Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010 Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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Renesas MCU

M16C Family R32C / M32C / M16C / R8C



World's No. 1 Flash MCUs!!

World's No. 1 Flash MCUs **Proof No. 1**

Total shipments of **1,200,000,000***1 units!!

Thanks to strong demand, total flash MCU shipments reached the 1.2 billion mark in March 2007. Renesas flash MCUs are used in a wide range of consumer, industrial and automotive applications. (*1: Based on fiscal 2007 results and the planned value in fiscal 2008.)



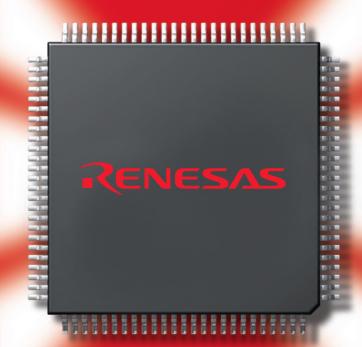
No. 1 lineup of flash MCUs with over 470 products in 40 series!!

Divided into high-end, middle, and low-end classes, the flash MCU lineup is built on the most advanced technology. Flexible support is provided for increasingly large and complex software.



High-speed flash memory supporting up to 100MHz operation!!

Renesas flash technology provides direct memory access and no-wait-state operation at up to 100MHz to bring out the full capabilities of the MCU.



World's No. 1 Flash MCUs **Proof No. 4**

Rewriting possible during operation, and program/erase cycles increased to 100,000!

E2dataFlash substantially improves the functionality and performance of data flash, allowing data to be rewritten independently while the MCU is operating. Guaranteed program/erase cycles have been increased to 100,000, and data save times are two orders of magnitude faster than external E2PROM. (E2dataFlash: E2PROM emulation data flash memory)

World's No. 1 Flash MCUs **Proof No. 5**

40μ**sec.**/byte high-speed flash programming!!

Flash MCU technology supports high-speed programming at a rate of 512KB every 20 seconds (total time required for reprogramming, including erasing and programming).

World's No. 1 Flash MCUs **Proof No. 6**

Comprehensive support and service to assist developers!!

Renesas delivers seamless integrated development environments and up-to-date technical information for 8-bit to 32-bit MCUs alongside a quick and responsive support system.

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CPU Architecture

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Product Lineup

Development

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> Functions/ Application Fields

Memory Capacity

Products Lineup

Development Tools List

Partners Tools

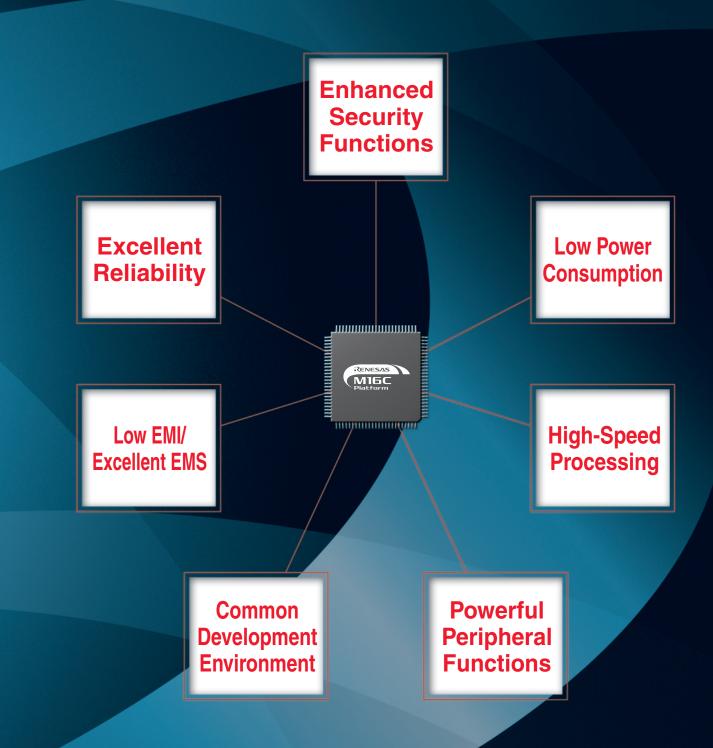
Overview of Web Site

Exceeding expectations for flash MCUs— FLASH & FLEXIBLE.

MCUs with embedded flash memory are now the main focus of MCU system development. Since its introduction, Flash MCUs from Renesas has been the industry leader in this product category. Over 470 individual products in 40 series are available, with processors ranging from 8 to 32 bits. Total shipments reached 1,200 million units in March 2007, making Renesas MCU the world's No. 1 flash MCU. With a wide selection of development tools from Renesas and our partner companies as well as comprehensive Web based support, it is now easier than ever to develop products around Flash MCU, and new advances are being made continuously.

The M16C Family is a complete development platform in all respects. It provides total support for the customer's system.



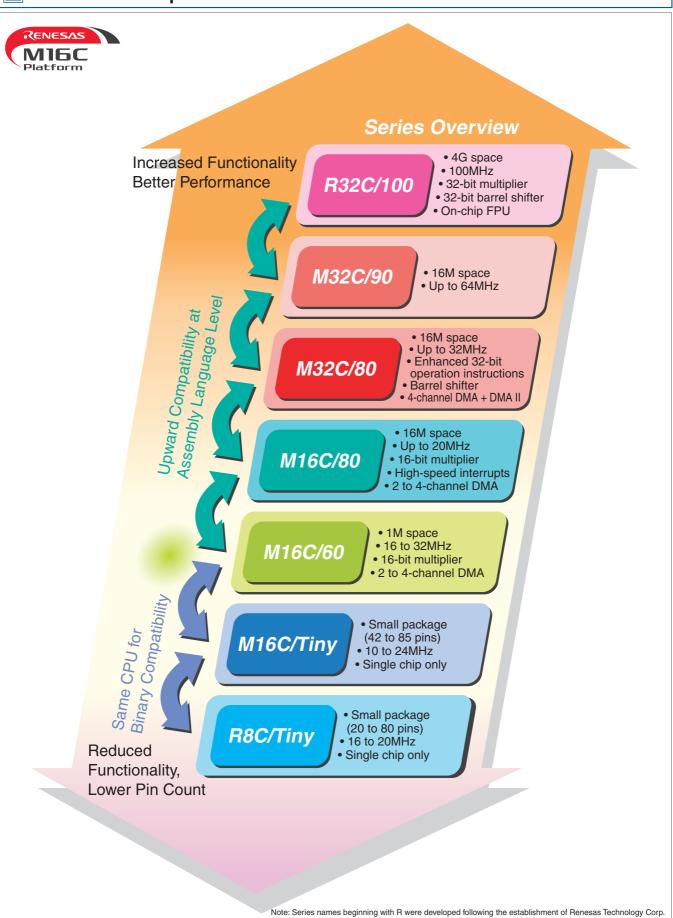


The M16C Family overcomes most of the design issues that traditionally affect MCUs, while still reducing total system costs and supporting a wide range of applications.

3

Roadmap

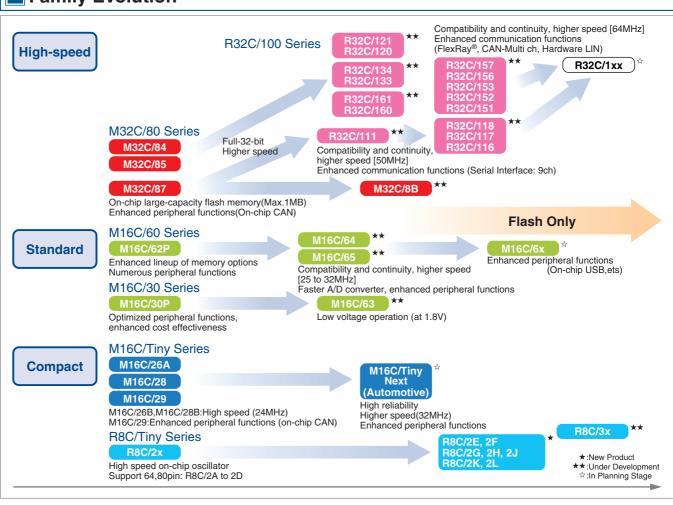
Overall Roadmap



Series Comparison

CPU Core	R8C	M16	C/60	M16C/80	M32	C/80	R32C/100
Address Space	1MB			16MB			4GB
DMA	No 2 to 4ch				4ch		
DMA II	No			Yes			
Operation Instructions	16-Bit Operation Instructions			32-Bit Operation Instructions			
Barrel Shifter		No	0		Yes		
Series	R8C/Tiny M16C/Tiny M16C/6X			M16C/80	M32C/8X	M32C/9X	R32C/1XX
Max. Operating Frequency	20MHz	24MHz	32MHz	20MHz	32MHz	64MHz	50MH/64MHz
Max. On-Chip Memory	128KB 128KB 768KB		256KB	1MB	512KB	1MB	
External Bus Extension	No			Yes			
Other	8bit I/O 8bit + 16bit I/O)	Intellig	ent I/O	FPU	

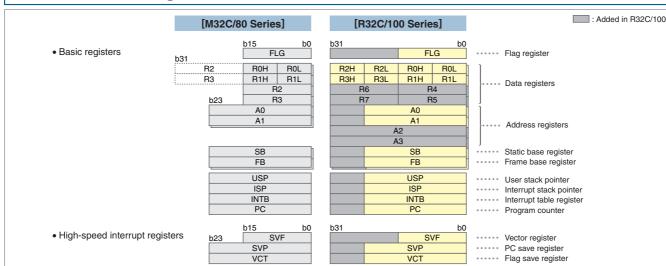
Family Evolution



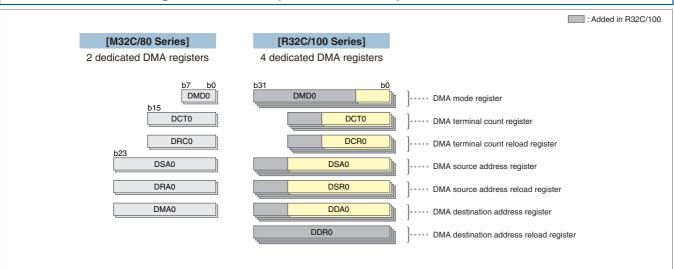
CPU Architecture

The register layout and addressing of the M16C Family are optimized for embedded applications. Naturally, development using high-level languages (C, C++) is supported.

R32C/M32C Register Model



R32C/M32C Register Model (DMA Related)



DMA Function

four channels

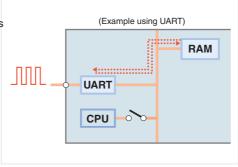
The DMAII/DTC function provides many other memory transfer capabilities, such as transfer of multiple bytes by a single event and transfer of data to multiple addresses by a single event

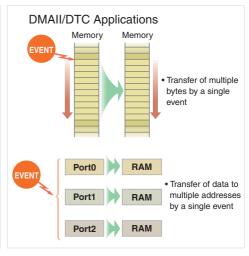
DMA, which transfers data without

CPU intervention, supports up to

(M32C/80 core, R32C/100 core).

Automatic serial I/O transfers Motor drive using microsteps Multichannel PWM output (max. 64) (Example using UART)





Basic Instructions

Frequently used instructions are executed in one cycle.

List of Instructions with 1-Cycle Execution Addressing (36 of 108 Total Instructions in the M32C/80)

Туре	Instruction	Function	
	ABS	Absolute value	
	ADC	Add with carry	
	ADCF	Add carry flag	
	ADD	Add without carry	
	CMP	Compare	
Arithmetic	DEC	Decrement	
7 414 11110410	EXTS	Extend sign	
	EXTZ	Extend zero	
	INC	Increment	
	NEG	Two's complement	
	SBB	Subtract with borrow	
	SBU	Subtract without borrow	
	AND	Logical AND	
	NOT	Invert all bits	
Logic	OR	Logical OR	
	TST	Test	
	XOR	Exclusive OR	
	MOV	Transfer	
Transfer	PUSH	Save	
	PUSHM	Save multiple registers	

Туре	Instruction	Function		
	BCLR	Clear bit		
Bit	BNOT	Invert bit		
manipulation	BNTST	Test inverted bit		
manipulation	BSET	Set bit		
	BTST	Test bit		
	ROLC	Rotate left with carry		
Shift	RORC	Rotate right with carry		
	ROT	Rotate		
1-bit shift	SHA	Shift arithmetic		
1-DIT SHITT	SHL	Shift logical		
	FCLR	Clear flag register bit		
	FSET	Set flag register bit		
	INDEX	Index		
	INTO	Interrupt on overflow		
Other	Jcnd	Jump on condition		
	LDC	Transfer to control register		
	NOP	No operation		
	PUSHC	Save control register		
	SCcnd	Store on condition		

Advanced Instructions (Enhanced 32-Bit Instructions - R32C/100)

The R32C/100 CPU core features enhanced 32-bit instructions and many instructions with advanced functionality.

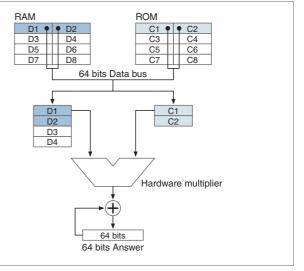
Category	Instruction	Description
	ADSF	Sign flag add
	EDIV	Signed divide (64 ÷ 32 → 32-bit)
	EDIVU	Unsigned divide (64 ÷ 32 → 32-bit)
Arithmetic instructions	EDIVX	Signed divide (32 ÷ 32 → 32-bit)
	EMUL	Signed multiply (32 ÷ 32 → 64-bit)
	MULX	Multiply with rounding
	EMULU	Unsigned multiply (32 ÷ 32 → 64-bit)
	ADDF	Floating point add
	CMPF	Floating point compare
	CNVIF	Convert integer → floating point number
Floating point operation instructions	DIVF	Floating point divide
	MULF	Floating point multiply
	ROUND	Convert floating point number → integer
	SUBF	Floating point subtract
	SUNTIL	Search until data matching search string
	SONTIL	found
	SWHILE	Search until data not matching search
	SWITTLE	string found
High-level language support instructions	EXITI	Release interrupt stack frame
Other	STOP	Stop

Enhanced Multiply and Accumulate Instruction

The multiply and accumulate instruction has been further enhanced.

M32C/80 (2 cycles)
16bits \times 16bits + 48bits \rightarrow 48bits

R32C/100 (1 cycle)32bits × 32bits + 64bits → 64bits

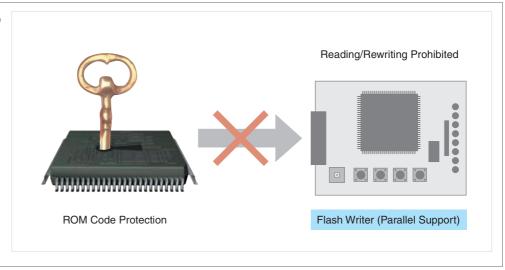


Concepts Security Functions

The M16C Family incorporates a number of security functions to prevent unauthorized access to its internal ROM contents.

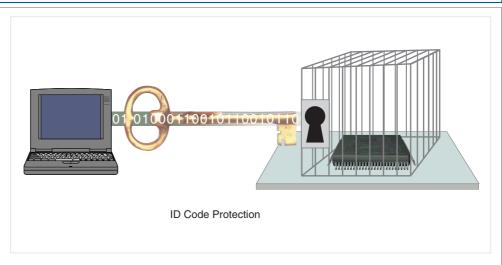
Flash Memory ROM Code Protection

During parallel programming, the ROM protection bits prevent reading or overwriting of on-chip flash memory. It is not even possible to read the contents of flash memory using an external flash programmer. (The protect bits can only be changed by serial programming.)



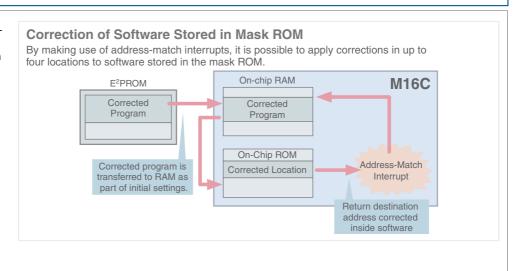
Flash Memory ID Code Protection

For a serial programming command to be accepted, the ID code sent from the serial programming must match the ID code programmed in internal ROM. This prevents unauthorized access. (Repeated ID verification is not allowed.)



Rom Correction

The M16C can use the addressmatch interrupt registers make corrections to software stored in the mask ROM. This means it is not necessary to replace all the MCUs if a problem arises in the software stored in the mask ROM.



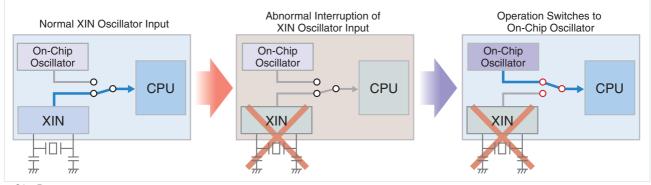
Concepts Excellent Reliability

The M16C Family incorporates many design features to ensure reliable operation under a variety of conditions.

On-Chip Oscillator with Fail Safe Feature

Enhanced Reliability with On-Chip Oscillator and Oscillation Stop Detection Circuit

Detects abnormal interruption of XIN oscillator input and switches to the on-chip oscillator in order to continue microcomputer operation.

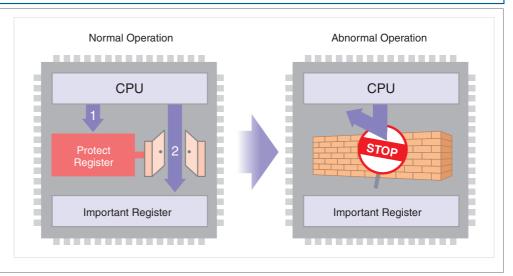


Other Features

- It is possible to use software to halt XIN oscillator input and MCU can operate using the high-speed on-chip oscillator instead. (This also reduces power consumption.)
- The watchdog timer can operate independently using the separate low-speed (125kHz) on-chip ascillator.

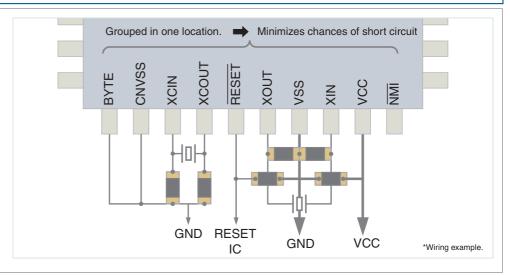
Protecting Critical Registers

The register protect feature can be used to safeguard access to important registers and ports. This can prevent unauthorized access to key registers should program runaway occur. It is necessary to set the protect register before accessing important registers.



Grouping Together of Important Pins

The pin layout is designed to simplify arrangement of power supply and ground lines and facilitate the connection of decoupling capacitors. This also minimizes the chances of short circuit.

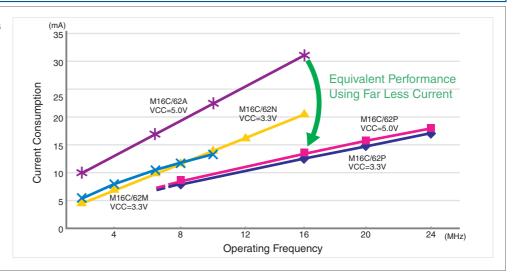


Concepts Low-Power Operation

M16C MCUs are designed to minimize power consumption.

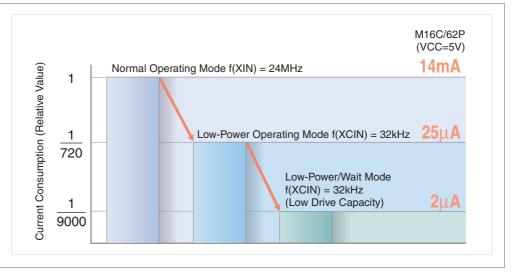
Low-Current Consumption through Advanced Processes

Advanced fabrication processes bring with them reductions in current consumption. The latest version's MCUs use far less current to provide equivalent processing performance.



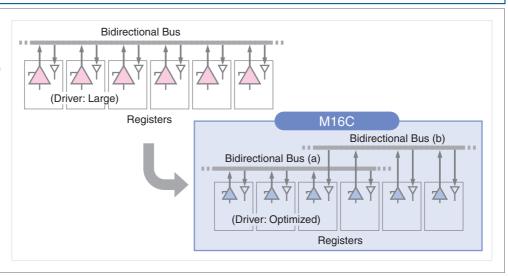
Multiple Power Management Functions

There are two on-chip clock generator circuits, main clock and subclock. It is possible to switch between them to reduce power consumption and noise (low-power mode switching).



Reduced Load Capacitance

Discrete buses distribute load capacitance and reduce power loss due to discharging. In addition, lower load capacitance permits faster bus operation.



Concepts Low EMI/Excellent EMS

The M16C Family is designed to maximize EMI/EMS performance. This reduces costs associated with EMI/EMS countermeasures for application developers.

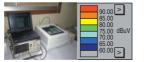
Low Electromagnetic Interference (EMI)

The M16C Family is designed to minimize switching noise. Noise output is reduced by as much as 20dB.

EM Scan

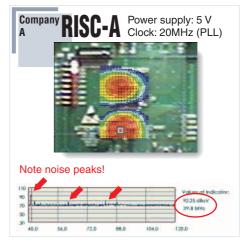
Measurement method: EM scan measurement using electromagnetic field probe Measurement conditions:

Measurement frequency range 40 to 120MHz



Measuring device: EPS-M1 EM scanner, Noise Laboratory Co., Ltd.
Measurement location: Kansai Electronic Industry Development Center
Measurement frequency range: 30 to 110MHz
Measurement unit: 2mm²

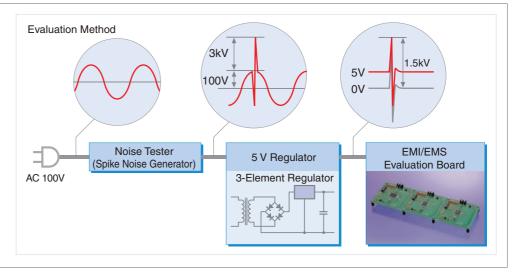




Note: Evaluation is also performed using the VDE and TEM cell methods. Only products that meet uniform standards are produced in volume.

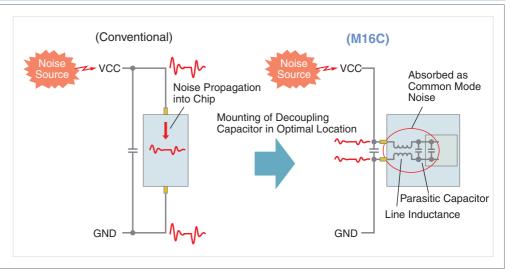
Excellent Ability to Withstand Noise (EMS)

All M16C/M32C MCUs are designed using various noise reduction techniques. These MCUs are extensively tested using different noise test methods.



Short Distance between VCC and VSS

The VCC and VSS pins are arranged close together on M16C MCUs to prevent noise from entering via the VCC and ground wiring. Internal parasitic capacitors provide further protection against noise at the VCC and VSS pins. This design also helps suppress unwanted noise emission from the chip itself.

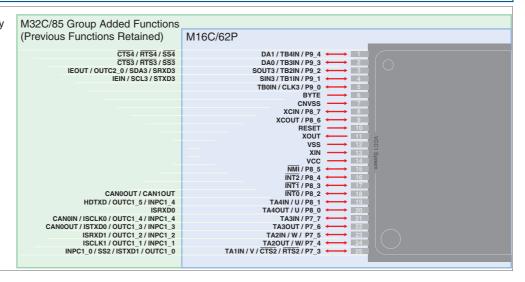


Concepts Excellent Compatibility

The M16C Family provides compatibility in all aspects, allowing easy transition to higher end models.

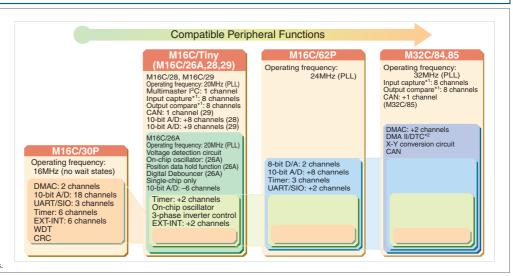
Pin Compatible

The products in the M16C Family are pin compatible, so there is almost no need for wiring changes on the board when switching to newer versions or changing to different MCUs within the same family.



Compatible Peripheral Functions

Products in the M16C Family have compatible CPU cores and peripheral functions.

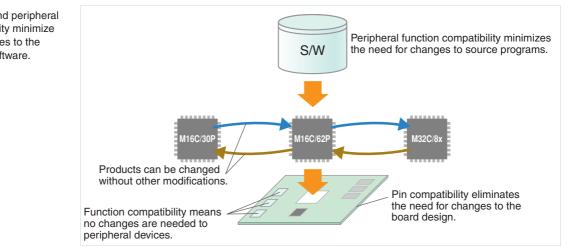


Notes

- High-function timer with communication
- DMA II and DTC are DMA functions that can be initiated by peripheral I/O requests

Advantages of Compatibility

Pin compatibility and peripheral function compatibility minimize the need for changes to the board design or software.

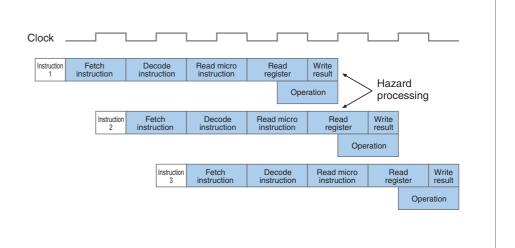


Concepts High-Speed Processing

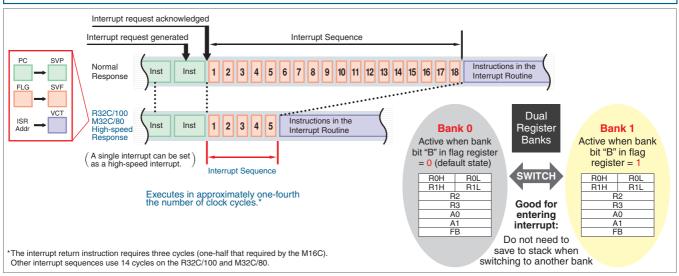
The M16C Family provides high-speed processing under a variety of conditions.

R32C CPU Core Pipeline

The number of pipeline stages has been increased from three (previous version) to five to boost processing speed.



High-Speed Interrupt Processing (R32C/M32C)



Floating Point Instructions (R32C)

The R32C incorporates a single-precision 32-bit FPU and supports floating point instructions.

Instruction set

CNVIF: Convert integer → floating point number ROUND: Convert floating point number → integer

ADDF: Floating point add SUBF: Floating point subtract MULF: Floating point multiply DIVF: Floating point divide CMPF: Floating point compare

Rounding modes

- Bound to nearest value
- · Round towards zero
- Round towards negative infinity

Exception processing

- Illegal input
- Overflow
- Underflow

Data format (single-precision floating point number)



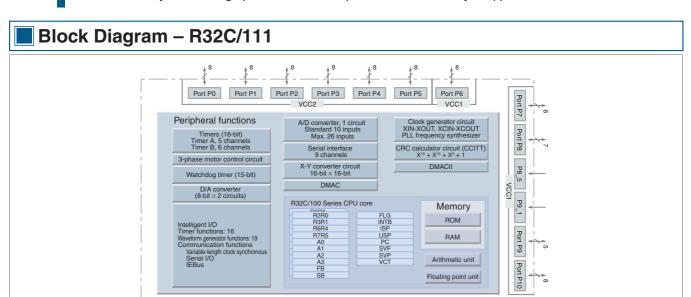
- Zero: 0 and mantissa = 0

Unsupported numeric values

- Not a number (Nan): Exponent = 255 and mantissa ≠ 0
- Infinity: Exponent = 255 and mantissa = 0
- Subnormal numbers: Exponent = 0 and mantissa ≠ 0

Concepts Abundant Peripheral Functions

The M16C Family includes high-performance on-chip functions for a variety of applications.



Peripheral IC 1

CLK

Data

Peripheral IC 2

CLK

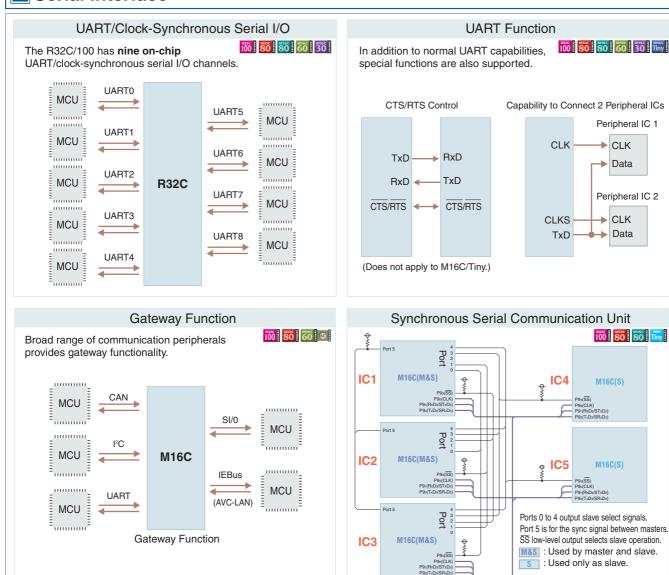
Data

100 80 M32c M16c Tiny

M16C(S)

M16C(S)

Serial Interface

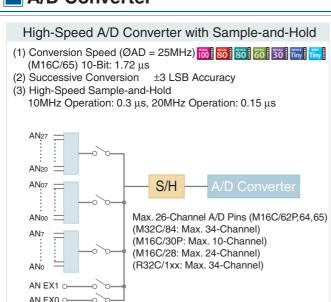


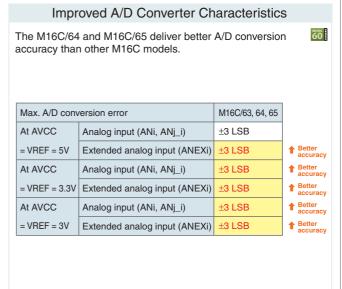
I²C Bus Interface

The I²C Bus is supported as a serial interface.

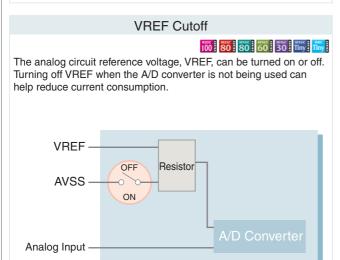
Supported MCUs	M16C/62P, M16C/64, M32C, R32C	M16C/63, M16C/65, M16C/Tiny, R8C/Tiny	
Communication control method Partial software control		Hardware control	
Start condition overlap detection	No detection	Detection supported	
Arbitration lost detection	Requires flag to be initialized for each byte	Does not require flag to be initialized for each byte	
Slave address match determination	Match determination by software	Match determination by hardware, interrupt generated only on match	
Initial acknowledge generation	Generated by software after slave address determined	Automatic processing by hardware	
Timeout detection function	None	Supported (dedicated timer)	
Max. communication speed	384 kbps (because the SCL low duration ≥ 1.3 μs standard is not met at faster speeds)	400 kbps (max. value of I ² C Bus standard high-speed mode)	

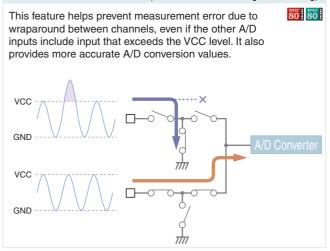
A/D Converter





100 80 80 M16C M16C Tiny Tiny



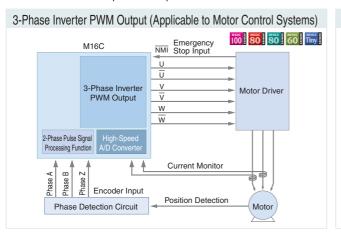


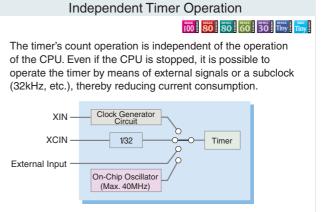
Measurement Error Avoidance (Unused A/D Overvoltage Processing)

Concepts Abundant Peripheral Functions

Highly Functional Timers

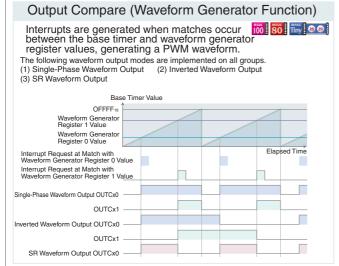
M16C MCUs have input and output timers that are used in combination with other peripheral functions.

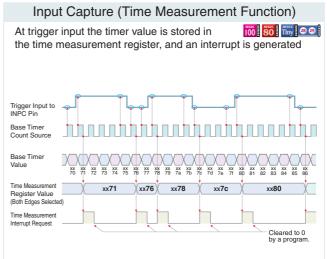


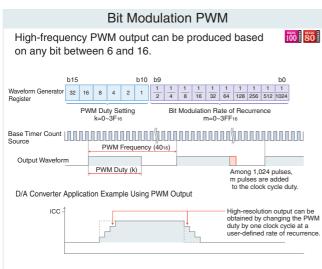


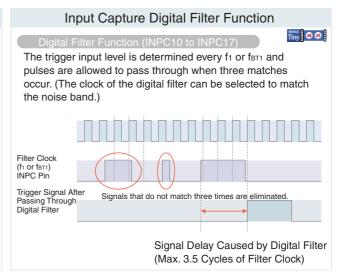
Intelligent I/O

I/O ports can be configured to implement different peripheral functions.





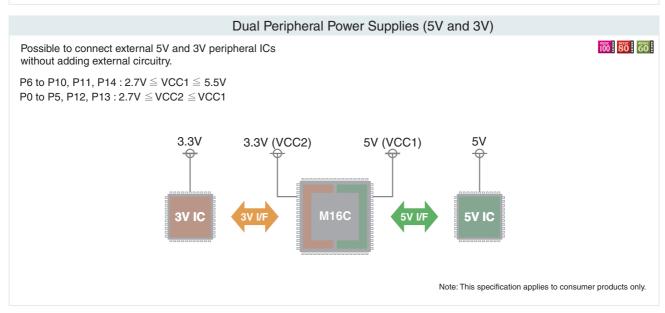




Bus Control

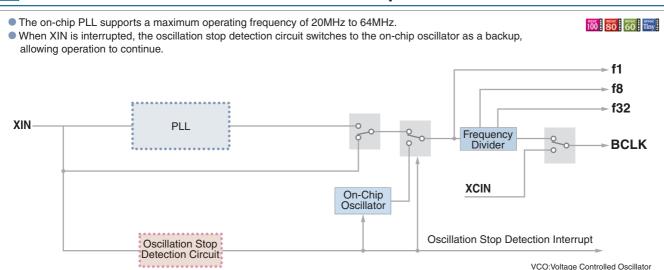
As the CPU operation speed increases, timing control of the external devices becomes more difficult.





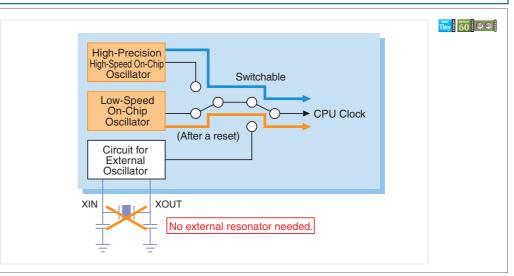
Concepts Abundant Peripheral Functions

PLL Oscillator Circuit and Oscillation Stop Detection Circuit



On-Chip Oscillator Startup

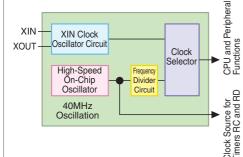
After a reset is cleared, operation starts using the low-speed on-chip oscillator. By using the high-precision high-speed on-chip oscillator, it is possible to configure a system that does not require an external resonator.

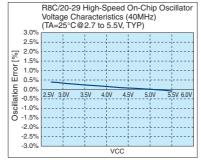


High-Precision High-Speed On-Chip Oscillator

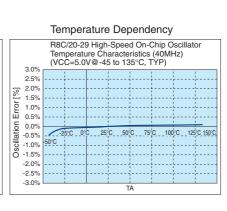
Highest precision in the industry over a range of temperatures and voltages.

● The 40MHz clock generated can be used to operate 16-bit timers (Max. 20MHz clock in R8C/Tiny Series).





Power Supply Voltage Dependency



Tiny 60 60

Reset Function (On-Chip Reset Circuit)

- Voltage-Drop Interrupt (Enabled/Disabled by Software)
 Enables software detection of power supply voltage drops without external circuitry.

 On-Chip Reset Circuit (Enabled/Disabled by Software)

 Prevents malfunctions caused by voltage dropping below the guaranteed operation voltage.

 Voltage Drop Interrupt

 Voltage D
- The number of external reset ICs can be reduced.

 Setting can be made before reset clearing using the optional function select register.

 No external reset ICs can be reduced.

 Reset/Interrupt

 VCC Py

 Reset Cleared

 Reset Cleared

 Reset Cleared

Tiny 60 60 6

Watchdog Timer

Approx. 0.3VCC Reset Pin



bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
CSPROINI	Reserved	LVD0ON	Reserved	ROMCP1	ROMCR	Reserved	WDTON

CSPROINI

- 1: Count source protect mode disabled after a reset (uses CPU clock)
- 0: Count source protect mode enabled after a reset (uses low-speed on-chip oscillator)



Clock is separate from CPU and does not stop!

Note: Does not apply to R8C/12 and R8C/13.

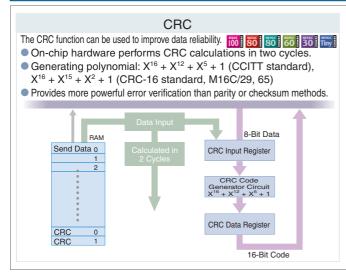
WDTON

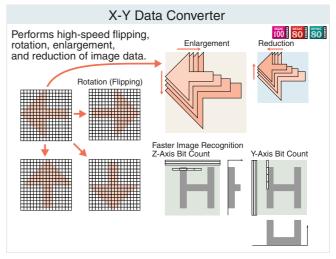
- 1: Watchdog timer remains stopped after a reset
- 0: Watchdog timer automatically restarts after a reset



Constant monitoring of reset start setting!

Other Functions





Lineup of Products with On-Chip Flash Memory

All series in the M16C Family include products with on-chip flash memory.

Features of M16C MCUs with On-Chip Flash Memory

1. High-Speed Programming/Erasing

Programming 256KB of flash memory takes only four seconds (serial rewrite mode). This greatly reduces the programming burden in the volume production process. (M16C/62P)

2. High Reliability

High data storage reliability, erasing reliability, and programming reliability help prevent problems following mounting.

3. ROM Code Protect Function

High-level security functionality is built in.

4. Support for On-Line Programming (CPU Rewrite Mode)

High-level security functionality is built in.

5. Support for Data Flash Memory

Products are available with extra-high guaranteed write/erase counts up to 10,000 times



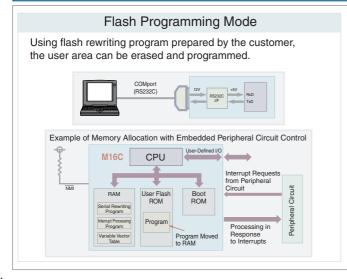


List of Flash Programmers

Renesas/Partner Vendor	Product Model	Programming Mode
BPM Microsystems	BP-2610, BP-2710, BP-2710M	Parallel (Gang)
Data I/O Corporation	UNISITE, 3980(3900), Optima, Dual, Qctal, PP100	Parallel (Gang)
Data I/O Corporation	Image Writer	Serial
System General Corp.	T9600	Parallel (Gang)
Sunny Giken Inc.	S550-SFWv3, S550-SFW1U	Serial
Suring diken inc.	S550-MFW1U	Parallel (Gang) and Serial
Suisei Electronics System	EFP-S2/S2V	Parallel and Serial
Co., Ltd.	EFP-RC	Serial
Yokogawa Digital	MegaNETIMPRESS	Serial
Computer Corporation	C"arNETIMPRESS	Serial and CAN
Hokuto Denshi Co., Ltd.	FLASH2, FLASHMATE5V1, FM-ONE	Serial
Banaga Taghnalagy Corn	R0E00008AKCE00(E8a)	Serial
Renesas Technology Corp.	M3A-08006	Serial

See the "Partners Tools" for details on programmers.

On-Chip Flash Memory Functions



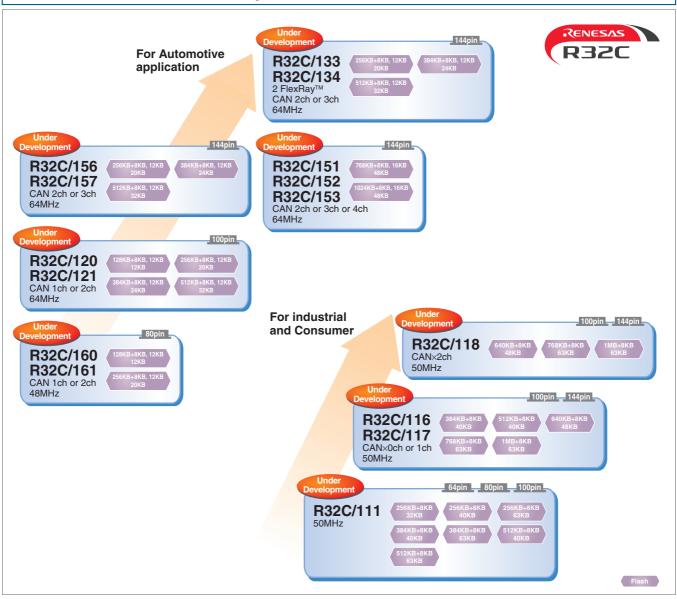
Data Flash A small block of flash memory called data flash memory is provided separately from the program flash memory. This area supports a maximum erase count of 10,000 times. It can also be used as a substitute for external EEPROM. 32+4KB Version 64+4KB Version O0000 SFR O00400 SFR Small Flash Memory

RAM1KR Block for Data Storage RAM2KB 2 KB × 2 0F000 0F000 Flash Memory Flash Memory 2KB 0F800 0F800 Flash Memory Flash Memory 2KB 2KB Data Flash 10000 10000 Standard Rewrite Count: 10,000 Times' F0000 32KB *Please see the hardware manual for details of F8000 Flash Memory 16KB 16KB 32KB individual products. 8KB FFFFF



M32C/100 Series

R32C/100 Series Roadmap



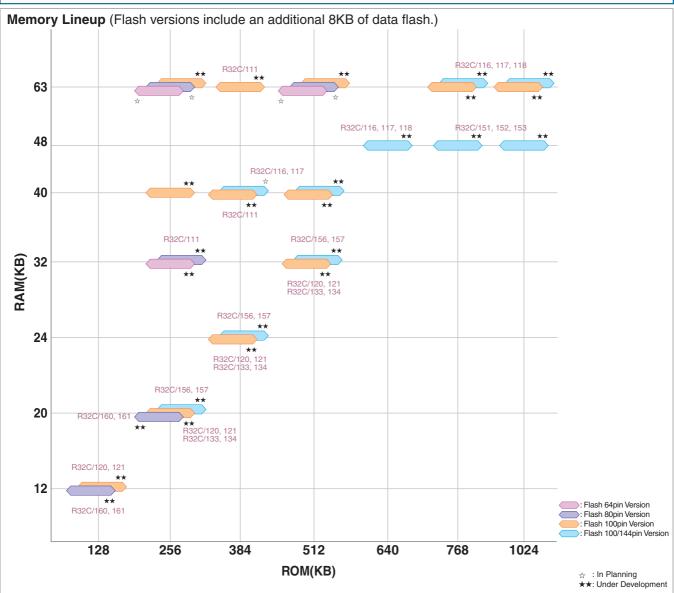
R32C/111 Group Features

- 32-bit CICS MCUs inheriting the M16C/M32C features and employing R32C/100 Series CPU core.
- 32-bit barrel shifter, 32-bit multiplier, and high-precision FPU on-chip
- Performs 32-bitX32-bit multiply-accumulate operations in one clock cycle.
- Register bit length extended from M32C/80 and number of registers increased.
- 64-bit internal memory bus
- Short jumps with no penalty
- Enhanced Communication Function (SIO x 9 channels)

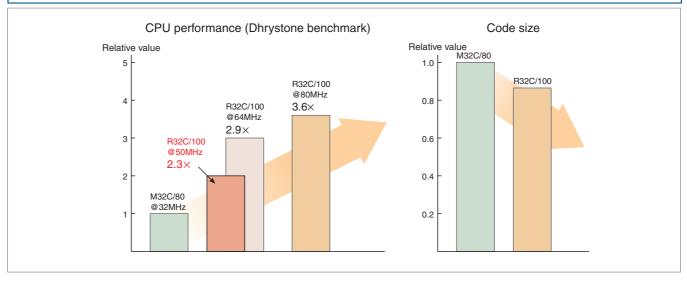
R32C/111 Block Diagram TimerA 5ch R32C/100 PLL 50MHz Sub Clock 32kHz 32bit Multip WDT Interrupt X-Y Intelligent I/O 3ch DMAC CRC DMA-Ⅱ 10bit A/D 8bit D/A Flash MAX 512KB With Protect

M32C/100 Series

Memory Lineup



R32C/100 Series Performance (On-Chip ROM/RAM)



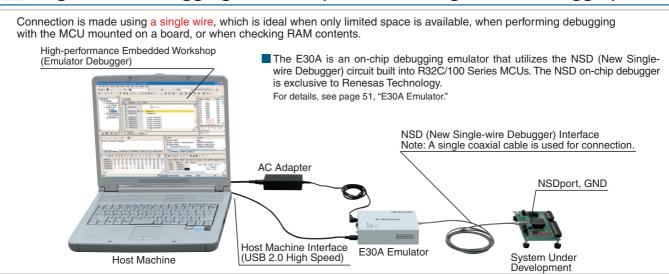


M32C/100 Series

R32C/100 CPU Core Performance Overview

Item	M32C/80	R32C/100	
Basic instructions	108 instructions	108 instructions	
Hardware multiplier	16 × 16 = 32	$32 \times 32 = 64$	
Multiply and accumulate	$16 \times 16 + 48 = 48$	$32 \times 32 + 64 = 64$	
FPU	No	Yes (IEEE 754 single-precision)	
Barrel shifter	16-bit	32-bit	
Address match interrupt	8 points settable	No	
DMA transfer unit	8-bit, 16-bit	8-bit, 16-bit, 32-bit	
DMA transfer space	Fixed address from 16Mbyte user-specified space (16Mbyte space) 16Mbyte user-specified space from fixed address (16Mbyte space)	User-specified 64MB space from 64MB (0000000h-01FFFFFFh) and (FE000000h-FFFFFFFh) user-specified space	
DMA transfer address direction	Forward direction, fixed (not possible to set both transfer source and destination to forward direction or to fixed)	Forward direction, fixed (possible to set both transfer source and destination to forward direction or to fixed)	
DMAC II transfer space	64 Kbytes	User-specified 64MB space from 64MB (00000000h–01FFFFFFh) and (FE000000h–FFFFFFFh) user-specified space	

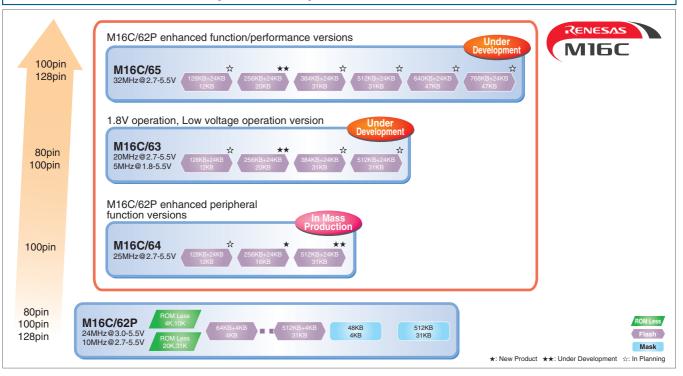
Single-Wire Debugging Interface (NSD: New Single-wire Debugger)





M16C/63, 64, 65 Group

M16C/63, 64, 65 Group Roadmap



M16C/65 Group Features

- Continuation of features from M16C/62P
 - Maintains compatibility with M16C and M32C (pin compatibility, compatibility with peripheral functions).
 - Retains features such as low EMI noise and low current consumption.
- Improved performance
 - Faster operation: 24MHz (M16C/62P) → 32MHz
- Contributions to reduced system cost
 - On-chip power-on reset function
 - → Enables elimination of external reset IC/circuit.
 - High-speed (40MHz) on-chip oscillator
 - Enables elimination of external oscillator.
- Other main performance and function enhancements
 - On-chip flash memory enhanced (512KB/31KB to 768KB/47KB)
 - Improved DMA (2 channels (M16C/62P)
 - → 4 channels
 - Improved serial communication (5 channels (M16C/62P)
 - → 8 channels @100 pins
 - Faster A/D conversion (2.75 μs @12MHz (M16C/62P)
 - → 1.72 µs @25MHz
 - On-chip realtime clock (1-week timer)
 - On-chip remote control receiver
 - On-chip CEC* circuit
 - Enhanced on-chip debugging function (OCD)
 - *: CEC Consumer Electronics Control (Device control signal and protocol regulated by HDMI) HDMI - High Definition Multimedia Interface

M16C/65 Block Diagram (100pin Version)

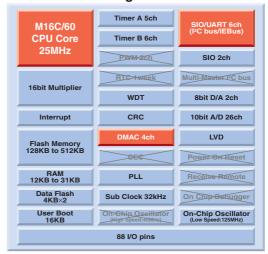


M16C/63, 64, 65 Group

M16C/64 Group Features

- Continuation of features from M16C/62P
 - Maintains compatibility with M16C and M32C (pin compatibility, compatibility with peripheral functions).
 - Retains features such as low EMI noise and low current consumption.
- Improved performance
 - Faster operation: 24MHz (M16C/62P) → 25MHz (M16C/64)
- Other main performance and function enhancements
- Improved DMA (2 channels (M16C/62P))
 - → 4 channels
- Improved serial communication (5 channels (M16C/62P))
 - → 8 channels @100 pins
- Faster A/D conversion (2.75 µs @12MHz (M16C/62P)
 - → 1.72 µs @25MHz

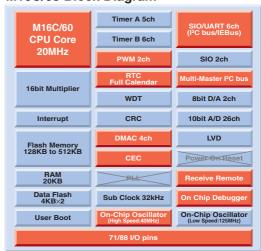
M16C/64 Block Diagram



M16C/63 Group Features

- Continuation of features from M16C/62P
 - Maintains compatibility with M16C and M32C (pin compatibility, compatibility with peripheral functions).
 - Retains features such as low EMI noise and low current consumption.
- Improved performance
 - Low voltage at 1.8 V
- Contributions to reduced system cost
 - High-speed (40MHz) on-chip oscillator
 - → Enables elimination of external oscillator.
- Other main performance and function enhancements
 - Improved DMA (2 channels (M16C/62P)
 - → 4 channels
 - Improved serial communication (5 channels (M16C/62P)
 - → 8 channels @100 pins
 - Faster A/D conversion (2.75 $\mu s \ @\,12MHz$ (M16C/62P)
 - \rightarrow 2.15 μ s @20MHz
 - On-chip realtime clock (Full calendar)
 - On-chip remote control receiver
 - On-chip CEC* circuit
 - Enhanced on-chip debugging function (OCD)
 - *: CEC Consumer Electronics Control (Device control signal and protocol regulated by HDMI) HDMI - High Definition Multimedia Interface

M16C/63 Block Diagram

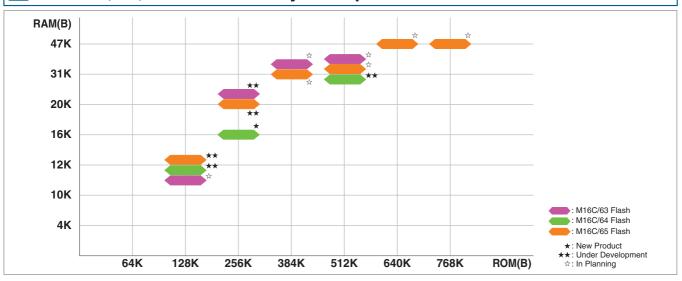


- IEBus is a trademark of NEC Electronics Corporation.



M16C/63, 64, 65 Group

■ M16C/63, 64, 65 Flash Memory Lineup



M16C/63, 64, 65 New Functions

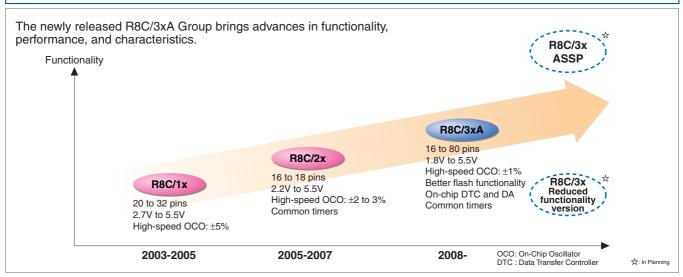
Item	M16C/62P	M16C/63	M16C/64	M16C/65	
Max. CPU speed	24MHz (VCC = 3.0 to 5.5V)	20MHz (VCC = 2.7 to 5.5V)	25MHz (VCC = 2.7 to 5.5V)	32MHz (VCC = 2.7 to 5.5V)	1 Faster
I ² C Bus	Simple I ² C Bus	No	Simple I ² C Bus	Multimaster I ² C Bus	↑ New function
Realtime clock	No	No	No	Yes	↑ New function
8-bit PWM	No	2 channels	No	2 channels	↑ New function
UART	3 channels		6 channels		
DMA	2 channels (24 sources)	4 channels (43 sources)			↑ More channels
External interrupts	6 interrupts	8 interrupts			↑ More interrupts
Port 8_5	Input only	I.	I/O (N channel open drain output)		
Timer clock source	f64 not settable		f64 settable		↑ New function
Flash memory erase suspend	No	No	No	Yes	↑ New function
Flash memory user boot area	No	No	No	Yes	New function

M16C/63, 64, 65 Specification Comparison

tem		M16C/63 (100 pin version)	M16C/64 (100-pin version)	M16C/65 (100-pin version)
asic instruction	ons	91 instructions	←	←
Ain. instruction	time	50ns (20MHz, 0 wait, VCC = 2.7 to 5.5V)	40ns (25MHz, 0 wait states, VCC = 2.7 to 5.5V)	31.2ns (32MHz, 0 wait states, VCC = 2.7 to 5.5V)
		200ns (5MHz, 0 wait, VCC = 1.8 to 5.5V)		
Memory	ROM	128KB, 256KB, 384KB, 512KB	128KB, 256KB, 512KB	128KB, 256KB, 384KB, 512KB, 640KB, 768KB
	RAM	12KB, 20KB, 31KB	12KB, 16KB, 31KB	12KB, 20KB, 31KB, 47KB
/O ports		8-bit × 11 (N channel O.D. × 3 (P70, P71, P85))	←	←
nput ports	P85	_	_	_
Timers		11 (timer A × 5, timer B × 6)	←	←
PWM		8-bit × 2 channels	_	8-bit x 2 channels
RTC		1ch (Full Calendar)	_	1 channel (1 week)
Serial interface		Synchronous/asynchronous x 6 channels (I ² C Bus and IEBus support x 6 channels), synchronous x 2 channels	←	←
Multimaster I ² C	Bus	1 channel	_	1 channel
VD converter		10bit x max. 26 channels, ±3LSB (at 3V, 5V)	10-bit x max. 26 channels, ±3 LSB (at 3V and 5V)	←
		Resolution: 10bit	Resolution: 10-bit	
		Conversion speed (10bit): 2.15 µs at 5V/	Conversion speed (10-bit): 1.72 μs at 5V/	
		(single, repeat, single sweep, repeat sweep 0, 1)	(single, repeat, single sweep, repeat sweep 0, 1)	
D/A converter		8bit × 2	←	←
DMAC		4 channels	←	←
CRC		With SFR access monitor function	Yes	With SFR access monitor function
Natchdog time	r	15-bit x 1 channel (with prescaler)	-	←
		Reset start function selectable		
External interru	upts	NMI, INTO, INT1, INT2, INT3, INT4, INT5, INT6, INT7, key input (10 sources)	←	←
Address match		4	←	←
Remote control r	reception circuit	Yes	_	Yes
CEC circuit		Yes	_	Yes
Clock generate	or circuit	5 circuits: PLL high-speed, high-precision (32MHz at ±1.0%)	4 circuits: PLL low-speed (125kHz) on-chip oscillator, XIN, XCIN	5 circuits: PLL high-speed, high-precision (32MHz at ±1.0%)
-		on-chip oscillator, low-speed (125kHz) on-chip oscillator, XIN, XCIN	(built-in feedback resistor, external ceramic resonator or crystal oscillator)	on-chip oscillator, low-speed (125kHz) on-chip oscillator, XIN, XCII
		(built-in feedback resistor, external ceramic resonator or crystal oscillator)		(built-in feedback resistor, external ceramic resonator or crystal oscillator)
oltage drop de	etection circuit	Yes (selectable between 3 values)	Yes (selectable between 2 values)	Yes (selectable among 3 values)
Power-on reset		Yes	_	Yes
ower supply v	/oltage	2.7 to 5.5V (20MHz), 1.8 to 5.5V (5MHz)	2.7 to 5.5V (25MHz)	2.7 to 5.5V (32MHz)
ackage		80 pin (0.5mm pin pitch)	100-pin (0.5/0.65mm pin pitch)	80-pin (0.65mm pin pitch), 100-pin (0.5/0.65mm pin pitch), 128-pin (0.5mm pin pitch)
	les	Single-chip, memory expansion, microprocessor	-	←
Operating mod		E8a	E100, E8a	←

R8C/3xA Group

R8C/Tiny Series Roadmap



R8C/3x

R8C/3xA Group Product Concept

Four key concepts: Broad range of products, excellent functionality, designed for safety, and ease of use.

Broad Range of Products

- ROM/RAM size: 4KB to 128KB/256B to 10KB
- Pin expandability: Packages with 20 to 80 pins
 Ultracompact package: 4×4 mm QFN package under

Excellent Functionality

- Wide operating voltage range: 1.8V to 5.5V
- 16-bit CPU core for powerful operation processing
- Data transfer controller (DTC)
- Data flash with background operation (BGO) function
 High-speed on-chip oscillator with improved precision:
- D/A converters standard (except for 20-pin versions)
- Enhanced on-chip debugging function

Designed for Safety

- · Elimination of restrictions on power-rise gradient for power-
- Improved low-voltage detection circuit with selectable detection voltage
 - Independent watchdog timer (WDT) that does not stop thanks to watchdog timer count source protection mode

Ease of Use

- · Availability of flash-only versions (with support for preshipment programming)
- Modules common with other series (common timers, synchronous serial communication unit (SSU)/I2C, highspeed on-chip oscillator (OCO), power-on reset (POR)/low-voltage detection circuit (LVD), etc.)

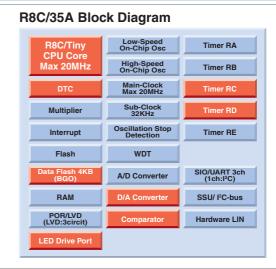
 • High-efficiency ROM optimized for C language
- Middleware and RTOS support
- · Support from a variety of third-party vendors

R8C/35A Group Features



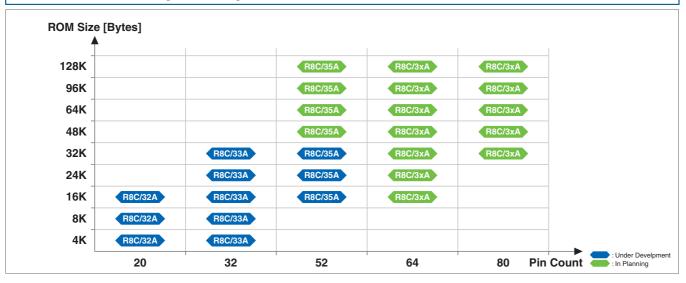
- Support for 1.8V operating voltage VCC = 1.8V to 5.5V (f(XIN) = 2MHz)

- VCC = 2.2V to 5.5V (f(XIN) = 5MHz) VCC = 2.7V to 5.5V (f(XIN) = 10MHz) VCC = 3.0V to 5.5V (f(XIN) = 20MHz)
- High-precision (target ±1%), high-speed on-chip oscillator (40MHz)
 Subclock oscillator circuit (32.768KHz)
- Data transfer controller (DTC) 1 channel
- D/A converter
- Additional 16-bit timer (timer RC)
- Support for motor control using timer RD
- Synchronous serial communication unit (SSU)
- I²C-bus (also functions as SSU)
- Data flash area that can substitute for external E²PROM
- The data flash is equipped with a background operation (BGO) function. Power-on reset function and low-voltage detection function that eliminate
- the need for an external reset chip; support for external voltage monitoring
- Large-current drive ports switchable between sink and source modes
- Compatible with E8a low-cost on-chip debugging emulator
- 52-pin package



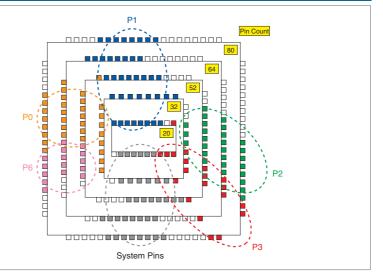
R8C/3xA Group

R8C/3xA Group Lineup



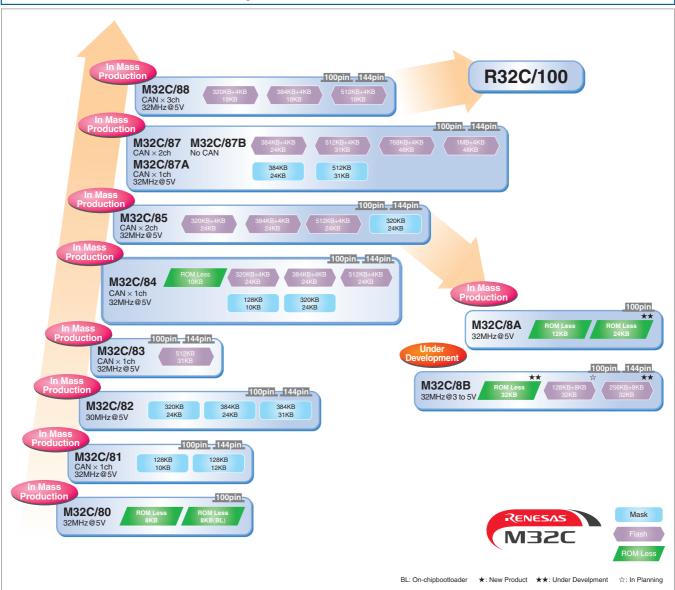
R8C/3xA Group Pin Assignments

The same pins are oriented in the same direction even when the pin count differs. This simplifies board changes.



M32C/80 Series

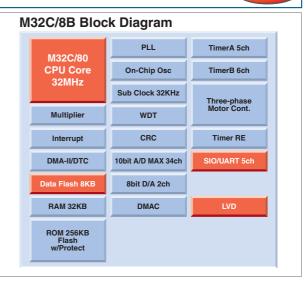
■ M32C/80 Series Roadmap



M32C/8B Group Features



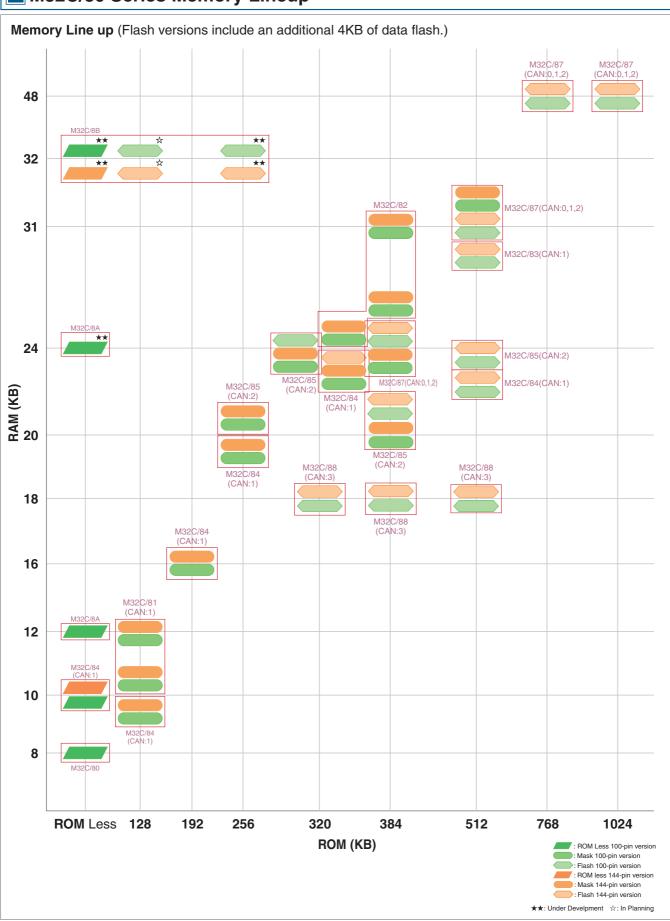
- Backward compatibility with the M16C/80, allowing for easy upgrading when high-speed operation (32MHz @ 3V to 5V) is required
- 32-bit arithmetic and transfer instructions as well as highspeed 32-bit multiple-shift instructions (using on-chip barrel shifter) for rapid operation processing
- Low-voltage detection (LVD) function (option)
- Ability to use data flash area as substitute for external E²PROM (flash versions only)





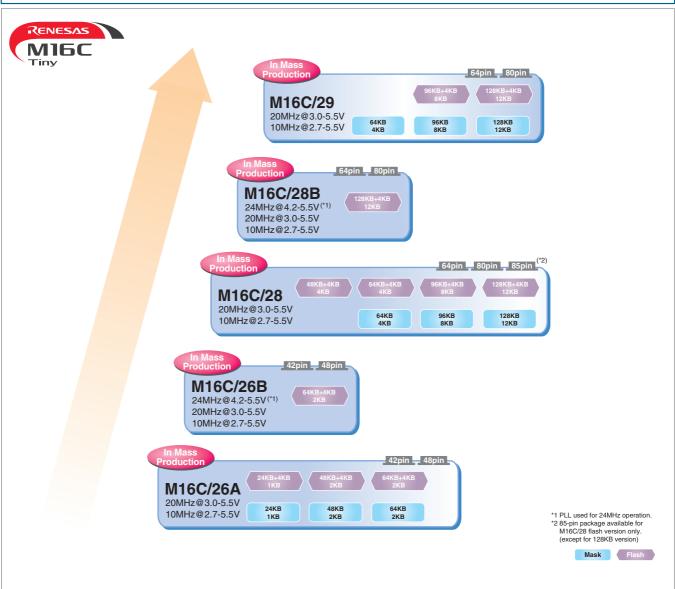
M32C/80 Series

M32C/80 Series Memory Lineup

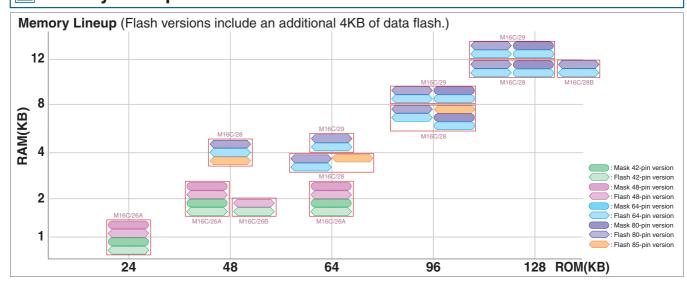


M16C/Tiny Series

M16C/Tiny Series Roadmap



Memory Lineup

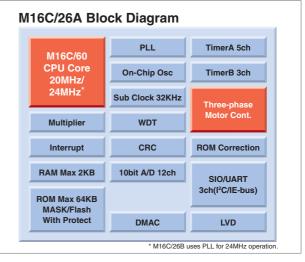




M16C/Tiny Series

M16C/26A Group Features

- Small foot print (7mm square, 48pins) and high-speed operation (20MHz@5V).
- Instructions and peripheral functions are compatible with M16C/62P for easy program portability.
- 3-phase motor control timer, enabling motor control in compact products.
- Data flash area can be used in place of external EEPROM.
- Higher frequency version (24MHz@5V) also available (M16C/26B).



M16C/28 Group Features

- Small foot print and high-speed operation (20MHz@5V)
- Instructions and peripheral functions are compatible with M16C/62P for easy program portability.
- 3-phase motor control timer, enabling motor control in compact products.
- Support for max. 2 I²C-bus channels using multimaster I²C-bus
- Data flash area can be used in place of external EEPROM.
- Higher frequency version (24MHz@5V) also available (M16C/28B).
- Small package (7mm×7mm: 85pins) available for flash versions only (except for 128KB products of M16C/28 and M16C/28B).

M16C/28 Block Diagram PLL TimerA 5ch M16C/60 **CPU Core** On-Chip Osc TimerB 3ch 20MHz/ 24MHz Sub Clock 32KHz Motor Cont. Multiplier WDT Interrupt **ROM Correction** RAM Max 12KB 10bit A/D Max 27ch SIO/UART 3ch(I2C/IE-bus) **ROM Max 128KB** IC/OC 8ch MASK/Flash With Protect SIO Max 2ch LVD DMAC Multimaster I²C

IC:Input Capture OC:Output Compare * M16C/28B uses PLL for 24MHz operation

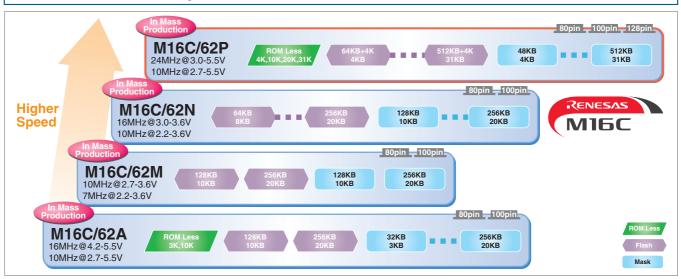
M16C/29 Group Features

- Adds CAN 2.0B to M16C/28. Compatible with M16C/28.
- Small mounting area and high-speed operation (20MHz@5V)
- Instructions and peripheral functions are compatible with M16C/62P for easy program portability.
- Retains 3-phase motor control timer, enabling motor control in compact products.
- Input-capture and output-compare functions for more flexible signal control
- Support for max. 2 I²C-bus channels using multimaster I²C-bus
- Data flash area can be used in place of external EEPROM.

M16C/29 Block Diagram PLL TimerA 5ch M16C/60 **CPU** Core On-Chip Osc TimerB 3ch 20MHz Sub Clock 32KHz Multiplier WDT CRC **ROM Correction** Interrupt RAM Max 12KB SIO/UART 3ch(I²C/IE-bus) 10bit A/D Max 27ch SIO Max 2ch **ROM Max 128KB** MASK/Flash With Protect LVD Multimaster I²C **CAN 2.0B 1ch**

M16C/62

M16C/62 Roadmap

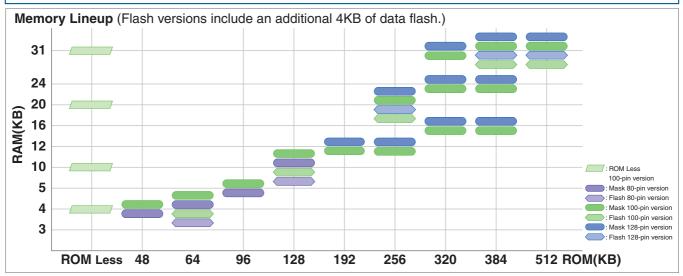


M16C/62P Group Features

- Wide range of memory options (ROM/RAM: ROM Less/4KB to 512KB/31KB)
- Supports 3V and 5V peripheral power supplies, allowing direct connection to 3V memory and 5V devices.
- SIO (3 channels) supports a subset of the IEBus and I²C-bus standards, allowing connection of a large number of devices.
- Insertion of from 0 to 3 wait states can be selected, allowing connection of slower devices.
- Enhanced watchdog timer, oscillation stop detection circuit, and new reset circuit on-chip

M16C/62P Block Diagram PLL TimerA 5ch M16C/60 On-Chip Osc TimerB 6ch 24MHz Sub Clock 32KHz Motor Cont. Multiplier WDT Interrupt CRC **ROM Correction** SIO/UART 3ch(I²C/IE-bus) RAM Max 31KB 10bit A/D 26ch 8bit D/A 2ch SIO 2ch **ROM Max 512KB** MASK/Flash With Protect LVD DMAC

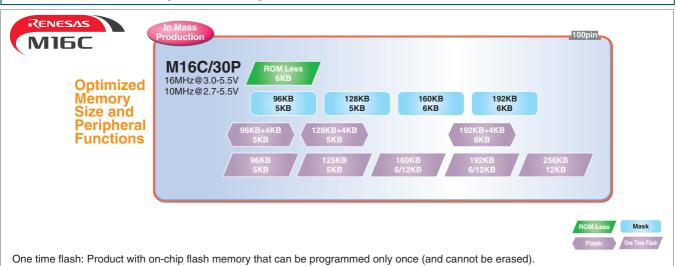
Memory Lineup





M16C/30P Group

M16C/30P Group Roadmap



M16C/30P Group Features

- Compatible with M16C/62P while achieving lower cost through reduced functions and ROM/RAM capacity.
- Operating frequency of 16MHz (3V to 5V)
- Reduced peripheral functions (timer: 6 channels, SIO: 3 channels, A/D; 18 channels), limited to most commonly used functions.
- Package: 100-pin package only.
- Support for single-chip, memory expansion, and microprocessor modes
- Wide variety of on-chip memory options: Mask ROM, flash, one time flash and ROM Less versions available.
- Compatible with development support tools for the M16C/62P.

M16C/30P Block Diagram TimerA 3ch SIO/UART 2ch l²C-bus TimerB 3ch SIO/UART 1ch l²C-bus/IEBus

16bit Multiplier

RAM

Interrupt CRC

ROM
Flash/One Time
esh/Lite Flash/Mask
w/Protect 10bit A/D 18ch

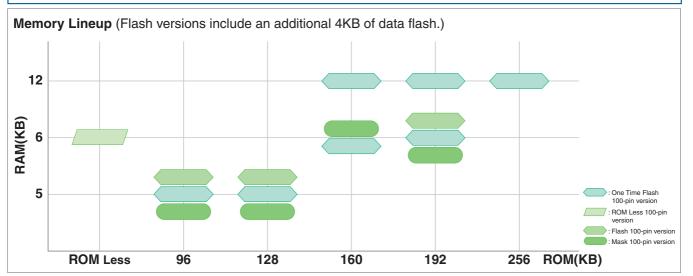
Sub Clock 32kHz

DMAC

WDT

ROM Correction

Memory Lineup





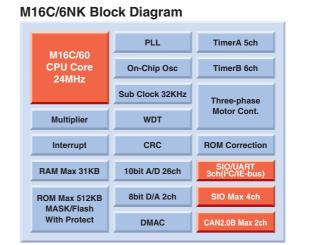
M16C/6N

■ M16C/6N Roadmap

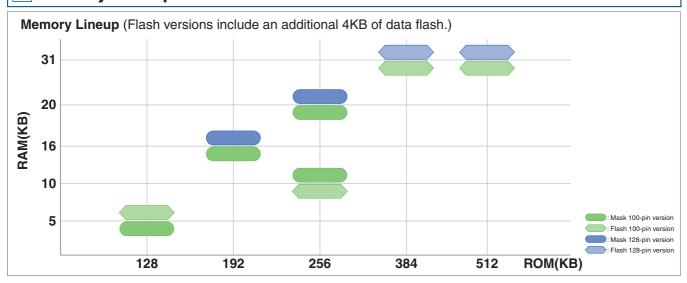


M16C/6NK Group Features

- Retains the features of the M16C/62P (CPU core, low power consumption, EMI characteristics, peripheral functions) and adds CAN (2.0B) support.
 - M16C/6NK, M16C/6NM: CAN 2.0B 2 channels, M16C/6NL, M16C/6NN: CAN 2.0B 1 channel
- Additional communication functions (CAN, serial interface: 5 channels (M16C/6NK, M16C/6NL)/ 7 channels (M16C/6NM, M16C/6NN))
- Improved failsafe functions such as enhanced watchdog timer and oscillation stop detection circuit, additional external interrupts (9 channels: M16C/6NM, M16C/6NN)



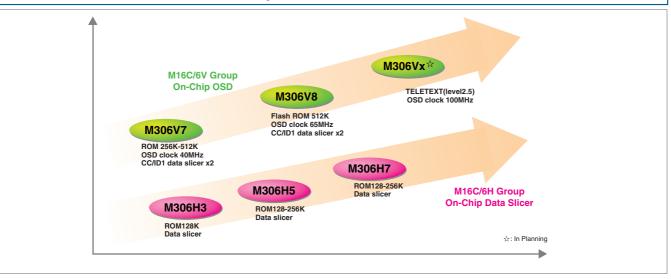
Memory Lineup





ASSP

M16C/6V, M16C/6H Roadmap



M16C/6V Group Features (OSD, on-chip data-slicer)

- On-chip OSD or data slicer for control of closed caption function or TV with ID1 function
- Memory options from 256KB to 512KB
- OSD supports display of 636 to 890 characters: 32 charactersX16 lines or 40 charactersX16 lines.
- Retains the features of the M16C/62P (low power consumption, EMI/EMS characteristics, peripheral functions).

M16C/6V7 Block Diagram SIO/UART 2ch TimerA 5ch **CPU Core** WDT TimerB 6ch 16MHz **PWM** CRC 16bit Multiplier **DMAC** 8bit D/A 2ch Multimaster I²C 2cl Interrupt PLL 8bit D/A 6ch OSD Cloc **ROM MAX512K ROM Correction** Flash/Mask W/Protect Power On Reset Sub Clock 32kHz

M16C/6H Group Features (on-chip multi-slicer)

- MCU with on-chip multi-slicer with worldwide compatibility and designed for DVD/HDD recorders.
- Support for TELETEXT, PDC, VPS, EPG-J, XDS, WSS, VideoID, etc.
- Retains the features of the M16C/62P (low power consumption, EMI/EMS characteristics, peripheral functions).

M16C/6H7 Block Diagram TimerA 5ch SIO/UART 3ch M16C/60 **CPU Core** TimerB 6ch SIO 2ch 16MHz PWM WDT 16bit Multiplier DMAC CRC PLL 10bit A/D 8ch Interrupt Sync Signal **ROM MAX256K ROM Correction** Low-Voltage RTC Flash/Mask W/Protect **Power On Reset** Slicer RAM RAM Sub Clock 32kHz IR I/O



ASSP

M16C/6S Group Features (on-chip power line communication)

- MCU with on-chip power line modem developed by Yitran (IT800) for power line communication
- Uses frequency band from 100kHz to 400kHz for power line communication, enabling a data transfer rate of 7.5kbps.
- Retains the features of the M16C/62P (low power consumption, EMI/EMS characteristics, peripheral functions).

M16C/6S Block Diagram ROM Correction TimerA 5ch M16C/60 **CPU Core PWM** Power On Reset 15.36MHz DMAC 16bit Multiplier SIO/UART 2ch (I2C) UART 1ch I²C Interrupt SIO 1ch ROM Flash 96KB W/Protect WDT

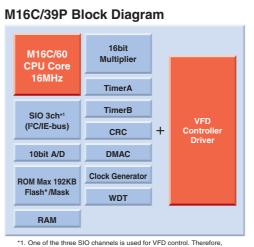
M16C/24 Group Features (on-chip USB controller)

- On-chip USB controller with full-speed support
- USB pull-up power supply circuit, USB clock generator circuit, many USB control functions
- Audio interface function implemented through addition of multi-bit serial I/O, memory card interface enhanced by strengthened CRC calculation function.
- Retains the features of the M16C/62P (low power consumption, EMI/EMS characteristics, peripheral functions).

M16C/24 Block Diagram Power On Reset TimerA 5ch **CPU Core** PWM 16MHz DMAC Supply Output Pin SIO/UART 2ch (I2C) 16bit Multiplier Interrupt Multifunction - Channel UART WDT **ROM MAX128KB** Flash/Mask W/Protect **ROM Correction**

■ M16C/39P Group Features (SiP combining VFD controller/driver)

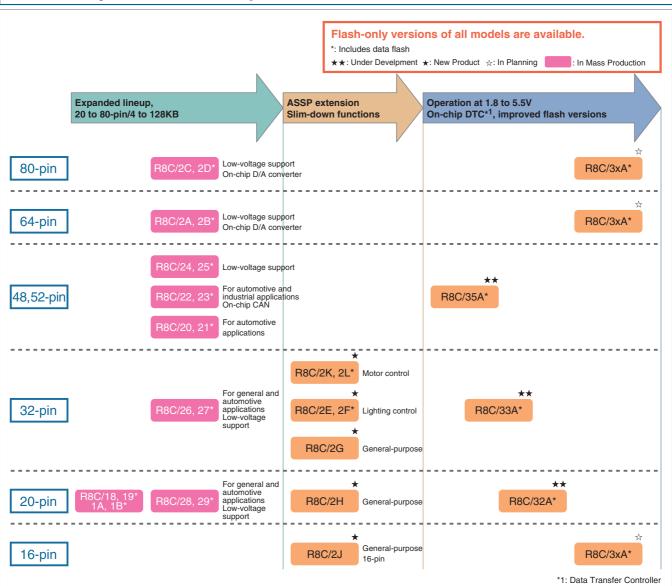
- SiP combining M16C/30P general MCU and VFD controller/driver
- Retains features of the M16C/62P while slimming down ROM/RAM and peripheral functions.
- 34 user-configurable high-voltage ports (setting support for 2 to 16 digits)
- Dimmer function, variable frame cycle SiP: Solution Integrated Product™



*1. One of the three SIO channels is used for VFD control. Therefore, two SIO channels are available to the user.
*(Note): Flash version is under development.

R8C/Tiny Series

R8C/Tiny Series Roadmap



R8C/18-1B Group Features

- High-precision, high-speed on-chip oscillator (8MHz)
- On-chip multimaster I²C-bus
- On-chip clock-synchronous serial I/O with chip select
- Data flash area can be used in place of external EEPROM.
 R8C/19 Group, R8C/1B Group
- On-chip switchable sink or source-type large-current drive ports.
- On-chip power-on reset function and voltage detection function eliminate need for separate reset IC.
- 20pin Packages

Low-Speed On-Chip Osc **R8C/Tiny** Timer X High-Speed On-Chip Osc Max 20MHz Timer Z Multiplier Interrupt Oscillation Stop Detection Flash Timer C WDT RAM SIO/UART 2ch A/D Converter SIO /Multi-master I²C POR/LVD **LED Drive Port**

R8C/18-1B Block Diagram



R8C/Tiny Series

R8C/20-23 Group Features

- R8C/Tiny Series for automotive applications
- CAN 2.0B added. Upward compatible with R8C/22 Group, R8C/23 Group, R8C/20 Group, and R8C/21 Group.

 Support for high-temperature operation

D version: -40 to 85°C J version : -40 to 85°C K version : -40 to 125°C

Support for high-speed operation
D version: VCC = 2.7 to 3.0V (f(XIN) = 10MHz)
D version: VCC = 3.0 to 5.5V (f(XIN) = 20MHz)
J version: VCC = 2.7 to 3.0V (f(XIN) = 10MHz)
J version: VCC = 3.0 to 5.5V (f(XIN) = 20MHz)
K version: VCC = 3.0 to 5.5V (f(XIN) = 10MHz)
K version: VCC = 2.7 to 3.0V (f(XIN) = 16MHz)
K version: VCC = 3.0 to 5.5V (f(XIN) = 16MHz)
High-precision high-speed on-chip estillator (4)

- High-precision, high-speed on-chip oscillator (40MHz)
- Data flash area can be used in place of external EEPROM. (R8C/21 Group, R8C/23 Group)
- On-chip power-on reset function and voltage detection function eliminate need for separate reset IC.
- 48pin Packages

R8C/20-23 Block Diagram R8C/Tiny Timer RA **CPU Core** Max 20MHz Timer RB Multiplier Interrupt Timer RD Flash Timer RE WDT RAM SIO/UART 2ch A/D Converter SIO /Multi-master I²C POR/LVD CAN (Only R8C/22, 23) Hardware LIN

R8C/24-25 Group Features

Support for low-voltage operation

VCC = 2.2 to 5.5V (f(XIN) = 5MHz)

VCC = 2.7 to 5.5V (f(XIN) = 10MHz)

VCC = 3.0 to 5.5 V (f(XIN) = 20 MHz)

- High-precision, high-speed on-chip oscillator (40MHz)
- On-chip subclock oscillator circuit (32.768kHz)
- On-chip timer RD for motor control
- On-chip multimaster I²C-bus
- On-chip clock-synchronous serial I/O with chip select
- Data flash area can be used in place of external EEPROM. (R8C/25 Group)
- On-chip power-on reset function and voltage detection function eliminate need for separate reset IC.
- On-chip switchable sink- or source-type large-current drive ports.
- 52pin Packages

R8C/24-25 Block Diagram



R8C/26-29 Group Features

- Support for low-voltage operation
 - VCC = 2.2 to 5.5V (f(XIN) = 5MHz) (N and D versions)

VCC = 2.7 to 5.5V (f(XIN) = 10MHz)

VCC = 3.0 to 5.5 V (f(XIN) = 16 MHz) (K version)

VCC = 3.0 to 5.5 V (f(XIN) = 20 MHz) (other than K version)

- High-precision, high-speed on-chip oscillator (40MHz)
- On-chip subclock oscillator circuit (32.768kHz) (N and D versions)
- On-chip multimaster I²C-bus
- On-chip clock-synchronous serial I/O with chip select
- Data flash area can be used in place of external EEPROM. (R8C/27 Group, R8C/29 Group)
- On-chip power-on reset function and voltage detection function eliminate need for separate reset IC.
- On-chip switchable sink- or source-type large-current drive ports. (N and D versions)
- 32pin Packages (R8C/26, R8C/27 Group)
- 20pin Packages (R8C/28, R8C/29 Group)

R8C/26-29 Block Diagram

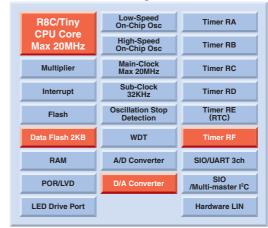
R8C/Tiny	Low-Speed On-Chip Osc	Timer RA
CPU Core Max 20MHz	High-Speed On-Chip Osc	Timer RB
Multiplier	Main-Clock Max 20MHz	Timer RC
Interrupt	Sub-Clock 32KHz	
Flash	Oscillation Stop Detection	Timer RE (RTC)
Data Flash 2KB	WDT	
RAM	A/D Converter	SIO/UART 2ch
POR/LVD		SIO /Multi-master I ² C
LED Drive Port		Hardware LIN

R8C/Tiny Series

R8C/2A-2D Group Features

- Support for low-voltage operation
 - VCC = 2.2 to 5.0 V (f(XIN) = 5 MHz)
 - VCC = 2.7 to 5.5 V (f(XIN) = 10 MHz)
 - VCC = 3.0 to 5.5V (f(XIN) = 20MHz)
- High-precision, high-speed on-chip oscillator (40MHz)
- On-chip subclock oscillator circuit (32.768kHz)
- On-chip D/A converter
- Additional 16-bit timer channel (timer RF)
- Support for motor control by on-chip timer RD
- On-chip multimaster I²C-bus
- On-chip clock-synchronous serial I/O with chip select
- Data flash area can be used in place of external EEPROM. (R8C/2B Group, R8C/2D Group)
- On-chip power-on reset function and voltage detection function eliminate need for separate reset IC.
- On-chip switchable sink- or source-type large-current drive ports.
- 64pin Packages (R8C/2A, R8C/2B Group)
- 80pin Packages (R8C/2C, R8C/2D Group)

R8C/2A-2D Block Diagram

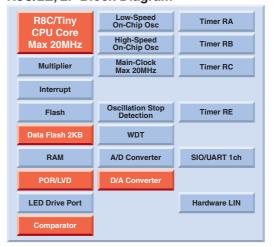


R8C/2E and R8C/2F Group Features

New Product

- Operating voltage
 - VCC = 2.7 to 5.5V (f(XIN) = 10MHz)
 - VCC = 3.0 to 5.5V (f(XIN) = 20MHz)
- High-precision, high-speed on-chip oscillator (40MHz)
- On-chip D/A converter
- On-chip comparator enabling comparison with external power supply
- Data flash area that can be used as substitute for external EEPROM (R8C/2F Group)
- No need for separate reset chip thanks to power-on reset function and voltage detection function
- On-chip switchable sink- or source-type large-current drive norts
- Compatible with low-cost on-chip debugging emulator
- 32-pin package

R8C/2E, 2F Block Diagram

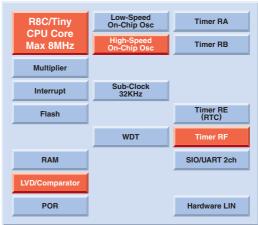


R8C/2G Group Features



- Low-voltage operation possible
 - VCC = 2.2 to 5.5V (f(XIN) = 4MHz)
 - VCC = 2.7 to 5.5V (f(XIN) = 8MHz)
- High-precision, high-speed on-chip oscillator (8MHz)
- On-chip subclock generator circuit (32.768kHz)
- 1-channel 16-bit timer (timer RF)
- On-chip voltage detection circuit (comparison with external power supply possible in comparator mode)
- Compatible with low-cost on-chip debugging emulator
- On-chip hardware LIN (using 1 timer channel)
- 32-pin package

R8C/2G Block Diagram

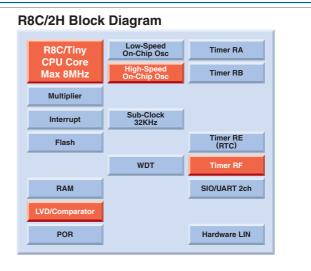


R8C/Tiny Series

R8C/2H Group Features



- Low-voltage operation possible
 - VCC = 2.2 to 5.5V (f(XIN) = 4MHz)
 - VCC = 2.7 to 5.5V (f(XIN) = 8MHz)
- High-precision, high-speed on-chip oscillator (8MHz)
- On-chip subclock generator circuit (32.768kHz)
- 1-channel 16-bit timer (timer RF)
- On-chip voltage detection circuit (comparison with external power supply possible in comparator mode)
- Compatible with low-cost on-chip debugging emulator
- On-chip hardware LIN (using 1 timer channel)
- 20-pin package



R8C/2J Group Features



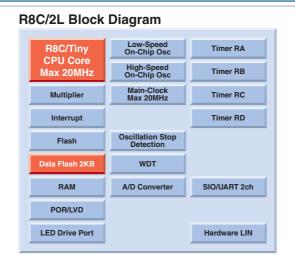
- Low-voltage operation possible
 - VCC = 2.2 to 5.5V (f(XIN) = 4MHz)
 - VCC = 2.7 to 5.5V (f(XIN) = 8MHz)
- High-precision, high-speed on-chip oscillator (8MHz)
- 1-channel 16-bit timer (timer RF)
- On-chip voltage detection circuit (comparison with external power supply possible in comparator mode)
- Compatible with low-cost on-chip debugging emulator
- On-chip hardware LIN (using 1 timer channel)
- 20-pin package (only 16 pins enabled)

R8C/ZJ Block Diagram R8C/Tiny CPU Core Max 8MHz Multiplier Interrupt Flash WDT Timer RF SIO/UART 1ch LVD/Comparator POR Hardware LIN

R8C/2K and R8C/2L Group Features



- Low-voltage operation possible
 - VCC = 2.2 to 5.5V (f(XIN) = 5MHz)
 - VCC = 2.7 to 5.5V (f(XIN) = 10MHz)
 - VCC = 3.0 to 5.5V (f(XIN) = 20MHz)
- High-precision, high-speed on-chip oscillator (40MHz)
- Motor control possible using on-chip timer RD
- Data flash area that can be used as substitute for external EEPROM (R8C/2L Group)
- No need for separate reset chip thanks to power-on reset function and voltage detection function
- On-chip switchable sink- or source-type large-current drive ports.
- Compatible with low-cost on-chip debugging emulator
- 32-pin package



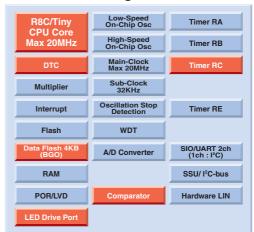
R8C/3xA Series

R8C/32A Group Features



- 1.8V operation possible
 - VCC = 1.8 to 5.5V (f(XIN) = 2MHz)
 - VCC = 2.2 to 5.5V (f(XIN) = 5MHz)
 - VCC = 2.7 to 5.5V (f(XIN) = 10MHz)
 - VCC = 3.0 to 5.5V (f(XIN) = 20MHz)
- High-precision(Target: 1%), high-speed on-chip oscillator (40MHz)
- Sub clock oscillator(32.768kHz)
- Data Transfer Controller(DTC) 1ch
- Synchronous serial communication unit
- I²C-bus(Shared with Synchronous Serial Communication unit)
- Data flash area that can be used as substitute for external EEPROM and added BGA(Back Ground Operation) function to Data flash area
- No need for separate reset chip thanks to power-on reset function and voltage detection function and possible to monitor the external supply voltage by comparator
- On-chip switchable sink- or source-type large-current drive ports.
- Compatible with low-cost on-chip debugging emulator E8a
- 20-pin SSOP package

R8C/32A Block Diagram

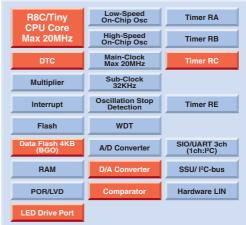


R8C/33A Group Features



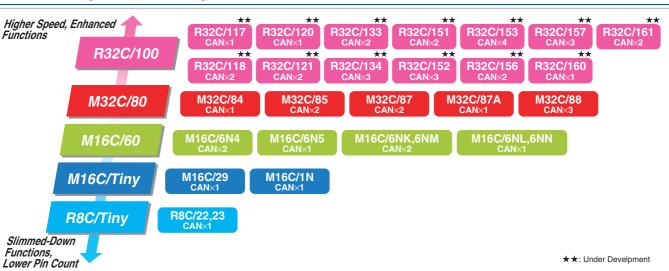
- 1.8V operation possible
 - VCC = 1.8 to 5.5V (f(XIN) = 2MHz)
 - VCC = 2.2 to 5.5V (f(XIN) = 5MHz)
 - VCC = 2.7 to 5.5V (f(XIN) = 10MHz)
 - VCC = 3.0 to 5.5V (f(XIN) = 20MHz)
- High-precision(Target: 1%), high-speed on-chip oscillator (40MHz)
- Sub clock oscillator(32.768kHz)
- Data Transfer Controller(DTC) 1ch
- D/A converter
- Synchronous serial communication unit
- I²C-bus(Shared with Synchronous Serial Communication unit)
- Data flash area that can be used as substitute for external EEPROM and added BGA(Back Ground Operation) function to Data flash area
- No need for separate reset chip thanks to power-on reset function and voltage detection function and possible to monitor the external supply voltage by comparator
- On-chip switchable sink- or source-type large-current drive norts
- Compatible with low-cost on-chip debugging emulator E8a
- 32-pin package

R8C/33A Block Diagram



On-Chip CAN

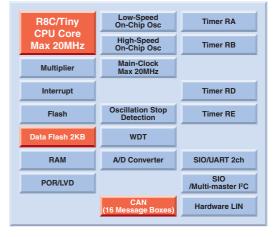
On-Chip CAN Lineup



R8C/22, 23 Group Features

- Power supply voltage: 3.0 to 5.5 V/Max. 20MHz, 2.7 to 5.5 V/Max. 10MHz
- ROM/RAM capacity: 32KB/2KB, 48KB/2.5KB, 64KB/3KB,
 - 96KB/5KB, 128KB/6KB - Data flash 1KB 2 blocks (R8C/23 only)
- Clock generator circuits: 3 on-chip circuits
 - XIN-XOUT main clock (on-chip oscillation stop detection circuit)
 - High-speed (40MHz)/low-speed on-chip oscillators
- Voltage detection circuits (LVD): 3 circuits
- Power-on reset (POR)
- Multifunction timers
 - 8-bit timer: 3 channels (timer RA, timer RB, timer RE) 16-bit timer: 2 channels (timer RD)
- Serial I/O
 - Clock-synchronous/UART: 1 channel, UART: 1 channel I²C-bus/SIO: 1 channel
 - H/W-LIN (uses UART and timer RA)
- CAN: 16 message boxes: 1 channel
 A/D converter: 10-bit 12 channels
- Ports
 - Pull-up resistor: Settable for all ports (excluding dedicated input ports)
- Watchdog timer: 1 channel (supports hardware resets)
- Package: 48-pin LQFP (7mm 7mm, 0.5mm pitch)

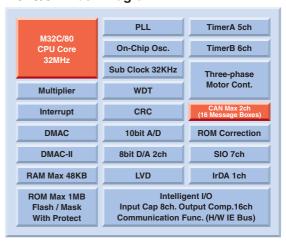
R8C/22, 23 Block Diagram



M32C/87 Group Features

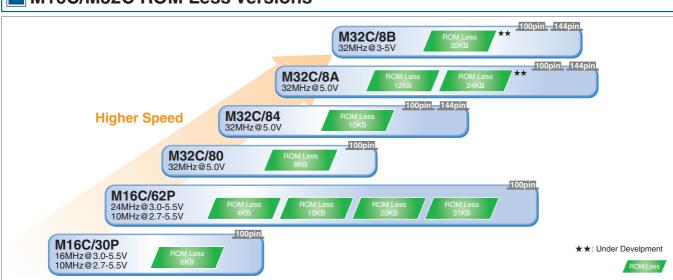
- High-speed operation and large-capacity on-chip memory
 - M32C/80 core, 32MHz@5V operation
 - On-chip 1MB flash and 48KB RAM is tops in the M16C Family.
- Abundant on-chip peripheral functions
 - Abundant on-chip peripheral functions such as CAN, serial, and IrDA
 - · M32C/87: CAN 2 channels
 - · M32C/87A: CAN 1 channel
 - On-chip intelligent I/O Implementation of functions such as PWM output and SIO communication based on 16-bit timer.
- Support for easier to use functions
 - Supports 3V and 5V peripheral power function, allowing direct connection to 3V memory and 5V devices.
- Backward compatibility
 - Pin compatible and peripheral function compatible with products such as the M16C/62P, while retaining features including low noise, low power consumption, and high ROM efficiency.

M32C/87 Block Diagram



ROM Less Versions

M16C/M32C ROM Less Versions



M16C/M32C ROM Less Product Features

- External ROM products ranging from M16C core to M32C
- Support for function (separate bus) facilitating connection of external memory if large memory capacity is required and function (multiplex bus) to reduce the number of pins used
- Products are available with enhanced bus interfaces supporting a variety of timing requirements.
- Support for simultaneous connection of two voltages, 3.3V for memory interface and 5V for peripheral functions
- Retains the features of the M16C Family (low power consumption, EMI/EMS characteristics, peripheral functions).
- In addition to a full emulator, a compact emulator is under development.

RAM Capacity 6KB

M32C/8A Block Diagram TimerA 5ch PLL On-Chip Osc TimerB 6ch Sub Clock 32KHz Three-phase Motor Cont. Multiplier WDT CRC Interrupt **DMAC** 10bit A/D **ROM Correction** DMA-II/DTC 8bit D/A 2ch SIO 5ch LVD **RAM Max 24KB**

Product Lineup ★★: Under Develpment M30802SQF 828T100 ZA60200 03 0.5mm pitch, 144pins 20mm 20mm 0.5mm pitch, 100pins 0.65mm pitch, 100pins Group M16C/30P M16C/62P M16C/80 M32C/80 M32C/84 M32C/8A M32C/8A 4KB 10KB 20KB 10KB 24KB

8KB

10KB

12KB

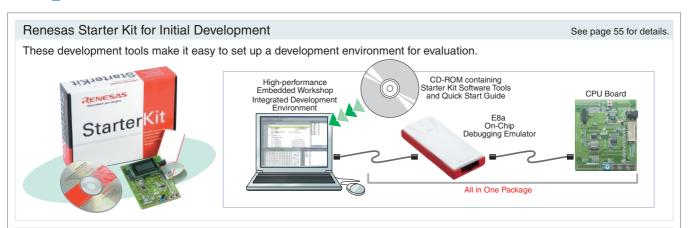
24KB

32KB

Development Tools

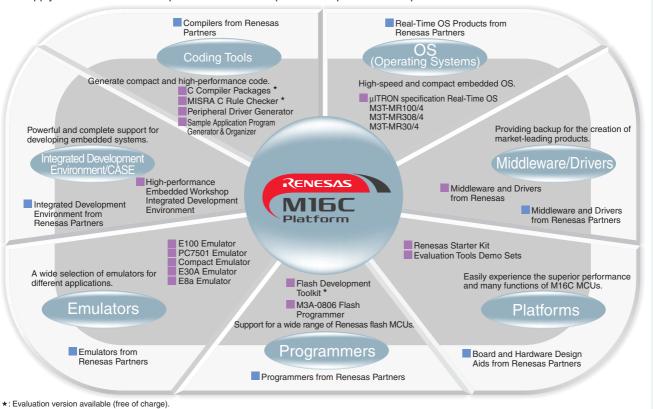


Renesas provides customers with comprehensive product development support in partnership with leading third-party vendors.



Development Environment for Maximizing the Performance of Renesas MCUs

We supply customers with development environment optimized for product development.



Internet-Based Update Utilities

Renesas helps you keep your development environment up to date with support via the Web.

Auto-Update Utility

This utility notifies you when free upgrades are available for software you have installed on your PC. Simply follow the instructions displayed by the auto-update wizard to upgrade your software to the latest version. (bundled with the software products that Highperformance Embedded Workshop V4.0 or later supports)



Document Updater

This utility finds documents related to the target MCU and displays them on a list. It provides an easy way to review, download and update essential documentation. You can download from our web site (free of charge): URL: http://www.renesas.com/du



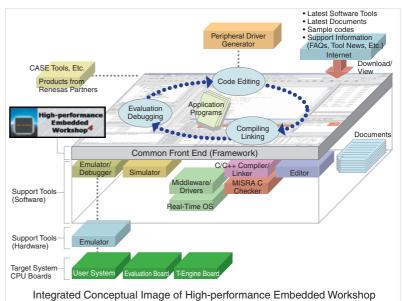
Integrated Development Environment Providing Powerful and Complete Support for Developing Embedded Systems

Renesas integrated development environment brings together the tools needed for developing applications, including a compiler and debugger (emulator software). All steps from coding to evaluation and verification can be performed using a single application.

High-performance Embedded Workshop Integrated Development Environment

 Integrated and centralized control over all tools, from the editor to the debugger

- Flexible support for multiple build*1 configurations (support for saving multiple optionally specified configurations, support for addition of external build tools, etc.)
- Per-project management of source files
- Easy-to-use GUI based on Microsoft Windows
- Generation of C startup code customized for individual MCUs
- Test support function for improving debugging efficiency
- Always up to date tools and documents
- Auto-update utility (See page 47 for details.)Document updater (See page 47 for details.)
- Flexible customization functions
- · Custom build phase
- TargetServer (extended COM functions)
- Extended Tcl/Tk functions and scripting
- Works with products from Renesas partner companies \bullet CASE*2 tools to support upstream process design
- I/F provided for version control tools
- *1 Build: The sequence of operations involved in generating object code, including compiling, assembling and linking.
- *2 CASE: Computer Aided Software Engineering



C Compiler Packages

C Compiler

- Conforms to ANSI*1 language standard.
- Optimization features and many #pragma extended functions for extracting top performance from the MCU
- Support for use of near/far designations with variables
- Function for calculating the stack size to be used
- Support for embedding of SQMlint MISRA-C*2 rule
- Possible to download the latest manuals and sample codes by using document updater
 - 1. ANSI: American National Standards Institute
 - *2. MISRA: Motor Industry Software Reliability Association "MISRA" is a registered trademark of MISRA Ltd, held on behalf of the MISRA Consortium.

Simulator debugger

- Support for target-less evaluation
- C language and assembly language source-level debugging
- Support for source file editing
- Trace function
- RAM monitor function
- Virtual port I/O and virtual interrupts functions
- GUI implementation of target I/O functions

Package lineup

Product name	Part No.
C-compiler package for R32C Series	R0C56400XSW01R
C-compiler package for M32C Series [M3T-NC308WA]	R0C30800CLW05R
C-compiler package for M16C Tiny/R8CTiny Series [M3T-NC30WA]	R0C30600CLW05R

Package product contents

- Compiler
- Simulater debugger
- High-performance Embedded Workshop Integrated Development Environment
- Auto-update utility

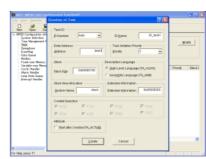
Note: MISRA-C rule checker SQMint is the compiler optional product and sold separately

Real-Time OS

Provides easy control of large-scale and complex applications in real time. Reduces program development time and improves reusability and maintainability.

- Conforms to μITRON4.0 standard.
- Compact size suitable for ROM programming.
- Context selection function allows reduction of amount of RAM used.
- Excellent real-time functionality (interrupt response time, task switching time)
- Simple initial setup of application programs for use with real-time OS
- Configurator provided.
- Wide array of operating system debugging functions when integrated debugging in High-performance Embedded Workshop

Note: See the "Development Tools List" listing for the individual MCU for details on available real-time OS packages as well as information on the operating environment.



Example GUI Configuration Window

Coding Assistance Tool (**)



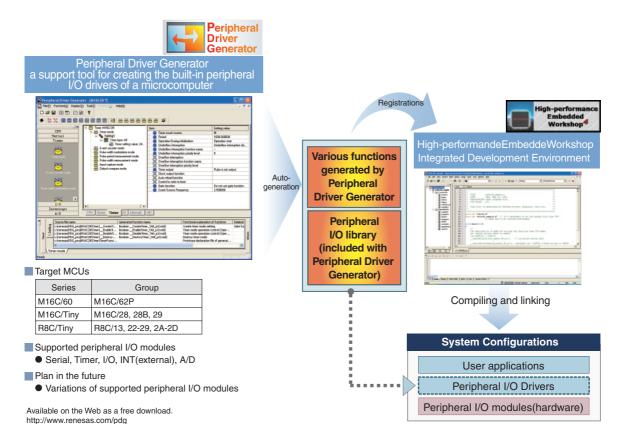
Renesas provides the coding assistance tool easy to use and to generate peripheral drivers and sample codes automatically

Peripheral Driver Generator



This utility automatically generates I/O drivers for MCU on-chip peripheral functions and setting routines (functions) based on settings entered via a simple GUI.

- Simple to use: Possible for developers to set registers via a simple GUI by eliminating developers having to do manual coding.
- Shorter development times: Making settings is easy since there is no need to do manual coding of peripheral I/O functions.
- Improved reliability: Avoid mistakes or omissions in peripheral I/O register settings.



Sample Application Program Generator & Organizer



Sample Application Program Generator & Organizer is a utility program that is available free of charge. It lets you generate sample program code by simply selecting the functions you wish to implement on the MCU.

Simple Operation

Generate sample program code for the MCU of your choice without the need for complex environment settings

• Flexible Design

Program code for different applications, such as communication control or data flash control, can be combined freely.

High Efficiency

You can register your own program code and then combine it with other programs.

Instructional Materials

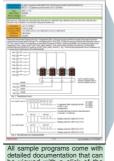
The package includes detailed reference materials in digital form, including MCU peripheral circuit diagrams and timing charts. Sango outputs C language source code containing detailed comments.

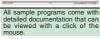
Target MCUs

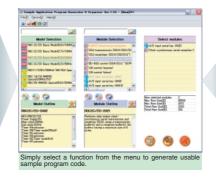
R8C/Tiny Series

R8C/11, R8C/13, R8C/1A, R8C/1B, R8C/24, R8C/25, R8C/26, R8C/27, R8C/2C, R8C/2D

Available on the Web as a free download. http://www.renesas.com/sango



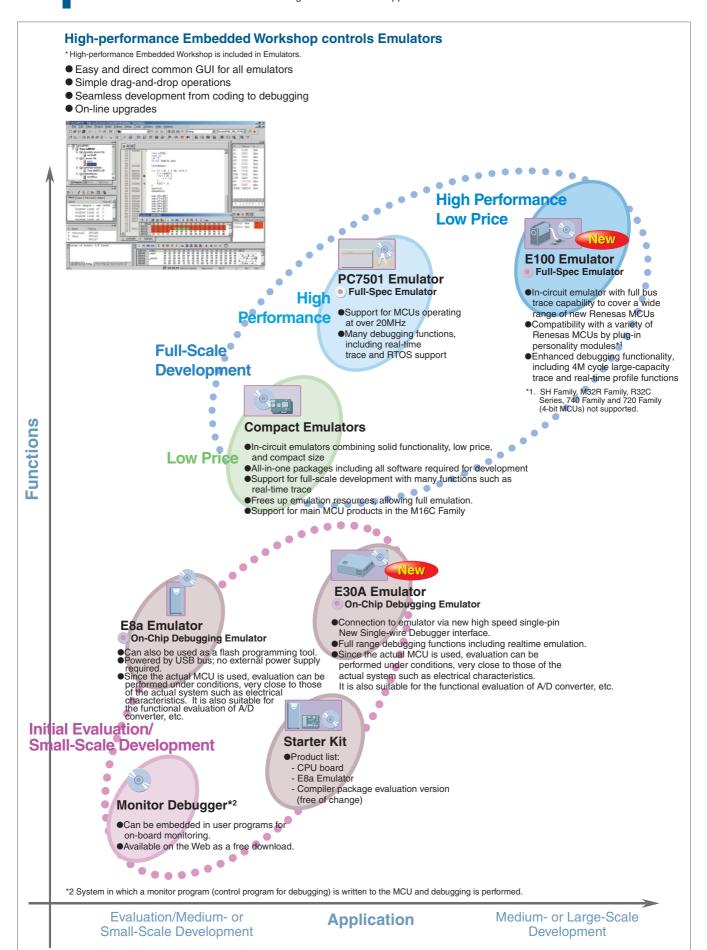








Wide variations of selectable emulators according to the customer's applications.



E100 Emulator





This in-circuit emulator has full bus trace capability and supports a wide range of new 8-bit to 32-bit Renesas MCUs.

The E100 emulator is designed to provide compatibility with the full range of Renesas MCU products scheduled for development over the next several years. Developers can accommodate new products appearing in future simply by changing the MCU unit and accessories. The E100 makes it possible to build a debugging environment supporting a variety of MCUs at minimum cost. It supports the development of a wide range of application products.

Target MCUs

Series	Group
M16C/60	M16C/64, M16C/65**
R8C/Tiny	R8C/32A**, R8C/33A**, R8C/35A**

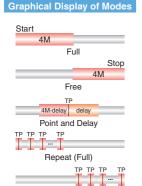
**: Future support planned

See the following URL for details: http://www.renesas.com/e100

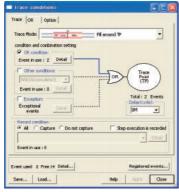
- Operating environment
- Windows® XP, Windows® 2000
- Features
 - Convenient and easy-to-use debugging environment
 - · Visual display of settings for intuitive operation
 - Useful debugging, evaluation, and analysis functions
 - High-capacity (4M) cycle trace capability
 - Newly added functions, including real-time profiling, C0/C1 coverage, stack access violation detection, and initialization omission detection
 - Excellent extensibility to new MCU models and high cost-performance ratio
 - Compatibility with new MCU products by changing the MCU unit*1
 - Far cheaper and enhanced functionality compared with previous full-spec emulators from Renesas
 - *1. MCU unit sold separately. SH Family, M32R Family, R32C Series, 740 Family, and 720 Family (4-bit MCUs) not supported.

Refined and Easy-to-Use GUI

- Visual representation of functions makes it easier to grasp the settings overall and makes operation more intuitive.
- Settings can be made easily by dragging and dropping between windows.



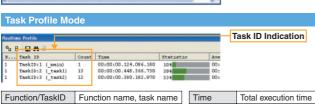
Repeat (Free)



Trace Condition Settings Dialog

Real-Time Profiling

- Measures the execution time and the call frequency of up to 8,000 functions, making it easy to identify bottlenecks.
- Measurement does not require halting execution of the program under development.
- In addition to function profile mode, profile modes for individual tasks are supported.



Function/TaskID	Function name, task name		Time	Total execution time
Address	Start address of function or task		Statistic	Utilization ratio
Size	Size of function or task		Average	Average execution time
Count	Call count	1		



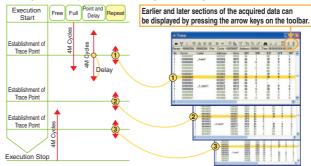
- Product contents
- Emulator main unit (E100)
- AC adapter (100V to 240V, 50/60Hz)
- Power cable
- USB interface cable
- MCU unit*1
 - Flexible cable for connection to system under development
 - Software CD-ROM (High-performance Embedded Workshop integrated development environment, emulator debugger)
- *1. MCU unit sold separately. Each supported MCU requires a separate MCU unit.

High-Capacity (4M) Cycle Trace Capability for Enhanced Real-Time Trace Performance

 In addition to the trace modes offered on earlier emulators, the E100 has a repeat function to identify problems related to processes that are executed repeatedly.

Repeat Function Usage Example

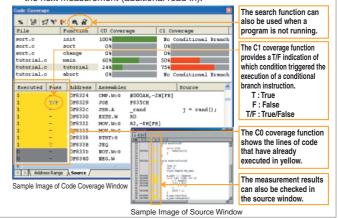
By setting a trace point that corresponds with UART receive processing, it is possible repeatedly to record the 512 cycles preceding and following each receive operation. In this way, data corruption that occurs only occasionally can be identified.



Locations where problems have occurred can be located quickly by combining search functions.

C1 Coverage

- In addition to C0 coverage, which measures execution coverage, C1 coverage measures branch coverage, for more effective evaluation.
 Note: C1 coverage is not supported for the H8S/Tiny Series.
- Measurement results can be stored and then merged with the results of the next measurement (additional read-in).



PC7501 Emulator



Full-Spec Emulator with Support for all of M16C Family MCUs

The PC7501 is a full-featured emulator that supports M16C Family MCUs. Switchable emulation probes (sold separately) provide support for different MCU models in the M16C Family.

Target MCUs

• M32C/80 Series, M16C/60 Series, M16C/30 Series, M16C/Tiny Series, R8C/Tiny Series

E100 Emulator (See page 51) supports new M16C family MCUs (except for R32C/100 Series) that wil be developed in the future.

MCUs that are supported by PC7501 are shown below. http://www.renesas.com/pc7501

- Operating environment
 - Windows® XP, Windows® 2000
- Features
 - Full-bus-trace emulator for M16C Family MCUs
 - Flexible support for different MCU products by changing the firmware
 - Support for USB, LPT parallel, and LAN communication
 - The MCU is positioned on the probe block directly above the user system for enhanced signal integrity.
 - AC adapter complying with safety standards supplied.
 - Support for power supply voltages of 100 to 240V, 50/60Hz



Product contents

- Emulator unit
- Software CD-ROM (High-performance Embedded Workshop integrated development environment, etc.)
- Power, parallel, and USB cables
- Emulation probe connector cable
- User's manual

Compact Emulators http://www.renesas.com/cpe



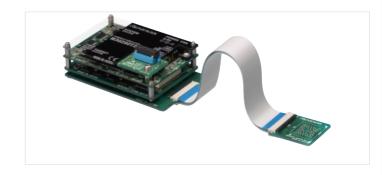
In-Circuit Emulators Combining Solid Functionality, Low Price, and Compact Size

Though small in size, these compact emulators provide the solid debugging functions of full-spec units such as real-time trace.

The product package includes software tools such as an integrated development environment, Emulator Debuggers, Compiler packages evaluation version (free of charge). Customers can begin development work on application programs right away after purchasing it.

■ Target MCUs

- M32C/80 Series, M16C/80 Series, M16C/60 Series, M16C/30 Series, M16C/Tiny Series, R8C/Tiny Series
- Operating environment
 - Windows[®] XP, Windows[®] 2000
- Features
 - All-in-one packages including all software required for development
 - Compact design and Low price
 - An emulation memory function and microprocessor mode can be added by connecting an optional emulation memory board.
 - Solid debugging functions
 - Hardware break function
 - Real-time trace function
 - Real-time RAM monitor function
 - USB interface support



■ Product contents

- Emulator unit
- Software CD-ROM (High-performance Embedded Workshop integrated development environment, compiler package evaluation version [free of charge])
- USB and power cables (separate 5V/2A power supply required for compact emulator)
- User's manual

E30A Emulator





Emulator with NSD interface allowing connection via a single pin

The E30A emulator features a NSD (New Single-wire Debugger) interface and supports the R32C/100 Series. It makes it simple to perform software verification functions such as on-chip debugging and data tuning in the actual operating environment.

- Target MCUs
 - R32C/100 Series
- Operating environment
 - Windows® XP, Windows® 2000
- Features
 - Connection to emulator via newly developed single-pin NSD interface.
 (A coaxial cable is the only additional item required to perform debugging.)
 - OCD (On-Chip Debugger) functionality
 - It is not necessary to probe the foot pattern of the target MCU.
 - There is no MCU signal deterioration.
 - No need for custom evaluation chips or custom packages.
 (Debugging can be performed with the target MCU in place.)
 - Full range debugging functions
 - Supports realtime emulation at the MCU's maximum operating frequency.
 - Break and trace functionality are implemented in the MCU's onchip circuitry.
 - Unit incorporates large-capacity trace memory.
 - Supports interval time measurement from the data access starting point.



- Product contents
 - Emulator unit
 - Oscillator circuit board
 - AC Adaptor, AC power cable
 - USB cable
 - Coaxial cable, Optional cable
 - Coaxial conversion board, Optional board
 - Software CD-ROM (High-performance Embedded Workshop integrated development environment)

R32C/111**, R32C/116**, R32C/117**, R32C/118**

E8a Emulator



Low-priced on-chip debugging emulator that can also be used to program flash memory on 8-bit to 32-bit Renesas MCUs.

R32C/100

Main Specifications:

- A single unit provides support for on-chip debugging and flash programming.
- Evaluation can be performed under conditions, very close to those of the actual system such as electrical characteristics.
- The emulator uses USB bus power from the PC and does not require a separate power supply to operate.
- A 3.5V or 5.0V power supply may be provided to the target system via the emulator.
- The following software is bundled with the product, so you can start application development immediately after purchasing it.
 - High-performance Embedded Workshop integrated development environment
 - Compiler package evaluation version (free of charge)
 - Flash Development Toolkit evaluation version (free of charge)
- The bundled software can also be downloaded free of charge from the E8a emulator Web site.

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M32C/84, M32C/85, M32C/87, M32C/88, M32C/8B** M32C/80 M16C/62P, M16C/6N4, M16C/6N5, M16C/6NK, M16C/6NL, M16C/6NM, M16C/6NN, M16C/60 Target MCUs in M16C/6S, M16C/64, M16C/63**, M16C/65** the M16C Family M16C/30 M16C/Tiny M16C/26A, M16C/28, M16C/29 R8C/10~19, R8C/1A, R8C/1B, R8C/20~29, R8C/2A~2H, R8C/2J~2L, R8C/Tiny R8C/32A**, R8C/33A**, R8C/35A** Max. operating frequency Max. operating frequency of target MCU Target MCU modes | Single-chip mode, memory expansion mode (supported MCU modes differ depending on the MCU product) Supported power supply voltage 2.7V to 5.5V (within guaranteed flash programming operation range of target MCU) Power supply to MCU Supplied by emulator (3.3V or 5.0V, max. 300mA) or from Vcc on user board 255 points Number of break points differs depending on the MCU product. Hardware breaks Forced break pushing the STOP button of debugger. Special breaks Availability of this function and number of events recorded differ depending on the MCU product.*1 Trace Operating environment | Windows® XP, Windows® 2000 14-pin connector [Product Type 2514-6002: 3M (Minnesota Mining and Manufacturing Company)] User interface Connection to developer's system Connects using supplied user interface cable. (Connection signals differ depending on the target MCU product.)

Use of developer's resources On some MCU models, the emulator may require access to some port peripheral functions and ROM or RAM.*

1 Be sure to read the E8a user's manual corresponding to the target MCU before using the E8a emulator. See the E8a emulator Web site for details of target MCUs: http://www.renesas.com/e8a.

★★: To be supported soon



■ E8 emulator (discontinued product)

Although the E8a has replaced to the E8, support for new MCU models will continue to be added to the E8 through July 2008. (This will consist mainly of adding support for versions of existing products with new ROM/RAM configurations.) However, there are no plans to provide support for MCU products (740 Family, M16C/65 ** Group, R8C/32A ***, 33A ***, 35A ***, etc.) that would require major changes to the emulator software.

Flash Development Toolkit http://www.renesas.com/fdt

An On-Board Programming Tool from Renesas. (Flash Development Toolkit)

Supports on-board programming of Renesas flash MCUs using a Flexible GUI graphical user interface (GUI) for ease of use. Three programming operation window styles are available to match Using the Toolkit by Creating a Project GUI designed specifically for flash programming 2. Simple Interface Window Comprehensive message log Identification code auto programming function 14.00 Functions for preventing operation errors (2636F)₂ Evaluation version (free of charge) available for download on Main specifications Supports a wide variety of MCUs ranging from Target MCUs 8-bit to 32-bit models. (See Web site for details.) The project management function enables efficient data management for systems incorporating multiple MCUs or for different development phases. It is very convenient The simple interface window is called Operating environment Windows® XP, Windows® 2000 up from the main window. It allows the user to program flash memory Distribution media CD-ROM Supported languages Japanese/English for multiple projects easily using the when using the toolkit for development work. project management function. File download • Block erase Using the Toolkit without Creating a Proje Upload 3 Basic Window Blank check memory without first creating a project • File checksum The number of files that can be programmed at • Edit file one time is limited to one.

Note: Available since Flash Development Toolkit Join files with version 3. • Manage project Rogan Flath · Select protection level for flash programming Select output messages (standard/advanced) Identification code auto programming function Programming Tool Configuration Diagram

Note: Support for programming of M16C Family and 740 Family MCUs via a serial connection (RS-232C) is being added to the Flash Development Toolkit incrementally. See the Web site for details of supported MCUs: http://www.renesas.com/fdt.

USB

0

Flash Development

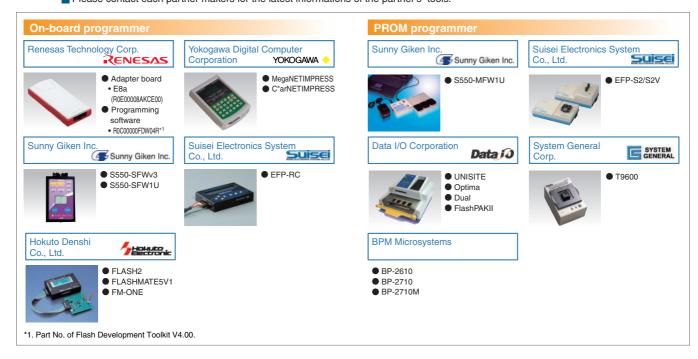
Toolkit

Flash programmers from Renesas and partner vendors

There are two types of programmers that support Renesas flash MCUs. On-board programmers support programming of the MCU when mounted in the system, and PROM programmers are used to program the MCU without a target board. We work together with our partner vendors to ensure availability of a wide range of programmer products to meet a variety of requirements. Please contact each partner makers for the latest informations of the partner's tools.

E8a (R0E00008AKCE00)

Serial (RS-232C)



Initial Implementation Tools

Low-priced and Support for Basic Functions

Renesas Starter Kit

This is a user-friendly evaluation tool for Renesas MCUs. The included E8a emulator and High-performance Embedded Workshop integrated development environment provide support for coding and debugging. In addition, it is possible to perform on-board programming of MCUs using Flash Development Toolkit.

Ta	arget MCUs	Product name	Part No.
Group	Series	Froduct name	raitino.
M32C/80	M32C/84, 85, 87, 88	Renesas Starter Kit for M32C/87	R0K330879S001BE
M16C/60	M16C/62P, 30P	Renesas Starter Kit for M16C/62P	R0K33062PS001BE
	M16C/6NK	Renesas Starter Kit for M16C/6NK	R0K3306NKS001BE
M16C/Tiny	M16C/28, 29	Renesas Starter Kit for M16C/29	R0K330290S001BE
	M16C/26A	Renesas Starter Kit for M16C/26A	R0K33026AS001BE
R8C/Tiny	R8C/1A,1B	Renesas Starter Kit for R8C/1B	R0K5211B4S001BE
	R8C/20-23	Renesas Starter Kit for R8C/23	R0K521237S001BE
	R8C/24, 25	Renesas Starter Kit for R8C/25	R0K521256S001BE
	R8C/26, 27	Renesas Starter Kit for R8C/27	R0K521276S001BE
	R8C/2C, 2D	Renesas Starter Kit for R8C/2D	R0K5212D8S001BE

Note: See the following URL for details on the latest lineup http://www.renesas.com/renesas starter kits

- Product contents
- CPU board
- E8a on-chip debugging emulator unit
- Software CD-ROM
- High-performance Embedded Workshop integrated development environment
- Compiler package evaluation version (free of charge)
- E8a emulator debugger
- Flash Development Toolkit evaluation version (free of charge)
- Connecting cable, etc.



Overview of Renesas Starter Kit Park Web Site

http://www.renesas.com/rsk_park

The Renesas Starter Kit Park Web site presents a variety of information on Renesas starter kits equipped with Renesas MCUs. Here you will find product information, downloadable program code (application programs, libraries, and utilities) that can be run on Renesas starter kits, and details on items such as expansion

In future even more items that will assist persons wishing to study or evaluate MCUs using Renesas starter kits will appear on the Web site. Please check back frequently.



M3A-0806

The M3A-0806 is a flash writer that uses standard serial I/O mode 2 (UART mode). It rewrites programs using only four lines (TxD, RxD, GND, and Vcc). If the supplied cable is used, there is no need for an RS-232C driver for the target board. Note that the M3A-0806 does not support rewriting of the data area.

- Package includes flash reprogramming software and a custom serial cable.
- Very economically priced flash writer

Target MCUs

R8C/10 to 19, R8C/1A, R8C/1B, R8C/20 to R8C/29, R8C/2A to R8C/2D, M16C/26A, M16C/28, M16C/29, M16C/62A, M16C/62M, M16C/62P, M16C/6N, M16C/6S, M16C/80, M16C/30P, M32C/83, M32C/84, M32C/85, M32C/87

Operating environment Windows® XP, Windows® 2000

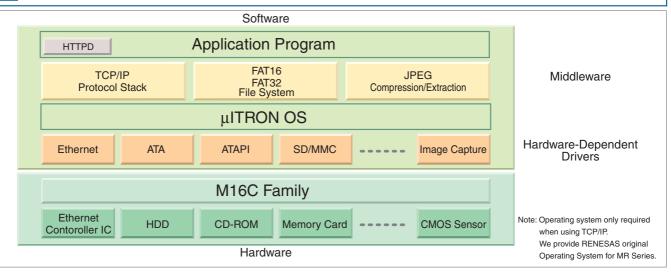
Note: The flash rewriting (Flashstarter) software used by the M3A-0806 is distributed free

The EXE file and source code are available for download from the Renesas Web site. http://www.renesas.com/download



Note: The target board is not included

M16C Middleware



TCP/IP Protocol Stack

Two versions of the standard Internet protocol stack, slim and ultracompact, are available for the M16C family. Both designed to use a minimum of ROM and RAM. Flexible support for a variety of applications.

Features

- Slim version (target MCUs: M16C/62 Group*1)
 - Essential functions and a compact design (uses approx. 33 Kbytes of ROM).
 - Enables protocol processing using the MCU's on-chip memory.
- Ultra-compact version (target MCUs: M16C/Tiny and R8C/Tiny Series)
 The ultra-compact version required no OS (uses approx. 8 Kbytes of ROM) and can be stored in the on-chip memory of the Tiny Series.
 Note: See the lineup of Software Libraries to Support Tiny MCUs on the next page for details
- *1. Compatible with M16C/62A, M16C/62M, M16C/62N, and M16C/62P

Applications

Internet cameras, remote monitoring/control systems, Internetcapable home appliances, etc.

Implementation model

	User ap	plication												
HTTP server	FTP server	DHCP client	SMTP client											
	TCP/IP													
PPP		LAN driver												
OS (not	needed for u	Iltra-compac	t version)											
	Hard	ware												

FAT File System

The FAT file system library provides data compatibility with PCs for various types of memory cards and enables storage of large-volume resources on hard disks to support the increasing popularity of broadband connections.

Features

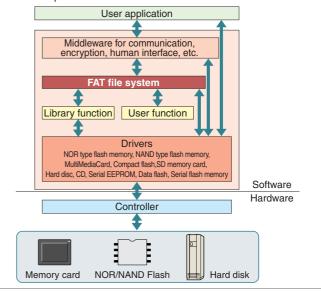
- Support for FAT12, FAT16, VFAT, and FAT32
- Support for multiple drives
- Support for long filenames and Japanese filenames
- Light version available with support for short filenames only (for M32C and M16C)
- Minimal memory usage, fast operation
- Includes sample source code for RAM disk driver

Applications

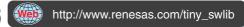
Digital cameras, digital camcorders, hard disk drive video recorders, hard disk drive audio recorders, other PC-compatible data storage devices

Total support from Renesas

Renesas provides developers with total support in the form of drivers for MCU and memory as well as middleware to enable efficient implementation of functions.

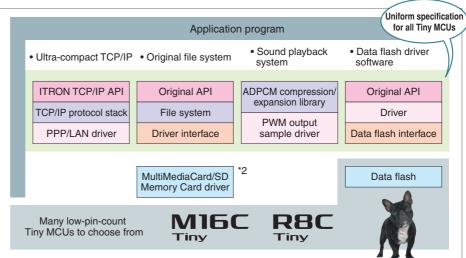


Software Libraries to Support Tiny MCUs http://www.renesas.com/tiny_swlib



Renesas supplies software libraries for evaluation purposes to customers using Tiny Series MCUs. Designed to be compact enough for embedding on a single chip, these programs are compatible with all Tiny MCUs. The software libraries for Tiny MCUs enable developers to create applied solutions for embedded devices essential in today's ubiquitously networked society, for example devices supporting remote operation via a network.

The programs composing the software libraries implement simple functions and are easy to use, making them ideal for use in training and evaluation. They can be embedded in systems that are mass produced,*1 thereby helping bring down the final market cost of the product Feel free to try them out and see what they can do for you.



- *1. Since they are intended for evaluation, these software libraries come with no warranty or support.
- *2. MultiMediaCard and SD Memory Card drivers are sold separately. Development of systems using MultiMediaCard (MMC) or SD Memory Card technology requires purchase of a license. For information on licensing, contact the MultiMediaCard Association or SD Card Association.

Ultra-Compact TCP/IP Protocol Stack

This communication protocol software library achieves very compact size by keeping the number of functions to a bare minimum.

- Small memory requirements: Approx. 8 Kbytes of ROM and 0.5 Kbytes of RAM (in case of R8C/Tiny) (Enables TCP/IP protocol handling using the on-chip memory of a Tiny MCU.)
- · No OS necessary.
- · Conforms to ITRON TCP/IP API standard.
- Includes sample driver for LAN controller (RTL8019AS).
- Includes sample driver for PPP.

Applications

- Remote device control/monitoring using mobile phone packet communication terminal (vehicle position data management, remote equipment malfunction diagnostics, etc.)
- · Security services (communication of information on visitors/intruders to mobile phones, etc.)
- Centralized equipment management in office buildings and factories (management of climate control systems, lighting, sensors, etc.)

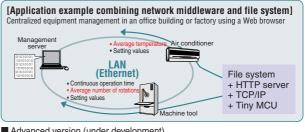
Advanced version

An ultra-compact TCP/IP protocol stack with support for multiple communication terminals and higher data transfer speeds is also

Original File System

The original file system supports storage of measurement data or history data and the reprogramming of internal memory with data stored on memory cards.

- Small memory requirements: Approx. 9.8 Kbytes of ROM and 256 bytes of RAM (in case of R8C/Tiny)
- No OS necessary. File system uses original format.
- FAT file system conversion function provides compatibility with PC data.
- Data storage and data logging on devices of various kinds
- Storage of personal user data on healthcare products, etc.
- Updating of programs and data on memory cards or devices that utilize data

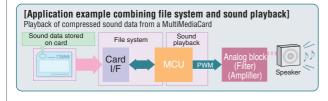


Advanced version (under development) A version of the original file system with extended functionality, such as support for directory and user-defined filenames, is currently under

Sound Playback System

This software enables sound output on any system incorporating a Tiny MCU. It can be used to add true sound output functionality to devices that previously only provided visual indications or beeps

- Sound compression and expansion using exclusive ADPCM format.
- Small memory requirements: Approx. 0.4 Kbytes of ROM and 20 bytes of RAM (in case of R8C/Tiny)
- High-speed expansion processing optimized for each MCU Enables expansion and playback by R8C/Tiny operating at 4 MHz of audio sampled at 8 kHz.
- Includes sound compression/expansion utility (PC application) for compressing recorded sound data (in WAV format) on a PC. (The compressed data can then be used by the MCU.)
- · Includes sample driver for PWM output.



Data Flash Driver Software

This block device driver enables the storing of data in data flash on R8C/Tiny and M16C/Tiny MCUs. It simplifies the task of building a data management system using data flash.

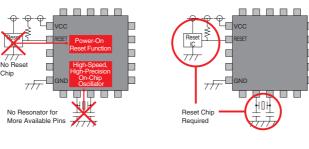
- Small memory requirements: Approx. 3 Kbytes of ROM and 100 bytes of RAM (R8C/Tiny, three data, including stack)
- Capable of handling different data sizes.
- Max. data update count: 1,000,000 times or more (depending on number and size of data units and the update count)
- Old data can be restored if system shutdown occurs during data undate.
- Drive function interrupt/restart supported. This prevents the driver from monopolizing the CPU for an excessive length of

Demo Sets

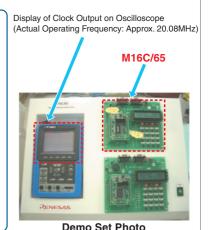
M16C/65 Demo Set

Description of New Functions — High-Speed, High-Precision On-Chip Oscillator and Power-On Reset

- 1. The high-speed on-chip oscillator (40MHz oscillation frequency, divided by 2) functions as the CPU clock. (The clock signal waveform is output to an oscilloscope, demonstrating that it is equivalent to an external resonator.)
- 2. The power-on reset function eliminates the need for an external reset chip (thereby reducing costs).



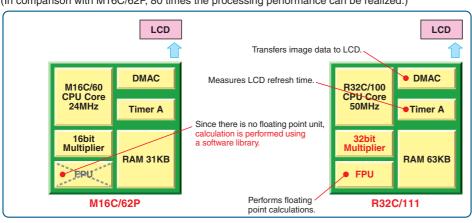
M16C/65 M16C/62P



R32C/111 Demo Set

A demonstration of high-speed arithmetic processing employing a 32-bit multiplier and single-precision FPU.

(In comparison with M16C/62P, 80 times the processing performance can be realized.)



Operations Processed float x = 0.0, y = 0.0, x1, y1; for(int n=0; n < 2000; n++){ \(\text{iff the bound of the b



Demo Set Photo

Audio Decompression/ Audio Output Demo Set(R8C/25)

- Decompresses compressed audio data stored in the MCU's on-chip flash memory and produces PWM output for audio playback. The data
- compression format is ADPCM.

 The demo kit consists of an audio board (board with an amplifier, LPF, and compact speaker mounted on it) connected to the Renesas Starterkit for R8C/25.



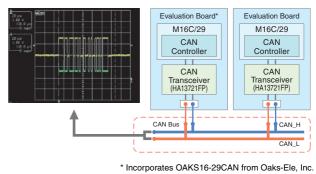
Industrial CAN Communication Demo Set (M16C/29)

Features

• Direct measurement of CAN communication waveforms on the CAN bus using M16C/29 starter kit

CAN Controller Features

- Communication speed: Max. 1Mbps Bus length: 40m/1Mbps
- Protocol standard: Ver. 2.0B
- Hardware synchronization/resynchronization



Functions/Applications

Applications

		A	V/Hor	ne Us	se	ı	PC Re	elated		Automo	tive (App	licable P	roducts A	vailable)				. Ideal . Sultable
Series	Group	Audio	Video	Appliances	Amusement	PC	Storage	Imaging	Display	Engine	Driving Safety	Body/Chassis	Navigation/ Information	Car Audio	Mobile	Networking	Industrial/Security	Notes
R32C/100	R32C/160, 161**																	
	R32C/156, 157**									•								
	R32C/151, 152, 153**																	
	R32C/133, 134 **																	
	R32C/120, 121 **																	
	R32C/116, 117, 118**	•																
	R32C/111**	•					•										•	
M32C/80	M32C/8B**			•			•											
	M32C/8A																	
	M32C/88	•	•			•	•			•							•	
	M32C/87																	Large-capacity flash applications
	M32C/85																	
	M32C/84																	
	M32C/83	•	•		•	•	•		•	•							•	
	M32C/82																	
	M32C/81														•			
	M32C/80	•																
M16C/80	M16C/80	•	•		•	•	•		•	•							•	
M16C/60	M16C/6S																	
	M16C/6N																	
	M16C/6V																	
	M16C/6H																	
	M16C/63 **																	
	M16C/64 **																	
	M16C/65 **																	
	M16C/62P																	
	M16C/62A																	
	M16C/62N		•				•										•	
M16C/30	M16C/30P																	
	M16C/39P																	
M16C/20	M16C/2N															•		
	M16C/24						•											
M16C/Tiny	M16C/29																	
	M16C/28																	
	M16C/26A																	
M16C/10	M16C/1N																	
																	7	★★: Under Develpment

Applications

: Ideal : Suitable AV/Home Use PC Related Automotive (Applicable Products Available) Industrial/Security Safety Body/Chassis Amusement Networking Car Audio Series Group Notes Imaging Driving Display Engine Appliar Mobile Audio Stor PC R8C/Tiny R8C/18 R8C/19 R8C/1A R8C/1B R8C/20 R8C/21 R8C/22 R8C/23 R8C/24 R8C/25 R8C/26 R8C/27 R8C/28 R8C/29 R8C/2A R8C/2B R8C/2C R8C/2D R8C/2E R8C/2F R8C/2G • R8C/2H R8C/2J R8C/2K R8C/2L R8C/32A** R8C/33A** R8C/35A**

★★: Under Develpmen

Package Photos



PLSP0020JB-A (Previous code: 20P2F-A) (0.65mm pitch/4.4mm×6.5mm)



PLQP0052JA-A (Previous code: 52P6A-A) (0.5mm pitch/10mm×10mm)



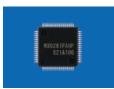
PRDP0020BA-A (Previous code: 20P4B) (20mil/6.3mm×19.0mm)



PTLG0064JA-A (Previous code: 64F0G) (6mm×6mm)



PWQN0028KA-B (Previous code: 28PJW-B) (5mm×5mm)



PLQP0064KB-A (Previous code: 64P6Q-A) (0.5mm pitch/10mm×10mm)



PLQ0032GB-A (Previous code: 32P6U-A) (0.8mm pitch/7mm×7mm)



PLQP0064GA-A (Previous code: 64P6U-A) (0.8mm pitch/14mm×14mm)



: Ideal : Suitable

PLQP0048KB-A (Previous code: 48P6Q-A) (0.5mm pitch/7mm×7mm)



PLQP0080KB-A (Previous code: 80P6Q-A) (0.5mm pitch/12mm×12mm)



PRQP0080JA-A (Previous code: 80P6S-A) (0.65mm pitch/14mm×14mm)



PLQP0128KB-A (Previous code: 128P6Q-A) (0.5mm pitch/14mm×20mm)



PTLG0085JB-A (Previous code: 85FOG) (7mm×7mm)



(Previous code: 144P6Q-A) (0.5mm pitch/20mm×20mm)



PTQP100LB-A (Previous code: 100PFB) (0.4mm pitch/12mm × 12mm/1mm Thickness)



(Previous code: 100P6Q-A) (0.5mm pitch/14mm×14mm)



PRQP0100JB-A (Previous code: 100P6S-A) (0.65mm pitch/14mm×20mm)

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Functions/Applications

Standard Functions

		Series					R32C/100								M22C/R0	W132 C/00				0000	M16C/80				M16C/60						M16C/30)))	M16C/20		M16C/Tiny	
		Group		R32C/160, 161 **	R32C/156, 157 **	R32C/151, 152, 153 **		R32C/120, 121 **	R32C/116, 117, 118 **	R32C/111**	M32C/8B **	M32C/8A	M32C/88	M32C/87	M32C/85	M32C/84	M32C/83	M32C/82	M32C/81	M32C/80	M16C/80	M16C/6N	M16C/6V	M16C/6H	M16C/63**	M16C/64**	M16C/65**	M16C/62P	M16C/62A	M16C/62N	M16C/30P	M16C/39P	M16C/24	M16C/29	M16C/28, 28B	M16C/26A, 26B
	CPU	Multipli			•	•														•															•	
			cumulate instruction																																	
		Barrel s	hitter	•	•			•	•			•	•				•	•														_			_	
or O, memory bus lunctions	DMAA	FPU DMAC																																		
5	DMA	DTC/DI	441														•		•										•		•					
5	On abin	RAM	VIAII														-																			
2	On-chip memory	Flash n	nemory																		#															
2	inemory	Mask F																																		
5		One-tin	ne PROM																																	
-		QzRON																														\neg				
		ROM L																																		
ĵ		Data fla																																	•	
5			n security																	(•					
	External bus		ata separate buses																	•		•														
	extensions		lata multiplex bus		•	•	•																													
		DRAM	controller																	(
2	Clocks	PLL																																		
supply infoliories		Subclo																																		
5		On-chip	oscillator																																	
<u>,</u>			n stop detection																																	
2		Frequenc	cy divider circuit																																	
0			onsumption mechanism																	•																
2	Voltage		ge detection/LVD																																	
CIOCK POWER	detection		on reset																																	
3		5V																																		
	voltage	3V		•	•	•	•		•								•			•															•	
	A/D converters	8-bit																																		
		10-bit		•	•	•	•	•	•			•	•				•	•	•			•			•				•		•					•
		S&H																																		
		8-bit		•	•	•	•	•	•	•		•	•		•		•	•	•			•			•			•	•	•		_				
	Timers	Input ca															•															_				
			compare		-												•		•																	
		bit	16-bit PWM output																		#															
			Real-time ports														_						_						_		_	_				
			Event counter																																	
			2-phase encoder input																																	
			3-phase inverter output																																	
	Real-time cl		o pridoc invertor odiput																																	
	Watchdog	00.1																																		
	Serial I/F	Clock non-	synchronous serial																																	
Periprieral lunctions			nchronous serial	•		•		•	•	•		•	•	•	•		•	•	•				•	•	•	•			•	•	•		•		•	
5	Advanced	I ² C bus															•			•											•			0,	0.	
5	communication	IEBus												•						•		•							•	•					• (
ਰ		Smart o	ard/SIM																	•																
D		Synchronous	serial communication																													\Box				П
=		unit/Special																																		
ט		CAN																																		
		LIN																		(•														
		Flex Ra	y																																	
		HDLC																																		
		USB Fu	ınction																																	
		IrDA												•																						
	Display	OSD																																		
		Data sli																																	_	
			display tube controller																																	
	Operation	CRC		•	•	•	•		•											•		•						•		•	•					
	functions		version	•			•		•																										4	
	I/O ports		rrent drive ports																																	
			open-drain ports														•	•																		
			oull-up resistors					•	•								•						0		•		•	•	•							
					-	-																											_			-
		On-chip	debugging d flash rewriting		•	•	•		•	•							•												•	•	0	4	0	•		_

Standard Functions

		Series	;													F	R8C/	/Tin	у												
		Group		R8C/18	R8C/19	R8C/1A	R8C/1B	R8C/20	R8C/21	R8C/22	R8C/23	R8C/24	R8C/25	R8C/26	R8C/27	R8C/28	R8C/29	R8C/2A	R8C/2B	R8C/2C	R8C/2D	R8C/2E	R8C/2F	R8C/2G	R8C/2H	R8C/2J	R8C/2K	R8C/2L	R8C/32A**	R8C/33A**	R8C/35A**
	CPU	Multipli		•	•	•		•		•		•						•	•				•						•		
		Multiply-a Barrel	accumulate instruction																												
S	DMA	DMAC	Silitei																												
CPU, memory bus functions		DTC/D	MAII																												
nct	On-chip	RAM																													
tu s	memory	Flash n	nemory																•												
snq		Mask F																													
Š		QzRON	ne PROM																												
JE S		ROM L																													
me		Data fla																													
Ď,			ash(with BGO)																												
2		Prograi	m security																												
	External bus		data separate buses																												
	extensions		data multiplex bus																												
	Olaska	PLL	controller																												
supply functions	Clocks	Subclo	ck/RTC											Note	Note	Note	Note														
ıncti			o oscillator																												
y fu			ion stop detection	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				•	•		•	
ldd		Freque	ncy divider circuit																												
ร		Low-power-consumption mechan age Low-voltage detection/L								•																					
power	Voltage																														
a g	detection		on reset	•	•	•		•	•	•		•		•	•	•	•	•	•				•								
Slook	Operating voltage	5V 3V		•	•																										
		8-bit																													
	7 (D CONVOICOS	10-bit																													
		S&H				•	•	•	•	0	•	•	•	•	•	•	•	•	•	•		•	•					•	0	•	
	Comparato																														
	D/A converter	8-bit																													
	Timers	Input ca		•	•	•		•	•	•	•	•	•		•	•		•	•			•	•		•	•			•	•	
			compare 16-bit	•																										•	
			PWM output																												
			Real-time ports																												
			Event counter																												
			2-phase encoder input																												
			3-phase inverter output																												
	Real-time c	lock										•	•		•	•	•	•	•					•	•					•	
Peripheral functions	Watchdog Serial I/F	Clock no	n-synchronous serial		•	•	•		•		•	•	•	•				•				•		•					•		
E.	Seliai I/F		ynchronous serial																												
fu	Advanced	I ² C bus				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•								•	•	
<u>ra</u>	communication	IEBus																													
he			card/SIM																												
erip			s serial communication unit																												
ص		CAN								•																					
		LIN HDLC																													
		USB F	ınction																												
		IrDA	unouon																												
	Display	OSD																													
		Data sl																													
			nt display tube controller																												
	Operation	CRC																													
	functions		nversion											Note	Note	Note	Note														
	I/O ports	N-chann	eurrent drive ports lel open-drain ports																												
			pull-up resistors	•													•					•	•	•		•		•			
	On-chip debugging		o debugging	•						•	•	•					•					•	•			•		•		•	
	functions	On-boa	rd flash rewriting	•																											
	functions On-board flash rewriting																									*	r★: l	Jnde	r Dev	/elopi	ment

Flash Memory Versions

Memory Options (ROM/RAM)

								RAM siz	e (bytes)						
		256	384	512	768	1K	1.5K	2K	2.5K	3K	4K	5K	6K	7K	8K
	2K	R8C/2J	/ D00/40												
	4K	R8C/2H	R8C/18 R8C/1A R8C/2J												
	4K+2K		R8C/19 R8C/1B												
	4K+4K			R8C/32A** R8C/33A**											
	8K		R8C/2H	R8C/18 R8C/1A R8C/26 R8C/28 R8C/2E		R8C/2K									
	8K+2K			R8C/19 R8C/1B R8C/27 R8C/29 R8C/2F		R8C/2L									
	8K+4K					R8C/32A** R8C/33A**									
	12K				R8C/18 R8C/1A										
	12K+2K				R8C/19 R8C/1B										
	16K			R8C/2G		R8C/18 R8C/1A R8C/24 R8C/26 R8C/28 R8C/2E	R8C/2K								
	16K+2K					R8C/19 R8C/1B R8C/25 R8C/27 R8C/29 R8C/2F	R8C/2L								
	16K+4K						R8C/32A** R8C/33A** R8C/35A**								
ytes)	24K 24K+2K					R8C/2G	R8C/26 R8C/27	R8C/24 R8C/25							
size (b	24K+4K					M16C/26A	1100/21	R8C/33A**							
ROM	24K 24K+2K 24K+4K					R8C/2G	R8C/26	R8C/20 R8C/22 R8C/24							
	32K+2K						R8C/27	R8C/21 R8C/23 R8C/25							
	32K+4K							NOC/25	R8C/33A** R8C/35A**						
	48K								R8C/20 R8C/22 R8C/24 R8C/2A R8C/2C						
	48K+2K								R8C/23 R8C/23 R8C/25 R8C/2B R8C/2D						
	48K+4K 64K							(M16C/26A)		R8C/20 R8C/22 R8C/24 R8C/2A R8C/2C	M16C/28				M16C/62N
	64K+2K									R8C/21 R8C/23 R8C/25 R8C/2B R8C/2D					
	64K+4K							M16C/26A		M16C/1N	M16C/28 M16C/62P	Dooles.		Page	
	96K											R8C/20 R8C/22 M16C/30P		R8C/2A R8C/2C	
	96K+2K											R8C/21 R8C/23		R8C/2B R8C/2D	Megains
	96K+4K											M16C/30P			M16C/28 M16C/29
													7	t★: Under [l Development

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Memory Options (ROM/RAM)

											RAM siz										
		2K	2.5K	3K	4K	5K	6K	7K	7.5K	8K	10K	12K	16K	18K	20K	24K	31K	32K	40K	48K	63K
	128K					M16C/30P	R8C/20 R8C/22		R8C/2A R8C/2C		M16C/62A M16C/62N M16C/80										
	128K+2K						R8C/21 R8C/23		R8C/2B R8C/2D		m100/00										
	128K+4K					M16C/6N	(100,20)		(400,-2)		M16C/62P	M16C/28									
						M16C/30P						M16C/29 R32C/120**									
	128K+8K											R32C/121**									
	12011+011											R32C/160** R32C/161**									
												R32C/120**									
	128K+12K											R32C/121**									
												R32C/160** R32C/161**									
	160K					M16C/30P						M16C/30P									
	192K 192K+4K						M16C/30P					M16C/30P									
							(11100/001)					M16C/30P			M16C/62A						
	256K														M16C/62N M16C/80						
	256K+4K										M16C/6N				M16C/62P						
															R32C/120**			M32C/8B** R32C/118**	R32C/111**		R32C/111**
															R32C/121** R32C/133**			N32U/110**			
	256K+8K														R32C/134**						
															R32C/156** R32C/157**						
															R32C/160**						
															R32C/161** R32C/120**						
															R32C/121**						
															R32C/133** R32C/134**						
	256K+12K														R32C/156**						
															R32C/157**						
															R32C/160** R32C/161**						
	256K+24K												M16C/64*		M16C/65**						
es)	00017 - 417													M32C/88	M16C/63**	M32C/84					
ROM size (bytes)	320K+4K													M32C/88		M32C/85 M32C/84	M16C/62P				
Size	384K+4K													IIIOZO/00		M32C/85	M16C/6N				
Š																M32C/87 R32C/121**			(R32C/111**)		R32C/111**
_																R32C/133**			R32C/116**		TIOLO TT
	384K+8K															R32C/134** R32C/156**			R32C/117**		
																R32C/157**					
																R32C/121** R32C/133**					
	384K+12K															R32C/134**					
																R32C/156**					
	512K															R32C/157**	M32C/83				
	E40K : 4K													M32C/88		M32C/84	M16C/62P				
	512K+4K															M32C/85	M16C/6N M32C/87				
																		R32C/121**	R32C/111**		R32C/111**
	512K+8K																	R32C/133** R32C/134**	R32C/116** R32C/117**		
																		R32C/156**			
																		R32C/157** R32C/121**			
	E401/ 12::																	R32C/133**			
	512K+12K																	R32C/134** R32C/156**			
	E 1016 - 1																/m	R32C/157**			
	512K+24K																M16C/64**			R32C/116**	
	640K+8K																			R32C/117**	
	768K+4K																			R32C/118** M32C/87	
																				R32C/151**	
	768K+8K																			R32C/152** R32C/153**	
																				R32C/151**	NIVEW 110 M
	768K+16K																			R32C/152** R32C/153**	
	1MB+4K																			M32C/87	
	1MB+8K																			R32C/151** R32C/152**	R32C/116** R32C/117**
	I IVID+di\																			R32C/153**	R32C/118**
	1MD : 1017																			R32C/151**	
	1MB+16K																			R32C/152** R32C/153**	
																4	· Now P	roduct	4 + · Lln	dor Dovo	lonmont

Flash Memory Versions

Memory Options (Pin count)

							Pin count					
T		20	32	42	48	52	64	80	85	100	128	144
	2K	R8C/2J										
		R8C/18										
	4K	R8C/1A										
		R8C/2H										
-		R8C/2J										
	4K+2K	R8C/19										
-	4K+4K	R8C/32A**	R8C/33A**>									
-		R8C/18	R8C/26									
		R8C/1A	R8C/2E									
	8K	R8C/28	R8C/2K									
		R8C/2H										
		R8C/19	R8C/27									
	8K+2K	R8C/1B	R8C/2F									
		R8C/29	R8C/2L									
	8K+4K	R8C/32A**	R8C/33A**									
	12K	R8C/18										
L	1210	R8C/1A										
	12K+2K	R8C/19										
		R8C/1B										
		R8C/18	R8C/26			R8C/24						
	16K	R8C/1A	R8C/2E									
		R8C/28	R8C/2G R8C/2K									
H		DOC/10				R8C/25						
	16K+2K	R8C/19	R8C/2F			NOU/23						
	TORTER	R8C/29	R8C/2L									
H	16K+4K	R8C/32A**	R8C/33A**			R8C/35A**						
-	-	TIOUIDER	R8C/26			R8C/24						
	24K		R8C/2G			1100/21						
	24K+2K		R8C/27			R8C/25						
	24K+4K		R8C/33A **	M16C/26A	M16C/26A	R8C/35A**						
es			R8C/26		R8C/20	R8C/24						
(D)	32K		R8C/2G		R8C/22							
size	32K+2K		R8C/27		R8C/21	R8C/25						
≥	32N+2N				R8C/23							
<u>~</u> [32K+4K					R8C/35A**>						
	48K				R8C/20	R8C/24	R8C/2A	R8C/2C				
L					R8C/22							
	48K+2K				R8C/21	R8C/25	R8C/2B	R8C/2D				
L				MARKET	R8C/23		N/AA'AA	14/00/00	N/AD/A			
-	48K+4K			M16C/26A			M16C/28	M16C/28	M16C/28			
	64K				R8C/20	R8C/24	R8C/2A	R8C/2C				
H					R8C/22	D00/05	DOC/OD	DOG/OD				
	64K+2K				R8C/21 >	R8C/25	R8C/2B	R8C/2D				
-				MISCISSA			M16C/28	M16C/28	M16C/28			
	64K+4K			<m16c 26a=""></m16c>	M16C/26A >		< M16C/28 >	M16C/28 >	<u>M16C/28</u>			
H					R8C/20		R8C/2A	R8C/2C		M16C/30P		
	96K				R8C/22		HOULE	1100/20		111100/001		
	0014 514				R8C/21		R8C/2B	R8C/2D				
	96K+2K				R8C/23							
	0017 117						M16C/28	M16C/28	M16C/28	M16C/30P		
	96K+4K						M16C/29	M16C/29				
					R8C/20		R8C/2A	R8C/2C		M16C/30P		M16C/80
	128K				R8C/22					M16C/62A		
	1201									M16C/62N		
L										M16C/80		
	128K+2K				R8C/21		R8C/2B	R8C/2D				
					R8C/23							
							M16C/28	M16C/28		M16C/30P		
	128K+4K						M16C/29	M16C/29		M16C/62A		
L								M16C/62P		M16C/62N		
	128K+8K							R32C/160**		R32C/120**		
-								R32C/161 **		R32C/121**		
	128K+12K							R32C/160**		R32C/120**		
-								R32C/161 **		R32C/121**		
		1			-							er Developmen

Memory Options (Pin count)

						Pin count				
		42	48	52	64	80	85	100	128	144
	160K							M16C/30P		
	192K							M16C/30P		
	192K+4K							M16C/30P		
								M16C/62A		M16C/80
	256K							M16C/30P		
	20010							M16C/62N		
								M16C/80		
	256K+4K							M16C/62P	M16C/62P	
	2501(141(M16C/6N		
					R32C/111**	R32C/111**		R32C/111**		R32C/156**
	256K+8K					R32C/160**		R32C/120**		R32C/157**
	2501(+01(R32C/161 **		R32C/121**		M32C/8B **
								M32C/8B **>		
						R32C/160**		R32C/120**		R32C/133**
	256K+12K					R32C/161 **		R32C/121**		R32C/134**
	2001(1121(R32C/156**
										R32C/157**
	256K+24K							M16C/64*		
	2501(+241(M16C/65**		
								M32C/84		M32C/84
	320K+4K							M32C/85		M32C/85
								M32C/88		M32C/88
								M16C/62P	M16C/62P	M32C/84
								M16C/6N	M16C/6N	M32C/85
	384K+4K							M32C/84		M32C/88
	304N+4N							M32C/85		M32C/87
								M32C/87		
								M32C/88		
								R32C/111**		R32C/116**
	0041/.01/							R32C/116**		R32C/117**
	384K+8K							R32C/117**		R32C/156**
								R32C/121**		R32C/157**
								R32C/111**		R32C/133**
								R32C/121**		R32C/134**
	384K+12K									R32C/156**
<u></u>										R32C/157**
(bytes)	512K							M32C/83		M32C/83
٩								M16C/62P	M16C/62P	M32C/84
size								M16C/6N	M16C/6N	M32C/85
×								M32C/84		M32C/88
ROM	512K+4K							M32C/85		M32C/87
								M32C/87		
								M32C/88		
								R32C/111**		R32C/156**
								R32C/116**		R32C/157**
	512K+8K							R32C/117**		R32C/116**
								R32C/121**		R32C/117**
								R32C/121**		R32C/133**
								(R32C/134**
	512K+12K									R32C/156**
										R32C/157**
	512K+24K							M16C/64**		(1020)101
								R32C/116**		<r32c 116**=""></r32c>
	640K+8K							R32C/117**		R32C/117**
								R32C/118**		R32C/118**
	768K+4K							M32C/87		M32C/87
								R32C/116**		R32C/116**
								R32C/117**		R32C/117**
								R32C/118**		R32C/118**
	768K+8K									R32C/151 **
										R32C/152**
										R32C/153**
										R32C/151 **
	768K+16K									R32C/152**
										R32C/153**
	1MB+4K							M32C/87		M32C/87
								R32C/116**		R32C/116**
								R32C/117**		R32C/117**
								R32C/118**		R32C/118**
	1MB+8K									R32C/151 **
										R32C/152**
										R32C/153**
										R32C/151 **
	1MB+16K									R32C/152**
										R32C/153**
										11020,100
								→ · Now	Product ++·I	Jnder Development

Mask Versions

Memory Options (ROM/RAM)

	1K	2K	3K	4K	5K	6K	RAM size	10K	12K	16K	18K	20K	24K	31K	32K
	110	LIV	M16C/62P	711	JIC	M16C/30P	M32C/80	M16C/80	M32C/8A	IOIC	1010	M16C/62P	M16C/80	M16C/62P	M32C/8B
DOML			WI 100/02F			WITOC/30F	WI320/00	M16C/62P	WI32C/OA			WITOC/02F	W100/60	WITOC/OZF	W320/0D
ROM Less															
	(11/00/00)							M32C/84							
24K	M16C/26A														
32K	M16C/1N		M16C/62A												
48K		M16C/26A		M16C/62P											
		M16C/26A	M16C/1N	M16C/28				M16C/62A							
64K				M16C/29											
				M16C/62A											
				M16C/62P											
					M16C/30P		M16C/28	M16C/62A							
96K					M16C/62A		M16C/29								
					M16C/62P										
					M16C/30P			M16C/62A	M16C/28						
					M16C/39P			M16C/62N	M16C/29						
					M16C/62A			M16C/62P	M16C/62N						
128K					M16C/6N			M16C/80	M32C/81						
								M32C/81							
								M32C/84							
160K						M16C/30P									
						M16C/30P			M16C/62P	M16C/6N					
192K						M16C/39P									
								M16C/6N	M16C/62P			M16C/62A			
												M16C/62N			
												M16C/62P			
256K												M16C/6N			
250K												M16C/80			
												M32C/84			
										M16C/62P		M32C/85	Micologe	Micology	
										WI10C/02P			M16C/62P	M16C/62P	
320K													M32C/82		
													M32C/84		
													M32C/85		
										M16C/62P			M16C/62P	M16C/62P	
													M32C/82	M32C/82	
384K													M32C/84		
													M32C/85		
													M32C/87		
512K														M32C/87	

★★: Under Development

Memory Options (Pin count)

				Pin o	count			
		42	48	64	80	100	128	144
	ROM Less					M16C/62P M16C/80 M32C/8A M32C/80		M16C/80 M32C/84 M32C/8B**
						M32C/84 M32C/8B**		
	24K	M16C/26A	M16C/26A					
	32K		M16C/1N		M16C/62N	M16C/62A		
	48K	M16C/26A	M16C/26A		M16C/62P	M16C/62P		
	64K	M16C/26A	M16C/26A M16C/1N	M16C/28 M16C/29	M16C/28 M16C/29 M16C/62A M16C/62P	M16C/62A M16C/62P		
	96K			M16C/28 M16C/29	M16C/28 M16C/29 M16C/62A M16C/62P	M16C/30P M16C/62A M16C/62P		
ROM size (bytes)	128K			M16C/28 M16C/29	M16C/28 M16C/29 M16C/62A M16C/62P	M16C/30P M16C/39P M16C/62A M16C/62N M16C/62P M16C/6N M16C/80 M32C/81		M32C/81 M32C/84
	160K					M16C/30P		
	192K					M16C/30P M16C/39P M16C/62P M16C/62N	M16C/62P M16C/62N	
	256K				M16C/62A M16C/62N	M16C/62N M16C/62N M16C/62P M16C/6N M16C/80	M16C/62N	M16C/80
	320K					M16C/62P M32C/82 M32C/84 M32C/85	M16C/62P	M32C/82 M32C/84 M32C/85
	384K					M16C/62P M32C/82 M32C/87	M16C/62P	M32C/82 M32C/87
	512K					M32C/87		M32C/87

★★: Under Development

• Specifications (R32C/100 Series)

Group			R32C	/111			R32C/116																	
	ROM (Bytes)	256K+8K	384K	+8K			512k	(+8K			640K	+8K	768	(+8K		1024	K+8K							
	RAM (Bytes)	40K 63K	40K	63K	40K	63K	0.1	40	K		48				631									
Memory	ROM Type*1								F															
	Data Flash/E2 Data Flash Program Security		8K (Data	a Flash)		Voc	/ID Code	o Chook	Function,		Data Flas			e 1000ti	mes)									
	CPU					168	(ID Cour	e Grieck	R32C/10		ue Frote	ct Fullet	1011)											
	Basic Instructions								10															
CPU	Minimum Instruction Execution Time (ns)								20 (@5								10-bit							
Cro	Multiplier								32×32															
	Multiply-Accumulate Instruction							-	32×32+0							63K es) n be selected (8/ 10-bit×26 10-bit×26 9 (Intelligent I/O) 24 (Timer A, Intelligent I/O) 53 11 48000000000000000000000000000000000								
	Barrel Shifter DMAC (Channels)								Ye 4															
DMA	DTC/DMAC II						DMACI	(Starts I	by all peri		nterrupt f	actors)												
	Address Space (Bytes)							(64															
External Bus	External Bus Interface					Suppor	t for inse	ertion of	wait state	es, Outp	uts 4 chi	-select	signals											
Expansion	Bus Structure	Selectable fr					Se	electable	from Sep	arate bu	ıs, Multip	ex bus.	Data Bus	Width o	an be se	lected (8	/16/32-k	bit)						
	DRAM Controller	Data Bus W	idin can b	e select	eu (o/ 10-b	11.)										-								
	Clock Generation Circuit					4 0	circuits (Main clor	ck, PLL, S	ub-clock	c. on-chin	oscillat	or)											
	PLL								Ye		.,		,											
	Subclock								Ye															
Clock	RTC								_															
	On-Chip Oscillator	———	Ye	es					Ye		Yes	Low spe	ed: 125	kHz)										
	Oscillation Stop Detection Frequency Divider								1/n (n =															
	Power Save								Wait/															
Power Supply	Power-On Reset/POR								_															
Voltage Detection								,	Yes (Low	voltage														
A/D.O	Resolution×Channels			10-bi	t×26						10-bi	×34			10-b	it×26	10-b	it×34						
A/D Converter	Sample and Hold								Ye															
D/A Converter	Multi-Channel Sample and Hold Resolution × Channels								8-bit															
2,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	8-bit																							
	16-bit							11	1 (Timer A	, Timer	B)													
	Input Capture								16 (Intellia															
	Output Compare		1	9 (Intell	igent I/O)						24 (Intelli	gent I/O)				x26 10-bit x26 10-bit x26 10-bit x27 11-bit x28 12-bit x29 (Tin x29 (T							
Timer	PWM Output	I	24 (Ti	imer A, I	ntelligent I	I/O)				29 (1	imer A, I	ntelligen	t I/O)		24 (T	imer A,		imer A,						
	Real-Time Port								3 (Intellig	ent I/O)					intollig	0110 17 07	Intollia	,one 1, 0,						
	Event Counter								1 (Timer A		B)													
	2-Phase Encoder Input								er A)+2 (
	3-Phase Inverter Control				1 (s	hared v	with Time	er A4, Tir	ner A1, T		Timer B	2, Dead t	time Time	er)			10-bit 1							
Watchdog Tin		-							1															
Serial Interface	Clock Sync./ Clock Async. Clock Sync. Only								9 (UA 1 (Intellig															
Octial interface	Clock Async. Only								T (IIICOIII)															
I ² C-bus			7 (UA	ART)							8 (U	RT, Mul	ti master	· I ² C)		(Intelligent I/O) 24 (Intelligent I/O) 29 (Tim								
IEBus								8 (l	JART, Inte	elligent	I/O)													
Smart Card/S		l							7.01	DT)														
Synchronous Serial C	Communication Unit/Special Serial I/O Channels								7 (U															
CAN	Message Box (Numbers)																							
IrDA	moodage Don (italiaeie)																							
CRC Calculati	ion Circuit							1 (CRC	-CCITT (X	16+X12+	·X ⁵ +1))													
X/Y Converte									Ye															
	Input Only (Numbers)	-					_		2															
	CMOS I/O (Numbers)		82				8				12													
I/O Ports	N-Channel Open Drain Port (Numbers)	I	2	:			(prograi	6 mmable)			5 (progran	o nmable)			(progra	immable)	(progra	อ6 ammable						
	High Current Drive Port								_															
	Pull-Up Resistor		85				5	3			8							89						
External Inter				1	1						1-	4				1	1	14						
Debugging Function	On-Chip Debug On-Board Flash Program								Ye															
	ROM Correction Function	1							Ye															
Other Functions	Others		3V, 5V in	nterface								5V torel	ant input											
Operating Fre	equency/Supply Voltage							5	50MHz/3.			5.51												
Operating An	mbient Temperature (°C)								-40 t	o 85														
		ı																						
		ı		•	¥.						4					Y		Ą						
		I		5	2						Σ					꽃		₹						
Pankaga		I		Ş	ž						4					ĕ		4						
Package		ı		Š	2						Ğ					2	1	2						
Package		,		,	PLGP0100KB-A						PI 0P0144KA <u>.</u> A					ក្ត		ă						
Package											0							_						
Package																								
Package																								
Package		* *	*	ž	ž	ž	ž	ž.	ž I	ž	ž	ž	ž	ž.	ž	<u>*</u>	ž							
Package		* * *	±B*	₽8**	* # # # # # # # # # # # # # # # # # # #	¥*	₽B * *	** B±	**0	**0	+₽*	**0±	÷D**	₽D**	* * # # # # # # # # # # # # # # # # # #	** ## **	₽D**	₹* G						
Package Part No.		4DFB** 0DFB**	5DFB**	1DFB**	6DFB**	2DFB**	6DFB**	6PFB**	6DFD**	6PFD**	7DFD**	7PFD**	8DFD**	8PFD**	9DFB**	9PFB * *	9DFD**	9PFD**						
		1114DFB** 1110DFB**	1115DFB**	1111DFB**	4116DFB**	4112DFB**	1166DFB **	1166PFB**	1166DFD**	1166PFD**	1167DFD**	1167PFD**	1168DFD**	1168PFD**	1169DFB**	1169PFB**	1169DFD**	1169PFD**						
		R5F64114DFB**	R5F64115DFB**	R5F64111DFB**	R5F64116DFB**	R5F64112DFB**	R5F64166DFB**	R5F64166PFB**	R5F64166DFD**	R5F64166PFD**	R5F64167DFD**	R5F64167PFD**	R5F64168DFD**	R5F64168PFD**	R5F64169DFB**	R5F64169PFB**	R5F64169DFD**	R5F64169PFD**						

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

• Specifications (R32C/100 Series)

Group						R320	C/117									R320	C/118								
	ROM (Bytes)	5	12K+8		640k	(+8K	768	(+8K		1024	K+8K		640k	(+8K	768	+8K		1024	K+8K						
	RAM (Bytes)		40K		48	BK			6	3K			48	3K			6	3K							
Memory	ROM Type*1							OIC (D	FI		F /	- 4000													
ŀ	Data Flash/E2 Data Flash Program Security						Ves (I				am /eras			oction)											
	CPU						100 (1	D OOGC			00 core		toot i ui	iotionij											
	Basic Instructions									10	08														
CPU	Minimum Instruction Execution Time (ns)										OMHz)														
0.0	Multiplier										2 → 64														
	Multiply-Accumulate Instruction Barrel Shifter										64 → 64 es	+				(16/32-bit) 10-bit×26 10-bit×									
	DMAC (Channels)										‡														
DMA	DTC/DMAC II						D	MACII (Starts b		ipheral i	interrup	t factor	s)											
	Address Space (Bytes)										ŀМ														
External Bus	External Bus Interface										es, Outp														
Expansion	Bus Structure DRAM Controller				Select	able fro	m Sepai	rate bus	s, Multip	ex bus,	Data Bu	s Width	can be	selecte	d (8/16/	32-bit)									
	Clock Generation Circuit						4 cir	cuits (M	lain cloc	k. PLL. :	- Sub-cloc	k. on-ch	nin oscil	lator)											
	PLL						4 011	ourto (iii	uni oloc		es	nt, 011 01	iip oooii	utorij											
	Subclock										es														
Clock	RTC																								
Olock	On-Chip Oscillator								Yes		eed: 125	kHz)													
	Oscillation Stop Detection										es O to O t	,													
•	Frequency Divider Power Save										2 to 24 Stop)													
Power Supply	Power-On Reset/POR										_														
Power Supply Voltage Detection	Low Voltage Detection/LVD										voltage	e)													
	Resolution × Channels	10-bit×2	6		10-bi	t×34			10-b	it×26			10-bi	t×34			10-b	it×26	10-bi	t×34					
A/D Converter	Sample and Hold		Yes																						
D/A Converter	Multi-Channel Sample and Hold Resolution × Channels		-																						
D/A Converter	8-bit	11 (Timer B)																							
	16-bit		11 (Timer A, Timer B) 16 (Intelligent I/O)																						
	Input Capture								1	6 (Intell	igent I/O))													
	Output Compare	19	(0)		24 (Intell	igent I/(0)		(Intallia	9) 24 (Intelligent I/O)						(Inday)	19	(Intallia	24					
_		19 (Intelligent I/O) 24 (Intelligent I/O) 19 (Intelligent I/O) 24 (Intelligent I/O) (Intelligent I/O) (Intelligent I/O) 19 (Intelligent I/O) (Intelligent I/O) (Intelligent I/O) (Intelligent I/O) (Intelligent I/O)																							
Timer	PWM Output	24 (Timer Intelligent	A,	29 (Timer A, I	ntellige	nt I/O)		24 (T	mer A, ent I/O)		29 (Ti	mer A, I	ntellige	nt I/O)		24 (Ti	imer A,	mer A,						
	Real-Time Port	into ingone									gent I/O	1					Intollia	011011	5110 17 07						
	Event Counter										A, Timer														
	2-Phase Encoder Input										(Intellige							19 (Intelligent I/O) (Intelligent I/O) (Intelligent I/O)							
	3-Phase Inverter Control					1 (sh	ared wit	th Timer	A4, Tin		Timer A2	, Timer	B2, Dea	d time	Timer)										
Watchdog Tin										0.41	•														
Serial Interface	Clock Sync./ Clock Async. Clock Sync. Only										ART) gent I/O	٨													
Serial Interface	Clock Async. Only									-	Bent 1/ O	,													
I ² C-bus	<u> </u>								8 (U	ART, Mu	lti maste	erl ² C)													
IEBus									8 (L	ART, In	telligent	I/O)													
Smart Card/S																									
Synchronous Serial C	ommunication Unit/Special Serial I/O Channels						1			7 (U	ART)						2								
CAN	Message Box (Numbers)									3	2														
IrDA										_	_														
CRC Calculation	on Circuit								1 (CRC-	CCITT ((¹⁶ +X ¹² -	+X ⁵ +1))												
X/Y Converte											es														
	Input Only (Numbers) CMOS I/O (Numbers)	0.4				20					2			20						00					
	N-Channel Open Drain Port	84 36				20			_	84 86			12				_	34 36	12	20 56					
I/O Ports	(Numbers)	(programma	ole)		56 (progr	ammabl	le)		(progra	mmable)		5	6 (progr	ammab	le)		(progra	mmable)	(prograi	mmable)					
	High Current Drive Port																								
	Pull-Up Resistor	53				9				3			8					53		19					
External Inter		11			1	4			1	1 v			1	4				11	1	4					
Debugging Function	On-Chip Debug On-Board Flash Program	—									es es														
0.1 5	ROM Correction Function										-														
Other Functions	Others										ant input	t													
	quency/Supply Voltage									0MHz/3	0 to 5.5														
Operating Am	bient Temperature (°C)									-40	to 85														
		1																							
		4			•	∢			1	∢			•	4				₫	5	<u> </u>					
Package		🖁			}	2				ž.			2	2				ž		≩					
1 ackage		ĕ				7			3	ž				<u> </u>				ĕ	4	<u> </u>					
		<u> </u>			Ş	<u> </u>				2			5	2			1	<u> </u>		Ĩ					
		PLQP0100KB-A			,	PLGP0144KA-A			1 :	PLQP0100KB-A			4 4774	2				PLQP0100KB-A	A-0444KA-A	ź					
						_				-				_				_		-					
		* 1	ž	ž	ž	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*					
		R5F64176DFB**	RSE64176DED**	R5F64176PFD**	R5F64177DFD**	R5F64177PFD**	R5F64178DFD**	R5F64178PFD**	R5F64179DFB**	R5F64179PFB**	R5F64179DFD**	R5F64179PFD**	R5F64187DFD**	R5F64187PFD**	R5F64188DFD**	R5F64188PFD**	R5F64189DFB**	R5F64189PFB**	R5F64189DFD**	R5F64189PFD**					
Part No.		6D		6PI	<u>6</u>	7P	8D	8P	106	9P.	106	146.	1 <u>0</u> 2	7P	80	8P	06	146	106	99					
		417	1	117	117	117	117	117	117	117	117	117	118	118	118	118	118	118	118	118					
		194	E F	F64	F6,	F6	F6	F6.	F64	F6.	F64	F6.	F6	F6.	F6.	F6.	F6	94	F6.	, E					
		R5	8	R5	RS	RS	R5	RS	RS	R5	R5,	R5	R5	R5	R5	R5	RSI	RS	R5.	R5					

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

• Specifications (M32C/80 Series)

Group		M32C/8A		M32	C/8B			M32	C/80			M32C/83					
	ROM (Bytes)		_		256K	+ 8K		_	-			512K					
	RAM (Bytes)	12K		32				8				31K					
	ROM Type*1		L		F OK (D-t			l	-			F					
Memory	Data Flash/E2 Data Flash				8K (Data						I						
	Program Security		_		Yes (ID Code Cl ROM Code Pro			-	-		Yes (II	D Code Check F Code Protect Fu	unction ,				
					HOW OOUCTTO	recet i unocion,					110111	oode i ioteet i t	anotion,				
	CPU Basic Instructions						M32C/8										
OBLI	Minimum Instruction Execution Time (ns)						31.3 (@:										
CPU	Multiplier						16×1										
	Multiply-Accumulate Instruction						16×16+										
	Barrel Shifter DMAC (Channels)						Ye										
DMA	DTC/DMAC II					MAC II (Sta			rrupt factors	.)							
	Address Space (Bytes)					,	16			•							
		Support for insertion of 1															
		to 6	Sunne	ort for inserti	on of 1 to 7	wait											
External Bus	External Bus Interface	wait states, Outputs 4	states,	Outputs 4 ch	nip-select sig	mals,			n of 1 to 6 w ip-select sig			nsertion of 1 to ts 4 chip-select					
Expansion		chip-select		Page mode	support		States, C	utputs 4 cm	ip-select sigi	iais	Cutpu	is 4 cilip-select	Signals				
		signals, Page mode support															
	Bus Structure		from Separa	ate bus, Multi	plex bus. Dat	a Bus Width	can be select	ted (8/16-bit)	. The numbe	r of output a	I ddress buses	can be selec	cted (16/20)				
	DRAM Controller			,		_						Yes	, , , , , , , , , , , , , , , , , , , ,				
	Clock Generation Circuit		4 circuits (Main clock, PLL, Sub-clock and On-chip oscillator)														
	PLL						Ye Ye										
	Subclock RTC																
Clock	On-Chip Oscillator						Ye	es									
	Oscillation Stop Detection						Ye = 1, 2, 3, 4, 6										
	Frequency Divider Power Save																
Power Supply	Power-On Reset/POR						Wait/	- -									
Voltage Detection					Ye	s (Low volta	ge)					_					
	Resolution × Channels	10-bi	t × 10	10-bit × 18	10-bit×26	10-bit × 34		10-bi	t × 10		10-bit × 26	(2 circuits)	10-bit × 34				
A/D Converter	Sample and Hold						Ye				10-bit × 26 (2 circuits) 10-bit × (2 circuits)						
	Multi-Channel Sample and Hold			Yes													
D/A Converter	Resolution × Channels		8-bit×2														
	8-bit						-	-									
	16-bit						11 (Timer A	A, Timer B)			I = 0		40 (1-4-)154 (/0)				
	Input Capture Output Compare										10 (Intell	gent I/O)	12 (Intelligent I/O) 28 (Intelligent I/O)				
_						5 (Timer A)							33 (Timer A,				
Timer	PWM Output			15 (Timer A, I	ntelligent I/O)	Intelligent I/O)											
	Real-Time Port					_					4 (Intelli	gent I/O)	16 (Intelligent I/O)				
	Event Counter						11 (Timer A	A, Timer B)									
	2-Phase Encoder Input 3-Phase Inverter Control					3 (Timer A)	Timer A1 T	imer A2 Tin	ner B2, Dead	time timer	3 (Timer A) + 2 (Intelligent I/C						
Watchdog Tin					T (onaroa w		1		nor BE, Boud	timo timo							
	Clock Sync./ Clock Async.					5 (UART)					7 (UART, Intelligent I/O)						
Serial Interface	Clock Sync. Only								2	Intelligent l	/0)						
I ² C-bus	Clock Async, Only						5 (U/	ART)									
IEBus						5 (UART)	3 (0)	-1111/			6 (UA	RT, Intellige	nt I/O)				
Smart Card/S							5 (U/				•						
Synchronous Serial C CAN	Communication Unit/Special Serial I/O Channels						5 (U/	ART)				1					
CAN	Message Box (Numbers)											1 16					
IrDA	mossage zex (reampore)							-									
CRC Calculati						1 (0	RC-CCITT (X		+ 1))								
X/Y Converte	Input Only (Numbers)						Y∈										
	CMOS I/O (Numbers)	4	5	81	85	121		4	5			35	121				
I/O Ports	N-Channel Open Drain Port (Numbers)						2	2									
	High Current Drive Port						_										
External lat	Pull-Up Resistor	4	5	81	85	121		4	5		L :	35	121				
External Inter	On-Chip Debug		_		V	es	1		_			Yes					
Debugging Function	On-Board Flash Program		_			es						Yes					
Other Functions	ROM Correction Function						_	•									
- 2.10. 1 0110110113	Others				3	V, 5V Interfa	ce										
Operating Fre	equency/Supply Voltage	32MHz/4.2 to 5.5V, 24MHz/		32MHz/4	.2 to 5.5V		32MH=	/4.2 to 5.5V	24MHz/3.0 t	o 5,5V		MHz/4.2 to 5					
		3.0 to 5.5V									20	MHz/3.0 to !	b.5V				
Operating An	mbient Temperature (°C)						-20 to 85,	-40 to 85				1					
		· ·	<u> </u>	Y-	Α¥	4-	<	<u> </u>	· .	ţ	₹	4	4				
Package		إ ا	5	4K	OKE	4KA		3			🖁) KB	A A				
		}	2	314)10(314	7	2	}	2	19)10(PLOP0144KA-A				
		8	5	GPC	OPC	OP.C		5	8	3	ĕ	P.G	P.G				
		=	į	P.L.	PL(PL() 0	E		<u>.</u>	E	PL(PL				
								3		1-atc							
		PLOP0100KB-A PLOP0144KA-A PLOP0100KB-A PROP0100JB-A PROP0100JB-A PROP0100JB-A PROP0100JB-A															
					*	*		یۃ		묽							
Part No.		<u>*</u> _	**	**Ф	GP**	**dĐ	£.	FP-BL"	9	GP-BL	e.	9	g.				
Part No.		0SGP*	**dDS9	**d588	6FGGP**	8FGGP**	SAFP)SAFP-BL™	SAGP)SAGP-BL	3FJFP	3FJGP	5FJGP				
Part No.		M308A0SGP*	M308B6SGP**	M308B8SGP**	M308B6FGGP**	M308B8FGGP**	M30800SAFP	M30800SAFP-BL"	M30800SAGP	M30800SAGP-BL	M30833FJFP	M30833FJGP	M30835FJGP				

¹ Built-in boot loader function ROM-less version
*¹ F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

• Specifications (M32C/80 Series)

									N	VI32C/84								
	ROM (Bytes)		_		128K			320K		320K + 4	(384K	3	84K + 4	K	5	12K + 4H	K
	RAM (Bytes)			IOK								24K						
	ROM Type*1		L			IV	1			F		M				F		
Memory	Data Flash/E2 Data Flash				-					4K (Data Flas	1)	-			4K (Dat	a Flash)		
										V. an out out to								
	Program Security				_					Yes (ID Code Check Fu ROM Code Protect Fur		_	Yes (ID C	ode Check	c Function,	ROM Cod	e Protect F	unctio
											, LOVII)							
	CPU								M32	2C/80 Core								
	Basic Instructions									108								
CPU	Minimum Instruction Execution Time (ns)									(@32MHz)								
OF O	Multiplier									6×16→32								
	Multiply-Accumulate Instruction								16×	16 + 48 → 48								
	Barrel Shifter									Yes								
OMA	DMAC (Channels)									4								
DIVIA	DTC/DMAC II						DMAC	I (Star	ts by all	I peripheral	interrup	factors)						
	Address Space (Bytes)									16M								
		Support for insertion o	of 1 to 6															
External Bus	External Bus Interface	wait states, Outputs 4 cl				Sı	upport f	for inser	tion of	1 to 6 wait	states, O	ıtputs 4 c	hip-sele	ct signa	ls			
Expansion		signals, Page mode si																
	Bus Structure	Selectable	e from Sepa	rate bus,	Multiple	x bus, D	Data Bus	Width o	an be se	elected (8/10	i-bit), The	number o	f output	address	buses o	an be se	lected (16/20
	DRAM Controller																	
	Clock Generation Circuit					4 ci	rcuits (N	Vlain clo	ck, PLL,	Sub-clock	and On-c	nip oscilla	itor)					
	PLL									Yes								
	Subclock									Yes								
Clock	RTC									_								
	On-Chip Oscillator									Yes								
	Oscillation Stop Detection									Yes								
	Frequency Divider							1/n (n		, 4, 6, 8, 10,	12, 14, 16	6)						
	Power Save								W	/ait/Stop								
ower Supply	Power-On Reset/POR																	
/oltage Detection	Low Voltage Detection/LVD	Yes (Low voltage) 10 hit v 10 10 hit v 26 10 hit v 26 10 hit v 26 10 hit v 21														10-bi		
	Resolution × Channels	10-bit ×	10-bit×10 10-bit×18 10-bit×26 10-bit×34 10-bit×26 10-bit×26 10-bit×34 10-bit×34 10-bit×34 10-bit×34 10-bit×36 10-bit															10-bit
A/D Converter	Sample and Hold	-																
	Multi-Channel Sample and Hold	 8-bit×2																
D/A Converter	Resolution × Channels		8-bit×2															
	8-bit		8-DIT × 2															
	16-bit								11 (Tim	ner A, Timei	B)							
	Input Capture	8 (Intelligent I/O) 8 (Intelligent I/O)																
	Output Compare																	
Timer	PWM Output							13	(Timer	A, Intellige	nt I/O)							
	Real-Time Port	- -																
	Event Counter	11 (Timer A, Timer B)																
	2-Phase Encoder Input	3 (Timer A) + 1 (Intelligent I/O)																
	3-Phase Inverter Control	1 (shared with Timer A4, Timer A1, Timer A2, Timer B2, Dead time timer)																
Watchdog Tir										1								
	Clock Sync./ Clock Async.							6	(UART	, Intelligent	I/O)							
Serial Interface	Clock Sync. Only								1 (Int	telligent I/C)							
	Clock Async, Only									_								
I ² C-bus									5	(UART)								
IEBus									5	(UART)								
Smart Card/S										(UART)								
Synchronous Serial	Communication Unit/Special Serial I/O								5	(UART)								
CAN	Channels									1								
	Message Box (Numbers)									16								
IrDA																		
CRC Calculat								1 (CI	RC-CCIT	$T (X^{16} + X^{12} -$	- X ⁵ + 1))							
X/Y Converte										Yes								
	Input Only (Numbers)									1								
	CMOS I/O (Numbers)	45	81	8	5	121	8	5	121	85 12	1 85	121	8	5	121	8	5	121
I/O Ports	N-Channel Open Drain Port (Numbers)									2								
	High Current Drive Port									_		1		_	T ==			-
	Pull-Up Resistor	45	81	8	5	121	8	5	121	85 12	1 85	121	8	5	121	8	b	121
	rrunte Dine									11								
External Inte										Yes		_	-			es		
	On-Chip Debug									Yes			-			es		
	On-Chip Debug On-Board Flash Program					Ye	es					Yes			-	-		
External Inter	On-Chip Debug On-Board Flash Program ROM Correction Function		_						21/ 0	5V Interface								
Debugging Function Other Functions	On-Chip Debug On-Board Flash Program ROM Correction Function Others	-	_					0085				- > /						
Debugging Function Other Functions Operating Fro	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	-	_					32MHz/	4.2 to 5	.5V, 24MHz	/3.0 to 5.	5V						
Debugging Function Other Functions Operating Fro	On-Chip Debug On-Board Flash Program ROM Correction Function Others		_					32MHz/	4.2 to 5		/3.0 to 5.	5V		I				_
Debugging Function Other Functions Operating Fro	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage		_					32MHz/	4.2 to 5	.5V, 24MHz	/3.0 to 5.	5V						
Debugging Function Other Functions Operating Fro	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage								4.2 to 5 -20 to	.5V, 24MHz 85, – 40 to	/3.0 to 5.8							
Debugging Function Other Functions Operating Fre	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage			4-5	3-A	4-A			4.2 to 5 -20 to	.5V, 24MHz 85, – 40 to	/3.0 to 5.8		4-F	4-5 A-1	4-4 A-1	3-A	3-A	Α-1
Debugging Function Other Functions Operating Fro Operating An	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage			NB-A	IKB-A	ıKA-A			4.2 to 5 -20 to	.5V, 24MHz 85, – 40 to	/3.0 to 5.8		J.B-A	IKB-A	KA-A	JB-A	кв-А	KA-A
Debugging Function Other Functions Operating Fro Operating An	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage			100JB-A	100KB-A	144KA-A			4.2 to 5 -20 to	.5V, 24MHz 85, – 40 to	/3.0 to 5.8		100JB-A	100KB-A	144KA-A	100JB-A	100KB-A	144KA-A
Debugging Function Other Functions Operating Fro	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage			P0100JB-A	P0100KB-A	P0144KA-A			4.2 to 5 -20 to	.5V, 24MHz 85, – 40 to	/3.0 to 5.8		P0100JB-A	P0100KB-A	P0144KA-A	P0100JB-A	P0100KB-A	P0144KA-A
Debugging Function Other Functions Operating Fro	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage			3QP0100JB-A	.QP0100KB-A	.OP0144KA-A			4.2 to 5 -20 to	.5V, 24MHz 85, – 40 to	/3.0 to 5.8		3QP0100JB-A	.QP0100KB-A	.QP0144KA-A	3QP0100JB-A	.QP0100KB-A	.QP0144KA-A
Debugging Function Other Functions Operating Fro Operating An	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage		PLQP0100KB-A I	PRQP0100JB-A	PLQP0100KB-A	PLQP0144KA-A	PRQP0100JB-A	PLQP0100KB-A	4.2 to 5	.5V, 24MHz	/3.0 to 5.8	PLOP0144KA-A	PRQP0100JB-A	PLQP0100KB-A	PLQP0144KA-A	PRQP0100JB-A	PLQP0100KB-A	PLQP0144KA-A
Debugging Function Other Functions Operating Fro Operating An	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage			PRQP0100JB-A	PLQP0100KB-A	PLQP0144KA-A			4.2 to 5 -20 to	.5V, 24MHz 85, – 40 to	/3.0 to 5.8		PRQP0100JB-A	PLQP0100KB-A	PLQP0144KA-A	PRQP0100JB-A	PLQP0100KB-A	PLOP0144KA-A
Debugging Function Other Functions Operating Fro	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage			PRQP0100JB-A	PLQP0100KB-A	PLQP0144KA-A			4.2 to 5 -20 to	.5V, 24MHz 85, – 40 to	/3.0 to 5.8		PRQP0100JB-A	PLQP0100KB-A	PLQP0144KA-A	PROP0100JB-A	PLQP0100KB-A	PLQP0144KA-A
Debugging Function Other Functions Operating Fro Operating An	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage						PRQP0100JB-A	PLQP0100KB-A	PLOP0144KA-A 6 4 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0	.5V, 24MHz 85, – 40 to	85 85 V. B-SUNDON B-S	* PLQP0144KA-A	PRQP0100JB-A	PLQP0100KB-A	PLQP0144KA-A	PROP0100JB-A	PLQP0100KB-A	PLQP0144KA-A
Debugging Function Other Functions Operating Fro Operating An	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage						PRQP0100JB-A	PLQP0100KB-A	PLOP0144KA-A 6 4 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0	.5V, 24MHz 85, – 40 to	85 85 V. B-SUNDON B-S	* PLQP0144KA-A	PRQP0100JB-A	PLQP0100KB-A	PLQP0144KA-A	PROP0100JB-A	PLQP0100KB-A	PLOP0144KA-A
Debugging Function Other Functions Operating Fr Operating An	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage						PRQP0100JB-A	PLQP0100KB-A	PLOP0144KA-A 6 4 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0	.5V, 24MHz .85, -40 to	(3.0 to 5.) 85 V-900100DDH	* PLQP0144KA-A		_				PLQP0144KA-A
Debugging Function Other Functions Operating Fro Operating An	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	PROP0100JB-A	PLΩP0100KB-A PLΩP0144KA-A				PRQP0100JB-A	PLQP0100KB-A	PLOP0144KA-A 6 4 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0	.5V, 24MHz .85, -40 to	(3.0 to 5.) 85 V-900100DDH	* PLQP0144KA-A		_				
Debugging Function Other Functions Operating Fr Operating An	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	PROP0100JB-A	PLΩP0100KB-A PLΩP0144KA-A				PRQP0100JB-A	PLQP0100KB-A	PLOP0144KA-A 6 4 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0	.5V, 24MHz .85, -40 to	(3.0 to 5.) 85 V-900100DDH	* PLQP0144KA-A		_				
ebugging Function Other Functions Operating Fr Operating An	On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	PROP0100JB-A		M30840MC-XXXFP* PRQP0100JB-A	M30840MC-XXXGP* PLQP0100KB-A	W30842MC-XXXGP* PLQP0144KA-A			4.2 to 5 -20 to	.5V, 24MHz 85, – 40 to	(3.0 to 5.) 85 V-900100DDH		M30843FHFP PROP0100JB-A	M30843FHGP PLOP0100KB-A	M30845FHGP PLQP0144KA-A	M30843FJFP PROP0100JB-A	M30843FJGP PLQP0100KB-A	M30845FJGP PLOP0144KA-A

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Group								M32	C/85						
	ROM (Bytes)		320K			320K + 4K		38	4K		384K + 4K			512K + 4k	(
	RAM (Bytes)								4K						
Memory	ROM Type*1		М			F			VI				F		
	Data Flash/E2 Data Flash		_			(Data Fla		-	_			4K (Dat	a Flash)		
	Program Security		_			ode Check de Protect		-	-	Yes (ID (ode Chec	k Function,	ROM Cod	le Protect	Function)
	CPU						-	M32C/	80 Core						
	Basic Instructions								08						
CPU	Minimum Instruction Execution Time (ns)							31,3 (@							
0.0	Multiplier								6→32						
	Multiply-Accumulate Instruction Barrel Shifter								+48→48 es						
	DMAC (Channels)								4						
DMA	DTC/DMAC II					DM	ACII (Star			terrupt fac	tors)				
	Address Space (Bytes)							16	SM .						
External Bus	External Bus Interface					port for in									
Expansion	Bus Structure DRAM Controller	Selectab	le from Se	parate bus,	Multiplex	bus, Data B	us Width c	an be selec	ted (8/16-b	it), The nur	nber of out	put addres	s buses car	n be select	ed (16/20)
	Clock Generation Circuit					4 circuits	(Main clos	k PLL Su	h-clock an	d On-chip	nscillator)				
	PLL					4 on ourts	(ividin olov		es	a on omp	Joinutor,				
	Subclock								es						
Clock	RTC								-						
Olock	On-Chip Oscillator								es						
	Oscillation Stop Detection						1/n/n-		es c o 10 12	14 16)					
	Frequency Divider Power Save						1/11 (N=	1, 2, 3, 4, Wait	6, 8, 10, 12 /Stop	, 14, 10)					
Power Supply	Power-On Reset/POR							-	_						
Voltage Detection	Low Voltage Detection/LVD								voltage)						
	Resolution×Channels	10-bi	t×26	10-bit × 34	10-b	it×26	10-bit × 34	10-bit × 26		10-bi	t×26	10-bit × 34	10-b	it×26	10-bit × 34
A/D Converter	Sample and Hold							Y	es						
D/A Converter	Multi-Channel Sample and Hold Resolution × Channels							9 hi	t×2						
D/A Converter	8-bit							0-bi							
	16-bit							11 (Timer	A, Timer B)					
	Input Capture							8 (Intelli							
_	Output Compare							8 (Intelli							
Timer	PWM Output						13	(Timer A, I	ntelligent	1/0)					
	Real-Time Port Event Counter							11 (Timer /	A Timer R	1					
	2-Phase Encoder Input							mer A) + 1							
	3-Phase Inverter Control				1 (sh	ared with					ead time t	imer)			
Watchdog Tir									1						
Carial Interfere	Clock Sync./ Clock Async.						6	(UART, Int		0)					
Serial Interface	Clock Sync. Only Clock Async. Only							1 (Intelli	gent I/O/						
I ² C-bus	Glook Adynor Chry							5 (U.	ART)						
IEBus								5 (U.	ART)						
Smart Card/S								5 (U.							
Synchronous Serial (Communication Unit/Special Serial I/O							5 (U.							
CAN	Channels Message Box (Numbers)								2 × 2						
IrDA	Wessage Dox (Numbers)														
CRC Calculati	ion Circuit						1 (CF	C-CCITT ()	K ¹⁶ + X ¹² + X	⁵ + 1))					
X/Y Converte									es						
	Input Only (Numbers)		_					,		_	_	404			
I/O Ports	N-Channel Open Drain Port (Numbers)	8	5	121	1	35	121	85	121 2	8	5	121		35	121
., 0 1 0113	High Current Drive Port								-						
	Pull-Up Resistor	8	5	121	8	35	121	85	121	8	5	121	8	35	121
External Inter									1						
Debugging Function	On-Chip Debug				-	Yes		-					es		
	On-Board Flash Program ROM Correction Function		Yes			Yes			es			Y	es -		
Other Functions	Others		169						nterface						
	equency/Supply Voltage						32MHz/	1.2 to 5.5V,	24MHz/3.	0 to 5.5V					
Operating An	nbient Temperature (°C)				,			-20 to 85,	– 40 to 85	5					
		-		ď	4	-	4	-	a	-	-	4	-		ď
		PRQP0100JB-A	PLQP0100KB-A	PLOP0144KA-A	PRQP0100JB-A	PLQP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLQP0144KA-A	PRQP0100JB-A	PLQP0100KB-A	PLQP0144KA-A	PRQP0100JB-A	PLQP0100KB-A	PLQP0144KA-A
Package		é	Š	4	6	Š	44 4	Š	44 4	8	Š	4	é	Š	4 4 4
		6	5	0,	P01	0,0	0	0,0	0	20	0	0,	20	5	0
		ᅙ	2	5	<u>8</u>	5	2	5	3	<u> </u>	3	2	豆	2	5
		-	-		-		-	_	<u> </u>	-	<u> </u>	-	<u>-</u>	-	_
			_	_				*	*						
) HX	Ö	SS				XG	XGF						
Part No.		ξ.	K.	Š.	<u>e</u>	9	9	×	X	e.	6	65	ę.	25	25
		M30853MW-XXXFP	M30853MW-XXXGP	M30855MW-XXXGP	M30853FWFP	M30853FWGP	M30855FWGP	M30853MH-XXXGP**	M30855MH-XXXGP	M30853FHFP	M30853FHGP	M30855FHGP	M30853FJFP	M30853FJGP	M30855FJGP
		082	085	085	082	082	085	082	082	082	085	082	085	085	085
		M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Group							M32	2C/87 (M32C/	87)							- 1	VI32C/8	37 (M32	C/87A)		
	ROM (Bytes)	384	4K	384K	+ 4K	Ę	512K		512K	+ 4K	768K	+ 4K		1M + 4K		38-	4K	384K	+ 4K		512K	
	RAM (Bytes)		24	4K				31K					48K				24	K			31K	
Mamani	ROM Type*1	I.	/1		F		M					F				I.	1	F	=		M	
Memory	Data Flash/E2 Data Flash	-	-	4K (Dat	a Flash)		_				4K (Data FI	ash)			-	-	4K (Data	a Flash)		_	
	Program Security	l -	_		heck Function,		_					le Chec				_	_	Yes I D Code C			_	
				ROM Code Pr	otect Function)					RON		Protec		ion)				ROM Code Pro	tect Function)			
	CPU										M32	2C/80 C	ore									
	Basic Instructions											108										
CPU	Minimum Instruction Execution Time (ns)											(@32N										
0.0	Multiplier											×16→										
	Multiply-Accumulate Instruction										16×	16 + 48	→48									
	Barrel Shifter											Yes										
DMA	DMAC (Channels)	_										4										
	DTC/DMAC II	-						L	IVIACI	(Start	s by all		ieral in	terrupt	factors)						
	Address Space (Bytes)	-					0				4 - 7	16M			. 1. 1	1						
External Bus Expansion	External Bus Interface	Color	4 - 1-1 - 6-			84141								puts 4						harasta	-41/4	10 (00)
Expansion	Bus Structure DRAM Controller	Selec	table ir	om sep	parate D	us, Multi	piex b	us, Dat	a bus v	viatn ca	in be se	elected_	(0/10-0	it), The	numbe	or out	out add	ress bu	ses can	be sele	ctea (i	10/20/
	Clock Generation Circuit	_						4 oiro	ite (N/I	nin alaa	L DII	Sub al	ook on	d On-ch	in ocai	llotor)						
	PLL PLL	_						4 Circu	iits (ivia	ain cioc	K, PLL,	Yes	ock and	u On-cn	iip oscii	ilator)						
	Subclock	_										Yes										
	RTC	_										Tes										
Clock	On-Chip Oscillator	-										Yes										
	Oscillation Stop Detection											Yes										
	Frequency Divider									1/p /n –	1.2 2		.10 12	, 14, 16)							
	Power Save									., (11 –		ait/Sto		, 1-7, 10								
Power Supply	Power-On Reset/POR										71											
Voltage Detection	Low Voltage Detection/LVD										Yes (I	ow vo	Itage)									
	-	10-bit	10-hit	10-hit	10-hit	40		10-hit	10-hit	10-hit					10-hit	10-hit	10-hit	10-hit	10-hit			10-bit
4/0.0	Resolution × Channels	×26	×34	×26	×34	10-bit >	<26	×34	×26	×34	×26	×34	10-bi	t×26	×34	×26	×34	×26	×34	10-bit	×26	×34
A/D Converter	Sample and Hold	T						-				Yes										
	Multi-Channel Sample and Hold																					
D/A Converter	Resolution × Channels										8	B-bit×2	2									
	8-bit											_										
	16-bit										11 (Tim	er A, T	imer B)									
	Input Capture		Yes																			
		10 (Intelligent	16 Inteligent	10 (Intelligent	16 (Intelligent	10 (Intel	igent	16 (Intelligent	10 (Intelligent	16 Intelligent				elligent	16 (Intelligent	10 (Intelligent	16 (Intelligent	10 (Intelligent	16 (Intelligent	10 (Inte	lligent	16 Inteligent
	Output Compare	(0)				I/O)				1/0)	1/0	1/0)	1/	0)			1/01			I/C	0)	1/0)
		w.m	M.T.	67 TA	M.T	15 (Time	er A.	M.T	0 T 1	M.T.	er er	M.T 1	15 (Tir	ner A.	M.T	er (Tour A	04 /T A	# # I	M/T1	15 (Tin	ner A.	M.T.
Timer	PWM Output	15 (Timer A, Intelligent I/O)	21 (Timer A, Intelligent I/O)	15 (Timer A,	21 (Timer A, Intelligent I/O)	Intellig	ent	21 (Timer A, Intelligent I/O)	15 (Timer A, Intelligent I/O)	21 (Timer A, Intelligent I/O)	15 (Timer A, Intelligent I/O)	21 (Timer A, Intelligent I/O)	Intell	igent	21 (Timer A, Intelligent I/O)	15 (Timer A, Intelligent (/O)	21 (Timer A,	15 (Timer A, Intelligent I/O)	21 (Timer A, Intelligent (/O)	Intelli	gent	21 (Timer A, Intelligent (/O)
		ilitaligali () 0)	morngent (10)	Interligenti/O)	ilitaliyali (jv)	I/O))	liitaliyait (10)	interigent (10)	ilicaligani (O)	Ilitaliyalit I/V/	ilitaliyali (joj	1/	0)	ilitaliyali (10)	iliterilgenit (ro)	III.carigeiit I/O/	ilitaliyali (jo)	musingent (ro)	I/C))	intelligent (10)
	Real-Time Port	3 (Intelligent	8 (Intelligent	3 Inteligent	8 (Intelligent	3 (Intelli	igent	8 (Intelligent	3 (Intelligent	8 (Intelligent	3 (Intelligent	8 (Intelligent	3 (Inte	lligent	8 (Intelligent	3 (Intelligent	8 (Intelligent	3 (Intelligent	8 (Intelligent	3 (Intel	lligent	8 (Intelligent
	near-title Fort	(0)	1/0)	1/0)	[(0)	1/0))	[(0)	1/0)	1/0)	[/0]	1/0)	1/4		(0)	1/0)	[/0]	(0)	1/0)	I/C	D) ¯	1/0)
	Event Counter			•							11 (Tim	er A, T	imer B)									
	2-Phase Encoder Input									3 (Tir	ner A)	+ 1 (Int	elligen	t I/O)								
	3-Phase Inverter Control						1 (sha	red wi	th Tim	er A4, 1	limer A	1, Time	er A2, T	imer Ba	2, Dead	time ti	mer)					
Watchdog Tin	ner											1										
		7.11407	0.01107	2.01407	AULANT	7 (1145		AULANT	2.01407	0.01407	THANT	0.01407	7.01	ADT	AULANT	2.01407	OULART	THANT	0.01107	7.014	NDT.	0.01107
	Clock Sync./ Clock Async.	7 (UART, Intelligent I/O)	8 (UART, Intelligent I/O)	7 (UART, Intelligent I/O)	8 (UART, Intelligent I/O)	7 (UAF Intelligen	11, † 1/0)	8 (UART, Intelligent I/O)	7 (UART, Intelligent I/O)	8 (UART, Intelligent I/O)	7 (UART, Intelligent I/O)	8 (UART, Intelligent I/O)	7 (U Intellig		8 (UART, Intelligent I/O)	7 (UART, Intelligent (/O)	8 (UART, Inteligent I/O)	7 (UART, Intelligent I/O)	8 (UART, Intelligent (/O)	7 (UA Intellige	AKI, ent I/O)	8 (UART, Intelligent (/O)
Serial Interface		intaligate (10)	mungent (O)	Interigenti/O/	intaligant () 0/	intenigen	1,0,	intangont i) 0/	mengencho	intelligent (O)	intangon (1) 0)	intelligent () 0)	intellig	ent i/O/	intelligent (10)	morngent (10)	inteligentito)	intelligent () O/	mengent (O)	intellige	int 1/0/	intelligent (10)
	Clock Sync. Only										2 (Int	elligen	t I/O)									
	Clock Async. Only											_										
l ² C-bus												(UART										
IEBus										6		Intelli		D)								
Smart Card/S												(UART										
Synchronous Serial C	ommunication Unit/Special Serial I/O										5	(UART	Γ)									
CAN	Channels							- 2											1			
	Message Box (Numbers)							16:	۷2										16			
IrDA												s (UAR										
CRC Calculation										1 (CR	C-CCIT	T (X16+	$X^{12} + X$	°+1))								
X/Y Converte												Yes										
	Input Only (Numbers)		46:		46:	-		40:		45:		1		_	46:		46:		45:			1.00
	CMOS I/O (Numbers)	85	121	85	121	85		121	85	121	85	121	8	5	121	85	121	85	121	8	b	121
I/O Ports	N-Channel Open Drain Port (Numbers)											2										
	High Current Drive Port		40.					404				-	-	-	40.	C= 1	40-		40.			
Estano III	Pull-Up Resistor	85	121	85	121	85		121	85	121	85	121		5	121	85	121	85	121	8		121
External Inter		11	14	11	14	11		14	11	14	11	14	1	1	14	11	14	11	14	11		14
Debugging Function	On-Chip Debug	<u> </u>			es							Yes					-		es			
J. J	On-Board Flash Program				es							Yes							es			
Other Functions	ROM Correction Function	Ye	es	-	-		Yes				21.7 -	<u> </u>				Ye	es	-	-		Yes	
	Others	-								ORAL!- ' 4		V Inter		0 40 5 5	v							
	quency/Supply Voltage	-							32			.5V, 241 85. – 4		0 to 5.5	v							
Operating Am	bient Temperature (°C)	 		1				-			–∠U to	ძნ, — 4	+U TO 85	,								
		ا ر ا	_			_	_	_	_	_			_	ارا	ا ہا	ارا	_		ارا	_	_	_
		🚡	4-4	4	7-	#	<u>*</u>	4-4	7-8	4	4-8	🕌	4-8	%	 	1/4	4	7-8	7-	7-8	8-7	
Package		🕺	\$	X	\ \ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \	2	옹	\$	N K	4 K	OKE	\ \ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \	0.5	👸	\$	N	\$	OKE	\$	悥	K	\ \
		ĕ	4	100	4	6	ĕ	4	100	4	100	4	5	Ğ	4	10	4	100	4	흔	100	14
		8	P0	P0	6	B	<u>8</u>	<u>6</u>	9	P0	P0	6	P0	8	6	6	9	P0	9	<u>a</u>	9	P0
		PLQP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLQP0144KA-A	PRQP0100JB-A	PLOP0100KB-A	PLOP0144KA-A	PLOP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLQP0144KA-A	PROP0100JB-A	PLQP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLOP0144KA-A	PLQP0100KB-A	PLOP0144KA-A	PROP0100JB-A	PLOP0100KB-A	PLQP0144KA-A
		_ =	<u>a</u>			<u>a</u>	<u>~</u>	₫.	<u> </u>	4	4		<u>a</u>	<u>ā</u>	4	4	<u> </u>	4	4	₫	₫.	_ =
																0	0					_
		65	65			بم	6	6								KGF	M30875MHA-XXXGP			E	9	9
		ĬŽ	Š			8	Š	ŏ								8	8	۵.	۵.	8	8	8
Part No.		3	Š	65	6	Ş	Ş	Ş	6	6	6	6	p.	6	6	A)	Ā.	4G	4G	¥	-¥	Ā
		Σ	Σ	ΙĚ	Į Ě	Σ	Ξ	Ξ	E	E S	X	ĬŽ.	臣	끝		Ξ	Ξ	E	E	Σ	Σ	Σ
		73	875	873	M30875FHGP	M30876MJ-XXXFP	M30876MJ-XXXGP	M30878MJ-XXXGP	M30876FJGP	M30878FJGP	M30879FKGP	M3087BFKGP	879	879	M3087BFLGP	873	875	873	875	876	876	878
				_ ~	~~	~	~	~	~	~	~	~	~	~	~	~	~	~	~			- w
		308	30	30	<u>8</u>	33	8	3	<u>8</u>	3	3	<u>8</u>	8	<u>8</u>	<u>8</u>	30	<u>8</u>	30	30	8	30	30
		M30873MH-XXXGP	M30875MH-XXXGP	M30873FHGP	M30	M3(M3(M3(M3(M3(M3(M3(M30879FLFP	M30879FLGP	M3(M30873MHA-XXXGP	M3(M30873FHAGP	M30875FHAGP	M30876MJA-XXXFP	M30876MJA-XXXGP	M30878MJA-XXXGP

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Group				M32C/	37 (M32	2C/87A)							M32	C/87 (N	/I32C/8	37B)					
	ROM (Bytes)	512K		768K	+ 4K		1M + 4ŀ	<	38	4K	384K	+4K		512K	24::	512K	+ 4K	768K	+ 4K		IM + 4K	(
	RAM (Bytes)	31	IK		F	48K			<u> </u>	24	IK E	-		B./I	31K				F	48K		
Memory	ROM Type*1 Data Flash/E2 Data Flash	_		AK (г Data Fl	ach)				VI	4K (Data	a Flach)		M				AK (Data FI	ach)		
			Vac			k Func	tion				Yes ID Code Cl						Yee		le Chec		ion	
	Program Security					t Funct			-	-	ROM Code Pro			_					Protec			
	CPU										M32	2C/80 C	ore									
	Basic Instructions											108										
CPU	Minimum Instruction Execution Time (ns)											(@32N										
	Multiplier											×16→										
	Multiply-Accumulate Instruction Barrel Shifter	_									16×	16 + 48	→48									
	DMAC (Channels)	_										Yes 4										
DMA	DTC/DMAC II								MAC I	I (Start	s by all		eral int	errupt	factors)						
	Address Space (Bytes)									,	,	16M										
External Bus	External Bus Interface												es, Out									
Expansion	Bus Structure	Selec	table fr	om Sep	oarate b	us, Mu	ltiplex b	ous, Da	a Bus V	Vidth ca	an be se	elected	(8/16-bit	t), The i	number	of out	put add	lress bu	ises car	be sele	cted (1	16/20)
	DRAM Controller							4 -1	-: (B.A.	-11	I. DIII		1	0		1-4\						
	Clock Generation Circuit PLL							4 circ	uits (IVI	ain cloc	K, PLL,	Yes	ock and	On-cn	ıp oscil	lator)						
	Subclock	_										Yes										
	RTC																					
Clock	On-Chip Oscillator											Yes										
	Oscillation Stop Detection											Yes										
	Frequency Divider									1/n (n=				14, 16)								
	Power Save										W	ait/Sto	pp									
Power Supply	Power-On Reset/POR	<u> </u>									V- "		le									
Voltage Detection	Low Voltage Detection/LVD	40.1.	40	40.1.	40			40.1.	40.1.	40.1.				-	40.1.	40 1 1	40.1.	40.1.	40.1.			40
	Resolution×Channels					10-bi	t×26						10-bit	×26						10-bi	t×26	10-bit ×34
A/D Converter	Sample and Hold										20											
	Multi-Channel Sample and Hold											_										
D/A Converter	Resolution×Channels										8	3-bit×2	2									
	8-bit																					
	16-bit																					
	Input Capture		1/n (n = 1, 2, 3, 4, 6, 8, 10, 12, 14, 16) Wait/Stop																			
	Output Compare	10 (Intelligent I/O)				10 (Int	elligent									10 (Intelligent				10 (Inte	ligent	16 (Intelligent I/O)
		1/0/	7.1	111	1.17			1.17		1-1	110	1,01	- '		111		1.0	111			,	
Timer	PWM Output	15 (Timer A,				15 (III	mer A, ligent						15 (IIII	ner A, igent						15 (III Intell	ner A, igent	21 (Timer A, Intelligent
		Intelligent (/O)																		1/0	0)	1/0)
	Deal Time Dant	3 (Intelligent	8 Intelligent	3 (Intelligent	8 Intelligent	3 (Inte	lligent	8 (Intelligent	3 (Intelligent	8 (Intelligent	3 (Intelligent	8 (Intelligent	3 (Intel	ligent	8 (Intelligent	3 (Intelligent	8 (Intelligent	3 (Intelligent	8 (Intelligent	3 (Inte	lligent	8 (Intelligent
	Real-Time Port	1/0)	1/0)	(0)	1/0)		O) ¯	1/0)	1/0)	[0]	1/0)	1/0)	I/C) (1/0)	[/0]	(0)	1/0)	[/0]	1/0) (C	1/0)
	Event Counter										11 (Tim											
	2-Phase Encoder Input												elligent									
Watah dan Tin	3-Phase Inverter Control						1 (sha	ared w	th Time	er A4, T	imer A	1, Time 1	r A2, Ti	mer B2	, Dead	time t	imer)					
Watchdog Tin	liei								ı						1							
	Clock Sync./ Clock Async.	7 (UART,	8 (UART,	7 (UART,	8 (UART,	7 (U		8 (UART,	7 (UART,	8 (UART,	7 (UART,	8 (UART,	7 (UA		8 (UART,	7 (UART,	8 (UART,	7 (UART,	8 (UART,	7 (U		8 (UART,
Serial Interface		Intelligent (/O)	Inteligent I/O)	Intelligent I/O)	Intelligent (/O)	intellig	ent I/O)	Intelligent (/O)	Intelligent (/O)	Intelligent I/O)	Intelligent I/O	Intelligent (/O)	Intellige	nt I/O)	Intelligent (/O)	Intelligent I/O)	Intelligent I/O)	Intelligent (/O)	Inteligent I/O)	Intellige	ent I/O)	Inteligent I/O)
	Clock Sync. Only				•						2 (Int	elligen	t I/O)									
	Clock Async. Only																					
I ² C-bus												(UART										
IEBus	\									6			gent I/O)								
Smart Card/S												(UART										
Synchronous Serial C	Communication Unit/Special Serial I/O Channels	_			1						5	(UARI	,		_							
CAN	Message Box (Numbers)				16										_							
IrDA	Jourgo Don (radinibers)										Ye	s (UAR	RT)									
CRC Calculation	on Circuit									1 (CR			X ¹² + X ⁵	+1))								
X/Y Converte	r											Yes										
	Input Only (Numbers)											1										
	CMOS I/O (Numbers)	85	121	85	121	8	35	121	85	121	85	121	85	5	121	85	121	85	121	8	5	121
I/O Ports	N-Channel Open Drain Port (Numbers)											2										
	High Current Drive Port	or	101	OF.	101	_)E	101	OF.	101	OF.	124	C.		124	OF.	124	OF.	101	_	_	101
External Inter	Pull-Up Resistor	85 11	121 14	85 11	121 14		85 1	121 14	85 11	121 14	85 11	121 14	85		121 14	85 11	121 14	85 11	121 14	8		121 14
	On-Chip Debug	l			Yes	· '			- ''-	_ '**	Ye		· '		1.4			- ' '	Yes	<u>'</u>		
Debugging Function	On-Board Flash Program	i i			Yes				-		Ye			_					Yes			
Othor Eurotice	ROM Correction Function				_				Y	es	-	-		Yes								
Other Functions	Others											V Inter										
	equency/Supply Voltage								32	2MHz/4			VIHz/3.0	to 5.5	V							
Operating Am	nbient Temperature (°C)	ļ.,	1								– 20 to	85, -4	10 to 85	-				1	1			_
		4	⋖	4	4	d	4	₫	4	4	₄	₫		a	4	a	4	a	₫	4	4	4
		🚡	Ā	B	Ā	<u>B</u>	<u>8</u>	Ā	🔬	Š	A	Ā	<u></u>	-B	Ā	<u>-</u>	Ā	B-/	Ā	<u>8</u>	<u>-</u> B	Ā
Package		ĕ	X	ĕ	¥	9	×	¥	Ιğ	其	×	¥	8)0K	¥	Š	¥	×	4	00	×	1
		2	017	010	017	010	010	017	1 2	017	010	017	010	010	0.17	010	017	010	017	010	010	017
		PLQP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLQP0144KA-A	PROP0100JB-A	PLQP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLQP0144KA-A	PROP0100JB-A	PLQP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLQP0144KA-A	PRQP0100JB-A	PLQP0100KB-A	PLQP0144KA-A
		<u>4</u>	٦.	<u>ا</u> ج	<u>ا</u> ج	R .	<u>٦</u>	Ę	4	<u>ا</u> ج	<u>4</u>	Ę	품	7	7	7	<u>ا</u> م	Ę	٦.	- H	4	T
									_													
									ρ	P P			F	GD)	G G							
		_	_	_	<u>م</u>		۵.	_	8	8	_	_	8	8	8	_	a	_	۵.	_	_	_
			(7)	9	P _G	上	19	P _G	₩	_ ₩	g	BG	<u>a</u>	B-)	<u>6</u>	150	BGI	S S	86	E.	30	- S
Part No.		AG	ĕ	<		- 4			I #	F												
Part No.		6FJAG	8FJA(9FKA	BFK	9FL/	9FL/	밁	3MH	5MH	3FH	5FH	6MJ	6MJ	SM.	6FJI	8FJI	9FKI	H.	9FLE	9FLE	딞
Part No.		0876FJAG	0878FJA(0879FKA	087BFK	0879FL/	0879FL/	087BFL	0873MH	0875MH	0873FHI	0875FH	0876MJ	0876MJ	0878MJ	0876FJI	0878FJI	0879FKI	087BFK	0879FLE	0879FLF	087BFLI
Part No.		M30876FJAGP	M30878FJAGP	M30879FKAGP	M3087BFKAGP	M30879FLAFP	M30879FLAGP	M3087BFLAGP	M30873MHB-XXXGP	M30875MHB-XXXGP	M30873FHBGP	M30875FHBGP	M30876MJB-XXXFP	M30876MJB-XXXGP	M30878MJB-XXXGP	M30876FJBGP	M30878FJBGP	M30879FKBGP	M3087BFKBGP	M30879FLBFP	M30879FLBGP	M3087BFLBGP

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

• Specifications (M16C/80 Series)

Group													M16	C/80											
	ROM (Bytes)						-									12							6K		
	RAM (Bytes)	_		1	0K					24	4K					10	K					20	OK		
Memory	ROM Type*1							L							F			M			F			M	
	Data Flash/E2 Data Flash													-											
	Program Security						-	_							ode Check			_			ode Check			_	
	CPU												1400/		de Protect I	unction)				NUM CO	de Protect	runction)			
	Basic Instructions	-										IV	100/	30 Cor	е										
	Minimum Instruction Execution Time (ns)	-										-		OMHz	١										_
CPU		-													,										_
	Multiplier	-												6→32	10										_
	Multiply-Accumulate Instruction	-										16	× 16-	- 48 → 4	18										
	Barrel Shifter	-												-											_
DMA	DMAC (Channels) DTC/DMAC II	-												1											
	Address Space (Bytes)	-																							_
	External Bus Interface							0				4 4 - 0	16		01		1. 1	1							
External Bus Expansion	Bus Structure	Cal		£	Separa	4- 6	N/1I4					1 to 3									hussa			Land (11	2/2
LAPAIISIOII	DRAM Controller	Seit	ectable	rom	Separa	ite bus	, wuit	piex b	us, Da	ta bus	wiatn	can be		eu (o/ es	(וומ-סונ)	, The n	umbei	or ou	tput a	uaress	buses	can be	e seiec	ea (it)/2
	Clock Generation Circuit	-									2 -1-	cuits (Ch. al	a als\									_
	PLL PLL	-									Z CII	cuits (i	viain (HOCK,	Sub-ci	OCK)									_
																									_
	Subclock RTC	-											Y	es											_
Clock		-																							_
	On-Chip Oscillator	-																							_
	Oscillation Stop Detection Frequency Divider	-									1/n/-	= 1, 2,	2 4 4	S Q 10	12 4	1 10									_
	Power Save	-									1/11 (N	- 1, 2,	3, 4, 0		, IZ, T	4, 10)									_
Dower Commit	Power-On Reset/POR												vvai()	- otop											_
Power Supply Voltage Detection	Low Voltage Detection/LVD													_											_
	Resolution × Channels	\vdash											10-bi												_
A/D Converter	Sample and Hold	_												t x IU es											_
A/D Converter	Multi-Channel Sample and Hold													-											_
D/A Converter	Resolution × Channels												8-bi	+ > 2											_
D/A CONVENTED	8-bit												0-131												_
	16-bit											11 /T	imer /	۹, Time	or R)										_
	Input Capture											11(1		, IIIIII	ei D/										_
	Output Compare													_											_
Timer	PWM Output												5 (Tin	ner A)											_
IIIIei	Real-Time Port												3 (1111	-											_
	Event Counter											11 /T	imer /	A, Time	or R)										_
	2-Phase Encoder Input												3 (Tin		CI D,										_
	3-Phase Inverter Control							1 (sha	red w	ith Tin	ner A4	, Time			12 Tin	ner R2	Dead	time	timer)						_
Watchdog Tin								1 (5110	ii cu ii		iici A	,		1	·, ····	ICI DE	, Dead	time	tillioi,						_
Tratona og 1111	Clock Sync./ Clock Async.												5 (U												_
Serial Interface	Clock Sync. Only																								_
	Clock Async. Only												-	_											
I ² C-bus		1											3 (U	ART)											
IEBus													3 (U	ART)											
Smart Card/S	IM												3 (U	ART)											
Synchronous Serial C	ommunication Unit/Special Serial I/O												3 (U	ART)											
CAN	Channels												-	-											
CAN	Message Box (Numbers)												-	_											
IrDA													-	_											
CRC Calculation											1 (0	RC-CC			2 + X ⁵ +	- 1))									
X/Y Converte														es											
	Input Only (Numbers)												•												
	CMOS I/O (Numbers)		4	15		8	1		4	5		8		8	5	121	8	5	121	8	35	121	8	5	12
I/O Ports	N-Channel Open Drain Port (Numbers)												- 2	2											
	High Current Drive Port												-												_
	Pull-Up Resistor			15		8	1		4	5		8		8	5	121	8	5	121	8	85	121	8	5	12
External Inter													1	1											
Debugging Function	On-Chip Debug														Yes			_			Yes				
	On-Board Flash Program						-								Yes						Yes				
Other Functions	ROM Correction Function								_									Yes			_			Yes	
	Others	_										10.5		-	10 -										
	quency/Supply Voltage									2	20MHz	/4.2 to				to 5.5\									
Operating Am	bient Temperature (°C)	-										-20	to 85,	- 40 t	to 85							1			_
		l	_		_	.	-		_		_	_		ارا	_	_	_			_		_	ا بر ا	_	_
			- 4	2	'	:	à	;	à		à	2		🚼	8-7	4	8-7	8-7	}	8-A	4	4	8-7	8-4	4 4 74 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Package		:	3		3		₹	:	3		3	Š		5	옹	4¥.	2	NS IS	\$	3	\	\ \$	3	꽁	1
-		:	5	3	2	;	4		5		2	1		5	10	14	10	10	5	10	É	14	100	ě	;
		1 3	ĕ	8	3	8	3	8	ž	8	3	6	:	8	P0	<u>ا</u>	P0	P0	<u>6</u>	Po	<u>6</u>	P0	P0	6	8
		1	PROP0100JB-A	!	PLCP0100KB-A	3	PLUPU144KA-A	8	PROP0100JB-A	9	PLCP0100KB-A	PI OP0144KA_A	1	PROP0100JB-A	PLQP0100KB-A	PLOP0144KA-A	PROP0100JB-A	PLOP0100KB-A	PLOP0144KA-A	PROP0100JB-A	PLOP0100KB-A	PLOP0144KA-A	PROP0100JB-A	PLOP0100KB-A	
			Δ.	'	_		7		_		_	۵		Δ.	Δ.		Δ.		<u>a</u>	<u>a</u>	<u>a</u>	Δ.	<u>a</u>	₫.	
																			_					0	
			lote1		Note1		Note1		Note1		Note1		Note1				F	M30800MC-XXXGP	M30802MC-XXXGP				흕	M30803MG-XXXGP	
			7		B		B				B		M30805SGP-BL 10001				M30800MC-XXXFP	8	8				M30803MG-XXXFP	8	
Part No.		۾ ا	M30800SFP-BL	65	M30800SGP-BL	6	M30802SGP-BL	بم ا	M30803SFP-BL	65	M30803SGP-BL	6	9	氏	M30800FCGP	M30802FCGP	Š	Š	ر ک	Œ.	M30803FGGP	M30805FGGP	6	Ġ	
		M30800SFP	SE	M30800SGP	380	M30802SGP	250	M30803SFP	38F	M30803SGP	386	M30805SGP	550	M30800FCFP)FC	2FC	Ě	Ň	Š	M30803FGFP	37.6	3FG	Ž.	Ž	
		80	800	800	800	807	80%	803	803	803	803	308	308	308	800	80%	800	300	80%	803	803	806	803	803	
		308	308	308	308	308	308	308	30%	308	308	308	300	30	308	308	308	308	308	30%	30%	30%	308	308	
		Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	2	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	

★: New product ★★: Under development

Built-in boot loader function ROM-less version

* F: Flash memory version, L: ROM-less version, M: Mask ROM version, O: One time PROM version, Qz: QzROM version

• Specifications (M16C/60 Series : M16C/63, M16C/64, M16C/65 Group)

Group			M16	C/63						M16	C/64					M16	C/65	
	ROM (Bytes)			+24K					+24K			512K				256K		
	RAM (Bytes)		20	OK				10	6K			31	K			20	K	
Memory	ROM Type*1									F								
	Data Flash/E2 Data Flash	8K (Data Fla	sh:Progr	am/Eras	se 10k times					ta Flash)								
	Program Security CPU					Yes (I	D Code	Check F		, ROM Core	ode Prot	ect Fund	tion)					
	Basic Instructions									91								
	Minimum Instruction Execution Time (ns)		50 (@:	20MHz)							25MHz)				T	31 25 16	32MHz	1
CPU	Multiplier		30 (%)	LOWIT IZ)					16×1	16 →32	/ZJIVII 12/					31,23 (6	932IVII IZ	<u> </u>
	Multiply-Accumulate Instruction									+32 →32								
	Barrel Shifter								10 / 10	-								
	DMAC (Channels)									4								
DMA	DTC/DMAC II									_								
	Address Space (Bytes)								1	М								
External Bus	External Bus Interface	Support for insertio Outputs 4 chip-select 4M bytes by address s	t signals, Av	ailable to	_					to 3 wait s es by addi					d "	Outputs 4 ch	n of 0 to 5 wait s iip-select signal Iress space expa	s,
Expansion	Bus Structure	Selectable from Sep Data Bus Width car The number of output addres	be selected (8/16	i-bit),	_		Sel	ectable							Ith can bo lected (1			bit),
	DRAM Controller								-									
	Clock Generation Circuit	4 circuits (M					4 cir	rcuits (IV	lain cloc	k, PLL, S	ub clock	c. On-chi	p oscilla	ator)				High speed
		on-chip oscilla	or, Low-	speed o	n-chip oscilla	ator)	7 011	(17	3100	.,, 0	0.001				on-chip osc	cillator, Low-	speed on-chi	ıp oscillator)
	PLL		•	_					V	7001		Y	es					
Cleat	Subclock			•		-			Yes (32	.768kHz)	_							
Clock	RTC On-Chip Oscillator	2 circuits (High		es MHz Lo	w eneed-12	2KH2/			Von	(Low sp	ood:12=	νH)			2 ojravite /L		es IMHz, Low sp	ood:12ELU=\
	Oscillation Stop Detection	E circuite (High	specu:40	AVIITZ, LO	m speed: 128	-K[12]				(Low sp	reeu: IZ5	KFIZ)			1 2 circuits (F	ngn speea:40	nninz, Low sp	rceu. IZOKMZ)
	Frequency Divider							1.		es 2, 4, 8, 1	16)							
	Power Save							1/		Z, 4, 8, 1 /Stop	10)							
Power Supply	Power Save Power-On Reset/POR							_	vvait	, στορ					Т	v	es	
Power Supply Voltage Detection	Low Voltage Detection/LVD	Vac	(Voltage	detection	on 3)				,	Yes (Low	/ voltage	•)			Vac		detection	on 31
. 3.1.20 2010011011	Resolution × Channels	168	, ronage	actacile	0,					it×26	voitage	.,			1 165	, ronage	detection	0.1 0/
A/D Converter	Sample and Hold									es								
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Multi-Channel Sample and Hold									_								
D/A Converter	Resolution × Channels								8-b	it×2								
	8-bit									_								
	16-bit							11	l (Timer	A, Timer	B)							
	Input Capture																	
	Output Compare									_								
Timer	PWM Output	7 (TimerA, F	WM fun	ction)	5 (Timer A, PWM f	unction)				5 (Tin	ner A)				7 (Tin	ner A. PV	VM Fund	ction)
	Real-Time Port	. (,.		,	1-(. , , , , , ,			,
	Event Counter							11	(Timer	A, Timer	B)							
	2-Phase Encoder Input									ner A)								
	3-Phase Inverter Control	1 (shared with T	mer A4. T	imer A1.														
		Timer A2, Timer E) —			1 (s	shared w	ith Time	er A4, Tir	ner A1,	Timer A	2, Timer	B2, Dead	d time ti	mer)	
Watchdog Tin	mer									1								
	Clock Sync./ Clock Async.	6 (L	ART)		3 (UAR	T)						6 (U.	ART)					
Serial Interface	Clock Sync. Only								2 (5	SI/O)								
	Clock Async, Only				1 (UAR							-						
I ² C-bus		7 (Multi mas		ART)	5 (Multi master I ² C					6 (U	ART)				7 (Mu	ulti mast	er I ² C, U	ART)
IEBus		6 (0	ART)		3 (UAR	1)]						6 (U.	ART)					
Smart Card/S		6.0	ADT\		2 (114 D)	T\			1 (U	ART)		0.411	A DT\					
Synchronous Serial C	Communication Unit/Special Serial I/O	6 (0	ART)		3 (UAR	')						6 (U	ARI)					
CAN	Channels									_								
IrDA	Message Box (Numbers)									_								
CRC Calculati	ion Circuit	1 (CRC-CCITT(X16	Y 12 , V 5 .	1) /CPC	16 /Y16 , V15 , V	2 _ 1\\			1 (000	-CCITT ()	V16 , V12	V5 : 411			1 (CRC-CCITT	γ η ν υ ν ν ι ν ι ν ι ν ι ν ι ν ι ν ι · ν ι · ν · ·	1)/CDC 46 (V)	€_ γ 15 , γ 2 , 4 11
X/Y Converte		I (UNU-CUITI(X"	TA +A +	1)/000	10 (A +A +A	+1))			i (UNU		A TA 1	- A + I))			I I (UNU-UUII I	IN TA TAT	- i//∪nυ-10 (λ	TA TA + 1))
A/ I Converte	Input Only (Numbers)																	
	CMOS I/O (Numbers)		35		68				-			g	5					
I/O Ports	N-Channel Open Drain Port (Numbers)				, 00					3								
,	High Current Drive Port									_								
	Pull-Up Resistor		35		68							8	5					
External Inter				7	•								3					
	On-Chip Debug								Y	'es								
Debugging Function	On-Board Flash Program								Y	'es								
	ROM Correction Function																	
Other Functions		3V, 5V interface Re	mote con	rol eignol	Remote control	signal									l			
Jano. Functions	Others	reception func	ion, CEC f	แบเ อเชเเสเ unction	reception fund	ction,				3V, 5V i	nterface				3V, 5V In	terface Pat	tern Matcl	hing Input
					CEC functi	on									1		_	
	equency/Supply Voltage				1.8 to 5.5V					25MHz/2							7 to 5.5	
Operating An	nbient Temperature (°C)	- 40 to 85	-20	to 85	-40 to 85 -20	U to 85	-40	to 85	-20	to 85	-40	to 85	-20	to 85	-40	to 85	-20	to 85
															1			
															l			
		1 2 2	2	PLQP0100KB-A	PLQP0080KB-A		PROP0100JD-B	PLQP0100KB-A	PRQP0100JD-B	PLQP0100KB-A	PROP0100JD-B	PLQP0100KB-A	PROP0100JD-B	PLQP0100KB-A	PRQP0100JD-B	PLQP0100KB-A	PROP0100JD-B	PLQP0100KB-A
		2 3	3	 	- X		2	8	3	X	3	8	2	8	3	N N	2	8
Package			5	6	080		10	6	6	10	6	10	6	ě	5	10	6	10
Package		1 5 5	<u>6</u>	હૂ	P0		₽0	<u>@</u>	ਔ	- G	₹	<u>6</u>	<u>,</u> ₹	<u> </u>	ĕ	O.	ĕ	Q
Package		P01		2	ڌِ		8	2	&	S) Š	2	<u>چ</u>	S	ĕ	l 9	ا ک	1 9
Package		RQP01	8				۵			_ 4								
Package		PRQP0100JD-B	PRQP0100JD-B	Δ.							_				- "	Δ.	<u>~</u>	
Package		PRQP01	PRQ	Δ.												_	<u>-</u>	<u>~</u>
Package		PRQP01		4												4	<u>a</u>	<u>-</u>
Package			*	÷		ž.,	*	:	.	*	*	*.	*_	**		*		*
			*	÷		IFE**	FA**	FB**	FA**	FB**)FA**)FB**	JFA**	LFB**		*		*
Package Part No.			*	÷		ENFE**	DDFA**	ODFB**	DNFA**	DNFB**	MDFA**	MDFB**	MNFA**	MNFB**		*		*
<u> </u>			*	÷		32ENFE**	40DDFA**	40DDFB**	40DNFA**	40DNFB**	40MDFA**	40MDFB**	40MNFA**	40MNFB**		*		*
•			*	÷		F3632ENFE**	:3640DDFA**	:3640DDFB**	:3640DNFA**	:3640DNFB**	:3640MDFA**	:3640MDFB**	:3640MNFA**	:3640MNFB**		*		*
•		R5F3630EDFA** PRQP01		R5F3630ENFB** P	*	R5F3632ENFE**	R5F3640DDFA**	R5F3640DDFB**	R5F3640DNFA**	R5F3640DNFB**	R5F3640MDFA**	R5F3640MDFB**	R5F3640MNFA**	R5F3640MNFB**	R5F3650EDFA**	R5F3650EDFB** P	R5F3650ENFA** PI	R5F3650ENFB**

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

• Specifications (M16C/60 Series : M16C/62P Group)

											/116C/62	.г								
	ROM (Bytes)				-					48	ЗК		64K		6	64K + 4k	(96K	
	RAM (Bytes)	41	K	10			0K	3′	1K				4	IK.					5K	
Vlemory	ROM Type*1					-						M			***	F			M	
•	Data Flash/E2 Data Flash							_								Data Fl			_	
	Program Security	l						_							Yes (ID Co ROM Code				-	
	CPU									1/11	6C/60 C	0.00			HOW COU	e i i otecti	unction			
	Basic Instructions									1011	91	ore								
	Minimum Instruction Execution Time (ns)									41 7	7 (@24IV	1Hz)								
PU	Multiplier										6×16→									
	Multiply-Accumulate Instruction										16+32									
	Barrel Shifter										_									
OMA	DMAC (Channels)										2									
JIVIA	DTC/DMAC II										_									
	Address Space (Bytes)						1	M						_	11\		_	11/		-
External Bus	External Bus Interface	Suppo	ort for in	sertion	of 1 to bytes	3 wait s by addr	states, C ess spa	Outputs ce expa	4 chip-s nsion fu	elect sig	ınals, A	vailable	to 4M	_	Support for of 1 to 3 wa Outputs 4 cl signals, Avail bytes by add expansion Selectable fro	ait states, hip-select lable to 4M Iress space function	_	Support for of 1 to 3 wa Outputs 4 ch signals, Avail bytes by addi expansion Selectable from	it states, hip-select able to 4M ress space function	_
Expansion	Bus Structure	Select	able fro	m Separ numb	rate bus, er of ou	, Multipl tput add	lex bus, dress bu	Data Busses can l	s Width be selec	can be s ted (12/	elected 16/20)	(8/16-bit), The	_	bus, Multip Data Bus Win selected (8/1 number of out buses can be (12/16)	plex bus, dth can be (6-bit), The tput address e selected	_	bus, Multip Data Bus Wic selected (8/1) number of out buses can be (12/16)	lex bus, dth can be 6-bit), The put address e selected	_
	DRAM Controller								(8.8. *		_									
	Clock Generation Circuit	 					4	circuits	(Wain o	ciock, Pl		ciock, O	n-chip	oscillato	r)					
	PLL	-									Yes									
	Subclock RTC	—									Yes									
Clock	On-Chip Oscillator	 									Yes									
	Oscillation Stop Detection	 									Yes									
	Frequency Divider									1/n (n	= 1, 2, 4	. 8. 16)								
	Power Save										= 1, 2, 4 Vait/Sto									
ower Supply	Power-On Reset/POR									•	_	Ρ								
ower Supply oltage Detection	Low Voltage Detection/LVD									Yes (Low vol	tage)								
	Resolution × Channels										0-bit×2									
A/D Converter	Sample and Hold										Yes									
	Multi-Channel Sample and Hold																			
D/A Converter	Resolution×Channels										8-bit×2	!								_
	8-bit										_									
	16-bit									11 (Tin	ner A, Ti	mer B)								
	Input Capture										_									
	Output Compare										-									
	PWM Output						5 (Tir	ner A)						3 (Timer A)	5 (Tim	er A)	3 (Timer A)	5 (Time	er A)	3 (Tin
Timer	Real-Time Port																			
ıımer	near-title roll	I									_							0 (11111		
ıımer	Event Counter									11 (Tin	ner A, Ti	mer B)						0 (11111		
ilmer							3 (Tir	ner A)		11 (Tin	ner A, Ti	mer B)		2 (Timer A)	3 (Tim	er A)	2 (Timer A)	3 (Time	er A)	2 (Tim
ilmer	Event Counter 2-Phase Encoder Input													2 (Timer A)	1 (shared with	h Timer A4,	2 (Timer A)	3 (Time	Timer A4,	2 (Tim
ilmer	Event Counter		1 (sha	red wit	h Timer	A4, Tim		mer A) Timer A2	2, Timer					2 (Timer A)	1 (shared with Timer A1, Time	h Timer A4, er A2, Timer	2 (Timer A)	3 (Time 1 (shared with Timer A1, Time	n Timer A4, er A2, Timer	2 (Tim
	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control		1 (sha	red wit	h Timer	A4, Tim			2, Timer		d time			2 (Timer A)	1 (shared with	h Timer A4, er A2, Timer	2 (Timer A)	3 (Time	n Timer A4, er A2, Timer	2 (Tim
	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer		1 (sha	red wit	h Timer	A4, Tin	ner A1,	Timer A2	2, Timer					_	1 (shared with Timer A1, Time B2, Dead tir	h Timer A4, er A2, Timer me timer)	_	3 (Time 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, er A2, Timer ne timer)	_
Watchdog Ti	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async.		1 (sha	red wit	h Timer	A4, Tin	ner A1,		2, Timer	B2, Dea	d time t	timer)		2 (Timer A)	1 (shared with Timer A1, Time	h Timer A4, er A2, Timer me timer)	2 (Timer A)	3 (Time 1 (shared with Timer A1, Time	n Timer A4, er A2, Timer ne timer)	_
Watchdog Ti	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only		1 (sha	red wit	h Timer	A4, Tim	ner A1,	Timer A2	2, Timer	B2, Dea	d time	timer)			1 (shared with Timer A1, Time B2, Dead tir 3 (UA	h Timer A4, er A2, Timer me timer)		3 (Time 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, er A2, Timer ne timer)	2 (U
Watchdog Ti Serial Interface	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async.		1 (sha	red wit	h Timer	A4, Tim	ner A1,	Timer A2	2, Timer	B2, Dea	1 (SI/O)	timer)		_	1 (shared with Timer A1, Time B2, Dead tir	h Timer A4, er A2, Timer me timer)	_	3 (Time 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, er A2, Timer ne timer)	_
Watchdog Ti Serial Interface ² C-bus	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only		1 (sha	red wit	h Timer	A4, Tin	ner A1,	Timer A2	2, Timer	B2, Dea	1 (SI/O)	timer)			1 (shared with Timer A1, Time B2, Dead tir 3 (UA	h Timer A4, er A2, Timer me timer)		3 (Time 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, er A2, Timer ne timer)	2 (U
Watchdog Ti Serial Interface ² C-bus EBus	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only		1 (sha	red wit	h Timer	A4, Tim	ner A1,	Timer A2	2, Timer	B2, Dea	d time 1 2 (SI/O) 3 (UART	timer)			1 (shared with Timer A1, Time B2, Dead tir 3 (UA	h Timer A4, er A2, Timer me timer)		3 (Time 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, er A2, Timer ne timer)	2 (U
Watchdog Ti Serial Interface PC-bus IEBus Smart Card/S	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only		1 (sha	red wit	h Timer	A4, Tim	ner A1,	Timer A2	2, Timer	B2, Dea	1 (UART I (UART I (UART	timer)			1 (shared with Timer A1, Time B2, Dead tir 3 (UA	h Timer A4, er A2, Timer me timer)		3 (Time 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, er A2, Timer ne timer)	2 (U
Watchdog Ti Serial Interface PC-bus IEBus Smart Card/s Synchronous Serial	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only SIM Communication Unit/Special Serial I/O		1 (sha	red wit	h Timer	A4, Tin	ner A1,	Timer A2	2, Timer	B2, Dea	d time 1 2 (SI/O) 3 (UART	timer)			1 (shared with Timer A1, Time B2, Dead tir 3 (UA	h Timer A4, er A2, Timer me timer)		3 (Time 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, er A2, Timer ne timer)	2 (U
Watchdog Ti Serial Interface I ^c C-bus IEBus Smart Card/s	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only SIIM Communication Unit/Special Serial1/0 Channels		1 (sha	red wit	h Timer	A4, Tim	ner A1,	Timer A2	2, Timer	B2, Dea	1 (UART I (UART I (UART	timer)			1 (shared with Timer A1, Time B2, Dead tir 3 (UA	h Timer A4, er A2, Timer me timer)		3 (Time 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, er A2, Timer ne timer)	2 (U
Watchdog Ti Serial Interface FC-bus IEBus Smart Card/s Synchronous Serial CAN	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only SIM Communication Unit/Special Serial I/O		1 (sha	red wit	h Timer	A4, Tin	ner A1,	Timer A2	2, Timer	B2, Dea	d time f	timer)			1 (shared with Timer A1, Time B2, Dead tir 3 (UA	h Timer A4, er A2, Timer me timer)		3 (Time 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, er A2, Timer ne timer)	2 (U
Watchdog Til Serial Interface PC-bus IEBus Smart Card/S Synchronous Serial CAN	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers)		1 (sha	red wit	h Timer	A4, Tin	ner A1,	Timer A2		B2, Dea	1 (UART I (UAR))))	+ 1))		1 (shared with Timer A1, Time B2, Dead tir 3 (UA	h Timer A4, er A2, Timer me timer)		3 (Time 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, er A2, Timer ne timer)	2 (U
Watchdog Ti Serial Interface PC-bus IEBus Smart Card/S Synchronous Serial CAN IrDA CRC Calculat	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only Communication Unit/Special Serial1/0 Channels Message Box (Numbers)		1 (sha	red wit	h Timer	A4, Tin	ner A1,	Timer A2		B2, Dea	1 (UART I (UAR	timer)	+ 1))		1 (shared with Timer A1, Time B2, Dead tir 3 (UA	h Timer A4, er A2, Timer me timer)		3 (Time 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, er A2, Timer ne timer)	2 (U
Watchdog Til Serial Interface PC-bus IEBus Smart Card/S Synchronous Serial CAN	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only SIM Communication Unit/Special Serial I/0 Channels Message Box (Numbers)		1 (sha	red wit	h Timer	A4, Tim	ner A1,	Timer A2		B2, Dea	1 (SI/O) 3 (UART 3 (UART 1 (UART 1 (UART))))	+ 1))		1 (shared with Timer A1, Time B2, Dead tir 3 (UA	h Timer A4, er A2, Timer me timer)		3 (Time 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, er A2, Timer ne timer)	2 (U
Watchdog Ti Serial Interface PC-bus IEBus Smart Card/S Synchronous Serial CAN IrDA CRC Calculat	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers)		1 (sha	red wit		A4, Tim	ner A1,	Timer A2		B2, Dea	1 2 (SI/O) 3 (UART 3 (UART 1 (UART	timer)	+ 1))		1 (shared with Timer A1, Time B2, Dead tir 3 (UA	h Timer A4, er A2, Timer me timer) ART)		3 (Tim: 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, per A2, Timer ne timer)	2 (U) 1 (U)
Watchdog Ti Serial Interface PC-bus IEBus Smart Card/3 Synchronous Serial CAN IrDA CRC Calculat X/Y Converte	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only SIM Communication Unit/Special SerialI/0 Channels Message Box (Numbers) cion Circuit er Input Only (Numbers) CMOS I/O (Numbers)		1 (sha	red wit			ner A1,	Timer A2		B2, Dea	1 2 (SI/O) 3 (UART 3 (UART 1 (UART 1 (UART 1 (UART - 1 (UART 1 (UART - 1 (UART))))	+1))	2 (UART)	1 (shared with Timer A1, Timu B2, Dead tin 3 (UA	h Timer A4, er A2, Timer me timer) ART)	2 (UART) 1 (UART)	3 (Time 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, per A2, Timer ne timer)	2 (U.
Watchdog Ti Serial Interface ² C-bus EBus Smart Card/3 ynchronous Serial CAN rDA CRC Calculat K/Y Converte	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers)		1 (sha	red wit			ner A1,	Timer A2		B2, Dea	1 2 (SI/O) 3 (UART 3 (UART 1 (UART	timer)	+ 1))	2 (UART)	1 (shared with Timer A1, Timu B2, Dead tin 3 (UA	h Timer A4, er A2, Timer me timer) ART)	2 (UART) 1 (UART)	3 (Tim: 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, per A2, Timer ne timer)	2 (U) 1 (U)
Watchdog Ti Serial Interface PC-bus IEBus Smart Card/3 Synchronous Serial CAN IrDA CRC Calculat X/Y Converte	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) cion Circuit er Input Only (Numbers) ICMOS I/O (Numbers) IN-Channel Open Drain Port (Numbers)		1 (sha	red wit	5		ner A1,	Timer A2		B2, Dea	1 2 (SI/O) 3 (UART 3 (UART 1 (UART 3 (UART	timer)	+1))	2 (UART)	1 (shared with Timer A1, Timu B2, Dead tin 3 (UA	h Timer A4, er A2, Timer me timer) ART) -	2 (UART) 1 (UART)	3 (Tim: 1 (shared with Timer A1, Time B2, Dead tin	n Timer A4, re A2, Timer ne timer)	2 (U) 1 (U)
Watchdog Ti Serial Interface PC-bus IEBus Smart Card/S Synchronous Serial CAN IrDA CRC Calculat	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only SIM Communication Unit/Special Serial1/0 Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor		1 (sha	ared with	5	0	3 (U	Timer A2		B2, Dea	1 2 (SI/O) 3 (UART 3 (UART 1 (UART 3 (UART	timer))))) X ¹² + X ⁵ -	+ 1))	2 (UART) 1 (UART) 68	1 (shared with Timer A1, Timer A2, Timer A3, Timer A3, Timer A3 (UA)	h Timer A4, er A2, Timer me timer)	2 (UART)	3 (Tirm 1 (shared with Timer A1, Timer B2, Dead tin 3 (UA	n Timer A4, er A2, Timer ne timer)	2 (U
Watchdog Ti Serial Interface 2C-bus EBus Smart Card/s Synchronous Serial CAN rDA CRC Calculat K/Y Converter /O Ports	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only SIM Communication Unit/Special Serial1/0 Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor		1 (sha	ired wit	5	0	3 (U	ART)		B2, Dea	1 2 (SI/O) 3 (UART 3 (UART 1 (UART 3 (UART	timer))))) X ¹² + X ⁵ -	+1))	2 (UART) 1 (UART) 68	1 (shared with Timer A1, Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (U.A.	h Timer A4, er A2, Timer me timer)	2 (UART) 1 (UART) 68	3 (Tirm 1 (shared with Timer A1, Timer B2, Dead tin 3 (UA)	n Timer A4, er A2, Timer ne timer)	2 (U) 1 (U)
Watchdog Ti Serial Interface 2C-bus EBus Smart Card/s Synchronous Serial CAN rDA CRC Calculat K/Y Converter /O Ports	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only Communication Unit/Special Serial1/0 Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) N-Channel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins		1 (sha	viting the second secon	5	0	3 (U	ART)		B2, Dea	1 2 (SI/O) 3 (UART 3 (UART 1 (UART 3 (UART	timer))))) X ¹² + X ⁵ -	+1))	2 (UART) 1 (UART) 68	1 (shared with Timer A1, Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (U.A.	h Timer A4, er A2, Timer me timer) ART) -	2 (UART) 1 (UART) 68	3 (Tirm 1 (shared with Timer A1, Timer B2, Dead tin 3 (UA)	n Timer A4, er A2, Timer ne timer)	2 (U) 1 (U)
Watchdog Til Serial Interface C-bus EBus Smart Card/synchronous Serial CAN TDA CRC Calculat K/Y Converte /O Ports External Inte	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/0 Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug		1 (sha	with the second	5	0	3 (U	ART) -		B2, Dea	1 2 (SI/O) 3 (UART 3 (UART 1 (UART 3 (UART	timer))))) X ¹² + X ⁵ -	+1))	2 (UART) 1 (UART) 68	1 (shared with Timer A1, Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (U.A.	h Timer A4, er A2, Timer me timer) ART) - - - - - - - - - - - - -	2 (UART) 1 (UART) 68	3 (Tirm 1 (shared with Timer A1, Timer B2, Dead tin 3 (UA)	n Timer A4, er A2, Timer ne timer)	2 (U) 1 (U)
Vatchdog Tilerial Interface C-bus EBus Smart Card/synchronous Serial CAN PAC Calculat C/Y Converte O Ports External Inter ebugging Function	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) cion Circuit er Input Only (Numbers) I/Channel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others		1 (sha	with the second	5	0	3 (U	ART) - II - Yes	1 (C	B2, Dea	1 2 (SI/O) 2 (SI/O) 8 (UART 6 (UART 1 1 (UART 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	timer)))) X ¹² + X ⁵ -		2 (UART) 1 (UART) 68 68 8	1 (shared with Timer A1, Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (U.A.	h Timer A4, Timer A4, Timer A4, Timer A4, Timer B4, Time	2 (UART) 1 (UART) 68	3 (Tirm 1 (shared with Timer A1, Timer B2, Dead tin 3 (UA)	n Timer A4, ra A2, Timer ne timer)	2 (U) 1 (U)
Natchdog Tiles of the control of the	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage		1 (sha	ared wit	5	0	3 (U	ART) - II - Yes	1 (C	B2, Dea	1 2 (SI/O) 6 (UART	timer)))) X ¹² +X ⁵ - 5		2 (UART) 1 (UART) 68 68 8	1 (shared with Timer A1, Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (U.A.	h Timer A4, Timer A4, Timer A4, Timer A4, Timer B4, Time	2 (UART) 1 (UART) 68	3 (Tirm 1 (shared with Timer A1, Timer B2, Dead tin 3 (UA)	n Timer A4, ra A2, Timer ne timer)	2 (U) 1 (U)
Vatchdog Tile in interface in i	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync./ Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) cion Circuit er Input Only (Numbers) I/Channel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others		1 (sha	ared with	5	0	3 (U	ART) - II - Yes	1 (C	B2, Dea	1 2 (SI/O) 2 (SI/O) 8 (UART 6 (UART 1 1 (UART 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	timer)))) X ¹² +X ⁵ - 5		2 (UART) 1 (UART) 68 68 8	1 (shared with Timer A1, Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (U.A.	h Timer A4, Timer A4, Timer A4, Timer A4, Timer B4, Time	2 (UART) 1 (UART) 68	3 (Tirm 1 (shared with Timer A1, Timer B2, Dead tin 3 (UA)	n Timer A4, ra A2, Timer ne timer)	2 (U) 1 (U)
Watchdog Tile Serial Interface Constant Card/Synchronous Serial CAN TDA CRC Calculate K/Y Converte O Ports External Inter Debugging Function Other Functions Operating Fr	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	nouB-A			5 5 5	0	3 (U	ART) - I1 - Yes	1 (C	3V, /3.0 to 5 0 -20 tc	1 2 (SI/O) 3 (UART 1 (I (UART 1 (timer)))) X ¹² + X ⁵ - 5 face MHz/2.7 0 to 85	to 5.5V	2 (UART) 1 (UART) 68 68 8	1 (shared with limer A), Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (UA)	h Timer A4, Zimer me timer) ART)	2 (UART) 1 (UART) 68 68	3 (Tirm 1 (shared with Timer A1, Timer B2, Dead tin 3 (UA	n Timer A4, r A2, Timer ne timer) IRT) Ves	- 2 (U. 1 (U
Natchdog Ti Serial Interface C-bus EBus Semart Card/s synchronous Serial CAN rDA CRC Calculat K/Y Converte /O Ports External Inte Debugging Function Other Functions Operating Fr Operating Ar	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	1100JB-A			5 5 5	0	3 (U	ART) - I1 - Yes	1 (C	3V, /3.0 to 5 0 -20 tc	1 2 (SI/O) 3 (UART 1 (I (UART 1 (timer)))) X ¹² + X ⁵ - 5 face MHz/2.7 0 to 85	to 5.5V	2 (UART) 1 (UART) 68 68 8	1 (shared with limer A), Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (UA)	h Timer A4, Zimer me timer) ART)	2 (UART) 1 (UART) 68 68	3 (Tirm 1 (shared with Timer A1, Timer B2, Dead tin 3 (UA	n Timer A4, r A2, Timer ne timer) IRT) Ves	- 2 (U. 1 (U
Natchdog Ti Serial Interface C-bus EBus Semart Card/s synchronous Serial CAN rDA CRC Calculat K/Y Converte /O Ports External Inte Debugging Function Other Functions Operating Fr Operating Ar	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	P0100JB-A			5 5 5	0	3 (U	ART) - I1 - Yes	1 (C	3V, /3.0 to 5 0 -20 tc	1 2 (SI/O) 3 (UART 1 (I (UART 1 (timer)))) X ¹² + X ⁵ - 5 face MHz/2.7 0 to 85	to 5.5V	2 (UART) 1 (UART) 68 68 8	1 (shared with limer A), Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (UA)	h Timer A4, Zimer me timer) ART)	2 (UART) 1 (UART) 68 68	3 (Tirm 1 (shared with Timer A1, Timer B2, Dead tin 3 (UA	n Timer A4, r A2, Timer ne timer) IRT) Ves	- 2 (U. 1 (U
Vatchdog Tiles of the control of the	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	RQP0100JB-A			5 5 5	0	3 (U	ART) - I1 - Yes	1 (C	3V, /3.0 to 5 0 -20 tc	1 2 (SI/O) 3 (UART 1 (I (UART 1 (timer)))) X ¹² + X ⁵ - 5 face MHz/2.7 0 to 85	to 5.5V	2 (UART) 1 (UART) 68 68 8	1 (shared with limer A), Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (UA)	h Timer A4, Zimer me timer) ART)	2 (UART) 1 (UART) 68 68	3 (Tirm 1 (shared with Timer A1, Timer B2, Dead tin 3 (UA	n Timer A4, r A2, Timer ne timer) IRT) Ves	2 (U
Vatchdog Tilerial Interface C-bus EBus EBus EBus EAN DA EAN DA EC Calculat C/Y Converte CO Ports External Inter Exbugging Function ther Functions Operating Fr Operating Ar	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	PRQP0100JB-A	1 (sha	PRQP0100JB-A	5	0	3 (U	ART) - II - Yes	1 (C	B2, Dea	1 2 (SI/O) 6 (UART	timer)))) X ¹² +X ⁵ - 5		2 (UART) 1 (UART) 68 68 8	1 (shared with Timer A1, Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (U.A.	h Timer A4, Timer A4, Timer A4, Timer A4, Timer B4, Time	2 (UART) 1 (UART) 68	3 (Tirm 1 (shared with Timer A1, Timer B2, Dead tin 3 (UA)	n Timer A4, ra A2, Timer ne timer)	2 (U
Vatchdog Tilerial Interface C-bus EBus Gmart Card/s ynchronous Serial CAN CDA CRC Calculat C/Y Converte CO Ports External Inte ebugging Function Operating Fr Operating Ar	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	PRQP0100JB-A			5 5 5	0	3 (U	ART) - I1 - Yes	1 (C	3V, /3.0 to 5 0 -20 tc	1 2 (SI/O) 3 (UART 1 (I (UART 1 (timer)))) X ¹² + X ⁵ - 5 face MHz/2.7 0 to 85	to 5.5V	2 (UART) 1 (UART) 68 68 8	1 (shared with limer A), Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (UA)	h Timer A4, Zimer me timer) ART)	2 (UART) 1 (UART) 68 68	3 (Tirm 1 (shared with Timer A1, Timer B2, Dead tin 3 (UA	n Timer A4, r A2, Timer ne timer) IRT) Ves	2 (U
Natchdog Ti Serial Interface C-bus EBus Semart Card/s synchronous Serial CAN rDA CRC Calculat K/Y Converte /O Ports External Inte Debugging Function Other Functions Operating Fr Operating Ar	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	PRQP0100JB-A			5 5 5	0	3 (U	ART) - I1 - Yes	1 (C	3V, 73.0 to 5 0 -20 to 4 8700000000000000000000000000000000000	1 2 (SI/O) 8 (UART III (UART III (UART III (UART III III III III III III III III III I	timer))))) X ¹² + X ⁵ 5 face MHz/2.7 0 to 85 V-800000000000000000000000000000000000	PLOP0100KB-A	2 (UART) 1 (UART) 4-W	1 (shared with limer A), Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (UA)	h Timer A4, Zimer me timer) ART)	2 (UART) 1 (UART) 68 68	3 (Tirm 1 (shared with Timer At, Timer B2, Dead tin B2, Dead tin B2, Dead tin B2, Dead tin B3 (UA B5) B5	n Timer A4, r A2, Timer r A2, r A2, Timer r A2, r A3, r A4, r A3, r A4, r A3, r A4,	2 (U. 1 (U.
Natchdog Ti Serial Interface C-bus EBus Semart Card/s synchronous Serial CAN rDA CRC Calculat K/Y Converte /O Ports External Inte Debugging Function Other Functions Operating Fr Operating Ar	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	PRQP0100JB-A			5 5 5	0	3 (U	ART) - I1 - Yes	1 (C	3V, 73.0 to 5 0 -20 to 4 8700000000000000000000000000000000000	1 2 (SI/O) 8 (UART III (UART III (UART III (UART III III III III III III III III III I	timer))))) X ¹² + X ⁵ 5 face MHz/2.7 0 to 85 V-800000000000000000000000000000000000	PLOP0100KB-A	2 (UART) 1 (UART) 4-W	1 (shared with limer A), Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (UA)	h Timer A4, Zimer me timer) ART)	2 (UART) 1 (UART) 68 68	3 (Tirm 1 (shared with Timer At, Timer B2, Dead tin B2, Dead tin B2, Dead tin B2, Dead tin B3 (UA B5) B5	n Timer A4, r A2, Timer r A2, r A2, Timer r A2, r A3, r A4, r A3, r A4, r A3, r A4,	2 (U
Vatchdog Tileserial Interface CC-bus EBus Smart Card/Synchronous Serial CAN TDA RC Calculat C/Y Converts CAN CAN CO Ports External Interebugging Function Other Functions Operating Fr Operating Ar Cackage	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	PRQP0100JB-A			5 5 5	0	3 (U	ART) - I1 - Yes	1 (C	3V, 73.0 to 5 0 -20 to 4 8700000000000000000000000000000000000	1 2 (SI/O) 8 (UART III (UART III (UART III (UART III III III III III III III III III I	timer))))) X ¹² + X ⁵ 5 face MHz/2.7 0 to 85 V-800000000000000000000000000000000000	PLOP0100KB-A	2 (UART) 1 (UART) 4-W	1 (shared with Timer A1, Time B2, Dead tin B	h Timer A4, Timer A4, Timer B4, A2, Timer B4, A2, Timer B4, B4,	2 (UART) 1 (UART) 1 (UART) 4 (3 (Tirm 1 (shared with Timer At, Timer B2, Dead tin B2, Dead tin B2, Dead tin B2, Dead tin B3 (UA B5) B5	n Timer A4, r A2, Timer r A2, r A2, Timer r A2, r A3, r A4, r A3, r A4, r A3, r A4,	2 (U
Vatchdog Tiles of the control of the	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage		PLQP0100KB-A	PRQP0100JB-A	PLQP0100KB-A	PRQP0100JB-A	3 (U	ART) - Yes	1 (C) 4-840100KB-A	3V, 73.0 to 5 0 -20 to 4 8700000000000000000000000000000000000	1 2 (SI/O) 8 (UART III (UART III (UART III (UART III III III III III III III III III I	timer))))) X ¹² + X ⁵ 5 face MHz/2.7 0 to 85 V-800000000000000000000000000000000000	PLOP0100KB-A	2 (UART) 1 (UART) 4-W	1 (shared with Timer A1, Time B2, Dead tin B	h Timer A4, Timer A4, Timer B4, A2, Timer B4, A2, Timer B4, B4,	2 (UART) 1 (UART) 1 (UART) 4 (3 (Tirm 1 (shared with Timer At, Timer B2, Dead tin B2, Dead tin B2, Dead tin B2, Dead tin B3 (UA B5) B5	n Timer A4, r A2, Timer r A2, r A2, Timer r A2, r A3, r A4, r A3, r A4, r A3, r A4,	2 (U 1 (U
Vatchdog Tilerial Interface C-bus EBus Gmart Card/s ynchronous Serial CAN PDA RC Calculat (/Y Converts External Intellebugging Function other Functions Operating Fr Operating Ar Package	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage		PLQP0100KB-A	PRQP0100JB-A	PLQP0100KB-A	PRQP0100JB-A	3 (U	ART) - Yes	1 (C) 4-840100KB-A	3V, 73.0 to 5 0 -20 to 4 8700000000000000000000000000000000000	1 2 (SI/O) 8 (UART III (UART III (UART III (UART III III III III III III III III III I	timer))))) X ¹² + X ⁵ 5 face MHz/2.7 0 to 85 V-800000000000000000000000000000000000	PLOP0100KB-A	2 (UART) 1 (UART) 4-W	1 (shared with Timer A1, Time B2, Dead tin B	h Timer A4, Timer A4, Timer B4, A2, Timer B4, A2, Timer B4, B4,	2 (UART) 1 (UART) 1 (UART) 4 (3 (Tirm 1 (shared with Timer At, Timer B2, Dead tin B2, Dead tin B2, Dead tin B2, Dead tin B3 (UA B5) B5	n Timer A4, r A2, Timer r A2, r A2, Timer r A2, r A3, r A4, r A3, r A4, r A3, r A4,	2 (U. 1 (U.
Vatchdog Tilerial Interface C-bus EBus EBus CAN DA RC Calculat (// Y Converte // O Ports xternal Inte ebugging Function ther Functions Operating Fr Operating Ar ackage	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage		PLQP0100KB-A	PRQP0100JB-A	PLQP0100KB-A	PRQP0100JB-A	3 (U	ART) - Yes	1 (C) 4-840100KB-A	3V, 73.0 to 5 0 -20 to 4 8700000000000000000000000000000000000	1 2 (SI/O) 8 (UART III (UART III (UART III (UART III III III III III III III III III I	timer))))) X ¹² + X ⁵ 5 face MHz/2.7 0 to 85 V-800000000000000000000000000000000000	PLOP0100KB-A	2 (UART) 1 (UART) 4-W	1 (shared with Timer A1, Time B2, Dead tin B	h Timer A4, Timer A4, Timer B4, A2, Timer B4, A2, Timer B4, B4,	2 (UART) 1 (UART) 1 (UART) 4 (3 (Tirm 1 (shared with Timer At, Timer B2, Dead tin B2, Dead tin B2, Dead tin B2, Dead tin B3 (UA B5) B5	n Timer A4, r A2, Timer r A2, r A2, Timer r A2, r A3, r A4, r A3, r A4, r A3, r A4,	2 (U 1 (U
Vatchdog Tilerial Interface C-bus EBus Gmart Card/s ynchronous Serial CAN PDA RC Calculat (/Y Converts External Intellebugging Function other Functions Operating Fr Operating Ar Package	Event Counter 2-Phase Encoder Input 3-Phase Inverter Control mer Clock Sync. / Clock Async. Clock Sync. Only Clock Async. Only Clock Async. Only SIM Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) Inchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	W30622SPFP PRQP0100JB-A			5 5 5	0	3 (U	ART) - I1 - Yes	1 (C	3V, /3.0 to 5 0 -20 tc	1 2 (SI/O) 3 (UART 1 (I (UART 1 (timer)))) X ¹² + X ⁵ - 5 face MHz/2.7 0 to 85	to 5.5V	2 (UART) 1 (UART) 68 68 8	1 (shared with limer A), Time B2, Dead tin B2, Dead tin B2, Dead tin B3 (UA)	h Timer A4, Zimer me timer) ART)	2 (UART) 1 (UART) 68 68	3 (Tirm 1 (shared with Timer A1, Timer B2, Dead tin 3 (UA	n Timer A4, r A2, Timer ne timer) IRT) Ves	- 2 (U 1 (U

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

• Specifications (M16C/60 Series : M16C/62P Group)

Program Security	Group												М	16C/6	2P										
MAM (Pyres)		ROM (Bytes)		128K		12	8K + 4	IK		192K				25	6K				2	56K + 4	1K			320K	
Description		RAM (Bytes)			1						12	2K						20						16K	
Description Control	Memory					-11.15													***						
Foreign and Section Foreign Fo	•	Data Flash/E2 Data Flash											_					Van II				-41			
Part		Program Security		-									_					ROM	Code	Prote	ck Func	ction,		-	
March Interface Part Par		CPU											M16	C/60 (Core										
Mailtiglier																									
Married State St	CPU																								_
Barrel Shifter																									
MAC DOCAMAC DOCAMAC													10 ^	- 52	. 32										_
DTC/DMAC State Space (Bytes) State St	DRAA													2											
External Bus interface Septic header Sep	ZIVIA		L	_										_											
A Comparison Superson Super			Support for of 1 to 3 with Outputs 4 c signals, Av 4M bytes b space ex	r insertion ait states, chip-select railable to by address pansion	_	Support for of 1 to 3 wa Outputs 4 cl signals, Ava 4M bytes by space exp	insertion ait states, hip-select ailable to y address pansion	_	Supp	ort for	inserti	ion of	1 to 3 v	wait st			s 4 chi			ıals, Av	/ailabl	e to 4N	/I byte:	s by ac	dre
DRAM Controller	External Bus Expansion	Bus Structure	Selectab Separat Multiplex I Bus Widtl selected (8 The number address bus	le from te bus, bus, Data h can be 8/16-bit), r of output ses can be	_	Selectabl Separate Multiplex b Bus Width selected (8 The number address bus	le from e bus, ous, Data o can be 1/16-bit), of output es can be	_	Sele	ctable	from \$	Separa										3/16-bit	t), The	numb	er o
PLL		DRAM Controller												_											
Subdock Fee		Clock Generation Circuit								4 circu	uits (M	ain clo	ck, PLI		clock,	On-ch	ip osci	llator)							
A Converter Control																									_
On-Chip Osellators On-Chip														Yes											_
Desilitation Stop Detection Frequency Divider Frequency Divi	Clock													Yes											_
Frequency Divider																									_
Power-On Reset/FOR Power-O		Frequency Divider										1		= 1, 2, 4		5)									
Note													W	ait/St	ор										_
Resolution x Channels Reso	ower Supply													_											
10 Convert Michael Sample and Hold	orage Detection																								
Motificianest Sample and Hold Septime Se	\/D Converter												10		26										_
A Converted Resolution x Channels S-bit x 2 S-bit x 2 S-bit x 2 S-bit x 2 S-bit x 3 S-bit x 3 S-bit x 4 S-bit x 5 S-	A/D Converter													-											_
16-bit	D/A Converter												8	3-bit×	2										_
Input Capture														_											
Output Compare Park S (Timer A) 3 (T												1	1 (Tim	er A, T	īmer E	3)									
PWM Output S (Timer A) 3/line k S (Timer A) S (Time														_											
Real-Time Port			E /Tim	λον Δ\	2 (Times A)	E /Tim	or A)	2 (Times A)								E /	Timor	Λ\							
Event Counter	Timer		o (IIIII)	ier A)	3 (Timer A)	mir) e	er A)	3 (Timer A)								5 (ıımer	A)							
2-Phase Invote Invote 3 (Timer A) 2 (Timer B) 2	· · · · · · · · · · · · · · · · · · ·											1	1 (Tim	er A. T	īmer E	3)									_
Ashbase Inverted Control Robert friend Robert friend			3 (Tim	er A)	2 (Timer A)	3 (Tim	er A)	2 (Timer A)						,			Timer	A)							_
Clock Sync, Only Clock Async, Only Clock			Timer A1, Tim	er A2, Timer	_	Timer A1, Time	er A2, Timer	_			1	(share	d with		r A4 , Ti	imer A	1, Tim	er A2, ⁻	Timer	B2, De	ad tim	e time	r)		
Clock Sync. Only	Watchdog Tir		2 (11/	ADT\	2 (LIADT)	2 (114	DT)	2 (LIADT)						1		2	/LIADT	r\							
Clock Async, Only	Sorial Interface		3 (UA	ART)	Z (UAKI)	3 (UA	(KI)	Z (UAKI)						(\$1/0	1)	3	(UAK)							
C-bus SBus 3 (UART) SBus 3 (UART) SBus 1 (UART) SB	Serial iliteriace		-		1 (UART)	_		1 (UART)						. (31/0	'		_								
The control of the function The	l²C-bus							. (********					3	(UAR	Τ)										_
Channels	IEBus																								
Channels Channels																									
Message Box (Numbers)	Synchronous Serial (-										3		Γ)										
DA	CAN																								_
CRC Calculation Circuit	IrDA	coodgo Dox (Mullibers)												_											_
Input Only (Numbers)	CRC Calculati											1 (CR	CCIT	T (X ¹⁶ +	X12 +	(⁵ + 1))									
CO Ports CO S / O (Numbers) 85 68 85 68 85 111	X/Y Converte													_											
NC Ports NC Ports NC Ports NC Ports Pright Current Drive Port Pright Curre			<u> </u>	-				60	_	c	144	_	c .		_	E	444	_	-	144			c		
High Current Drive Port Pull-Up Resistor 85 68 85 68 85 68 85 111	I/O Porte		8	5	68	85	,	68	8	5	111	8	ວ		8	5	111	8	5	111		- 8	5		1
Pull-Up Resistor 85 68 85 68 85 111 85	.,																								_
NoChip Debug		Pull-Up Resistor	8	5	68	85	5	68	8	5	111	8	5		8	5	111	8	5	111		8	5		1
On-Board Flash Program - Yes Yes - Yes Yes - Yes Yes - Yes -	External Inter		11		8	11		8									11								_
Non-Correction Function Yes - Yes Ye	Debugging Function																								_
Others O																							-		_
Perating Frequency/Supply Voltage 24MHz/3.0 to 5.5V, 10MHz/2.7 to 5.5V	Other Functions			162										V inte	rface									162	_
Company Comp	Operating Fre										241	VIHz/3				.7 to 5	.5V								_
			L .																						_
			4	4	4	_	a	₫	4	a	4		a	a		a	4	4	a	4	_ a	a		a	.
	Package		QP0100JB-/	.QP0100KB-/	QP0080JA-	QP0100JB-/	.QP0100KB-/	10P0080JA-	QP0100JB-/	.QP0100KB-/	.QP0128KB-/	QP0100JB-/	.QP0100KB-/	.QP0128KB-/	QP0100JB-/	.QP0100KB-/	.QP0128KB-/	QP0100JB-/	.QP0100KB-/	.OP0128KB-/	10P0100JB-	.QP0100KB-/	QP0100JB-/	.QP0100KB-/	
### ### ### ### ### ### ### ### ### ##			_ ≝		<u> </u>	<u> </u>	చ	<u>F</u>	_ E	귙	굽	<u> </u>	占	ᆸ	<u> </u>	귙		4	ᆸ	ᆫచ	_ #	귙	_ E	귙	
M30620MCP-XXXF M30620MCP-XXXG M30621MCP-XXXG M30622MCP-XXXG M30622MCP-XXXG M30622MGP-XXXG M30622MGP-XXXF M30622MMP-XXXF M30622MMP-XXXF			_	٩	_				α.	۵.	_	_	Ģ.	و.	_	<u>م</u>	و.						ę.	95	
M30620MCI M30620MCI M30621MCI M30621MCI M30622MEI M30622MGI M30622MGI M30624MGI M30624FGP M30624FGP M30621FGP M30621FGP M30621FGP M30621FGP M30621FGP M30621FGP M30621FGP M30621FGP M30621FGP M30621FGP M30621FGP	Part No.		-XXXFI	5-XXXG	5-XXXG	<u>e</u>	GP	GP	-XXXFI	SXXX-	5XXXG	P-XXXF	P-XXXG	P-XXXG	P-XXXF	P-XXXG	P-XXXG	Ē	GР	ą.	Ē.	g ₀	P-XXXF	P-XXXC	
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			130620MCP	130620MCP	130621MCP	130620FCPF	130620FCP	130621FCPC	130622MEP	130622MEP	130623MEP	130622MGF	130622MGF	130623MGF	130624MGF	130624MGF	130625MGF	130624FGPI	130624FGP0	130625FGP	13062LFGPI	13062LFGP(130622MWI	130622MWI	GOVEN GIRINGGOOGEN
			≥	2	2	2	2	Σ	Σ	2	2	Σ	2	2	≥	Σ	≥	2	≥	≥	Σ	2	Σ	Σ	

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Oz : OzROM version

• Specifications (M16C/60 Series : M16C/62P Group)

Manual M	Group	Juliona (W1100/C								<u> </u>				M160	:/62P											
Memory Description Descr	•	ROM (Bytes)			32	0K							384K					38	34K + 4	1K		512K		5	12K + 4	4K
DEAT PRINTED Files				24K			31K						24K							3′	IK					
Program Security	Memory		_							M								AIZ I				M		AIZ		
Projection Assembly	-																							_		
Basic heteroreform		Program Security								_								ROM Co	de Protect	Function)		_				
Ministration for Architect Ministration Minis													N			е										
Multiplear 16 x 16 - 22																										
March Accordance 16 × 16 + 22 + 22 22 23	CPU		-										4			z)										
Barrel Shifter													16			32										
DIADA																										
Clock	DMA													2	2											
External Bus External Bus External Bus External Bus Structure Capacita Cap	DIVIA																									
Separate Description Substitution Substitutio	Forternal Book			Cunn	art fa	incor	tion of	1 +0 2	woit	ototoo	Outo	uto 4	shin or			Avoil	abla ta	4N/1 h	utoc b	v odd	****	2000 0	vnono	ion fur	ation	
Clock Clock Generation Grazif			Select																							
PLL						- p a a	, .			-,				_	_	,,									,	,
Subclock										4 ci	rcuits	(Main	clock,	PLL, S	ub clo	ck, Or	n-chip	oscilla	tor)							
Clock Price Pric			_																							
Check Chec			-											Ye	es											
Content Person	Clock													V	-											
Frequency Divider Freq																										
Power-On Reset/FOR													1/n			, 16)										
Water Water Was Converted Was Converted Was Converted Was Converted Was Was Converted Was														Wait/	Stop											
AD Converter Sample and Hold Sample and Ho	Power Supply		_										Va	- //		1										
Sample and Hold Sample and	voltage Detection												re			ge)										
Math-Channels September	A/D Converter																									
Sebit 11		Multi-Channel Sample and Hold		 8-bit×2 																						
16-bit	D/A Converter		<u> </u>											8-bi	t×2											
Imput Capture			_										44 (7	-	- \ Ti	D\										
Output Compare Feat-Time Port Feat													11(imer A	4, Hm	er b)										
Figure F														_	-											
Event Counter 3-Phase Encoder Input 3-Phase Enco	Timer													5 (Tim	ner A)											
2-Phase Renoder Input 1 (shared with Timer A4, Timer A2, Timer B2, Dead time timer 1 (shared with Timer A4, Timer A4, Timer B4, Timer B2, Dead time timer 1 (shared with Timer A4, Timer A4, Timer B4, Timer B4, Timer B2, Dead time timer 1 (shared with Timer A4, Timer A4, Timer B4, Timer														-												
S-Phase Invertee Control 1 (shared with Timer A4, Timer A2, Timer B2, Dead time timer) 1 1 1 1 1 1 1 1 1													11 (7			er B)										
Vale									1 (sha	red w	ith Tin	ner A4	Time			12 Tin	ner R2	Dead	time	timer)						
Clock Sync. Clock Async. Only 2 (SI/O) 2 (SI/O)	Watchdog Tin								1 (3110	ii cu vi		101 744	,			·, ····	ici DE,	Deua		tillioi,						
Clock Async. Only		Clock Sync./ Clock Async.																								
FC-bus	Serial Interface													2 (S	I/O)											
Smart Card/SIM	I²C hua	Clock Async. Only	-											2/11	A DT\											
Care																										
CAN Message Box (Numbers)		IM																								
Final Fina	Synchronous Serial C																									
FDA	CAN																									
CRC Calculation Circuit	IrDΔ	iviessage Box (Numbers)	-																							
Input Only (Numbers) S5		on Circuit										1 (0	CRC-C	CITT ()	(16 + X1	2 + X ⁵ +	- 1))									
I/O Ports External Interrupt Pins Exte		r												-	-											
High Current Drive Port Pull-Up Resistor 85 111	L/O D t.		8	5	111	8	15	111	8	35	111	8	5			5	111	8	5	111	8	5	111	8	5	111
Full-Up Resistor 85	I/O Ports													- 2	<u>.</u>											
External Interrupts Pins			8!	5	111	8	15	111	8	85	111	8	5	111	8	5	111	8	5	111	8	5	111	8	5	111
Debugging Function Debug Debugging Function Debugging Functions Debugging Func	External Inter		Ľ																							
Color Colo	Debugging Function									_												_				
Other Othe	bedagging runotion		_																Yes						Yes	
Operating Frequency/Supply Voltage	Other Functions		-							Yes			21	/ 5V i	atorfa	20			_			Yes			_	
Coperating Ambient Temperature (°C)	Operating Fre										2	24MHz					to 5.5\	,								
XXXGP																										
XXXGP																										
XXXGP			_	_		_		_			_			_	_	_	_	_	_		_		_		_	
XXXGP			<u>4</u>	À	<u></u>	4	/ <u>A</u>	<u>-B</u>	<u></u>	A A	A	<u></u>	<u> </u>	B-/	<u>-</u>	-B	/-B	B-/	B-/	<u></u>	4	A	Ä	<u>4</u>	A A	
XXXGP	Package			ĕ	8	8	ĕ	28K	3	ĕ	8	2	ĕ	%K	9	ĕ	8K	90	Š	8	8	š	- 8K	3	ĕ	8
XXXGP			9	010	9	6	010	01;	9	010	0,	9	100	01;	20	010	01;	01	010	1,0	20	100	01,	9	010	01,0
XXXGP			ğ	ä	ä	ğ	ğ	ġ.	ğ	ģ	g l	ğ	ä	g l	ğ	ğ	g	ğ	g	ä	ğ	ä	ğ	ğ	ğ	PLQP0128KB-A
M30624MMP-XXXFP M30625MMP-XXXGP M30622MMP-XXXGP M30622MHP-XXXGP M30622MHP-XXXGP M30622MHP-XXXGP M30622MHP-XXXGP M30622MHP-XXXGP M30622MHP-XXXGP M30622MHP-XXXGP M30627MHP-XXXGP M30627MHP-XXXGP M30627MHP-XXXGP M30627MHP-XXXGP M30626MJP-XXXGP M30626MJP-XXXGP M30626MJP-XXXGP M30626MJP-XXXGP M30626MJP-XXXGP M30626MJP-XXXGP M30626MJP-XXXGP M30626MJP-XXXGP			ä	굽	굽	4	굽	굽	古	굽	굽	4	굽	굽	¥	굽	చ	Ā	곱	굽	풉	굽	굽	4	굽	굽
M306256MMP-XXXFP M30625MMP-XXXFP M30625MMP-XXXGP M30622MMP-XXXFP M30622MMP-XXXGP M30622MMP-XXXGP M30623MMP-XXXGP M30625MMP-XXXFP M30625MMP-XXXGP M30626MJP-XXXGP M30626FJPFP M30626FJPFP M30626FJPFP M30626FJPFP M30626FJPFP																										
M30624MWP-XXXF M30624MWP-XXXF M30624MWP-XXXF M30625MMP-XXXF M30625MMP-XXXF M30625MMP-XXXF M30625MMP-XXXF M30625MMP-XXXF M30625MMP-XXXF M30625MMP-XXXF M30626MMP-XXXF M30626MMP-XXXF M30626MMP-XXXF M30626MMP-XXXF M30626MMP-XXXF M30626MMP-XXXF M30626MMP-XXXF M30626MMP-XXXF M30626MMP-XXXF M30626MMP-XXXF M30626MMP-XXXF M30626MMP-XXXF				Δ.	_		<u>a</u>	_																		
M30624MWP-X M30624MWP-X M30624MWP-X M30624MMP-X M30624MMP-X M30626HPGP			X	X	S	X	SS	SX S	K	XG	S	X	XG	S	X	S	XG				XFP	X G	XG			
МЗО624МW МЗО624МW МЗО625МW МЗО625МW МЗО625МH МЗО625МH МЗО625МH МЗО626КHР МЗО626КHР МЗО626КHР МЗО626КHР МЗО626КHР МЗО626КHР	Part No.		X-Y	-X	\ \frac{1}{2}	P-X	P-X	P-X	Š	×	×	Š	Š	X	X	×	×	œ.	9	8	×	×	×	ę.	65	6
M30624 M30624 M30626 M30627 M30623 M30621 M30626 M30626 M30626 M30626 M30626 M30626 M30626 M30626			M	M	M	M	M	M	Ā	MH	ΨH	MH	Ä	MH	MH	MH	MH	문	표	분	M	M.	MJF	F.	F.P.	1
M30			1624	1624	1625	1626	929	627	1622	1622	1623	1624	1624	1625,	1626	1626	1627	1626,	1626	1627	1626	929	1627	929	1626	M30627FJPGP
			M30	M30	M30	M30	M30	M30	M30	M30	M30	M30	M30	M30	M30	M30	M30	M30	M30	M30	M30	M30	M30	M30	M30	M30
*! F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version 🔭 🛨 : New product ★ : Under develope	ti E - Elaah	privarajon L. DOM less																								

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

• Specifications (M16C/60 Series : M16C/6N Group)

Group	buttons (W1100)				C/6N4				M16C/6N5	
Стопр	ROM (Bytes)	128K	1201	(+4K	256K	2564	+ 4K	128K		+ 4K
	RAM (Bytes)	IZON	5K	+ 4N	2501	10K	+ 4N	IZON	5K	. + 4K
	ROM Type*1	м		F	М		•	м		=
Memory	Data Flash/E2 Data Flash	_	4K (Dat	a Flash)	-	4K (Dat	a Flash)	-	4K (Dat	a Flash)
	Program Security	_	Yes (ID Code C	heck Function,	_	Yes (ID Code C	heck Function,	_	Yes (ID Code C	heck Function,
	-		ROM Code Pro	otect Function)		ROM Code Pro	tect Function)		ROM Code Pro	tect Function)
	CPU					M16C/60 Core				
	Basic Instructions					91				
CPU	Minimum Instruction Execution Time (ns) Multiplier					41.7 (@24MHz) 16×16→32				
	Multiply-Accumulate Instruction					16×16+32-32				
	Barrel Shifter					_				
DRAA	DMAC (Channels)					2				
DMA	DTC/DMAC II					_				
	Address Space (Bytes)					1M				
External Bus	External Bus Interface					3 wait states, C				
Expansion	Bus Structure	Selectable from	Separate bus, Mi	ultiplex bus, Data	Bus Width can b	e selected (8/16-l	oit), The number	of output address	s buses can be sel	lected (12/16/20
	DRAM Controller Clock Generation Circuit			4 oi	rouite (Main alos	k, PLL, Sub cloc	On ahin acaill	ntor)		
	PLL			4 (11	icuits (iviaiii cioc	Yes	t, On-thip ostini	ator,		
	Subclock					Yes				
	RTC					_				
Clock	On-Chip Oscillator					Yes				
	Oscillation Stop Detection		<u> </u>	<u> </u>	<u> </u>	Yes				<u> </u>
	Frequency Divider				1/	'n (n = 1, 2, 4, 8, 1	6)			
	Power Save					Wait/Stop				
Power Supply Voltage Detection	Power-On Reset/POR									
voltage Detection	Low Voltage Detection/LVD Resolution × Channels					10-bit×26				
A/D Converter	Sample and Hold					Yes				
, D CONVENTE	Multi-Channel Sample and Hold					—				
D/A Converter	Resolution × Channels					8-bit×2				
,	8-bit					_				
	16-bit				11	(Timer A, Timer	B)			
	Input Capture					_				
	Output Compare									
Timer	PWM Output					5 (Timer A)				
	Real-Time Port						D)			
	Event Counter 2-Phase Encoder Input				11	(Timer A, Timer 3 (Timer A)	В)			
	3-Phase Inverter Control			1 /charad wi	ith Timor A4 Tin	ner A1, Timer A2	Timer P2 Dea	d time timer)		
Watchdog Tin				i (Silaieu Wi	itti ilillei A4, ilil	1	Tillier DZ, Dea	a time timer,		
Tratemacy	Clock Sync./ Clock Async.					3 (UART)				
Serial Interface	Clock Sync. Only	İ				1 (SI/O)				
	Clock Async. Only					_				
I ² C-bus						3 (UART)				
IEBus	NIN A					3 (UART)				
Smart Card/S	Communication Unit/Special Serial I/O					1 (UART) 3 (UART)				
	Channels			:	2	3 (OAIII)		I	1	
CAN	Message Box (Numbers)				+ 16				16	
IrDA	,					_				
CRC Calculati	on Circuit	İ			1 (CRC-	-CCITT (X16 + X12 +	· X⁵ + 1))			
X/Y Converte										
	Input Only (Numbers)					1				
L/O.D.	CMOS I/O (Numbers)					85				
I/O Ports	N-Channel Open Drain Port (Numbers)					2				
	High Current Drive Port Pull-Up Resistor	-				85				
External Inter						11				
	On-Chip Debug	_	Y.	es	_		es	T -	Y.	es
Debugging Function	On-Board Flash Program	_		es	_		es	_		es
Othor Eurotion	ROM Correction Function	Yes		_	Yes		-	Yes		-
Other Functions	Others									
	quency/Supply Voltage				2	24MHz/3.0 to 5.5	v			
Operating Am	nbient Temperature (°C)		I	I		-40 to 85			1	
			_		-	_		4		_
		着	<u>-6</u>		ģ	<u></u>		<u> </u>	1	14
Package		l ğ	200	3	Ě	6		Ě	6	§
		PLQP0100KB-A	PRQP0100JB-A		PLGP0100KB-A	PRQP0100JB-A		PLCP0100KB-A	PRQP0100JB-A	PLQP0100KB-A
		Ιã	ď		à	l g		à	Š	l á
		1	Æ		Ž	Ě	}	ž	Œ	1
		85			9			95		
		Ž			X			Ž		
Part No.		M306N4MC-XXXGP	£.	g.	M306N4MG-XXXGP	턌	95	M306N5MC-XXXGP	<u>e</u>	ģ
		W4	M306N4FCFP	M306N4FCGP	W4W	M306N4FGFP	M306N4FGGP	2Wi	M306N5FCFP	M306N5FCGP
		Nec	N90	N90	Nec	Nec	N9C	Nec	N90	N9C
		M30	M30	M30	M30	M30	M30	M30	M30	W30
4 F · Flash memo	orv version, L : ROM-less vers	cion M · Mack RON	Avereion O · One	time PROM version	Oz · OzBOM vore	ion		-t · Now pr	oduct **: Und	lar davalanmar

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

• Specifications (M16C/60 Series : M16C/6N Group)

Group			M160	6NK		M16	C/6NL			M160	6NM			M160	C/6NN	
	ROM (Bytes)	192K	256K	384K + 4K	512K + 4K	192K 256K	384K+4K	512K + 4K	192K	256K	384K+4K	512K + 4K	192K	256K	384K+4K	512K+4l
	RAM (Bytes)	16K	20K	311		16K 20K	31k		16K	20K	31		16K	20K		1K
	ROM Type*1	N		F		M	F		IV.				N			F
Memory	Data Flash/E2 Data Flash	_	_	4K (Data		_	4K (Data	Flash)	_		4K (Dat	a Flash)	_	-	4K (Dat	
				Yes (ID Cod			Yes (ID Cod				Yes (ID Co				Yes (ID Co	
	Program Security	l -	_	Function, R		_	Function, RO		_	_	Function,		_	_	Function,	
	1 rogram occurry	İ		Protect Fu			Protect Fu				Protect F				Protect F	
	CPU								60 Core							
	Basic Instructions							9								
	Minimum Instruction Execution Time (ns)							41.7 (@								
CPU	Multiplier															
								16×1								
	Multiply-Accumulate Instruction	<u> </u>						16×16-	+32→32							
	Barrel Shifter	<u> </u>														
DMA	DMAC (Channels)	<u> </u>							2							
	DTC/DMAC II							-	M							
	Address Space (Bytes) External Bus Interface	<u> </u>				C	41				alata a alban	4 -11-				
External Bus		0 1 1 1				Support for inser										40/40/
Expansion	Bus Structure	Selectabl	le from Se	eparate bus	s, Multipl	ex bus, Data Bus V	Vidth can be	e selecte	d (8/16-bi	t), The nu	imber of o	utput add	iress buse	s can be	selected (12/16/
	DRAM Controller							.								
	Clock Generation Circuit	<u> </u>				4 circuits	(Main clock			On-chip	oscillator	·)				
	PLL								es							
	Subclock	<u> </u>							es							
Clock	RTC	<u> </u>						-								
0.50K	On-Chip Oscillator								es							
	Oscillation Stop Detection								es							
	Frequency Divider						1/1	n (n = 1,	2, 4, 8, 16)						
	Power Save								/Stop							
Power Supply	Power-On Reset/POR							-	-							
/oltage Detection	Low Voltage Detection/LVD							-	_							
	Resolution × Channels							10-bi	t×26							
A/D Converter	Sample and Hold								es							
., 2 000	Multi-Channel Sample and Hold								_							
D/A Converter	Resolution × Channels							8-bi	t×2							
S/A GOIIVEITEI	8-bit							0 51								
	16-bit						11	/Timer	A, Timer E	21						
	Input Capture	-					- "	(Tillier /	4, IIIIIei c	•1						
		-														
T	Output Compare	<u> </u>						F /T-								
Timer	PWM Output							5 (Tin	ier A)							
	Real-Time Port							-								
	Event Counter						11		A, Timer E	5)						
	2-Phase Encoder Input							3 (Tin								
	3-Phase Inverter Control					1 (shared with Tin	ner A4, IIm			limer B2	, Dead tii	ne timer				
Watchdog Tin		<u> </u>														
	Clock Sync / Clock Async				0.10			3 (U	ARI)							
Serial Interface	Clock Sync. Only	<u> </u>			2 (S	1/0)						4 (S	I/O)			
	Clock Async. Only	<u> </u>														
l ² C-bus								3 (U								
IEBus								3 (U.								
Smart Card/S								1 (U.								
Synchronous Serial C	Communication Unit/Special Serial I/O							3 (U.	ART)							
CAN	Channels			2			1				2				1	
	Message Box (Numbers)		16-	+ 16			16			16	+ 16			1	16	
IrDA									-							
CRC Calculation							1 (CRC-	CCITT ()	$(^{16} + X^{12} +)$	(⁵ + 1))						
X/Y Converte																
	Input Only (Numbers)								1							
	CMOS I/O (Numbers)				8	5						1	11			
I/O Ports	N-Channel Open Drain Port (Numbers)								2							
	High Current Drive Port							_	=							
	Pull-Up Resistor				8	5						1	11			
External Inter					1								4			
	On-Chip Debug	-		Ye		<u> </u>	Yes	s	_	-	Ye		_	-	V.	es
Debugging Function	On-Board Flash Program	_		Ye		_	Yes		_	-		es	_	-		es
	ROM Correction Function	٧ı	es			Yes	-		Ye	s		-	Ye	es	<u> </u>	
Other Functions	Others	16		1		163		_	_ "						-	
Operating Fre	equency/Supply Voltage						2.	4MH2/3	.0 to 5.5V							
	nbient Temperature (°C)								to 85							
Package	ibient remperature (C)				PLQP01	UUKB-V		-40	10 03			PLQP01	28KB-V			
ackage					FLUFUI	OUND-M						FLUFUI	COUD-H			
			_						ي.	<u> </u>			ο_	مِ		
		Ē	XG			ig Kil			S S	Š			Š	Š		
		8	×	۵.		8 8	Δ.		×	×	و_	Δ.	Š	×	_	
			1	5	5		5	6	Li Li	Ġ	우	5		Ġ	후	5
Part No.		<u>u</u>	9	T				~	_							
Part No.		KME	KMG	표	중	Ĭ Į	<u> </u>	Ē	∑ ∑	Σ	MF	Ą	Σ	Ž	当	<u>"</u>
Part No.		6NKME-	8NKMG	6NKFH	6NKF.	ENLM!	6NLFH	6NLFJ(ENMM	9NMM	6NMF	6NMF.	6NNM	6NNM	6NNF	SNNF
Part No.		M306NKME-XXXGP	M306NKMG-XXXGP	M306NKFHGP	M306NKFJGP	M306NLME-XXXGP M306NLMG-XXXGP	M306NLFHGP	M306NLFJGP	M306NMME-XXXGP	M306NIMIMG-XXXGP	M306NMFHGP	M306NMFJGP	M306NNME-XXXGP	M306NNMG-XXXGP	M306NNFHGP	M306NNFJGP

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

• Specifications (M16C/30 Series)

Group							M16	C/30P					
	ROM (Bytes)	-	-		96	6K		96K	+ 4K		12	8K	
	RAM (Bytes)	6	K					5	iΚ	•			
Memory	ROM Type*1	L			F	P	/			F			VI
wichiory	Data Flash/E2 Data Flash			-	_	1		1	ta Flash)			-	
	Program Security	-	-	Yes (ID Code C	Check Function)	-	-	Yes (ID Code C	Check Function, otect Function)	Yes (ID Code C	heck Function)	-	_
	CPU						M16C/	60 Core	otect i unction)				
	Basic Instructions							91					
	Minimum Instruction Execution Time (ns)							16MHz)					
CPU	Multiplier							16→32					
	Multiply-Accumulate Instruction						16×16	+32→32					
	Barrel Shifter						-						
DMA	DMAC (Channels) DTC/DMAC II							2					
	Address Space (Bytes)							M					
External Bus	External Bus Interface				Support f	for insertion		ates, Output	s 4 chip-sele	ct signals			
Expansion	Bus Structure	Selectable	from Separa	te bus, Multi							ddress buses	can be selec	ted (16/20)
	DRAM Controller							_					
	Clock Generation Circuit					2 cir	cuits (Main	clock, Sub-c	lock)				
	PLL							-					
	Subclock RTC						Y	es					
Clock	On-Chip Oscillator							_					
	Oscillation Stop Detection							_					
	Frequency Divider							, 2, 4, 8, 16)					
	Power Save		-				Wait	/Stop	-				
Power Supply Voltage Detection	Power-On Reset/POR						-	_					
vortage Detection	Low Voltage Detection/LVD Resolution × Channels						10 %						
A/D Converter	Sample and Hold							es					
., 2 3311461461	Multi-Channel Sample and Hold							_					
D/A Converter	Resolution×Channels							_					
	8-bit						-	_					
	16-bit							A, Timer B)					
	Input Capture												
Timer	Output Compare PWM Output							mer A)					
IIIIIei	Real-Time Port						3 (111	—					
	Event Counter						6 (Timer A	A, Timer B)					
	2-Phase Encoder Input							ner A)					
	3-Phase Inverter Control							_					
Watchdog Tin	ner							1					
Serial Interface	Clock Sync./ Clock Async. Clock Sync. Only						3 (U	ART)					
Serial interrace	Clock Async. Only							_					
I ² C-bus	Glock Adynor Chry						3 (U	IART)					
IEBus							1 (U	IART)					
Smart Card/S								IART)					
Synchronous Serial C	Communication Unit/Special Serial I/O						1 (U	IART)					
CAN	Channels Message Box (Numbers)												
IrDA	Wessage Dox (Wallibers)						-	_					
CRC Calculati	ion Circuit					1 (0	RC-CCITT ($X^{16} + X^{12} + X^{5}$	+ 1))				
X/Y Converte							•	_					
	Input Only (Numbers)							1					
I/O Ports	M Channel Open Drain Part (Numbers)							35 2					
I/O FORES	N-Channel Open Drain Port (Numbers) High Current Drive Port						-	_					
	Pull-Up Resistor						8	35					
External Inter	rrupts Pins							10					
Debugging Function	On-Chip Debug								es				
	On-Board Flash Program	-	_		iting is possible)	_	-	Y	es	Yes (Only Rewr	iting is possible)		
Other Functions	ROM Correction Function Others			Υ.	es		-		_		Ye	es	
Operating Fre	equency/Supply Voltage					16MHz	/3.0 to 5.5V	, 10MHz/2.7	to 5,5V				
Operating Am	nbient Temperature (°C)						-20 to 85	, -40 to 85					
		*	Ä.A	3-A	3-A	- Y	3-A	¥-¥	3-A	¥.	🐇	₹	¥-
Package		PROP0100JB-A	PLQP0100KB-A	PRQP0100JB-A	PLQP0100KB-A	PRQP0100JB-A	PLQP0100KB-A	PRQP0100JB-A	PLQP0100KB-A	PROP0100JB-A	PLOP0100KB-A	PRQP0100JB-A	PLOP0100KB-A
		010	9	10	10	10	100	10	100	5	9	5	000
		ĕ	Ã	ĕ	Ĭ Ã) A	PG	ĕ	§	l g	🕺	l G	%
		%	7	E E	2	l &	PLC	¥	F	¥	12	l ĕ	2
			_	_	_	_	_	_				_	_
				2	La Table	F	GP)			Ē	ote1	윤	GP)
				M30302GAPFP* Koost	<u>,</u>	M30302MAP-XXXFP	M30302MAP-XXXGP	_	_	*L	<u>مُ</u>	M30302MCP-XXXFP	M30302MCP-XXXGP
Part No.		JFP.	GP	APF	M30302GAPGP*	AP.	AP-	M30302FAPFP	M30302FAPGP	M30302GCPFP'	M30302GCPGP*	CP.	CP.
		12SF	12SF	12G/	12G	12M.)2M.	12F#	12F#)2G)2G	12M	12M
		M30302SPFP	M30302SPGP	3030	3030	3030	3030	3030	3030	3030	3030	3030	3030
		Ĕ	Ĕ	Ĕ	Ĕ	ž	ž	Ĕ	Ĕ	Ĕ	Ĕ	ž	Ĕ
I Date and a set to													

Data can only be written once and cannot be erased.

*' F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, $\Omega z : \Omega z$ ROM version

^{★:} New product ★★: Under development

• Specifications (M16C/30 Series)

Group										M160	C/30P								
	ROM (Bytes)	128K	+ 4K			16	0K					19	2K			192K	+ 4K	25	6K
	RAM (Bytes)	5			6			12	2K		6			12	2K		K	12	
Memory	ROM Type*1			F		ľ	/			F		l l	/				F		
o.ii	Data Flash/E2 Data Flash	4K (Dat							-							4K (Dat		-	-
	Program Security	ROM Code Pro	heck Function,	Yes (ID Code (check Function)	-	_	Yes (ID	Code C	heck Fu	nction)	-	-	Yes (ID Code C	Check Function)	Yes (ID Code C	Check Function, otect Function)	Yes (ID Code C	heck Function)
	CPU	Hom dode i i	ottott i unotion)							M16C/	60 Core					nom oode in	otest i unstioni		
	Basic Instructions										1								
CPU	Minimum Instruction Execution Time (ns)									62.5 (@	16MHz)								
CPU	Multiplier										6→32								
	Multiply-Accumulate Instruction									16×16	+32→32								
	Barrel Shifter	-									-								
DMA	DMAC (Channels) DTC/DMAC II										2								
	Address Space (Bytes)										М								
External Bus	External Bus Interface					S	upport	for inser	tion of 1			puts 4 c	hip-sele	ct signa	İs				
Expansion	Bus Structure	Select	able fror	n Separa	te bus, N	/lultiplex	bus, Da	ta Bus W	idth can	be selec	ted (8/16	-bit), The	numbe	r of outp	ut addre	ess buses	can be s	selected (16/20)
	DRAM Controller									-									
	Clock Generation Circuit								2 circuit	s (Main	clock, Su	ıb-clock)							
	PLL Subclock	-									 es								
	RTC										-								
Clock	On-Chip Oscillator									-	_								
	Oscillation Stop Detection																		
	Frequency Divider								1/		2, 4, 8, 1	6)							
	Power Save	L								Wait	/Stop								
Power Supply Voltage Detection	Power-On Reset/POR Low Voltage Detection/LVD	<u> </u>								-	_								
voltage Detection	Resolution × Channels										t×18								
A/D Converter	Sample and Hold										es								
.,	Multi-Channel Sample and Hold									-	_								
D/A Converter	Resolution×Channels									-	_								
	8-bit										-								
	16-bit								6	(Timer A	, Timer	В)							
	Input Capture Output Compare										_								
Timer	PWM Output										ner A)								
	Real-Time Port										-								
	Event Counter								6	(Timer A	, Timer	B)							
	2-Phase Encoder Input									1 (Tin	ner A)								
187 . I I T	3-Phase Inverter Control									-	-								
Watchdog Tin	ner Clock Sync./ Clock Async.									3 (U.	1 ^DT\								
Serial Interface	Clock Sync. Only										- HN1/								
	Clock Async. Only									-	_								
I ² C-bus										3 (U.									
IEBus										1 (U.									
Smart Card/S	ommunication Unit/Special Serial I/O									1 (U. 1 (U.									
	Channels									1 (0	AN 1 /								
CAN	Message Box (Numbers)									-	_								
IrDA										-	-								
CRC Calculati									1 (CRC-	CCITT ()	(16 + X12 +	· X⁵ + 1))							
X/Y Converte										-	-								
	Input Only (Numbers) CMOS I/O (Numbers)										1 5								
I/O Ports	N-Channel Open Drain Port (Numbers)										2								
,	High Current Drive Port										_								
	Pull-Up Resistor										5								
External Inter										1	0								
Debugging Function	On-Chip Debug		es	V /A 1 -	atura est			V. 12	-	-				V (A. 1. 2	M		es	V 10-1- D	
	On-Board Flash Program ROM Correction Function	Y	es	Tes (Unity Kew)	iting is possible)		-	Yes (On		iting is p es	ossible)	-	-	Yes (Only Rewri	iting is possible	Y	es	Yes (Only Rewri	
Other Functions	Others	 		1					Y	-	_							, Y6	-0
Operating Fre	quency/Supply Voltage							161	MHz/3.0	to 5.5V.	10MHz/	2.7 to 5	5V						
Operating Am	bient Temperature (°C)										-40 to								
						ـــا												_	
		PROP0100JB-A	PLQP0100KB-A	PROP0100JB-A	PLQP0100KB-A	PRQP0100JB-A	PLQP0100KB-A	PRQP0100JB-A	PLQP0100KB-A	PRQP0100JB-A	PLQP0100KB-A	PRQP0100JB-A	PLQP0100KB-A	PRQP0100JB-A	PLQP0100KB-A	PROP0100JB-A	PLQP0100KB-A	PRQP0100JB-A	PLQP0100KB-A
Package		3	×	3	¥	3	×	3	×	3	×	20	×	2	X	20	X	2	Š
		5	6	16	010	6	010	6	010	010	010	010	010	010	010	010	010	010	010
		&	8	B	8	ଜ	8	8	8	8	8	g	g	9	- B	g	g.	9	ð
		E	<u> </u>	E	<u> </u>	E	_ ₹	E	₹	8	<u> </u>	8	5	8	7	8	4	R	5
						_	۵.												
				Note1	Note1	M30302MDP-XXXFP	M30302MDP-XXXGP	Note1	Note1	Note1	Note1	M30302MEP-XXXFP	M30302MEP-XXXGP	Vote1	Note1			Note1	n Note1
Part No.		ę.	65		g.	×	×	ě.	ğ. G	Å	<u>*</u>	×	×	à.	.	ę.	6	Ť.	M30302GGPGP*
. art Ivo		M30302FCPFP	M30302FCPGP	M30302GDPFP*	M30302GDPGP	4DP	4D	M30304GDPFP*	M30304GDPGP*	M30302GEPFP	M30302GEPGP	ЛЕР	Æ	M30304GEPFP	M30304GEPGP	M30302FEPFP	M30302FEPGP	M30302GGPFP*	GB
		102F	102F	3020	3026	302N	302N	3046	1046	3026	3026	302N	302N	1046	1046	102F	102F	3026	3026
		1303	1303	1303	1303	1303	1303	1303	1303	1303	1303	1303	1303	1303	1303	1303	1303	1303	1303
		Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Ξ	Σ	Σ	Ξ	Σ	Σ	Σ	Ξ

¹ Data can only be written once and cannot be erased.
*¹ F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Ωz : ΩzROM version

^{★:} New product ★★: Under development

• Specifications (M16C/1N Group)

Group		M16C/1N
	ROM (Bytes)	64K+4K
	RAM (Bytes)	94K - 4K
B.//		on F
Memory	ROM Type*1	
	Data Flash	Yes (4K)
	Program Security	Yes (ID Code Check Function, ROM Code Protect Function)
	CPU	M16C/60 core
	Basic Instructions	91
0011	Minimum Instruction Execution Time (ns)	62,5 (@16MHz)
CPU	Multiplier	16×16→32
	Multiply-Accumulate Instruction	16×16+32-32
	Barrel Shifter	10×10+32 32
DMA	DMAC (Channels)	
	DTC/DMAC II	<u> </u>
	Address Space (Bytes)	_
External Bus	External Bus Interface	-
Expansion	Bus Structure	-
	DRAM Controller	-
	Clock Generation Circuit	3 circuits (Main clock, Sub clock, On-chip oscillator)
	PLL	5 circuits (Main clock, Our clock, Or clock)
	Subclock	Yes
Clock	On-Chip Oscillator	Yes
	Oscillation Stop Detection	Yes
	Frequency Divider	1/n (n = 1, 2, 4, 8, 16)
	Power Save	Wait/Stop
Power Supply	Power-On Reset/POR	
Voltage Detection	Low Voltage Detection/LVD	_
Voltage Detection		40 12 14 4
	Resolution×Channels	10-bit×14
A/D Converter	Sample and Hold	Yes
	Multi-Channel Sample and Hold	-
D/A Converter	Resolution × Channels	8-bit×1
	8-bit	4 (Timer 1, Timer X, Timer Y, Timer Z)
	16-bit	1 (Timer C)
	Input Capture	1 (Timer C)
	Output Compare	T (Miller O)
-		0(5)
Timer	PWM Output	2 (Timer Y, Timer Z)
	Real-Time Port	-
	Event Counter	1 (Timer X)
	2-Phase Encoder Input	<u> </u>
	3-Phase Inverter Control	-
Watchdog Tir		-
y	Clock Sync./ Clock Async.	2 (UART)
Serial Interface	Clock Sync. Only	
Jenai interiace	Clock Async. Only	_
I²C hus	GIOCK ASYIIC, OILLY	2
I ² C-bus		
IEBus		-
Smart Card/S		<u>-</u>
Synchronous Serial	Communication Unit/Special Serial I/O	_
0.4.8.1	Channels	1
CAN	Message Box (Numbers)	16
IrDA	1	
CRC Calculat	ion Circuit	_
		_
X/Y Converte		<u> </u>
	Input Only (Numbers)	<u> </u>
	CMOS I/O (Numbers)	37
I/O Ports	N-Channel Open Drain Port (Numbers)	-
	High Current Drive Port	8
	Pull-Up Resistor	37
External Inte		8
LACTIO IIILE		
Debugging Function	On-Chip Debug	Yes
00 0	On-Board Flash Program	Yes
Other Functions	ROM Correction Function	<u> </u>
Other Functions	Others	-
Operating Fro	equency/Supply Voltage	16MHz/4.2 to 5.5V
	nbient Temperature (°C)	-40 to 85
Package		PLQP0048KB-A
. ackage		r Edi WYOND-A
Part No.		M301N2F8FP
		in M. Mark POM version O. One time PPOM version Oz. OzDOM version

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Group						I.	116C/26A	(M16C/26A)						M.	16C/2	26A
	ROM (Bytes)	24	V	24K -	L AV	48		48K+		64	IV	ı	641	(M (+ 4K	16C/2	26B)
ŀ	RAM (Bytes)	24		Z4K- K	+ 4K	40	N.	401.+	41	2			041	\ + 4K		
Manaan	ROM Type*1	I.		F	:	N	1	F		I.				F		
Memory	Data Flash/E2 Data Flash	-	-	4K (Data		-	-	4K (Data		-	-			ıta Flash)		
	Program Security	-	-	Yes (ID Code Cl ROM Code Pro		_	-	Yes (ID Code Che ROM Code Prote	eck Function,	-	-		(ID Code N VI Code Pi			
	CPU			NOW Code Pro	tect runction)			M16C/60				hui	vi Code Pi	otect ru	nctio	n)
	Basic Instructions							91								
ODLI	Minimum Instruction Execution Time (ns)						50 (@2	20MHz)						41.7	(@24	MHz)
CPU	Multiplier							16×16	→32							
	Multiply-Accumulate Instruction							16×16+3	32→32							
	Barrel Shifter															
DMA	DMAC (Channels) DTC/DMAC II							2								
	Address Space (Bytes)															
External Bus	External Bus Interface							_								
Expansion	Bus Structure							_								
	DRAM Controller							_								
	Clock Generation Circuit					4 circuit	s (Main cl	lock, PLL, Su		On-chip os	cillator)					
	PLL Subclock							Yes								
	RTC							Yes	5							
Clock	On-Chip Oscillator							Yes								
	Oscillation Stop Detection							Yes								
	Frequency Divider							1/n (n = 1, 2,								
	Power Save							Wait/S	Stop							
Power Supply Voltage Detection	Power-On Reset/POR															
voitage Detection	Low Voltage Detection/LVD Resolution × Channels	10 his v 10	10 bit v 10	10 hit v 10	10 bit v 10	10 hi4 v 10	10 hi+ v 10	Yes (Low v		10 hit v 10	10 hit v 10	10 hit v 10	10 bis v 44	110 6:4	12 14	hi4v4
A/D Converter	Sample and Hold	10-bit × 12	t×12 10-bit×10 10-bit×12 10-bit×10 10-bit×12 10-bit×10 10-bit×12 10-bit×10 10-bit×12 10-bit×10 10-bit×12 10-bit×10													J-DIT X
A, D Converter	Multi-Channel Sample and Hold															
D/A Converter	Resolution × Channels		Yes — — — — — — — — — — — — — — — — — — —													
	8-bit															
	16-bit							8 (Timer A,	Timer B)							
	Input Capture															
T	Output Compare							5 (Time	41							
Timer	PWM Output Real-Time Port							5 (Time	er A)							
	Event Counter							8 (Timer A,	Timer B)							
	2-Phase Encoder Input							3 (Time								
	3-Phase Inverter Control				1 (sh	ared with	imer A4,	Timer A1, Tir	mer A2, T	imer B2, D	ead time t	imer)				
Watchdog Tin		ļ.,						1_								
	Clock Sync./ Clock Async.	3 (UART)	2 (UART)	3 (UART)	2 (UART)	3 (UART)	2 (UART)	3 (UART) 2	2 (UART)	3 (UART)	2 (UART)	3 (UART)	2 (UART)	3 (UAR	T) 2	(UART
Serial Interface	Clock Sync. Only Clock Async. Only															
I ² C-bus	Clock Asylic, Olly							1 (UAI	RT)							
IEBus																
Smart Card/S	10.0							1 (UAI	RT)							
Comphanage Co. 10	SIIVI							1 (UAI 1 (UAI								
Synchronous Serial C	Communication Unit/Special Serial I/O							1 (UAI 1 (UAI	RT)							
	communication Unit/Special Serial I/O Channels							1 (UAI 1 (UAI	RT)							
CAN	Communication Unit/Special Serial I/O							1 (UAI 1 (UAI	RT)							
CAN IrDA	Communication Unit/Special Serial I/O Channels Message Box (Numbers)					1 (CRC-	COITT (Y ¹⁶	1 (UAI 1 (UAI — —	RT) RT)	(Y ¹6 ⊥ Y ¹5 ⊥	Y² ⊥ 1\\					
CAN	Communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit					1 (CRC-	CCITT (X ¹⁶	1 (UAI 1 (UAI	RT) RT)	(X ¹⁶ + X ¹⁵ +	X ² + 1))					
CAN IrDA CRC Calculation	Communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit					1 (CRC-	CCITT (X ¹⁶	1 (UAI 1 (UAI - - - + X ¹² + X ⁵ + 1	RT) RT)	(X ¹⁶ + X ¹⁵ +	X ² + 1))					
CAN IrDA CRC Calculation X/Y Converter	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers)	39	33	39	33	1 (CRC-	CCITT (X ¹⁶	1 (UAI 1 (UAI - - - + X ¹² + X ⁵ + 1	RT) RT)	(X ¹⁶ + X ¹⁵ +	X ² + 1))	39	33	39		33
CAN IrDA CRC Calculatio X/Y Converter	Communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) IN-Channel Open Drain Port (Numbers)	39	33	39	33			1 (UAI 1 (UAI - - - + X ¹² + X ⁵ + 1	RT) RT))/CRC-16			39	33	39		33
CAN IrDA CRC Calculatio X/Y Converter	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) ICMOS I/O (Numbers) I/Channel Open Drain Port (Numbers) High Current Drive Port					39	33	1 (UAI 1 (UAI - - + X ¹² + X ⁵ + 1 - - 39	RT) RT))/CRC-16	39	33					
CAN IrDA CRC Calculatic X/Y Converter	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit Input Only (Numbers) CMOS I/O (Numbers) Nchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor	39	33	39	33			1 (UAI 1 (UAI - - + X'2 + X'5 + 1 - 39 - 39	RT) RT))/CRC-16			39	33	39		33
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Interr	Communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) IvChanal Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins			39	33	39	33	1 (UAI 1 (UAI - - + X'2 + X'5 + 1 - - 39 39	RT) RT))/CRC-16	39	33		33	39		
CAN IrDA CRC Calculation	Communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug			39 Ye	33 es	39	33	1 (UAI 1 (UAI	RT) RT))/CRC-16 33	39	33		33	39 Yes		
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Intern Debugging Function	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CCMOS I/O (Numbers) Nchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program	39	33	39	33 es	39	33	1 (UAI 1 (UAI 1 (UAI	RT) RT))/CRC-16 33	39	33	39	33	39		
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Inter Debugging Function	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit r Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function		33	39 Ye	33 es	39	33	1 (UAI 1 (UAI 1 (UAI	RT) RT))/CRC-16 33	39	33	39	33	39 Yes		
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Inter Debugging Function Other Functions	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) Nchanel Open Drain Port (Numbers) Nchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others	39	33	39 Ye	33 es	39	33	1 (UAI 1 (UAI 1 (UAI	RT) RT))/CRC-16 33	39	33	39	33	39 Yes Yes		
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Inter Debugging Function Other Functions	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit r Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function	39	33	39 Ye	33 es	39 39	33 33 	1 (UAI 1 (UAI 1 (UAI	RT) RT))/CRC-16 33 33	39	33	39	33	Yes Yes — 24MH 20MH	z/3.0 t	33 0 5.5V, 0 5.5V,
CAN IrDA CRC Calculatic X/Y Converte I/O Ports External Inter Debugging Function Other Functions Operating Free	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	39	33	39 Ye	33 es	39 	33 	1 (UAI 1	RT) RT))/CRC-16 33 33	39	33	39	33	Yes Yes — 24MH 20MH 10MH	z/3.0 t z/2.7 t	33 0 5.5V, 0 5.5V, to 5.5V
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Interr Debugging Function Other Functions Operating Free	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) Nchanel Open Drain Port (Numbers) Nchanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others	39	33	39 Ye	33 es	39 	33 	1 (UAI 1	RT) RT))/CRC-16 33 33	39	33	39	33	Yes Yes — 24MH 20MH	z/3.0 t z/2.7 t	33 0 5.5V, 0 5.5V,
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Interr Debugging Function Other Functions Operating Free	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	39	33	39 Ye	33 es	39 	33 	1 (UAI 1	RT) RT))/CRC-16 33 33	39	33	39	33	Yes Yes — 24MH 20MH 10MH	z/3.0 t z/2.7 t	33 0 5.5V, 0 5.5V, to 5.5V
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Interr Debugging Function Other Functions Operating Free	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	39 	33	Ye Ye	33 es es es	39 39	33	1 (UAI 1	RT) RT))/CRC-16 33 33 to 5.5V	39 39	33 33 -s s match×2)	39	33	39 Yes Yes - 24MH 20MH 10MH -40 to 8	z/3.0 t z/2.7 t	33 to 5.5V, to 5.5V, to 5.5V
CAN IrDA CRC Calculation K/Y Converted I/O Ports External Internolebugging Function Other Functions Operating Free Operating Am	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	39 	33	Ye Ye	33 es es es	39 39	33	1 (UAI 1	RT) RT))/CRC-16 33 33 to 5.5V	39 39	33 33 -s s match×2)	39	33	39 Yes Yes - 24MH 20MH 10MH -40 to 8	z/3.0 t z/2.7 t	33 to 5.5V, to 5.5V, to 5.5V
CAN IrDA CRC Calculation K/Y Converted I/O Ports External Internolebugging Function Other Functions Operating Free Operating Am	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	39 	33	Ye Ye	33 es es es	39 39	33	1 (UAI 1	RT) RT))/CRC-16 33 33 to 5.5V	39 39	33 33 -s s match×2)	39	33	39 Yes Yes - 24MH 20MH 10MH -40 to 8	z/3.0 t z/2.7 t	33 to 5.5V, to 5.5V, to 5.5V
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Inter Debugging Function Other Functions Operating Free Operating Am	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	39 	33	Ye Ye	33 es es es	39 39	33	1 (UAI 1	RT) RT))/CRC-16 33 33 to 5.5V	39 39	33 33 -s s match×2)	39	33	39 Yes Yes - 24MH 20MH 10MH -40 to 8	z/3.0 t z/2.7 t	33 to 5.5V, to 5.5V, to 5.5V
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Inter Debugging Function Other Functions Operating Free Operating Am	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	39 	33	Ye Ye	33 es es es	39 39	33	1 (UAI 1	RT) RT))/CRC-16 33 33 to 5.5V	39 39	33 33 -s s match×2)	39	33	39 Yes Yes - 24MH 20MH 10MH -40 to 8	z/3.0 t z/2.7 t	33 to 5.5V, to 5.5V, to 5.5V
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Inter Debugging Function Other Functions Operating Free Operating Am	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	39	33	39 Ye	33 es	39 	33 	1 (UAI 1	RT) RT))/CRC-16 33 33	39	33	39	33	Yes Yes — 24MH 20MH 10MH	z/3.0 t z/2.7 t	33 0 5.5V, 0 5.5V, to 5.5V
CAN IrDA CRC Calculation K/Y Converted I/O Ports External Internolebugging Function Other Functions Operating Free Operating Am	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	39 	33	Ye Ye	33 es es es	39 39	33	1 (UAI 1	RT) RT))/CRC-16 33 33 to 5.5V	39 39	33 33 -s s match×2)	39	33	39 Yes Yes - 24MH 20MH 10MH -40 to 8	z/3.0 t z/2.7 t	33 to 5.5V, to 5.5V, to 5.5V
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Inter Debugging Function Other Functions Operating Free Operating Am	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	Yes (Address	33 	Ye Ye	33 es es es	39 	33 33	1 (UAI 1	RT) RT))/CRC-16 33 33 to 5.5V	39 	33 33 s s match×2)	39	33	39 Yes Yes - 24MH 20MH 10MH -40 to 8	z/3.0 t z/2.7 t	33 to 5.5V, to 5.5V, to 5.5V
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Inter Debugging Function Other Functions Operating Free Operating Am	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	Yes (Address	33 	Ye Ye	33 es es es	39 	33 33	1 (UAI 1	RT) RT))/CRC-16 33 33 to 5.5V	39 	33 33 s s match×2)	39	33	39 Yes Yes - 24MH 20MH 10MH -40 to 8	z/3.0 t z/2.7 t	33 to 5.5V, to 5.5V, to 5.5V
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Inter Debugging Function Other Functions Operating Free Operating Am Package	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	Yes (Address	33 	PLQP0048KB-A	PRSP0042GA-B	39 	33 33	1 (UAI 1	RT) ()/CRC-16 33 33 to 5.5V	39 	33 33 s s match×2)	PLQP0048KB-A	PRSP0042GA-B	39 Yes Yes 24MH 10MH 10MH -40 to 8	z/3.0 t z/2.7 t	PRSP0042GA-B 58 00 97 00
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Interr Debugging Function Other Functions Operating Free	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	Yes (Address	33 	PLQP0048KB-A	PRSP0042GA-B	39 	33 33	1 (UAI 1	RT) ()/CRC-16 33 33 to 5.5V	39 	33 33 s s match×2)	PLQP0048KB-A	PRSP0042GA-B	39 Yes Yes 24MH 10MH 10MH -40 to 8	z/3.0 t z/2.7 t	PRSP0042GA-B 58 00 97 00
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Inter Debugging Function Other Functions Operating Free Operating Am Package	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	Yes (Address	33 	PLQP0048KB-A	PRSP0042GA-B	39 	33 33	1 (UAI 1	RT) ()/CRC-16 33 33 to 5.5V	39 	33 33 s s match×2)	PLQP0048KB-A	PRSP0042GA-B	39 Yes Yes 24MH 10MH 10MH -40 to 8	z/3.0 t z/2.7 t	PRSP0042GA-B 58 00 97 00
CAN IrDA CRC Calculatic X/Y Converter I/O Ports External Inter Debugging Function Other Functions Operating Free Operating Am Package	communication Unit/Special Serial I/O Channels Message Box (Numbers) on Circuit or Input Only (Numbers) CMOS I/O (Numbers) High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	39 	33	Ye Ye	33 es es es	39 39	33	1 (UAI 1	RT) RT))/CRC-16 33 33 to 5.5V	39 39	33 33 -s s match×2)	39	33	39 Yes Yes - 24MH 20MH 10MH -40 to 8	z/3.0 t z/2.7 t	33 to 5.5V, to 5.5V, to 5.5V

 $[\]star^*$ F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Group									r	VI16C/28	3									C/28 C/28B)
	ROM (Bytes)		48K + 4H	(6.	4K		64K + 4K		96	SK .		96K + 4K		12	8K		128	(+ 4K	_,_55,
	RAM (Bytes)		101(41	`		K	1	0410 410			,, <u>, , , , , , , , , , , , , , , , , , </u>	8K	301(41(- 12		1	2K	() 410	
	ROM Type*1		F			VI		F		I.	/I		F		ľ	VI .			F	
Vlemory	Data Flash/E2 Data Flash	4K (Data Fl	ash)	-	_	4K	(Data Fla	sh)	-	_	4K	(Data Fla	sh)	-	_		4K (Da	ta Flash)	
	Program Security		de Check			_		ode Check F		_	_		ode Check F		_	_			heck Fu	
		ROM Cod	le Protect	Function)			ROM Co	de Protect F	unction)				de Protect F	unction)			ROM	Code Pr	otect Fu	nction
	CPU									M1	6C/60 C	ore								
	Basic Instructions										91								T	
CPU	Minimum Instruction Execution Time (ns)								50	(@20MI									41.7 (@	24MH2
	Multiplier	-									5×16→:									
	Multiply-Accumulate Instruction Barrel Shifter	-								16 X	16 + 32 —	→3Z								
	DMAC (Channels)	_									2									
DMA	DTC/DMAC II																			
	Address Space (Bytes)										_									
External Bus	External Bus Interface										_									
Expansion	Bus Structure										_									
	DRAM Controller										_									
	Clock Generation Circuit						4	circuits	(Main c	lock, PL	L, Sub	clock, O	n-chip o	scillato	r)					
	PLL										Yes									
	Subclock										Yes									
Clock	RTC																			
	On-Chip Oscillator										Yes									
	Oscillation Stop Detection									41. 1	Yes	0.10								
	Frequency Divider	-									= 1, 2, 4									
D C 1	Power Save Power-On Reset/POR	-								v	/ait/Sto	h								
Power Supply Voltage Detection	Low Voltage Detection/LVD	 								Vec /	Low vol	tare)								
	Resolution × Channels	10-hi-	t×24	10-bit × 13	10-hit v 24	10-hit v 12	10-b	it×24	10-hit v 12	10-bit × 24			t×24	10-hit v 12	10-hit v 24	10_hit v 12	10_hit > 24	10-hit v 12	10-bit×24	10_hits
A/D Converter	Sample and Hold	10-01	. ^ 27	10 DIL \ 13	I IV DILAZ4	1 10 1011 \ 13	10-01		o ont∧10	10 011 1 24	Yes	10-01		.v ant∧ 13	IV DIL A Z4	I IADIEV 19	10-011.AZ4	10-01t \ 13	103011.124	ווערטונ)
., = converter	Multi-Channel Sample and Hold										Yes									
D/A Converter	Resolution × Channels		162																	
	8-bit	1	- 8 (Timer A Timer R)																	
	16-bit		8 (Timer B)																	
	Input Capture									8	(Timer	S)								
	Output Compare									8	(Timer	S)								
Timer	PWM Output									13 (Tin	ner A, Ti	mer S)								
	Real-Time Port										_									
	Event Counter										er A, Tiı									
	2-Phase Encoder Input									3 (Time										
	3-Phase Inverter Control					1	(shared	with Tin	ner A4,	Timer A		r A2, Ti	mer B2, I	Dead ti	me time	er)				
Watchdog Tin		-									1	,								
Serial Interface	Clock Sync./ Clock Async. Clock Sync. Only	2 (S	1/0)	1 (SI/O)	2 (61/0)	1 (01/0)	2 /6	SI/O)	1 (01/0)	2 (SI/O)	1 (SUO)		i/O)	1 (01/0)	2 (61(0)	1 (01/0)	2 (61/0)	1 (01/0)	2 (SI/O)	1 /01//
Serial interface	Clock Async. Only	2 (3	1/0/	1 (31/0)	2 (31/0)	1 (31/0)	2 (3	n/U/	1 (31/0)	2 (31/0)	1 (31/0)	2 (3	1/0/	1 (31/0)	2 (31/0)	1 (31/0)	2 (31/0)	1 (31/0)	[2 (31/0)	1 (31/0
I²C-bus	Clock Asylic. Olly								2	(Multi n	nastar l	C HAR	T)							
IEBus											(UART		• /							
Smart Card/S	IM										(UART									
	Communication Unit/Special Serial I/O										(UART									
	Channels										_									
CAN	Message Box (Numbers)										_									
IrDA											_									
CRC Calculati																				
X/Y Converte																				
	Input Only (Numbers)					_	_				_						_	_		_
	CMOS I/O (Numbers)	7	1	55	71	55	7	71	55	71	55	7	1	55	71	55	71	55	71	55
I/O Ports	N-Channel Open Drain Port (Numbers)																			
	High Current Drive Port	 -	1	E.	74		-	14	ee.	74		_	14	EF	74		74		74	
Evtornel late	Pull-Up Resistor	7		55	71	55	7	71	55	71	55	7	1	55	71	55	71	55	71	55
External Inter	On-Chip Debug	 	Yes					Yes		_	- ''		Yes		_				es	
Debugging Function	On-Board Flash Program		Yes			_		Yes			_		Yes		_	_	1		es	
	ROM Correction Function					ss match × 2)		_		Yes (Addres			-			ss match × 2)			_	
Other Functions	Others				1 100 (Muule:	musell∧Zj				. oo muuits					700 (Audito	~ musell∧4)				
		i –																	24MH+/4	2 to 5 EV
Operating Fre	equency/Supply Voltage	l						20MHz/	3.0 to 5	.5V, 10N	/IHz/2.7	to 5.5V	,						24MHz/4 20MHz/3	0 to 5.5V
																			10MHz/2	.7 to 5.5V
Operating As-	nbient Temperature (°C)	-20 to 85, -40 to 85	-20 to 85		20 to 95	, — 40 to	. 25	-20	•	0 to 85,	_40+-	. 25	-20		_ 20 +-	25	10 to 85		. 40	to 85
Operating All	iolonic reiniperature (C)	-40 to 85	to 85		10 00	, - 40 (, 00	to 85	-2	00,	-40 10		to 85		-2010	, 00, -4			-40	10 00
		l																	1	
		l																	1	
		₹	Ą.	¥.	∀	¥	₹	🧸	4-8	₹	¥.	₹	Y.	¥-	¥.	Į Ž	Į Ž	₹	₹	<u>₹</u>
Package		X	S.	素	×	ੜੋ	🕺	12	ξE	X	ξĒ	🕺	E	ភ	ž	ξĒ	×	품	š	굶
90		8	086	90	80	90	80	86	790	86	790	8	380	790	080	064	80	064	8	064
		&	05	8	8	<u>@</u>	8	6	ē.	<u>@</u>	<u>6</u>	<u>@</u>	ß	ē.	<u>a</u>	Q.	<u>6</u>	<u>@</u>	8	8
		PLQP0080KB-A	PTLG0085JB-A	PLQP0064KB-A	PLQP0080KB-A	PLQP0064KB-A	PLQP0080KB-A	PTLG0085JB-A	PLQP0064KB-A	PLQP0080KB-A	PLQP0064KB-A	PLQP0080KB-A	PTLG0085JB-A	PLQP0064KB-A	PLQP0080KB-A	PLQP0064KB-A	PLQP0080KB-A	PLQP0064KB-A	PLQP0080KB-A	PLQP0064KB-A
			۵	4	4	<u>a</u>	<u> </u>	<u> </u>	4	Δ.	Δ.	_	۵	Δ.	Δ.	Δ.	Δ.	Δ.		4
					_	_				0	0					0				
					불	불				M30280MA-XXXHP	M30281MA-XXXHP				М30280МС-ХХХНР	M30281MC-XXXHP				
			(D		M30280M8-XXXHP	M30281M8-XXXHP		U U		8	8	_	ى ق	0	- 8	8			<u>*</u>	<u>*</u>
Part No.		法	NS.	붓	<u>&</u>	<u>~</u>	뭂) ×	퐀	A-)		当	Š	Ħ	<u> </u>	ું	崇	法	点	H H
		М30280F6НР	M30280F6WG	M30281F6HP	NO.	Σ.	M30280F8HP	M30280F8WG	M30281F8HP	No.	Σ	M30280FAHP	M30280FAWG	M30281FAHP	NO.	Ξ	М30280FСНР	M30281FCHP	M30280FCBHP	M30281FCBHP*
		028	028	028	028	028	028	028	928	028	028	128	028	028	028	028	028	028	028	028
		13(M3(13(13(//3(//3(43(M3(M3(M3(43(43(43(M3(//3(//30	//30	13(/30
		_	_	_	_	_	_			_		_	_	_		_	_	_		_

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

						M16C/	29				
	ROM (Bytes)	64	K	90	6K	96K + 4	4K	12	8K	128K	+ 4K
	RAM (Bytes)	41	K		8	K				2K	
Memory	ROM Type*1		r	VI		F		I.	Л	ı	
ivieillory	Data Flash/E2 Data Flash		-			4K (Data F	Flash)	-	-	4K (Dat	a Flash)
	Program Security	i	-	_		Yes (ID Code Che		_	_	Yes (ID Code C	
						ROM Code Prote				ROM Code Pro	tect Function
	CPU					M16C/60	Core				
	Basic Instructions Minimum Instruction Execution Time (ns)					91 50 (@20N	MU-)				
CPU	Multiplier					16×16-					
	Multiply-Accumulate Instruction					16×16+3					
	Barrel Shifter					-					
DRAA	DMAC (Channels)					2					
DMA	DTC/DMAC II					_					
	Address Space (Bytes)					_					
External Bus	External Bus Interface										
Expansion	Bus Structure										
	DRAM Controller				4 -114- (84-						
	Clock Generation Circuit PLL				4 circuits (ivia	in clock, PLL, Sub Yes	o cłock, Un-ci	nip oscillator)			
	Subclock					Yes					
	RTC					- 163					
Clock	On-Chip Oscillator					Yes					
	Oscillation Stop Detection					Yes					
	Frequency Divider					1/n (n = 1, 2,	4, 8, 16)				
	Power Save					Wait/St	top				
Power Supply Voltage Detection	Power-On Reset/POR										
Voltage Detection	Low Voltage Detection/LVD					Yes (Low vo					
A/D Converter	Resolution × Channels Sample and Hold	10-bit×27	10-bit × 16	10-bit × 27	10-bit × 16	10-bit×27 Yes	10-bit × 16	10-bit×27	10-bit×16	10-bit×27	10-bit × 16
A/D Converter	Multi-Channel Sample and Hold					Yes					
D/A Converter	Resolution × Channels										
2771 0011101101	8-bit					_					
	16-bit					8 (Timer A, 1	Timer B)				
	Input Capture					8 (Time	r S)				
	Output Compare					8 (Time					
Timer	PWM Output					13 (Timer A,	Timer S)				
	Real-Time Port						E D)				
	Event Counter 2-Phase Encoder Input					8 (Timer A, 1 3 (Timer A) + 1					
	3-Phase Inverter Control			1 (shar	ed with Timer	A4, Timer A1, Tim		R2 Dead time	timer)		
Watchdog Tin				1 (31141	ca with hinter	1	ici AL, illici	DL, Dead time	, timer,		
	Clock Sync./ Clock Async.					3 (UAR	RT)				
Serial Interface	Clock Sync. Only	2 (SI/O)	1 (SI/O)	2 (SI/O)	1 (SI/O)	2 (SI/O)	1 (SI/O)	2 (SI/O)	1 (SI/O)	2 (SI/O)	1 (SI/O)
-1	Clock Async. Only	<u> </u>									
I ² C-bus IEBus						2 (Multi master 1 (UAR					
Smart Card/S	IM					1 (UAR					
	Communication Unit/Special Serial I/O					1 (UAR					
	Channels					1	,				
CAN	Message Box (Numbers)					16					
IrDA						_					
CRC Calculati					1 (CRC-CCITT	$(X^{16} + X^{12} + X^5 + 1)$	/CRC-16 (X16	$+ X^{15} + X^2 + 1))$			
X/Y Converte		<u> </u>				_					
	Input Only (Numbers)	74	ee .	7.	F	74	EE.	74	e-	74	
	CMOS I/O (Numbers) N-Channel Open Drain Port (Numbers)	71	55	71	55	71	55	71	55	71	55
I/O Porte	is onamics open pram Fort (Numbers)										
I/O Ports		1		71	55				55	74	
I/O Ports	High Current Drive Port	71	55	/ / /		71	55	71		71	55
I/O Ports External Inter	High Current Drive Port Pull-Up Resistor	71	55	/1		71 11	55	71		/1	55
External Inter	High Current Drive Port Pull-Up Resistor	71	55				55	71		/1 Ye	
	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program	71	-			11	55	-	- -		es
External Inter Debugging Function	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function	71	-	s match×2)	33	11 Yes	55	71 - Yes (Addres	- -	Ye	es
External Inter Debugging Function Other Functions	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others	71	-			11 Yes Yes		Yes (Addres	- -	Ye	es
External Inter Debugging Function Other Functions Operating Fre	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others quency/Supply Voltage	71	-			11 Yes Yes — — ———————————————————————————	DMHz/2.7 to	Yes (Addres	- -	Ye	es
External Inter Debugging Function Other Functions Operating Fre	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others	71	-			11 Yes Yes	DMHz/2.7 to	Yes (Addres	- -	Ye	es
External Inter Debugging Function Other Functions Operating Fre	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others quency/Supply Voltage	71	-			11 Yes Yes — — ———————————————————————————	DMHz/2.7 to	Yes (Addres	- -	Ye	es
External Inter Debugging Function Other Functions Operating Fre	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others quency/Supply Voltage		Yes (Addres	ss match ×2)	20M	11 Yes Yes	DMHz/2.7 to 9 40 to 85	Yes (Addres	s match × 2)	Y0 Y0 -	es es -
External Inter Debugging Function Other Functions Operating Fre Operating Am	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others quency/Supply Voltage		Yes (Addres	ss match ×2)	20M	11 Yes Yes	DMHz/2.7 to 9 40 to 85	Yes (Addres	s match × 2)	Y0 Y0 -	es es -
External Inter Debugging Function Other Functions Operating Fre	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others quency/Supply Voltage		Yes (Addres	ss match ×2)	20M	11 Yes Yes	DMHz/2.7 to 9 40 to 85	Yes (Addres	s match × 2)	Y0 Y0 -	es es -
External Inter Debugging Function Other Functions Operating Fre Operating Am	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others quency/Supply Voltage		Yes (Addres	ss match ×2)	20M	11 Yes Yes	DMHz/2.7 to 9 40 to 85	Yes (Addres	s match × 2)	Y0 Y0 -	es es -
External Inter Debugging Function Other Functions Operating Fre Operating Am	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others quency/Supply Voltage		Yes (Addres	ss match ×2)	20M	11 Yes Yes	DMHz/2.7 to 9 40 to 85	Yes (Addres	s match × 2)	Y0 Y0 -	es es -
External Inter Debugging Function Other Functions Operating Fre Operating Am	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others quency/Supply Voltage	71	-			11 Yes Yes — — ———————————————————————————	DMHz/2.7 to	Yes (Addres	- -	Ye	es
External Inter Debugging Function Other Functions Operating Fre Operating Am	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others quency/Supply Voltage		Yes (Addres	ss match ×2)	20M	11 Yes Yes	DMHz/2.7 to 9 40 to 85	Yes (Addres	s match × 2)	Y0 Y0 -	es es -
External Inter Debugging Function Other Functions Operating Fre Operating Am	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others quency/Supply Voltage	PLQP0080KB-A	Ves (Addres	es match×2)	PLQP0064KB-A	11 Yes Yes	DMHz/2.7 to 9 40 to 85	Yes (Addres 5.5V	s match×2)	Y0 Y0 -	es es -
External Inter Debugging Function Other Functions Operating Fre Operating And Package	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others quency/Supply Voltage	PLQP0080KB-A	Ves (Addres	es match×2)	PLQP0064KB-A	111	DMHz/2.7 to 9	Yes (Addres 5.5V	s match×2)	PLQP0080KB-A	BLOP0064KB-A
External Inter Debugging Function Other Functions Operating Fre Operating Am	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others quency/Supply Voltage	PLQP0080KB-A	Ves (Addres	es match×2)	PLQP0064KB-A	111	DMHz/2.7 to 9	Yes (Addres 5.5V	s match×2)	PLQP0080KB-A	BLOP0064KB-A
External Inter Debugging Function Other Functions Operating Fre Operating An	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others quency/Supply Voltage	PLQP0080KB-A	Ves (Addres	es match×2)	PLQP0064KB-A	111	DMHz/2.7 to 9	Yes (Addres 5.5V	s match×2)	PLQP0080KB-A	BLOP0064KB-A
External Inter Debugging Function Other Functions Operating Fre Operating An	High Current Drive Port Pull-Up Resistor rupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others quency/Supply Voltage		Yes (Addres	ss match ×2)	20M	11 Yes Yes	DMHz/2.7 to 9 40 to 85	Yes (Addres	s match × 2)	Y0 Y0	es es -

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

• Specifications (M16C/6H Group)

Group			M16C/6H	
	ROM (Bytes)	128K	25	6K
	RAM (Bytes)	5K	8	K
Memory	ROM Type*1	N	Л	F
vieillory	Data Flash		_	
	Program Security	-	-	Yes (ID code check function, ROM code protect function)
	CPU		M16C/60 Core	
	Basic Instructions		91	
CPU	Minimum Instruction Execution Time (ns)		62,5 (@16MHz)	
	Multiplier		16×16→32	
	Multiply-Accumulate Instruction		16×16+32→32	
DMA	DMAC (Channels)		2	
	Clock Generation Circuit		2 circuits (Main clock, Sub-clock)	
	PLL		=	
	Subclock		Yes	
Clock	RTC		Yes	
	On-Chip Oscillator		<u> </u>	
	Frequency Divider		1/n (n = 1, 2, 4, 8, 16)	
	Power Save	Normal operation (High-	speed, Medium-speed, Low-speed, Low-power	consumption)/Wait/Stop
	Resolution×Channels		8-bit × (8 + 2)	
D/A Converter	Sample and Hold		<u> </u>	
Timer	16-bit		11 (Timer A, Timer B)	
Watchdog Tin			1	
	Clock Sync./ Clock Async.		3 (UART0 to UART2)	
Serial Interface	Clock Sync. Only		2 (SI/O3, SI/O4)	
	Clock Async. Only		<u> </u>	
l²C-bus			4 (UART0 to UART2 + Multi master I ² C)	
IEBus			1 (UART2)	
Smart Card/S			1 (UART2)	
Synchronous Serial Co	ommunication Unit/Special Serial I/O		_	
CAN	Channels		_	
	Message Box (Numbers)		<u> </u>	
CRC Calculation			1 (CRC-CCITT (X16+X12+X5+1))	
	Input Only (Numbers)		1	
/O Ports	CMOS Output Only (Numbers)	-		1
	CMOS I/O (Numbers)		79	
	N-Channel Open Drain Port (Numbers)		4	
External Inter			8	
Debugging Function	On-Board Flash Program	-	-	Yes
Other Functions	ROM Correction Function	Yes (Adress		_
	Others	VBI	Data slicer (PDC, VPS, WSS, EPG-J, CCD, CC2X,	ID-1)
	quency/Supply Voltage		16MHz/4.5 to 5.5V	
	bient Temperature (°C)		-20 to 70	
Package			PRQP0100JB-A	
Part No.		M306H7MC-XXXFP	M306H7MG-XXXFP	M306H7FGFP

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

• Specifications (M16C/6S Group)

Group		M16C/6S
	ROM (Bytes)	96K
	RAM (Bytes)	24K
Memory	ROM Type*1	
ivieillory	Data Flash	- 1
	Program Security	Yes (ID code check function, ROM code protect function)
	CPU	M16C/60 Core
	Basic Instructions	91
CPU	Minimum Instruction Execution Time (ns)	65.1 (@15.36MHz)
0.0	Multiplier	16×16−32
	Multiply-Accumulate Instruction	16×16+32→32
	Barrel Shifter	1
D144	DMAC (Channels)	2
DMA	DTC/DMAC II	
	Address Space (Bytes)	-
External Bus	External Bus Interface	-
Expansion	Bus Structure	
Expansion		
	DRAM Controller	
	Clock Generation Circuit	2 circuits (Main clock, On-chip oscillator)
	PLL	-
	Subclock	<u>-</u>
Clock	Real Time clock	_
CIOCK	On-Chip Oscillator	Yes
	Oscillation Stop Detection	-
	Frequency Divider	1/n (n = 1, 2, 4, 8, 16)
	Power Save	Normal operation (High-speed), Medium-speed)/Wait/Stop
D	Power-On Reset/POR	Normal operation (riigh-speed, Medium-speed), wait/Stop
Power Supply Voltage Detection		<u>-</u>
voitage Detection	Low Voltage Detection/LVD	-
	Resolution × Channels	-
A/D Converter	Sample and Hold	-
	Multi-Channel Sample and Hold	_
D/A Converter	Resolution × Channels	I
	8-bit	1
	16-bit	5 (Timer A)
	Input Capture	
	Output Compare	_
Timer	PWM Output	
ilmer		<u>-</u>
	Real-Time Port	-
	Event Counter	-
	2-Phase Encoder Input	
	3-Phase Inverter Control	<u>-</u>
Watchdog Tin	ner	-
	Clock Sync./ Clock Async.	2 (UART0, UART1)
Serial Interface	Clock Sync. Only	2 (SI/O4 is internally connected to IT800)
	Clock Async. Only	1 (UART2)
I ² C-bus		3 (UARTO to UART2)
IEBus		o Joseph Do Onite
Smart Card/S	IN/I	<u> </u>
		<u> </u>
Synchronous Serial C	ommunication Unit/Special Serial I/O	
CAN	Channels	
	Message Box (Numbers)	-
IrDA		
CRC Calculati	on Circuit	-
X/Y Converte		-
	Input Only (Numbers)	1
	CMOS I/O (Numbers)	20
I/O Ports	N-Channel Open Drain Port (Numbers)	
I/O Ports		1 (17/_0)
	High Current Drive Port	
	Pull-Up Resistor	20 (Pull-up resistor can be set every four ports)
External Inter		3 (INT1-INT3)
Debugging Eurotia	On-Chip Debug	Yes
Debugging Function	On-Board Flash Program	Yes
	ROM Correction Function	——————————————————————————————————————
Other Functions	Others	Power line communication function
Operating Fro	quency/Supply Voltage	Fower me communication interior 15.36WHz/3.0 to 3.6V
	bient Temperature (°C)	-20 to 85, -40 to 85
Package		PLQP0064KB-A
Part No.		M306S0FAGP
		Model Adi

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Oz : OzROM version

^{★:} New product ★★: Under development

• Specifications (M16C/39P Group)

Group		M160	C/39P
	ROM (Bytes)	128K	192K
	RAM (Bytes)	5K	6K
Memory	ROM Type*1		М
	Data Flash	-	-
	Program Security	=	
	CPU	M16C/	
	Basic Instructions		1
CPU	Minimum Instruction Execution Time (ns)		16MHz)
	Multiplier		6→32
	Multiply-Accumulate Instruction		+32→32
DMA	DMAC (Channels)		2
	Clock Generation Circuit	2 circuits (Main	clock, Sub clock)
	PLL		-
Clock	Subclock	Yes (32.	768kHz)
	On-Chip Oscillator	-	-
	Frequency Divider		2, 4, 8, 16)
	Power Save		ow-speed, Low-power consumption)/Wait/Stop
A/D Converter	Resolution × Channels	10-bi	t×18
D/A Converter	Resolution × Channels	-	
	16-bit		A, Timer B)
Timer	PWM Output		ith Timer A)
	Event Counter		imer A, Timer B)
100 - 1 1 700	2-Phase Encoder Input	1 (shared wi	th Timer A2)
Watchdog Tir	ner	O.UIADTO	I LIADTO
Serial Interface	Clock Sync / Clock Async		I, UART2)
120.1	Clock Sync, Only	1 (used in UARTO	
I ² C-bus IEBus		2 (shared with	
Smart Card/S	NID #	1 (shared w	vith UART2)
	Communication Unit/Special Serial I/O		pecial mode 2)
VFD	Communication Unit/Special Serial I/U		umbers) ≦ 32, 2 ≦ Digit (Numbers) ≦ 16)
CRC Calculati	Cinavit	1 (CRC-CCITT ()	
CRC Calculati			
	Input Only (Numbers) CMOS I/O (Numbers)		<u>1</u> :1
I/O Davida	High Current Drive Port		4
I/O Ports	N-Channel Open Drain Port (Numbers)	2 (P7 (•
	Pull-Up Resistor		be set every four ports)
External Inter		51 (rull-up resistor can	ne set every rour ports)
External intel	ROM Correction Function	Yes (Addres	re match × 2)
Other Functions	Others	tes (Addres	- match \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
Operating Fre	equency/Supply Voltage	When using VFD:16MHz/4.5 When not using VFD:16MHz/4.	- 5 to 5.5V, 10MHz/3.0 to 3.6V, 4.2 to 5.5V, 10MHz/2.7 to 5.5V
Operating An	nbient Temperature (°C)		to 75
Package	ibient lemperature (C)		100JB-A
Laskage		ritaro	
Part No.		M30392MCP-XXXFP	M30392MEP-XXXFP

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Group								R	8C/1	8												R8	C/1	9					
	ROM (Bytes)		4K			8	K			12	K			16	K		4	K + 2K	Т	8K +	2K	Т		12K	+ 2K			16K	+ 2K
	RAM (Bytes)		384			5				76				1				384		51				76				1	
Memory	ROM Type*1															F	:												
	Data Flash / E2 Data Flash								-												Flash	: pro	grar	n/era	ise 10	0k tin	nes)		
	Program Security										Yes	(ID c	ode o	check				l code pr	otect	functi	ion)								
	CPU															R8C													
	Basic Instructions															8													
CPU	Minimum Instruction Execution Time (ns)	_															омн												
	Multiplier	-															6→32												
	Multiply-Accumulate Instruction	-								4- (B)		.11-	1101				- 32						11-4-	1					
	Clock Generation Circuit PLL	-						3 (ircui	ts (IV	ain c	носк,	nıgı	n spe	ea on	i-cnip	OSCI	illator, Lo	w spe	ea o	1-cnip	OSCI	Hato	or)					
	Subclock																												
	Real Time clock															_	_												
Clock	On-Chip Oscillator									2 cir	cuits	(Hia	h pre	ecisio	n. Hid	nh sn	eed:	8MHz, L	ow sr	eed :	125k	Hz)							
	Oscillation Stop Detection											,	p		,	γ _ε		· · · · · · · · · · · · · · · · · · ·	op			,							
	Frequency Divider														l/n (r			8, 16)											
	Power Save																Stop												
Power Supply	Power-On Reset/POR															Ye													
Voltage Detection	Low Voltage Detection/LVD													Yes	(Vol	tage	dete	ction 2)											
A/D Converter	Resolution×Channels																												
	Sample and Hold															-													
D/A Converter	Resolution×Channels															-													
	8-bit													- 1				ner Z)											
	16-bit																ner C												
	Input Capture																	mer C)											
_	Output Compare		1 (shaed with Timer C) 1 (shaed with Timer Z)																										
Timer	PWM Output	_	1 (shaed with Timer Z) — 1 (shaed with Timer X)																										
	Real-Time Port	-																											
	Event Counter 2-Phase Encoder Input	-	1 (shaed with Tim											mer X)															
	3-Phase Inverter Control																												
Watchdog Tir									1.6	with	auto	mati	r etai	rtina	funct	ion a	nd cl	lock sour	ce nro	tecti	on fuu	oction	.,						
watendog in	Clock Sync./ Clock Async.								- ' '	VVILII	auto	mati	c stai	itilig			RT0)		ce pre	tecti	on rui	ictioi	"/						
Serial Interface	Clock Sync. Only															- (0,	_	'											
Conditionado	Clock Async. Only														-	1 (UA	RT1)	1											
I ² C-bus																	_												
Synchronous Serial (Communication Unit/Special Serial I/O															-	-												
0411	Channels															-	-												
CAN	Message Box (Numbers)															-	-												
	Input Only (Numbers)															3	3												
	CMOS Output Only (Numbers)															-	-												
I/O Ports	CMOS I/O (Numbers)															1													
,	N-Channel Open Drain Port (Numbers)	_																											
	High Current Drive Port																												
=	Pull-Up Resistor															1													
External Inter		-														7													
Debugging Function	On-Chip Debug On-Board Flash Program															Ye Ye													
	ROM Correction Function															16	-												
Other Functions	Others	\vdash													-	omn	arato	r											
Operating Fre	equency/Supply Voltage												20M	Hz/3.				Hz/2.7 to	5.5V										
		-20	-40	2	0 to	-40				-40				-40					0 to	-40			_	-40				-40	-2
Operating An	nbient Temperature (°C)	to 85			35	to 85	-2	20 to	85	to 85	-2	20 to	85	to 85	-2	20 to	85		35	to 85	-2) to 8	5	to 85	-2	20 to	85	to 85	8
		İ																											
		l																											
		∢		4	⋖	-	9	4	∢		-B	_	∢	4	9	4	∢	4	∢	4	9	4	∢	4	9	4	∢	_	9
Doolsono		0020BA-A		0020JB-A	0020BA-A	0020JB-A	%	9	20020BA-A	0020JB-A	ž	0020JB-A	0020BA-A	0020JB-A	×	0020JB-A	0020BA-A	0020JB-A	0020BA-A	0020JB-A	ž	0020JB-A	0020BA-A	0020JB-A	N0028KA-B	0020JB-A	90020BA-A	0020JB-A	N0028KA-B
Package		2		ವ	201	쥖	028	쥖	20E	쥖	028	쥖	20E	딣	028	2	20E	507	20E	쥖	028	쥖ㅣ	20E	20.7	028	20	20E	쥖	88
		8		8	00	000	2	00	00	00	9	8	00	00	2	00	00	00	00	90	2	8	8	00	2	00	00	00	2
		PRDP		PLSP	PRDP	PLSP	PWQN0028KA-B	PLSP0020JB-A	PRDP	PLSP(PWQN0028KA-B	PLSP(PRDP(PLSP(PWQN0028KA-B	PLSP	PRDP	PLSP(PRDP	PLSP	PWQN0028KA-B	PLSP(PRDP	PLSP(PWQ	PLSP(PRDP	PLSP(PWQ
		#		굽	Œ	귙	2	귑	#	립	₹	귙	품	굽	2	립	4	굽	E	귑	2	굽	ᆂ	귑	2	귑	#	굽	2
		_	۰			ے				م				ے				۵		۵				۵				ے	
Part No.		R5F21181DD	R5F21181DSI	SP	R5F21182DD	R5F21182DSF	R5F21182NP	SP	R5F21183DD	R5F21183DSP	R5F21183NP	SP	R5F21184DD	R5F21184DSI	R5F21184NP	R5F21184SP	R5F21191DD	R5F21191DSI	R5F21192DD	R5F21192DS	R5F21192NP	S	R5F21193DD	R5F21193DSF	Z	SP	R5F21194DD	R5F21194DSF	R5F21194NP
		181	18	R5F21181SP	182	182	182	R5F21182SP	183	183	183	R5F21183SP	184	184	184	184	191	R5F21191DS R5F21191SP	192	192	192	R5F21192SP	193	193	R5F21193NP	R5F21193SP	194	194	194
		21.	21,	21.	21.	21.	21.	21.	21.	21.	21.	21.	21.	21.	21.	21.	21.	21	21.	21.	21.	21	21.	21.	21.	21.	21.	21.	21.
		35F	55	5F.	15F	15F	15F	35F	5F	5F	35F	15F	35F	15F	15F	15F	35F	15F	15F	15F	15F	15F	15F	35F	15F	5F	5F	5F	5F
		۳.	~	~	~	<u>«</u>	22	œ	Œ	ш.	8	<u>~</u>	Œ	<u>«</u>	Œ	œ	22	œ œ	~	Œ	œ	œ	œ	8	<u>~</u>	œ	E	œ	<u>~</u>

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Group								R	BC/1	A												R	3C/1E	3					
	ROM (Bytes)		4K			8				12				16				(+ 2K		8K +		\Box			+ 2K			16K	
	RAM (Bytes)		384			5′	12			76	8			1	K			384		51	2			76	18			11	K
Memory	ROM Type*1																												
	Data Flash / E2 Data Flash								_						_							: pro	gran	1/era	se 10)k tin	nes)		
	Program Security										Yes	(ID co	ode c	heck				code pi	otect	tunct	ion)								
	CPU	-														R8C													
CPU	Basic Instructions Minimum Instruction Execution Time (ns)														EO	8:	oMH2												
CPU	Multiplier	-															01VI⊓2 5 → 32												
	Multiply-Accumulate Instruction																32 -												
	Clock Generation Circuit							3.0	ircui	te (M	ain c	lock	High	ı ena				lator, Lo	w ene	and o	n-chir	060	illato	r)					
	PLL	\vdash							, ii cui	13 (14)	anı	iock,	riigi	i spe	eu on	-cinp	. 0301	iatoi, L	ov spe	eu o	ii-ciiiş	030	illato	.,					
	Subclock																												
	Real Time clock																												
Clock	On-Chip Oscillator									2 cir	cuits	(Hia	h pre	cisio	n. Hic	ah sp	eed :	8MHz, I	.ow sr	eed :	125k	Hz)							
	Oscillation Stop Detection											,,,,,	р. с		,	Υe		·····-, ·				,							
	Frequency Divider													1	l/n (n			3. 16)											
	Power Save																Stop												
Power Supply	Power-On Reset/POR															Ye													
Voltage Detection	Low Voltage Detection/LVD													Yes	s (Vol	tage	dete	tion 2)											
A/D Comment	Resolution×Channels															10-bi													
A/D Converter	Sample and Hold															Yε	s												
D/A Converter	Resolution × Channels																-												
	8-bit														2 (Tin			er Z)											
	16-bit																er C)												
	Input Capture																	mer C)											
	Output Compare																	mer C)											
Timer	PWM Output													1	(shar	ed w	ith Ti	mer Z)											
	Real-Time Port																•												
	Event Counter		1 (shared with Timer X) — — — —																										
	2-Phase Encoder Input																												
	3-Phase Inverter Control																												
Watchdog Tir		_							1 (with	auto	matio	c star	rting				ock sou	ce pro	tecti	on fu	nctio	n)						
	Clock Sync./ Clock Async.															1 (UA	RT0)												
Serial Interface	Clock Sync. Only															-													
	Clock Async. Only	_														1 (UA													
I ² C-bus	0	-									1 (sr	ared	with	1 Syn				I Comm	unicat	ion C	Init)								
Synchronous Serial	Communication Unit/Special Serial I/O														1 (sn	ared	with	FC)											
CAN	Channels (Name have)	-																											
	Message Box (Numbers)																												
	Input Only (Numbers) CMOS Output Only (Numbers)	-														3	-												
	CMOS I/O (Numbers)	\vdash														1:													
I/O Ports	N-Channel Open Drain Port (Numbers)	\vdash														- 1	-												
	High Current Drive Port	 														4													
	Pull-Up Resistor															1:													
External Inter																7													
	On-Chip Debug															Υe													
Debugging Function	On-Board Flash Program															Ye													
	ROM Correction Function																-												
Other Functions	Others															_													
Operating Fre	equency/Supply Voltage												20MI	Hz/3.	0 to 5	5.5V.	10M	Hz/2.7 t	5.5V										
		-20	-40	-2	0 to	-40			<u></u>	-40				-40					20 to	-40	_	0 to 8		-40			0.5	-40	-2
Operating An	mbient Temperature (°C)		to 85		5	to 85		20 to	85	to 85	-2	20 to	85	to 85		20 to	85	to 85	85	to 85	-2	υ το ε	55	to 85		0 to	85	to 85	8
																						\Box							
																									.				
		∢	_	-	⋖	_	9	ا ہے	∢	_	œ.	ا ہے	⋖	ا ـ ا	9	ا ہ	∢	_	⋖	ا ہے ا	9	_	⋖	_	<u> </u>	ا ہے	⋖	_	8
Deeleene		☆	2	3	\ \d	B-7	Ϋ́	1 -8	₩.	-A	χ	1 -8	₩.	1	X	4	Α̈́	1 8	Α̈́	P-4	Ž	9	Ä.	-B	꽃	4	\ ×	B-4	Ž
Package		0020BA-A	0000 IB.A	3	0020BA-A	0020JB-A	N0028KA-B	PLSP0020JB-A	PRDP0020BA-A	0020JB-A	N0028KA-B	0020JB-A	20020BA-A	0020JB-A	N0028KA-B	90020JB-A	0020BA-A	0020JB-A	PRDP0020BA-A	0020JB-A	PWQN0028KA-B	0020JB-A	P0020BA-A	'0020JB-A	N0028KA-B	PLSP0020JB-A	20020BA-A	0020JB-A	N0028KA-B
		8	Š	Š	8	00	Š	8	8	8	١ĕ	9	00	60	9	S	8	8	8	00	9	8	8	00	9	8	8	00	Š
		립	ő	2		SP	ō.	S	8	SP	٥	SP	ď	SP	g l	S		SP	<u>6</u>	SP	₫l	S	9	SP	₫	SP	8	SP	g
		PRD	2	Z .	PRD	PLSP	PWO	곱	뚭	PLSP	PWO	PLSP	PRDF	PLSP	PWO	PLSP	PRD	PLSP	2	PLSP	2	PLSP	PRDF	PLSP	PWO	చ	PRDF	PLSP	PWO
			_			_				_				_				_		_				_				_	
			DS	SP	8	DS	₹	SP	8	DS	F	SP	9	DS	F	SP	8	SO	0	SO	₽	SP	8	DS	₽	SP	8	SO	F
Part No.			-		2	2	7	2	13	13	13	3	14	4	14	4	=	E 2	121	321	22	22	23	33	33	33	74	341	841
Part No.		 	4	A	✓	4	4																						
Part No.		11A1I	11A1	11A	11A	11A	11A	1	=	17	17	11/	11/	11/	17	1 5	=	118	118	11	=	=	1	11E	=	11	1	11	Ξ
Part No.		R5F211A1DD	R5F211A1DSI	R5F211A1SF	R5F211A2DD	R5F211A2DSP	R5F211A2NP	R5F211A2SF	R5F211A3DD	R5F211A3DSP	R5F211A3NP	R5F211A3SF	R5F211A4DD	R5F211A4DSI	R5F211A4NP	R5F211A4SP	R5F211B1DD	R5F211B1DSI	R5F211B2DD	R5F211B2DSP	R5F211B2NP	R5F211B2SP	R5F211B3DE	R5F211B3DSI	R5F211B3NF	R5F211B3SF	R5F211B4DD	R5F211B4DSF	R5F211B4NP

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

RAMI Bytes 2K 2.5K 3K 2K 2.5K	Group			R8C/22			R8C/23	
RAMI (Bytes)		ROM (Bytes)	32K	48K	64K	32K + 2K	48K + 2K	64K + 2K
Data Flash / EZ Data Flash —			2K	2.5K	3K		2.5K	
Data Flash / EZ Data Flash Program Security Yes (ID code check function), ROM code protect function) ROC Core	emorv	ROM Type*1				F		
Program Security	,			_		2K (Data	Flash : program/erase 1	0k times)
PU Basic Instructions 83 83 16 17 16 17 17 17 18 18 18 18 18				Ves	(ID code check function.			
Basic Instructions				100				
Multiplier Sol @200Hr2 Multiplier Sol @200Hr2 Multiplier Sol @200Hr2 Multiplier Sol @200Hr2 Multiplier Sol @200Hr2 Multiplier Sol @200Hr2 Source Source Source Sol @200Hr2 Source Sol @200Hr2 Source Sol @200Hr2 Source Sol @200Hr2 Source Sol @200Hr2 Sol &200Hr2								
Multiplier 16 × 16 + 32 Multiplier 16 × 16 + 32 32 3 circuits (Main clock, High speed on-chip oscillator, Low speed on-chip oscillator, PLL	DII							
Multiply-Accumulate Instruction 16 x 16 + 32 - 32	FU							
Clock Generation Circuit								
PLL				2 sinevite (B#sin				
Subclock				3 circuits (Main e	aock, might speed on-chij	o oscillator, Low speed o	m-cmp oscillator)	
Real Time clock					·			
On-Chip Oscillator 2 circuits (High precision, High speed : 40MHz, Low speed : 125kHz)					·	=		
Oscillation Stop Detection Yes	Clock							
Frequency Divider Prover Save				2 circuits			: 125kHz)	
Power Save Wait/Stop								
Power-On Reset/POR Power-On Power-On Reset/POR Power-On Power-O								
December December								
	ower Supply							
	oltage Detection	Low Voltage Detection/LVD			Yes (Voltage	detection 2)		
Sample and Hold Yes	/D 0	Resolution × Channels			10-bi	t×12		
8-bit 3 (Timer RB, Timer RE) 16-bit 2 (Timer RD)	A/D Converter	Sample and Hold			Y	es		
8-bit 3 (Timer RB, Timer RE) 16-bit 2 (Timer RD)	O/A Converter	Resolution × Channels			-	_		
16-bit	,				3 (Timer BA, Tim	er RB. Timer RE)		
Input Capture								
Output Compare								
PWM Output								
Real-Time Port	Imar							
Event Counter 1 (shared with Timer RA) 2-Phase Encoder Input 3-Phase Incoder Input 1 (shared with Timer RD) 3-Phase Incoder Input 1 (with automatic starting function and clock source protection function) 1 (with automatic starting function and clock source protection function) 1 (with automatic starting function and clock source protection function) 1 (with automatic starting function and clock source protection function) 1 (with automatic starting function and clock source protection function) 1 (with automatic starting function and clock source protection function) 1 (with automatic starting function and clock source protection function) 1 (with automatic starting function and clock source protection function) 1 (with automatic starting function and clock source protection function) 1 (with automatic starting function) 1 (with automatic starting function) 1 (with automatic starting function of its white function) 1 (with automatic starting function of its white function) 1 (with automatic starting function of its white function) 1 (with automatic starting function of its white function) 1 (with automatic starting function of its white function) 1 (with automatic starting function of its white function) 1 (with automatic starting function of its white function) 1 (with automatic starting function of its white function) 1 (with automatic starting function of its white function) 1 (with automatic starting function) 1 (with automatic starting function of its white function) 1 (with automatic starting function) 1 (with automatic starting function) 1 (with automatic starting function) 1 (with automatic starting function) 1 (with automatic starting function) 1 (with automatic starting function) 1 (with automatic starting function) 1 (with automatic starting function) 1 (with automatic starting function) 1 (with automatic starting function) 1 (with automatic starting function) 1 (with automatic starting function) 1 (with automatic start	illiei				/ (Shared With Th	Her ND, Hiller ND)		
2-Phase Encoder Input 3-Phase Inverter Control 1 (shared with Timer RD)					4 (-1	4l- T DA\		
3-Phase Inverter Control 1 (shared with Timer RD)					i (snared wi	tn Ilmer KA)		
Validation Val								
Clock Sync. / Clock Async. Clock Sync. Only Clock Sync. Only Clock Sync. Only T (UART1)								
Clock Sync. Only 1 (UART1)	Watchdog III			1 (with auto			ion function)	
Clock Async. Only								
	Serial Interface							
Can Channels Cha		Clock Async, Only						
CAN Channels				1 (s			Jnit)	
Message Box (Numbers) 16	Synchronous Serial C	ommunication Unit/Special Serial I/O			1 (shared	l with I ² C)		
Message Box (Numbers) 16	CANI	Channels				1		
CMOS Output Only (Numbers)	AIN	Message Box (Numbers)			1	6		
CMOS Output Only (Numbers)		Input Only (Numbers)			:	3		
CMOS I/O (Numbers)						_		
Nc Nc Nc Nc Nc Nc Nc Nc		CMOS I/O (Numbers)			4	.1		
High Current Drive Port	/O Ports							
Pull-Up Resistor 41						_		
External Interrupts Pins 8 8 8 8 8 8 8 8 8						1		
On-Chip Debug Yes	vtornal Inter							
On-Board Flash Program Yes	.xternar inter							
ROM Correction Function	ebugging Function							
Others - Communications - Communication - Comm								
Others	ther Functions				<u> </u>			
Perating Ambient Temperature (°C) —40 to 85 PLQP0048KB-A						-		
ackage PLQP0048KB-A								
		bient Temperature (°C)						
Part No. R5F21226DFP R5F21227DFP R5F21228DFP R5F21236DFP R5F21237DFP R5F21238U	ackage				PLQP00	48KB-A		
	art No.		R5F21226DFP	R5F21227DFP	R5F21228DFP	R5F21236DFP	R5F21237DFP	R5F21238DF

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Group							R80	/24											R8C	/25					
	ROM (Bytes)		16K		24	K		32K		48		64		16	K + 2K	\Box	24K+2	K		2K + 2	K	48K -		64K -	
	RAM (Bytes)		1K				2K			2.5	5K	3⊧			1K				2K			2.5	5K	31	<u>K_</u>
Memory	ROM Type*1												- F			01/ //	D					N	1		
	Data Flash / E2 Data Flash Program Security						-	_	Voc	/ID co/	da cha	ok fund	tion F	OM o	odo pr		Data FI functio		progr	am/e	rase 1	JK tim	es)		
	CPU								162	יוט כטו	ue che	ck rune	R8C C		oue pr	otecti	unctio	"							
	Basic Instructions												89												
CPU	Minimum Instruction Execution Time (ns)											5	0 (@20												_
	Multiplier												16×16	→32											
	Multiply-Accumulate Instruction													32 → 32											
	Clock Generation Circuit					4 cir	cuits (Main	clock,	Sub cl	lock, H	igh sp	ed on	-chip c	scilla	or, Lo	w spee	d on	-chip d	oscilla	tor)				
	PLL												- '00 7	00111											
	Subclock Real Time clock	-											s (32.7) s (Tim	68kHz)										
Clock	On-Chip Oscillator							2 ci	rcuite	(High	nrecis				MHz	OW ST	peed : '	2511	1 7)						
	Oscillation Stop Detection							2 01	Tourts	(riigii	precis	1011, 111	Yes		141112,	LOW 3	occu .	ZJKI	121						
	Frequency Divider											1/n (, 4, 8,	16)										
	Power Save												Wait/S												
Power Supply	Power-On Reset/POR												Yes												
Voltage Detection											,	Yes (Vo			on 3)										
A/D Converter	Resolution×Channels												10-bit												
	Sample and Hold	_											Yes	5											
D/A Converter	Resolution × Channels 8-bit	_									3 /T:	mer RA	Tima	r RD 7	limor '	SE)									
	16-bit										3 (11		(Time		illiei	IL/									
	Input Capture										- 1	3 (share			r RD)										
	Output Compare		9 (shared with Timer RD, Timer RE) 7 (shared with Timer RB, Timer RD)																						
Timer	PWM Output																								
	Real-Time Port		 1 (shared with Timer RA)																						
	Event Counter		1 (shared with Timer RA)																						
	2-Phase Encoder Input																								
147	3-Phase Inverter Control							4 / ***				1 (share													
Watchdog Ti	Clock Sync./ Clock Async.	-						i (Witi	n auto	matic	startin			UART		ce pro	tection	tun	ction)						—
Serial Interface												2 (0	AN 10,	UANI	''										
Oction interface	Clock Async. Only																								
I ² C-bus	- Caronina Cara								1 (s	hared v	with S	vnchro	nous S	Serial (Comm	unicat	ion Un	t)							
Synchronous Serial	Communication Unit/Special Serial I/O											1 (s	nared v	with I2	C)										
CAN	Channels												_												
	Message Box (Numbers)																								
	Input Only (Numbers)	_											3												—
	CMOS Output Only (Numbers) CMOS I/O (Numbers)	_											41												—
I/O Ports	N-Channel Open Drain Port (Numbers)	-											- 41												
	High Current Drive Port												8												
	Pull-Up Resistor												41												
External Inte	errupts Pins												8												
Debugging Function	On-Chip Debug												Yes												
Debugging Function	Un-Board Flash Program												Yes	8											
Other Functions	ROM Correction Function																								
	Others requency/Supply Voltage	_							2084	11- (2.0	\ 4 - F F	1/ 108		74- 51	-1/ FB	#II- /O	24- 51								—
					-40	-20	-40		ZUIVI	-40	-20	- 40		-40	ov, or		2 to 5.	-	- 40			-40	-20	-40	-20
		1 40	20 4	o 85	to 85		to 85	-20	to 85		to 85			to 85	-20 to				to 85	-20	to 85	to 85			
	mbient Temperature (°C)	- 40 to 85	-20 to																					-	
		- 40 to 85	-20 to																						
			-20 to						⋖			<				⋖		⋖			⋖		_		
		to 85				<	τ.														7		9		
Operating A		to 85				< <	<u> </u>		ķ			Š				₹		Ą			JA-		4		
Operating A		to 85				10. A	A-A-C-C-C-C-C-C-C-C-C-C-C-C-C-C-C-C-C-C		964JA-			52JA-)64JA		52JA-			064JA-		152.1A.4		
		to 85 00052JA-A		30064JA-A		DOOR? IA.A			G0064JA-A			P0052JA-A				30064JA-A		P0052JA-A			G0064JA-A		P0052.14.4		
Operating A		to 85 00052JA-A		30064JA-A					TLG0064JA-			LQP0052JA-				TLG0064JA-		LOP0052JA-			TLG0064JA-		I OP0052.1A.4		
Operating A		to 85				PI OBOOES IA.A			PTLG0064JA-			PLQP0052JA-				PTLG0064JA-		PLOP0052JA-			PTLG0064JA-		PI OP0052.1A.A		
Operating A		to 85 00052JA-A		30064JA-A					PTLG0064JA-			PLOP0052JA-				PTLG0064JA-		PLQP0052JA-			PTLG0064JA-		PI OP0052 14.4		
Operating A		to 85 00052JA-A		30064JA-A					PTLG0064JA-			PLQP0052JA-				PTLG0064JA-		PLQP0052JA-			PTLG0064JA-		PI OP0052.14.4		
Operating A		to 85 PLOP0052JA-A		PTLG0064JA-A	Q.	2		Q -	PTL(d.	ą.			p.	e.	PTLC	e.	Pro		d.	PTL(ę.			ę.
Operating Ar		to 85 PLOP0052JA-A		PTLG0064JA-A	SDFP	2		SNFP	PTL(SDFP	SNFP			SDFP	SNFP	PTLC	SDFP	Pro		SNFP	PTL(SDFP			SNFP
Operating A		to 85 PLOP0052JA-A		PTLG0064JA-A	45SDFP	2		46SNFP	PTL(47SDFP	47SNFP			54SDFP	54SNFP	PTLC	55SDFP	Pro		56SNFP	PTL(57SDFP			58SNFP
Operating Ar		to 85 PLOP0052JA-A		PTLG0064JA-A	1245SDFP	2		1246SNFP	PTL(1247SDFP	1247SNFP			1254SDFP	1254SNFP	PTLC	1255SDFP	Pro		1256SNFP	PTL(1257SDFP			1258SNFP
Operating Ar		to 85 00052JA-A		30064JA-A	R5F21245SDFP			R5F21246SNFP	R5F21246SNLG PTLG0064JA-	R5F21247SDFP	R5F21247SNFP	R5F21248SDFP PLQP0052JA-	R5F21248SNFP	R5F21254SDFP	R5F21254SNFP	R5F21254SNLG PTLG0064JA-	R5F21255SDFP	KSFZ1ZSSNFP PLQP0052JA-	R5F21256SDFP	R5F21256SNFP	R5F21256SNLG PTLG0064JA-	R5F21257SDFP	R5F21257SNFP PI OP0052.1A-6	R5F21258SDFP	R5F21258SNFP

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Group				R86	C/26							R80	27					R8C	/28			R80	/29	
	ROM (Bytes)	8K		16K	24		32K		8K+2	2K	16K -	+ 2K	24K	+2K		-2K	8			SK	8K -	+ 2K		+ 2K
	RAM (Bytes)	512	2	1K		1.5k	(512	2	11	K		1.5	5K		51	2	1	K	5	12	1	K
N/1	ROM Type*1												F											
Memory	Data Flash / E2 Data Flash				_				2K (I	Data F	lash :	prog	ram/e	rase 1	0k time	es)		-	-			ata Flas rase 10		
	Program Security						١	es (II	D code	e chec	k fun	ction,	ROM	code r	rotect	functi	ion)							
	CPU												Core				,							
	Basic Instructions											8	9											
CPU	Minimum Instruction Execution Time (ns)										5	0 (@2	20MHz	:)										
	Multiplier											16×1	6→32											
	Multiply-Accumulate Instruction										16	×16-	+ 32 →	32										
	Clock Generation Circuit				4 cir	cuits (N	lain clo	ck, Sı	ub clo	ck, Hi	gh sp	eed o	n-chip	oscilla	ator, Lo	w spe	ed or	n-chip	oscilla	itor)				
	PLL											-	-											
	Subclock												768kH											
Clock	Real Time clock												mer RI											
CIOCK	On-Chip Oscillator						2 circu	its (H	ligh p	recisio	on, Hi	gh sp	eed:4	10MHz	, Low s	peed	: 125k	Hz)						
	Oscillation Stop Detection												es											
	Frequency Divider										1/n (2, 4, 8	3, 16)										
	Power Save												/Stop											
Power Supply	Power-On Reset/POR												es											
Voltage Detection	Low Voltage Detection/LVD									Υ	es (Vo	oltage	detec	tion 3)									
A/D Converter	Resolution×Channels						10)-bit ×	<12							I				10-b	it×4			
	Sample and Hold											Y	es											
D/A Converter	Resolution×Channels											-	_											
	8-bit									3 (Tin				, Timer	· RE)									
	16-bit												er RC											
	Input Capture													ner RC)										
	Output Compare													C, Time										
Timer	PWM Output								4	4 (shaı	red w	ith Tir	ner RE	3, Time	er RC)									
	Real-Time Port											-												
	Event Counter									1	(shar	ed wi	th Tim	ner RA)										
	2-Phase Encoder Input											-												
	3-Phase Inverter Control											-	_											
Watchdog Tir						1	(with a				g func	ction a	and clo	ock sou	urce pro	otectio	on fun	ction)						
	Clock Sync./ Clock Async.						2 (UAI	RTO, I	UART	1)										1 (UA	ARTO)			
Serial Interface	Clock Sync. Only											-	_											
	Clock Async, Only																			1 (UA	ART1)			
I ² C-bus							1	(sha	red w	ith Sy					nunicat	tion U	nit)							
Synchronous Serial	Communication Unit/Special Serial I/O										1 (s	hared	with	I ² C)										
CAN	Channels												_											
	Message Box (Numbers)																							
	Input Only (Numbers)												3											
	CMOS Output Only (Numbers)												-								_			
I/O Ports	CMOS I/O (Numbers)							25												1	3			
	N-Channel Open Drain Port (Numbers)																							
	High Current Drive Port											- 1	В								•			
Forten 11	Pull-Up Resistor							25												1	3			
External Inter													7											
Debugging Function	On-Chip Debug												es											
	On-Board Flash Program											Y	es											
Other Functions	ROM Correction Function Others																							
	equency/Supply Voltage	-40	20 4	30	-40	-20 -				to 5.5\ -20				5.5V, 5 -20	MHz/2 - 40			20	40	20	40	20	40	-20
	mbient Temperature (°C)	- 40 to 85	-20 -4 to 85 to 8	5 to 85	to 85	to 85 t	o 85 to	85 to	o 85 t	to 85 1	- 40 to 85	-20 to 85	- 40 to 85	to 85	to 85 t	- 20 to 85	- 40 to 85	- 20 to 85	to 85	to 85	to 85	to 85	-40 to 85	to 85
Package							PLQI	P0032	2GB-A	١									P	LSP00	20JB-	Α		
Part No.		R5F21262SDFP	R5F21262SNFP R5F21264SDFP	R5F21264SNFP	R5F21265SDFP	R5F21265SNFP	R5F21266SDFP	712003177	R5F21272SDFP	R5F21272SNFP	R5F21274SDFP	R5F21274SNFP	R5F21275SDFP	R5F21275SNFP	R5F21276SDFP	R5F21276SNFP	R5F21282SDSP	R5F21282SNSP	R5F21284SDSP	R5F21284SNSP	R5F21292SDSP	R5F21292SNSP	R5F21294SDSP	R5F21294SNSP
		RSF	RSF	RSF	R5F	RSF	RSF	2	RSI	RSF	RSF	RSF	RSF	R5F	RSF	RSF	RSF	R5F	RSF	R5F	R5F	R5F	R5F	R5F

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Oz : OzROM version

^{★:} New product ★★: Under development

Group									F	8C/:	2A															R80	/2B	1							
	ROM (Bytes)			18K	_	T	_	64K		I			6K		T		12		\Box	4	8K + 2	K		64K				96	K + 2	2K				K + :	
	RAM (Bytes)	\vdash	2	.5K				3K				7	′K		\perp		7.5	5K	ᆜ		2.5K			3	<u> </u>				7K				7	.5K	
Vlemory	ROM Type*1 Data Flash / E2 Data Flash		—							_												21	(Dat	a Fla	sh · ı	roa	ram	/ors	sea 1	INk :	tim	06)			
	Program Security											,	Yes	(ID e	code	le ch	eck :	funct	ion.	ROM	code	orote				nog	alli	/ 61 6	130	IUK		53/			
	CPU																		18C (
	Basic Instructions																		89																
CPU	Minimum Instruction Execution Time (ns)	╙																		MHz)														
	Multiplier Multiply-Accumulate Instruction	\vdash	_		_															→32 32 →	22														
	Clock Generation Circuit	\vdash	_		_			4 c	ircui	ts (N	/lain	ı clo	ck.	Sub	clo	ock. I	liah					ator, l	ow s	need	on-	hin	osc	illat	or)						
	PLL		_		_								,	-				орос	_	01111	000	,		poor	-	и	-		·.,						
	Subclock																			68k⊦															
Clock	Real Time clock	╙															_			er R															
	On-Chip Oscillator Oscillation Stop Detection										2 (circu	uits	(Hig	jh p	recis	ion	, High	ı spe Ye		OIVIH	, Low	spee	d : 12	25kH	z)									
	Frequency Divider																1	/n (n:			16)														
	Power Save		_		_														/ait/		, 10,														
Power Supply	Power-On Reset/POR																		Ye	s															
Voltage Detection		\vdash															Yes	(Volt			tion 3)													
A/D Converter	Resolution × Channels	\vdash																1	0-bit																
D/A Converter	Sample and Hold Resolution × Channels	\vdash	—		—		—												Ye 8-bit																
DIN CONVENTED	8-bit		_													3 (T	ime	r RA,			Time	r RE)													
	16-bit		_													4 (T	mei	RC,	Time	er RD	, Time	r RF)													
	Input Capture																					, Tim													
T	Output Compare											1	14 (s									ner RE)										
Timer	PWM Output Real-Time Port	\vdash	—		—									10	(sna	ared	witi	n IIm	er Ki	s, IIn	ier K	, Tim	er KD)											
	Event Counter		_		_												1 (s	hared	l wit	h Tin	er RA)													
	2-Phase Encoder Input		_														. ,-		_			,													
	3-Phase Inverter Control																	hared																	
Watchdog Ti		<u> </u>								1	(wi	th a	uto	mat	ic s	tarti						urce p	roted	tion	func	tion)									
Serial Interface	Clock Sync./ Clock Async. Clock Sync. Only	-	—		—												3	(UAF	(10 t	o UA	K12)														
Serial litteriace	Clock Async. Only																		_																
I ² C-bus			_									1	l (sł	hare	d w	vith S	Syno	hron	ous	Seria	Com	munic	ation	Unit)										
Synchronous Serial	Communication Unit/Special Serial I/O																	1 (sha	ared	with	ľC)														
CAN	Channels	\vdash																	_																
	Message Box (Numbers) Input Only (Numbers)	\vdash	—		—		—												2																
	CMOS Output Only (Numbers)		_		_																														
I/O Ports	CMOS I/O (Numbers)																		55																
I/O FOILS	N-Channel Open Drain Port (Numbers)		_																_																
	High Current Drive Port Pull-Up Resistor	┢	—																- 8 - 55	,															
External Inte																			8																
	On-Chip Debug		_																Ye																
Debugging Function	On-Board Flash Program																		Ye																
Other Functions	ROM Correction Function	╙																																	
	Others equency/Supply Voltage	\vdash	_		_							- 2	ORA	U-/1	2 0 1	to 5	51/	100/1	1-/2	7 +0	. F.V	5MHz	22+	. 5 5	,										
	mbient Temperature (°C)	-40 tc	85	-20	to 8	5 -4	40 to 85	-2	0 to	85 -	- 40 to											to 85				85	-40	to 85	-2	0 to	85	-40 t	to 85	-20	0 to
p			7	Ť	Ť	+	T	ĮΪ	Ť	Ť		-	Ť	Ť	1		Ť	Τ.			ΤĪ			+	Ť	T			ī	Ĭ		- T		Ť	Ť
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Package		§	춖ㅣ	ĝ ;	축 [:	3 2	기불	₽ Q	축	\$ 3	9	\$ 6	9	\$:	3	ĝ ş	0	1 2	\$	\$ \$	Ęģ.	\$ \$	§	\$ 5	: 꽃	\$	₽ G	축	ĝ.	*	₹.	₽ G		ĝ∣	춫
		18	9	8	9 8	9 8	3 8	9	9	9	9	9	9	9 8	9 3	8 8		8 8	8	90	90	90	9	9 8	9	9	90	90	90	90	9	90	90	9	9
			۱ڲ	PLOP0064GA-A	PLOP0064KB-A	PILG0064JA-A	PLQP0064KB-A	PLQP0064GA-A	PLQP0064KB-A	PTLG0064JA-A	PLOP0064GA-A	PLOP0064KB-A	PLOP0064GA-A	PLQP0064KB-A	PILG0064JA-A	PLQP0064GA-A	PLCI 0004KD-A	PLQP0064KB-A	PTLG0064JA-A	PLQP0064GA-A	PLQP0064GA-A	PLOP0064KB-A PTLG0064JA-A	PLQP0064GA-A	PLOP0064KB-A	PLQP0064KB-A	PTLG0064JA-A	PLQP0064GA-A	PLQP0064KB-A	PLQP0064GA-A	PLQP0064KB-A	PTLG0064JA-A	PLQP0064GA-A	PLQP0064KB-A	PLQP0064GA-A	PLQP0064KB-A
		18	al		۶ ج	= =	: [글	2	7	E 2	7 3	급 :	급 :	ᆲ	E i	ᆲ	1 3	5 3	뒽	ᆲ	2	ᆲ	김	ᆲ	. 3	ΙĒ	P	7	7	7	E	7	7	ᆲ	긥
		PLOP0064GA-A	PLQP0064KB-A	ᆲ	- -				_	_	-		-	_																_		_			_
		PLOP	2	리	- '		+																												
		PLOP	Pro	립	<u> </u>																														
						٠, و	Δ.	٨	_	ئ	4	. ا	<u>م</u>	ا ہے	ا بئ	۷ .	. <	(ا ق	۵ ۵	a	*:	4	ے اے		<u>*</u>	A	<u>-</u>	A	ے	*5	٨		4	
						DEA	DFP	NFA	NFP	NLG*	DFA	OFF	SNFA	NFP	NLG*	DFA	2 2	NFP	*NLG*	DFA	NFA	NFP NLG*	DFA	DFP	NFP	NLG*	DFA	DFP	NFA	NFP	*NLG*	DFA	DFP	NFA	NFP
Part No.						A/SINEGE RSDFA	\8SDFP	A8SNFA	ASSNFP	ASSNLG*	ASDFA	ASDFP	AASNFA	ASNFP	AASINLG	CSDFA	CONEA	CSNFP	ACSNLG*	37SDFA	37SNFA	37SNFP 17SNLG*	38SDFA	38SDFP	8SNFP	*BNLG*	SASDFA	SASDFP	SASNFA	SASNFP	3ASNLG [⋆]	SCSDFA	SCSDFP	SCSNFA	SCSNFP
Part No.						12A8SDFA	12A8SDFP	12A8SNFA	12A8SNFP	12A8SNLG*	12AASDFA	12AASDFP	12AASNFA	12AASNFP	12AASNLG*	12ACSDFA	12ACSNEA	12ACSNFP	12ACSNLG*	12B7SDFA	12B7SNFA	12B7SNFP 12B7SNLG*	12B8SDFA	12B8SDFP	12B8SNFP	12B8SNLG*	12BASDFA	12BASDFP	12BASNFA	12BASNFP	12BASNLG*	12BCSDFA	12BCSDFP	12BCSNFA	12BCSNFP
Part No.					R5F212A7SNFP P	RSF212A/SNLG"	R5F212A8SDFP	R5F212A8SNFA	R5F212A8SNFP	R5F212A8SNLG*	K5FZ1ZAASDFA	R5F212AASDFP	R5F212AASNFA	R5F212AASNFP	R5F212AASINLG*	R5F212ACSDFA	NSI ZI ZACSDI F	R5F212ACSNFP	R5F212ACSNLG*	R5F212B7SDFA	R5F212B7SNFA	R5F212B7SNFP R5F212B7SNLG*	R5F212B8SDFA	R5F212B8SDFP	R5F212B8SNFP	R5F212B8SNLG*	R5F212BASDFA	R5F212BASDFP	R5F212BASNFA	R5F212BASNFP	R5F212BASNLG*	R5F212BCSDFA	R5F212BCSDFP	R5F212BCSNFA	R5F212BCSNFP

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

				R80	C/2C							R80	:/2D			
ROM (Bytes)	48	8K	6-	4K	96	6K	12	8K	48K	+ 2K	64K	+ 2K	96K	+ 2K	128K	+ 2K
RAM (Bytes)	2.!	5K	3	K	7	K	7.		2.5	5K	3	K	7	K	7.	5K
ry ROM Type*1																
Data Flash / E2 Data Flash					-								ram/eras	e 10k tim	es)	
Program Security						es (ID co	de check			le protec	t functior	1)				
CPU	_								Core							
Basic Instructions								8								
Minimum Instruction Execution Time (n	_							50 (@2								
Multiplier Multiply-Accumulate Instructio	_								6→32 +32→32							
Clock Generation Circu				Lairouite	(Main clo	ak Cub a	look High			oillator I	ow cooo	l on ohin	occillato	-1		
PLL	1			Circuits	(IVIAIII CIO	ck, Sub c	iock, mgi	speeu o	- -	ciliatoi, L	ow speed	i on-cinp	OSCIIIALO	17		
Subclock								Yes (32,	768kHz)							
Real Time clock								Yes (Tir								
On-Chip Oscillator					2 circu	its (High	precision			Hz. Low	speed : 1	25kHz)				
Oscillation Stop Detection							p		es	,						
Frequency Divider							1	/n (n = 1,	2, 4, 8, 16	6)						
Power Save									Stop							
ipply Power-On Reset/POR									es							
Detection Low Voltage Detection/LVD							Yes	(Voltage	detection	n 3)						
Resolution × Channels									t×20							
Sample and Hold									es							
nverter Resolution × Channels								8-bi								
8-bit									er RB, Tir							
16-bit									er RD, Ti							
Input Capture							hared wit									
Output Compare					1		l with Tin					F)				
PWM Output						10 (sl	hared wit	h Timer R	B, Timer	RC, Time	er RD)					
Real-Time Port									-							
Event Counter	_						1 (s	hared wi	th Timer	RA)						
2-Phase Encoder Input							1/-	- 	th Timer	DD\						
3-Phase Inverter Contro dog Timer	4				1 (with a	utomotio					untontion.	function				
Clock Sync./ Clock Asyn					i (with a	utomatic			to UART2		rotection	iunction	'			
terface Clock Sync., Clock Asyn	1							(UANTO	- UANTZ	.,						
Clock Async. Only								_	_							
S Clock Adynor Chry					1	(shared	with Syn	hronous	Serial Co	mmunica	ation Uni	t)				
ous Serial Communication Unit/Special Serial I	5					(0.1.0.1.0.0.			with I ² C)			-,				
Channels								-								
Message Box (Numbers								-	_							
Input Only (Numbers)								- 2	2							
CMOS Output Only (Number								-	_							
rts CMOS I/O (Numbers)								7	1							
N-Channel Open Drain Port (Number								-								
High Current Drive Port									3							
Pull-Up Resistor								7								
al Interrupts Pins									3							
Function On-Chip Debug									es							
On-Board Flash Program									es							
nctions ROM Correction Function	4							-	-							
Others	_					08411 (0.0) 4- E E) '	400011 12	-	/ FR4:: '	224 5 -	V				
ting Frequency/Supply Voltage		20 4- 05	40 4- CF	20 +- 0"			to 5.5V,						40 4- CF	20.4- 05	40 4- 05	20.4
ting Ambient Temperature (°C) ge	-40 to 85	-20 to 85	- 40 to 85	- 20 to 85	-40 to 85	-20 to 85	- 40 to 85	PLQP00		-20 to 85	-40 to 85	-20 to 85	- 40 to 85	-20 to 85	-40 to 85	-20 to
о.	F212C7SDFP	F212C7SNFP	F212C8SDFP	F212C8SNFP	F212CASDFP	F212CASNFP	F212CCSDFP			F212D7SNFP	F212D8SDFP	F212D8SNFP	F212DASDFP	F212DASNFP	F212DCSDFP	R5F212DCSNFP
o.		8F212C7SDFP	SF212C7SDFP	TEF212C7SDFP TEF212C7SNFP TEF212C7SNFP	36F212C7SDFP 36F212C7SNFP 36F212C8SDFP	36F212C7SDFP 36F212C7SNFP 36F212C8SDFP 36F212C8SNFP	36F212C7SDFP 36F212C7SNFP 36F212C8SDFP 36F212C8SNFP 36F212CASDFP	35F212C7SDFP 35F212C7SNFP 35F212C8SDFP 35F212C8SNFP 35F212CASDFP 35F212CASDFP	RF212C7SDFP RF212C8SDFP RF212C8SDFP RF212CASDFP RF212CASDFP RF212CASDFP RF212CASDFP	18F212C7SDFP 18F212C7SNFP 18F212C8SDFP 18F212CASDFP 18F212CASDFP 18F212CCSDFP 18F212CCSDFP 18F212CCSDFP 18F212CCSDFP	45F212C7SDFP 45F212C7SNFP 45F212C8SDFP 45F212C8SNFP 45F212CASDFP 45F212CCSDFP 45F212CCSNFP 45F212D7SDFP	RSF212C7SDFP RSF212C8SDFP RSF212C8SNFP RSF212CASNFP RSF212CCSDFP RSF212CCSNFP RSF212CCSNFP RSF212D7SDFP RSF212D7SNFP	RSF212C7SDFP RSF212C7SNFP RSF212C8SNFP RSF212CASDFP RSF212CCSNFP RSF212CCSNFP RSF212CCSNFP RSF212D7SNFP RSF212D7SNFP RSF212D7SNFP RSF212D7SNFP	RSF212C7SDFP RSF212C7SNFP RSF212C8SDFP RSF212C6SDFP RSF212CCSNFP RSF212CCSNFP RSF212D7SDFP RSF212D7SDFP RSF212D7SDFP RSF212D8SDFP RSF212D8SDFP	46F212C7SNFP 46F212C8SDFP 46F212C8SNFP 46F212C8SNFP 46F212CCSNFP 46F212CCSNFP 46F212D7SNFP 46F212D7SNFP 46F212D7SNFP 46F212D4SNFP 46F212D4SNFP 46F212D4SNFP 46F212D4SNFP 46F212D4SNFP 46F212D4SNFP	RSF212C7SDFP RSF212C7SNFP RSF212C8SNFP RSF212C6SNFP RSF212CCSNFP RSF212D7SNFP RSF212D7SNFP RSF212D7SNFP RSF212DASNFP RSF212DASNFP RSF212DASNFP RSF212DASNFP RSF212DASNFP RSF212DASNFP RSF212DASNFP

^{*&#}x27; F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Oz : OzROM version

^{★:} New product ★★: Under development

Group			R80	C/2E			R80	C/2F	
	ROM (Bytes)	8	K	16	6K	8K +	- 2K	16K -	+ 2K
	RAM (Bytes)	51	2	1	K	51	2	11	<
/lemory	ROM Type*1				ı				
-	Data Flash / E2 Data Flash		-	-		2K	(Data Flash : prog	ram/erase 10k tim	es)
	Program Security			Yes (ID co	de check function,	ROM code protect	function)		
	CPU				R8C	Core			
	Basic Instructions				8	9			
CPU	Minimum Instruction Execution Time (ns)				50 (@2	OMHz)			
	Multiplier				16×1	6→32			
	Multiply-Accumulate Instruction				16×16-	-32→32			
	Clock Generation Circuit		3 cir	cuits (Main clock,	High speed on-chip	oscillator, Low sp	eed on-chip oscill	ator)	
	PLL				<u> </u>	-			
	Subclock				-	-			
	Real Time clock				-	-			
Clock	On-Chip Oscillator			2 circuits (High	precision, High sp	eed: 40MHz. Low	speed : 125kHz)		
	Oscillation Stop Detection				Ye		,		
	Frequency Divider				1/n (n = 1,				
	Power Save				Wait				
Power Supply	Power-On Reset/POR				Yelley				
oltage Detection	Low Voltage Detection/LVD				Yes (Voltage				
	Resolution × Channels					t×12			
A/D Converter	Sample and Hold					: A 12			
D/A Converter	Resolution × Channels				8-bi				
D/A CONVENTED	8-bit				3 (Timer RA, Tim				
	16-bit				1 (Tim				
	Input Capture				4 (shared wi				
	Output Compare				5 (shared with Tir				
Timer	PWM Output				4 (shared with Tir				
imer	Real-Time Port				4 (Shared With Hr	ner nb, Illiler nc)			
					1 (shared wi	4l- Ti DA\			
	Event Counter				i (snared wi	tn Timer KA)			
	2-Phase Encoder Input					_			
147 - 4 - 1 - 1 T	3-Phase Inverter Control			4 / 141		-			
Watchdog Tin				1 (with automatic	starting function a		otection function		
0	Clock Sync. / Clock Async.				1 (UA	(KIU)			
Serial Interface	Clock Sync. Only					_			
120.1	Clock Async. Only								
l ² C-bus									
Synchronous Serial C	ommunication Unit/Special Serial I/O					-			
CAN	Channels					-			
	Message Box (Numbers)								
	Input Only (Numbers)								
	CMOS Output Only (Numbers)								
I/O Ports	CMOS I/O (Numbers)				2				
	N-Channel Open Drain Port (Numbers)								
	High Current Drive Port								
	Pull-Up Resistor				2				
External Inter									
Debugging Function	On-Chip Debug				Ye				
	On-Board Flash Program				Ye				
Other Functions	ROM Correction Function								
	Others				compar				
	quency/Supply Voltage				OMHz/3.0 to 5.5V,				
	bient Temperature (°C)	– 40 to 85	-20 to 85	-40 to 85	-20 to 85	-40 to 85	- 20 to 85	-40 to 85	-20 to 85
Package					PLQP00	32GB-A			
art No.		R5F212E2DFP*	R5F212E2NFP*	R5F212E4DFP*	R5F212E4NFP*	R5F212F2DFP*	R5F212F2NFP*	R5F212F4DFP*	RSF212F4NFP*
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^{*&#}x27; F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Oz : OzROM version

^{★:} New product ★★: Under development

Group				R80	C/2G				R8C	:/2H			R80	C/2J	
	ROM (Bytes)	16	K	2	4K	32	2K	4	K	81	<	2	K	4	K
	RAM (Bytes)	51	2		1	K		2	56	38	4	2!	56	38	34
Memory	ROM Type*1	İ						•	F			•			
-	Data Flash / E2 Data Flash								_						
	Program Security					Yes (ID	code chec	k function,	ROM code	protect fu	nction)				
	CPU							R8C	Core	•					
	Basic Instructions							8	19						
CPU	Minimum Instruction Execution Time (ns)								8MHz)						
	Multiplier								6→32						
	Multiply-Accumulate Instruction								+32→32						
	Clock Generation Circuit		3 circuits	(Main cloc	k, High sp	ed on-chir	oscillator	Low spec	ed on-chip	oscillator)		2 circuits (High	speed on-chip osci	lator, Low speed or	n-chip oscillator)
	PLL				, ,									, , , , , , , , , , , , , , , , , , , ,	
	Subclock	i				Yes (32.	768KHz)						-	_	
	Real Time clock					Yes (Tir								_	
Clock	On-Chip Oscillator				2			on. High st	eed : 8MH	z, Low spe	ed : 125kF	lz)			
	Oscillation Stop Detection					,	J	,	_			,			
	Frequency Divider							1/n (n = 1	2, 4, 8, 16)						
	Power Save								/Stop						
Power Supply	Power-On Reset/POR								es						
Voltage Detection	Low Voltage Detection/LVD						V		detection	3)					
	Resolution × Channels						- 10	, voitage	_						
A/D Converter	Sample and Hold							-	_						
D/A Converter	Resolution × Channels								_						
D/A Converter	8-bit	-			2 /Tim	er RA, Tim	or DR Tim	or DE)					/Timer D/	A, Timer RB	1)
	16-bit				3 (1111	iei na, iiiii	ei ND, IIII		ner RF)				. (IIIIIei NA	, IIIIei ND	<u>''</u>
	Input Capture						1		ith Timer R	E\					
	Output Compare				2 (-1	ed with Tir			ith limer n	ir)		1 4	/alaanad	ith Timer R	E\
Times	PWM Output				Z (Snar	ea with iii			ith Timer R	D)		'	(Snared w	ıtıı ilmer n	<i>F)</i>
Timer	Real-Time Port							(Snared Wi	un nimer n	D)					
	Event Counter								- 46 T	A \					
								(snared wi	th Timer R	Α)					
	2-Phase Encoder Input 3-Phase Inverter Control								_						
Watchdog Tir					1 /200	th automai	lie etertine	function	nd dode o	ource prote	nation fun	ation)			
watendog in	Clock Sync./ Clock Async.				1 (001	2 (UARTO		i iunicuon a	and clock s	ource prote	ection fun	Cuon,	1 /11	ARTO)	
Serial Interface						Z (UART	, UARTZ)					<u> </u>	1 (0/	AKTU)	
Serial Interrace	Clock Sync. Only								_						
I ² C-bus	Clock Async. Only														
	Communication Unit/Special Serial I/O														
Synchronous Serial C															
CAN	Channels														
	Message Box (Numbers)														
	Input Only (Numbers)													_	
	CMOS Output Only (Numbers)				-		1								
I/O Ports	CMOS I/O (Numbers)				27			L		5			1	2	
	N-Channel Open Drain Port (Numbers)	-													
	High Current Drive Port									_				•	
	Pull-Up Resistor				27				1	5		<u></u>	1	2	
External Inter					8			L			-	6			
Debugging Function	On Chip Debug								es						
	On-Board Flash Program							Y	es						
Other Functions	ROM Correction Function														
	Others					comp				monitor 1 a	and 2)				
	equency/Supply Voltage								4MHz/2.2						
	nbient Temperature (°C)	- 40 to 85	-20 to 85		-20 to 85	- 40 to 85	-20 to 85	- 40 to 85	-20 to 85	- 40 to 85			-20 to 85	– 40 to 85	-20 to 85
Package				PLQP0	032GB-A						PLSP00	20JB-A			
Part No.		R5F212G4SDFP*	R5F212G4SNFP*	R5F212G5SDFP*	R5F212G5SNFP*	R5F212G6SDFP*	R5F212G6SNFP*	R5F212H1SDSP*	R5F212H1SNSP*	R5F212H2SDSP*	R5F212H2SNSP*	R5F212J0SDSP*	R5F212J0SNSP*	R5F212J1SDSP*	R5F212J1SNSP*
		RS	R5	RS	R5	R5	R5	P.5	P.5	R5	R5	P.5	P.5	R5	RS
*1 E . Elash mam	any varsion L. POM loss vars	ion M. Moo	k POM vor	ion O. On	a tima PPON	_	L O-POM W		_	_	_		_		_

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Oz : OzROM version

^{★:} New product ★★: Under development

• Specifications (R8C/Tiny Series)

Group			R8C	C/2K			R80	C/2L	
	ROM (Bytes)	81	K	16	6K	8K -	+2K	16K -	+ 2K
	RAM (Bytes)	11	X	1.5	5K	1	K	1.5	5K
Vlemory	ROM Type*1					-			
	Data Flash / E2 Data Flash			_		2K	(Data Flash : prog	ram/erase 10k time	es)
	Program Security			Yes (ID co	de check function,				
	CPU			,		Core			
	Basic Instructions					9			
CPU	Minimum Instruction Execution Time (ns)				50 (@2				
51 0	Multiplier					6→32			
	Multiply-Accumulate Instruction					+32→32			
	Clock Generation Circuit		2 air	cuits (Main clock, I			and an ahin ansill	lotou\	
	PLL		3 011	cuits (iviairi ciock, i	nigii speed on-ciii	oscillator, Low sp	beed on-chip oscill	ator)	
	Subclock				-	-			
Clock	Real Time clock			0 1 1 111 1			1 405111		
	On-Chip Oscillator			2 circuits (High	precision, High sp		speed : 125kHz)		
	Oscillation Stop Detection					es			
	Frequency Divider				1/n (n = 1,				
	Power Save					/Stop			
ower Supply oltage Detection	Power-On Reset/POR					es			
/oltage Detection	Low Voltage Detection/LVD					detection 3)			
A/D Converter	Resolution × Channels				10-b	it×9			
Converter	Sample and Hold		_		Υ.	es			
D/A Converter	Resolution × Channels				-	_			
	8-bit				2 (Timer RA	. Timer RB)			
	16-bit		-		3 (Timer RC				
	Input Capture				12 (shared with Ti				
	Output Compare				12 (shared with Ti				
Timer	PWM Output				nared with Timer F		w PD)		
illilei	Real-Time Port			10 (51	iareu witii iiiilei r	b, illiel no, illie	ן מא וּ		
	Event Counter				4 (-1	4l- T DA)			
					1 (shared wi	tn Ilmer KA)			
	2 Phase Encoder Input								
	3-Phase Inverter Control				1 (shared wi				
Watchdog Tin				1 (with automatic			rotection function	1	
	Clock Sync. / Clock Async.				2 (UARTO), UAR12)			
Serial Interface	Clock Sync. Only				-	-			
	Clock Async. Only				-				
l²C-bus					-	-			
Synchronous Serial C	Communication Unit/Special Serial I/O					-			
CAN	Channels					<u>- </u>			
	Message Box (Numbers)				-				
	Input Only (Numbers)					3			
	CMOS Output Only (Numbers)				-				
I/O Ports	CMOS I/O (Numbers)				2	5			
I/O Ports	N-Channel Open Drain Port (Numbers)				-				
	High Current Drive Port					3			
	Pull-Up Resistor		-			5			
External Inter					-				
	On-Chip Debug					es			
Debugging Function	On-Board Flash Program					es			
	ROM Correction Function					-			
Other Functions	Others					_			
Operating Fra	equency/Supply Voltage			201/14-12 0	to 5.5V, 10MHz/2	7 to 5 5\/ 5\/U-/	2 2 to 5 5V		
	nbient Temperature (°C)	- 40 to 85	-20 to 85	- 40 to 85	-20 to 85	- 40 to 85	- 20 to 85	-40 to 85	-20 to 85
	nbient Temperature (C)	- 40 to 85	-20 to 85	- 40 to 85			- 20 to 85	- 40 to 85	-20 to 85
Package					PLQP00	32GB-A			
		<u> </u>	*AHP	DFP*	NFP*	OFP∗	*AFP)FP*	*d-J
Part No.		R5F212K2SDFP	R5F212K2SNFP	R5F212K4SDFP	R5F212K4SNFP	R5F212L2SDFP	R5F212L2SNFP	R5F212L4SDFP	R5F212L4SNFP

^{*&#}x27; F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Oz : OzROM version

★: New product ★★: Under development

Group				R8C/3	32A							R8C	/33A							R8C	/35A		
	ROM (Bytes)	4K+	4K	8K+	4K	16K -	+ 4K	4K -	+ 4K		+ 4K		+ 4K	24K	+ 4K	32K -	- 4K	16K	+ 4K	24K	+ 4K	32K	+ 4K
	RAM (Bytes)	512	2	1K		1.5	5K	5	12	1	K		5K	2	K	2.5	K	1.9	δK	2	K	2.	.5K
Vlemory	ROM Type*1												F										
	Data Flash / E2 Data Flash													ase 10									
	Program Security							Ye	es (ID c	ode ch	eck fu			code pr	otect f	unction	1)						
	CPU												Core										
	Basic Instructions												9										
CPU	Minimum Instruction Execution Time (ns)											50 (@2											
	Multiplier												6 → 32										
	Multiply-Accumulate Instruction											6×16											
	Clock Generation Circuit					4 circui	ts (Ma	in cloc	k, Sub	clock,	High s	peed o	n-chip	oscillat	tor, Lov	w speed	d on-cl	nip osc	illator))			
	PLL											-	_										
	Subclock											/es (32.											
Clock	Real Time clock											Yes (Ti											
Olock	On-Chip Oscillator						2	? circui	ts (Higl	h preci	sion, F	ligh sp	eed:4	0MHz,	Low sp	eed : 1	25kHz)					
	Oscillation Stop Detection												es										
	Frequency Divider										1/n	(n = 1,		16)									
	Power Save												/Stop										
Power Supply	Power-On Reset/POR												es										
Voltage Detection	Low Voltage Detection/LVD										Yes (\	/oltage	detec	tion 3)									
A/D Converter	Resolution×Channels			10-bit	×4										10-bi	t×12							
	Sample and Hold											Υ	es										
D/A Converter	Resolution×Channels			_											8-bi	t×2							
	8-bit									3 (1	Timer F	RA, Tim	er RB,	Timer I	RE)								
	16-bit								1 (Tim	er RC)									3 (Tir	ner RC	, Time	r RD)	
	Input Capture							4 (sha	red wi	th Tim	er RC)							12 (s	hared v	with Ti	mer RC	, Time	r RD
	Output Compare						5 (sh	nared v	vith Tir	ner RC	, Time	r RE)						13 (sha	red with	Timer R	C, Timer	RD, Ti	mer R
Timer	PWM Output						4 (sh	nared v	vith Tin	ner RB	, Time	r RC)						10 (sha	red with	Timer R	B, Timer	RC, Tir	mer R
	Real-Time Port	İ										-	_										
	Event Counter	İ									1 (sha	red wi	th Tim	er RA)									
	2-Phase Encoder Input	i										-	_										
	3-Phase Inverter Control								_	_									1 (sha	red wi	th Time	er RD)	
Watchdog Tir	mer			1 (witl	h auto	matic	start fu	unction	ı, clock	sourc	e prote	ection 1	unctio	n, low-	speed	on-chip	oscill	ator fo	r watc	hdog ti	imer)		
	Clock Sync./ Clock Async.	i	2 (U	JARTO,	UARI	Γ2)								3 (U	ARTO	to UAR	T2)						
Serial Interface	Clock Sync. Only	İ										-	_										
	Clock Async, Only											-	_										
l ² C-bus							1	(share	d with	Synch	ronous	s Seria	Comn	nunicat	ion Un	it) + 1 (UART:	2)					
Synchronous Serial (Communication Unit/Special Serial I/O										1	shared	with I	²C)									
0.4.81	Channels											-	_										
CAN	Message Box (Numbers)											-	_										
	Input Only (Numbers)												1										
	CMOS Output Only (Numbers)											-	_										
	CMOS I/O (Numbers)			15	i							2	:7							4	7		
I/O Ports	N-Channel Open Drain Port (Numbers)											-	_										
	High Current Drive Port	i		15								2	7							4	7		
	Pull-Up Resistor			15								2	7							4	7		
External Inter	rrupts Pins								7	7)		
	On-Chip Debug											Υ	es										
Debugging Function	On-Board Flash Program	İ											es										
0.1	ROM Correction Function	İ										-	-										
Other Functions	Others						com	parato	r A×2	(share	d with	voltad	e mon	itor 1 a	nd 2) +	compa	rator l	B×2					
Operating Fre	equency/Supply Voltage	İ														2MHz							
	nbient Temperature (°C)	-40 to 85	-20 to 85 -	-40 to 85	-20 to 85	-40 to 85													-20 to 85	-40 to 85	-20 to 85	-40 to 85	-20 to
Package	•			SP002								LQP00								LQP00			_
Part No.		R5F21321ADSP**	R5F21321ANSP**	R5F21322ADSP**	R5F21322ANSP**	R5F21324ADSP**	R5F21324ANSP**	R5F21331ADFP**	R5F21331ANFP**	R5F21332ADFP**	R5F21332ANFP**	R5F21334ADFP**	R5F21334ANFP**	R5F21335ADFP**	R5F21335ANFP**	R5F21336ADFP**	R5F21336ANFP**	R5F21354ADFP**	R5F21354ANFP**	R5F21355ADFP**	R5F21355ANFP**	R5F21356ADFP**	R5F21356ANFP**

^{*&#}x27; F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Oz : OzROM version

^{★:} New product ★★: Under development

Automotive MCUs

Group	54110110 (11020) 10		•				R320	:/120					
	ROM (Bytes)		128K + 8K		<u> </u>	128K + 12K			256K + 8K		1	256K + 12K	
	RAM (Bytes)		120K TOK	1:	2K	IZOK I IZK			250K T OK	2	0K	ZOOK IZK	
Memory	ROM Type*1				-14			=			010		
,	Data Flash/E2 Data Flash	81	K (Data Flas	h)	8K (Data Flash), 4K	(E2dateFlash:program	n/erase 100k times)	8	K (Data Flasi	h)	8K (Data Flash), 4K	(E2dateFlash:progra	m/erase 100k times)
	Program Security								Protect Fund				
	CPU						R32C/1	00 Core					
	Basic Instructions							08					
CPU	Minimum Instruction Execution Time (ns)							@64MHz)					
01 0	Multiplier							2 → 64					
	Multiply-Accumulate Instruction							+64→64					
	Barrel Shifter							es					
DMA	DMAC (Channels) DTC/DMAC II					DRAGOTT (O)		4		,			
						DIVIACII (Sta	rts by all pe 64		errupt factors	5)			
External Bus	Address Space (Bytes) External Bus Interface						04	-					
Expansion	Bus Structure						_	_					
	DRAM Controller							_					
	Clock Generation Circuit				4 ci	rcuits (Main	clock, PLL, S	Sub clock, or	n-chip oscilla	tor)			
	PLL					, , , , , , , , , , , , , , , , , , , ,		es					
	Subclock							es					
Clock	RTC												
CIOCK	On-Chip Oscillator							es					
	Oscillation Stop Detection							es					
	Frequency Divider							2 to 24)					
	Power Save						Wait	/Stop					
Power Supply Voltage Detection	Power-On Reset/POR Low Voltage Detection/LVD					.,,	es (Low volt	-	1				
voltage Detection	Resolution × Channels					Ye		age detection t×26	on)				
A/D Converter	Sample and Hold							es					
A/D Converter	Multi-Channel Sample and Hold							-					
D/A Converter	Resolution × Channels						8-hi	t×2					
2771 0011101101	8-bit							-					
	16-bit						11 (Timer	A, TimerB)					
	Input Capture						16 (Intelli						
	Output Compare							igent I/O)					
Timer	PWM Output					2	1 (TimerA, Ir	ntelligent I/0	O)				
	Real-Time Port						-						
	Event Counter							A, TimerB)					
	2-Phase Encoder Input 3-Phase Inverter Control				4 /-b		TimerA) + 2		/O) ierB2, Dead T	E T			
Watchdog Tin					i (snared v	vitii iiiiierA4		imeraz, nin	ierbz, Deau i	iline iliner)			
wateridog iiii	Clock Sync./ Clock Async.						5 (U.						
Serial Interface	Clock Sync. Only						- 0 (0	-					
	Clock Async. Only						-	_					
I ² C-bus	· · · · · · · · · · · · · · · · · · ·						3 (U.	ART)					
IEBus							-	-					
Smart Card/S							-	-					
Synchronous Serial C	communication Unit/Special Serial I/O							1					
CAN	Channels							1					
	Message Box (Numbers)						3	2					
FlexRay IrDA							-	_					
CRC Calculation	on Circuit					1 /00	C - CCITT (X	16 + X12 + V	(5 ± 1))				
X/Y Converte						1 (011		es	· · · //				
.,	Input Only (Numbers)							2					
	CMOS I/O (Numbers)							4					
I/O Ports	N-Channel Open Drain Port (Numbers)						-						
	High Current Drive Port							-					
	Pull-Up Resistor							5					
External Inter							1	1					
Debugging Function	On-Chip Debug							es					
	On-Board Flash Program						Y	es					
Other Functions	ROM Correction Function						1181.0	-					
	Others quency/Supply Voltage							nannels .0 to 5.5V					
	nbient Temperature (°C)	-40 to 85	-40 to 105	-40 to 125	-40 to 95	-40 to 105			-40 to 105	-40 to 125	-40 to 85	- 40 to 105	- 40 to 125
Package	iononic reimperature (G)	70 10 03	-0 to 100	TO 10 123	70 10 00	70 (0 103		00KB-A	70 10 100	0 to 120	70 10 00	, 40 to 100	10 10 123
. somego								- J					
		*	* m	ě	* m	* m	ž.	* m	* * *	M	* m	* m	, a
Part No.		R5F6420EJFB**	R5F6420ELFB**	R5F6420EKFB**	R5F64200JFB*	R5F64200LFB**	R5F64200KFB**	R5F6420FJFB**	R5F6420FLFB**	R5F6420FKFB*	R5F64201JFB**	R5F64201LFB**	R5F64201KFB**
		20E	20E	20E	200	200	200	20F	20F	20F	201	201	201
		64.	.64	.64	.64	.64	64.	.64	64.	.64	64.	64.	64.
		35F	35F	35F	35F	35F	35F	35F	35F	35F	35F	35F	35F
			_			_	_	_	_	_	_	-	_

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

Group					R320	C/121			
	ROM (Bytes)	128K + 8K	128K + 12K	256K + 8K	256K + 12K	384K + 8K	384K + 12K	512K + 8K	512K + 12K
	RAM (Bytes)	1	2K	2	:0K		4K	3	2K
	ROM Type*1					F			
Memory	D . El . (E0 D . El .)	OK /D . E	8K (Data Flash), 4K	01/ (D . 51 1)	8K (Data Flash), 4K	01/ (D . El .)	8K (Data Flash), 4K	01/ (D . El .)	8K (Data Flash), 4K
	Data Flash/E2 Data Flash	8K (Data Flash)	(E2dateFlash:program/ erase 100k times)	8K (Data Flash)	(E2dateFlash:program/ erase 100k times)	8K (Data Flash)	(E2dateFlash:program/ erase 100k times)	8K (Data Flash)	(E2dateFlash:program erase 100k times)
	Program Security		erase rook times,	Voc /ID Co	de Check Function	POM Codo Proto			erase rook times,
	CPU Security			Yes (ID Co		, NOW Code Prote	ct runction)		
	Basic Instructions					08			
	Minimum Instruction Execution Time (ns)					@64MHz)			
CPU	Multiplier					32 → 64			
	Multiply-Accumulate Instruction					+64→64			
	Barrel Shifter					es			
DMA	DMAC (Channels)					4			
	DTC/DMAC II			DMAC	☐ (Starts by all pe		tactors)		
F	Address Space (Bytes) External Bus Interface				64	4M 			
External Bus Expansion	Bus Structure					_			
	DRAM Controller					_			
	Clock Generation Circuit			4 circuits	(Main clock, PLL,	Sub clock, on-chip	oscillator)		
	PLL					es			
	Subclock					'es			
Clock	RTC					-			
	On-Chip Oscillator					es			
	Oscillation Stop Detection Frequency Divider					es 24\			
	Power Save					= 2 to 24)			
Power Supply	Power-On Reset/POR				vvait	/Stop			
Voltage Detection	Low Voltage Detection/LVD				Yes (Low volt	age detection)			
	Resolution × Channels					it×26			
A/D Converter	Sample and Hold				Υ	'es			
	Multi-Channel Sample and Hold					_			
D/A Converter	Resolution×Channels				8-b	it×2			
	8-bit								
	16-bit					A, TimerB)			
	Input Capture Output Compare					igent I/O) igent I/O)			
Timer	PWM Output					ntelligent I/O)			
·····c·	Real-Time Port				ZI (IIIICIA,	—			
	Event Counter				11 (Timer	A, TimerB)			
	2-Phase Encoder Input				3 (TimerA) + 2	(Intelligent I/O)			
	3-Phase Inverter Control			1 (shared with T	imerA4, TimerA1, 1	TimerA2, TimerB2,	Dead Time Timer)		
Watchdog Tir					- "	1			
Serial Interface	Clock Sync./ Clock Async. Clock Sync. Only				5 (U	ART)			
Serial Internace	Clock Async. Only					_			
I ² C-bus	Glock Adynor Chry				3 (U	ART)			
IEBus					•	- 1			
Smart Card/S						_			
Synchronous Serial (Communication Unit/Special Serial I/O					3			
CAN	Channels					2			
FlexRay	Message Box (Numbers)					32			
IrDA						_			
CRC Calculati	on Circuit				1 (CRC-CCITT (X	(16 + X12 + X5 + 1))		
X/Y Converte	er					'es			
	Input Only (Numbers)					2			
	CMOS I/O (Numbers)					34			
I/O Ports	N-Channel Open Drain Port (Numbers)				•	_			
	High Current Drive Port Pull-Up Resistor								
External Inter						35 I 1			
	On-Chip Debug					es			
Debugging Function	On-Board Flash Program					es es			
O4h F	ROM Correction Function					_			
Other Functions	Others					hannels			
	equency/Supply Voltage					1.0 to 5.5V			
Operating Fre		-40 -40 -40	-40 -40 -40	-40 -40 -40	-40 -40 -40 to 85 to 105 to 125	-40 -40 -40	-40 -40 -40	-40 -40 -40	-40 -40 -40
	nbient Temperature (°C)		10 65 10 105 10 125	7 10 05 10 105 10 125		100KB-A	1 10 05 10 105 10 125	10 05 10 105 10 125	10 03 10 103 10 12
Operating An	nbient Temperature (°C)	to 85 to 105 to 125			I LUIT U	IN C			
	nbient Temperature (°C)	to 85 to 105 to 125							
Operating An	nbient Temperature (°C)	to 85 to 105 to 125							
Operating An	nbient Temperature (°C)							* * *	
Operating An Package	nbient Temperature (°C)		** ** **	* * * *	**8. **8.	** ** ** ** ** ** ** ** ** ** ** ** **	** 8 ** 8	** ** ** ** ** ** ** ** ** ** ** ** **	**8. **8.
Operating An Package	nbient Temperature (°C)		0.JFB** 0.LFB** 0.KFB**	FJFB** FLFB**	1JFB** 1LFB**	GJFB**	2JFB** 2LFB** 2KFB**	HJFB** HLFB**	3JFB** 3LFB**
Operating An	nbient Temperature (°C)		1210JFB** 210LFB** 210KFB**	21FJFB** 21FLFB** 21FKFB**	211JFB** 211LFB** 211KFB**	21GJFB** 21GLFB** 21GKFB**	212JFB** 212LFB** 212KFB**	21HJFB** 21HLFB** 21HKFB**	213JFB** 213LFB** 213KFB**
Operating An Package	nbient Temperature (°C)	R5F6421EJB** R5F6421ELFB** R5F6421EKFB**	R5F64210JFB** R5F64210LFB** R5F64210KFB**	R5F6421FJFB** R5F6421FLFB** R5F6421FKFB**	R5F64211JFB** R5F64211LFB** R5F64211KFB**	RSF6421GJFB** RSF6421GLFB** RSF6421GKFB**	R5F64212JFB** R5F64212LFB** R5F64212KFB**	RSF6421HJFB** RSF6421HLFB** RSF6421HKFB**	R5F64213JFB** R5F64213LFB** R5F64213KFB**

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Automotive MCUs

Group				R320	C/133					R320	C/134		
	ROM (Bytes)	256K -	+ 12K	384K	+ 12K	512K	+ 12K	256K	+ 12K	384K	+ 12K	512K	+ 12K
	RAM (Bytes)	20			4K		2K		OK		4K		2K
Memory	ROM Type*1			_				F					
,	Data Flash/E2 Data Flash				8K (D	ata Flash) 4			erase 100k t	imes)			
	Program Security								Protect Fund				
	CPU				103	ID COUL ONE		00 Core	i rotect i une	,tion,			
	Basic Instructions							08					
	Minimum Instruction Execution Time (ns)							960MHz)					
CPU								900WIFIZ) B2→64					
	Multiplier												
	Multiply-Accumulate Instruction Barrel Shifter							+64→64					
	DMAC (Channels)							es 4					
DMA						DRAACTI (C+			rrupt factors				
	DTC/DMAC II					DIVIACT (Sta			rrupt factors	1			
	Address Space (Bytes)						- 64	1M					
External Bus Expansion	External Bus Interface							_					
Expansion	Bus Structure												
	DRAM Controller				4 -1		-II- DII 4			4 \			
	Clock Generation Circuit				4 CI	rcuits (Main			n-chip oscilla	tor)			
	PLL							es					
	Subclock						Υ	es					
Clock	RTC						-	-					
	On-Chip Oscillator							es					
	Oscillation Stop Detection							es O.A.					
	Frequency Divider	ļ						2 to 24)					
	Power Save						Wait	/Stop					
Power Supply Voltage Detection	Power-On Reset/POR						-	_					
vortage Detection	Low Voltage Detection/LVD							_					
	Resolution×Channels							t×34					
A/D Converter	Sample and Hold						Υ	es					
	Multi-Channel Sample and Hold												
D/A Converter	Resolution×Channels						8-bi	t×2					
	8-bit						·						
	16-bit							A, TimerB)					
	Input Capture							igent I/O)					
	Output Compare							igent I/O)					
Timer	PWM Output					2	1 (TimerA, I	ntelligent I/C	D)				
	Real-Time Port						-	_					
	Event Counter							A, TimerB)					
	2-Phase Encoder Input							(Intelligent I					
	3-Phase Inverter Control				1 (shared v	vith TimerA			erB2, Dead 1	ime Timer)			
Watchdog Tir								1					
	Clock Sync./ Clock Async.						5 (U	ART)					
Serial Interface	Clock Sync. Only						-	_					
	Clock Async. Only												
I ² C-bus							3 (U	ART)					
IEBus							-	_					
Smart Card/S							-	_					
Synchronous Serial (Communication Unit/Special Serial I/O							2					
CAN	Channels				2			L			3		
	Message Box (Numbers)							32					
FlexRay								2					
IrDA								_					
CRC Calculati						1 (CR		16 + X12 + X	5 + 1))				
X/Y Converte								es					
	Input Only (Numbers)							2					
	CMOS I/O (Numbers)							20					
I/O Ports	N-Channel Open Drain Port (Numbers)							_					
	High Current Drive Port							-					
	Pull-Up Resistor							21					
External Inter	rrupts Pins							4					
Debugging Function	On-Chip Debug							es					
	On-Board Flash Program							es					
Other Functions	ROM Correction Function												
	Others							-					
	equency/Supply Voltage	L						0 to 5.5V					
	nbient Temperature (°C)	-40 to 85	-40 to 125	- 40 to 85	-40 to 125	- 40 to 85			-40 to 125	-40 to 85	−40 to 125	- 40 to 85	- 40 to 125
Package							PLQP01	44KA-A					
		*	*		*		*		*		*		*
		* <u></u>	۵	<u>*</u>	<u>*</u>	, to	Δ.	<u>*</u>	۵	Å	Δ.	, t	Δ.
Part No.		<u> </u>	Ā	5	Ā	<u> </u>	Ā	5	Ā	Ę	Ā	<u> </u>	Ā
		131	23	32,	32	33	33	141.	141	145	142	143	143
		R5F64331JFD**	R5F64331KFD*	R5F64332JFD**	R5F64332KFD*	R5F64333JFD**	R5F64333KFD**	R5F64341JFD**	R5F64341KFD**	R5F64342JFD**	R5F64342KFD™	R5F64343JFD**	R5F64343KFD**
		576	5F6	5Fe	5Fe	5F6	5F6] 	5F6	5F6	5F6	2F6	5F6
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^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

Group							R320	C/151					
	ROM (Bytes)		768K + 8K			768K + 16K			1024K + 8K			1024K + 16K	
	RAM (Bytes)							8K			•		
Memory	ROM Type*1							F					
	Data Flash/E2 Data Flash	8	K (Data Flas	h)		(E2dateFlash:progra			K (Data Flas		8K (Data Flash), 8K	(E2dateFlash:progra	m/erase 100k time
	Program Security				Yes (ID Code Che			Protect Fundament	ction)			
	CPU							00 Core					
	Basic Instructions							08					
CPU	Minimum Instruction Execution Time (ns)							@64MHz)					
	Multiplier							32→64					
	Multiply-Accumulate Instruction							+64→64					
	Barrel Shifter DMAC (Channels)							es4					
DMA	DTC/DMAC II					DMACII (Sta			rrunt factor	-1			
	Address Space (Bytes)				·	DIVIACE (St		IM	Trupt lactors	>1			
External Bus	External Bus Interface							-					
Expansion	Bus Structure							_					
	DRAM Controller							_					
	Clock Generation Circuit				4 ci	rcuits (Main	clock, PLL,	Sub clock, o	n-chip oscilla	itor)			
	PLL						Υ	es	-				
	Subclock						Υ	es					
Clock	RTC												
CIOCK	On-Chip Oscillator							es					
	Oscillation Stop Detection							es					
	Frequency Divider							2 to 24)					
	Power Save						Wait	/Stop					
Power Supply Voltage Detection	Power-On Reset/POR												
voltage Detection	Low Voltage Detection/LVD					ΥΥ		age detection	on)				
A/D Commenter	Resolution × Channels							it×34					
A/D Converter	Sample and Hold Multi-Channel Sample and Hold							es					
D/A Converter	Resolution × Channels							it×2					
D/A Converter	8-bit						0-10	_					
	16-bit						11 (Timer	A, TimerB)					
	Input Capture							igent I/O)					
	Output Compare							igent I/O)					
Timer	PWM Output					3		ntelligent I/0	O)				
	Real-Time Port						· · · · · · · · · · · · · · · · · · ·	_					
	Event Counter						11 (Timer	A, TimerB)					
	2-Phase Encoder Input							(Intelligent l					
	3-Phase Inverter Control				1 (shared v	vith TimerA			erB2, Dead	Time Timer)			
Watchdog Tin								1					
	Clock Sync / Clock Async							ART)					
Serial Interface	Clock Sync. Only												
l²C-bus	Clock Async. Only							ART)					
IEBus								AN1/					
Smart Card/S	IM							_					
	Communication Unit/Special Serial I/O							3					
	Channels							2					
CAN	Message Box (Numbers)							 32					
FlexRay													
IrDA													
CRC Calculati						1 (CR		16 + X12 + X	(5 + 1))				
X/Y Converte								es					
	Input Only (Numbers)							2					
LO D.	CMOS I/O (Numbers)							20					
I/O Ports	N-Channel Open Drain Port (Numbers)												
	High Current Drive Port												
External Inter	Pull-Up Resistor	-						21 4					
External inter	On-Chip Debug							es					
Debugging Function	On-Board Flash Program							es					
	ROM Correction Function							_					
Other Functions	Others						LIN:8 c	hannels					
Operating Fre	quency/Supply Voltage							.0 to 5.5V					
	nbient Temperature (°C)	-40 to 85	-40 to 105	-40 to 125	-40 to 85	-40 to 105			-40 to 105	-40 to 125	-40 to 85	-40 to 105	-40 to 125
Package								I44KA-A					
		*	‡	1	*	*	*	*	*	*	*	*	t
		Ē	E .	E.	۾	٩	Ē	Ę.	Ę.	Œ	بَ	۾	Ê
Part No.		R5F6451MJFD**	R5F6451MLFD**	R5F6451MKFD**	R5F64514JFD**	R5F64514LFD**	R5F64514KFD**	R5F6451NJFD**	R5F6451NLFD**	R5F6451NKFD*	R5F64515JFD**	R5F64515LFD**	R5F64515KFD**
		511	21	511	21,	51,	21,	511	511	51	518	515	515
		-64	-64	-64	-64	-64	-64	-64	-64	-64	-64	-64	-64
		35F	35F	35F	35F	35F	35F	355	35F	35	35F	35F	35F
		_		_	_	0 0 0014	_	-	-	_			

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Automotive MCUs

Group	Jacrono (11020) 10						R320	:/152					
	ROM (Bytes)		768K + 8K			768K + 16K			1024K + 8K			1024K + 16k	(
	RAM (Bytes)		700K + 0K			700K + 10K	48	BK	1024K + 0K			102410 + 101	
Memory	ROM Type*1						ï						
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Data Flash/E2 Data Flash	81	(Data Flas	h)	8K (Data Flash), 8K	(E2dateFlash:progra			K (Data Flasi	1)	8K (Data Flash), 8K	(E2dateFlash:progra	m/erase 100k times)
	Program Security								Protect Fund				
	CPU						R32C/1	00 Core					
	Basic Instructions						10						
CPU	Minimum Instruction Execution Time (ns)							964MHz)					
010	Multiplier						32×3						
	Multiply-Accumulate Instruction						32×32-						
	Barrel Shifter							es .					
DMA	DMAC (Channels) DTC/DMAC II					DREADTI (OL	4 . 1 11		rrupt factors				
	Address Space (Bytes)					JIVIACII (Sta	rts by all pe		rrupt factors	9)			
External Bus	External Bus Interface						- 04	-IVI					
Expansion	Bus Structure							_					
	DRAM Controller							_					
	Clock Generation Circuit				4 ci	rcuits (Main	clock, PLL, S	Sub clock, or	n-chip oscilla	tor)			
	PLL					, , , , , , , , , , , , , , , , , , , ,		es					
	Subclock						Ye						
Clock	RTC						-	-					
CIOCK	On-Chip Oscillator							es					
	Oscillation Stop Detection							es					
	Frequency Divider						1/n (n =						
	Power Save						Wait	Stop					
Power Supply Voltage Detection	Power-On Reset/POR Low Voltage Detection/LVD					v	s (Low volta						.
voltage Detection	Resolution × Channels							t×34	on)				
A/D Converter	Sample and Hold							es	-				
7.72 00.110.101	Multi-Channel Sample and Hold							-					
D/A Converter	Resolution × Channels						8-bi	t×2					
	8-bit						_	-					
	16-bit						11 (Timer/						
	Input Capture						32 (Intelli						
_	Output Compare						32 (Intelli						
Timer	PWM Output					3	7 (TimerA, Ir	ntelligent I/C	D)				
	Real-Time Port						44 (17	- TD)					
	Event Counter 2-Phase Encoder Input					2 /	11 (Timer/ TimerA) + 2 (/O)				
	3-Phase Inverter Control				1 (shared v				erB2, Dead 1	Time Timer)			
Watchdog Tin					. (0.14.04.1		,		.0.22, 2000				
	Clock Sync./ Clock Async.						5 (U	ART)					
Serial Interface	Clock Sync. Only						_	-					
	Clock Async. Only						-	-					
I ² C-bus							3 (U	ART)					
IEBus							-	-					
Smart Card/S	Communication Unit/Special Serial I/O							>					
	Channels												
CAN	Message Box (Numbers)							2					
FlexRay								-					
IrDA							-	-					
CRC Calculati						1 (CR	C-CCITT (X	16 + X12 + X	5 + 1))				
X/Y Converte								es					
	Input Only (Numbers)						- 2						
LIO D	CMOS I/O (Numbers)						12						
I/O Ports	N-Channel Open Drain Port (Numbers)							- -					
	High Current Drive Port Pull-Up Resistor						12	-					
External Inter								4					
	On-Chip Debug							es					
Debugging Function	On-Board Flash Program							es					
Other Fr. C	ROM Correction Function							-					
Other Functions	Others						LIN:8 cl	nannels					
	quency/Supply Voltage							.0 to 5.5V					
	nbient Temperature (°C)	-40 to 85	-40 to 105	-40 to 125	-40 to 85	-40 to 105			-40 to 105	-40 to 125	-40 to 85	- 40 to 105	- 40 to 125
Package							PLQP01	44KA-A					
Part No.		R5F6452MJFD**	R5F6452MLFD**	R5F6452MKFD**	R5F64524JFD**	R5F64524LFD**	R5F64524KFD**	R5F6452NJFD**	R5F6452NLFD**	R5F6452NKFD**	R5F64525JFD**	R5F64525LFD**	R5F64525KFD**
		R5F645	R5F645	R5F645	R5F645	R5F645	R5F645	R5F645	R5F645	R5F645	R5F645	R5F645	R5F645

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

B-bit 11 (TimerA, TimerB) 11 (TimerA, TimerB) 12 (Intelligent I/O) 13 (Intelligent I/O) 14 (Intelligent I/O) 14 (Intelligent I/O) 15 (Intelligent I/O) 16 (Intelligent I/O) 16 (Intelligent I/O) 16 (Intelligent I/O) 16 (Intelligent I/O) 16 (Intelligent I/O) 16 (Intelligent I/O) 16 (Intelligent I/O) 16 (Intelligent I/O) 16 (Intelligent I/O) 16 (Intelligent I/O) 16 (Intelligent I/O) 16 (Intelligent I/O) 16 (Intelligent I/O) 16 (Intelligent I/O) 16 (Intelligent I/O) 17 (Intelligen	Group							R320	C/153					
Manual		ROM (Bytes)		768K + 8K			768K + 16K			1024K + 8K			1024K + 16K	
Data Rash/E2 Data Flash R. (Data Flash Porpara Security Yes (ID Code Che Function, ROCK Ode Protest Function) R. Our Relative		RAM (Bytes)										•		
Program Security	Memory													
CPU			8	K (Data Flas	h)							8K (Data Flash), 8K	(E2dateFlash:program	n/erase 100k time
Park Park						Yes (ID Code Che			Protect Fun	ction)			
Pose Supply Ministry Mini														
Multiplier 32 x x 2 - 94 Multiplier Barrel Shifter Yes														
Multiplier	CPU													
Sarral Shifter Per														
DMAC (Channels)														
DIAM														
Address Space (Bytes) Esternal Bus Interface	DMA						DRAGET (OL				- 1			
External Bus Exte							JIVIACII (Sta			errupt tactor	5)			
Expansion	Fortennal Box							04	+IVI					
DRAM Controller									_					
Clock Cloc	Ехраногон								_					
PLL Webside Wes						4 ci	rcuits (Main	clock PLL	Sub-clock o	n-chin oscill:	ator)			
Subclock Frequency Divider Power Save							rourts (main			ir citip oscilit	1017			
A														
On-Chip Oscillator On-Chip														
Power Signity Power Signit	Clock							γ	es					
Frequeny Divider Prower Save Prower S														
Power Saye Power-On Reset/PCR														
Power-On Reset/POR														
Voltage Detection Low Voltage Detection Low Voltage Detection Resolution × Channels Resoluti	Power Supply								_ '					
Resolution × Channels	Voltage Detection						Y	s (Low volt	age detection	n)				
Mdit-Channels Mdit-Channel		Resolution × Channels												
	A/D Converter	Sample and Hold						Υ	es					
16-bit 11 (TimerA, TimerB) 11 (TimerA, TimerB) 12 (TimerA, TimerB) 13 (Intelligent I/O) 13 (Intelligent I/O) 13 (Intelligent I/O) 13 (Intelligent I/O) 14 (Intelligent I/O) 14 (Intelligent I/O) 14 (Intelligent I/O) 14 (Intelligent I/O) 14 (Intelligent I/O) 15 (Intelligen		Multi-Channel Sample and Hold							_					
1.	D/A Converter	Resolution × Channels						8-b	it×2					
Public Public		8-bit							_					
Duty t Compare														
PMM Output														
Real-Time Port Event Counter 11 (TimerA, TimerB) 3 (TimerAl) + 2 (Intelligent I/O) 3 - Phase Encoder Input 3 (TimerAl) + 2 (Intelligent I/O) 3 - Phase Encoder Input 3 (TimerAl) + 2 (Intelligent I/O) 3 - Phase Encoder Input 4 (TimerAl) + 2 (TimerB2, TimerB2, Dead Time Timer) 4 (TimerB2, TimerB2, Dead Time Timer) 4 (TimerB2, TimerB2, Dead Time Timer) 4 (TimerB2, TimerB2, Dead Time Timer) 4 (TimerB2, TimerB2, Dead Time Timer) 4 (TimerB2, TimerB2, Dead Time Timer) 4 (TimerB2, TimerB2, Dead Time Timer) 4 (TimerB2, TimerB2, Dead Time Timer) 4 (TimerB2, TimerB2, Dead Time Timer) 4 (TimerB2, TimerB2, Dead Time Timer) 4 (TimerB2, TimerB2, Dead Time TimerB2, Dead														
Event Counter 2-Phase Encoder Input 3-Phase Inverter Control 3-Phas	Timer						3	7 (TimerA, I	ntelligent I/0	O)				
2-Phase Encoder Input 3 (TimerA) + 2 (Intelligent I/O) 3-Phase Inverter Control 1 (shared with TimerA4, TimerA2, TimerB2, Dead Time Timer)									_					
Serial Interface 1 (shared with TimerA4, TimerA1, TimerA2, TimerB2, Dead Time Timer 1														
Matchdog Timer														
Serial Interface						1 (shared v	vith TimerA4			erB2, Dead	Time Timer)			
Clock Sync. Only Clock Sync.	Watchdog IIn													
Clock Async. Only	0.111.6													
FC-bus 3 (UART)	Seriai Interrace													
EBus	I ² C hua	Clock Asylic. Olly												
Synchronous Serial Communication Unit/Special Serial I/O 3 3 5 5 5 5 5 5 5 5														
Synchronous Serial Communication Unit/Special Serial I/O Channels		IN							_					
CAN Channels Ch									3					-
Message Box (Numbers) 32									_					
FlexRay	CAN													
IrDA	FlexRav	g (1101112010)							_					
CRC Calculation Circuit									_					
Input Only (Numbers) 2 2 2 2 2 2 2 2 2		on Circuit					1 (CR	C-CCITT (X	16 + X12 + X	(5 + 1))				
Input Only (Numbers)							,							
I/O Ports														
No Ports														
Pull-Up Resistor 121	I/O Ports	N-Channel Open Drain Port (Numbers)							_					
Pull-Up Resistor 121									-					
External Interrupts Pins								1	21					
On-Board Flash Program On-Board Flash Prog	External Inter								14					
On-Board Flash Program On-Board Flash Prog	Debugging Frankle	On-Chip Debug						Y	es					
Other Function COME LIN:8 channels Operating Frequency/Supply Voltage 64MHz/3.0 to 5.5V Operating Ambient Temperature (*C) -40 to 85 -40 to 105 -40 to 125 -40 to 85 -40 to 105 <t< td=""><td>Debugging Function</td><td>On-Board Flash Program</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Debugging Function	On-Board Flash Program												
Unters LIN:3 channels Chann	Other Functions	ROM Correction Function							_					
Operating Ambient Temperature (°C) -40 to 85 -40 to 105 -40 to 125	Other Functions	Others						LIN:8 c	hannels					
		nbient Temperature (°C)	-40 to 85	- 40 to 105	-40 to 125	-40 to 85	-40 to 105			-40 to 105	-40 to 125	-40 to 85	-40 to 105	-40 to 125
Package PLQP0144KA-A	Package							PLQP0	I44KA-A					
			*	*	1	*	*	‡	#	*	*	*	*	ž
			Ē	6	E	۾	۾ ا	Ē	E	<u> </u>	6	Ď.	۾	Ü
R5F6453MJFD** R5F6453MJFD** R5F6453MJFD** R5F6453MJFD** R5F6453MJFD** R5F6453NJFD** R5F6453NJFD** R5F6453NJFD**	Part No.		Ş	Į.	Ž	2	1	¥	2	Į.	¥	25].	R5F64535KFD**
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			53	53	53	23,	23,	53,	53	531	53	53	53	53
49 49 49 49 49 49 49 49			.64	.64	.64	.64	-64	-64	.64	.64	.64	.64	-64	.64
15 15 15 15 15 15 15 15			35F	35F	155	35	35F	35F	35F	35F	35F	35F	35	35

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Automotive MCUs

Group									R320	C/156								
	ROM (Bytes)	256K + 8	K	2	256K + 12I	K	3	84K + 8k	(3	384K + 12k	C	5	12K + 8	K	T :	512K + 12	K
	RAM (Bytes)	2501(10		0K	.501(121			04101		4K	70410 121	`		/IZIC O		2K	J 1210 1 12	
	ROM Type*1			.010						F								
Memory				QK (Data E	Flash), 4K (E2	dataElach:					Flash), 4K (E2d	lataFlach:				SK (Data	Flash), 4K (E2	dataElach:
	Data Flash/E2 Data Flash	8K (Data Fl	ash)	progra	m/erase 100k	times)	8K (Data Fla	ısh)	progra	m/erase 100k	times)	8K (Data Fl	ash)	progra	m/erase 100	k times)
	Program Security			progra	111/01400 1001		ID Code (Chack E	unction		ode Prote		ionl			progre	anny or alocal room	tillioo
	CPU					162 (1	D Code (CHECK		00 Core		ect Fullci	ion,					
											•							
	Basic Instructions									08	,							
CPU	Minimum Instruction Execution Time (ns)							1		@64MH	z)							
	Multiplier									2 → 64								
	Multiply-Accumulate Instruction									+64 →64	1							
	Barrel Shifter									es								
DMA	DMAC (Channels)					_				4								
	DTC/DMAC II					L	DIVIACII	(Starts b			interrupt	factors)						
	Address Space (Bytes)								64	IM								
External Bus	External Bus Interface								-	_								
Expansion	Bus Structure								-	_								
	DRAM Controller								-									
	Clock Generation Circuit					4 ciı	rcuits (M	ain cloc	k, PLL, S	Sub cloc	k, on-chip	oscillat	or)					
	PLL									es								
	Subclock								Y	es								
Clock	RTC																	
CIOCK	On-Chip Oscillator								Y	es								
	Oscillation Stop Detection								Y	es								
	Frequency Divider								1/n (n=	2 to 24)							
	Power Save									/Stop								
Power Supply	Power-On Reset/POR																	
Voltage Detection	Low Voltage Detection/LVD							Yes (L	ow volt	age det	ection)							
	Resolution × Channels							,		t×34								
A/D Converter	Sample and Hold									es								
7.,2 00	Multi-Channel Sample and Hold									_								
D/A Converter	Resolution × Channels								8-hi	t×2								
D/A CONVENTED	8-bit								0-10									
	16-bit							11	/Timor	A, Time	-D\							
										igent I/0								
	Input Capture																	
_	Output Compare									igent I/0								
Timer	PWM Output							37 (11	merA, I	ntelliger	nt I/O)							
	Real-Time Port																	
	Event Counter									A, Time								
	2-Phase Encoder Input									(Intellig								
	3-Phase Inverter Control				1 (s	hared w	vith Time	erA4, Iin			, TimerB2,	Dead II	me IIm	ier)				
Watchdog Tin										1								
	Clock Sync./ Clock Async.								5 (U	ART)								
Serial Interface	Clock Sync. Only								-									
	Clock Async. Only																	
I ² C-bus									3 (U	ART)								
IEBus									-	_								
Smart Card/S																		
Synchronous Serial C	ommunication Unit/Special Serial I/O									3								
CAN	Channels									2								
	Message Box (Numbers)									2								
FlexRay										_								
IrDA																		
CRC Calculati	on Circuit						1	(CRC - C	CITT (X	16 + X1	2 + X5 + 1))						
X/Y Converte	r									es								
	Input Only (Numbers)									2								
	CMOS I/O (Numbers)									20								
I/O Ports	N-Channel Open Drain Port (Numbers)									_								
	High Current Drive Port									_								
	Pull-Up Resistor								1	21								
External Inter	:									4								
	On-Chip Debug									es								
Debugging Function	On-Board Flash Program									es es								
	ROM Correction Function									_								
Other Functions	Others	-							LINI.4 -	– hannels								
Operating Fra		-								0 to 5.5								
	quency/Supply Voltage bient Temperature (°C)	-40 to 85 -40 to 105	_40 to 100	_ 40 +o 0E	_40 to 10F	_40 to 10F	_40 +^ OF	_40 to 10F	-40+4 10F	_40 +- 05	_40 to 100	-40 to 12E	_40 to 0F	_ 10 +o 10F	_ 40 +4 100	_40 +- 01	- 40 to 10F	_40 +4 125
Package	iblent Temperature (C)	-40 to 65 -40 to 105	-40 to 125	-40 10 65	-40 to 105	-40 to 125	-40 to 65	-40 to 105		44KA-A		-40 to 125	-40 10 65	- 40 to 105	- 40 to 125	-40 to 8	0 -40 to 100	- 40 to 125
Part No.		FJFD**	FKFD**	1JFD**	1LFD**	1KFD**	GJFD**	GLFD**	*			2KFD**	нЈЕр**	HLFD**	HKFD**	3JFD**	3LFD**	3KFD**
		R5F6456FJFD**	R5F6456FKFD**	R5F64561JFD*	R5F64561LFD	R5F64561KFD*	R5F6456GJFD**	R5F6456GLFD*⁴	R5F6456GKFD*	R5F64562JFD**	R5F64562LFD**	R5F64562KFD*	R5F6456HJFD**	R5F6456HLFD*	R5F6456HKFD*	R5F64563JFD	R5F64563LFD**	R5F64563KFD**

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

Group							R32C	/157								
	ROM (Bytes)	256K + 8K		256K + 12K		384K + 8K		3	84K + 12K	Т	5	12K + 8	K	T 5	512K + 12	2K
	RAM (Bytes)		20K				24							2K		
Memory	ROM Type*1						F									
iviemory	Data Flash/E2 Data Flash	8K (Data Flas		ata Flash), 4K (E2dateF		(Data Flash	,,		lash), 4K (E2dat		8K (Data FI	ash)	8K (Data	Flash), 4K (E	2dateFlash
		OK (Buta Hus	rr, pi	ogram/erase 100k time	'				n/erase 100k tir			Dutuii	u311,	progra	m/erase 100	k times)
	Program Security			Y	es (ID Code	Check Fun			ode Protec	t Functi	ion)					
	CPU					R		00 Core								
	Basic Instructions Minimum Instruction Execution Time (ns)					15	10	8 64MHz	Λ.							
CPU	Multiplier						32×32)							
	Multiply-Accumulate Instruction							64 - 64								
	Barrel Shifter						Ye									
DMA	DMAC (Channels)						4									
DIVIA	DTC/DMAC II				DMAC II	(Starts by			interrupt f	actors)						
	Address Space (Bytes)						64									
External Bus Expansion	External Bus Interface Bus Structure															
LAPAIISIOII	DRAM Controller															
	Clock Generation Circuit				1 circuits (f	Vlain clock,	PII S	ub cloc	k on-chin	oscillato	or)					
	PLL						Ye		it, on onip	000	.,					
	Subclock						Ye									
Clock	RTC						-	-								
Clock	On-Chip Oscillator						Ye									
	Oscillation Stop Detection						Ye									
	Frequency Divider					1/		2 to 24)								
D 0 1	Power Save						Wait/	Stop								
Power Supply Voltage Detection	Power-On Reset/POR Low Voltage Detection/LVD					Yes (Low	- volto	ao dota	otion)							
voltage Detection	Resolution × Channels					Tes (LOW	10-bit		ction							
A/D Converter	Sample and Hold						Ye									
.,	Multi-Channel Sample and Hold															
D/A Converter	Resolution × Channels						8-bit	×2								
	8-bit							-								
	16-bit							, Timer								
	Input Capture							gent I/C								
Timer	Output Compare					32 (37 (Time		gent I/C								
Ilmer	PWM Output Real-Time Port					37 (IIII)	erA, in	temgen	11/0)							
	Event Counter					11 (7	ΓimerΔ	, Timer	R)							
	2-Phase Encoder Input					3 (TimerA										
	3-Phase Inverter Control			1 (share	d with Tim	nerA4, Timei				Dead Tir	ne Tim	er)				
Watchdog Tin							1									
	Clock Sync./ Clock Async.						5 (UA									
Serial Interface	Clock Sync. Only							-								
I ² C-bus	Clock Async. Only						3 (U/	ART)								
IEBus							3 (07									
Smart Card/S	IM						_	-								
	ommunication Unit/Special Serial I/O						3									
CAN	Channels						3									
	Message Box (Numbers)						32									
FlexRay								•								
IrDA CBC Colouloti	an Circuit					LICEC CO	TT /V	IC : V42	VE - 411							
CRC Calculati X/Y Converte					1	I (CRC-CCI	Ye		+ AD + 1))							
A/ I Converte	Input Only (Numbers)															
	CMOS I/O (Numbers)						12									
I/O Ports	N-Channel Open Drain Port (Numbers)						-									
	High Current Drive Port						_									
	Pull-Up Resistor						12	1								
External Inter							14									
Debugging Function	On-Chip Debug						Ye									
559	On-Board Flash Program						Ye	S								
Other Functions	ROM Correction Function						BL 4 - L									
Oneveting Eve	Others quency/Supply Voltage							annels 0 to 5.5	.,							
	bient Temperature (°C)	-40 to 85 -40 to 105 -	-40 to 125 40	to 85 -40 to 105 -40 t	125 - 40 to 85					40 to 125	40 to 85	-40 to 105	-40 to 125	-40 to 8F	-40 to 105	-40 to 125
Package	ibione remperature (6)	40 10 00 40 10 100	10 10 120 10	10 00 40 10 100 40 1	1000			44KA-A	40 10 100	10 10 120	10 10 00	10 10 100	10 10 120	10 10 00	10 10 100	10 10 120
J-																
		* *	* *	t	*	*	*	ž	ž	ž	*	\$	*	ŧ	ž	ž
D . N		, i	Ē t	ַבָּ בַּ	Ē	6	6	٦	<u>ب</u>	Ē	Ð	Ē	윤	, D	Ļ	Ē
Part No.		R5F6457FJFD**	R5F6457FKFD**	R5F64571LFD**	R5F6457GJFD	R5F6457GLFD**	R5F6457GKFD*	R5F64572JFD	R5F64572LFD**	R5F64572KFD*	R5F6457HJFD**	R5F6457HLFD**	R5F6457HKFD**	R5F64573JFD*	R5F64573LFD**	R5F64573KFD**
		457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
		, F6,	, F6,	Feb.	F62	, E64	9 <u>F</u> 6	, E64	, E	, F6,	, E64	F62	F64	F64	F64	-F62
		R5	R5	3.5	RS	RS	RS	RS	RS	R2	R5	RS	RS	R5	RS	RS
															1	

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Automotive MCUs

Memory FAM (Bytes) 12K	ot factors)
RAM (Bytes) 12K	20K Data Flash) 8K (Data Flash), 4K (E2date program/erase 100k tim tect Function) pt factors)
Memory Date Flash/E2 Date Flash 8K (Date Flash), 4K (E2dateFlash) 8K (Date Flash) 8K (Date F	program/erase 100k tim tect Function) pt factors)
Date Flash/EZ Date Flash SK (Date Flash) SK (Date Flash), JK (EZdateFlash: Program/seares Diotk times) Program/seares Diotk times) Yes (ID Code Check Function, ROM Code Prote R32C/100 Core Basic Instructions 108	program/erase 100k tim tect Function) pt factors)
CPU	ot factors)
Description	
Multiplier 32×32-64	
Multiply-Recumble Instruction 32 × 32 + 64 - 64	
Barrel Shifter Yes	
DMA DMAC (Channels) 4 DMAC II DMAC II (Starts by all peripheral interrupt 64M External Bus External Bus Interface — Expansion — DRAM Controller — Clock — REXESTRUCTURE — On-Chip Colock Generation Circuit 4 circuits (Main clock, PLL, Sub clock, on-chip 7 kg Clock — RTC — On-Chip Oscillator Yes Subdock Yes Power Supphy — Power Supphy — Power Supphy — Power Supphy Power-On Reset/POR Voltage Detection — Voltage Detection (VD) Yes (Low voltage detection) A/D Converter Resolution × Channels Sample and Hold — I/A Converter Resolution × Channels Sample and Hold — I/A Converter Resolution × Channels Sample and Hold — Vialual Mull-Claumed Sample and Hold — Vialual Mull-Claumed Sam	
DIMAC	
External Bus External Bus External Bus Interface	
External Bus External Bus Interface	ip oscillator)
Bus Structure	ip oscillator)
DRAM Controller	ip oscillator)
Clock Generation Circuit	ip oscillator)
PLL Subclock Yes	
Clock	
On-Chip Oscillator Yes	
On-Ling Discriptor Yes	
Frequency Divider Power Save Wait/Stop Power Save Power Sav	
Power Save Power Save Power-On Reset/POR Power-On Reset/POR Power-On Reset/POR Power-On Reset/POR Power-On Reset/POR Power-On Reset/POR Power-On Reset/POR Power-On Reset/POR Power-On Resolution × Channels 10-bit × 23	
Power Supply Voltage Detection Commonstration Commo	
Voltage Defection Low Voltage Detection Low Voltage detection	
A/D Converted Sample and Hold Yes	
A/D Converter Sample and Hold Wulk-Channel Sample and Hold Resolution × Channels − − − − − − − − − − − − − − − − − −	
Multi-Channel Sample and Hold	
D/A Converter Resolution x Channels S-bit 11 (TimerA, TimerB) 11 (TimerA, TimerB) 11 (TimerA, TimerB) 11 (TimerA, TimerB) 11 (TimerA, TimerB) 11 (TimerA, TimerB) 11 (TimerA, TimerB) 12 (TimerA, TimerB) 13 (Intelligent I/O) 13 (Intelligent I/O) 14 (ItmerA, TimerB) 11 (TimerA, TimerB) 12 (TimerB) 11 (TimerA, TimerB) 13 (TimerA) + 2 (TimerB) 13 (TimerA) + 2 (TimerB) 14 (TimerA, TimerA2, TimerB2	
Times	
Timer	
Input Capture	
Timer	
Timer	
Event Counter 2-Phase Encoder Input 3 (TimerA) + 2 (Intelligent I/O) 3 (TimerA) + 2 (Intelligent I/O) 3 (TimerA) + 2 (Intelligent I/O) 3 (TimerA) + 2 (Intelligent I/O) 3 (TimerA) + 2 (Intelligent I/O) 3 (TimerA) + 2 (Intelligent I/O) 4 (Intelligent I/O) 4 (Intelligent I/O) 5 (IDART)	
2-Phase Encoder Input 3 (TimerA) + 2 (Intelligent I/O) 3-Phase Inverter Control 1 (shared with TimerA4, TimerA1, TimerA2, TimerB2	
3-Phase Inverter Control 1 (shared with Timer A4, Timer A2, Timer B2, Watchdog Timer 1 1 1 1 1 1 1 1 1	
Variable Variable	
Clock Sync. Only	2, Dead Time Timer)
Clock Sync. Only	
Clock Async, Only — I°C-bus 3 (UART) IEBus — Smart Card/SIM — Synchronous Serial Vommunication Unit/Special Serial I/O — CAN Channels 1 Message Box (Numbers) 32 IrDA — CRC Calculation Circuit 1 (CRC – CCITT (X16 + X12 + X5 + 1)) X/Y Converter Yes Li [Du Only (Numbers) 2 CMOS I/O (Numbers) 64 M-Channel Open Drain Port (Immers) — High Current Drive Port — Pull-Up Resistor 65 External Interrupts (Institute) On-Chip Debug Yes	
FC-bus 3 (UART) IEBus	
FBus	
Smart Card/SIM — Synchronus Serial Cormounication Unit/Special Serial I/O 1 CAN Channels 1 Message Box (Numbers) 32 FlexRay – IrDA – CRC Calculation Circuit 1 (CRC – CCITT (X16 + X12 + X5 + 1)) X/Y Convert Yes I/O Ports CMOS I/O (Numbers) 2 McDannel Open Drain Port (Numbers) 64 McDannel Open Drain Port (Numbers) – High Current Drive Port – Pull-Up Resistor 65 External Intertupts On-Chip Debug On-Chip Debug Yes	
Synchronous Serial Communication Unit/(Special Serial I/O	
Texal	
Message Box (Numbers) 32 FlexRay	
IrDA	
CRC Calculation Circuit 1 (CRC - CCITT (X16 + X12 + X5 + 1)) X/Y Convert Yes Input Only (Numbers) 2 CMOS I/O (Numbers) 64 I/O Ports Inchannel Open Drain Port (Numbers) — High Current Drive Port Pull-Up Resistor 65 External Interrupts Pins 7 Dahunoning Eurotion On-Chip Debug Yes	
X/Y Converter Yes I/O Ports Input Only (Numbers) 2 I/O Ports M-Chanel Open Drain Port (Numbers) — High Current Drive Port — Pull-Up Resistor 65 External Interrupts Pins 7 Debugging Eigenfalls On-Chip Debug Yes	
Input Only (Numbers) 2	1))
CMOS I/O (Numbers) 64	
N-Channel Open Drain Port (Numbers)	
High Current Drive Port — — — — — — — — —	
External Interrupts Pins 7 Dabugging Function On-Chip Debug Yes	
External Interrupts Pins 7 Debugging Function On-Chip Debug Yes	
Rahuaring Function On-Chip Debug Yes	
Other Function ROM Correction Function -	
Other Functions Others LIN:1 channel	
Operating Frequency/Supply Voltage 48MHz/3.0 to 5.5V	
Operating Ambient Temperature (°C)	
Package PLQP080KB-A	i0 to 105 -40 to 125 -40 to 85 -40 to 105 -40
PSF64606LFP** RSF64600LFP** RSF64600LFP** RSF64600LFP**	10 to 105 -40 to 125 -40 to 85 -40 to 105 -40
R5F6. R5F6.	#BFF64601LFP*** #BFF64601LFP*** #BFF64601LFP*** #BFF64601LFP*** #BFF64601LFP***

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

Group							R320	/161					
	ROM (Bytes)	12	28K + 8K			128K + 12K			256K + 8K			256K + 12K	
	RAM (Bytes)		-ore i ore	12	2K	ILOIC ILIC			LOOK TON	20	ОК	LOOK ILK	
Memory	ROM Type*1						-	-					
,	Data Flash/E2 Data Flash	8K (D	Data Flash)		8K (Data Flash), 4K	(E2dateFlash:progran	n/erase 100k times)	8	K (Data Flash	1)	8K (Data Flash), 4K	(E2dateFlash:progra	m/erase 100k time:
	Program Security		•						Protect Func				
	CPU						R32C/1						
	Basic Instructions						10						
0011	Minimum Instruction Execution Time (ns)						20.8 (@	48MHz)					
CPU	Multiplier						32×3						
	Multiply-Accumulate Instruction						32×32-	-64 →64					
	Barrel Shifter						Ye	es					
DRAA	DMAC (Channels)						4	ļ.					
DMA	DTC/DMAC II					MACII (Sta	rts by all pe	ripheral inte	rrupt factors)			
	Address Space (Bytes)						64	M					
External Bus	External Bus Interface						-	-					
Expansion	Bus Structure	<u> </u>					-	-					
	DRAM Controller						-	-					
	Clock Generation Circuit				4 ci	rcuits (Main	clock, PLL, S	ub clock, or	ı-chip oscilla	tor)			
	PLL						Ye	es					
	Subclock						Ye	es					
Clock	RTC						-	-					
Olock	On-Chip Oscillator						Ye						
	Oscillation Stop Detection						Ye						
	Frequency Divider						1/n (n =						
	Power Save						Wait	Stop					
Power Supply Voltage Detection	Power-On Reset/POR						-	-					
Voltage Detection	Low Voltage Detection/LVD					Ye	s (Low volta	age detectio	n)				
	Resolution×Channels						10-bi	t×23					
A/D Converter	Sample and Hold						Ye	es					
	Multi-Channel Sample and Hold						-	-					
D/A Converter	Resolution×Channels						-	-					
	8-bit						-	-					
	16-bit						11 (Timer/	A, TimerB)					
	Input Capture						8 (Intellig						
	Output Compare						8 (Intelli						
Timer	PWM Output					1:	3 (TimerA, Ir		0)				
	Real-Time Port						_	-	•				
	Event Counter						11 (Timer/	A. TimerB)					
	2-Phase Encoder Input					3 (TimerA) + 2 ((O)				
	3-Phase Inverter Control				1 (shared v				erB2, Dead T	ime Timer)			
Watchdog Tir					,			l	,				
	Clock Sync./ Clock Async.						5 (U.	ART)					
Serial Interface	Clock Sync. Only							-					
	Clock Async. Only						_	_					
I ² C-bus	,,						3 (U.	ART)					
IEBus							- ,	_					
Smart Card/S	SIM						-						
		ļ						_					
Synchronous Serial (-	<u>-</u>					
	Communication Unit/Special Serial I/O Channels												
Synchronous Serial C	Communication Unit/Special Serial I/O Channels						2	2					
CAN	Communication Unit/Special Serial I/O							2					
	Communication Unit/Special Serial I/O Channels						2	2					
CAN FlexRay IrDA	Communication Unit/Special Serial I/O Channels Message Box (Numbers)					1 (CR	3 - -	2 2 -	5+1))				
CAN FlexRay IrDA CRC Calculati	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit					1 (CR	3 - - C – CCITT (X	2 2 - - 16 + X12 + X	5 + 1))				
CAN FlexRay IrDA	Communication Unit/Special Serial I/O Channels Message Box (Numbers)					1 (CR	2 3 - - C – CCITT (X Ye	2 2 - - 16 + X12 + X	5 + 1))				
CAN FlexRay IrDA CRC Calculati	Communication Unit/Special Serial I/O Channels Message Box (Numbers)					1 (CR	3 - - C – CCITT (X Ye	2 2 - - 16 + X12 + X	5 + 1))				
CAN FlexRay IrDA CRC Calculati X/Y Converte	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit Input Only (Numbers) CMOS I/O (Numbers)					1 (CR	2 3 - - C – CCITT (X Ye	2 2 - - 16 + X12 + X es 2	5+1))				
CAN FlexRay IrDA CRC Calculati	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit r Input Only (Numbers) CMOS I/O (Numbers) N-Channel Open Drain Port (Numbers)					1 (CR	3 - - C – CCITT (X Y(2 2 - - 16 + X12 + X es 2	5+1))				
CAN FlexRay IrDA CRC Calculati X/Y Converte	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit or Input Only (Numbers) CMOS I/O (Numbers) HChannel Open Drain Port (Numbers) High Current Drive Port					1 (CR	3 3 C-CCITT (X Y) 6 	2 2 - - 16+X12+X es 2 4	5+1))				
CAN FlexRay IrDA CRC Calculati X/Y Converte	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) CMOS I/O (Numbers) NcOhanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor					1 (CR	2 3 3 - - C – CCITT (X Y) 6 - - 6	2 2 - - 16+X12+X es 2 4 - -	5+1))				
CAN FlexRay IrDA CRC Calculati X/Y Converte I/O Ports External Inter	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit or Input Only (Numbers) ICMOS I/O (Numbers) INChannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins					1 (CR	2 3 3 - C – CCITT (X Y 4 6 - - 6	2 2 - - 116 + X12 + X ss 2 4 - - 5	5 + 1))				
CAN FlexRay IrDA CRC Calculati X/Y Converte	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) CMOS I/O (Numbers) HChannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug					1 (CR	2 3 3 	2 2 - - 16+X12+X ess 2 4 - - 5	5+1))				
CAN FlexRay IrDA CRC Calculati X/Y Converte I/O Ports External Inter Debugging Function	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit or Input Only (Numbers) KChanel Open Drain Port (Numbers) HChanel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program					1 (CR	2 3 3 	2 2 - - 116 + X12 + X ss 2 4 - - 5	5+1))				
CAN FlexRay IrDA CRC Calculati X/Y Converte I/O Ports External Inter	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) ICMOS I/O (Numbers) INChannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function					1 (CR	2 3 3 5 6 6 7 7	2 2 2 - - 116 + X12 + X es 2 4 - - 5 7	5+1))				
CAN FlexRay IrDA CRC Calculati X/Y Converte I/O Ports External Inter Debugging Function Other Functions	Communication Unit/Special Serial I/O Channels Message Box (Numbers) Input Only (Numbers) Input Only (Numbers) Inchannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others					1 (CR	3 3 	2 2 - - 16 + X12 + X 88 2 4 - - 5 5 98 88	5+1))				
CAN FlexRay IrDA CRC Calculati X/Y Converte I/O Ports External Inter Debugging Function Other Functions Operating Fre	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) CMOS I/O (Numbers) HChannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage		MA to 10E	_M0+c 12F			2 3 3 5 6 6 6 6 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1	2 2 - - 16 + X12 + X s 2 4 - - 5 7 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9		_A0 to 42F			40.40
CAN FlexRay IrDA CRC Calculati X/Y Converte I/O Ports External Inter Debugging Function Other Functions Operating Fre Operating An	Communication Unit/Special Serial I/O Channels Message Box (Numbers) Input Only (Numbers) Input Only (Numbers) Inchannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others	-40 to 85 -4	40 to 105 -	-40 to 125	-40 to 85		3 3 3 5 6 6 6 7 7, 7, 10111 c 48MHz/3 -40 to 125	2 2 2 - - 16 + X12 + X 8 2 4 - - 5 7 8 8 9 8 9 8 9 9 1 0 10 0 to 5.5V - -40 to 85		-40 to 125	−40 to 85	_40 to 105	-40 to 12
CAN FlexRay IrDA CRC Calculati X/Y Converte I/O Ports External Inter Debugging Function Other Functions Operating Fre	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) CMOS I/O (Numbers) HChannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	-40 to 85 -4	40 to 105 -	-40 to 125	-40 to 85		2 3 3 5 6 6 6 6 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1	2 2 2 - - 16 + X12 + X 8 2 4 - - 5 7 8 8 9 8 9 8 9 9 1 0 10 0 to 5.5V - -40 to 85		-40 to 125	-40 to 85	_40 to 105	-40 to 12
CAN FlexRay IrDA CRC Calculati X/Y Converte I/O Ports External Inter Debugging Function Other Functions Operating Fre Operating An	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) CMOS I/O (Numbers) HChannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	-40 to 85 -4	40 to 105] -	-40 to 125	-40 to 85		3 3 3 5 6 6 6 7 7, 7, 10111 c 48MHz/3 -40 to 125	2 2 2 - - 16 + X12 + X 8 2 4 - - 5 7 8 8 9 8 9 8 9 9 1 0 10 0 to 5.5V - -40 to 85		-40 to 125	- 40 to 85	-40 to 105	-40 to 12
CAN FlexRay IrDA CRC Calculati X/Y Converte I/O Ports External Inter Debugging Function Other Functions Operating Fre Operating An	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) CMOS I/O (Numbers) HChannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage		*		-40 to 85	-40 to 105	2 3 3 	2 2 2 - - 16 + X12 + X 88 2 4 - - 5 7 88 98 98 - 0 to 5.5V -40 to 85 80KB-A	-40 to 105	*		*	
CAN FlexRay IrDA CRC Calculati X/Y Converte I/O Ports External Inter Debugging Function Other Functions Operating Fre Operating An Package	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) CMOS I/O (Numbers) HChannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage		*		*	-40 to 105	2 3 3 	2 2 2 - - 16 + X12 + X 88 2 4 - - 5 7 88 98 98 - 0 to 5.5V -40 to 85 80KB-A	-40 to 105	*		*	
CAN FlexRay IrDA CRC Calculati X/Y Converte I/O Ports External Inter Debugging Function Other Functions Operating Fre Operating An	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) CMOS I/O (Numbers) HChannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage		*		*	-40 to 105	2 3 3 	2 2 2 - - 16 + X12 + X 88 2 4 - - 5 7 88 98 98 98 - 0 to 5.5V -40 to 85 80KB-A	-40 to 105	*		*	
CAN FlexRay IrDA CRC Calculati X/Y Converte I/O Ports External Inter Debugging Function Other Functions Operating Fre Operating An Package	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) CMOS I/O (Numbers) HChannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage		*		*	-40 to 105	2 3 3 	2 2 2 - - 16 + X12 + X 88 2 4 - - 5 7 88 98 98 98 - 0 to 5.5V -40 to 85 80KB-A	-40 to 105	*		*	
CAN FlexRay IrDA CRC Calculati X/Y Converte I/O Ports External Inter Debugging Function Other Functions Operating Fre Operating An Package	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) CMOS I/O (Numbers) HChannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage		*		*	-40 to 105	2 3 3 	2 2 2 - - 16 + X12 + X 88 2 4 - - 5 7 88 98 98 98 - 0 to 5.5V -40 to 85 80KB-A	-40 to 105	*		*	
CAN FlexRay IrDA CRC Calculati X/Y Converte I/O Ports External Inter Debugging Function Other Functions Operating Fre Operating An Package	Communication Unit/Special Serial I/O Channels Message Box (Numbers) ion Circuit er Input Only (Numbers) CMOS I/O (Numbers) HChannel Open Drain Port (Numbers) High Current Drive Port Pull-Up Resistor rrupts Pins On-Chip Debug On-Board Flash Program ROM Correction Function Others equency/Supply Voltage	HSF6461EJFP**	R5F6461ELFP**	B5F6461EKFP**	- 40 to 85		3 3 3 5 6 6 6 7 7, 7, 10111 c 48MHz/3 -40 to 125	2 2 2 - - 16 + X12 + X 8 2 4 - - 5 7 8 8 9 8 9 8 9 9 1 0 10 0 to 5.5V - -40 to 85		— 40 to 125	- 40 to 85	- 40 to 105	B5F64611KFP**

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Automotive MCUs

• Specifications (M32C/80 Series)

Оросии	Julion3 (111020/0			,																					
Group												M32	C/84 (I	VI32C	/84T)										
	ROM (Bytes)			8K			25				32	ок			38	4K			384K	+ 4K			512K	+ 4K	
	RAM (Bytes)		10	K			20	K									24	IK .				_			
Memory	ROM Type*1	-							ľ	/										-		F S Elso	h)		
	Data Flash/E2 Data Flash	\vdash								_									V-			a Flas	n) Functio	n .	
	Program Security	l							-	-													unctio		
	CPU											r	/132C/8	30 Cor	e										
	Basic Instructions												10												
CPU	Minimum Instruction Execution Time (ns)											3	1,3 (@												
	Multiplier	_										4	16×1 6×16+												
	Multiply-Accumulate Instruction Barrel Shifter											- 1	Ye		40										
	DMAC (Channels)																								
DMA	DTC/DMAC II									MAC	Ⅱ (Sta	rts by	all pe	ripher	al inte	rrupt f	actors	;)							
	Address Space (Bytes)												-	-											
External Bus	External Bus Interface												-												
Expansion	Bus Structure DRAM Controller																								
	Clock Generation Circuit								4 ci	rcuits	(Main	clock.	PLL. S	ub clo	ock. O	n-chip	oscilla	tor)							
	PLL										(,	Ye					,							
	Subclock												Ye	es											
Clock	RTC													-											
	On-Chip Oscillator Oscillation Stop Detection	-											Ye Ye												
	Frequency Divider										1/n (n	1=1.2	, 3, 4, 0		0. 12. 1	14, 16)									
	Power Save										.,	, 2	Wait/		., . . ,	, ,									
Power Supply	Power-On Reset/POR												-												
Voltage Detection	Low Voltage Detection/LVD	_											_					_					T		_
	Resolution×Channels	10-bit ×26	10-bit ×34			10-bit ×26	10-bit ×34		10-bit ×34	10-bit ×26	10-bit ×34		10-bit ×34				10-bit ×34		10-bit ×34		10-bit ×34		10-bit ×34	10-bit ×26	
A/D Converter	Sample and Hold	^20	_ ^ 34	^20	_ ^ 34	^20	^ 34	^20	_ ^ 34	^20	_ ∧ 34	_ ^ 20	× 34		^ 34	_ ^ 20	^ 34	^20	^ 34	^20	^ 34	_ ^20	^ 34	^20	^ 34
	Multi-Channel Sample and Hold													-											
D/A Converter	Resolution×Channels												8-bi	t×2											
	8-bit																								
	16-bit Input Capture												imer /												
	Output Compare												Intelli Intelli												
Timer	PWM Output										1		er A, I			D)									
	Real-Time Port												-	-											
	Event Counter												īmer /												
	2 Phase Encoder Input	_						4 / 1					A) + 1					_	- ,						
Watchdog Tin	3-Phase Inverter Control	\vdash						1 (sna	rea wi	tn IIn	ner A4,	, IIme	r A1, 1	ımer A	AZ, IIN	ner B2	, Dead	lime	(imer	1					
wateridog iiii	Clock Sync./ Clock Async.											6 (UA	RT, Int	ellige	nt I/O)										
Serial Interface	Clock Sync. Only												Intelli												
	Clock Async. Only													-											
I ² C-bus IEBus													5 (U												
Smart Card/S	IM												5 (U												
	Communication Unit/Special Serial I/O												5 (U												
CAN	Channels												•	l											
	Message Box (Numbers)												1	6											
IrDA CRC Calculation	on Circuit	\vdash									1 10	י אמי	CITT ()	- /16 . V	12 _ V 5	L 1)\									
X/Y Converte		\vdash									1 (0	nu-U	CITT ()		+ X*	+ 1))									
, . Soliverte	Input Only (Numbers)												- 10												
	CMOS I/O (Numbers)	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121
I/O Ports	N-Channel Open Drain Port (Numbers)												2	2											
	High Current Drive Port Pull-Up Resistor	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121
External Inter		00	121	00	121	00	121	_ 0 0	121	00	121	_ 00	121		121	_ 00	121	00	121	_ 00	121	_ 00	121	_ 00	121
	On-Chip Debug								_	-											Υ	es			
Debugging Function	On-Board Flash Program								-	-											Υ	es			
Other Functions	ROM Correction Function	_							Y	es											-	_			
	Others quency/Supply Voltage	-										221	/IHz/4	2 to 5	5V										
	bient Temperature (°C)	-40	to 85	-40	to 105	-40	to 85	-40	to 105	-40	to 85		io 105			-40	to 105	-40	to 85	-40	to 105	-40	to 85	- 40	to 105
,						.,				.,				.,		1.5									T
		₹	<u>Y</u>	3-A	Y	3-A	₹	¥.	<u>Y</u>	¥-	<u>Y</u>	¥-K	₹	¥-K	\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \	¥.	\\\	3-A	₹	¥.	¥.	¥.	¥.		۲.
Package		뽏	¥) KE	}	OKE	₹ 4) KE	\$) KE	\$) KE	4 4	OKE.	\$	%	₹ 4	0KE	4K) KE	₹ 4	%	4	KE	4 4
		PLQP0100KB-A	PLOP0144KA-A	PLOP0100KB-A	PLOP0144KA-A	PLOP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLOP0144KA-A	PLQP0100KB-A	PLOP0144KA-A	PLQP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLOP0144KA-A	PLQP0100KB-A	PLOP0144KA-A	PLQP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLQP0144KA-A	PLOP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLQP0144KA-A
		ဋ	<u>%</u>	2P0	2	2P0	ا ک	2P0	Z	2P0	Z	2P.0	ا ک	2 P 0	K	P0	<u>P</u>	2P0	P.0	<u>P</u>	2P0	Z	2P0	ک <u>ر</u>	2 P 0
		ऱ	7	P.C	7	P.C	H	P.C	<u>7</u>	P.C	<u>7</u>	P.	H	P	7	<u>7</u>	<u> </u>	P	H	<u> </u>	P.C	<u>7</u>	PLC	٦ ۲	P.C
		Ē		_		_		_	_	_	_	Ē			_				_	_		Ē	Ė		
												*	*												
		9	9	GP.	G _P	g.	g.	G G	G G	g)	GP)	XGP	XGP	9	9	G G	G G								
Dout No.		Š	Š	Š	Š	X	X	2	2	Š	Š	×	×	X	X	Ž	Š	0	Δ.	_	_	_	_	0	a
Part No.		[[]	L.	5	S	Ę	F	99	-G	¥.	×	W	W	높	냪	\ \.	₹	Ţ	Ţ	JO .	1UG.	Į D	15T	l G	IUG
		M30840MCT-XXXGP	M30842MCT-XXXGP	M30840MCU-XXXGP	M30842MCU-XXXGP	M30843MGT-XXXGP	M30845MGT-XXXGP	M30843MGU-XXXGP	M30845MGU-XXXGP	M30843MWT-XXXGP	M30845MWT-XXXGP	N30843MWU-XXXGP	M30845MWU-XXXGP*	M30843MHT-XXXGP	M30845MHT-XXXGP	M30843MHU-XXXGP	M30845MHU-XXXGP	M30843FHTGP	M30845FHTGP	M30843FHUGP	M30845FHUGP	M30843FJTGP	M30845FJTGF	M30843FJUGP	M30845FJUGP
		308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308
												_		Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ
*1 E : Elach mama	ory version 1 : ROM-less ver	1.4	. Maal	DOM.		0.0-	- 41	DDOM.		. 07	3-DOM		. –												nment

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

★: New product ★★: Under development

	54t10113 (1 11 1020/0			,								N/IOO	C/0E /	Maac	/0ET\										
Group	DOM (D. 4)		0.5	CIV			20	01/			2201		C/85 (I	VI32C		41/			20.41/	. 41/			E401/	. 41/	
	ROM (Bytes) RAM (Bytes)	-		6K OK			32	0K			320K	+ 4K			24	4K 1K			384K	+ 4K			512K	+ 4K	
D/I ama ama	ROM Type*1				P	VI					- 1	F				/I					- 1	F			
Memory	Data Flash/E2 Data Flash				-	-				4	K (Dat	a Flasi	ո)		-	_				4	K (Dat	a Flasi	h)		
	Program Security				-	_				Yes (ID	Code C	heck Fu	nction,		-	_		Yes (ID	Code C	heck F	unction,	ROM C	ode Pro	tect Fu	nction)
	CPU									ROW	Code Pro			20.0											
	Basic Instructions	\vdash										IN.	/I32C/8	30 Cor)8	e										
	Minimum Instruction Execution Time (ns)											3	1.3 (@		z)										
CPU	Multiplier												16×1		_,										
	Multiply-Accumulate Instruction											10	6×16-	- 48 →	48										
	Barrel Shifter													es											
DMA	DMAC (Channels) DTC/DMAC II	-							-	2010	Ⅱ (Sta	uto hu	all no		al inta										
	Address Space (Bytes)									JIVIAC	ц (Эца	ir to by	all pe	-	ai iiite	rrupt i	actors	•1							
External Bus	External Bus Interface												-	_											-
Expansion	Bus Structure												-	-											
	DRAM Controller																								
	Clock Generation Circuit PLL								4 CII	rcuits	(Main	CIOCK,	PLL, S		ock, Oi	n-cnip	OSCIII	itor)							
	Subclock													35 95											
Ol I.	RTC												_												
Clock	On-Chip Oscillator												Y	es											
	Oscillation Stop Detection	<u> </u>									41.1			es		4 40.									
	Frequency Divider Power Save										1/n (r	1 = 1, 2	, 3, 4, (Wait,		0, 12, 1	14, 16)									
Power Supply	Power-On Reset/POR	\vdash											vvait/	- oroh											
Voltage Detection	Low Voltage Detection/LVD													-											
	Resolution × Channels	10-bit							10-bit							10-bit					10-bit				
A/D Converter		×26	×34	×26	×34	×26	×34	×26	×34	×26	×34	×26		×26	×34	×26	×34	×26	×34	×26	×34	×26	×34	×26	×34
	Sample and Hold Multi-Channel Sample and Hold												Y (es											
D/A Converter	Resolution × Channels												8-bi	t×2											
	8-bit												-	-											
	16-bit												imer /												
	Input Capture Output Compare												Intelli Intelli												
Timer	PWM Output										1				ent I/0	D)									
	Real-Time Port												-	-	,										
	Event Counter												imer /												
	2-Phase Encoder Input							1 /-1		AL Tour					igent I		D I	т	T:						
Watchdog Tin	3-Phase Inverter Control	 						i (Sila	red wi	ui iiii	ier A4	, mne	A1, 1	imer <i>i</i>	42, 1111	ier bz,	Deau	IIIIie	mmer)						
J	Clock Sync./ Clock Async.											6 (UA	RT, Int	ellige	nt I/O)										
Serial Interface	Clock Sync. Only											1 (Intelli	gent I/	(O)										
I ² C-bus	Clock Async. Only												5 (U.	A DT\											
IEBus													5 (U												
Smart Card/S	IM												5 (U.												
Synchronous Serial C	ommunication Unit/Special Serial I/O												5 (U												
CAN	Channels												10												
IrDA	Message Box (Numbers)												16	×2											
CRC Calculation	on Circuit										1 (C	RC-C	CITT ()	K ¹⁶ + X	12 + X ⁵ -	+ 1))									
X/Y Converte													Y	es											
	Input Only (Numbers)		401		401	0=	401	-	401	0=	401	0-	404	_	404	0-	404	0-	404	0-	401	0-	404	0-	404
I/O Ports	CMOS I/O (Numbers) N-Channel Open Drain Port (Numbers)	85	121	85	121	85	121	85	121	85	121	85	121		121	85	121	85	121	85	121	85	121	85	121
./01016	High Current Drive Port	\vdash												_											
	Pull-Up Resistor	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121	85	121
External Inter	rupts Pins													1											
Debugging Function	On-Chip Debug	<u> </u>										es										es			
00 0	On-Board Flash Program ROM Correction Function	\vdash			v.	es						es			v	es						es			
Other Functions	Others				- 1								-	_	- 11										
	quency/Supply Voltage			,									/IHz/4												
Operating Am	bient Temperature (°C)	-40	to 85	-40	to 105	-40	to 85	-40	to 105	-40	to 85	-40	to 105	-40	to 85	—40	to 105	-40	to 85	-40	to 105	-40	to 85	-40	to 105
		1																							
		<	⋖	<	⋖	⋖	⋖	<	⋖	⋖	<	⋖	∢	⋖	< 4	⋖	∢	⋖	< 4	⋖	<	⋖	∢	⋖	∢
Deales		PLOP0100KB-A	PLOP0144KA-A	PLQP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLOP0144KA-A	PLOP0100KB-A	PLOP0144KA-A	PLQP0100KB-A	PLOP0144KA-A	PLQP0100KB-A	PLQP0144KA-A	PLOP0100KB-A	PLOP0144KA-A	PLOP0100KB-A	PLQP0144KA-A	PLOP0100KB-A	PLQP0144KA-A	PLOP0100KB-A	PLOP0144KA-A	PLOP0100KB-A	PLQP0144KA-A	PLQP0100KB-A	PLQP0144KA-A
Package		≅	44	8	44	8	44	8	44	8	44	8	44	8	44	00	44	00	44	00	44	8	44	8	44
		<u>8</u>	P0	P2	P0	5	P9	5	P0	<u>8</u>	P9	<u>8</u>	P01	P0	<u> </u>	P01	5	P01	5	P01	P3	P0	P01	P3	P3
		길	g	길	g	길	g	길	길	길	길	길	Z,	g	길	g	길	ק	길	ρŢ	길	g	밀	g	길
		_	Δ.	Δ.	Δ.	-	-	-	Δ.	-	Δ.	-	Δ.	4	-	Δ.	Δ.	4	-	4	-	Δ.	Δ.		
		6	65	*d5	*d5	65	9	*d5	*d5					6	25	* d5	*d5								
		M30853MGT-XXXGP	M30855MGT-XXXGP	M30853MGU-XXXGP	M30855MGU-XXXGP	M30853MWT-XXXGP	M30855MWT-XXXGP	M30853MWU-XXXGP	M30855MWU-XXXGP			_	۵.	M30853MHT-XXXGP	M30855MHT-XXXGP	M30853MHU-XXXGP	M30855MHU-XXXGP								
Part No.		Ĭ.	Z-TS	<u> </u>	<u></u>	Ê	Ş	N.	N.	M30853FWTGF	M30855FWTGP	M30853FWUGF	M30855FWUGP	¥	ř	÷	÷	TGP	T _G	UGF	M30855FHUGP	TGP	TGP	ПGР	UGP
		3M(5MC	3MC	5MC	3M/	5MV	3M/	2W	3FV	2FV	3FV	2EV	3MF	5MI	3MI	5MI	M30853FHTGP	M30855FHTGP	M30853FHUGF	12E	M30853FJTGF	M30855FJTGP	M30853FJUGP	M30855FJUGP
		3085	3085	3085	3085	3085	3085	3085	3085	3085	3085	3085	3085	3085	3085	3085	3085	3085	3085	3085	3085	3085	3085	3085	3085
		ž	Ĕ	ž	ž	Ξ̈́	ž	ž	ž	ž	ž	ž	ž	ž	Ξ̈́	ž	ž	ž	ž	ž	Σ̈́	ž	ž	ž	ž
At E. Elsek	ory version 1 : BOM-less vers			DOM:		0.0		DDOM		0	2-DOM														nment

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Automotive MCUs

Group							M32C/88 (M32C/88T)					
	ROM (Bytes)		3201	(+ 4K			384K	. + 4K			512K	(+ 4K	
	RAM (Bytes)							3K					
Memory	ROM Type*1							F					
	Data Flash/E2 Data Flash					ID O . d . Ob .		a Flash)	D 4 4 E	41 1			
	Program Security CPU				Yes (ID Code Che		80 Core	Protect Fund	ction)			
	Basic Instructions							08					
	Minimum Instruction Execution Time (ns)						31,3 (@						
CPU	Multiplier							6→32					
	Multiply-Accumulate Instruction							+48→48					
	Barrel Shifter						Y	es					
DMA	DMAC (Channels)							4					
DIVIA	DTC/DMAC II					DMAC II (Sta	rts by all pe	ripheral inte	rrupt factors	s)			
	Address Space (Bytes)						-	-					
External Bus Expansion	External Bus Interface							_					
Expunsion	Bus Structure DRAM Controller							_					
	Clock Generation Circuit				4 ci	rcuits (Main	clock. PLL. S	Sub clock. O	n-chip oscilla	itor)			
	PLL							es					
	Subclock							es					
Clock	RTC						-	-					
CIOCK	On-Chip Oscillator							es					
	Oscillation Stop Detection							es					
	Frequency Divider					1/n (r	1=1, 2, 3, 4,		14, 16)				
Davies Commit	Power Save Power-On Reset/POR						wait	/Stop					
Power Supply Voltage Detection	Low Voltage Detection/LVD							_					
voltage potention	Resolution × Channels	10-bit × 26	10-bit × 34	10-bit × 26	10-bit × 34	10-bit × 26	10-bit × 34	10-bit × 26	10-bit × 34	10-bit × 26	10-bit × 34	10-bit × 26	10-bit × 34
A/D Converter	Sample and Hold		.0 5.67.04		10 211 704	,		es		S SILA EU	10 511 704	, 10 DILAEU	
.,	Multi-Channel Sample and Hold						_	_					
D/A Converter	Resolution × Channels						8-bi	t×2					
	8-bit						-	-					
	16-bit						11 (Timer						
	Input Capture						8 (Intelli						
T	Output Compare						8 (Intelli		21				
Timer	PWM Output Real-Time Port					1.	3 (Timer A, I	ntelligent i/(-	رر				
	Event Counter						11 (Timer	A Timer B)					
	2-Phase Encoder Input					3.0	Timer A) + 2	(Intelligent I	/O)				
	3-Phase Inverter Control				1 (shared w					Time Timer)		
Watchdog Tin								1	,		,		
	Clock Sync./ Clock Async.						6 (UART, Int	elligent I/O)					
Serial Interface	Clock Sync. Only						1 (Intelli	gent I/O)					
-20.	Clock Async. Only												
I ² C-bus IEBus							5 (U.						
Smart Card/S	IN/						5 (U. 5 (U.						
	Communication Unit/Special Serial I/O						5 (U.						
	Channels							3					
CAN	Message Box (Numbers)							×3					
IrDA	,						-	-					
CRC Calculation	on Circuit					1 (C	RC-CCITT ($X^{16} + X^{12} + X^{5}$	+ 1))				
X/Y Converte							Y	es					
	Input Only (Numbers)												
	CMOS I/O (Numbers)	85	121	85	121	85	121	85	121	85	121	85	121
I/O Ports	N-Channel Open Drain Port (Numbers)							2					
	High Current Drive Port	or.	404	er.	121	or.	101		404	e-	104	er.	121
External Inter	Pull-Up Resistor	85	121	85	121	85	121	85 1	121	85	121	85	121
	On-Chip Debug							es					
Debugging Function	On-Board Flash Program							es es					
	ROM Correction Function							-					
Other Functions	Others						-	-					
Operating Fre	quency/Supply Voltage							2 to 5.5V					
Operating Am	nbient Temperature (°C)	-40	to 85	-40	to 105	-40	to 85	-40	to 105	-40	to 85	-40	to 105
					_	_		_		_			
		8-A	Α-Α	8-A	A-A	B-A	A-A	B-A	^	V	^	"	*
			4	OK	\ \ \\ \ \ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \	OK!	\ \ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \	X	\$	×	3	K	3
Package		5	4	101	4	10,	14.	PLOP0100KB-A	PLOP0144KA-A	100	47	6	47
Package		1001	_		. 0	2	6	§	8	2	۱ ک	ا ک	8
Package		2P0100k	2P01	Ä	⊱	_ ~					7	7	
Package		PLQP0100F	LOP01	Lap	Lop	7.0	2	5	2	2	2	2	일
Package		PLOP0100KB-A	PLOP0144KA-A	PLQP0100KB-A	PLOP0144KA-A	PLOP0100KB-A	PLOP0144KA-A	P.C	P.C	PLQP0100KB-A	PLOP0144KA-A	PLQP0100KB-A	PLOP0144KA-A
Package		PLQP0100h	PLOP01	PLOPI	ЬГОР	PLO	PLC	PLC	PLC	PLO	PLOI	PLOI	PLO
Package						PLO	PLC	PLC	PLC	PLO	PLQI	PLQI	PLO
Package													
Package													
		M30880FWTGP PLQP01009	M30882FWTGP PLOP01	M30880FWUGP PLQP	M30882FWUGP PLOP	M30880FHTGP PLO	M30882FHTGP PLC	M30880FHUGP PLC	M30882FHUGP PLC	M30880FJTGP PLO	M30882FJTGP PLQI	M30880FJUGP PLQI	M30882FJUGP PLQ

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

• Specifications (M16C/60 Series)

Memory R D P	ROM (Bytes) RAM (Bytes) ROM Type*1	48K			M16C/62P (I				
Memory R			64K	64K + 4K	96K	128K	128K + 4K	384K	+ 4K
Memory R			4K		5K	10		31	
viemory D		ı	Л	F	N	1		F	
Р	Data Flash	-		Yes (4K)	-			Yes (4K)	
		_		Yes (ID Code Check Function,		_	Yes (I	D Code Check Fund	ction,
C	Program Security	-	-	ROM Code Protect Function)	-	-	ROM	Code Protect Fund	ction)
	CPU				M16C/6	60 Core			
F	Basic Instructions				9				
м	Minimum Instruction Execution Time (ns)				41,7 (@.				
	Multiplier				16×1				
	Multiply-Accumulate Instruction				16×16-				
	Barrel Shifter				-	-			
Г	DMAC (Channels)				- 2)			
	DTC/DMAC II								
	Address Space (Bytes)				_	_			
	External Bus Interface				_				
	Bus Structure				_				
	DRAM Controller					_			
	Clock Generation Circuit			A circuite (Main clock PLL S	ub clock, On-chip	oscillator)		
	PLL			4 Circuits (i		es	OSCIII atori		
	Subclock				Ye				
B	RTC				Y6				
	On-Chip Oscillator Oscillation Stop Detection				Ye	es			
	Frequency Divider				1/n (n = 1,				
	Power Save								
					Wait/	- -			
	Power-On Reset/POR								
	Low Voltage Detection/LVD								
	Resolution × Channels				10-bi				
	Sample and Hold				Ye	es			
	Multi-Channel Sample and Hold				-	-			
	Resolution × Channels				8-bi	t×2			
	8-bit				-	-			
	16-bit				11 (Timer A	A, Timer B)			
	Input Capture				-	-			
	Output Compare				-	_			
	PWM Output				5 (Tim				
	Real-Time Port								
	Event Counter				11 (Timer A				
	2-Phase Encoder Input				3 (Tim				
	3-Phase Inverter Control			1 (shared with Time			Dead Time Timer)	
Watchdog Time					1				
	Clock Sync./ Clock Async.				3 (U				
	Clock Sync. Only				2 (S	I/O)			
	Clock Async. Only				-	-			
l ² C-bus					3 (U				
IEBus					3 (U				
Smart Card/SIN					1 (U				
	mmunication Unit/Special Serial I/O				3 (U	ART)			
	Channels								
IV.	Message Box (Numbers)					-			
IrDA					-	-			
CRC Calculation	n Circuit				1 (CRC-CCITT ()				
X/Y Converter					-				
	Input Only (Numbers)				1				
	CMOS I/O (Numbers)				8				
	N-Channel Open Drain Port (Numbers)				2	2			
	High Current Drive Port					-			
	Pull-Up Resistor				8				
External Interru					1	1			
	On-Chip Debug			Yes		- 7		Yes	
U	On-Board Flash Program		-	Yes		-		Yes	
	ROM Correction Function	Y	es	_	Ye	es		_	
(Others				-	-			
	uency/Supply Voltage				24MHz/4				
Operating Ambi	pient Temperature (°C)				-40	to 85			
									_
				4				¥	4
Package				8				J.E	모
uonage				8				100	_ 8
				ž				.0 ₋	70
				PLOP0100KB-A				PRQP0100JB-A	PLQP0100KB-A
				4				2	7
			_		<u>0</u>	<u>e</u>			
		d.	6			9			
		KXGP (X	XGF		ΘXX	9XX			
Part No.		-XXXGP	-XXXGF	<u>.</u>	9XXX-	9xxx-	ن	ę.	ę,
Part No.		16T-XXXGP	I8T-XXXGF	3TGP	IAT-XXXG	ICT-XXXG	CTGP	Đ.	4TGP
Part No.		CM6T-XXXGP	CM8T-XXXGF	CF8TGP	CIMAT-XXXG	AMCT-XXXG	AFCTGP	JEНТЕР	JFHTGP
Part No.		M3062CM6T-XXXGP	M3062CM8T-XXXGP	M3062CF8TGP	M3062CMAT-XXXGP	M3062AMCT-XXXGP	M3062AFCTGP	М3062JFHTFР	M3062JFHTGP

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Automotive MCUs

• Specifications (M16C/60 Series)

Group											M16C	/62A	M160	C/62T)										
	ROM (Bytes)	32K	6	4K									128K										25	6K	
	RAM (Bytes)	3K	4	IK .						5	K								10K				20	K	
Memory	ROM Type*1	<u> </u>		- N	1							(F				
	Data Flash Program Security							_					-				Voc./	D Code	Chool	k Funct	ion PO	M Cod	o Droto	ot Euro	otion
	CPU										IV	16C/6	60 Co	re			162 (D Coue	Cileci	K FUIICE	ioli, no	ivi Cou	e riole	ct ruii	HOII
	Basic Instructions											9													
CPU	Minimum Instruction Execution Time (ns)										62	.5 (@	16MH	lz)											
CFU	Multiplier											16×1													
	Multiply-Accumulate Instruction										16	×16+	-32 →	32											
	Barrel Shifter DMAC (Channels)	_											-												
DMA	DTC/DMAC [-											-												
	Address Space (Bytes)											_													
External Bus	External Bus Interface											_	-												
Expansion	Bus Structure											_	-												
	DRAM Controller																								
	Clock Generation Circuit PLL	_								2 circ	uits (l	Vlain o	lock,	Sub	clock)										
	Subclock	-										Ye	-												
	RTC												-												
Clock	On-Chip Oscillator											_	-												
	Oscillation Stop Detection											_	-												
	Frequency Divider										1/n (n = 1,		3, 16)											
	Power Save	<u> </u>										Wait/	Stop												
Power Supply Voltage Detection	Power-On Reset/POR Low Voltage Detection/LVD	-											-												
. Jinago DolGolloll	Resolution × Channels											10-bi	×26												
A/D Converter	Sample and Hold											Ye													
	Multi-Channel Sample and Hold												-												
D/A Converter	Resolution×Channels											8-bi	:×2												
	8-bit	<u> </u>									44		-	F1											
	16-bit Input Capture	_									11 (1	imer /	A, IIm	ier B)											
	Output Compare												-												
	PWM Output	3 (Timer A)	5 (Timer A)	3 (Timer	A) 5 (Ti	mer A)	3 (Timer	A)	5 (Timer A)	3 (Tin	ner A)	5 (Timer A)	3 (Timer A)	5 (Timer	A)	3 (Tim	ner A)			5 (Tin	ner A)		
	Real-Time Port												-				- '								
	Event Counter											imer /													
Timer	2-Phase Encoder Input	2 (Timer A)	3 (Timer A)	2 (Timer	A) 3 (Ti	mer A)	2 (Timer	A)	3 (Timer A)	2 (Tin	ner A)		2 (Timer A)	3 (Пmer	A)	2 (Tim	ner A)			3 (Tin	ner A)		
	3-Phase Inverter Control	_	1 (shared with Timer A4, Timer A1, Timer A2, Timer B2, Dead Time Timer)	_	with A4, A1, A2, B2,	hared Timer Timer Timer Timer Dead Timer)		-		1 (shared with Timer A4, Timer A1, Timer A2, Timer B2, Dead Time Timer	-	-	1 (shared with Timer A4, Timer A1, Timer A2, Timer B2, Dead Time Timer	_	Timer /	nared w A4, Tim A2, Tim Time Ti	er A1, er B2,	-	-	1 Tim	er A1,	, Time	ith Tin er A2, ne Tin	Time	4, : B2,
Watchdog Tir	ner	_					1			,					<u> </u>										
	Clock Sync./ Clock Async.	2 (UART)	3 (UART)	2 (UAR	T) 3 (L	JART)	2	(UAR	T)	3 (UART)	2 (U	ART)	3 (UART)	2 (UART)	3	(UAR1)	2 (U	ART)			3 (U.	ART)		
Serial Interface	Clock Sync, Only											2 (S													
I²C-bus	Clock Async, Only	1 (UART)	_	1 (UAR	r)		1	(UAR	T)		1 (U	ART)		1 (UART)		_		1 (UA	ART)				_		
IEBus		\vdash										1 (U/													
Smart Card/S	SIM											1 (U/													
	Communication Unit/Special Serial I/O												- 1												
CAN	Channels											-													
	Message Box (Numbers)												•												
IrDA CRC Calculati	on Circuit									1 /01	RC-CC	ITT /	- /16 , V	12 , 🗸	1111										
X/Y Converte		\vdash								1 (01	.0-00		-		T 1))										
.,	Input Only (Numbers)											1													
	CMOS I/O (Numbers)	68	85	68		85		68		85	6	8	85	68		85		6	8			8	5		
I/O Ports	N-Channel Open Drain Port (Numbers)											2	!												
	High Current Drive Port	60	OE	60	_	05		60		ог	_	-	OF	60		0E	_	-	0				5		—
External Inter	Pull-Up Resistor	68 8	85 11	68 8		85 11		68 8		85 11	6		85 11	68 8		85 11		6					5 1		
	On-Chip Debug	۲				• •	1	_								··			•	-	Yes		•		
Debugging Function	On-Board Flash Program							_													Yes				
Other Functions	ROM Correction Function						-	Yes	-		-										_	-	-		
	Others /Complex Voltage	<u> </u>		108411 /:	04						4.05	-		11		-				108411	-/4.0				
	equency/Supply Voltage	-40	40	16MHz/4.		T						1Hz/4			-40			-		16MH				-40	-40
Operating An	nbient Temperature (°C)		to 125 - 40	to 85 -4	0 to 125	-40	to 85		10 to 1	125	- 40 to 85	to 125	-40	to 85	to 125	-4	0 to	35	- 40 1	to 105	-40 t	o 85	- 40 to 105	to 85	to 105
Package		PROP0080JA-A	PRQP0100JB-A	PROP0080JA-A		PRQP0100JB-A		PRQP0080JA-A		PRQP0100JB-A	A AL COOLD	A-Access 12017	PRQP0100JB-A	PRQP0080JA-A		PRQP0100JB-A		PROPOGE IA.A	U-V00000 IDII I	4 00 000	PRGP01003B-A	PLQP0100KB-A	PRQP0100JB-A	PLQP0100KB-A	PRQP0100JB-A
Part No.		M30623M4T-XXXGP	M30622M8V-XXXFP M30622M8T-XXXFP	M30623M8T-XXXGP	M30622MCV-XXXFP	M30622MCT-XXXFP	M30623MCT-XXXGP	M30623MCV-XXXGP	M30623ECVGP	M30622ECVFP	M30623ECT-XXXGP	M30623ECV-XXXGP	M30622ECTFP	M30623ECTGP	M30622ECV-XXXFP	M30622ECT-XXXFP	M30620FCT-XXXFP	M30621FCTGP	M30621FCUGP	M30620FCUFP	M30620FCTFP	M30624FGT-XXXGP	M30624FGUFP	M30624FGTGP	M30624FGU-XXXFP

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

• Specifications (M16C/60 Series)

Group									M160	6N4											M160	C/6N5			
	ROM (Bytes)		12	8K			128K	+ 4K			25	6K			256K	+ 4K			12	3K			128K	+ 4K	
	RAM (Bytes)				5	K							10	K							5	K			
Memory	ROM Type*1			VI			F				N				F				N				F		
,	Data Flash		-	_			Yes				-	-			Yes				_	•			Yes		
	Program Security		-	_			Code Cl				-	-			Code Cl ode Pro				_				Code C		
	CPU					NOIVI C	oue rio	ilect ru	iliction)			n.		60 Cor		tect rui	iction)					NOIVI C	Jude Fro	ilect ru	noue
	Basic Instructions											- 10	9		ь										_
	Minimum Instruction Execution Time (ns)													0MHz)										_
CPU	Multiplier												16×1												_
	Multiply-Accumulate Instruction													-32 →3	32										_
	Barrel Shifter												-	-											_
	DMAC (Channels)	i											- 2	2											_
OMA	DTC/DMAC II												-	-											
	Address Space (Bytes)												11												
xternal Bus	External Bus Interface										tion of														
xpansion	Bus Structure	Select	table f	rom S	eparate	bus, l	Vlultipl	ex bus	s, Data	Bus W	Vidth ca	an be s	electe	d (8/16	6-bit), 1	he nu	mber o	f outp	ut add	ress b	uses c	an be	selecte	d (12/	16/
	DRAM Controller													-											
	Clock Generation Circuit								4 cii	cuits	(Main	clock,			ck, On	-chip	oscilla	or)							_
	PLL	_												es											_
	Subclock RTC	_											Ye												_
Clock	On-Chip Oscillator	\vdash											Y												_
	Oscillation Stop Detection	 											Y												_
	Frequency Divider	\vdash										1/n		2, 4, 8	. 16)										_
	Power Save											./11	Wait,		,,										_
ower Supply	Power-On Reset/POR													-											_
Power Supply Voltage Detection	Low Voltage Detection/LVD												-	-											_
	Resolution × Channels												10-bi	t×26											
A/D Converter	Sample and Hold	Yes — 8-bit × 2 — 11 (Timer A, Timer B)																							
	Multi-Channel Sample and Hold																								
D/A Converter	Resolution×Channels																								
	8-bit																								
	16-bit																								
	Input Capture												-	_											
	Output Compare PWM Output	-											- /												
Timer	Real-Time Port	_											5 (Tin	ner A)											_
	Event Counter	_										11 /T	imor	٠ ۱, Tim	ον D\										_
	2-Phase Encoder Input												3 (Tin		51 D/										_
	3-Phase Inverter Control							1 (sha	red wi	th Tim	ner A4,				2. Tim	er B2	Dead	Time '	Timer)						_
Watchdog Tin								. (0114			,		, .			O. D.,	2000								_
	Clock Sync./ Clock Async.												3 (U.												_
Serial Interface	Clock Sync. Only	i											1 (S												
	Clock Async. Only	i											-	-											
I ² C-bus													3 (U,												
IEBus													3 (U												
Smart Card/S													1 (U.												
Synchronous Serial C	ommunication Unit/Special Serial I/O												3 (U.	ART)											
CAN	Channels									2							\rightarrow					1			_
	Message Box (Numbers)	_							16-	⊦ 16											1	16			_
IrDA	Oii4	_									1.10	DC C	NTT ()	- /16 · V1	2 . 🕶 .	411									_
CRC Calculation		-									1 (0	RC-C	JIII (2	(" + X	² + X ⁵ +	- 1))									_
X/Y Converter	Input Only (Numbers)	_																							
-	CMOS I/O (Numbers)																								
I/O Ports	N-Channel Open Drain Port (Numbers)	-											- 2												
., 5 . 0.13	High Current Drive Port	l												-											
	Pull-Up Resistor	İ											8	5											_
External Inter		İ											1												_
	On-Chip Debug		-	_			Υe	es			-				Υe	es	T		_	-			Ye	es	
Debugging Function	On-Board Flash Program						Υe				-				Yε	s			_				Ye		
Other Functions	ROM Correction Function		Υ	es							Ye	es				-			Yε	s					
	Others												-												
	quency/Supply Voltage													2 to 5											
Operating Am	bient Temperature (°C)	-40	to 85	- 40	to 125	-40 to 85	-40 t	o 125	_	40 to	85	-40 t	o 125	-40	to 85	-40 t	o 125	-40 to 85	- 40 t	o 125	-40 to 85	-40 t	to 125	-40	to
		_	_		_		_		_		l .	.	_	_	_	_		_			_			_	
		I ∰	ĕ.	↑	, A	∆	🕺	A.	₩.	₩.			Ä	Ä	¥	₩		Ä			Ä.				1 3
Package		😸	2	😤	2	😸	5	X	3	꽁	=	3	X	2	꽁	3		옹			2		}	5	
, i		6	110	5	10	6	6	10	5	9	5	2	5	10	5	5		5			10		{	2	
		M	PO	&	P	<u>8</u>	ĕ	<u>8</u>) Š	<u>8</u>	8	ξ	2	PO	<u>8</u>	٦ <u>6</u>		2			ĕ		8	2	
		PLOP0100KB-A	PROP0100JB-A	PLQP0100KB-A	PROP0100JB-A	PLOP0100KB-A	PROP0100JB-A	PLQP0100KB-A	PROP0100JB-A	PLOP0100KB-A	A all cottod Cdd	£	PLQP0100KB-A	PROP0100JB-A	PLOP0100KB-A	PROP0100JB-A		PLQP0100KB-A			PROP0100JB-A		A GYOOLOGO IS	3	
		_	4	_	_	_	Δ.	Δ.	_	_	-	-	_	Δ.	Δ.	Δ.		Δ.			_			-	_'
		9.	ę.	6	ę.					65	۾ ا	<u>-</u>	9					9.	6	e-	۾ ا				
		M306N4MCT-XXXGP	M306N4MCT-XXXFP	M306N4MCV-XXXGP	M306N4MCV-XXXFP					M306N4MGT-XXXGP	M306N4MGT-XXXFP	M306N4MGV-XXXFP	M306N4MGV-XXXGP					M306N5MCT-XXXGP	M306N5MCV-XXXGP	M306N5MCV-XXXFP	M306N5MCT-XXXFP				
Part No.		Ş.	Ŝ	3	3	9	Œ	G	£.	2	<u>2</u>	×	××	Œ	9	Ē.	9	5	Ž.	X	2	Œ	6	9	
art IVO.		10/	I)	5	5	M306N4FCTGP	M306N4FCVFP	M306N4FCVGP	M306N4FCTFP	JD/	19/	JG	/G	M306N4FGTFP	M306N4FGTGP	M306N4FGVFP	M306N4FGVGP	LQ/	5	5	101	M306N5FCVFP	M306N5FCVGP	M306N5FCTGP	GTTOTTINOOCRA
		14N	NAN	14	147	14	4	14	44	NA.	NAN	14	N4N	14F	44	4	4	NSN	NSI	NSI	NSI	NSF	NSF	NSF	į,
		1900	1900	190	1900	1908	1908	1908	1900	1908	1900	1908	1908	1908	1908	1908	1902	1908	1908	1908	1900	1900	1900	1908	3
		M3	M3	<u>S</u>	<u>S</u>	M3	Z3	M	Z3	M3	M3	M3	N S	M3	Σ	Σ	Σ	Σ	Σ	Σ	<u>Z</u>	Z 3	M3	M3	5
																									_

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Automotive MCUs

• Specifications (M16C/60 Series)

Multiplate 16 × 16 + 32 - 32	Group			M160	C/6NK			M160	C/6NM	
RAMI (Bytes)		ROM (Bytes)	384K	+ 4K	512K	(+ 4K	384	(+ 4K	512	C + 4K
Memory February							iK		'	
Data Fisch	Memory									
Program Security						Yes	(4K)			
Post Post					Yes (ID Cod			ct Function)		
Basic Instructions Section Sec										
Harris Instance for any in the part										
Multiplate										
Butlay	CPU									
Barrel Shifter										
DMAC Channels 2						16×16-	+32→32			
DITA										
DTCDMAC1 Company Com	DMA					:	2			
External Bus External Bus Interface	DIVIA	DTC/DMAC II				-	-			
Expansion Bus Structure		Address Space (Bytes)				-	-			
Expansion Pauk Controller	External Bus	External Bus Interface				-	-			
DRAM Controller	Expansion	Bus Structure				-	_			
Clock Ceneration Circuit						-	_			
PLL Subdock Yes Yes Subdock Yes Subdock Yes Yes Subdock					4 circuits	(Main clock PLL 9	Sub clock On-chin	oscillator)		
Subclock Yes					1 011 04110			ooomator,		
RTC										
On-Chip Oscillator On-Chip						Υ.	_			
Oct-Cup Oscillation Stop Detection Yes	Clock					.,	- 			
Frequency Divider 1/n (n = 1, 2, 4, 8, 16)										
Power Supply Power-On Reset/POR										
Power-OR Reset/POR										
Voltage Defection Low Voltage Detection Low Voltage Detection Low Voltage Detection Low Voltage						Wait	/Stop			
Voltage Defection Low Voltage Detection Low Voltage Detection Low Voltage Detection Low Voltage	Power Supply									
Resolution x Channels	Voltage Detection					-	-			
All Converter Sample and Hold New Yes						10-bi	t×26			
Multi-Channels Sample and fold	A/D Converter									
Discrimination Disc	7.,2 00					-	_			
S-bit	D/A Convertor					9 hi	+∨2			
16-bit	D/A Converter					0-01				
Injust Capture						44 (T	4 T D)			
Timer Filtrer Filter Filter Filter Filter Filter Filter Filtrer Filter Filter Filter Filter Filter Filter Filtrer Filter										
PWM Output						-	_			
Real-Time Port						-	-			
Event Counter 3 (Timer A, Timer B) 3 (Timer A) 3 (Timer					5 (Tin	ner A)			
2-Phase Encoder Input 3 (Timer A) 3 - Phase Inverter Control 1 (shared with Timer A4, Timer A2, Timer B2, Dead Time Timer 1						-	_			
3-Phase Inverter Control 1 (shared with Timer A4, Timer A2, Timer B2, Dead Timer Timer 1		Event Counter				11 (Timer a	A, Timer B)			
Serial Interface Clock Sync. / Clock Async. Clock Async. Only Clock Async. Onl		2-Phase Encoder Input				3 (Tin	ner A)			
Clock Sync. Clock Async. Only 2 (SI/O) 4 (SI/O)		3-Phase Inverter Control			1 (shared with Tim	ner A4, Timer A1, T	imer A2, Timer B2	, Dead Time Timer	')	
Clock Sync. Clock Async. Only 2 (SI/O) 4 (SI/O)	Watchdog Tin	ner					1			
Clock Sync, Only Clock Sync, Only Clock Sync, Only Clock Sync, Only Clock Sync, Only Clock Sync, Only Clock Sync, Only Clock Sync, Only Clock Sync, Only Clock Sync, Only Synchronous Serial Communication Unit/Special Serial (I/O Synchronous Serial Communication Unit/Special Serial (I/O Synchronous Serial Communication Unit/Special Serial I/O Synchronous Serial I/O Synchronous Serial I/O Synchronous Serial I/O Synchronous Synchronous Synchronous Synchronous Synchronous Synchronous S						3 (U	ART)			
Clock Async. Only	Serial Interface			2 (9	I/O)			4 (5	SI/O)	
Signart Card/SIM Signart Card/SIM Signart Card/SIM Signart Card/SIM Signart Card/SIM Signart Card/SIM Signart Card/SIM Signart Card/SIM Signart Card/SIM Signart Card/SIM Signart Card/SIM Signart Card/SIM Signart Card/SIM Signart Card/SIM Signart Card/SIM Signart Card/SIM Signart Card/Sim Signart Card/Sim Signart Car						-	_		, ,	
IEBus 3 (UART) 5 5 1 (UART) 5 5 5 5 5 5 5 5 5	I²Chus	olock / loyner only				3 (11	ΔRT)			
Smart Card/SIM										
Synchronous Serial Communication Unit/Special Serial I/O Channels 2		INA								
CAN Channels										
Total	Synchronous Serial C									
Nessage Box (Numbers) 16+16	CAN									
CRC Calculation Circuit		Message Box (Numbers)				16-	+16			
Input Only (Numbers)	IrDA					-	<u>- </u>			
Input Only (Numbers)						1 (CRC-CCITT ($X^{16} + X^{12} + X^5 + 1)$			
Input Only (Numbers)	X/Y Converte	r								
I/O Ports							1			
				۶	35			1	11	
High Current Drive Port Pull-Up Resistor 85 111	I/O Ports			`		:	2			
Pull-Up Resistor 85	.,									
Comparing Frequency/Supply Voltage Plack					25			1	11	
On-Chip Debug Yes On-Board Flash Program Yes On-Board Flash Program Yes Other Functions Other Functions Other S Other S Operating Frequency/Supply Voltage On-Board Flash Program Other S Operating Ambient Temperature (*C) -40 to 125 -40 to 85 -40 to 125 -40 to 125 -40 to 125 Operating Ambient Temperature (*C) Operating Ambient Temperature	Evtornallat									
On-Board Flash Program On-Board Flash Prog	External inter			1	11		L		14	
Comparing Frequency/Supply Voltage Comparing Frequency/Supply Voltage Comparing Frequency/Supply Voltage Comparing Frequency/Supply Voltage Comparing Ambient Temperature (°C) -40 to 125	Debugging Function									
Others	00 0									
Others Community Communi	Other Functions									
Operating Ambient Temperature (°C) -40 to 125 -40 to 85 -40 to 125 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>										
Package PLQP0100KB-A PLQP0128KB-A										
Package PLQP0100KB-A PLQP0128KB-A	Operating An	nbient Temperature (°C)	- 40 to 125			- 40 to 125	-40 to 85	- 40 to 125	-40 to 85	-40 to 125
	Package							PLQP0	128KB-A	
M306NIKFHVGP M306NIKFJVGP M306NIMFJTGP M306NIMFJTGP M306NIMFJTGP										
M306NKFHVGP M306NKFJTGP M306NMFHTGP M306NMFHTGP										
M306NKFJTGP M306NMFJTGP M306NMFJTGP M306NMFJTGP							_	0		
Part No. M306NIKFJTC M306NIKFJTC M306NIMFT M306NIMFJTC M306NIMFJTC M306NIMFT			9	6	<u>6</u>	<u>G</u>	9	5	9	9
M306NKF1 M306NKF1 M306NWF1 M306NWF1	Part No		ž	Ĕ	Ţ	Š	Ė	≥	Ĕ	Š
M306NIK M306NIK M306NIV	i art ivo,		É	臣	골	<u> </u>	Ē	Ē	Ę	E
M306f M306f M306f M306f M306f M306f M306f			¥	ž	¥	¥	2	2	2	2
M3 M3 M3 M3 M3 M3 M3 M3 M3 M3 M3 M3 M3 M			190	190	190	190	190	190	190	190
2 2 2 2 2 2 2			13(13	33	13,	33	130	13(13(
			2	2	2	2	2	2	2	2

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

★: New product ★★: Under development

• Specifications (M16C/Tiny Series)

• opecini	cations (witou/ i	IIIy oc	1163/														
Group		M'	16C/26A	(M16C/26	6 T)						M16	C/28					
	ROM (Bytes)	24K+4K	48K + 4K	64K	+ 4K		64	4K			96	SK .			96K	+ 4K	
	RAM (Bytes)	1K		2K			4	K					8	K			
Memory	ROM Type*1			F						/I						F	
o.ii	Data Flash/E2 Data Flash			a Flash)	_				-	-						a Flash)	
	Program Security			heck Fun					-	-					D Code C Code Pro		
	CPU	110111	oode i ii	recer an	Ction,	l			M16C/	60 Core				HOW	Oode i i	otect i aii	otion,
	Basic Instructions									1							
CPU	Minimum Instruction Execution Time (ns)	50	(@20MH	lz)	62,5 (@16MHz)	50 (@2	20MHz)	62.5 (@	16MHz)	50 (@2	(OMHz)	62.5 (@	16MHz)	50 (@2	20MHz)	62.5 (@	16MHz)
CFU	Multiplier									6→32							
	Multiply-Accumulate Instruction								16×16-	+32→32							
	Barrel Shifter DMAC (Channels)									- 2							
DMA	DTC/DMAC II									<u>-</u>							
	Address Space (Bytes)								-	_							
External Bus	External Bus Interface								-	_							
Expansion	Bus Structure								-	-							
	DRAM Controller							/B.0 - 1 1 -	-I. DII C		0	!	.1				
	Clock Generation Circuit PLL					4	circuits	(IVIain clo		es clock,	On-cnip	oscillatoi	1)				
	Subclock									es							
Ol I-	RTC								-								
Clock	On-Chip Oscillator								Y	es							
	Oscillation Stop Detection									es							
	Frequency Divider							1		2, 4, 8, 16	5)						
Danies Comple	Power Save Power-On Reset/POR								vvait	/Stop							
Power Supply Voltage Detection	Low Voltage Detection/LVD								-	_							
	Resolution × Channels		10-bi	t×12		10-bit×27	10-bit × 16	10-bit × 27	10-bit × 16	10-bit×27	10-bit×16	10-bit × 27	10-bit × 16	10-bit×27	10-bit×16	10-bit×27	10-bit × 16
A/D Converter	Sample and Hold								Y	es							
	Multi-Channel Sample and Hold									es							
D/A Converter	Resolution × Channels 8-bit																
	16-bit							\$, Timer B	3						
	Input Capture			_				`	/ (IIIII /	i, iiiiici b	8 (Tin	ner S)					
	Output Compare			_							8 (Tin	ner S)					
Timer	PWM Output		5 (Tir	ner A)						1	3 (Timer A	۹, Timer ۹	S)				
	Real-Time Port																
	Event Counter 2-Phase Encoder Input		3 (Tir	20r A)					(Timer A	, Timer B	i) Timer A) -	1 /Times	· C1				
	3-Phase Inverter Control		3 (111	ier A)		l 1 (shared	with Tim	ner A4. Tii	ner A1. T)			
Watchdog Tin						1 (Silaica	***************************************	101 744, 111	1101 741, 1	1	Timer DE,	, Dead III	ne mner,				
	Clock Sync./ Clock Async.								3 (U.								
Serial Interface	Clock Sync. Only			_		2 (SI/O)	1 (SI/O)	2 (SI/O)	1 (SI/O)	2 (SI/O)	1 (SI/O)	2 (SI/O)	1 (SI/O)	2 (SI/O)	1 (SI/O)	2 (SI/O)	1 (SI/O)
I ² C h	Clock Async. Only		1 // 1	A DT\					-	- 2 /8/		I2C 11/	\DT\				
I ² C-bus IEBus			1 (U	ARI)		l			1 (U.		lulti mast	er I C, U	ARI)				
Smart Card/S	IM								1 (U.								
	Communication Unit/Special Serial I/O								1 (U.								
CAN	Channels								-	-							
	Message Box (Numbers)																
IrDA CRC Calculation	an Civacit					1	(CRC-CC	NTT /V16 .	V12 V5	1)/CBC	16 (V16 : V	715 . V2 . 1	11				
X/Y Converte							(CNC-CC	/III (A T		- -	10 (X T X	<u> </u>	"				
7,, 1 00,,10,,10	Input Only (Numbers)								-	-							
	CMOS I/O (Numbers)		3	9		71	55	71	55	71	55	71	55	71	55	71	55
I/O Ports	N-Channel Open Drain Port (Numbers)								-	-							
	High Current Drive Port			0		71	ee.	71	-	71	ee .	71	ee.	71	E E	71	ee.
External Inter	Pull-Up Resistor	-		9		71	55	71	55 1	71 1	55	71	55	71	55	71	55
	On-Chip Debug		Υ	es					-	_					Y	es	
Debugging Function	On-Board Flash Program			es												es	
Other Functions	ROM Correction Function			_				Ye	s (Addres	s match >	< 2)				-	-	
1 4.1.0110113	Others				acent :			1	-	_	-					1	
Operating Fre	quency/Supply Voltage	20MI	1z/3.0 to	5.5V	16MHz/ 4.2 to 5.5V	20MHz/3	.0 to 5.5V	16MHz/4	2 to 5.5V	20MHz/3	0 to 5.5V	16MHz/4	2 to 5.5V	20MHz/3	.0 to 5.5V	16MHz/4	2 to 5.5V
Operating Am	nbient Temperature (°C)	<u> </u>	-40 to 8	5	-40 to 125	- 40	to 85	-401	o 125	- 40	to 85	-401	to 125	- 40	to 85	- 40	to 125
			:	<u> </u>		₹	₹	₹	4-₩	4.	4	₹	4.	Ă.	Ă.	Ĭ.	Ă.
Package						🖁	#		*	l ä	🖁	🖁	¥	N N	\\ \\ \\		#
				2		80	90	80	900	80	90	80	90	80	90	80	90
			j	<u> </u>		8	<u>8</u>	<u> </u>	P0	<u> </u>	<u>&</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u>8</u>	<u> </u>
			ì	rLCr0048Nb-A		PLQP0080KB-A	PLQP0064KB-A	PLQP0080KB-A	PLQP0064KB-A	PLQP0080KB-A	PLQP0064KB-A	PLQP0080KB-A	PLQP0064KB-A	PLQP0080KB-A	PLQP0064KB-A	PLQP0080KB-A	PLQP0064KB-A
			'				_	_	_	_		_	_	_	_	_	_
						울	울	분	문	문	문	₹	₹				
				0	۵	M30280M8T-XXXHP	M30281M8T-XXXHP	M30280M8V-XXXHP	M30281M8V-XXXHP	M30280MAT-XXXHP	M30281MAT-XXXHP	M30280MAV-XXXHP	M30281MAV-XXXHP	c		<u>_</u>	۵
Part No.		M30260F3TGP	M30260F6TGP	M30260F8TGP	M30260F8VGP	£	£	%-)	8/-)	AT.)	AT-)	\ -\	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	M30280FATHP	M30281FATHP	M30280FAVHP	M30281FAVHP
		30F3	30F6	90F8	30F8	MOX	Ž.	NO.	71 M	NOW,	1M.	NO.	71 M	30FA	31FA	30FA	11FA
		3026	3026	3026	3026	3028	3028	3028	3028	3028	3028	3028	3028	3028	3028	3028	3028
		MS	MS	Z Z	M S	MS.	N N	N N	M3	E S	ES S	MS.	E S	MS	Z Z	N N	E S
*1 E : Elech mome	ory version, L : ROM-less vers	nion M · M	ant DOM	orgion O	. On a simo	DDOM you	oion Oz i C	D-POM vor	-1				A . Nlass				elopment

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Automotive MCUs

• Specifications (M16C/Tiny Series)

	Jacions (141100/1	,,,,		,																	
Group											M16	C/29									
	ROM (Bytes)		64				96	6K			96K	+ 4K			12	8K			128K	+4K	
	RAM (Bytes)	—	4	K	_	4			8	K		_			-		1:	2K			
Memory	ROM Type*1	\vdash			ľ	VI						F Floob	١			/1			4K /Det		
	Data Flash/E2 Data Flash	\vdash			-	_						a Flash heck Fu				_			4K (Dat Code C		
	Program Security				-	-				ROM C	Code Pro	neck Fu	nction)		-	_			Code Pro		
	CPU											60 Core									
	Basic Instructions										9	1									
CPU	Minimum Instruction Execution Time (ns)	50 (@2	.0MHz)	62.5 (@	16MHz)	50 (@2	0MHz)	62.5 (@	16MHz)	50 (@2			16MHz)	50 (@2	0MHz)	62,5 (@	16MHz)	50 (@2	20MHz)	62.5 (@	16MHz)
•	Multiplier											6→32									
	Multiply-Accumulate Instruction	_										+32→32 -	2								
	Barrel Shifter DMAC (Channels)											- 2									
DMA	DTC/DMAC II											_									
	Address Space (Bytes)										-	_									
External Bus	External Bus Interface										-	_									
Expansion	Bus Structure										-	-									
	DRAM Controller																				
	Clock Generation Circuit PLL	_						4 circu	ıits (Ma	ın clock			ck, On-c	hip osc	illator)						
	Subclock	\vdash										es es									
	RTC											-									
Clock	On-Chip Oscillator										Y	es									
	Oscillation Stop Detection										Υ	es									
	Frequency Divider									1/r		2, 4, 8,	16)								
	Power Save										Wait	/Stop									
Power Supply Voltage Detection	Power-On Reset/POR Low Voltage Detection/LVD	-									-										
voltage Detection	Resolution × Channels	10-bit × 27	10-hit v 16	10-hit v 27	10-hit v 16	10-bit × 27	10-hit ∨ 16	10-hit v 27	10-hit v 16	10-hi+ ∨ 27	10 hit v 16	10-hit v 27	10-hit v 16	10-hit v 27	10-hit v 16	10-hi+ ∨ 27	10-hit ∨ 16	10-hit v 27	10-hit v 16	10-hit ∨ 27	10-hit v 16
A/D Converter	Sample and Hold	IV DILAZI	.v ып∧ 10	10 DIL A 2/	10 DIL V 10	I TO DILAZI	iv ant ∧ 10	I IV DILAZI	I IN DIE V 10	10 MLAZ/		es	10 DIL V 10	IV DILAZI	10 NIL \ 10	IV DILAZ/	IV DIL A 10	10 DIL \ 2/	10 DIL \ 10	εν υπ.ΛΔ/	IN DILA 10
	Multi-Channel Sample and Hold											es									
D/A Converter	Resolution × Channels											-									
	8-bit	_									_		-								
	16-bit	⊢								8 (, Timer	· B)								
	Input Capture Output Compare	_										ner S) ner S)									
Timer	PWM Output									13		A, Time	r S)								
	Real-Time Port										-	_	. 0,								
	Event Counter									8 (Timer A	A, Timer	· B)								
	2-Phase Encoder Input											+ 1 (Tim									
	3-Phase Inverter Control						1 (share	ed with	Timer A	44, Tim			2, Timer	B2, De	ad Time	Timer)					
Watchdog Tin		_										1 ART)									
Serial Interface	Clock Sync./ Clock Async. Clock Sync. Only	2 (SI/O)	1 (\$1/0)	2 (\$1/0)	1 (\$1/0)	2 (\$1/0)	1 (\$1/0)	2 (\$1/0)	1 (\$1/0)	2 (\$1/0)			1 (\$1/0)	2 (\$1/0)	1 (\$1/0)	2 (\$1/0)	1 (\$1/0)	2 (\$1/0)	1 (\$1/0)	2 (\$1/0)	1 (\$1/0)
- Silai interiace	Clock Async. Only	- (5//5/	. (01/0/	_ (31/3)	1 (31/3/	_ (01/0/	. (51/0)	_ (31/3)	1 (01/0)	_ (01/0)	- (31/3/	_ (31/3/	1 (31/0)	_ (01/0)	. (01/0)	_ (01/0/	, , , , , , , , , , , ,	_ (31/3)	1 (01/0)	_ (01/0)	, ,01/0/
I ² C-bus										2 (Mu		ter I ² C, l	UART)								
IEBus												ART)									
Smart Card/S		⊢									1 (U										
	ommunication Unit/Special Serial I/O Channels	\vdash										ART) 1									
CAN	Message Box (Numbers)											6									
IrDA											-	_									
CRC Calculati								1 (CRC	-CCITT	(X16 + X	$X^{12} + X^{5} +$	1)/CRC	-16 (X ¹	⁶ + X ¹⁵ +	X ² + 1))						
X/Y Converte											-										
	Input Only (Numbers)	74	EF	74	EF	74	Er.	74	EF	74	-	74	E F	74	EF	74	EF	74	EF	74	EF
I/O Ports	CMOS I/O (Numbers) N-Channel Open Drain Port (Numbers)	71	55	71	55	71	55	71	55	71	55	71	55	71	55	71	55	71	55	71	55
1,01016	High Current Drive Port											_									
	Pull-Up Resistor	71	55	71	55	71	55	71	55	71	55	71	55	71	55	71	55	71	55	71	55
External Inter												1									
Debugging Function	On-Chip Debug				-							es								es	
	On-Board Flash Program				-	-						es		V .	-	-			Y	es	
Other Functions	ROM Correction Function Others	_		Yes	Addres	s match	1×2)				-			Yes (Addres	s match	1×2)				
Operating Fre	quency/Supply Voltage	20MHz/2	20MHz/3.0 to 5.5V 16MHz/4.2 to 5.5V 20MHz/3.0 to 5.5V 16MHz/4.2 to 5.5V 20MHz/3.0 to 5.0V 20MHz/3.0 to 5.0V 20MHz/3.0 to 5.0V 20MHz/3.0 to 5.0V 20MHz/3.0 to 5.0V 20MHz/3.0 to 5.0V 20MHz/3.0 to 5.0V 20MHz/3.0 to 5.0V 20MHz/3.0 to 5.0V 20MHz/3.0 to 5.0V 20MHz/3.0 to 5.0V 20MHz/3.0 to 5.0V 20MHz/3.0 to 5.0V 20MHz/							2 to 5.5V											
	bient Temperature (°C)	- 40 t			to 125		to 85		to 125		to 85		to 125		to 85		to 125		to 85		o 125
	,, 21																				
		4	, č	¥.	¥.	¥.	4-K	¥.	¥.	۲.	¥.	¥.	¥-8	۲.	۸ <u>-</u>	۲.	¥.	¥.	4-K	¥	۲.
Package		%	꽃) XE	¥)KE	‡)XE	‡ ¥) XE	¥)XE	‡) XE	‡KE	X	¥)XE	‡KE)KE	¥
		8	90	086	PLQP0064KB-A	180	7900	PLQP0080KB-A	900	180	900	086	PLQP0064KB-A	080	900	086	900	086	7900	PLQP0080KB-A	900
		육) F	%	%	2P0	2P0) F0	P0	2P0	%) F0	P0) F	2P0	%) F0) F0	2P0	P0	Å
		PLQP0080KB-A	PLQP0064KB-A	PLQP0080KB-A	LC	PLQP0080KB-A	PLOP0064KB-A	LC.	PLQP0064KB-A	PLQP0080KB-A	PLQP0064KB-A	PLQP0080KB-A	PLC	PLQP0080KB-A	PLOP0064KB-A	PLQP0080KB-A	PLQP0064KB-A	PLQP0080KB-A	PLQP0064KB-A	PLC	PLOP0064KB-A
				-	-					-	-	-	-		-	-	-	-		-	
		윺	全	웊	윺	윺	웊	웊	윺					웊	윺	ឣ	물				
		X	X	Š	Š	Š	X	Š	Š					Š	X	Š	Š	_		0	
Part No.		M30290M8T-XXXHP	M30291M8T-XXXHP	M30290M8V-XXXHP	M30291M8V-XXXHP	M30290MAT-XXXHP	M30291MAT-XXXHP	M30290MAV-XXXHP	M30291MAV-XXXHP	M30290FATHP	🖹	M30290FAVHP	M30291FAVHP	M30290MCT-XXXHP	M30291MCT-XXXHP	M30290MCV-XXXHP	M30291MCV-XXXHP	M30290FCTHP	M30291FCTHP	M30290FCVHP	M30291FCVHP
		OM(Ĭ	NO NO	Ĭ	OM,	Δĺ	OW,	Ž	0FA	M30291FATHP	0FA	1FA	OM	JM(OM	Σ	OFC	150	OFC.	150
		050	029	029	029	029	029	029	029	029	029	029	029	029	029	029	029	029	029	029	029
		3	X3	M3	M3	M3,	M3	M3	M3,	M3,	M3	M3	M3	M3	M3	M3,	M3	M3	M3	M3,	M3,

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

• Specifications (M16C/10 Series)

Group	Jacrono (IVIII o o, I	,		M16	C/1N		
Стопр	ROM (Bytes)	24	2K	64		CAV	+ 4K
	RAM (Bytes)		K	0.		K	T 4K
					3		-
Memory	ROM Type*1			Л			F
	Data Flash		-				(4K)
	Program Security		-			Yes (ID Code Check Function)	, ROM Code Protect Function)
	CPU			M16C/	60 Core		
	Basic Instructions			9	1		
	Minimum Instruction Execution Time (ns)				16MHz)		
CPU	Multiplier			16×1			
	Multiply-Accumulate Instruction			16×16-	+32→32		
	Barrel Shifter				-		
DMA	DMAC (Channels)			-			
DIVIA	DTC/DMAC II			-	-		
	Address Space (Bytes)			-	_		
External Bus	External Bus Interface			-	_		
Expansion	Bus Structure			-	_		
	DRAM Controller				_		
			3	circuits (Main clock, Sul	alask On shin assillate	\	
	Clock Generation Circuit		<u>ა</u>	circuits (iviain clock, Sui	Glock, On-enip oscillate	or)	
	PLL						
	Subclock			Υ-	es		
Clock	RTC			-	-		
CIOCK	On-Chip Oscillator			Y	es		
	Oscillation Stop Detection			Y	es		
	Frequency Divider			1/n (n = 1,			
	Power Save			Wait			
Danier Committee	Power-On Reset/POR			- -			
Power Supply Voltage Detection							
voltage Detection	Low Voltage Detection/LVD						
	Resolution × Channels						
A/D Converter	Sample and Hold						
	Multi-Channel Sample and Hold						
D/A Converter	Resolution × Channels						
	8-bit						
	16-bit			4 (Timer 1, Timer) 1 (Tin			
	Input Capture			1 (Tin			
				1 (1111	iler C)		
_	Output Compare						
Timer	PWM Output			2 (Timer \	/, Timer Z)		
	Real-Time Port			-	_		
	Event Counter			1 (Tin	ner X)		
	2-Phase Encoder Input			-	_		
	3-Phase Inverter Control			-	_		
Watchdog Tin	ner			-	_		
Waterland III	Clock Sync./ Clock Async.			2 (U.	ADT\		
Serial Interface	Clock Sync. Only				_		
Serial Interface					<u> </u>		
-2	Clock Async. Only						
I ² C-bus					_		
IEBus				-	-		
Smart Card/S				-	_		
Synchronous Serial C	ommunication Unit/Special Serial I/O			-	_		
	Channels				1		
CAN	Message Box (Numbers)				6		
IrDA	Douge Don (Italiibels)				_		
CRC Calculati	on Circuit			-			
					<u>-</u> -		
X/Y Converte							
	Input Only (Numbers)				_		
	CMOS I/O (Numbers)				7		
I/O Ports	N-Channel Open Drain Port (Numbers)			-			
	High Current Drive Port				3		
	Pull-Up Resistor				7		
External Inter					3		
	On-Chip Debug		-			v	es
Debugging Function							
	On-Board Flash Program		•				es
Other Functions	ROM Correction Function		Y	es		-	
	Others				-		
	quency/Supply Voltage				.2 to 5.5V		
Operating Am	bient Temperature (°C)	- 40 to 125	- 40 to 85	-40 to 125	- 40 to 85	-40 to 125	-40 to 85
Package		· ·	· ·	PLQP00	48KB-A		· · ·
		<u>e</u>	£ £	£.	£ .		
		×	Ž	×	Ž		
Part No.		Ϋ́	×	×	×	£	C.
raitivo,		M301N2M4V-XXXFP	M301N2M4T-XXXFP	M301N2M8V-XXXFP	M301N2M8T-XXXFP	M301N2F8VFP	M301N2F8TFP
		ZIV	ZN	ZN	ZZ	2F	2F
		Z Z	Z	2	2	Ž.	Z
		130	130	130	130	130	130
		Σ	Σ	Σ	Σ	Σ	Σ

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Automotive MCUs

• Specifications (R8C/Tiny Series)

Group					R8C	/20									R8C	/21				
	ROM (Bytes)	32K		48K	64	ιK	96			8K		+2K	48K -	+2K	64K	+ 2K		+2K	128K	+ 2K
	RAM (Bytes)	2K		2.5K	3	K	5	K	6	K	2	:K	2.5	K	3	K	5	iΚ	6l	<
Memory	ROM Type*1										F									
	Data Flash/E2 Data Flash														2K (Data	a Flash))			
	Program Security						Yes (ID	Code C	heck Fu			Code Pro	tect Fu	nction)	1					
	CPU										Core									
	Basic Instructions										9									
CPU	Minimum Instruction	50	62,5 50	62,5	50	62.5	50	62.5	50	62,5	50	62,5	50	62.5	50	62,5	50	62,5	50	62.5
0.0	Execution Time (ns)	(@20MHz) (@	16MHz) (@20MH	z) (@16MHz)	(@20MHz)	(@16MHz)	(@20MHz)	(@16MHz)	(@20MHz)		(@20MHz)	(@16MHz)								
	Multiplier										6 → 32									
	Multiply-Accumulate Instruction									16×16										
	Clock Generation Circuit							2 circ	uits (Ma	ain cloc	k, On-c	hip osci	lator)							
	PLL									-										
	Subclock									-	_									
Clock	RTC										_									
	On-Chip Oscillator					Ye	es (High	precisi	ion, Hig			Hz, Low	speed :	125kH	lz)					
	Oscillation Stop Detection										es									
	Frequency Divider								1/1	n (n = 1,		16)								
	Power Save										/Stop									
Power Supply Voltage Detection	Power-On Reset/POR	—							V "		es	: O)								
vortage Detection	Low Voltage Detection/LVD								Yes (Voltage		ion 2)								
A/D Converter	Resolution × Channels	—									t×12									
D/A 0	Sample and Hold									Y	es									
D/A Converter	Resolution × Channels							_	(T	DA T		T								
	8-bit							3	(IImer			Timer R	E)							
	16-bit								0 (-1-	2 (Tim										
	Input Capture							0.4		ared wi			3E\							
T	Output Compare											, Timer I								
Timer	PWM Output							/ (5	snared	with III	ner KB,	Timer F	ND)							
	Real-Time Port Event Counter								1 (ab	ared wi	th Time	DA\								
	2-Phase Encoder Input	_							1 (511	areu wi	<u> </u>	er na)								
	3-Phase Inverter Control								1 (ab	ared wi	th Time	» PD\								
Watchdog Tin							1 (varith	autom				e protec	tion fur	otion)						
wateridog iiii	Clock Sync./ Clock Async.						I (WILLI	autom	iatic Sta		ARTO)	e protet	,tion iui	ictioni						
Serial Interface	Clock Sync. Only									1 (0)	-									
Oction interface	Clock Async. Only									1 (11)	ART1)									
I ² C-bus	Glock Async, Only						1 (Sha	re with	Synch			Commu	nication	Unit)						
	Communication Unit/Special Serial I/O						. (0			(Share			out.o	011111						
	Channels								•	-	_	-								
CAN	Message Box (Numbers)									_	_									
	Input Only (Numbers)										3									
	CMOS I/O (Numbers)										1									
I/O Ports	N-Channel Open Drain Port (Numbers)									_	_									
	High Current Drive Port									-	_									
	Pull-Up Resistor									4	1									
External Inter											В									
	On-Chip Debug	İ									es									
Debugging Function	On-Board Flash Program									Y	es									
Other Functions	ROM Correction Function																			
Other Functions	Others																			
			MHz/3.0 20MHz/3 0 5.5V. to 5.5V		20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.	20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.	20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.	20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.	20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.	20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.	20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.	20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.
Operating Fre	quency/Supply Voltage		0 3.5V, 10 3.5V MHz/2.7 10MHz/:			10 5.5V, 10MHz/2.7	10 5.5V, 10MHz/2.7	10 5.5 V, 10MHz/2.7	10 5.5V,	10 5.5V,	10 5.5V, 10MHz/2.7	10 5.5V,		10 5.5V, 10MHz/2.7	10 5.5V,	10 5.5V, 10MHz/2.7	10 5.5V,	10 5.5V,	10 5.5V, 10MHz/2.7	10 5.5 V, 10MHz/2.7
			o 5.5V to 5.5V		to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V
Operating Am	bient Temperature (°C)	-40 to 85 -4	0 to 125 -40 to	35 - 40 to 125	- 40 to 85	-40 to 125	-40 to 85	-40 to 125	-40 to 85	-40 to 125	-40 to 85	-40 to 125	-40 to 85	-40 to 125	-40 to 85	-40 to 125	- 40 to 85	-40 to 125	-40 to 85	-40 to 125
Package										PLQP00										
<u> </u>																				
								0												•
Part No.		<u></u>	는 은	E E	윤	臣	臣	Ê	<u>E</u>	臣	_ ₽	E	윤	F	윤	E	Ħ	Ė		Ĥ
Tart 140		%)6k) X	8)8K	A.	A	2	Ď	<u> </u>	16K	17.	17K	<u>8</u>	18 X	Ψ	Į	걸	Ž
		12(120	120	12(12(12(12(12(12(12	12.	12.	12.	12.	12.	12.	121	12.	12.
		R5F21206JFP	R5F21206KFP	R5F21207KFP	R5F21208JFP	R5F21208KFP	R5F2120AJFP	R5F2120AKFP	R5F2120CJFP	R5F2120CKFP	R5F21216JFP	R5F21216KFP	R5F21217JFP	R5F21217KFP	R5F21218JFP	R5F21218KFP	R5F2121AJFP	R5F2121AKFP	R5F2121CJFP	R5F2121CKFP
		82	35 8	P.5	35	55	85	85	55	55	82	P5	5.	R5	85	R5	R5	35	5.	82

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

★: New product ★★: Under development

• Specifications (R8C/Tiny Series)

Group						R8C/22				R8C/23										
	ROM (Bytes)	321	K	48	K	64K		6K	128K 32K+2K 48K+2K 64K+2K 96K+2K 128K+2K 6K 2K 2.5K 3K 5K 6K											
	RAM (Bytes)	2K	(2.5	iκ	3K		5K	6	K	2	K	2.5	K	3	K	5	K	6	K
Vlemory	ROM Type*1						•		•		F									
•	Data Flash/E2 Data Flash					_									2K (Dat	a Flash)			
	Program Security						Yes (ID	Code C	heck Fu	ınction.	ROM C	ode Pro	tect Fu	nction))					
	CPU										Core			-						
	Basic Instructions										9									
	Minimum Instruction	50	62,5	50	62.5	50 6	.5 50	62,5	50	62,5	50	62,5	50	62.5	50	62,5	50	62,5	50	62,5
CPU	Execution Time (ns)		(@16MHz)	(@20MHz)	(@16MHz)		MHz) (@20MHz	(@16MHz)	(@20MHz)	(@16MHz)	(@20MHz)	(@16MHz)	(@20MHz)	(@16MHz)	(@20MHz)	(@16MHz)	(@20MHz)	(@16MHz)	(@20MHz)	(@16MH
	Multiplier									16×1	6→32	-						-		
	Multiply-Accumulate Instruction	İ								16×16	+32→32	2								
	Clock Generation Circuit	İ						2 circ	uits (Ma				lator)							
	PLL	İ								-		•								
	Subclock									-	_									
	RTC	i									_									
Clock	On-Chip Oscillator						Yes (Hig	h precis	ion. Hig	h spee	d : 40MI	Hz. Low	speed	125kH	lz)					
	Oscillation Stop Detection						,,,,,		,		es	,								
	Frequency Divider								1/1		2, 4, 8,	16)								
	Power Save	i							.,,		/Stop									
Power Supply	Power-On Reset/POR										es									
Power Supply Voltage Detection	Low Voltage Detection/LVD								Yes (detecti	ion 2)								
	Resolution × Channels	i									t×12									
A/D Converter	Sample and Hold										es									
D/A Converter	Resolution × Channels										_									
2771 0011101101	8-bit							3	(Timer	RA Tim	er RR	Timer R	F)							
	16-bit								(11111)		er RD)		_,							
	Input Capture								8 (sh		th Time	r RD)								
	Output Compare							9 (shared				RE)							
Timer	PWM Output								shared											
iiiiei	Real-Time Port								Silaicu		- IIII,	IIIII I	10,							
	Event Counter								1 (ch	ared wi	th Time	r RA)								
	2-Phase Encoder Input								1 (511		_									
	3-Phase Inverter Control								1 (ch	ared wi	th Time	r BD)								
Watchdog Tin							1 (varit	h auton					tion fu	oction)						
wateridog iiii	Clock Sync./ Clock Async.						1 (0010	ii auton	iatic ste		ARTO)	e protec	, cion iui	iction,						
Serial Interface	Clock Sync, Only	l								. (0,										
Oction interface	Clock Async. Only									1 (11)	ART1)									
I ² C-bus	Glock / Loymor Gray	 					1 (Sh	are with	Synch			`ommu	nication	[[nit]						
	ommunication Unit/Special Serial I/O						1 (01	uic witi			with I'		illoution	Oilit						
	Channels										6	<u> </u>								
CAN	Message Box (Numbers)										_									
	Input Only (Numbers)										3									
	CMOS I/O (Numbers)										1									
I/O Ports	N-Channel Open Drain Port (Numbers)																			
,	High Current Drive Port										_									
	Pull-Up Resistor	l								4	1									
External Inter		l									8									
	On-Chip Debug	l								Y	es									
Debugging Function	On-Board Flash Program										es									
Other French	ROM Correction Function	İ								-	_									
Other Functions	Others	Ì								-	_									
		20MHz/3.0 1	16MHz/3.0 to	20MHz/3.0 to	16MHz/3.0 to	20MHz/3.0 to 16MH:	/3,0 to 20MHz/3,0 t	o 16MHz/3.0 to	20MHz/3.0 to	16MHz/3 0+A	20MHz/3,0 to	16MHz/3.0 to	20MHz/3.0 to	16MHz/3.0 to	20MHz/3.0 to	16MHz/3.0 to	20MHz/3,0 to	16MHz/3.0 to	20MHz/3.0 to	16MHz/3.0 to
0		to 5,5V.	5.5V.	5,5V.	5,5V.	5,5V, 5,	V. 5.5V.	5.5V.	5,5V.	5,5V.	5,5V.	5,5V,	5.5V.	5.5V.	5.5V.	5,5V,	5.5V,	5.5V,	5.5V.	5.5V.
Operating Fre	quency/Supply Voltage	10MHz/2.7 to 1	10MHz/2.7 to	10MHz/2.7 to	10MHz/2.7 to	10MHz/2.7 to 10MH:	/2.7 to 10MHz/2.7 t	o 10MHz/2.7 to	10MHz/2.7 to	10MHz/2.7 to	10MHz/2.7 to	10MHz/2.7 to	10MHz/2.7 to	10MHz/2.7 to	10MHz/2.7 to	10MHz/2.7 to	10MHz/2.7 to	10MHz/2.7 to	10MHz/2.7 to	10MHz/2.7 to
		5.5V	5.5V	5.5V	5.5V	5.5V 5.	V 5.5V	5.5V	5.5V	5.5V	5.5V	5.5V	5.5V	5.5V	5.5V	5.5V	5.5V	5.5V	5.5V	5.5V
Operating Am	bient Temperature (°C)	-40 to 85	-40 to 125	-40 to 85	-40 to 125	-40 to 85 -40	o 125 -40 to 8	5 -40 to 125	-40 to 85	-40 to 125	-40 to 85	-40 to 125	-40 to 85	-40 to 125	-40 to 85	-40 to 125	-40 to 85	-40 to 125	-40 to 85	-40 to 125
Package	•									PLQP00	48KB-A	i i								
Doub NI		<u>n</u>	유	<u>G</u>	Œ	£ 6	: L	<u> </u>	<u>£</u>	£	윤	윤	<u>a</u>	Œ	C	유	유	윤	Œ	윤
Part No.								š												
							23													
						:21														
		35	35	35	35	35	35	35F	35F	35.	35	35F	35F	35	35F	35F	35F	35F	35F	35F
		R6F21226.FP R6F21226.FP R6F21227.JFP R6F21223.JFP R6F21223.FP R6F21223.FP R6F21223.FP R6F21233.FP R6F21233.FP R6F21233.FP R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF R6F21233.FF																		

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

^{★:} New product ★★: Under development

Automotive MCUs

• Specifications (R8C/Tiny Series)

Group			R80	:/26			R80	C/27			R80	:/28			R80	/29	
	ROM (Bytes)	16	K	32	2K	16K	+ 2K	32K	+ 2K	16	SK .	32	2K	16K	+ 2K	32K	+ 2K
	RAM (Bytes)	11	<	1.9	5K	1	K		δK				1	K			
Memory	ROM Type*1									F							
	Data Flash/E2 Data Flash		-	-			2K (Dat	a Flash)			-	-			2K (Dat	a Flash)	
	Program Security					Ye	s (ID Cod	de Check			de Protec	t Functio	n)				
	CPU								R8C	Core							
	Basic Instructions								8	9							
CPU	Minimum Instruction	50	62,5	50	62.5	50	62,5	50	62,5	50	62,5	50	62,5	50	62.5	50	62,5
01 0	Execution Time (ns)	(@20MHz)	(@16MHz)	(@20MHz)	(@16MHz)	(@20MHz)	(@16MHz)	(@20MHz)		(@20MHz)	(@16MHz)	(@20MHz)	(@16MHz)	(@20MHz)	(@16MHz)	(@20MHz)	(@16MHz)
	Multiplier									6→32							
	Multiply-Accumulate Instruction									+32→32							
	Clock Generation Circuit						2	circuits (N	/lain cloc	k, On-chip	oscillate	or)					
	PLL									_							
	Subclock RTC									_							
Clock	On-Chip Oscillator					Vaa	/Link no	aniniam II	-	- - -		d . 10EI	-U-V				
						Yes	(High pre	ecision, H			, Low spe	ea : 1251	(HZ)				
	Oscillation Stop Detection Frequency Divider									es 2, 4, 8, 16	21						
	Power Save									2, 4, 6, 10 /Stop	"						
Power Supply	Power-On Reset/POR									es							
Voltage Detection	Low Voltage Detection/LVD							Voc		detection	n 21						
	Resolution × Channels				10-hi	t×12		162	, voitage		,		10-h	it×4			
A/D Converter	Sample and Hold				10.01	1			V	es			10-0				
D/A Converter	Resolution × Channels									_							
2777 0011701101	8-bit							3 (Time	r RA. Tim	er RB, Tir	ner RE)						
	16-bit							. ,		er RC)	,						
	Input Capture							4 (s			RC)						
	Output Compare		4 (shared with Timer RC) 5 (shared with Timer RC, Timer RE)								-						
Timer	PWM Output									ner RB, T							
	Real-Time Port								-	-							
	Event Counter							1 (s	hared wi	th Timer	RA)						
	2-Phase Encoder Input								-	-							
	3-Phase Inverter Control								-	_							
Watchdog Tin							(with au	tomatic s	tart, cloc	k source j	orotectio	n functio					
	Clock Sync./ Clock Async.				2 (UARTO), UART1)							1 (UA	(RTO)			
Serial Interface	Clock Sync. Only								-								
-0-	Clock Async. Only									L			1 (UA	(RT1)			
I ² C-bus						1	(Share v	with Synd			mmunica	tion Unit)				
Synchronous Serial C	ommunication Unit/Special Serial I/O								1 (Share	with I ² C)							
CAN	Channels																
	Message Box (Numbers) Input Only (Numbers)									3							
	CMOS I/O (Numbers)				2	E				3 			1	2			
I/O Ports	N-Channel Open Drain Port (Numbers)																
1/0 10113	High Current Drive Port									_							
	Pull-Up Resistor				2	5							1	3			
External Inter									-	1 7				-			
	On-Chip Debug									es							
Debugging Function	On-Board Flash Program									es							
011	ROM Correction Function								-	_							
Other Functions	Others								-	_							
		20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.	20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.	20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.	20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.	20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.	20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.	20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.	20MHz/3.0 to 5.5V.	16MHz/3.0 to 5.5V.
Operating Fre	quency/Supply Voltage	10MHz/2.7	10 5.5 V,	10 5.5 V,	10 5.5V,	10 5.5 V,	10MHz/2.7	10MHz/2.7	10 5.5V,	10 5.5V,	10MHz/2.7	10MHz/2.7	10MHz/2.7	10MHz/2.7	10MHz/2.7	10 5.5V,	10 5.5 V,
		to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V	to 5.5V
Operating Am	bient Temperature (°C)	- 40 to 85	-40 to 125	-40 to 85	- 40 to 125	- 40 to 85	-40 to 125	-40 to 85	-40 to 125	-40 to 85	-40 to 125	-40 to 85	-40 to 125	-40 to 85	-40 to 125	- 40 to 85	-40 to 125
Package					PLQP00					1.5.15.00			PLSP00				
Part No.		4JFP	4KFP	ығр	бКFР	4JFP	4KFP	SJFP	6KFP	4JSP	4KSP	6JSP**	6KSP**	4JSP	4KSP	6JSP	6KSP
		R5F21264JFP	R5F21264KFP	R5F21266JFP	R5F21266KFP	R5F21274JFP	R5F21274KFP	R5F21276JFP	R5F21276KFP	R5F21284JSP	R5F21284KSP	R5F21286JSP*	R5F21286KSP	R5F21294JSP	R5F21294KSP	R5F21296JSP	R5F21296KSP

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

★: New product ★★: Under development

MCUs for Notebook PCs / PC Servers

• Specifications (M16C/6K Group)

Group		M16C/6KA
	ROM (Bytes)	128K
	RAM (Bytes)	5K
Memory	ROM Type*1	F
•	Data Flash	-
	Program Security	-
	CPU	M16C/60 Core
	Basic Instructions	91
CPU	Minimum Instruction Execution Time (ns)	62,5 (@16MHz)
CPU	Multiplier	16×16→32
	Multiply-Accumulate Instruction	16×16+32→32
	Barrel Shifter	-
DMA	DMAC (Channels)	-
	Clock Generation Circuit	2 circuits (Main clock, Sub clock)
OlI-	Subclock	-
Clock	Frequency Divider	1/n (n = 1, 2, 4, 8, 16)
	Power Save	Normal operating (High-speed, Medium-speed) /Wait/Stop
A/D Converter	Resolution × Channels	10-bit×10
A/D Converter	Sample and Hold	-
D/A Converter	Resolution × Channels	-
	8-bit	-
Time	16-bit	11
Timer	PWM Output	6
	Event Counter	-
Watchdog Tin	ner	1
	Clock Sync./ Clock Async.	1
Serial Interface	Clock Sync. Only	2 (SI/O3, SI/O4)
	Clock Async, Only	-
I ² C-bus		3
	Input Only (Numbers)	1
	CMOS I/O (Numbers)	129
I/O Ports	N-Channel Open Drain Port (Numbers)	37
	High Current Drive Port	16
	Pull-Up Resistor	104
External Inter		16
Other Functions	ROM Correction Function	T T
	Others	PS/2 Interface × 3
	equency/Supply Voltage	16MHz/3.0 to 3.6V
	nbient Temperature (°C)	-20 to 85
Package		PTQP0144LA-A
Part No.		M306KAFCLRP

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM versio

^{★:} New product ★★: Under development

USB MPUs and MCUs

• Specifications (M16C/20 Series)

Group			M16C/24	
	ROM (Bytes)	64K	12	8K
	RAM (Bytes)	5K	10	DK .
	ROM Type*1	N	1	F
Memory	Data Flash		_	
,	Program Security	-		Yes (ID code check function, ROM code protect function)
	CPU		M16C/60 Core	
	Basic Instructions		91	
	Minimum Instruction Execution Time (ns)		62.5 (@16MHz)	
CPU	Multiplier		16×16→32	
	Multiply-Accumulate Instruction		16×16+32→32	
	Barrel Shifter		10×10+32 32	
	DMAC (Channels)		4	
DMA	DTC/DMAC II		<u>-</u>	
	Address Space (Bytes)		1M	
F		Command for		dest sinuals
External Bus Expansion	External Bus Interface		insertion of 1 to 3 wait states, Outputs 4 chip-se	
Expansion	Bus Structure	Separate bus/Data Bus Width can i	pe selected (8/16-bit), The number of output add	iress buses can be selected (16/20)
	DRAM Controller		_	
	Clock Generation Circuit	3 cii	cuits (Main clock, Sub-clock and On-chip oscilla	tor)
	PLL		Yes	
	Subclock		Yes	
Clock	RTC		<u>-</u>	
Clock	On-Chip Oscillator		Yes	
	Oscillation Stop Detection		Yes	
	Frequency Divider		1/n (n = 1, 2, 4, 8, 16)	
	Power Save	Normal operating (High-	speed, Medium-speed, Low-speed, Low-power of	onsumption) /Wait/Stop
Power Supply	Power-On Reset/POR	Troinial operating (ringin t		onoumption, , truit, otop
Voltage Detection	Low Voltage Detection/LVD			
Voltage Detection	Resolution × Channels		10-bit×8	
A /D 0				
A/D Converter	Sample and Hold		Yes	
	Multi-Channel Sample and Hold		_	
D/A Converter	Resolution×Channels		<u> </u>	
	8-bit		<u> </u>	
	16-bit	5 (Timer A0, Timer A1, Timer A2, Timer A3, Timer A	44)
	Input Capture		_	
	Output Compare		-	
Timer	PWM Output	5 (shared	with Timer A0, Timer A1, Timer A2, Timer A3, T	imer A4)
	Real-Time Port		_	
	Event Counter	5 (shared	with Timer A0, Timer A1, Timer A2, Timer A3, T	imer A4)
	2-Phase Encoder Input			,
	3-Phase Inverter Control		_	
Watchdog Tin			1	
Tratomacy in	Clock Sync./ Clock Async.		4 (UARTO, UART1, UART2, UART3)	
Serial Interface	Clock Sync. Only		— — — — — — — — — — — — — — — — — — —	
Oction Interface	Clock Async. Only		_	
I ² C-bus	Glock Asylic, Olly		4 (HADTO HADTA HADTA HADTA)	
IEBus			4 (UARTO, UART1, UART2, UART3)	
	NINA.		4 (UARTO, UART1, UART2, UART3)	
Smart Card/S			4 (UARTO, UART1, UART2, UART3)	
Synchronous Serial C	Communication Unit/Special Serial I/O		2 (UART0, UART1, Serial sound interface)	
CAN	Channels		_	
	Message Box (Numbers)			
USB Function	1		Yes (Full-Speed)	
IrDA			<u> </u>	
CRC Calculati			2 (CRC-CCITT, CRC16)	
X/Y Converte	er			
	Input Only (Numbers)		1	
	CMOS I/O (Numbers)		80	
I/O Ports	N-Channel Open Drain Port (Numbers)		2	
	High Current Drive Port		8 (20mA)	
	Pull-Up Resistor		80 (Possible to Set Each of 4 Ports)	
External Inter			12 (INT×3, NMI×1, Key Input ×8)	
	On-Chip Debug		12 (INT × 3, NIMI × 1, Key Iliput × 6)	
Debugging Function	On-Board Flash Program		_	
		V- (A.1.1.	as motab)	
Other Functions	ROM Correction Function	Yes (Addre		
	Others		Serial Sound Interface : 2, AND Flash Controller	
	equency/Supply Voltage		16MHz/3.0 to 3.6	
	nbient Temperature (°C)		-20 to 85	
Package			PLQP0100KB-A	
Part No.		M30245M8-XXXGP	M30245MC-XXXGP	M30245FCGP
E · Elseh mem	on version 1 : BOM less vers	sion, M : Mask ROM version, O : One time PROM version	Oz : OzBOM version	★: New product ★★: Under developme

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

★: New product ★★: Under development

TV MCUs

• Specifications (M16C/6V Group)

Group		у стоир,			M16	C/6V			
	ROM (Bytes)	25	6K	38	34K		51	2K	
	RAM (Bytes)				0K				6K
Memory	ROM Type*1	M	F	M	F	M	F	M	F
,	Data Flash				· .				
	Program Security	_	Yes (ID code check function)	_	Yes (ID code check function)	_	Yes (ID code check function)	_	Yes (ID code check function)
	CPU		100 (12 0000 0110011 1011011011)			60 Core	100 (10 0000 0110011 011011)		1 100 (12 1000 01100111011011011)
	Basic Instructions					11			
	Minimum Instruction Execution Time (ns)					16MHz)			
CPU	Multiplier					6→32			
	Multiply-Accumulate Instruction					+32→32			
	Barrel Shifter				10 × 10	_			
	DMAC (Channels)					2			
DMA	DTC/DMAC II					<u>-</u>			
	Address Space (Bytes)				1	M			
Fortuna I Book	External Bus Interface		Cunnor	t for insertion of 1			anala ICCO CC1 C	C2 CC21	
External Bus Expansion	Bus Structure	Conor		width can be seled					16/20)
Lxpansion		Separ	ate bus, Data bus	width can be selec	ctea (o-bit/ io-bit),	ne number of our	tput address buses	s can be selected (10/20)
	DRAM Controller			0 -!		Code alle de OCD all	1-1		
	Clock Generation Circuit			3 CI	rcuits (iviain clock,	Sub-clock OSD cl	DCK)		
	PLL								
	Subclock				Υ.	es			
Clock	Real Time clock				-				
	On-Chip Oscillator				-	_			
	Oscillation Stop Detection					_			
	Frequency Divider					2, 4, 8, 16)			
	Power Save		Normal ope	ration (High-speed	I, Medium-speed, I	_ow-speed, Low-p	ower consumption	ı)/Wait/Stop	
Power Supply	Power-On Reset/POR					_			
Voltage Detection	Low Voltage Detection/LVD				-				
	Resolution × Channels					t×6			
A/D Converter	Sample and Hold				Υ	es			
	Multi-Channel Sample and Hold				-				
D/A Converter	Resolution × Channels				8-bi	t×2			
	8-bit					-			
	16-bit				8 (Timer A	A, Timer B)			
	Input Capture					_			
	Output Compare					_			
Timer	PWM Output				2 (Tin	ner A)			
	Real-Time Port					_			
	Event Counter				8 (Timer A	A, Timer B)			
	2-Phase Encoder Input				-				
	3-Phase Inverter Control								
Watchdog Tin						1			
	Clock Sync./ Clock Async.				2 (UARTO	, UART2)			
Serial Interface	Clock Sync. Only				•	_			
	Clock Async. Only					_			
I ² C-bus					2 (Multi n	naster I ² C)			
IEBus					•				
Smart Card/S									
Synchronous Serial C	Channels				<u>'</u>	- -			
CAN	Channels				-	_			
IrDA	Message Box (Numbers)				-				
CRC Calculati	on Circuit								
X/Y Converte						<u>-</u> -			
	Input Only (Numbers)								
I/O Danta	CMOS I/O (Numbers)					24			
I/O Ports	N-Channel Open Drain Port (Numbers)					2			
	High Current Drive Port			-,					
Frateur III	Pull-Up Resistor			74 (P		be set every four p	oorts)		
External Inter			V	1		3	V		V
Debugging Function	On-Chip Debug		Yes	- -	Yes		Yes	_	Yes
	On-Board Flash Program	Van (Addana - 11 a)	Yes	Ver (Adden)	Yes	Van (Addings of 1 at	Yes	Ver (Address 11 5)	Yes
Other Functions		Yes (Address match × 2)	_	Yes (Address match × 2)		Yes (Address match × 2)	-	Yes (Address match × 2)	
	Others			CCD,		ple-layer, 512-colo	าบรม		
	quency/Supply Voltage					15 to 3.45V			
	nbient Temperature (°C)					to 70			
Package					PRQP0	100JB-A			
				_				ę.	
		XF		, X		产		Ş	
Part No.		X		S S		8		Ŗ	ę.
rartivo,		<u>-</u>	GF.		生	ŝ	뵨	ACI	JAL
		JAN.	7Ft	Z Z	7.1	Į.	7F.	Į V	7.
		790	790	790	790	790	796	790	790
		M306V7MG-XXXFP	M306V7FGFP	M306V7MH-XXXFP	M306V7FHFP	M306V7MJ-XXXFP	M306V7FJFP	М306V7МЈА-ХХХFР	M306V7FJAFP
			_	_	_	_	_	_	_

^{*1} F : Flash memory version, L : ROM-less version, M : Mask ROM version, O : One time PROM version, Qz : QzROM version

★: New product ★★: Under development

Development Tools List

Development Tools for R32C/100 Series

М	cu		Software tools		On-chip debug	ging emulator*5	Programming tool
Series	Group	RTOS	C compiler package*2	IDE	Low-price version	High-function version	
	R32C/111** R32C/116** R32C/117** R32C/118**				E8a**		Flash Development Toolkit (R0C00000FDW04R)* ⁷ ** (E8a emulator is necessary at programming) **
	R32C/120**						
	R32C/121** R32C/133**		R32C Series	High-performance			
R32C/100**	R32C/134**	M3T-MR100/4*1 *6	C Compiler package	Embedded Workshop		E30A	
11020,100	R32C/151**		(MISRA C*3)	*4			
	R32C/152**				_		_
	R32C/153**						_
	R32C/156**						
	R32C/157**						
	R32C/160**						
	R32C/161**						

- *1. M3T-MR100/4 is a general term referring to the real-time OS development kit (M3T-MR100K/4) and the mass production contract (M3T-MR100S/4).
- *2. C compiler package includes integrated development environment (High-performance Embedded Workshop), C compiler, assembler and simulator debugger.
 *3. MISRA C rule checking functionality may be added by installing the optional SQMlint (Part No.: R0C00000SCW01R) MISRA C rule checker.
- *4. High-performance Embedded Workshop is included with C compiler package and Emulator software
- *5. E30A emulator bundles emulator software.
- *6. Please refer to the following URL for the target MCU group (http://www.renesas.com/r32c100)
- *7. Flash Development Toolkit is available in a product version (with technical support) and an evaluation version (without technical support) Visit the Renesas Technology Web site (http://www.renesas.com/fdt) to confirm support details for specific MCU product numbers
- **: Under development or evaluation: product name may be changed.

Operating Environment for R32C/100 Series Software Tools

Product type	Product name	Host machine (OS)*8
RTOS	M3T-MR100/4*1	IBM PC/AT Compatibles (Windows® XP, 2000)
C compiler package	C compiler package for R32C Series*2	IBM PC/AT Compatibles (Windows® XP, 2000)
MISRA C rule checker	SQMlint*3	IBM PC/AT Compatibles (Windows® XP, 2000)
IDE	High-performance Embedded Workshop*4	IBM PC/AT Compatibles (Windows® XP, 2000)
Simulator debugger	Simulator Debugger for R32C Series*5	IBM PC/AT Compatibles (Windows® XP, 2000)
Emulator software	Emulator Software for E8a *7**	IBM PC/AT Compatibles (Windows® XP, 2000)
Emulator software	Emulator Software for E30A*7	IBM PC/AT Compatibles (Windows* XP, 2000)
Flash Development ToolKit	Flash Development Toolkit*8	IBM PC/AT Compatibles (Windows® XP, 2000)

- *1. M3T-MR100/4 is a general term referring to the real-time OS development kit (M3T-MR100K/4) and the mass production contract (M3T-MR100S/4).
- *2. The C compiler package for R32C/100 Series includes an integrated development environment (High-Performance Embedded Workshop), C compiler, assembler and simulator debugger.
- *3. SQMlint MISRA C rule checker (Part No.: R0C00000SCW01R) is sold as the optional product of Renesas C compiler.

 *4. High-performance Embedded Workshop is included with C compiler package and Emulator debugger.

 *5. Simulator debugger is included with C compiler package.
- *6. Please refer to the following URL for Windows Vista
- http://www.renesas.com/tool_env
- *7. Emulator software is included in Emulators.
- *8. Flash Development Toolkit (Part No.: R0C00000FDW04R) is available in a product version (with technical support) and an evaluation version (without technical support). The E8a emulator (Part No.: R0E00008AKCE00) is necessary for programming.

Development Tools for M32C/80 Series

M	CU	Introductory tools		Software tools		Emulate	or (include	d emulator so	ftware*7)	Program	ming tool
				C compiler		Onchip	Compact	In-circuit	emulator	Flash	IC applies board*13
Series	Group	Starter kit	RTOS	package	IDE	debugging emulator	emulator	Emulator	Emulation probe	programmer*10	IC socket board*13
	M32C/80	_				_	M30850T3-CPE *8		M30850T2-EPB	_	_
	M32C/82						_		M30830T-EPB		
	M32C/84 (M32C/84, M32C/84T) M32C/85 (M32C/85, M32C/85T)						M30850T3-CPE *8		M30850T2-EPB	(E8a emulator is necessary at	R0K3100PSZ000BR (for PRQP0100JB-A [Previous code: 100P6S-A]) R0K3100PQZ000BR (for PLQP0100KB-A [Previous code:
M32C/80	M32C/87 (M32C/87, M32C/87A, M32C/87B)	Renesas Starter Kit for M32C/87 (R0K330879S001BE)	M3T-MR308/4*2	M3T-NC308WA*3 (MISRA C*4)	High- performance Embedded	E8a* ⁶	M30870T2-CPE	PC7501	M30870T-EPB	programming) or M3A-0806* ¹²	100P6Q-A]) R0K3144PSZ000BR (for PLQP0144KA-A [Previous code: 144P6Q-A])
	M32C/88 (M32C/88T)	*1			Workshop*⁵		_		M30880T-EPB	Flash Development Toolkit*11 (E8a emulator is necessary at programming)	R0K3100PQZ000BR (for PLQP0100KB-A [Previous code: 100P6Q-A]) R0K3144PSZ000BR (for PLQP0144KA-A [Previous code: 144P6Q-A])
	M32C/8A					_	M30850T3-CPE *8		M30850T2-EPB	_	
	M32C/8B**	-				E8a* ⁶ ★★	_		***	Flash Development Toolkit*11 ** (E8a emulator is necessary at programming)	_

^{*1.} CPU board, E8a on-chip debugging emulator, software (High-Performance Embedded Workshop integrated development environment, M3T-NC308WA C compiler package evaluation version, E8a emulator software, Flash Development Toolkit evaluation version), etc., are included. Depending on the shipping date, the bundled software may include products or versions that are not the most recent ones available. The latest versions may be downloaded (free of charge) from the Reneasa Technology Web site (http://www.reneasa.com/download).

*2. M3T-MR308/4 is a general term referring to the real-time OS development kit (M3T-MR308K/4) and the mass production contract (M3T-MR308S/4).

*3. The M3T-NC308WA includes an integrated development environment (High-Performance Embedded Workshop), C compiler, assembler and simulator debugger.

*4. MISRA C rule checking functionality may be added by installing the optional SQMIIIM MISRA C rule checker (Part No.: ROC0000SCWO1R).

*5. High-performance Embedded Workshop is included with C compiler package and Emulator software.

*6. The E8a emulator (Part No.: RDC0006AKCEO) includes emulator software (High-Performance Embedded Workshop integrated development environment, E8a emulator software, ompiler evaluation version, Flash Development Toolkit evaluation version). Depending on the shipping date, the bundled software may include products or versions that are not the most recent ones available. The latest versions may be downloaded (free of charge) from the Reneasa Technology Web site (http://www.renesas.com/download).

*7. Each emulator includes an emulator debugger. Depending on the shipping date, the bundled emulator debugger may include products or versions that are not the most recent ones available. The latest versions may be downloaded (free of charge) from the Reneasa Technology Web site (http://www.renesas.com/download).

*8. The M3085073-CPE is the successor to the M3085073-CPE supports allocation of emulation memory to an external area and microprocessor mode using the optional R0E33

- *8. The M30850T3-CPE is the successor to the M30850T2-CPE. The M30850T3-CPE supports allocation of emulation memory to an external area and microprocessor mode using the optional R0E330850MSRC0 emulation memory board.
 *9. The M32C/82 Group can be used with the combination of an emulator debugger, the PC4701U emulator and the M30830T-RPD-E emulation pod only when the MCU operating frequency is 20MHz or less.
 *10. A variety of compatible programmers are available from our partner vendors. Contact the manufacturer regarding programmer details, supported MCUs and suitability for installation in a mass production or factory environment.
 *11. Flash Development Toolkit (Part No.: R0C00000FDW04R) is available in a product version (with technical support) and an evaluation version (without technical support). The E8a emulator is necessary for programming, Visit the Renesas Technology Web site (http://www.renesas.com/fdt) to confirm support details for specific MCU product numbers.
 *12. The data flash areas of the M32C/84 and M32C/85 Groups cannot be reprogrammed.
 *13. The IC socket hoard is a programming adapter that supports a specific programmer.
- *13. The IC socket board is a programming adapter that supports a specific programmer.

 ★★: Under Development ★★★: In Planning

Accessories for M32C/80 Series

N	ICU			Accessories	
Series	Group	Package type	Package name	Previous code	Recommended accessories*1
	M32C/80	100 pin 0.5mm pitch LQFP	PLQP0100KB-A	100P6Q-A	M3T-F160-100NSD (optional)
	W32C/60	100 pin 0.65mm pitch QFP	PRQP0100JB-A	100P6S-A	M3T-F160-100NRB (optional)
	M32C/82 M32C/84 (M32C/84, M32C/84T)	100 pin 0.5mm pitch LQFP	PLQP0100KB-A	100P6Q-A	M3T-F160-100NSD (optional)
M200/00	M32C/85 (M32C/85, M32C/85T)	100 pin 0.65mm pitch QFP	PRQP0100JB-A	100P6S-A	M3T-F160-100NRB (optional)
M32C/80	(M32C/87, M32C/87A, M32C/87B)	144 pin 0.5mm pitch LQFP	PLQP0144KA-A	144P6Q-A	M3T-FLX-144NSD (optional)
	M32C/88	100 pin 0.5mm pitch LQFP	PLQP0100KB-A	100P6Q-A	M3T-F160-100NSD (optional)
	(M32C/88T)	144 pin 0.5mm pitch LQFP	PLQP0144KA-A	144P6Q-A	M3T-FLX-144NSD (optional)
	M32C/8A	100 pin 0.5mm pitch LQFP	PLQP0100KB-A	100P6Q-A	M3T-F160-100NSD (optional)
	M32C/8B **	100 pin 0.5mm pitch LQFP	PLQP0100KB-A	100P6Q-A	M3T-F160-100NSD (optional)
	WI326/8B **	144 pin 0.5mm pitch LQFP	PLQP0144KA-A	144P6Q-A	M3T-FLX-144NSD (optional)

^{*1.} A variety of other accessories are available. Visit the Renesas Technology Web site (http://www.renesas.com/accessory) for details.

⁽optional): Not included with compact emulator or emulation probe. Purchase it separately

^{★★:} Under Development

Development Tools List

Development Tools for M16C/80 Series

	MCU			Software tools		Emula	ator (bundled Em	ulator software*5)	Programming tool	
	Series Group		RTOS	C compiler	IDE	Compact	In-	In-circuit emulator		IC socket board*7
	Series	Group	nius	package	IDE	emulator	Emulator	Emulation pod or Probe	programmer	10 300ket board
									M3A-0806	R0K3100PSZ000BR
										(for PRQP0100JB-A
		M16C/80	M3T-MR308/4*1		High-performance Embedded Workshop*4	M30800T-CPE (RAM 10K)				[Previous code: 100P6S-A])
								M30803T-RPD-E		R0K3100PQZ000BR
N	/116C/80						PC4701U	(RAM 24K)*6		(for PLQP0100KB-A
								(NAIVI 24K)		[Previous code: 100P6Q-A])
										R0K3144PSZ000BR
										(for PLQP0144KA-A
										[Previous code: 144P6Q-A])

- *1. M3T-MR308/4 is a general term referring to the real-time OS development kit (M3T-MR308K/4) and the mass production contract (M3T-MR308S/4).
- *2. The M3T-NC308WA includes an integrated development environment (High-Performance Embedded Workshop), C compiler, assembler and simulator debugger.
- *3. MISRA C rule checking functionality may be added by installing the optional SQMlint MISRA C rule checker (Part No.: R0C00000SCW01R).
- *4. High-performance Embedded Workshop is included with C compiler package and Emulator debugger.
- *5. Each emulator includes an emulator debugger. Depending on the shipping date, the bundled emulator debugger may include products or versions that are not the most recent ones available. The latest versions may be downloaded (free of charge) from the Renesas Technology Web site (http://www.renesas.com/download).
- *6. Please contact us when you use this for the M16C/80T Group for automotive applications.
- *7. The IC socket board is a programming adapter that supports a specific programmer.

Accessories for M16C/80 Series

MCU		Accessories						
Series	Group	Package type	Package name	Previous code	Recommended accessories ¹			
		100 pin 0.5mm pitch LQFP	PLQP0100KB-A	100P6Q-A	M3T-F160-100NSD (optional)			
M16C/80	M16C/80	100 pin 0.65mm pitch QFP	PRQP0100JB-A	100P6S-A	M30800T-PTC (included) + M3T-100LCC-DMS (optional) + M3T-FLX-100NRB (optional)			
		144 pin 0.5mm pitch LQFP	PLQP0144KA-A	144P6Q-A	M3T-FLX-144NSD (optional)			

*1. A variety of other accessories are available. Visit the Renesas Technology Web site (http://www.renesas.com/accessory) for details. (optional): Not included with emulation pod or probe. Purchase it separately (included): Included with emulation pod or probe

Operating Environment for M32C/80 and M16C/80 Series Software Tools

Product type	Product type	Host machine (OS)*8
RTOS	M3T-MR308/4*1	IBM PC/AT Compatibles (Windows® XP, 2000)
C compiler package	M3T-NC308WA*2	IBM PC/AT Compatibles (Windows® XP, 2000)
MISRA C rule checker	SQMlint*3	IBM PC/AT Compatibles (Windows® XP, 2000)
IDE	High-performance Embedded Workshop*4	IBM PC/AT Compatibles (Windows® XP, 2000)
Simulator debugger	Simulator Debugger for M32C Series*5	IBM PC/AT Compatibles (Windows® XP, 2000)
	PC7501 Emulator Debugger for M32C Series*6	
	PC4701 Emulator Debugger for M32C Series*6	
Emulator debugger	Compact Emulator Debugger for M32C Series*6	IBM PC/AT Compatibles (Windows® XP, 2000)
	FoUSB/UART Debugger for M32C Series*6	
	E8a Emulator Software*6	
Flash Development Toolkit	Flash Development Toolkit*7	IBM PC/AT Compatibles (Windows® XP, 2000)

- 1. M3T-MR308/4 is a general term referring to the real-time OS development kit (M3T-MR308K/4) and the mass production contract (M3T-MR308S/4).
- *2. The M3T-NC308WA includes an integrated development environment (High-Performance Embedded Workshop), C compiler, assembler and simulator debugger.
- *3. SQMlint MISRA C rule checker (Part No.: R0C00000SCW01R) is sold as the optional product of Renesas C compiler
- *4. High-performance Embedded Workshop is included with C compiler package and Emulator debugger.
- *5. Simulator debugger is included with C compiler package.
 *6. Emulator debugger is bundled with emulators.
- *7. Flash Development Toolkit (Part No.: R0C00000FDW04R) is available in a product version (with technical support) and an evaluation version (without technical support).
 - The E8a emulator (Part No.: R0E00008AKCE00) is necessary for programming.
- *8. Please refer to the following URL for Windows Vista. http://www.renesas.com/tool_env

50 30 20 10 Development Tools for M16C/60, 30, 20 and 10 Series

MCU		Introductory tools Software tools		ls	Emulator (included E		d Emulator software*7)		Programmi	ng tool		
Series	Group	MCU	Starter kit	RTOS	C compiler package	IDE	Onchip debugging emulator	Compact emulator	In-cire Emulator	Emulation probe, pod or MCU unit	Flash programmer	IC socket board*20
	M16C/	/63 * *	_				E8a* ⁶ ★★	_	_		Flash Development Toolkit *19 ★★ (E8a emulator is necessary at programming)	_
	M16C	/64**	_				E8a*6		E100*21 (R0E001000EMU00)	R0E530640MCU00	Flash Development Toolkit *19 (E8a emulator is necessary at programming)	
	M16C/65**		**				E8a* ⁶ ★★	<u> </u>	E100*21 (R0E001000EMU00)	**	Flash Development Toolkit *19★★ (E8a emulator is necessary at programming)	_
	M160	C/62A					M30620T-CI	M30620T-CPE	-	M30620T2-RPD-E	M3A-0806*17 *18	
	M160	C/62M	_					_	PC4701U	M30620TL-RPD-E		R0K3100PSZ000BR
	M160	C/62N								M3062NT3-RPD-E	M3A-0806*17	(for PRQP0100JB-A [Previous code: 100P6S-A])
M16C/60	M16C/62P		Renesas Starter Kit for M16C/62P (R0K33062PS001BE)				E8a* ⁶	M3062PT3-CPE*8	PC7501	M3062PT2-EPB*10		R0K3100PQZ000BR (for PLQP0100KB-A [Previous code: 100P6Q-A])
	M16C/6V	M306V7			M3T-NC30WA *3 (MISRA C*4)		_		PC4701U	M306V7T-RPD-E	_	_
	M16C/6N	M306N4 M306N5 M306NK M306NL M306NM M306NN	Renesas Starter Kit for M16C/6NK (R0K3306NKS001BE)	M3T-MR30/4*2		High- performance Embedded Workshop*5	E8a* ⁶	_	PC7501	M306NKT-EPB*11	Flash Development Toolkit*19 (E8a emulator is necessary at programming) or M3A-0806*17	R0K3100PSZ000BR (for PRQP0100JB-A [Previous code: 100P6S-A]) R0K3100PQZ000BR (for PLQP0100KB-A [Previous code: 100P6Q-A])
	M16C/6H	M306H7					_		PC4701U	M306H7T3-RPD-E	_	
	M16C/6S	M306S0	_				E8a*6	M3062PT3-CPE + M306S0T-PRB* ⁹	PC7501	M3062PT2-EPB*12 + M306S0T-PRB*9	Flash Development Toolkit*19 (E8a emulator is necessary at	
M16C/30	M16C/30P	M30302 M30304	Renesas Starter Kit for M16C/62P (R0K33062PS001BE) *1					M3062PT3-CPE*8	PC7501	M3062PT2-EPB*10	programming) or M3A-0806*17	_
	M16C/39P	M30392								M3062PT2-EPB*13 + M30396T-PRB*14	_	
M16C/20	M16C/24	M30245	-				_	_		M30245T3-RPD-E	*16	
M16C/10	M16C/1N	M301N2							PC4701U	M30100T3-RPD-E + M301N2T-PRB*15	M3A-0806*17	

- *1. CPU board, E8a on-chip debugging emulator, software (High-Performance Embedded Workshop integrated development environment, M3T-NC30WA C compiler package evaluation version, E8a emulator software, Flash Development Toolkit evaluation version), etc., are included. Depending on the shipping date, the bundled software may include products or versions that are not the most recent ones available. The latest versions may be downloaded (free of charge) from the Renesas Technology Web site (http://www.renesas.com/download). M3T-MR30/4 is a general term referring to the real-time OS development kit (M3T-MR30K/4) and the mass production contract (M3T-MR30S/4)
- The M3T-NC30WA includes an integrated development environment (High-Performance Embedded Workshop), C compiler, assembler and simulator debugger. MISRA C rule checking functionality may be added by installing the optional SQMlint MISRA C rule checker (Part No.: R0C00000SCW01R).
- High-performance Embedded Workshop is included with C compiler package and Emulator debugger.
- The E8a emulator (Part No.: R0E00008AKCE00) includes emulator software (High-Performance Embedded Workshop integrated development environment, E8a emulator software, compiler evaluation version, Flash Development Toolkit evaluation version). Depending on the shipping date, the bundled software may include products or versions that are not the most recent ones available. The latest versions may be downloaded (free of charge) from the Renesas Technology Web site (http://www.renesas.com/download)
- Each emulator or MCU unit includes an emulator debugger. Depending on the shipping date, the bundled emulator debugger may include products or versions that are not the most recent ones available. The latest versions may be downloaded (free of charge) from the Renesas Technology Web site (http://www.renesas.com/download).
- Allocation of emulation memory to an external area and microprocessor mode are supported using the optional R0E33062PMSRC0 emulation memory board.
- Signal converter board for the M16C/6S0 in the M16C/6S Group.
- *10. May be used with the combination of the PC4701U emulator, M3062PT3-RPD-E emulation pod only when the MCU operating frequency is 16MHz or less.
- *11. The M306N4 and M306NK in the M16C/6N Group can be used with the combination of the PC4701U emulator and M306NKT3-RPD-E emulation pod only when the MCU operating frequency is 16MHz or less
- *12. May be used with the combination of the PC4701U emulator, M3062PT3-RPD-E and M306S0T-PRB emulation pod only when the MCU operating frequency is 16MHz or less.
- *13. May be used with the combination of the PC4701U emulator, M3062PT3-RPD-E emulation and M30396T-PRB only when the MCU operating frequency is 16MHz or less.
- *14. Signal converter board for the M16C/39P Group. *15. Pod probe for the M16C/1N Group.
- *16. A variety of compatible programmers are available from our partner vendors. Contact the manufacturer regarding programmer details, supported MCUs and suitability for installation in a mass production or factory environment.
- *17. The data flash area cannot be reprogrammed.
- *18. Advantest Corporation's R4945 or R4945A programmer and PCA7413F-80 program writer adapter for the PRQP0080JA-A (formerly 80P6S-A) package or PCA7412F-100 program writer
- adapter for the PRQP0100JB-A (formerly 100P6S-A) package may be used to program the M16C/62A one-time PROM.

 *19. Flash Development Toolkit (Part No.: R0C00000FDW04R) is available in a product version (with technical support) and an evaluation version (without technical support). The E8a emulator is necessary for programming. Visit the Renesas Technology Web site (http://www.renesas.com/fdt) to confirm support details for specific MCU product numbers.
- *20. The IC socket board is a programming adapter that supports a specific programmer.
 *21. MCU unit(optional) and a converter board for connecting to target MCU are needed. Please refer to the list "Converter Board for M16C/64 Group and M16C/65 Group in M16C/60 Series"

Development Tools List

Converter Board for M16C/64 Group and M16C/65 Group in M16C/60 Series

	Corios	Croun	Targe	Target MCU						
	Series	Group	Package type	Package name	Previous code	Converter board				
	M16C/60	M16C/64**	100 pin 0.5mm pich LQFP	PLQP0100KB-A	100P6Q-A	R0E0100TNPFK00				
		M16C/65**	100 pin 0.65mm pich QFP	PRQP0100JD-B	100P6F-A	R0E0100TNPFJ00				

^{★★:} Under Develpment

Set Package of Compact Emulators for M16C/62P and M16C/30P Group

Series	Group	Targe	et MCU		Product Type name	Components*1	
Series	Group	Package type	Package name	Previous code	Product Type name	Components	
		80 pin 0.65mm pich QFP	PROP0080 IA-A	80P6S-A	M3062PT3-CPE-1	Compact emulator M3062PT3-CPE*2	
		oo piir o.oomiin picir Qi i	THE COOLA	001 00 A	WI30021 13-01 L-1	Converter board M3062PT-80FPB	
						Compact emulator M3062PT3-CPE *2	
					M3062PT3-CPE-2	Converter board M30800T-PTC	
M16C/60	M16C/62P	100 pin 0.65mm pich QFP	PRQP0100JB-A	100P6S-A		IC socket IC61-1004-051	
M16C/30					M3062PT3-CPE-5	Compact emulator M3062PT3-CPE*2	
W 16C/30	M16C/30P				WISOOZI 13-CI L-3	Converter board M3T-F160-100NRB	
		100 pin 0.5mm pich LQFP	DI ODO100KB-A	100P6O-A	Maneapta CDE a	Compact emulator M3062PT3-CPE*2	
		100 piii 0.3iiiii picii EQi i	LQI 0100KD-A	1001 0Q-A	WI3002F 13-CFE-3	Converter board M3T-F160-100NSD	
		128 pin 0.5mm pich LQFP	DI ODO130KD A	128P6∩-∆	M3063DT3-CDE-4	Compact emulator M3062PT3-CPE*2	
		120 pin 0.5min pich EQL	I LQI 0120ND-A	1201 0Q-A	10100021 13-0FE-4	Converter board M3T-FLX-128NRD	

^{*1.} For debugging, the combination of a compact emulator and a converter board supporting the target MCU are used to connect to the user's system.

60 30 20 10 Accessories for M16C/60, 30, 20 and 10 Series

	MCU				Accessor	ies	Franklatan.	
Series	Group	MCU	Package type	Package name	Previous code	Recommended accessories*1	Emulator	
	M160	2/CO A	80 pin 0.65mm pich QFP	PRQP0080JA-A	80P6S-A	M3T-FLX-100LCC (included) + M3T-100LCC-80QSB (optional)		
		C/62M	100 pin 0.5mm pich LQFP	PLQP0100KB-A	100P6Q-A	M3T-FLX-100NSD (optional)	PC4701U	
	WITOC	/OZIVI	100 pin 0.65mm pich QFP	PRQP0100JB-A	100P6S-A	M3T-FLX-100NRB (optional)		
			80 pin 0.65mm pich QFP	PRQP0080JA-A	80P6S-A	M3062PT-80FPB (optional)		
	M160	NeoN	100 pin 0.4mm pich TQFP	PTQP0100LB-A	100PFB-A	M3T-F160-100NSE (optional)	PC4701U	
	IVITOC	J/02IN	100 pin 0.5mm pich LQFP	PLQP0100KB-A	100P6Q-A	M3T-F160-100NSD (optional)	FC47010	
			100 pin 0.65mm pich QFP	PRQP0100JB-A	100P6S-A	M3T-F160-100NRB (optional)		
			80 pin 0.65mm pich QFP	PRQP0080JA-A	80P6S-A	M3062PT-80FPB (optional)		
	Misc	\62D	100 pin 0.5mm pich LQFP PLQP0100KB-A 100P6Q-A M3T-F160-100NSD (optional)		M3T-F160-100NSD (optional)	PC7501		
M16C/60	M16C/62P		100 pin 0.65mm pich QFP	PRQP0100JB-A	100P6S-A	M3T-F160-100NRB (optional)	FC/301	
W 100/00			128 pin 0.5mm pich LQFP	PLQP0128KB-A	128P6Q-A	M3T-F160-128NRD (optional)		
	M16C/6V	M306V7	100 pin 0.65mm pich QFP	PRQP0100JB-A	100P6S-A	M3T-F160-100NRB (optional)	PC4701U	
		M306N4	100 pin 0.5mm pich LQFP	PLQP0100KB-A	100P6Q-A	M3T-F160-100NSD (optional)		
		M306N5	100 pin 0.65mm pich QFP	PRQP0100JB-A	100P6S-A	M3T-F160-100NRB (optional)		
	M16C/6N	M306NK M306NL	100 pin 0.5mm pich LQFP	PLQP0100KB-A	100P6Q-A	M3T-F160-100NSD (optional)	PC7501	
		M306NM M306NN	128 pin 0.5mm pich LQFP	PLQP0128KB-A	128P6Q-A	M3T-F160-128NRD (optional)		
	M16C/6H	M306H7	100 pin 0.65mm pich QFP	PRQP0100JB-A	100P6S-A	M30800T-PTC (included) + LCC Socket (included)	PC4701U	
	M16C/6S	M306S0	64 pin 0.5mm pich LQFP	PLQP0064KB-A	64P6Q-A	*2	PC7501	
	M16C/30P	M30302	100 pin 0.5mm pich LQFP	PLQP0100KB-A	100P6Q-A	M3T-F160-100NSD (optional)		
M16C/30		M30304	100 pin 0.65mm pich QFP	PRQP0100JB-A	100P6S-A	M3T-F160-100NRB (optional)	PC7501	
	M16C/39P	M30392	100 pin 0.65mm pich QFP	PRQP0100JB-A	100P6S-A	M3T-F160-100NRB (optional)		
M16C/20	M16C/24	M30245	100 pin 0.5mm pich LQFP	PLQP0100KB-A	100P6Q-A	M3T-FLX-100NSD (included)	PC4701U	
M16C/10	M16C/1N	M301N2	48 pin 0.5mm pich LQFP	PLQP0048KB-A	48P6Q-A	M30102T-PTC (optional)	PC4/01U	

^{*1.} A variety of other accessories are available. Visit the Renesas Technology Web site (http://www.renesas.com/accessory) for details *2. Accessories are attached to signal converter board M306S0T-PRB.

(included): Included with compact emulator, emulation pod or probe.

(optional): Not included with compact emulator, emulation pod or probe. Purchase it separately.

Compact emulators and converter boards can be purchased individually.

*2. With the optional emulation memory board R0E33062PMSRC0, emulation memory allocation function and microprocessor mode are available.

Operating Environment for M16C/60, 30, 20 and 10 Series Software Tools

Product type	Product name	Host machine (OS)*8
RTOS	M3T-MR30/4*1	IBM PC/AT Compatibles (Windows® XP, 2000)
C compiler package	M3T-NC30WA*2	IBM PC/AT Compatibles (Windows® XP, 2000)
MISRA C rule checker	SQMlint*3	IBM PC/AT Compatibles (Windows® XP, 2000)
IDE	High-performance Embedded Workshop*4	IBM PC/AT Compatibles (Windows® XP, 2000)
Simulator debugger	Simulator Debugger for M16C and R8C/Tiny Series*5	IBM PC/AT Compatibles (Windows® XP, 2000)
Emulator debugger	PC7501 Emulator Debugger for M16C and R8C/Tiny Series*6 PC4701 Emulator Debugger for M16C Series*6 Compact Emulator Debugger for M16C and R8C/Tiny Series*6 FoUSB/UART Debugger for M16C and R8C/Tiny Series*6 E8a Emulator Software*6	IBM PC/AT Compatibles (Windows® XP, 2000)
Flash Development Toolkit	Flash Development Toolkit*7	IBM PC/AT Compatibles (Windows® XP, 2000)

^{*1.} M3T-MR30/4 is a general term referring to the real-time OS development kit (M3T-MR30K/4) and the mass production contract (M3T-MR30S/4).
*2. The M3T-NC30WA includes an integrated development environment (High-Performance Embedded Workshop),

C compiler, assembler and simulator debugger.

*3. SQMlint MISRA C rule checker (Part No.: R0C00000SCW01R) is sold as the optional product of Renesas C compiler.

^{*4.} High-performance Embedded Workshop is included with C compiler package and Emulator debugger.

^{*5.} Simulator debugger is included with C compiler package.
*6. Emulator debugger is bundled with emulators.

^{*7.} Flash Development Toolkit (Part No.: R0C00000FDW04R) is available in a product version (with technical support) and an evaluation version (without technical support). The E8a emulator (Part No.: R0E00008AKCE00) is necessary for programming.

*8. Please refer to the following URL for Windows Vista.

http://www.renesas.com/tool_env

Development Tools List

Development Tools for M16C/Tiny Series

MCU			Introductory tools	y tools Software tools				ulator (Emulator s	software is in	cluded.*6)	Programmi	ng tool
Series	Group	MCU	Starter kit	RTOS	C compiler package	IDE	Onchip debugging emulator	Compact emulator	In-cire Emulator	cuit emulator Emulation probe	Flash Programmer*12	IC socket board*13
	M16C/26A		Renesas Starter Kit forM16C/26A (R0K33026AS001BE)*1	l .			mbedded (R0E00008AKCE00)		2-CPE*8 PC7501	M3028BT-EPB*9	Flash Development Toolkit*10 (R0C00000FDW04R) (E8a emulator is necessary at	48P6Q-AJ)
M16C/Tiny	M16C/28 (M16C/28, M16C/28B)	M30280 M30281	Renesas Starter Kit for M16C/29		M3T-NC30WA*3 (MISRA C*4)	High- performance Embedded Workshop*5		IM3028BT2_CPE*8				R0K3064PQZ000BR (for PLQP100KB-A [Previous code: 64P6Q-A])
	M16C/29	M30290 M30291	_			·					programming) or M3A-0806 * ¹¹	R0K3080PQZ000BR (for PLQP0080KB-A [Previous code: 80P6Q-A])

- CPU board, E8a on-chip debugging emulator, software (High-Performance Embedded Workshop integrated development environment, M3T-NC30WA C compiler package evaluation version, E8a emulator software, Flash Development Toolkit evaluation version), etc., are included. Depending on the shipping date, the bundled software may include products or versions that are not the most recent ones available. The latest versions may be downloaded (free of charge) from the Renesas Technology Web site (http://www.renesas.com/download).
- M3T-MR30/4 is a general term referring to the real-time OS development kit (M3T-MR30K/4) and the mass production contract (M3T-MR30S/4).
- *3. The M3T-NC30WA includes an integrated development environment (High-Performance Embedded Workshop), C compiler, assembler and simulator debugger *4. MISRA C rule checking functionality may be added by installing the optional SQMlint MISRA C rule checker (Part No.: R0C00000SCW01R).
- High-performance Embedded Workshop is included with C compiler package and emulator debugger.
- Each emulator includes an emulator debugger. Depending on the shipping date, the bundled emulator debugger may include products or versions that are not the most recent ones available. The latest versions may be downloaded (free of charge) from the Renesas Technology Web site (http://www.renesas.com/download).
- The E8a emulator (Part No.: ROE00008AKCE00) includes emulator software (High-Performance Embedded Workshop integrated development environment, E8a emulator software, compiler evaluation version, Flash Development Toolkit evaluation version). Depending on the shipping date, the bundled software may include products or versions that are not the most recent ones available. The latest versions may be downloaded (free of charge) from the Renesas Technology Web site (http://www.renesas.com/download).
- M3028BT2-CPE is the successor product of the M30290T2-CPE. It supports 24MHz operation of M16C/Tiny series MCUs. The converter board for the target connection is necessary for M3028BT2-CPE. The set sales of the emulator and the converter board are also available. For details, please refer to the lists of "Set Package of Compact Emulator for M16C/Tiny Series" and "Converter Board for M16C/Tiny Series"
- M3028BT-EPB is the successor product of the M30290T-EPB. It supports 24MHz operation of M16C/Tiny series MCUs. The converter board for the target connection is necessary for M3028BT-EPB.
 - The set sales of the emulator and the converter board are also available. For details, please refer to the lists of "Set Package of PC7501 Emulation Probe for M16C/Tiny Series" and
- *10. Flash Development Toolkit (Part No.: R0C00000FDW04R) is available in a product version (with technical support) and an evaluation version (without technical support). Visit the Renesas Technology Web site (http://www.renesas.com/fdt) to confirm support details for specific MCU product numbers.
- 11. The data flash areas cannot be reprogrammed.
- *12. A variety of compatible programmers are available from our partner vendors. Contact the manufacturer regarding programmer details, supported MCUs and suitability for installation in a mass production or factory environment
- *13. The IC socket board is a programming adapter that supports a specific programmer

Set Package of Compact Emulators for M16C/Tiny Series

Series Group		MCU	Targ	get MCU		Product name	Components*1
Series	Group	IVICO	Package type	Package name	Previous code	Floudelliame	Components
	M16C/26A	M30263	42 pin 0.8mm pitch SSOP	PRSP0042GA-B	42P2R-E	M3028BT2-CPE-1	Compact emulator M3028BT2-CPE
	(M16C/26A,						Converter board M30263T-42SSB
	M16C/26B,	M30260	48 pin 0.5mm pitch LQFP	DI ODOMAKR-V	48P6Q-A	M3028BT2-CPE-2	Compact emulator M3028BT2-CPE
	M16C/26T)		40 pin 0.5min pilon EQL1	I LQI 0040ND-A	401 0Q-A	W3020D12-01 L-2	Converter board M30260T-48FPD
	(M16C/28, M30291 M16C/28B) M30280	M30281	64 pin 0.5mm pitch LQFP 80 pin 0.5mm pitch LQFP	DI ODOGAKD A	64P6Q-A	M3028BT2-CPE-3	Compact emulator M3028BT2-CPE
M16C/Tiny		M30291		FLQF0004ND-A	04F0Q-A	W3020D12-CFE-3	Converter board M30291T-64FPD
		M30280		DI ODOGGIZA A	80P6Q-A	M3028BT2-CPE-4	Compact emulator M3028BT2-CPE
		M30290	60 piii 0.5iiiiii piicii LQFF	FLQF0000KB-A	BUF UQ-A	W3020D12-CPE-4	Converter board M30290T-80FPD
-						Compact emulator M3028BT2-CPE	
	(M16C/28,	M30280	85 pin 0.65mm pitch TFLGA	PTLG0085JB-A	85F0G	M3028BT2-CPE-5	Converter board M30280T-85LGF
	M16C/28B)						Converter board M302601-65LGF

^{*1.} For debugging, the combination of a compact emulator and a converter board supporting the target MCU are used to connect to the user's system. Compact emulators and converter boards can be purchased individually.

Set Package of PC7501 Emulation Probe for M16C/Tiny Series

Series	Croun	MCU	Targ	get MCU		Product name	Components*1
Series	Group	IVICO	Package type	Package type Package name Previous code		Product name	Components
	M16C/26A	M30263	42 pin 0.8mm pitch SSOP	PBSB0043GA-B	42P2R-E	M3028BT-EPB-1	Emulation probe M3028BT-EPB
	(M16C/26A, M16C/26B, M16C/26T)	10130203	42 piii 0.6i1iiii piicii 330F	FN3F0042GA-B	42F2N-E	IVIOUZOD I-EFB-I	Converter board M30263T-42SSB
		M30260	48 pin 0.5mm pitch LQFP	DI ODOMAKB-V	48P6Q-A	M3028BT-EPB-2	Emulation probe M3028BT-EPB
		10100200	40 pin 0.5min pilon EQL	I LQI 0040KD-A	401 0Q-A	WI3020D1-L1 D-2	Converter board M30260T-48FPD
		M30281	64 pin 0.5mm pitch LQFP	PLQP0064KB-A	64P6Q-A	M3028BT-EPB-3	Emulation probe M3028BT-EPB
M16C/Tiny		M30291	04 pin 0.5min pilon EQFF	I LQI 0004ND-A	041 0Q-A	WI3020D1-EFB-3	Converter board M30291T-64FPD
	M16C/28B)	M30280	80 pin 0.5mm pitch LQFP	PLQP0080KB-A	80P6Q-A	M3028BT-EPB-4	Emulation probe M3028BT-EPB
	M16C/29	M30290	OU PIIT U.SITIITI PILCIT LQFF	FLQF0000KB-A	OUF OQ-A	WI3020D1-EFB-4	Converter board M30290T-80FPD
	M16C/28						Emulation probe M3028BT-EPB
	(M16C/28,	M30280	85 pin 0.65mm pitch TFLGA	PTLG0085JB-A	85F0G	M3028BT-EPB-5	Converter board M30280T-85LGF
	M16C/28B)						Converter board wood2001-00EGF

^{1.} For debugging, the combination of an emulation probe and a converter board supporting the target MCU are used to connect to the user's system. Emulation probes and converter boards can be purchased individually

Converter Board for M16C/Tiny Series*1

Series	Group	MCU	Tar	get MCU		Converter	
Series	Group	IVICO	Package type	Package name	Previous code	Converter	
	M16C/26A (M16C/26A,	M30263	42 pin 0.8mm pitch SSOP	PRSP0042GA-B	42P2R-E	M30263T-42SSB	
	M16C/26B, M16C/26T)	M30260	48 pin 0.5mm pitch LQFP	PLQP0048KB-A	48P6Q-A	M30260T-48FPD	
M16C/Tiny	M16C/28 (M16C/28, M16C/28B) M16C/29	M30281 M30291	64 pin 0.5mm pitch LQFP	PLQP0064KB-A	64P6Q-A	M30291T-64FPD	
		M30280 M30290	80 pin 0.5mm pitch LQFP	PLQP0080KB-A	80P6Q-A	M30290T-80FPD	
	M16C/28 (M16C/28, M16C/28B)	M30280	85 pin 0.65mm pitch TFLGA	PTLG0085JB-A	85F0G	M30280T-85LGF	

^{*1.} A variety of other accessories are available. Visit the Renesas Technology Web site (http://www.renesas.com/accessory) for details.

Operating Environment for M16C/Tiny Series Software Tools

Product type	Product name	Host machine (OS)*8
RTOS	M3T-MR30/4*1	IBM PC/AT Compatibles (Windows® XP, 2000)
C compiler package	M3T-NC30WA*2	IBM PC/AT Compatibles (Windows® XP, 2000)
MISRA C rule checker	SQMlint*3	IBM PC/AT Compatibles (Windows® XP, 2000)
IDE	High-performance Embedded Workshop*4	IBM PC/AT Compatibles (Windows® XP, 2000)
Simulator debugger	Simulator Debugger for M16C and R8C/Tiny Series*5	IBM PC/AT Compatibles (Windows® XP, 2000)
Emulator debugger	PC7501 Emulator Debugger for M16C and R8C/Tiny Series* ⁶ Compact Emulator Debugger for M16C and R8C/Tiny Series* ⁶ E8a Emulator Software* ⁶	IBM PC/AT Compatibles (Windows® XP, 2000)
Flash Development Toolkit	Flash Development Toolkit*7	IBM PC/AT Compatibles (Windows® XP, 2000)

- *1. M3T-MR30/4 is a general term referring to the real-time OS development kit (M3T-MR30K/4) and the mass production contract (M3T-MR30S/4).
 *2. The M3T-NC30WA includes an integrated development environment (High-Performance Embedded Workshop), C compiler, assembler and simulator debugger.
- *3. SQMlint MISRA C rule checker (Part No.: R0C00000SCW01R) is sold as the optional product of Renesas C compiler.
- *4. High-performance Embedded Workshop is included with C compiler package and Emulator debugger. *5. Simulator debugger is included with C compiler package.
- *6. Emulator debugger is bundled with emulators.
- *7. Flash Development Toolkit (Part No.: R0C00000FDW04R) is available in a product version (with technical support) and an evaluation version (without technical support). The E8a emulator (Part No.: R0E00008AKCE00) is necessary for programming.
- *8. Please refer to the following URL for Windows Vista. http://www.renesas.com/tool_env

Development Tools List

Development Tools for R8C/Tiny Series

M	CU	Introductory tool		Software too	ls		nulator(Emulator	software is inc	cluded.*6)	Programming	tool	
Series	Group	Starter kit*1	RTOS	C compiler	IDE	Onchip debugging emulator	Compact		cuit emulator	Flash	IC socket	
COLICO		Otario ni		package*3	IDE	emulator	emulator	Emulator	Emulation probe or MCU unit	Programmer*12	board*13	
	R8C/18	_								Flash Development Toolkit ^{*10} (E8a emulator is		
	R8C/19										MOA 0444	
	R8C/1A	Renesas Starter Kit for R8C/1B									M3A-0114	
	R8C/1B	(R0K5211B4S001BE)										
	R8C/20											
	R8C/21	Renesas Starter Kit								necessary at programming) or	D0//5040007000DD	
	R8C/22	for R8C/23 (R0K521237S001BE)								M16C Flash Starter	R0K521238Z000BR	
	R8C/23									M3A-0806*11		
	R8C/24	Renesas Starter		MOTING 20WA High-		E8a (R0E00008AKCE00)	R0E521000CPE00	PC7501	R0E521000EPB00			
	R8C/25	Kit for R8C/25 (R0K521256S001BE)			*7	~**		~9		R0K521258Z000BR		
	R8C/26	Renesas Starter Kit								Flash Development Toolkit*10 (R0C00000FDW04R) (E8a emulator is necessary at	R0K521276Z000BR	
	R8C/27	for R8C/27 (R0K521276S001BE)									11010212702000011	
	R8C/28				Embedded	bedded					M3A-0114	
R8C/Tiny	R8C/29	_			Workshop*⁵						MOX OTT	
1100/Tilly	R8C/2A										programming)	**
	R8C/2B									M16C Flash Starter M3A-0806*11		
	R8C/2C	Renesas Starter Kit for R8C/2D									R0K5212D8Z000BR	
	R8C/2D	(R0K5212D8S001BE)										
	R8C/2E*					E8a						
	R8C/2F*											
	R8C/2G*						_	_		Flash Development Toolkit		
	R8C/2H*	_				(R0E00008AKCE00)				(R0C00000FDW04R)*10 (E8a emulator is		
	R8C/2J *									necessary at programming)	_	
	R8C/2K*						R0E521000CPE00	PC7501	R0E521000EPB00 *9			
	R8C/2L*						***		*9	Flash Development	_	
	R8C/32A**					E8a		E100		Toolkit (R0C00000FDW04R)*10		
	R8C/33A**	**				(R0E00008AKCE00)	_	(R0E001000 EMU00) *15	_	(E8a emulator is		
	R8C/35A**							*15		necessary at programming)		

- CPU board, E8a on-chip debugging emulator, software (High-Performance Embedded Workshop integrated development environment, M3T-NC30WA C compiler package evaluation version, E8a emulator software. Flash Development Toolkit evaluation version), etc., are included. Depending on the shipping date, the bundled software may include products or versions. that are not the most recent ones available. The latest versions may be downloaded (free of charge) from the Renesas Technology Web site (http://www.renesas.com/download).
- The M3T-NC30WA includes an integrated development environment (High-Performance Embedded Workshop), C compiler, assembler and simulator debugger
- Evaluation version of C compiler package exits.
- MISRA C rule checking functionality may be added by installing the optional SQMlint MISRA C rule checker (Part No.: R0C00000SCW01R)
- High-performance Embedded Workshop is included with C compiler package and Emulator debugger
- Each emulator includes an emulator debugger. Depending on the shipping date, the bundled emulator debugger may include products or versions that are not the most recent ones available. The latest versions may be downloaded (free of charge) from the Renesas Technology Web site (http://www.renesas.com/download).
- The E8a emulator (Part No.: ROE00008AKCE00) includes emulator software (High-Performance Embedded Workshop integrated development environment, E8a emulator software, compiler evaluation version, Flash Development Toolkit evaluation version). Depending on the shipping date, the bundled software may include products or versions that are not the most recent ones available.
- The latest versions may be downloaded (free of charge) from the Renesas Technology Web site (http://www.renesas.com/download)
- The converter board for the target connection is necessary for R0E521000CPE00. The set sales of the emulator and the converter board are also available. For details, please refer to the lists of Set Package of Compact Emulator for R8C/Tiny Series.
- The converter board for the target connection is necessary for R0E521000EPB00. The set sales of the emulator and the converter board are also available. For details, please refer to the lists of "Set Package of PC7501 Emulation Probe for R8C/Tiny Series"
- *10. Flash Development Toolkit (Part No.: R0C00000FDW04R) is available in a product version (with technical support) and an evaluation version (without technical support). Visit the Renesas Technology Web site (http://www.renesas.com/fdt) to confirm support details for specific MCU product numbers.
- *11. Flash Programmer which supports standard serial I/O mode 2 (UART) and includes the M16C Flash Starter Software (for Windows)
- *12. A variety of compatible programmers are available from our partner vendors. Contact the manufacturer regarding programmer details, supported MCUs and suitability for installation in a mass production or factory environment.
- *13. The IC socket board is a programming adapter that supports a specific programmer.
 *14. M3T-MR30/4 is a general term referring to the real-time OS development kit (M3T-MR30K/4) and the mass production contract (M3T-MR30S/4).
- *15. MCU unit(under development) and the converter board(under development) for connecting to MCU are needed.
- **: Under development or evaluation: product name may be changed. When MCU is under development, restrictions and other limitation for tools may arise

Operating Environment for R8C/Tiny Series Software Tools

Product type	Product name	Host machine (OS)*7
RTOS	M3T-MR30/4*8	IBM PC/AT Compatibles (Windows® XP, 2000)
C compiler package	M3T-NC30WA*1	IBM PC/AT Compatibles (Windows® XP, 2000)
MISRA C rule checker	SQMlint*2	IBM PC/AT Compatibles (Windows® XP, 2000)
IDE	High-performance Embedded Workshop*3	IBM PC/AT Compatibles (Windows® XP, 2000)
Simulator debugger	Simulator Debugger for M16C and R8C/Tiny Series*4	IBM PC/AT Compatibles (Windows® XP, 2000)
Emulator debugger	PC7501 Emulator Debugger for M16C and R8C/Tiny Series*5 Compact Emulator Debugger for M16C and R8C/Tiny Series*5 E8a Emulator Software*5	IBM PC/AT Compatibles (Windows® XP, 2000)
Flash Development Toolkit	Flash Development Toolkit*6	IBM PC/AT Compatibles (Windows® XP, 2000)

- *1. The M3T-NC30WA includes an integrated development environment (High-Performance Embedded Workshop), C compiler, assembler and simulator debugger
- *2. SQMlint MISRA C rule checker (Part No.: R0C00000SCW01R) is sold as the optional product of Renesas C compiler.
- *3. High-performance Embedded Workshop is included with C compiler package and Emulator debugger.
 *4. Simulator debugger is included with C compiler package.
- *5. Emulator debugger is bundled with emulators.
- *6. Flash Development Toolkit (Part No.: R0C00000FDW04R) is available in a product version (with technical support) and an evaluation version (without technical support).
 - The E8a emulator (Part No.: R0E00008AKCE00) is necessary for programming.
- *7. Please refer to the following URL for Windows Vista. http://www.renesas.com/tool_env
- *8. M3T-MR30/4 is a general term referring to the real-time OS development kit (M3T-MR30K/4) and the mass production contract (M3T-MR30S/4).

set Package of Compact Emulator for R8C/Tiny Series

Target MCU			Components (Compact emulator and converter board are also sold separately		
Group	Package name	Product name	Compact emulator	Converter board*1	
R8C/18 R8C/19	PLSP0020JB-A *Previous code : 20P2F-A (20-pin 0.65mm-pitch LSSOP)	R0E521174CPE00		R0E521174CSJ00	
R8C/1A R8C/1B	PRDP0020BA-A *Previous code : 20P4B (20-pin 1.778mm-pitch SDIP)	R0E521174CPE10		R0E521174CDB00	
R8C/20 R8C/21 R8C/22 R8C/23	PLQP0048KB-A *Previous code : 48P6Q-A (48-pin 0.5mm-pitch LQFP)	R0E521237CPE00		R0E521237CFK00	
R8C/24 R8C/25	PLQP0052JA-A *Previous code : 52P6A-A (52-pin 0.65mm-pitch LQFP)	R0E521258CPE00		R0E521258CFJ00	
R8C/26 R8C/27	PLQP0032GB-A *Previous code : 32P6U-A (32-pin 0.8mm-pitch LQFP)	R0E521276CPE00	R0E521000CPE00	R0E521276CFG00	
R8C/28 R8C/29	PLSP0020JB-A *Previous code : 20P2F-A (20-pin 0.65mm-pitch LSSOP)	R0E521174CPE00		R0E521174CSJ00	
R8C/2A	PLQP0064KB-A *Previous code : 64P6Q-A (64-pin 0.5mm-pitch LQFP)	R0E5212BACPE10		R0E5212BACFK00	
R8C/2B	PLQP0064GA-A *Previous code : 64P6U-A (64-pin 0.8mm-pitch LQFP)	R0E5212BACPE00		R0E5212BACFG00	
R8C/2C R8C/2D	PLQP0080KB-A *Previous code : 80P6Q-A (80-pin 0.5mm-pitch LQFP)	R0E5212DACPE00		R0E5212DACFK00	
R8C/2K* R8C/2L*	PLQP0032GB-A *Previous code : 32P6U-A (32-pin 0.8mm-pitch LQFP)	R0E5212L4CPE00		R0E5212L4CFG00	

^{*1.} Converter board, socket for user system connection and user's manual are included.

* : New Product

Development Tools List

Set Package of PC7501 Emulation Probe for R8C/Tiny Series

	Target MCU	Dec deset a con-	Product name Components (Compact emulator and converter board are	
Group	Package name	Product name	Compact emulator	Converter board *1
R8C/18 R8C/19	PLSP0020JB-A *Previous code : 20P2F-A (20-pin 0.65mm-pitch LSSOP)	R0E521174EPB00		R0E521174CSJ00
R8C/1A R8C/1B	PRDP0020BA-A *Previous code : 20P4B (20-pin 1.778mm-pitch SDIP)	R0E521174EPB10		R0E521174CDB00
R8C/20 R8C/21 R8C/22 R8C/23	PLQP0048KB-A *Previous code : 48P6Q-A (48-pin 0.5mm-pitch LQFP)	R0E521237EPB00		R0E521237CFK00
R8C/24 R8C/25	PLQP0052JA-A *Previous code : 52P6A-A (52-pin 0.65mm-pitch LQFP)	R0E521258EPB00		R0E521258CFJ00
R8C/26 R8C/27	PLQP0032GB-A *Previous code : 32P6U-A (32-pin 0.8mm-pitch LQFP)	R0E521276EPB00	R0E521000EPB00	R0E521276CFG00
R8C/28 R8C/29	PLSP0020JB-A *Previous code : 20P2F-A (20-pin 0.65mm-pitch LSSOP)	R0E521174EPB00		R0E521174CSJ00
R8C/2A	PLQP0064KB-A *Previous code : 64P6Q-A (64-pin 0.5mm-pitch LQFP)	R0E5212BAEPB10		R0E5212BACFK00
R8C/2B	PLQP0064GA-A *Previous code : 64P6U-A (64-pin 0.8mm-pitch LQFP)	R0E5212BAEPB00		R0E5212BACFG00
R8C/2C R8C/2D	(PLQP0080KB-A *Previous code : 80P6Q-A (80-pin 0.5mm-pitch LQFP)	R0E5212DAEPB00		R0E5212DACFK00
R8C/2K* R8C/2L*	PLQP0032GB-A *Previous code : 32P6U-A (32-pin 0.8mm-pitch LQFP)	R0E5212L4EPB00		R0E5212L4CFG00

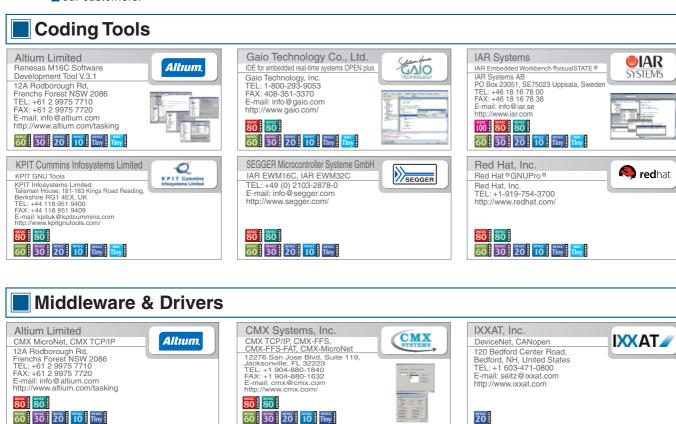
^{*1.} Converter board, socket for user system connection and user's manual are included.

*: New product

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Powerful alliances between Renesas and its partner companies support the product development work of our customers.







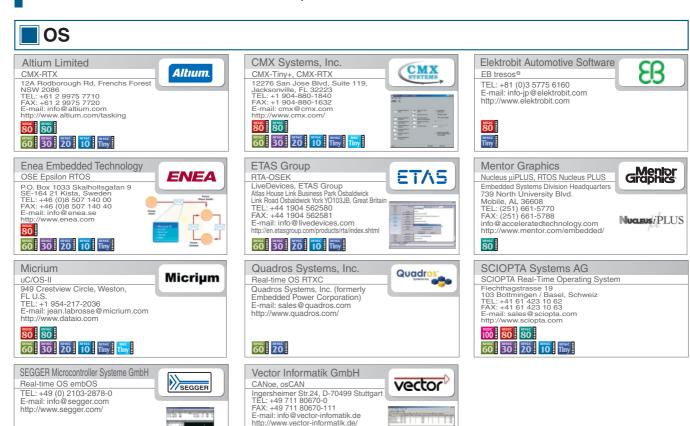


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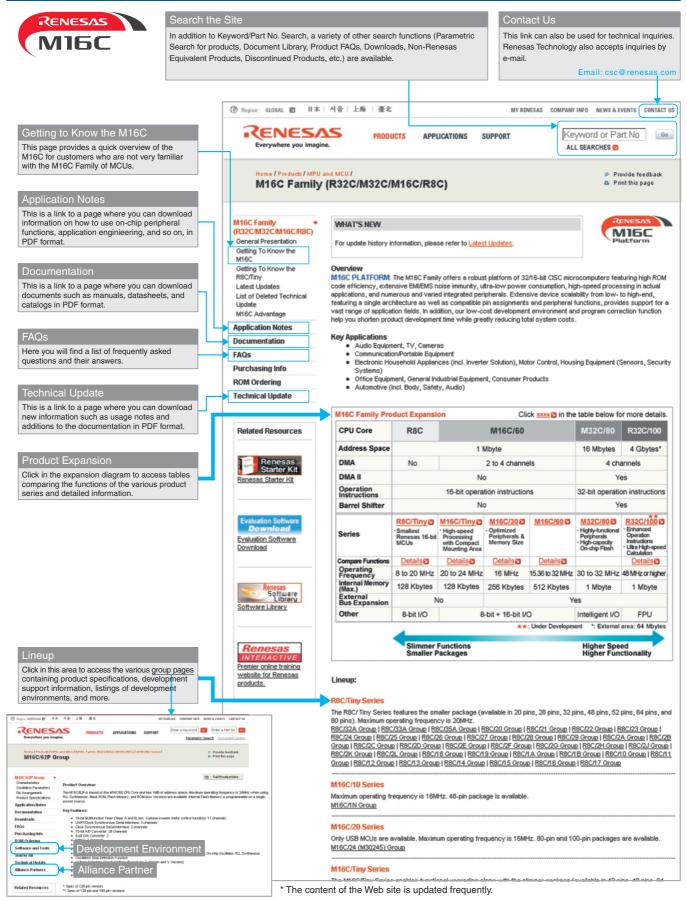
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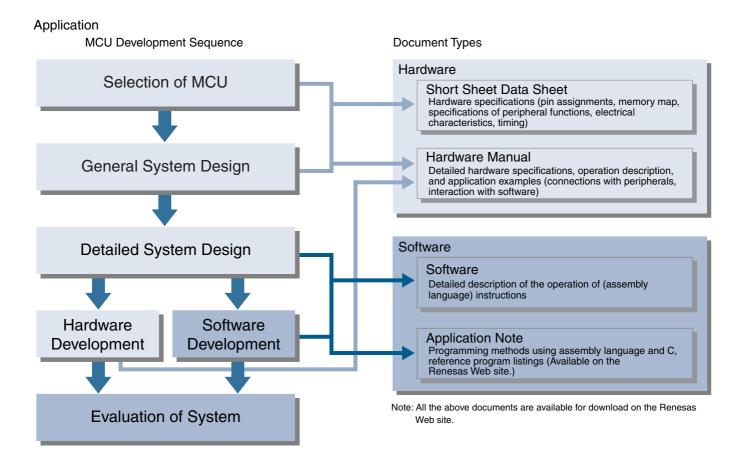
Overview of Web Site

Visit the Web site for assistance in choosing M16C Family products and for the latest technical information for use in system development.

Renesas M16C Family Web Page http://www.renesas.com/en/m16c



Documentation



Application Notes

In addition to the manuals for each product, a large number of application notes are available that customers can make immediate use of in their programs.

List of Application Note Categories					
A/D Converters	D/A Converters	Flash Memory			
l ² C-bus	Intelligent I/O	Interrupts			
Noise	CRC	Program Security			
Resets	Serial Interfaces	PWM Timers for 3-Phase Motor Drive			
Timers	Watchdog Timers	DMAC			
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Applications	Motors	Inverter			
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