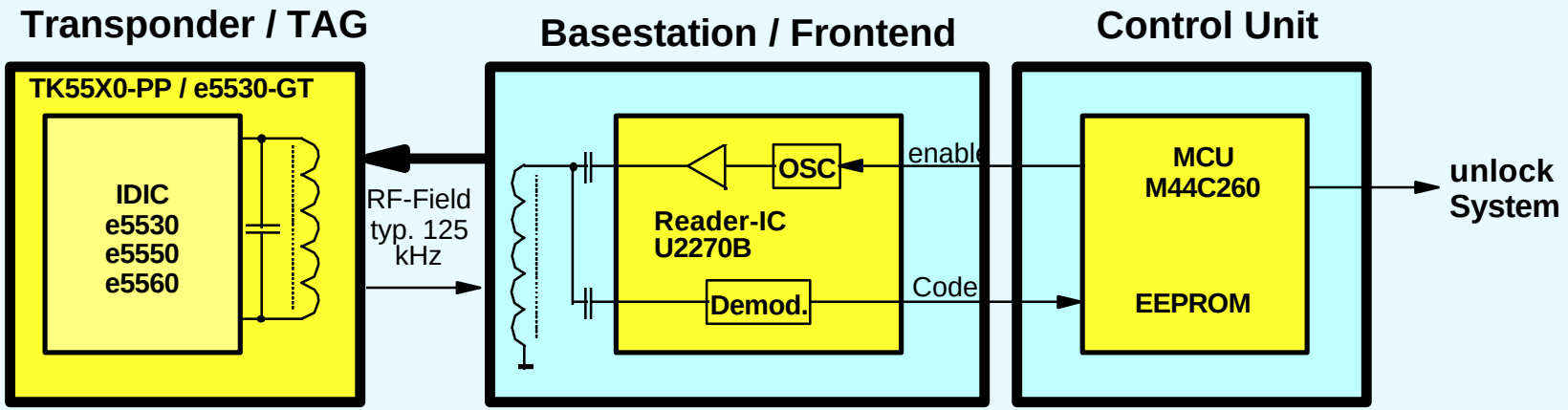
Agenda

- Definition
- Product positioning
- Technical review
- Applications (Automotive)
- Key Features
- Key Benefits

IDentification IC - Overall Focus -

- Identification Systems are within TEMIC's strategic direction
- One Identification team now responsible for IDIC, Transponder, Reader IC, System concepts and application support
- We offer system solutions, components and system support
- Applications include identification of objects, access authorization and anti-theft protection

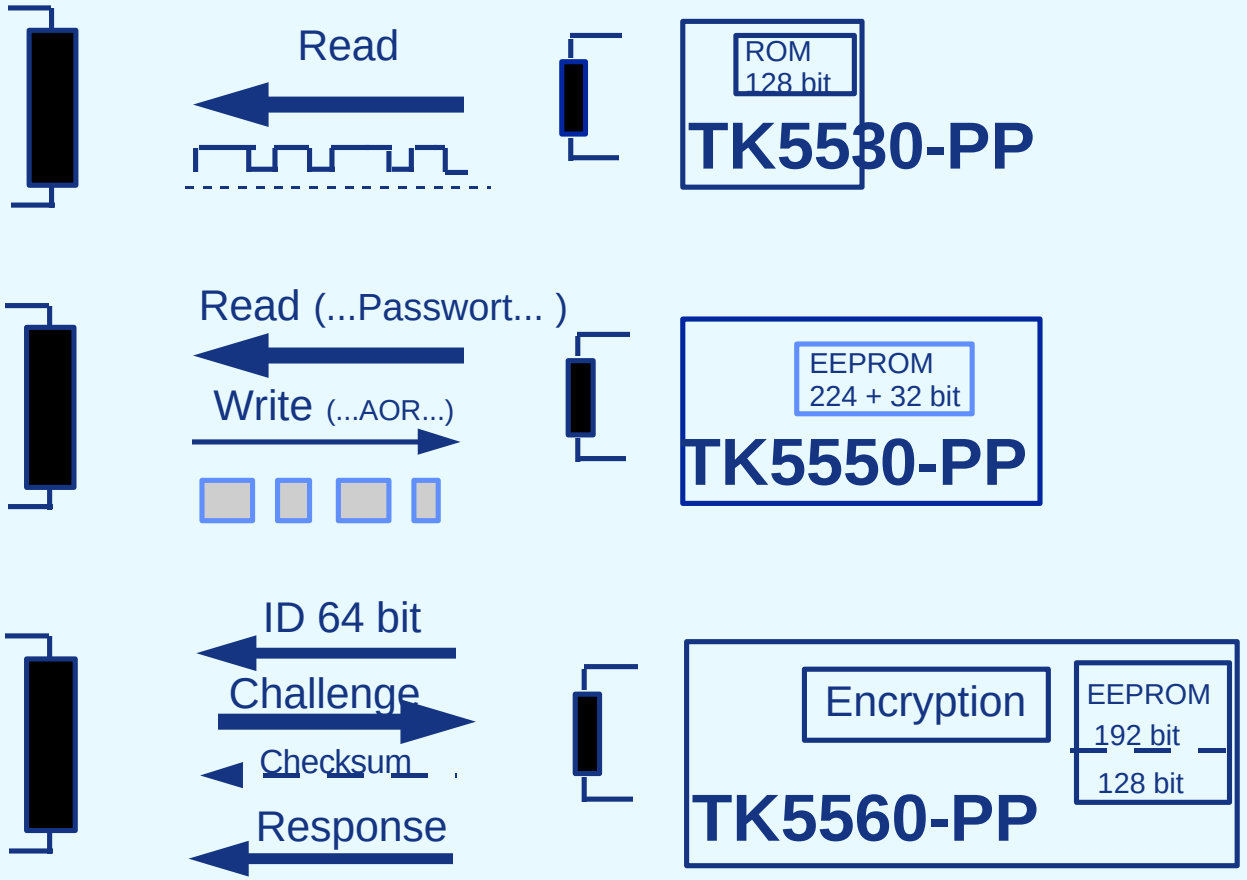


IDentification IC - Transponder -

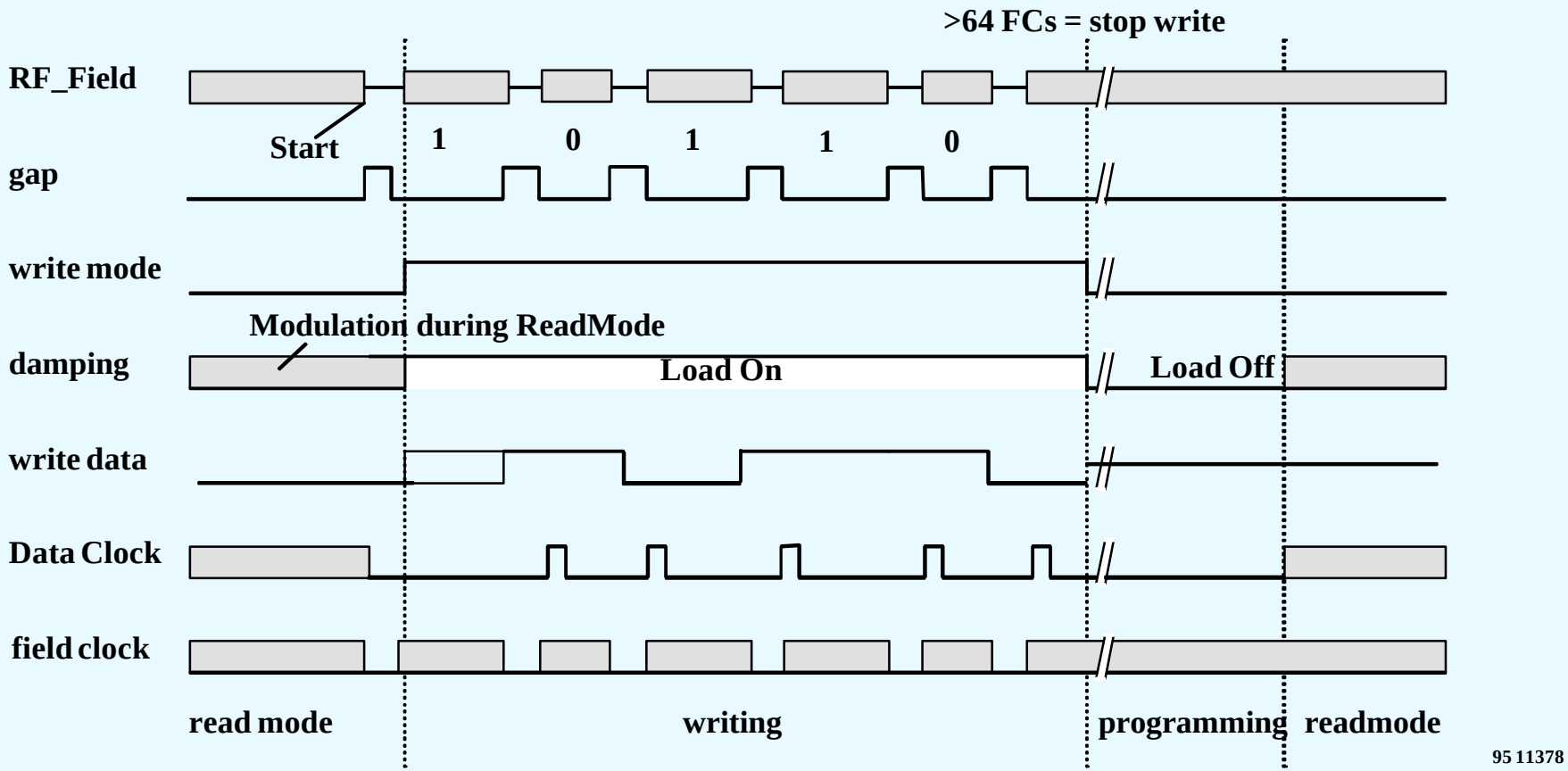
- Plastiktransponder
  - size: 12,05 x 5,9 x 3 mm
  - frequency: 125 kHz
  - automotive applications
  - larger read distance
  - production 800 Kpcs with TK 5530 now
  - carries e5530 / e5550 / e5560
  - samples available in-line with IDIC (IC)
  - high volume production line in preparation

- Glastransponder
  - size: 12 x 2,12 mm
  - smallest size on the market!
  - frequency: 125 kHz
  - animal and automotive
  - 3 Mill. pieces manufactured
  - qualified for automotive
  - carries e5530 IDIC

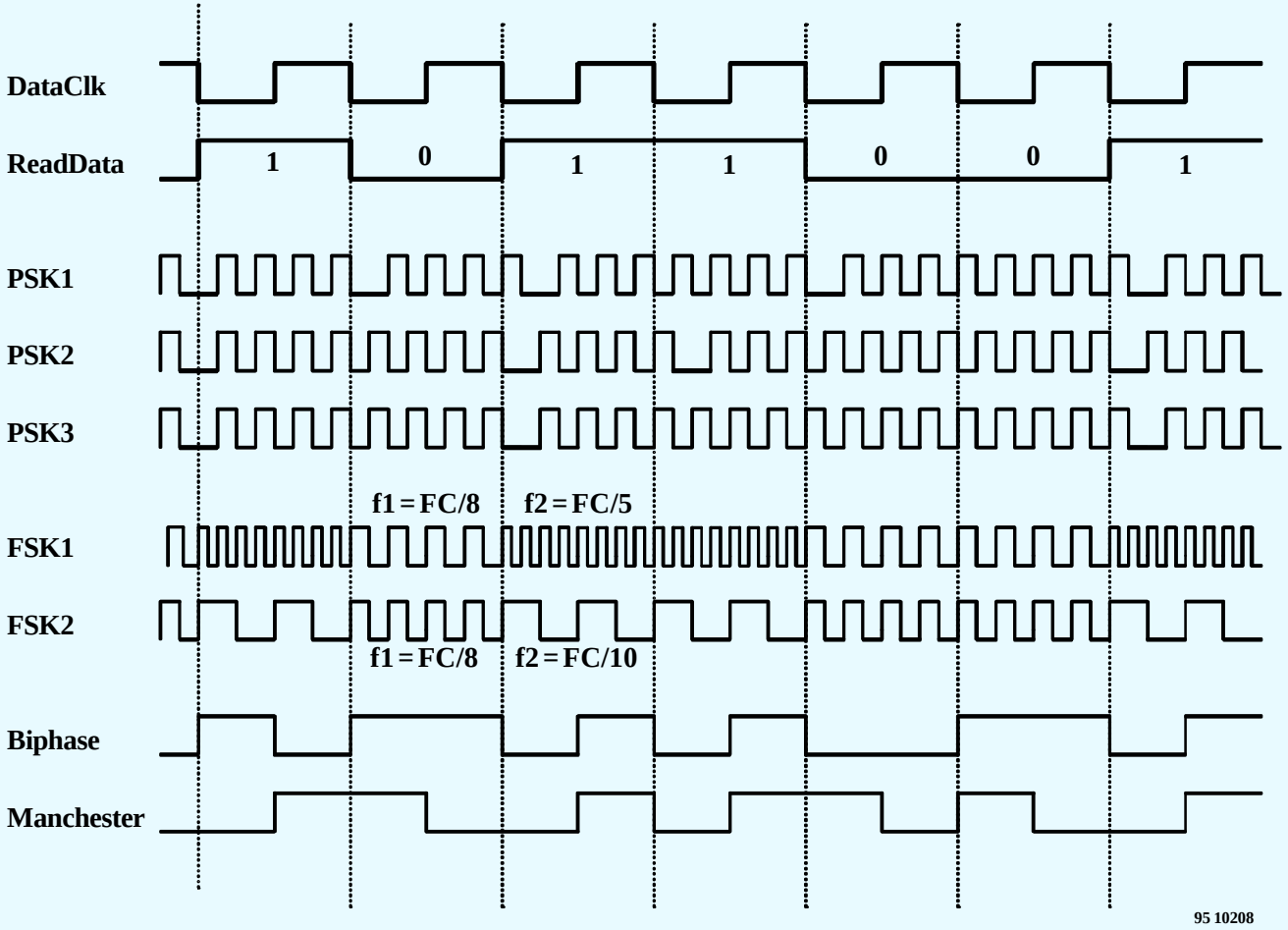
Transponder : Basic Features



TK5550 / TK5560 Signals during writing



Modulation modes

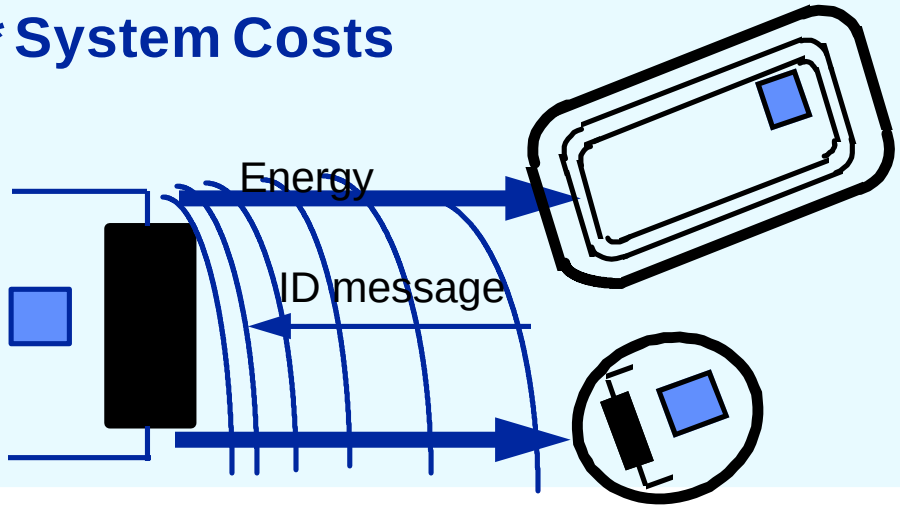


5530	5550	5560	U2 270
X	X		
X	X		
X	X	X	X
X	X	X	X

IDENTIFICATION

System Components to identify Objects and Persons

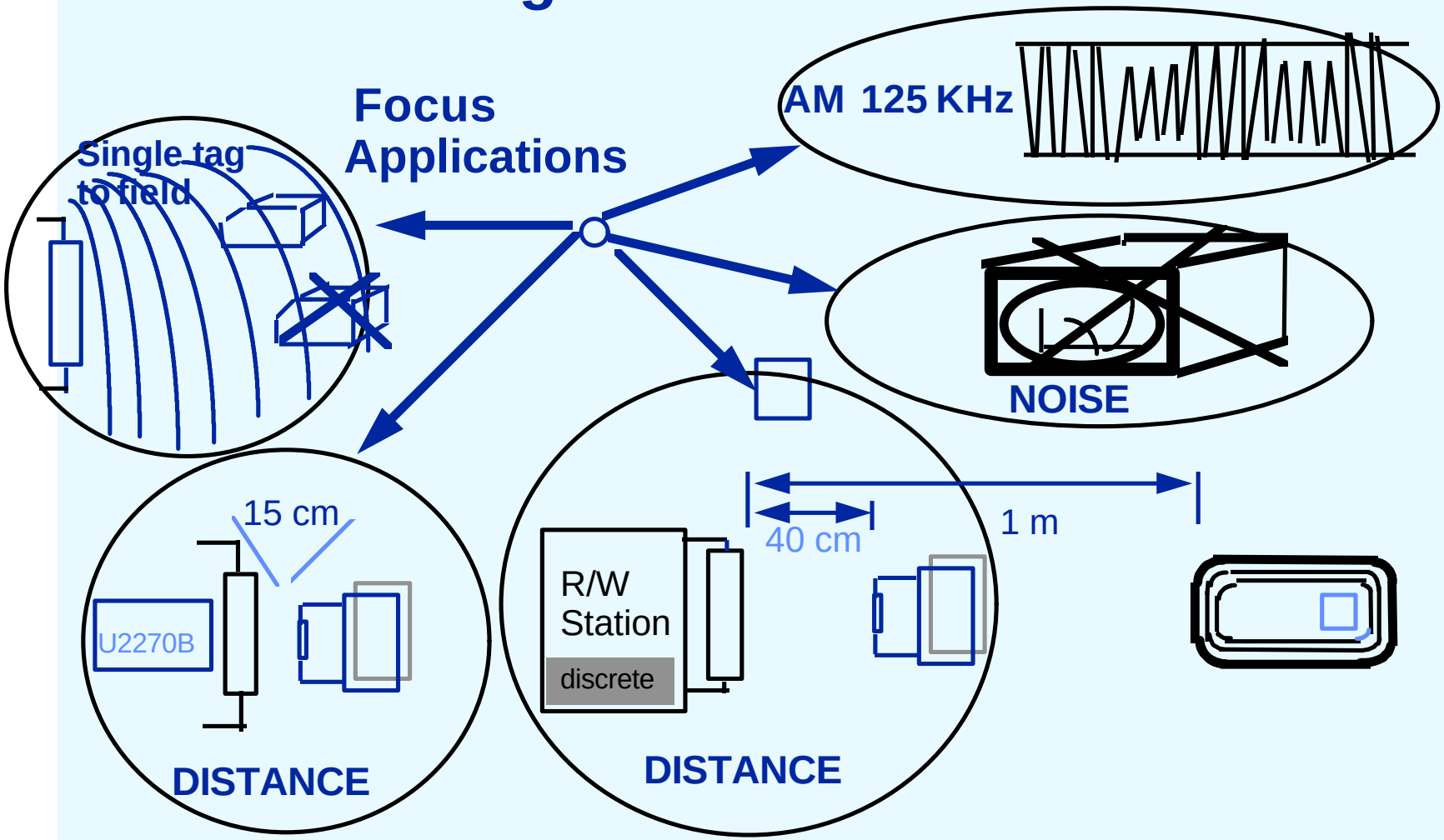
* Short ID-codes
* Mobile data carrier (no battery !)
* Contactless
* Data Integrity & Safety
* Flexibility
* Smart
* System Costs



Customers Design Priority:

R / W Base Station

Focus for design in



System design: Key parameters

Q-Factor

$Q = f_0 / B$

$Q = V_R / V_{DRV}$

$Q_{autom} = 12$ (recommeded)
$Q_{max} = 15$

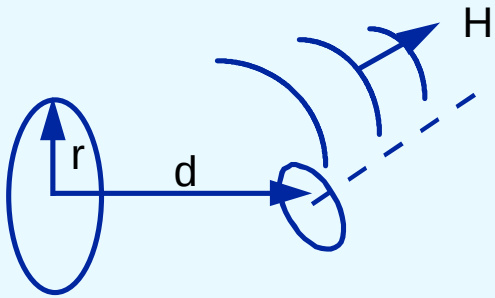
Increased Q = reduced bandwith

Optimize Q between 5 ...15
* >> Lock cylinder influence increased
* << Induced signal voltage reduced

K Coupling factor

K= f (1/d; r; position)

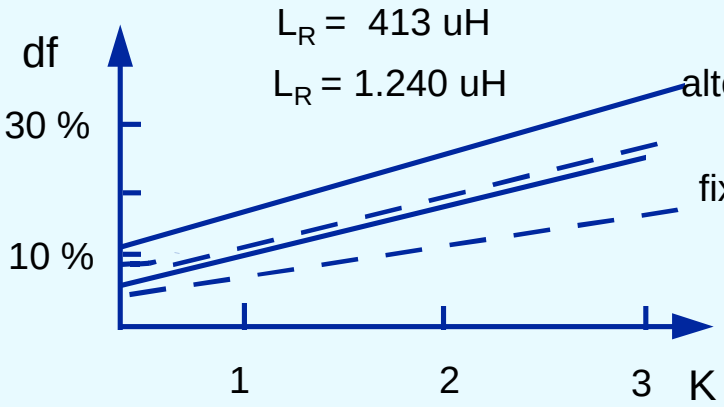
Increased K by
*smallest acceptable distance d
*biggest acceptable reader coil diameter r
*best compromise for position



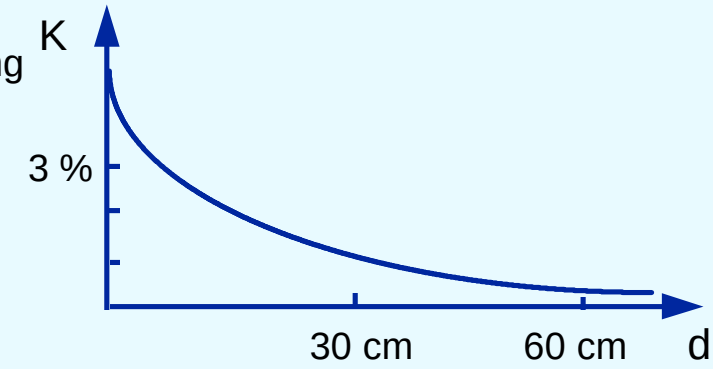
Frequency tolerance / Signal voltage

Single f_O	optimized K and df_O	++ component; ++ uC;
Double f_{O1} / f_{O2}		++ df_O; - - periphery / uC
df_O= inacceptable	>> K ; << df_O	

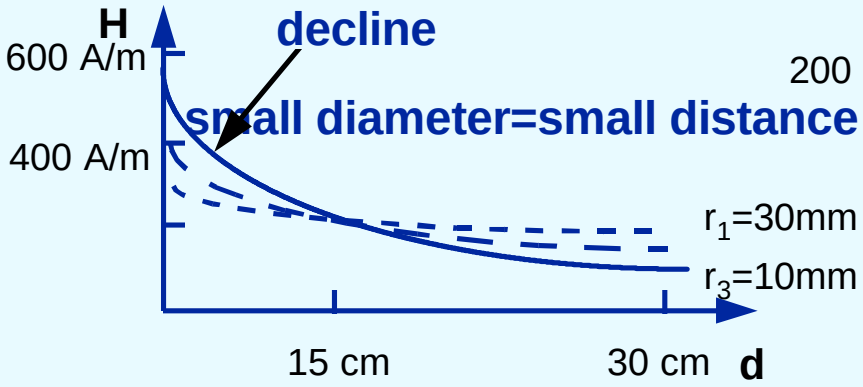
System design : Key parameters (2)



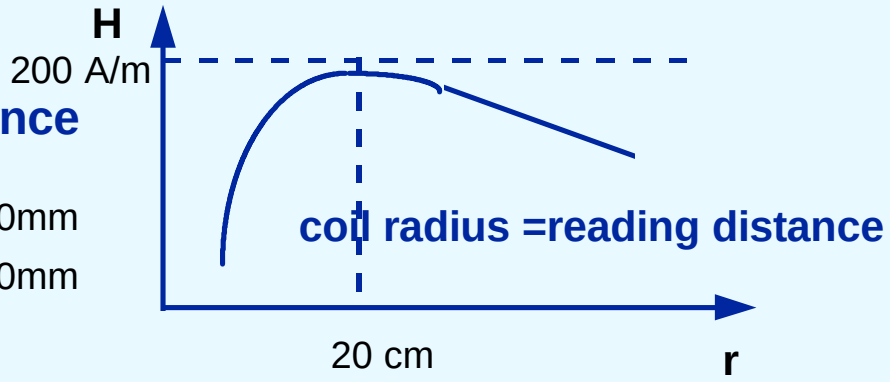
Tolerable tolerance = f (K; L)



Magn coupling factor versus distance



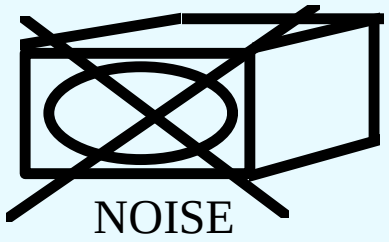
Maximum achievable field strenth

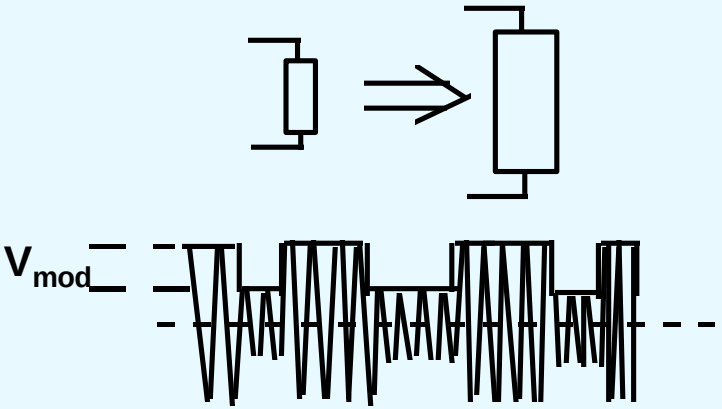


Optimized radius for maximum of field strength

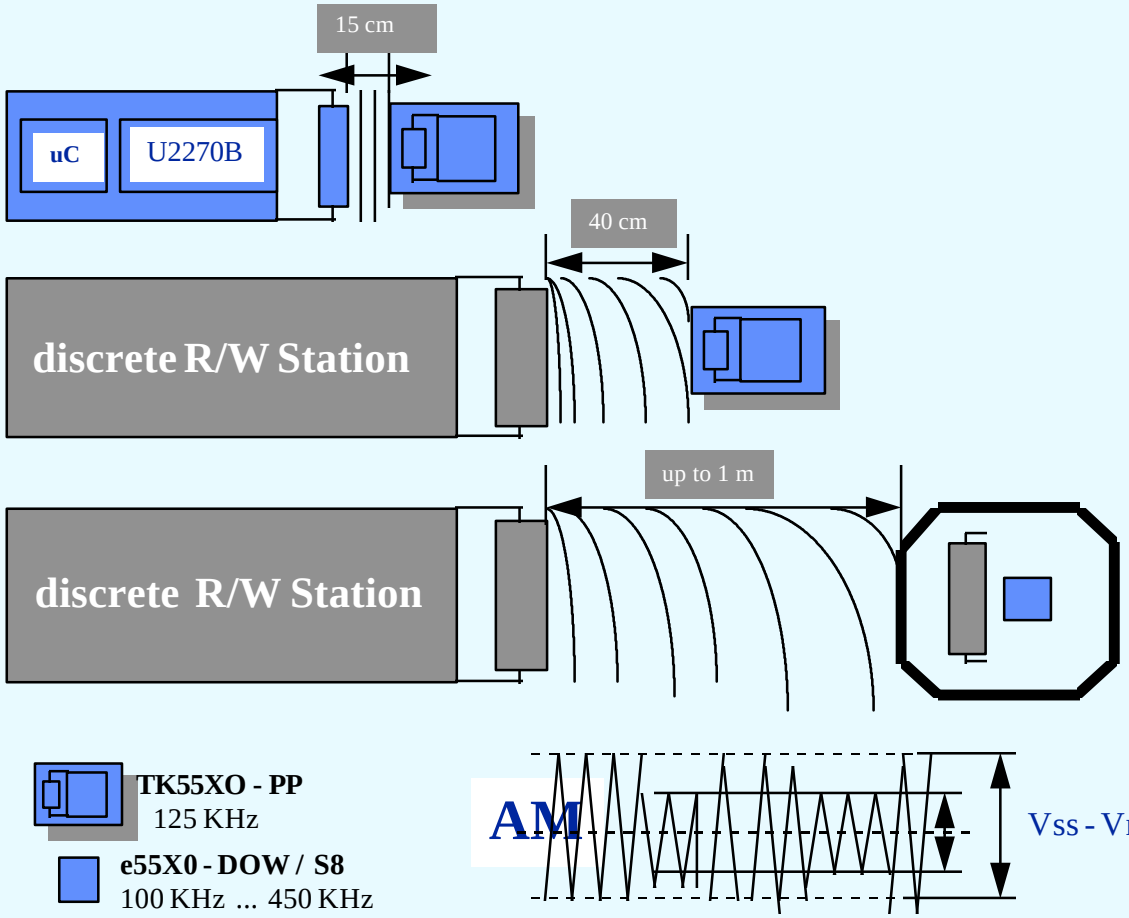
System design: Extended R / W distance

- R/W Base Station optimization
- Noise free enviroment
- f- adjustment $f_{read} = f_{transp}$
- Optimized reader coil
- Reader susceptibility for V_{mod}
- Optimized transponder coil





System design: R / W Distance



System design: Conclusions

- 125KHz VLF System - most penetrated in the market
- AM system: well suitable for low cost systems
- Most applications cost limited
- Low distances often requested
- Optimize distance by improved reader parameters
- Long distance - extensive solutions
- For anticollision avoidance use e5550 AOR mode

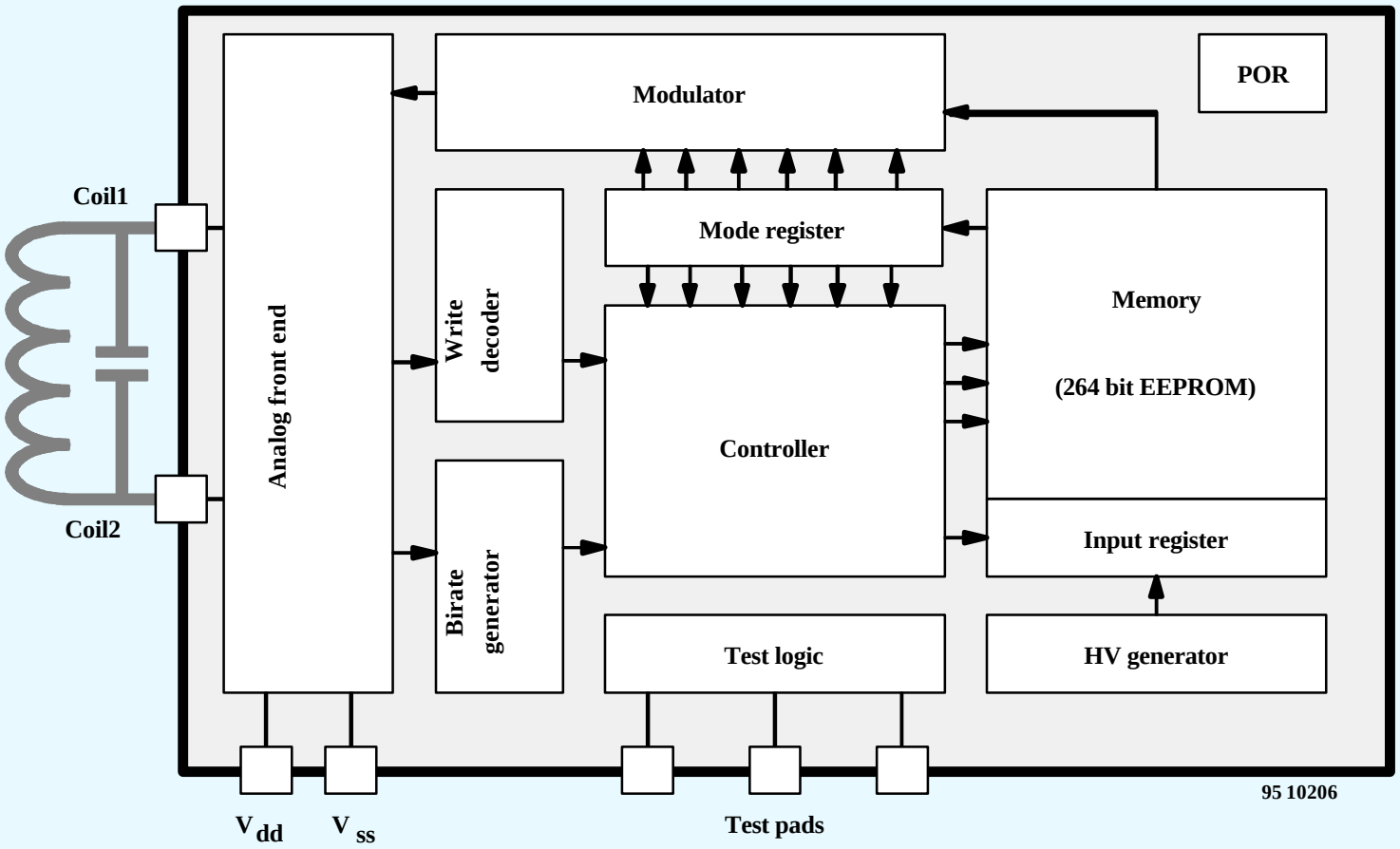
TK 55X0-PP Key Features

- Read only and R/W
- 128 bit - 224 bit user programmable
- Optimized data integrity (header, checksum, lockbit)
- Write protection (Password mode, Lockbit) *
- Answer on request - makes transponder unique *
- Different security level
- Automotive approved *

IDentification IC - Product Survey -

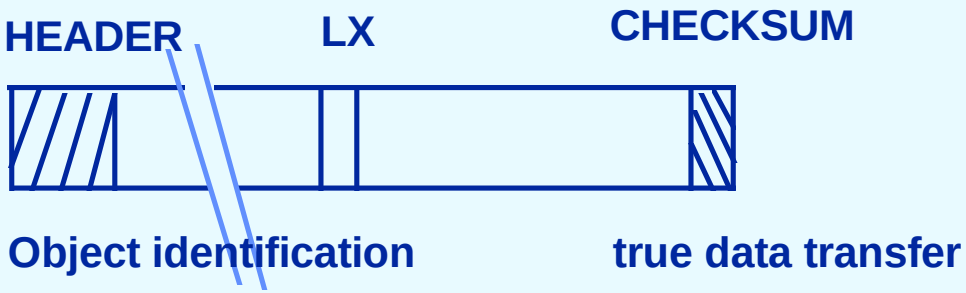
IC	e5530	e5550	e5560	U2270B
Status	production	production	samples Q4/96	production
Operation	read-only 100 - 350 KHz	read/write low power 100 - 350 KHz	read/write encryption low power 100 - 350 KHz	basestation IC antenna driver 100-150 kHz osc. receiver/filter
Memory	4 x 32 bit laser fusable ROM	8 x 32 bit EEPROM 8 lockbits	10 x 32 bit EEPROM incl. lockbits	
Application	object ID	object ID datacom	object ID high security	frontend basestation

TK 5550 Block diagramm

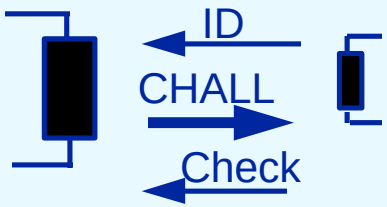


TK55X0-PP: Data Integrity

Header; Checksum
Lockbit

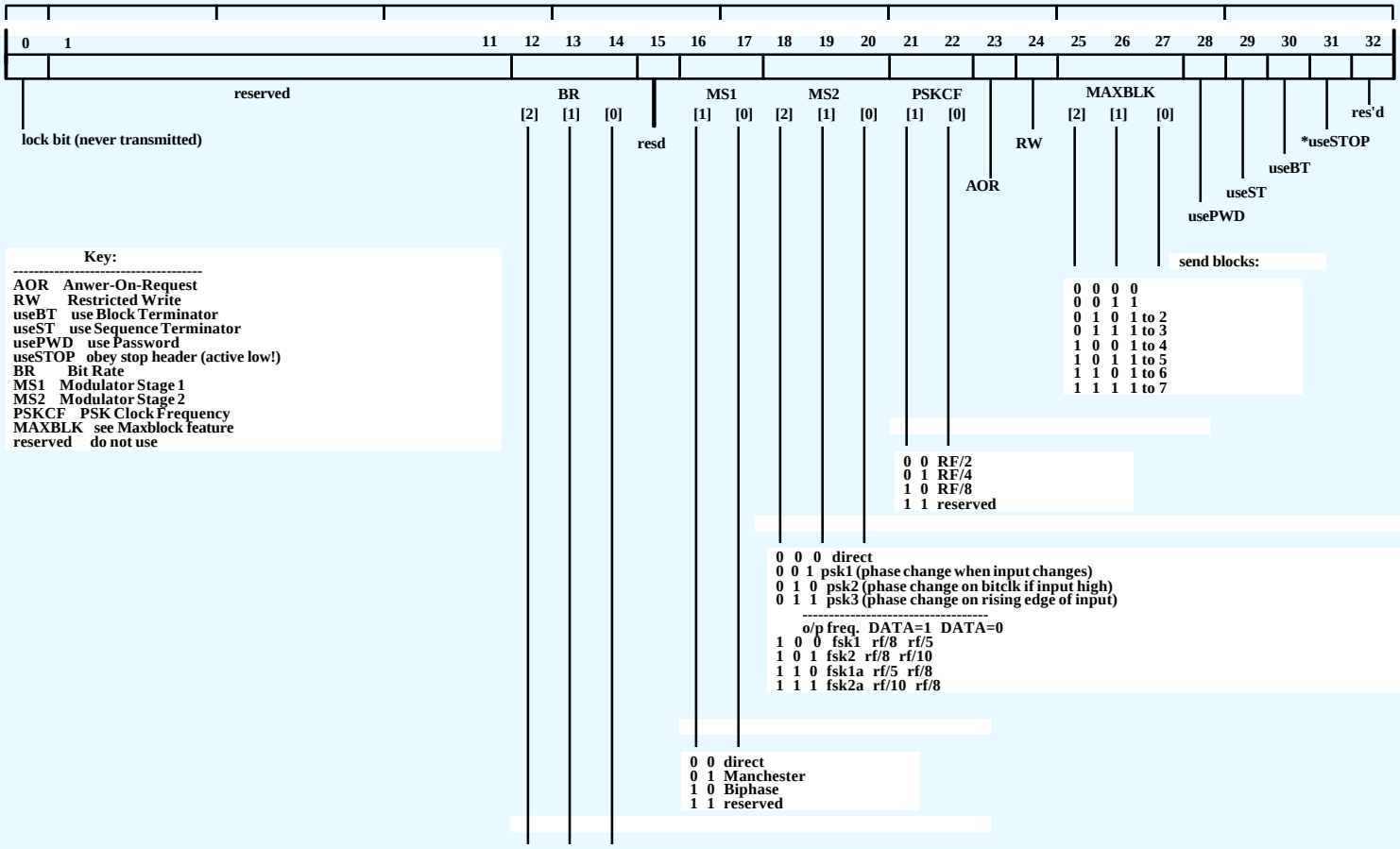


Authentification

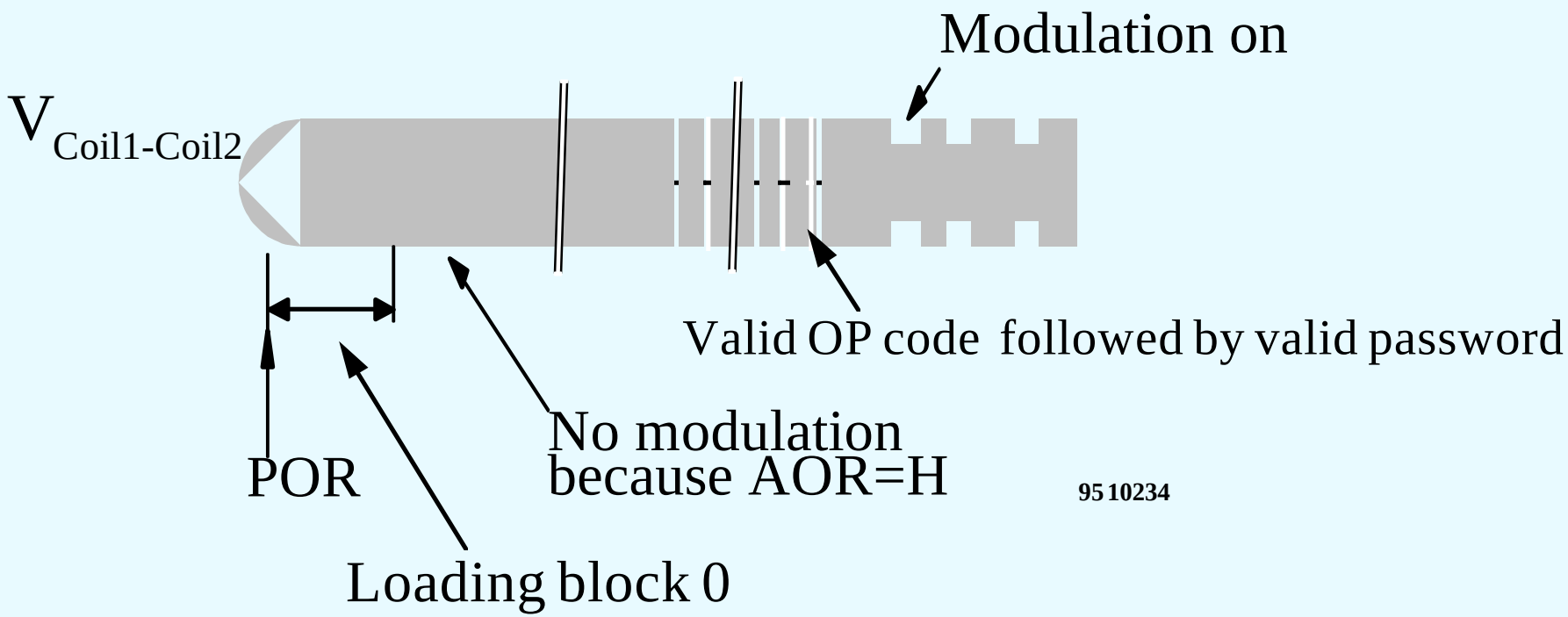


Challange

TK5550 Memory map block 0



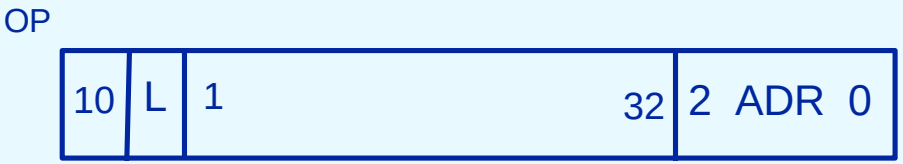
TK5550 Answer on request mode (AOR)



Modulation enabled only after valid signal from base station

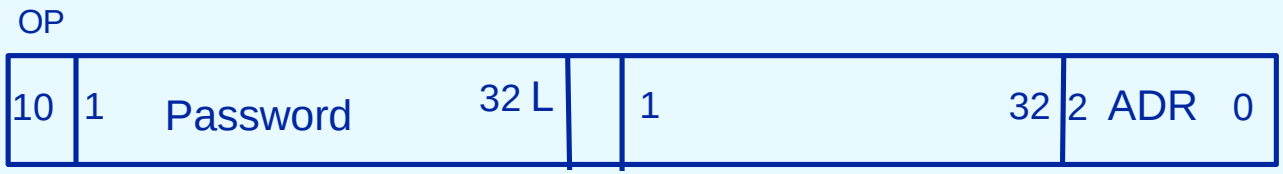
TK5550 : Date Security Modes

Standard Write



PWD

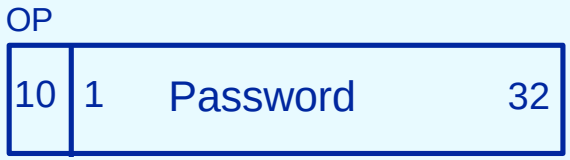
Write Access



AOR

"Tag is here"

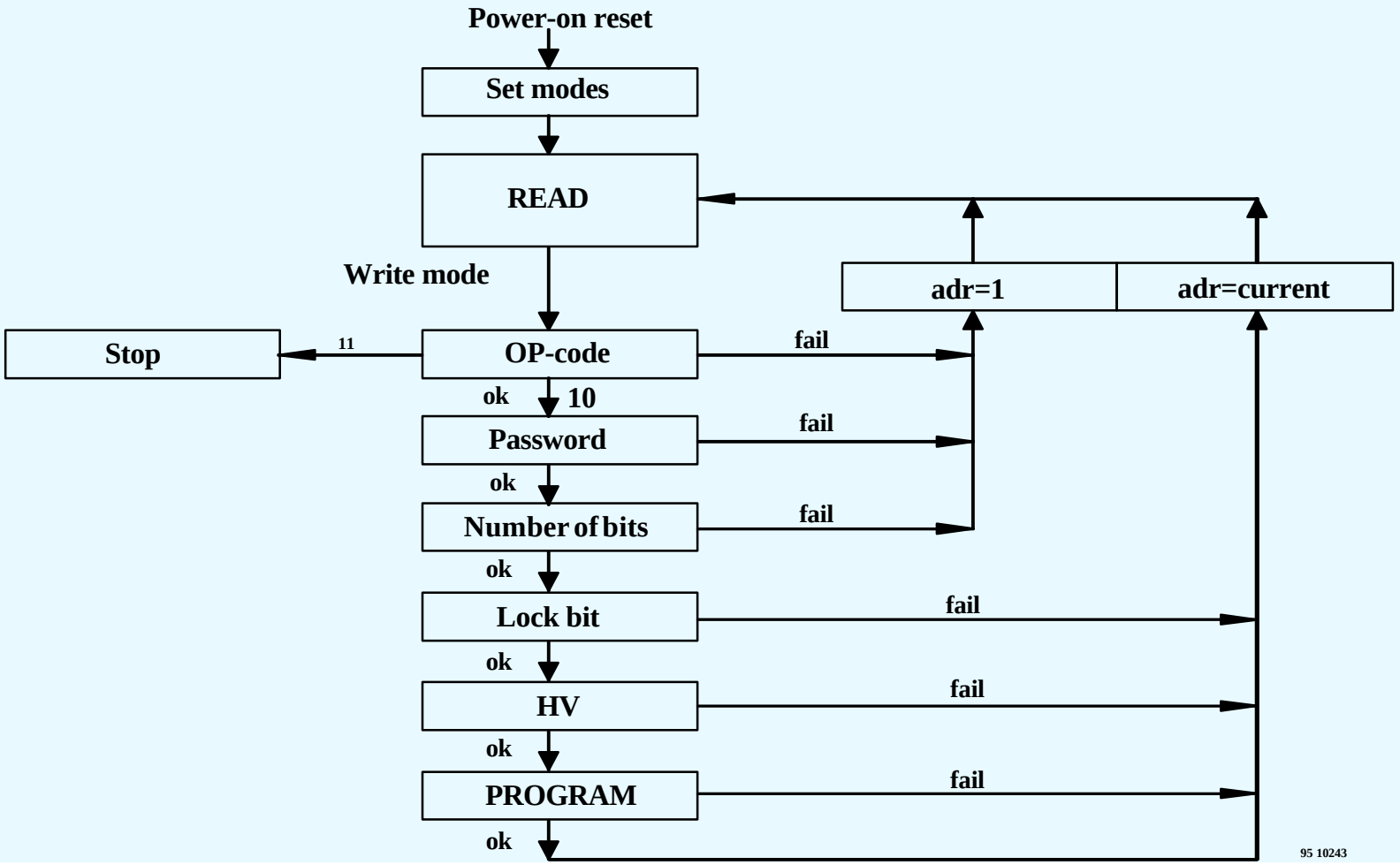
Anticollision avoidance



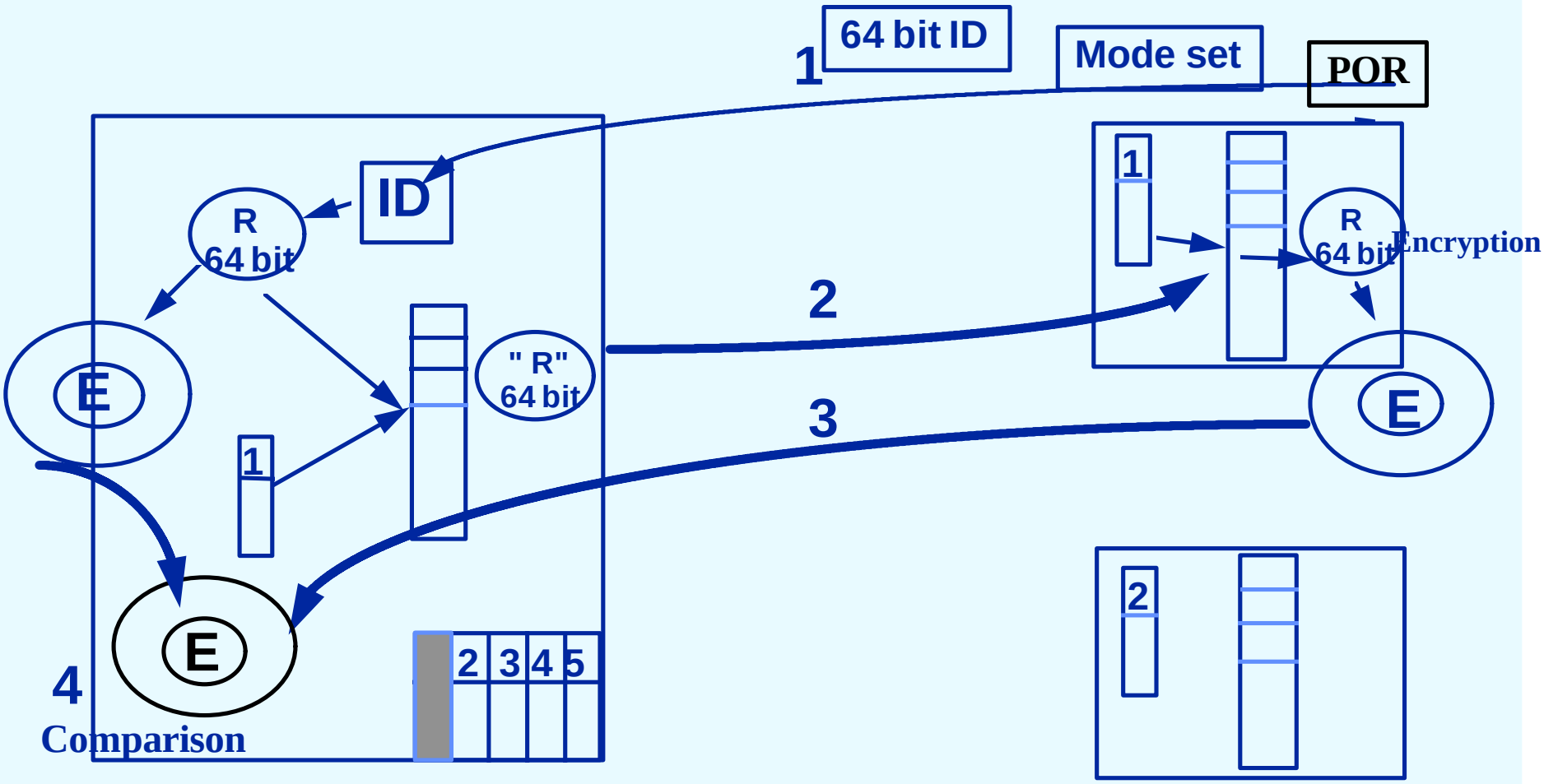
TK55X0-PP Protection features

Protection against		TK5550-PP	TK5560-PP	
Crypto	Read out	-	X	
Passwort	Overwrite	X	X	
AOR	Modulation enabling	X	-	
UV / X-ray	Reprogramming	-	X	
Lockbit	Manipulation	X	X	
		blockwise	block 1 - 4	ID code
			block 5 - 8	Cryptokey
			block 9	Password
			block 0/1/5	bit 1-8

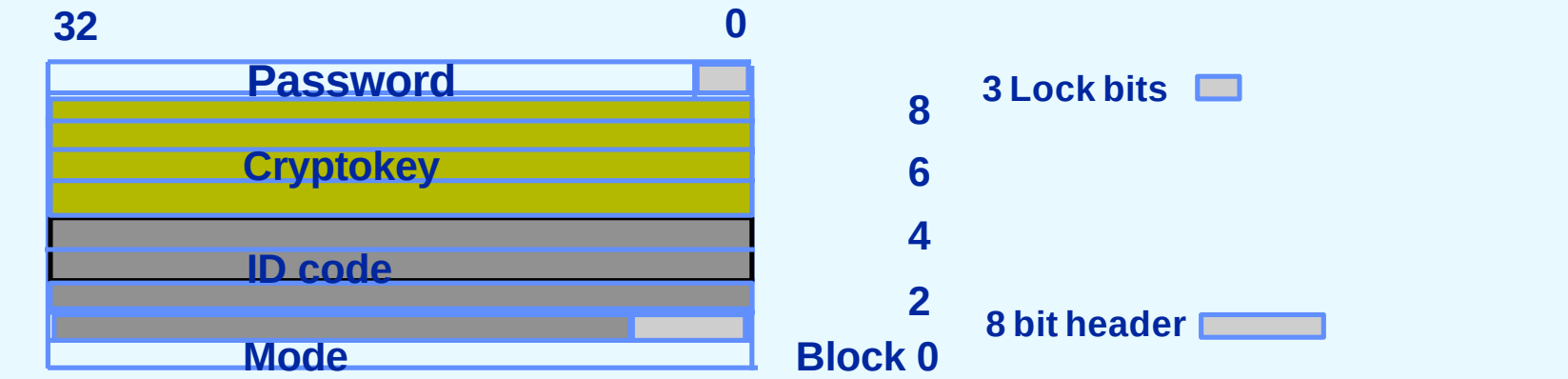
TK5550 Functional algorithm



TK5560-PP: Basic Procedure



TK 5560 Memory Map



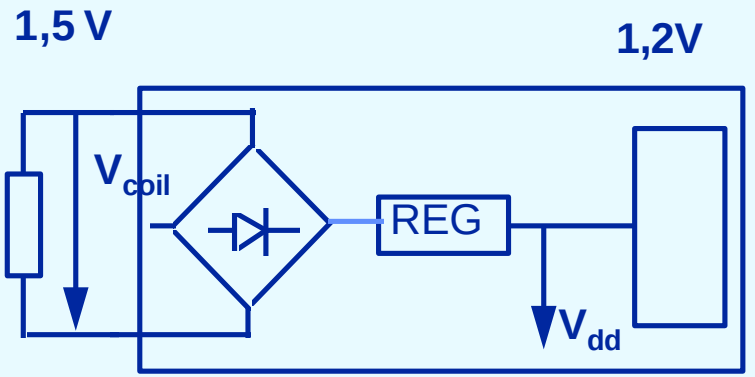
MOD	0=Manch; 1= Biphase
BR	0=Rf/32; 1=Rf/64
BC	0=128; 1=64bit
T	Terminator
L_C	Lockbit first 8 bits
H	Header lockbit
4F	Enable 4F-Header
L_O	Lockbit block 0
adapt	resonance frequency adaptation

not used	0	0
Philips terminator	0	1
TEMIC terminator	1	0
no terminator	1	1

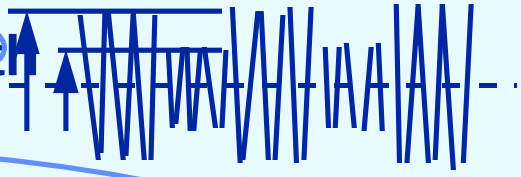
TK 5560-PP Key benefits

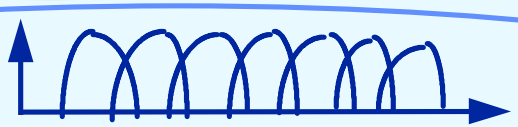
1,5 Low Voltage
10 uW Low Power

Low internal voltage drop V_{coil} - V_{cc}



Maximum possible modulation depth



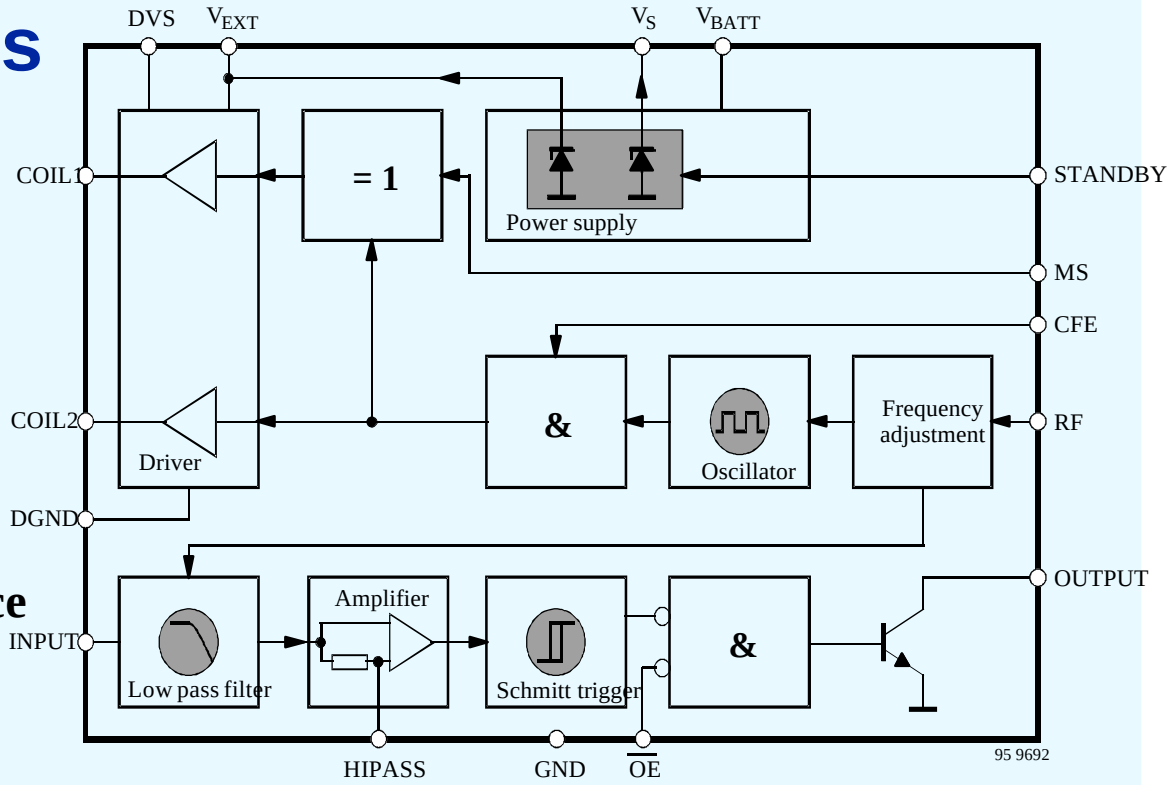


Self adaption f_{syst} Distance optimized

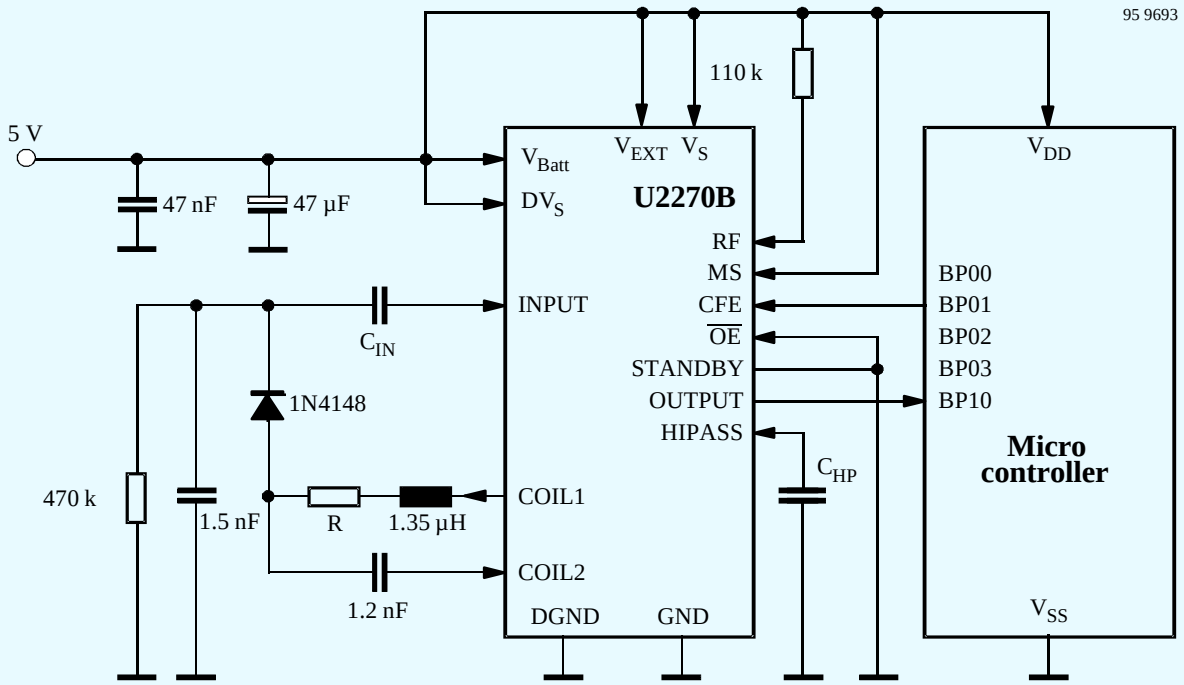
Time optimized protocoll

U2270B Key Features

- Supplies energy for RF - field
- Proceeding of AM signal
- Encoded signal to the micro
- 100 kHz - 150 kHz
- Reduced periphery for short distance
- Control loop externally
- Tuning capability
- Applications for extended distances

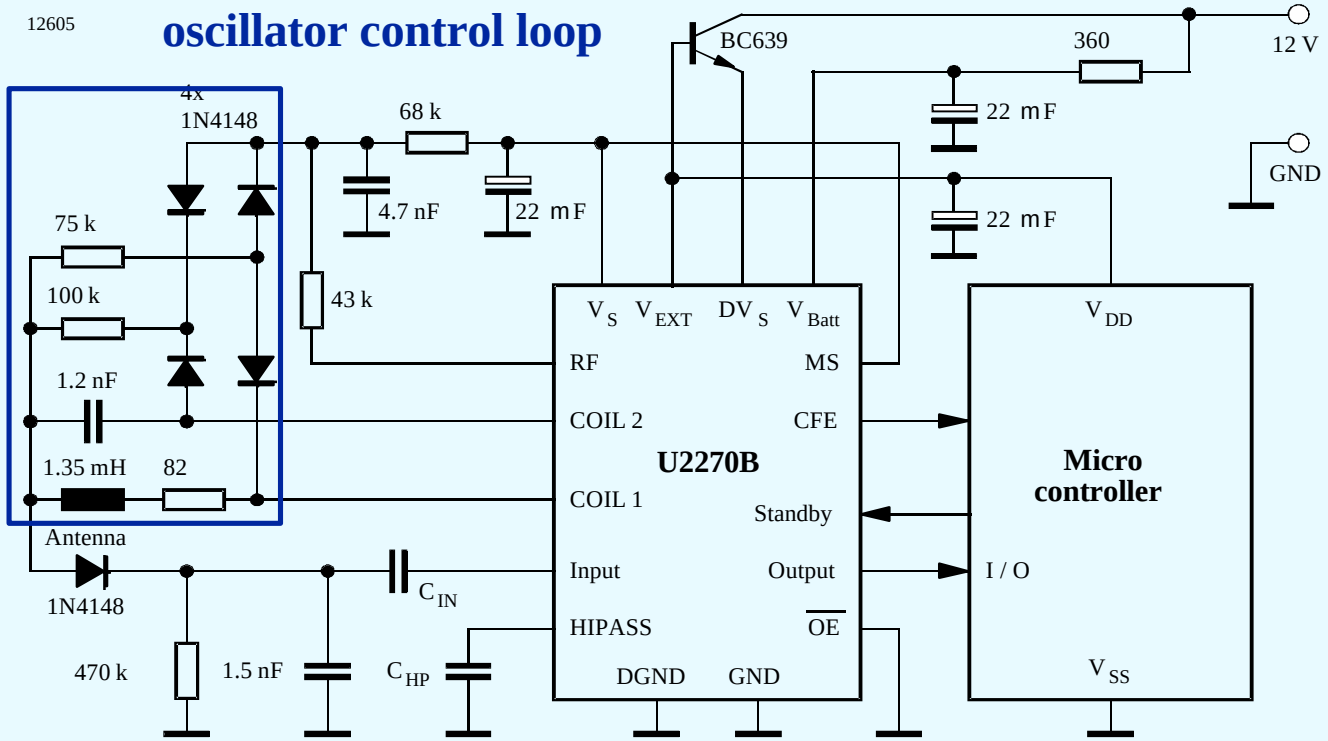


U2270B Application (1)



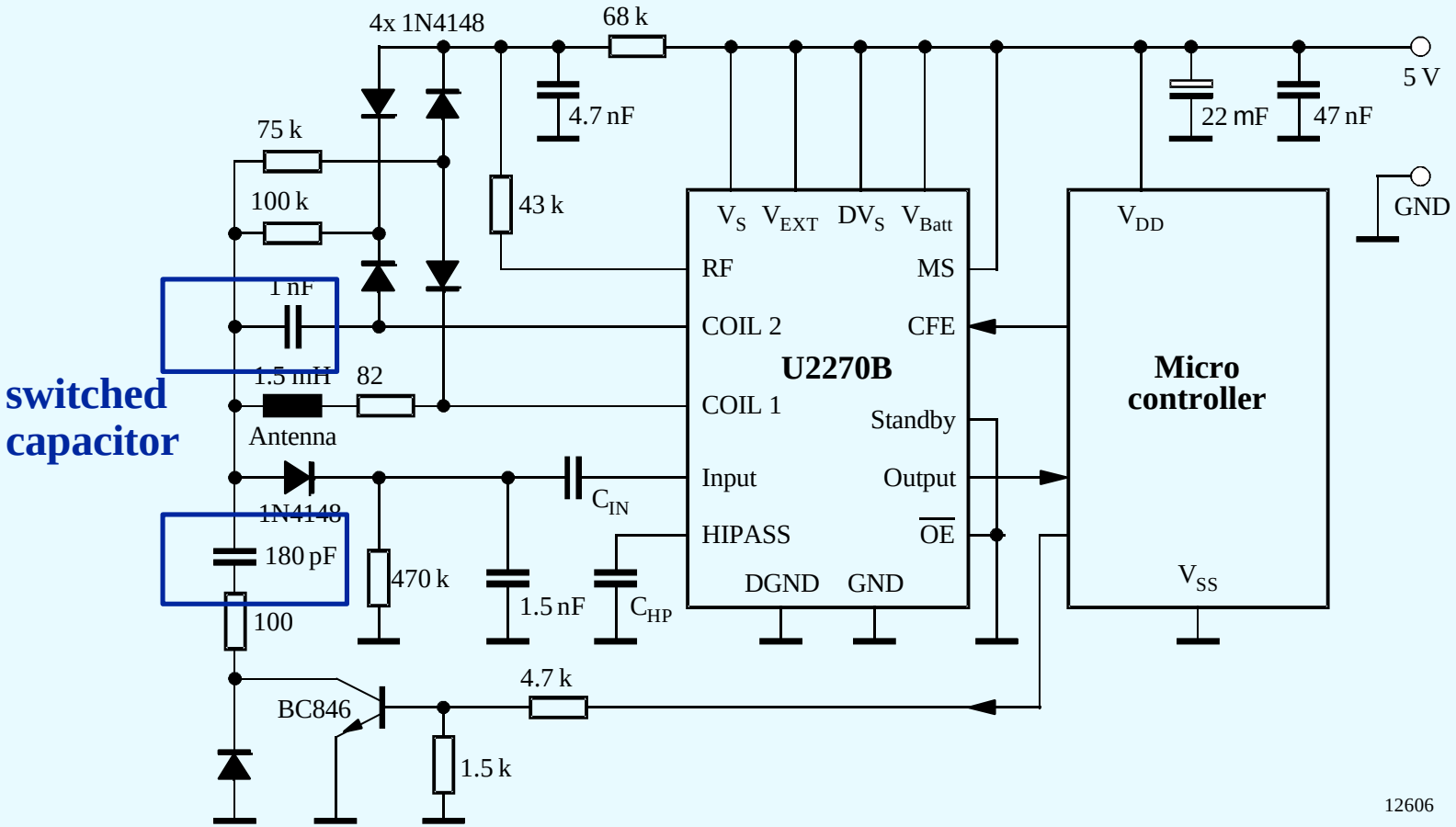
Basic Application for high magnetic coupling

U2270B Application (2)



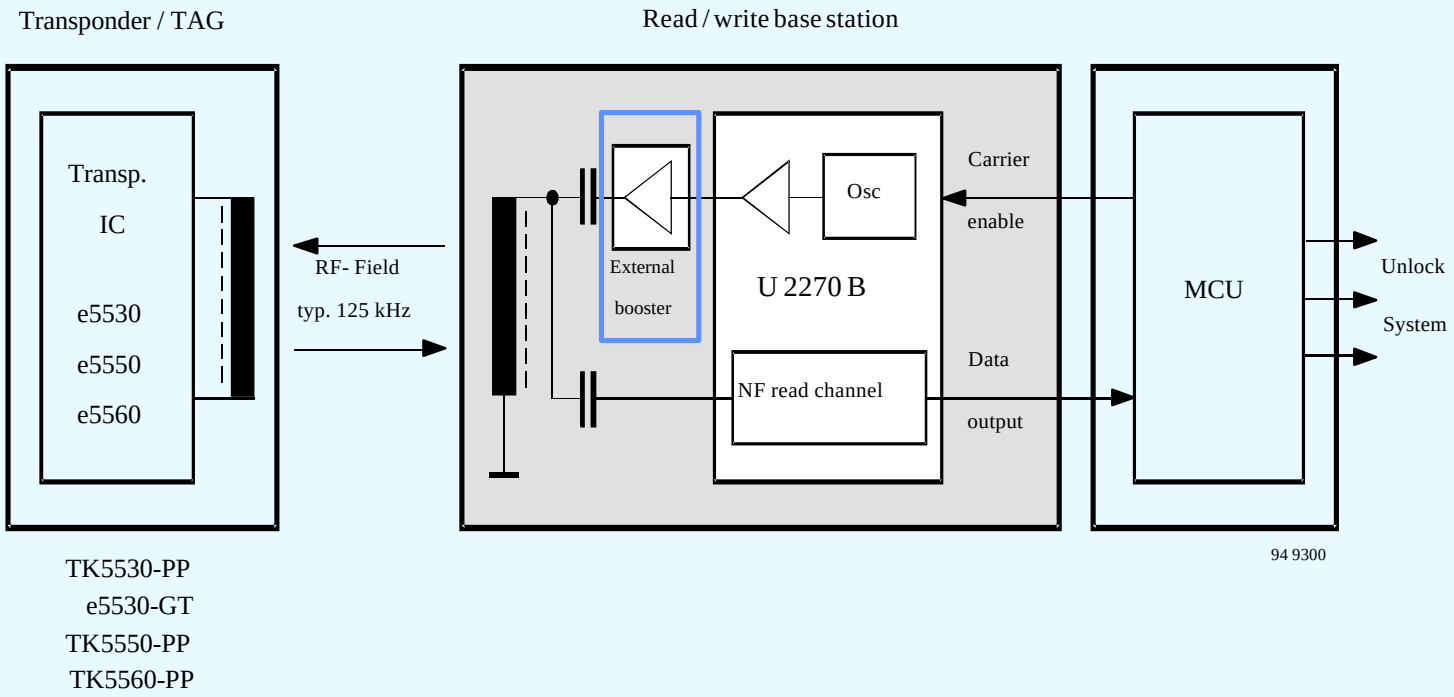
Application for extended R/W distance

U 2270B Application (3)



Maximum distance by alternating frequency

U2270B : Application (4)



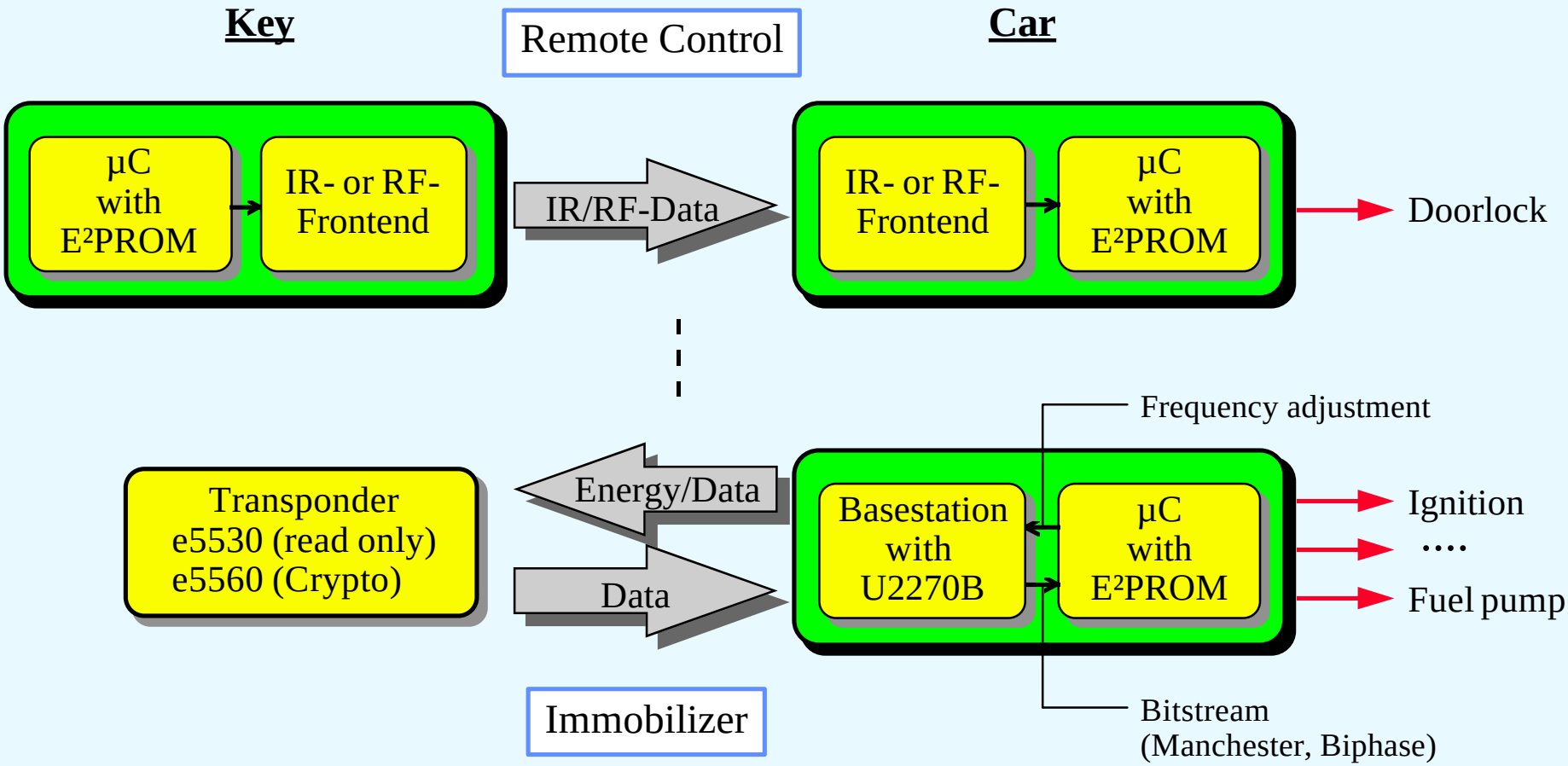
TK5530-PP
e5530-GT
TK5550-PP
TK5560-PP

Extended R / W distance

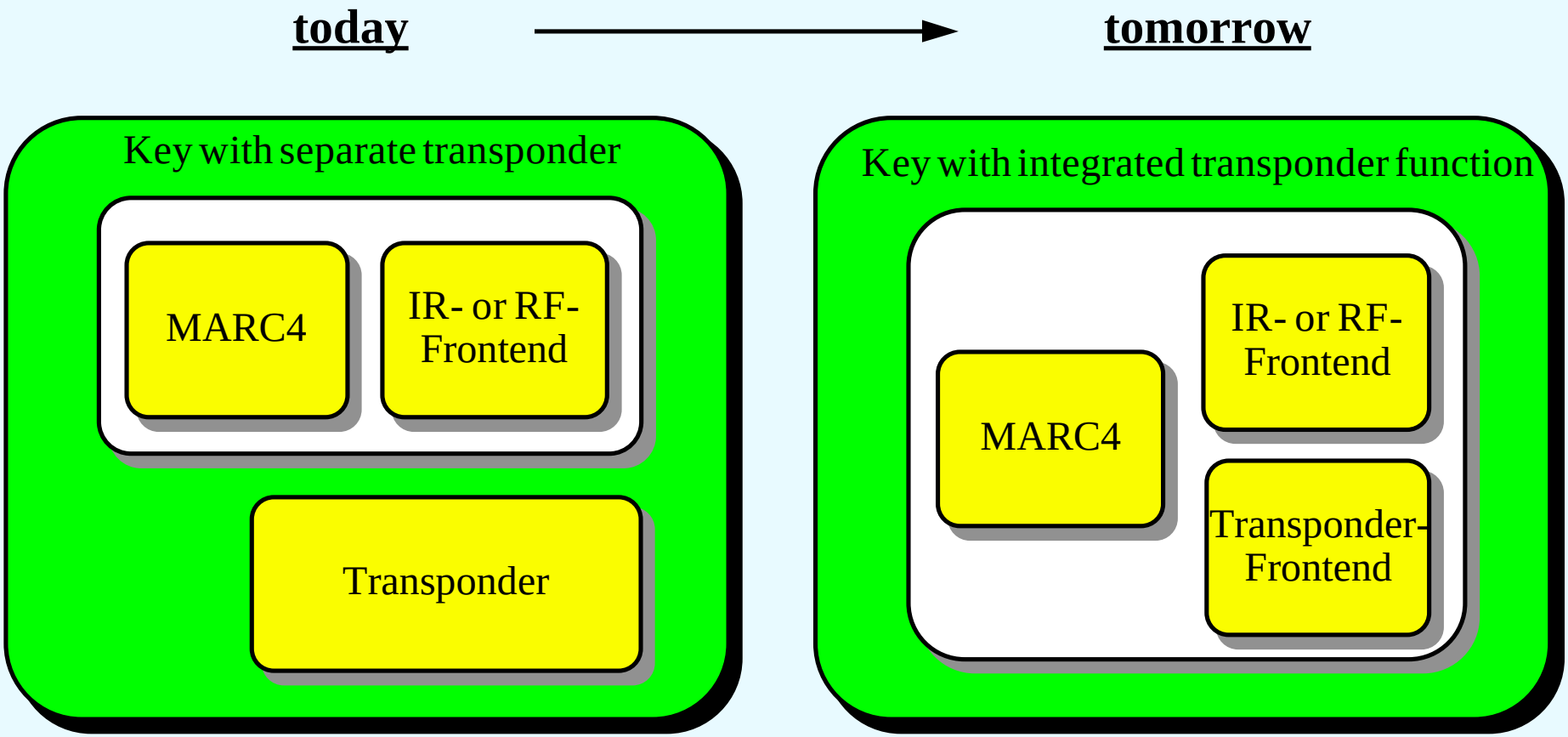
Automotive Applications

TK 5530 - PP	Read only	Immobilizer Seat detection Car radio
TK 5550K-PP	Read Write	Service Book Convenience Logistics
TK 5560-PP	Read Write Crypto	Immobilizer

Remote Keyless Entry and Immobilization System Today

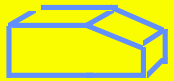
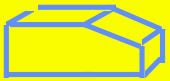


Transmitter Concept for Remote Keyless Entry and Immobilization



Ordering Information

Standard Components Availability

Type	Package	Basic Features		Function
e5530H-**232** (-230)	DOW / S8	Manch **Rf/32** (Rf/40)	R	Tag - IC 
e5530H-230	GT	Manch Rf/40	R	G-Transp 
TK5530**HM-232** (-230)	PP	Manch **Rf/32** (Rf/40)	R	P-Transp 
e5550 **K** (.....H)	DOW / S8	All modulation **Rf/8 /32 /50 /100** (Rf/50 /64 /100 /128)	R / W	Tag - IC 
TK5550**K** (.....H)	PP	All modulation **Rf/8 /32 /50 /100** (Rf/50 /64 /100 /128	R / W	P-Transp 
U2270B-A	FP	Manch / Biphase Rf/32 /40 /50/ 64	R / W	Base station IC 

Tools

	Samples	Demokit	Actual Data sheet	New Data sheet	Applicat note	
e 5530 - DOW e 5530 - S8 e 5530 - GT TK 5530 - PP	X X X X	X	12 / 95 - 12 / 95 02 / 96	11 / 96 12 / 96 10 / 96		
e 5550 - DOW e 5550 - S8 TK 5550 - PP	X X X	X	12 / 95 -	10 / 96 10 / 96		
e 5560 - DOW TK5560 - PP	12/96 12/96	2/97	5 / 96 -	11 / 96 10 / 96		
U2270B-FP	X	X	12 / 95	10 / 96	* 01 / 96 * 06 / 96	
	New data book: 03 / 97					

IDentification: Benefits

- Choice of options
- Broad frequency range
- Appropriate security - price level selectable
- Well suitable by shorten R/W time cycle
- Emulation of components
- Unique data carrier selectable

IDIC Technical Features

- Mix of data rate / modulation
- Low voltage drop on rectifier
- Optimum of modulation depth
- Read / Write distance identical
- 0/1 Bit : certain number of clocks
- Gap time variabel
- Self adaption - optimized read distance

Transponders: Benefits

- Few standard components - huge opportunities
- Automotive design
- Standard package and small size well accepted
- Automotive manufacture competence
- System features - flexible and easy to run

Key selling points

- 4 years competence as chip / transponder supplier
- Subsupplier for card and tag manufacturers
- 2 years competence as automotive subsupplier
- Performance by key benefits and optimized costs
- Improving system competence

Conclusions

- Enormous market request
- New applications comming up
- Spread scope of TEMIC components and options
- Competence and experience in different applications
- Optimized tools till end of 1996

U 2270 B Demoboard (1)