EMC
TEST REPORT

Equipment Under Test	:	Network Enabler Module
Model No.(s)	:	NE-4120A
Applicant	:	Moxa Technologies Co., Ltd.
Address of Applicant	:	Fl. 4, No. 135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, Taiwan, R.O.C.
Manufacturer	:	N/A
Address of Manufacturer	:	N/A

Standards:

EN55022 : 1998 Class B, EN61000-3-2 : 2001, EN61000-3-3 : 2001.
EN55024 : 1998 : EN61000-4-2 : 1995, EN61000-4-3 : 2001 EN61000-4-4 : 1995, EN61000-4-5 : 1995, EN61000-4-6 : 1996, EN61000-4-11 : 1994.

In the configuration tested, the EUT complied with the standards specified above.

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Taiwan EMC Services or testing done by SGS Taiwan EMC Services in connection with distribution or use of the product described in this report must be approved by SGS Taiwan EMC Services in writing.

Jason Lin

Contents

Contents

Contents

General Description

1.1 General Description of EUT

Name of EUT : Network Enabler Module
Model No.(s) : NE-4120A
Variant Description: N/A

1.2 Details of EUT

Power Supply : AC 230V/50Hz
Power Cord : Unshielded
Modes/Function : 1. Stand by. 2. Operation.

1.3 Description of Support Units

PRODUCT	MANUFACTURER	MODEL NO.	SERIAL NO.
PC	HP	723D	TW23420337
Monitor	HP	Vf51	TWTFG01092
Keyboard	HP	5181	BE22316922
Mouse	HP	P813I-O	K023302201
Printer	HP	DJ640C	TH12QE110Y
Gamepad	Logitech	G-UC3B	AE23704872

1.4 Operation Procedure

1. Set down EUT with support units and turn on the power of all equipment.
2. Pre-test the EUT in all modes by each model, then figure the worst case out.
3. Execute the appropriate program to exercise the EUT.
4. During testing immunity tests, have to monitor the EUT if it works properly to meet with the performance criteria of standards.

1.5 The worst case of the EUT

EUT will be carried out in the worst case as follows:
Model No.: NE-4120A
Mode : Operation mode

1.6 Modification List

No modification by SGS Taiwan EMC Lab.

Radio Disturbance

EN55022 : 1998

2.1 Test Results

EN55022 Class B	Result
Conducted Emission	**PASS**
Radiated Emission	**PASS**

2.2 Frequency Range

Conducted Emission : 150 kHz - 30 MHz
Radiated Emission : 30 MHz - 1000 MHz

2.3 Methods and Procedures

Standard	Date	Description
EN55022	1998	Limits and methods of measurement of radio interference characteristics of information technology equipment.

2.4. Test of Conducted Emission

2.4.1 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
HP EMC Analyzer	8594EM	3624A00203	Dec. 31, 2002
EMI Test Receiver	ESCS 30	828985/004	Jan. 15, 2003
HP Transient Limiter	11947A	3107A02062	Jul. 21, 2003
Coaxial Cables	No. 3, 4	-	N/A
Rolf-Heine L.I.S.N	NNB-2/16Z	99012	Dec. 30, 2002

2.4.2 Test Site

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2.4.3 EUT Operating Condition

Environment :

Temperature	Humidity	Atmospheric Pressure
26 °C	55%RH	1006 mbar

Test setup : Please refer to photo of CE testing set-up

2.4.4 Measurement Data

Product Name:	Network Enabler Module	Test Date:	23.OCT.03
Model No.:	NE-4120A	Tester :	Gallon
Test Mode:	Operation Mode	Temperature:	26 ℃
Test Result:	PASS	Humidity:	55 %

Main Terminals:L

FREQ MHz	QP1 dBuV	AVG1 dBuV	Factor	QP2 dBuV	AVG2 dBuV	QP Limit	AV Limit	QP Offset	AV Offset
0.154	44.3	38.1	2.99	47.29	41.09	65.81	55.81	-18.52	-14.72
0.554	36.1	29.1	2.89	38.99	31.99	56.00	46.00	-17.01	-14.01
1.015	32.3	30.3	2.80	35.10	33.10	56.00	46.00	-20.90	-12.90
3.604	33.4	30.7	3.15	36.55	33.85	56.00	46.00	-19.45	-12.15
10.16	31.8	27.3	3.30	35.10	30.60	60.00	50.00	-24.90	-19.40
29.54	18.1	13.6	3.89	21.99	17.49	60.00	50.00	-38.01	-32.51

1." -" denotes the emission level was - 10 dB beneth the Average limit,so nothing need to re-check anymore.

2. QP1/ AVG1 value means the QP/AV reading without the factor.

3. QP2/AVG2 value means the QP/AV final reading with the factor.

Product Name:	Network Enabler Module	Test Date:	23.OCT.03
Model No.:	NE-4120A	Tester :	Gallon
Test Mode:	Operation Mode	Temperature:	26 ℃
Test Result:	PASS	Humidity:	55 %

Main Terminals:N

FREQ MHz	QP1 dBuV	AVG1 dBuV	Factor	QP2 dBuV	AVG2 dBuV	QP Limit	AV Limit	QP Offset	AV Offset
0.23	41.60	33.80	2.88	44.48	36.68	62.77	52.77	-18.29	-16.09
0.55	36.10	26.60	2.89	38.99	29.49	56.00	46.00	-17.01	-16.51
1.94	25.60	23.70	3.08	28.68	26.78	56.00	46.00	-27.32	-19.22
5.81	26.40	22.70	3.22	29.62	25.92	60.00	50.00	-30.38	-24.08
10.16	27.30	21.60	3.30	30.60	24.90	60.00	50.00	-29.40	-25.10
22.53	16.20	7.50	3.68	19.88	11.18	60.00	50.00	-40.12	-38.82

1." -" denotes the emission level was - 10 dB beneth the Average limit,so nothing need to re-check anymore.
2. QP1/ AVG1 value means the QP/AV reading without the factor.
3. QP2/AVG2 value means the QP/AV final reading with the factor.

2.5 Test of Radiated Emission

2.5.1 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
HP Spectrum Analyzer	8594E	3810A06555	Nov.06.2002
EMI Test Receiver	ESCS 30	828985/004	Jan. 15, 2003
RF-Amplifier	8447D	2944A09469	Jul.24.2003
Broadband Antenna	VULB9160	6038	Dec.31,2002
Turn Table	DT420	420/542	N/A
Antenna Master	MA 240	240/515	N/A
Controller	HD 100	100/589	N/A

2.5.2 Test Site

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2.5.3 EUT Operating Condition

Environment :

Temperature	Humidity	Atmospheric Pressure
24 °C	44 %RH	1006 mbar

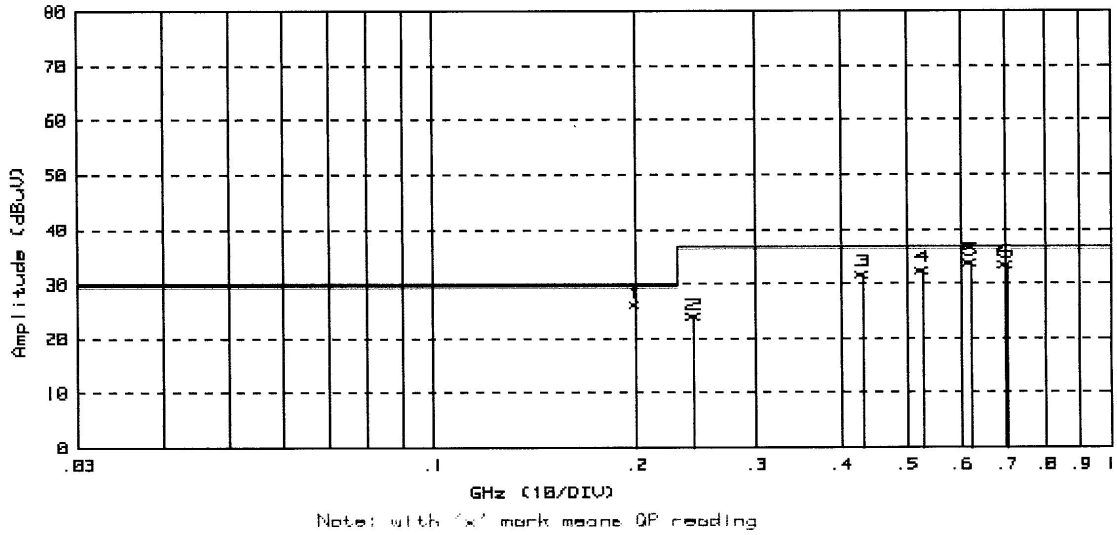
Test setup : Please refer to photo of RE testing set-up

2.5.4 Measurement Data

2.5.4.1 Horizontal measurement

SGS EMC Lab. Site 1

Customer:MOXA	Model :NE-4120A	Date:22 Oct 2003
Antenna :VULB 9160	Polr. :Horizontal-10 M	Time:18:35:08
S.P.A. :R32(3)61X	PreAmp.:HP 8447D	file#: 6726
Rule :EN55022-B	Mode :	Tmp.(C):24
Receiver:ESCS 30	Tester :Gallon	Humid(%):44
Remark :		



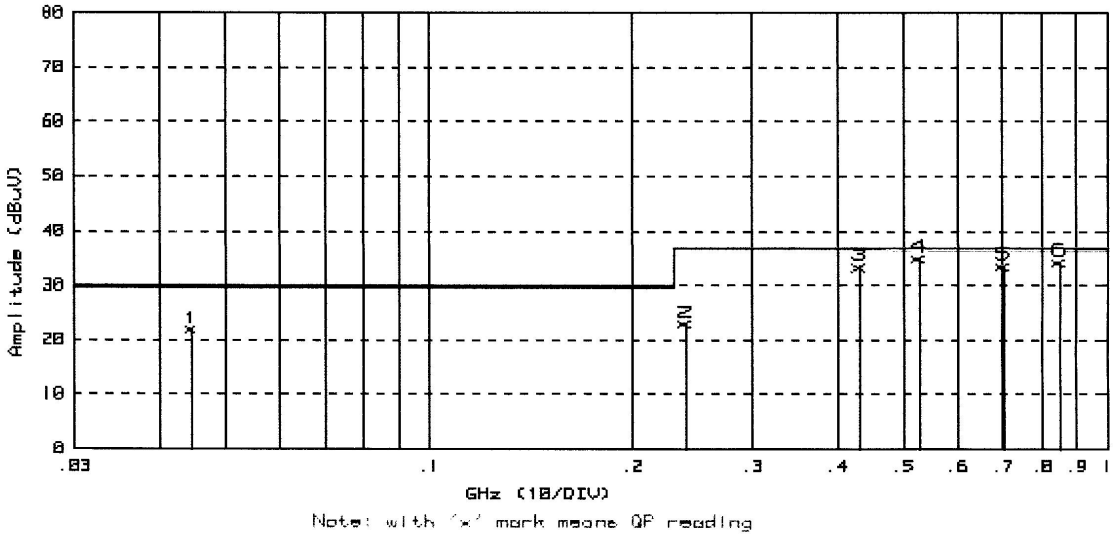
No.	FREQ. <MHz>	RAW DATA <dBuV>	C'Fac <dB>	CORR'd < dBuV/m >	LIMIT	MARGIN <dB>	ANTENNA HEIGHT	TABLE ANGLE
1	198.78	13.2	12.8	26.0	30.0	-4.0	100.0	0.0
2	243.40	9.6	14.3	23.9	37.0	-13.1	100.0	0.0
3	431.58	10.2	21.5	31.7	37.0	-5.3	100.0	0.0
4	530.52	7.9	24.5	32.4	37.0	-4.6	100.0	0.0
5	623.64	7.2	26.4	33.6	37.0	-3.4	100.0	0.0
6	701.06	5.2	28.1	33.3	37.0	-3.7	100.0	0.0

Page 1/1 of 6726--->NA

2.5.4.2 Vertical measurement

SGS EMC Lab. Site 1

Customer:MOXA	Model :NE-4120A	Date:22 Oct 2003
Antenna :VULB 9160	Polr. :Vertical-10 M	Time:18:38:49
S.P.A. :R32(3)61X	PreAmp.:HP 8447D	file#: 6727
Rule :EN55022-B	Mode :	Tmp.(C):24
Receiver:ESCS 30	Tester :Gallon	Humid(%):44
Remark :		



No.	FREQ. <MHz>	RAW DATA <dBuV>	C'Fac <dB>	CORR'd < dBuV/m >	LIMIT	MARGIN <dB>	ANTENNA HEIGHT	TABLE ANGLE
1	44.56	8.3	13.4	21.7	30.0	-8.3	100.0	0.0
2	239.52	8.7	14.2	22.9	37.0	-14.1	100.0	0.0
3	431.58	11.7	21.5	33.2	37.0	-3.8	100.0	0.0
4	530.52	10.2	24.5	34.7	37.0	-2.3	100.0	0.0
5	701.24	5.3	28.1	33.4	37.0	-3.6	100.0	0.0
6	850.62	3.3	30.8	34.1	37.0	-2.9	100.0	0.0

Page 1/1 of 6727--->NA

Harmonics

EN61000-3-2 : 2001

3.1 Test Results

EN61000-3-2 : 2001	**PASS**

3.2 Methods and Procedures

Standard	Date	Description
EN61000-3-2	2001	Disturbances in supply systems caused by household appliances and similar electrical equipment.

3.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
CHROMA ATE Power Analyzer	6630	000110	Jan. 29, 2003
CHROMA ATE Programmable AC Power Source	6530	0159	Nov. 06, 2002

3.4 Test Site

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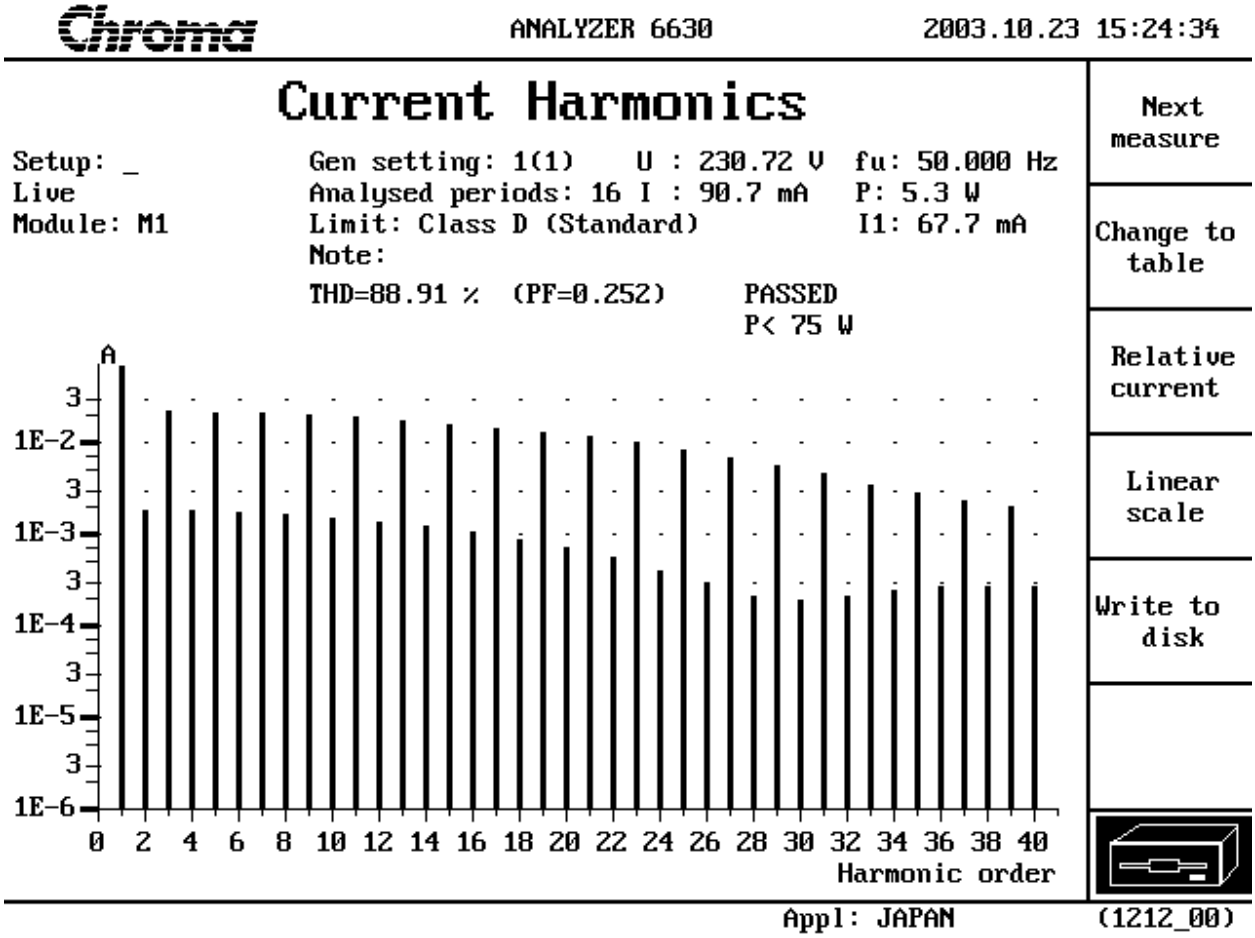
3.5 EUT Operating Condition

Environment :

Temperature	Humidity	Atmospheric Pressure
23 °C	52 %RH	1005mbar

Test setup : Please refer to photo of HARMONIC testing set-up

3.6 Measurement Data (1)



Measurement Data (2)

Chroma ANALYZER 6630 2003.10.23 15:26:03

Current Harmonics

Setup: _
Live
Module: M1

Gen setting: 1(1) U : 230.72 V fu: 50.000 Hz
Analysed periods: 16 I : 90.7 mA P: 5.3 W
Limit: Class D (Standard) I1: 67.7 mA
Note:

THD=88.91 % (PF=0.252) PASSED
P< 75 W

No	mA	Lim mA	No	mA	Lim mA	No	mA	Lim mA
1	67.7		15	16.3		29	5.7	
2	1.9		16	1.1		30	0.2	
3	22.1		17	14.8		31	4.6	
4	1.8		18	0.9		32	0.2	
5	21.9		19	13.2		33	3.6	
6	1.8		20	0.7		34	0.2	
7	21.1		21	11.6		35	2.8	
8	1.7		22	0.6		36	0.3	
9	20.1		23	10.0		37	2.3	
10	1.5		24	0.4		38	0.3	
11	19.0		25	8.5		39	2.1	
12	1.4		26	0.3		40	0.3	
13	17.7		27	7.1				
14	1.2		28	0.2				

Current range: 1 Ap

Next measure
Change to bar graph
Relative current
Write to disk

Appl: JAPAN (1212_01)

Flicker

EN61000-3-3 : 2001

4.1 Test Results

EN61000-3-3 :2001	**PASS**

4.2 Methods and Procedures

Standard	Date	Description
EN61000-3-3	2001	Disturbances in supply systems caused by household appliances and similar electrical equipment.

4.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
CHROMA ATE Power Analyzer	6630	000110	Jan. 29, 2003
CHROMA ATE Programmable AC Power Source	6530	0159	Nov. 06, 2002

4.4 Test Site

SGS Taiwan LTD.

4.5 EUT Operating Condition

Environment :

Temperature	Humidity	Atmospheric Pressure
23 °C	52 %RH	1005 mbar

Test setup : Please refer to photo of FLICKER testing set-up

4.6 Measurement Data

Chroma ANALYZER 6630 2003.10.23 15:37:04

Extreme Flicker-I M1

Note:
Physical Reference Impedance
U: 230.8 V I: 90.6 mA f: 49.999 Hz PF: 0.252

EVALUATION:----------

Type of observation period		Short	Long		Limit
Observation time	Tp :	10	10	min	
Maximum relative voltage change	dmax:		0.00	%	4
Max rel steady state voltage change	dc :		0.00	%	3
Duration of d(t) > 3 %	t :		0.00	s	0.2
Short term flicker severity	Pst :		0.00		1.00
Long term flicker severity	Plt :	---	0.00		0.65

Based on 1 (1) short term cycles

PASSED

Measurement completed

Next measure

Extreme time graph

Change to histogram

Write to disk

Select module

Appl: JAPAN (1311_00)

IMMUNITY

EN61000-4-2 : 1995
EN61000-4-3 : 2001
EN61000-4-4 : 1995
EN61000-4-5 : 1995
EN61000-4-6 : 1996
EN61000-4-11 : 1994

5.1 Test Results

EN61000-4-2 : 1995	**PASS**
EN61000-4-3 : 2001	**PASS**
EN61000-4-4 : 1995	**PASS**
EN61000-4-5 : 1995	**PASS**
EN61000-4-6 : 1996	**PASS**
EN61000-4-11 : 1994	**PASS**

5.2 Performance Criteria Description

Criterion A - The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion B - The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion C - Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.

5.3 Test of EN61000-4-2

5.3.1 Methods and Procedures

Standard	Date	Description
EN61000-4-2	1995	Electrostatic Discharge (ESD)

5.3.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
ESD Tester	ESS-100L	1010C03705	JAN.10,2003
VCP	0.5 x 0.5 m	-	N/A
Earth Reference Plane	6.5 x 3.5 m	-	N/A

5.3.3 Test Site

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5.3.4 EUT Operating Condition

Environment :

Temperature	Humidity	Atmospheric Pressure
24 °C	54 %RH	1006 mbar

Test setup : Please refer to photo of ESD testing set-up

5.3.5 Results of Electrostatic Discharge Test (ESD)

Basic Standard : EN61000-4-2
Discharge Impedance : 330 ohm / 150 pF
Discharge Voltage : Air Discharge – 2 ~ 8 KV
Contact Discharge – 4 kV
VCP – 4 kV
Polarity : Positive/Negative
Number of Discharge : Minimum 10 times at each test point
Discharge Mode : Single Discharge
Discharge Period : 1 second minimum

Note 1 : For contact discharge, the EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity. All tests according to sec. 4.2.1 of EN55024 : 1998.

A. Observations :

Test points: 1. Surface of case. 2. Junction of case.

Direct Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
2 ~ 8	+/-	1 ~ 2	N/A	A
4	+/-	N/A	N/A	N/A

Results A : No degradation in the performance of the EUT was observed.
N/A : Not Applicable.

B. Observations :

Test points: 1. Front side. 2. Rear side. 3. Left side. 4. Right side.

Indirect Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling	Vertical Coupling
4	+/-	1 - 4	A	A

Results A : No degradation in the performance of the EUT was observed.
N/A : Not Applicable.

5.4 Test of EN61000-4-3

5.4.1 Methods and Procedures

Standard	Date	Description
EN61000-4-3	2001	Radio-Frequency Electromagnetic Field Susceptibility Test, RS

5.4.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
Signal Generator	Sml02	100439	OCT.25,2002
Agilent EMC Analyzer	E7405A	US40240202	May.22.2003
M2SAmplifier(80–1000MHz)	8113-800/25	9811-108	N/A
Turn Table	DS412HA	N/A	N/A
Antenna Tower	FIXED	N/A	N/A
Controller	HD050	97C8-1028	N/A
Power antenna	BTA-H	09008	N/A
STRENGTH FIELD Meter	EMR-30	BN2244/80	OCT.30, 2002

5.4.3 Test Site

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5.4.4 EUT Operating Condition

Environment :

Temperature	Humidity	Atmospheric Pressure
24 °C	48 %RH	1006 mbar

Test setup : Please refer to photo of RS testing set-up

5.4.5 Results of Radiated Radio Frequency Electromagnetic (RS)

Basic Standard : EN61000-4-3
Frequency range : 80 MHz - 2000 MHz
Field strength : 3 V/m
Modulation : AM 80%
Frequency step : 1 % of fundamental
Polarity of Antenna : Horizontal and Vertical
Test distance : 3 m

No.	Frequency (MHz)	Antenna Orientation	Observation	EUT Orientation
1	80 - 2000	Vertical/Horizontal	A	0 degree
2	80 - 2000	Vertical/Horizontal	A	90 degree
3	80 - 2000	Vertical/Horizontal	A	180 degree
4	80 - 2000	Vertical/Horizontal	A	270 degree

Results

A : The EUT had been noised during F=302MHz to 330MHz,however, the Performance of EUT keep in normal operation.

N/A : Not Applicable.

5.5 Test of EN61000-4-4

5.5.1 Methods and Procedures

Standard	Date	Description
EN61000-4-4	1995	Electrical fast transient/burst requirements

5.5.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
Haefely EFT/Burst Tester	PEFT Junior	583333-30	NOV.13,2002
Haefely HV Attenuator	-	080029-07	N/A
HP Oscilloscope	54600A	3134A05034	N/A

5.5.3 Test Site

SGS Taiwan LTD.

5.5.4 EUT Operating Condition

Environment :

Temperature	Humidity	Atmospheric Pressure
23°C	52 %RH	1005 mbar

Test setup : Please refer to photo of EFT testing set-up

5.5.5 Results of Electrical Fast Transient (EFT)

Basic Standard : EN61000-4-4
Test Voltage : AC Input/Output - 1 kV
Polarity : Positive/Negative
Impulse Frequency : 5 kHz
Tr/Tn : 5/50ns
Burst : 15ms/300ms

Observation :

Test Point	Polarity	Test Level (kV)	Results
L	+/-	1	A
N	+/-	1	A
PE	+/-	1	A
L + N	+/-	1	A
L+PE	+/-	1	A
L+N+PE	+/-	1	A

Results

A : No degradation in the performance of the EUT was observed.
N/A : Not Applicable.

5.6 Test of EN61000-4-5

5.6.1 Methods and Procedures

Standard	Date	Description
EN61000-4-5	1995	Surge immunity test

5.6.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
Haefely Surge Tester	Psurge 4010	583334-04	NOV.07, 2002
Lecroy Oscilloscope	9310CM	10181	NOV.06, 2002

5.6.3 Test Site

SGS Taiwan LTD.

5.6.4 EUT Operating Condition

Environment :

Temperature	Humidity	Atmospheric Pressure
23 °C	52 %RH	1005 mbar

Test setup : Please refer to photo of SURGE testing set-up

5.6.5 Results of Surge Test

Test Rate : 1 pulse every minute
No. of Tests : 5 positive and 5 negative pulses

Observation Description

Test Point	Phase Angle (degree)	Polarity (+/-)	Test Level (kV)	Observation
L – N	0, 90, 180, 270	+/-	0.5	A
L – PE	0, 90, 180, 270	+/-	1	A
N - PE	0, 90, 180, 270	+/-	1	A

Results

A : No degradation in the performance of the EUT was observed.
N/A : Not Applicable.

5.7 Test of EN61000-4-6

5.7.1 Methods and Procedures

Standard	Date	Description
EN61000-4-6	1996	Immunity to conducted disturbances, induced by radio-frequency fields.

5.7.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
R. S. Signal Generator	SMY01	844146/016	NOV.06,2002
Kalmus RF Power Amplifier	116FC-CE	8380-1	Jul. 24, 2003
FCC CDN M3-16A	14413-016	9744	JAN.16, 2003
Bird-30Db-PowerAttenuator	25-A-MFN-30	9724	N/A
HP EMC Analyzer	8594EM	3624A00203	Dec. 31, 2002
Coaxial Cables	No. 15-17, 21-23	N/A	N/A

5.7.3 Test Site

SGS Taiwan LTD.

5.7.4 EUT Operating Condition

Environment :

Temperature	Humidity	Atmospheric Pressure
23 °C	52 %RH	1005 mbar

Test setup : Please refer to photo of CS testing set-up

5.7.5 Results of Immunity to Conducted Disturbances (CS)

Basic Standard : EN61000-4-6
Frequency range : 0.15 MHz - 80 MHz
Field strength : 3 V/rms
Modulation : AM 80%, 1 kHz Sinewave
Frequency step : 1 % of fundamental
Dwell Time : 2 seconds
Coupling Method : CDN 3 Lines

Cable Description	Frequency (MHz)	Observation
AC input	0.15 – 80	A

Results

A : No degradation in the performance of the EUT was observed.
N/A : Not Applicable.

5.8 Test of EN61000-4-11

5.8.1 Methods and Procedures

Standard	Date	Description
EN61000-4-11	1994	Voltage dips, short interruptions and voltage variations immunity tests

5.8.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
HAEFELY Line Interference Tester	PLINE 1610	083732-25	NOV.07, 2002
Pintek Oscilloscope	PS200	79043261	N/A

5.8.3 Test Site

SGS Taiwan LTD.

5.8.4 EUT Operating Condition

Environment :

Temperature	Humidity	Atmospheric Pressure
23 °C	52 %RH	1005 mbar

Test setup : Please refer to photo of DIP testing set-up

5.8.5 Results of Voltage Dips Immunity Test

EUT Rated Voltage : 230 Volts.
Voltage : 30, 95 % Ut
Phase Angle : 0, 90, 180, 270 degree
Total events: 3 dropouts
Event interval : 10 seconds

Voltage (%Ut)	**Duration of Dropout (period)**	**Observation**
30	25	A
95	0.5	A
95	250	A

Results

A : No degradation in the performance of the EUT was observed.
N/A : Not Applicable.

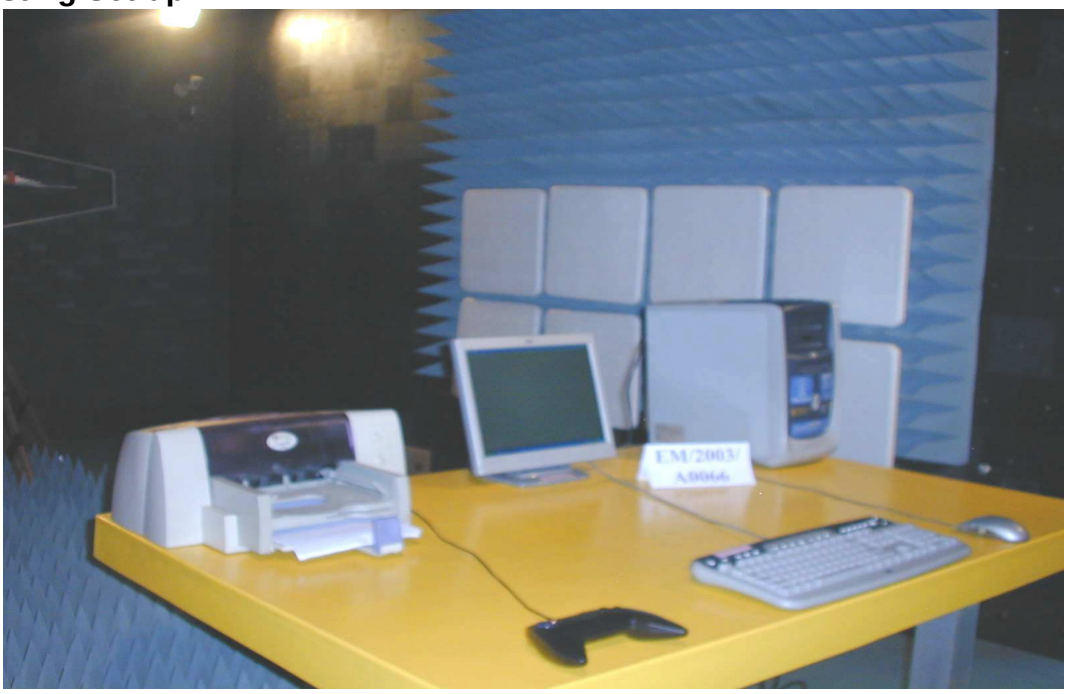
CE Testing Set-up

RE Testing Set-up

HARMONIC & FLICKER Testing Set-up

ESD Testing Set-up

RS Testing Set-up



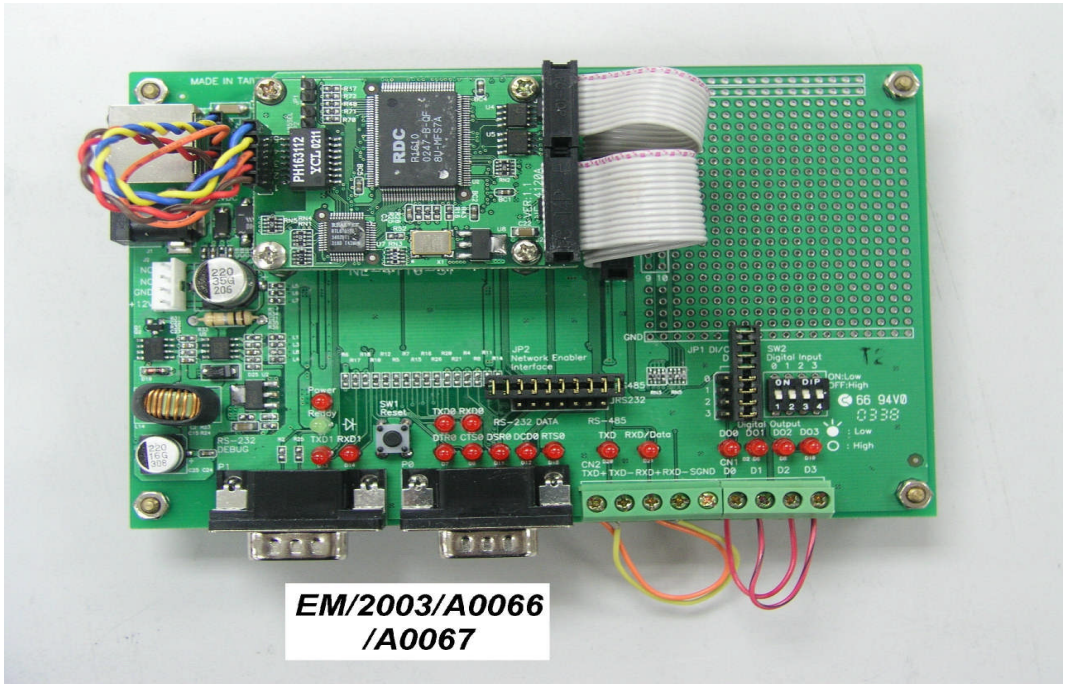
EFT Testing Set-up

SURGE Testing Set-up

CS Testing Set-up

DIP Testing Set-up

Exterior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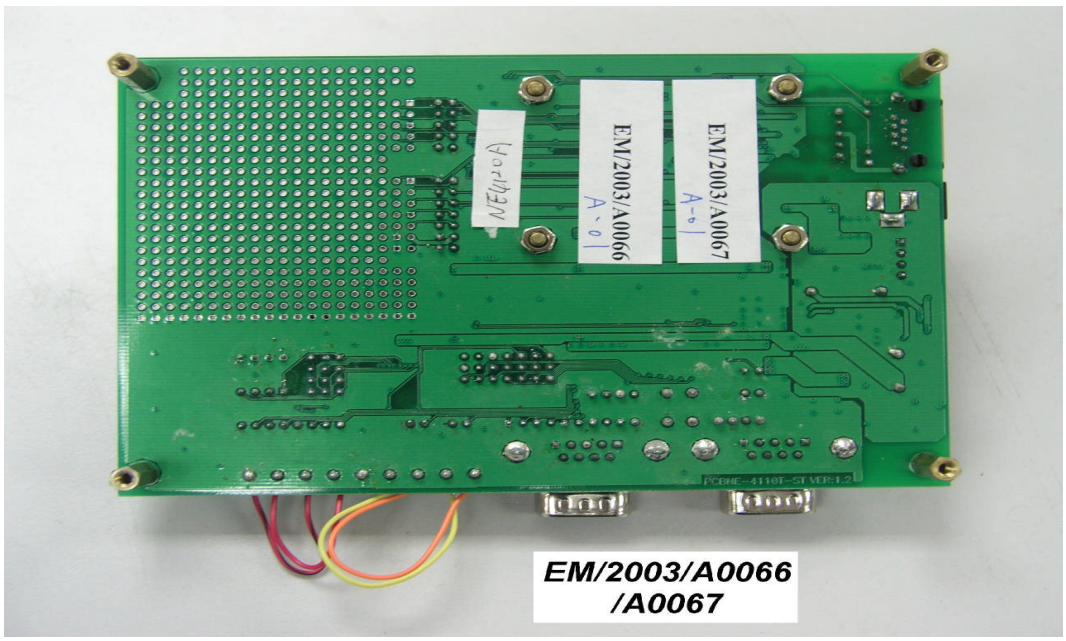
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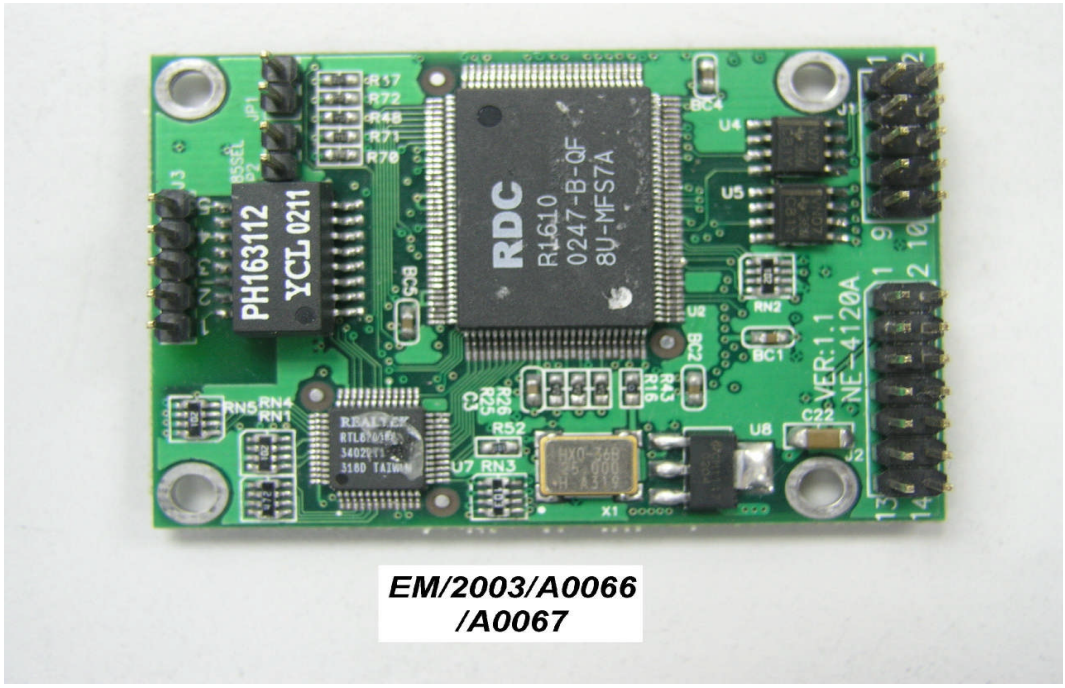

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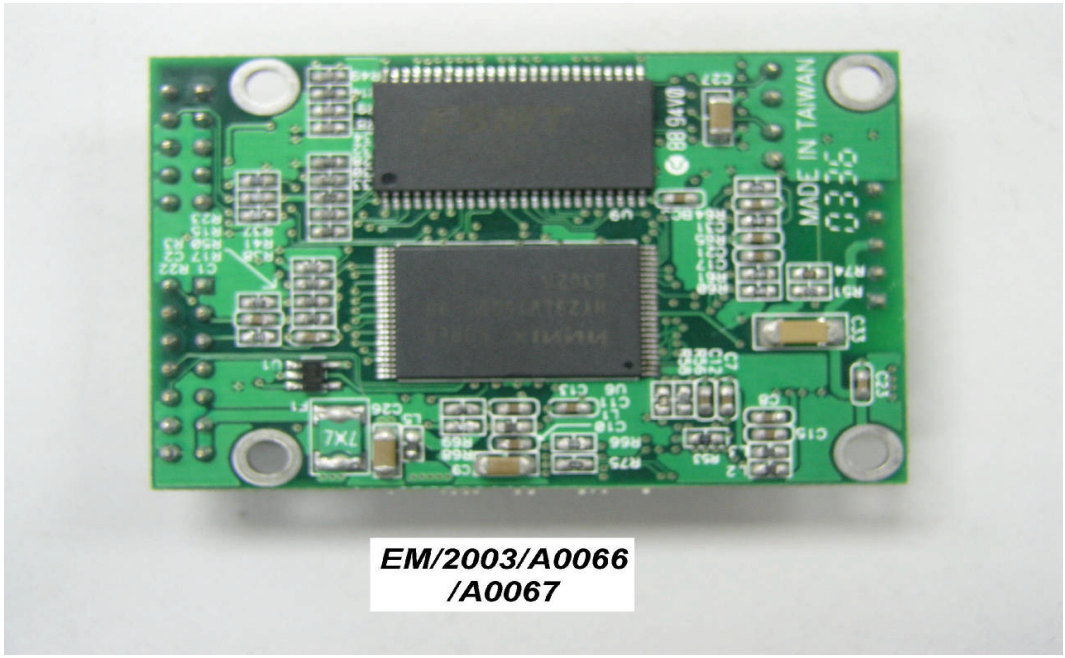

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