Certificate

Issue Date: June 28, 2013
Ref. Report No. ISL-13LE238CE

Product Name	:	Fanless, Extended-temp Embedded Computing System
Model(s)	:	ECS-7xxx; ECS-7000-6GDE(R); ECS-7000-6GD610QW; ECS-7000-6GDE610QW; ECS-7000-6R610QW
Responsible Party	:	Vecow Co.,Ltd
Address	:	12F., No. 111, Zhongcheng Rd., Tucheng Dist., New Taipei City 23674 Taiwan (R.O.C)

We, **International Standards Laboratory**, hereby certify that:

The device bearing the trade name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in European Council Directive- EMC Directive 2004/108/EC. The device was passed the test performed according to :

CE

Standards:

EN 55022: 2010 and CISPR 22: 2008 (modified)
EN 61000-3-2: 2006+A1:2009 +A2:2009 and IEC 61000-3-2: 2005+A1:2008 +A2:2009
EN 61000-3-3: 2008 and IEC 61000-3-3: 2008
EN 55024: 2010 and CISPR 24: 2010
EN 61000-4-2: 2009 and IEC 61000-4-2: 2008
EN 61000-4-3: 2006+A1: 2008 +A2: 2010 and
IEC 61000-4-3:2006+A1: 2007+A2: 2010
EN 61000-4-4: 2004 +A1:2010 and IEC 61000-4-4: 2004 +A1:2010
EN 61000-4-5: 2006 and IEC 61000-4-5: 2005
EN 61000-4-6: 2009 and IEC 61000-4-6: 2008
EN 61000-4-8: 2010 and IEC 61000-4-8: 2009
EN 61000-4-11: 2004 and IEC 61000-4-11: 2004

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

International Standards Laboratory

Jim Chu / Director

☒ **Lung-Tan LAB**:
No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.
Lung-Tan Hsiang, Tao Yuan County 325, Taiwan
Tel: 886-3-407-1718; Fax: 886-3407-1738

Nemko ELA113B

CE MARK TECHNICAL FILE

AS/NZS EMC CONSTRUCTION FILE

of

Product Name

Fanless, Extended-temp Embedded Computing System

Model

ECS-7xxx; ECS-7000-6GDE(R); ECS-7000-6GD610QW; ECS-7000-6GDE610QW; ECS-7000-6R610QW

Contains:

1. Declaration of Conformity
2. EN55022/CISPR 22, AS/NZS CISPR 22 EMI test report
3. EN55024/CISPR 24, EN61000-3-2 / IEC 61000-3-2, and EN61000-3-3 / IEC 61000-3-3 test report
4. Block Diagram and Schematics
5. Users' manual

Declaration of Conformity

Name of Responsible Party:	Vecow Co.,Ltd
Address of Responsible Party:	12F., No. 111, Zhongcheng Rd., Tucheng Dist., New Taipei City 23674 Taiwan (R.O.C)
Declares that product:	Fanless, Extended-temp Embedded Computing System
Model:	ECS-7xxx; ECS-7000-6GDE(R); ECS-7000-6GD610QW; ECS-7000-6GDE610QW; ECS-7000-6R610QW
Assembled by:	Same as above
Address:	Same as above

Conforms to the EMC Directive 2004/108/EC as attested by conformity with the following harmonized standards:

EN 55022:2010, CISPR 22:2008 (modified) and AS/NZS CISPR 22:2009+A1:2010: Limits and methods of measurement of Radio Interference characteristics of Information Technology Equipment.
EN 55024:2010 and CISPR 24:2010: Information technology equipment-Immunity characteristics - Limits and methods of measurement.

Standard	Description	Results	Criteria
EN 61000-4-2:2009 IEC 61000-4-2:2008	Electrostatic Discharge	Pass	B
EN 61000-4-3:2006+A1:2008 +A2:2010 IEC 61000-4-3:2006+A1:2007+A2:2010	Radio-Frequency, Electromagnetic Field	Pass	A
EN 61000-4-4: 2004 +A1:2010 IEC 61000-4-4: 2004 +A1:2010	Electrical Fast Transient/Burst	Pass	B
EN 61000-4-5: 2006 IEC 61000-4-5: 2005	Surge	Pass	B
EN 61000-4-6:2009 IEC 61000-4-6:2008	Conductive Disturbance	Pass	A
EN 61000-4-8:2010 IEC 61000-4-8:2009	Power Frequency Magnetic Field	Pass	A
EN 61000-4-11: 2004 IEC 61000-4-11: 2004	Voltage Dips / Short Interruption and Voltage Variation		
	>95% in 0.5 period	Pass	B
	30% in 25 period	Pass	C
	>95% in 250 period	Pass	C

<to be continued>

Standard	Description	Results
EN 61000-3-2: 2006 +A1:2009 +A2:2009 IEC 61000-3-2: 2005 +A1:2008 +A2:2009	Limits for harmonics current emissions	Pass
EN 61000-3-3: 2008 IEC 61000-3-3: 2008	Limits for voltage fluctuations and flicker in low-voltage supply systems.	Pass

We, Vecow Co.,Ltd, hereby declare that the equipment bearing the trade name and model number specified above was tested conforming to the applicable Rules under the most accurate measurement standards possible, and that all the necessary steps have been taken and are in force to assure that production units of the same equipment will continue to comply with the requirements.

Vecow Co.,Ltd

Date: June 28, 2013

Declaration of Conformity

Name of Responsible Party:	Vecow Co.,Ltd
Address of Responsible Party:	12F., No. 111, Zhongcheng Rd., Tucheng Dist., New Taipei City 23674 Taiwan (R.O.C)
Declares that product:	Fanless, Extended-temp Embedded Computing System
Model:	ECS-7xxx; ECS-7000-6GDE(R); ECS-7000-6GD610QW; ECS-7000-6GDE610QW; ECS-7000-6R610QW
Assembled by:	Same as above
Address:	Same as above

Conforms to the C-Tick Mark and EMI part of RCM Mark requirements as attested by conformity with the following standards:

EN 55022:2010, CISPR 22:2008 (modified) and AS/NZS CISPR 22:2009+A1:2010: Limits and methods of measurement of Radio Interference characteristics of Information Technology Equipment.
EN 55024:2010 and CISPR 24:2010: Information technology equipment-Immunity characteristics - Limits and methods of measurement.

Standard	Description	Results	Criteria
EN 61000-4-2:2009 IEC 61000-4-2:2008	Electrostatic Discharge	Pass	B
EN 61000-4-3:2006+A1:2008 +A2:2010 IEC 61000-4-3:2006+A1:2007+A2:2010	Radio-Frequency, Electromagnetic Field	Pass	A
EN 61000-4-4: 2004 +A1:2010 IEC 61000-4-4: 2004 +A1:2010	Electrical Fast Transient/Burst	Pass	B
EN 61000-4-5: 2006 IEC 61000-4-5: 2005	Surge	Pass	B
EN 61000-4-6:2009 IEC 61000-4-6:2008	Conductive Disturbance	Pass	A
EN 61000-4-8:2010 IEC 61000-4-8:2009	Power Frequency Magnetic Field	Pass	A
EN 61000-4-11: 2004 IEC 61000-4-11: 2004	Voltage Dips / Short Interruption and Voltage Variation		
	>95% in 0.5 period	Pass	B
	30% in 25 period	Pass	C
	>95% in 250 period	Pass	C

<to be continued>

Standard	Description	Results
EN 61000-3-2: 2006 +A1:2009 +A2:2009 IEC 61000-3-2: 2005 +A1:2008 +A2:2009	Limits for harmonics current emissions	Pass
EN 61000-3-3: 2008 IEC 61000-3-3: 2008	Limits for voltage fluctuations and flicker in low-voltage supply systems.	Pass

We, Vecow Co.,Ltd, hereby declare that the equipment bearing the trade name and model number specified above was tested conforming to the applicable Rules under the most accurate measurement standards possible, and that all the necessary steps have been taken and are in force to assure that production units of the same equipment will continue to comply with the requirements.

Vecow Co.,Ltd

Date: June 28, 2013

CE TEST REPORT

of

EN55022 / CISPR 22 / AS/NZS CISPR 22
Class A
EN55024 / CISPR 24 / IMMUNITY
EN61000-3-2 / EN61000-3-3

Product : **Fanless,**

Extended-temp Embedded Computing System

Model(s): **ECS-7xxx; ECS-7000-6GDE(R);**
ECS-7000-6GD610QW;
ECS-7000-6GDE610QW;
ECS-7000-6R610QW

Applicant: **Vecow Co.,Ltd**

Address: **12F., No. 111, Zhongcheng Rd., Tucheng Dist., New Taipei City 23674 Taiwan (R.O.C)**

Test Performed by:

International Standards Laboratory
<Lung-Tan LAB>
*Site Registration No.
BSMI: SL2-IN-E-0013; SL2-R1/R2-E-0013; TAF: 0997
FCC: TW1036; IC: IC4067B-1; NEMKO: ELA 113B
VCCI: <Conduction 02>C-1440, T-1676, <Conduction 03>C-2845, T-1464, <Chamber 02>R-1435, G-17, <Chamber 12>R-2598,G-16, <Chamber 14>G-211,
*Address:
No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.
Lung-Tan Hsiang, Tao Yuan County 325, Taiwan
*Tel: 886-3-407-1718; Fax: 886-3-407-1738

Report No.: **ISL-13LE238CE**
Issue Date : **June 28, 2013**

This report totally contains 77 pages including this cover page and contents page.

Contents of Report

1. General

1.1 Certification of Accuracy of Test Data

Standards:	Please refer to 1.2
Equipment Tested:	Fanless, Extended-temp Embedded Computing System
Model:	ECS-7xxx; ECS-7000-6GDE(R); ECS-7000-6GD610QW; ECS-7000-6GDE610QW; ECS-7000-6R610QW
Applicant:	Vecow Co.,Ltd
Sample received Date:	May 16, 2013
Final test Date:	EMI:refer to the date of test data EMS: June 26, 2013
Test Site:	International Standards Laboratory Chamber 02; Chamber 14; Conduction 02; Immunity02
Test Distance:	10M; 3M (above1GHz) (EMI test)
Temperature:	refer to each site test data
Humidity:	refer to each site test data
Input power:	Conduction input power: AC 230 V / 50 Hz Radiation input power: AC 230 V / 50 Hz Immunity input power: AC 230 V / 50 Hz
Test Result:	**PASS**
Report Engineer:	Jayla Lu
Test Engineer:	James Kuo
Approved By:	Jim Chu / Director

1.2 Test Standards

The tests which this report describes were conducted by an independent electromagnetic compatibility consultant, International Standards Laboratory in accordance with the following

EN 55022:2010, CISPR 22:2008 (modified) and AS/NZS CISPR 22:2009+A1:2010: Class A: Limits and methods of measurement of Radio Interference characteristics of Information Technology Equipment.
EN 55024:2010 and CISPR 24:2010: Information technology equipment-Immunity characteristics - Limits and methods of measurement.

characteristics - Limits and methods of measurement.

Standard	Description	Results	Criteria
EN 61000-4-2:2009 IEC 61000-4-2:2008	Electrostatic Discharge	Pass	B
EN 61000-4-3:2006+A1:2008 +A2:2010 IEC 61000-4-3:2006+A1:2007+A2:2010	Radio-Frequency, Electromagnetic Field	Pass	A
EN 61000-4-4: 2004 +A1:2010 IEC 61000-4-4: 2004 +A1:2010	Electrical Fast Transient/Burst	Pass	B
EN 61000-4-5: 2006 IEC 61000-4-5: 2005	Surge	Pass	B
EN 61000-4-6:2009 IEC 61000-4-6:2008	Conductive Disturbance	Pass	A
EN 61000-4-8:2010 IEC 61000-4-8:2009	Power Frequency Magnetic Field	Pass	A
EN 61000-4-11: 2004 IEC 61000-4-11: 2004	Voltage Dips / Short Interruption and Voltage Variation		
	>95% in 0.5 period	Pass	B
	30% in 25 period	Pass	C
	>95% in 250 period	Pass	C

Standard	Description	Results
EN 61000-3-2: 2006 +A1:2009 +A2:2009 IEC 61000-3-2: 2005 +A1:2008 +A2:2009	Limits for harmonics current emissions	Pass
EN 61000-3-3: 2008 IEC 61000-3-3: 2008	Limits for voltage fluctuations and flicker in low-voltage supply systems.	Pass

1.2.1 Criteria for Compliance: EN 55024

Performance criterion A
During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.

Performance criterion B
After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.

Performance criterion C
During and after testing, a temporary loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions.
Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

1.3 Description of EUT

EUT

Description: Fanless, Extended-temp Embedded Computing System
Condition: Pre-Production
Model: ECS-7xxx; ECS-7000-6GDE(R); ECS-7000-6GD610QW; ECS-7000-6GDE610QW; ECS-7000-6R610QW
Serial Number: N/A

Components	Vendor	Model Number
Main Board	VECOW	ECS-7000
CPU	Intel	Core™ i7-3610QE Processor 3.3GHz
Memory	DIMM Memory: Vecow M340S-W28M1 DDR3 2GB PC3-1333/1600MHz or DDR3 4GB PC3-1333/1600MHz or DDR3 8GB PC3-1333/1600MHz	
SSD m-SATA	MemoRight	32GB(Model: D150Q)
		8GB(Model: BT-25)
	A+cpi	32GB(Model: SED25-M)
Power adaptor	Seasonic	Model: SSA-1201-24

The I/O ports of EUT are listed below:

I/O Port/Cable Type	Quantity
DC IN Port	Three
Isolated DIO Port	one
USB3.0 Port	four
USB2.0 Port	two
Serial Port	four
Display Port	two
DVI-D Port	one
VGA Port	one
LAN Port (10M/100M/1000Mbps)	six
Line-In	one
Line-Out	one
Mic-In	one

All the devices listed below are chosen by the applicant to be the representative configuration for testing in this report.

Configuration	1
CPU	Intel Core™ i7-3610QE Processor 3.3GHz
Motherboard	ECS-7000
Memory	Vecow-8GB PC3-1333MHz
SSD m-SATA	MemoRight 32GB(Model: D150Q)
Power adaptor	Seasonic (Model: SSA-1201-24)
Resolution	DVI-D & Display*2 1920*1200 60Hz

Different Model list:

Model	Market
ECS-7xxx	Different customer
ECS-7000-6GDE(R)	
ECS-7000-6GD610QW	
ECS-7000-6GDE610QW	
ECS-7000-6R610QW	

EMI Noise Source:
Crystal:

Crystal	Point
25MHz	X1
25MHz	X2
32.768KHz	X3
25MHz	X4
25MHz	X5
25MHz	X6
25MHz	X7
25MHz	X8

EMI Solution:
N/A

1.4 Description of Support Equipment

For EMI test Support unit: 1~21
For EMS test Support unit: 10~30

No	Unit	Model / Serial No.	Brand	Power Cord	FCC ID
1	USB Mouse	MS111-P S/N:N/A	DELL	N/A	FCC DOC
2	USB Keyboard	KB4021 S/N:N/A	DELL	N/A	FCC DOC
3	24” LCD Monitor	U2412Mb S/N:N/A	DELL	Non-shielded	FCC DOC
4	24” LCD Monitor	U2412Mb S/N:N/A	DELL	Non-shielded	FCC DOC
5	24” LCD Monitor	LT2452pwC S/N:N/A	LENOVO	Non-shielded	FCC DOC
6	WD Hard Disk Case(3.0)	WDBACY5000ABK -00 S/N: N/A	Western Digital	N/A	FCC DOC
7	WD Hard Disk Case(3.0)	WDBACY5000ABK -00 S/N: N/A	Western Digital	N/A	FCC DOC
8	WD Hard Disk Case(3.0)	WDBACY5000ABK -00 S/N: N/A	Western Digital	N/A	FCC DOC
9	WD Hard Disk Case(3.0)	WDBACY5000ABK -00 S/N: N/A	Western Digital	N/A	FCC DOC
10	Notebook Personal Computer	Latitude D620 S/N:N/A	DELL	Non-shielded	FCC DOC
11	Notebook Personal Computer	Latitude D620 S/N:N/A	DELL	Non-shielded	FCC DOC
12	Notebook Personal Computer	Latitude D620 S/N:N/A	DELL	Non-shielded	FCC DOC
13	Notebook Personal Computer	Latitude D620 S/N:N/A	DELL	Non-shielded	FCC DOC
14	Notebook Personal Computer	Latitude D620 S/N:N/A	DELL	Non-shielded	FCC DOC
15	Notebook Personal Computer	Latitude D620 S/N:N/A	DELL	Non-shielded	FCC DOC

No	Unit	Model / Serial No.	Brand	Power Cord	FCC ID
16	Aceex Modem	DM1414 S/N: 0301000557	Aceex	Non-shielded	FCC DOC
17	Aceex Modem	DM1414 S/N: 0301000557	Aceex	Non-shielded	FCC DOC
18	Aceex Modem	DM1414 S/N: 0301000557	Aceex	Non-shielded	FCC DOC
19	Aceex Modem	DM1414 S/N: 0301000557	Aceex	Non-shielded	FCC DOC
20	Microphone and Headset	ET-E200 S/N: N/A	Ergotech	N/A	FCC DOC
21	Coson radio cassette player	C-2087 S/N: N/A	Coson	N/A	FCC DOC
22	24” LCD Monitor	U2410F S/N:N/A	DELL	Non-shielded	FCC DOC
23	24” LCD Monitor	U2410F S/N:N/A	DELL	Non-shielded	FCC DOC
24	24” LCD Monitor	U2410F S/N:N/A	DELL	Non-shielded	FCC DOC
25	Traveling Disk (3.0)	TS16GJF700 S/N: N/A	Transcend	N/A	FCC DOC
26	Traveling Disk (3.0)	TS16GJF700 S/N: N/A	Transcend	N/A	FCC DOC
27	Traveling Disk (3.0)	TS16GJF700 S/N: N/A	Transcend	N/A	FCC DOC
28	Traveling Disk (3.0)	TS16GJF700 S/N: N/A	Transcend	N/A	FCC DOC
29	USB Mouse	MO56UC S/N:N/A	DELL	N/A	FCC DOC
30	USB Keyboard	SK-8115 S/N:N/A	DELL	N/A	FCC DOC

1.5 Software for Controlling Support Unit

Test programs exercising various part of EUT were used. The programs were executed as follows:

For EMI test configuration:

1. Send H pattern to the LCD monitor.
2. Read and write data through EUT SSD m-SATA.
3. Read and write data the WD Hard Disk Case(3.0) through EUT USB 3.0 port.
4. Receive audio signal from Coson radio cassette player through Line-In Port.
5. Send audio signal to the Microphone and Headset (Headset) through Headset Port.
6. Receive audio signal form Microphone and Headset (Microphone) through Microphone Port.
7. Receive and transmit package of EUT to the NB through LAN port.
8. Repeat the above steps.

	File	Issue Date
24” LCD Monitor	BurnIn.exe	2011/7/2
SSD m-SATA	BurnIn.exe	2011/7/2
WD Hard Disk Case(3.0)	BurnIn.exe	2011/7/2
Microphone and HeadSet (HeadSet)	BurnIn.exe	2011/7/2
Aceex Modem	IntelEMC.exe	04/11/2007
LAN	BurnIn.exe	2011/7/2

For EMS test configuration:

1. Send H pattern to the LCD monitor.
2. Read and write data through EUT SSD m-SATA.
3. Read and write data the Traveling Disk (3.0) through EUT USB 3.0 port.
4. Receive audio signal from Coson radio cassette player through Line-In Port.
5. Send audio signal to the Microphone and Headset (Headset) through Headset Port.
6. Receive audio signal form Microphone and Headset (Microphone) through Microphone Port.
7. Receive and transmit package of EUT to the NB through LAN port.
8. Repeat the above steps.

	File	Issue Date
24” LCD Monitor	BurnIn.exe	2011/7/2
SSD m-SATA	BurnIn.exe	2011/7/2
Traveling Disk (3.0)	BurnIn.exe	2011/7/2
Microphone and HeadSet (HeadSet)	BurnIn.exe	2011/7/2
Aceex Modem	IntelEMC.exe	04/11/2007
LAN	BurnIn.exe	2011/7/2

1.6 I/O Cable Condition of EUT and Support Units

For EMI test configuration:

Description	Path	Cable Length	Cable Type	Connector Type
AC Power cable	100V~240V to SPS	1.8M	Non-shielded	Plastic Head
Display data cable*2	24” LCD Monitor to EUT Display port	1.8M	Shielded	Metal Head
DVI-D data cable	24” LCD Monitor to EUT DVI-D port	1.8M	Shielded	Metal Head
USB Keyboard	USB Keyboard to EUT USB2.0 port	1.8M	Non-shielded	Metal Head
USB Mouse	USB Mouse to EUT USB2.0 port	1.8M	Non-shielded	Metal Head
Audio data cable	Microphone and HeadSet to EUT microphone port and line out port	1.8M	Non-shielded	Metal Head
Audio Data Cable	Coson radio cassette player to EUT Line In Port	1.8M	Non-shielded	Metal Head
USB data cable*4	WD Hard Disk Case(3.0) to EUT USB 3.0 port	1.27M	Shielded	Metal Head
LAN data cable*6	Support NB(Latitude D620) LAN port to EUT LAN port	33 feet	Non-shielded	Plastic Head
Modem Data Cable*4	Modem to EUT Serial Port	1.8M	Shielded	Metal Head
Isolated DIO Data Cable	Isolated DIO Data Cable with Dummy	1.8M	Shielded	Metal Head

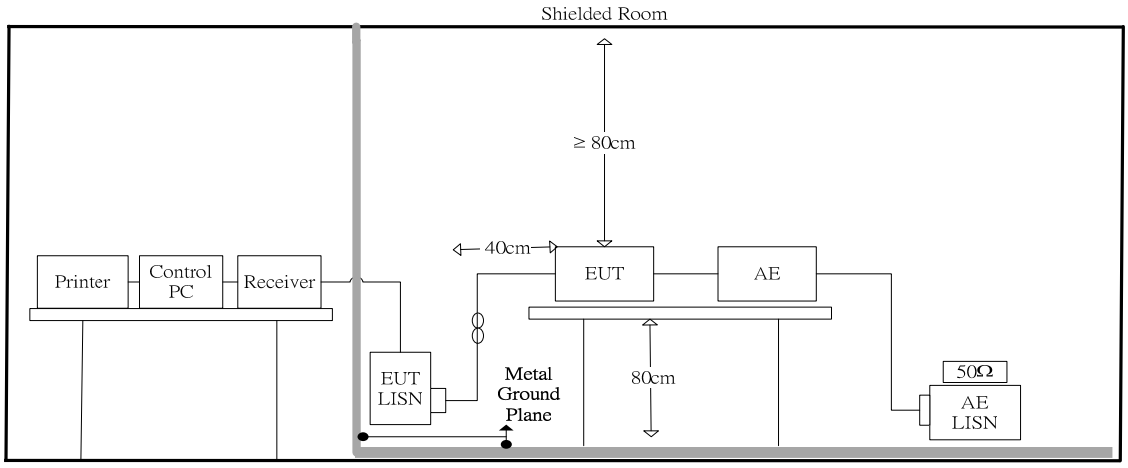
For EMS test configuration:

Description	Path	Cable Length	Cable Type	Connector Type
AC Power cable	100V~240V to SPS	1.8M	Non-shielded	Plastic Head
Display data cable*2	24” LCD Monitor to EUT Display port	1.8M	Shielded	Metal Head
DVI-D data cable	24” LCD Monitor to EUT DVI-D port	1.8M	Shielded	Metal Head
USB Keyboard	USB Keyboard to EUT USB2.0 port	1.8M	Non-shielded	Metal Head
USB Mouse	USB Mouse to EUT USB2.0 port	1.8M	Non-shielded	Metal Head
Audio data cable	Microphone and HeadSet to EUT microphone port and line out port	1.8M	Non-shielded	Metal Head
Audio Data Cable	Coson radio cassette player to EUT Line In Port	1.8M	Non-shielded	Metal Head
USB data cable*4	Traveling Disk (3.0) to EUT USB 3.0 port	1.0M	Shielded	Metal Head
LAN data cable*6	Support NB(Latitude D620) LAN port to EUT LAN port	33 feet	Non-shielded	Plastic Head
Modem Data Cable*4	Modem to EUT Serial Port	1.8M	Shielded	Metal Head
Isolated DIO Data Cable	Isolated DIO Data Cable with Dummy	1.8M	Shielded	Metal Head

2. Power Main Port Conducted Emissions

2.1 Test Setup and Procedure

2.1.1 Test Setup



2.1.2 Test Procedure

The measurements are performed in a 3.5m x 3.4m x 2.5m shielded room, which referred as Conduction 01 test site, or a 3m x 3m x 2.3m test site, which referred as Conduction 02 test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

Power to the EUT was provided through the LISN which has the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the standard. Power to the LISNs were filtered to eliminate ambient signal interference and these filters were bonded to the ground plane. Peripheral equipment required to provide a functional system (support equipment) for EUT testing was powered from the second LISN through a ganged, metal power outlet box which is bonded to the ground plane at the LISN.

The interconnecting cables were arranged and moved to get the maximum measurement. Both the line of power cord, hot and neutral, were measured. All of the interface cables were manipulated according to EN 55022 requirements.

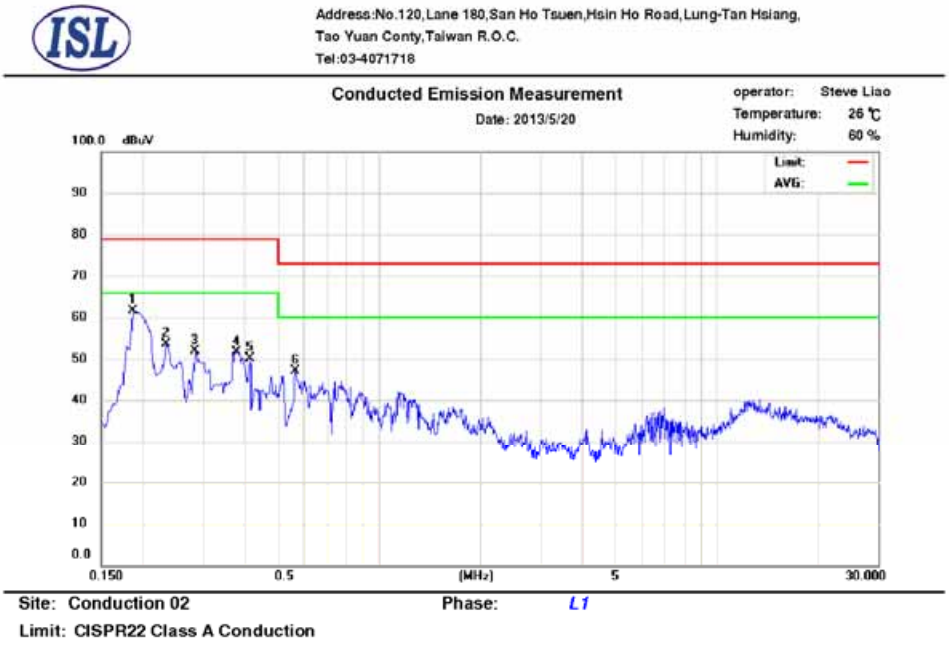
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

2.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	150KHz--30MHz
Detector Function:	Quasi-Peak / Average Mode
Resolution Bandwidth:	9KHz

2.2 Conduction Test Data: Configuration 1

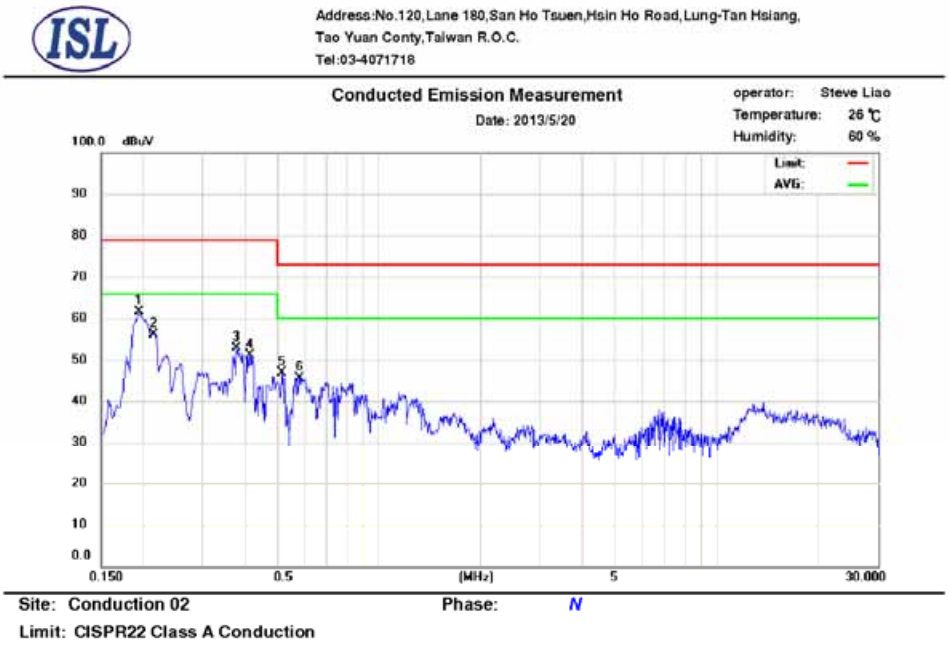
Table 2.2.1 Power Line Conducted Emissions (Line)



No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.19	9.63	57.74	79.00	-21.26	49.54	66.00	-16.46	
2	0.23	9.64	50.30	79.00	-28.70	47.86	66.00	-18.14	
3	0.29	9.64	48.54	79.00	-30.46	43.53	66.00	-22.47	
4	0.38	9.64	49.58	79.00	-29.42	35.95	66.00	-30.05	
5	0.41	9.65	48.47	79.00	-30.53	32.68	66.00	-33.32	
6	0.57	9.65	41.78	73.00	-31.22	32.91	60.00	-27.09	

Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

Table 2.2.2 Power Line Conducted Emissions (Neutral)



No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.19	9.61	59.77	79.00	-19.23	57.60	66.00	-8.40	
2	0.22	9.61	47.54	79.00	-31.46	34.94	66.00	-31.06	
3	0.38	9.63	50.62	79.00	-28.38	37.08	66.00	-28.92	
4	0.41	9.64	49.46	79.00	-29.54	33.89	66.00	-32.11	
5	0.51	9.64	44.57	73.00	-28.43	32.40	60.00	-27.60	
6	0.58	9.64	43.63	73.00	-29.37	37.76	60.00	-22.24	

Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

2.3 Test Setup Photo

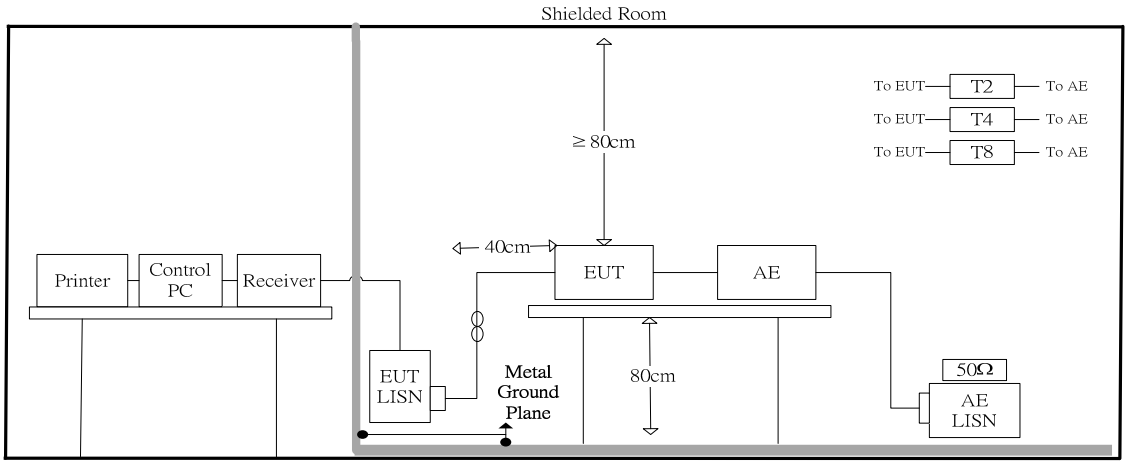
Front View

Back View

3. Telecommunication Port Conducted Emissions

3.1 Test Setup and Procedure

3.1.1 Test Setup



3.1.2 Test Procedure

The measurements are performed in a 3.5m x 3.4m x 2.5m shielded room, which referred as Conduction 01 test site, or a 3m x 3m x 2.3m test site, which referred as Conduction 02 test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

The EUT, any support equipment, and any interconnecting cables were arranged and moved to get the maximum measurement. All of the interface cables were manipulated according to EN 55022 requirements.

The port of the EUT was connected to the support equipment through the ISN and linked in normal condition.

AC input power for the EUT & the support equipment power outlets were obtained from the same filtered source that provided input power to the LISN.

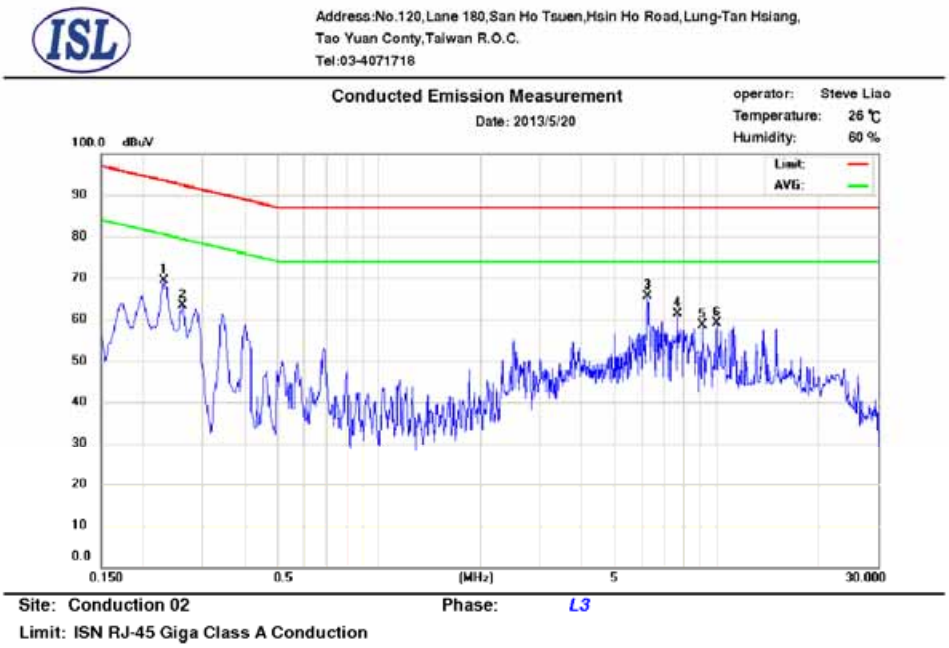
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information could be useful in reducing their amplitude.

3.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	150KHz--30MHz
Detector Function:	Quasi-Peak / Average Mode
Resolution Bandwidth:	9KHz

3.2 Test Data: LAN 1--10M

Table 3.2.1 Telecommunication Port Conducted Emission



No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.23	10.11	69.91	93.45	-23.54	65.97	80.45	-14.48	
2	0.26	10.09	58.79	92.37	-33.58	47.28	79.37	-32.09	
3	6.25	9.80	58.16	87.00	-28.84	47.19	74.00	-26.81	
4	7.67	9.81	55.82	87.00	-31.18	51.26	74.00	-22.74	
5	9.07	9.83	52.77	87.00	-34.23	46.56	74.00	-27.44	
6	10.01	9.84	47.40	87.00	-39.60	30.62	74.00	-43.38	

Note :

Margin = QP/AVG Emission - Limit

QP/AVG Emission = Receiver Reading + Correct Factor

Correct Factor = LISN Loss + Cable Loss

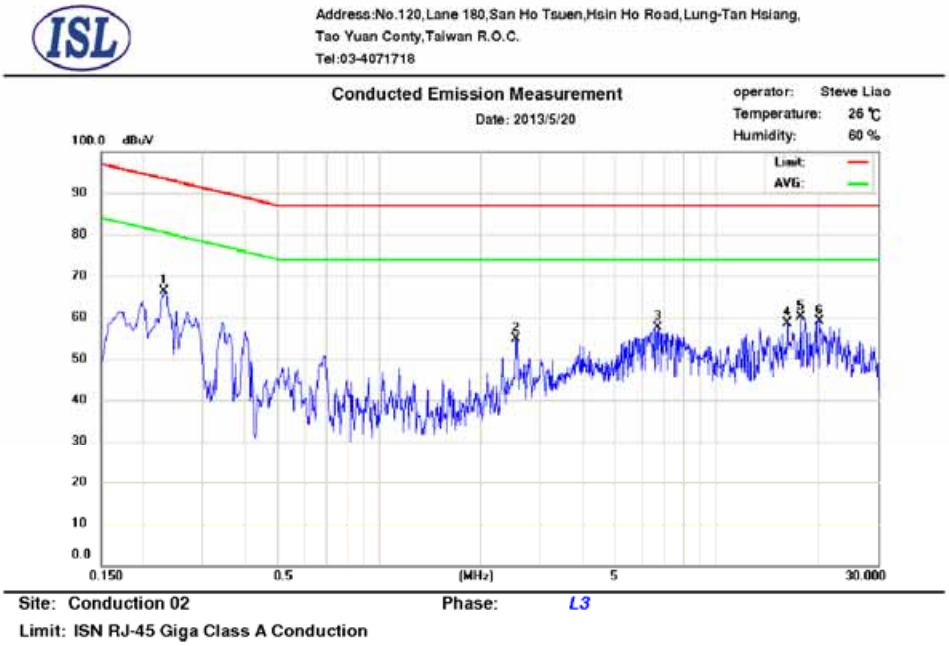
A margin of -8dB means that the emission is 8dB below the limit

The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.

If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.3 Test Data: LAN 1--100M

Table 3.3.1 Telecommunication Port Conducted Emission

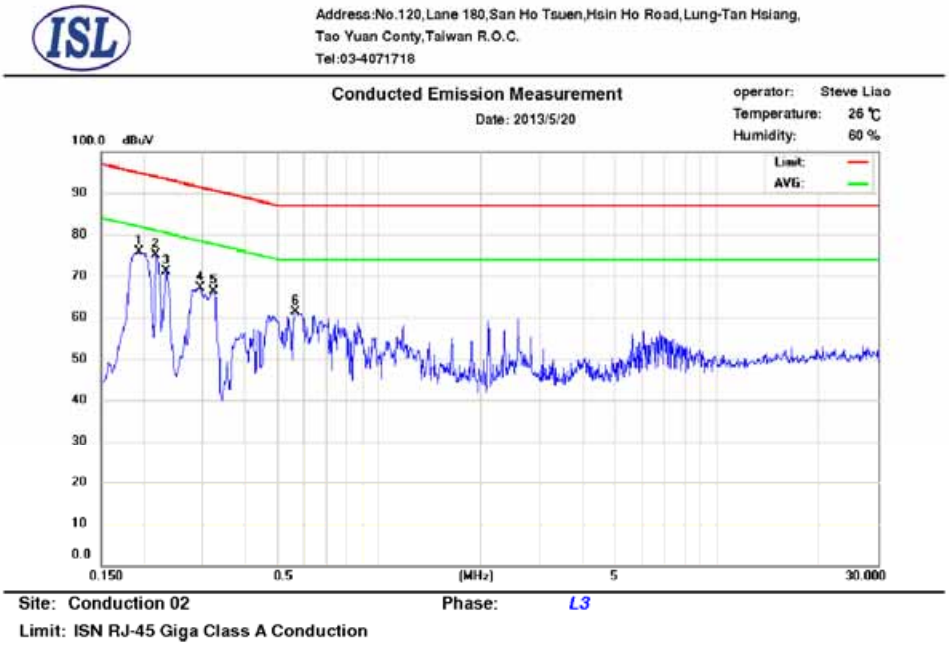


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.23	10.11	65.76	93.45	-27.69	61.67	80.45	-18.78	
2	2.55	9.77	51.63	87.00	-35.37	48.71	74.00	-25.29	
3	6.70	9.81	56.23	87.00	-30.77	51.37	74.00	-22.63	
4	16.17	9.91	57.72	87.00	-29.28	54.33	74.00	-19.67	
5	17.69	9.94	58.70	87.00	-28.30	55.41	74.00	-18.59	
6	20.26	9.99	57.83	87.00	-29.17	54.32	74.00	-19.68	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.4 Test Data: LAN 1--GIGA

Table 3.4.1 Telecommunication Port Conducted Emission

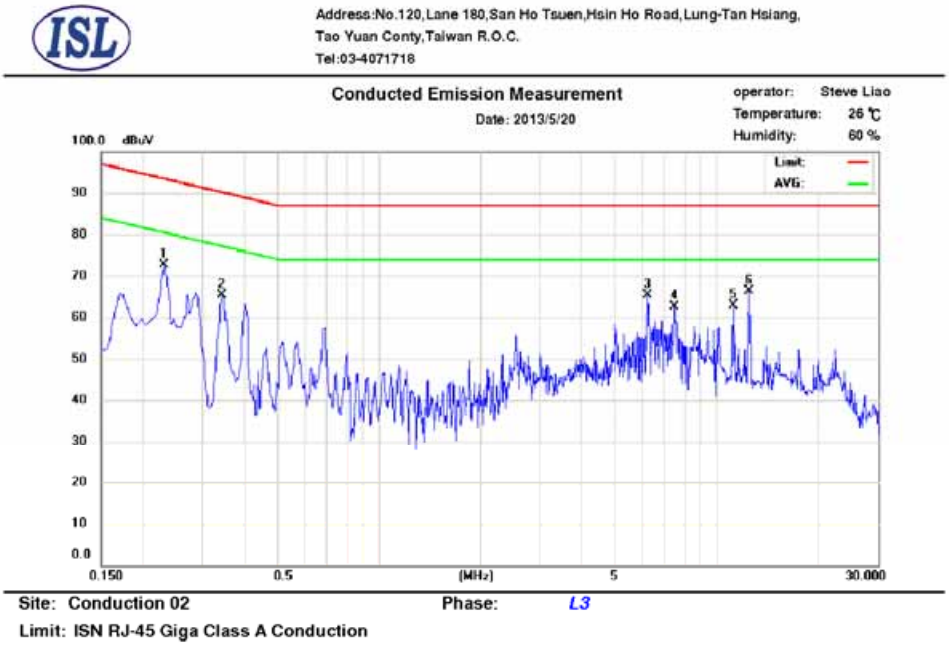


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.19	10.15	75.08	94.86	-19.78	72.04	81.86	-9.82	
2	0.22	10.11	65.53	93.89	-28.36	48.01	80.89	-32.88	
3	0.23	10.11	66.55	93.31	-26.76	66.38	80.31	-13.93	
4	0.29	10.06	66.39	91.41	-25.02	62.47	78.41	-15.94	
5	0.32	10.03	57.12	90.66	-33.54	42.17	77.66	-35.49	
6	0.57	9.88	58.46	87.00	-28.54	48.59	74.00	-25.41	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.5 Test Data: LAN 2--10M

Table 3.5.1 Telecommunication Port Conducted Emission

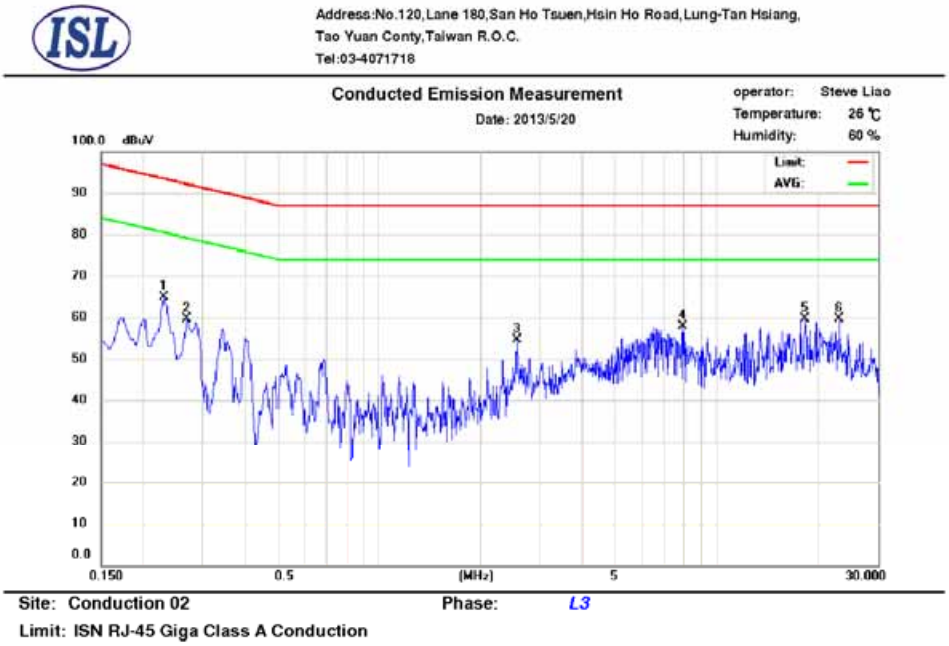


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.23	10.11	72.14	93.45	-21.31	68.15	80.45	-12.30	
2	0.34	10.02	65.02	90.15	-25.13	64.71	77.15	-12.44	
3	6.25	9.80	57.90	87.00	-29.10	46.35	74.00	-27.65	
4	7.50	9.82	61.38	87.00	-25.62	48.70	74.00	-25.30	
5	11.25	9.86	56.11	87.00	-30.89	46.18	74.00	-27.82	
6	12.50	9.87	58.89	87.00	-28.11	45.89	74.00	-28.11	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.6 Test Data: LAN 2--100M

Table 3.6.1 Telecommunication Port Conducted Emission

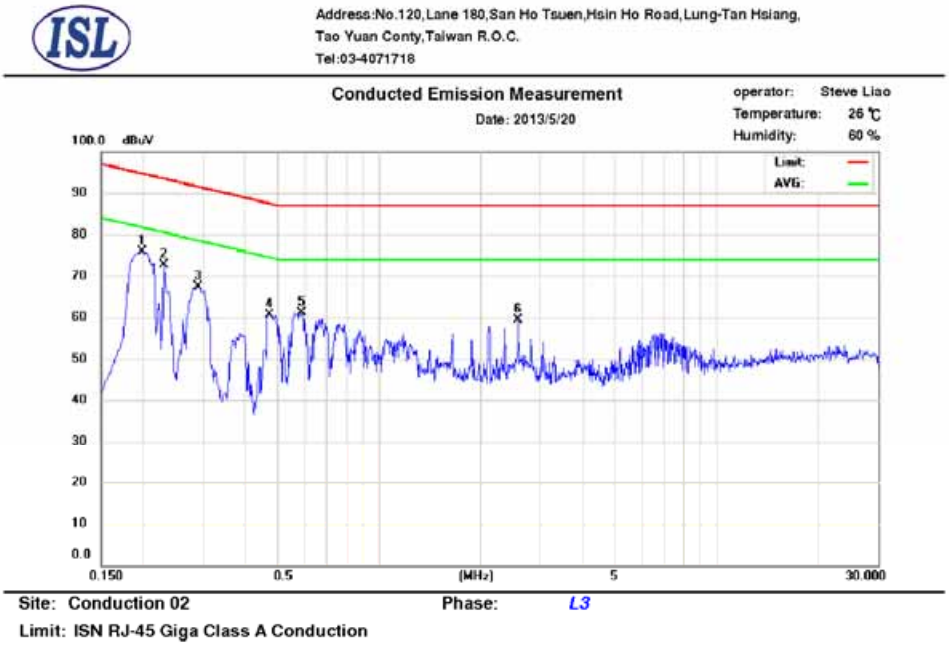


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.23	10.11	64.78	93.45	-28.67	60.82	80.45	-19.63	
2	0.27	10.08	57.01	92.12	-35.11	47.01	79.12	-32.11	
3	2.56	9.77	50.85	87.00	-36.15	48.30	74.00	-25.70	
4	7.92	9.82	52.91	87.00	-34.09	50.23	74.00	-23.77	
5	18.24	9.95	59.09	87.00	-27.91	55.82	74.00	-18.18	
6	23.13	10.08	59.13	87.00	-27.87	55.61	74.00	-18.39	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.7 Test Data: LAN 2--GIGA

Table 3.7.1 Telecommunication Port Conducted Emission

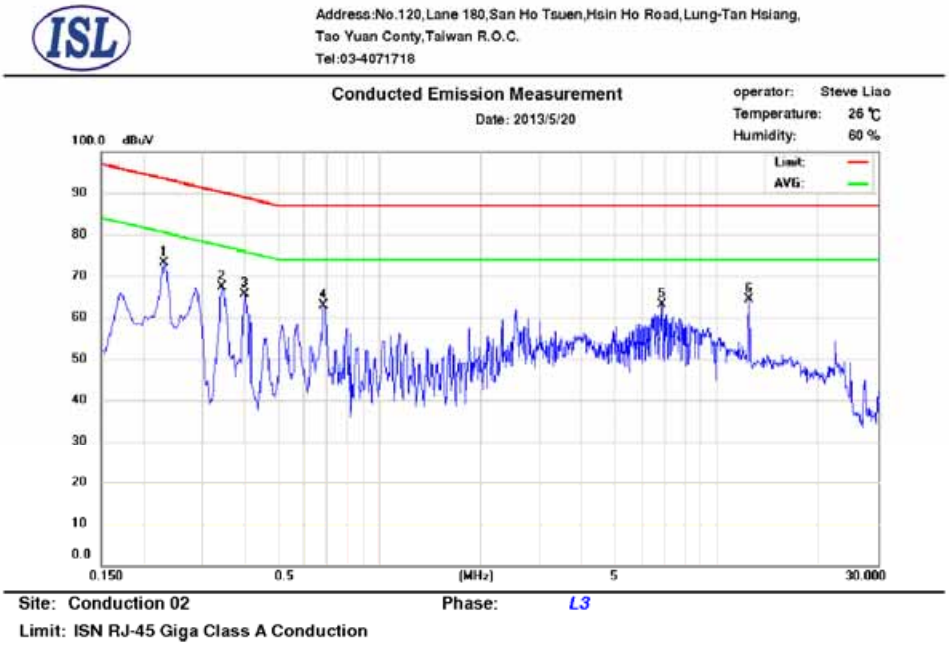


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.20	10.14	75.01	94.69	-19.68	72.05	81.69	-9.64	
2	0.23	10.11	59.41	93.45	-34.04	58.32	80.45	-22.13	
3	0.29	10.06	65.95	91.52	-25.57	61.43	78.52	-17.09	
4	0.47	9.91	57.30	87.44	-30.14	48.21	74.44	-26.23	
5	0.59	9.87	59.14	87.00	-27.86	52.67	74.00	-21.33	
6	2.59	9.77	58.27	87.00	-28.73	57.45	74.00	-16.55	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.8 Test Data: LAN 3--10M

Table 3.8.1 Telecommunication Port Conducted Emission

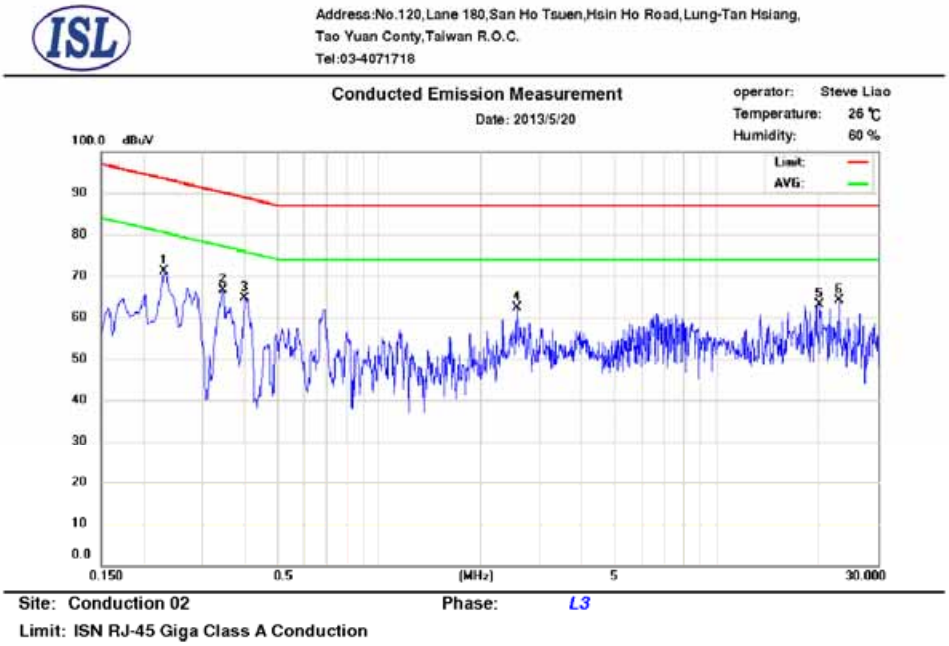


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.23	10.11	72.68	93.45	-20.77	68.67	80.45	-11.78	
2	0.34	10.02	66.89	90.15	-23.26	66.57	77.15	-10.58	
3	0.40	9.97	65.53	88.90	-23.37	64.31	75.90	-11.59	
4	0.69	9.86	62.26	87.00	-24.74	60.35	74.00	-13.65	
5	6.90	9.81	59.59	87.00	-27.41	55.72	74.00	-18.28	
6	12.50	9.87	57.31	87.00	-29.69	46.88	74.00	-27.12	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.9 Test Data: LAN 3--100M

Table 3.9.1 Telecommunication Port Conducted Emission

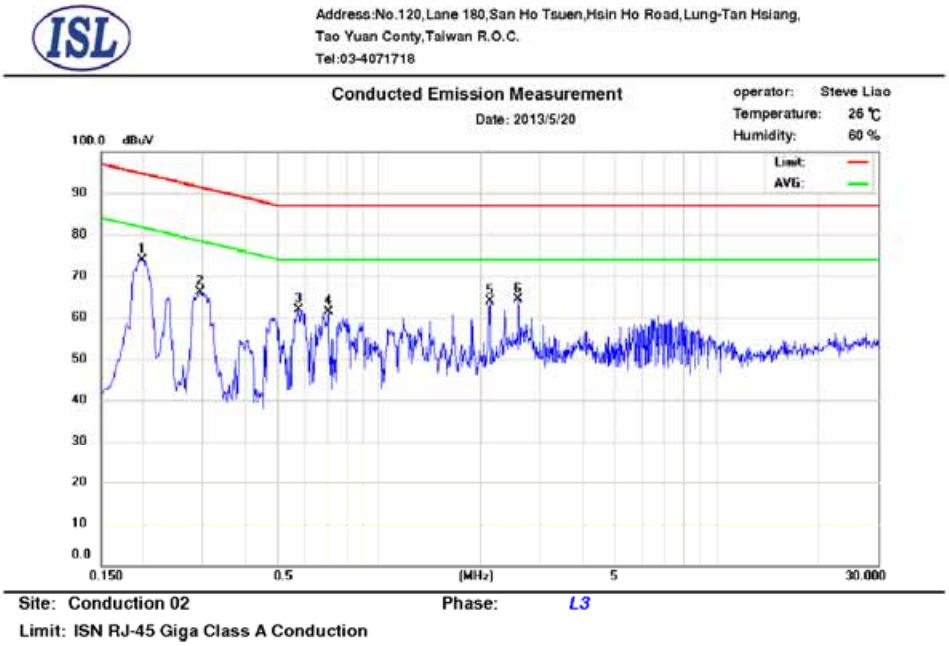


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.23	10.11	70.44	93.45	-23.01	66.61	80.45	-13.84	
2	0.35	10.01	65.19	90.06	-24.87	61.95	77.06	-15.11	
3	0.40	9.97	64.21	88.90	-24.69	62.33	75.90	-13.57	
4	2.55	9.77	60.73	87.00	-26.27	57.02	74.00	-16.98	
5	20.26	9.99	61.50	87.00	-25.50	57.74	74.00	-16.26	
6	23.13	10.08	62.27	87.00	-24.73	58.35	74.00	-15.65	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.10 Test Data: LAN 3--GIGA

Table 3.10.1 Telecommunication Port Conducted Emission

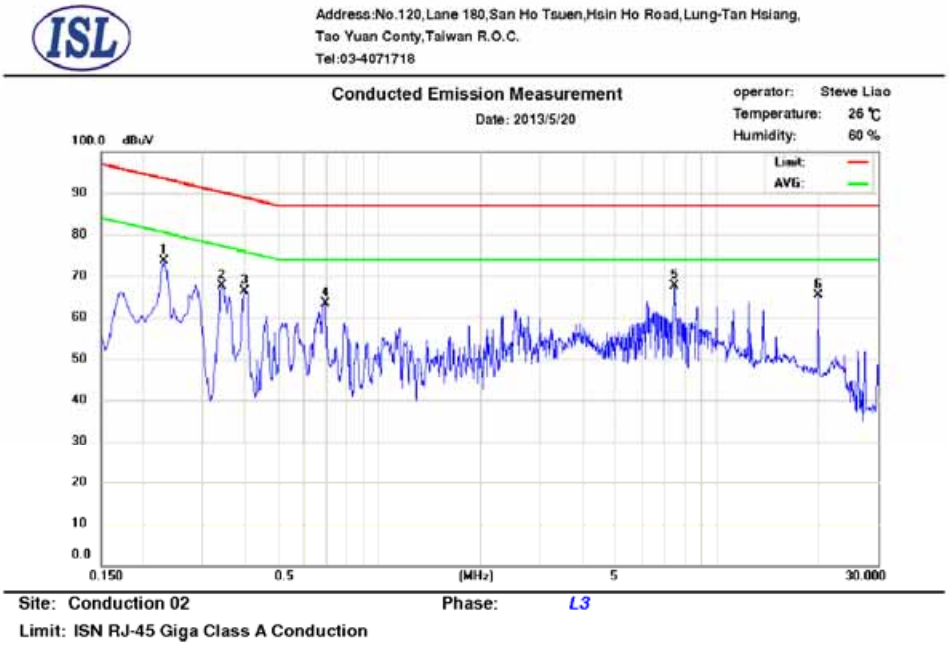


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.20	10.14	73.29	94.69	-21.40	70.56	81.69	-11.13	
2	0.29	10.06	65.01	91.41	-26.40	61.23	78.41	-17.18	
3	0.58	9.87	59.58	87.00	-27.42	53.78	74.00	-20.22	
4	0.71	9.86	58.21	87.00	-28.79	51.98	74.00	-22.02	
5	2.12	9.77	62.04	87.00	-24.96	61.53	74.00	-12.47	
6	2.59	9.77	64.12	87.00	-22.88	63.20	74.00	-10.80	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.11 Test Data: LAN 4--10M

Table 3.11.1 Telecommunication Port Conducted Emission

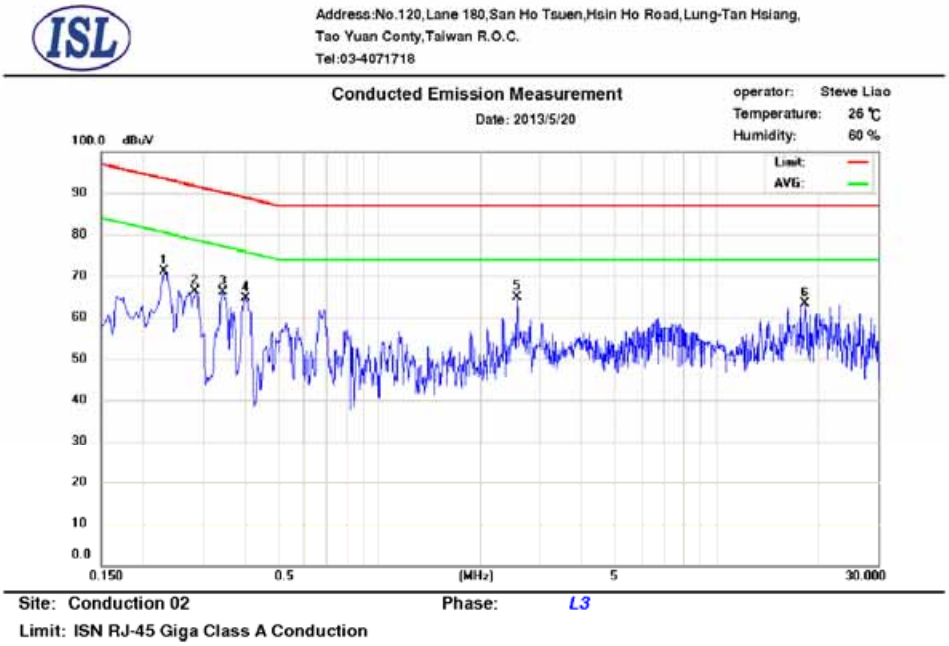


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.23	10.11	72.97	93.45	-20.48	68.97	80.45	-11.48	
2	0.34	10.02	67.37	90.15	-22.78	66.87	77.15	-10.28	
3	0.40	9.97	65.76	88.90	-23.14	64.78	75.90	-11.12	
4	0.69	9.86	61.00	87.00	-26.00	57.66	74.00	-16.34	
5	7.50	9.81	59.31	87.00	-27.69	48.54	74.00	-25.46	
6	20.00	9.98	56.85	87.00	-30.15	45.74	74.00	-28.26	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.12 Test Data: LAN 4--100M

Table 3.12.1 Telecommunication Port Conducted Emission

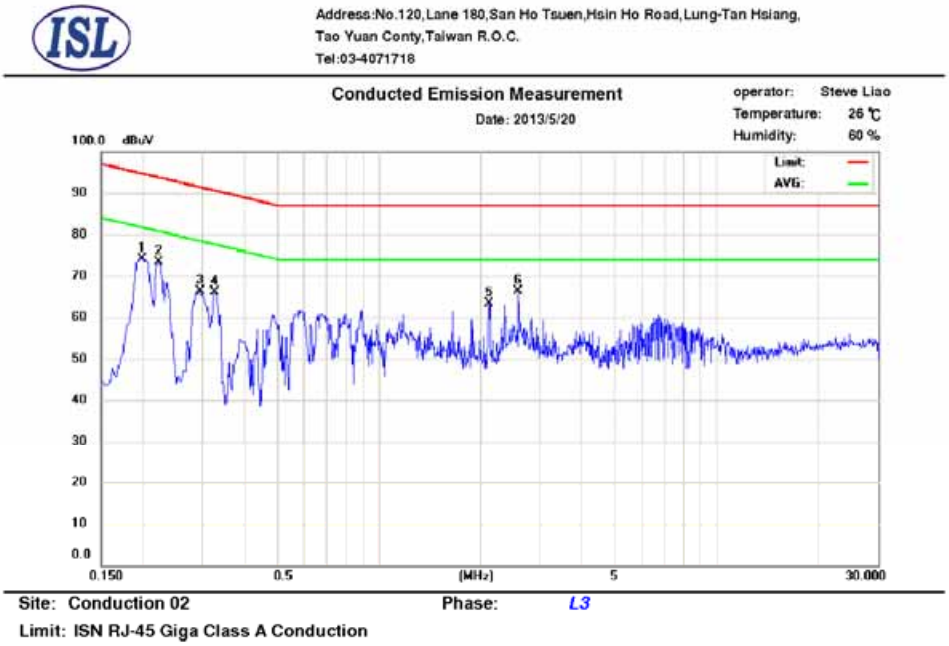


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.23	10.11	70.25	93.45	-23.20	66.67	80.45	-13.78	
2	0.29	10.07	66.30	91.64	-25.34	63.71	78.64	-14.93	
3	0.35	10.01	65.02	90.06	-25.04	61.99	77.06	-15.07	
4	0.40	9.97	64.33	88.81	-24.48	63.68	75.81	-12.13	
5	2.57	9.77	59.36	87.00	-27.64	56.87	74.00	-17.13	
6	18.24	9.95	62.62	87.00	-24.38	59.73	74.00	-14.27	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.13 Test Data: LAN 4--GIGA

Table 3.13.1 Telecommunication Port Conducted Emission

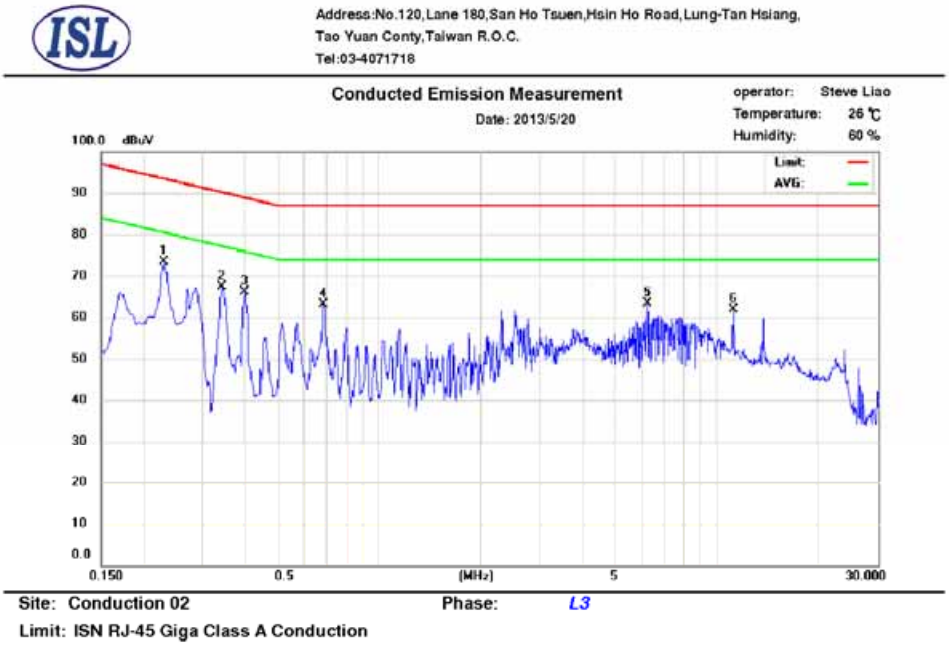


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.20	10.14	73.02	94.69	-21.67	63.20	81.69	-18.49	
2	0.22	10.11	60.54	93.74	-33.20	43.86	80.74	-36.88	
3	0.29	10.06	65.29	91.41	-26.12	61.28	78.41	-17.13	
4	0.33	10.03	57.97	90.55	-32.58	40.30	77.55	-37.25	
5	2.12	9.77	61.02	87.00	-25.98	59.84	74.00	-14.16	
6	2.59	9.77	63.53	87.00	-23.47	62.07	74.00	-11.93	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.14 Test Data: LAN 5--10M

Table 3.14.1 Telecommunication Port Conducted Emission

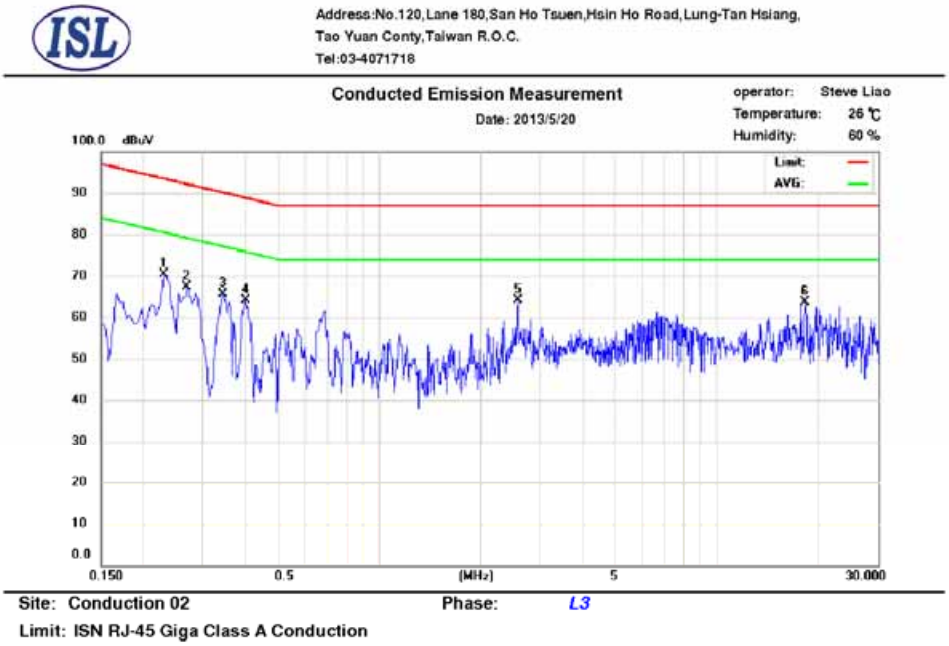


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.23	10.11	72.99	93.45	-20.46	68.93	80.45	-11.52	
2	0.34	10.02	67.11	90.15	-23.04	66.85	77.15	-10.30	
3	0.40	9.97	65.69	88.90	-23.21	64.57	75.90	-11.33	
4	0.69	9.86	62.43	87.00	-24.57	60.68	74.00	-13.32	
5	6.25	9.80	56.31	87.00	-30.69	46.81	74.00	-27.19	
6	11.25	9.86	56.36	87.00	-30.64	50.10	74.00	-23.90	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.15 Test Data: LAN 5--100M

Table 3.15.1 Telecommunication Port Conducted Emission

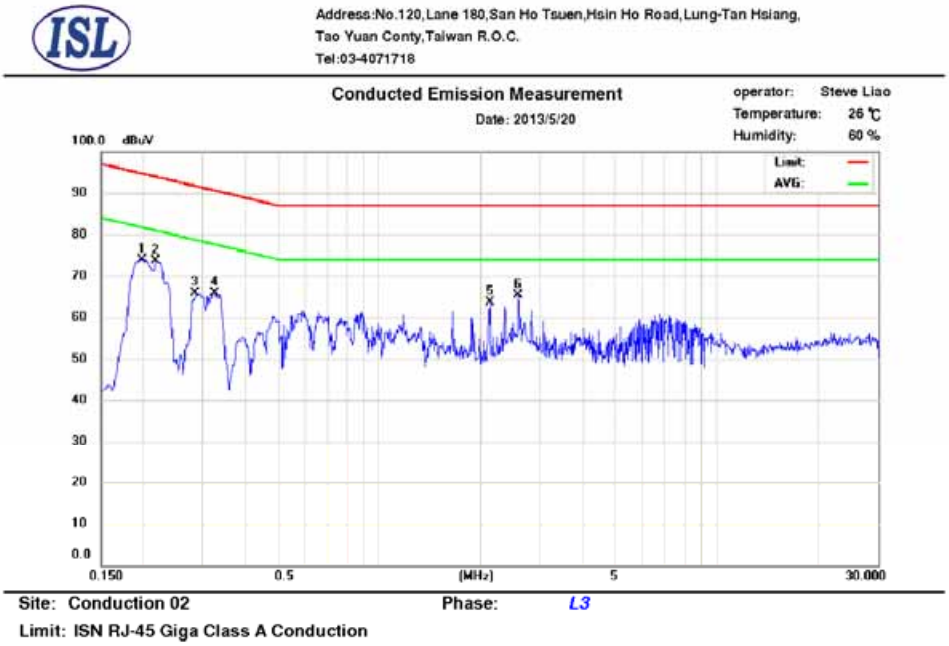


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.23	10.11	68.99	93.45	-24.46	65.56	80.45	-14.89	
2	0.27	10.08	63.89	92.12	-28.23	54.44	79.12	-24.68	
3	0.35	10.01	64.69	90.06	-25.37	59.96	77.06	-17.10	
4	0.40	9.97	63.64	88.81	-25.17	62.49	75.81	-13.32	
5	2.57	9.77	61.28	87.00	-25.72	58.78	74.00	-15.22	
6	18.24	9.95	62.49	87.00	-24.51	59.15	74.00	-14.85	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.16 Test Data: LAN 5--GIGA

Table 3.16.1 Telecommunication Port Conducted Emission

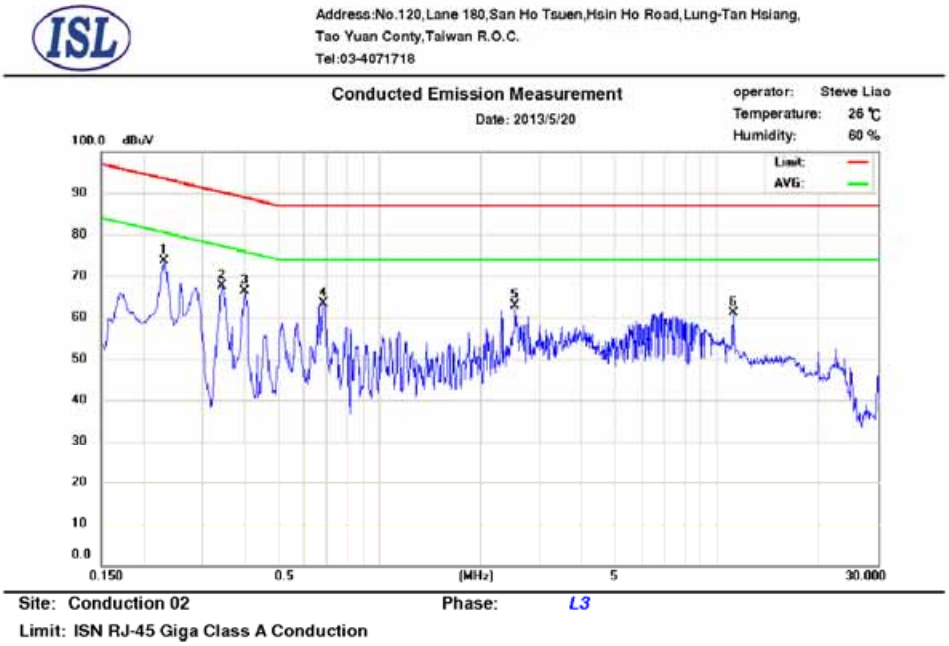


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.20	10.14	73.19	94.69	-21.50	69.96	81.69	-11.73	
2	0.22	10.11	72.50	93.89	-21.39	64.70	80.89	-16.19	
3	0.29	10.07	63.07	91.64	-28.57	54.80	78.64	-23.84	
4	0.33	10.03	58.28	90.55	-32.27	42.10	77.55	-35.45	
5	2.12	9.77	62.52	87.00	-24.48	62.06	74.00	-11.94	
6	2.59	9.77	64.28	87.00	-22.72	62.87	74.00	-11.13	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.17 Test Data: LAN 6--10M

Table 3.17.1 Telecommunication Port Conducted Emission

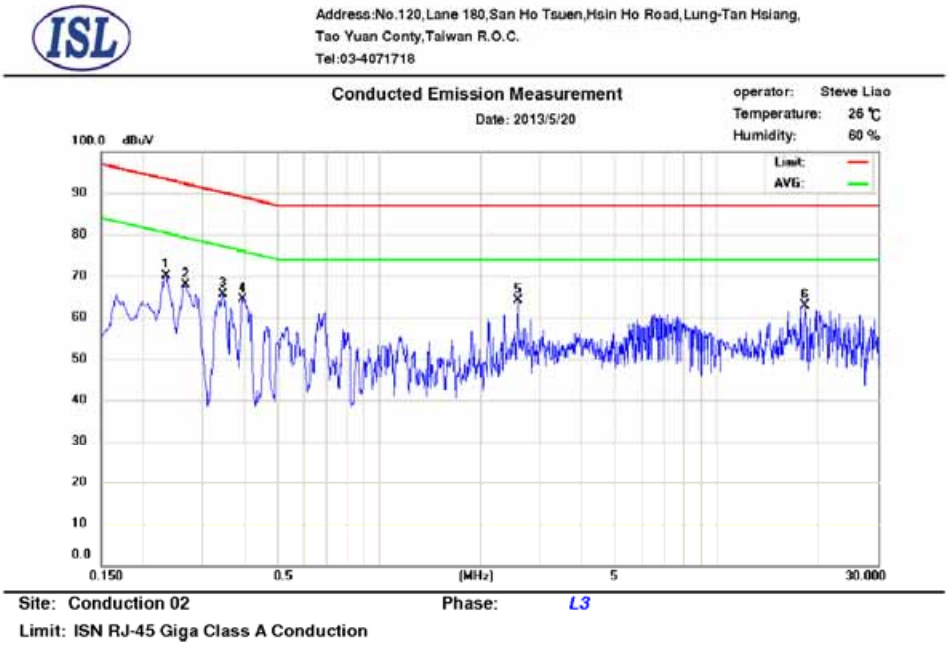


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.23	10.11	73.03	93.45	-20.42	68.93	80.45	-11.52	
2	0.34	10.02	67.25	90.15	-22.90	66.90	77.15	-10.25	
3	0.40	9.97	65.65	88.90	-23.25	64.83	75.90	-11.07	
4	0.69	9.86	62.48	87.00	-24.52	60.23	74.00	-13.77	
5	2.53	9.77	61.13	87.00	-25.87	60.77	74.00	-13.23	
6	11.25	9.86	54.85	87.00	-32.15	47.93	74.00	-26.07	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.18 Test Data: LAN 6--100M

Table 3.18.1 Telecommunication Port Conducted Emission

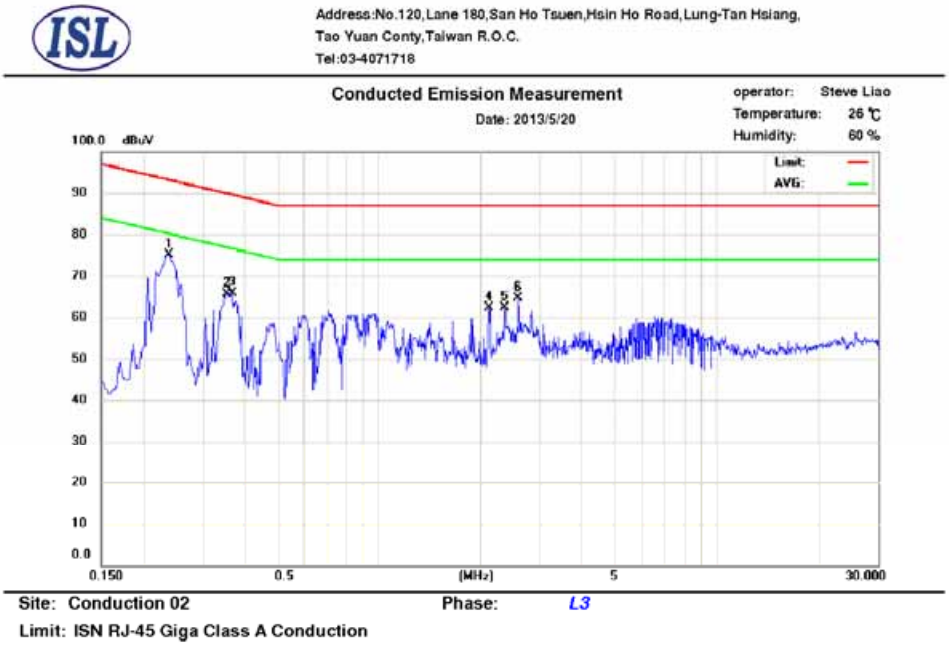


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.23	10.11	68.26	93.31	-25.05	64.78	80.31	-15.53	
2	0.27	10.08	63.23	92.24	-29.01	54.49	79.24	-24.75	
3	0.35	10.01	64.46	90.06	-25.60	61.51	77.06	-15.55	
4	0.39	9.97	60.37	88.98	-28.61	51.39	75.98	-24.59	
5	2.58	9.77	57.49	87.00	-29.51	53.09	74.00	-20.91	
6	18.24	9.95	62.15	87.00	-24.85	58.51	74.00	-15.49	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

3.19 Test Data: LAN 6--GIGA

Table 3.19.1 Telecommunication Port Conducted Emission



No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.24	10.11	74.11	93.17	-19.06	70.31	80.17	-9.86	
2	0.35	10.01	64.90	89.87	-24.97	60.68	76.87	-16.19	
3	0.37	10.00	62.91	89.56	-26.65	51.76	76.56	-24.80	
4	2.12	9.77	61.09	87.00	-25.91	60.40	74.00	-13.60	
5	2.35	9.77	60.83	87.00	-26.17	59.05	74.00	-14.95	
6	2.59	9.77	63.06	87.00	-23.94	62.10	74.00	-11.90	

Note :
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

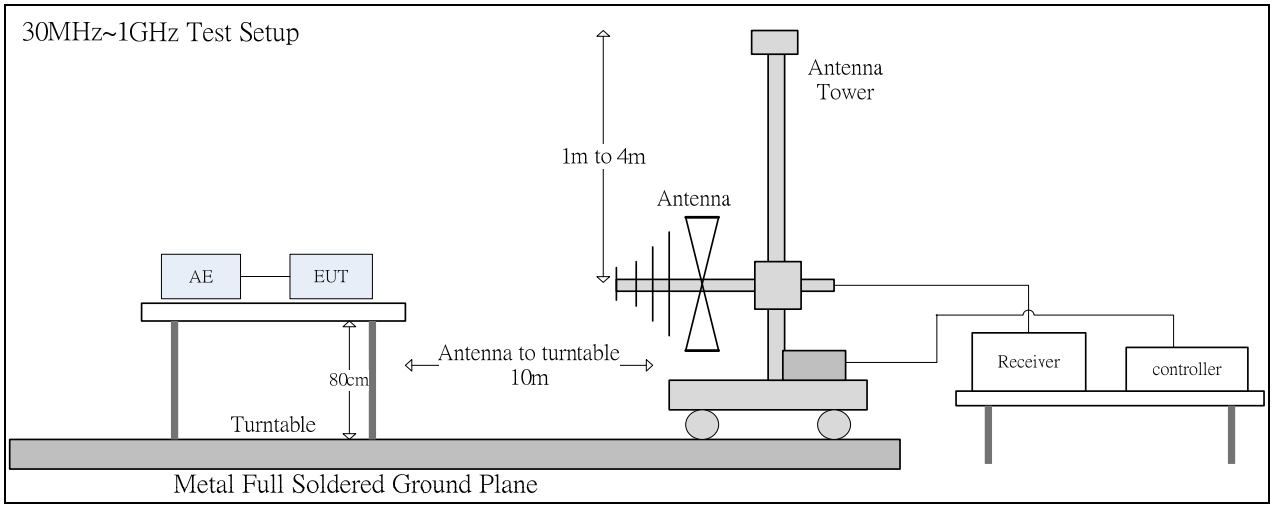
3.20 Test Setup Photo

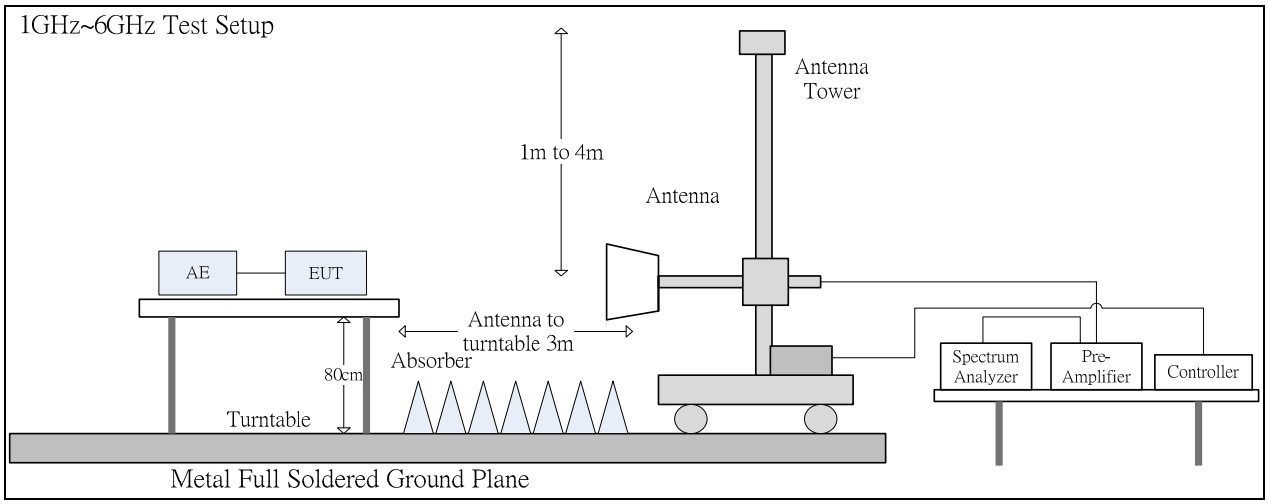
Refer to the Setup Photos for Power Main Port Conducted Emissions

4. Radiated Disturbance Emissions

4.1 Test Setup and Procedure

4.1.1 Test Setup





4.1.2 Test Procedure

The radiated emissions test will then be repeated on the open site or chamber to measure the amplitudes accurately and without the multiple reflections existing in the shielded room. The EUT and support equipment are set up on the turntable of one of 10 meter open field sites or 10 meter chamber. Desktop EUT are set up on a wooden stand 0.8 meter above the ground or floor-standing arrangement shall be placed on the horizontal ground reference plane. The test volume for a height of up to 30 cm may be obstructed by absorber placed on the ground plane.

For the initial measurements, the receiving antenna is varied from 1-4 meter height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. The highest emissions between 30 MHz to 1000 MHz were analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. The highest emissions between 1 GHz to 6 GHz were analyzed in details by operating the spectrum analyzer in peak and average mode to determine the precise amplitude of the emissions.

At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum measurement. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings. All of the interface cables were manipulated according to EN 55022 requirements.

The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes. If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz. If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.

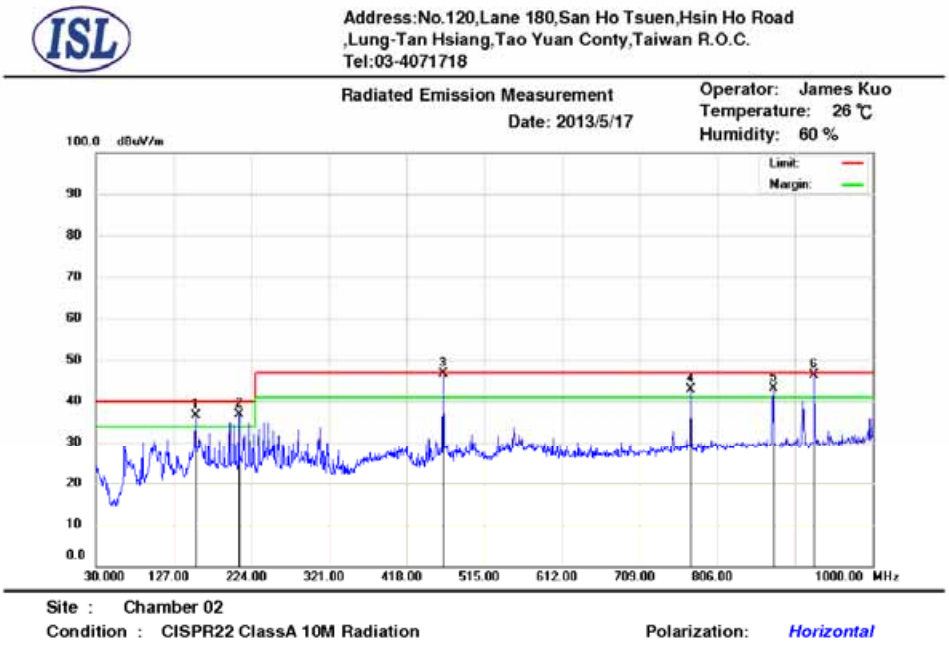
4.1.3 Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	30MHz--1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth:	120KHz

Frequency Range:	Above 1 GHz to 6 GHz
Detector Function:	Peak/Average Mode
Resolution Bandwidth:	1MHz

4.2 Radiation Test Data: Configuration 1

Table 4.2.1 Radiated Emissions (Horizontal)

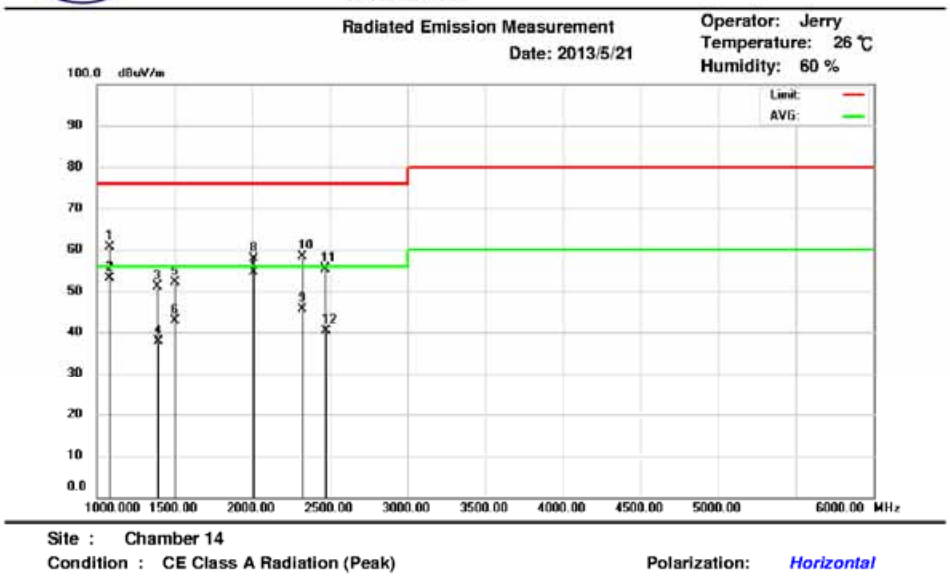


Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	154.1600	24.36	12.37	36.73	40.00	-3.27	112	134	peak
2	208.4800	24.73	12.04	36.77	40.00	-3.23	100	132	peak
3	463.5430	25.54	21.07	46.61	47.00	-0.39	187	140	QP
4	773.0200	17.55	25.34	42.89	47.00	-4.11	236	95	peak
5	875.8400	16.68	26.44	43.12	47.00	-3.88	100	285	peak
6	927.0820	19.45	26.89	46.34	47.00	-0.66	100	23	QP

* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
BILOG Antenna Distance: 10 meters

Below 1GHz test, if the peak measured value meets the QP limit, it is unnecessary to perform the QP measurement. measurement.

Address:No.120,Lane 180,San Ho Tsuen,Hsin Ho Road
,Lung-Tan Hsiang,Tao Yuan Conty,Taiwan R.O.C.
Tel:03-4071718

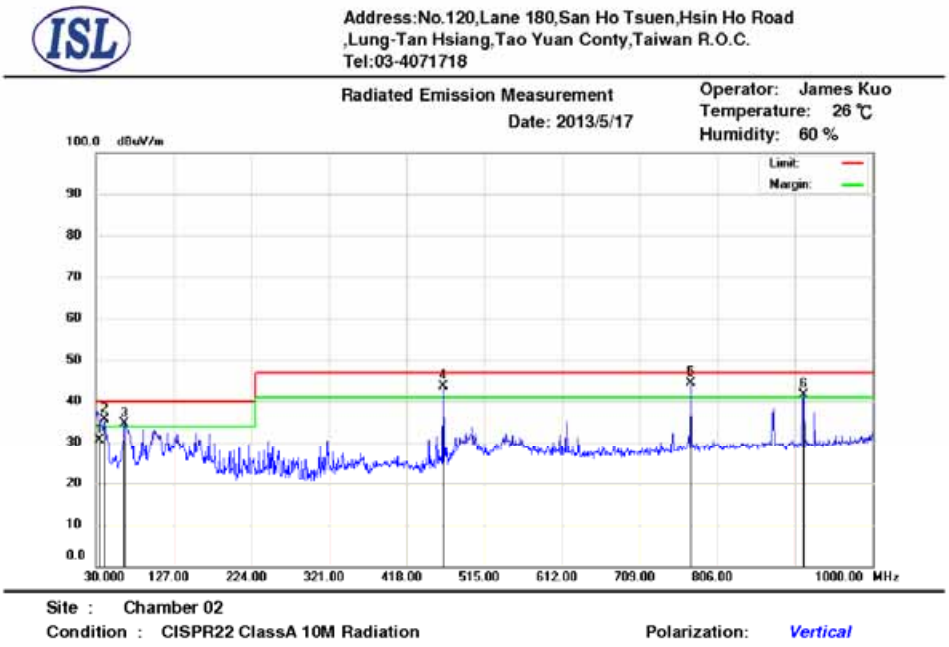


Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1060.00	76.80	-16.08	60.72	76.00	-15.28	357	156	peak
2	1061.58	69.33	-16.08	53.25	56.00	-2.75	100	36	AVG
3	1390.00	66.94	-15.91	51.03	76.00	-24.97	378	170	peak
4	1390.50	53.75	-15.91	37.84	56.00	-18.16	111	186	AVG
5	1500.00	68.03	-15.84	52.19	76.00	-23.81	123	314	peak
6	1500.01	58.70	-15.84	42.86	56.00	-13.14	149	36	AVG
7	2008.72	66.62	-12.06	54.56	56.00	-1.44	135	22	AVG
8	2010.00	69.98	-12.05	57.93	76.00	-18.07	100	303	peak
9	2317.80	57.04	-11.44	45.60	56.00	-10.40	119	46	AVG
10	2320.00	69.86	-11.44	58.42	76.00	-17.58	225	99	peak
11	2470.00	66.58	-11.14	55.44	76.00	-20.56	370	349	peak
12	2472.31	51.39	-11.13	40.26	56.00	-15.74	115	336	AVG

* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Horn Antenna Distance: 3 meters

Above 1GHz test, if the peak measured value meets the average limit, it is unnecessary to perform the average measurement.

Table 4.2.2 Radiated Emissions (Vertical)

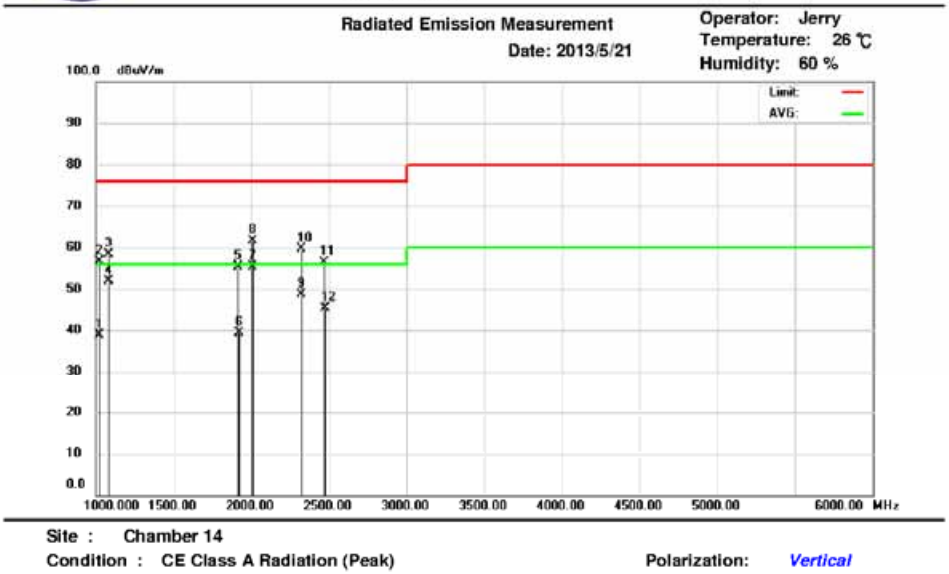


Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	33.8841	12.94	17.74	30.68	40.00	-9.32	100	207	QP
2	40.6700	21.75	13.79	35.54	40.00	-4.46	308	117	peak
3	65.8900	26.67	7.95	34.62	40.00	-5.38	378	338	peak
4	463.5900	22.67	21.07	43.74	47.00	-3.26	256	324	peak
5	772.5520	19.11	25.34	44.45	47.00	-2.55	268	337	QP
6	913.6700	14.84	26.75	41.59	47.00	-5.41	161	355	peak

* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
BILOG Antenna Distance: 10 meters

Below 1GHz test, if the peak measured value meets the QP limit, it is unnecessary to perform the QP measurement. measurement.

Address:No.120,Lane 180,San Ho Tsuen,Hsin Ho Road
,Lung-Tan Hsiang,Tao Yuan Conty,Taiwan R.O.C.
Tel:03-4071718



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1015.45	55.11	-16.13	38.98	56.00	-17.02	110	9	AVG
2	1020.00	72.73	-16.13	56.60	76.00	-19.40	122	142	peak
3	1080.00	74.56	-16.08	58.48	76.00	-17.52	352	12	peak
4	1081.64	68.01	-16.08	51.93	56.00	-4.07	100	122	AVG
5	1915.00	68.15	-12.72	55.43	76.00	-20.57	224	29	peak
6	1920.25	52.14	-12.68	39.46	56.00	-16.54	109	224	AVG
7	2008.66	67.47	-12.06	55.41	56.00	-0.59	100	172	AVG
8	2010.00	73.72	-12.05	61.67	76.00	-14.33	345	352	peak
9	2317.66	60.01	-11.44	48.57	56.00	-7.43	120	180	AVG
10	2320.00	71.12	-11.44	59.68	76.00	-16.32	338	114	peak
11	2470.00	67.47	-11.14	56.33	76.00	-19.67	132	265	peak
12	2472.21	56.58	-11.13	45.45	56.00	-10.55	114	58	AVG

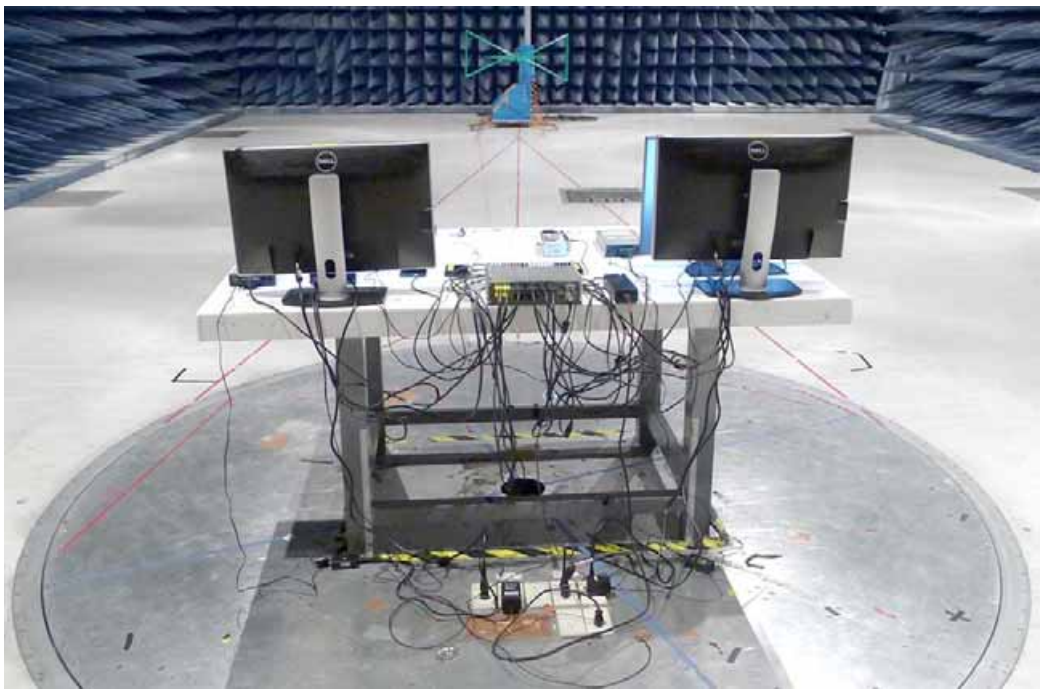
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Horn Antenna Distance: 3 meters

Above 1GHz test, if the peak measured value meets the average limit, it is unnecessary to perform the average measurement.

4.3 Test Setup Photo

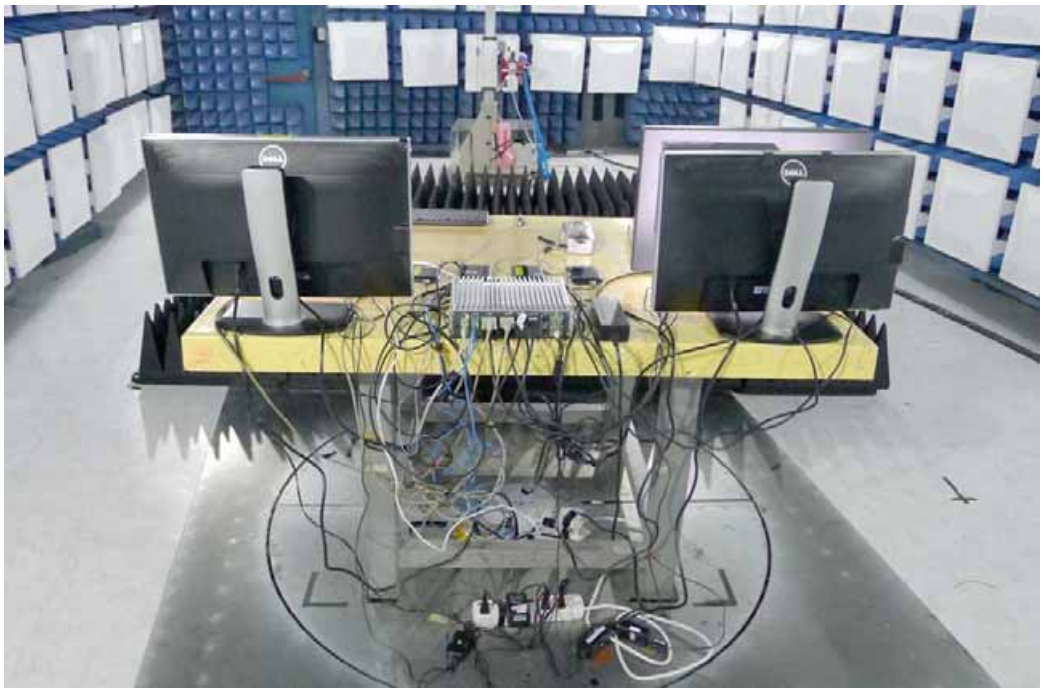
Front View (30MHz~1GHz)

Back View (30MHz~1GHz)



Front View (above 1GHz)

Back View (above 1GHz)



5. Electrostatic discharge (ESD) immunity

5.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-2/ IEC EN61000-4-2 (details referred to Sec 1.2)
Test Level:	Air +/- 2 kV, +/- 4 kV, +/- 8 kV Contact +/- 2 kV, +/- 4 kV
Criteria:	B
Test Procedure	refer to ISL QA -T4-E-S7
Temperature:	25 °C
Humidity:	45%

Selected Test Point

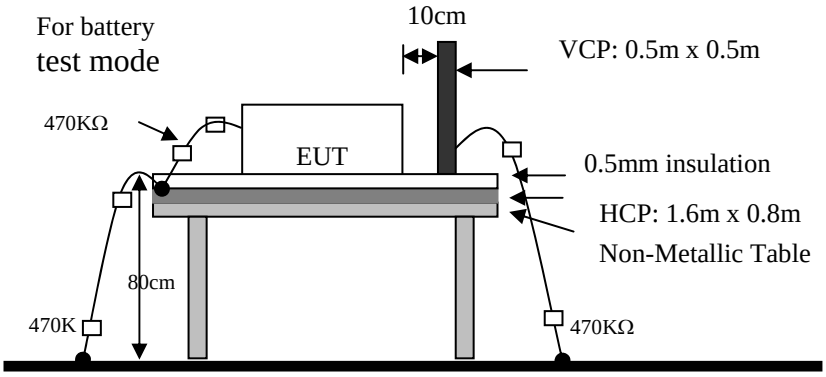
Air: discharges were applied to slots, aperture or insulating surfaces. 10 single air discharges were applied to each selected points.

Contact: Total 200 discharges minimum were to the selected contact points.

Indirect Contact Points: 25 discharges were applied to center of one edge of VCP and each EUT side of HCP with 10 cm away from EUT.

5.2 Test Setup

EUT is 1m from the wall and other metallic structure. When Battery test mode is needed, a cable with one 470KΩ resister at two rare ends is connected from metallic part of EUT and screwed to HCP.



Ground reference Plane

5.3 Test Result

Performance of EUT complies with the given specification.

5.4 Test Point

Red arrow lines indicate the contact points, and blue arrow lines indicate the air points.

Figure 1: Test Point Assignments Discharge:

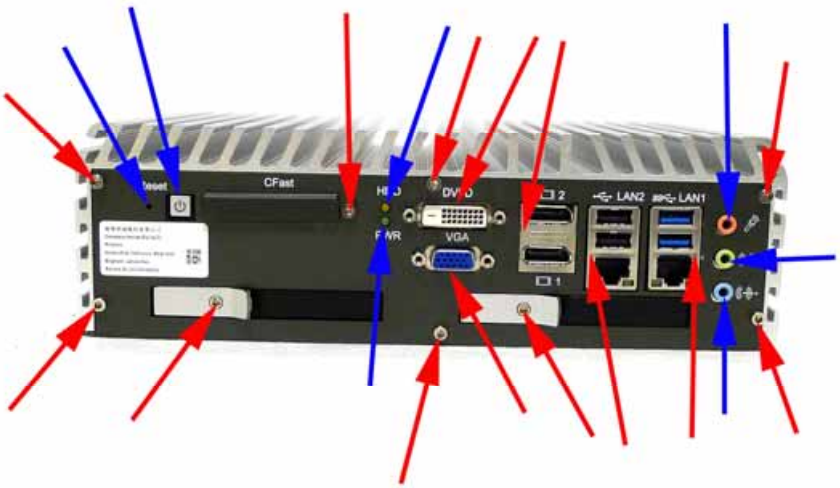


Figure 2: Test Point Assignments Discharge:

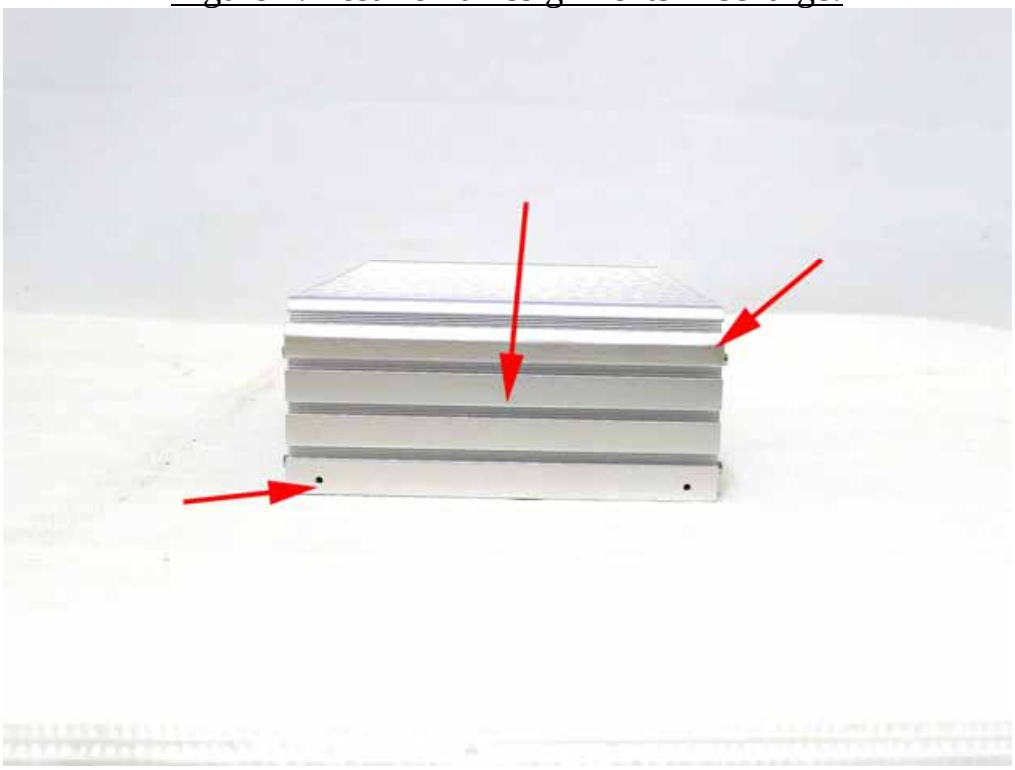


Figure 3: Test Point Assignments Discharge:

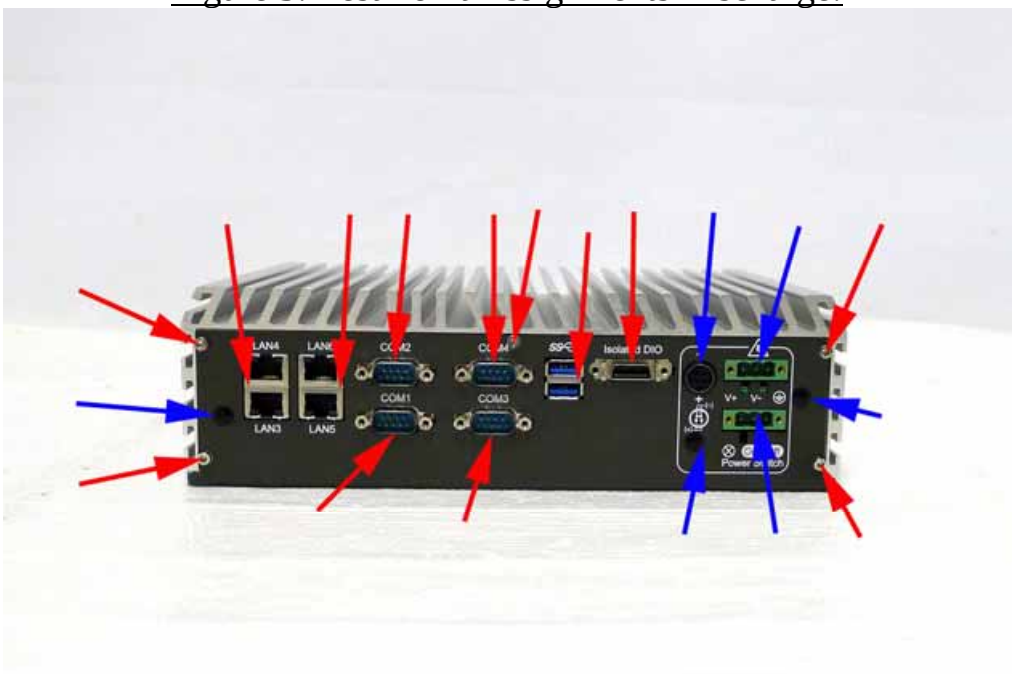


Figure 4: Test Point Assignments Discharge:

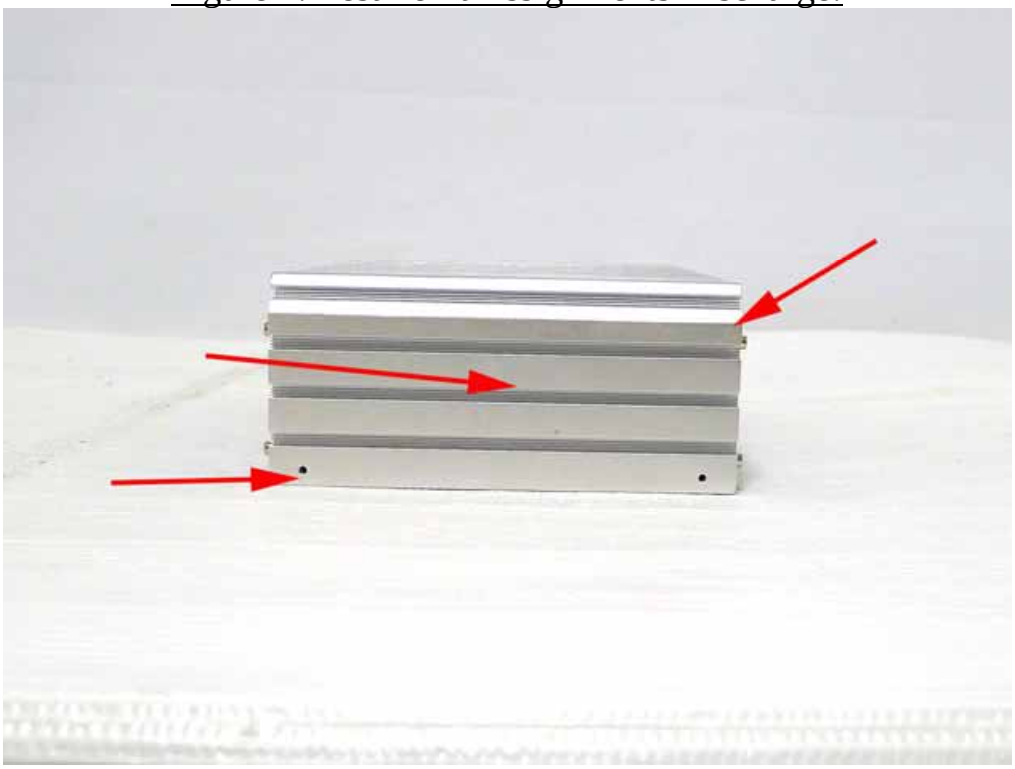


Figure 5: Test Point Assignments Discharge:

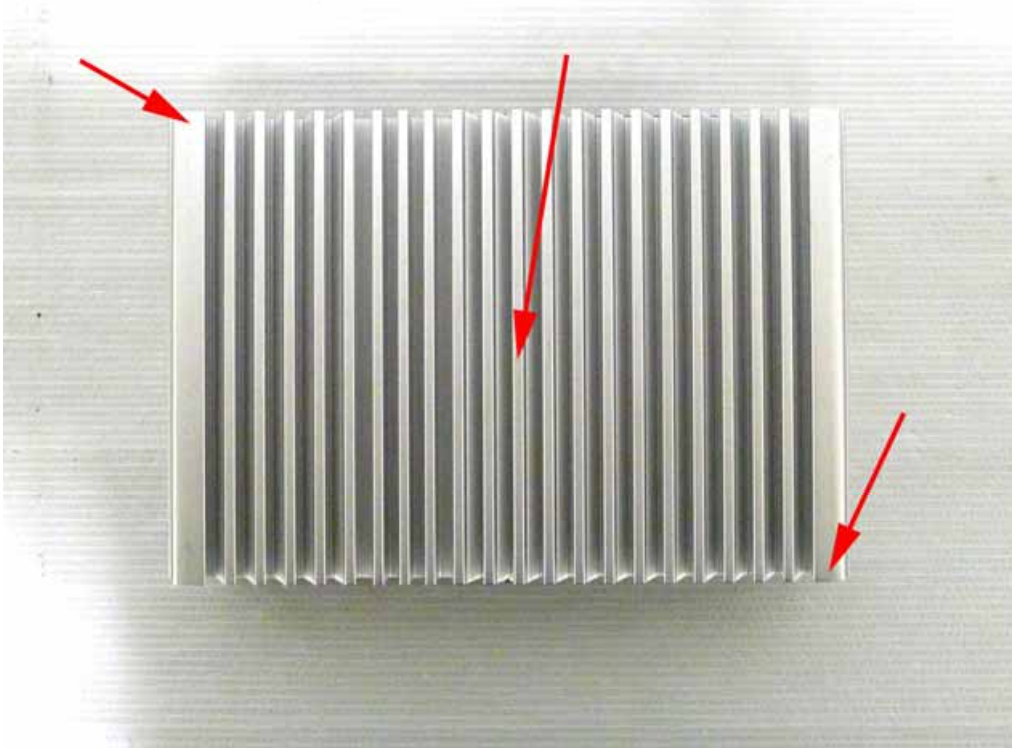


Figure 6: Test Point Assignments Discharge:

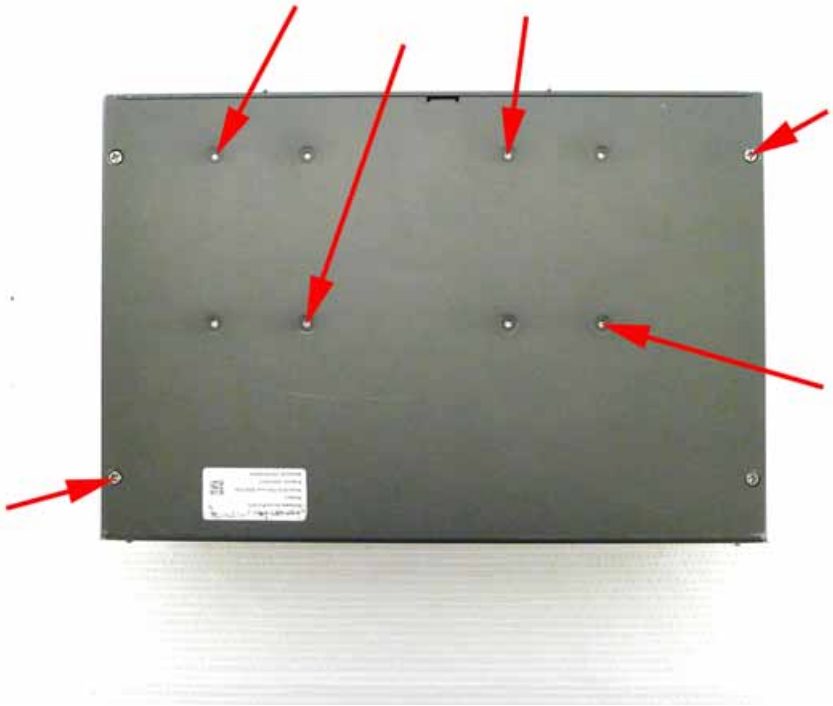


Figure 7: Test Point Assignments Discharge:

Figure 8: Test Point Assignments Discharge:

5.5 Test Setup Photo

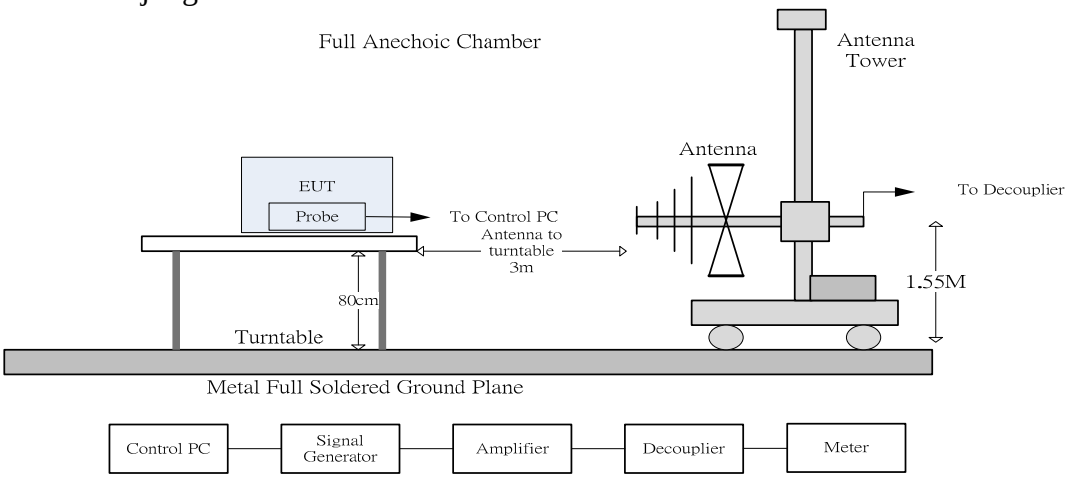
6. Radio-Frequency, Electromagnetic Field immunity

6.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-3/ IEC EN61000-4-3 (details referred to Sec 1.2)
Test Level:	3 V/m
Modulation:	AM 1KHz 80%
Frequency range:	80 MHz~1 GHz
Frequency Step:	1% of last step frequency
Dwell time:	3s
Polarization:	Vertical and Horizontal
EUT Azimuth Angle	☒0° ☒90° ☒180° ☒270°
Criteria:	A
Test Procedure	refer to ISL QA -T4-E-S8
Temperature:	26°C
Humidity:	58%

6.2 Test Setup

The field sensor is placed at one calibration grid point to check the intensity of the established fields on both polarizations. EUT is adjusted to have each side of EUT face coincident with the calibration plane. A CCD camera and speakers are used to monitor the condition of EUT for the performance judgment.



6.3 Test Result

Performance of EUT complies with the given specification.

6.4 Test Setup Photo

7. Electrical Fast transients/burst immunity

7.1 Test Specification

Port:	AC mains; Twisted Pair LAN Port
Basic Standard:	EN 61000-4-4/ IEC EN61000-4-4 (details referred to Sec 1.2)
Test Level:	AC Power Port: +/- 1 kV Twisted Pair LAN Port (I/O Cables): +/- 0.5 kV
Rise Time:	5ns
Hold Time:	50ns
Repetition Frequency:	5KHz
Criteria:	B
Test Procedure	refer to ISL QA -T4-E-S9
Temperature:	26 °C
Humidity:	58%

Test Procedure

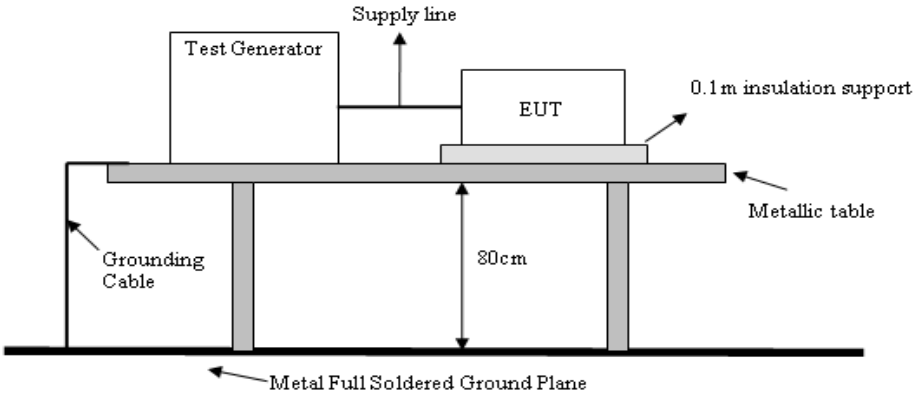
The EUT was setup on a nonconductive table 0.1 m above a reference ground plane.

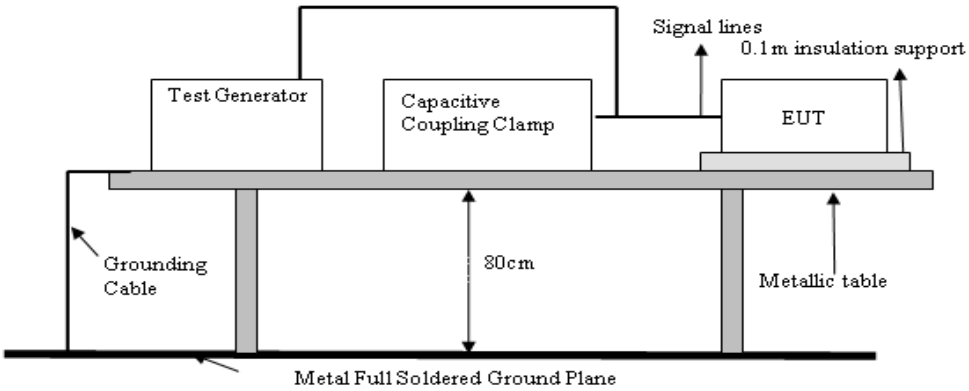
Test Points	Polarity	Result	Comment
Line	+	N	60 sec
	-	N	60 sec
Neutral	+	N	60 sec
	-	N	60 sec
Ground	+	N	60 sec
	-	N	60 sec
Line to Neutral	+	N	60 sec
	-	N	60 sec
Line to Ground	+	N	60 sec
	-	N	60 sec
Neutral to Ground	+	N	60 sec
	-	N	60 sec
Line to Neutral to Ground	+	N	60 sec
	-	N	60 sec
Capacitive coupling clamp	+	N	60 sec
	-	N	60 sec

Note: 'N' means normal, the EUT function is correct during the test.

7.2 Test Setup

EUT is at least 50cm from the conductive structure.





7.3 Test Result

Performance of EUT complies with the given specification.

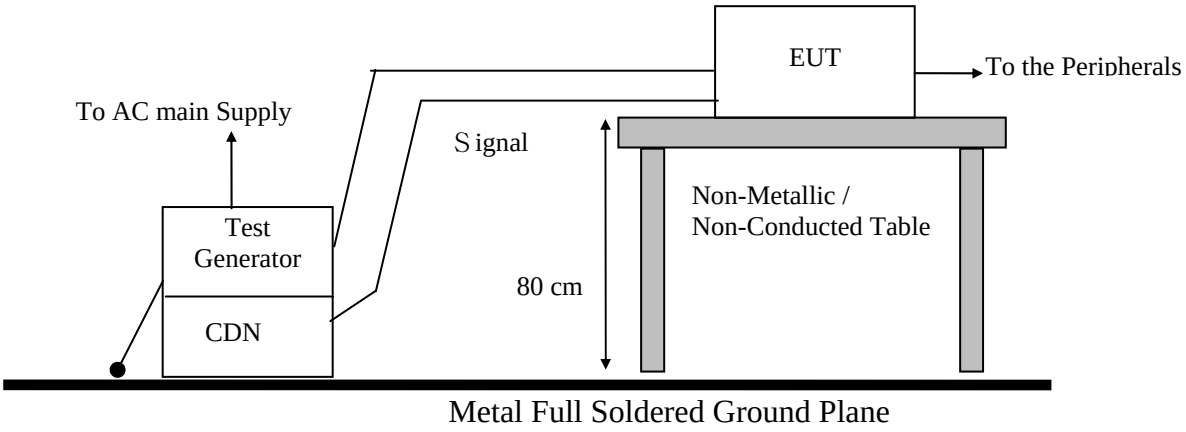
7.4 Test Setup Photo

8. Surge Immunity

8.1 Test Specification

Port:	AC mains
Basic Standard:	EN 61000-4-5/ IEC EN61000-4-5 (details referred to Sec 1.2)
Test Level:	Line to Line: +/- 0.5 kV, +/- 1 kV Line to Earth: +/- 0.5 kV, +/- 1 kV, +/- 2kV
Rise Time:	1.2us
Hold Time:	50us
Repetition Rate:	30 second
Angle:	☒0° ☒90° ☒180° ☒270°
Criteria:	B
Test Procedure:	refer to ISL QA -T4-E-S10
Temperature:	26°C
Humidity:	58%

8.2 Test Setup



8.3 Test Result

Performance of EUT complies with the given specification.

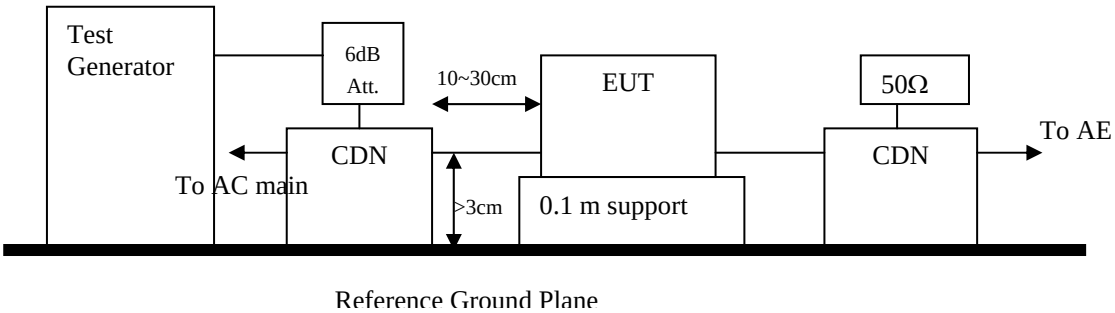
8.4 Test Setup Photo

9. Immunity to Conductive Disturbance

9.1 Test Specification

Port:	AC mains; Twisted Pair LAN Port
Basic Standard:	EN 61000-4-6/ IEC EN61000-4-6 (details referred to Sec 1.2)
Test Level:	3 V
Modulation:	AM 1KHz 80%
Frequency range:	0.15 MHz - 80MHz
Frequency Step:	1% of last Frequency
Dwell time:	3s
Criteria:	A
CDN Type:	CDN M2+M3, CDN T4, CDN T8
Test Procedure	refer to ISL QA -T4-E-S11
Temperature:	26°C
Humidity:	58%

9.2 Test Setup



9.3 Test Result

Performance of EUT complies with the given specification.

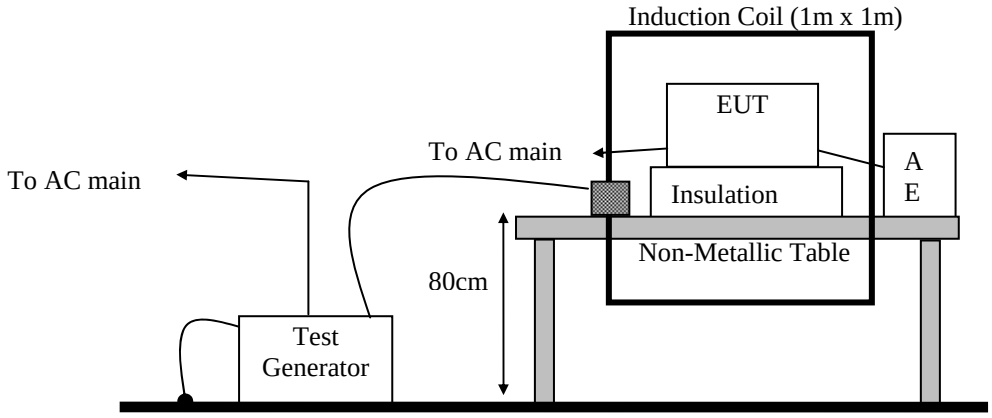
9.4 Test Setup Photo

10. Power Frequency Magnetic Field immunity

10.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-8/ IEC EN61000-4-8 (details referred to Sec 1.2)
Test Level:	1A/m
Polarization:	X, Y, Z
Criteria:	A
Test Procedure	refer to ISL QA -T4-E-S12
Temperature:	26°C
Humidity:	58%

10.2 Test Setup



10.3 Test Result

Performance of EUT complies with the given specification.

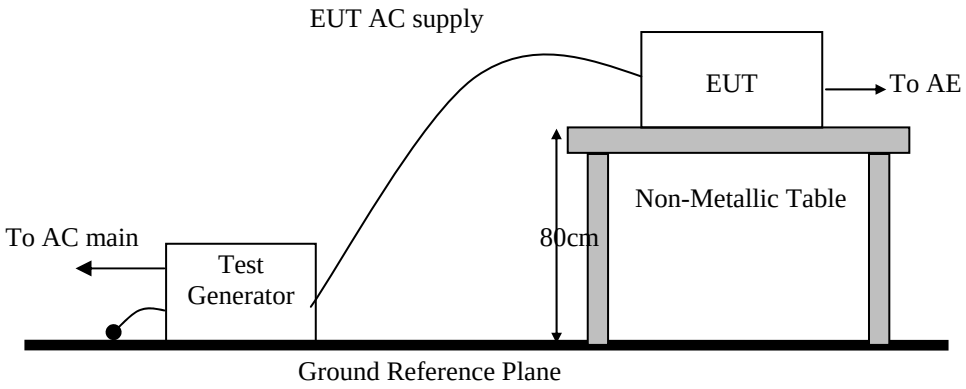
10.4 Test Setup Photo

11. Voltage Dips, Short Interruption and Voltage Variation immunity

11.1 Test Specification

Port:	AC mains
Basic Standard:	EN 61000-4-11/ IEC EN61000-4-11 (details referred to Sec 1.2)
Test Level: Criteria:	>95% in 0.5 period B
Test Level: Criteria:	30% in 25 period C
Test Level: Criteria:	>95% in 250 period C
Phase:	0°; 180°
Test intervals:	3 times with 10s each
Test Procedure	refer to ISL QA -T4-E-S13
Temperature:	26°C
Humidity:	58%

11.2 Test Setup



11.3 Test Result

Performance of EUT complies with the given specification.

11.4 Test Setup Photo

12. Harmonics

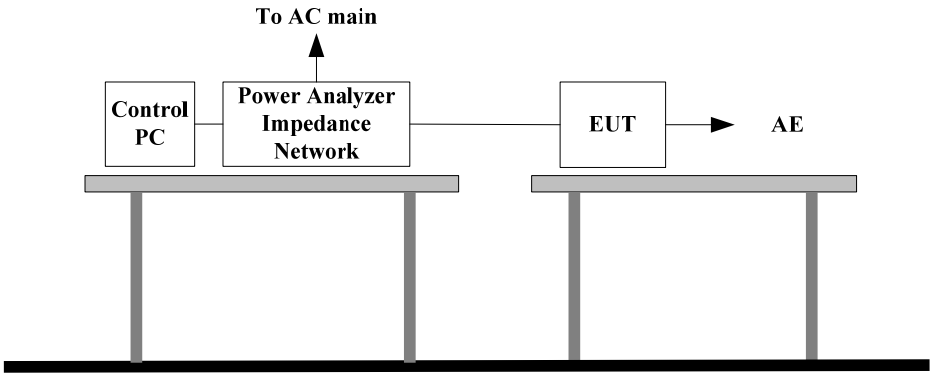
12.1 Test Specification

Port:	AC mains
Active Input Power:	>75W
Basic Standard:	EN61000-3-2/IEC 61000-3-2 (details referred to Sec 1.2)
Test Duration:	2.5min
Class:	D
Test Procedure	refer to ISL QA -T4-E-S14
Temperature:	26°C
Humidity:	58%

Test Procedure

The EUT is supplied in series with shunts or current transformers from a source having the same nominal voltage and frequency as the rated supply voltage and frequency of the EUT. The EUT is configured to its rated current with additional resistive load when the testing is performed.
Equipment having more than one rated voltage shall be tested at the rated voltage producing the highest harmonics as compared with the limits.

12.2 Test Setup



12.3 Test Result

Performance of EUT complies with the given specification.

12.4 Test Data

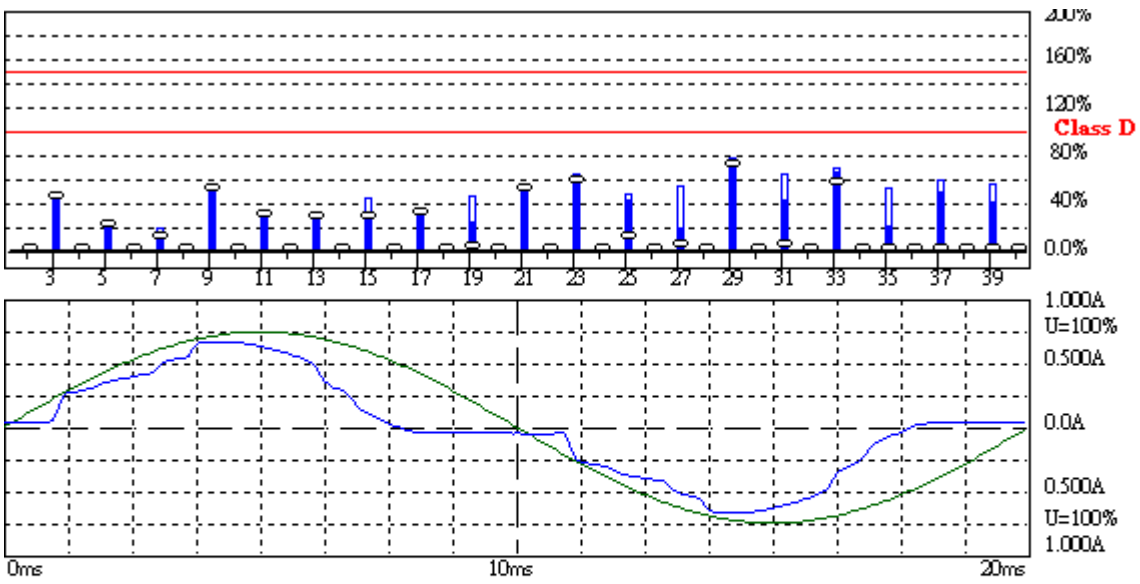
Urms =	230.5V	Freq =	50.000	Range:	1 A
Irms =	0.381A	Ipk =	0.684A	cf =	1.795
P =	79.00W	S =	87.79VA	pf =	0.900
THDi =	33.4 %	THDu =	0.10 %	Class D	

Test - Time : 3min (100 %)

Limit Reference: Pmax = 80.378W

Test completed, Result: PASSED

Order	Freq. [Hz]	Iavg [A]	Iavg%L [%]	Irms [A]	Irms%L [%]	Imax [A]	Imax%L [%]	Limit [A]	Status
1	50	0.3570		0.3623		0.3653			
2	100	0.0000		0.0013		0.0023			
3	150	0.1201	43.932	0.1207	44.176	0.1212	44.333	0.2733	
4	200	0.0000		0.0004		0.0005			
5	250	0.0304	19.917	0.0305	19.943	0.0305	19.943	0.1527	
6	300	0.0000		0.0004		0.0005			
7	350	0.0077	9.5681	0.0073	9.0363	0.0133	16.554	0.0804	
8	400	0.0000		0.0004		0.0007			
9	450	0.0198	49.376	0.0203	50.421	0.0204	50.877	0.0402	
10	500	0.0000		0.0002		0.0004			
11	550	0.0078	27.776	0.0079	27.988	0.0079	27.988	0.0281	
12	600	0.0000		0.0002		0.0002			
13	650	0.0062	26.084	0.0062	25.897	0.0063	26.666	0.0238	
14	700	0.0000		0.0002		0.0003			
15	750	0.0057	27.416	0.0053	25.739	0.0086	41.715	0.0206	
16	800	0.0000		0.0002		0.0003			
17	850	0.0055	30.358	0.0059	32.189	0.0060	32.859	0.0182	
18	900	0.0000		0.0002		0.0002			
19	950	0.0004	2.1766	0.0037	22.485	0.0070	42.721	0.0163	
20	1000	0.0000		0.0003		0.0005			
21	1050	0.0075	50.590	0.0076	51.774	0.0078	53.017	0.0147	
22	1100	0.0000		0.0003		0.0008			
23	1150	0.0078	57.623	0.0075	55.798	0.0083	61.695	0.0135	
24	1200	0.0000		0.0005		0.0006			
25	1250	0.0014	11.015	0.0051	40.926	0.0056	44.871	0.0124	
26	1300	0.0000		0.0003		0.0005			
27	1350	0.0003	2.4151	0.0018	15.976	0.0060	52.721	0.0115	
28	1400	0.0000		0.0002		0.0007			
29	1450	0.0075	70.365	0.0079	73.785	0.0081	75.501	0.0107	
30	1500	0.0000		0.0005		0.0008			
31	1550	0.0003	2.8564	0.0041	40.966	0.0062	61.754	0.0100	
32	1600	0.0000		0.0006		0.0007			
33	1650	0.0051	54.591	0.0059	63.135	0.0063	67.691	0.0094	
34	1700	0.0000		0.0002		0.0006			
35	1750	0.0000	0.0000	0.0016	17.948	0.0045	51.084	0.0088	
36	1800	0.0000		0.0002		0.0007			
37	1850	0.0000	0.0000	0.0039	46.705	0.0048	56.922	0.0084	
38	1900	0.0000		0.0005		0.0007			
39	1950	0.0000	0.0000	0.0031	38.461	0.0042	53.076	0.0079	
40	2000	0.0000		0.0003		0.0004			



Harmonic Emission - IEC 61000-3-2 , EN 61000-3-2 , (EN60555-2)

Urms =	230.5	V	P =	79.00	W	THC =	0.128	A	Range:	1 A
Irms =	0.381	A	pf =	0.900		Pmax =	80.38	W	V-nom:	230 V
									TestTime:	3 min (100%)

Test completed, Result: PASSED

HAR-1000 EMC-Retest

12.5 Test Setup Photo

Refer to the Setup Photo for Voltage Fluctuations

13. Voltage Fluctuations

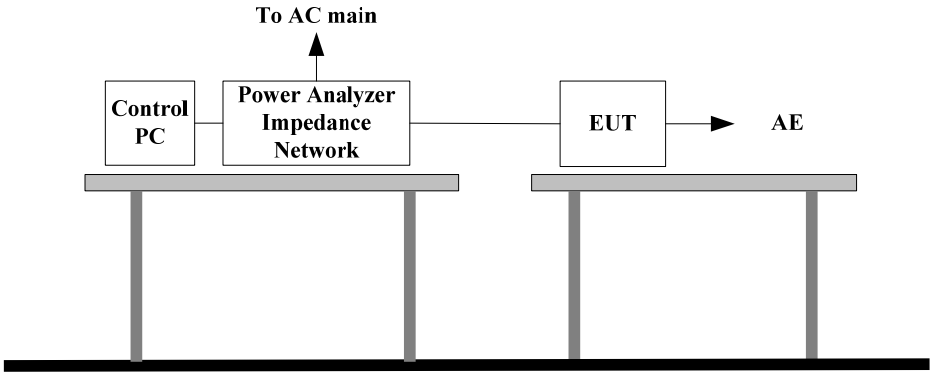
13.1 Test Specification

Port:	AC mains
Basic Standard:	EN61000-3-3/IEC61000-3-3 (details referred to Sec 1.2)
Test Procedure	refer to ISL QA -T4-E-S14
Observation period:	For Pst 10min
	For Plt 2 hours
Temperature:	26°C
Humidity:	58%

Test Procedure

The EUT is supplied in series with reference impedance from a power source with the voltage and frequency as the nominal supply voltage and frequency of the EUT.

13.2 Test Setup

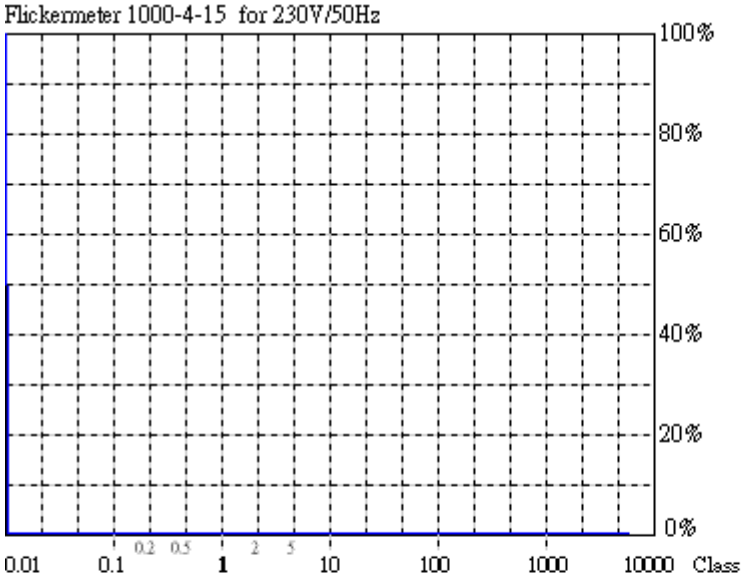


13.3 Test Result

Performance of EUT complies with the given specification.

13.4 Test Data

Flickermeter 1000-4-15 for 230V/50Hz



Actual Flicker (Fli):	**0.00**
Short-term Flicker (Pst):	**0.07**
Limit (Pst):	1.00
Long-term Flicker (Plt):	**0.07**
Limit (Plt):	0.65
Maximum Relative Volt. Change (dmax):	**0.00%**
Limit (dmax):	4.00%
Relative Steady-state Voltage Change (dc):	**0.01%**
Limit (dc):	3.30%
Maximum Interval exceeding 3.30% (dt):	**0.00ms**
Limit (dt>Lim):	500ms

Flicker Emission - IEC 61000-3-3 , EN 61000-3-3 , (EN60555-3)

Urms =	230.3	V	P =	80.40	W
Irms =	0.388	A	pf =	0.900	

Range:	1 A
V-nom:	230 V
TestTime:	120 min (10000%)

Test completed, Result: PASSED

HAR-1000 EMC-Retest

13.5 Test Setup Photo

14. Appendix

14.1 Appendix A: Test Equipment

14.1.1 Test Equipment List

Location Con02	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 02	LISN 15	R&S	ENV216	101335	09/08/2012	09/08/2013
Conduction 02	LISN 06	ROHDE&SCHWARZ	ESH3/Z5	828874/009	01/22/2013	01/22/2014
Conduction 02	Conduction 02-1 Cable	WOKEN	CFD 300-NL	Conduction 02 -1	06/28/2012	06/28/2013
Conduction 02	EMI Receiver 14	ROHDE& SCHWARZ	ESCI	101034	02/19/2013	02/19/2014
Conduction 02	ISN T4 03	FCC	FCC-TLISN-T4-02	20254	11/10/2012	11/10/2013
Conduction 02	ISN T8 05	Teseq GmbH	ISN T800	30305	04/23/2013	04/23/2014

Location Chamber02	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation (Chamber02)	BILOG Antenna 15	Teseq GmbH	CBL6112D	27622	01/10/2013	01/10/2014
Radiation (Chamber02)	Coaxial Cable Chmb 02-10M-02	MIYAZAK	8D-FB	Chmb 02-10M-02	10/08/2012	10/08/2013
Radiation (Chamber02)	EMI Receiver 12	ROHDE & SCHWARZ	ESCI	100804	07/19/2012	07/19/2013

Location Chmb14	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Rad. Above 1GHz	Spectrum Analyzer 24 (1G~26.5GHz)	Agilent	N9010A	MY49060537	07/17/2012	07/17/2013
Rad. Above 1GHz	Horn Antenna 06 (1G~18G)	ETS	3117	00066665	10/15/2012	10/15/2013
Rad. Above 1GHz	Microwave Cable 20 (1G~18G)	HUBER SUHNER	Sucoflex 106	67618/6 and 67619/6	02/06/2013	02/06/2014
Rad. Above 1GHz	Preamplifier 13	MITEQ	JS44-00101800-25-10P-44	1329256	07/23/2012	07/23/2013

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
EN61K-3-2/3	Harmonic/Flicker Test System 02	EMC PARTNER	HARMONICS -1000	143	03/28/2013	03/28/2014
EN61K-4-2	ESD Gun 05	EM TEST	Dito	V0640101838	04/24/2013	04/24/2014
EN61K-4-3	Broadband Log-Periodic Antenna	AR	AT1080	310698	N/A	N/A
EN61K-4-3	Horn Antenna RF-01	AR	ATS700M11G	0335864	N/A	N/A
EN61K-4-3	Amplifier 80Mz~1GHz 250W	AR	250W1000A	312494	N/A	N/A
EN61K-4-3	Amplifier 800MHz~4.2GHz 50W	AR	50S1G4M1	312762	N/A	N/A
EN61K-4-3	Amplifier 4.0~8.0GHz 35W	AR	35S4G8AM1	0335752	N/A	N/A
EN61K-4-3	Broadband coupler 10K~220Mhz	Amplifier Research	DC2500	19810	N/A	N/A
EN61K-4-3	Broadband Coupler 80M~1GHz	Amplifier Research	DC6180	20364	N/A	N/A
EN61K-4-3	Broadband Couplier 1~4GHz	Werlatone	C5291	6516	N/A	N/A
EN61K-4-3	Coaxial Cable Chmb 04-3M-2	Belden	RG-8/U	Chmb 04-3M-2	N/A	N/A
EN61K-4-3	Signal Generator 03	Anritsu	MG3642A	6200162550	06/26/2012	06/26/2013
EN61K-4-4	EFT and SURGE Test System	EM TEST	UCS-500 M6B	V0728102674	12/14/2012	12/14/2013
EN61K-4-5	CDN-UTP83	EMC-PARTNER	CDN-UTP8	017	05/29/2013	05/29/2014
EN61K-4-5	SURGE-TESTER	EMC Partner	MIG0603IN3	523	05/29/2013	05/29/2014
EN61K-4-6	CDN M2+M3 03	Frankonia	M2+M3	A3027007	09/01/2012	09/01/2013
EN61K-4-6	CDN T4 04	FCC Inc.	FCC-801-T4	02069	09/24/2012	09/24/2013
EN61K-4-6	CDN T8 02	FCC Inc.	FCC-801-T8	08019	06/07/2012	06/07/2013
EN61K-4-6	Coaxial Cable 4-6 02-1			4-6 02-1	N/A	N/A
EN61K-4-6	Conducted Immunity Test System 02	Frankonia	CIT-10/75	102D1331	05/31/2013	05/31/2014
EN61K-4-8	Magnetic Field Immunity Loop	FCC	F-1000-4-8-L-1M	01037	06/04/2013	06/04/2014
EN61K-4-8	Magnetic Field Test Generator	FCC	F-1000-4-8-G-125A	01038	06/04/2013	06/04/2014
EN61K-4-11	Voltage Dip and UP Simulator	NoiseKen	VDS-2002	VDS0640162	09/17/2012	09/17/2013

PS: N/A => The equipment does not need calibration.

14.1.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

Test Item	Filename	Version
EN61000-3-2	EMC Partner	4.18
EN61000-3-3	EMC Partner	4.18
EN61000-4-2	N/A	2.0
EN61000-4-3	i2	4.130102k
EN61000-4-4	EMC TEST	4.10
EN61000-4-5	EMC Partner	1.69
EN61000-4-6	EMC Partner	2.22
EN61000-4-8	N/A	
EN61000-4-11	NOISE KEN	2.0

Site	Filename	Version	Issue Date
Conduction/Radiation	EZ EMC	ISL-03A2	3/6/2013

14.2 Appendix B: Uncertainty of Measurement

The measurement uncertainty refers to CISPR 16-4-2:2003. The coverage factor k = 2 yields approximately a 95 % level of confidence.

<Conduction 02>
AMN: ±3.29dB
ISN: ±4.43dB

<Chamber 02 (10M)>
Horizontal
30MHz~200MHz: ±3.93dB
200MHz~1000MHz: ±4.05dB
Vertical
30MHz~200MHz: ±4.21dB
200MHz~1000MHz: ±4.04dB

<Chamber 14 (3M)>
1GHz~6GHz: ±4.72dB
1GHz~18GHz: ±4.98dB
18GHz~26.5GHz: ±3.63dB
26.5GHz~40GHz: ±3.58dB

<Immunity 02>

Test item	Uncertainty	Test item	Uncertainty
EN61000-4-2 (ESD)		EN61000-4-5 (Surge)	
Rise time tr	≦ 15%	Time	± 1.00%
Peak current Ip	≦ 6.3%	Voltage	± 1.41%
current at 30 ns	≦ 6.3%	Current	± 1.11%
current at 60 ns	≦ 6.3%	EN61000-4-6 (CS)	
EN61000-4-3 (RS)	± 2.19dB	CDN	± 1.36dB
EN61000-4-4 (EFT)		EM Clamp	± 3.19dB
Time	± 3.23%	EN61000-4-8 (Magnetic)	± 1.14%
Voltage	± 1.85%	EN61000-4-11 (Dips)	
Current	± 1.85%	Time	± 2.80%
		Voltage	± 0.24%

Test item	Uncertainty	Test item	Uncertainty
EN61000-3-2 (Harmonics)	± 4.93 %	EN61000-3-3 (Fluctuations and Flicker)	± 4.93 %

14.3 Appendix C: Photographs of EUT

Please refer to the File of **ISL-13LE238P**