Certificate

Issue Date: August 6, 2014
Ref. Report No. ISL-14HE218CE

Product Name	:	Network Attached Storage
Model(s)	:	TS-431; NAS-431; NAS-431G; MS-431; GS-431; Q801; Q802; Q803; Q804
Brand	:	QNAP
Responsible Party	:	QNAP Systems, Inc.
Address	:	3F, No.22, Zhongxing Rd., Xizhi Dist., New Taipei City 221, Taiwan

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+AC2011 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: 2013 and IEC 61000-3-3: 2013
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

☒ **Hsi-Chih LAB**:
No. 65, Gu Dai Keng Street, Hsi-Chih Dist.,
New Taipei City 221, Taiwan
Tel: 886-2-2646-2550; Fax: 886-2-2646-4641

Nemko
ELA113A

CE MARK TECHNICAL FILE

AS/NZS EMC CONSTRUCTION FILE

of

Product Name

Network Attached Storage

Model

TS-431; NAS-431; NAS-431G; MS-431; GS-431; Q801; Q802; Q803; Q804

Brand

QNAP

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. Certificate of EN60950-1
5. Block Diagram and Schematics
6. Users' manual

Declaration of Conformity

Name of Responsible Party:	QNAP Systems, Inc.
Address of Responsible Party:	3F, No.22, Zhongxing Rd., Xizhi Dist., New Taipei City 221, Taiwan
Declares that product:	Network Attached Storage
Model:	TS-431; NAS-431; NAS-431G; MS-431; GS-431; Q801; Q802; Q803; Q804
Brand:	QNAP
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+AC:2011, 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: 2013 IEC 61000-3-3: 2013	Limits for voltage fluctuations and flicker in low-voltage supply systems.	Pass

Conforms to the Low Voltage Directive 2006/95/EC, 93/68/EEC as attested by conformity with the following harmonized standard:

EN60950-1:2006+A11:2009+A1:2010+A12:2011: Safety of Information Technology Equipment Including electrical business equipment

We, QNAP Systems, Inc., 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.

QNAP Systems, Inc.

Date: August 6, 2014

Declaration of Conformity

Name of Responsible Party:	QNAP Systems, Inc.
Address of Responsible Party:	3F, No.22, Zhongxing Rd., Xizhi Dist., New Taipei City 221, Taiwan
Declares that product:	Network Attached Storage
Model:	TS-431; NAS-431; NAS-431G; MS-431; GS-431; Q801; Q802; Q803; Q804
Brand:	QNAP
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+AC:2011, 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: 2013 IEC 61000-3-3: 2013	Limits for voltage fluctuations and flicker in low-voltage supply systems.	Pass

We, QNAP Systems, Inc., 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.

QNAP Systems, Inc.

Date: August 6, 2014

CE TEST REPORT

of

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

Product : **Network Attached Storage**

Model(s): **TS-431; NAS-431; NAS-431G; MS-431; GS-431; Q801; Q802; Q803; Q804**

Brand: **QNAP**

Applicant: **QNAP Systems, Inc.**

Address: **3F, No.22, Zhongxing Rd., Xizhi Dist., New Taipei City 221, Taiwan**

Test Performed by:

International Standards Laboratory
<Hsi-Chih LAB>
*Site Registration No.
BSMI:SL2-IN-E-0037; SL2-R1/R2-E-0037; TAF: 1178
FCC: TW1067; IC: IC4067A-1; NEMKO: ELA 113A
VCCI: <Conduction01>C-354, T-1749, <OATS01>R-341,
<Chamber01>G-443
*Address:
No. 65, Gu Dai Keng Street,
Hsi-Chih Dist., New Taipei City 221, Taiwan
*Tel: 886-2-2646-2550; Fax: 886-2-2646-4641

Report No.: **ISL-14HE218CE**
Issue Date : **August 6, 2014**

This report totally contains 57 pages including this cover page and contents page.

Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

Contents of Report

1. General

1.1 Certification of Accuracy of Test Data

Standards:	Please refer to 1.2
Equipment Tested:	Network Attached Storage
Model:	TS-431; NAS-431; NAS-431G; MS-431; GS-431; Q801; Q802; Q803; Q804
Brand:	QNAP
Applicant:	QNAP Systems, Inc.
Sample received Date:	July 28, 2014
Final test Date:	EMI:refer to the date of test data EMS: August 5, 2014
Test Site:	International Standards Laboratory OATS 01; Chamber 01; Conduction 01; Immunity 01
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:	Maggy Han
Test Engineer:	Stanley Tsai
Approved By:	Eddy Hsiung

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+AC:2011, CISPR 22:2008 (modified) and AS/NZS CISPR 22: 2009+A1:2010: Class B: 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

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: 2013 IEC 61000-3-3: 2013	Limits for voltage fluctuations and flicker in low-voltage supply systems.	Pass

1.2.1 Performance 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

Product Name	Network Attached Storage
Condition	Pre-Production
Model Number(s)	TS-431; NAS-431; NAS-431G; MS-431; GS-431; Q801; Q802; Q803; Q804
Serial Number	N/A
Power Supply	DELTA (Model: DPS-90FB A) AC input: 100-240V, 2A-1A, 50Hz-60Hz DC output:12V---7.5A Max output:90W
Motherboard	Model: TS-X31 V1.3
SATA Board	Model: TS-451 BP V1.0
USB 3.0 Port	Three 9-pins
E-SATA Port	One 7-pins
RJ45 Port	Two 8-pins (10/100/1000Mbps)
ENTER Switch	One
Reset Switch	One
Power Switch	One
DC12V Power Port	One
Maximum Operating Frequency	1.2GHz

For Telecom Configurations

Configurations	LAN SPEED	RJ45 Port
1	10/100/1000Mbps	1
2	10/100/1000Mbps	2

EMI Noise Source

Motherboard Crystal	25MHz (Y2)	The same as Photo EUT-6
	48MHz (Y3)	The same as Photo EUT-7
	25MHz (Y4)	The same as Photo EUT-8
	32.768KHz (Y6)	The same as Photo EUT-9
SATA Board Crystal	20MHz (X1)	The same as Photo EUT-13
	20MHz (X2)	The same as Photo EUT-14

EMI Solution

Solution	Quantity	Specification	Location
Core	1	Delta Power Supply DELTA Model: DPS-60PB A has shipped attached Core	The same as Photo EUT-15
Gasket	1	Rui Xing 30*15*4mm	The same as Photo EUT-16
Gasket	1	Rui Xing 10*10*10mm	The same as Photo EUT-17

Model Difference

Model	Package	Selling markets
TS-431	Color Box	Household storage related distributors
NAS-431	White Box	General storage system project
NAS-431G	White Box	General storage system project
MS-431	White Box	General storage system project
GS-431	White Box	General storage system project
Q801	Color Box	ODM storage system project
Q802	Color Box	ODM storage system project
Q803	Color Box	ODM storage system project
Q804	Color Box	ODM storage system project

1.4 Description of Support Equipment

Unit	Model Serial No.	Brand	Power Cord	FCC ID
Notebook Personal Computer	Latitude D400 S/N: N/A	DELL	Non-shielded, Detachable	FCC DOC
Rack mountable Switch	DGS-1008D	D-Link	Non-shielded, Detachable	FCC DOC
USB3.0 External HDD Enclosure*3	WDBACY5000ABK-PESN S/N: XH1E31FSV80	WD	N/A	FCC DOC
E-SATA Hard Disk	NST-200SU-BK S/N:N/A	NexStar	Non-shielded, Detachable	FCC DOC
3.5” SATA Hard Disk*4	WD5000AZRX	WD	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:

A. Read and write to the disk drives.
B. Send package to the Router LAN port (Router).
C. Receive and transmit package of EUT to the Rack mountable Switch HUB through LAN port.
D. Used Tfgen.exe to send signal to EUT RJ45 port through PC RJ45 port.
E. Read and write data in the USB3.0 Hard Disk through EUT USB3.0 port.
F. Read and write data in the E-SATA Hard Disk through EUT E-SATA port.
G. Repeat the above steps.

	File name	Issued Date
External HDD Enclosure USB2.0	InterEMC.exe	9/04/2000
External HDD Enclosure USB3.0	InterEMC.exe	9/04/2000
E-SATA External HDD Enclosure	InterEMC.exe	9/04/2000
RJ45	ping.exe	05/05/1999
RJ45	Tfgen.exe	06/23/1999
3.5” SATA Hard Disk	InterEMC.exe	9/04/2000

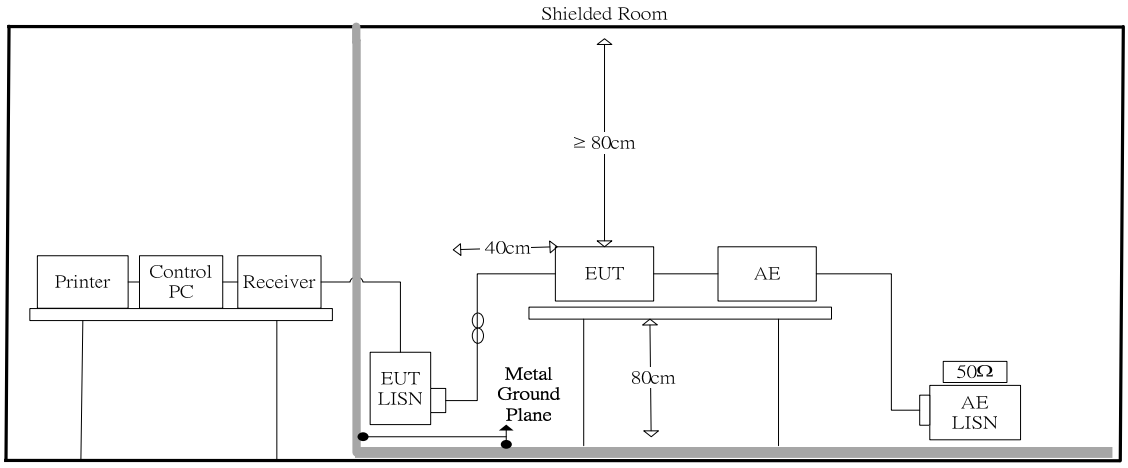
1.6 I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type	Connector Type
AC Power Cord	110V (~240V) to EUT SPS	1.8M	Non-shielded, Detachable	Plastic Head
USB3.0 Data Cable*3	USB3.0 External HDD Enclosure USB3.0 Port to EUT USB3.0 Port	1M	Shielded, Detachable	Metal Head
E-SATA Data Cable	E-SATA External HDD Enclosure E-SATA Port to EUT E-SATA Port	1M	Shielded, Detachable	Plastic Head
RJ45 Data Cable*2	EUT RJ45 Port to Switch HUB RJ45 Port	1.5M	Non-shielded, Detachable	RJ-45, with Plastic Head
RJ45 Data Cable	Switch HUB RJ45 Port to Notebook RJ45 Port	10M	Non-shielded, Detachable	RJ-45, with Plastic 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.

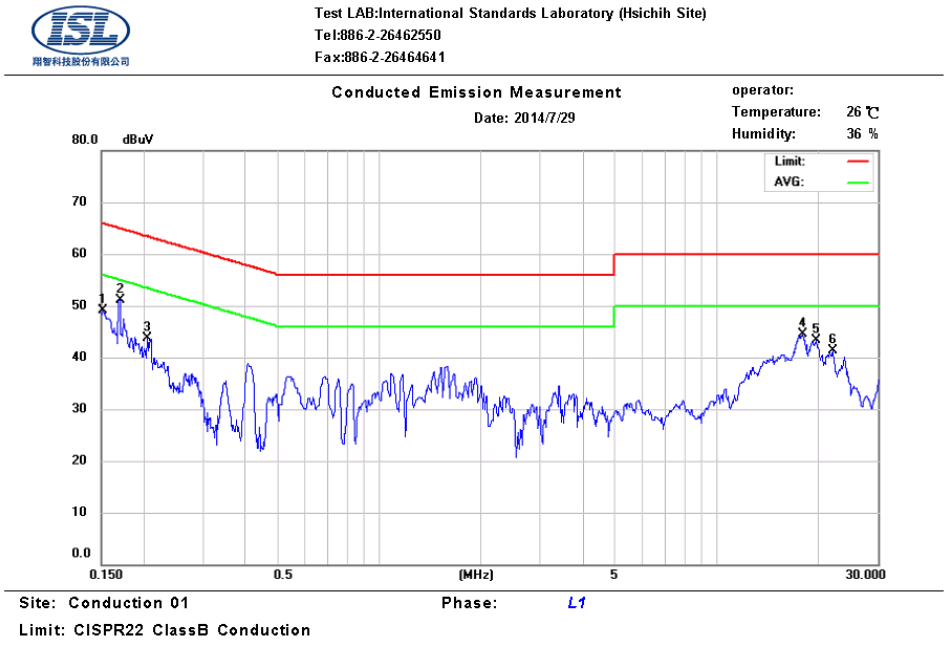
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

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

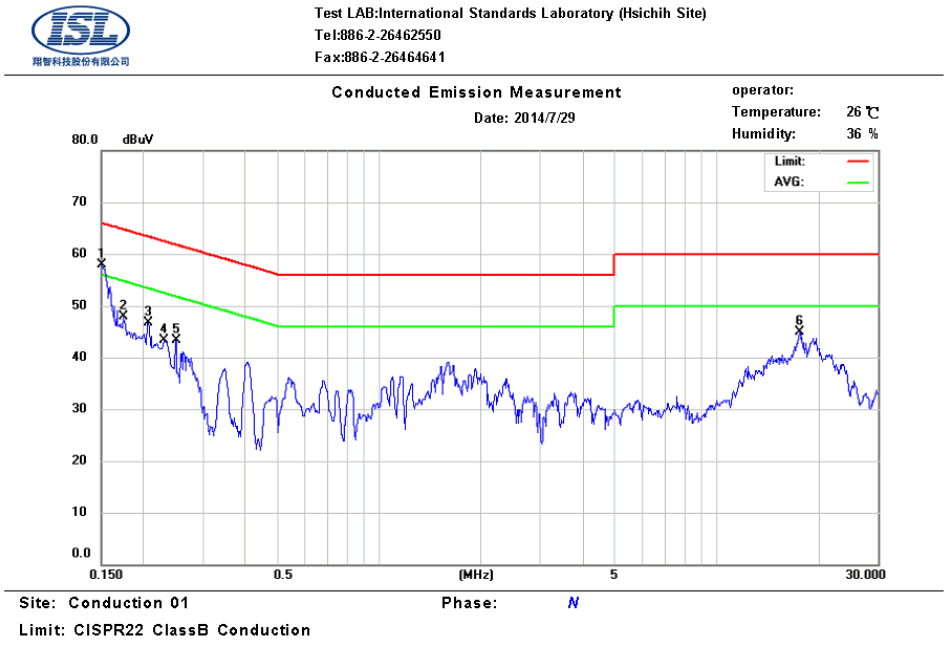
Table 2.2.1 Power Line Conducted Emissions (Line)



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	0.15	9.63	50.31	65.91	-15.60	40.06	55.91	-15.85	
2	0.17	9.63	44.07	65.00	-20.93	37.04	55.00	-17.96	
3	0.20	9.63	37.02	63.41	-26.39	26.67	53.41	-26.74	
4	17.93	9.83	36.97	60.00	-23.03	28.84	50.00	-21.16	
5	19.65	9.83	36.24	60.00	-23.76	28.07	50.00	-21.93	
6	22.05	9.85	32.92	60.00	-27.08	25.72	50.00	-24.28	

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	0.15	9.64	52.42	65.98	-13.56	43.81	55.98	-12.17	
2	0.17	9.64	42.61	64.78	-22.17	31.00	54.78	-23.78	
3	0.21	9.64	37.69	63.39	-25.70	29.80	53.39	-23.59	
4	0.23	9.65	35.67	62.48	-26.81	24.04	52.48	-28.44	
5	0.25	9.65	35.11	61.81	-26.70	28.38	51.81	-23.43	
6	17.57	9.99	34.25	60.00	-25.75	26.75	50.00	-23.25	

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

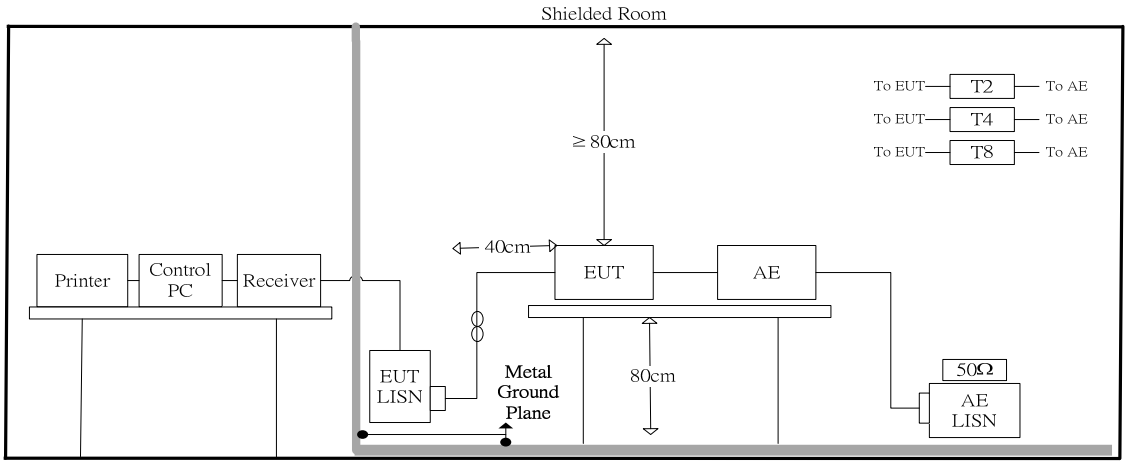
Front View

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.

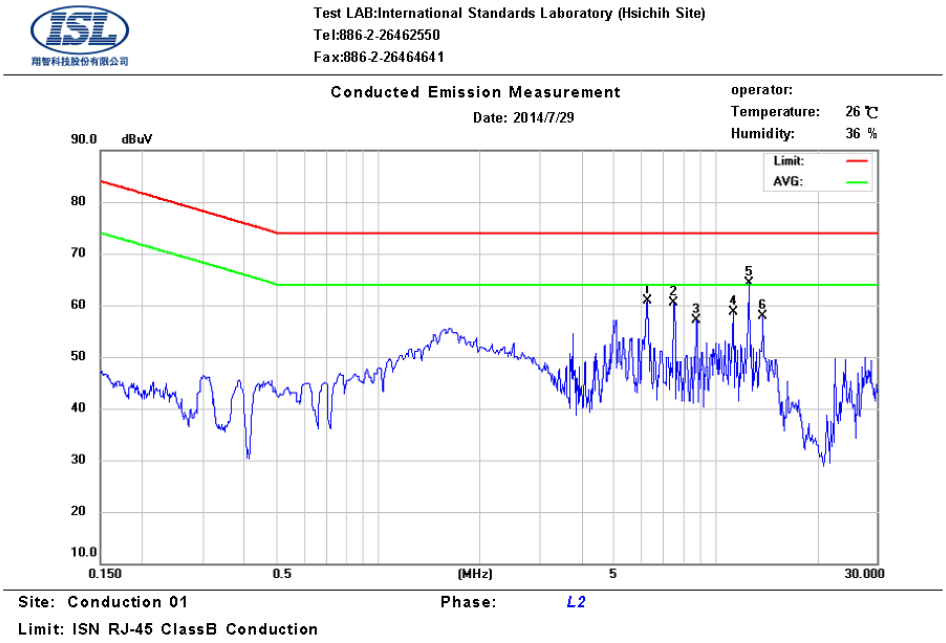
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information could be useful in reducing their amplitude.

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	6.25	9.61	52.10	74.00	-21.90	39.05	64.00	-24.95	
2	7.50	9.61	52.93	74.00	-21.07	39.85	64.00	-24.15	
3	8.75	9.61	49.08	74.00	-24.92	34.94	64.00	-29.06	
4	11.25	9.61	51.78	74.00	-22.22	39.47	64.00	-24.53	
5	12.50	9.63	55.89	74.00	-18.11	44.20	64.00	-19.80	
6	13.75	9.64	49.06	74.00	-24.94	38.27	64.00	-25.73	

Note :

Margin = QP/AVG Emission - Limit

QP/AVG Emission = Receiver Reading + Correct Factor

Correct Factor = LISN Loss + Cable Loss

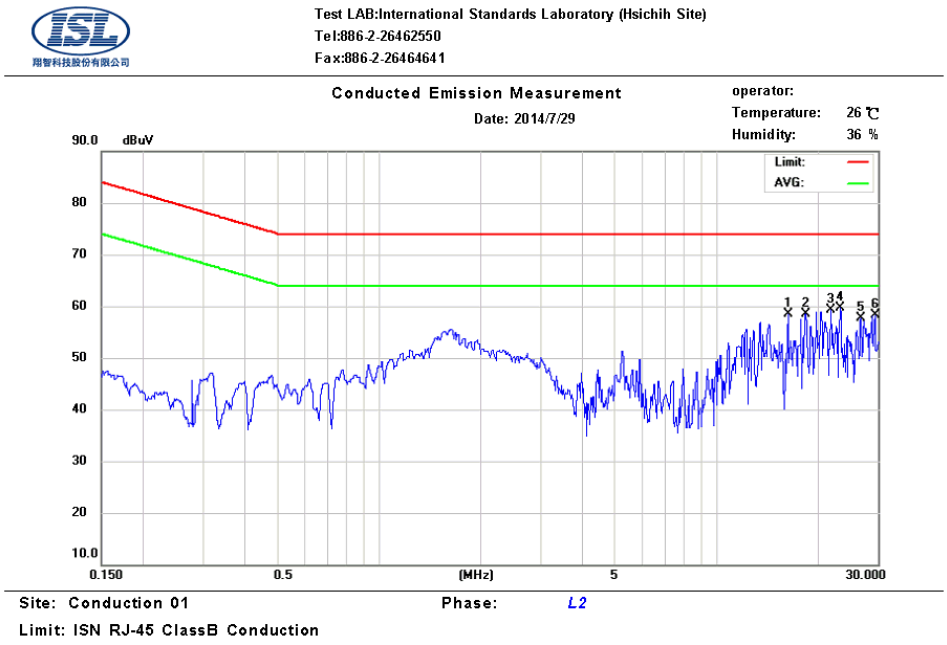
A margin of -8dB means that the emission is 8dB below the limit

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

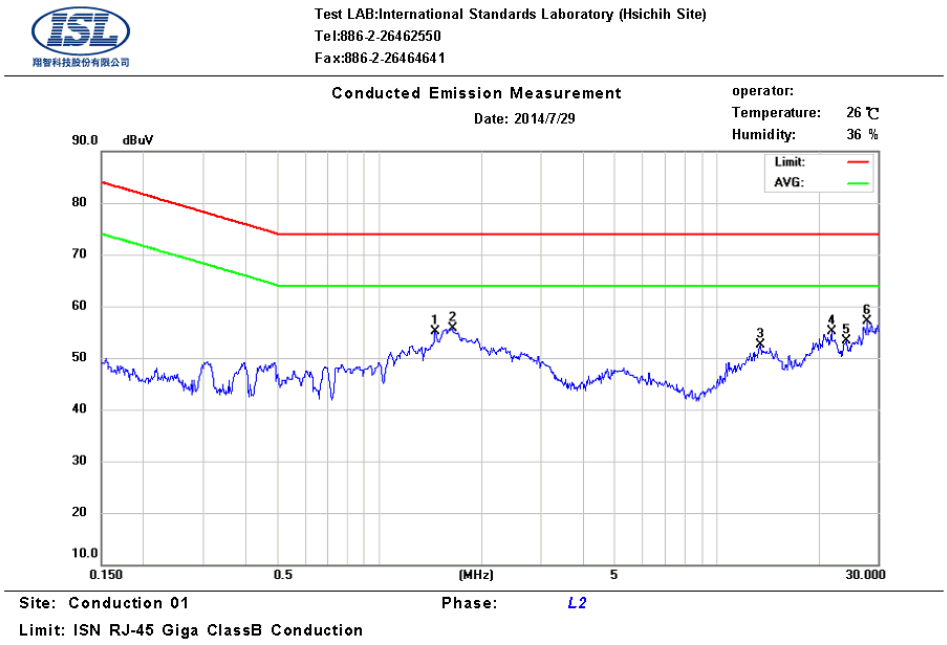


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	16.23	9.67	53.69	74.00	-20.31	51.14	64.00	-12.86	
2	18.25	9.71	44.57	74.00	-29.43	42.10	64.00	-21.90	
3	21.68	9.79	34.75	74.00	-39.25	21.15	64.00	-42.85	
4	23.13	9.83	54.25	74.00	-19.75	52.17	64.00	-11.83	
5	26.63	9.93	31.62	74.00	-42.38	19.95	64.00	-44.05	
6	29.25	10.02	36.82	74.00	-37.18	23.93	64.00	-40.07	

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.

3.4 Test Data: LAN 1--GIGA (Voltage)

Table 3.4.1 Telecommunication Port Conducted Emission

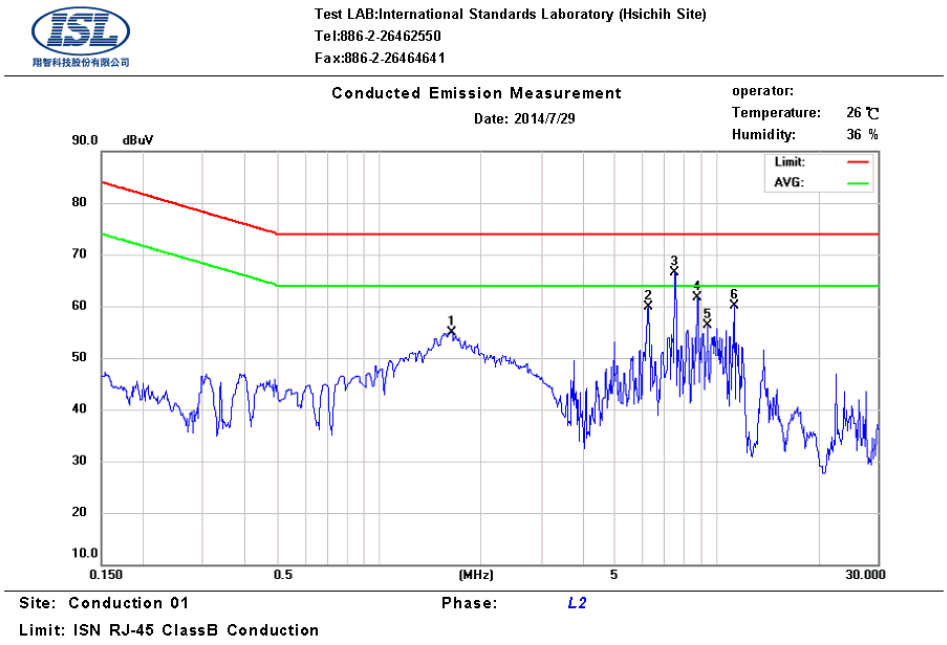


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	1.46	9.68	50.06	74.00	-23.94	41.98	64.00	-22.02	
2	1.64	9.68	52.37	74.00	-21.63	40.13	64.00	-23.87	
3	13.43	9.64	43.37	74.00	-30.63	37.98	64.00	-26.02	
4	21.77	9.79	46.03	74.00	-27.97	40.48	64.00	-23.52	
5	24.10	9.85	47.81	74.00	-26.19	44.26	64.00	-19.74	
6	27.85	9.97	47.09	74.00	-26.91	41.53	64.00	-22.47	

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

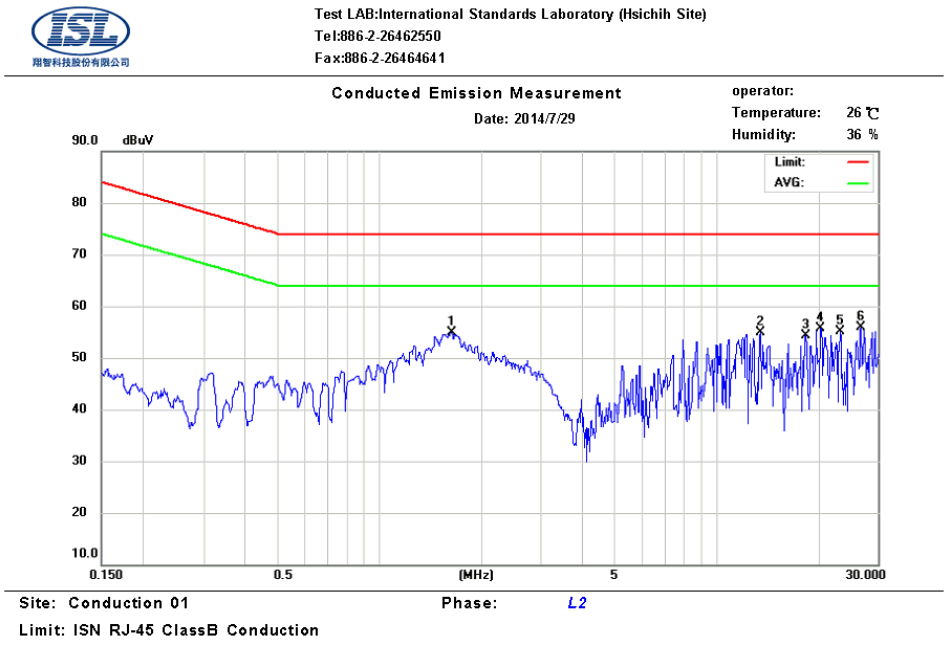


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	1.63	9.68	52.61	74.00	-21.39	42.11	64.00	-21.89	
2	6.25	9.61	52.72	74.00	-21.28	39.89	64.00	-24.11	
3	7.50	9.61	58.23	74.00	-15.77	40.49	64.00	-23.51	
4	8.75	9.61	54.60	74.00	-19.40	41.94	64.00	-22.06	
5	9.40	9.61	47.86	74.00	-26.14	36.00	64.00	-28.00	
6	11.25	9.61	53.03	74.00	-20.97	40.60	64.00	-23.40	

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

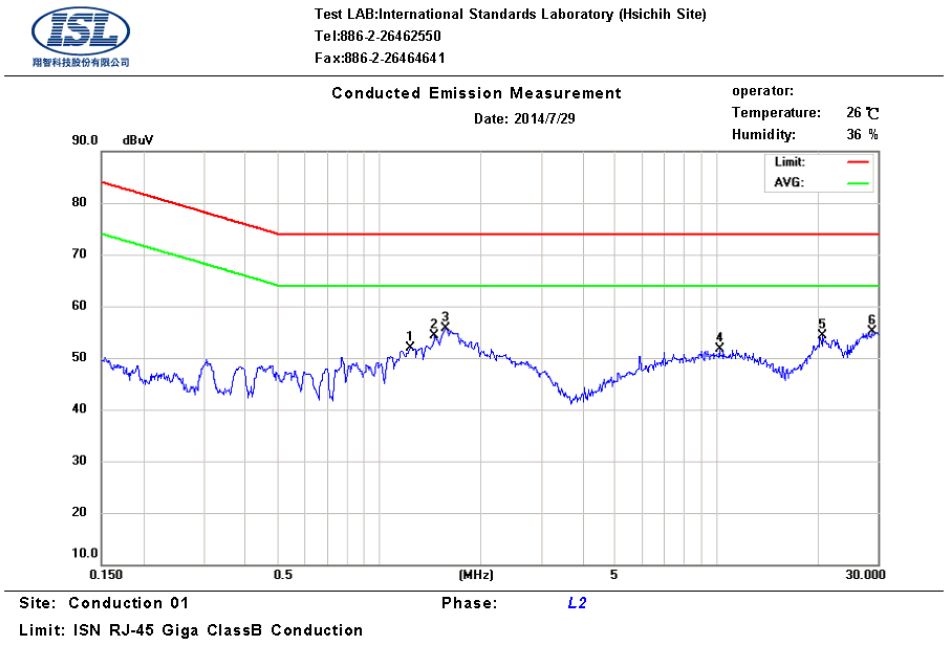


No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	1.63	9.68	52.56	74.00	-21.44	41.47	64.00	-22.53	
2	13.43	9.64	43.89	74.00	-30.11	41.38	64.00	-22.62	
3	18.25	9.71	41.07	74.00	-32.93	39.34	64.00	-24.66	
4	20.27	9.76	35.99	74.00	-38.01	20.13	64.00	-43.87	
5	23.13	9.83	50.31	74.00	-23.69	49.90	64.00	-14.10	
6	26.63	9.93	27.66	74.00	-46.34	13.79	64.00	-50.21	

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 (Voltage)

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	1.24	9.70	48.02	74.00	-25.98	37.82	64.00	-26.18	
2	1.45	9.68	49.21	74.00	-24.79	39.46	64.00	-24.54	
3	1.57	9.68	52.63	74.00	-21.37	40.11	64.00	-23.89	
4	10.18	9.61	42.95	74.00	-31.05	37.43	64.00	-26.57	
5	20.55	9.76	45.06	74.00	-28.94	39.51	64.00	-24.49	
6	28.65	9.99	46.68	74.00	-27.32	41.11	64.00	-22.89	

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.

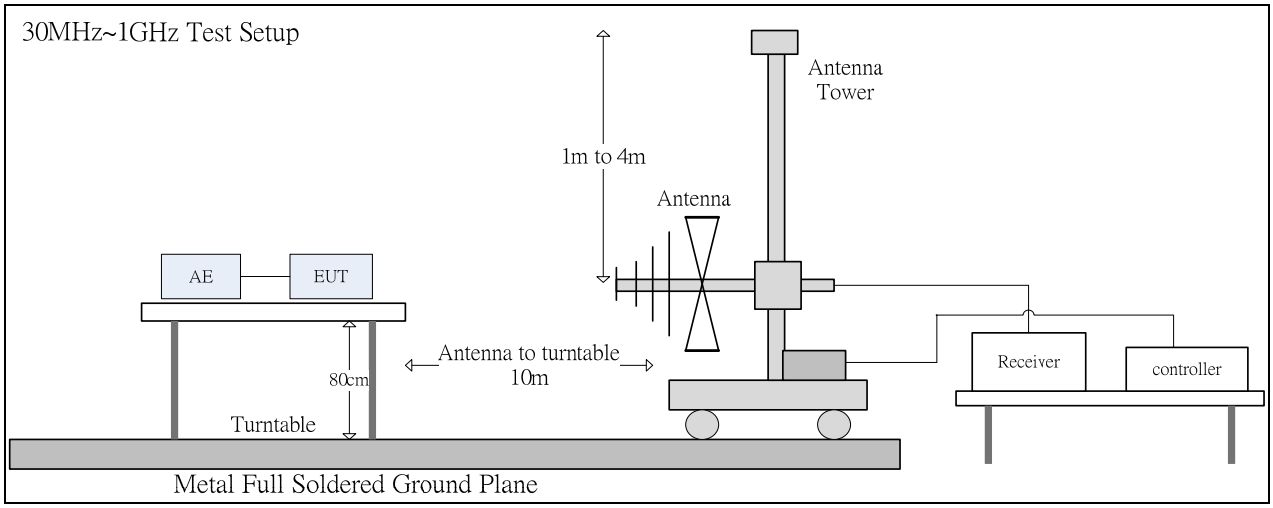
3.8 Test Setup Photo

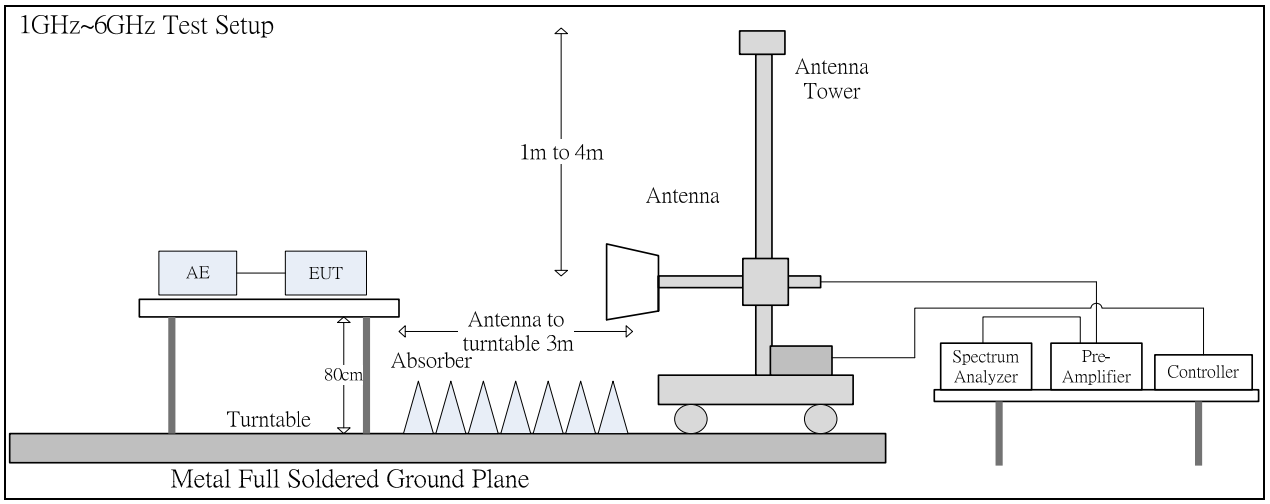
Refer to the Setup Photos for Power Main Port Conducted Emissions

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.

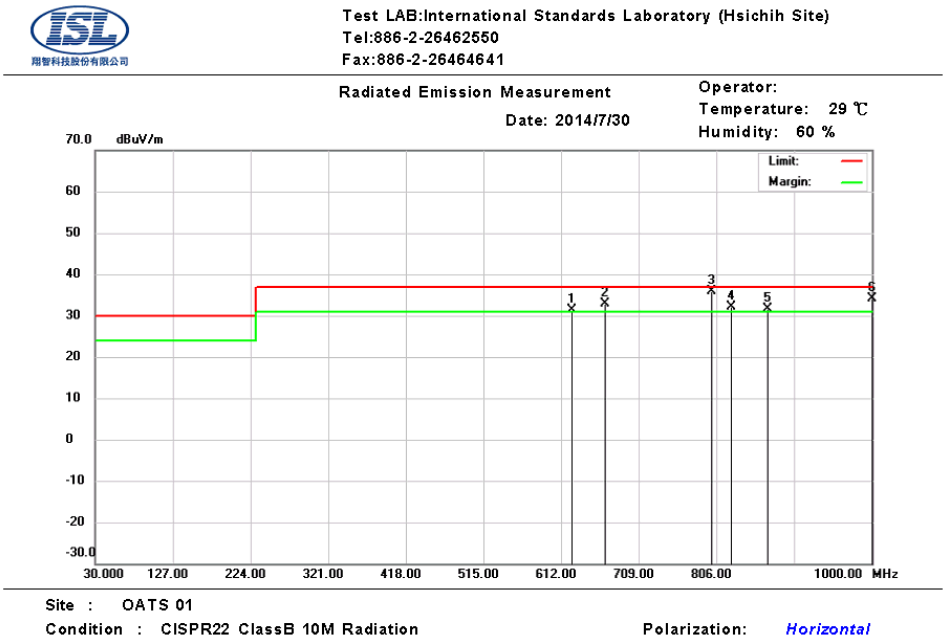
4.1.3 Spectrum Analyzer Configuration (for the frequencies tested)

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	624.9800	9.25	22.11	31.36	37.00	-5.64	101	354	QP
2	666.3200	10.04	22.95	32.99	37.00	-4.01	112	96	QP
3	799.9900	11.01	24.83	35.84	37.00	-1.16	148	147	QP
4	824.4300	6.87	25.23	32.10	37.00	-4.90	231	204	QP
5	869.7000	5.74	25.91	31.65	37.00	-5.35	100	35	QP
6	999.9900	6.54	27.58	34.12	37.00	-2.88	197	253	QP

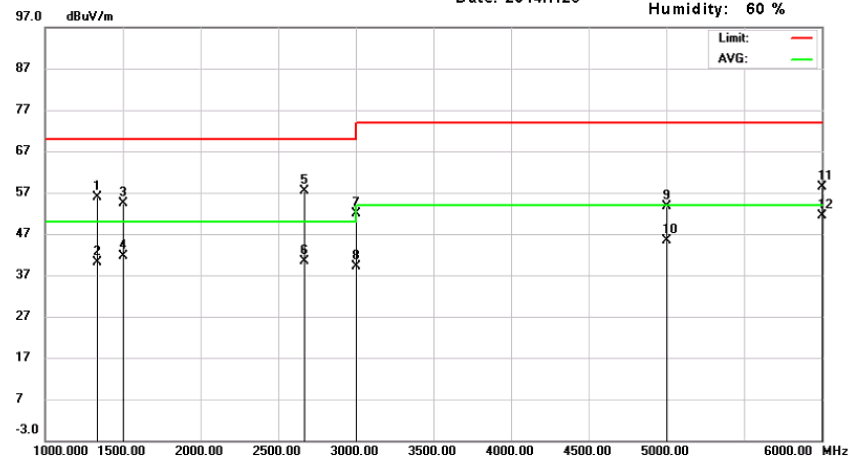
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
BILOG Antenna Distance: 10 meters

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

Test LAB:International Standards Laboratory (Hsichih Site)
Tel:886-2-26462550
Fax:886-2-26464641

Radiated Emission Measurement

Operator:
Temperature: 26 ℃
Humidity: 60 %
Date: 2014/7/28



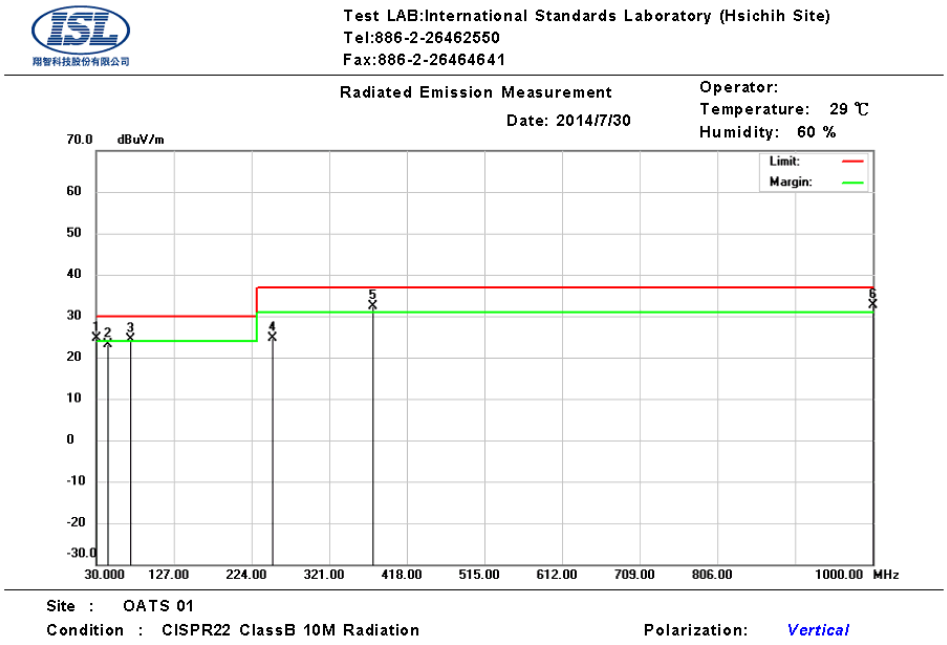
Site : Chamber 01
Condition : CISPR22 ClassB 3M above1GHz Radiation Polarization: *Horizontal*

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	1332.700	76.51	-20.72	55.79	70.00	-14.21	136	158	peak
2	1332.700	60.96	-20.72	40.24	50.00	-9.76	136	158	AVG
3	1500.500	75.02	-20.59	54.43	70.00	-15.57	148	144	peak
4	1500.500	62.16	-20.59	41.57	50.00	-8.43	148	144	AVG
5	2665.100	71.78	-14.44	57.34	70.00	-12.66	134	18	peak
6	2665.100	54.86	-14.44	40.42	50.00	-9.58	134	18	AVG
7	2999.760	65.82	-13.84	51.98	70.00	-18.02	159	13	peak
8	2999.760	52.99	-13.84	39.15	50.00	-10.85	159	13	AVG
9	5000.200	64.72	-11.10	53.62	74.00	-20.38	189	19	peak
10	5000.200	56.56	-11.10	45.46	54.00	-8.54	189	19	AVG
11	5999.940	67.66	-9.36	58.30	74.00	-15.70	189	26	peak
12	5999.940	60.71	-9.36	51.35	54.00	-2.65	189	26	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)

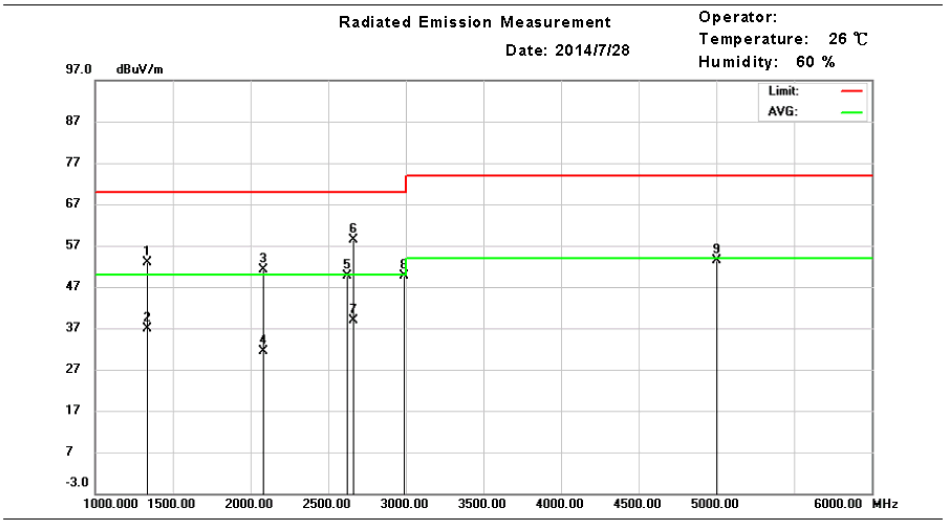


Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	30.0100	3.25	21.44	24.69	30.00	-5.31	158	299	QP
2	44.3600	11.87	11.37	23.24	30.00	-6.76	100	105	QP
3	72.6800	15.57	8.86	24.43	30.00	-5.57	100	231	QP
4	250.1900	11.24	13.35	24.59	37.00	-12.41	100	41	QP
5	375.3200	15.15	17.30	32.45	37.00	-4.55	113	115	QP
6	1000.0000	5.01	27.58	32.59	37.00	-4.41	274	131	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.

Test LAB:International Standards Laboratory (Hsichih Site)
Tel:886-2-26462550
Fax:886-2-26464641



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	1332.300	73.50	-20.72	52.78	70.00	-17.22	111	25	peak
2	1332.300	57.69	-20.72	36.97	50.00	-13.03	111	25	AVG
3	2078.200	66.82	-15.59	51.23	70.00	-18.77	141	31	peak
4	2078.200	46.86	-15.59	31.27	50.00	-18.73	141	31	AVG
5	2620.000	64.27	-14.52	49.75	70.00	-20.25	164	136	peak
6	2664.590	72.83	-14.44	58.39	70.00	-11.61	188	31	peak
7	2664.590	53.20	-14.44	38.76	50.00	-11.24	188	31	AVG
8	2990.000	63.59	-13.86	49.73	70.00	-20.27	171	41	peak
9	5000.000	64.41	-11.10	53.31	74.00	-20.69	124	147	peak

* 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

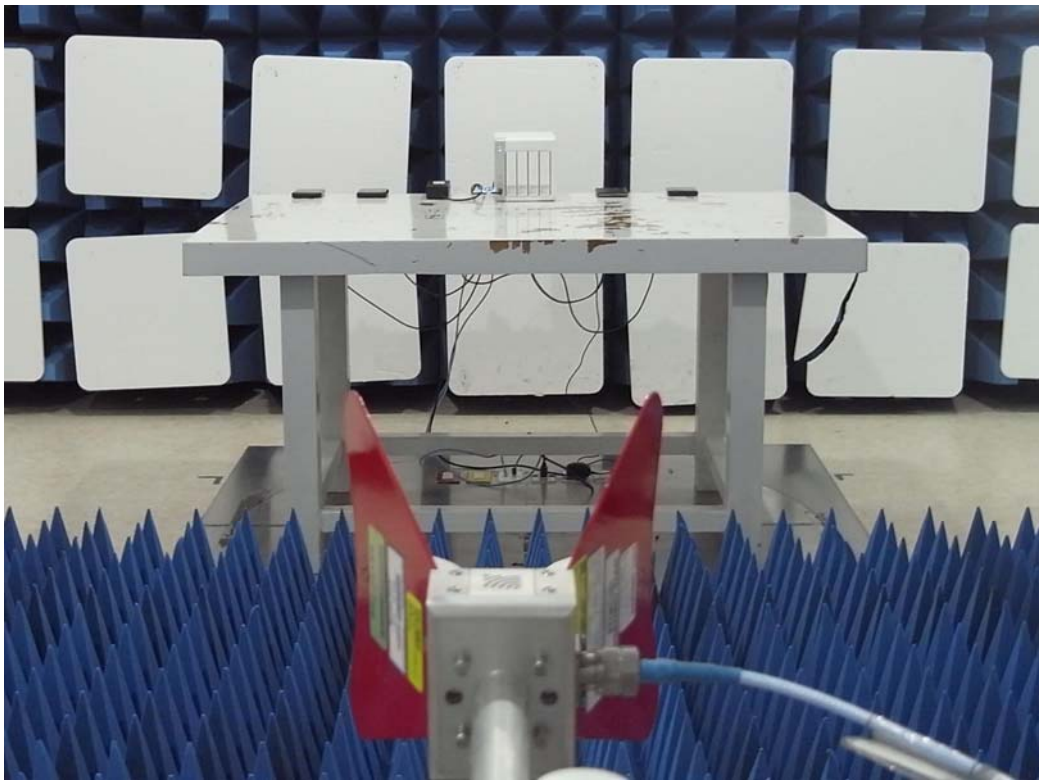
Above 1GHz test, if the peak measured value meets the average limit, it is unnecessary to perform the average measurement.

4.3 Test Setup Photo

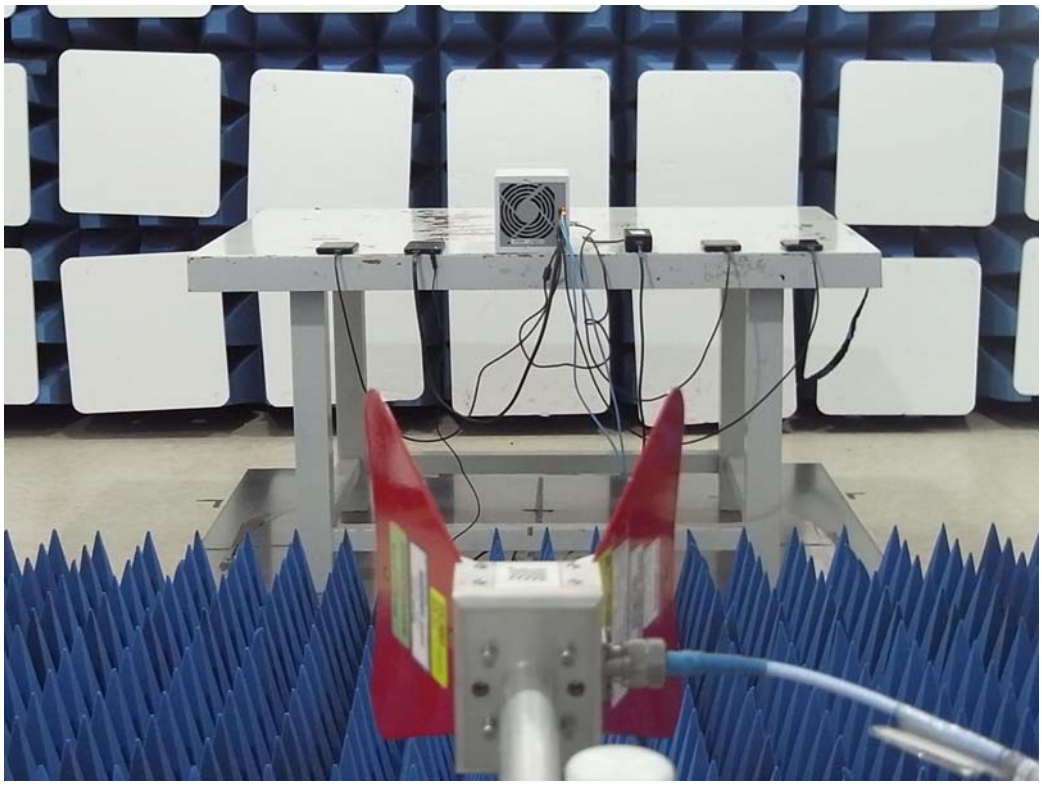
Front View (30MHz~1GHz)

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:	17 °C
Humidity:	56%

Selected Test Point

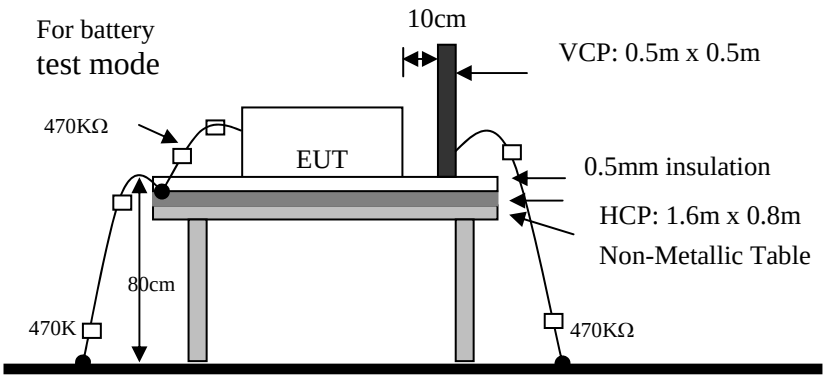
Air: discharges were applied to slots, aperture or insulating surfaces. 10 single air discharges were applied to each selected points.

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.



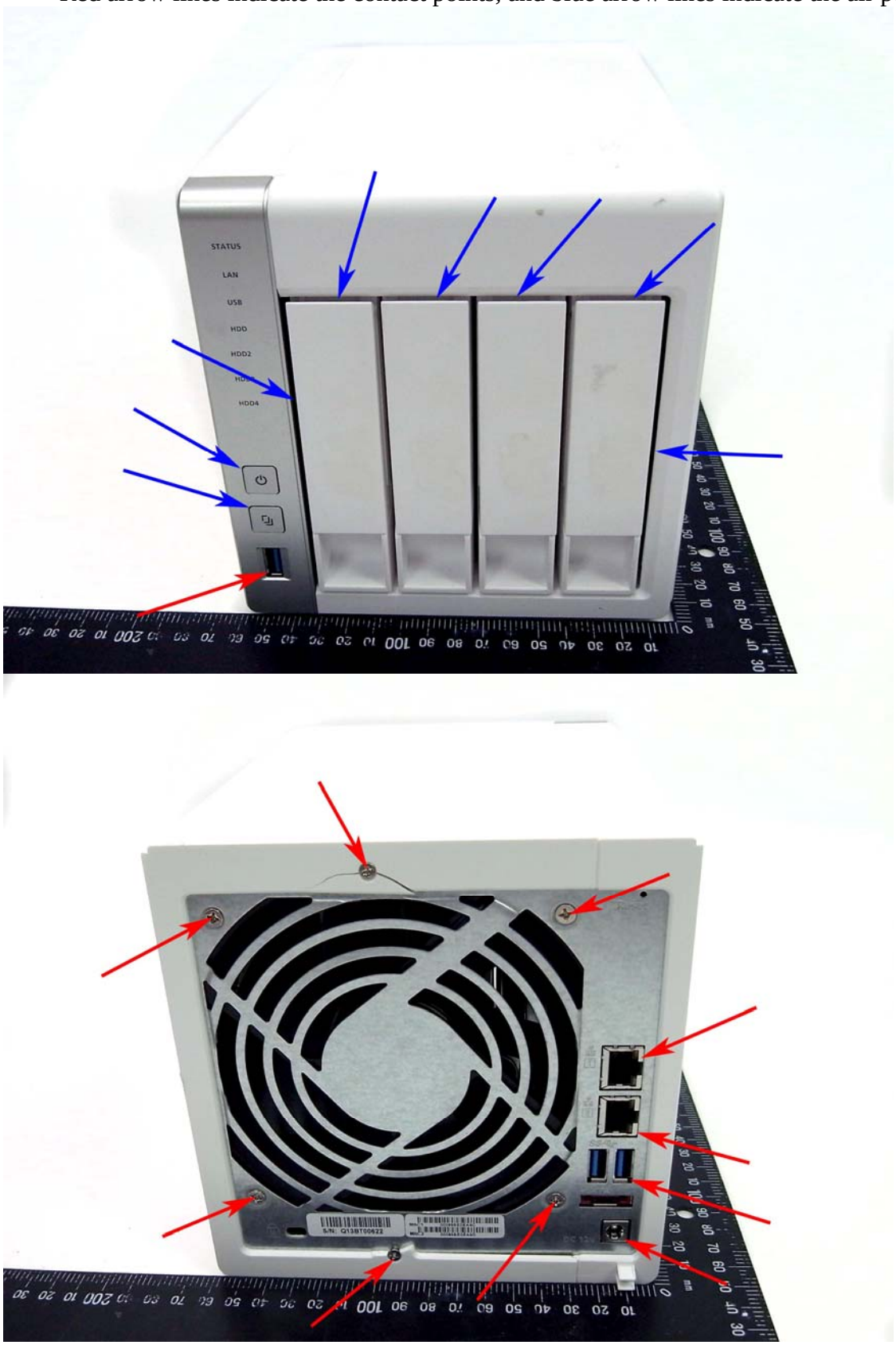
Ground reference Plane

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.



5.5 Test Setup Photo

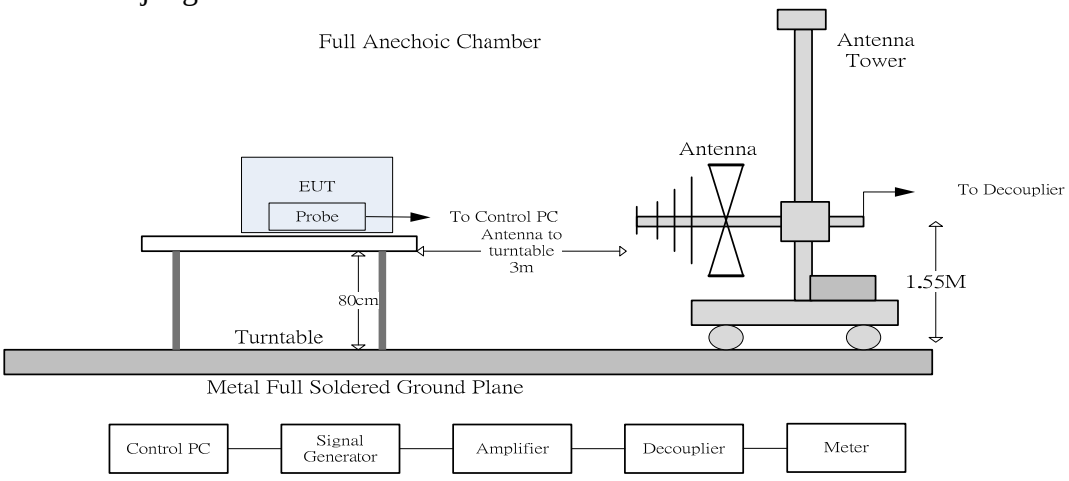
6. Radio-Frequency, Electromagnetic Field immunity

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:	17°C
Humidity:	56%

6.2 Test Setup

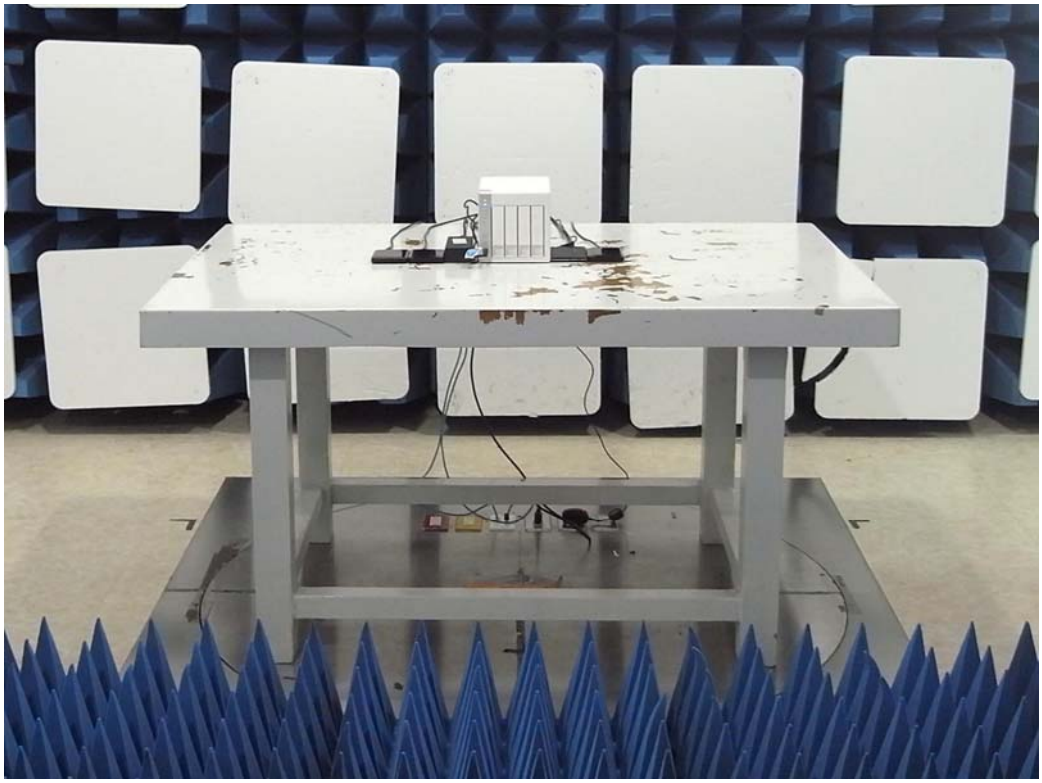
The field sensor is placed at one calibration grid point to check the intensity of the established fields on both polarizations. EUT is adjusted to have each side of EUT face coincident with the calibration plane. A CCD camera and speakers are used to monitor the condition of EUT for the performance 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:	17 °C
Humidity:	56%

Test Procedure

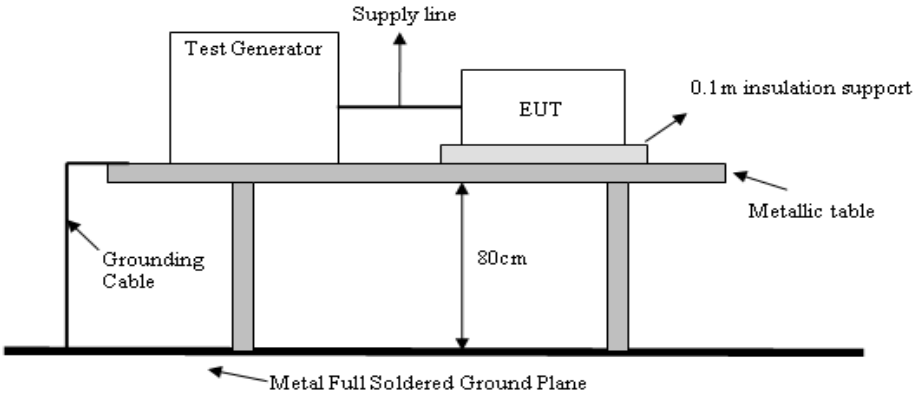
The EUT was setup on a nonconductive table 0.1 m above a reference ground plane.

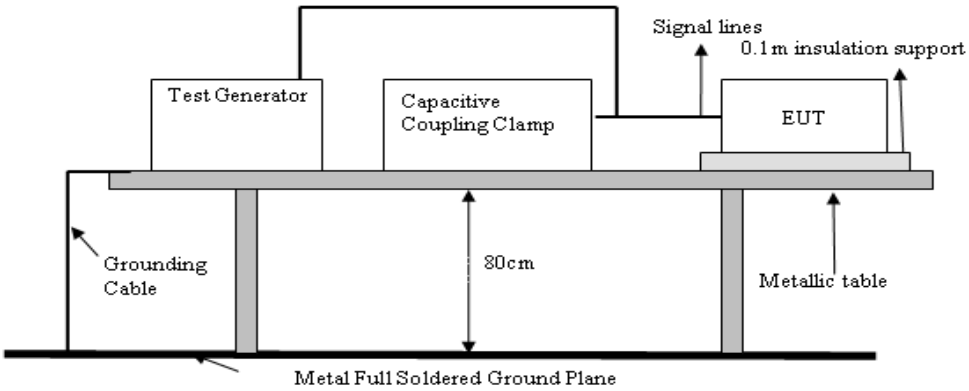
Test Points	Polarity	Result	Comment
Line	+	N	60 sec
	-	N	60 sec
Neutral	+	N	60 sec
	-	N	60 sec
Ground	+	N	60 sec
	-	N	60 sec
Line to Neutral	+	N	60 sec
	-	N	60 sec
Line to Ground	+	N	60 sec
	-	N	60 sec
Neutral to Ground	+	N	60 sec
	-	N	60 sec
Line to Neutral to Ground	+	N	60 sec
	-	N	60 sec
Capacitive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

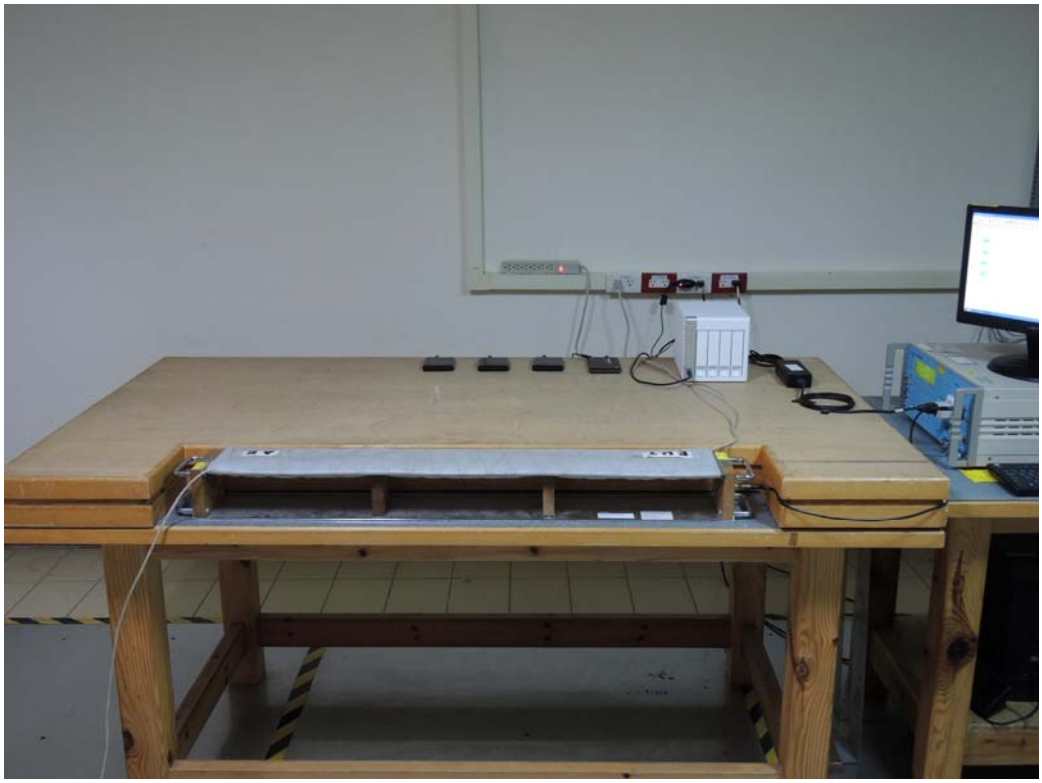




7.3 Test Result

Performance of EUT complies with the given specification.

7.4 Test Setup Photo

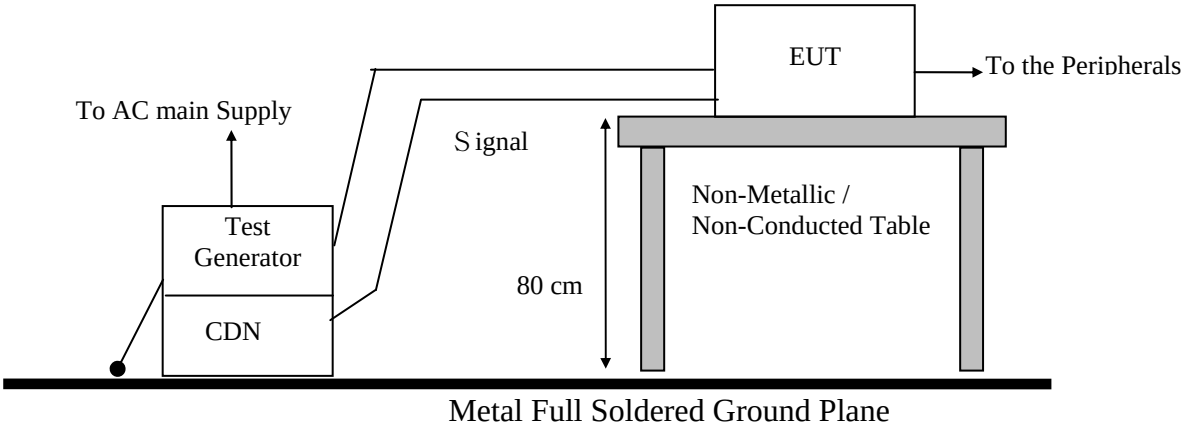


8. Surge Immunity

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 seconds
Angle:	☒0° ☒90° ☒180° ☒270°
Criteria:	B
Remarks:	
Test Procedure:	refer to ISL QA -T4-E-S10
Temperature:	17°C
Humidity:	56%

8.2 Test Setup



8.3 Test Result

Performance of EUT complies with the given specification.

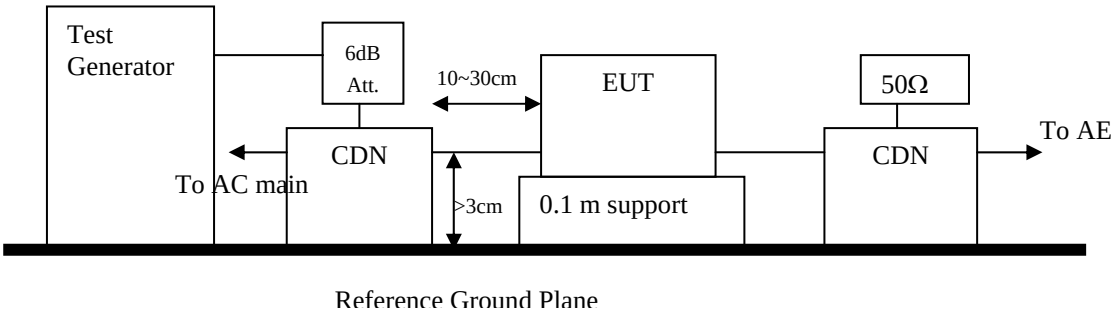
8.4 Test Setup Photo

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 T2, CDN T4, CDN T8, EM Clamp
Test Procedure	refer to ISL QA -T4-E-S11
Temperature:	17°C
Humidity:	56%

9.2 Test Setup



9.3 Test Result

Performance of EUT complies with the given specification.

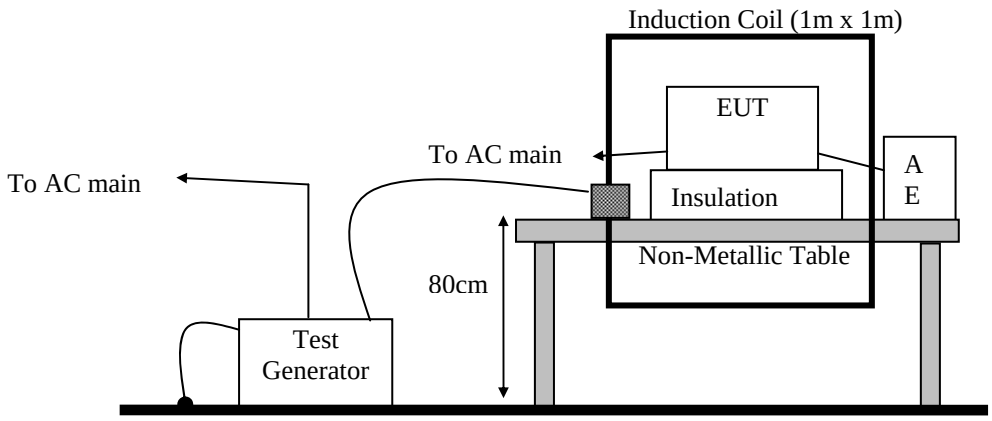
9.4 Test Setup Photo

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:	17°C
Humidity:	56%

10.2 Test Setup



10.3 Test Result

Performance of EUT complies with the given specification.

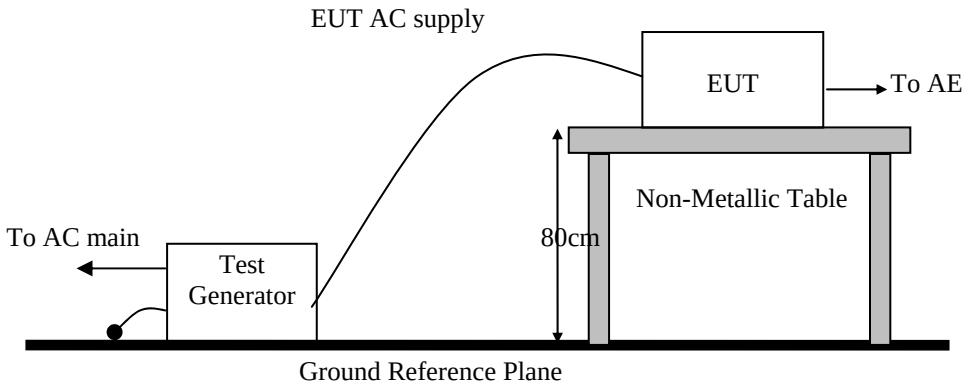
10.4 Test Setup Photo

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:	17°C
Humidity:	56%

11.2 Test Setup



11.3 Test Result

Performance of EUT complies with the given specification.

11.4 Test Setup Photo

12. Harmonics

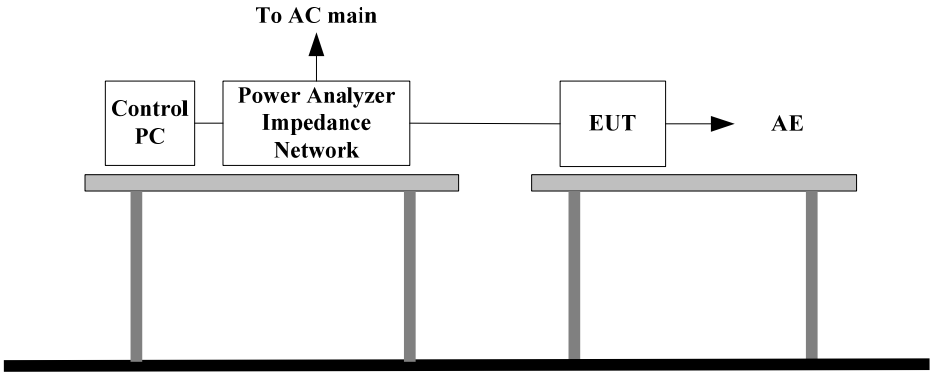
12.1 Test Specification

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:	A
Test Procedure	refer to ISL QA -T4-E-S14
Temperature:	17°C
Humidity:	56%

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

Active input power under 75W, no limit apply, declare compliance.

13. Voltage Fluctuations

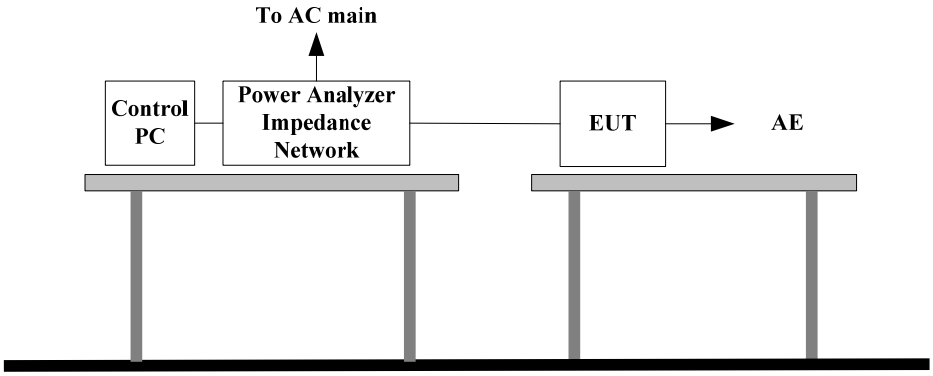
13.1 Test Specification

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:	17°C
Humidity:	56%

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

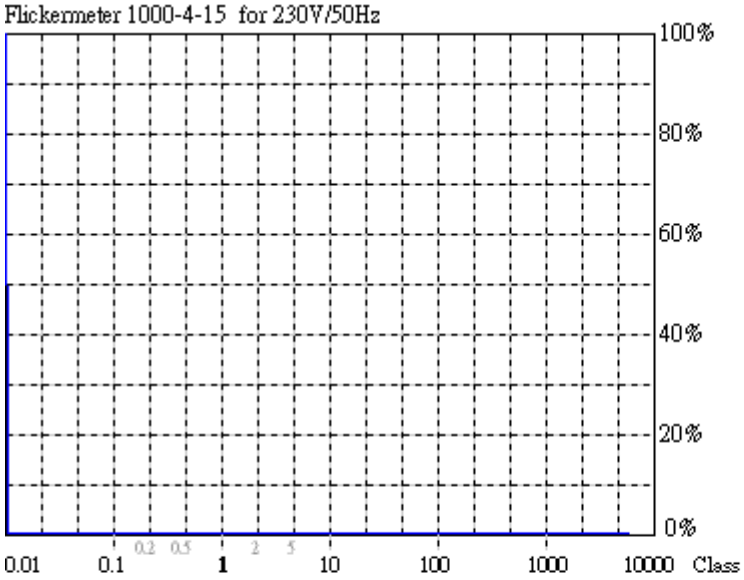


13.3 Test Result

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):	**0.09%**
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

2014/7/30 PM 03:22:2

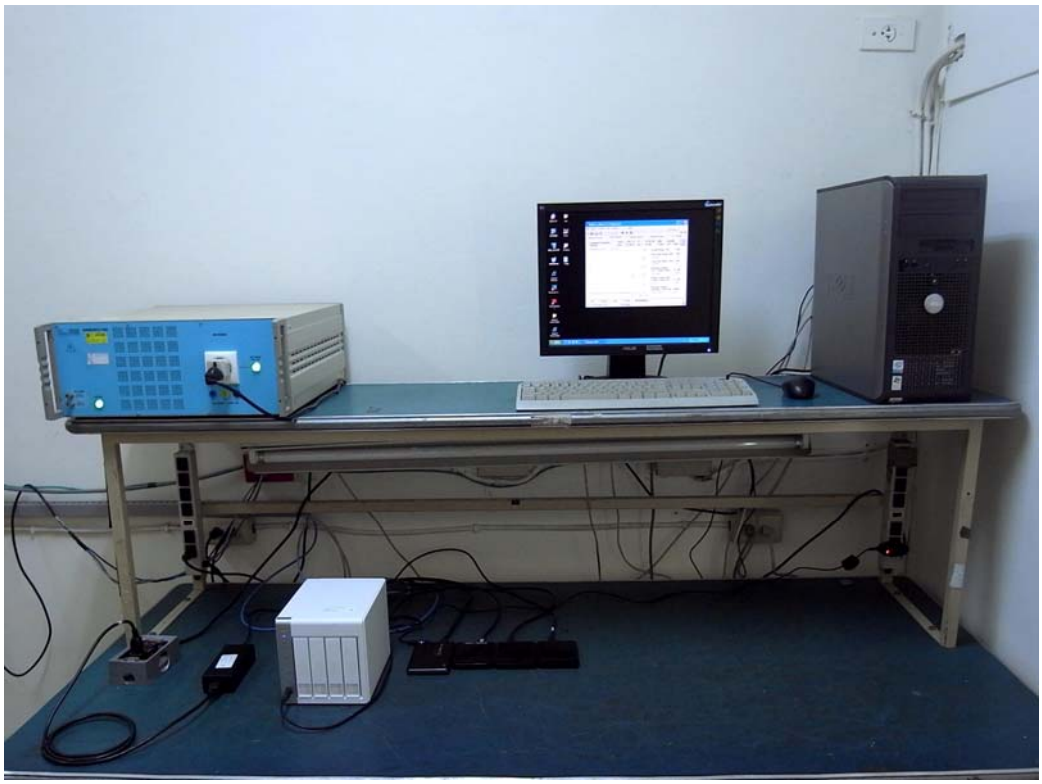
Urms =	229.7	V	P =	33.72	W
Irms =	0.343	A	pf =	0.428	

Range:	2 A
V-nom:	230 V
TestTime:	120 min (10000%)

Test completed, Result: PASSED

HAR-1000 EMC-Retro

13.5 Test Setup Photo



14. Appendix

14.1 Appendix A: Test Equipment

14.1.1 Test Equipment List

Location CON01	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction	Coaxial Cable 1F-C1	HUBER SUHNER	RG214U	389942	10/25/2013	10/25/2014
Conduction	LISN 21	ROHDE & SCHWARZ	ENV216	101476	05/26/2014	05/26/2015
Conduction	LISN 22	ROHDE & SCHWARZ	ENV216	101478	05/26/2014	05/26/2015
Conduction	ISN T2 03	FCC	FCC-TLISN-T2-02	20618	08/13/2013	08/13/2014
Conduction	ISN T4 05	FCC	FCC-TLISN-T4-02	20619	08/13/2013	08/13/2014
Conduction	ISN T8 08	Teseq GmbH	ISN T800	36155	01/28/2014	01/28/2015
Conduction	ISN T8 06 (Shielding)	Teseq GmbH	ISN ST08	33999	08/10/2013	08/10/2014
Conduction	EMI Receiver 15	ROHDE & SCHWARZ	ESCI	101166	05/06/2014	05/06/2015

Location OATS01	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation	BILOG Antenna 10	Sumol Sciences	JB1	A013004-1	07/09/2014	07/09/2015
Radiation	Coaxial Cable 3F-10M	EMCI	CFD400-NL	ISL-R001	03/14/2014	03/14/2015
Radiation	EMI Receiver 13	ROHDE & SCHWARZ	ESCI	101015	04/11/2014	04/11/2015

Location Chamber 01	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Rad. above 1Ghz	Horn Antenna 11	ETS-LINDGREN	3117	00114397	03/21/2014	03/21/2015
Rad. above 1Ghz	Horn Antenna 03	COM-Power	AH-826	08010	04/01/2013	04/01/2015
Rad. above 1Ghz	Horn Antenna 05	Com-Power	AH-640	100A	01/09/2013	01/09/2015
Rad. above 1Ghz	Microwave Cable-16	HUBER SUHNER	SUCFLEX 104	345761/4	01/06/2014	01/06/2015
Rad. above 1Ghz	Preamplifier 20	EMCI	EMC051845	980084	11/06/2013	11/06/2014
Rad. above 1Ghz	Microwave Cable-19	HUBER SUHNER	SUCFLEX 102	MY 2151/2	05/22/2014	05/22/2015
Rad. above 1Ghz	Preamplifier 22	EMCI	EMC184045	980124	04/09/2014	04/09/2015
Rad. above 1Ghz	Spectrum Analyzer 23	ROHDE & SCHWARZ	FSU43	101255	11/07/2013	11/07/2014

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
EN61K-3-2/3	DC Burn-In Load 02	D-RAM	DBS-2100	2100-910027	N/A	N/A
EN61K-3-2/3	Harmonic/Flicker Test System 03	EMC Partner	HARMONICS-1000	178	03/21/2014	03/21/2015
EN61K-4-,4,5,8,11	TRANSIENT 2000 01	EMC Partner	TRANSIENT-2000	950	05/08/2014	05/08/2015
EN61K-4-2	ESD GUN 11	TESEQ	NSG 438	1278	09/12/2013	09/12/2014
EN61K-4-3	BILOG Antenna 06	Schaffner	CBL6112B	2754	N/A	N/A
EN61K-4-3	Amplifier 80Mz~1GHz 250W	AR	250W1000A	312494	N/A	N/A
EN61K-4-3	Amplifier 800MHz~3.0GHz 60W	AR	60S1G3	312762	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 Coupler 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 07	ROHDE& SCHWARZ	SMB100A	107780	09/23/2013	09/23/2014
EN61K-4-4	Digital Oscilloscope	Tektronix	TDS 684A	B010761	N/A	N/A
EN61K-4-4	EFT Clamp	Precision	1604242	CNEFT1000-103	N/A	N/A
EN61K-4-5	CDN-UTP8 01	EMC Partner	CDN-UTP8	032	04/11/2014	04/11/2015
EN61K-4-5	SURGE-TESTER 01	EMC Partner	MIG0603IN3	778	04/09/2014	04/09/2015
EN61K-4-6	6dB Attenuator	Weinschel Corp	33-6-34	BC5975	N/A	N/A
EN61K-4-6	Amplifier 4-6	Amplifier Research	150A100	1-1-R-02157	N/A	N/A
EN61K-4-6	Attenuator 6dB 4-6	BIRO	100-A-FFN-06	0123	N/A	N/A
EN61K-4-6	CDN M2+M3	Frankonia	M2+M3	A3011016	08/10/2013	08/10/2014
EN61K-4-6	CDN T2 01	Frankonia	T2	A3010003	08/10/2013	08/10/2014
EN61K-4-6	CDN T4 05	FCC Inc.	FCC-801-T4-RJ45	08020	09/06/2013	09/06/2014
EN61K-4-6	CDN T8 01	FCC Inc.	FCC-801-T8-RJ45	08021	09/06/2013	09/06/2014
EN61K-4-6	CDN RJ45/S 01	Frankonia	CDN-RJ45/S	A3150047	10/19/2013	10/19/2014
EN61K-4-6	EM-Clamp 01	FCC	F-203I-23MM	539	N/A	N/A
EN61K-4-6	Coaxial Cable 4-6 01-1	Harbour Industries	M17/128-RG400	4-6 01-1	N/A	N/A
EN61K-4-6	Coaxial Cable 4-6 01-2	Harbour Industries	M17/128-RG400	4-6 01-2	N/A	N/A
EN61K-4-6	Coaxial Cable 4-6 01-3	Harbour Industries	M17/128-RG400	4-6 01-3	N/A	N/A
EN61K-4-6	KAL-AD RJ45S	BIRO			N/A	N/A
EN61K-4-6	KAL-AD T2	BIRO			N/A	N/A
EN61K-4-6	Passive Impedance Adaptor 4-6	FCC	FCC-801-150-50-CDN	9758;9759	N/A	N/A
EN61K-4-6, CISPR 13, Antenna	Signal Generator 02	HP	8648B	3642U01040	09/05/2013	09/05/2014
EN61K-4-8	Magnetic Field Antenna	Precision	TRAIZ44B	MF1000-23	N/A	N/A

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	4.20
EN61000-3-3	EMC Partner	4.20
EN61000-4-2	N/A	
EN61000-4-3	i2	4.130102g
EN61000-4-4	EMC Partner	1.79
EN61000-4-5	EMC Partner	1.82
EN61000-4-6	EMC Partner	1.12
EN61000-4-8	EMC Partner	1.79
EN61000-4-11	EMC Partner	1.79

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 16-4-2:2011. The coverage factor k = 2 yields approximately a 95 % level of confidence.

<Conduction 01>
AMN: ±3.28dB
ISN T2: ±3.86dB
ISN T4: ±4.27dB
ISN T8: ±3.86dB

<OATS 01 (10M)>
Horizontal
30MHz~200MHz: ±3.36dB
200MHz~1000MHz: ±4.08dB
Vertical
30MHz~200MHz: ±3.99dB
200MHz~1000MHz: ±4.16dB

<Chamber 01 (3M)>
1GHz~6GHz: ±4.70dB
6GHz~18GHz: ±4.91dB
18GHz~26.5GHz: ±4.34dB
18GHz~26.5GHz: ±4.38dB

<Immunity 01>

Test item	Uncertainty	Test item	Uncertainty
EN61000-4-2 (ESD)		EN61000-4-5 (Surge)	
Rise time tr	≦ 15%	Time	± 1.16%
Peak current Ip	≦ 6.3%	Voltage	± 1.63%
current at 30 ns	≦ 6.3%	Current	± 1.28%
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	± 1.43%	EN61000-4-8 (Magnetic)	±1.12%
Voltage	± 1.11%	EN61000-4-11 (Dips)	
Current	± 1.85%	Time	± 1.16%
		Voltage	± 0.10%

Test item	Uncertainty	Test item	Uncertainty
EN61000-3-2 (Harmonics)	± 4.43 %	EN61000-3-3 (Fluctuations and Flicker)	± 4.43 %

14.3 Appendix C: Photographs of EUT

Please refer to the File of **ISL-14HE218P**