Certificate

Issue Date: August 28, 2017
Ref. Report No. ISL-17LE068CE-MA

Product Name : DC/DC converter

Model(s) : THN 15-7212WIRzzzzzzzz; THN 15-2410WIRzzzzzzzz;
THN 15-2411WIRzzzzzzzz; THN 15-2412WIRzzzzzzzz;
THN 15-2413WIRzzzzzzzz; THN 15-2415WIRzzzzzzzz;
THN 15-2421WIRzzzzzzzz; THN 15-2422WIRzzzzzzzz;
THN 15-2423WIRzzzzzzzz; THN 15-2425WIRzzzzzzzz;
THN 15-4810WIRzzzzzzzz; THN 15-4811WIRzzzzzzzz;
THN 15-4812WIRzzzzzzzz; THN 15-4813WIRzzzzzzzz;
THN 15-4815WIRzzzzzzzz; THN 15-4821WIRzzzzzzzz;
THN 15-4822WIRzzzzzzzz; THN 15-4823WIRzzzzzzzz;
THN 15-4825WIRzzzzzzzz; THN 15-7210WIRzzzzzzzz;
THN 15-7211WIRzzzzzzzz; THN 15-7213WIRzzzzzzzz;
THN 15-7215WIRzzzzzzzz; THN 15-7221WIRzzzzzzzz;
THN 15-7222WIRzzzzzzzz; THN 15-7223WIRzzzzzzzz;
THN 15-7225WIRzzzzzzzz;THN 15-1210Nzzzzzzzz;
THN 15-1211Nzzzzzzzz; THN 15-1212Nzzzzzzzz;
THN 15-1213Nzzzzzzzz; THN 15-1215Nzzzzzzzz;
THN 15-1221Nzzzzzzzz; THN 15-1222Nzzzzzzzz;
THN 15-1223Nzzzzzzzz; THN 15-1225Nzzzzzzzz;
THN 15-2410Nzzzzzzzz; THN 15-2411Nzzzzzzzz;
THN 15-2412Nzzzzzzzz; THN 15-2413Nzzzzzzzz;
THN 15-2415Nzzzzzzzz; THN 15-2421Nzzzzzzzz;
THN 15-2422Nzzzzzzzz; THN 15-2423Nzzzzzzzz;
THN 15-2425Nzzzzzzzz; THN 15-4810Nzzzzzzzz;
THN 15-4811Nzzzzzzzz; THN 15-4812Nzzzzzzzz;
THN 15-4813Nzzzzzzzz; THN 15-4815Nzzzzzzzz;
THN 15-4821Nzzzzzzzz; THN 15-4822Nzzzzzzzz;
THN 15-4823Nzzzzzzzz; THN 15-4825Nzzzzzzzz;
z = any alphanumeric character or punctuation, "-" or blank for marketing purpose and no impact safety related critical components and constructions.

Applicant : TRACO ELECTRONIC AG

Brand :

Address : Sihlbruggstrasse 111 CH-6340 Baar Switzerland

Certificate

Issue Date: August 28, 2017
Ref. Report No. ISL-17LE068CE-MA

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 2014/30/EU. The device was passed the test performed according to :

CE

Standards:

EN 55032:2015+AC:2016, CISPR 32: 2015+COR1:2016
AS/NZS CISPR 32:2015
EN 55024: 2010+A1:2015 and CISPR 24: 2010+A1:2015
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 61000-4-4:2012 and IEC 61000-4-4:2012
EN 61000-4-5: 2014 and IEC 61000-4-5: 2014
EN 61000-4-6:2014+AC:2015 and IEC 61000-4-6:2013
EN 61000-4-8: 2010 and IEC 61000-4-8: 2009

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

Bert Chang / 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

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

ilac-MRA TAF Testing Laboratory 0997

Nemko ELA113B

CE MARK TECHNICAL FILE

AS/NZS EMC CONSTRUCTION FILE

of

Product Name

DC/DC converter

Model

THN 15-7212WIRzzzzzzzz; THN 15-2410WIRzzzzzzzz;
THN 15-2411WIRzzzzzzzz; THN 15-2412WIRzzzzzzzz;
THN 15-2413WIRzzzzzzzz; THN 15-2415WIRzzzzzzzz;
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THN 15-4825WIRzzzzzzzz; THN 15-7210WIRzzzzzzzz;
THN 15-7211WIRzzzzzzzz; THN 15-7213WIRzzzzzzzz;
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THN 15-7225WIRzzzzzzzz;THN 15-1210Nzzzzzzzz;
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THN 15-1215Nzzzzzzzz; THN 15-1221Nzzzzzzzz; THN 15-1222Nzzzzzzzz;
THN 15-1223Nzzzzzzzz; THN 15-1225Nzzzzzzzz; THN 15-2410Nzzzzzzzz;
THN 15-2411Nzzzzzzzz; THN 15-2412Nzzzzzzzz; THN 15-2413Nzzzzzzzz;
THN 15-2415Nzzzzzzzz; THN 15-2421Nzzzzzzzz; THN 15-2422Nzzzzzzzz;
THN 15-2423Nzzzzzzzz; THN 15-2425Nzzzzzzzz; THN 15-4810Nzzzzzzzz;
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THN 15-4815Nzzzzzzzz; THN 15-4821Nzzzzzzzz; THN 15-4822Nzzzzzzzz;
THN 15-4823Nzzzzzzzz; THN 15-4825Nzzzzzzzz;
z = any alphanumeric character or punctuation, "-" or blank for marketing purpose and no impact safety related critical components and constructions.

Brand

Contains:

1. Declaration of Conformity
2. EN55032/CISPR 32, AS/NZS CISPR 32 EMI test report
3. EN55024/CISPR 24

Declaration of Conformity

Name of Responsible Party:	TRACO ELECTRONIC AG
Address of Responsible Party:	Sihlbruggstrasse 111 CH-6340 Baar Switzerland
Declares that product:	DC/DC converter
Model:	THN 15-7212WIRzzzzzzzz; THN 15-2410WIRzzzzzzzz; THN 15-2411WIRzzzzzzzz; THN 15-2412WIRzzzzzzzz; THN 15-2413WIRzzzzzzzz; THN 15-2415WIRzzzzzzzz; THN 15-2421WIRzzzzzzzz; THN 15-2422WIRzzzzzzzz; THN 15-2423WIRzzzzzzzz; THN 15-2425WIRzzzzzzzz; THN 15-4810WIRzzzzzzzz; THN 15-4811WIRzzzzzzzz; THN 15-4812WIRzzzzzzzz; THN 15-4813WIRzzzzzzzz; THN 15-4815WIRzzzzzzzz; THN 15-4821WIRzzzzzzzz; THN 15-4822WIRzzzzzzzz; THN 15-4823WIRzzzzzzzz; THN 15-4825WIRzzzzzzzz; THN 15-7210WIRzzzzzzzz; THN 15-7211WIRzzzzzzzz; THN 15-7213WIRzzzzzzzz; THN 15-7215WIRzzzzzzzz; THN 15-7221WIRzzzzzzzz; THN 15-7222WIRzzzzzzzz; THN 15-7223WIRzzzzzzzz; THN 15-7225WIRzzzzzzzz;THN 15-1210Nzzzzzzzz; THN 15-1211Nzzzzzzzz; THN 15-1212Nzzzzzzzz; THN 15-1213Nzzzzzzzz; THN 15-1215Nzzzzzzzz; THN 15-1221Nzzzzzzzz; THN 15-1222Nzzzzzzzz; THN 15-1223Nzzzzzzzz; THN 15-1225Nzzzzzzzz; THN 15-2410Nzzzzzzzz; THN 15-2411zzzzzzzz; THN 15-2412Nzzzzzzzz; THN 15-2413Nzzzzzzzz; THN 15-2415Nzzzzzzzz; THN 15-2421Nzzzzzzzz; THN 15-2422Nzzzzzzzz; THN 15-2423Nzzzzzzzz; THN 15-2425Nzzzzzzzz; THN 15-4810Nzzzzzzzz; THN 15-4811Nzzzzzzzz; THN 15-4812Nzzzzzzzz; THN 15-4813Nzzzzzzzz; THN 15-4815zzzzzzzz; THN 15-4821Nzzzzzzzz; THN 15-4822Nzzzzzzzz; THN 15-4823Nzzzzzzzz; THN 15-4825Nzzzzzzzz; z = any alphanumeric character or punctuation, "-" or blank for marketing purpose and no impact safety related critical components and constructions.
Brand:	TRACO POWER
Assembled by:	Same as above
Address:	Same as above

<to be continued>

Conforms to the EMC Directive 2014/30/EU as attested by conformity with the following harmonized standards:

EN 55032:2015+AC:2016, CISPR 32: 2015+COR1:2016: Electromagnetic compatibility of multimedia equipment - Emission requirements.
AS/NZS CISPR 32:2015: Electromagnetic compatibility of multimedia equipment- Emission requirements

Performed Item	Test Performed	Deviation	Result
Conducted emissions from the AC mains power ports	Yes	No	PASS
Telecommunication Port Conducted Emissions (asymmetric mode)	N/A	N/A	N/A
Radiated emissions at frequencies below 1 GHz	Yes	No	PASS
Radiated emissions at frequencies above 1 GHz	N/A	N/A	N/A
Radiated emissions from FM receivers	N/A	N/A	N/A
Voltage Disturbance Emissions at Antenna Terminals	N/A	N/A	N/A
Differential voltage emissions	N/A	N/A	N/A
Outdoor units of home satellite receiving systems	N/A	N/A	N/A

EN 55024:2010+A1:2015 and CISPR 24:2010+A1:2015: 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	A
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 61000-4-4:2012 IEC 61000-4-4:2012	Electrical Fast Transient/Burst	Pass	A
EN 61000-4-5:2014 IEC 61000-4-5:2014	Surge	Pass	A
EN 61000-4-6:2014+AC:2015 IEC 61000-4-6:2013	Conductive Disturbance	Pass	A
EN 61000-4-8:2010 IEC 61000-4-8:2009	Power Frequency Magnetic Field	Pass	A

We, TRACO ELECTRONIC AG, 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.

TRACO ELECTRONIC AG

Date: August 28, 2017

Declaration of Conformity

Name of Responsible Party:	TRACO ELECTRONIC AG
Address of Responsible Party:	Sihlbruggstrasse 111 CH-6340 Baar Switzerland
Declares that product:	DC/DC converter
Model:	THN 15-7212WIRzzzzzzzz; THN 15-2410WIRzzzzzzzz; THN 15-2411WIRzzzzzzzz; THN 15-2412WIRzzzzzzzz; THN 15-2413WIRzzzzzzzz; THN 15-2415WIRzzzzzzzz; THN 15-2421WIRzzzzzzzz; THN 15-2422WIRzzzzzzzz; THN 15-2423WIRzzzzzzzz; THN 15-2425WIRzzzzzzzz; THN 15-4810WIRzzzzzzzz; THN 15-4811WIRzzzzzzzz; THN 15-4812WIRzzzzzzzz; THN 15-4813WIRzzzzzzzz; THN 15-4815WIRzzzzzzzz; THN 15-4821WIRzzzzzzzz; THN 15-4822WIRzzzzzzzz; THN 15-4823WIRzzzzzzzz; THN 15-4825WIRzzzzzzzz; THN 15-7210WIRzzzzzzzz; THN 15-7211WIRzzzzzzzz; THN 15-7213WIRzzzzzzzz; THN 15-7215WIRzzzzzzzz; THN 15-7221WIRzzzzzzzz; THN 15-7222WIRzzzzzzzz; THN 15-7223WIRzzzzzzzz; THN 15-7225WIRzzzzzzzz;THN 15-1210Nzzzzzzzz; THN 15-1211Nzzzzzzzz; THN 15-1212Nzzzzzzzz; THN 15-1213Nzzzzzzzz; THN 15-1215Nzzzzzzzz; THN 15-1221Nzzzzzzzz; THN 15-1222Nzzzzzzzz; THN 15-1223Nzzzzzzzz; THN 15-1225Nzzzzzzzz; THN 15-2410Nzzzzzzzz; THN 15-2411zzzzzzzz; THN 15-2412Nzzzzzzzz; THN 15-2413Nzzzzzzzz; THN 15-2415Nzzzzzzzz; THN 15-2421Nzzzzzzzz; THN 15-2422Nzzzzzzzz; THN 15-2423Nzzzzzzzz; THN 15-2425Nzzzzzzzz; THN 15-4810Nzzzzzzzz; THN 15-4811Nzzzzzzzz; THN 15-4812Nzzzzzzzz; THN 15-4813Nzzzzzzzz; THN 15-4815zzzzzzzz; THN 15-4821Nzzzzzzzz; THN 15-4822Nzzzzzzzz; THN 15-4823Nzzzzzzzz; THN 15-4825Nzzzzzzzz; z = any alphanumeric character or punctuation, "-" or blank for marketing purpose and no impact safety related critical components and constructions.
Brand:	TRACO POWER
Assembled by:	Same as above
Address:	Same as above

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

AS/NZS CISPR 32:2015: Electromagnetic compatibility of multimedia equipment-Emission requirements

We, TRACO ELECTRONIC AG, 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.

TRACO ELECTRONIC AG

Date: August 28, 2017

CE TEST REPORT

of

EN55032 / CISPR 32 / AS/NZS CISPR 32
Class B
EN55024 / CISPR 24 / IMMUNITY

Product : **DC/DC converter**

Model(s): **THN 15-7212WIRzzzzzzzz**
(more serial models listed on1.3 of this test report)

Brand: TRACO POWER

Applicant: **TRACO ELECTRONIC AG**

Address: **Sihlbruggstrasse 111 CH-6340 Baar**
Switzerland

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, <Conduction 04>C-4778, T-2295, <Chamber 02>R-1435, G-17, <Chamber 12>R-2598, G-16, <Chamber 14>G-211,
*Address:
No. 120, Lane 180, Hsin Ho Rd.,
Lung-Tan Dist., Tao Yuan City 325, Taiwan
*Tel: 886-3-407-1718; Fax: 886-3-407-1738

Report No.: **ISL-17LE068CE-MA**
Issue Date : **August 28, 2017**

This report totally contains 49 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:	DC/DC converter
Model:	THN 15-7212WIRzzzzzzzz (more serial models listed on1.3 of this test report)
Brand:	TRACO POWER
Applicant:	TRACO ELECTRONIC AG
Sample received Date:	January 19, 2017
Final test Date:	EMI: refer to the date of test data EMS: February 13, 2017
Test Site:	International Standards Laboratory Chamber 02; Conduction 03; Immunity 02
Test Distance:	10M (EMI test)
Temperature:	refer to each site test data
Humidity:	refer to each site test data
Atmospheric Pressure:	86 kPa to 106 kPa
Input power:	THN 15-4810WIR, input power DC 48 V THN 15-7212WI, input power DC 110 V
Test Result:	**PASS**
Report Engineer:	Cheryl Tung
Test Engineer:	Hasan Yu Hasan Yu
Approved By:	W.H. Chang W.H. Chang / 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 55032:2015+AC:2016, CISPR 32: 2015+COR1:2016: Class B: Electromagnetic compatibility of multimedia equipment - Emission requirements.
AS/NZS CISPR 32:2015: Class B: Electromagnetic compatibility of multimedia equipment- Emission requirements

Performed Item	Test Performed	Deviation	Result
Conducted emissions from the AC mains power ports	Yes	No	PASS
Telecommunication Port Conducted Emissions (asymmetric mode)	N/A	N/A	N/A
Radiated emissions at frequencies below 1 GHz	Yes	No	PASS
Radiated emissions at frequencies above 1 GHz	N/A	N/A	N/A
Radiated emissions from FM receivers	N/A	N/A	N/A
Voltage Disturbance Emissions at Antenna Terminals	N/A	N/A	N/A
Differential voltage emissions	N/A	N/A	N/A
Outdoor units of home satellite receiving systems	N/A	N/A	N/A

EN 55024:2010+A1:2015 and CISPR 24:2010+A1:2015: 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	A
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 61000-4-4:2012 IEC 61000-4-4:2012	Electrical Fast Transient/Burst	Pass	A
EN 61000-4-5:2014 IEC 61000-4-5:2014	Surge	Pass	A
EN 61000-4-6:2014+AC:2015 IEC 61000-4-6:2013	Conductive Disturbance	Pass	A
EN 61000-4-8:2010 IEC 61000-4-8:2009	Power Frequency Magnetic Field	Pass	A

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 Model Number Definition

There is more than one model number for this product, please refer the details listed below:

THN 15-7212WIRzzzzzzzz; THN 15-2410WIRzzzzzzzz; THN 15-2411WIRzzzzzzzz;
THN 15-2412WIRzzzzzzzz; THN 15-2413WIRzzzzzzzz; THN 15-2415WIRzzzzzzzz;
THN 15-2421WIRzzzzzzzz; THN 15-2422WIRzzzzzzzz; THN 15-2423WIRzzzzzzzz;
THN 15-2425WIRzzzzzzzz; THN 15-4810WIRzzzzzzzz; THN 15-4811WIRzzzzzzzz;
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THN 15-7213WIRzzzzzzzz; THN 15-7215WIRzzzzzzzz; THN 15-7221WIRzzzzzzzz;
THN 15-7222WIRzzzzzzzz; THN 15-7223WIRzzzzzzzz; THN 15-7225WIRzzzzzzzz;
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THN 15-4822Nzzzzzzzz; THN 15-4823Nzzzzzzzz; THN 15-4825Nzzzzzzzz;
z = any alphanumeric character or punctuation, "-" or blank for marketing purpose and no impact safety related critical components and constructions.

1.4 Description of EUT

EUT

Description	DC/DC Converter
Condition	Pre-Production
Model	THN 15-7212WIRzzzzzzzz (more serial models listed on1.3 of this test report)
Serial Number	N/A
Highest working frequency:	330kHz
The radiation test should be tested till	1GHz

The devices can be installed inside the EUT are listed below:

Model Name	Input	Output	load	Refer to the photo
THN 15-4810WIR	48VDC	3.3VDC	0.73Ω	EUT-1~2
THN 15-7212WIR	110VDC	12VDC	9.6Ω	EUT-3~4

Test configuration:
For EMI test mode

Configuration	Model Name	Input	Output	load
1	THN 15-7212WIR	110VDC	12VDC	9.6Ω
2	THN 15-4810WIR	48VDC	3.3VDC	0.73Ω

For EMS test mode

Configuration	Model Name	Input	Output	load
1	THN 15-7212WIR	110VDC	12VDC	9.6Ω

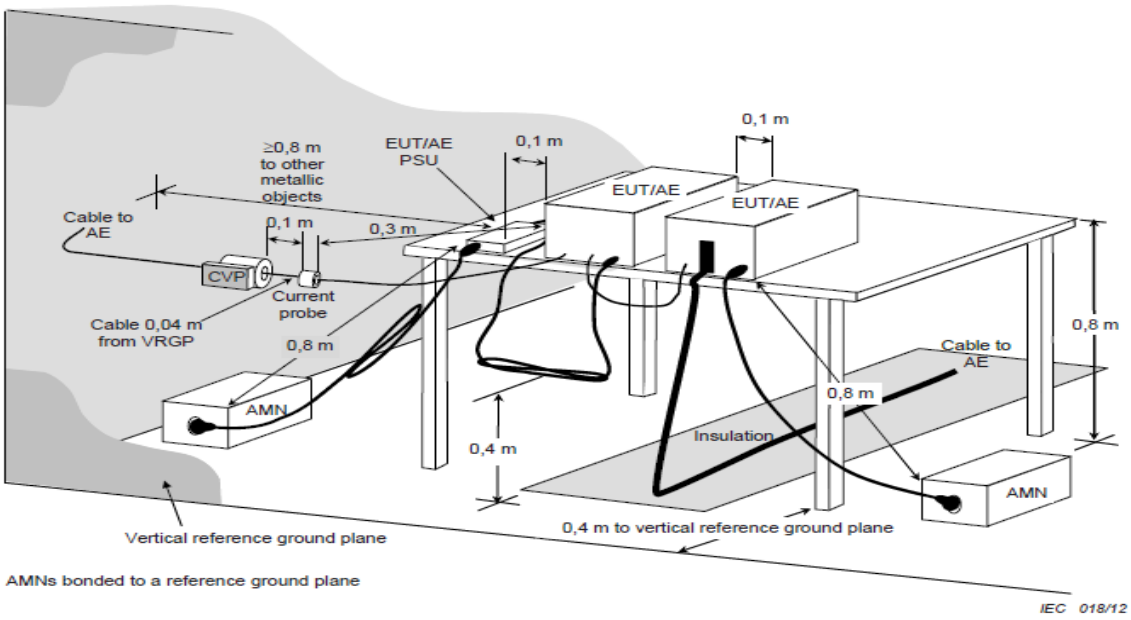
1.5 Description of Support Equipment

No	Unit	Model Serial No.	Brand	Power Cord	FCC ID
1	Programmable DC power supply	PSW 160-21.6 S/N: GEP152281	GWINSTEK	Non-shielded	N/A
2	Dummy Load	N/A S/N: N/A	N/A	N/A	N/A

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 shielded room 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, live and neutral, were measured. All of the interface cables were manipulated according to EN 55032 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

2.1.4 Limit

Conducted emissions from the power mains power ports of Class A equipment:

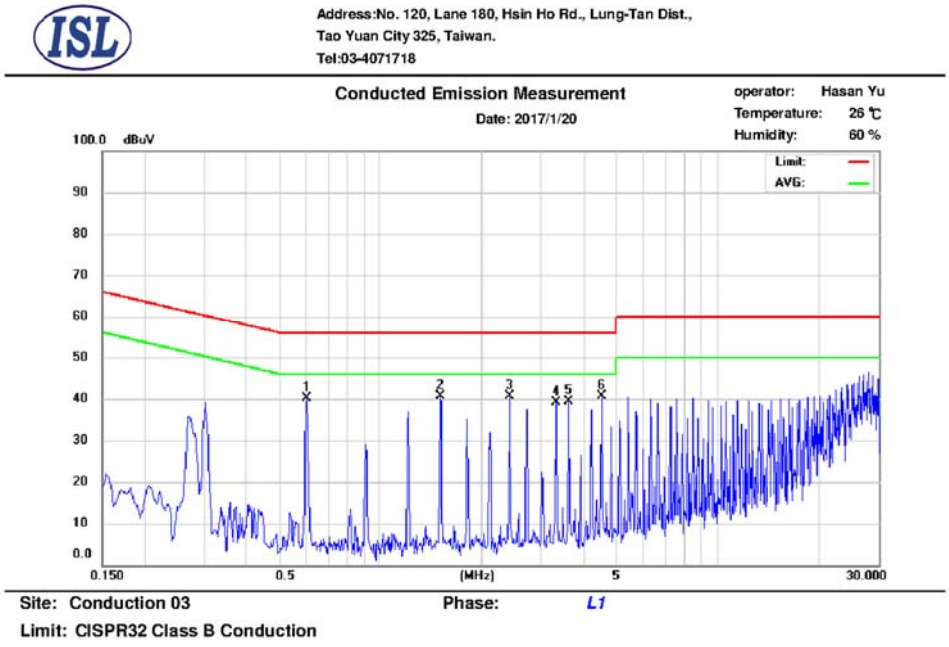
Frequency	QP	AV
MHz	dB(μV)	dB(μV)
0.15-0.50	79	73
5.0-30	66	60
Note: The lower limit shall apply at the transition frequencies		

Conducted emissions from the power mains power ports of Class B equipment:

Frequency	QP	AV
MHz	dB(μV)	dB(μV)
0.15-0.50	66-56	56-46
0.50-5.0	56	46
5.0-30	60	50
Note: The lower limit shall apply at the transition frequencies		

2.2 Conduction Test Data: Configuration 1

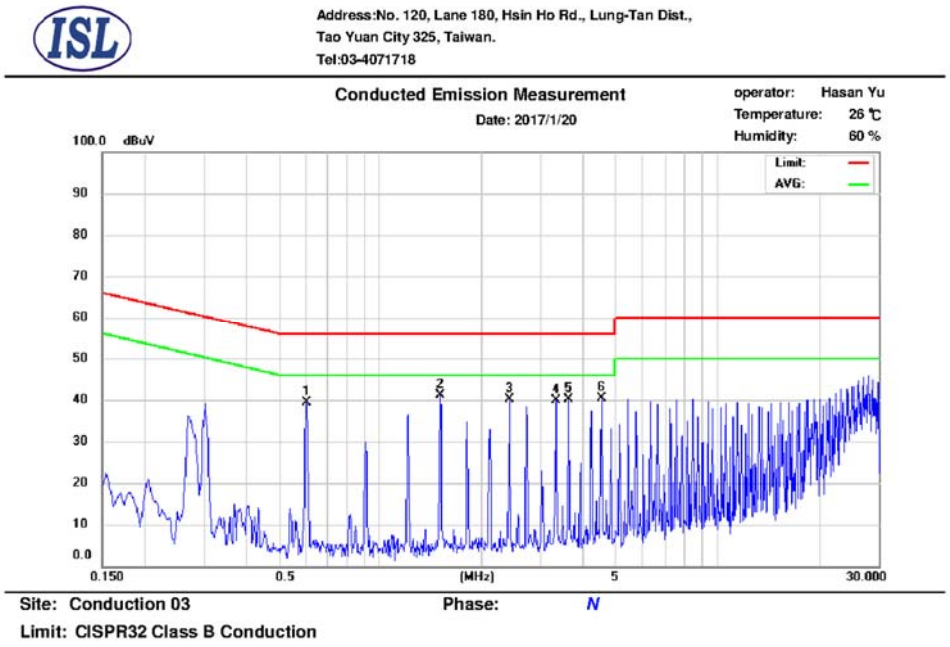
- Live



No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.606	39.25	39.52	0.13	39.38	56.00	-16.62	39.65	46.00	-6.35
2	1.510	40.24	40.50	0.15	40.39	56.00	-15.61	40.65	46.00	-5.35
3	2.418	39.79	39.99	0.19	39.98	56.00	-16.02	40.18	46.00	-5.82
4	3.326	37.14	36.98	0.20	37.34	56.00	-18.66	37.18	46.00	-8.82
5	3.626	38.97	39.16	0.20	39.17	56.00	-16.83	39.36	46.00	-6.64
6	4.534	38.69	38.43	0.22	38.91	56.00	-17.09	38.65	46.00	-7.35

Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = QP_R/AVG_R + 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.

- Neutral

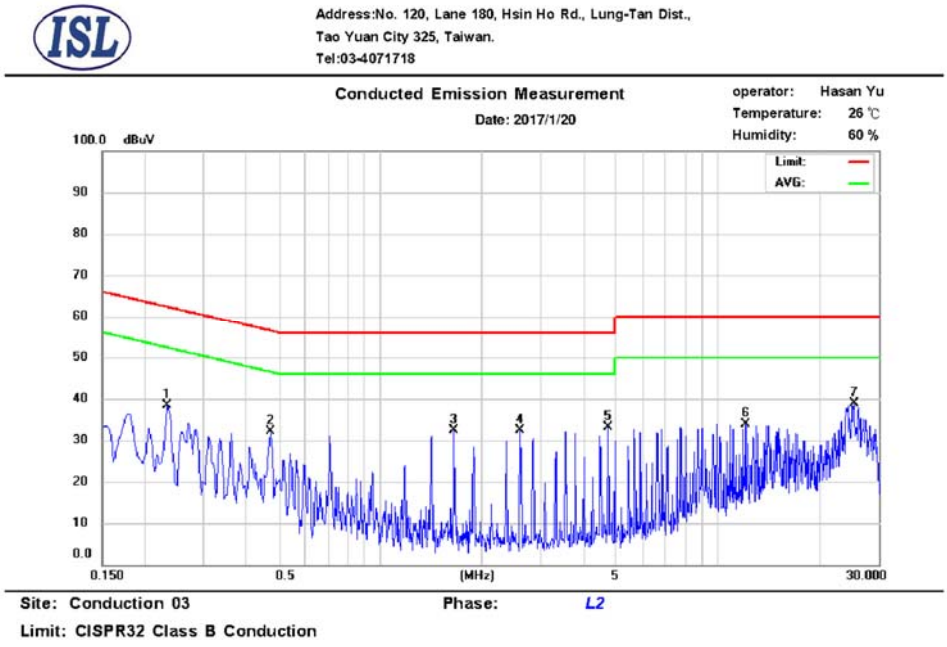


No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.606	38.48	38.75	0.14	38.62	56.00	-17.38	38.89	46.00	-7.11
2	1.510	40.57	40.85	0.16	40.73	56.00	-15.27	41.01	46.00	-4.99
3	2.418	40.81	39.68	0.19	41.00	56.00	-15.00	39.87	46.00	-6.13
4	3.322	39.28	39.51	0.24	39.52	56.00	-16.48	39.75	46.00	-6.25
5	3.626	37.93	37.78	0.25	38.18	56.00	-17.82	38.03	46.00	-7.97
6	4.530	39.68	39.81	0.28	39.96	56.00	-16.04	40.09	46.00	-5.91

Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = QP_R/AVG_R + 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 Conduction Test Data: Configuration 2

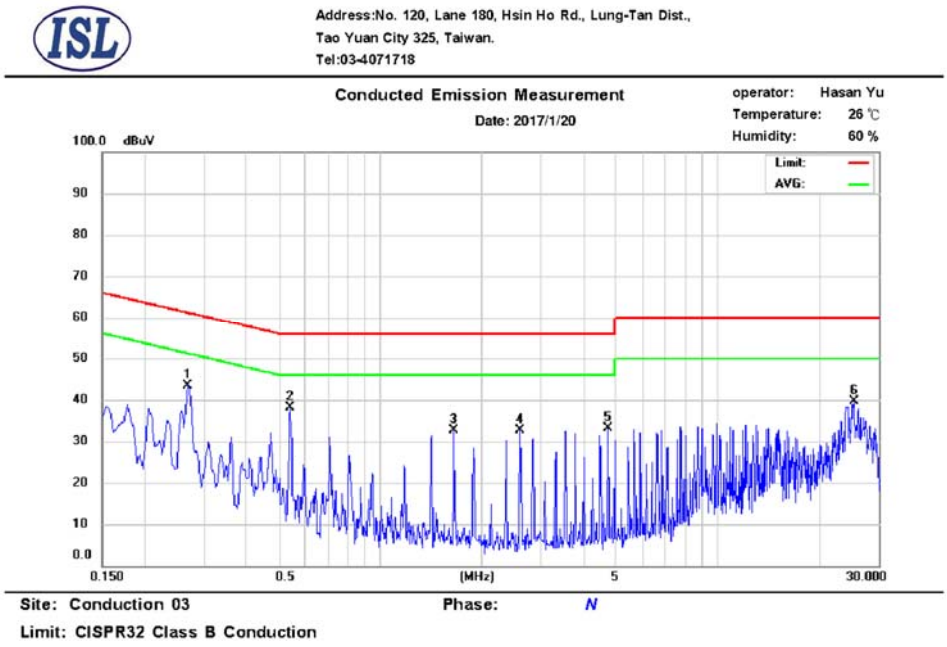
- Live



No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.234	36.11	30.62	0.08	36.19	62.31	-26.12	30.70	52.31	-21.61
2	0.474	30.83	30.72	0.13	30.96	56.44	-25.48	30.85	46.44	-15.59
3	1.658	31.57	31.81	0.16	31.73	56.00	-24.27	31.97	46.00	-14.03
4	2.602	31.89	31.99	0.19	32.08	56.00	-23.92	32.18	46.00	-13.82
5	4.734	32.39	32.62	0.22	32.61	56.00	-23.39	32.84	46.00	-13.16
6	12.070	32.35	31.87	0.36	32.71	60.00	-27.29	32.23	50.00	-17.77
7	25.322	37.09	33.07	0.64	37.73	60.00	-22.27	33.71	50.00	-16.29

Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = QP_R/AVG_R + 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.

- Neutral



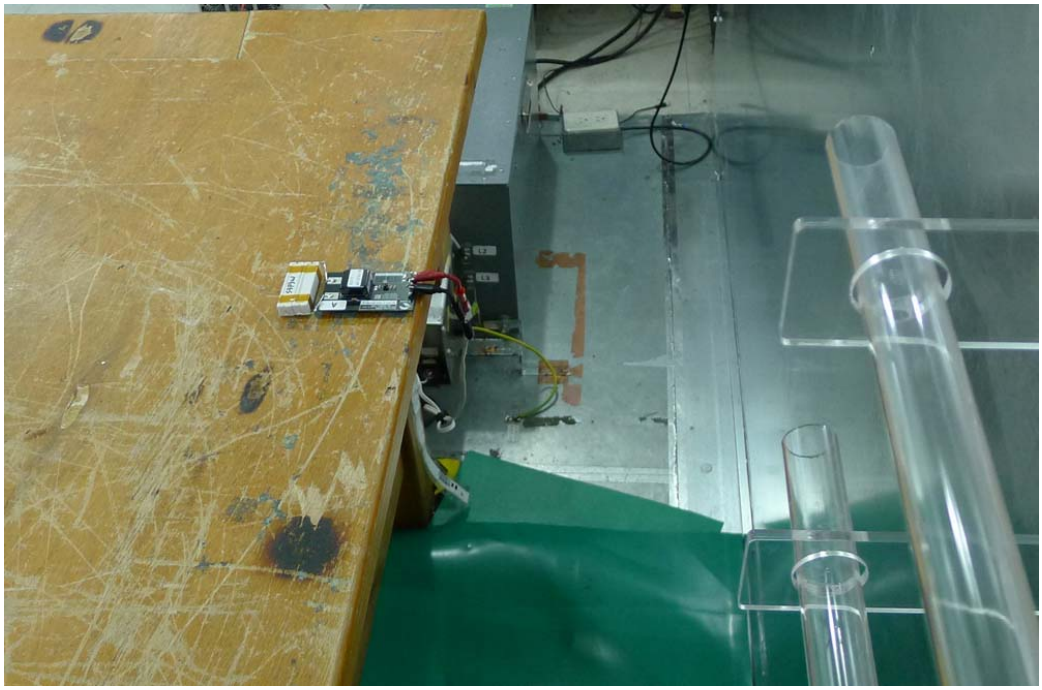
No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.270	43.66	39.27	0.15	43.81	61.12	-17.31	39.42	51.12	-11.70
2	0.542	36.73	32.28	0.14	36.87	56.00	-19.13	32.42	46.00	-13.58
3	1.658	31.52	31.76	0.16	31.68	56.00	-24.32	31.92	46.00	-14.08
4	2.602	31.81	31.94	0.20	32.01	56.00	-23.99	32.14	46.00	-13.86
5	4.734	32.35	32.58	0.28	32.63	56.00	-23.37	32.86	46.00	-13.14
6	25.326	37.08	35.82	0.72	37.80	60.00	-22.20	36.54	50.00	-13.46

Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = QP_R/AVG_R + 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.

2.4 Test Setup Photo

Front View

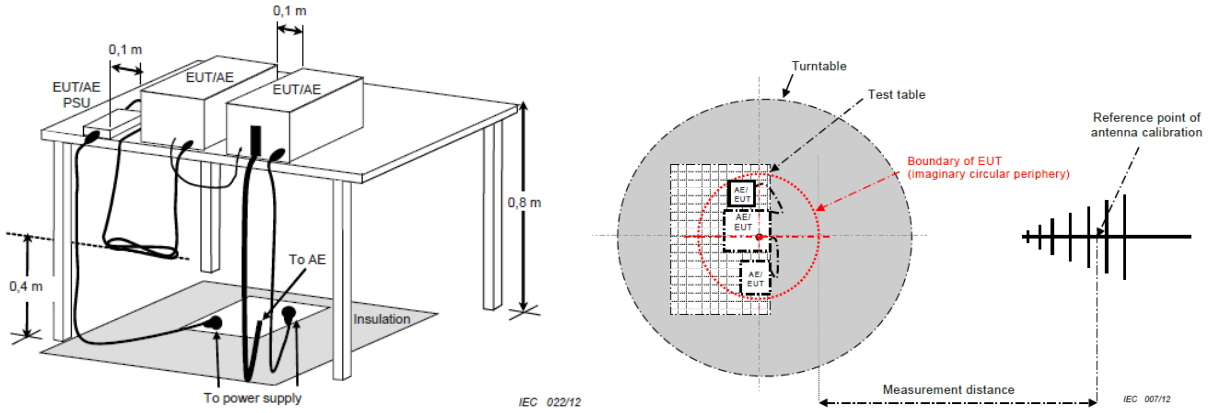
Back View

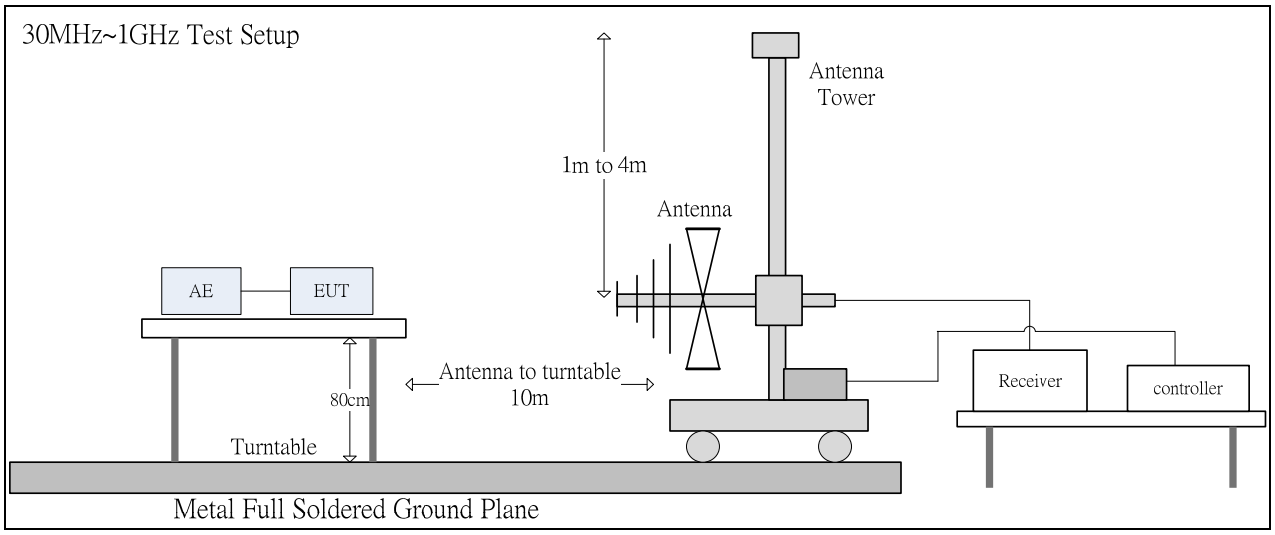


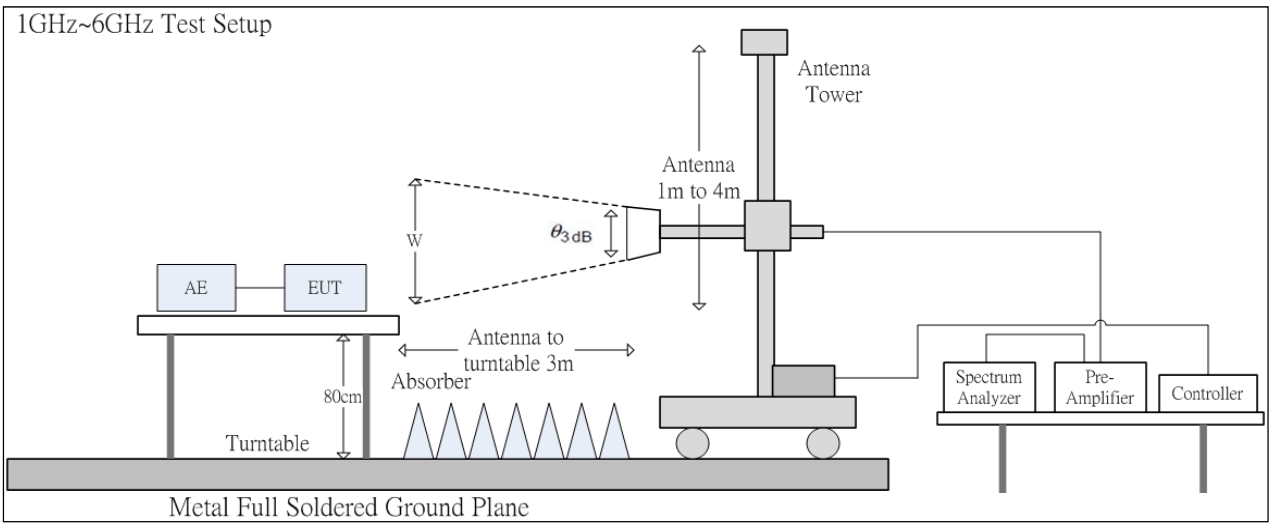
4. Radiated Disturbance Emissions

4.1 Test Setup and Procedure

4.1.1 Test Setup







The 3dB beam width of the horn antenna used for the test is as shown in the table below.

Frequency (GHz)	E-plane	H-plane	$\theta_{3\,dB}$ **(min)**	d= 3 m
				w (m)
1	88°	147°	88°	5.79
2	68°	119°	68°	4.04
3	73°	92°	73°	4.44
4	70°	89°	70°	4.20
5	55°	60°	55°	3.12
6	63°	62°	62°	3.60

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 FRP stand 0.8 meter above the ground or floor-standing arrangement shall be placed on the horizontal ground reference 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. The test volume for a height of up to 30 cm may be obstructed by absorber placed on the ground plane.

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 55032 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)

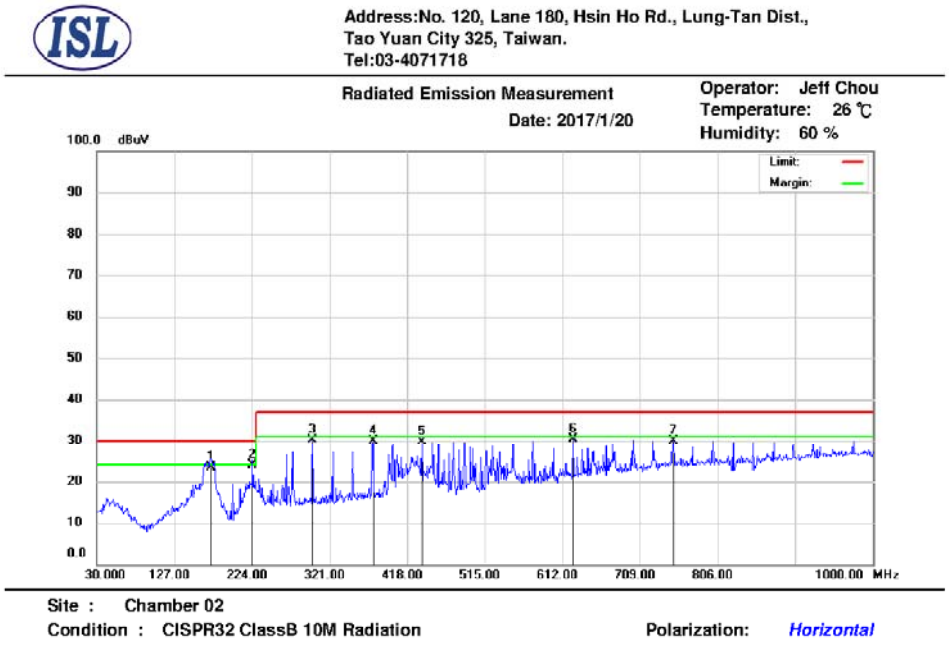
Frequency Range: 30MHz-1000MHz
Detector Function: Quasi-Peak Mode
Resolution Bandwidth: 120kHz

4.2 Limit

Radiated emissions at frequencies up to 1 GHz for Class B equipment:

Frequency range MHz	Measurement		Class B limits dB(μV/m)
	Distance m	Detector type / bandwidth	OATS/SAC
30-230	10	Quasi Peak / 120 kHz	30
230-1000			37
30-230	3		40
230-1000			47

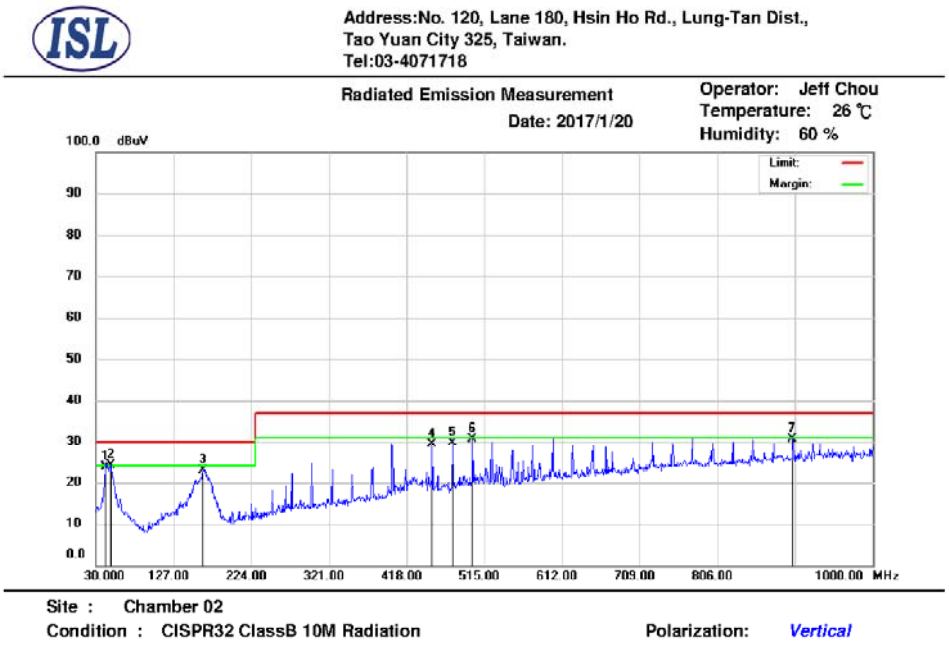
4.3 Radiation Test Data: Configuration 1
- Radiated Emissions (Horizontal)



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	172.59	39.48	-16.16	23.32	30.00	-6.68	100	39	QP
2	224.97	42.17	-18.36	23.81	30.00	-6.19	294	184	QP
3	299.66	44.65	-14.42	30.23	37.00	-6.77	362	11	peak
4	375.32	42.24	-12.42	29.82	37.00	-7.18	100	209	peak
5	436.43	40.39	-10.77	29.62	37.00	-7.38	258	271	peak
6	625.58	37.21	-6.85	30.36	37.00	-6.64	100	144	peak
7	750.71	34.08	-4.26	29.82	37.00	-7.18	100	94	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
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.

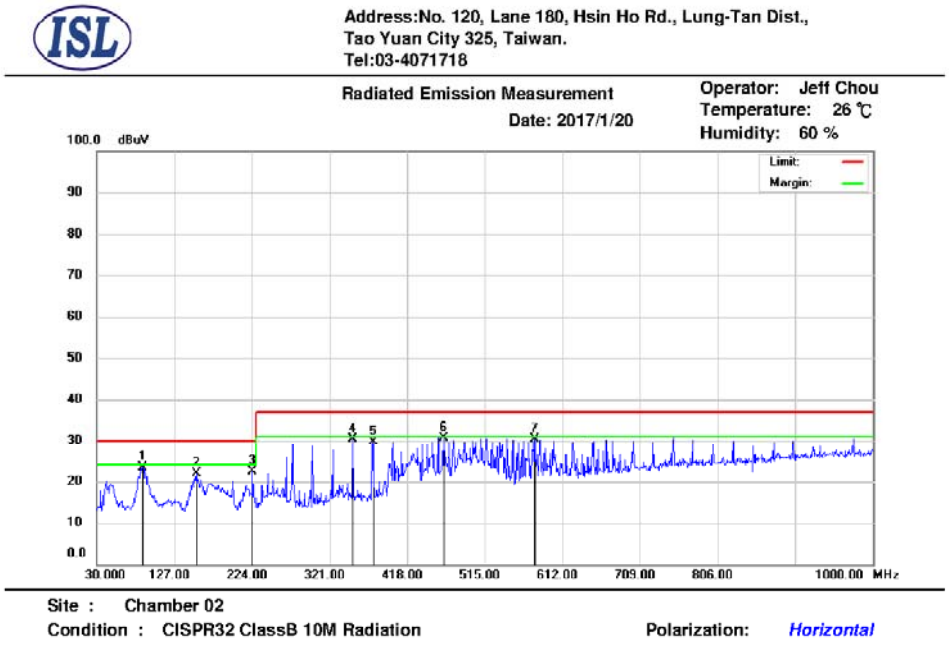
- Radiated Emissions (Vertical)



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	42.61	41.07	-17.34	23.73	30.00	-6.27	191	219	QP
2	48.43	40.99	-16.94	24.05	30.00	-5.95	307	163	QP
3	163.86	36.67	-15.69	22.98	30.00	-7.02	100	311	peak
4	450.01	39.88	-10.43	29.45	37.00	-7.55	241	122	peak
5	475.23	39.49	-9.96	29.53	37.00	-7.47	347	341	peak
6	500.45	40.05	-9.50	30.55	37.00	-6.45	325	357	peak
7	900.09	33.36	-2.76	30.60	37.00	-6.40	176	132	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
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.

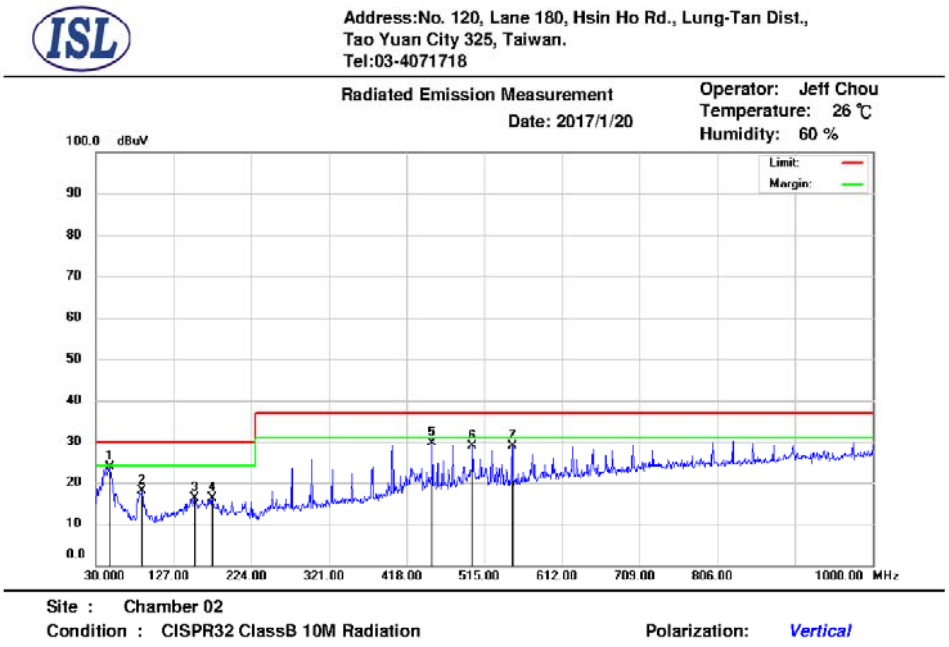
4.4 Radiation Test Data: Configuration 2
- Radiated Emissions (Horizontal)



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	87.23	45.16	-21.77	23.39	30.00	-6.61	283	345	peak
2	154.16	37.70	-15.79	21.91	30.00	-8.09	215	201	peak
3	224.97	40.75	-18.36	22.39	30.00	-7.61	258	200	peak
4	350.10	43.56	-13.17	30.39	37.00	-6.61	159	136	peak
5	375.32	42.02	-12.42	29.60	37.00	-7.40	100	4	peak
6	463.59	40.79	-10.18	30.61	37.00	-6.39	100	278	peak
7	577.08	38.28	-7.91	30.37	37.00	-6.63	100	269	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
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.

- Radiated Emissions (Vertical)

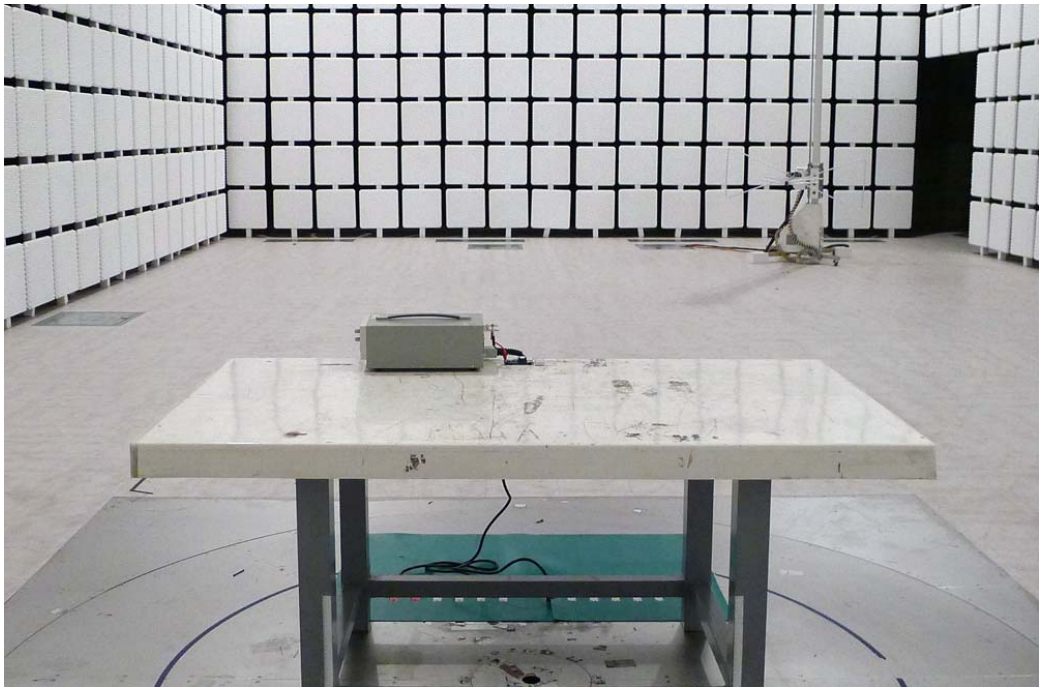


Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	47.46	40.69	-16.98	23.71	30.00	-6.29	256	114	peak
2	87.23	39.67	-21.77	17.90	30.00	-12.10	309	335	peak
3	153.19	31.95	-15.82	16.13	30.00	-13.87	247	77	peak
4	175.50	32.53	-16.47	16.06	30.00	-13.94	100	132	peak
5	450.01	40.14	-10.43	29.71	37.00	-7.29	366	81	peak
6	500.45	38.27	-9.50	28.77	37.00	-8.23	298	218	peak
7	549.92	37.59	-8.72	28.87	37.00	-8.13	193	20	peak

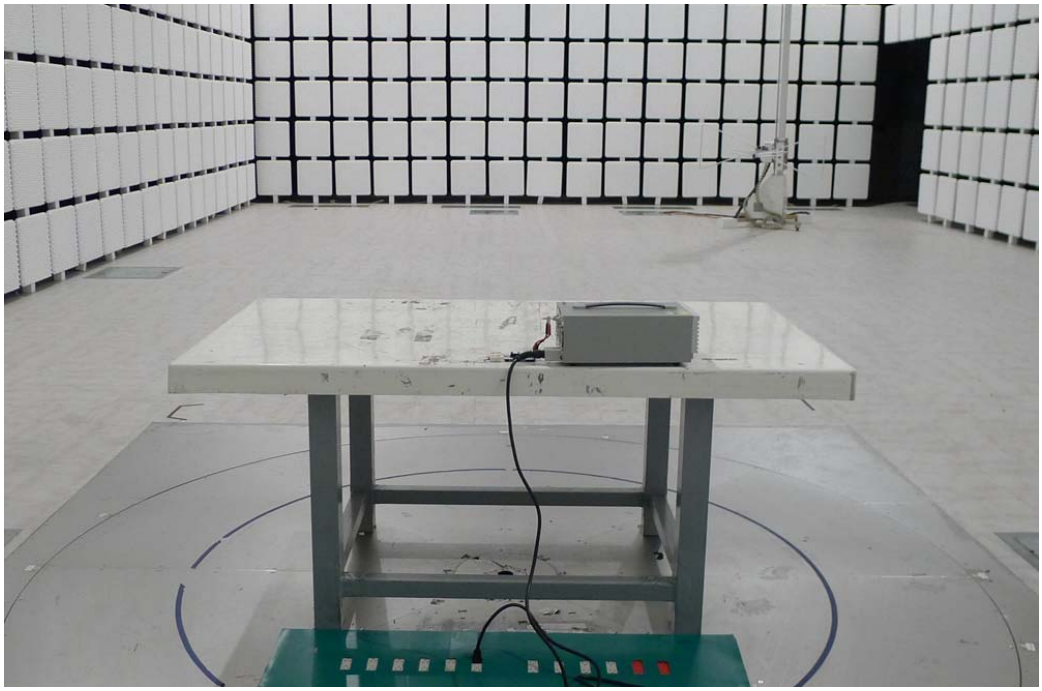
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
BILOG Antenna Distance: 10 meters
Below 1GHz test, if the peak measured value meets the QP limit, it is unnecessary to perform the QP measurement.

4.5 Test Setup Photo

Front View (30MHz~1GHz)



Back View (30MHz~1GHz)



5. Electrostatic discharge (ESD) immunity

5.1 Test Specification and Setup

5.1.1 Test Specification

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

Selected Test Point

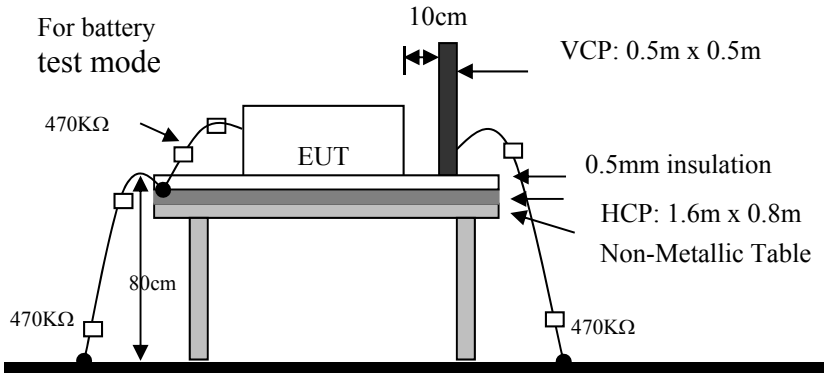
Air: discharges were applied to slots, aperture or insulating surfaces. 10 single air discharges were applied to each selected points.

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.

5.1.2 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.



5.1.3 Test Result

Performance of EUT complies with the given specification.

5.2 Test Data

Date: 02/13/2017	Temperature: 22℃	Engineer: James Kuo
EUT Model Name : THN 15-7212WIRzzzzzzzz	Humidity: 40%	Equipment: NoiseKen(Model: ESS-2002ES)
Power :	Barometer Pressure: 100.1kPa	ESD Site: 1F
Support Unit : DC Source	Voltage/Freq: 110 Vdc	Basic Standard: EN61000-4-2

→ Blue arrow represent Air discharge point
→ Red arrow represent Contact discharge point
ND=No Discharge; meets criteria but unable to obtain an electrostatic discharge (ESD) at this test point.
X=EUT DOES NOT meet the acceptance criteria
A=criteria A, B=criteria B, C=criteria C

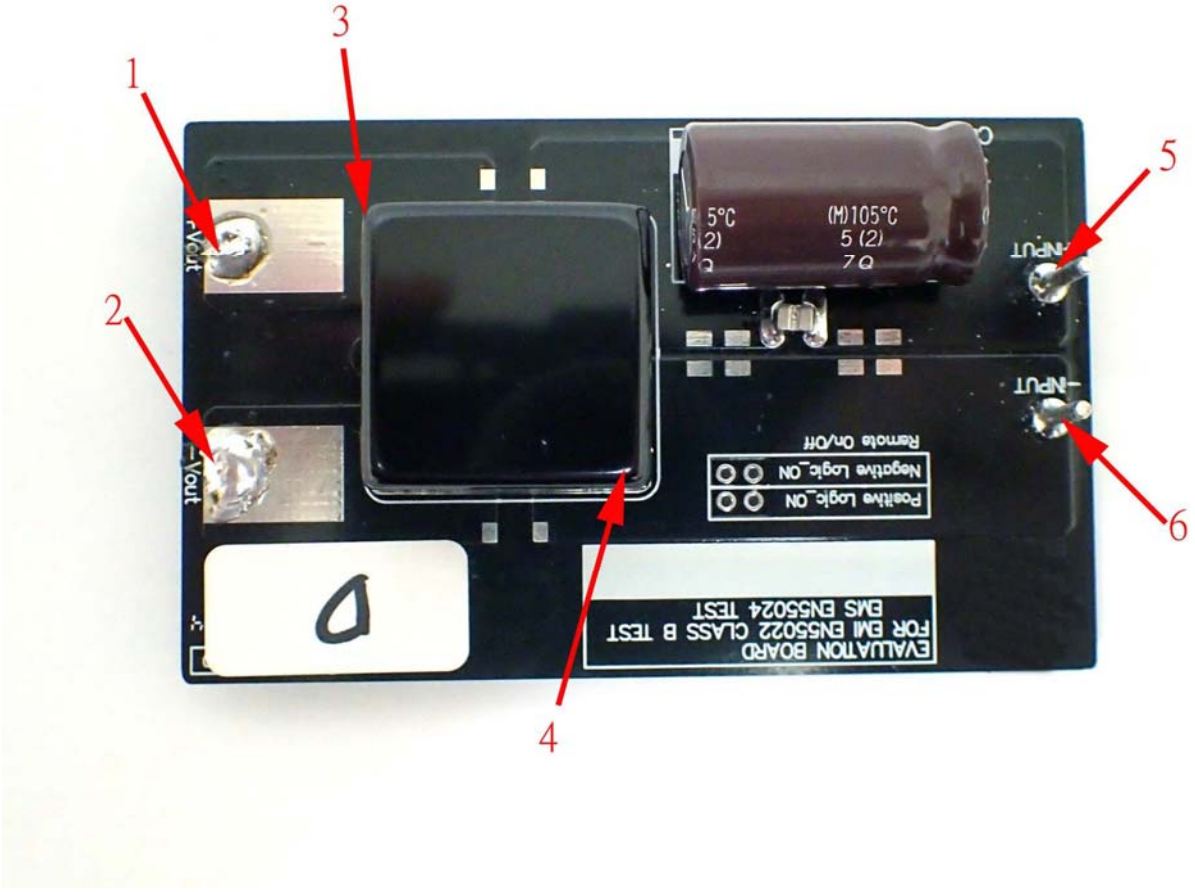
Contact Discharge	Voltage kV Level 25 Discharge @ 1 PPS								
Test Location	+4	-4	+6	-6					Comments
1	A	A	A	A					
2	A	A	A	A					
3	A	A	A	A					
4	A	A	A	A					
5	A	A	A	A					
6	A	A	A	A					
Indirect Contact	Voltage kV Level 25 Discharge @ 1 PPS								
Test Location	+4	-4	+6	-6					Comments
VCP Front	A	A	A	A					
VCP Right	A	A	A	A					
VCP Left	A	A	A	A					
VCP Back	A	A	A	A					
Test Location	+4	-4	+6	-6					Comments
HCP Front	A	A	A	A					
HCP Right	A	A	A	A					
HCP Left	A	A	A	A					
HCP Back	A	A	A	A					

Additional Notes: A=criteria A, B=criteria B, C=criteria C

5.3 Test Point

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

Figure 1: Test Point Assignments Discharge:



5.4 Test Setup Photo

6. Radio-Frequency, Electromagnetic Field immunity

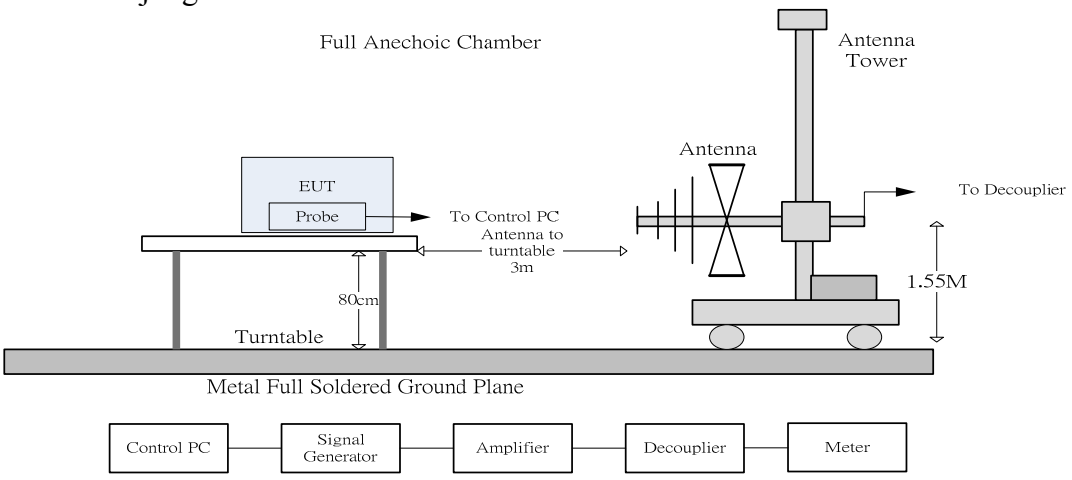
6.1 Test Specification and Setup

6.1.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-3/ IEC 61000-4-3 (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

6.1.2 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.



6.1.3 Test Result

Performance of EUT complies with the given specification.

6.2 Test Data

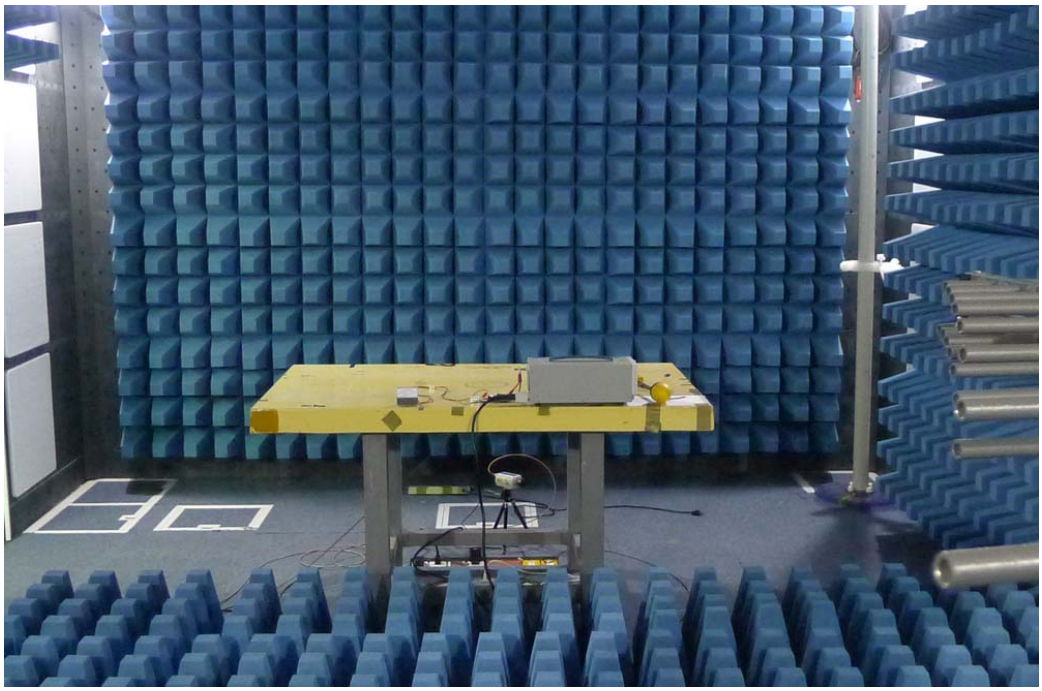
Date : 2017/01/25	Temperature : 24 ℃	Engineer: Hasan Yu
EUT Model Name : THN 15-7212WIRzzzzzzzz	Humidity : 57 %	Test Chamber: Chamber 04
Support Unit : DC Source	Barometer Pressure: 99.5 kPa	Basic Standard: EN61000-4-3
	Voltage/Freq: DC 110V	

A=criteria A, B=criteria B, C=criteria C

EUT Angle	Frequency		Dwell time	Modulation	Level (V/m)	Antenna Polarization	EUT Status	Comments
	Range (MHz)	Steps %						
0° (front)	80-1000	1	3s	80% @ 1kHz	10	Vertical	A	
90° (left)	80-1000	1	3s	80% @ 1kHz	10	Vertical	A	
180° (back)	80-1000	1	3s	80% @ 1kHz	10	Vertical	A	
270° (right)	80-1000	1	3s	80% @ 1kHz	10	Vertical	A	
0° (front)	80-1000	1	3s	80% @ 1kHz	10	Horizontal	A	
90° (left)	80-1000	1	3s	80% @ 1kHz	10	Horizontal	A	
180° (back)	80-1000	1	3s	80% @ 1kHz	10	Horizontal	A	
270° (right)	80-1000	1	3s	80% @ 1kHz	10	Horizontal	A	

Additional Notes: A=criteria A, B=criteria B, C=criteria C

6.3 Test Setup Photo



7. Electrical Fast transients/burst immunity

7.1 Test Specification and Setup

7.1.1 Test Specification

Port:	mains
Basic Standard:	EN 61000-4-4/ IEC 61000-4-4 (details referred to Sec 1.2)
Test Level:	Power Port: +/- 0.5 kV
Rise Time:	5ns
Hold Time:	50ns
Repetition Frequency:	5kHz
Criteria:	B
Test Procedure	refer to ISL QA -T4-E-S9

Test Procedure

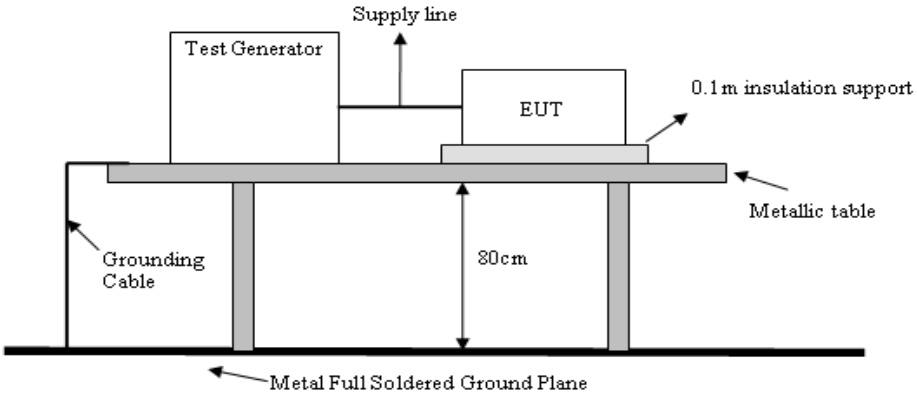
The EUT was setup on a nonconductive table 0.1 m above a reference ground plane.

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

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

7.1.2 Test Setup

EUT is at least 50cm from the conductive structure.



7.1.3 Test Result

Performance of EUT complies with the given specification.

7.2 Test Data

Date : 2017/01/24	Temperature : 24 ℃	Engineer: Hasan Yu
EUT Model Name : THN 15-7212WIRzzzzzzzz	Humidity : 57 %	Equipment: EM TEST (Model: UCS-500 M6B)
Support Unit : DC Source	Barometer Pressure: 99.5 kPa	Basic Standard: EN61000-4-4
	Voltage/Freq: DC 110V	

A=criteria A, B=criteria B, C=criteria C

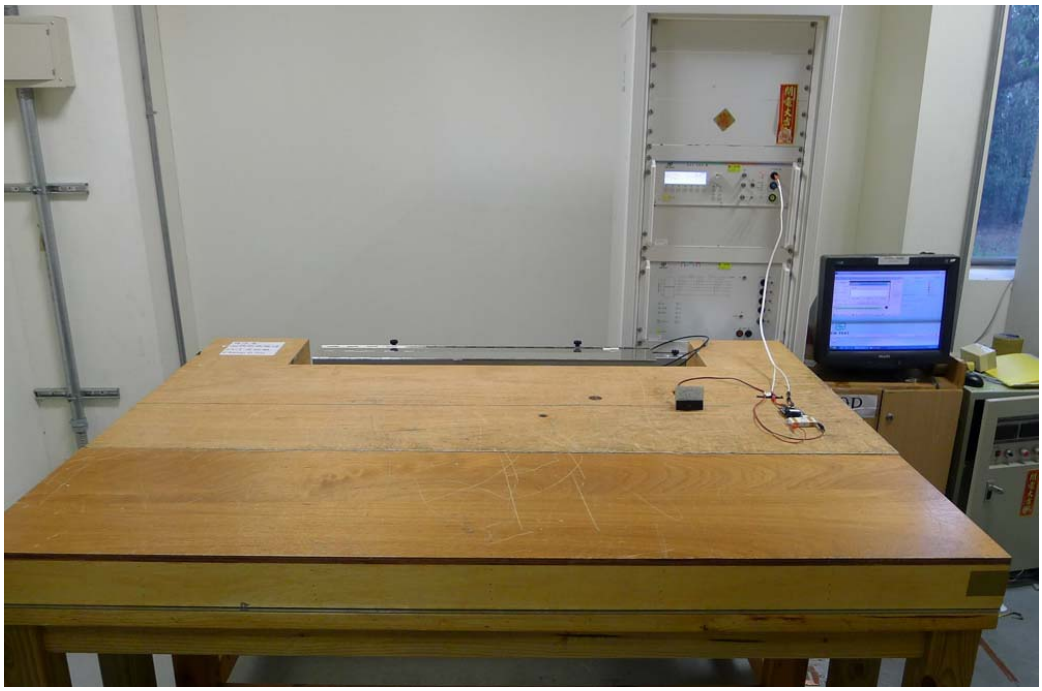
Power Port: ☑	Signal Port: Telephone Port: ☐ LAN Port: ☐

Power Port

Line Under Test	Voltage Level	Severity Level	Pulse Polarity	Burst Repetition Rate	Test Duration	EUT Status	Comments
Line	2.0kV	3	+	5/50(Tr/Th)/5.0kHz	1 Minutes	A	
Line	2.0kV	3	-	5/50(Tr/Th)/5.0kHz	1 Minutes	A	
Neutral	2.0kV	3	+	5/50(Tr/Th)/5.0kHz	1 Minutes	A	
Neutral	2.0kV	3	-	5/50(Tr/Th)/5.0kHz	1 Minutes	A	
Line/Neutral	2.0kV	3	+	5/50(Tr/Th)/5.0kHz	1 Minutes	A	
Line/Neutral	2.0kV	3	-	5/50(Tr/Th)/5.0kHz	1 Minutes	A	

Additional Notes: A=criteria A, B=criteria B, C=criteria C

7.3 Test Setup Photo



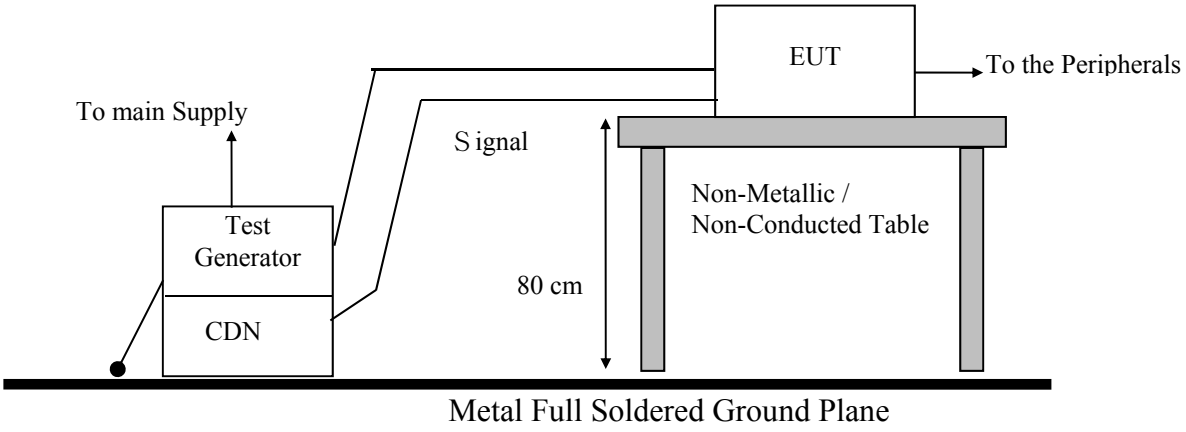
8. Surge Immunity

8.1 Test Specification and Setup

8.1.1 Test Specification

Port:	mains
Basic Standard:	EN 61000-4-5/ IEC 61000-4-5 (details referred to Sec 1.2)
Test Level:	Line to Ground: +/- 0.5 kV
Rise Time:	1.2us
Hold Time:	50us
Repetition Rate:	30 seconds
Angle:	NA
Criteria:	B
Test Procedure:	refer to ISL QA -T4-E-S10

8.1.2 Test Setup



8.1.3 Test Result

Performance of EUT complies with the given specification.

8.2 Test Data

Date : 2017/01/23	Temperature : 24 ℃	Engineer :Hasan Yu
EUT Model Name : THN 15-7212WIRzzzzzzzz	Humidity : 57 %	Equipment: EMC PARINER (Model:IMU-3000)
Support Unit : DC Source	Barometer Pressure: 99.5 kPa	Basic Standard: EN61000-4-5
	Voltage/Freq: DC 110V	
A=criteria A, B=criteria B, C=criteria C		
Power Port: ☑	Telephone Port: ☐	LAN Port: ☐

Power Port

Line Under Test	Voltage	Level	Impedance	Repetition Rate	Cycle	Pulse Position	EUT Status	Comments
Line-Neutral	＋0.5kV	1	2Ω	60 sec	5		A	
Line-Neutral	－0.5kV	1	2Ω	60 sec	5		A	
Line-Neutral	＋1.0kV	2	2Ω	60 sec	5		A	
Line-Neutral	－1.0kV	2	2Ω	60 sec	5		A	
Line-Neutral	＋2.0kV	3	2Ω	60 sec	5		A	Customer requirement
Line-Neutral	－2.0kV	3	2Ω	60 sec	5		A	Customer requirement

Additional Notes: A=criteria A, B=criteria B, C=criteria C

8.3 Test Setup Photo

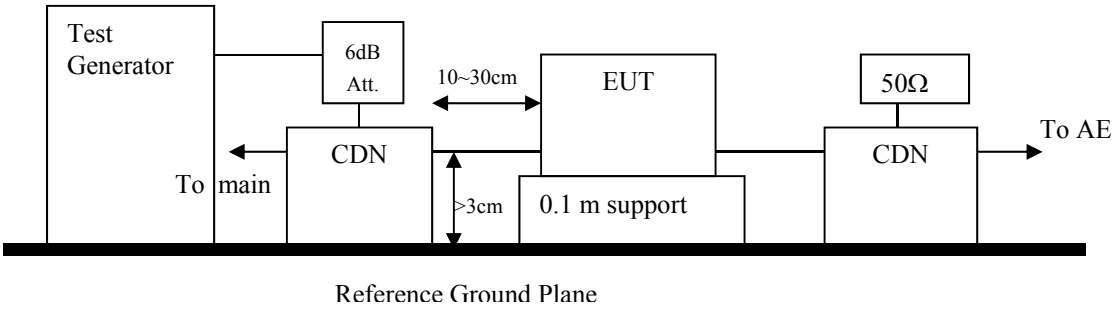
9. Immunity to Conductive Disturbance

9.1 Test Specification and Setup

9.1.1 Test Specification

Port:	Power mains
Basic Standard:	EN 61000-4-6/ IEC 61000-4-6 (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

9.1.2 Test Setup



9.1.3 Test Result

Performance of EUT complies with the given specification.

9.2 Test Data

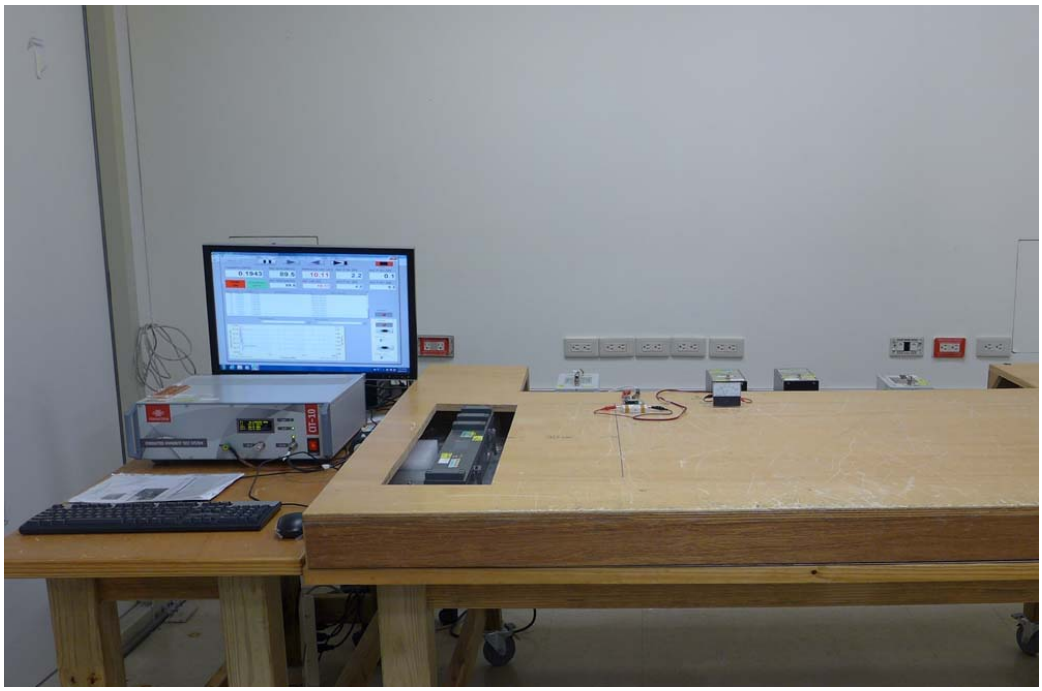
Date : 2017/01/23	Temperature : 24 ℃	Engineer : Hasan Yu
EUT Model Name : THN 15-7212WIRzzzzzzzz	Humidity : 57 %	Equipment: Frankonia (CIT-10/75)
Support Unit : DC Source	Barometer Pressure: 99.5 kPa	Basic Standard: EN61000-4-6
	Voltage/Freq: DC 110V	

A=criteria A, B=criteria B, C=criteria C

Line Under Test	Frequency		Level	Modulation	Dwell time	EUT Status	Comments
	Range(MHz)	Steps %					
Power Port	0.15-80	1	10V	80% @ 1kHz	3s	A	

Additional Notes: A=criteria A, B=criteria B, C=criteria C

9.3 Test Setup Photo



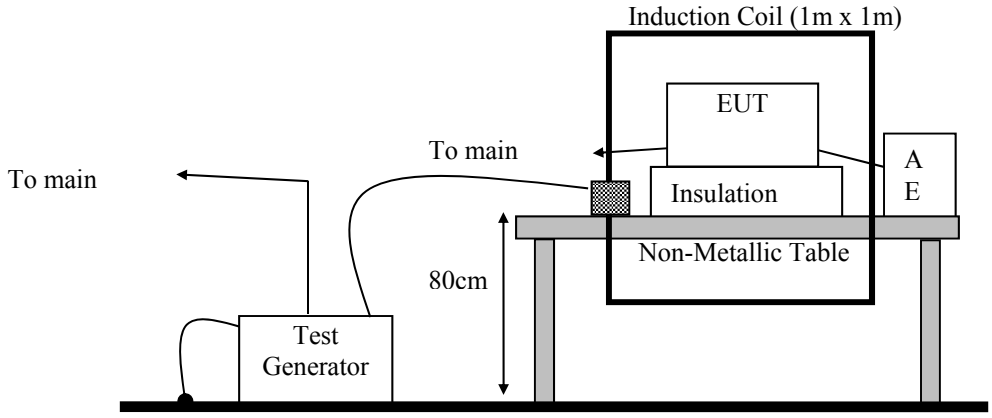
10. Power Frequency Magnetic Field immunity

10.1 Test Specification and Setup

10.1.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-8/ IEC 61000-4-8 (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

10.1.2 Test Setup



10.1.3 Test Result

Performance of EUT complies with the given specification.

10.2 Test Data

Date : 2017/01/24	Temperature : 24 ℃	Engineer: Hasan Yu
EUT Model Name : THN 15-7212WIRzzzzzzzz	Humidity : 57 %	Equipment: AC Power Source : Pic Model: AC Power Source Immunity Loop: Pic Model:PMF1000
Support Unit : DC Source	Barometer Pressure: 99.5 kPa	Basic Standard: EN61000-4-8
	Voltage/Freq: DC 110V	

Test Mode: 1A/m

Antenna Polarization	Frequency Hz	Test Level (A/m)	Test Duration	EUT Status	Comments
X	50	1	1 Minutes	A	
Y	50	1	1 Minutes	A	
Z	50	1	1 Minutes	A	

Test Mode: 100A/m

Antenna Polarization	Frequency Hz	Test Level (A/m)	Test Duration	EUT Status	Comments
X	50	100	1 Minutes	A	Customer requirement
Y	50	100	1 Minutes	A	Customer requirement
Z	50	100	1 Minutes	A	Customer requirement

Test Mode: 1000A/m

A=criteria A, B=criteria B, C=criteria C

Antenna Polarization	Frequency Hz	Test Level (A/m)	Test Duration	EUT Status	Comments
X	50	1000	1 Second	A	Customer requirement
Y	50	1000	1 Second	A	Customer requirement
Z	50	1000	1 Second	A	

Additional Notes: A=criteria A, B=criteria B, C=criteria C

10.3 Test Setup Photo

11. Appendix

11.1 Appendix A: Test Equipment

11.1.1 Test Equipment List

Location Con03	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 03	EMI Receiver 11	ROHDE & SCHWARZ	ESCI	100568	06/13/2016	06/13/2017
Conduction 03	LISN 19	R&S	ENV216	101425	03/11/2016	03/11/2017
Conduction 03	LISN 08	FCC	FCC-LISN-50/250-25-2-01	07039	06/28/2016	06/28/2017
Conduction 03	Conduction 03 -1 Cable	WOKEN	CFD 300-NL	Conduction 03 -1	08/29/2016	08/29/2017

Location Chamber02	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation (Chamber02)	BILOG Antenna 17	Schwarzbeck	Schwarzbeck VULB 9168+EMCI-N-6-05	645	01/11/2017	01/11/2018
Radiation (Chamber02)	Preamplifier 25	EMCI	EMC9135	980295	01/11/2017	01/11/2018
Radiation (Chamber02)	Coaxial Cable Chmb 02-10M-02	MIYAZAK	8D-FB	Chmb 02-10M-02	08/29//2016	08/29/2017
Radiation (Chamber02)	EMI Receiver 12	ROHDE & SCHWARZ	ESCI	100804	08/19/2016	08/19/2017

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
EN61K-4-2	ESD Gun 06	EM TEST	Dito	V0729102699	07/05/2016	07/05/2017
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 80M~1GHz	Amplifier Research	DC6180A	0341805	N/A	N/A
EN61K-4-3	Coaxial Cable	INSULATED	NPS-4806-2360-NP3	108599.003.01.03	N/A	N/A
EN61K-4-3	Broadband Coupler 0.8G~4.26GHz	AR	DC7144A	0335226	N/A	N/A
EN61K-4-3	Broadband Coupler 4G~8GHz	AR	DC7350A	0335817	N/A	N/A
EN61K-4-3	Signal Generator 07	ROHDE& SCHWARZ	SMB100A	107780	10/05/2016	10/05/2017
EN61K-4-4	EFT and SURGE Test System	EM TEST	UCS-500 M6B	V0728102674	01/12/2017	01/12/2018
EN61K-4-4	Capacitive Coupling Clamp	EM TEST	HFK	0907-106	01/12/2017	01/12/2018
EN61K-4-5	CDN-UTP8	EMC-PARTNER	CDN-UTP8	017	03/10/2016	03/10/2017
EN61K-4-5	SURGE-TESTER	EMC Partner	MIG0603IN3	523	03/10/2016	03/10/2017
EN61K-4-6	CDN M2+M3 02	Frankonia	CDN M2+M3	A3011024	09/14/2015	09/14/2017
EN61K-4-6	CDN T2 04	FCC Inc.	FCC-801-T2	02067	08/16/2016	08/16/2017
EN61K-4-6	CDN T4 06	FCC Inc.	FCC-801-T4	02017	08/04/2016	08/04/2017
EN61K-4-6	CDN T8-10_1	Teseq GmbH	CDN T8 10	41242	02/23/2016	02/23/2017
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-DC	126B1301/2014	02/23/2016	02/23/2017
EN61K-4-6	EM-Clamp	Schaffner	KEMZ-801	19215	10/11/2016	10/11/2017
EN61K-4-8	Magnetic Field Immunity Loop	FCC	F-1000-4-8-L-1M	01037	05/17/2016	05/17/2017
EN61K-4-8	Magnetic Field Test Generator	FCC	F-1000-4-8-G-125A	01038	05/17/2016	05/17/2017

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

1.1.1 Software for Controlling Spectrum/Receiver and Calculating Test Data

Test Item	Filename	Version
EN61000-3-2	California Instruments	CTSMXL V2.13.1
EN61000-3-3	California Instruments	CTSMXL V2.13.1
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	FRANKONIA CD-LAB	V5.221

11.2 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 03>
AMN: ±2.88dB

<Chamber 02 (10M)>
Horizontal
30MHz~200MHz: ±4.38dB
200MHz~1000MHz: ±4.12dB
Vertical
30MHz~200MHz: ±4.57dB
200MHz~1000MHz: ±4.10dB

<Immunity 02>

Test item	Uncertainty	Test item	Uncertainty
EN 61000-4-2 (ESD)		EN 61000-4-6 (CS)	
Rise time tr	≦ 15%	CDN	± 1.36dB
Peak current Ip	≦ 6.3%	EM Clamp	± 3.19dB
current at 30 ns	≦ 6.3%	EN 61000-4-8 (Magnetic)	± 5.59%
current at 60 ns	≦ 6.3%		
EN 61000-4-3 (RS)	± 2.19dB		
EN 61000-4-4 (EFT)			
voltage rise time (tr)	± 6.2%		
peak voltage value (VP)	± 8.6%		
voltage pulse width (tw)	± 5.9%		
EN 61000-4-5 (Surge)			
Time	± 3.9%		
Voltage	± 3.9%		
Current	± 2.7%		

11.3 Appendix C: Photographs of EUT

Please refer to the File of **ISL-*17LE068*P-MA**