

Verification

Issue Date: July 6, 2017
Ref. Report No. ISL-17LE068CE50155-MA

Product Name : DC/DC converter
Model(s) : 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 15-7212WIRzzzzzzzz; THN 15-7213WIRzzzzzzzz;
THN 15-7215WIRzzzzzzzz; THN 15-7221WIRzzzzzzzz;
THN 15-7222WIRzzzzzzzz; THN 15-7223WIRzzzzzzzz;
THN 15-7225WIRzzzzzzzz;
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

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. The device was passed the test performed according to :

Standards:

EN 50155:2007+AC:2012 for EMC, Environmental and Characteristic
EN 50121-3-2:2006 for EMC
EN 60068-2-1:2007 for Environmental
EN 60068-2-2:2007 for Environmental
EN 60068-2-30:2005 for Environmental
EN 61373:2010 for Environmental

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 Chen
Bert Chang / Director

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TEST REPORT

of

EN 50155

(EMC, Characteristic, Environmental...Test)

Product : **DC/DC converter**

Model(s): **THN 15-7212WIRZZZZZZZZ**
(more serial models listed on 1.3 of this test report)



Brand:

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-17LE068CE50155-MA**

Issue Date : **July 6, 2017**

This report totally contains 79 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.

This test report shall not be reproduced except in full, without the written approval of International Standards Laboratory.

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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 on 1.3 of this test report)

Brand: 

Applicant: TRACO ELECTRONIC AG

Sample received Date: January 13, 2017

Final test Date: Refer to the date of test data

Test Site: International Standards Laboratory

Test Distance: 10M

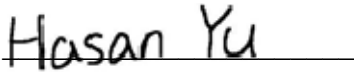
Temperature: Refer to each site test data


Humidity: Refer to each site test data

Input power: Conduction input power: DC 110 V
Radiation input power: DC 110 V

Test Result: PASS

Report Engineer: Cheryl Tung

Test Engineer: 
Hasan Yu

Approved By: 
Angus Chu / Director

1.2 Test Standards

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

- ☒ EN 50155: 2007+AC:2012 for EMC, Environmental and Characteristic
 - ☒ EN 50121-3-2: 2006 for EMC
 - ☒ EN 60068-2-1: 2007 for Environmental
 - ☒ EN 60068-2-2: 2007 for Environmental
 - ☒ EN 60068-2-30: 2005 for Environmental
 - ☒ EN 61373: 2010 for Environmental

Characteristic Test					
Report Clause	Performed Item	EN 50155 Reference Clause(s)	Reference Standard	Result	Location of Test
2.1	Visual Inspection	12.2.1	-	PASS	ISL LAB
2.2	Performance (Supply Variations)	12.2.2 5.1.1.1	-	PASS	ISL LAB
2.3	Performance (Supply Interruption)	12.2.2 5.1.1.2 5.1.3	-	PASS	ISL LAB
2.4	Performance (Supply Change Over)	12.2.2 5.1.3	-	PASS	ISL LAB
2.5	Insulation Test	12.2.9	-	PASS	ISL LAB
2.6	Supply Overvoltages	12.2.6	-	PASS	ISL LAB

Electromagnetic Compatibility (EMC)					
Report Clause	Performed Item	EN 50155 Reference Clause(s)	Reference Standard	Result	Location of Test
3.1	Surges Test	12.2.7.1	EN 50121-3-2 EN 61000-4-5	PASS	ISL LAB
3.2	Electrostatic Discharge Test	12.2.7.2	EN 50121-3-2 EN 61000-4-2	PASS	ISL LAB
3.3	Transient Burst Susceptibility Test	12.2.7.3	EN 50121-3-2 EN 61000-4-4	PASS	ISL LAB
3.4	Radio- Frequency, Electromagnetic Field Immunity Test	12.2.8.1	EN 50121-3-2 EN 61000-4-3	PASS	ISL LAB
3.5	Radio- Frequency, Conducted Disturbances Immunity Test	12.2.8.1	EN 50121-3-2 EN 61000-4-6	PASS	ISL LAB
3.6	Power Line Conducted Emission Measurement	12.2.8.2	EN 50121-3-2 EN 55011	PASS	ISL LAB
3.7	Radiated Emission Measurement	12.2.8.2	EN 50121-3-2 EN 55011	PASS	ISL LAB

Environmental Tests					
Report Clause	Performed Item	EN 50155 Reference Clause(s)	Reference Standard	Result	Location of Test
4.1	Cooling Test	12.2.3	EN 60068-2-1	PASS	ISL LAB
4.2	Dry Heat Test	12.2.4	EN 60068-2-2	PASS	ISL LAB
4.3	Damp Heat Test	12.2.5	EN 60068-2-30	PASS	ISL LAB
4.4	Random Vibration Test	12.2.11	EN 61373	PASS	GTTI LAB
4.5	Increased Random Vibration Test	12.2.11	EN 61373	PASS	GTTI LAB
4.6	Shock Test	12.2.11	EN 61373	PASS	GTTI LAB

1.2.1 Performance Criteria for Compliance: EN 50121-1

Performance criterion A: The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. 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, either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

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

1.3 Model Number Definition

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

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 15-7212WIRzzzzzzzz;
THN 15-7213WIRzzzzzzzz; THN 15-7215WIRzzzzzzzz; THN 15-7221WIRzzzzzzzz;
THN 15-7222WIRzzzzzzzz; THN 15-7223WIRzzzzzzzz; THN 15-7225WIRzzzzzzzz;

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 on 1.3 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 15-7212WIRzzzzzzzz	110VDC	12VDC	9.6Ω	EUT-1~2

Test configuration:

Configuration	Model Name	Input	Output	load
1	THN 15-7212WIRzzzzzzzz	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. Characteristic Test

2.1 Visual Inspection

2.1.1 Inspection Requirement:

The visual inspection shall be carried out to ensure that the equipment construction meets its specified requirements.

Test Procedures

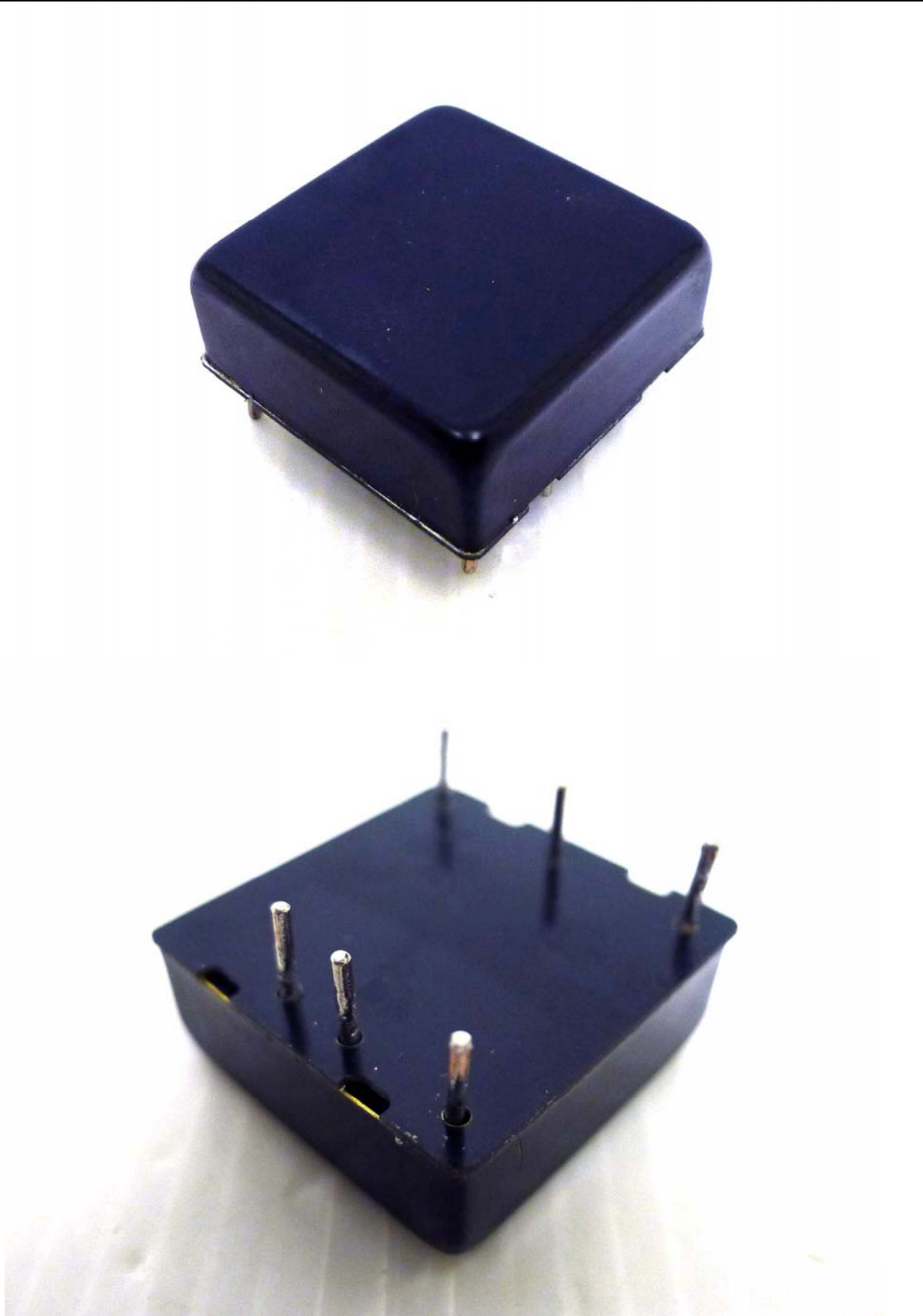
Test Procedures were referred to EN 50155 sub-clause 12.2.1

2.1.2 Inspection Result

Date : 2017/01/17	Temperature : 20 °C	Engineer : Hasan Yu
EUT Model Name : THN 15-7212WIRZZZZZZZ	Humidity : 51.6 %	Barometer Pressure: 99.8 kPa
		Standard: EN 50155 12.2.1
Voltage/Freq: 110Vdc/ 0Hz		
Visual inspection requirement(12.2.1):		
The visual inspection shall be carried out to ensure that the equipment is of sound construction and, so far as can be ascertained, meets its specified requirements. A visual inspection shall also be carried out after a type test has been performed to check whether any damage or deterioration has occurred resulting from the tests.		

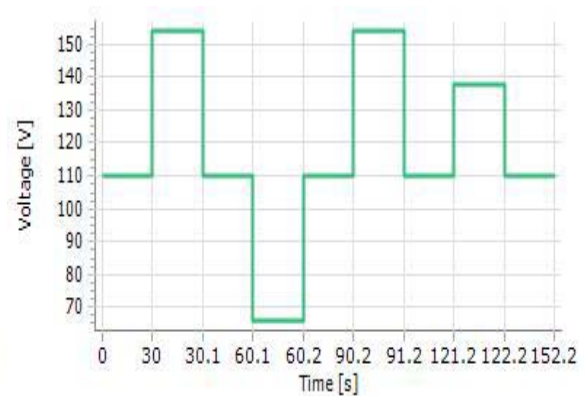
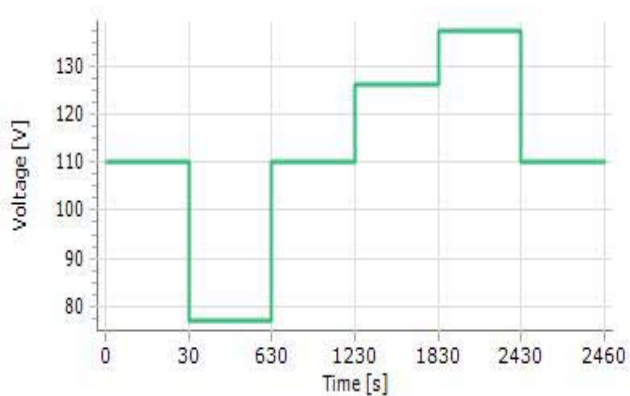
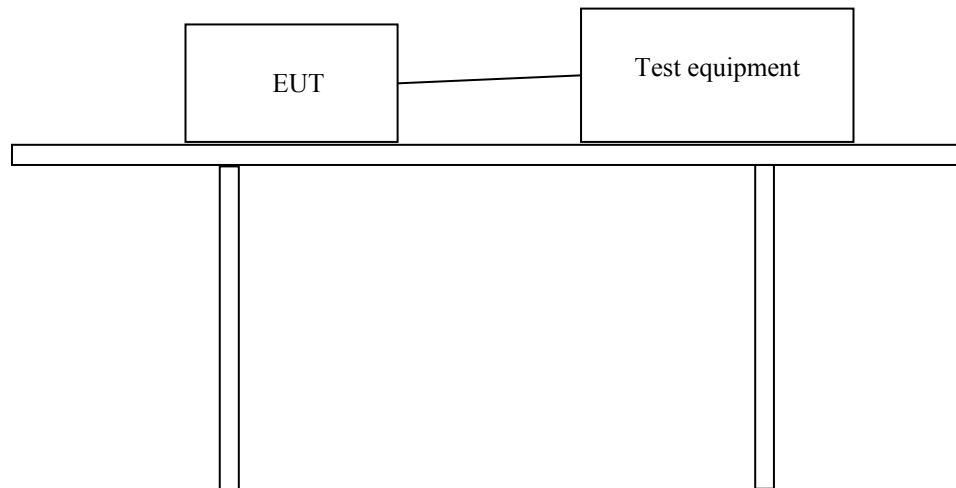
Inspection item	Result
EUT outside	OK
Ground point	N/A
EUT function	OK

Before test



2.2 Performance (Supply Variations)

2.2.1 Test Setup



2.2.2 Test Procedure

Test Procedures were referred to EN 50155 sub-clause 12.2.2 & 5.1.1.1

2.2.3 Test Requirement

☒ D.C. supplied equipment:

Test performed to prove correct functioning at nominal supply voltage and at the upper and lower limits of specified voltage as defined below.

Minimum voltage: $0.7 U_n$

Nominal voltage: U_n

Rated voltage: $1.15 U_n$

Maximum voltage: $1.25 U_n$

Voltage fluctuations (e.g. during start-up of auxiliary equipment or voltage oscillations of battery chargers) lying between $0.6 U_n$ and $1.4 U_n$ and not exceeding 0.1 s shall not cause deviation of function.

Voltage fluctuations lying between $1.25 U_n$ and $1.4 U_n$ and not exceeding 1 s shall not cause damage: equipment may not be fully functioning during these fluctuations.

☐ A.C. supplied equipment:

Test performed to prove correct functioning at:

Nominal voltage and frequency;

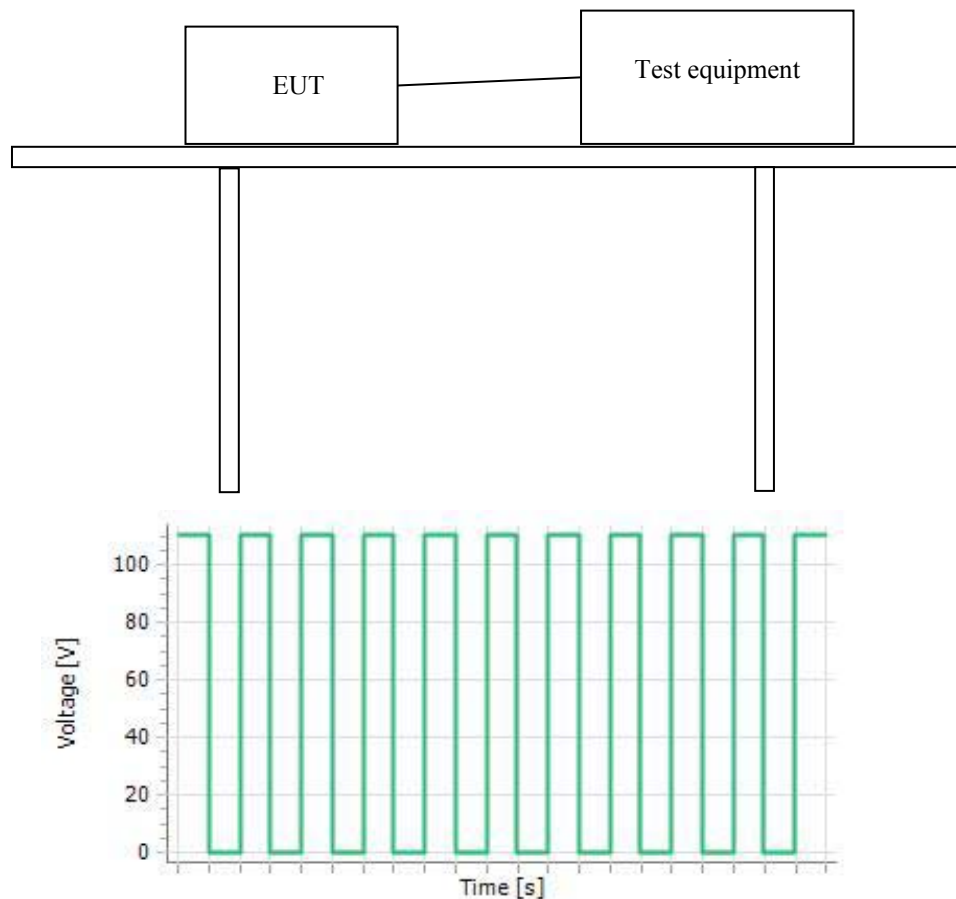
The upper and lower limits of voltage and frequency in all combinations.

2.2.4 Test Result

Date : 2017/01/20		Temperature : 24 °C		Engineer : Hasan Yu	
EUT Model Name : THN 15-7212WIRzzzzzzzz		Humidity : 57 %		Barometer Pressure: 99.5 kPa	
Test mode: Full load				Standard: EN 50155 12.2.2	
Voltage/Freq: 110Vdc/ 0Hz					
Variations of Voltage supply	Level	Voltage	Test Time	EUT Status	Comments
Minimum voltage	0.7 Un	77Vdc	10 min	Pass	
Nominal voltage	Un	110Vdc	10 min	Pass	
Rated voltage	1.15 Un	126.5Vdc	10 min	Pass	
Maximum voltage	1.25 Un	137.5Vdc	10 min	Pass	
Voltage fluctuations	Level	Voltage	Test Time	EUT Status	Comments
High voltage	1.4 Un	154Vdc	0.1 s	Pass	
Low voltage	0.6 Un	66Vdc	0.1 s	Pass	
High voltage	1.4 Un	154Vdc	1 s	Pass	
High voltage	1.25 Un	137.5Vdc	1 s	Pass	

2.3 Performance (Supply Interruption)

2.3.1 Test Setup



2.3.2 Test Procedure

Test Procedures were referred to EN 50155 sub-clause 12.2.2 & 5.1.1.2

2.3.3 Test Requirement

Interruptions of input voltage as defined below:

- Class S1: no interruptions
- Class S2: 10 ms interruptions

Test acceptance requirements:

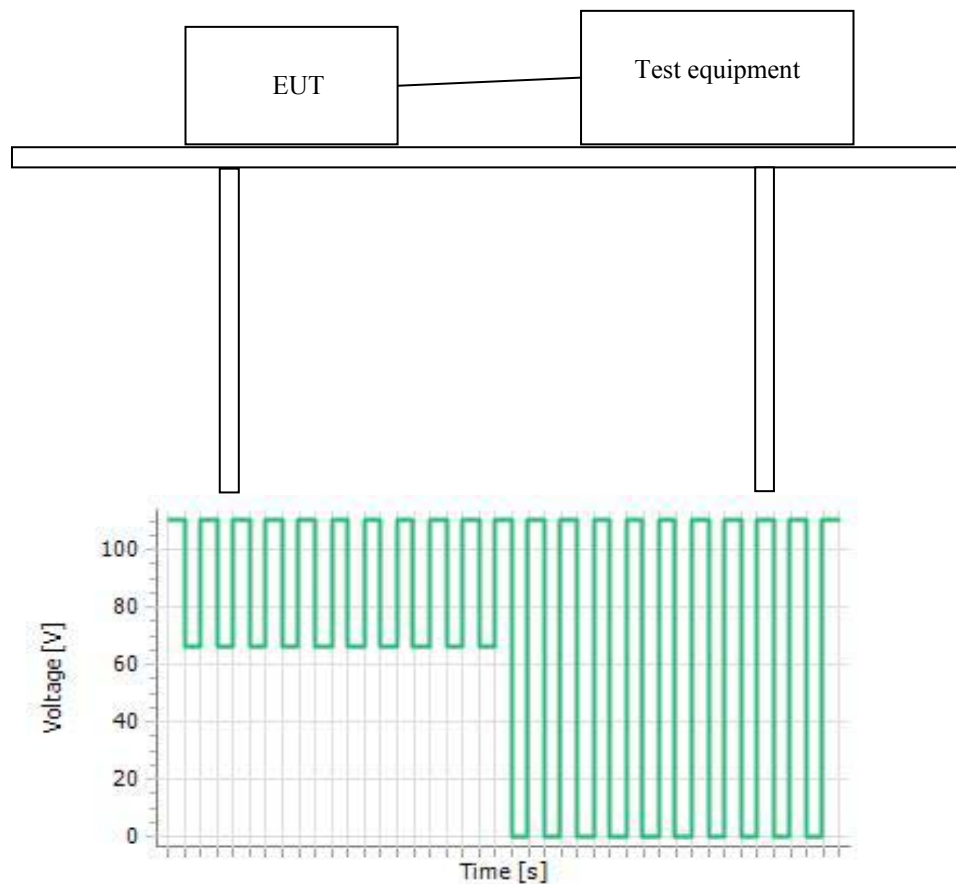
The equipment continues to function and indicate correctly without intervention or need for resetting by the operator.

2.3.4 Test Result

Date : 2017/01/20		Temperature : 24 °C		Engineer : Hasan Yu	
EUT Model Name : THN 15-7212WIRZZZZZZZZ		Humidity : 57 %		Barometer Pressure: 99.5 kPa	
Test mode: Full load				Standard: EN 50155 12.2.2	
Voltage/Freq: 110Vdc/ 0Hz					
Interruptions of voltage supply	Level	Voltage	INT time	EUT Status	Comments
Class S1:Voltage interruptions	Un	110Vdc	0 s	Pass	
Class S2:Voltage interruptions	0 Un	0Vdc	10ms	Pass	Note
Note: Manufacturers in this test plus a 56uF capacitor					

2.4 Performance (Supply Change Over)

2.4.1 Test Setup



2.4.2 Test Procedure

Test Procedures were referred to EN 50155 sub-clause 12.2.2 & 5.1.3

2.4.3 Test Requirement

- Class C1 at 0.6 U_n during 100ms (without interruptions)
 - Class C2 during a supply break of 30ms
- Test acceptance requirements:
The equipment continues to function and indicate correctly without intervention or need for resetting by the operator.

2.4.4 Test Result

Date : 2017/01/20		Temperature : 24 °C		Engineer : Hasan Yu	
EUT Model Name : THN 15-7212WIRZZZZZZZZ		Humidity : 57 %		Barometer Pressure: 99.5 kPa	
Test mode: Full load				Standard: EN 50155 12.2.2	
Voltage/Freq: 110Vdc/ 0Hz					
Supply change over	Level	Voltage	INT time	EUT Status	Comments
Class C1:60% residual voltage	0.6 Un	66Vdc	100ms	Pass	
Class C2:0% residual voltage	0 Un	0Vdc	30ms	Pass	Note
Note: Manufacturers in this test plus a 150uF capacitor					

2.5 Insulation Test

2.5.1 Test Procedure

Test Procedures were referred to EN 50155 sub-clause 12.2.9

2.5.2 Test Requirement

(1) Insulation measurement Test: 500VDC

The insulation resistance test carried out at 500 VDC and the values recorded.

The test repeated after the voltage withstand test.

Test acceptance requirements:

There shall be no fundamental deterioration from the initial measurement.

(2) Voltage withstand test:

500 VAC or 700 VDC for nominal battery voltages below 72 V (or 50 VAC)

1000 VAC or 1400 VDC for nominal battery voltages from 72 V up to 125 V, (or from 50 to 90 VAC), and

1500 VAC or 2100 VDC for nominal battery voltages above 125 V and up to 315 V, (or from 90 to 225 VAC)

Test acceptance requirements:

Neither disruptive discharge nor flashover shall occur.

2.5.3 Test Result

Date : 2017/01/19	Temperature : 20 °C	Engineer : Jimmy Wen
EUT Model Name : THN 15-7212WIRZZZZZZZZ	Humidity : 63 %	Equipment: KIMO, 9056
	Barometer Pressure: 99.2 kPa	Standard: EN 50155 12.2.9

Insulation Test Requirement (12.2.9):				
1.Insulation measurement Test :				
The insulation resistance test shall be carried out at 500 Vdc and the values recorded. The test shall then be repeated after the voltage withstand test. There shall be no fundamental deterioration from the initial measurement.				
Test item	Test Time	Insulation measurement test		Comments
		before withstand	after withstand	
Input to Output	1 min	>50GΩ	>50GΩ	

2.Voltage Withstand test				
500Vac or 700Vdc for nominal battery voltages below 72 Vdc (or 50 Vac). 1000Vac or 1400Vdc for nominal battery voltage from 72Vdc up to 125Vdc, (or from 50 to 90 Vac), and 1500Vac or 2100Vdc for nominal battery voltage above 125Vdc and up to 315Vdc, (or from 90 to 225 Vac). Neither disruptive discharge nor flashover shall occur				
Test item	Test Voltage	Test Time	Result	Comments
Input to Output	1400Vdc	1 min	0.00mA	
Input to Output	3000Vdc	1 min	0.00mA	Customer requirement

2.6 Supply Overvoltages

2.6.1 Test Procedure

Test Procedures were referred to EN 50155 sub-clause 12.2.6

2.6.2 Test Requirement

☒ D.C. supplied equipment:

Voltage Level min.	Duration d max.	Duration D max.	Series Resistor (Tol. $\pm 10\%$)
1.4 Un	0.1 s	1.0 s	1 Ω

Test acceptance requirements: No failure shall occur

☐ A.C. supplied equipment:

Voltage Level min.	Duration D min.	Series Resistor ^a (Tol. $\pm 10\%$)
1.4 Un	1.0 s	1 Ω

^a Inclusive of power supply impedance.

Test acceptance requirements: No failure shall occur

2.6.3 Test Result

Date : 2017/01/25		Temperature : 24 °C		Engineer : Hasan Yu	
EUT Model Name : THN 15-7212WIRzzzzzzzz		Humidity : 57 %		Barometer Pressure: 99.5 kPa	
Test mode: Full Load				Standard: EN 50155 12.2.6	
Voltage/Freq: 110Vdc/ 0Hz					
Test item	Level	Voltage	Test Time	EUT Status	Comments
140% Voltage	1.4 Un	154Vdc	1 s	Pass	

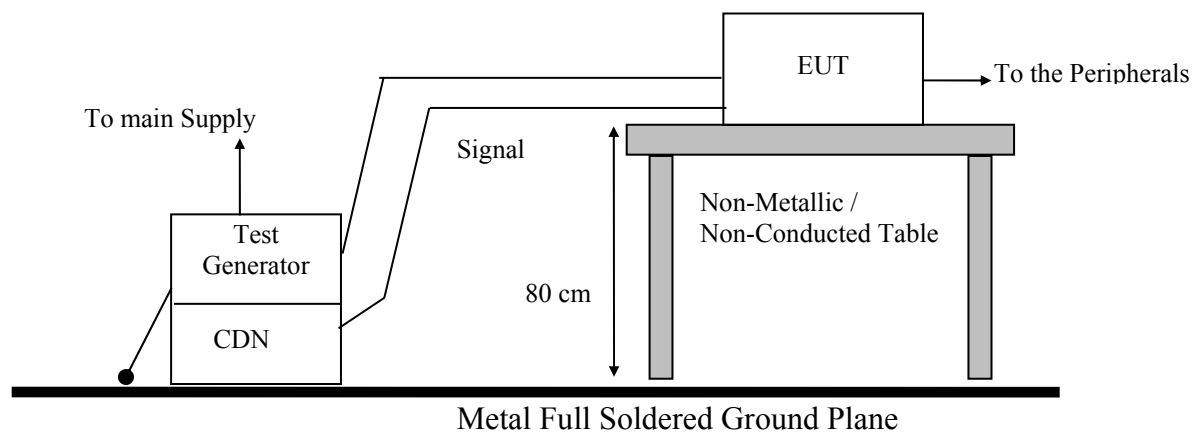
3. Electromagnetic Compatibility (EMC)

3.1 Surges Test

3.1.1 Test Specification

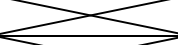
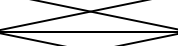


Port:	Power mains
Basic Standard:	EN 61000-4-5/ IEC 61000-4-5 (details referred to Sec 1.2)
Test Level:	<input type="checkbox"/> AC mains: Line to Line: +/- 0.5 kV, +/- 1 kV Line to Earth: +/- 0.5 kV, +/- 1 kV, +/- 2kV <input checked="" type="checkbox"/> DC mains: Line to Line: +/- 0.5 kV, +/- 1 kV Line to Earth: +/- 0.5 kV, +/- 1 kV, +/- 2kV
Rise Time:	1.2us
Hold Time:	50us
Impedance	$42\Omega + 0.5\mu F$
Repetition Rate:	60 seconds
Angle:	N/A
Criteria:	B
Test Procedure:	refer to ISL QA -T4-E-S10

3.1.2 Test Setup

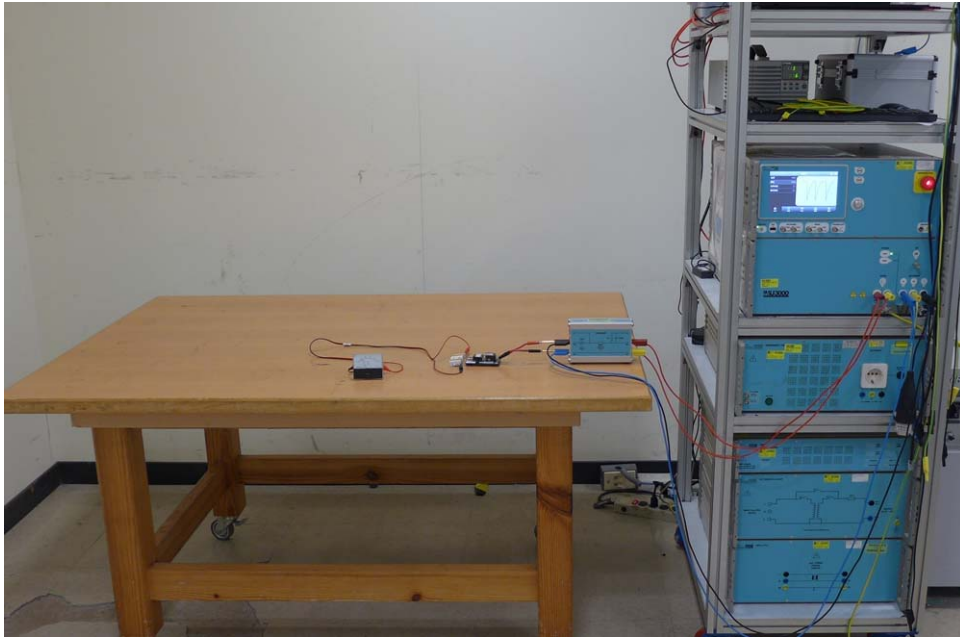


Criteria: B

3.1.3 Test Result

Date : 2017/01/23		Temperature : 24 °C		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: <input checked="" type="checkbox"/>		Telephone Port: <input type="checkbox"/>			LAN Port: <input type="checkbox"/>			
Power Port								
Line Under Test	Voltage	Level	Impedance	Repetition Rate	Cycle	Pulse Position	EUT Status	Comments
Line-Neutral	+0.5kV	1	42Ω	60 sec	5		A	
Line-Neutral	-0.5kV	1	42Ω	60 sec	5		A	
Line- Neutral	+1.0kV	2	42Ω	60 sec	5		A	
Line- Neutral	-1.0kV	2	42Ω	60 sec	5		A	
Additional Notes: A=criteria A, B=criteria B, C=criteria C								

3.1.4 Test Setup Photo



3.2 Electrostatic Discharge Test

3.2.1 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, +/- 6 kV
Criteria:	B
Test Procedure	refer to ISL QA -T4-E-S7

Selected Test Point

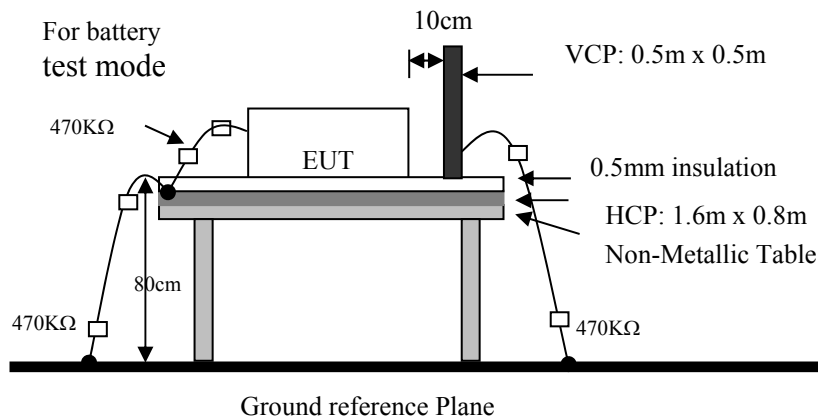
Air: discharges were applied to slots, aperture or insulating surfaces. 10 single air discharges were applied to each selected points.

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.

3.2.2 Test Setup

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

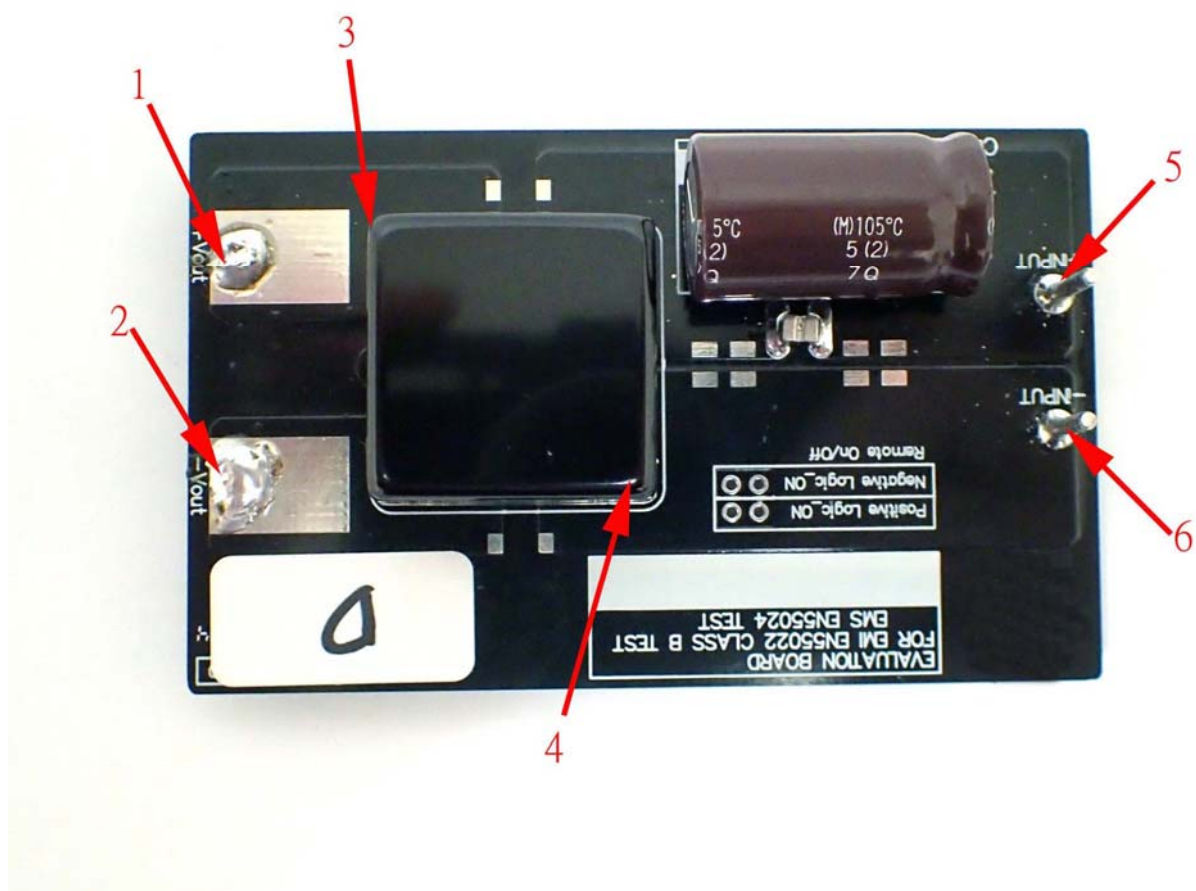


Criteria: B

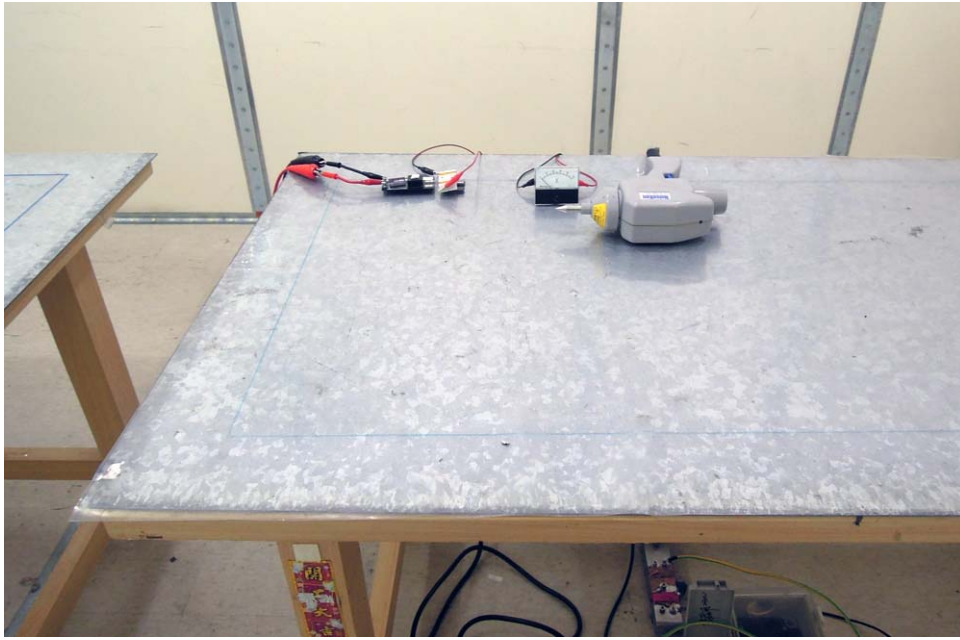
3.2.3 Test Result

Date: 02/13/2017	Temperature: 22°C	Engineer: James Kuo							
EUT Model name: THN 15-7212WIRzzzzzzzz	Humidity: 40%	Equipment: EM TEST(Model: Dito)							
Support Unit : DC Source	Barometer Pressure: 100.1kPa	ESD Site: 1F							
	Voltage/Freq: 110 Vdc	Basic Standard: EN61000-4-2							
<p>→ 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</p>									
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									

Figure 1: Test Point Assignments Discharge:



3.2.4 Test Setup Photo



3.3 Transient Burst Susceptibility Test

3.3.1 Test Specification

Port:	Power mains
Basic Standard:	EN 61000-4-4/ IEC 61000-4-4 (details referred to Sec 1.2)
Test Level:	<input type="checkbox"/> AC Power Port: +/- 2 kV <input checked="" type="checkbox"/> DC Power Port: +/- 2 kV
Rise Time:	5ns
Hold Time:	50ns
Repetition Frequency:	5KHz
Criteria:	B
Test Procedure	refer to ISL QA -T4-E-S9

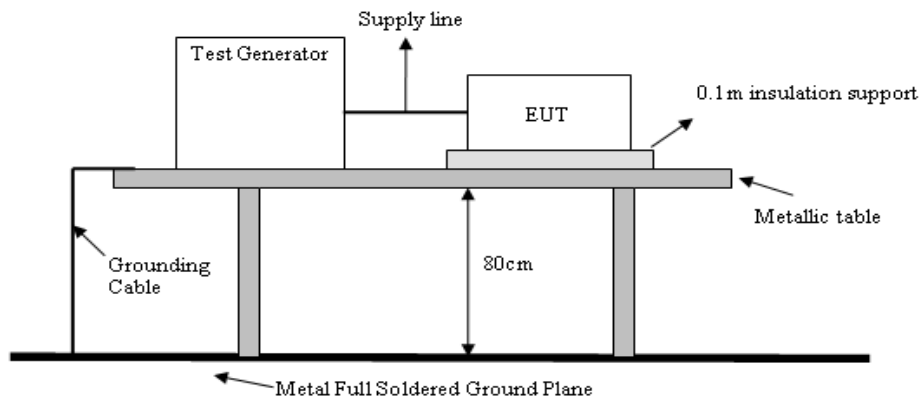
Test Procedure

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

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

3.3.2 Test Setup

EUT is at least 50cm from the conductive structure.



Criteria: A

3.3.3 Test Result

Date : 2017/01/24		Temperature : 24 °C		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: <input checked="" type="checkbox"/>		Signal Port: Telephone Port: <input type="checkbox"/> LAN Port: <input type="checkbox"/>					
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							

3.3.4 Test Setup Photo



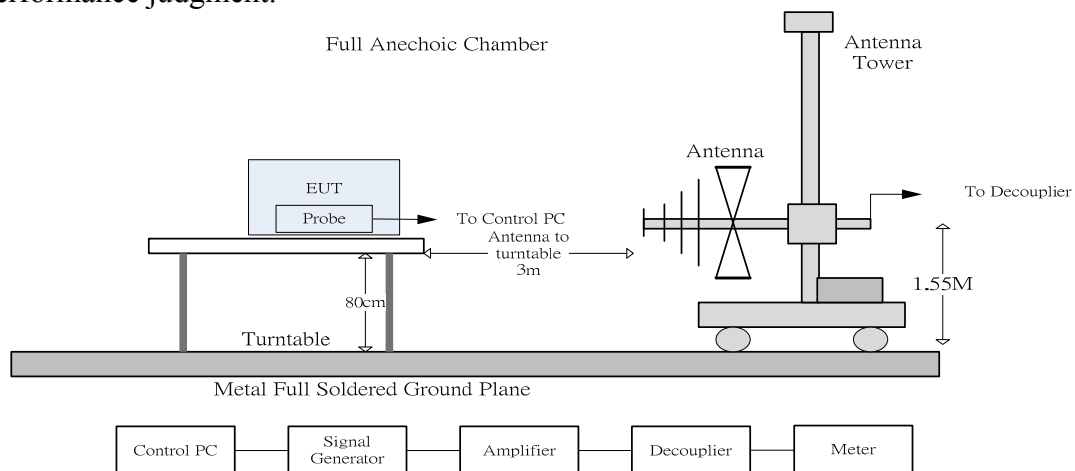
3.4 Radio- Frequency, Electromagnetic Field Immunity Test

3.4.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-3/ IEC 61000-4-3 (details referred to Sec 1.2)
Test Level:	80 MHz~1 GHz 20 V/m 1.4 GHz~2.1 GHz 10 V/m 2.1 MHz~2.5 GHz 5 V/m
Modulation:	AM 1kHz 80%
Frequency Step:	1% of last step frequency
Dwell time:	3s
Polarization:	Vertical and Horizontal
EUT Azimuth Angle	<input checked="" type="checkbox"/> 0° <input checked="" type="checkbox"/> 90° <input checked="" type="checkbox"/> 180° <input checked="" type="checkbox"/> 270°
Criteria:	A
Test Procedure	refer to ISL QA -T4-E-S8

3.4.2 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.



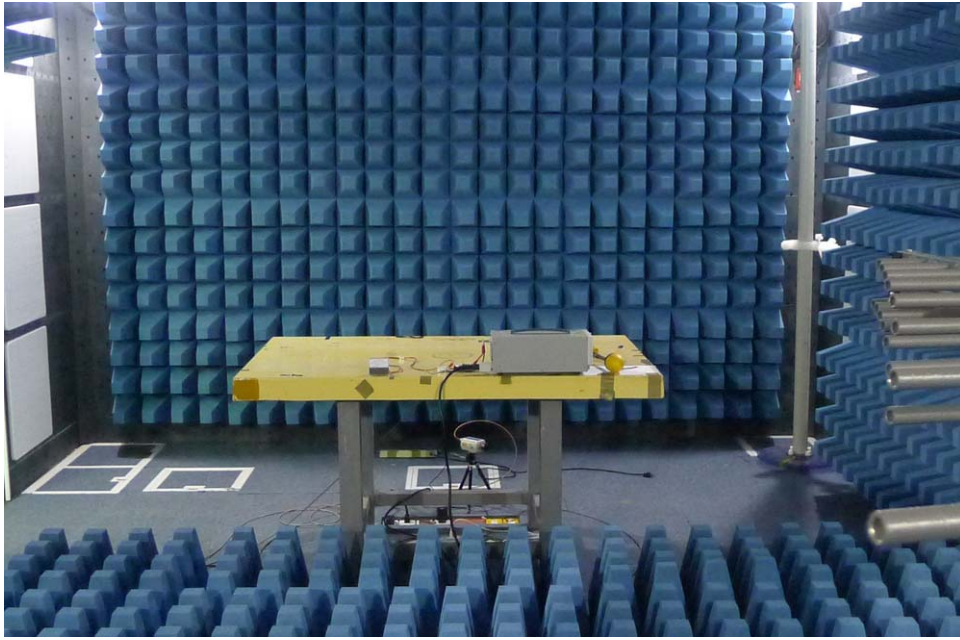
Criteria: A

3.4.3 Test Result

Date : 2017/01/25			Temperature : 24 °C			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	20	Vertical	A	
90° (left)	80-1000	1	3s	80% @ 1kHz	20	Vertical	A	
180° (back)	80-1000	1	3s	80% @ 1kHz	20	Vertical	A	
270° (right)	80-1000	1	3s	80% @ 1kHz	20	Vertical	A	
0° (front)	80-1000	1	3s	80% @ 1kHz	20	Horizontal	A	
90° (left)	80-1000	1	3s	80% @ 1kHz	20	Horizontal	A	
180° (back)	80-1000	1	3s	80% @ 1kHz	20	Horizontal	A	
270° (right)	80-1000	1	3s	80% @ 1kHz	20	Horizontal	A	
EUT Angle	Frequency		Dwell time	Modulation	Level (V/m)	Antenna Polarization	EUT Status	Comments
	Range (MHz)	Steps %						
0° (front)	1400-2100	1	3s	80% @ 1kHz	10	Vertical	A	
90° (left)	1400-2100	1	3s	80% @ 1kHz	10	Vertical	A	
180° (back)	1400-2100	1	3s	80% @ 1kHz	10	Vertical	A	
270° (right)	1400-2100	1	3s	80% @ 1kHz	10	Vertical	A	
0° (front)	1400-2100	1	3s	80% @ 1kHz	10	Horizontal	A	
90° (left)	1400-2100	1	3s	80% @ 1kHz	10	Horizontal	A	
180° (back)	1400-2100	1	3s	80% @ 1kHz	10	Horizontal	A	
270° (right)	1400-2100	1	3s	80% @ 1kHz	10	Horizontal	A	
EUT	Frequency		Dwell	Modulation	Level	Antenna	EUT Status	Comments

Angle	Range (MHz)	Steps %	time		(V/m)	Polarization		
0° (front)	2100-2500	1	3s	80% @ 1kHz	5	Vertical	A	
90° (left)	2100-2500	1	3s	80% @ 1kHz	5	Vertical	A	
180° (back)	2100-2500	1	3s	80% @ 1kHz	5	Vertical	A	
270° (right)	2100-2500	1	3s	80% @ 1kHz	5	Vertical	A	
0° (front)	2100-2500	1	3s	80% @ 1kHz	5	Horizontal	A	
90° (left)	2100-2500	1	3s	80% @ 1kHz	5	Horizontal	A	
180° (back)	2100-2500	1	3s	80% @ 1kHz	5	Horizontal	A	
270° (right)	2100-2500	1	3s	80% @ 1kHz	5	Horizontal	A	
Additional Notes: A=criteria A, B=criteria B, C=criteria C								

3.4.4 Test Setup Photo

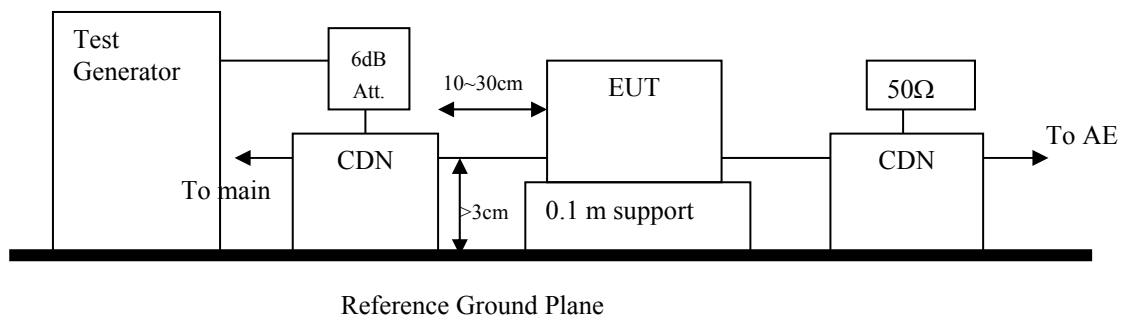


3.5 Radio- Frequency, Conducted Disturbances Immunity Test

3.5.1 Test Specification

Port:	Power mains
Basic Standard:	EN 61000-4-6/ IEC 61000-4-6 (details referred to Sec 1.2)
Test Level:	10 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

3.5.2 Test Setup



Criteria: A

3.5.3 Test Result

Date : 2017/01/23		Temperature : 24 °C		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							

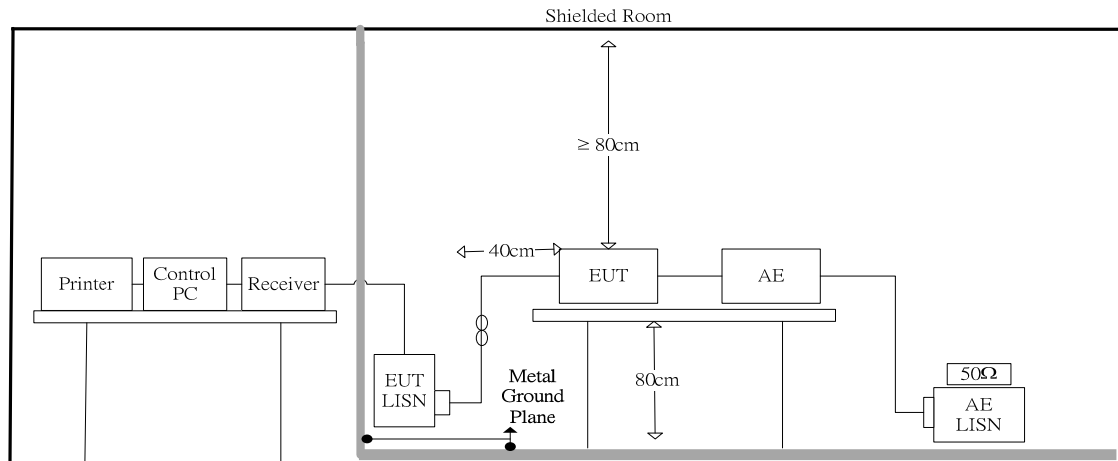
3.5.4 Test Setup Photo



3.6 Power Line Conducted Emission

3.7 Test Setup and Procedure

3.7.1 Test Setup



3.7.2 Test Procedure

The measurements were performed in a shielded room test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which was 0.8 meters above an earth-grounded.

Power to the EUT was provided through the LISN which had the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the standard. Power to the LISNs was 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 was bonded to the ground plane at the LISN.

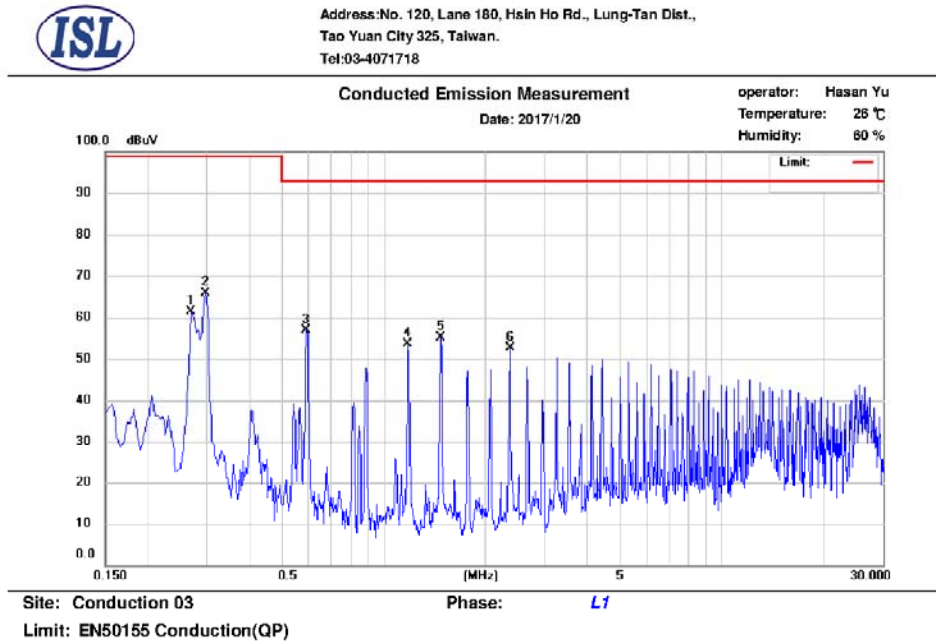
The interconnecting cables were arranged and moved to get the maximum measurement. Both the line of power cord, hot and neutral, were measured.

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.

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

Frequency Range:	150kHz to 30MHz
Detector Function:	Quasi-Peak
Resolution Bandwidth:	9kHz

3.8 Conduction Test Data: Configuration 1 -Line/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	0.270	61.42	57.46	0.09	61.51	99.00	-37.49	57.55		
2	0.298	64.11	64.36	0.10	64.21	99.00	-34.79	64.46		
3	0.590	56.75	57.02	0.13	56.88	93.00	-36.12	57.15		
4	1.182	53.20	53.46	0.13	53.33	93.00	-39.67	53.59		
5	1.478	53.90	54.09	0.14	54.04	93.00	-38.96	54.23		
6	2.366	47.58	47.22	0.19	47.77	93.00	-45.23	47.41		

Note:

Margin = QP/AVG Emission - Limit

QP/AVG Emission = QP_R/AVG_R + Correct Factor

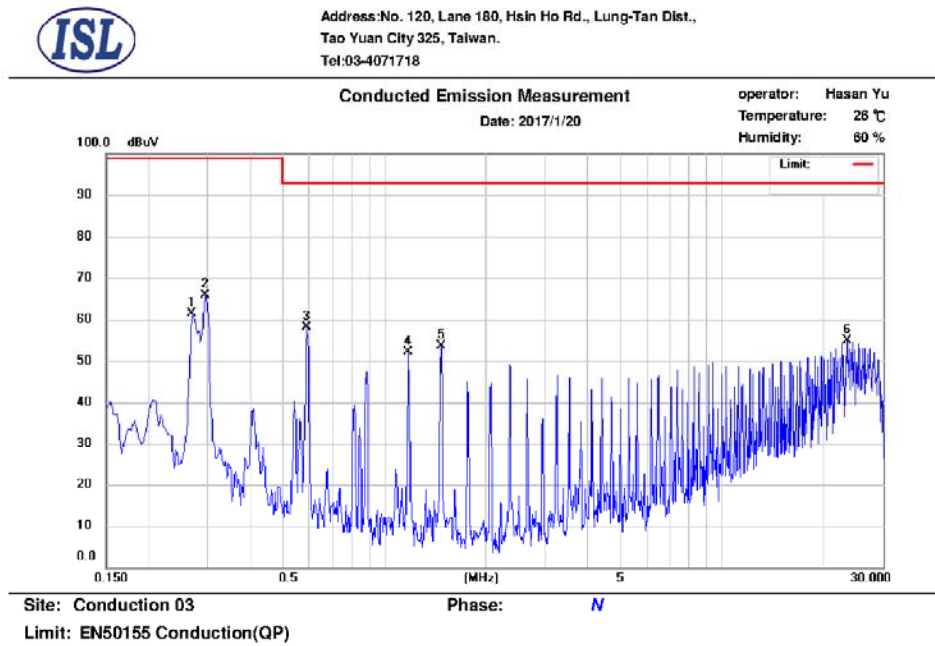
Correct Factor = LISN Loss + Cable Loss

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	61.38	57.41	0.09	61.47	99.00	-37.53	57.50		
2	0.294	65.76	66.12	0.10	65.86	99.00	-33.14	66.22		
3	0.590	57.69	57.94	0.13	57.82	93.00	-35.18	58.07		
4	1.182	50.12	50.31	0.13	50.25	93.00	-42.75	50.44		
5	1.474	53.43	53.68	0.14	53.57	93.00	-39.43	53.82		
6	23.590	49.23	42.88	0.60	49.83	93.00	-43.17	43.48		

Note:

Margin = QP/AVG Emission - Limit

QP/AVG Emission = QP_R/AVG_R + Correct Factor

Correct Factor = LISN Loss + Cable Loss

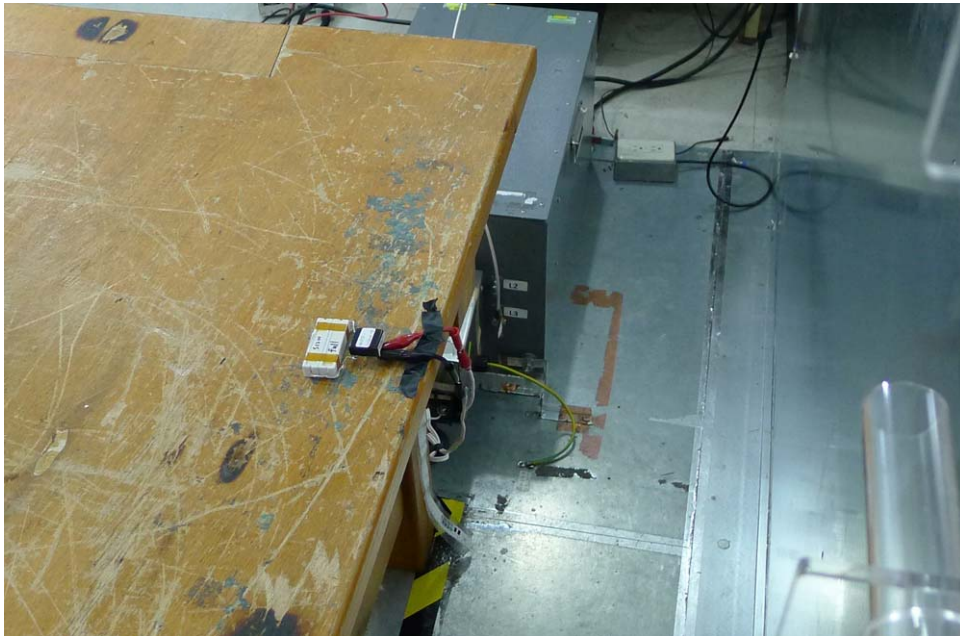
A margin of -8dB means that the emission is 8dB below the limit

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.

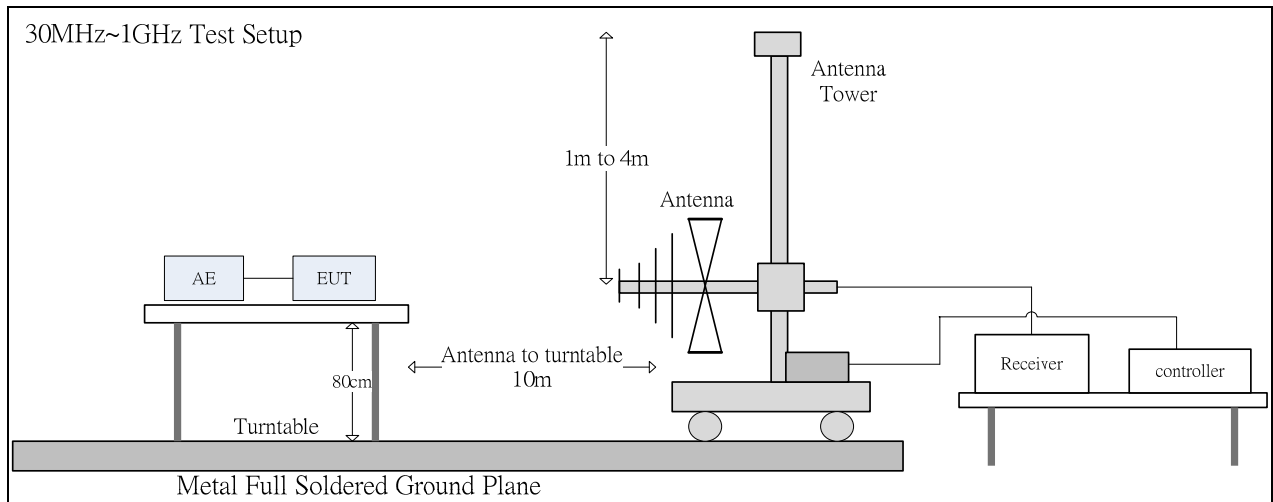
3.8.1 Test Setup Photo





3.9 Radiated emission

3.9.1 Test Setup



3.9.2 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.

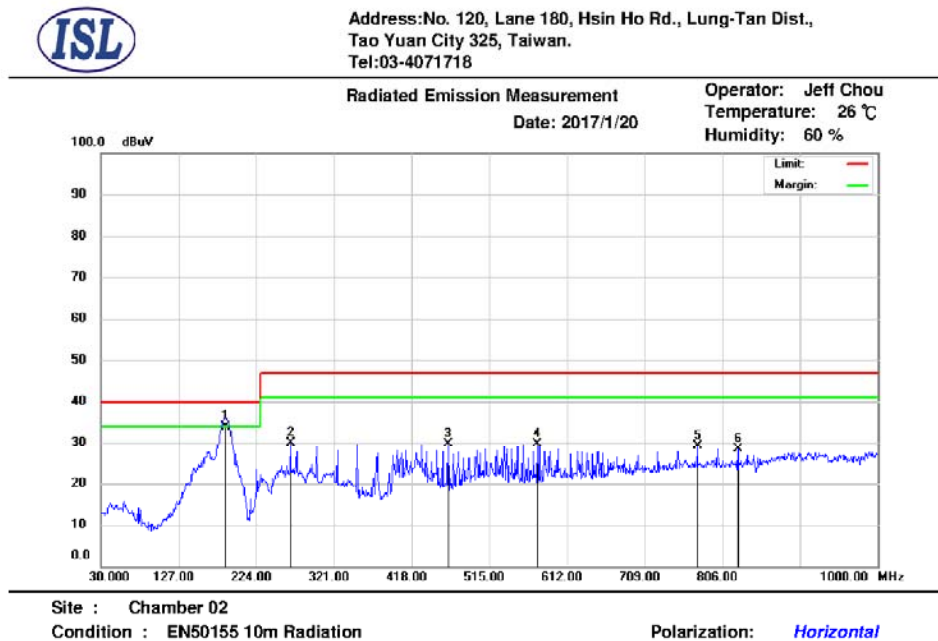
At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum measurement. Once the maximum reading is obtained, the antenna elevation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

3.9.3 Spectrum Analyzer Configuration (for the frequencies tested)

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

3.10 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	185.52	51.53	-17.71	33.82	40.00	-6.18	400	29	QP
2	266.68	45.63	-15.66	29.97	47.00	-17.03	100	144	peak
3	463.59	39.79	-10.16	29.61	47.00	-17.39	251	103	peak
4	575.14	37.55	-7.96	29.59	47.00	-17.41	127	194	peak
5	774.96	33.29	-4.12	29.17	47.00	-17.83	100	25	peak
6	825.40	32.21	-3.77	28.44	47.00	-18.56	100	6	peak

* Note:

Margin = Emission – Limit

Emission = Radiated Amplitude + Correct Factor

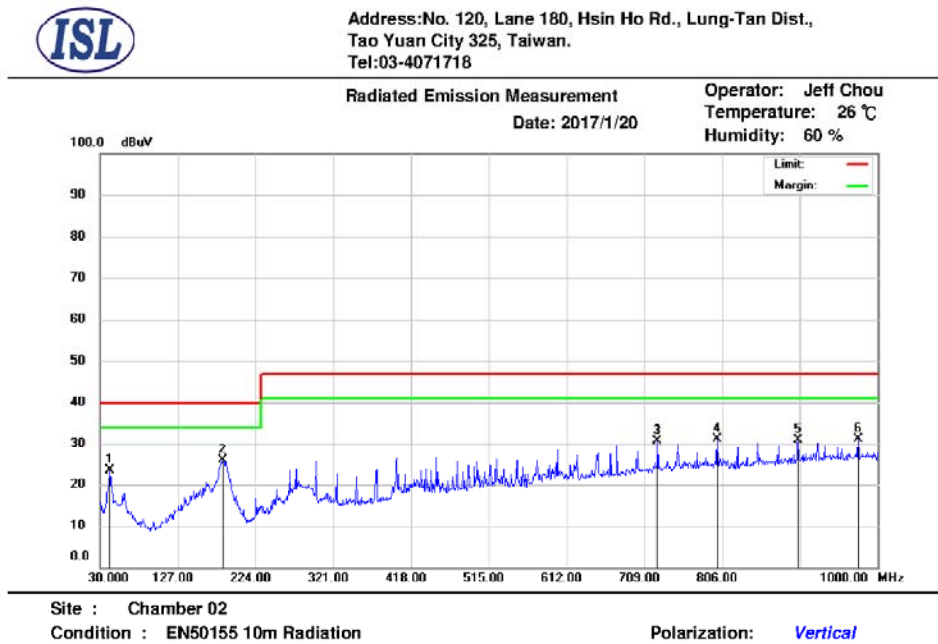
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain

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	40.62	-17.34	23.28	40.00	-16.72	201	277	peak
2	183.26	43.20	-17.40	25.80	40.00	-14.20	210	289	peak
3	725.49	35.52	-4.97	30.55	47.00	-16.45	100	228	peak
4	800.18	35.22	-3.97	31.25	47.00	-15.75	323	46	peak
5	901.06	33.65	-2.75	30.90	47.00	-16.10	172	129	peak
6	975.75	32.76	-1.72	31.04	47.00	-15.96	250	177	peak

* Note:

Margin = Emission – Limit

Emission = Radiated Amplitude + Correct Factor

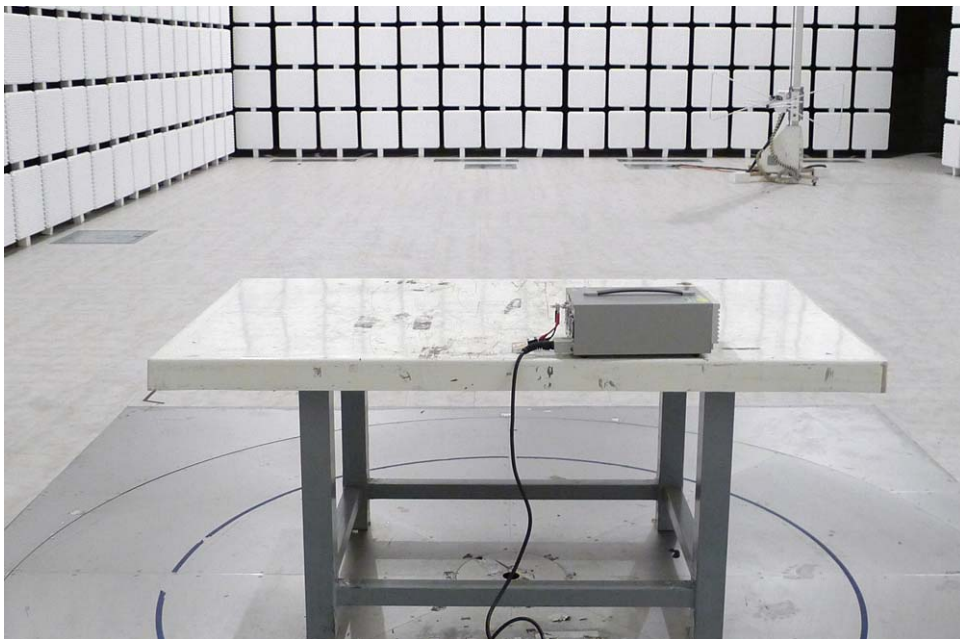
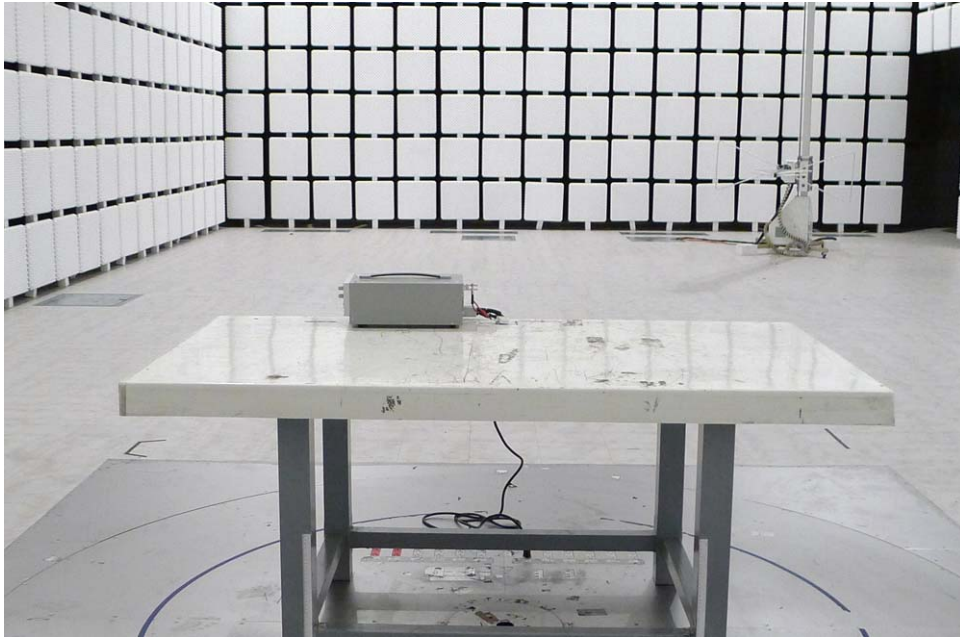
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain

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.

3.10.1 Test Setup Photo



4. Environmental Tests

4.1 Cooling test

4.1.1 Test Ambience

Temperature: $21^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Humidity: $53\% \pm 6\%$

4.1.2 EUT name & Model Quantity:

EUT name: DC-DC converter

Model name: THN 15-7212WIRzzzzzzzz

Quantity: 1 set

4.1.3 Test Procedure

Test Procedures were referred to EN 50155 sub-clause 12.2.3

4.1.4 Test Condition

Temperature: -40°C , test 2 hours.

Performance Check: The performance check was carried out before and after the cooling test.

4.1.5 Test Result

1. Test configuration was shown in Figure 1.
2. The testing data were shown in Figure 2.
3. Test specimen was visually inspected after test. No physical damage occurred.
4. The function of specimen was normal during and after the cooling test.
5. According to test result, the specimen pass the EN 50155 Class TX/Column2 cooling test.

4.1.6 Test Setup Photo



Figure 1: Cooling/Dry Heat/Damp Heat Test setup photo

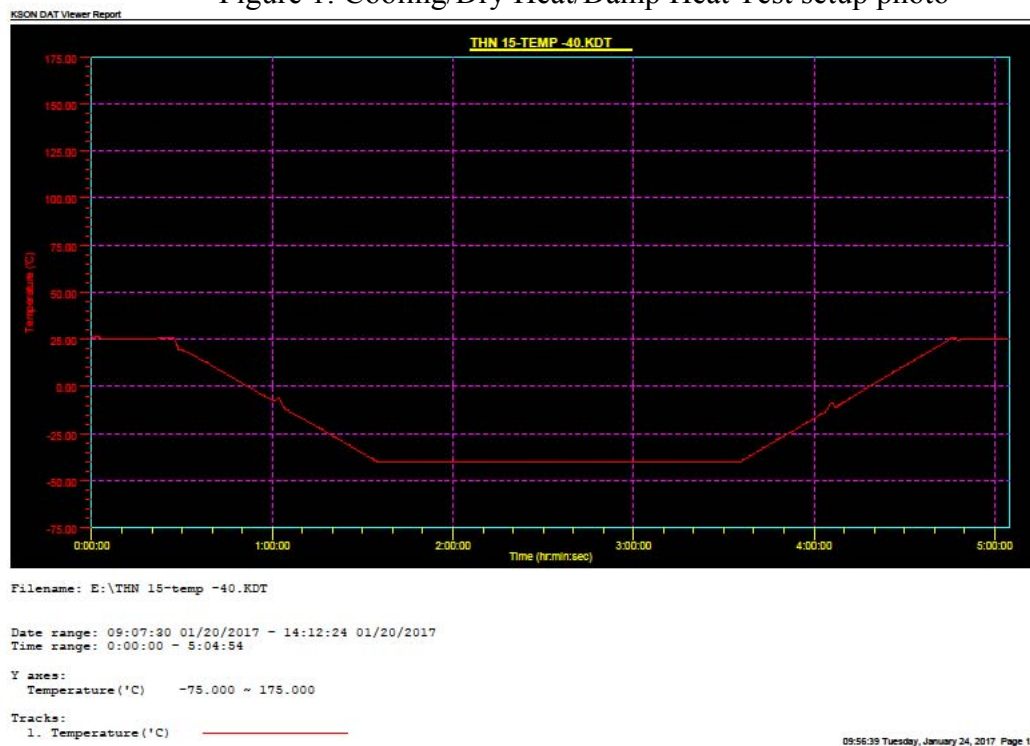


Figure 2: Cooling Test Record

4.2 Dry Heat Test

4.2.1 Test Ambience

Temperature: $21^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Humidity: $53\% \pm 6\%$

4.2.2 EUT name & Model Quantity:

EUT name: DC-DC converter

Model name: THN 15-7212WIRzzzzzzzz

Quantity: 1 set

4.2.3 Test Procedure

Test Procedures were referred to EN 50155 sub-clause 12.2.4

4.2.4 Test Condition

Temperature: 70°C & 85°C 6 hours,

Performance Check:

The performance check was carried out before, during and after the Dry Heat Test.

4.2.5 Test Result

1. Test configuration was shown in Figure 1.
2. The testing data were shown in Figure 3 for Model: THN 15-7212WIRzzzzzzzz (Full load).
3. The testing data were shown in Figure 4 for Model: THN 15-7212WIRzzzzzzzz (10W load).
4. Test specimen was visually inspected after test. No physical damage occurred.
5. The function of specimen was normal during and after the Dry heat test.
6. According to test result, the specimen pass the EN 50155 Class TX/Column2 Dry heat test.

4.2.6 Test Setup Photo



Figure 1: Cooling/Dry Heat/Damp Heat Test setup photo

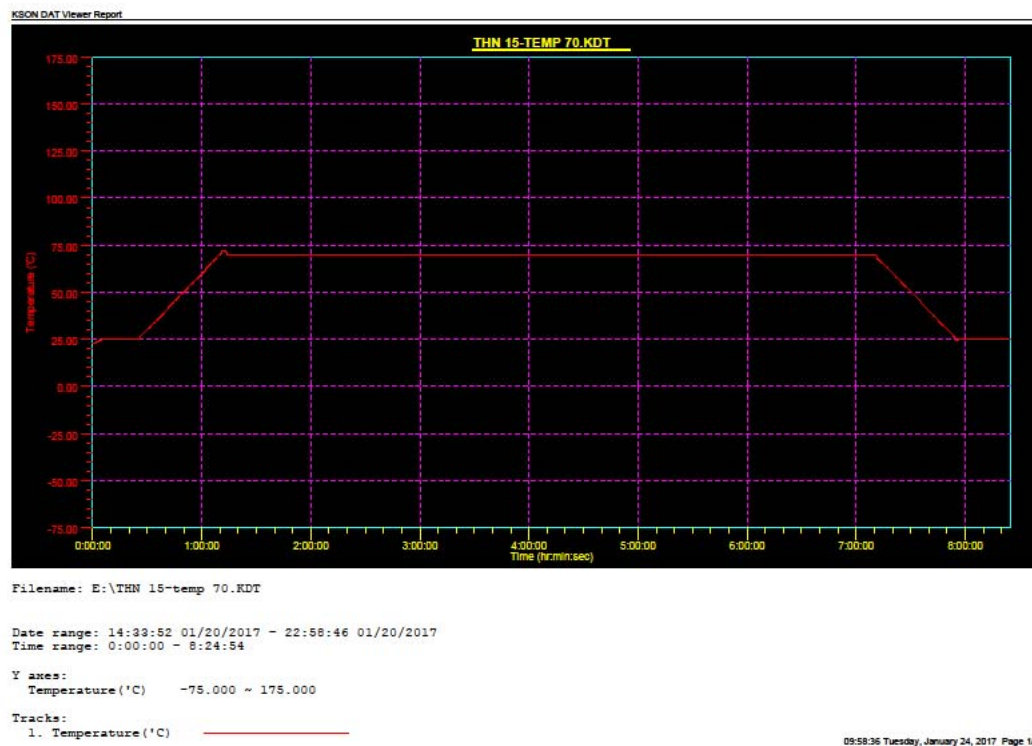


Figure 3: Dry Heat Test Record for Model: THN 15-7212WIRzzzzzzzz (Full load)

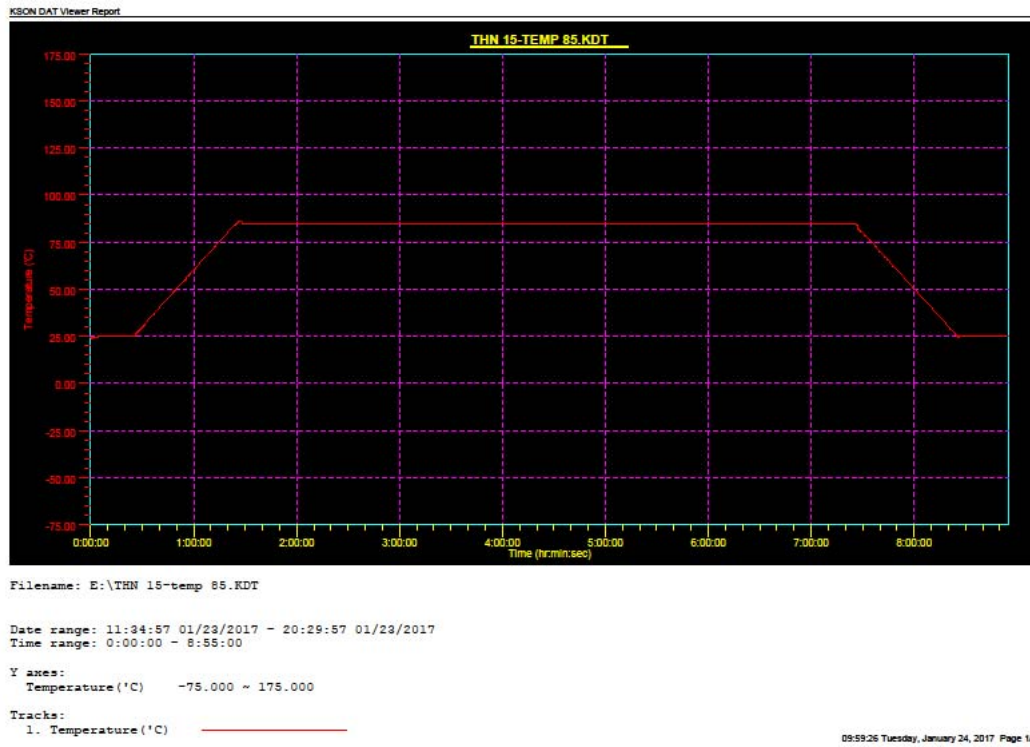


Figure 4: Dry Heat Test Record for Model: THN 15-7212WIRzzzzzzzzz (10W load)

4.3 Damp Heat Test

4.3.1 Test Ambience

Temperature: $21^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Humidity: $53\% \pm 6\%$

4.3.2 Specimen & Model Quantity:

EUT name: DC/DC converter

Model name: THN 15-7212WIRzzzzzzzz

Quantity: 1 set

4.3.3 Test Procedure

Test Procedures were referred to EN 50155 sub-clause 12.2.5

4.3.4 Test Condition

Temperature / Humidity:

$25^{\circ}\text{C} \sim 55^{\circ}\text{C}$, $95\% \pm 5\% \text{RH}$ without condensation, 48 hours.

Performance Check:

The performance check was carried out before and after the Damp Heat Test.

4.3.5 Test Result

1. Test configuration was shown in Figure 1.
2. The testing data were shown in Figure 5.
3. Test specimen was visually inspected after test. No physical damage occurred.
4. The function of specimen was normal during and after the Damp heat test.
5. According to test result, the specimen pass the EN 50155 ch.12.2.5 Dry heat test.

4.3.6 Test Setup Photo



Figure 1: Cooling/Dry Heat/Damp Heat Test setup photo

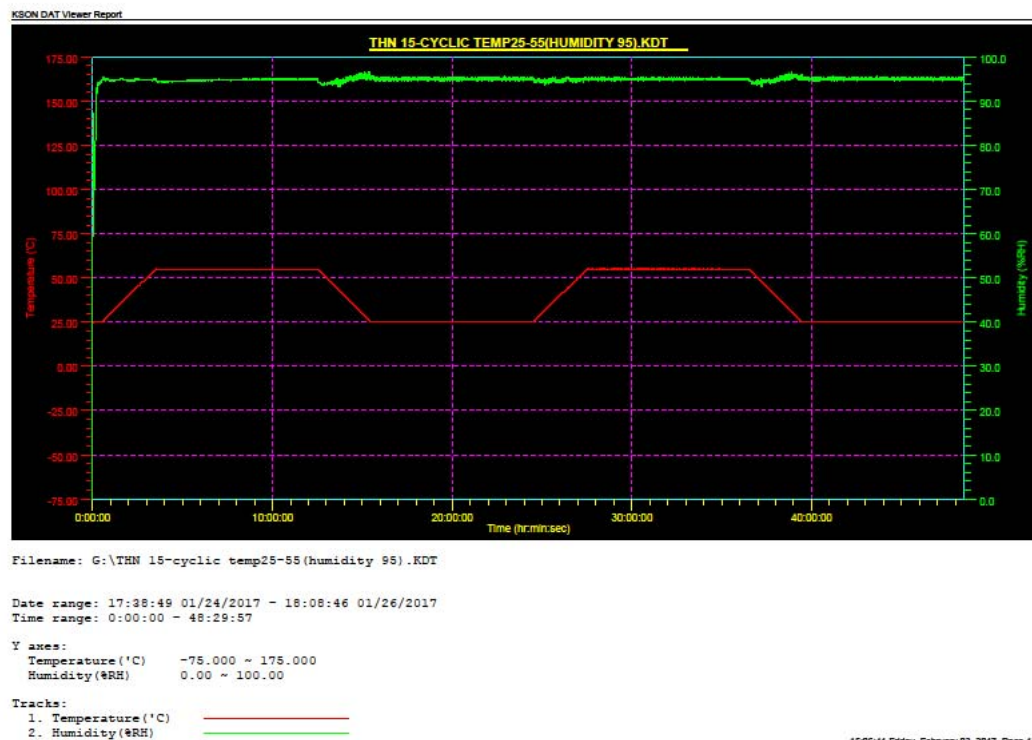


Figure 5: Dry Heat Test Record

Date : 2017/01/25	Temperature : 19.8 °C	Engineer : Jimmy Wen		
EUT Model Name : THN 15-7212WIRZZZZZZZZ	Humidity : 62.6 %	Equipment: KIMO, 9056		
	Barometer Pressure: 99.2 kPa	Standard: EN 50155 12.2.9		
Insulation Test Requirement (12.2.9):				
1.Insulation measurement Test :				
The insulation resistance test shall be carried out at 500 Vdc and the values recorded. The test shall then be repeated after the voltage withstand test. There shall be no fundamental deterioration from the initial measurement.				
Test item	Test Time	Insulation measurement test		Comments
		before withstand	after withstand	
Input to Output	1 min	>13GΩ	>13GΩ	
2.Voltage Withstand test				
500Vac or 700Vdc for nominal battery voltages below 72 Vdc (or 50 Vac). 1000Vac or 1400Vdc for nominal battery voltage from 72Vdc up to 125Vdc, (or from 50 to 90 Vac), and 1500Vac or 2100Vdc for nominal battery voltage above 125Vdc and up to 315Vdc, (or from 90 to 225 Vac). Neither disruptive discharge nor flashover shall occur				
Test item	Test Voltage	Test Time	Result	Comments
Input to Output	3000V	1 min	0.00mA	

Date : 2017/01/25		Temperature : 24 °C		Engineer : Hasan Yu	
EUT Model Name : THN 15-7212WIRZZZZZZZZ		Humidity : 57 %		Barometer Pressure: 99.5 kPa	
Test mode: Full load				Standard: EN 50155 12.2.2	
Voltage/Freq: 110Vdc/ 0Hz					
Variations of Voltage supply	Level	Voltage	Test Time	EUT Status	Comments
Minimum voltage	0.7 Un	77Vdc	10 min	Pass	
Nominal voltage	Un	110Vdc	10 min	Pass	
Rated voltage	1.15 Un	126.5Vdc	10 min	Pass	
Maximum voltage	1.25 Un	137.5Vdc	10 min	Pass	
Voltage fluctuations	Level	Voltage	Test Time	EUT Status	Comments
High voltage	1.4 Un	154Vdc	0.1 s	Pass	
Low voltage	0.6 Un	66Vdc	0.1 s	Pass	
High voltage	1.4 Un	154Vdc	1 s	Pass	
High voltage	1.25 Un	137.5Vdc	1 s	Pass	
Interruptions of voltage supply	Level	Voltage	INT time	EUT Status	Comments
Class S1:Voltage interruptions	Un	110Vdc	0 s	Pass	
Class S2:Voltage interruptions	0 Un	0Vdc	10ms	Pass	
Supply change over	Level	Voltage	INT time	EUT Status	Comments
Class C1:60% residual voltage	0.6 Un	66Vdc	100ms	Pass	
Class C2:0% residual voltage	0 Un	0Vdc	30ms	Pass	

Date : 2017/01/25	Temperature : 20 °C	Engineer : Hasan Yu
EUT Model Name : THN 15-7212WIRzzzzzzzz	Humidity : 51.6 %	Barometer Pressure: 99.8 kPa
		Standard: EN 50155 12.2.1
Voltage/Freq: 110Vdc/ 0Hz		
Visual inspection requirement(12.2.1):		
The visual inspection shall be carried out to ensure that the equipment is of sound construction and, so far as can be ascertained, meets its specified requirements. A visual inspection shall also be carried out after a type test has been performed to check whether any damage or deterioration has occurred resulting from the tests.		

Inspection item	Result
EUT outside	Good
Ground point	N/A
EUT function	Normal

Before test : Ok



4.4 Random Vibration Test

4.4.1 Test Specification and / or standard :

EN61373:2010 Category 1 Class B

4.4.2 Specimen & Model Quantity:

Model	THN 15-7212WIR////////
Quantity:	1

4.4.3 Testing Equipment :

Vibration & Shock Environmental Equipment KD-9363EM-1000F2K-50N250

Max. force : 1000 kgf-peak / 250 kgw Loading

Max. displacement : 50 mm p-p

Max. acceleration : 55 g

Frequency range : 2 to 2000 Hz

Calibrate trace code : VS-CV-050930-02

4.4.4 Test Condition and procedure :

Test Condition:

5 to 150 Hz , In put 110 VDC.

Transverse : 0.45 m/s²,

Longitudinal : 0.70 m/s²,

Vertical : 1.01 m/s²,

X/Y/Z , 10 min/axis ,Total 1 H

Test Procedure:

(1) Check out samples.

(2) Place the test samples on the vibration table in its normal operating orientation and configuration.

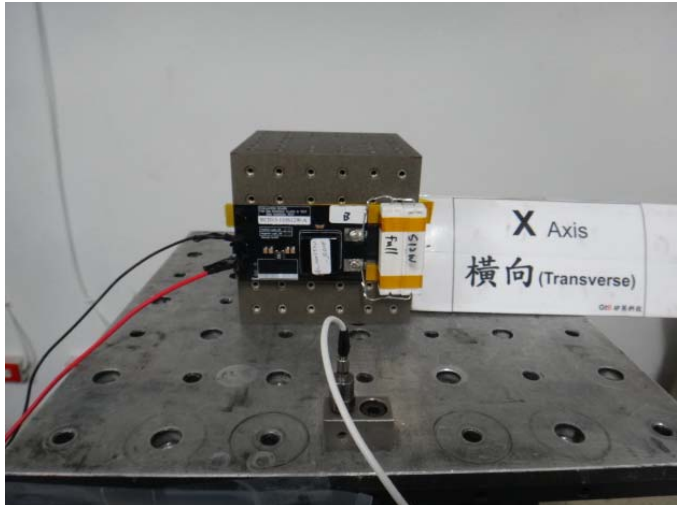
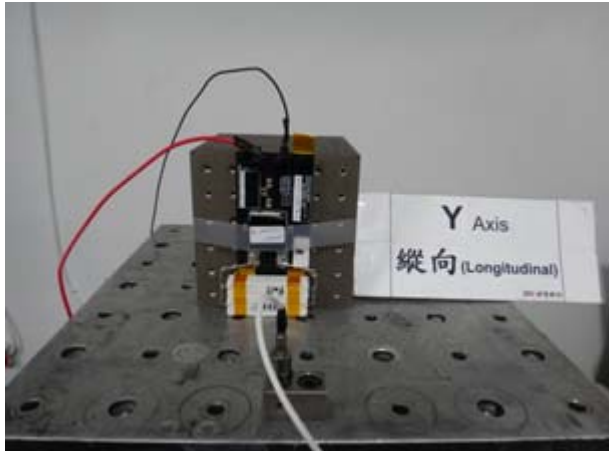
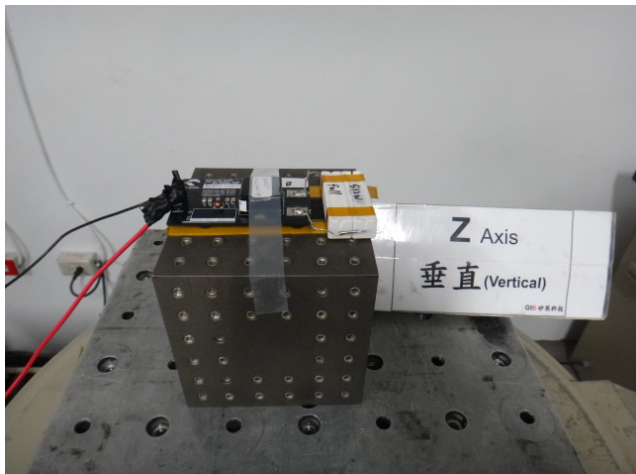
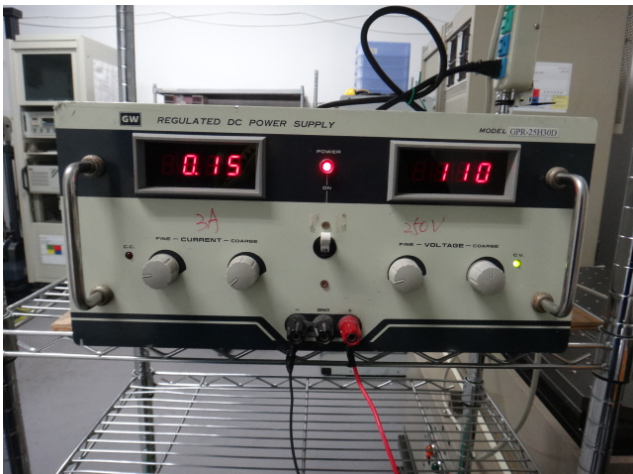
(3) Set test conditions and start to test.

(4) Finish testing, check out samples and prepare final report.

4.4.5 Test Result

Visual inspection and electrical measurement are to be done by customer.

4.4.6 Test Setup Photo

<p>Transverse X Axis</p>	<p>Longitudinal Y Axis</p>
	
<p>Vertical Z Axis</p>	<p>110 VDC</p>
	

4.5 Increased Random Vibration Test

4.5.1 Test Specification and / or standard :

EN61373:2010 Category 1 Class B

4.5.2 Test Sample and Quantity :

Model	THN 15-7212WIR////////
Quantity:	1

4.5.3 Testing Equipment :

Vibration & Shock Environmental Equipment KD-9363EM-1000F2K-50N250

Max. force : 1000 kgf-peak / 250 kgw Loading

Max. displacement : 50 mm p-p

Max. acceleration : 55 g

Frequency range : 2 to 2000 Hz

Calibrate trace code : VS-CV-050930-02

4.5.4 Test Condition and procedure :

Test Condition:

5 to 150 Hz ,

Transverse : 2.55 m/s²,

Longitudinal : 3.96 m/s²,

Vertical : 5.72 m/s²,

X/Y/Z , 5 H/axis ,Total 15 H

Test Procedure:

(1) Check out samples.

(2) Place the test samples on the vibration table in its normal operating orientation and configuration.

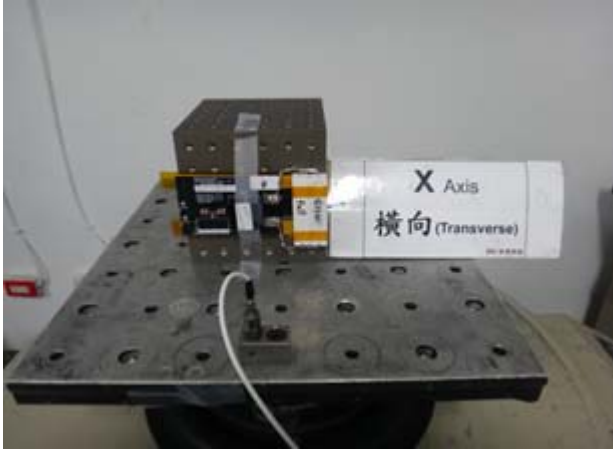
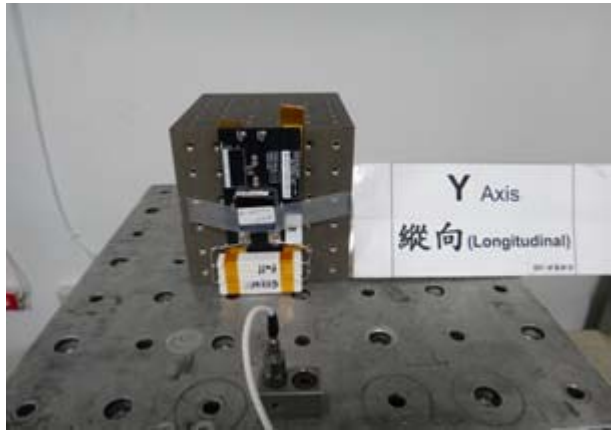
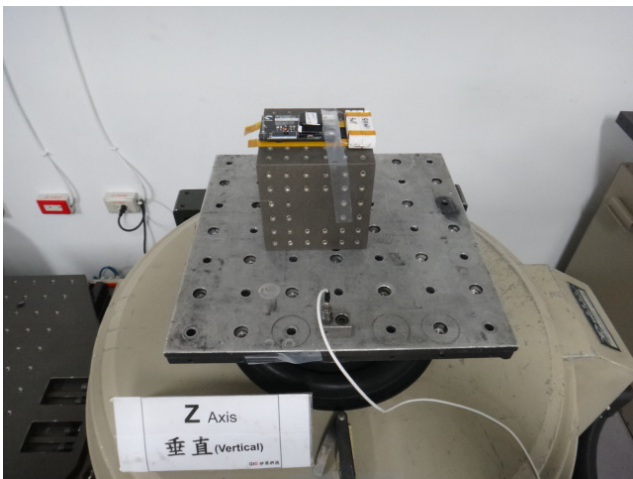
(3) Set test conditions and start to test.

(4) Finish testing, check out samples and prepare final report.

4.5.5 Test Result

Visual inspection and electrical measurement are to be done by customer.

4.5.6 Test Setup Photo

<p>Transverse X Axis</p>	
<p>Longitudinal Y Axis</p>	
<p>Vertical Z Axis</p>	

4.6 Shock Test

4.6.1 Test Specification and / or standard :

EN61373:2010 Category 1 Class B

4.6.2 Test Sample and Quantity :

Model	THN 15-7212WIR////////
Quantity:	1

4.6.3 Testing Equipment :

Vibration & Shock Environmental Equipment KD-9363EM-1000F2K-50N250

Max. force : 1000 kgf-peak / 250 kgw Loading

Max. displacement : 50 mm p-p

Max. acceleration : 55 g

Frequency range : 2 to 2000 Hz

Calibrate trace code : VS-CV-050930-02

4.6.4 Test Condition and procedure :

Test Condition:

Transverse: 30m/s²(Peak acceleration A),30ms(Nominal duration D),

Longitudinal: 50 m/s²(Peak acceleration A),30ms(Nominal duration D),

Vertical : 30m/s²(Peak acceleration A),30ms(Nominal duration D),

X/Y/Z , Total 18 times .

Test Procedure:

(1) Check out samples.

(2) Place the test samples on the vibration table in its normal operating Orientation and configuration.

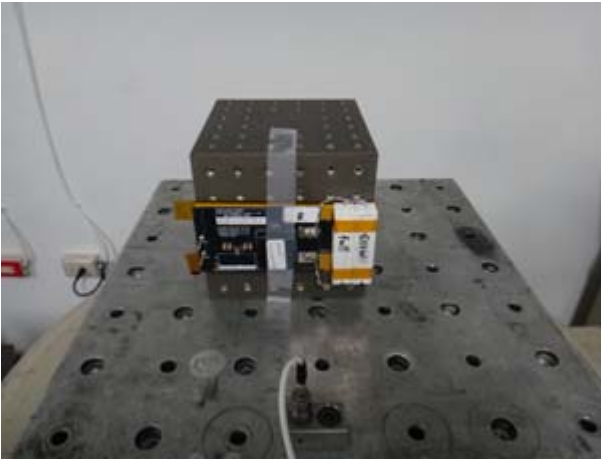
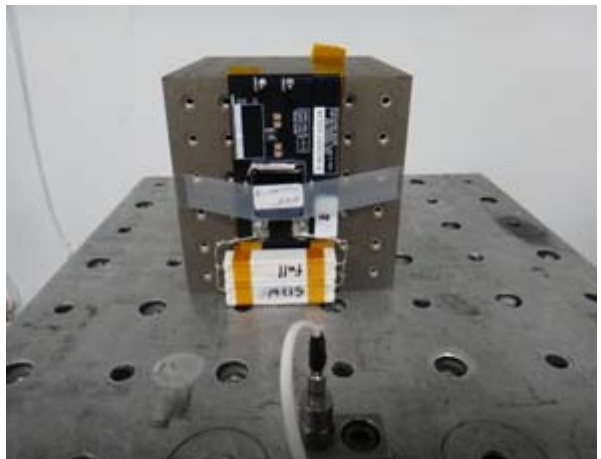
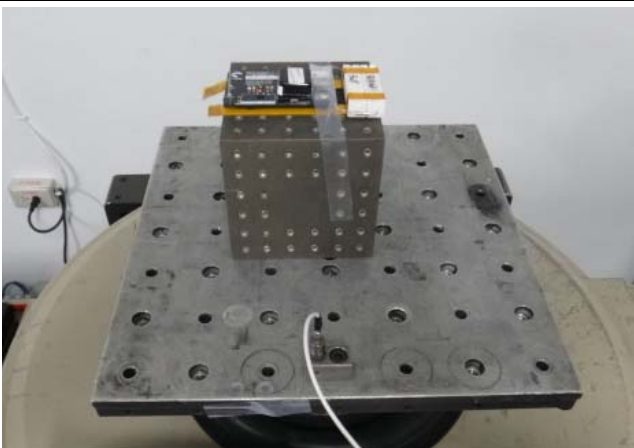
(3) Set test conditions and start to test.

(4) Finish testing, check out samples and prepare final report.

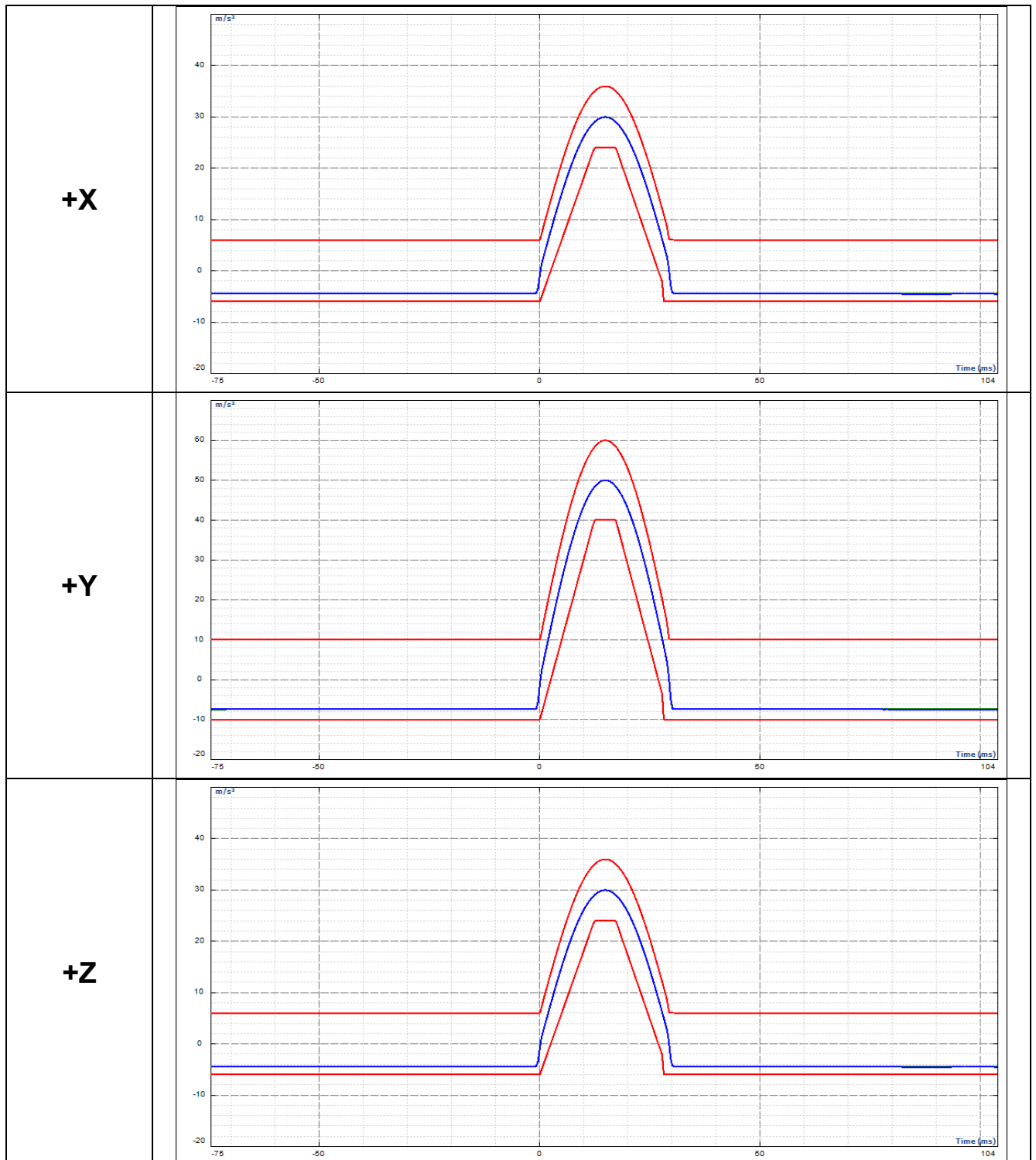
4.6.5 Test Result

Visual inspection and electrical measurement are to be done by customer.

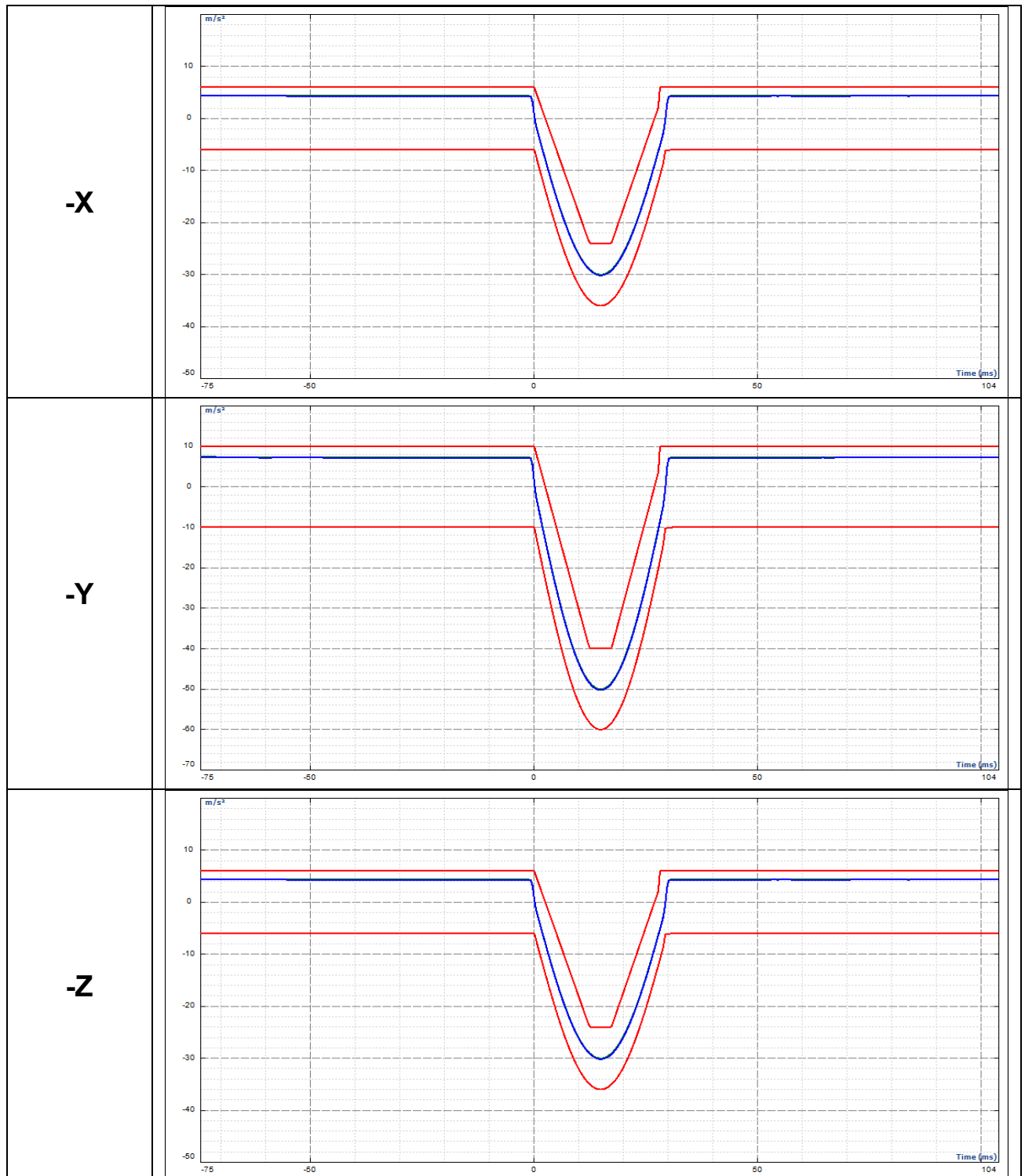
4.6.6 Test Setup Photo

<p>Transverse +/- X Axis</p>	
<p>Longitudinal +/- Y Axis</p>	
<p>Vertical +/- Z Axis</p>	

4.6.7 Test Profile



4.6.8 Test Profile



5. Appendix

5.1 Appendix A: Test Equipment

5.1.1 Test Equipment List

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
EN 50155 12.2.2	Power Source_01	EMTEST	Netwave 7-400	P1453146268	08/17/2016	08/17/2017
EN 50155 12.2.3	Temperature chamber	King San	THS-B4T-150	5290K	13/12/2016	13/12/2017
EN 50155 12.2.4	Temperature chamber	King San	THS-B4T-150	5290K	13/12/2016	13/12/2017
EN 50155 12.2.5	Temperature chamber	King San	THS-B4T-150	5290K	13/12/2016	13/12/2017
EN 50155 12.2.6	Power Source_01	EMTEST	Netwave 7-400	P1453146268	08/17/2016	08/17/2017
EN 50155 12.2.9	Programmable Auto safety tester	Chroma ATE INC.	9056	905600000072	19/08/2016	19/08/2017
EN 50155 12.2.11	Standard Electromagnetic Vibrator	KDI	KD-9363EM-1000F2K-50N250	KD-9363EM-1000F2K-50N250	03/06/2016	03/06/2017

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 07	NoiseKen	ESS-2002EX	ESS0878638	12/22/2016	12/22/2017
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

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

5.1.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

Test Item	Filename	Version
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

5.2 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.

<Chamber 02 (3M)>

1GHz~6GHz: $\pm 4.70\text{dB}$

<Conduction 03>

AMN: $\pm 2.88\text{dB}$

5.3 Appendix C: Photographs of EUT

Please refer to the File of **ISL-17LE068P-CE155-MA**