Certificate

Issue Date: March 12, 2021
Ref. Report No. ISL-20LE970CE-MA

Product Name : THN 20WIR THN 30WIR Series

Model(s) : THN 30-7210WIR;THN 30-7225WIR;THN 30-2410WIR;
THN 30-2411WIR;THN 30-2412WIR;THN 30-2413WIR;
THN 30-2415WIR;THN 30-2422WIR;THN 30-2423WIR;
THN 30-2425WIR;THN 30-4810WIR;THN 30-4811WIR;
THN 30-4812WIR;THN 30-4813WIR;THN 30-4815WIR;
THN 30-4822WIR;THN 30-4823WIR;THN 30-4825WIR;
THN 30-7211WIR;THN 30-7212WIR;THN 30-7213WIR;
THN 30-7215WIR;THN 30-7222WIR;THN 30-7223WIR;
THN 20-2410WIR;THN 20-2411WIR;THN 20-2412WIR;
THN 20-2413WIR;THN 20-2415WIR;THN 20-2422WIR;
THN 20-2423WIR;THN 20-2425WIR;THN 20-4810WIR;
THN 20-4811WIR;THN 20-4812WIR;THN 20-4813WIR;
THN 20-4815WIR;THN 20-4822WIR;THN 20-4823WIR;
THN 20-4825WIR;THN 20-7210WIR;THN 20-7211WIR;
THN 20-7212WIR;THN 20-7213WIR;THN 20-7215WIR;
THN 20-7222WIR;THN 20-7223WIR;THN 20-7225WIR

Brand : TRACO POWER

Responsible Party : TRACO ELECTRONIC AG

Address : Sihlbruggstrasse 111 CH-6340 Baar Switzerland

Certificate

Issue Date: March 12, 2021
Ref. Report No. ISL-20LE970CE-MA

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

The sample ISL received which 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. And Our laboratories is the accredited laboratories and are approved according to ISO/IEC 17025. The device was passed the test performed according to :

CE

Standards:

EN 55032:2015+A11:2020, CISPR 32:2015+A1:2019: Class A
AS/NZS CISPR 32:2015+A1:2020: Class A
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+A1:2017 and IEC 61000-4-5:2014+A1:2017
EN 61000-4-6:2014+AC:2015 and IEC 61000-4-6:2013
EN 61000-4-8:2010 and IEC 61000-4-8:2009
EN 61000-4-11:2004+A1:2017 and IEC 61000-4-11:2004+A1:2017

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.
The determination of the test results is determined by customer agreement, regulations or standard document specifications.
The Laboratory evaluates measurement inaccuracies based on regulatory or standard document specifications and is listed in the report for reference. The quantitative project part judges the conformity of the test results based on the evaluation results of the standard cited uncertainty, and the qualitative project does not temporarily evaluate the measurement uncertainty.

Angus Chu

Angus Chu / Director

International Standards Laboratory Corp. LT Lab.
TEL: +886-3-263-8888 FAX: +886-3-263-8899
No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan

CE TEST REPORT

of

EN 55032 / CISPR 32 / AS/NZS CISPR 32
Class A
EN 55024 / CISPR 24 / IMMUNITY
EN 61000-3-2 / EN 61000-3-3

Product : **THN 20WIR THN 30WIR Series**
Model(s): **THN 30-7210WIR;THN 30-7225WIR**
(more serial models listed on 1.3 of this test report)

Brand: **TRACO POWER**
Applicant: **TRACO ELECTRONIC AG**
Address: **Sihlbruggstrasse 111 CH-6340 Baar Switzerland**

Test Performed by:

International Standards Laboratory Corp. LT Lab.
TEL: +886-3-263-8888 FAX: +886-3-263-8899
No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan

Report No.: **ISL-20LE970CE-MA**
Issue Date : **March 12, 2021**

Contents of Report

1. General

1.1 Certification of Accuracy of Test Data

Standards:	Please refer to 1.2
Equipment Tested:	THN 20WIR THN 30WIR Series
Model:	THN 30-7210WIR;THN 30-7225WIR (more serial models listed on 1.3 of this test report)
Brand:	TRACO POWER
Applicant:	TRACO ELECTRONIC AG
Sample received Date:	November 26, 2020
Final test Date:	EMI: refer to the date of test data EMS: December 17, 2020
Test Site:	Chamber 12; Chamber 14; Conduction 03
Test Distance:	10m; 3m (above1GHz) (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:	Conduction input power: DC 110 V; DC 72 V Radiation input power: DC 110 V; DC 72 V Immunity input power: DC 110 V
Test Result:	**PASS**
Report Engineer:	Cheryl Tung
Test Engineer:	Sawyer chiang Sawyer Chiang
Approved By:	Benson Chen Benson Chen / Associate Director

1.2 Test Standards

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

EN 55032:2015+A11:2020, CISPR 32:2015+A1:2019: Class A: Electromagnetic compatibility of multimedia equipment - Emission requirements.
AS/NZS CISPR 32:2015+A1:2020: Class A: 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	Yes	No	PASS
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	B
EN 61000-4-3:2006+A1:2008 +A2:2010 IEC 61000-4-3:2006+A1:2007+A2:2010	Radio-Frequency, Electromagnetic Field	Pass	A
EN 61000-4-4:2012 IEC 61000-4-4:2012	Electrical Fast Transient/Burst	Pass	B
EN 61000-4-5:2014+A1:2017 IEC 61000-4-5:2014+A1:2017	Surge	Pass	B
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 30-7210WIR;THN 30-7225WIR;THN 30-2410WIR;
THN 30-2411WIR;THN 30-2412WIR;THN 30-2413WIR;
THN 30-2415WIR;THN 30-2422WIR;THN 30-2423WIR;
THN 30-2425WIR;THN 30-4810WIR;THN 30-4811WIR;
THN 30-4812WIR;THN 30-4813WIR;THN 30-4815WIR;
THN 30-4822WIR;THN 30-4823WIR;THN 30-4825WIR;
THN 30-7211WIR;THN 30-7212WIR;THN 30-7213WIR;
THN 30-7215WIR;THN 30-7222WIR;THN 30-7223WIR;
THN 20-2410WIR;THN 20-2411WIR;THN 20-2412WIR;
THN 20-2413WIR;THN 20-2415WIR;THN 20-2422WIR;
THN 20-2423WIR;THN 20-2425WIR;THN 20-4810WIR;
THN 20-4811WIR;THN 20-4812WIR;THN 20-4813WIR;
THN 20-4815WIR;THN 20-4822WIR;THN 20-4823WIR;
THN 20-4825WIR;THN 20-7210WIR;THN 20-7211WIR;
THN 20-7212WIR;THN 20-7213WIR;THN 20-7215WIR;
THN 20-7222WIR;THN 20-7223WIR;THN 20-7225WIR

1.4 Description of EUT

EUT

This report test data using the report number 20LE970CE

Description	THN 20WIR THN 30WIR Series
Condition	Pre-Production
Model	THN 30-7210WIR;THN 30-7225WIR (more serial models listed on 1.3 of this test report)
Test Model	THN 30-7210WIR
Brand	TRACO POWER
Serial Number	N/A
Highest working frequency	Less than 108MHz

pre-test configuration:

Configuration	Model Name	Input VDC	Output Voltage VDC
1	THN 30-7210WIR	110	3.3
2	THN 30-7225WIR	110	±24

According to the Pre-test, it was found that Configuration 1 is the worst. It was taken as the representative condition for testing by the applicant and its data are recorded in the present document.

Test configuration:

Configuration	Model Name	Input VDC	Output Voltage VDC
1	THN 30-7210WIR	110	3.3
2		72	3.3

For EMS (Not Include Electrical Fast transients/burst immunity & Surge Immunity) test mode

Configuration	Model Name	Input VDC	Output Voltage VDC	With an aluminum electrolytic capacitor test board
1	THN 30-7210WIR	110	3.3	No

For Electrical Fast transients/burst immunity & Surge Immunity test mode

Configuration	Model Name	Input VDC	Output Voltage VDC	With an aluminum electrolytic capacitor test board
1	THN 30-7210WIR	110	3.3	Yes

Different Model list:

Model Name	Input Range (VDC)	Output Voltage (VDC)
THN 30-2410WIR	9 ~ 36	3.3
THN 30-2411WIR	9 ~ 36	5.1
THN 30-2412WIR	9 ~ 36	12
THN 30-2413WIR	9 ~ 36	15
THN 30-2415WIR	9 ~ 36	24
THN 30-2422WIR	9 ~ 36	±12
THN 30-2423WIR	9 ~ 36	±15
THN 30-2425WIR	9 ~ 36	±24
THN 30-4810WIR	18 ~ 75	3.3
THN 30-4811WIR	18 ~ 75	5.1
THN 30-4812WIR	18 ~ 75	12
THN 30-4813WIR	18 ~ 75	15
THN 30-4815WIR	18 ~ 75	24
THN 30-4822WIR	18 ~ 75	±12
THN 30-4823WIR	18 ~ 75	±15
THN 30-4825WIR	18 ~ 75	±24
THN 30-7210WIR	36 ~ 160	3.3
THN 30-7211WIR	36 ~ 160	5.1
THN 30-7212WIR	36 ~ 160	12
THN 30-7213WIR	36 ~ 160	15
THN 30-7215WIR	36 ~ 160	24
THN 30-7222WIR	36 ~ 160	±12
THN 30-7223WIR	36 ~ 160	±15
THN 30-7225WIR	36 ~ 160	±24
THN 20-2410WIR	9 ~ 36	3.3
THN 20-2411WIR	9 ~ 36	5.1
THN 20-2412WIR	9 ~ 36	12
THN 20-2413WIR	9 ~ 36	15
THN 20-2415WIR	9 ~ 36	24
THN 20-2422WIR	9 ~ 36	±12
THN 20-2423WIR	9 ~ 36	±15
THN 20-2425WIR	9 ~ 36	±24
THN 20-4810WIR	18 ~ 75	3.3
THN 20-4811WIR	18 ~ 75	5.1
THN 20-4812WIR	18 ~ 75	12
THN 20-4813WIR	18 ~ 75	15
THN 20-4815WIR	18 ~ 75	24
THN 20-4822WIR	18 ~ 75	±12
THN 20-4823WIR	18 ~ 75	±15
THN 20-4825WIR	18 ~ 75	±24
THN 20-7210WIR	36 ~ 160	3.3
THN 20-7211WIR	36 ~ 160	5.1

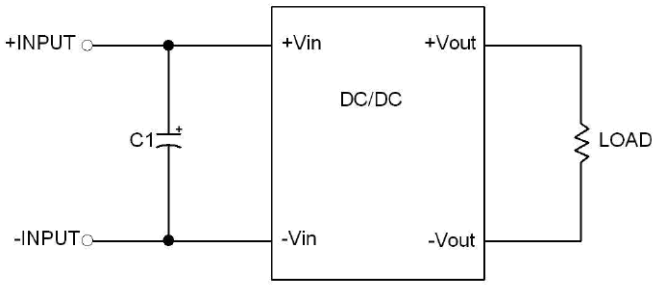
Model Name	Input Range (VDC)	Output Voltage (VDC)
THN 20-7212WIR	36 ~ 160	12
THN 20-7213WIR	36 ~ 160	15
THN 20-7215WIR	36 ~ 160	24
THN 20-7222WIR	36 ~ 160	±12
THN 20-7223WIR	36 ~ 160	±15
THN 20-7225WIR	36 ~ 160	±24

EMI Noise Source:
Please refer to the technical documents.

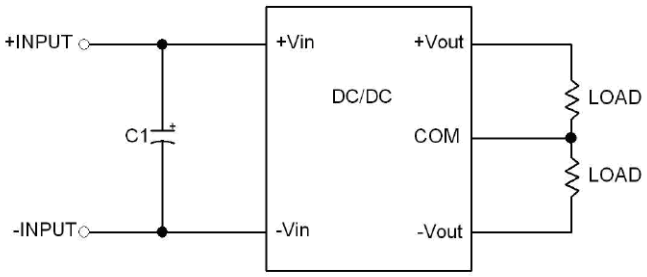
Solution:

For EMI test requirements/Class A

THN 20WIR SERIES



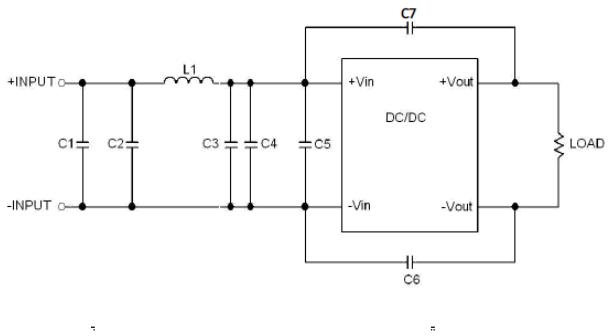
Single Output



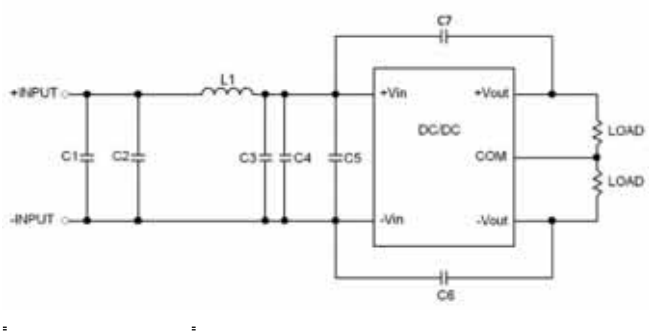
Dual Output

Model	C1
THN 20-24□ □ WIR THN 20-48□ □ WIR	N/A
THN 20-72□ □ WIR	4.7uF/200V Nippon Chemi-con KXJ series

THN 30WIR SERIES



Single Output



Dual Output

Model	C1	L1	C2、C3、C4、C5
THN 30-24□ □ WIR	10uF / 50V	2.2uH	N/A
THN 30-48□ □ WIR	4.7uF /100V	10uH	N/A
THN 30-72□ □ WIR	1.0uF /250V	100uH	1.0uF/250V

For Electrical Fast transient & Surge Immunity test requirements

Model Reference	Increase countermeasure components
THN 20-24□ □ WIR	With an external input filter capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ58A, 58V, 3000Watt peak pulse power) in parallel.
THN 20-48□ □ WIR	With an external input filter capacitor (Nippon chemi-con KY series, 220μF/100V)
THN 20-72□ □ WIR	With an external input filter capacitor (Nippon chemi-con KXJ series, 150μF/200V) and a TVS (SMBJ300A, 300V, 600Watt peak pulse power) in parallel.

Model Reference	Increase countermeasure components
THN 30-24□ □ WIR	With an external input filter capacitor (Nippon chemi-con KY series, 220μF/100V)
THN 30-48□ □ WIR	With an external input filter capacitor (Nippon chemi-con KY series, 220μF/100V)
THN 30-72□ □ WIR	With 2pcs aluminum electrolytic capacitor (Nippon chemi-con KXJ series, 150μF/200V in parallel) and a TVS (SMBJ220A, 220V, 600Watt peak pulse power) in parallel.

1.5 Description of Support Equipment

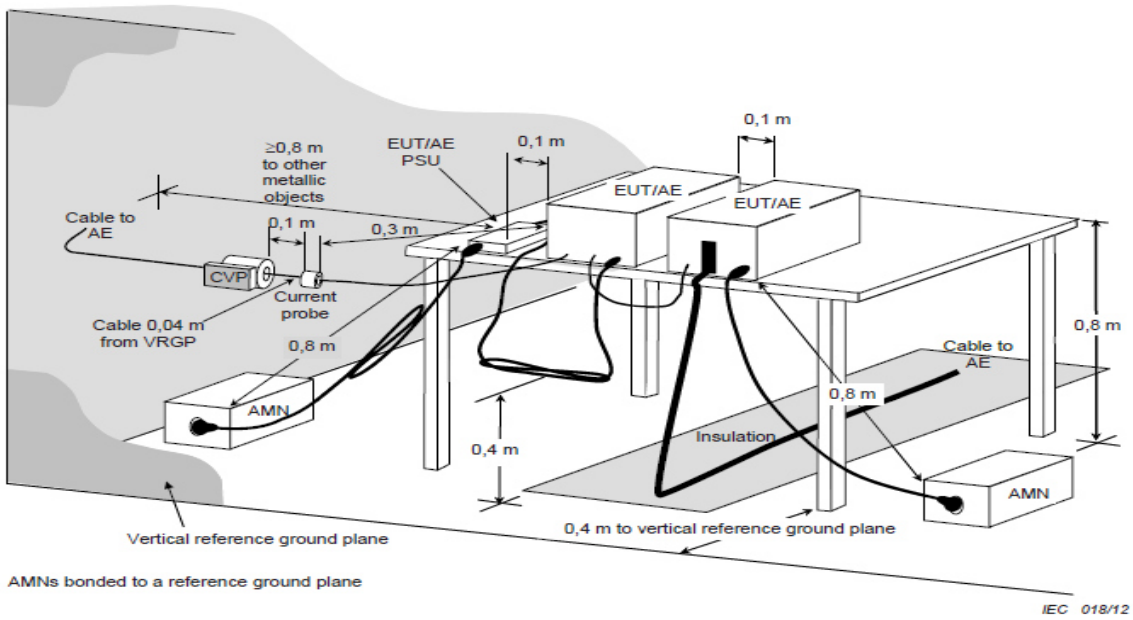
For EMI test Configuration Support unit: 1~2
For EMS test Configuration Support unit: 1~3

No	Unit	Model Serial No.	Brand	Power Cord	FCC ID
1	DC Power Source	GPD-4050D S/N: N/A	GW INSTEK	Non-shielded	FCC DOC
2	Dummy Load	N/A S/N: N/A	N/A	N/A	N/A
3	DC Voltage meter	BN-670 S/N: N/A	Bonny	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 AC mains power ports of Class_A equipment:

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

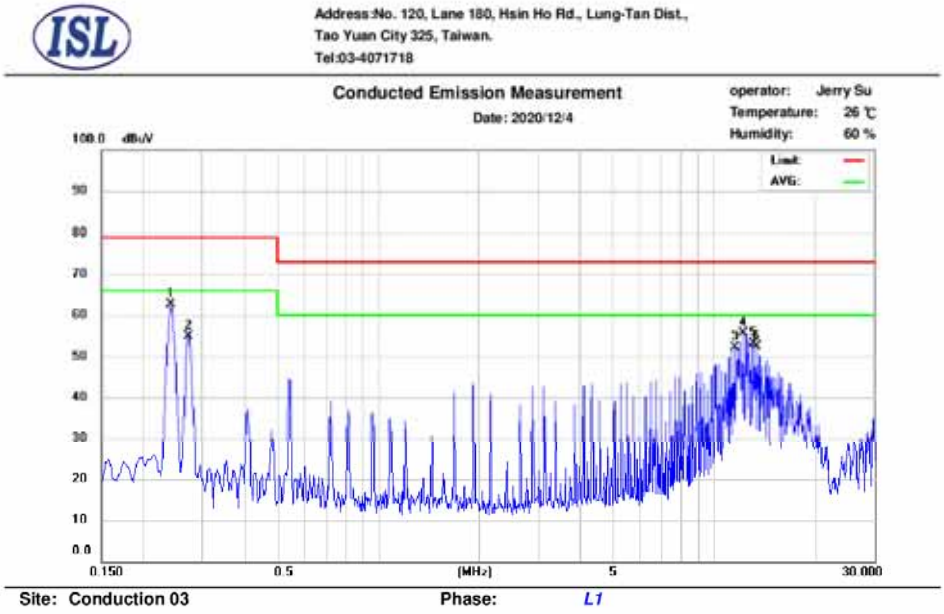
Conducted emissions from the AC mains power ports of Class_B equipment:

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		

*** Conducted emissions test use AC Limit to test EUT DC power according to customer requirements**

2.2 Conduction Test Data: Configuration 1

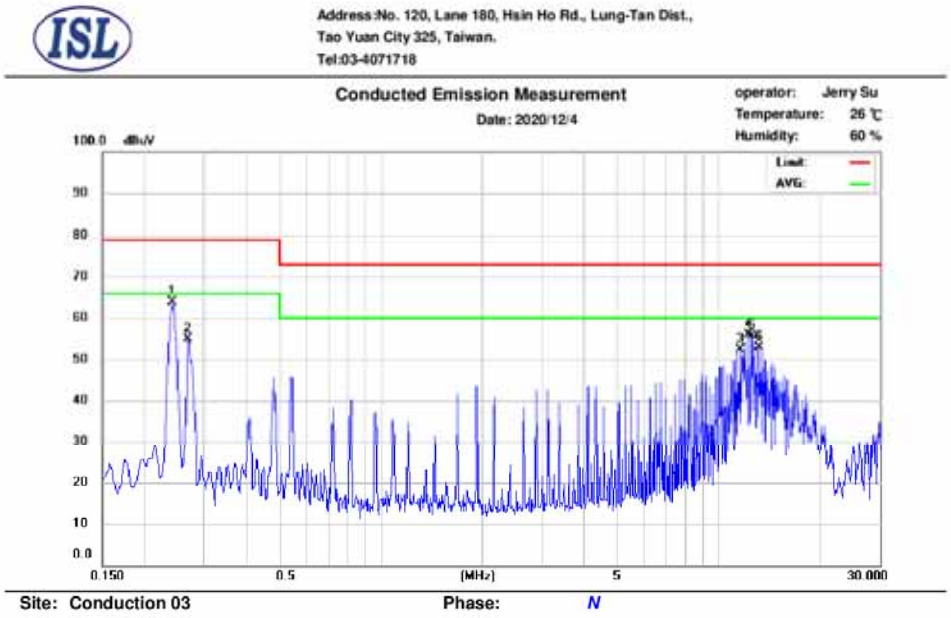
-Live



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	0.242	52.29	52.55	10.16	62.45	79.00	-16.55	62.71	66.00	-3.29
2	0.274	43.96	41.17	10.16	54.12	79.00	-24.88	51.33	66.00	-14.67
3	11.570	41.24	41.20	10.53	51.77	73.00	-21.23	51.73	60.00	-8.27
4	12.294	44.68	44.67	10.55	55.23	73.00	-17.77	55.22	60.00	-4.78
5	13.258	42.04	41.97	10.57	52.61	73.00	-20.39	52.54	60.00	-7.46
6	13.498	41.11	40.48	10.57	51.68	73.00	-21.32	51.05	60.00	-8.95

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

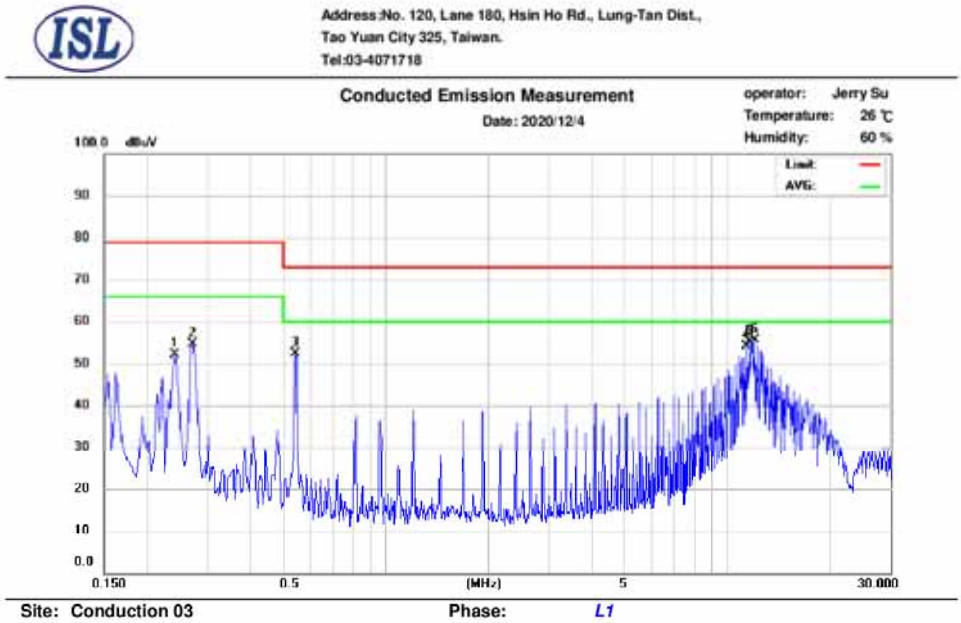


No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.242	53.52	53.78	10.15	63.67	79.00	-15.33	63.93	66.00	-2.07
2	0.270	44.31	41.50	10.15	54.46	79.00	-24.54	51.65	66.00	-14.35
3	11.570	41.40	41.45	10.52	51.92	73.00	-21.08	51.97	60.00	-8.03
4	12.294	44.74	44.69	10.54	55.28	73.00	-17.72	55.23	60.00	-4.77
5	12.534	44.56	44.53	10.54	55.10	73.00	-17.90	55.07	60.00	-4.93
6	13.258	41.80	41.69	10.56	52.36	73.00	-20.64	52.25	60.00	-7.75

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

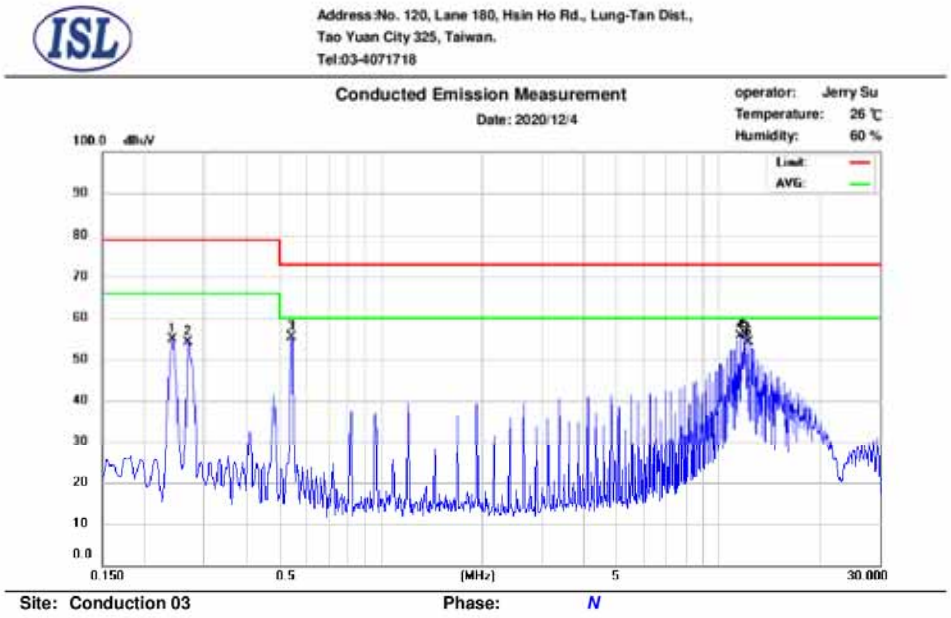
-Live



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	0.242	41.43	41.71	10.16	51.59	79.00	-27.41	51.87	66.00	-14.13
2	0.274	43.33	39.44	10.16	53.49	79.00	-25.51	49.60	66.00	-16.40
3	0.546	43.66	39.79	10.17	53.83	73.00	-19.17	49.96	60.00	-10.04
4	11.326	42.55	40.97	10.53	53.08	73.00	-19.92	51.50	60.00	-8.50
5	11.566	42.73	40.21	10.53	53.26	73.00	-19.74	50.74	60.00	-9.26
6	12.050	44.16	42.95	10.55	54.71	73.00	-18.29	53.50	60.00	-6.50

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



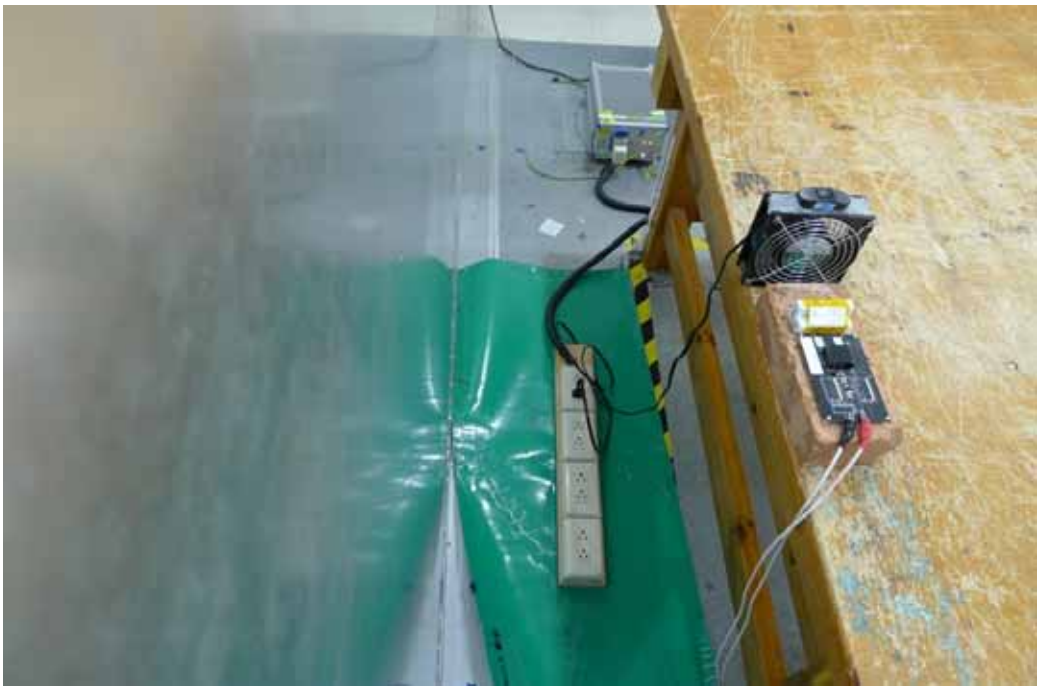
No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.242	44.29	44.56	10.15	54.44	79.00	-24.56	54.71	66.00	-11.29
2	0.270	43.74	40.93	10.15	53.89	79.00	-25.11	51.08	66.00	-14.92
3	0.546	42.14	38.79	10.16	52.30	73.00	-20.70	48.95	60.00	-11.05
4	11.574	44.16	43.05	10.52	54.68	73.00	-18.32	53.57	60.00	-6.43
5	12.054	44.62	44.60	10.54	55.16	73.00	-17.84	55.14	60.00	-4.86
6	12.294	42.96	42.74	10.54	53.50	73.00	-19.50	53.28	60.00	-6.72

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

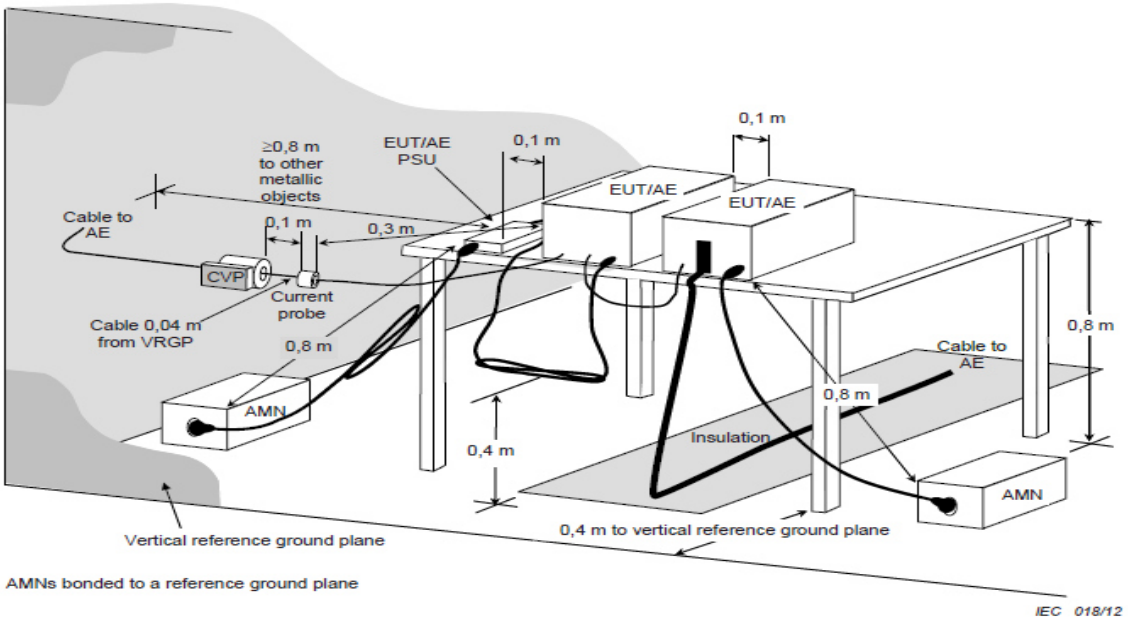
Back View



3. Telecommunication Port Conducted Emissions

3.1 Test Setup and Procedure

3.1.1 Test Setup



3.1.2 Test Procedure

The measurements are performed in a 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.

The EUT, any support equipment, and any interconnecting cables were arranged and moved to get the maximum measurement. All of the interface cables were manipulated according to EN 55032 requirements.

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

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

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

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

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

3.1.4 Limit

Asymmetric mode conducted emissions from Class_A equipment:
Applicable to
1. wired network ports.
2. optical fibre ports with metallic shield or tension members.
3. antenna ports.

Frequency range MHz	Coupling device	Detector type / bandwidth	Class_A voltage limits dB(μV)	Class_A current limits dB(μA)
0.15-0.5	AAN	Quasi Peak / 9 kHz	97-87	n/a
0.5-30			87	
0.15-0.5	AAN	Average / 9 kHz	84-74	
0.5-30			74	
0.15-0.5	CVP and current probe	Quasi Peak / 9 kHz	97-87	53-43
0.5-30			87	43
0.15-0.5	CVP and current probe	Average / 9 kHz	84-74	40-30
0.5-30			74	30
0.15-0.5	Current Probe	Quasi Peak / 9 kHz	n/a	53-43
0.5-30				43
0.15-0.5	Current Probe	Average / 9 kHz		40-30
0.5-30				30

Asymmetric mode conducted emissions from Class_B equipment:
Applicable to:
1. wired network ports.
2. optical fibre ports with metallic shield or tension members.
3. broadcast receiver tuner ports.
4. antenna ports.

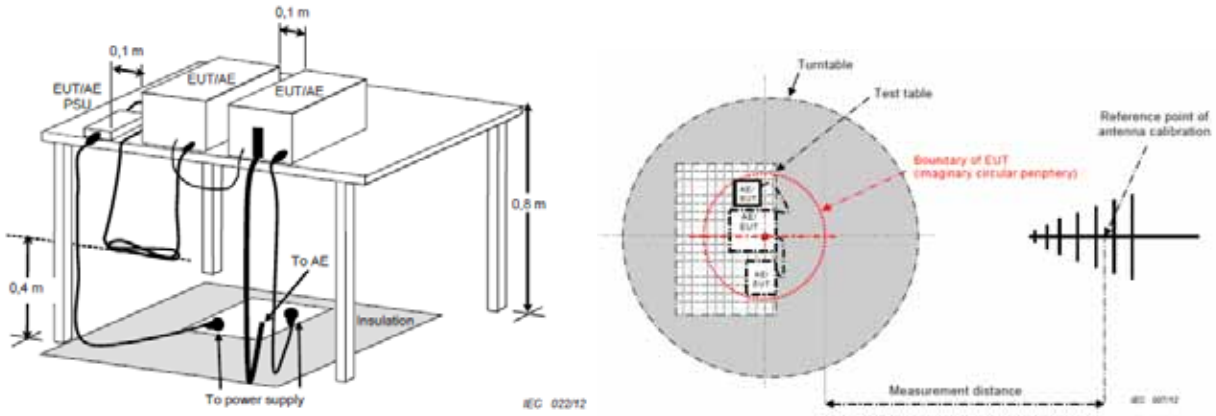
Frequency range MHz	Coupling device	Detector type / bandwidth	Class_B voltage limits dB(μV)	Class_B current limits dB(μA)
0.15-0.5	AAN	Quasi Peak / 9 kHz	84-74	n/a
0.5-30			74	
0.15-0.5	AAN	Average / 9 kHz	74-64	
0.5-30			64	
0.15-0.5	CVP and current probe	Quasi Peak / 9 kHz	84-74	40-30
0.5-30			74	30
0.15-0.5	CVP and current probe	Average / 9 kHz	74-64	30-20
0.5-30			64	20
0.15-0.5	Current Probe	Quasi Peak / 9 kHz	n/a	40-30
0.5-30				30
0.15-0.5	Current Probe	Average / 9 kHz		30-20
0.5-30				20

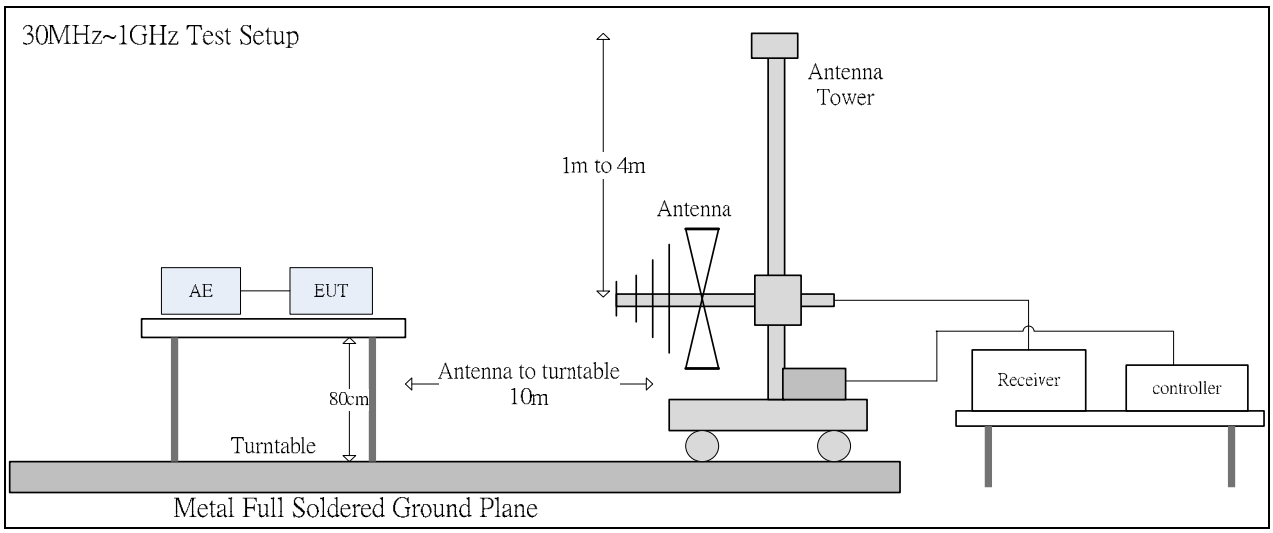
****Remarks: It is not necessary to be tested on this item.**

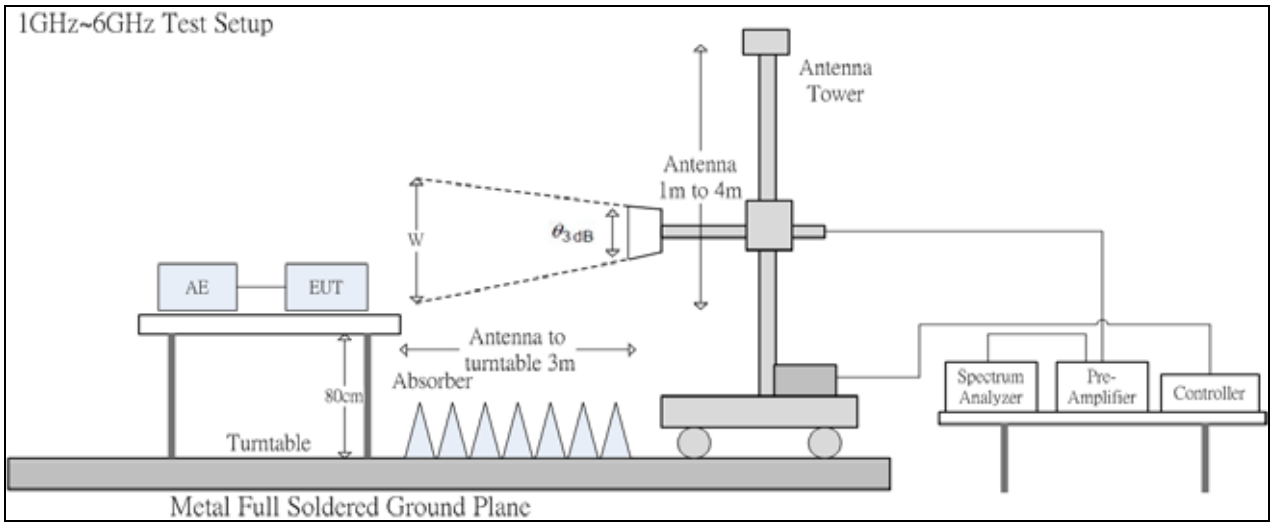
4. Radiated Disturbance Emissions

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 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 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

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

4.2 Limit

Radiated emissions at frequencies up to 1 GHz for Class_A equipment:

Frequency range MHz	Measurement		Class_A limits dB(μV/m)
	Distance m	Detector type / bandwidth	OATS/SAC
30-230	10	Quasi Peak / 120 kHz	40
230-1000			47
30-230	3		50
230-1000			57

Radiated emissions at frequencies above 1 GHz for Class_A equipment:

Frequency range MHz	Measurement		Class_A limits dB(μV/m)
	Distance m	Detector type / bandwidth	FSOATS
1000-3000	3	Average / 1MHz	56
3000-6000			60
1000-3000		Peak / 1MHz	76
3000-6000			80

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

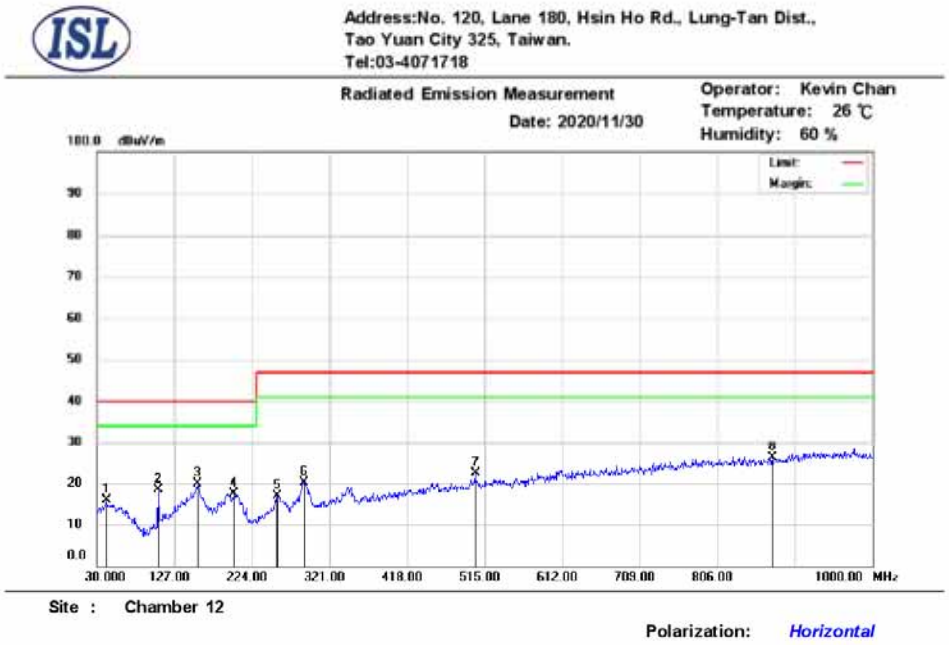
Radiated emissions at frequencies above 1 GHz for Class_B equipment:

Frequency range MHz	Measurement		Class_B limits dB(μV/m)
	Distance m	Detector type / bandwidth	FSOATS
1000-3000	3	Average / 1MHz	50
3000-6000			54
1000-3000		Peak / 1MHz	70
3000-6000			74

Radiated emissions from FM receivers:

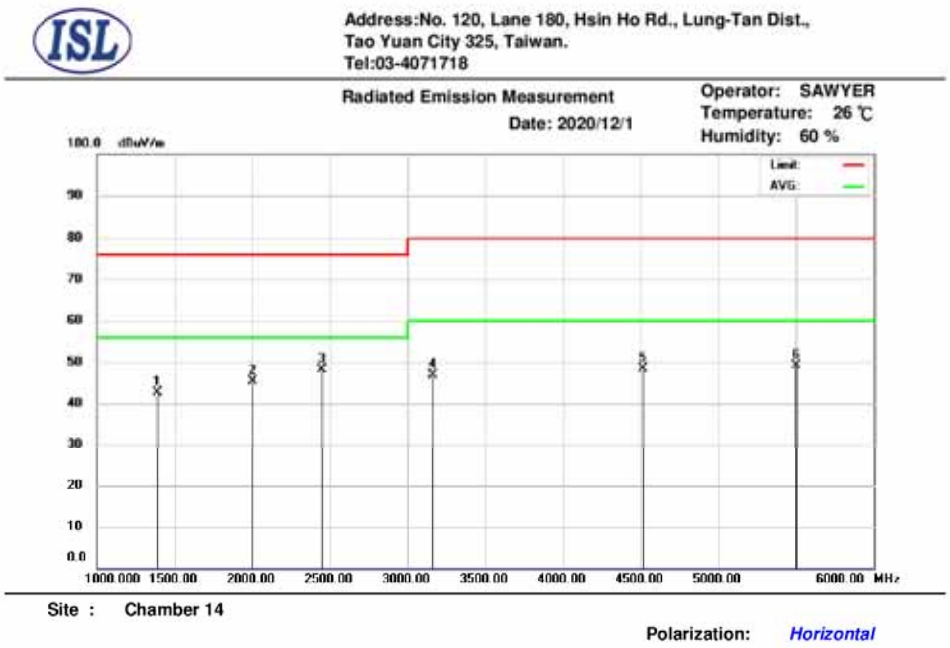
Frequency range MHz	Measurement		Class_B limits dB(μV/m)	
	Distance m	Detector type / bandwidth	Fundamental	Harmonics
			OATS/SAC	OATS/SAC
30-230	10	Quasi Peak / 120 kHz	50	42
230-300				42
300-1000				46
30-230	3		60	52
230-300				52
300-1000				56

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



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	42.61	32.96	-17.13	15.83	40.00	-24.17	230	0	peak
2	106.63	38.42	-20.06	18.36	40.00	-21.64	314	360	peak
3	156.10	35.54	-15.61	19.93	40.00	-20.07	300	357	peak
4	201.69	35.45	-18.19	17.26	40.00	-22.74	400	164	peak
5	256.01	33.05	-16.10	16.95	47.00	-30.05	300	202	peak
6	288.99	34.75	-14.61	20.14	47.00	-26.86	300	358	peak
7	503.36	31.87	-9.58	22.29	47.00	-24.71	200	15	peak
8	874.87	29.89	-3.76	26.13	47.00	-20.87	400	168	peak

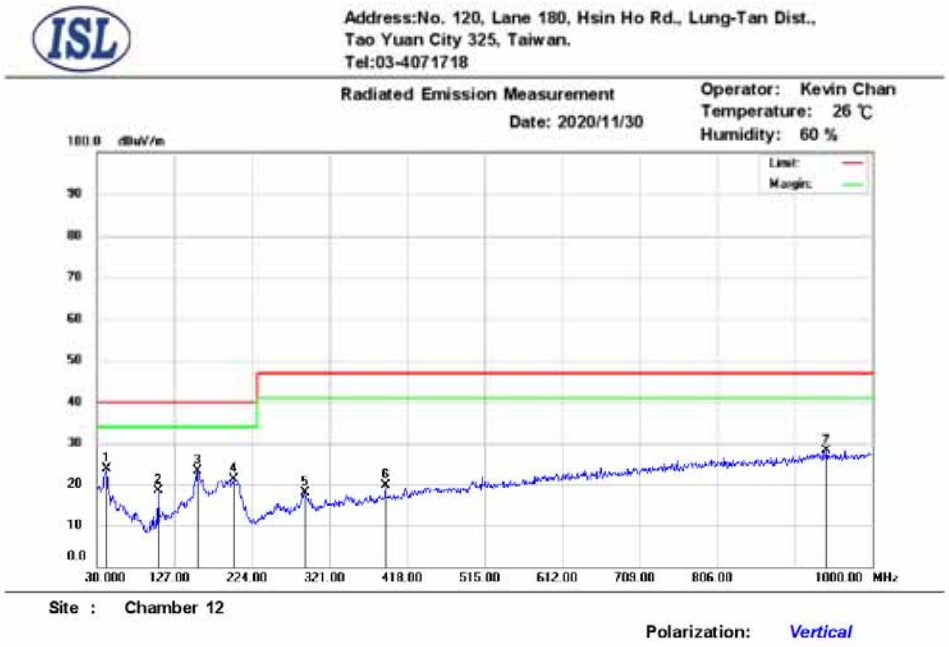
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Antenna Distance: 10 meters
Below 1GHz test, if the peak measured value meets the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



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1390.00	48.58	-5.87	42.71	76.00	-33.29	174	360	peak
2	2005.00	47.43	-2.16	45.27	76.00	-30.73	299	77	peak
3	2450.00	49.14	-1.10	48.04	76.00	-27.96	100	104	peak
4	3160.00	46.84	0.13	46.97	80.00	-33.03	299	179	peak
5	4515.00	47.01	1.42	48.43	80.00	-31.57	400	283	peak
6	5505.00	46.22	2.89	49.11	80.00	-30.89	100	59	peak

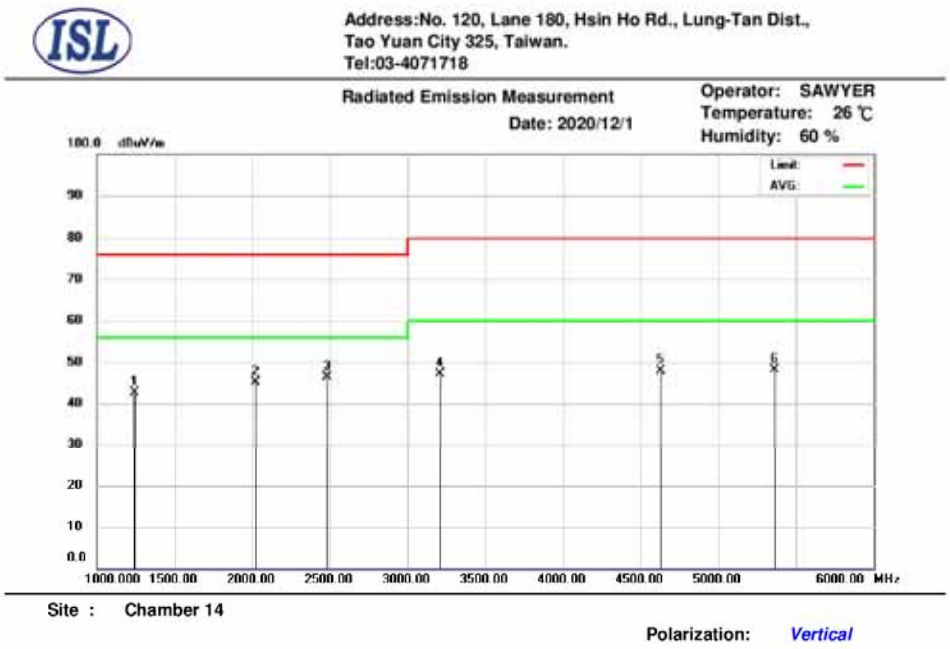
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Antenna Distance: 3 meters
Above 1GHz test, if the peak measured value meets the average limit, it is unnecessary to perform the average measurement.

-Radiated Emissions (Vertical)



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	42.61	40.69	-17.13	23.56	40.00	-16.44	248	0	peak
2	106.63	38.40	-20.06	18.34	40.00	-21.66	100	272	peak
3	156.10	38.62	-15.61	23.01	40.00	-16.99	100	26	peak
4	200.72	39.38	-18.14	21.24	40.00	-18.76	100	13	peak
5	289.96	32.56	-14.58	17.98	47.00	-29.02	100	21	peak
6	390.84	31.79	-12.09	19.70	47.00	-27.30	400	71	peak
7	942.77	30.51	-2.42	28.09	47.00	-18.91	200	34	peak

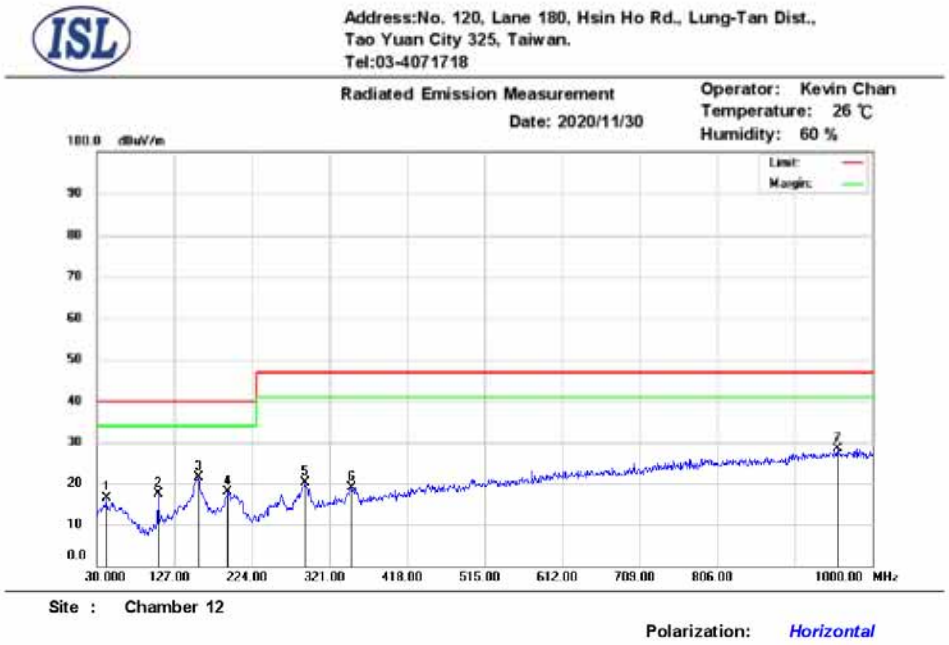
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Antenna Distance: 10 meters
Below 1GHz test, if the peak measured value meets the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



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1240.00	48.71	-6.17	42.54	76.00	-33.46	400	126	peak
2	2020.00	47.24	-2.15	45.09	76.00	-30.91	200	37	peak
3	2480.00	47.43	-1.02	46.41	76.00	-29.59	301	141	peak
4	3210.00	47.02	0.15	47.17	80.00	-32.83	301	112	peak
5	4630.00	46.17	1.63	47.80	80.00	-32.20	386	360	peak
6	5365.00	45.51	2.52	48.03	80.00	-31.97	200	205	peak

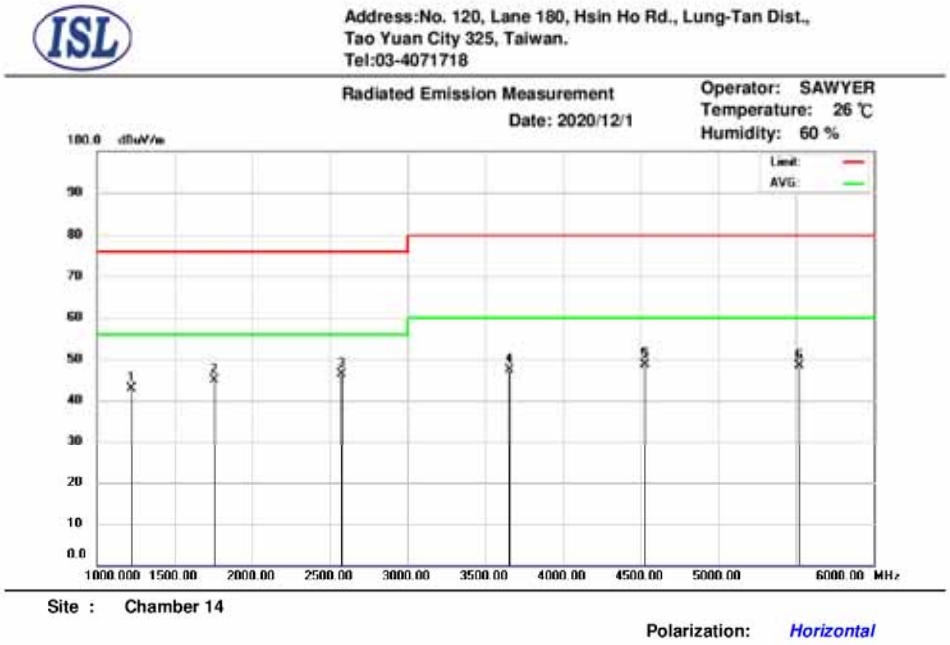
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Antenna Distance: 3 meters
Above 1GHz test, if the peak measured value meets the average limit, it is unnecessary to perform the average measurement.

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



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	41.64	33.60	-17.20	16.40	40.00	-23.60	400	359	peak
2	106.63	37.53	-20.06	17.47	40.00	-22.53	300	202	peak
3	157.07	36.87	-15.59	21.28	40.00	-18.72	400	354	peak
4	193.93	35.94	-18.06	17.88	40.00	-22.12	400	149	peak
5	289.96	34.65	-14.58	20.07	47.00	-26.93	300	153	peak
6	349.13	32.30	-13.31	18.99	47.00	-28.01	218	0	peak
7	956.35	30.72	-2.26	28.46	47.00	-18.54	100	137	peak

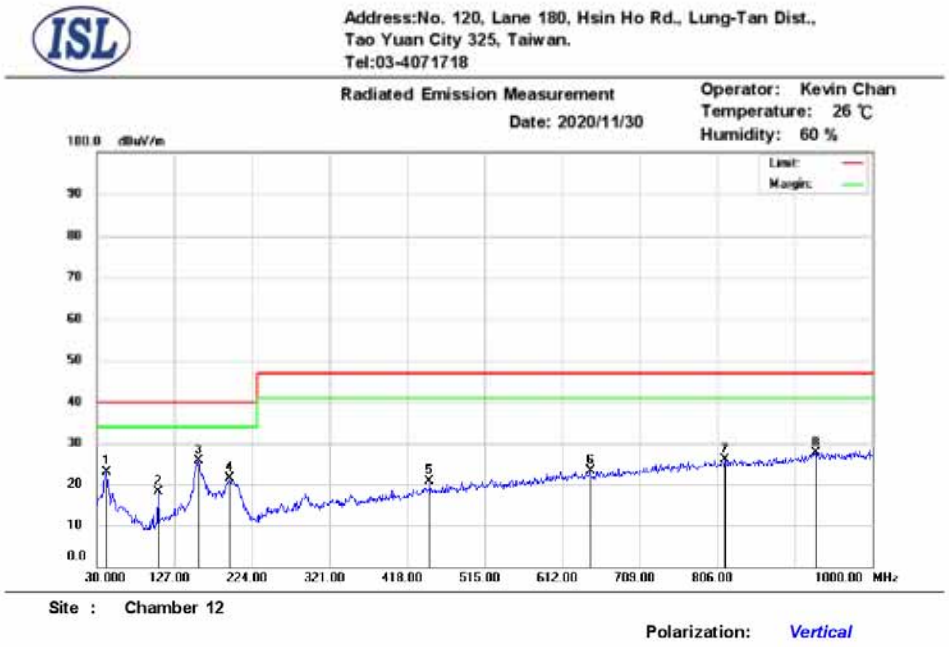
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Antenna Distance: 10 meters
Below 1GHz test, if the peak measured value meets the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



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1220.00	49.05	-6.26	42.79	76.00	-33.21	400	280	peak
2	1755.00	49.30	-4.31	44.99	76.00	-31.01	300	48	peak
3	2575.00	47.33	-1.04	46.29	76.00	-29.71	400	171	peak
4	3655.00	46.74	0.52	47.26	80.00	-32.74	400	305	peak
5	4530.00	47.13	1.50	48.63	80.00	-31.37	100	268	peak
6	5520.00	45.51	2.84	48.35	80.00	-31.65	199	4	peak

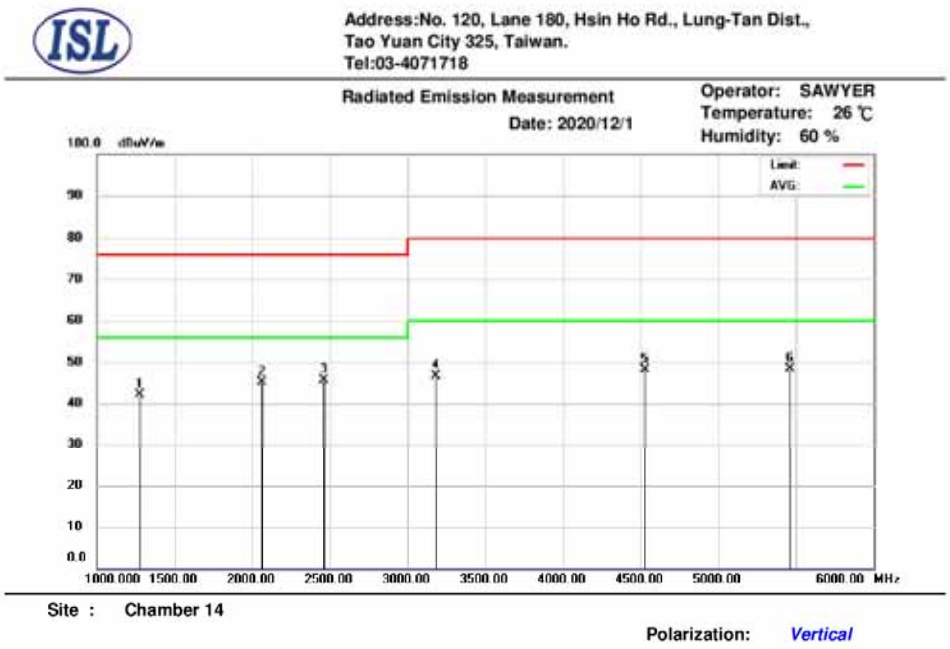
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Antenna Distance: 3 meters
Above 1GHz test, if the peak measured value meets the average limit, it is unnecessary to perform the average measurement.

-Radiated Emissions (Vertical)



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	41.64	39.99	-17.20	22.79	40.00	-17.21	100	11	peak
2	106.63	38.31	-20.06	18.25	40.00	-21.75	100	281	peak
3	157.07	41.12	-15.59	25.53	40.00	-14.47	100	32	peak
4	195.87	39.36	-18.04	21.32	40.00	-18.68	100	76	peak
5	446.13	31.05	-10.32	20.73	47.00	-26.27	300	75	peak
6	646.92	29.94	-6.79	23.15	47.00	-23.85	100	88	peak
7	815.70	30.11	-4.27	25.84	47.00	-21.16	276	0	peak
8	929.19	30.25	-2.55	27.70	47.00	-19.30	262	0	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
Antenna Distance: 10 meters
Below 1GHz test, if the peak measured value meets the QP limit, it is unnecessary to perform the QP measurement.



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1275.00	48.25	-6.02	42.23	76.00	-33.77	212	0	peak
2	2060.00	47.36	-2.12	45.24	76.00	-30.76	100	263	peak
3	2460.00	46.82	-1.07	45.75	76.00	-30.25	100	315	peak
4	3180.00	46.52	0.15	46.67	80.00	-33.33	200	290	peak
5	4530.00	46.57	1.50	48.07	80.00	-31.93	100	31	peak
6	5465.00	45.63	2.76	48.39	80.00	-31.61	100	359	peak

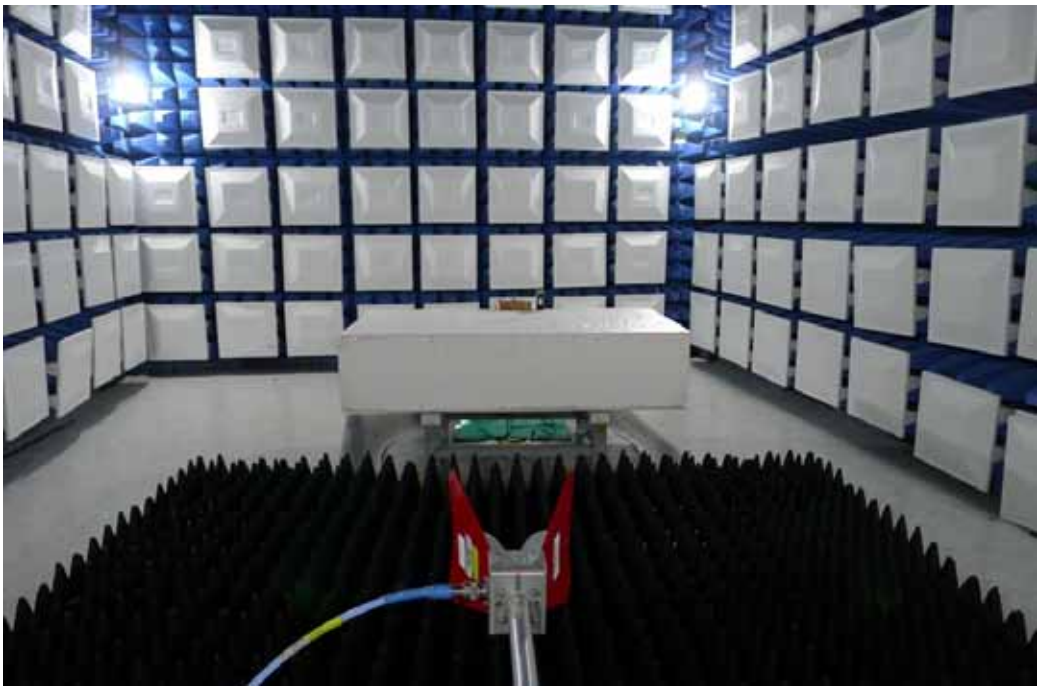
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Antenna Distance: 3 meters
Above 1GHz test, if the peak measured value meets the average limit, it is unnecessary to perform the average measurement.

4.5 Test Setup Photo

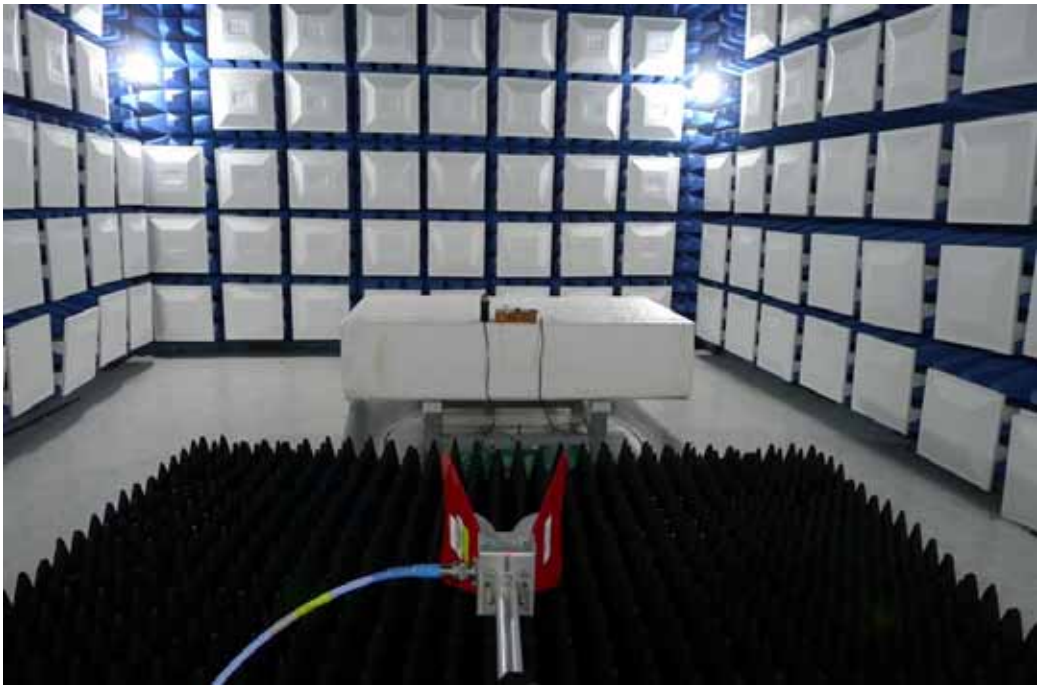
Front View (30MHz~1GHz)

Back View (30MHz~1GHz)

Front View (above 1GHz)



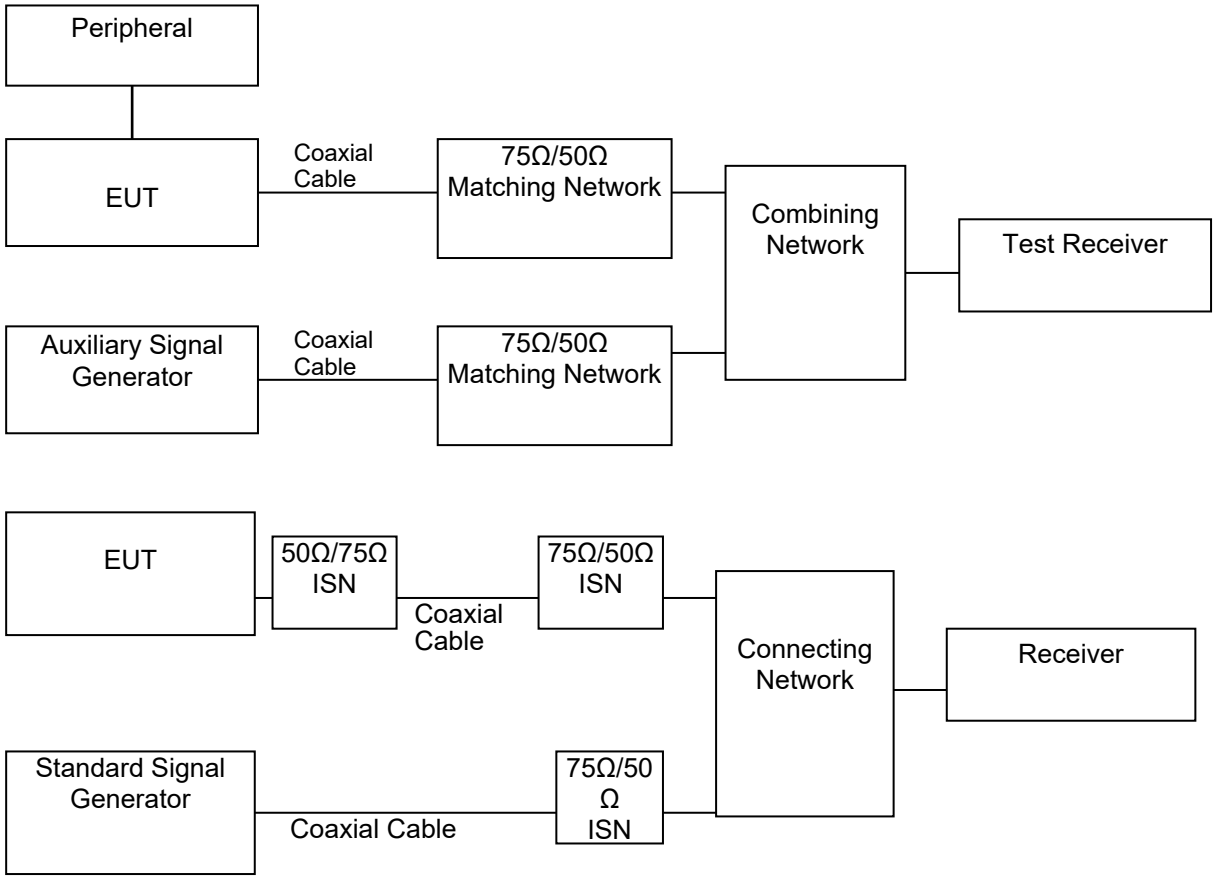
Back View (above 1GHz)



5. Voltage Disturbance Emissions at Antenna Terminals

5.1 Test Setup and Procedure

5.1.1 Test Setup



5.1.2 Test Procedure

The output level of the auxiliary signal generator was set to 70dBuV at the EUT antenna terminal with 75 ohms impedance with an un-modulated carrier.
The highest emissions 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 power of EUT was switched off to make sure the emission was not contributed by the auxiliary signal generator. While doing so, the interconnecting cables and major parts of the system were moved around to maximize the emission.

5.1.3 EMI Receiver Configuration (for the frequencies tested)

Frequency Range: 30MHz-2150MHz
Detector Function: Quasi-Peak Mode
Resolution Bandwidth: 120kHz

5.1.4 Limit

Applicable to:

1. TV broadcast receiver tuner ports with an accessible connector.

2. RF modulator output ports.

3. FM broadcast receiver tuner ports with an accessible connector.

Table clause	Frequency range MHz	Detector type/ bandwidth	Class B limits dB(μV) 75 Ω			Applicability
			Other	Local Oscillator Fundamental	Local Oscillator Harmonics	
A12.1	30 – 950	For frequencies ≤1 GHz Quasi Peak/ 120 kHz	46	46	46	See a)
	950 – 2 150		46	54	54	
A12.2	950 – 2 150		46	54	54	See b)
A12.3	30 – 300		46	54	50	See c)
	300 – 1 000				52	
A12.4	30 – 300	For frequencies ≥1 GHz Peak/ 1 MHz	46	66	59	See d)
	300 – 1 000				52	
A12.5	30 – 950		46	76	46	See e)
	950 – 2 150			n/a	54	

a) Television receivers (analogue or digital), video recorders and PC TV broadcast receiver tuner cards working in channels between 30 MHz and 1 GHz, and digital audio receivers.

b) Tuner units (not the LNB) for satellite signal reception.

c) Frequency modulation audio receivers and PC tuner cards.

d) Frequency modulation car radios.

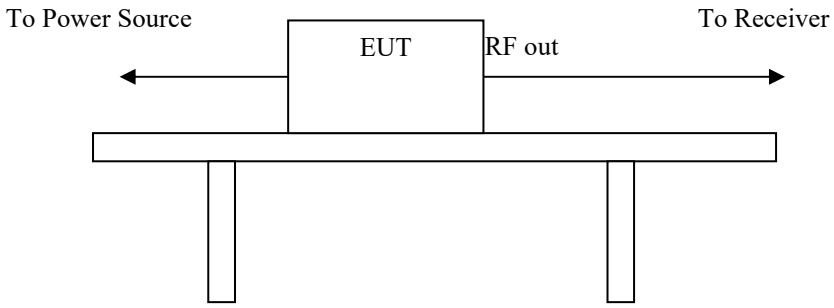
e) Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports.

****Remarks: It is not necessary to be tested on this item.**

6. Differential Voltage Emissions

6.1 Test Setup and Procedure

6.1.1 Test Setup



6.1.2 Test Procedure

The output level of the auxiliary signal generator was set to 70dBuV at the EUT antenna terminal with 75 ohms impedance with an un-modulated carrier.
The highest emissions 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 power of EUT was switched off to make sure the emission was not contributed by the auxiliary signal generator. While doing so, the interconnecting cables and major parts of the system were moved around to maximize the emission.

6.1.3 EMI Receiver Configuration (for the frequencies tested)

Frequency Range:	30MHz-2150MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth:	120kHz

6.1.4 Limit

Applicable to:

1. TV broadcast receiver tuner ports with an accessible connector.

2. RF modulator output ports.

3. FM broadcast receiver tuner ports with an accessible connector.

Table clause	Frequency range MHz	Detector type/ bandwidth	Class B limits dB(μV) 75 Ω			Applicability
			Other	Local Oscillator Fundamental	Local Oscillator Harmonics	
A12.1	30 – 950	For frequencies ≤1 GHz Quasi Peak/ 120 kHz	46	46	46	See a)
	950 – 2 150		46	54	54	
A12.2	950 – 2 150		46	54	54	See b)
A12.3	30 – 300		46	54	50	See c)
	300 – 1 000				52	
A12.4	30 – 300	For frequencies ≥1 GHz Peak/ 1 MHz	46	66	59	See d)
	300 – 1 000				52	
A12.5	30 – 950		46	76	46	See e)
	950 – 2 150			n/a	54	

a) Television receivers (analogue or digital), video recorders and PC TV broadcast receiver tuner cards working in channels between 30 MHz and 1 GHz, and digital audio receivers.

b) Tuner units (not the LNB) for satellite signal reception.

c) Frequency modulation audio receivers and PC tuner cards.

d) Frequency modulation car radios.

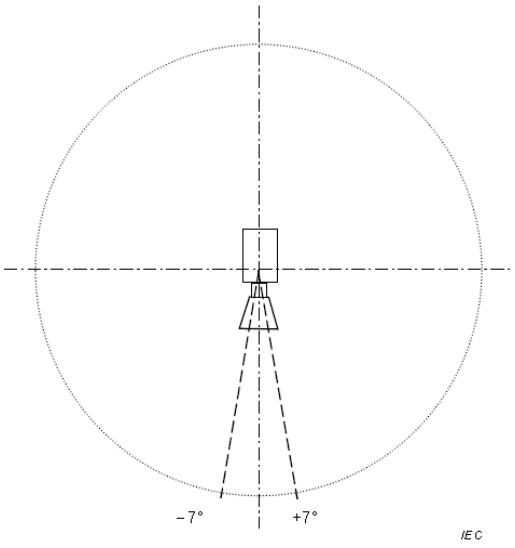
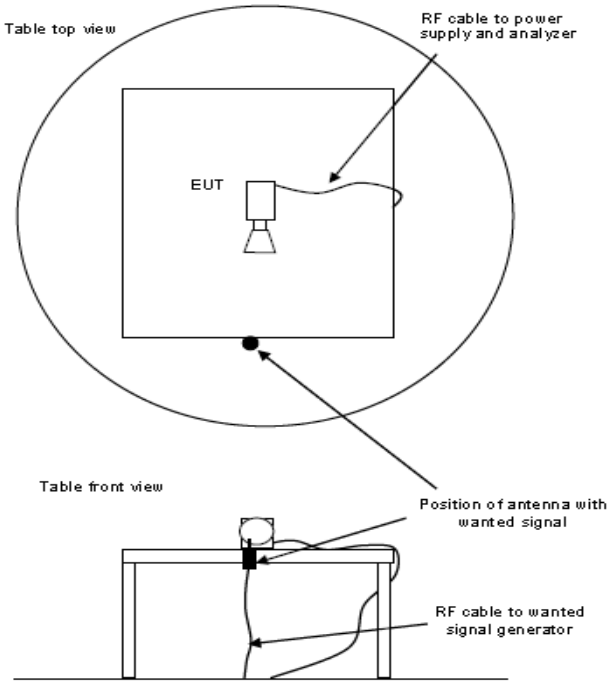
e) Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports.

****Remarks: It is not necessary to be tested on this item.**

7. Outdoor units of home satellite receiving systems

7.1 Test Setup and Procedure

7.1.1 Test Setup

	
Description of ±7° of the main beam axis of the EUT	Measurement arrangements of transmit antenna for the wanted signal

7.1.2 Test Procedure

The input signal shall be adjusted to get the maximum rated output level from the EUT. For the measurement in the frequency range from 30 MHz to 18 GHz the input signal shall be adjusted so that the output frequency is within this frequency range. For the measurement in the frequency range above 1 GHz, the frequency of the input signal shall be adjusted in such a way that the EUT is measured, as a minimum, at the lowest, middle and highest rated output frequency within the measured frequency range.

7.1.3 Spectrum Analyzer Configuration (for the frequencies tested)

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

Frequency Range: Above 1000MHz
Detector Function: Peak/Average Mode
Resolution Bandwidth: 1MHz

7.1.4 Limit

Table Clause	Frequency Range MHz	Measurement			Class B Limits	Applicable to
		Facility (see Table A.1)	Distance m	Detector type / Bandwidth		
A7.1	30 to 1 000	SAC / OATS / FAR	See Table A.4	Quasi Peak / 120 kHz	See Table A.4	
A7.2	1 000 to 2 500	FSOATS	3	Average / 1 MHz	50 dB(μV/m)	LO leakage and spurious radiated emissions from the EUT, in the region outside ±7° of the main beam axis. See Figure H.1
	2 500 to 18 000				64 dB(μV/m)	
A7.3	1 000 to 18 000	FSOATS	3	Average / 1 MHz	37 dB(μV/m)	LO leakage from the EUT, in the region within ±7° of the main beam axis. See Figure H.1
A7.4	1 000 to 18 000	Conducted (Clause H.4)	n/a	Average / 1 MHz	30 dBpW	
For details of the EUT configuration, see Annex H. For radiated emissions measurements at frequencies up to 1 GHz, the requirements defined in Table A.4 shall be satisfied. Apply the appropriate limits across the entire frequency range. Apply the limits defined in table Clause A7.1 and A7.2. Also apply the limits defined in either table Clause A7.3 or A7.4.						

****Remarks: It is not necessary to be tested on this item.**

8. Electrostatic discharge (ESD) immunity

8.1 Test Specification and Setup

8.1.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-2/ IEC 61000-4-2 (details referred to Sec 1.2)
Test Level: (By manufacture reference)	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

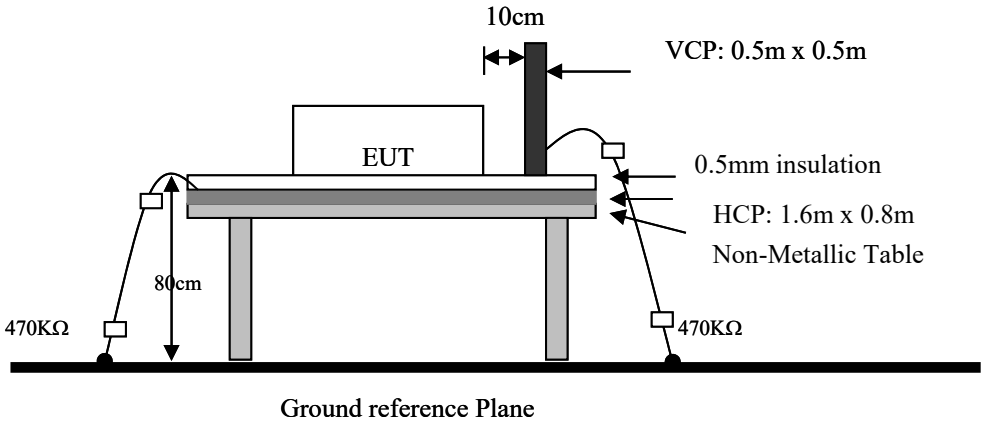
Air: discharges were applied to slots, aperture or insulating surfaces. 10 single air discharges were applied to each selected points.

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.

8.1.2 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.



8.1.3 Test Result

Performance of EUT complies with the given specification

8.2 Test Data: Configuration 1

Basic Standard	EN 61000-4-2	Date
EUT Model Name	THN 30-7210WIR	2020-12-17
		Engineer
Barometer Pressure	100.8kPa	SAWYER
Temperature	25℃	Equipment & Test Site
Humidity	40%	EM TEST(Model: Dito)
Voltage/Freq.	110Vdc	

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

→Blue arrow represent Air discharge point

→Red arrow represent Contact discharge point

ND=No Discharge, No Arcing; 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 25 Discharge @ 1 PPS										
Test Location	+4	-4	+6	-6							Comments
1	ND	ND	ND	ND							
2	ND	ND	ND	ND							
3	ND	ND	ND	ND							
4	ND	ND	ND	ND							
5	ND	ND	ND	ND							
Air Discharge	Voltage kV 10 Discharge @ 1 PPS										
Test Location	+2	-2	+4	-4	+8	-8					Comments
1	ND	ND	ND	ND	A	A					
2	ND	ND	ND	ND	A	A					
3	ND	ND	ND	ND	A	A					
4	ND	ND	ND	ND	A	A					
5	ND	ND	ND	ND	A	A					
Indirect Discharge	Voltage kV 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

8.3 Test Point

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

Figure 1 : Test Point Assignments Discharge:

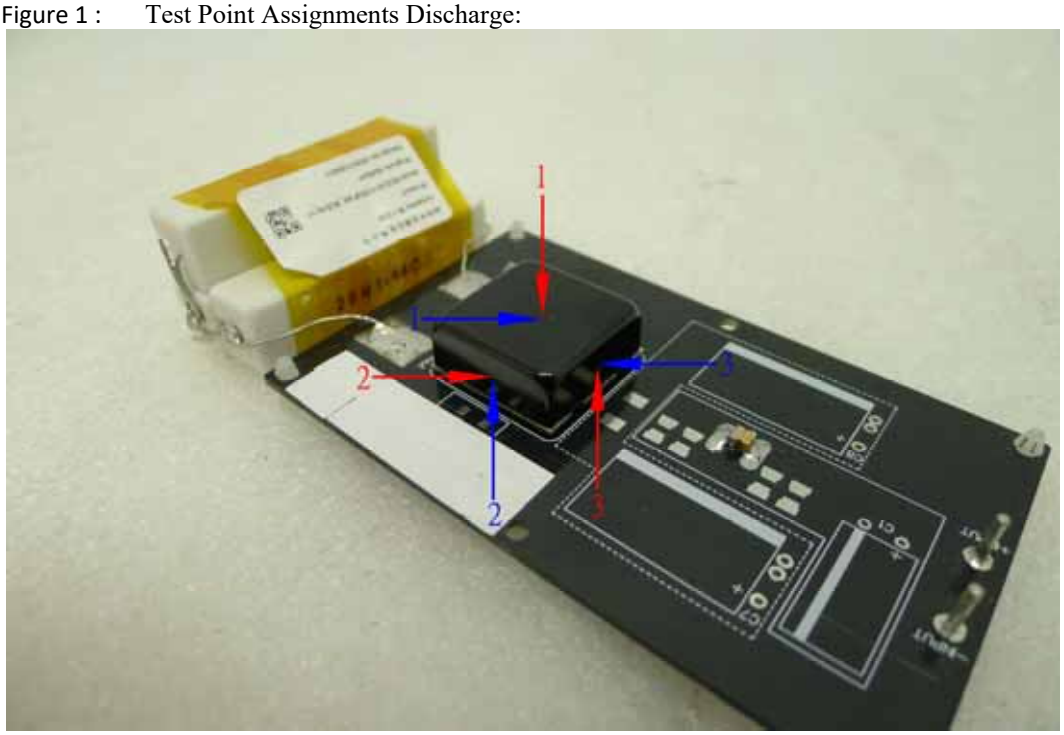
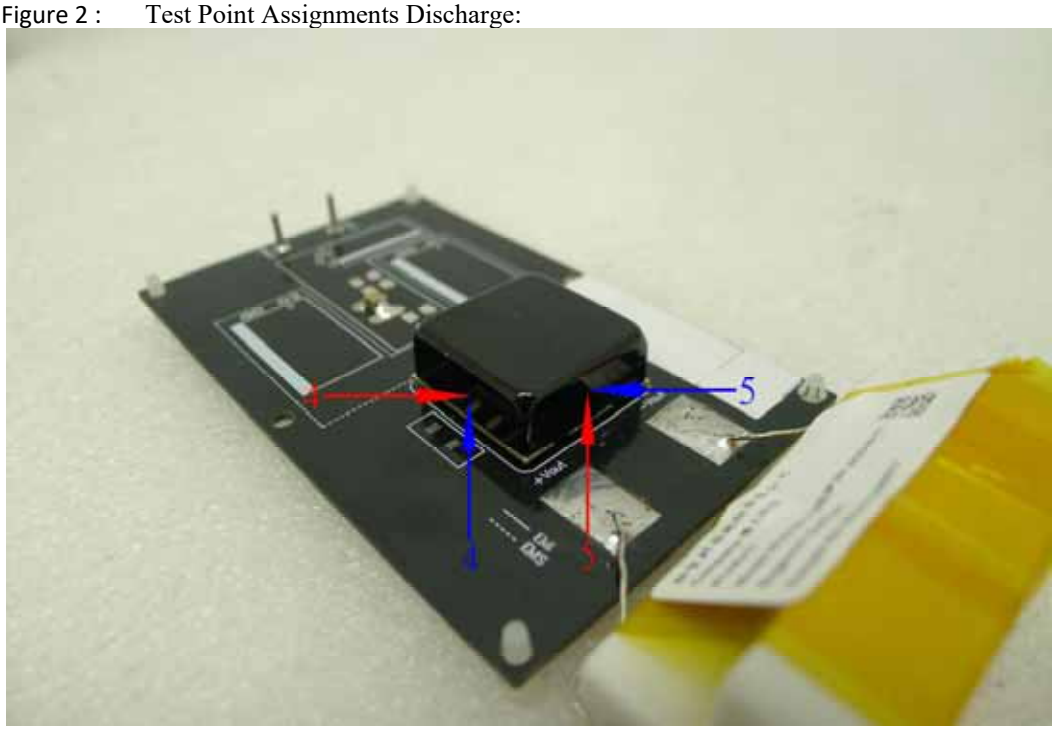


Figure 2 : Test Point Assignments Discharge:



8.4 Test Setup Photo

9. Radio-Frequency, Electromagnetic Field immunity

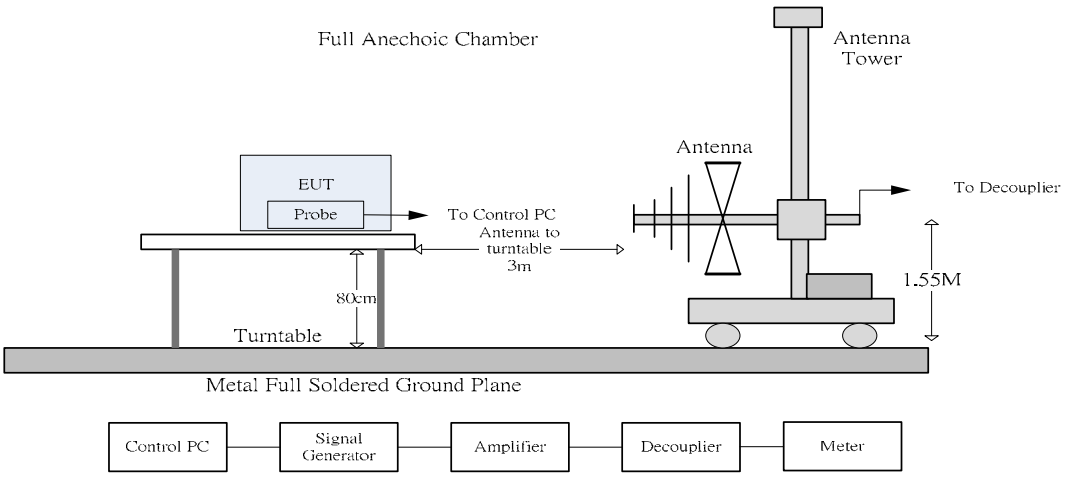
9.1 Test Specification and Setup

9.1.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-3/ IEC 61000-4-3 (details referred to Sec 1.2)
Test Level: (By manufacture reference)	20 V/m
Modulation:	AM 1kHz 80%
Frequency range:	80 MHz~1 GHz
Frequency Step:	1% of last step frequency
Dwell time:	2s
Polarization:	Vertical and Horizontal
EUT Azimuth Angle	☒0° ☒90° ☒180° ☒270°
Criteria:	A
Test Procedure	refer to ISL QA -T4-E-S8

9.1.2 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.



9.1.3 Test Result

Performance of EUT complies with the given specification

9.2 Test Data: Configuration 1

Basic Standard	EN 61000-4-3	Date
EUT Model Name	THN 30-7210WIR	2020-12-17
		Engineer
Barometer Pressure	102.2kPa	SAWYER
Temperature	23℃	Equipment & Test Site
Humidity	55%	Chamber 15
Voltage/Freq.	110 Vdc	

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	2s	80% @ 1kHz	20	Vertical	A	
90°(left)	80-1000	1	2s	80% @ 1kHz	20	Vertical	A	
180°(back)	80-1000	1	2s	80% @ 1kHz	20	Vertical	A	
270°(right)	80-1000	1	2s	80% @ 1kHz	20	Vertical	A	
0°(front)	80-1000	1	2s	80% @ 1kHz	20	Horizontal	A	
90°(left)	80-1000	1	2s	80% @ 1kHz	20	Horizontal	A	
180°(back)	80-1000	1	2s	80% @ 1kHz	20	Horizontal	A	
270°(right)	80-1000	1	2s	80% @ 1kHz	20	Horizontal	A	

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

9.3 Test Setup Photo

10. Electrical Fast transients/burst immunity

10.1 Test Specification and Setup

10.1.1 Test Specification

Port:	DC mains
Basic Standard:	EN 61000-4-4/ IEC 61000-4-4 (details referred to Sec 1.2)
Test Level: (By manufacture reference)	DC Power Port: +/- 2 kV
Rise Time:	5ns
Hold Time:	50ns
Burst Period:	300ms
Repetition Frequency:	5kHz
Criteria:	B
Test Procedure	refer to ISL QA -T4-E-S9

Test Procedure

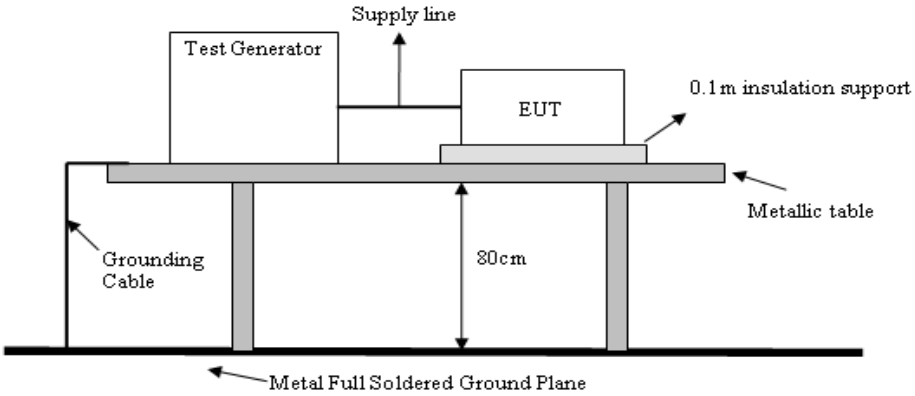
The EUT was setup on a nonconductive table 0.1 m above a reference ground plane.

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

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

10.1.2 Test Setup

EUT is at least 50cm from the conductive structure.



10.1.3 Test Result

Performance of EUT complies with the given specification

10.2 Test Data: Configuration 1

Basic Standard	EN 61000-4-4	Date	
EUT Model Name	THN 30-7210WIR	2020-11-27	
		Engineer	
Barometer Pressure	102.3kPa	SAWYER	
Temperature	24℃	Equipment & Test Site	
Humidity	52%	EMC-PARTNER (Model: IMU3000)	
Voltage/Freq.	110 Vdc		

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

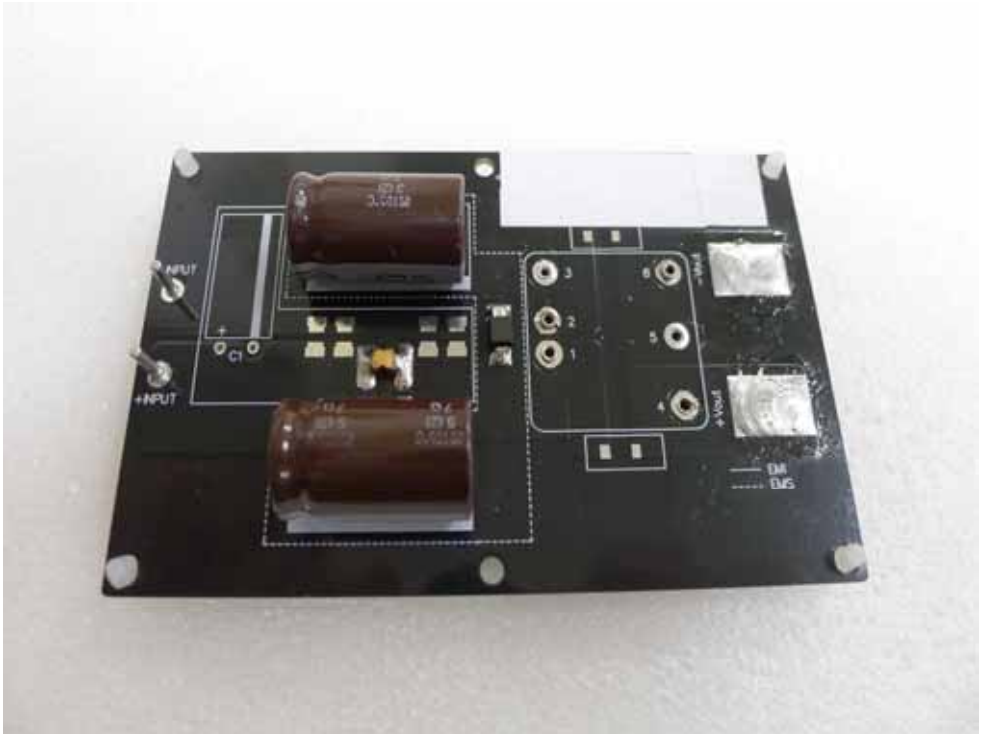
AC Power Port: ☐	DC Power Port: ☑	LAN Port: ☐	Telephone Port: ☐

DC Power Port

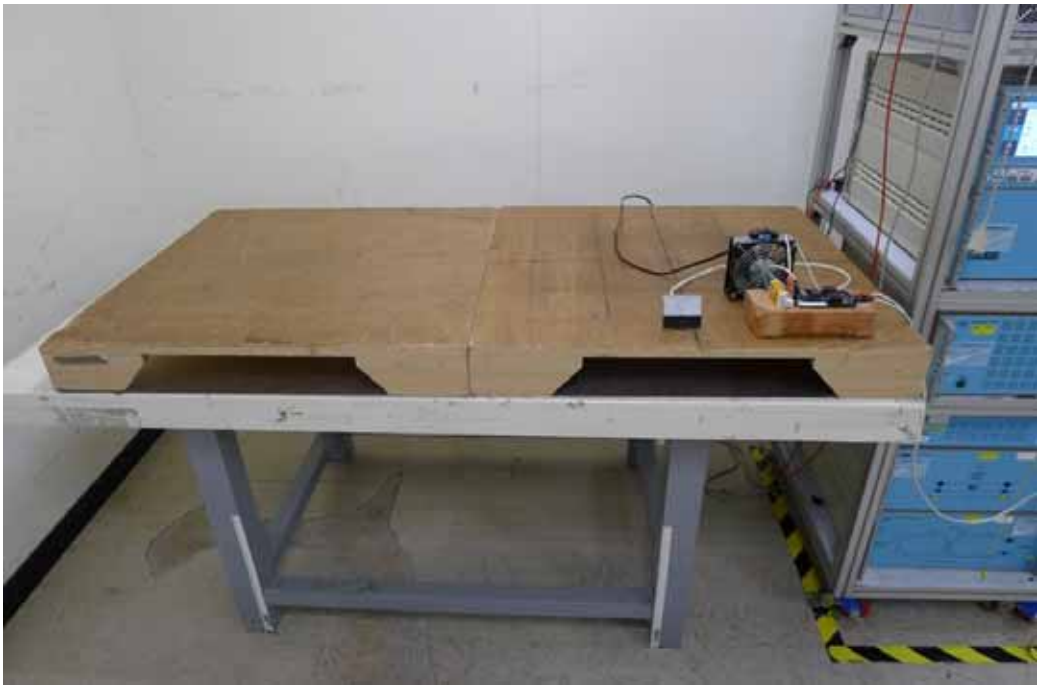
Line Under Test	Voltage Level	Severity Level	Pulse Polarity	Burst Repetition Rate	Test Duration	EUT Status	Comments
Line	2.0kV	3	+	300ms / 5.0kHz	1 Minutes	A	
Line	2.0kV	3	-	300ms / 5.0kHz	1 Minutes	A	
Neutral	2.0kV	3	+	300ms / 5.0kHz	1 Minutes	A	
Neutral	2.0kV	3	-	300ms / 5.0kHz	1 Minutes	A	
Line- Neutral	2.0kV	3	+	300ms / 5.0kHz	1 Minutes	A	
Line- Neutral	2.0kV	3	-	300ms / 5.0kHz	1 Minutes	A	

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

NOTE:
With 2pcs aluminum electrolytic capacitor(Nippon chemi-con KXJ series,150μF/200V in parallel) and a TVS (SMBJ220A, 220V, 600Watt peak pulse power) in parallel.



10.3 Test Setup Photo



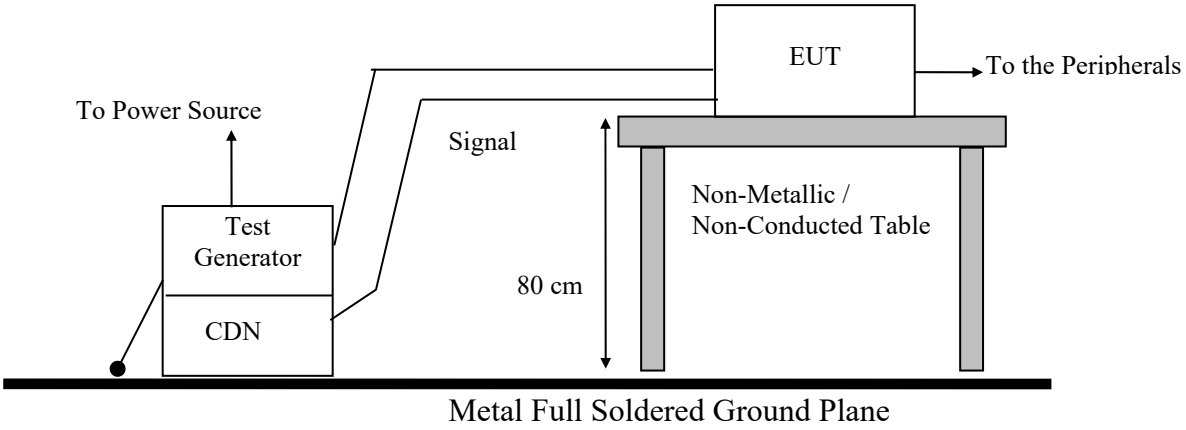
11. Surge Immunity

11.1 Test Specification and Setup

11.1.1 Test Specification

Port:	DC mains
Basic Standard:	EN 61000-4-5/ IEC 61000-4-5 (details referred to Sec 1.2)
Test Level: (By manufacture reference)	Line to Line: +/- 0.5 kV, +/- 1 kV, +/- 2 kV
Rise Time:	1.2us
Hold Time:	50us
Repetition Rate:	60 seconds
Angle:	☐0° ☐90° ☐180° ☐270°
Criteria:	B
Test Procedure:	refer to ISL QA -T4-E-S10

11.1.2 Test Setup



11.1.3 Test Result

Performance of EUT complies with the given specification

11.2 Test Data: Configuration 1

Basic Standard	EN 61000-4-5	Date
EUT Model Name	THN 30-7210WIR	2020-11-30
		Engineer
Barometer Pressure	102.3kPa	SAWYER
Temperature	24℃	Equipment & Test Site
Humidity	52%	EMC-PARTNER (Model: IMU3000)
Voltage/Freq.	110 Vdc	

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

AC Power Port: ☐	DC Power Port: ☑	LAN Port: ☐	Telephone Port: ☐

DC Power Port

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

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

NOTE:
With 2pcs aluminum electrolytic capacitor(Nippon chemi-con KXJ series,150μF/200V in parallel) and a TVS (SMBJ220A, 220V, 600Watt peak pulse power) in parallel.

11.3 Test Setup Photo

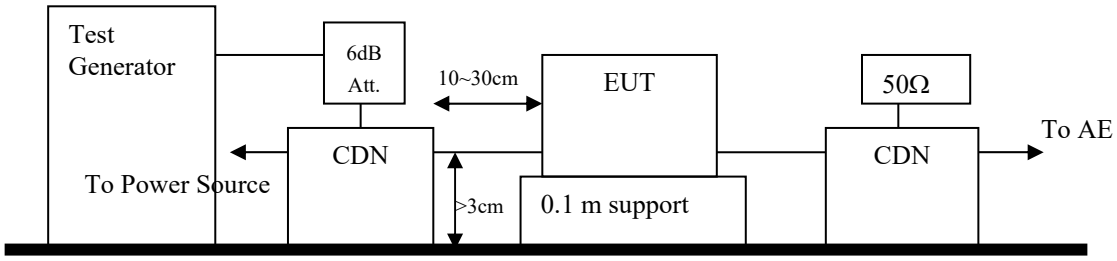
12. Immunity to Conductive Disturbance

12.1 Test Specification and Setup

12.1.1 Test Specification

Port:	DC mains
Basic Standard:	EN 61000-4-6/ IEC 61000-4-6 (details referred to Sec 1.2)
Test Level: (By manufacture reference)	0.15MHz to 10MHz: 10 Vrms
Modulation:	AM 1kHz 80%
Frequency range:	0.15 MHz - 80MHz
Frequency Step:	1% of last Frequency
Dwell time:	2s
Criteria:	A
CDN Type:	CDN M2+M3
Test Procedure	refer to ISL QA -T4-E-S11

12.1.2 Test Setup



Reference Ground Plane

12.1.3 Test Result

Performance of EUT complies with the given specification

12.2 Test Data: Configuration 1

Basic Standard	EN 61000-4-6				Date		
EUT Model Name	THN 30-7210WIR				2020-11-28		
					Engineer		
Barometer Pressure	102.2kPa				SAWYER		
Temperature	24℃				Equipment & Test Site		
Humidity	57%				FRANKONIA (Model: CIT-10/75)		
Voltage/Freq.	110 Vdc						
A=criteria A, B=criteria B, C=criteria C							
DC Power Port							
Line Under Test	Frequency		Level	Modulation	Dwell time	EUT Status	Comments
	Range (MHz)	Steps %					
DC Power Port	0.15 to 80	1	10V	80% @ 1kHz	2s	A	
Additional Notes: A=criteria A, B=criteria B, C=criteria C							

12.3 Test Setup Photo

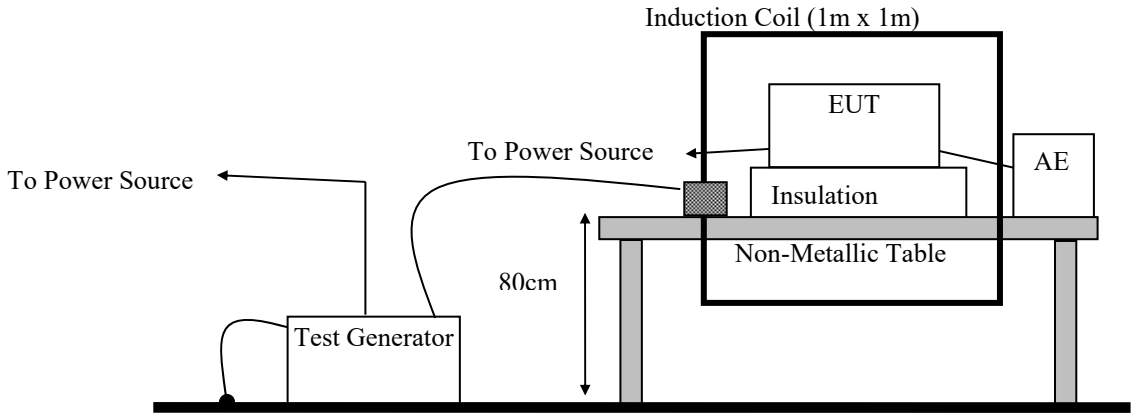
13. Power Frequency Magnetic Field immunity

13.1 Test Specification and Setup

13.1.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-8/ IEC 61000-4-8 (details referred to Sec 1.2)
Test Level: (By manufacture reference)	100 A/m, 1000 A/m
Polarization:	X, Y, Z
Criteria:	A
Test Procedure	refer to ISL QA -T4-E-S12

13.1.2 Test Setup



13.1.3 Test Result

Performance of EUT complies with the given specification

13.2 Test Data: Configuration 1

Basic Standard	EN 61000-4-8	Date
EUT Model Name	THN 30-7210WIR	2020-11-30
		Engineer
Barometer Pressure	102.3kPa	SAWYER
Temperature	24℃	Equipment & Test Site
Humidity	55%	Magnetic Field Immunity Loop Brand: Pic Model:PMF1000 & Magnetic Field Test AC Power Source Brand: Pic Model: AC Power Source
Voltage/Freq.	110Vdc	

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

Antenna Polarization	Frequency (Hz)	Test Level	Test Duration	EUT Status	Comment
X	0	100 A/m	1 Minutes	A	
Y	0	100 A/m	1 Minutes	A	
Z	0	100 A/m	1 Minutes	A	
X	0	1000 A/m	1 Second	A	
Y	0	1000 A/m	1 Second	A	
Z	0	1000 A/m	1 Second	A	

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

13.3 Test Setup Photo

14. Appendix

14.1 Appendix A: Test Equipment

14.1.1 Test Equipment List

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 03	EMI Receiver 15	ROHDE & SCHWARZ	ESCI	101166	07/29/2020	07/29/2021
Conduction 03	LISN 19	R&S	ENV216	101425	11/05/2020	11/05/2021
Conduction 03	LISN 15	R&S	ENV216	101335	11/27/2020	11/27/2021
Conduction 03	Conduction 04-3 Cable	WOKEN	CFD 300-NL	conduction 04-3	09/07/2020	09/07/2021

Location Chmb12	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation (Chamber12)	BILOG Antenna 18	Schwarzbeck	Schwarzbeck VULB 9168+EMCI-N -6-05	646	02/18/2020	02/18/2021
Radiation (Chamber12)	Preamplifier 26	EMCI	EMC9135	980297	02/21/2020	02/21/2021
Radiation (Chamber12)	Coaxial Cable Chmb 12-10M-01	PEWC	CFD400-NL	Chmb 12-10M-01	10/14/2020	10/14/2021
Radiation (Chamber12)	EMI Receiver 19	ROHDE & SCHWARZ	ESR 3	102460	08/04/2020	08/04/2021

Location Chmb14	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Rad. Above 1GHz	Spectrum Analyzer 25	R&S	FSV 40	101499	11/04/2020	11/04/2021
Rad. Above 1GHz	Horn Antenna 06	ETS-Lindgren	3117	00066665	11/04/2020	11/04/2021
Rad. Above 1GHz	Preamplifier 20	EMC INSTRUMENT	EMC051845	980084	11/19/2020	11/19/2021
Rad. Above 1GHz	Microwave Cable-11	HUBER SUHNER	SUCOFLEX 106	78034/6	02/03/2020	02/03/2021
Rad. Above 1GHz	Microwave Cable-26	EMCI	EMC104-NM-SM-800	141112	02/26/2020	02/26/2021

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
EN61K-4-2	ESD Gun 9	EM TEST	Dito	V1018106503	04/28/2020	04/28/2021
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	11/29/2020	11/29/2021
EN61K-4-4 EN61K-4-5	EFT and SURGE Test System	EMC Partner	IMU3000	1547	09/19/2020	12/19/2021
EN61K-4-6	CDN M2+M3 04	TESEQ	CDN M016	43257	09/03/2020	09/03/2021
EN61K-4-6	Coaxial Cable 4-6 02-1			4-6 02-1	N/A	N/A
EN61K-4-6	Conducted Immunity Test System 03	Frankonia	CIT-10-75	126B1151	01/15/2020	01/15/2021
EN61K-4-8	Magnetic Field Test Generator 02	PIC	PMF-1000	ANT150701	05/08/2019	05/08/2020

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

****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 Partner	1.69
EN61000-4-5	EMC Partner	1.69
EN61000-4-6	FRANKONIA CD-LAB	V5.221
EN61000-4-8	N/A	

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

14.2 Appendix B: Uncertainty of Measurement

The laboratory measurement uncertainty accordance with refers to CISPR 16-4-2. If Ulab is less than or equal to Ucispr in Table 1, then the test report may either state the value of Ulab or state that Ulab is less than Ucispr.
The coverage factor k = 2 yields approximately a 95 % level of confidence.

<Conduction 03>
AMN: ±2.90dB

<Chamber 12 (10M)>
Horizontal
30MHz~200MHz: ±4.14dB
200MHz~1000MHz: ±4.12dB
Vertical
30MHz~200MHz: ±4.30dB
200MHz~1000MHz: ±4.45dB

<Chamber 14 (3M)>
1GHz~6GHz: ±4.93dB

<Immunity 02>

Test item	Uncertainty	Test item	Uncertainty
EN 61000-4-2 (ESD)		EN 61000-4-6 (CS)	
Rise time tr	≦ 9.81%	CDN	± 1.74dB
Peak current Ip	≦ 5.54%	EM Clamp	± 3.36dB
current at 30 ns	≦ 5.55%	EN 61000-4-8 (Magnetic)	± 6.53%
current at 60 ns	≦ 5.55%		
EN 61000-4-3 (RS)	± 1.89dB		
EN 61000-4-4 (EFT)			
voltage rise time (tr)	± 5.1%		
peak voltage value (VP)	± 6.39%		
voltage pulse width (tw)	± 5.0%		
EN 61000-4-5 (Surge)			
open-circuit voltage front time	±13.5%		
open-circuit voltage peak value	±6.6%		
open-circuit voltage duration (Td)	53.33μs		

14.3 Appendix C: Photographs of EUT

Please refer to the File of **ISL-*20LE970*P-MA**

--- END ---

Appendix

Photographs of EUT

of

Product Name

THN 20WIR THN 30WIR Series

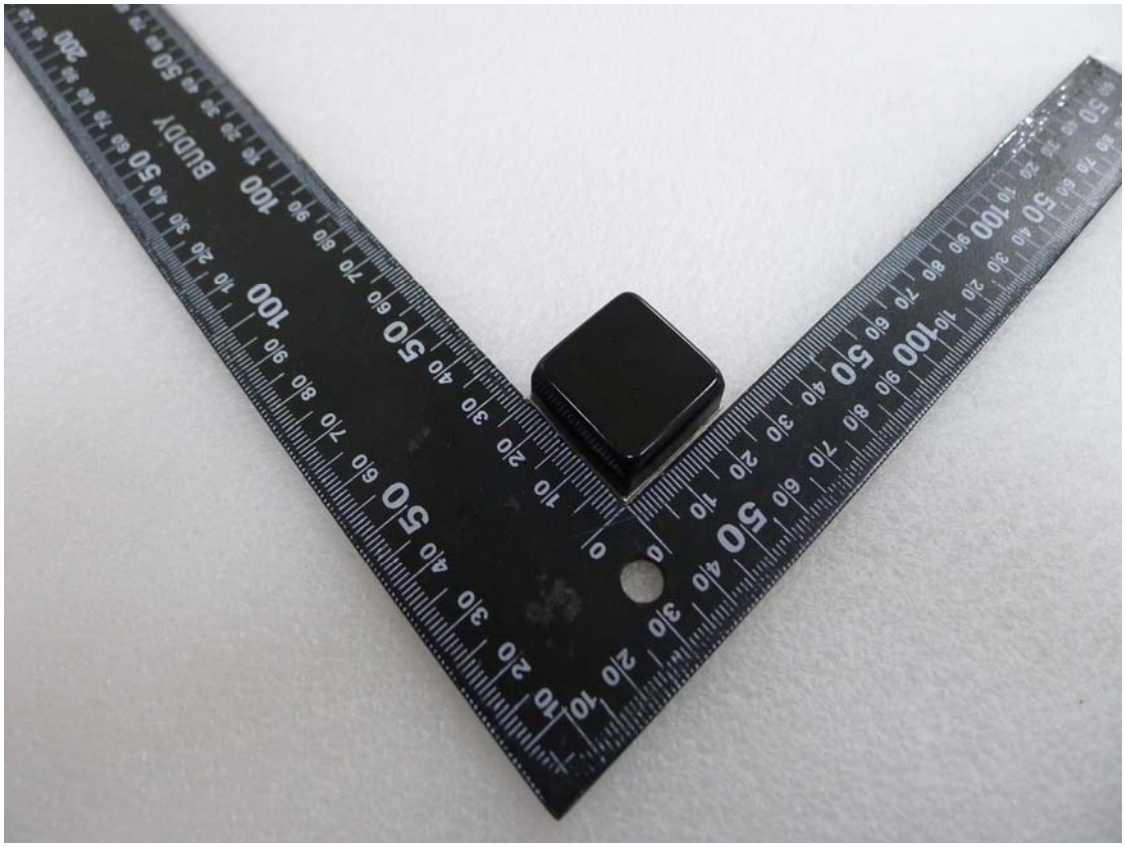
Model

**THN 30-7210WIR;THN 30-7225WIR;THN 30-2410WIR;
THN 30-2411WIR;THN 30-2412WIR;THN 30-2413WIR;
THN 30-2415WIR;THN 30-2422WIR;THN 30-2423WIR;
THN 30-2425WIR;THN 30-4810WIR;THN 30-4811WIR;
THN 30-4812WIR;THN 30-4813WIR;THN 30-4815WIR;
THN 30-4822WIR;THN 30-4823WIR;THN 30-4825WIR;
THN 30-7211WIR;THN 30-7212WIR;THN 30-7213WIR;
THN 30-7215WIR;THN 30-7222WIR;THN 30-7223WIR;
THN 20-2410WIR;THN 20-2411WIR;THN 20-2412WIR;
THN 20-2413WIR;THN 20-2415WIR;THN 20-2422WIR;
THN 20-2423WIR;THN 20-2425WIR;THN 20-4810WIR;
THN 20-4811WIR;THN 20-4812WIR;THN 20-4813WIR;
THN 20-4815WIR;THN 20-4822WIR;THN 20-4823WIR;
THN 20-4825WIR;THN 20-7210WIR;THN 20-7211WIR;
THN 20-7212WIR;THN 20-7213WIR;THN 20-7215WIR;
THN 20-7222WIR;THN 20-7223WIR;THN 20-7225WIR**

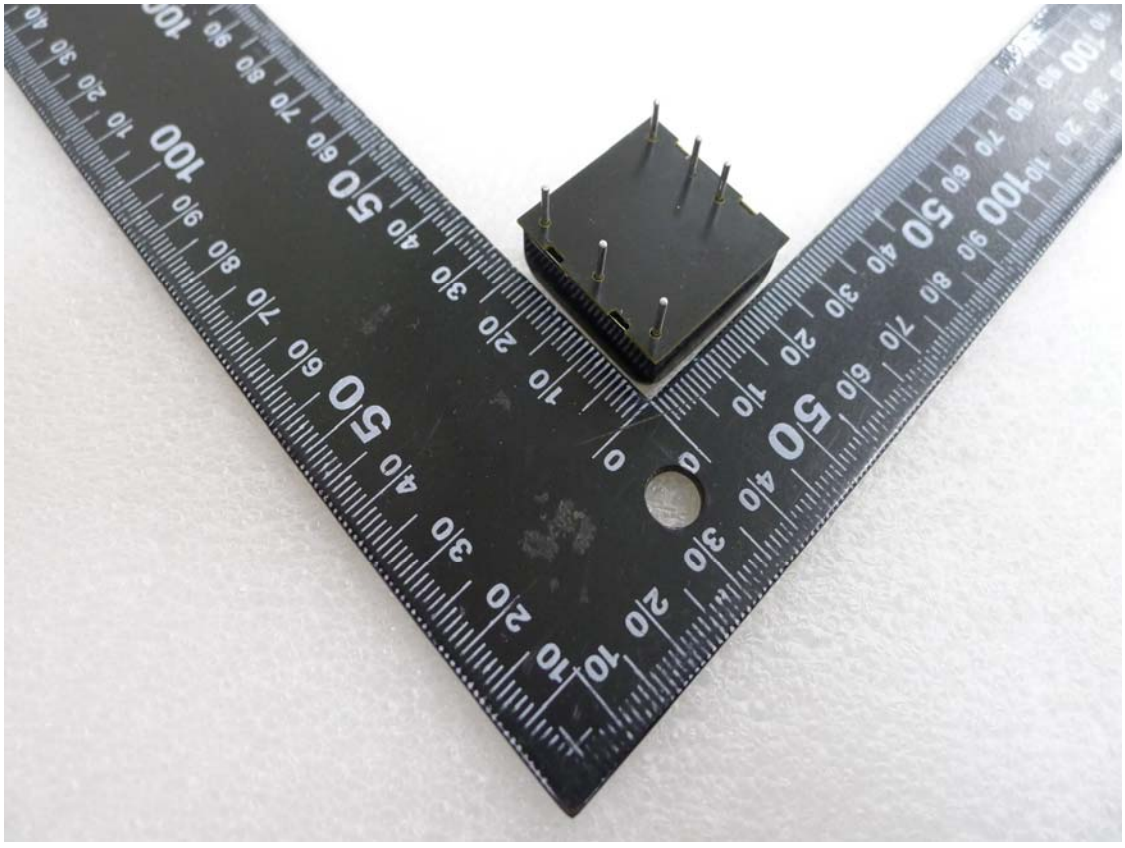
Brand

TRACO POWER

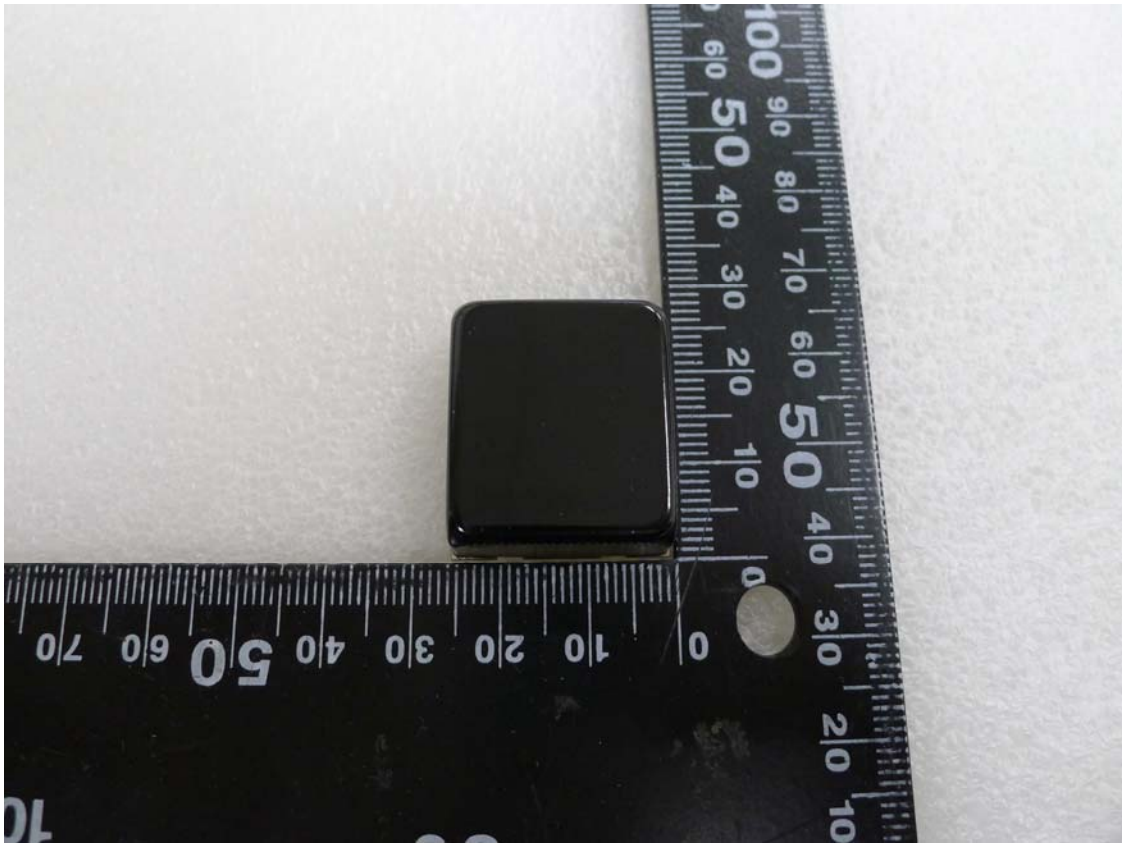
EUT-1.



EUT-2.



EUT-3.



EUT-4.