Certificate

Issue Date: December 25, 2019
Ref. Report No. ISL-19LE853CE

Product Name	:	Mother Board
Model(s)	:	MAPLKAS
Responsible Party	:	GIGA-BYTE TECHNOLOGY CO., LTD.
Address	:	No.6, Baoqiang Rd., Xindian Dist., New Taipei City 231, Taiwan

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 55032:2012+AC:2013, CISPR 32:2012: Class A
EN 55032:2015+AC:2016, CISPR 32:2015+COR1:2016: Class A
AS/NZS CISPR 32:2015: Class A
EN 61000-3-2:2014 and IEC 61000-3-2:2014
EN 61000-3-3: 2013 and IEC 61000-3-3: 2013
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:**
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

CE MARK TECHNICAL FILE

AS/NZS EMC CONSTRUCTION FILE

of

Product Name

Mother Board

Model

MAPLKAS

Contains:

1. Declaration of Conformity
2. EN 55032/CISPR 32/AS/NZS CISPR 32 EMI test report
3. EN 55024/CISPR 24, EN 61000-3-2/ IEC 61000-3-2, and EN 61000-3-3/ IEC 61000-3-3 test report
4. Block Diagram and Schematics
5. Users' manual

Declaration of Conformity

Name of Responsible Party: GIGA-BYTE TECHNOLOGY CO., LTD.

Address of Responsible Party: No.6, Baoqiang Rd., Xindian Dist.,
New Taipei City 231, Taiwan

Declares that product: Mother Board

Model: MAPLKAS

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

EN 55032:2012+AC:2013, CISPR 32:2012:Class A: Electromagnetic compatibility of multimedia equipment - Emission requirements.
EN 55032:2015+AC:2016, CISPR 32:2015+COR1:2016: Class A: Electromagnetic compatibility of multimedia equipment - Emission requirements.
AS/NZS CISPR 32:2015: 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)	Yes	No	PASS
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

<to be continued>

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
EN 61000-4-11: 2004+A1:2017 IEC 61000-4-11: 2004+A1:2017	Voltage Dips / Short Interruption and Voltage Variation		
	>95% in 0.5 period	Pass	B
	30% in 25 period	Pass	C
	>95% in 250 period	Pass	C

Standard	Description	Results
EN 61000-3-2:2014 IEC 61000-3-2:2014	Limits for harmonics current emissions	Pass
EN 61000-3-3: 2013 IEC 61000-3-3: 2013	Limits for voltage fluctuations and flicker in low-voltage supply systems.	Pass

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

Alan Wu
GIGA-BYTE TECHNOLOGY CO., LTD.

Date: December 25, 2019

Remarks: 1) The responsible party for Declaration of Conformity must be located within Europe, 2) The above is a sample of DoC, one should modify it to meet remark 1.

Declaration of Conformity

Name of Responsible Party:	GIGA-BYTE TECHNOLOGY CO., LTD.
Address of Responsible Party:	No.6, Baoqiang Rd., Xindian Dist., New Taipei City 231, Taiwan
Declares that product:	Mother Board
Model:	MAPLKAS

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

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

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

Alan Wu
GIGA-BYTE TECHNOLOGY CO., LTD.

Date: December 25, 2019

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 : **Mother Board**

Model(s): **MAPLKAS**

Applicant: **GIGA-BYTE TECHNOLOGY CO., LTD.**

Address: **No.6, Baoqiang Rd., Xindian Dist.,**
New Taipei City 231, Taiwan

Test Performed by:

International Standards Laboratory Corp.
<LT LAB>
*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-19LE853CE**
Issue Date : **December 25, 2019**

This report totally contains 78 pages including this cover page and contents page.

Contents of Report

1. General

1.1 Certification of Accuracy of Test Data

Standards:	Please refer to 1.2
Equipment Tested:	Mother Board
Model:	MAPLKAS
Applicant:	GIGA-BYTE TECHNOLOGY CO., LTD.
Sample received Date:	December 11, 2019
Final test Date:	EMI: refer to the date of test data EMS: December 24, 2019
Test Site:	Chamber 12; Chamber 14; Conduction 04; Immunity 02
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: AC 230 V / 50 Hz Radiation input power: AC 230 V / 50 Hz Immunity input power: AC 230 V / 50 Hz
Test Result:	**PASS**
Report Engineer:	Alice Chiu
Test Engineer:	James Kuo
Approved By:	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 55032:2012+AC:2013, CISPR 32:2012:Class A: Electromagnetic compatibility of multimedia equipment - Emission requirements.
EN 55032:2015+AC:2016, CISPR 32:2015+COR1:2016: Class A: Electromagnetic compatibility of multimedia equipment - Emission requirements.
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Performed Item	Test Performed	Deviation	Result
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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
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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
EN 61000-4-11: 2004+A1:2017 IEC 61000-4-11: 2004+A1:2017	Voltage Dips / Short Interruption and Voltage Variation		
	>95% in 0.5 period	Pass	B
	30% in 25 period	Pass	C
	>95% in 250 period	Pass	C

Standard	Description	Results
EN 61000-3-2:2014 IEC 61000-3-2:2014	Limits for harmonics current emissions	Pass
EN 61000-3-3: 2013 IEC 61000-3-3: 2013	Limits for voltage fluctuations and flicker in low-voltage supply systems.	Pass

1.2.1 Performance Criteria for Compliance: EN 55024

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

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

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

1.3 Description of EUT

EUT

Description	Mother Board
Model	MAPLKAS
Condition	Pre-Production
Serial Number	N/A
Maximum display resolution	3840*2160 60Hz
Highest working frequency	1.60GHz

The devices can be supported with the EUT are listed below:

Component	Vendor	Description
CPU	INTEL	E3940 (1.60GHz 4 core)
		E3930 (1.30GHz 2 core)
Mother Board	GIGABYTE	MAPLKAS
Adapter	FSP	FSP065-REBN2 (65W)
	APD	DA-65C19 (65W)

Support unit:

Component	Vendor	Description
RAM		DDR3L 1600 (8GB)
HDD(SATA)	WD	WD5000BPKT (500GB)

The I/O ports of EUT are listed below:
For Industrial Embedded System Kit:

I/O Port Type	Quantity
D-SUB Port	One
LAN Port(10M/100M/1Gbps)	Two
HDMI Port	One
Audio In Port	One
USB 3.0 Port	Two
USB 2.0 Port	Two
COM port	Four
DC INPUT Port	One

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

Test Configuration:

Configuration	1
CPU	INTEL E3940 (1.60GHz 4 core)
Mother Board	Gigabyte (Model: MAPLKAS)
Memory	DDR3L 1600 8GB*2
HDD	WD (Model: WD5000BPKT) (500GB)
Power Supplier	APD (Model: DA-65C19) (65W)
Resolution	1920*1080 60Hz (D-SUB & HDMI port)

EMI Noise Source:

Crystal	Point
32.768kHz	X1
19.2MHz	X3
25MHz	X12
25MHz	X13
27MHz	LVX1

EMI Solution:
Please refer to the technical documents.

1.4 Description of Support Equipment

For EMI test configuration support unit: 1~12
For EMS test configuration support unit: 7~18

No	Unit	Model / Serial No.	Brand	Power Cord	FCC ID
1	LCD Monitor	P2416D S/N: N/A	DELL	Non-shielded	FCC DOC
2	LCD Monitor	P2416D S/N: N/A	DELL	Non-shielded	FCC DOC
3	USB Mouse	MOCZUL S/N: N/A	DELL	N/A	FCC DOC
4	USB Keyboard	SK-8175 S/N: N/A	DELL	N/A	FCC DOC
5	Hard disk case	HD-PNTU3 S/N: N/A	BUFFALD	N/A	FCC DOC
6	Hard disk case	HD-PNTU3 S/N: N/A	BUFFALD	N/A	FCC DOC
7	Speaker/ microphone	RC-E160 S/N: N/A	HTC	N/A	FCC DOC
8	Modem	DM1414 S/N: N/A	Aceex	Non-shielded	FCC DOC
9	Modem	DM1414 S/N: N/A	Aceex	Non-shielded	FCC DOC
10	Modem	DM1414 S/N: N/A	Aceex	Non-shielded	FCC DOC
11	Modem	DM1414 S/N: N/A	Aceex	Non-shielded	FCC DOC
12	Personal Computer	3212-BK1 S/N: NA	LENOVO	Non-shielded	FCC DOC
13	Traveling Disk	TS16GJF700 S/N: N/A	Transcend	N/A	FCC DOC
14	Traveling Disk	TS16GJF700 S/N: N/A	Transcend	N/A	FCC DOC
15	LCD monitor	UP2414Q S/N: N/A	DELL	Non-shielded	FCC DOC
16	LCD Monitor	U2412M S/N: N/A	DELL	Non-shielded	FCC DOC
17	USB Mouse	MO56U0 S/N: NA	DELL	N/A	FCC DOC
18	USB Keyboard	SK-8115 S/N: NA	DELL	N/A	FCC DOC

1.5 Software for Controlling Support Unit

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

For EMI test configuration:

1. Send color bar to the LCD Monitor through EUT USB D-SUB Port.
2. Send color bar to the LCD Monitor through EUT USB HDMI Port.
3. Read and write data through HDD(SATA).
4. Read and write Hard disk casethrough EUT USB 3.0 Port.
5. Receive audio signal from Speaker/Microphone(microphone) through EUT Audio in port.
6. Send signal to the Modem through EUT Com Port.
7. Receive and transmit packet of EUT to the Personal Computer through LAN port.
8. Repeat the above steps.

	File	Issue Date
LCD Monitor	Windows Media Player	02/15/2016
HDD	BurnIn 8.1	01/10/2017
Hard Disk Case	BurnIn 8.1	01/10/2017
Modem	BurnIn 8.1	01/10/2017
Speaker/Microphone	BurnIn 8.1	01/10/2017
LAN	Ping	

For EMS test configuration:

1. Send color bar to the LCD Monitor through EUT USB D-SUB Port.
2. Send color bar to the LCD Monitor through EUT USB HDMI Port.
3. Read and write data through HDD(SATA).
4. Read and write Traveling Disk through EUT USB 3.0 Port.
5. Receive audio signal from Speaker/Microphone(microphone) through EUT Audio in port.
6. Send signal to the Modem through EUT Com Port.
7. Receive and transmit packet of EUT to the Personal Computer through LAN port.
8. Repeat the above steps.

	File	Issue Date
LCD Monitor	Windows Media Player	02/15/2016
HDD	BurnIn 8.1	01/10/2017
Traveling Disk	BurnIn 8.1	01/10/2017
Modem	BurnIn 8.1	01/10/2017
Speaker/Microphone	BurnIn 8.1	01/10/2017
LAN	Ping	

1.6 I/O Cable Condition of EUT and Support Units

For EMI test configuration:

Description	Path	Cable Length	Cable Type	Core	Remark
AC Power Cable	230V to PC SPS	1.8m	Non-shielded	No	
USB Mouse Data Cable	USB Mouse to EUT USB Port	1.8m	Shielded	No	
USB Keyboard Data Cable	USB Keyboard to EUT USB Port	1.8m	Shielded	No	
D-SUB Data Cable	LCD Monitor to EUT D-SUB Port	1.8m	Shielded	Yes	
HDMI Data Cable	LCD Monitor to EUT HDMI Port	1.8m	Shielded	No	
USB data cable*2	Hard disk case to EUT USB 3.0 Port	1.0m	Shielded	No	
Audio data cable	Speaker/Microphone to EUT Audio In Port	1.4m	Shielded	No	
Modem Data Cable*4	Modem to EUT Com Port	1.8m	Shielded	No	
LAN data cable*2	Personal Computer LAN port to EUT LAN port	10m	Non-shielded	No	Cat5e

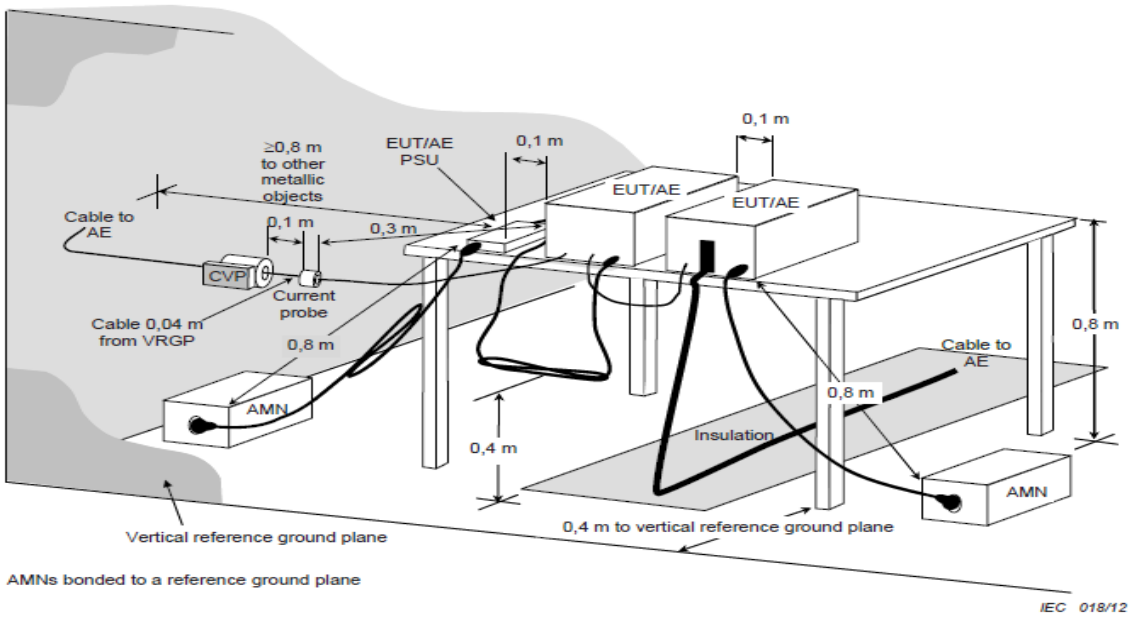
For EMS test configuration:

Description	Path	Cable Length	Cable Type	Core	Remark
AC Power Cable	100V~240V to PC SPS	1.8m	Non-shielded	No	
USB Mouse Data Cable	USB Mouse to EUT USB Port	1.8m	Shielded	No	
USB Keyboard Data Cable	USB Keyboard to EUT USB Port	1.8m	Shielded	No	
D-SUB Data Cable	LCD Monitor to EUT D-SUB Port	1.8m	Shielded	Yes	
HDMI Data Cable	LCD Monitor to EUT HDMI Port	1.8m	Shielded	No	
USB data cable*2	Traveling USB Disk to EUT USB 3.0 Port	1.0m	Shielded	No	
Audio data cable	Speaker/Microphone to EUT Audio In Port	1.4m	Shielded	No	
Modem Data Cable*4	Modem to EUT Com Port	1.8m	Shielded	No	
LAN data cable*2	Personal Computer LAN port to EUT LAN port	10m	Non-shielded	No	Cat5e

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		

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	0.158	37.17	20.48	9.68	46.85	79.00	-32.15	30.16	66.00	-35.84
2	0.170	35.85	19.55	9.68	45.53	79.00	-33.47	29.23	66.00	-36.77
3	0.182	34.46	15.95	9.68	44.14	79.00	-34.86	25.63	66.00	-40.37
4	11.474	21.50	15.86	9.96	31.46	73.00	-41.54	25.82	60.00	-34.18
5	13.234	22.96	17.20	9.99	32.95	73.00	-40.05	27.19	60.00	-32.81
6	17.606	23.15	13.03	10.03	33.18	73.00	-39.82	23.06	60.00	-36.94

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.

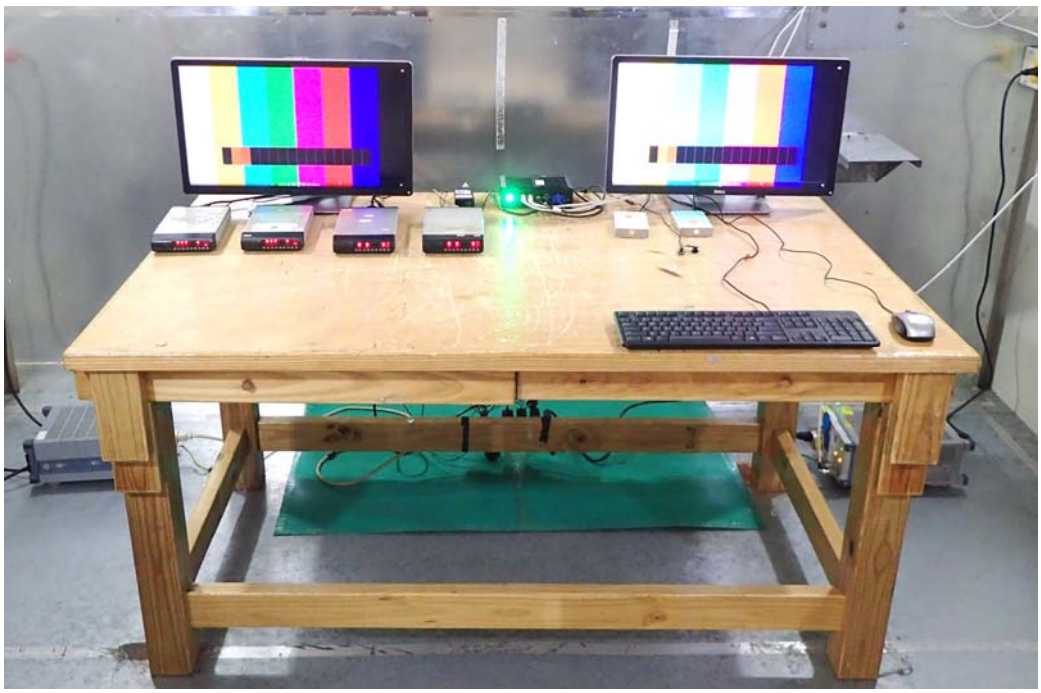
- Neutral

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	0.166	36.50	19.20	9.64	46.14	79.00	-32.86	28.84	66.00	-37.16
2	0.174	34.81	17.13	9.64	44.45	79.00	-34.55	26.77	66.00	-39.23
3	0.234	26.89	12.30	9.63	36.52	79.00	-42.48	21.93	66.00	-44.07
4	11.174	22.44	16.59	9.97	32.41	73.00	-40.59	26.56	60.00	-33.44
5	13.294	22.62	16.85	10.01	32.63	73.00	-40.37	26.86	60.00	-33.14
6	17.642	23.65	13.55	10.10	33.75	73.00	-39.25	23.65	60.00	-36.35

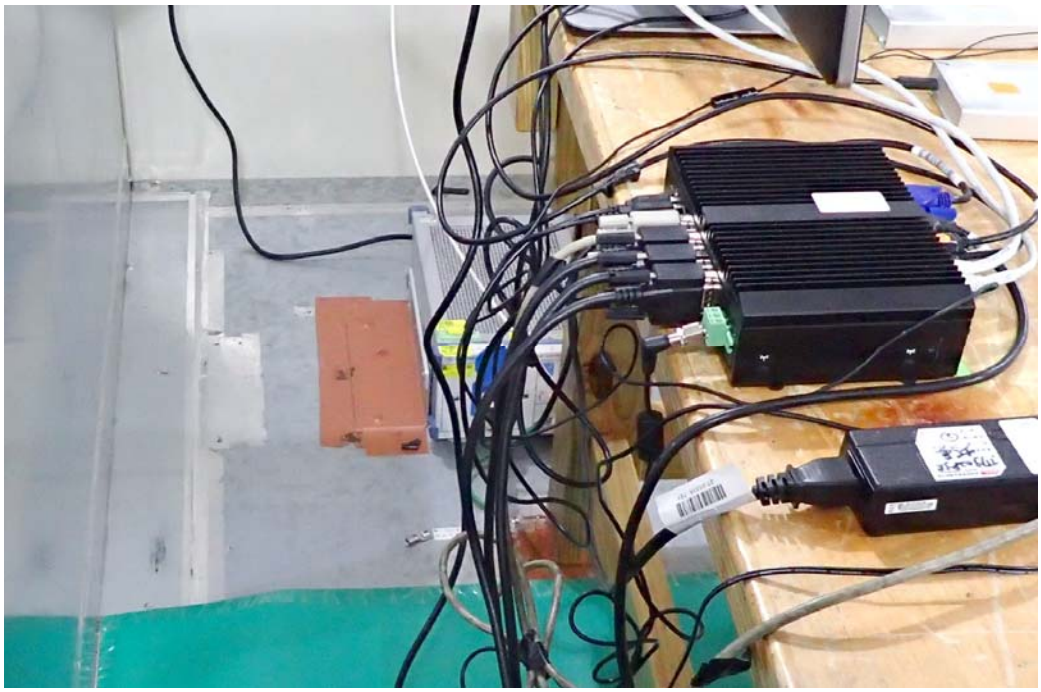
Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = QP_R/AVG_R + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak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

2.3 Test Setup Photo

Front View



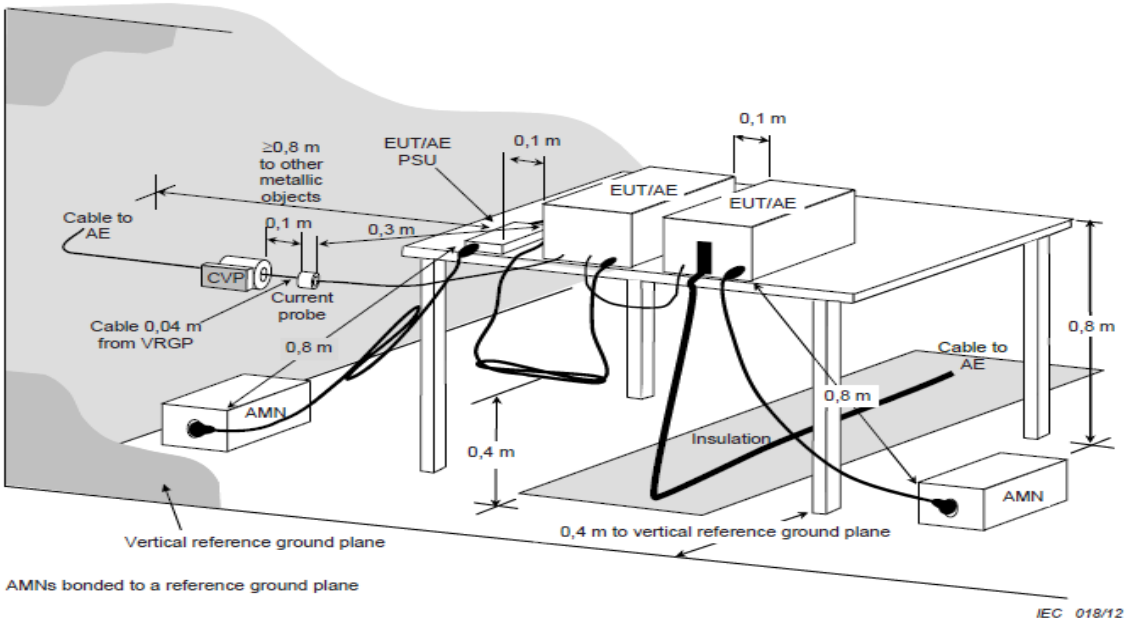
Back View



3. Telecommunication Port Conducted Emissions

3.1 Test Setup and Procedure

3.1.1 Test Setup



3.1.2 Test Procedure

The measurements are performed in a 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

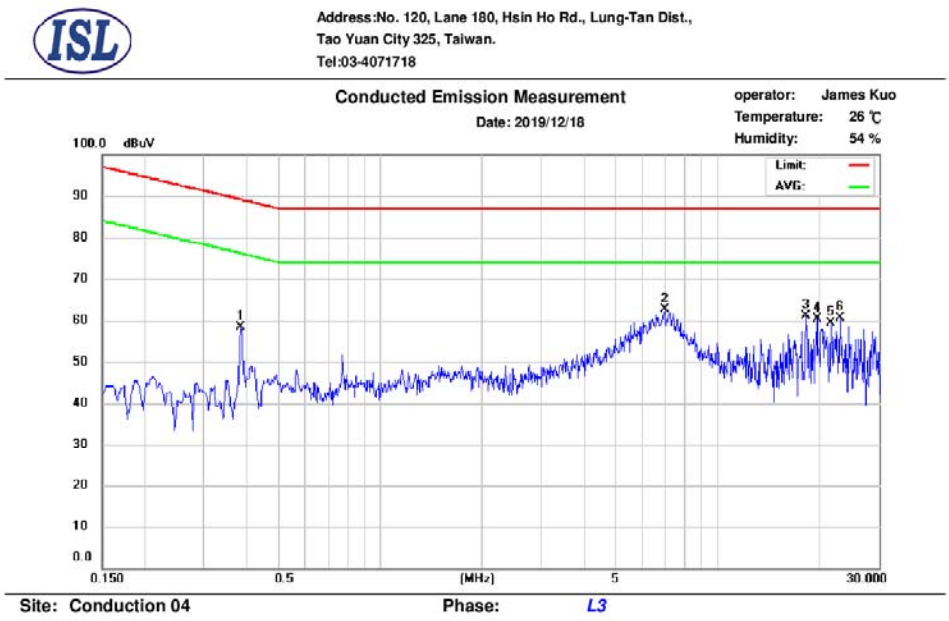
Asymmetric mode conducted emissions from Class_A equipment:
Applicable to
1. wired network ports.
2. optical fibre ports with metallic shield or tension members.
3. antenna ports.

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

3.2 Test Data: Configuration 1\LAN1\100M



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	0.386	48.17	47.86	9.73	57.90	89.15	-31.25	57.59	76.15	-18.56
2	6.962	46.97	35.46	9.60	56.57	87.00	-30.43	45.06	74.00	-28.94
3	18.242	50.72	48.04	9.80	60.52	87.00	-26.48	57.84	74.00	-16.16
4	19.710	49.66	46.88	9.83	59.49	87.00	-27.51	56.71	74.00	-17.29
5	21.662	50.03	47.28	9.88	59.91	87.00	-27.09	57.16	74.00	-16.84
6	23.130	50.30	47.61	9.93	60.23	87.00	-26.77	57.54	74.00	-16.46

Note :

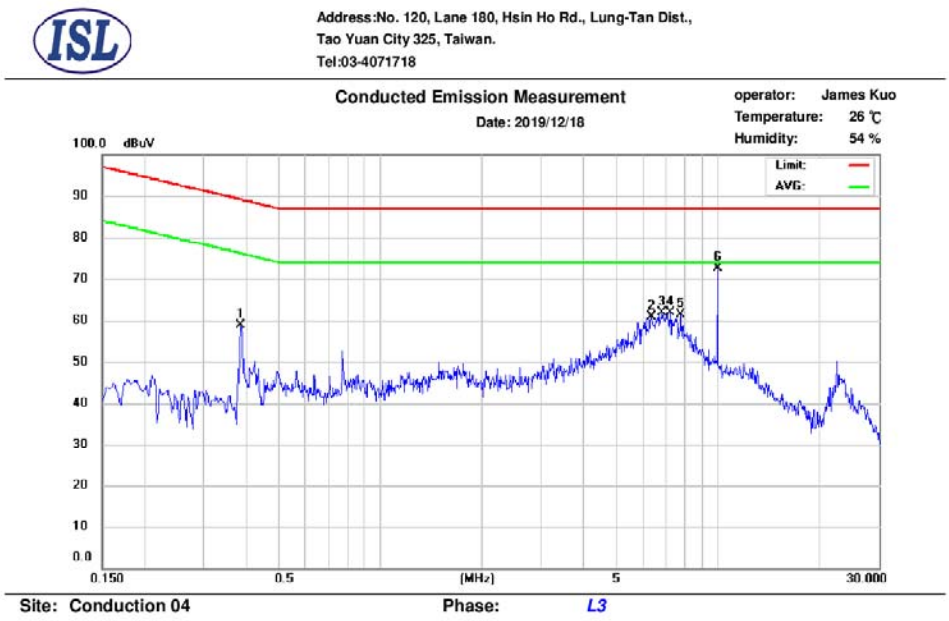
Margin = QP/AVG Emission – Limit QP/AVG Emission = QP_R/AVG_R + Correct Factor

Correct Factor = LISN Loss + Cable Loss A margin of -8dB means that the emission is 8dB below the limit

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

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

3.3 Test Data: Configuration 1\LAN1\10M



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	0.386	47.55	47.38	9.73	57.28	89.15	-31.87	57.11	76.15	-19.04
2	6.374	46.03	34.66	9.60	55.63	87.00	-31.37	44.26	74.00	-29.74
3	6.874	46.54	35.01	9.60	56.14	87.00	-30.86	44.61	74.00	-29.39
4	7.246	46.17	34.85	9.60	55.77	87.00	-31.23	44.45	74.00	-29.55
5	7.798	42.98	32.79	9.61	52.59	87.00	-34.41	42.40	74.00	-31.60
6	10.001	62.49	44.11	9.66	72.15	87.00	-14.85	53.77	74.00	-20.23

Note :

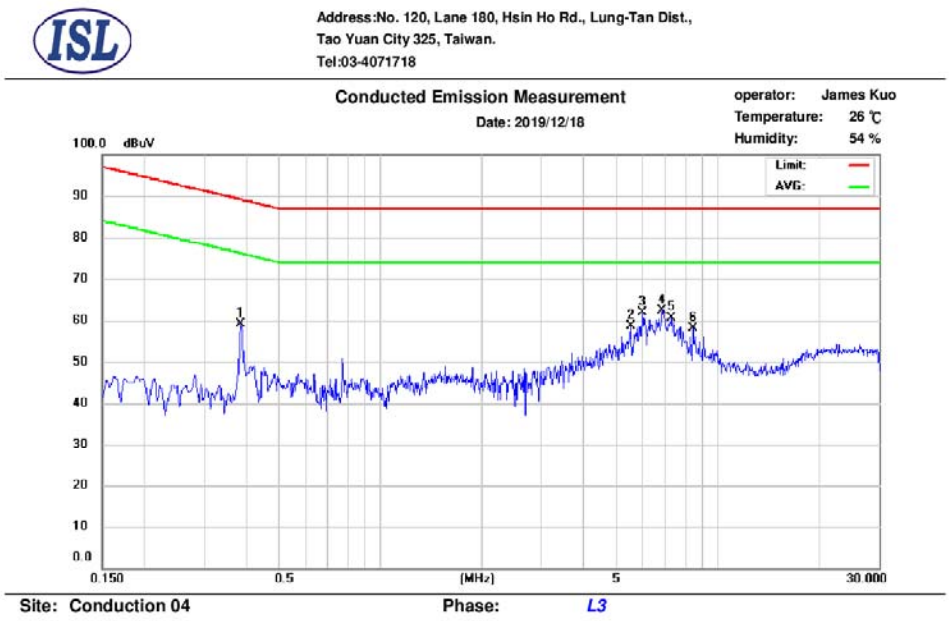
Margin = QP/AVG Emission – Limit QP/AVG Emission = QP_R/AVG_R + Correct Factor

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.

3.4 Test Data: Configuration 1\LAN1\1G



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	0.386	48.55	48.07	9.73	58.28	89.15	-30.87	57.80	76.15	-18.35
2	5.530	42.69	33.30	9.59	52.28	87.00	-34.72	42.89	74.00	-31.11
3	5.990	44.78	34.96	9.59	54.37	87.00	-32.63	44.55	74.00	-29.45
4	6.870	47.24	36.45	9.60	56.84	87.00	-30.16	46.05	74.00	-27.95
5	7.322	46.10	35.31	9.60	55.70	87.00	-31.30	44.91	74.00	-29.09
6	8.434	41.10	33.10	9.62	50.72	87.00	-36.28	42.72	74.00	-31.28

Note :

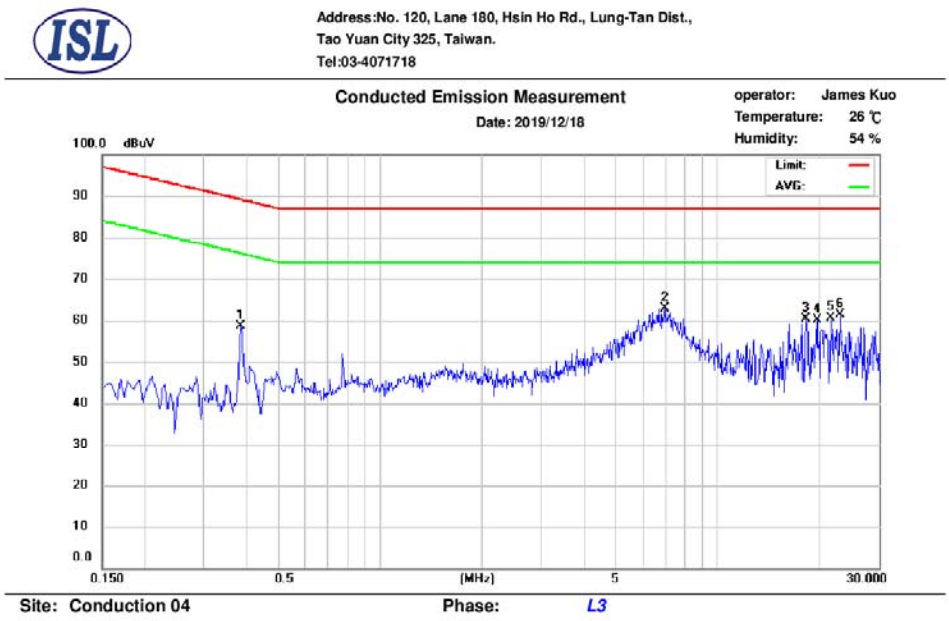
Margin = QP/AVG Emission – Limit QP/AVG Emission = QP_R/AVG_R + Correct Factor

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.

3.5 Test Data: Configuration 1\LAN2\100M



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	0.386	48.23	47.88	9.73	57.96	89.15	-31.19	57.61	76.15	-18.54
2	6.958	47.05	35.56	9.60	56.65	87.00	-30.35	45.16	74.00	-28.84
3	18.242	50.73	48.08	9.80	60.53	87.00	-26.47	57.88	74.00	-16.12
4	19.710	49.66	46.86	9.83	59.49	87.00	-27.51	56.69	74.00	-17.31
5	21.662	50.02	47.29	9.88	59.90	87.00	-27.10	57.17	74.00	-16.83
6	23.130	50.33	47.63	9.93	60.26	87.00	-26.74	57.56	74.00	-16.44

Note :

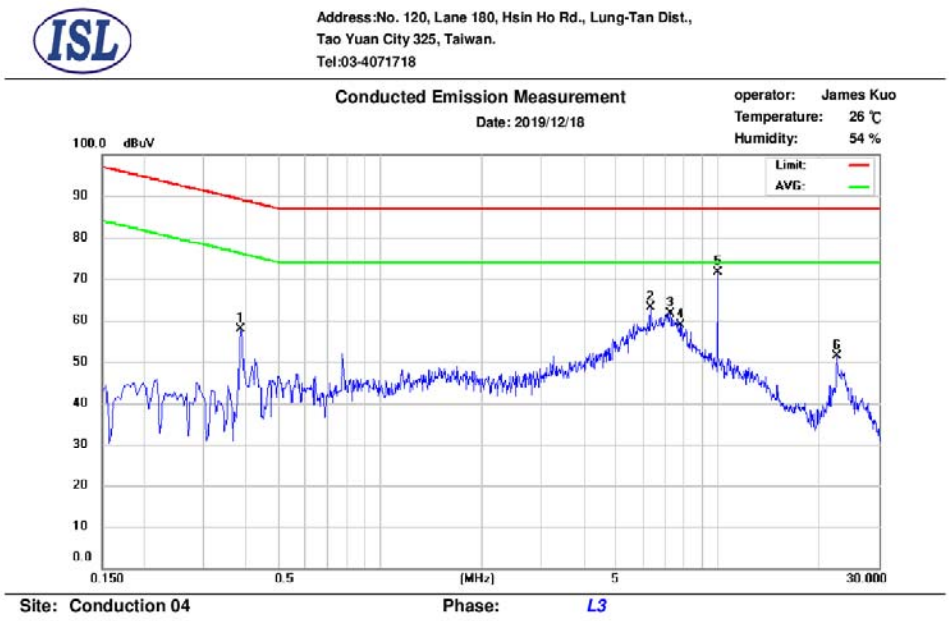
Margin = QP/AVG Emission – Limit QP/AVG Emission = QP_R/AVG_R + Correct Factor

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.

3.6 Test Data: Configuration 1\LAN2\10M



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	0.386	47.68	47.51	9.73	57.41	89.15	-31.74	57.24	76.15	-18.91
2	6.342	46.00	35.25	9.60	55.60	87.00	-31.40	44.85	74.00	-29.15
3	7.230	46.71	35.18	9.60	56.31	87.00	-30.69	44.78	74.00	-29.22
4	7.818	42.56	32.44	9.61	52.17	87.00	-34.83	42.05	74.00	-31.95
5	10.001	62.51	44.07	9.66	72.17	87.00	-14.83	53.73	74.00	-20.27
6	22.570	41.00	39.43	9.91	50.91	87.00	-36.09	49.34	74.00	-24.66

Note :

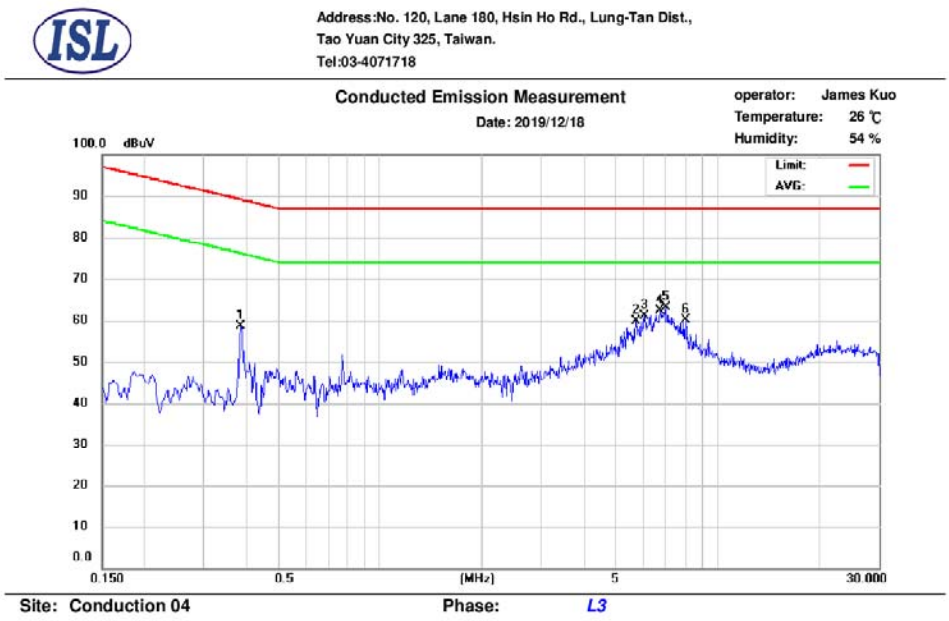
Margin = QP/AVG Emission – Limit QP/AVG Emission = QP_R/AVG_R + Correct Factor

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.

3.7 Test Data: Configuration 1\LAN2\1G



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	0.386	48.35	48.00	9.73	58.08	89.15	-31.07	57.73	76.15	-18.42
2	5.722	43.77	34.30	9.59	53.36	87.00	-33.64	43.89	74.00	-30.11
3	6.086	45.18	35.25	9.60	54.78	87.00	-32.22	44.85	74.00	-29.15
4	6.766	46.46	35.70	9.59	56.05	87.00	-30.95	45.29	74.00	-28.71
5	7.046	46.80	35.76	9.60	56.40	87.00	-30.60	45.36	74.00	-28.64
6	8.058	41.90	33.32	9.61	51.51	87.00	-35.49	42.93	74.00	-31.07

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.

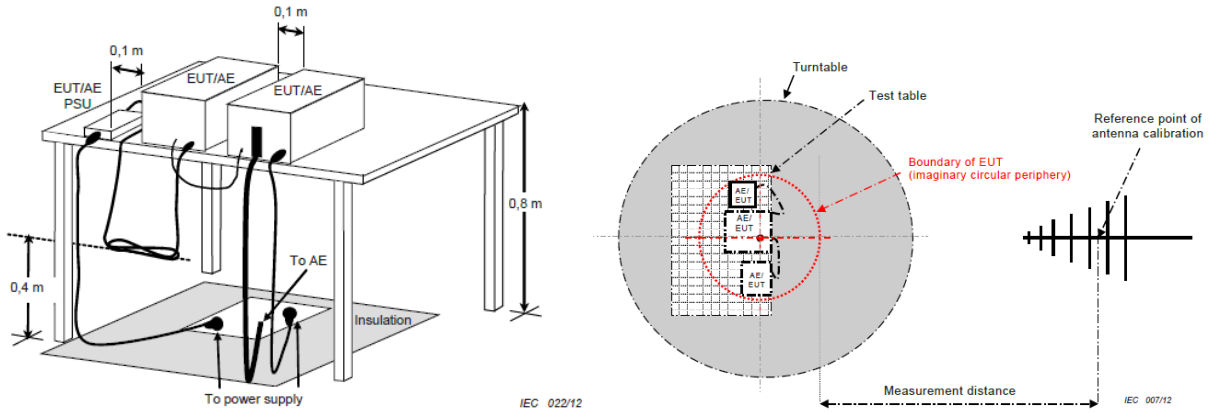
3.8 Test Setup Photo

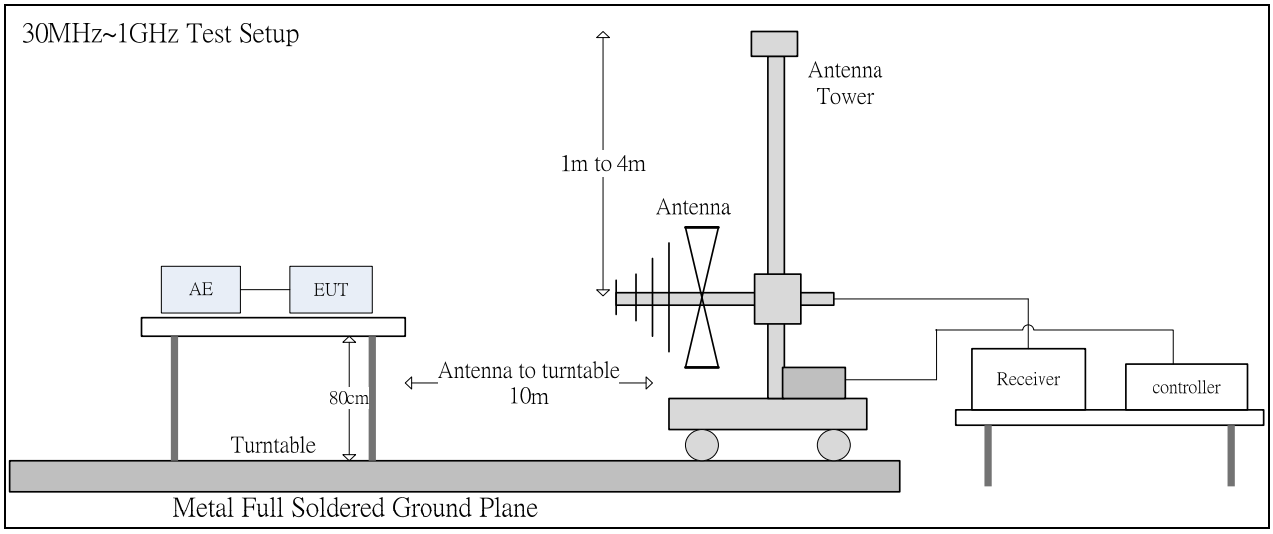
Refer to the Setup Photos for Power Main Port Conducted Emissions

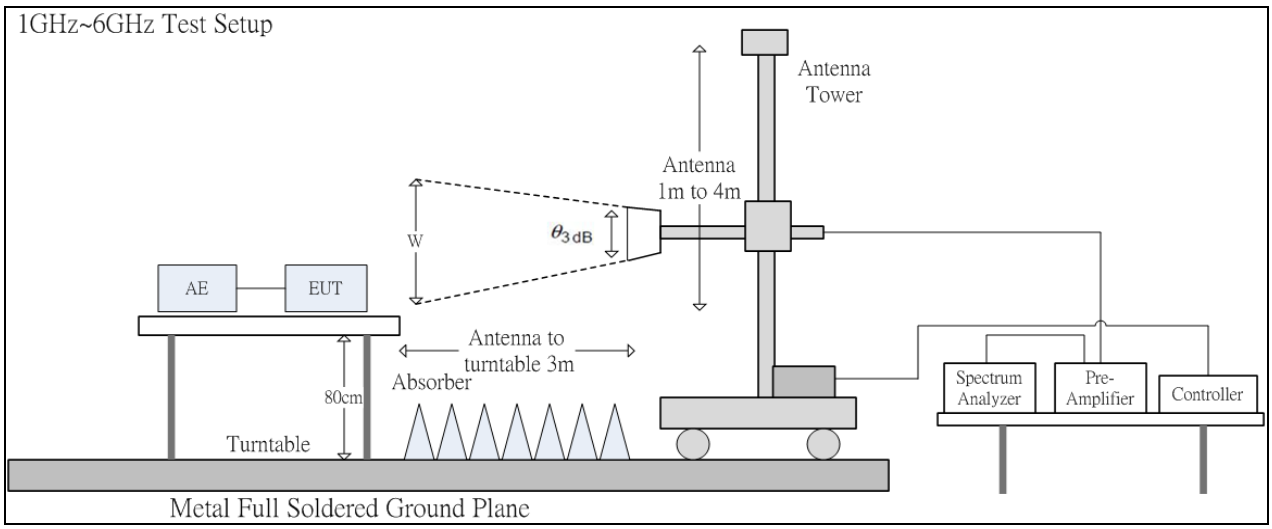
4. Radiated Disturbance Emissions

4.1 Test Setup and Procedure

4.1.1 Test Setup







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

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

4.1.2 Test Procedure

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

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

At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum measurement. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings. All of the interface cables were manipulated according to EN 55032 requirements.

The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes.

If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz.

If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz.

If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz.

If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.

4.1.3 Spectrum Analyzer Configuration (for the frequencies tested)

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

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

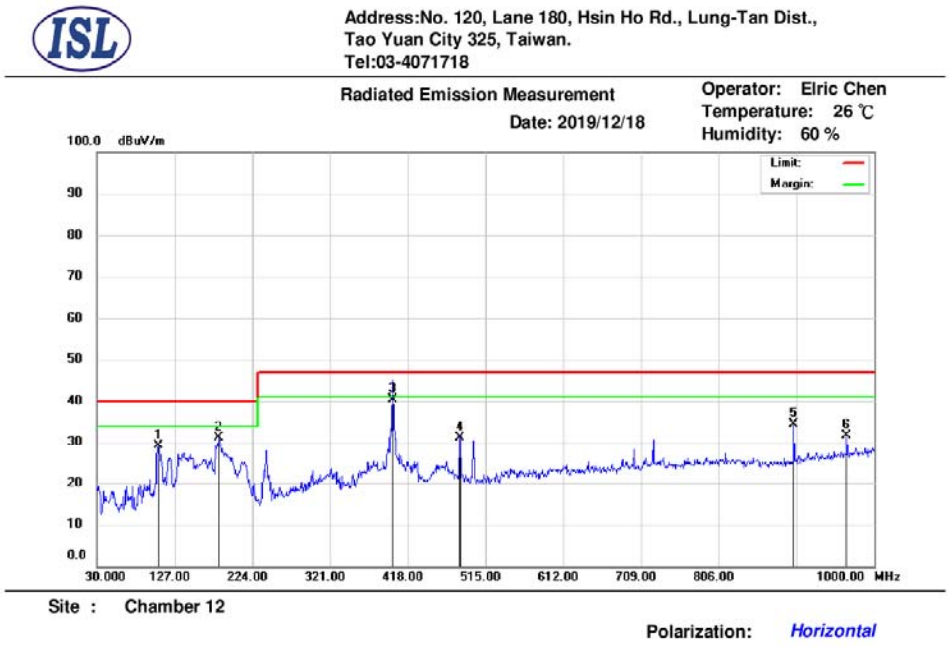
Radiated emissions at frequencies above 1 GHz for Class_B equipment:

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

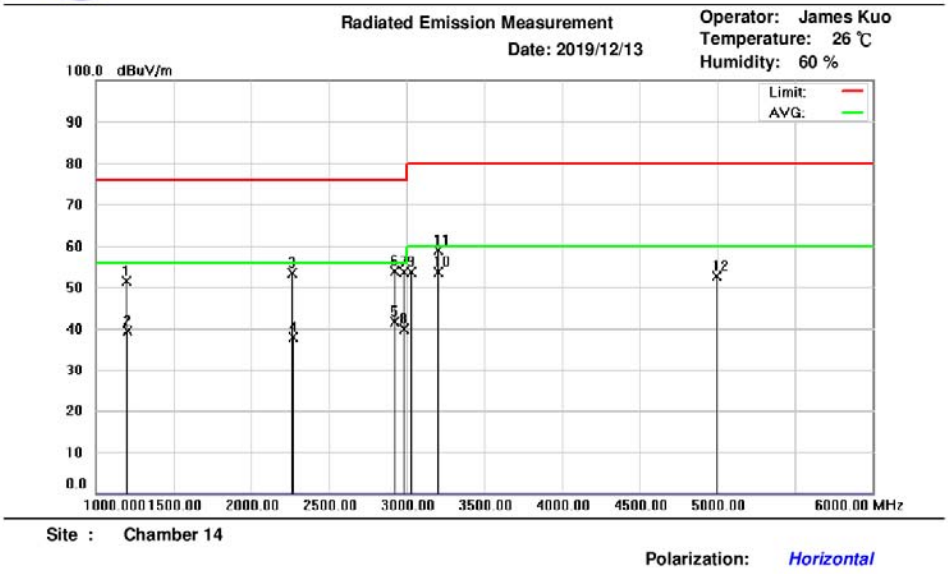
4.3 Radiation Test Data: Configuration 1
- Radiated Emissions (Horizontal)



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	106.63	49.02	-19.78	29.24	40.00	-10.76	300	171	peak
2	182.29	48.35	-17.12	31.23	40.00	-8.77	400	228	peak
3	399.04	52.30	-11.96	40.34	47.00	-6.66	217	132	QP
4	482.99	41.04	-10.02	31.02	47.00	-15.98	150	47	peak
5	900.09	38.60	-4.23	34.37	47.00	-12.63	100	117	peak
6	966.05	33.92	-2.34	31.58	47.00	-15.42	100	19	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.

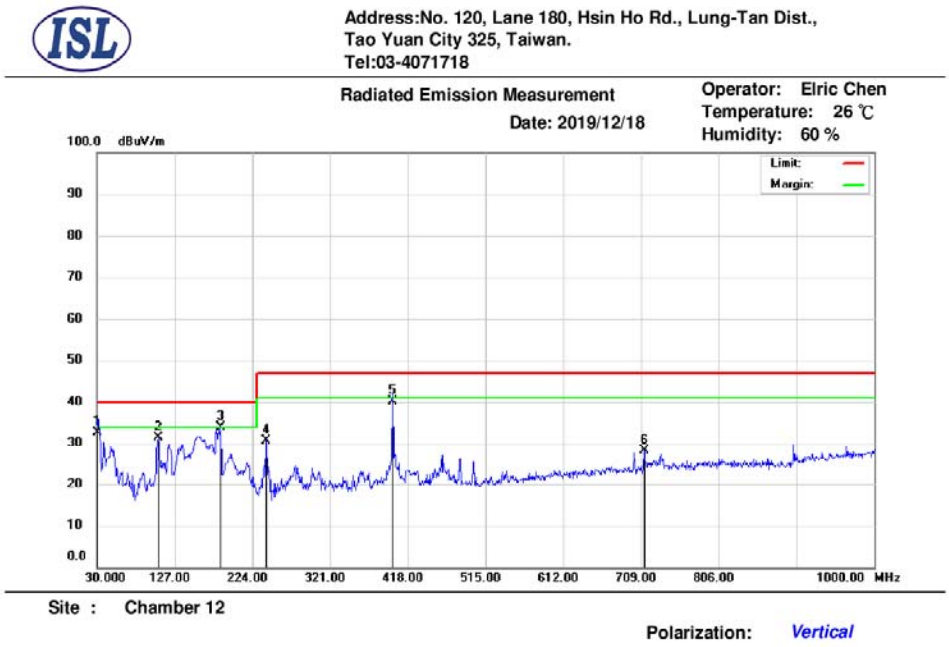
Address:No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,
Tao Yuan City 325, Taiwan.
Tel:03-4071718



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1195.00	67.41	-16.11	51.30	76.00	-24.70	150	333	peak
2	1198.76	55.49	-16.08	39.41	56.00	-16.59	151	337	AVG
3	2265.00	66.31	-12.93	53.38	76.00	-22.62	100	166	peak
4	2266.53	50.86	-12.93	37.93	56.00	-18.07	101	169	AVG
5	2922.84	52.96	-11.44	41.52	56.00	-14.48	199	73	AVG
6	2925.00	65.28	-11.44	53.84	76.00	-22.16	199	73	peak
7	2980.00	64.98	-11.30	53.68	76.00	-22.32	199	76	peak
8	2983.63	51.28	-11.29	39.99	56.00	-16.01	199	73	AVG
9	3030.00	64.83	-11.24	53.59	80.00	-26.41	250	94	peak
10	3199.86	64.37	-10.66	53.71	60.00	-6.29	200	243	AVG
11	3200.00	69.62	-10.66	58.96	80.00	-21.04	199	240	peak
12	4995.00	61.92	-9.29	52.63	80.00	-27.37	199	288	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.

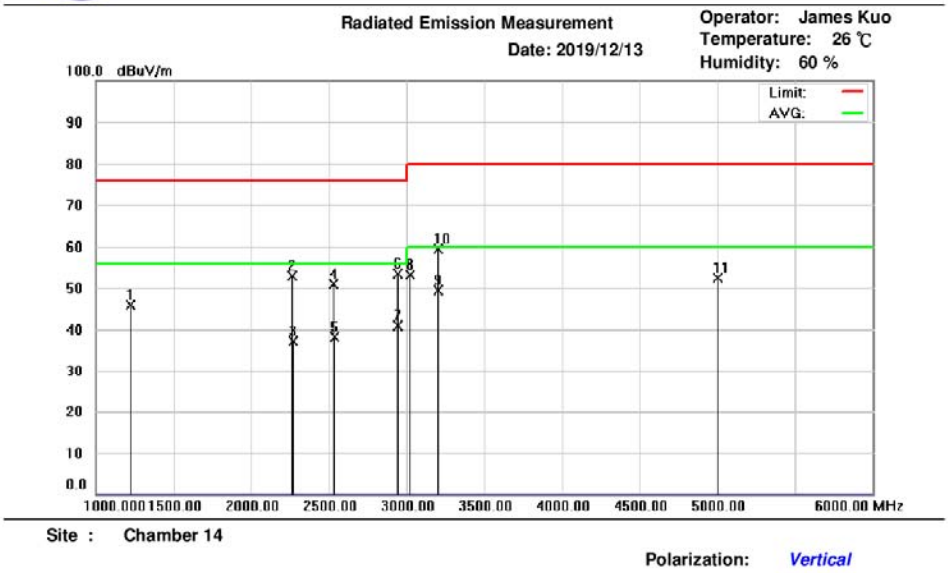
-Radiated Emissions (Vertical)



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	30.76	51.57	-18.89	32.68	40.00	-7.32	100	175	QP
2	106.63	51.05	-19.78	31.27	40.00	-8.73	150	198	peak
3	184.23	51.01	-17.21	33.80	40.00	-6.20	100	164	peak
4	241.46	47.44	-16.69	30.75	47.00	-16.25	102	0	peak
5	399.07	52.01	-11.96	40.05	47.00	-6.95	105	137	QP
6	712.88	34.04	-5.81	28.23	47.00	-18.77	250	191	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.

Address:No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,
Tao Yuan City 325, Taiwan.
Tel:03-4071718

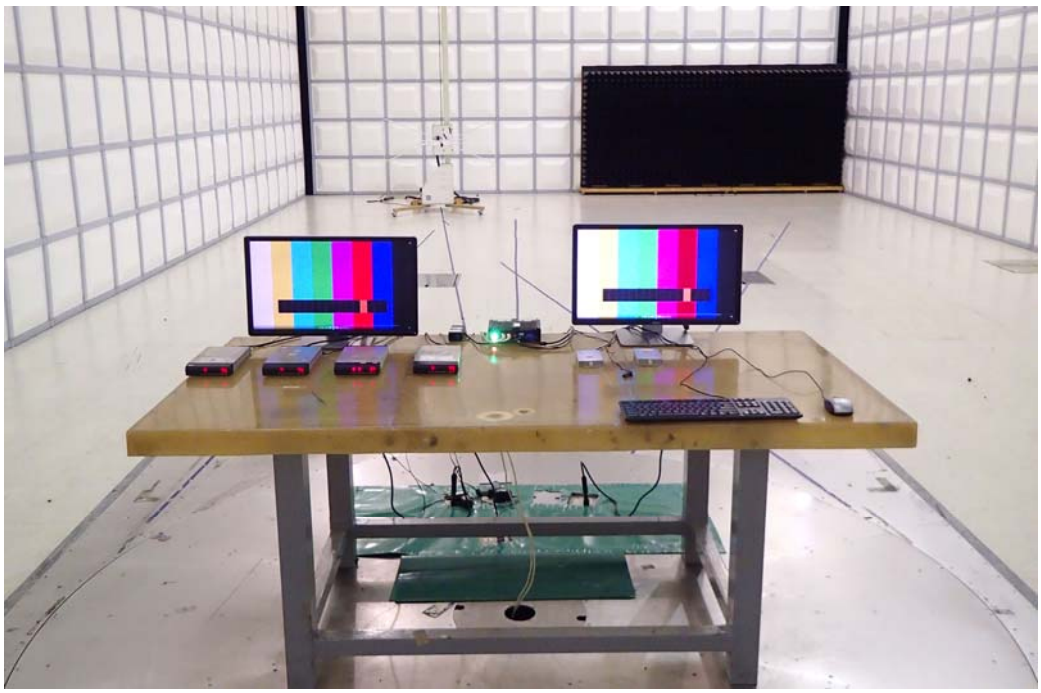


Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1220.00	61.82	-16.04	45.78	76.00	-30.22	150	6	peak
2	2265.00	65.80	-12.93	52.87	76.00	-23.13	100	128	peak
3	2266.56	50.13	-12.93	37.20	56.00	-18.80	101	124	AVG
4	2530.00	62.66	-11.87	50.79	76.00	-25.21	200	211	peak
5	2533.45	50.02	-11.87	38.15	56.00	-17.85	199	214	AVG
6	2940.00	64.81	-11.40	53.41	76.00	-22.59	250	84	peak
7	2942.03	52.20	-11.40	40.80	56.00	-15.20	250	81	AVG
8	3025.00	64.27	-11.24	53.03	80.00	-26.97	250	86	peak
9	3199.82	60.04	-10.66	49.38	60.00	-10.62	148	230	AVG
10	3200.00	70.04	-10.66	59.38	80.00	-20.62	150	227	peak
11	5000.00	61.60	-9.29	52.31	80.00	-27.69	200	21	peak

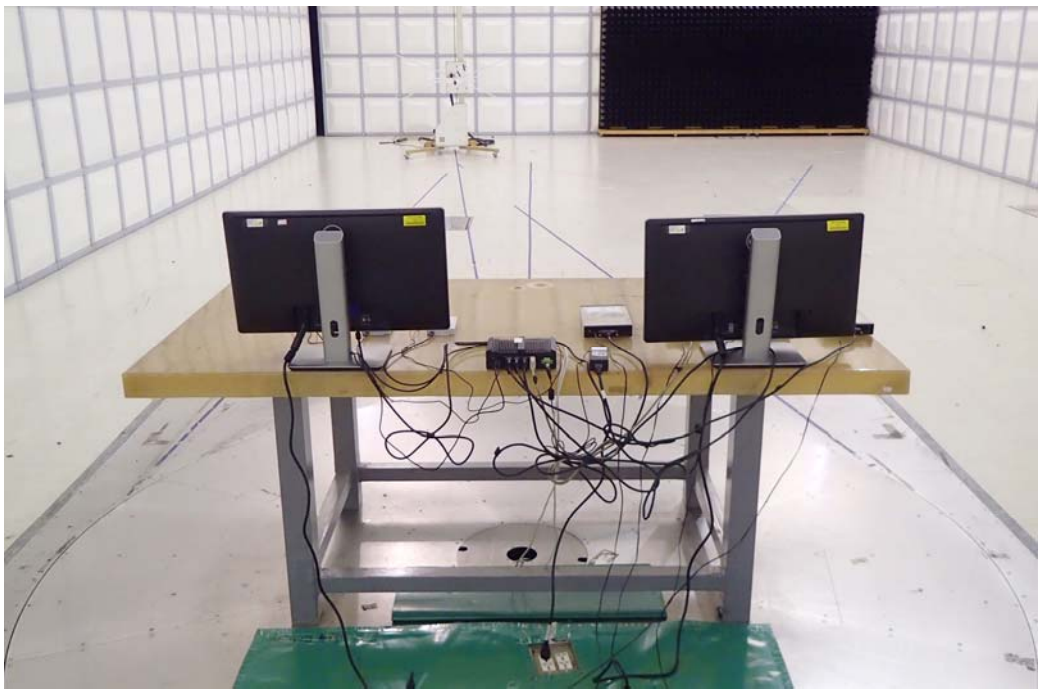
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Antenna Distance: 3 meters
Above 1GHz test, if the peak measured value meets the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

4.4 Test Setup Photo

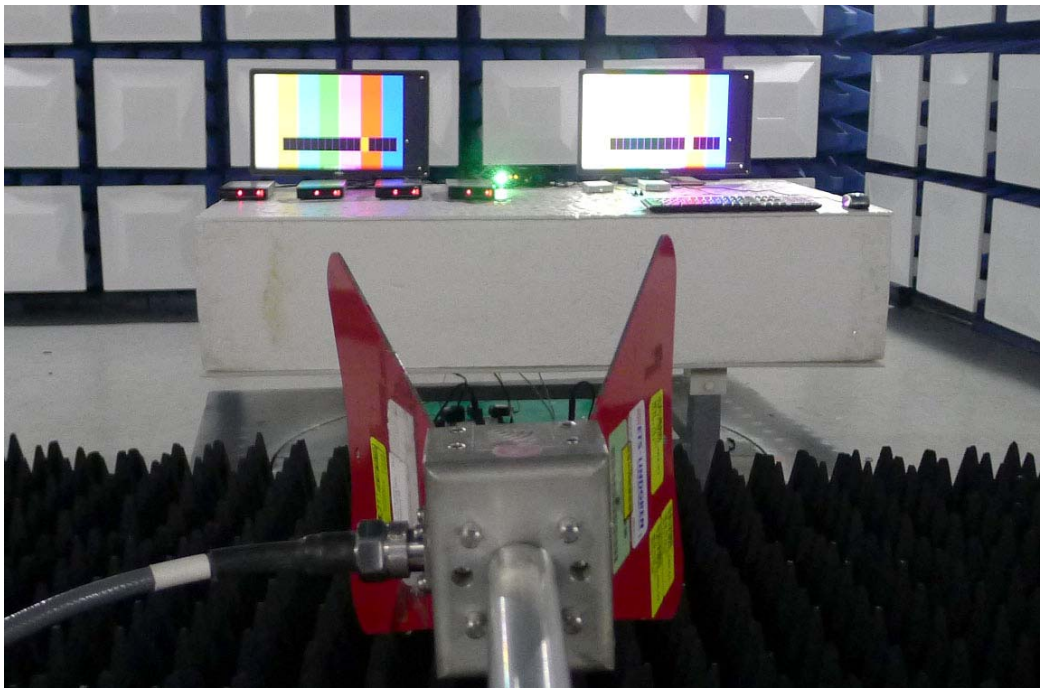
Front View (30MHz~1GHz)



Back View (30MHz~1GHz)



Front View (above 1GHz)

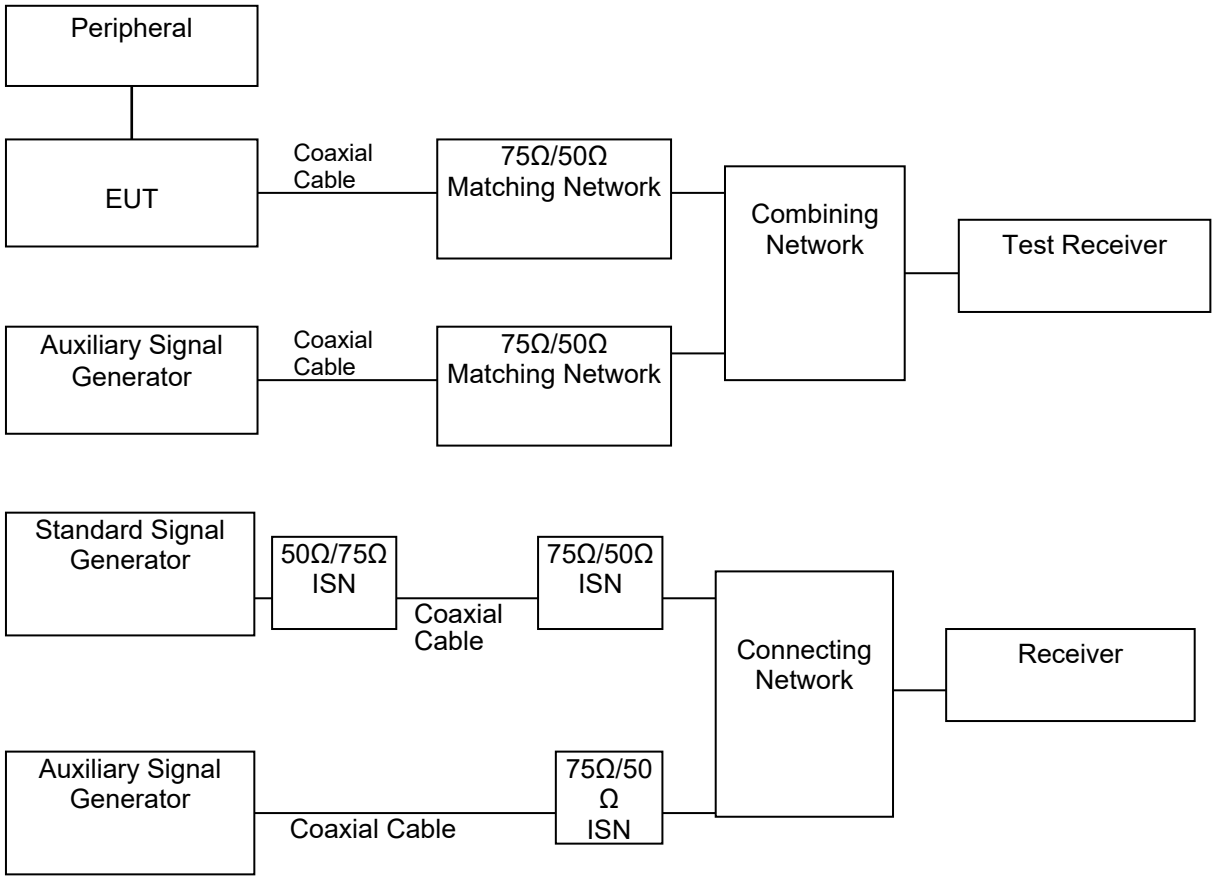


Back View (above 1GHz)

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.

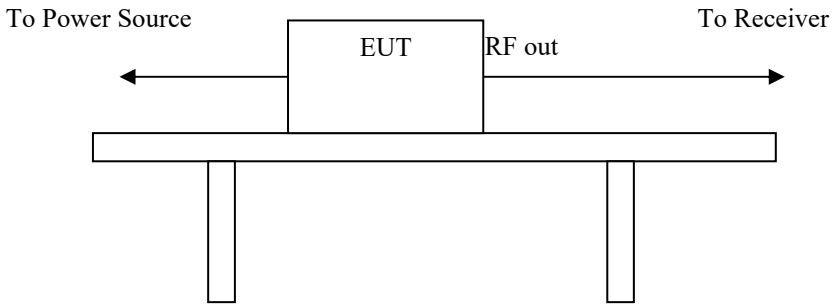
e) Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports.

****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.

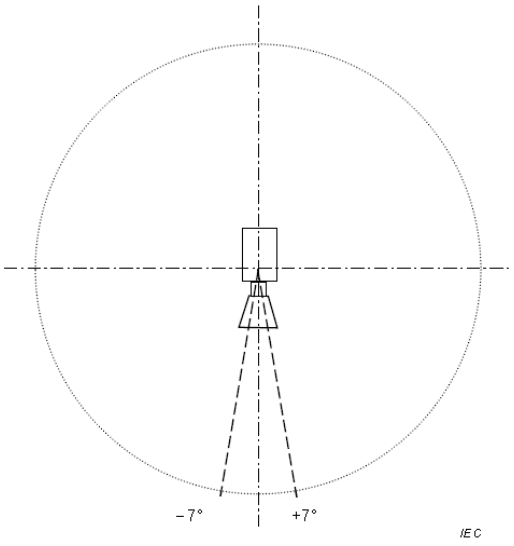
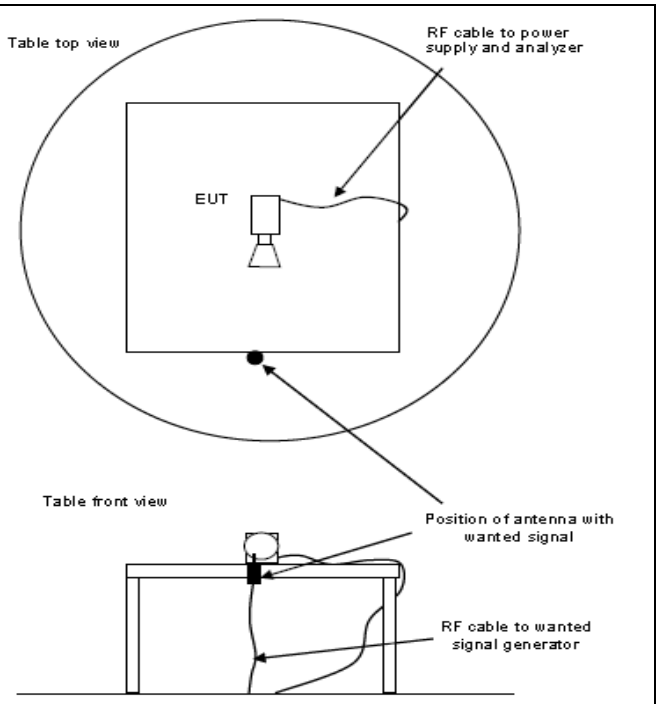
e) Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports.

****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:	Air +/- 2 kV, +/- 4 kV, +/- 8 kV Contact +/- 4 kV
Criteria:	B
Test Procedure	refer to ISL QA -T4-E-S7

Selected Test Point

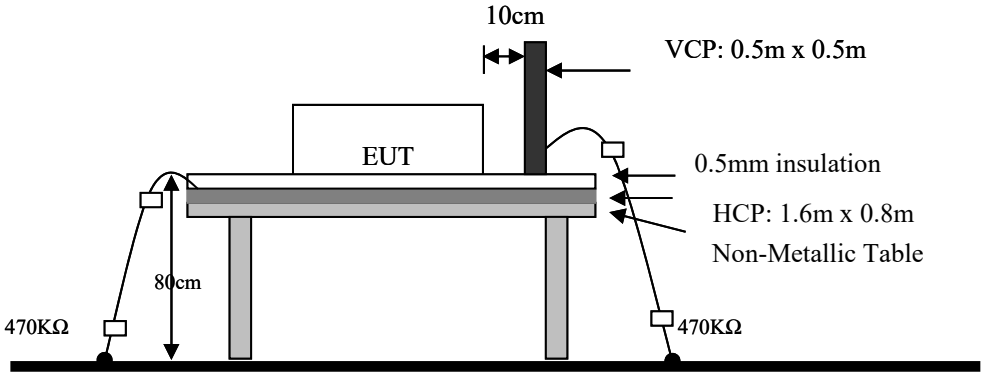
Air: discharges were applied to slots, aperture or insulating surfaces. 10 single air discharges were applied to each selected points.

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

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

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	MAPLKAS		2019-12-23
Power	APD (Model: DA-65C19)		Engineer
Barometer Pressure	100.8kPa		James Kuo
Temperature	22℃		Equipment & Test Site
Humidity	40%		EM TEST(Model: Dito)
Voltage/Freq.	230 Vac/50Hz		ESD 1F

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

→Blue arrow represent Air discharge point

→Red arrow represent Contact discharge point

ND=No Discharge; Meets criteria but unable to obtain an electrostatic discharge (ESD) at this test point.

X=EUT DOES NOT meet the acceptance criteria

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

Contact Discharge	Voltage kV 25 Discharge @ 1 PPS										
Test Location	+4	-4									Comments
1	A	A									
2	A	A									
3	A	A									
4	A	A									
5	A	A									
6	A	A									
7	A	A									
8	A	A									
9	A	A									
Air Discharge	Voltage kV 10 Discharge @ 1 PPS										
Test Location	+2	-2	+4	-4	+8	-8					Comments
1	ND	ND	A	A	A	A					
2	ND	ND	A	A	A	A					
3	ND	ND	A	A	A	A					
4	ND	ND	A	A	A	A					
5	ND	ND	ND	ND	A	A					
6	ND	ND	A	A	A	A					
7	ND	ND	A	A	A	A					
8	ND	ND	A	A	A	A					
9	ND	ND	A	A	A	A					
10	ND	ND	A	A	A	A					
11	ND	ND	A	A	A	A					
12	ND	ND	A	A	A	A					
13	ND	ND	ND	ND	A	A					
Indirect Discharge	Voltage kV 25 Discharge @ 1 PPS										
Test Location	+4	-4									Comments
VCP Front	A	A									
VCP Right	A	A									
VCP Left	A	A									
VCP Back	A	A									
Test Location	+4	-4									Comments
HCP Front	A	A									
HCP Right	A	A									
HCP Left	A	A									
HCP Back	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:

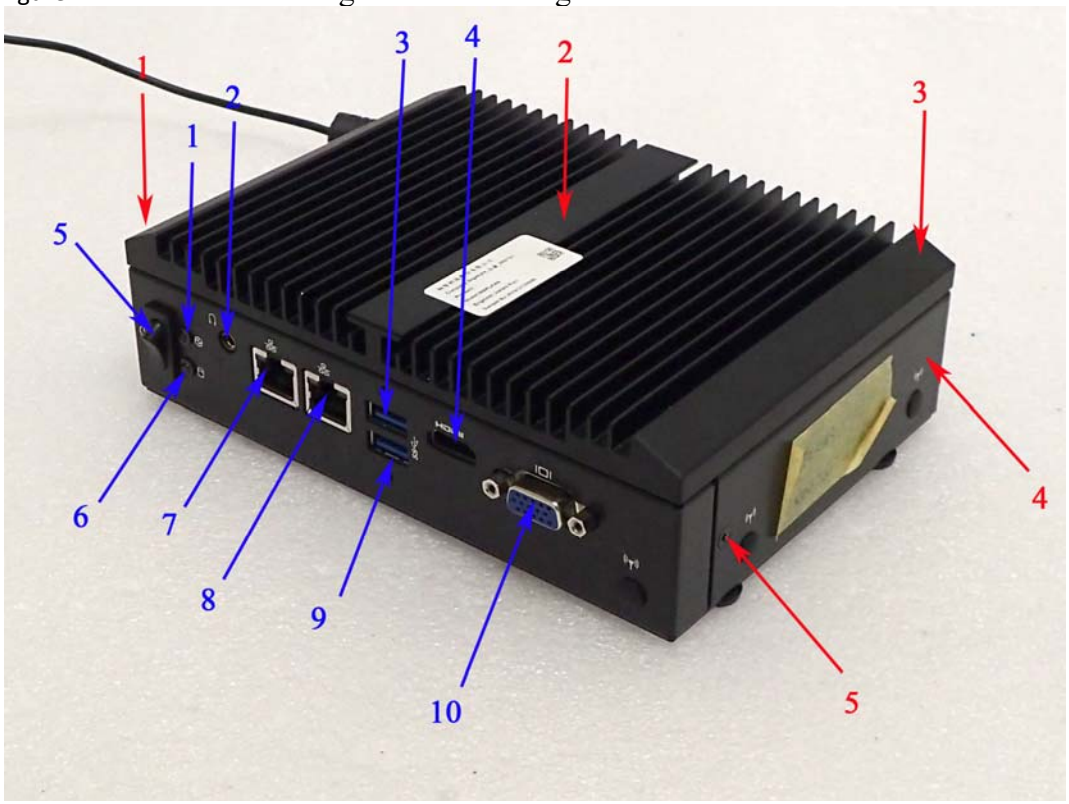
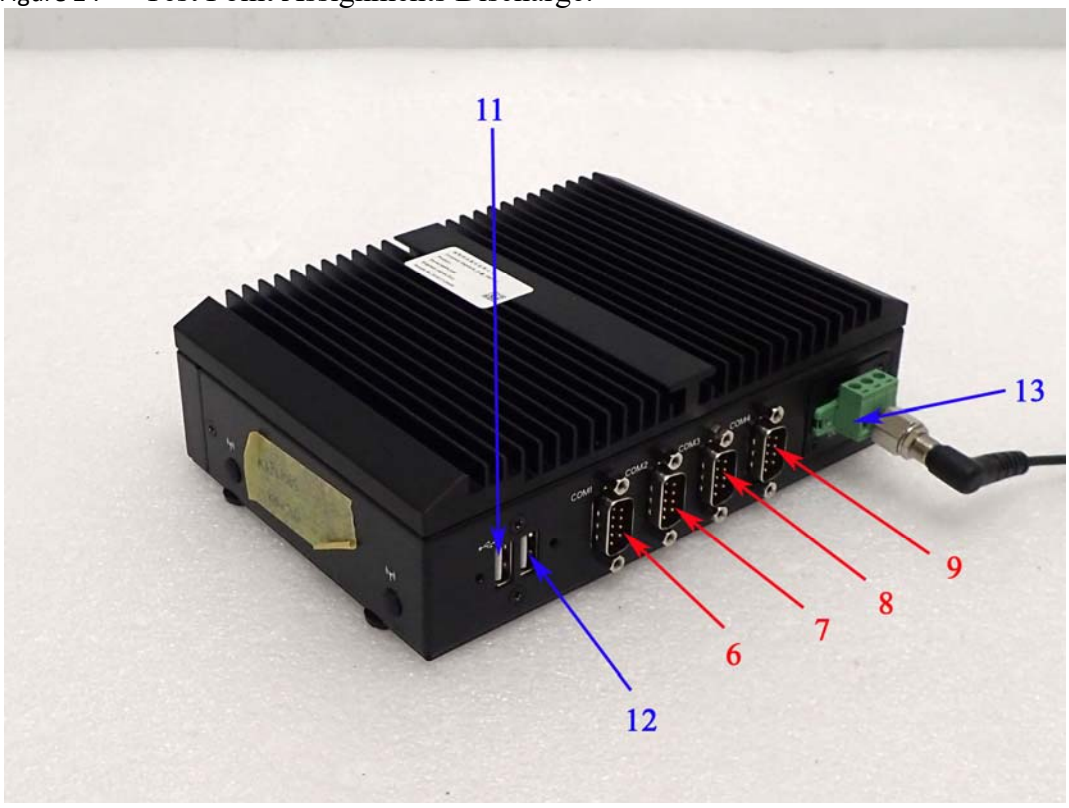


Figure 2 : Test Point Assignments Discharge:



8.4 Test Setup Photo

9. Radio-Frequency, Electromagnetic Field immunity

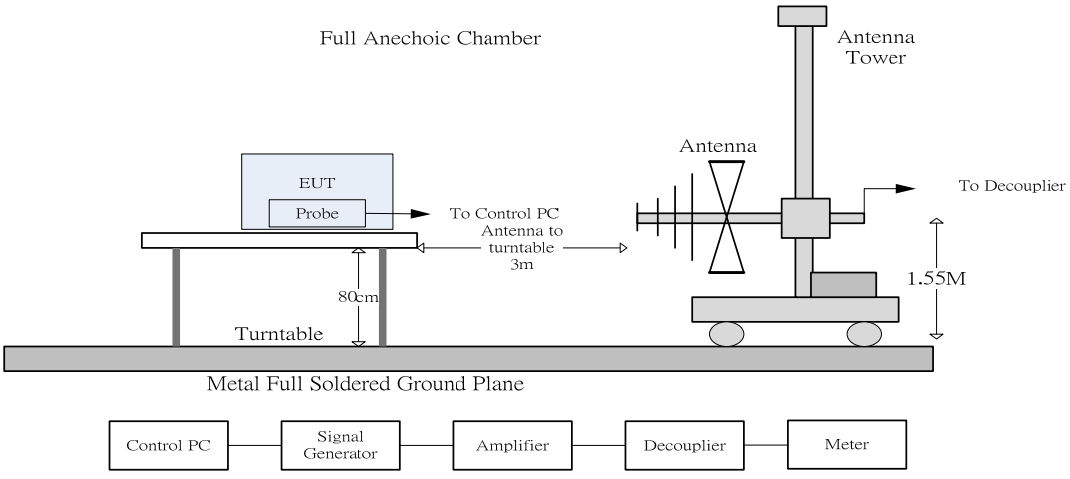
9.1 Test Specification and Setup

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:	3 V/m
Modulation:	AM 1kHz 80%
Frequency range:	80 MHz~1 GHz
Frequency Step:	1% of last step frequency
Dwell time:	3s
Polarization:	Vertical and Horizontal
EUT Azimuth Angle	☒0° ☒90° ☒180° ☒270°
Criteria:	A
Test Procedure	refer to ISL QA -T4-E-S8

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

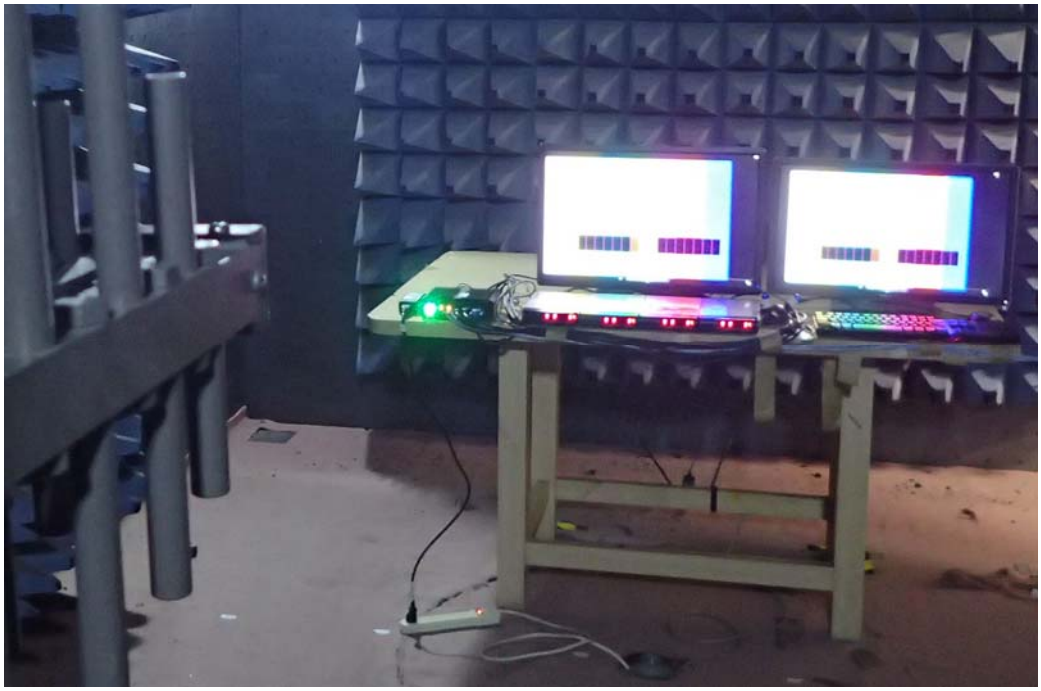
Basic Standard	EN 61000-4-3	Date	
EUT Model Name	MAPLKAS	2019-12-24	
Power	APD (Model: DA-65C19)	Engineer	
Barometer Pressure	100.8kPa	James Kuo	
Temperature	22℃	Equipment & Test Site	
Humidity	63%	Chamber 04	
Voltage/Freq.	230 Vac/50Hz		

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	3	Vertical	A	
90°(left)	80-1000	1	3s	80% @ 1kHz	3	Vertical	A	
180°(back)	80-1000	1	3s	80% @ 1kHz	3	Vertical	A	
270°(right)	80-1000	1	3s	80% @ 1kHz	3	Vertical	A	
0°(front)	80-1000	1	3s	80% @ 1kHz	3	Horizontal	A	
90°(left)	80-1000	1	3s	80% @ 1kHz	3	Horizontal	A	
180°(back)	80-1000	1	3s	80% @ 1kHz	3	Horizontal	A	
270°(right)	80-1000	1	3s	80% @ 1kHz	3	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:	AC mains; Twisted Pair LAN Port
Basic Standard:	EN 61000-4-4/ IEC 61000-4-4 (details referred to Sec 1.2)
Test Level:	AC Power Port: +/- 1 kV Twisted Pair LAN Port (I/O Cables): +/- 0.5 kV
Rise Time:	5ns
Hold Time:	50ns
Burst Period:	300ms
Repetition Frequency:	5kHz
Criteria:	B
Test Procedure	refer to ISL QA -T4-E-S9

Test Procedure

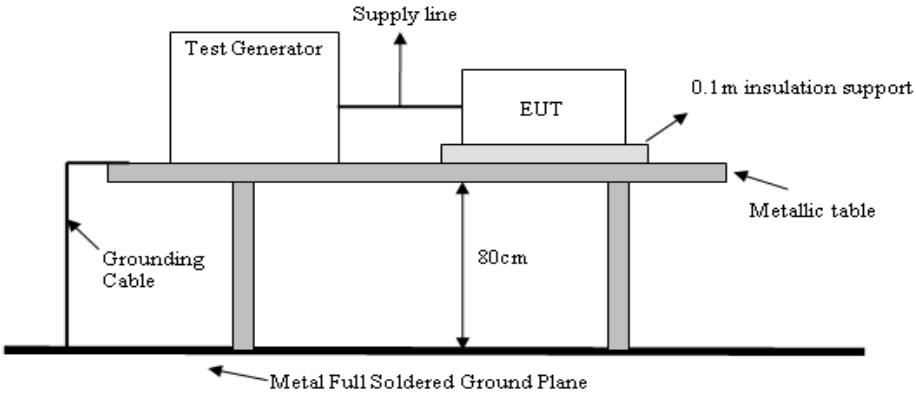
The EUT was setup on a nonconductive table 0.1 m above a reference ground plane.

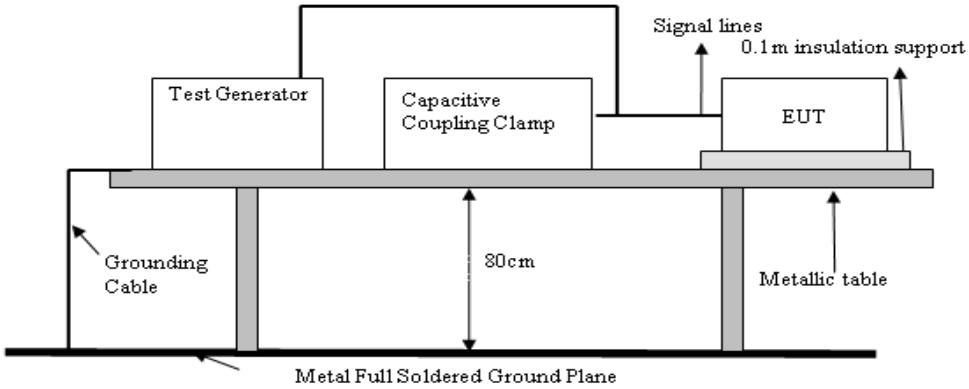
Test Points	Polarity	Result	Comment
Line	+	N	60 sec
	-	N	60 sec
Neutral	+	N	60 sec
	-	N	60 sec
Ground	+	N	60 sec
	-	N	60 sec
Line to Neutral	+	N	60 sec
	-	N	60 sec
Line to Ground	+	N	60 sec
	-	N	60 sec
Neutral to Ground	+	N	60 sec
	-	N	60 sec
Line to Neutral to Ground	+	N	60 sec
	-	N	60 sec
Capacitive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

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

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	MAPLKAS	2019-12-24	
Power	APD (Model: DA-65C19)	Engineer	
Barometer Pressure	100.8kPa	James Kuo	
Temperature	22℃	Equipment & Test Site	
Humidity	62%	EM TEST (Model: UCS-500 M6B)	
Voltage/Freq.	230 Vac/50Hz		

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

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

AC Power Port

Line Under Test	Voltage Level	Severity Level	Pulse Polarity	Burst Repetition Rate	Test Duration	EUT Status	Comments
Line	1.0kV	2	+	300ms / 5.0kHz	1 Minutes	A	
Line	1.0kV	2	-	300ms / 5.0kHz	1 Minutes	A	
Neutral	1.0kV	2	+	300ms / 5.0kHz	1 Minutes	A	
Neutral	1.0kV	2	-	300ms / 5.0kHz	1 Minutes	A	
Ground	1.0kV	2	+	300ms / 5.0kHz	1 Minutes	A	
Ground	1.0kV	2	-	300ms / 5.0kHz	1 Minutes	A	
Line- Neutral	1.0kV	2	+	300ms / 5.0kHz	1 Minutes	A	
Line- Neutral	1.0kV	2	-	300ms / 5.0kHz	1 Minutes	A	
Line- Ground	1.0kV	2	+	300ms / 5.0kHz	1 Minutes	A	
Line- Ground	1.0kV	2	-	300ms / 5.0kHz	1 Minutes	A	
Neutral - Ground	1.0kV	2	+	300ms / 5.0kHz	1 Minutes	A	
Neutral - Ground	1.0kV	2	-	300ms / 5.0kHz	1 Minutes	A	
Line-Neutral - Ground	1.0kV	2	+	300ms / 5.0kHz	1 Minutes	A	
Line-Neutral - Ground	1.0kV	2	-	300ms / 5.0kHz	1 Minutes	A	

Signal Port Tested in Capacitive Clamp

Line Under Test	Voltage Level	Severity Level	Pulse Polarity	Burst Repetition Rate	Test Duration	EUT Status	Comments
Capacitive Clamp	0.5kV	2	+	300ms / 5.0kHz	1 Minutes	A	
Capacitive Clamp	0.5kV	2	-	300ms / 5.0kHz	1 Minutes	A	

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

10.3 Test Setup Photo

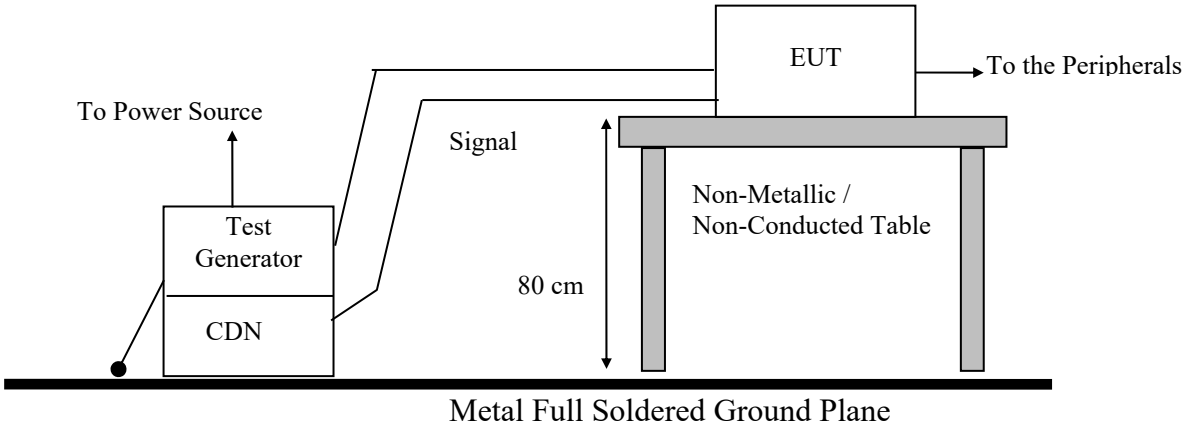
11. Surge Immunity

11.1 Test Specification and Setup

11.1.1 Test Specification

Port:	AC mains
Basic Standard:	EN 61000-4-5/ IEC 61000-4-5 (details referred to Sec 1.2)
Test Level:	Line to Line: +/- 0.5 kV, +/- 1 kV Line to Earth: +/- 0.5 kV, +/- 1 kV, +/- 2kV
Rise Time:	1.2us
Hold Time:	50us
Repetition Rate:	30 seconds
Angle:	☒0° ☒90° ☒180° ☒270°
Criteria:	B
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	MAPLKAS		2019-12-24
Power	APD (Model: DA-65C19)		Engineer
Barometer Pressure	100.8kPa		James Kuo
Temperature	22℃		Equipment & Test Site
Humidity	62%		EMC PARTNER (Model:MIG0603IN3)
Voltage/Freq.	230 Vac/50Hz		
A=criteria A, B=criteria B, C=criteria C			
AC Power Port: ☑	DC Power Port: ☐	LAN Port: ☐	Telephone Port: ☐

AC Power Port

Line Under Test	Voltage	Level	Polarity	Repetition Rate	Cycle	Pulse Position	EUT Status	Comments
Line-Neutral	0.5kV	2	+	30 sec	5	0, 90, 180, 270	A	
Line-Neutral	0.5kV	2	−	30 sec	5	0, 90, 180, 270	A	
Line-Ground	0.5kV	1	+	30 sec	5	0, 90, 180, 270	A	
Line-Ground	0.5kV	1	−	30 sec	5	0, 90, 180, 270	A	
Neutral- Ground	0.5kV	1	+	30 sec	5	0, 90, 180, 270	A	
Neutral- Ground	0.5kV	1	−	30 sec	5	0, 90, 180, 270	A	
Line- Neutral	1.0kV	3	+	30 sec	5	0, 90, 180, 270	A	
Line- Neutral	1.0kV	3	−	30 sec	5	0, 90, 180, 270	A	
Line-Ground	1.0kV	2	+	30 sec	5	0, 90, 180, 270	A	
Line-Ground	1.0kV	2	−	30 sec	5	0, 90, 180, 270	A	
Neutral- Ground	1.0kV	2	+	30 sec	5	0, 90, 180, 270	A	
Neutral- Ground	1.0kV	2	−	30 sec	5	0, 90, 180, 270	A	
Line-Ground	2.0kv	3	+	30 sec	5	0, 90, 180, 270	A	
Line-Ground	2.0kv	3	−	30 sec	5	0, 90, 180, 270	A	
Neutral- Ground	2.0kv	3	+	30 sec	5	0, 90, 180, 270	A	
Neutral- Ground	2.0kv	3	−	30 sec	5	0, 90, 180, 270	A	

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

11.3 Test Setup Photo

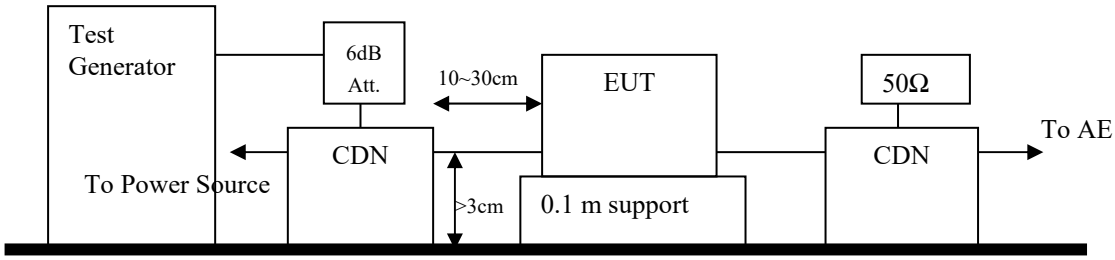
12. Immunity to Conductive Disturbance

12.1 Test Specification and Setup

12.1.1 Test Specification

Port:	AC mains; Twisted Pair LAN Port
Basic Standard:	EN 61000-4-6/ IEC 61000-4-6 (details referred to Sec 1.2)
Test Level:	3 V
Modulation:	AM 1kHz 80%
Frequency range:	0.15 MHz - 80MHz
Frequency Step:	1% of last Frequency
Dwell time:	3s
Criteria:	A
CDN Type:	CDN M2+M3, CDN T4, CDN T8
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	MAPLKAS	2019-12-20
Power	APD (Model: DA-65C19)	Engineer
Barometer Pressure	100.8kPa	James Kuo
Temperature	23℃	Equipment & Test Site
Humidity	62%	FRANKONIA (Model: CIT-10/75)
Voltage/Freq.	230 Vac/50Hz	

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

AC Power Port

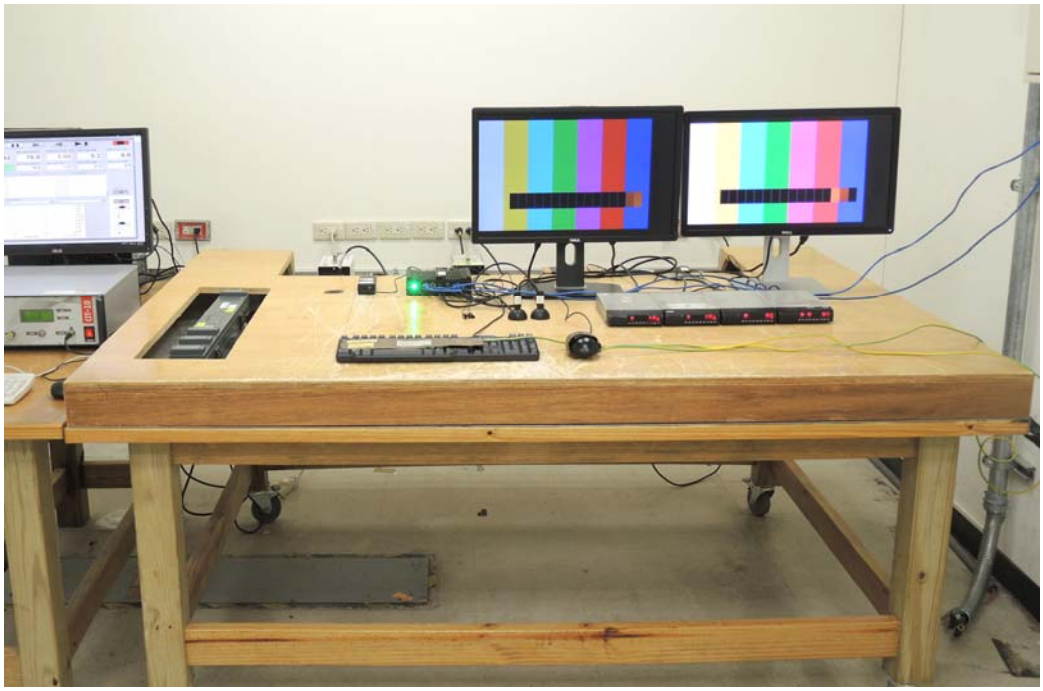
Line Under Test	Frequency		Level	Modulation	Dwell time	EUT Status	Comments
	Range (MHz)	Steps %					
AC Power Port	0.15 to 80	1	3V	80% @ 1kHz	3s	A	

Signal & Telecommunication Port

Line Under Test	Frequency		Level	Modulation	Dwell time	EUT Status	Comments
	Range (MHz)	Steps %					
LAN Port 1	0.15 to 80	1	3V	80% @ 1kHz	3s	A	
LAN Port 2	0.15 to 80	1	3V	80% @ 1kHz	3s	A	

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

12.3 Test Setup Photo



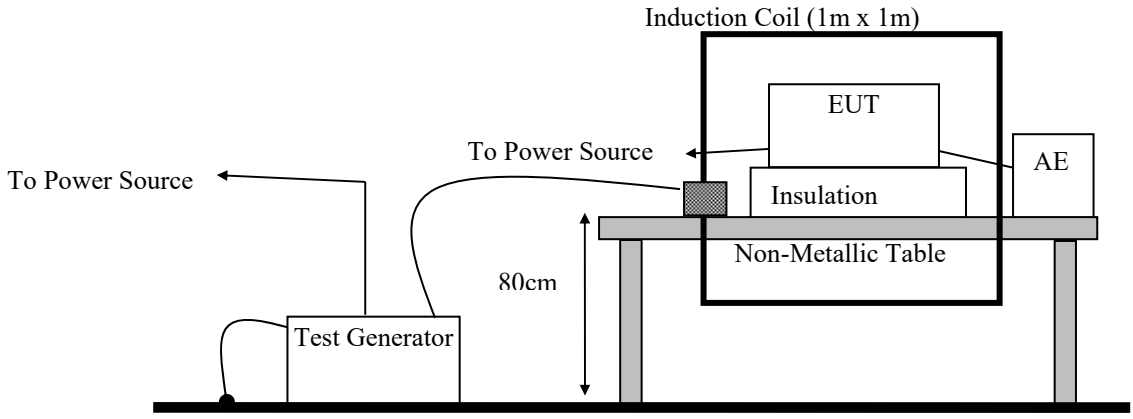
13. Power Frequency Magnetic Field immunity

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:	1A/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

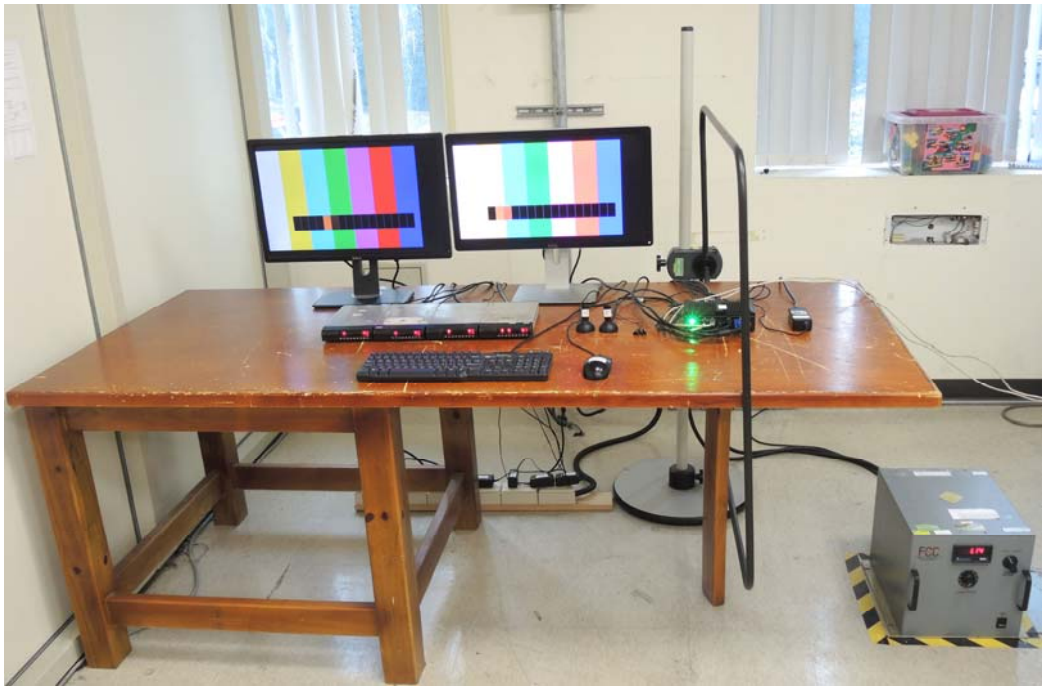
Basic Standard	EN 61000-4-8	Date	
EUT Model Name	MAPLKAS	2019-12-20	
Power	APD (Model: DA-65C19)	Engineer	
Barometer Pressure	100.8kPa	James Kuo	
Temperature	23℃	Equipment & Test Site	
Humidity	62%	FCC(F-1000-4-8-G-125A) Immunity Loop: FCC (F-100-4-8-L-1M)	
Voltage/Freq.	230 Vac/50Hz		

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

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

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

13.3 Test Setup Photo



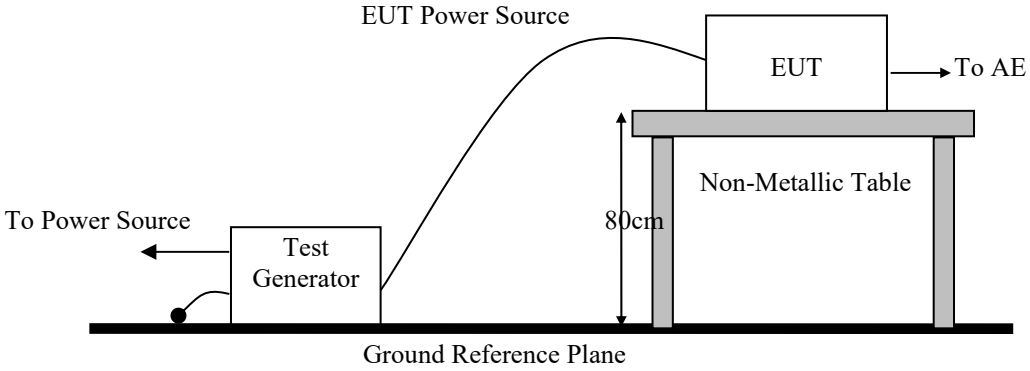
14. Voltage Dips, Short Interruption and Voltage Variation immunity

14.1 Test Specification and Setup

14.1.1 Test Specification

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

14.1.2 Test Setup



14.1.3 Test Result

Performance of EUT complies with the given specification

14.2 Test Data: Configuration 1

Basic Standard	EN 61000-4-11			Date	
EUT Model Name	MAPLKAS			2019-12-18	
Power	APD (Model: DA-65C19)			Engineer	
Barometer Pressure	100.8kPa			James Kuo	
Temperature	23℃			Equipment & Test Site	
Humidity	62%			NOISEKEN (Model:VDS-2002)	
Voltage/Freq.	100Vac/50Hz and 240Vac/50Hz				
A=criteria A, B=criteria B, C=criteria C					
Voltage / Freq.: 240Vac/50Hz					
Voltage Dips Reduction (%)	Duration	Phase	Test Cycle	EUT Status	Comments
>95%	0.5 period	0°	3	A	
	0.5 period	180°	3	A	
30%	25 period	0°	3	A	
	25 period	180°	3	A	
Voltage Interruptions (%)	Duration	Phase	Test Cycle	EUT Status	Comments
>95%	250 period	0°	3	C	Note 1
	250 period	180°	3	C	Note 1
Voltage / Freq.: 100Vac/50Hz					
Voltage Dips Reduction (%)	Duration	Phase	Test Cycle	EUT Status	Comments
>95%	0.5 period	0°	3	A	
	0.5 period	180°	3	A	
30%	25 period	0°	3	A	
	25 period	180°	3	A	
Voltage Interruptions (%)	Duration	Phase	Test Cycle	EUT Status	Comments
>95%	250 period	0°	3	C	Note 1
	250 period	180°	3	C	Note 1
Additional Notes: A=criteria A, B=criteria B, C=criteria C					
Note 1: EUT Shutdown.					

14.3 Test Setup Photo

15. Harmonics

15.1 Test Specification and Setup

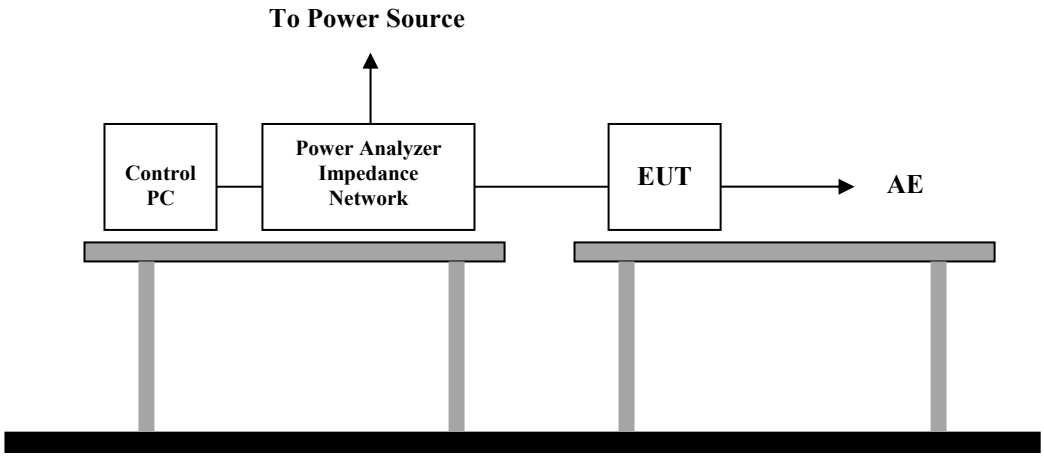
15.1.1 Test Specification

Port:	AC mains
Active Input Power:	<75W
Basic Standard:	EN 61000-3-2/IEC 61000-3-2 (details referred to Sec 1.2)
Test Duration:	2.5min
Class:	A
Test Procedure	refer to ISL QA -T4-E-S14
Temperature:	23°C
Humidity:	62%

Test Procedure

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

15.1.2 Test Setup



15.1.3 Limit

Limits of Class **A** Harmonics Currents

Harmonics Order n	Maximum Permissible harmonic current A	Harmonics Order n	Maximum Permissible harmonic current A
Odd harmonics		Even harmonics	
3	2.30	2	1.08
5	1.14	4	0.43
7	0.77	6	0.30
9	0.40	8 ≤ n≤ 40	0.23 * 8/n
11	0.33		
13	0.21		
15 ≤ n ≤39	0.15 * 15/n		

15.1.4 Test Result

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

16. Voltage Fluctuations

16.1 Test Specification and Setup

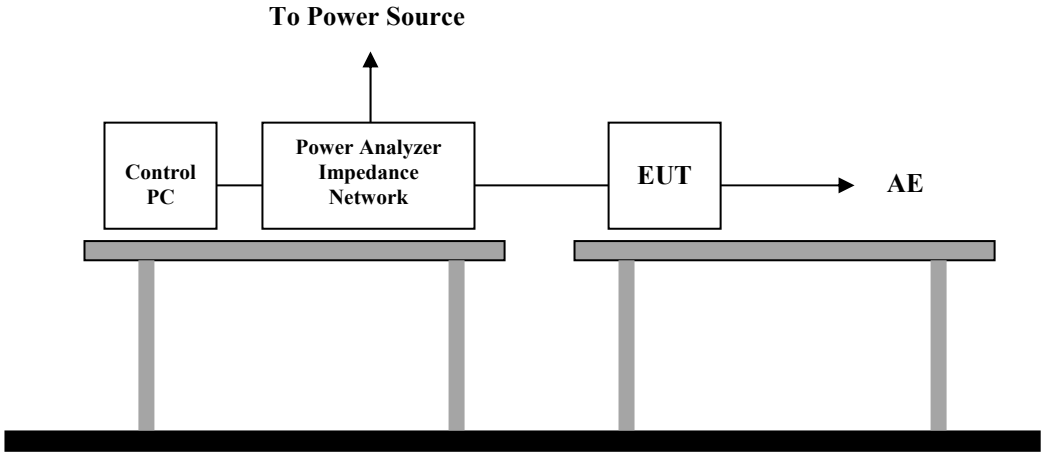
16.1.1 Test Specification

Port:	AC mains
Basic Standard:	EN 61000-3-3/IEC61000-3-3 (details referred to Sec 1.2)
Test Procedure	refer to ISL QA -T4-E-S14
Observation period:	For Pst 10min
	For Plt 2 hours
Temperature:	23°C
Humidity:	62%

Test Procedure

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

16.1.2 Test Setup



16.1.3 Test Result

Performance of EUT complies with the given specification.

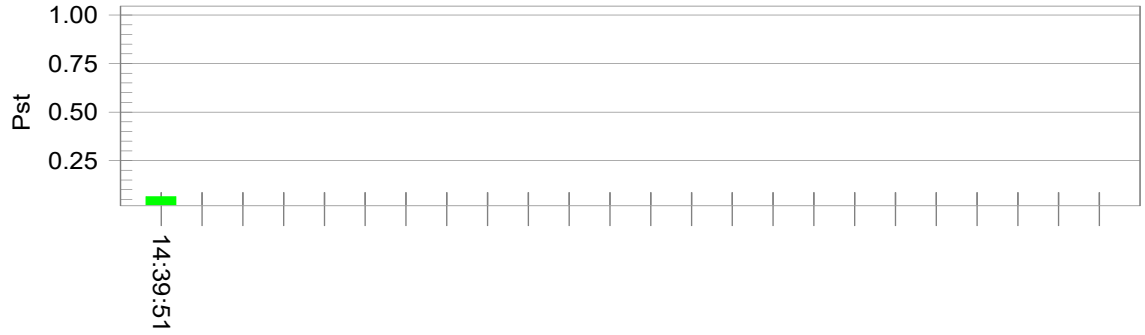
16.2 Test Data: Configuration

Flicker Test Summary per EN/IEC61000-3-3 Ed. 3.0 (2013) (Run time)

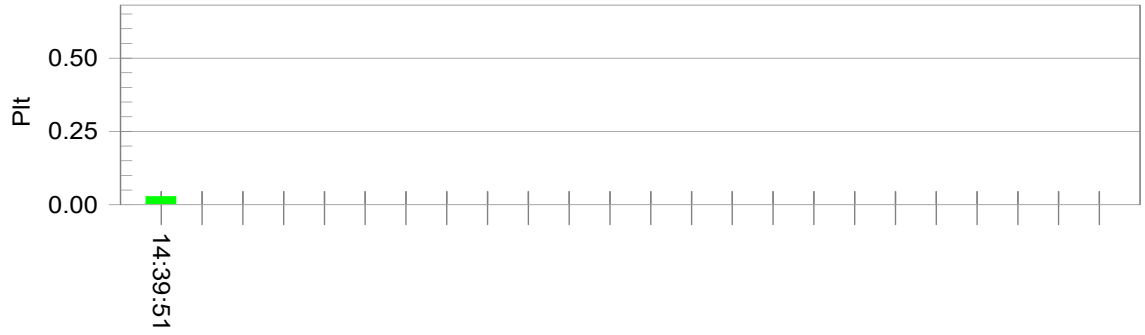
Test category: All parameters (European limits) **Test Margin: 100**
Test duration (min): 10 **Data file name: CTSMXL_F-001786.cts_data**

Test Result: Pass **Status: Test Completed**

Pst_i and limit line **European Limits**



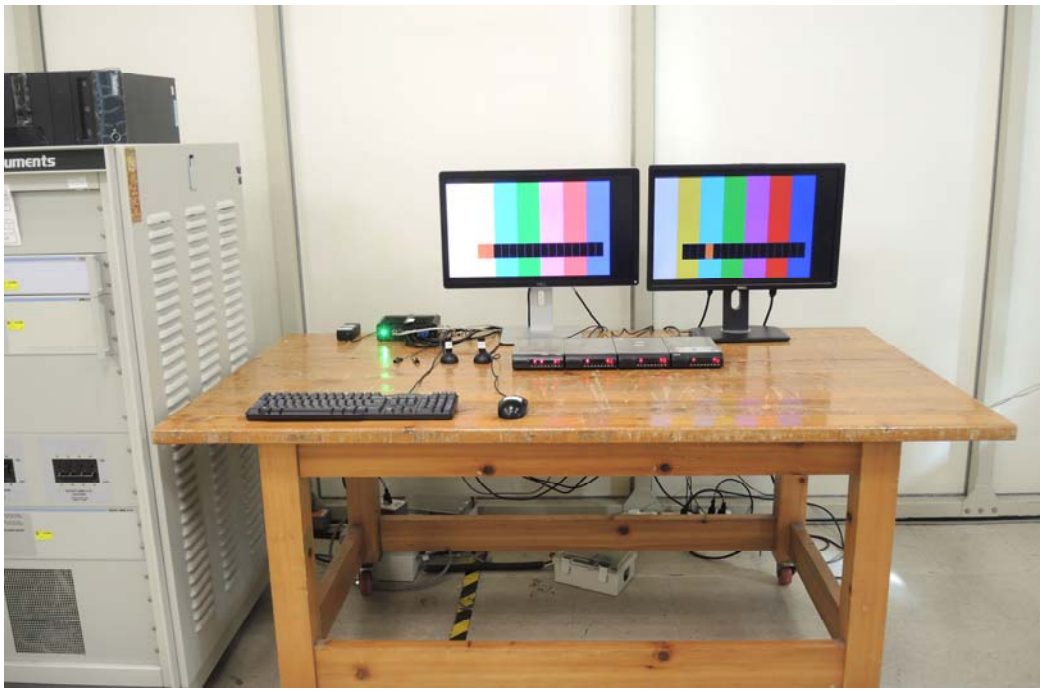
Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt):	**229.73**			
T-max (mS):	**0.0**	**Test limit (mS):**	**500.0**	**Pass**
Highest dc (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Highest dmax (%):	**0.09**	**Test limit (%):**	**4.00**	**Pass**
Highest Pst (10 min. period):	**0.064**	**Test limit:**	**1.000**	**Pass**
Highest Plt (2 hr. period):	**0.028**	**Test limit:**	**0.650**	**Pass**

16.3 Test Setup Photo



17. Appendix

17.1 Appendix A: Test Equipment

17.1.1 Test Equipment List

Location Con04	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 04	LISN 18	ROHDE & SCHWARZ	ENV216	101424	07/09/2019	07/09/2020
Conduction 04	LISN 03	ROHDE & SCHWARZ	ESH3-Z5	828874/010	07/22/2019	07/22/2020
Conduction 04	ISN T8 07	Teseq GmbH	ISN T800	30834	09/09/2019	09/09/2020
Conduction 04	EMI Receiver 18	ROHDE&SCHWARZ	ESCI	101392	06/14/2019	06/14/2020

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	01/29/2019	01/29/2020
Radiation (Chamber12)	Preamplifier 26	EMCI	EMC9135	980297	01/23/2019	01/23/2020
Radiation (Chamber12)	Coaxial Cable Chmb 12-10M-01	PEWC	CFD400-NL	Chmb 12-10M-01	09/16/2019	09/16/2020
Radiation (Chamber12)	EMI Receiver 18	ROHDE & SCHWARZ	ESCI	101392	06/14/2019	06/14/2020

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	11/01/2019	11/01/2020
Rad. Above 1GHz	Horn Antenna 13	ETS-Lindgren	3117	0161229	09/09/2019	09/09/2020
Rad. Above 1GHz	Preamplifier 20	EMC INSTRUMENT	EMC051845/EMCI-S-18-06	980084/AT-S 18001	03/21/2019	03/21/2020
Rad. Above 1GHz	Microwave Cable 35	WOKEN	WCBA-WCA04NM.SM6	Chamber 14-1	01/31/2019	01/31/2020
Rad. Above 1GHz	Microwave Cable 36	WOKEN	WCBA-WCA04NM.SM0.8	Chamber 14-2	01/31/2019	01/31/2020

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
EN61K-4-2	ESD Gun 12	EM TEST	Dito	P1650188689	05/07/2019	05/07/2020
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	12/04/2019	12/04/2020
EN61K-4-4	EFT and SURGE Test System	EM TEST	UCS-500 M6B	V0728102674	02/14/2019	02/14/2020
EN61K-4-4	Capacitive Coupling Clamp	EM TEST	HFK	0907-106	02/14/2019	02/14/2020
EN61K-4-5	CDN-UTP8 ED3	EMC-PARTNER	CDN-UTP8	1509	04/02/2019	04/02/2020
EN61K-4-5	SURGE-TESTER	EMC Partner	MIG0603IN3	523	04/02/2019	04/02/2020
EN61K-4-6	CDN M2+M3 04	TESEQ	CDN M016	43257	09/10/2019	09/10/2020
EN61K-4-6	CDN T4 06	FCC Inc.	FCC-801-T4	02068	06/24/2019	06/24/2020
EN61K-4-6	CDN T8-10_2	Teseq GmbH	CDN T8 10	41241	03/26/2019	03/26/2020
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	03/25/2019	03/25/2020
EN61K-4-8	Magnetic Field Immunity Loop	FCC	F-1000-4-8-L-1M	01037	05/27/2019	06/05/2020
EN61K-4-8	Magnetic Field Test Generator	FCC	F-1000-4-8-G-125A	01038	05/27/2019	06/05/2020
EN61K-4-11	Voltage Dip and UP Simulator 01	NoiseKen	VDS-2002	VDS1750439	09/25/2019	09/25/2020
EN61K-3-2/3, EN61K-3-11-12	(Harmonic/Flicker) MX Series CTSH Compliance Test System	California Instruments	MX60T04GH 10400	72793	08/05/2019	08/05/2020

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

**Software for Controlling Spectrum/Receiver and Calculating Test Data

Test Item	Filename	Version
EN61000-3-2	California Instruments	CTSMXL V2.19.0
EN61000-3-3	California Instruments	CTSMXL V2.19.0
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
EN61000-4-8	N/A	
EN61000-4-11	NOISE KEN	2.0

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

17.2 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 04>
AMN: ±2.90dB
ISN T8: ±3.05dB

<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 61000-4-11 (Dips)	± 2.41%
EN 61000-4-3 (RS)	± 1.89dB	EN 61000-3-2 (Harmonics)	± 1.29 %
EN 61000-4-4 (EFT)		EN 61000-3-3 (Fluctuations and Flicker)	± 6.8 %
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		

17.3 Appendix C: Photographs of EUT

Please refer to the File of **ISL-*19LE853*P**