

Certificate

Issue Date: February 17, 2017
Ref. Report No. ISL-17LE092C32

Product Name : Poe Injector
Model(s) : MIT-69a-bcdefgh
Responsible Party : MStronic Co., Ltd.
Address : 2F, 12, Gongshang Rd., Wugu District, New Taipei City, 248 Taiwan

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

The device bearing the trade name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in European Council Directive- EMC Directive 2014/30/EU. The device was passed the test performed according to :



Standards:

EN 55032:2015+AC:2016, CISPR 32: 2015+COR1:2016
AS/NZS CISPR 32:2015

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

International Standards Laboratory

W.H. Chang

W.H. Chang / Director

☐ **Hsi-Chih LAB:**

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CE MARK TECHNICAL FILE

AS/NZS EMC CONSTRUCTION FILE

of

Product Name

Poe Injector

Model

MIT-69a-bcdefgh

Contains:

1. Declaration of Conformity
2. EN55032/CISPR 32, AS/NZS CISPR 32 EMI test report
3. Block Diagram and Schematics
4. Users' manual

Declaration of Conformity

Name of Responsible Party: MStronic Co., Ltd.
Address of Responsible Party: 2F, 12, Gongshang Rd., Wugu District,
New Taipei City, 248 Taiwan
Declares that product: Poe Injector
Model: MIT-69a-bcdefgh
Assembled by: Same as above
Address: Same as above

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

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

Performed Item	Test Performed	Deviation	Result
Conducted emissions from the AC mains power ports	Yes	No	PASS
Telecommunication Port Conducted Emissions (asymmetric mode)	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>

We, MStronic 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.

MStronic Co., Ltd.

Date: February 17, 2017

Declaration of Conformity

Name of Responsible Party: MStronic Co., Ltd.
Address of Responsible Party: 2F, 12, Gongshang Rd., Wugu District,
New Taipei City, 248 Taiwan
Declares that product: Poe Injector
Model: MIT-69a-bcdefgh
Assembled by: Same as above
Address: Same as above

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

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

We, MStronic 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.

MStronic Co., Ltd.

Date: February 17, 2017

CE TEST REPORT

of
EN55032 / CISPR 32 / AS/NZS CISPR 32
Class A

Product : **Poe Injector**

Model(s): **MIT-69a-bcdefgh**

Applicant: **MSTronic Co., Ltd.**

Address: **2F, 12, Gongshang Rd., Wugu District,
New Taipei City, 248 Taiwan**

Test Performed by:

International Standards Laboratory

<Lung-Tan LAB>

*Site Registration No.

BSMI: SL2-IN-E-0013; SL2-R1/R2-E-0013; TAF: 0997

FCC: TW1036; IC: IC4067B-1; NEMKO: ELA 113B

VCCI: <Conduction 02>C-1440, T-1676, <Conduction 03>C-2845,
T-1464, <Conduction 04>C-4778, T-2295, <Chamber 02>R-1435, G-17,
<Chamber 12>R-2598, G-16, <Chamber 14>G-211,

*Address:

No. 120, Lane 180, Hsin Ho Rd.,

Lung-Tan Dist., Tao Yuan City 325, Taiwan

*Tel: 886-3-407-1718; Fax: 886-3-407-1738

Report No.: **ISL-17LE092C32**

Issue Date : **February 17, 2017**

This report totally contains 33 pages including this cover page and contents page.

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

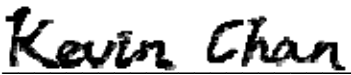
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1. General

1.1 Certification of Accuracy of Test Data

Standards:	Please refer to 1.2
Equipment Tested:	Poe Injector
Model:	MIT-69a-bcdefgh
Applicant:	MSTronic Co., Ltd.
Sample received Date:	April 6, 2016
Final test Date:	EMI: refer to the date of test data
Test Site:	International Standards Laboratory Chamber 12; Conduction 02; Immunity02
Test Distance:	10M (EMI test)
Temperature:	refer to each site test data
Humidity:	refer to each site test data
Atmospheric Pressure:	86 kPa to 106 kPa
Input power:	Conduction input power: DC 48V Radiation input power: DC 48V
Test Result:	PASS
Report Engineer:	Jayla Lu
Test Engineer:	 Kevin Chan
Approved By:	 W.H. Chang / Director

1.2 Test Standards

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

EN 55032:2015+AC:2016, CISPR 32: 2015+COR1:2016: Class 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

1.4 Description of Support Equipment

No	Unit	Model / Serial No.	Brand	Power Cord	FCC ID
1	DC Power Supply	PSW 160-21.6 S/N: GEP152286	GWWINSTEK	Non-shielded	FCC DOC
2	Personal Computer	RW7 S/N: N/A	Lenovo	Non-shielded	FCC DOC
3	Notebook	TP00026A S/N: N/A	Lenovo	Non-shielded	FCC DOC
4	Support POE	N/A S/N: N/A	N/A	Non-shielded	FCC DOC
5	LOAD	N/A S/N: N/A	N/A	Non-shielded	FCC DOC

1.5 Software for Controlling Support Unit

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

1. Receive and transmit package of PC to the EUT through LAN port.
2. Receive and transmit package and dc power of Support POE to the EUT through POE port.
3. Receive and transmit package of NB to the Support POE through LAN port.
4. Support POE with LOAD.
5. Repeat the above steps.

	Filename	Issued Date
LAN	Ping.exe	

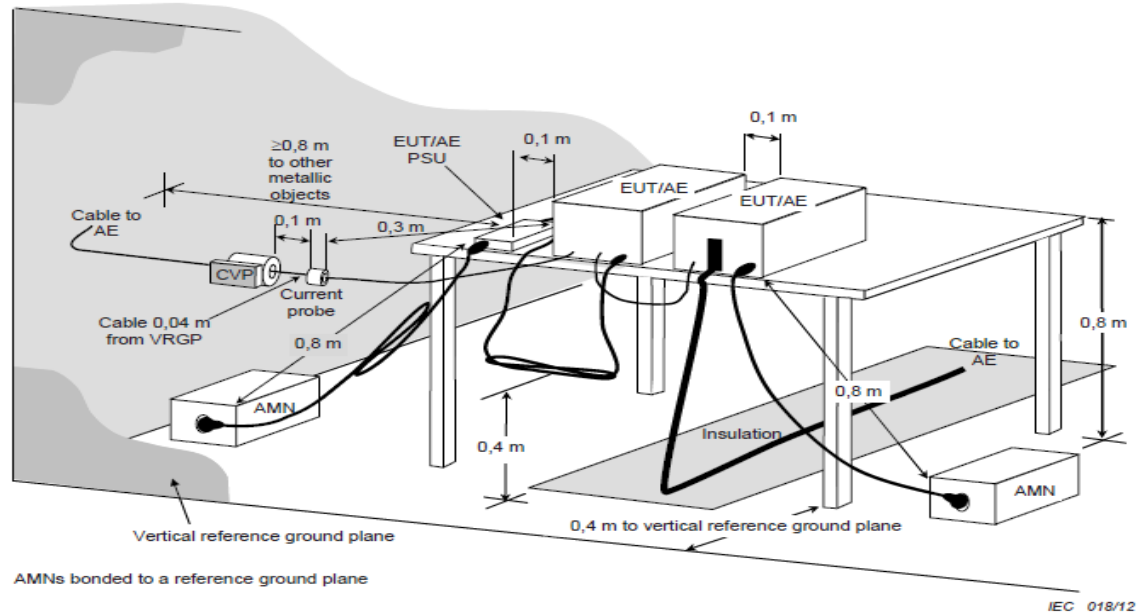
1.6 I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type
DC Power cable	48~72V to EUT SPS	5m	Non-shielded
LAN data cable	PC LAN(RJ-45) Port to EUT LAN port	10m	Non-shielded
LAN data cable	Support POE (RJ-45) Port to EUT POE port	10m	Non-shielded
LAN data cable	Support POE (RJ-45) Port to NB LAN port	10m	Non-shielded

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(μ V)	dB(μ V)
0.15-0.50	79	73
5.0-30	66	60
Note: The lower limit shall apply at the transition frequencies		

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

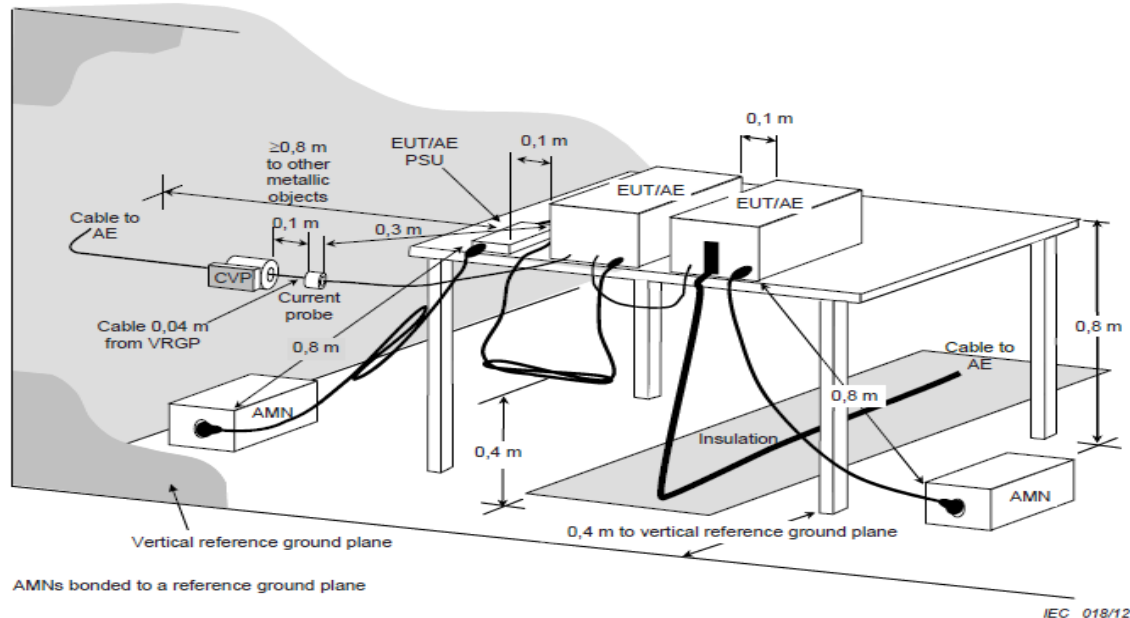
Frequency	QP	AV
MHz	dB(μ V)	dB(μ V)
0.15-0.50	66-56	56-46
0.50-5.0	56	46
5.0-30	60	50
Note: The lower limit shall apply at the transition frequencies		

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

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

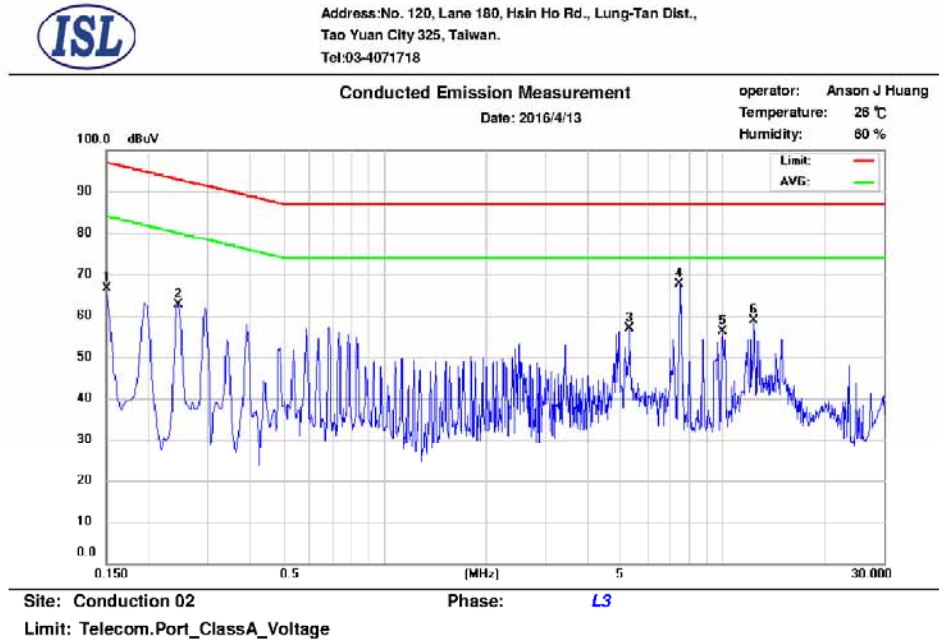
Asymmetric mode conducted emissions from Class B equipment:

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: LAN--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	0.150	55.87	56.11	10.35	66.22	97.00	-30.78	66.46	84.00	-17.54
2	0.246	52.14	52.40	10.15	62.29	92.89	-30.60	62.55	79.89	-17.34
3	5.326	40.82	33.19	9.82	50.64	87.00	-36.36	43.01	74.00	-30.99
4	7.502	48.79	36.56	9.83	58.62	87.00	-28.38	46.39	74.00	-27.61
5	10.010	36.84	17.53	9.86	46.70	87.00	-40.30	27.39	74.00	-46.61
6	12.446	42.24	29.88	9.88	52.12	87.00	-34.88	39.76	74.00	-34.24

Note :

Margin = QP/AVG Emission - Limit

QP/AVG Emission = QP_R/AVG_R + Correct Factor

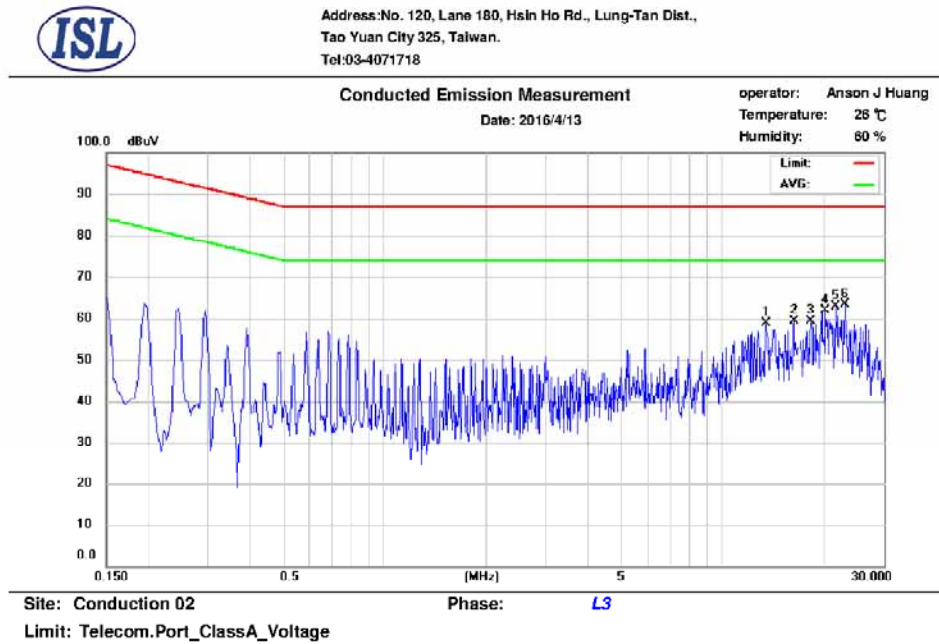
Correct Factor = LISN Loss + Cable Loss

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: LAN--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	13.418	47.87	44.75	9.90	57.77	87.00	-29.23	54.65	74.00	-19.35
2	16.226	48.42	45.77	9.94	58.36	87.00	-28.64	55.71	74.00	-18.29
3	18.246	48.20	45.64	9.99	58.19	87.00	-28.81	55.63	74.00	-18.37
4	20.258	51.46	48.04	10.04	61.50	87.00	-25.50	58.08	74.00	-15.92
5	21.662	52.42	49.00	10.07	62.49	87.00	-24.51	59.07	74.00	-14.93
6	23.126	52.91	49.65	10.11	63.02	87.00	-23.98	59.76	74.00	-14.24

Note :

Margin = QP/AVG Emission - Limit

QP/AVG Emission = QP_R/AVG_R + Correct Factor

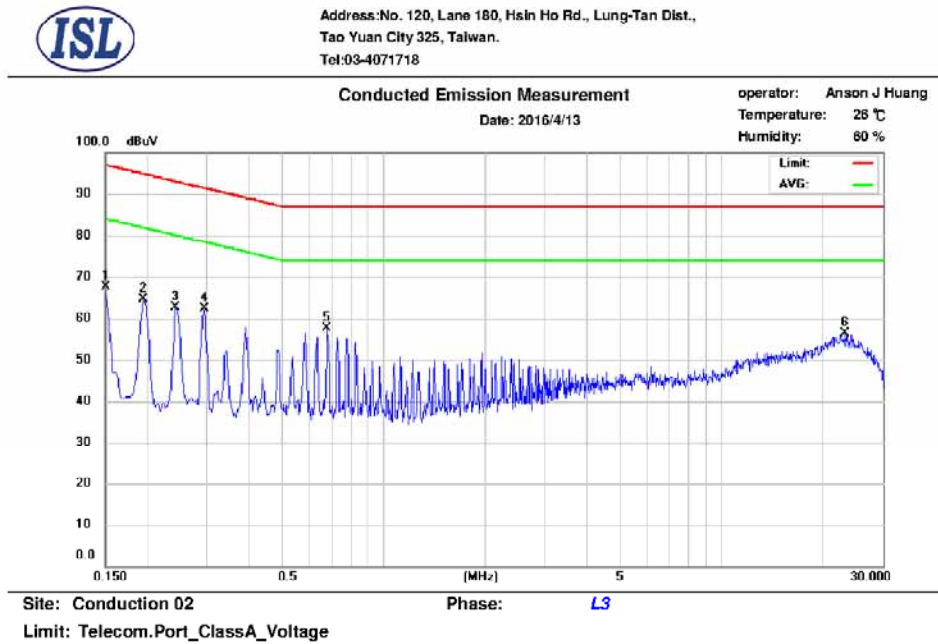
Correct Factor = LISN Loss + Cable Loss

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: LAN--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	0.150	56.37	56.57	10.35	66.72	97.00	-30.28	66.92	84.00	-17.08
2	0.194	54.01	54.16	10.21	64.22	94.86	-30.64	64.37	81.86	-17.49
3	0.242	51.81	51.98	10.15	61.96	93.03	-31.07	62.13	80.03	-17.90
4	0.294	51.33	51.43	10.11	61.44	91.41	-29.97	61.54	78.41	-16.87
5	0.682	47.50	47.56	9.91	57.41	87.00	-29.59	57.47	74.00	-16.53
6	23.254	40.36	34.73	10.12	50.48	87.00	-36.52	44.85	74.00	-29.15

Note :

Margin = QP/AVG Emission - Limit

QP/AVG Emission = QP_R/AVG_R + Correct Factor

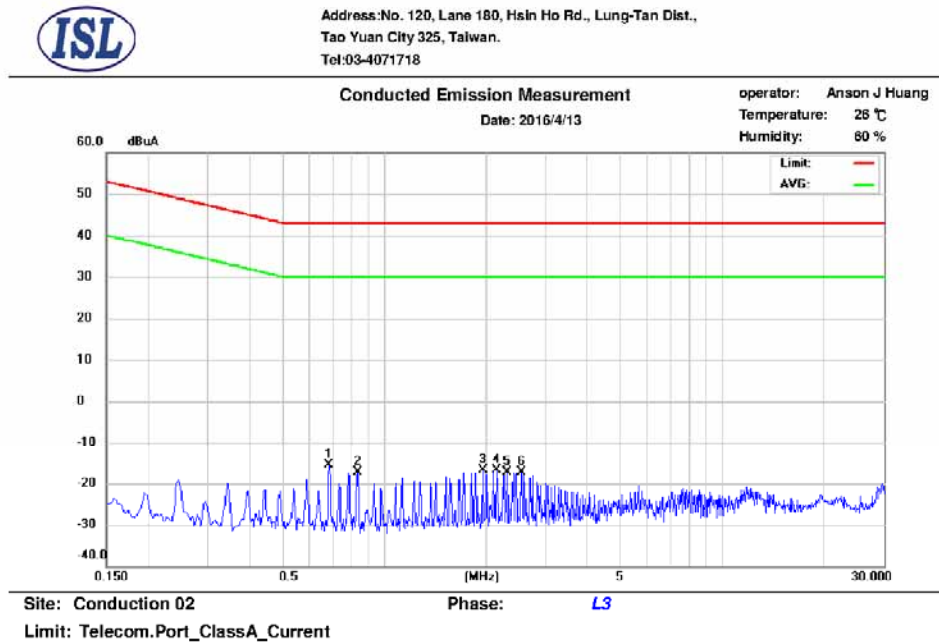
Correct Factor = LISN Loss + Cable Loss

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: POE--GIGA (Current)



No.	Frequency (MHz)	QP_R (dBuA)	AVG_R (dBuA)	Correct Factor (dB)	QP Emission (dBuA)	QP Limit (dBuA)	QP Margin (dB)	AVG Emission (dBuA)	AVG Limit (dBuA)	AVG Margin (dB)
1	0.686	-16.7	-16.8	0.09	-16.6	43.00	-59.68	-16.77	30.00	-46.77
2	0.834	-19.5	-19.8	0.05	-19.5	43.00	-62.50	-19.84	30.00	-49.84
3	1.958	-18.1	-18.3	-0.01	-18.1	43.00	-61.12	-18.36	30.00	-48.36
4	2.154	-18.1	-18.6	-0.01	-18.1	43.00	-61.18	-18.62	30.00	-48.62
5	2.302	-18.2	-18.8	0.00	-18.2	43.00	-61.22	-18.86	30.00	-48.86
6	2.546	-18.7	-19.1	-0.01	-18.7	43.00	-61.74	-19.18	30.00	-49.18

Note :

Margin = QP/AVG Emission - Limit

QP/AVG Emission = QP_R/AVG_R + Correct Factor

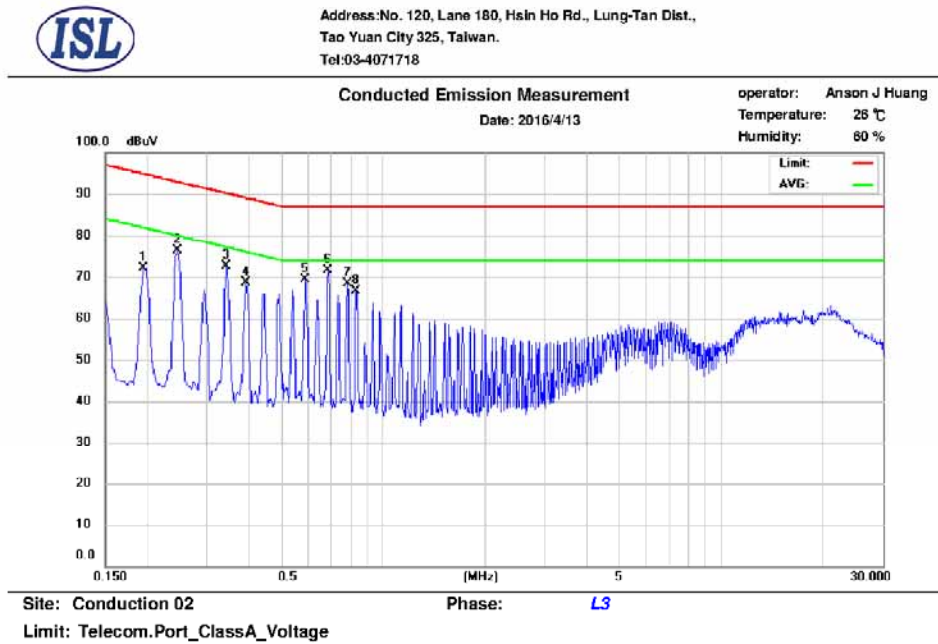
Correct Factor = LISN Loss + Cable Loss

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: POE--GIGA (Voltage)



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	0.194	51.16	51.39	20.60	71.76	94.86	-23.10	71.99	81.86	-9.87
2	0.246	55.37	55.63	20.60	75.97	92.89	-16.92	76.23	79.89	-3.66
3	0.342	51.69	51.94	20.60	72.29	90.15	-17.86	72.54	77.15	-4.61
4	0.390	47.56	47.78	20.61	68.17	89.06	-20.89	68.39	76.06	-7.67
5	0.586	48.49	48.74	20.61	69.10	87.00	-17.90	69.35	74.00	-4.65
6	0.686	50.47	50.73	20.61	71.08	87.00	-15.92	71.34	74.00	-2.66
7	0.782	47.29	47.53	20.62	67.91	87.00	-19.09	68.15	74.00	-5.85
8	0.830	45.47	45.71	20.61	66.08	87.00	-20.92	66.32	74.00	-7.68

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.

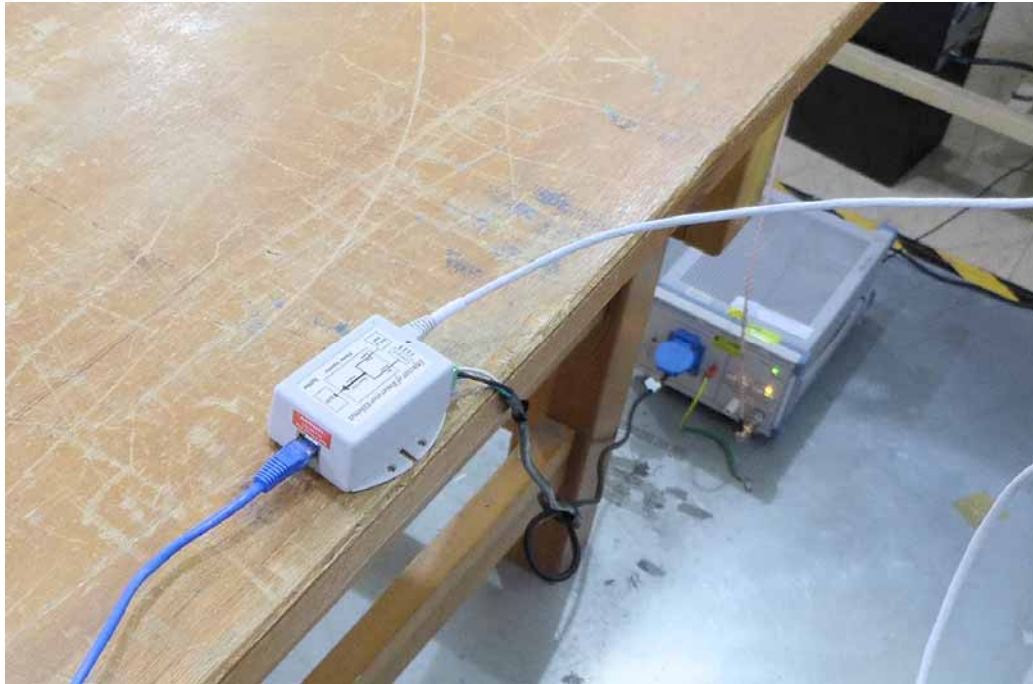
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

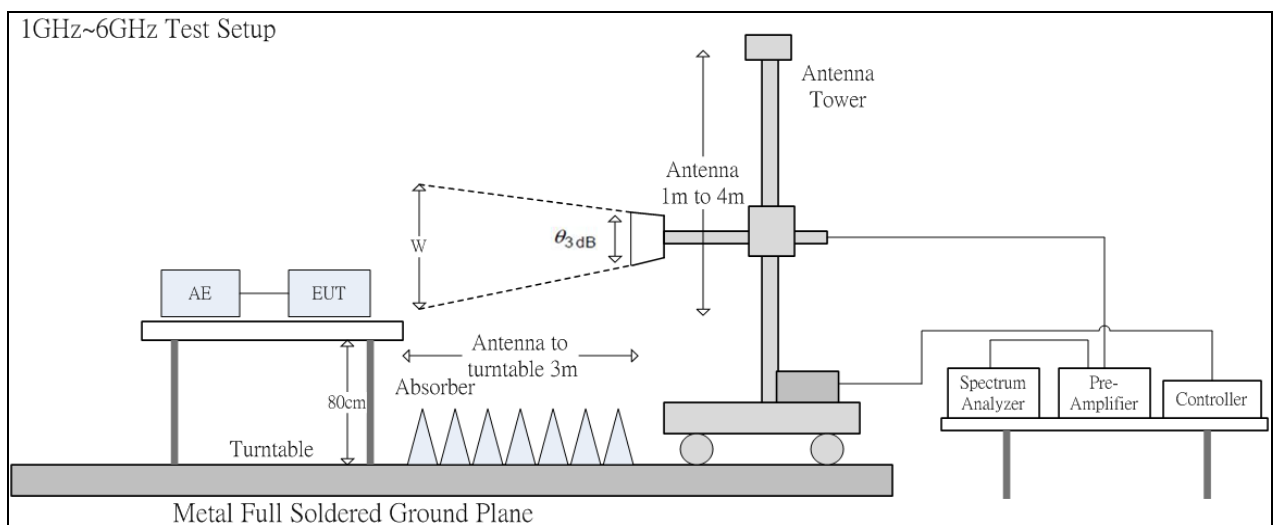
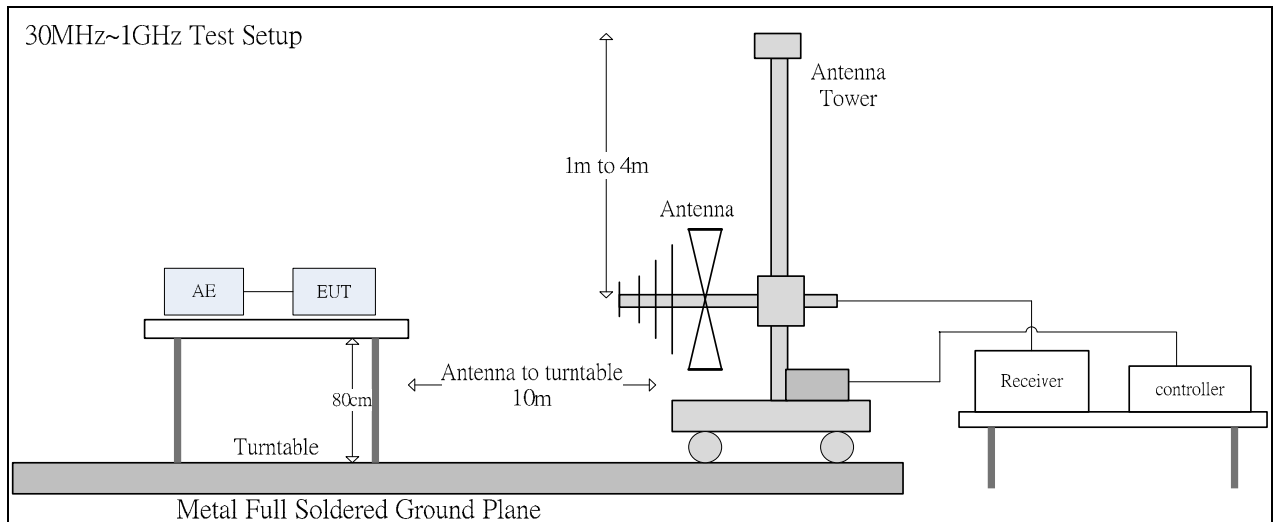
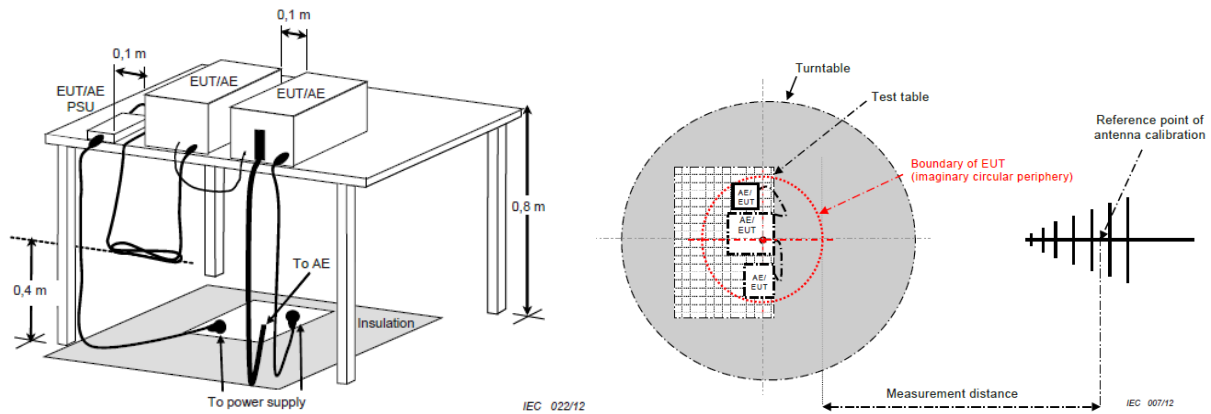
3.7 Test Setup Photo

Front View



Back View





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	$\theta_{3\text{dB}}(\text{min})$	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(μ V/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

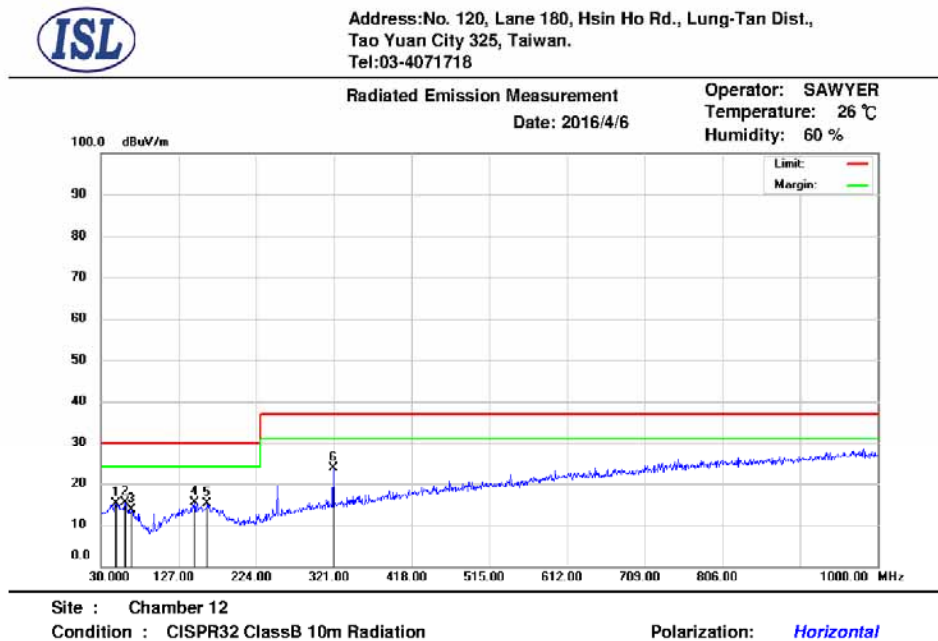
Radiated emissions at frequencies above 1 GHz for Class B equipment:

Frequency range MHz	Measurement		Class B limits dB(μ V/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	48.43	32.10	-17.02	15.08	30.00	-14.92	176	293	peak
2	60.07	32.99	-17.53	15.46	30.00	-14.54	136	238	peak
3	67.83	32.24	-18.53	13.71	30.00	-16.29	170	228	peak
4	146.40	31.79	-16.36	15.43	30.00	-14.57	342	228	peak
5	162.89	30.90	-15.89	15.01	30.00	-14.99	389	237	peak
6	320.03	37.91	-14.32	23.59	37.00	-13.41	152	67	peak

* Note:

Margin = Emission – Limit

Emission = Radiated Amplitude + Correct Factor

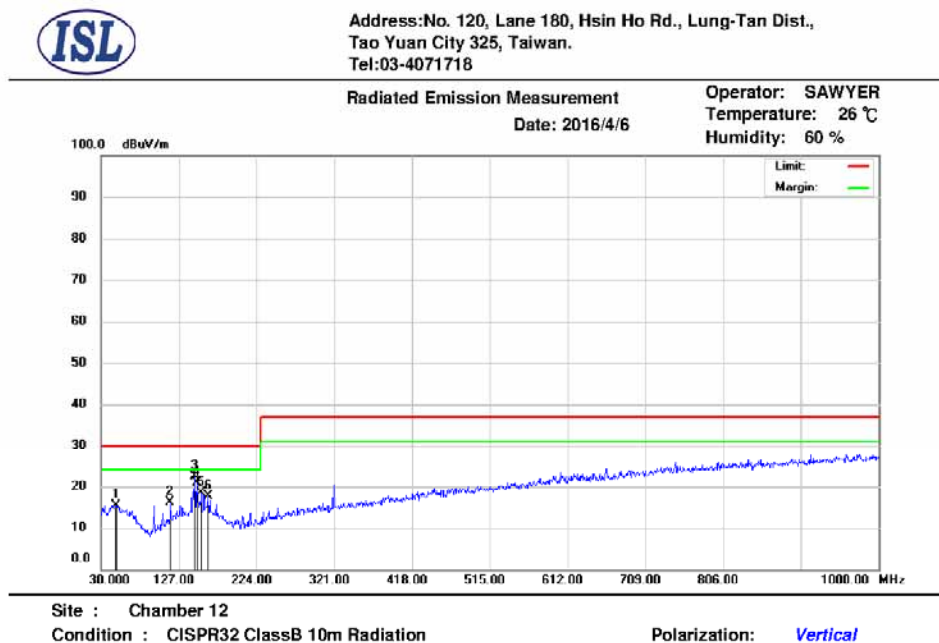
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain

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

BILOG Antenna Distance: 10 meters

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

- Radiated Emissions (Vertical)



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor (dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	48.43	32.47	-17.02	15.45	30.00	-14.55	229	102	peak
2	116.33	34.96	-18.82	16.14	30.00	-13.86	296	329	peak
3	147.37	36.73	-16.32	22.41	30.00	-7.59	329	329	peak
4	149.31	37.10	-16.20	20.90	30.00	-9.10	230	7	peak
5	155.13	34.36	-15.97	18.39	30.00	-11.61	328	85	peak
6	163.86	33.54	-15.92	17.62	30.00	-12.38	154	33	peak

* Note:

Margin = Emission – Limit

Emission = Radiated Amplitude + Correct Factor

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

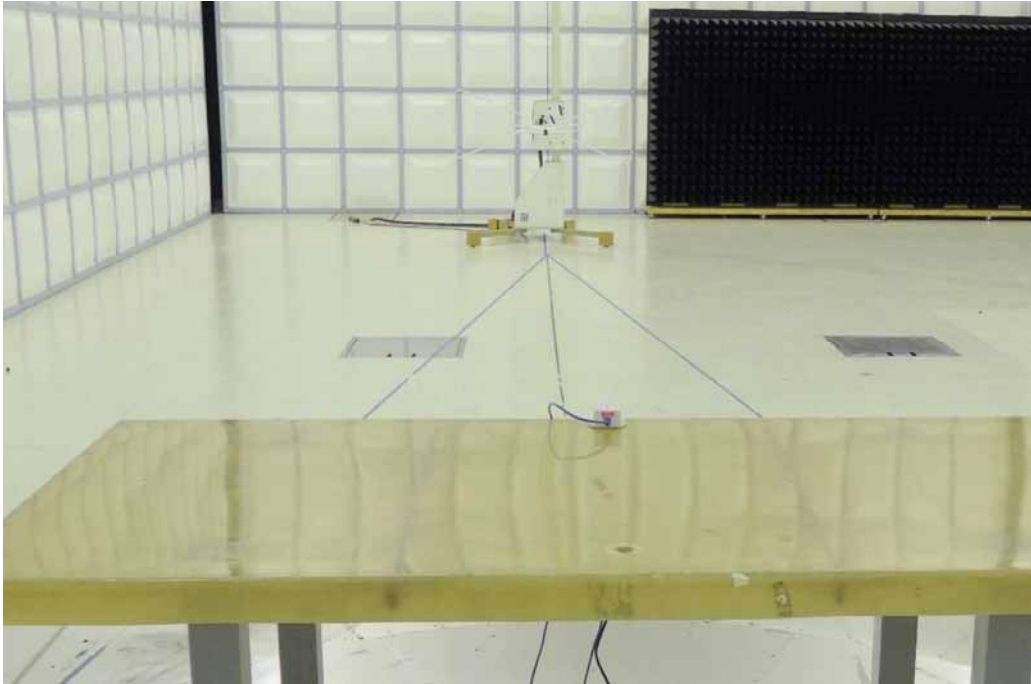
A margin of -8dB means that the emission is 8dB below the limit

BILOG Antenna Distance: 10 meters

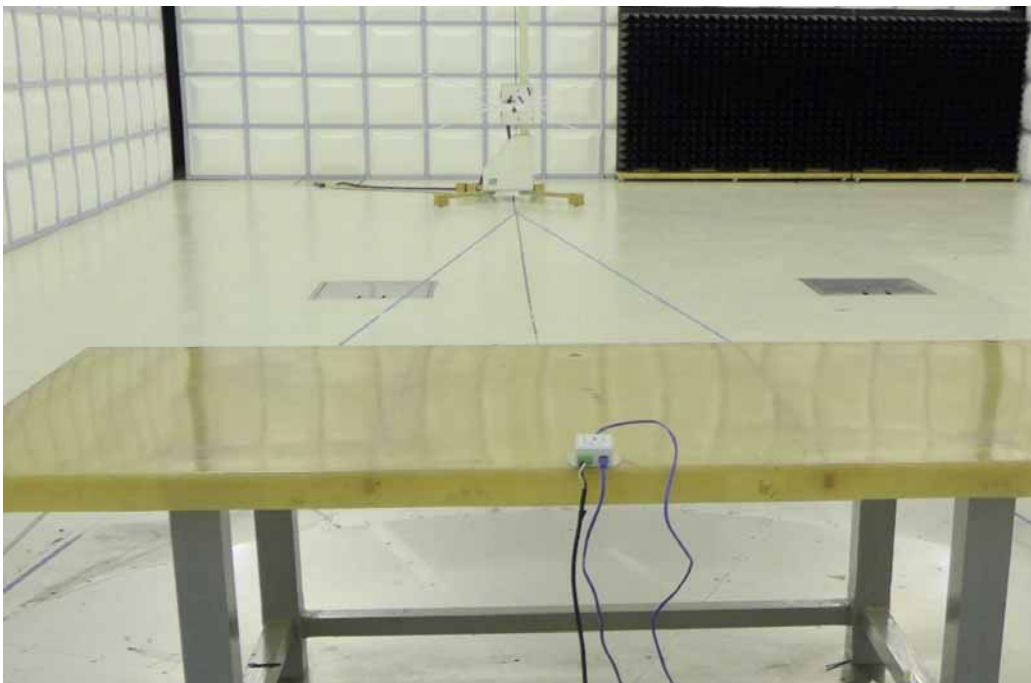
Below 1GHz test, if the peak measured value meets the QP limit, it is unnecessary to perform the QP measurement.

4.4 Test Setup Photo

Front View (30MHz~1GHz)



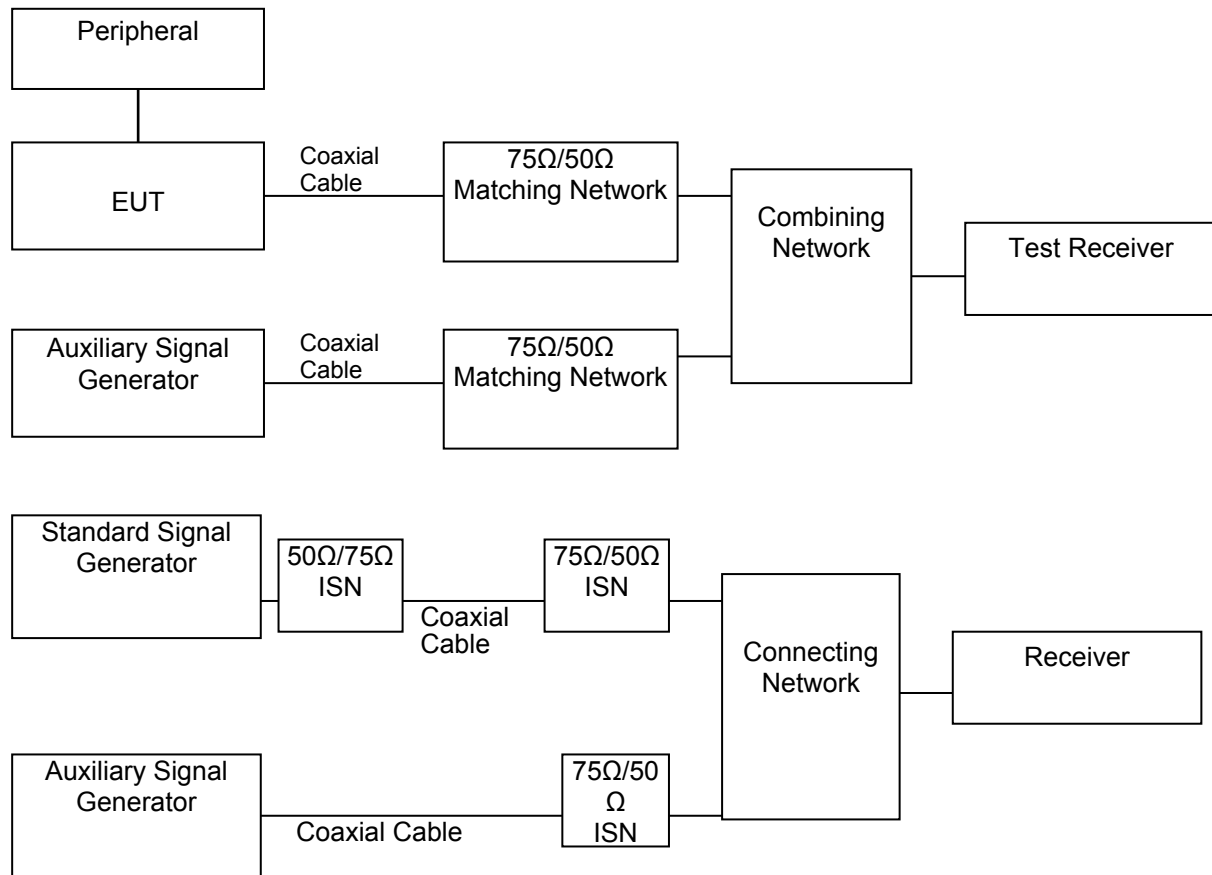
Back View (30MHz~1GHz)



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.

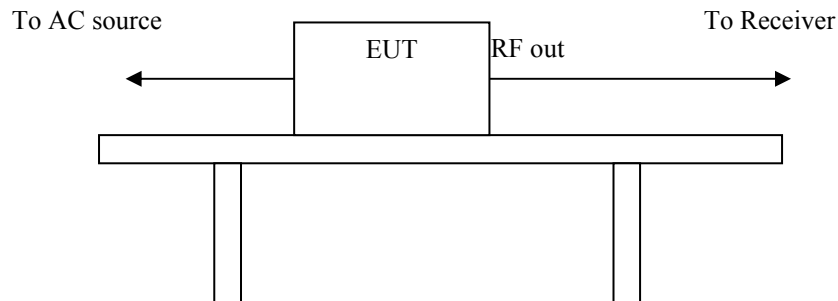
Table clause	Frequency range MHz	Detector type/ bandwidth	Class B limits dB(μV) 75 Ω			Applicability
			Other	Local Oscillator Fundamental	Local Oscillator Harmonics	
A12.1	30 – 950	For frequencies ≤1 GHz	46	46	46	See a)
	950 – 2 150		46	54	54	
A12.2	950 – 2 150	Quasi Peak/ 120 kHz	46	54	54	See b)
A12.3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

7.1 Appendix A: Test Equipment

7.1.1 Test Equipment List

Location Con02	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 02	LISN 15	R&S	ENV216	101335	09/22/2016	09/22/2017
Conduction 02	LISN 03	ROHDE&SCHWARZ	ESH3/Z5	828874/010	02/26/2016	02/26/2017
Conduction 02	Conduction 02-1 Cable	WOKEN	CFD 300-NL	Conduction 02 -1	08/29/2016	08/29/2017
Conduction 02	EMI Receiver 14	ROHDE&SCHWARZ	ESCI	101034	05/31/2016	05/31/2017
Conduction 02	ISNT4 07	Teseq GmbH	ISN T400A	30449	07/20/2016	07/20/2017
Conduction 02	ISN T8 10	Teseq GmbH	ISN T800	42773	07/18/2016	07/18/2017

Location Chmb12	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation	BILOG Antenna 18	Schwarzbeck	Schwarzbeck VULB 9168+EMCI-N-6-05	646	01/11/2017	01/11/2018
Radiation	Preamplifier 26	EMCI	EMC9135	980297	01/11/2017	01/11/2018
Radiation	Coaxial Cable Chmb 12-10M-01	PEWC	CFD400-NL	Chmb 12-10M-01	10/13/2016	10/13/2017
Radiation	EMI Receiver 10	ROHDE & SCHWARZ	ESCI	100567	08/11/2016	08/11/2017

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

7.2 Appendix B: Uncertainty of Measurement

The measurement uncertainty refers to CISPR 16-4-2:2011. The coverage factor $k = 2$ yields approximately a 95 % level of confidence.

<Conduction 02>

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

ISN T2: $\pm 3.52\text{dB}$

ISN T4: $\pm 3.52\text{dB}$

ISN T8: $\pm 3.52\text{dB}$

CVP: $\pm 3.84\text{dB}$

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

<Chamber 12 (10M)>

Horizontal

30MHz~200MHz: $\pm 3.93\text{dB}$

200MHz~1000MHz: $\pm 4.09\text{dB}$

Vertical

30MHz~200MHz: $\pm 4.58\text{dB}$

200MHz~1000MHz: $\pm 3.99\text{dB}$

7.3 Appendix C: Photographs of EUT

Please refer to the File of **ISL-17LE092P**