Certificate

Issue Date: August 7, 2017
Ref. Report No. ISL-17LE479CT

Product Name	:	Display Module
Model(s)	:	Display Module
Responsible Party	:	WINSTAR Display Co., Ltd.
Address	:	Central Taiwan Science Park 5F., No. 31, Keya Rd., Daya Dist., Taichung City 428, 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 the EMI part of RCM Mark. The device was passed the test performed according to :

Standards:

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

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

International Standards Laboratory

Bert Chen

Bert Chen / Director

☐ **Hsi-Chih LAB**:
No. 65, Gu Dai Keng St. Hsichih,
Taipei Hsien 22179, Taiwan.
Tel: 886-2-2646-2550; Fax: 886-2-2646-4641

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

Declaration of Conformity

Name of Manufacturer:	WINSTAR Display Co., Ltd.
Address of Manufacturer:	Central Taiwan Science Park 5F., No. 31, Keya Rd., Daya Dist., Taichung City 428, Taiwan
Declares that product:	Display Module
Model:	Display Module
Assembled by: Address:	Same as above 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
Class A

We, WINSTAR Display 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.*

WINSTAR Display Co., Ltd.
Date: August 7, 2017

EMI TEST REPORT

of

RCM Class A

Product : **Display Module**

Model(s): **Display Module**

Brand: **WINSTAR**

Applicant: **WINSTAR Display Co., Ltd.**

Address: **Central Taiwan Science Park**
5F., No. 31, Keya Rd., Daya Dist.,
Taichung City 428, 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-11440, 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-17LE479CT**
Issue Date : **August 7, 2017**

This report totally contains 31 pages including this cover page and contents page.

Contents of Report

1. General

1.1 Certification of Accuracy of Test Data

Standards:	AS/NZS CISPR 32:2015: Electromagnetic compatibility of multimedia equipment- Emission requirements
	Class A
Equipment Tested:	Display Module
Model(s):	Display Module
Brand:	WINSTAR
Applicant:	WINSTAR Display Co., Ltd.
Sample received Date:	August 4, 2017
Final test Date:	refer to the date of test data
Test Site:	International Standards Laboratory Conduction 02; Chamber 12; Chamber 14
Test Distance:	10M; 3M (above1GHz)
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
Test Result:	PASS
Report Engineer:	Cheryl Tung

Test Engineer: Bear Perng

Approved By: Angus Chu / Director

1.2 Summary of Test Result

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

1.3 Description of EUT

EUT

Description	Display Module
Condition	Pre-Production
Model	Display Module
Serial Number	N/A
Highest working frequency: 165MHz The radiation test should be tested till 2GHz	

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

Components	Vendor	Model Name
LCD Panel	WINSTAR Display Co., Ltd.	WF50BTIFGDHGX#
		WF50BTIFGDHTX#
		WF50BTIFGDHNX#

The I/O ports of EUT are listed below:

I/O Port Type	Quantity
HDMI Port	1
Micro USB Port	1

Pretest Test configuration:

Configuration	LCD Panel	Voltage
1	WF50BTIFGDHNX#	230V
2	WF50BTIFGDHNX#	110V

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

Configuration	LCD Panel	Voltage
1	WF50BTIFGDHNX#	230V

EMI Noise Source:
Please refer to the technical documentation for details

EMI Solution:
Please refer to the technical documentation for details

1.4 Description of Support Equipment

No	Unit	Model / Serial No.	Brand	Power Cord	FCC ID
1	AC Adapter	ADP-10AW S/N: N/A	Lenovo	N/A	N/A
2	Control Personal Computer	RASPBERRY PI 3 MODEL B S/N: N/A	Raspberry Pi Foundation	N/A	N/A

1.5 Software for Controlling Support Unit

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

1. Send Color Bar to the EUT through EUT HDMI Port..
2. Repeat the above steps.

	Filename	Issued Date
EUT Monitor	Omplayer	06/05/2016

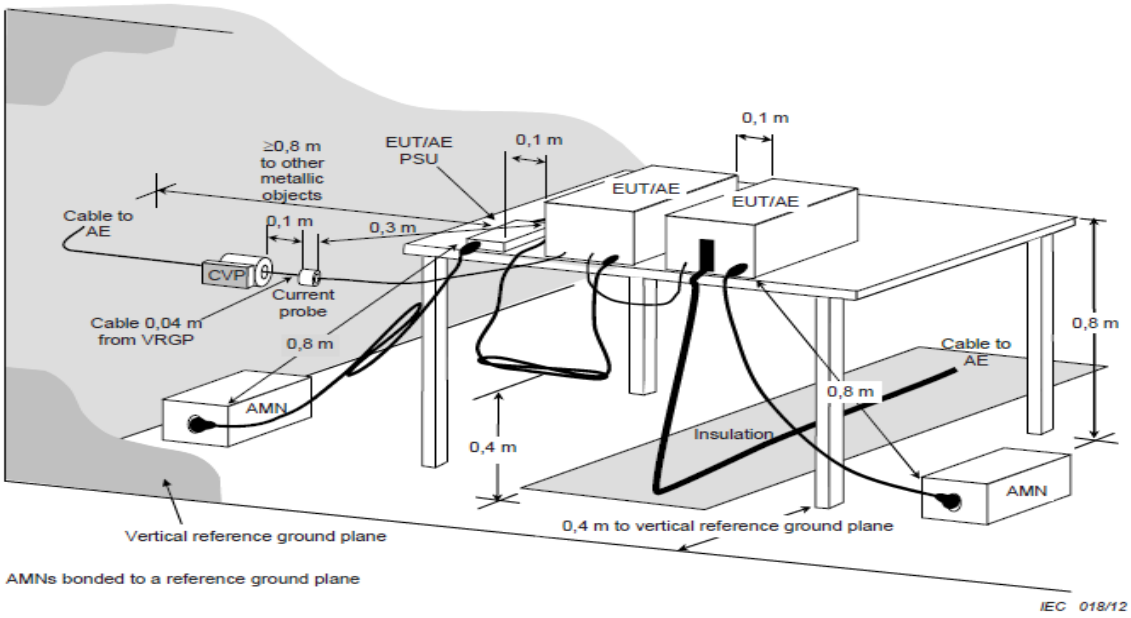
1.6 I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type
USB Power Cable	AC Adapter USB port to Control Personal Computer Micro USB Port	1.0m	Shielded
HDMI Data Cable	EUT HDMI Port to Control Personal Computer HDMI Port	1.8m	Shielded (With core)

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 & AS/NZS CISPR 32 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:

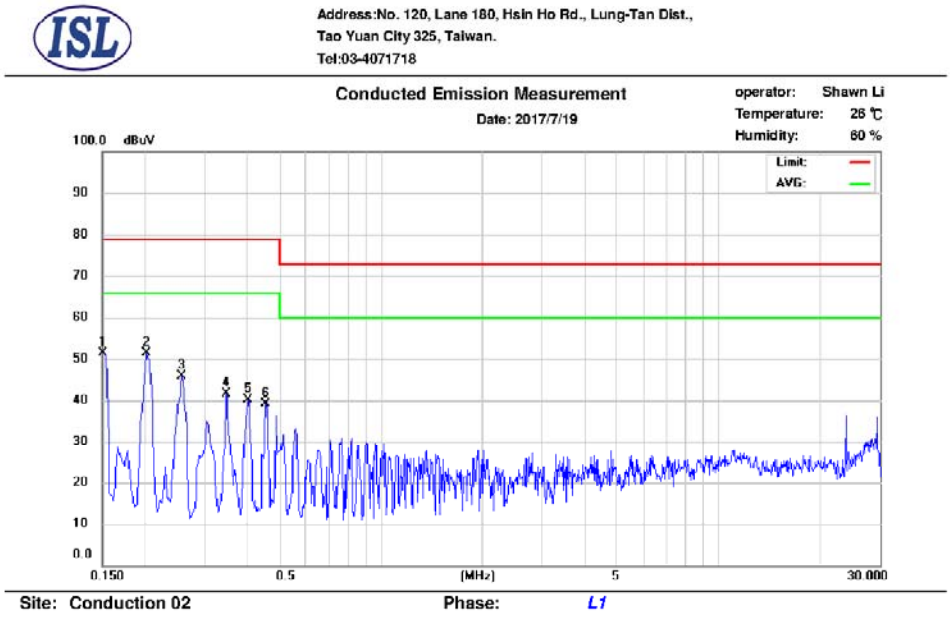
Frequency	QP	AV
MHz	dB(μV)	dB(μV)
0.15-0.50	79	73
5.0-30	66	60
Note: The lower limit shall apply at the transition frequencies		

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

Frequency	QP	AV
MHz	dB(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

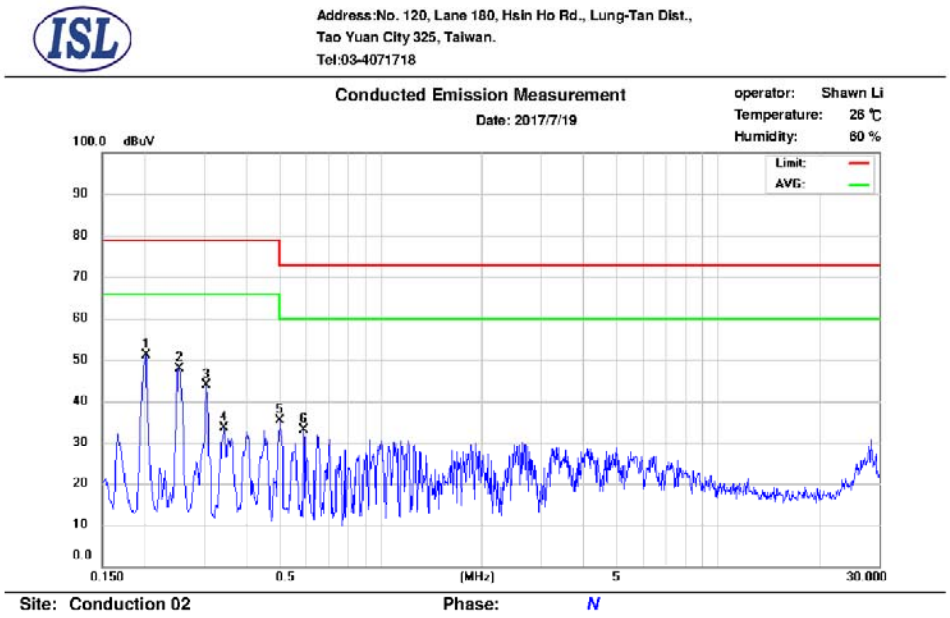
- Live



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	0.150	42.17	28.39	9.70	51.87	79.00	-27.13	38.09	66.00	-27.91
2	0.202	40.47	30.86	9.76	50.23	79.00	-28.77	40.62	66.00	-25.38
3	0.258	32.67	22.74	9.75	42.42	79.00	-36.58	32.49	66.00	-33.51
4	0.350	29.41	18.84	9.75	39.16	79.00	-39.84	28.59	66.00	-37.41
5	0.406	29.27	19.81	9.75	39.02	79.00	-39.98	29.56	66.00	-36.44
6	0.458	26.09	19.61	9.75	35.84	79.00	-43.16	29.36	66.00	-36.64

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



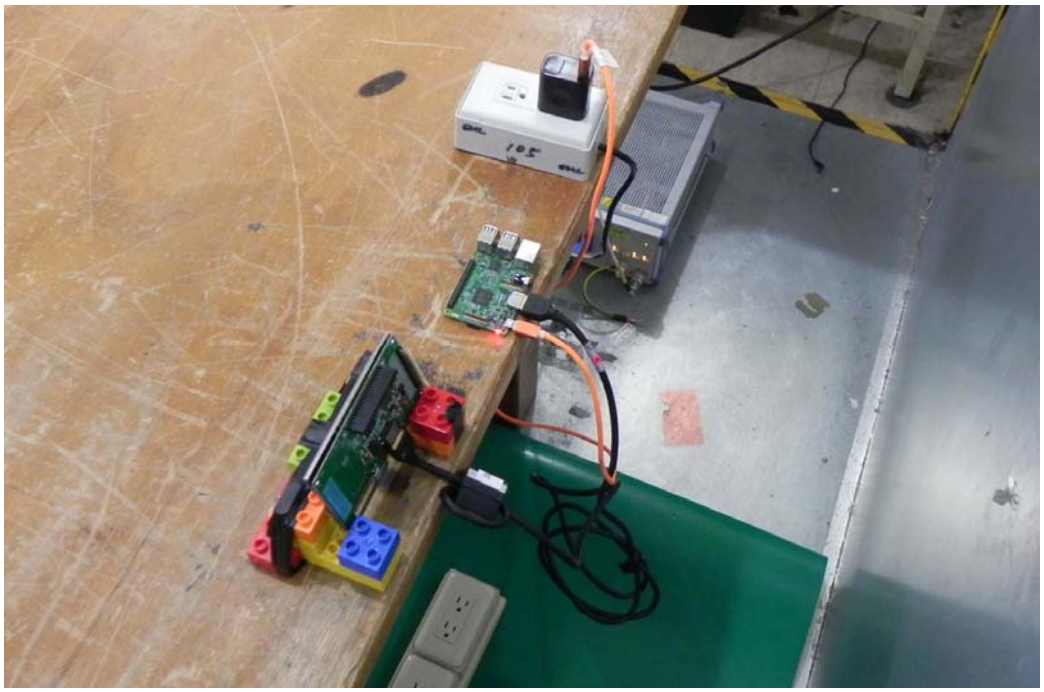
No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.202	39.66	22.65	9.71	49.37	79.00	-29.63	32.36	66.00	-33.64
2	0.254	35.70	24.13	9.70	45.40	79.00	-33.60	33.83	66.00	-32.17
3	0.306	29.99	18.85	9.69	39.68	79.00	-39.32	28.54	66.00	-37.46
4	0.346	27.64	11.20	9.69	37.33	79.00	-41.67	20.89	66.00	-45.11
5	0.506	26.44	20.43	9.70	36.14	73.00	-36.86	30.13	60.00	-29.87
6	0.594	15.09	1.85	9.72	24.81	73.00	-48.19	11.57	60.00	-48.43

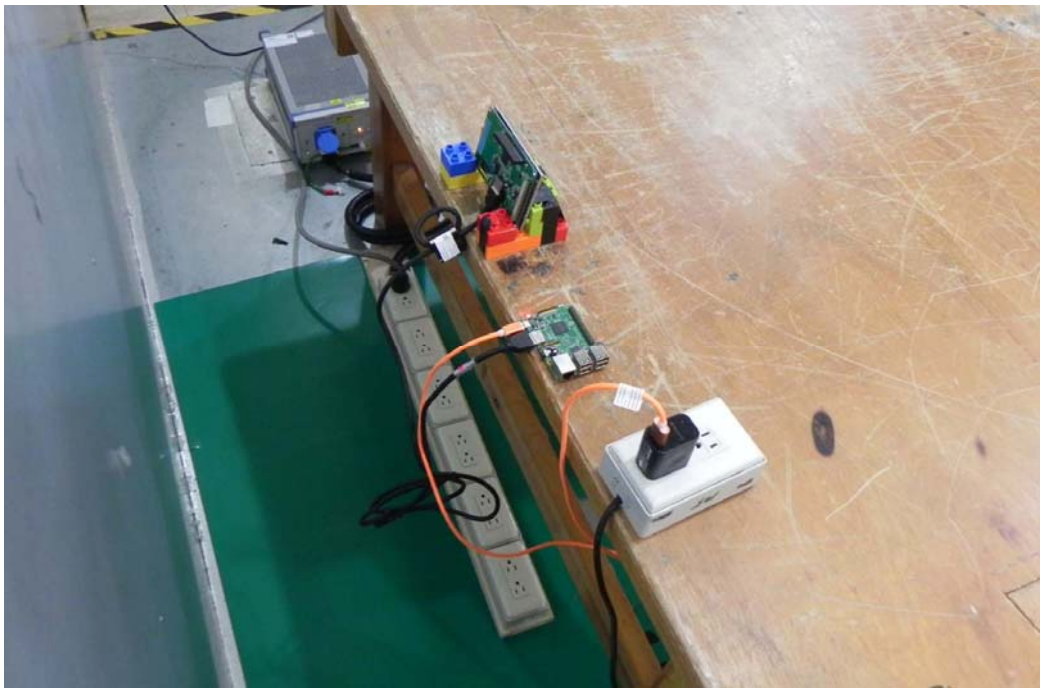
Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = QP_R/AVG_R + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak 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

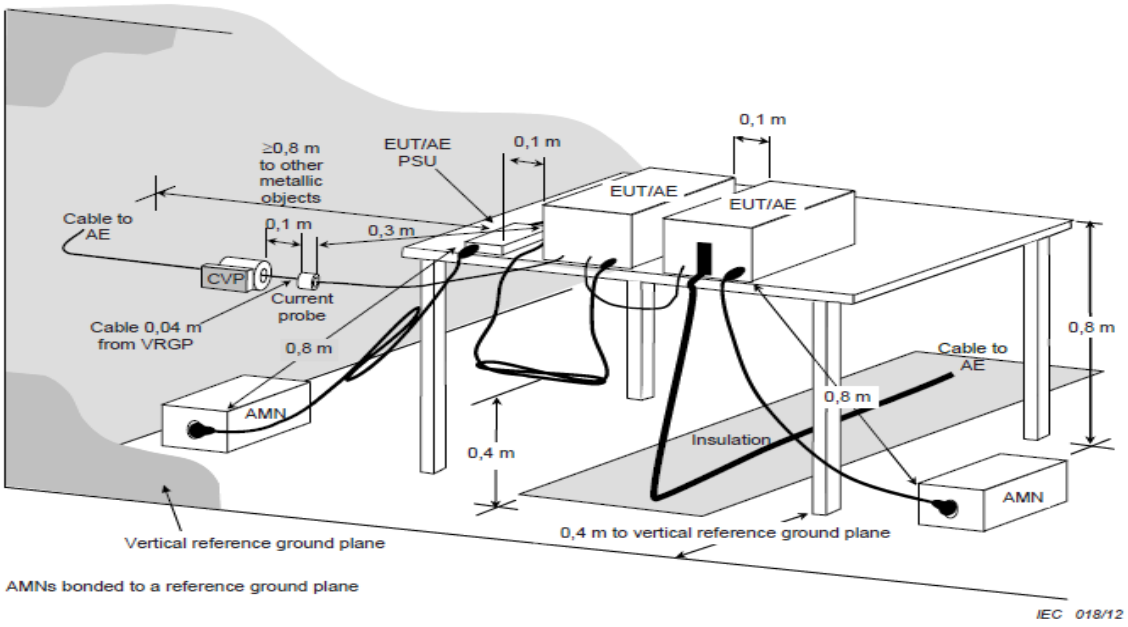




3. Telecommunication Port Conducted Emissions

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 & AS/NZS CISPR 32 requirements.

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

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

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

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

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

3.1.4 Limit

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

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

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

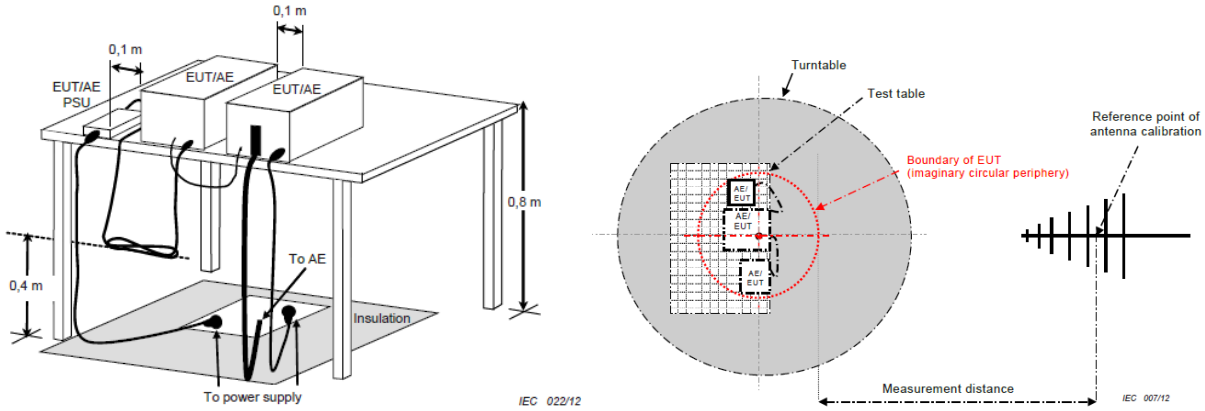
Frequency range MHz	Coupling device	Detector type / bandwidth	Class B voltage limits dB(μV)	Class B current limits dB(μA)
0.15-0.5	AAN	Quasi Peak / 9 kHz	84-74	n/a
0.5-30			74	
0.15-0.5	AAN	Average / 9 kHz	74-64	
0.5-30			64	
0.15-0.5	CVP and current probe	Quasi Peak / 9 kHz	84-74	40-30
0.5-30			74	30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

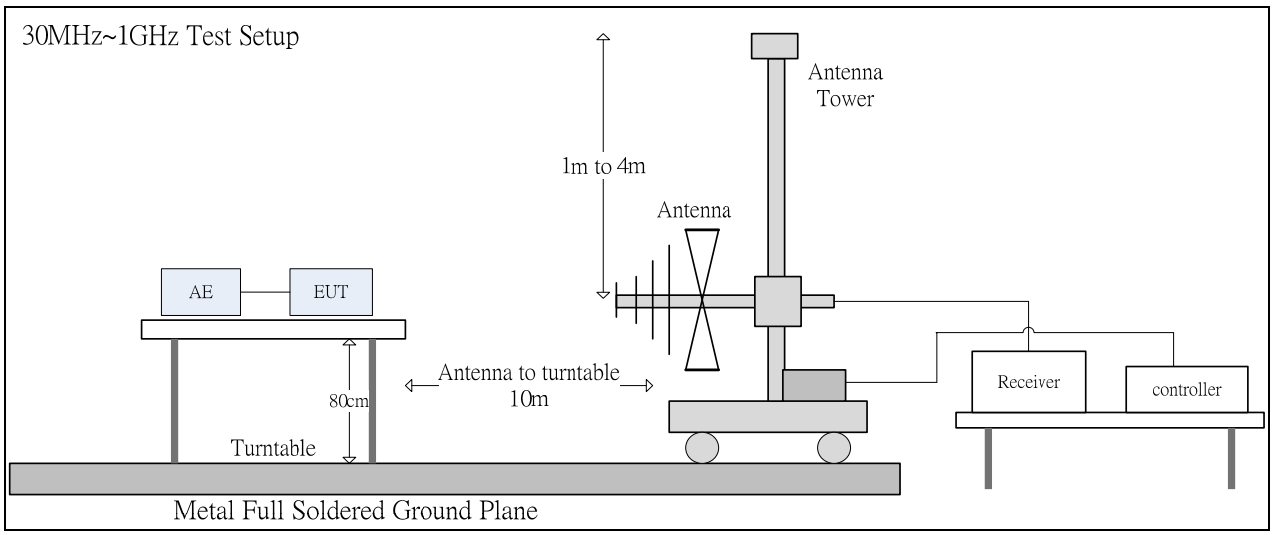
****Remarks: It is not necessary to be tested on this item.**

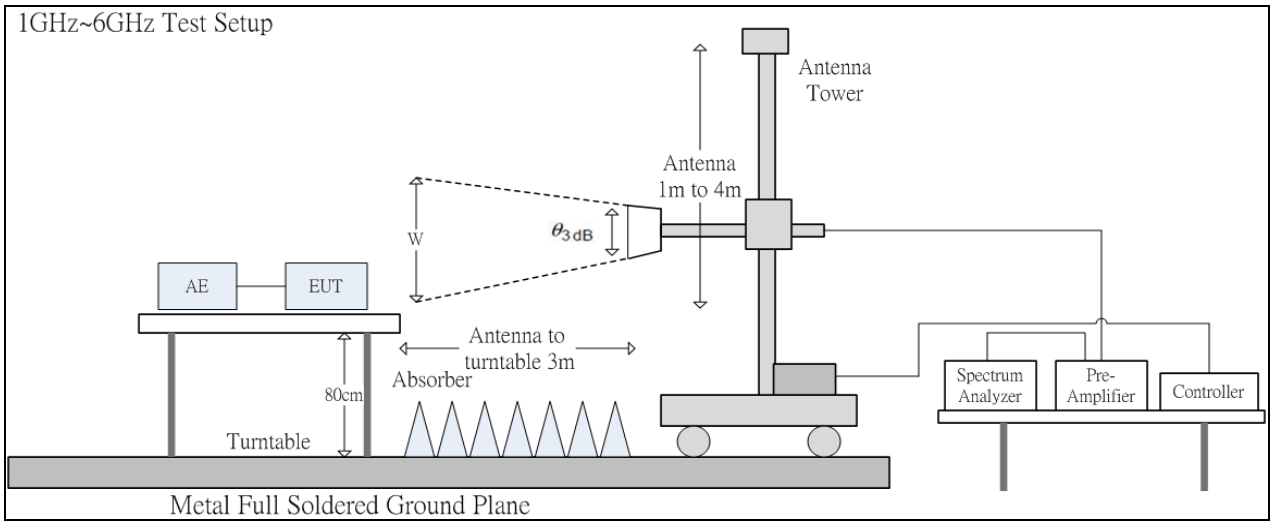
4. Radiated Disturbance Emissions

4.1 Test Setup and Procedure

4.1.1 Test Setup







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

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

4.1.2 Test Procedure

The radiated emissions test will then be repeated on the 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 & AS/NZS CISPR 32 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

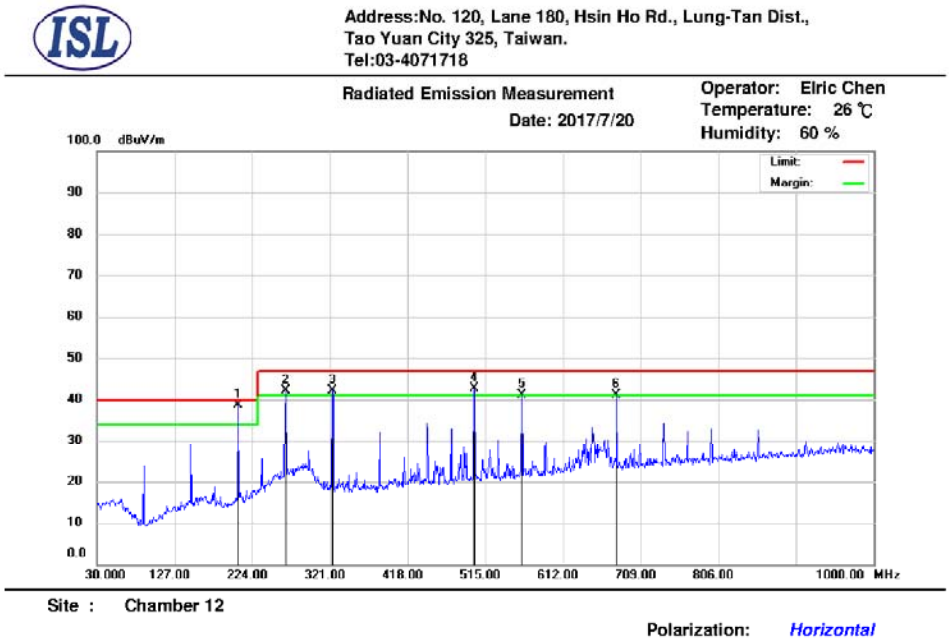
Radiated emissions at frequencies above 1 GHz for Class B equipment:

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)

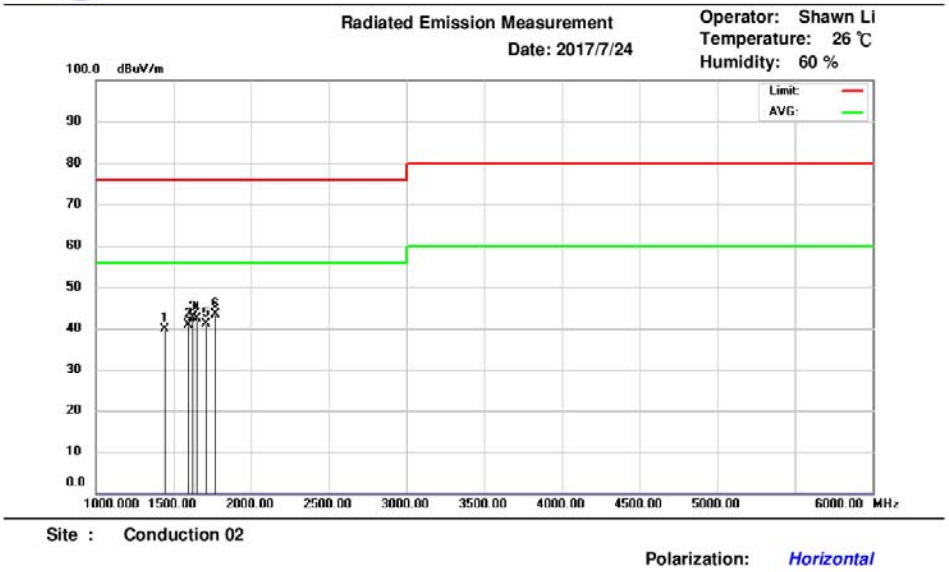


Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	206.54	57.68	-18.93	38.75	40.00	-1.25	100	285	peak
2	265.71	56.33	-16.16	42.17	47.00	-4.83	100	303	peak
3	323.91	56.22	-14.20	42.02	47.00	-4.98	373	291	peak
4	501.42	52.33	-9.80	42.53	47.00	-4.47	100	236	peak
5	560.59	49.99	-8.88	41.11	47.00	-5.89	245	326	peak
6	678.93	47.87	-6.68	41.19	47.00	-5.81	100	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.

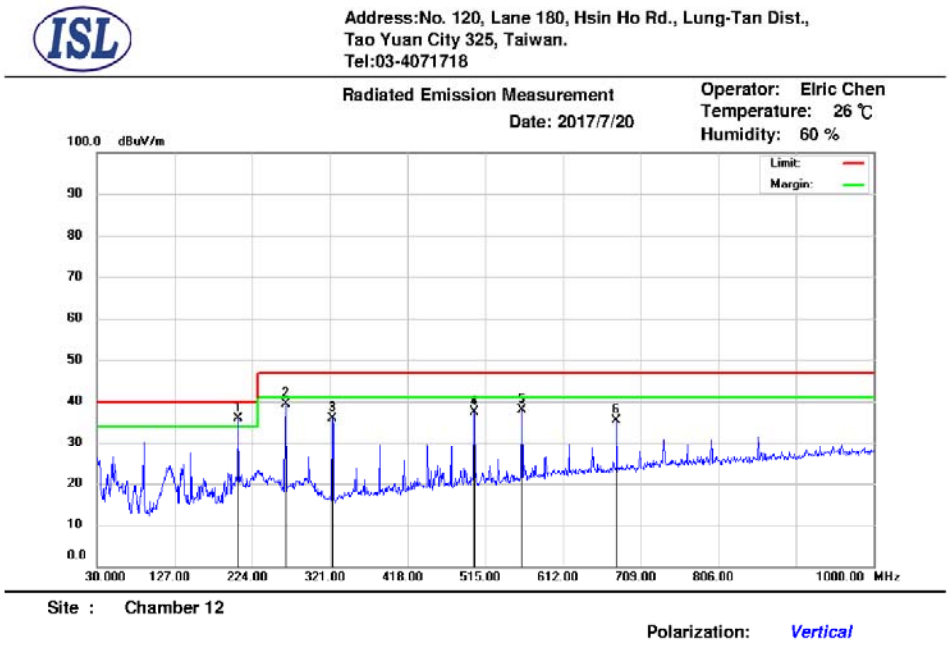
Address:No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,
Tao Yuan City 325, Taiwan.
Tel:03-4071718



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	1445.00	55.42	-15.61	39.81	76.00	-36.19	100	125	peak
2	1595.00	55.76	-14.81	40.95	76.00	-35.05	100	345	peak
3	1625.00	57.17	-14.56	42.61	76.00	-33.39	399	181	peak
4	1650.00	56.64	-14.35	42.29	76.00	-33.71	238	10	peak
5	1710.00	55.02	-13.87	41.15	76.00	-34.85	125	70	peak
6	1770.00	56.78	-13.38	43.40	76.00	-32.60	183	346	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
Horn 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)

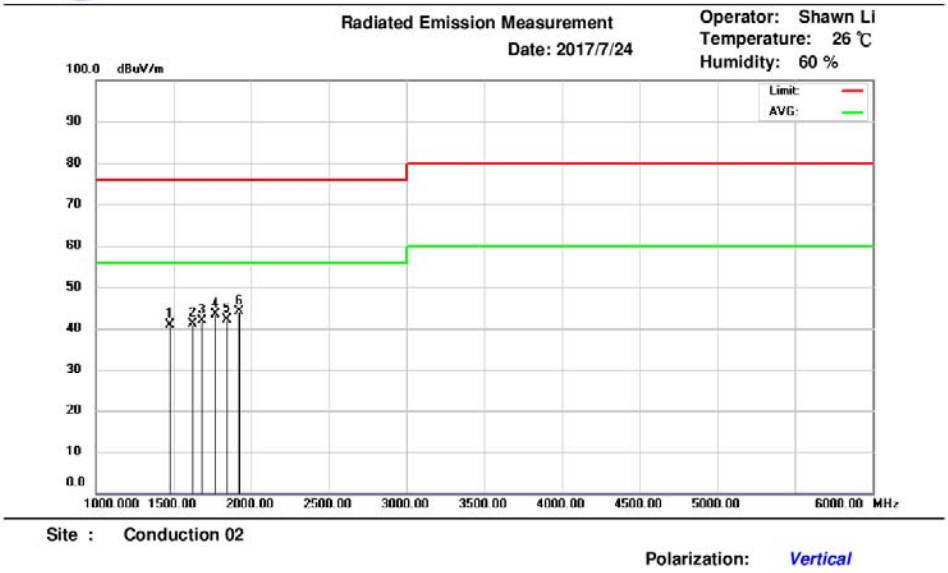


Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	206.54	54.89	-18.93	35.96	40.00	-4.04	100	156	peak
2	265.71	55.61	-16.16	39.45	47.00	-7.55	398	112	peak
3	323.91	50.05	-14.20	35.85	47.00	-11.15	315	291	peak
4	501.42	47.09	-9.80	37.29	47.00	-9.71	382	342	peak
5	560.59	46.72	-8.88	37.84	47.00	-9.16	100	161	peak
6	678.93	42.12	-6.68	35.44	47.00	-11.56	274	198	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.

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

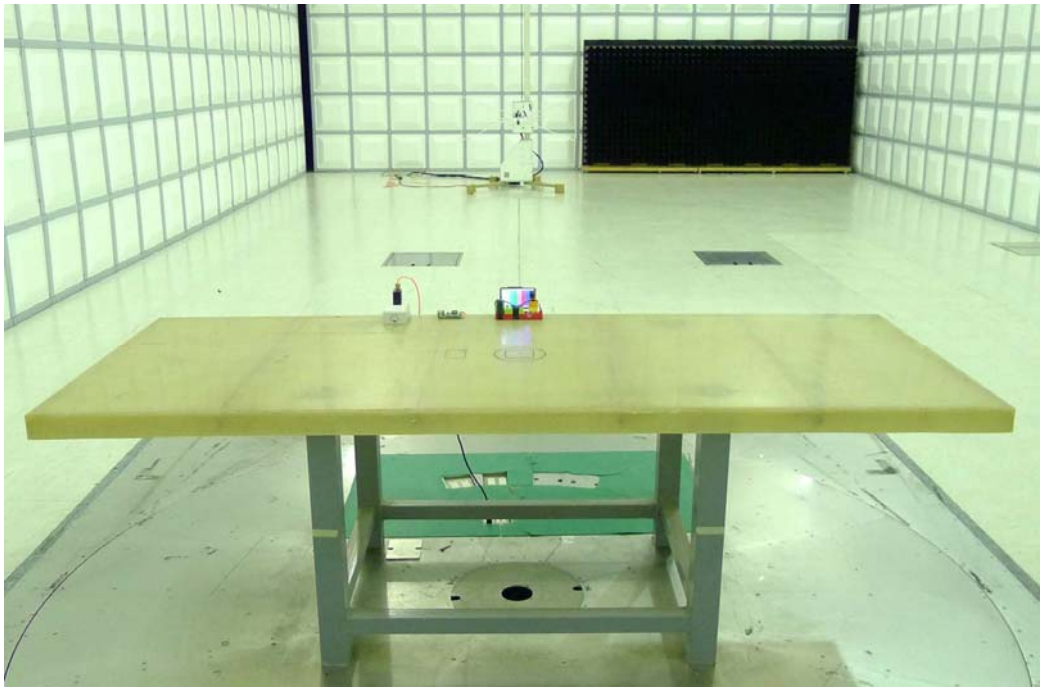


Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1475.00	56.53	-15.60	40.93	76.00	-35.07	100	125	peak
2	1625.00	55.75	-14.56	41.19	76.00	-34.81	333	187	peak
3	1680.00	56.06	-14.11	41.95	76.00	-34.05	131	11	peak
4	1770.00	56.83	-13.38	43.45	76.00	-32.55	158	177	peak
5	1845.00	54.83	-12.77	42.06	76.00	-33.94	100	103	peak
6	1920.00	56.17	-12.15	44.02	76.00	-31.98	141	211	peak

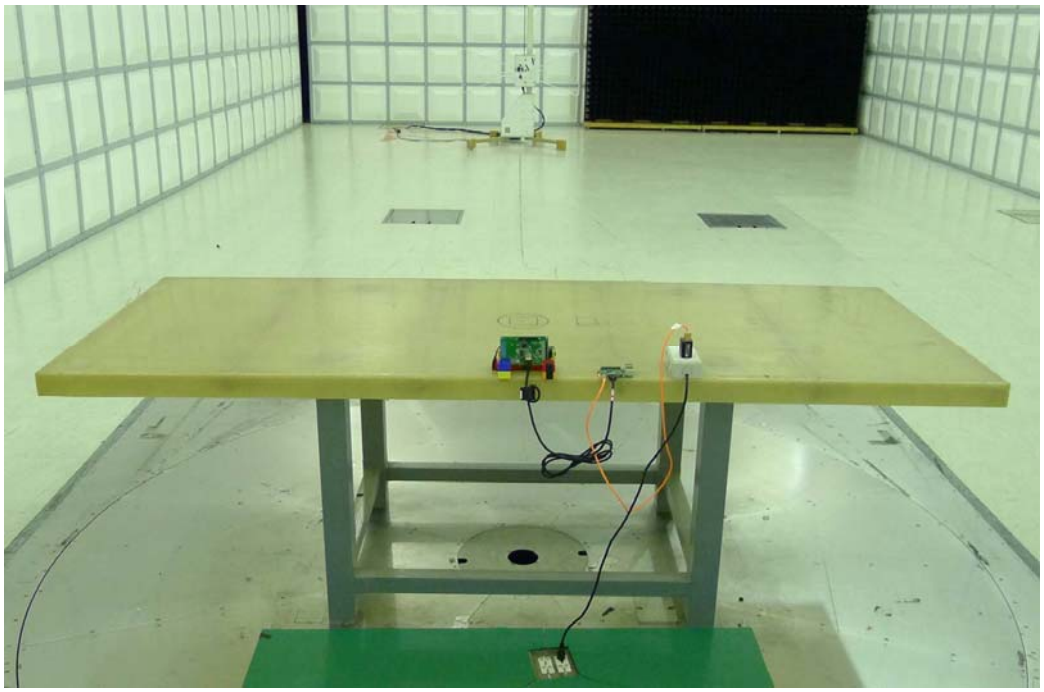
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Horn Antenna Distance: 3 meters
Above 1GHz test, if the peak measured value meets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

4.4 Test Setup Photo

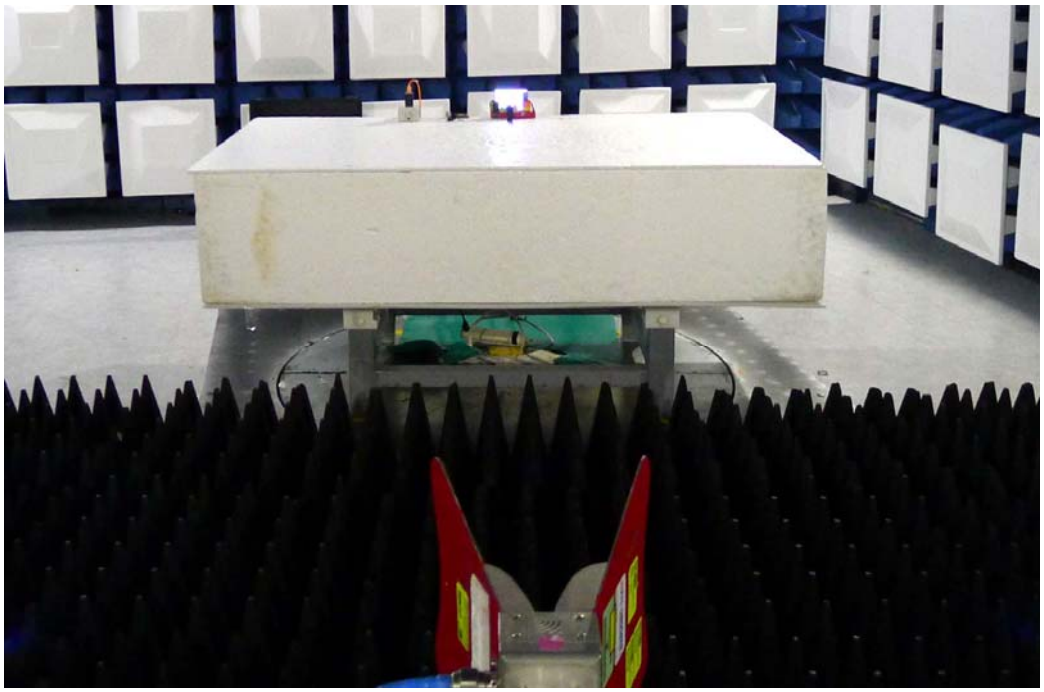
Front View (30MHz~1GHz)



Back View (30MHz~1GHz)



Front View (above 1GHz)

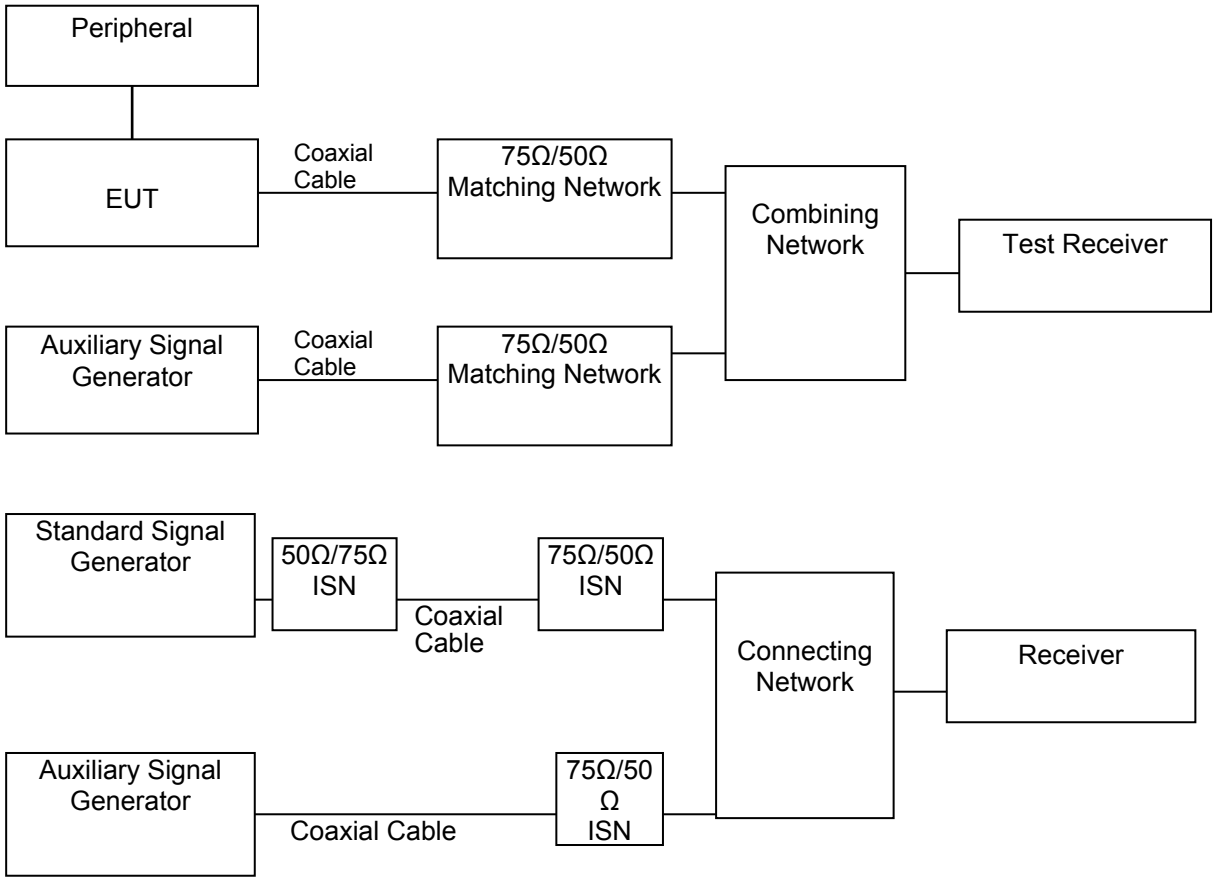


Back View (above 1GHz)

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.

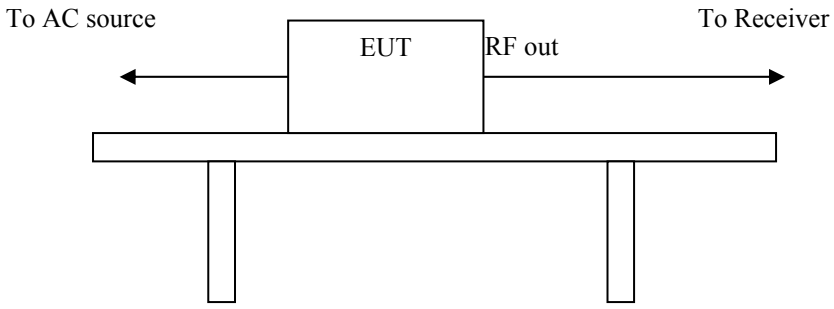
e) Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports.

****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. 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 20	R&S	ENV216	101477	07/15/2017	07/15/2018
Conduction 02	LISN 23	FCC	FCC-LISN-50-25-2-01	07038	12/30/2016	12/30/2017
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	06/06/2017	06/06/2018

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	01/05/2017	01/05/2018
Radiation (Chamber12)	Preamplifier 26	EMCI	EMC9135	980297	12/27/2016	12/27/2017
Radiation (Chamber12)	Coaxial Cable Chmb 12-10M-01	PEWC	CFD400-NL	Chmb 12-10M-01	10/13/2016	10/13/2017
Radiation (Chamber12)	EMI Receiver 10	ROHDE & SCHWARZ	ESCI	100567	08/11/2016	08/11/2017

Location Chmb14	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Rad. Above 1GHz	Spectrum Analyzer 24 (1G~26.5GHz)	Agilent	N9010A	MY49060537	08/11/2016	08/11/2017
Rad. Above 1GHz	Horn Antenna 06 (1G~18G)	ETS	3117	00066665	11/30/2016	11/30/2017
Rad. Above 1GHz	Preamplifier 13 (1G-18G)	MITEQ	JS44-00101800-25-10P-44	1329256	08/12/2016	08/12/2017
Rad. Above 1GHz	Microwave Cable 24	HUBER SUHNER	EMC104-NM-SM-800	140905	09/26/2016	09/26/2017
Rad. Above 1GHz	Microwave Cable 29	EMC Instruments	EMC104-NM-SM-6000	170107	02/23/2017	02/23/2018

7.1.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

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: ±2.88dB

<Chamber 12 (10M)>
Horizontal
30MHz~200MHz: ±3.93dB
200MHz~1000MHz: ±4.09dB
Vertical
30MHz~200MHz: ±4.58dB
200MHz~1000MHz: ±3.99dB

<Chamber 14 (3M)>
1GHz~6GHz: ±4.94dB