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TESTING
CNAS L0310



EMC Test Report

Product Name: Smart Home Gateway

Product Model: EchoLife LS1015

Report Number: SYBH(E)02174756EB

FCC ID: QISLS1015

Reliability Laboratory of Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District,
Shenzhen, 518129, P.R.C

Tel: +86 755 28780808 Fax: +86 755 89652518

Notice

1. The laboratory has passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L0310.
2. The laboratory has passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01.
3. The laboratory has been listed by the US Federal Communications Commission to perform electromagnetic emission measurements.
 - The recognition number for the test site located in Shenzhen is 97456
 - The recognition number for the test site located in Shanghai is 684868.
 - The recognition number for the test site located in Chengdu is 216797.
4. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements.
 - The recognition number for the test site located in Shenzhen is 6369A-1;
 - The recognition numbers for the test site located in Shanghai is 6369D, which contains 6369D-1 (3m chamber) and 6369D-2 (10m chamber).
 - The recognition number for the test site located in Chengdu is 6369E-1.
5. The laboratory located in Shenzhen has been listed by the VCCI to perform EMC measurements, the accreditation numbers for the test site No.1 are R-3892, G-415, C-4361, and T-1348.
6. The laboratory (Reliability Lab of Huawei Technologies Co., Ltd) is also named as “Global Compliance and Testing Center of Huawei Technologies Co., Ltd”; the both names have coexisted since 2009.
7. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
8. The test report is invalid if there is any evidence of erasure and/or falsification.
9. The test report is only valid for the test samples.
10. Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.



Applicant: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Product Name: Smart Home Gateway
Product Model: EchoLife LS1015

Date of Receipt Sample: 2016-01-13
Start Date of Test: 2016-01-14
End Date of Test: 2016-01-19

Test Result: Pass

Approved by Senior Engineer:	2016-01-26	Ren Huasheng	
	Date	Name	Signature

Prepared by:	2016-01-25	Wang Ying	
	Date	Name	Signature



Modification Record

No.	Last Report No.	Modification Description
1	N/A	First report



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1 General Information

1.1 Applied Standard

Applied Product Standard: FCC CFR47 Part 15 Subpart B:2015
ICES-003 Issue 6:2016

Test Method: ANSI C63.4:2014

1.2 Test Location

Test Location 1: Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies
Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.3 Test Environment Condition

Ambient Temperature: 20-25°C
Relative Humidity: 45-55%
Atmospheric Pressure: 101kPa



2 Summary of Test Results

Table 1 Test summary

EUT Classification: Class B Digital Device				
Test Items	Test Configuration	Limit	Test Result	Location
<u>Radiated Emissions</u> Enclosure Port	TC1~TC2	Class B	Pass	Location1
<u>Conducted Emissions</u> AC Power Port	TC1~TC2	Class B	Pass	Location1

Note:
1, Measurement taken is within the uncertainty of measurement system.
2, TC is short for test configuration

3 Equipment Specification

3.1 General Description

The EchoLife LS1015 (hereinafter referred to as LS1015) is an indoor Smart Home Gateway designed for home users. LS1015 can link various detectors for home security. And it has many ports:

- ◆ Internet Port: 10M/100M/1000M
- ◆ Ethernet Port: 10M/100M
- ◆ USB Port: USB 2.0
- ◆ WLAN: IEEE 802.11 b/g/n
- ◆ Z-Wave: For detectors

3.2 Specification

Table 2 Main equipment specification

Rated Input Voltage	Adapter input: ~ 100 V to 240 V, 50/60 Hz EUT input:  12 V, 2 A
Rated Power (W)	10 W
Dimensions (W x D x H)	127 mm (W) x 34 mm (D) x 106 mm (H)
Weight (kg)	0.3 kg
Transmit Frequency (MHz)	2412 MHz–2462 MHz
Receive Frequency (MHz)	2412 MHz–2462 MHz
Z-wave (MHz)	908.40 MHz -916.00 MHz



Figure 1. EUT Appearance



3.3 Board and SubAssembly

Table 3 Board list

Board	
Board Name	Description
HS3025GFA	1GE, 1FE, 1USB, WIFI, Z-WAVE

Table 4 Subassembly list

Subassembly			
Subassembly Name	Model	Manufacturer	Description
Adapter	HW-120200U1W	Dongguan Shilong Fuhua electronic Co.,Ltd	Input voltage : ~ 100V-240V, 50/60Hz 0.8A Output voltage : === 12 V 2A
	HW-120200U1W	Shenzhen HuntKey Electric Co., Ltd	Input voltage : ~ 100V-240V, 50/60Hz 0.8A Output voltage : === 12 V 2A

4 System Configuration during EMC Test

The Equipment under Test (EUT) was functioning correctly during all tests. The EUT was installed within the test site and was configured to simulate a typical configuration.

4.1 Ports and Cables

Table 5 Ports and cables

Port	Connector	Length	Qty.	Type of Cable
AC Power Port	N/A	1.5	1	Unshielded
GE	RJ45	10	1	UTP-CAT5
FE	RJ45	10	1	UTP-CAT5

4.2 Auxiliary Equipment

Table 6 Auxiliary equipment

Equipment	Model	Manufacturer	S/N	Calibration Date	Calibration Interval (month)
Data network analyzer	Smartbits600	Spirent	SZ0500038070	2015-05-28	24
PC	Lenovo M4000	LEGEND	N/A	N/A	N/A
Notebook PC	HP 2540p	HP	3105033009	N/A	N/A
USB memorizer	N/A	Kingston	N/A	N/A	N/A

4.3 Test Configurations

The equipment under test (EUT) was connected to ancillary devices in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment). There were two test configurations. TC1 and TC2 were shown in the following table and figures:

Table 7 Test configuration

Configuration No.	Configuration Description	
TC1	Adapter(UE)	HW-120200U1W
TC2	Adapter(HuntKey)	HW-120200U1W

Note*: "UE" is the trademark of Dongguan Shilong Fuhua Electronic Co.,Ltd manufacturer, "Huntkey" is the trademark of Shenzhen Huntkey Electric Co., Ltd manufacturer.

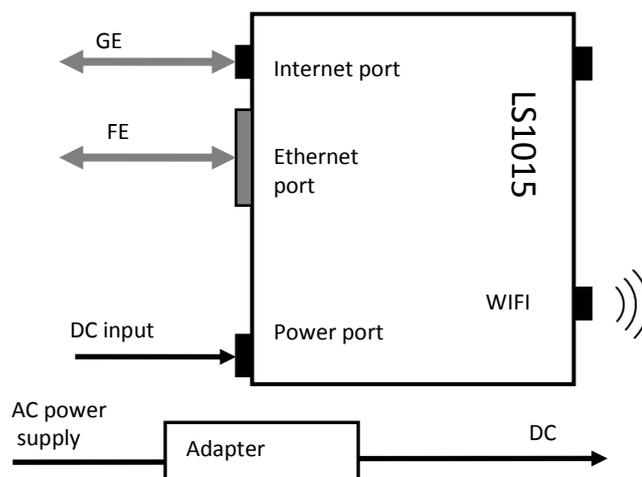


Figure 4. : Test configuration

4.4 Test Conditions and Connections

The Ethernet ports of LS1015 should connect to the SmartBits 600. The data flow rates of each Ethernet port is nearly 100M when the Ethernet port is FE. Data transmission is normal at the Ethernet port with no packet loss or error codes.

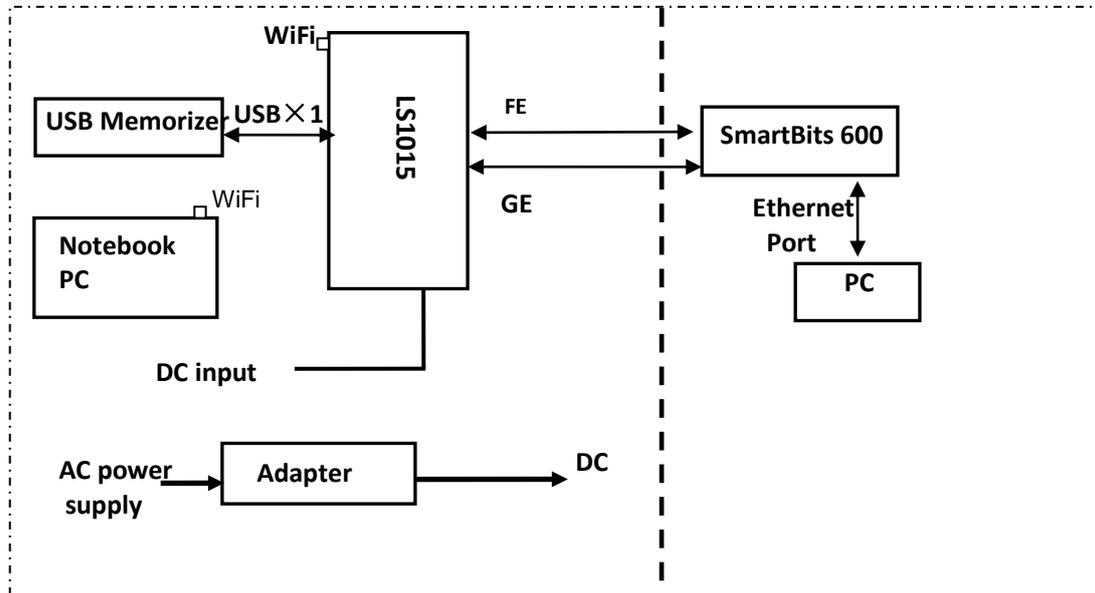


Figure 5. Test connection

5 Details of Test Items

5.1 Radiated Emission 30 MHz to 18 GHz

5.1.1 Test Procedure

The test site semi-anechoic chamber for 30MHz to 1GHz test has met the requirement of NSA tolerance 4 dB according to the standard ANSI C63.4. The test distance was 3m. The set-up and test methods were according to ANSI C63.4.

The test site full-anechoic chamber for above 1GHz test has met the requirement of S_{VSWR} tolerance 6 dB in accordance with the standard ANSI C63.4. The test distance was 3 m for above 1GHz.

A preliminary scan and a final scan of the emissions were made from 30 MHz to 18 GHz by using test script of software; the emissions were measured using Quasi-Peak Detector for 30 MHz to 1 GHz, Average and Peak detector for above 1 GHz. The maximal emission value was acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance with the software setup. Normally, the height range of antenna was 1 m to 4 m, the azimuth range of turntable was 0° to 360°, The receive antenna has two polarizations V and H.

The test set-up is shown in diagram as below:

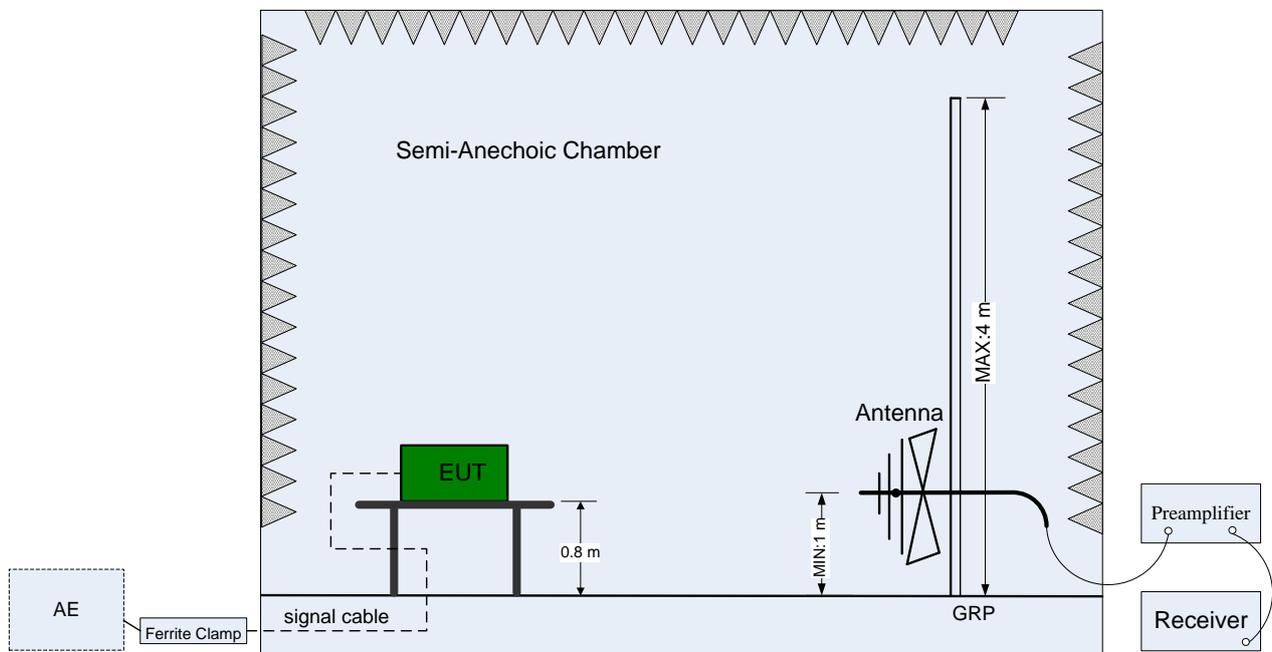


Figure 6. Test set-up of radiated disturbance (30 MHz-1 GHz)

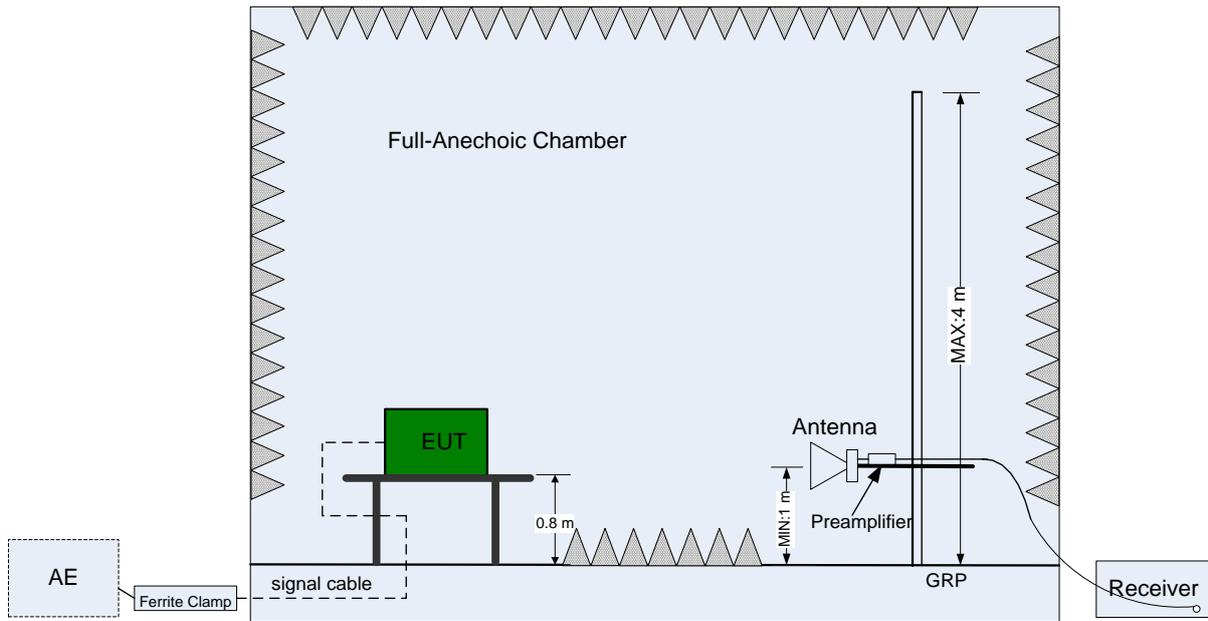


Figure 7. Test set-up of radiated disturbance (above 1 GHz)

5.1.2 Test Results

The EUT has met the requirements for radiated emission of enclosure port.
For the test data, see section 8.1.

Table 8 Test limits for 30MHz to 1GHz at a measuring distance of 3m

Frequency range	30 MHz to 1 GHz	
Measuring distance	3 m	
Classification	Class B	
Limits(Class B)	30 MHz to 88 MHz	40.0 dB μ V/m
	88 MHz to 216 MHz	43.5 dB μ V/m
	216 MHz to 960 MHz	46.0 dB μ V/m
	960 MHz to 1 GHz	53.9 dB μ V/m

Table 9 Test limits for above 1GHz at a measuring distance of 3m

Frequency range	1 GHz to 18 GHz	
Measuring distance	3 m	
Classification	Class B	
Limits(Class B)	AV Detector	PK Detector
	53.9 dB μ V/m	73.9 dB μ V/m

Note: The highest frequency of the internal sources of the EUT is 2462 MHz, the measurement was made up to 18 GHz.

5.2 Conducted Disturbance 0.15 MHz to 30 MHz

5.2.1 Test Procedure

The EUT was configured as described in section 4. The mains cable of the EUT must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

The test set-up is shown in diagram as below:

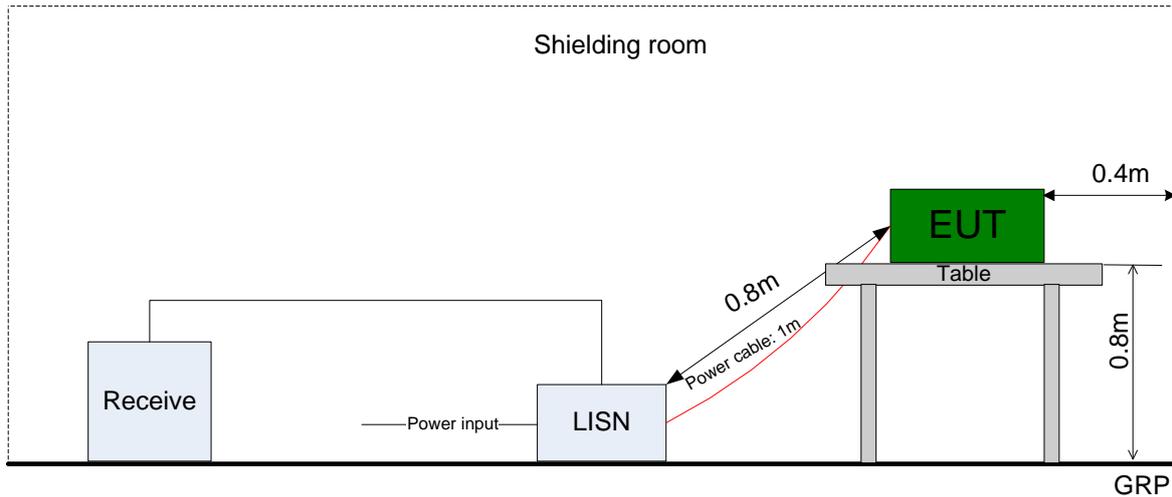


Figure 8. Test set-up of conducted disturbance for AC power port

5.2.2 Test Results

The EUT has met the requirements of FCC Part15 and ICES 003 for Conducted Disturbance of AC Power Port

For the test data, see section 8.2

Table 10 Limits of AC power port

Frequency range	150 kHz to 30 MHz	
Classification	Class B	
Limit(Class B)	Voltage limits (dB μ V)	
	QP	AV
0.15 to 0.5 MHz	66 to 56	56 to 46
0.5 to 5 MHz	56	46
5 to 30 MHz	60	50

**6 Main Test Instruments**

Table 11 Main test instrument

Test Item	Test Instrument	Model	Manufacturer	Calibration Date	Calibration Interval (Month)
Radiated emission (3m chamber)	EMI test receiver	ESU40 (100144)	R&S	2015-10-21	12
	Bilog antenna	CBL 6112B (2941)	Schaffner	2014-08-18	24
	Horn antenna	HF906 (359287/006)	R&S	2014-08-16	24
	Chamber _NSA	3m chamber	Albatross	2015-03-27	36
	Chamber _S _{VSWR}	3m chamber	Albatross	2015-08-25	36
Conducted emission	EMI test receiver	ESCI (100929)	R&S	2015-10-30	12
	Artificial mains network	ENV4200 (100046)	R&S	2015-05-19	12
Software Information					
Test Item		Software Name	Manufacturer	Version	
Radiated emission (3m chamber)		ES-K1	R&S	V1.7.1	
Conducted emission		ES-K1	R&S	V1.7.1	



7 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Table 12 System measurement uncertainty

Items		Extended Uncertainty
Radiated emission (3m chamber)	Field strength (dB μ V/m)	U=4.15 dB; k=2 (30 MHz-1 GHz)
		U=3.64 dB; k=2 (1 GHz-18 GHz)
Conducted Emission	Disturbance Voltage (dB μ V)	U=3.3 dB; k=2

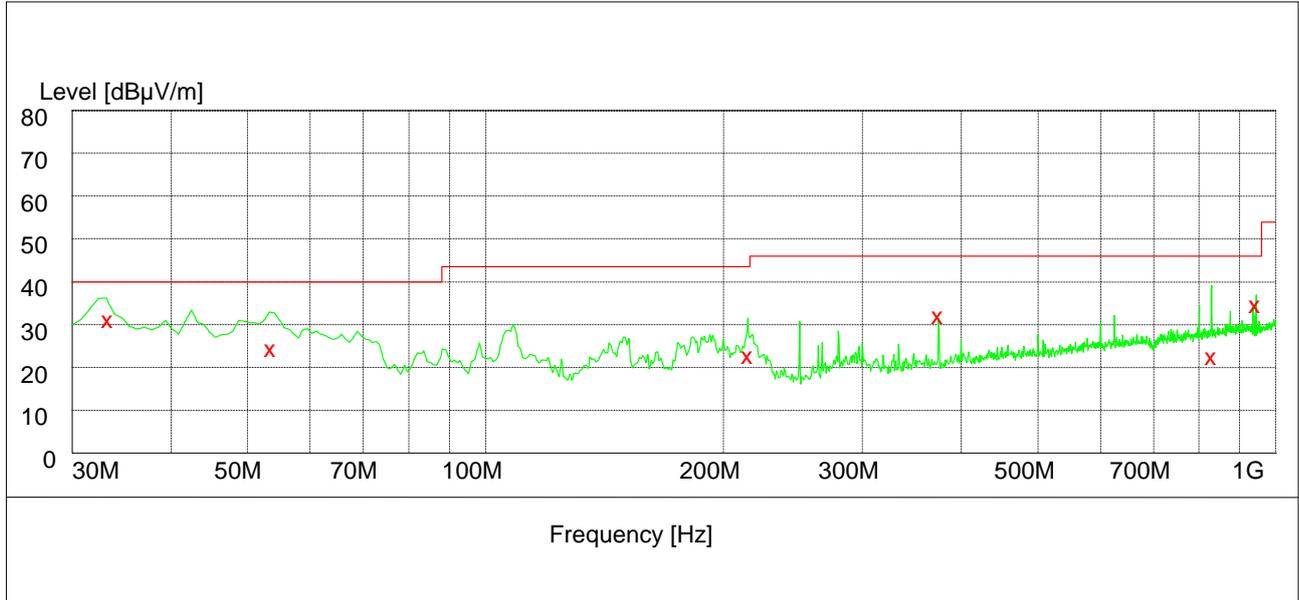


8 Graph and Data of Emission Test

8.1 Radiated Disturbance

8.1.1 Radiated Disturbance of TC1 for 30MHz-1GHz

Graph of Test result (30 MHz-1 GHz)



Measurement Result: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
33.420000	32.70	-7.0	40.0	7.3	100.0	127.00	VERTICAL
53.640000	26.10	-16.2	40.0	13.9	100.0	291.00	VERTICAL
215.280000	24.40	-12.0	43.5	19.1	134.0	0.00	HORIZONTAL
375.000000	33.70	-6.1	46.0	12.3	100.0	224.00	HORIZONTAL
832.020000	24.20	1.8	46.0	21.8	100.0	3.00	HORIZONTAL
944.220000	36.20	2.7	46.0	9.8	100.0	193.00	HORIZONTAL

Note:

Margin=Limit-Level

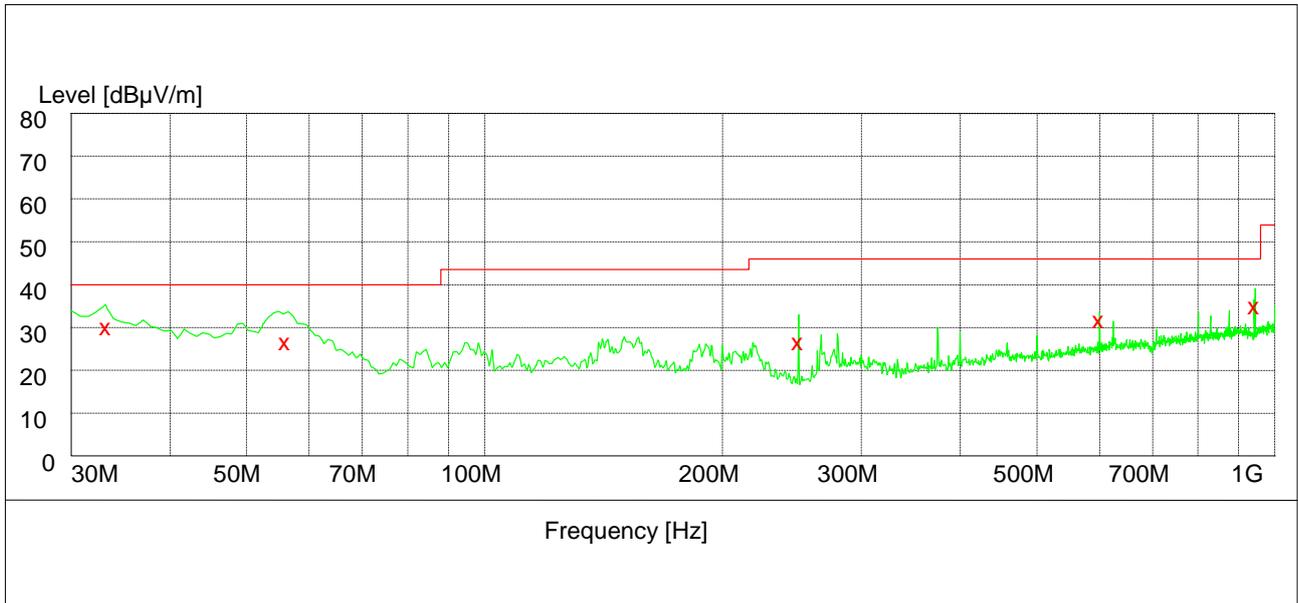
Level =Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)

The reading level is used to calculate by software which is not shown in the sheet.



8.1.2 Radiated Disturbance of TC2 for 30MHz-1GHz

Graph of Test result (30 MHz-1 GHz)



Measurement Result: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
33.300000	31.60	-6.9	40.0	8.4	100.0	108.00	VERTICAL
56.100000	28.20	-17.0	40.0	11.8	100.0	264.00	VERTICAL
250.020000	28.10	-9.8	46.0	17.9	102.0	218.00	VERTICAL
600.000000	33.30	-1.9	46.0	12.7	128.0	61.00	HORIZONTAL
944.220000	36.50	2.7	46.0	9.5	113.0	160.00	HORIZONTAL

Note:

Margin=Limit-Level

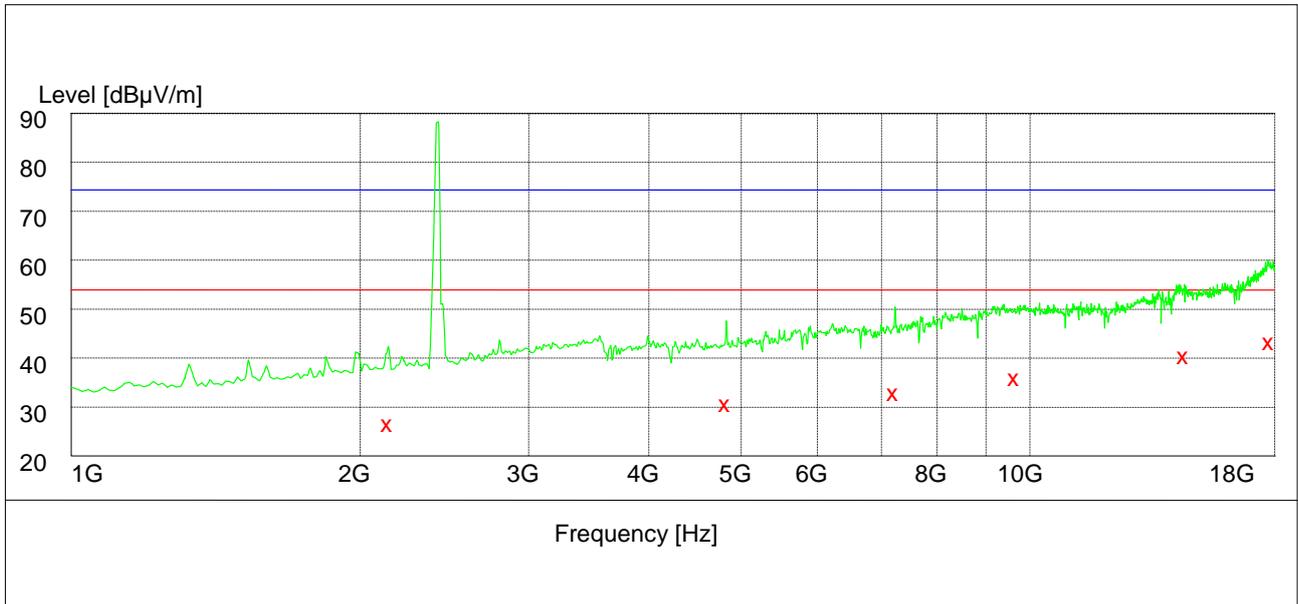
Level =Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)

The reading level is used to calculate by software which is not shown in the sheet.



8.1.3 Radiated Disturbance of TC1~TC2 for 1GHz-18GHz

Graph of Test result (above 1 GHz)



Measurement Result: AV Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
2141.500000	28.00	-4.4	53.9	25.9	100.0	73.00	VERTICAL
4823.500000	32.00	3.8	53.9	21.9	110.0	107.00	VERTICAL
7219.000000	34.40	9.4	53.9	19.5	109.0	97.00	HORIZONTAL
9640.500000	37.40	13.7	53.9	16.5	103.0	11.00	VERTICAL
14477.000000	41.80	25.3	53.9	12.1	141.0	66.00	VERTICAL
17769.000000	44.70	31.4	53.9	9.2	100.0	1.00	VERTICAL

Note:

Margin=Limit-Level

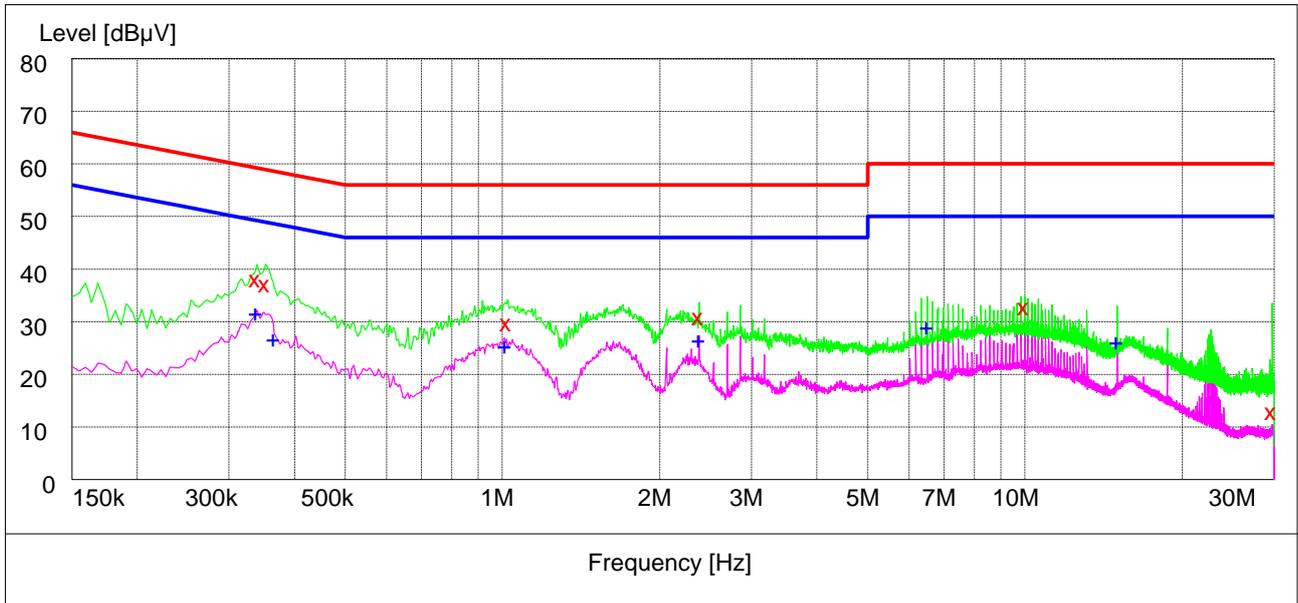
Level =Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)

The reading level is used to calculate by software which is not shown in the sheet.



8.2 Conducted Disturbance

8.2.1 AC Power Port Test Data of TC1



Measurement Result: QP Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.339000	39.00	10.7	59	20.2	N	FLO
0.352500	38.10	10.7	59	20.8	N	FLO
1.023000	30.80	10.6	56	25.2	N	FLO
2.377500	31.80	10.6	56	24.2	N	FLO
9.987000	33.70	10.8	60	26.3	N	FLO
29.710500	13.80	10.9	60	46.2	L3	FLO

Measurement Result: AV Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.339000	32.70	10.7	49	16.5	N	FLO
0.366000	27.60	10.7	49	21.0	N	FLO
1.014000	26.30	10.6	46	19.7	N	FLO
2.377500	27.40	10.6	46	18.6	N	FLO
6.499500	30.00	10.6	50	20.0	N	FLO
15.013500	27.10	10.8	50	22.9	L3	FLO

Note:

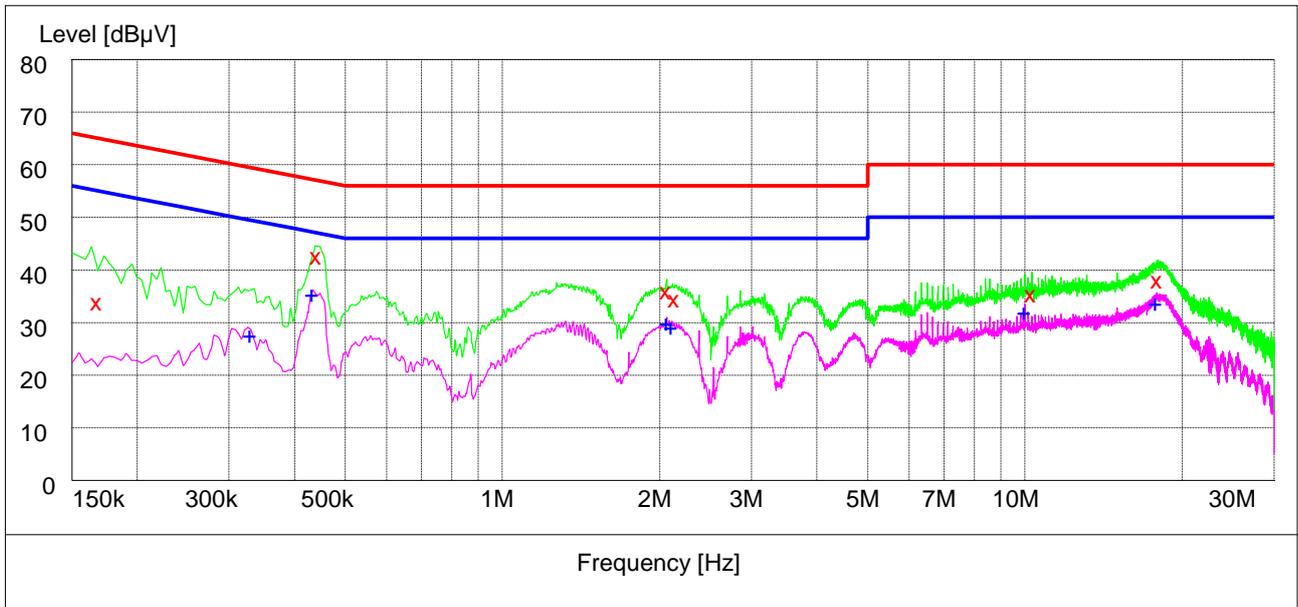
Margin=Limit-Level

Level= Reading level+ Transd (cable loss + correction factor)

The reading level is used to calculate by software which is not shown in the sheet.



8.2.2 AC Power Port Test Data of TC2



Measurement Result: QP Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.168000	34.80	10.5	65	30.3	N	FLO
0.442500	43.50	10.7	57	13.5	N	FLO
2.062500	36.90	10.6	56	19.1	L3	FLO
2.143500	35.50	10.6	56	20.5	L3	FLO
10.306500	36.40	10.8	60	23.6	L3	FLO
18.042000	38.90	10.7	60	21.1	L3	FLO

Measurement Result: AV Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.330000	28.40	10.7	49	21.0	N	FLO
0.433500	36.40	10.7	47	10.8	N	FLO
2.062500	30.80	10.6	46	15.2	L3	FLO
2.112000	30.20	10.6	46	15.8	L3	FLO
9.987000	32.90	10.8	50	17.1	L3	FLO
17.830500	34.60	10.7	50	15.4	L3	FLO

Note:

Margin=Limit-Level

Level= Reading level+ Transd (cable loss + correction factor)

The reading level is used to calculate by software which is not shown in the sheet.

9 Photographs of Test Set-up

9.1 Radiated Emission

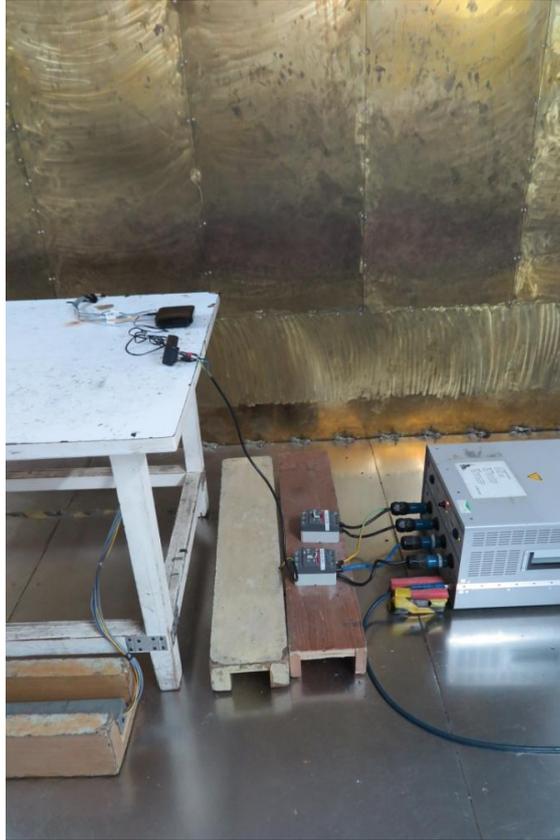


Radiated emission for 30 MHz-1 GHz



Radiated emission for 1GHz to 18GHz

9.2 Conducted Emission



Conducted emissions of AC power port

**Appendix: Abbreviation**

Table 13 Abbreviation

Abbreviation	Full Name
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EUT	Equipment Under Test
AE	Auxiliary Equipment
AC	Alternate Current
DC	Direct Current
NSA	Normalized Site Attenuation
S_{VSWR}	Site Voltage Standing Wave Ratio
LISN	Line Impedance Stabilization Network
TC	Test configuration
N/A	Not Applicable

END