



EMC Test Report

Product Name: GPON Terminal

Product Model: EchoLife HG8245H

Report Number: SYBH(E)01179233EB

Reliability Laboratory of Huawei Technologies Co., Ltd.

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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 site recognition number is 97456.
4. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 6369A-1 and 6369A-3.
5. The laboratory has been listed by the VCCI to perform EMC measurements. The accreditation numbers of test site No.1 are R-3892, G-415, C-4361, and T-1348, and the accreditation numbers of test site No.2 are R-3760, G-485, C-4210 and T-1237.
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Applicant: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Product Name: GPON Terminal
Product Model: EchoLife HG8245H

Date of Receipt Sample: 2013-12-05
Start Date of Test: 2013-12-06
End Date of Test: 2013-12-16

Test Result: Pass

Approved by Senior Engineer:	2014-01-10	Zhang Xinghai	<i>Zhang Xing hai</i>
	Date	Name	Signature

Prepared by:	2014-01-09	Deng Ruling	<i>Deng Ruling</i>
	Date	Name	Signature



Modification Record

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



Content

1	General Information	6
1.1	Applied Standard	6
1.2	Test Location	6
1.3	Test Environment Condition	6
2	Summary of Test Results	7
3	Equipment Specification	8
3.1	General Description	8
3.2	Specification.....	8
3.3	Board and SubAssembly	11
4	System Configuration during EMC Test	12
4.1	Ports and Cables	12
4.2	Auxiliary Equipment	12
4.3	Test Configurations and Test Mode	12
4.4	Test Conditions and Connections.....	13
5	Details of Test Items	15
5.1	Radiated Emission 30 MHz to 18 GHz.....	15
5.2	Conducted Disturbance 0.15 MHz to 30 MHz.....	17
6	Main Test Instruments	18
7	System Measurement Uncertainty	18
8	Graph and Data of Emission Test	19
8.1	Radiated Disturbance	19
8.2	Conducted Disturbance	21
9	Photographs of Test Set-up.....	23
9.1	Radiated Emission.....	23
9.2	Conducted Emission.....	24
	Appendix: Abbreviation	25



1 General Information

1.1 Applied Standard

Applied Product Standard: FCC CFR47 Part 15 Subpart B:2012
ICES-003 Issue 5:2012

Test Method: ANSI C63.4:2003

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-TC3	Class B	Pass	Location1
<u>Conducted Emissions</u> AC Power Port	TC1-TC3	Class B	Pass	Location1

Note:
1, Measurement taken is within the uncertainty of measurement system.
2, TC = Test configuration

3 Equipment Specification

3.1 General Description

The EchoLife HG8245H GPON terminal (hereinafter referred to as HG8245H) is an indoor optical network terminal (ONT) designed for home users and small office. The HG8245H uses the gigabit-capable passive optical network (GPON) technology to provide a high-speed data channel with an upstream rate of 1.244 Gbit/s and a downstream rate of 2.488 Gbit/s through a single optical fiber. In this way, you can use the HG8245H to enjoy the high-speed data service, quality voice service, superior video service, and secure and reliable wireless access service.

As a network terminal, the HG8245H is deployed at the GPON access layer and connects the home users and SOHO users to the Internet through the optical upstream port. On the local area network (LAN) side, the HG8245H provides abundant hardware ports to meet multiple networking requirements of home users.

- ◆ Four 10/100/1000 Base-T Ethernet ports that can function as the service ports for service terminals such as PC, set top box (STB), and video phone.
- ◆ Two TEL ports that provide superior and cost-effective voice over IP (VoIP), fax over IP (FoIP), and modem over IP (MoIP) services.
- ◆ One WLAN port to support a secure and reliable high-speed wireless network.
- ◆ One USB port that can be attached with USB disks to provide convenient home network attached storage and file sharing services.

3.2 Specification

Table 2 Main equipment specification

Rated Input Voltage	~ 100 V to 240 V, 50/60 Hz
Rated Power (W)	14 W
Dimensions (W x D x H)	195 mm (W) x 174 mm (D) x 34 mm (H)
Weight (kg)	0.6 kg
Transmit Frequency (MHz)	Wlan Band: 2.4G (2412 MHz - 2472 MHz)
Receive Frequency (MHz)	Wlan Band: 2.4G (2412 MHz - 2472 MHz)
Frequency of the Internal Source (MHz)	25 MHz, 40 MHz, 125 MHz, 480 MHz, 1244 MHz, 2400 MHz–2484 MHz, 2488 MHz,



Figure 1. EUT appearance



Figure 2. EUT Appearance (Adapter of HuntKey: HW-120200U3W)



Figure 3. EUT Appearance (Adapter of UE: HW-120200U3W)



Figure 4. EUT Appearance (Battery of HW-Li2Ah-C and HW-Li4Ah-C)



Figure 5. EUT Appearance (Battery charger of UE36-138250SPA or UE36-138250SPA1)

**3.3 Board and SubAssembly**

Table 3 Board list

Board	
Board Name	Description
HG8245XGA	1PON, 4GE, 2POTS, 1USB, 1WIFI

Table 4 Subassembly list

Subassembly			
Subassembly Name	Model	Manufacturer	Description
Adapter	HW-120200U3W	Shenzhen Huntkey Electric Co., Ltd	Input voltage : ~ 100V-150V, 50/60Hz 0.8A Output voltage : === 12 V 2A
	HW-120200U3W	Dongguan Shilong Fuhua electronic Co.,Ltd	Input voltage : ~ 100V-150V, 50/60Hz 0.8A Output voltage : === 12 V 2A
Li-battery charger	UE36-138250SPA	Dongguan Shilong Fuhua electronic Co.,Ltd	Input voltage : ~ 100V-240V 50/60Hz 1.2A Output voltage : === 13.8V 2.5A
	UE36-138250SPA1	Dongguan City Shilong Fuhua Electronic Co.,Ltd	Input voltage : ~ 100V-240V 50/60Hz 0.9A Output voltage : === 13.8V 2.5A
Li-Battery HW-Li2Ah-C	HW-Li2Ah-C	SCUD (FU JIAN) ELECTRONIC CO.,LTD	Rating Voltage: === 11.1V Rating Capacity:2Ah
Li-Battery HW-Li4Ah-C	HW-Li4Ah-C	SCUD (FU JIAN) ELECTRONIC CO.,LTD	Rating Voltage: === 11.1V Rating Capacity:4Ah



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	Quantity	Length (m)	Connector	Type of Cable
AC Power Port	1	1.5	N/A	Unshielded
POTS	2	5	RJ11	UTP-CAT3
GE	4	10	RJ45	UTP-CAT5
PON	1	10	SC	Single-mode optical fiber

4.2 Auxiliary Equipment

Table 6 Auxiliary equipment

Equipment	Model	Manufacturer	S/N	Calibration Date	Calibration Interval (month)	Remark
TELEPHONE	TCL 37	TCL	N/A	N/A	N/A	N/A
Data network analyzer	Smartbits600	Spirent	SZ0500038070	2013-05-28	12	N/A
PC	Lenovo M4000	LEGEND	N/A	N/A	N/A	N/A
DSLAM	MA5603T	Huawei	N/A	N/A	N/A	N/A
USB memorizer	NA	Kingston	N/A	N/A	N/A	N/A
Notebook PC	HP 2540p	HP	3105033009	N/A	N/A	N/A

4.3 Test Configurations and Test Mode

4.3.1 Test Configuration

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 three test configurations. TC1 – TC3 were shown in the following table and figures:

Table 7 Test configuration

Configuration No.	Configuration Description
TC1	Adapter (HuntKey)*: HW-120200U3W
TC2	Adapter (UE)*: HW-120200U3W
TC3	Battery: HW-Li2Ah-C; HW-Li4Ah-C
	Battery charger : UE36-138250SPA; UE36-138250SPA1

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

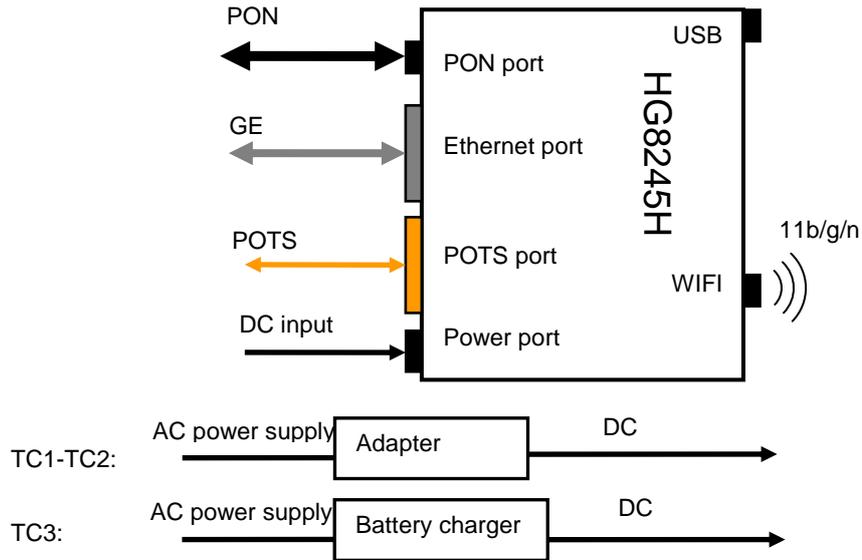


Figure 6.: Test configuration1,2 and 3 (TC1 to TC3)

4.3.2 Test Mode

There were two test Modes. TM1 and TM2 were shown in the table below:

Table 1 Test modes

Test Mode	Mode Describe
TM1	WLAN idle Mode
TM2	WLAN traffic Mode

When the EUT was required to be in the traffic mode for WLAN mode, a call was set up using a series of command and the following conditions should be met:

The EUT should be commanded to operate at maximum transmit power 19 dBm;

When the EUT was in the idle mode, the EUT switched on but didn't transmit power, available for service and available to respond to a request to set up a call.

4.4 Test Conditions and Connections

The HG8245H was connected with the OLT through a single-mode optical fiber and 15–20 dB optical attenuation is added. The Ethernet ports of HG8245H should connect to the SmartBits 600. The data flow rates of each Ethernet port is nearly 250M when the Ethernet port is GE. Data transmission is normal at the Ethernet port with no packet loss or error codes. Each POTS port of HG8245H should connect with a phone. Voice service was configured on the board so that voice connection can be built between phone1 and phone2.

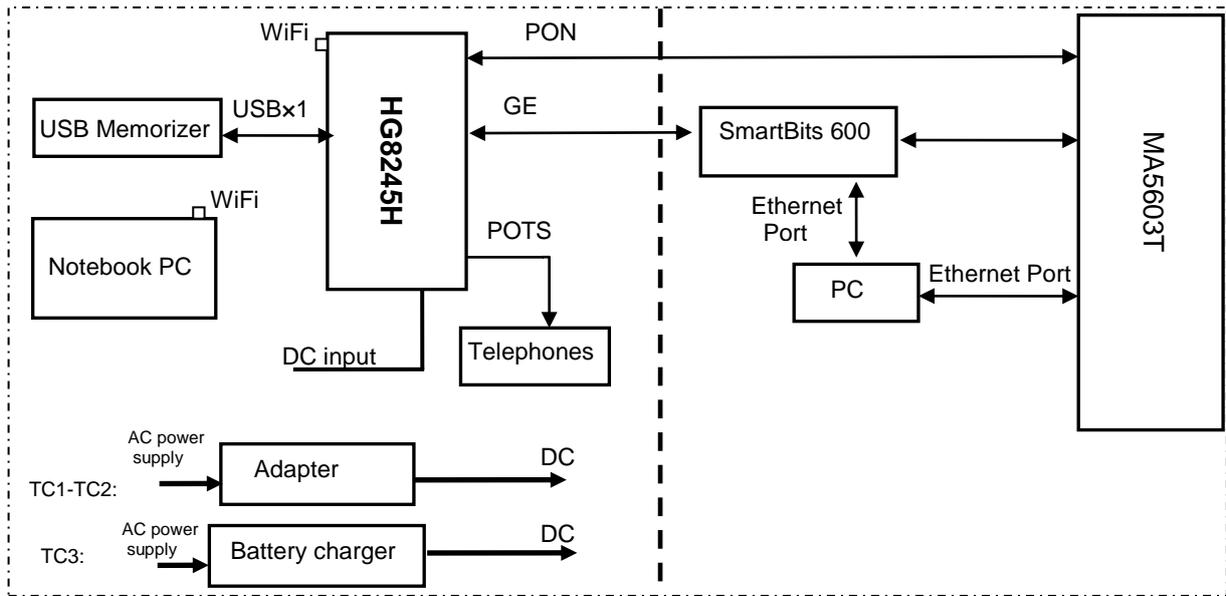


Figure 7. Test connection of TC1 to TC3

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 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.

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:

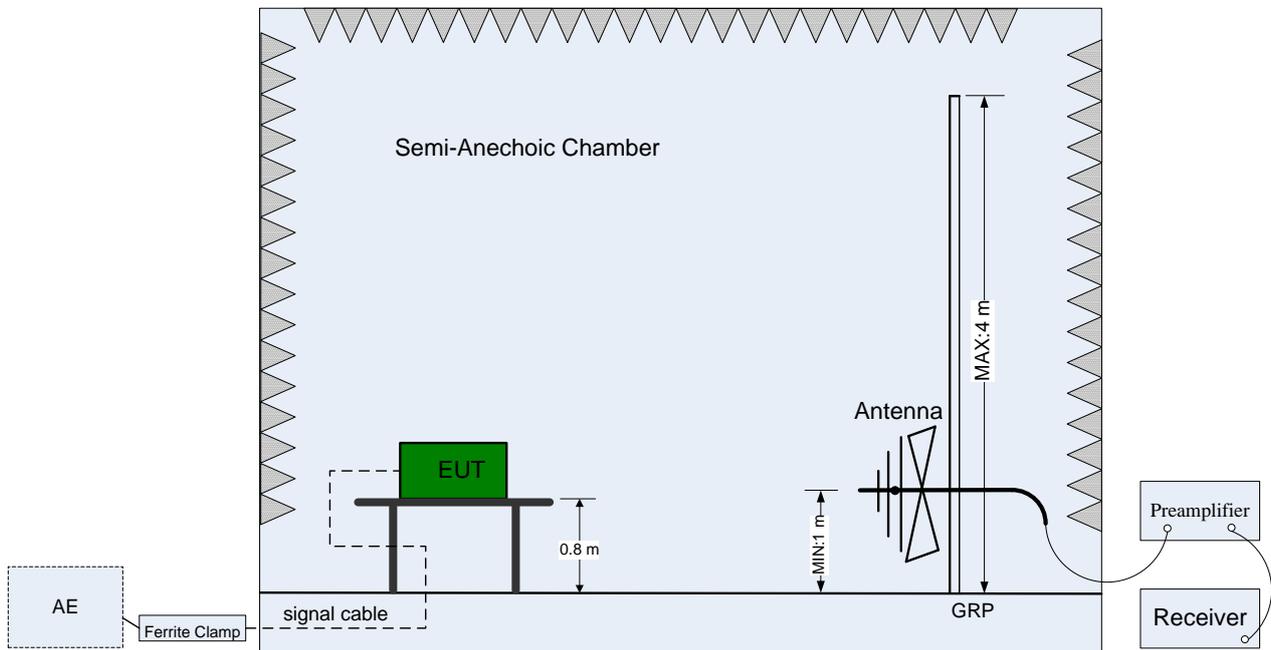


Figure 8. Test set-up of radiated disturbance (30 MHz-1 GHz)

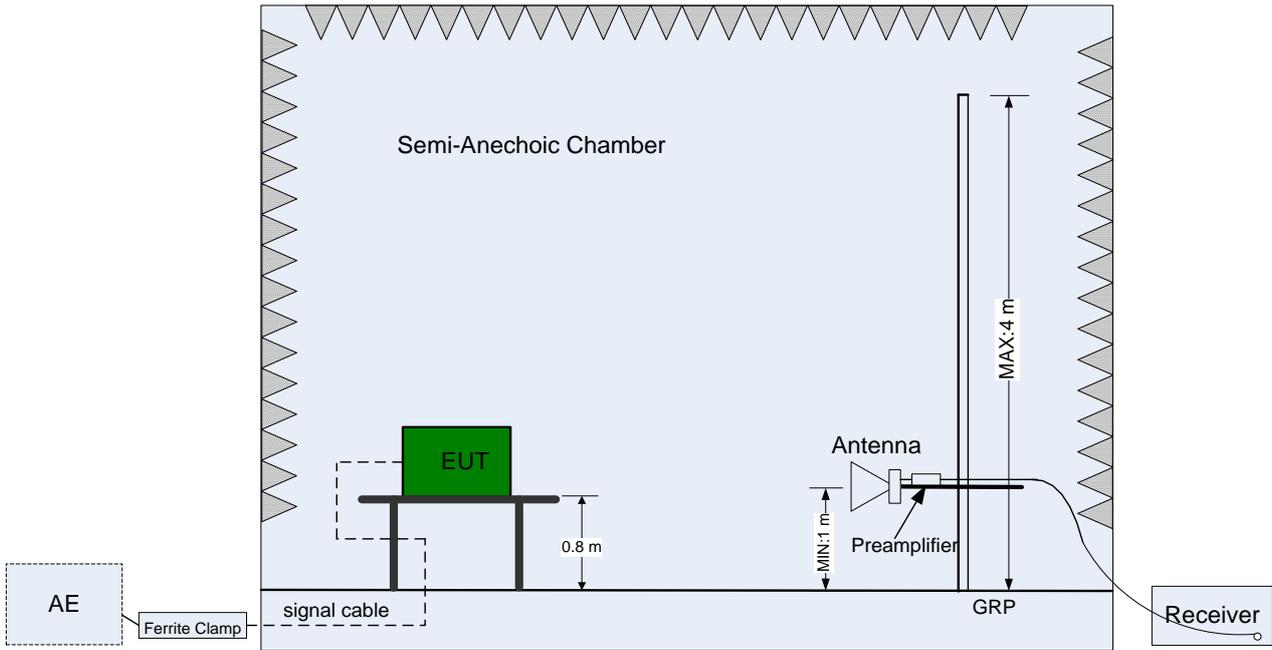


Figure 9. Test set-up of radiated disturbance (above 1 GHz)

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 2 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 3 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 2488 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.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

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

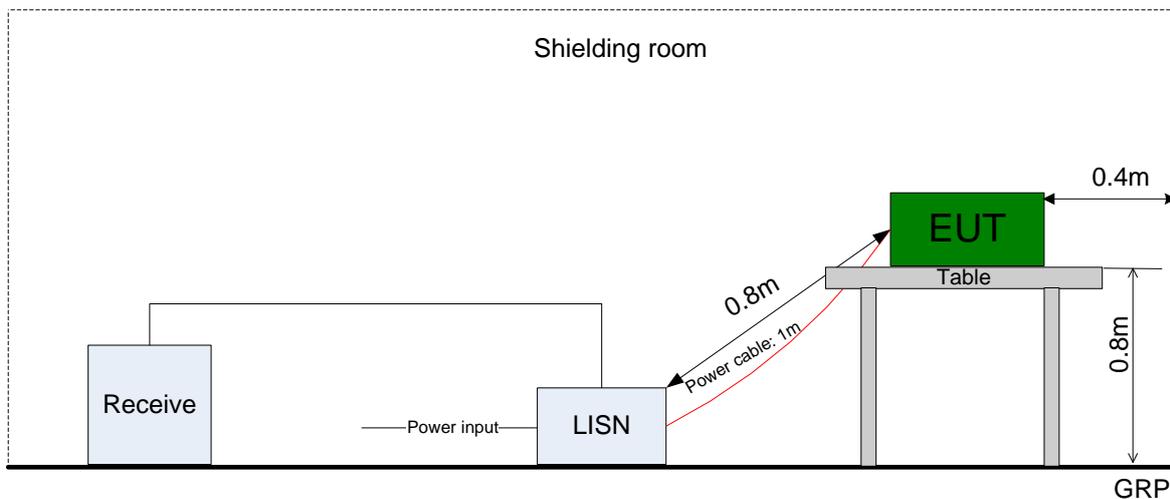


Figure 10. Test set-up of conducted disturbance for AC power port

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 4 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 5 Main test instrument

Test Item	Test Instrument	Model	Manufacturer	Calibration Date	Calibration Interval (Month)
Radiated emission (G2 3m chamber)	EMI test receiver	ESU40 (100144)	R&S	2013-05-13	12
	Bilog antenna	CBL 6112B (2536)	Schaffner	2013-03-23	24
	Horn antenna	HF906 (359287/006)	R&S	2012-09-15	24
	Chamber_NSA	3m chamber	Albatross	2013-04-02	36
Conducted emission (G2)	EMI test receiver	ESCI (100929)	R&S	2013-05-13	12
	Artificial mains network	ENV4200 (100046)	R&S	2013-05-13	12
Software Information					
	Test Item	Software Name	Manufacturer	Version	
	Radiated emission (G2 3m chamber)	ES-K1	R&S	V1.7.1	
	Conducted emission (G2&K3)	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 6 System measurement uncertainty

Items		Extended Uncertainty
Radiated emission (G2 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 (G2)	Disturbance Voltage (dB μ V)	U=3.3 dB; k=2

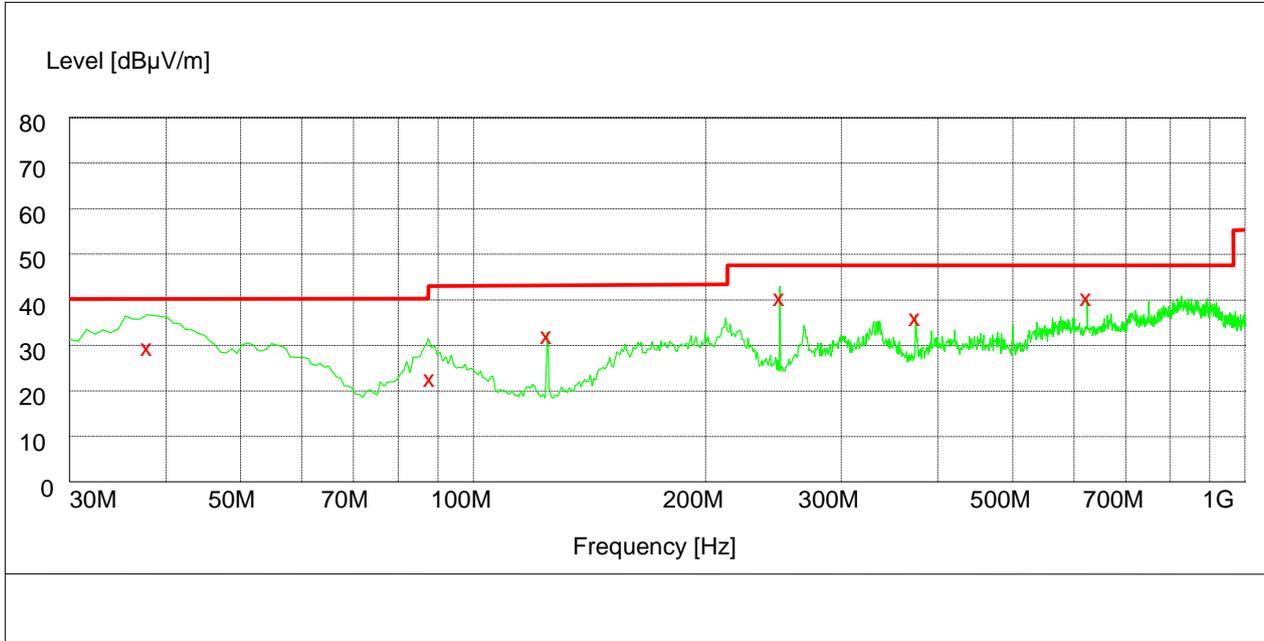


8 Graph and Data of Emission Test

8.1 Radiated Disturbance

8.1.1 Radiated Disturbance of TC1 to TC3

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
37.980000	30.80	-10.0	40.0	9.2	100.0	10.00	VERTICAL
88.260000	24.10	-16.2	43.5	19.4	108.0	201.00	VERTICAL
124.980000	33.40	-14.1	43.5	10.1	150.0	169.00	HORIZONTAL
250.020000	41.90	-9.8	46.0	4.1	100.0	305.00	HORIZONTAL
375.000000	37.20	-6.3	46.0	8.8	100.0	218.00	HORIZONTAL
625.020000	41.80	-1.5	46.0	4.2	120.0	289.00	HORIZONTAL

Note:

Margin=Limit-Level

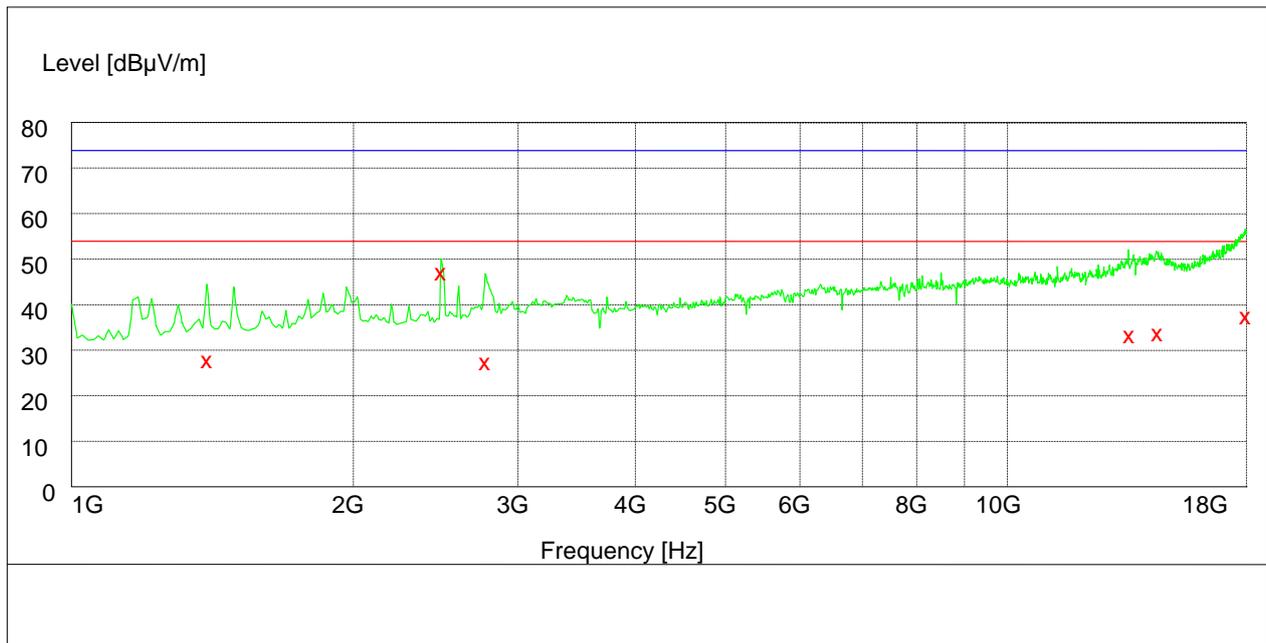
Level =Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)

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

TC1 to TC3 were tested, and the worst test result was supplied.



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
1400.000000	29.20	-5.0	53.9	24.7	100.0	18.00	HORIZONTAL
2488.500000	48.50	0.7	53.9	5.4	100.0	258.00	VERTICAL
2775.000000	28.60	1.8	53.9	25.3	100.0	197.00	HORIZONTAL
13525.500000	34.70	21.3	53.9	19.2	150.0	217.00	HORIZONTAL
14505.500000	35.20	23.1	53.9	18.7	100.0	224.00	HORIZONTAL
17999.500000	38.90	30.9	53.9	15.0	145.0	214.00	VERTICAL

Note:

Margin=Limit-Level

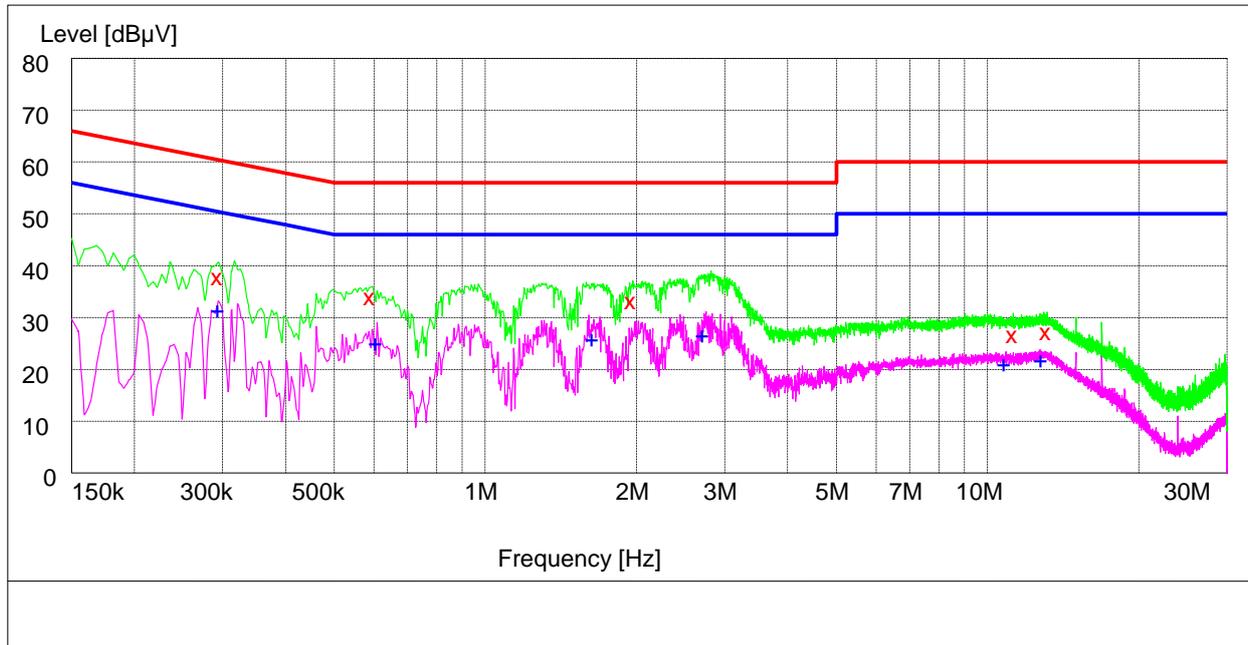
Level =Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)

TC1 to TC3 were tested, and the worst test result was supplied.



8.2 Conducted Disturbance

8.2.1 AC Power Port Test Data of TC1-TC2



Measurement Result: QP Detector

Frequency (MHz)	Level (dBµV)	Transd (dB)	Limit (dBµV)	Margin (dB)	Line	PE
0.294000	38.70	9.9	60	21.7	N	FLO
0.591000	34.90	9.9	56	21.1	N	FLO
1.954500	34.30	10.0	56	21.7	N	FLO
2.845500	-3.70	10.0	56	59.7	L3	FLO
11.269500	27.60	10.2	60	32.4	L3	FLO
13.150500	28.30	10.4	60	31.7	L3	FLO

Measurement Result: AV Detector

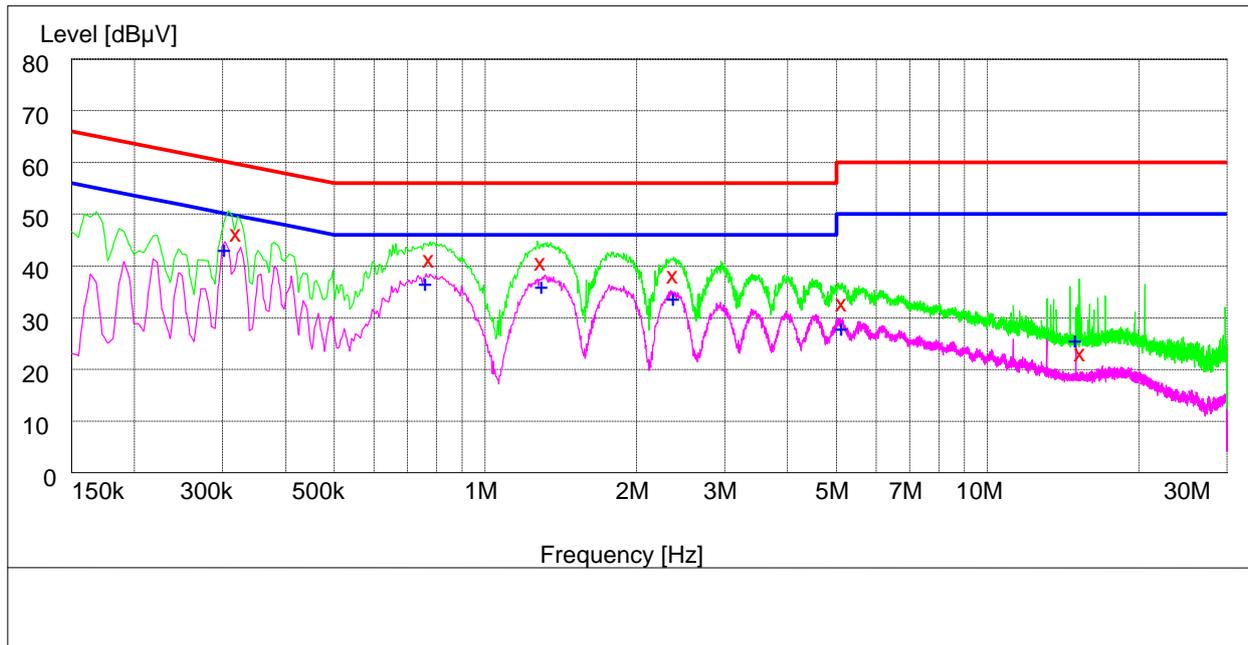
Frequency (MHz)	Level (dBµV)	Transd (dB)	Limit (dBµV)	Margin (dB)	Line	PE
0.294000	32.40	9.9	50	18.0	L3	FLO
0.604500	26.00	9.9	46	20.0	N	FLO
1.635000	26.90	10.0	46	19.1	L3	FLO
2.715000	27.60	10.0	46	18.4	N	FLO
10.819500	22.10	10.3	50	27.9	L3	FLO
12.804000	22.80	10.4	50	27.2	L3	FLO

Note:

- 1, Level= Reading level+ Transd (cable loss + correction factor)
The reading level is used to calculate by software which is not shown in the sheet.
- 2, TC1-TC2 were tested, and the worse test result was supplied.



8.2.2 AC Power Port Test Data of TC3



Measurement Result: QP Detector

Frequency (MHz)	Level (dBµV)	Transd (dB)	Limit (dBµV)	Margin (dB)	Line	PE
0.321000	47.20	9.9	60	12.5	N	FLO
0.775500	42.20	9.8	56	13.8	N	FLO
1.293000	41.60	9.8	56	14.4	N	FLO
2.373000	39.10	10.1	56	16.9	N	FLO
5.145000	33.80	10.3	60	26.2	L3	FLO
15.360000	24.20	10.5	60	35.8	L3	FLO

Measurement Result: AV Detector

Frequency (MHz)	Level (dBµV)	Transd (dB)	Limit (dBµV)	Margin (dB)	Line	PE
0.303000	44.10	9.9	50	6.1	L3	FLO
0.762000	37.60	9.9	46	8.4	N	FLO
1.297500	37.10	9.8	46	8.9	N	FLO
2.373000	34.60	10.1	46	11.4	L3	FLO
5.136000	29.00	10.2	50	21.0	L3	FLO
15.018000	26.60	10.5	50	23.4	L3	FLO

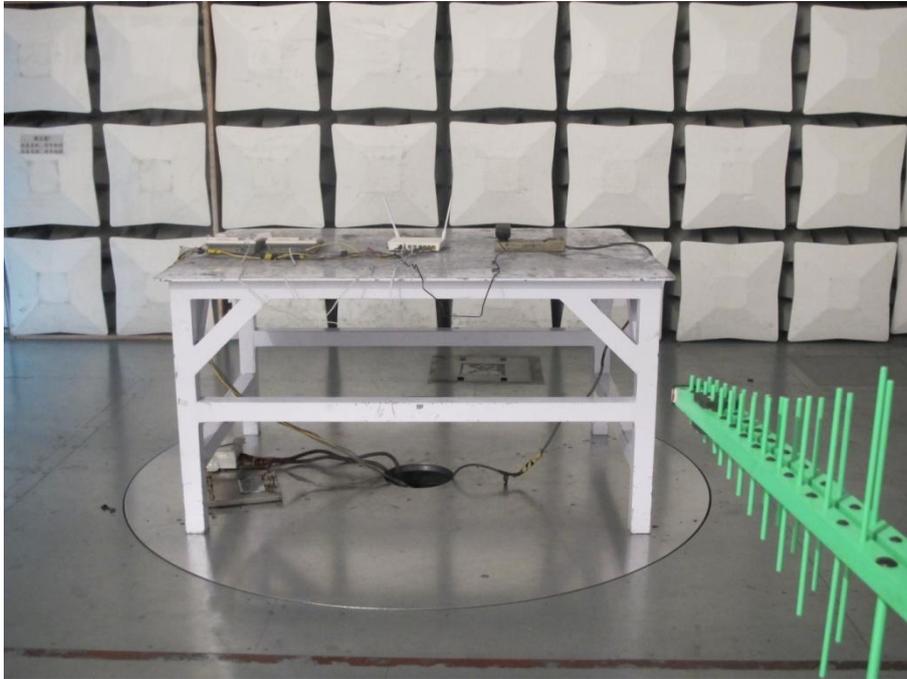
Note:

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 7 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
LISN	Line Impedance Stabilization Network
TC	Test configuration
N/A	Not Applicable

END