



EMC Test Report

Product Name: Enterprise Gateway

Product Model: eSpace EGW1520

Report Number: SYBH (E) 00812028EB

Reliability Laboratory of Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District,
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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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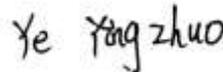


Applicant: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Product Name: Enterprise Gateway
Product Model: eSpace EGW1520

Date of Receipt Sample: 2012-12-17
Start Date of Test: 2012-12-17
End Date of Test: 2012-12-21

Test Result: Pass

Approved by Senior Engineer:	2013-01-06	Zhang Xinghai	
	Date	Name	Signature

Prepared by:	2013-01-05	Ye Yingzhuo	
	Date	Name	Signature



Modification Record

No.	Last Report No.	Modification Description
1	N/A	First report
2	SYBH(E)00656231EB	Update the board's version and the input voltage of adapter.



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1 General Information

1.1 Applied Standard

Applied Product Standard: FCC CFR47 Part 15 Subpart B:2011
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 Summary of test results

EUT Classification: Class A Digital Device				
Test Items	Test Configuration	Limit	Test Result	Location
<u>Radiated Emissions</u> Enclosure Port	TC1	Class B	Pass	Location1
<u>Conducted Emissions</u> <input type="checkbox"/> DC Power Port <input checked="" type="checkbox"/> AC Power Port	TC1	Class B	Pass	Location1
Note: 1, Measurement taken is within the uncertainty of measurement system. 2, TC = Test configuration 3, <input checked="" type="checkbox"/> The item has been tested; <input type="checkbox"/> The item has not been tested.				

3 Equipment Specification

3.1 General Description

Huawei eSpace EGW1520 is a new-generation enterprise gateway that provides a complete access solution and implements data, voice, broadband connection, wireless access, and security-related functions. It is an optimal choice for Small Office Home Office (SOHO) users and small-sized enterprises to establish an integrated office network.

The eSpace EGW1520 provides various uplink ports for different networking scenarios. It also provides diversified user ports to establish flexible office networks.

3.2 Specification

Table 1 Main equipment specification

Rated Input Voltage	Adapter input: ~100-240V (50/60HZ) Equipment input:  12V
Rated Power (W)	Max 24 W
Dimensions(W x D x H)	305mm (W) x 175 mm (D) x35mm (H)
Weight (kg)	0.83 kg
Transmit frequency	2.4 GHz~2.4835 GHz for 802.11n Band
Receive frequency	2.4 GHz~2.4835 GHz for 802.11n Band
Maximum output power	16±1.5 dBm
Frequency of the Internal Source (MHz)	380 kHz, 20 MHz, 25 MHz, 10 MHz, 40 MHz, 6.25 MHz, 333 MHz, 100 MHz,



Figure 1.EUT appearance



HKA02412020-3K (Huntkey)



HW-120200E1W (FUHUA)



HW-120200U1W (Huntkey)



HW-120200U1W (FUHUA)
Figure 2. Adapter appearance



3.3 Board and Sub-Assembly

Table 2 Board list

Board	
Board Name	Description
EG12MAUB	Manufactured Board,EGW1520,EG12MAUB,UPLINK:ADSL,GE,3G(USB),FXO*4.DOWNLINK:FE*4,WLAN,FXS*1

Table 3 Subassembly list

Subassembly			
Subassembly Name	Model	Manufacturer	Description
AC/DC Adapter	HKA024120 20-3K	Huntkey	AC/DC Adapter--5degC-45degC-100V-240V - 12V/2A-Europe Standerd-DC inlet
AC/DC Adapter	HW-120200E1W	Fuhua	AC/DC Adapter--5degC-45degC-100V-240V - 12V/2A-Europe Standerd-DC inlet
AC/DC Adapter	HKA024120 20-4K	Huntkey	AC/DC Adapter--5degC-45degC-100V-240V - 12V/2A-UK Standerd-DC inlet
AC/DC Adapter	HW-120200B1W	Fuhua	AC/DC Adapter--5degC-45degC-100V-240V - 12V/2A-UK Standerd-DC inlet
AC/DC Adapter	HW-120200U1W	Huntkey	Adapter,-5degC, 45degC, 100V-240V, 12V/2A, US Standard/DC inlet
AC/DC Adapter	HW-120200U1W	Fuhua	Adapter,-5degC, 45degC, 100V-240V, 12V/2A, US Standard/DC inlet



4 System Configuration during EMC Test

The Equipment under Test (EUT) functions 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 4 Port and cables

Port	Quantity	Length (m)	Connector	Type of Cable
AC Power port	1	2	/	Unshielded
GE(WAN)	1	10	RJ45	UTP-5
FE(LAN)	4	10	RJ45	UTP-5
FXS	1	10	RJ11	2-core telephone Unshielded Cable
FXO	4	10	RJ11	2-core telephone Unshielded Cable
ADSL	1	10	RJ11	2-core telephone Unshielded Cable
USB	1	1	USB	

4.2 Auxiliary Equipment

Table 5 Auxiliary equipment

Name	Model	Manufacturer	S/N	Calibration Date	Cal Interval (month)
Enterprise Gatewei	eSpace EGW 1500E	Huawei	021FNU10B8000 02	NA	NA
DSLAM	MA5616	Huawei	21023520356TA7 000160	NA	NA
Data network analyzer	Tesgine	Huawei	5306090619	2011-05-24	24
IP Phone	ET635	Huawei	286ED4A7648F	NA	NA
IP Phone	ET655	Huawei	286ED4A76AF3	NA	NA
IP Phone	ET685	Huawei	286ED4A77799	NA	NA
PC	HP 2540p	HP	A101038556	NA	NA
Telephone	HCD868	TCL	010Y0B206C091 2400149	NA	NA

4.3 Test Configurations

The EUT was connected to auxiliary equipment in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

There was one test configuration. TC1 was shown in the following figure:

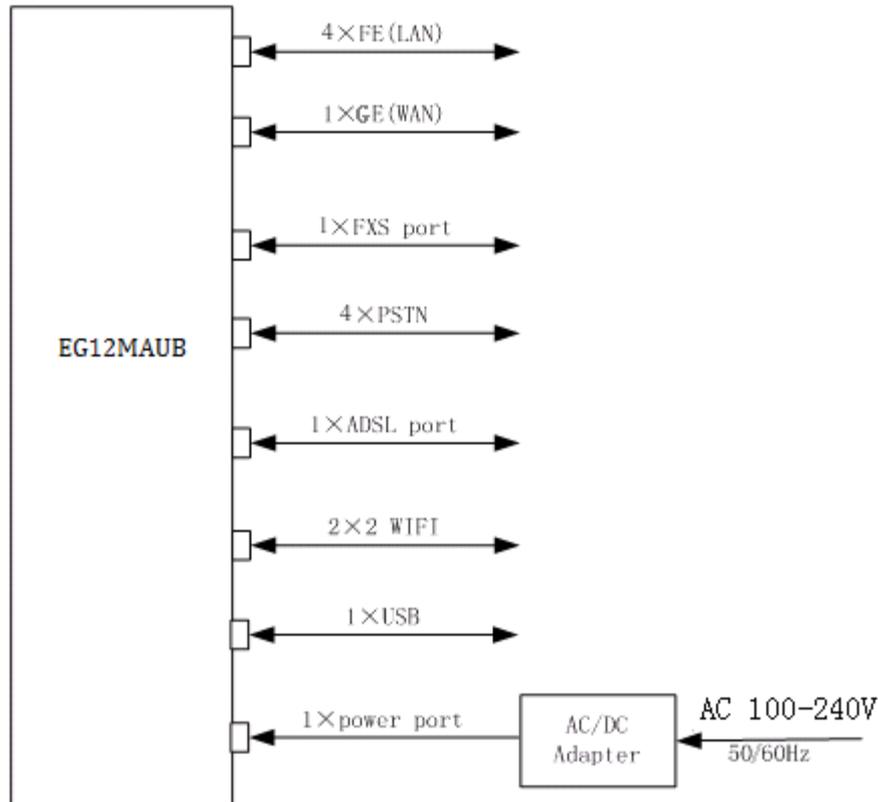


Figure 3. Test configuration1 (TC1)

4.4 Test Condition and Connection

4.4.1 Test Condition

EGW enables the customer to connect their site to the voice network using xDSL. Voice calls can be made up via SIP trunks.

Besides the SIP channels, EGW also supports a standard PSTN connection for POTS device. EGW includes 1 FXS interfaces port with RJ-11 connector. EGW supports IEEE802.11b/g/n standards and Wi-Fi IP Phone or PC access.

EGW includes 4 LAN ports (10M/100Mbps) with RJ-45 connectors, which are supported for IP Phone, PC or LAN Switch.

EGW supports one USB2.0 Host for HSPA backup (3G data card).



4.4.2 Test Connection

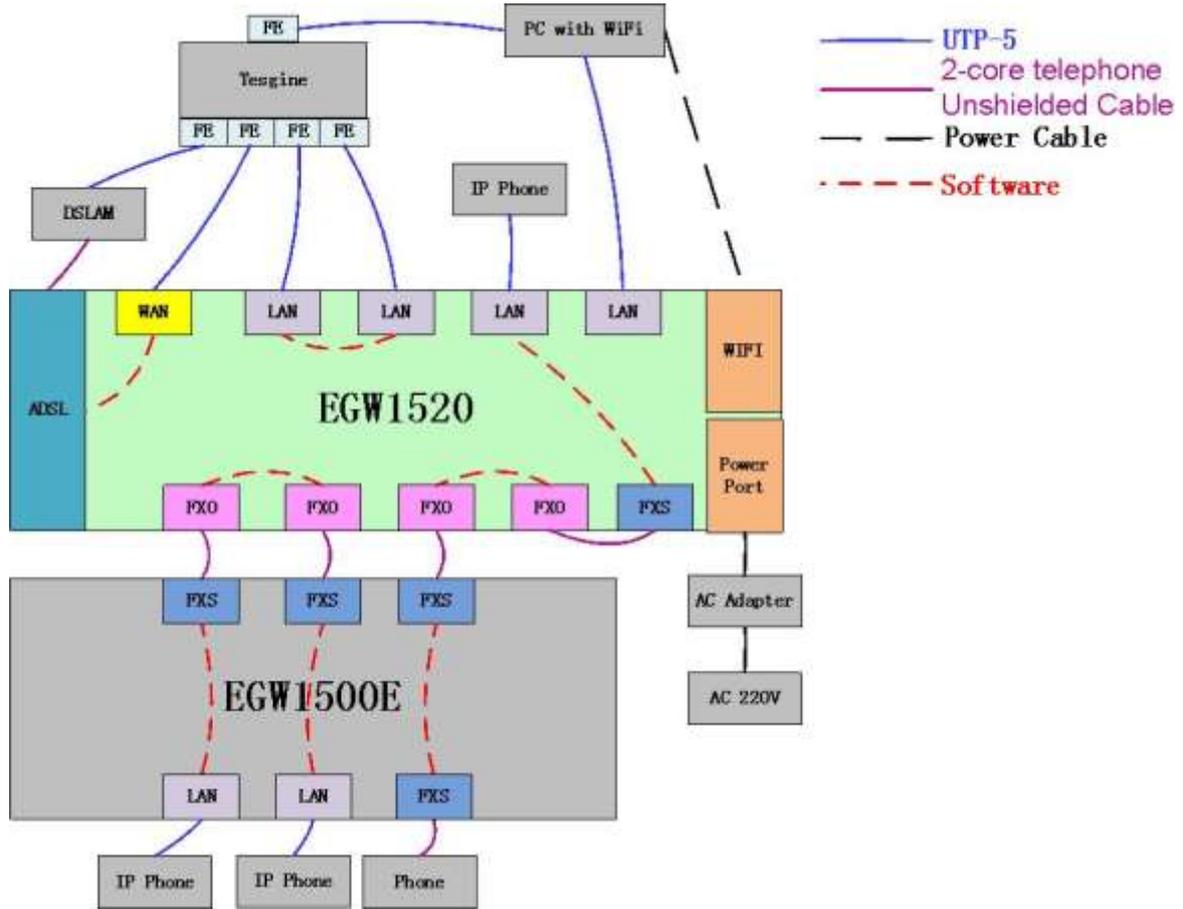


Figure 4. Test connection

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 has met the requirement of NSA tolerance 4 dB according to the standards: 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:

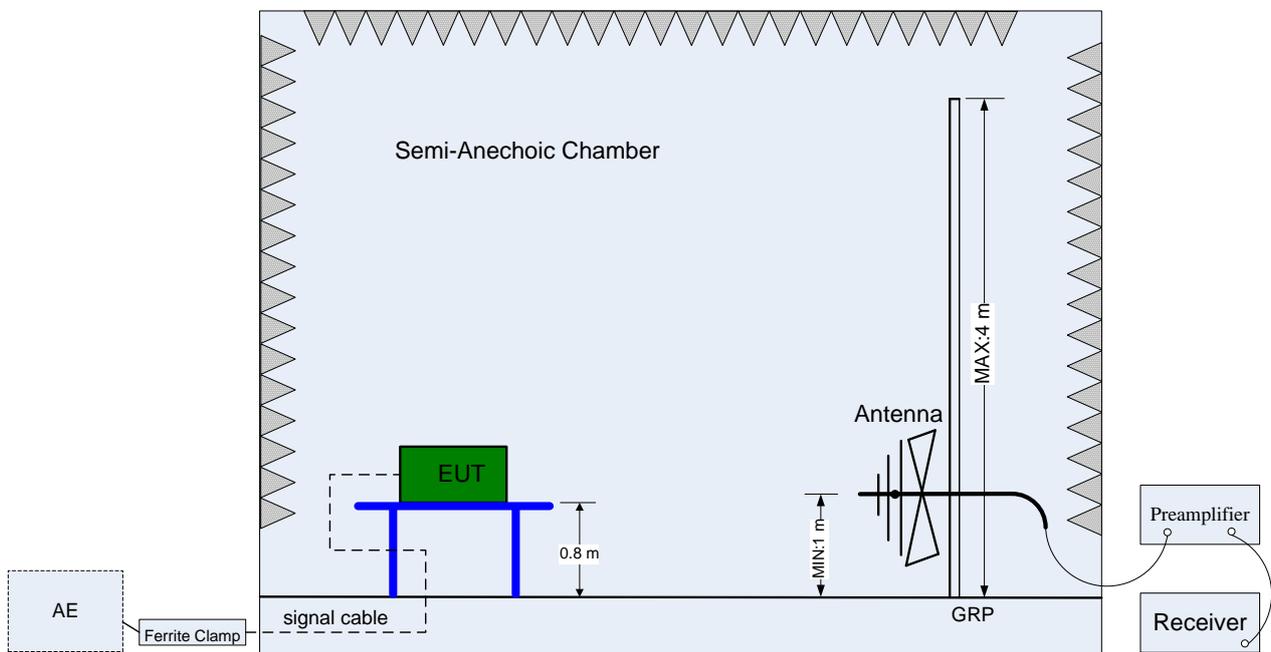


Figure 5. Test set-up of radiated disturbance (30 MHz-1 GHz)

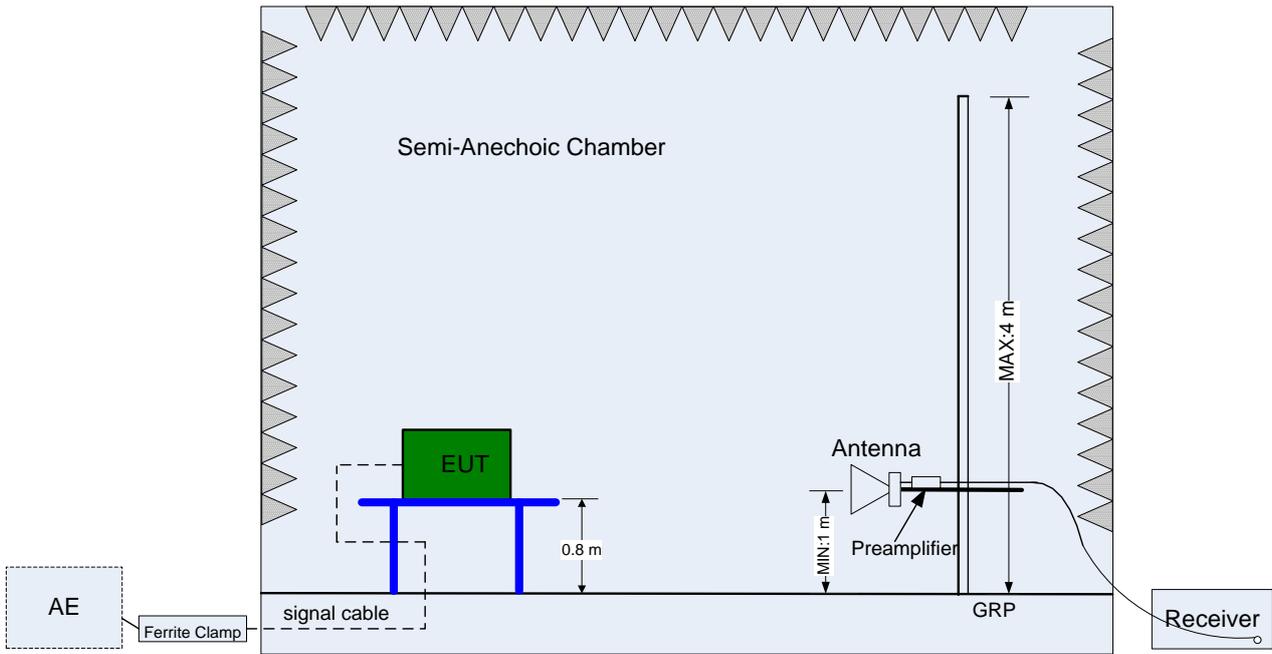


Figure 6. Test set-up of radiated disturbance (above 1 GHz)

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 6 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 7 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

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:

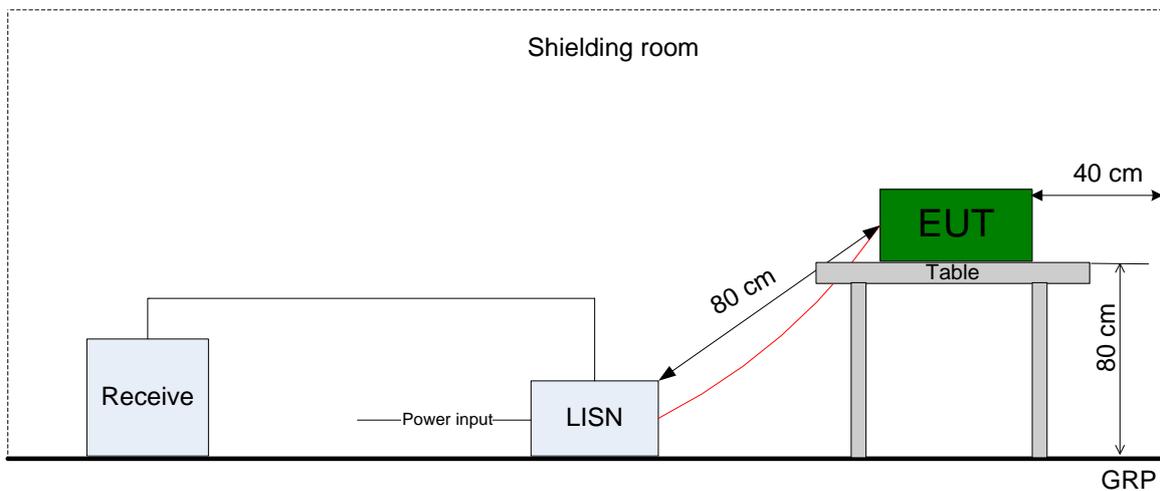


Figure 7. Test set-up of conducted disturbance for power port

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 8 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 9 Main test instrument

Test Item	Test Instrument	Model	Manufacturer	Calibration Date	Calibration Interval (Month)
Radiated emission	EMI test receiver	ESU40	R&S	2012-05-14	12
	Bilog antenna	CBL 6112B (2747)	Schaffner	2012-01-13	12
	Horn antenna	HF906	R&S	2012-03-24	12
	Chamber _NSA	3m chamber	Albatross	2011-03-02	24
Conducted emission	EMI test receiver	ESCI	R&S	2012-05-14	12
	Artificial mains network	ENV4200	R&S	2012-05-14	12
Software Information					
	Test Item	Software Name	Manufacturer	Version	
	Radiated emission	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 10 System measurement uncertainty

Items		Extended Uncertainty
Radiated emission	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

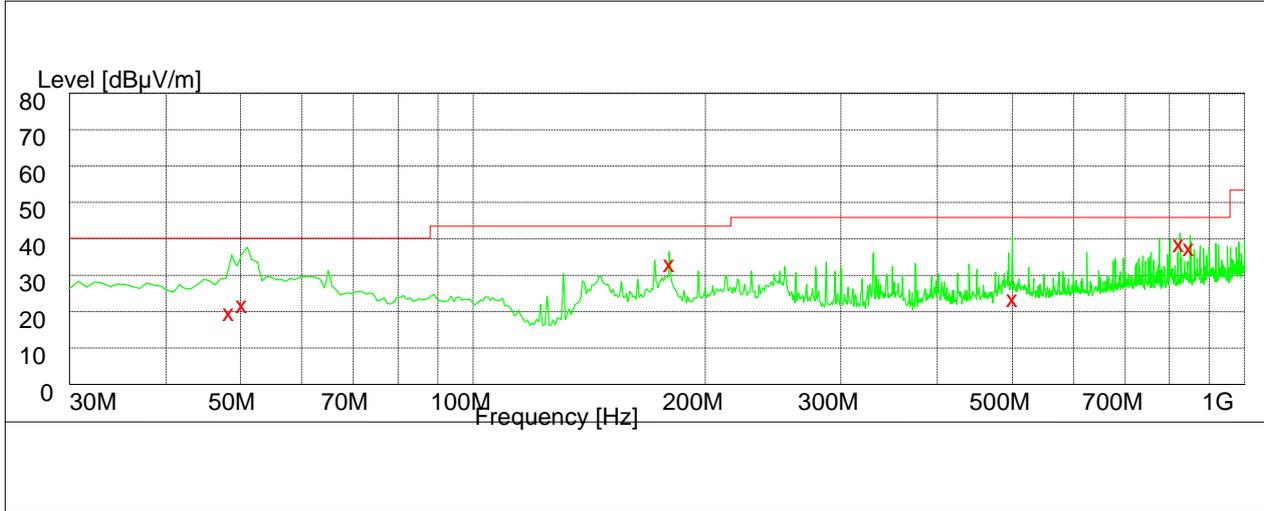


8 Graph and Data of Emission Test

8.1 Radiated Disturbance

8.1.1 Radiated Disturbance for FCC Part 15

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
48.480000	21.60	-15.0	40.0	18.4	158.0	86.00	VERTICAL
50.460000	24.00	-15.7	40.0	16.0	100.0	82.00	VERTICAL
180.240000	35.20	-13.0	43.5	8.3	200.0	20.00	HORIZONTAL
501.720000	25.80	-4.5	46.0	20.2	106.0	120.00	VERTICAL
825.000000	40.60	0.5	46.0	5.4	100.0	46.00	HORIZONTAL
850.020000	39.50	0.9	46.0	6.5	101.0	209.00	HORIZONTAL

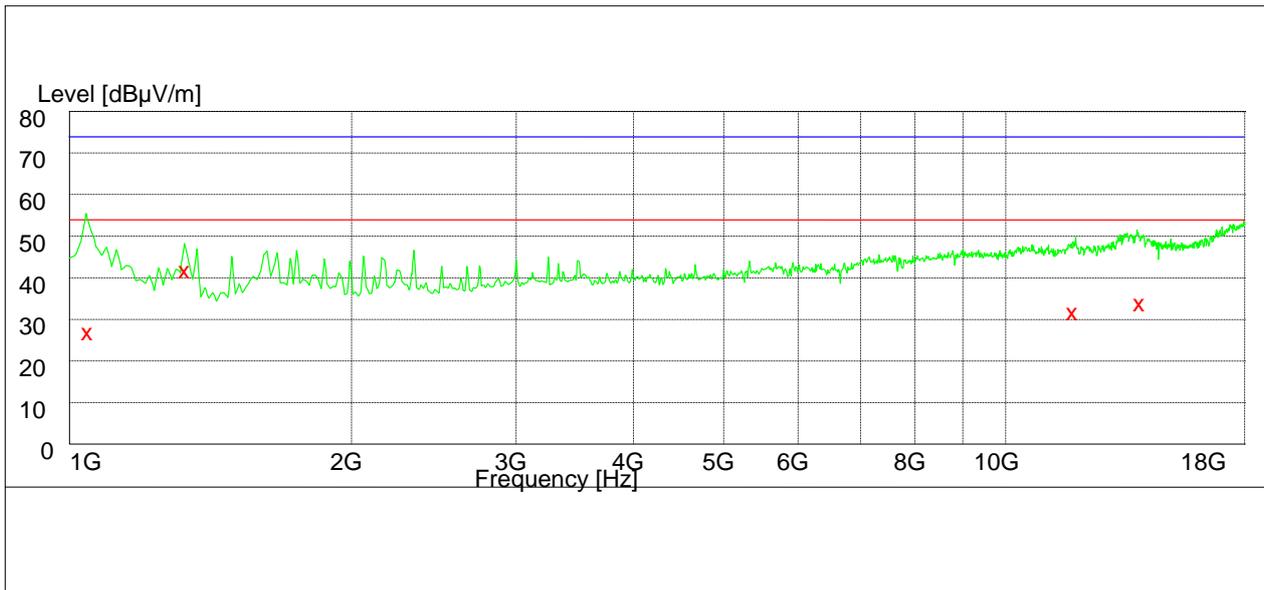
Notes:

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.



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
1049.392000	28.60	-6.6	53.9	25.3	100.0	288.00	HORIZONTAL
1333.136000	43.50	-5.0	53.9	10.4	150.0	93.00	VERTICAL
11829.700000	33.40	14.8	53.9	20.5	149.0	320.00	HORIZONTAL
13937.588000	35.50	21.5	53.9	18.4	150.0	122.00	VERTICAL

Notes:

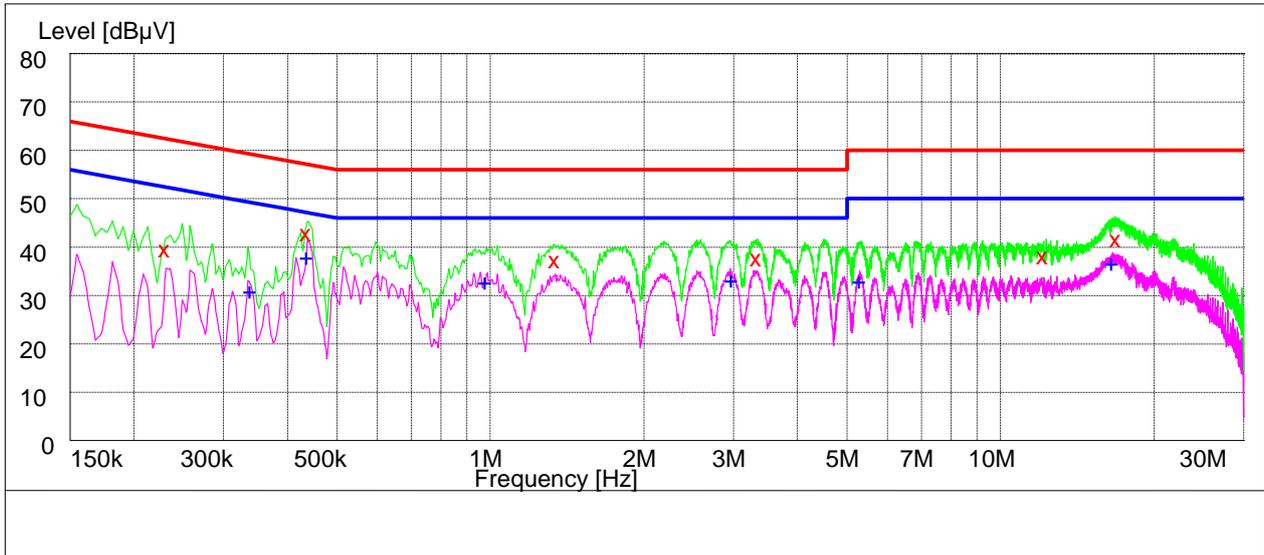
Level =Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)

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



Measurement Result: QP Detector

Frequency (MHz)	Level (dBµV)	Transd (dB)	Limit (dBµV)	Margin (dB)	Line	PE
0.231000	40.80	9.9	62	21.6	L3	FLO
0.438000	44.00	9.9	57	13.1	L3	FLO
1.342500	38.50	9.9	56	17.5	N	FLO
3.345000	38.80	10.0	56	17.2	N	FLO
12.178500	39.20	10.4	60	20.8	N	FLO
16.948500	42.70	10.6	60	17.3	L3	FLO

Measurement Result: AV Detector

Frequency (MHz)	Level (dBµV)	Transd (dB)	Limit (dBµV)	Margin (dB)	Line	PE
0.339000	32.10	9.9	49	17.1	N	FLO
0.438000	39.10	9.9	47	8.0	N	FLO
0.978000	33.90	9.8	46	12.1	N	FLO
2.985000	34.20	10.0	46	11.8	N	FLO
5.298000	34.10	10.3	50	15.9	N	FLO
16.543500	37.90	10.6	50	12.1	N	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 11 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