EMC Test Report

Product Name: **Enterprise Gateway**

Product Model: **eSpace EGW1500E**

Report Number: **SYBH (E)00637997EB**

Reliability Laboratory of Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
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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 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-2364, G-415, C-2583, and T-256, and the accreditation numbers of test site No.2 are R-3760, G-485, C-4210 and T-1237.
6. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
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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 EGW1500E
Version:	V100R001
Date of Receipt Sample:	2012-06-26
Start Date of Test:	2012-07-01
End Date of Test:	2012-07-11
Test Result:	Pass

Approved by Senior Engineer:	2012-07-18	Zhang Xinghai	Zhang Xing hai
	Date	Name	Signature
Prepared by:	2012-07-18	Lu Wei	Lu Wei
	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:2011 ICES-003:2004
Test Method:	ANSI C63.4:2003 CAN/CSA-CEI/IEC CISPR 22:02

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℃
Relative Humidity:	45-55%
Atmospheric Pressure:	101kPa

2 Summary of Test Results

Table 1 Summary of test results

EUT Classification:
Class B Digital Device

Test Items	Test Configuration	Limit	Test Result	Location
Radiated Emissions Enclosure Port	TC1	Class B	Pass	Location1
Conducted Emissions ☐DC Power Port ☒AC Power Port	TC1	Class B	Pass	Location1

Note:
1, Measurement taken is within the uncertainty of measurement system.
2, TC = Test configuration
3, ☒ The item has been tested; ☐ The item has not been tested.

3 Equipment Specification

3.1 General Description

Huawei Enterprise Gateway 1500E (eSpace EGW1500E) can access multiple services. Integrating applications such as voice, data, and broadband connection, the eSpace EGW1500E provides an abundant and complete access solution. This releases users from buying and installing a larger number of devices. Therefore, the eSpace EGW1500E becomes an optimal choice for small enterprises to establish integrated office network.
The eSpace EGW1500E provides users with comprehensive access services of high performance.

Network side

The eSpace EGW1500E uses the Asymmetric Digital Subscriber Line (ADSL) or Wide Area Network (WAN) port to connect to the IP network, which adapts to various networks. When the ADSL or WAN port failed to connect to the IP network, users can connect the High Speed Packet Access (HSPA) network adapter using a USB port and access the 3G network in wireless mode. This assures users of high-speed and reliable network services.

User side

The eSpace EGW1500E provides Wireless Local Area Network (WLAN) and Local Area Network (LAN) ports. These ports connect terminals such as PCs, IP phones, LAN switches, and WiFi terminals to establish enterprise LAN network. In addition, the eSpace EGW1500E provides four Plain Old Telephone Service (POTS) ports for connecting POTS phones and fax machines. This makes the voice call and fax services available to enterprises. One FXO port is also provided. With this port, a voice service user can connect to the Public Switched Telephone Network (PSTN) network whether the eSpace EGW1500E is powered off or on.
The eSpace EGW1500E can function as a small IP PBX device to connect POTS phones, IP phones, Integrated Access Device (IADs), and multimedia soft terminals. By doing this, the eSpace EGW1500E enables voice functions inside enterprises and substitutes voice service users to register with the IMS/NGN network to achieve outer-office calls.

3.2 Specification

Table 2 Main equipment specification

Rated Input Voltage	EUT: ⎓ 12V Adapter: ～ 100V-240V(50/60Hz) (Adapter is Primary Power)
Rated Power	24W
Dimensions (W x D x H)	305mm (width) × 175 mm (depth) × 42mm (height)
Weight	1.5kg
Transmit Frequency	2.4GHz～2.4835GHz for 802.11n Band
Receive Frequency	2.4GHz～2.4835GHz for 802.11n Band
Maximum Output Power	18±2dBm
Frequency of the Internal Source	20M, 25M
Work frequencies	380K,333M,100M,10M,40M,6.25M

Figure 1. EUT Appearance

3.3 Board and SubAssembly

Table 3 Board list

Board		
Board Name	Hardware Version	Description
EG11MAUA	VER.A	Manufactured Board, EGW1500E, EG11MAUA, UPLINK: ADSL, FE, 3G(USB), PSTN. DOWNLINK : FE*8, WLAN, FXS*4

Table 4 Subassembly list

Subassembly			
Subassembly Name	Model	Manufacturer	Description
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) 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	Board	Length	Qty.	Type of Cable	Remark
AC Power port	/	EG11MAUA	2	1	Unshielded	
FE(WAN)	RJ45	EG11MAUA	10	1	UTP-5	outdoor signal port
FE(LAN)	RJ45	EG11MAUA	10	8	UTP-5	Indoor signal port
FXS	RJ11	EG11MAUA	10	4	2-core telephone Unshielded Cable	Indoor signal port
ADSL	RJ11	EG11MAUA	10	1	2-core telephone Unshielded Cable	outdoor signal port
PSTN	RJ11	EG11MAUA	10	1	2-core telephone Unshielded Cable	outdoor signal port
USB	/	EG11MAUA	/	1		

4.2 Auxiliary Equipment

Table 6 Auxiliary equipment

Equipment	Model	Manufacturer	S/N	Calibration Date	Calibration Interval (month)	Remark
DSLAM	MA5616	Huawei	21023520356 TA7000160	N/A	N/A	
Data network analyzer	Tesgine	Huawei	5306090619	2011-05-24	24	
Lien simulator	2km Simulator	Huawei	N/A	N/A	N/A	
PC	HP 2540p	HP	A101038556	N/A	N/A	
Telephone	HCD868	TCL	010Y0B206C 0912401956	N/A	N/A	
Telephone	HCD868	TCL	010Y0B206C 0912402308	N/A	N/A	
Telephone	HCD868	TCL	010Y0B206C 0912401467	N/A	N/A	
Telephone	HCD868	TCL	010Y0B206C 0912400149	N/A	N/A	

4.3 Test Configurations

The eSpace EGW1500E system was connected to ancillary in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).
There were one test configurations. TC1 were shown in the diagrams below:

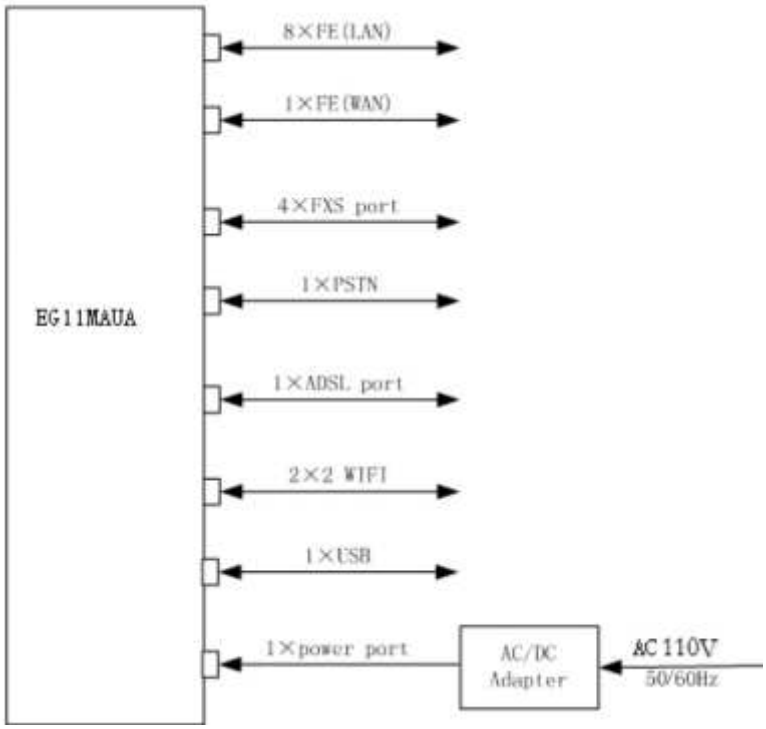


Figure 2. : Test Configuration1 (TC1)

4.4 Test Conditions and Connections

EGW enables the customer to connect their site to the Vodafone 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 4 FXS interfaces ports with RJ-11 connector. EGW supports IEEE802.11b/g/n standards and Wi-Fi IP Phone or PC access.
EGW includes 8 LAN ports (10M/100Mpbs) 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).

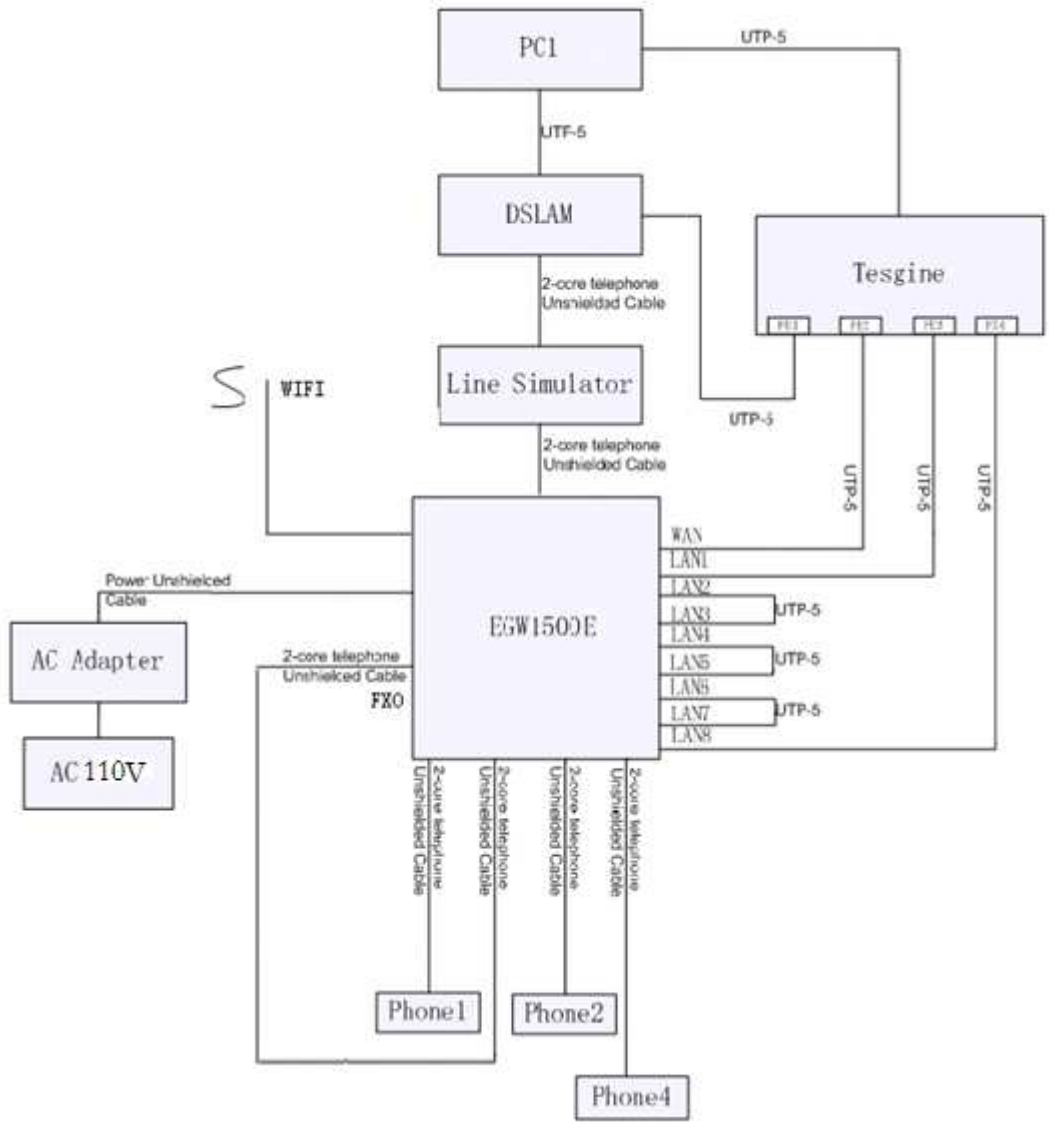


Figure 3. Test connection of TC1

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 and CAN/CSA-CEI/IEC CISPR 22

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 (30 MHz to1 GHz) and AV detector (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:

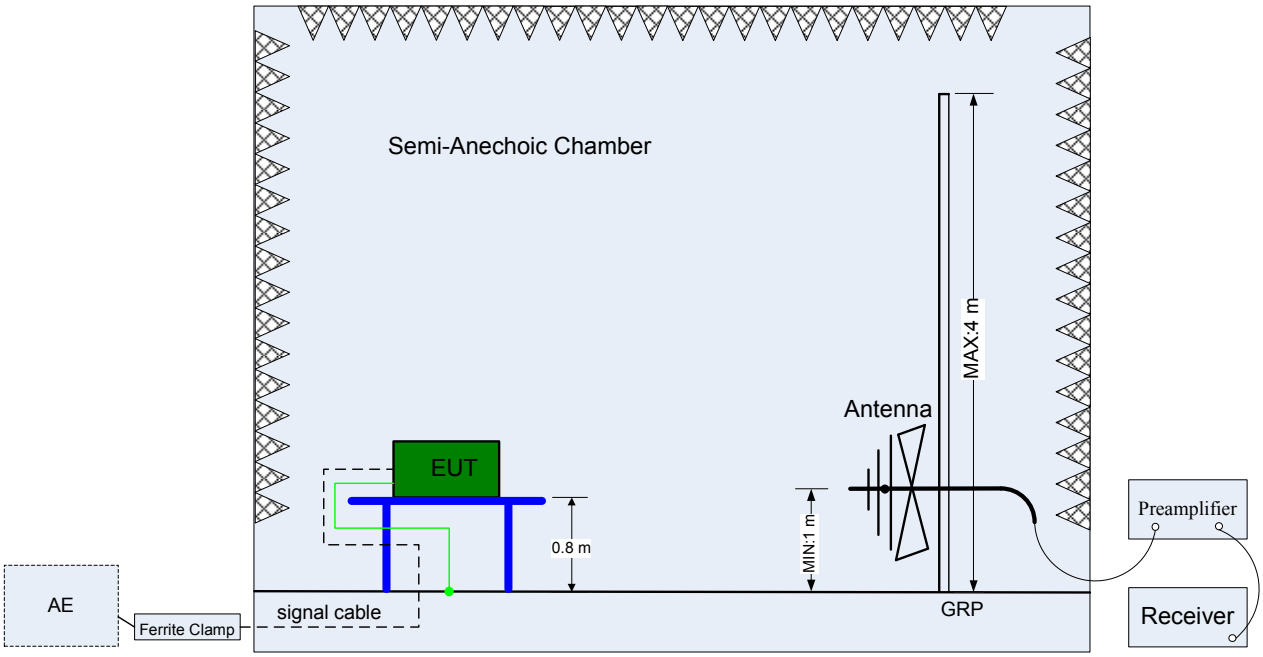


Figure 4. Test set-up of radiated disturbance (30 MHz-1 GHz)

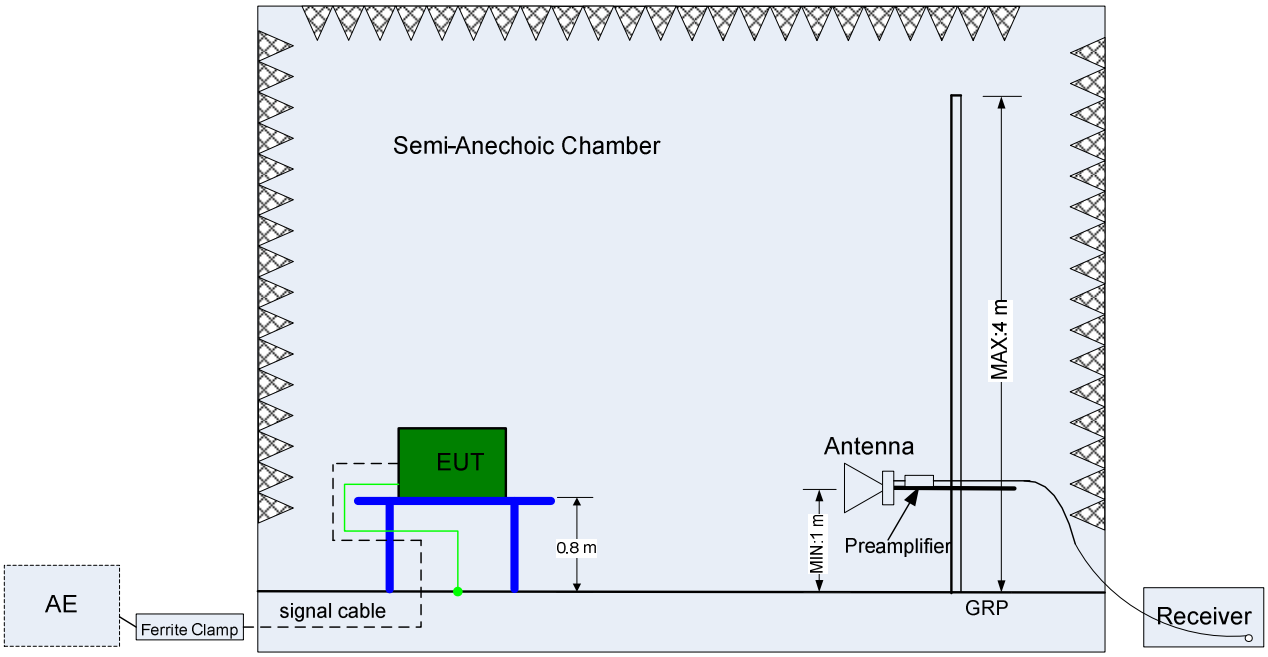


Figure 5. Test set-up of radiated disturbance (above 1 GHz)

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 7 Test Limits for FCC Part 15

Frequency range	30 MHz to 18 GHz
Measuring distance	3 m
Classification	Class B
Limits(Class B)	30 MHz to 88 MHz 40.0 dBµV/m 88 MHz to 216 MHz 43.5 dBµV/m 216 MHz to 960 MHz 46.0 dBµV/m 960 MHz to 18 GHz 53.9dBµV/m

Note: The highest frequency of the internal sources of the EUT is 333 MHz, the measurement was made up to 18 GHz.

Table 8 Test Limits for CAN/CSA-CEI/IEC CISPR 22

Frequency range	30 MHz to 1 GHz
Measuring distance	3 m
Classification	Class B
Limits(Class B)	30 MHz to 230 MHz 40 dBµV/m 230 MHz to 1 GHz 47 dBµV/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:

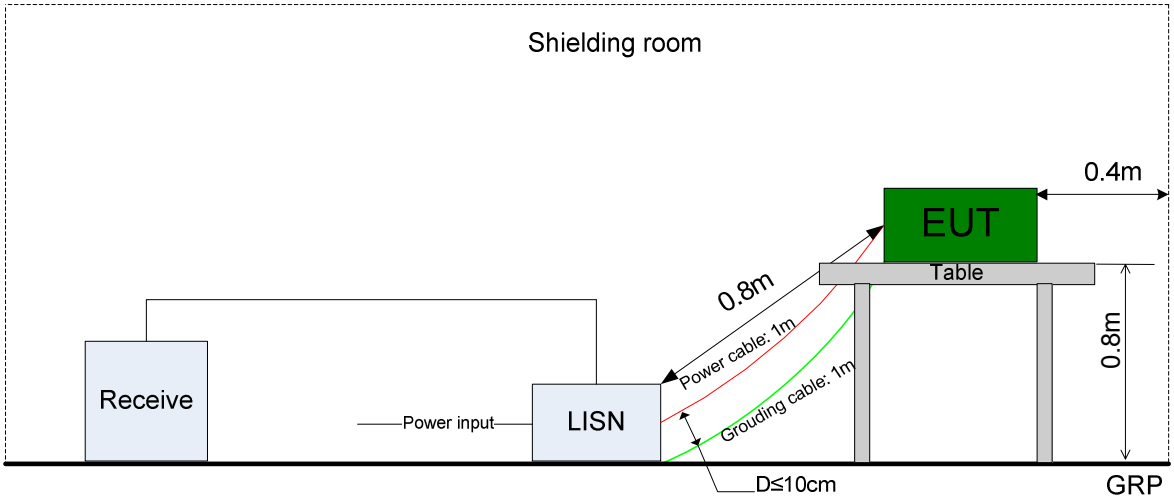


Figure 6. Test set-up of conducted disturbance for power port

5.2.2 Test Results

The EUT has met the requirements of FCC Part15 and CAN/CSA-CEI/IEC CISPR 22 for Conducted Disturbance of AC Power Port
For the test data, see section 8.2.

Table 9 Limits of AC power port

Frequency range	150 kHz to 30 MHz	
Classification	Class B	
Limit(Class B)	Voltage limits (dBµV)	
	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 10 Main test instrument

Test Item	Test Instrument	Model	Manufacturer	Calibration Date	Calibration Interval (Month)
Radiated emission (G2 3m chamber)	EMI test receiver	ESU40	R&S	2012-05-14	12
	Bilog antenna	CBL 6112B (2536)	Schaffner	2012-01-13	12
	Horn antenna (1 to 18GHz)	HF906	R&S	2012-03-24	24
	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 11 System measurement uncertainty

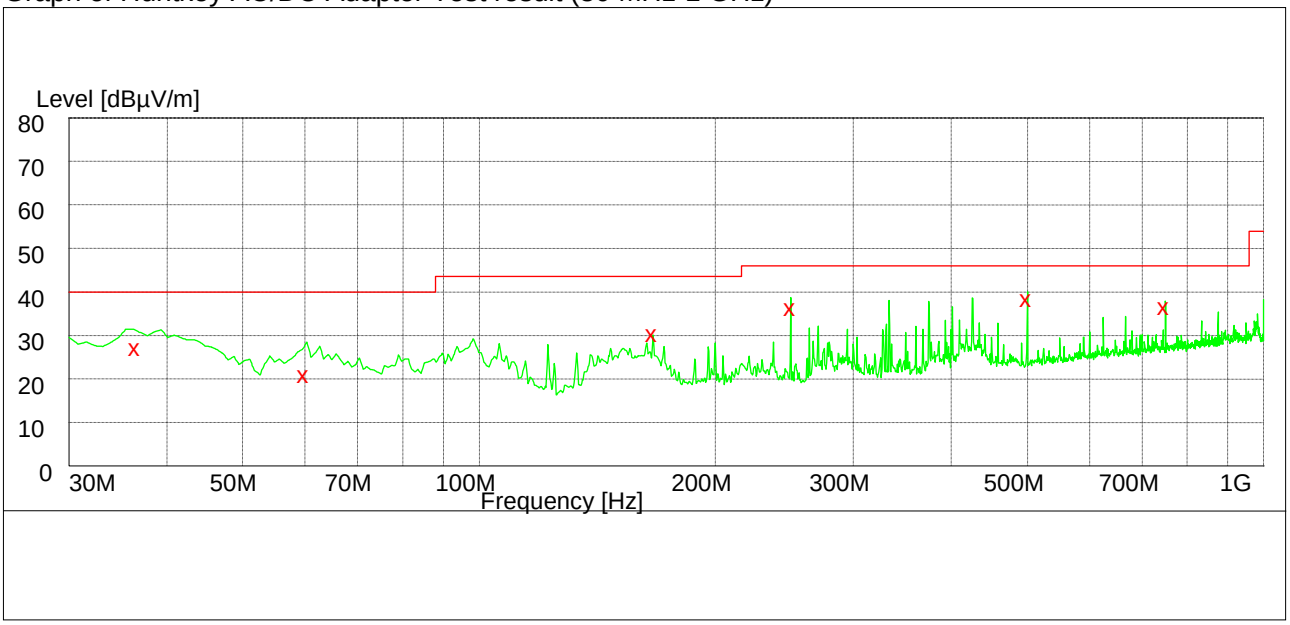
Items		Extended Uncertainty
Radiated emission (G2 3m chamber)	Field strength (dBμV/m)	U=4.15 dB; k=2 (30 MHz-1 GHz)
		U=3.64 dB; k=2 (1 GHz-18 GHz)
Conducted Emission	Disturbance Voltage (dBμV)	U=3.3 dB; k=2

8 Graph and Data of Emission Test

8.1 Radiated Disturbance

8.1.1 Radiated Disturbance of TC1 for FCC Part 15

Graph of Huntkey AC/DC Adapter Test result (30 MHz-1 GHz)

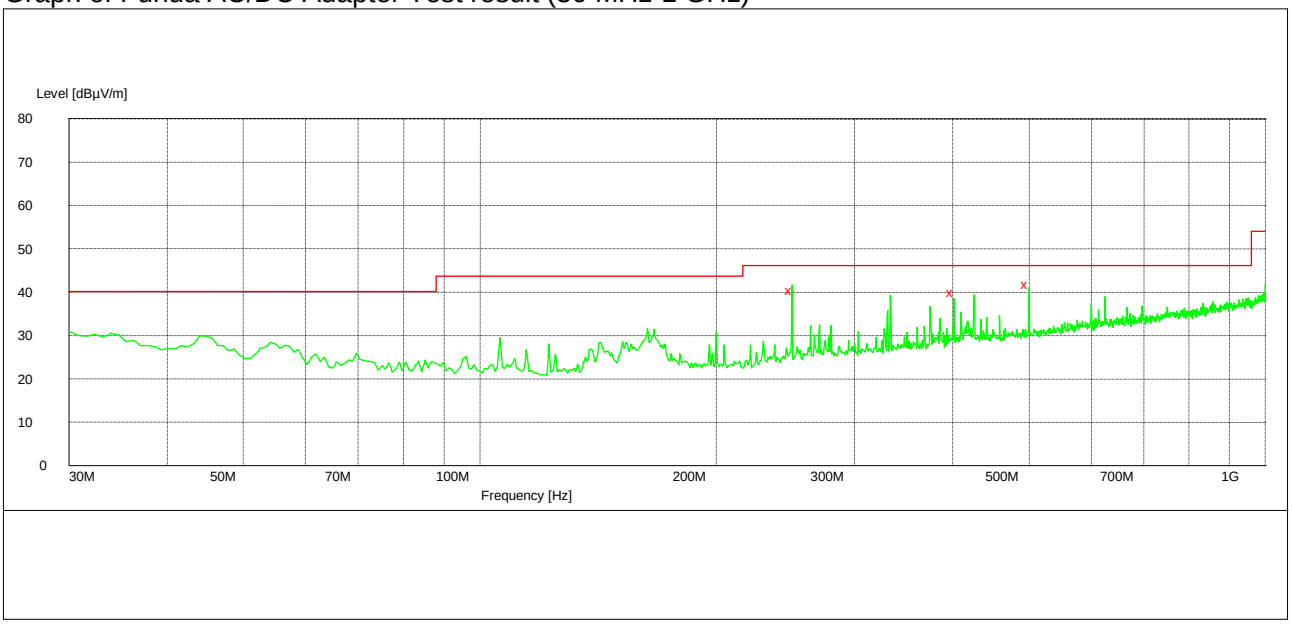


Measurement Result: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
36.540000	28.60	-7.2	40.0	11.4	100.0	76.00	VERTICAL
60.000000	22.40	-17.0	40.0	17.6	144.0	225.00	VERTICAL
166.680000	31.90	-11.0	43.5	11.6	150.0	185.00	HORIZONTAL
250.020000	37.80	-8.2	46.0	8.2	100.0	86.00	VERTICAL
499.980000	39.80	-3.2	46.0	6.2	199.0	14.00	HORIZONTAL
750.000000	38.20	0.4	46.0	7.8	100.0	100.00	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 Fuhua AC/DC Adapter Test result (30 MHz-1 GHz)

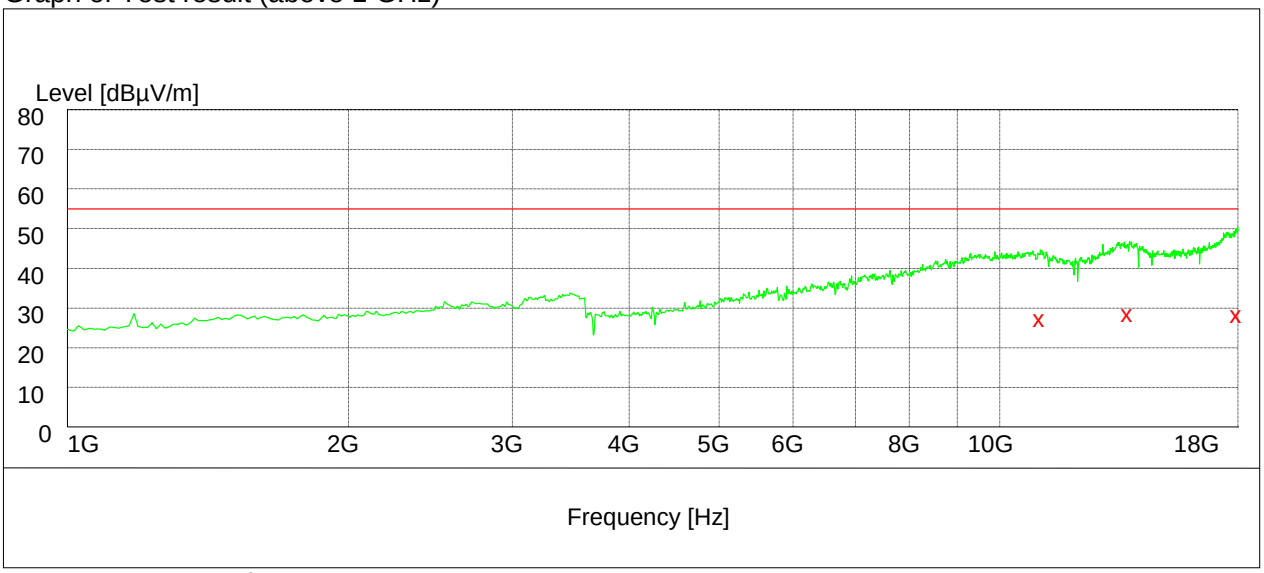


Measurement Result: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
250.020000	40.50	-8.2	46.0	5.5	109.0	360.00	HORIZONTAL
401.400000	40.10	-4.2	46.0	5.9	100.0	23.00	HORIZONTAL
499.980000	41.80	-3.2	46.0	4.2	200.0	0.00	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)

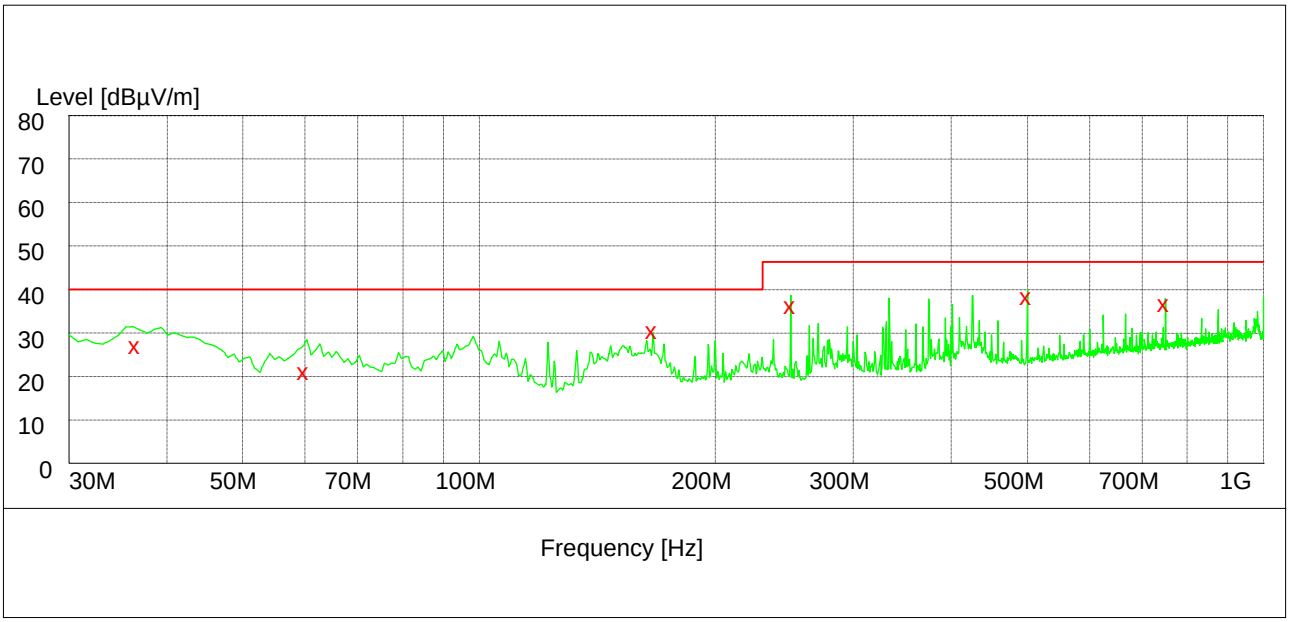


Measurement Result: AV Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
11059.000000	29.00	10.3	53.9	24.9	150.0	316.00	HORIZONTAL
13734.000000	30.40	17.6	53.9	23.5	144.0	262.00	VERTICAL
17986.500000	30.20	24.9	53.9	23.7	100.0	198.00	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.
The highest frequency of internal sources of the AC/DC adapter is less than 108 MHz, the different AC/DC adapter was not affect the test result of 1GHz-18 GHz.

8.1.2 Radiated Disturbance of TC1 for CAN/CSA-CEI/IEC CISPR 22



Measurement Result: QP Detector

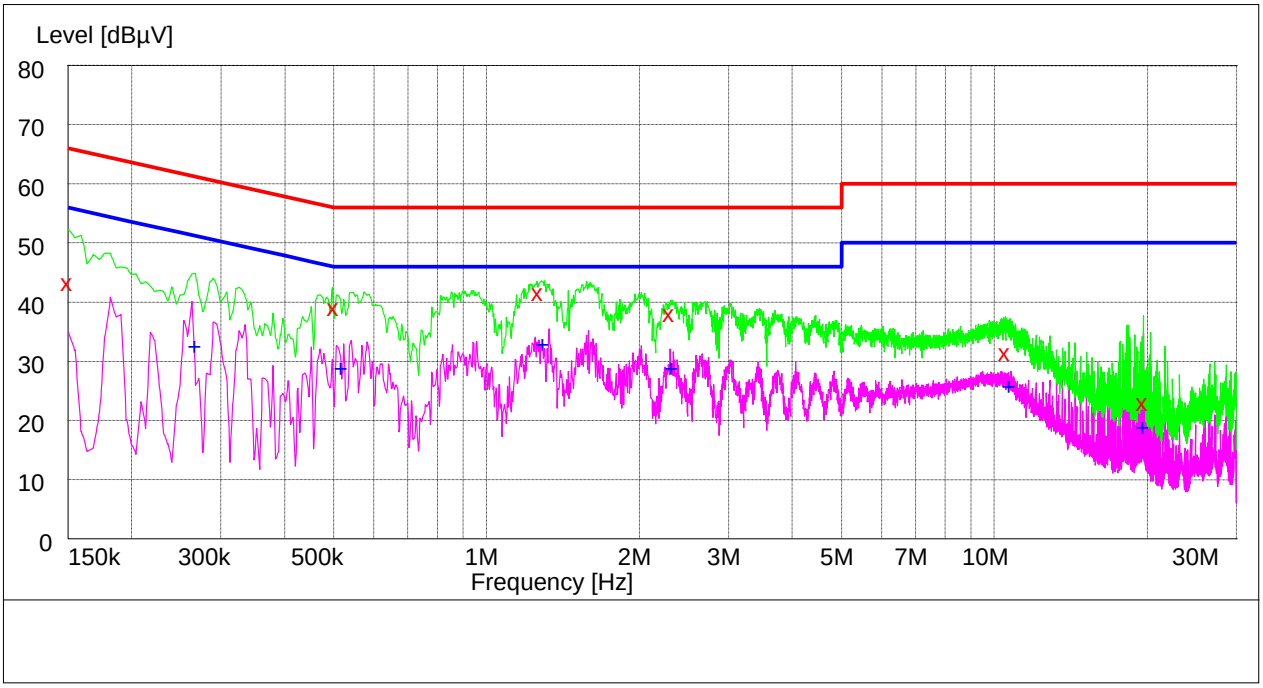
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
36.540000	28.60	-7.2	40.0	11.4	100.0	76.00	VERTICAL
60.000000	22.40	-17.0	40.0	17.6	144.0	225.00	VERTICAL
166.680000	31.90	-11.0	40.0	8.1	150.0	185.00	HORIZONTAL
250.020000	37.80	-8.2	47.0	9.2	100.0	86.00	VERTICAL
499.980000	39.80	-3.2	47.0	7.2	199.0	14.00	HORIZONTAL
750.000000	38.20	0.4	47.0	8.8	100.0	100.00	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.

8.2 Conducted Disturbance

8.2.1 AC Power Port Test Data

Huntkey AC/DC Adapter



Measurement Result: QP Detector

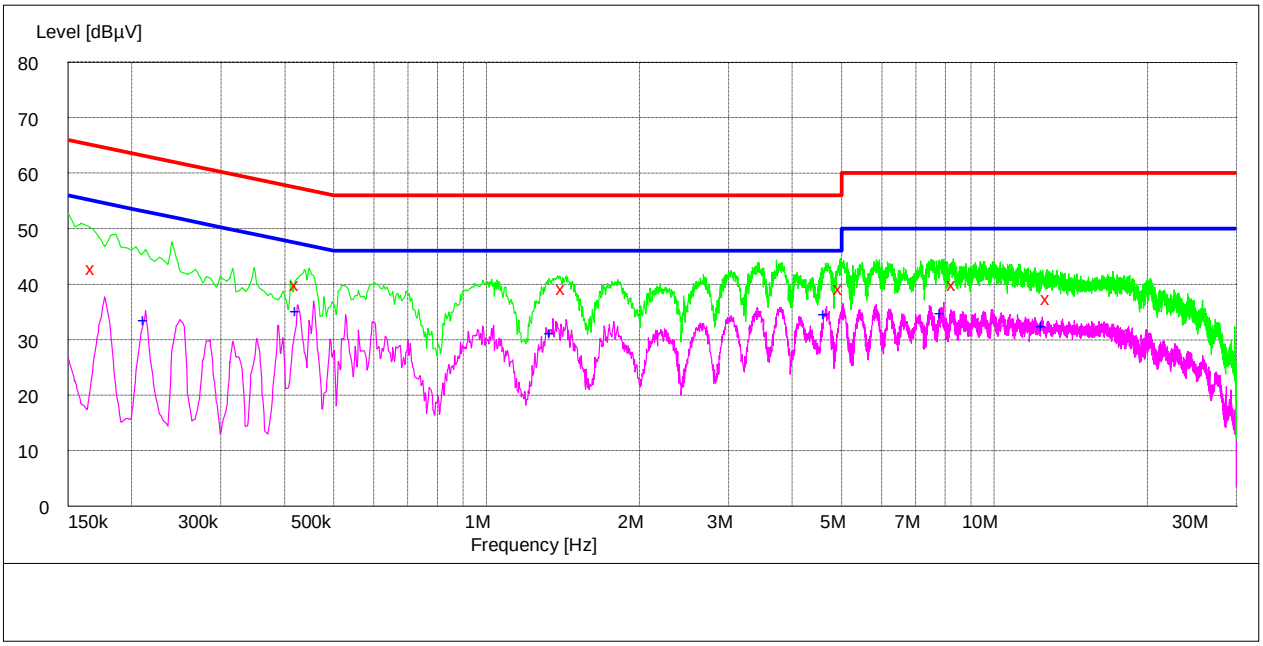
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.150000	43.90	9.9	66	22.1	L3	FLO
0.501000	39.70	9.9	56	16.3	N	FLO
1.270500	42.20	9.8	56	13.8	L3	FLO
2.301000	38.70	10.1	56	17.3	L3	FLO
10.563000	32.20	10.4	60	27.8	L3	FLO
19.711500	23.60	10.6	60	36.4	L3	FLO

Measurement Result: AV Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.267000	33.10	9.9	51	18.1	N	FLO
0.519000	29.50	9.9	46	16.5	N	FLO
1.293000	33.40	9.8	46	12.6	L3	FLO
2.323500	29.50	10.1	46	16.5	L3	FLO
10.729500	26.20	10.3	50	23.8	L3	FLO
19.711500	19.40	10.6	50	30.6	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.

Fuhua AC/DC Adapter



Measurement Result: QP Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.168000	43.10	9.9	65	22.0	L3	FLO
0.424500	40.20	9.9	57	17.2	N	FLO
1.419000	39.40	9.9	56	16.6	L3	FLO
4.987500	39.50	10.2	56	16.5	L3	FLO
8.326500	40.20	10.3	60	19.8	L3	FLO
12.768000	37.70	10.4	60	22.3	L3	FLO

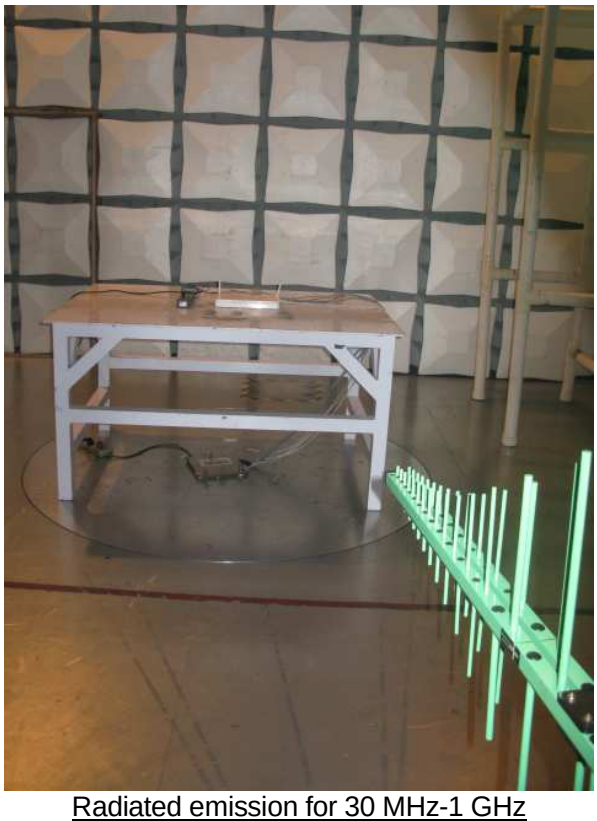
Measurement Result: AV Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.213000	33.80	9.9	53	19.3	N	FLO
0.424500	35.40	9.9	47	12.0	N	FLO
1.342500	31.40	9.9	46	14.6	L3	FLO
4.650000	34.80	10.2	46	11.2	N	FLO
7.885500	35.10	10.3	50	14.9	L3	FLO
12.475500	32.60	10.4	50	17.4	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 12 Abbreviation

Abbreviation	Full Name
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EUT	Equipment Under Test
AE	Auxiliary Equipment
AC	Alternate Current
NSA	Normalized Site Attenuation
LISN	Line Impedance Stabilization Network
TC	Test configuration
N/A	Not Applicable

END