

EMC Test Report

Product Name: Wireless LAN Access Point

Product Model: AP6010SN-GN

Report Number: SYBH (E) 005052012EB

Reliability Laboratory of Huawei Technologies Co., Ltd.

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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.
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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: Wireless LAN Access Point
Product Model: AP6010SN-GN
Version: V200R001

Date of Receipt Sample: 2012-04-12
Start Date of Test: 2012-04-13
End Date of Test: 2012-04-19

Test Result: Pass

Zhang Xinghai

Approved by Senior Engineer:	<u>2012-05-19</u>	<u>Zhang Xinghai</u>	
	Date	Name	Signature

Prepared by:	<u>2012-05-10</u>	<u>Lu Huan</u>	<u>Lu Huan</u>
	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 C63.4:2009
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°C
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
<u>Radiated Emissions</u> Enclosure Port	TC1,TC2	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, The item has been tested; The item has not been tested.

3 Equipment Specification

3.1 General Description

The AP6010SN is a standard indoor dual-band 2x2 MIMO access point (AP) that supports 2.4 GHz and 5 GHz frequency bands. It complies with IEEE 802.11a/b/g/n connects a large number of users, and works as a Fit AP. The AP6010SN has the following advantages:

- High reliability
- High security
- Simple network deployment
- Automatic AC discovery and configuration
- Real-time management and maintenance

The AP6010SN is recommended for use in buildings with a simple structure, small area, a high density of users, and require a high capacity, for example, small-scale meeting rooms, bars, and entertainment places. The AP6010SN APs can be flexibly deployed in these places and work in both Fit AP and bridge mode.

3.2 Specification

Table 2 Main equipment specification

Input Rated Voltage	Adatpter input: ~ 100 V to 240 V (50/60 Hz) Equipment input:  -12 V POE input:  -48 V
Rated Power (W)	13 W
Dimensions (W x D x H)	180 mm (W) x 180 mm (D) x 40 mm (H)
Weight (kg)	0.4 kg
Transmit Frequency (MHz)	WLAN 2.4G
Receive Frequency (MHz)	WLAN 2.4G
Maximum Output Power (dBm)	WLAN 2.4G:<36dBm
Frequency of the Internal Source (MHz)	40MHz; 25MHz; 125MHz;100MHz



Figure 1. EUT appearance



3.3 Board and SubAssembly

Table 3 Board list

Board		
Board Name	Hardware Version	Description
H86D2TD1D200	VER.C	Mainboard

Table 4 Subassembly list

Subassembly			
Subassembly Name	Model	Manufacturer	Description
AC/DC Adapter	HW-120200C1W	Fuhua	Input voltage: \sim 90-270 V/50-60 Hz Output voltage: --- +12 V, 2A
AC/DC Adapter	HKA02412020-1K	Huntkey	Input voltage: \sim 90-270 V/50-60 Hz 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
DC 12V port	DC JACK	2m	1	Unshielded
GE	RJ45	10m	1	USTP-5

4.2 Auxiliary Equipment

Table 6 Auxiliary equipment

Name	Model	Manufacturer	S/N	Cal Date	Cal Interval (month)
Access Controller	WS6603	Huawei	210235182910BB000017	N/A	N/A
POE SWITCH	S5300	Huawei	210235182910BB000017	N/A	N/A
Server	THINKPAD X201	LENOVO	A110409221	N/A	N/A
Sta (PC)	THINKPAD X61	LENOVO	3108040580	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, as shown in the following table and figures:

Table 7 Test configuration

Configuration No.	Configuration Description
TC1:	AC Adapter input
TC2:	PoE

4.4 Test Condition and Connection

4.4.1 Test Condition and Test Connection for TC1

In this connection, the AP functions as a Fit AP that provides only data forwarding functions. The Access Controller is responsible for user access, authentication, AP management, and configurations of security protocols, routing, and QoS. The sta is used as WLAN terminal user and Powered by +12VDC adapter.

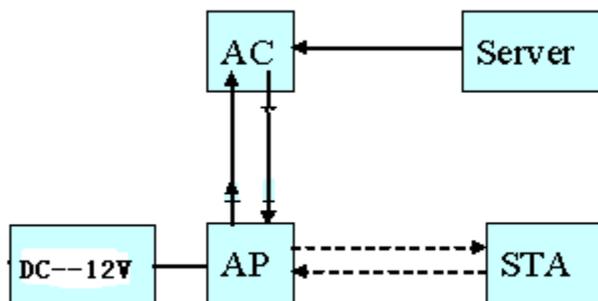


Figure 2. : Test Connection (TC1)

4.4.2 Test Condition and Test Connection for TC1

The AP functions as a Fit AP that provides only data forwarding functions. The Access Controller is responsible for user access, authentication, AP management, and configurations of security protocols, routing, and QoS. The STA is used as WLAN terminal user and Powered by POE

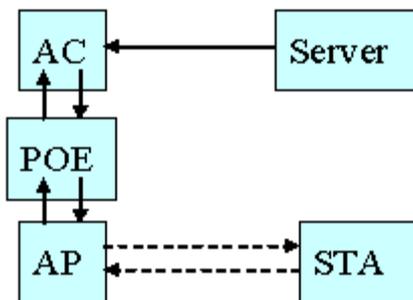


Figure 3. : Test Connection (TC2)

5 Details of Test Items

5.1 Radiated Emission 30 MHz to 4 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 4 GHz by using test script of software; the emissions were measured using Quasi-Peak Detector (30 MHz to 1 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:

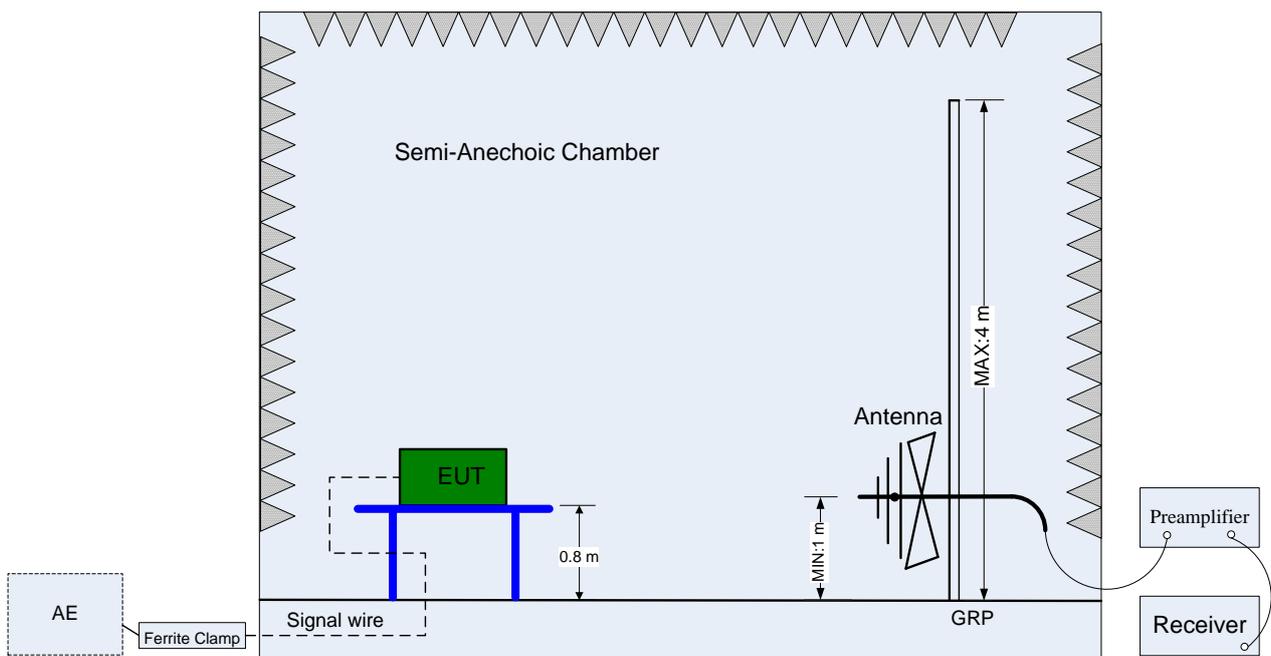


Figure 4. Test set-up of radiated disturbance (30 MHz-1 GHz)

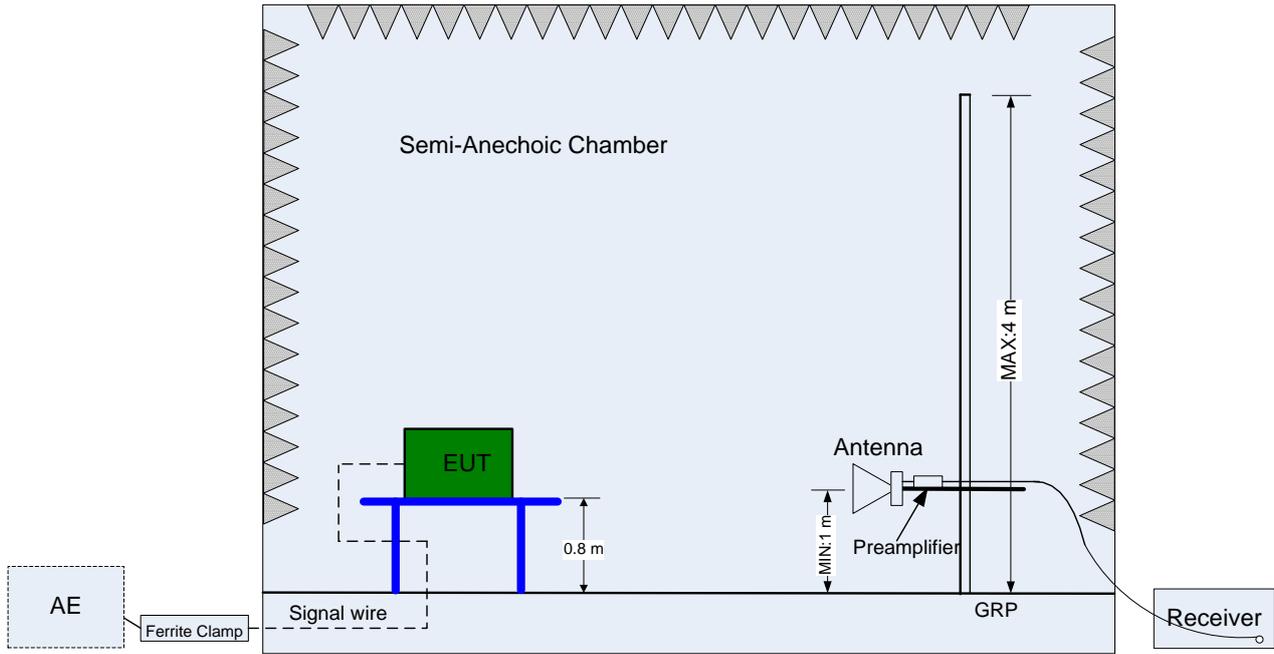


Figure 5. Test set-up of radiated disturbance (above 1 GHz)

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 8 Test Limits for FCC Part 15

Frequency range	30 MHz to 4 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 4 GHz	53.9dB μ V/m

Note: The highest frequency of the internal sources of the EUT is 125MHz, the measurement was made up to 4GHz.

Table 9 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 dB μ V/m
	230 MHz to 1 GHz	47 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:

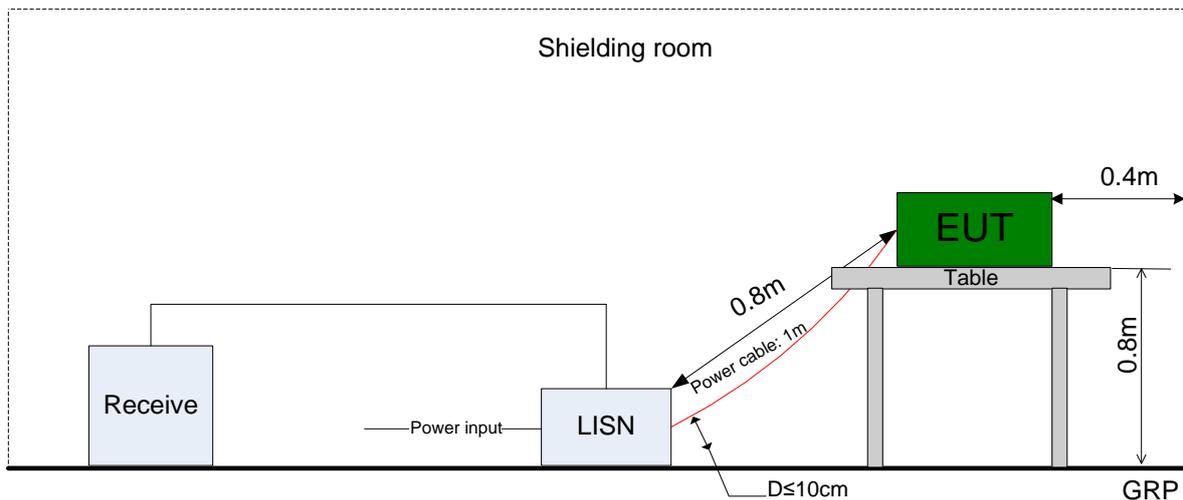


Figure 6. Test set-up of conducted disturbance for power port

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 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	EMI test receiver	ESU40	R&S	2011-05-05	12
	Bilog antenna	CBL 6112B (2941)	Schaffner	2012-01-13	12
	Horn antenna	HF906	R&S	2011-05-08	12
	Chamber _NSA	3m chamber	Albatross	2011-03-02	24
Conducted emission	EMI test receiver	ESCI	R&S	2011-05-13	12
	Artificial mains network	ENV4200	R&S	2011-05-13	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 12 System measurement uncertainty

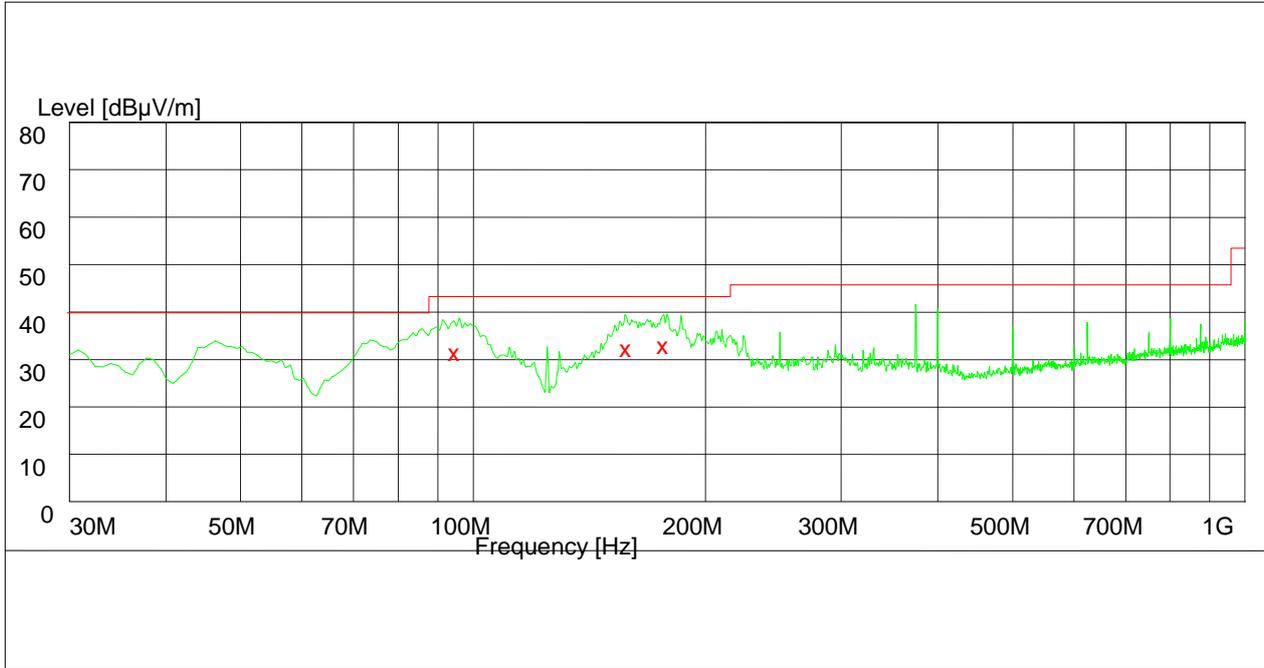
Items		Extended Uncertainty
Radiated Emission	Field strength (dB μ V/m)	U=4.15 dB; k=2 (30 MHz-1 GHz)
		U=3.64 dB; k=2 (1 GHz-4 GHz)
Conducted Emission	Disturbance Voltage (dB μ V)	U=3.3 dB; k=2



8 Graph and Data of Emission Test

8.1 Radiated Disturbance

8.1.1 Radiated Disturbance of TC1 for FCC Part 15



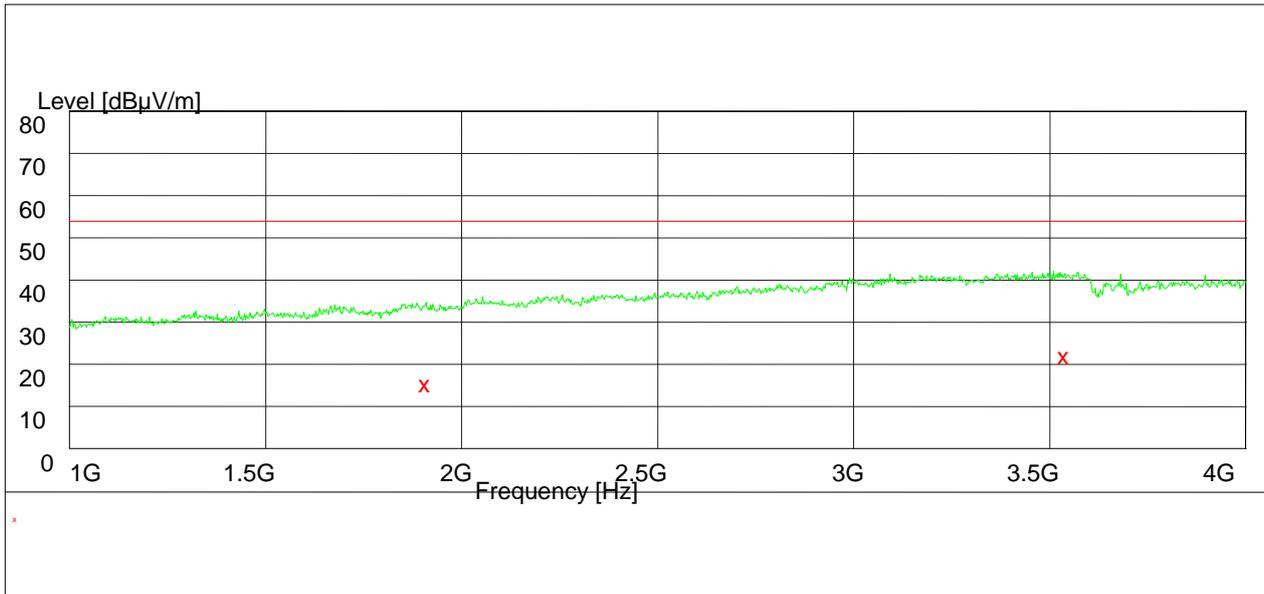
Graph of Test result (30 MHz-1 GHz)

Measurement Result: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
95.000400	34.2	-10.4	43.5	9.3	199.0	11.00	HORIZONTAL
158.331360	35.10	-9.7	43.5	8.4	176.0	152.00	HORIZONTAL
177.153840	35.60	-10.4	43.5	7.9	199.0	18.00	HORIZONTAL

Notes:

- 1, Both Fuhua and Huntkey Adapter were tested, and the worse test result is supplied.
- 2, 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

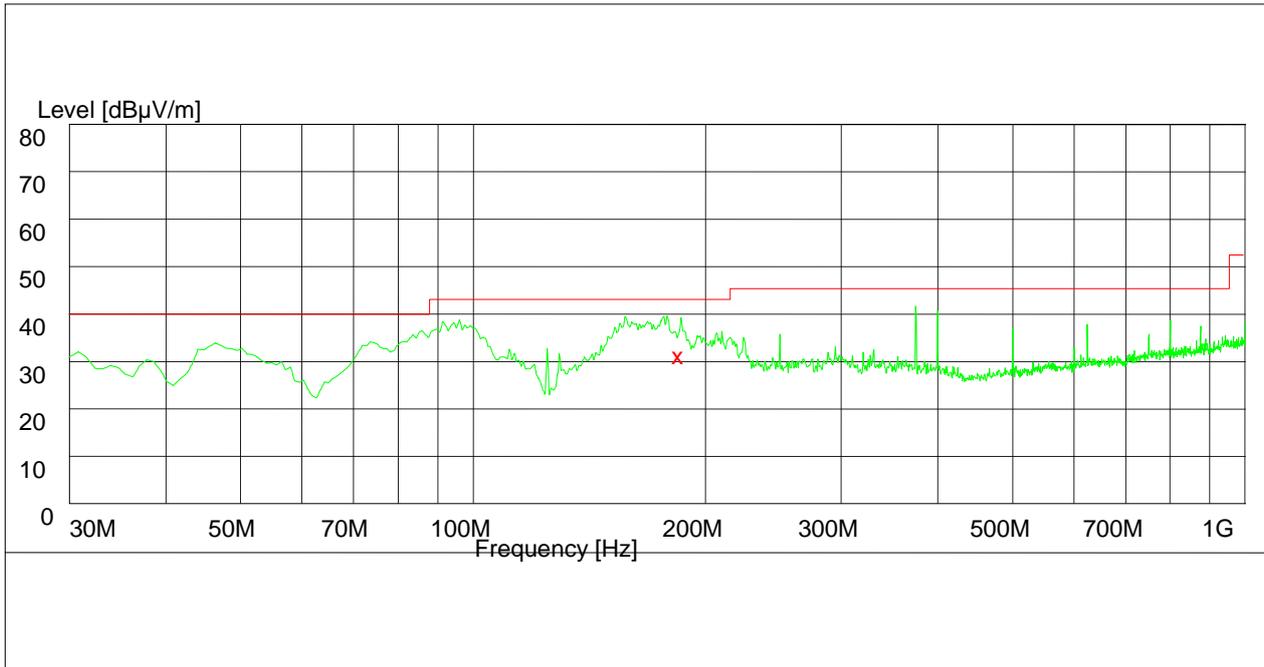
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
1909.500000	18.50	-2.0	53.9	35.4	135	38	HORIZONTAL
3539.000000	25.30	5.1	53.9	28.6	114.0	71.00	HORIZONTAL

Notes:

- 1, Both Fuhua and Huntkey Adapter were tested, and the worse test result is supplied.
 - 2, 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 FCC Part 15



(30GHz -1GHz)

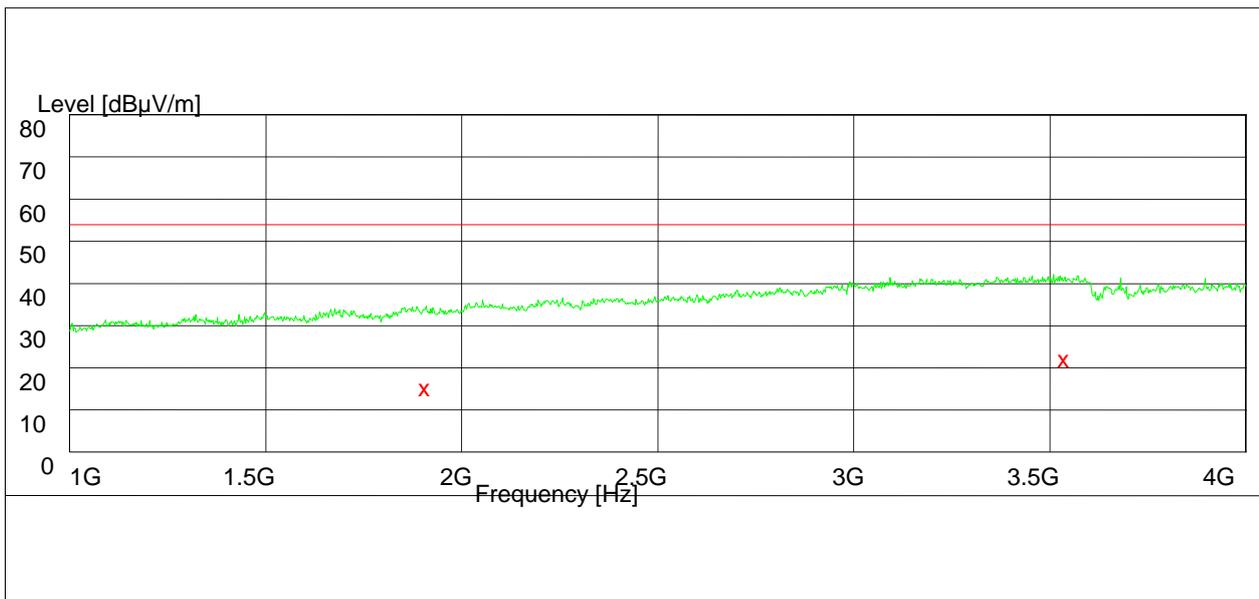
Measurement Result: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
185.016240	34.00	-10.7	43.5	9.5	150.0	28.00	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
1909.500000	18.50	-2.0	53.9	35.4	135.0	38.00	HORIZONTAL
3539.000000	25.30	5.1	53.9	28.6	114.0	71.00	HORIZONTAL

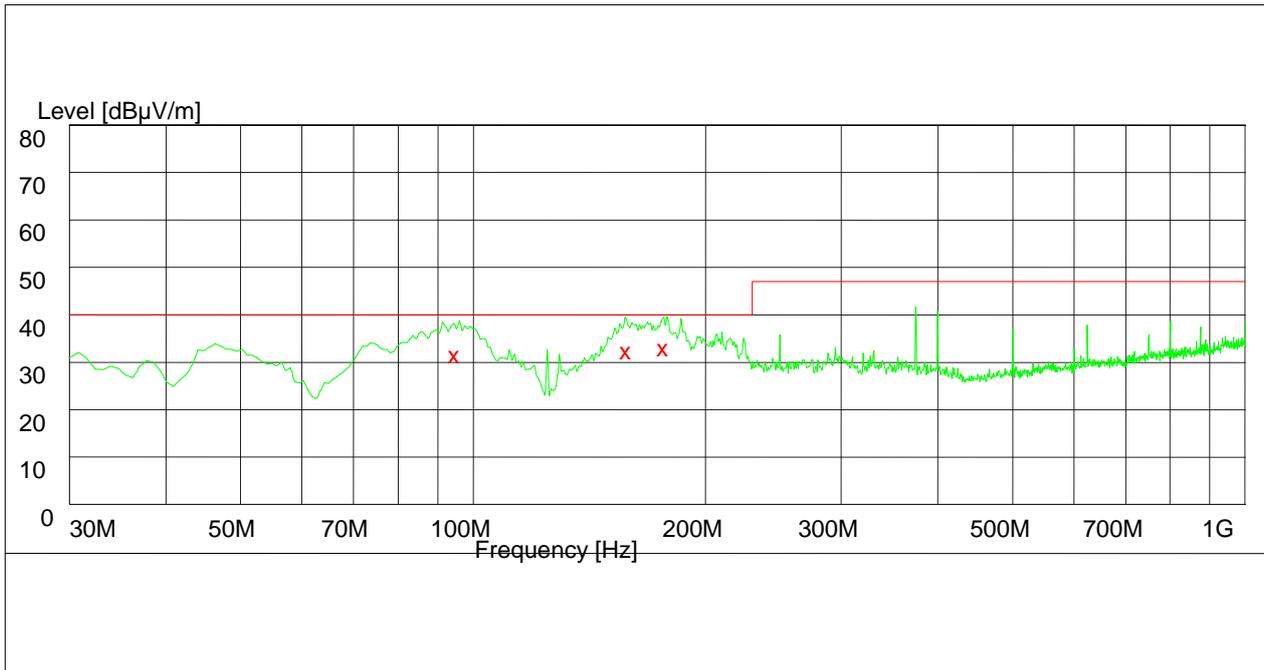
Notes:

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.



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



(30MHz-1GHz)

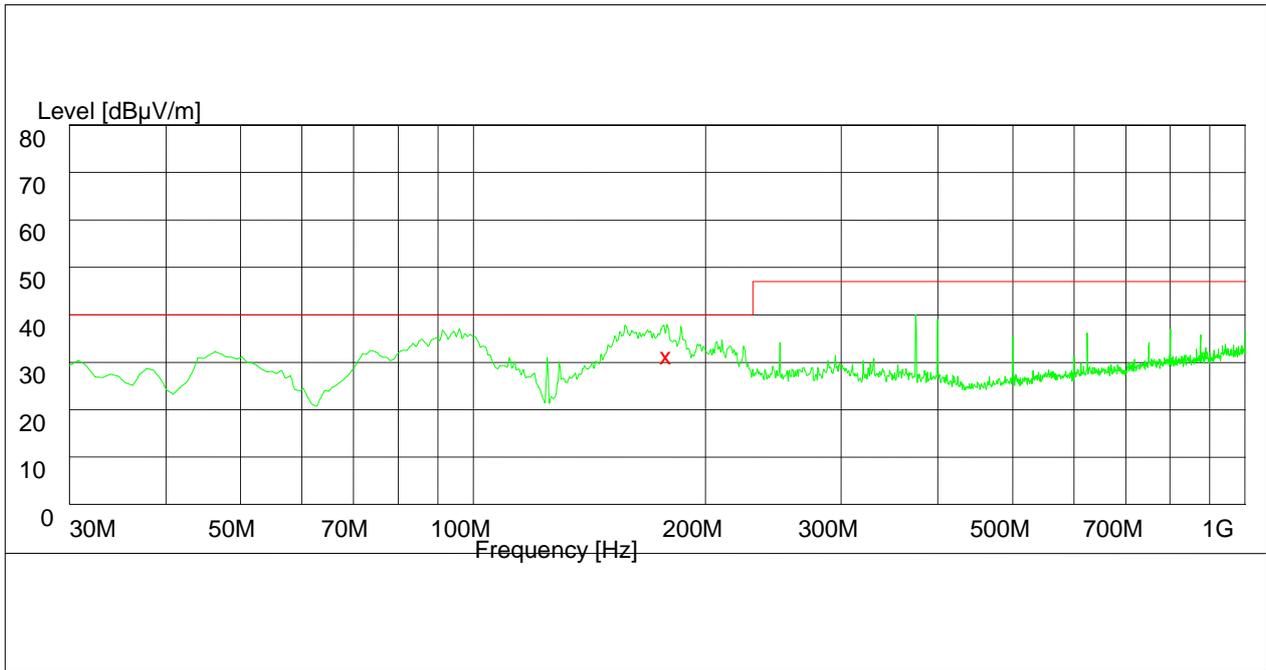
Measurement Result: QP Detector

Frequency (MHz)	Level (dBµV/m)	Transd (dB)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
95.000400	34.2	-10.4	40	5.8	199.0	11.00	HORIZONTAL
158.331360	35.10	-9.7	40	4.9	176.0	152.00	HORIZONTAL
177.153840	35.60	-10.4	40	4.4	199.0	18.00	HORIZONTAL

- 1,Both Fuhua and Huntkey Adapter were tested, and the worse test result is supplied.
 - 2,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.



8.1.4 Radiated Disturbance of TC2 for CAN/CSA-CEI/IEC CISPR 22



(30GHz -1GHz)

Measurement Result: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
185.016240	34.00	-10.7	40.0	6.0	150.0	28.00	HORIZONTAL

Notes:

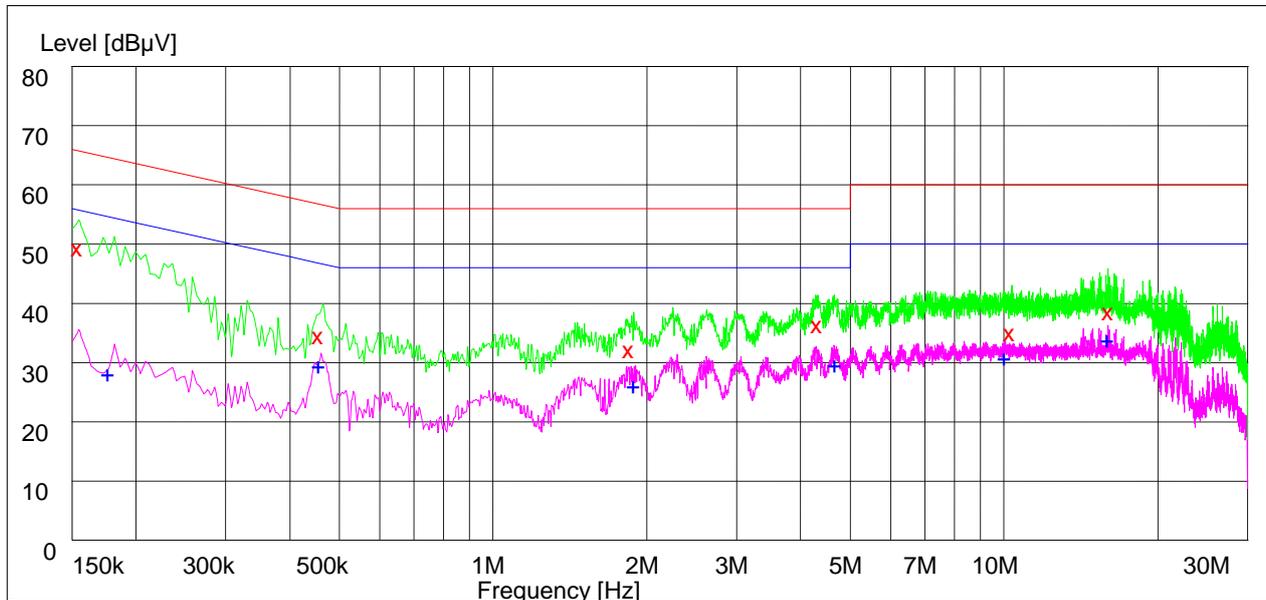
Level =Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)

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 (Fuhua Adapter)



Measurement Result: QP Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.154500	51.10	9.9	66	14.7	L3	---
0.456000	36.40	9.9	57	20.4	N	---
1.855500	34.00	10.0	56	22.0	L3	---
4.326000	38.10	10.2	56	17.9	L3	---
10.315500	36.80	10.5	60	23.2	N	---
16.102500	40.40	10.5	60	19.6	L3	---

Measurement Result: AV Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.177000	29.90	9.9	55	24.7	N	---
0.456000	31.30	9.9	47	15.5	L3	---
1.891500	27.80	10.0	46	18.2	L3	---
4.686000	31.50	10.2	46	14.5	N	---
10.063500	32.70	10.5	50	17.3	N	---
15.976500	35.60	10.5	50	14.4	L3	---

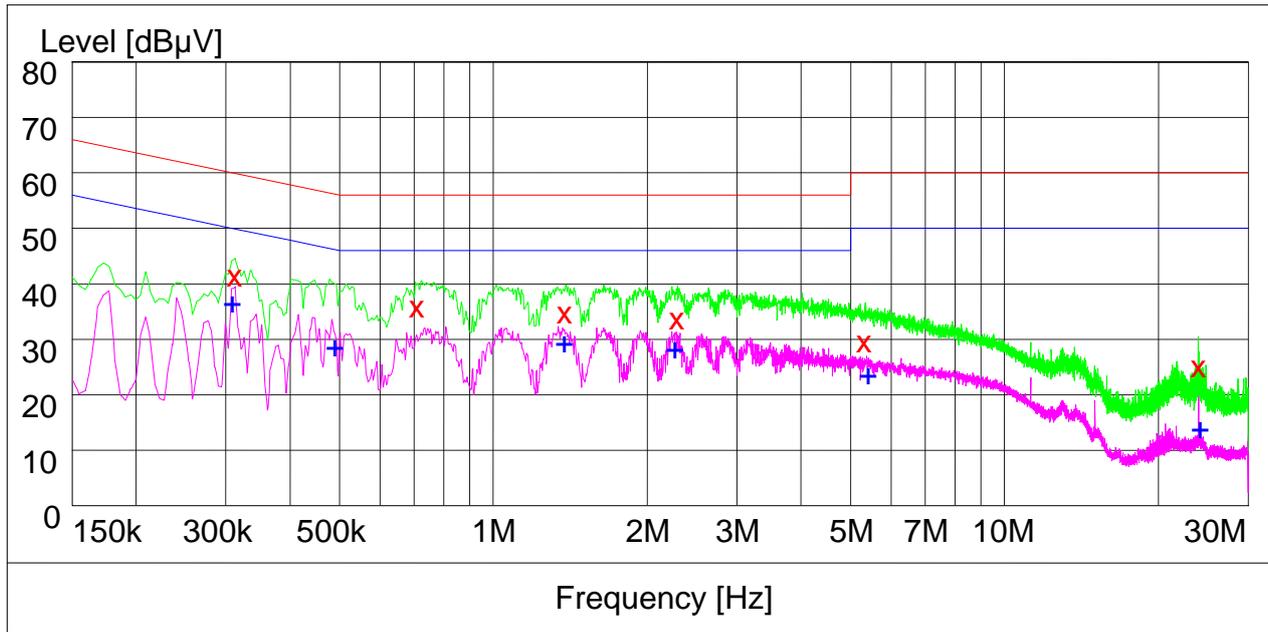
Notes:

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.



8.2.1 AC Power Port Test Data (Huntkey Adapter)



(Huntkey Adapter was used)

Measurement Result: QP Detector

Frequency (MHz)	Level (dBµV)	Transd (dB)	Limit (dBµV)	Margin (dB)	Line	PE
0.312000	43.50	9.9	60	16.4	N	---
0.708000	38.00	9.9	56	18.0	L3	---
1.378500	36.90	9.9	56	19.1	N	---
2.287500	35.90	10.1	56	20.1	L3	---
5.320500	31.80	10.3	60	28.2	L3	---
23.959500	27.20	10.8	60	32.8	N	---

Measurement Result: AV Detector

Frequency (MHz)	Level (dBµV)	Transd (dB)	Limit (dBµV)	Margin (dB)	Line	PE
0.307500	38.70	9.9	50	11.3	N	---
0.487500	30.80	9.9	46	15.4	N	---
1.369500	31.60	9.9	46	14.4	N	---
2.256000	30.50	10.1	46	15.5	L3	---
5.397000	25.80	10.3	50	24.2	L3	---
24.004500	16.10	10.8	50	33.9	N	---

Note:

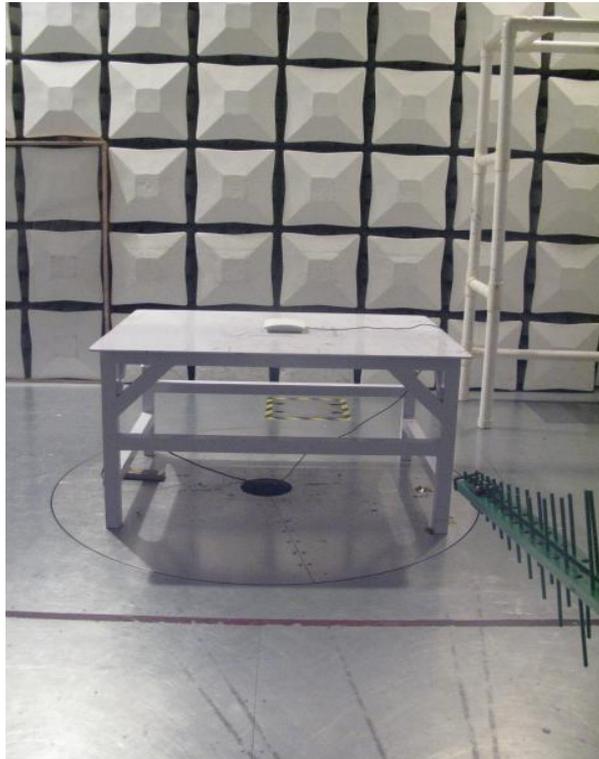
Level= Reading level+ Transd (cable loss + correction factor)

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 above 1 GHz



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

END