



EMC Test Report

Product Name: Wireless LAN Access Point
Wireless LAN Access Point
Outdoor WirelessLAN Access Point

Product Model: WA615DN-AGN
WA635SN-GN
WA655DN-AGN

Report Number: SYBH (E) 076052012EB

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 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.
7. The test report is invalid if there is any evidence of erasure and/or falsification.
8. The test report is only valid for the test samples.
9. 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 1: Wireless LAN Access Point
Product Model 1: WA615DN-AGN
Product Name 2: Wireless LAN Access Point
Product Model 2: WA635SN-GN
Product Name 3: Outdoor Wireless LAN Access Point
Product Model 3: WA655DN-AGN
Version: V200R001
Date of Receipt Sample: 2012-03-12
Start Date of Test: 2012-03-20
End Date of Test: 2012-04-19

Test Result: Pass

Approved by Senior Engineer: 2012-05-19 Zhang Xinghai
Date Name Signature

Zhang Xinghai

Prepared by: 2012-05-10 LuHuan
Date Name Signature

LuHuan



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	Boards 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	12
4.4	Test Condition and Connection	13
5	Details of Test Items	14
5.1	Radiated Emission 30 MHz to 4 GHz	14
5.2	Conducted Disturbance 0.15 MHz to 30 MHz	17
6	Main Test Instruments.....	19
7	System Measurement Uncertainty	20
8	Graph and Data of Emission Test	21
8.1	Radiated Disturbance for FCC Part 15.....	21
8.2	Radiated Disturbance for CAN/CSA-CEI/IEC CISPR 22.....	31
8.3	Conducted Disturbance.....	36
9	Photographs of Test Set-up for WA615DN-AGN	40
10	Photographs of Test Set-up for WA635SN-GN	41
11	Photographs of Test Set-up for WA655DN-AGN	43
	Appendix: Abbreviation.....	44



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-TC5	Class B	Pass	Location1
<u>Conducted Emissions</u> ☐ DC Power Port ☒ 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, ☒ The item has been tested; ☐ The item has not been tested.				

Table 2



3 Equipment Specification

3.1 General Description

The WA615DN 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 WA615DN has the following advantages:

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

The WA615DN 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 WA615DN APs can be flexibly deployed in these places and work in both Fit AP and bridge mode.

The WA635SN is a cost-efficient single-band AP that supports the 2.4 GHz frequency band and provides full power. It complies with IEEE 802.11a/b/g/n, and works as a Fit AP. The WA635SN has the following advantages:

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

The WA635SN is recommended on large-scale networks where users are distributed in a large area and an indoor distribution system is used, for example, office buildings, business buildings, hotels, airports, and bus stations. The WA635SN APs provide indoor wireless signal coverage in these scenarios.

The WA655DN is an outdoor dual-band access point (AP) that supports 2.4 GHz and 5 GHz frequency bands, and has enhanced coverage performance and protection capabilities. It supports wireless bridging, complies with IEEE 802.11a/b/g/n, connects a large number of users, and works as a Fit AP. The WA655DN has the following advantages:

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

The WA655DN is recommended for use in residential or commercial properties without wired resources. The WA655DN APs can be deployed at both ends of a commercial street or in the building opposite to a commercial property. The APs must be equipped with external antennas to implement wireless signal coverage.

Table 3 Specification Main equipment specification

Input Rated Voltage	Adatppter input: ~ 100 V to 240 V (50/60 Hz) (TC1,TC3) Equipment input: === -12 V(TC1,TC3) POE input: === -48 V(TC2,TC4,TC5)
Rated Power (W)	WA615DN-AGN: 13 W WA635SN-GN: 13 W WA655DN-AGN: 25 W
Dimensions (W x D x H)	WA615DN-AGN: 180 mm (W) x 180 mm (D) x 40 mm (H) WA635SN-GN: 150 mm (W) x 130 mm (D) x 35 mm (H) WA655DN-AGN: 270 mm (W) x 270 mm (D) x 85mm (H)
Weight (kg)	WA615DN-AGN: 0.4 kg WA635SN-GN: 0.6 kg WA655DN-AGN: 3kg
Transmit frequency	WLAN 2.4G WLAN 5G
Receive frequency	WLAN 2.4G WLAN 5G
Maximum output power	WA615DN-AGN: WLAN 5G: 5150~5250MHz <23dBm 5250~5350 MHz <23dBm 5470~5725 MHz <23dBm 5725~5825 MHz <36dBm WLAN 2.4G:<36dBm WA635SN-GN: WLAN 2.4G:<36dBm WA655DN-AGN: WLAN 5G: 5250-5350MHz <23dBm 5470-5725 MHz <23dBm 5725-5825 MHz <36dBm WLAN 2.4G:<36dBm
Frequency of the Internal Source (MHz)	40MHz; 25MHz; 125MHz;100MHz



Figure 1. EUT appearance (WA615DN-AGN)



Figure 2. EUT appearance(WA635SN-GN)



Figure 3. EUT appearance(TC5)



3.2 Boards and Subassembly

Table 4 Board list

Board		
Board Name	Hardware Version	Description
H86D2TD1D200	VER.C	Mainboard for WA615DN-AGN
H86D2TS5L200	VER.C	Mainboard for WA635SN-GN
H86D2TD5D200	VER.C	Mainboard for WA655DN-AGN

Table 5 Subassembly list

Subassembly			
Subassembly Name	Model	Manufacturer	Description
AC/DC Adapter	HW-120200C1W	Fuhua	input voltage: ~ 90-270 V/50-60 Hz Output voltage: --- +12 V, 2A
AC/DC Adapter	HKA024120 20-1K	Huntkey	Input voltage: ~ 90-270 V/50-60 Hz Output voltage: --- +12 V, 2A



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 6 Ports and cables

Port	Connector	Length	Qty.	Type of Cable
DC 12V port	DC JACK	2m	1	Unshielded(TC1,TC3)
GE	RJ45	10m	1	STP-5 for TC5
GE	RJ45	10m	1	UTP-5 for TC1-TC4
Earthing	OT	2m	1	Earth cable for TC3, TC4, TC5

4.2 Auxiliary Equipment

Table 7 Auxiliary equipment

Equipment	Model	Manufacturer	S/N	Calibration Date	Calibration 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 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 were five test configurations. TC1, TC2, TC3, TC4 and TC5 were shown in the following tables and figures:

Table 8 Test configuration

Configuration No.	Configuration Description
TC1:	WA615DN-AGN, AC Adapter input
TC2:	WA615DN-AGN, PoE Power supply
TC3:	WA635SN-GN, AC Adapter input
TC4	WA635SN-GN, PoE Power supply
TC5	WA655DN-AGN, PoE Power supply

4.4 Test Condition and Connection

4.4.1 Test Condition and Connection f for TC1 and TC3

In this connection, the AP functions as a Fit AP that provides only data forwarding functions. The Access Controller (AC) 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.

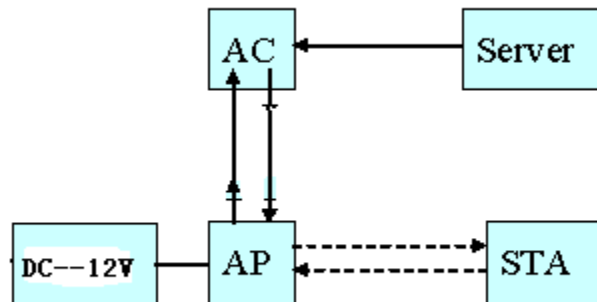


Figure 4. : Test Connection (TC1,TC3)

4.4.2 Test Condition and Connection for TC2, TC4 and TC5

The AP functions as a Fit AP that provides only data forwarding functions. The Access Controller (AC) 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

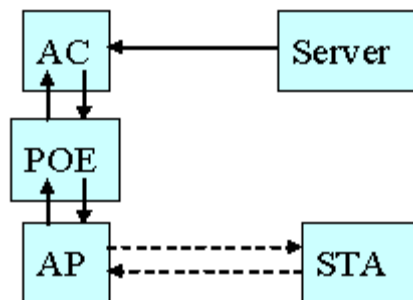


Figure 5. : Test Connection (TC2,TC4,TC5)

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:

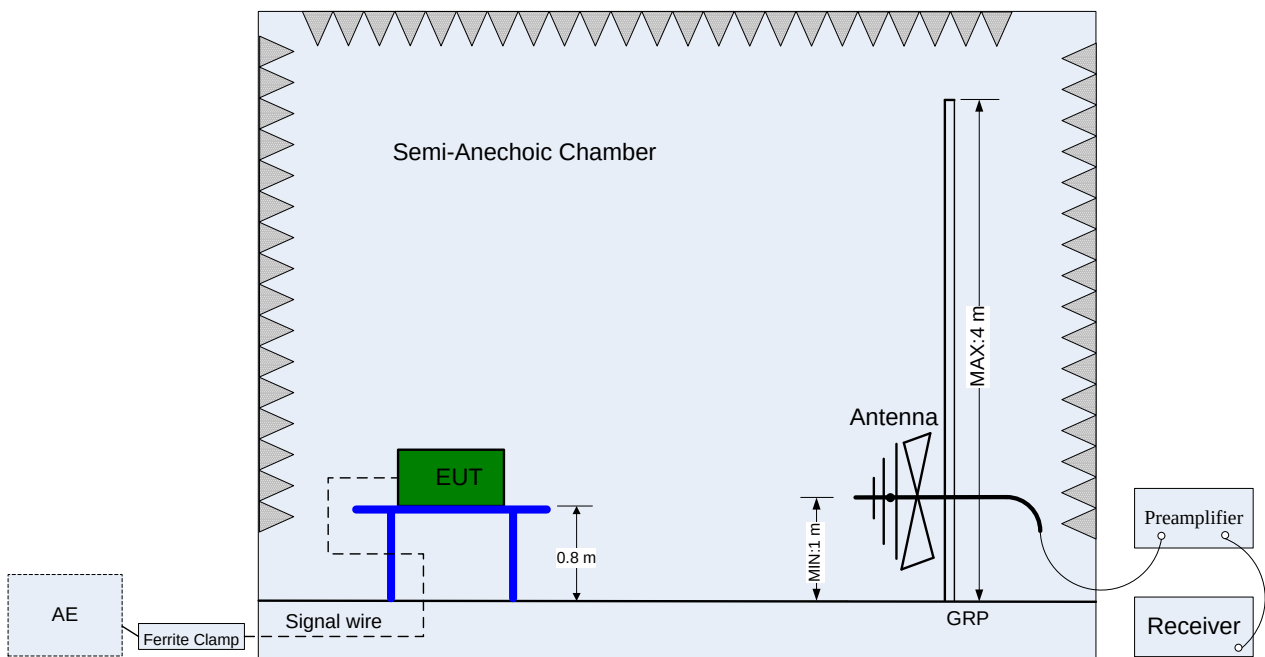


Figure 6. Test set-up of radiated disturbance for TC1 and TC2 (30MHz-1GHz)

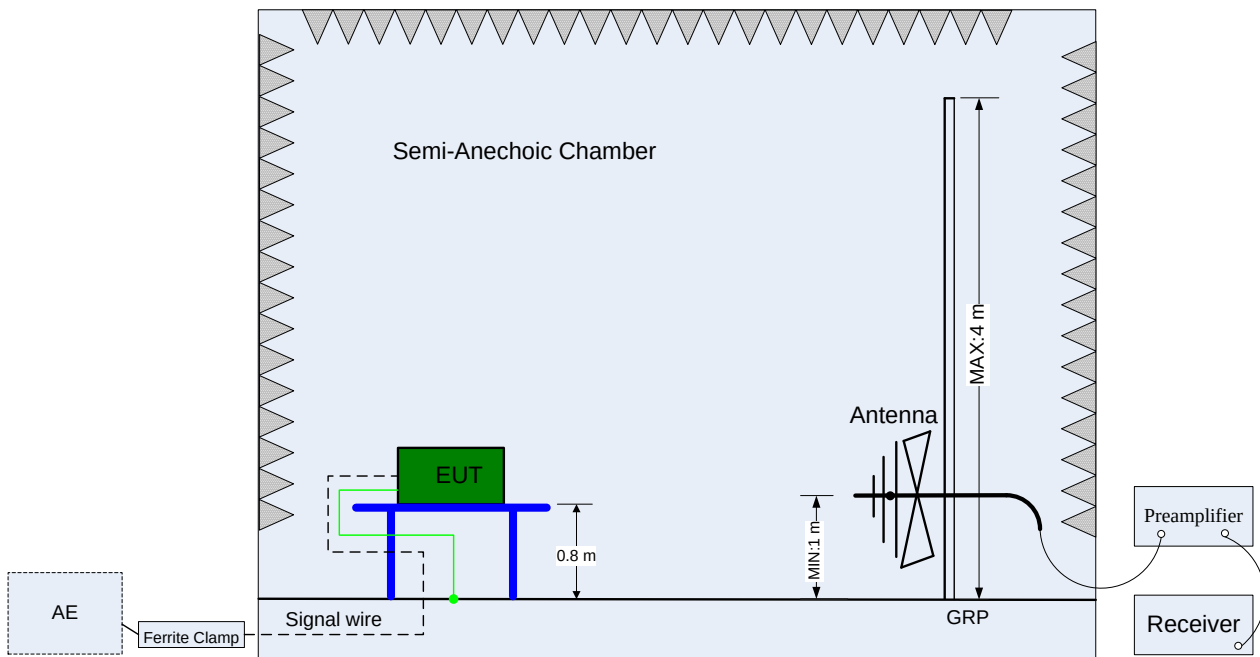


Figure 7. Test set-up of radiated disturbance for TC3,TC4, TC5 (30MHz-1GHz)

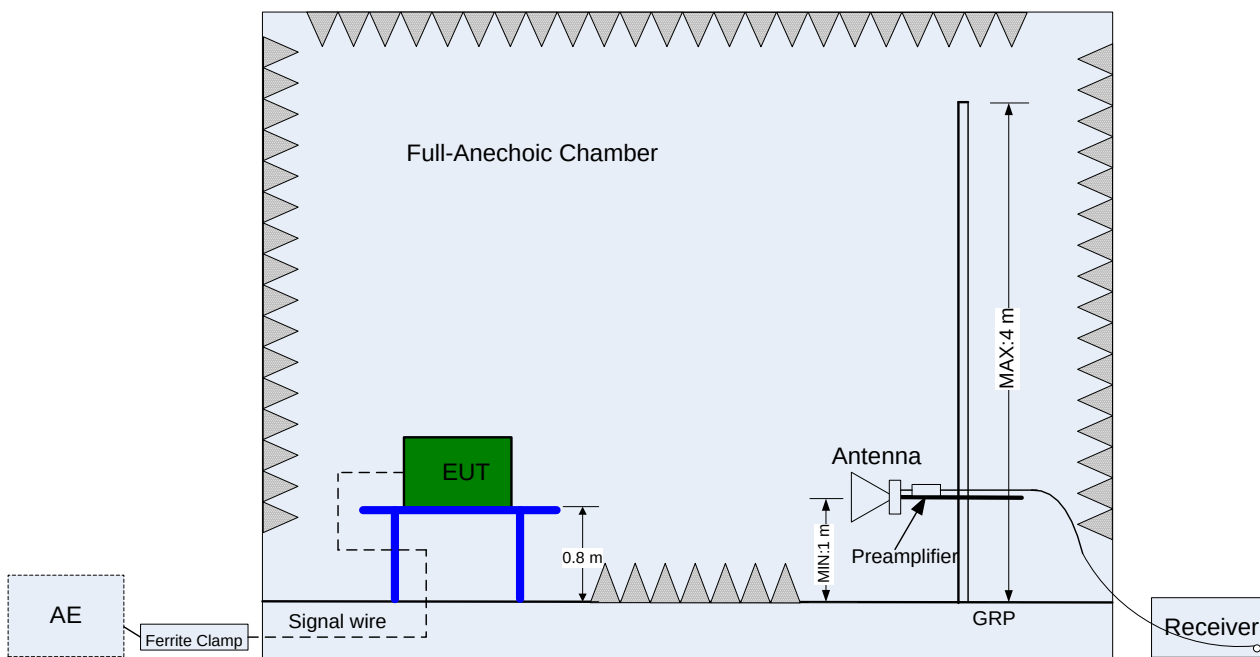


Figure 8. Test set-up of radiated disturbance for TC1 and TC2 (above 1GHz)

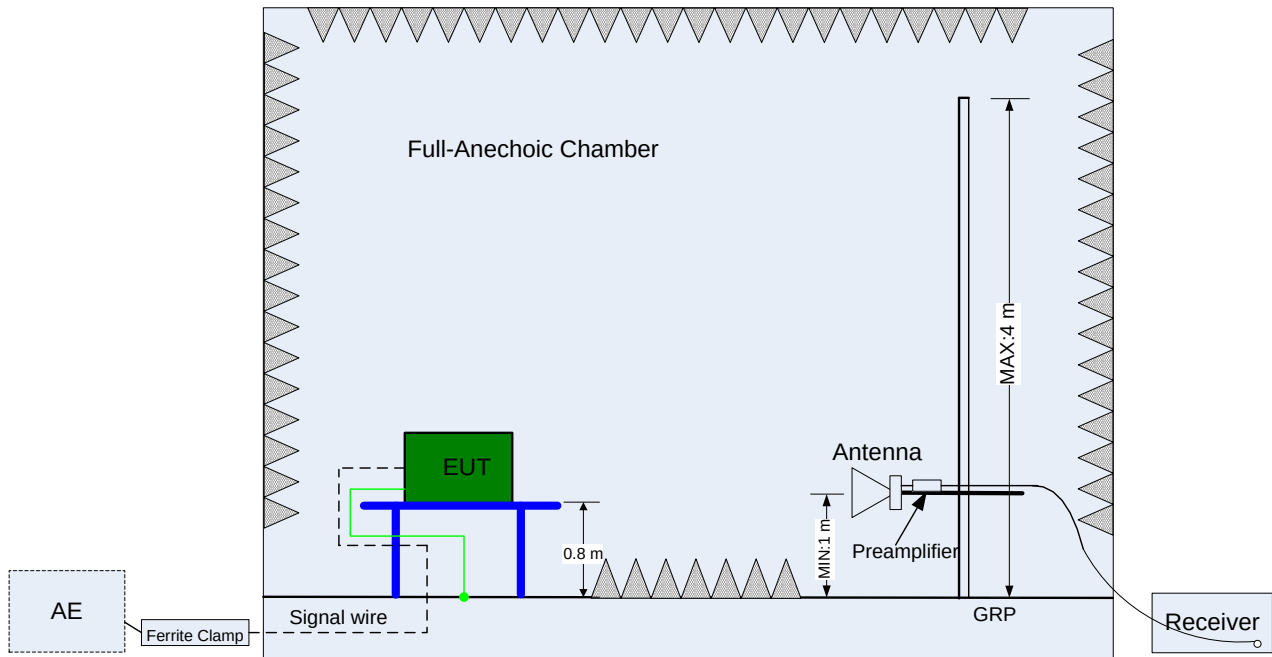


Figure 9. Test set-up of radiated disturbance for TC3,TC4, TC5 (above 1GHz)

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 9 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 10 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:

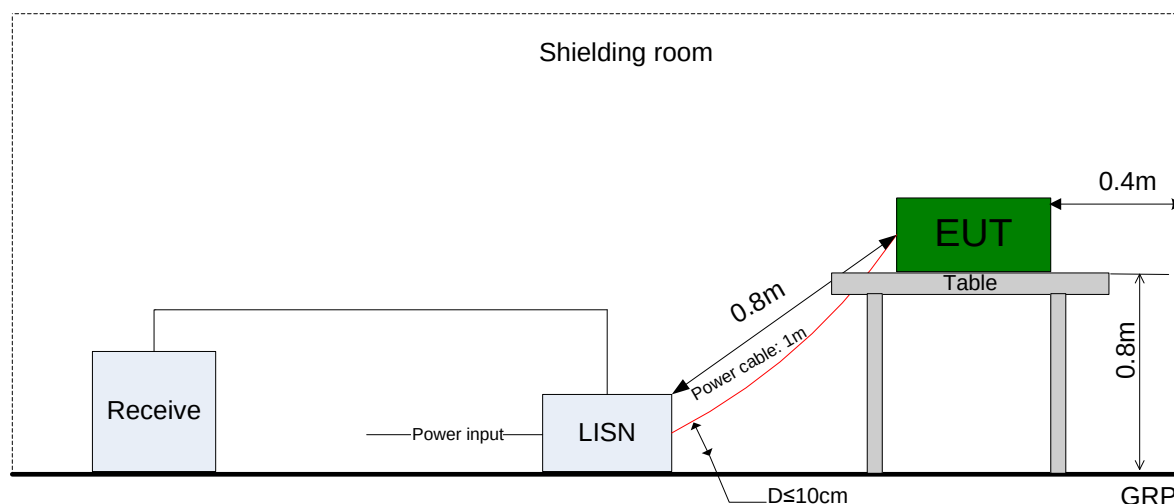


Figure 10. Test set-up of conducted disturbance for power port(TC1)

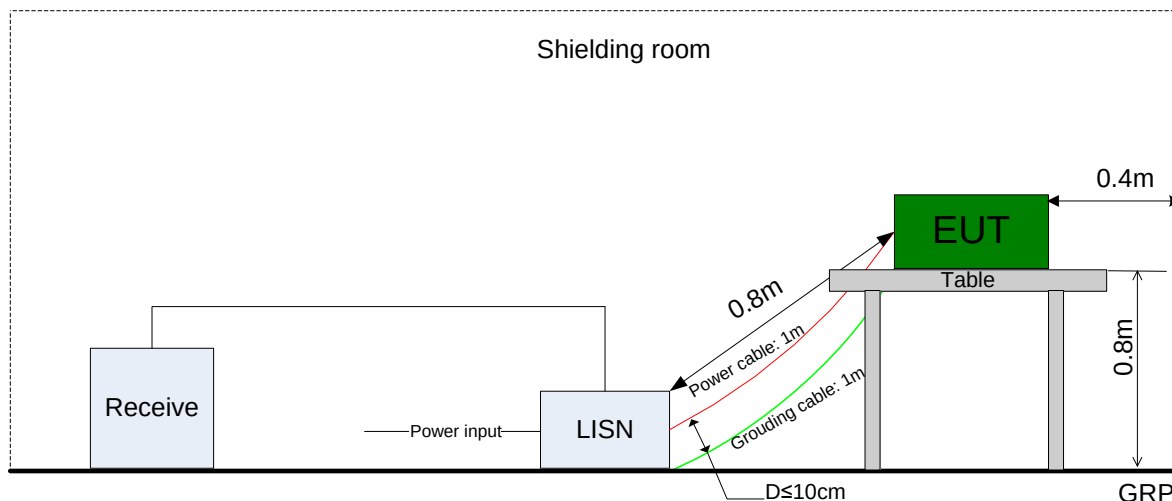


Figure 11. Test set-up of conducted disturbance for power port(TC3)

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 11 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 12 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 13 System measurement uncertainty

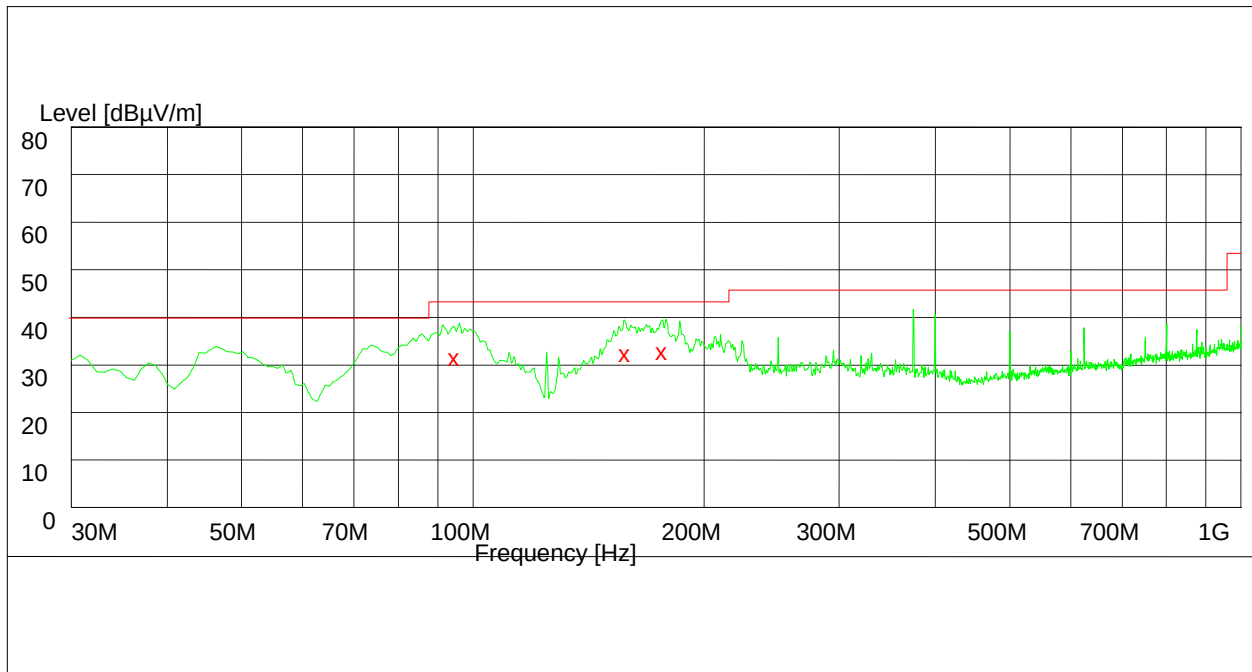
Items		Extended Uncertainty
Radiated Emission	Field strength (dB μ V/m)	U=4.15 dB; k=2 (30 MHz-1 GHz)
		U=3.64 dB; k=2 (1 GHz-4 GHz)
Conducted Emission	Disturbance Voltage (dB μ V)	U=3.3 dB; k=2



8 Graph and Data of Emission Test

8.1 Radiated Disturbance for FCC Part 15

8.1.1 Radiated Disturbance of TC1 for FCC Part 15



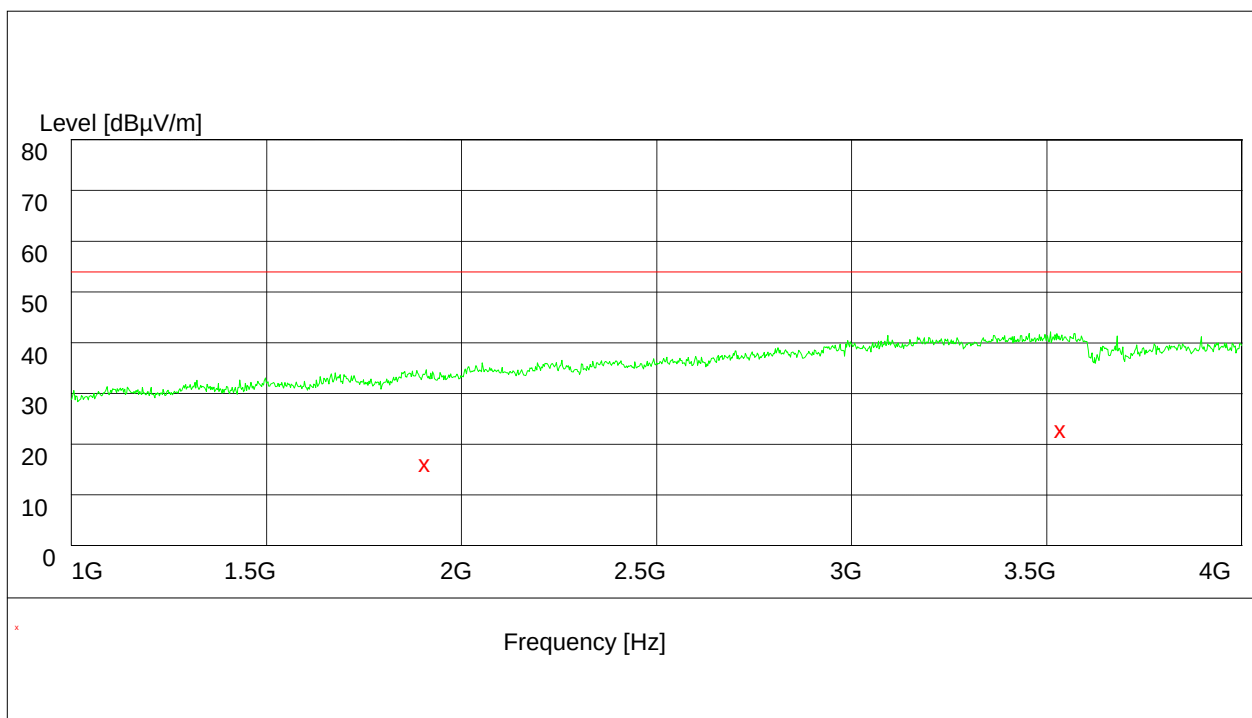
Graph of Test result (30 MHz-1 GHz)

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, The Fuhua and Huntkey Adapters 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

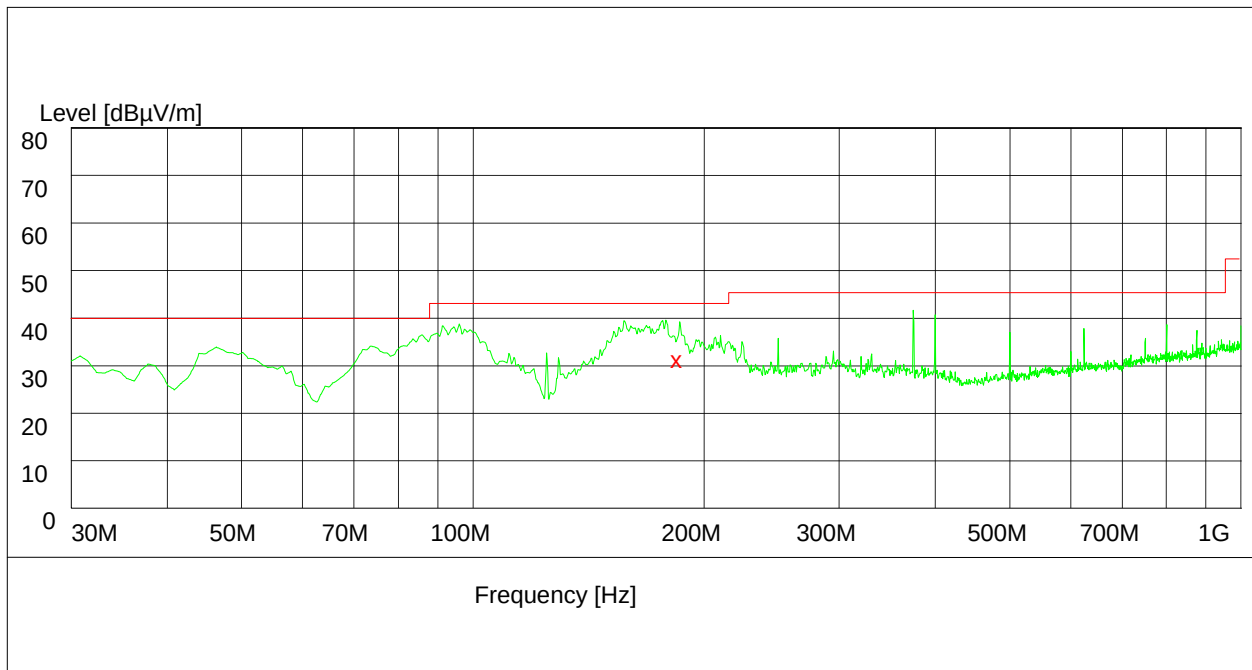
Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
1909.500000	18.50	-2.0	53.9	35.4	135	38	HORIZONTAL
3539.000000	25.30	5.1	53.9	28.6	114.0	71.00	HORIZONTAL

Notes:

- 1, The Fuhua and Huntkey Adapters 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)

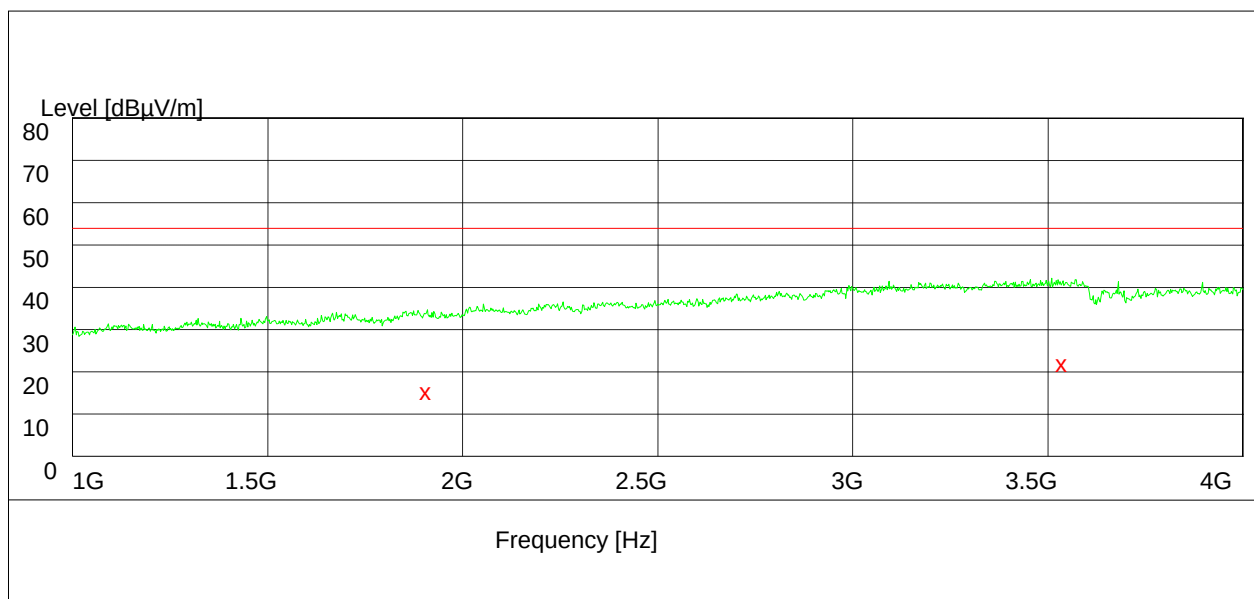
Measurement Result: QP Detector

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

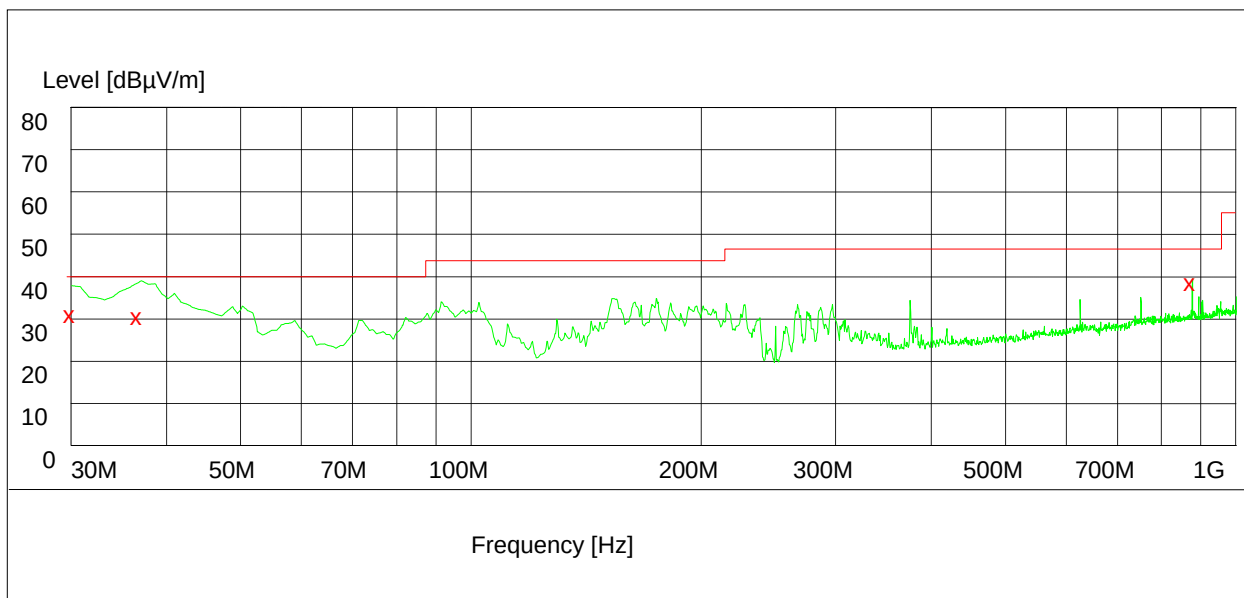
Notes:

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 TC3 for FCC Part 15

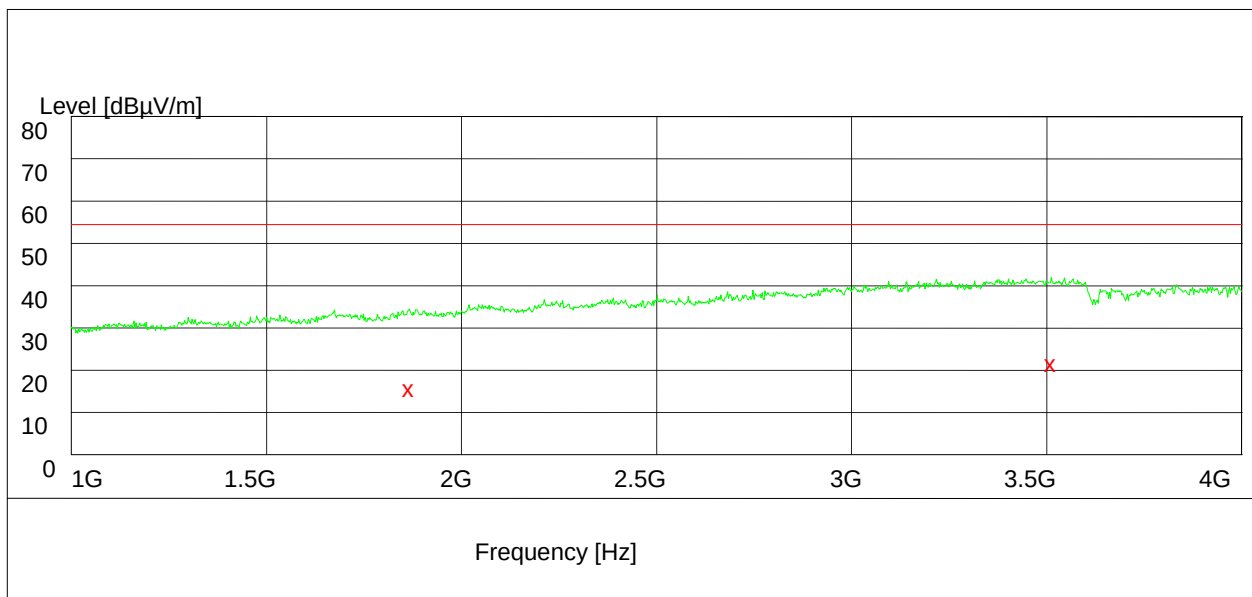


Measurement Result: QP Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
30.00000	34.2	-2.8	40	5.8	100	279	VERTICAL
36.67416	33.7	-6.7	40	6.3	100	10	VERTICAL
875.0016	41.8	3.6	46	4.2	100	218	HORIZONTAL

Notes:

- 1, The Fuhua and Huntkey Adapters 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

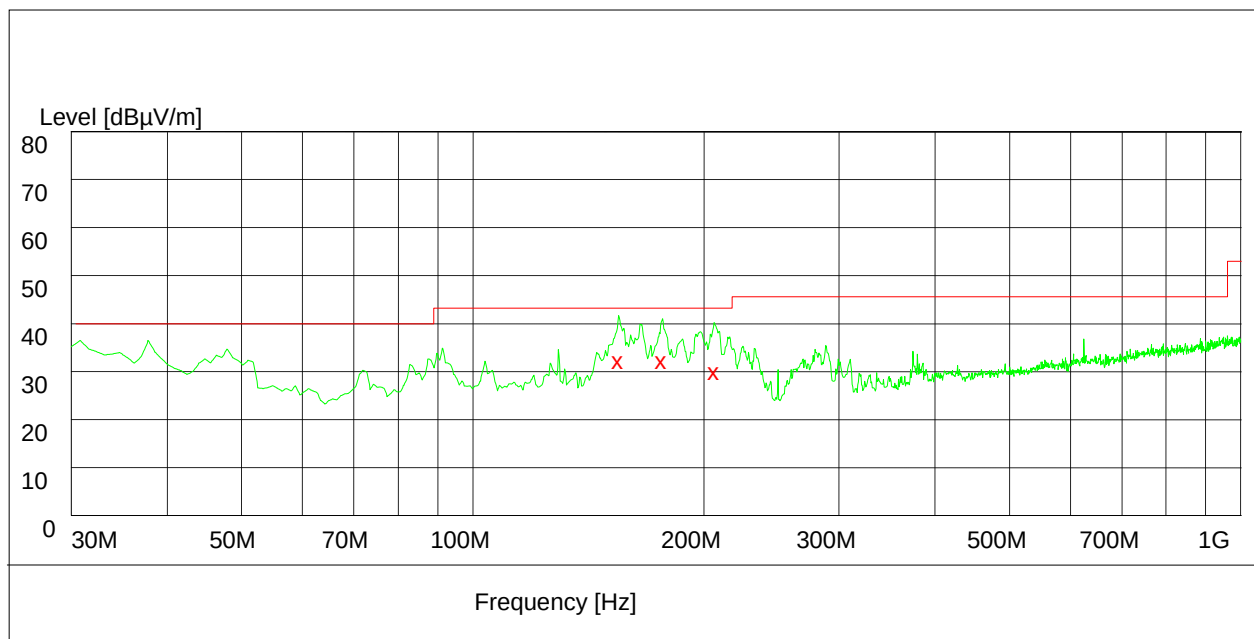
Frequency	Level	Transd	Limit	Margin	Height	Azimuth	Polarisation
MHz	dBμV/m	dB	dBμV/m	dB	cm	deg	
1868.5	19	-2.2	53.9	34.9	198	337	VERTICAL
3513.5	24.8	5	53.9	29.1	150	360	HORIZONTAL

Notes:

- 1, The 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 T4 for FCC Part 15



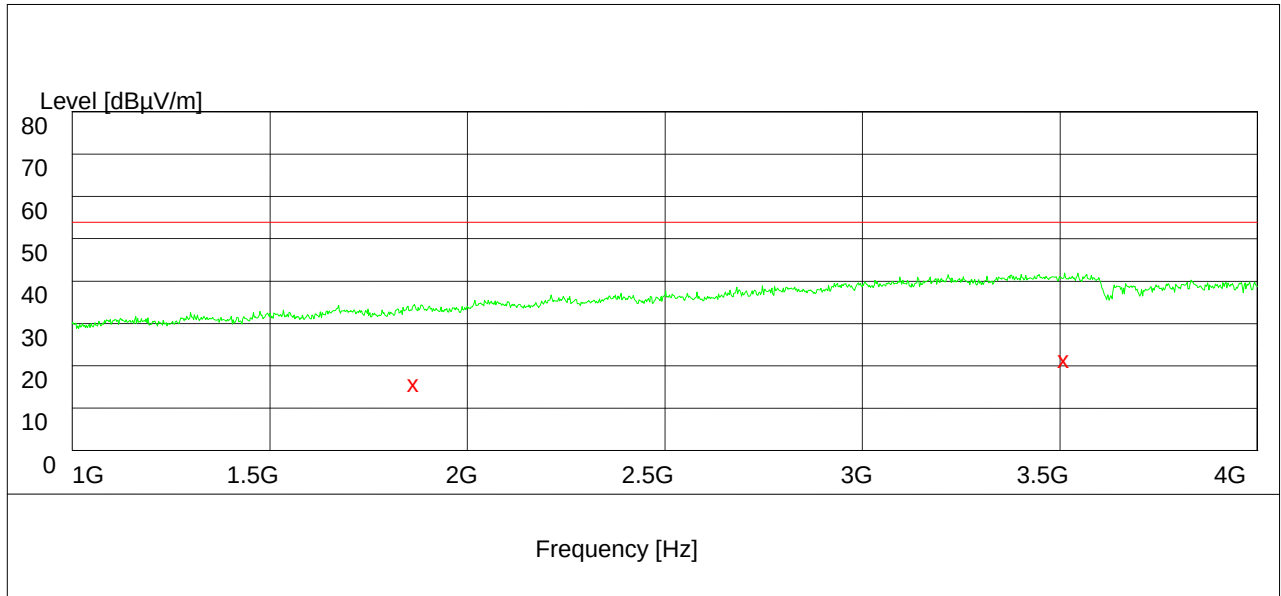
Measurement Result: QP Detector

Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth h (deg)	Polarisation
155.24664	34.8	-9.6	43.5	8.7	169	33	HORIZONTAL
176.75736	34.9	-10.4	43.5	8.6	100	235	VERTICAL
206.73048	32.7	-10	43.5	10.8	135	144	HORIZONTAL

Note:

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.



Measurement Result: AV Detector

Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
1868.5	20.0	-2.2	53.9	33.9	198	337	VERTICAL
3513.5	24.8	5	53.9	29.1	150	360	HORIZONTAL

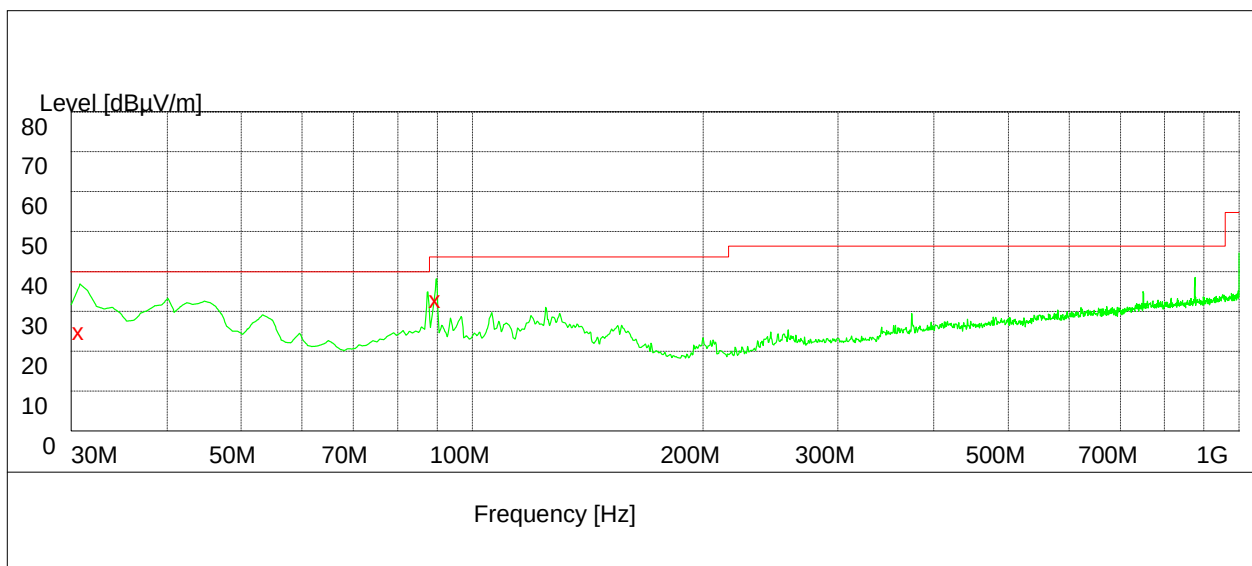
Note:

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.



8.1.5 Radiated Disturbance of TC5



Graph of Test result (30 MHz-1 GHz)

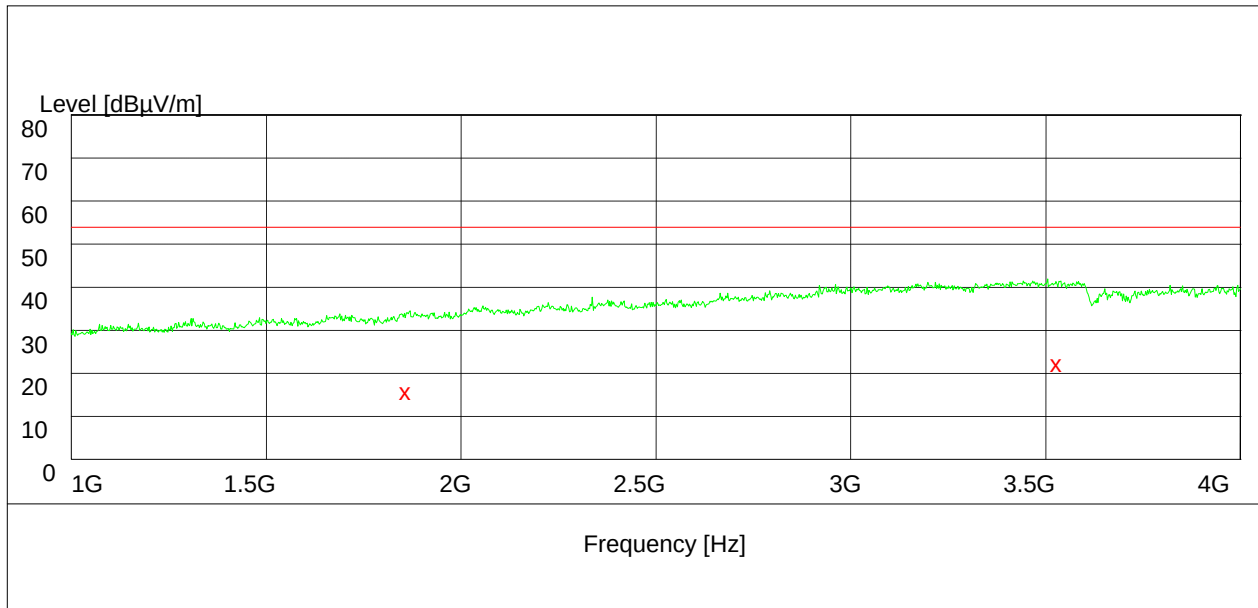
Measurement Result: QP Detector

Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
30.828240	28.50	-3.3	40.0	11.5	114.0	355.00	VERTICAL
89.814480	36.00	-11.2	43.5	7.5	147.0	284.00	VERTICAL

Note:

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.



Measurement Result: AV Detector

Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
1862.000000	18.90	-2.2	53.9	35.0	156.0	17.00	HORIZONTAL
3531.500000	25.30	5.1	53.9	28.6	185.0	137.00	VERTICAL

Note:

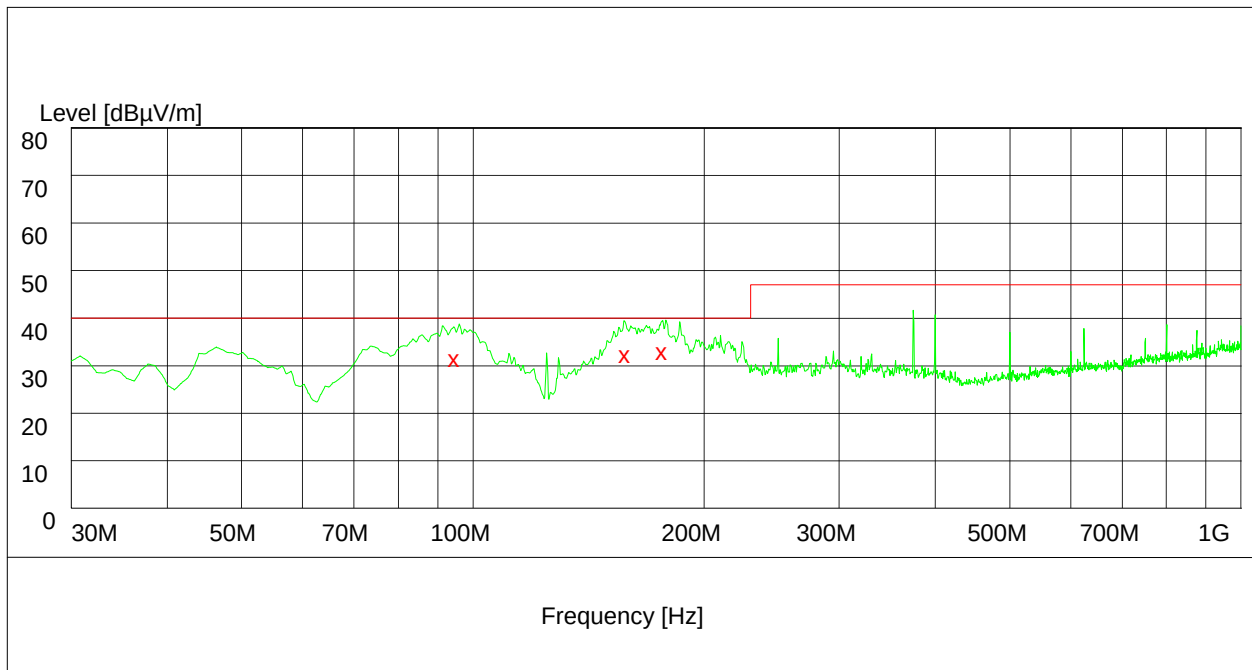
Level = Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)

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



8.2 Radiated Disturbance for CAN/CSA-CEI/IEC CISPR 22

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



(30MHz-1GHz)

Measurement Result: QP Detector

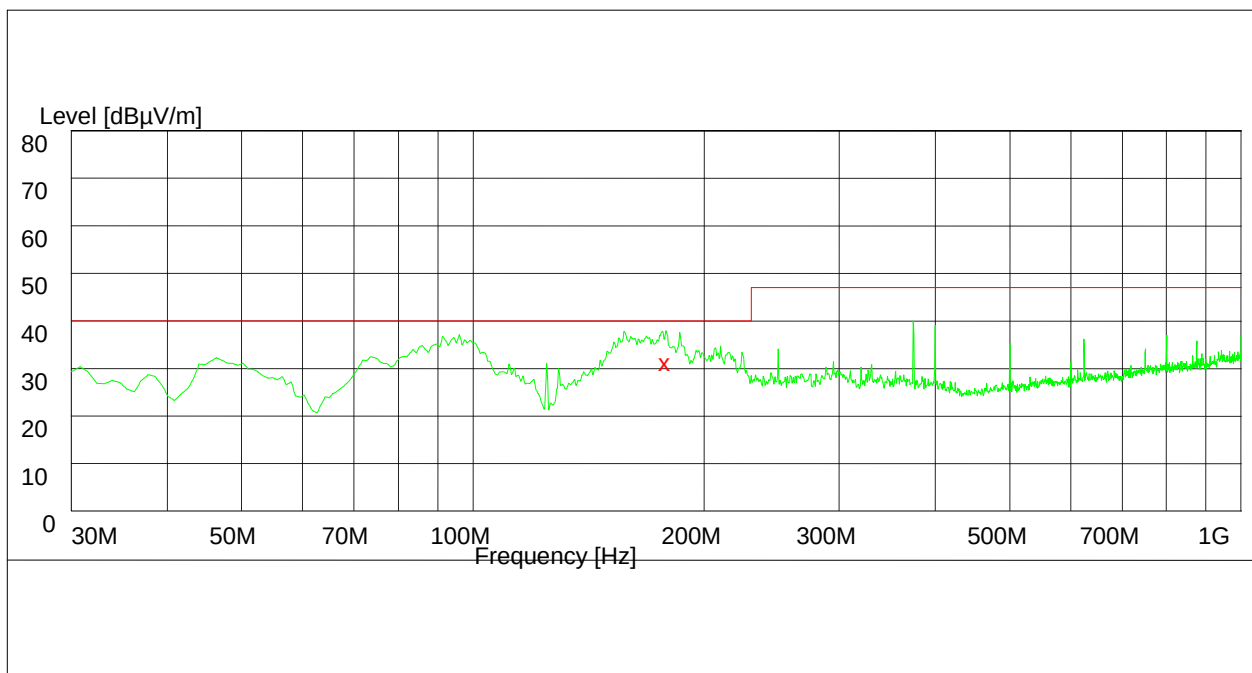
Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
95.000400	34.2	-10.4	40	5.8	199.0	11.00	HORIZONTAL
158.331360	35.10	-9.7	40	4.9	176.0	152.00	HORIZONTAL
177.153840	35.60	-10.4	40	4.4	199.0	18.00	HORIZONTAL

Note:

- 1, The Fuhua and Huntkey adapters were tested, and the worse test result is supplied above.
 - 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.



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



(30GHz -1GHz)

Measurement Result: QP Detector

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

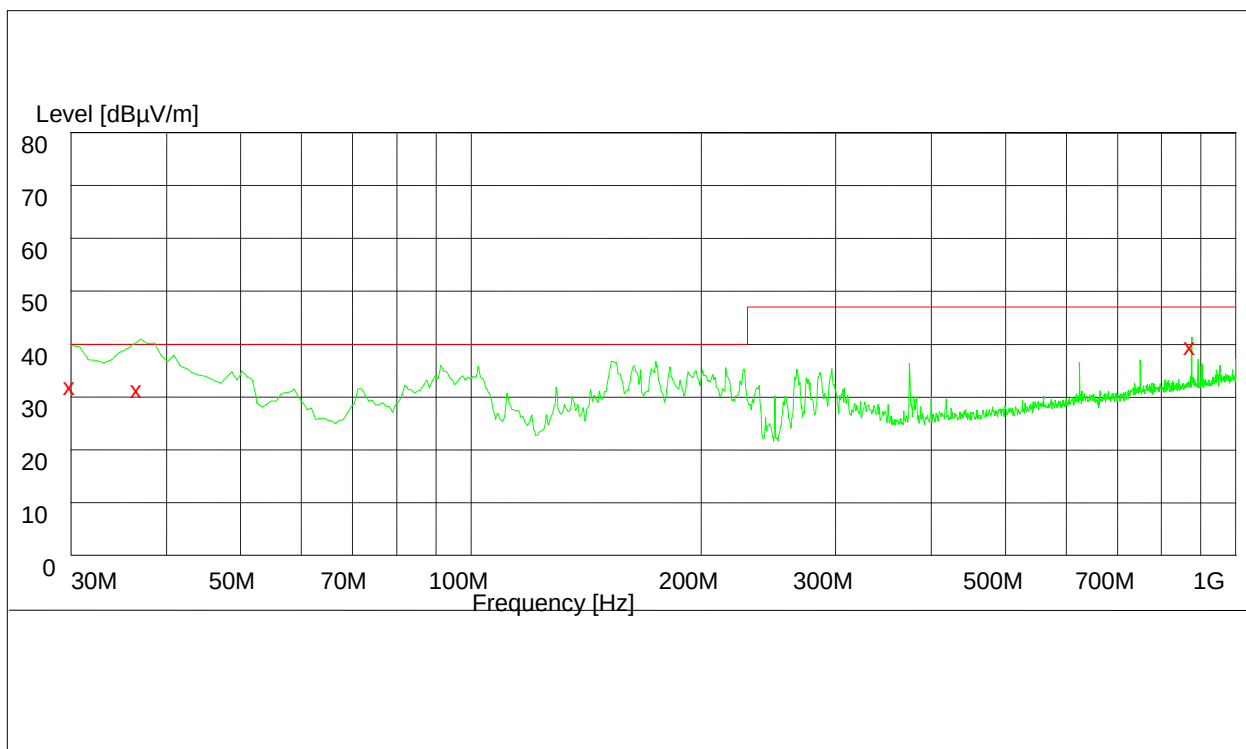
Note:

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.



8.2.3 Radiated Disturbance of TC3 for CAN/CSA-CEI/IEC CISPR 22



Measurement Result: QP Detector

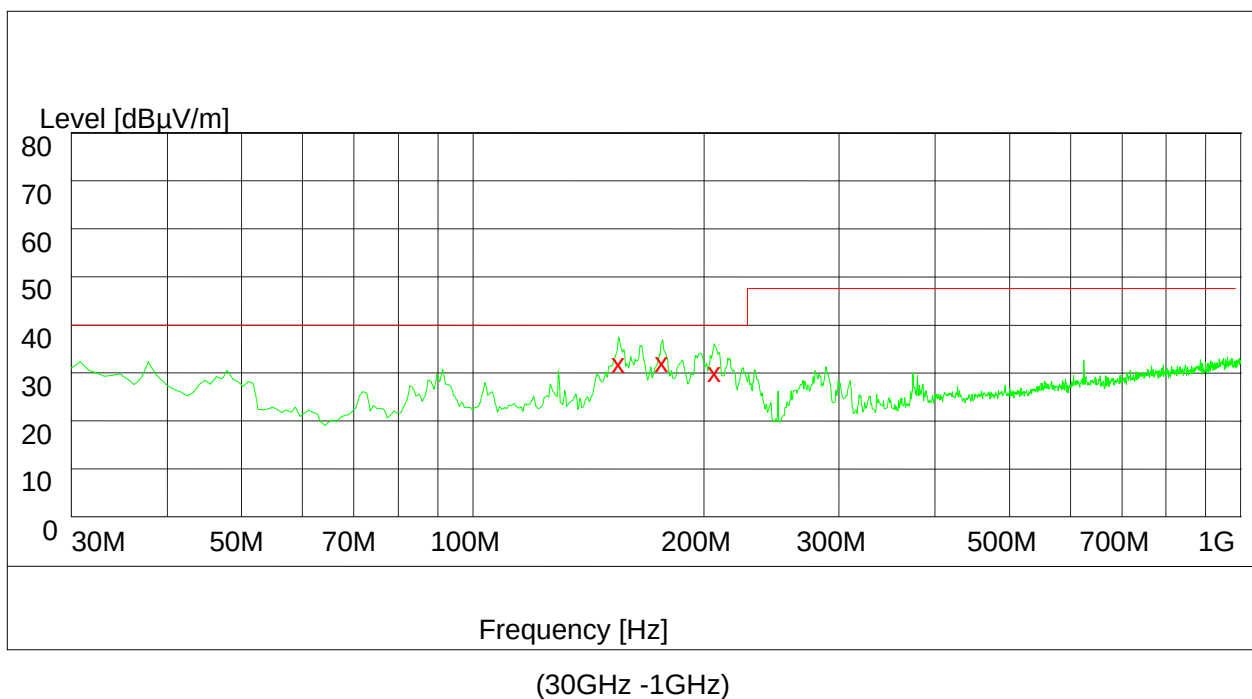
Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
30.000000	34.20	-2.8	40.0	5.8	100.0	279.00	VERTICAL
36.674160	33.70	-6.7	40.0	6.3	100.0	10.00	VERTICAL
875.001600	41.80	3.6	47.0	5.2	100.0	218.00	HORIZONTAL

Note:

- 1, The Fuhua and Huntkey adapters were tested, and the worse test result is supplied above.
- 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.



8.2.4 Radiated Disturbance of TC4 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 h (deg)	Polarisation
155.24664	34.8	-9.6	40.0	5.2	169	33	HORIZONTAL
176.75736	34.9	-10.4	40.0	5.3	100	235	VERTICAL
206.73048	32.7	-10	40.0	7.2	135	144	HORIZONTAL

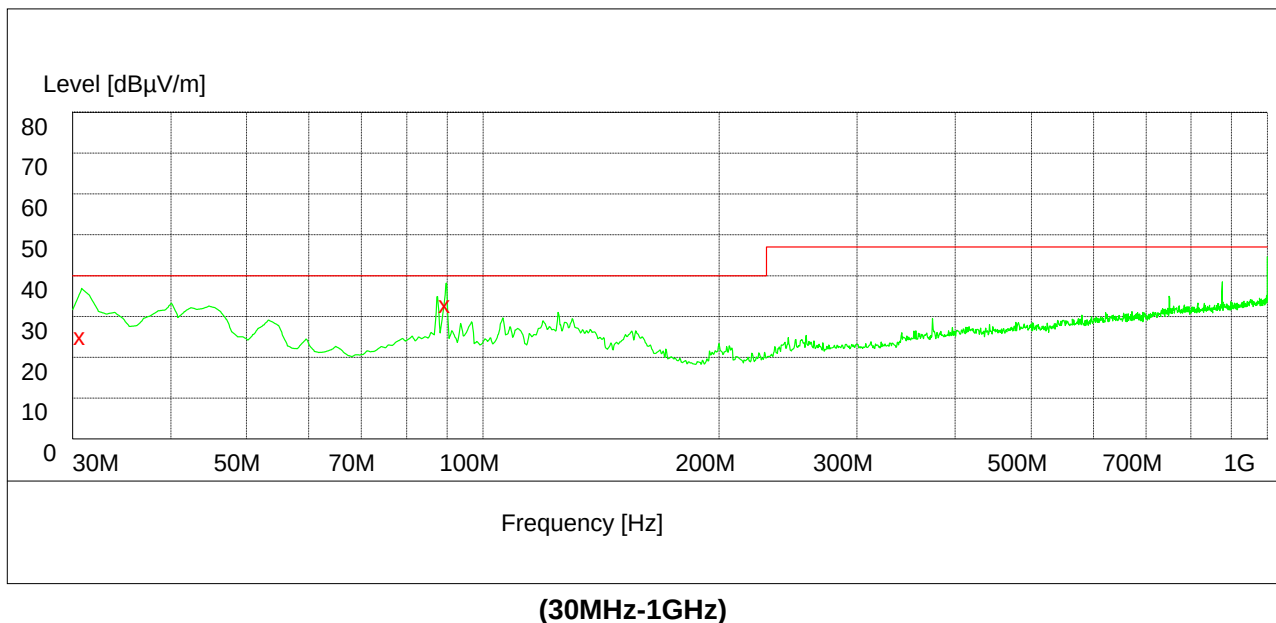
Note:

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.



8.2.5 Radiated Disturbance of TC5 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
30.828240	28.50	-3.3	40.0	11.5	114.0	355.00	VERTICAL
89.814480	36.00	-11.2	40.0	4.0	147.0	284.00	VERTICAL

Note:

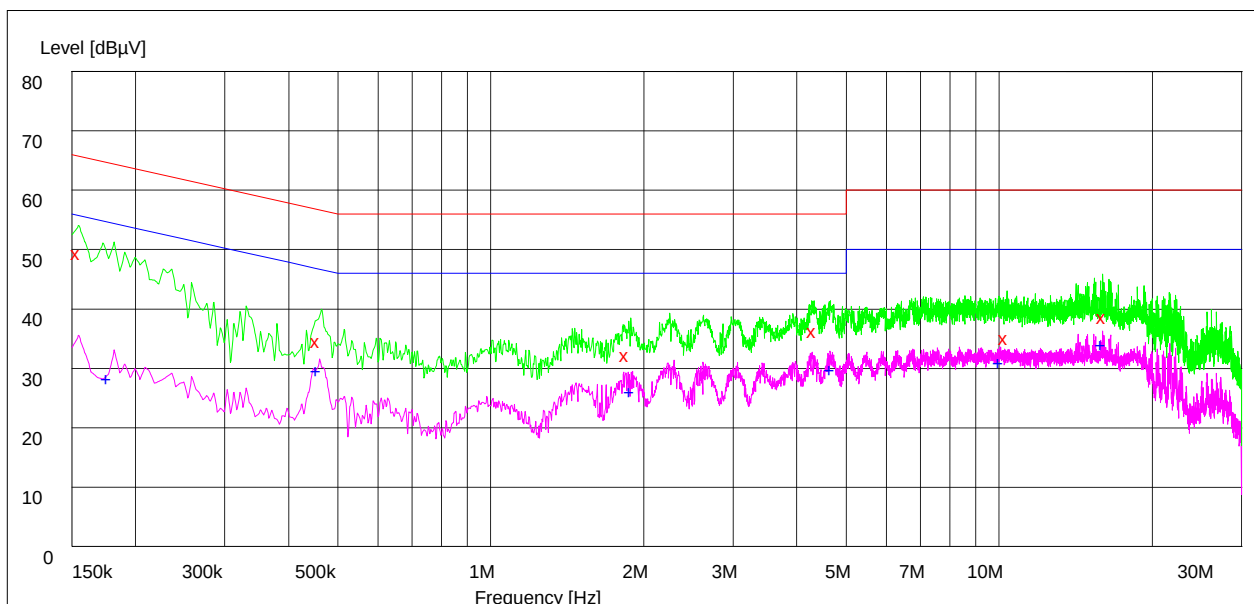
Level = Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)

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



8.3 Conducted Disturbance

8.3.1 AC Power Port Test Data of TC1(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	---

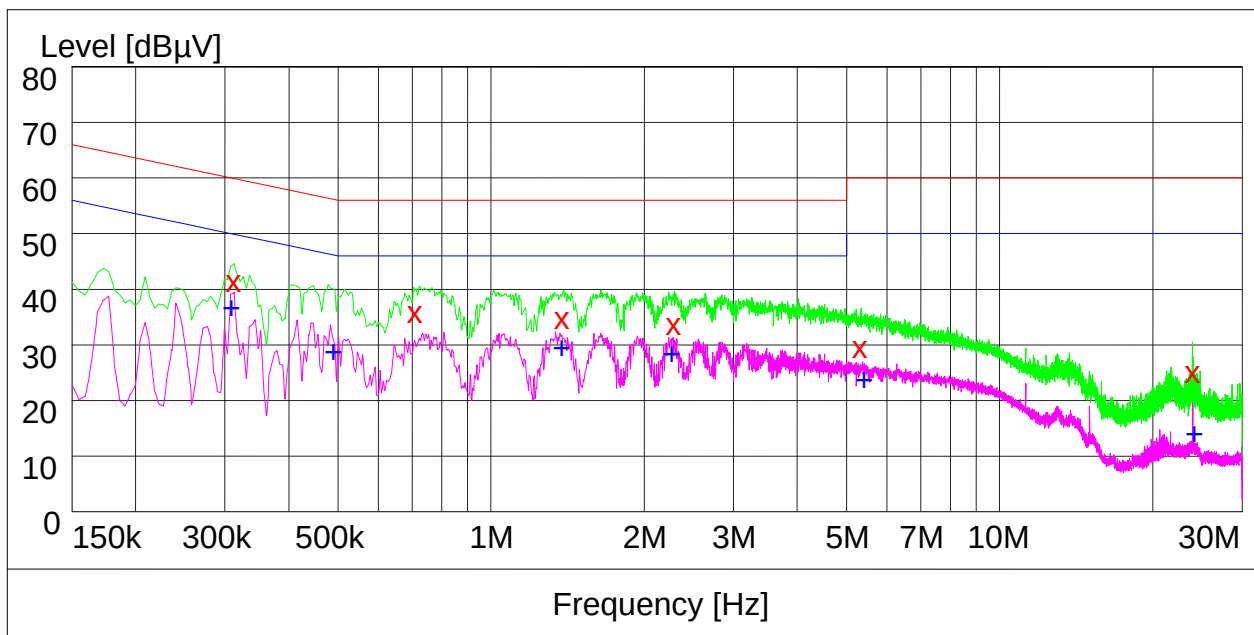
Note:

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

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



8.3.2 AC Power Port Test Data of TC1(Huntkey Adapter)



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	---

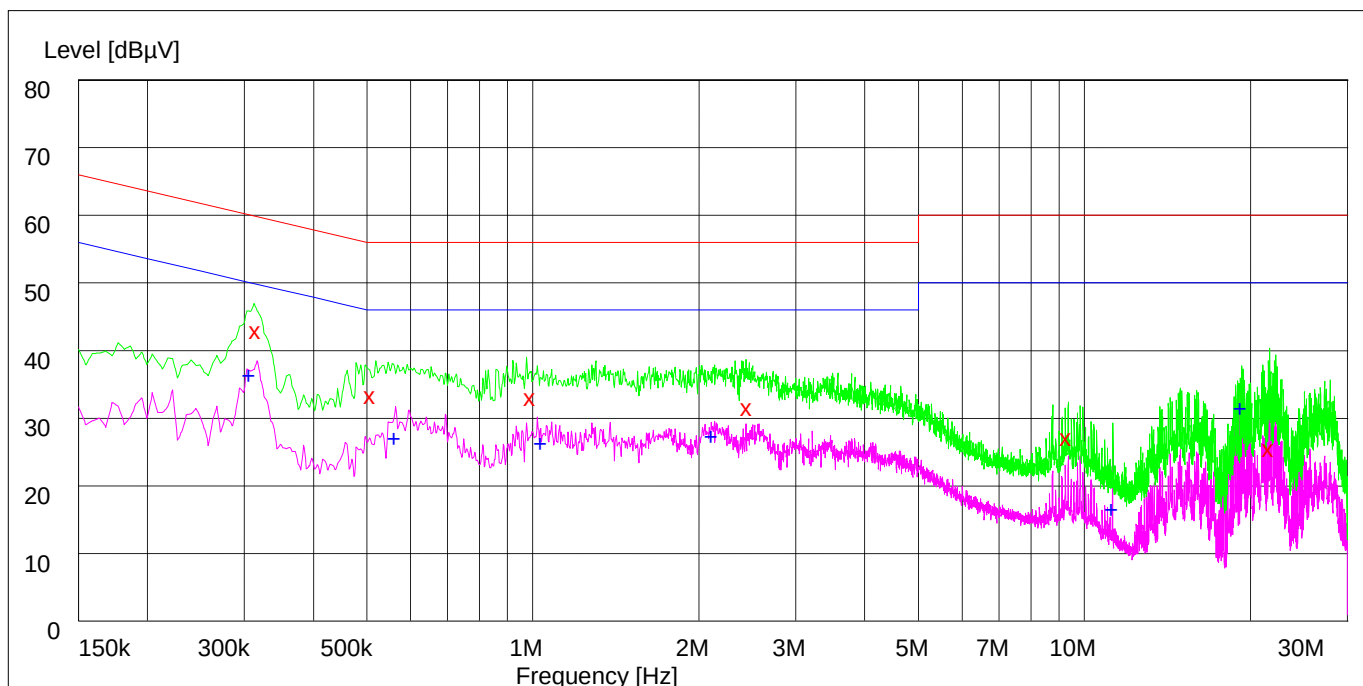
Note:

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

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



8.3.3 AC Power Port Test Data of TC3 (Fuhua Adapter)



(Fuhua Adapter was used)

Measurement Result: QP Detector

Frequency (MHz)	Level (dBμV)	Transd (dB)	Limit (dBμV)	Margin (dB)	Line	PE
0.3165	44.4	9.9	60	15.4	N	GND
0.51	34.7	9.9	56	21.3	L3	GND
0.996	34.4	9.8	56	21.6	N	GND
2.463	33	10.1	56	23.0	L3	GND
9.348	28.6	10.4	60	31.4	N	GND
21.7185	26.9	10.6	60	33.1	L3	GND

Measurement Result: AV Detector

Frequency (MHz)	Level (dBμV)	Transd (dB)	Limit (dBμV)	Margin (dB)	Line	PE
0.3075	37.7	9.9	50	12.3	N	GND
0.564	28.3	9.9	46	17.7	L3	GND
1.041	27.6	9.8	46	18.4	N	GND
2.121	28.7	10.1	46	17.3	L3	GND
11.265	17.9	10.2	50	32.1	L3	GND
19.3065	32.8	10.6	50	17.2	L3	GND

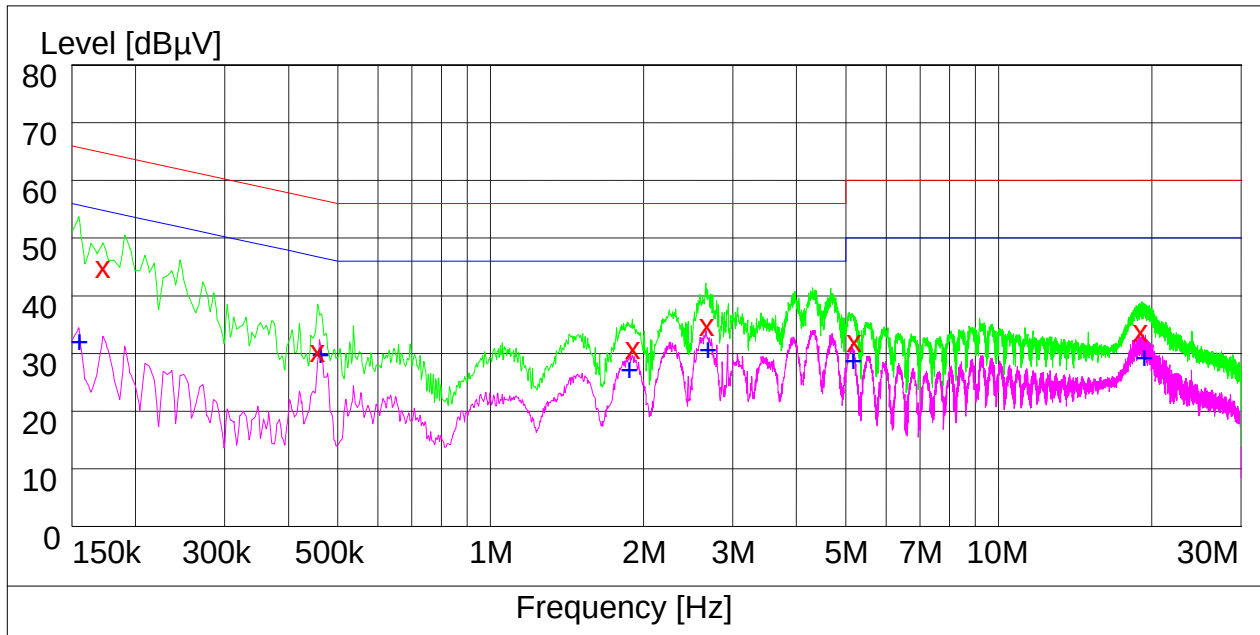
Note:

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

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



8.3.4 AC Power Port Test Data of TC3 (Huntkey Adapter)



Measurement Result: QP Detector

Frequency (MHz)	Level (dBμV)	Transd (dB)	Limit (dBμV)	Margin (dB)	Line	PE
0.172500	46.90	9.9	65	17.9	L3	GND
0.456000	32.50	9.9	57	24.3	N	GND
1.905000	33.00	10.0	56	23.0	N	GND
2.670000	36.90	10.1	56	19.1	L3	GND
5.190000	34.10	10.3	60	25.9	L3	GND
19.009500	35.90	10.6	60	24.1	N	GND

Measurement Result: AV Detector

Frequency (MHz)	Level (dBμV)	Transd (dB)	Limit (dBμV)	Margin (dB)	Line	PE
0.154500	33.90	9.9	56	21.9	N	GND
0.460500	31.80	9.9	47	14.9	N	GND
1.869000	29.10	10.0	46	16.9	N	GND
2.665500	32.60	10.1	46	13.4	L3	GND
5.154000	30.60	10.3	50	19.4	L3	GND
19.230000	31.20	10.6	50	18.8	N	GND

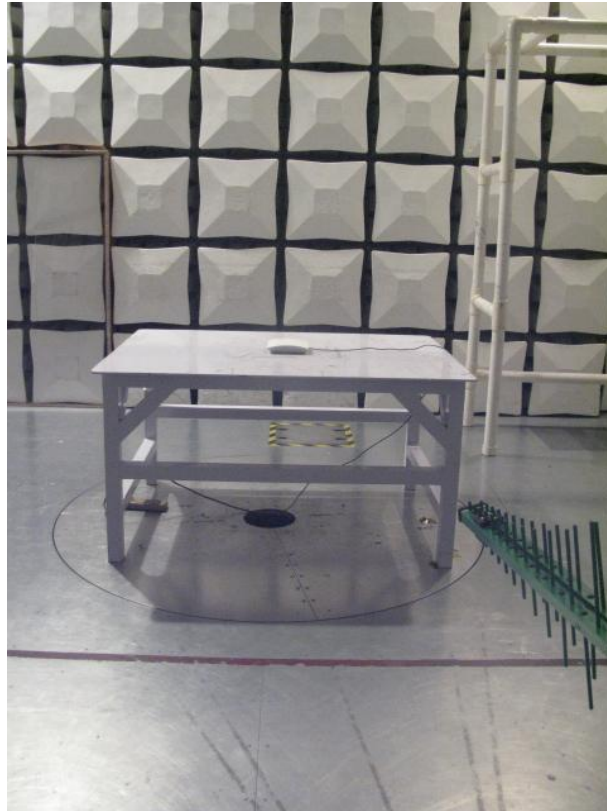
Note:

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 for WA615DN-AGN



Radiated emission for 30 MHz to 1 GHz



Radiated emission for 1 GHz to 6 GHz

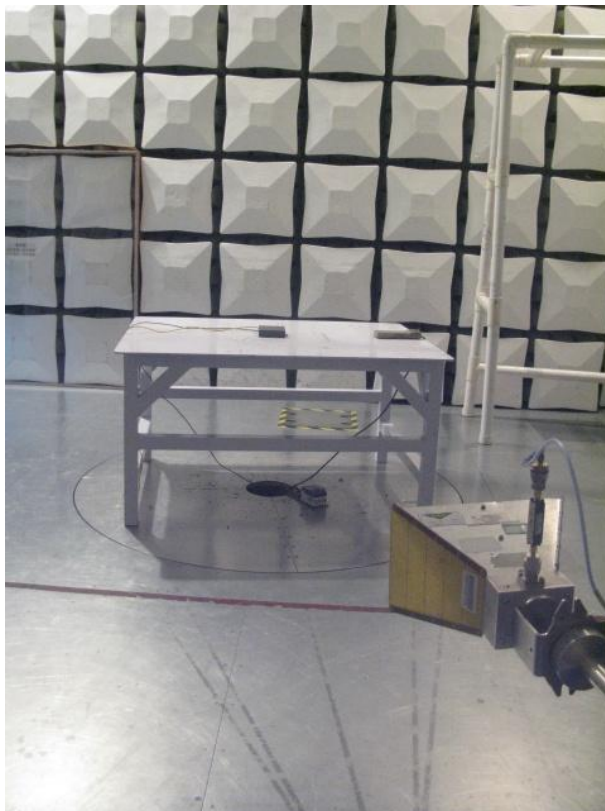


Conducted emissions of AC power port

10 Photographs of Test Set-up for WA635SN-GN



Radiated emission for 30 MHz to 1 GHz



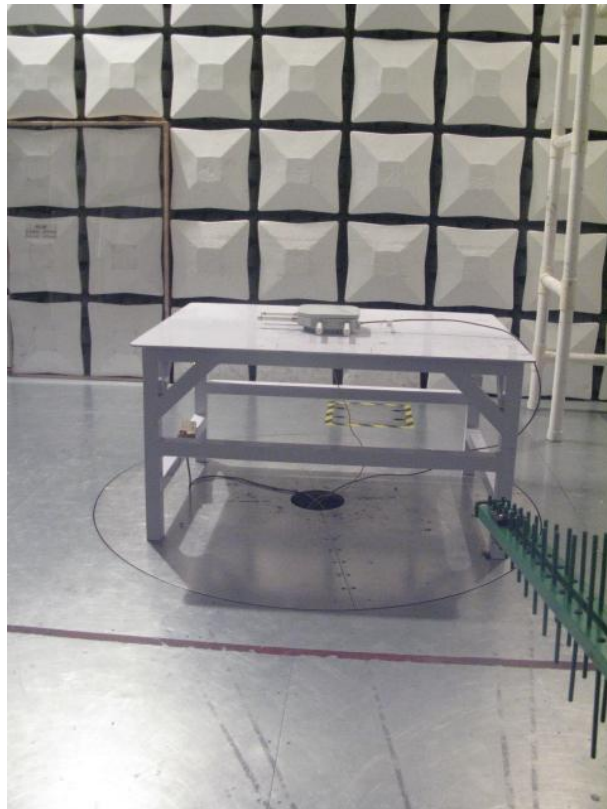
Radiated emission for 1 GHz to 4GHz



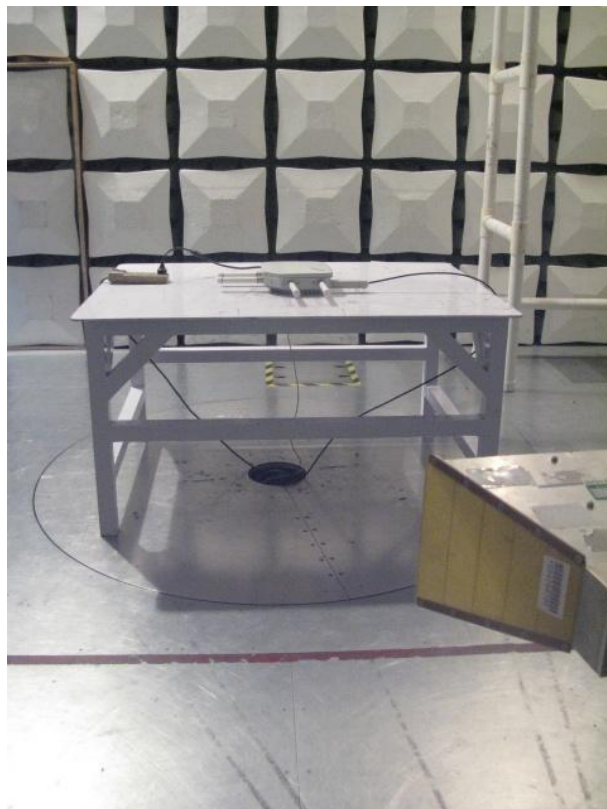
Conducted emissions of AC power port



11 Photographs of Test Set-up for WA655DN-AGN



Radiated emission for 30 MHz to 1 GHz



Radiated emission for 1 GHz to 4 GHz



Appendix: Abbreviation

Table 14 Abbreviation

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

END