



EMC Test Report

Product Name: Mobile WiFi

Model Number: HWD31

Report No: SYBH(Z-EMC)086102014-2

FCC ID: QISHWD31

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

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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

Date of Receipt Test Item: Nov.04,2014
Start Date of Test: Nov.07,2014
End Date of Test: Nov.19,2014

Test Result: Pass

Approved By
(Lab Manager)

2014-11-20
Date

Liu Chunlin
Name

Signature

Prepared by
(Test Engineer)

2014-11-20
Date

Hu Wenkai
Name

Signature



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1 General Information

1.1 EUT Description

EUT Description	
Product Name	Mobile WiFi
Model Number	HWD31
Input voltage	~5V
TX Frequency	WCDMA BAND II: 1850MHz to 1910MHz WCDMA BAND V: 824MHz to 849MHz LTE Band 17: 704MHz to 714MHz BT: 2400MHz to 2483.5MHz WIFI 2.4G: 2422MHz to 2467MHz WIFI 5G: 5170MHz to 5330MHz 5490MHz to 5710MHz
RX Frequency	WCDMA BAND II: 1930MHz to 1990MHz WCDMA BAND V: 869MHz to 894MHz LTE Band 17: 734MHz to 746MHz BT: 2400MHz to 2483.5MHz WIFI 2.4G: 2422MHz to 2467MHz WIFI 5G: 5170MHz to 5330MHz 5490MHz to 5710MHz
S/N	G9F0114A18000154
HW Version	CL1KD02UM
SW Version	11.411.03.05.824
EUT Accessory	
Data cable	Data Cable USB A Male to Micro Usb 120cm, shielded
Adapter	Brand: HUAWEI Model: HW-050200U3W Input voltage: 100-240V~ 50/60Hz 0.5A MAX Output voltage: 5.0V $\pm$ 2.0A Rated Power: 10W S/N: HWHKAHE41106658
Rechargeable Li-ion	Brand: HUAWEI Battery Model: HB414790EBW Rated capacity: 2300mAh Nominal Voltage: $\pm$ 3.8V Charging Voltage: $\pm$ 4.2V

Remark: The above EUT's information is declared by manufacturer. Please refer to the specifications or user's manual for more detailed information.



1.2 Test Site Information

Test Site:	RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD.
Test Site Location:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.3 Applied Standards

APPLIED STANDARD

47 CFR FCC Part 15 : 2013, Subpart B

2 Summary of Results

Summary of Results				
Test Items	Test Mode	Performance Class & Required Performance Criteria	Result	Site
<u>Radiated Emissions</u> Enclosure Port	Mode1, Mode 3	CLASS B	Pass	Site1
<u>Conducted Emissions</u> ☒ DC Power Port ☒ AC Power Port ☐ Telecommunication Ports	Mode 1-Mode 4	CLASS B	Pass	Site1
Note: 1, Measurement taken is within the measurement uncertainty of measurement system. 2, ☒ The item has been tested; ☐ The item has not been tested.				

During the measurement, the environmental conditions complied with the range listed as below.

Item	Required
Ambient temperature	15°C ~ 35°C
Relative humidity	25% ~ 75%
Atmospheric pressure	86kPa ~ 106kPa

3 System Configuration during EMC Test

3.1 Test Mode

Huawei has verified the construction and function in typical operation. All the test modes were carried out with the EUT under normal operation, which were shown in this test report and defined as below:

Test Mode	
Mode 1	EUT with Adapter+ Idle Mode
Mode 2	EUT with Adapter+ Traffic Mode
Mode 3	EUT with PC+ Idle Mode
Mode 4	EUT with PC+ Traffic Mode

Remark:

- 1) If there is one kind of accessories with different models, each one should be applied throughout the compliance test respectively, however, only the worst case will be recorded in this report.
- 2) If EUT has more than one typical operation, only the worst test mode will be recorded in this report.

Traffic Mode:

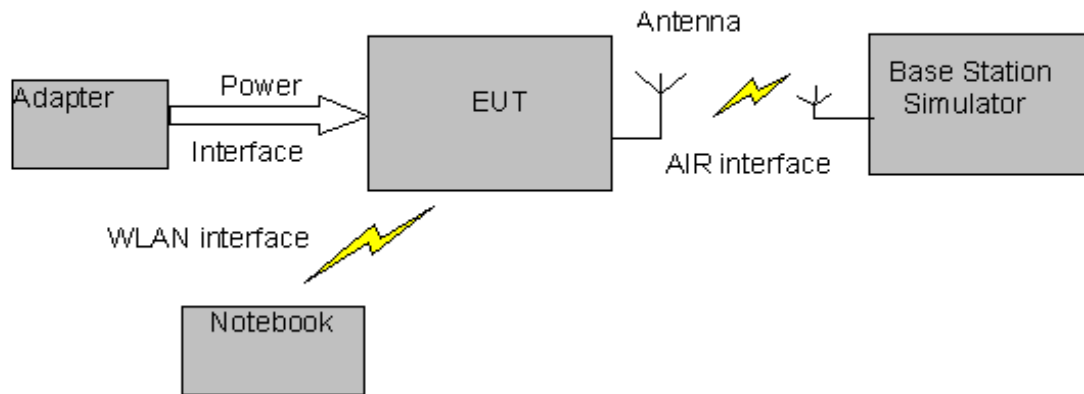
When the EUT state is switched on and with Radio Resource Control (RRC) connection established.

Idle Mode:

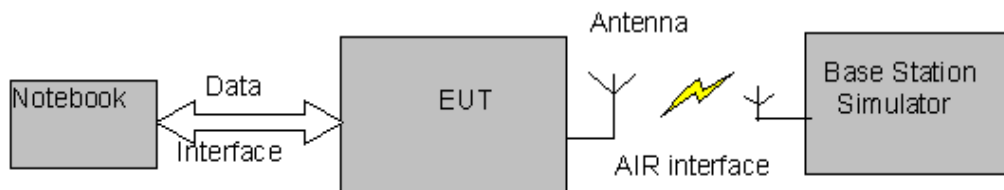
When the EUT state is switched on but without Radio Resource Control (RRC) connection.

3.2 Test System Configuration

Connection Diagram (Mode 1~Mode 2)



Connection Diagram (Mode 3~Mode 4)





3.3 Cables Used during Test

Cable	Quantity	Length	Type of Cable
USB	1	120CM	Shielded

3.4 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Calibrated Deadline	Cal interval (month)
Radio Communication Tester	CMU200	R&S	3608082535	2015-11-03	12
Radio Communication Tester	CMW500	R&S	A111278719	2015-09-03	24
Notebook	MS2220	Acer	3107084890	/	/

4 Electromagnetic Interference (EMI)

4.1 Radiated Disturbance 30MHz to 18GHz

4.1.1 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4-2009. The test distance was 3m. The set-up and test methods were according to ANSI C63.4-2009.

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 (30MHz~1GHz) and AV/PK detector (above 1GHz). 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 1m to 4m. The azimuth range of turntable was 0° to 360°. The receiving antenna has two polarizations V and H.

Measurement bandwidth (RBW) for 30MHz to 1000 MHz: 120 kHz;

Measurement bandwidth (RBW) for 1000MHz to 18000 MHz: 1MHz;

EUT was configured in idle mode and the test performed at worst emission state.

4.1.2 Test setup

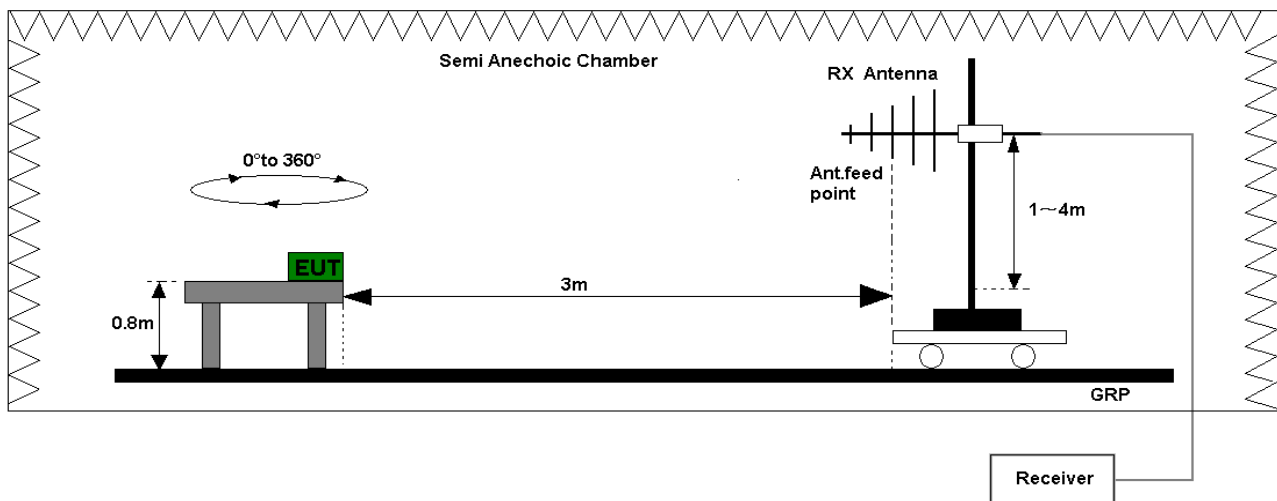


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz)

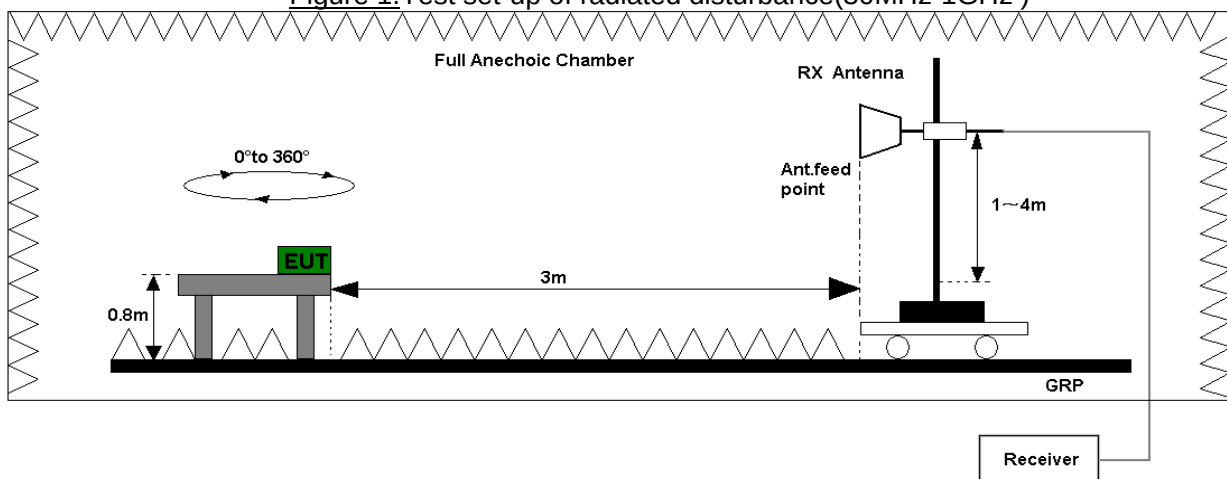


Figure 2. Test set-up of radiated disturbance(above 1GHz)



4.1.3 Test Results

The EUT has met the requirements for Radiated Emission of enclosure port.
Refer to the section 7.1 of this report for test data..

Test Limits (Class B)				
Frequency of Emission (MHz)	Radiated Limit			
	Unit(μ V/m)		Unit(dB μ V/m)	
30-88	100		40	
88-216	150		43.5	
216-960	200		46	
Above 960	500		54	
Above 1000	AV	PK	AV	PK
	500	5000	54	74

4.2 Conducted Disturbance 0.15 MHz to 30MHz

4.2.1 Test Procedure

The Table-top EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm away from LISN. The set-up and test methods were according to ANSI C63.4-2009. Conducted Disturbance at AC Port measurements were undertaken on the L and N Lines. The emissions were measured using a Quasi-Peak Detector and Average Detector. EUT was communicated with the simulator through Air interface, the simulator controls the EUT to transmitter the maximum power which defined in specification of product. The EUT operated on the typical channel.

Measurement bandwidth (RBW) for 150 kHz to 30 MHz: 9 kHz;

The EUT was set in the shielded chamber and operated under nominal conditions.

4.2.2 Test Setup

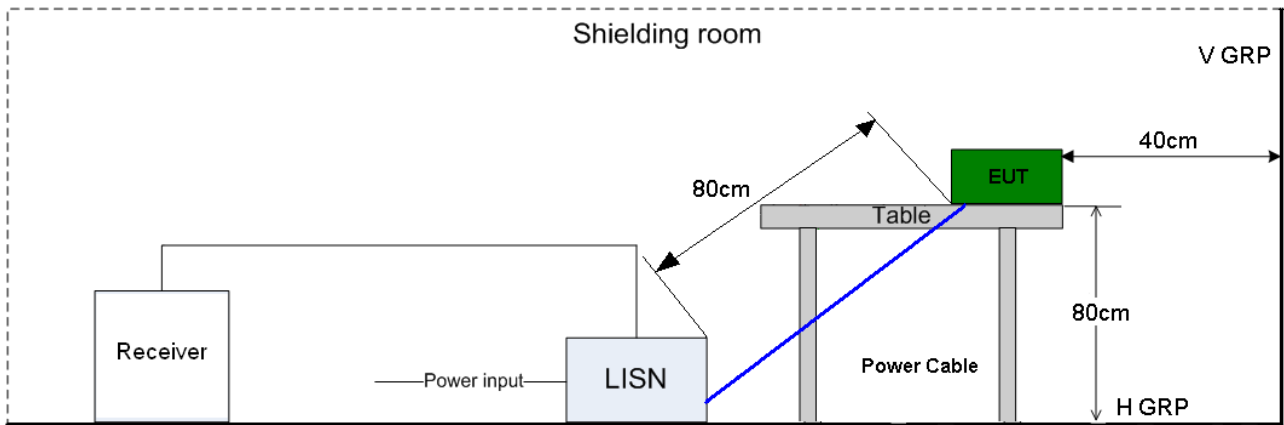


Figure 3. Test Set-up of conducted disturbance

4.2.3 Test Results

The EUT has met requirements for Conducted disturbance.

Refer to the section 7.2 of this report for test data.

Test Limit of AC Power Port		
Frequency range	150kHz ~ 30MHz	
Frequency	Voltage limits	
	QP	AV
0.15MHz~0.5MHz	66-56dB μ V	56-46 dB μ V
0.5MHz-5MHz	56dB μ V	46 dB μ V
5MHz~30MHz	60dB μ V	50 dB μ V

5 Main Test Instruments

Main Test Equipments						
Test item	Test Instrument	Model	S/N	Manufacturer	Calibrated deadline	Cal interval (month)
RE	EMI Test receiver	ESU26	100150	R&S	May.8, 2015	12
	Broadband Antenna	VULB 9163	9163-520	SCHWARZBECK	Dec.20 2015	24
	Horn Antenna	HF906	100683	R&S	Feb.01, 2015	24
CE	EMI Test receiver	ESCI	101163	R&S	Nov. 03, 2015	12
	Artificial Mains Network	ENV216	100382	R&S	Nov. 03, 2015	12
Software Information						
Test Item	Software Name		Manufacturer		Version	
RE	ES-K1		R&S		1.7.1	
CE	EMC32		R&S		V8.40.0	



6 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

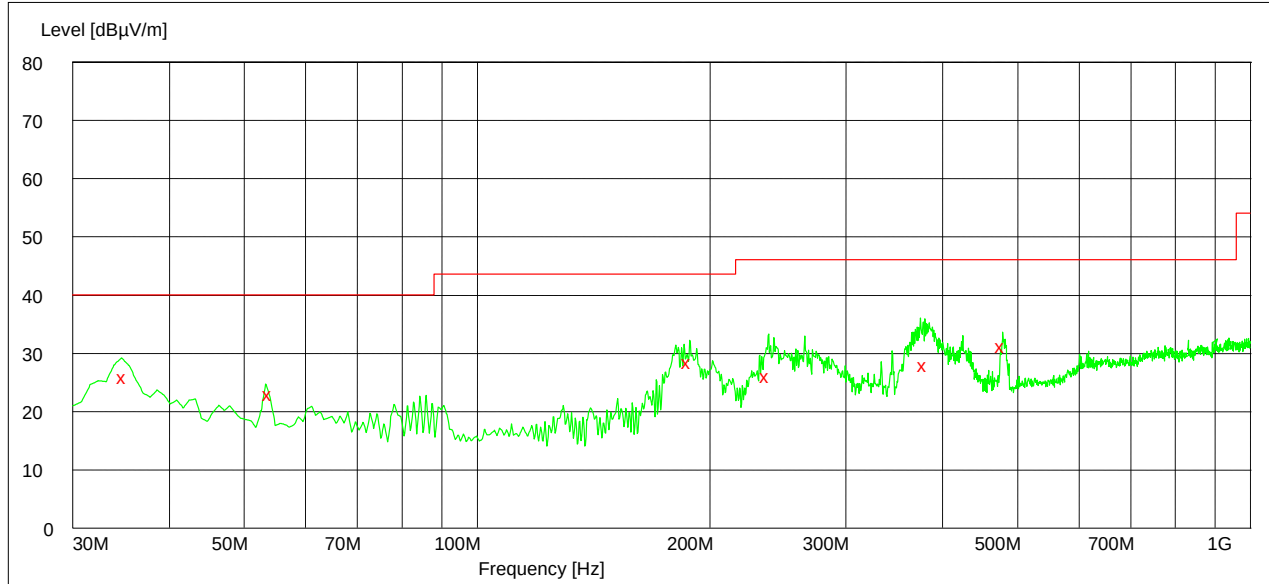
System Measurement Uncertainty		
Items		Extended Uncertainty
RE(30MHz-1GHz)	Field strength (dB μ V/m)	U=4.1dB; k=2
RE(1GHz-18GHz)	Field strength (dB μ V/m)	U=5.1dB; k=2
CE	Disturbance Voltage (dB μ V)	U=2.6dB; k=2

7 Test Data and Graph

Only the worst test result was shown in this report.

7.1 Radiated Disturbance

30MHz~1GHz



MEASUREMENT RESULT: QP Detector

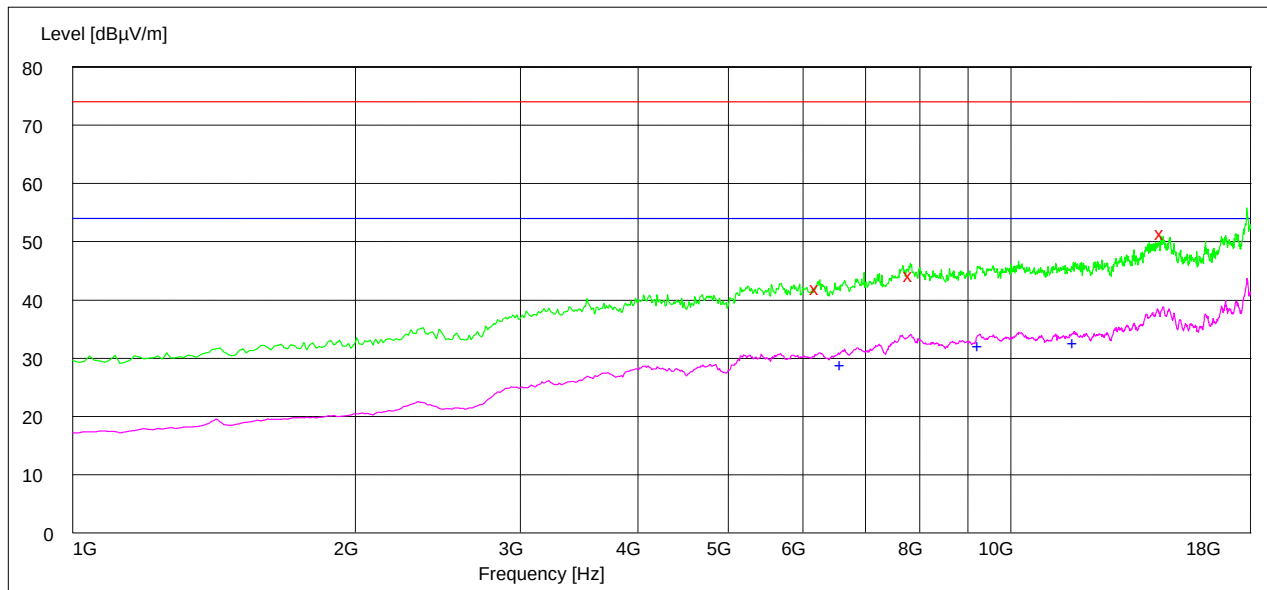
Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
35.016000	26.10	13.5	40.0	13.9	112.0	360.00	VERTICAL
54.000000	23.20	15.0	40.0	16.8	100.0	98.00	VERTICAL
188.004000	28.70	12.8	43.5	14.8	100.0	0.00	VERTICAL
237.188000	26.20	14.2	46.0	19.8	126.0	360.00	HORIZONTAL
379.080000	28.00	18.9	46.0	18.0	112.0	227.00	HORIZONTAL
478.108000	31.40	20.3	46.0	14.6	115.0	202.00	VERTICAL

Note:

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

The reading level is calculated by software which is not shown in the sheet.

1GHz~18GHz



MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
6218.900000	42.20	1.2	74.0	31.8	121.0	220.00	HORIZONTAL
7821.600000	44.40	5.5	74.0	29.6	100.0	133.00	HORIZONTAL
14512.000000	51.50	17.2	74.0	22.5	150.0	44.00	VERTICAL

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
6605.400000	29.00	0.9	54.0	25.0	113.0	312.00	HORIZONTAL
9263.300000	32.20	5.9	54.0	21.8	150.0	166.00	VERTICAL
11693.000000	32.70	8.5	54.0	21.3	100.0	315.00	VERTICAL

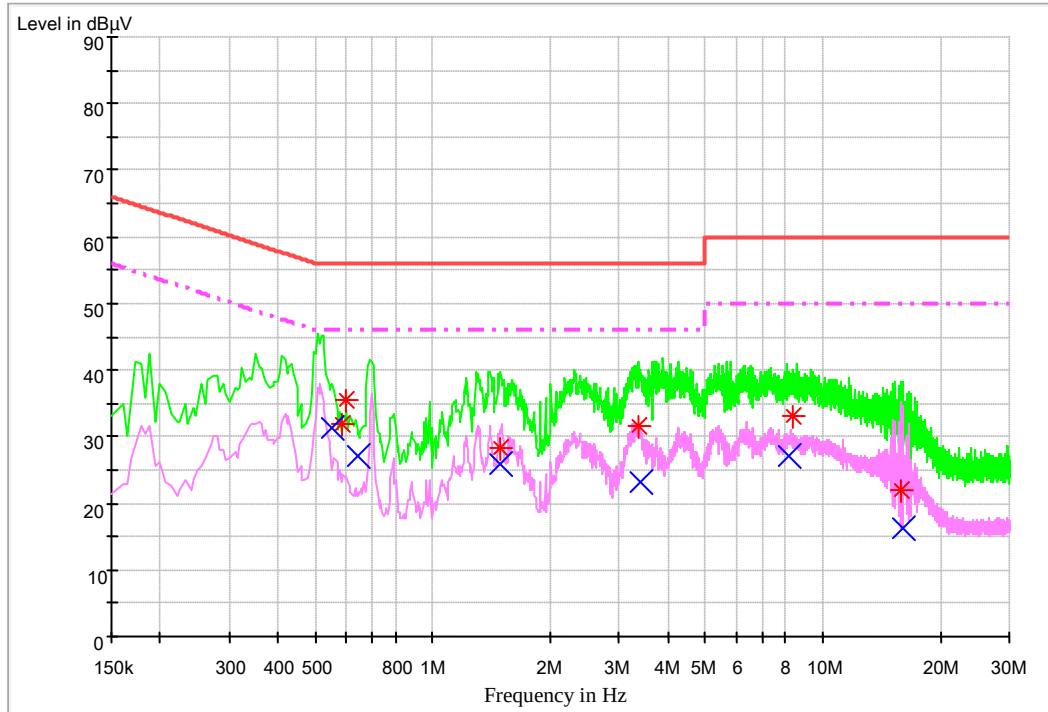
Note:

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

The reading level is calculated by software which is not shown in the sheet.

7.2 Conducted Disturbance

AC Port Test Data



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV	Line	Transd dB	Margin dB	Limit dBμV	PE
0.587422	31.8	N	9.7	24.2	56.0	FLO
0.598654	35.4	N	9.7	20.6	56.0	FLO
1.494551	28.1	L1	9.7	27.9	56.0	FLO
3.379242	31.6	N	9.7	24.4	56.0	FLO
8.398376	33.0	N	9.9	27.0	60.0	FLO
15.888254	21.9	L1	10.1	38.1	60.0	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV	Line	Transd dB	Margin dB	Limit dBμV	PE
0.551572	31.4	N	9.7	14.6	46.0	FLO
0.642132	27.0	L1	9.7	19.0	46.0	FLO
1.487580	26.0	N	9.7	20.0	46.0	FLO
3.385980	23.3	N	9.7	22.7	46.0	FLO
8.163420	27.2	N	9.9	22.8	50.0	FLO
16.048216	16.3	L1	10.0	33.7	50.0	FLO

Note:

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

The reading level is calculated by software which is not shown in the sheet.

-----END-----