



EMC Test Report

Product Name: 1200Mbps Wireless Router

Product Model: WS5200

Report Number: SYBH(Z-EMC)20180202009001-2

FCC ID: QISWS5200

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 Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 6369A-1.
4. The laboratory (Reliability Lab of Huawei Technologies Co., Ltd) is also named “Global Compliance and Testing Center of Huawei Technologies Co., Ltd” , the both names have coexisted since 2009.
5. The laboratory has been recognized by the US Federal Communications Commission (FCC) to perform compliance testing subject to the Commission's Certification rules. The Designation Number is CN1173, and the Test Firm Registration Number is 294140.
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Applicant: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei
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Date of Receipt Test Item: 2018-03-15
Start Date of Test: 2018-03-15
End Date of Test: 2018-03-25

Test Result: Pass

Approved By
(Lab Manager)

2018-03-27
Date

Roger Zhang
Name

Roger Zhang

Signature

Operator
(Test Engineer)

2018-03-25
Date

FengJinhua
Name

Feng Jinhua

Signature



Modification Record


No.	Last Report No.	Modification Description
1	NA	First report

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1 General Information

1.1 EUT Description

EUT Description	
Product Name	1200Mbps Wireless Router
Model Number	WS5200
Input voltage	AC:100~240 V 0.5A DC: 12V 1A
TX Frequency	WIFI 2.4G 2400MHz to 2483.5MHz WIFI 5G 5150MHz to 5250MHz WIFI 5G 5725MHz to 5850MHz
RX Frequency	WIFI 2.4G 2400MHz to 2483.5MHz WIFI 5G 5150MHz to 5250MHz WIFI 5G 5725MHz to 5850MHz
S/N	3SG7S18118000024
HW Version	AMEWS5200M
SW Version	8.0.0.1
EUT Accessory	
Adapter	Manufacture: Huawei Technologies Co.,Ltd. Model: HW-120100U01 Input voltage: 100-240V ~50/60Hz, 0.5 A Output voltage:  12 V 1 A Rated Power: 12 W S/N: U96601HAK00011 A966E4HBN00051

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 1:	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 2017, 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 Mode2	CLASS B	Pass	Site1
<u>Conducted Emissions</u> <input checked="" type="checkbox"/> DC Power Port <input checked="" type="checkbox"/> AC Power Port <input type="checkbox"/> Telecommunication Ports	Mode1 Mode2	CLASS B	Pass	Site1
Note: 1, Measurement taken is within the uncertainty of test system. 2, <input checked="" type="checkbox"/> The item has been tested; <input type="checkbox"/> 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

The EUT was configured, installed, arranged and operated in a manner consistent with typical application. The following mode(s) were applied during the compliance test.

Test Mode	
Mode 1:	EUT with Adapter+ LAN/WAN+ Wireless Service Idle Mode
Mode 2:	EUT with Adapter+ LAN/WAN+ Wireless Service 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.

Worst Case:

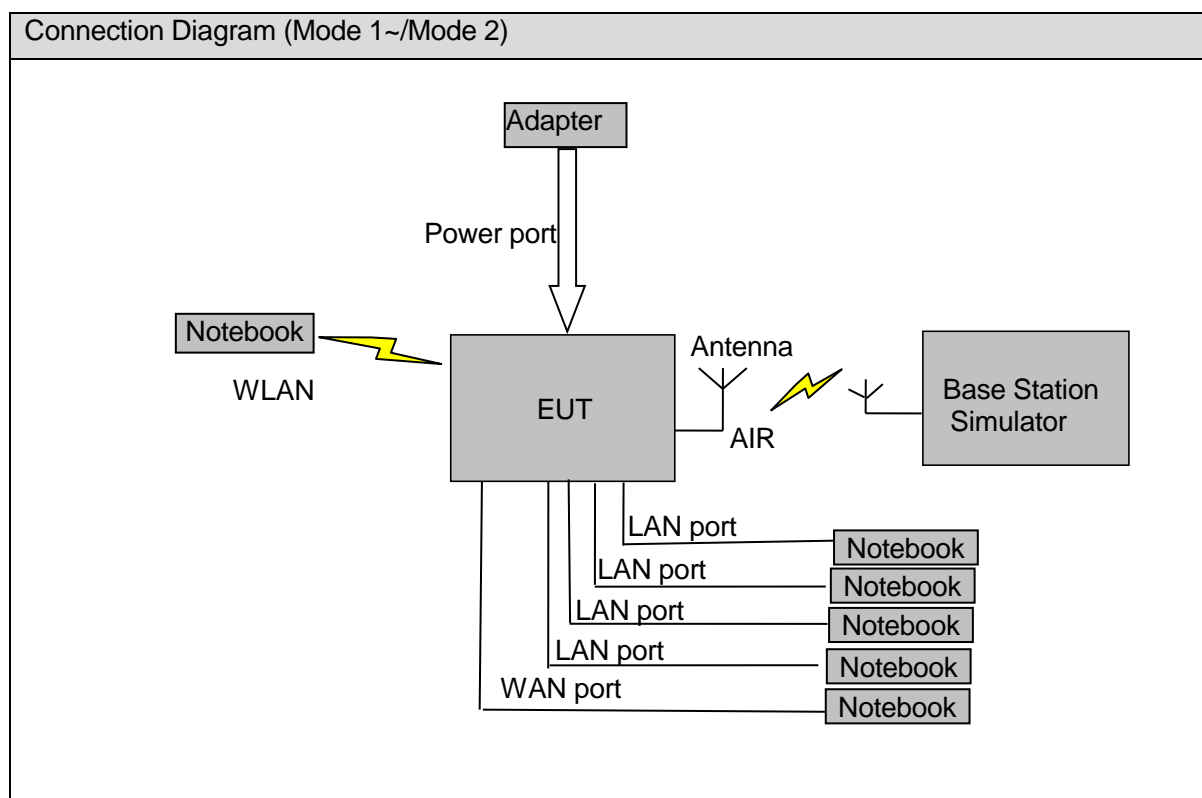
- 1) Radiated Emission

Mode 2: Adapter (Model: HW-120100U01, SN: U96601HAK00011) + LAN/WAN+ Wireless Service idle .This result is the worst case.

- 2) Conducted Emission

Mode 2: Adapter (Model: HW-120100U01, SN: A966E4HBN00051) + LAN/WAN+ Wireless Service Traffic. This result is the worst case.

3.2 Test System Configuration



3.3 Cables Used during Test

Cable	Quantity	Length	Type of Cable
AC Power	1	<3m	unshielded
Lan Cable	5	<3m	unshielded

3.4 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Calibrated Deadline	Cal interval
Notebook	X230	Lenovo	A130911985	N/A	Notebook
Notebook	X230	Lenovo	A131113804	N/A	Notebook
Notebook	X230	Lenovo	A130911972	N/A	Notebook
Notebook	X230	Lenovo	A131111954	N/A	Notebook
Notebook	X230	Lenovo	A121210260	N/A	Notebook

4 Electromagnetic Interference (EMI)

4.1 Radiated Disturbance 30MHz to 40GHz

4.1.1 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4-2014. The test distance was 3m. The set-up and test methods were according to ANSI C63.4-2014.

A preliminary scan and a final scan of the emissions were made from 30 MHz to 40 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 40000 MHz: 1MHz;

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

4.1.2 Test setup

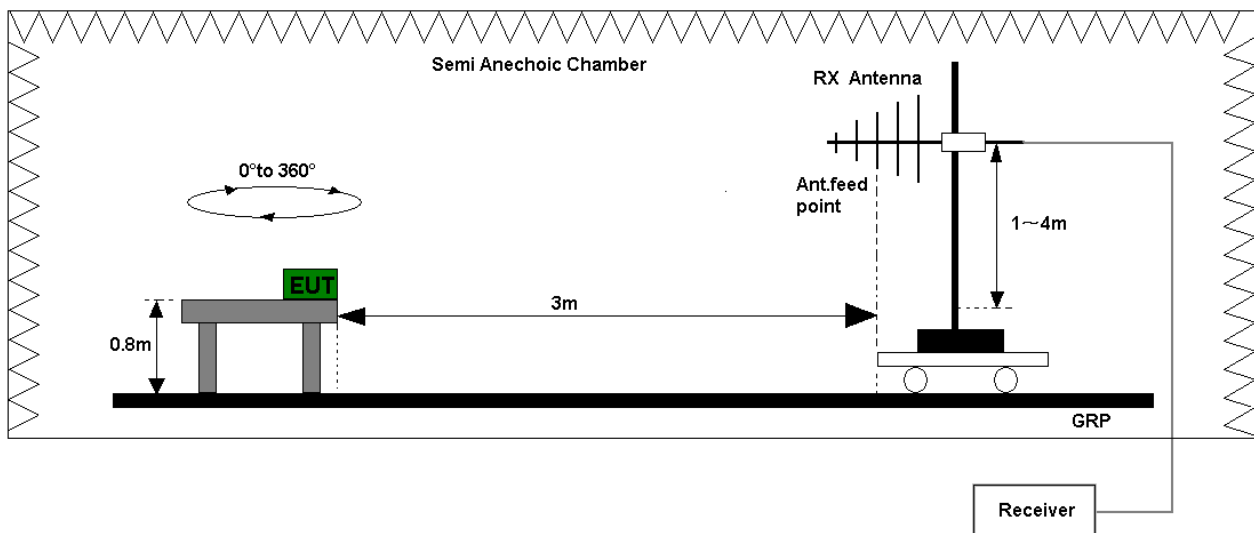


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz)

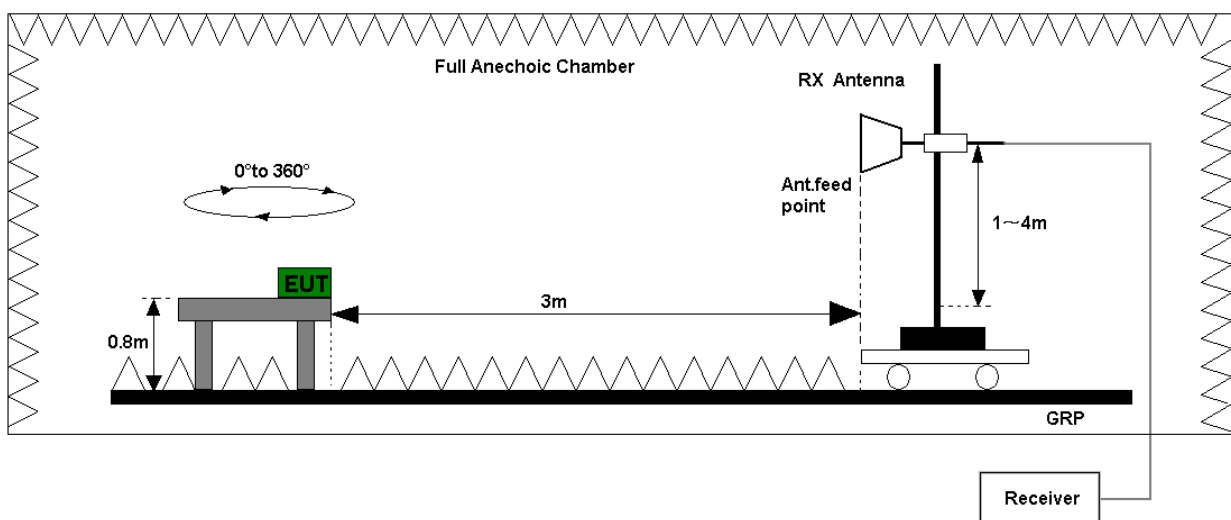


Figure 2. Test set-up of radiated disturbance(above 1GHz)

4.1.3 Test Results

The EUT has met the requirements for Radiated Emission of enclosure port.
Refer to the section 7 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 C63.4-2014. 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

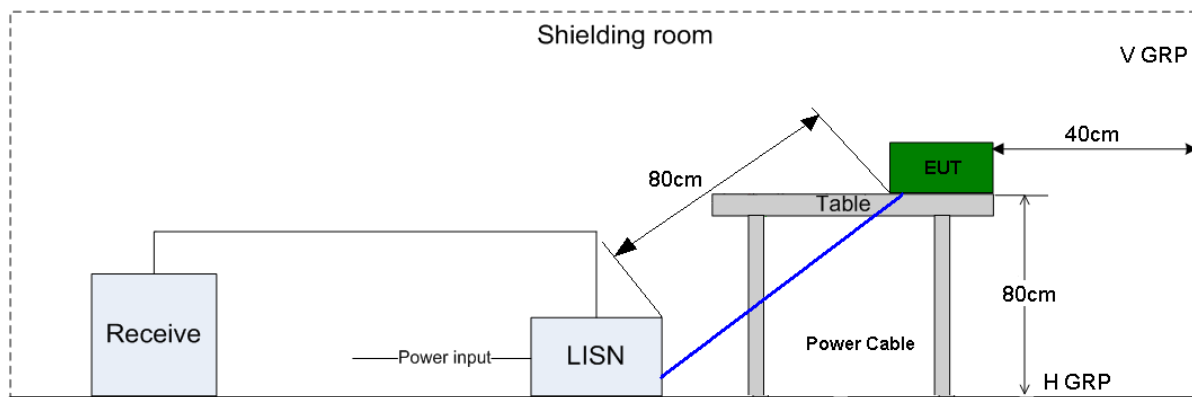


Figure 3. Test Set-up of conducted disturbance

4.2.3 Test Results

The EUT has met requirements for Conducted disturbance of power lines. Refer to the section 7 of this report for test data.

Test Limit of AC Power Port(CLASS B)		
Frequency range	150kHz ~ 30MHz	
Frequency	Voltage limits	
	QP (dBμV)	AV (dBμV)
0.15MHz~0.5MHz	66-56	56-46
0.5MHz-5MHz	56	46
5MHz~30MHz	60	50

5 Main Test Instruments

Main Test Equipments						
Test item	Test Instrument	Model	S/N	Manufacturer	Calibrated Deadline	Cal interval
RE	EMI Test receiver	ESU26	100150	R&S	Jan. 19, 2019	12
	Spectrum Analyzer	FSU43	100048	R&S	Jan. 29, 2019	12
	Broadband Antenna	VULB 9163	9163-491	SCHWARZBECK	Mar. 28, 2019	24
	Horn antenna (18 to 26.5G)	3160-09	5140299	ETS	Jul. 20, 2019	24
	Horn antenna (26.5 to 40G)	3160-10	LM5947	ETS	Jul. 19, 2019	24
	Amplifier	SCU26	10021	R&S	May. 16, 2018	12
	Amplifier	SCU40	10016	R&S	May. 16, 2018	12
	Horn Antenna	HF906	100683	R&S	May.15, 2018	24
CE	EMI Test receiver	ESCI	101163	R&S	May. 15, 2018	12
	Artificial Mains Network	ENV4200	100134	R&S	May. 15, 2018	12
	Artificial Mains Network	ENV216	100382	R&S	May.29, 2018	12
Software Information						
Test Item	Software Name	Manufacturer		Version		
RE	EMC32	R&S		V9.25.0		
CE	EMC32	R&S		V9.25.0		

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 (dBμV/m)	U=4.1dB; k=2
RE(1GHz-18GHz)	Field strength (dBμV/m)	U=5.1dB; k=2
RE(18 GHz-26.5GHz)	Field strength (dBμV/m)	U=4.82 dB; k=2
RE (26.5 GHz- 40GHz)	Field strength (dBμV/m)	U=5.22 dB; k=2
CE	Disturbance Voltage (dBμV)	U=2.5dB; k=2

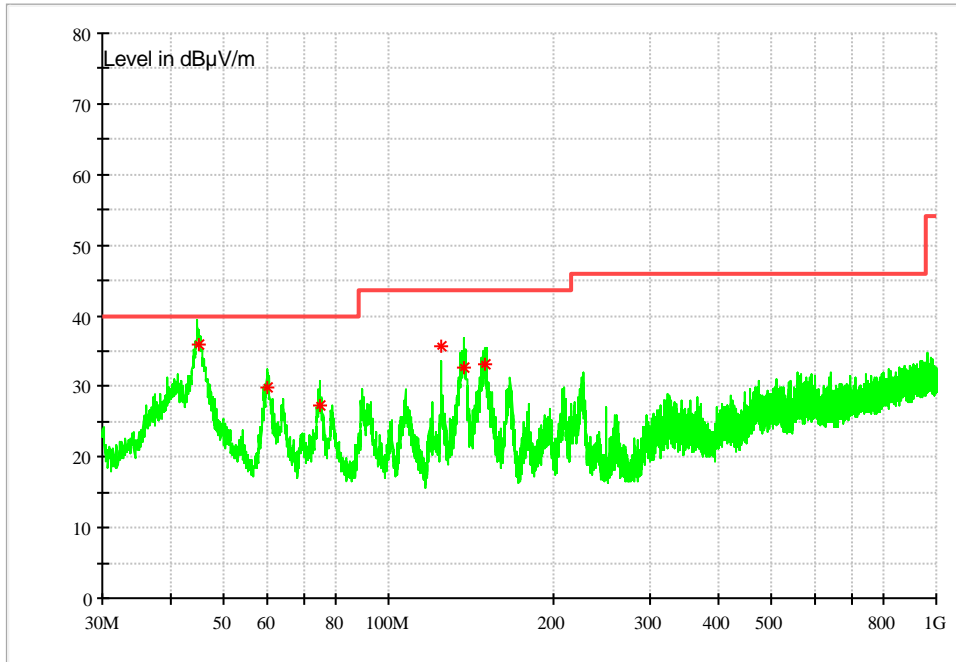
7 Test Data and Graph

Only the worst test results were shown

7.1 Radiated Disturbance

7.1.1 30MHz~1GHz

Test Mode: Mode1



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
45.093700	35.88	16.5	40.00	4.12	101.0	71.0	V
60.130700	29.90	12.1	40.00	10.10	101.0	46.0	V
74.697700	27.37	7.8	40.00	12.63	101.0	65.0	V
124.988940	35.69	14.0	43.50	7.81	102.0	92.0	V
137.338680	32.68	13.6	43.50	10.82	100.0	179.0	V
149.678780	33.15	12.5	43.50	10.35	100.0	192.0	V

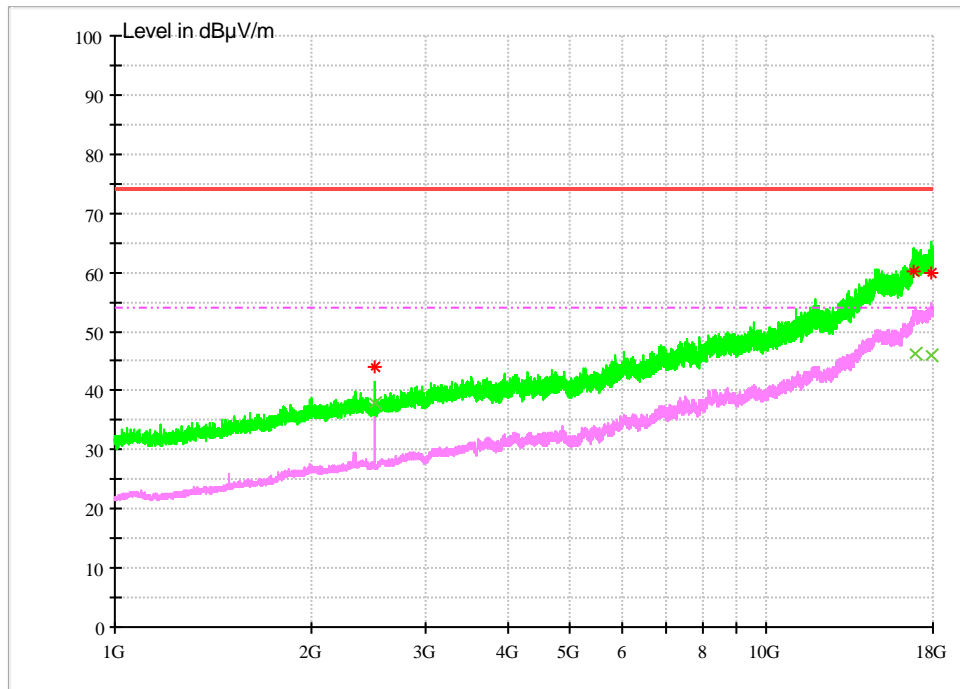
Note:

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.

7.1.2 1GHz~18GHz

Test Mode: Mode1



MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
2500.014	44.09	-7.6	74	29.91	100	159	V
16861.366	60.13	20.9	74	13.87	200	228	V
17934.965	59.8	21.5	74	14.2	154	286	V

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
2500.012	37.88	-7.6	54	16.12	100	163	V
16874.618	46.26	21	54	7.74	100	193	V
17885.16	46.1	21.6	54	7.9	100	137	V

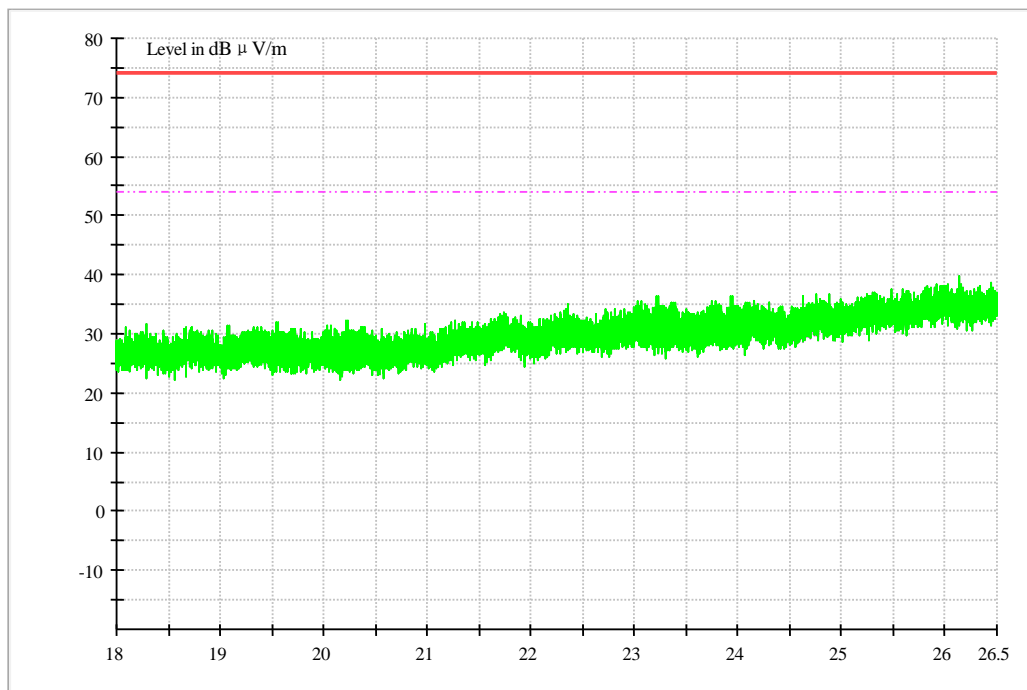
Note:

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.

7.1.3 18GHz~26.5GHz

Test Mode: Mode1

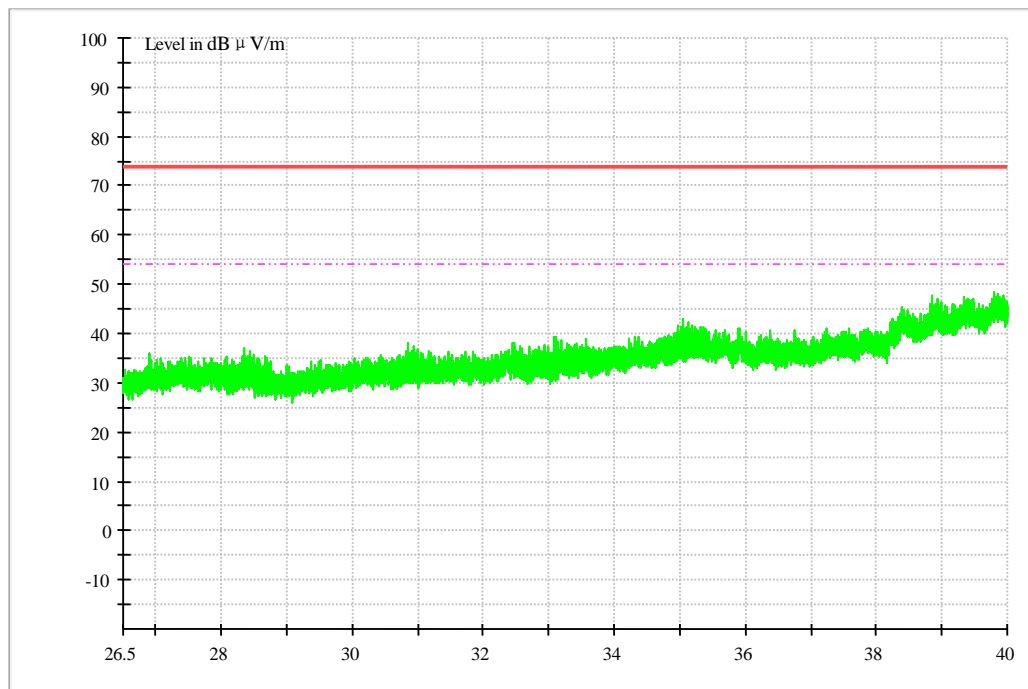


NOTE 1: The data was measured by Peak detector.

NOTE 2: No peak found in the Test Range of "18 GHz to 26.5GHz"

7.1.4 26.5GHz~40GHz

Test Mode: Mode1



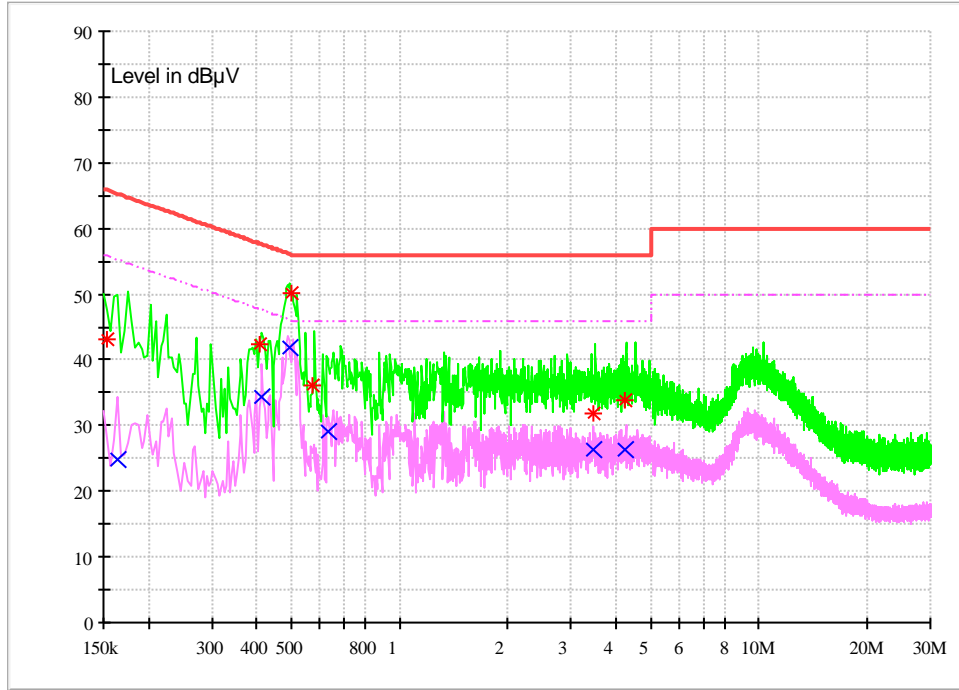
NOTE 1: The data was measured by Peak detector.

NOTE 2: No peak found in the Test Range of "26.5 GHz to 40GHz"

7.2 Conducted Disturbance

7.2.1 AC Port Test Data

Test Mode: Mode2



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV	Line	Transd dB	Margin dB	Limit dBμV	PE
0.153048	43.1	L1	9.7	22.73	65.83	FLO
0.408959	42.35	L1	9.7	15.32	57.67	FLO
0.500955	50.14	L1	9.7	5.86	56	FLO
0.570548	36.09	L1	9.7	19.91	56	FLO
3.47668	31.78	N	9.8	24.22	56	FLO
4.253623	33.76	L1	9.8	22.24	56	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV	Line	Transd dB	Margin dB	Limit dBμV	PE
0.164553	24.91	N	9.7	30.32	55.23	FLO
0.413474	34.42	L1	9.7	13.16	47.58	FLO
0.494714	41.94	L1	9.7	4.15	46.09	FLO
0.630594	29.01	L1	9.7	16.99	46	FLO
3.473944	26.28	L1	9.8	19.72	46	FLO
4.23585	26.34	L1	9.8	19.66	46	FLO

-----END-----