



EMC Test Report

Product Name: HUAWEI Wingle E8231

Model Number: E8231s-6

Report No: SYBH(Z-EMC)074112013-2

FCC ID: QISE8231S-6

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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.
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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: Oct.30,2013
Start Date of Test: Nov.27,2013
End Date of Test: Dec.03,2013
Test Result: Pass

**Approved By
(Lab Manager)**

2013-12-11
Date

Liu Chunlin
Name

Signature

Liu Chunlin

**Prepared by
(Test Engineer)**

2013-12-11
Date

Wu Yafeng
Name

Signature

Wu Yafeng



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1 General Information

1.1 EUT Description

EUT Description	
Product Name	HUAWEI Wingle E8231
Model Number	E8231s-6
Input voltage	DC 5V
TX Frequency	GSM 850:824MHz To 849MHz GSM1900:1850MHz To 1910MHz WCDMA Band II :1850MHz To 1910MHz WCDMA Band V : 824MHz To 849MHz WIFI: 2412MHz to 2462MHz
RX Frequency	GSM850:869MHz To 894MHz GSM1900:1930MHz To 1990MHz WCDMA BAND II :1930MHz To 1990MHz WCDMA BAND V : 869MHz To 894MHz WIFI: 2412MHz to 2462MHz
S/N	N4B01A93B1400133
HW Version	CH1E8231SM
SW Version	22.621.01.00.00
EUT Accessory	
Data cable	Data Cable USB Male to USB Female, shielded
Adapter	Brand: HUAWEI Model: HW-050100U4W Input voltage: 100-240V~50/60Hz, 0.2A Output voltage: 5.0V  1.0A Rated Power: 5W S/N: HWBYA01DB050002 S/N: HWUEA01DA200001

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 15:2012, 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,Mode3	CLASS B	Pass	Site1
<u>Conducted Emissions</u> ☒ DC Power Port ☒ AC Power Port ☐ Telecommunication Ports	Mode1~Mode4	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 PC+ Idle Mode
Mode 2:	EUT with PC+ Traffic Mode
Mode 3:	Adapter + Idle Mode
Mode 4:	Adapter +Traffic

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.

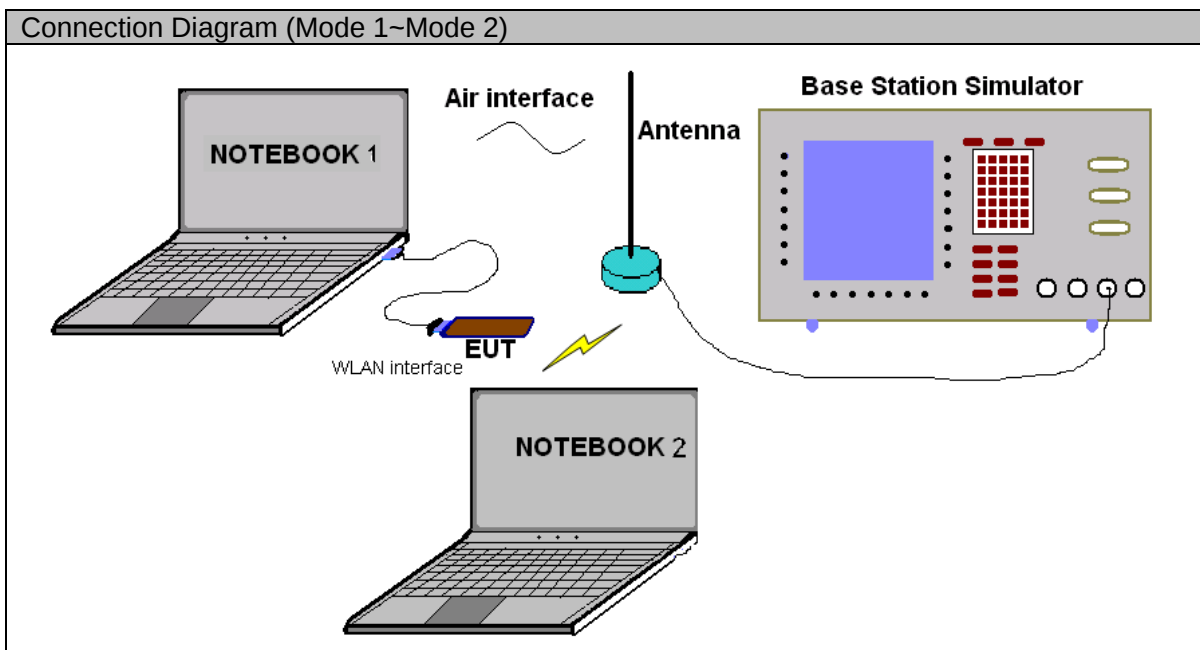
Traffic Mode:

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



The diagram illustrates the experimental setup for the proposed system. It shows a **NOTEBOOK** connected to a **WIFI Adapter** and a **power** source. The **WIFI Adapter** is connected to an **EUT** (External Unit Test). The **EUT** is connected to an **Antenna** via an **Air interface**. The **Antenna** is connected to a **Base Station Simulator**.



3.3 Cables Used during Test

Cable	Quantity	Length	Type of Cable
USB	1	<3m	shielded

3.4 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Calibrated Deadline	Cal interval (month)
Radio Communication Tester	CMU200	R&S	3608105673	2013-12-22	12
Notebook	X200	ThinkPad	31090403588	/	/
Notebook	T61	Lenovo	3108052581	/	/

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

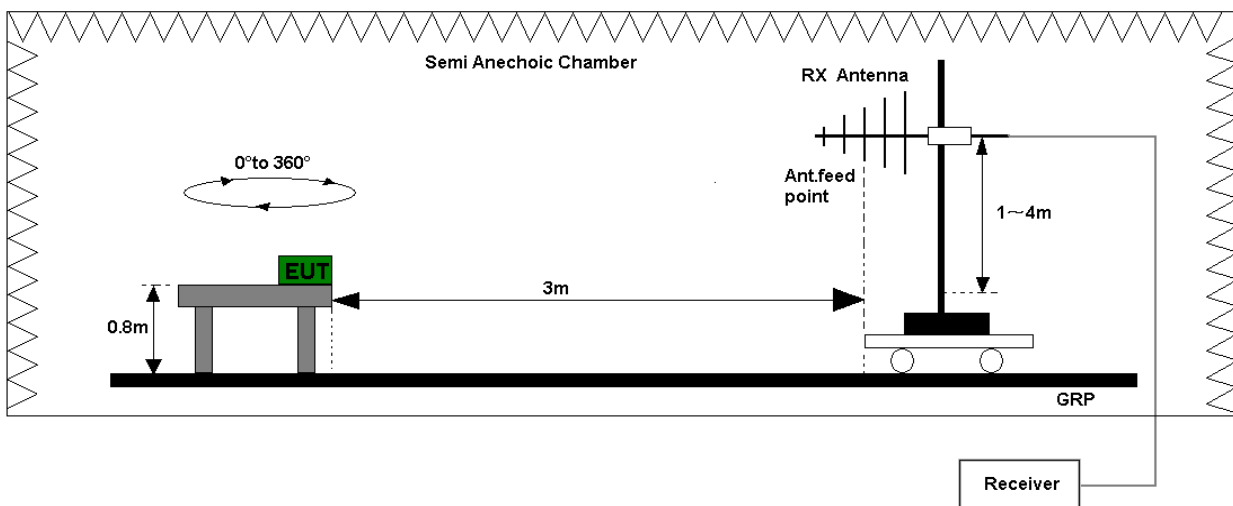


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz)

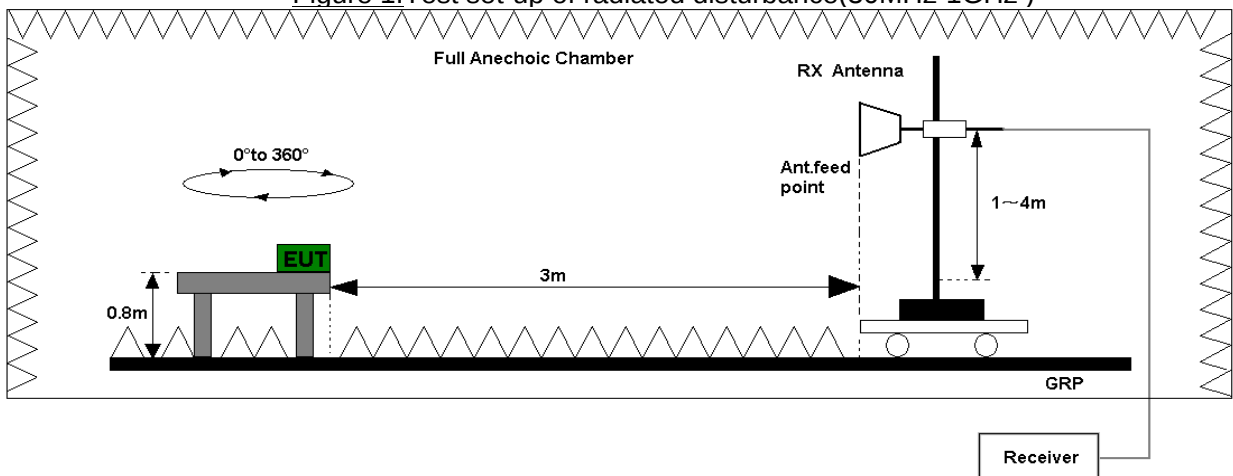


Figure 2. Test set-up of radiated disturbance(above 1GHz)

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

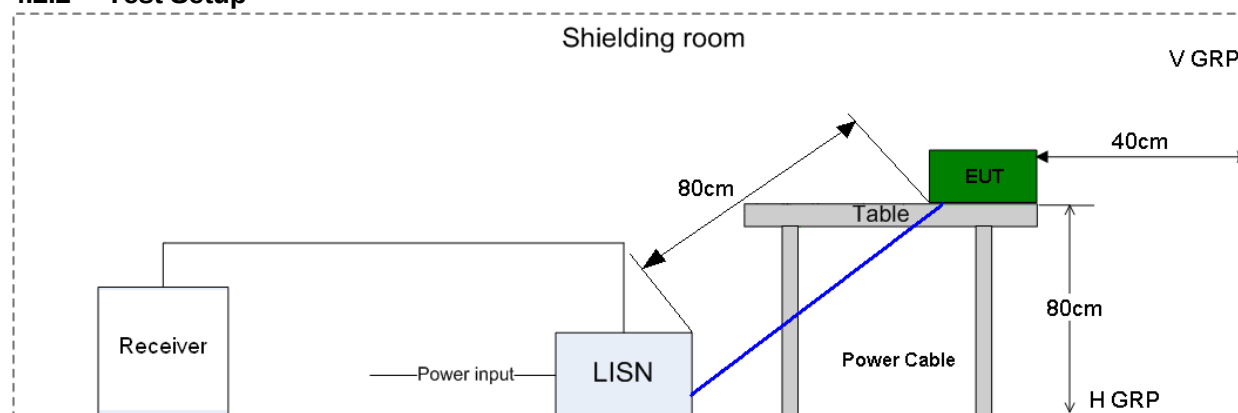


Figure 3. Test Set-up of conducted disturbance

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	66-56dBμV	56-46 dBμV
0.5MHz-5MHz	56dBμV	46 dBμV
5MHz~30MHz	60dBμV	50 dBμV

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.14, 2014	12
	Broadband Antenna	VULB 9163	9163-356	SCHWARZBECK	May.27 2014	24
	Horn Antenna	HF906	100683	R&S	Feb.01, 2015	24
CE	EMI Test receiver	ESCI	101163	R&S	Jan. 28, 2014	12
	Artificial Mains Network	ENV216	100382	R&S	Jan. 28, 2014	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:

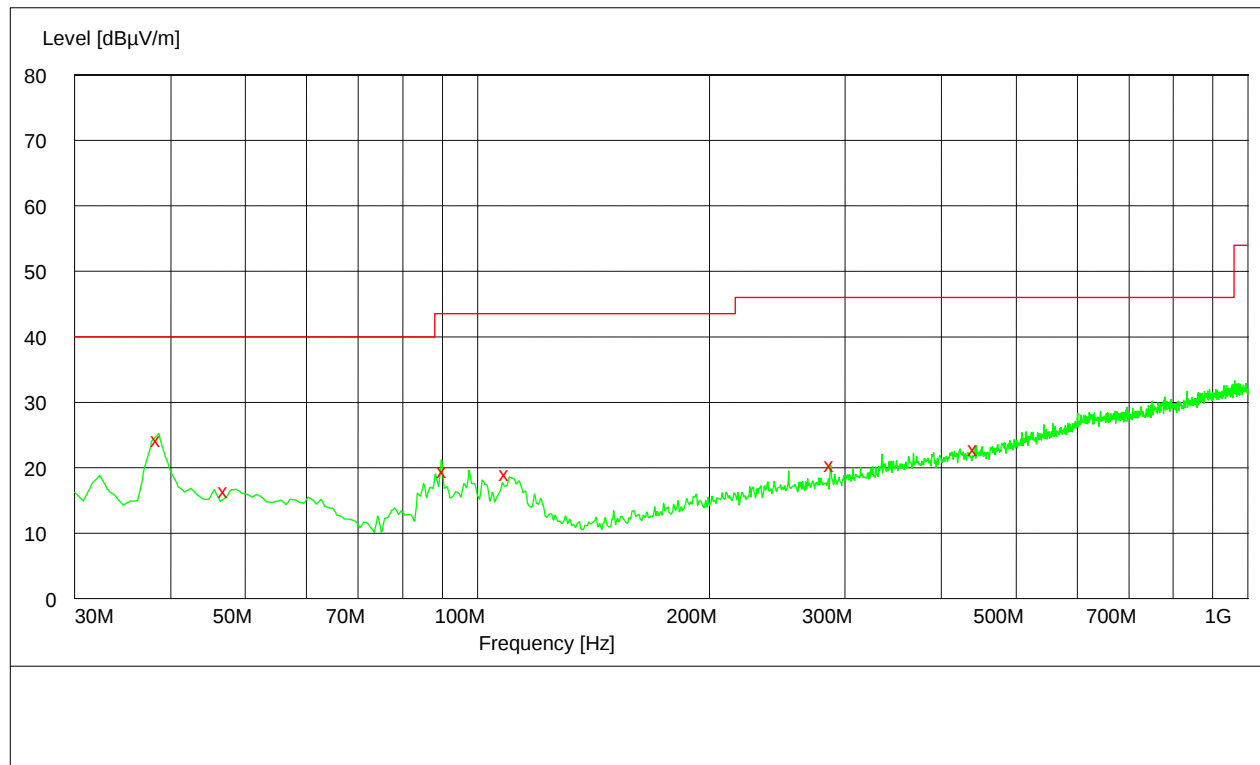
System Measurement Uncertainty		
Items		Extended Uncertainty
RE(30MHz-1GHz)	Field strength (dB μ V/m)	U=4.1dB; k=2
RE(1GHz-18GHz)	Field strength (dB μ V/m)	U=5.1dB; k=2
CE	Disturbance Voltage (dB μ V)	U=2.6dB; k=2

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

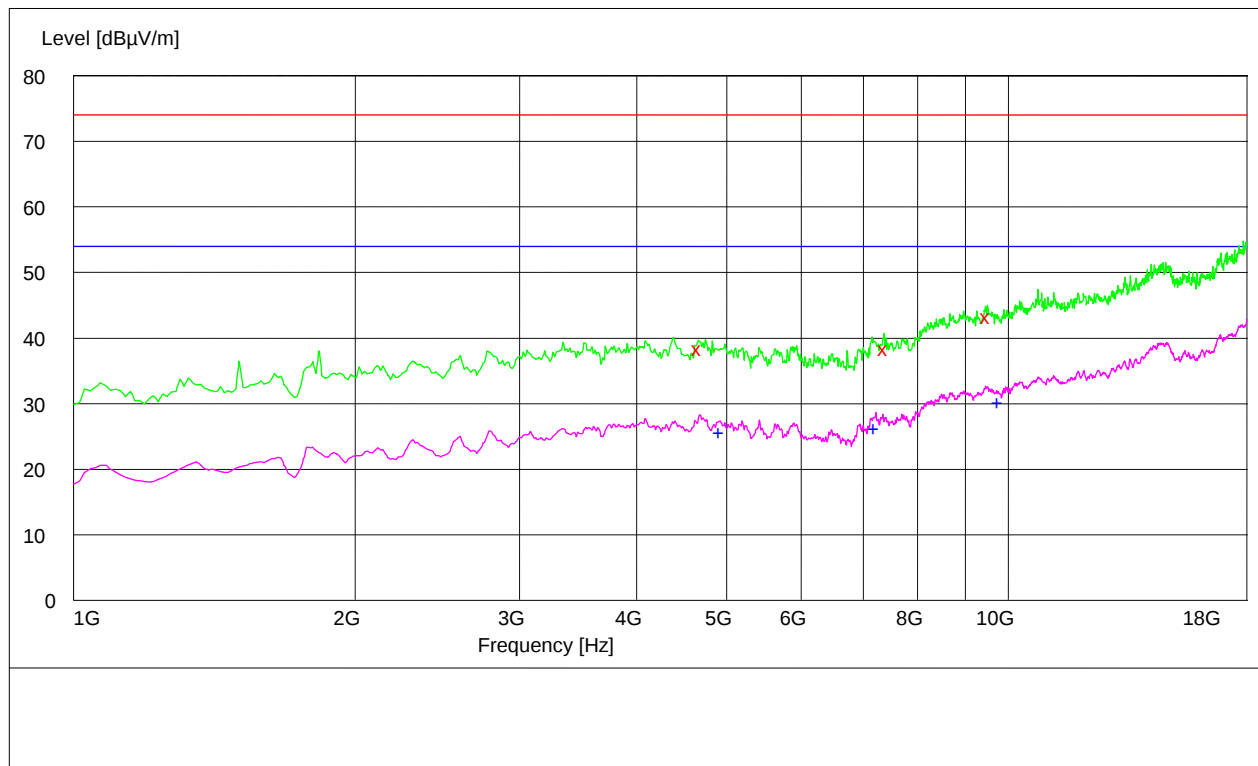
Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
38.530000	24.40	12.9	40.0	15.6	103.0	156.00	VERTICAL
47.160000	16.60	13.0	40.0	23.4	103.0	276.00	VERTICAL
90.600000	19.60	12.0	43.5	25.9	180.0	142.00	VERTICAL
109.140000	19.20	12.4	43.5	24.3	103.0	159.00	VERTICAL
288.000000	20.60	15.3	46.0	25.4	118.0	350.00	HORIZONTAL
442.380000	23.10	19.0	46.0	22.9	299.0	232.00	HORIZONTAL

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
4665.400000	38.40	-2.8	74.0	35.6	100.0	223.00	HORIZONTAL
7384.500000	38.50	2.7	74.0	35.5	100.0	263.00	VERTICAL
9502.000000	43.30	5.8	74.0	30.7	100.0	218.00	VERTICAL

MEASUREMENT RESULT: AV Detector

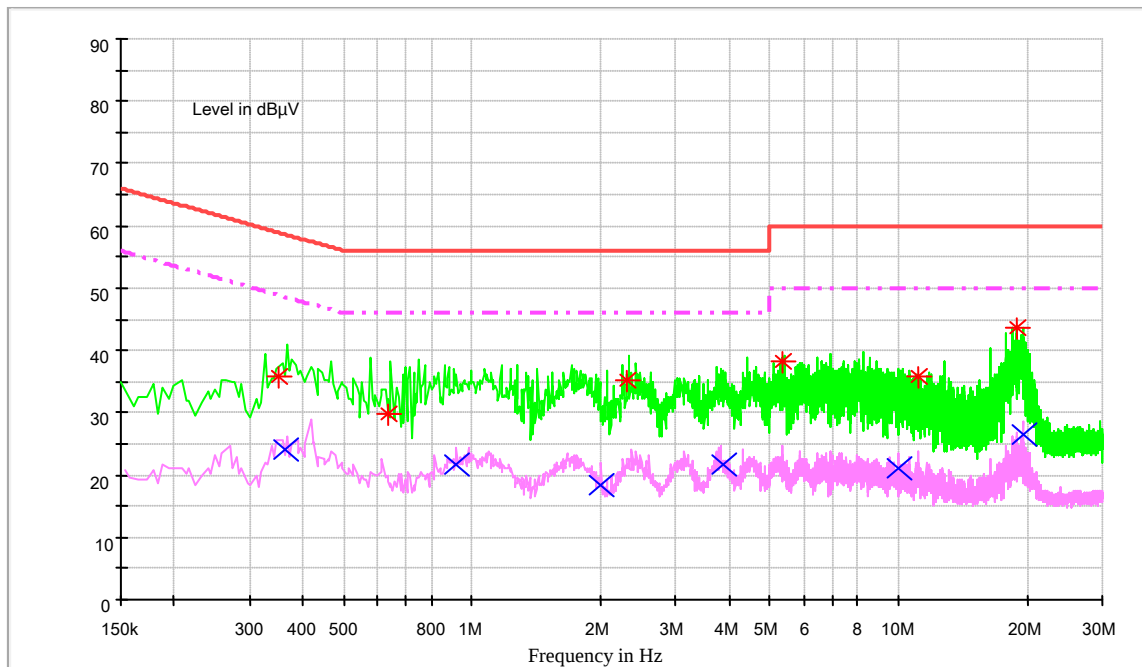
Frequency MHz	Level dBμV/ m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
4920.300000	25.60	-2.0	54.0	28.4	100.0	91.00	HORIZONTAL
7210.700000	26.20	2.5	54.0	27.8	100.0	194.00	VERTICAL
9766.500000	30.30	6.0	54.0	23.7	100.0	151.00	HORIZONTAL

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
0.349485	36.0	L1	9.7	23.0	59.0	FLO
0.632017	29.9	L1	9.7	26.1	56.0	FLO
2.297392	35.2	L1	9.7	20.8	56.0	FLO
5.350624	38.2	L1	9.8	21.8	60.0	FLO
11.103022	35.8	L1	9.9	24.2	60.0	FLO
18.899716	43.6	N	10.1	16.4	60.0	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV	Line	Transd dB	Margin dB	Limit dBμV	PE
0.364582	24.2	N	9.7	24.4	48.6	FLO
0.918683	21.7	N	9.7	24.3	46.0	FLO
1.989154	18.3	N	9.7	27.7	46.0	FLO
3.882413	21.7	N	9.7	24.3	46.0	FLO
10.008784	21.1	N	9.9	28.9	50.0	FLO
19.493663	26.4	N	10.1	23.6	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.

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