



EMC Test Report

Product Name: Smart Phone

Model Number: HUAWEI GRA-L09

Report No: SYBH(Z-EMC)028022015-2

FCC ID: QISGRA-L09

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1 General Information

1.1 EUT Description

EUT Description	
Product Name	Smart Phone
Model Number	HUAWEI GRA-L09
Input voltage	DC 3.8V
TX Frequency	GSM 850:824MHz to 849MHz GSM1900:1850MHz to 1910MHz WCDMA BAND II: 1850MHz to1910MHz WCDMA BAND IV: 1713MHz to 1753MHz WCDMA BAND V: 824MHz to 849MHz LTE Band 2: 1850MHz to 1910MHz LTE Band 4: 1710MHz to 1755MHz LTE Band 5: 824MHz to 849MHz LTE Band 7: 2500MHz to 2570MHz LTE Band 12: 699MHz to 716MHz LTE Band 17: 704MHz to 716MHz LTE Band 25: 1850MHz to 1915MHz LTE Band 26: 814MHz to 849MHz BT/WIFI: 2400MHz to 2483.5MHz
RX Frequency	GSM850:869MHz to 894MHz GSM1900:1930MHz to 1990MHz WCDMA BAND II: 1930MHz to 1990MHz WCDMA BAND IV: 2113MHz to 2153MHz WCDMA BAND V: 869MHz to 894MHz LTE Band 2: 1930MHz to 1990MHz LTE Band 4: 2110MHz to 2155MHz LTE Band 5: 869MHz to 894MHz LTE Band 7: 2620MHz to 2690MHz LTE Band 12: 729MHz to 746MHz LTE Band 17: 734MHz to 746MHz LTE Band 25: 1930MHz to 1995MHz LTE Band 26: 859MHz to 894MHz BT/WIFI: 2400 MHz to 2483.5MHz GPS: 1575.42MHz
S/N	S7M0115128000088
HW Version	HL2UGRACEM
SW Version	M100-L09V100R1001C900B022
EUT Accessory	
Data cable	Data Cable USB A Male to Micro USB, Shielded
Adapter	Brand: HUAWEI Model: HW-050100E2W Input voltage: 100-240V 50/60Hz ,0.2A Output voltage: 5V === 1A Rated Power: 5W S/N: HWBYAGD90700692 S/N: HWHKABD82419807



Adapter	Brand: HUAWEI Model: HW-050100U2W Input voltage: 100-240V 50/60Hz ,0.2A Output voltage: 5V === 1A Rated Power: 5W S/N: HWBYAAD80620678 S/N: HWHKAAD92515686
Adapter	Brand: HUAWEI Model: HW-050100B2W Input voltage: 100-240V 50/60Hz ,0.2A Output voltage: 5V === 1A Rated Power: 5W S/N: BYAGD92600361 S/N: HWHKAADA1100719
Adapter	Brand: HUAWEI Model: HW-050100A2W Input voltage: 100-240V~50/60Hz, 0.2A Output voltage: 5.0V === 1.0A Rated Power: 5W S/N: BYAADA2900011 S/N: HWHKAADA1800045
Adapter	Brand: HUAWEI Model: HW-050100E01 Input voltage: 100-240V~50/60Hz, 0.2A Output voltage: 5.0V === 1.0A Rated Power: 5W S/N: B66732F1L00051 S/N: Y66701F1T00041 S/N: H6671RF2200029 S/N: P66701F2900020
Adapter	Brand: HUAWEI Model: HW-050100B01 Input voltage: 100-240V~50/60Hz, 0.2A Output voltage: 5.0V === 1.0A Rated Power: 5W S/N: B66887F1R00117 S/N: B668XXYMDSSSSS S/N: H6681RF1T00061 S/N: Y66801F2A00010
Adapter	Brand: HUAWEI Model: HW-050100A01 Input voltage: 100-240V~50/60Hz, 0.2A Output voltage: 5.0V === 1.0A Rated Power: 5W S/N: Y66601F1T00038 S/N: B66601F1Y00005 S/N: B666XXYMDSSSSS S/N: H6661RF1L00031
Adapter	Brand: HUAWEI Model: HW-050100U01 Input voltage: 100-240V~50/60Hz, 0.2A



	Output voltage: 5.0V $\overline{\overline{\overline{\quad}}}$ 1.0A Rated Power: 5W S/N: Y66901F1T00128 S/N: B66932F2900101 S/N: H6691RF2200118 S/N: B669XXYMDSSSSS
Rechargeable Li-ion	Brand: HUAWEI Battery Model: HB3447A9EBW Rated capacity: 2600mAh Nominal Voltage: $\overline{\overline{\overline{\quad}}}$ +3.8V Charging Voltage: $\overline{\overline{\overline{\quad}}}$ +4.35V

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-Mode2 Mode 4	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	Mode 1-Mode 4	CLASS B	Pass	Site1
Note: 1, Measurement taken is within the measurement uncertainty of measurement 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

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:	Adapter + Earphone + Camera On + Idle
Mode 2:	Adapter + Earphone + Playing + Idle
Mode 3:	Adapter + Earphone + Traffic
Mode 4:	USB Copy(EUT with PC) + Earphone + Idle

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.

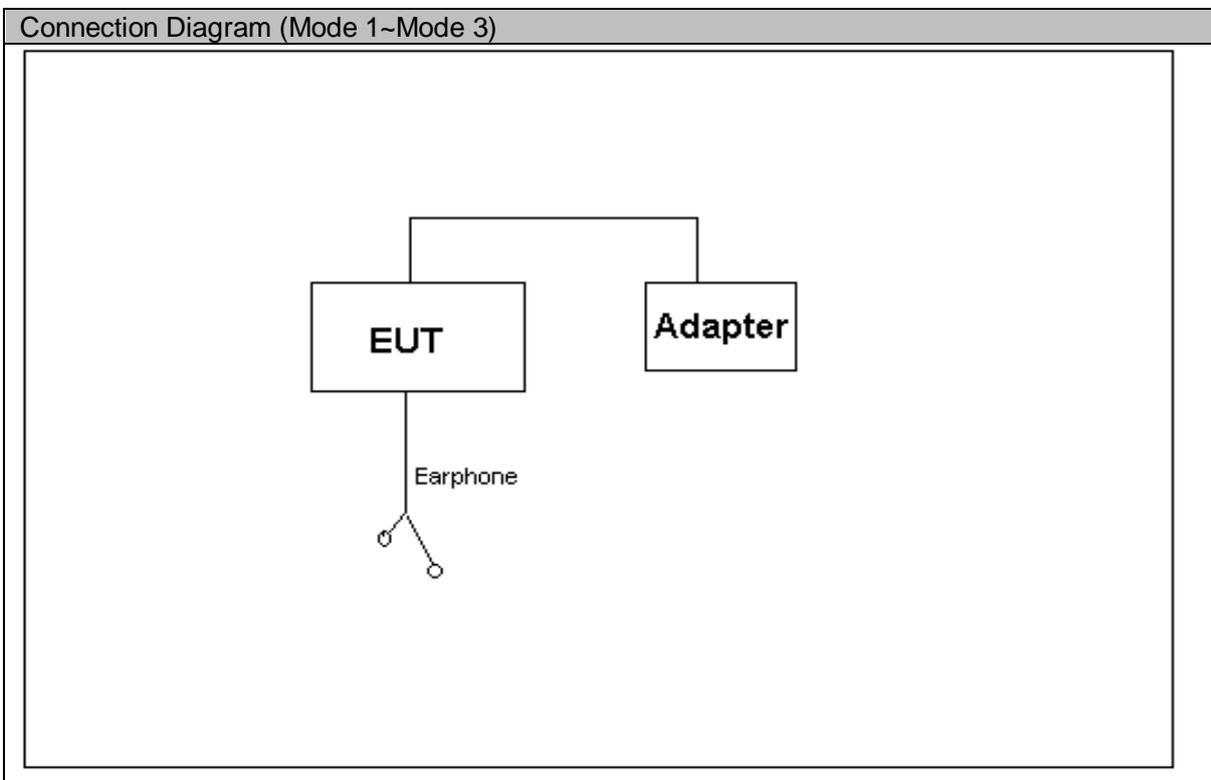
Traffic Mode:

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

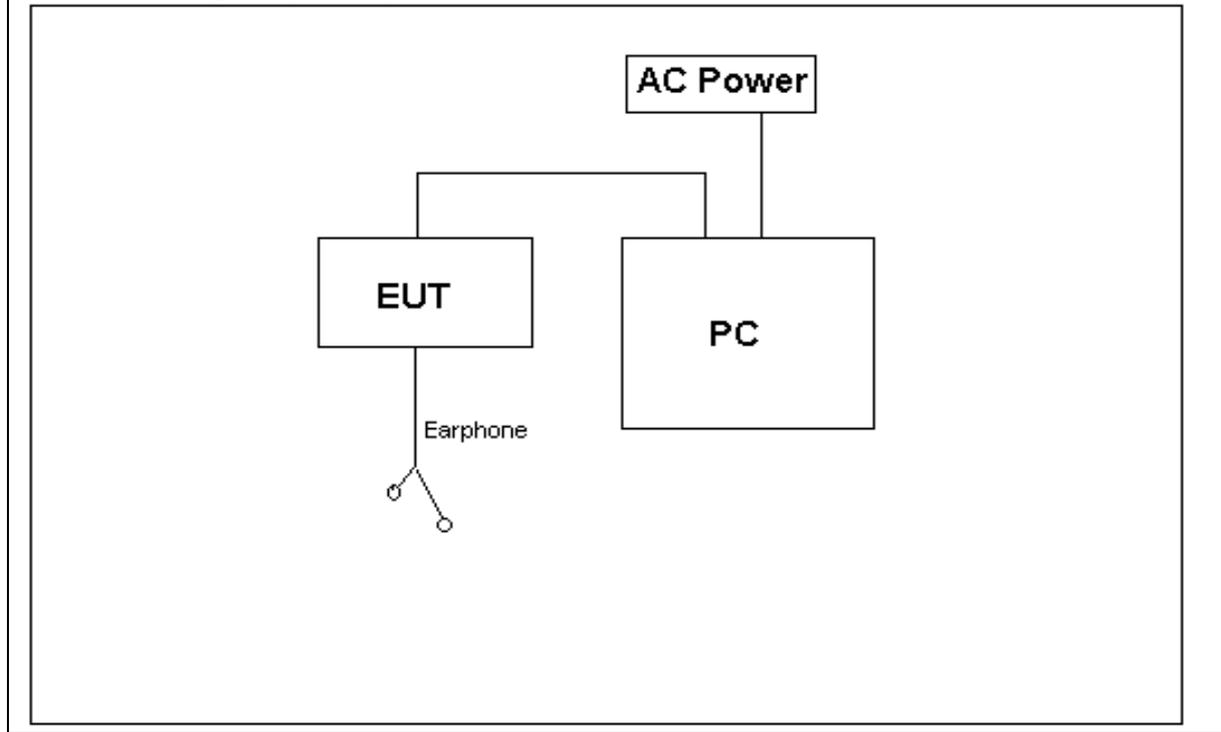
Idle Mode:

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

3.2 Test System Configuration



Connection Diagram (Mode 4)





3.3 Cables Used during Test

Cable	Quantity	Length	Type of Cable
USB	1	<3m	Shielded
Earphone	1	<3m	Unshielded

3.4 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Calibrated Deadline	Cal interval (month)
Radio Communication Tester	CMU200	R&S	3607033573	2015-09-12	12
Radio Communication Tester	CMW500	R&S	A111278719	2015-09-17	12
Notebook	X200	ThinkPad	31090403588	/	/

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

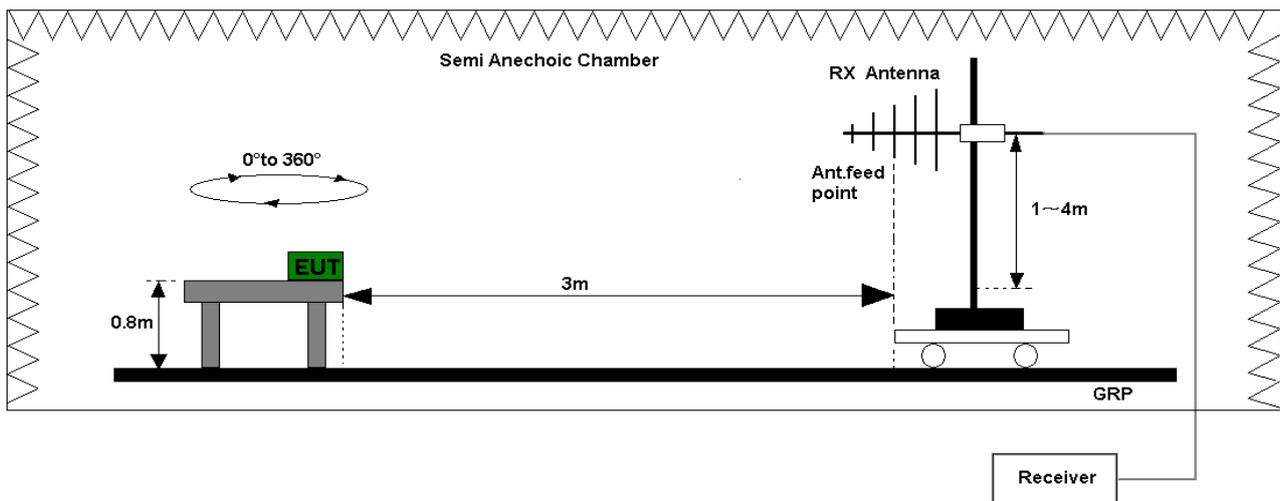


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz)

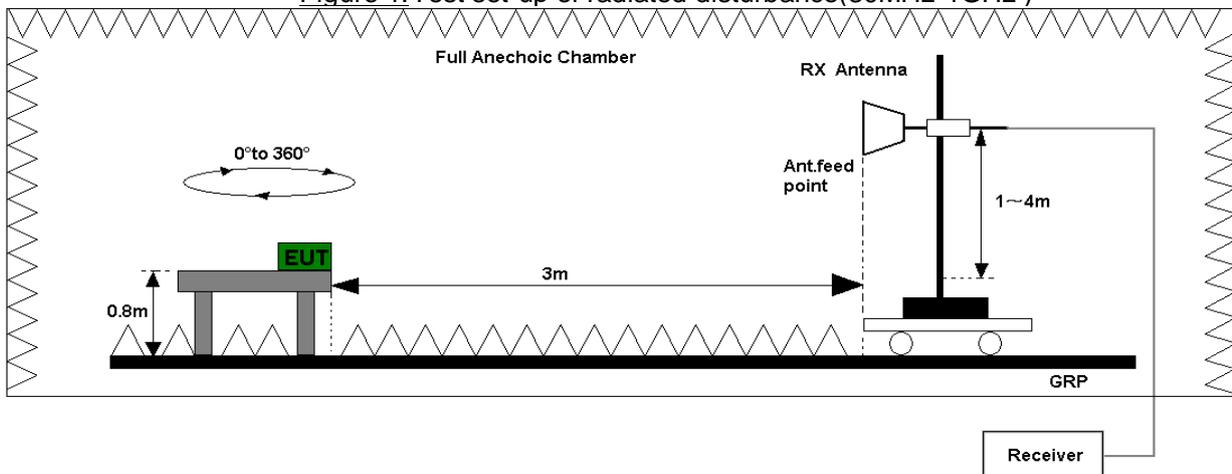


Figure 2. Test set-up of radiated disturbance(above 1GHz)



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

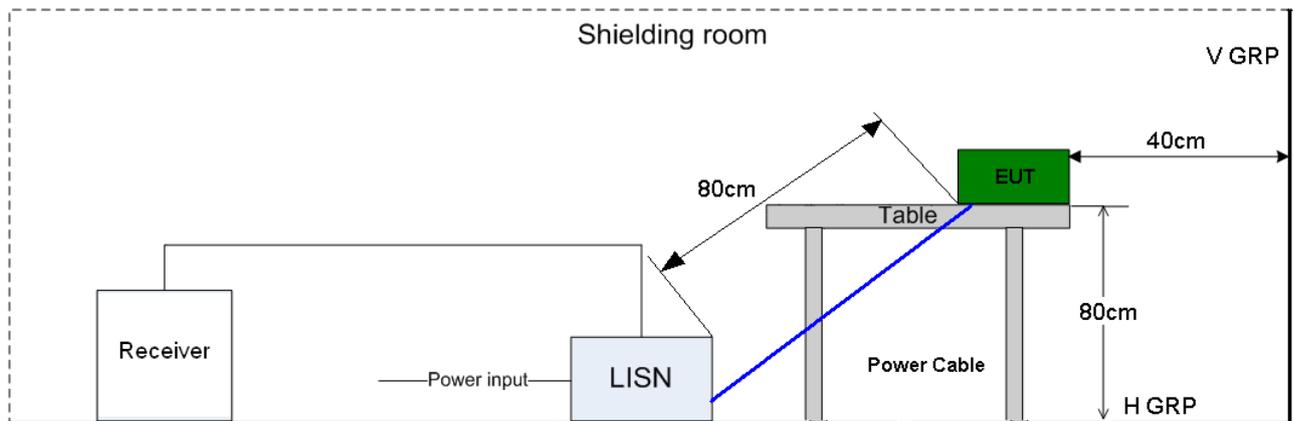


Figure 3. Test Set-up of conducted disturbance

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.08, 2015	12
	Broadband Antenna	VULB 9163	9163-520	SCHWARZ BECK	Dec.20 2015	24
	Horn Antenna	HF907	100365	R&S	Dec.20, 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:

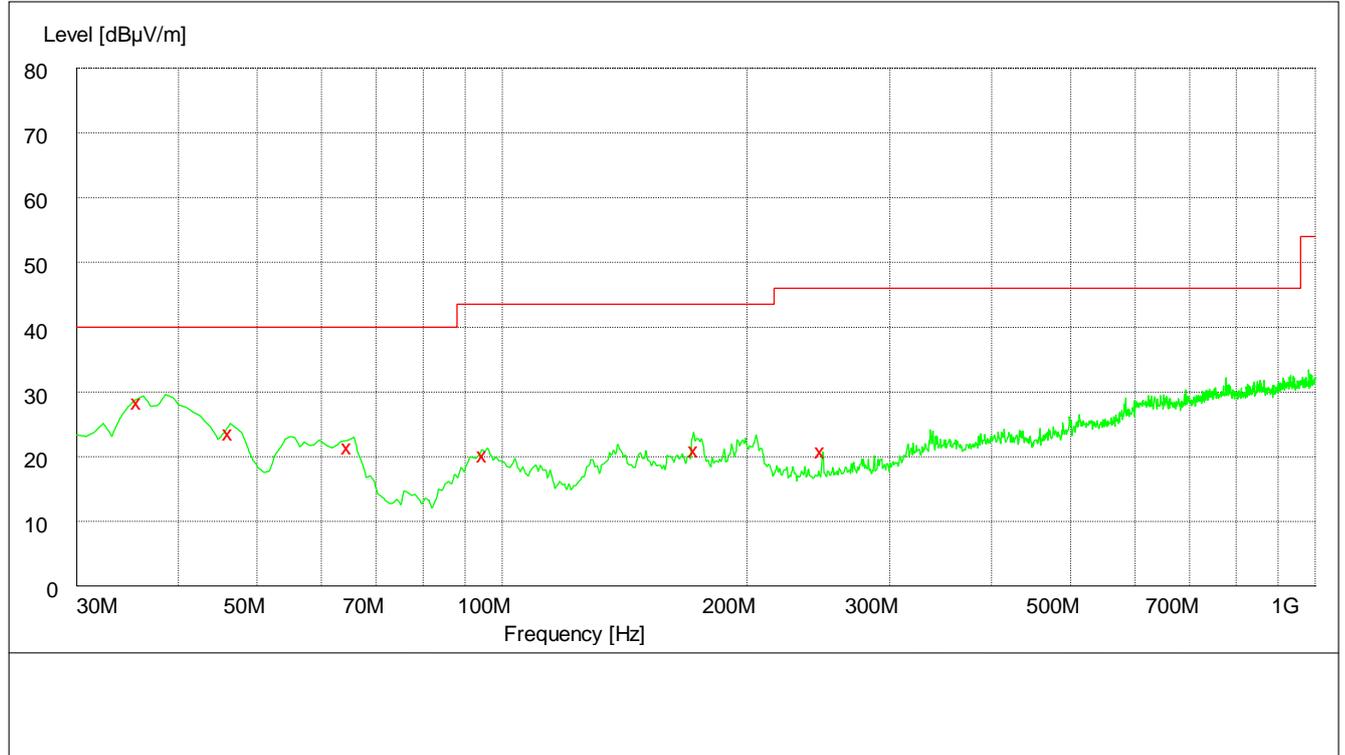
System Measurement Uncertainty		
	Items	Extended Uncertainty
RE(30MHz-1GHz)	Field strength (dB μ V/m)	U=4.1dB; k=2
RE(1GHz-18GHz)	Field strength (dB μ V/m)	U=5.1dB; k=2
CE	Disturbance Voltage (dB μ V)	U=2.6dB; k=2

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
35.788000	29.00	13.8	40.0	11.0	100.0	2.00	VERTICAL
46.236000	24.10	15.4	40.0	15.9	100.0	129.00	VERTICAL
64.856000	22.00	13.0	40.0	18.0	100.0	203.00	VERTICAL
95.060000	20.70	12.6	43.5	22.8	100.0	30.00	VERTICAL
172.848000	21.50	10.8	43.5	22.0	100.0	322.00	VERTICAL
247.576000	21.40	14.6	46.0	24.6	126.0	337.00	HORIZONTAL

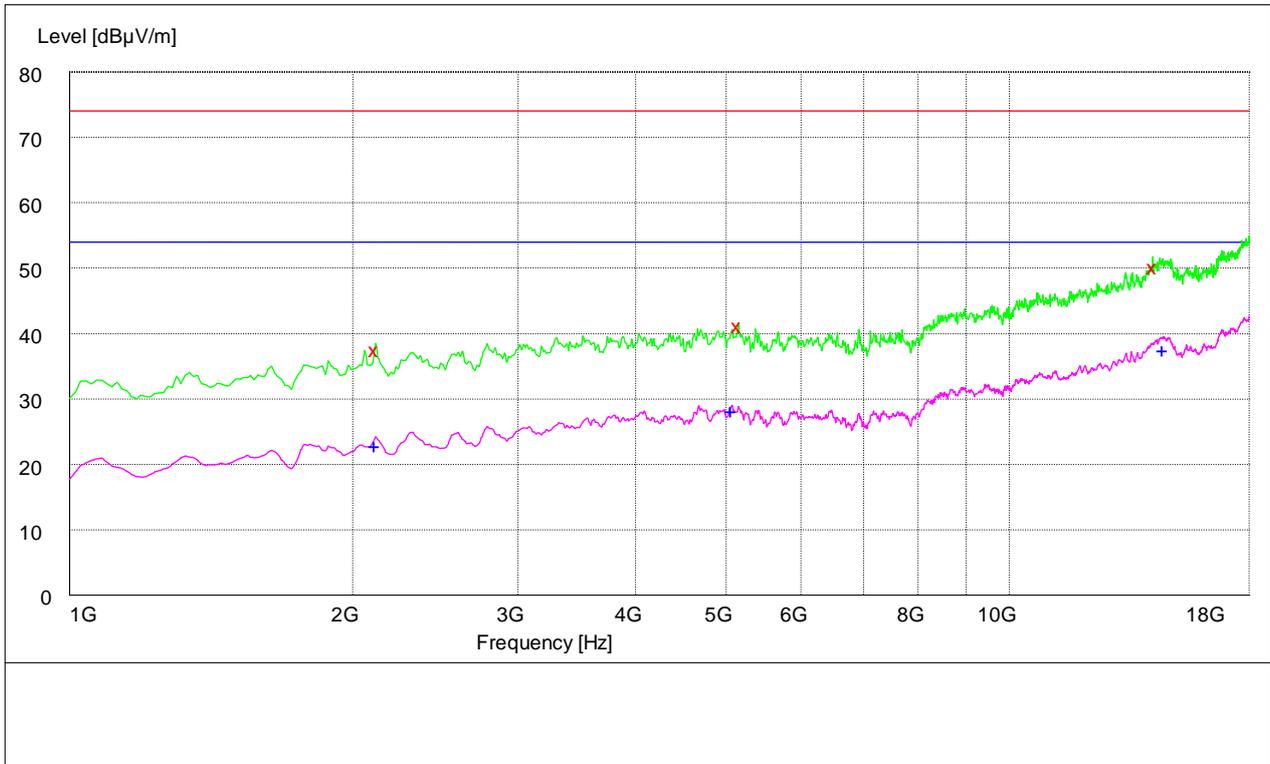
Note:

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
2117.700000	37.80	-10.2	74.0	36.2	108.0	33.00	HORIZONTAL
5148.000000	41.50	-1.5	74.0	32.5	101.0	156.00	VERTICAL
14219.700000	50.50	15.8	74.0	23.5	150.0	318.00	VERTICAL

MEASUREMENT RESULT: AV Detector

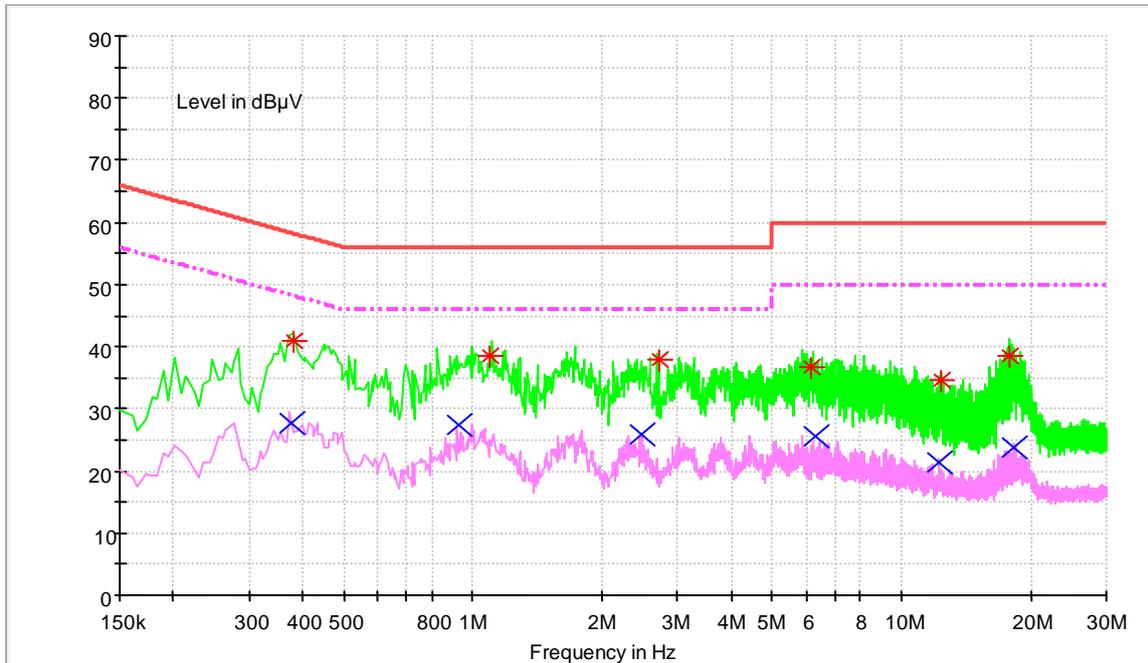
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
2119.200000	23.20	-10.2	54.0	30.8	102.0	239.00	HORIZONTAL
5065.400000	28.50	-1.4	54.0	25.5	101.0	11.00	VERTICAL
14565.200000	37.80	16.5	54.0	16.2	100.0	316.00	VERTICAL

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
0.381338	40.8	L1	9.7	17.4	58.2	FLO
1.094621	38.6	L1	9.7	17.4	56.0	FLO
2.705906	37.9	N	9.7	18.1	56.0	FLO
6.158437	36.6	L1	9.9	24.3	60.0	FLO
12.397774	34.6	L1	10.0	25.4	60.0	FLO
17.768940	38.7	N	10.1	21.3	60.0	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV	Line	Transd dB	Margin dB	Limit dBµV	PE
0.377925	27.7	N	9.7	20.6	48.3	FLO
0.922094	27.4	L1	9.7	18.6	46.0	FLO
2.485762	25.8	N	9.7	20.2	46.0	FLO
6.328204	25.7	N	9.8	24.3	50.0	FLO
12.212658	21.2	N	10.0	28.8	50.0	FLO
18.287138	23.6	N	10.1	26.4	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**-----