



# EMC Test Report

**Product Name: Smart Phone**

**Model Number: HMA-L29, HMA-L09**

**Report No: SYBH(Z-EMC) 20180702002001-2**

**FCC ID: QISHMA-LX9**

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

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## Notice

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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 as “Global Compliance and Testing Center of Huawei Technologies Co., Ltd”, the both names have coexisted since 2009.
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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:** 2018-08-06

**Start Date of Test:** 2018-08-06

**End Date of Test:** 2018-08-16

**Test Result:** Pass

**Approved By  
(Lab Manager)**

2018-08-20  
Date

He Hao  
Name

*He Hao*

Signature

**Prepared by  
(Test Engineer)**

2018-08-17  
Date

Peng Shaohua  
Name

*Peng Shaohua*

Signature



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**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	Smart Phone
Model Number	HMA-L29, HMA-L09
Serials Number	VDY0118703000032(HMA-29)
Input Rated Voltage	DC 3.8V
TX Frequency	GSM 850: 824MHz to 849MHz PCS 1900: 1850MHz to 1910MHz WCDMA Band II: 1850MHz to 1910MHz WCDMA Band IV: 1710MHz to 1755MHz 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 26: 814MHz to 849MHz LTE BAND 38: 2570MHz to 2620MHz LTE BAND 41: 2496MHz to 2690MHz 2.4G WIFI: 2400MHz to 2472 MHz Bluetooth: 2400MHz to 2483.5MHz 5G WIFI:5150MHz to 5350MHz 5470MHz to 5725MHz 5725MHz to 5850MHz NFC: 13.56MHz
RX Frequency	GSM 850: 869MHz to 894MHz GSM 1900: 1930MHz to 1990MHz WCDMA Band II: 1930MHz to 1990MHz WCDMA Band IV: 2110MHz to 2155MHz 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: 704MHz to 716MHz LTE BAND 26: 859MHz to 894MHz LTE BAND 38: 2570MHz to 2620MHz LTE BAND 41: 2496MHz to 2690MHz 2.4G WIFI: 2400MHz to 2472 MHz Bluetooth: 2400MHz to 2483.5MHz 5G WIFI:5150MHz to 5350MHz 5470MHz to 5725MHz 5725MHz to 5850MHz GPS/ Galileo: 1575.42MHz/1176.45MHz BDS: 1561.098MHz GLONASS: 1602.5625MHz FM: 87.5MHz to108MHz

	NFC: 13.56MHz
HW Version	HL1HIMAM
SW Version	9.0.0.46 (C432E55R1P7log)
EUT Accessory	
USB(04071722)	Data Cable USB A Male to Type C ,Shield Manufacturer: LUXSHARE Precision Industry Co., Ltd. HUIZHOU DEHONG TECHNOLOGY CO.,LTD. Ningbo Broad Telecommunication Co., Ltd.
Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-050450B00 Input voltage: 100-240V 50/60Hz ,0.75A Output voltage: 5V  2A OR 5V  4.5A OR 4.5V  5A Rated Power: 10W/22.5W SN:H82922H3J31705 K82971H3R11886 CA37Y9J7H01187
Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-050450E00 Input voltage: 100-240V 50/60Hz ,0.75A Output voltage: 5V  2A OR 5V  4.5A OR 4.5V  5A Rated Power: 10W/22.5W SN:H8301OH7412711 K83059H4V07826 CA37Y9J7H01229
Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-050450U00 Input voltage: 100-240V 50/60Hz ,0.75A Output voltage: 5V  2A OR 5V  4.5A OR 4.5V  5A Rated Power: 10W/22.5W SN:H828K8H3V05002 K8281OH6920035 CA37Y9J7H01360
Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-050450A00 Input voltage: 100-240V 50/60Hz ,0.75A Output voltage: 5V  2A OR 5V  4.5A OR 4.5V  5A Rated Power: 10W/22.5W SN:H83011H3S04782 K83171H4J05584
Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-050450E01 Input voltage: 100-240V 50/60Hz ,0.75A Output voltage: 5V  2A OR 5V  4.5A OR 4.5V  5A Rated Power: 10W/22.5W SN: CA37Y9J7H01745
Rechargeable Li-ion	Manufacturer:Huawei Technologies Co.,Ltd.

	Battery Model: HB436486ECW Rated capacity: 3900mAh Nominal Voltage:  +3.82V Charging Voltage:  +4.40V SN: 2157LYHB05X09AE1; 2157ACH957G3BBEF;
Earphone(22040229)	Model: MEMD1632B580C00 Manufacturer: Jiangxi Lianchuang Hongsheng Electronic Co. ,LTD
Earphone(22040229)	Model: EMC309-001 Manufacturer: MERRY ELECTRONICS (SHENZHEN) CO., LTD.
Earphone(22040229)	Model: 1311-3291-3.5mm-229 Manufacturer: Boluo County Quancheng Electronic Co.,ltd

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 Differences Description

Model	HMA-L29	HMA-L09
Brand	the same	the same
Frequency	the same	the same
SIM Card	Dual SIM	Single SIM
Hardware Version	the same	the same
Software Version	Different	Different
Dimensions	the same	the same
Appearance	the same	the same
main antenna	the same	the same
BT/Wi-Fi antenna	the same	the same
div antenna	the same	the same

HMA-L09 and HMA-L29 are same except SIM card as above.

HMA-L29 has dual SIM card, and HMA-L09 has single SIM card.

With the consideration of difference, all the EMC tests were tested on the model HMA-L29.

## 1.4 Applied Standards

**APPLIED STANDARD**

**47 CFR FCC Part 15, 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	Mode 1~ Mode 5	CLASS B	Pass	Site1
<u>Conducted Emissions</u> <input 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 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:	Charging +traffic +WIFI+BT+NFC+GNSS On +Earphone
Mode 2:	Charging +Camera On +Earphone +idle
Mode 3:	Charging +Video Playing +Earphone +idle
Mode 4:	USB Copy(EUT with PC) +Earphone
Mode 5:	USB+ Earphone +DOCK+Display

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:

Radiated Emission:

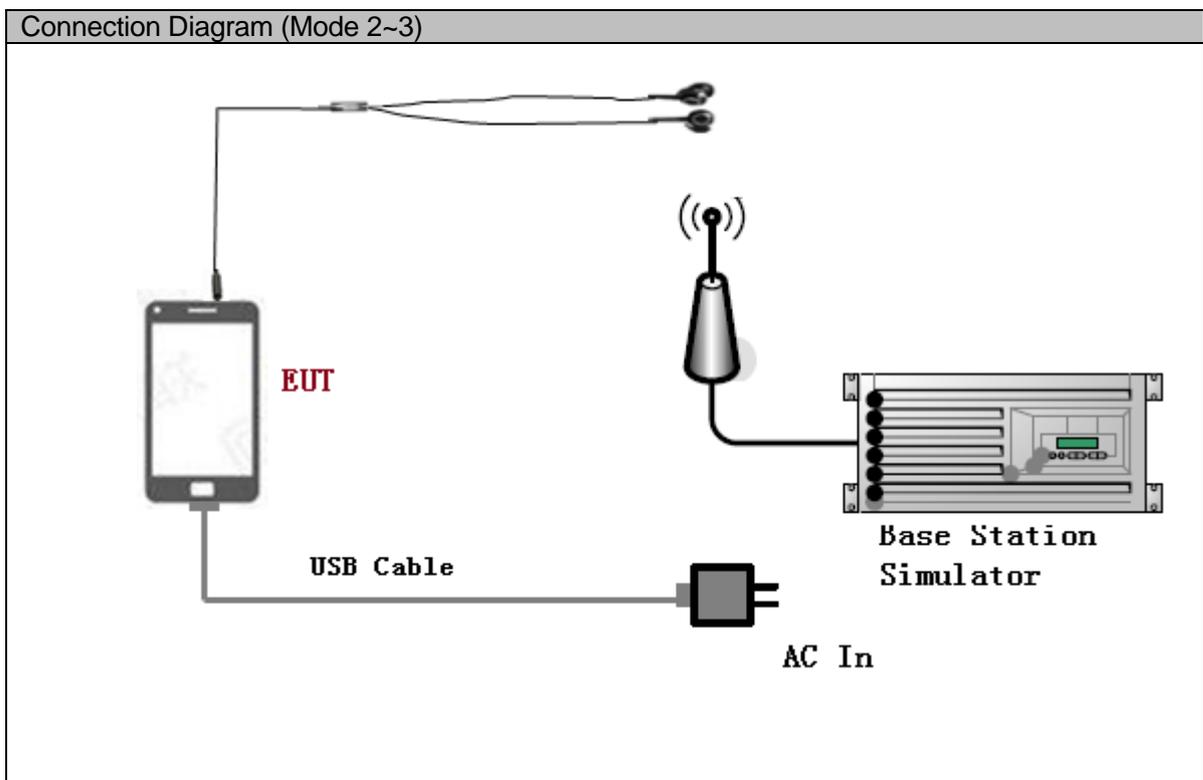
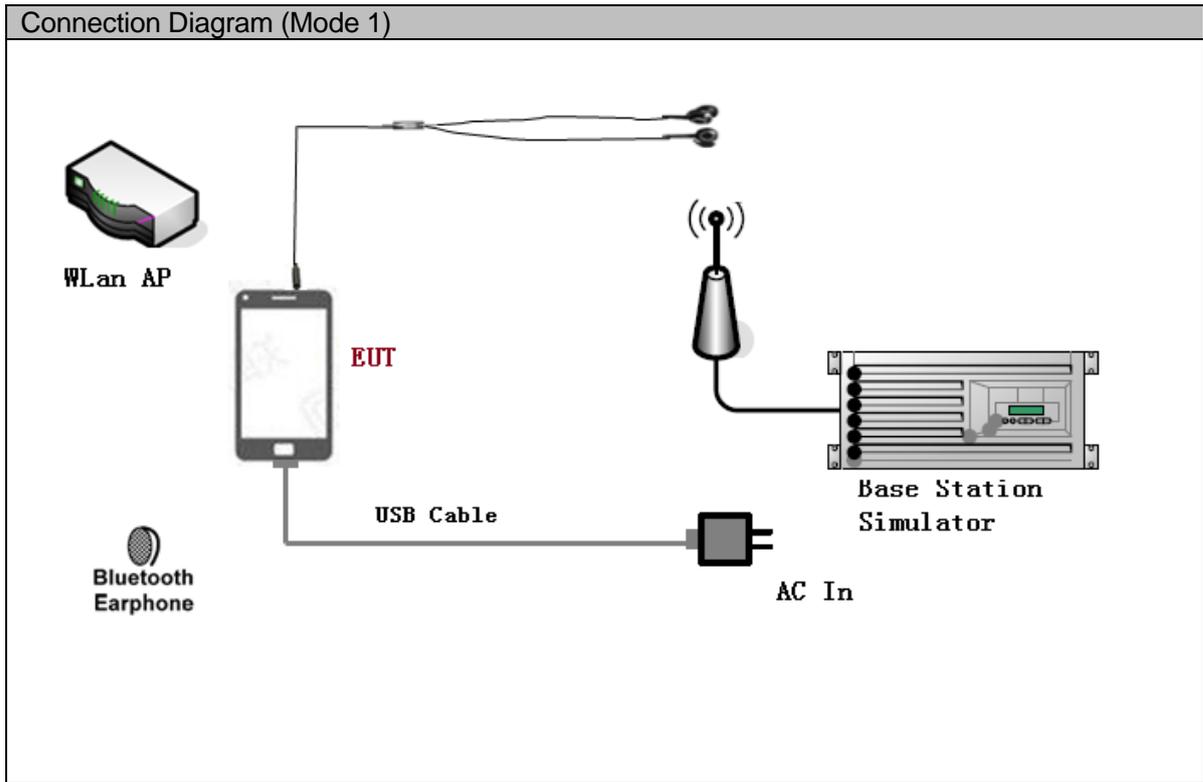
Adapter (Model: HW-050450E00, SN: K83059H4V07826) + Charging+ Camera On +Earphone +idle  
the result is the worst (30MHz~1GHz).

Adapter (Model: HW-050450E00, SN: K83059H4V07826) +Charging+ Camera On +Earphone +idle  
the result is the worst (1GHz~6GHz).

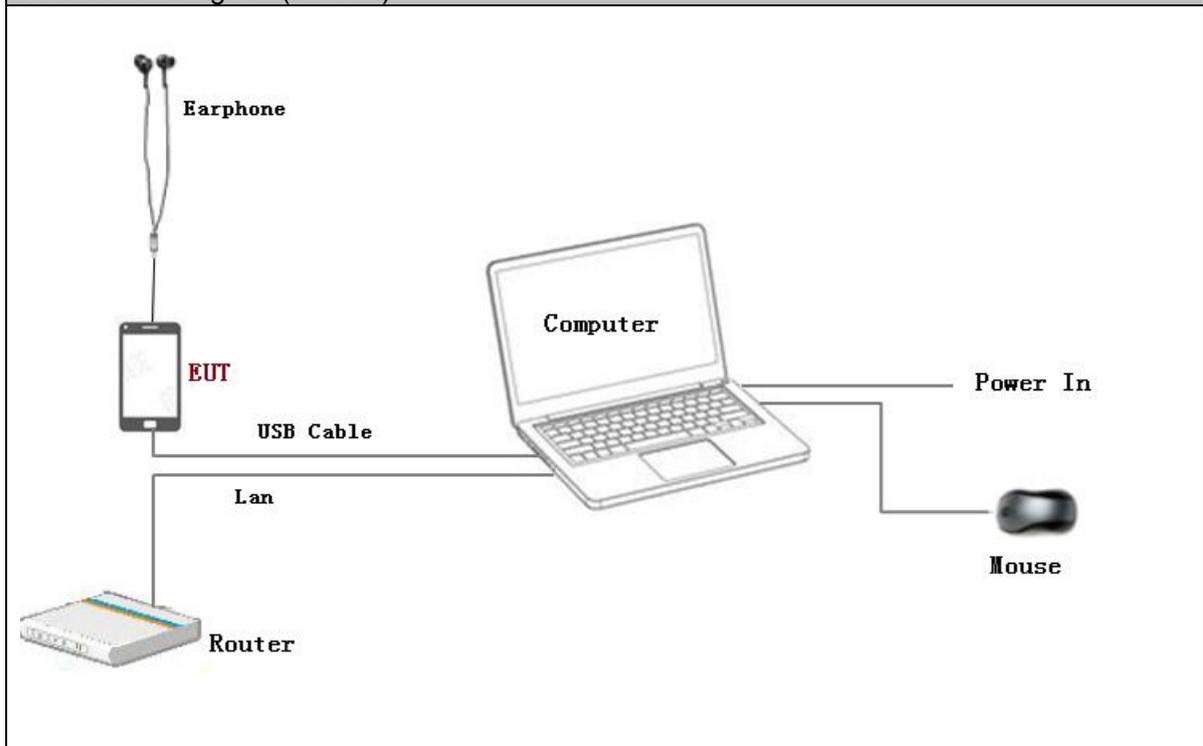
Conducted Emission:

Adapter (Model: HW-050450E01, SN: CA37Y9J7H01745) + Charging +traffic +WIFI+BT+NFC+GNSS  
On +Earphone  
the result is the worst.

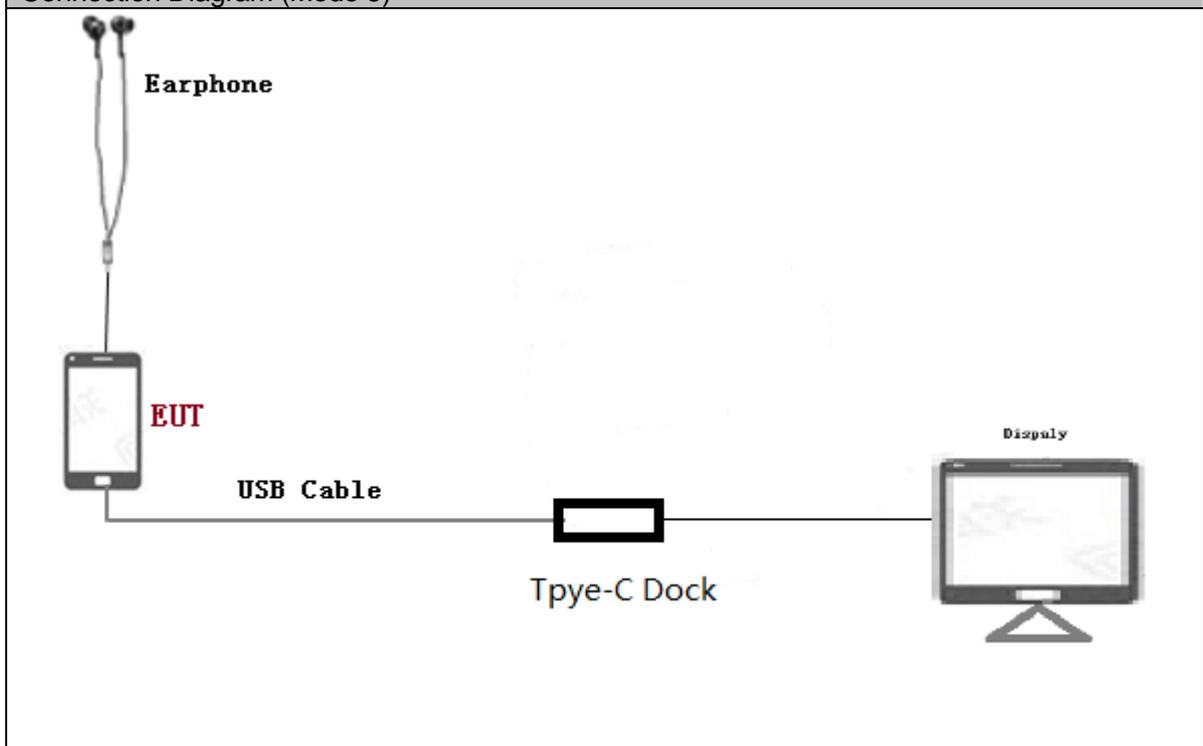
### 3.2 Test System Configuration



Connection Diagram (Mode 4)



Connection Diagram (Mode 5)



### 3.3 Cables Used during Test

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

### 3.4 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Calibrated Deadline	Cal interval
Radio Communication Tester	CMU200	R&S	3608082535	2019-05-07	12
Radio Communication Tester	MT8820C	Anritsu	A110518805	2019-05-08	12
Notebook	S3	ThinkPad	A140714638	/	/
Mouse	M-U0025-O	Lenovo	HS423HB22TB	/	/
Dock	AD10	HUAWEI	S2201615	/	/
display	L197	Lenovo	8M03373A0956 983	/	/

## 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: ANCI C63.4: 2014. The test distance was 3m. The set-up and test methods were according to ANCI 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

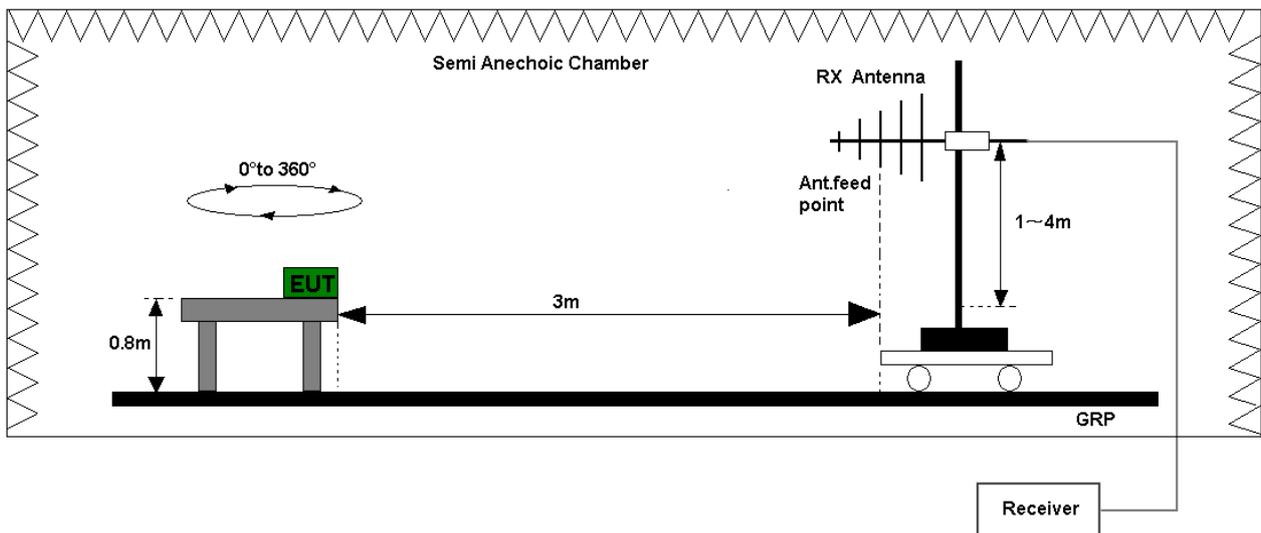


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz)

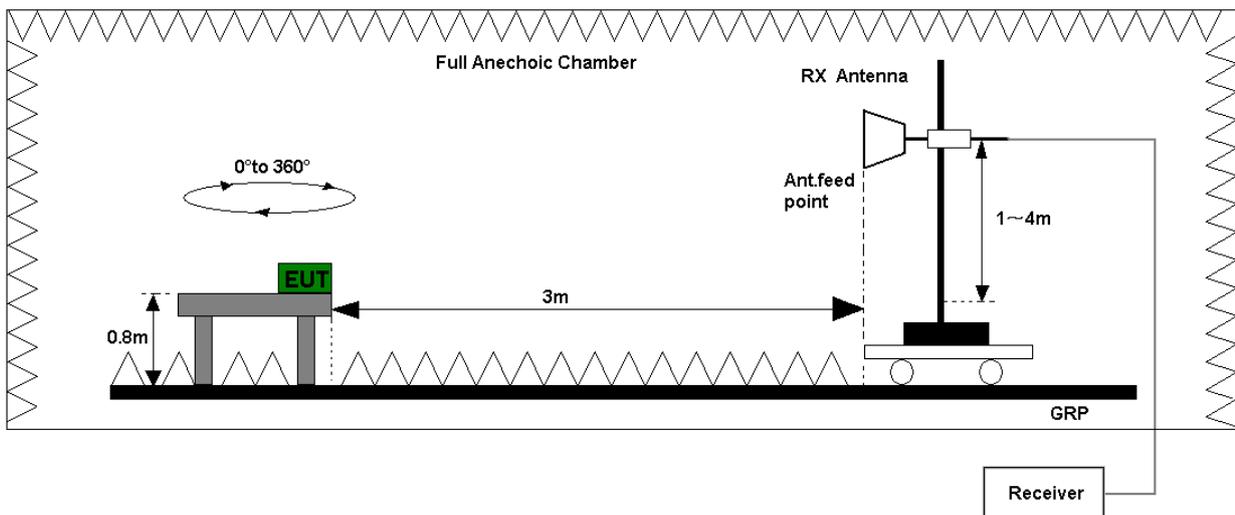


Figure 2. Test set-up of radiated disturbance(above 1GHz)



### 4.1.3 Test Results

The EUT has met the requirements for Radiated Emission of enclosure port.  
 Refer to the section 7.1.1 of this report for test data.

Test Limits (Class B)				
Frequency of Emission (MHz)	Radiated Limit			
	Unit( $\mu$ V/m)		Unit(dB $\mu$ 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 ANCI 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

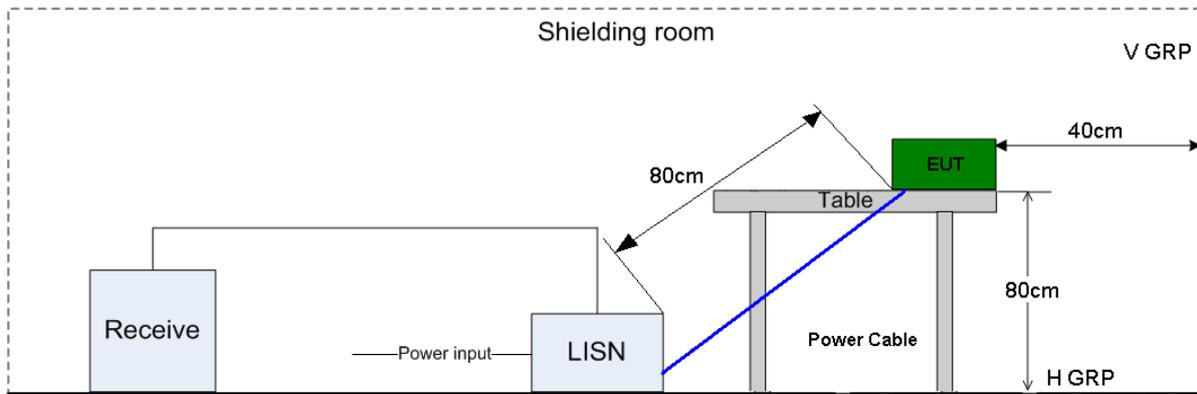


Figure 3. Test Set-up of conducted disturbance

### 4.2.3 Test Results

The EUT has met requirements for Conducted disturbance of power lines.

Refer to the section 7.2.1 of this report for test data.

Test Limit of AC Power Port		
Frequency range	150kHz ~ 30MHz	
Frequency	Voltage limits	
	QP (dB $\mu$ V)	AV (dB $\mu$ V)
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	Jun. 28, 2019	12
	Spectrum Analyzer	FSU43	100048	R&S	Jun. 29, 2019	12
	Broadband Antenna	VULB 9163	9163-491	SCHWARZ BECK	Mar. 28, 2019	24
	Horn Antenna	HF906	100683	R&S	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. 08, 2019	12
	Amplifier	SCU40	10016	R&S	May. 08, 2019	12
CE	EMI Test receiver	ESCI	101163	R&S	Jan. 19, 2019	12
	Artificial Mains Network	ENV216	100382	R&S	May. 08, 2019	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 (dB $\mu$ V/m)	U=4.1dB; k=2
RE(1GHz-18GHz)	Field strength (dB $\mu$ V/m)	U=5.1dB; k=2
RE(18 GHz-26.5GHz)	Field strength (dB $\mu$ V/m)	U=4.82dB; k=2
RE (26.5 GHz- 40GHz)	Field strength (dB $\mu$ V/m)	U=5.22dB; k=2
CE	Disturbance Voltage (dB $\mu$ V)	U=2.5dB; k=2

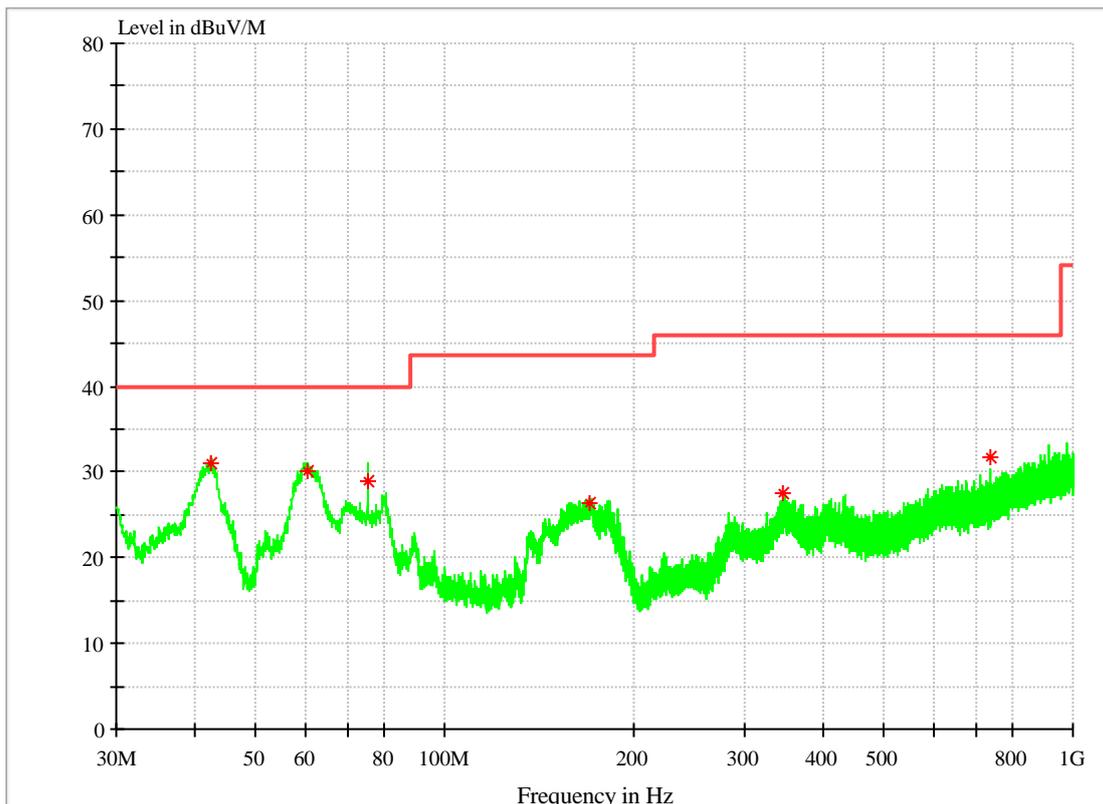
## 7 Test Data and Graph

Only the worst test results were shown

### 7.1 Radiated Disturbance

#### 7.1.1 30MHz~1GHz

Test Mode 2: Charging +Camera On +Earphone +idle



#### MEASUREMENT RESULT: QP Detector

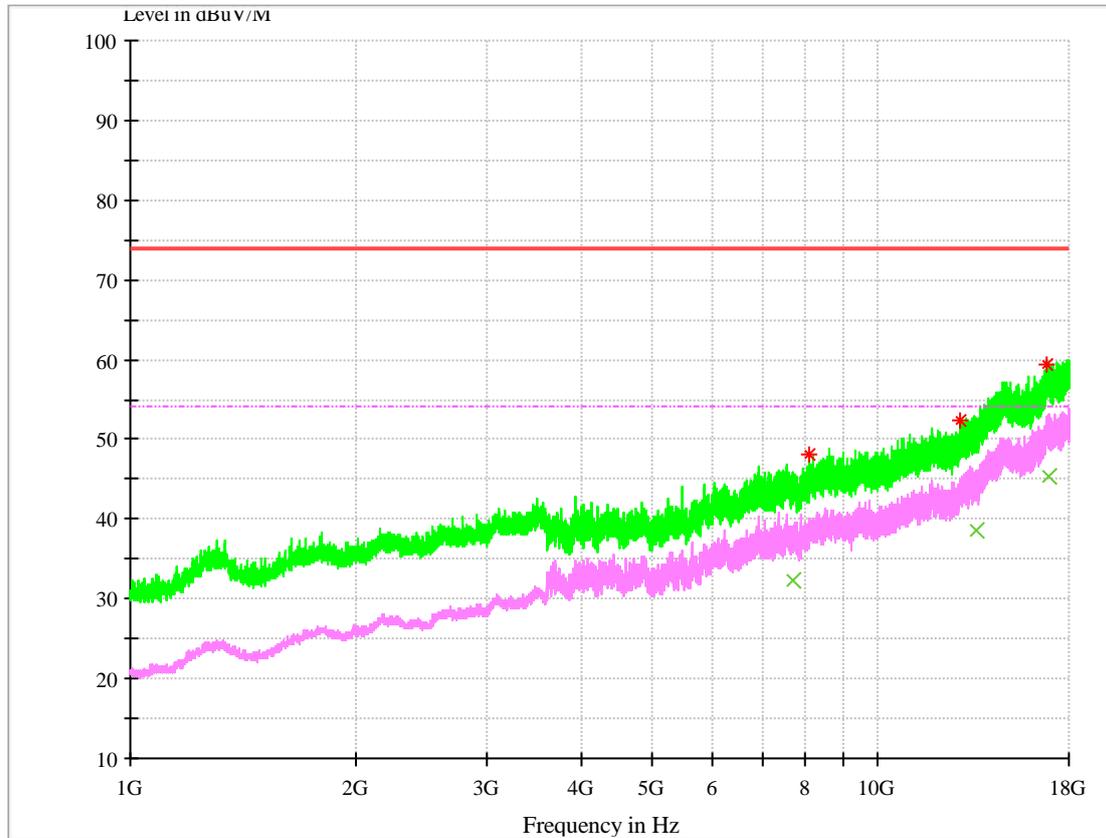
Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Height cm	Azimuth deg	Polarisation
42.599760	31.10	14.4	40.00	8.90	100.0	84.0	V
60.393440	30.18	13.6	40.00	9.82	122.0	330.0	V
75.304880	28.88	8.9	43.50	11.12	143.0	294.0	H
169.768720	26.39	10.8	46.00	17.11	101.0	180.0	V
344.748420	27.41	16.7	46.00	18.59	101.0	17.0	V
738.864060	31.67	23.1	46.00	14.33	143.0	153.0	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 2: Charging +Camera On +Earphone +idle



#### MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
8102.147333	48.02	4.6	74	25.98	142.0	323.0	H
12905.838000	52.42	13.3	74	21.58	186.0	9.0	V
16832.154667	59.38	20.8	74	14.62	109.0	66.0	V

#### MEASUREMENT RESULT: AV Detector

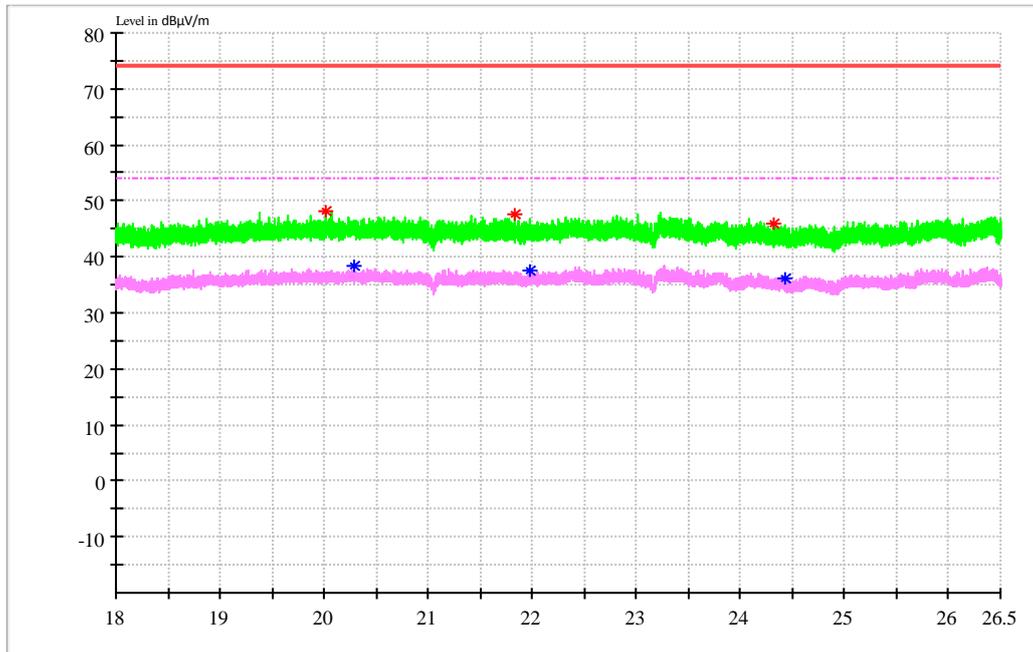
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
7682.148667	32.41	5.3	54	21.59	200.0	36.0	H
13508.767333	38.64	12.4	54	15.36	200.0	115.0	H
16933.642000	45.34	20.6	54	8.66	194.0	245.0	V

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.

### 7.1.3 18GHz~26.5GHz

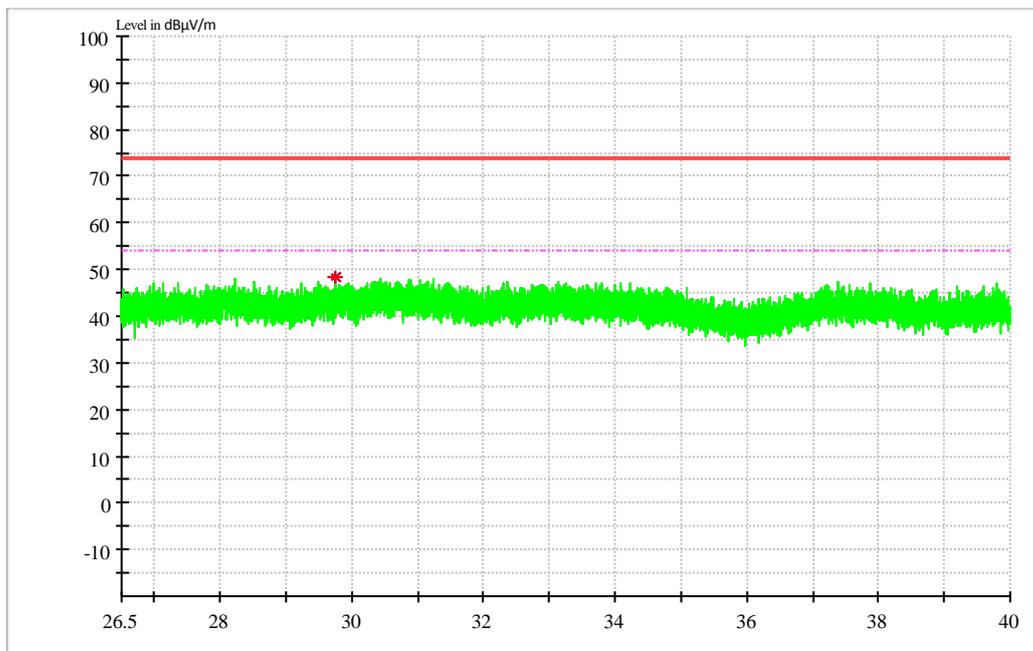
Test Mode 2:Charging +Camera On +Earphone +idle



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 2:Charging +Camera On +Earphone +idle

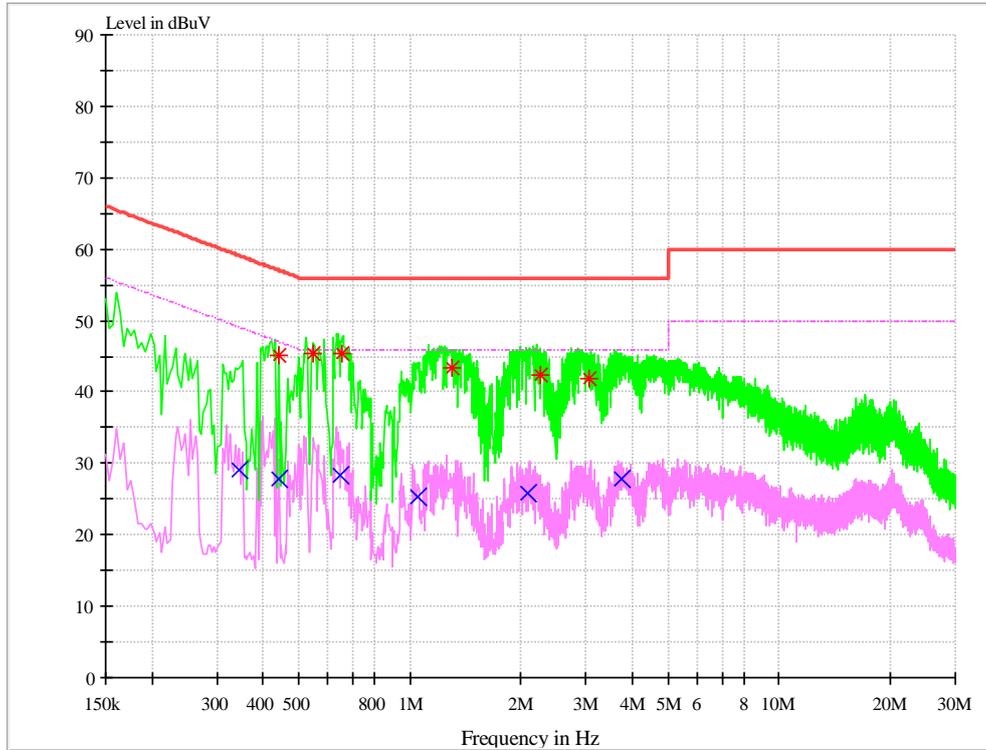


NOTE 1: The data was measured by Peak detector.  
NOTE 2: No peak found in the Test Range of "26.5 GHz to 40GHz"

## 7.2 Conducted Disturbance

### 7.2.1 AC Port Test Data

Test Mode 1: Charging + traffic +WIFI+BT+NFC+GNSS On +Earphone



#### MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dB $\mu$ V	Line	Transd dB	Margin dB	Limit dB $\mu$ V	PE
0.440633	45.08	N	9.7	11.97	57.05	FLO
0.545663	45.49	N	9.7	10.51	56.00	FLO
0.652740	45.36	N	9.7	10.64	56.00	FLO
1.304256	43.38	N	9.7	12.62	56.00	FLO
2.244155	42.25	N	9.7	13.75	56.00	FLO
3.049463	41.91	N	10.0	14.09	56.00	FLO

#### MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dB $\mu$ V	Line	Transd dB	Margin dB	Limit dB $\mu$ V	PE
0.343887	29.18	L1	9.7	19.93	49.11	FLO
0.439886	27.75	N	9.7	19.31	47.06	FLO
0.648033	28.40	L1	9.7	17.60	46.00	FLO
1.044946	25.39	N	9.7	20.61	46.00	FLO
2.076861	25.80	N	9.7	20.20	46.00	FLO
3.751182	27.74	N	10.0	18.26	46.00	FLO

-----END-----