EMC Test Report

Product Name: Smart Phone

Product Model: VOG-L29/VOG-L09

Report Number: SYBH(Z-EMC) 20191026012001-2

FCC ID: QISVOG-LX9

Reliability Laboratory of Huawei Technologies Co., Ltd.

(Global Compliance and Testing Center of Huawei Technologies Co., Ltd.)

No.2, New City Avenue, Songshan Lake Sci. & Tech. Industry Park, Dongguan, 523808, P.R.C
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Notice

1. **The laboratory has passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L0310.**
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 recognized by the Innovation, Science and Economic Development Canada (ISED) to test to Canadian radio equipment requirements. The CAB identifier is CN0003, and the ISED# is 21741.**
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.**
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11. **If any question about this report, please contact the laboratory (PublicGCTC@huawei.com).**

Applicant:	Huawei Technologies Co., Ltd.
Address:	No.2 New City Avenue Songshan Lake Sci. &Tech. Industry Park, Dongguan, Guangdong, P.R.C
Date of Receipt Test Item:	2019-11-01
Start Date of Test:	2019-11-04
End Date of Test:	2019-11-22
Test Result:	Pass

Operator (Test Engineer)	**2019-11-22**	**Li Tao**	Li Tao
	Date	**Name**	**Signature**
Approved By (Lab Manager)	**2019-11-25**	**He Hao**	He Hao
	Date	**Name**	**Signature**

Modification Record

No.	Last Report No.	Modification Description
1	NA	First report
2	SYBH(Z-EMC) 20181224014002-2	Second report: For detail, please refer to 1.2 on page 9.

TABLE OF CONTENT

1 General Information

1.1 EUT Description

EUT Description	
Product Name	Smart Phone
Model Number	VOG-L29/VOG-L09
Input voltage	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: 2535MHz to 2655MHz 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 Wireless Charging: 110kHz-148kHz
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: 2535MHz to 2655MHz 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 Wireless Charging: 110kHz-148kHz GPS/ Galileo: 1575.42MHz/1176.45MHz BDS: 1561.098MHz GLONASS: 1602.5625MHz
S/N	DUM0118C17000176

HW Version	HL2VOGUEM
SW Version	9.1.0.223(C432E4R2P2)
EUT Accessory	
Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-100400B01 Input voltage: 100-240V ~50/60Hz 1.2A Output voltage: 5V ⎓ 2A OR 9V ⎓ 2A OR 10V ⎓ 4A SN: JB93L2KAW05448
Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-100400U01 Input voltage: 100-240V ~50/60Hz 1.2A Output voltage: 5V ⎓ 2A OR 9V ⎓ 2A OR 10V ⎓ 4A SN:JB94L4K6M00063
Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-100400E01 Input voltage: 100-240V ~50/60Hz 1.2A Output voltage: 5V ⎓ 2A OR 9V ⎓ 2A OR 10V ⎓ 4A SN:JB92L4K6M01198
Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-100400A01 Input voltage: 100-240V ~50/60Hz 1.2A Output voltage: 5V ⎓ 2A OR 9V ⎓ 2A OR 10V ⎓ 4A SN:JB95L3KB100039
Data cable(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.
Rechargeable Li-ion	Manufacture: Huawei Technologies Co.,Ltd. Battery Model: HB486486ECW Li-ion Polymer Battery Capacity: 4100mAh Nominal Voltage: +3.82V Charging Voltage: +4.40V SN: 6DUNACI724G00064 5WNDAYI726X00085
Earphone(22040296)	Manufacturer: Foster Electric Co.,(GuangZhou) LTD. Jiangxi Lianchuang Hongsheng Electronic Co., LTD. Boluo County Quancheng Electronic Co., Ltd. Goertek Inc.

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 Differences Description

The difference between VOG-L29 and VOG-L09:
The only difference between VOG -L29 and VOG -L09 is that VOG -L09 deletes into single SIM card by software. Other parts of the two models are the same.With the consideration of difference, all the EMC tests were tested on the model VOG-L29.

Compared with the previous report :(SYBH(Z-EMC) 20181224014002-2)
The difference are as follows:new adapters added.

Item	Model name	different
New add	HW-100400E01	Meet energy efficiency level VI
	HW-100400U01	
	HW-100400B01	
	HW-100400A01	

Notes: With the consideration of identities and differences listed above, EMC do full test with new adapter Coding.

1.3 Test Site Information

Test Site 1:	Reliability Laboratory of Huawei Technologies Co., Ltd. Global Compliance and Testing Center of Huawei Technologies Co., Ltd.

Test Site Location:	No.2, New City Avenue, Songshan Lake Sci. & Tech. Industry Park, Dongguan, 523808, P.R.C

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**
Radiated Emissions Enclosure Port	Mode 1~ Mode 4 Mode 7~Mode 9	CLASS B	Pass	Site1
Conducted Emissions ☐DC Power Port ☒AC Power Port ☐Telecommunication Ports	Mode 1 Mode 3 Mode 6 Mode 7 Mode 9	CLASS B	Pass	Site1
Note: 1, Measurement taken is within the uncertainty of test 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

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+ Camera On + Idle
Mode 2:	Earphone + Camera On + Idle
Mode 3:	Charging+ video Playing + Idle
Mode 4:	Earphone + video Playing + Idle
Mode 5:	Earphone +traffic
Mode 6:	Charging+traffic+WIFI+BT+GNSS+NFC On
Mode 7:	USB Copy(EUT with PC)
Mode 8:	USB&DP +Display
Mode 9:	Charging + Wireless Charging

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.

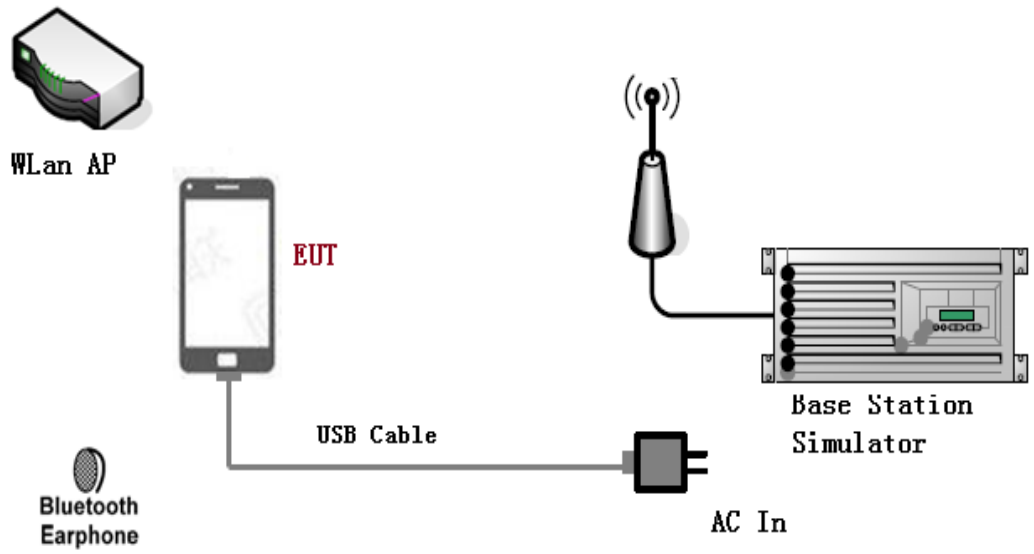
Traffic Mode:
When the EUT state is switched on and with Radio Resource Control (RRC) connection established.

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

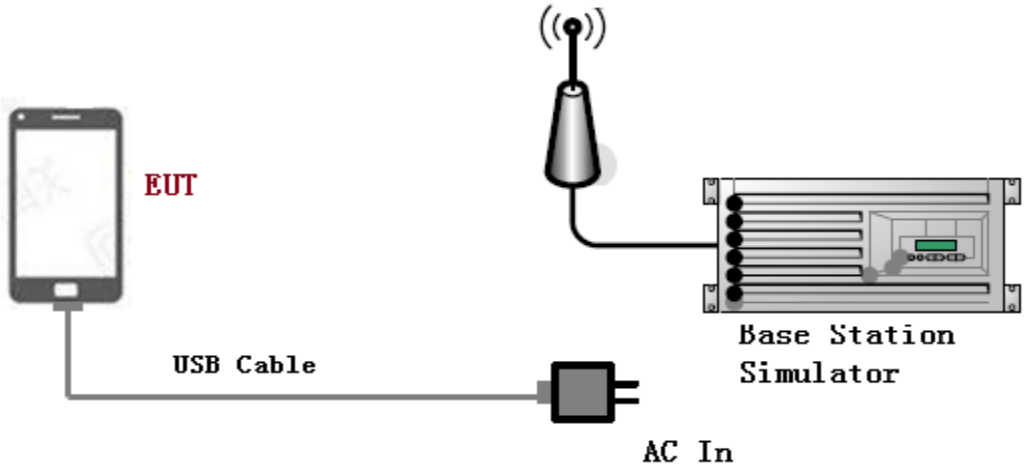
Worst Case:
Radiated Emission:
Adapter (Model: HW-100400U01, SN: JB94L4K6M00063)+ Charging+ video Playing + Idle,the result is the worst (30MHz~1GHz).
Adapter (Model: HW-100400U01, SN: JB94L4K6M00063)+ Charging+ video Playing + Idle,the result is the worst (1GHz~40GHz).
Conducted Emission:
Adapter (Model: HW-100400U01, SN: JB94L4K6M00063) + Charging + Wireless Charging,the result is the worst.

3.2 Test System Configuration

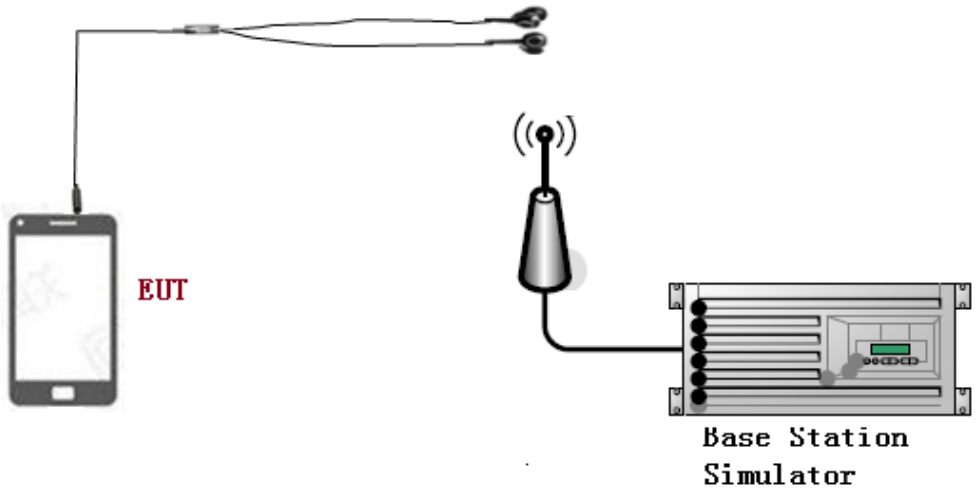
Connection Diagram (Mode 6)



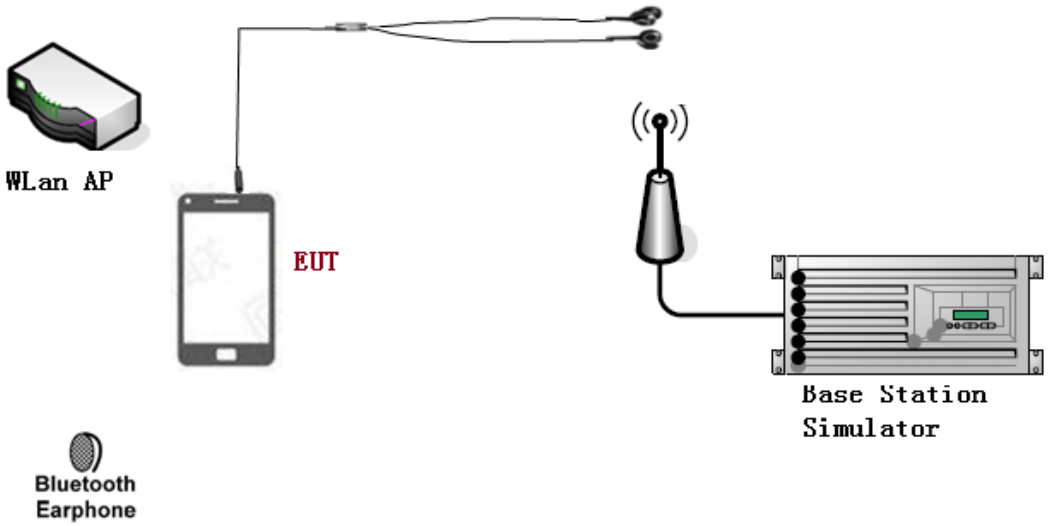
Connection Diagram (Mode 1&Mode 3)



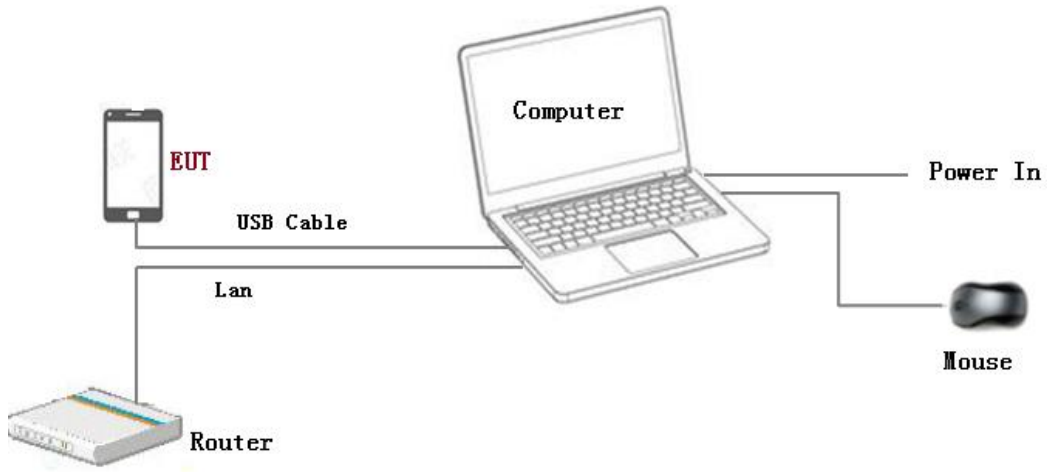
Connection Diagram (Mode 2&Mode 4)



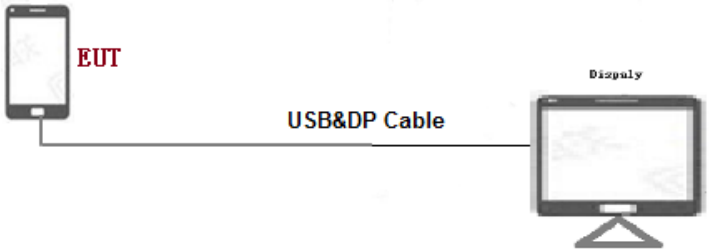
Connection Diagram (Mode 5)



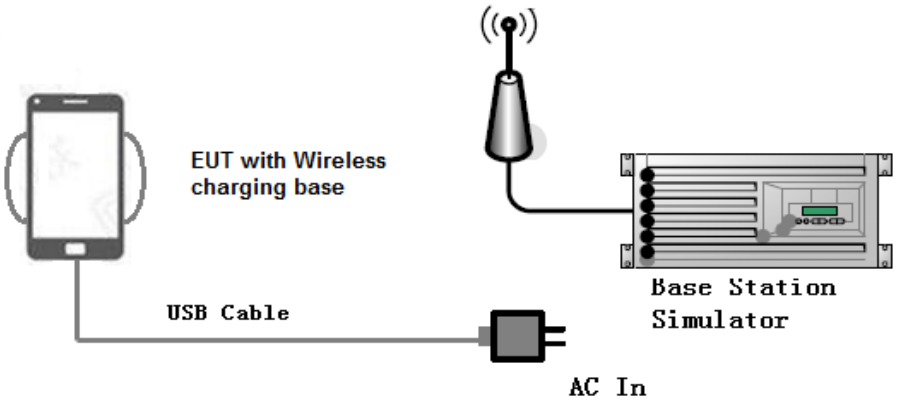
Connection Diagram (Mode 7)



Connection Diagram (Mode 8)



Connection Diagram (Mode 9)



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
Radio Communication Tester	CMU200	R&S	3608082535	2020-02-29	12
Radio Communication Tester	MT8820C	Anritsu	6200971028	2020-02-29	12
Notebook	S3	ThinkPad	A140714638	/	/
Mouse	M-U0025-O	Lenovo	HS423HB22TB	/	/
Wireless Charging Base	CP60	HUAWEI	2155030353C8B027778	/	/

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 to40 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

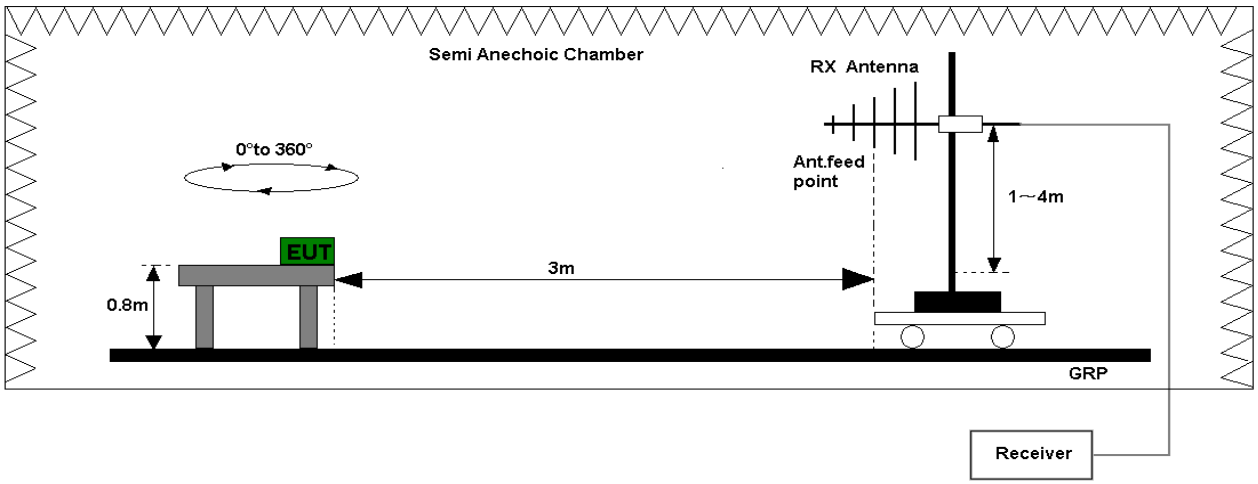


Figure 1.Test set-up of radiated disturbance(30MHz-1GHz)

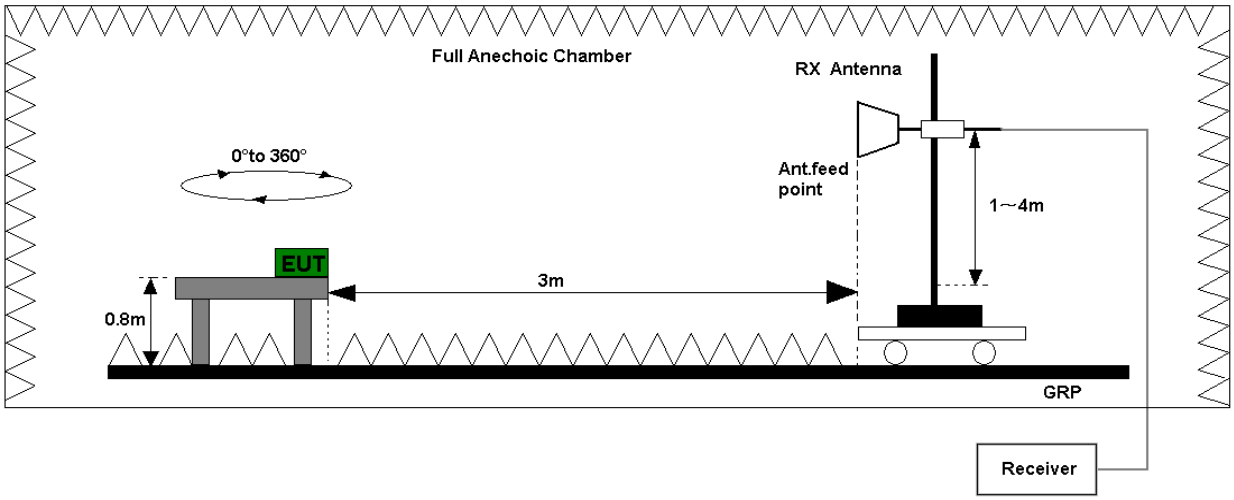


Figure 2.Test set-up of radiated disturbance(above 1GHz)

4.1.3 Test Results

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

Test Limits (Class B)				
Frequency of Emission (MHz)	Radiated Limit			
	Unit(μV/m)		Unit(dBμV/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

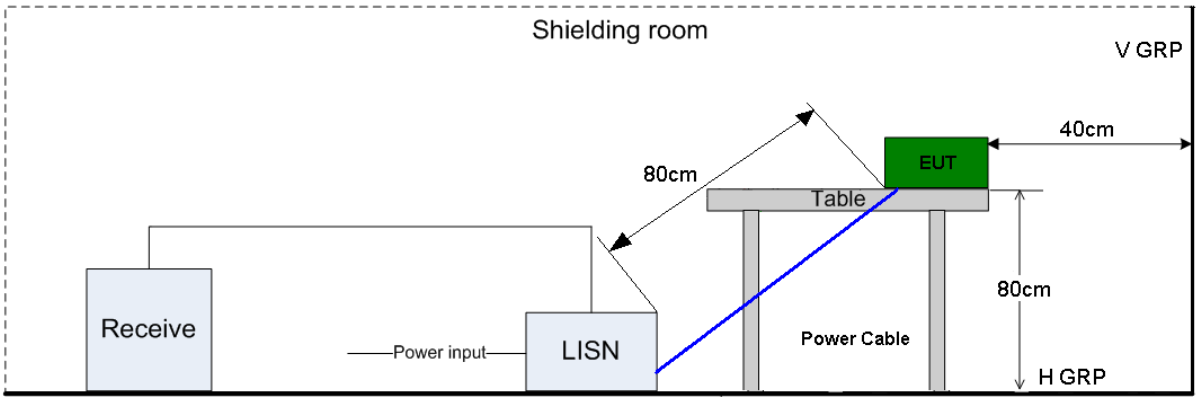


Figure 3. Test Set-up of conducted disturbance

4.2.3 Test Results

The EUT has met requirements for Conducted disturbance of power lines.
Refer to the section 7.2 of this report for test data.

Test Limit of AC Power Port		
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	100387	R&S	Jan. 14, 2020	12
	Spectrum Analyzer	FSU43	100144	R&S	Jan. 14, 2020	12
	Broadband Antenna	VULB 9163	9163-491	SCHWARZBECK	Feb. 21, 2021	24
	Horn Antenna (1G-18G)	HF907	100305	R&S	Mar. 15, 2021	24
	Horn Antenna (18G-40G)	BBHA9170	00863	SCHWARZBECK	Mar. 29, 2021	24
CE	EMI Test receiver	ESCI	101163	R&S	Jan. 14, 2020	12
	Artificial Mains Network	ENV216	100382	R&S	Feb. 29, 2020	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=5.24dB; k=2
RE(1GHz-18GHz)	Field strength (dBμV/m)	U=4.84dB; k=2
RE(18GHz-26.5GHz)	Field strength (dBμV/m)	U=4.62dB; k=2
RE(26.5GHz-40GHz)	Field strength (dBμV/m)	U=5.16dB; k=2
CE	Disturbance Voltage (dBμV)	U=2.3dB; k=2

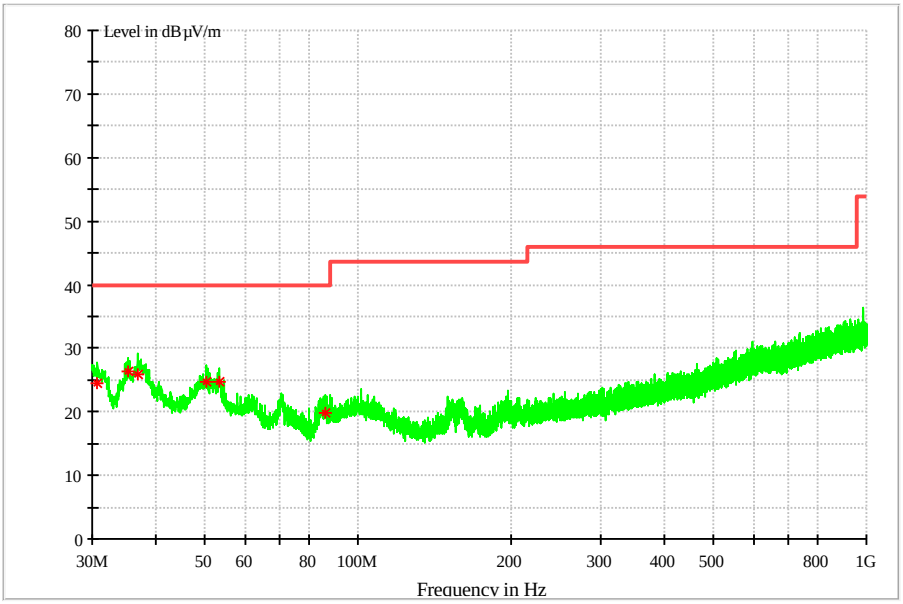
7 Test Data and Graph

Only the worst test results were shown

7.1 Radiated Disturbance

7.1.1 30MHz~1GHz

Test Mode 3: Charging+Video Playing +Idle



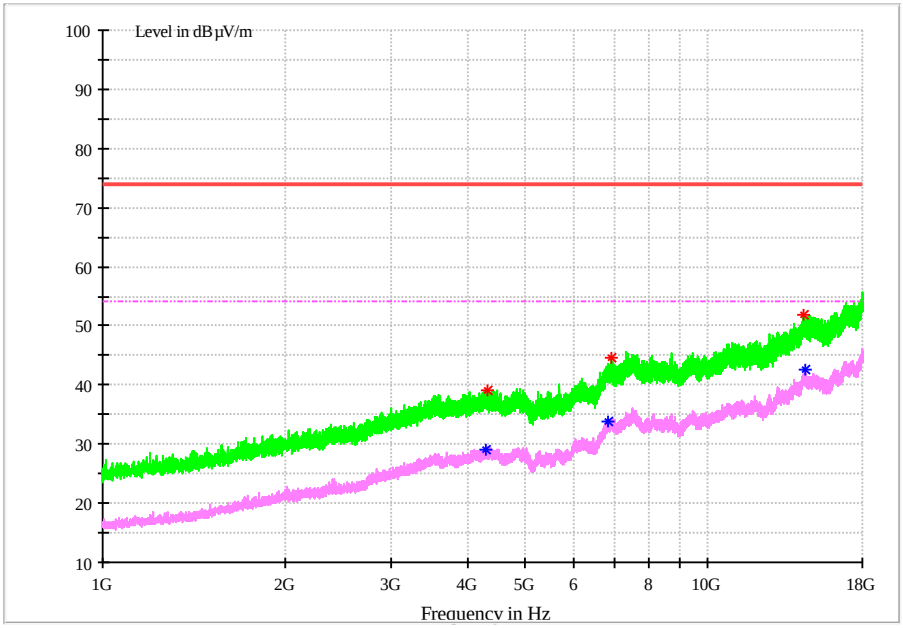
MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
30.776000	24.39	12.8	40.00	15.61	100.0	319.0	V
35.238000	26.31	12.8	40.00	13.69	100.0	198.0	V
36.935500	25.86	13.3	40.00	14.14	100.0	358.0	V
50.418500	24.71	13.8	40.00	15.29	100.0	120.0	V
53.377000	24.61	13.7	40.00	15.39	100.0	2.0	V
86.211500	19.87	11.5	40.00	20.13	100.0	217.0	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 3: Charging+Video Playing +Idle



MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
4312.733333	39.01	-4.8	74.00	34.99	100.0	0.0	V
6917.133333	44.53	1.2	74.00	29.47	100.0	22.0	V
14381.266667	51.85	11.1	74.00	22.15	100.0	263.0	H

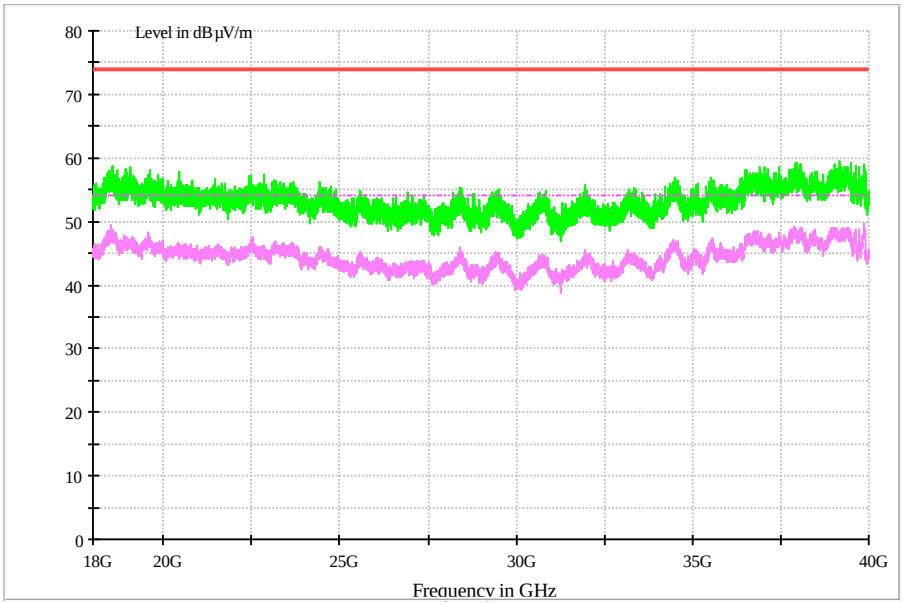
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
4292.333333	28.98	-4.8	54.00	25.02	100.0	346.0	H
6831.566667	33.89	1.3	54.00	20.11	100.0	136.0	V
14444.733333	42.55	11.1	54.00	11.45	100.0	22.0	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-40GHz

Test Mode 3: Charging+Video Playing +Idle

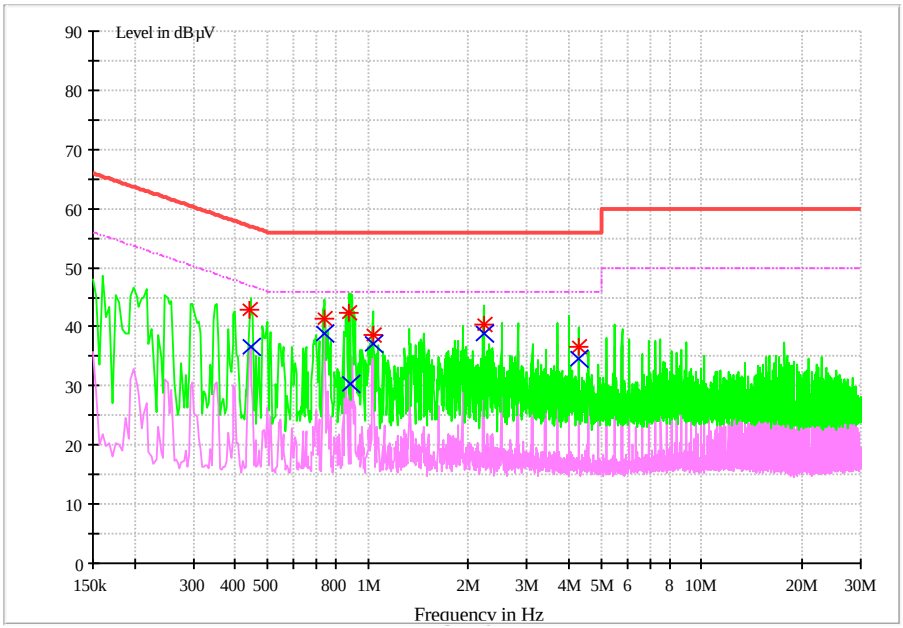


NOTE 1: No peak found in the Test Range of ”18GHz to 40GHz”.

7.2 Conducted Disturbance

7.2.1 AC Port Test Data

Test Mode 9: Charging + Wireless Charging



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV	Line	Transd dB	Margin dB	Limit dBµV	PE
0.444012	42.98	L1	9.7	14.01	56.99	FLO
0.740593	41.34	N	9.7	14.66	56.00	FLO
0.880118	42.39	L1	9.7	13.61	56.00	FLO
1.035834	38.50	N	9.7	17.50	56.00	FLO
2.222234	40.24	N	9.7	15.76	56.00	FLO
4.297654	36.58	L1	9.8	19.42	56.00	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV	Line	Transd dB	Margin dB	Limit dBµV	PE
0.445747	36.64	N	9.7	10.31	46.95	FLO
0.740679	38.96	N	9.7	7.04	46.00	FLO
0.884612	30.44	L1	9.7	15.56	46.00	FLO
1.037742	37.22	N	9.7	8.78	46.00	FLO
2.221914	38.81	N	9.7	7.19	46.00	FLO
4.297185	34.64	N	9.8	11.36	46.00	FLO

----------END----------