EMC Test Report

Product Name: Virtual Reality Device

Model Number: AV02，AV02-J

Report No: SYBH(Z-EMC) 20181026002002-2

FCC ID： QISAV02-J

Reliability Laboratory of Huawei Technologies Co., Ltd.

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

Administration Building, Headquarters of Chang Lina Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, 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 for site 1.**
2. **The laboratory has passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01 for site 1.**
3. **The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 6369A-1 for site 1.**
4. **The laboratory has been recognized by the US Federal Communications Commission (FCC) to perform compliance testing subject to the Commission's Declaration Of Conformity (DOC) and Certification rules. The Designation Number is CN1173, and the Test Firm Registration Number is 294140 for site 1.**
5. **The laboratory has passed the accreditation by The American Association for Laboratory Accreditation (NVLAP). The accreditation number is 4086F-1 for site 2.**
6. **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:	2018-11-15
Start Date of Test:	2018-11-16
End Date of Test:	2018-12-05
Test Result:	Pass

Approved By (Lab Manager)	**2018-12-05**	**He Hao**	He Hao
	Date	**Name**	**Signature**
Prepared by (Test Engineer)	**2018-12-05**	**Peng Shaohua**	Peng Shaohua
	Date	**Name**	**Signature**

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Modification Record

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

TABLE OF CONTENT

1 General Information

The virtual reality device suit mainly includes virtual reality glasses and virtual reality handle. Virtual reality glasses provide a TYPE C interface to connect Huawei mobile phones and computers to experience virtual reality. At the same time, it provides a 3.5 mm headset jack for better audio effect. The virtual reality glasses provide a Micro-USB interface connecting to a third-party VR location device. The virtual reality handle is used with the virtual glasses to control and operate various functions.

The AV02，AV02-J are the same.

1.1 EUT Description

EUT Description	
Product Name	Virtual Reality Device
Model Number	AV02，AV02-J
Serials Number	9UOP0218402000182
Input Rated Voltage	DC 3.82V
Rated Power	10W
HW Version	HL1AV02M
SW Version	AV02C00B227
TX Frequency	Bluetooth:2400MHz to 2483.5MHz
RX Frequency	Bluetooth:2400MHz to 2483.5MHz
EUT Accessory	
Virtual Reality Handle	Model: CF20 Manufacturer: Huawei Technologies Co., Ltd. HW Version:Ver-N SW Version:huaweivr-v1.3n Power supply:Battery Brand Name: Energizer Model No.:E92 Capacity: 1200mAh Rated Voltage: 1.5V
USB(04071121)	Data Cable USB A Male to USB Type C, Shielded Model: 130-26988 Manufacturer: HL TECHNOLOGY GROUP
	Data Cable USB A Male to USB Type C, Shielded Model: L99UC001-CS-H Manufacturer: LUXSHARE Precision Industry Co., Ltd. .
	Data Cable USB A Male to USB Type C, Shielded Model: 6691-10YZ-0183 Manufacturer: Cheng Uei Precision Ind. Co., Ltd.
	Data Cable USB A Male to USB Type C, Shielded Model: CUDU01B-HC288-EH Manufacturer: FOXCONN INTERCONNECT TECHNOLOGY LIMITED
Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-050200U02 Input voltage: 100-240V 50/60Hz 0.5A Output voltage: 5V ⎓ 2A SN:H95522H3J31705 K95561H3R11886 B95517G5E05132

	P95521J4E00043
Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-050200E02 Input voltage: 100-240V 50/60Hz 0.5A Output voltage: 5V ⎓ 2A SN:H9541OH7412711 K95459H4V07826 B95486G5E05132 P95449J4E00043
Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-050200B02 Input voltage: 100-240V 50/60Hz 0.5A Output voltage: 5V ⎓ 2A SN:H953K8H3V05002 K9531OH6920035 B95356G5E05132 P95349J4E00043
Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-050200A02 Input voltage: 100-240V 50/60Hz 0.5A Output voltage: 5V ⎓ 2A SN: B93595G5E05132 K93591H4J05584
Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-050200J02 Input voltage: 100-240V 50/60Hz 0.5A Output voltage: 5V ⎓ 2A SN: K9578OH6920035 P95739J4E00043
Rechargeable Li-ion	Manufacturer:Huawei Technologies Co.,Ltd. Battery Model: HB405979ECW Rated capacity: 2920mAh Nominal Voltage: : ⎓ +3.82V Charging Voltage: ⎓ +4.40V SN: 2157LYHB05X09AE1; 2157ACH957G3BBEF;

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

Site 1:	RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD.
Test Site Location:	No.2 New City Avenue Songshan Lake Sci. &Tech. Industry Park, Dongguan, Guangdong, P.R.C
Site 2:	Sporton International (Shenzhen) Inc.
Test Site Location:	No.3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P.R.China

1.3 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 5	CLASS B	Pass	Site2
Conducted Emissions ☐DC Power Port ☒AC Power Port ☐Telecommunication Ports	Mode 2,Mode 5	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:	Video Playing with Smart Phone (Smart Phone +USB cable+ virtual reality glasses+Earphone)+ Bluetooth link(Virtual Reality Handle to smart phone)
Mode 2:	Video Playing with PC (PC+ DP&USB cable+ virtual reality glasses+Earphone).
Mode 3:	Game Playing with NOLO(PC+ DP&USB cable+ virtual reality glasses+Earphone)
Mode 4:	traffic+Earphone(virtual reality glasses+USB cable + smart phone+ Earphone)+ Bluetooth link(Virtual Reality Handle to smart phone)
Mode 5:	Charging (adaptor+ USB cable+ virtual reality glasses)

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.

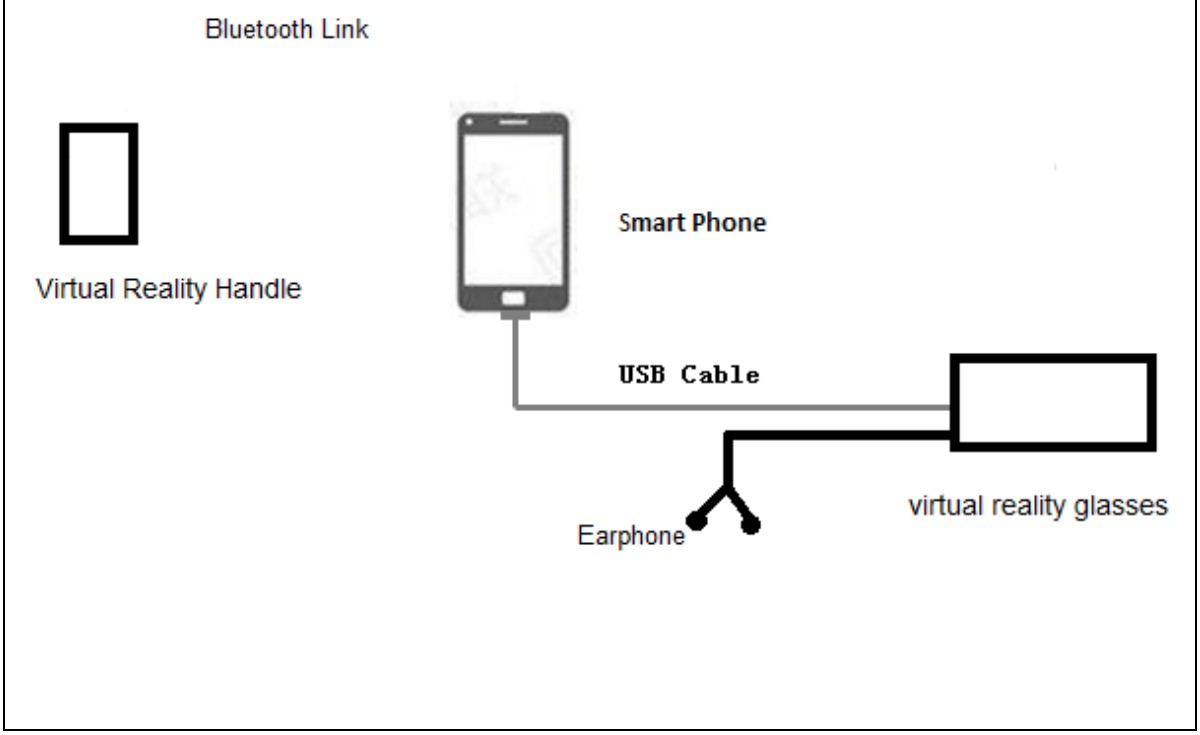
Traffic Mode:
When the EUT state is switched on and with Radio Resource Control (RRC) connection established.

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

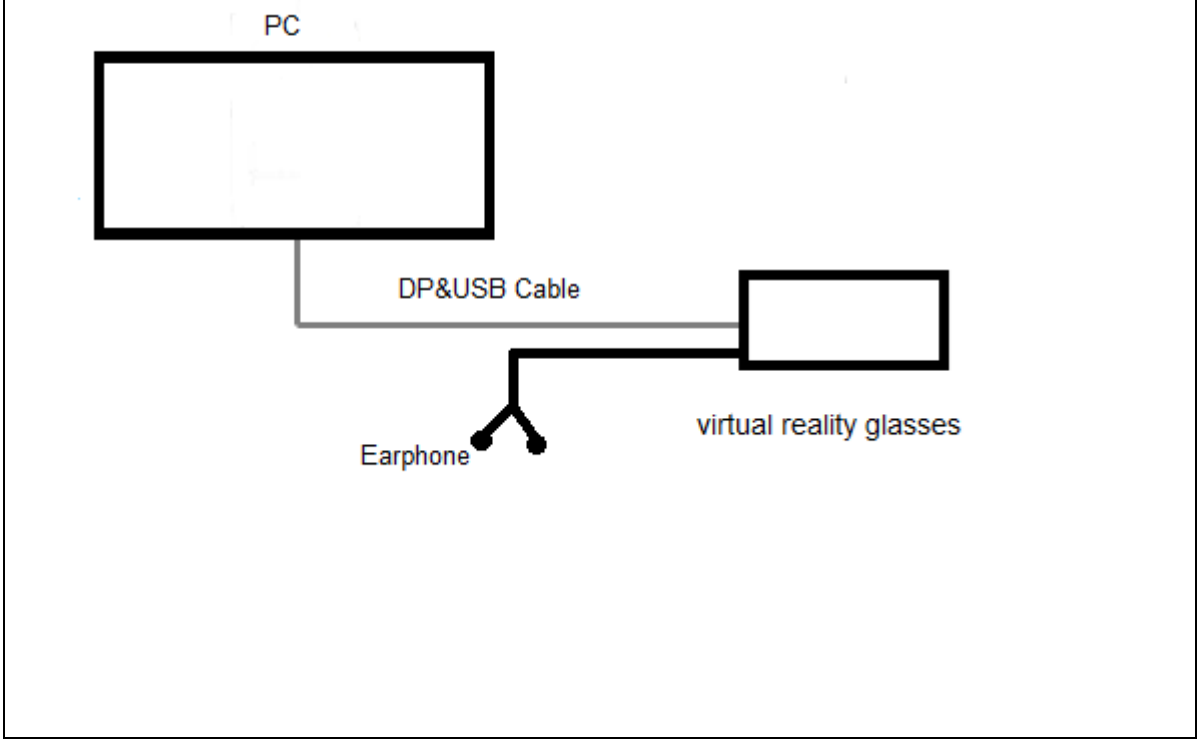
Worst Case:
Radiated Emission:
Video Playing with PC (PC+ DP&USB cable+ virtual reality glasses+Earphone).the result is the worst (30MHz~26.5GHz).
Conducted Emission:
Adapter (Model: HW-050200U02, SN: P95521J4E00043) + Charging the result is the worst
the result is the worst.

3.2 Test System Configuration

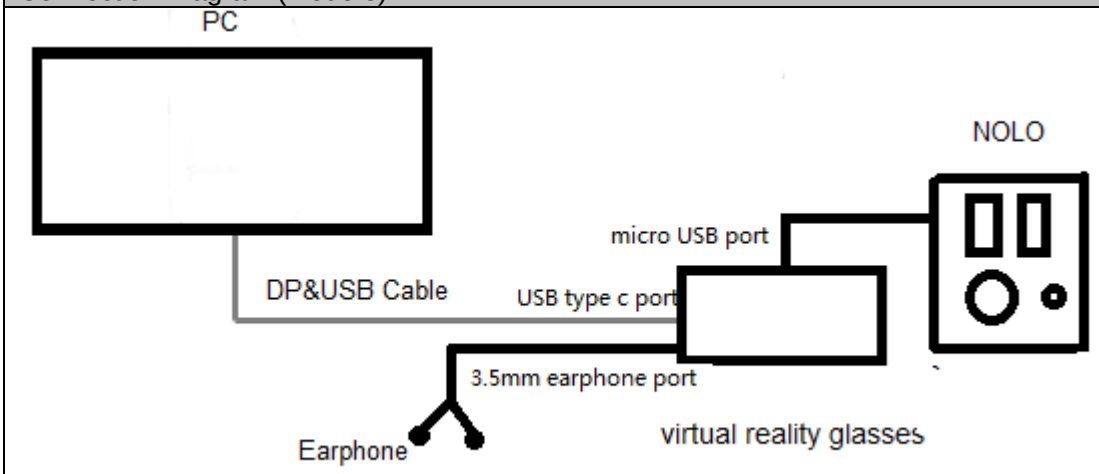
Connection Diagram (Mode 1)



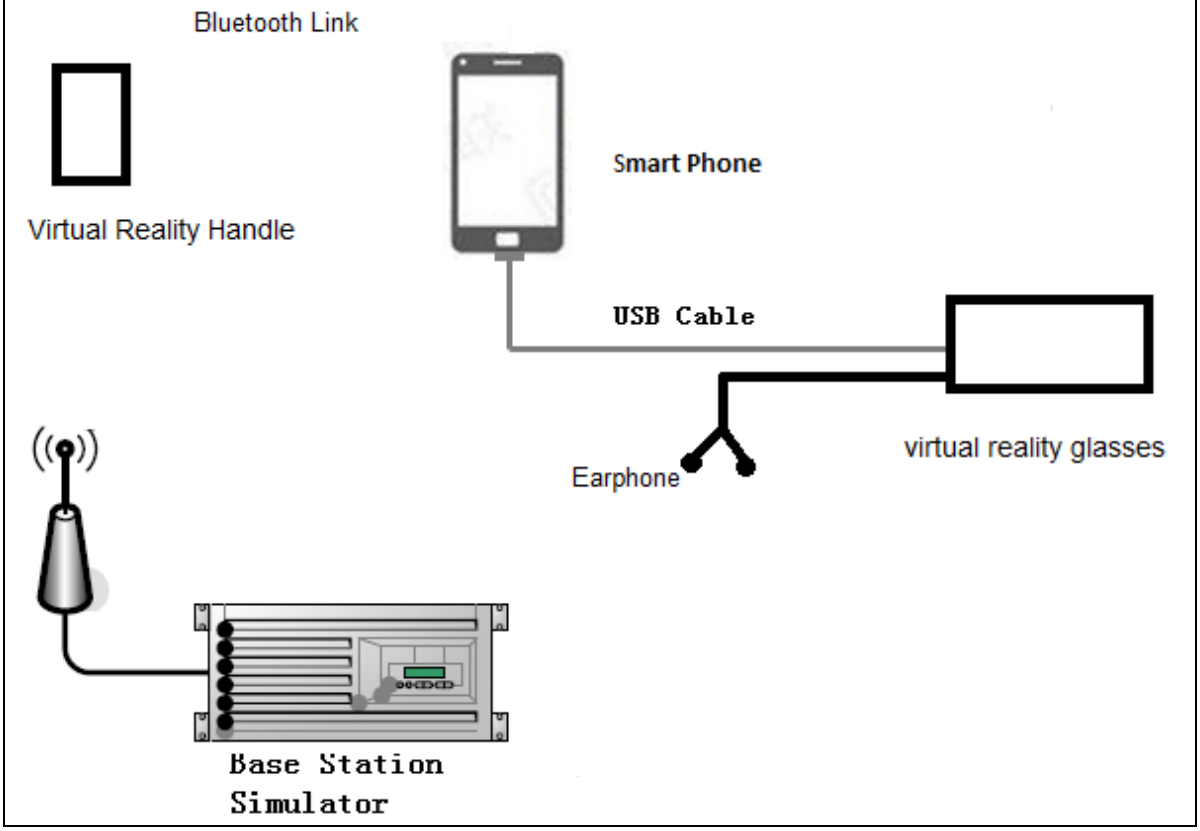
Connection Diagram (Mode 2)



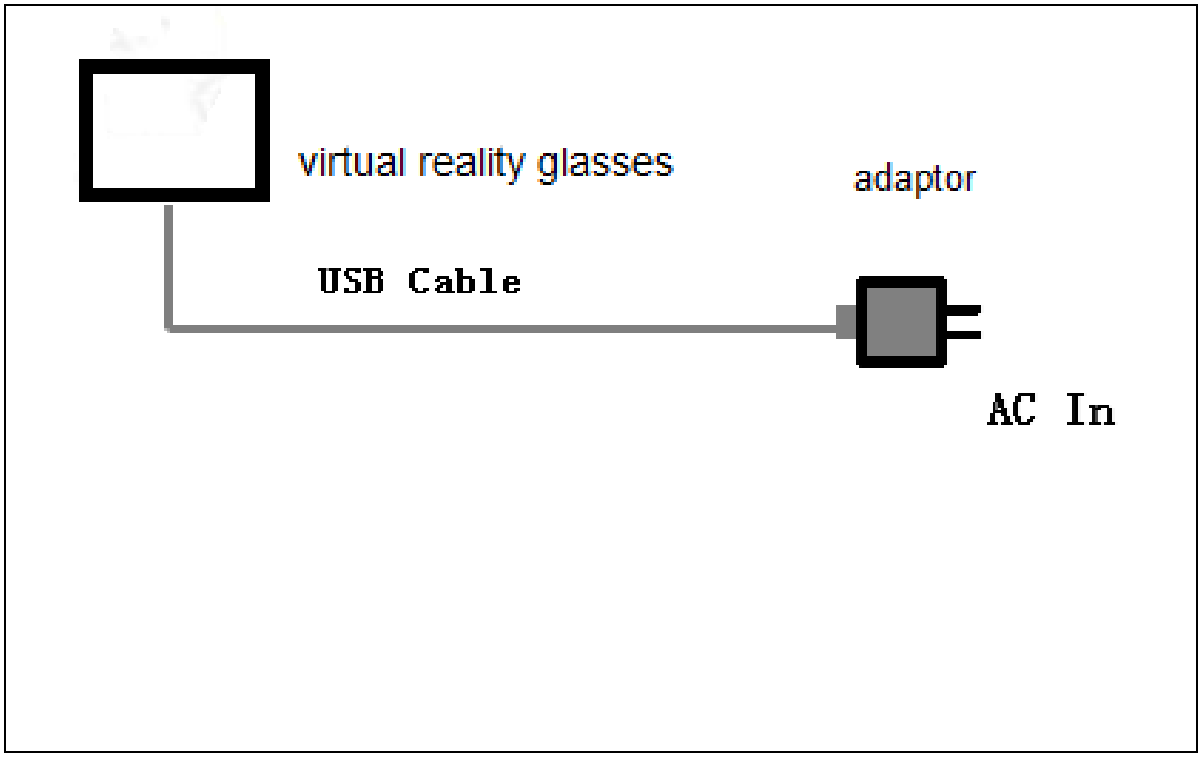
Connection Diagram (Mode 3)



Connection Diagram (Mode 4)



Connection Diagram (Mode 5)


virtual reality glasses
adaptor
USB Cable
AC In

3.3 Cables Used during Test

Cable	Quantity	Length	Type of Cable
USB	1	<3m	Shielded
DP&USB	1	<3m	Shielded

3.4 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Calibrated Deadline	Cal interval (month)
Smart Phone	ALPS-AL00	HUAWEI	023RY152V001493	\	\
Record	BLA-AL00	HUAWEI	045GH152V00345	\	\
PC	15R4	DELL	DVHV0034565	\	\
NOLO CV1	NOLO CV1	NOLO	P021369000182	\	\
earphone	Windy-S	GoerTek Inc.	001	\	\
Radio Communication Tester	CMU200	R&S	3608082535	2019-03-01	12

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

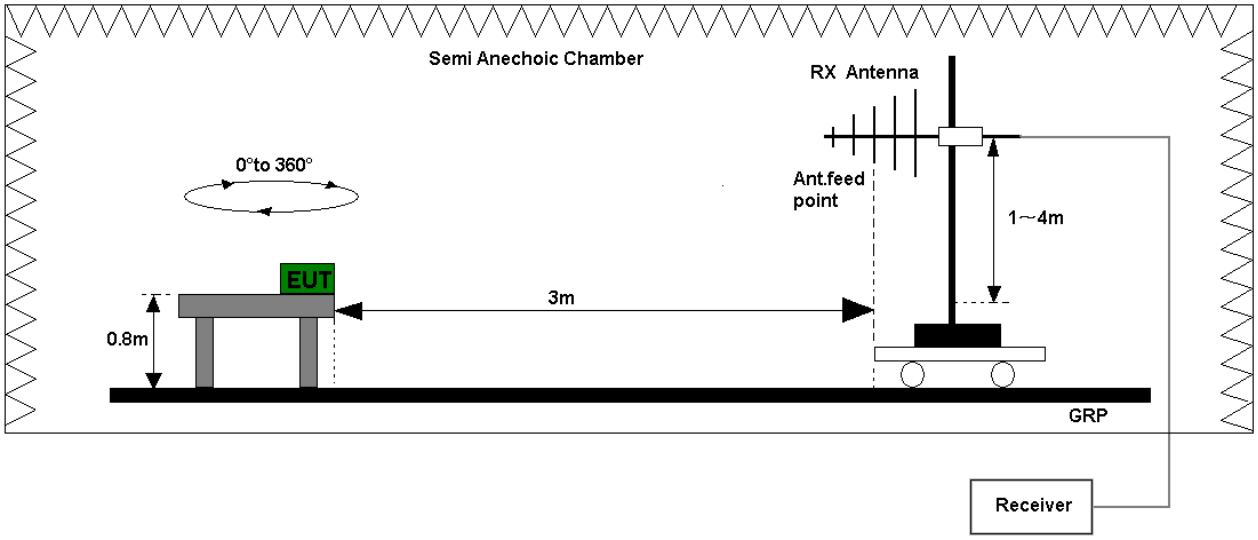


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz)

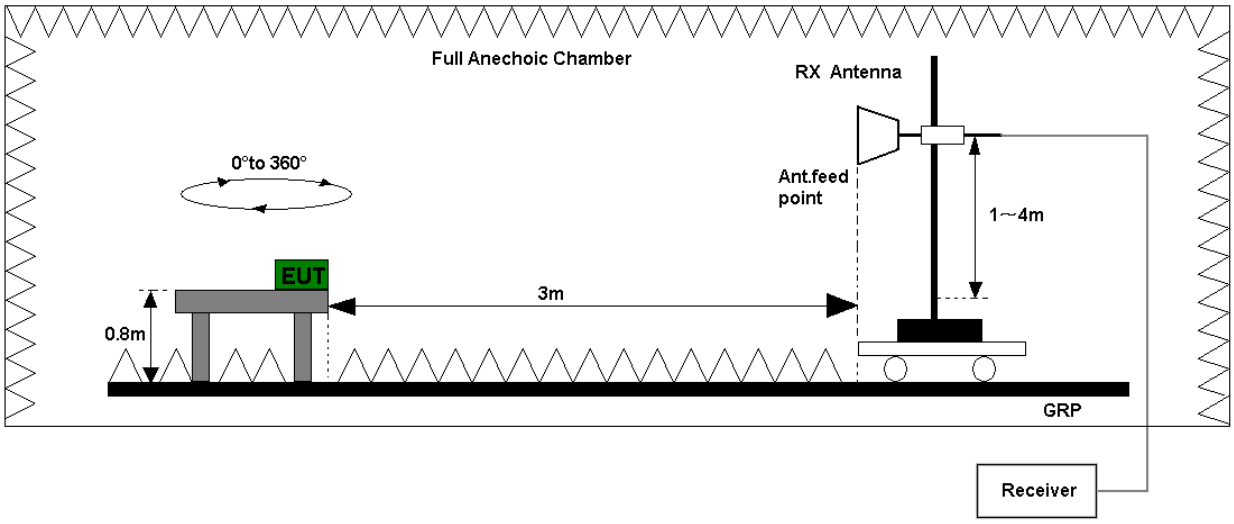


Figure 2. Test set-up of radiated disturbance(above 1GHz)

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(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 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

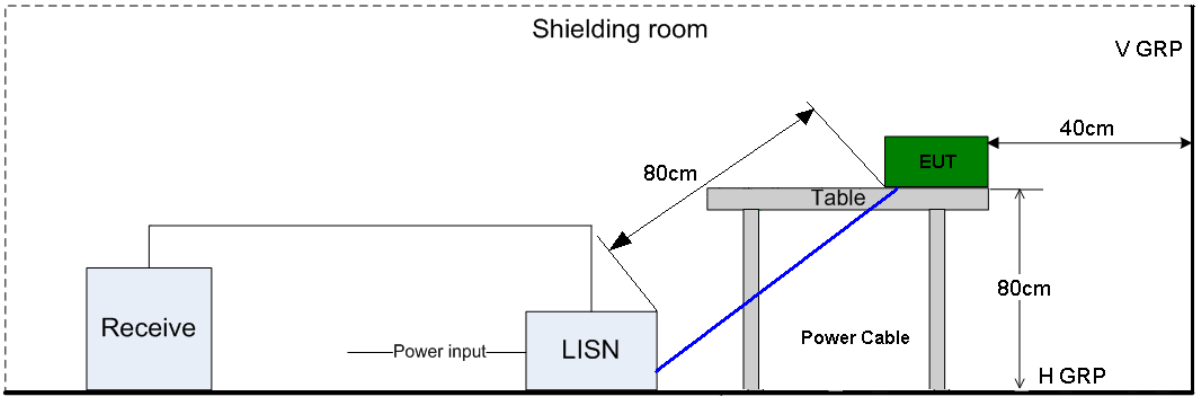


Figure 3. Test Set-up of conducted disturbance

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 (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&SA	N9038A	MY52260185	Agilent	Aug.29, 2019	12
	Bilog Antenna	CBL6112D	35407	TeseQ	Jun. 4, 2019	12
	Double Ridge Horn Antenna	3117	119436	ETS Lindgren	Jun. 27, 2019	24
	SHF-EHF Horn	AH-840	101071	com-power	Mar. 28, 2019	24
	HF Amplifier	83017A	MY53270104	0.5GHz~26.5Ghz	Dec.27, 2017	12
	HF Amplifier	TTA1840-35-HG	1871923	18GHz~40GHz	Jul.17.2018	12
	Horn antenna (18 to 26.5G)	3160-09	5140299	ETS	Jul. 20, 2019	24
	LF Amplifier	BPA-530	102209	Burgeon	Apr.19, 2019	12
	HF Amplifier	AMF-7D-00101800-30-10P-R	1707137	MITEQ	Oct. 17, 2019	12
CE	EMI Test receiver	ESCI	101163	R&S	Jan. 19, 2019	12
	Artificial Mains Network	ENV4200	100134	R&S	Jan. 18, 2019	12
	Artificial Mains Network	ENV216	100382	R&S	May. 08, 2019	12

Software Information			
Test Item	Software Name	Manufacturer	Version
RE	EMC32	AUDIX	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=4.8dB; k=2
RE(1GHz-18GHz)	Field strength (dBμV/m)	U=5dB; k=2
RE(18 GHz-26.5GHz)	Field strength (dBμV/m)	U=4.82dB; k=2
CE	Disturbance Voltage (dBμV)	U=2.5dB; k=2

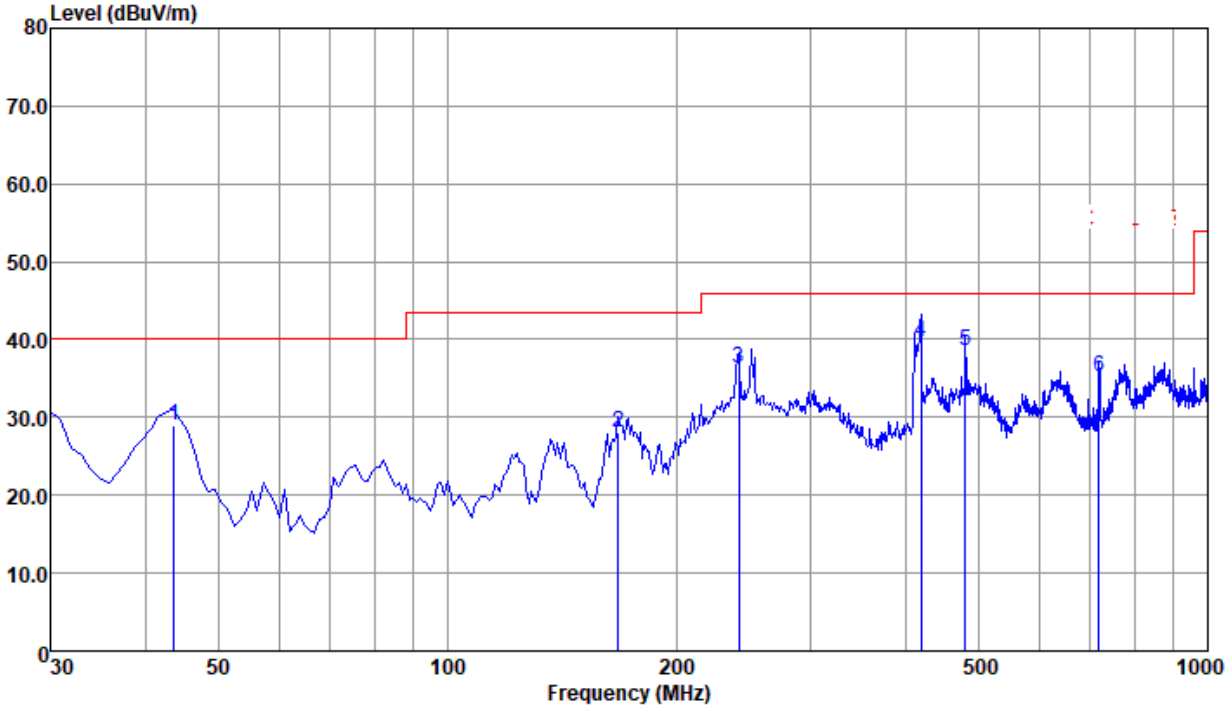
7 Test Data and Graph

Only the worst test results were shown

7.1 Radiated Disturbance

7.1.1 30MHz~1GHz

Test Mode 2: Video Playing with PC (PC+ DP&USB cable+ virtual reality glasses+Earphone).

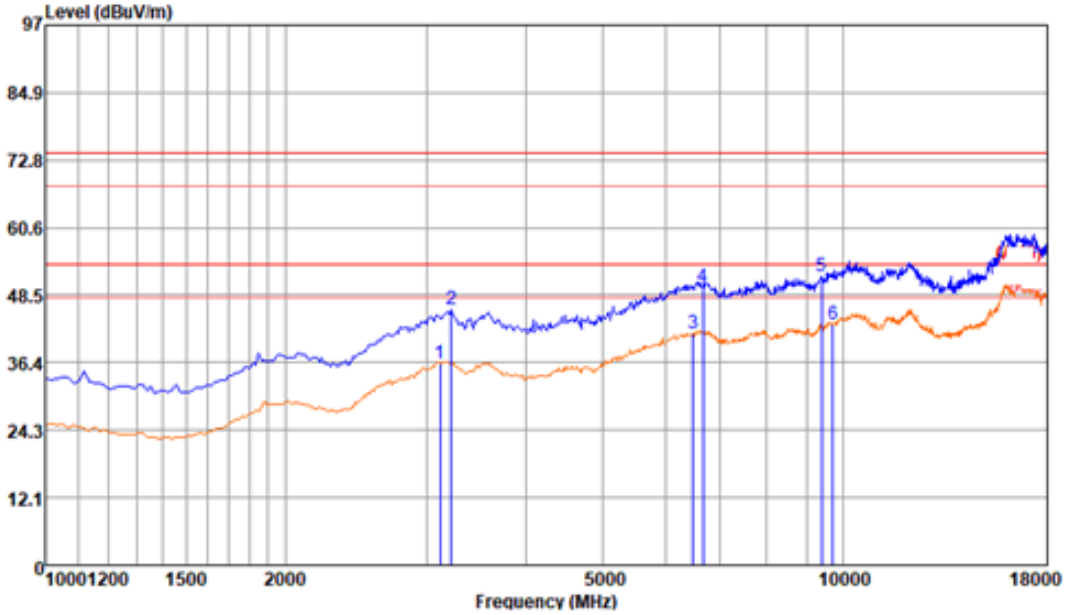


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	43.58	28.91	-11.09	40.00	43.23	16.96	0.42	31.70	QP
2	167.74	28.08	-15.42	43.50	42.29	15.70	1.42	31.33	QP
3	241.46	36.42	-9.58	46.00	48.10	17.54	1.82	31.04	QP
4 pp	418.97	39.66	-6.34	46.00	46.35	21.95	2.46	31.10	QP
5	480.08	38.46	-7.54	46.00	43.87	23.04	2.65	31.10	QP
6	719.67	35.23	-10.77	46.00	37.98	25.15	3.34	31.24	QP

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: Video Playing with PC (PC+ DP&USB cable+ virtual reality glasses+Earphone).

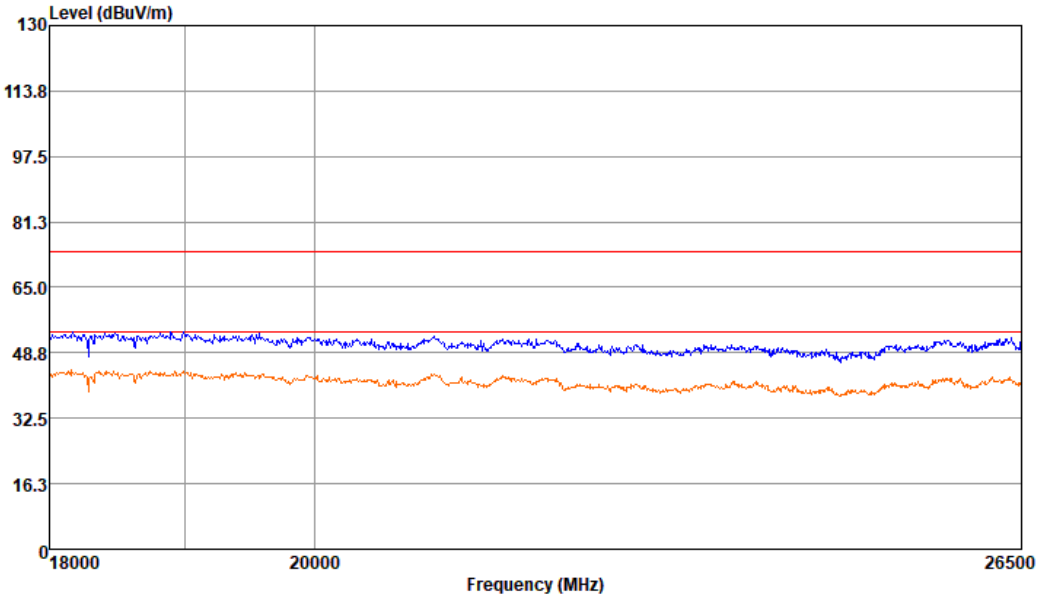


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	3125.00	36.20	-17.80	54.00	51.01	33.78	8.99	57.58	Average
2	3227.00	45.86	-28.14	74.00	60.63	33.96	9.09	57.82	Peak
3	6474.00	41.56	-12.44	54.00	49.61	34.84	15.12	58.01	Average
4	6661.00	50.03	-23.97	74.00	57.74	34.98	15.63	58.32	Peak
5 pk	9381.00	51.78	-22.22	74.00	57.58	36.35	12.99	55.14	Peak
6 pp	9687.00	43.34	-10.66	54.00	48.82	36.55	13.39	55.42	Average

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: Video Playing with PC (PC+ DP&USB cable+ virtual reality glasses+Earphone).

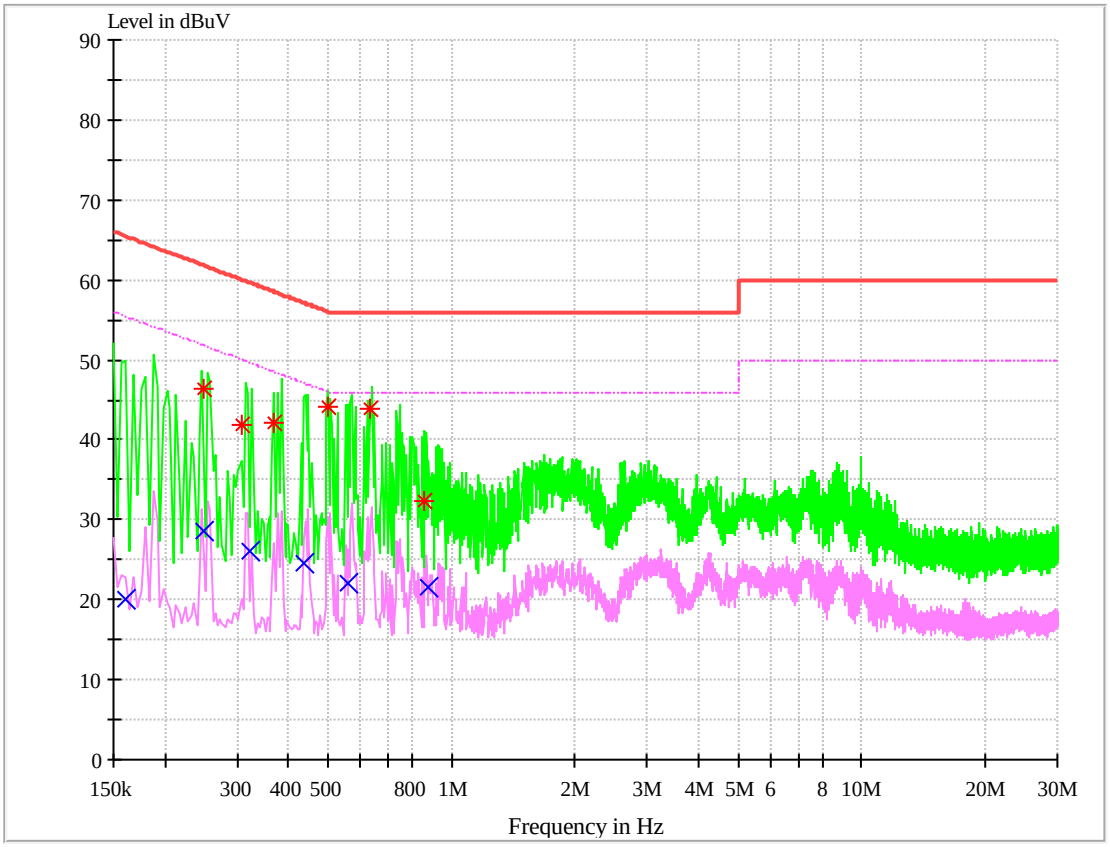


NOTE 1: The data was measured by Peak detector.
NOTE 2: No peak found in the Test Range of “18 GHz to 26.5GHz”

7.2 Conducted Disturbance

7.2.1 AC Port Test Data

Test Mode 5: Charging (adaptor+ USB cable+ virtual reality glasses)



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV	Line	Transd dB	Margin dB	Limit dBµV	PE
0.249789	46.30	L1	9.7	15.46	61.76	FLO
0.307241	41.82	L1	9.7	18.23	60.05	FLO
0.368012	42.10	L1	9.7	16.45	58.55	FLO
0.498210	44.05	L1	9.7	11.98	56.03	FLO
0.633818	43.88	N	9.7	12.12	56.00	FLO
0.861954	32.32	N	9.8	23.68	56.00	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV	Line	Transd dB	Margin dB	Limit dBµV	PE
0.161176	20.15	L1	9.7	35.25	55.40	FLO
0.249926	28.68	L1	9.7	23.08	51.76	FLO
0.320648	26.18	N	9.7	23.51	49.69	FLO
0.435118	24.69	N	9.7	22.46	47.15	FLO
0.556619	22.02	N	9.8	23.98	50.00	FLO
0.873857	21.55	N	9.8	24.45	50.00	FLO

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