EMC Test Report

Product Name: Tablet

Model Number: CMR-AL19

Report No: SYBH(Z-EMC)018122017-2

FCC ID：QISCMR-AL19

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 obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: 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 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.**
5. **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."**
6. **The test report is invalid if not marked with the stamps or the signatures of the persons responsible for performing, revising and approving the test report.**
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8. **If there is any dissidence for the test report, please file objection to the test centre within 15 days from the date of receiving the test report.**
9. **Normally, the test report is only responsible for the samples that have undergone the test.**
10. **Context of the test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of the laboratory.**

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:	2017-12-07
Start Date of Test:	2017-12-08
End Date of Test:	2017-12-15
Test Result:	Pass

Approved By (Lab Manager)	**2017-12-20**	**Roger Zhang**	Roger Zhang
	Date	**Name**	**Signature**
Prepared by (Test Engineer)	**2017-12-18**	**Li hongpin**	Li hongpin
	Date	**Name**	**Signature**

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	Tablet
Model Number	CMR-AL19
Serials Number	CMR0117A20000179
Input Rated Voltage	DC 3.82V
TX Frequency	GSM 850: 824MHz to 849MHz DCS 1900: 1850MHz to 1910MHz WCDMA 850: 824MHz to 849MHz WCDMA 1900: 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: 2570 MHz to 2620 MHz LTE BAND 41: 2545 MHz to 2655 MHz Bluetooth2.0/3.0+LE 4.2: 2402MHz to 2480MHz WIFI-2.4G b/g/n: 2412MHz to 2462MHz WIFI-5G a/n/ac: 5150 MHz -5250 MHz /5250 MHz -5350 MHz /5470 MHz -5725 MHz/5725 MHz -5850 MHz
RX Frequency	GSM 850: 869MHz to 894MHz DCS 1900: 1930MHz to 1990MHz WCDMA 850: 869MHz to 894MHz WCDMA 1900: 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 26: 859MHz to 894MHz LTE BAND 38: 2570 MHz to 2620 MHz LTE BAND 41: 2545 MHz to 2655 MHz Bluetooth2.0/3.0+LE 4.2: 2402MHz to 2480MHz WIFI-2.4G b/g/n: 2412MHz to 2462MHz WIFI-5G a/n/ac: 5150 MHz -5250 MHz /5250 MHz -5350 MHz /5470 MHz -5725 MHz/5725 MHz -5850 MHz GPS: 1575.42MHz
HW Version	SH1CMRONLM
SW Version	CMR-AL19 8.0.1.3(SP1C331)
EUT Accessory	
USB	Data Cable USB A Male to Typle C,Shield Manufacturer: FOXCONN INTERCONNECT TECHNOLOGY LIMITED. HONGLIN TECHNOLOGY CO.,LTD Luxshare Precision Industry Co., Ltd foxlink cheng uei precision industry Co., Ltd

Adapter	Manufacturer: Huawei Technologies Co.,Ltd. Model: HW-059200UHQ Input voltage: 100-240V 50/60Hz ,0.5A Output voltage: 5V ⎓ 2A or 9V ⎓ 2A SN: B76595GCY02927;K76547GCR14739
Rechargeable Li-ion	Manufacturer: Huawei Technologies Co.,Ltd. Battery Model: HB2994I8ECW Rated capacity: 7350 mAh Nominal Voltage: +3.82V Charging Voltage: +4.4V SN:5GHUAYH721;5FAFGIH628;5FAHSCHA11
Typle C to Audio connector	Manufacturer: Jiangxi Lianchuang Hongsheng Electronic Co.; FOSTER ELECTRIC CO. (HONG KONG) LTD. Merry Electronics Co.,Ltd. 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
Test Site 2:	RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD.
Test Site Location:	No.2 New City Avenue Songshan Lake Sci. &Tech. Industry Park, Dongguan, Guangdong, China

1.3 Applied Standards

APPLIED STANDARD

47 CFR FCC Part 15:2016, Subpart B

2 Summary of Results

Summary of Results				
Test Items	**Test Mode**	**Performance Class & Required Performance Criteria**	**Result**	**Site**
Radiated Emissions Enclosure Port	Mode2~ Mode4	CLASS B	Pass	Site1 Site2
Conducted Emissions ☐DC Power Port ☒AC Power Port ☐Telecommunication Ports	Mode1~ Mode2&4	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 +WIFI+BT+GPS On+Traffic
Mode 2:	Charging+Camera On+idle
Mode 3:	Video Playing+Earphone+idle
Mode 4:	Data Transmitting

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.

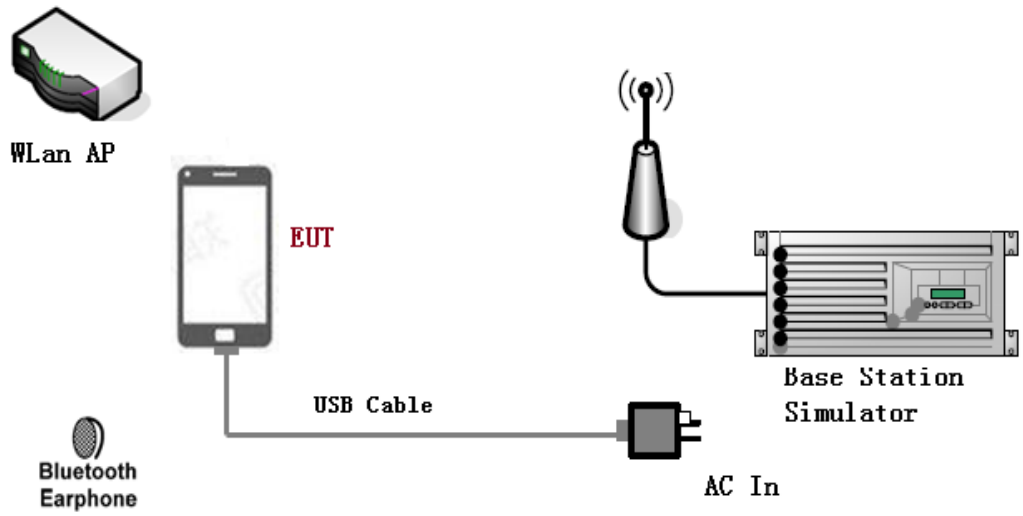
Worst Case:

1) Radiated Emission: Mode 4

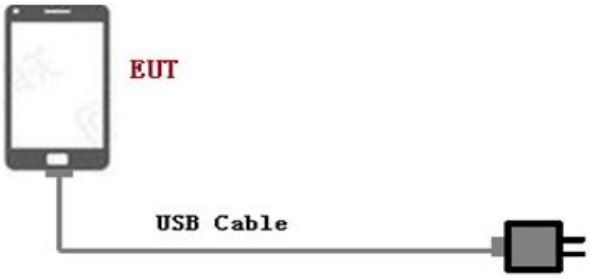
2) Conducted Emission: Mode 1

3.2 Test System Configuration

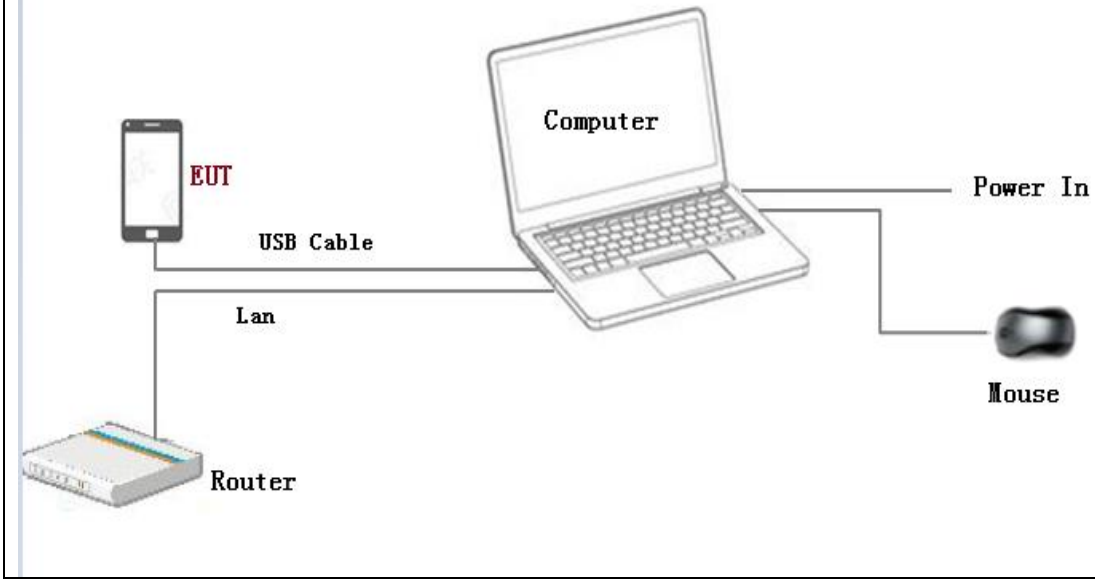
Connection Diagram (Mode 1)



Connection Diagram (Mode 2)



Connection Diagram (Mode 3)


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
Radio Communication Tester	CMU200	R&S	3608082535	2018-03-01
Radio Communication Tester	MT8820C	Anritsu	A110518805	2018-05-15
Notebook	S3	ThinkPad	A140714638	/
Mouse	M-U0025-O	Lenovo	HS423HB22TB	/
Earphone	MEMD1532B528A00	Huawei	22040300	/

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: 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 to18 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

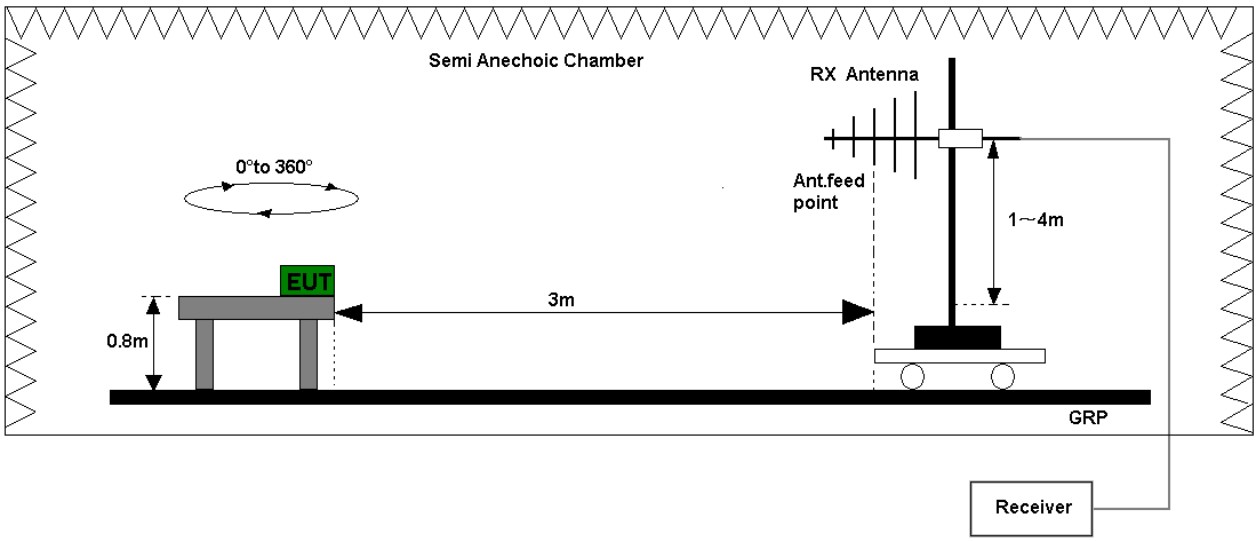


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz)

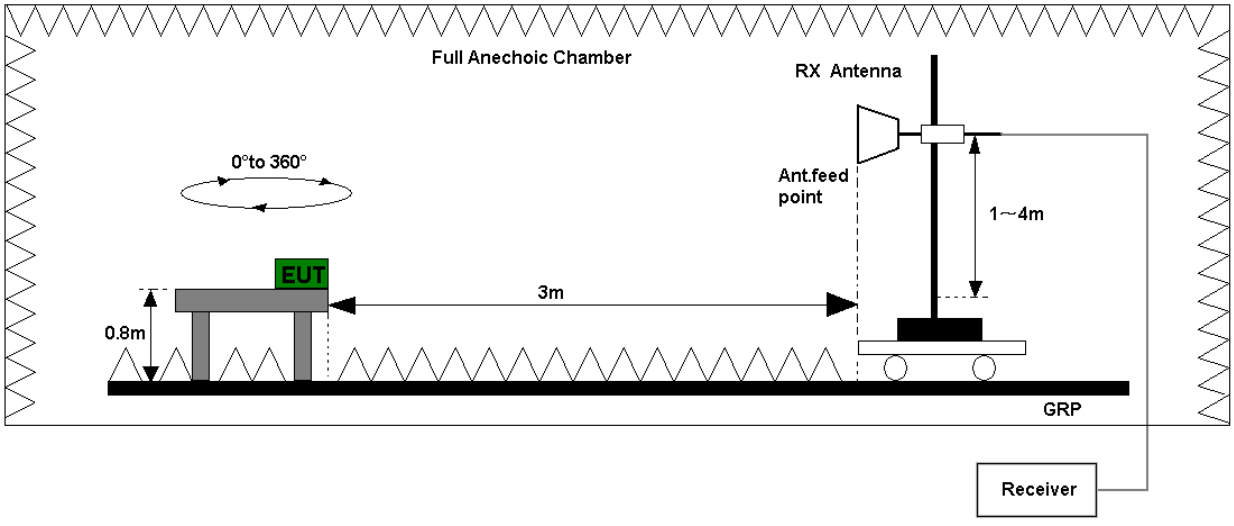


Figure 2. Test set-up of radiated disturbance(above 1GHz)

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

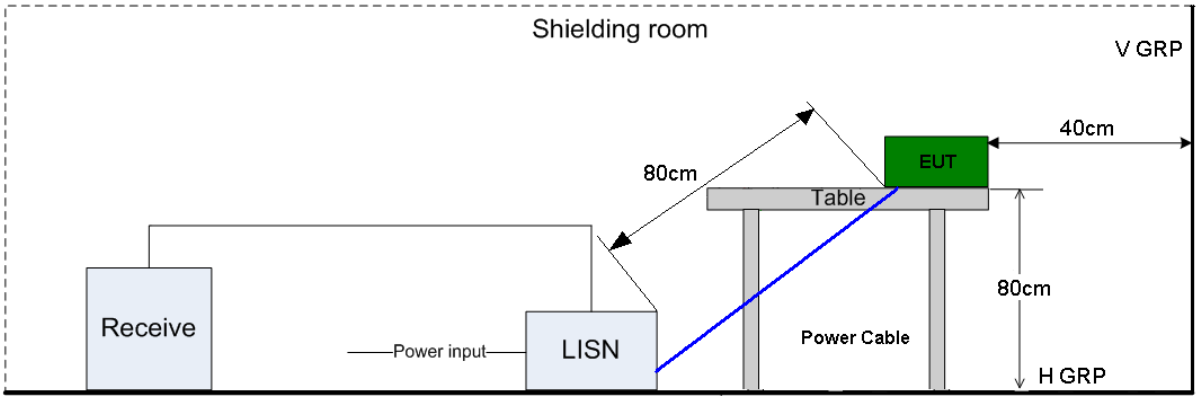


Figure 3. Test Set-up of conducted disturbance

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	ESU26	100150	R&S	Jun. 20, 2018	12
	Spectrum Analyzer	E4447A	MY52090002	Agilent	Oct. 22, 2018	12
	Broadband Antenna	VULB 9163	9163-491	SCHWARZBECK	Mar. 28, 2019	24
	Horn Antenna	HF906	100683	R&S	Mar. 28, 2019	24
	Horn antenna (18 to 40GHz)	SAS-574	426	A.H.Systems	Air.09,2018	24
CE	EMI Test receiver	ESU26	100150	R&S	May. 15, 2018	12
	Artificial Mains Network	ENV4200	100134	R&S	May. 15, 2018	12
	Artificial Mains Network	ENV216	100382	R&S	May. 15, 2018	12

Software Information			
Test Item	Software Name	Manufacturer	Version
RE	EMC32	R&S	V9.25.0
RE	ES-K1	R&S	V1.7.1
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=4.1dB; k=2
RE(1GHz-18GHz)	Field strength (dBμV/m)	U=5.0dB; k=2
RE(18 GHz-26.5GHz)	Field strength (dBμV/m)	U=5.9 dB; k=2
RE (26.5 GHz- 40GHz)	Field strength (dBμV/m)	U=5.8 dB; k=2
CE	Disturbance Voltage (dBμV)	U=2.5dB; k=2

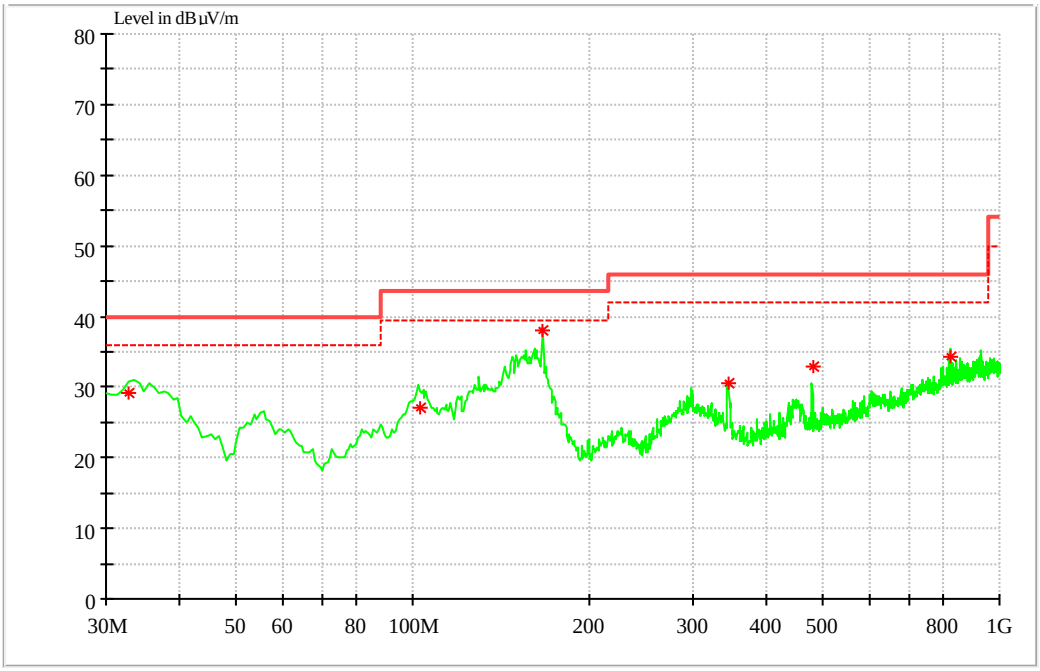
7 Test Data and Graph

Only the worst test results were shown

7.1 Radiated Disturbance

7.1.1 30MHz~1GHz

Test Mode 4: Data Transmitting



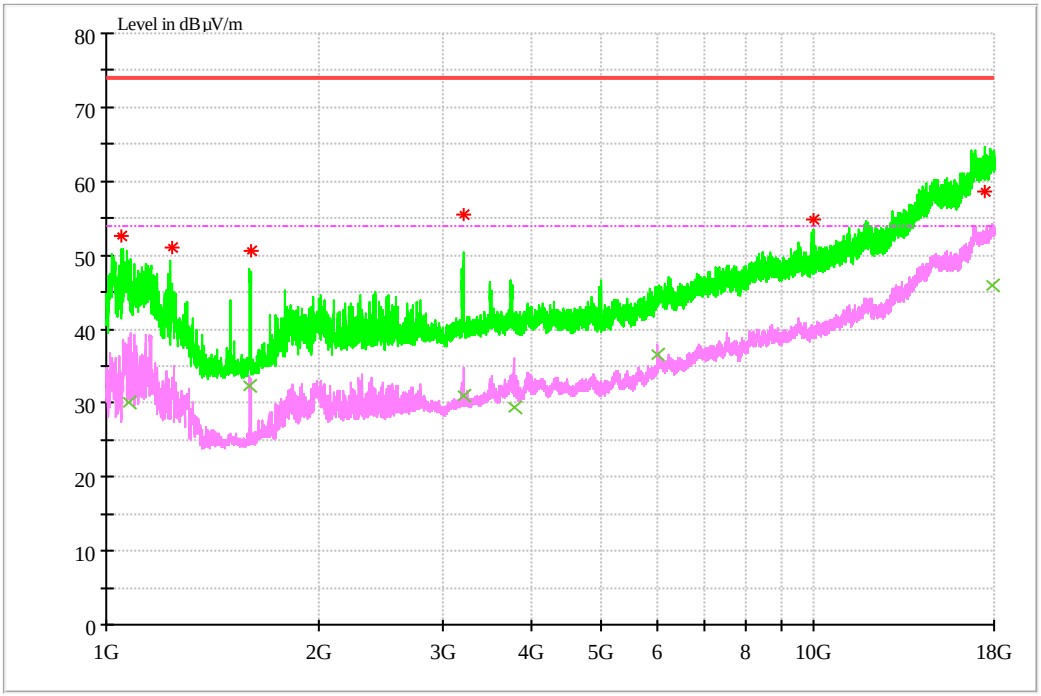
MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
32.878000	29.15	15.0	40.00	10.85	109.0	112.0	V
102.938286	26.94	12.0	43.50	16.56	100.0	87.0	V
166.138000	38.11	11.8	43.50	5.39	116.0	135.0	H
346.311428	30.51	17.0	46.00	15.49	142.0	89.0	V
479.995143	32.79	20.1	46.00	13.21	100.0	159.0	H
823.065714	34.23	25.4	46.00	11.77	100.0	170.0	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 4: Data Transmitting



MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
1048.340000	52.63	-15.5	74.00	21.37	100.0	156.0	V
1237.847334	51.04	-14.3	74.00	22.96	100.0	96.0	V
1599.177333	50.63	-12.0	74.00	23.37	100.0	149.0	V
3199.678666	55.52	-4.4	74.00	18.48	100.0	210.0	V
9984.374000	54.84	7.3	74.00	19.16	109.0	147.0	V
17465.416000	58.65	20.2	74.00	15.35	158.0	240.0	V

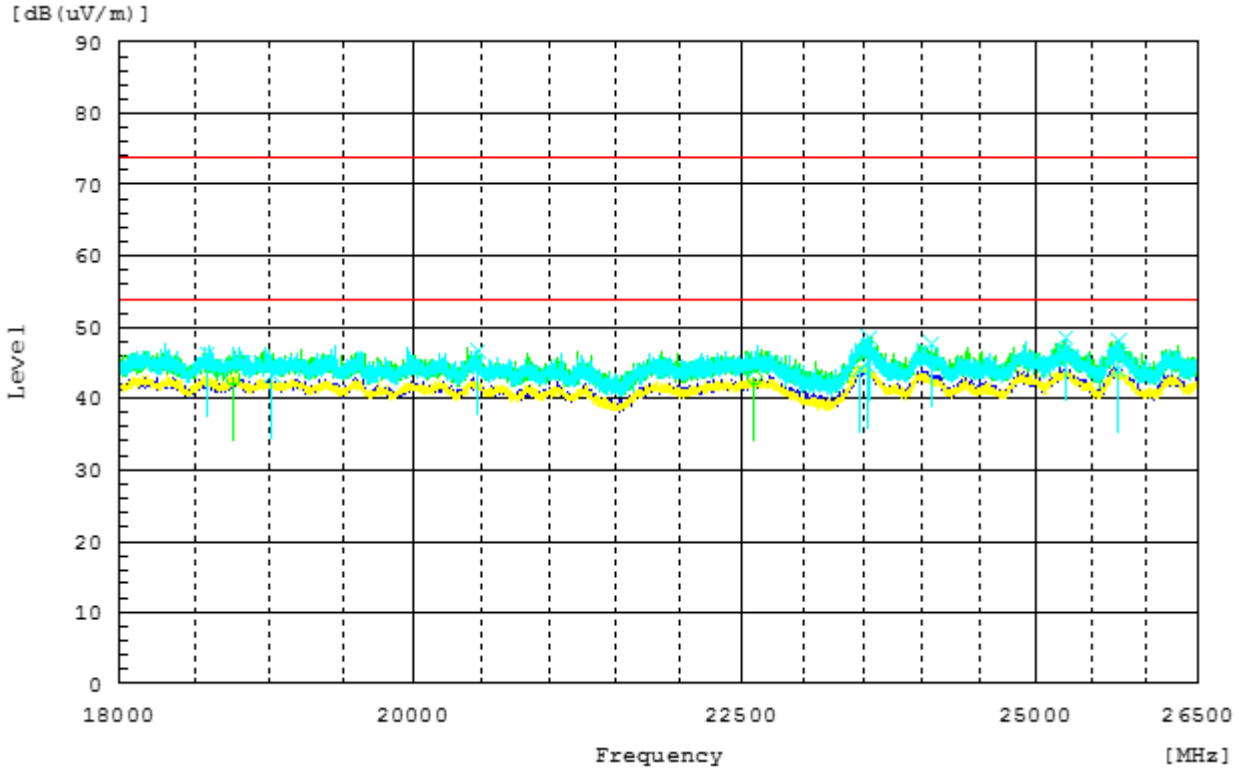
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
1075.802666	30.02	-15.2	54.00	23.98	100.0	143.0	V
1594.663333	32.41	-12.0	54.00	21.59	100.0	148.0	V
3194.575333	30.94	-4.5	54.00	23.06	100.0	209.0	V
3768.853333	29.51	-3.3	54.00	24.49	100.0	71.0	V
6000.162667	36.45	1.2	54.00	17.55	127.0	244.0	V
17873.744000	45.82	21.6	54.00	8.18	119.0	273.0	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 4: Data Transmitting



MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
18578.850	46.4	-14.3	74.0	27.6	100	279	V
20463.300	46.7	-16.2	74.0	27.3	100	210	V
23546.250	48.7	-12.3	74.0	25.3	100	19	V
24076.650	47.9	-12.0	74.0	26.1	100	357	V
25270.050	48.6	-11.8	74.0	25.4	100	359	V
25751.150	48.3	-11.6	74.0	25.7	100	334	V

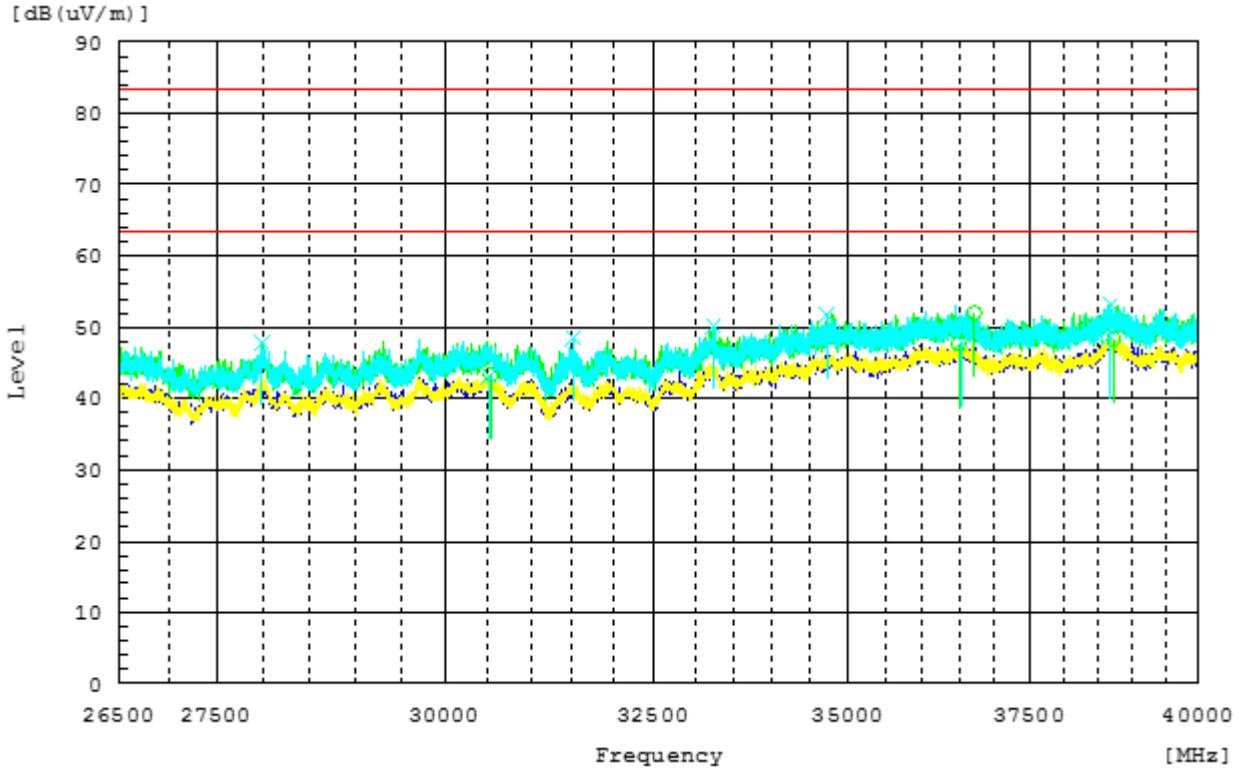
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
18746.300	43.0	-14.5	54.0	11.0	100	0	H
19010.650	43.3	-15.5	54.0	10.7	100	197	V
22600.200	42.9	-13.5	54.0	11.1	100	13	H
23477.400	44.3	-12.3	54.0	9.7	100	197	V
23533.500	44.8	-12.2	54.0	9.2	100	0	V
25742.650	44.1	-11.6	54.0	9.9	100	357	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.

7.1.4 26.5GHz~40GHz

Test Mode 4: Data Transmitting



MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
27980.950	48.0	-10.5	84.0	36.0	100	356	V
31501.750	48.6	-4.6	84.0	35.4	100	1	V
33235.150	50.3	-1.0	84.0	33.7	100	319	V
34712.050	51.8	1.6	84.0	32.2	100	333	V
36714.100	51.9	2.3	84.0	32.1	100	292	H
38662.150	53.2	1.2	84.0	30.8	100	340	V

MEASUREMENT RESULT: AV Detector

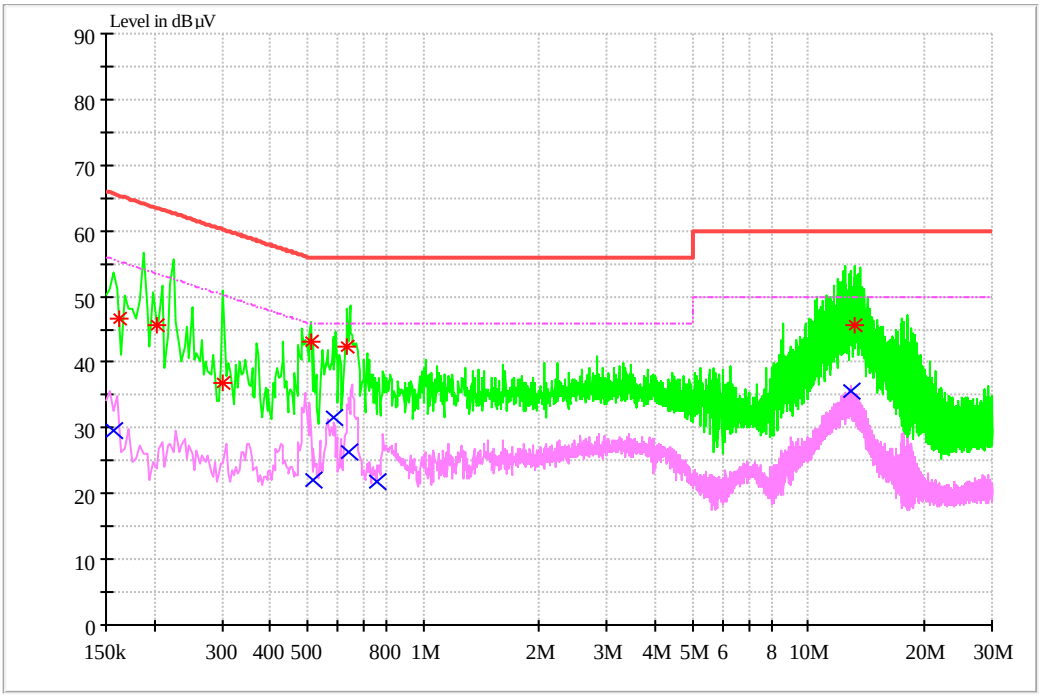
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
30510.850	43.2	-5.7	64.0	20.8	100	66	V
30533.800	43.3	-5.7	64.0	20.7	100	128	H
36507.550	47.7	3.3	64.0	16.3	100	0	H
36527.800	48.0	3.3	64.0	16.0	100	100	V
38666.200	48.8	1.3	64.0	15.2	100	46	V
38731.000	48.3	1.6	64.0	15.7	100	0	H

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.
Limit:(PK)=74+20log(D1/D2)=74+20log(3/1)=84; Limit:(AV)=54+20log(D1/D2)=54+20log(3/1)=64

7.2 Conducted Disturbance

7.2.1 AC Port Test Data

Test Mode 1: Charging +WIFI+BT+GPS On+Traffic



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV	Line	Transd dB	Margin dB	Limit dBµV	PE
0.162499	46.64	L1	9.7	18.69	65.34	FLO
0.202856	45.53	N	9.7	17.96	63.49	FLO
0.302191	36.79	N	9.7	23.39	60.18	FLO
0.510203	43.05	L1	9.7	12.95	56.00	FLO
0.629489	42.24	L1	9.7	13.76	56.00	FLO
13.144463	45.63	N	10.1	14.37	60.00	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV	Line	Transd dB	Margin dB	Limit dBµV	PE
0.157410	29.63	N	9.7	25.97	55.60	FLO
0.516367	22.04	L1	9.7	23.96	46.00	FLO
0.588287	31.67	L1	9.7	14.33	46.00	FLO
0.637074	26.22	L1	9.7	19.78	46.00	FLO
0.761753	21.92	L1	9.7	24.08	46.00	FLO
12.961846	35.49	N	10.0	14.51	50.00	FLO

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