

EMC TEST REPORT

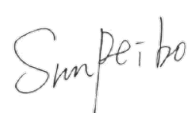
Applicant:	Xiaomi Communications Co., Ltd.
Address:	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

Manufacturer or Supplier:	Xiaomi Communications Co., Ltd.
Address:	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085
Product:	Mobile Phone
Brand Name:	Redmi
Model Name:	2312CRNCCL
FCC ID:	2AFZZNCCL
Date of tests:	Oct. 16, 2023 ~ Nov. 22, 2023

The submitted sample of the above equipment has been tested for according to the requirements of the following standards:

- ☐ FCC Part 15, Subpart B, Class A
☒ FCC Part 15, Subpart B, Class B
☒ ANSI C63.4:2014

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Prepared by Chao Wu Engineer / Mobile Department	Approved by Peibo Sun Manager / Mobile Department
 Date: Nov. 22, 2023	 Date: Nov. 22, 2023

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Test Report No.: W7L-P23100008EM01

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
W7L-P23100008EM01	Original release	Nov. 22, 2023

1 GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Mobile Phone	
BRAND NAME	Redmi	
MODEL NAME	2312CRNCCL	
NOMINAL VOLTAGE	5Vdc(adapter or host equipment) 3.82Vdc (Li-ion, battery)	
MODULATION TYPE	BT_LE	GFSK
	Bluetooth	GFSK, $\pi/4$ -DQPSK, 8DPSK
	FM	FM
	WLAN	DSSS, OFDM
	GPS/GALILEO/GLO NASS/BDS	BPSK
	GSM/GPRS/EDGE	GMSK, 8PSK
	WCDMA	QPSK, BPSK
	LTE	QPSK/16QAM/64QAM
OPERATING FREQUENCY	Bluetooth/BT_LE	2402MHz ~ 2480MHz
	FM	87.5MHz ~ 108MHz
	WLAN	2412 ~ 2462MHz for 11b/g/n(HT20) 5180 ~ 5240MHz, 5260 ~ 5320 MHz, 5500 ~ 5700MHz, 5745 ~ 5825 MHz for 11a/ n(HT20)/ n(HT40) / ac(VHT20)/ ac(VHT40) / ac(VHT80)
	GPS/GALILEO/GLO NASS/BDS	1559MHz ~ 1610MHz
	GSM	824.2MHz ~ 848.8MHz (FOR GSM 850) 1850.2MHz ~ 1909.8MHz (FOR GSM 1900)
	WCDMA	1852.4MHz ~ 1907.6MHz(FOR WCDMA Band 2) 1712.4MHz ~ 1752.6MHz(FOR WCDMA Band 4) 826.4MHz ~ 846.6MHz (FOR WCDMA Band 5)

OPERATING FREQUENCY	LTE	1850.7MHz ~ 1909.3MHz (FOR LTE Band2) 1710.7MHz ~ 1754.3MHz (FOR LTE Band4) 824.7MHz ~ 848.3MHz (FOR LTE Band5) 2502.5MHz ~ 2567.5MHz (FOR LTE Band7) 779.5MHz ~ 784.5MHz (FOR LTE Band13) 814.7MHz ~ 848.3MHz (FOR LTE Band26) 2572.5MHz ~ 2617.5MHz (FOR LTE Band38) 2498.5MHz ~ 2687.5MHz (FOR LTE Band41) 1710.7MHz ~ 1779.3MHz (FOR LTE Band66)
HW VERSION	13510C3Y	
SW VERSION	Android 14	
IMEI	864532070015406/14 864532070023426/34 864532070023566/74 864532070033300/18	
I/O PORTS	Refer to user's manual	
CABLE SUPPLIED	USB cable: non-shielded cable, with w/o ferrite core, 1.0 meter	

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

1.2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart B		
Standard Section	Test Item	Result
FCC Part 15, Subpart B, Class B ANSI C63.4:2014	Conducted Test	Compliance
	Radiated Emission Test (30MHz ~ 1GHz)	Compliance
	Radiated Emission Test (Above 1GHz)	Compliance

1.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	150kHz ~ 30MHz	±2.70dB
Radiated emissions	30MHz~1GHz	±4.98dB
	1GHz ~6GHz	±4.70dB
	6GHz ~18GHz	±4.60dB
	18GHz ~40GHz	±4.12dB

1.4 DESCRIPTION OF TEST MODES

Test Mode	Test Condition
Radiated emission test	
1	GSM850 Idle+ Adapter 1+ USB cable 1+ Earphone+ SD+ BT Idle+ WIFI Idle (2.4G)+ Front Camera On+ SIM1+ Sample 1
2	GSM1900 Idle+ Adapter 2+ USB cable 2+ Earphone+ SD+ BT Idle+ WIFI Idle (5G B1)+ Back Camera On+ SIM2+ Sample 1
3	WCDMA B2 Idle+ Adapter 1+ USB cable 3+ Earphone+ SD+ BT Idle+ WIFI Idle (5G B2)+ Front Camera On+ SIM1+ Sample 1
4	WCDMA B4 Idle+ Adapter 2+ USB cable 4+ Earphone+ SD+ BT Idle+ WIFI Idle (2.4G)+ Back Camera On+ SIM2+ Sample 1
5	WCDMA B5 Idle+ Adapter 1+ USB cable 5+ Earphone+ SD+ BT Idle+ WIFI Idle (5G B3)+ FM RX+ SIM1+ Sample 1
6	LTE B2 Idle+ Adapter 2+ USB cable 1+ Earphone+ SD+ BT Idle+ WIFI Idle (2.4G)+ SIM2+ Sample 1
7	LTE B4 Idle+ Adapter 1+ USB cable 2+ Earphone+ SD+ BT Idle+ WIFI Idle (5G B4)+ SIM1+ Sample 1
8	LTE B5 Idle+ Adapter 2+ USB cable 3+ Earphone+ SD+ BT Idle+ WIFI Idle (2.4G)+ SIM2+ Sample 1
9	LTE B7 Idle+ Adapter 2+ USB cable 4+ Earphone+ SD+ BT Idle+ WIFI Idle (5G B1)+ MPG4+ SIM1+ Sample 1
10	LTE B13 Idle+ Adapter 1+ USB cable 5+ Earphone+ SD+ BT Idle+ WIFI Idle (2.4G)+ Front Camera On+ SIM2+ Sample 1
11	LTE B26 Idle+ Adapter 2+ USB cable 1+ Earphone+ SD+ BT Idle+ WIFI Idle (2.4G)+ Back Camera On+ SIM1+ Sample 1
12	LTE B66 Idle+ Adapter 1+ USB cable 2+ Earphone+ SD+ BT Idle+ WIFI Idle (5G B3)+ SIM2+ Sample 1
13	LTE B38 Idle+ USB Link + Data Transmission+ USB cable 1+ SD+ BT Idle+ WIFI Idle (2.4G)+ EUT to Notebook+ Earphone+ SIM1+ Sample 1
14	LTE B41 Idle+ USB Link + Data Transmission+ USB cable 2+ SD+ BT Idle+ WIFI Idle (5G B1)+ Notebook to EUT+ Earphone+ SIM2+ Sample 1
15	LTE B5 Idle+ USB Link + Data Transmission+ USB cable 3+ SD+ BT Idle+ WIFI Idle (2.4G)+ EUT to Notebook+ Earphone+ SIM1+ Sample 1
16	LTE B7 Idle+ USB Link + Data Transmission+ USB cable 4+ SD+ BT Idle+ WIFI Idle (5G B1)+ Notebook to EUT+ Earphone+ SIM2+ Sample 1
17	LTE B13 Idle+ USB Link + Data Transmission+ USB cable 5+ SD+ BT Idle+ WIFI Idle (2.4G)+ EUT to Notebook+ Earphone+ SIM1+ Sample 1
18	Powered by battery+ Earphone+ SD+ BT Idle+ WIFI Idle (5G B1)+ MPG4+ SIM1+ Sample 1
19	Worst of 1-18+ Sample 2
20	Worst of 1-18+ Sample 3
21	Worst of 1-18+ Sample 4

Conducted emission test	
1	GSM850 Idle+ Adapter 1+ USB cable 1+ Earphone+ SD+ BT Idle+ WIFI Idle (2.4G)+ Front Camera On+ SIM1+ Sample 1
2	GSM1900 Idle+ Adapter 2+ USB cable 2+ Earphone+ SD+ BT Idle+ WIFI Idle (5G B1)+ Back Camera On+ SIM2+ Sample 1
3	WCDMA B2 Idle+ Adapter 1+ USB cable 3+ Earphone+ SD+ BT Idle+ WIFI Idle (5G B2)+ Front Camera On+ SIM1+ Sample 1
4	WCDMA B4 Idle+ Adapter 2+ USB cable 4+ Earphone+ SD+ BT Idle+ WIFI Idle (2.4G)+ Back Camera On+ SIM2+ Sample 1
5	WCDMA B5 Idle+ Adapter 1+ USB cable 5+ Earphone+ SD+ BT Idle+ WIFI Idle (5G B3)+ FM RX+ SIM1+ Sample 1
6	LTE B2 Idle+ Adapter 2+ USB cable 1+ Earphone+ SD+ BT Idle+ WIFI Idle (2.4G)+ SIM2+ Sample 1
7	LTE B4 Idle+ Adapter 1+ USB cable 2+ Earphone+ SD+ BT Idle+ WIFI Idle (5G B4)+ SIM1+ Sample 1
8	LTE B5 Idle+ Adapter 2+ USB cable 3+ Earphone+ SD+ BT Idle+ WIFI Idle (2.4G)+ SIM2+ Sample 1
9	LTE B7 Idle+ Adapter 2+ USB cable 4+ Earphone+ SD+ BT Idle+ WIFI Idle (5G B1)+ MPG4+ SIM1+ Sample 1
10	LTE B13 Idle+ Adapter 1+ USB cable 5+ Earphone+ SD+ BT Idle+ WIFI Idle (2.4G)+ Front Camera On+ SIM2+ Sample 1
11	LTE B26 Idle+ Adapter 2+ USB cable 1+ Earphone+ SD+ BT Idle+ WIFI Idle (2.4G)+ Back Camera On+ SIM1+ Sample 1
12	LTE B66 Idle+ Adapter 1+ USB cable 2+ Earphone+ SD+ BT Idle+ WIFI Idle (5G B3)+ SIM2+ Sample 1
13	LTE B38 Idle+ USB Link + Data Transmission+ USB cable 1+ SD+ BT Idle+ WIFI Idle (2.4G)+ EUT to Notebook+ Earphone+ SIM1+ Sample 1
14	LTE B41 Idle+ USB Link + Data Transmission+ USB cable 2+ SD+ BT Idle+ WIFI Idle (5G B1)+ Notebook to EUT+ Earphone+ SIM2+ Sample 1
15	LTE B5 Idle+ USB Link + Data Transmission+ USB cable 3+ SD+ BT Idle+ WIFI Idle (2.4G)+ EUT to Notebook+ Earphone+ SIM1+ Sample 1
16	LTE B7 Idle+ USB Link + Data Transmission+ USB cable 4+ SD+ BT Idle+ WIFI Idle (5G B1)+ Notebook to EUT+ Earphone+ SIM2+ Sample 1
17	LTE B13 Idle+ USB Link + Data Transmission+ USB cable 5+ SD+ BT Idle+ WIFI Idle (2.4G)+ EUT to Notebook+ Earphone+ SIM1+ Sample 1
18	Worst of 1-17+ Sample 2
19	Worst of 1-17+ Sample 3
20	Worst of 1-17+ Sample 4

NOTE:

1. For conducted emission test, Pre-scan all mode, mode 2 was the worst case and only this mode was presented in this report.
2. For radiated emission test, Pre-scan all mode, test mode 14 was the worst case and only this mode was presented in this report

1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

FOR ALL TESTS

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Laptop	Lenovo	Thinkpad L440	R90FTFKP	N/A
2	Micro SD	SAM SUNG	N/A	N/A	N/A
3	GPS Simulator+Antenna	TOJOIN	GNSS-5000A	E1-010-010119	N/A
4	Universal radio communication tester	Rohde&Schwarz	CMW500	N/A	N/A
5	Printer	HP	hp LaserJet 1300	CNSJF75989	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	USB Line: Shielded, Detachable 1m;
2	N/A
3	N/A
4	N/A

2 EMISSION TEST

2.1 CONDUCTED EMISSION MEASUREMENT

2.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

TEST STANDARD: FCC PART 15, SUBPART B (SECTION: 15.107 A CLASS B)

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

TEST STANDARD: FCC PART 15, SUBPART B (SECTION: 15.107 B CLASS A)

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60

NOTE: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

2.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
WIDEBANDRADIO COMMUNICATION TESTER	Rohde&Schwarz	CMW500	169399	Jun.27,22	Jun.26,24
EMI Test Receiver	Rohde&Schwarz	ESR3	102749	Feb.25,22	Feb.24,24
ELEKTRA test software	Rohde&Schwarz	ELEKTRA	NA	N/A	N/A
LISN network	Rohde&Schwarz	ENV216	102640	Feb.17,22	Feb.16,24
CABLE	Rohde&Schwarz	W61.01	N/A	Apr.28,23	Oct.27,23
CABLE	Rohde&Schwarz	W61.01	N/A	Oct.27,23	Apr.26,24
CABLE	Rohde&Schwarz	W601	N/A	Apr.28,23	Oct.27,23
CABLE	Rohde&Schwarz	W601	N/A	Oct.27,23	Apr.26,24

NOTE: 1. The test was performed in CE shielded room.

2.1.3 TEST PROCEDURES

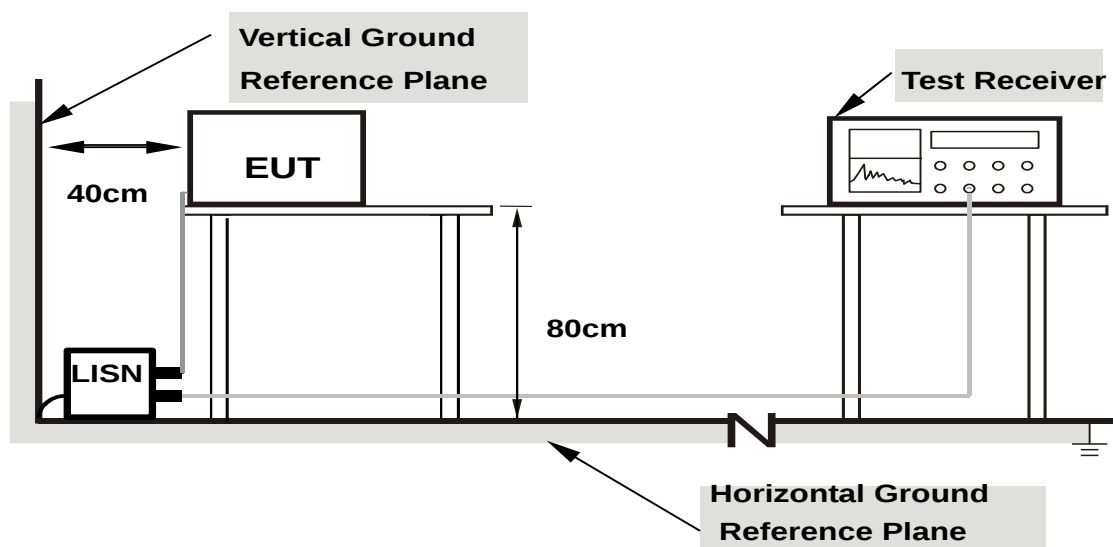
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

2.1.4 DEVIATION FROM TEST STANDARD

No deviation.

2.1.5 TEST SETUP



**Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80
from other units and other metal planes**

For the actual test configuration, please refer to the attached file (Test Setup Photo).

2.1.6 EUT OPERATING CONDITIONS

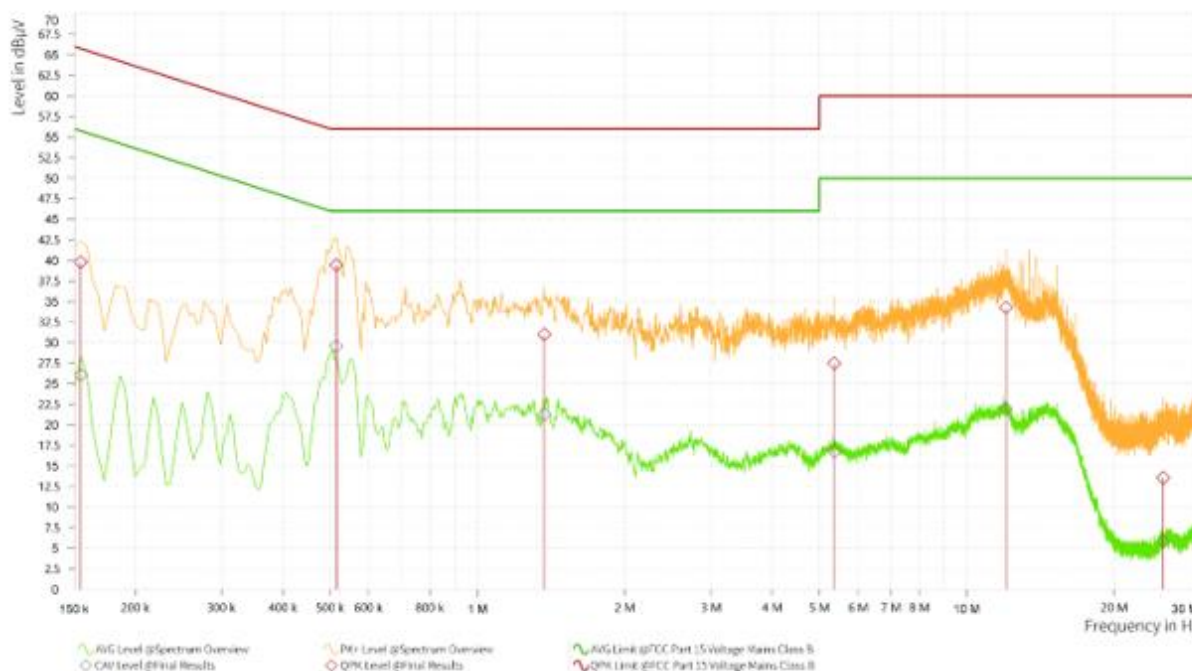
- a. Turned on the power and connected of all equipment.
- b. EUT was operated according to the use type described in the manufacturer's specifications or the user's manual.

2.1.7 TEST RESULTS

TEST VOLTAGE	Input 120 Vac, 60 Hz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
ENVIRONMENTAL CONDITIONS	26deg. C, 51%RH	TESTED BY	Carl xie

R _g	Frequency [MHz]	QPK Level [dBuV]	QPK Limit [dBuV]	QPK Margin [dB]	CAV Level [dBuV]	CAV: AVG Limit [dBuV]	CAV Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]
1	0.155	39.80	65.75	25.95	26.09	55.75	29.66	12.51	L1	9.000
1	0.515	39.44	56.00	16.56	29.56	46.00	16.44	11.75	L1	9.000
1	1.370	31.01	56.00	24.99	21.28	46.00	24.72	11.76	L1	9.000
1	5.361	27.46	60.00	32.54	16.75	50.00	33.25	11.80	L1	9.000
1	12.035	34.27	60.00	25.73	21.95	50.00	28.05	11.84	L1	9.000
1	25.233	13.54	60.00	46.46	5.83	50.00	44.17	11.89	L1	9.000

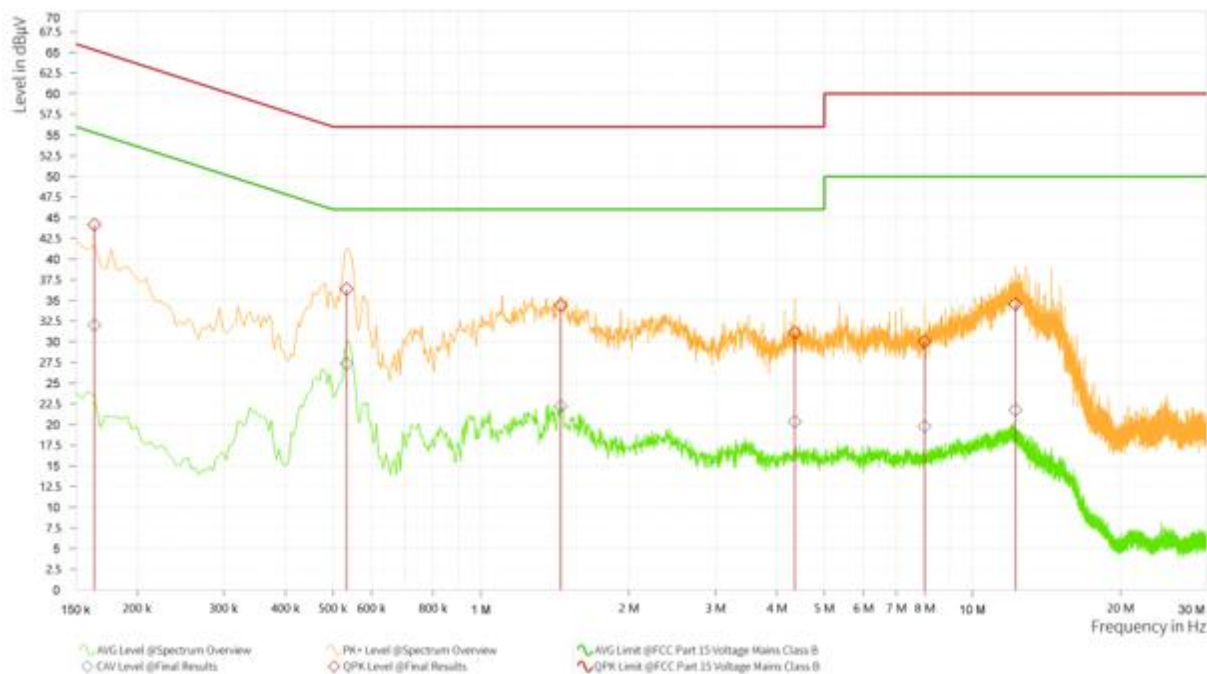
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Limit value - Emission level
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



TEST VOLTAGE	Input 120 Vac, 60 Hz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
ENVIRONMENTAL CONDITIONS	26deg. C, 51%RH	TESTED BY	Carl xie

R _z	Frequency [MHz]	QPK Level [dBuV]	QPK Limit [dBuV]	QPK Margin [dB]	CAV Level [dBuV]	CAV: AVG Limit [dBuV]	CAV Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]
1	0.164	44.16	65.28	21.12	32.01	55.28	23.27	12.17	N	9.000
1	0.533	36.37	56.00	19.63	27.35	46.00	18.65	12.78	N	9.000
1	1.455	34.39	56.00	21.61	22.23	46.00	23.77	12.74	N	9.000
1	4.353	31.10	56.00	24.90	20.35	46.00	25.65	12.76	N	9.000
1	7.994	30.04	60.00	29.96	19.80	50.00	30.20	12.78	N	9.000
1	12.246	34.57	60.00	25.43	21.76	50.00	28.24	12.81	N	9.000

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Limit value - Emission level
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



2.2 RADIATED EMISSION MEASUREMENT

2.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

TEST STANDARD: FCC PART 15, SUBPART B (SECTION: 15.109)

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

Radiated Emissions Limits at 3 meters (dB μ V/m)		
Frequencies (MHz)	FCC 15B, Class A	FCC 15B, Class B
30-88	49	40
88-216	53.5	43.5
216-960	56	46
960-1000	59.5	54
Above 1000	Avg: 59.5 Peak: 79.5	Avg: 54 Peak: 74

Frequency Range (For unintentional radiators)

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705-108	1000
108-500	2000
500-1000	5000
Above 1000	5 th harmonic of the highest frequency or 40GHz, whichever is lower

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
 2. Emission level (dB μ V/m) = 20 log Emission level (μ V/m).
 3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
 4. QP detector shall be applied if not specified.

2.2.2 TEST INSTRUMENTS

Frequency range below 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
WIDEBANDRADIO COMMUNICATION TESTER	Rohde&Schwarz	CMW500	169399	Jun.27,22	Jun.26,24
3m Semi-anechoic Chamber	TDK	9m*6m*6m	HRSW-SZ-EMC-02Chamber	Nov.24,22	Nov.23,25
Bilog Antenna	SCHWARZBECK	VULB 9163	1264	Feb.28,22	Feb.27,24
EMI Test Receiver	R&S	ESW44	101973	Feb.25,22	Feb.24,24
Measurement Software	R&S	ELEKTRA	N/A	N/A	N/A
6DB attenuator	Tonscend Technology Co., Ltd	N/A	23062787	N/A	N/A
Pre-Amplifier	R&S	SCU08F1	101028	Sep.16,22	Sep.15,24
CABLE	R&S	W13.01	N/A	Apr.28,23	Oct.27,23
CABLE	R&S	W13.01	N/A	Oct.27,23	Apr.26,24
CABLE	R&S	W13.02	N/A	Apr.28,23	Oct.27,23
CABLE	R&S	W13.02	N/A	Oct.27,23	Apr.26,24
CABLE	R&S	W12.14	N/A	Apr.28,23	Oct.27,23
CABLE	R&S	W12.14	N/A	Oct.27,23	Apr.26,24

Frequency range above 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
WIDEBANDRADIO COMMUNICATION TESTER	Rohde&Schwarz	CMW500	169399	Jun.27,22	Jun.26,24
3m Fully-anechoic Chamber	TDK	9m*6m*6m	HRSW-SZ-EMC-01Chamber	Nov.24,22	Nov.23,25
Horn Antenna	ETS-LINDGREN	3117	227836	Aug.22,22	Aug.21,24
EMI Test Receiver	R&S	ESW44	101973	Feb.25,22	Feb.24,24
Pre-Amplifier	R&S	SCU08F1	101028	Sep.16,22	Sep.15,24
Measurement Software	R&S	ELEKTRA	N/A	N/A	N/A
CABLE	R&S	W13.01	N/A	Apr.28,23	Oct.27,23
CABLE	R&S	W13.01	N/A	Oct.27,23	Apr.26,24
CABLE	R&S	W13.02	N/A	Apr.28,23	Oct.27,23
CABLE	R&S	W13.02	N/A	Oct.27,23	Apr.26,24
CABLE	R&S	W12.14	N/A	Apr.28,23	Oct.27,23
CABLE	R&S	W12.14	N/A	Oct.27,23	Apr.26,24

- NOTE:** 1. The test was performed in 3m chamber.
2. The FCC Site Registration No. is 434559; The Designation No. is CN1325

2.2.3 TEST PROCEDURE

<Frequency Range below 1GHz>

The basic test procedure was in accordance with ANSI C63.4:2014 (section 12).

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.

NOTE:

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. $\text{Emission level(dBuV/m)} = \text{Raw Value(dBuV)} + \text{Correction Factor(dB/m)}$
3. $\text{Correction Factor(dB/m)} = \text{Antenna Factor (dB/m)} + \text{Cable Factor (dB)}$ (if the raw value not contains the amplifier);
4. $\text{Correction Factor(dB/m)} = \text{Antenna Factor (dB/m)} + \text{Cable Factor (dB)} - \text{Amplifier Gain(dB)}$ (if the raw value contains the amplifier).
5. $\text{Margin value} = \text{Limit value} - \text{Emission level}$

<Frequency Range above 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter fully-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. The bore sight should be used during the test above 1GHz.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz

NOTE:

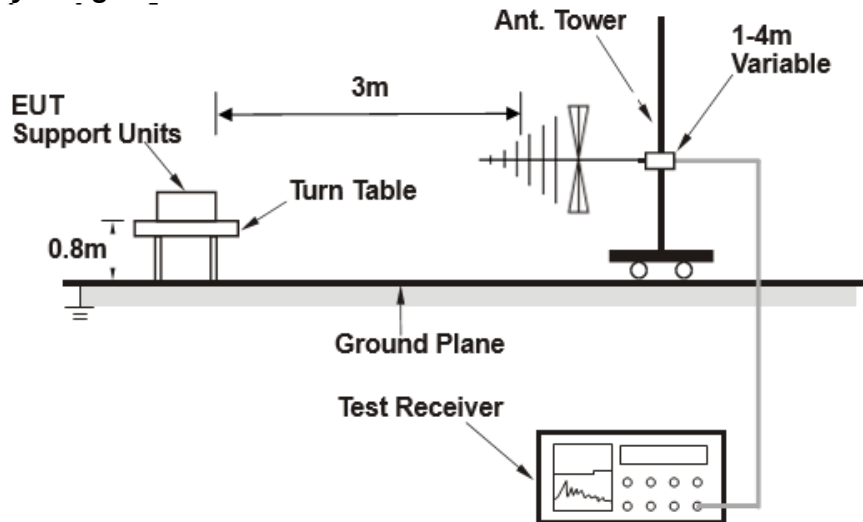
1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth of test receiver/spectrum analyzer is 1Hz for Average detection (AV) at frequency above 1GHz.
3. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.
4. $\text{Emission level(dBuV/m)} = \text{Raw Value(dBuV)} + \text{Correction Factor(dB/m)}$
5. $\text{Correction Factor(dB/m)} = \text{Antenna Factor (dB/m)} + \text{Cable Factor (dB)}$ (if the raw value not contains the amplifier);
6. $\text{Correction Factor(dB/m)} = \text{Antenna Factor (dB/m)} + \text{Cable Factor (dB)} - \text{Amplifier Gain(dB)}$ (if the raw value contains the amplifier)
7. $\text{Margin value} = \text{Limit value} - \text{Emission level}$

2.2.4 DEVIATION FROM TEST STANDARD

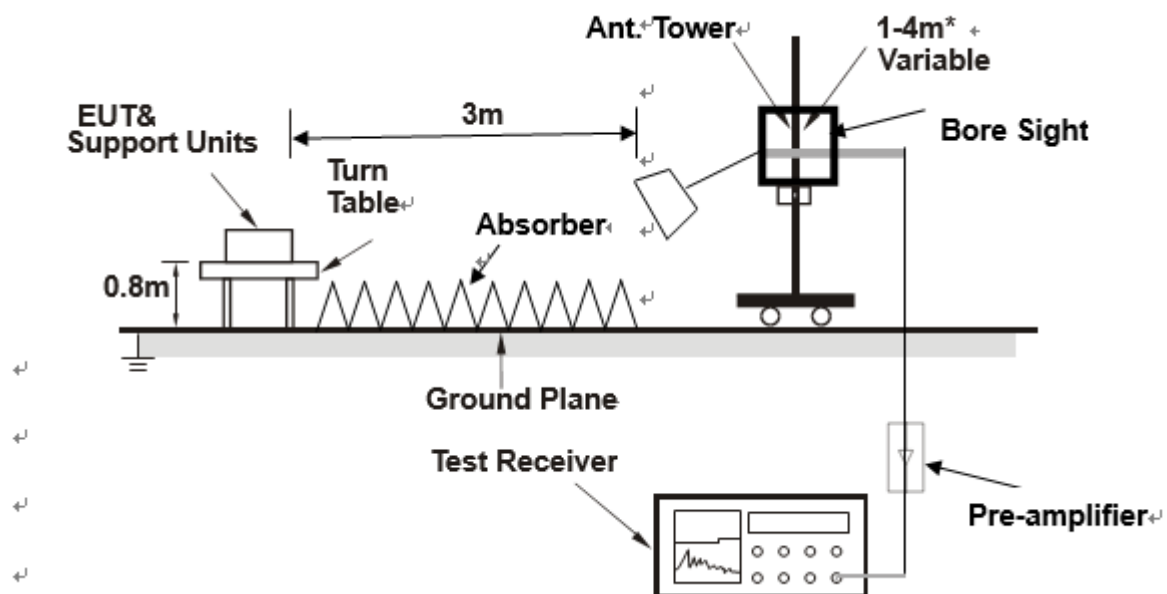
No deviation.

2.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



Note: Above 1G is a directional antenna

depends on the EUT height and the antenna 3dB bandwidth both, refer to section 7.3 of CISPR 16-2-3.

2.2.6 EUT OPERATING CONDITIONS

Same as item 2.1.6.

2.2.7 TEST RESULTS

Acceleromete alternative worst case:

TEST VOLTAGE	Input 120 Vac, 60 Hz	FREQUENCY RANGE	30-1000 MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70 %RH	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Quasi-Peak, 120 kHz
TESTED BY	Jace Hu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

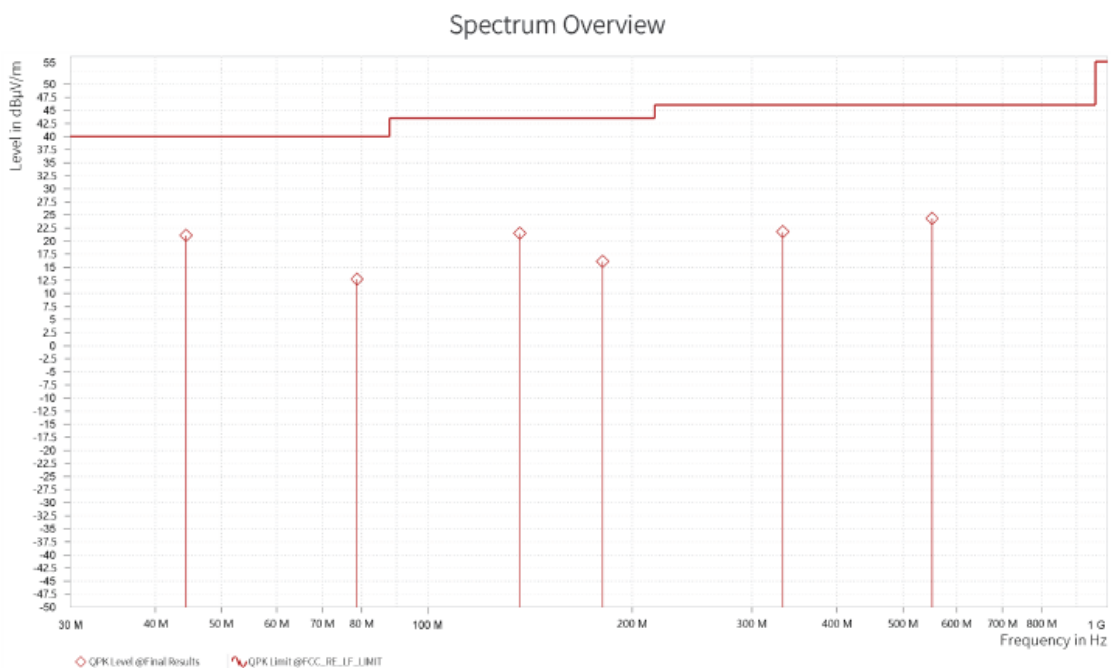
Rg	Frequency [MHz]	QPK Level [dBμV/m]	QPK Limit [dBμV/m]	QPK Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]	Meas. BW [kHz]
1	44.374	21.07	40.00	18.93	-10.35	H	359	2	120.000
1	78.720	12.71	40.00	27.29	-16.61	H	226.8	2	120.000
1	136.656	21.48	43.50	22.02	-15.63	H	226.8	2	120.000
1	180.879	16.13	43.50	27.37	-13.15	H	88.1	2	120.000
1	332.860	21.78	46.00	24.22	-6.20	H	5	1	120.000
1	552.036	24.34	46.00	21.66	-4.16	H	355.7	2	120.000

REMARKS: 1. Emission level(dBuV/m)=Read Value(dBuV) + Correction Factor(dB/m)

2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)- Amplifier Gain

3. The other emission levels were very low against the limit.

4. Margin value = Limit value - Emission level

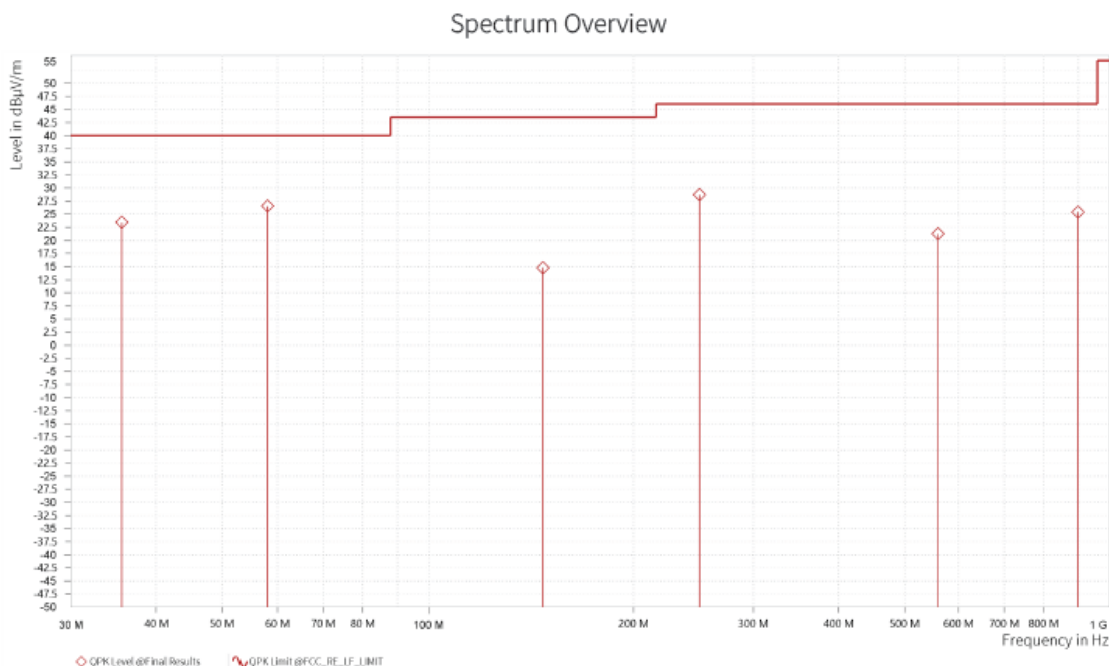


TEST VOLTAGE	Input 120 Vac, 60 Hz	FREQUENCY RANGE	30-1000 MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70% RH	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Quasi-Peak , 120 kHz
TESTED BY	Jace Hu		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	QPK Level [dBμV/m]	QPK Limit [dBμV/m]	QPK Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]	Meas. BW [kHz]
1	35.644	23.43	40.00	16.57	-12.57	V	359.1	1	120.000
1	58.042	24.12	40.00	15.88	-11.59	V	133.1	1	120.000
1	147.282	14.79	43.50	28.71	-15.50	V	133.1	1	120.000
1	249.970	28.71	46.00	17.29	-9.02	V	0.9	2	120.000
1	560.193	21.24	46.00	24.76	-4.14	V	133.1	1	120.000
1	898.370	25.38	46.00	20.62	1.40	V	4.9	1	120.000

- REMARKS:**
1. Emission level(dBuV/m)=Read Value(dBuV) + Correction Factor(dB/m)
 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) -Amplifier Gain
 3. The other emission levels were very low against the limit.
 4. Margin value = Limit value - Emission level.



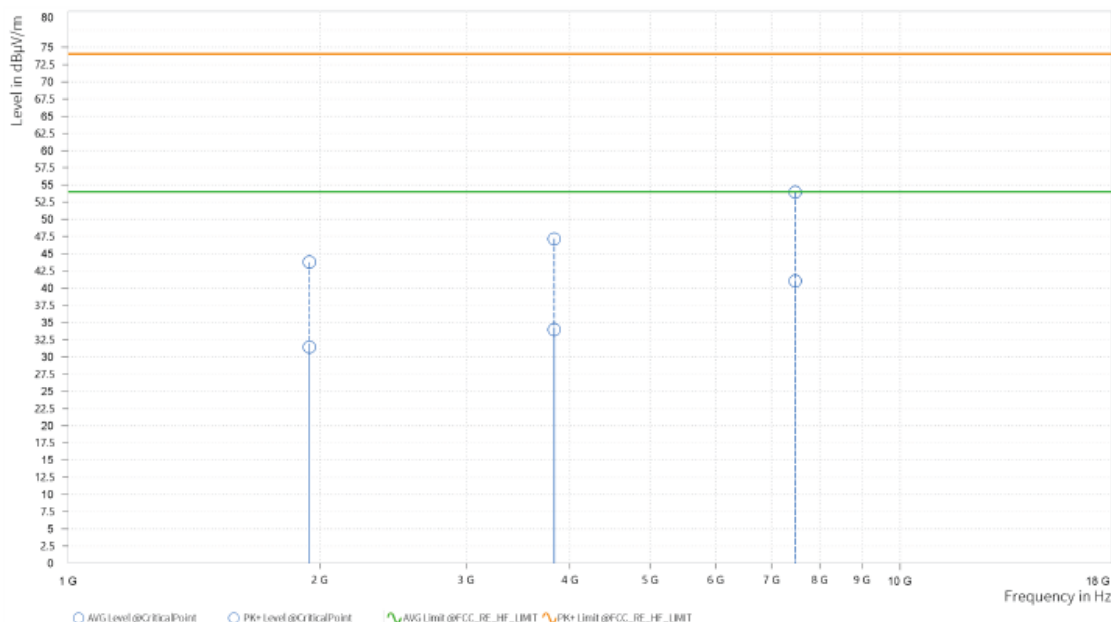
TEST VOLTAGE	Input 120 Vac, 60 Hz	FREQUENCY RANGE	1-18 GHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70 %RH	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Peak/Average, 1 MHz
TESTED BY	Jace Hu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBμV/m]	PK+ Limit [dBμV/m]	PK+ Margin [dB]	AVG Level [dBμV/m]	AVG Limit [dBμV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,944.000	43.79	74.00	30.21	31.43	54.00	22.57	5.60	H	0.9	2
1	3,832.500	47.16	74.00	26.84	33.97	54.00	20.03	9.95	H	302.9	1
1	7,475.500	53.96	74.00	20.04	41.01	54.00	12.99	16.88	H	359	2

- REMARKS:**
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
 2. Negative sign (-) in the margin column signify levels below the limit.
 3. Frequency range scanned: 1GHz to 5th harmonic of the highest frequency or 40GHz, whichever is lower .For frequency above 18GHz, the emission was tested 20db below the limit so the data not recorded in the sheet.
 4. Only emissions significantly above equipment noise floor are reported.

Spectrum Overview



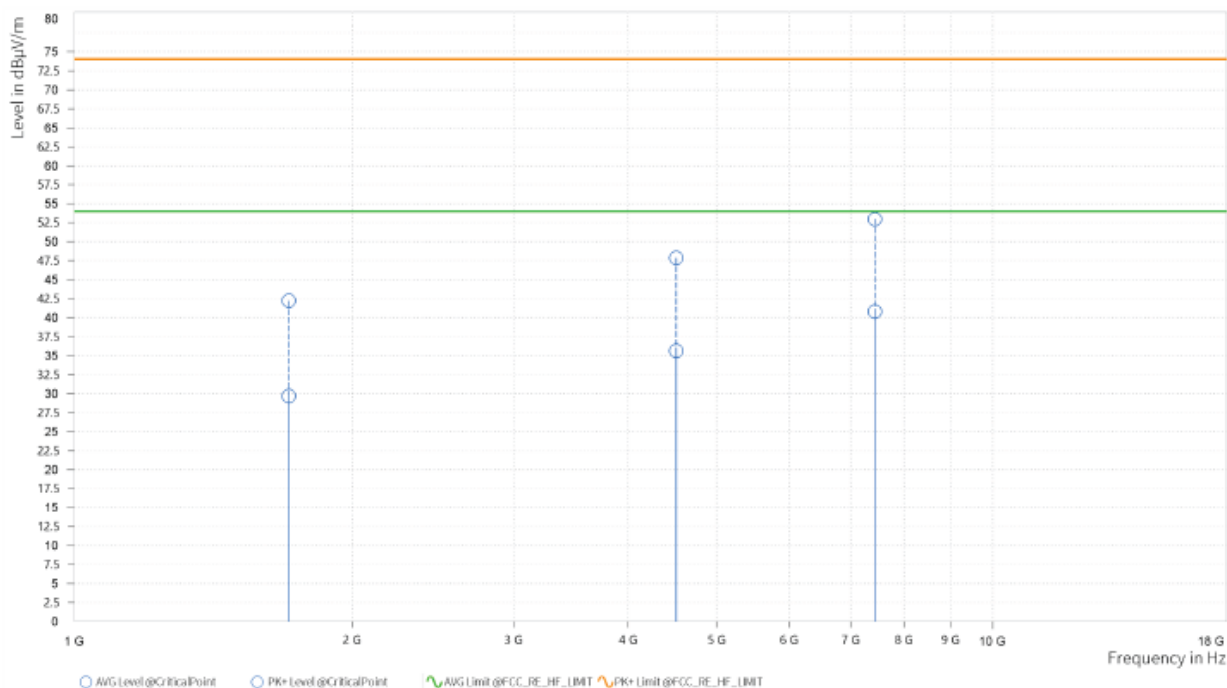
TEST VOLTAGE	Input 120 Vac, 60 Hz	FREQUENCY RANGE	1-18 GHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70 %RH	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Peak/Average, 1 MHz
TESTED BY	Jace Hu		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBμV/m]	PK+ Limit [dBμV/m]	PK+ Margin [dB]	AVG Level [dBμV/m]	AVG Limit [dBμV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,705.500	42.22	74.00	31.78	29.68	54.00	24.32	2.97	V	355	2
1	4,516.000	47.87	74.00	26.13	35.61	54.00	18.39	11.87	V	192.1	2
1	7,441.000	52.98	74.00	21.02	40.81	54.00	13.19	16.88	V	57	2

- REMARKS:**
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
 2. Negative sign (-) in the margin column signify levels below the limit.
 3. Frequency range scanned: 1GHz to 5th harmonic of the highest frequency or 40GHz, whichever is lower .For frequency above 18GHz, the emission was tested 20db below the limit so the data not recorded in the sheet.
 4. Only emissions significantly above equipment noise floor are reported.

Spectrum Overview



3 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications were made to the EUT by the lab during the test.

---END---