Certificate #6613.01

EMC TEST REPORT

Applicant:	HMD Global Oy
Address:	Bertel Jungin aukio 9, 02600 Espoo, Finland

Manufacturer or Supplier:	HMD Global Oy
Address:	Bertel Jungin aukio 9, 02600 Espoo, Finland
Product:	Mobile Phone
Brand Name:	NOKIA
Model Name:	TA-1541
FCC ID:	2AJOTTA-1541
Date of tests:	Sep. 04, 2023 ~ Sep. 12, 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 <u>COMPLY</u> with the test requirement

Prepared by Chao Wu Engineer / Mobile Department	Approved by Peibo Sun Manager / Mobile Department
Chao Wu	Sun Peibo
Date: Sep. 12, 2023	Date: Sep. 12, 2023

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
W7L-P23010004-2EM01	Original release	Feb. 23, 2023
PSU-QSU2309010210EM01	Based on the original product adding 2G PA second supply. The FX5196 add 2nd supply FX5596Y, raw material of Wafer and the printing model have changes. The IC design has not changed and there is no impact on BT and WIFI, other has not changed. This report verify the CE,RE and replace the worst case.	Sep. 12, 2023

1 GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF EUT

PRODUCT*	Mobile Phone	
BRAND NAME*	NOKIA	
MODEL NAME*	TA-1541	
NOMINAL VOLTAGE*	5.0Vdc(adapter) 3.85Vdc (Li-ion, battery)	
MODULATION TYPE*	**BT_LE**	GFSK
	Bluetooth	GFSK, π/4-DQPSK, 8DPSK
	FM	FM
	WLAN	DSSS, OFDM
	GPS/GALILEO/GLONASS/GPS/SBAS	BPSK
	GSM/GPRS/EDGE	GMSK, 8PSK
	WCDMA	HSDPA/HSUPA/DC-HSDPA/HSPA+
	LTE	QPSK/16QAM/64QAM
OPERATING FREQUENCY*	**Bluetooth/BT_LE**	2402MHz ~ 2480MHz
	FM	87.5MHz ~ 108MHz
	WLAN	2412 ~ 2462MHz for 11b/g/n(HT20)
	GPS/GALILEO/GLONASS/GPS/SBAS	1559MHz ~ 1610MHz
	GSM	824.2MHz ~ 848.8MHz (FOR GSM 850) 1850.2MHz ~ 1909.8MHz (FOR GSM 1900)
	WCDMA	1922.6MHz~ 1977.4MHz(FOR WCDMA Band 1) 1852.4MHz ~ 1907.6MHz(FOR WCDMA Band 2) 1712.4MHz ~ 1752.6MHz(FOR WCDMA Band 4) 826.4MHz ~ 846.6MHz (FOR WCDMA Band 5) 882.4MHZ ~ 912.6MHz (FOR WCDMA Band 8)
	LTE	1922.5MHz~ 1977.5MHz (FOR LTE Band1) 1850.7MHz ~ 1909.3MHz (FOR LTE Band2) 1710.7MHz ~ 1784.3MHz (FOR LTE Band3) 1710.7MHz ~ 1754.3MHz (FOR LTE Band4) 824.7MHz ~ 848.3MHz (FOR LTE Band5) 2502.5MHz ~ 2567.5MHz (FOR LTE Band7) 880.7MHz ~ 914.3MHz (FOR LTE Band8) 699.7MHz ~ 715.3MHz (FOR LTE Band12) 779.5MHz ~ 784.5MHz (FOR LTE Band13)

		706.5MHz ~ 713.5MHz (FOR LTE Band17) 704.5MHz ~ 746.5MHz (FOR LTEBand28) 1710.7MHz ~ 1779.3MHz (FOR LTE Band66)
HIGHEST FREQUENCY*	2567.5MHz	
HW VERSION*	SPR_S63Q0	
SW VERSION*	00WW_0_090	
I/O PORTS*	Refer to user's manual	
CABLE SUPPLIED*	USB cable: non-shielded cable, with w/o ferrite core, 1 meter USB cable: non-shielded cable, with w/o ferrite core, 1 meter USB cable: non-shielded cable, with w/o ferrite core, 1 meter Earphone: non-shielded cable, with w/o ferrite core, 1.2 meter	
ACCESSORY DEVICES*	Refer to note as below	

NOTE:

1. *Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information , Test Lab is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.

2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

3. The product of TA-1541(FCC ID: 2AJOTTA-1541) have version and components manufacturer from a second supplier. The first version is 090, the second one is 103, only the version changes, and the RF parameters do not change, components manufacturer with following changes as below:

NO.	Change Description		specificatons	first supplier	specificatons	second supplier
1	PCBA	64GB EMMC	FEMDNN064G-A3A56 BWCTARV11X64G	Longsys	FEMDNN064G-A3A56 BWCTARV11X64G	Biwin
2		2GB LPDDR	FLXC2002G-N2 BWMZEX32H2A-16G-X	Longsys	FLXC2002G-N2 BWMZEX32H2A-16G-X	Biwin
3		3GB LPDDR	FLXC4003G-50 BWMEXX32H2A-24Gb-X	Longsys	FLXC4003G-50 BWMEXX32H2A-24Gb-X	Biwin
4		4GB LPDDR	FLXC2004G-30 BWMZCX32H2A-32G-X	Longsys	FLXC2004G-30 BWMZCX32H2A-32G-X	Biwin
5		PCB	/	KINGSHINE	/	WUZHU
6	LCM	LCD	6.517 HKC，360min,400typ, 2.5D	TCL	6.517 BOE（B8），360min,400typ, 2.5D	Lian Chuang
7	Front camera	Camera	8M FF COM	Lian Heyingxiang	8M FF COM	Shijia

8	Rear camera	Camera	13M-AF COB	Lian Heyingxiang	13M-AF COB	Ruicheng
9	Macro CAM	Camera	2M FF	Shijia	2M FF	Lian Heying xiang
10	fingerprint	module	Back fingerprint	Hedayuan	Back fingerprint	Sanyingxin
11	Speaker		1712 1W	Dong Sheng	1712 1W	Xin Rongda
12	Vibrator		1027 FPC	Kai Long	1027 FPC	Chao Yin
13	Receiver		0809	Dong Sheng	0809	Xin Rongda
14	FPC		/	Lante	/	Kaihongxing
15	Battery		5000MAH	Gaoyuan	5000MAH	Feng Hua
16	Data cable		2A typeC	Yuwei	2A typeC	Juwei

4. List of Accessory:

ACCESSORIES	BRAND	MANUFACTURER	MODEL	SPECIFICATION
LCD Panel 1	HKC	MianYang HKC Optoelectronics Technology Co., Ltd.	QM065HS03-1	6.517
LCD Panel 2	BOE	BOE	BV065WBQ-L1B	6.517
Battery 1	Nokia	Guangdong Fenghua New Energy Co.,Ltd.	WT510	Capacity：3.85 Vdc, 4900mAh
Battery 2	Nokia	GUANGDONG FENGHUA NEW ENERGY CO.,LTD.	WT510	Capacity：3.85 Vdc, 4900mAh
AC Adapter 1	Nokia	SHENZHEN BAIJUNDA ELECTRONICS.,LTD	AD-010U	I/P: 100-240Vac, 0.35A, O/P: 5.0Vdc, 2.0A
Earphone	Juwei Electronics Co., LTD	Juwei Electronics Co., LTD	JWEP1252-H21H	Signal Line, 1.2meter
USB Cable 1	Juwei Electronics Co., LTD	Juwei Electronics Co., LTD	JWUB1536-H21H	Signal Line, 1.0meter
USB Cable 2	Yu Wei	N/A	CH2212TC	Signal Line, 1.0meter
USB Cable 3	Sai bao	Saibao (Jiangxi) Industrial Co., Ltd	SHM1-A003A	Signal Line, 1.0meter

5. This report refers to the data of W7L-P23010004-1EM01(model:TA-1536, FCC ID: 2AJOTTA-1536), the difference of TA-1536 and TA-1541 is TA-1541 change model name, TA-1536 is dual card, TA-1541 is single card, and functions are realized through softwareIn. This report verify the test data of CE,RE worst case , So this report only replaces the test data of RE,CE worst case, other data is copied from the report W7L-P23010004-1EM01(model:TA-1536, FCC ID: 2AJOTTA-1536).

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**	**Test lab***
FCC Part 15, Subpart B, Class B ANSI C63.4:2014	Conducted Test	Compliance	A
	Radiated Emission Test (30MHz ~ 1GHz)	Compliance	A
	Radiated Emission Test (Above 1GHz)	Compliance	A

NOTE:
1.Based on the original product adding 2G PA second supply. The FX5196 add 2nd supply FX5596Y, raw material of Wafer and the printing model have changes. The IC design has not changed and there is no impact on BT and WIFI, other has not changed. This report verify the CE,RE and replace the worst case.

***Test Lab Information Reference**

Lab A:

Huarui 7Layers High Technology (Suzhou) Co., Ltd.

Lab Address:

Tower N, Innovation Center, 88 Zhuyi Road, High-tech District, Suzhou City, Anhui Province

Accredited Test Lab Cert 6613.01

The FCC Site Registration No. is 434559; The Designation No. is CN1325.

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~1GMHz	±4.98dB
	1GMHz ~6GMHz	±4.70dB
	6GMHz ~18GMHz	±4.60dB

1.4 DESCRIPTION OF TEST MODES

Test Mode	Test Condition
Radiated emission test	
1	GSM 850 Idle + earphone + USB Cable1 + adapter + BT Idle + wifi idle + GPS Rx + SIM1 + Front Camera On + SD + Battery 1 + Sample1
2	PCS 1900 Idle + earphone + USB Cable2 + adapter + BT Idle + wifi idle + GOLNASS Rx + SIM1 + Back Camera On + SD + Battery 1 + Sample1
3	WCDMA B2 idle + earphone + USB Cable3 + adapter + BT Idle + wifi idle + GALILEO Rx + SIM1 + FM RX + SD + Battery 1 + Sample1
4	WCDMA B4 idle + earphone + USB Cable1 + adapter + BT Idle + wifi idle + BDS Rx + SIM1 + SD + Battery 1 + Sample1
5	WCDMA B5 idle + earphone + USB Cable2 + adapter + BT Idle + wifi idle + SBAS Rx + SIM1 + SD + Battery 1 + Sample1
6	LTE B2 idle + earphone + USB Cable3 + adapter + BT Idle + wifi idle + GPS Rx + SIM1 + MPG4 + SD + Battery 1 + Sample1
7	LTE B4 idle + earphone + USB Cable1 + adapter + BT Idle + wifi idle + GOLNASS Rx + SIM1 + SD + Battery 1 + Sample1
8	LTE B5 idle + earphone + USB Cable2 + adapter + BT Idle + wifi idle + GALILEO Rx + SIM1 + SD + Battery 1 + Sample1
9	LTE B7 idle + earphone + USB Cable3 + adapter + BT Idle + wifi idle + BDS Rx + SIM1 + SD + Battery 1 + Sample1
10	LTE B12 idle + earphone + USB Cable1 + adapter + BT Idle + wifi idle + SBAS Rx + SIM1 + SD + Battery 1 + Sample1
11	LTE B13 idle + earphone + USB Cable2 + adapter + BT Idle + wifi idle + GPS Rx + SIM1 + SD + Battery 1 + Sample1
12	LTE B17 idle + earphone + Powered by Battery + BT Idle + wifi idle + GOLNASS Rx + SIM2 + SD + Battery 1 + Sample1
13	LTE B28 idle + earphone + USB Cable2 + Data Transmission + BT Idle + wifi idle + GALILEO Rx + SIM1 + EUT to Notebook + SD + Battery 1 + Sample1
14	LTE B66 idle + earphone + USB Cable3 + Data Transmission + BT Idle + wifi idle + BDS Rx + SIM1 + Notebook to EUT + SD + Battery 1 + Sample1
15	worst of 1-14 + Battery 2 + Sample2

Test Mode	Test Condition
Conducted emission test	
1	GSM 850 Idle + earphone + USB Cable1 + adapter + BT Idle + wifi idle + GPS Rx + SIM1 + Front Camera On + SD + Battery 1 + Sample1
2	PCS 1900 Idle + earphone + USB Cable2 + adapter + BT Idle + wifi idle + GOLNASS Rx + SIM1 + Back Camera On + SD + Battery 1 + Sample1
3	WCDMA B2 idle + earphone + USB Cable3 + adapter + BT Idle + wifi idle + GALILEO Rx + SIM1 + FM RX + SD + Battery 1 + Sample1
4	WCDMA B4 idle + earphone + USB Cable1 + adapter + BT Idle + wifi idle + BDS Rx + SIM1 + SD + Battery 1 + Sample1
5	WCDMA B5 idle + earphone + USB Cable2 + adapter + BT Idle + wifi idle + SBAS Rx + SIM1 + SD + Battery 1 + Sample1
6	LTE B2 idle + earphone + USB Cable3 + adapter + BT Idle + wifi idle + GPS Rx + SIM1 + MPG4 + SD + Battery 1 + Sample1
7	LTE B4 idle + earphone + USB Cable1 + adapter + BT Idle + wifi idle + GOLNASS Rx + SIM1 + SD + Battery 1 + Sample1
8	LTE B5 idle + earphone + USB Cable2 + adapter + BT Idle + wifi idle + GALILEO Rx + SIM1 + SD + Battery 1 + Sample1
9	LTE B7 idle + earphone + USB Cable3 + adapter + BT Idle + wifi idle + BDS Rx + SIM1 + SD + Battery 1 + Sample1
10	LTE B12 idle + earphone + USB Cable1 + adapter + BT Idle + wifi idle + SBAS Rx + SIM1 + SD + Battery 1 + Sample1
11	LTE B13 idle + earphone + USB Cable2 + adapter + BT Idle + wifi idle + GPS Rx + SIM1 + SD + Battery 1 + Sample1
12	LTE B17 idle + earphone+ USB Cable3 + adapter + BT Idle + wifi idle + GOLNASS Rx + SIM1 + SD + Battery 1 + Sample1
13	LTE B28 idle + earphone + USB Cable1 + adapter + BT Idle + wifi idle + GALILEO Rx + SIM1 + SD + Battery 1 + Sample1
14	LTE B66 idle + earphone + USB Cable2 + adapter + BT Idle + wifi idle + BDS Rx + SIM1 + SD + Battery 1 + Sample1
15	worst of 1-14 + Sample2 + Battery 2

NOTE:

1. For radiated emission test, test mode 1 was the verification case and only this mode was presented in this report
2. For conducted emission test, test mode 3 was the verification 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 E14	SL10W47313	N/A
2	Micro SD	SAM SUNG	N/A	N/A	N/A
3	Bluetooth	Rohde&Schwarz	SMBV100B	102176	N/A
4	FM signal generator	Rohde&Schwarz	SMB 100A	182185	N/A
5	GPS Simulator+Antenna	Rohde&Schwarz	SMBV100A	261436	N/A
6	Universal radio communication tester	Rohde&Schwarz	CMW500	169399	N/A
7	WIFI Router	HUAWEI	N/A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	USB Line: 1m;

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

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date
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	W601	N/A	Apr.28,23	Oct.27,23
WIDEBANDRADIO COMMUNICATION TESTER	Rohde&Schwarz	CMW500	169399	Jun.27,22	Jun.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.

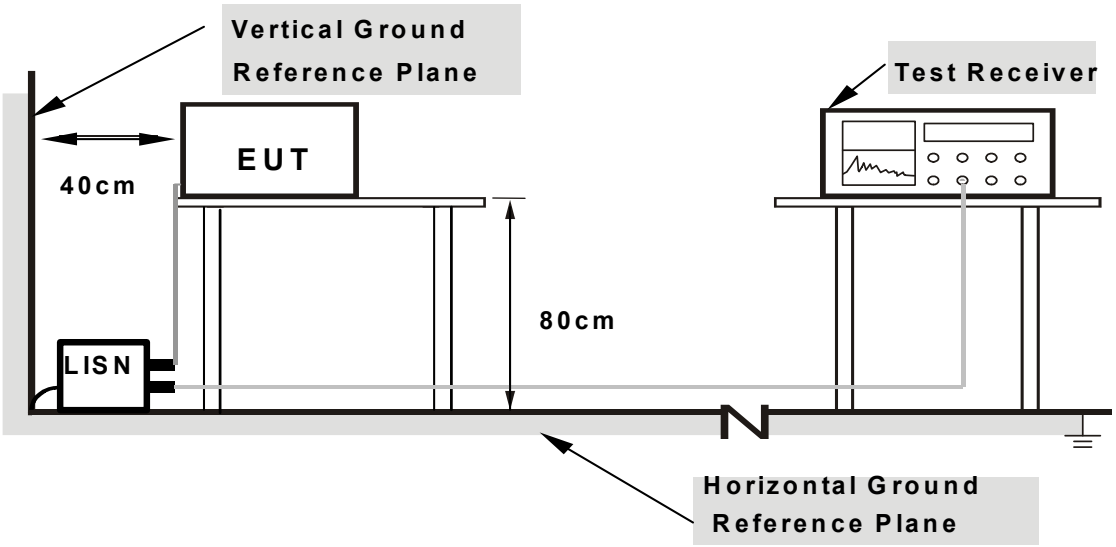
c. The frequency range from 150 kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

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

Worst case data:

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**	Chao Wu

Rg	Frequency [MHz]	QPK Level [dBμV]	QPK Limit [dBμV]	QPK Margin [dB]	CAV Level [dBμV]	CAV: AVG Limit [dBμV]	CAV Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]
1	0.681	37.88	56.00	18.12	22.99	46.00	23.01	11.75	L1	9.000
1	2.067	27.87	56.00	28.13	14.90	46.00	31.10	11.76	L1	9.000
1	3.165	29.29	56.00	26.71	16.30	46.00	29.70	11.78	L1	9.000
1	9.384	46.00	60.00	14.00	30.35	50.00	19.65	11.83	L1	9.000
1	11.387	43.96	60.00	16.04	28.76	50.00	21.24	11.84	L1	9.000
1	16.589	34.99	60.00	25.01	24.69	50.00	25.31	11.86	L1	9.000

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Limit value- Emission level
4. Correction factor = Insertion loss + Cable loss + Attenuate
5. 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**	Chao Wu

Rg	Frequency [MHz]	QPK Level [dBμV]	QPK Limit [dBμV]	QPK Margin [dB]	CAV Level [dBμV]	CAV: AVG Limit [dBμV]	CAV Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]
1	0.672	46.60	56.00	9.40	36.74	46.00	9.26	12.75	N	9.000
1	0.884	38.81	56.00	17.19	28.64	46.00	17.36	12.74	N	9.000
1	4.070	36.15	56.00	19.85	24.92	46.00	21.08	12.76	N	9.000
1	9.299	47.83	60.00	12.17	36.43	50.00	13.57	12.79	N	9.000
1	11.207	46.72	60.00	13.28	35.37	50.00	14.63	12.80	N	9.000
1	16.688	35.03	60.00	24.97	27.41	50.00	22.59	12.84	N	9.000

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Limit value- Emission level
4. Correction factor = Insertion loss + Cable loss + Attenuate
5. 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 (dBμV/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	5th harmonic of the highest frequency or 40GHz, whichever is lower

NOTE:
1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/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

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date
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

Frequency range above 1GHz

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date
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	W13.02	N/A	Apr.28,23	Oct.27,23

NOTE:

1. The calibration interval of the above test instruments is 6 months or 24 months or 36 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in 3m Chamber.

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. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
3. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier);
4. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier).
5. Margin value = Limit value -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.Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)

5.Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier);

6.Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier)

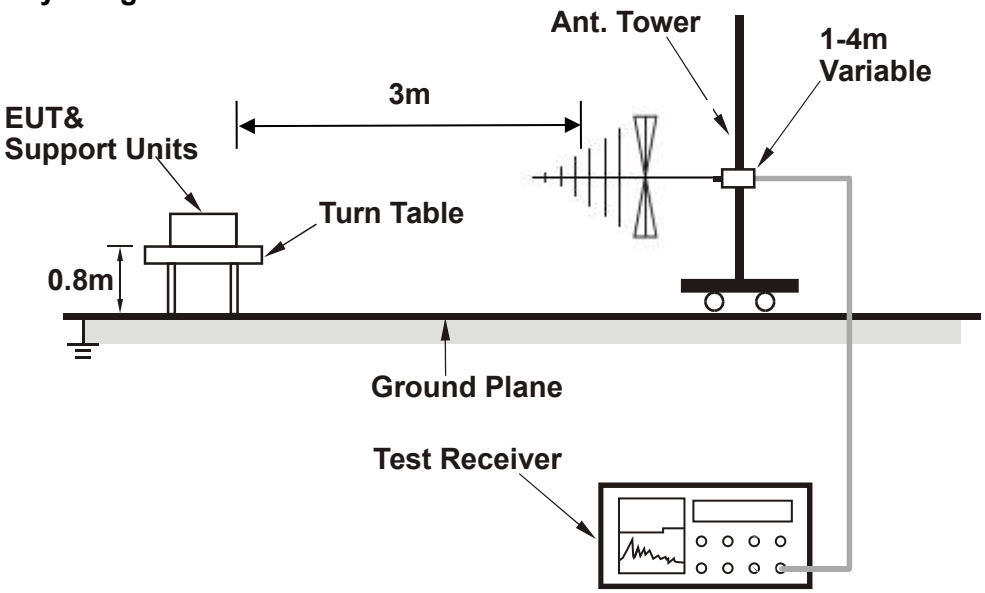
7.Margin value = Limit value- Emission level.

2.2.4 DEVIATION FROM TEST STANDARD

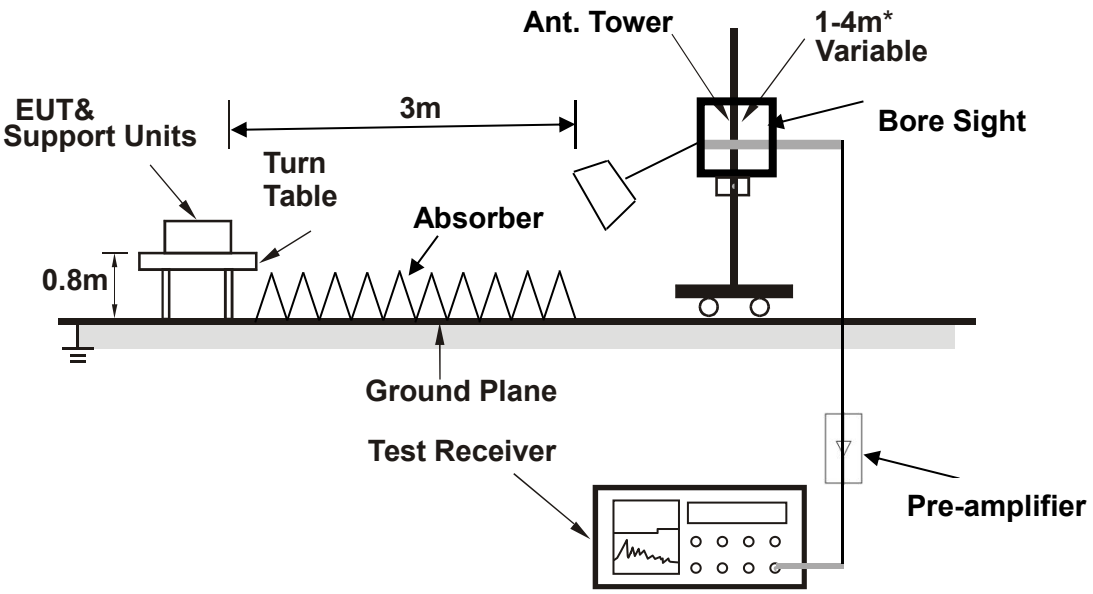
No deviation.

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

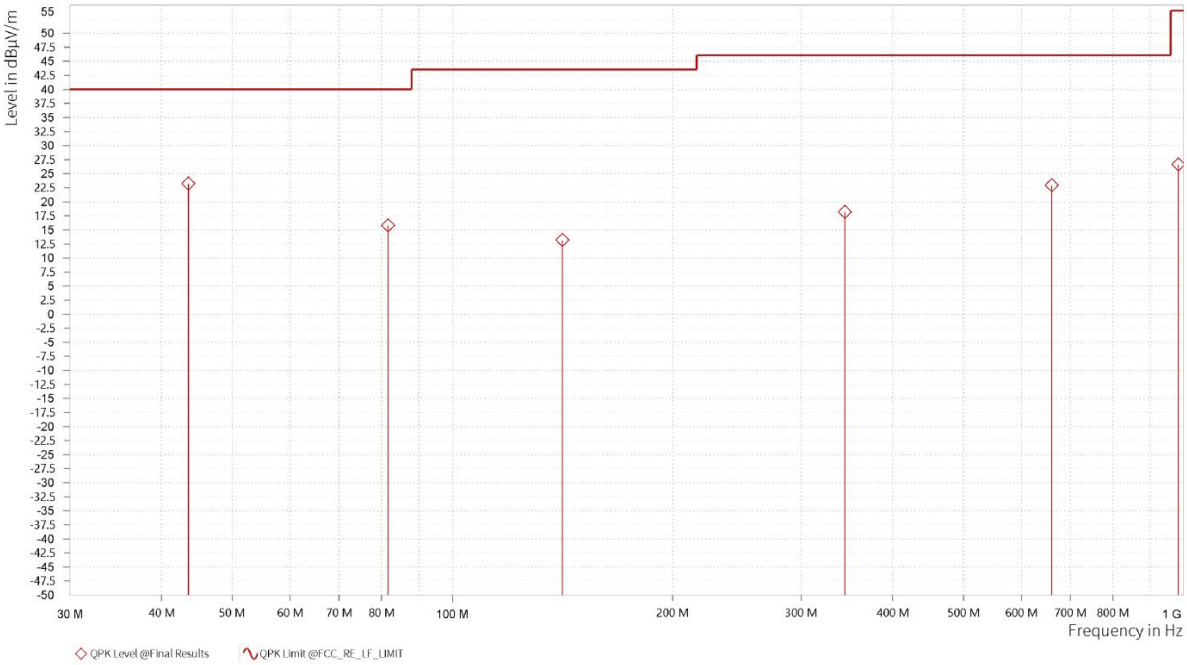
Worst case:

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	Chao Wu		

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	43.536	23.18	40.00	16.82	-10.39	H	356.2	2	120.000
1	81.675	15.79	40.00	24.21	-16.35	H	359	2	120.000
1	141.374	13.15	43.50	30.35	-15.67	H	359	2	120.000
1	344.324	18.19	46.00	27.81	-5.64	H	5.6	1	120.000
1	660.368	22.89	46.00	23.11	-2.61	H	356.2	2	120.000
1	983.819	26.60	54.00	27.40	2.76	H	359	2	120.000

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: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported.

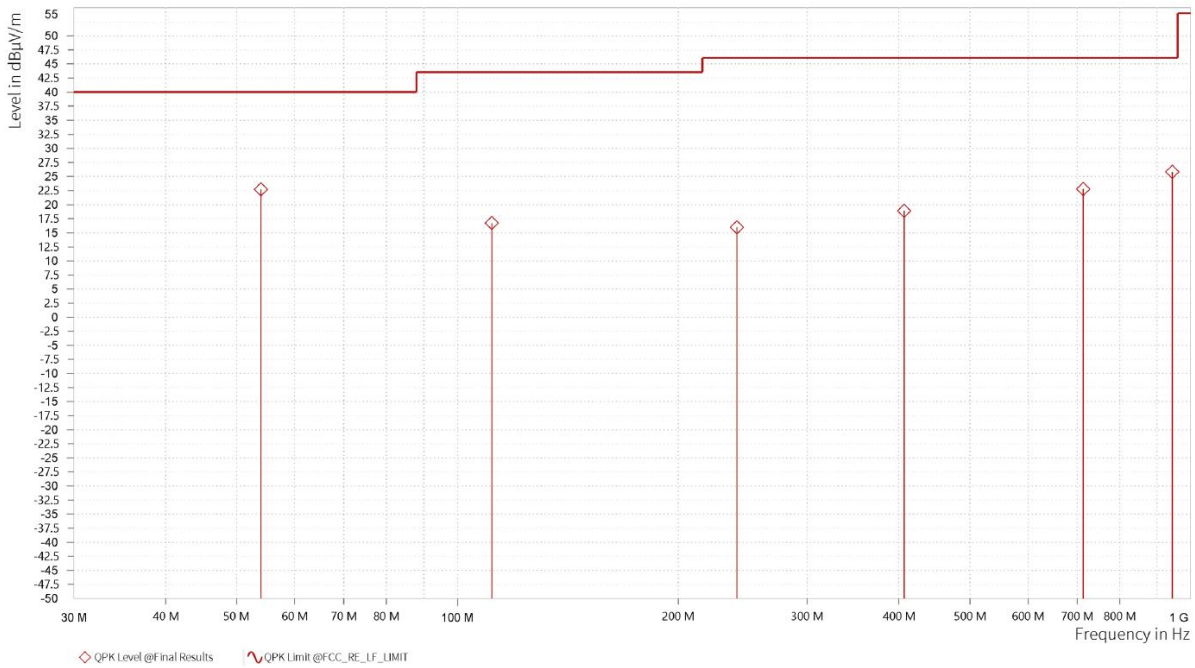

Level in dBµV/m
55
50
47.5
45
42.5
40
37.5
35
32.5
30
27.5
25
22.5
20
17.5
15
12.5
10
7.5
5
2.5
0
-2.5
-5
-7.5
-10
-12.5
-15
-17.5
-20
-22.5
-25
-27.5
-30
-32.5
-35
-37.5
-40
-42.5
-45
-47.5
-50
30 M
40 M
50 M
60 M
70 M
80 M
100 M
200 M
300 M
400 M
500 M
600 M
700 M
800 M
1 G
Frequency in Hz
QPK Level @Final Results
QPK Limit @FCC_RE_LF_LIMIT

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	Chao Wu		

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	53.985	22.71	40.00	17.29	-10.48	V	355	2	120.000
1	111.392	16.70	43.50	26.80	-12.44	V	1.1	2	120.000
1	240.578	15.95	46.00	30.05	-9.27	V	132	1	120.000
1	406.448	18.87	46.00	27.13	-4.95	V	1.1	2	120.000
1	713.189	22.75	46.00	23.25	-1.51	V	90.4	2	120.000
1	943.343	25.81	46.00	20.19	1.85	V	4.3	1	120.000

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: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported.



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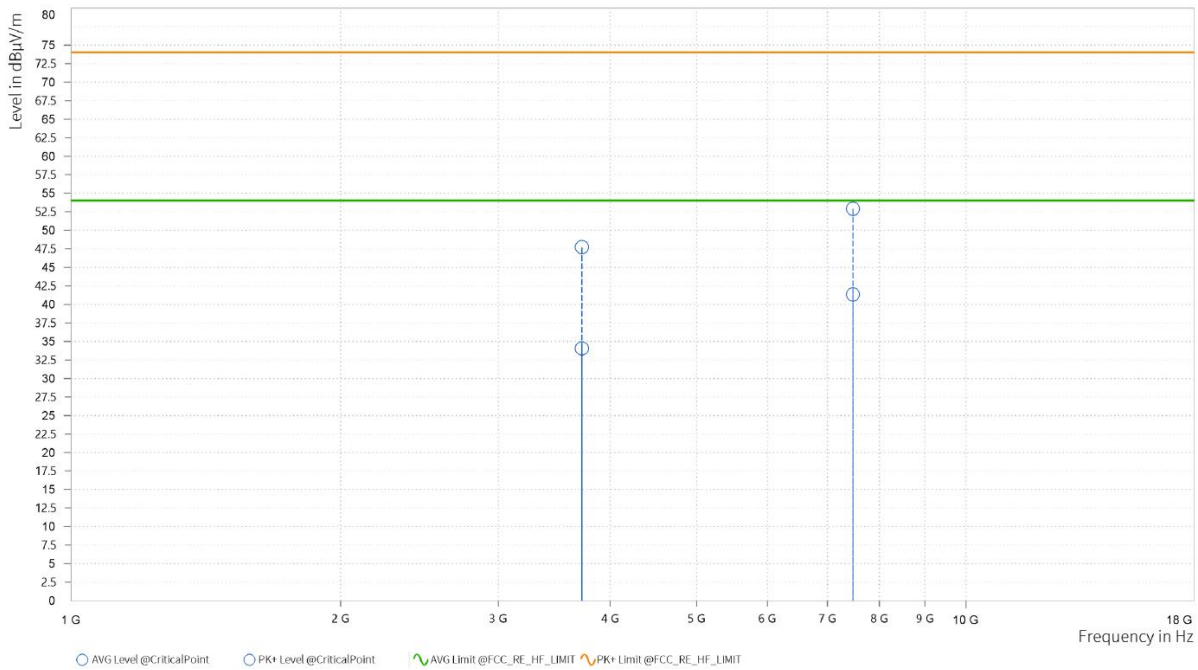
TEST VOLTAGE	Input 120 Vac, 60 Hz	**FREQUENCY RANGE**	1-18 GHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70 %RH	**DETECTOR FUNCTION & RESOLUTION BANDWIDTH**	Peak/Average, 1 MHz
TESTED BY	Chao Wu		

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	3,720.500	47.73	74.00	26.27	34.05	54.00	19.95	9.78	H	356.2	2
1	7,475.000	52.91	74.00	21.09	41.33	54.00	12.67	16.88	H	166.7	1

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.

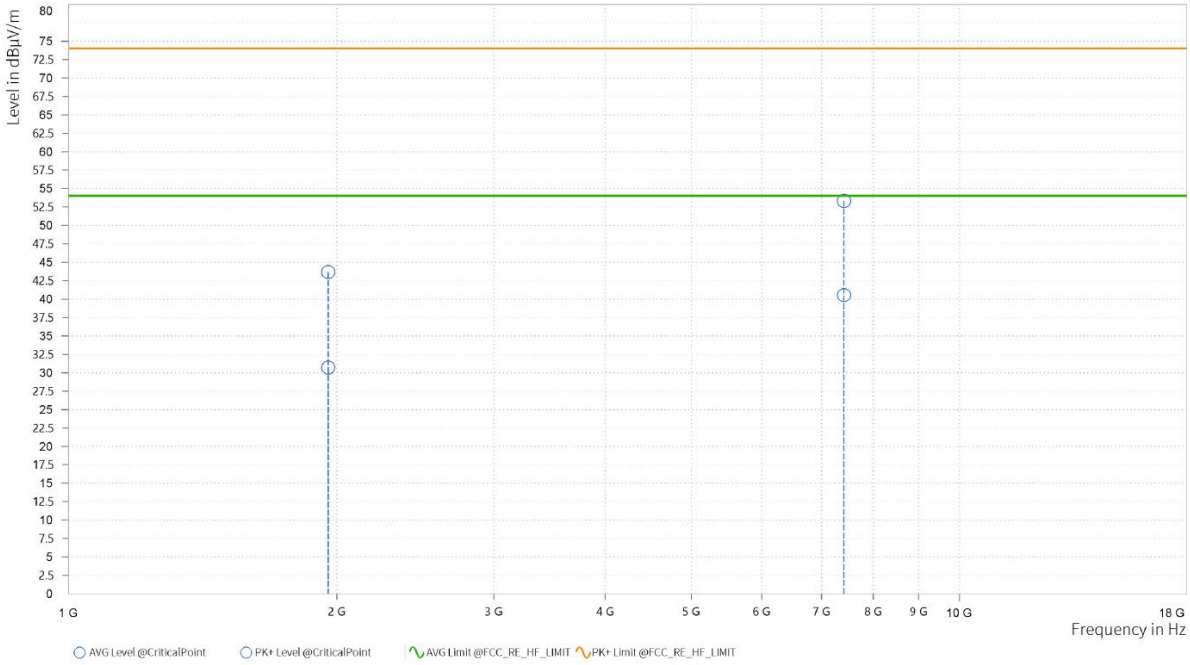


TEST VOLTAGE	Input 120 Vac, 60 Hz	**FREQUENCY RANGE**	1-18 GHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70 %RH	**DETECTOR FUNCTION & RESOLUTION BANDWIDTH**	Peak/Average, 1 MHz
TESTED BY	Chao Wu		

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	1,956.500	43.64	74.00	30.36	30.69	54.00	23.31	5.69	V	194.5	2
1	7,422.000	53.32	74.00	20.68	40.52	54.00	13.48	16.85	V	194.5	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.



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---