VARIANT EMC TEST REPORT

Applicant:	i.safe MOBILE GmbH
Address:	i_Park Tauberfranken 10 97922 Lauda-Koenigshofen Germany

Manufacturer or Supplier:	i.safe MOBILE GmbH
Address:	i_Park Tauberfranken 10 97922 Lauda-Koenigshofen Germany
Product:	Mobile phone
Marketing Name	IS440.x,EdgeOne,EdgeTwo
Brand Name:	i.safe MOBILE,RuggedEdge
Model Name:	M440A01
FCC ID:	2AACZ-M440A01
Date of tests:	Apr. 01, 2024 ~ Jun. 25, 2024 Dec. 09, 2024 ~ Dec. 30, 2024

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 Simon Wang Engineer / Mobile Department	Approved by Luke Lu Manager / Mobile Department
Simon Wang Date: Dec. 30, 2024	Luke Lu Date: Dec. 30, 2024

TABLE OF CONTENTS

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
W7L-P24030018EM01	Original release	Jun. 25, 2024
PSZ-NQN2412090319EM01	This product has differences in appearance design and prototype size compared to the original product. This report verify the worst case of RE/CE. So this report update the RE/CE data.	Dec. 30, 2024

1 GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Mobile phone	
BRAND NAME	i.safe MOBILE,RuggedEdge	
MARKETING NAME	IS440.x,EdgeOne,EdgeTwo	
MODEL NAME	M440A01	
NOMINAL VOLTAGE	5Vdc (adapter or host equipment) 3.7Vdc (Li-ion, battery)	
MODULATION TYPE	**BT_LE**	GFSK
	Bluetooth	GFSK, π/4-DQPSK, 8DPSK
	NFC	ASK
	WLAN	DSSS, OFDM, OFDMA
	GPS/GALILEO/GLONASS/BDS	BPSK
	LTE	QPSK/16QAM/64QAM
	5G NR	DFT-s-OFDM(π/2BPSK,QPSK,16QAM,64QAM,256QAM); CP-OFDM(QPSK,16QAM,64QAM,256QAM);
OPERATING FREQUENCY	**Bluetooth/BT_LE**	2402MHz ~ 2480MHz
	NFC	13.56 MHz
	WLAN	2412 ~ 2462MHz for 11b/g/n(HT20/40)/ ax(HE20/40)/ax(20M RU242) /(40M RU484) 5180 ~ 5240MHz, 5260 ~ 5320 MHz, 5500 ~ 5720MHz, 5745 ~ 5825 MHz for 802.11a/n/ac/ax (20MHz), 802.11ax20 (RU 242);802.11 n/ac/ax (40MHz), 802.11ax40 (RU 484);802.11ac/ax(80MHz), 802.11ax80 (RU 996);802.11ac/ax (160MHz), 802.11ax160 (RU full)
	GPS/GALILEO/GLONASS/BDS	1559MHz ~ 1610MHz
	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) 699.7MHz ~ 715.3MHz (FOR LTE Band12) 779.5MHz ~ 784.5MHz (FOR LTE Band13) 790.5MHz ~ 795.5MHz (FOR LTE Band14)

		706.5MHz ~ 713.5MHz (FOR LTE Band17) 1850.7MHz ~ 1914.3MHz (FOR LTE Band25) 814.7MHz ~ 848.3MHz (FOR LTE Band26) 2307.5MHz ~ 2312.5MHz (FOR LTE Band30) 2572.5MHz ~ 2617.5MHz (FOR LTE Band38) 2498.5MHz ~2687.5MHz (FOR LTE Band41) 3452.5MHz ~3547.5MHz (FOR LTE Band42) 3602.5MHz ~3697.5MHz (FOR LTE Band43) 3552.5MHz ~3697.5MHz (FOR LTE Band48) 1710.7MHz ~ 1779.3MHz (FOR LTE Band66) 665.5MHz ~ 695.5MHz (FOR LTE Band71) 825.6MHz ~ 847.4MHz (FOR LTE Band5B) 2505.5MHz ~ 2564.7MHz (FOR LTE Band7C) 2577.5MHz ~ 2612.5MHz (FOR LTE Band38C) 2499.3MHz ~2686.7MHz (FOR LTE Band41C) 3453.3MHz ~3546.7MHz (FOR LTE Band42C) 3553.3MHz ~3696.7MHz (FOR LTE Band48C) 1712.5MHz ~1782.3MHz (FOR LTE Band66B) 1713.3MHz ~1776.7MHz (FOR LTE Band66C)
	5G NR	SA: n2(1852.5MHz ~1907.5MHz) n5(826.5MHz ~ 846.5MHz) n7(2502.5MHz ~ 2567.5MHz) n12(701.5MHz ~ 713.5MHz) n14(790.5MHz ~ 795.5MHz) n25(1852.5MHz ~ 1912.5MHz) n30(2307.5MHz ~ 2312.5MHz) n38(2580MHz ~ 2610MHz) n41(2506.02 ~ 2679.99MHz) n48(3555 ~ 3694.98MHz) n66(1712.5 ~ 1777.5MHz) n71(665.5 ~ 695.5MHz) n77(Part27Q)(3455.01 ~ 3544.98MHz) n77(Part27O)(3705 ~ 3975MHz) n78(Part27Q)(3455.01 ~ 3544.98MHz) ENDC DC_2A_n5A DC_2A_n7A DC_2A_n12A DC_2A_n38A DC_2A_n41A DC_2A_n48A DC_2A_n66A DC_2A_n71A DC_2A_n78A

		DC_4A_n38A DC_4A_n41A DC_4A_n78A DC_5A_n2A DC_5A_n7A DC_5A_n38A DC_5A_n41A DC_5A_n48A DC_5A_n66A DC_5B_n66A DC_5A_n77A DC_5A_n78A DC_5A-5A_n2A DC_7A_n2A DC_7A_n5A DC_7C_n5A DC_7A_n12A DC_7A_n66A DC_7A_n71A DC_7A_n77A DC_7C_n77A DC_7A_n78A DC_12A_n2A DC_12A_n7A DC_12A_n25A DC_12A_n38A DC_12A_n66A DC_12A_n41A DC_12A_n77A DC_12A_n78A DC_13A_n2A DC_13A_n7A DC_13A_n66A DC_13A_n77A DC_13A_n78A DC_14A_n2A DC_14A_n66A DC_14A_n77A DC_25A_n41A DC_26A_n41A DC_26A_n78A DC_38A_n78A DC_41C_n77A DC_41A_n77A DC_41A_n78A

		DC_41C_n78A DC_48A_n5A DC_48A_n25A DC_48A_n66A DC_66A_n2A DC_66A_n5A DC_66A_n7A DC_66A_n12A DC_66A_n25A DC_66A_n38A DC_66A_n41A DC_66A_n48A DC_66A_n71A DC_66A_n77A DC_66A_n78A DC_71A_n2A DC_71A_n7A DC_71A_n38A DC_71A_n41A DC_71A_n66A DC_71A_n78A
HW VERSION	V05	
SW VERSION	IS440_00.00_1_20240613	
I/O PORTS	Refer to user's manual	
CABLE SUPPLIED	USB cable: with shielded cable, w/o ferrite core, 1.0 meter	
ACCESSORY DEVICES	Refer to note as below	

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.

3. List of Accessory:

ACCESSORIES	BRAND	MANUFACTURER	MODEL	SPECIFICATION
AC Adapter	N/A	SHENZHEN SHI YINGYUAN POWER SUPPLY TECHNOLOGY CO., LTD.	ICP12-050-2000B	I/P: 100-240Vac, 0.5A, O/P: 5Vdc, 2A
Battery 1	N/A	FPR Connectivity Technology Inc.	BPIS440A.1A	Capacity: 3.7Vdc, 2400mAh
Battery 2	N/A	FPR Connectivity Technology Inc.	IS440.1H	Capacity: 3.7Vdc, 4800mAh
USB Cable	N/A	Winpower Technology Co., LTD	PROTECTOR 2.0	Signal Line,1.0meter

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	LTE B5 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle+Front Camera On
2	LTE B12 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle +MPG4
3	LTE B13 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle +NFC
4	LTE B14 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle +Front Camera On
5	LTE B17 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle +MPG4
6	LTE B26 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle+NFC
7	LTE B71 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle+Front Camera On
8	SA N5 Idle+Adapter +USB cable +BT Idle+WIFI Idle +MPG4
9	SA N12 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle +NFC
10	SA N71 Idle+USB Link +Data Transmission+USB cable +BT Idle+WIFI Idle+Notebook to EUT+Earphone
11	Powered by battery+Earphone+BT Idle+WIFI Idle (2.4G)+MPG4
12	Worst of 1-11+Battery 2

Conducted emission test	
1	LTE B5 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle+Front Camera On
2	LTE B12 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle +MPG4
3	LTE B13 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle +NFC
4	LTE B14 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle +Front Camera On
5	LTE B17 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle +MPG4
6	LTE B26 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle+NFC
7	LTE B71 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle+Front Camera On
8	SA N5 Idle+Adapter +USB cable +BT Idle+WIFI Idle +MPG4
9	SA N12 Idle+Adapter +USB cable +Earphone+BT Idle+WIFI Idle +NFC
10	SA N71 Idle+USB Link +Data Transmission+USB cable +BT Idle+WIFI Idle+Notebook to EUT+Earphone
11	Worst of 1-11+Battery 2

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 3 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	Earphone	MI	N/A	N/A	N/A
3	Adapter	MI	MDY-12-EA	N/A	N/A
4	Micro SD	SAM SUNG	N/A	N/A	N/A
5	USB Cable	MI	N/A	N/A	N/A
6	Universal radio communication tester	Rohde&Schwarz	CMW500	N/A	N/A
7	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

#1

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR3	101900	Feb. 14,24	Feb. 13,25
EMC32 test software	Rohde&Schwarz	EMC32	NA	NA	NA
LISN network	Rohde&Schwarz	ENV216	101922	Mar. 10,24	Mar. 09,25

#2

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR3	101900	Feb. 14,24	Feb. 13,25
EMC32 test software	Rohde&Schwarz	EMC32	NA	NA	NA
LISN network	Rohde&Schwarz	ENV216	101922	Mar. 10,24	Mar. 09,25

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.

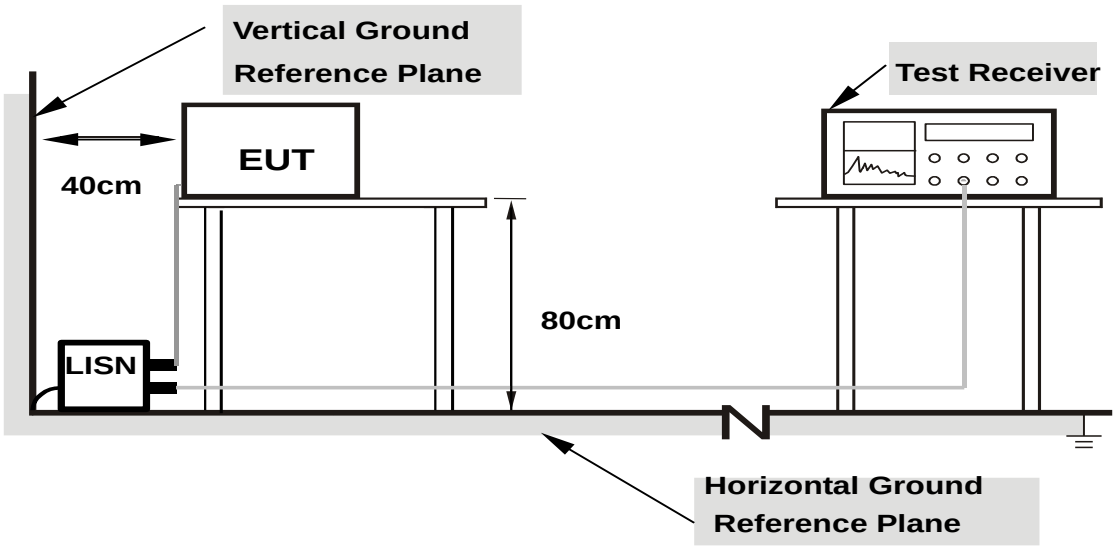
c. The frequency range from 150 kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

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

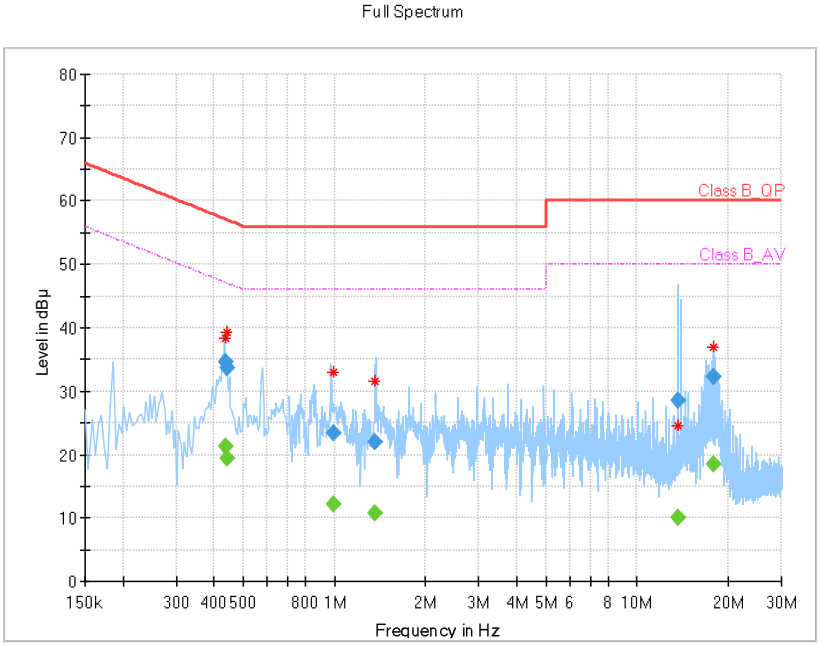
a. Turned on the power and connected of all equipment.
b. EUT was operated according to the use type described in the manufacturer's specifications or the user's manual.

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

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.435000	---	21.26	47.16	25.90	L1	ON	9.8
0.435000	34.65	---	57.16	22.51	L1	ON	9.8
0.443000	---	19.45	47.01	27.56	L1	ON	9.8
0.443000	33.69	---	57.01	23.32	L1	ON	9.8
0.991000	---	12.13	46.00	33.87	L1	ON	9.8
0.991000	23.30	---	56.00	32.70	L1	ON	9.8
1.363000	---	10.82	46.00	35.18	L1	ON	9.8
1.363000	21.89	---	56.00	34.11	L1	ON	9.8
13.635000	---	10.00	50.00	40.00	L1	ON	10.7
13.635000	28.63	---	60.00	31.37	L1	ON	10.7
17.883000	---	18.53	50.00	31.47	L1	ON	11.1
17.883000	32.21	---	60.00	27.79	L1	ON	11.1

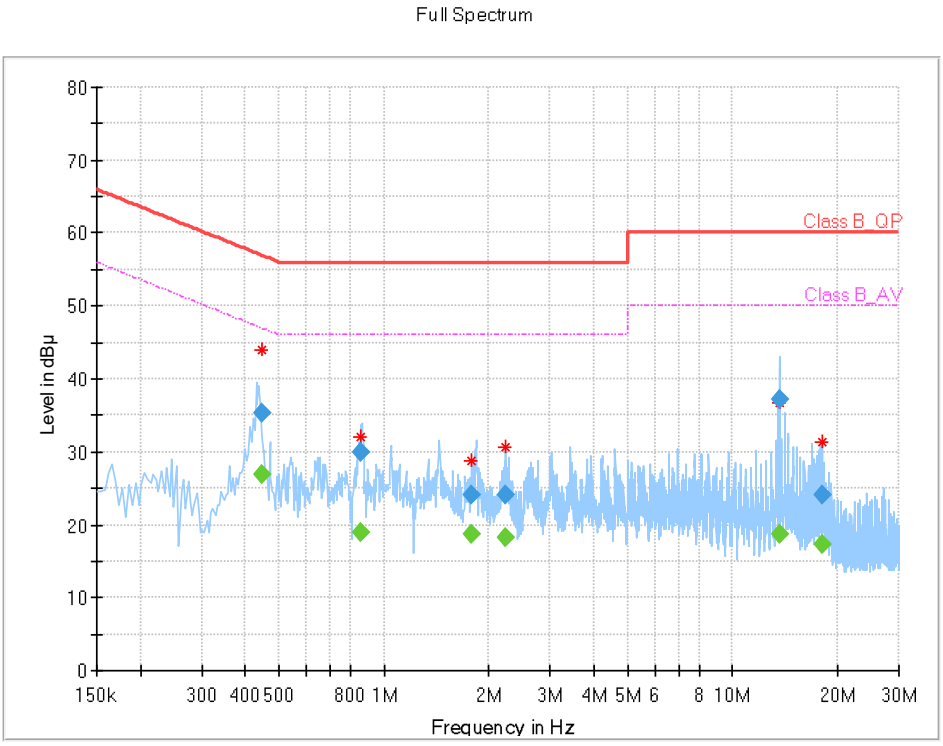
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Limit 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

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.446000	---	27.01	46.95	19.94	N	ON	9.6
0.446000	35.35	---	56.95	21.60	N	ON	9.6
0.858000	---	19.02	46.00	26.98	N	ON	9.7
0.858000	29.88	---	56.00	26.12	N	ON	9.7
1.782000	---	18.77	46.00	27.23	N	ON	9.8
1.782000	24.02	---	56.00	31.98	N	ON	9.8
2.222000	---	18.23	46.00	27.77	N	ON	9.8
2.222000	24.06	---	56.00	31.94	N	ON	9.8
13.642000	---	18.70	50.00	31.30	N	ON	10.7
13.642000	37.26	---	60.00	22.74	N	ON	10.7
18.110000	---	17.29	50.00	32.71	N	ON	11.2
18.110000	24.10	---	60.00	35.90	N	ON	11.2

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 (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	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 (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

#1

Frequency range below1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	Nov. 14,23	Nov. 13,26
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Feb. 18,24	Feb. 17,25
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Mar. 28,24	Mar. 27,25
Signal Pre-Amplifier	EMSI	EMC 9135	980249	May. 06,23	May. 05,24
Signal Pre-Amplifier	EMSI	EMC 9135	980249	May. 05,24	May. 04,25
E3 Test Software	E3	V 9.160323	N/A	N/A	N/A

Frequency range above 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	Nov. 14,23	Nov. 13,26
Horn Antenna	ETS-LINDGREN	3117	00168728	Nov. 30,23	Nov. 29,24
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K-SG/QMS-00361	15433	Sep.04, 23	Sep.03, 24
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Mar. 28,24	Mar. 27,25
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	May.10,23	May.09,24
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	May.09,24	May.08,25
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Feb. 17,24	Feb. 16,25
E3 Test Software	E3	V 9.160323	N/A	N/A	N/A

#2

Frequency range below1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	Nov. 14,23	Nov. 13,26
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Feb. 18,24	Feb. 17,25
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Mar. 28,24	Mar. 27,25
Signal Pre-Amplifier	EMSI	EMC 9135	980249	May. 05,24	May. 04,25
E3 Test Software	E3	V 9.160323	N/A	N/A	N/A

Frequency range above 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	Nov. 14,23	Nov. 13,26
Horn Antenna	ETS-LINDGREN	3117	00168728	Nov. 29,22	Nov. 28,25
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K-SG/QMS-00361	15433	Sep.03, 24	Sep.02, 25
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Mar. 28,24	Mar. 27,25
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	May.09,24	May.08,25
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Feb. 17,24	Feb. 16,25
E3 Test Software	E3	V 9.160323	N/A	N/A	N/A

NOTE: 1. The test was performed in 3m chamber.
2. The FCC Site Registration No. is 525120; The Designation No. is CN1171

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 = Emission level – Limit value.

<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:

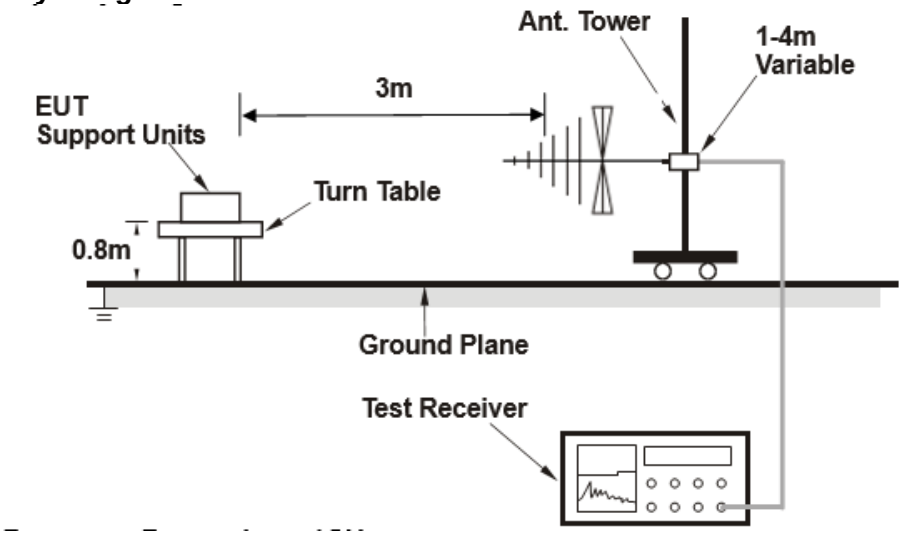
- The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test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

2.2.4 DEVIATION FROM TEST STANDARD

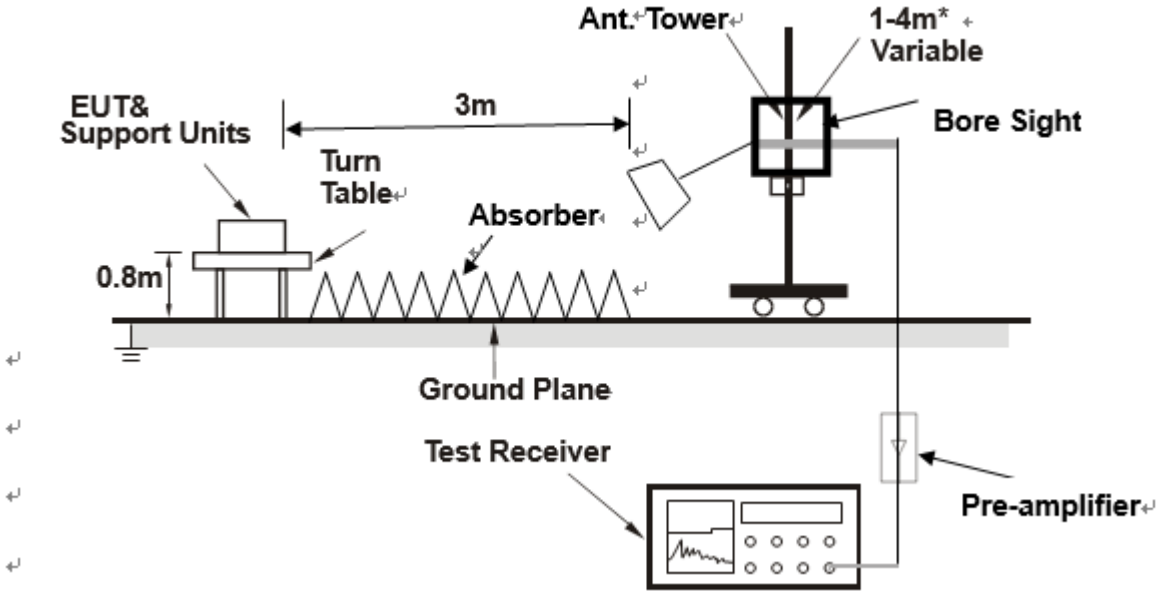
No deviation.

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

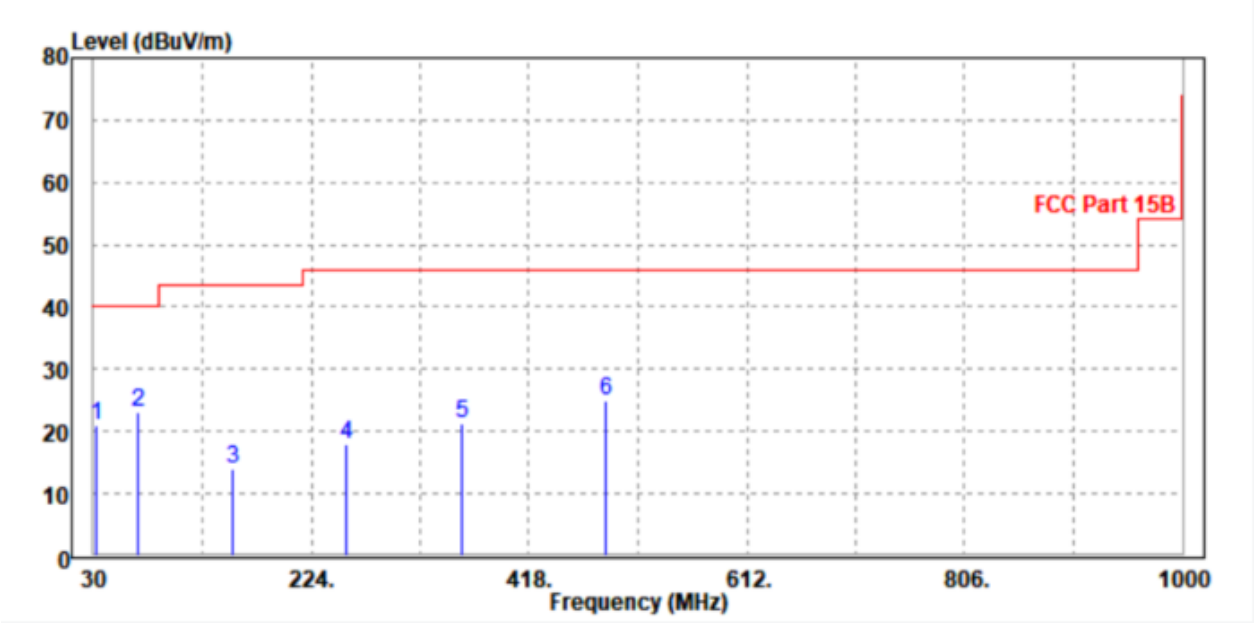
TEST VOLTAGE	Input 120 Vac, 60 Hz	FREQUENCY RANGE	30-1000 MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70 %RH	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Quasi-Peak, 120 kHz
TESTED BY	Jace Hu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m		
1	32.910	21.07	34.58	40.00	-18.93	-13.51	Peak	Horizontal
2 PP	69.770	23.19	46.83	40.00	-16.81	-23.64	Peak	Horizontal
3	154.160	13.92	33.18	43.50	-29.58	-19.26	Peak	Horizontal
4	256.010	17.86	34.37	46.00	-28.14	-16.51	Peak	Horizontal
5	358.830	21.25	34.75	46.00	-24.75	-13.50	Peak	Horizontal
6	486.870	24.90	36.00	46.00	-21.10	-11.10	Peak	Horizontal

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 = Emission level – Limit value.

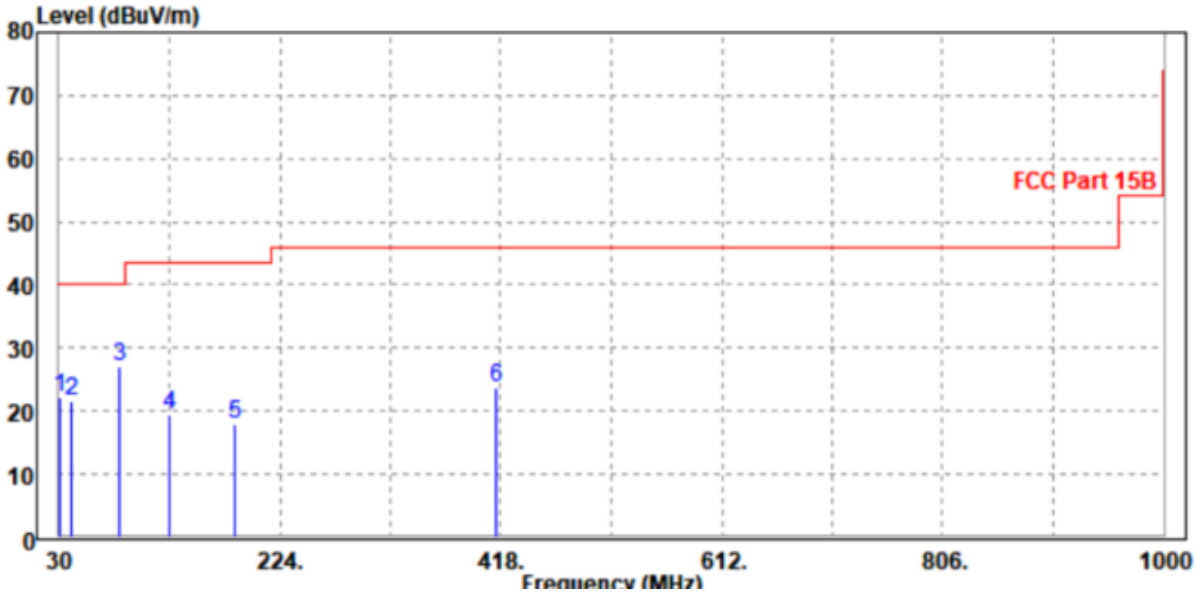


TEST VOLTAGE	Input 120 Vac, 60 Hz	FREQUENCY RANGE	30-1000 MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70% RH	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Quasi-Peak , 120 kHz
TESTED BY	Jace Hu		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m		
1	30.970	22.31	34.99	40.00	-17.69	-12.68	Peak	Vertical
2	41.640	21.62	39.88	40.00	-18.38	-18.26	Peak	Vertical
3 PP	83.350	27.15	51.56	40.00	-12.85	-24.41	Peak	Vertical
4	127.000	19.45	42.38	43.50	-24.05	-22.93	Peak	Vertical
5	184.230	17.95	37.80	43.50	-25.55	-19.85	Peak	Vertical
6	414.120	23.70	35.13	46.00	-22.30	-11.43	Peak	Vertical

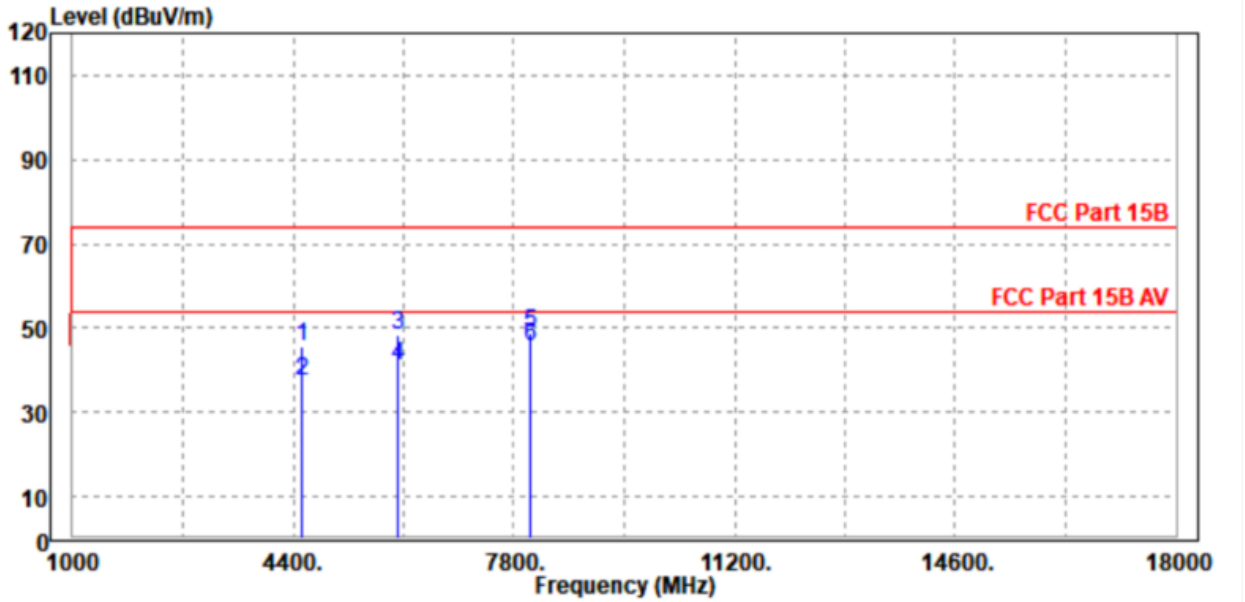
REMARKS:
1. Emission level(dBuV/m)=Read Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) -Amplifier Gain
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



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										
FREQ. (MHz)	**EMISSION LEVEL (dBuV/m)**	**READ LEVEL (dBuV)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA FACTOR (dB /m)**	**CABLE LOSS (dB)**	**PREAMP FACTOR (dB)**	**ANTENNA HEIGHT (cm)**	**TABLE ANGLE (Degree)**	**REMARK**
4536	45.8	47.63	74	-28.2	34.01	10.46	46.3	100	0	Peak
4536	37.5	39.33	54	-16.5	34.01	10.46	46.3	100	0	Average
5998	48.37	47.9	74	-25.63	35.1	11.75	46.38	100	0	Peak
5998	41.05	40.58	54	-12.95	35.1	11.75	46.38	100	0	Average
8038	48.77	44.87	74	-25.23	35.62	13.99	45.71	100	0	Peak
8038	45.66	41.76	54	-8.34	35.62	13.99	45.71	100	0	Average

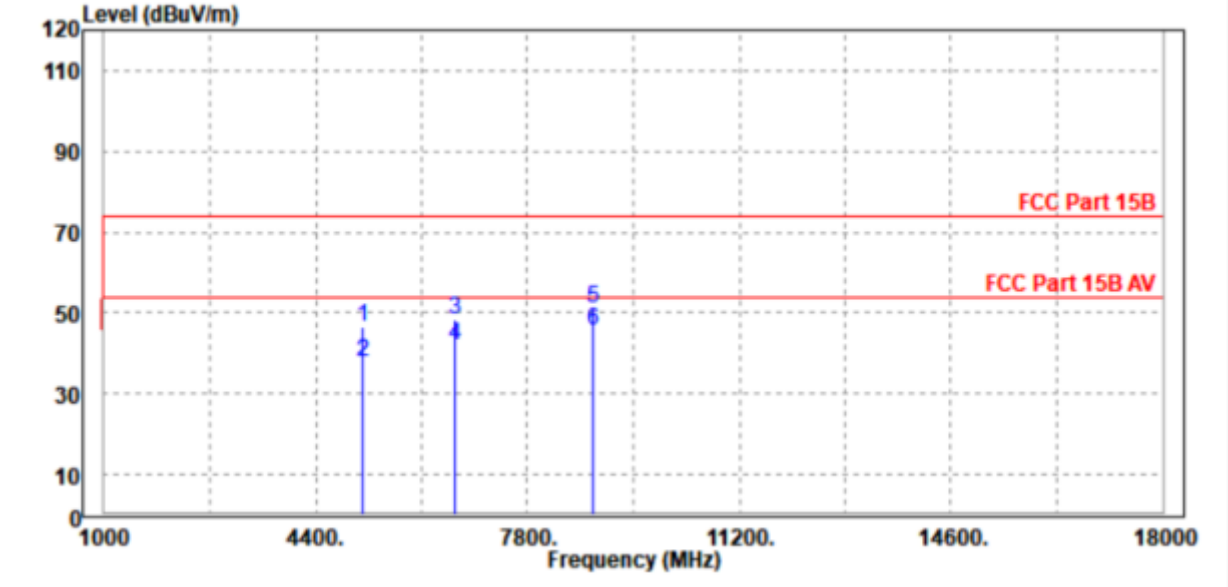
REMARKS:
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 1GHz to 5th harmonic of the 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	Jace Hu		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	**EMISSION LEVEL (dBuV/m)**	**READ LEVEL (dBuV)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA FACTOR (dB /m)**	**CABLE LOSS (dB)**	**PREAMP FACTOR (dB)**	**ANTENNA HEIGHT (cm)**	**TABLE ANGLE (Degree)**	**REMARK**
5165	46.68	48.12	74	-27.32	33.97	11.18	46.59	100	360	Peak
5165	37.89	39.33	54	-16.11	33.97	11.18	46.59	100	360	Average
6627	48.32	46.88	74	-25.68	35.39	12.55	46.5	100	360	Peak
6627	41.79	40.35	54	-12.21	35.39	12.55	46.5	100	360	Average
8854	51.33	46.3	74	-22.67	35.99	14.46	45.42	100	360	Peak
8854	45.86	40.83	54	-8.14	35.99	14.46	45.42	100	360	Average

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---