ACCREDITED
Certificate # 3939.01

EMC TEST REPORT

Applicant:	Sonim Technologies, Inc.
Address:	1875 S. Grant St. Suite 750. San Mateo, CA, 94402

Manufacturer or Supplier:	Sonim Technologies (Shenzhen) Limited
Address:	2nd Floor, No. 2 Building Phase B, Daqian Industrial park, Longchang Road, 67 District, Baoan, Shenzhen, P. R. China
Product:	Mobile Phone
Brand Name:	Sonim
Model Name:	XP3800
FCC ID:	WYPPC2223
Date of tests:	Oct. 09, 2018 ~ Dec. 20, 2018

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 B**
☒ **ANSI C63.4:2014**

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

Issued by Alex Chen Engineer / Mobile Department	Approved by Sam Tung Manager / Mobile Department
Alex Date: Dec. 21, 2018	 Date: Dec. 21, 2018

TABLE OF CONTENTS

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FV180829W002	Original release	Dec. 21, 2018

BV 7Layers Communications Technology (Shenzhen) Co. Ltd

No.B102, Dazu Chuangxin Mansion, North of Beihuan Avenue, North Area, Hi-Tech Industrial Park, Nanshan District, Shenzhen51800, China

Tel: +86 755 8869 6566
Fax: +86 755 8869 6577
Email: customerservice.dg@cn.bureauveritas.com

1 GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Mobile Phone	
BRAND NAME	Sonim	
MODEL NAME	XP3800	
NOMINAL VOLTAGE	5.0Vdc (adapter or host equipment) 3.7Vdc (Li-ion, battery)	
BATTERY 1	Brand Name: Sonim Model Name: BAT-01500-01S Power Rating: DC 3.7V, 1500mAh, Li-ion	
MODULATION TYPE	**WLAN**	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
	BT_LE	BT-LE(GFSK) for DTS
	Bluetooth	GFSK, π/4-DQPSK, 8DPSK
	GPS/GLONASS	C/A code
	FM	FSK
	GSM/GPRS/EDGE	GMSK, 8PSK
	CDMA	QPSK, HPSK
	WCDMA	BPSK/QPSK
	LTE	QPSK/16QAM/64QAM
OPERATING FREQUENCY	**WLAN**	2412 ~ 2462MHz for 11b/g/n(HT20) 2422 ~ 2452MHz for 11n(HT40) 5150 ~ 5250MHz, 5250 ~ 5350MHz, 5470 ~ 5725MHz, 5725 ~ 5825MHz for 11a/n(HT20)/n(HT40)
	Bluetooth/BT_LE	2402MHz ~ 2480MHz
	GPS	1575.42MHz
	GLONASS	1602MHz
	FM	88MHz ~ 108MHz
	GSM/GPRS/ EDGE	824.2MHz ~ 848.8MHz (FOR GSM 850) 1850.2MHz ~ 1909.8MHz (FOR GSM 1900)
	CDMA	824.7MHz ~ 848.31MHz(FOR CDMA BC0) 1851.25MHz ~1908.75MHz(FOR CDMA BC1) 817.9MHz ~ 823.1MHz(FOR CDMA BC10)
	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)

	LTE	1850.7MHz ~ 1909.3MHz (FOR LTE Band2) 1710.7MHz ~ 1754.3MHz (FOR LTE Band4) 824.7MHz ~ 848.3MHz (FOR LTE Band5) 699.7MHz ~ 715.3MHz (FOR LTE Band12) 779.5MHz ~ 784.5MHz (FOR LTE Band13) 790.5MHz ~ 795.5MHz (FOR LTE Band14) 1850.7MHz ~ 1914.3MHz (FOR LTE Band25) 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	DVT2	
SW VERSION	3A.0.0-00-8.1.0-29.09.04	
I/O PORTS	Refer to user's manual	
CABLE SUPPLIED	USB cable: non-shielded, detachable, 1.5 m	
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. The EUT was powered by the following adapters:

ADAPTER 1	
BRAND:	Sonim
MODEL:	TUUS050100-K00
INPUT:	AC 100-240V, 200mA
OUTPUT:	DC 5V, 1000mA

ADAPTER 2	
BRAND:	Sonim
MODEL:	AQ05A-050B
INPUT:	AC 100-240V, 200mA
OUTPUT:	DC 5V, 1000mA

3. The EUT matched the following USB cable:

USB CABLE	
BRAND:	N.A
MODEL:	N.A
SIGNAL LINE:	1.5 METER

4. 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**	**Remark**
FCC Part 15, Subpart B, Class B ANSI C63.4:2014	Conducted Test	PASS	Meets limits minimum passing margin is -9.17dB at 0.544000MHz.
	Radiated Emission Test (30MHz ~ 1GHz)	PASS	Meets Class B Limit Minimum passing margin is -3.07dB at 422.85MHz
	Radiated Emission Test (Above 1GHz)	PASS	Meets Class B Limit Minimum passing margin is -11.88dB at 3680MHz

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	+/-2.66dB
Radiated emissions	30MHz ~ 1GHz	+/-3.26dB
	1GHz ~ 18GHz	+/-4.48dB

1.4 DESCRIPTION OF TEST MODES

Test Mode	Test Condition
Radiated emission test	
1	GSM850 Idle+ Adapter1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ FM RX
2	GSM1900 Idle+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx+ MPG 4
3	CDMA BC0+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Front camera on
4	CDMA BC1+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx+ Back camera on
5	CDMA BC10+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ FM RX
6	WCDMA B2 Idle+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx+ MPG4
7	WCDMA B4 Idle+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Front camera on
8	WCDMA B5 Idle+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx+ Back camera on
9	LTE B2 Idle+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ FM RX
10	LTE B4 Idle+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx+ MPG 4
11	LTE B5 Idle+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Front camera on
12	LTE B12 Idle+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx+ Back camera on
13	LTE B13 Idle+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ FM RX
14	LTE B14 Idle+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx+ MPG 4
15	LTE B25 Idle+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Front camera on
16	LTE B26 Idle+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx + Back camera on
17	LTE B38 Idle+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx + FM RX
18	LTE B41 Idle+ USB Link+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx + MPG 4
19	LTE B66 Idle+ USB Link+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Front camera on
20	USB Link+ Data Trasmission(PC to EUT)+ Earphone+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx
21	USB Link+ Data Trasmission(PC to SD)+ Earphone+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx
Conducted emission test	

1	GSM850 Idle+ Adapter1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Back camera on
2	GSM1900 Idle+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx+ MPG 4
3	CDMA BC0+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Front camera on
4	CDMA BC1+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx+ FM Rx
5	CDMA BC10+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ FM RX
6	WCDMA B2 Idle+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx+ MPG4
7	WCDMA B4 Idle+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Front camera on
8	WCDMA B5 Idle+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx+ Back camera on
9	LTE B2 Idle+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ FM RX
10	LTE B4 Idle+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx+ MPG 4
11	LTE B5 Idle+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Front camera on
12	LTE B12 Idle+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx+ Back camera on
13	LTE B13 Idle+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ FM RX
14	LTE B14 Idle+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx+ MPG 4
15	LTE B25 Idle+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Front camera on
16	LTE B26 Idle+ Adapter 2+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx + FM Rx
17	LTE B38 Idle+ Adapter 1+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4)+ GPS Rx + FM RX
18	LTE B41 Idle+ USB Link+ Earphone+ USB cable+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx + MPG4
19	LTE B66 Idle+ USB Link+ Earphone+ USB cable+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Front camera on
20	USB Link+ Data Trasmission(PC to EUT)+ Earphone+ BT Idle+ WIFI Idle(5G)+ GLONESS Rx
21	USB Link+ Data Trasmission(PC to SD)+ Earphone+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx

NOTE:

1. For conducted emission test, test mode 1, 20 was the worst case and only this mode was presented in this report.
2. For radiated emission test, test mode 4, 20 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 EMISSION TESTS

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Earphone	Nokia	WH-108	N/A	N/A
2	Notebook	Lenovo	Thnikpad X520	SL10H14859JS	N/A
3	Printer	HP	Hp LaserJet 1300	CNSJF75989	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A
2	N/A
3	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)

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

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.
EMI Test Receiver	Rohde&Schwarz	ESR3	101900	Mar. 15,18	Mar. 14,19
EMC32 test software	Rohde&Schwarz	EMC32	NA	NA	NA
LISN network	Rohde&Schwarz	ENV216	101922	Mar. 15,18	Mar. 14,19

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

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

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.

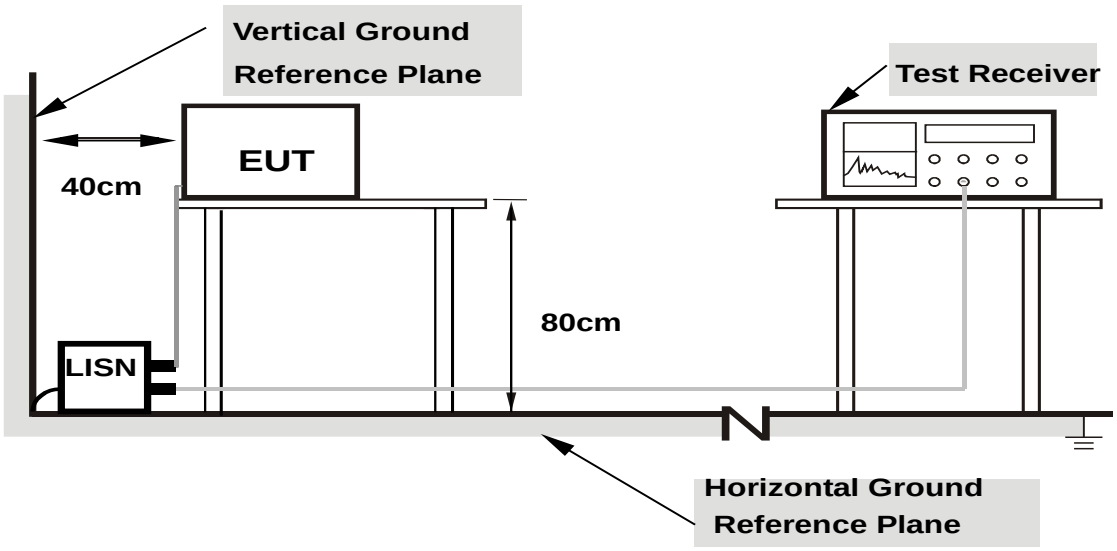
c. The frequency range from 150 kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

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.

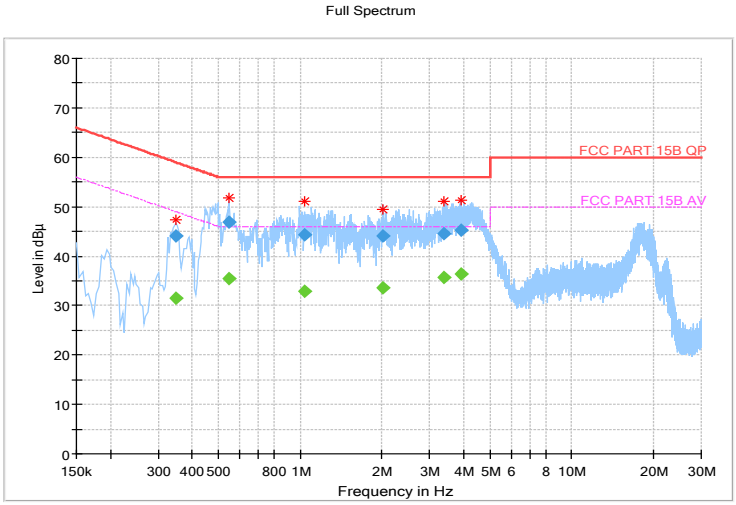
2.1.7 TEST RESULTS

Mode 1

TEST VOLTAGE	DC 5V From Adapter Input 120 Vac, 60 Hz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 43RH	**TESTED BY**	John Wen

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.348000	---	31.44	49.01	-17.57	L1	ON	9.7
0.348000	44.12	---	59.01	-14.89	L1	ON	9.7
0.544000	---	35.37	46.00	-10.63	L1	ON	9.7
0.544000	**46.83**	**---**	**56.00**	**-9.17**	**L1**	**ON**	**9.7**
1.036000	---	32.93	46.00	-13.07	L1	ON	9.7
1.036000	44.41	---	56.00	-11.59	L1	ON	9.7
2.012000	---	33.47	46.00	-12.53	L1	ON	9.7
2.012000	44.07	---	56.00	-11.93	L1	ON	9.7
3.400000	---	35.59	46.00	-10.41	L1	ON	9.7
3.400000	44.66	---	56.00	-11.34	L1	ON	9.7
3.928000	---	36.34	46.00	-9.66	L1	ON	9.7
3.928000	45.29	---	56.00	-10.71	L1	ON	9.7

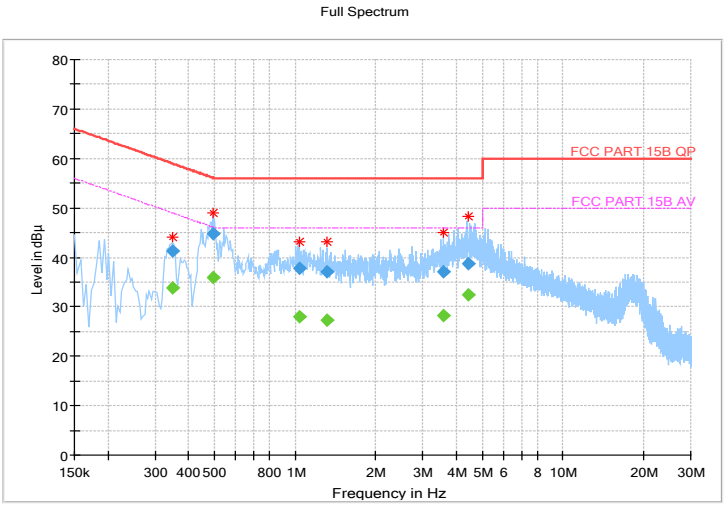
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



TEST VOLTAGE	DC 5V From Adapter Input 120 Vac, 60 Hz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 43RH	TESTED BY	John Wen

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.348000	---	33.71	49.01	-15.30	N	ON	10.0
0.348000	41.24	---	59.01	-17.77	N	ON	10.0
0.496000	---	35.94	46.07	-10.13	N	ON	10.1
0.496000	44.75	---	56.07	-11.32	N	ON	10.1
1.036000	---	28.09	46.00	-17.91	N	ON	9.9
1.036000	37.71	---	56.00	-18.29	N	ON	9.9
1.316000	---	27.35	46.00	-18.65	N	ON	9.9
1.316000	36.98	---	56.00	-19.02	N	ON	9.9
3.596000	---	28.20	46.00	-17.80	N	ON	9.8
3.596000	37.00	---	56.00	-19.00	N	ON	9.8
4.448000	---	32.33	46.00	-13.67	N	ON	9.8
4.448000	38.64	---	56.00	-17.36	N	ON	9.8

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 = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.

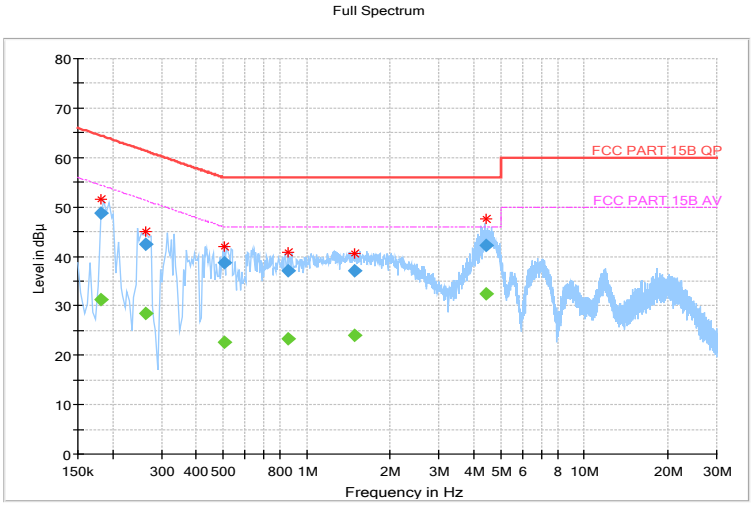


Mode 20

TEST VOLTAGE	Data trasmission Input 120 Vac, 60 Hz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 43RH	**TESTED BY**	John Wen

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.182000	---	31.19	54.39	-23.20	L1	ON	9.7
0.182000	48.85	---	64.39	-15.54	L1	ON	9.7
0.264000	---	28.44	51.30	-22.86	L1	ON	9.7
0.264000	42.43	---	61.30	-18.87	L1	ON	9.7
0.508000	---	22.57	46.00	-23.43	L1	ON	9.7
0.508000	38.64	---	56.00	-17.36	L1	ON	9.7
0.860000	---	23.44	46.00	-22.56	L1	ON	9.7
0.860000	37.04	---	56.00	-18.96	L1	ON	9.7
1.488000	---	23.96	46.00	-22.04	L1	ON	9.7
1.488000	37.01	---	56.00	-18.99	L1	ON	9.7
4.436000	---	32.44	46.00	-13.56	L1	ON	9.7
4.436000	42.21	---	56.00	-13.79	L1	ON	9.7

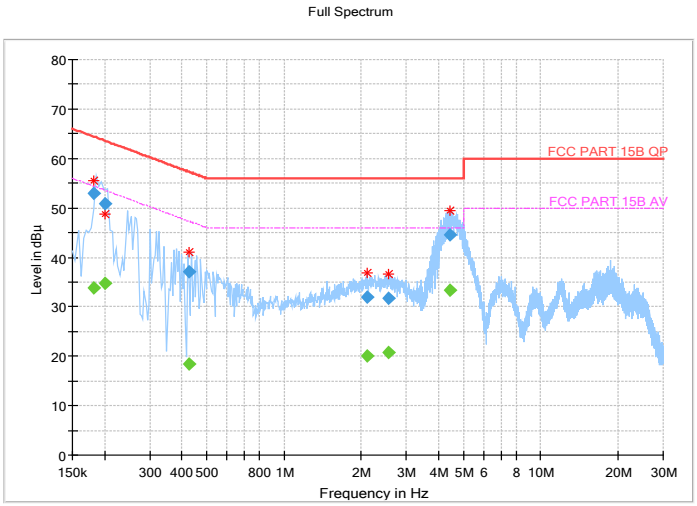
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



TEST VOLTAGE	Data trasmission Input 120 Vac, 60 Hz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 43RH	**TESTED BY**	John Wen

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.182000	---	33.82	54.39	-20.57	N	ON	10.2
0.182000	**52.97**	**---**	**64.39**	**-11.42**	**N**	**ON**	**10.2**
0.200000	---	34.67	53.61	-18.94	N	ON	9.9
0.200000	50.77	---	63.61	-12.84	N	ON	9.9
0.428000	---	18.37	47.29	-28.92	N	ON	10.1
0.428000	37.01	---	57.29	-20.28	N	ON	10.1
2.102000	---	20.12	46.00	-25.88	N	ON	9.8
2.102000	31.91	---	56.00	-24.09	N	ON	9.8
2.556000	---	20.72	46.00	-25.28	N	ON	9.8
2.556000	31.68	---	56.00	-24.32	N	ON	9.8
4.436000	---	33.29	46.00	-12.71	N	ON	9.8
4.436000	44.51	---	56.00	-11.49	N	ON	9.8

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 = Emission level - Limit value
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 10 meters (dBμV/m)				
Frequencies (MHz)	**FCC 15B/ ICES-003, Class A**	**FCC 15B / ICES-003, Class B**	**CISPR 22, Class A**	**CISPR 22, Class B**
30-88	39	29.5	40	30
88-216	43.5	33.1		
216-230	46.4	35.6		
230-960			47	37
960-1000	49.5	43.5		
1000-3000	Avg: 49.5 Peak: 69.5	Avg: 43.5 Peak: 63.5	Not defined	Not defined
3000+			Not defined	Not defined

Radiated Emissions Limits at 3 meters (dBμV/m)				
Frequencies (MHz)	**FCC 15B / ICES-003, Class A**	**FCC 15B / ICES-003, Class B**	**CISPR 22, Class A**	**CISPR 22, Class B**
30-88	49.5	40	50.5	40.5
88-216	54	43.5		
216-230	56.9	46		
230-960			57.5	47.5
960-1000	60	54		
1000-3000	Avg: 60 Peak: 80	Avg: 54 Peak: 74	Avg: 56 Peak: 76	Avg: 50 Peak: 70
3000+			Avg: 60 Peak: 80	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 below1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	Apr. 21,18	Apr. 20,19
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Mar. 15,18	Mar. 14,19
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Mar. 16,18	Mar. 15,19
Signal Pre-Amplifier	EMSI	EMC 9135	980249	Jul. 09,18	Jul. 08,19

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	Apr. 21,18	Apr. 20,19
Horn Antenna	ETS-LINDGREN	3117	00168728	Mar. 15,18	Mar. 14,19
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Mar. 16,18	Mar. 15,19
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	Jul. 09,18	Jul. 08,19

NOTE: 1. The test was performed in 3m chamber.
2. The calibration interval of the above test instruments is 12 months or 24 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
3. 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:

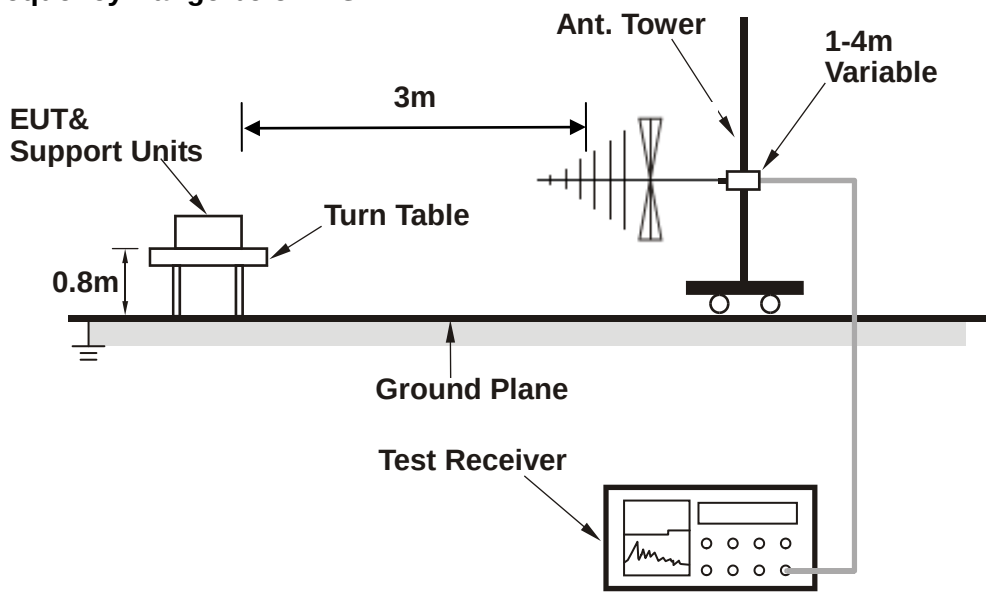
1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth of test receiver/spectrum analyzer is 10Hz 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 = Emission level – Limit value.

2.2.4. DEVIATION FROM TEST STANDARD

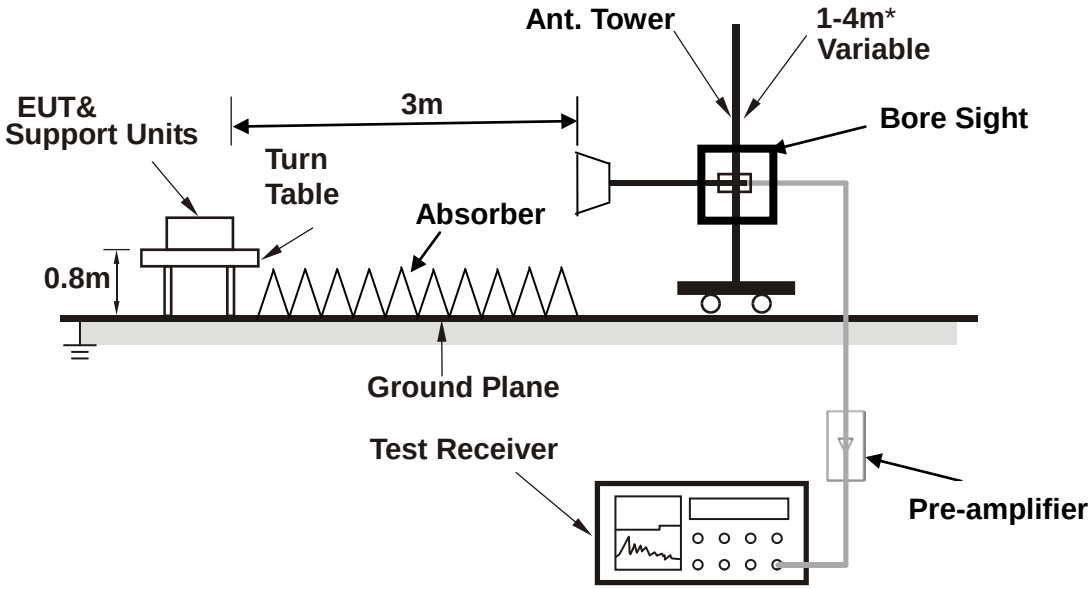
No deviation.

2.2.5. TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

2.2.6. EUT OPERATING CONDITIONS

Same as item 2.1.6.

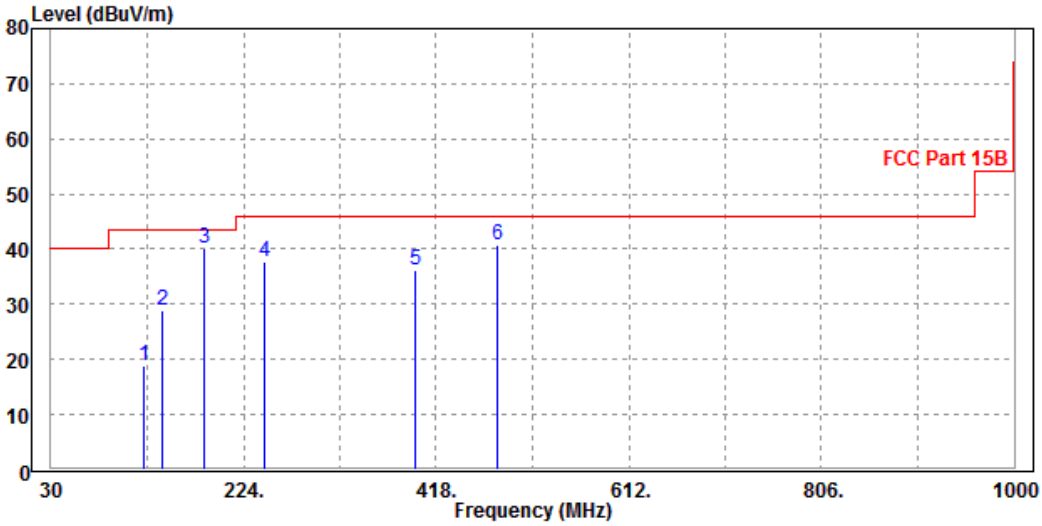
2.2.7. TEST RESULTS

Mode 4

TEST VOLTAGE	DC 5V From Adapter 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	Rose Ma		

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**
123.12	18.72	45.72	43.5	-24.78	8.46	1.46	36.92	132	145	QP
142.52	28.87	55.11	43.5	-14.63	9.03	1.56	36.83	178	268	QP
184.23	**40.29**	**65.02**	**43.5**	**-3.21**	**10.21**	**1.72**	**36.66**	**200**	**179**	**QP**
244.37	37.72	59.77	46	-8.28	12.46	2.01	36.52	114	255	QP
396.66	36.25	53.36	46	-9.75	16.99	2.61	36.71	104	160	QP
480.08	40.79	56.96	46	-5.21	17.82	2.92	36.91	200	300	QP

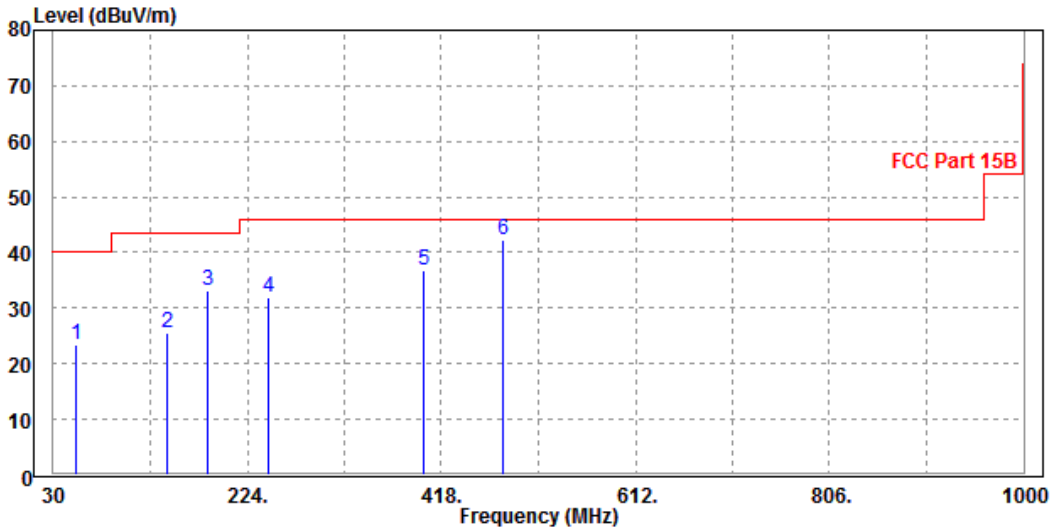
REMARKS:
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported.



TEST VOLTAGE	DC 5V From Adapter 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	Rose Ma		

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**
52.31	23.43	52.98	40	-16.57	6.8	1.02	37.37	120	148	QP
143.49	25.62	51.77	43.5	-17.88	9.11	1.56	36.82	112	263	QP
184.23	33.13	57.86	43.5	-10.37	10.21	1.72	36.66	134	279	QP
244.37	31.98	54.03	46	-14.02	12.46	2.01	36.52	140	288	QP
399.57	36.93	53.94	46	-9.07	17.09	2.62	36.72	170	286	QP
480.08	42.18	58.35	46	-3.82	17.82	2.92	36.91	110	245	QP

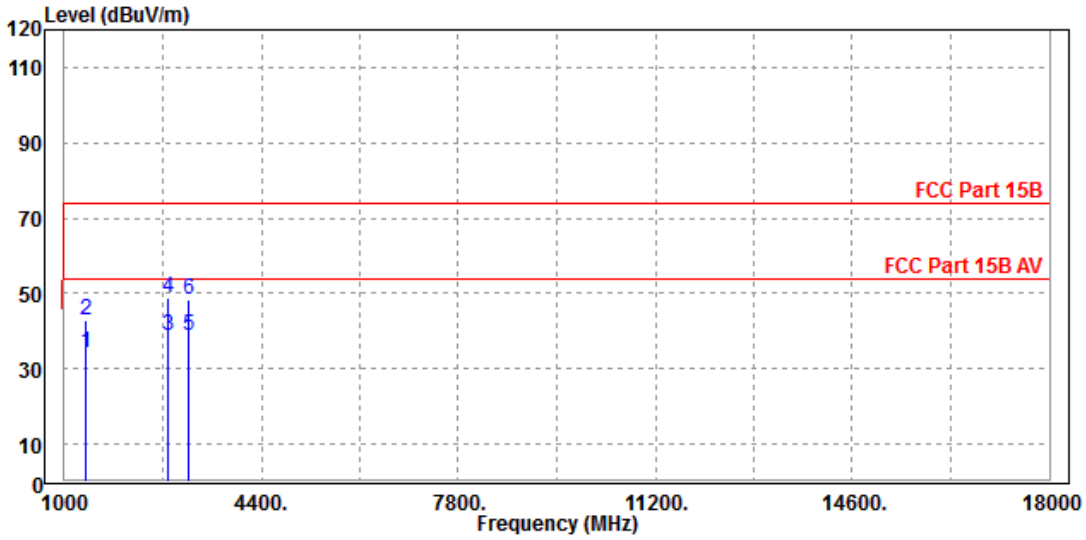
REMARKS:
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported.



TEST VOLTAGE	DC 5V From Adapter 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	Rose Ma		

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
1358	34.13	47.66	54	-19.87	28.84	5.99	48.36	106	150	Average
1358	42.94	56.47	74	-31.06	28.84	5.99	48.36	106	150	Peak
2779	38.71	45.52	54	-15.29	32.68	8.83	48.32	100	0	Average
2779	48.86	55.67	74	-25.14	32.68	8.83	48.32	100	0	Peak
3150	38.79	44.78	54	-15.21	32.93	9.43	48.35	130	200	Average
3150	48.52	54.51	74	-25.48	32.93	9.43	48.35	130	200	Peak

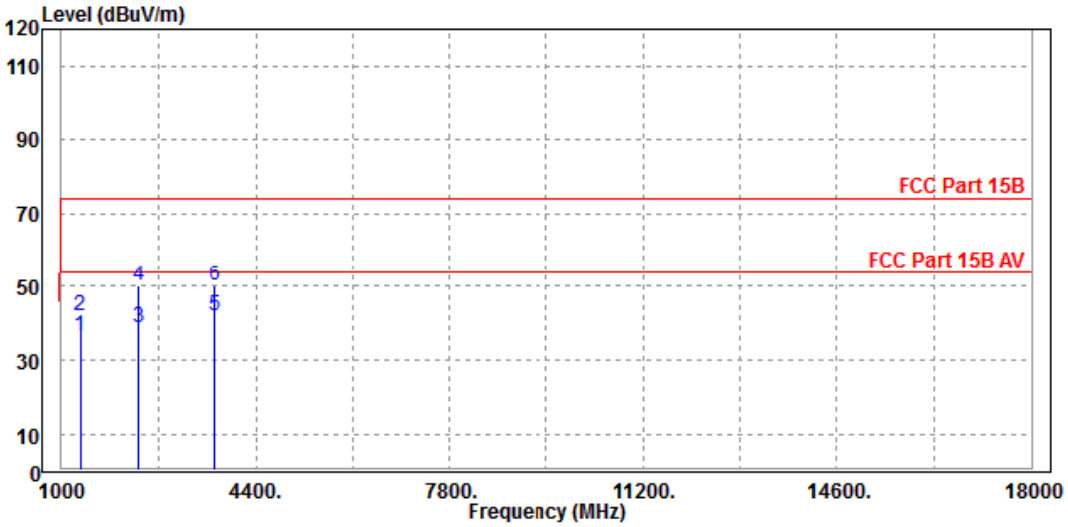
REMARKS:
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 1GHz to 18GHz.
4. Only emissions significantly above equipment noise floor are reported.



TEST VOLTAGE	DC 5V From Adapter 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	Rose Ma		

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
1326	36.64	50.22	54	-17.36	28.87	5.91	48.36	170	145	Average
1326	41.91	55.49	74	-32.09	28.87	5.91	48.36	170	145	Peak
2345	38.79	46.79	54	-15.21	32.25	8.07	48.32	100	210	Average
2345	50.01	58.01	74	-23.99	32.25	8.07	48.32	100	210	Peak
3680	**42.12**	**47.04**	**54**	**-11.88**	**33.29**	**10.26**	**48.47**	**100**	**96**	**Average**
3680	50.23	55.15	74	-23.77	33.29	10.26	48.47	100	96	Peak

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 18GHz.
4. Only emissions significantly above equipment noise floor are reported.

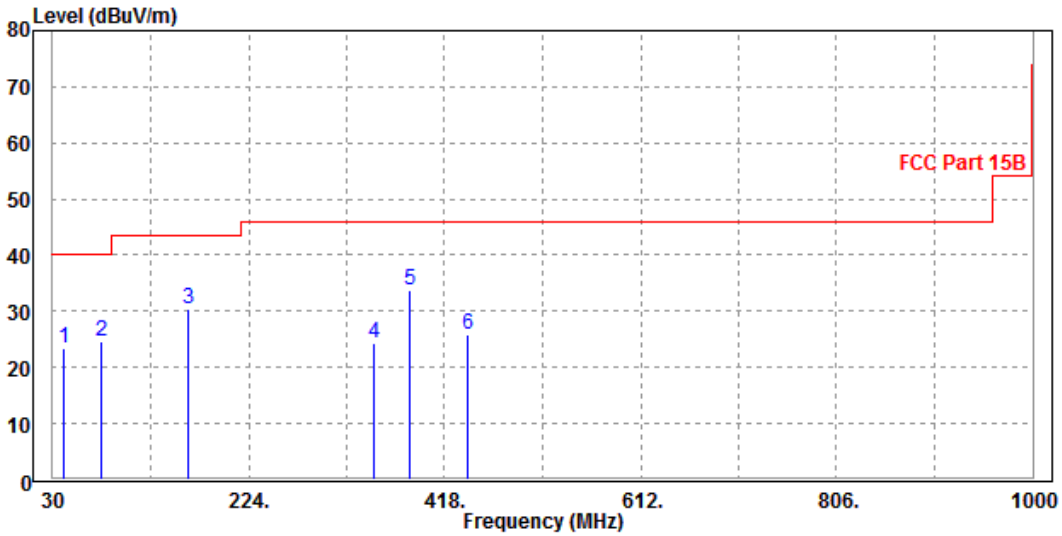


Mode 20

TEST VOLTAGE	Data trasmission 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	Rose Ma		

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**
40.67	23.52	49.64	40	-16.48	10.42	0.93	37.47	120	54	QP
77.53	24.7	52.78	40	-15.3	7.9	1.2	37.18	133	264	QP
163.86	30.29	54.85	43.5	-13.21	10.5	1.67	36.73	100	230	QP
348.16	24.41	43.22	46	-21.59	15.39	2.41	36.61	200	310	QP
384.05	33.65	51.21	46	-12.35	16.57	2.55	36.68	155	240	QP
441.28	25.77	42.35	46	-20.23	17.47	2.77	36.82	106	209	QP

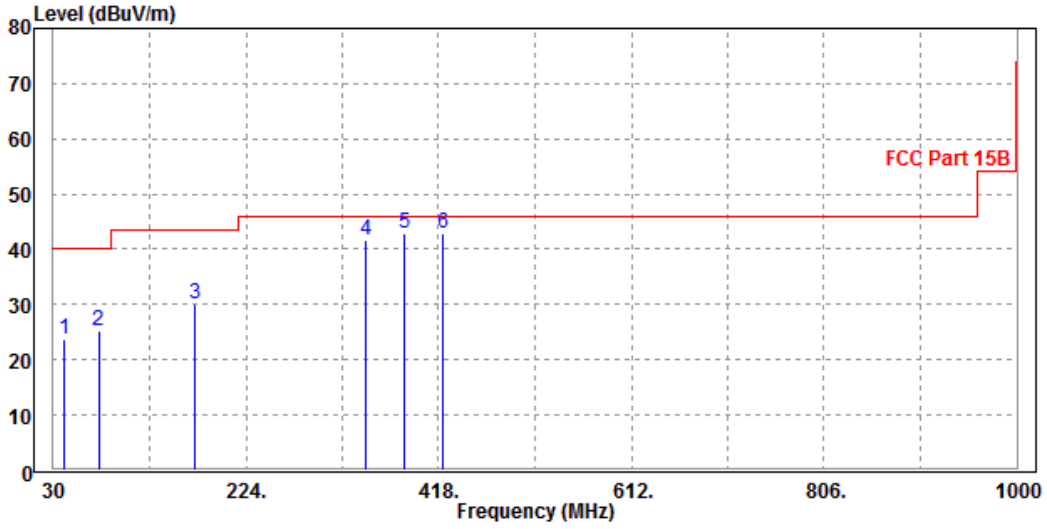
REMARKS:
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported.



TEST VOLTAGE	Data trasmission 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	Rose Ma		

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**
40.67	23.68	49.8	40	-16.32	10.42	0.93	37.47	117	262	QP
75.59	25.25	53.43	40	-14.75	7.82	1.2	37.2	162	279	QP
172.59	30.1	54.83	43.5	-13.4	10.29	1.69	36.71	112	251	QP
345.25	41.66	60.57	46	-4.34	15.29	2.4	36.6	100	0	QP
384.05	42.82	60.38	46	-3.18	16.57	2.55	36.68	100	0	QP
422.85	**42.93**	**59.69**	**46**	**-3.07**	**17.31**	**2.7**	**36.77**	**100**	**0**	**QP**

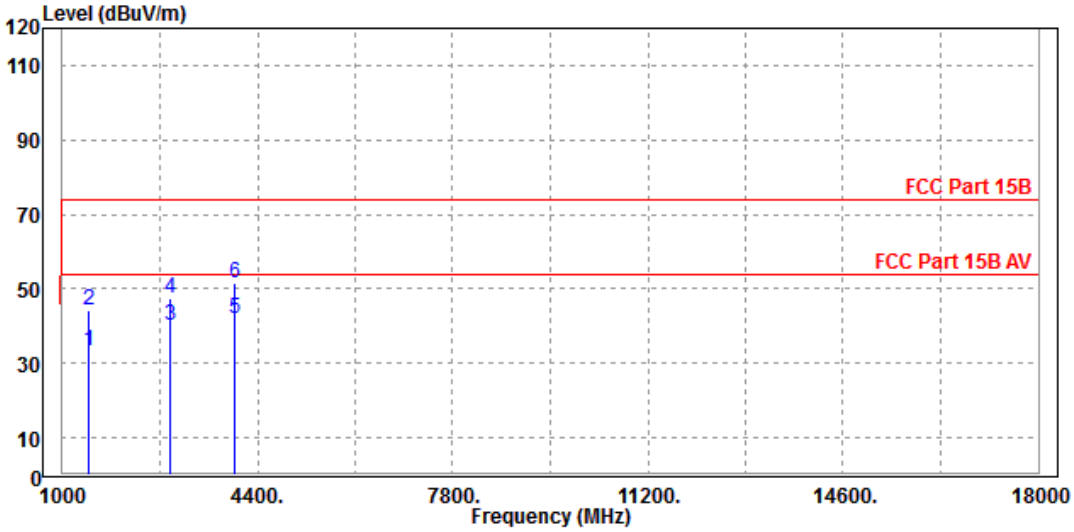
REMARKS:
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported.



TEST VOLTAGE	Data trasmission 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	Rose Ma		

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**
1460	33.19	46.58	54	-20.81	28.74	6.23	48.36	120	260	Average
1460	44.45	57.84	74	-29.55	28.74	6.23	48.36	120	260	Peak
2886	40.02	46.54	54	-13.98	32.79	9.01	48.32	106	45	Average
2886	47.64	54.16	74	-26.36	32.79	9.01	48.32	106	45	Peak
4010	**41.78**	**45.72**	**54**	**-12.22**	**33.81**	**10.82**	**48.57**	**100**	**205**	**Average**
4010	51.42	55.36	74	-22.58	33.81	10.82	48.57	100	205	Peak

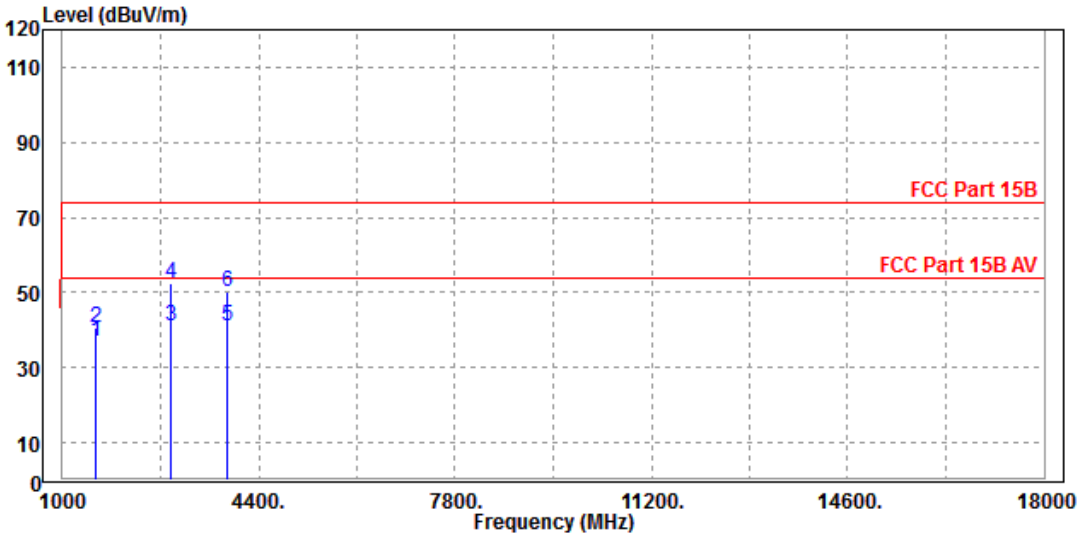
REMARKS:
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported.



TEST VOLTAGE	Data trasmission 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	Rose Ma		

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**
1584	36.87	49.48	54	-17.13	29.24	6.51	48.36	100	216	Average
1584	40.68	53.29	74	-33.32	29.24	6.51	48.36	100	216	Peak
2874	40.88	47.44	54	-13.12	32.77	8.99	48.32	150	312	Average
2874	52.48	59.04	74	-21.52	32.77	8.99	48.32	150	312	Peak
3860	40.84	45.22	54	-13.16	33.58	10.57	48.53	200	178	Average
3860	50.39	54.77	74	-23.61	33.58	10.57	48.53	200	178	Peak

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.



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---