

## 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:	GSM/WCDMA/LTE Mobile Phone
Brand Name:	Nokia
Model Name:	TA-1127
FCC ID:	2AJOTTA-1127
Date of tests:	Dec. 19, 2018 ~ Jan. 15, 2019

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
 Date: Jan. 18, 2019	 Date: Jan. 18, 2019

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Test Report No.: FV180928W004

## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FV180928W002	Original release	Jan. 16, 2019
FV180928W004	Based on the original report changing model name & FCC ID and disable one SIM card. All the data is copies from the original report FV180928W002.	Jan. 18, 2019

## 1 GENERAL INFORMATION

### 1.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	GSM/WCDMA/LTE Mobile Phone	
<b>BRAND NAME</b>	Nokia	
<b>MODEL NAME</b>	TA-1127	
<b>NOMINAL VOLTAGE</b>	5.0Vdc (adapter or host equipment) 3.85Vdc (Li-ion, battery)	
<b>MODULATION TYPE</b>	<b>WLAN</b>	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
	<b>BT_LE</b>	BT-LE(GFSK) for DTS
	<b>Bluetooth</b>	GFSK, $\pi/4$ -DQPSK, 8DPSK, LE
	<b>GPS/ GLONASS</b>	C/A code
	<b>FM</b>	FSK
	<b>GSM/GPRS/EDGE</b>	GMSK, 8PSK
	<b>WCDMA</b>	BPSK/QPSK
	<b>LTE</b>	QPSK/16QAM
<b>OPERATING FREQUENCY</b>	<b>WLAN</b>	2412-2462MHz for 11b/g/n(HT20)
	<b>Bluetooth/BT_LE</b>	2402MHz ~ 2480MHz
	<b>GPS</b>	1575.42MHz
	<b>GLONASS</b>	1602MHz
	<b>FM</b>	88MHz ~ 108MHz
	<b>GSM</b>	824.2MHz ~ 848.8MHz (FOR GSM 850) 1850.2MHz ~ 1909.8MHz (FOR GSM 1900)
	<b>WCDMA</b>	1852.4MHz ~ 1907.6MHz(FOR WCDMA Band 2) 1712.4MHz ~ 1752.6MHz(FOR WCDMA Band 4) 826.4MHz ~ 846.6MHz (FOR WCDMA Band 5)
	<b>LTE</b>	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) 706.5MHz ~ 713.5MHz (FOR LTE Band17)
<b>HW VERSION</b>	HW0242	
<b>SW VERSION</b>	000C_0_310	
<b>I/O PORTS</b>	Refer to user's manual	



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<b>CABLE SUPPLIED</b>	USB cable: non-shielded, detachable, 1.0meter Earphone cable: non-shielded, detachable, 1.5meter
<b>ACCESSORY DEVICES</b>	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.

**List of Accessories:**

ACCESSORIES	BRAND	MODEL	Manufacturer	SPECIFICATION
AC Adapter 1	Aohai	AD-5WU(US)	DONGGUAN AOHAITECHNOLOGY CO., LTD.	I/P:100-240Vac, 150mA O/P: 5Vdc, 1A
AC Adapter 2	DVE	AD-5WU(US)	Dee Van Enterprise Co., LTD.	I/P:100-240Vac, 150mA O/P: 5Vdc, 1A
Battery	Lishen	HE365	-	Rating: 3.85Vdc, 2500mAh
USB Cable 1	Nokia	CA-10W	Shenglan Technology Co., Ltd	1.0m shielded cable w/o core
USB Cable 2	Nokia	MICRO USB 5V2A	RongTaiFeng Technology Co.,Ltd	1.0m shielded cable w/o core
Earphone	Nokia	WH-108	OBO	1.5m shielded cable w/o core

## 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 -4.57dB at 2.594000MHz.
	Radiated Emission Test (30MHz ~ 1GHz)	PASS	Meets Class B Limit Minimum passing margin is -7.4dB at 401.51MHz
	Radiated Emission Test (Above 1GHz)	PASS	Meets Class B Limit Minimum passing margin is -11.03dB at 3260MHz

## 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
<b>Radiated emission test</b>	
1	GSM850 Idle+ Adapter 1+ Earphone+ USB cable 1+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ FM RX
2	GSM1900 Idle+ Adapter 2+ Earphone+ USB cable 2+ BT Idle+ WIFI Idle(2.4G)+ GLONESS Rx+ Front camera on
3	WCDMA B2 Idle+ Adapter 1+ Earphone+ USB cable 1+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Back camera on
4	WCDMA B4 Idle+ Adapter 2+ Earphone+ USB cable 2+ BT Idle+ WIFI Idle(2.4G)+GLONESS Rx+ MPG 4
5	WCDMA B5 Idle+ Adapter 1+ Earphone+ USB cable 1+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ FM RX
6	LTE B2 Idle+ Adapter 2+ Earphone+ USB cable 2+ BT Idle+ WIFI Idle(2.4G)+GLONESS Rx+ Front camera on
7	LTE B4 Idle+ Adapter 1+ Earphone+ USB cable 1+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Back camera on
8	LTE B5 Idle+ Adapter 2+ Earphone+ USB cable 2+ BT Idle+ WIFI Idle(2.4G)+GLONESS Rx+ MPG 4
9	LTE B7 Idle+ Adapter 1+ Earphone+ USB cable 1+ BT Idle+WIFI Idle(2.4G)+GPS Rx+FM RX
10	LTE B12 Idle+ Adapter 2+Earphone+ USB cable 2+ BT Idle+WIFI Idle(2.4G)+GLONESS Rx+ Front camera on
11	LTE B17 Idle+ Adapter 1+ Earphone+USB cable 1+ BT Idle+ WIFI Idle(2.4G)+GPS Rx+ Back camera on
12	USB Cable 1+USB Link+ Data Trasmission(PC to EUT)+Earphone+BT Idle+WIFI Idle(2.4G)+ GLONESS Rx
13	USB Cable 2+USB Link+ Data Trasmission(PC to SD)+Earphone+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx
<b>Conducted emission test</b>	
1	GSM850 Idle+ Adapter 1+ Earphone+ USB cable 1+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ FM RX
2	GSM1900 Idle+ Adapter 2+ Earphone+ USB cable 2+ BT Idle+ WIFI Idle(2.4G)+ GLONESS Rx+ Front camera on
3	WCDMA B2 Idle+ Adapter 1+ Earphone+ USB cable 1+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Back camera on
4	WCDMA B4 Idle+ Adapter 2+ Earphone+ USB cable 2+ BT Idle+ WIFI Idle(2.4G)+GLONESS Rx+ MPG 4
5	WCDMA B5 Idle+ Adapter 1+ Earphone+ USB cable 1+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ FM RX
6	LTE B2 Idle+ Adapter 2+ Earphone+ USB cable 2+ BT Idle+ WIFI Idle(2.4G)+GLONESS Rx+ Front camera on
7	LTE B4 Idle+ Adapter 1+ Earphone+USB cable 1+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx+ Back camera on
8	LTE B5 Idle+ Adapter 2+ Earphone+ USB cable 2+ BT Idle+ WIFI Idle(2.4G)+GLONESS Rx+



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	MPG 4
9	LTE B7 Idle+ Adapter 1+ Earphone+ USB cable 1+ BT Idle+WIFI Idle(2.4G)+GPS Rx+FM RX
10	LTE B12 Idle+ Adapter 2+Earphone+ USB cable 2+ BT Idle+WIFI Idle(2.4G)+GLONASS Rx+ Front camera on
11	LTE B17 Idle+ Adapter 1+ Earphone+USB cable 1+ BT Idle+ WIFI Idle(2.4G)+GPS Rx+ Back camera on
12	USB Cable 1+USB Link+ Data Trasmission(PC to EUT)+Earphone+BT Idle+WIFI Idle(2.4G)+ GLONASS Rx
13	USB Cable 2+USB Link+ Data Trasmission(PC to SD)+Earphone+ BT Idle+ WIFI Idle(2.4G)+ GPS Rx

**NOTE:**

1. For conducted emission test, test mode 3, 12 was the worst case and only this mode was presented in this report.
2. For radiated emission test, test mode 3, 12 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	GPS Simulator +Antenna	TOJOIN	GNSS-5000A	E1-010-010119	N/A
2	Wireless AP	ABOCOM	WR224GR	060500749P	N/A
3	FM signal generator	Rohde & Schwarz	SMB100A	109279	N/A
4	Printer	HP	Hp LaserJet 1300	CNSJF75989	N/A
5	Notebook	Lenovo	Thnikpad X520	SL10H14859JS	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A
2	N/A
3	N/A
4	N/A
5	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

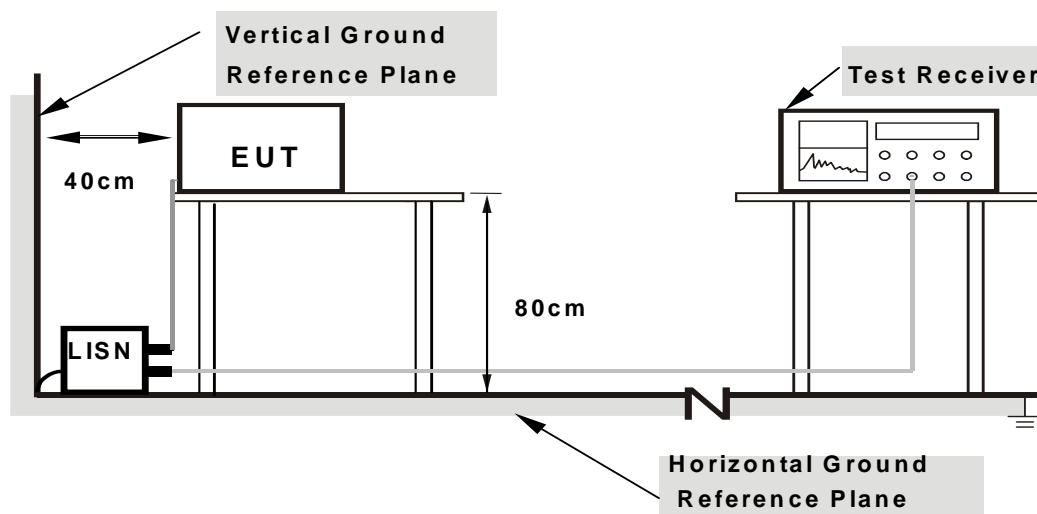
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling 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 cm 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

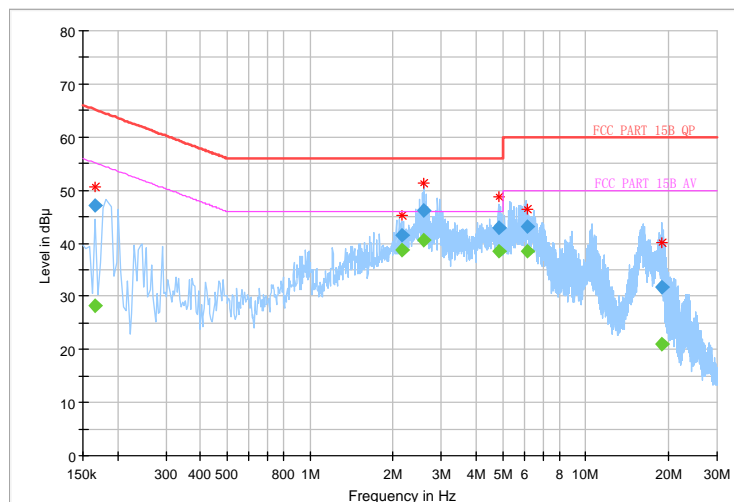
### Mode 3

<b>TEST VOLTAGE</b>	DC 5V From Adapter Input 120 Vac, 60 Hz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 50RH	<b>TESTED BY</b>	John Wen

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.166000	---	28.25	55.16	-26.91	L1	ON	9.7
0.166000	47.19	---	65.16	-17.97	L1	ON	9.7
2.146000	---	38.71	46.00	-7.29	L1	ON	9.7
2.146000	41.63	---	56.00	-14.37	L1	ON	9.7
2.592000	---	40.68	46.00	-5.32	L1	ON	9.7
2.592000	46.21	---	56.00	-9.79	L1	ON	9.7
4.828000	---	38.54	46.00	-7.46	L1	ON	9.7
4.828000	42.80	---	56.00	-13.20	L1	ON	9.7
6.128000	---	38.38	50.00	-11.62	L1	ON	9.8
6.128000	43.09	---	60.00	-16.91	L1	ON	9.8
18.956000	---	21.09	50.00	-28.91	L1	ON	9.9
18.956000	31.81	---	60.00	-28.19	L1	ON	9.9

- 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.

Full Spectrum

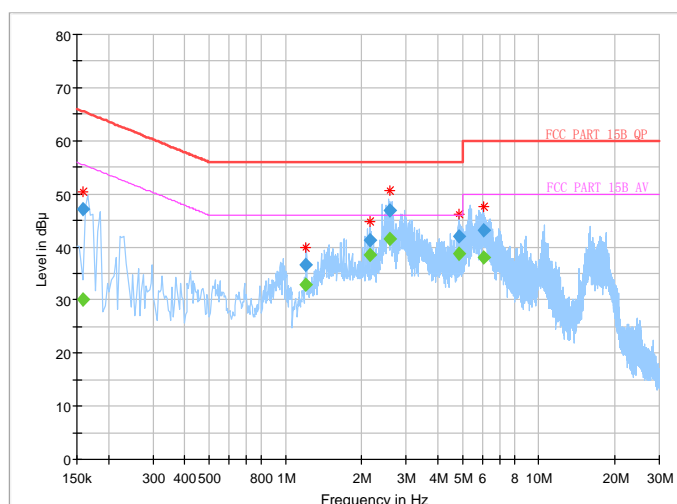


<b>TEST VOLTAGE</b>	DC 5V From Adapter Input 120 Vac, 60 Hz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 50RH	<b>TESTED BY</b>	John Wen

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.158000	---	30.00	55.57	-25.57	N	ON	10.1
0.158000	47.01	---	65.57	-18.56	N	ON	10.1
1.204000	---	32.99	46.00	-13.01	N	ON	9.9
1.204000	36.57	---	56.00	-19.43	N	ON	9.9
2.146000	---	38.45	46.00	-7.55	N	ON	9.8
2.146000	41.20	---	56.00	-14.80	N	ON	9.8
<b>2.594000</b>	---	<b>41.43</b>	<b>46.00</b>	<b>-4.57</b>	<b>N</b>	<b>ON</b>	<b>9.8</b>
2.594000	46.84	---	56.00	-9.16	N	ON	9.8
4.874000	---	38.77	46.00	-7.23	N	ON	9.8
4.874000	41.89	---	56.00	-14.11	N	ON	9.8
6.084000	---	37.97	50.00	-12.03	N	ON	9.8
6.084000	43.06	---	60.00	-16.94	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.

Full Spectrum



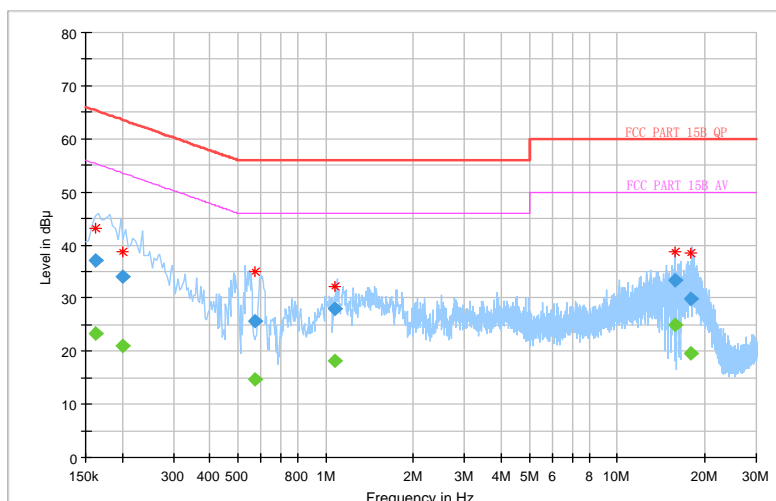
Mode 12

<b>TEST VOLTAGE</b>	Data trasmission Input 120 Vac, 60 Hz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 50RH	<b>TESTED BY</b>	John Wen

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.162000	---	23.39	55.36	-31.97	L1	ON	9.6
0.162000	37.08	---	65.36	-28.28	L1	ON	9.6
0.200000	---	21.08	53.61	-32.54	L1	ON	9.7
0.200000	34.08	---	63.61	-29.53	L1	ON	9.7
0.574000	---	14.67	46.00	-31.33	L1	ON	9.7
0.574000	25.66	---	56.00	-30.34	L1	ON	9.7
1.072000	---	18.12	46.00	-27.88	L1	ON	9.7
1.072000	28.01	---	56.00	-27.99	L1	ON	9.7
15.848000	---	24.84	50.00	-25.16	L1	ON	9.9
15.848000	33.39	---	60.00	-26.61	L1	ON	9.9
17.972000	---	19.48	50.00	-30.52	L1	ON	9.9
17.972000	29.80	---	60.00	-30.20	L1	ON	9.9

- 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.

Full Spectrum

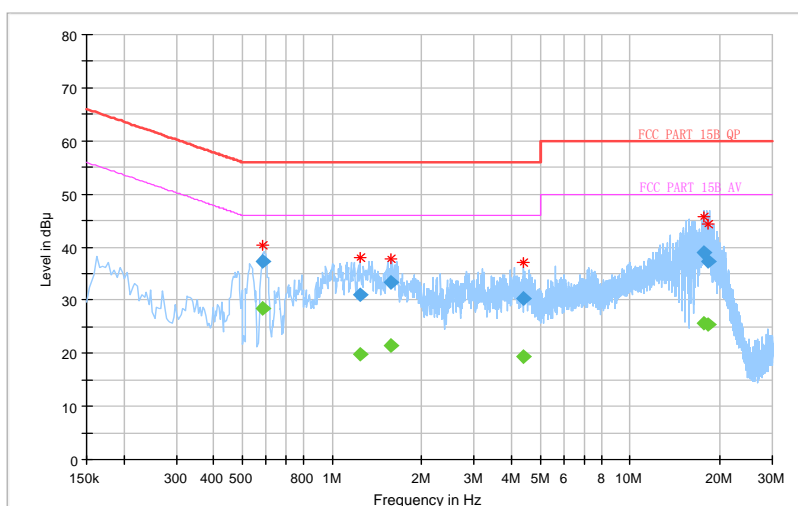


<b>TEST VOLTAGE</b>	Data trasmission Input 120 Vac, 60 Hz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 50RH	<b>TESTED BY</b>	John Wen

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
<b>0.588000</b>	---	<b>28.51</b>	<b>46.00</b>	<b>-17.49</b>	<b>N</b>	<b>ON</b>	<b>10.1</b>
0.588000	37.30	---	56.00	-18.70	N	ON	10.1
1.248000	---	19.86	46.00	-26.14	N	ON	9.9
1.248000	30.93	---	56.00	-25.07	N	ON	9.9
1.568000	---	21.41	46.00	-24.59	N	ON	9.9
1.568000	33.35	---	56.00	-22.65	N	ON	9.9
4.372000	---	19.33	46.00	-26.67	N	ON	9.8
4.372000	30.24	---	56.00	-25.76	N	ON	9.8
17.592000	---	25.77	50.00	-24.23	N	ON	10.0
17.592000	39.02	---	60.00	-20.98	N	ON	10.0
18.368000	---	25.47	50.00	-24.53	N	ON	10.0
18.368000	37.31	---	60.00	-22.69	N	ON	10.0

- 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.

Full Spectrum



## 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	Avg: 43.5	Not defined	Not defined
3000+	Peak: 69.5	Peak: 63.5	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	5 <sup>th</sup> 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

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

**<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:**

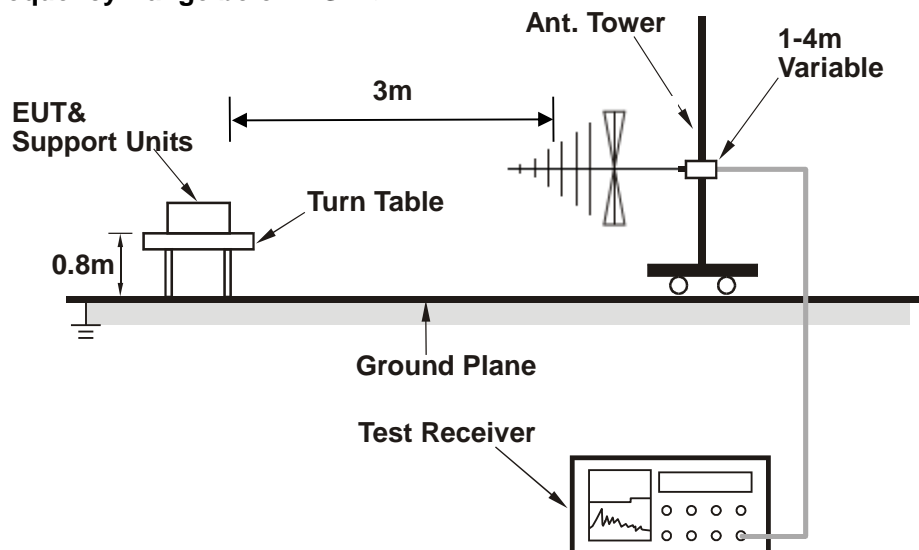
1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test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

**2.2.4. DEVIATION FROM TEST STANDARD**

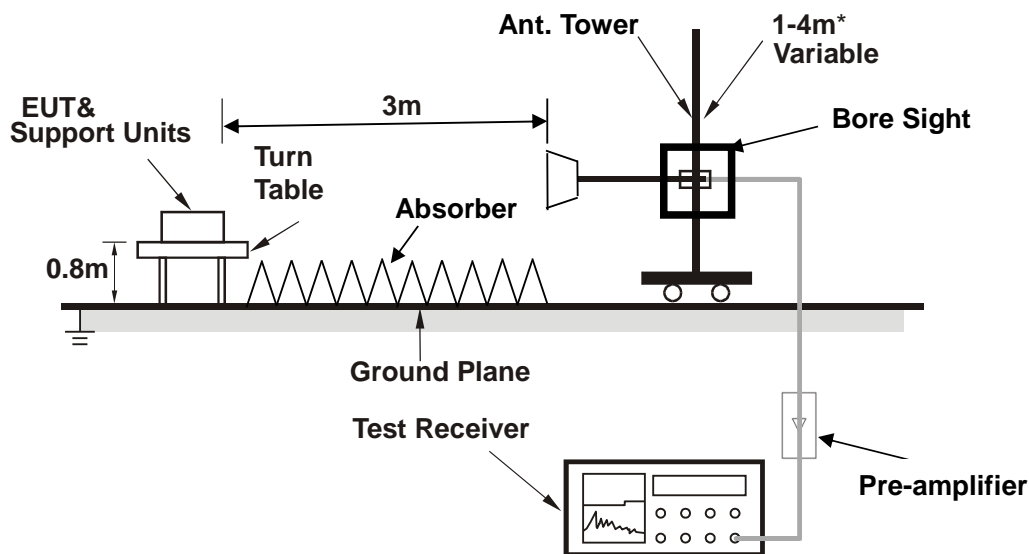
No deviation.

## 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.

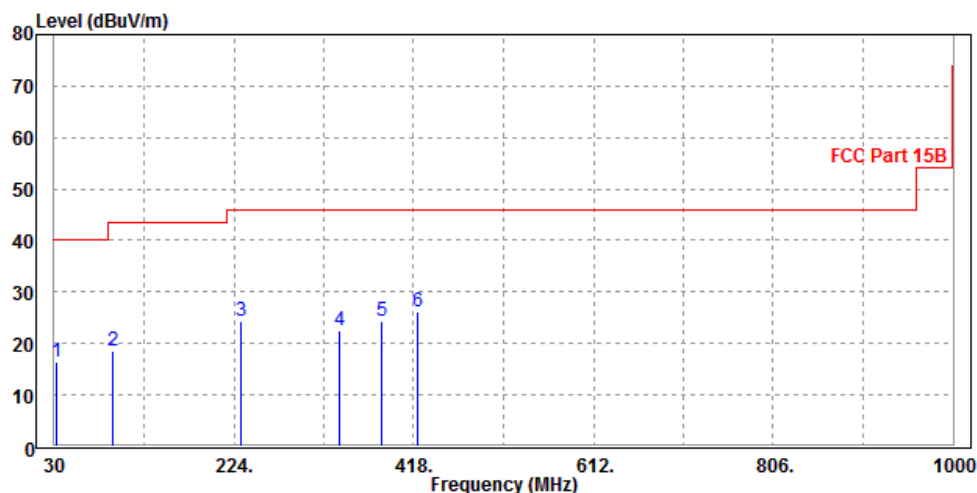
## 2.2.7. TEST RESULTS

### Mode 3

<b>TEST VOLTAGE</b>	DC 5V From Adapter Input 120 Vac, 60 Hz	<b>FREQUENCY RANGE</b>	30-1000 MHz
<b>ENVIRONMENTAL CONDITIONS</b>	23deg. C, 70 %RH	<b>DETECTOR FUNCTION &amp; RESOLUTION BANDWIDTH</b>	Quasi-Peak, 120 kHz
<b>TESTED BY</b>	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
31.94	16.56	37.39	40	-23.44	15.91	0.8	37.54	120	138	QP
93.05	18.41	45.5	43.5	-25.09	8.64	1.29	37.02	145	265	QP
231.76	24.43	47.08	46	-21.57	11.93	1.95	36.53	113	248	QP
338.46	22.52	41.66	46	-23.48	15.07	2.37	36.58	174	298	QP
384.05	24.32	41.88	46	-21.68	16.57	2.55	36.68	156	267	QP
422.85	26.26	43.02	46	-19.74	17.31	2.7	36.77	100	280	QP

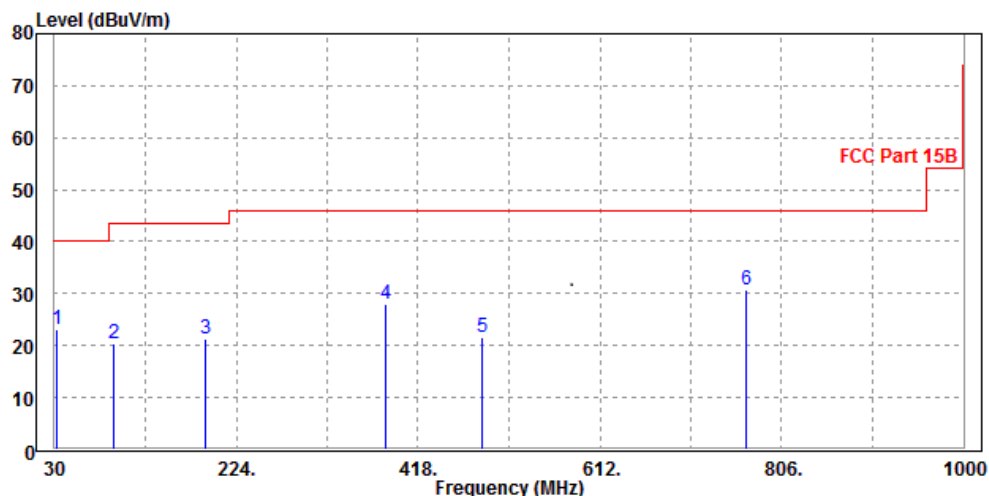
- REMARKS:**
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
  2. Negative sign (-) in the margin column signify levels below the limit.
  3. Frequency range scanned: 30MHz to 1000MHz.
 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



<b>TEST VOLTAGE</b>	DC 5V From Adapter Input 120 Vac, 60 Hz	<b>FREQUENCY RANGE</b>	30-1000 MHz
<b>ENVIRONMENTAL CONDITIONS</b>	23deg. C, 70 %RH	<b>DETECTOR FUNCTION &amp; RESOLUTION BANDWIDTH</b>	Quasi-Peak, 120 kHz
<b>TESTED BY</b>	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
31.94	23.11	43.94	40	-16.89	15.91	0.8	37.54	190	240	QP
93.05	20.5	47.59	43.5	-23	8.64	1.29	37.02	114	180	QP
191.02	21.34	45.82	43.5	-22.16	10.38	1.75	36.61	155	209	QP
384.05	28.06	45.62	46	-17.94	16.57	2.55	36.68	100	293	QP
486.87	21.71	37.82	46	-24.29	17.88	2.94	36.93	200	178	QP
<b>768.17</b>	<b>30.69</b>	<b>41.55</b>	<b>46</b>	<b>-15.31</b>	<b>22.9</b>	<b>3.78</b>	<b>37.54</b>	<b>144</b>	<b>249</b>	<b>QP</b>

- 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.

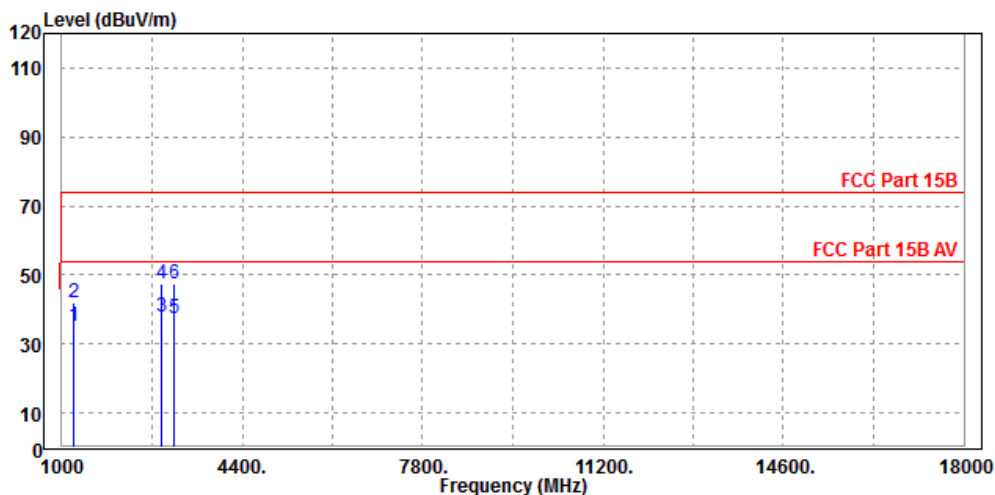


<b>TEST VOLTAGE</b>	DC 5V From Adapter Input 120 Vac, 60 Hz	<b>FREQUENCY RANGE</b>	1-18 GHz
<b>ENVIRONMENTAL CONDITIONS</b>	23deg. C, 70 %RH	<b>DETECTOR FUNCTION &amp; RESOLUTION BANDWIDTH</b>	Peak/Average, 1 MHz
<b>TESTED BY</b>	Rose Ma		

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
1235	35.09	48.78	54	-18.91	28.97	5.7	48.36	100	135	Average
1235	41.94	55.63	74	-32.06	28.97	5.7	48.36	100	135	Peak
2864	37.98	44.56	54	-16.02	32.76	8.98	48.32	124	140	Average
2864	47.43	54.01	74	-26.57	32.76	8.98	48.32	124	140	Peak
3126	37.55	43.57	54	-16.45	32.93	9.4	48.35	120	260	Average
3126	47.25	53.27	74	-26.75	32.93	9.4	48.35	120	260	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.

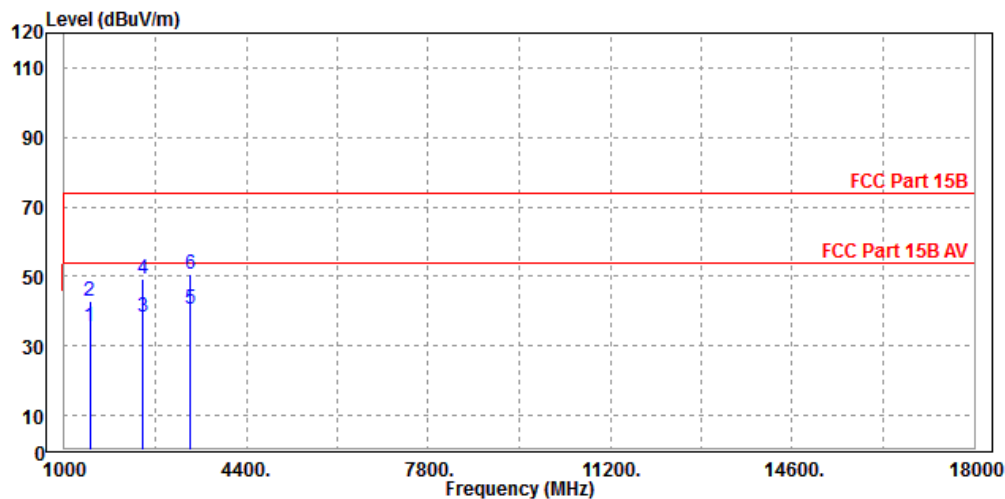


TEST VOLTAGE	DC 5V From Adapter Input 120 Vac, 60 Hz	FREQUENCY RANGE	1-18 GHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70 %RH	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Peak/Average, 1 MHz
TESTED BY	Rose Ma		

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
1474	35.74	49.11	54	-18.26	28.73	6.26	48.36	105	156	Average
1474	42.96	56.33	74	-31.04	28.73	6.26	48.36	105	156	Peak
2456	38.19	45.86	54	-15.81	32.36	8.27	48.3	103	252	Average
2456	49.36	57.03	74	-24.64	32.36	8.27	48.3	103	252	Peak
<b>3360</b>	<b>40.76</b>	<b>46.44</b>	<b>54</b>	<b>-13.24</b>	<b>32.97</b>	<b>9.74</b>	<b>48.39</b>	<b>100</b>	<b>88</b>	<b>Average</b>
3360	50.57	56.25	74	-23.43	32.97	9.74	48.39	100	88	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.

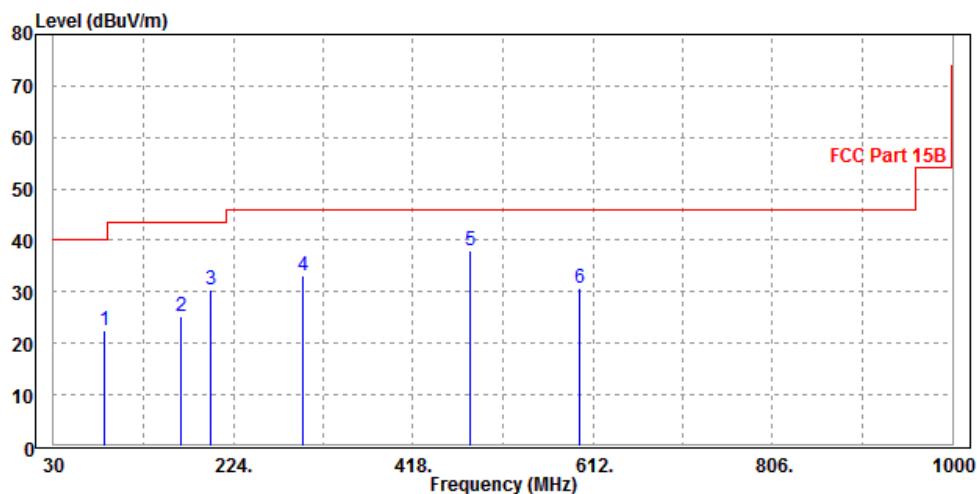


**Mode 12**

<b>TEST VOLTAGE</b>	Data trasmission Input 120 Vac, 60 Hz	<b>FREQUENCY RANGE</b>	30-1000 MHz
<b>ENVIRONMENTAL CONDITIONS</b>	23deg. C, 70 %RH	<b>DETECTOR FUNCTION &amp; RESOLUTION BANDWIDTH</b>	Quasi-Peak, 120 kHz
<b>TESTED BY</b>	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
84.32	22.52	50.22	40	-17.48	8.17	1.23	37.1	114	127	QP
167.74	25.26	49.89	43.5	-18.24	10.41	1.68	36.72	180	260	QP
199.75	30.32	54.48	43.5	-13.18	10.59	1.79	36.54	178	266	QP
298.69	33.2	53.72	46	-12.8	13.77	2.21	36.5	100	320	QP
480.08	38	54.17	46	-8	17.82	2.92	36.91	136	298	QP
597.45	30.68	44.81	46	-15.32	19.95	3.16	37.24	100	210	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.

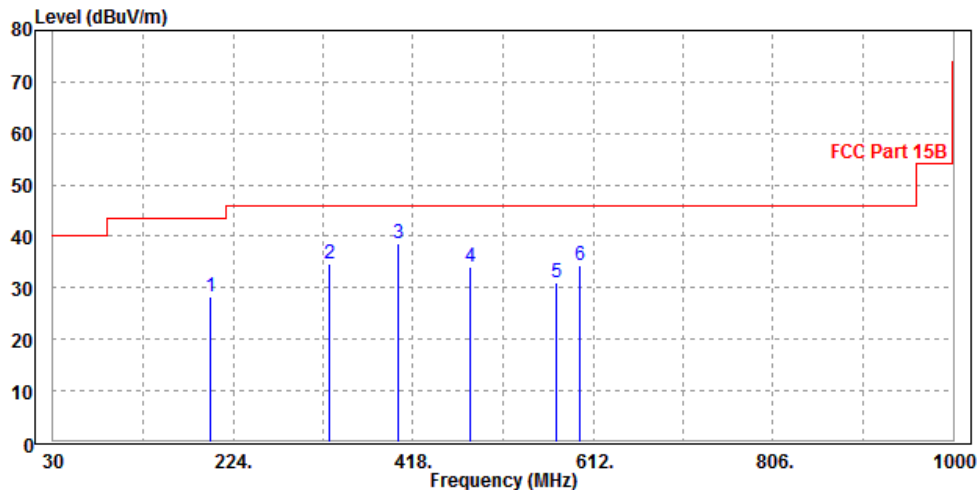


<b>TEST VOLTAGE</b>	Data trasmission Input 120 Vac, 60 Hz	<b>FREQUENCY RANGE</b>	30-1000 MHz
<b>ENVIRONMENTAL CONDITIONS</b>	23deg. C, 70 %RH	<b>DETECTOR FUNCTION &amp; RESOLUTION BANDWIDTH</b>	Quasi-Peak, 120 kHz
<b>TESTED BY</b>	Rose Ma		

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
199.75	28.28	52.44	43.5	-15.22	10.59	1.79	36.54	200	200	QP
327.79	34.76	54.28	46	-11.24	14.72	2.32	36.56	200	190	QP
<b>401.51</b>	<b>38.6</b>	<b>55.58</b>	<b>46</b>	<b>-7.4</b>	<b>17.11</b>	<b>2.63</b>	<b>36.72</b>	<b>100</b>	<b>150</b>	<b>QP</b>
480.08	34.12	50.29	46	-11.88	17.82	2.92	36.91	120	146	QP
572.23	31.1	45.72	46	-14.9	19.44	3.11	37.17	130	232	QP
597.45	34.3	48.43	46	-11.7	19.95	3.16	37.24	200	187	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.

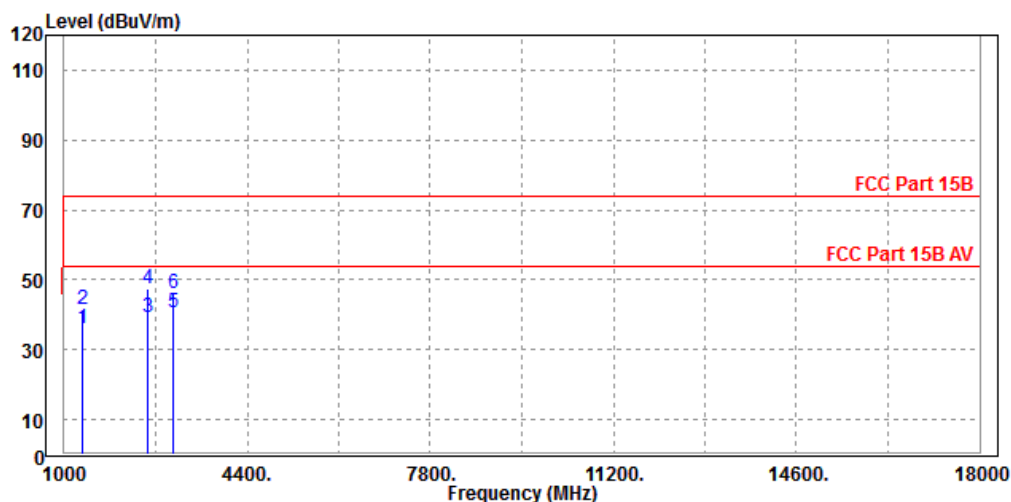


<b>TEST VOLTAGE</b>	Data trasmission Input 120 Vac, 60 Hz	<b>FREQUENCY RANGE</b>	1-18 GHz
<b>ENVIRONMENTAL CONDITIONS</b>	23deg. C, 70 %RH	<b>DETECTOR FUNCTION &amp; RESOLUTION BANDWIDTH</b>	Peak/Average, 1 MHz
<b>TESTED BY</b>	Rose Ma		

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
1335	36.1	49.66	54	-17.9	28.87	5.93	48.36	100	156	Average
1335	41.32	54.88	74	-32.68	28.87	5.93	48.36	100	156	Peak
2550	39.31	46.72	54	-14.69	32.45	8.44	48.3	120	280	Average
2550	47.67	55.08	74	-26.33	32.45	8.44	48.3	120	280	Peak
3020	40.79	46.98	54	-13.21	32.9	9.24	48.33	102	286	Average
3020	45.97	52.16	74	-28.03	32.9	9.24	48.33	102	286	Peak

**REMARKS:**

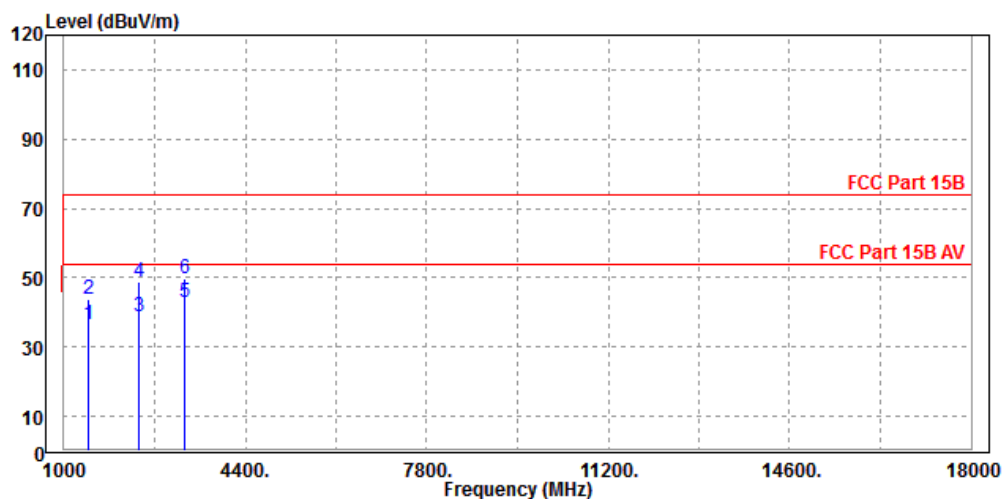
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 30MHz to 1000MHz.
4. Only emissions significantly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



<b>TEST VOLTAGE</b>	Data trasmission Input 120 Vac, 60 Hz	<b>FREQUENCY RANGE</b>	1-18 GHz
<b>ENVIRONMENTAL CONDITIONS</b>	23deg. C, 70 %RH	<b>DETECTOR FUNCTION &amp; RESOLUTION BANDWIDTH</b>	Peak/Average, 1 MHz
<b>TESTED BY</b>	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
1450	36.65	50.06	54	-17.35	28.75	6.2	48.36	100	170	Average
1450	44	57.41	74	-30	28.75	6.2	48.36	100	170	Peak
2398	38.93	46.77	54	-15.07	32.3	8.17	48.31	100	140	Average
2398	48.62	56.46	74	-25.38	32.3	8.17	48.31	100	140	Peak
<b>3260</b>	<b>42.97</b>	<b>48.8</b>	<b>54</b>	<b>-11.03</b>	<b>32.95</b>	<b>9.59</b>	<b>48.37</b>	<b>100</b>	<b>289</b>	<b>Average</b>
3260	49.66	55.49	74	-24.34	32.95	9.59	48.37	100	289	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 Report No.: FV180928W004

### **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---**