

## 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:	Multi-band GSM/WCDMA/LTE phone with Bluetooth&WLAN
Brand Name:	NOKIA
Model Name:	TA-1404
FCC ID:	2AJOTTA-1404
Date of tests:	Nov. 25, 2021 ~ Dec. 12, 2021

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
  Date: Dec. 13, 2021	  Date: Dec. 13, 2021

This report is governed by, and incorporates by reference, CPS Conditions of Service as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

# TABLE OF CONTENTS

<b>RELEASE CONTROL RECORD .....</b>	<b>3</b>
<b>1 GENERAL INFORMATION.....</b>	<b>4</b>
1.1 GENERAL DESCRIPTION OF EUT.....	4
1.2 SUMMARY OF TEST RESULTS.....	6
1.3 MEASUREMENT UNCERTAINTY .....	6
1.4 DESCRIPTION OF TEST MODES.....	7
1.5 DESCRIPTION OF SUPPORT UNITS.....	9
<b>2 EMISSION TEST .....</b>	<b>10</b>
2.1 CONDUCTED EMISSION MEASUREMENT.....	10
2.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT.....	10
2.1.2 TEST INSTRUMENTS.....	10
2.1.3 TEST PROCEDURES .....	11
2.1.4 DEVIATION FROM TEST STANDARD .....	11
2.1.5 TEST SETUP.....	12
2.1.6 EUT OPERATING CONDITIONS.....	12
2.1.7 TEST RESULTS .....	13
2.2 RADIATED EMISSION MEASUREMENT.....	15
2.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT .....	15
2.2.2 TEST INSTRUMENTS.....	16
2.2.3 TEST PROCEDURE.....	17
2.2.4 DEVIATION FROM TEST STANDARD .....	18
2.2.5 TEST SETUP.....	19
2.2.6 EUT OPERATING CONDITIONS.....	19
2.2.7 TEST RESULTS .....	20
<b>3 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB .....</b>	<b>24</b>



**BUREAU**  
**VERITAS**

Test Report No.: W7L-P21100018-1EM01

## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
W7L-P21100018-1EM01	Original release	Dec. 13, 2021



# 1 GENERAL INFORMATION

## 1.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Multi-band GSM/WCDMA/LTE phone with Bluetooth&WLAN	
<b>BRAND NAME</b>	NOKIA	
<b>MODEL NAME</b>	TA-1404	
<b>NOMINAL VOLTAGE</b>	5.0/9.0/12.0Vdc(adapter or host equipment) 3.85Vdc (Li-ion, battery)	
<b>MODULATION TYPE</b>	<b>BT_LE</b>	GFSK
	<b>Bluetooth</b>	GFSK, $\pi/4$ -DQPSK, 8DPSK
	<b>FM</b>	FM
	<b>WLAN</b>	DSSS, OFDM
	<b>GNSS</b>	BPSK
	<b>GSM/GPRS/EDGE</b>	GMSK, 8PSK
	<b>WCDMA</b>	QPSK
	<b>LTE</b>	QPSK/16QAM/64QAM
<b>OPERATING FREQUENCY OPERATING FREQUENCY</b>	<b>Bluetooth/BT_LE</b>	2402MHz ~ 2480MHz
	<b>FM</b>	87.5MHz ~ 108MHz
	<b>WLAN</b>	2412 ~ 2472MHz for 11b/g/n(HT20)/n(HT40) 5180 ~ 5240MHz, 5260 ~ 5320 MHz, 5500 ~ 5700MHz, 5745 ~ 5825 MHz for 11a/ n(HT20)/ n(HT40) / ac(VHT20)/ ac(VHT40) / ac(VHT80)
	<b>GPS/BDS/ GALILEO</b>	1559MHz ~ 1610MHz
	<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) 779.5MHz ~ 748.5MHz (FOR LTE Band13) 706.5MHz ~ 713.5MHz (FOR LTE Band17) 1710.7MHz ~ 1779.3MHz (FOR LTE Band66)

BUREAU  
VERITAS

Test Report No.: W7L-P21100018-1EM01

<b>HW VERSION</b>	19655-1-11M12
<b>SW VERSION</b>	00WW_0_010
<b>I/O PORTS</b>	Refer to user's manual
<b>CABLE SUPPLIED</b>	USB1 cable: unshielded without ferrite, 1.0meter USB2 cable: unshielded without ferrite, 1.0meter USB3 cable: unshielded without ferrite, 1.0meter Earphone1: non-shielded cable, with w/o ferrite core, 1.2 meter Earphone2: non-shielded cable, with w/o ferrite core, 1.2 meter
<b>ACCESSORY DEVICES</b>	Refer to note as below

**NOTE:**

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

**List of Accessory:**

ACCESSORIES	BRAND	MANUFACTURER	MODEL	SPECIFICATION
Battery	Nokia	Hunan Gaoyuan Battery Co., Ltd.	WT341	Capacity: 3.85 Vdc, 4900mAh
AC Adapter 1	Nokia	ShenZhenBaiJunDa ElectronicCO.,LTD.	AD-010U	I/P: 100-240Vac, 0.35A, O/P: 5.0Vdc, 2.0A
AC Adapter 2	Nokia	SHENZHEN TIANYIN ELECTRONICS CO., LTD.	CH-21U	I/P: 100-240Vac, 0.3A, O/P: 5.0Vdc, 2.0A
AC Adapter 3	Nokia	YuTong Electronics(HuiZhou) Co.,Ltd	PA-US5V2A-03 6	I/P: 100-240Vac, 0.5A, O/P: 5.0Vdc, 2.0A
AC Adapter 4	Nokia	Dongguan Aohai Technology Co., Ltd.	A829US	I/P: 100 - 240Vac, 0.5A, O/P:5.0 Vdc,3A/9.0 Vdc, 2.2 3A/12.0 Vdc,1.67A
Earphone 1	Nokia	NEW LEADER INDUSTRY CO.,LTD	HS-34	Signal Line, 1.2meter
Earphone 2	Nokia	Guangdong Wivtak Technology Co., Ltd.	HS-34	Signal Line, 1.2meter
USB Cable 1	Nokia	HUIZHOU WASHIN ELECTRONICS CO.,LTD	CB-36A	Signal Line, 1.0meter
USB Cable 2	Nokia	Shenzhen BRL Technology Co.,Ltd.	CB-36A	Signal Line, 1.0meter
USB Cable 3	Nokia	Saibao(Jiangi) Communication Industial Co.,Ltd	CB-12A	Signal Line, 1.0meter



**BUREAU VERITAS** Test Report No.: W7L-P21100018-1EM01  
**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

## 1.2 MEASUREMENT UNCERTAINTY

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

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

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



### 1.3 DESCRIPTION OF TEST MODES

Test Mode	Test Condition
<b>Radiated emission test</b>	
1	GSM850 Idle + Adapter1 + SIM1 + USB cable 1 + Earphone1 + BT Idle + WIFI Idle + Front Camera On
2	GSM1900 Idle + Adapter2 + SIM2 + USB cable 2 + Earphone2 + BT Idle + WIFI Idle + Back Camera On
3	WCDMA B2 Idle + Adapter3 + SIM1 + USB cable 2 + Earphone2 + BT Idle + WIFI Idle + Front Camera On
4	WCDMA B4 Idle + Adapter4 + SIM2 + USB cable 3 + Earphone1 + BT Idle + WIFI Idle + Back Camera On
5	WCDMA B5 Idle + Adapter1 + SIM1 + USB cable 1 + Earphone1 + BT Idle + WIFI Idle
6	LTE B2 Idle + Adapter2 + SIM2 + USB cable 2 + Earphone2 + BT Idle + WIFI Idle
7	LTE B4 Idle + Adapter3 + SIM1 + USB cable 2 + Earphone2 + BT Idle + WIFI Idle
8	LTE B5 Idle + Adapter4 + SIM1 + USB cable 3 + Earphone1 + BT Idle + WIFI Idle+ MPG4
9	LTE B7 Idle + Adapter1 + SIM2 + USB cable 2 + Earphone1 + BT Idle + WIFI Idle+ Front Camera On
10	LTE B12 Idle + USB Link + Data Transmission + SIM2 + BT Idle + WIFI Idle+ EUT to Notebook + USB cable 2 + Earphone2
11	LTE B13 Idle + USB Link + Data Transmission + SIM1 + BT Idle + WIFI Idle+ Notebook to EUT+ USB cable 1 + Earphone1
12	LTE B17 Idle + USB Link + Data Transmission + SIM2 + BT Idle + WIFI Idle+ SD to Notebook + USB cable 3 + Earphone2
13	LTE B66 Idle + USB Link + Data Transmission + SIM1 + BT Idle + WIFI Idle+ Notebook to SD + USB cable 1 + Earphone1

<b>Conducted emission test</b>	
1	GSM850 Idle + Adapter1 + SIM1 + USB cable 1 + Earphone1 + BT Idle + WIFI Idle + Front Camera On
2	GSM1900 Idle + Adapter2 + SIM2 + USB cable 2 + Earphone2 + BT Idle + WIFI Idle + Back Camera On
3	WCDMA B2 Idle + Adapter3 + SIM1 + USB cable 2 + Earphone2 + BT Idle + WIFI Idle + Front Camera On
4	WCDMA B4 Idle + Adapter4 + SIM2 + USB cable 3 + Earphone1 + BT Idle + WIFI Idle + Back Camera On
5	WCDMA B5 Idle + Adapter1 + SIM1 + USB cable 1 + Earphone1 + BT Idle + WIFI Idle
6	LTE B2 Idle + Adapter2 + SIM2 + USB cable 2 + Earphone2 + BT Idle + WIFI Idle
7	LTE B4 Idle + Adapter3 + SIM1 + USB cable 2 + Earphone2 + BT Idle + WIFI Idle
8	LTE B5 Idle + Adapter4 + SIM1 + USB cable 3 + Earphone1 + BT Idle + WIFI Idle+ MPG4
9	LTE B7 Idle + Adapter1 + SIM2 + USB cable 2 + Earphone1 + BT Idle + WIFI Idle+ Front Camera On
10	LTE B12 Idle + USB Link + Data Transmission + SIM2 + BT Idle + WIFI Idle+ EUT to Notebook + USB cable 2 + Earphone2



BUREAU  
VERITAS

**Test Report No.: W7L-P21100018-1EM01**

11	LTE B13 Idle + USB Link + Data Transmission + SIM1 + BT Idle + WIFI Idle+ Notebook to EUT+ USB cable 1 + Earphone1
12	LTE B17 Idle + USB Link + Data Transmission + SIM2 + BT Idle + WIFI Idle+ SD to Notebook + USB cable 3 + Earphone2
13	LTE B66 Idle + USB Link + Data Transmission + SIM1 + BT Idle + WIFI Idle+ Notebook to SD + USB cable 1 + Earphone1

**NOTE:**

1. For conducted emission test, Pre-scan all mode, mode 3 was the worst case and only this mode was presented in this report.
2. For radiated emission test, Pre-scan all mode, test mode 10 was the worst case and only this mode was presented in this report



## 1.4 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	Thnikpad L440	R90FTFKP	N/A
4	Micro SD	SAM SUNG	N/A	N/A	N/A
6	FM signal generator	Rohde&Schwarz	SMB 100A	109279	N/A
7	GPS Simulator+Antenna	TOJOIN	GNSS-5000A	E1-010-010119	N/A
8	Universal radio communication tester	Rohde&Schwarz	CMW500	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	USB Line: Shielded, Detachable 1m;
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 a CLASS B)**

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

**TEST STANDARD: FCC Part 15, Subpart B (Section: 15.107 b CLASS A)**

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

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

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

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

#### 2.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR3	101900	Mar. 03,21	Mar. 02, 22
EMC32 test software	Rohde&Schwarz	EMC32	NA	NA	NA
LISN network	Rohde&Schwarz	ENV216	101922	Feb. 25,21	Feb. 24, 22

**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.

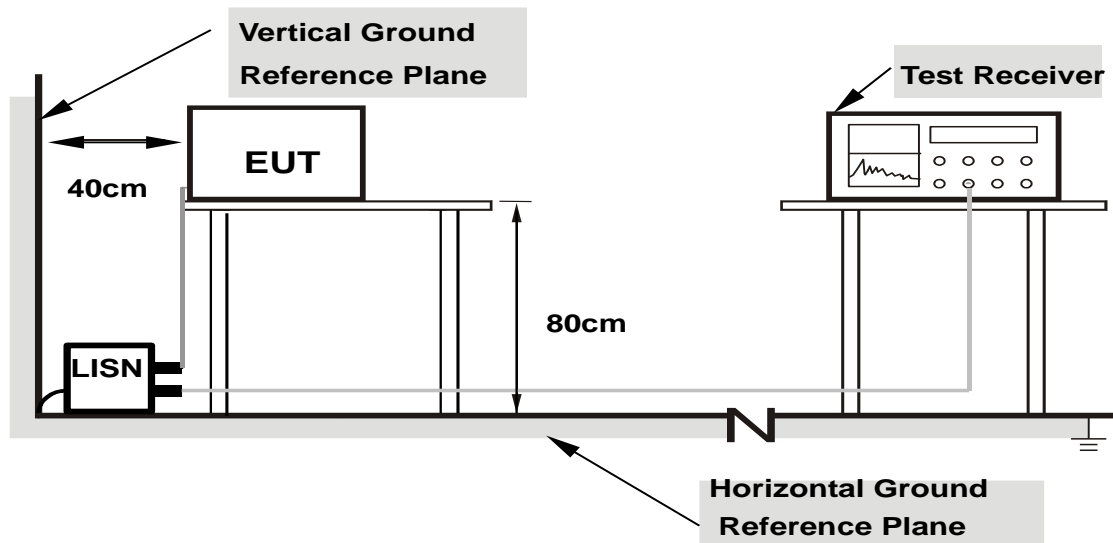
**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

### 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.



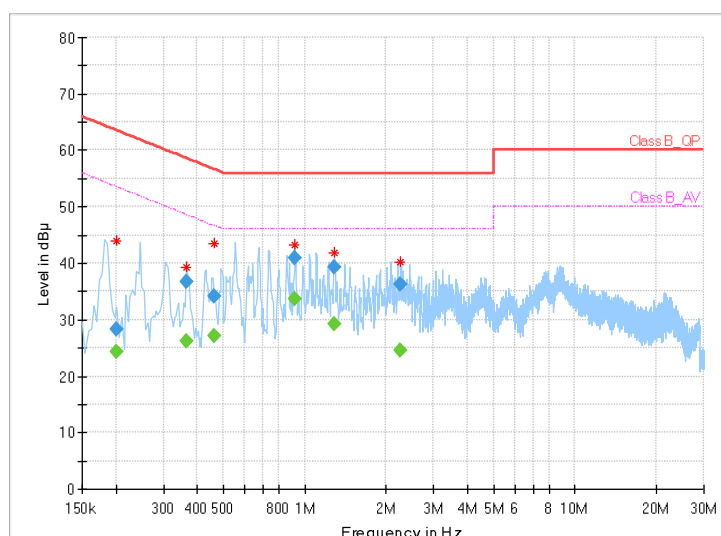
## 2.1.7 TEST RESULTS

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

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.200000	---	24.31	53.61	29.30	L1	ON	9.7
0.200000	28.40	---	63.61	35.21	L1	ON	9.7
0.364000	---	26.21	48.64	22.43	L1	ON	9.7
0.364000	36.76	---	58.64	21.88	L1	ON	9.7
0.460000	---	27.14	46.69	19.55	L1	ON	9.7
0.460000	34.19	---	56.69	22.50	L1	ON	9.7
0.920000	---	33.69	46.00	12.31	L1	ON	9.7
0.920000	41.05	---	56.00	14.95	L1	ON	9.7
1.288000	---	29.18	46.00	16.82	L1	ON	9.7
1.288000	39.38	---	56.00	16.62	L1	ON	9.7
2.264000	---	24.52	46.00	21.48	L1	ON	9.7
2.264000	36.32	---	56.00	19.68	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 = Limit value - Emission level
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.

Full Spectrum

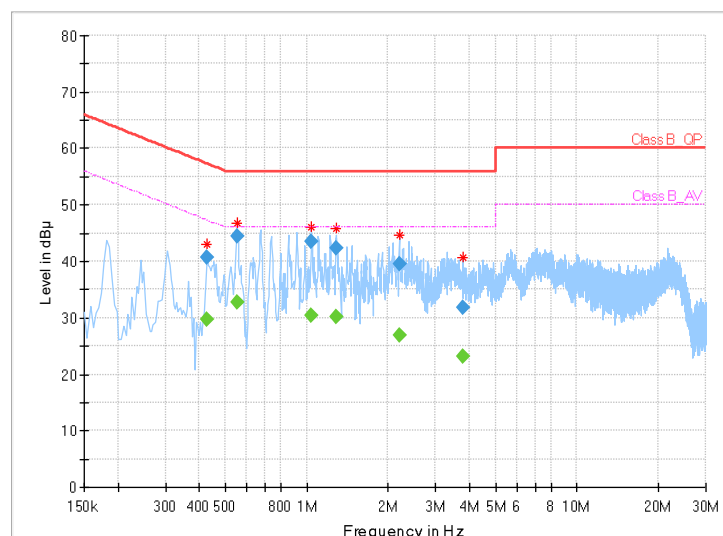


<b>TEST VOLTAGE</b>	Input 120 Vac, 60 Hz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	26deg. C, 51%RH	<b>TESTED BY</b>	Carl xie

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.428000	---	29.79	47.29	17.50	N	ON	9.7
0.428000	40.72	---	57.29	16.57	N	ON	9.7
0.552000	---	32.82	46.00	13.18	N	ON	9.7
0.552000	44.43	---	56.00	11.57	N	ON	9.7
1.040000	---	30.51	46.00	15.49	N	ON	9.8
1.040000	43.53	---	56.00	12.47	N	ON	9.8
1.288000	---	30.07	46.00	15.93	N	ON	9.8
1.288000	42.45	---	56.00	13.55	N	ON	9.8
2.200000	---	26.82	46.00	19.18	N	ON	9.8
2.200000	39.46	---	56.00	16.54	N	ON	9.8
3.796000	---	23.23	46.00	22.77	N	ON	9.8
3.796000	31.71	---	56.00	24.29	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 = Limit value - Emission level
  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 3 meters (dB $\mu$ V/m)		
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, 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 <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 (dB $\mu$ V/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	May. 19,20	May. 18,23
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Mar. 05,21	Mar. 04,22
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Apr. 22,21	Apr. 21,22
Signal Pre-Amplifier	EMSI	EMC 9135	980249	Jun. 02,21	Jun. 01,22
Test Software	ADT	ADT_Radiated_V8.7.07	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	May. 19,20	May. 18,23
Horn Antenna	ETS-LINDGREN	3117	00168728	May. 19,20	May. 18,23
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Apr. 22,21	Apr. 21,22
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	Jun. 03,21	Jun. 02,22

**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 10 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:

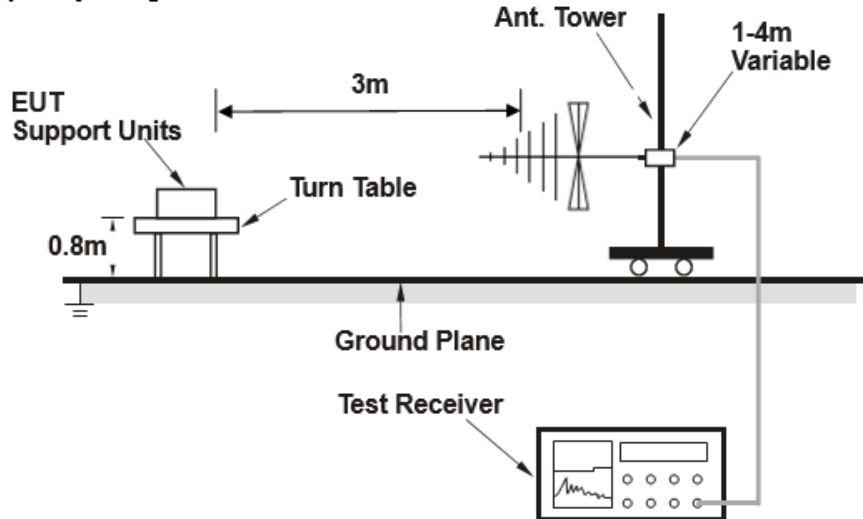
- The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test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

## 2.2.4 DEVIATION FROM TEST STANDARD

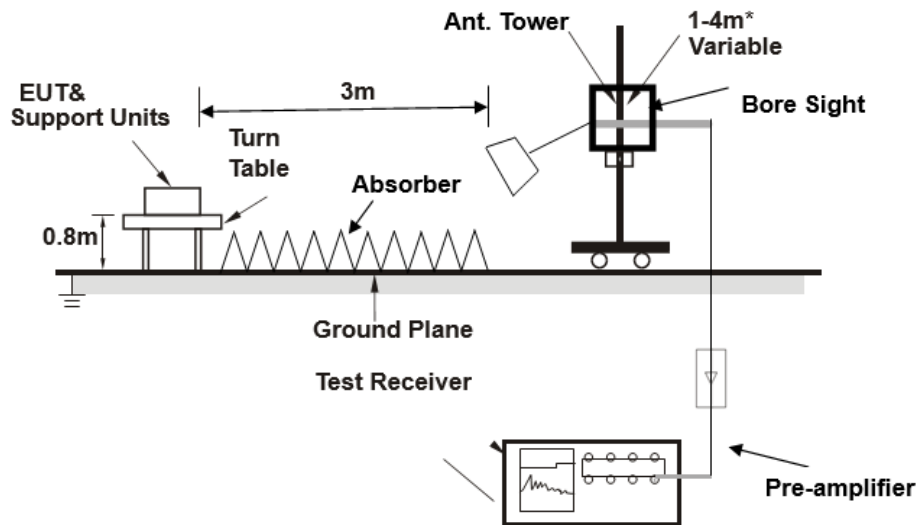
No deviation.

## 2.2.5 TEST SETUP

### <Frequency Range below 1GHz>



### <Frequency Range above 1GHz>



**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.



**BUREAU VERITAS** Test Report No.: W7L-P21100018-1EM01  
**2.2.7 TEST RESULTS**

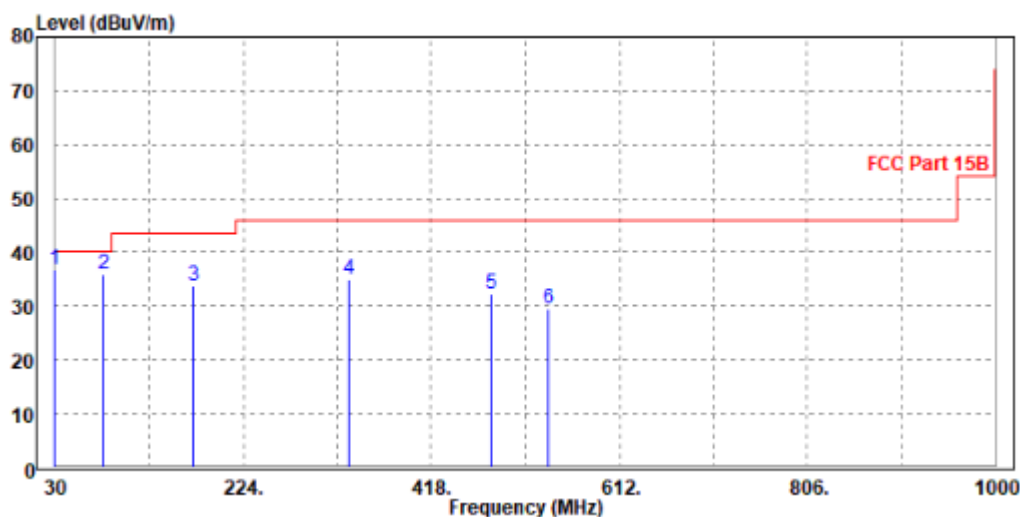
Acceleromete alternative worst case:

<b>TEST VOLTAGE</b>	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>	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 PP	30.000	36.82	53.51	40.00	-3.18	-16.69	Peak	Horizontal
2	79.470	35.98	64.94	40.00	-4.02	-28.96	Peak	Horizontal
3	172.590	33.88	59.40	43.50	-9.62	-25.52	Peak	Horizontal
4	332.640	34.88	55.75	46.00	-11.12	-20.87	Peak	Horizontal
5	480.080	32.25	49.69	46.00	-13.75	-17.44	Peak	Horizontal
6	538.280	29.40	45.79	46.00	-16.60	-16.39	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.

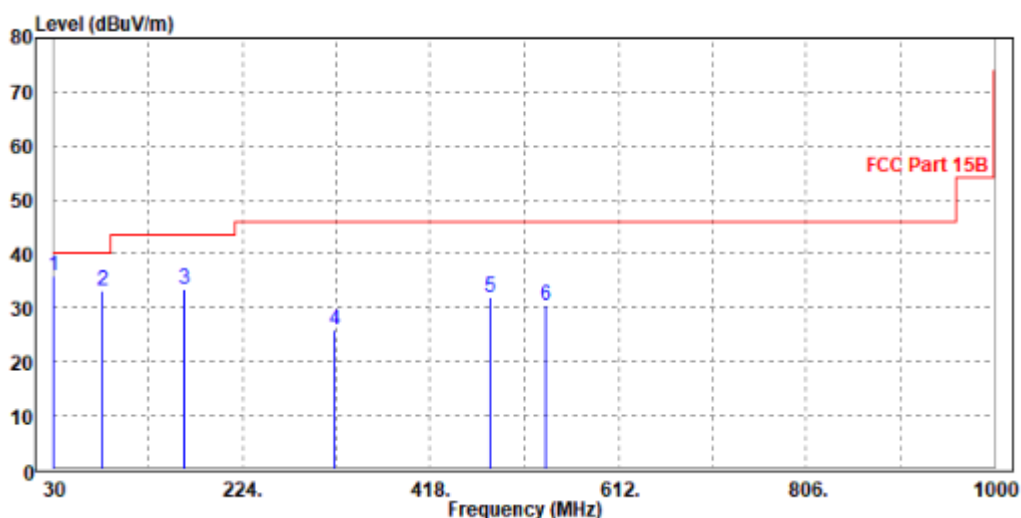


TEST VOLTAGE	Input 120 Vac, 60 Hz	FREQUENCY RANGE	30-1000 MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70% RH	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Quasi-Peak , 120 kHz
TESTED BY	Jace Hu		

**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 PP	30.000	35.86	52.65	40.00	-4.14	-16.79	Peak	Vertical
2	79.470	33.25	61.82	40.00	-6.75	-28.57	Peak	Vertical
3	164.830	33.39	58.21	43.50	-10.11	-24.82	Peak	Vertical
4	320.030	25.73	46.12	46.00	-20.27	-20.39	Peak	Vertical
5	480.080	31.83	48.89	46.00	-14.17	-17.06	Peak	Vertical
6	536.340	30.29	46.40	46.00	-15.71	-16.11	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.





**BUREAU  
VERITAS**

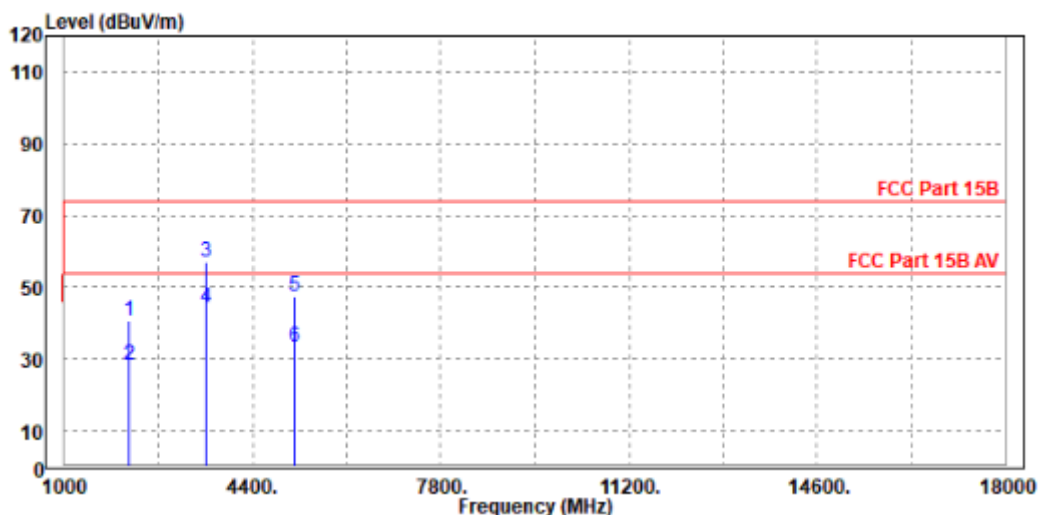
**Test Report No.: W7L-P21100018-1EM01**

<b>TEST VOLTAGE</b>	Data Transmission 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>	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
2156	40.44	50.26	74	-33.56	31	5.54	46.36	200	0	Peak
2156	28.11	37.93	54	-25.89	31	5.54	46.36	200	0	Average
3567	56.93	62.99	74	-17.07	33.04	7.28	46.38	200	0	Peak
3567	44.19	50.25	54	-9.81	33.04	7.28	46.38	200	0	Average
5165	47.66	49.93	74	-26.34	34.53	9.55	46.35	200	0	Peak
5165	33.28	35.55	54	-20.72	34.53	9.55	46.35	200	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 30GHz. 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.





**BUREAU  
VERITAS**

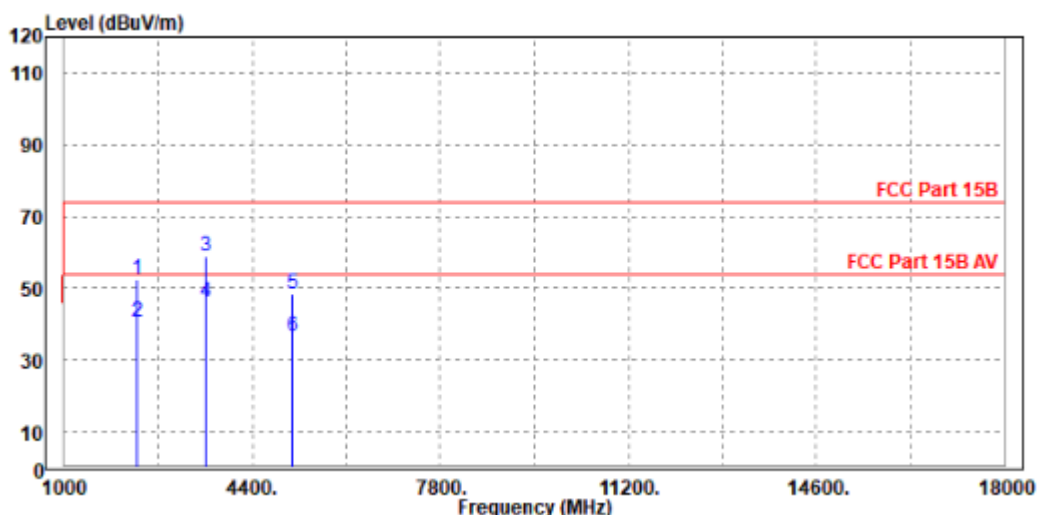
**Test Report No.: W7L-P21100018-1EM01**

<b>TEST VOLTAGE</b>	Data Transmission 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>	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
2326	52.52	61.14	74	-21.48	31.98	5.77	46.37	300	0	Peak
2326	40.7	49.32	54	-13.3	31.98	5.77	46.37	300	0	Average
3550	58.98	65.15	74	-15.02	32.93	7.28	46.38	300	0	Peak
3550	46.07	52.24	54	-7.93	32.93	7.28	46.38	300	0	Average
5114	48.33	50.66	74	-25.67	34.6	9.44	46.37	300	0	Peak
5114	36.29	38.62	54	-17.71	34.6	9.44	46.37	300	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 30GHz. 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 Report No.: W7L-P21100018-1EM01

### **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---**