# RADIO TEST REPORT

Report No.: SHATBL2210021W03

Applicant:

Third Reality, Inc.

Address:

NO.9 Nanxu Road,RunZhou District,Zhenjiang,Jiangsu,China

| | | |
|---|---|---|
| Product Name | : | Smart Hub Gen2 |
| Brand Name | : | N/A |
| Model Name | : | 3RSH04027BWZ |
| Series Model | : | N/A |
| FCC ID | : | 2AOCT-3RSH04027BWZ |
| Test Standard | : | FCC Part15.247 |

# GENERAL DESCRIPTION

**Applicant's Name**.....: Third Reality, Inc.

Address..... : NO.9 Nanxu Road,RunZhou District,Zhenjiang,Jiangsu,China

**Manufacture's Name**.....: Third Reality, Inc.

Address..... : NO.9 Nanxu Road,RunZhou District,Zhenjiang,Jiangsu,China

**Product Description**

Product Name..... : Smart Hub Gen2

Brand Name .....: N/A

Model Name..... : 3RSH04027BWZ

Series Model.....: N/A

**Test Standards**..... : FCC Part15.247

Test Procedure..... : ANSI C63.10-2013

This device described above has been tested by ATBL, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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Date of receipt of test item..... : 2022-11-25

Date (s) of performance of tests.....: 2022-11-01 ~ 2022-11-10

Date of Issue..... : 2022-11-11

Test Result..... : **Pass**

Report Prepared by :

chris

(Chris Xu / Jack Suo)

Report Approved by :

Ghost Li.

(Ghost Li)

Authorized Signatory :

Terry Yang

(Terry Yang)

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## Revision History

| Rev. | Issue Date | Report NO. | Effect Page | Contents |
|---|---|---|---|---|
| 00 | 2022-11-11 | SHATBL2210021W03 | ALL | Initial Issue |

# 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:
KDB 558074 D01 15.247 Meas Guidance v05r02.

| FCC Part 15.247,Subpart C | | | |
|---|---|---|---|
| Standard Section | Test Item | Judgment | Remark |
| 15.207 | Conducted Emission | PASS | -- |
| 15.247 (a)(2) | 6dB&99% Bandwidth | PASS | -- |
| 15.247 (b)(3) | Output Power | PASS | -- |
| 15.247(d) & 15.209 & 15.205 | Radiated Spurious Emission | PASS | -- |
| 15.247(d) & 15.205 | Conducted Spurious & Band Edge Emission | PASS | -- |
| 15.247 (e) | Power Spectral Density | PASS | -- |
| 15.205 | Restricted bands of operation | PASS | -- |
| 15.203 | Antenna Requirement | PASS | -- |

NOTE:

(1) 'N/A' denotes test is not applicable in this Test Report.

(2) All tests are according to ANSI C63.10-2013.

# 2. GENERAL INFORMATION

## 2.1 GENERAL DESCRIPTION OF THE EUT

<table>
<tr><td>Product Name</td><td>Smart Hub Gen2</td></tr>
<tr><td>Trade Name</td><td>N/A</td></tr>
<tr><td>Model Name</td><td>3RSH04027BWZ</td></tr>
<tr><td>Series Model</td><td>N/A</td></tr>
<tr><td>Model Difference</td><td>N/A</td></tr>
<tr><td>Product Description</td><td>The EUT is Smart Hub Gen2
<table>
<tr><td>Operation Frequency:</td><td>2405~2480 MHz</td></tr>
<tr><td>Modulation Type:</td><td>OQPSK</td></tr>
<tr><td>Radio Technology:</td><td>ZigBee</td></tr>
<tr><td>ZigBee Version:</td><td>5.0</td></tr>
<tr><td>Number Of Channel:</td><td>16</td></tr>
<tr><td>Antenna Designation:</td><td>PCB Antenna</td></tr>
<tr><td>Antenna Gain (dBi)</td><td>2 dBi</td></tr>
</table></td></tr>
<tr><td>Channel List</td><td>Please refer to the Note 2.</td></tr>
<tr><td>Power Rating</td><td>N/A</td></tr>
<tr><td>Battery</td><td>N/A</td></tr>
<tr><td>Hardware version number</td><td>V0.5</td></tr>
<tr><td>Software version number</td><td>02.00.31.00</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the Note 1.</td></tr>
</table>

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.

2.

| Channel list | | | |
|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| CH 11 | 2405 | CH 19 | 2445 |
| CH 12 | 2410 | CH 20 | 2450 |
| CH 13 | 2415 | CH 21 | 2455 |
| CH 14 | 2420 | CH 22 | 2460 |
| CH 15 | 2425 | CH 23 | 2465 |
| CH 16 | 2430 | CH 24 | 2470 |
| CH 17 | 2435 | CH 25 | 2475 |
| CH 18 | 2440 | CH 26 | 2480 |

3.

Table for Filed Antenna

| Ant. | Model Name | Antenna Type | Connector | Gain (dBi) | NOTE |
|---|---|---|---|---|---|
| 1 | 3RSH04027BWZ | PCB Antenna | N/A | 2 dBi | ZigBee ANT |

## 2.2 DESCRIPTION OF THE TEST MODES

For conducted test items and radiated spurious emissions
Each of these EUT operation mode(s) or test configuration mode(s) mentioned below was evaluated respectively.

| Worst Mode | EUT Channel | Test Frequency (MHz) |
|---|---|---|
| Mode 1 | TX CH11 | 2405 |
| Mode 2 | TX CH18 | 2440 |
| Mode 3 | TX CH26 | 2480 |

Note:

(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.

For Conducted Emission

| Test Case | |
|---|---|
| Conducted Emission | Mode 4 : Keeping ZigBee TX |

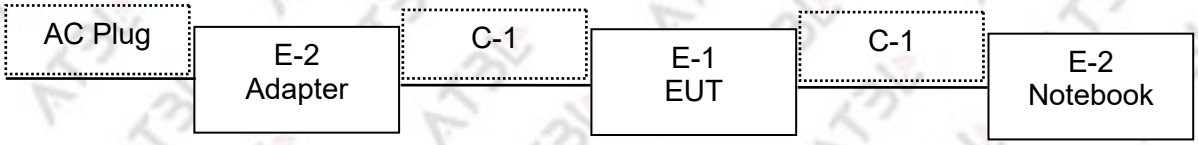
## 2.3 TEST SOFTWARE AND POWER LEVEL

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

| RF Function | Type | Mode Or Modulation type | Ant Gain(dBi) | Power Class | Software For Testing |
|---|---|---|---|---|---|
| ZigBee | ZigBee | OQPSK | 2 | 17 | Provided by the customer |

## 2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test




The EUT was programmed to be in continuously transmitting mode.

## 2.5 DESCRIPTION OF necessary accessories AND 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.

Necessary accessories

| Item | Equipment | Mfr/Brand | Model/Type No. | Length | Note |
|---|---|---|---|---|---|
| N/A | N/A | N/A | N/A | N/A | N/A |

Support units

| Item | Equipment | Mfr/Brand | Model | Type No. | Note |
|---|---|---|---|---|---|
| E-2 | Notebook | Lenovo | DESKTOP-USDEO09 | 00326-10000-00000-AA636 | N/A |
| C-1 | USB Cable | N/A | 100cm | N/A | N/A |

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

## 2.6 LABORATORY INFORMATION

| | |
|---|---|
| Company Name: | Shanghai ATBL Technology Co., Ltd. |
| Address: | Building 8, No. 160, Basheng Road, Waigaoqiao Free Trade Zone, Pudong New Area, Shanghai |
| Telephone: | +86(0)21-51298625 |
| The FCC Registration Number (FRN): | 0031025281 |
| A2LA Number: | 6184.01 |
| CNAS Number: | CNAS L14531 |

## 2.7 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**, where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95** %.

| No. | Item | Uncertainty |
|---|---|---|
| 1 | RF output power, conducted | ±0.962dB |
| 2 | Conducted spurious emissions | ±2.986dB |
| 3 | All emissions, radiated 30MHz-1GHz | ±2.49dB |
| 4 | All emissions, radiated 1GHz-18GHz | ±3.50dB |
| 5 | Occupied bandwidth | ±23.36Hz |
| 6 | Power spectral density | ±0.866dB |

## 2.8 EQUIPMENTS LIST

### 2.8.1 Radiation Test equipment

| Kind of Equipment | Manufacturer | Type No. | Serial No. | Management number | Calibrated until |
|---|---|---|---|---|---|
| Test Receiver | R&S | ESCI | 100469 | SHATBL-E003 | 2023.05.20 |
| Spectrum Analyzer | Agilent | N9020A | MY50200811 | SHATBL-E017 | 2023.05.20 |
| Bilog Antenna | SCHWARZBECK | VLUB 9168 | 01174 | SHATBL-E008 | 2023.05.20 |
| Horn Antenna | SCHWARZBECK | BBHA 9120D | 02014 | SHATBL-E009 | 2023.05.20 |
| Pre-Amplifier (0.1M-3GHz) | JPT | JPA-10M1G35 | 2101010003500 1 | SHATBL-E005 | 2023.05.20 |
| Pre-Amplifier (1G-18GHz) | JPT | JPA0118-55-30 3A | 1910001800055 000 | SHATBL-E006 | 2023.05.20 |
| Temperature & Humidity | DeLi | DeLi | N/A | SHATBL-E016 | 2023.05.20 |
| Antenna/Turntable Controller | Brilliant | N/A | N/A | SHATBL-E007 | N/A |
| Test SW | FALA | EMC-RI(Ver.4A2) | | SHATBL-E046 | N/A |

### 2.8.2 Conduction Test equipment

| Kind of Equipment | Manufacturer | Type No. | Serial No. | Management number | Calibration date |
|---|---|---|---|---|---|
| Test Receiver | R&S | ESPI | 101679 | SHATBL-E012 | 2023.05.20 |
| LISN | R&S | ENV216 | 101300 | SHATBL-E013 | 2023.05.20 |
| LISN | R&S | ENV216 | 100333 | SHATBL-E041 | 2023.05.20 |
| Temperature & Humidity | DeLi | DeLi | N/A | SHATBL-E015 | 2023.05.20 |
| Test SW | FALA | EZ-EMC(Ver.EMC-CON3A1.1) | | SHATBL-E044 | N/A |

2.8.3 RF Connected Test

| Kind of Equipment | Manufacturer | Type No. | Serial No. | equipment number | Calibrated until |
|---|---|---|---|---|---|
| Power meter (with pulse power sensor) | Anritsu | ML2496A | 1935001 | SHATBL-W030 | 2023.09.27 |
| Pulse power sensor (with power meter) | Anritsu | MA2411B | 1911006 | SHATBL-W031 | 2023.09.27 |
| Signal Analyzer | Agilent | N9020A | MY57300196 | SHATBL-W004 | 2023.09.27 |
| Signal Generator | Agilent | N5182B | MY46240556 | SHATBL-W005 | 2023.09.27 |
| Wireless Communications Test Set | R&S | CMW500 | 101331 | SHATBL-W007 | 2023.09.27 |
| Temperature & Humidity | Deli | deli | N/A | SHATBL-W011 | 2023.09.27 |
| Attenuator | Agilent | 8494B | DC-18G | SHATBL-W009 | 2023.09.27 |
| Attenuator | Agilent | 8496B | DC-18G | SHATBL-W010 | 2023.09.27 |
| power splitter | MNK | MPD-DC/6-2S | 62315 G51 | SHATBL-W015 | 2023.09.27 |
| | | | 62315 G52 | SHATBL-W016 | 2023.09.27 |
| Filter | Chengdu kangmaiwei | ZBSF-C2400-2483.5-T3 | N/A | SHATBL-W021 | N/A |
| Constant temperature and humidity box | KSON | THS-B6C-150 | 6159K | SHATBL-W019 | 2023.01.17 |
| Test SW | FALA | LZ-RF(Ver.LzRF-03A3.1) | | SHATBL-W020 | N/A |

# 3. EMC EMISSION TEST

## 3.1 CONDUCTED EMISSION MEASUREMENT

### 3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

Operating frequency band. In case the emission fall within the restricted band specified on Part 207(a) limit in the table below has to be followed.

| FREQUENCY (MHz) | Conducted Emission limit (dBuV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 -0.5 | 66 - 56 * | 56 - 46 * |
| 0.50 -5.0 | 56.00 | 46.00 |
| 5.0 -30.0 | 60.00 | 50.00 |

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

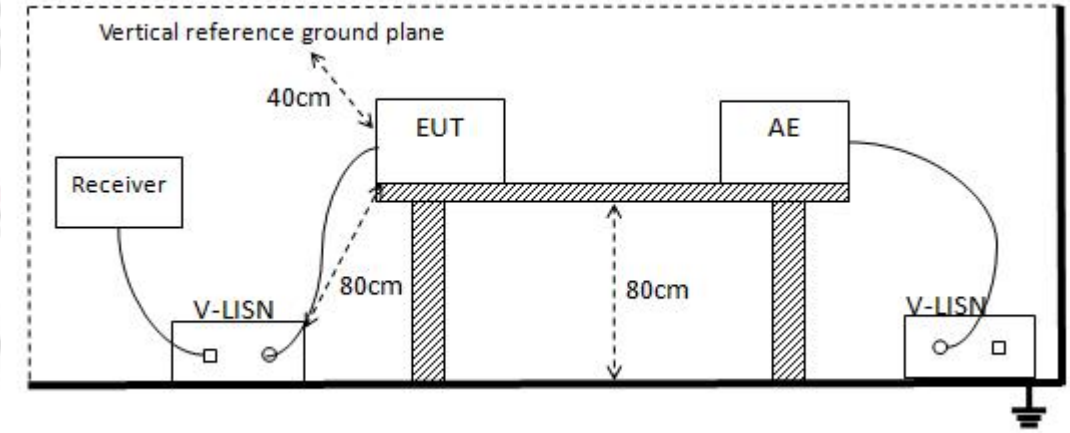
The following table is the setting of the receiver

| Receiver Parameters | Setting |
|---|---|
| Attenuation | 10 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| IF Bandwidth | 9 kHz |

3.2 TEST PROCEDURE

a. The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN is at least 80 cm from the nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3 TEST SETUP

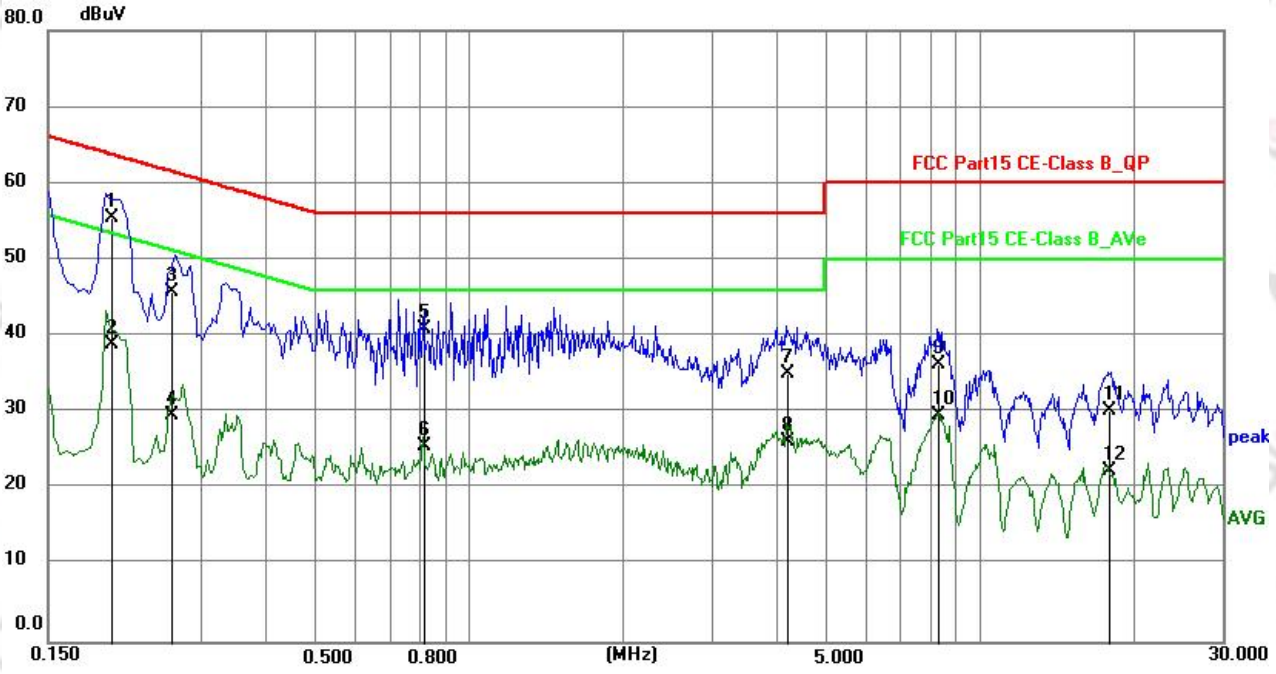



3.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.5 TEST RESULTS

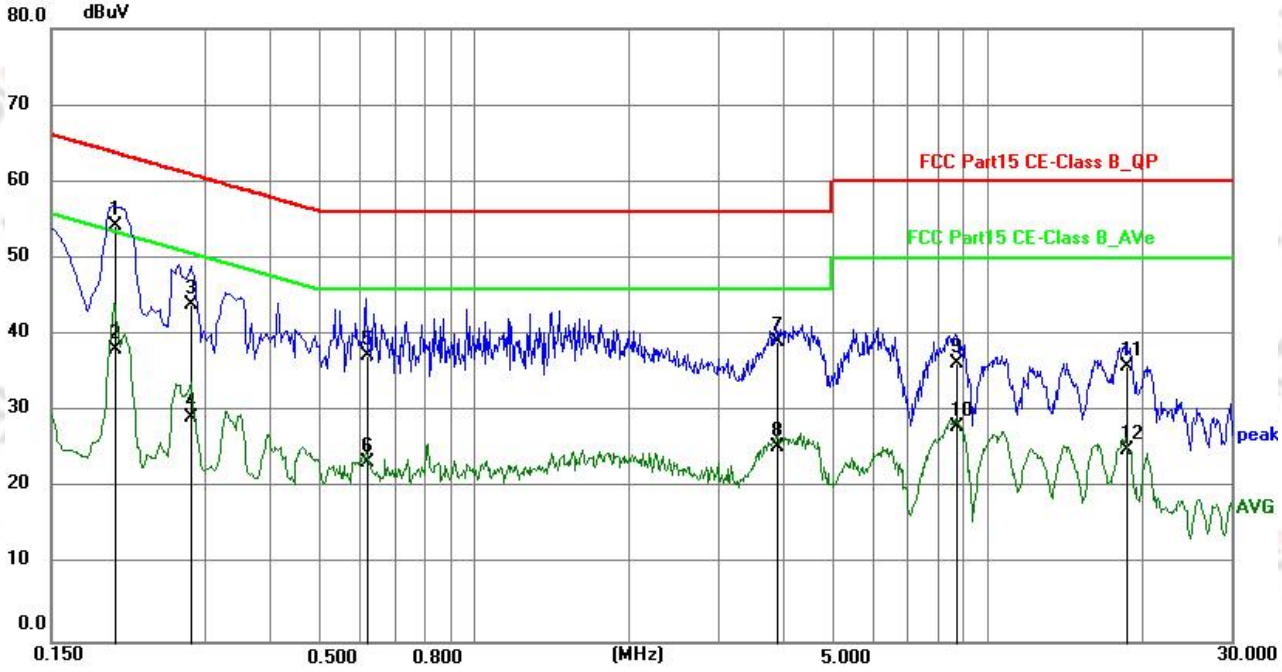
| Temperature: | 25.1℃ | Relative Humidity: | 49% |
|---|---|---|---|
| Phase: | L | Test Mode: | Mode 1 |
| Test Voltage: | AC 120V/60Hz | Test Date: | 2022.11.01 |




| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 0.1990 | 45.80 | 9.76 | 55.56 | 63.65 | -8.09 | QP |
| 2 | 0.1990 | 29.25 | 9.76 | 39.01 | 53.65 | -14.64 | AVG |
| 3 | 0.2630 | 36.12 | 9.76 | 45.88 | 61.34 | -15.46 | QP |
| 4 | 0.2630 | 20.01 | 9.76 | 29.77 | 51.34 | -21.57 | AVG |
| 5 | 0.8170 | 31.18 | 9.76 | 40.94 | 56.00 | -15.06 | QP |
| 6 | 0.8170 | 16.03 | 9.76 | 25.79 | 46.00 | -20.21 | AVG |
| 7 | 4.2100 | 25.33 | 9.84 | 35.17 | 56.00 | -20.83 | QP |
| 8 | 4.2100 | 16.53 | 9.84 | 26.37 | 46.00 | -19.63 | AVG |
| 9 | 8.2840 | 26.44 | 9.93 | 36.37 | 60.00 | -23.63 | QP |
| 10 | 8.2840 | 19.73 | 9.93 | 29.66 | 50.00 | -20.34 | AVG |
| 11 | 17.9950 | 20.18 | 10.17 | 30.35 | 60.00 | -29.65 | QP |
| 12 | 17.9950 | 12.30 | 10.17 | 22.47 | 50.00 | -27.53 | AVG |

Remark:
1. All readings are Quasi-Peak
2. Margin = Result (Result =Reading + Factor)–Limit
3.Factor= Cable Loss +Antenna Factor-Amplifier Gain

| | | | |
|---|---|---|---|
| Temperature: | 25.1℃ | Relative Humidity: | 49% |
| Phase: | N | Test Mode: | Mode 1 |
| Test Voltage: | AC 120V/60Hz | Test Date: | 2022.11.01 |




| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 0.1990 | 44.51 | 9.73 | 54.24 | 63.65 | -9.41 | QP |
| 2 | 0.1990 | 28.52 | 9.73 | 38.25 | 53.65 | -15.40 | AVG |
| 3 | 0.2810 | 34.29 | 9.73 | 44.02 | 60.79 | -16.77 | QP |
| 4 | 0.2810 | 19.64 | 9.73 | 29.37 | 50.79 | -21.42 | AVG |
| 5 | 0.6190 | 27.64 | 9.72 | 37.36 | 56.00 | -18.64 | QP |
| 6 | 0.6190 | 13.70 | 9.72 | 23.42 | 46.00 | -22.58 | AVG |
| 7 | 3.8900 | 29.32 | 9.82 | 39.14 | 56.00 | -16.86 | QP |
| 8 | 3.8900 | 15.60 | 9.82 | 25.42 | 46.00 | -20.58 | AVG |
| 9 | 8.6980 | 26.45 | 9.93 | 36.38 | 60.00 | -23.62 | QP |
| 10 | 8.6980 | 18.23 | 9.93 | 28.16 | 50.00 | -21.84 | AVG |
| 11 | 18.7030 | 25.81 | 10.23 | 36.04 | 60.00 | -23.96 | QP |
| 12 | 18.7030 | 14.80 | 10.23 | 25.03 | 50.00 | -24.97 | AVG |

Remark:
1. All readings are Quasi-Peak
2. Margin = Result (Result =Reading + Factor)–Limit
3.Factor= Cable Loss +Antenna Factor-Amplifier Gain

# 4. RADIATED EMISSION MEASUREMENT

## 4.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (Frequency Range 9kHz-1000MHz)

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(kHz) | 300 |
| 0.490~1.705 | 24000/F(kHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

| FREQUENCY (MHz) | (dBuV/m) (at 3M) | |
|---|---|---|
| | PEAK | AVERAGE |
| Above 1000 | 74 | 54 |

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RESTRICTED FREQUENCY BANDS

FCC:

| FREQUENCY (MHz) | FREQUENCY (MHz) | FREQUENCY (MHz) | FREQUENCY (GHz) |
|---|---|---|---|
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| 0.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 25.5-25.67 | 1300-1427 | 8.025-8.5 |
| 4.17725-4.17775 | 37.5-38.25 | 1435-1626.5 | 9.0-9.2 |
| 4.20725-4.20775 | 73-74.6 | 1645.5-1646.5 | 9.3-9.5 |
| 6.215-6.218 | 74.8-75.2 | 1660-1710 | 10.6-12.7 |
| 6.26775-6.26825 | 108-121.94 | 1718.8-1722.2 | 13.25-13.4 |
| 6.31175-6.31225 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475-156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2690-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293 | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3600-4400 | Above 38.6 |
| 13.36-13.41 | | | |

For Radiated Emission

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Detector | Peak/QP/AV |
| Start Frequency | 9 kHz/150KHz(Peak/QP/AV) |
| Stop Frequency | 150kHz/30MHz(Peak/QP/AV) |
| RB / VB (emission in restricted band) | 200Hz (From 9kHz to 0.15MHz)/<br>9kHz (From 0.15MHz to 30MHz);<br>200Hz (From 9kHz to 0.15MHz)/<br>9kHz (From 0.15MHz to 30MHz) |

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Detector | Peak/QP |
| Start Frequency | 30 MHz(Peak/QP) |
| Stop Frequency | 1000 MHz (Peak/QP) |
| RB / VB (emission in restricted band) | 120 kHz / 300 kHz |

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Detector | Peak/AV |
| Start Frequency | 1000 MHz(Peak/AV) |
| Stop Frequency | 10th carrier hamonic(Peak/AV) |
| RB / VB (emission in restricted band) | 1 MHz / 3 MHz(Peak)<br>1 MHz/1/T MHz(AVG) |

For Restricted band

| Spectrum Parameter | Setting |
|---|---|
| Detector | Peak/AV |
| Start/Stop Frequency | Lower Band Edge: 2310 to 2410 MHz<br>Upper Band Edge: 2475 to 2500 MHz |
| RB / VB | 1 MHz / 3 MHz(Peak)<br>1 MHz/1/T MHz(AVG) |

| Receiver Parameter | Setting |
|---|---|
| Start ~ Stop Frequency | 9kHz~90kHz / RB 200Hz for PK & AV |
| Start ~ Stop Frequency | 90kHz~110kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 110kHz~490kHz / RB 200Hz for PK & AV |
| Start ~ Stop Frequency | 490kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

4.2 TEST PROCEDURE

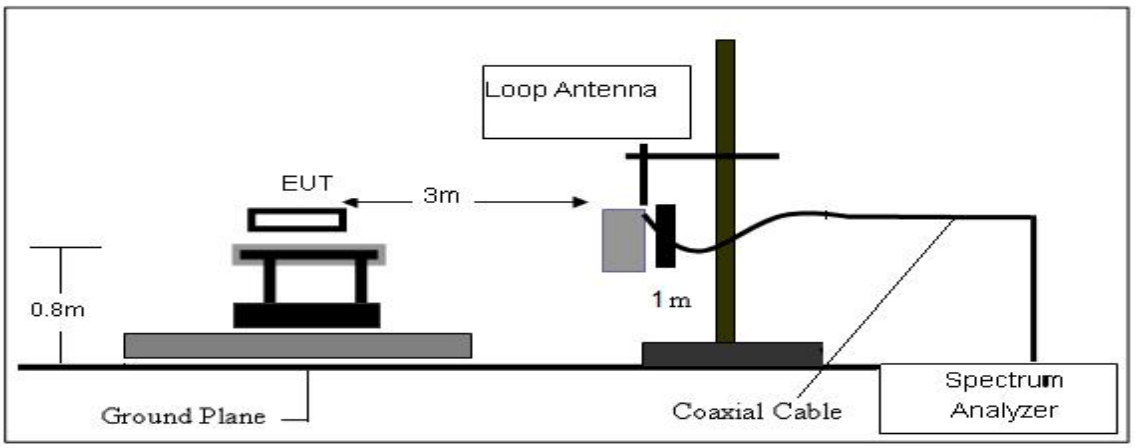
a. The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
b. The EUT was placed on the top of a rotating table 0.8 meters(above 1GHz is 1.5 m) above the ground at a 3 meter an echoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment shall be 0.8 m(above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. Horizontal and vertical polarization of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

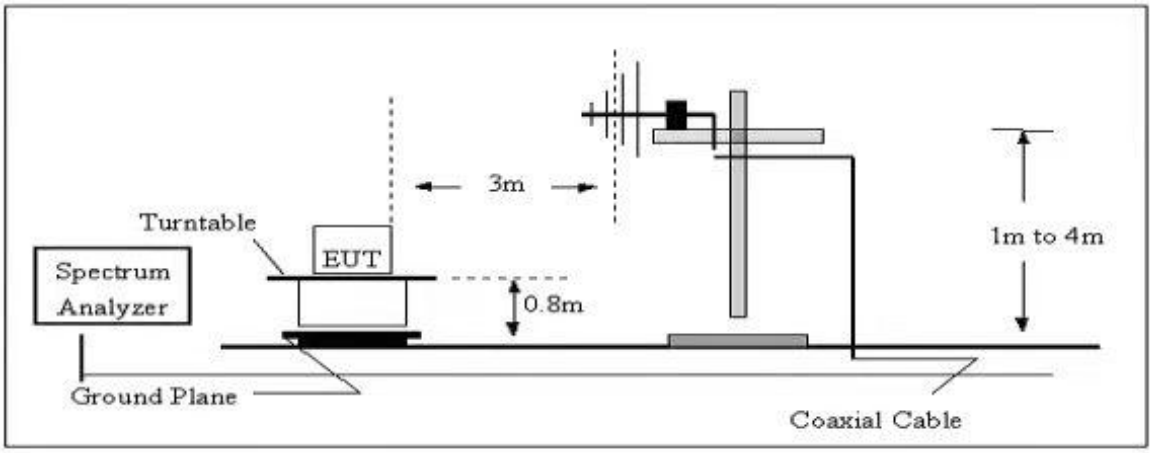
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

4.3 TEST SETUP

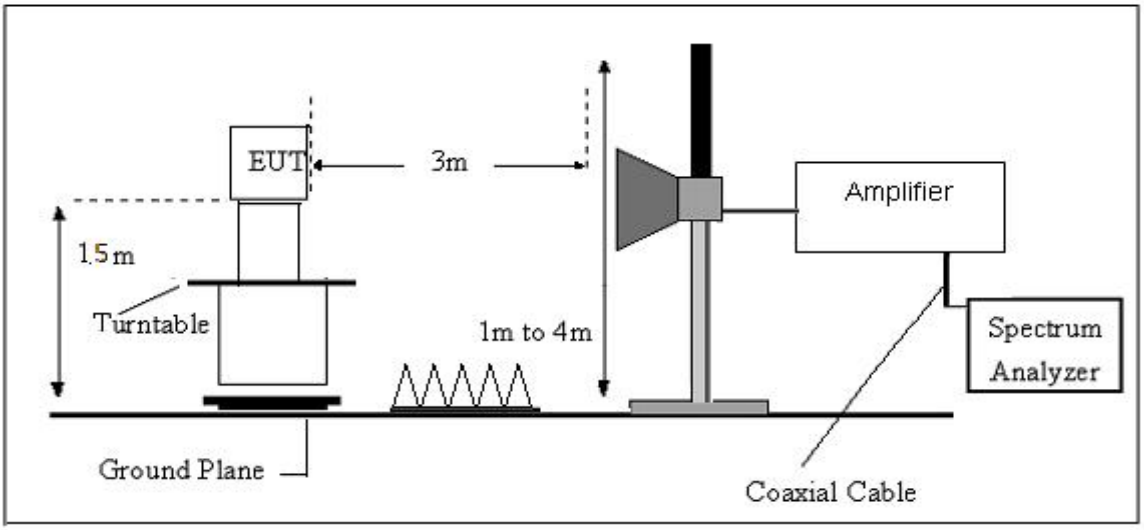
(A) Radiated Emission Test-Up Frequency Below 30MHz




(B) Radiated Emission Test-Up Frequency 30MHz~1GHz




(C) Radiated Emission Test-Up Frequency Above 1GHz




4.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

4.5 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

| Frequency | FS | RA | AF | CL | AG | Factor |
|---|---|---|---|---|---|---|
| (MHz) | (dBμV/m) | (dBμV/m) | (dB) | (dB) | (dB) | (dB) |
| 300 | 40 | 58.1 | 12.2 | 1.6 | 31.9 | -18.1 |

Factor=AF+CL-AG

4.6 TEST RESULTS

| Temperature: | 23.2℃ | Relative Humidity: | 52%RH |
|---|---|---|---|
| Test Voltage: | AC 5V | Polarization: | -- |
| Test Mode: | TX Mode1/3 | | |

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =40 log (specific distance/test distance)(dB);

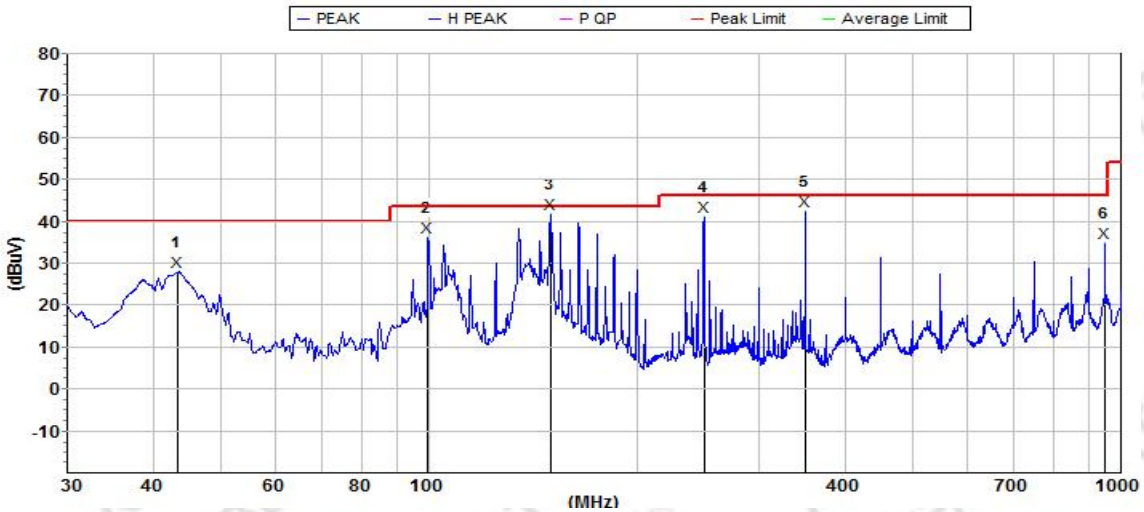
Limit line = specific limits(dBuv) + distance extrapolation factor.

(30MHz -1000MHz)

| | | | |
|---|---|---|---|
| Temperature: | 23.2℃ | Relative Humidity: | 52%RH |
| Test Voltage: | AC 5V | Phase: | Horizontal |
| Test Mode: | TX Mode 1 | | |

Remark:
1. Margin = Result (Result =Reading + Factor )–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

Mode 1 Horizontal

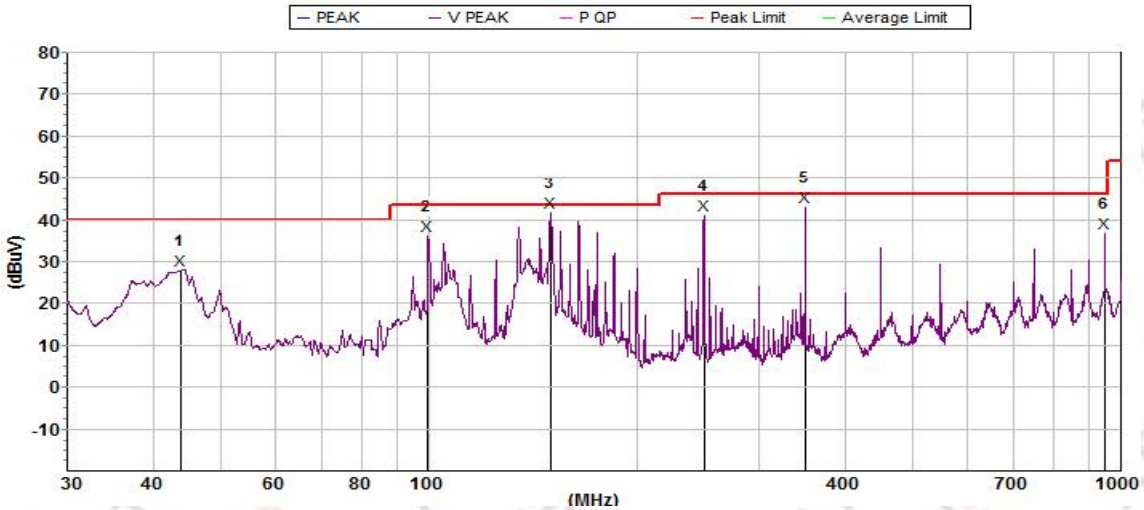



| Mk. | Freq. (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Ant.F/G. (dB/m) | Amp.G. (dB) | Cbl.L. (dB) | Pol. |
|---|---|---|---|---|---|---|---|---|
| 1 | 43.429513 | 28.0 | 40.0 | 12.0 | 13.9 | 32.4 | 0.8 | H |
| 2 | 99.702770 | 36.3 | 43.5 | 7.2 | 10.2 | 32.9 | 1.4 | H |
| 3 | 150.274066 | 41.8 | 43.5 | 1.7 | 14.2 | 32.8 | 1.3 | H |
| 4 | 249.862716 | 41.2 | 46.0 | 4.8 | 11.6 | 32.8 | 2.6 | H |
| 5 | 349.862839 | 42.6 | 46.0 | 3.4 | 13.4 | 32.5 | 2.7 | H |
| 6 | 948.760988 | 35.0 | 46.0 | 11.0 | 20.3 | 31.3 | 3.8 | H |

| Temperature: | 23.2℃ | Relative Humidity: | 52%RH |
|---|---|---|---|
| Test Voltage: | AC 5V | Phase: | Vertical |
| Test Mode: | TX Mode 1 | | |

Remark:
1. Margin = Result (Result =Reading + Factor )–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

Mode 1 Vertical



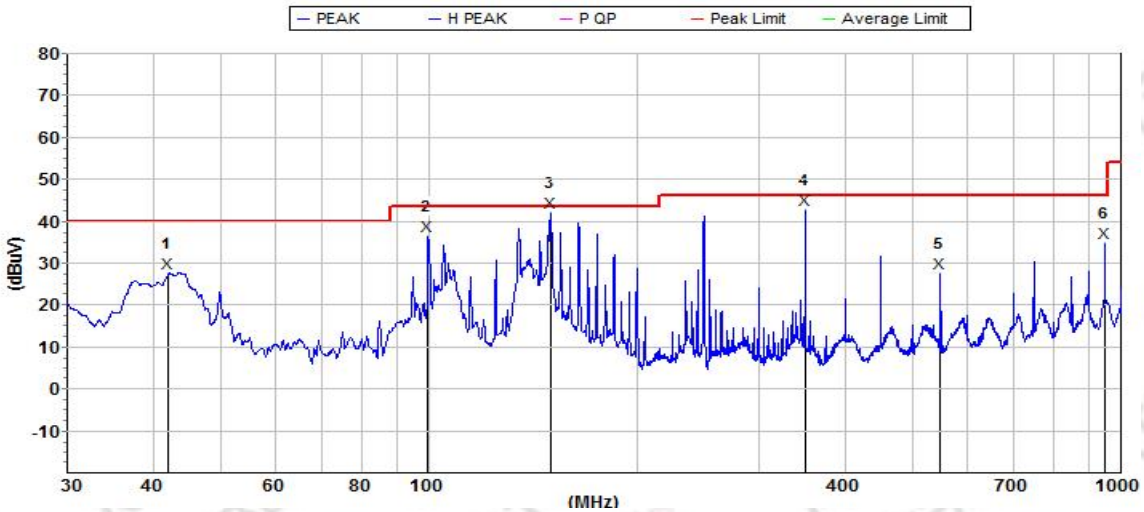

| Mk. | Freq. (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Ant.F/G. (dB/m) | Amp.G. (dB) | Cbl.L. (dB) | Pol. |
|---|---|---|---|---|---|---|---|---|
| 1 | 43.888789 | 28.0 | 40.0 | 12.0 | 13.9 | 32.4 | 0.8 | V |
| 2 | 99.702770 | 36.4 | 43.5 | 7.1 | 10.2 | 32.9 | 1.4 | V |
| 3 | 150.274066 | 41.9 | 43.5 | 1.6 | 14.2 | 32.8 | 1.3 | V |
| 4 | 249.862716 | 41.2 | 46.0 | 4.8 | 11.6 | 32.8 | 2.6 | V |
| 5 | 349.862839 | 43.0 | 46.0 | 3.0 | 13.8 | 32.5 | 2.7 | V |
| 6 | 948.760988 | 37.0 | 46.0 | 9.0 | 22.1 | 31.3 | 3.8 | V |

(30MHz -1000MHz)

| | | | |
|---|---|---|---|
| Temperature: | 23.2℃ | Relative Humidity: | 52%RH |
| Test Voltage: | AC 5V | Phase: | Horizontal |
| Test Mode: | TX Mode 3 | | |

Remark:
1. Margin = Result (Result =Reading + Factor )–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

Mode 3 Horizontal

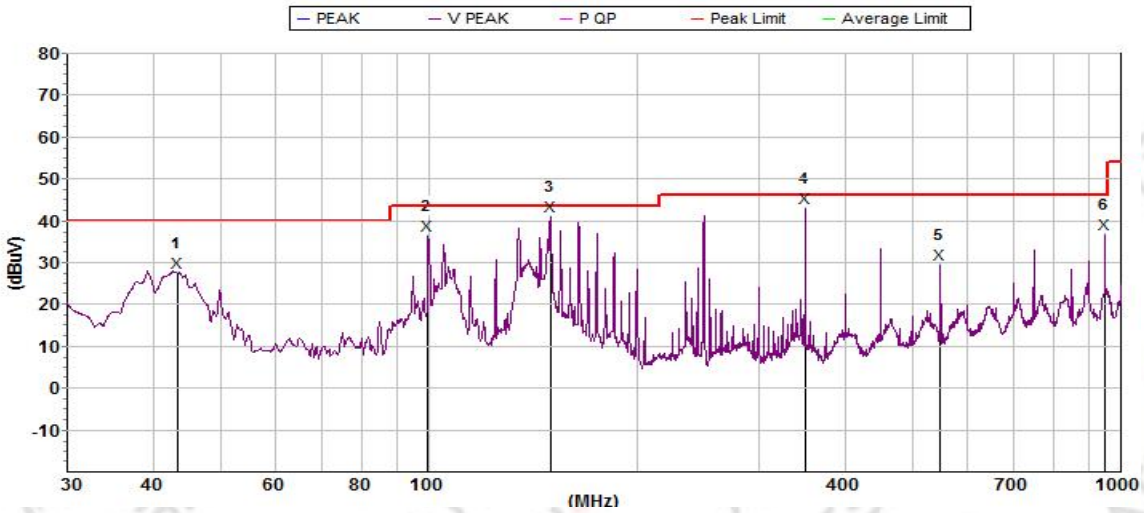



| Mk. | Freq. (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Ant.F/G. (dB/m) | Amp.G. (dB) | Cbl.L. (dB) | Pol. |
|---|---|---|---|---|---|---|---|---|
| 1 | 42.080322 | 27.7 | 40.0 | 12.3 | 14.0 | 32.4 | 0.8 | H |
| 2 | 99.702770 | 36.5 | 43.5 | 7.0 | 10.1 | 32.9 | 1.4 | H |
| 3 | 149.748044 | 42.2 | 43.5 | 1.3 | 14.1 | 32.9 | 1.3 | H |
| 4 | 349.862839 | 42.7 | 46.0 | 3.3 | 13.4 | 32.5 | 2.7 | H |
| 5 | 549.019455 | 27.6 | 46.0 | 18.4 | 15.4 | 32.4 | 3.1 | H |
| 6 | 948.760988 | 35.0 | 46.0 | 11.0 | 20.3 | 31.3 | 3.7 | H |

| | | | |
|---|---|---|---|
| Temperature: | 23.2℃ | Relative Humidity: | 52%RH |
| Test Voltage: | AC 5V | Phase: | Vertical |
| Test Mode: | TX Mode 3 | | |

Remark:
1. Margin = Result (Result =Reading + Factor )–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

Mode 3 Vertical



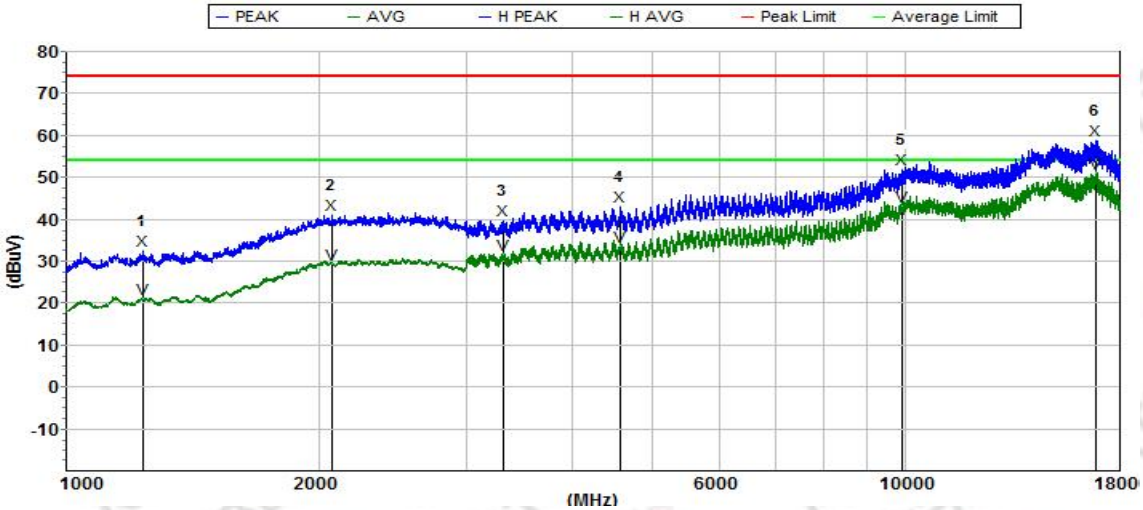

| Mk. | Freq. (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Ant.F/G. (dB/m) | Amp.G. (dB) | Cbl.L. (dB) | Pol. |
|---|---|---|---|---|---|---|---|---|
| 1 | 43.429513 | 27.8 | 40.0 | 12.2 | 13.9 | 32.4 | 0.8 | V |
| 2 | 99.702770 | 36.5 | 43.5 | 7.0 | 10.2 | 32.9 | 1.4 | V |
| 3 | 149.748044 | 41.3 | 43.5 | 2.2 | 14.2 | 32.9 | 1.3 | V |
| 4 | 349.862839 | 43.1 | 46.0 | 2.9 | 13.8 | 32.5 | 2.7 | V |
| 5 | 549.019455 | 29.7 | 46.0 | 16.3 | 17.4 | 32.5 | 3.1 | V |
| 6 | 948.760988 | 37.0 | 46.0 | 9.0 | 22.1 | 31.3 | 3.8 | V |

(30MHz -18000MHz)

| Temperature: | 23.2℃ | Relative Humidity: | 52%RH |
|---|---|---|---|
| Test Voltage: | AC 5V | Phase: | Horizontal |
| Test Mode: | TX Mode 1 | | |

Remark:
1. Margin = Result (Result =Reading + Factor )–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

Mode 1 Horizontal

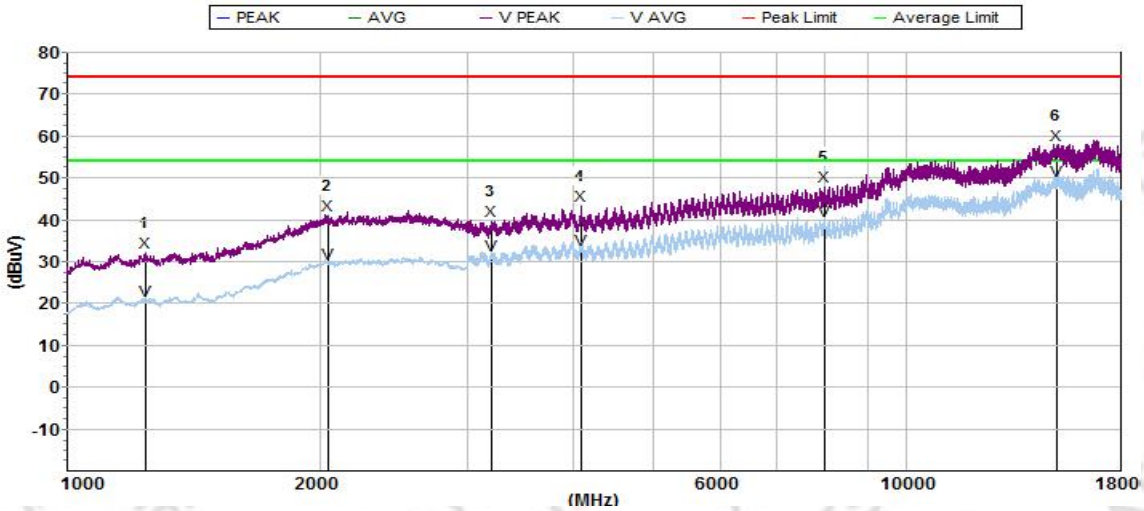



| Mk. | Freq. (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Ant.F/G. (dB/m) | Amp.G. (dB) | Cbl.L. (dB) | Pol. |
|---|---|---|---|---|---|---|---|---|
| Peak | | | | | | | | |
| 1 | 1235.000000 | 32.7 | 74.0 | 41.3 | 20.7 | 57.3 | 2.3 | H |
| 2 | 2076.000000 | 41.2 | 74.0 | 32.8 | 22.1 | 50.1 | 2.7 | H |
| 3 | 3317.250000 | 39.9 | 74.0 | 34.1 | 24.1 | 51.0 | 3.1 | H |
| 4 | 4569.000000 | 43.2 | 74.0 | 30.8 | 24.7 | 50.0 | 3.6 | H |
| 5 | 9924.000000 | 51.9 | 74.0 | 22.1 | 27.5 | 48.5 | 5.4 | H |
| 6 | 16821.750000 | 58.8 | 74.0 | 15.2 | 30.9 | 47.4 | 6.8 | H |
| Avg | | | | | | | | |
| 1 | 1235.000000 | 21.2 | 54.0 | 32.8 | 20.7 | 57.3 | 2.3 | H |
| 2 | 2076.000000 | 29.4 | 54.0 | 24.6 | 22.1 | 50.1 | 2.7 | H |
| 3 | 3317.250000 | 31.5 | 54.0 | 22.5 | 24.1 | 51.0 | 3.1 | H |
| 4 | 4569.000000 | 33.6 | 54.0 | 20.4 | 24.7 | 50.0 | 3.6 | H |
| 5 | 9924.000000 | 43.3 | 54.0 | 10.7 | 27.5 | 48.5 | 5.4 | H |
| 6 | 16821.750000 | 51.0 | 54.0 | 3.0 | 30.9 | 47.4 | 6.8 | H |

| | | | |
|---|---|---|---|
| Temperature: | 23.2℃ | Relative Humidity: | 52%RH |
| Test Voltage: | AC 5V | Phase: | Vertical |
| Test Mode: | TX Mode 1 | | |

Remark:
1. Margin = Result (Result =Reading + Factor )–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

Mode 1 Vertical



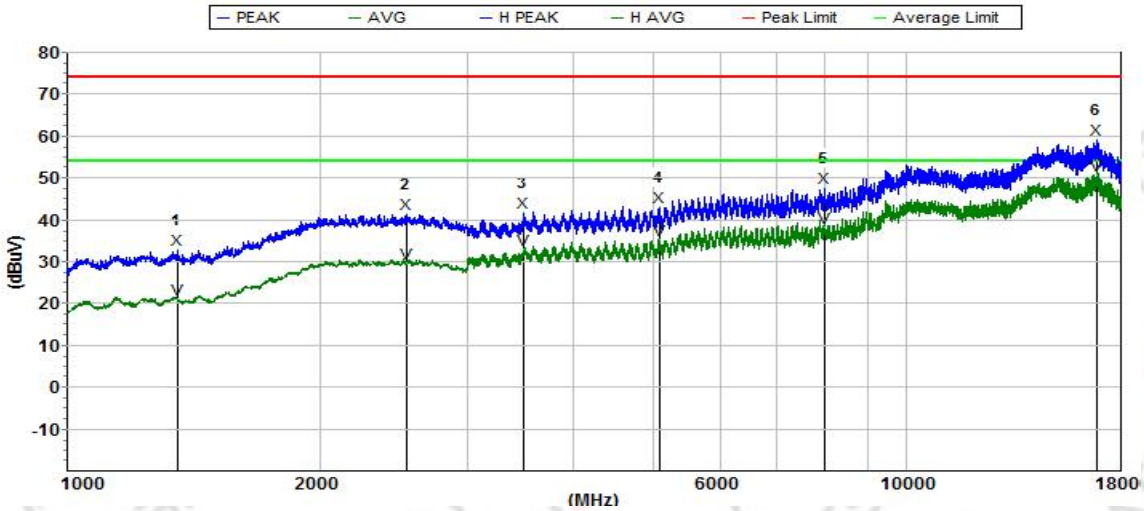

| Mk. | Freq. (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Ant.F/G. (dB/m) | Amp.G. (dB) | Cbl.L. (dB) | Pol. |
|---|---|---|---|---|---|---|---|---|
| Peak | | | | | | | | |
| 1 | 1238.000000 | 32.4 | 74.0 | 41.6 | 20.7 | 57.3 | 2.3 | V |
| 2 | 2048.000000 | 41.3 | 74.0 | 32.7 | 22.2 | 50.1 | 2.7 | V |
| 3 | 3205.500000 | 40.0 | 74.0 | 34.0 | 24.4 | 51.3 | 3.0 | V |
| 4 | 4093.500000 | 43.4 | 74.0 | 30.6 | 24.8 | 50.1 | 3.3 | V |
| 5 | 7983.000000 | 48.0 | 74.0 | 26.0 | 26.9 | 48.6 | 4.9 | V |
| 6 | 15078.000000 | 58.1 | 74.0 | 15.9 | 31.1 | 46.9 | 6.3 | V |
| Avg | | | | | | | | |
| 1 | 1238.000000 | 20.8 | 54.0 | 33.2 | 20.7 | 57.3 | 2.3 | V |
| 2 | 2048.000000 | 29.6 | 54.0 | 24.4 | 22.2 | 50.1 | 2.7 | V |
| 3 | 3205.500000 | 31.7 | 54.0 | 22.3 | 24.4 | 51.3 | 3.0 | V |
| 4 | 4093.500000 | 33.1 | 54.0 | 20.9 | 24.8 | 50.1 | 3.3 | V |
| 5 | 7983.000000 | 39.8 | 54.0 | 14.2 | 26.9 | 48.6 | 4.9 | V |
| 6 | 15078.000000 | 49.4 | 54.0 | 4.6 | 31.1 | 46.9 | 6.3 | V |

(30MHz -18000MHz)

| | | | |
|---|---|---|---|
| Temperature: | 23.2℃ | Relative Humidity: | 52%RH |
| Test Voltage: | AC 5V | Phase: | Horizontal |
| Test Mode: | TX Mode 3 | | |

Remark:
1. Margin = Result (Result =Reading + Factor )–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

Mode 3 Horizontal

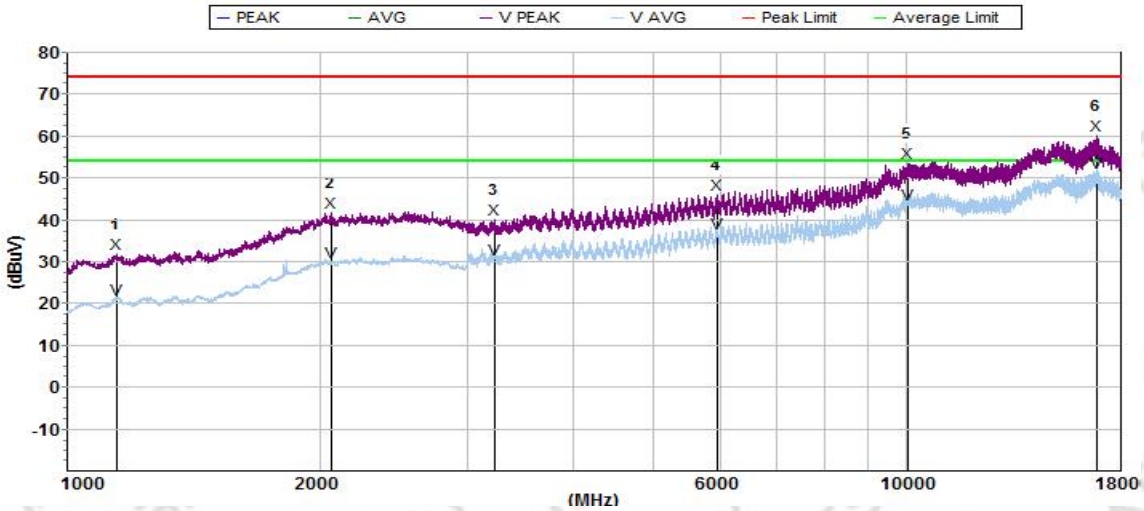



| Mk. | Freq. (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Ant.F/G. (dB/m) | Amp.G. (dB) | Cbl.L. (dB) | Pol. |
|---|---|---|---|---|---|---|---|---|
| Peak | | | | | | | | |
| 1 | 1353.000000 | 32.9 | 74.0 | 41.1 | 20.8 | 57.3 | 2.3 | H |
| 2 | 2537.000000 | 41.4 | 74.0 | 32.6 | 23.0 | 50.3 | 2.8 | H |
| 3 | 3501.000000 | 41.9 | 74.0 | 32.1 | 24.2 | 50.5 | 3.1 | H |
| 4 | 5072.250000 | 43.0 | 74.0 | 31.0 | 24.8 | 49.2 | 3.7 | H |
| 5 | 7984.500000 | 47.7 | 74.0 | 26.3 | 26.1 | 48.6 | 4.9 | H |
| 6 | 16836.000000 | 59.4 | 74.0 | 14.6 | 30.9 | 47.4 | 6.8 | H |
| Avg | | | | | | | | |
| 1 | 1353.000000 | 21.2 | 54.0 | 32.8 | 20.8 | 57.3 | 2.3 | H |
| 2 | 2537.000000 | 29.7 | 54.0 | 24.3 | 23.0 | 50.3 | 2.8 | H |
| 3 | 3501.000000 | 32.8 | 54.0 | 21.2 | 24.2 | 50.5 | 3.1 | H |
| 4 | 5072.250000 | 35.1 | 54.0 | 18.9 | 24.8 | 49.2 | 3.7 | H |
| 5 | 7984.500000 | 38.1 | 54.0 | 15.9 | 26.1 | 48.6 | 4.9 | H |
| 6 | 16836.000000 | 50.8 | 54.0 | 3.2 | 30.9 | 47.4 | 6.8 | H |

| Temperature: | 23.2℃ | Relative Humidity: | 52%RH |
|---|---|---|---|
| Test Voltage: | AC 5V | Phase: | Vertical |
| Test Mode: | TX Mode 3 | | |

Remark:
1. Margin = Result (Result =Reading + Factor )–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

Mode 3 Vertical



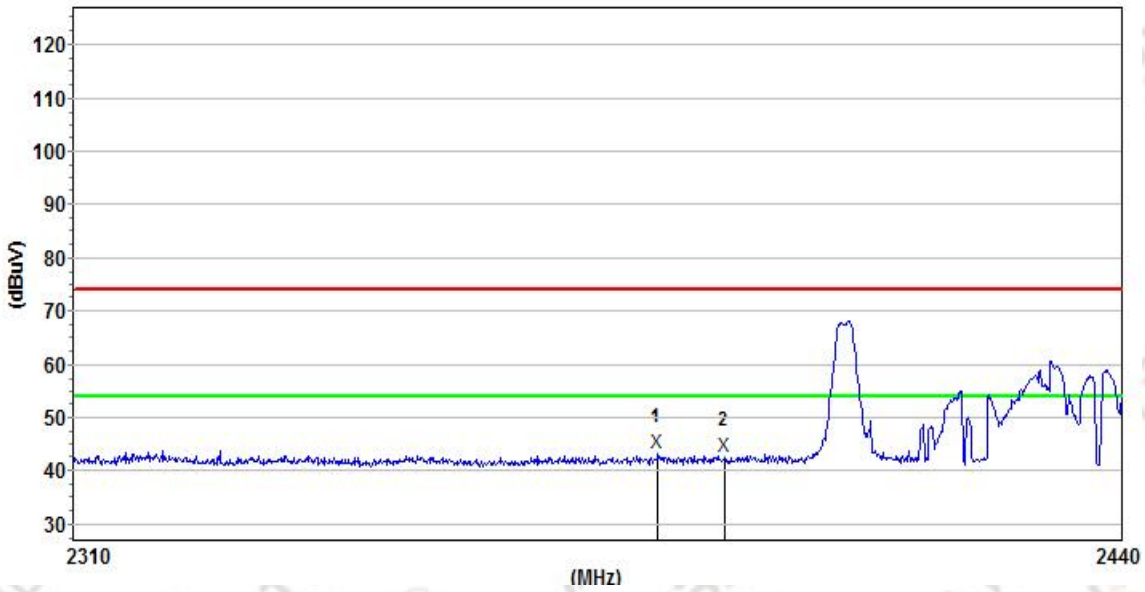

| Mk. | Freq. (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Ant.F/G. (dB/m) | Amp.G. (dB) | Cbl.L. (dB) | Pol. |
|---|---|---|---|---|---|---|---|---|
| Peak | | | | | | | | |
| 1 | 1144.000000 | 31.9 | 74.0 | 42.1 | 20.7 | 57.3 | 2.2 | V |
| 2 | 2068.000000 | 41.9 | 74.0 | 32.1 | 22.3 | 50.1 | 2.7 | V |
| 3 | 3234.750000 | 40.1 | 74.0 | 33.9 | 24.4 | 51.2 | 3.0 | V |
| 4 | 5940.750000 | 46.1 | 74.0 | 27.9 | 25.5 | 48.9 | 4.1 | V |
| 5 | 10035.750000 | 53.6 | 74.0 | 20.4 | 28.4 | 48.5 | 5.4 | V |
| 6 | 16839.750000 | 60.2 | 74.0 | 13.8 | 31.4 | 47.4 | 6.8 | V |
| Avg | | | | | | | | |
| 1 | 1144.000000 | 21.1 | 54.0 | 32.9 | 20.7 | 57.3 | 2.2 | V |
| 2 | 2068.000000 | 30.0 | 54.0 | 24.0 | 22.3 | 50.1 | 2.7 | V |
| 3 | 3234.750000 | 30.6 | 54.0 | 23.4 | 24.4 | 51.2 | 3.0 | V |
| 4 | 5940.750000 | 36.8 | 54.0 | 17.2 | 25.5 | 48.9 | 4.1 | V |
| 5 | 10035.750000 | 43.8 | 54.0 | 10.2 | 28.4 | 48.5 | 5.4 | V |
| 6 | 16839.750000 | 51.4 | 54.0 | 2.6 | 31.4 | 47.4 | 6.8 | V |

Note:
1.All TX Mode, the worst case is mode1&3, only show the worst case.
2.Other 18G-25G Emission detected are more than 20dB below the limit.

4.6 TEST RESULTS (Restricted Bands Requirements)

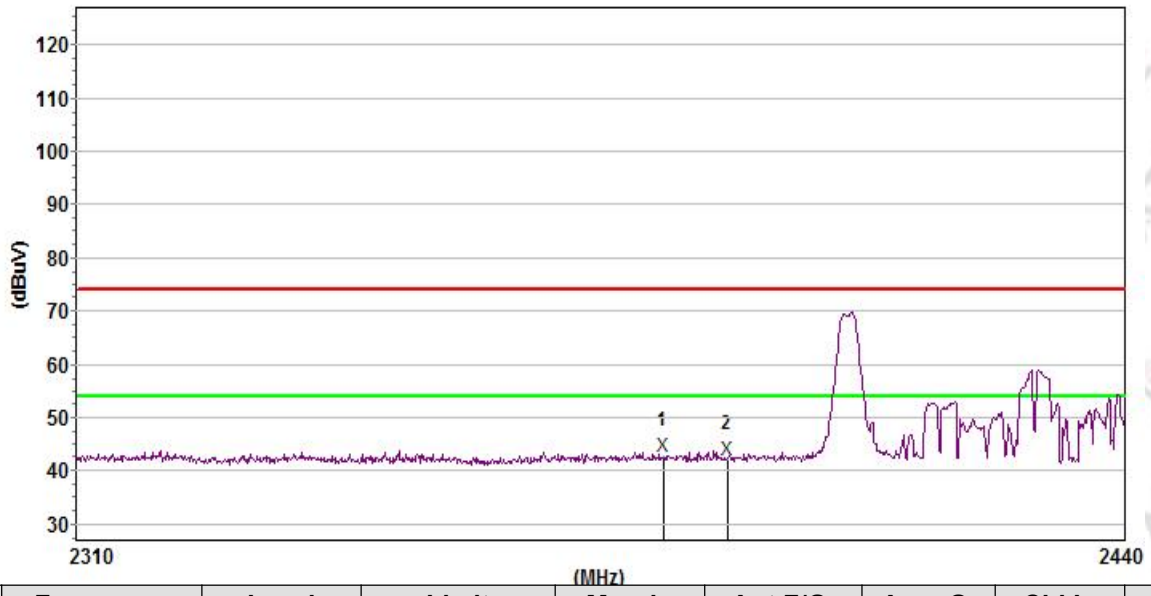
**GFSK-Low**

Horizontal




| Mk. | Frequency | Level | Limit | Margin | Ant.F/G. | Amp.G. | Cbl.L. | Pol. |
|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | (dBuV/m) | (dB) | (dB/m) | (dB) | (dB) | |
| PK | | | | | | | | |
| 1 | 2381.661401 | 43.3 | 74.0 | 30.7 | 22.7 | 50.2 | 2.8 | H |
| 2 | 2390.000000 | 42.9 | 74.0 | 31.1 | 22.8 | 50.2 | 2.8 | H |

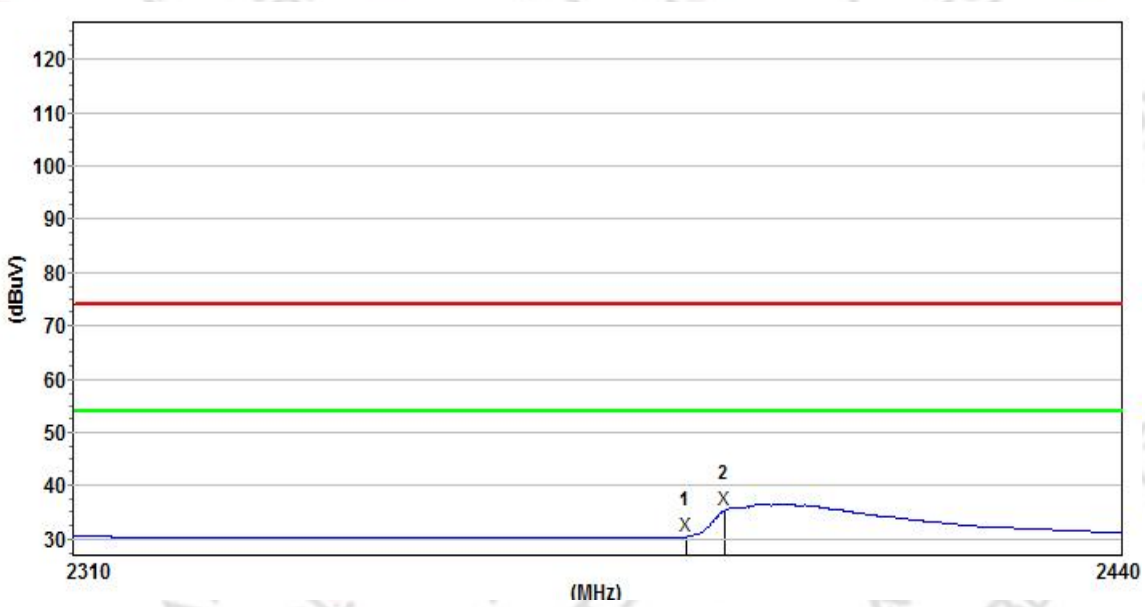
Vertical




| Mk. | Frequency | Level | Limit | Margin | Ant.F/G. | Amp.G. | Cbl.L. | Pol. |
|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | (dBuV/m) | (dB) | (dB/m) | (dB) | (dB) | |
| PK | | | | | | | | |
| 1 | 2382.052625 | 42.9 | 74.0 | 31.1 | 23.1 | 50.2 | 2.8 | V |
| 2 | 2390.000000 | 42.1 | 74.0 | 31.9 | 23.1 | 50.2 | 2.8 | V |

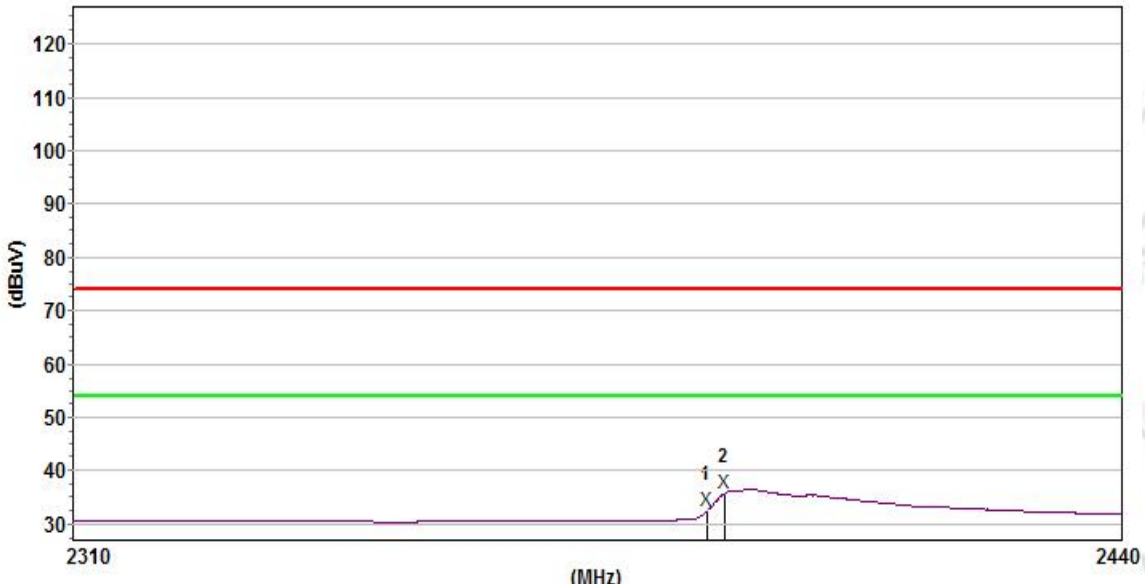
**GFSK-Low**

Horizontal




| Mk. | Frequency | Level | Limit | Margin | Ant.F/G. | Amp.G. | Cbl.L. | Pol. |
|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | (dBuV/m) | (dB) | (dB/m) | (dB) | (dB) | |
| AVG | | | | | | | | |
| 1 | 2385.054142 | 30.5 | 54.0 | 23.5 | 22.7 | 50.2 | 2.8 | H |
| 2 | 2390.000000 | 35.4 | 54.0 | 18.6 | 22.8 | 50.2 | 2.8 | H |

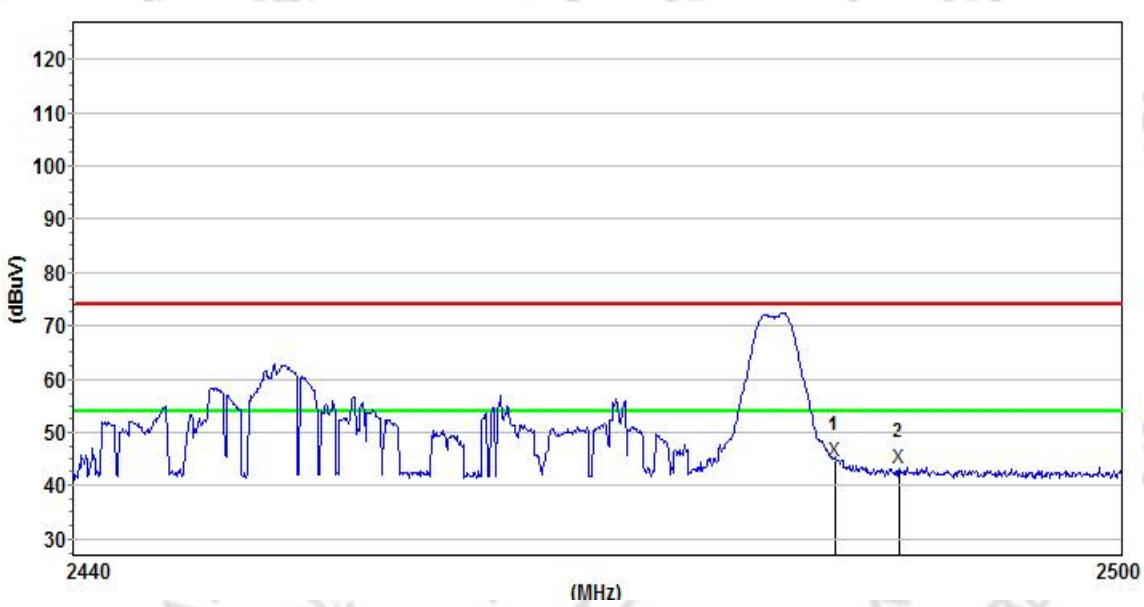
Vertical




| Mk. | Frequency | Level | Limit | Margin | Ant.F/G. | Amp.G. | Cbl.L. | Pol. |
|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | (dBuV/m) | (dB) | (dB/m) | (dB) | (dB) | |
| AVG | | | | | | | | |
| 1 | 2387.797961 | 32.6 | 54.0 | 21.4 | 23.1 | 50.2 | 2.8 | V |
| 2 | 2390.000000 | 35.8 | 54.0 | 18.2 | 23.1 | 50.2 | 2.8 | V |

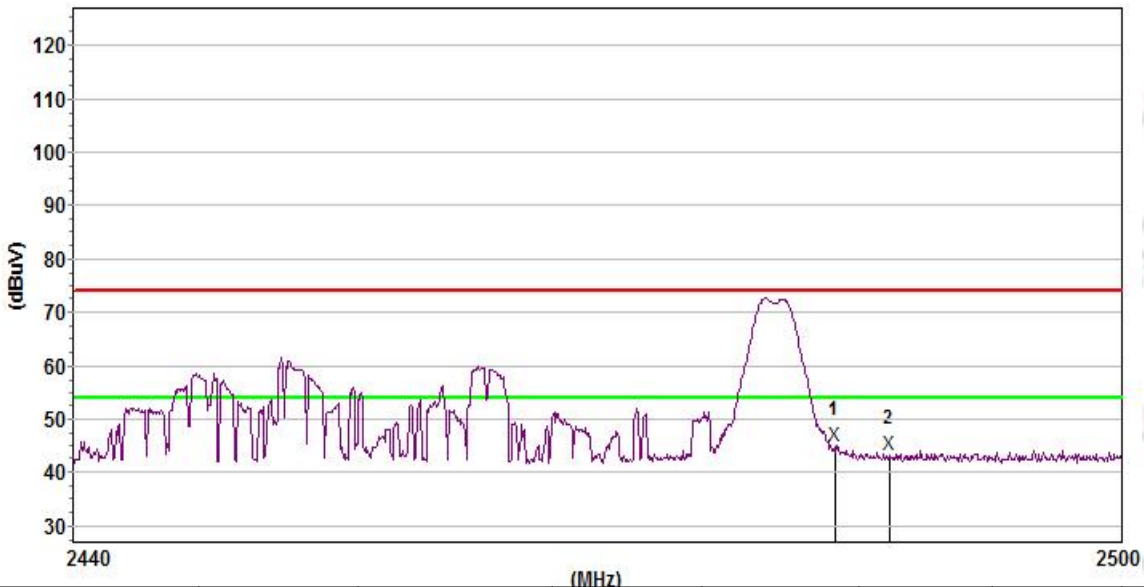
**GFSK-High**

Horizontal




| Mk. | Frequency | Level | Limit | Margin | Ant.F/G. | Amp.G. | Cbl.L. | Pol. |
|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | (dBuV/m) | (dB) | (dB/m) | (dB) | (dB) | |
| PK | | | | | | | | |
| 1 | 2483.500000 | 44.7 | 74.0 | 29.3 | 22.9 | 50.2 | 2.8 | H |
| 2 | 2487.157970 | 43.3 | 74.0 | 30.7 | 22.9 | 50.2 | 2.8 | H |

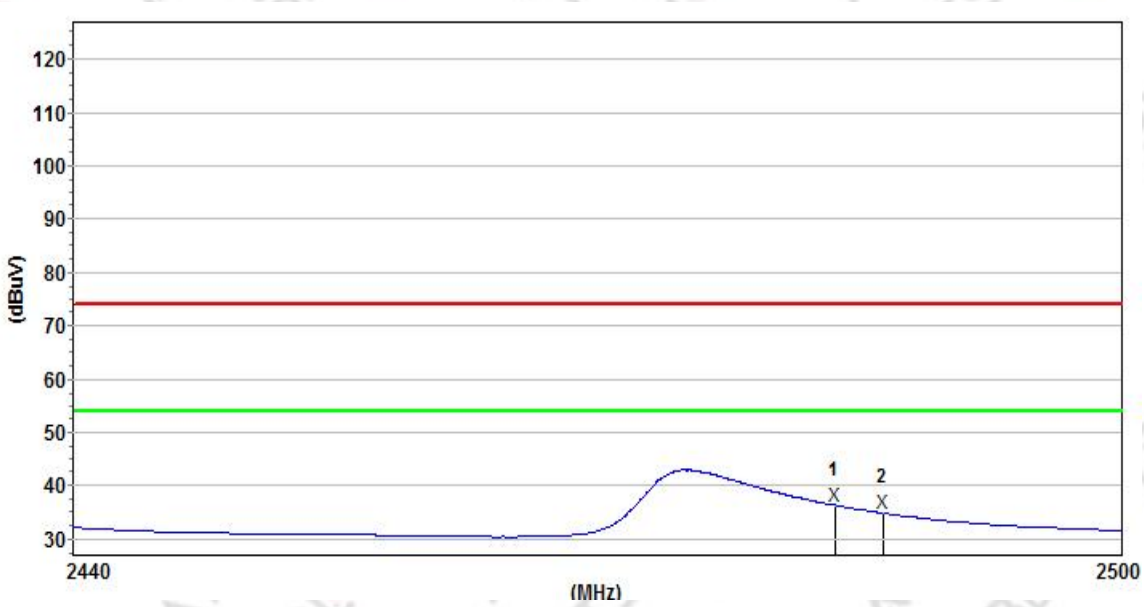
Vertical




| Mk. | Frequency | Level | Limit | Margin | Ant.F/G. | Amp.G. | Cbl.L. | Pol. |
|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | (dBuV/m) | (dB) | (dB/m) | (dB) | (dB) | |
| PK | | | | | | | | |
| 1 | 2483.500000 | 45.0 | 74.0 | 29.0 | 23.3 | 50.2 | 2.8 | V |
| 2 | 2486.553846 | 43.4 | 74.0 | 30.6 | 23.3 | 50.2 | 2.8 | V |

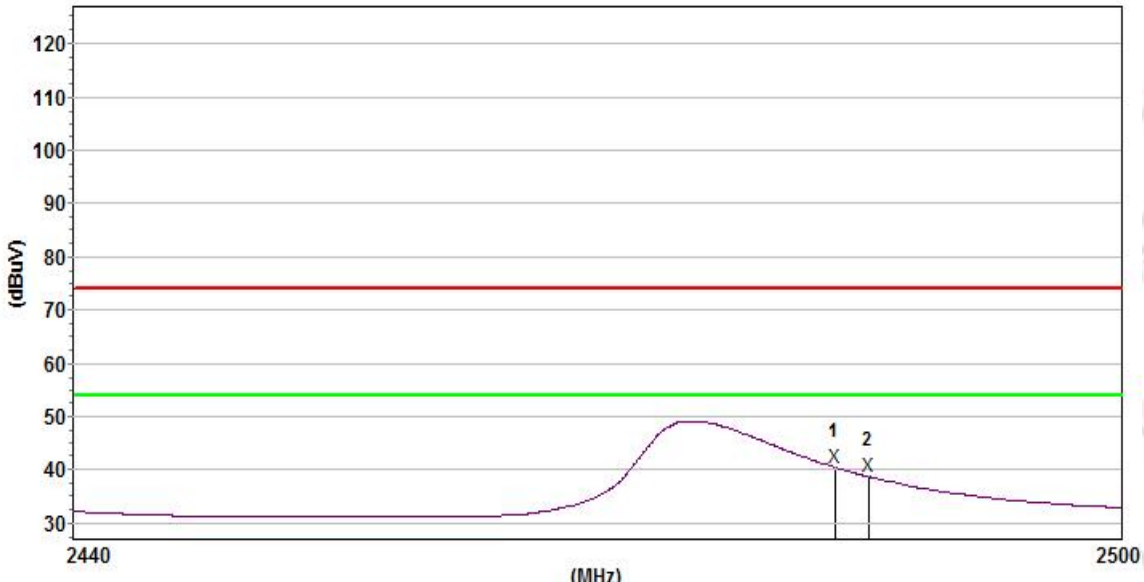
**GFSK- High**

Horizontal




| Mk. | Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Ant.F/G. (dB/m) | Amp.G. (dB) | Cbl.L. (dB) | Pol. |
|---|---|---|---|---|---|---|---|---|
| AVG | | | | | | | | |
| 1 | 2483.500000 | 36.3 | 54.0 | 17.7 | 22.9 | 50.2 | 2.8 | H |
| 2 | 2486.191442 | 34.9 | 54.0 | 19.1 | 22.9 | 50.2 | 2.8 | H |

Vertical




| Mk. | Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Ant.F/G. (dB/m) | Amp.G. (dB) | Cbl.L. (dB) | Pol. |
|---|---|---|---|---|---|---|---|---|
| AVG | | | | | | | | |
| 1 | 2483.500000 | 40.4 | 54.0 | 13.6 | 23.3 | 50.2 | 2.8 | V |
| 2 | 2485.406414 | 38.7 | 54.0 | 15.3 | 23.3 | 50.2 | 2.8 | V |

# 5. CONDUCTED SPURIOUS & BAND EDGE EMISSION

## 5.1 LIMIT

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

## 5.2 TEST PROCEDURE

| Spectrum Parameter | Setting |
|---|---|
| Detector | Peak |
| Start/Stop Frequency | 30 MHz to 10th carrier harmonic |
| RB / VB (emission in restricted band) | 100 kHz/300 kHz |
| Trace-Mode: | Max hold |

For Band edge

| Spectrum Parameter | Setting |
|---|---|
| Detector | Peak |
| Start/Stop Frequency | Lower Band Edge: 2300 – 2407 MHz<br>Upper Band Edge: 2475 – 2500 MHz |
| RB / VB (emission in restricted band) | 100 kHz/300 kHz |
| Trace-Mode: | Max hold |

## 5.3 TEST SETUP

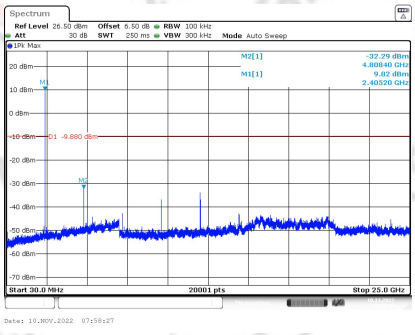
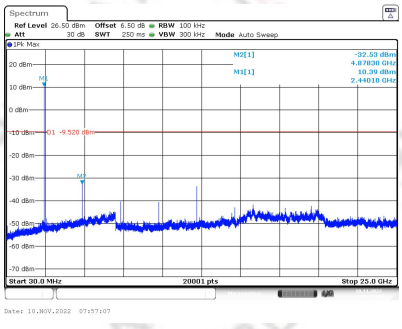
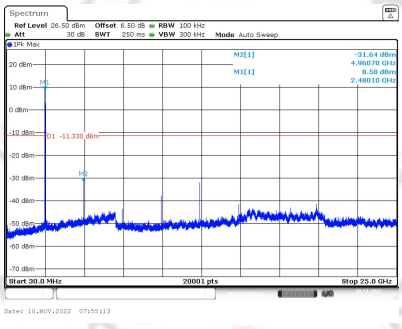

The EUT which is powered by the Battery, is connected to the Spectrum Analyzer; the RF loac attached to the EUT antenna terminal is 50 Ohm; the path loss as the factor is calibrated to correc the reading. Make the measurement with the spectrum analyzer's resolution bandwidth(RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

## 5.4 EUT OPERATION CONDITIONS

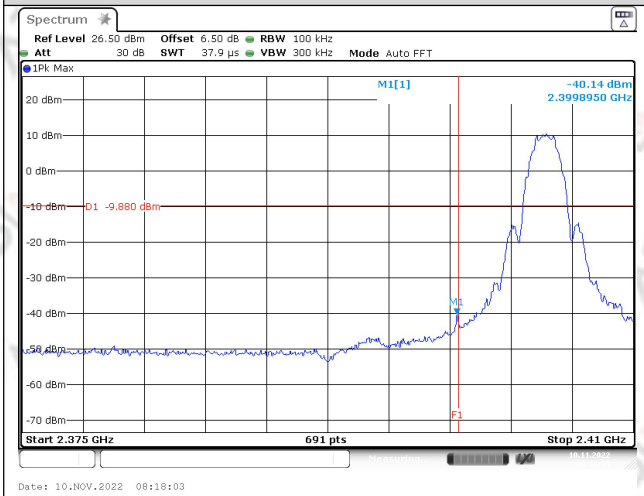
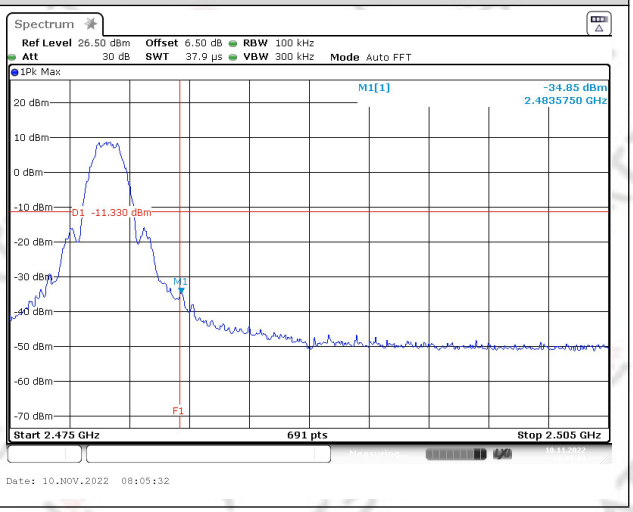
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

## 5.5 TEST RESULTS

| Temperature: | 23.2℃ | Relative Humidity: | 52%RH |
|---|---|---|---|
| Test Voltage: | AC 5V | Test Mode: | TX Mode 1/2/3 |

| Mode1 CH11 | Mode2 CH18 | Mode3 CH26 |
|---|---|---|
|  |  |  |

For Band edge(it's also the reference level for conducted spurious emission)

| Mode1 CH11 | Mode3 CH26 |
| --- | --- |
|  |  |

# 6. POWER SPECTRAL DENSITY TEST

## 6.1 LIMIT

| FCC Part 15.247,Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247(e) | Power Spectral Density | ≤8dBm (RBW≥3kHz) | 2400-2483.5 | PASS |

## 6.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW to: 100 kHz ≥ RBW ≥ 3 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

## 6.3 TEST SETUP

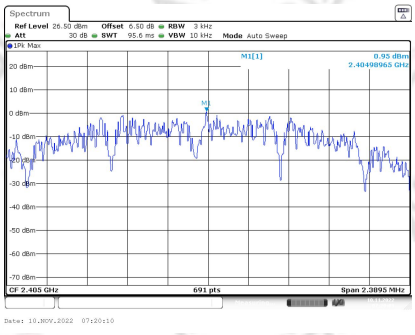
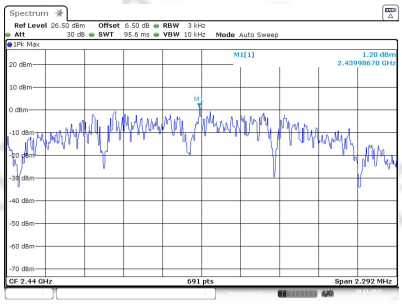
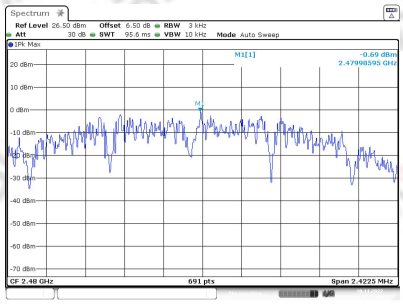

## 6.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

## 6.5 TEST RESULTS

| Temperature: | 23.2 ℃ | Relative Humidity: | 52%RH |
|---|---|---|---|
| Test Voltage: | AC 5V | Test Mode: | TX Mode1/2/3 |

| Frequency | Power Density (dBm/3kHz) | Limit (3kHz/dBm) | Result |
|---|---|---|---|
| 2405 MHz | 0.95 | ≤8 | PASS |
| 2440 MHz | 1.20 | ≤8 | PASS |
| 2480 MHz | -0.69 | ≤8 | PASS |

| Mode1 CH11 | Mode2 CH118 | Mode3 CH26 |
|---|---|---|
|  |  |  |

# 7. BANDWIDTH TEST

## 7.1 LIMIT

| FCC Part 15.247,Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247(a)(2) | Bandwidth | >= 500kHz (6dB bandwidth) | 2400-2483.5 | PASS |

## 7.2 TEST PROCEDURE

Connect the UUT to the spectrum analyzer and use the following settings:

| | |
|---|---|
| Center Frequency | The centre frequency of the channel under test |
| Detector | Peak |
| RBW | For 6 dB Bandwidth :100kHz<br>For 99% Bandwidth :1% to 5% of the occupied bandwidth |
| VBW | For 6dB Bandwidth : ≥3 × RBW<br>For 99% Bandwidth : approximately 3×RBW |
| Trace | Max hold |
| Sweep | Auto |

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB and 99% relative to the maximum level measured in the fundamental emission.

## 7.3 TEST SETUP


## 7.4 EUT OPERATION CONDITIONS

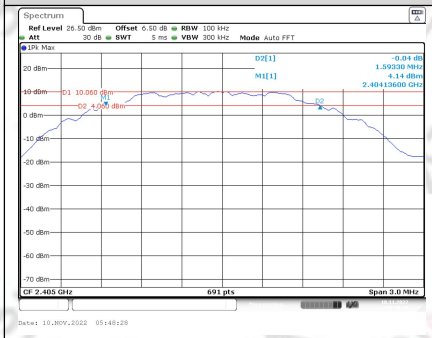
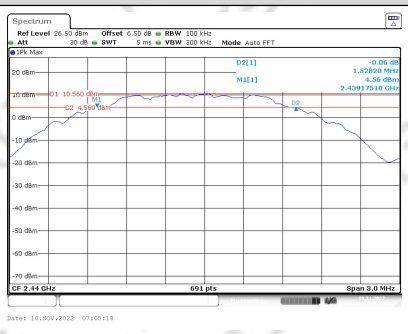
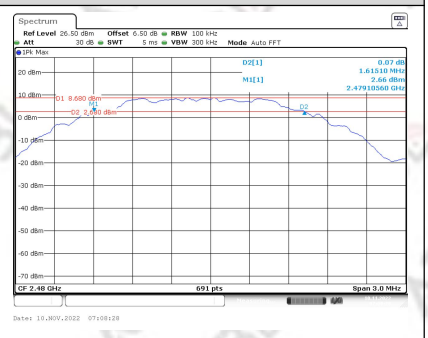
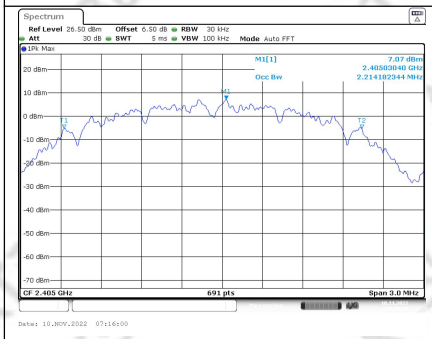
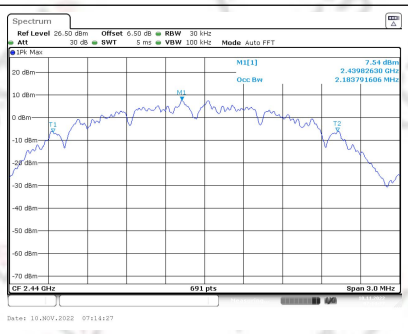
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

## 7.5 TEST RESULTS

| Temperature: | 23.2 ℃ | Relative Humidity: | 52%RH |
|---|---|---|---|
| Test Voltage: | AC 5V | Test Mode: | TX Mode1/2/3 |

| Frequency | 6dB Bandwidth (MHz) | 99% Bandwidth (MHz) | 6dB Bandwidth Limit(kHz) | Result |
|---|---|---|---|---|
| 2405 MHz | 1.593 | 2.214 | ≥500kHz | PASS |
| 2440 MHz | 1.528 | 2.183 | ≥500kHz | PASS |
| 2480 MHz | 1.615 | 2.218 | ≥500kHz | PASS |

6dB Bandwidth & 99% Bandwidth

| 6dB Bandwidth Mode1 CH 11 | 6dB Bandwidth Mode2 CH 18 | 6dB Bandwidth Mode3 CH 26 |
|---|---|---|
|  |  |  |
| **99% Bandwidth Mode1 CH 11** | **99% Bandwidth Mode2 CH 18** | **99% Bandwidth Mode3 CH 26** |
|  |  |  |

# 8. PEAK OUTPUT POWER TEST

## 8.1 LIMIT

| FCC Part 15.247,Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247(b)(3) | Output Power | 1 watt or 30dBm | 2400-2483.5 | PASS |

## 8.2 TEST PROCEDURE

PKPM1 Peak power meter method:

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

## 8.3 TEST SETUP


## 8.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

8.5 TEST RESULTS

| Temperature: | 23.2 ℃ | Relative Humidity: | 52%RH |
|---|---|---|---|
| Test Voltage: | AC 5V | Test Mode: | TX Mode1/2/3 |

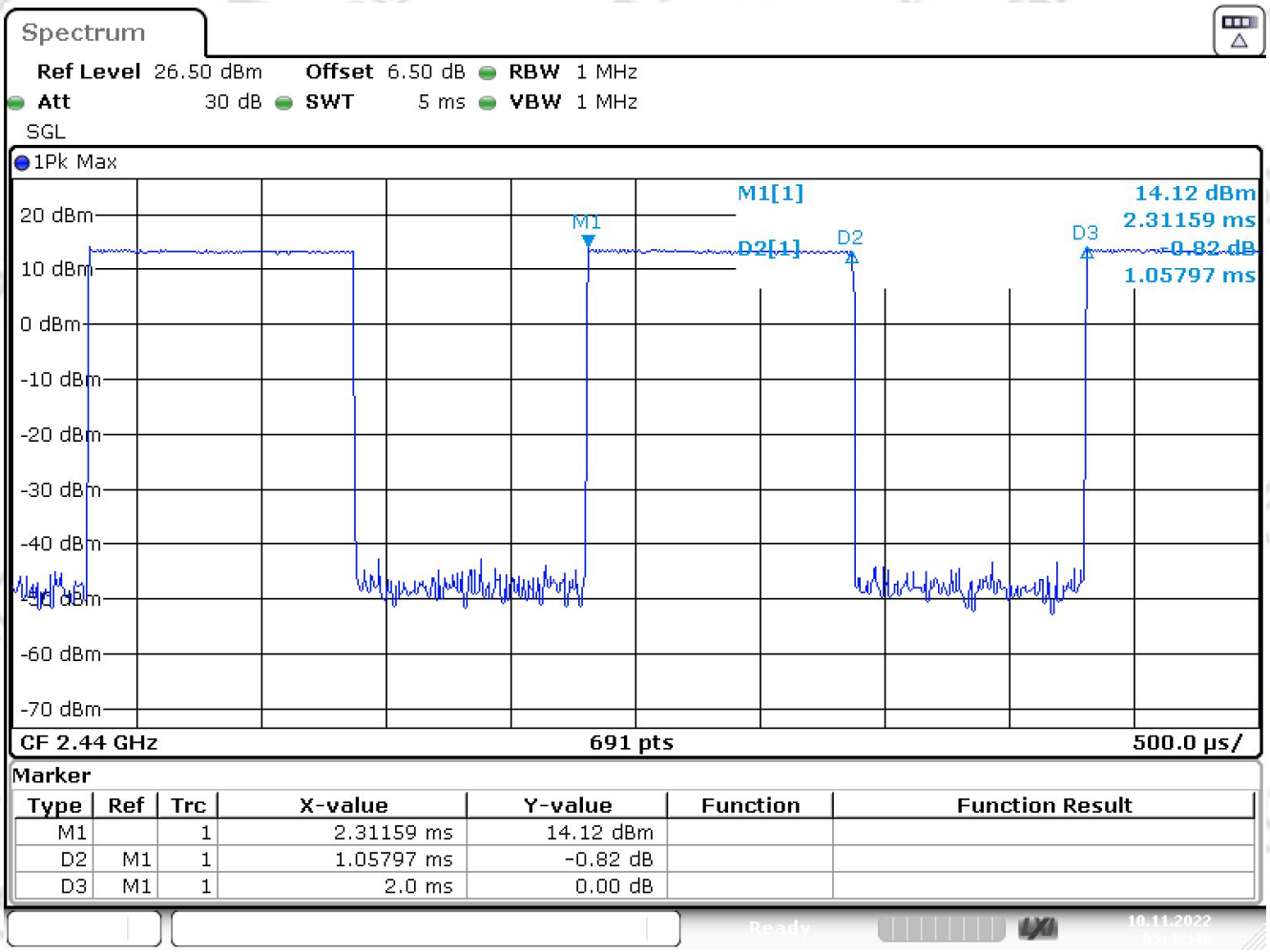
| Test Channel | Frequency | Peak Conducted Output Power | Average Conducted Output Power | LIMIT |
|---|---|---|---|---|
| | (MHz) | (dBm) | (dBm) | dBm |
| CH11 | 2405 | 12.55 | 12.39 | 30 |
| CH18 | 2440 | 12.69 | 12.48 | 30 |
| CH26 | 2480 | 12.84 | 12.69 | 30 |

EIRP Power

| Test Channel | Frequency | Peak Conducted Output Power | Antenna Gain | EIRP Power | LIMIT |
|---|---|---|---|---|---|
| | (MHz) | (dBm) | (dBi) | (dBm) | dBm |
| CH11 | 2405 | 12.55 | 2 | 14.55 | 36 |
| CH18 | 2440 | 12.48 | 2 | 14.48 | 36 |
| CH26 | 2480 | 12.69 | 2 | 14.69 | 36 |

Note: Our power sensor test AVG power has no duty cycle display. The power sensor measures AVG power is Burst power. The software has considered the factor of the duty cycle factor, so it is unnecessary to add it again.

Duty cycle

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| Ton | Tp | Duty cycle(%) | Duty factor(dB) |
|---|---|---|---|
| 1.05797 | 2.0 | 52.90 | 2.77 |

# 9. ANTENNA REQUIREMENT

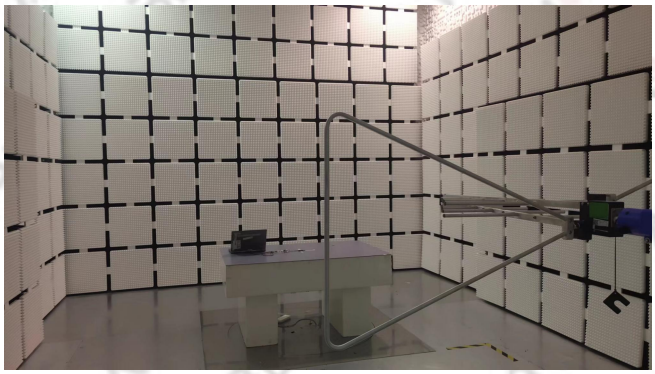
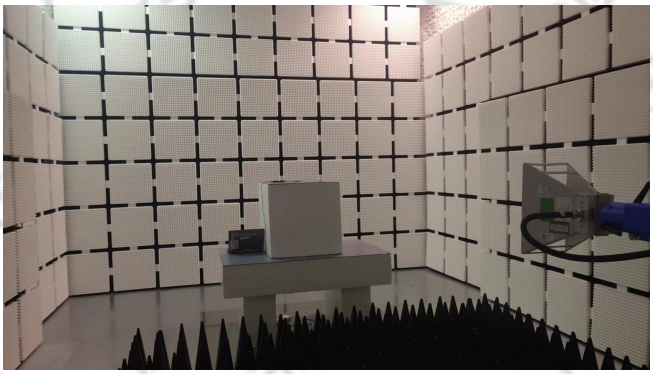
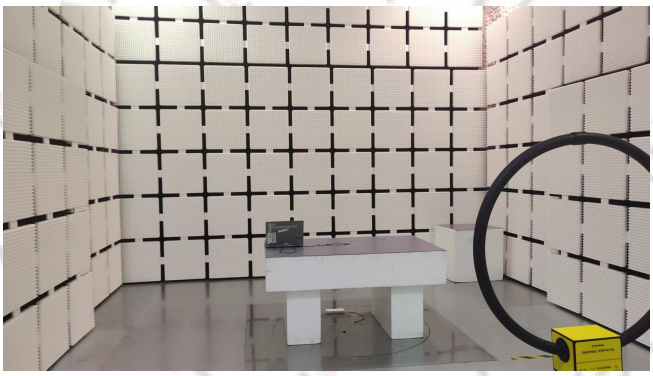
## 9.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

## 9.2 EUT ANTENNA

The EUT antenna is PCB Antenna. It comply with the standard requirement.

## APPENDIX-PHOTOS OF TEST SETUP

| Radiated Emissions for 30MHz~1GHz | Radiated Emissions for 1GHz~18GHz |
|---|---|
|  |  |
| **Conducted for RF** | **Radiated Emissions for 9kHz~30MHz** |
|  |  |
| **AC Power Line Conducted Emissions** | **Radiated Emissions for above 18GHz** |
|  |  |

※※※※※END OF THE REPORT※※※※※