



**FCC 47 CFR PART 15 SUBPART C  
ISED RSS-247 ISSUE 2**

**CERTIFICATION TEST REPORT**

*For*

**WIFI+BT module**

**MODEL NUMBER: WCT0LR2201J**

**FCC ID: 2AC23-WCT0LR2201J  
IC: 12290A-WCT0LR2201J**

**REPORT NUMBER: 4788426874-2**

**ISSUE DATE: May 7, 2018**

*Prepared for*

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Revision History

| Rev. | Issue Date | Revisions     | Revised By |
|------|------------|---------------|------------|
| --   | 5/7/2018   | Initial Issue |            |

| Summary of Test Results |                                |                                                                                                               |              |
|-------------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------|--------------|
| Clause                  | Test Items                     | FCC/IC Rules                                                                                                  | Test Results |
| 1                       | Peak Conducted Output Power    | FCC 15.247 (b) (1)<br>RSS-247 Clause 5.1 (b)                                                                  | Complied     |
| 2                       | Radiated Bandedge and Spurious | FCC 15.247 (d)<br>FCC 15.209<br>FCC 15.205<br>RSS-247 Clause 5.5<br>RSS-GEN Clause 8.9<br>RSS-GEN Clause 8.10 | Complied     |
| 3                       | Antenna Requirement            | FCC 15.203<br>RSS-GEN Clause 8.3                                                                              | Complied     |

## TABLE OF CONTENTS

|                                                    |           |
|----------------------------------------------------|-----------|
| <b>1. ATTESTATION OF TESCT RESULTS .....</b>       | <b>6</b>  |
| <b>2. TEST METHODOLOGY .....</b>                   | <b>7</b>  |
| <b>3. FACILITIES AND ACCREDITATION .....</b>       | <b>7</b>  |
| <b>4. CALIBRATION AND UNCERTAINTY .....</b>        | <b>8</b>  |
| 4.1. MEASURING INSTRUMENT CALIBRATION .....        | 8         |
| 4.2. MEASUREMENT UNCERTAINTY .....                 | 8         |
| <b>5. EQUIPMENT UNDER TEST .....</b>               | <b>9</b>  |
| 5.1. DESCRIPTION OF EUT .....                      | 9         |
| 5.2. MAXIMUM OUTPUT POWER.....                     | 9         |
| 5.3. PACKET TYPE CONFIGURATION .....               | 9         |
| 5.4. CHANNEL LIST .....                            | 10        |
| 5.5. TEST CHANNEL CONFIGURATION.....               | 10        |
| 5.6. THE WORSE CASE POWER SETTING PARAMETER.....   | 10        |
| 5.7. DESCRIPTION OF AVAILABLE ANTENNAS .....       | 11        |
| 5.8. WORST-CASE CONFIGURATIONS.....                | 11        |
| 5.9. TEST ENVIRONMENT .....                        | 11        |
| 5.10. DESCRIPTION OF TEST SETUP .....              | 12        |
| 5.11. MEASURING INSTRUMENT AND SOFTWARE USED ..... | 13        |
| <b>6. ANTENNA PORT TEST RESULTS .....</b>          | <b>14</b> |
| 6.1. ON TIME AND DUTY CYCLE.....                   | 14        |
| 6.2. PEAK CONDUCTED OUTPUT POWER.....              | 16        |
| 6.2.1. GFSK MODE .....                             | 17        |
| 6.2.2. 8DPSK MODE .....                            | 17        |
| <b>7. RADIATED TEST RESULTS.....</b>               | <b>18</b> |
| 7.1. LIMITS AND PROCEDURE .....                    | 18        |
| 7.2. RESTRICTED BANDEDGE .....                     | 23        |
| 7.2.1. GFSK MODE .....                             | 23        |
| 7.2.2. 8DPSK MODE .....                            | 27        |
| 7.3. SPURIOUS EMISSIONS (1~18GHz) .....            | 31        |
| 7.3.1. GFSK MODE .....                             | 31        |
| 7.3.2. 8DPSK MODE .....                            | 37        |
| 7.4. SPURIOUS EMISSIONS 18G ~ 26GHz.....           | 43        |
| 7.4.1. GFSK MODE .....                             | 43        |
| 7.5. SPURIOUS EMISSIONS 30M ~ 1 GHz .....          | 45        |
| 7.5.1. GFSK MODE .....                             | 45        |

|        |                                    |    |
|--------|------------------------------------|----|
| 7.6.   | SPURIOUS EMISSIONS BELOW 30M ..... | 47 |
| 7.6.1. | GFSK MODE .....                    | 47 |
| 8.     | ANTENNA REQUIREMENTS .....         | 51 |

## 1. ATTESTATION OF TESCT RESULTS

### Applicant Information

Company Name: Hui Zhou Gaoshengda Technology Co.,LTD  
Address: HuaXing RD,NO 2,ZhongKai High Technology Development Area,Huizhou,Guangdong, China

### Manufacturer Information

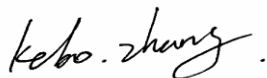
Company Name: Hui Zhou Gaoshengda Technology Co.,LTD  
Address: HuaXing RD,NO 2,ZhongKai High Technology Development Area,Huizhou,Guangdong, China

### EUT Description

Product Name: WIFI+BT module  
Brand Name: GSD  
Model Name: WCT0LR2201J  
Sample ID: 1220986  
Sample Status: Good  
Sample Received date: April 16, 2018  
Date Tested: May 2~May 4, 2018

| APPLICABLE STANDARDS     |              |
|--------------------------|--------------|
| STANDARD                 | TEST RESULTS |
| CFR 47 Part 15 Subpart C | PASS         |
| ISED RSS-247 Issue 2     | PASS         |
| ISED RSS-GEN Issue 4     | PASS         |

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Engineer

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Approved By:



Stephen Guo  
Laboratory Manager

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with DA 00-705, KDB414788 D01 Radiated Test Site v01, ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-247 Issue 2.

## 3. FACILITIES AND ACCREDITATION

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Location             | UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Address                   | Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Accreditation Certificate | UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. The Certificate Registration Number is 4102.01.<br>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The Designation Number is CN1187.<br>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been registered and fully described in a report filed with Industry Canada. The Company Number is 21320. |

Note: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Test Item                                                                                                                                     | Uncertainty         |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Uncertainty for Conduction emission test                                                                                                      | 2.90dB              |
| Uncertainty for Radiation Emission test(include Fundamental emission)<br>(9KHz-30MHz)                                                         | 2.2dB               |
| Uncertainty for Radiation Emission test(include Fundamental emission)<br>(30MHz-1GHz)                                                         | 4.52dB              |
| Uncertainty for Radiation Emission test<br>(1GHz to 26GHz)( include Fundamental emission)                                                     | 5.04dB(1-6GHz)      |
|                                                                                                                                               | 5.30dB (6GHz-18Gz)  |
|                                                                                                                                               | 5.23dB (18GHz-26Gz) |
| Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. |                     |

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

|                                    |                     |                     |           |
|------------------------------------|---------------------|---------------------|-----------|
| Equipment                          | WIFI+BT module      |                     |           |
| Model Name                         | WCT0LR2201J         |                     |           |
| Product Description<br>(Bluetooth) | Operation Frequency | 2402 MHz ~ 2480 MHz |           |
|                                    | Modulation Type     |                     | Data Rate |
|                                    | GFSK                |                     | 1Mbps     |
|                                    | π/4-DQPSK           |                     | 2Mbps     |
|                                    | 8DPSK               |                     | 3Mbps     |
| Power Supply                       | AC120V/60Hz         |                     |           |
| Bluetooth Version                  | BT 4.2+EDR          |                     |           |
| Hardware Version                   | V1.0                |                     |           |
| Software Version                   | V1.27               |                     |           |

### 5.2. MAXIMUM OUTPUT POWER

| Bluetooth Mode | Frequency (MHz) | Channel Number | Max Output Power (dBm) | EIRP (dBm) |
|----------------|-----------------|----------------|------------------------|------------|
| GFSK           | 2402-2480       | 0-78[79]       | 2.098                  | 5.338      |
| 8DPSK          | 2402-2480       | 0-78[79]       | 3.332                  | 6.672      |

### 5.3. PACKET TYPE CONFIGURATION

| Test Mode | Packet Type | Setting(Packet Length) |
|-----------|-------------|------------------------|
| GFSK      | DH1         | 27                     |
|           | DH3         | 183                    |
|           | DH5         | 339                    |
| π/4-DQPSK | 2-DH1       | 54                     |
|           | 2-DH3       | 367                    |
|           | 2-DH5       | 679                    |
| 8DPSK     | 3-DH1       | 83                     |
|           | 3-DH3       | 552                    |
|           | 3-DH5       | 1021                   |

#### 5.4. CHANNEL LIST

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| 00      | 2402            | 20      | 2422            | 40      | 2442            | 60      | 2462            |
| 01      | 2403            | 21      | 2423            | 41      | 2443            | 61      | 2463            |
| 02      | 2404            | 22      | 2424            | 42      | 2444            | 62      | 2464            |
| 03      | 2405            | 23      | 2425            | 43      | 2445            | 63      | 2465            |
| 04      | 2406            | 24      | 2426            | 44      | 2446            | 64      | 2466            |
| 05      | 2407            | 25      | 2427            | 45      | 2447            | 65      | 2467            |
| 06      | 2408            | 26      | 2428            | 46      | 2448            | 66      | 2468            |
| 07      | 2409            | 27      | 2429            | 47      | 2449            | 67      | 2469            |
| 08      | 2410            | 28      | 2430            | 48      | 2450            | 68      | 2470            |
| 09      | 2411            | 29      | 2431            | 49      | 2451            | 69      | 2471            |
| 10      | 2412            | 30      | 2432            | 50      | 2452            | 70      | 2472            |
| 11      | 2413            | 31      | 2433            | 51      | 2453            | 71      | 2473            |
| 12      | 2414            | 32      | 2434            | 52      | 2454            | 72      | 2474            |
| 13      | 2415            | 33      | 2435            | 53      | 2455            | 73      | 2475            |
| 14      | 2416            | 34      | 2436            | 54      | 2456            | 74      | 2476            |
| 15      | 2417            | 35      | 2437            | 55      | 2457            | 75      | 2477            |
| 16      | 2418            | 36      | 2438            | 56      | 2458            | 76      | 2478            |
| 17      | 2419            | 37      | 2439            | 57      | 2459            | 77      | 2479            |
| 18      | 2420            | 38      | 2440            | 58      | 2460            | 78      | 2480            |
| 19      | 2421            | 39      | 2441            | 59      | 2461            |         |                 |

#### 5.5. TEST CHANNEL CONFIGURATION

| Test Mode | Test Channel Number | Test Channel      |
|-----------|---------------------|-------------------|
| GFSK      | CH 00, CH 39, CH 78 | Low, Middle, High |
| 8DPSK     | CH 00, CH 39, CH 78 | Low, Middle, High |

#### 5.6. THE WORSE CASE POWER SETTING PARAMETER

| The Worst Case Power Setting Parameter under 2400 ~ 2483.5MHz Band |                         |              |       |       |
|--------------------------------------------------------------------|-------------------------|--------------|-------|-------|
| Test Software                                                      |                         | RELBTAPP     |       |       |
| Modulation Type                                                    | Transmit Antenna Number | Test Channel |       |       |
|                                                                    |                         | CH 00        | CH 39 | CH 78 |
| GFSK                                                               | 1                       | 6            | 6     | 6     |
| 8DPSK                                                              | 1                       | 6            | 6     | 6     |

## 5.7. DESCRIPTION OF AVAILABLE ANTENNAS

| Ant. | Frequency (MHz) | Antenna Type     | Antenna Gain (dBi) |
|------|-----------------|------------------|--------------------|
| 2    | 2402-2480       | External Antenna | 3.24               |

Note: There are two antenna in the EUT, only antenna 2 support BT mode.

| Test Mode | Transmit and Receive Mode | Description                                            |
|-----------|---------------------------|--------------------------------------------------------|
| GFSK      | 1TX, 1RX                  | Chain 1 can be used as transmitting/receiving antenna. |
| 8DPSK     | 1TX, 1RX                  | Chain 1 can be used as transmitting/receiving antenna. |

## 5.8. WORST-CASE CONFIGURATIONS

| Bluetooth Mode | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|----------------|-----------------------|-----------------|------------------|
| BR             | FHSS                  | GFSK            | 1Mbit/s          |
| EDR            | FHSS                  | 8DPSK           | 3Mbit/s          |

Note: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.

## 5.9. TEST ENVIRONMENT

| Environment Parameter | Selected Values During Tests |              |
|-----------------------|------------------------------|--------------|
| Relative Humidity     | 55 ~ 65%                     |              |
| Atmospheric Pressure: | 1025Pa                       |              |
| Temperature           | TN                           | 23 ~ 28 °C   |
| Voltage :             | VL                           | N/A          |
|                       | VN                           | AC 120V 60Hz |
|                       | VH                           | N/A          |

Note: VL= Lower Extreme Test Voltage  
VN= Nominal Voltage.  
VH= Upper Extreme Test Voltage  
TN= Normal Temperature

## 5.10. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Item | Equipment    | Brand Name | Model Name  | P/N      |
|------|--------------|------------|-------------|----------|
| 1    | PC           | Dell       | Vostro 3902 | 8KNDDDB2 |
| 2    | USB TO RS232 | N/A        | N/A         | N/A      |

### I/O CABLES

| Cable No | Port | Connector Type | Cable Type | Cable Length(m) | Remarks |
|----------|------|----------------|------------|-----------------|---------|
| 1        | N/A  | N/A            | N/A        | N/A             | N/A     |

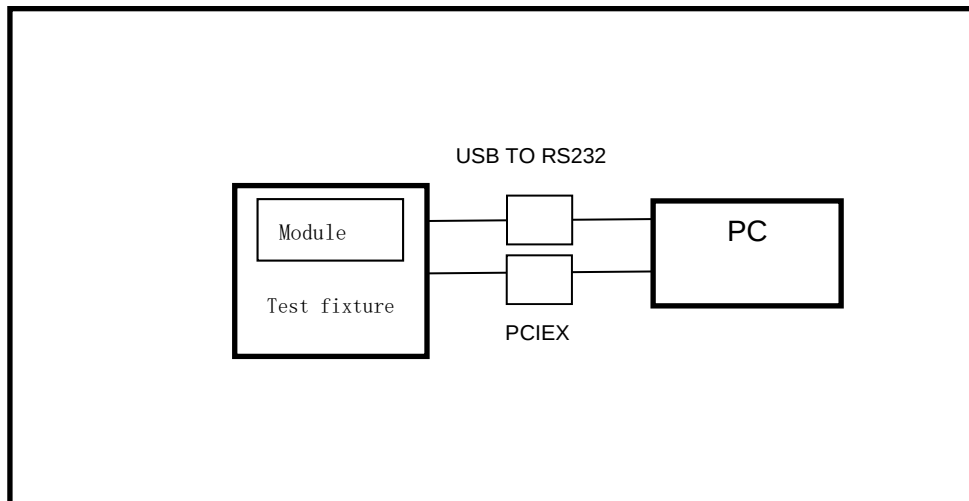
### ACCESSORY

| Item | Accessory | Brand Name | Model Name | Description |
|------|-----------|------------|------------|-------------|
| 1    | N/A       | N/A        | N/A        | N/A         |

### TEST SETUP

The EUT can work in an engineer mode with a software through a PC.

### SETUP DIAGRAM FOR TESTS



## 5.11. MEASURING INSTRUMENT AND SOFTWARE USED

| Conducted Emissions                 |                                         |              |                                     |               |               |               |
|-------------------------------------|-----------------------------------------|--------------|-------------------------------------|---------------|---------------|---------------|
| Used                                | Equipment                               | Manufacturer | Model No.                           | Serial No.    | Last Cal.     | Next Cal.     |
| <input checked="" type="checkbox"/> | EMI Test Receiver                       | R&S          | ESR3                                | 101961        | Dec.12, 2017  | Dec.11, 2018  |
| <input checked="" type="checkbox"/> | Two-Line V-Network                      | R&S          | ENV216                              | 101983        | Dec.12, 2017  | Dec.11, 2018  |
| <input checked="" type="checkbox"/> | Artificial Mains Networks               | Schwarzbeck  | NSLK 8126                           | 8126465       | Dec.12, 2017  | Dec.11, 2018  |
| Software                            |                                         |              |                                     |               |               |               |
| Used                                | Description                             |              | Manufacturer                        | Name          |               | Version       |
| <input checked="" type="checkbox"/> | Test Software for Conducted disturbance |              | UL                                  | Antenna port  |               | Ver. 7.2      |
| Radiated Emissions                  |                                         |              |                                     |               |               |               |
| Used                                | Equipment                               | Manufacturer | Model No.                           | Serial No.    | Last Cal.     | Next Cal.     |
| <input checked="" type="checkbox"/> | MXE EMI Receiver                        | KESIGHT      | N9038A                              | MY56400036    | Dec.12, 2017  | Dec.11, 2018  |
| <input checked="" type="checkbox"/> | Hybrid Log Periodic Antenna             | TDK          | HLP-3003C                           | 130960        | Dec.12, 2017  | Dec.11, 2018  |
| <input checked="" type="checkbox"/> | Preamplifier                            | HP           | 8447D                               | 2944A09099    | Dec.12, 2017  | Dec.11, 2018  |
| <input checked="" type="checkbox"/> | EMI Measurement Receiver                | R&S          | ESR26                               | 101377        | Dec.12, 2017  | Dec.11, 2018  |
| <input checked="" type="checkbox"/> | Horn Antenna                            | TDK          | HRN-0118                            | 130939        | Jan. 09, 2016 | Jan. 09, 2019 |
| <input checked="" type="checkbox"/> | High Gain Horn Antenna                  | Schwarzbeck  | BBHA-9170                           | 691           | Jan.06, 2016  | Jan.06, 2019  |
| <input checked="" type="checkbox"/> | Preamplifier                            | TDK          | PA-02-0118                          | TRS-305-00066 | Dec.12, 2017  | Dec.11, 2018  |
| <input checked="" type="checkbox"/> | Preamplifier                            | TDK          | PA-02-2                             | TRS-307-00003 | Dec.12, 2017  | Dec.11, 2018  |
| <input checked="" type="checkbox"/> | Loop antenna                            | Schwarzbeck  | 1519B                               | 00008         | Mar. 26, 2016 | Mar. 26, 2019 |
| <input checked="" type="checkbox"/> | Band Reject Filter                      | Wainwright   | WRCJV8-2350-2400-2483.5-2533.5-40SS | 4             | Dec.12, 2017  | Dec.11, 2018  |
| Software                            |                                         |              |                                     |               |               |               |
| Used                                | Description                             |              | Manufacturer                        | Name          |               | Version       |
| <input checked="" type="checkbox"/> | Test Software for Radiated disturbance  |              | Farad                               | EZ-EMC        |               | Ver. UL-3A1   |
| Other instruments                   |                                         |              |                                     |               |               |               |
| Used                                | Equipment                               | Manufacturer | Model No.                           | Serial No.    | Last Cal.     | Next Cal.     |
| <input checked="" type="checkbox"/> | Spectrum Analyzer                       | Keysight     | N9030A                              | MY55410512    | Dec.12, 2017  | Dec.11, 2018  |
| <input checked="" type="checkbox"/> | Power Meter                             | Keysight     | N9031A                              | MY55416024    | Dec.12, 2017  | Dec.11, 2018  |
| <input checked="" type="checkbox"/> | Power Sensor                            | Keysight     | N9323A                              | MY55440013    | Dec.12, 2017  | Dec.11, 2018  |

## 6. ANTENNA PORT TEST RESULTS

### 6.1. ON TIME AND DUTY CYCLE

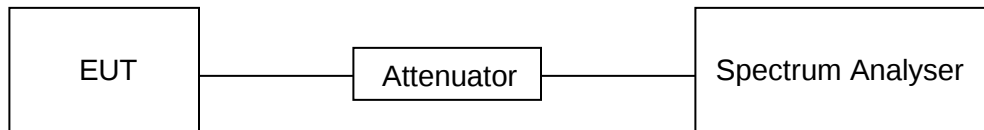
#### LIMITS

None; for reporting purposes only

#### PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method

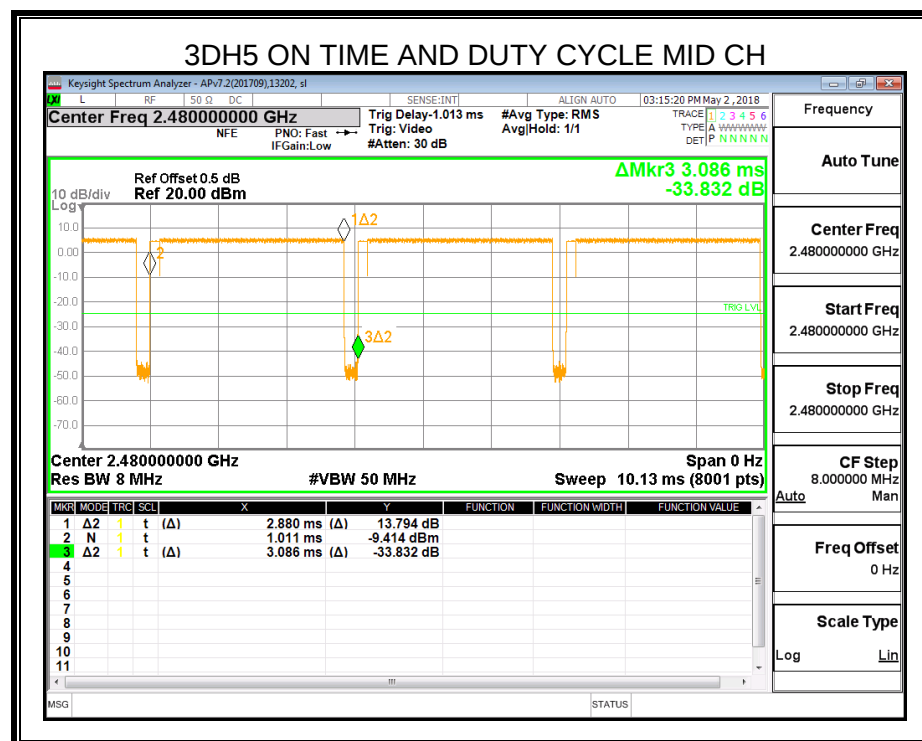
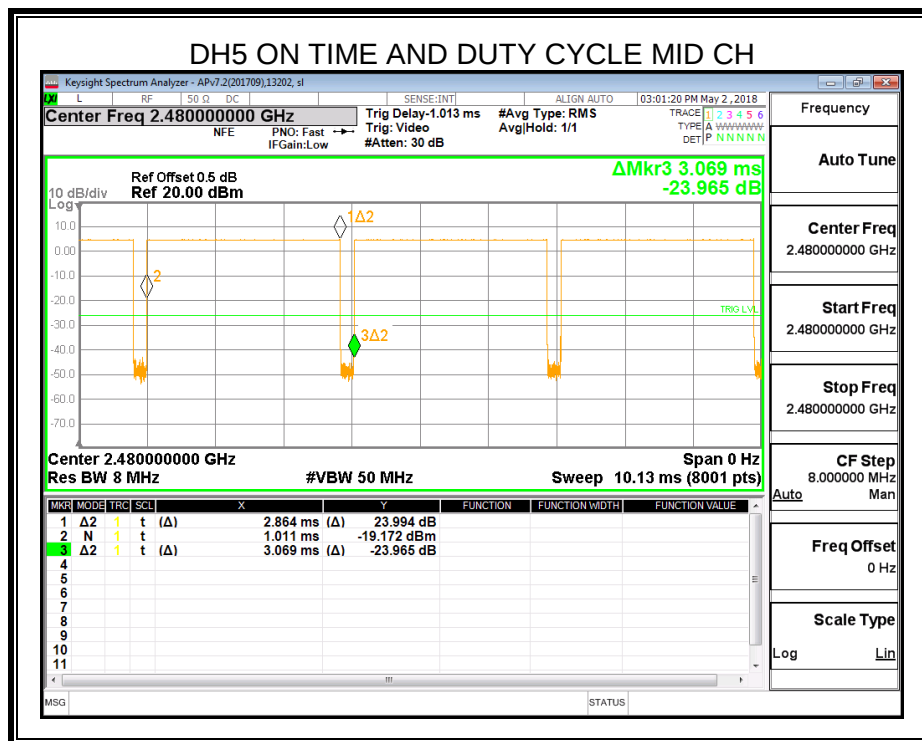
#### TEST SETUP



#### RESULTS

| Mode  | On Time (msec) | Period (msec) | Duty Cycle x (Linear) | Duty Cycle (%) | Duty Cycle Correction Factor (db) | 1/T Minimum VBW (KHz) |
|-------|----------------|---------------|-----------------------|----------------|-----------------------------------|-----------------------|
| GFSK  | 2.864          | 3.069         | 0.933                 | 93             | 0.325                             | 0.350                 |
| 8DPSK | 2.880          | 3.086         | 0.933                 | 93             | 0.325                             | 0.350                 |

Note: Duty Cycle Correction Factor= $10\log(1/x)$ .  
Where: x is Duty Cycle(Linear)  
Where: T is On Time (transmit duration)



## 6.2. PEAK CONDUCTED OUTPUT POWER

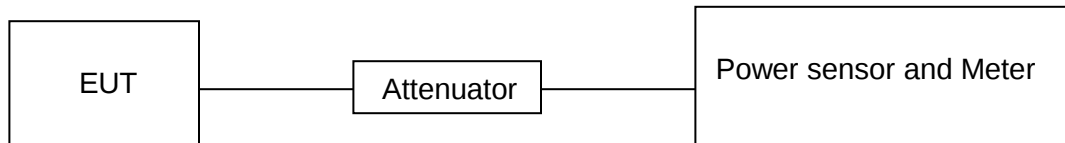
### LIMITS

| FCC Part15 (15.247) , Subpart C<br>RSS-247 ISSUE 2 |                             |                 |                       |
|----------------------------------------------------|-----------------------------|-----------------|-----------------------|
| Section                                            | Test Item                   | Limit           | Frequency Range (MHz) |
| FCC 15.247 (b) (1)<br>RSS-247 Clause 5.4 (b)       | Peak Conducted Output Power | 1 watt or 30dBm | 2400-2483.5           |

### TEST PROCEDURE

Place the EUT on the table and set it in the transmitting mode.  
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.  
Measure peak power each channel.

### TEST SETUP



## **RESULTS**

### **6.2.1. GFSK MODE**

| Channel | Frequency | Maximum Conducted Output Power(PK) | EIRP  | Result |
|---------|-----------|------------------------------------|-------|--------|
|         | (MHz)     | (dBm)                              | (dBm) |        |
| Low     | 2402      | 2.081                              | 5.321 | Pass   |
| Middle  | 2441      | 2.098                              | 5.338 | Pass   |
| High    | 2480      | 2.036                              | 5.280 | Pass   |

Note: EIRP= Maximum Conducted Output Power + Antenna Gain

### **6.2.2. 8DPSK MODE**

| Channel | Frequency | Maximum Conducted Output Power(PK) | EIRP  | Result |
|---------|-----------|------------------------------------|-------|--------|
|         | (MHz)     | (dBm)                              | (dBm) |        |
| Low     | 2402      | 3.332                              | 6.672 | Pass   |
| Middle  | 2441      | 3.309                              | 6.549 | Pass   |
| High    | 2480      | 3.201                              | 6.441 | Pass   |

Note: EIRP= Maximum Conducted Output Power + Antenna Gain

## 7. RADIATED TEST RESULTS

### 7.1. LIMITS AND PROCEDURE

#### LIMITS

Please refer to FCC §15.205 and §15.209

Please refer to SS-GEN Clause 8.9 and Clause 8.10

Radiation Disturbance Test Limit for FCC (Class B)(9KHz-1GHz)

| Frequency<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(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                                |
| 960~1000           | 500                                  | 3                                |

Note: 1) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

(2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). This paragraph (f) shall not apply to Access BPL devices operating below 30 MHz.

Radiation Disturbance Test Limit for FCC (Above 1G)

| Frequency (MHz) | dB(uV/m) (at 3 meters) |         |
|-----------------|------------------------|---------|
|                 | Peak                   | Average |
| Above 1000      | 74                     | 54      |

Restricted bands of operation

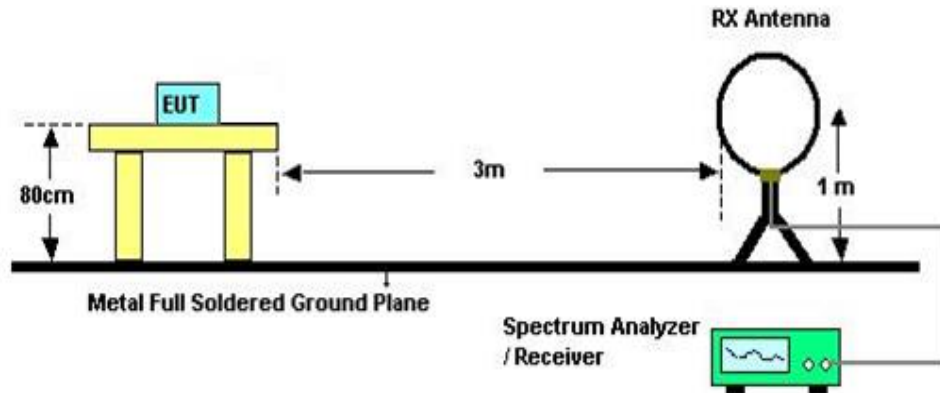
| MHz                      | MHz                 | MHz           | GHz              |
|--------------------------|---------------------|---------------|------------------|
| 0.090-0.110              | 16.42-16.423        | 399.9-410     | 4.5-5.15         |
| <sup>1</sup> 0.495-0.505 | 16.69475-16.69525   | 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     | ( <sup>2</sup> ) |
| 13.36-13.41              |                     |               |                  |

Note: <sup>1</sup>Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup>Above 38.6c

## TEST SETUP AND PROCEDURE

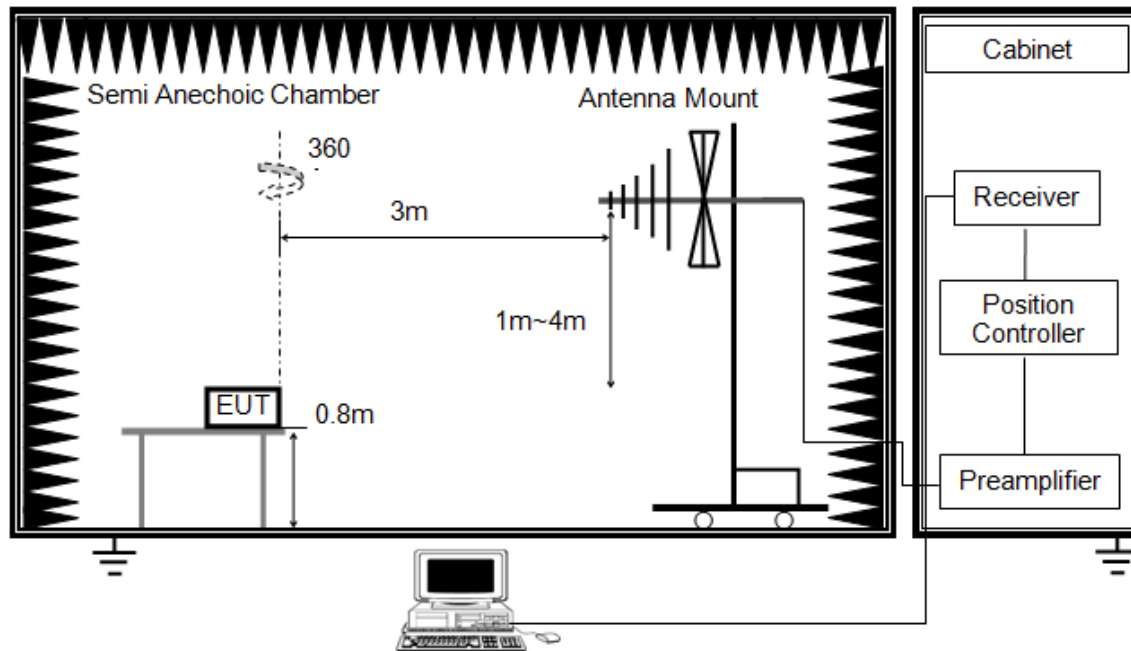
Below 30MHz



The setting of the spectrum analyser

|       |                                                            |
|-------|------------------------------------------------------------|
| RBW   | 200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz) |
| VBW   | 200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz) |
| Sweep | Auto                                                       |
| Trace | Max hold                                                   |

1. The testing follows the guidelines in ANSI C63.10-2013
2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80cm meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
6. For measurement below 1GHz, 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. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)
8. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

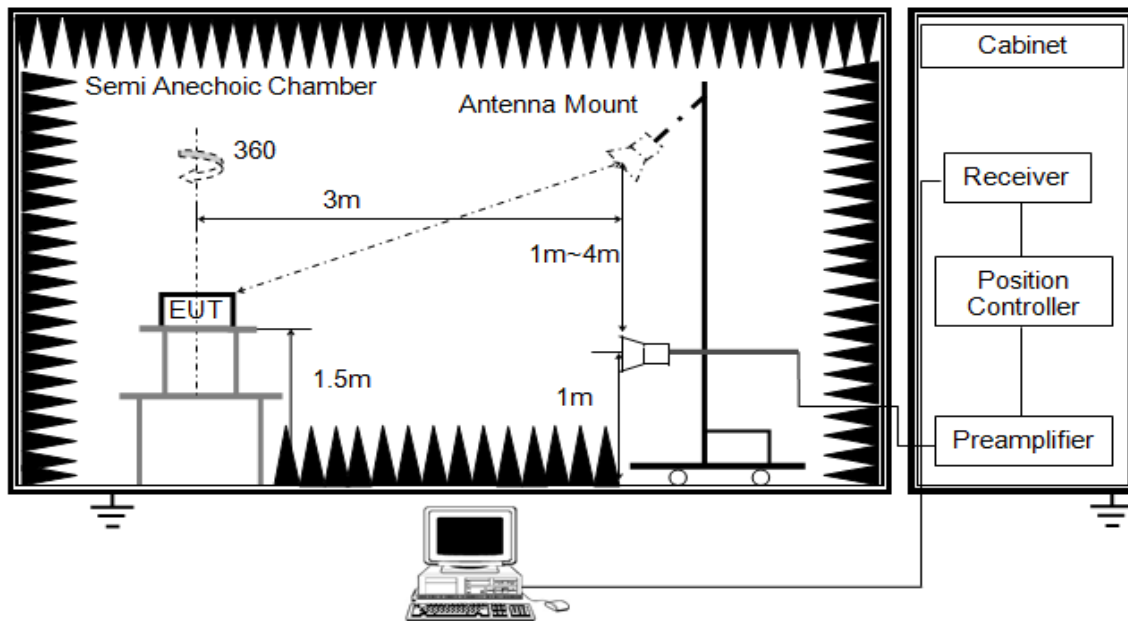


The setting of the spectrum analyzer

|       |          |
|-------|----------|
| RBW   | 120K     |
| VBW   | 300K     |
| Sweep | Auto     |
| Trace | Max hold |

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80cm above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement below 1GHz, 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. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
6. For the actual test configuration, please refer to the related item in this test report.

Above 1G



|          |                             |
|----------|-----------------------------|
| RBW      | 1M                          |
| VBW      | PEAK: 3M<br>AVG: see note 6 |
| Sweep    | Auto                        |
| Detector | Peak                        |
| Trace    | Max hold                    |

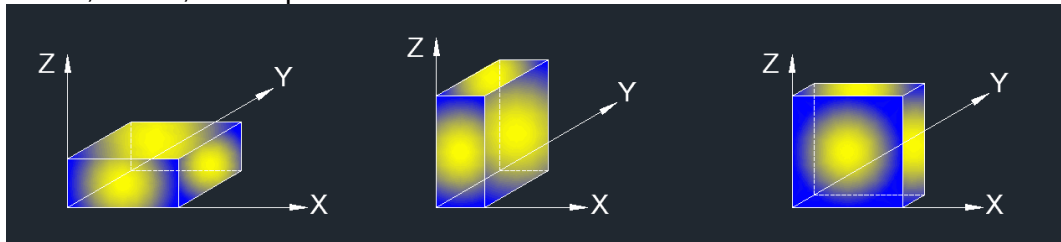
1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80cm above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.
6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector. For the Duty Cycle please refer to clause 6.1.ON TIME AND DUTY CYCLE.

If that calculated VBW is not available on the analyzer then the next higher value should be used.

In this case 500Hz should be used.

7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

X axis, Y axis, Z axis positions:

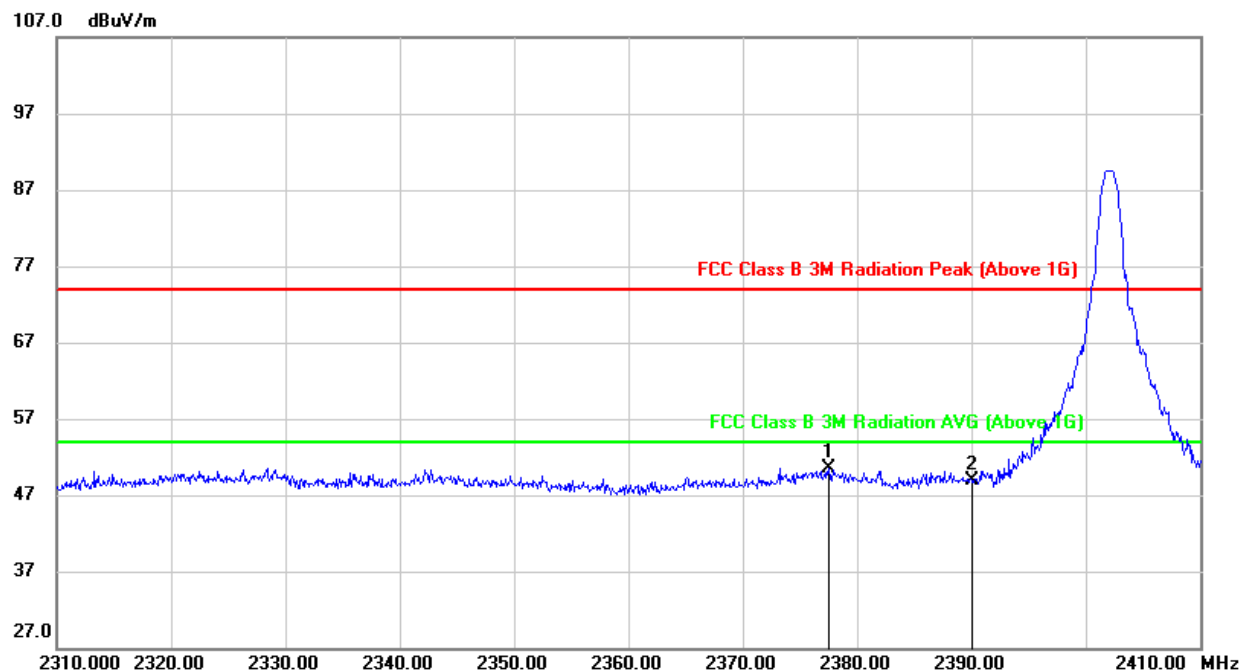


Note: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

## 7.2. RESTRICTED BANDEDGE

### 7.2.1. GFSK MODE

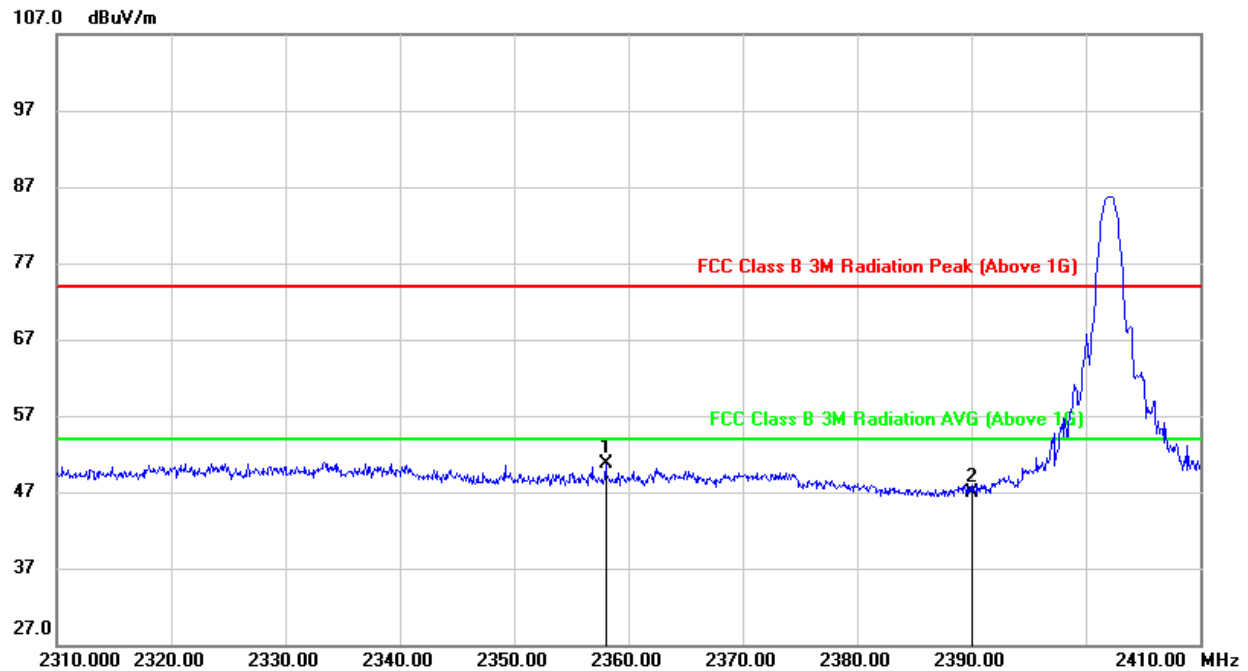
#### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|--------|
| 1   | 2377.500        | 17.31            | 33.23        | 50.54           | 74.00          | -23.46      | peak   |
| 2   | 2390.000        | 15.68            | 33.14        | 48.82           | 74.00          | -25.18      | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Peak: Peak detector.  
4. AVG: VBW=1/Ton where: ton is transmit duration.  
5. For transmit duration, please refer to clause 6.1.  
6. Only the worst case emission will be recorder, if it complies with the limit, the other emissions deemed to comply with the limit.

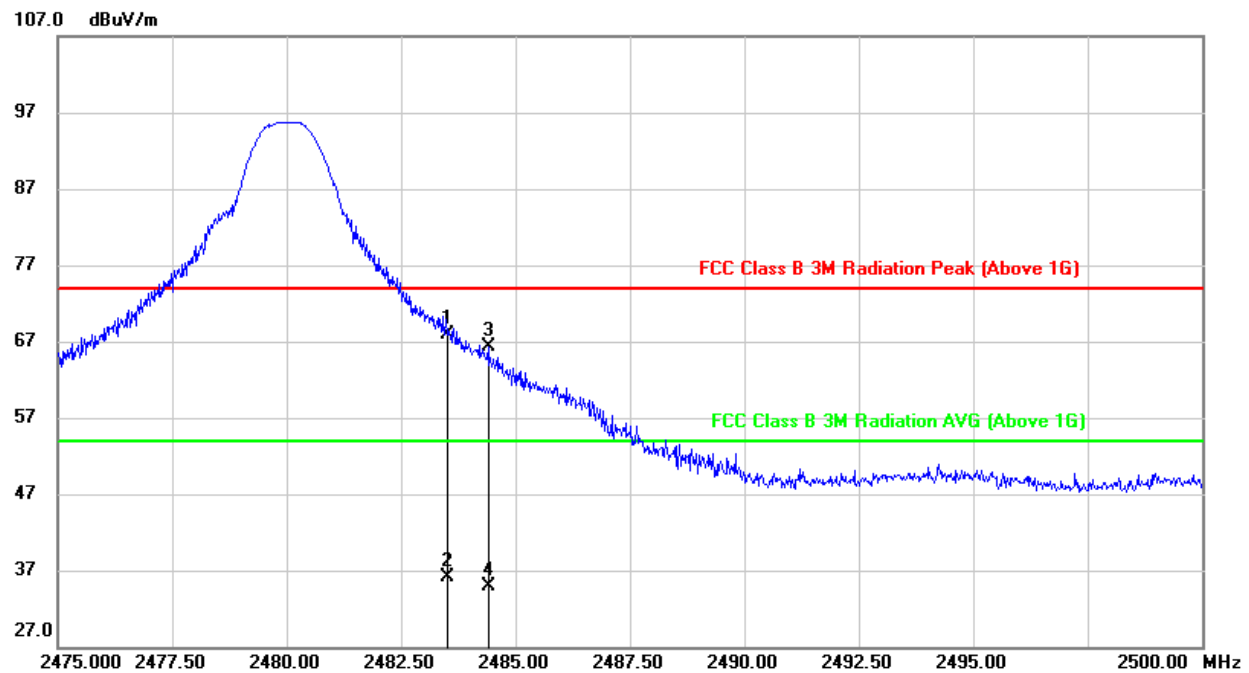
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1   | 2358.000           | 17.17               | 33.48           | 50.65              | 74.00             | -23.35         | peak   |
| 2   | 2390.000           | 13.73               | 33.24           | 46.97              | 74.00             | -27.03         | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. AVG: VBW=1/Ton where: ton is transmit duration.  
 5. For transmit duration, please refer to clause 6.1.  
 6. Only the worst case emission will be recorder, if it complies with the limit, the other emissions deemed to comply with the limit.

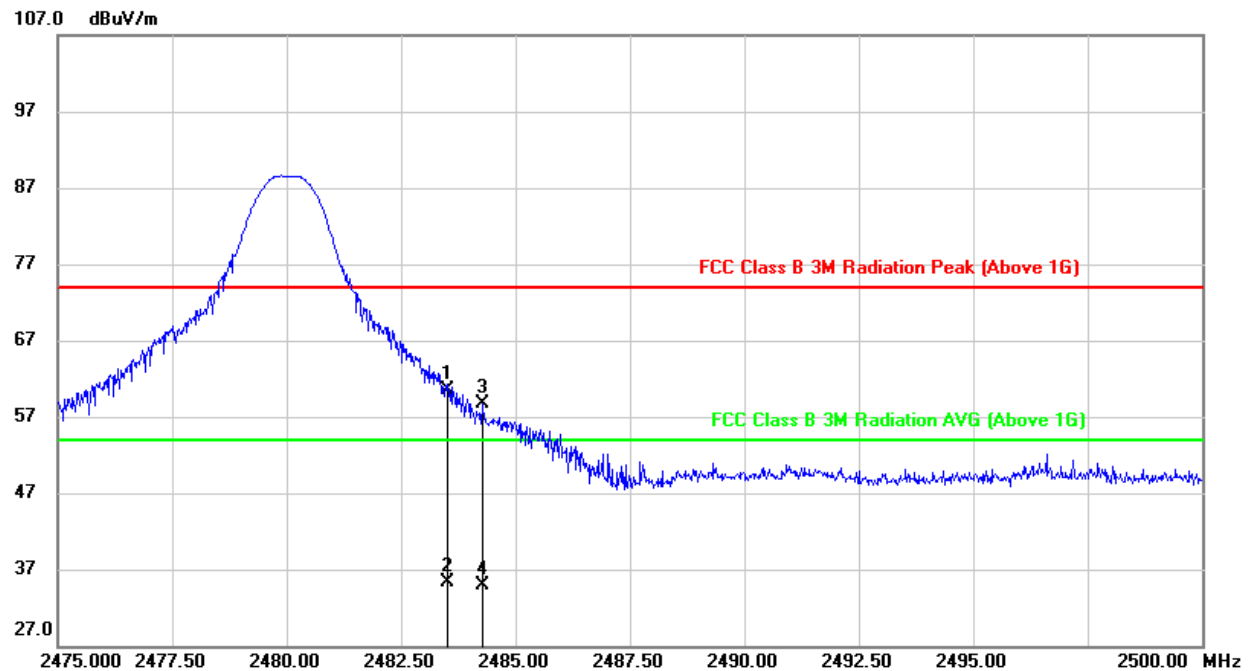
**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1   | 2483.500           | 35.18               | 32.78           | 67.96              | 74.00             | -6.04          | peak   |
| 2   | 2483.500           | 3.34                | 32.78           | 36.12              | 54.00             | -17.88         | AVG    |
| 3   | 2484.400           | 33.53               | 32.78           | 66.31              | 74.00             | -7.69          | peak   |
| 4   | 2484.400           | 2.20                | 32.78           | 34.98              | 54.00             | -19.02         | AVG    |

Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. AVG: VBW=1/Ton where: ton is transmit duration.  
 5. For transmit duration, please refer to clause 6.1.  
 6. Only the worst case emission will be recorder, if it complies with the limit, the other emissions deemed to comply with the limit.

**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**

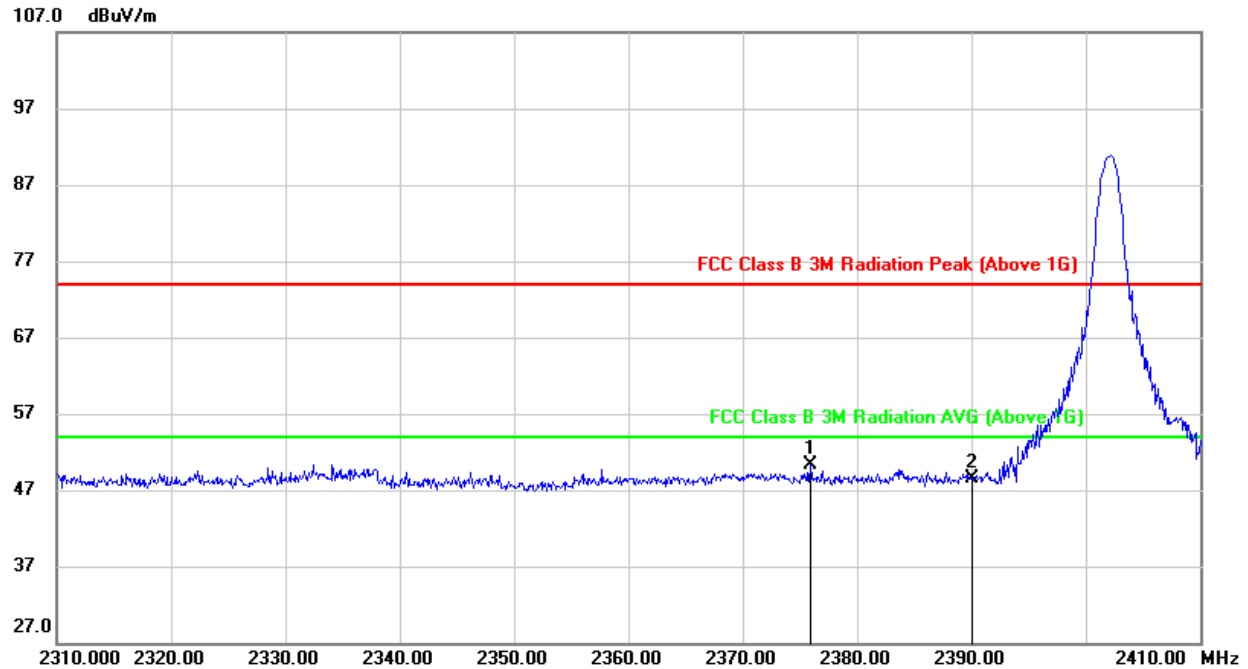


| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|--------|
| 1   | 2483.500        | 27.63            | 32.88        | 60.51           | 74.00          | -13.49      | peak   |
| 2   | 2483.500        | 2.44             | 32.88        | 35.32           | 54.00          | -18.68      | AVG    |
| 3   | 2484.275        | 25.78            | 32.88        | 58.66           | 74.00          | -15.34      | peak   |
| 4   | 2484.275        | 2.06             | 32.88        | 34.94           | 54.00          | -19.06      | AVG    |

Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. AVG: VBW=1/Ton where: ton is transmit duration.  
 5. For transmit duration, please refer to clause 6.1.  
 6. Only the worst case emission will be recorder, if it complies with the limit, the other emissions deemed to comply with the limit.

## 7.2.2. 8DPSK MODE

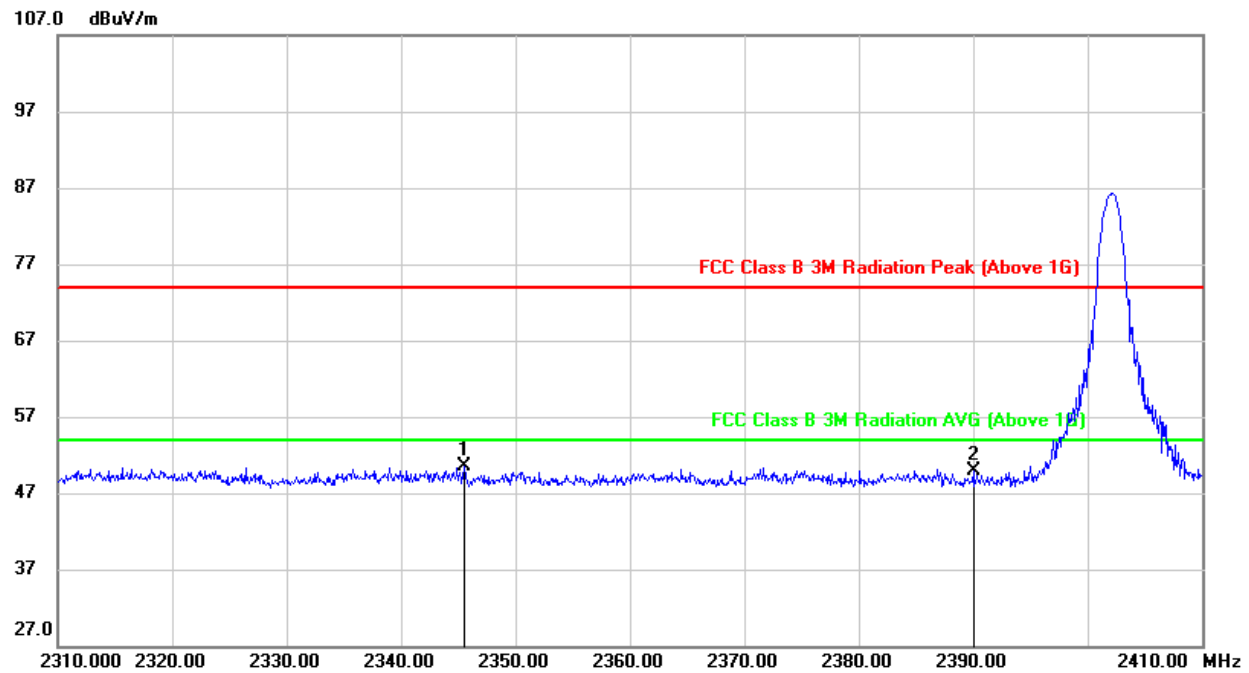
### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|--------|
| 1   | 2375.900        | 16.98            | 33.24        | 50.22           | 74.00          | -23.78      | peak   |
| 2   | 2390.000        | 15.31            | 33.14        | 48.45           | 74.00          | -25.55      | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. AVG: VBW=1/Ton where: ton is transmit duration.  
 5. For transmit duration, please refer to clause 6.1.  
 6. Only the worst case emission will be recorder, if it complies with the limit, the other emissions deemed to comply with the limit.

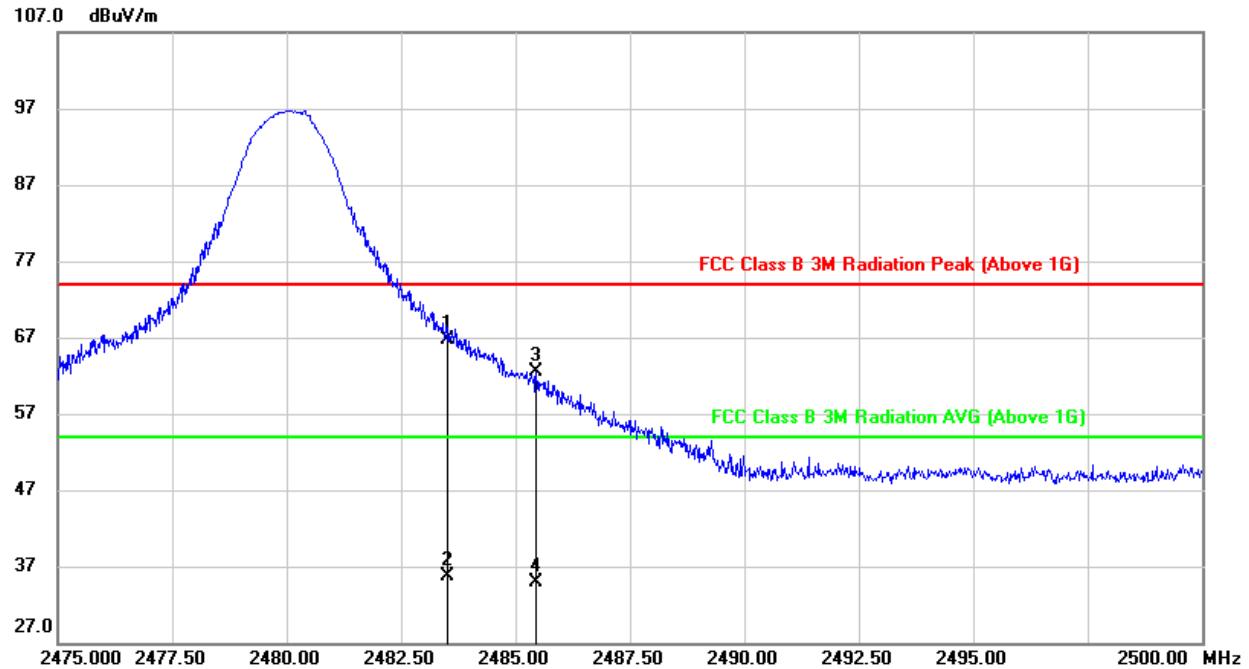
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1   | 2345.500           | 16.90               | 33.57           | 50.47              | 74.00             | -23.53         | peak   |
| 2   | 2390.000           | 16.69               | 33.24           | 49.93              | 74.00             | -24.07         | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. AVG: VBW=1/Ton where: ton is transmit duration.  
 5. For transmit duration, please refer to clause 6.1.  
 6. Only the worst case emission will be recorder, if it complies with the limit, the other emissions deemed to comply with the limit.

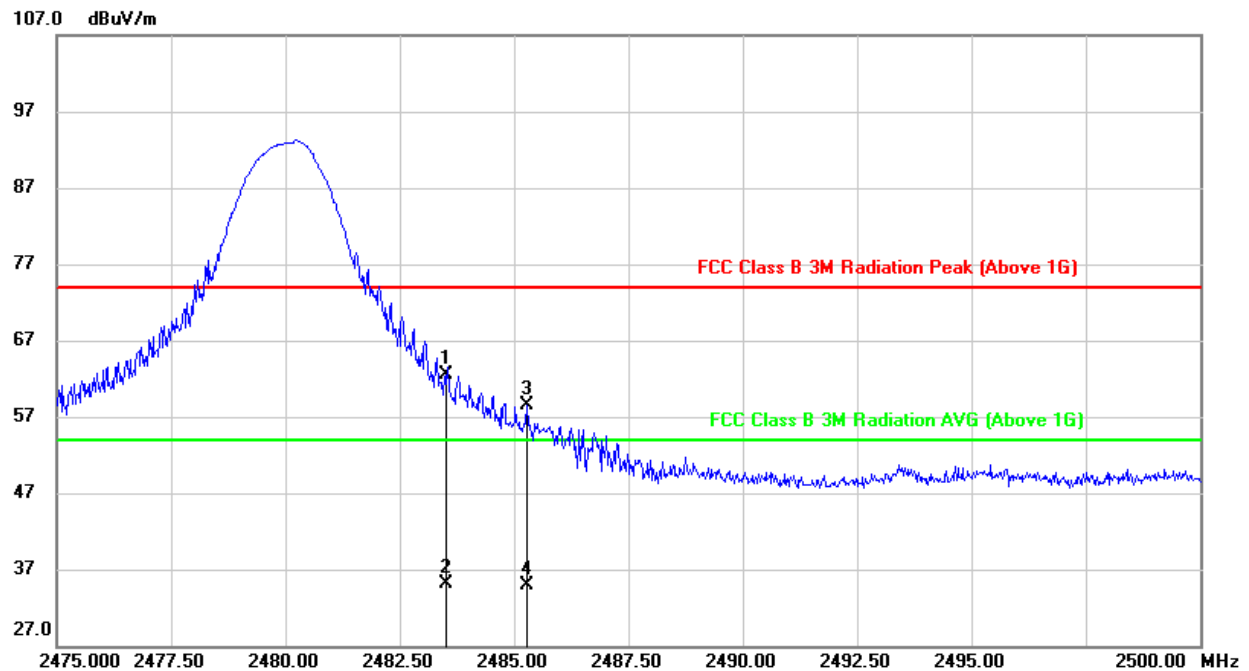
**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1   | 2483.500           | 34.01               | 32.78           | 66.79              | 74.00             | -7.21          | peak   |
| 2   | 2483.500           | 2.87                | 32.78           | 35.65              | 54.00             | -18.35         | AVG    |
| 3   | 2485.450           | 29.73               | 32.79           | 62.52              | 74.00             | -11.48         | peak   |
| 4   | 2485.450           | 2.03                | 32.79           | 34.82              | 54.00             | -19.18         | AVG    |

Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Peak: Peak detector.  
4. AVG: VBW=1/Ton where: ton is transmit duration.  
5. For transmit duration, please refer to clause 6.1.  
6. Only the worst case emission will be recorder, if it complies with the limit, the other emissions deemed to comply with the limit.

**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



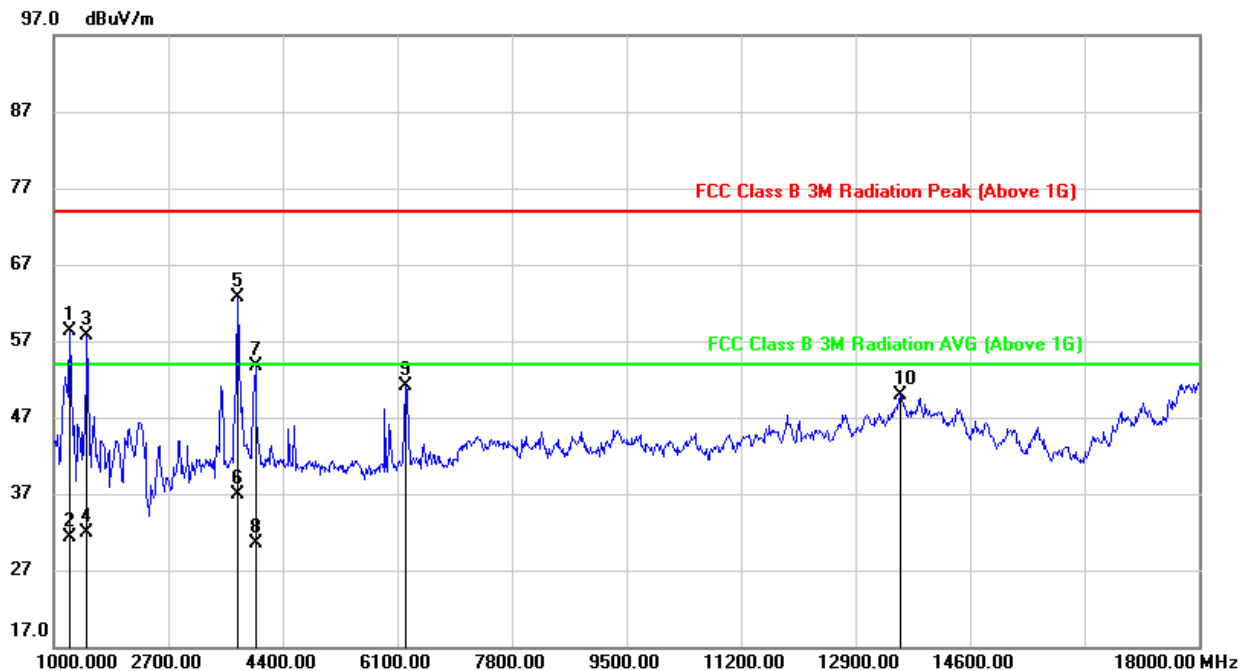
| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|--------|
| 1   | 2483.500        | 29.60            | 32.88        | 62.48           | 74.00          | -11.52      | peak   |
| 2   | 2483.500        | 2.24             | 32.88        | 35.12           | 54.00          | -18.88      | AVG    |
| 3   | 2485.275        | 25.52            | 32.89        | 58.41           | 74.00          | -15.59      | peak   |
| 4   | 2485.275        | 1.99             | 32.89        | 34.88           | 54.00          | -19.12      | AVG    |

Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. AVG: VBW=1/Ton where: ton is transmit duration.  
 5. For transmit duration, please refer to clause 6.1.  
 6. Only the worst case emission will be recorder, if it complies with the limit, the other emissions deemed to comply with the limit.

### 7.3. SPURIOUS EMISSIONS (1~18GHz)

#### 7.3.1. GFSK MODE

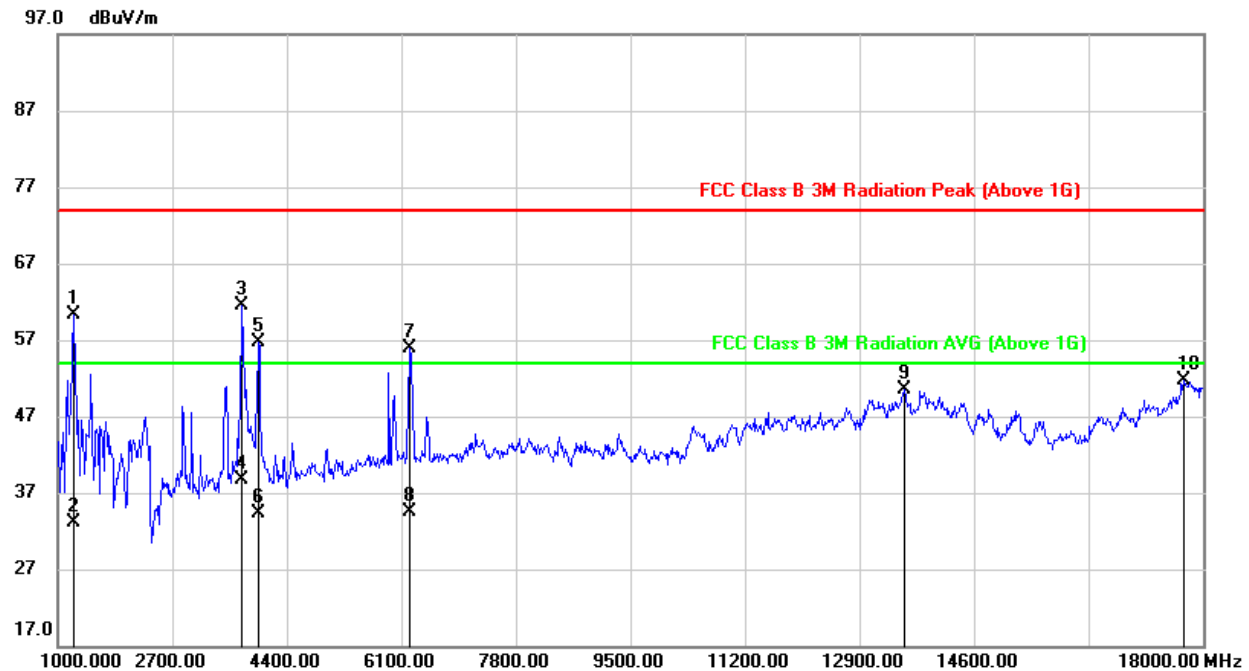
##### HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|--------|
| 1   | 1238.000        | 71.53            | -13.27       | 58.26           | 74.00          | -15.74      | peak   |
| 2   | 1238.000        | 44.48            | -13.27       | 31.21           | 54.00          | -22.79      | AVG    |
| 3   | 1493.000        | 70.44            | -12.68       | 57.76           | 74.00          | -16.24      | peak   |
| 4   | 1493.000        | 44.66            | -12.68       | 31.98           | 54.00          | -22.02      | AVG    |
| 5   | 3737.000        | 67.44            | -4.83        | 62.61           | 74.00          | -11.39      | peak   |
| 6   | 3737.000        | 41.81            | -4.83        | 36.98           | 54.00          | -17.02      | AVG    |
| 7   | 3992.000        | 58.20            | -4.42        | 53.78           | 74.00          | -20.22      | peak   |
| 8   | 3992.000        | 34.98            | -4.42        | 30.56           | 54.00          | -23.44      | AVG    |
| 9   | 6219.000        | 48.26            | 2.79         | 51.05           | 74.00          | -22.95      | peak   |
| 10  | 13563.000       | 31.13            | 18.86        | 49.99           | 74.00          | -24.01      | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Peak: Peak detector.  
4. AVG: VBW=1/Ton where: ton is transmit duration.  
5. For transmit duration, please refer to clause 6.1.

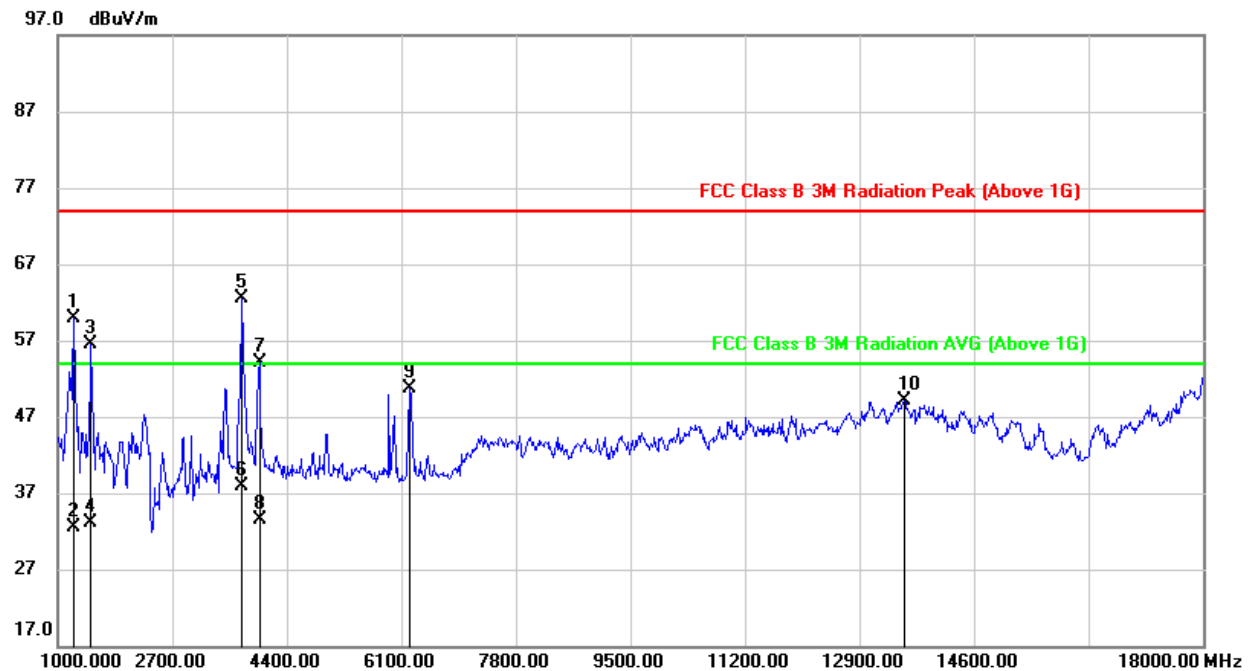
**HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)**



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1   | 1238.000           | 73.45               | -13.22          | 60.23              | 74.00             | -13.77         | peak   |
| 2   | 1238.000           | 46.34               | -13.22          | 33.12              | 54.00             | -20.88         | AVG    |
| 3   | 3737.000           | 66.28               | -4.81           | 61.47              | 74.00             | -12.53         | peak   |
| 4   | 3737.000           | 43.59               | -4.81           | 38.78              | 54.00             | -15.22         | AVG    |
| 5   | 3975.000           | 61.09               | -4.42           | 56.67              | 74.00             | -17.33         | peak   |
| 6   | 3975.000           | 38.74               | -4.42           | 34.32              | 54.00             | -19.68         | AVG    |
| 7   | 6219.000           | 53.13               | 2.83            | 55.96              | 74.00             | -18.04         | peak   |
| 8   | 6219.000           | 31.73               | 2.83            | 34.56              | 54.00             | -19.44         | AVG    |
| 9   | 13563.000          | 31.31               | 19.25           | 50.56              | 74.00             | -23.44         | peak   |
| 10  | 17711.000          | 26.73               | 25.04           | 51.77              | 74.00             | -22.23         | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Peak: Peak detector.  
4. AVG: VBW=1/Ton where: ton is transmit duration.  
5. For transmit duration, please refer to clause 6.1.

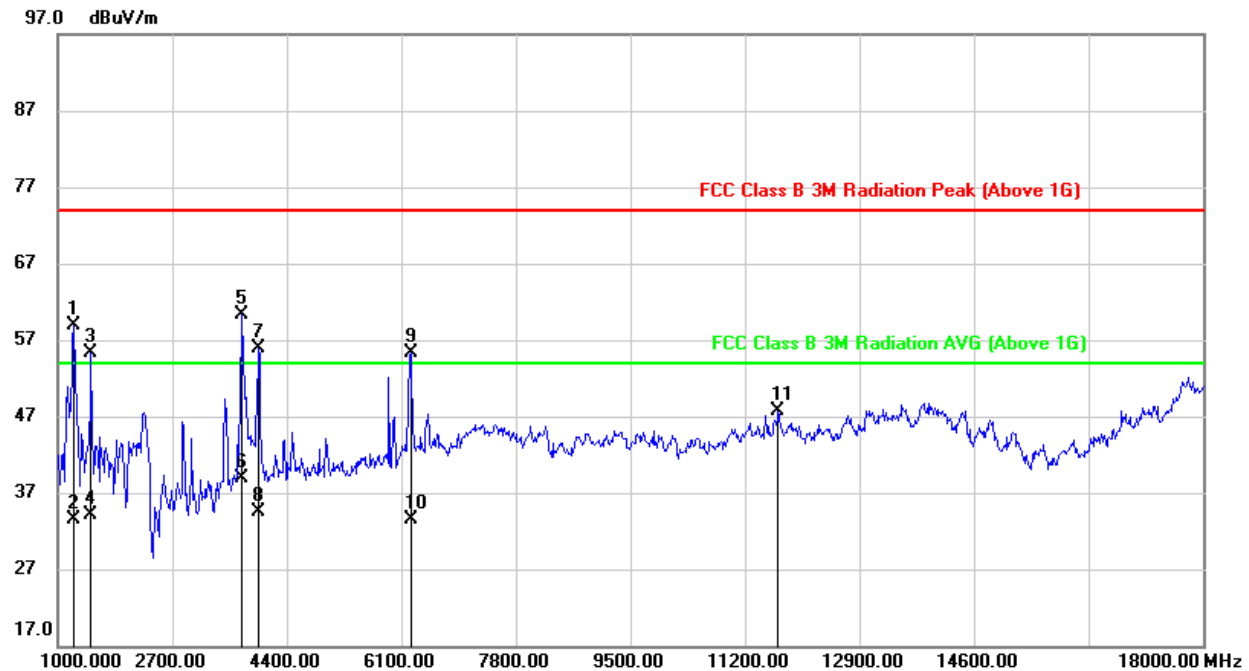
### HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|--------|
| 1   | 1238.000        | 73.11            | -13.27       | 59.84           | 74.00          | -14.16      | peak   |
| 2   | 1238.000        | 45.72            | -13.27       | 32.45           | 54.00          | -21.55      | AVG    |
| 3   | 1493.000        | 69.26            | -12.68       | 56.58           | 74.00          | -17.42      | peak   |
| 4   | 1493.000        | 45.80            | -12.68       | 33.12           | 54.00          | -20.88      | AVG    |
| 5   | 3737.000        | 67.31            | -4.83        | 62.48           | 74.00          | -11.52      | peak   |
| 6   | 3737.000        | 42.81            | -4.83        | 37.98           | 54.00          | -16.02      | AVG    |
| 7   | 3992.000        | 58.43            | -4.42        | 54.01           | 74.00          | -19.99      | peak   |
| 8   | 3992.000        | 37.87            | -4.42        | 33.45           | 54.00          | -20.55      | AVG    |
| 9   | 6219.000        | 47.94            | 2.79         | 50.73           | 74.00          | -23.27      | peak   |
| 10  | 13563.000       | 30.18            | 18.86        | 49.04           | 74.00          | -24.96      | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Peak: Peak detector.  
4. AVG: VBW=1/Ton where: ton is transmit duration.  
5. For transmit duration, please refer to clause 6.1.

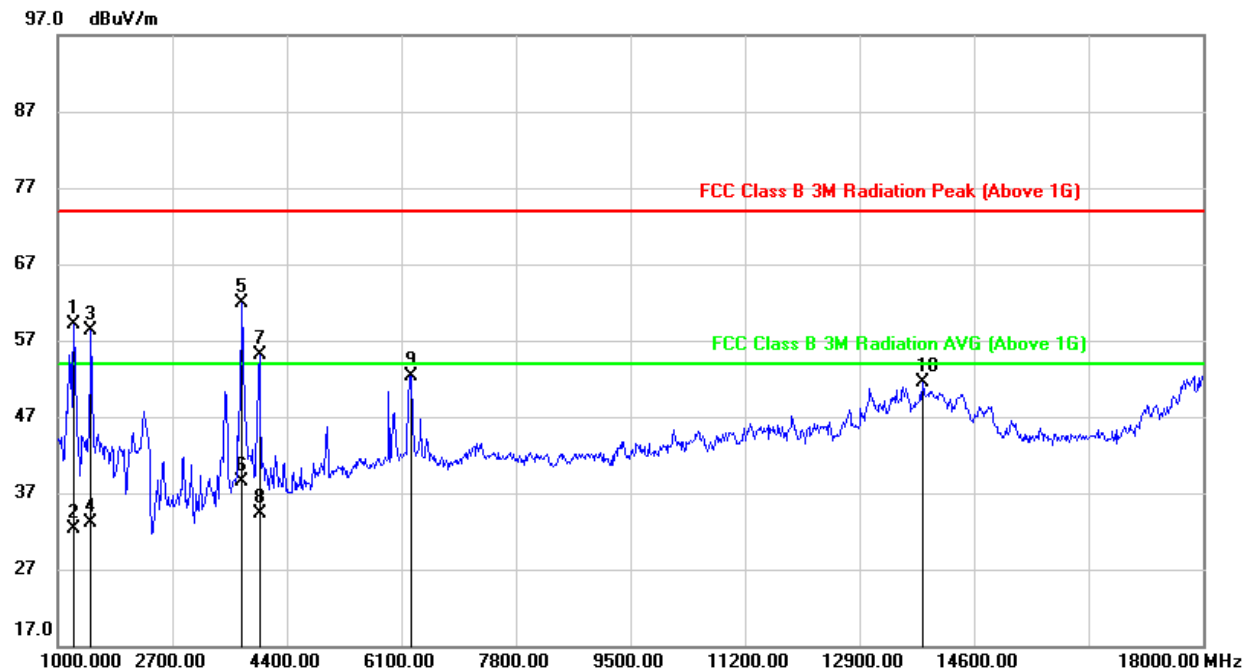
# HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|--------|
| 1   | 1238.000        | 72.13            | -13.22       | 58.91           | 74.00          | -15.09      | peak   |
| 2   | 1238.000        | 46.64            | -13.22       | 33.42           | 54.00          | -20.58      | AVG    |
| 3   | 1493.000        | 68.07            | -12.77       | 55.30           | 74.00          | -18.70      | peak   |
| 4   | 1493.000        | 46.89            | -12.77       | 34.12           | 54.00          | -19.88      | AVG    |
| 5   | 3737.000        | 65.17            | -4.81        | 60.36           | 74.00          | -13.64      | peak   |
| 6   | 3737.000        | 43.70            | -4.81        | 38.89           | 54.00          | -15.11      | AVG    |
| 7   | 3975.000        | 60.41            | -4.42        | 55.99           | 74.00          | -18.01      | peak   |
| 8   | 3975.000        | 38.98            | -4.42        | 34.56           | 54.00          | -19.44      | AVG    |
| 9   | 6236.000        | 52.41            | 2.89         | 55.30           | 74.00          | -18.70      | peak   |
| 10  | 6236.000        | 30.56            | 2.89         | 33.45           | 54.00          | -20.55      | AVG    |
| 11  | 11693.000       | 32.54            | 15.07        | 47.61           | 74.00          | -26.39      | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Peak: Peak detector.  
4. AVG: VBW=1/Ton where: ton is transmit duration.  
5. For transmit duration, please refer to clause 6.1.

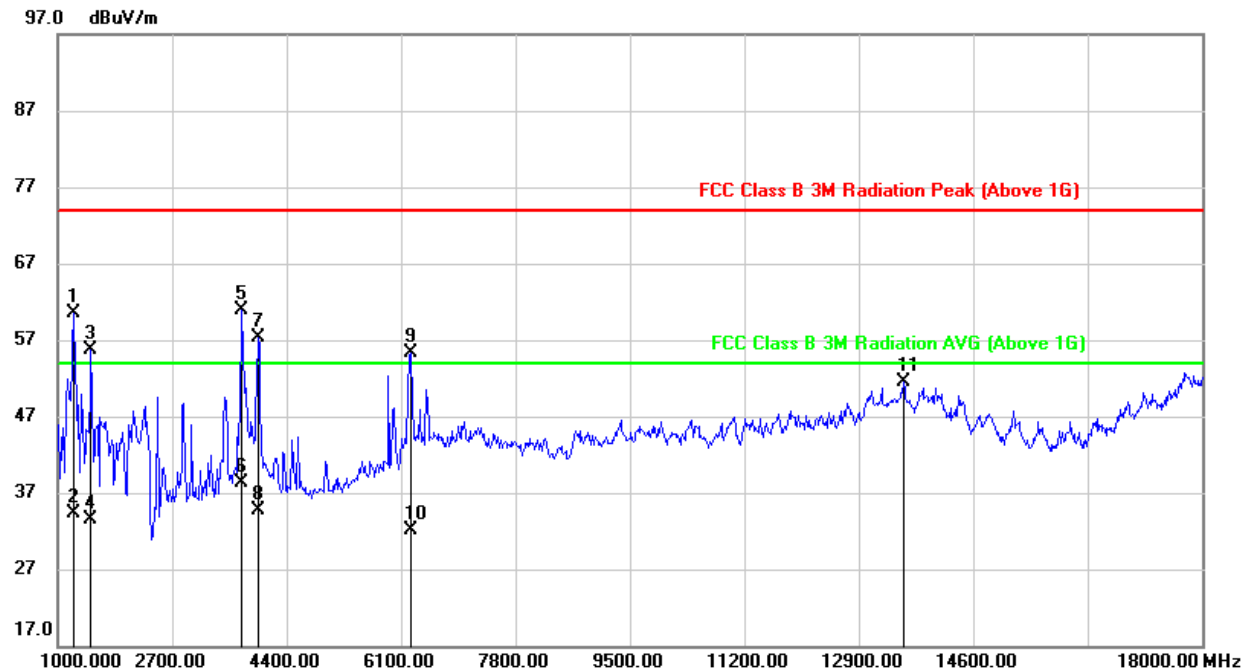
# HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|--------|
| 1   | 1238.000        | 72.34            | -13.27       | 59.07           | 74.00          | -14.93      | peak   |
| 2   | 1238.000        | 45.62            | -13.27       | 32.35           | 54.00          | -21.65      | AVG    |
| 3   | 1493.000        | 71.00            | -12.68       | 58.32           | 74.00          | -15.68      | peak   |
| 4   | 1493.000        | 45.80            | -12.68       | 33.12           | 54.00          | -20.88      | AVG    |
| 5   | 3737.000        | 66.76            | -4.83        | 61.93           | 74.00          | -12.07      | peak   |
| 6   | 3737.000        | 43.30            | -4.83        | 38.47           | 54.00          | -15.53      | AVG    |
| 7   | 3992.000        | 59.43            | -4.42        | 55.01           | 74.00          | -18.99      | peak   |
| 8   | 3992.000        | 38.68            | -4.42        | 34.26           | 54.00          | -19.74      | AVG    |
| 9   | 6236.000        | 49.56            | 2.82         | 52.38           | 74.00          | -21.62      | peak   |
| 10  | 13835.000       | 32.55            | 19.01        | 51.56           | 74.00          | -22.44      | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Peak: Peak detector.  
4. AVG: VBW=1/Ton where: ton is transmit duration.  
5. For transmit duration, please refer to clause 6.1.

**HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)**

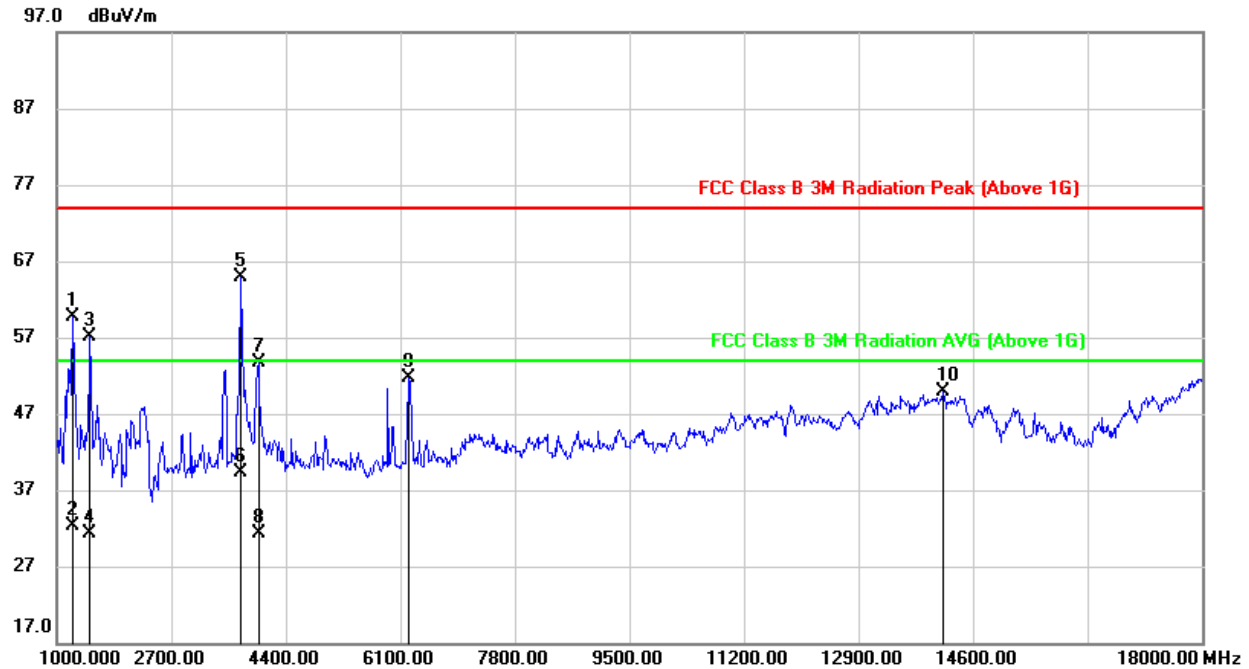


| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1   | 1238.000           | 73.78               | -13.22          | 60.56              | 74.00             | -13.44         | peak   |
| 2   | 1238.000           | 47.45               | -13.22          | 34.23              | 54.00             | -19.77         | AVG    |
| 3   | 1493.000           | 68.54               | -12.77          | 55.77              | 74.00             | -18.23         | peak   |
| 4   | 1493.000           | 46.33               | -12.77          | 33.56              | 54.00             | -20.44         | AVG    |
| 5   | 3737.000           | 65.64               | -4.81           | 60.83              | 74.00             | -13.17         | peak   |
| 6   | 3737.000           | 43.04               | -4.81           | 38.23              | 54.00             | -15.77         | AVG    |
| 7   | 3975.000           | 61.74               | -4.42           | 57.32              | 74.00             | -16.68         | peak   |
| 8   | 3975.000           | 39.04               | -4.42           | 34.62              | 54.00             | -19.38         | AVG    |
| 9   | 6253.000           | 52.29               | 2.96            | 55.25              | 74.00             | -18.75         | peak   |
| 10  | 6253.000           | 29.16               | 2.96            | 32.12              | 54.00             | -21.88         | AVG    |
| 11  | 13563.000          | 32.16               | 19.25           | 51.41              | 74.00             | -22.59         | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. AVG: VBW=1/Ton where: ton is transmit duration.  
 5. For transmit duration, please refer to clause 6.1.

### 7.3.2. 8DPSK MODE

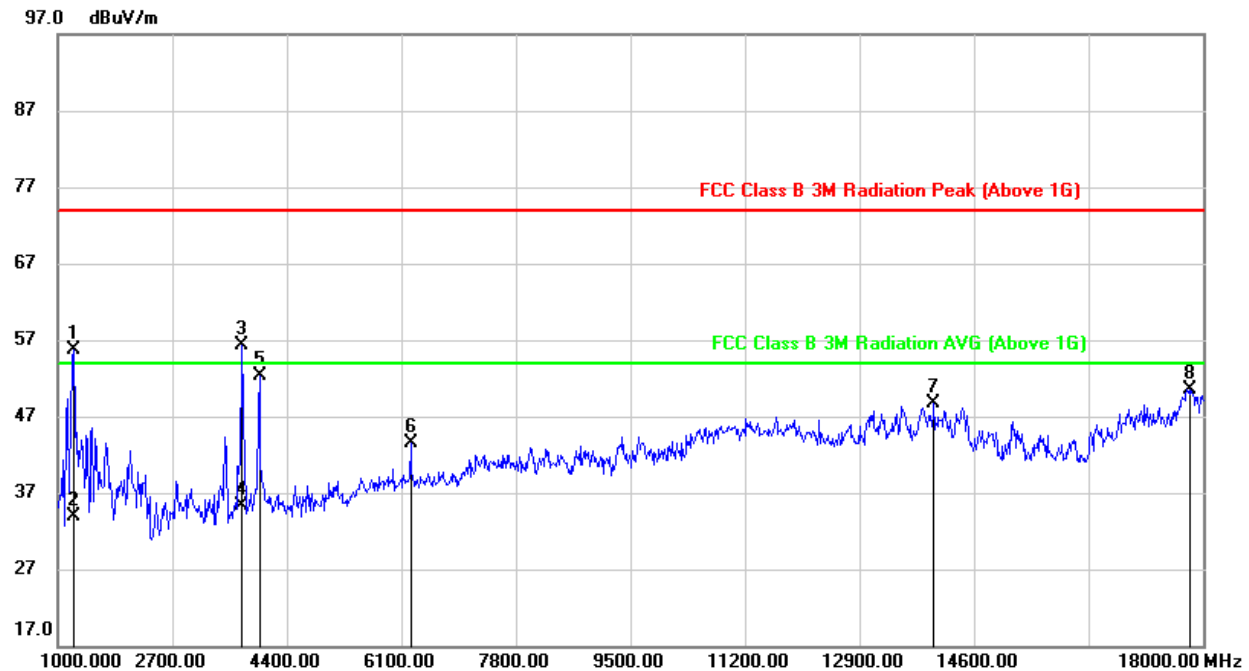
#### HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|--------|
| 1   | 1238.000        | 72.98            | -13.27       | 59.71           | 74.00          | -14.29      | peak   |
| 2   | 1238.000        | 45.59            | -13.27       | 32.32           | 54.00          | -21.68      | AVG    |
| 3   | 1493.000        | 69.80            | -12.68       | 57.12           | 74.00          | -16.88      | peak   |
| 4   | 1493.000        | 44.02            | -12.68       | 31.34           | 54.00          | -22.66      | AVG    |
| 5   | 3720.000        | 69.77            | -4.89        | 64.88           | 74.00          | -9.12       | peak   |
| 6   | 3720.000        | 44.17            | -4.89        | 39.28           | 54.00          | -14.72      | AVG    |
| 7   | 3992.000        | 58.14            | -4.42        | 53.72           | 74.00          | -20.28      | peak   |
| 8   | 3992.000        | 35.66            | -4.42        | 31.24           | 54.00          | -22.76      | AVG    |
| 9   | 6219.000        | 48.86            | 2.79         | 51.65           | 74.00          | -22.35      | peak   |
| 10  | 14158.000       | 31.34            | 18.56        | 49.90           | 74.00          | -24.10      | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Peak: Peak detector.  
4. AVG: VBW=1/Ton where: ton is transmit duration.  
5. For transmit duration, please refer to clause 6.1.

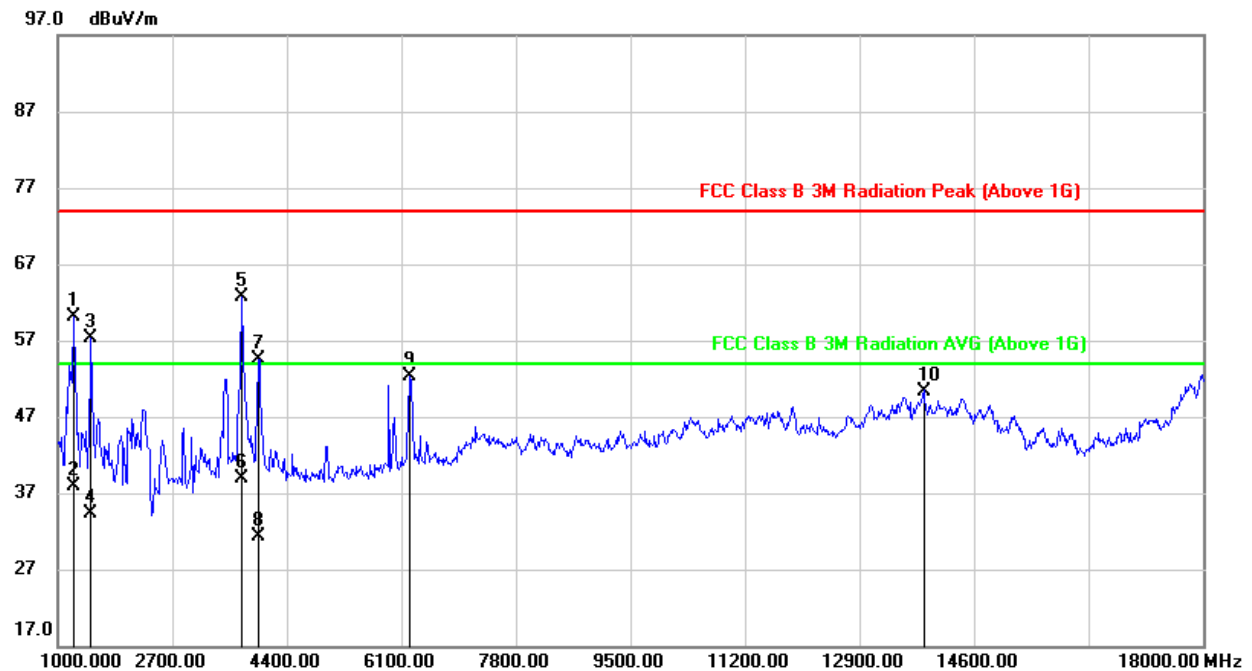
**HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)**



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|--------|
| 1   | 1238.000        | 68.85            | -13.22       | 55.63           | 74.00          | -18.37      | peak   |
| 2   | 1238.000        | 47.08            | -13.22       | 33.86           | 54.00          | -20.14      | AVG    |
| 3   | 3737.000        | 61.11            | -4.81        | 56.30           | 74.00          | -17.70      | peak   |
| 4   | 3737.000        | 40.16            | -4.81        | 35.35           | 54.00          | -18.65      | AVG    |
| 5   | 3992.000        | 56.81            | -4.42        | 52.39           | 74.00          | -21.61      | peak   |
| 6   | 6236.000        | 40.65            | 2.89         | 43.54           | 74.00          | -30.46      | peak   |
| 7   | 14005.000       | 29.76            | 18.95        | 48.71           | 74.00          | -25.29      | peak   |
| 8   | 17796.000       | 24.34            | 26.24        | 50.58           | 74.00          | -23.42      | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. AVG: VBW=1/Ton where: ton is transmit duration.  
 5. For transmit duration, please refer to clause 6.1.

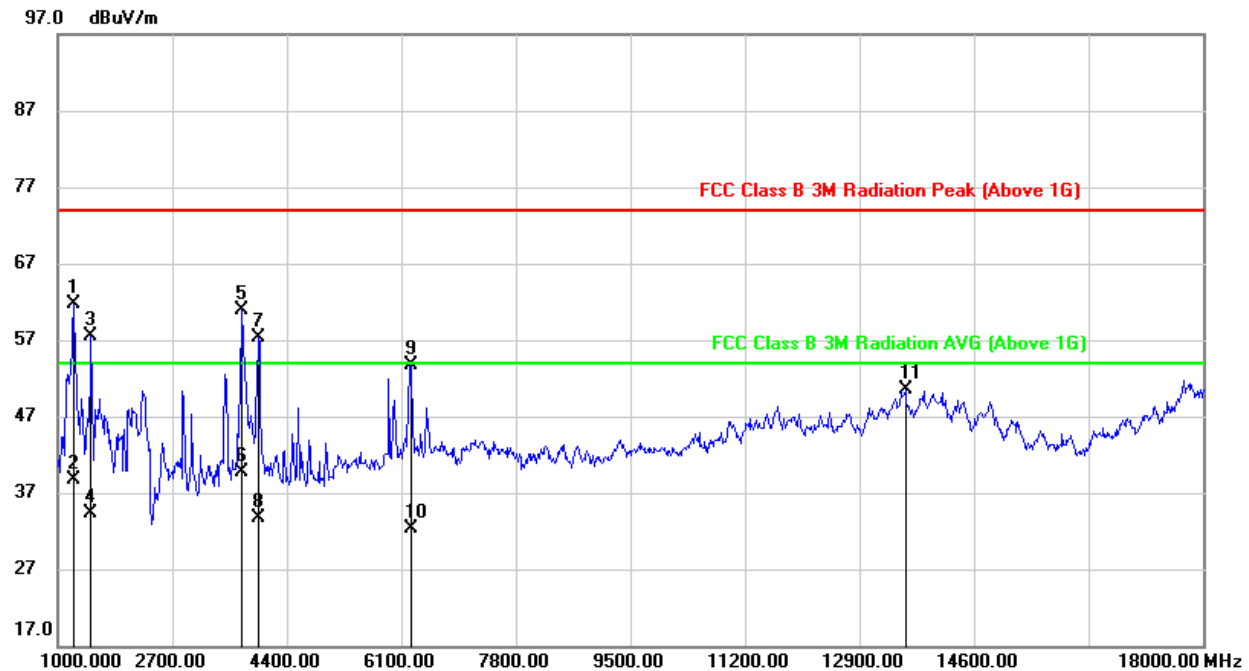
### HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|--------|
| 1   | 1238.000        | 73.33            | -13.27       | 60.06           | 74.00          | -13.94      | peak   |
| 2   | 1238.000        | 51.26            | -13.27       | 37.99           | 54.00          | -16.01      | AVG    |
| 3   | 1493.000        | 70.06            | -12.68       | 57.38           | 74.00          | -16.62      | peak   |
| 4   | 1493.000        | 46.91            | -12.68       | 34.23           | 54.00          | -19.77      | AVG    |
| 5   | 3720.000        | 67.54            | -4.89        | 62.65           | 74.00          | -11.35      | peak   |
| 6   | 3720.000        | 43.86            | -4.89        | 38.97           | 54.00          | -15.03      | AVG    |
| 7   | 3975.000        | 58.90            | -4.42        | 54.48           | 74.00          | -19.52      | peak   |
| 8   | 3975.000        | 35.63            | -4.42        | 31.21           | 54.00          | -22.79      | AVG    |
| 9   | 6219.000        | 49.47            | 2.79         | 52.26           | 74.00          | -21.74      | peak   |
| 10  | 13852.000       | 31.38            | 19.02        | 50.40           | 74.00          | -23.60      | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Peak: Peak detector.  
4. AVG: VBW=1/Ton where: ton is transmit duration.  
5. For transmit duration, please refer to clause 6.1.

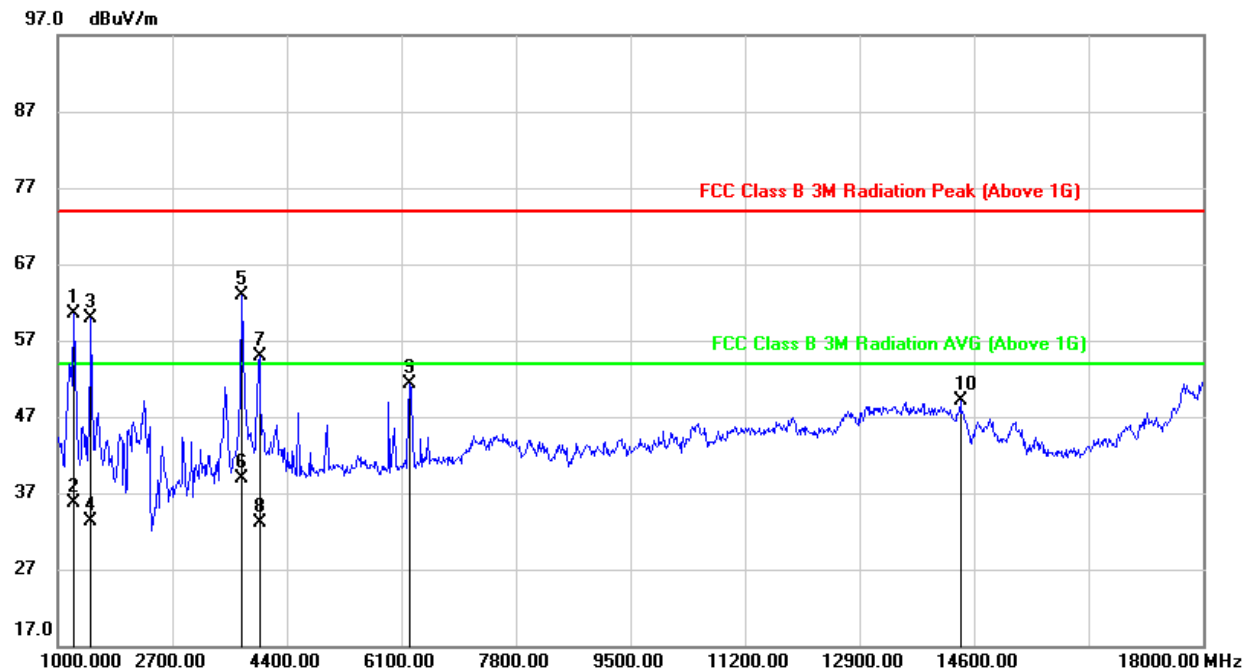
# HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1   | 1238.000           | 74.93               | -13.22          | 61.71              | 74.00             | -12.29         | peak   |
| 2   | 1238.000           | 51.96               | -13.22          | 38.74              | 54.00             | -15.26         | AVG    |
| 3   | 1493.000           | 70.18               | -12.77          | 57.41              | 74.00             | -16.59         | peak   |
| 4   | 1493.000           | 47.00               | -12.77          | 34.23              | 54.00             | -19.77         | AVG    |
| 5   | 3737.000           | 65.63               | -4.81           | 60.82              | 74.00             | -13.18         | peak   |
| 6   | 3737.000           | 44.59               | -4.81           | 39.78              | 54.00             | -14.22         | AVG    |
| 7   | 3975.000           | 61.63               | -4.42           | 57.21              | 74.00             | -16.79         | peak   |
| 8   | 3975.000           | 38.07               | -4.42           | 33.65              | 54.00             | -20.35         | AVG    |
| 9   | 6236.000           | 50.90               | 2.89            | 53.79              | 74.00             | -20.21         | peak   |
| 10  | 6236.000           | 29.46               | 2.89            | 32.35              | 54.00             | -21.65         | AVG    |
| 11  | 13580.000          | 31.39               | 19.06           | 50.45              | 74.00             | -23.55         | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Peak: Peak detector.  
4. AVG: VBW=1/Ton where: ton is transmit duration.  
5. For transmit duration, please refer to clause 6.1.

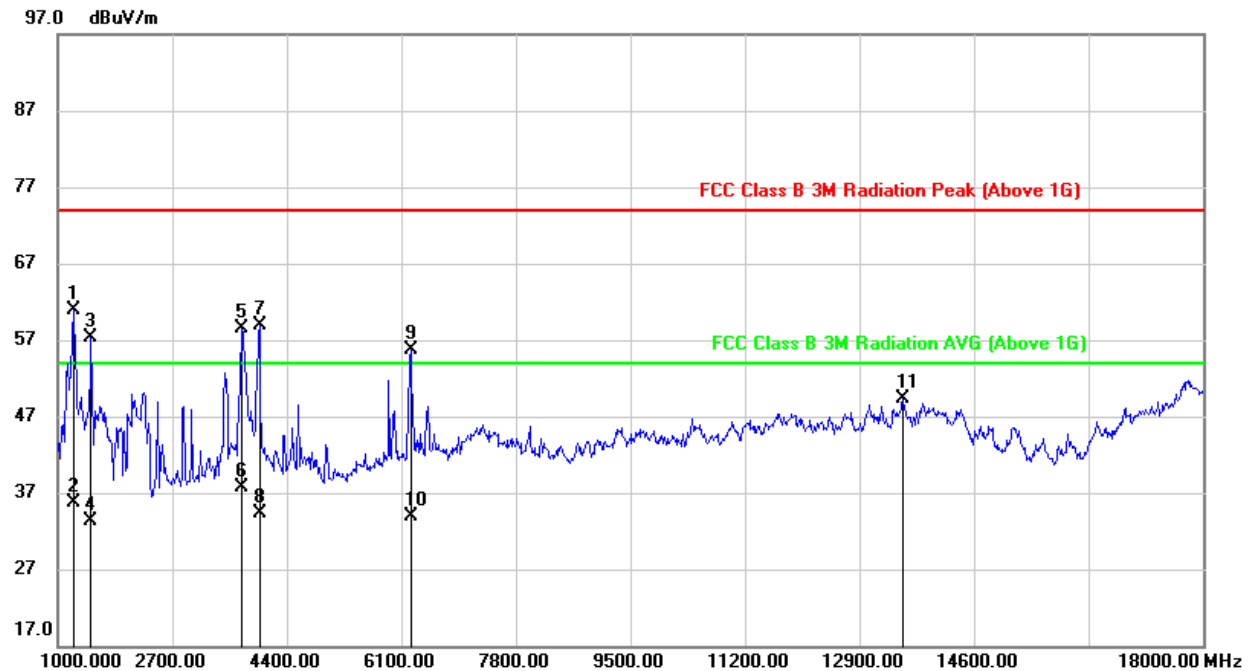
# HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|--------|
| 1   | 1238.000        | 73.85            | -13.27       | 60.58           | 74.00          | -13.42      | peak   |
| 2   | 1238.000        | 48.92            | -13.27       | 35.65           | 54.00          | -18.35      | AVG    |
| 3   | 1493.000        | 72.61            | -12.68       | 59.93           | 74.00          | -14.07      | peak   |
| 4   | 1493.000        | 45.91            | -12.68       | 33.23           | 54.00          | -20.77      | AVG    |
| 5   | 3737.000        | 67.65            | -4.83        | 62.82           | 74.00          | -11.18      | peak   |
| 6   | 3737.000        | 43.82            | -4.83        | 38.99           | 54.00          | -15.01      | AVG    |
| 7   | 3992.000        | 59.30            | -4.42        | 54.88           | 74.00          | -19.12      | peak   |
| 8   | 3992.000        | 37.54            | -4.42        | 33.12           | 54.00          | -20.88      | AVG    |
| 9   | 6219.000        | 48.53            | 2.79         | 51.32           | 74.00          | -22.68      | peak   |
| 10  | 14396.000       | 30.84            | 18.20        | 49.04           | 74.00          | -24.96      | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Peak: Peak detector.  
4. AVG: VBW=1/Ton where: ton is transmit duration.  
5. For transmit duration, please refer to clause 6.1.

**HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)**



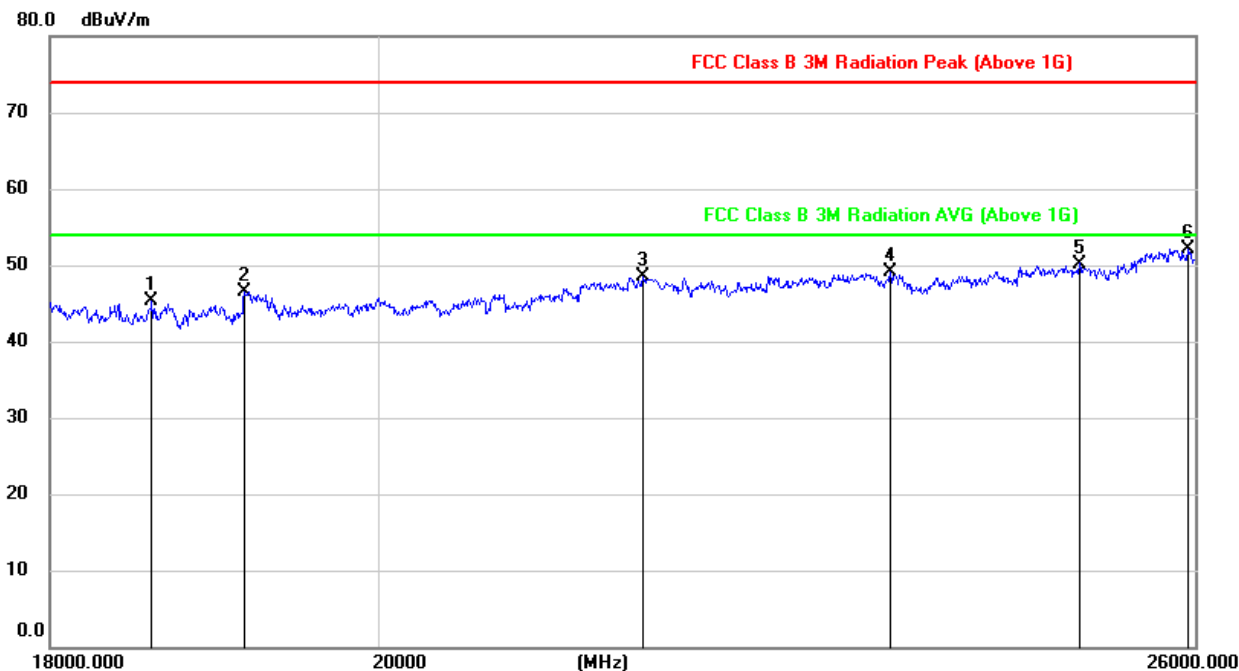
| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1   | 1238.000           | 74.08               | -13.22          | 60.86              | 74.00             | -13.14         | peak   |
| 2   | 1238.000           | 48.85               | -13.22          | 35.63              | 54.00             | -18.37         | AVG    |
| 3   | 1493.000           | 70.15               | -12.77          | 57.38              | 74.00             | -16.62         | peak   |
| 4   | 1493.000           | 45.98               | -12.77          | 33.21              | 54.00             | -20.79         | AVG    |
| 5   | 3720.000           | 63.36               | -4.83           | 58.53              | 74.00             | -15.47         | peak   |
| 6   | 3720.000           | 42.51               | -4.83           | 37.68              | 54.00             | -16.32         | AVG    |
| 7   | 3992.000           | 63.23               | -4.42           | 58.81              | 74.00             | -15.19         | peak   |
| 8   | 3992.000           | 38.74               | -4.42           | 34.32              | 54.00             | -19.68         | AVG    |
| 9   | 6236.000           | 52.76               | 2.89            | 55.65              | 74.00             | -18.35         | peak   |
| 10  | 6236.000           | 31.09               | 2.89            | 33.98              | 54.00             | -20.02         | AVG    |
| 11  | 13546.000          | 29.85               | 19.38           | 49.23              | 74.00             | -24.77         | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Peak: Peak detector.  
4. AVG: VBW=1/Ton where: ton is transmit duration.  
5. For transmit duration, please refer to clause 6.1.

## 7.4. SPURIOUS EMISSIONS 18G ~ 26GHz

### 7.4.1. GFSK MODE

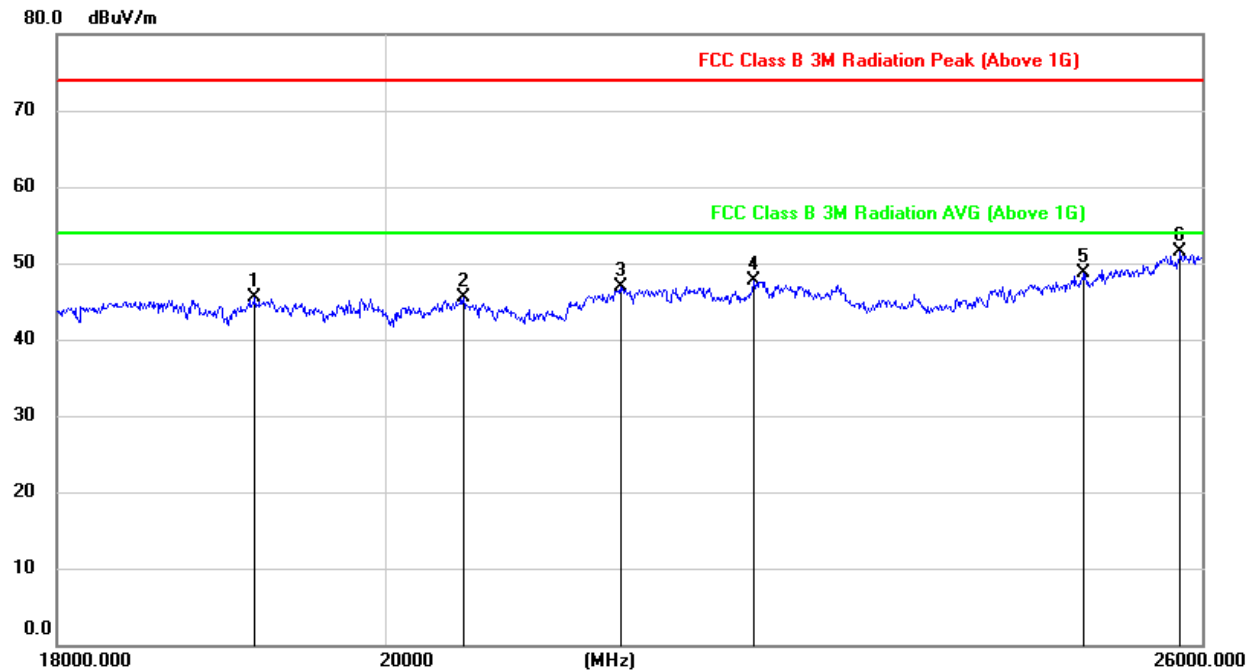
#### SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1   | 18598.841          | 50.55               | -5.32           | 45.23              | 74.00             | -28.77         | peak   |
| 2   | 19161.153          | 52.03               | -5.45           | 46.58              | 74.00             | -27.42         | peak   |
| 3   | 21776.975          | 52.84               | -4.35           | 48.49              | 74.00             | -25.51         | peak   |
| 4   | 23577.238          | 52.19               | -3.16           | 49.03              | 74.00             | -24.97         | peak   |
| 5   | 25052.067          | 52.21               | -2.01           | 50.20              | 74.00             | -23.80         | peak   |
| 6   | 25942.698          | 53.00               | -0.96           | 52.04              | 74.00             | -21.96         | peak   |

Note: 1. Peak Result= Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. All the modes had been tested, but only the worst data were recorded in the report.

**SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)**



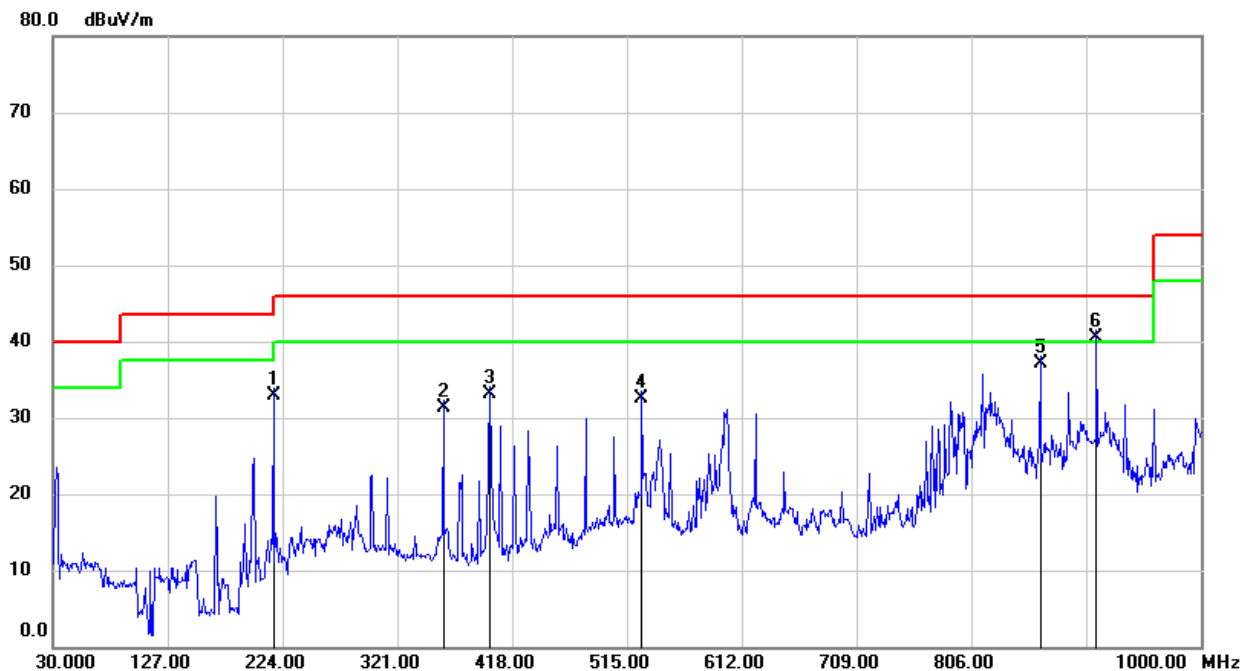
| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1   | 19182.303          | 51.08               | -5.49           | 45.59              | 74.00             | -28.41         | peak   |
| 2   | 20510.030          | 50.86               | -5.35           | 45.51              | 74.00             | -28.49         | peak   |
| 3   | 21569.760          | 51.46               | -4.59           | 46.87              | 74.00             | -27.13         | peak   |
| 4   | 22518.026          | 51.55               | -3.87           | 47.68              | 74.00             | -26.32         | peak   |
| 5   | 25033.649          | 50.82               | -2.04           | 48.78              | 74.00             | -25.22         | peak   |
| 6   | 25818.977          | 52.23               | -0.74           | 51.49              | 74.00             | -22.51         | peak   |

- Note: 1. Peak Result = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. All the modes had been tested, but only the worst data were recorded in the report.

## 7.5. SPURIOUS EMISSIONS 30M ~ 1 GHz

### 7.5.1. GFSK MODE

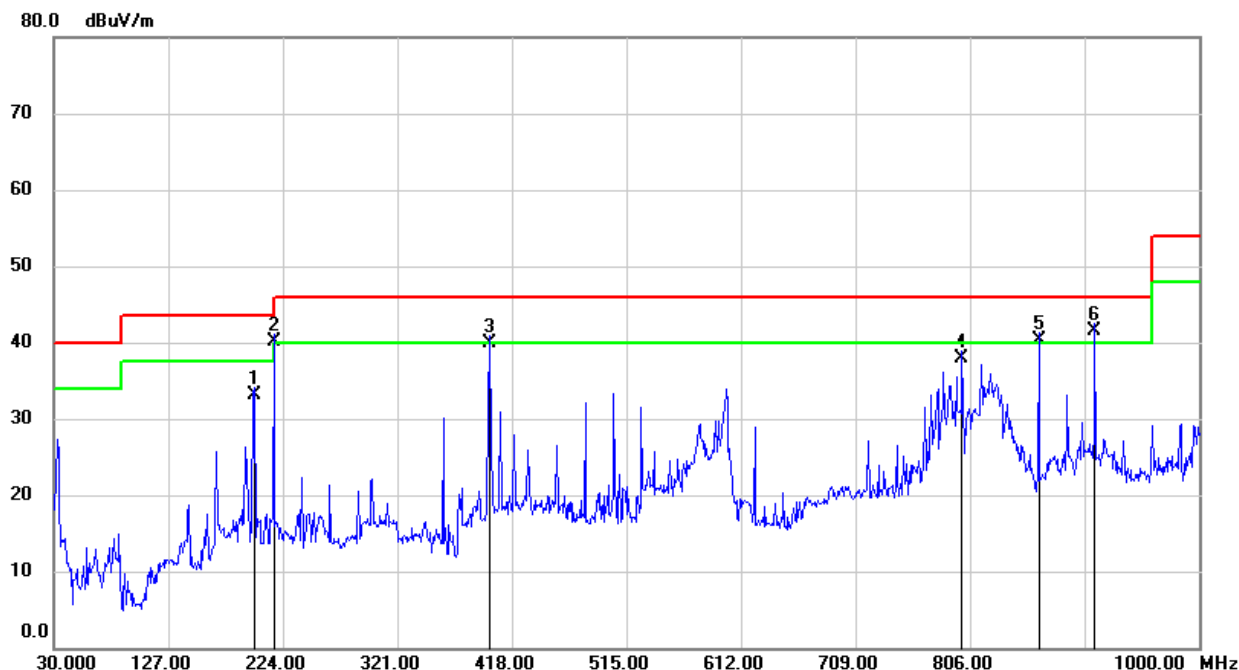
#### SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1   | 216.2400           | 61.30               | -28.45          | 32.85              | 46.00             | -13.15         | QP     |
| 2   | 359.8000           | 57.39               | -26.17          | 31.22              | 46.00             | -14.78         | QP     |
| 3   | 398.6000           | 58.19               | -25.15          | 33.04              | 46.00             | -12.96         | QP     |
| 4   | 527.6100           | 54.06               | -21.55          | 32.51              | 46.00             | -13.49         | QP     |
| 5   | 864.2000           | 54.28               | -17.13          | 37.15              | 46.00             | -8.85          | QP     |
| 6   | 911.7300           | 56.64               | -16.20          | 40.44              | 46.00             | -5.56          | QP     |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.  
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.  
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

**SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)**



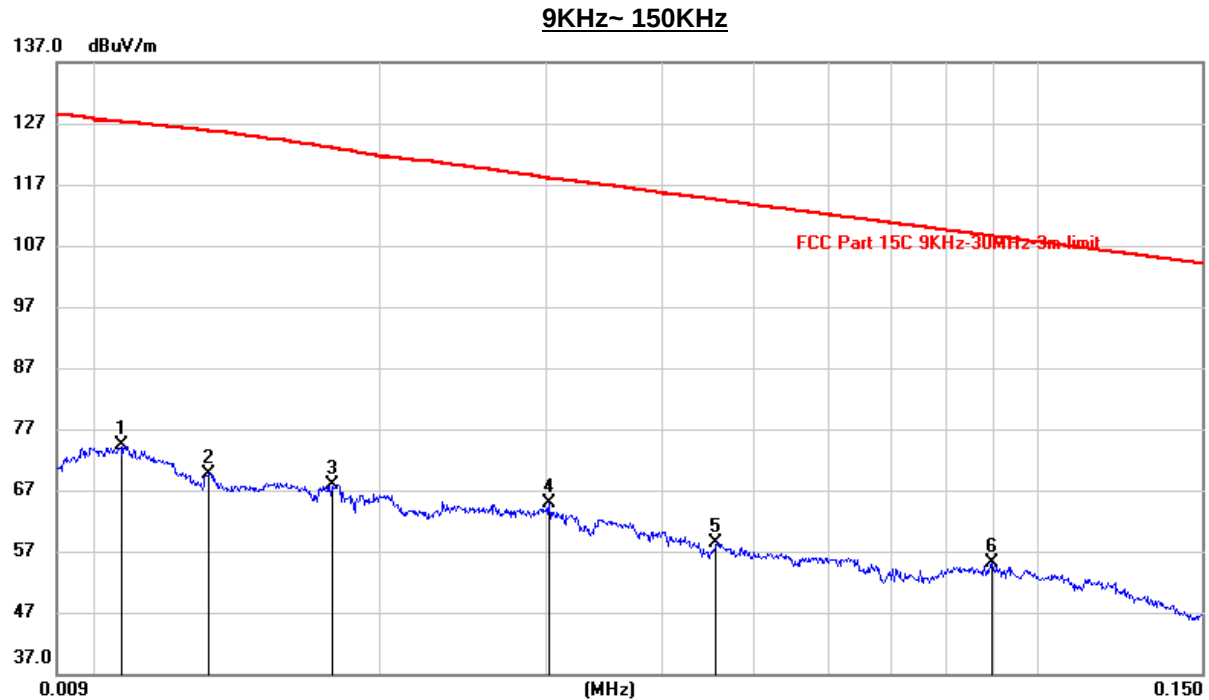
| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|--------|
| 1   | 199.7500        | 61.29            | -28.12       | 33.17           | 43.50          | -10.33      | QP     |
| 2   | 216.2400        | 68.60            | -28.45       | 40.15           | 46.00          | -5.85       | QP     |
| 3   | 399.5700        | 65.10            | -25.15       | 39.95           | 46.00          | -6.05       | QP     |
| 4   | 799.2100        | 57.51            | -19.60       | 37.91           | 46.00          | -8.09       | QP     |
| 5   | 864.2000        | 57.47            | -17.13       | 40.34           | 46.00          | -5.66       | QP     |
| 6   | 911.7300        | 57.76            | -16.20       | 41.56           | 46.00          | -4.44       | QP     |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.  
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.  
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto

## 7.6. SPURIOUS EMISSIONS BELOW 30M

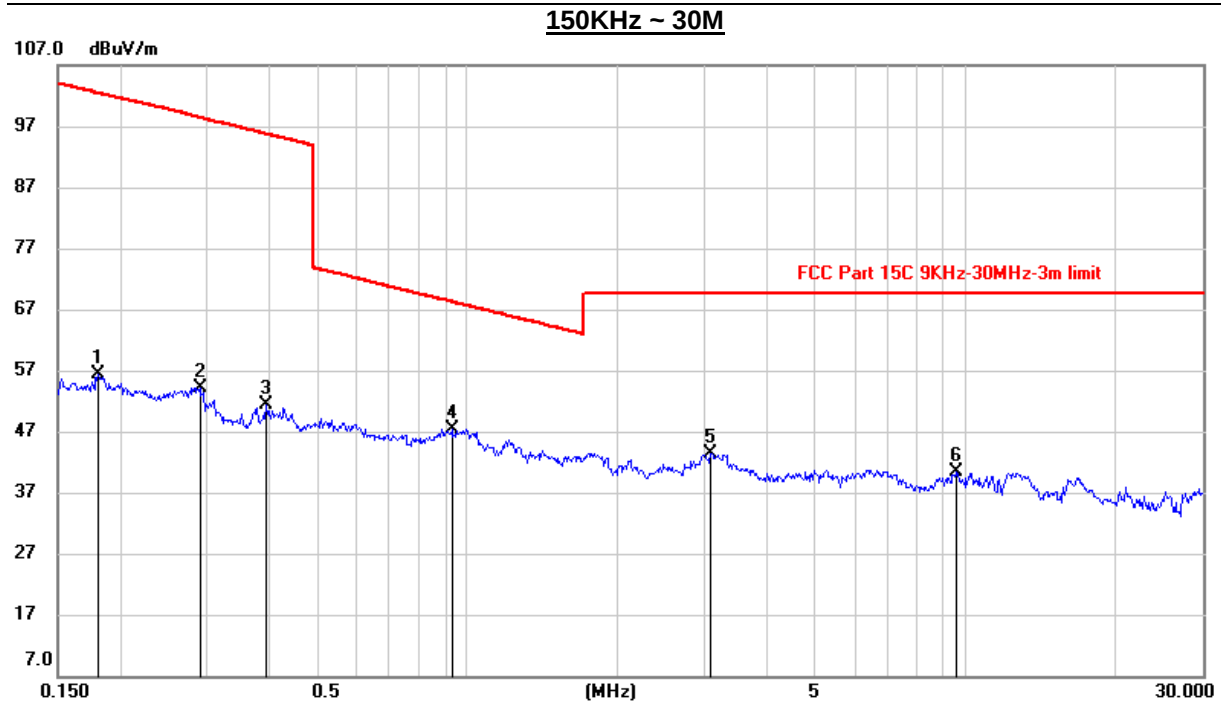
### 7.6.1. GFSK MODE

#### SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



| No. | Frequency<br>(KHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1   | 0.0106             | 54.04               | 20.22           | 74.26              | 127.24            | -52.98         | peak   |
| 2   | 0.0131             | 49.46               | 20.24           | 69.70              | 125.73            | -56.03         | peak   |
| 3   | 0.0177             | 47.71               | 20.29           | 68.00              | 122.96            | -54.96         | peak   |
| 4   | 0.0302             | 44.46               | 20.31           | 64.77              | 118.01            | -53.24         | peak   |
| 5   | 0.0454             | 38.09               | 20.31           | 58.40              | 114.51            | -56.11         | peak   |
| 6   | 0.0893             | 34.95               | 20.25           | 55.20              | 108.59            | -53.39         | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
 2. All the modes had been tested, but only the worst data were recorded in the report.  
 3. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

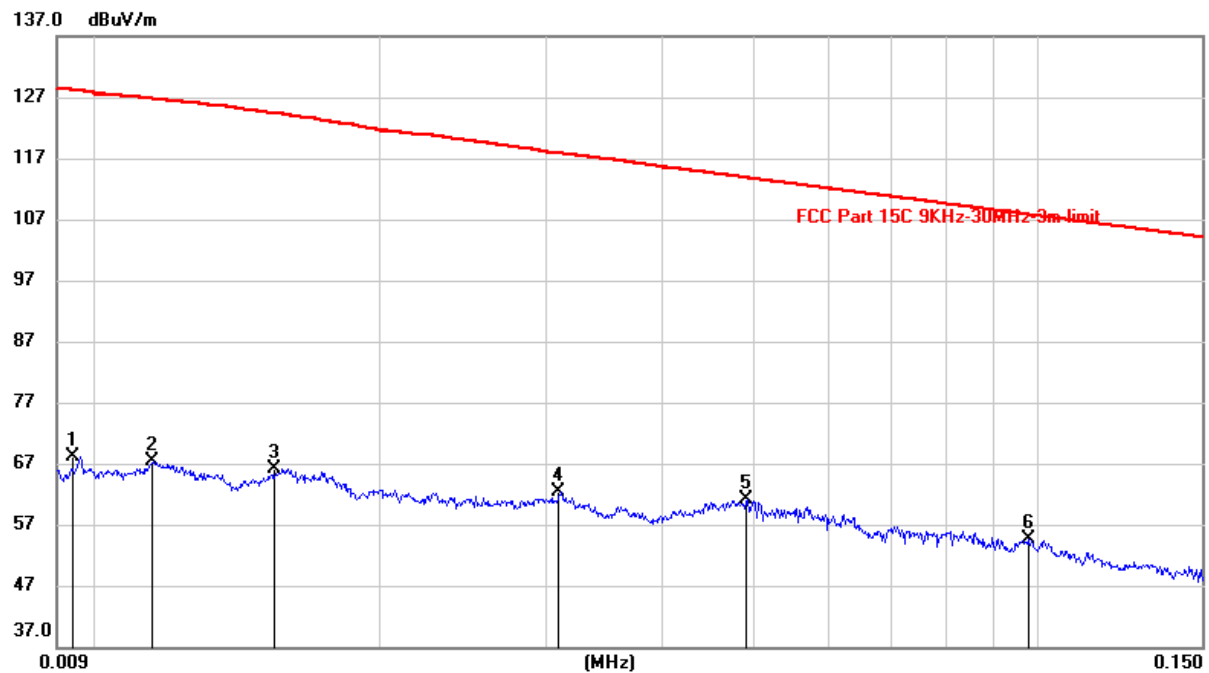


| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1   | 0.1806             | 35.95               | 20.39           | 56.34              | 102.47            | -46.13         | peak   |
| 2   | 0.2893             | 33.86               | 20.31           | 54.17              | 98.44             | -44.27         | peak   |
| 3   | 0.3934             | 30.99               | 20.27           | 51.26              | 95.73             | -44.47         | peak   |
| 4   | 0.9282             | 27.00               | 20.37           | 47.37              | 68.26             | -20.89         | peak   |
| 5   | 3.0737             | 22.52               | 20.91           | 43.43              | 69.54             | -26.11         | peak   |
| 6   | 9.5518             | 19.31               | 21.04           | 40.35              | 69.54             | -29.19         | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
 2. All the modes had been tested, but only the worst data were recorded in the report.  
 3. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

**SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)**

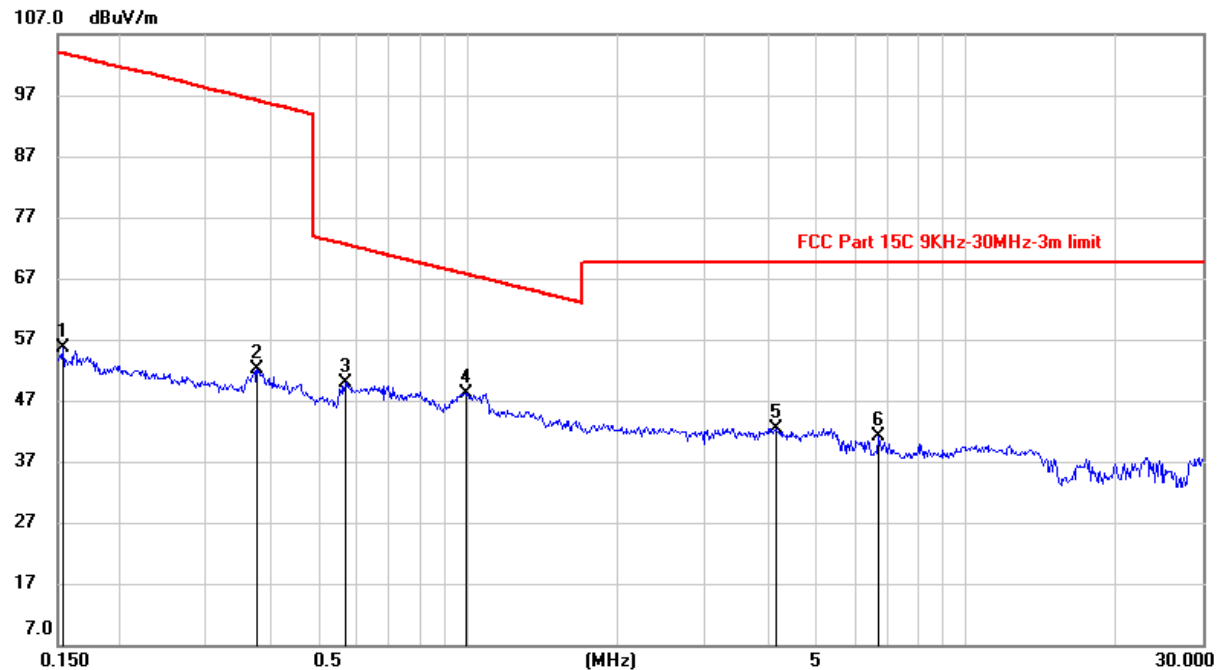
**9KHz~ 150KHz**



| No. | Frequency (KHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|--------|
| 1   | 0.0094          | 47.90            | 20.26        | 68.16           | 128.06         | -59.90      | peak   |
| 2   | 0.0114          | 47.19            | 20.22        | 67.41           | 126.76         | -59.35      | peak   |
| 3   | 0.0154          | 45.87            | 20.26        | 66.13           | 124.35         | -58.22      | peak   |
| 4   | 0.0309          | 42.11            | 20.31        | 62.42           | 117.84         | -55.42      | peak   |
| 5   | 0.0490          | 40.78            | 20.31        | 61.09           | 113.81         | -52.72      | peak   |
| 6   | 0.0976          | 34.42            | 20.23        | 54.65           | 107.82         | -53.17      | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
 2. All the modes had been tested, but only the worst data were recorded in the report.  
 3. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

**150KHz ~ 30M**



| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Correct<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1   | 0.1539             | 35.32               | 20.42           | 55.74              | 103.86            | -48.12         | peak   |
| 2   | 0.3770             | 31.85               | 20.28           | 52.13              | 96.14             | -44.01         | peak   |
| 3   | 0.5671             | 29.55               | 20.27           | 49.82              | 72.57             | -22.75         | peak   |
| 4   | 0.9889             | 27.85               | 20.37           | 48.22              | 67.70             | -19.48         | peak   |
| 5   | 4.1573             | 21.40               | 21.02           | 42.42              | 69.54             | -27.12         | peak   |
| 6   | 6.6977             | 20.21               | 20.90           | 41.11              | 69.54             | -28.43         | peak   |

Note: 1. Measurement = Reading Level + Correct Factor.  
 2. All the modes had been tested, but only the worst data were recorded in the report.  
 3. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

## 8. ANTENNA REQUIREMENTS

### APPLICABLE REQUIREMENTS

Please refer to FCC §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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### ANTENNA CONNECTOR

EUT has an external antenna with antenna connector, it will be installed in a specific environment and users cannot change the antenna.

### ANTENNA GAIN

The antenna gain of EUT is less than 6 dBi.

## END OF REPORT

Page 51 of 51