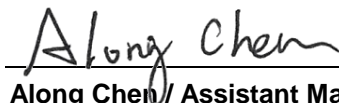


# FCC Test Report

**FCC ID** : 2AQYEFMP169  
**Equipment** : Mobile Phone  
**Model No.** : F-02L  
**Brand Name** : FUJITSU  
**Applicant** : FUJITSU CONNECTED TECHNOLOGIES Ltd.  
**Address** : 1-1, Kamikodanaka 4-chome, Nakahara-ku,  
Kawasaki 211-8588, Japan  
**Standard** : 47 CFR FCC Part 15.247  
**Received Date** : Feb. 12, 2019  
**Tested Date** : Feb. 19 ~ Mar. 05, 2019

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:



Along Chen / Assistant Manager

Approved by:



Gary Chang / Manager



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## Release Record

| Report No. | Version | Description                          | Issued Date   |
|------------|---------|--------------------------------------|---------------|
| FR8D1403AD | Rev. 01 | Initial issue                        | Mar. 22, 2019 |
| FR8D1403AD | Rev. 02 | Modified type error on section 3.8.4 | Apr. 03, 2019 |

## Summary of Test Results

| FCC Rules           | Test Items                 | Measured   | Result |
|---------------------|----------------------------|--|--------|
| 15.207              | Conducted Emissions        | [dBuV]: 2.285MHz<br>30.41 (Margin -15.59dB) - AV         | Pass   |
| 15.247(d)<br>15.209 | Radiated Emissions         | [dBuV/m at 3m]: 47.56MHz<br>28.32 (Margin -11.68dB) - PK | Pass   |
| 15.247(d)           | Band Edge                  | Meet the requirement of limit                            | Pass   |
| 15.247(b)(1)        | Conducted Output Power     | Power [dBm]: 10.66                                       | Pass   |
| 15.247(a)(1)(iii)   | Number of Hopping Channels | Meet the requirement of limit                            | Pass   |
| 15.247(a)(1)        | Hopping Channel Separation | Meet the requirement of limit                            | Pass   |
| 15.247(a)(1)(iii)   | Dwell Time                 | Meet the requirement of limit                            | Pass   |
| 15.203              | Antenna Requirement        | Meet the requirement of limit                            | Pass   |

### Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

### Comments and Explanations:

The declared values of gain for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of the gain.

# 1 General Description

## 1.1 Information

### 1.1.1 Product Details

|              |                                   |
|--------------|-----------------------------------|
| Product Name | Mobile Phone                      |
| Brand Name   | FUJITSU                           |
| Model Name   | F-02L                             |
| IMEI Code    | 353323100015576 / 353323100017150 |
| H/W Version  | v2.1.0                            |
| S/W Version  | R022.1e                           |

### 1.1.2 Specification of the Equipment under Test (EUT)

| RF General Information |                |                     |                |           |
|------------------------|----------------|---------------------|----------------|-----------|
| Frequency Range (MHz)  | Bluetooth Mode | Ch. Frequency (MHz) | Channel Number | Data Rate |
| 2400-2483.5            | BR             | 2402-2480           | 0-78 [79]      | 1 Mbps    |
| 2400-2483.5            | EDR            | 2402-2480           | 0-78 [79]      | 2 Mbps    |
| 2400-2483.5            | EDR            | 2402-2480           | 0-78 [79]      | 3 Mbps    |

Note 1: RF output power specifies that Maximum Peak Conducted Output Power.  
 Note 2: Bluetooth BR uses a GFSK.  
 Note 3: Bluetooth EDR uses a combination of  $\pi/4$ -DQPSK and 8DPSK.

### 1.1.3 Antenna Details

| Ant. No. | Type     | Connector | Gain (dBi) | Remarks |
|----------|----------|-----------|------------|---------|
| 1        | Monopole | No        | -5         | ---     |

### 1.1.4 Power Supply Type of Equipment under Test (EUT)

|                   |   |
|-------------------|---|
| Power Supply Type | 3.8Vdc from battery:<br>9Vdc,1.5A from adapter (No bundle, support unit only) |
|-------------------|---|

### 1.1.5 Accessories

| Accessories |           |   |
|-------------|-----------|---|
| No.         | Equipment | Description   |
| 1           | Battery   | Brand: FUJITSU CONNECTED TECHNOLOGIES LIMITED<br>Model Name: CA54310-0074<br>Power Rating: 3.8Vdc, 2,780mAh, 10.6Wh |

### 1.1.6 Channel List

| Frequency band (MHz) |                 |         |                 | 2400~2483.5 |                 |         |                 |
|----------------------|-----------------|---------|-----------------|-------------|-----------------|---------|-----------------|
| Channel              | Frequency (MHz) | Channel | Frequency (MHz) | Channel     | Frequency (MHz) | Channel | Frequency (MHz) |
| 0                    | 2402            | 20      | 2422            | 40          | 2442            | 60      | 2462            |
| 1                    | 2403            | 21      | 2423            | 41          | 2443            | 61      | 2463            |
| 2                    | 2404            | 22      | 2424            | 42          | 2444            | 62      | 2464            |
| 3                    | 2405            | 23      | 2425            | 43          | 2445            | 63      | 2465            |
| 4                    | 2406            | 24      | 2426            | 44          | 2446            | 64      | 2466            |
| 5                    | 2407            | 25      | 2427            | 45          | 2447            | 65      | 2467            |
| 6                    | 2408            | 26      | 2428            | 46          | 2448            | 66      | 2468            |
| 7                    | 2409            | 27      | 2429            | 47          | 2449            | 67      | 2469            |
| 8                    | 2410            | 28      | 2430            | 48          | 2450            | 68      | 2470            |
| 9                    | 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            | ---     | ---             |

### 1.1.7 Test Tool and Duty Cycle

| Test Tool                  | QRCT, v 3.0.54.0 |                  |
|----------------------------|------------------|------------------|
| Duty Cycle and Duty Factor | Duty Cycle (%)   | Duty Factor (dB) |
| DH5                        | 78.61%           | 1.05             |
| 2DH5                       | 78.61%           | 1.05             |
| 3DH5                       | 78.61%           | 1.05             |

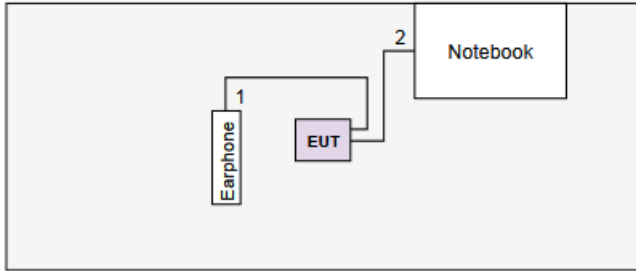
### 1.1.8 Power Index of Test Tool

| Modulation Mode       | Test Frequency (MHz) |      |      |
|-----------------------|----------------------|------|------|
|                       | 2402                 | 2441 | 2480 |
| GFSK/1Mbps            | 9                    | 9    | 9    |
| $\pi/4$ -DQPSK /2Mbps | 9                    | 9    | 9    |
| 8DPSK/3Mbps           | 9                    | 9    | 9    |

### 1.2 Local Support Equipment List

| Support Equipment List |           |       |                |     |         |
|------------------------|-----------|-------|----------------|-----|---------|
| No.                    | Equipment | Brand | Model          | S/N | Remarks |
| 1                      | Earphone  | APPLE | MD827FE/A      | 6   | ---     |
| 2                      | Notebook  | DELL  | Latitude E6440 | --- | ---     |

### 1.3 Test Setup Chart

| Test Setup Diagram   |                           |
|--|---------------------------|
|  |                           |
| No.  | Signal cable / Length (m) |
| 1  | Audio, 1.2m non-shielded. |
| 2  | USB Type-C, 1m shielded.  |

## 1.4 The Equipment List

| Test Item            | Conducted Emission            |                  |               |                  |                   |
|----------------------|-------------------------------|------------------|---------------|------------------|-------------------|
| Test Site            | Conduction room 1 / (CO01-WS) |                  |               |                  |                   |
| Instrument           | Manufacturer                  | Model No.        | Serial No.    | Calibration Date | Calibration Until |
| Receiver             | R&S                           | ESR3             | 101657        | Jan. 08, 2019    | Jan. 07, 2020     |
| LISN                 | SCHWARZBECK                   | Schwarzbeck 8127 | 8127-667      | Nov. 05, 2018    | Nov. 04, 2019     |
| RF Cable-CON         | Woken                         | CFD200-NL        | CFD200-NL-001 | Oct. 23, 2018    | Oct. 23, 2019     |
| Measurement Software | AUDIX                         | e3               | 6.120210k     | NA               | NA                |

Note: Calibration Interval of instruments listed above is one year.

| Test Item            | Radiated Emission          |                      |                  |                  |                   |
|----------------------|----------------------------|----------------------|------------------|------------------|-------------------|
| Test Site            | 966 chamber1 / (03CH01-WS) |                      |                  |                  |                   |
| Instrument           | Manufacturer               | Model No.            | Serial No.       | Calibration Date | Calibration Until |
| Spectrum Analyzer    | R&S                        | FSV40                | 101498           | Dec. 27, 2018    | Dec. 26, 2019     |
| Receiver             | R&S                        | ESR3                 | 101658           | Dec. 11, 2018    | Dec. 10, 2019     |
| Bilog Antenna        | SCHWARZBECK                | VULB9168             | VULB9168-522     | Jul. 18, 2018    | Jul. 17, 2019     |
| Horn Antenna 1G-18G  | SCHWARZBECK                | BBHA 9120 D          | BBHA 9120 D 1096 | Dec. 18, 2018    | Dec. 17, 2019     |
| Horn Antenna 18G-40G | SCHWARZBECK                | BBHA 9170            | BBHA 9170517     | Nov. 15, 2018    | Nov. 14, 2019     |
| Loop Antenna         | R&S                        | HFH2-Z2              | 100330           | Nov. 09, 2018    | Nov. 08, 2019     |
| Loop Antenna Cable   | KOAX KABEL                 | 101354-BW            | 101354-BW        | Oct. 08, 2018    | Oct. 07, 2019     |
| Preamplifier         | EMC                        | EMC02325             | 980225           | Jul. 20, 2018    | Jul. 19, 2019     |
| Preamplifier         | Agilent                    | 83017A               | MY39501308       | Oct. 04, 2018    | Oct. 03, 2019     |
| Preamplifier         | EMC                        | EMC184045B           | 980192           | Aug. 09, 2018    | Aug. 08, 2019     |
| RF Cable             | EMC                        | EMC104-SM-SM-8000    | 181106           | Oct. 08, 2018    | Oct. 07, 2019     |
| RF Cable             | HUBER+SUHNER               | SUCOFLEX104          | MY16019/4        | Oct. 08, 2018    | Oct. 07, 2019     |
| RF Cable             | HUBER+SUHNER               | SUCOFLEX104          | MY16014/4        | Oct. 08, 2018    | Oct. 07, 2019     |
| LF cable 1M          | EMC                        | EMCCFD400-NM-NM-1000 | 160502           | Oct. 08, 2018    | Oct. 07, 2019     |
| LF cable 3M          | Woken                      | CFD400NL-LW          | CFD400NL-001     | Oct. 08, 2018    | Oct. 07, 2019     |
| LF cable 10M         | Woken                      | CFD400NL-LW          | CFD400NL-002     | Oct. 08, 2018    | Oct. 07, 2019     |
| Measurement Software | AUDIX                      | e3                   | 6.120210g        | NA               | NA                |

Note: Calibration Interval of instruments listed above is one year.



|   |                     |                  |                   |                         |                          |
|---|---------------------|------------------|-------------------|-------------------------|--------------------------|
| <b>Test Item</b>  | RF Conducted        |                  |                   |                         |                          |
| <b>Test Site</b>  | (TH01-WS)           |                  |                   |                         |                          |
| <b>Instrument</b>   | <b>Manufacturer</b> | <b>Model No.</b> | <b>Serial No.</b> | <b>Calibration Date</b> | <b>Calibration Until</b> |
| Spectrum Analyzer   | R&S                 | FSV40            | 101063            | Apr. 16, 2018           | Apr. 15, 2019            |
| Power Meter   | Anritsu             | ML2495A          | 1241002           | Oct. 09, 2018           | Oct. 08, 2019            |
| Power Sensor  | Anritsu             | MA2411B          | 1207366           | Oct. 09, 2018           | Oct. 08, 2019            |
| DC POWER SOURCE   | GW INSTRON          | GPC-6030D        | EM892433          | Oct. 25, 2018           | Oct. 24, 2019            |
| Measurement Software  | Sporton             | SENSE-15247_FS   | V5.10.2           | NA                      | NA                       |
| Note: Calibration Interval of instruments listed above is one year. |                     |                  |                   |                         |                          |

## 1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247

ANSI C63.10-2013

FCC KDB 558074 D01 15.247 Meas Guidance v05r01

## 1.6 Deviation from Test Standard and Measurement Procedure

None

## 1.7 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

| Measurement Uncertainty  |             |
|--------------------------|-------------|
| Parameters               | Uncertainty |
| Bandwidth                | ±34.130 Hz  |
| Conducted power          | ±0.808 dB   |
| Power density            | ±0.583 dB   |
| Conducted emission       | ±2.715 dB   |
| AC conducted emission    | ±2.92 dB    |
| Radiated emission ≤ 1GHz | ±3.41 dB    |
| Radiated emission > 1GHz | ±4.59 dB    |

## 2 Test Configuration

### 2.1 Testing Condition

| Test Item          | Test Site | Ambient Condition | Tested By              |
|--------------------|-----------|-------------------|------------------------|
| AC Conduction      | CO01-WS   | 21°C / 56%        | Akun Chung             |
| Radiated Emissions | 03CH01-WS | 20-24°C / 63-65%  | Roger Lu<br>Akun Chung |
| RF Conducted       | TH01-WS   | 22°C / 64%        | Roger Lu               |

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- IC site registration No.: 10807A-1

### 2.2 The Worst Test Modes and Channel Details

| Test item   | Mode      | Test Frequency (MHz) | Data Rate (Mbps) | Test Configuration |
|---|-----------|----------------------|------------------|--------------------|
| Conducted Emissions                                       | 8DPSK     | 2480                 | 1Mbps            | ---                |
| Radiated Emissions ≤ 1GHz                                 | 8DPSK     | 2480                 | 1Mbps            | ---                |
| Radiated Emissions > 1GHz                                 | GFSK      | 2402, 2441, 2480     | 1Mbps            | ---                |
|   | 8DPSK     | 2402, 2441, 2480     | 3Mbps            |                    |
| Conducted Output Power                                    | GFSK      | 2402, 2441, 2480     | 1Mbps            | ---                |
|   | π/4 DQPSK | 2402, 2441, 2480     | 2Mbps            |                    |
|   | 8DPSK     | 2402, 2441, 2480     | 3Mbps            |                    |
| Number of Hopping Channels                                | GFSK      | 2402~2480            | 1Mbps            | ---                |
|   | π/4 DQPSK | 2402~2480            | 2Mbps            |                    |
|   | 8DPSK     | 2402~2480            | 3Mbps            |                    |
| Hopping Channel Separation<br>20dB and Occupied bandwidth | GFSK      | 2402, 2441, 2480     | 1Mbps            | ---                |
|   | π/4 DQPSK | 2402, 2441, 2480     | 2Mbps            |                    |
|   | 8DPSK     | 2402, 2441, 2480     | 3Mbps            |                    |
| Dwell Time  | GFSK      | 2441                 | 1Mbps            | ---                |
|   | π/4 DQPSK | 2441                 | 2Mbps            |                    |
|   | 8DPSK     | 2441                 | 3Mbps            |                    |

**NOTE:**

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Y-plane** results were found as the worst case and were shown in this report.

## 3 Transmitter Test Results

### 3.1 Conducted Emissions

#### 3.1.1 Limit of Conducted Emissions

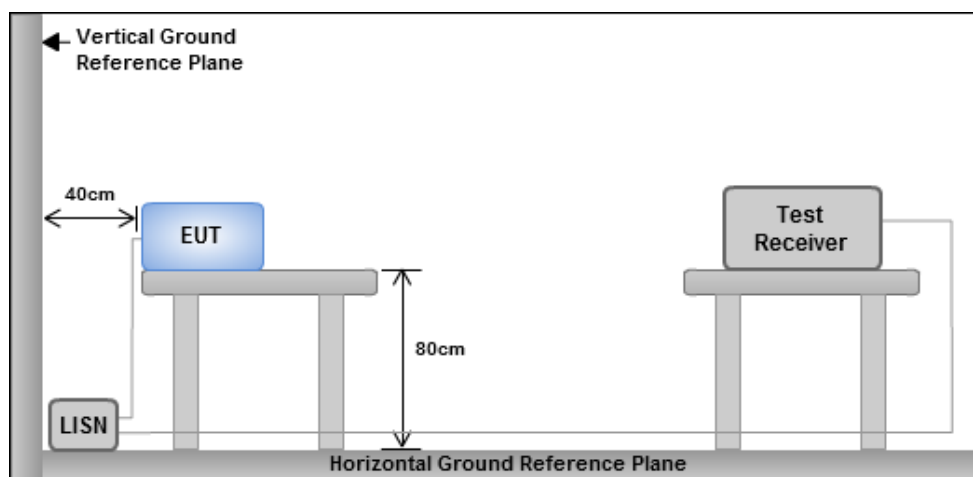
| Conducted Emissions Limit |            |           |
|---------------------------|------------|-----------|
| Frequency Emission (MHz)  | Quasi-Peak | Average   |
| 0.15-0.5                  | 66 - 56 *  | 56 - 46 * |
| 0.5-5                     | 56         | 46        |
| 5-30                      | 60         | 50        |

Note 1: \* Decreases with the logarithm of the frequency.

#### 3.1.2 Test Procedures

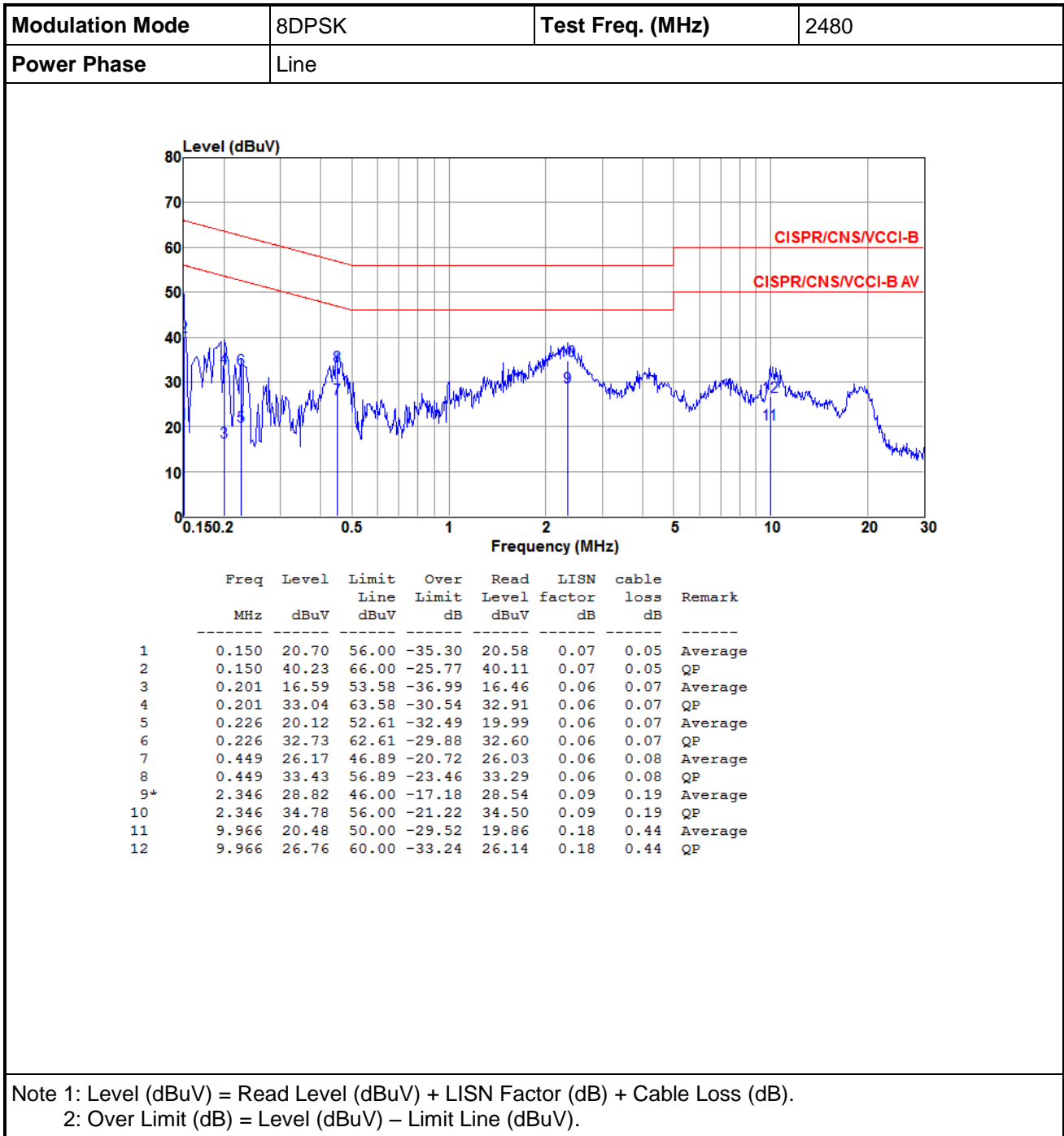
1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50  $\Omega$  LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V/60Hz

#### 3.1.3 Test Setup

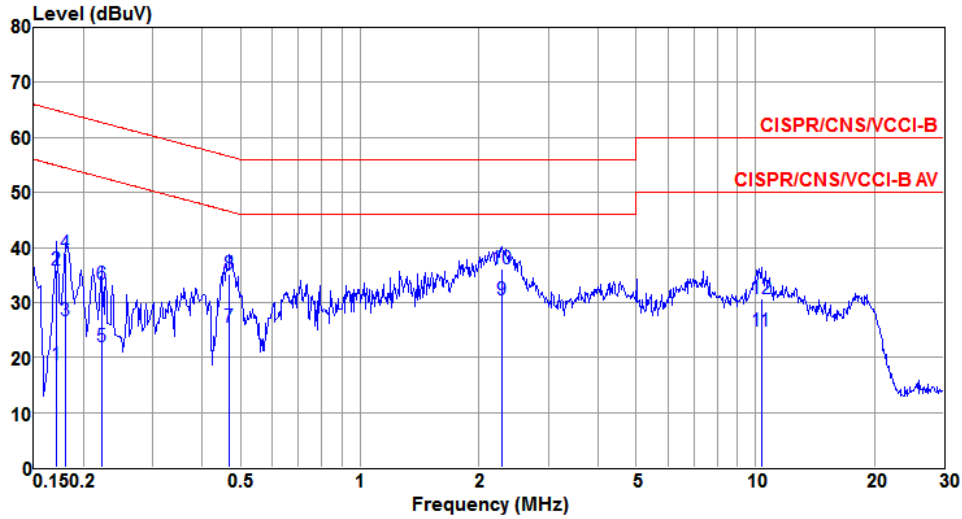


- Note: 1. Support units were connected to second LISN.  
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

### 3.1.4 Test Result of Conducted Emissions



|                        |         |                         |      |
|------------------------|---------|-------------------------|------|
| <b>Modulation Mode</b> | 8DPSK   | <b>Test Freq. (MHz)</b> | 2480 |
| <b>Power Phase</b>     | Neutral |                         |      |



|    | Freq<br>MHz | Level<br>dBuV | Limit<br>Line<br>dBuV | Over<br>Limit<br>dB | Read<br>Level<br>dBuV | LISN<br>factor<br>dB | cable<br>loss<br>dB | Remark  |
|----|-------------|---------------|-----------------------|---------------------|-----------------------|----------------------|---------------------|---------|
| 1  | 0.171       | 18.75         | 54.90                 | -36.15              | 18.64                 | 0.05                 | 0.06                | Average |
| 2  | 0.171       | 35.89         | 64.90                 | -29.01              | 35.78                 | 0.05                 | 0.06                | QP      |
| 3  | 0.180       | 26.71         | 54.50                 | -27.79              | 26.61                 | 0.04                 | 0.06                | Average |
| 4  | 0.180       | 39.05         | 64.50                 | -25.45              | 38.95                 | 0.04                 | 0.06                | QP      |
| 5  | 0.222       | 21.86         | 52.74                 | -30.88              | 21.75                 | 0.04                 | 0.07                | Average |
| 6  | 0.222       | 33.33         | 62.74                 | -29.41              | 33.22                 | 0.04                 | 0.07                | QP      |
| 7  | 0.469       | 25.61         | 46.54                 | -20.93              | 25.48                 | 0.05                 | 0.08                | Average |
| 8  | 0.469       | 35.16         | 56.54                 | -21.38              | 35.03                 | 0.05                 | 0.08                | QP      |
| 9* | 2.285       | 30.41         | 46.00                 | -15.59              | 30.16                 | 0.07                 | 0.18                | Average |
| 10 | 2.285       | 36.06         | 56.00                 | -19.94              | 35.81                 | 0.07                 | 0.18                | QP      |
| 11 | 10.342      | 24.78         | 50.00                 | -25.22              | 24.15                 | 0.18                 | 0.45                | Average |
| 12 | 10.342      | 30.74         | 60.00                 | -29.26              | 30.11                 | 0.18                 | 0.45                | QP      |

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).  
 2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

## 3.2 Unwanted Emissions into Restricted Frequency Bands

### 3.2.1 Limit of Unwanted Emissions into Restricted Frequency Bands

| Restricted Band Emissions Limit |                       |                         |                      |
|---------------------------------|-----------------------|-------------------------|----------------------|
| Frequency Range (MHz)           | Field Strength (uV/m) | Field Strength (dBuV/m) | Measure Distance (m) |
| 0.009~0.490                     | 2400/F(kHz)           | 48.5 - 13.8             | 300                  |
| 0.490~1.705                     | 24000/F(kHz)          | 33.8 - 23               | 30                   |
| 1.705~30.0                      | 30                    | 29                      | 30                   |
| 30~88                           | 100                   | 40                      | 3                    |
| 88~216                          | 150                   | 43.5                    | 3                    |
| 216~960                         | 200                   | 46                      | 3                    |
| Above 960                       | 500                   | 54                      | 3                    |

**Note 1:**  
Quasi-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

**Note 2:**  
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

### 3.2.2 Test Procedures

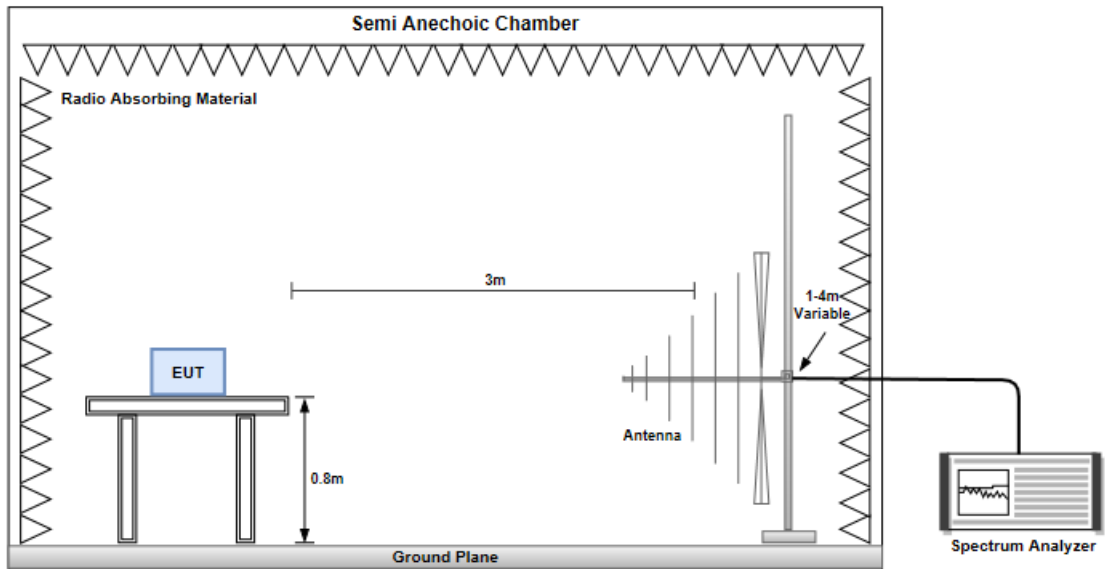
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

**Note:**

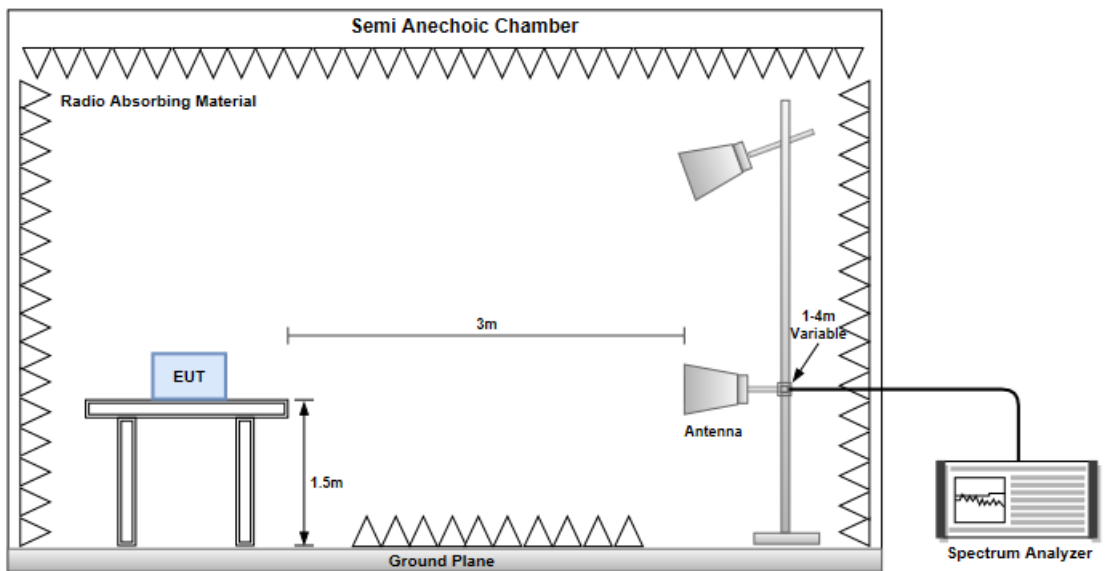
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. Radiated emission above 1GHz / Peak value  
RBW=1MHz, VBW=3MHz and Peak detector  
Radiated emission above 1GHz / Average value for harmonics  
The average value is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula for DH5 packet type which has worst duty factor:
3.
$$20\log(\text{Duty cycle}) = 20\log \frac{1\text{s} / 1600 * 5}{100 \text{ ms}} = -30.1\text{dB}$$
4. Radiated emission above 1GHz / Average value for other emissions  
RBW=1MHz, VBW=1/T and Peak detector

### 3.2.3 Test Setup

#### Radiated Emissions below 1 GHz

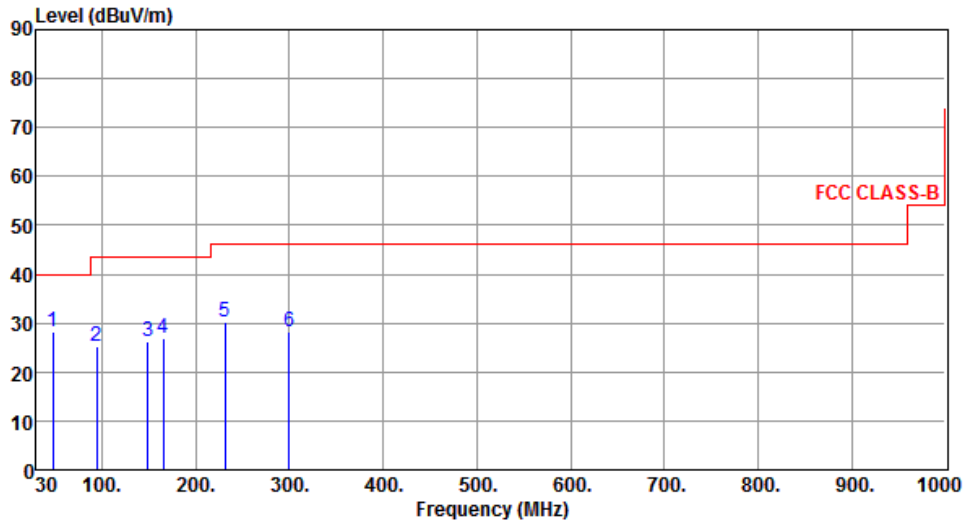


#### Radiated Emissions above 1 GHz



### 3.2.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

|                     |            |                         |      |
|---------------------|------------|-------------------------|------|
| <b>Modulation</b>   | 8DPSK      | <b>Test Freq. (MHz)</b> | 2480 |
| <b>Polarization</b> | Horizontal |                         |      |



|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|--------|-------------------|----------------------|
| 1 | 47.56        | 28.32                       | 40.00           | -11.68       | 36.09                 | -7.77        | Peak   | ---               | ---                  |
| 2 | 94.27        | 25.31                       | 43.50           | -18.19       | 39.35                 | -14.04       | Peak   | ---               | ---                  |
| 3 | 148.60       | 26.21                       | 43.50           | -17.29       | 34.56                 | -8.35        | Peak   | ---               | ---                  |
| 4 | 165.34       | 26.87                       | 43.50           | -16.63       | 35.22                 | -8.35        | Peak   | ---               | ---                  |
| 5 | 231.32       | 30.21                       | 46.00           | -15.79       | 40.43                 | -10.22       | Peak   | ---               | ---                  |
| 6 | 299.31       | 28.14                       | 46.00           | -17.86       | 35.95                 | -7.81        | Peak   | ---               | ---                  |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

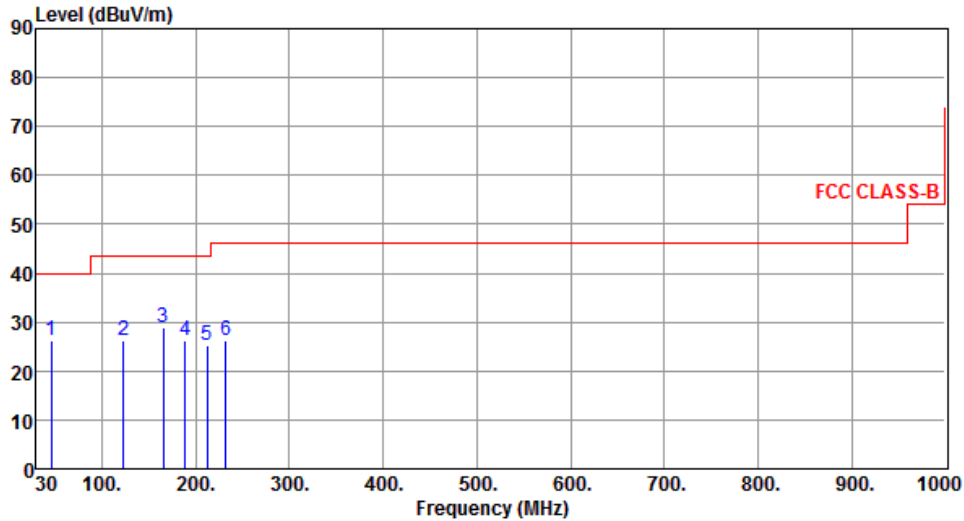
\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.



|                     |          |                         |      |
|---------------------|----------|-------------------------|------|
| <b>Modulation</b>   | 8DPSK    | <b>Test Freq. (MHz)</b> | 2480 |
| <b>Polarization</b> | Vertical |                         |      |



|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|--------|-------------------|----------------------|
| 1 | 45.74        | 26.32                       | 40.00           | -13.68       | 34.09                 | -7.77        | Peak   | ---               | ---                  |
| 2 | 123.21       | 26.21                       | 43.50           | -17.29       | 36.50                 | -10.29       | Peak   | ---               | ---                  |
| 3 | 165.21       | 28.99                       | 43.50           | -14.51       | 37.34                 | -8.35        | Peak   | ---               | ---                  |
| 4 | 189.24       | 26.21                       | 43.50           | -17.29       | 36.55                 | -10.34       | Peak   | ---               | ---                  |
| 5 | 212.21       | 25.14                       | 43.50           | -18.36       | 36.08                 | -10.94       | Peak   | ---               | ---                  |
| 6 | 231.89       | 26.24                       | 46.00           | -19.76       | 36.41                 | -10.17       | Peak   | ---               | ---                  |

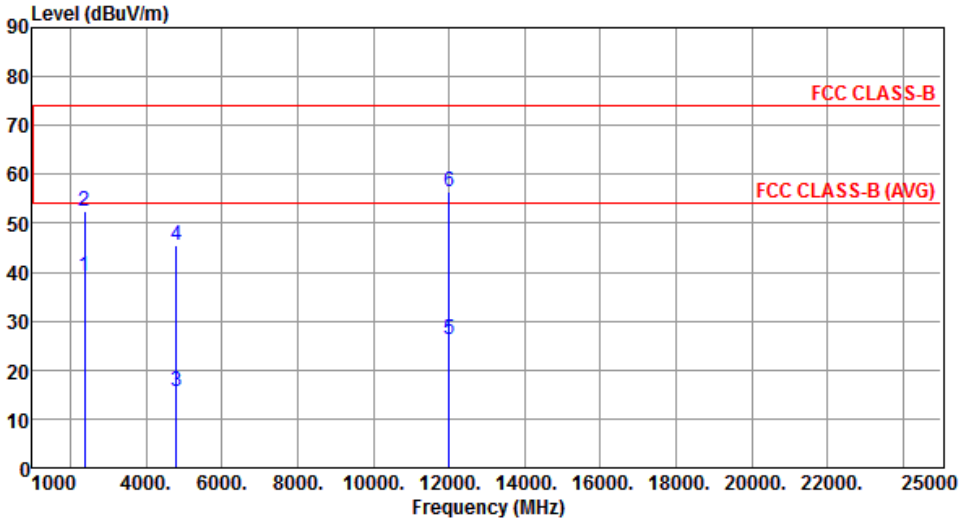
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

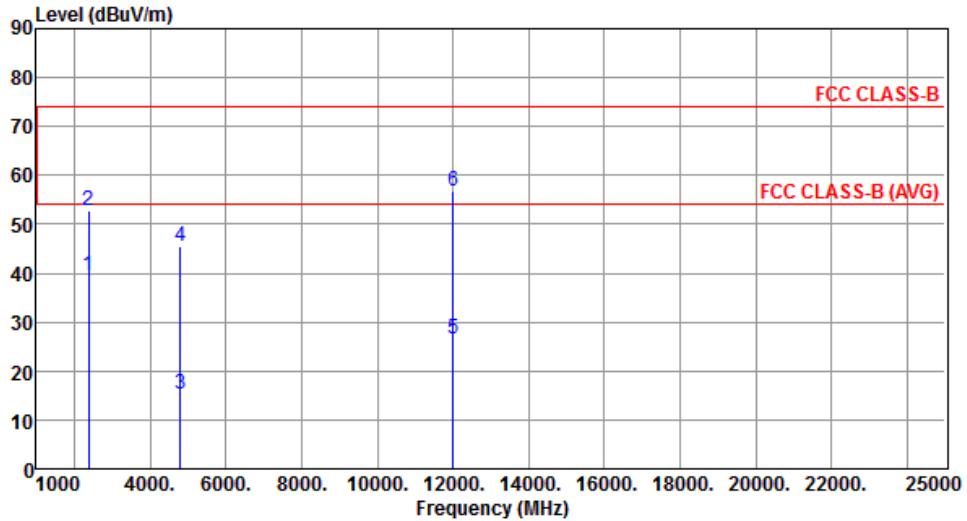
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

### 3.2.5 Transmitter Radiated Unwanted Emissions (Above 1GHz) for GFSK

| Modulation  | GFSK       | Test Freq. (MHz) | 2402   |        |            |        |         |          |            |
|---|------------|------------------|--------|--------|------------|--------|---------|----------|------------|
| Polarization  | Horizontal |                  |        |        |            |        |         |          |            |
|    |            |                  |        |        |            |        |         |          |            |
|   | Freq.      | Emission level   | Limit  | Margin | SA reading | Factor | Remark  | ANT High | Turn Table |
|   | MHz        | dBuV/m           | dBuV/m | dB     | dBuV       | dB     |         | cm       | deg        |
| 1   | 2390.00    | 39.29            | 54.00  | -14.71 | 42.36      | -3.07  | Average | 120      | 132        |
| 2   | 2390.00    | 52.49            | 74.00  | -21.51 | 55.56      | -3.07  | Peak    | 120      | 132        |
| 3   | 4804.00    | 15.53            | 54.00  | -38.47 | 12.03      | 3.50   | Average | 100      | 20         |
| 4   | 4804.00    | 45.63            | 74.00  | -28.37 | 42.13      | 3.50   | Peak    | 100      | 20         |
| 5   | 12010.00   | 26.35            | 54.00  | -27.65 | 13.09      | 13.26  | Average | 100      | 50         |
| 6   | 12010.00   | 56.45            | 74.00  | -17.55 | 43.19      | 13.26  | Peak    | 100      | 50         |
| <p>Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)<br/>           *Factor includes antenna factor , cable loss and amplifier gain<br/>           Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).</p> |            |                  |        |        |            |        |         |          |            |

|                     |          |                         |      |
|---------------------|----------|-------------------------|------|
| <b>Modulation</b>   | GFSK     | <b>Test Freq. (MHz)</b> | 2402 |
| <b>Polarization</b> | Vertical |                         |      |



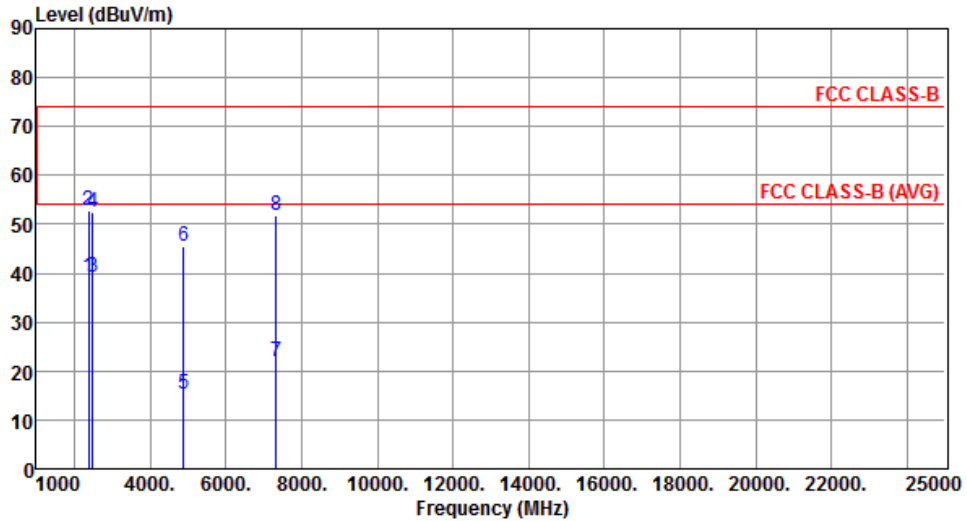
|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2390.00      | 39.40                       | 54.00           | -14.60       | 42.47                 | -3.07        | Average | 188               | 213                  |
| 2 | 2390.00      | 52.69                       | 74.00           | -21.31       | 55.76                 | -3.07        | Peak    | 188               | 213                  |
| 3 | 4804.00      | 15.40                       | 54.00           | -38.60       | 11.90                 | 3.50         | Average | 100               | 50                   |
| 4 | 4804.00      | 45.50                       | 74.00           | -28.50       | 42.00                 | 3.50         | Peak    | 100               | 50                   |
| 5 | 12010.00     | 26.58                       | 54.00           | -27.42       | 13.32                 | 13.26        | Average | 100               | 70                   |
| 6 | 12010.00     | 56.68                       | 74.00           | -17.32       | 43.42                 | 13.26        | Peak    | 100               | 70                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

|                     |            |                         |      |
|---------------------|------------|-------------------------|------|
| <b>Modulation</b>   | GFSK       | <b>Test Freq. (MHz)</b> | 2441 |
| <b>Polarization</b> | Horizontal |                         |      |



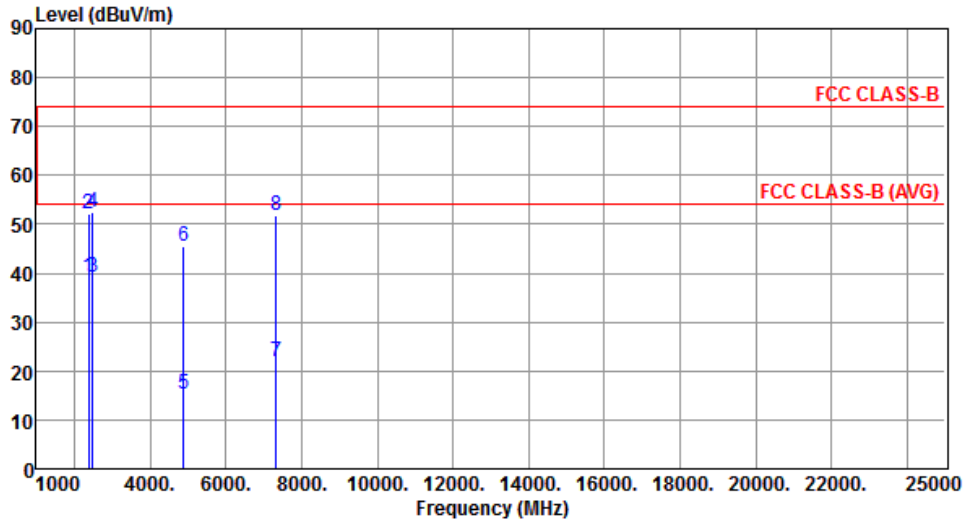
|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2390.00      | 39.16                       | 54.00           | -14.84       | 42.23                 | -3.07        | Average | 119               | 131                  |
| 2 | 2390.00      | 52.73                       | 74.00           | -21.27       | 55.80                 | -3.07        | Peak    | 119               | 131                  |
| 3 | 2483.50      | 39.13                       | 54.00           | -14.87       | 42.35                 | -3.22        | Average | 119               | 131                  |
| 4 | 2483.50      | 52.35                       | 74.00           | -21.65       | 55.57                 | -3.22        | Peak    | 119               | 131                  |
| 5 | 4882.00      | 15.36                       | 54.00           | -38.64       | 11.75                 | 3.61         | Average | 100               | 90                   |
| 6 | 4882.00      | 45.46                       | 74.00           | -28.54       | 41.85                 | 3.61         | Peak    | 100               | 90                   |
| 7 | 7323.00      | 21.76                       | 54.00           | -32.24       | 12.97                 | 8.79         | Average | 100               | 60                   |
| 8 | 7323.00      | 51.86                       | 74.00           | -22.14       | 43.07                 | 8.79         | Peak    | 100               | 60                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

|                     |          |                         |      |
|---------------------|----------|-------------------------|------|
| <b>Modulation</b>   | GFSK     | <b>Test Freq. (MHz)</b> | 2441 |
| <b>Polarization</b> | Vertical |                         |      |



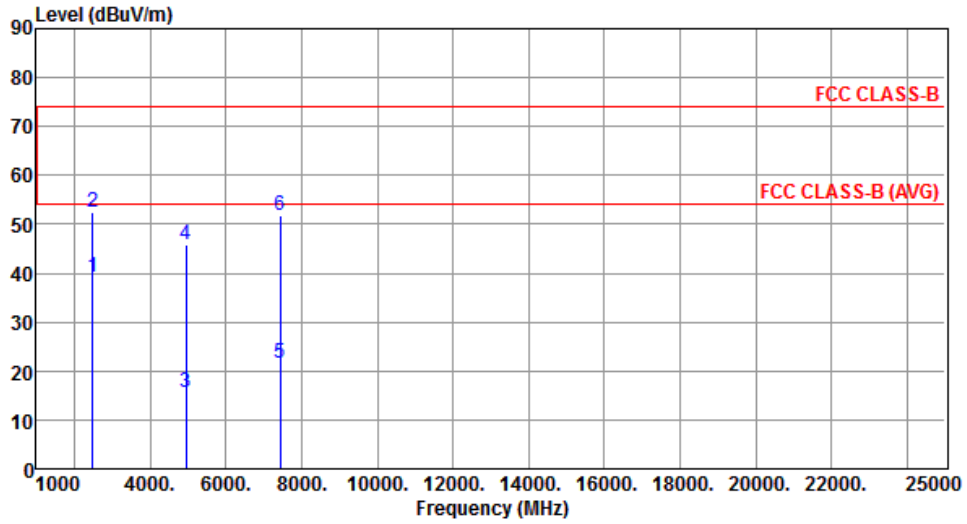
|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2390.00      | 39.16                       | 54.00           | -14.84       | 42.23                 | -3.07        | Average | 212               | 204                  |
| 2 | 2390.00      | 52.29                       | 74.00           | -21.71       | 55.36                 | -3.07        | Peak    | 212               | 204                  |
| 3 | 2483.50      | 39.14                       | 54.00           | -14.86       | 42.36                 | -3.22        | Average | 212               | 204                  |
| 4 | 2483.50      | 52.46                       | 74.00           | -21.54       | 55.68                 | -3.22        | Peak    | 212               | 204                  |
| 5 | 4882.00      | 15.29                       | 54.00           | -38.71       | 11.68                 | 3.61         | Average | 100               | 20                   |
| 6 | 4882.00      | 45.39                       | 74.00           | -28.61       | 41.78                 | 3.61         | Peak    | 100               | 20                   |
| 7 | 7323.00      | 21.83                       | 54.00           | -32.17       | 13.04                 | 8.79         | Average | 100               | 50                   |
| 8 | 7323.00      | 51.93                       | 74.00           | -22.07       | 43.14                 | 8.79         | Peak    | 100               | 50                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

|                     |            |                         |      |
|---------------------|------------|-------------------------|------|
| <b>Modulation</b>   | GFSK       | <b>Test Freq. (MHz)</b> | 2480 |
| <b>Polarization</b> | Horizontal |                         |      |



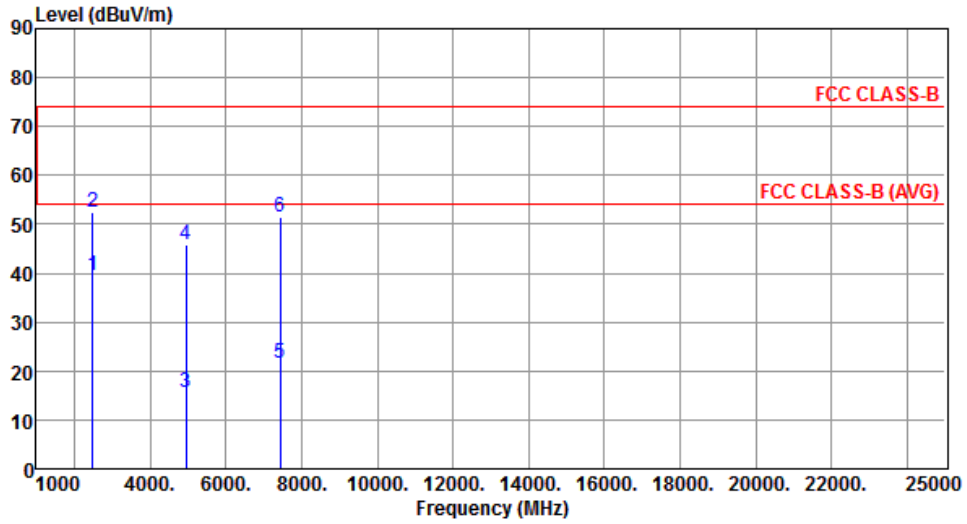
|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2483.50      | 39.29                       | 54.00           | -14.71       | 42.51                 | -3.22        | Average | 121               | 135                  |
| 2 | 2483.50      | 52.44                       | 74.00           | -21.56       | 55.66                 | -3.22        | Peak    | 121               | 135                  |
| 3 | 4960.00      | 15.73                       | 54.00           | -38.27       | 11.87                 | 3.86         | Average | 100               | 85                   |
| 4 | 4960.00      | 45.83                       | 74.00           | -28.17       | 41.97                 | 3.86         | Peak    | 100               | 85                   |
| 5 | 7440.00      | 21.60                       | 54.00           | -32.40       | 13.06                 | 8.54         | Average | 100               | 40                   |
| 6 | 7440.00      | 51.70                       | 74.00           | -22.30       | 43.16                 | 8.54         | Peak    | 100               | 40                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

|                     |          |                         |      |
|---------------------|----------|-------------------------|------|
| <b>Modulation</b>   | GFSK     | <b>Test Freq. (MHz)</b> | 2480 |
| <b>Polarization</b> | Vertical |                         |      |



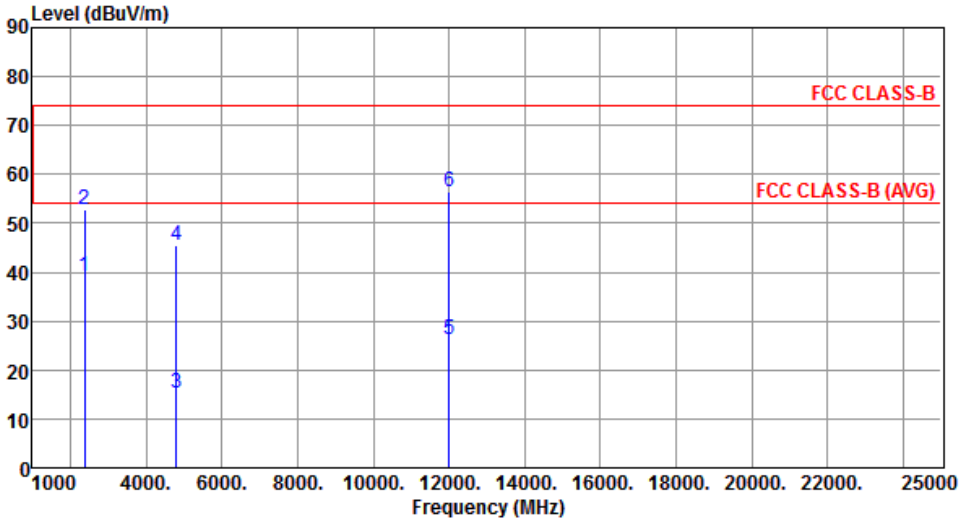
|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2483.50      | 39.44                       | 54.00           | -14.56       | 42.66                 | -3.22        | Average | 185               | 221                  |
| 2 | 2483.50      | 52.31                       | 74.00           | -21.69       | 55.53                 | -3.22        | Peak    | 185               | 221                  |
| 3 | 4960.00      | 15.66                       | 54.00           | -38.34       | 11.80                 | 3.86         | Average | 100               | 90                   |
| 4 | 4960.00      | 45.76                       | 74.00           | -28.24       | 41.90                 | 3.86         | Peak    | 100               | 90                   |
| 5 | 7440.00      | 21.51                       | 54.00           | -32.49       | 12.97                 | 8.54         | Average | 100               | 50                   |
| 6 | 7440.00      | 51.61                       | 74.00           | -22.39       | 43.07                 | 8.54         | Peak    | 100               | 50                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

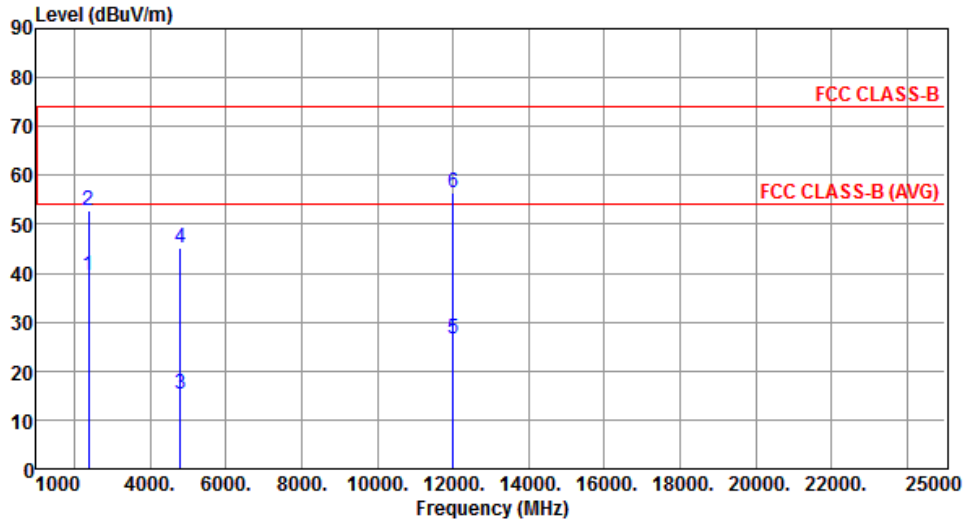
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

### 3.2.6 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 8DPSK

| Modulation  | 8DPSK      | Test Freq. (MHz) | 2402   |        |            |        |         |          |            |
|---|------------|------------------|--------|--------|------------|--------|---------|----------|------------|
| Polarization  | Horizontal |                  |        |        |            |        |         |          |            |
|    |            |                  |        |        |            |        |         |          |            |
|   | Freq.      | Emission level   | Limit  | Margin | SA reading | Factor | Remark  | ANT High | Turn Table |
|   | MHz        | dBuV/m           | dBuV/m | dB     | dBuV       | dB     |         | cm       | deg        |
| 1   | 2390.00    | 39.25            | 54.00  | -14.75 | 42.32      | -3.07  | Average | 121      | 136        |
| 2   | 2390.00    | 52.73            | 74.00  | -21.27 | 55.80      | -3.07  | Peak    | 121      | 136        |
| 3   | 4804.00    | 15.26            | 54.00  | -38.74 | 11.76      | 3.50   | Average | 100      | 25         |
| 4   | 4804.00    | 45.36            | 74.00  | -28.64 | 41.86      | 3.50   | Peak    | 100      | 25         |
| 5   | 12010.00   | 26.23            | 54.00  | -27.77 | 12.97      | 13.26  | Average | 100      | 55         |
| 6   | 12010.00   | 56.33            | 74.00  | -17.67 | 43.07      | 13.26  | Peak    | 100      | 55         |
| <p>Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)<br/>           *Factor includes antenna factor , cable loss and amplifier gain<br/>           Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).</p> |            |                  |        |        |            |        |         |          |            |



|                     |          |                         |      |
|---------------------|----------|-------------------------|------|
| <b>Modulation</b>   | 8DPSK    | <b>Test Freq. (MHz)</b> | 2402 |
| <b>Polarization</b> | Vertical |                         |      |



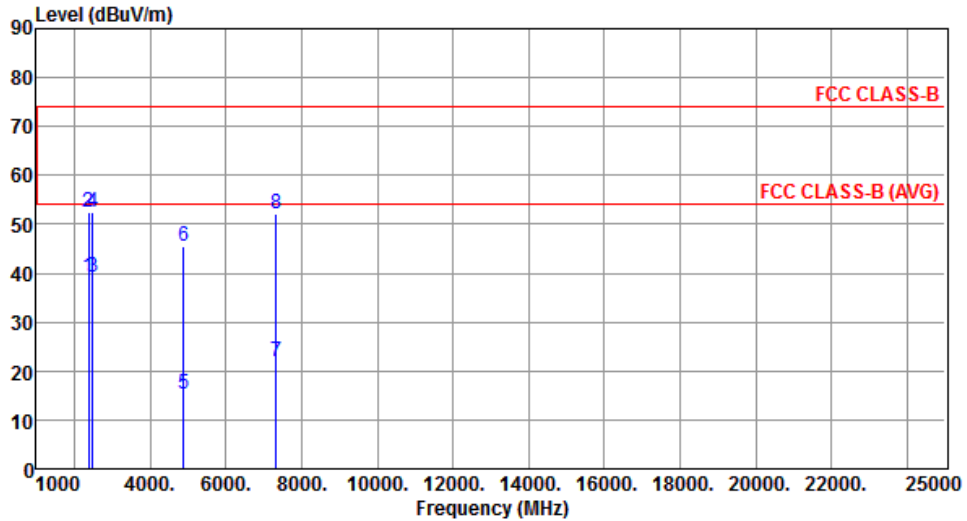
|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2390.00      | 39.45                       | 54.00           | -14.55       | 42.52                 | -3.07        | Average | 190               | 213                  |
| 2 | 2390.00      | 52.69                       | 74.00           | -21.31       | 55.76                 | -3.07        | Peak    | 190               | 213                  |
| 3 | 4804.00      | 15.23                       | 54.00           | -38.77       | 11.73                 | 3.50         | Average | 100               | 40                   |
| 4 | 4804.00      | 45.33                       | 74.00           | -28.67       | 41.83                 | 3.50         | Peak    | 100               | 40                   |
| 5 | 12010.00     | 26.45                       | 54.00           | -27.55       | 13.19                 | 13.26        | Average | 100               | 65                   |
| 6 | 12010.00     | 56.55                       | 74.00           | -17.45       | 43.29                 | 13.26        | Peak    | 100               | 65                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

|                     |            |                         |      |
|---------------------|------------|-------------------------|------|
| <b>Modulation</b>   | 8DPSK      | <b>Test Freq. (MHz)</b> | 2441 |
| <b>Polarization</b> | Horizontal |                         |      |



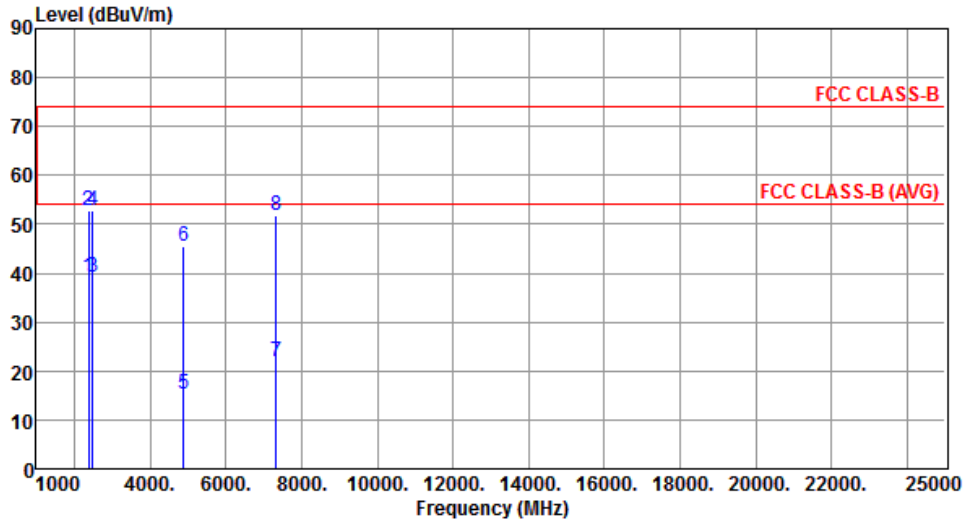
|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2390.00      | 39.29                       | 54.00           | -14.71       | 42.36                 | -3.07        | Average | 120               | 135                  |
| 2 | 2390.00      | 52.60                       | 74.00           | -21.40       | 55.67                 | -3.07        | Peak    | 120               | 135                  |
| 3 | 2483.50      | 39.04                       | 54.00           | -14.96       | 42.26                 | -3.22        | Average | 120               | 135                  |
| 4 | 2483.50      | 52.44                       | 74.00           | -21.56       | 55.66                 | -3.22        | Peak    | 120               | 135                  |
| 5 | 4882.00      | 15.30                       | 54.00           | -38.70       | 11.69                 | 3.61         | Average | 100               | 80                   |
| 6 | 4882.00      | 45.40                       | 74.00           | -28.60       | 41.79                 | 3.61         | Peak    | 100               | 80                   |
| 7 | 7323.00      | 21.89                       | 54.00           | -32.11       | 13.10                 | 8.79         | Average | 100               | 50                   |
| 8 | 7323.00      | 51.99                       | 74.00           | -22.01       | 43.20                 | 8.79         | Peak    | 100               | 50                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

|                     |          |                         |      |
|---------------------|----------|-------------------------|------|
| <b>Modulation</b>   | 8DPSK    | <b>Test Freq. (MHz)</b> | 2441 |
| <b>Polarization</b> | Vertical |                         |      |



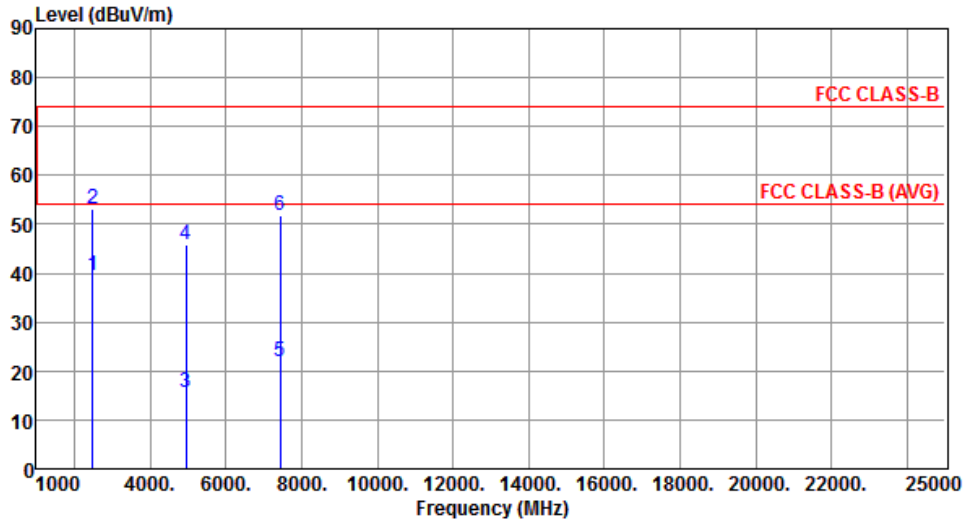
|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2390.00      | 39.25                       | 54.00           | -14.75       | 42.32                 | -3.07        | Average | 211               | 206                  |
| 2 | 2390.00      | 52.73                       | 74.00           | -21.27       | 55.80                 | -3.07        | Peak    | 211               | 206                  |
| 3 | 2483.50      | 39.29                       | 54.00           | -14.71       | 42.51                 | -3.22        | Average | 211               | 206                  |
| 4 | 2483.50      | 52.76                       | 74.00           | -21.24       | 55.98                 | -3.22        | Peak    | 211               | 206                  |
| 5 | 4882.00      | 15.35                       | 54.00           | -38.65       | 11.74                 | 3.61         | Average | 100               | 40                   |
| 6 | 4882.00      | 45.45                       | 74.00           | -28.55       | 41.84                 | 3.61         | Peak    | 100               | 40                   |
| 7 | 7323.00      | 21.79                       | 54.00           | -32.21       | 13.00                 | 8.79         | Average | 100               | 90                   |
| 8 | 7323.00      | 51.89                       | 74.00           | -22.11       | 43.10                 | 8.79         | Peak    | 100               | 90                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

|                     |            |                         |      |
|---------------------|------------|-------------------------|------|
| <b>Modulation</b>   | 8DPSK      | <b>Test Freq. (MHz)</b> | 2480 |
| <b>Polarization</b> | Horizontal |                         |      |



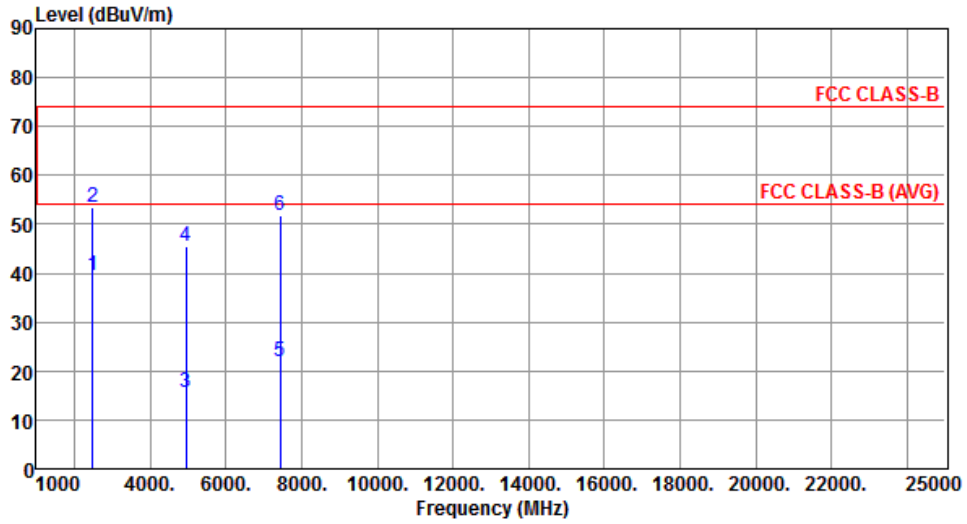
|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2483.50      | 39.44                       | 54.00           | -14.56       | 42.66                 | -3.22        | Average | 125               | 141                  |
| 2 | 2483.50      | 53.14                       | 74.00           | -20.86       | 56.36                 | -3.22        | Peak    | 125               | 141                  |
| 3 | 4960.00      | 15.64                       | 54.00           | -38.36       | 11.78                 | 3.86         | Average | 100               | 70                   |
| 4 | 4960.00      | 45.74                       | 74.00           | -28.26       | 41.88                 | 3.86         | Peak    | 100               | 70                   |
| 5 | 7440.00      | 21.83                       | 54.00           | -32.17       | 13.29                 | 8.54         | Average | 100               | 50                   |
| 6 | 7440.00      | 51.93                       | 74.00           | -22.07       | 43.39                 | 8.54         | Peak    | 100               | 50                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

|                     |          |                         |      |
|---------------------|----------|-------------------------|------|
| <b>Modulation</b>   | 8DPSK    | <b>Test Freq. (MHz)</b> | 2480 |
| <b>Polarization</b> | Vertical |                         |      |



|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2483.50      | 39.62                       | 54.00           | -14.38       | 42.84                 | -3.22        | Average | 189               | 225                  |
| 2 | 2483.50      | 53.53                       | 74.00           | -20.47       | 56.75                 | -3.22        | Peak    | 189               | 225                  |
| 3 | 4960.00      | 15.48                       | 54.00           | -38.52       | 11.62                 | 3.86         | Average | 100               | 50                   |
| 4 | 4960.00      | 45.58                       | 74.00           | -28.42       | 41.72                 | 3.86         | Peak    | 100               | 50                   |
| 5 | 7440.00      | 21.79                       | 54.00           | -32.21       | 13.25                 | 8.54         | Average | 100               | 60                   |
| 6 | 7440.00      | 51.89                       | 74.00           | -22.11       | 43.35                 | 8.54         | Peak    | 100               | 60                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

### 3.3 Unwanted Emissions into Non-Restricted Frequency Bands

#### 3.3.1 Limit of Unwanted Emissions into Non-Restricted Frequency Bands

Peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz.

#### 3.3.2 Test Procedures

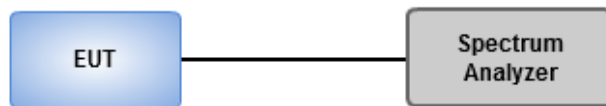
##### Reference level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Use the peak marker function to determine the maximum PSD level

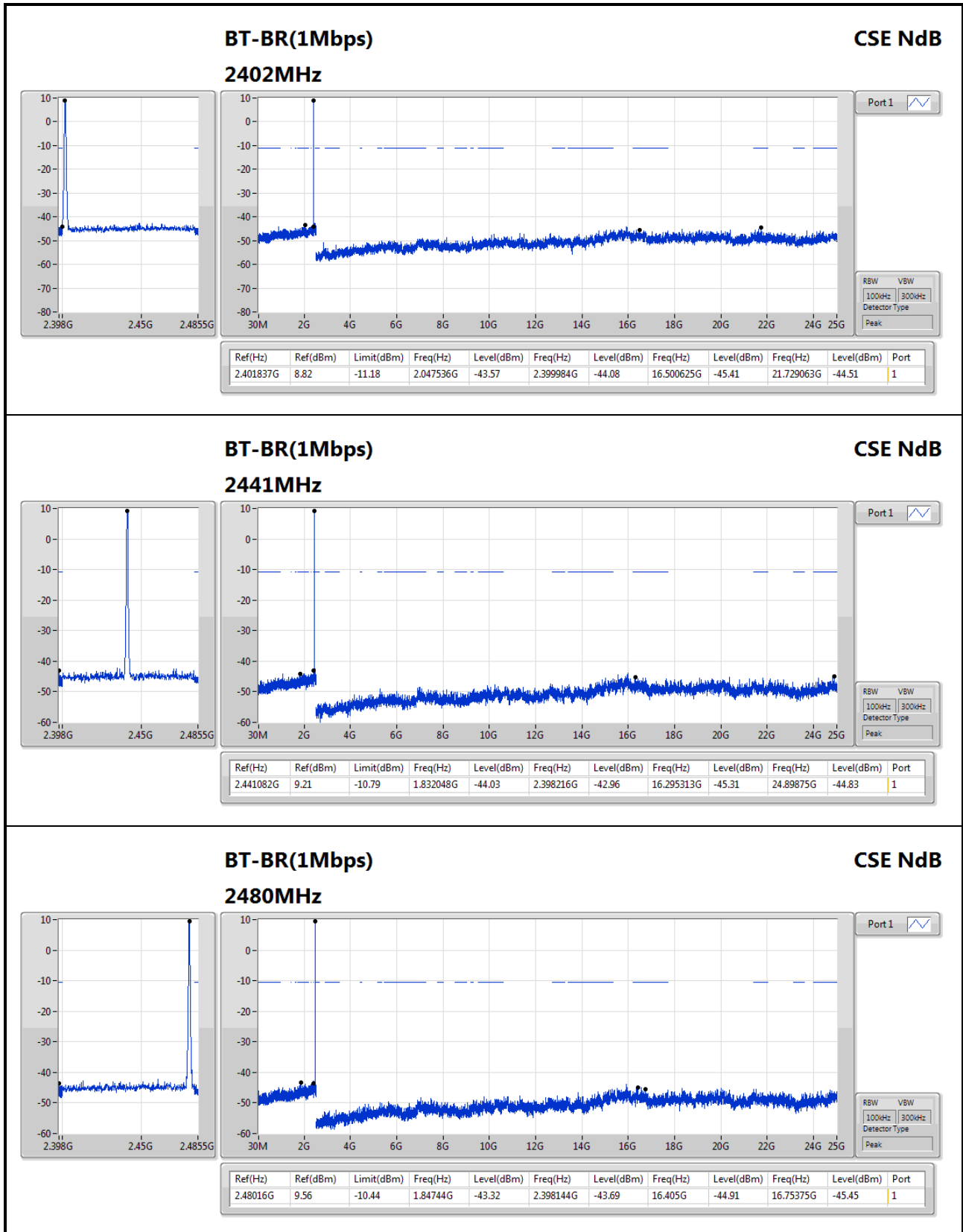
##### Emission level measurement

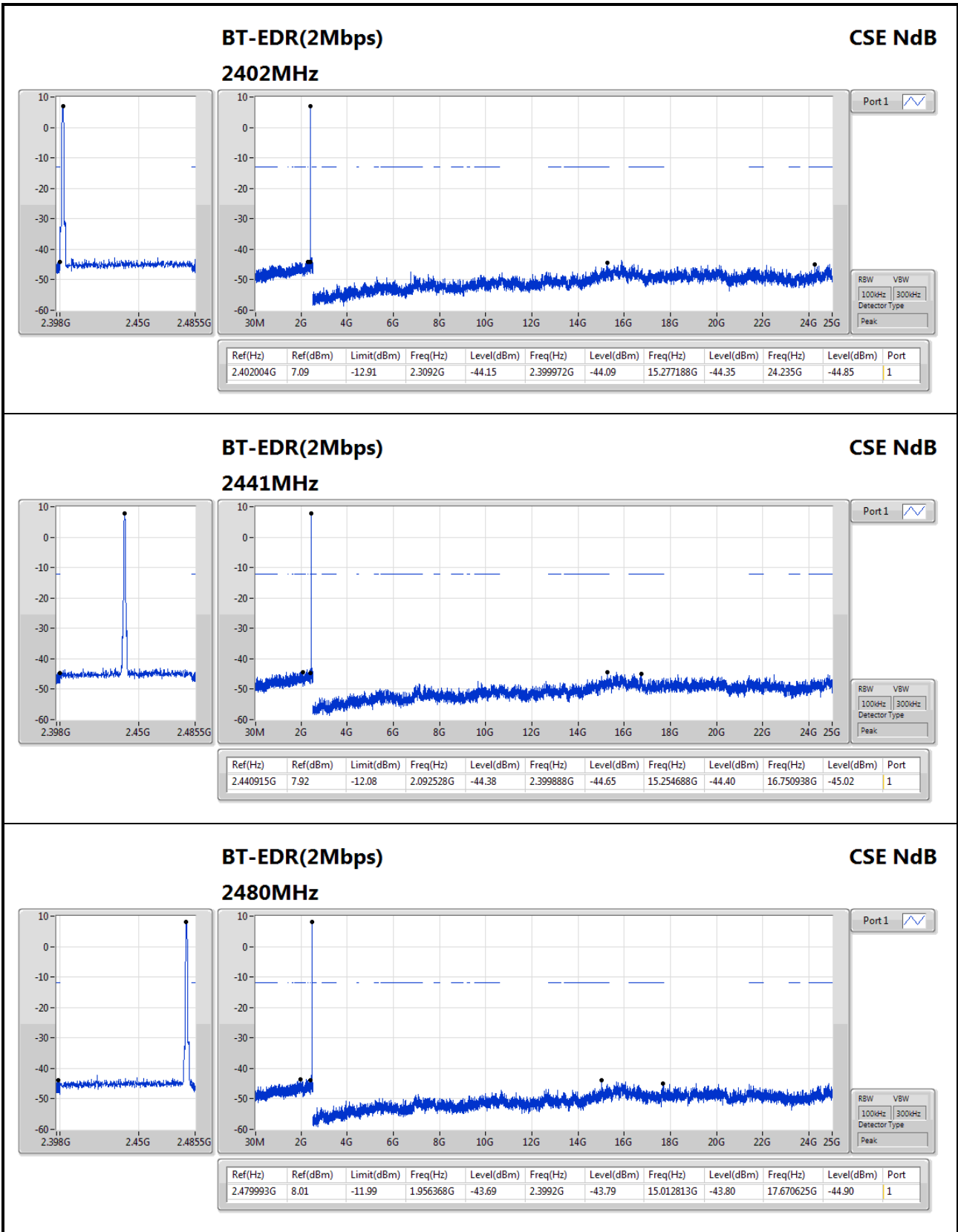
1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 25GHz
4. Use the peak marker function to determine the maximum amplitude level

#### 3.3.3 Test Setup

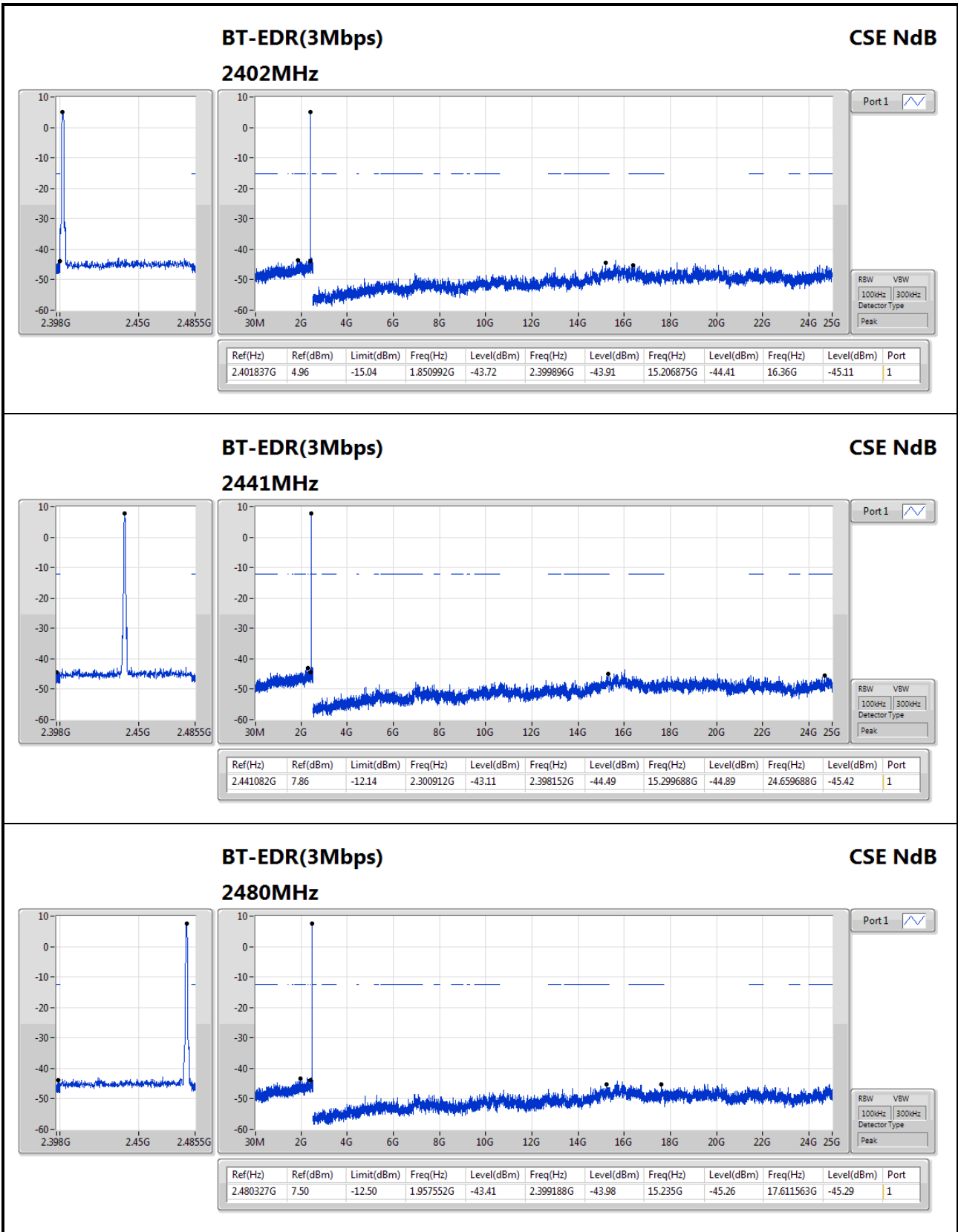


### 3.3.4 Unwanted Emissions into Non-Restricted Frequency Bands

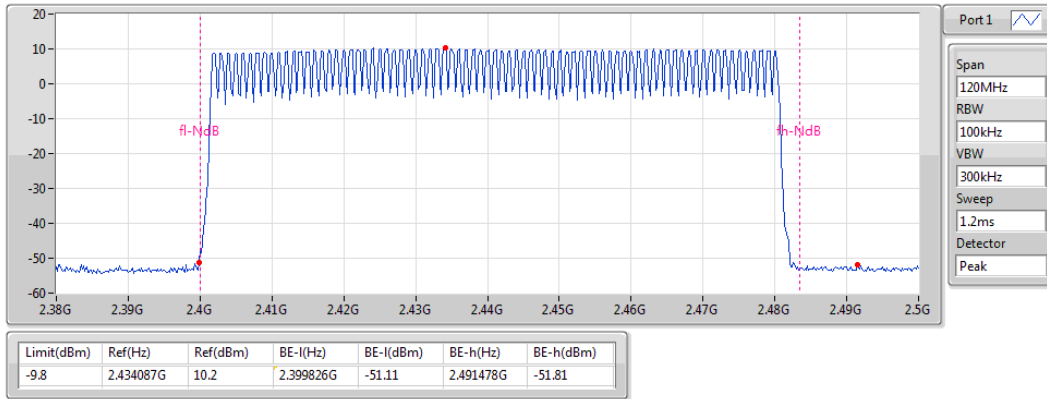




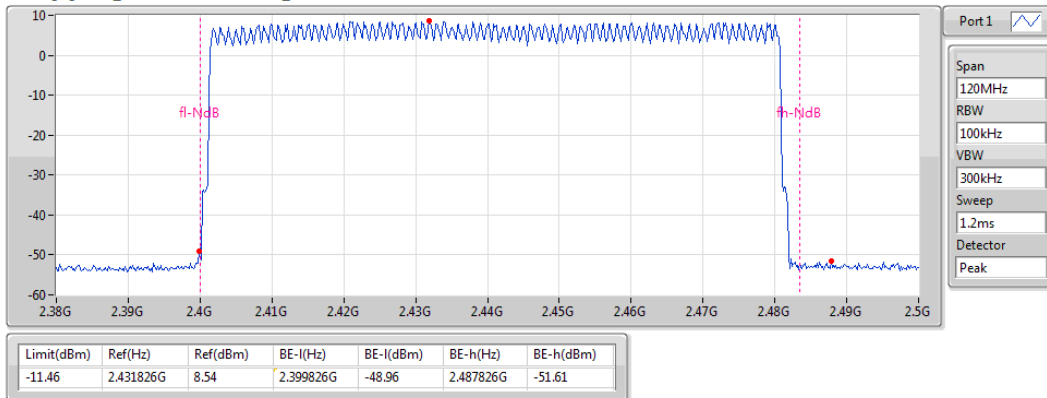




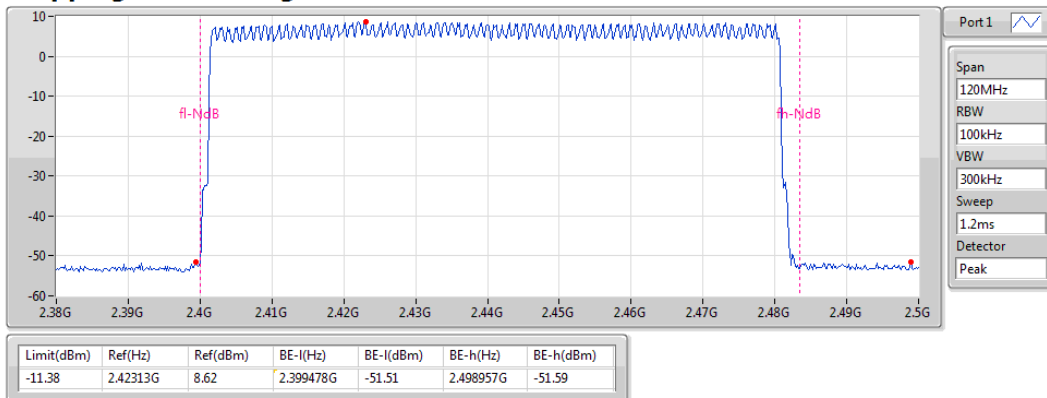
**BT-BR(1Mbps)**  
**2441MHz**  
**Hopping Ch Bandedge (Non-restricted Band)**



**BT-EDR(2Mbps)**  
**2441MHz**  
**Hopping Ch Bandedge (Non-restricted Band)**



**BT-EDR(3Mbps)**  
**2441MHz**  
**Hopping Ch Bandedge (Non-restricted Band)**



## 3.4 Conducted Output Power

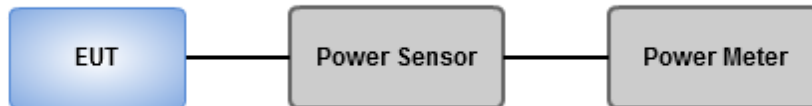
### 3.4.1 Limit of Conducted Output Power

- 1 Watt  
For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band.
- 0.125 Watt  
For all other frequency hopping systems in the 2400–2483.5 MHz band.
- 0.125 Watt  
For Frequency hopping systems operating in the 2400–2483.5 MHz band have hopping channel carrier frequencies that are separated by two-thirds of the 20 dB bandwidth of the hopping channel.

### 3.4.2 Test Procedures

1. A wideband power meter is used for power measurement. Bandwidth of power sensor and meter is 50MHz
2. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power

### 3.4.3 Test Setup



### 3.4.4 Test Result of Conducted Output Power

#### Summary of Peak Conducted Output Power

| Mode          | Power (dBm) | Power (W) |
|---------------|-------------|-----------|
| 2.4-2.4835GHz | -           | -         |
| BT-BR(1Mbps)  | 10.21       | 0.01050   |
| BT-EDR(2Mbps) | 10.27       | 0.01064   |
| BT-EDR(3Mbps) | 10.66       | 0.01164   |

#### Result

| Mode          | Result | Gain (dBi) | Power (dBm) | Power Limit (dBm) |
|---------------|--------|------------|-------------|-------------------|
| BT-BR(1Mbps)  | -      | -          | -           | -                 |
| 2402MHz       | Pass   | -5.00      | 9.48        | 21.00             |
| 2441MHz       | Pass   | -5.00      | 10.21       | 21.00             |
| 2480MHz       | Pass   | -5.00      | 10.19       | 21.00             |
| BT-EDR(2Mbps) | -      | -          | -           | -                 |
| 2402MHz       | Pass   | -5.00      | 9.33        | 21.00             |
| 2441MHz       | Pass   | -5.00      | 10.26       | 21.00             |
| 2480MHz       | Pass   | -5.00      | 10.27       | 21.00             |
| BT-EDR(3Mbps) | -      | -          | -           | -                 |
| 2402MHz       | Pass   | -5.00      | 9.61        | 21.00             |
| 2441MHz       | Pass   | -5.00      | 10.49       | 21.00             |
| 2480MHz       | Pass   | -5.00      | 10.66       | 21.00             |

### Summary of Conducted (Average) Output Power

| Mode          | Power<br>(dBm) | Power<br>(W) |
|---------------|----------------|--------------|
| 2.4-2.4835GHz | -              | -            |
| BT-BR(1Mbps)  | 10.09          | 0.01021      |
| BT-EDR(2Mbps) | 7.85           | 0.00610      |
| BT-EDR(3Mbps) | 7.88           | 0.00614      |

### Result

| Mode          | Result | Gain<br>(dBi) | Power<br>(dBm) | Power Limit<br>(dBm) |
|---------------|--------|---------------|----------------|----------------------|
| BT-BR(1Mbps)  | -      | -             | -              | -                    |
| 2402MHz       | Pass   | -5.00         | 9.36           |                      |
| 2441MHz       | Pass   | -5.00         | 10.09          |                      |
| 2480MHz       | Pass   | -5.00         | 10.07          |                      |
| BT-EDR(2Mbps) | -      | -             | -              |                      |
| 2402MHz       | Pass   | -5.00         | 6.96           |                      |
| 2441MHz       | Pass   | -5.00         | 7.85           |                      |
| 2480MHz       | Pass   | -5.00         | 7.79           |                      |
| BT-EDR(3Mbps) | -      | -             | -              |                      |
| 2402MHz       | Pass   | -5.00         | 6.97           |                      |
| 2441MHz       | Pass   | -5.00         | 7.79           |                      |
| 2480MHz       | Pass   | -5.00         | 7.88           |                      |

Note: Average power is for reference only.

## 3.5 Number of Hopping Frequency

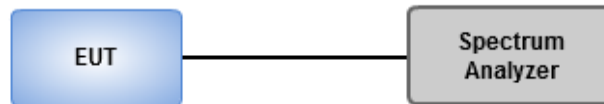
### 3.5.1 Limit of Number of Hopping Frequency

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

### 3.5.2 Test Procedures

1. Set RBW = 100kHz, VBW = 300kHz, Sweep time = Auto, Detector = Peak Trace max hold.
2. Allow trace to stabilize.

### 3.5.3 Test Setup



### 3.5.4 Test Result of Number of Hopping Frequency

#### Summary

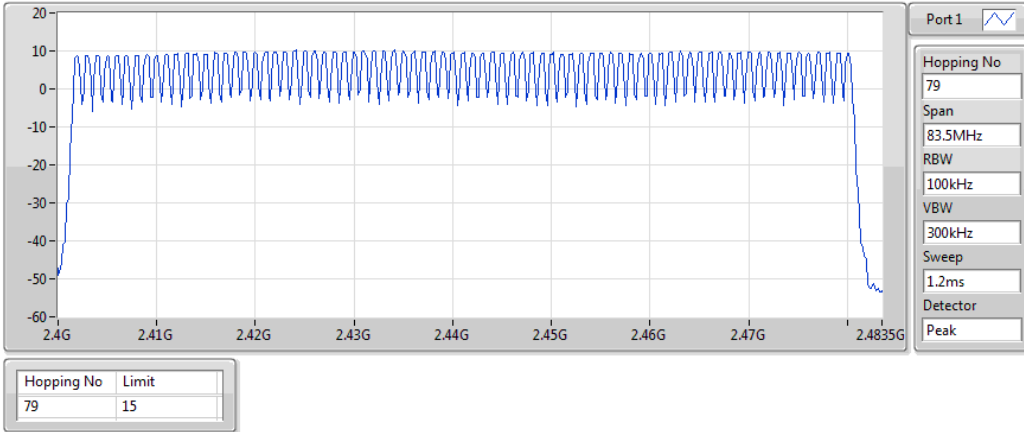
| Mode          | Max-Hop No |
|---------------|------------|
| 2.4-2.4835GHz | -          |
| BT-BR(1Mbps)  | 79         |
| BT-EDR(2Mbps) | 79         |
| BT-EDR(3Mbps) | 79         |

#### Result

| Mode          | Result | Hopping No | Limit |
|---------------|--------|------------|-------|
| BT-BR(1Mbps)  | -      | -          | -     |
| 2441MHz       | Pass   | 79         | 15    |
| BT-EDR(2Mbps) | -      | -          | -     |
| 2441MHz       | Pass   | 79         | 15    |
| BT-EDR(3Mbps) | -      | -          | -     |
| 2441MHz       | Pass   | 79         | 15    |

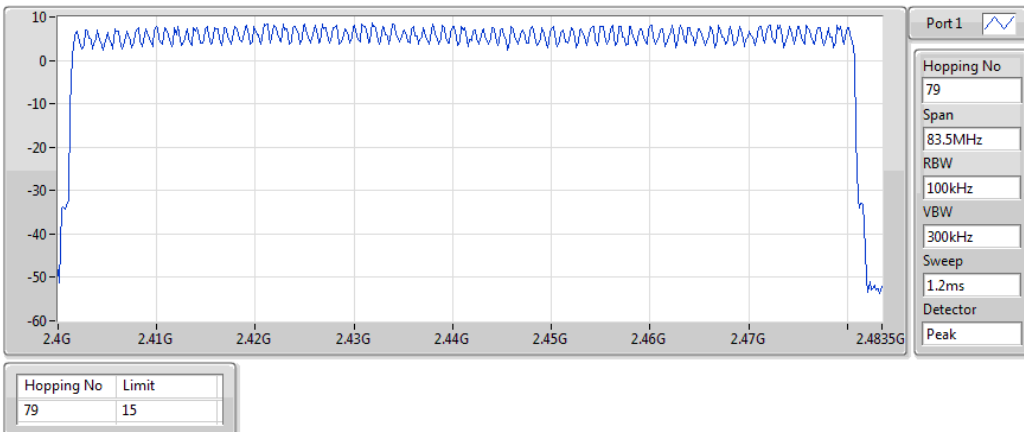
**BT-BR(1Mbps)**  
**2441MHz**

**Hopping Ch**



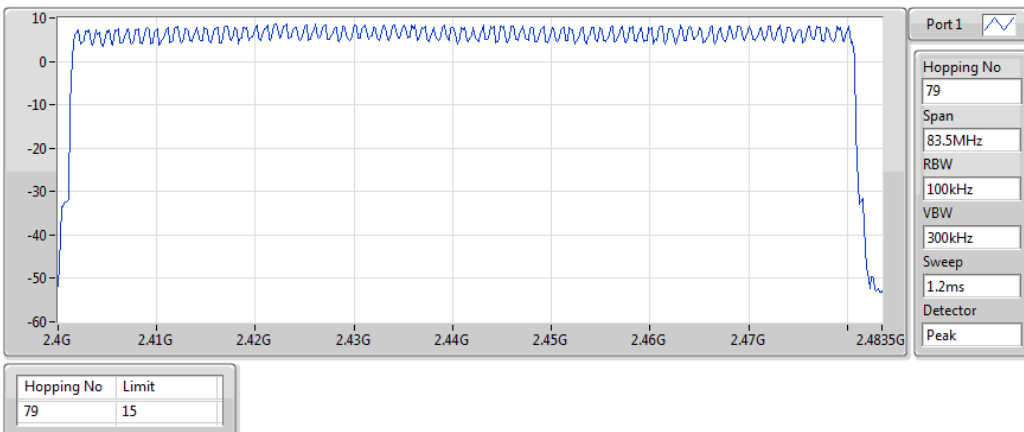
**BT-EDR(2Mbps)**  
**2441MHz**

**Hopping Ch**



**BT-EDR(3Mbps)**  
**2441MHz**

**Hopping Ch**





## 3.6 20dB and Occupied Bandwidth

### 3.6.1 Test Procedures

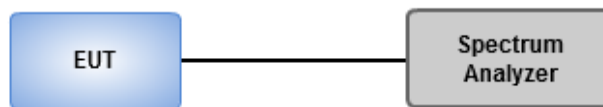
#### 20dB Bandwidth

1. Set RBW=10kHz VBW= 30kHz for BT BR mode, RBW=20kHz, VBW=100kHz for other modes, Sweep time = Auto, Detector=Peak , Trace max hold
2. Allow trace to stabilize
3. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

#### Occupied Bandwidth

1. Set RBW=10kHz VBW= 30kHz for BT BR mode, RBW=20kHz, VBW=100kHz for other modes, Sweep time = Auto, Detector=Sample , Trace max hold
2. Allow trace to stabilize
3. Use Occupied bandwidth function of spectrum analyzer to measuring 99% occupied bandwidth

### 3.6.2 Test Setup



### 3.6.3 Test result of 20dB and Occupied Bandwidth

#### Summary

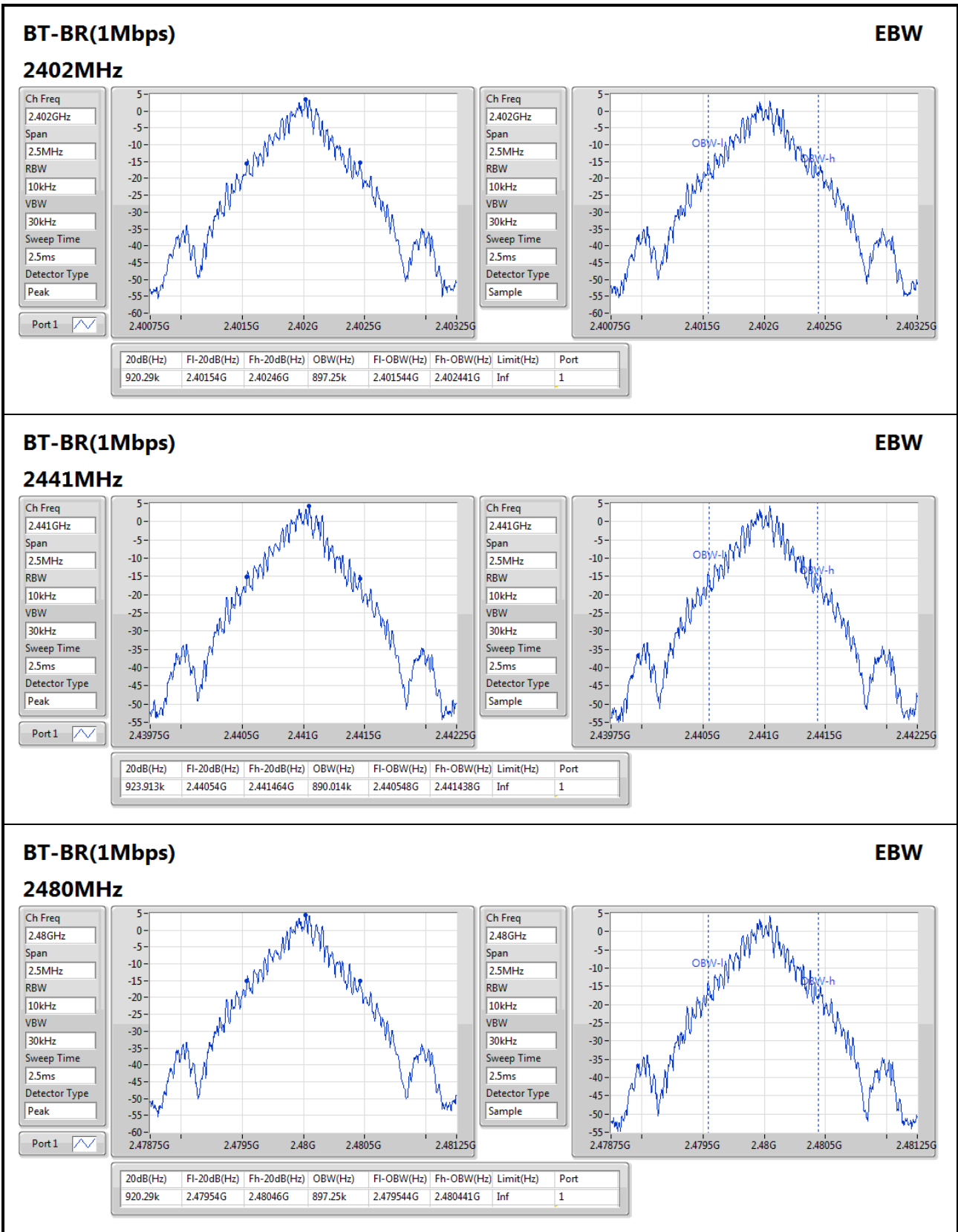
| Mode          | Max-N dB<br>(Hz) | Max-OBW<br>(Hz) | ITU-Code | Min-N dB<br>(Hz) | Min-OBW<br>(Hz) |
|---------------|------------------|-----------------|----------|------------------|-----------------|
| 2.4-2.4835GHz | -                | -               | -        | -                | -               |
| BT-BR(1Mbps)  | 923.913k         | 897.25k         | 897KF1D  | 920.29k          | 890.014k        |
| BT-EDR(2Mbps) | 1.312M           | 1.19M           | 1M19G1D  | 1.254M           | 1.176M          |
| BT-EDR(3Mbps) | 1.341M           | 1.19M           | 1M19G1D  | 1.312M           | 1.183M          |

**Max-N dB** = Maximum20dB down bandwidth; **Max-OBW** = Maximum99% occupied bandwidth;  
**Min-N dB** = Minimum20dB down bandwidth; **Min-OBW** = Minimum99% occupied bandwidth;

#### Result

| Mode          | Result | Limit<br>(Hz) | Port 1-N dB<br>(Hz) | Port 1-OBW<br>(Hz) |
|---------------|--------|---------------|---------------------|--------------------|
| BT-BR(1Mbps)  | -      | -             | -                   | -                  |
| 2402MHz       | Pass   | Inf           | 920.29k             | 897.25k            |
| 2441MHz       | Pass   | Inf           | 923.913k            | 890.014k           |
| 2480MHz       | Pass   | Inf           | 920.29k             | 897.25k            |
| BT-EDR(2Mbps) | -      | -             | -                   | -                  |
| 2402MHz       | Pass   | Inf           | 1.312M              | 1.179M             |
| 2441MHz       | Pass   | Inf           | 1.254M              | 1.19M              |
| 2480MHz       | Pass   | Inf           | 1.261M              | 1.176M             |
| BT-EDR(3Mbps) | -      | -             | -                   | -                  |
| 2402MHz       | Pass   | Inf           | 1.341M              | 1.19M              |
| 2441MHz       | Pass   | Inf           | 1.341M              | 1.187M             |
| 2480MHz       | Pass   | Inf           | 1.312M              | 1.183M             |

**Port X-N dB** = Port X20dB down bandwidth; **Port X-OBW** = Port X99% occupied bandwidth;


**BT-BR(1Mbps)**
**EBW**

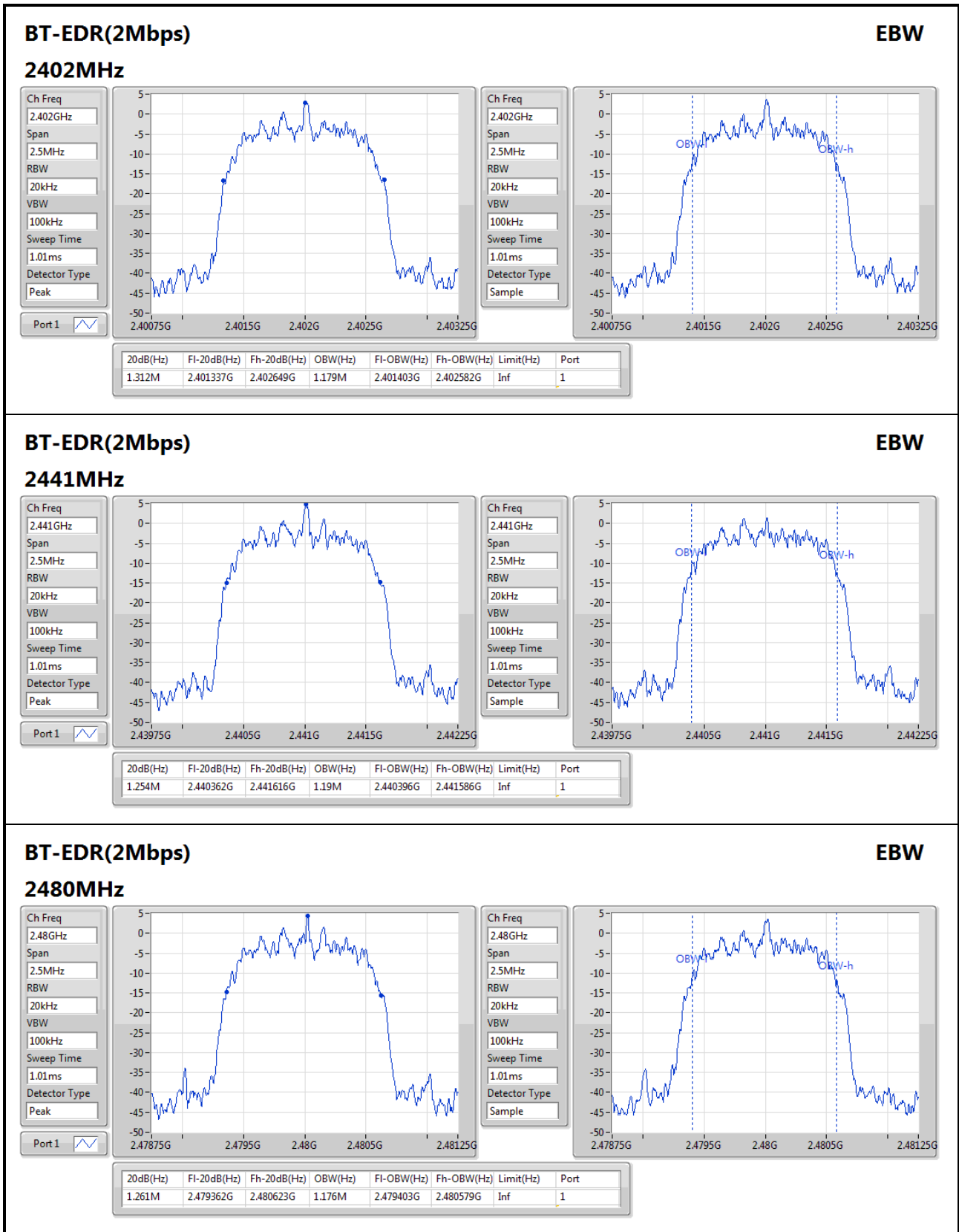
### 2480MHz

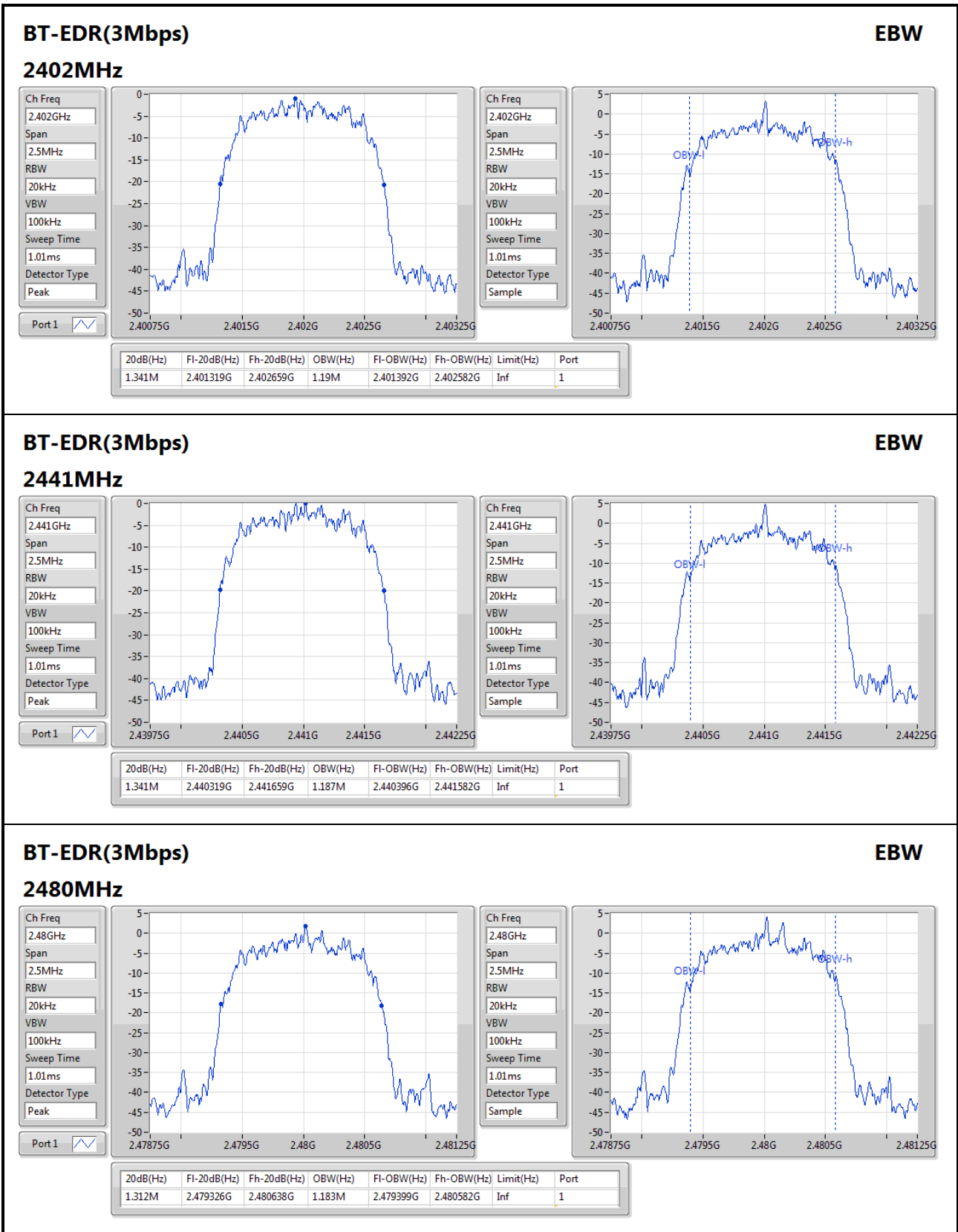
Ch Freq: 2.48GHz  
Span: 2.5MHz  
RBW: 10kHz  
VBW: 30kHz  
Sweep Time: 2.5ms  
Detector Type: Peak

Ch Freq: 2.48GHz  
Span: 2.5MHz  
RBW: 10kHz  
VBW: 30kHz  
Sweep Time: 2.5ms  
Detector Type: Sample



| 20dB(Hz) | Fl-20dB(Hz) | Fh-20dB(Hz) | OBW(Hz) | Fl-OBW(Hz) | Fh-OBW(Hz) | Limit(Hz) | Port |
|----------|-------------|-------------|---------|------------|------------|-----------|------|
| 920.29k  | 2.47954G    | 2.48046G    | 897.25k | 2.479544G  | 2.480441G  | Inf       | 1    |





## 3.7 Channel Separation

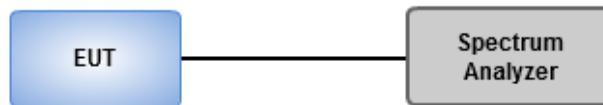
### 3.7.1 Limit of Channel Separation

- Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.
- Frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

### 3.7.2 Test Procedures

1. Set RBW=30kHz, VBW=100kHz, Sweep time = Auto, Detector=Peak Trace max hold
2. Allow trace to stabilize
3. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The EUT shall show compliance with the appropriate regulatory limit

### 3.7.3 Test Setup



### 3.7.4 Test result of Channel Separation

#### Summary

| Mode          | Max-Space<br>(Hz) | Min-Space<br>(Hz) |
|---------------|-------------------|-------------------|
| 2.4-2.4835GHz | -                 | -                 |
| BT-BR(1Mbps)  | 1.004348M         | 1M                |
| BT-EDR(2Mbps) | 1M                | 1M                |
| BT-EDR(3Mbps) | 1M                | 1M                |

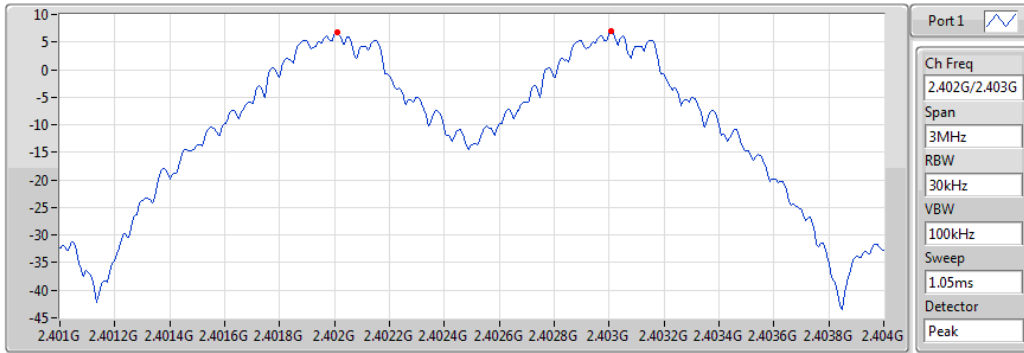
#### Result

| Mode          | Result | Fl<br>(Hz) | Fh<br>(Hz) | Ch.Space<br>(Hz) | Limit<br>(Hz) |
|---------------|--------|------------|------------|------------------|---------------|
| BT-BR(1Mbps)  | -      | -          | -          | -                | -             |
| 2402MHz       | Pass   | 2.402009G  | 2.403009G  | 1M               | 612.91314k    |
| 2441MHz       | Pass   | 2.441009G  | 2.442009G  | 1M               | 615.326058k   |
| 2480MHz       | Pass   | 2.479004G  | 2.480009G  | 1.004348M        | 612.91314k    |
| BT-EDR(2Mbps) | -      | -          | -          | -                | -             |
| 2402MHz       | Pass   | 2.402009G  | 2.403009G  | 1M               | 873.792k      |
| 2441MHz       | Pass   | 2.441009G  | 2.442009G  | 1M               | 835.164k      |
| 2480MHz       | Pass   | 2.479009G  | 2.480009G  | 1M               | 839.826k      |
| BT-EDR(3Mbps) | -      | -          | -          | -                | -             |
| 2402MHz       | Pass   | 2.402009G  | 2.403009G  | 1M               | 893.106k      |
| 2441MHz       | Pass   | 2.441009G  | 2.442009G  | 1M               | 893.106k      |
| 2480MHz       | Pass   | 2.479009G  | 2.480009G  | 1M               | 873.792k      |

### BT-BR(1Mbps)

### Channel Separation

2.402G/2.403GHz



| Fl(Hz)    | Fh(Hz)    | Ch.Space(Hz) | Limit(Hz)  |
|-----------|-----------|--------------|------------|
| 2.402009G | 2.403009G | 1M           | 612.91314k |

### BT-BR(1Mbps)

### Channel Separation

2.441G/2.442GHz



| Fl(Hz)    | Fh(Hz)    | Ch.Space(Hz) | Limit(Hz)   |
|-----------|-----------|--------------|-------------|
| 2.441009G | 2.442009G | 1M           | 615.326058k |

### BT-BR(1Mbps)

### Channel Separation

2.48G/2.479GHz



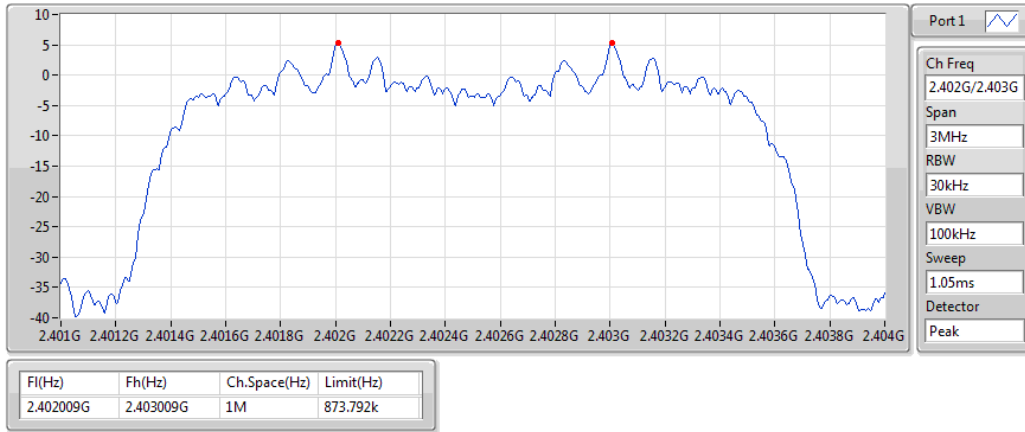
| Fl(Hz)    | Fh(Hz)    | Ch.Space(Hz) | Limit(Hz)  |
|-----------|-----------|--------------|------------|
| 2.479004G | 2.480009G | 1.004348M    | 612.91314k |



### BT-EDR(2Mbps)

### Channel Separation

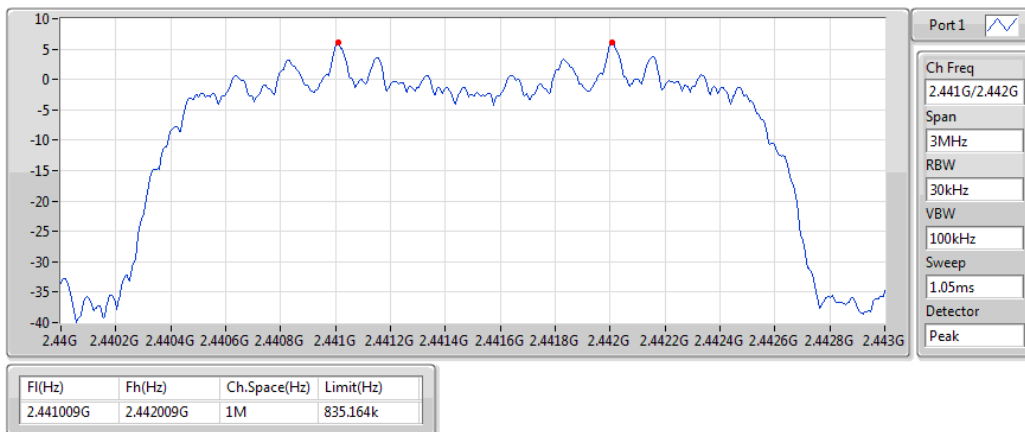
2.402G/2.403GHz



### BT-EDR(2Mbps)

### Channel Separation

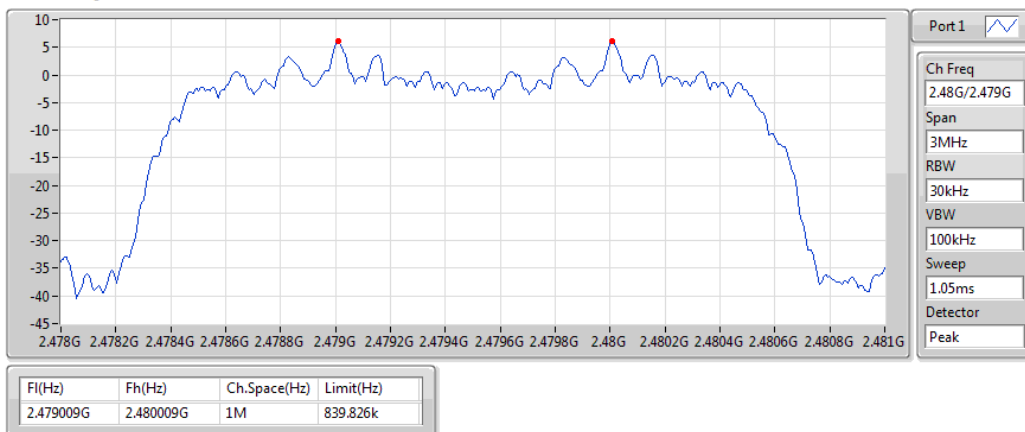
2.441G/2.442GHz



### BT-EDR(2Mbps)

### Channel Separation

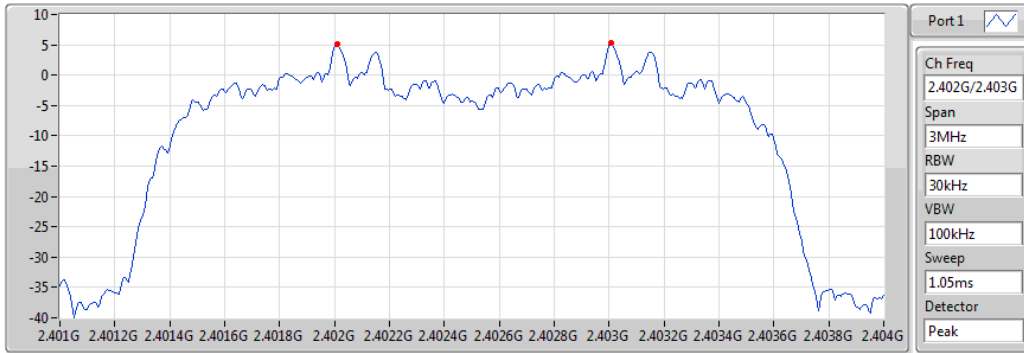
2.48G/2.479GHz



### BT-EDR(3Mbps)

### Channel Separation

2.402G/2.403GHz

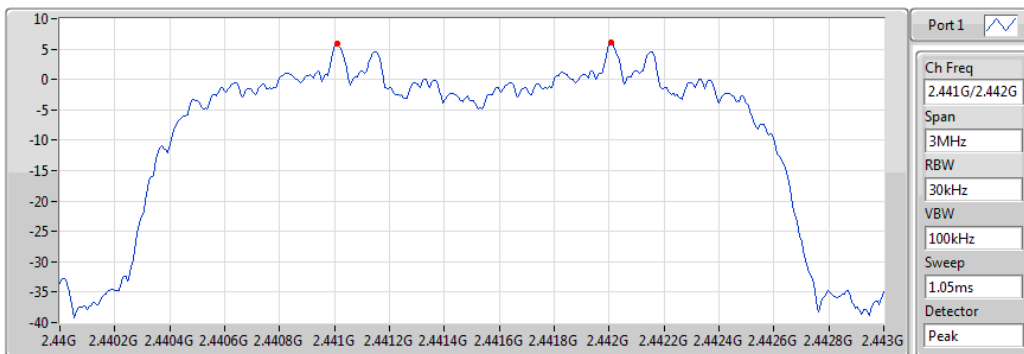


| F1(Hz)    | Fh(Hz)    | Ch.Space(Hz) | Limit(Hz) |
|-----------|-----------|--------------|-----------|
| 2.402009G | 2.403009G | 1M           | 893.106k  |

### BT-EDR(3Mbps)

### Channel Separation

2.441G/2.442GHz

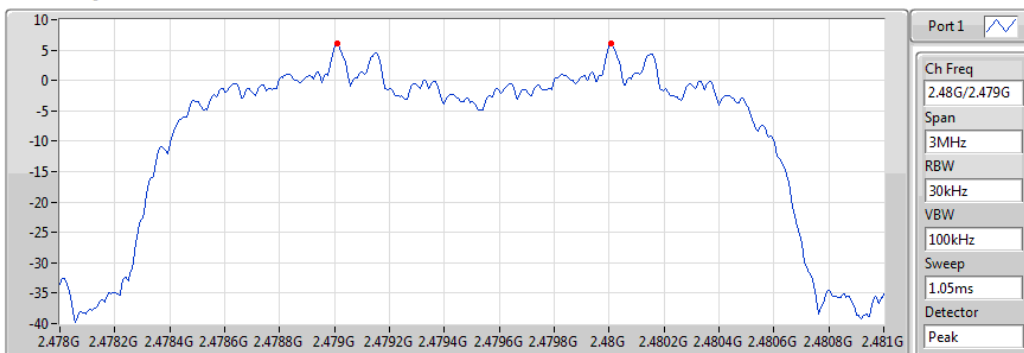


| F1(Hz)    | Fh(Hz)    | Ch.Space(Hz) | Limit(Hz) |
|-----------|-----------|--------------|-----------|
| 2.441009G | 2.442009G | 1M           | 893.106k  |

### BT-EDR(3Mbps)

### Channel Separation

2.48G/2.479GHz



| F1(Hz)    | Fh(Hz)    | Ch.Space(Hz) | Limit(Hz) |
|-----------|-----------|--------------|-----------|
| 2.479009G | 2.480009G | 1M           | 873.792k  |

## 3.8 Number of Dwell Time

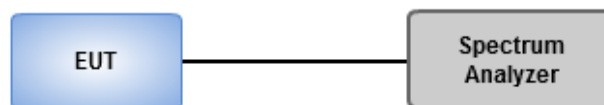
### 3.8.1 Limit of Dwell time

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### 3.8.2 Test Procedures

1. Set RBW=300kHz,VBW=1MHz,Sweep time = 10 ms, Detector=Peak, Span=0Hz,Trace max hold
2. Enable gating and trigger function of spectrum analyzer to measure burst on time.
3. The DH1 packet can cover a single time slot. A maximum length packet has duration of 1 time slots.  
Non AFH mode  
The hopping rate is 1600 hops/second so the maximum dwell time is 1/1600 seconds. DH1 Packet permit maximum  $1600 / 79 / 2 = 10.12$  hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $10.12 \times 31.6 = 320$  within 31.6 seconds.  
AFH mode  
The hopping rate is 800 hops/second so the maximum dwell time is 1/800 seconds. DH1 Packet permit maximum  $800 / 20 / 2 = 20$  hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $20 \times 8 = 160$  within 8 seconds.
4. The DH3 packet can cover up to 3 time slots. A maximum length packet has duration of 3 time slots.  
Non AFH mode  
The hopping rate is 1600 hops/second so the maximum dwell time is 3/1600 seconds. DH3 Packet permit maximum  $1600 / 79 / 4 = 5.06$  hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $5.06 \times 31.6 = 160$  within 31.6 seconds.  
AFH mode  
The hopping rate is 800hops/second so the maximum dwell time is 3/800 seconds. DH3 Packet permit maximum  $800 / 20 / 4 = 10$  hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $10 \times 8 = 80$  within 8 seconds.
5. The DH5 packet can cover up to 5 time slots. Operate DH5 at maximum dwell time and maximum duty cycle. A maximum length packet has duration of 5 time slots.  
Non AFH mode  
The hopping rate is 1600 hops/second so the maximum dwell time is 5/1600 seconds, or 3.125ms. DH5 Packet permit maximum  $1600 / 79 / 6 = 3.37$  hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $3.37 \times 31.6 = 106.6$  within 31.6 seconds  
AFH mode  
The hopping rate is 800 hops/second so the maximum dwell time is 5/800 seconds. DH5 Packet permit maximum  $800 / 20 / 6 = 6.667$  hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $6.667 \times 8 = 53.33$  within 8 seconds

### 3.8.3 Test Setup



### 3.8.4 Test Result of Dwell Time

#### Summary

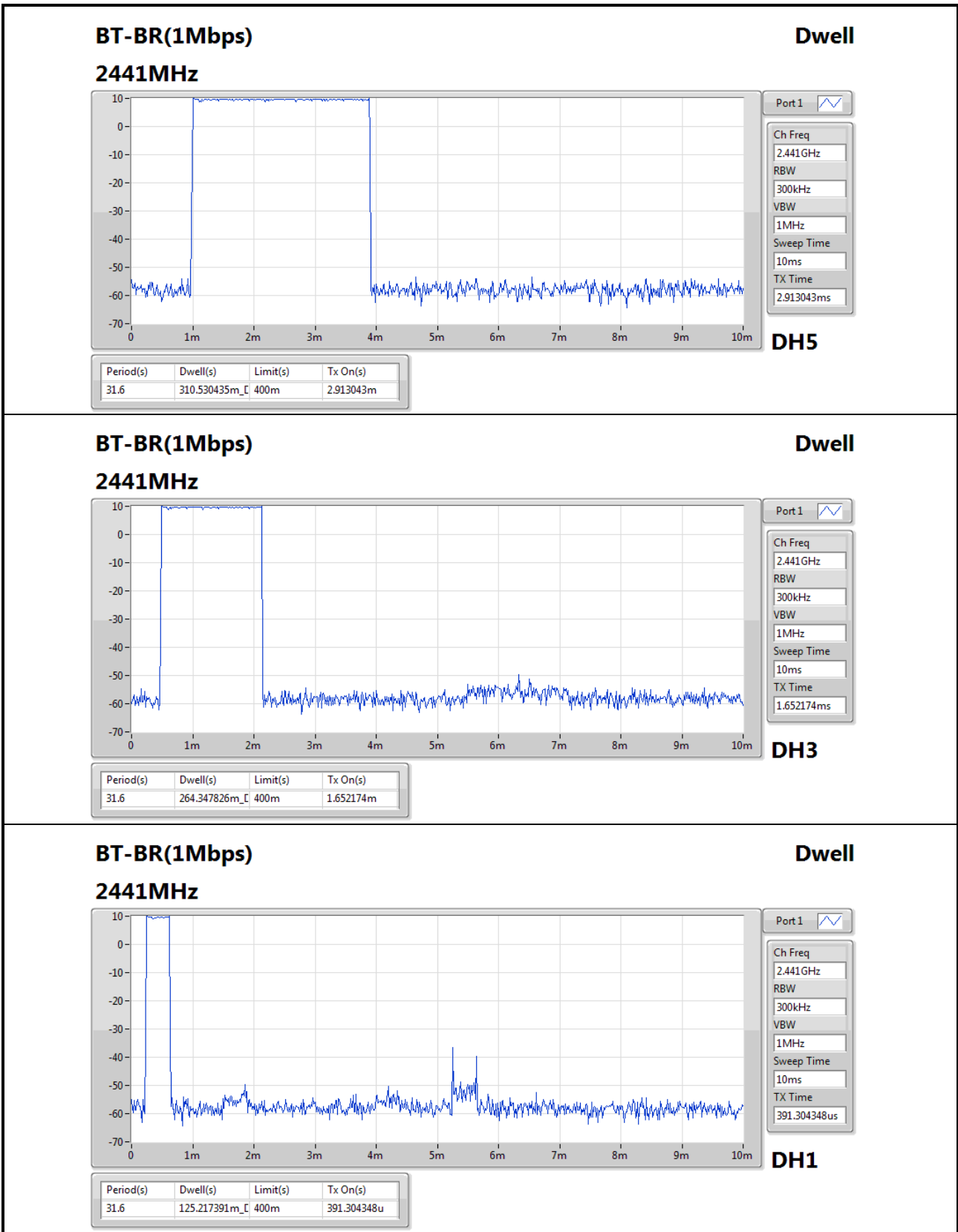
| Mode          | Max-Dwell<br>(s) |
|---------------|------------------|
| 2.4-2.4835GHz | -                |
| BT-BR(1Mbps)  | 310.530435m_DH5  |
| BT-EDR(2Mbps) | 310.530435m_DH5  |
| BT-EDR(3Mbps) | 308.985507m_DH5  |

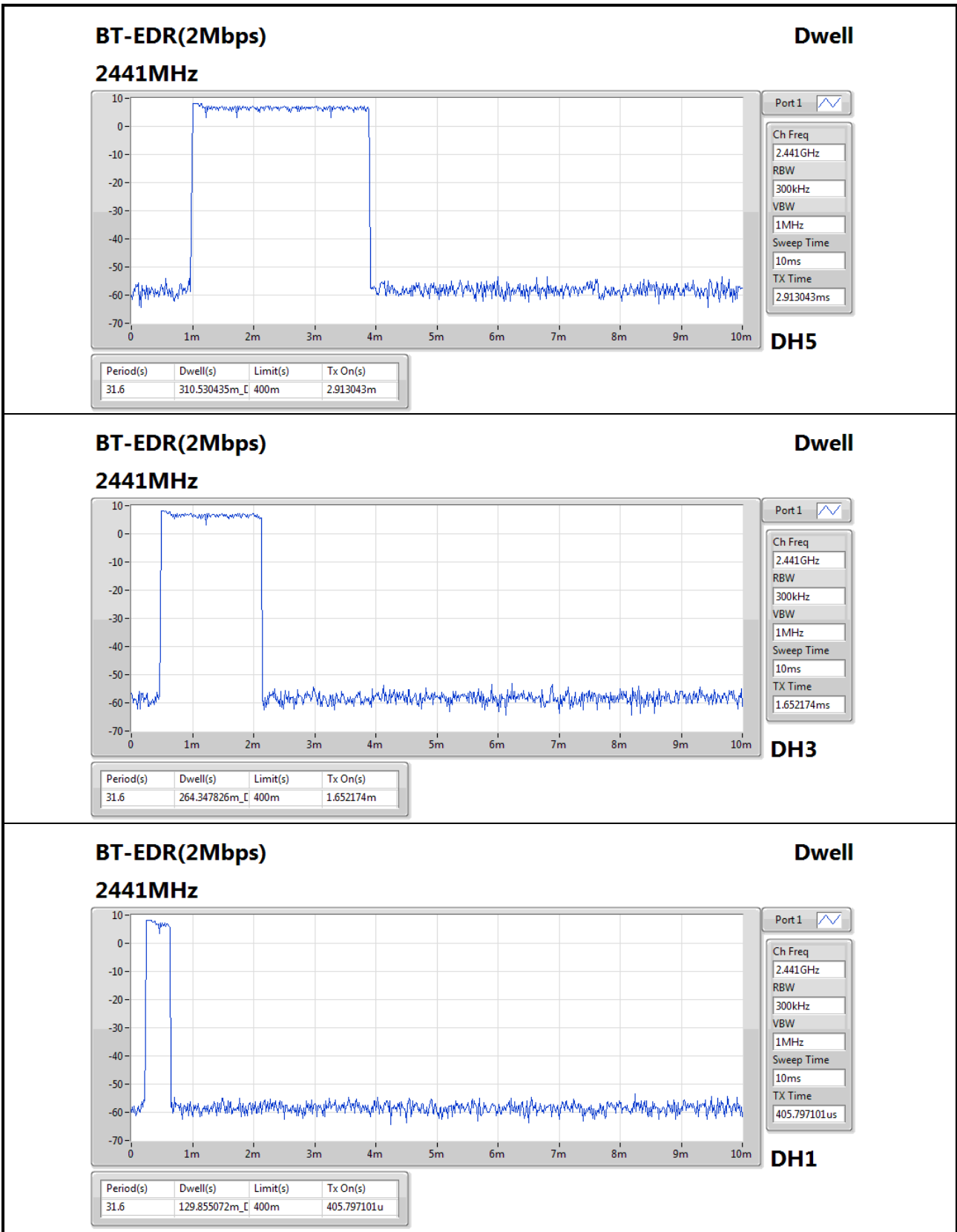
#### Result/ Non AFH mode

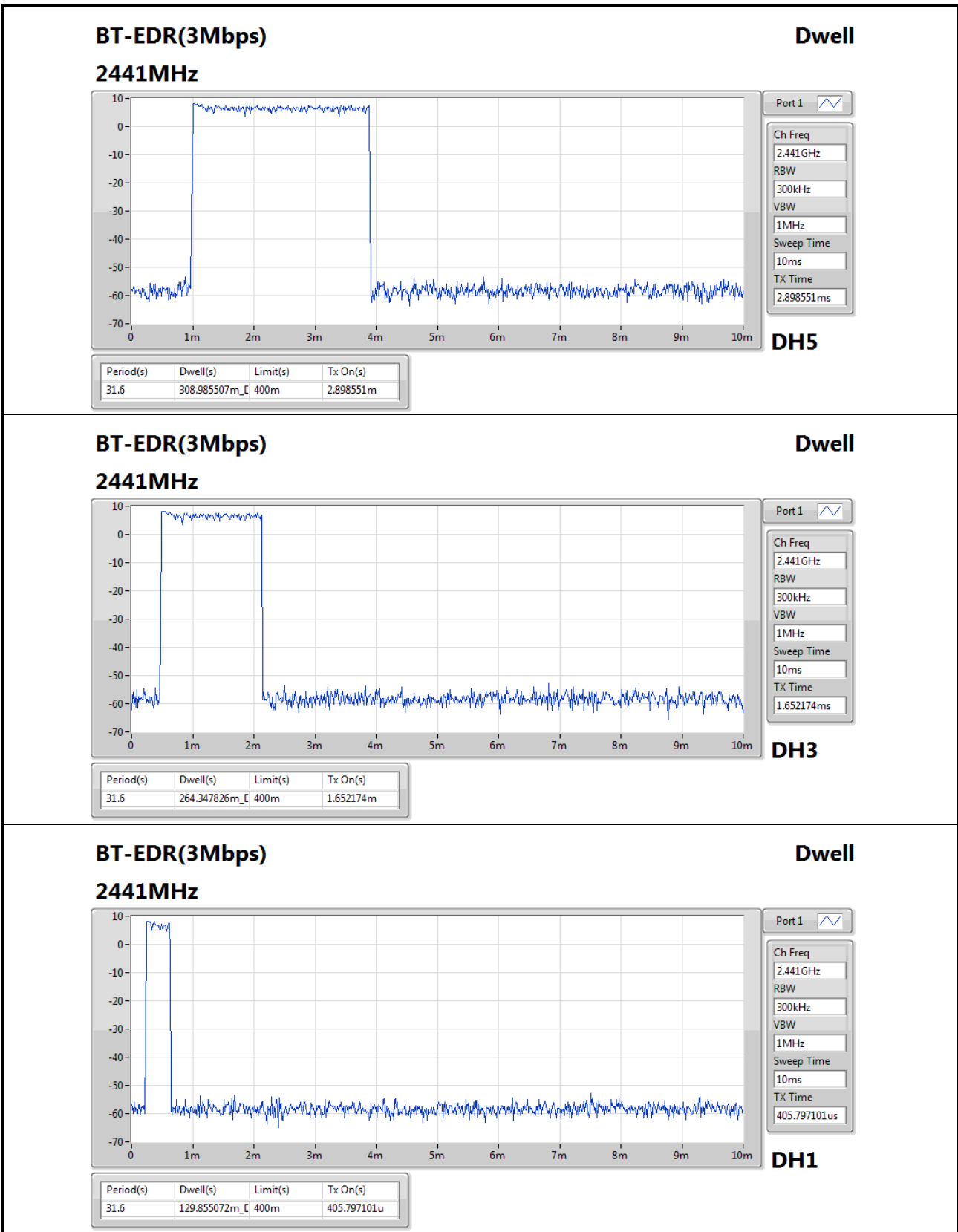
| Mode          | Result | Period<br>(s) | Dwell<br>(s)    | Limit<br>(s) | Tx On<br>(s) |
|---------------|--------|---------------|-----------------|--------------|--------------|
| BT-BR(1Mbps)  | -      | -             | -               | -            | -            |
| 2441MHz       | Pass   | 31.6          | 310.530435m_DH5 | 400m         | 2.913043m    |
| 2441MHz       | Pass   | 31.6          | 264.347826m_DH3 | 400m         | 1.652174m    |
| 2441MHz       | Pass   | 31.6          | 125.217391m_DH1 | 400m         | 391.304348u  |
| BT-EDR(2Mbps) | -      | -             | -               | -            | -            |
| 2441MHz       | Pass   | 31.6          | 310.530435m_DH5 | 400m         | 2.913043m    |
| 2441MHz       | Pass   | 31.6          | 264.347826m_DH3 | 400m         | 1.652174m    |
| 2441MHz       | Pass   | 31.6          | 129.855072m_DH1 | 400m         | 405.797101u  |
| BT-EDR(3Mbps) | -      | -             | -               | -            | -            |
| 2441MHz       | Pass   | 31.6          | 308.985507m_DH5 | 400m         | 2.898551m    |
| 2441MHz       | Pass   | 31.6          | 264.347826m_DH3 | 400m         | 1.652174m    |
| 2441MHz       | Pass   | 31.6          | 129.855072m_DH1 | 400m         | 405.797101u  |

**Result/ AFH mode**

| Mode          | Result | Period<br>(s) | Dwell<br>(s)  | Limit<br>(s) | Tx On<br>(s) |
|---------------|--------|---------------|---------------|--------------|--------------|
| BT-BR(1Mbps)  | -      | -             | -             | -            | -            |
| 2441MHz       | Pass   | 8             | 155.3526m_DH5 | 400m         | 2.913043m    |
| 2441MHz       | Pass   | 8             | 132.1739m_DH3 | 400m         | 1.652174m    |
| 2441MHz       | Pass   | 8             | 62.6087m_DH1  | 400m         | 391.304348u  |
| BT-EDR(2Mbps) | -      | -             | -             | -            | -            |
| 2441MHz       | Pass   | 8             | 155.3526m_DH5 | 400m         | 2.913043m    |
| 2441MHz       | Pass   | 8             | 132.1739m_DH3 | 400m         | 1.652174m    |
| 2441MHz       | Pass   | 8             | 64.92754m_DH1 | 400m         | 405.797101u  |
| BT-EDR(3Mbps) | -      | -             | -             | -            | -            |
| 2441MHz       | Pass   | 8             | 154.5797m_DH5 | 400m         | 2.898551m    |
| 2441MHz       | Pass   | 8             | 132.1739m_DH3 | 400m         | 1.652174m    |
| 2441MHz       | Pass   | 8             | 64.92754m_DH1 | 400m         | 405.797101u  |









## 4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

### **Linkou**

Tel: 886-2-2601-1640

No. 30-2, Ding Fwu Tsuen, Lin  
Kou District, New Taipei City,  
Taiwan, R.O.C.

### **Kwei Shan**

Tel: 886-3-271-8666

No. 3-1, Lane 6, Wen San 3rd St.,  
Kwei Shan District, Tao Yuan City  
333, Taiwan, R.O.C.

### **Kwei Shan Site II**

Tel: 886-3-271-8640

No. 14-1, Lane 19, Wen San 3rd  
St., Kwei Shan District, Tao Yuan  
City 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666

Fax: 886-3-318-0155

Email: ICC\_Service@icertifi.com.tw

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