# FCC TEST REPORT

# (Bluetooth EDR)

| | |
|---|---|
| **Product:** | LTE/CDMA Multi-Mode Digital Mobile Phone |
| **Model Name:** | Z862VL |
| **FCC ID:** | SRQ-Z862VL |
| **Applicant:** | ZTE Corporation |
| **Address:** | ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R.China |
| **Manufacturer:** | ZTE Corporation |
| **Address:** | ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R.China |
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| **Report No.:** | RF160419W002-1 |
| **Received Date:** | Apr. 22, 2016 |
| **Test Date:** | Apr. 23, 2016 ~ May 24, 2016 |
| **Issued Date:** | May 25, 2016 |

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# RELEASE CONTROL RECORD

| ISSUE NO. | REASON FOR CHANGE | DATE ISSUED |
|---|---|---|
| RF160419W002-1 | Original release | May 25, 2016 |

# 1 CERTIFICATION

| | |
|---|---|
| **PRODUCT:** | LTE/CDMA Multi-Mode Digital Mobile Phone |
| **BRAND NAME:** | ZTE |
| **MODEL NAME:** | Z862VL |
| **APPLICANT:** | ZTE Corporation |
| **TESTED:** | Apr. 23, 2016 ~ May 24, 2016 |
| **TEST SAMPLE:** | Identical Prototype |
| **STANDARDS:** | **FCC Part 15, Subpart C. Section 15.247**<br>ANSI C63.10-2013 |

The above equipment has been tested by **Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY** : _____ , **DATE:** May 25, 2016
( Amyee Qian / Engineer)

**APPROVED BY** : _____ , **DATE:** May 25, 2016
( William Chung / Manager)

# 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 15, Subpart C | | | |
|---|---|---|---|
| **STANDARD SECTION** | **TEST TYPE AND LIMIT** | **RESULT** | **REMARK** |
| 15.207 | AC Power Conducted Emission | PASS | Meet the requirement of limit. Minimum passing margin is 14.18dB at 0.532000MHz. |
| 15.247(a)(1)(iii) | Number of Hopping Frequency Used | PASS | Meet the requirement of limit. |
| 15.247(a)(1)(iii) | Dwell Time on Each Channel | PASS | Meet the requirement of limit. |
| 15.247(a)(1) | 1. Hopping Channel Separation<br>2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System | PASS | Meet the requirement of limit. |
| 15.247(b) | Maximum Peak Output Power | PASS | Meet the requirement of limit. |
| 15.247(d)& 15.209 | Transmitter Radiated Emissions | PASS | Meet the requirement of limit. Minimum passing margin is -4.4dB at 36.79MHz. |
| 15.247(d) | Out of band Measurement | PASS | Meet the requirement of limit. |
| 15.203 | Antenna Requirement | PASS | No antenna connector is used. |

**NOTE:** If The Frequency Hopping System operating in 2400-2483.5MHz band and the output power less than 125mW. The hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of hopping channel whichever is greater.

## 2.1 MEASUREMENT UNCERTAINTY

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

| MEASUREMENT | FREQUENCY | UNCERTAINTY |
|---|---|---|
| Conducted emissions | 9kHz~30MHz | 2.66dB |
| Radiated emissions | 9KHz ~ 30MHz | 2.74dB |
| | 30MHz ~ 1GMHz | 3.55dB |
| | 1GHz ~ 18GHz | 4.84dB |
| | 18GHz ~ 40GHz | 1.94dB |

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

# 3 GENERAL INFORMATION

## 3.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| **PRODUCT** | LTE/CDMA Multi-Mode Digital Mobile Phone |
| **MODEL NAME** | Z862VL |
| **POWER SUPPLY** | 5.0Vdc (adapter or host equipment)<br>3.85Vdc (Li-ion, battery) |
| **MODULATION TECHNOLOGY** | FHSS |
| **MODULATION TYPE** | GFSK, 8DPSK, π/4 DQPSK |
| **OPERATING FREQUENCY** | 2402MHz~2480MHz |
| **NUMBER OF CHANNEL** | 79 |
| **MAX. OUTPUT POWER** | 8.590mW (Max. Measured) |
| **ANTENNA TYPE** | Internal Antenna with 0dBi gain |
| **I/O PORTS** | Refer to user's manual |
| **CABLE SUPPLIED** | USB cable: shielded, detachable, 1.0meter |

**NOTE**:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. The EUT was powered by the following adapters:

| **ADAPTER 1** | |
|---|---|
| **BRAND:** | ZTE |
| **MODEL:** | STC-A51A-Z |
| **INPUT:** | AC 100-240V, 250mA |
| **OUTPUT:** | DC 5V, 1000mA |

| **ADAPTER 2** | |
|---|---|
| **BRAND:** | ZTE |
| **MODEL:** | STC-A51A-Z |
| **INPUT:** | AC 100-240V, 400mA |
| **OUTPUT:** | DC 5V, 2100mA |

3. The EUT matched the following USB cable:

| **USB CABLE** | |
|---|---|
| **BRAND:** | ZTE |
| **MODEL:** | USB-MU5-B-100-L |
| **SIGNAL LINE:** | 1.0 METER |

4. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

## 3.2 DESCRIPTION OF TEST MODES

79 channels are provided to this EUT:

| CHANNEL | FREQ. (MHz) | CHANNEL | FREQ. (MHz) | CHANNEL | FREQ. (MHz) | CHANNEL | FREQ. (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 | | |

### 3.2.1 ONFIGURATION OF SYSTEM UNDER TEST

Please see section 5 photograph of the test configuration for reference.

### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports
The worst case was found when positioned on X axis for radiated emission.
Following channel(s) was (were) selected for the final test as listed below:

| EUT CONFIGURE MODE | APPLICABLE TO | | | | DESCRIPTION |
|---|---|---|---|---|---|
| | RE<1G | RE≥1G | PLC | APCM | |
| - | √ | √ | √ | √ | - |

Where **RE<1G:** Radiated Emission below 1GHz **RE≥1G:** Radiated Emission above 1GHz
**PLC:** Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

**RADIATED EMISSION TEST (BELOW 1 GHz):**

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.
☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | PACKET TYPE |
|---|---|---|---|---|---|
| - | 0 to 78 | 0 | FHSS | 8DPSK | DH5 |

For the test results, only the worst case was shown in test report.

**RADIATED EMISSION TEST (ABOVE 1 GHz):**

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.
☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | PACKET TYPE |
|---|---|---|---|---|---|
| - | 0 to 78 | 0, 39, 78 | FHSS | GFSK | DH5 |
| - | 0 to 78 | 0, 39, 78 | FHSS | 8DPSK | DH5 |

## POWER LINE CONDUCTED EMISSION TEST:

The EUT was tested with the following mode

| EUT CONFIGURE MODE | TESTED CONDITION |
|---|---|
| - | BT Link + USB cable + Adapter |

## ANTENNA PORT CONDUCTED MEASUREMENT:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.

☒ Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | PACKET TYPE |
|---|---|---|---|---|
| 0 to 78 | 0, 39, 78 | FHSS | GFSK | DH5 |
| 0 to 78 | 0, 39, 78 | FHSS | 8DPSK | DH5 |

## TEST CONDITION:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | TEST VOLTAGE (SYSTEM) | TESTED BY |
|---|---|---|---|
| **RE<1G** | 22deg. C, 54%RH | DC 5V from adaptor | Alex Chen |
| **RE≥1G** | 22deg. C, 54%RH | DC 5V from adaptor | Alex Chen |
| **PLC** | 25deg. C, 60%RH | DC 5V from adaptor | Yuqiang Yin |
| **APCM** | 25deg. C, 60%RH | DC 3.85V from battery | Yuqiang Yin |

## 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C. Section 15.247**
**ANSI C63.10-2013**

**FCC Public Notice DA 00-705**

**NOTE:** 1. All test items have been performed and recorded as per the above standards.

2. The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (Verification). The test report has been issued separately.

## 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
|---|---|---|---|---|---|
| 1 | DC source | LONG WEI | PS-6403D | 010934269 | N/A |
| 2 | PC | HP | A6608CN | 3CR83825X3 | N/A |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|---|---|
| 1 | DC Line: Unshielded, Detachable 1.0m |
| 2 | AC Line: Unshielded, Detachable 1.5m |

# 4 TEST TYPES AND RESULTS

## 4.1 CONDUCTED EMISSION MEASUREMENT

### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

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

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

### 4.1.2 TEST INSTRUMENTS

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| EMI Test Receiver | Rohde&Schwarz | ESCS30 | 100340 | May 11,15 | May 10,17 |
| Artificial Mains Network | Rohde&Schwarz | ENV216 | 101173 | Mar. 04,16 | Mar. 03,17 |
| Artificial Mains Network | Rohde&Schwarz | ESH3-Z5 | 100317 | Apr. 05,16 | Apr. 04,17 |
| Voltage probe | SCHWARZBECK | TK 9421 | TK 9421-176 | Jan. 08,16 | Jan. 07,17 |
| Test software | ADT | ADT_Cond_V7.3.7 | N/A | N/A | N/A |

**NOTE:**

1. The test was performed in shielded room 553.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

### 4.1.3 TEST PROCEDURES

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

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

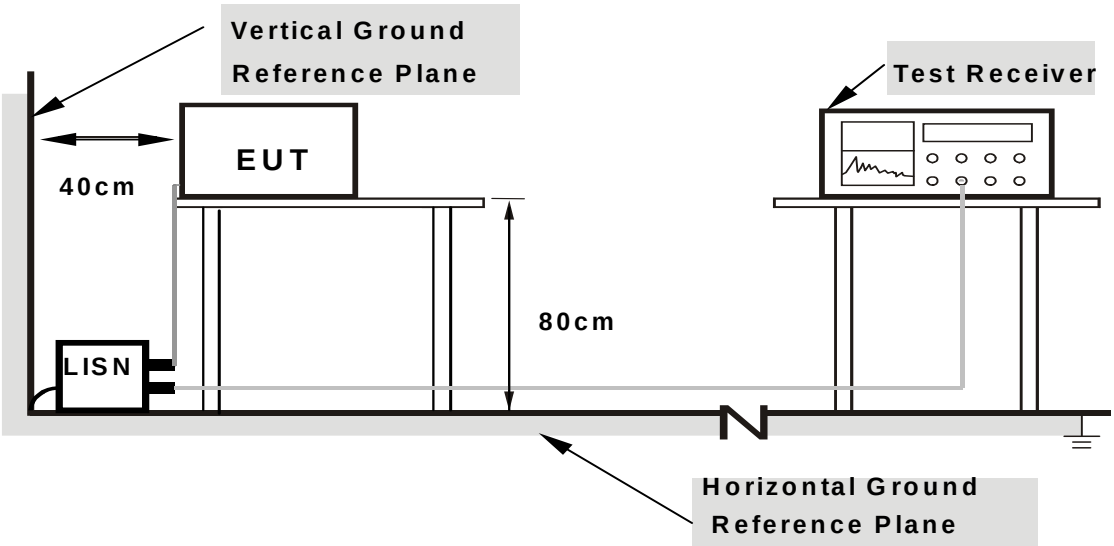
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

### 4.1.5 TEST SETUP




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

For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 4.1.6 EUT OPERATING CONDITIONS

a. Turned on the power and connected of all equipment.
b. EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.

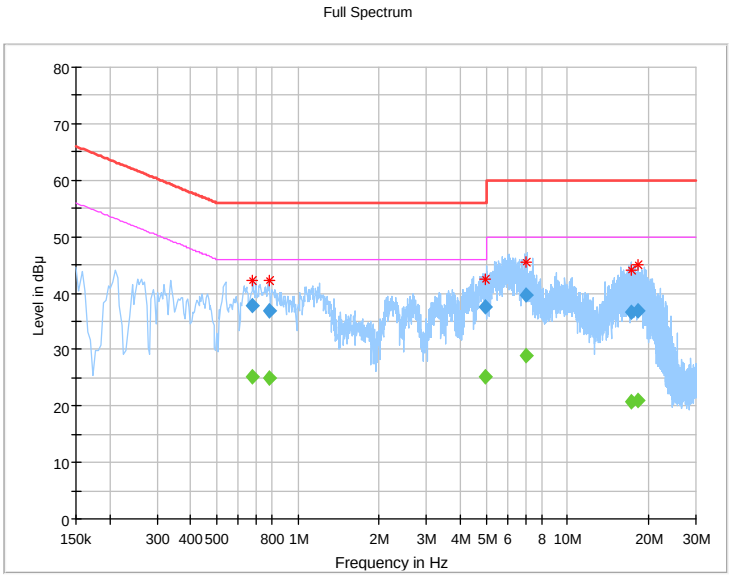
## 4.1.7 TEST RESULTS

**CONDUCTED WORST-CASE DATA:**

| **Phase** | Line (L) | **Detector Function** | Quasi-Peak (QP) / Average (AV) |
|---|---|---|---|

| Frequency (MHz) | QuasiPeak (dB¦ÌV) | CAverage (dB¦ÌV) | Limit (dB¦ÌV) | Margin (dB) | Line | Filter | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 0.680000 | --- | 25.20 | 46.00 | -20.80 | L | ON | 9.7 |
| 0.680000 | 37.86 | --- | 56.00 | -18.14 | L | ON | 9.7 |
| 0.784000 | --- | 24.87 | 46.00 | -21.13 | L | ON | 9.7 |
| 0.784000 | 36.76 | --- | 56.00 | -19.24 | L | ON | 9.7 |
| 4.960000 | --- | 25.15 | 46.00 | -20.85 | L | ON | 9.7 |
| 4.960000 | 37.53 | --- | 56.00 | -18.47 | L | ON | 9.7 |
| 7.068000 | --- | 28.88 | 50.00 | -21.12 | L | ON | 9.8 |
| 7.068000 | 39.64 | --- | 60.00 | -20.36 | L | ON | 9.8 |
| 17.300000 | --- | 20.83 | 50.00 | -29.17 | L | ON | 10.0 |
| 17.300000 | 36.57 | --- | 60.00 | -23.43 | L | ON | 10.0 |
| 18.260000 | --- | 20.91 | 50.00 | -29.09 | L | ON | 9.9 |
| 18.260000 | 36.82 | --- | 60.00 | -23.18 | L | ON | 9.9 |

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.

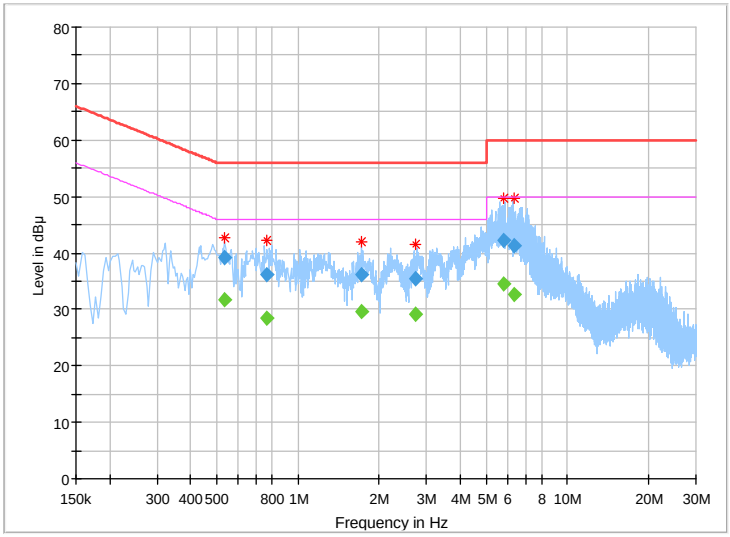


| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|---|---|---|---|

| Frequency (MHz) | QuasiPeak (dBuV) | CAverage (dBuV) | Limit (dBuV) | Margin (dB) | Line | Filter | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| **0.532000** | **---** | **31.82** | **46.00** | **-14.18** | **N** | **ON** | **10.1** |
| 0.532000 | 39.14 | --- | 56.00 | -16.86 | N | ON | 10.1 |
| 0.764000 | --- | 28.53 | 46.00 | -17.47 | N | ON | 10.0 |
| 0.764000 | 36.20 | --- | 56.00 | -19.80 | N | ON | 10.0 |
| 1.732000 | --- | 29.67 | 46.00 | -16.33 | N | ON | 9.8 |
| 1.732000 | 36.11 | --- | 56.00 | -19.89 | N | ON | 9.8 |
| 2.732000 | --- | 29.05 | 46.00 | -16.95 | N | ON | 9.8 |
| 2.732000 | 35.54 | --- | 56.00 | -20.46 | N | ON | 9.8 |
| 5.784000 | --- | 34.58 | 50.00 | -15.42 | N | ON | 9.8 |
| 5.784000 | 42.27 | --- | 60.00 | -17.73 | N | ON | 9.8 |
| 6.340000 | --- | 32.73 | 50.00 | -17.27 | N | ON | 9.8 |
| 6.340000 | 41.21 | --- | 60.00 | -18.79 | N | ON | 9.8 |

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.

Full Spectrum



## 4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a). Other emissions shall be at least 20dB below the highest level of the desired power.

| FREQUENCIES (MHz) | FIELD STRENGTH (microvolts/meter) | MEASUREMENT DISTANCE (meters) |
|---|---|---|
| 0.009 ~ 0.490 | 2400/F(kHz) | 300 |
| 0.490 ~ 1.705 | 24000/F(kHz) | 30 |
| 1.705 ~ 30.0 | 30 | 30 |
| 30 ~ 88 | 100 | 3 |
| 88 ~ 216 | 150 | 3 |
| 216 ~ 960 | 200 | 3 |
| Above 960 | 500 | 3 |

**NOTE**:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

### 4.2.2 TEST INSTRUMENTS

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| EMI Test Receiver | Rohde&Schwarz | ESR7 | 101494 | Apr. 05,16 | Apr. 04,17 |
| Bilog Antenna | Teseq | CBL 6111D | 30643 | Jul. 16, 15 | Jul. 15, 16 |
| Horn Antenna (1GHz -18GHz) | ETS -Lindgren | 3117 | 00062558 | May 30, 14 | May 29, 17 |
| Amplifier | Burgeon | BPA-530 | 100220 | Apr. 05,16 | Apr. 04,17 |
| Pre-Amplifier (18GHz-40GHz) | EMCI | EMC 184045 | 980102 | Nov. 20,15 | Nov. 19,17 |
| Pre-Amplifier | HP | 8449B | 3008A00409 | Apr. 25,15 | Apr. 24,17 |
| GPS Generator+ Antenna | TOJOIN | GNSS-5000A | E1-010119 | Aug. 08, 14 | Aug. 07, 16 |
| 3m Semi-anechoic Chamber | ETS-LINDGREN | 9m*6m*6m | NSEMC003 | Mar. 12,16 | Mar. 11,18 |
| Test Software | ADT | ADT_Radiated _V7.6.15.9.2 | N/A | N/A | N/A |

**NOTE:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in 966 Chamber.
3. The FCC Site Registration No. is 502831.

### 4.2.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

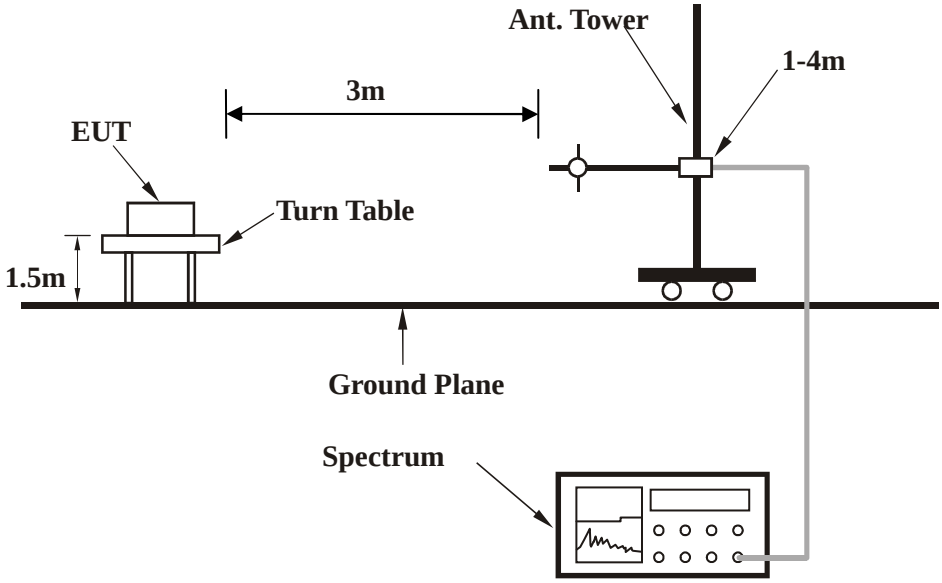
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

### 4.2.5 TEST SETUP




For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 4.2.6 EUT OPERATING CONDITIONS

a. Set the EUT under full load condition and placed them on a testing table.
b. Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.
c. The necessary accessories enable the EUT in full functions.

## 4.2.7 TEST RESULTS

**BELOW 1GHz WORST-CASE DATA:**

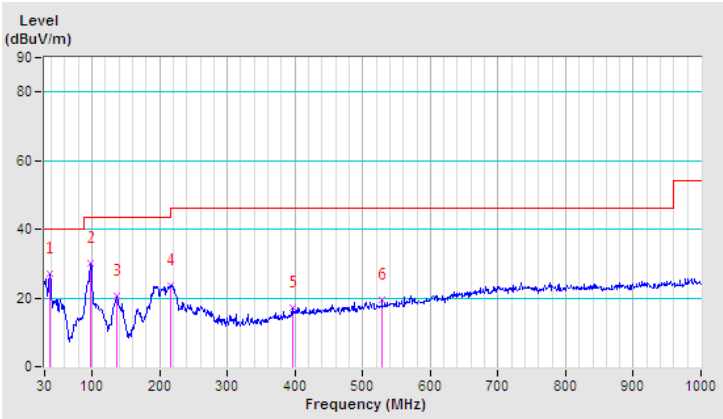
**8DPSK DH5**

| | | | |
|---|---|---|---|
| **CHANNEL** | Channel 0 | **DETECTOR FUNCTION** | Quasi-Peak (QP) |
| **FREQUENCY RANGE** | 30MHz ~ 1GHz | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **NO.** | **FREQ. (MHz)** | **EMISSION LEVEL (dBuV/m)** | **LIMIT (dBuV/m)** | **MARGIN (dB)** | **ANTENNA HEIGHT (m)** | **TABLE ANGLE (Degree)** | **RAW VALUE (dBuV)** | **CORRECTION FACTOR (dB/m)** |
| 1 | 36.79 | 27.0 QP | 40.0 | -13.0 | 1.00 H | 0 | 49.78 | -22.82 |
| **2** | 97.90 | 30.1 QP | 43.5 | -13.4 | 1.00 H | 0 | 56.92 | -26.79 |
| 3 | 136.70 | 20.5 QP | 43.5 | -23.0 | 1.00 H | 0 | 46.78 | -26.32 |
| 4 | 215.27 | 23.8 QP | 43.5 | -19.7 | 1.00 H | 0 | 46.84 | -23.02 |
| 5 | 395.69 | 17.1 QP | 46.0 | -28.9 | 1.00 H | 0 | 33.33 | -16.23 |
| 6 | 528.58 | 19.5 QP | 46.0 | -26.5 | 1.00 H | 0 | 33.72 | -14.21 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

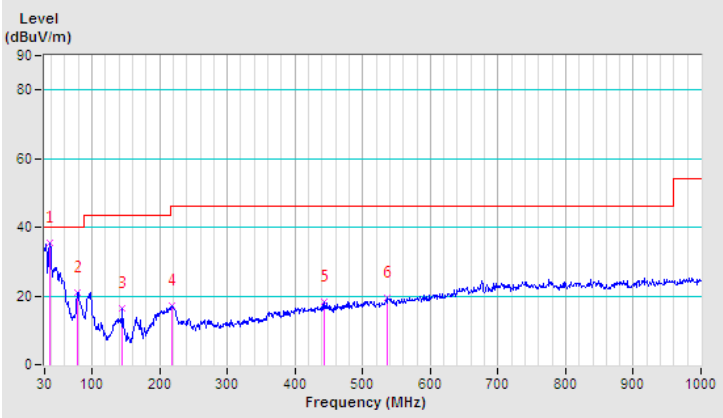


| | | | |
|---|---|---|---|
| **CHANNEL** | Channel 0 | **DETECTOR FUNCTION** | Quasi-Peak (QP) |
| **FREQUENCY RANGE** | 30MHz ~ 1GHz | | |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **NO.** | **FREQ. (MHz)** | **EMISSION LEVEL (dBuV/m)** | **LIMIT (dBuV/m)** | **MARGIN (dB)** | **ANTENNA HEIGHT (m)** | **TABLE ANGLE (Degree)** | **RAW VALUE (dBuV)** | **CORRECTION FACTOR (dB/m)** |
| 1 | 36.79 | 35.6 QP | 40.0 | -4.4 | 1.00 V | 0 | 58.44 | -22.82 |
| 2 | 78.50 | 21.0 QP | 40.0 | -19.0 | 1.00 V | 0 | 49.04 | -28.07 |
| 3 | 144.46 | 16.4 QP | 43.5 | -27.1 | 1.00 V | 0 | 42.03 | -25.62 |
| 4 | 218.18 | 17.3 QP | 46.0 | -28.7 | 1.00 V | 0 | 40.14 | -22.87 |
| 5 | 442.25 | 18.1 QP | 46.0 | -27.9 | 1.00 V | 0 | 33.65 | -15.52 |
| 6 | 536.34 | 19.5 QP | 46.0 | -26.5 | 1.00 V | 0 | 33.52 | -14.05 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



## ABOVE 1GHz WORST-CASE DATA:

## GFSK DH5

| | | | |
|---|---|---|---|
| **CHANNEL** | TX Channel 0 | **DETECTOR FUNCTION** | Peak (PK) |
| **FREQUENCY RANGE** | 1GHz ~ 25GHz | | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **NO.** | **FREQ. (MHz)** | **EMISSION LEVEL (dBuV/m)** | **LIMIT (dBuV/m)** | **MARGIN (dB)** | **ANTENNA HEIGHT (m)** | **TABLE ANGLE (Degree)** | **RAW VALUE (dBuV)** | **CORRECTION FACTOR (dB/m)** |
| 1 | 2390.00 | 44.2 PK | 74.0 | -29.9 | 1.85 H | 320 | 52.02 | -7.87 |
| 2 | 2390.00 | 33.6 AV | 54.0 | -20.4 | 1.85 H | 320 | 41.49 | -7.87 |
| 3 | #2400.00 | 49.3 PK | 79.5 | -30.2 | 1.85 H | 320 | 57.09 | -7.84 |
| 4 | #2400.00 | 37.9 AV | 73.1 | -35.2 | 1.85 H | 320 | 45.71 | -7.84 |
| 5 | *2402.00 | 99.5 PK | | | 1.85 H | 320 | 107.35 | -7.84 |
| 6 | *2402.00 | 93.1 AV | | | 1.85 H | 320 | 100.98 | -7.84 |
| 7 | 4804.00 | 56.5 PK | 74.0 | -17.5 | 2.00 H | 320 | 58.55 | -2.04 |
| 8 | 4804.00 | 49.0 AV | 54.0 | -5.0 | 2.00 H | 320 | 51.02 | -2.04 |
| **ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M** | | | | | | | | |
| **NO.** | **FREQ. (MHz)** | **EMISSION LEVEL (dBuV/m)** | **LIMIT (dBuV/m)** | **MARGIN (dB)** | **ANTENNA HEIGHT (m)** | **TABLE ANGLE (Degree)** | **RAW VALUE (dBuV)** | **CORRECTION FACTOR (dB/m)** |
| 1 | 2390.00 | 46.1 PK | 74.0 | -28.0 | 1.00 V | 300 | 53.92 | -7.87 |
| 2 | 2390.00 | 33.8 AV | 54.0 | -20.2 | 1.00 V | 300 | 41.69 | -7.87 |
| 3 | #2400.00 | 47.5 PK | 76.8 | -29.3 | 1.00 V | 300 | 55.29 | -7.84 |
| 4 | #2400.00 | 36.4 AV | 70.3 | -33.9 | 1.00 V | 300 | 44.22 | -7.84 |
| 5 | *2402.00 | 96.8 PK | | | 1.00 V | 300 | 104.65 | -7.84 |
| 6 | *2402.00 | 90.3 AV | | | 1.00 V | 300 | 98.11 | -7.84 |
| 7 | 4804.00 | 51.7 PK | 74.0 | -22.4 | 1.00 V | 158 | 53.69 | -2.04 |
| 8 | 4804.00 | 44.3 AV | 54.0 | -9.7 | 1.00 V | 158 | 46.36 | -2.04 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

| CHANNEL | TX Channel 39 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 25GHz | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2441.00 | 102.6 PK | | | 1.85 H | 315 | 110.34 | -7.73 |
| 2 | *2441.00 | 96.3 AV | | | 1.85 H | 315 | 104.04 | -7.73 |
| 3 | 4882.00 | 57.1 PK | 74.0 | -16.9 | 1.85 H | 320 | 58.90 | -1.78 |
| 4 | 4882.00 | 48.7 AV | 54.0 | -5.3 | 1.85 H | 320 | 50.52 | -1.78 |
| 5 | 7323.00 | 53.6 PK | 74.0 | -20.4 | 1.85 H | 212 | 50.83 | 2.76 |
| 6 | 7323.00 | 42.2 AV | 54.0 | -11.8 | 1.85 H | 212 | 39.48 | 2.76 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2441.00 | 100.2 PK | | | 1.00 V | 300 | 107.94 | -7.73 |
| 2 | *2441.00 | 92.4 AV | | | 1.00 V | 300 | 100.09 | -7.73 |
| 3 | 4882.00 | 52.8 PK | 74.0 | -21.2 | 1.00 V | 162 | 54.59 | -1.78 |
| 4 | 4882.00 | 45.5 AV | 54.0 | -8.5 | 1.00 V | 162 | 47.27 | -1.78 |
| 5 | 7323.00 | 54.6 PK | 74.0 | -19.4 | 1.00 V | 98 | 51.85 | 2.76 |
| 6 | 7323.00 | 43.2 AV | 54.0 | -10.8 | 1.00 V | 98 | 40.45 | 2.76 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

| CHANNEL | TX Channel 78 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 25GHz | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2480.00 | 101.7 PK | | | 1.85 H | 320 | 109.29 | -7.61 |
| 2 | *2480.00 | 95.4 AV | | | 1.85 H | 320 | 103.00 | -7.61 |
| 3 | 2483.50 | 50.1 PK | 74.0 | -23.9 | 1.85 H | 320 | 57.74 | -7.60 |
| 4 | 2483.50 | 34.8 AV | 54.0 | -19.2 | 1.85 H | 320 | 42.38 | -7.60 |
| 5 | 4960.00 | 54.8 PK | 74.0 | -19.2 | 1.85 H | 320 | 56.31 | -1.52 |
| 6 | 4960.00 | 44.4 AV | 54.0 | -9.6 | 1.85 H | 320 | 45.89 | -1.52 |
| 7 | 7440.00 | 55.8 PK | 74.0 | -18.2 | 1.85 H | 155 | 52.88 | 2.96 |
| 8 | 7440.00 | 43.4 AV | 54.0 | -10.7 | 1.85 H | 155 | 40.39 | 2.96 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2480.00 | 97.3 PK | | | 1.00 V | 300 | 104.93 | -7.61 |
| 2 | *2480.00 | 91.0 AV | | | 1.00 V | 300 | 98.60 | -7.61 |
| 3 | 2483.50 | 45.6 PK | 74.0 | -28.4 | 1.00 V | 300 | 53.24 | -7.60 |
| 4 | 2483.50 | 34.4 AV | 54.0 | -19.6 | 1.00 V | 300 | 42.01 | -7.60 |
| 5 | 4960.00 | 53.8 PK | 74.0 | -20.2 | 1.00 V | 156 | 55.36 | -1.52 |
| 6 | 4960.00 | 43.4 AV | 54.0 | -10.6 | 1.00 V | 156 | 44.93 | -1.52 |
| 7 | 7440.00 | 56.8 PK | 74.0 | -17.3 | 1.00 V | 289 | 53.79 | 2.96 |
| 8 | 7440.00 | 44.4 AV | 54.0 | -9.7 | 1.00 V | 289 | 41.39 | 2.96 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

## BT_8DPSK

| CHANNEL | TX Channel 0 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 25GHz | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 2390.00 | 47.1 PK | 74.0 | -26.9 | 1.00 H | 58 | 54.99 | -7.87 |
| 2 | 2390.00 | 34.9 AV | 54.0 | -19.1 | 1.00 H | 58 | 42.73 | -7.87 |
| 3 | #2400.00 | 56.8 PK | 79.8 | -23.0 | 1.00 H | 360 | 64.66 | -7.84 |
| 4 | #2400.00 | 38.7 AV | 70.1 | -31.4 | 1.00 H | 360 | 46.50 | -7.84 |
| 5 | *2402.00 | 99.8 PK | | | 1.00 H | 360 | 107.63 | -7.84 |
| 6 | *2402.00 | 90.1 AV | | | 1.00 H | 360 | 97.91 | -7.84 |
| 7 | 4804.00 | 51.8 PK | 74.0 | -22.2 | 1.00 H | 285 | 53.82 | -2.04 |
| 8 | 4804.00 | 41.5 AV | 54.0 | -12.5 | 1.00 H | 285 | 43.53 | -2.04 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 2390.00 | 45.8 PK | 74.0 | -28.2 | 1.00 V | 300 | 53.68 | -7.87 |
| 2 | 2390.00 | 34.7 AV | 54.0 | -19.3 | 1.00 V | 300 | 42.58 | -7.87 |
| 3 | #2400.00 | 50.1 PK | 75.8 | -25.7 | 1.00 V | 300 | 57.95 | -7.84 |
| 4 | #2400.00 | 36.8 AV | 66.4 | -29.6 | 1.00 V | 300 | 44.66 | -7.84 |
| 5 | *2402.00 | 95.8 PK | | | 1.00 V | 300 | 103.67 | -7.84 |
| 6 | *2402.00 | 86.4 AV | | | 1.00 V | 300 | 94.25 | -7.84 |
| 7 | 4804.00 | 51.2 PK | 74.0 | -22.8 | 1.00 V | 262 | 53.25 | -2.04 |
| 8 | 4804.00 | 42.4 AV | 54.0 | -11.6 | 1.00 V | 262 | 44.47 | -2.04 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

| | | | |
|---|---|---|---|
| **CHANNEL** | TX Channel 39 | **DETECTOR FUNCTION** | Peak (PK)<br>Average (AV) |
| **FREQUENCY RANGE** | 1GHz ~ 25GHz | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **NO.** | **FREQ. (MHz)** | **EMISSION LEVEL (dBuV/m)** | **LIMIT (dBuV/m)** | **MARGIN (dB)** | **ANTENNA HEIGHT (m)** | **TABLE ANGLE (Degree)** | **RAW VALUE (dBuV)** | **CORRECTION FACTOR (dB/m)** |
| 1 | *2441.00 | 103.8 PK | | | 1.00 H | 360 | 111.50 | -7.73 |
| 2 | *2441.00 | 94.3 AV | | | 1.00 H | 360 | 102.05 | -7.73 |
| 3 | 4882.00 | 53.4 PK | 74.0 | -20.6 | 1.00 H | 192 | 55.19 | -1.78 |
| 4 | 4882.00 | 45.0 AV | 54.0 | -9.0 | 1.00 H | 192 | 46.80 | -1.78 |
| 5 | 7323.00 | 55.4 PK | 74.0 | -18.6 | 1.00 H | 35 | 52.67 | 2.76 |
| 6 | 7323.00 | 43.6 AV | 54.0 | -10.5 | 1.00 H | 35 | 40.79 | 2.76 |
| **ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M** | | | | | | | | |
| **NO.** | **FREQ. (MHz)** | **EMISSION LEVEL (dBuV/m)** | **LIMIT (dBuV/m)** | **MARGIN (dB)** | **ANTENNA HEIGHT (m)** | **TABLE ANGLE (Degree)** | **RAW VALUE (dBuV)** | **CORRECTION FACTOR (dB/m)** |
| 1 | *2441.00 | 98.2 PK | | | 1.00 V | 300 | 105.90 | -7.73 |
| 2 | *2441.00 | 88.9 AV | | | 1.00 V | 300 | 96.64 | -7.73 |
| 3 | 4882.00 | 52.3 PK | 74.0 | -21.7 | 1.00 V | 148 | 54.07 | -1.78 |
| 4 | 4882.00 | 41.9 AV | 54.0 | -12.1 | 1.00 V | 148 | 43.67 | -1.78 |
| 5 | 7323.00 | 55.6 PK | 74.0 | -18.4 | 1.00 V | 234 | 52.82 | 2.76 |
| 6 | 7323.00 | 43.3 AV | 54.0 | -10.7 | 1.00 V | 234 | 40.57 | 2.76 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

| CHANNEL | TX Channel 78 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 25GHz | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2480.00 | 104.5 PK | | | 1.00 H | 350 | 112.12 | -7.61 |
| 2 | *2480.00 | 95.4 AV | | | 1.00 H | 350 | 103.00 | -7.61 |
| 3 | 2483.50 | 51.6 PK | 74.0 | -22.4 | 1.00 H | 350 | 59.18 | -7.60 |
| 4 | 2483.50 | 35.0 AV | 54.0 | -19.0 | 1.00 H | 350 | 42.64 | -7.60 |
| 5 | 4960.00 | 52.6 PK | 74.0 | -21.4 | 1.00 H | 158 | 54.15 | -1.52 |
| 6 | 4960.00 | 41.7 AV | 54.0 | -12.3 | 1.00 H | 158 | 43.21 | -1.52 |
| 7 | 7440.00 | 55.2 PK | 74.0 | -18.8 | 1.00 H | 36 | 52.21 | 2.96 |
| 8 | 7440.00 | 43.8 AV | 54.0 | -10.3 | 1.00 H | 36 | 40.79 | 2.96 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2480.00 | 101.8 PK | | | 1.00 V | 340 | 109.45 | -7.61 |
| 2 | *2480.00 | 93.6 AV | | | 1.00 V | 340 | 101.17 | -7.61 |
| 3 | 2483.50 | 45.5 PK | 74.0 | -28.5 | 1.00 V | 340 | 53.13 | -7.60 |
| 4 | 2483.50 | 34.7 AV | 54.0 | -19.3 | 1.00 V | 340 | 42.26 | -7.60 |
| 5 | 4960.00 | 52.6 PK | 74.0 | -21.5 | 1.00 V | 123 | 54.07 | -1.52 |
| 6 | 4960.00 | 41.5 AV | 54.0 | -12.5 | 1.00 V | 123 | 43.04 | -1.52 |
| 7 | 7440.00 | 55.3 PK | 74.0 | -18.7 | 1.00 V | 258 | 52.30 | 2.96 |
| **8** | 7440.00 | 43.2 AV | 54.0 | -10.8 | 1.00 V | 258 | 40.21 | 2.96 |

**REMARKS:**

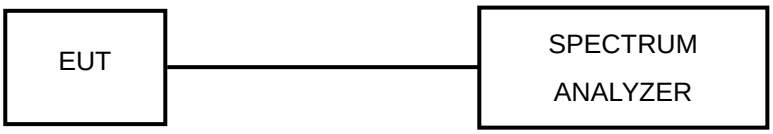
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

## 4.3 NUMBER OF HOPPING FREQUENCY USED

### 4.3.1 LIMIT OF HOPPING FREQUENCY USED

At least 15 channels frequencies, and should be equally spaced.

### 4.3.2 TEST SETUP




### 4.3.3 TEST INSTRUMENTS

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| Spectrum Analyzer (10Hz–40GHz) | Rohde&Schwarz | FSV40 | 101003 | Apr. 05,16 | Apr. 04,17 |
| Power Meter | Anritsu | ML2495A | 1139001 | Feb.19,16 | Feb. 18,17 |
| Power Sensor | Anritsu | MA2411B | 1126068 | Feb.19,16 | Feb. 18,17 |
| Power Sensor | Keysight | U2021XA | MY55060016 | May 27,15 | May 26,17 |
| Power Sensor | Keysight | U2021XA | MY55060018 | May 27,15 | May 26,17 |
| Digital Multimeter | FLUKE | 15B | A1220010DG | Oct. 12, 15 | Oct.11, 16 |

**NOTE:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in RF Oven room.

### 4.3.4 TEST PROCEDURES

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.

c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.

d. Set the SA on View mode and then plot the result on SA screen.

e. Repeat above procedures until all frequencies measured were completed.

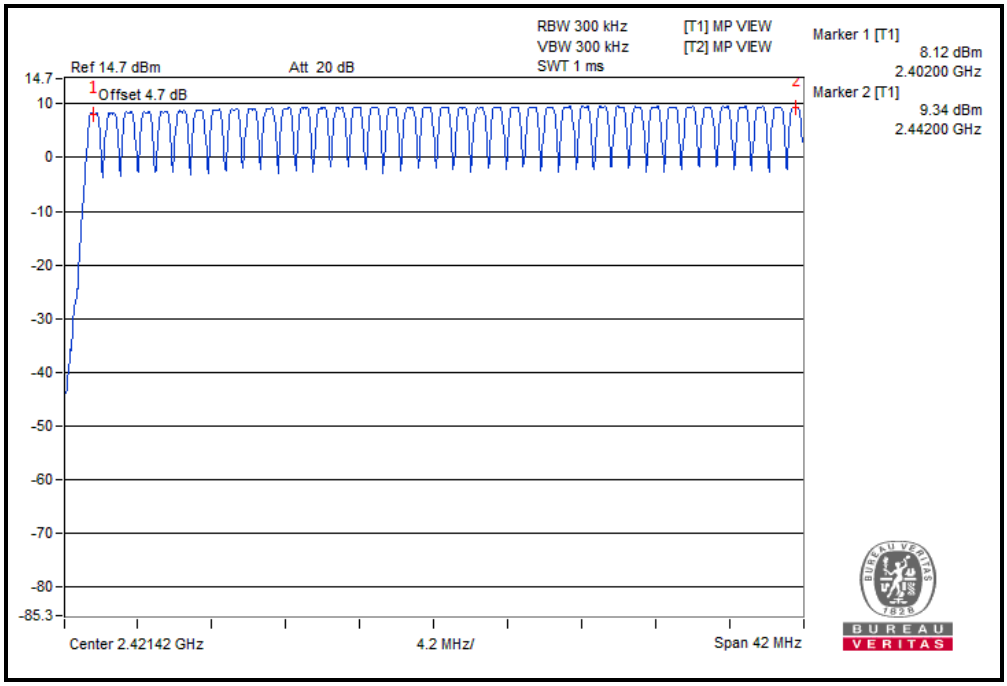
### 4.3.5 DEVIATION FROM TEST STANDARD

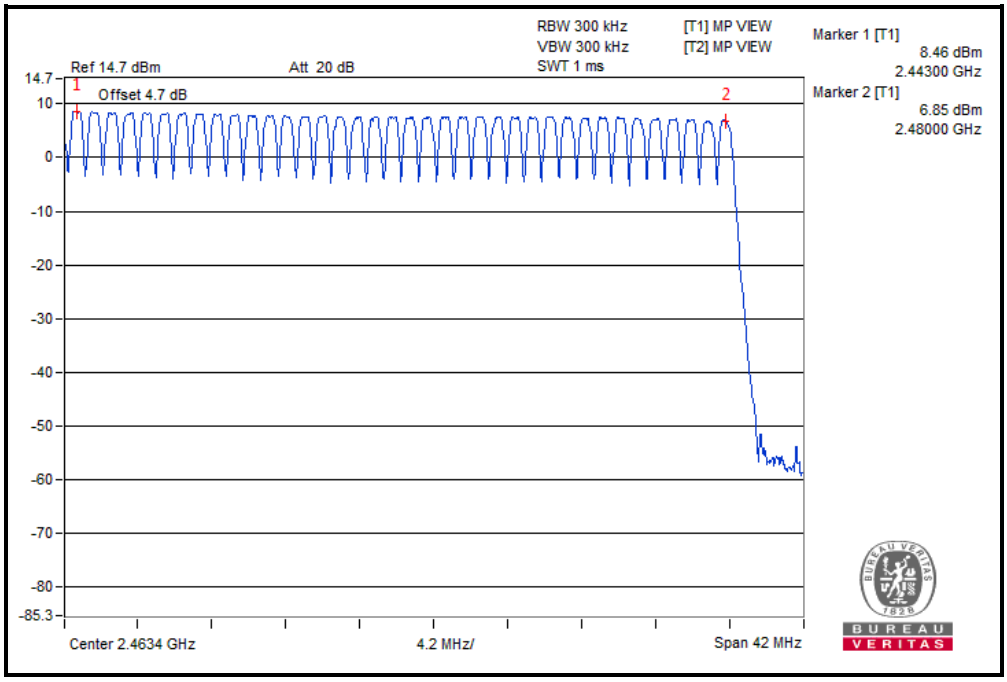
No deviation.

### 4.3.6 TEST RESULTS

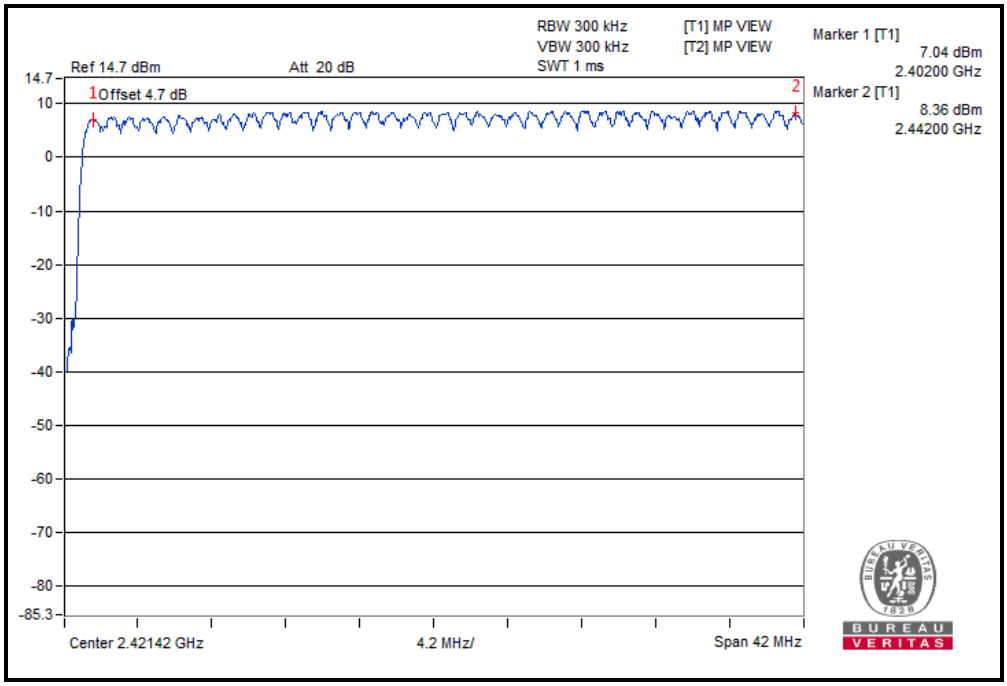
There are 79 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

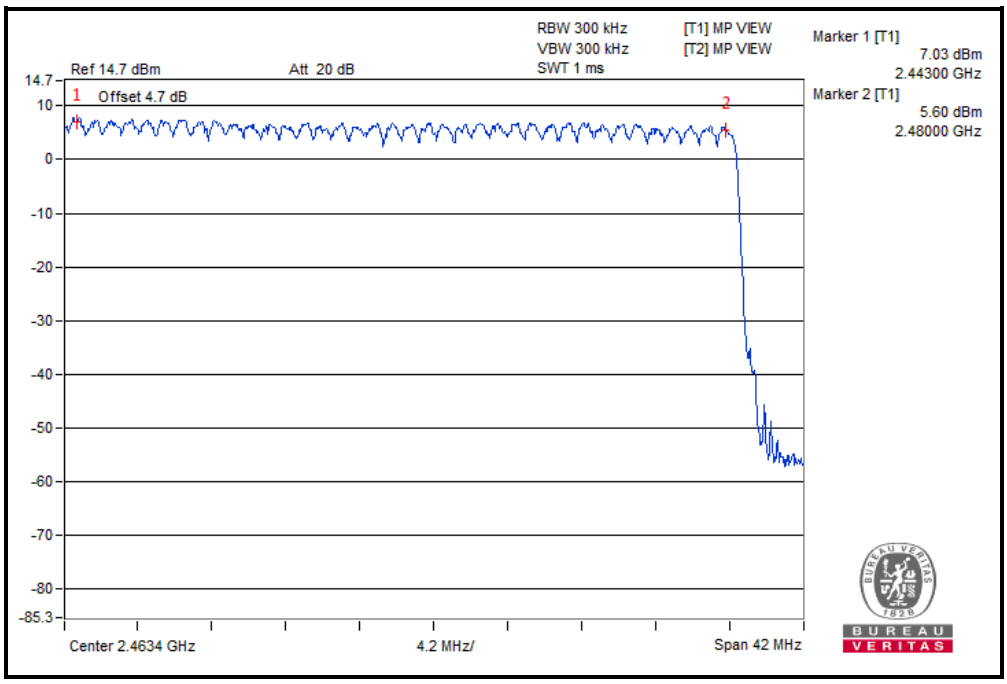
## GFSK


RBW 300 kHz
VBW 300 kHz
SWT 1 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
8.12 dBm
2.40200 GHz
Marker 2 [T1]
9.34 dBm
2.44200 GHz
Ref 14.7 dBm
Att 20 dB
Offset 4.7 dB
14.7
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-85.3
Center 2.42142 GHz
4.2 MHz/
Span 42 MHz


RBW 300 kHz
VBW 300 kHz
SWT 1 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
8.46 dBm
2.44300 GHz
Marker 2 [T1]
6.85 dBm
2.48000 GHz
Ref 14.7 dBm
Att 20 dB
Offset 4.7 dB
14.7
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-85.3
Center 2.4634 GHz
4.2 MHz/
Span 42 MHz

## 8DPSK


RBW 300 kHz
VBW 300 kHz
SWT 1 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
7.04 dBm
2.40200 GHz
Marker 2 [T1]
8.36 dBm
2.44200 GHz
Ref 14.7 dBm
Att 20 dB
Offset 4.7 dB
14.7
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-85.3
Center 2.42142 GHz
4.2 MHz/
Span 42 MHz

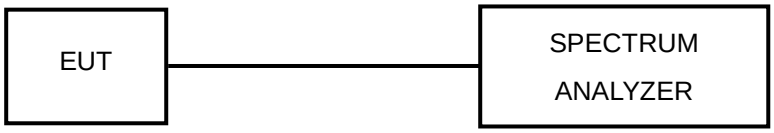

RBW 300 kHz
VBW 300 kHz
SWT 1 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
7.03 dBm
2.44300 GHz
Marker 2 [T1]
5.60 dBm
2.48000 GHz
Ref 14.7 dBm
Att 20 dB
Offset 4.7 dB
14.7
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-85.3
Center 2.4634 GHz
4.2 MHz/
Span 42 MHz

## 4.4 DWELL TIME ON EACH CHANNEL

### 4.4.1 LIMIT OF DWELL TIME USED

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.

### 4.4.2 TEST SETUP




### 4.4.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

### 4.4.4 TEST PROCEDURES

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.

c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.

d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.

e. Repeat above procedures until all different time-slot modes have been completed.

### 4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.4.6 TEST RESULTS

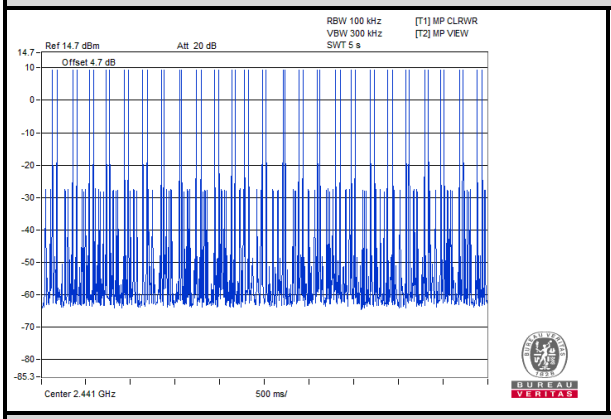
**GFSK**

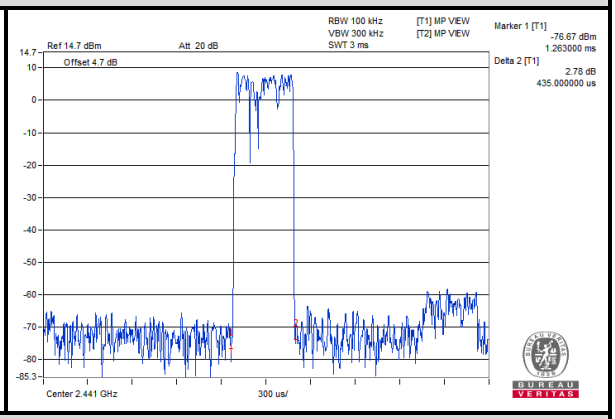
| Mode | Number of Hopping Channel | Number of transmission in a period(channel number*0.4 sec) | | | | Length of transmission time (msec) | Result (msec) | Limit (msec) | PASS / FAIL |
|---|---|---|---|---|---|---|---|---|---|
| | | period (sec) | sweep time (sec) | times in a sweep | times in a period | | | | |
| DH1 | 79 | 31.6 | 5 | 50 | 316 | 0.435 | 137.46 | 400 | PASS |
| DH3 | 79 | 31.6 | 5 | 27 | 170.64 | 1.695 | 289.23 | 400 | PASS |
| DH5 | 79 | 31.6 | 5 | 16 | 101.12 | 2.945 | 297.8 | 400 | PASS |

**NOTE:** Test plots of the transmitting time slot are shown on next 3 pages.

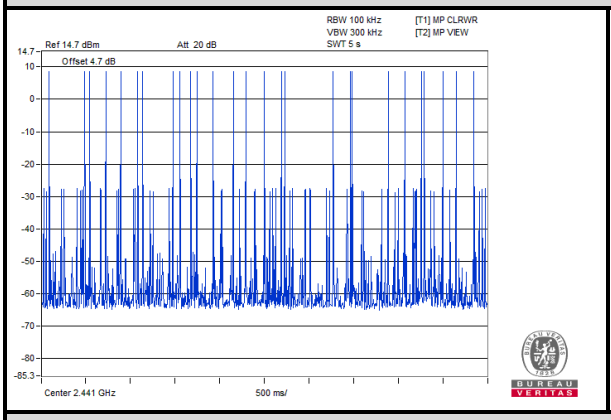
## GFSK

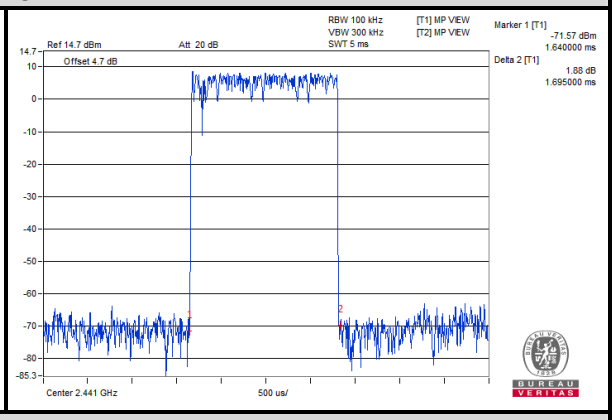
### DH1



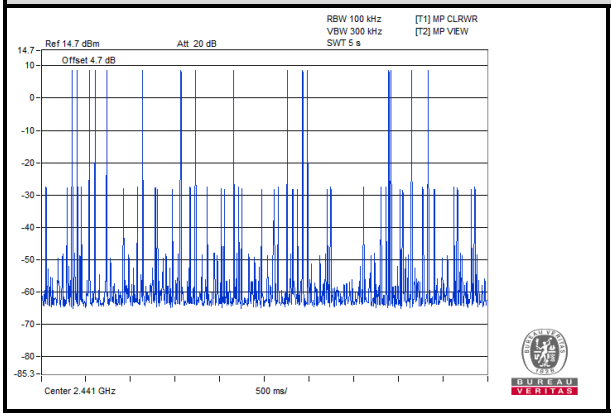



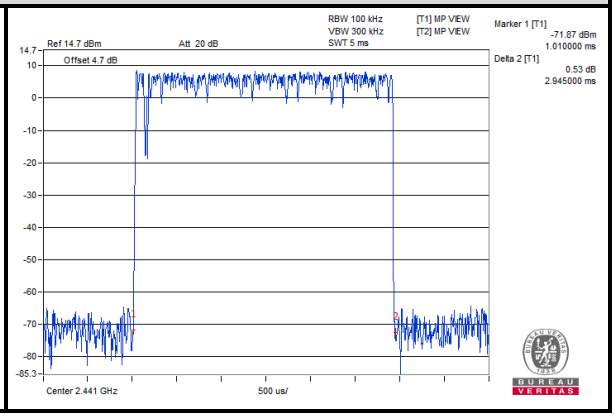

### DH3




### DH5



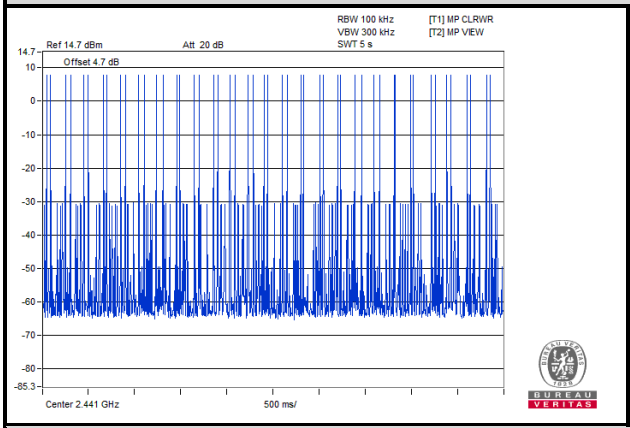
**8DPSK**

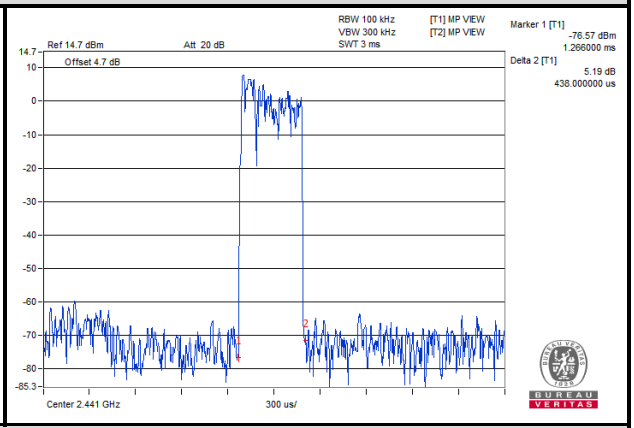
| Mode | Number of Hopping Channel | Number of transmission in a period(channel number*0.4 sec) | | | | Length of transmission time (msec) | Result (msec) | Limit (msec) | PASS / FAIL |
|---|---|---|---|---|---|---|---|---|---|
| | | period (sec) | sweep time (sec) | times in a sweep | times in a period | | | | |
| DH1 | 79 | 31.6 | 5 | 49 | 309.68 | 0.438 | 135.64 | 400 | PASS |
| DH3 | 79 | 31.6 | 5 | 27 | 170.64 | 1.7 | 290.09 | 400 | PASS |
| DH5 | 79 | 31.6 | 5 | 17 | 107.44 | 2.93 | 314.8 | 400 | PASS |

**NOTE:** Test plots of the transmitting time slot are shown on next 3 pages.

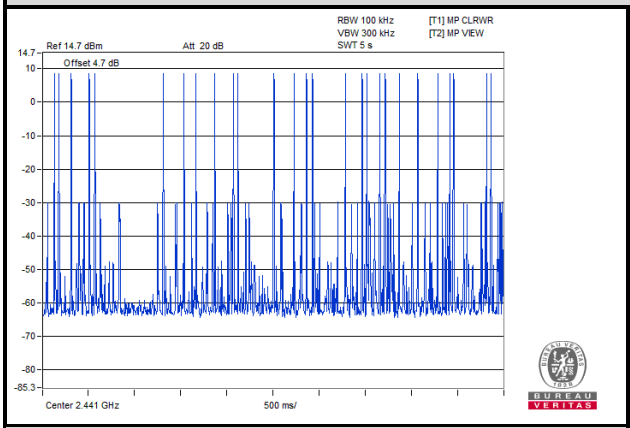
## 8DPSK

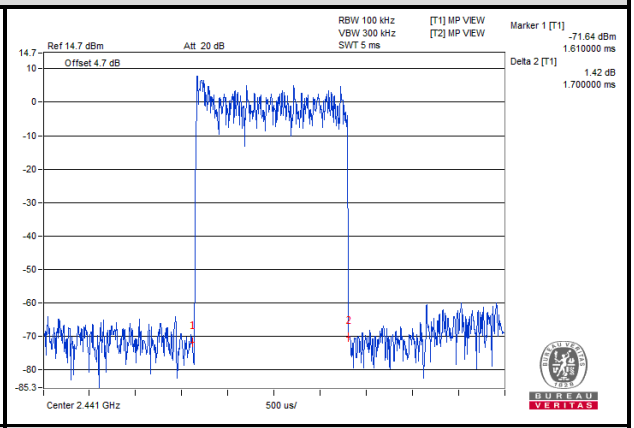
### DH1



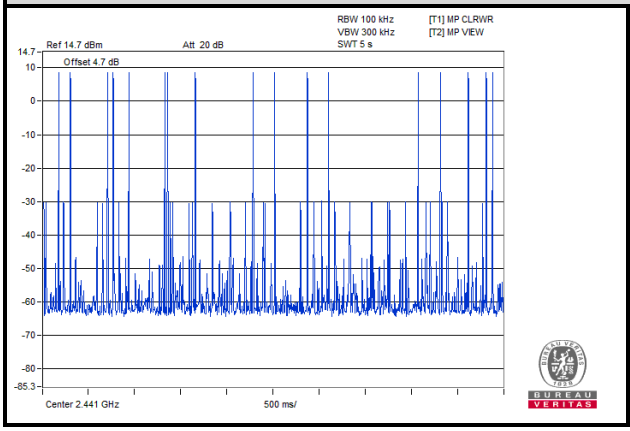



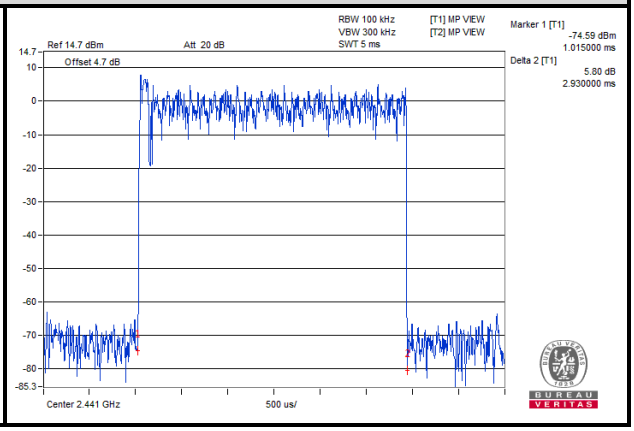

### DH3




### DH5



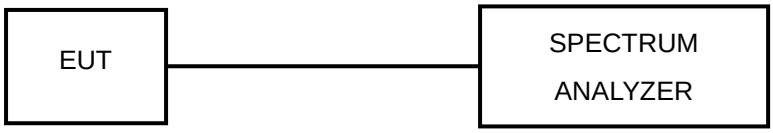



## 4.5 CHANNEL BANDWIDTH

### 4.5.1 LIMITS OF CHANNEL BANDWIDTH

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dBbandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

### 4.5.2 TEST SETUP




### 4.5.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

### 4.5.4 TEST PROCEDURE

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.

d. Repeat above procedures until all frequencies measured were complete.

### 4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.5.6 EUT OPERATING CONDITION

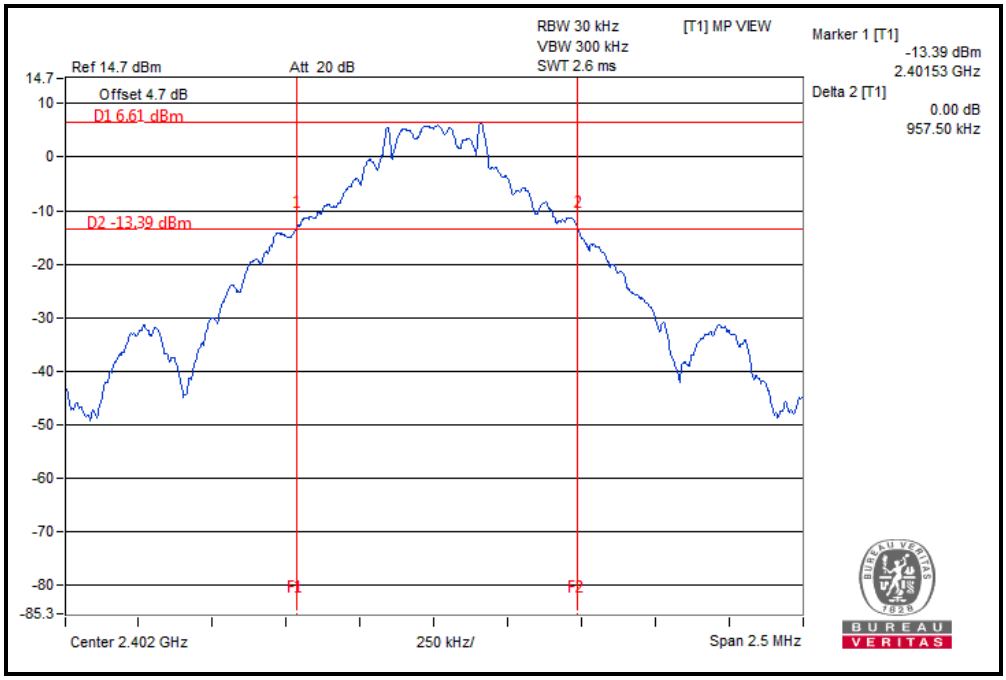
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

## 4.5.7 TEST RESULTS

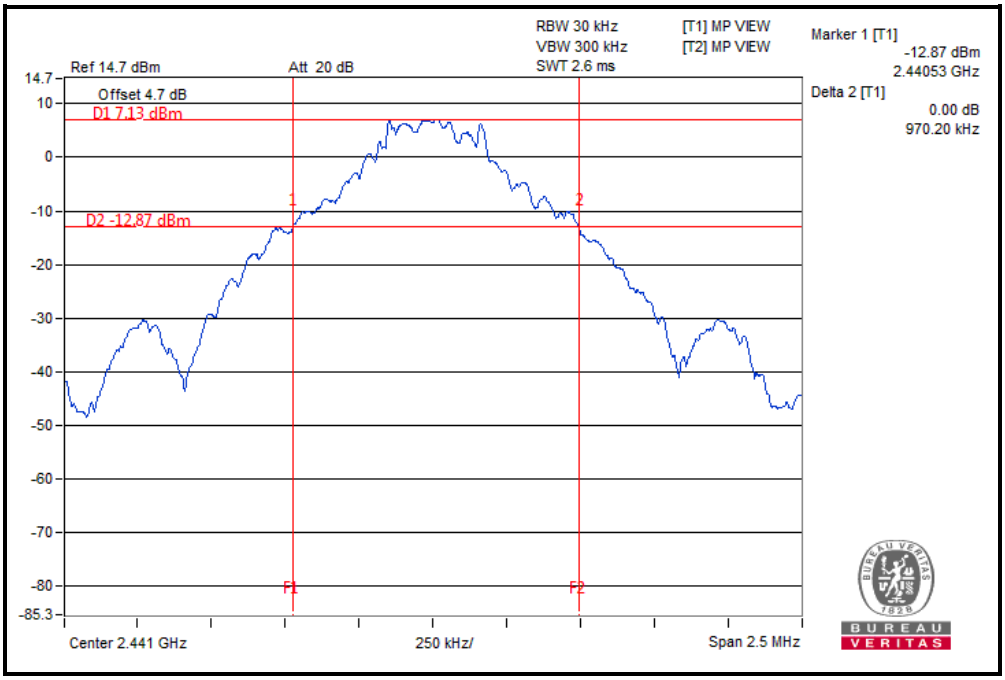
**GFSK**

| CHANNEL | CHANNEL FREQUENCY (MHz) | 20dB BANDWIDTH (MHz) |
|---|---|---|
| 0 | 2402 | 0.96 |
| 39 | 2441 | 0.97 |
| 78 | 2480 | 1.03 |

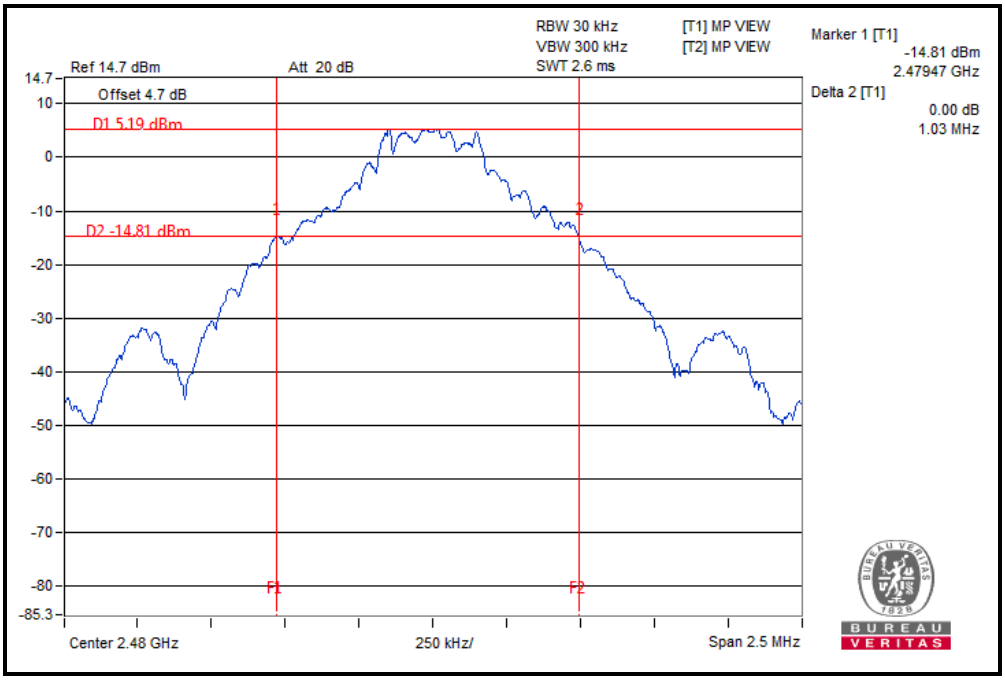
**CH 0**



## CH 39


RBW 30 kHz
VBW 300 kHz
SWT 2.6 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
-12.87 dBm
2.44053 GHz
Delta 2 [T1]
0.00 dB
970.20 kHz
Ref 14.7 dBm
Att 20 dB
Offset 4.7 dB
D1 7.13 dBm
D2 -12.87 dBm
14.7
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-85.3
F1
F2
Center 2.441 GHz
250 kHz/
Span 2.5 MHz

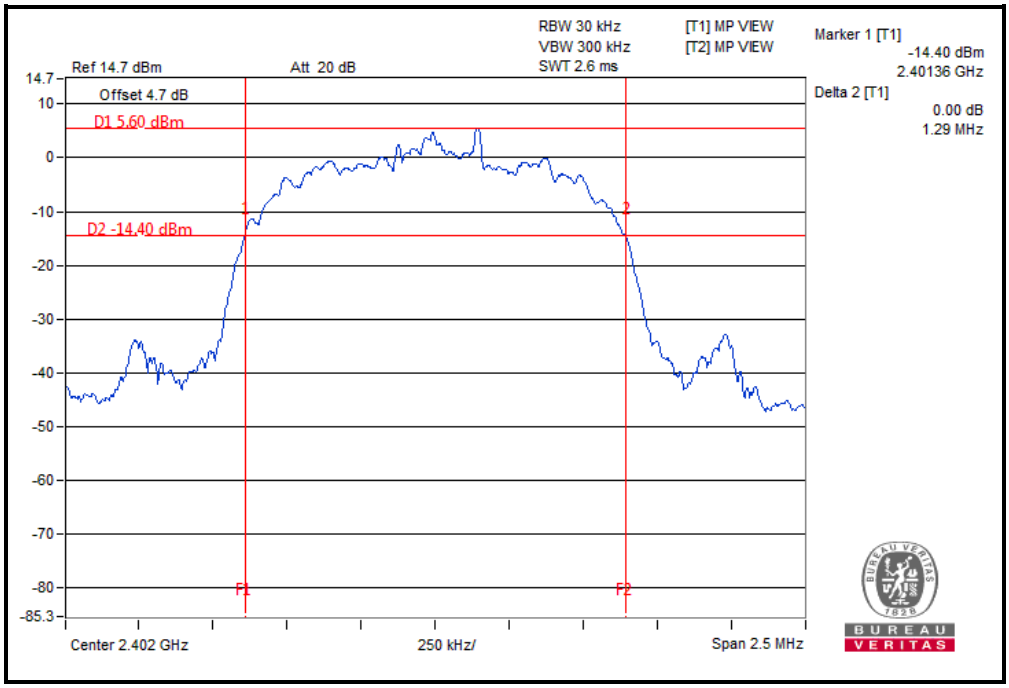
## CH 78


RBW 30 kHz
VBW 300 kHz
SWT 2.6 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
-14.81 dBm
2.47947 GHz
Delta 2 [T1]
0.00 dB
1.03 MHz
Ref 14.7 dBm
Att 20 dB
Offset 4.7 dB
D1 5.19 dBm
D2 -14.81 dBm
14.7
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-85.3
F1
F2
Center 2.48 GHz
250 kHz/
Span 2.5 MHz

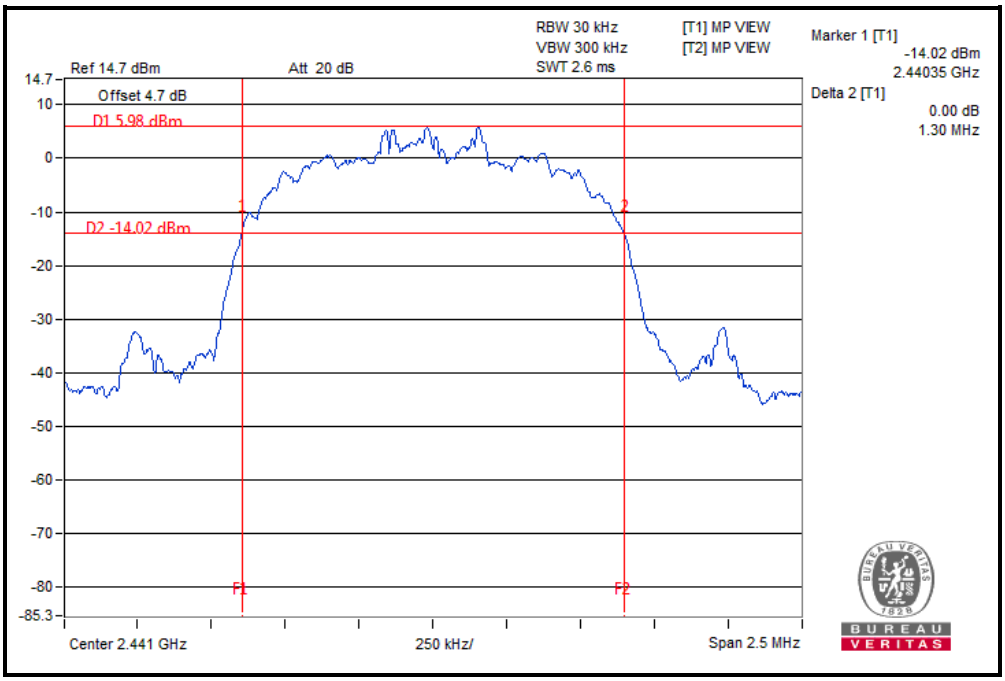
## 8DPSK

| CHANNEL | CHANNEL FREQUENCY (MHz) | 20dB BANDWIDTH (MHz) |
|---|---|---|
| 0 | 2402 | 1.29 |
| 39 | 2441 | 1.30 |
| 78 | 2480 | 1.30 |

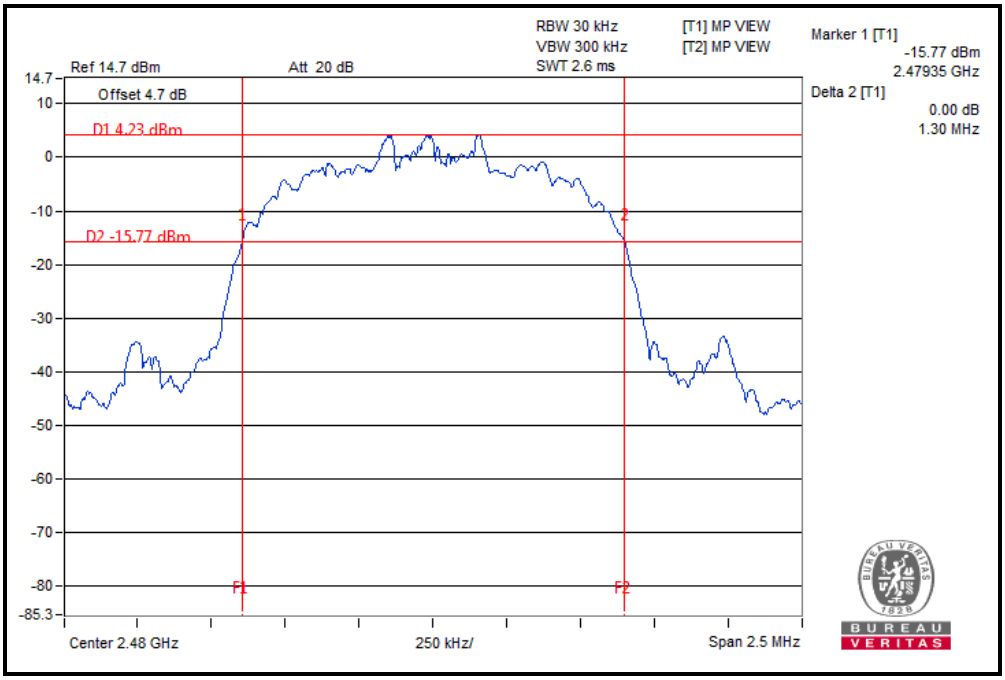
### CH 0



## CH 39


RBW 30 kHz
VBW 300 kHz
SWT 2.6 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
-14.02 dBm
2.44035 GHz
Delta 2 [T1]
0.00 dB
1.30 MHz
Ref 14.7 dBm
Att 20 dB
Offset 4.7 dB
D1 5.98 dBm
D2 -14.02 dBm
14.7
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-85.3
F1
F2
Center 2.441 GHz
250 kHz/
Span 2.5 MHz

## CH 78

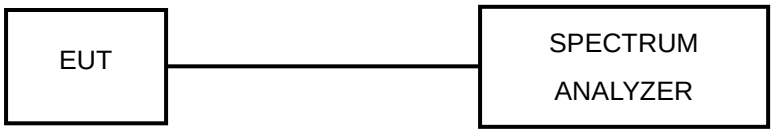

RBW 30 kHz
VBW 300 kHz
SWT 2.6 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
-15.77 dBm
2.47935 GHz
Delta 2 [T1]
0.00 dB
1.30 MHz
Ref 14.7 dBm
Att 20 dB
Offset 4.7 dB
D1 4.23 dBm
D2 -15.77 dBm
14.7
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-85.3
F1
F2
Center 2.48 GHz
250 kHz/
Span 2.5 MHz

## 4.6 HOPPING CHANNEL SEPARATION

### 4.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

At least 25kHz or two-third of 20dB hopping channel bandwidth (whichever is greater).

### 4.6.2 TEST SETUP




### 4.6.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

### 4.6.4 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

### 4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

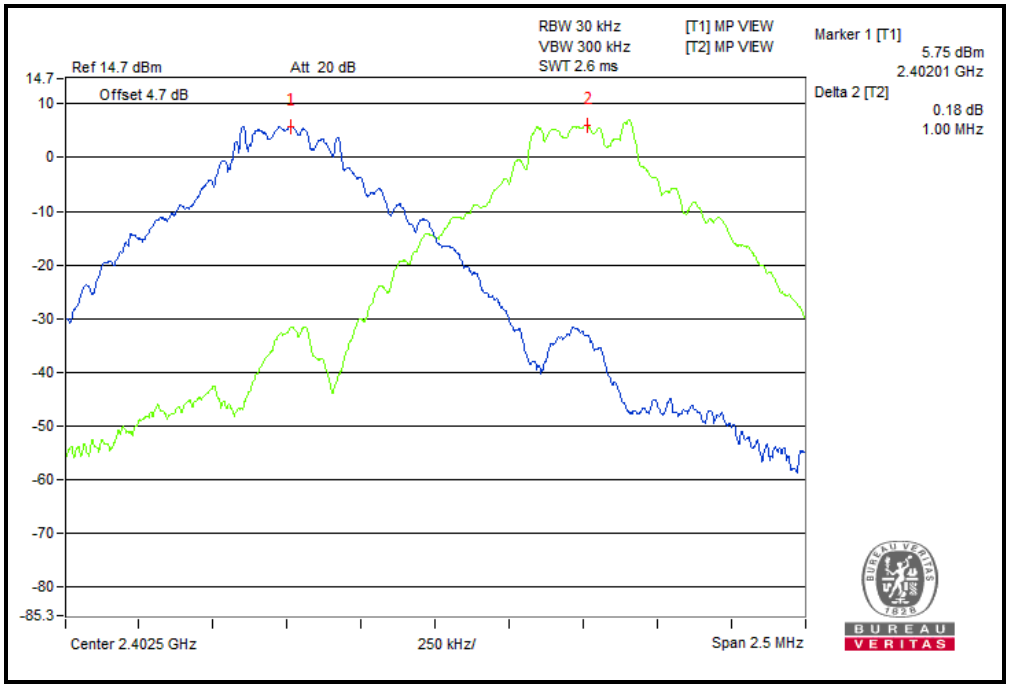
## 4.6.6 TEST RESULTS

**GFSK**

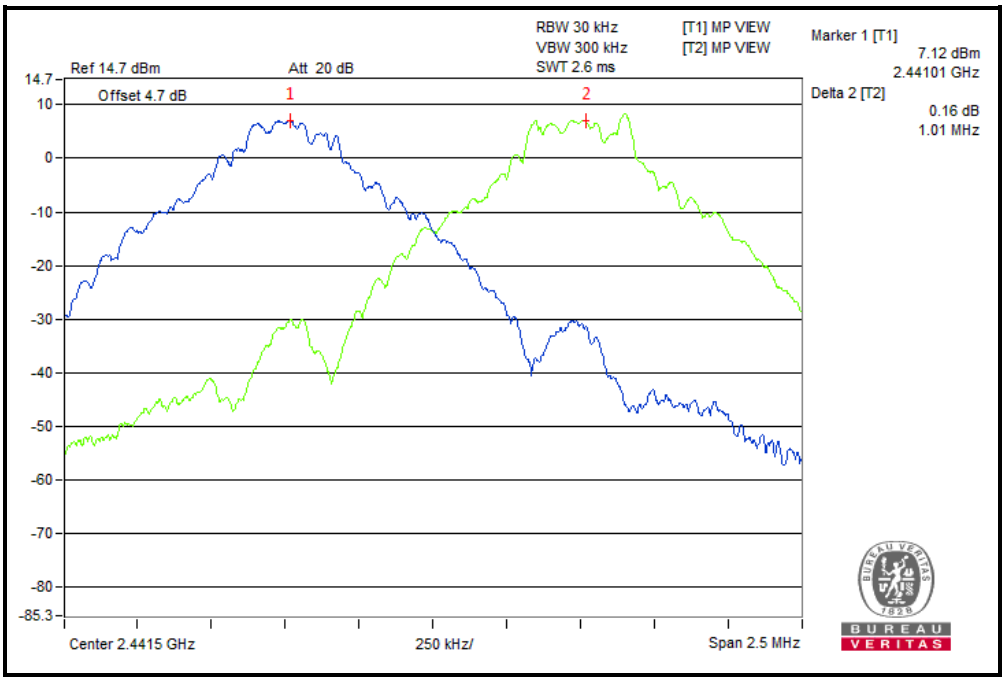
| CHANNEL | FREQUENCY (MHz) | ADJACENT CHANNEL SEPARATION (MHz) | 20dB BANDWIDTH (MHz) | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|
| 0 | 2402 | 1.00 | 0.96 | 0.64 | PASS |
| 39 | 2441 | 1.01 | 0.97 | 0.65 | PASS |
| 78 | 2480 | 1.00 | 1.03 | 0.69 | PASS |

**NOTE:** The minimum limit is two-third 20dB bandwidth.

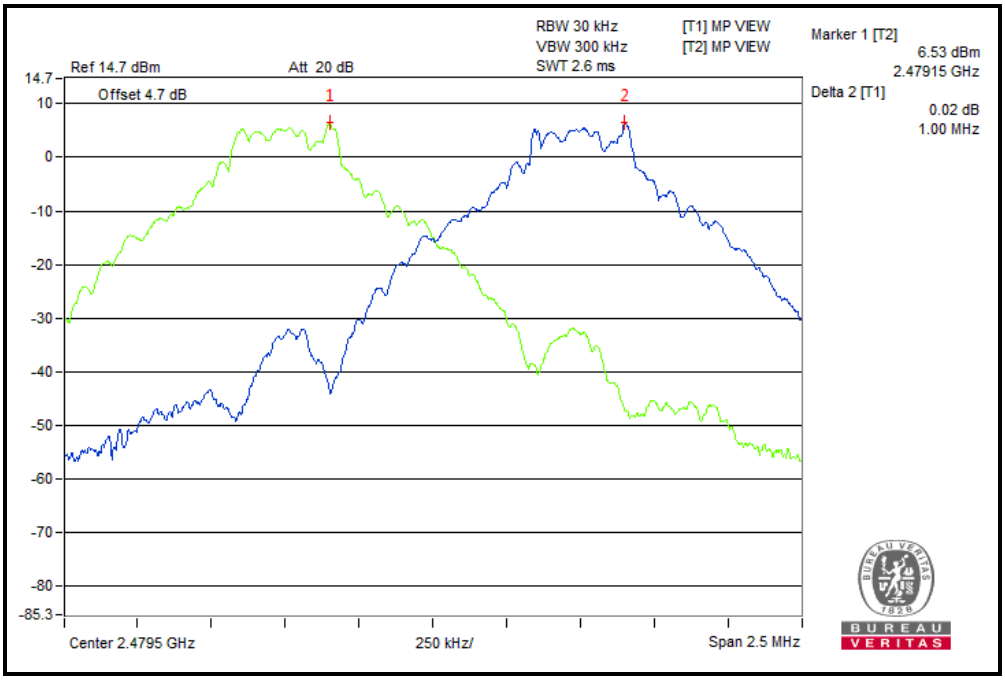
**CH 0**



## CH 39


RBW 30 kHz
VBW 300 kHz
SWT 2.6 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
7.12 dBm
2.44101 GHz
Delta 2 [T2]
0.16 dB
1.01 MHz
Ref 14.7 dBm
Att 20 dB
Offset 4.7 dB
14.7
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-85.3
Center 2.4415 GHz
250 kHz/
Span 2.5 MHz

## CH 78

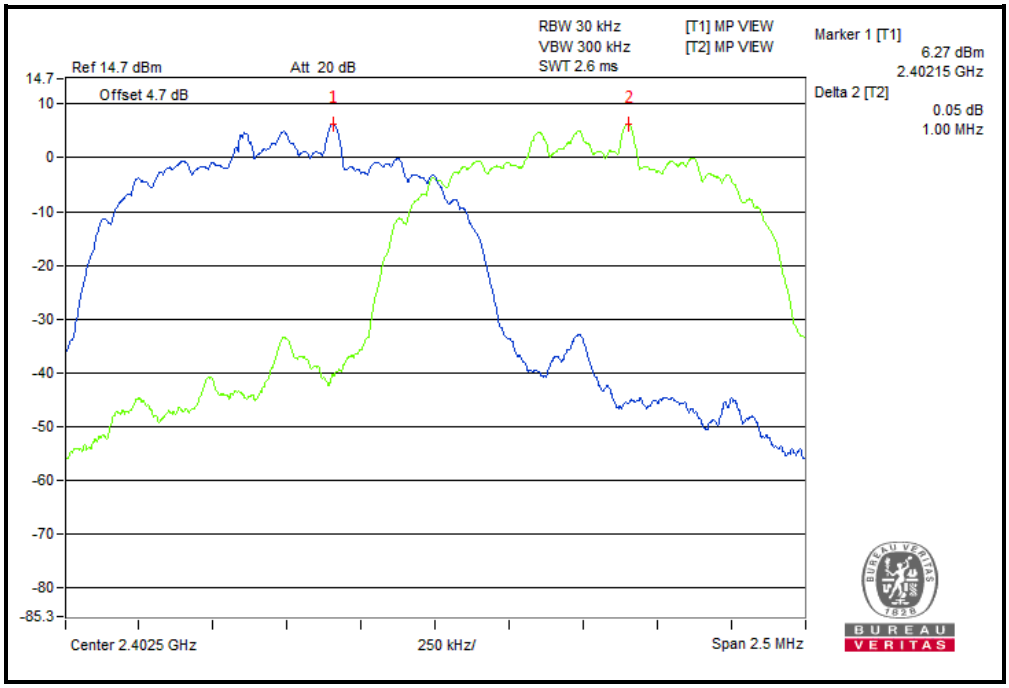

RBW 30 kHz
VBW 300 kHz
SWT 2.6 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T2]
6.53 dBm
2.47915 GHz
Delta 2 [T1]
0.02 dB
1.00 MHz
Ref 14.7 dBm
Att 20 dB
Offset 4.7 dB
14.7
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-85.3
Center 2.4795 GHz
250 kHz/
Span 2.5 MHz

## 8DPSK

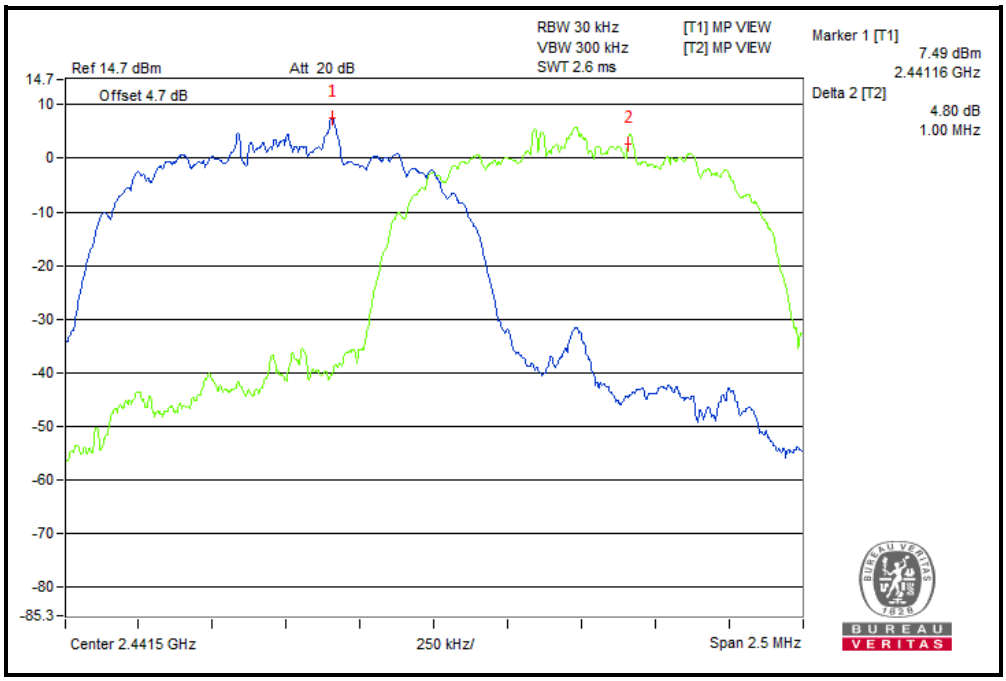
| CHANNEL | FREQUENCY (MHz) | ADJACENT CHANNEL SEPARATION (MHz) | 20dB BANDWIDTH (MHz) | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|
| 0 | 2402 | 1.00 | 1.29 | 0.86 | PASS |
| 39 | 2441 | 1.00 | 1.30 | 0.87 | PASS |
| 78 | 2480 | 1.01 | 1.30 | 0.87 | PASS |

**NOTE:** The minimum limit is two-third 20dB bandwidth.

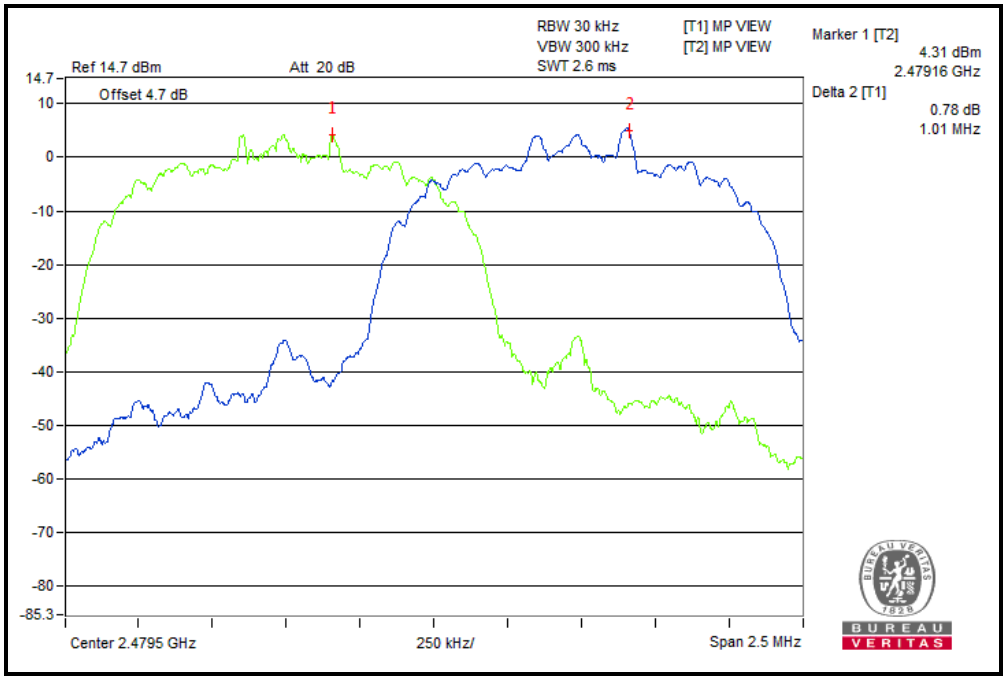
### CH 0



## CH 39


RBW 30 kHz
VBW 300 kHz
SWT 2.6 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
7.49 dBm
2.44116 GHz
Delta 2 [T2]
4.80 dB
1.00 MHz
Ref 14.7 dBm
Att 20 dB
Offset 4.7 dB
14.7
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-85.3
Center 2.4415 GHz
250 kHz/
Span 2.5 MHz

## CH 78

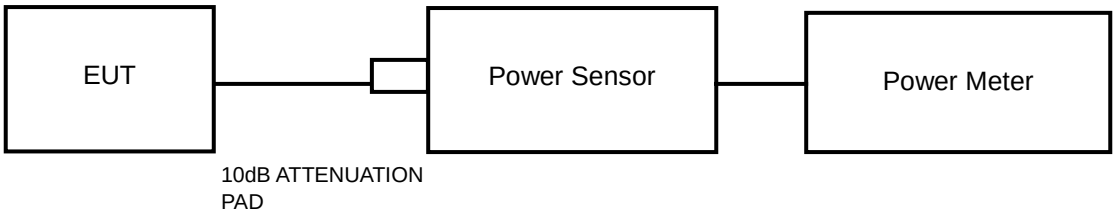

RBW 30 kHz
VBW 300 kHz
SWT 2.6 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T2]
4.31 dBm
2.47916 GHz
Delta 2 [T1]
0.78 dB
1.01 MHz
Ref 14.7 dBm
Att 20 dB
Offset 4.7 dB
14.7
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-85.3
Center 2.4795 GHz
250 kHz/
Span 2.5 MHz

## 4.7 MAXIMUM OUTPUT POWER

### 4.7.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

The Maximum Output Power Measurement is 125mW.

### 4.7.2 TEST SETUP




### 4.7.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

### 4.7.4 TEST PROCEDURES

A power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

### 4.7.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.7.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

### 4.7.7 TEST RESULTS

**GFSK**

| CHANNEL | CHANNEL FREQUENCY (MHz) | POWER OUTPUT (dBm) | POWER OUTPUT (mW) | POWER LIMIT (mW) | PASS/FAIL |
|---|---|---|---|---|---|
| 0 | 2402 | 7.40 | 5.495 | 125 | PASS |
| 39 | 2441 | 9.34 | **8.590** | 125 | PASS |
| 78 | 2480 | 7.23 | 5.284 | 125 | PASS |

**8DPSK**

| CHANNEL | CHANNEL FREQUENCY (MHz) | POWER OUTPUT (dBm) | POWER OUTPUT (mW) | POWER LIMIT (mW) | PASS/FAIL |
|---|---|---|---|---|---|
| 0 | 2402 | 6.44 | 4.406 | 125 | PASS |
| 39 | 2441 | 8.38 | 6.887 | 125 | PASS |
| 78 | 2480 | 6.27 | 4.236 | 125 | PASS |

## 4.8 OUT OF BAND MEASUREMENT

### 4.8.1 LIMITS OF OUT OF BAND MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100KHz RBW).

### 4.8.2 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

### 4.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. of Spectrum Analyzer was set RBW to 100 kHz and VBW to 100 kHz with suitable frequency span including 100 MHz bandwidth from band edge. Detector = PEAK and Trace mode = Max Hold. The band edges was measured and recorded.

### 4.8.4 DEVIATION FROM TEST STANDARD

No deviation.

### 4.8.5 EUT OPERATING CONDITION

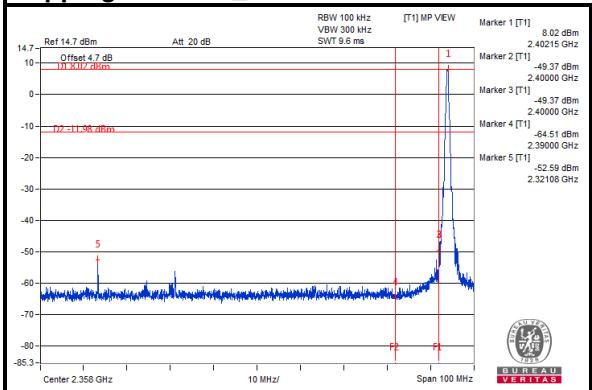
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

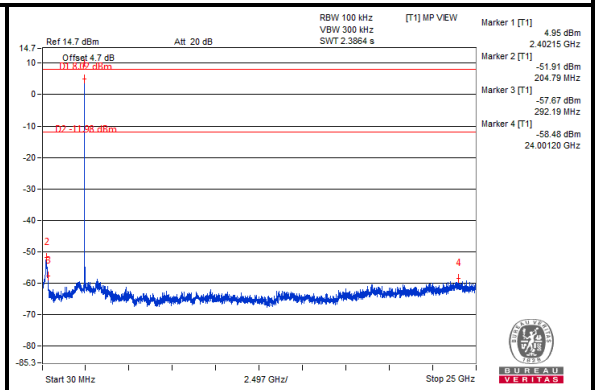
### 4.8.6 TEST RESULTS

The spectrum plots are attached on the following images. D1 line indicates the highest level. D2 line indicates the 20dB offset below D1. It shows compliance to the requirement.

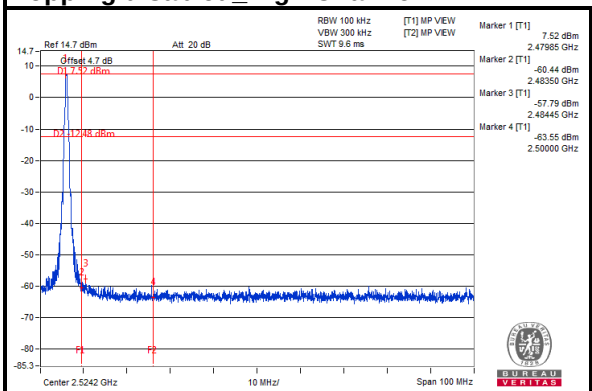
## GFSK

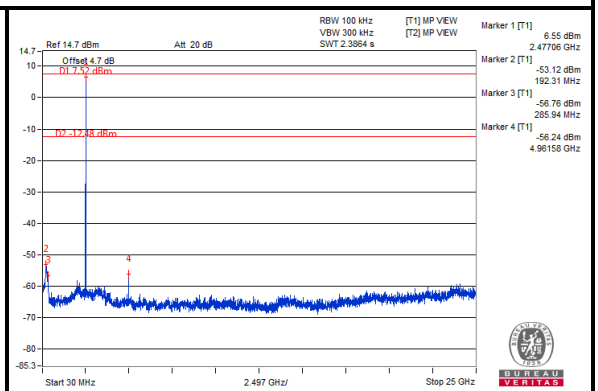
### Hopping disabled_Low Channel



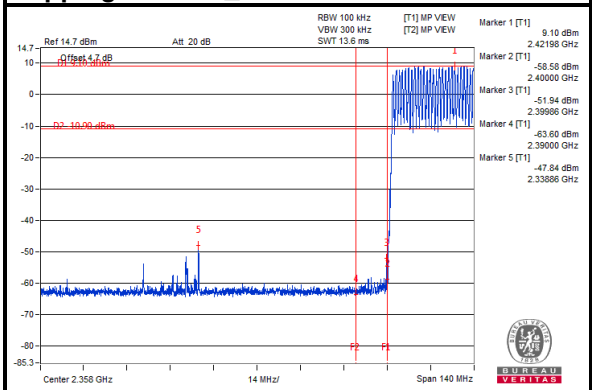




### Hopping disabled_High Channel

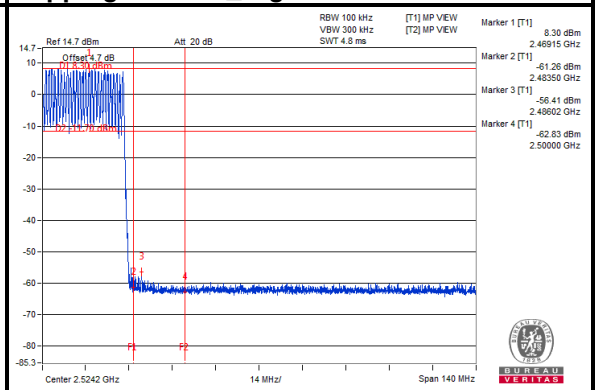



### Hopping enabled_Low Channel

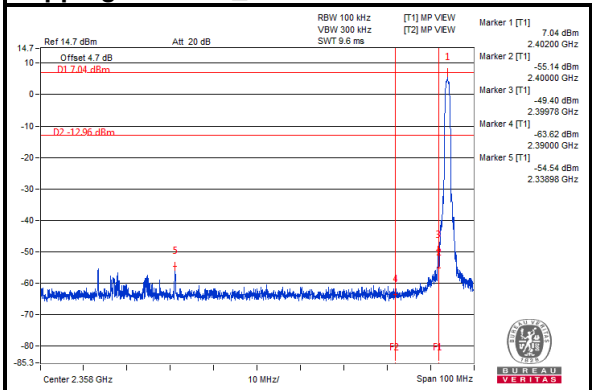


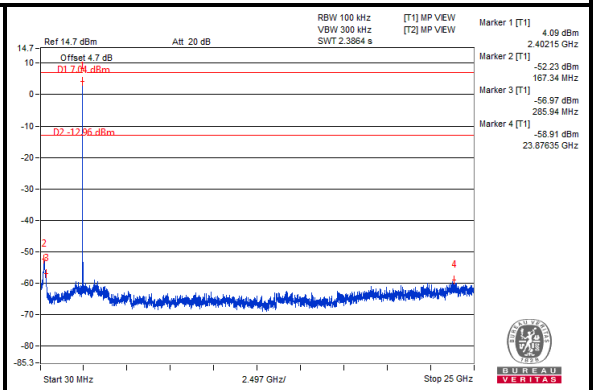

### Hopping enabled_High Channel



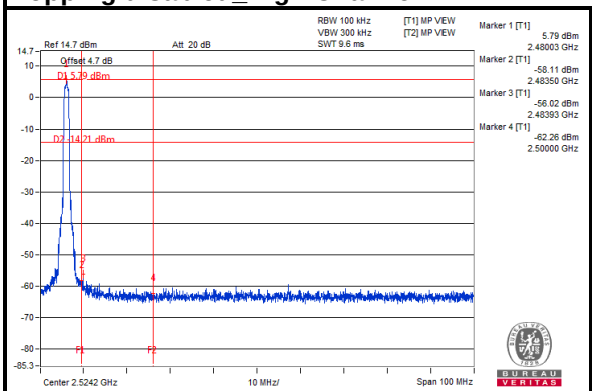
## 8DPSK

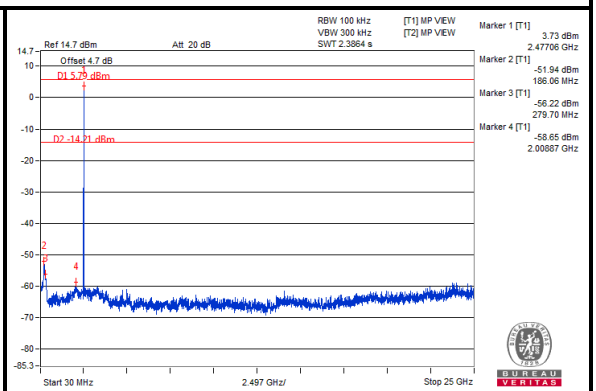
### Hopping disabled_Low Channel



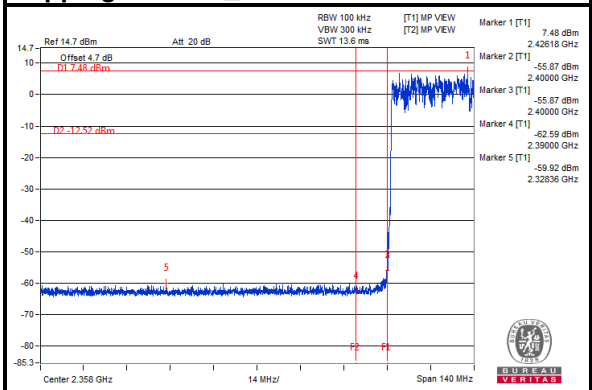




### Hopping disabled_High Channel

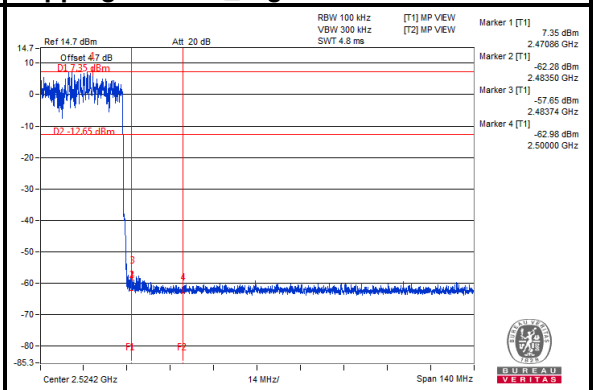



### Hopping enabled_Low Channel




### Hopping enabled_High Channel



# 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

# 6 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

**---END---**