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| TE  | EST REPORT  |  |  |  |
|---|---|--|--|--|
| Report Reference No                                 | TRE1805013706 R/C: 11244  |  |  |  |
| FCC ID:   | 2ADE3NMC001   |  |  |  |
| Applicant's name:                                   | WUXI IDATA TECHNOLOGY COMPANY LTD.  |  |  |  |
| Address   | Floor 11,Building B1,Wuxi Binhu National Sensing Information Center,No.999 Gaolang East Road, Wuxi, China |  |  |  |
| Manufacturer  | WUXI IDATA TECHNOLOGY COMPANY LTD.  |  |  |  |
| Address   | Floor 11,Building B1,Wuxi Binhu National Sensing Information Center,No.999 Gaolang East Road, Wuxi, China |  |  |  |
| Test item description:                              | NEW MOBILE COMPUTER   |  |  |  |
| Trade Mark  | iData   |  |  |  |
| Model/Type reference:                               | iData 50  |  |  |  |
| Listed Model(s)                                     | iData 55HC  |  |  |  |
| Standard:   | FCC CFR Title 47 Part 15 Subpart C Section 15.247   |  |  |  |
| Date of receipt of test sample:                     | May 16, 2018  |  |  |  |
| Date of testing                                     | May 17, 2018 - May 28, 2018   |  |  |  |
| Date of issue                                       | May 28, 2018  |  |  |  |
| Result  | PASS  |  |  |  |
| Compiled by<br>(Position+Printed name+Signature):   | File administrators Shayne Zhu  |  |  |  |
| Supervised by<br>(Position+Printed name+Signature): | Project Engineer Edward Pan Zdward Pan  |  |  |  |
| Approved by (Position+Printed name+Signature):      | RF Manager Hans Hu  |  |  |  |
| Testing Laboratory Name :                           | Shenzhen Huatongwei International Inspection Co., Ltd.  |  |  |  |
| Address:  | 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road,<br>Tianliao, Gongming, Shenzhen, China           |  |  |  |
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The test report merely corresponds to the test sample.

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# 1. TEST STANDARDS AND REPORT VERSION

# 1.1. Test Standards

The tests were performed according to following standards:

<u>FCC Rules Part 15.247:</u> Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devicese

# **1.2.** Report version information

| Revision No. | Date of issue | Description |
|--------------|---------------|-------------|
| N/A          | 2018-05-28    | Original    |
|              |               |             |
|              |               |             |
|              |               |             |
|              |               |             |

# 2. TEST DESCRIPTION

| Test Item                                  | Section in CFR 47 | Result | Test Engineer |
|--|-------------------|--------|---------------|
| Antenna Requirement                        | 15.203/15.247 (c) | PASS   | Xiaokang tan  |
| AC Power Line Conducted Emissions          | 15.207            | PASS   | Si Ding       |
| Conducted Peak Output Power                | 15.247 (b)(1)     | PASS   | Xiaokang tan  |
| 20 dB Bandwidth                            | 15.247 (a)(1)     | PASS   | Xiaokang tan  |
| Carrier Frequencies Separation             | 15.247 (a)(1)     | PASS   | Xiaokang tan  |
| Hopping Channel Number                     | 15.247 (a)(1)     | PASS   | Xiaokang tan  |
| Dwell Time                                 | 15.247 (a)(1)     | PASS   | Xiaokang tan  |
| Pseudorandom Frequency Hopping<br>Sequence | 15.247(b)(4)      | PASS   | Xiaokang tan  |
| Restricted band                            | 15.247(d)/15.205  | PASS   | Xiaokang tan  |
| Radiated Emissions                         | 15.247(d)/15.209  | PASS   | Shower Dai    |

Note: The measurement uncertainty is not included in the test result.

# 3. <u>SUMMARY</u>

# 3.1. Client Information

| Applicant:    | WUXI IDATA TECHNOLOGY COMPANY LTD.  |  |
|---------------|---|--|
| Address:      | Floor 11,Building B1,Wuxi Binhu National Sensing Information Center,<br>No.999 Gaolang East Road, Wuxi, China |  |
| Manufacturer: | WUXI IDATA TECHNOLOGY COMPANY LTD.  |  |
| Address:      | Floor 11,Building B1,Wuxi Binhu National Sensing Information Center,<br>No.999 Gaolang East Road, Wuxi, China |  |

# 3.2. Product Description

| Name of EUT:           | NEW MOBILE COMPUTER  |  |
|------------------------|--|--|
| Trade Mark:            | iData  |  |
| Model No.:             | iData 50   |  |
| Listed Model(s):       | iData 55HC   |  |
| IMEI:                  | Radiated:359157093486913<br>Conducted:359157093486970                                    |  |
| Power supply:          | DC 3.7V  |  |
| Adapter information 1: | Model: FJ-SW1260502000UN<br>Input: 100-240Va.c., 50/60Hz, 0.4A<br>Output: 5Vd.c., 2000mA |  |
| Adapter information 2: | Model:FJ-SW1202000N<br>Input:AC 100-240V 50/60Hz 0.6A Max<br>Output: 12Vd.c., 2000mA     |  |
| Hardware version:      | A20  |  |
| Software version:      | Android.Marshmallow.V6.0   |  |
| Bluetooth              |  |  |
| Version:               | Supported BT4.0+EDR  |  |
| Modulation:            | GFSK, π/4DQPSK, 8DPSK  |  |
| Operation frequency:   | 2402MHz~2480MHz  |  |
| Channel number:        | 79   |  |
| Channel separation:    | 1MHz   |  |
| Antenna type:          | PIFA Antenna   |  |
| Antenna gain:          | 1.5dBi   |  |

# 3.3. Operation state

#### Test frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channel which were tested. the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above gray bottom.

| Channel | Frequency (MHz) |
|---------|-----------------|
| 00      | 2402            |
| 01      | 2403            |
| :       | :               |
| 39      | 2441            |
| ÷       | :               |
| 77      | 2479            |
| 78      | 2480            |

#### > <u>TEST MODE</u>

For RF test items:

The engineering test program was provided and enabled to make EUT continuous transmit

For AC power line conducted emissions:

The EUT was set to connect with the Bluetooth instrument under large package sizes transmission.

For Radiated suprious emissions test item:

The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested ,but only the worst case (X axis) data recorded in the report.

# 3.4. EUT configuration

#### The following peripheral devices and interface cables were connected during the measurement:

- supplied by the manufacturer
- supplied by the lab

|   | Manufacturer: | / |
|---|---------------|---|
| 7 | Model No.:    | / |
|   | Manufacturer: | / |
| 7 | Model No.:    | / |

#### 3.5. Modifications

No modifications were implemented to meet testing criteria.

# 4. TEST ENVIRONMENT

## 4.1. Address of the test laboratory

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd. Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

## 4.2. Test Facility

#### CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### A2LA-Lab Cert. No.: 3902.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### FCC-Registration No.: 762235

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files.

#### IC-Registration No.:5377B-1

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No.: 5377B-1.

#### ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

## 4.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

| Temperature:       | 15~35°C     |
|--------------------|-------------|
| Relative Humidity: | 30~60 %     |
| Air Pressure:      | 950~1050mba |

#### 4.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors in calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd. quality system according to ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Here after the best measurement capability for Shenzhen Huatongwei International Inspection Co., Ltd. is reported:

| Test Items                              | Measurement Uncertainty | Notes |
|---|-------------------------|-------|
| Transmitter power conducted             | 0.57 dB                 | (1)   |
| Transmitter power Radiated              | 2.20 dB                 | (1)   |
| Conducted spurious emissions 9kHz~40GHz | 1.60 dB                 | (1)   |
| Radiated spurious emissions 9kHz~40GHz  | 2.20 dB                 | (1)   |
| Conducted Emissions 9kHz~30MHz          | 3.39 dB                 | (1)   |
| Radiated Emissions 30~1000MHz           | 4.24 dB                 | (1)   |
| Radiated Emissions 1~18GHz              | 5.16 dB                 | (1)   |
| Radiated Emissions 18~40GHz             | 5.54 dB                 | (1)   |
| Occupied Bandwidth                      |                         | (1)   |

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

#### **Conducted Emissions** Last Cal. Next Cal. Test Item Model No. Serial No. Manufacturer Equipment (mm-dd-yy) (mm-dd-yy) **EMI** Test 101247 R&S 11/11/2017 11/10/2018 ESCI 1 Receiver 2 Artificial Mains SCHWARZBECK **NNLK 8121** 573 11/11/2017 11/10/2018 2-Line V-3 R&S 100049 11/11/2017 11/10/2018 ESH3-Z5 Network **Pulse Limiter** ESH3-Z2 101488 11/11/2017 4 R&S 11/10/2018 RF 5 Connection HUBER+SUHNER EF400 N/A 11/21/2017 11/20/2018 Cable 6 **Test Software** R&S ES-K1 N/A N/A N/A **Radiated Emissions** Last Cal. Next Cal. Test Item Manufacturer Model No. Serial No. Equipment (mm-dd-yy) (mm-dd-yy) Semi-Anechoic SAC-3m-01 C11121 10/16/2016 1 Albatross projects 10/15/2019 Chamber **EMI** Test 2 R&S ESCI 100900 11/11/2017 11/10/2018 Receiver 3 HFH2-Z2 100020 11/20/2017 11/19/2020 Loop Antenna R&S Ultra-4 Broadband SCHWARZBECK VULB9163 538 4/5/2017 4/4/2020 Antenna 5 Horn Antenna SCHWARZBECK 9120D 1011 3/27/2017 3/26/2020 Broadband **BBHA9170** 6 SCHWARZBECK **BBHA9170** 3/27/2017 3/26/2020 Horn Antenna 472 7 Pre-amplifier SCHWARZBECK BBV 9743 9743-0022 10/17/2018 10/18/2017 Broadband 8 SCHWARZBECK BBV 9718 9718-248 10/18/2017 10/17/2018 Pre-amplifier Spectrum 9 R&S FSP40 100597 11/11/2017 11/10/2018 Analyzer **RF** Connection HUBER+SUHNE 10 N/A RE-7-FL 11/21/2017 11/20/2018 Cable R **RF** Connection HUBER+SUHNE 11/20/2018 RE-7-FH N/A 11/21/2017 11 Cable R 12 **Test Software** Audix E3 N/A N/A N/A 13 **Test Software** R&S N/A ES-K1 N/A N/A N/A 14 N/A N/A Turntable Maturo Germany TT2.0-1T 15 Antenna Mast CAM-4.0-P-12 N/A N/A N/A Maturo Germany

# 4.5. Equipments Used during the Test

| RF Con | RF Conducted Test      |              |           |            |                         |                         |
|--------|------------------------|--------------|-----------|------------|-------------------------|-------------------------|
| Item   | Test<br>Equipment      | Manufacturer | Model No. | Serial No. | Last Cal.<br>(mm-dd-yy) | Next Cal.<br>(mm-dd-yy) |
| 1      | Spectrum<br>Analyzer   | R&S          | FSV40     | 100048     | 11/11/2017              | 11/10/2018              |
| 2      | EXA Signal<br>Analyzer | Agilent      | N9020A    | 184247     | 9/22/2017               | 9/21/2018               |
| 3      | Power Meter            | Agilent      | U2021XA   | 178231     | 9/22/2017               | 9/21/2018               |
| 4      | OSP                    | R&S          | OSP120    | 101317     | N/A                     | N/A                     |

# 5. TEST CONDITIONS AND RESULTS

# 5.1. Antenna requirement

## <u>Requirement</u>

#### FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of anantenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

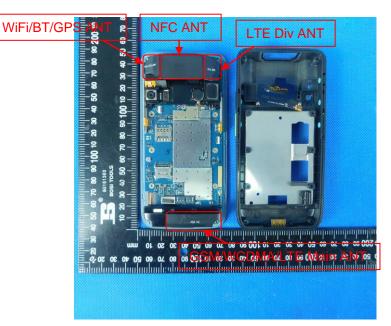
#### FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

# Test Result:

# ☑ Passed □ Not Applicable

The directional gain of the antenna less than 6 dBi, please refer to the below antenna photo.



# 5.2. Conducted Emissions (AC Main)

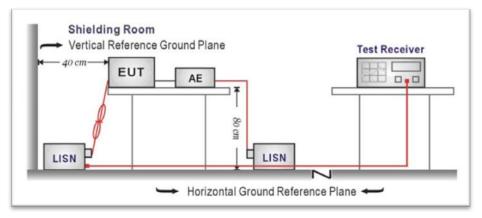
# <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.207

|                       | Limit (dBuV) |           |  |
|-----------------------|--------------|-----------|--|
| Frequency range (MHz) | Quasi-peak   | Average   |  |
| 0.15-0.5              | 66 to 56*    | 56 to 46* |  |
| 0.5-5                 | 56           | 46        |  |
| 5-30                  | 60           | 50        |  |

\* Decreases with the logarithm of the frequency.

## **TEST CONFIGURATION**



#### TEST PROCEDURE

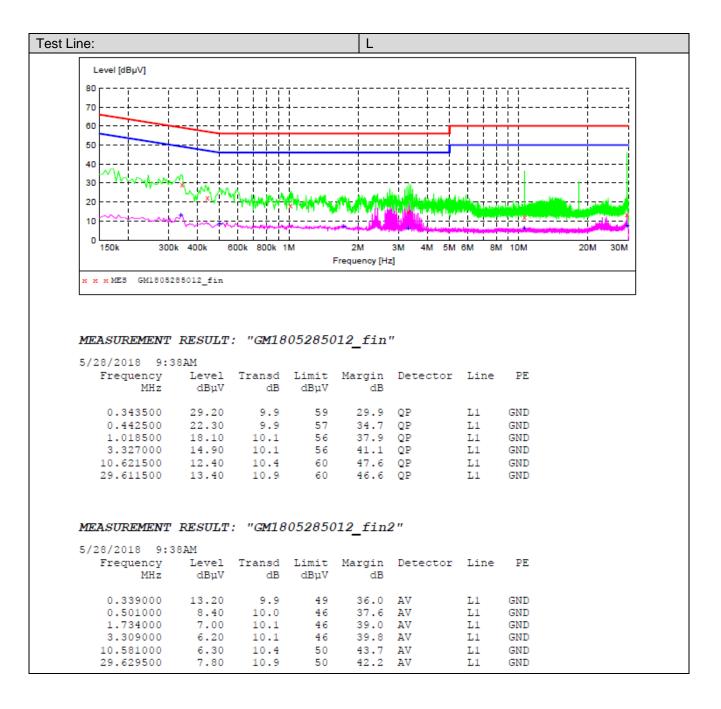
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
- 3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
- 4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
- 5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
- 6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
- 7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
- 8. During the above scans, the emissions were maximized by cable manipulation.

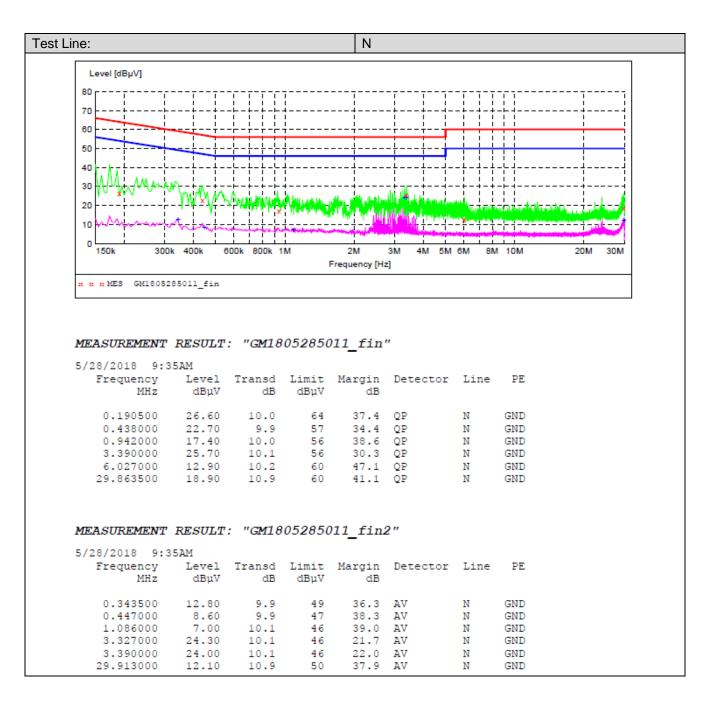
## TEST RESULTS

#### ☑ Passed □ Not Applicable

Note:

- 1) Transd= Cable lose + Pulse Limiter Factor + Artificial Mains Factor
- 2) Margin= Limit Level



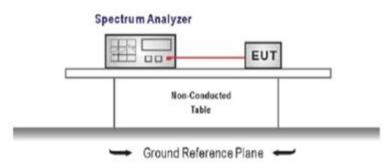


# 5.3. Conducted Peak Output Power

#### <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1): For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 nonoverlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the pathloss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel RBW≥ the 20 dB bandwidth of the emission being measured, VBW≥RBW Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

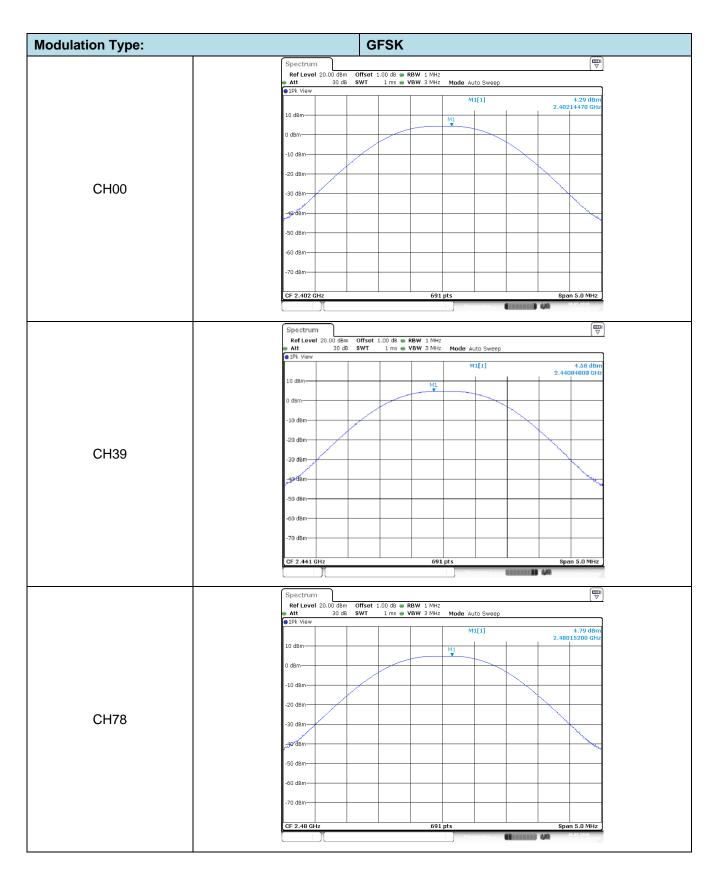
#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

#### ☑ Passed □ Not Applicable

| Modulation type | Channel | Output power (dBm) | Limit (dBm) | Result |  |
|-----------------|---------|--------------------|-------------|--------|--|
|                 | 00      | 4.29               |             |        |  |
| GFSK            | 39      | 4.58               | ≤ 30.00     | Pass   |  |
|                 | 78      | 4.79               |             |        |  |
|                 | 00      | 3.50               |             |        |  |
| π/4DQPSK        | 39      | 4.12               | ≤ 21.00     | Pass   |  |
|                 | 78      | 3.87               |             |        |  |
|                 | 00      | 3.67               |             |        |  |
| 8DPSK           | 39      | 3.84               | ≤ 21.00     | Pass   |  |
|                 | 78      | 4.06               |             |        |  |



| odulation Type: | π/4DQPSK  |
|-----------------|---|
|                 | Spectrum<br>RefLevel 20.00 dBm Offset 1.00 dB • RBW 2 MHz   |
|                 | ● Att 30 dB SWT 1 ms ● VBW 5 MHz Mode Auto Sweep<br>● 1Pk View  |
|                 | M1[1] 3.50 dBm<br>2.40215920 GHz  |
|                 | 10 dBm  |
|                 | 0 dBm   |
|                 | -40° đBm  |
| 01100           | -20 dBm   |
| CH00            | -30 dBm   |
|                 | -40 dBm   |
|                 | -50 d8m-  |
|                 | -60 dBm-  |
|                 | -70 dBm   |
|                 | CF 2.402 GHz         691 pts         Span 5.0 MHz   |
|                 | Measuring (MARINE A) 444 (1450)   |
|                 | Spectrum 🕎  |
|                 | RefLevel         20.00 dBm         Offset         1.00 dB         RBW         2 MHz           Att         30 dB         SWT         1 ms         VBW         5 MHz         Mode Auto Sweep  |
|                 | 1Pk View     M1[1] 4.12 dBm     2.4408420 CH2   |
|                 | 10 dBm  |
|                 | 0 d8m   |
|                 | =10 d8m   |
|                 | -20 d8m-  |
| CH39            | -30 d8m   |
|                 | -40 d8m-  |
|                 | -50 d8m-  |
|                 | -60 d8m-  |
|                 | -70 d8m-  |
|                 | CF 2.441 GHz 691 pts Span 5.0 MHz   |
|                 | CF 2.441 GHz         691 pts         Spon 5.0 MHz           Meanware         Meanware         Meanware         Meanware   |
|                 | Spectrum 🕎  |
|                 | Ref Level         20.00 dBm         Offset         1.00 dB         RBW         2 MHz           Att         30 dB         SWT         1 ms         VBW         5 MHz         Mode Auto Sweep |
|                 | IPk View     M1[1] 3.87 dBm     2.48012300 GHz  |
|                 | 10 dBm M1   |
|                 | 0 dBm   |
|                 | =16 <sup>°</sup> dBm  |
|                 | -20 dBm-  |
| CH78            | -30 dBm-  |
|                 | -40 dBm   |
|                 | -50 dBm   |
|                 | -60 d8m   |
|                 | -70 dBm   |
|                 |   |
|                 | CF 2.48 GHz 691 pts Span 5.0 MHz  |

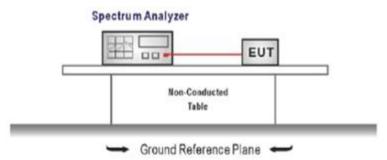
| Iodulation Type: | 8DPSK   |
|------------------|---|
|                  | Spectrum<br>Ref Level 20.00 dBm Offset 1.00 dB ● RBW 2 MHz  |
|                  | Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep<br>P1Pk View   |
|                  | M1[1] 3.67 dBm<br>2.40202890 GHz  |
|                  | 10 dBm  |
|                  | 0 dBm   |
|                  | -10 dBm   |
|                  | -20 dBm   |
| CH00             | -30 dBm   |
|                  |   |
|                  | -40 dBm   |
|                  | -50 dBm-  |
|                  | -60 dBm   |
|                  | -70 dBm   |
|                  | CF 2.402 GHz 691 pts Span 5.0 MHz   |
|                  | OF 2:402 Unit         Optimize         Optize         Optimize <thoptimize< th=""></thoptimize<> |
|                  | Spectrum 🕎  |
|                  | Ref Level 20.00 dBm Offset 1.00 dB  RBW 2 MHz   |
|                  | Att 30 dB SWT 1 ms ● VBW 5 MHz Mode Auto Sweep     ●1Pk View  |
|                  | M1[1] 3.84 dBm<br>2.44094930 CHz  |
|                  | M1<br>V   |
|                  | 0 dBm   |
|                  |   |
|                  | -20 dBm-  |
| CH39             | -30 d8m   |
|                  | -40 dBm   |
|                  | -50 dim   |
|                  |   |
|                  | -60 dBm   |
|                  | -70 d8m   |
|                  | CF 2.441 GHz 691 pts Span 5.0 MHz   |
|                  |   |
|                  | Spectrum 🕎  |
|                  | RefLevel 20.00 dBm Offset 1.00 dB RBW 2 MHz<br>Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep   |
|                  | \$     1Pk View     [1]     4.06 dBm     2.48002170 GHz   |
|                  | 10 dBm 2.48002170 GHz   |
|                  | 0 dBm   |
|                  | -10 d8m   |
|                  | -20 dBm   |
| CH78             |   |
|                  | -30 dBm   |
|                  | -40 dBm   |
|                  | -50 dBm   |
|                  | -60 dBm   |
|                  | -70 dBm   |
|                  |   |
|                  | CF 2.48 GHz 691 pts Span 5.0 MHz  |

# 5.4. 20 dB Bandwidth

## <u>LIMIT</u>

N/A

## **TEST CONFIGURATION**



#### TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- 3. Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel RBW  $\ge$  1% of the 20 dB bandwidth, VBW  $\ge$  RBW

Sweep = auto, Detector function = peak, Trace = max hold

4. Measure and record the results in the test report.

#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

🛛 Passed

#### Not Applicable

| Modulation type | Channel | 20 dB Bandwidth (MHz) | Limit (MHz) | Result |  |
|-----------------|---------|-----------------------|-------------|--------|--|
|                 | 00      | 0.93                  |             |        |  |
| GFSK            | 39      | 0.93                  | -           | Pass   |  |
|                 | 78      | 0.93                  |             |        |  |
|                 | 00      | 1.30                  |             |        |  |
| π/4DQPSK        | 39      | 1.29                  | -           | Pass   |  |
|                 | 78      | 1.29                  |             |        |  |
|                 | 00      | 1.29                  |             |        |  |
| 8DPSK           | 39      | 1.29                  | -           | Pass   |  |
|                 | 78      | 1.29                  |             |        |  |

| Iodulation Type: | GFSK  |
|------------------|---|
|                  | Spectrum (  |
|                  | Ref Level         20.00         dBm         Offset         1.00         dB         RBW         10         kHz           ● Att         30         dB         SWT         189.6         µs         • VBW         30         kHz   |
|                  | IPk View     M1[1] -22.27.dbm     One of the open |
|                  | 10 dbm M2[1]S dbm M2[1]S dbm  |
|                  | D dBm   |
|                  | NY VINA   |
|                  | -20 dBm 01 -21.350 dBm 44 00 00 00 00 00 00 00 00 00 00 00 00   |
| CU 100           |   |
| CH00             |   |
|                  | -50 dBm   |
|                  | -70 dBm   |
|                  |   |
|                  | CF 2.402 GHz 1001 pts Span 2.5 MHz<br>Marker  |
|                  | Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4015475 GHz         -22.27 dBm         -22.27 dBm         -  |
|                  | M2         1         2:40206         GHz         -1.35         dBm           D3         M1         1         927.5         KHz         0.01         dB  |
|                  |   |
|                  | Spectrum 🕎  |
|                  | RefLevel 20.00 dBm Offset 1.00 dB ● RBW 10 kHz<br>● Att 30 dB SWT 189.6 µs ● VBW 30 kHz Mode AutoFFT  |
|                  | ●1Pk View M1[1] -24.94 dBm  |
|                  | 10 dBm 2.44054750 GHz<br>-4.21 dBm  |
|                  | 0 dBm 2.44106000 GHz  |
|                  | -10 dBm   |
|                  | -20 dBm 01 -24.212 dBm 14 14 14 14 14 14 14 14 14 14 14 14 14   |
|                  | -30 dBm // // // // // // // // // // //  |
| CH39             | -40 dBm   |
|                  | -50 dBm 2 V V   |
|                  |   |
|                  | -70 dBm-  |
|                  | CF 2.441 GHz 1001 pts Span 2.5 MHz<br>Marker  |
|                  | Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4405475 GHz         -24.94 dBm   |
|                  | M2         1         2.44106 GHz         -4.21 dBm           D3         M1         1         927.5 kHz         -0.11 dB   |
|                  | Measuring (1992)  |
|                  | Spectrum 💭  |
|                  | RefLevel 20.00 dBm Offset 1.00 dB ● RBW 10 kHz<br>● Att 30 dB SWT 189.6 µs ● VBW 30 kHz Mode Auto FFT   |
|                  | PIPK View     M1[1] -21.67 dBm  |
|                  | 2.47954750 GHz  |
|                  | 10 dsm     -0.63 dbm       0 dsm     M2       -10 dsm     -0.63 dbm       -20 dsm     -0.63 dbm       -30 dsm     -0.63 dbm       -40 dsm     -0.63 dbm   |
|                  | -10 dBm   |
|                  | -10 dBm20. dBm  |
|                  | -30 dBm   |
| CH78             |   |
|                  |   |
|                  | 760 dBm   |
|                  | -70 dBm   |
|                  | CF 2.48 GHz 1001 pts Span 2.5 MHz   |
|                  | Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4795475 GHz         -21.67 dBm  |
|                  | M1         1         2.44939475442         -22107 00m           M2         1         2.46006 GHz         -0.83 dBm           D3         M1         1         927.5 KHz         0.03 dB  |
|                  | Measuring Unitation 🗰 🚧 12052010  |

| odulation Type: | π/4DQPSK   |
|-----------------|--|
|                 | Spectrum 🕎   |
|                 | RefLevel 20.00 dBm Offset 1.00 dB ● RBW 30 kHz<br>Att 30 dB SWT 63.1 µs ● VBW 100 kHz Mode Auto FFT  |
|                 | ●1Pk View M1[1] -20.18 dBm   |
|                 | 10 dBm 2.40136000 GHz<br>-0.18 dBm   |
|                 | 0 dBm M2 2.40216500 GHz  |
|                 | -10 dBm  |
|                 | -20 dam 01 -20.177 dam 01 -20.177 dam 02 -   |
|                 | -30 dBm  |
| CH00            | NED dBm  |
|                 | -50 dBm  |
|                 | -60 dBm  |
|                 | -70 dBm  |
|                 | CF 2.402 GHz         1001 pts         Span 2.5 MHz   |
|                 | Marker           Type         Ref         Trc         X-value         Y-value         Function         Function Result   |
|                 | M1         1         2.40136 GHz         -20.18 dBm           M2         1         2.402165 GHz         -0.18 dBm  |
|                 | D3 M1 1 1.295 MHz -0.39 dB Measuring.  |
|                 |  |
|                 | Spectrum<br>Ref Level 20.00 dbm Offset 1.00 db ● RBW 30 kHz  |
|                 | Att 30 dB SWT 63.1 µs VBW 100 kHz Mode Auto FFT  |
|                 | M1[1] -23.26 dBm<br>2.44036750 GHz   |
|                 | 10 08m M2[1]3.13 dBm   |
|                 |  |
|                 | -10 d8m  |
|                 | -20 dBm  |
| 01100           | -30 dBm  |
| CH39            | -40 dBm  |
|                 | -50 dBm  |
|                 | -60 dBm  |
|                 | -70 dBm  |
|                 | CF 2.441 GHz 1001 pts Span 2.5 MHz   |
|                 | Marker           Type         Ref         Trc         X-value         Y-value         Function         Function Result   |
|                 | M1         1         2.4403675 GHz         -23.26 dBm           M2         1         2.441165 GHz         -3.13 dBm           D3         M1         1         1.2875 MHz         -0.17 dB            |
|                 | DS         M1         1         1.2075 MM2         -0.17 UB  |
|                 |  |
|                 | Spectrum         (m)           Ref Level 20.00 dBm         Offset 1.00 dB ● RBW         30 kHz   |
|                 | ● Att 30 dB SWT 63.1 µs ● VBW 100 kHz Mode Auto FFT<br>●1Pk View   |
|                 | M1[1] -20.40 dBm<br>2.47936750 GHz   |
|                 | 10 dBm M2[1] 0.06 dBm M2 2.48015500 GHz  |
|                 | -10 dBm  |
|                 | -10 dsm / 1 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2  |
|                 |  |
| CH78            | -30 dBm  |
|                 |  |
|                 | -50 dBm  |
|                 | -60 dBm  |
|                 | -70 dBm  |
|                 | CF 2.48 GHz 1001 pts Span 2.5 MHz  |
|                 | Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4793675         GHz         -20.40         dBm |
|                 |  |
|                 | M2         1         2.480165 GHz         0.06 dBm           D3         M1         1         1.2875 MHz         0.18 dB  |

| Spectrum       Image: Constraint of the set of t   |
|--|
| 1Pk View       -19.99 dBm         0.0 dBm       -19.99 dBm         0.0 dBm       M2[1]       2.40135500 GHz         0.0 dBm       M2[1]       2.40216250 GHz         10 dBm       -19.523 dBm <sup>1</sup>   |
| 0 dBm     0.48 dBm       1 dBm     2.40216250 GHz       10 dBm     2.40216250 GHz       10 dBm     3       20 dBm     3       20 dBm     3       30 dBm     4       31 2 2.402 GHz     1001 pts       32 3 2.5 MHz       31 1 2 .4021625 GHz     0.42 dB       32 3 11     1.2875 MHz       33 4 11     1.42 dB       34 11     1.42 dB       3  |
| 10 dsm     10 d  |
| 30 dBm     40 dBm  |
| 60 dBm       60 dBm       60 dBm       60 dBm         70 dBm       100 1pts       Span 2.5 MHz         Jarker       101 1pts       Span 2.5 MHz         Jarker       1       2.401355 GHz       -19.99 dBm         M1       1       2.4021625 GHz       0.46 dBm         D3       M1       1       1.8275 MHz       0.42 dB         Spectrum       Function       MI       1.8255 MHz  |
| To dam         Span 2.5 MHz           jF 2.402 CHz         1001 pts         Span 2.5 MHz           arker   |
| Image: Sector Se                                    |
| M2         1         2.4021625 GHz         0.48 dBm           D3         M1         1         1.2875 MHz         0.42 dB           Spectrum         Marsundra         Marsundra         Marsundra  |
|  |
| Keilevei 20.00 ubmi Oliset 1.00 ub 🖷 KBW 30 KH2  |
| Att 30 dB SWT 63.1 µs ● VBW 100 kHz Mode Auto FFT<br>1Pk View  |
| 0 dBm 2.44035750 GHz<br>.2.49 dBm 2.49 dBm<br>   |
|  |
| 20 dbm D1 - 22.490 dBm 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4   |
| 50 dBm 60 dBm  |
| 70 d8m-  |
| SF 2.441 GHz         1001 pts         Span 2.5 MHz           Jarker         -  |
| M1         1         2.4403575 GHz        22.59 dBm           M2         1         2.441165 GHz        2.49 dBm           D3         M1         1.285 MHz         -0.10 dB   |
| Spectrum T   |
| RefLevel         20.00 dBm         Offset         1.00 dB         ● RBW         30 kHz           Att         30 dB         SWT         63.1 µs         ● VBW         100 kHz         Mode         Auto FFT           1Pk View  |
| 0 dBm 2.47935750 GHz<br>0 dBm M2[1] 0.69 dBm<br>0 dBm 2.48016500 GHz   |
| 10 d8m   |
|  |
| 50 dBm 60 |
| 70 d8m   |
| F 2.48 GHz         Span 2.5 MHz           arker         1001 pts         Span 2.5 MHz           grkps         Kef         Trc         X-value           Y-value         Y-value         Function         Function Result   |
| M1 1 2.4793575 GHz - 19.60 dBm   |
|  |

# 5.5. Carrier Frequencies Separation

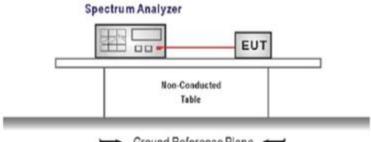
#### <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):

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. Alternatively,

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, provided the systems operate with an output power no greater than 125 mW.

#### **TEST CONFIGURATION**



--- Ground Reference Plane ----

#### TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = wide enough to capture the peaks of two adjacent channels RBW ≥ 1% of the span, VBW ≥ RBW Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

#### TEST MODE:

Please refer to the clause 3.3

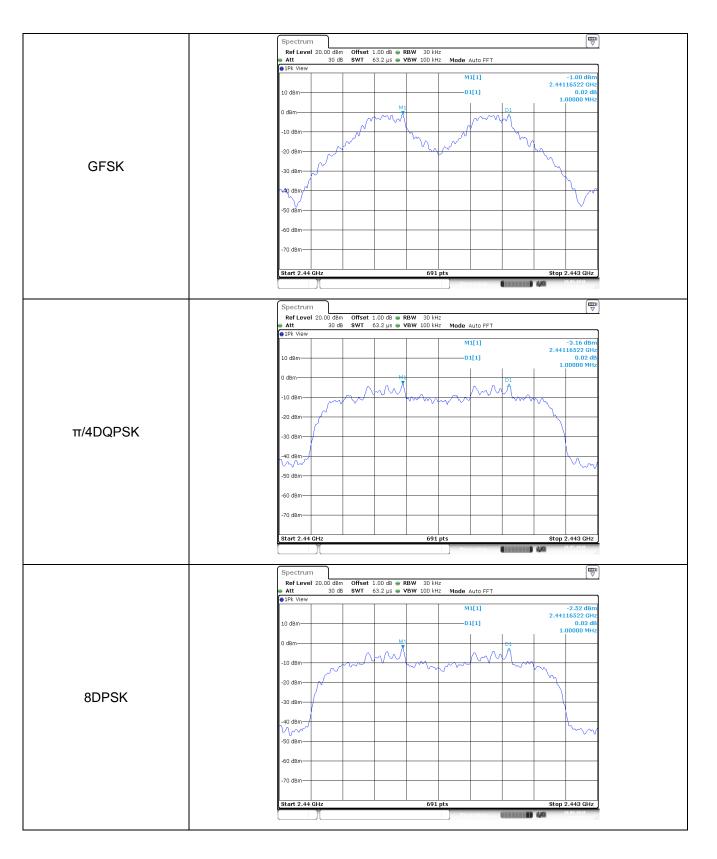
#### TEST RESULTS

#### ☑ Passed □ Not Applicable

| Modulation type | n type Channel Carrier Frequencie<br>Separation (MHz) |      | Limit (MHz) * | Result |
|-----------------|---|------|---------------|--------|
| GFSK            | 39  | 1.00 | ≥0.93         | Pass   |
| π/4DQPSK        | 39  | 1.00 | ≥0.86         | Pass   |
| 8DPSK           | 39  | 1.00 | ≥0.86         | Pass   |

Note:

\*: GFSK limit = The maximum 20 dB Bandwidth for GFSK modulation on the section 5.4.  $\pi$ /4DQPSK limit = 2/3 \* The maximum 20 dB Bandwidth for  $\pi$ /4DQPSK modulation on the section 5.4. 8DPSK limit = 2/3 \* The maximum 20 dB Bandwidth for 8DPSK modulation on the section 5.4

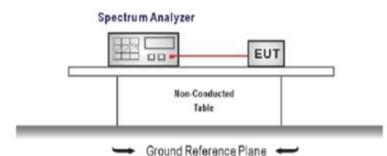


# 5.6. Hopping Channel Number

#### <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):Frequency hopping systems in the 2400–2483.5 MHz band shall use at least **15** channels.

#### TEST CONFIGURATION



#### TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = the frequency band of operation RBW ≥ 1% of the span, VBW ≥ RBW Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

☑ Passed □ Not Applicable

| Modulation type | Channel number | Limit  | Result |  |
|-----------------|----------------|--------|--------|--|
| GFSK            | 79             |        |        |  |
| π/4DQPSK        | 79             | ≥15.00 | Pass   |  |
| 8DPSK           | 79             |        |        |  |

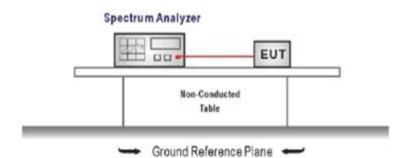
|          | Spectrum         (100 m)           Ref Level 20.00 dBm         Offset 1.00 dB ⊕ RBW 100 kHz  |
|----------|--|
|          | Att 30 dB SWT 1 ms VBW 300 kHz Mode Auto Sweep   |
|          | Phyview  |
|          | 10 dBm   |
|          |  |
|          | O d\$m   |
|          | -10 98 w at a na an a  |
|          | -20 dBm  |
| GFSK     |  |
| Gran     | -B0 dBm  |
|          | -40 dBm  |
|          |  |
|          | -50 dBm  |
|          | -60 dBm  |
|          | -70 dBm-   |
|          |  |
|          | Start 2.4 GHz 691 pts Stop 2.4835 GHz  |
|          | Mensurding (Example 1 Add 12 Add 13  |
|          | Spectrum 🕎   |
|          | Ref Level 20.00 dBm Offset 1.00 dB      RBW 100 kHz  |
|          | Att 30 dB SWT 1 ms VBW 300 kHz Mode Auto Sweep   |
|          |  |
|          | 10 dBm-  |
|          | · ARPONTATION AND A CONTRACT AND   |
|          |  |
|          | -10 dBm  |
|          | -20 dBm  |
| π/4DQPSK | -30 dBm  |
|          |  |
|          | -40 dBm  |
|          | -50 dBm  |
|          | -60 dBm  |
|          |  |
|          | -70 dBm  |
|          |  |
|          | Start 2.4 GHz 601 pts Stop 2.4835 GHz  |
|          | Start 2.4 GHz 691 pts Stop 2.4835 GHz  |
|          | Mersuring (1955)   |
|          | Spectrum   |
|          | Spectrum         Image: Constraint of the second of th |
|          | Spectrum         Image: Control of the source of the   |
|          | Spectrum         Image: Constraint of the second of th |
|          | Spectrum         Image: Control of the second s |
|          | Spectrum         Image: Control of the second s |
|          | Spectrum         Image: Control of the second s |
|          | Spectrum         Important for the second secon |
| 8DPSK    | Spectrum         Image: Constraint of the second secon |
| 8DPSK    | Spectrum         Important for the second secon |
| 8DPSK    | Spectrum         Image: Constraint of the second secon |
| 8DPSK    | Spectrum         Image: Control of the second s |
| 8DPSK    | Spectrum         Important Mail           Ref Level 20.00 dBm         Offset 1.00 dB         RBW 100 kHz           Att 30 dB         SWT 1 ms • VBW 300 kHz         Mode Auto Sweep           • IPk View         Important Mail         Important Mail           0 dBm         Important Mail         Important Mail           0 dBm         Important Mail         Important Mail           10 dBm         Important Mail         Important Mail           -10 dBm         Important Mail         Important Mail           -20 dBm         Important Mail         Important Mail  |
| 8DPSK    | Spectrum         Image: Control of the second s |
| 8DPSK    | Spectrum         Image: Control of the second s |
| 8DPSK    | Spectrum         Image: Control of the second of the s |
| 8DPSK    | Spectrum         Image: Control of the second of the s |

### 5.7. Dwell Time

#### <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):The average time of occupancy on any channel shall not be greater than 0.4 seconds within a pe-riod of 0.4 seconds multiplied by the number of hopping channels employed.

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel, RBW= 1 MHz, VBW ≥ RBW Sweep = as necessary to capture the entire dwell time per hopping channel, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

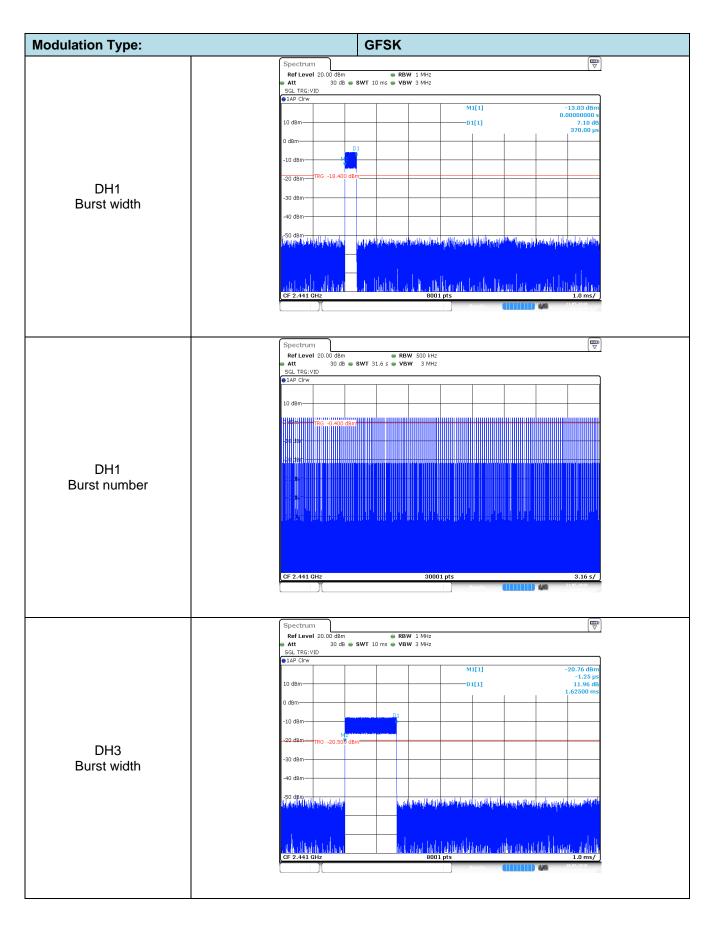
#### TEST MODE:

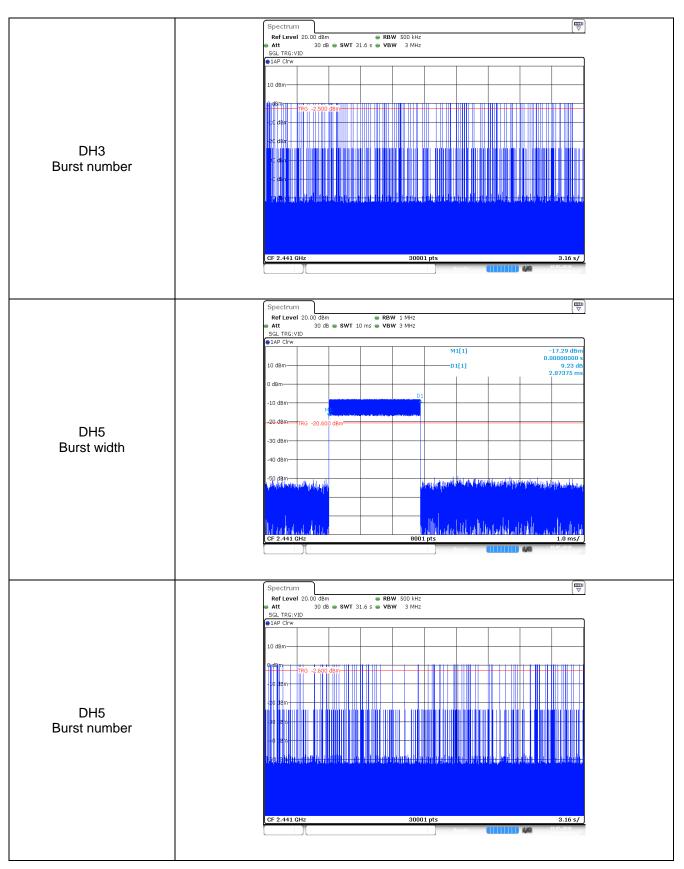
Please refer to the clause 3.3

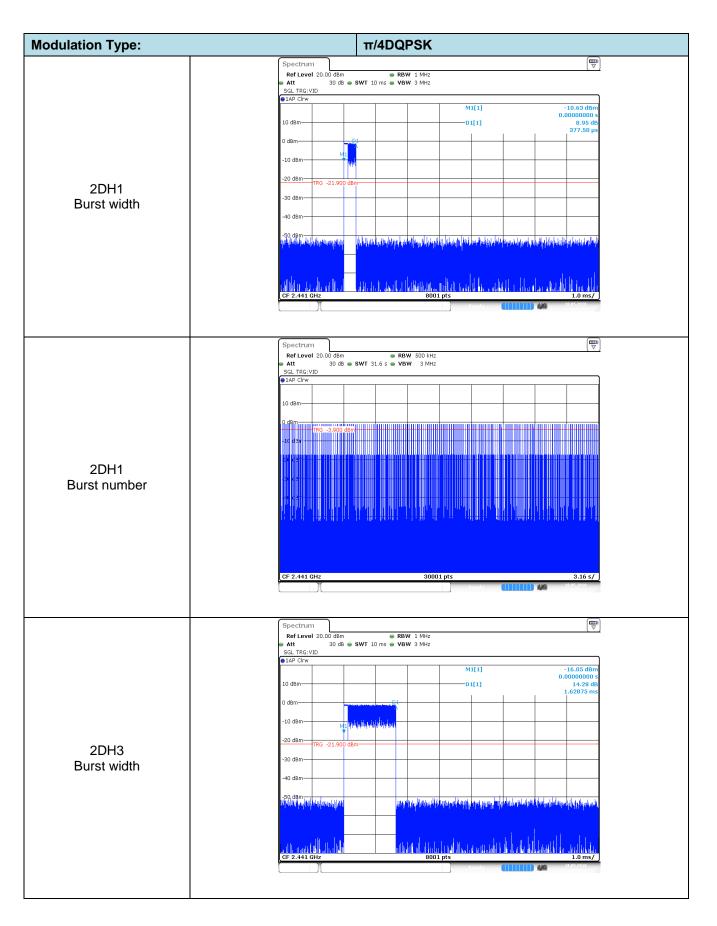
#### TEST RESULTS

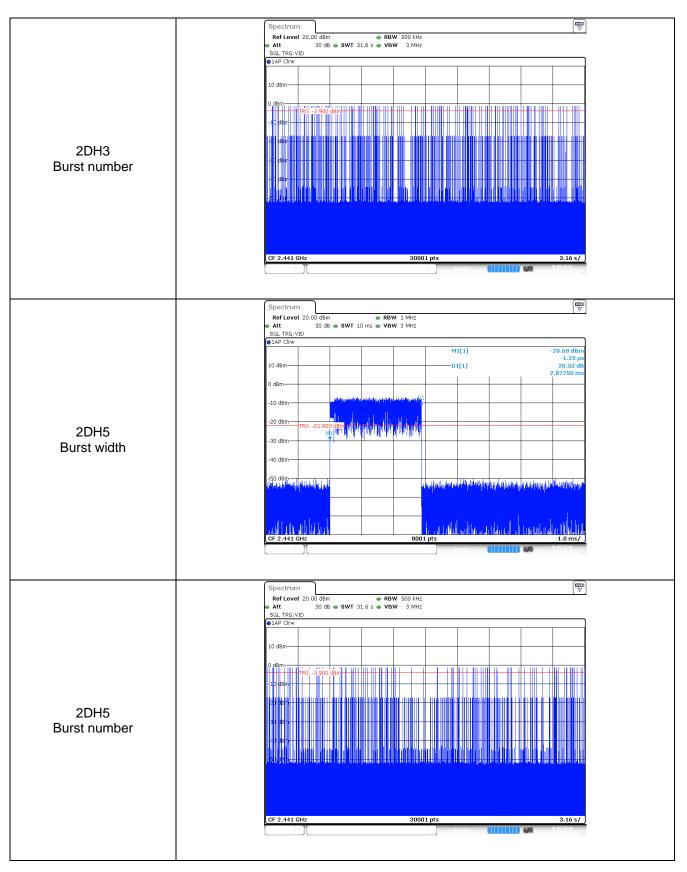
#### ☑ Passed □ Not Applicable

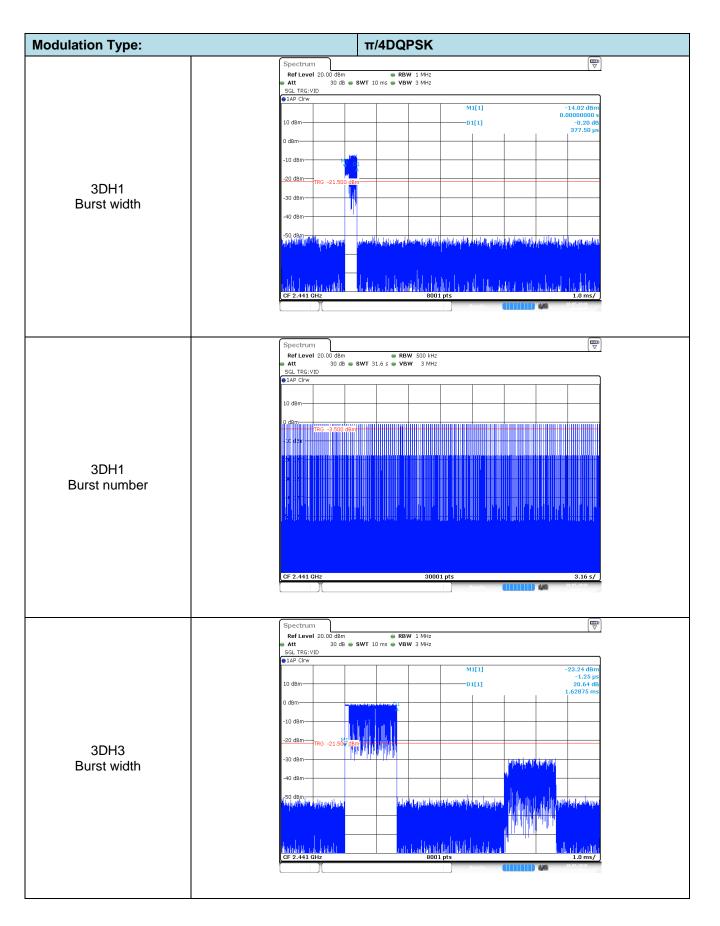
| Modulation<br>type | Channel |      | Total<br>Hops[hop*ch] | Dwell time<br>(Second) | Limit<br>(Second) | Result |
|--------------------|---------|------|-----------------------|------------------------|-------------------|--------|
|                    | DH1     | 0.37 | 314.00                | 0.12                   |                   |        |
| GFSK               | DH3     | 1.63 | 158.00                | 0.26                   | ≤ 0.40            | Pass   |
|                    | DH5     | 2.87 | 103.00                | 0.30                   |                   |        |
|                    | 2DH1    | 0.38 | 313.00                | 0.12                   |                   |        |
| π/4DQPSK           | 2DH3    | 1.63 | 153.00                | 0.25                   | ≤ 0.40            | Pass   |
|                    | 2DH5    | 2.88 | 106.00                | 0.31                   |                   |        |
|                    | 3DH1    | 0.38 | 314.00                | 0.12                   |                   |        |
| 8DPSK              | 3DH3    | 1.63 | 155.00                | 0.25                   | ≤ 0.40            | Pass   |
|                    | 3DH5    | 2.88 | 104.00                | 0.30                   |                   |        |

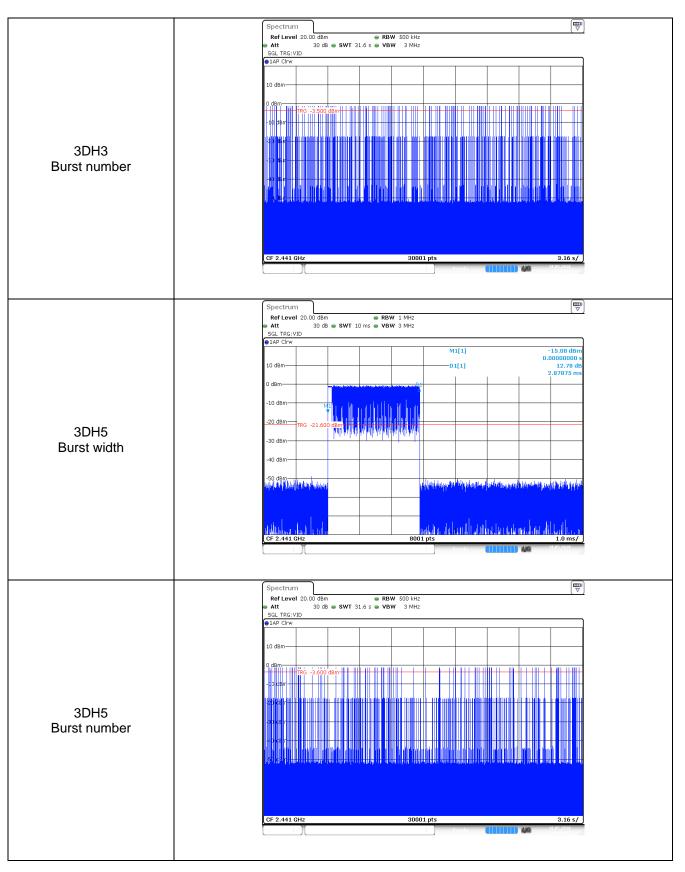












# 5.8. Pseudorandom Frequency Hopping Sequence

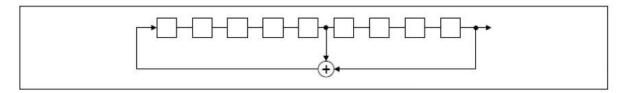
## <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):Frequency hopping systems shall have hopping channel carrier fre-quencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hop-ping channel, whichever is greater. Al-ternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier fre-quencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to chan-nel frequencies that are selected at the system hopping rate from a pseudo ran-domly ordered list of hopping fre-quencies. Each frequency must be used equally on the average by each trans-mitter. The system receivers shall have input bandwidths that match the hop-ping channel bandwidths of their cor-responding transmitters and shall shift frequencies in synchronization with the transmitted signals.

#### TEST RESULTS

The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 5<sup>th</sup> and 9<sup>th</sup> stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the friststage. The sequence begins with the frist one of 9 consecutive ones, for example: the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence:29-1=511 bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An explame of pseudorandom frequency hopping sequence as follows:

| 0 | 2 | 4 | 6 | 62           | 64       | 78 | 1 | 73 75 7 |
|---|---|---|---|--------------|----------|----|---|---------|
| ٦ |   |   |   | <br><u>-</u> |          |    |   |         |
|   |   |   |   |              |          | 1  |   |         |
|   |   |   |   | 1            |          |    |   |         |
|   |   |   |   | <br>         | <u> </u> |    |   | <br>    |

Each frequency used equally one the average by each transmitter.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.

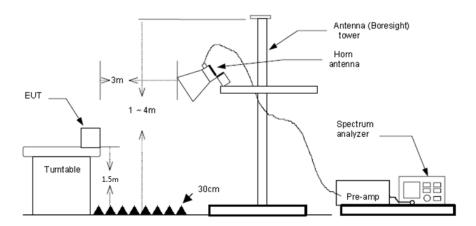
# 5.9. Restricted band (radiated)

#### <u>LIMIT</u>

#### FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

- 1. The EUT was setup and tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
- 2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
- 4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
- The receiver set as follow: RBW=1 MHz, VBW=3 MHz Peak detector for Peak value RBW=1 MHz, VBW=10 Hz Peak detector for Average value.

#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

☑ Passed □ Not Applicable

Note:

- 1) Final level= Read level + Antenna Factor+ Cable Loss- Preamp Factor
- 2) Have pre-scan all modulation mode, found the GFSK modulation which it was worst case, so only the worst case's data on the test report.
- 3) The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.

| Test channel:      |                         |                             |                       |                          | CH00              |                           |                       |              |               |  |
|--------------------|-------------------------|-----------------------------|-----------------------|--------------------------|-------------------|---------------------------|-----------------------|--------------|---------------|--|
| Frequency<br>(MHz) | Read<br>Level<br>(dBuV) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Factor<br>(dB) | Level<br>(dBuV/m) | Limit<br>Line<br>(dBuV/m) | Over<br>Limit<br>(dB) | Polarization | Test<br>value |  |
| 2310.00            | 31.77                   | 28.05                       | 6.62                  | 37.59                    | 28.85             | 74.00                     | -45.15                | Horizontal   | Peak          |  |
| 2390.03            | 40.34                   | 27.65                       | 6.75                  | 37.59                    | 37.15             | 74.00                     | -36.85                | Horizontal   | Peak          |  |
| 2310.00            | 31.38                   | 28.05                       | 6.62                  | 37.59                    | 28.46             | 74.00                     | -45.54                | Vertical     | Peak          |  |
| 2390.03            | 36.29                   | 27.65                       | 6.75                  | 37.59                    | 33.10             | 74.00                     | -40.90                | Vertical     | Peak          |  |
| 2310.00            | 19.47                   | 28.05                       | 6.62                  | 37.59                    | 16.55             | 54.00                     | -37.45                | Horizontal   | Average       |  |
| 2390.03            | 20.08                   | 27.65                       | 6.75                  | 37.59                    | 16.89             | 54.00                     | -37.11                | Horizontal   | Average       |  |
| 2310.00            | 19.91                   | 28.05                       | 6.62                  | 37.59                    | 16.99             | 54.00                     | -37.01                | Vertical     | Average       |  |
| 2390.03            | 19.76                   | 27.65                       | 6.75                  | 37.59                    | 16.57             | 54.00                     | -37.43                | Vertical     | Average       |  |

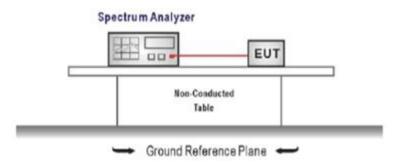
| Test channel:      |                         |                             |                       |                          | СН78              |                           |                       |              |               |  |
|--------------------|-------------------------|-----------------------------|-----------------------|--------------------------|-------------------|---------------------------|-----------------------|--------------|---------------|--|
| Frequency<br>(MHz) | Read<br>Level<br>(dBuV) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Factor<br>(dB) | Level<br>(dBuV/m) | Limit<br>Line<br>(dBuV/m) | Over<br>Limit<br>(dB) | Polarization | Test<br>value |  |
| 2483.50            | 58.66                   | 27.26                       | 6.83                  | 37.59                    | 55.16             | 74.00                     | -18.84                | Horizontal   | Peak          |  |
| 2500.00            | 33.64                   | 27.20                       | 6.84                  | 37.59                    | 30.09             | 74.00                     | -43.91                | Horizontal   | Peak          |  |
| 2483.50            | 53.81                   | 27.26                       | 6.83                  | 37.59                    | 50.31             | 74.00                     | -23.69                | Vertical     | Peak          |  |
| 2500.00            | 31.96                   | 27.20                       | 6.84                  | 37.59                    | 28.41             | 74.00                     | -45.59                | Vertical     | Peak          |  |
| 2483.50            | 30.73                   | 27.26                       | 6.83                  | 37.59                    | 27.23             | 54.00                     | -26.77                | Horizontal   | Average       |  |
| 2500.00            | 19.98                   | 27.20                       | 6.84                  | 37.59                    | 16.43             | 54.00                     | -37.57                | Horizontal   | Average       |  |
| 2483.50            | 30.61                   | 27.26                       | 6.83                  | 37.59                    | 27.11             | 54.00                     | -26.89                | Vertical     | Average       |  |
| 2500.00            | 19.82                   | 27.20                       | 6.84                  | 37.59                    | 16.27             | 54.00                     | -37.73                | Vertical     | Average       |  |

# 5.10. Band edge and Spurious Emissions (conducted)

## <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

### TEST CONFIGURATION



# TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: RBW = 100 kHz, VBW ≥ RBW, scan up through 10<sup>th</sup> harmonic. Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

☑ Passed □ Not Applicable

| Fest Item:      | Band edge                      | Modulation type:   | GFSK                                    |
|-----------------|--------------------------------|--|---|
|                 | Spectrum                       |  |   |
|                 |                                | 0 dBm Offset 1.00 dB      RBW 100 kHz 30 dB SWT 1.1 ms      VBW 300 kHz Mode Auto 9  | Sweep                                   |
|                 | • 1Pk Max                      | M1[1]  | 3.85 dBm                                |
|                 | 10 dBm                         | M2[1]  | 2.402180 GHz<br>-53.73 dBm              |
|                 | 0 dBm                          |  | 2.400000 ¢Hz                            |
|                 | -10 dBmD1 -1                   | 6.150 dBm  |   |
|                 | -20 dBm                        |  |   |
| CH00            | -40 dBm                        |  |   |
| No hopping mode | -50 dBm                        |  |   |
| no nopping mode | 4<br>560-8871                  | with the product of t | M3                                      |
|                 | -70 dBm                        |  |   |
|                 | Start 2.31 GHz                 | 691 pts  | Stop 2.405 GHz                          |
|                 | Marker<br>Type   Ref   Tra     | c X-value Y-value Function   | Function Result                         |
|                 | M1<br>M2                       | 1 2.40218 GHz 3.85 dBm<br>1 2.4 GHz -53.73 dBm   |   |
|                 | M4                             | 1 2.39 GHz -58.29 dBm<br>1 2.31 GHz -57.68 dBm   |   |
|                 | M5                             | 1 2.399906 GHz -55.59 dBm  | 18.05.2018                              |
|                 |                                |  | <u></u>                                 |
|                 | Spectrum                       |  |   |
|                 |                                | 0 dBm Offset 1.00 dB      RBW 100 kHz 30 dB SWT 1.1 ms      VBW 300 kHz Mode Auto 9  | Sweep                                   |
|                 | • 1Pk Max                      | M1[1]  | 3.77 dBm                                |
|                 | 10 dBm                         | M2[1]  | 2.402040 GHz<br>-56.50 diam             |
|                 | 0 dBm                          |  | 2.400000 642                            |
| 01100           | -10 dBm                        | 6.230 dBm  | (%)                                     |
|                 | -20 dBm                        |  |   |
|                 | -30 dBm                        |  |   |
| CH00            | -40 dBm                        |  |   |
| Hopping mode    | -50 08/1-<br>4<br>*50°08/10/10 | to a subscription of the second se  | M3 MB                                   |
|                 | -70 dBm                        |  |   |
|                 |                                |  |   |
|                 | Start 2.31 GHz<br>Marker       | 691 pts  | Stop 2.405 GHz                          |
|                 |                                | 1 2.40204 GHz 3.77 dBm   | Function Result                         |
|                 | M3                             | 1 2.4 GHz -56.50 dBm<br>1 2.39 GHz -59.26 dBm<br>1 0.01 GHz 50.20 dDm  |   |
|                 |                                | 1 2.31 GHz -58.73 dBm<br>1 2.39963 GHz -56.22 dBm  |   |
|                 |                                | Measurin   | 19.05.2018                              |
|                 | Spectrum                       |  |   |
|                 |                                | 0 dBm Offset 1.00 dB ● RBW 100 kHz<br>30 dB SWT 56.9 μs ● VBW 300 kHz Mode Auto F  |   |
|                 | • 1Pk Max                      | M1[1]  | 4.60 dBm                                |
|                 | 10 dBm                         | M2[1]  | 4.60 dBm<br>2.4801490 GHz<br>-57.58 dBm |
|                 | 0 dBm                          | M2[1]  | -57.58 UBM<br>2.4835000 GHz             |
|                 | -10 dBm                        |  |   |
|                 |                                | 5.400 dBm  |   |
|                 | -30 dBm                        |  |   |
| CH78            | -40 #Bm                        |  |   |
| No hopping mode | -\$0 dBm                       | 1 11/14  |   |
|                 | -60 dBm                        | Martin Martin and Martin Martin and Mar   | son managed                             |
|                 | -70 dBm                        |  |   |
|                 | Start 2.478 GHz                | 691 pts  | Stop 2.5 GHz                            |
|                 | Marker                         |  | ]                                       |
|                 |                                | 1 2.480149 GHz 4.60 dBm  | Function Result                         |
|                 | M3                             | 1 2.4835 GHz -57.58 dBm<br>1 2.5 GHz -59.96 dBm  |   |
|                 | M4                             | 1 2.4839623 GHz -56.80 dBm   | 18.05.2018                              |
|                 |                                | Measurin   |   |

| 01170                | ● 1Pk Max<br>10 dBm  | D1 -15.460 | ) dBm             |                             |  | M1[1]<br>M2[1]  |     | 2.48         | 4.54 dBm<br>01490 GHz<br>60.22 dBm<br>35000 GHz  |
|----------------------|----------------------|------------|-------------------|-----------------------------|--|---|-----|--------------|--|
| 01170                | -10 dBm              | D1 -15.460 | ) dBm             |                             |  |   |     |              |  |
| 01170                | 20 dBm               |            |                   |                             |  |   | -   |              |  |
| CH78<br>lopping mode | -30 dBm              | h          |                   |                             |  |   |     |              |  |
|                      | -60 dBm              | h          | M2                | M4<br>Mana Zu               |  | Angerta Ang |     | an ann acha  | , and a star of the star of th |
|                      | Start 2.47<br>Marker |            |                   |                             | 691 pt                                 |   |     |              | p 2.5 GHz  |
|                      | Type Re<br>M1        | f Trc      | X-value<br>2.4801 | 49 GHz                      | Y-value<br>4.54 dBm                    |   | Fun | ction Result |  |
|                      | M2<br>M3<br>M4       | 1          |                   | 35 GHz<br>2.5 GHz<br>17 GHz | -60.22 dBm<br>-60.02 dBm<br>-57.37 dBm |   |     |              |  |

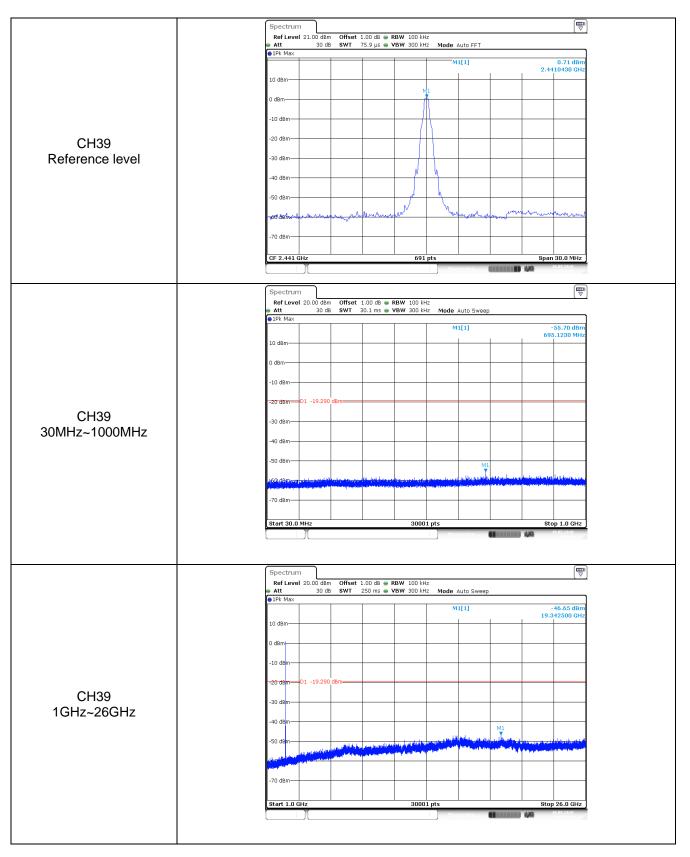
| est Item:       | Band edge                                 | Modu   | lation type:                       | т                 | τ/4DQPSK                    |
|-----------------|---|--|------------------------------------|-------------------|-----------------------------|
|                 | Spectrum                                  |  |                                    |                   |                             |
|                 | Ref Level<br>Att                          |  | VBW 100 kHz Mode                   | Auto Sweep        |                             |
|                 | ● 1Pk Max                                 |  | м                                  | 1[1]              | 2.35 dBm                    |
|                 | 10 dBm                                    |  |                                    | 2[1]              | 2.402180 GHz<br>-52.36 dBm  |
|                 | 0 dBm                                     |  |                                    |                   | 2.400000 <b>G</b> Hz        |
|                 | -10 dBm                                   | 01 -17.650 dBm   |                                    |                   |                             |
|                 | -20 dBm                                   | 01 -17.650 dBm   |                                    |                   |                             |
| 01100           | -30 dBm                                   |  |                                    |                   | - p h                       |
| CH00            | -40 dBm                                   |  |                                    |                   | MS                          |
| No hopping mode | -50 dBm<br>4<br>*-66°dBm******            | where the second share and a strategy an | all means have been a set of a set | de anne dans a da | M3                          |
|                 | -70 dBm                                   |  |                                    |                   |                             |
|                 |   |  |                                    |                   |                             |
|                 | Start 2.31 G<br>Marker                    | Hz   | 691 pts                            |                   | Stop 2.405 GHz              |
|                 | Type Ref                                  | 1 2.40218 GHz  | Y-value Func<br>2.35 dBm           | tion Func         | tion Result                 |
|                 | M2<br>M3                                  | 1 2.4 GHz<br>1 2.39 GHz  | -52.36 dBm<br>-58.69 dBm           |                   |                             |
|                 | M4<br>M5                                  | 1 2.31 GHz<br>1 2.399906 GHz   | -58.16 dBm<br>-52.18 dBm           |                   |                             |
|                 |   | ][]  | Mea                                | suring            | 18.05.2018                  |
|                 | Spectrum                                  |  |                                    |                   | ⊽                           |
|                 | Ref Level                                 |  |                                    |                   | 0                           |
|                 | <ul> <li>Att</li> <li>1Pk Max</li> </ul>  | 30 dB SWT 1.1 ms (   | VBW 300 kHz Mode                   |                   |                             |
|                 | 10 dBm                                    |  | M                                  | 1[1]              | 1.63 dBm<br>2.404110 GHz    |
|                 | 10 dBm                                    |  | м                                  | 2[1]              | -55.21 dBm<br>2.400000 GH   |
|                 | -10 dBm                                   |  |                                    |                   | 74%                         |
|                 |   | 91 -18.370 dBm   |                                    |                   |                             |
|                 | -30 dBm                                   |  |                                    |                   |                             |
| CH00            | -40 dBm                                   |  |                                    |                   |                             |
| Hopping mode    | -50 dBm                                   |  |                                    |                   | WHE                         |
|                 | 4<br>************************************ |  | the manage of the second           | manna harren      | M3                          |
|                 | -70 dBm                                   |  |                                    |                   |                             |
|                 | Start 2.31 0                              | iHz  | 691 pts                            |                   | Stop 2.405 GHz              |
|                 | Marker<br>Type   Ref                      |  | Y-value Func                       | tion Euro         | tion Result                 |
|                 |   | Trc         X-value           1         2.40411 GHz           1         2.4 GHz  | 1.63 dBm<br>-55.21 dBm             |                   | CION NOSUL                  |
|                 | M3<br>M4                                  | 1 2.39 GHz<br>1 2.31 GHz   | -58.73 dBm<br>-58.70 dBm           |                   |                             |
|                 | M5  | 1 2.31 GHZ<br>1 2.39963 GHZ  | -54.71 dBm                         |                   | 10.05.2010                  |
|                 |   | バ  | Mea                                | suring            | 4/0 18.05.2018              |
|                 | Spectrum                                  |  |                                    |                   |                             |
|                 | Att                                       | 20.00 dBm Offset 1.00 dB<br>30 dB SWT 56.9 µs  | RBW 100 kHz<br>VBW 300 kHz Mode    | Auto FFT          |                             |
|                 | ● 1Pk Max                                 |  |                                    | 1[1]              | 2.97 dBm                    |
|                 | 10 dBm M1                                 |  |                                    | 2[1]              | 2.4798310 GHz<br>-57.55 dBm |
|                 | 0 dBm                                     |  |                                    |                   | 2.4835000 GHz               |
|                 | -10 dBm                                   |  |                                    |                   |                             |
|                 | -20 dBm                                   | 1 -17.030 dBm  |                                    |                   |                             |
|                 | -30 d <mark>e</mark> m                    |  |                                    |                   |                             |
| CH78            | -40 Hem                                   | 4m -   |                                    |                   |                             |
| No hopping mode | 50 dBm                                    |  | M4                                 |                   |                             |
| ··· •           | -60 dBm                                   | M2 M2  | M4<br>Xummmmmm                     | mm                | Manana Arra                 |
|                 | -70 dBm                                   |  |                                    |                   |                             |
|                 |   |  |                                    |                   | 04 0 5 01                   |
|                 | Start 2.478<br>Marker                     |  | 691 pts                            |                   | Stop 2.5 GHz                |
|                 | Type Ref                                  | 1 2.479831 GHz   | Y-value Func<br>2.97 dBm           | tion Func         | tion Result                 |
|                 | M2<br>M3                                  | 1 2.4835 GHz<br>1 2.5 GHz  | -57.55 dBm<br>-56.52 dBm           |                   |                             |
|                 | M4  | 1 2.4866406 GHz  | -56.49 dBm                         |                   | 19.05.2010                  |
|                 |   | Л  | Mea                                | suring            | 173527 /                    |

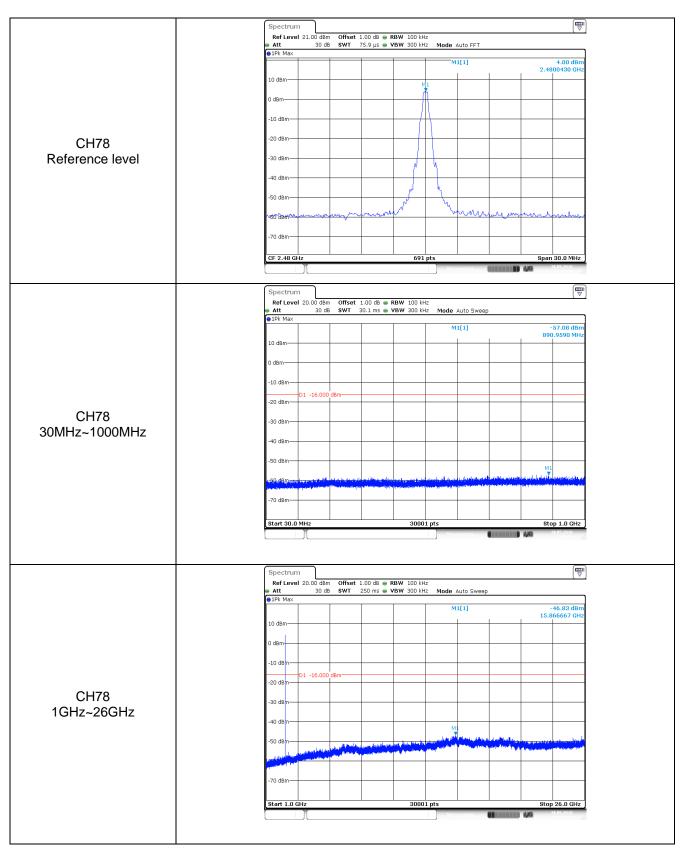
|                     |   | 0 dB <b>● RBW</b> 100 kHz<br>9 µs <b>● VBW</b> 300 kHz <b>Mode</b> Auto Ff | Ţ  |  |  |  |  |  |
|---------------------|---|--|--|--|--|--|--|--|
|                     | 10 d8m     1     0 d8m     1     0 d8m  | M1[1]<br>M2[1]   | 1.27 dBm<br>2.4780800 GHz<br>-58.95 dBm<br>2.4835000 GHz |  |  |  |  |  |
| CH78<br>opping mode | -10 dBm   |  |  |  |  |  |  |  |
|                     | -60 dBm   | <u></u>  |  |  |  |  |  |  |
|                     | Start 2.478 GHz<br>Marker   | Start 2.478 GHz 691 pts Stop 2.5 GHz                                       |  |  |  |  |  |  |
|                     | Type         Ref         Trc         X-value           M1         1         2.47800           M2         1         2.4835 | GHz -58.95 dBm<br>GHz -58.21 dBm   | Function Result  |  |  |  |  |  |
|                     |   | Measuring.   | 18.05.2018   |  |  |  |  |  |

| est Item:       | Band edge                   | Modulation type:   | 8DPSK   |
|-----------------|-----------------------------|--|---|
|                 | Spectrum                    |  |   |
|                 |                             | dBm   Offset 1.00 dB ● RBW 100 kHz<br>D dB   SWT   1.1 ms ● VBW 300 kHz   Mode Auto Swee   | ιρ  |
|                 | ●1Pk Max                    | M1[1]  | 2.48 dBm  |
|                 | 10 dBm                      |  | 2.402180 GHz<br>-53.46 ៥ផ្នូ៣   |
|                 | 0 dBm                       |  | 2.400000 dHz  |
|                 | -10 dBm                     | 520.dBm  |   |
|                 | -20 dBm 01 -17              |  |   |
| CH00            | -30 dBm                     |  |   |
| No hopping mode | -50 dBm                     |  | W   |
| No hopping mode | 4<br>StordBhillion          |  | Ma  |
|                 | -70 dBm                     |  |   |
|                 | Start 2.31 GHz              | 691 pts  | Stop 2.405 GHz  |
|                 | Marker<br>Type   Ref   Trc  | X-value Y-value Function   | Function Result   |
|                 | M1 1<br>M2 1                | 2.40218 GHz 2.48 dBm<br>2.4 GHz -53.46 dBm   |   |
|                 | M3 1<br>M4 1                | 2.39 GHz -59.29 dBm<br>2.31 GHz -57.13 dBm   |   |
|                 | M5 1                        | 2.399768 GHz -51.56 dBm  | 18.05.2018  |
|                 |                             |  |   |
|                 | Spectrum<br>Ref Level 20.00 | dBm Offset 1.00 dB 🖷 RBW 100 kHz   |   |
|                 |                             | D dB SWT 1.1 ms • VBW 300 kHz Mode Auto Swee   | 9   |
|                 |                             | M1[1]  | 1.71 dBm<br>2.404110 GHz  |
|                 | 10 dBm                      | M2[1]  | -54.10 dBm<br>2.400000 GHZ  |
|                 | 0 dBm                       |  | 2.100000 50/6   |
|                 | -10 dBm                     | 290 dBm  |   |
|                 | -30 dBm                     |  |   |
| CH00            | -40 dBm                     |  |   |
| Hopping mode    | -50 dBm                     |  | M3  |
|                 | torabin we we we            | and second the advantage of the second s |   |
|                 | -70 dBm                     |  |   |
|                 | Start 2.31 GHz              | 691 pts  | Stop 2.405 GHz  |
|                 | Marker<br>Type Ref Trc      | X-value Y-value Function   | Function Result   |
|                 | M1 1<br>M2 1<br>M3 1        | 2.40411 GHz 1.71 dBm<br>2.4 GHz -54.10 dBm<br>2.39 GHz -59.03 dBm  |   |
|                 | M4 1<br>M5 1                | 2.31 GHz -59.03 dBm<br>2.399768 GHz -53.52 dBm   |   |
|                 |                             | Measuring  | 12:05:2012  |
|                 | Spectrum                    |  |   |
|                 | Ref Level 20.00             | dBm <b>Offset</b> 1.00 dB <b>● RBW</b> 100 kHz<br>0 dB <b>SWT</b> 56.9 µs <b>● VBW</b> 300 kHz <b>Mode</b> Auto FFT  | ( 🗸 )   |
|                 | IPk Max                     |  | 2.98 dBm  |
|                 | 10 dBm                      | M1[1]<br>M2[1]   | 2.98 dBm<br>2.4801490 GHz<br>-58.30 dBm   |
|                 | 0 dBm                       | mz[1]  | 2.4835000 GHz   |
|                 | -10 dBm                     |  |   |
|                 | -20 dBm                     | 020 dBm  |   |
|                 | -30 dBm                     |  | + + + - +   |
| CH78            | -fordem                     |  | +   |
| No hopping mode | ,50 dBm                     | M2 M2  | M4 M  |
|                 | -60 dBm                     | M2 M2 Mar and a mar a  | a water and a second water and a second s |
|                 | -70 dBm                     |  | + + + 1   |
|                 | Start 2.478 GHz             | 691 pts  | Stop 2.5 GHz  |
|                 | Marker<br>Type   Ref   Trc  | X-value Y-value Function   | Function Result   |
|                 | M1 1<br>M2 1                | 2.480149 GHz 2.98 dBm<br>2.4835 GHz -58.30 dBm   |   |
|                 | M3 1<br>M4 1                | 2.5 GHz -58.89 dBm 2.4948986 GHz -57.07 dBm  |   |
|                 |                             | Measuring  | 12.052018   |

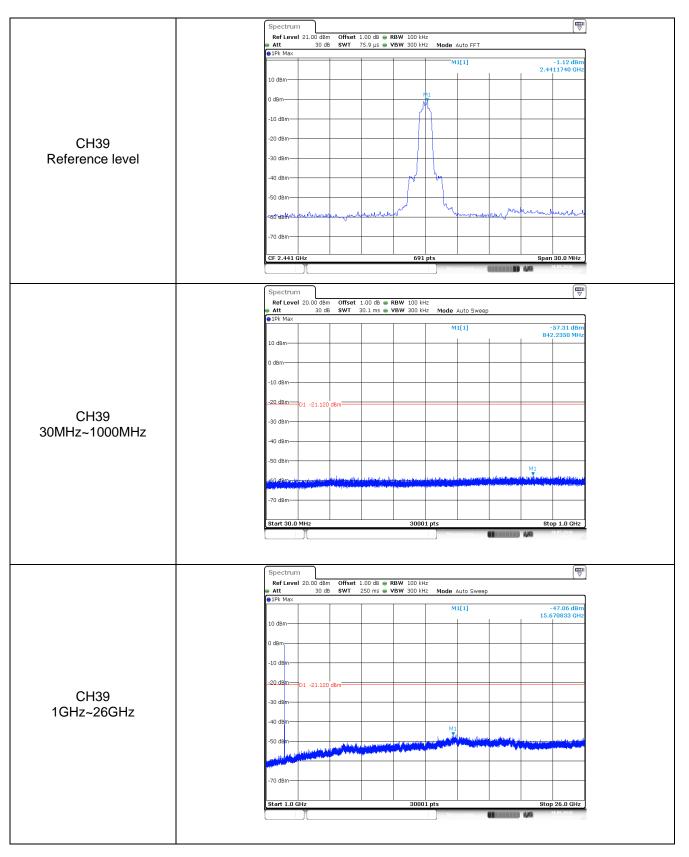
|                     | 👄 Att 30 dB                     | Offset 1.00 dB ● RBW 100<br>SWT 56.9 µs ● VBW 300           |                |  |
|---------------------|---------------------------------|---|----------------|--|
|                     | 1Pk Max     10 dBm              |   | M1[1]<br>M2[1] | 2.97 dBn<br>2.4801490 GH:<br>-58.97 dBn<br>2.4835000 GH: |
|                     | 20 dBm -17.030 dB               | 3m  |                |  |
| CH78<br>Hoppig mode | -30 dBm40 dBm50 dBm50 dBm50 dBm |   |                |  |
|                     | -60 d8m                         | M2<br>Antoning owners of a                                  |                |  |
|                     | Start 2.478 GHz                 | 69  | 01 pts         | Stop 2.5 GHz   |
|                     | Marker<br>Type Ref Trc<br>M1 1  | X-value Y-value<br>2.480149 GHz 2.97                        |                | Function Result  |
|                     | M2 1<br>M3 1<br>M4 1            | 2.4835 GHz -58.97<br>2.5 GHz -59.07<br>2.4917739 GHz -57.13 | dBm            |  |
|                     |                                 |   | Measuring      | 18.05.2018   |

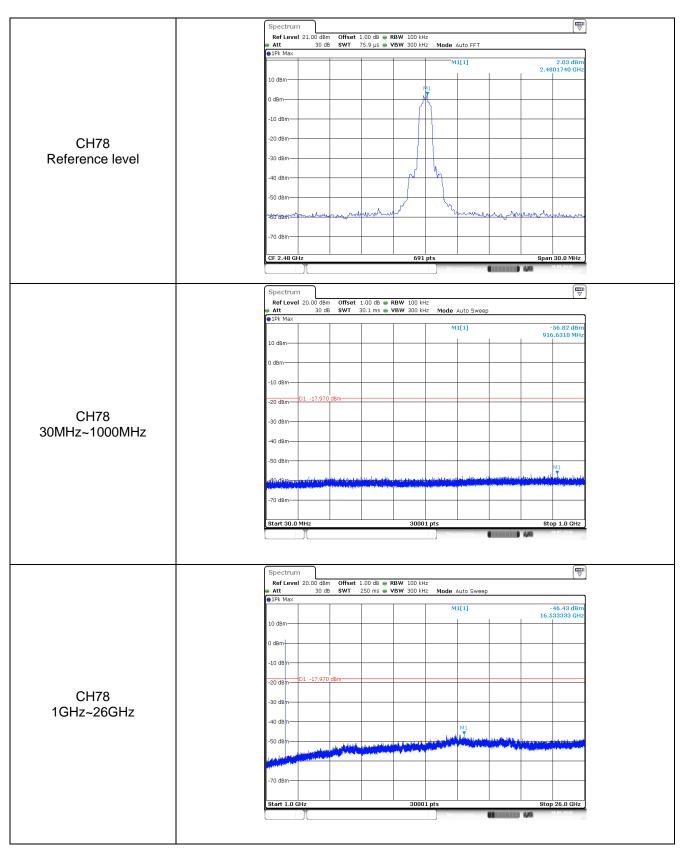
| est Item:       | SE |   | Modu   | lation ty               | /pe:   | GF   |   |
|-----------------|----|---|--|-------------------------|--|--|---|
|                 |    | Spectrum<br>Ref Level 21.00 d   | Bm Offset 1.00 dB                                    | • RBW 100 kH+           |  |  |   |
|                 |    | Att 30     IPk Max  | dB SWT 75.9 μs                                       | VBW 300 kHz             | Mode Auto FFT  |  |   |
|                 |    |   |  |                         | M1[1]  |  | 3.51 dBm<br>2.4020430 GHz   |
|                 |    | 10 dBm  |  | M1                      |  |  |   |
|                 |    | 0 dBm   |  |                         |  |  |   |
|                 |    | -10 dBm   |  | / \                     |  |  |   |
|                 |    | -20 dBm   |  |                         |  |  |   |
| CH00            |    | -30 dBm   |  |                         |  |  |   |
| Reference level |    | -40 dBm   |  | Ň                       | 1  |  |   |
|                 |    | -50 dBm   |  |                         | h  |  |   |
|                 |    | ~66°8Bh-readerseard   | and why man  | und                     | howenes  | and and and and  | معكميه  |
|                 |    |   | · · · · ·  |                         |  |  |   |
|                 |    | -70 dBm   |  |                         |  |  |   |
|                 |    | CF 2.402 GHz  |  | 691 pt                  | S<br>Measuring   |  | Span 30.0 MHz<br>18.05.2018   |
|                 |    |   |  |                         | _  |  |   |
|                 |    | Spectrum  |  |                         |  |  |   |
| CH00            |    | Att 30  | Bm Offset 1.00 dB<br>dB SWT 30.1 ms                  |                         | Mode Auto Sweep  | ρ  |   |
|                 |    | ● 1Pk Max   |  |                         | M1[1]  |  | -56.33 dBm  |
|                 |    | 10 dBm  |  |                         |  | <u>     </u>   | 821.5420 MHz  |
|                 |    | 0 dBm   |  |                         |  |  |   |
|                 |    | -10 dBm   |  |                         |  |  |   |
|                 |    | -20 dBm   | 90 dBm   |                         |  |  |   |
|                 |    | -30 dBm   |  |                         |  |  |   |
| 0MHz~1000MHz    |    |   |  |                         |  |  |   |
|                 |    | -40 dBm   |  |                         |  |  |   |
|                 |    | -50 dBm   |  |                         |  | M1   |   |
|                 |    | (150.dBm  | ile <mark>n 1906 generationen billen bere</mark> tet |                         | hand and the selected of the selection o | n syntender i helen syntemet<br>en sen en i helen helen period | Abdieleckologie statisticul<br>Ministration (Constantioning and   |
|                 |    | -70 dBm   |  |                         |  |  |   |
|                 |    | Start 30.0 MHz  |  | 30001 p                 | its  |  | Stop 1.0 GHz  |
|                 |    |   |  |                         | Measuring  | 4/4  | 18.05.2018<br>17:17:29  |
|                 |    |   |  |                         |  |  | Ē   |
|                 |    |   | Bm Offset 1.00 dB                                    |                         | Modo Auto C  |  |   |
|                 |    | Att 30     IPk Max  | dB SWT 250 ms  | - TETT SUU KHZ          | Mode Auto Sweep<br>M1[1]   | ,  | -47.12 dBm  |
|                 |    | 10 dBm  |  |                         | mr[1]  | · · · ·  | -47.12 dBm<br>16.202500 GHz   |
|                 |    | 0 dBm   |  |                         |  |  |   |
|                 |    |   |  |                         |  |  |   |
|                 |    | -10 dBm   | 90 dBm   |                         |  |  |   |
| CH00            |    | -20 dBm   |  |                         |  |  |   |
| 1GHz~26GHz      |    | -30 dBm   |  |                         |  |  |   |
|                 |    | -40 dBm   |  |                         | M1   |  |   |
|                 |    | -50 dBm   | and and the first of the date of the                 | Man of Man to the other | And the second s |  |   |
|                 |    | Local March and March |  |                         |  |  | A DECEMBER OF STREET, S |
|                 |    | -70 dBm   |  |                         |  |  |   |
|                 |    |   |  |                         |  |  |   |
|                 |    | Start 1.0 GHz   |  | 30001 p                 |  |  | Stop 26.0 GHz   |



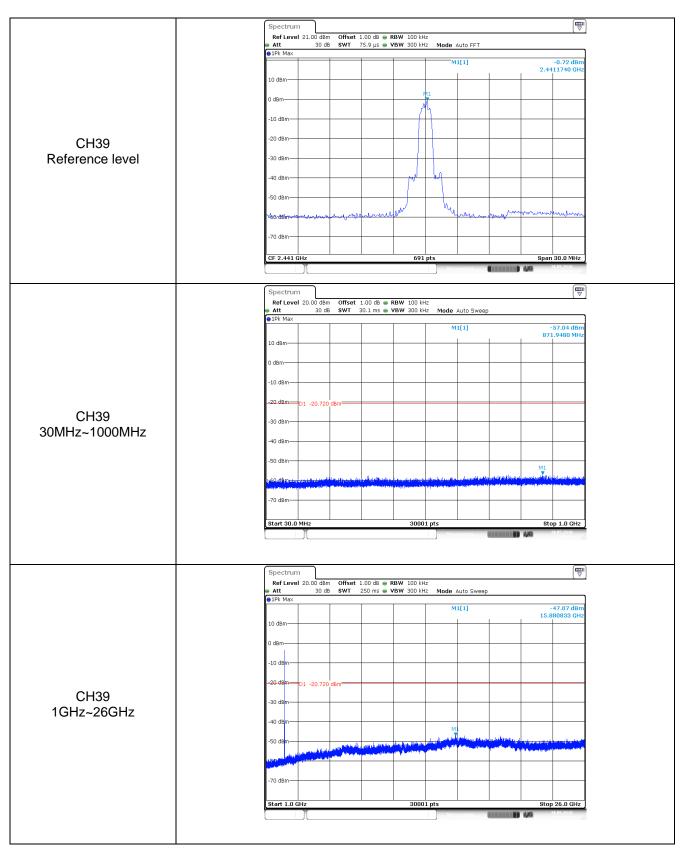


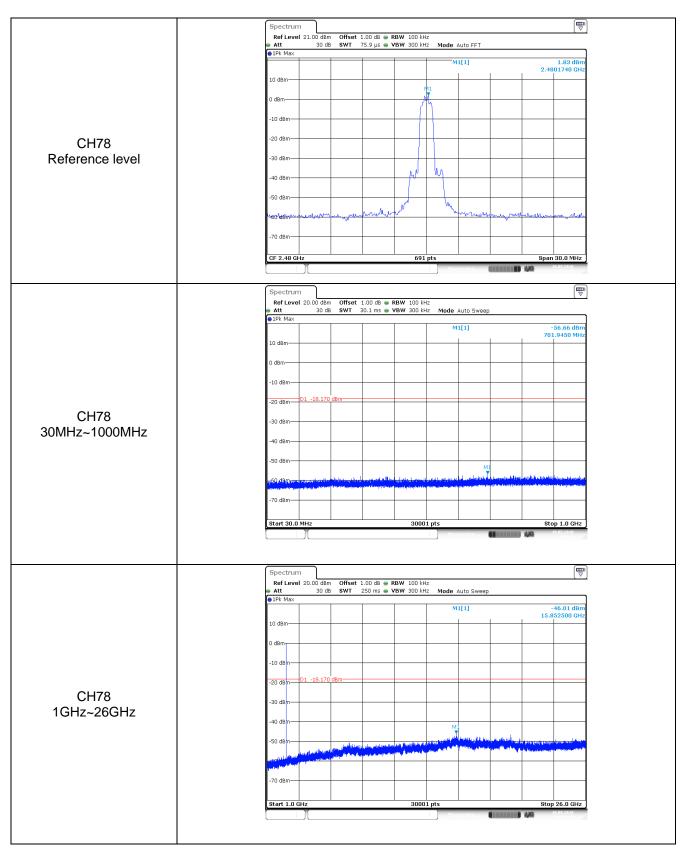
| est Item:          | SE |   | Modul                                 | ation ty                | vpe:   | Т  | т/4D0                                 | <b>PSK</b>                                |
|--------------------|----|---|---------------------------------------|-------------------------|--|--|---------------------------------------|---|
|                    |    | Spectrum  |                                       |                         |  |  |                                       |   |
|                    |    | Att 30 df                                       | n Offset 1.00 dB ●<br>8 SWT 75.9 µs ● |                         | Mode Auto FFT  |  |                                       |   |
|                    |    | 1Pk Max   |                                       |                         | M1[1]  |  | 9.40                                  | 1.86 dBm<br>)21740 GHz                    |
|                    |    | 10 dBm  |                                       |                         |  |  | 2.40                                  | J21740 GH2                                |
|                    |    | 0 dBm   |                                       | - M                     |  |  |                                       |   |
|                    |    | -10 dBm   |                                       | + $(1)$                 |  |  |                                       |   |
|                    |    | -20 dBm   |                                       |                         |  |  |                                       |   |
| CH00               |    | -30 dBm   |                                       |                         |  |  |                                       |   |
| Reference level    |    |   |                                       | N                       | M  |  |                                       |   |
|                    |    | -40 dBm   |                                       |                         |  |  |                                       |   |
|                    |    | -50 dBm   | a a motion of horizont                | and performance         | Mumm   |  |                                       |   |
|                    |    | ABDIdBm and | an marine                             |                         |  | Marriage Marrie  | harran harring                        | tallet and                                |
|                    |    | -70 dBm   |                                       |                         |  |  |                                       |   |
|                    |    | CF 2.402 GHz                                    |                                       | 691 pts                 | 5  |  |                                       | 30.0 MHz                                  |
|                    |    |   |                                       |                         | Measuring  |  | 4,44                                  | 17:30:15                                  |
|                    |    | Spectrum  |                                       |                         |  |  |                                       |   |
|                    |    | Ref Level 20.00 dBn                             | o Offset 1.00 dB 👄<br>SWT 30.1 ms 👄   | RBW 100 kHz             |  | 30   |                                       | <u>ر</u> ۷                                |
|                    |    | Att 30 da     Att 30 da                         |                                       | . 57 300 KHZ            | Mode Auto Swee   | ·Ρ   |                                       | -57.20 dBm                                |
| CH00               |    | 10 dBm  |                                       |                         |  | ++   |                                       | 0.5070 MHz                                |
|                    |    | 0 dBm   |                                       |                         |  |  |                                       |   |
|                    |    | -10 dBm   |                                       |                         |  |  |                                       |   |
|                    |    |   | dBm                                   |                         |  |  |                                       |   |
|                    |    | -20 dBill                                       |                                       |                         |  |  |                                       |   |
| 30MHz~1000MHz      |    | -30 dBm   |                                       |                         |  |  |                                       |   |
|                    |    | -40 dBm   |                                       |                         |  |  |                                       |   |
|                    |    | -50 dBm   |                                       |                         |  |  | м1                                    |   |
|                    |    | -60,dBm   | industrial and a first state of the   |                         | en de la construite de la construite des   | an la bata na kanada si k<br>Regional ta bata na sila si k | n halan dan dar<br>Namera dari sering | nitriten velleger<br>Service Service pro- |
|                    |    | -70 dBm   |                                       |                         |  |  |                                       |   |
|                    |    | Start 30.0 MHz                                  |                                       | 30001 pt                | ts   |  | Sto                                   | op 1.0 GHz                                |
|                    |    |   |                                       |                         | Measuring  |  | 4)44                                  | 18.05.2018                                |
|                    |    |   |                                       |                         |  |  |                                       |   |
|                    |    |   | n Offset 1.00 dB 👄                    |                         |  |  |                                       |   |
|                    |    |   | 3 SWT 250 ms 🖷                        |                         |  | р  |                                       |   |
|                    |    | 10 -20  |                                       |                         | M1[1]  |  | 15.2                                  | -46.84 dBm<br>240000 GHz                  |
|                    |    | 10 dBm  |                                       |                         |  |  |                                       |   |
|                    |    | 0 dBm   |                                       |                         |  |  |                                       |   |
|                    |    | -10 dBm   |                                       |                         |  |  |                                       |   |
| 01100              |    | -20 dBm-D1 -18.140                              | dBm                                   |                         |  |  |                                       |   |
| CH00<br>1GHz~26GHz |    | -30 dBm   |                                       | +                       |  | + -  |                                       |   |
|                    |    | -40 dBm   |                                       | +                       | M1   |  |                                       |   |
|                    |    | -50 dBm   | J. Jakan K. Jakasan Ma                | مغلقه والاستلحق الدرادي | M1<br>Land and a state   | In a fallel of the   |                                       | tolling a street                          |
|                    |    |   |                                       |                         | and the second | and a second second second                                 | Althorny at the Hand                  | and a second second second                |
|                    |    | -70 dBm   |                                       |                         |  |  |                                       |   |
|                    |    | -/0 0811  |                                       |                         |  |  |                                       |   |
|                    |    |   | 1 I                                   |                         | 1  |  |                                       | 1   |
|                    |    | Start 1.0 GHz                                   |                                       | 30001 p                 | Measuring  |  |                                       | 26.0 GHz                                  |





| st Item:        | SE                            | м   | odulat                         | ion type  | <b>e</b> :                 | 8              | DPSł                | (                                 |
|-----------------|-------------------------------|---|--------------------------------|---|----------------------------|----------------|---------------------|-----------------------------------|
|                 | Spectrum                      |   |                                |   |                            |                |                     |                                   |
|                 | Ref Level 3<br>Att<br>1Pk Max | 21.00 dBm Offset<br>30 dB SWT   | 1.00 dB 👄 RBV<br>75.9 μs 👄 VBV | V 100 kHz<br>V 300 kHz Mod  | le Auto FFT                |                |                     |                                   |
|                 | STER MAX                      |   |                                |   | M1[1]                      |                |                     | 2.04 dBm<br>1740 GHz              |
|                 | 10 dBm                        |   |                                | M1  |                            |                |                     |                                   |
|                 | 0 dBm                         |   |                                | <u> </u>  |                            |                |                     |                                   |
|                 | -10 dBm                       |   |                                |   |                            |                |                     |                                   |
|                 | -20 dBm                       |   |                                |   |                            |                |                     |                                   |
| CH00            | -30 dBm                       |   |                                |   |                            |                |                     |                                   |
| Reference level | -40 dBm                       |   |                                | MM  |                            |                |                     |                                   |
|                 | -50 dBm                       |   |                                |   |                            |                |                     |                                   |
|                 | -^89-d&m_00.1                 | waratele alexand  | mound                          |   | muner                      | Mr. ama        | mondra              | تىيەلەمبەھىيەت                    |
|                 | -70 dBm                       |   |                                |   |                            | ,              |                     |                                   |
|                 |                               |   |                                |   |                            |                |                     |                                   |
|                 | CF 2.402 GH                   | )(  |                                | 691 pts   | Measuring                  |                |                     | 30.0 MHz                          |
|                 |                               |   |                                |   |                            |                |                     |                                   |
|                 | Spectrum                      |   |                                |   |                            |                |                     |                                   |
|                 | 👄 Att                         | 20.00 dBm Offset<br>30 dB SWT   | 1.00 dB 👄 RBV<br>30.1 ms 👄 VBV | W 100 kHz<br>W 300 kHz Mo   | de Auto Sweep              |                |                     |                                   |
| CH00            | • 1Pk Max                     |   |                                |   | M1[1]                      |                |                     | 6.63 dBm<br>7700 MHz              |
|                 | 10 dBm                        |   | +                              |   |                            |                | 878                 | 7700 MHz                          |
|                 | 0 dBm                         |   |                                |   |                            |                |                     |                                   |
|                 | -10 dBm                       |   |                                |   |                            |                |                     |                                   |
|                 | -20 dBm D                     | 1 -17.960 dBm   |                                |   |                            |                |                     |                                   |
|                 | -30 dBm                       |   |                                |   |                            |                |                     |                                   |
| 30MHz~1000MHz   | -40 dBm                       |   |                                |   |                            |                |                     |                                   |
|                 | -50 dBm                       |   |                                |   |                            |                |                     |                                   |
|                 | is Silved Providence of       | ويعريها والمعالية وا  | and the second second second   | والمراجعة والتناوية أوالمحصوب   | onto and long bade         | ahadaan dhaday | M1<br>Jaco allas    | le li filma su na sun             |
|                 | -70 dBm                       | And the second |                                | in the contract of the second s |                            |                |                     |                                   |
|                 |                               |   |                                |   |                            |                |                     |                                   |
|                 | Start 30.0 M                  | IHz   |                                | 30001 pts   | Measuring                  |                |                     | 05.2018                           |
|                 |                               |   |                                |   |                            |                |                     |                                   |
|                 | Spectrum                      |   |                                |   |                            |                |                     |                                   |
|                 | 👄 Att                         | 20.00 dBm Offset<br>30 dB SWT   | 1.00 dB 👄 RBV<br>250 ms 👄 VBV  | V 100 kHz<br>V 300 kHz Mod  | le Auto Sweep              |                |                     |                                   |
|                 | 1Pk Max                       |   |                                |   | M1[1]                      |                | -4                  | 6.36 dBm<br>7500 GHz              |
|                 | 10 dBm                        |   |                                |   |                            |                | 10.89               |                                   |
|                 | 0 dBm                         |   |                                |   |                            |                |                     |                                   |
|                 | -10 dem                       |   |                                |   |                            |                |                     |                                   |
|                 | -20 dBm                       | 1 -17.960 dBm   |                                |   |                            |                |                     |                                   |
| CH00            | -30 dBm                       |   |                                |   | _                          |                |                     |                                   |
| 1GHz~26GHz      | -40 dBm                       |   |                                |   |                            |                |                     |                                   |
|                 | -50 dBm                       |   |                                | A. or B. H. G. Barrison and   | MI<br>International Action | و الحماليات    | a su producta se da | a fa tana a ka a ta a a a         |
|                 |                               | Second States   |                                |   | and the patients           |                | A                   | and and the state of the state of |
|                 | -70 dBm                       |   |                                |   |                            |                |                     |                                   |
|                 | -70 uBm                       |   |                                |   |                            |                |                     |                                   |
|                 | Start 1.0 GH                  |   |                                | 30001 pts   |                            |                |                     | 26.0 GHz                          |





# 5.11. Spurious Emissions (radiated)

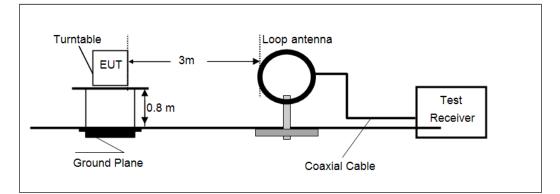
# <u>LIMIT</u>

# FCC CFR Title 47 Part 15 Subpart C Section 15.209

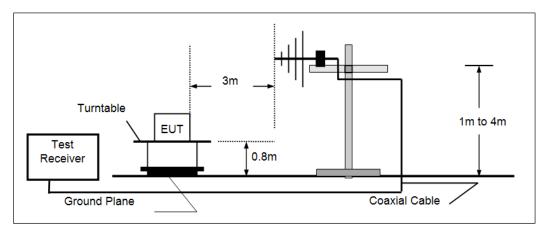
| Frequency         | Limit (dBuV/m @3m) | Value      |
|-------------------|--------------------|------------|
| 30 MHz ~ 88 MHz   | 40.00              | Quasi-peak |
| 88 MHz ~ 216 MHz  | 43.50              | Quasi-peak |
| 216 MHz ~ 960 MHz | 46.00              | Quasi-peak |
| 960 MHz ~ 1 GHz   | 54.00              | Quasi-peak |
| Above 1 GHz       | 54.00              | Average    |
|                   | 74.00              | Peak       |

# **TEST CONFIGURATION**

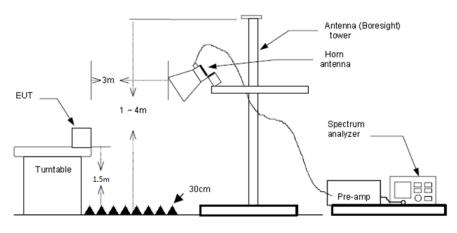
Below 30 MHz



# > 30 MHz ~1000 MHz



> Above 1 GHz



### TEST PROCEDURE

- 1. The EUT was tested according to ANSI C63.10:2013.
- 2. The EUT is placed on a turn table with 0.8 meter above ground for below 1GHz, 1.5 meter above ground for above 1GHz.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
- 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 5. Set to the maximum power setting and enable the EUT transmit continuously.
- 6. Use the following spectrum analyzer settings
  - (1) Span shall wide enough to fully capture the emission being measured;
    - (2) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold; If the emission level of the EUT measured by the peak detectoris 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

 (3) From 1 GHz to 10<sup>th</sup> harmonic: RBW=1 MHz, VBW=3 MHz Peak detector for Peak value RBW=1 MHz, VBW=10 Hz Peak detector for Average value.

#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

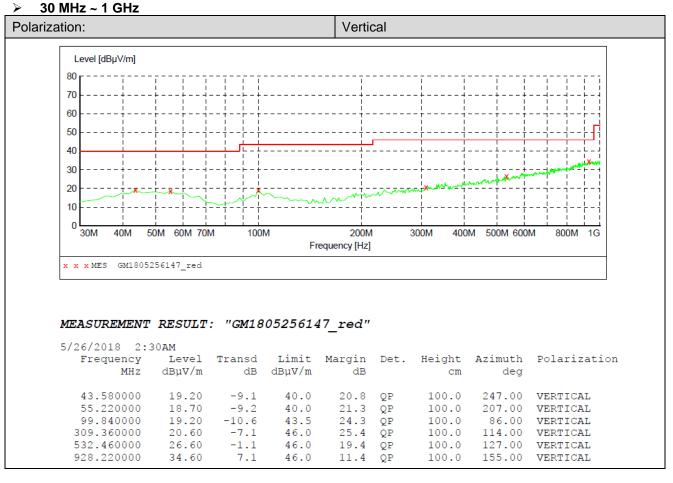
☑ Passed □ Not Applicable

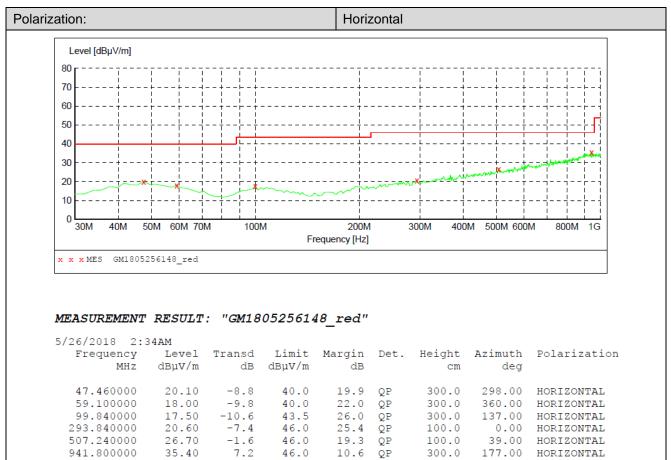
#### Note:

- 1) Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor
- 2) The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3) Below 1 GHz, Have pre-scan all modulation mode, found the GFSK modulation High channel which it was worst case, so only the worst case's data on the test report.
- 4) Above 1 GHz, Have pre-scan all modulation mode, found the GFSK modulation which it was worst case, so only the worst case's data on the test report
- 5) The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.

#### ➢ 9 kHz ~ 30 MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.





46.0

46.0

10.6 QP

Shenzhen Huatongwei International Inspection Co., Ltd.

26.70

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507.240000

941.800000

39.00 HORIZONTAL

HORIZONTAL

177.00

100.0

300.0

| 1 GHz ~ 25 GHz | 1 GHz ~ 25 GHz |
|----------------|----------------|
|----------------|----------------|

|                    | CH00                    |                             |                       |                          |                   |                        |                       |              |               |  |  |  |  |  |
|--------------------|-------------------------|-----------------------------|-----------------------|--------------------------|-------------------|------------------------|-----------------------|--------------|---------------|--|--|--|--|--|
| Frequency<br>(MHz) | Read<br>Level<br>(dBuV) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Factor<br>(dB) | Level<br>(dBuV/m) | Limit Line<br>(dBuV/m) | Over<br>Limit<br>(dB) | Polarization | Test<br>value |  |  |  |  |  |
| 1283.34            | 35.25                   | 26.22                       | 4.80                  | 37.18                    | 29.09             | 74.00                  | -44.91                | Vertical     | Peak          |  |  |  |  |  |
| 3570.71            | 35.72                   | 29.21                       | 8.22                  | 37.08                    | 36.07             | 74.00                  | -37.93                | Vertical     | Peak          |  |  |  |  |  |
| 5646.08            | 32.66                   | 31.71                       | 10.34                 | 34.34                    | 40.37             | 74.00                  | -33.63                | Vertical     | Peak          |  |  |  |  |  |
| 7209.02            | 35.20                   | 36.21                       | 11.87                 | 33.51                    | 49.77             | 74.00                  | -24.23                | Vertical     | Peak          |  |  |  |  |  |
| 1875.26            | 35.69                   | 25.32                       | 6.08                  | 37.48                    | 29.61             | 74.00                  | -44.39                | Horizontal   | Peak          |  |  |  |  |  |
| 3184.25            | 35.96                   | 28.80                       | 7.70                  | 37.41                    | 35.05             | 74.00                  | -38.95                | Horizontal   | Peak          |  |  |  |  |  |
| 4809.50            | 33.86                   | 31.58                       | 9.55                  | 35.72                    | 39.27             | 74.00                  | -34.73                | Horizontal   | Peak          |  |  |  |  |  |
| 7209.02            | 35.02                   | 36.21                       | 11.87                 | 33.51                    | 49.59             | 74.00                  | -24.41                | Horizontal   | Peak          |  |  |  |  |  |

| CH39               |                         |                             |                       |                          |                   |                        |                       |              |               |  |
|--------------------|-------------------------|-----------------------------|-----------------------|--------------------------|-------------------|------------------------|-----------------------|--------------|---------------|--|
| Frequency<br>(MHz) | Read<br>Level<br>(dBuV) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Factor<br>(dB) | Level<br>(dBuV/m) | Limit Line<br>(dBuV/m) | Over<br>Limit<br>(dB) | Polarization | Test<br>value |  |
| 1185.96            | 36.62                   | 26.19                       | 4.63                  | 37.23                    | 30.21             | 74.00                  | -43.79                | Vertical     | Peak          |  |
| 1884.83            | 35.84                   | 25.31                       | 6.09                  | 37.49                    | 29.75             | 74.00                  | -44.25                | Vertical     | Peak          |  |
| 3200.50            | 35.78                   | 28.80                       | 7.72                  | 37.40                    | 34.90             | 74.00                  | -39.10                | Vertical     | Peak          |  |
| 5086.52            | 32.67                   | 31.85                       | 9.74                  | 35.21                    | 39.05             | 74.00                  | -34.95                | Vertical     | Peak          |  |
| 1179.94            | 36.79                   | 26.14                       | 4.61                  | 37.24                    | 30.30             | 74.00                  | -43.70                | Horizontal   | Peak          |  |
| 3681.47            | 36.05                   | 29.30                       | 8.36                  | 37.00                    | 36.71             | 74.00                  | -37.29                | Horizontal   | Peak          |  |
| 5138.58            | 33.87                   | 31.74                       | 9.78                  | 35.10                    | 40.29             | 74.00                  | -33.71                | Horizontal   | Peak          |  |
| 7319.96            | 33.02                   | 36.30                       | 11.99                 | 33.32                    | 47.99             | 74.00                  | -26.01                | Horizontal   | Peak          |  |

| CH78               |                         |                             |                       |                          |                   |                        |                       |              |               |
|--------------------|-------------------------|-----------------------------|-----------------------|--------------------------|-------------------|------------------------|-----------------------|--------------|---------------|
| Frequency<br>(MHz) | Read<br>Level<br>(dBuV) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Factor<br>(dB) | Level<br>(dBuV/m) | Limit Line<br>(dBuV/m) | Over<br>Limit<br>(dB) | Polarization | Test<br>value |
| 1219.64            | 36.04                   | 26.28                       | 4.69                  | 37.21                    | 29.80             | 74.00                  | -44.20                | Vertical     | Peak          |
| 3135.99            | 36.11                   | 28.80                       | 7.64                  | 37.45                    | 35.10             | 74.00                  | -38.90                | Vertical     | Peak          |
| 4958.68            | 33.13                   | 31.46                       | 9.64                  | 35.45                    | 38.78             | 74.00                  | -35.22                | Vertical     | Peak          |
| 7489.60            | 33.02                   | 36.12                       | 12.36                 | 33.04                    | 48.46             | 74.00                  | -25.54                | Vertical     | Peak          |
| 1182.94            | 37.73                   | 26.17                       | 4.62                  | 37.23                    | 31.29             | 74.00                  | -42.71                | Horizontal   | Peak          |
| 3472.12            | 35.87                   | 28.78                       | 8.07                  | 37.16                    | 35.56             | 74.00                  | -38.44                | Horizontal   | Peak          |
| 5112.49            | 33.07                   | 31.85                       | 9.76                  | 35.16                    | 39.52             | 74.00                  | -34.48                | Horizontal   | Peak          |
| 7301.36            | 32.72                   | 36.30                       | 11.97                 | 33.35                    | 47.64             | 74.00                  | -26.36                | Horizontal   | Peak          |

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

2. The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.

3. The emission levels of other frequencies are very lower than the limit and not show in test report.

# 6. TEST SETUP PHOTOS

## **Conducted Emissions**



Radiated Emissions







# 7. EXTERANAL AND INTERNAL PHOTOS

Refere to the test report No.: TRE1805013701.

-----End of Report------