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| Т  | EST REPORT  |   |
|--|---|---|
| Report No:<br>Project No:  | CHTEW19070046 Re<br>SHT1906080901EW                                 | eport Verification:   |
| FCC ID:  | 2ABQ6-K10   | Reporting Cirrowing date                                      |
| Applicant's name:  | Inspira Technologies LLC  |   |
| Address  | 1901 4th Ave, Suite 210, San D                                      | Diego, CA 92101, USA  |
| Manufacturer   | Inspira Technologies LLC  |   |
| Address  | 1901 4th Ave, Suite 210, San D                                      | Diego, CA 92101, USA  |
| Test item description  | Tablet  |   |
| Trade Mark   |   |   |
| Model/Type reference   | K10   |   |
| Listed Model(s)  |   |   |
| Standard:  | FCC CFR Title 47 Part 15 Sub  | part C Section 15.247   |
| Date of receipt of test sample:  | Jun.27, 2019  |   |
| Date of testing  | Jun.27, 2019- Jul.12, 2019  |   |
| Date of issue  | Jul.15, 2019  |   |
| Result   | PASS  |   |
| Compiled by  |   |   |
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| Approved by  |   |   |
| (Position+Printed name+Signature):   | RF Manager Hans Hu  | Mansm   |
| Testing Laboratory Name :  | Shenzhen Huatongwei Intern  | ational Inspection Co. 1 td                                   |
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The test report merely correspond 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

<u>KDB 558074 D01 15.247 Meas Guidance v05r01:</u> Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of The FCC Rules

### 1.2. Report version

| Revision No. | Date of issue | Description |  |  |
|--------------|---------------|-------------|--|--|
| N/A          | 2019-07-15    | Original    |  |  |
|              |               |             |  |  |
|              |               |             |  |  |
|              |               |             |  |  |
|              |               |             |  |  |

# 2. TEST DESCRIPTION

| Test Item                                  | Section in CFR 47 | Result | Test Engineer   |
|--|-------------------|--------|-----------------|
| Antenna Requirement                        | 15.203/15.247 (c) | PASS   | Jiongsheng Feng |
| AC Power Line Conducted Emissions          | 15.207            | PASS   | Kang Yang       |
| Conducted Peak Output Power                | 15.247 (b)(1)     | PASS   | Bruce Wong      |
| 20 dB Bandwidth                            | 15.247 (a)(1)     | PASS   | Bruce Wong      |
| Carrier Frequencies Separation             | 15.247 (a)(1)     | PASS   | Bruce Wong      |
| Hopping Channel Number                     | 15.247 (a)(1)     | PASS   | Bruce Wong      |
| Dwell Time                                 | 15.247 (a)(1)     | PASS   | Bruce Wong      |
| Pseudorandom Frequency Hopping<br>Sequence | 15.247(b)(4)      | PASS   | Bruce Wong      |
| Restricted band                            | 15.247(d)/15.205  | PASS   | Tony Duan       |
| Radiated Emissions                         | 15.247(d)/15.209  | PASS   | Bruce Wong      |

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

# 3. <u>SUMMARY</u>

## 3.1. Client Information

| Applicant:   | Inspira Technologies LLC                          |  |
|--|---|--|
| Address: 1901 4th Ave, Suite 210, San Diego, CA 92101, USA |   |  |
| Manufacturer:  | Inspira Technologies LLC                          |  |
| Address:   | 1901 4th Ave, Suite 210, San Diego, CA 92101, USA |  |

## 3.2. Product Description

| Name of EUT:  | Tablet                |  |
|---|-----------------------|--|
| Trade Mark:   | -                     |  |
| Model No.:  | К10                   |  |
| Listed Model(s):  | -                     |  |
| Power supply:   | DC 3.7V from battery  |  |
| Adapter information:Model: K-T100502000UInput: 100-240Va.c., 50-60Hz, 0.35A MaxOutput: 5Vd.c., 2000mA |                       |  |
| Hardware version:   | android 9.0           |  |
| Software version:   | EM_T6318_V2.0         |  |
| Bluetooth   |                       |  |
| Version:  | Supported BT4.2+EDR   |  |
| Modulation:   | GFSK, π/4DQPSK, 8DPSK |  |
| Operation frequency:  | 2402MHz~2480MHz       |  |
| Channel number:   | 79                    |  |
| Channel separation:   | 1MHz                  |  |
| Antenna type:   | FPCB                  |  |
| Antenna gain:   | ≥0dBi±0.5 dBi         |  |

### 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            |

### > TEST MODE

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

| / | 1 | Manufacturer: | / |
|---|---|---------------|---|
|   | · | Model No.:    | / |
| , | / | Manufacturer: | / |
|   |   | 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.:5377A**

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.: 5377A.

### 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             | 0.51 dB                 | (1)   |
| Conducted spurious emissions 9kHz~40GHz | 0.51 dB                 | (1)   |
| Conducted Disturbance 150kHz~30MHz      | 3.02 dB                 | (1)   |
| Radiated Emissions below 1GHz           | 4.90 dB                 | (1)   |
| Radiated Emissions above 1GHz           | 4.96 dB                 | (1)   |
| Occupied Bandwidth                      | 70 Hz                   | (1)   |

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

## 4.5. Equipments Used during the Test

| •    | Conducted Emission                  |                    |                 |            |                              |                              |
|------|-------------------------------------|--------------------|-----------------|------------|------------------------------|------------------------------|
| Used | Test Equipment                      | Manufacturer       | Model No.       | Serial No. | Last Cal. Date<br>(YY-MM-DD) | Next Cal. Date<br>(YY-MM-DD) |
| •    | Shielded Room                       | Albatross projects | N/A             | N/A        | 2018/09/28                   | 2023/09/27                   |
| •    | EMI Test Receiver                   | R&S                | ESCI            | 101247     | 2018/10/27                   | 2019/10/26                   |
| •    | Artificial Mains                    | SCHWARZBECK        | NNLK 8121       | 573        | 2018/10/27                   | 2019/10/26                   |
| •    | Pulse Limiter                       | R&S                | ESH3-Z2         | 100499     | 2018/10/27                   | 2019/10/26                   |
| •    | RF Connection Cable                 | HUBER+SUHNER       | EF400           | N/A        | 2018/11/15                   | 2019/11/14                   |
| •    | Test Software                       | R&S                | ES-K1           | N/A        | N/A                          | N/A                          |
| 0    | Single Balanced<br>Telecom Pair ISN | FCC                | FCC-TLISN-T2-02 | 20371      | 2018/10/28                   | 2019/10/27                   |
| 0    | Two Balanced<br>Telecom Pairs ISN   | FCC                | FCC-TLISN-T4-02 | 20373      | 2018/10/28                   | 2019/10/27                   |
| 0    | Four Balanced<br>Telecom Pairs ISN  | FCC                | FCC-TLISN-T8-02 | 20375      | 2018/10/28                   | 2019/10/27                   |
| 0    | V-Network                           | R&S                | ESH3-Z6         | 100211     | 2018/10/27                   | 2019/10/26                   |
| 0    | V-Network                           | R&S                | ESH3-Z6         | 100210     | 2018/10/27                   | 2019/10/26                   |
| 0    | 2-Line V-Network                    | R&S                | ESH3-Z5         | 100049     | 2018/10/27                   | 2019/10/26                   |

| •    | Radiated Emission-6th test site |                    |              |            |                              |                              |
|------|---------------------------------|--------------------|--------------|------------|------------------------------|------------------------------|
| Used | Test Equipment                  | Manufacturer       | Model No.    | Serial No. | Last Cal. Date<br>(YY-MM-DD) | Next Cal. Date<br>(YY-MM-DD) |
| •    | Semi-Anechoic<br>Chamber        | Albatross projects | SAC-3m-02    | N/A        | 2018/09/30                   | 2021/09/29                   |
| •    | EMI Test Receiver               | R&S                | ESCI         | 100900     | 2018/10/28                   | 2019/10/27                   |
| •    | Loop Antenna                    | R&S                | HFH2-Z2      | 100020     | 2017/11/20                   | 2020/11/19                   |
| •    | Ultra-Broadband<br>Antenna      | SCHWARZBECK        | VULB9163     | 546        | 2017/04/05                   | 2020/04/04                   |
| •    | Pre-Amplifer                    | SCHWARZBECK        | BBV 9742     | N/A        | 2018/11/15                   | 2019/11/14                   |
| •    | RF Connection Cable             | HUBER+SUHNER       | N/A          | N/A        | 2018/09/28                   | 2019/09/27                   |
| •    | RF Connection Cable             | HUBER+SUHNER       | SUCOFLEX104  | 501184/4   | 2018/09/28                   | 2019/09/27                   |
| •    | Test Software                   | R&S                | ES-K1        | N/A        | N/A                          | N/A                          |
| •    | Turntable                       | Maturo Germany     | TT2.0-1T     | N/A        | N/A                          | N/A                          |
| •    | Antenna Mast                    | Maturo Germany     | CAM-4.0-P-12 | N/A        | N/A                          | N/A                          |

| •    | Radiated emission-7th test site |                    |             |            |                              |                              |  |
|------|---------------------------------|--------------------|-------------|------------|------------------------------|------------------------------|--|
| Used | Test Equipment                  | Manufacturer       | Model No.   | Serial No. | Last Cal. Date<br>(YY-MM-DD) | Next Cal. Date<br>(YY-MM-DD) |  |
| •    | Semi-Anechoic<br>Chamber        | Albatross projects | SAC-3m-01   | N/A        | 2018/09/30                   | 2021/09/29                   |  |
| •    | Spectrum Analyzer               | R&S                | FSP40       | 100597     | 2018/10/27                   | 2019/10/26                   |  |
| •    | Horn Antenna                    | SCHWARZBECK        | 9120D       | 1011       | 2017/03/27                   | 2020/03/26                   |  |
| •    | Pre-amplifier                   | BONN               | BLWA0160-2M | 1811887    | 2018/11/14                   | 2019/11/13                   |  |
| •    | Pre-amplifier                   | CD                 | PAP-0102    | 12004      | 2018/11/14                   | 2019/11/13                   |  |
| •    | Broadband Pre-<br>amplifier     | SCHWARZBECK        | BBV 9718    | 9718-248   | 2019/04/26                   | 2020/04/25                   |  |
| •    | RF Connection Cable             | HUBER+SUHNER       | RE-7-FH     | N/A        | 2018/11/15                   | 2019/11/14                   |  |
| •    | RF Connection Cable             | HUBER+SUHNER       | RE-7-FL     | N/A        | 2018/11/15                   | 2019/11/14                   |  |
| •    | Test Software                   | Audix              | E3          | N/A        | N/A                          | N/A                          |  |

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| • | Turntable    | Maturo Germany | TT2.0-1T     | N/A | N/A | N/A |
|---|--------------|----------------|--------------|-----|-----|-----|
| • | Antenna Mast | Maturo Germany | CAM-4.0-P-12 | N/A | N/A | N/A |

| •    | RF Conducted Method             |              |                 |            |                              |                              |
|------|---------------------------------|--------------|-----------------|------------|------------------------------|------------------------------|
| Used | Test Equipment                  | Manufacturer | Model No.       | Serial No. | Last Cal. Date<br>(YY-MM-DD) | Next Cal. Date<br>(YY-MM-DD) |
| •    | Signal and spectrum<br>Analyzer | R&S          | FSV40           | 100048     | 2018/10/28                   | 2019/10/27                   |
| •    | Spectrum Analyzer               | Agilent      | N9020A          | MY50510187 | 2018/09/29                   | 2019/09/28                   |
| 0    | Radio communication tester      | R&S          | CMW500          | 137688-Lv  | 2018/09/29                   | 2019/09/28                   |
| 0    | Test software                   | Tonscend     | JS1120-1(LTE)   | N/A        | N/A                          | N/A                          |
| 0    | Test software                   | Tonscend     | JS1120-2(WIFI)  | N/A        | N/A                          | N/A                          |
| 0    | Test software                   | Tonscend     | JS1120-3(WCDMA) | N/A        | N/A                          | N/A                          |
| 0    | Test software                   | Tonscend     | JS1120-4(GSM)   | N/A        | N/A                          | N/A                          |

# 5. TEST CONDITIONS AND RESULTS

### 5.1. Antenna requirement

### **Requirement**

### 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.

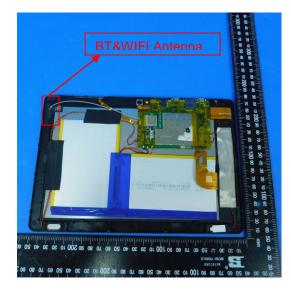
### FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(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)

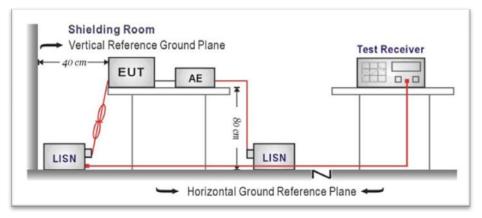
### <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.207

|                       | Limit (d   | lBuV)     |
|-----------------------|------------|-----------|
| 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

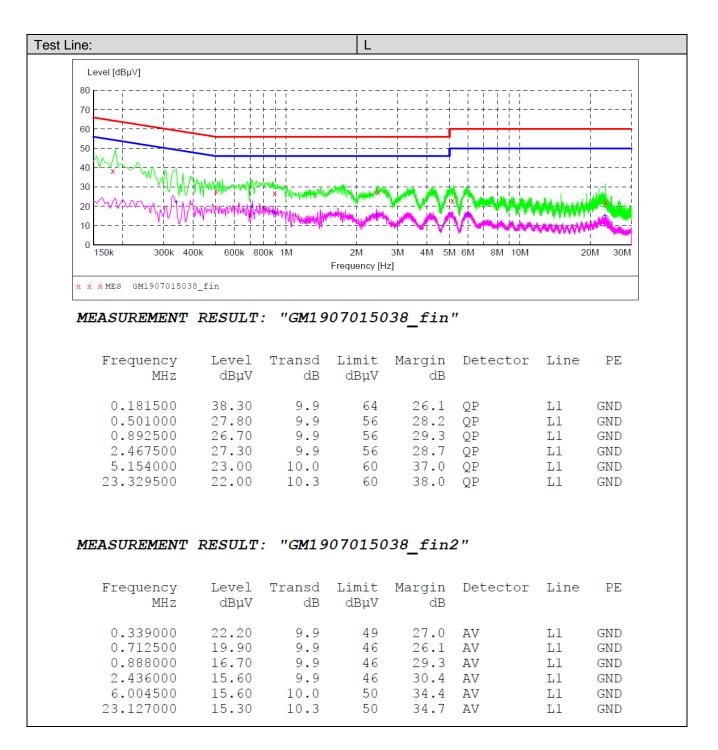
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm 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.

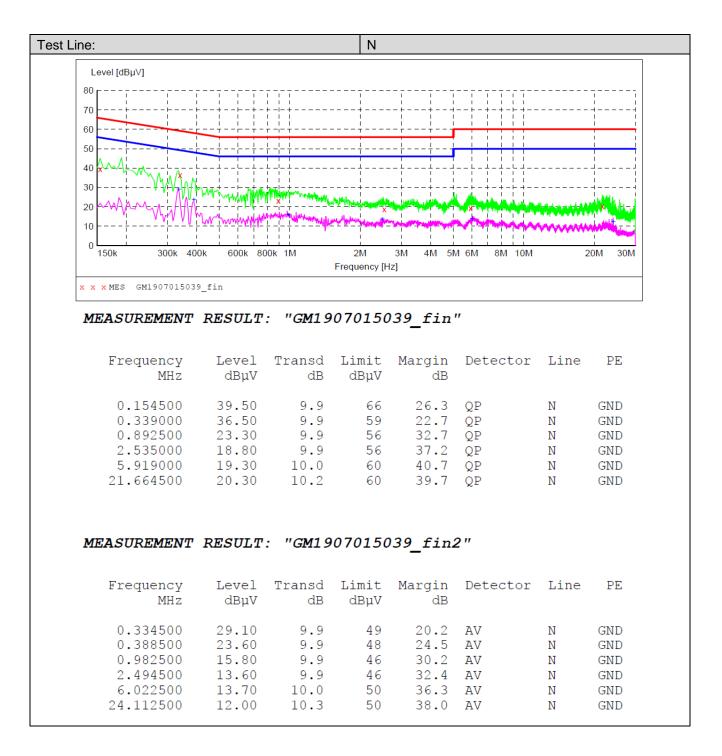
### TEST RESULTS

### ☑ Passed □ Not Applicable

Note:

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



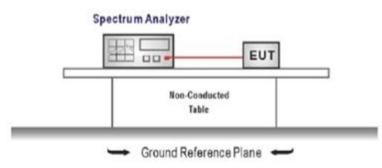


### 5.3. Conducted Peak Output Power

### <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) | AV Power | Limit (dBm) | Result |
|-----------------|---------|--------------------|----------|-------------|--------|
|                 | 00      | 6.54               | 6.45     |             |        |
| GFSK            | 39      | 6.33               | 6.24     | ≤ 30.00     | Pass   |
|                 | 78      | 6.07               | 5.99     |             |        |
|                 | 00      | 5.89               | 5.14     |             |        |
| π/4DQPSK        | 39      | 5.80               | 5.10     | ≤ 21.00     | Pass   |
|                 | 78      | 5.28               | 4.61     |             |        |
|                 | 00      | 5.91               | 5.11     |             |        |
| 8DPSK           | 39      | 5.82               | 5.06     | ≤ 21.00     | Pass   |
|                 | 78      | 5.33               | 4.57     |             |        |

| Modulation Type: | GFSK  |
|------------------|---|
|                  | Spectrum         Image: Construction of the section of the sect |
|                  | • IPk View               M1[1]             • 6.54 dBm             2.40204340 GHz            10 dBm               • 7            0 dBm               • 7   |
| CH00             | -10 dBm   |
| Child            | -30 dBm   |
|                  | -60 dBm70 dB  |
|                  | CF 2.402 CH2     B91 pts     Span 5.0 VH2       Daw:2.01.2019 161648     Monorman     Monorman  |
|                  | RefLevel 20.00 dBm Offset 1.00 dB RBW 1 MHz<br>Att 30 dB SWT 1 ms VBW 3 MHz Mode Auto Sweep<br>Count 500/500<br>Plk View  |
|                  | M1[1] 6.33 dBm<br>2.44095660 GHz<br>0 dBm<br>0 dBm  |
| CH39             | -10 dBm<br>-20 dBm  |
| 0100             | -30 dBm   |
|                  | -60 dBm   |
|                  | CF 2.441 GHz         691 pts         Span 5.0 MHz   |
|                  | Spectrum         Image: Construction of the section of the sect |
|                  | (1) dBm     (1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2  |
|                  | -10 dBm   |
| CH78             | -30 d8m   |
|                  | -50 dBm   |
|                  | CF 2.48 GHz 691 pts Span 5.0 MHz  |

| Ilation Type: | π/4DQPSK   |
|---------------|--|
|               | Spectrum<br>RefLevel 20.00 dBm Offset 1.00 dB  RBW 2 MHz<br>Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep |
|               | Count 500/500<br>9 IPk View  |
|               | M1[1] 5.89 (<br>2.40212300   |
|               | 10 dBm   |
|               | 0 dBm  |
|               | -10 dBm  |
|               | -20 dBm  |
| CH00          | -30 d8m  |
|               | -40 dBm  |
|               | -50 dBm  |
|               |  |
|               | -60 d8m-   |
|               | -70 d8m  |
|               | CF 2.402 GHz 691 pts Span 5.0 M  |
|               |  |
|               | Data:2.JUL2019 162331  |
|               | 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>Count 500/500  |
|               | ●1Pk View M1[1] 5.80 (   |
|               | 10 dBm Y Z.44110130  |
|               | 0 dBm  |
|               | -10 dBm  |
|               |  |
| СН39          | -20 dBm-   |
| 2039          | -30 dBm  |
|               | -40 dBm  |
|               | -50 dBm  |
|               | -60 dBm  |
|               | -70 dBm  |
|               |  |
|               | CF 2.441 GHz 691 pts Span 5.0 M  |
|               | Date:2.JUL2019 1625#2  |
|               | 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        |
|               | Count 500/500  FIR: View   |
|               | 10 dBm M1[1] 5.28 c<br>2.48013020  |
|               |  |
|               | 0 dBm  |
|               | -10 dBm-   |
|               | -20 dBm-   |
| H78           | -30 dBm  |
|               | -40 d8m-   |
|               | -50 dBm  |
|               |  |
|               | -60 dBm  |
|               | -70 d8m  |
|               | CF 2.48 GHz 691 pts Span 5.0 M   |
|               | Messuring Messuring Messuring  |

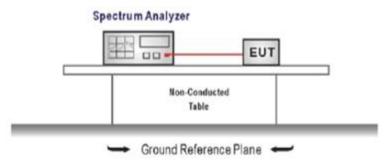
| Spectrum           Ref Level         20.00 dBm         Offset         1.00 dB         RBW         2 MHz           Att         30 dB         SWT         1 ms         VBW         5 MHz           Compt S0/E00         SWT         1 ms         VBW         5 MHz  |  |
|---|--|
|   | 91 dBm<br>30 GHz   |
| 0 dBm   |  |
| -10 dBm   |  |
| -30 dam   |  |
| -40 dBm-  |  |
| -60 dBm   |  |
| CF 2.402 GHz 691 pts Span 5.0   |  |
| Date:2.JUL2019 162967   |  |
| Ref Level         20.00         dBm         Offset         1.00         dB         RBW         2 MHz           Att         30         30 WT         1 ms         VBW 5 MHz         Mode         Auto Sweep           Count 500/0500         500         500         500         500         500         500 |  |
| 10 dBm  | 32 dBm<br>50 GHz   |
| 0 dBm   |  |
| -20 dam   |  |
| -30 dBm-  |  |
| -50 dBm   |  |
| -70 dBm-  |  |
| CF 2.441 GHz 691 pts Span 5.0   |  |
| 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  |  |
|   | 33 dBm<br>50 GHz   |
| 10 dBm MI   |  |
| -10 dBm   |  |
| -30 dBm-  |  |
| -40 dBm   |  |
| -60 dBm   |  |
| CF 2.48 GHz 691 pts Span 5.0  |  |
|   | Att 10 20 B WT 1 firs # VBW 5 Mz Mode Auto Sweep      Att 13     Att 23     Att 24     Att 24 |

### 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      | 1.29                  |             |        |
| π/4DQPSK        | 39      | 1.29                  | -           | Pass   |
|                 | 78      | 1.29                  |             |        |
|                 | 00      | 1.28                  |             |        |
| 8DPSK           | 39      | 1.29                  | -           | Pass   |
|                 | 78      | 1.29                  |             |        |

| Modulation Type: | GFSK   |
|------------------|--|
| CH00             | Spectrum       Image: Constraint of the cons         |
| CH39             | Spectrum         Image: Content of the content of |
| CH78             | Spectrum         Image: Construction of the construle of the construction of the construle of the construction of  |

| dulation Type: | π/4DQPSK   |
|----------------|--|
|                | Spectrum 🕎   |
|                | Ref Level 20.00 dBm Offset 1.00 dB ● RBW 30 kHz<br>● Att 30 dB SWT 63.1 μs ● VBW 100 kHz Mode Auto FFT   |
|                | Caunt 500/500  P1Pk View   |
|                | M1[1] -18:23 dBm   |
|                | 10 dBm M2 M2[1] 2.01 dBm 2.01 dBm 2.40216500 GHz 2.40216500 GHz  |
|                |  |
|                | -10 dbm 01 -17,990 dbm 02 03   |
|                | -20 dBm  |
| CI 100         |  |
| CH00           | -50 dBm  |
|                | -50 dBm  |
|                | -00 USIN   |
|                |  |
|                | CF 2.402 GHz 1001 pts Span 2.5 MHz<br>Marker   |
|                | Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4013675 GHz         ~18.23 dBm                  |
|                | M2         1         2.402165 GHz         2.01 dBm           D3         M1         1         1.285 MHz         0.19 dB   |
|                | Measuring  |
|                | Datu: 2.JUL 2019 16:22:51  |
|                | Spectrum 🕎   |
|                | 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>Count 500/500   |
|                | ●1Pk View M1[1] -18.18 dBm   |
|                | 10 dBm 2.44036750 GHz<br>M2 M2[1] 1.96 dBm<br>X 2.44116500 GHz   |
|                | 0 dBm  |
|                | -10 dBm  |
|                | -20 dBm 01 -18.041 dBm   |
|                | -30 dBm  |
| CH39           | 740-dB/h   |
|                | -50 dBm  |
|                | -60 dBm  |
|                | -70 dBm  |
|                | CF 2.441 GHz 1001 pts Span 2.5 MHz   |
|                | Marker<br>Type Ref   Trc   X-value   Y-value   Function   Function Result  |
|                | M1         1         2.4403675 GHz         -18.18 dBm           M2         1         2.441165 GHz         1.96 dBm   |
|                | D3 M1 1 1.2875 MHz -0.32 dB Nesturing  |
|                | Dam:2.JUL2019 1625:11  |
|                |  |
|                | RefLevel 20.00 dBm Offset 1.00 dB 👄 RBW 30 kHz   |
|                | Att 30 dB SWT 63.1 µs  |
|                | ●1Pk View M1[1] -18.62 dBm   |
|                | 10 dBm 2.47936750 GHz<br>  |
|                |  |
|                | -10 d8m  |
|                | -10 dem  |
|                | -30 d8m  |
| CH78           | ~10 dBm  |
|                | -50 d8m-   |
|                | -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 -18.62 dBm  |
|                | M1         1         2.4793675 GHz         -18.62 dBm           M2         1         2.490165 GHz         1.50 dBm           D3         M1         1         1.285 MHz         0.08 dB |
|                | M1         1         2.4793675 GHz         -18.62 dBm           M2         1         2.480165 GHz         1.50 dBm   |

| Modulation Type: | 8DPSK  |
|------------------|--|
| Modulation Type: | Spectrum         Image: Constraint of the set is a constraint of the s |
|                  | Type         Ref         Trc.         X-value         Y-value         Function         Function           M1         1         2.403575 GHz         -77.61.dBm         -   |
| CH39             | Ref Level 20.00 diam       Offset 1.00 dia       RBW 30 kHz         Att       30 dis       SWT 63.1 µs       VBW 100 kHz       Mode Auto FFT         Count 500/500       91% View       M1[1]       -17.50 diam         10 diam       M2 M2[1]       2.44035750 cHz       2.66 diam         0 diam       M2 M2[1]       2.36 diam       2.66 diam         0 diam       M2 M2[1]       2.36 diam       2.66 diam         -10 diam       M4       M2 M2[1]       2.36 diam         -20 diam       M4       M4       M4       4.4403750 cHz       3.4403750 cHz         -30 diam       M4       M4       M4       4.4403750 cHz       1.0404 cHz       1.0404 cHz         -70 diam       M4       M4       M4       1.0504 cHz       1.0404 cHz       1.0404 cHz         Type       Ref Trc       X-value       Y-value       Function       Function Result       1.0404 cHz         Marker       Type       Ref Trc       X-value       -17.50 diam       1.0104 cHz       1.0014 cHz       1.0104 cHz       1.0   |
| CH78             | Spectrum         Image: Spectrum           Ref Level 20.00 dbm         Offset 1.00 db         RBW         30 kHz           Att         30 db         SWT         63.1 µs         VBW         Mode Auto FFT           Count 500/500         IPK View         17.99 dbm         2.47935750 GHz         2.13 dbm           0 dbm         M2 M2[1]         2.30 dbm         2.4016250 GHz         2.30 dbm           0 dbm         M1[1]         2.4793575 GHz         3         3           20 dbm         M1         1.7.99 dbm         2.4016250 GHz         2.30 dbm           -10 dbm         M1         1.7.99 dbm         3         3         3           -20 dbm         M1         1.7.99 dbm         3         3         3         3           -30 dbm         M1         1.27.90 dbm         3         4  |

### 5.5. Carrier Frequencies Separation

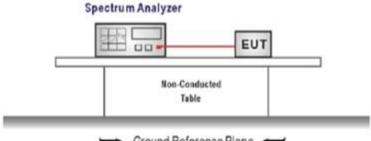
### <u>LIMIT</u>

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

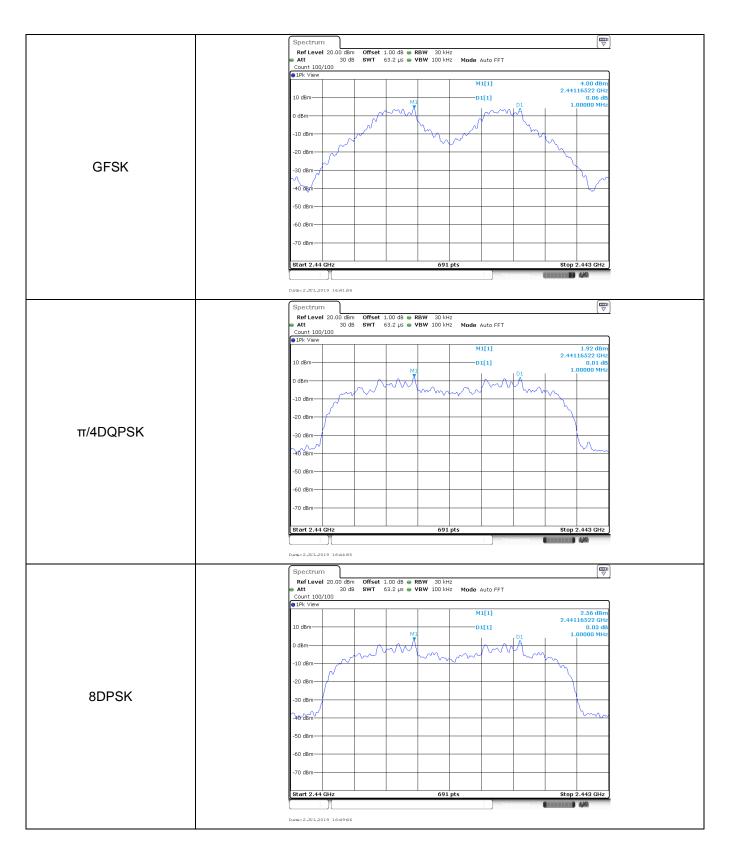
#### TEST RESULTS

#### ☑ Passed □ Not Applicable

| Modulation type | Channel | Carrier Frequencies<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

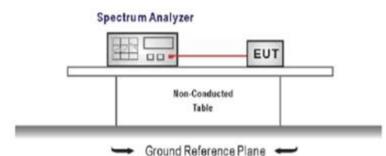


### 5.6. Hopping Channel Number

### LIMIT

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             |        |        |

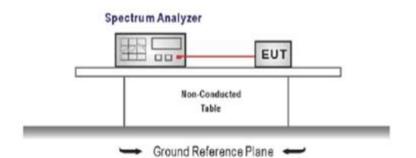
| GFSK  |                  |
|---|------------------|
| GFSK  |                  |
| -40 dBm   |                  |
| (-50 dBm  |                  |
|   |                  |
|   |                  |
|   | -   L            |
| -60 dBm-  |                  |
| -70 dBm-  |                  |
| Start 2.4 GHz 691 pts   | Stop 2.4835 GHz  |
| Measuring   | ·····            |
| Date: 2.JUL.2019 16:41:49   | (                |
| Spectrum<br>Ref Level 20.00 dBm Offset 1.00 dB  RBW 100 kHz                                     |                  |
| Att 30 dB SWT 1 ms VBW 300 kHz Mode Auto Sweep  |                  |
|   |                  |
|   |                  |
| 0.09844444444444444444444444444444444444  | ANNANANA ANA     |
| -10 d8m   |                  |
| -20 dBm   |                  |
| π/4DQPSK  |                  |
|   | - I Y            |
| -40 dBm-  |                  |
| -50 dBm-  | 4                |
| -60 d8m-  |                  |
| -70 dBm   |                  |
| Start 2.4 GHz 691 pts   | Stop 2.4835 GHz  |
| Heasting  |                  |
| Date:2.JUL2019 16:4538  |                  |
| Spectrum  |                  |
| RefLevel 20.00 d8m Offset 1.00 d8 RBW 100 kHz<br>Att 30 d8 SWT 1 ms VBW 300 kHz Mode Auto Sweep |                  |
| PPk View  |                  |
| 10 dBm  |                  |
| 0.0844400444444444444444444444444444444   | Allandraider and |
| -10 dBm   |                  |
| - 20 dBm  |                  |
|   |                  |
| 8DPSK   |                  |
| -40 dBm   |                  |
| -50 dBm-  |                  |
| -60 d8m   |                  |
| -70 dBm   |                  |
|   |                  |
| Start 2.4 GHz 691 pts   | Stop 2.4835 GHz  |
| Measuring   | 4/6              |

### 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:

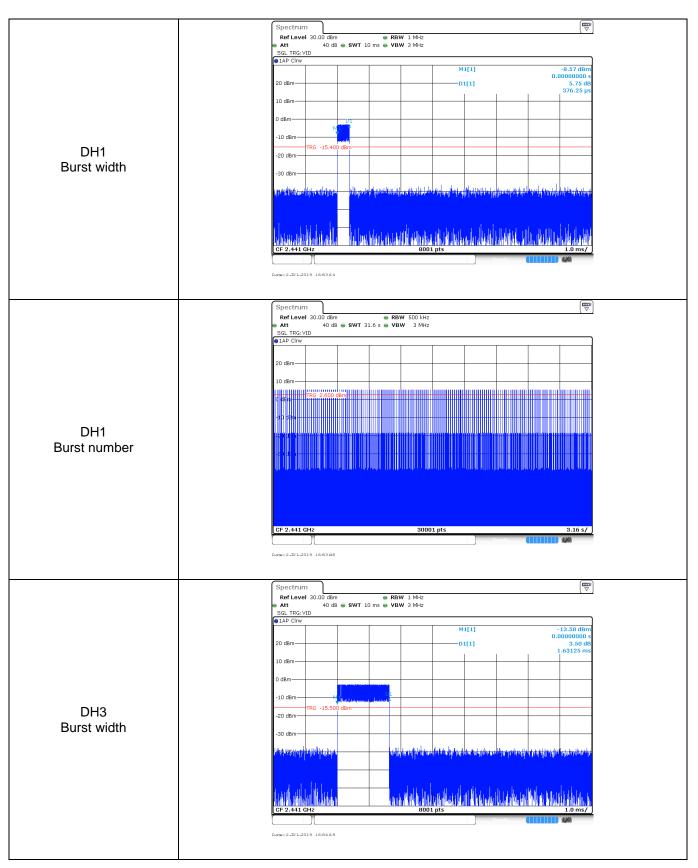
Please refer to the clause 3.3

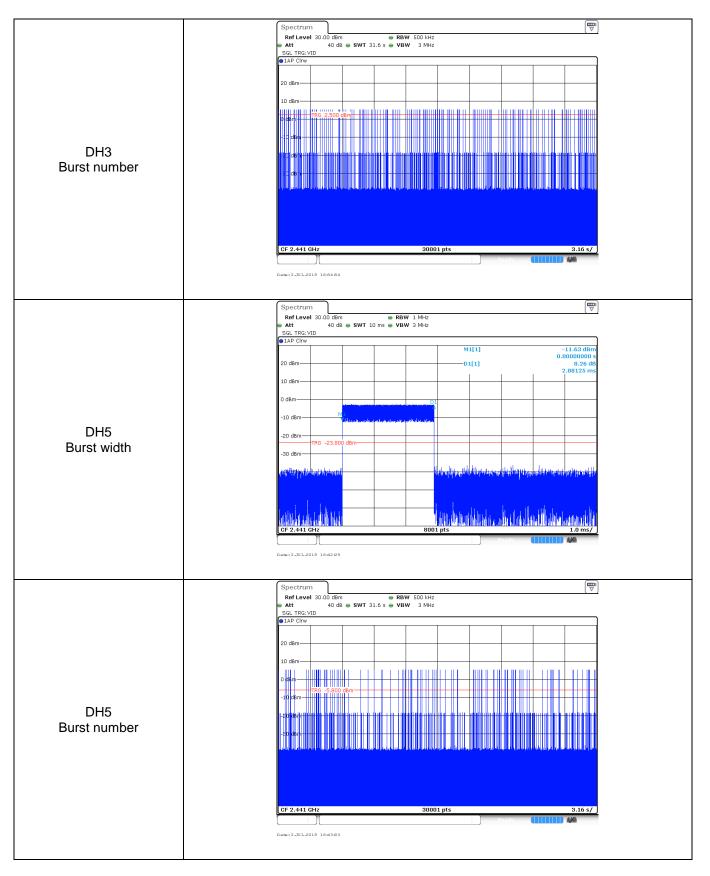
#### TEST RESULTS

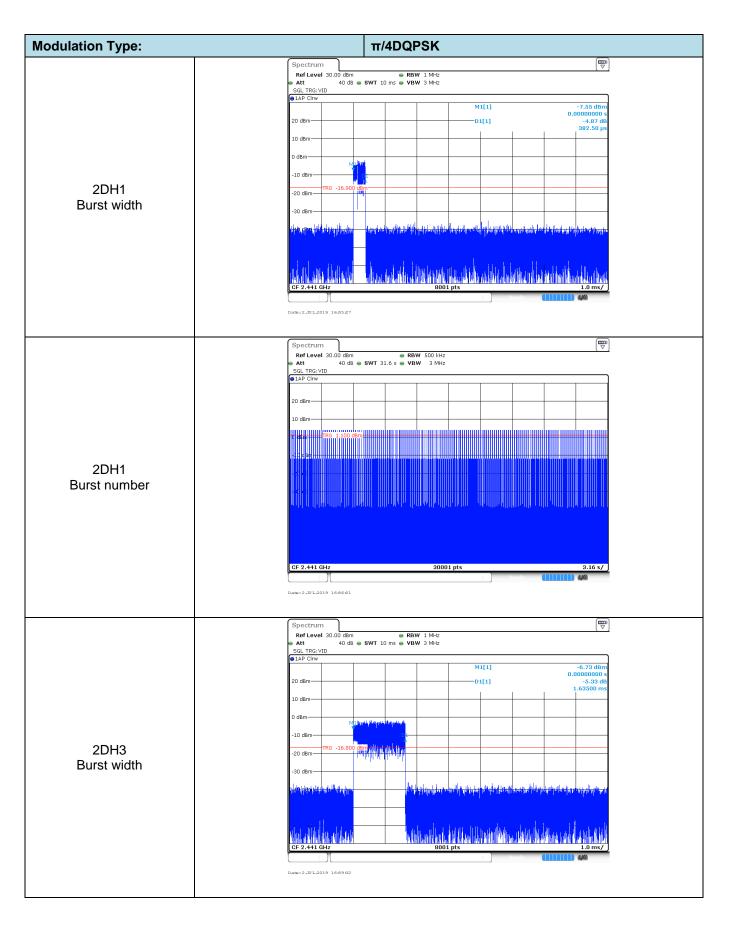
### ☑ Passed □ Not Applicable

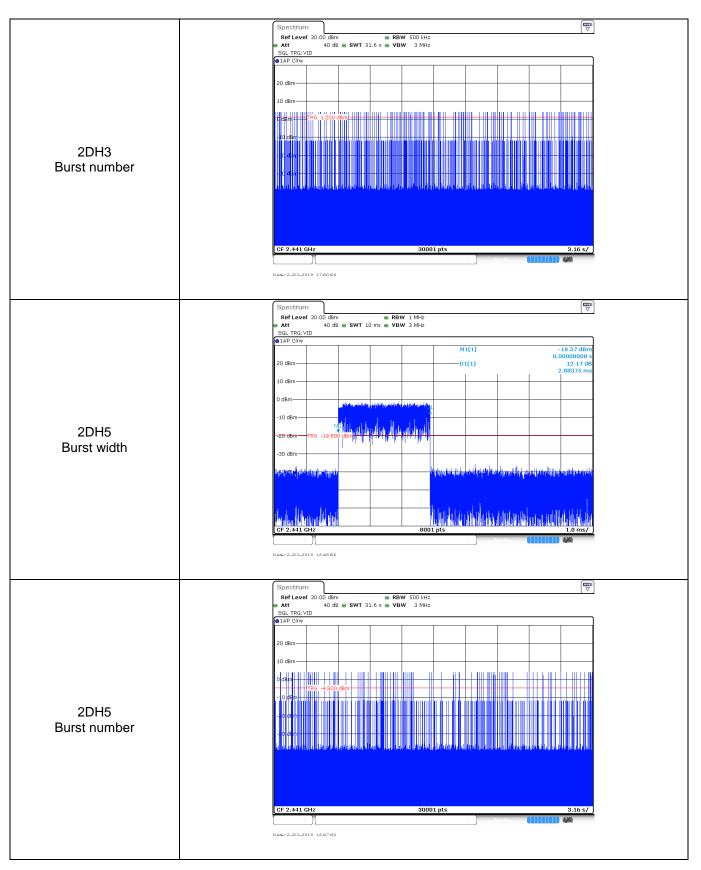
| Modulation<br>type | Channel   | Burst Width<br>[ms/hop/ch] | Total<br>Hops[hop*ch] | Dwell time<br>(Second) | Limit<br>(Second) | Result |
|--------------------|-----------|----------------------------|-----------------------|------------------------|-------------------|--------|
|                    | DH1       | 0.38                       | 314.00                | 0.12                   |                   |        |
| GFSK               | DH3       | 1.63                       | 162.00                | 0.26                   | ≤ 0.40            | Pass   |
|                    | DH5       | 2.88                       | 105.00                | 0.30                   |                   |        |
|                    | 2DH1      | 0.38                       | 314.00                | 0.12                   |                   |        |
| π/4DQPSK           | QPSK 2DH3 | 1.63                       | 163.00                | 0.27                   | ≤ 0.40            | Pass   |
|                    | 2DH5      | 2.88                       | 112.00                | 0.32                   |                   |        |
|                    | 3DH1      | 0.38                       | 314.00                | 0.12                   |                   |        |
| 8DPSK              | 3DH3      | 1.63                       | 157.00                | 0.26 ≤ 0.40            |                   | Pass   |
|                    | 3DH5      | 2.89                       | 102.00                | 0.29                   |                   |        |
|                    |           |                            |                       |                        |                   |        |

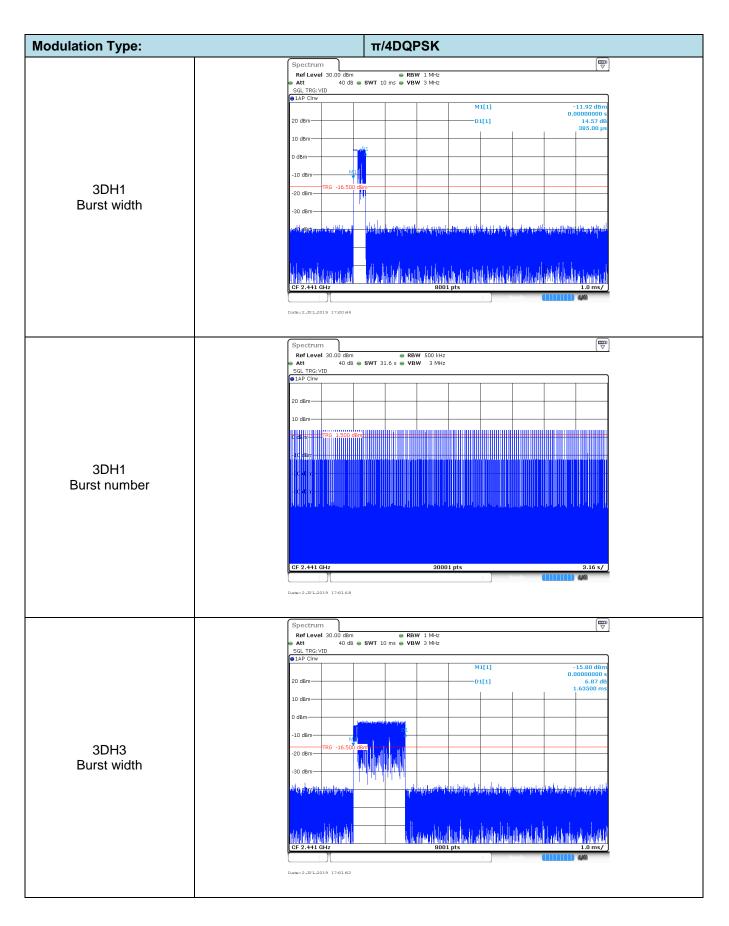
| Modulation Type: | GFSK |
|------------------|------|
|------------------|------|

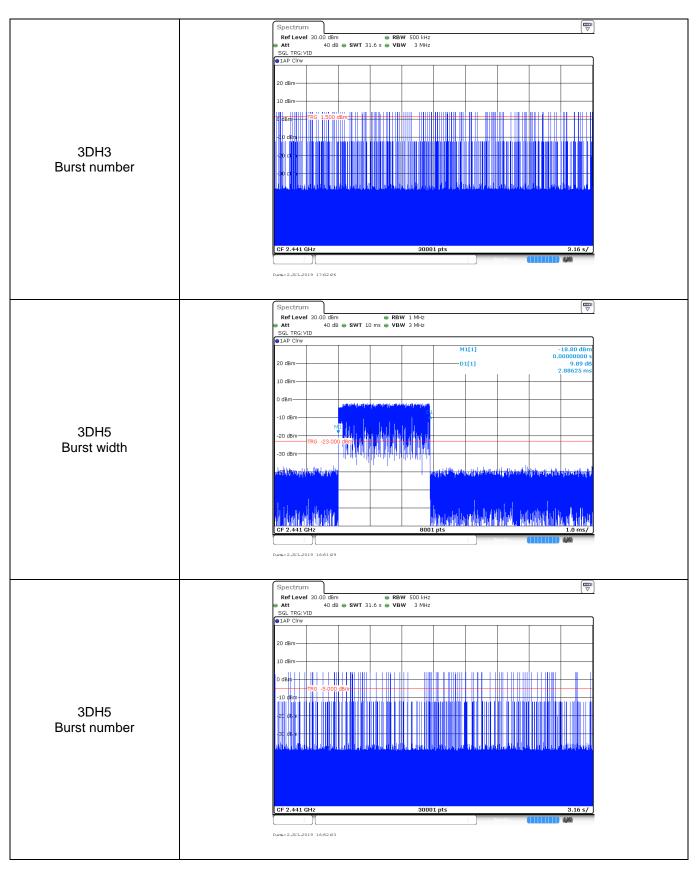












### 5.8. Pseudorandom Frequency Hopping Sequence

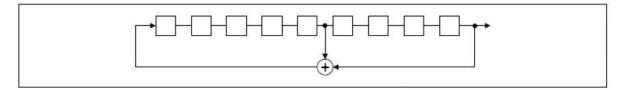
### <u>LIMIT</u>

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 | Ũ | 78       | 1      | 73    | 75 7 |
|---|---|---|---|-------|----|---|----------|--------|-------|------|
| ٦ |   |   |   | <br>1 |    |   | 1        |        | <br>Γ |      |
|   |   |   |   | 1     |    |   | i        |        | 1     |      |
|   |   |   |   |       |    |   | 1        |        |       |      |
|   |   |   |   |       | ∟. |   | <u>i</u> | $\Box$ | <br>L |      |

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.

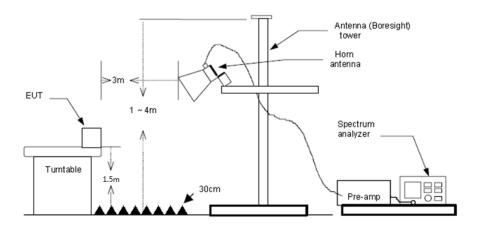
### 5.9. Restricted band (radiated)

### <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
- 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 channe    | el:                 |                |                   | СН00              |                |            |          |  |
|----------------|---------------------|----------------|-------------------|-------------------|----------------|------------|----------|--|
| Freq.<br>[MHz] | Reading<br>[dBµV/m] | Factor<br>[dB] | Level<br>[dBµV/m] | Limit<br>[dBµV/m] | Margin<br>[dB] | Polarity   | Detector |  |
| 2310.000       | 24.85               | -2.33          | 22.52             | 54.00             | 31.48          | Vertical   | AV       |  |
| 2310.000       | 31.36               | -2.33          | 29.03             | 74.00             | 44.97          | Vertical   | PK       |  |
| 2390.000       | 44.51               | -2.41          | 42.10             | 74.00             | 31.90          | Vertical   | PK       |  |
| 2390.000       | 30.89               | -2.41          | 28.48             | 54.00             | 25.52          | Vertical   | AV       |  |
| Freq.<br>[MHz] | Reading<br>[dBµV/m] | Factor<br>[dB] | Level<br>[dBµV/m] | Limit<br>[dBµV/m] | Margin<br>[dB] | Polarity   | Detector |  |
| 2310.000       | 30.13               | -2.33          | 27.80             | 74.00             | 46.20          | Horizontal | PK       |  |
| 2310.000       | 23.23               | -2.33          | 20.90             | 54.00             | 33.10          | Horizontal | AV       |  |
| 2390.000       | 37.68               | -2.41          | 35.27             | 54.00             | 18.73          | Horizontal | AV       |  |
| 2390.000       | 53.60               | -2.41          | 51.19             | 74.00             | 22.81          | Horizontal | PK       |  |

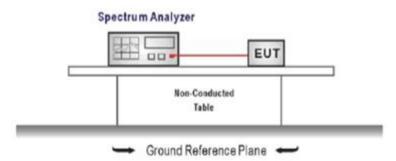
| Fest channe    | el:                 |                |                   | CH78              |                |            |          |  |
|----------------|---------------------|----------------|-------------------|-------------------|----------------|------------|----------|--|
| Freq.<br>[MHz] | Reading<br>[dBµV/m] | Factor<br>[dB] | Level<br>[dBµV/m] | Limit<br>[dBµV/m] | Margin<br>[dB] | Polarity   | Detector |  |
| 2483.500       | 58.63               | -2.15          | 56.48             | 74.00             | 17.52          | Vertical   | PK       |  |
| 2483.500       | 45.41               | -2.15          | 43.26             | 54.00             | 10.74          | Vertical   | AV       |  |
| 2500.000       | 30.18               | -2.10          | 28.08             | 54.00             | 25.92          | Vertical   | AV       |  |
| 2500.000       | 42.67               | -2.10          | 40.57             | 74.00             | 33.43          | Vertical   | PK       |  |
| Freq.<br>[MHz] | Reading<br>[dBµV/m] | Factor<br>[dB] | Level<br>[dBµV/m] | Limit<br>[dBµV/m] | Margin<br>[dB] | Polarity   | Detector |  |
| 2483.500       | 66.42               | -2.15          | 64.27             | 74.00             | 9.73           | Horizontal | PK       |  |
| 2483.500       | 53.46               | -2.15          | 51.31             | 54.00             | 2.69           | Horizontal | AV       |  |
| 2500.000       | 35.87               | -2.10          | 33.77             | 54.00             | 20.23          | Horizontal | AV       |  |
| 2500.000       | 50.42               | -2.10          | 48.32             | 74.00             | 25.68          | Horizontal | PK       |  |

# 5.10. Band edge and Spurious Emissions (conducted)

#### LIMIT

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

| Test Item:              | Band edge | Modulation type: GFSK  |
|-------------------------|-----------|--|
|                         |           | Spectrum         Image: Construction of the second sec                                 |
|                         |           | Image: big start with the start withe start with the start with the start with the start                        |
| CH00                    |           | -10 dBm  |
| No hopping mode         |           | -50 dBm  |
|                         |           | Start 2.31 GHz         691 pts         Stop 2.405 GHz           Marker         Type [Ref]         Trc         X-value         Y-value         Function           M1         1         2.40248 GHz         6.05 dBm         Function Result           M2         1         2.4 GHz         -52.57 dBm         Image: Start 2.31 GHz         Start 2.37 dBm           M3         1         2.39 GHz         -55.91 dBm         Image: Start 2.37 dBm         Image: Start 2.37 dBm           M4         1         2.31 GHz         -55.21 dBm         Image: Start 2.37 dBm         Image: Start 2.37 dBm  |
|                         |           | Measuring (111111) (4)   |
|                         |           | Spectrum         TOT           Ref Level 20.00 dBm         Offset 1.00 dB         RBW 100 kHz           Att         30 dB         SWT         1.1 ms         VBW 300 kHz         Mode Auto Sweep           Count 500/500         GBK Max         SWE         SWE         SWE         SWE   |
|                         |           | DPL Max         M1[1]         6.15 dBm           10 dBm         2.404240 GMz           0 dBm         M2[1]         -53.21 dPr           0 dBm         2.40000 dPz  |
|                         |           | -10 dBm 01 -13.850 dBm 01 -13.850 dBm 01 -13.950 dB |
| CH00<br>Hopping mode    |           | MC         MC         MC           MS         MS         MS  |
|                         |           | Start 2.31 GHz         691 pts         Stop 2.485 GHz           Marker         Type   Kef   Trc           X-value         Function         Function Result           M1         1         2.40424 GHz         6.15 dBm   |
|                         |           | M2         1         2.4 GHz         -53.21 dBm           M3         1         2.39 GHz         -56.44 dBm           M4         1         2.31 GHz         -55.70 dBm           M5         1         2.373884 GHz         -53.62 dBm   |
|                         |           | Date:2.2012:019 1642:03           Spectrum         Image: Control of the sector of the sect                        |
|                         |           | Att         30 dB         SWT         56.9 µs         VBW 300 kHz         Mode         Auto FFT           Count 500/S00         FIRk Max         M1[1]         5.90 dBm           10 dBm         2.4801490 GHz   |
|                         |           | M2[1]         -56.74 dBm           0 dBm         2.4835000 GHz           -10 dBm         0           -20 dBm         0   |
| CH78<br>No hopping mode |           | -30 dgm  |
|                         |           | -60 dBm  |
|                         |           | Start 2.478 GHz         Stop 2.5 GHz           Marker         Type Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.480149 GHz         5.90 dBm   |
|                         |           | M3 1 2:4935159 GHz -59:39 GHm<br>M4 1 2:4935159 GHz -56:77 dBm<br>Date:2.3012019 162120  |

#### Report No.: CHTEW19070046

|                      | Spectrum         Image: Constraint of the sector of t |
|----------------------|---|
|                      |   |
|                      | 10 dBm M1[1] 4.99 dBm<br>2.4780480 GHz<br>M2[1] -59.47 dBm  |
|                      | 2.4835000 GHz   |
|                      | -10 USI/V 1 -15.010 dBm   |
| CH78                 | -30 dBm   |
| CH78<br>Hopping mode |   |
|                      | -60 dBm - "" ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~  |
|                      | Start 2.478 GHz 691 pts Stop 2.5 GHz  |
|                      | Start 2.478 GH2 091 pts Stop 2.5 GH2  |
|                      | Type Ref Trc X-value Y-value Function Function Result   |
|                      | M1 1 2.478048 GHz 4.99 dBm  |
|                      | M2         1         2.4835 GHz         -59.47 dBm           M3         1         2.5 GHz         -60.07 dBm           M4         1         2.4980232 GHz         -57.24 dBm  |
|                      | Measuring (Annumatic Annumatic  |
|                      | Dam:2.JUL2019 16%220  |

| Fest Item:              | Band edge   | Modulation type:  | π/4DQPSK   |
|-------------------------|---|---|--|
| CH00<br>No hopping mode |   | Militian         Militian           1 20.00 dBm         Offset 1.00 dB @ RBW 100 kHz         Mode Auto Swee           30 dB         SWT         1.1 ms @ VBW 300 kHz         Mode Auto Swee           500         M1[1]         M2[1]         M2[1]           D1 -15.460 dBm         Image: Sweet Swe |  |
|                         | Marker         Type         Re           Type         Re         M2           M2         M3         M3           M4         M5         M4           Dates (2.201.2)         Spectrur                              | 1     2.40191 GHz     4.54 dBm       1     2.4 GHz     -50.88 dBm       1     2.39 GHz     -55.87 dBm       1     2.319 GHz     -54.96 dBm       1     2.399493 GHz     -51.62 dBm  | Function Result  |
| CH00                    | Ref Lave<br>Att<br>Count 500<br>IPk Max<br>10 dBm   | 1 20.00 dbm Offset 1.00 db @ RBW 100 kHz Mode Auto Swee 30 db SWT 1.1 ms @ VBW 300 kHz Mode Auto Swee /500 M1[1] M2[1] O1 -16.410 dBm O1 -16.410 dBm O1 -16.410 dBm   | 2.404110 GHz<br>-3.59 dBm<br>2.404110 GHz<br>-35.00 dBrg<br>2.400000 dHg |
| Hopping mode            | +50 dBm<br>   | f         Trc         X-value         Y-value         Function           1         2.40411 GHz         3.59 dBm         1           1         2.4 GHz         55.08 dBm         1           1         2.39 GHz         -55.09 dBm         1           1         2.31 GHz         -55.09 dBm         1           1         2.31 GHz         -55.09 dBm         1           1         2.399906 GHz         -53.10 dBm         1   | Stop 2,405 GHz   |
|                         | Date: 2.201.2<br>Spectrur<br>Ref Leve<br>Att<br>Count 500<br>IPk Max<br>10 dBmm   | 1 20.00 dBm Offset 1.00 dB = RBW 100 kHz<br>30 dB SWT 56.9 μs = VBW 300 kHz Mode Auto FFT<br>/500 M1[1]   | (₩   |
| CH78<br>No hopping mode | 10 dam, min       0 dam       -10 dam       -20 dam       -20 dam       -30 dam       -00 dam       -50 dam       -60 dam       -70 dam       Start 2.47       Marker       Type   Rt       Mil       M3       M4 |   |  |

#### Report No.: CHTEW19070046

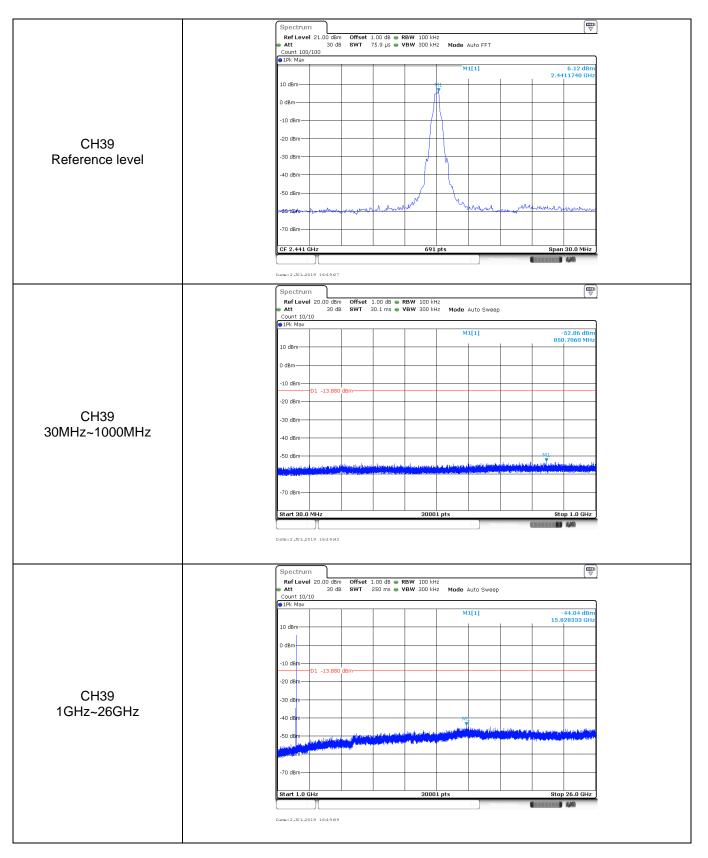
|                      | Spectrum         Image: Spectrum           Ref Level 20.00 dBm         Offset 1.00 dB ● RBW 100 kHz           Att         30 dB         SWT         56.9 µs ● VBW 300 kHz         Mode Auto FFT           Count S00/500         Count S00/500         Count S00/500         Count S00/500         Count S00/500 |
|----------------------|---|
|                      | IPk Max   |
|                      | 10 dBm  |
|                      | BdBm  |
|                      | -10 dBm   |
|                      | -20 dBm   |
|                      | -30 dBm   |
| CH78<br>Hopping mode | -40 dBm   |
| hopping mode         |   |
|                      | -70 dBm   |
|                      | Start 2.478 GHz 691 pts Stop 2.5 GHz  |
|                      | Marker  |
|                      | Type Ref Trc X-value Y-value Function Function Result   |
|                      | M1 1 2.47808 GHz 3.69 dBm<br>M2 1 2.4835 GHz -59.79 dBm   |
|                      | M2         1         2.8 G M         577 9 G M           M3         1         2.8 G H         -60.05 d Bm           M4         1         2.4837072 GHz         -57.23 d Bm  |
|                      | Measuring.  |
|                      | Datu:2.JUL2019 164647   |

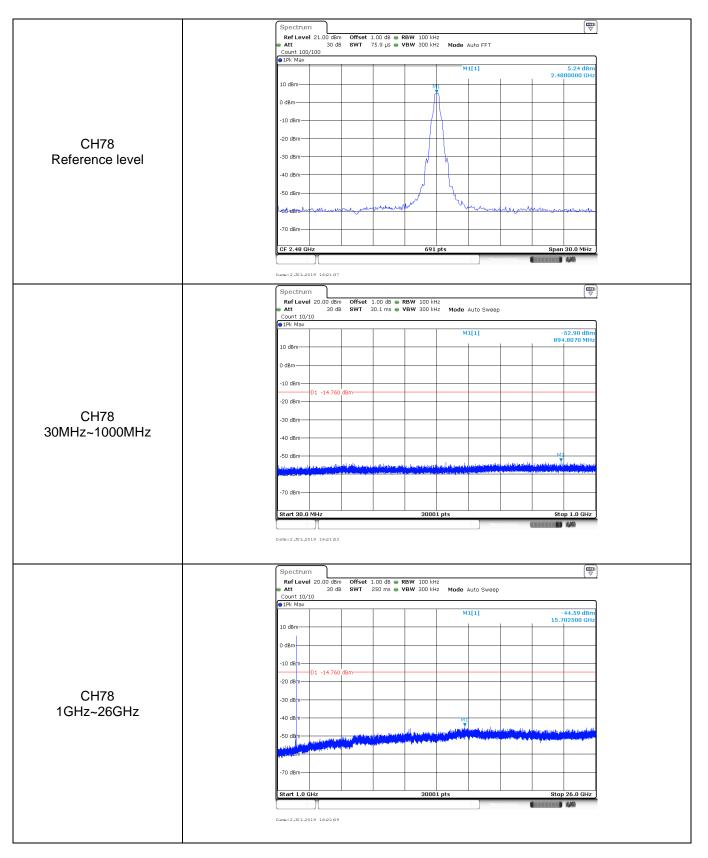
| st Item:                | Band edge                                     |   | Modu  | llation                                       | type:                    |   | 8DF              | SK  |
|-------------------------|---|---|---|---|--------------------------|---|------------------|---|
|                         | Att     Count     Dept                        | evel 20.00 dBm<br>30 dB<br>500/500  | Offset 1.00 dE<br>SWT 1.1 ms  |   |                          |   | •                | 4.43 dBm<br>2.401910,GHz                              |
|                         | 10 dBr<br>0 dBm<br>-10 dB<br>-20 dB<br>-30 dB | mD1 -15.570 dB  | 3m  |   | M2[                      | 1]  |                  | 2.401910.012<br>-52.02 dBm<br>2.400000 BHz            |
| CH00<br>No hopping mode | -40 de<br>-50 de<br>-60 de<br>-70 de          | m<br>m<br>m   | -notesta and -  | Aurona Maria                                  |                          | an and a start and a start a st | M3               |   |
|                         | Marke   | Ref         Trc           1         1           1         1           1         1 | X-value<br>2.40191 GHz<br>2.4 GHz<br>2.39 GHz<br>2.31 GHz<br>2.399768 GHz | Y-value<br>4.43<br>-52.02<br>-56.92<br>-55.91 | dBm<br>dBm<br>dBm<br>dBm | in  | S<br>Function Re | top 2.405 GHz<br>esult                                |
|                         | Spec  | UL.2019 16:31:32  | Offset 1.00 dB  | • RBW 1001                                    | Hz                       | Measuri   | DO               | <b>₩</b>  |
|                         | Att     Count     Count     To den     O dBm  | 500/500<br>Max  | SWT 1.1 ms  | • VBW 3001                                    | Hz Mode Au               | 1]  |                  | 2.89 dBm<br>2.404930 GHz<br>-53.52 dBm<br>2.400000 gw |
|                         | -10 d8<br>-20 d8<br>-30 d8                    | mD1 -17.110 dB  | 3m  |   |                          |   |                  |   |
| CH00<br>Hopping mode    | -40 dB<br>-50 dB<br>-60 dB<br>-70 dB          | m<br>/w////////////////////////   | handerstanders  | h-m-qlonutne-ndl                              | madrawet in the second   | rolline alon  | M3               | Me  |
|                         | Marke<br>Type<br>MM<br>M2<br>M42              | Ref         Trc           1         1           1         1           1         1 | X-value<br>2.40493 GHz<br>2.4 GHz<br>2.39 GHz<br>2.31 GHz                 | Y-value<br>2.89<br>-53.52<br>-56.47<br>-55.80 | JBm<br>JBm<br>JBm<br>JBm | in  | S<br>Function Re | top 2.405 GHz<br>əsult                                |
|                         | Spec  | UL.2019 16:50:13  | 2.399768 GHz  |   |                          | Measuri   | ng               | <b>₩</b>  |
|                         | 🗕 Att   | 30 dB<br>500/500<br>Max   | Offset 1.00 dE<br>SWT 56.9 μs   |   | Hz Mode Au               | 1]  |                  | 4.37 dBm<br>2.4801490 GHz                             |
| CH78<br>No hopping mode | 0 dBm<br>-10 dB<br>-20 dB                     | D1 -15.630 dE   | Jm  |   | M2[                      | 1]  |                  | -57.52 dBm<br>2.4835000 GHz                           |
|                         | -ao da<br>-bo da<br>/50 da<br>-60 da          | m   | M2994   | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~        | ****                     | 1.054 ct  |                  |   |
|                         | Marke   | 2.478 GHz<br>-<br>  Ref   Trc   | X-value<br>2.480149 GHz   | Y-value                                       |                          | in  | Function Re      | Stop 2.5 GHz<br>esult                                 |
|                         | MS<br>M3<br>M-                                | 1   | 2.4835 GHz<br>2.4835 GHz<br>2.5 GHz<br>2.4839304 GHz                      | -57.52  | dBm<br>dBm               | Measuri   |                  | 49  |

#### Report No.: CHTEW19070046

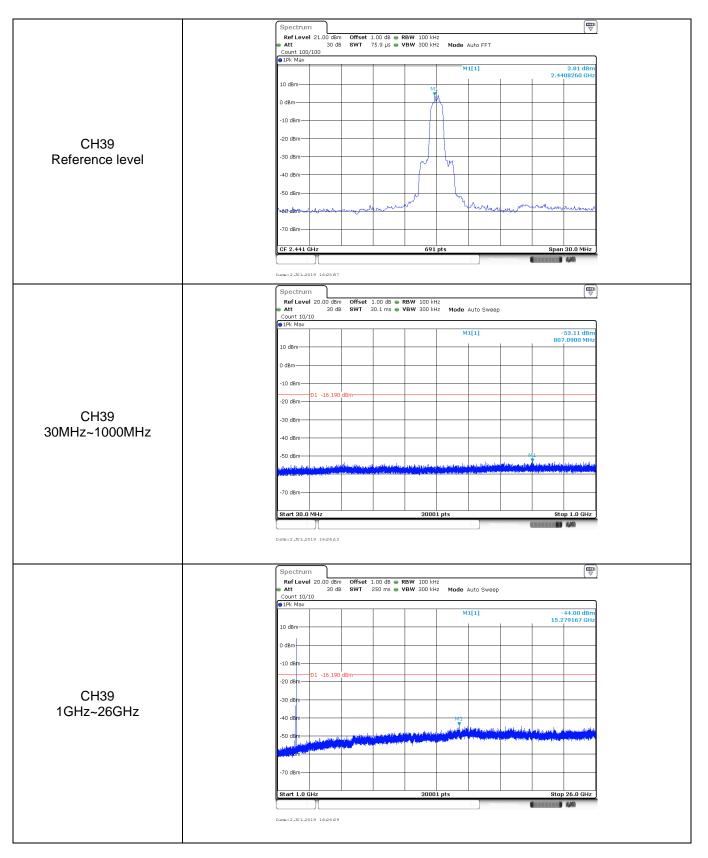
|                     | Spectrum<br>Ref Level<br>Att                          | 20.00 dBm |                                     |                                 | BW 100 kHz<br>BW 300 kHz | Mode Auto Fi  | T |     |             |
|---------------------|---|-----------|-------------------------------------|---------------------------------|--------------------------|---|---|-----|-------------|
| CH78<br>Hoppig mode | Count 500/<br>Irk Max<br>10 dBm<br>-10 dBm<br>-10 dBm | /500      | M2<br>X-value<br>2.478175<br>2.4893 | GHz<br>GHz<br>GHz<br>GHz<br>GHz | BW 300 kHz               | M1[1]<br>M2[1]<br>M2[1]<br>M2<br>M2<br>M2<br>M2<br>M2<br>M2<br>M2<br>M2<br>M2<br>M2 |   | 2.4 | top 2.5 GHz |

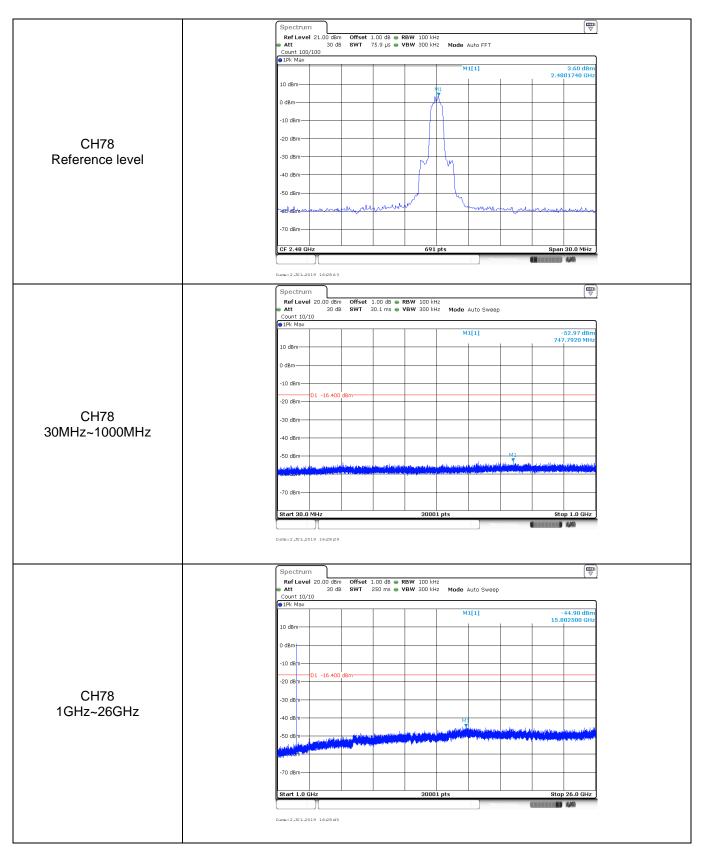
| CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00<br>CH00 | est Item:       | SE      |  | Μ                                       | odula                   | ation t                      | ype:                                    |                                 | G                                | FSK  |
|--|-----------------|---------|--|---|-------------------------|------------------------------|---|---------------------------------|----------------------------------|--|
| CH00<br>eference level   |                 |         |  |   |                         |                              |   |                                 |                                  | E C  |
| CH00<br>eference level   |                 |         | Att                                    |   |                         |                              |   | uto FFT                         |                                  |  |
| CH00<br>eference level   |                 |         |  |   |                         |                              |   |                                 |                                  |  |
| CH00<br>eference level   |                 |         |  |   |                         |                              | м                                       | u[1]                            | I                                | 5.76 dBi<br>2.4020000 GH   |
| CH00<br>eference level   |                 |         |  |   |                         | 2                            |   |                                 |                                  |  |
| CH00<br>eference level   |                 |         | 0 dBm                                  |   |                         |                              |   |                                 |                                  |  |
| CH00<br>eference level   |                 |         | -10 dBm                                |   |                         |                              |   |                                 |                                  |  |
| CH00<br>MHz-1000MHz  | CHOO            |         | -20 dBm                                |   |                         |                              |   |                                 |                                  |  |
| CH00<br>MHz~1000MHz  |                 |         | -30 dBm                                |   |                         |                              | 4                                       |                                 |                                  |  |
| CH00<br>MHz~1000MHz  | Reference level |         | -40 dBm                                |   |                         |                              |   |                                 |                                  |  |
| CH00<br>MHz-1000MHz  |                 |         | -50 dBm                                |   |                         | l v                          | <u> </u>                                |                                 |                                  |  |
| CH00<br>MHz~1000MHz  |                 |         | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | and | mont                    | r                            | July                                    | untryfu                         | Mr. Market                       | Manan  |
| CH00<br>MHz-1000MHz  |                 |         | -70 dBm                                |   |                         |                              |   |                                 |                                  |  |
| CH00<br>MHz-1000MHz  |                 |         | CE 2 402 GHz                           |   |                         | 691                          | nts                                     |                                 |                                  | Span 30.0 MHz  |
| CH00<br>MHz-1000MHz  |                 |         |  |   |                         | 051                          | pes                                     | Measu                           | ring                             |  |
| CH00<br>MHz~1000MHz  |                 |         | Date:2.JUL.2019 16                     | 6:17:18                                 |                         |                              |   |                                 |                                  |  |
| CH00<br>MHz~1000MHz  |                 |         |  |   |                         |                              |   |                                 |                                  |  |
| CH00<br>MHz~1000MHz  |                 |         |  |   | 1 00 40 - 1             |                              |   |                                 |                                  |  |
| CH00<br>MHz~1000MHz  |                 |         | 👄 Att                                  | 30 dB SWT                               | 30.1 ms 👄 '             | VBW 300 kH                   | z Mode                                  | Auto Sweep                      |                                  |  |
| CH00<br>MHz~1000MHz  |                 |         |  |   |                         |                              | м                                       | u[1]                            |                                  | -53.58 dBi   |
| CH00<br>MHz~1000MHz  |                 |         | 10 dBm                                 |   |                         |                              |   |                                 |                                  | 631.5900 MH  |
| CH00<br>MHz~1000MHz  |                 |         | 0 dBm                                  |   |                         |                              |   |                                 |                                  |  |
| CH00<br>MHz~1000MHz  |                 |         | -10 dBm                                |   |                         |                              |   |                                 |                                  |  |
| CH00<br>MHz~1000MHz         30 dm  |                 |         | D1 -                                   | 14.240 dBm                              |                         |                              |   |                                 |                                  |  |
| MHz~1000MHz         40 dBm         40 dBm         10  | CH00            |         |  |   |                         |                              |   |                                 |                                  |  |
| CH00<br>GHz~26GHz  |                 |         |  |   |                         |                              |   |                                 |                                  |  |
| CH00<br>GHz~26GHz  |                 |         | -40 dBm                                |   |                         |                              |   |                                 |                                  |  |
| Start 30.0 MHz         30001 pts         Stor           Dam: 22.012.2019 1647.04         Dam: 22.012.2019 1647.04         Dam: 22.012.2019 1647.04           Spectrum         Ref Level 20.00 dBm Offset 1.00 dB @ RBW 100 kHz<br>Att 30 dB WYT 250 ms @ VBW 300 kHz         Mode Auto Sweep           Court 10/10         Dam: 20.00 dBm Offset 1.00 dB @ RBW 100 kHz         Mode Auto Sweep           Court 10/10         Dam: 20 dB m Offset 1.00 dB @ RBW 100 kHz         Mode Auto Sweep           Court 10/10         Dam: 20 dB m Offset 1.00 dB m   |                 |         | -50 dBm                                | ata at Julian which can be              |                         | مراجلين فراعام فل            | a data da a da a da a da a da a da a da | M2<br>J. Local Republic         | م المراجع الم                    | Matteries Description of the   |
| Start 30.0 MHz         30001 pts         Stor           Dam: 22.012.2019 1647.04         Dam: 22.012.2019 1647.04         Dam: 22.012.2019 1647.04           Spectrum         Ref Level 20.00 dBm Offset 1.00 dB @ RBW 100 kHz<br>Att 30 dB WYT 250 ms @ VBW 300 kHz         Mode Auto Sweep           Court 10/10         Dam: 20.00 dBm Offset 1.00 dB @ RBW 100 kHz         Mode Auto Sweep           Court 10/10         Dam: 20 dB m Offset 1.00 dB @ RBW 100 kHz         Mode Auto Sweep           Court 10/10         Dam: 20 dB m Offset 1.00 dB m   |                 |         | -                                      | an dents Middan y consul y in           |                         |                              | dayah yang kana kana kata da            | a na shekara da katalikan kudir | belien verklen die erze viereite | a na an   |
| CH00<br>GHz~26GHz  |                 |         | -70 dBm                                |   |                         |                              |   |                                 |                                  |  |
| CH00<br>GHz~26GHz  |                 |         | Start 30.0 MHz                         |   |                         | 3000                         | 1 pts                                   |                                 |                                  | Stop 1.0 GHz   |
| Spectrum         Ref Level 20.00 dBm         Offset 1.00 dB         RBW 100 kHz         Mode Auto Sweep           Count 10/10         Image: Spectrum         Ima  |                 |         |  |   |                         |                              |   | Measu                           | ring 💵                           | 1991 - Carlos Ca |
| CH00         GBr         Offset 1.00 dB • RBW 100 kHz         Mode Auto Sweep           Count 10/10         • IPk Max         • M1[1]         • · · · · · · · · · · · · · · · · · · ·  |                 |         | Date:2.JUL.2019 16                     | 6:17:34                                 |                         |                              |   |                                 |                                  |  |
| CH00         GBr         Offset 1.00 dB • RBW 100 kHz         Mode Auto Sweep           Count 10/10         • IPk Max         • M1[1]         • · · · · · · · · · · · · · · · · · · ·  |                 | <b></b> | <u>(</u>                               | <u></u>                                 |                         |                              |   |                                 |                                  | ( <b>-</b>   |
| CH00<br>GHz~26GHz  |                 |         | Ref Level 20.0                         | 00 dBm Offset                           | 1.00 dB 👄 I             | RBW 100 kH                   | z                                       |                                 |                                  |  |
| CH00<br>GHz~26GHz  |                 |         | Count 10/10                            | 30 dB <b>SWT</b>                        | 250 ms 👄 🕻              | VBW 300 kH                   | z Mode /                                | uto Sweep                       |                                  |  |
| CH00<br>GHz~26GHz  |                 |         | THK Max                                |   |                         |                              | м                                       | I[1]                            |                                  | -44.17 dBi<br>15.856667 GH   |
| CH00<br>GHz~26GHz  |                 |         | 10 dBm                                 |   |                         |                              |   |                                 |                                  | 10.00007 GP  |
| CH00<br>GHz~26GHz  |                 |         | 0 dBm                                  |   |                         |                              |   |                                 |                                  |  |
| CH00<br>GHz~26GHz  |                 |         |  | 14.040 d2-                              |                         |                              |   |                                 |                                  |  |
| GHz~26GHz  |                 |         |  | 14.240 dBm                              |                         |                              |   |                                 |                                  |  |
| GHz~26GHz  |                 |         | -30 dBm                                |   |                         |                              |   |                                 |                                  |  |
|  | 1GHz~26GHz      |         |  |   |                         |                              | 101                                     |                                 |                                  |  |
|  |                 |         |  | ط الع و ال                              | يطر فعلمان بعار بين أور | ور السور مياليو.             | Abara and Alita and                     | illing a start of               | and the law,                     | epitela in a production production   |
| -70 dBm-   |                 |         | ملعقل بينان                            |   |                         | a bela alla se all'Alla da s | PROFESSION IN                           | - an stated production          | and the second second second     | a fan skriet fan fan fan fan skriet yn fan fan skriet yn fan fan skriet fan fan skriet fan fan skriet fan fan s  |
| -70 dBm  |                 |         |  |   |                         |                              |   |                                 |                                  |  |
|  |                 |         | -70 dBm                                |   |                         |                              |   |                                 |                                  |  |
|  |                 |         | Start 1.0 GHz                          | 1                                       | 1                       | 3000                         | 1 pts                                   |                                 |                                  | Stop 26.0 GHz  |
| Datu:2.201.2019 1617:50  |                 |         |  |   |                         |                              |   | Measu                           | ring                             | 4/4  |



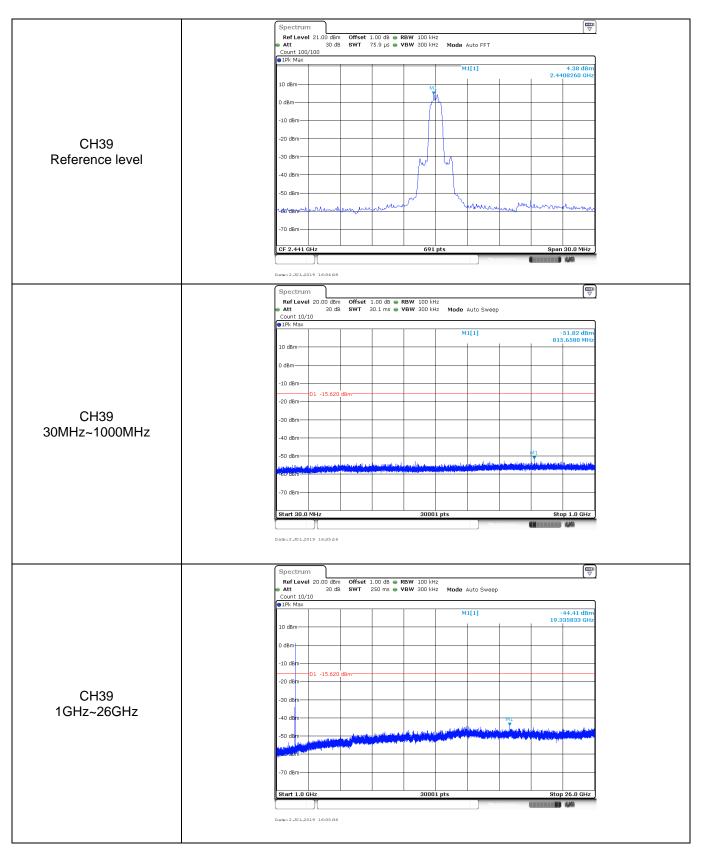


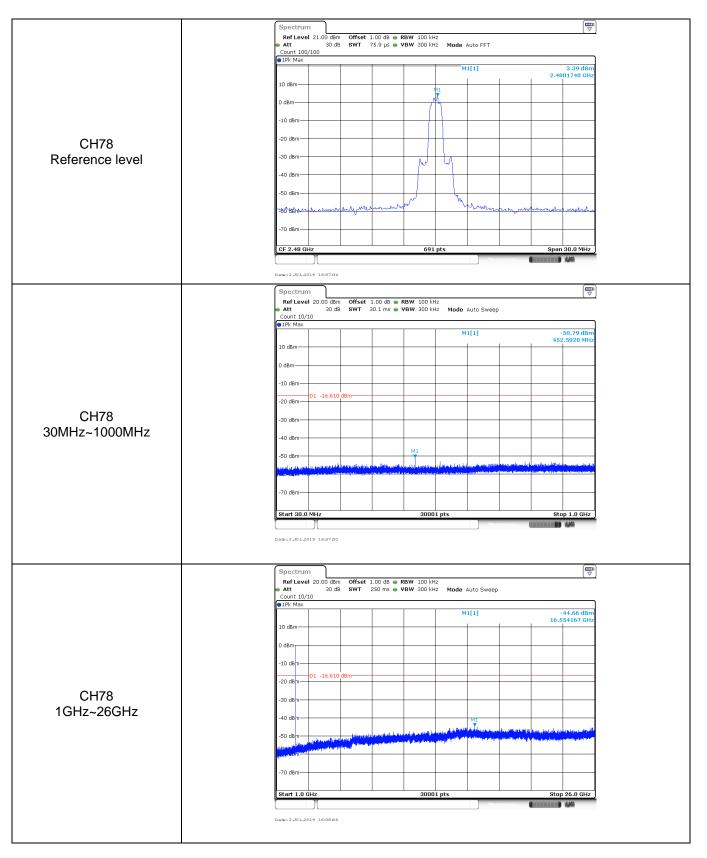
| t Item:         | SE |   | Modula   | ation ty                                 | /pe:  |                                   | π/4D0                                    | QPSK                     |
|-----------------|----|---|--|--|---|-----------------------------------|--|--------------------------|
|                 |    | Spectrum  |  |  |   |                                   |  |                          |
|                 |    | RefLevel 21.00 dBm<br>Att 30 dB   | Offset 1.00 dB   |  | Mode Auto FET   |                                   |  |                          |
|                 |    | Count 100/100   |  |  | House Hate III  |                                   |  |                          |
|                 |    |   |  |  | M1[1]   |                                   | 2.40                                     | 3.78 dBm<br>)18260 GHz   |
|                 |    | 10 dBm  |  | M  |   | -                                 | - 2.11                                   |                          |
|                 |    | 0 dBm   |  |  |   |                                   |  |                          |
|                 |    | -10 dBm   |  |  |   |                                   |  |                          |
|                 |    |   |  |  |   |                                   |  |                          |
| CH00            |    | -20 dBm   |  |  |   |                                   |  |                          |
| Reference level |    | -30 dBm   |  |  | m   |                                   |  |                          |
|                 |    | -40 dBm   |  |  |   |                                   |  |                          |
|                 |    | -50 dBm   |  | M  | - Un -  |                                   | -  |                          |
|                 |    | ~50 dBm ~~~~~~~~~~~~~~~~~~~~~~~   | munum  | w)"                                      | Merilino  | ner an                            | maraanar                                 | antar                    |
|                 |    | -70 dBm   |  |  |   |                                   |  |                          |
|                 |    | CF 2.402 GHz  |  | 691 pt                                   |   |                                   |  | 30.0 MHz                 |
|                 |    |   |  | 041 hr                                   | .s  | easuring                          | apar                                     |                          |
|                 |    | Data:2.JUL.2019 16:24:10  |  |  |   |                                   |  |                          |
|                 |    | Spectrum  |  |  |   |                                   |  |                          |
|                 |    | RefLevel 20.00 dBm<br>Att 30 dB   | Offset 1.00 dB ●<br>SWT 30.1 ms ●  |  | Mode Auto Swe   | ер                                |  |                          |
|                 |    | Count 10/10<br>Pk Max   |  |  |   |                                   |  |                          |
|                 |    |   |  |  | M1[1]   |                                   | . 97                                     | -52.16 dBm<br>5.8020 MHz |
|                 |    | 10 dBm  |  |  |   |                                   |  |                          |
|                 |    | 0 dBm   |  |  |   |                                   |  |                          |
|                 |    | -10 dBm   |  |  |   |                                   |  |                          |
|                 |    | -20 dBm   | IBm-   |  |   |                                   |  |                          |
| CH00            |    | -30 dBm   |  |  |   |                                   |  |                          |
| 0MHz~1000MHz    |    | -40 dBm   |  |  |   |                                   |  |                          |
|                 |    | -50 dBm   |  |  |   |                                   |  | M1                       |
|                 |    | labitentially partition   | and at so the term as the part of the  | و المادر بسير ها، به                     | te any first second as a first second second  |                                   | an ang ang ang ang ang ang ang ang ang a | that supported           |
|                 |    | Lenger of the second | ald <u>a a ling a sa ang ang ka</u> ng kang kang kang kang kang kang kang ka   | har an ann an gu gul chaon ta bhaile i s | and an a state of the state of |                                   |  |                          |
|                 |    | -70 dBm   |  |  |   |                                   |  |                          |
|                 |    | Start 30.0 MHz  |  | 30001 p                                  | ots   |                                   |  | op 1.0 GHz               |
|                 |    |   |  |  | M   | easuring                          |  | 4,40                     |
|                 |    | Date:2.JUL.2019 16:24:26  |  |  |   |                                   |  |                          |
|                 |    |   |  |  |   |                                   |  | _                        |
|                 |    | Spectrum<br>Ref Level 20.00 dBm   | Offset 1.00 dB 👄 I   | RBW 100 kHz                              |   |                                   |  |                          |
|                 |    | Att 30 dB<br>Count 10/10  | SWT 250 ms 👄   | VBW 300 kHz                              | Mode Auto Swee  | эр                                |  |                          |
|                 |    | ●1Pk Max  |  |  | M1[1]   |                                   |  | -44.31 dBm               |
|                 |    | 10 dBm  |  | +  |   | -                                 | 20.0                                     | 061667 GHz               |
|                 |    | 0 dBm   |  |  |   |                                   |  |                          |
|                 |    | -10 dgm   |  |  |   |                                   |  |                          |
|                 |    | D1 -16.220 c  | IBm-   | +  |   |                                   |  |                          |
| CH00            |    | -20 dBm-  |  |  |   |                                   |  |                          |
|                 |    | -30 dBm   |  | +  |   |                                   |  |                          |
| 1GHz~26GHz      |    | -40 dBm   |  | +  |   | INT.                              |  |                          |
|                 |    | -50 dBm   | with the second second   |  | a construction of the second structure of   | ephonaticality<br>Angeonetrapping | al den stelsand<br>Agenteren stel        | las itratificat          |
|                 |    | Cardina and Car | A REAL PROPERTY OF A REAL PROPER |  |   |                                   |  |                          |
|                 |    | -70 dBm   |  |  |   |                                   |  |                          |
|                 |    | , o dom   |  |  |   |                                   |  |                          |
|                 |    |   |  |  |   |                                   |  |                          |
|                 |    | Start 1.0 GHz   |  | 30001 p                                  | ots   | easurine -                        | Stop                                     | 26.0 GHz                 |





| est Item:       | SE |   | Modu                            | lation type   |   | 8DPSK   |
|-----------------|----|---|---------------------------------|---|---|---|
|                 |    | Spectrum  |                                 |   |   |   |
|                 |    | Ref Level 21.00 dBm<br>Att 30 dB<br>Count 100/100 | Offset 1.00 dB<br>SWT 75.9 μs ( | VBW 300 kHz Mode  | Auto FFT  |   |
|                 |    | IPk Max   |                                 | _   | M1[1]   | 4.07 dBm  |
|                 |    | 10 dBm  |                                 | M1  | +   | 2.4021740 GHz   |
|                 |    | 0 dBm   |                                 | , Å   |   |   |
|                 |    | -10 dBm   |                                 |   |   |   |
|                 |    | -20 d8m   |                                 |   |   |   |
| CH00            |    | -30 dBm   |                                 |   |   |   |
| Reference level |    | -40 dBm   |                                 | MM  |   |   |
|                 |    |   |                                 |   |   |   |
|                 |    | -50 dBm   | ine and                         | www.  | your engine   | anturbos . alman  |
|                 |    | -160-dBmllinen conclineder                        |                                 |   |   |   |
|                 |    | -70 dBm   |                                 |   |   |   |
|                 |    | CF 2.402 GHz                                      |                                 | 691 pts   | Measuring   | Span 30.0 MHz   |
|                 |    | Date:2.JUL.2019 16:31:56                          |                                 |   |   |   |
|                 |    |   |                                 |   |   |   |
|                 |    | Spectrum<br>Ref Level 20.00 dBm                   |                                 | - PRUL 402 MI-  |   |   |
|                 |    | Att 30 dB<br>Count 10/10                          | Offset 1.00 dB<br>SWT 30.1 ms   | RBW 100 kHz<br>VBW 300 kHz<br>Mode  | Auto Sweep  |   |
|                 |    | e 1Pk Max   |                                 |   | M1[1]   | -53.03 dBm  |
|                 |    | 10 dBm  |                                 |   | +   | 705.6960 MHz  |
|                 |    | 0 dBm   |                                 |   |   |   |
|                 |    | -10 dBm   |                                 |   |   |   |
|                 |    | -20 dBm   | dBm                             |   |   |   |
| CH00            |    | -30 dBm   |                                 |   |   |   |
| 30MHz~1000MHz   |    | -40 dBm   |                                 |   |   |   |
|                 |    | -50 dBm   |                                 |   | м   |   |
|                 |    | and a file of press of the set of the set         | Shawad yaya daridhiraa          | and the state of the | and the state of the | ي هو روسه الاستانا المالية وموجودها مخرج أمريك (1992)<br>مواريد وماريخ مسابق المراجعة المربوع مسابقها وال |
|                 |    | -70 dBm   |                                 |   |   |   |
|                 |    |   |                                 |   |   |   |
|                 |    | Start 30.0 MHz                                    |                                 | 30001 pts   | Measuring   | Stop 1.0 GHz  |
|                 |    | Data:2.JUL.2019 16:32:12                          |                                 |   |   |   |
|                 |    |   |                                 |   |   |   |
|                 |    | Spectrum<br>Ref Level 20.00 dBm                   | Offset 1.00 dB                  | BRW 100 kils  |   |   |
|                 |    | Att 30 dB   |                                 | VBW 300 kHz Mode  | Auto Sweep  |   |
|                 |    | ● 1Pk Max   |                                 |   | M1[1]   | -44.67 dBm  |
|                 |    | 10 dBm  |                                 |   | + +   | 15.805833 GHz   |
|                 |    | 0 dBm   |                                 |   |   |   |
|                 |    | -10 dem   |                                 |   |   |   |
|                 |    | -20 dBm   | dBm                             |   |   |   |
| CH00            |    | -30 dBm   |                                 |   |   |   |
| 1GHz~26GHz      |    | -40 dBm   |                                 |   | via   |   |
|                 |    | -50 dBm   |                                 | he had a second second been   | A station of the second   |   |
|                 |    |   | NATE A                          |   | C. CONTRACTOR OF THE OWNER  | an a  |
|                 |    | -70 dBm   |                                 |   |   |   |
|                 |    | -/ 0 upin   |                                 |   |   |   |
|                 |    |   |                                 |   |   |   |
|                 |    | Start 1.0 GHz                                     |                                 | 30001 pts   | Measuring   | Stop 26.0 GHz   |





# 5.11. Spurious Emissions (radiated)

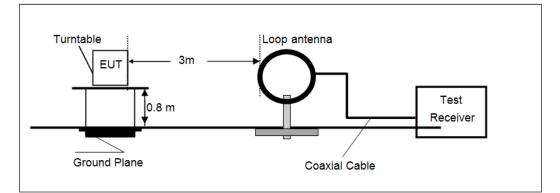
# <u>LIMIT</u>

### FCC CFR Title 47 Part 15 Subpart C Section 15.209

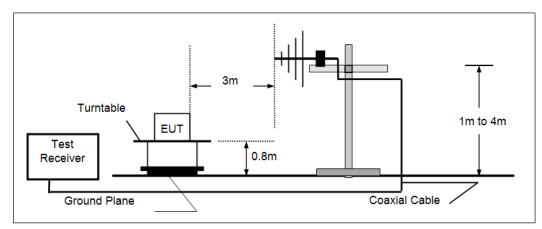
| Frequency         | Limit (dBuV/m @3m) | Value      |
|-------------------|--------------------|------------|
| 30 MHz ~ 88 MHz   | 40.00              | Quasi-peak |
| 88 MHz ~ 216 MHz  | 43.50              | Quasi-peak |
| 216 MHz ~ 960 MHz | 46.00              | Quasi-peak |
| 960 MHz ~ 1 GHz   |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

# **TEST CONFIGURATION**

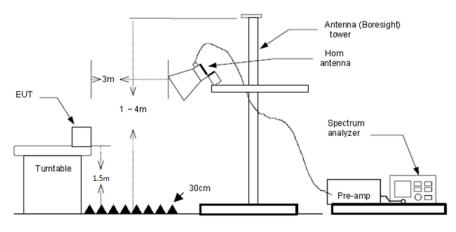
Below 30 MHz



#### > 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

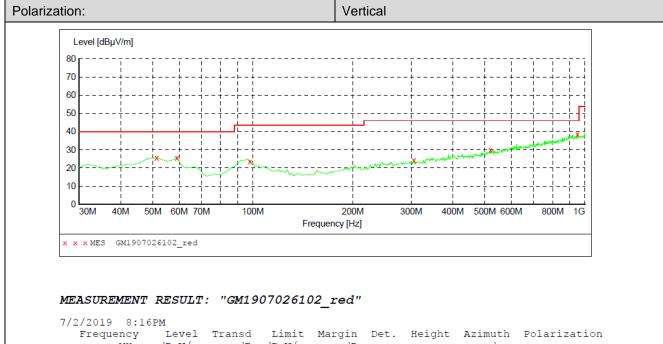
#### Note:

- 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.

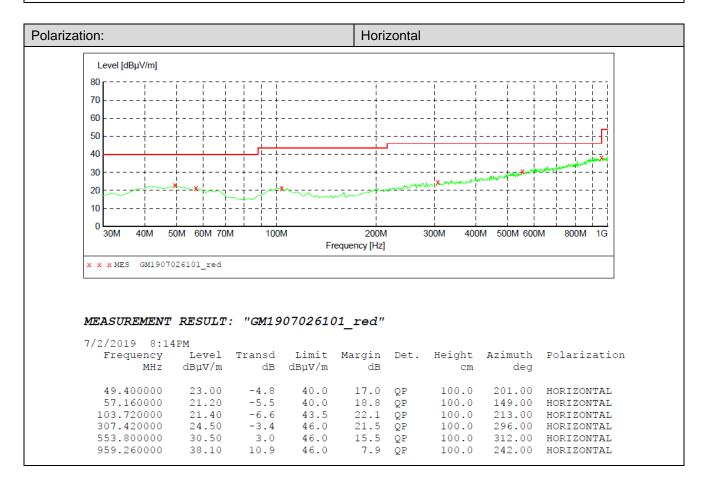
#### ➢ 9 kHz ~ 30 MHz

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.





| MHz        | dBµV/m | dB   | dBµV/m | dB   |    | CM    | deg    |          |  |
|------------|--------|------|--------|------|----|-------|--------|----------|--|
| 51.340000  | 25.60  | -4.9 | 40.0   | 14.4 | QP | 100.0 | 49.00  | VERTICAL |  |
| 59.100000  | 25.60  | -5.9 | 40.0   | 14.4 | QP | 100.0 | 77.00  | VERTICAL |  |
| 97.900000  | 23.70  | -6.9 | 43.5   | 19.8 | QP | 100.0 | 292.00 | VERTICAL |  |
| 305.480000 | 24.10  | -3.4 | 46.0   | 21.9 | QP | 100.0 | 292.00 | VERTICAL |  |
| 518.880000 | 29.80  | 2.4  | 46.0   | 16.2 | QP | 100.0 | 107.00 | VERTICAL |  |
| 949.560000 | 38.40  | 10.8 | 46.0   | 7.6  | QP | 100.0 | 350.00 | VERTICAL |  |
|            |        |      |        |      |    |       |        |          |  |



|                | CH00                |                |                   |                   |                |            |          |  |  |  |
|----------------|---------------------|----------------|-------------------|-------------------|----------------|------------|----------|--|--|--|
| Freq.<br>[MHz] | Reading<br>[dBµV/m] | Factor<br>[dB] | Level<br>[dBµV/m] | Limit<br>[dBµV/m] | Margin<br>[dB] | Polarity   | Detector |  |  |  |
| 1920.906       | 33.34               | -5.59          | 27.75             | 74.00             | 46.25          | Vertical   | PK       |  |  |  |
| 4696.843       | 31.23               | 6.36           | 37.59             | 74.00             | 36.41          | Vertical   | PK       |  |  |  |
| 6523.968       | 30.18               | 12.67          | 42.85             | 74.00             | 31.15          | Vertical   | PK       |  |  |  |
| 8008.875       | 30.13               | 18.20          | 48.33             | 74.00             | 25.67          | Vertical   | PK       |  |  |  |
| Freq.<br>[MHz] | Reading<br>[dBµV/m] | Factor<br>[dB] | Level<br>[dBµV/m] | Limit<br>[dBµV/m] | Margin<br>[dB] | Polarity   | Detector |  |  |  |
| 2662.625       | 38.26               | -0.13          | 38.13             | 74.00             | 35.87          | Horizontal | PK       |  |  |  |
| 4198.937       | 31.41               | 3.81           | 35.22             | 74.00             | 38.78          | Horizontal | PK       |  |  |  |
| 8029.437       | 31.37               | 18.23          | 49.60             | 74.00             | 24.40          | Horizontal | PK       |  |  |  |
| 8564.062       | 31.91               | 18.69          | 50.60             | 74.00             | 23.40          | Horizontal | PK       |  |  |  |

# > 1 GHz ~ 25 GHz

| CH39           |                     |                |                   |                   |                |            |          |  |  |  |
|----------------|---------------------|----------------|-------------------|-------------------|----------------|------------|----------|--|--|--|
| Freq.<br>[MHz] | Reading<br>[dBµV/m] | Factor<br>[dB] | Level<br>[dBµV/m] | Limit<br>[dBµV/m] | Margin<br>[dB] | Polarity   | Detector |  |  |  |
| 1472.937       | 34.57               | -5.62          | 28.95             | 74.00             | 45.05          | Vertical   | PK       |  |  |  |
| 4326.718       | 31.87               | 4.08           | 35.95             | 74.00             | 38.05          | Vertical   | PK       |  |  |  |
| 6457.875       | 30.09               | 12.00          | 42.09             | 74.00             | 31.91          | Vertical   | PK       |  |  |  |
| 9179.468       | 31.53               | 18.69          | 50.22             | 74.00             | 23.78          | Vertical   | PK       |  |  |  |
| Freq.<br>[MHz] | Reading<br>[dBµV/m] | Factor<br>[dB] | Level<br>[dBµV/m] | Limit<br>[dBµV/m] | Margin<br>[dB] | Polarity   | Detector |  |  |  |
| 1480.281       | 33.99               | -5.62          | 28.37             | 74.00             | 45.63          | Horizontal | PK       |  |  |  |
| 4334.062       | 30.68               | 4.16           | 34.84             | 74.00             | 39.16          | Horizontal | PK       |  |  |  |
| 5422.406       | 31.51               | 8.74           | 40.25             | 74.00             | 33.75          | Horizontal | PK       |  |  |  |
| 6607.687       | 30.60               | 13.17          | 43.77             | 74.00             | 30.23          | Horizontal | PK       |  |  |  |

| CH78           |                     |                |                   |                   |                |            |          |  |  |  |
|----------------|---------------------|----------------|-------------------|-------------------|----------------|------------|----------|--|--|--|
| Freq.<br>[MHz] | Reading<br>[dBµV/m] | Factor<br>[dB] | Level<br>[dBµV/m] | Limit<br>[dBµV/m] | Margin<br>[dB] | Polarity   | Detector |  |  |  |
| 1706.468       | 35.08               | -6.08          | 29.00             | 74.00             | 45.00          | Vertical   | PK       |  |  |  |
| 4290.000       | 32.56               | 3.78           | 36.34             | 74.00             | 37.66          | Vertical   | PK       |  |  |  |
| 5945.281       | 29.65               | 10.20          | 39.85             | 74.00             | 34.15          | Vertical   | PK       |  |  |  |
| 7362.625       | 30.70               | 16.25          | 46.95             | 74.00             | 27.05          | Vertical   | PK       |  |  |  |
| Freq.<br>[MHz] | Reading<br>[dBµV/m] | Factor<br>[dB] | Level<br>[dBµV/m] | Limit<br>[dBµV/m] | Margin<br>[dB] | Polarity   | Detector |  |  |  |
| 3195.781       | 33.83               | 0.82           | 34.65             | 74.00             | 39.35          | Horizontal | PK       |  |  |  |
| 4959.750       | 34.94               | 7.58           | 42.52             | 74.00             | 31.48          | Horizontal | PK       |  |  |  |
| 5921.781       | 29.55               | 10.08          | 39.63             | 74.00             | 34.37          | Horizontal | PK       |  |  |  |
| 8064.687       | 30.66               | 18.29          | 48.95             | 74.00             | 25.05          | Horizontal | PK       |  |  |  |

Remark:

1. Final Level =Receiver Read level + Antenna 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.

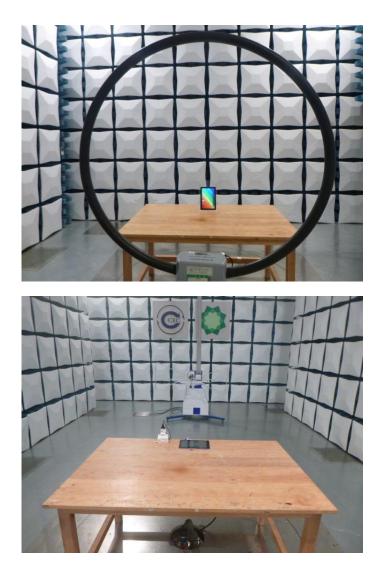
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

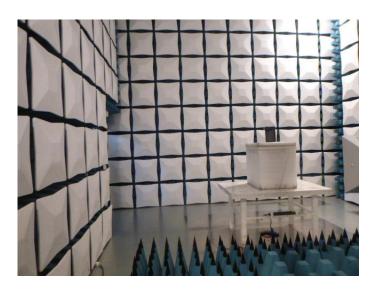
# 6. TEST SETUP PHOTOS

Conducted Emissions (AC Mains)



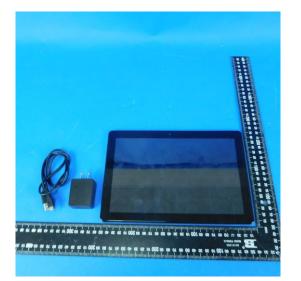
#### **Radiated Emissions**



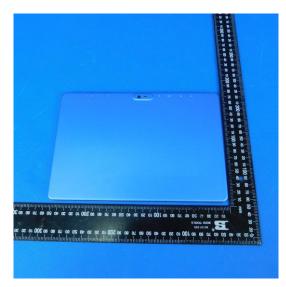


# 7. EXTERANAL AND INTERNAL PHOTOS

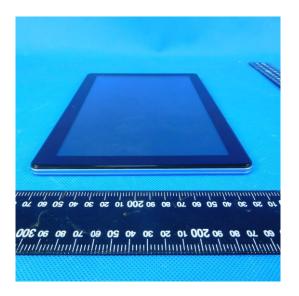
# **External Photos**









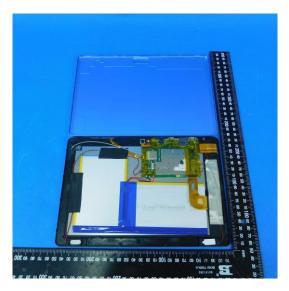


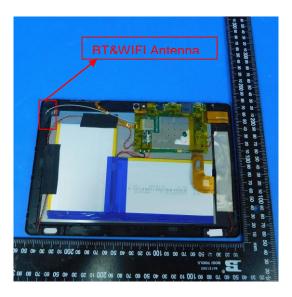


Shenzhen Huatongwei International Inspection Co., Ltd.



### Internal Photos













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