

# FCC Test Report

Report No.: AGC01082190901FE03

**FCC ID** : 2ANOX69097  
**APPLICATION PURPOSE** : Original Equipment  
**PRODUCT DESIGNATION** : E7/1000  
**BRAND NAME** : KYGO  
**MODEL NAME** : E7/1000  
**APPLICANT** : Kygo Life AS  
**DATE OF ISSUE** : Oct. 11, 2019  
**STANDARD(S)** : FCC Part 15.247  
**REPORT VERSION** : V1.0

## Attestation of Global Compliance (Shenzhen) Co., Ltd

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### REPORT REVISE RECORD

| Report Version | Revise Time | Issued Date   | Valid Version | Notes           |
|----------------|-------------|---------------|---------------|-----------------|
| V1.0           | /           | Oct. 11, 2019 | Valid         | Initial Release |



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## 1. VERIFICATION OF CONFORMITY

|                                 |   |
|---------------------------------|---|
| <b>Applicant</b>                | Kygo Life AS  |
| <b>Address</b>                  | Stortorvet 10,0155 Oslo, Norway   |
| <b>Manufacturer</b>             | GUANGZHOU U&I TECHNOLOGY COMPANY LIMITED  |
| <b>Address</b>                  | 4th Floor, 15th Building, Vtrek Innovation Industrial Park, No. 644 Shibei Road, Panyu District, Guangzhou, China |
| <b>Factory</b>                  | GUANGZHOU U&I TECHNOLOGY COMPANY LIMITED  |
| <b>Address</b>                  | 4th Floor, 15th Building, Vtrek Innovation Industrial Park, No. 644 Shibei Road, Panyu District, Guangzhou, China |
| <b>Product Designation</b>      | E7/1000   |
| <b>Brand Name</b>               | KYGO  |
| <b>Test Model</b>               | E7/1000   |
| <b>Date of test</b>             | Sep. 25, 2019 to Oct. 11, 2019  |
| <b>Deviation</b>                | None  |
| <b>Condition of Test Sample</b> | Normal  |
| <b>Test Result</b>              | Pass  |
| <b>Report Template</b>          | AGCRT-US-BR/RF  |

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC PART 15.247.

Prepared By



Sky Dong  
(Project Engineer)

Oct. 11, 2019

Reviewed By



Max Zhang  
(Reviewer)

Oct. 11, 2019

Approved By



Forrest Lei  
(Authorized Officer)

Oct. 11, 2019

## 2. GENERAL INFORMATION

### 2.1. PRODUCT DESCRIPTION

The EUT is designed as “E7/1000”. It is designed by way of utilizing the GFSK, Pi/4 DQPSK and 8DPSK technology to achieve the system operation.

A major technical description of EUT is described as following

|                     |   |
|---------------------|---|
| Operation Frequency | 2.402 GHz to 2.480GHz   |
| RF Output Power     | 1.618dBm(Max)   |
| Bluetooth Version   | V 5.0   |
| Modulation          | BR <input checked="" type="checkbox"/> GFSK, EDR <input checked="" type="checkbox"/> $\pi/4$ -DQPSK, <input checked="" type="checkbox"/> 8DPSK<br>BLE <input type="checkbox"/> GFSK 1Mbps <input type="checkbox"/> GFSK 2Mbps |
| Number of channels  | 79  |
| Hardware Version    | V5  |
| Software Version    | V01   |
| Antenna Designation | FPC Antenna(Comply with requirements of the FCC part 15.203)  |
| Antenna Gain        | 3.39dBi   |
| Power Supply        | DC 3.7V by battery  |

Note: The EUT comprises left and right channel headsets, both are the same and have been tested. Only the test data of left headset recorded in this report.

### 2.2. TABLE OF CARRIER FREQUENCIES

| Frequency Band | Channel Number | Frequency |
|----------------|----------------|-----------|
| 2402~2480MHZ   | 0              | 2402MHZ   |
|                | 1              | 2403MHZ   |
|                | :              | :         |
|                | 38             | 2440 MHZ  |
|                | 39             | 2441 MHZ  |
|                | 40             | 2442 MHZ  |
|                | :              | :         |
|                | 77             | 2479 MHZ  |
|                | 78             | 2480 MHZ  |

### 2.3. RECEIVER INPUT BANDWIDTH

The input bandwidth of the receiver is 1.3MHz. In every connection one Bluetooth device is the master and the other one is slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection (e.g. single or multislot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings.

Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be sent on the same frequency, it is sent on the next frequency of the hopping sequence.

### 2.4. EXAMPLE OF A HOPPING SEQUENCE IN DATA MODE

Example of a 79 hopping sequence in data mode:

40, 21, 44, 23, 42, 53, 46, 55, 48, 33, 52, 35, 50, 65, 54, 67  
56, 37, 60, 39, 58, 69, 62, 71, 64, 25, 68, 27, 66, 57, 70, 59  
72, 29, 76, 31, 74, 61, 78, 63, 01, 41, 05, 43, 03, 73, 07, 75  
09, 45, 13, 47, 11, 77, 15, 00, 64, 49, 66, 53, 68, 02, 70, 06  
01, 51, 03, 55, 05, 04

### 2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR

The generation of the hopping sequence in connection mode depends essentially on two input values:

1. LAP/UAP of the master of the connection.
2. Internal master clock

The LAP (lower address part) are the 24 LSB's of the 48 BD\_ADDRESS. The BD\_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24 MSB's of the 48 BD\_ADDRESS.

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For synchronization with other units only offset are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5us. The clock has a cycle of about one day (23h30). In most cases it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire LAP (24 bits), 4 LSB's (4 bits) (Input 1) and the 27 MSB's of the clock (Input 2) are used. With these input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following behavior:

The first connection between the two devices is established, a hopping sequence was generated. For transmitting the wanted data the complete hopping sequence was not used. The connection ended.

The second connection will be established. A new hopping sequence is generated. Due to the fact the Bluetooth clock has a different value, because the period between the two transmissions is longer (and it cannot be shorter) than the minimum resolution of the clock (312.5us). The hopping sequence will always differ from the first one.



## 2.6. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2ANOX69097** filing to comply with the FCC PART 15.247 requirements.

## 2.7. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

## 2.8. SPECIAL ACCESSORIES

Refer to section 5.2.

## 2.9. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.





### 3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%.

- Uncertainty of Conducted Emission,  $U_c = \pm 3.2$  dB
- Uncertainty of Radiated Emission below 1GHz,  $U_c = \pm 3.9$  dB
- Uncertainty of Radiated Emission above 1GHz,  $U_c = \pm 4.8$  dB
- Uncertainty of total RF power, conducted,  $U_c = \pm 0.8$  dB
- Uncertainty of spurious emissions, conducted,  $U_c = \pm 2.7$  dB
- Uncertainty of Occupied Channel Bandwidth:  $U_c = \pm 2$  %
- Uncertainty of Dwell Time:  $U_c = \pm 2$  %
- Uncertainty of Frequency:  $U_c = \pm 2$  %



#### 4. DESCRIPTION OF TEST MODES

| NO. | TEST MODE DESCRIPTION         |
|-----|-------------------------------|
| 1   | Low channel GFSK              |
| 2   | Middle channel GFSK           |
| 3   | High channel GFSK             |
| 4   | Low channel $\pi/4$ -DQPSK    |
| 5   | Middle channel $\pi/4$ -DQPSK |
| 6   | High channel $\pi/4$ -DQPSK   |
| 7   | Low channel 8DPSK             |
| 8   | Middle channel 8DPSK          |
| 9   | High channel 8DPSK            |
| 10  | Hopping mode GFSK             |
| 11  | Hopping mode $\pi/4$ -DQPSK   |
| 12  | Hopping mode 8DPSK            |

Note:

1. Only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.
4. The test software is the RTLBTAPP Version:5.2.2.1 which can set the EUT into the individual test modes.



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## 5. SYSTEM TEST CONFIGURATION

### 5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure :



### 5.2 EQUIPMENT USED IN TESTED SYSTEM

| Item | Equipment | Model No. | ID or Specification | Remark |
|------|-----------|-----------|---------------------|--------|
| 1    | E7/1000   | E7/1000   | 2ANOX69097          | EUT    |

### 5.3. SUMMARY OF TEST RESULTS

| FCC RULES          | DESCRIPTION OF TEST         | RESULT    |
|--------------------|-----------------------------|-----------|
| 15.247 (b)(1)      | Peak Output Power           | Compliant |
| 15.247 (a)(1)      | 20 dB Bandwidth             | Compliant |
| 15.247 (d)         | Conducted Spurious Emission | Compliant |
| 15.209             | Radiated Emission           | Compliant |
| 15.247 (a)(1)(iii) | Number of Hopping Frequency | Compliant |
| 15.247 (a)(1)(iii) | Time of Occupancy           | Compliant |
| 15.247 (a)(1)      | Frequency Separation        | Compliant |
| 15.207             | Conducted Emission          | N/A       |

Note: The EUT can not use the BT function with charging

## 6. TEST FACILITY

|  |  |
|--|--|
| <b>Test Site</b>                         | Attestation of Global Compliance (Shenzhen) Co., Ltd   |
| <b>Location</b>                          | 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China |
| <b>Designation Number</b>                | CN1259   |
| <b>FCC Test Firm Registration Number</b> | 975832   |
| <b>A2LA Cert. No.</b>                    | 5054.02  |
| <b>Description</b>                       | Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA  |

## TEST EQUIPMENT OF RADIATED EMISSION TEST

| Equipment                      | Manufacturer   | Model        | S/N        | Cal. Date     | Cal. Due      |
|--------------------------------|----------------|--------------|------------|---------------|---------------|
| TEST RECEIVER                  | R&S            | ESCI         | 10096      | Jun. 12, 2019 | Jun. 26, 2020 |
| EXA Signal Analyzer            | Aglient        | N9010A       | MY53470504 | Dec. 20, 2018 | Dec. 19, 2019 |
| 2.4GHz Fliter                  | EM Electronics | 2400-2500MHz | N/A        | Feb. 27, 2019 | Feb. 26, 2020 |
| Attenuator                     | ZHINAN         | E-002        | N/A        | Aug. 26, 2019 | Aug. 25, 2020 |
| Horn antenna                   | SCHWARZBECK    | BBHA 9170    | #768       | Jun. 12, 2019 | Jun. 26, 2020 |
| Active loop antenna (9K-30MHz) | ZHINAN         | ZN30900C     | 18051      | Jun. 14, 2018 | Jun. 13, 2020 |
| Double-Ridged Waveguide Horn   | ETS LINDGREN   | 3117         | 00034609   | May. 26, 2018 | May. 25, 2020 |
| Broadband Preamplifier         | ETS LINDGREN   | 3117PA       | 00225134   | Oct. 25, 2018 | Oct. 24, 2019 |
| ANTENNA                        | SCHWARZBECK    | VULB9168     | 494        | Jan. 09, 2019 | Jan. 08, 2021 |



## 7. PEAK OUTPUT POWER

### 7.1. MEASUREMENT PROCEDURE

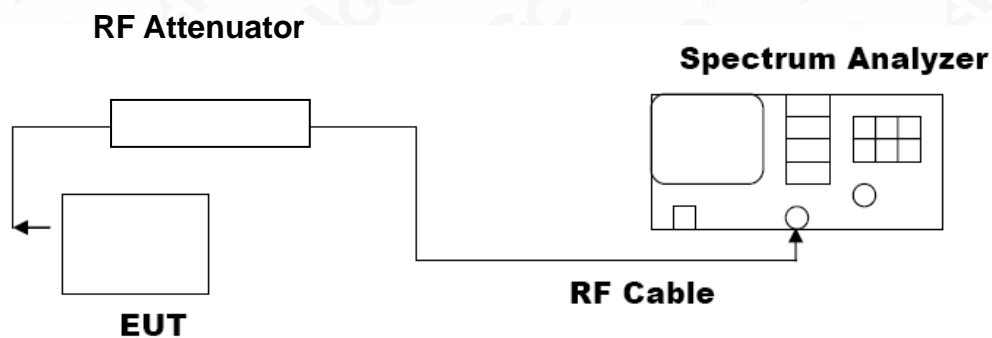
For peak power test:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
3. RBW > 20 dB bandwidth of the emission being measured.
4. VBW  $\geq$  RBW.
5. Sweep: Auto.
6. Detector function: Peak.
7. Trace: Max hold.

Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

### 7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

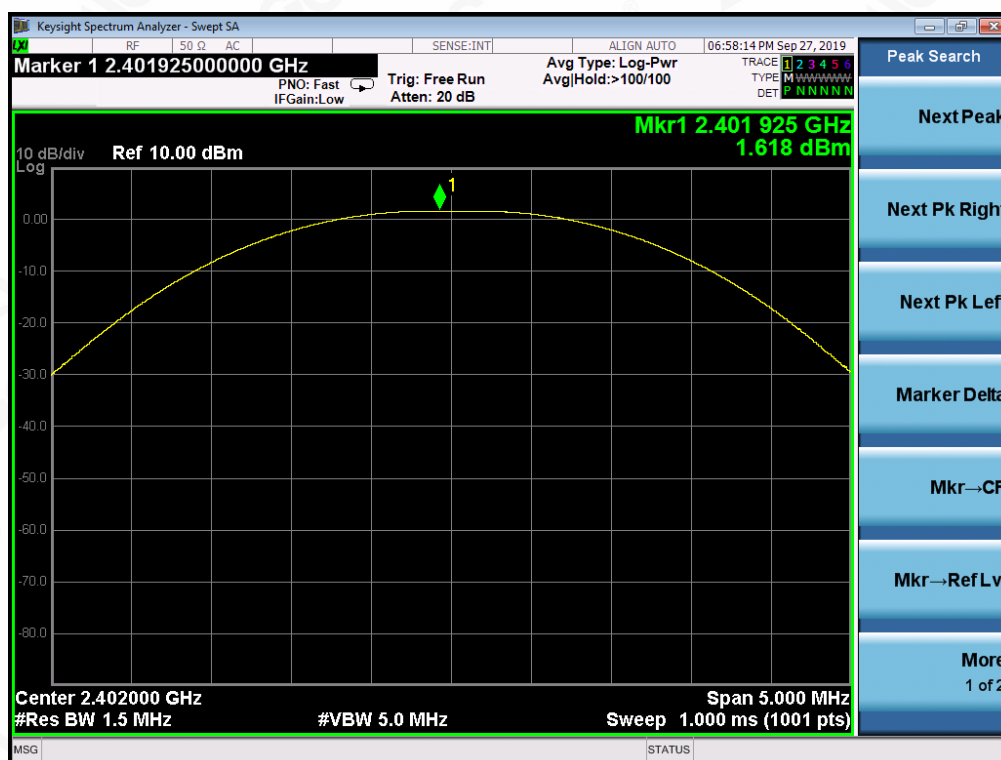
#### PEAK POWER TEST SETUP



### 7.3. LIMITS AND MEASUREMENT RESULT

| PEAK OUTPUT POWER MEASUREMENT RESULT<br>FOR GFSK MOUDULATION |                     |                            |              |
|--|---------------------|----------------------------|--------------|
| Frequency<br>(GHz)   | Peak Power<br>(dBm) | Applicable Limits<br>(dBm) | Pass or Fail |
| 2.402  | 1.618               | 30                         | Pass         |
| 2.441  | 0.410               | 30                         | Pass         |
| 2.480  | -0.712              | 30                         | Pass         |

CH0



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Keysight Spectrum Analyzer - Swept SA

RF 50  $\Omega$  AC SENSE:INT ALIGN: AUTO 07:00:04 PM Sep 27, 2019

Marker 1 2.440815000000 GHz PNO: Fast IFGain:Low Trig: Free Run Atten: 20 dB Avg Type: Log-Pwr Avg/Hold: >100/100

TRACE 1 2 3 4 5 6  
TYPE M P N N N N N  
DET P N N N N N

10 dB/div Log Ref 10.00 dBm

Mkr1 2.440 815 GHz  
0.410 dBm

Center 2.441000 GHz Span 5.000 MHz  
#Res BW 1.5 MHz #VBW 5.0 MHz Sweep 1.000 ms (1001 pts)

MSG STATUS

Keysight Spectrum Analyzer - Swept SA

RF 50  $\Omega$  AC SENSE:INT ALIGN: AUTO 07:00:38 PM Sep 27, 2019

**Marker 1 2.479860000000 GHz** PNO: Fast IFGain:Low Trig: Free Run Atten: 20 dB Avg Type: Log-Pwr Avg/Hold:>100/100

TRACE 1 2 3 4 5 6  
TYPE M  
DET P N N N N N

10 dB/div Log Ref 10.00 dBm

**Mkr1 2.479 860 GHz -0.712 dBm**

Center 2.480000 GHz Span 5.000 MHz  
#Res BW 1.5 MHz #VBW 5.0 MHz Sweep 1.000 ms (1001 pts)

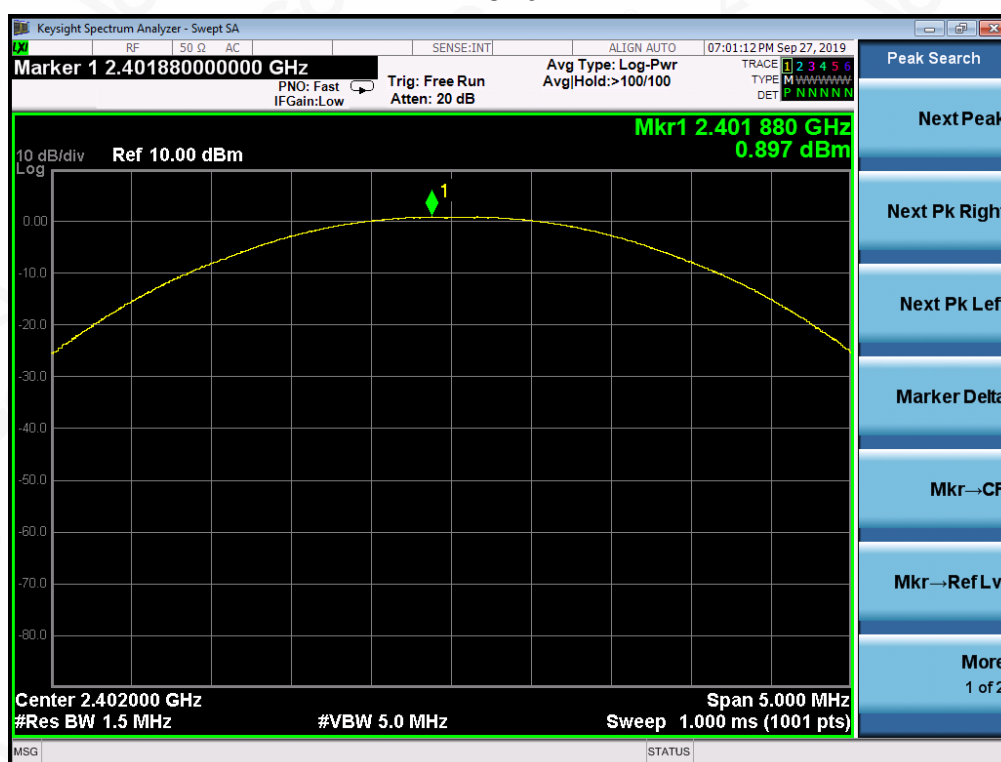
MSG STATUS

Peak Search  
Next Peak  
Next Pk Right  
Next Pk Left  
Marker Delta  
Mkr→CF  
Mkr→Ref Lvl  
More  
1 of 2



| PEAK OUTPUT POWER MEASUREMENT RESULT<br>FOR $\Pi$ /4-DQPSK MODULATION |                     |                            |              |
|---|---------------------|----------------------------|--------------|
| Frequency<br>(GHz)  | Peak Power<br>(dBm) | Applicable Limits<br>(dBm) | Pass or Fail |
| 2.402   | 0.897               | 30                         | Pass         |
| 2.441   | -0.176              | 30                         | Pass         |
| 2.480   | -0.677              | 30                         | Pass         |

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Keysight Spectrum Analyzer - Swept SA

Marker 1 2.441135000000 GHz

PNO: Fast IFGain:Low Trig: Free Run Atten: 20 dB

Avg Type: Log-Pwr Avg/Hold:>100/100

TRACE 1 2 3 4 5 6  
TYPE M P N N N N N  
DET P N N N N N

07:01:36 PM Sep 27, 2019

Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

Mkr→CF

Mkr→Ref Lvl

More

1 of 2

The figure shows a Keysight Spectrum Analyzer display. The main plot area shows a yellow trace of a swept signal. A green diamond marker labeled '1' is placed on the trace at a frequency of 2.441135 GHz. The y-axis is labeled '10 dB/div Log' and ranges from -80.0 to 0.0. The x-axis is labeled 'Ref 10.00 dBm'. The plot area is divided into a grid. The top status bar displays various settings: 'Marker 1 2.441135000000 GHz', 'PNO: Fast IFGain:Low', 'Trig: Free Run Atten: 20 dB', 'Avg Type: Log-Pwr Avg/Hold:>100/100', 'TRACE 1 2 3 4 5 6', 'TYPE M P N N N N N', 'DET P N N N N N', and the date/time '07:01:36 PM Sep 27, 2019'. The right side of the image shows a vertical menu with buttons for 'Peak Search', 'Next Peak', 'Next Pk Right', 'Next Pk Left', 'Marker Delta', 'Mkr→CF', 'Mkr→Ref Lvl', and 'More'. At the bottom right, it says '1 of 2'.

10 dB/div Log

Ref 10.00 dBm

Mkr1 2.441 135 GHz  
-0.176 dBm

Center 2.441000 GHz

#Res BW 1.5 MHz

#VBW 5.0 MHz

Span 5.000 MHz

Sweep 1.000 ms (1001 pts)

MSG STATUS

Keysight Spectrum Analyzer - Swept SA

RF 50 Ω AC SENSE:INT ALIGN: AUTO 07:02:05 PM Sep 27, 2019

Marker 1 2.479905000000 GHz PNO: Fast IF Gain: Low Trig: Free Run Atten: 20 dB Avg Type: Log-Pwr Avg/Hold: >100/100

TRACE 1 2 3 4 5 6 TYPE M P N N N N N N DET P N N N N N N

10 dB/div Log Ref 10.00 dBm

Mkr1 2.479 905 GHz -0.677 dBm

Center 2.480000 GHz Span 5.000 MHz  
#Res BW 1.5 MHz #VBW 5.0 MHz Sweep 1.000 ms (1001 pts)

MSG STATUS

Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

Mkr→CF

Mkr→Ref Lvl

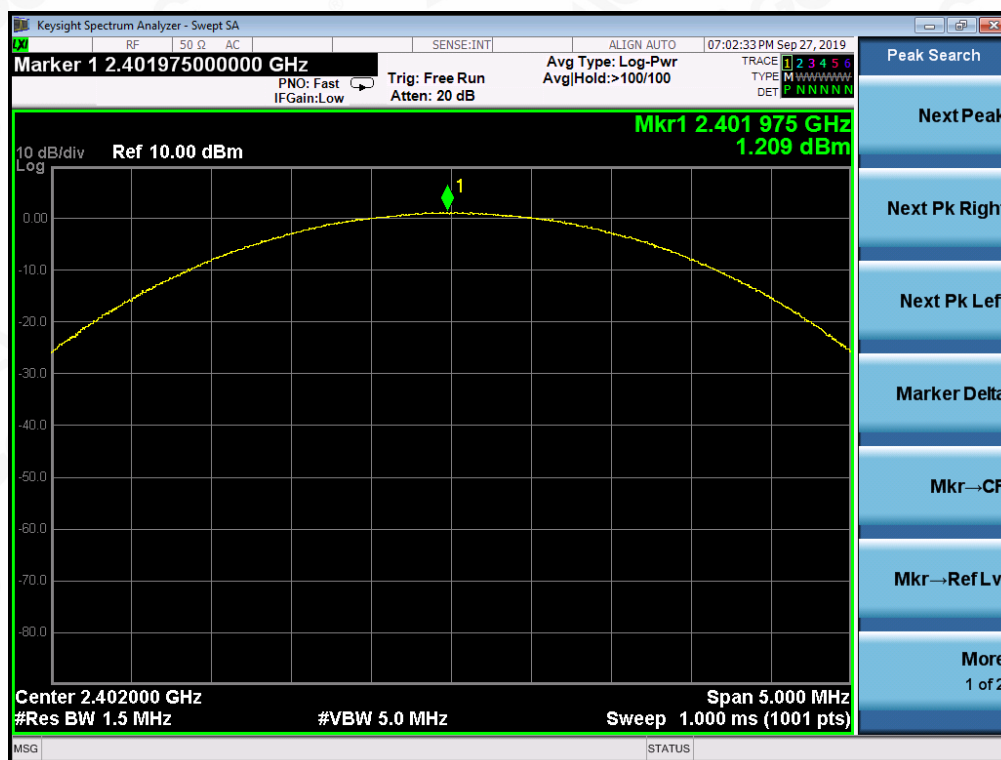
More

1 of 2



| PEAK OUTPUT POWER MEASUREMENT RESULT<br>FOR 8-DPSK MODULATION |                     |                            |              |
|---|---------------------|----------------------------|--------------|
| Frequency<br>(GHz)  | Peak Power<br>(dBm) | Applicable Limits<br>(dBm) | Pass or Fail |
| 2.402   | 1.209               | 30                         | Pass         |
| 2.441   | 0.097               | 30                         | Pass         |
| 2.480   | -0.974              | 30                         | Pass         |

CH0



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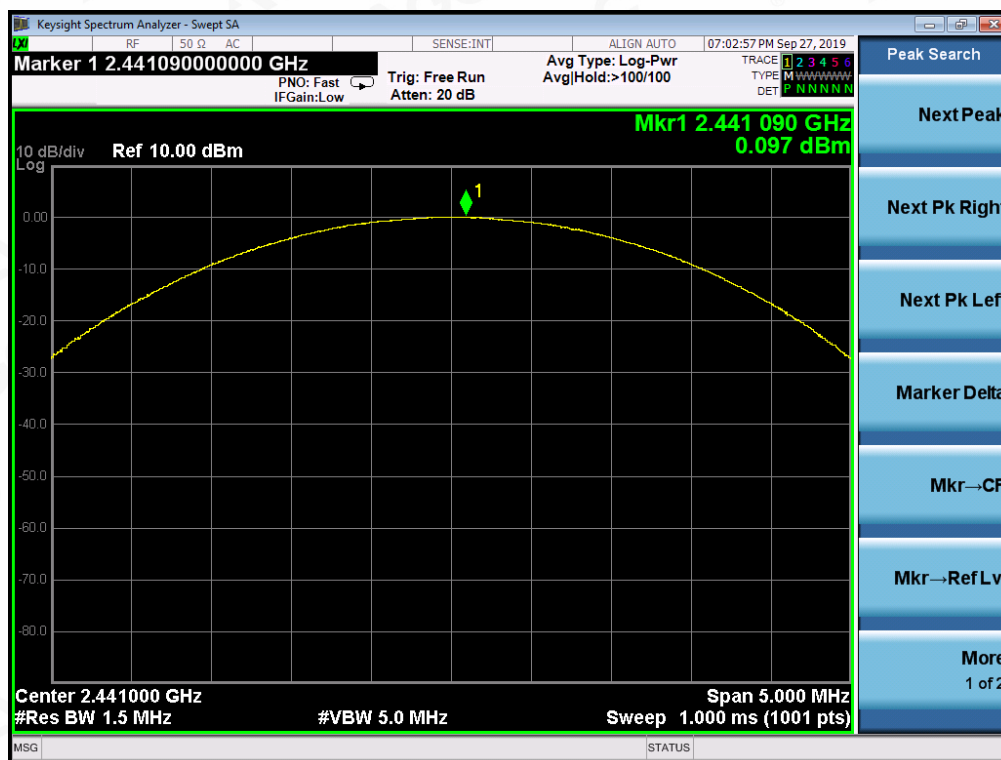
Add: 2/F., Building 2, Sanwei Chaxi Industrial Park, Sanwei Community,  
Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China

Tel: +86-755 2523 4088

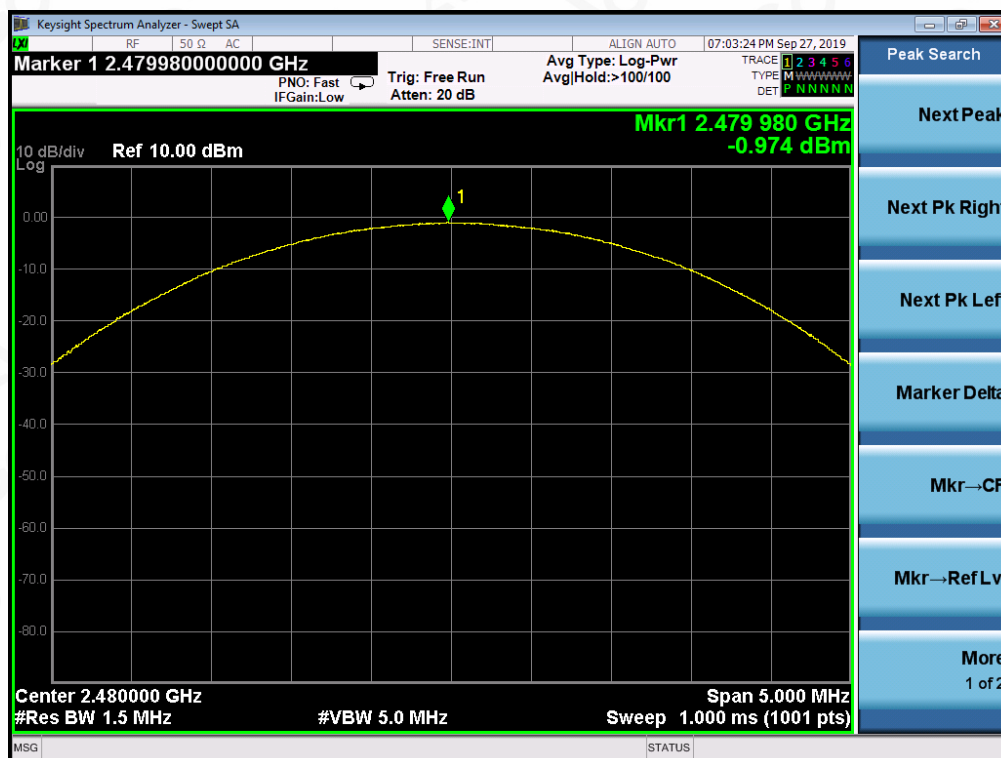
E-mail: agc@agc-cert.com

Service Hotline: 400 089 2118

CH39



CH78

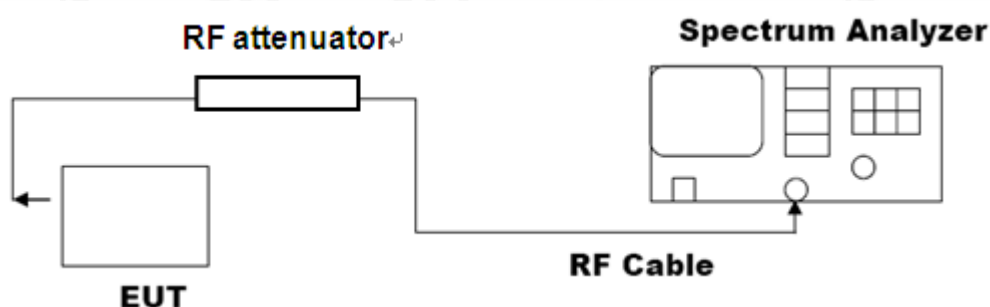


## 8. 20DB BANDWIDTH

### 8.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel  
The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

### 8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



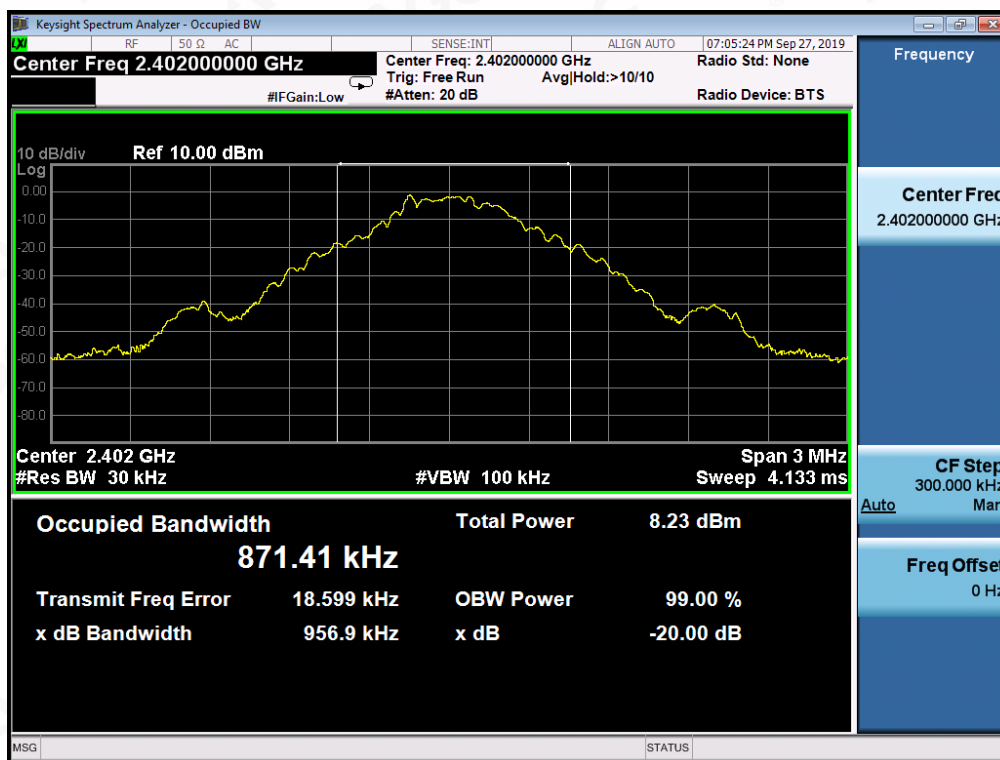
### 8.3. LIMITS AND MEASUREMENT RESULTS

| MEASUREMENT RESULT FOR GFSK MODULATION |                    |        |          |
|--|--------------------|--------|----------|
| Applicable Limits                      | Measurement Result |        |          |
|  | Test Data (MHz)    |        | Criteria |
| N/A                                    | Low Channel        | 0.9569 | PASS     |
|  | Middle Channel     | 0.9577 | PASS     |
|  | High Channel       | 0.9592 | PASS     |

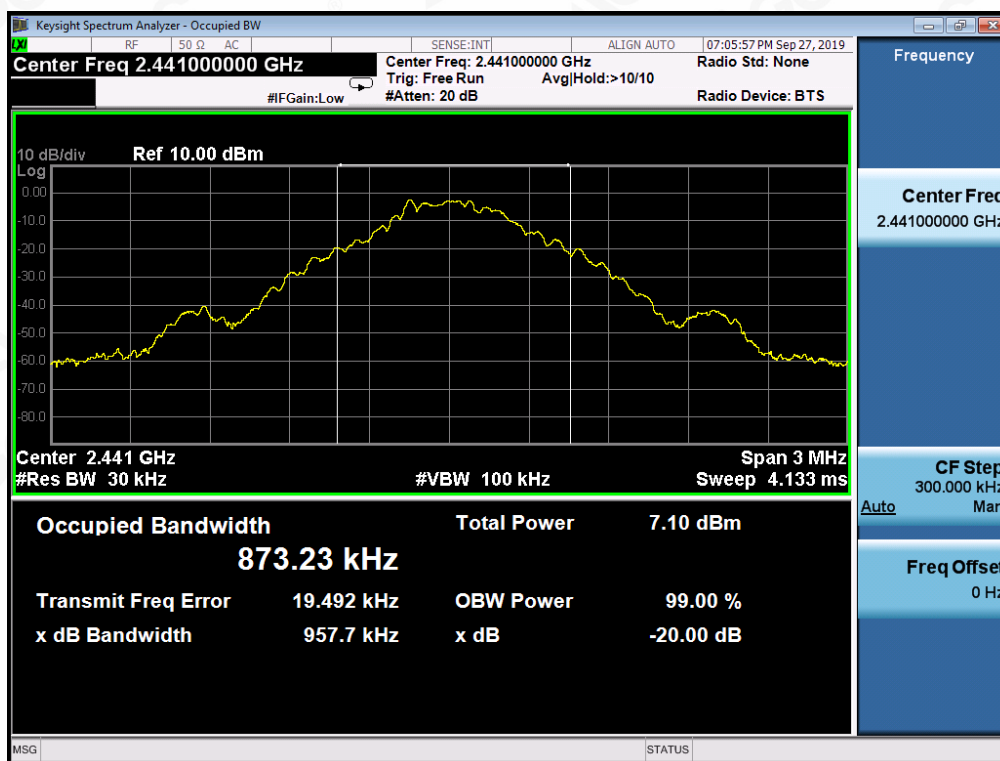




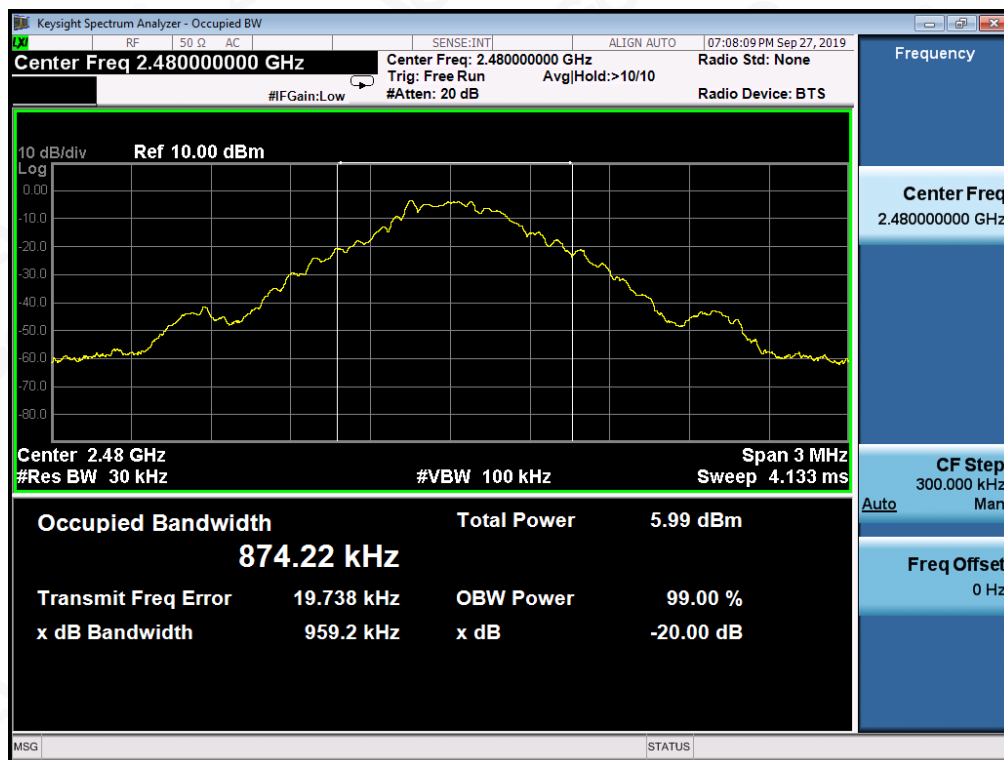
### TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

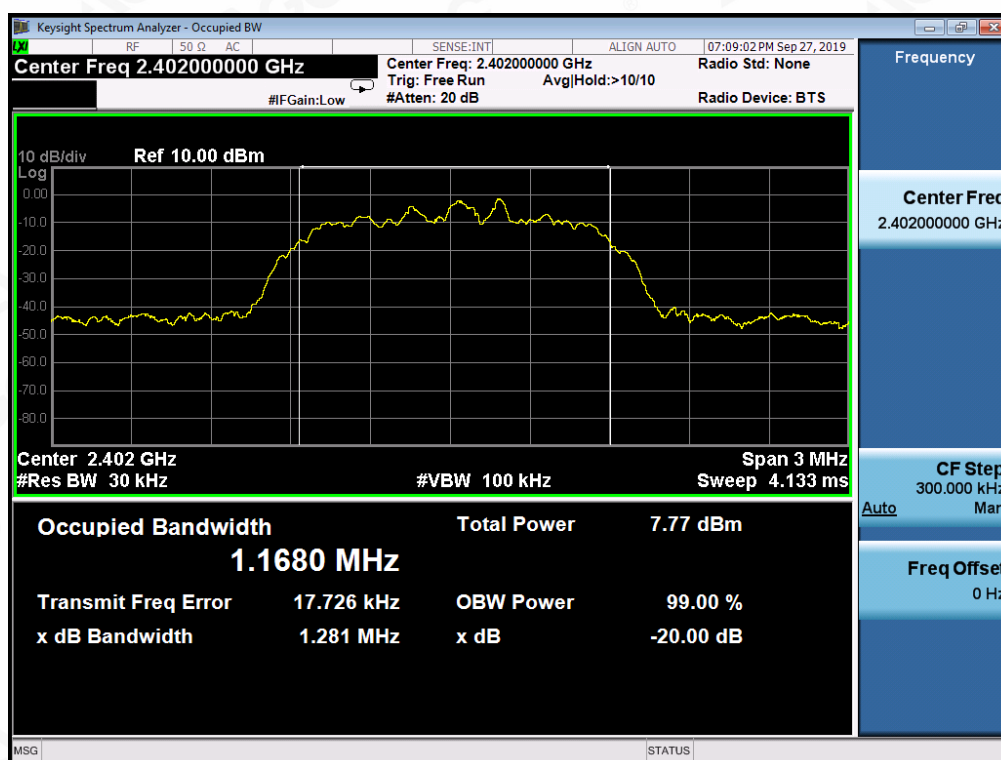


### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

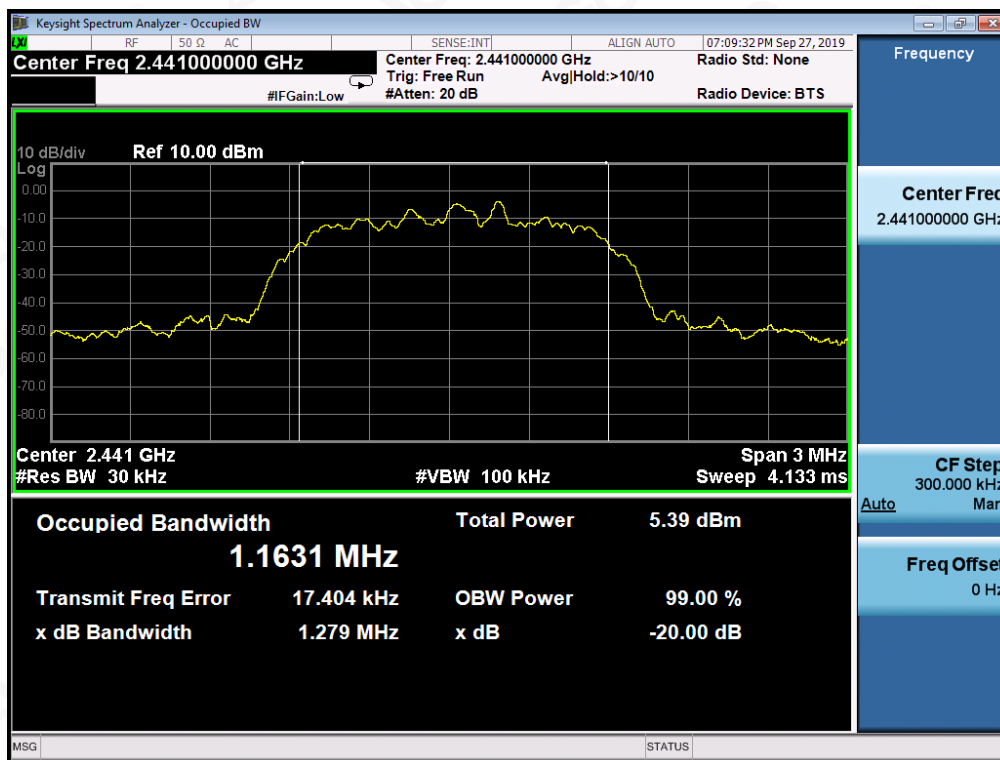


| MEASUREMENT RESULT FOR II /4-DQPSK MODULATION |                    |       |          |
|---|--------------------|-------|----------|
| Applicable Limits                             | Measurement Result |       |          |
|   | Test Data (MHz)    |       | Criteria |
| N/A   | Low Channel        | 1.281 | PASS     |
|   | Middle Channel     | 1.279 | PASS     |
|   | High Channel       | 1.279 | PASS     |

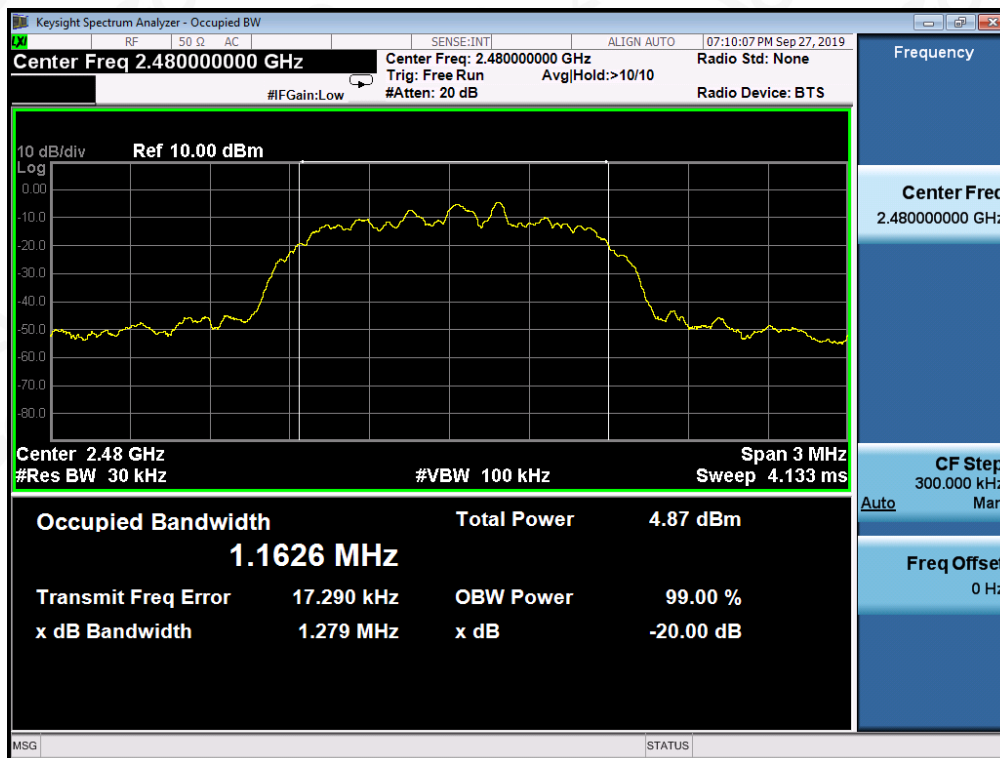
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



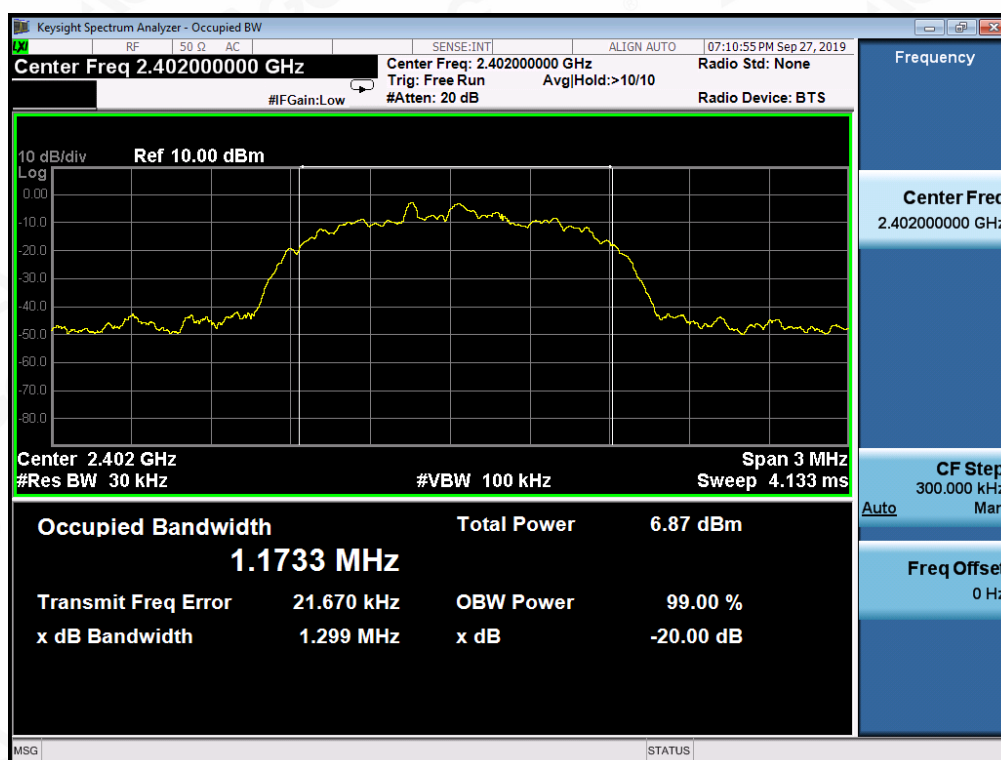
### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



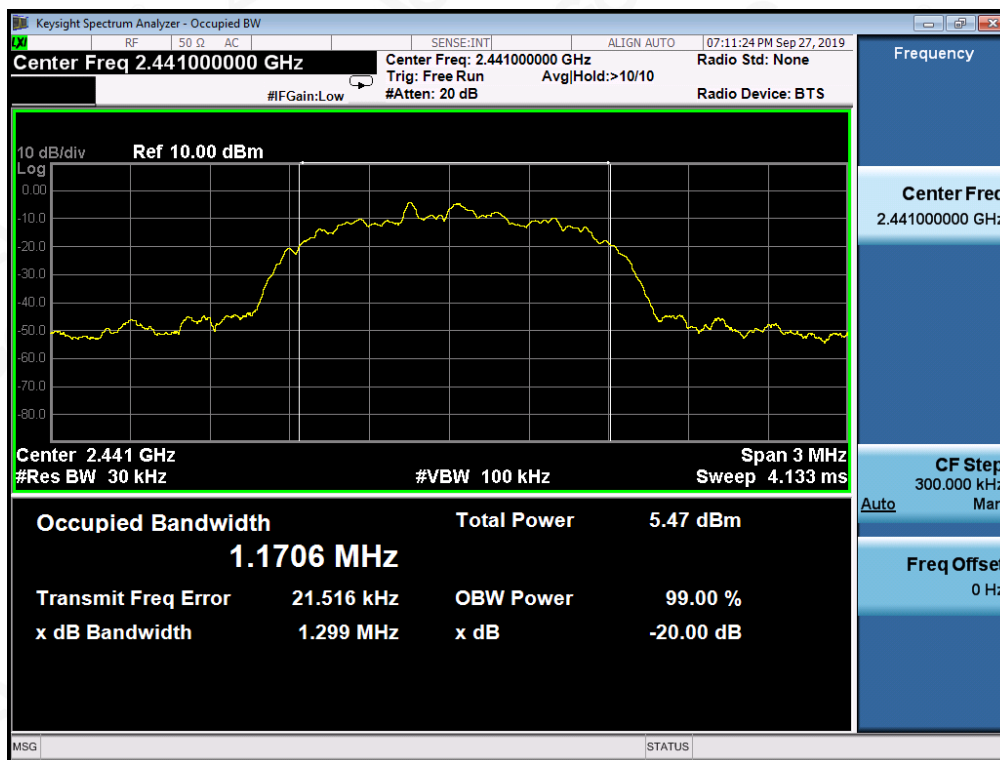


| MEASUREMENT RESULT FOR 8-DPSK MODULATION |                    |       |          |
|--|--------------------|-------|----------|
| Applicable Limits                        | Measurement Result |       |          |
|  | Test Data (MHz)    |       | Criteria |
| N/A                                      | Low Channel        | 1.299 | PASS     |
|  | Middle Channel     | 1.299 | PASS     |
|  | High Channel       | 1.301 | PASS     |

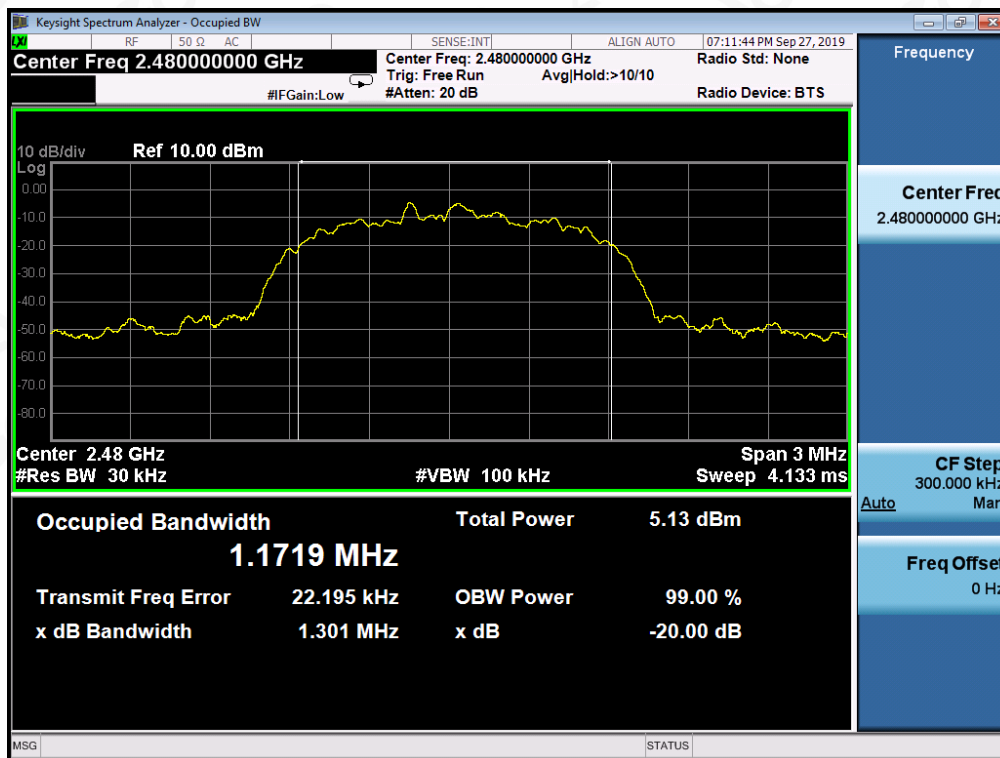
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



## 9. CONDUCTED SPURIOUS EMISSION

### 9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
3. Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.  
RBW = 100 kHz; VBW= 300 kHz; Sweep = auto; Detector function = peak.
4. Set SPA Trace 1 Max hold, then View.

### 9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2

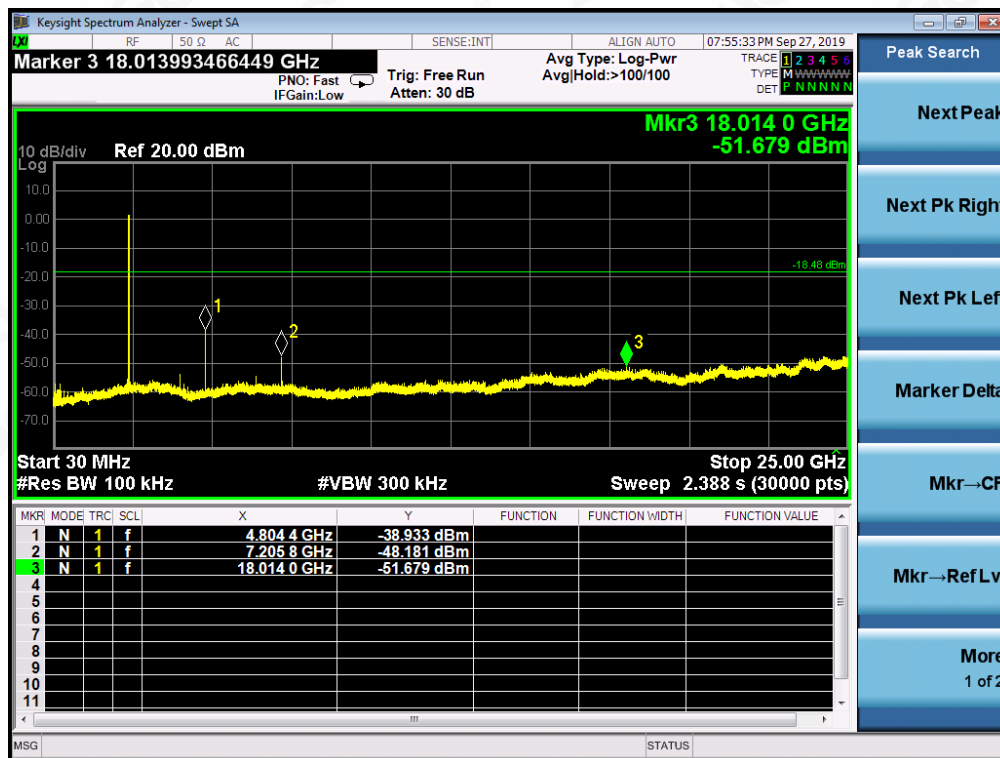
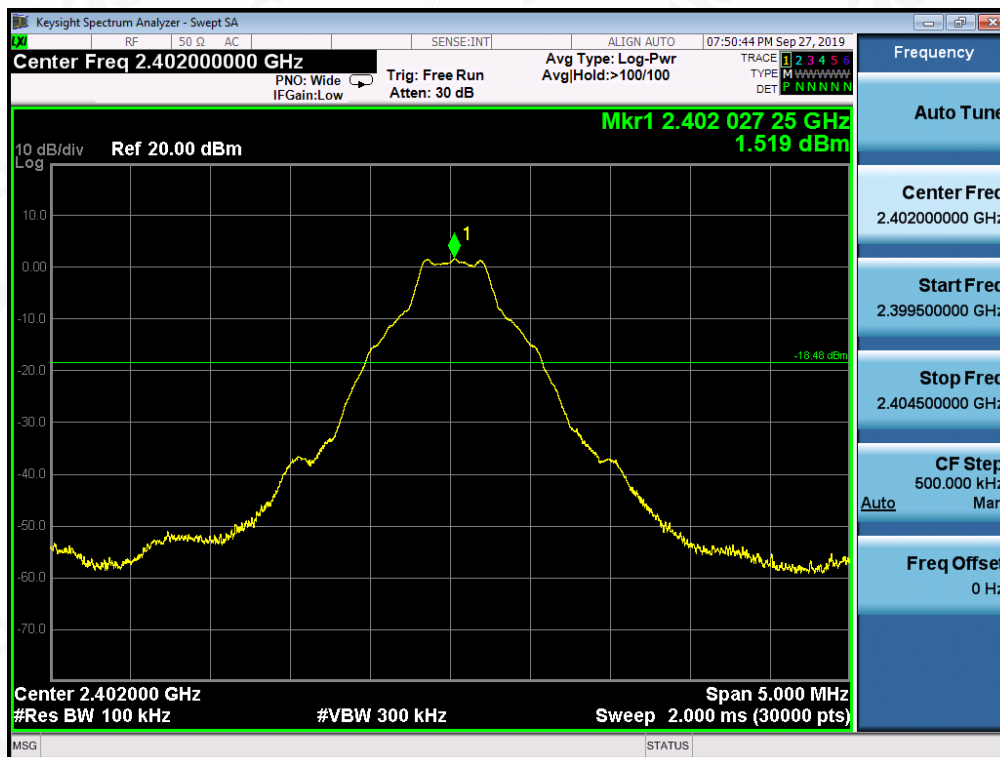
### 9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

### 9.4. LIMITS AND MEASUREMENT RESULT

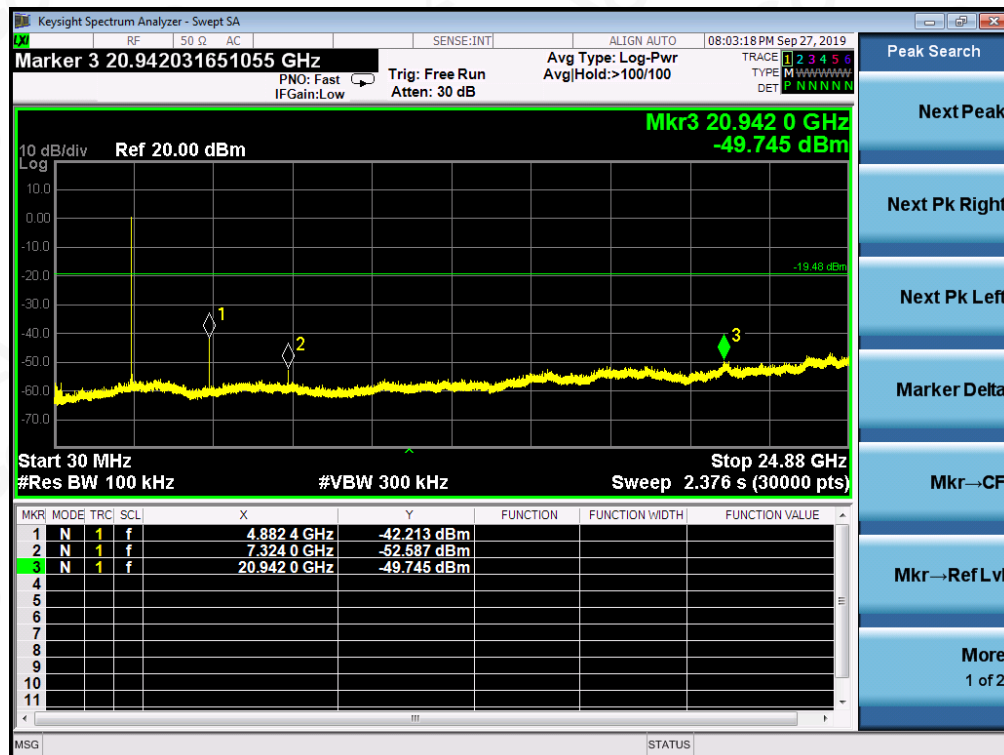
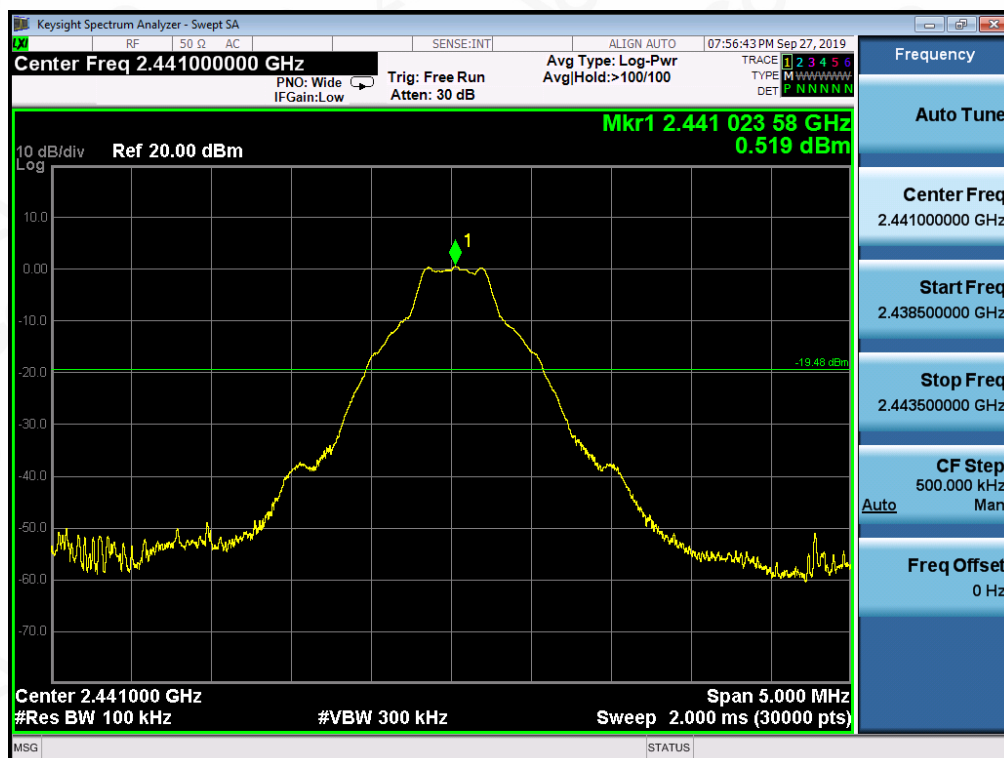
| LIMITS AND MEASUREMENT RESULT   |  |          |
|---|--|----------|
| Applicable Limits   | Measurement Result   |          |
|   | Test Data  | Criteria |
| In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.<br>In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a)) | At least -20dBc than the limit Specified on the BOTTOM Channel | PASS     |
|   | At least -20dBc than the limit Specified on the TOP Channel    | PASS     |

**TEST RESULT FOR ENTIRE FREQUENCY RANGE**  
**TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE**  
**OF GFSK MODULATION IN LOW CHANNEL**

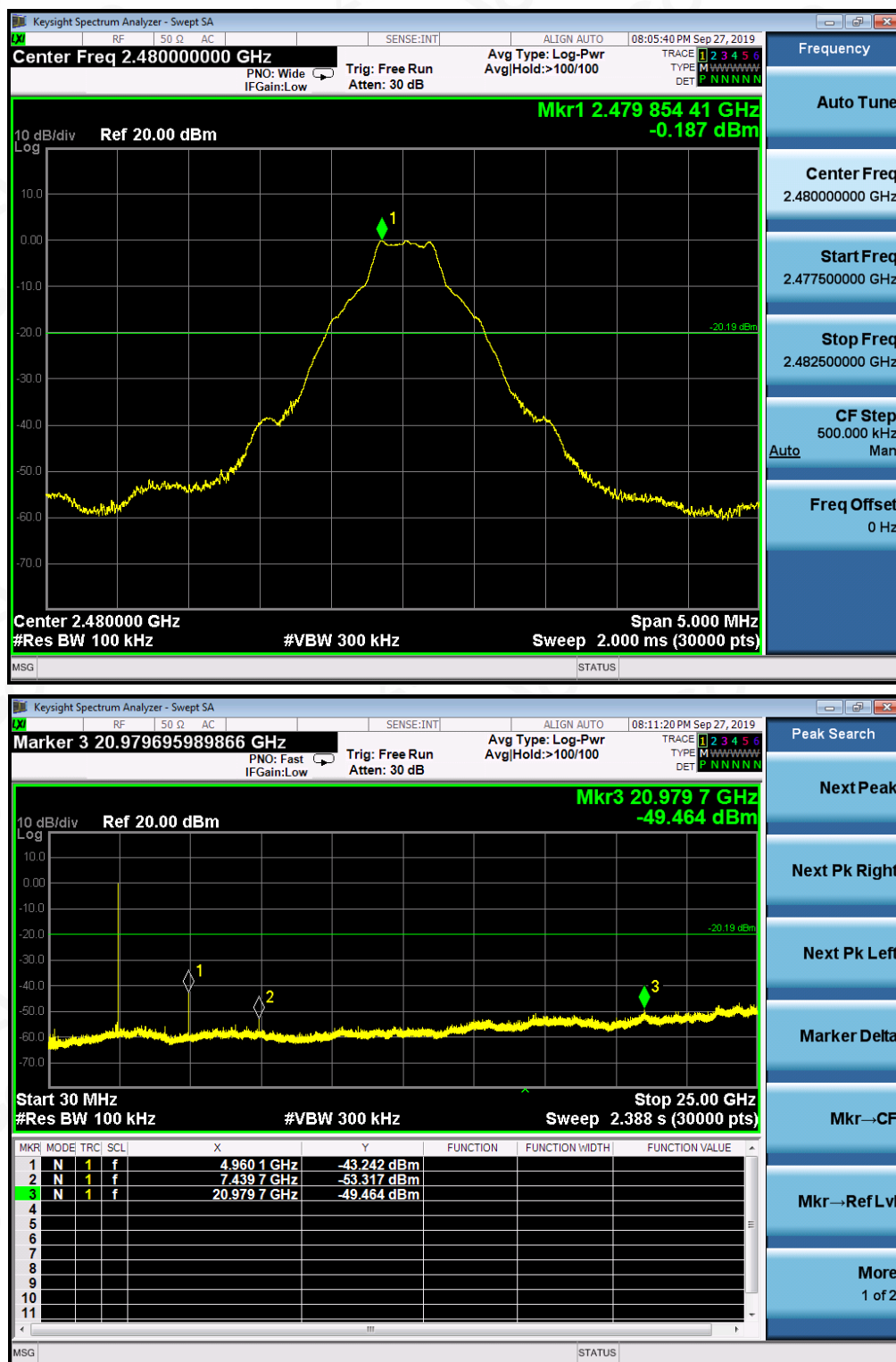




### TEST PLOT OF OUT OF BAND EMISSIONS OF GFSK MODULATION IN MIDDLE CHANNEL

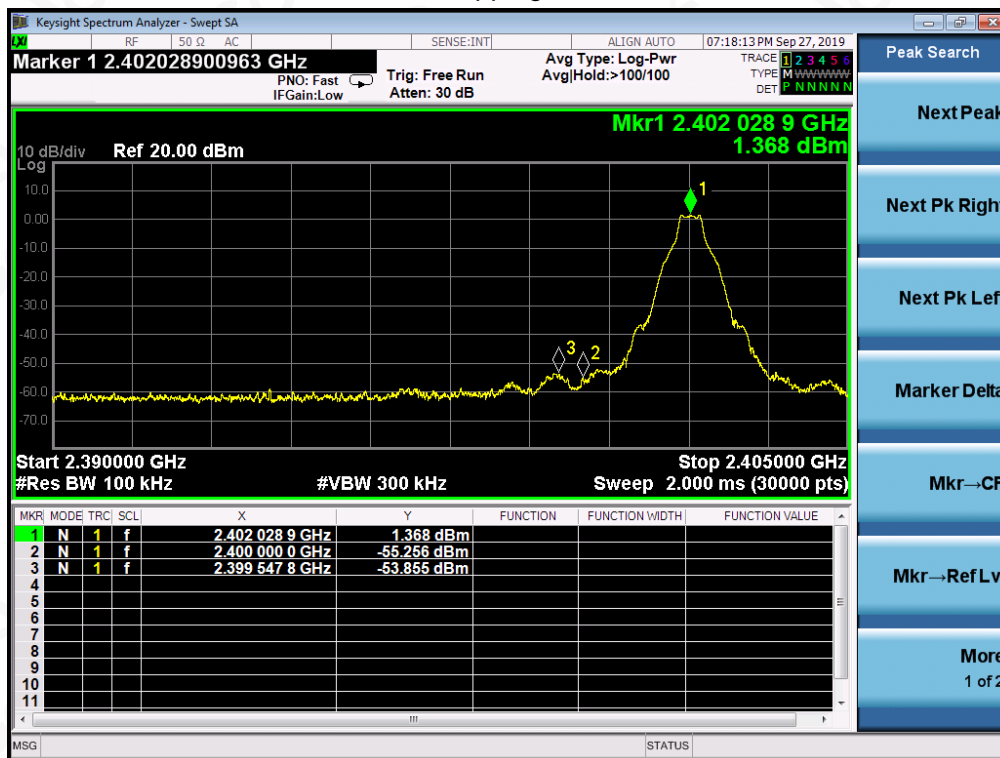


### TEST PLOT OF OUT OF BAND EMISSIONS OF GFSK MODULATION IN HIGH CHANNEL

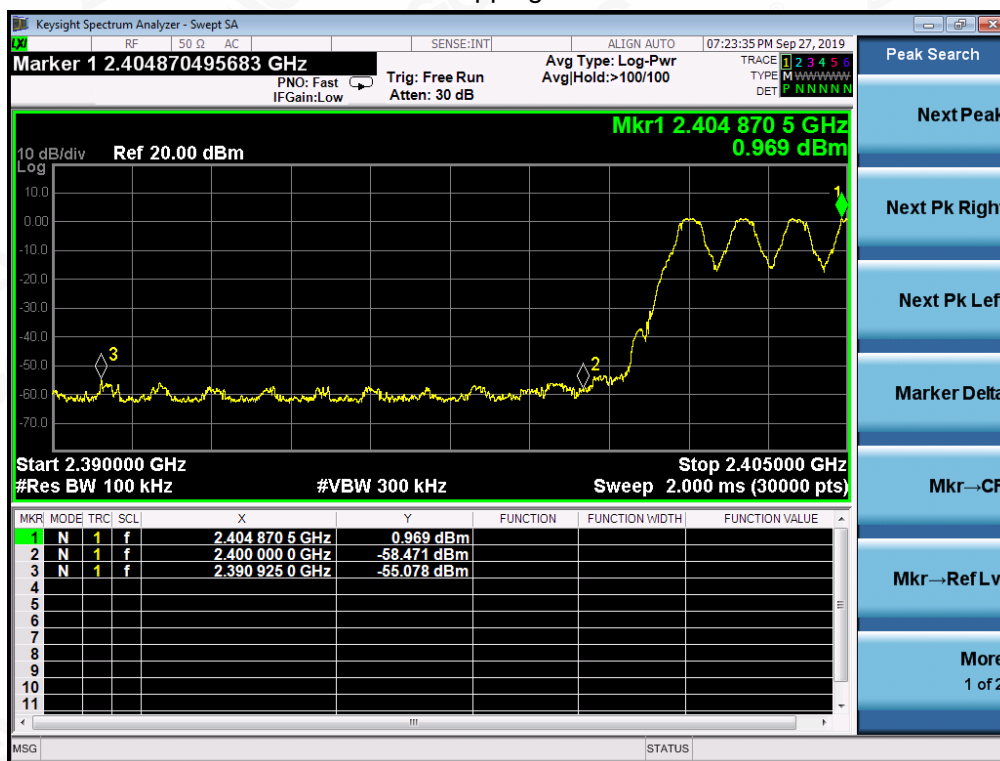


Note: The peak emissions without marker on the above plots are fundamental wave and need not to compare with the limit. The GFSK modulation is the worst case and only those data recorded in the report.

# TEST RESULT FOR BAND EDGE GFSK MODULATION IN LOW CHANNEL Hopping off



Hopping on



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Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China

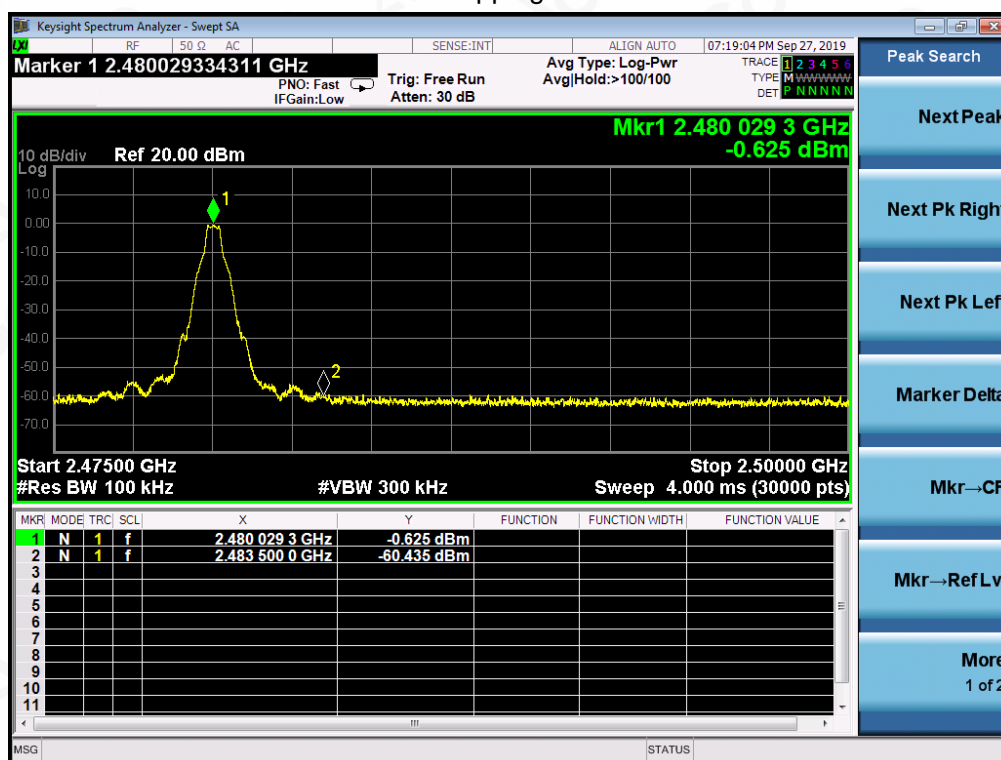
Tel: +86-755 2523 4088

E-mail: agc@agc-cert.com

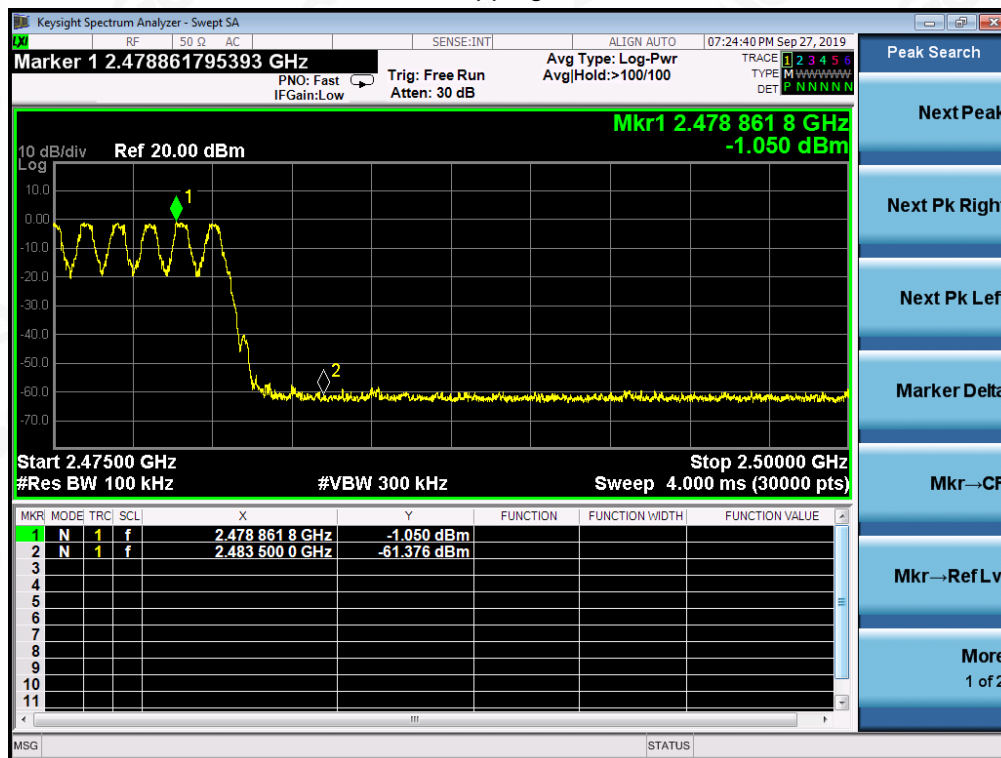
Service Hotline: 400 089 2118

## GFSK MODULATION IN HIGH CHANNEL

### Hopping off



### Hopping on



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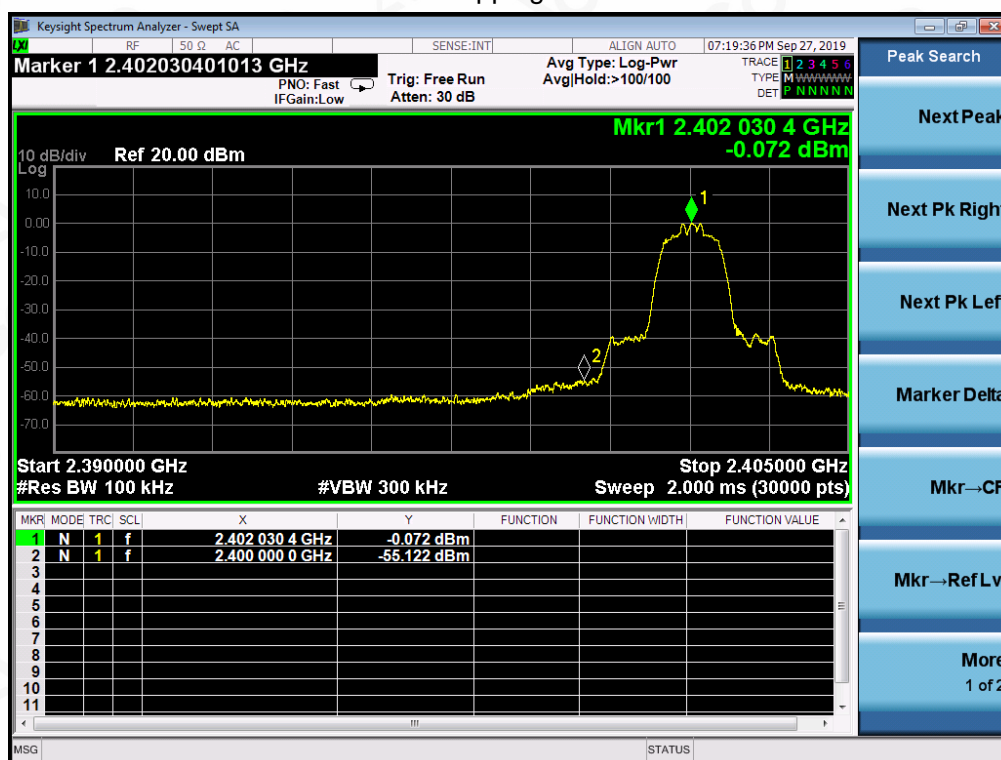
Tel: +86-755 2523 4088

E-mail: agc@agc-cert.com

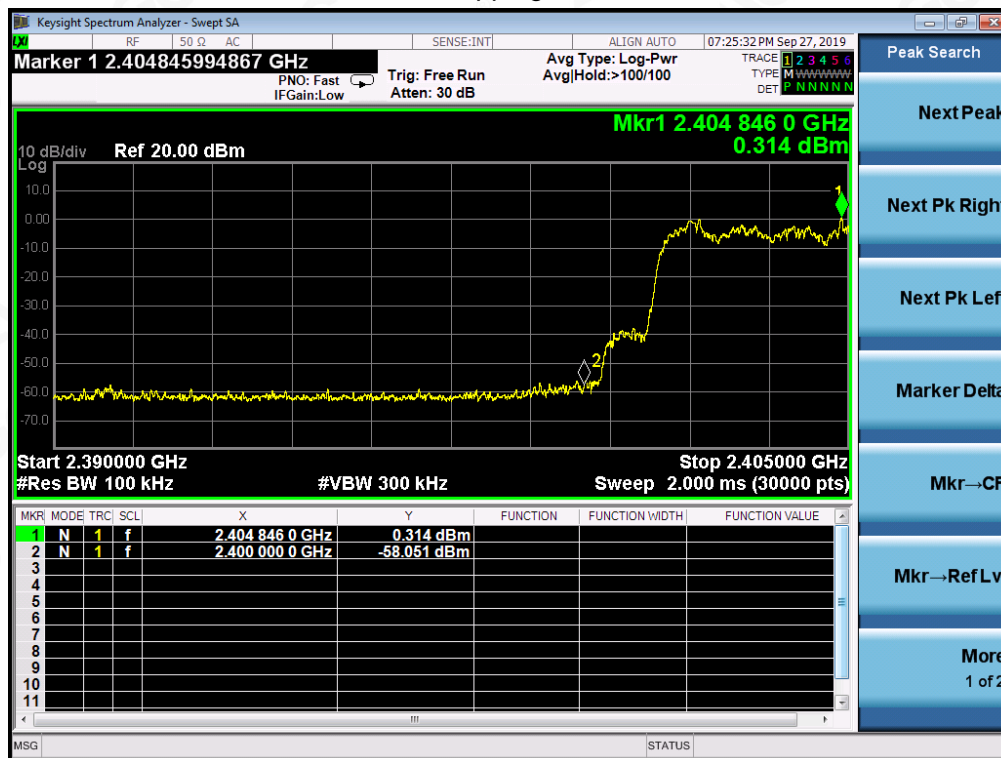
Service Hotline: 400 089 2118



$\pi$  /4-DQPSK MODULATION IN LOW CHANNEL  
Hopping off



Hopping on



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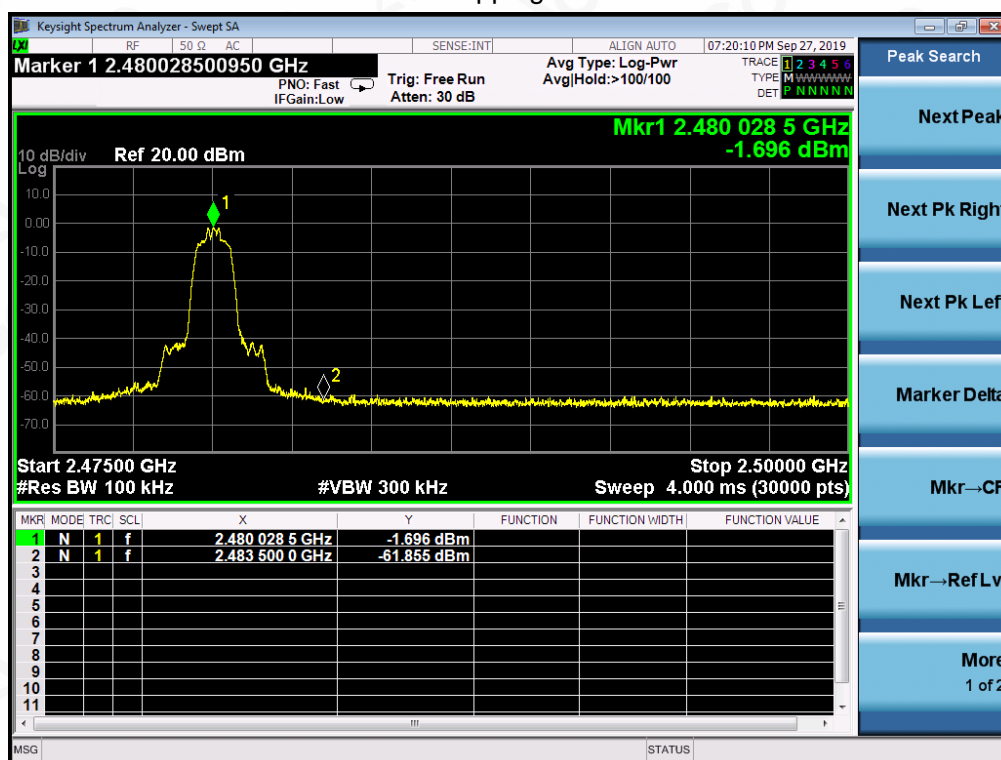
Add: 2/F., Building 2, Sanwei Chaxi Industrial Park, Sanwei Community,  
Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China

Tel: +86-755 2523 4088

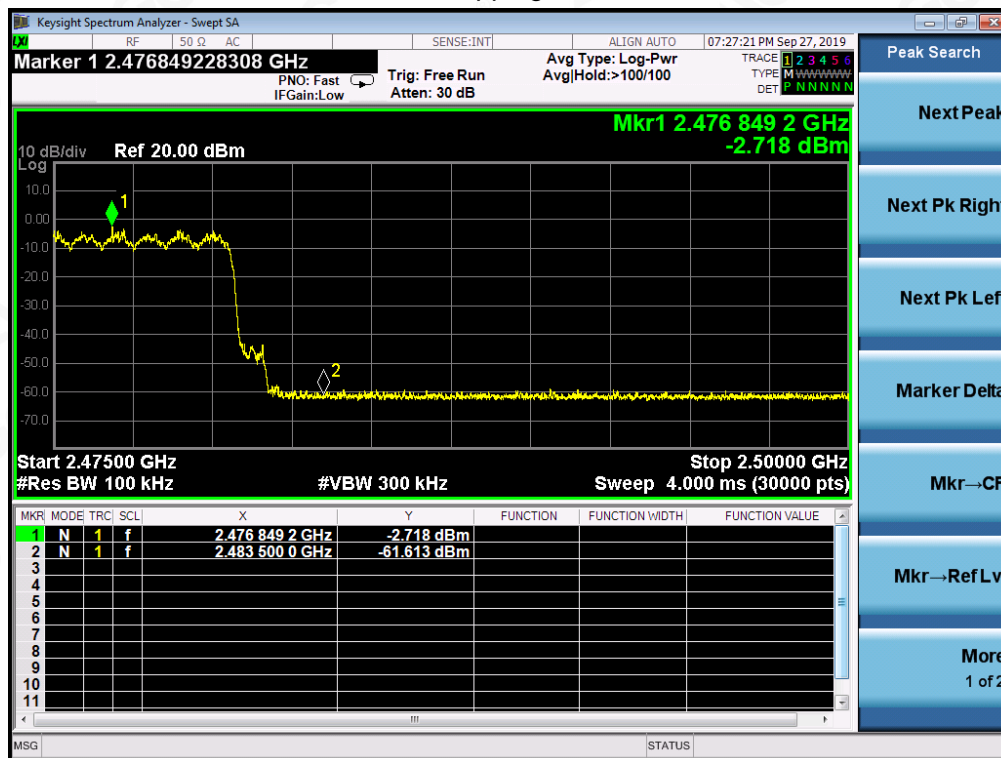
E-mail: agc@agc-cert.com

Service Hotline: 400 089 2118

$\pi$  /4-DQPSK MODULATION IN HIGH CHANNEL  
Hopping off



Hopping on



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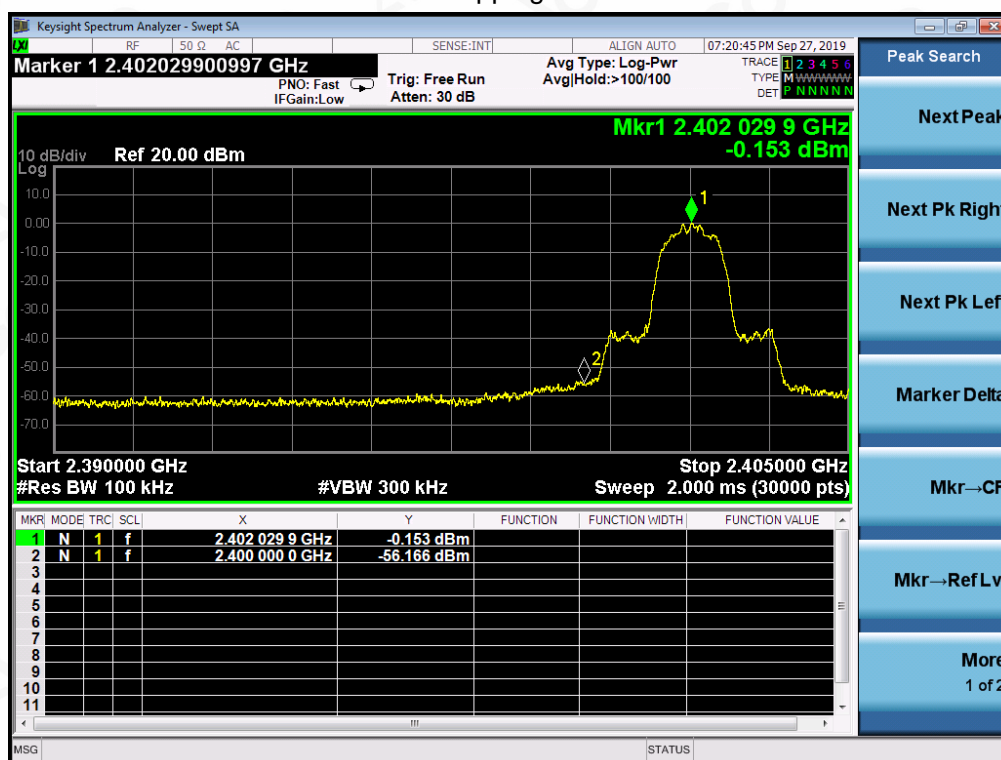
Add: 2/F., Building 2, Sanwei Chaxi Industrial Park, Sanwei Community,  
Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China

Tel: +86-755 2523 4088

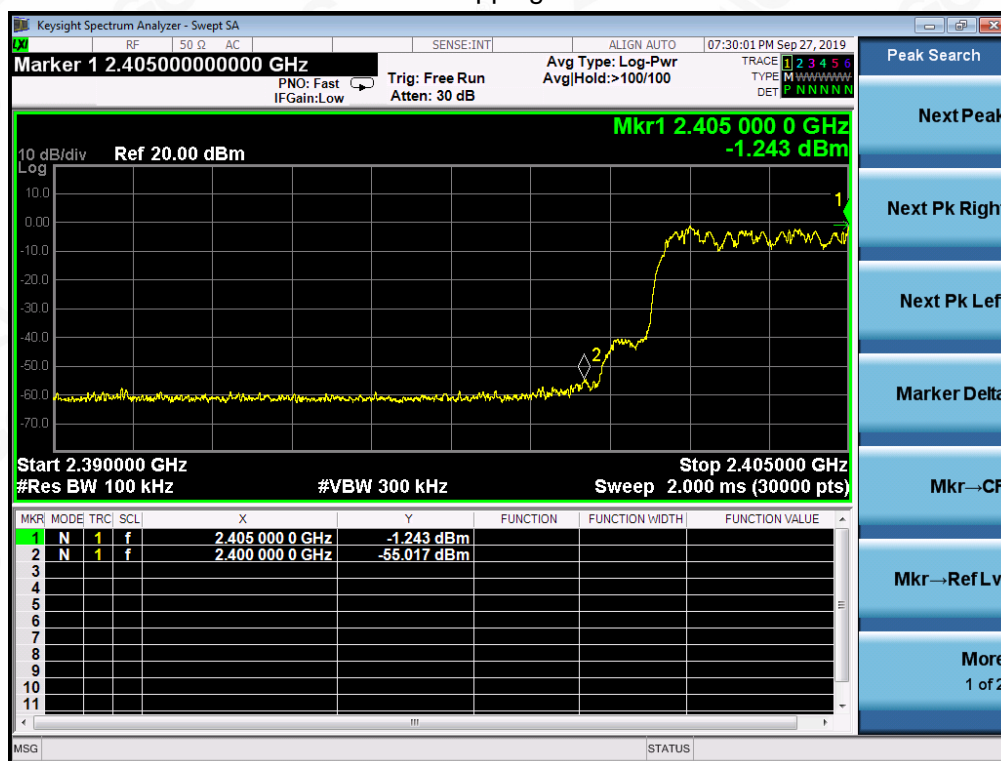
E-mail: agc@agc-cert.com

Service Hotline: 400 089 2118

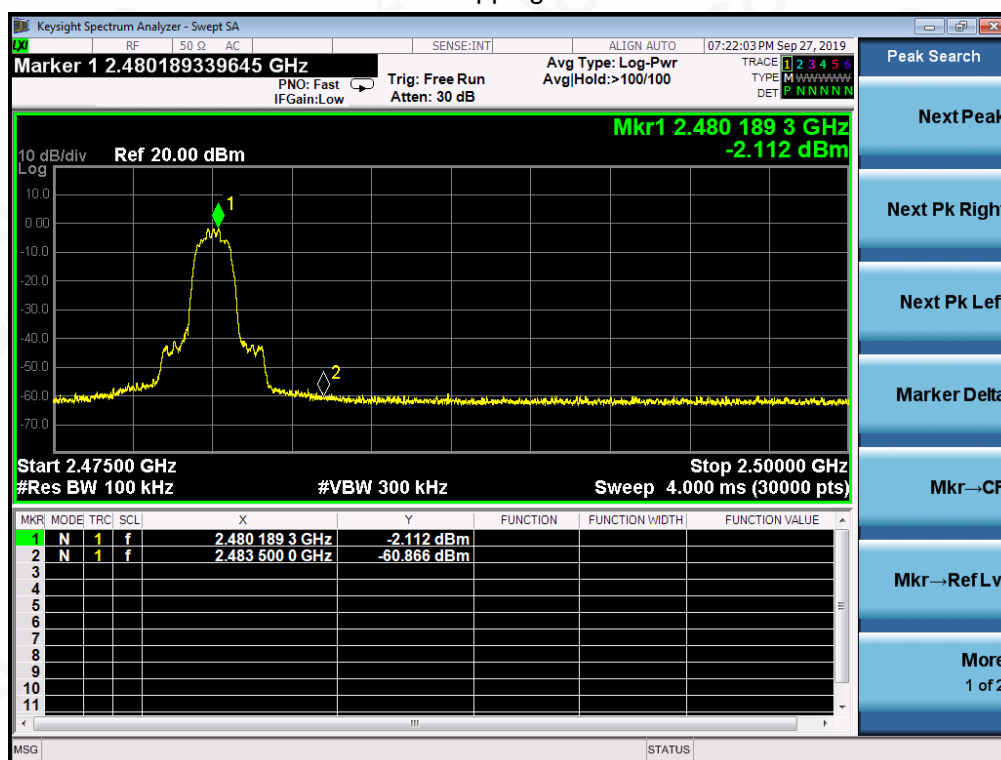
## 8-DPSK MODULATION IN LOW CHANNEL Hopping off



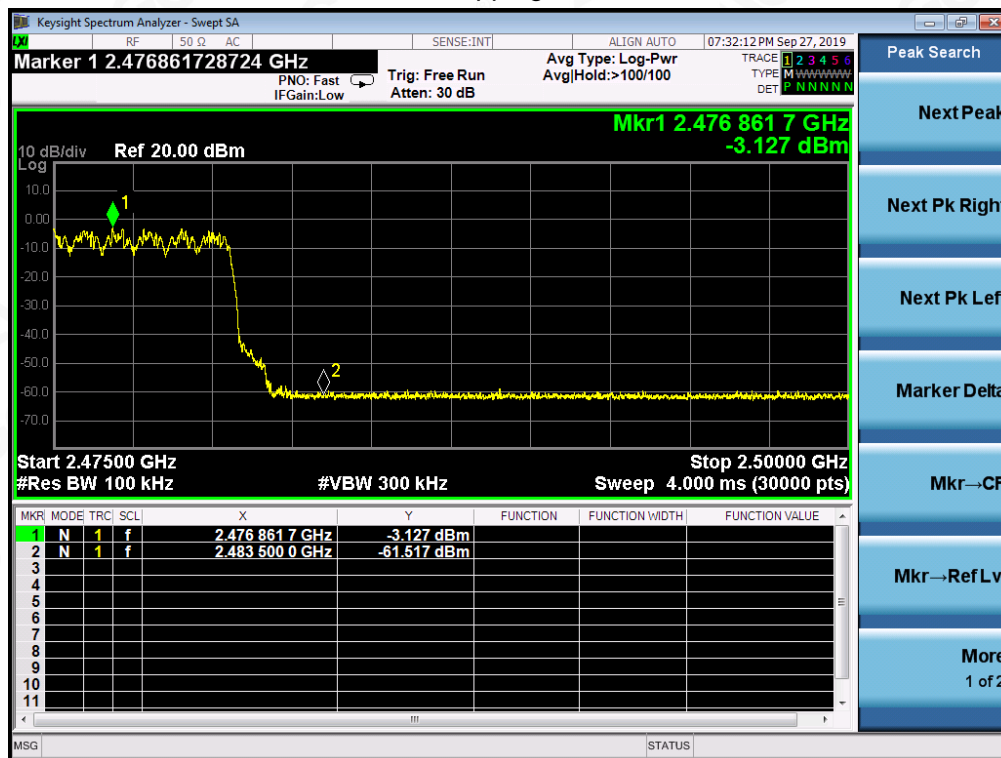
## Hopping on



## 8-DPSK MODULATION IN HIGH CHANNEL Hopping off



## Hopping on





## 10. RADIATED EMISSION

### 10.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter    | Setting   |
|-----------------------|---|
| Start ~Stop Frequency | 9KHz~150KHz/RB 200Hz for QP                               |
| Start ~Stop Frequency | 150KHz~30MHz/RB 9KHz for QP                               |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120KHz for QP                            |
| Start ~Stop Frequency | 1GHz~26.5GHz<br>1MHz/3MHz for Peak, 1MHz/3MHz for Average |

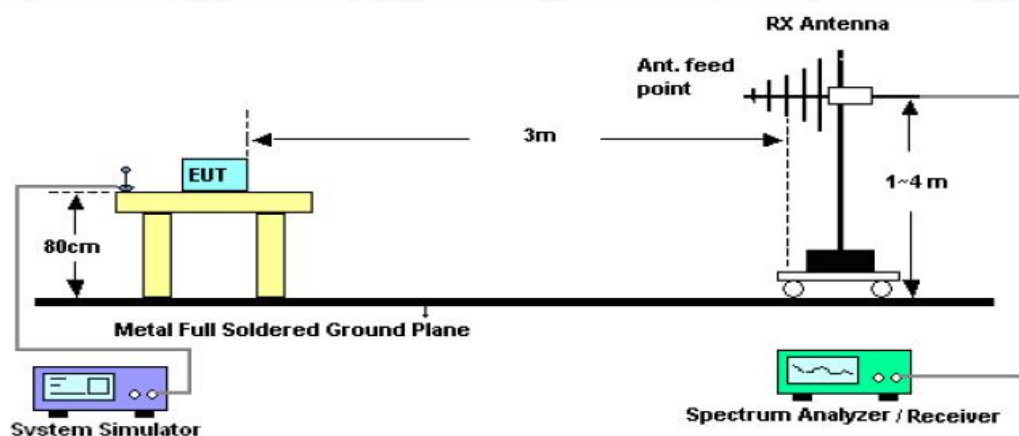
| Receiver Parameter    | Setting                        |
|-----------------------|--------------------------------|
| Start ~Stop Frequency | 9KHz~150KHz/RB 200Hz for QP    |
| Start ~Stop Frequency | 150KHz~30MHz/RB 9KHz for QP    |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120KHz for QP |

## 10.2. TEST SETUP

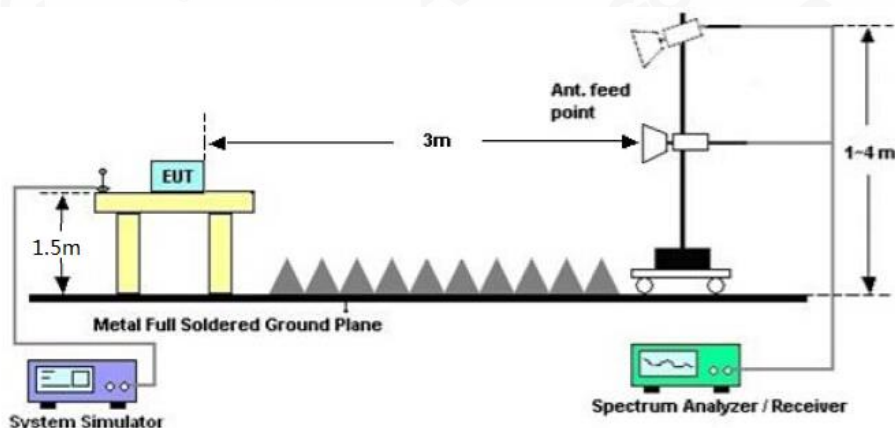
### Radiated Emission Test-Setup Frequency Below 30MHz



### RADIATED EMISSION TEST SETUP 30MHz-1000MHz



### RADIATED EMISSION TEST SETUP ABOVE 1000MHz



### 10.3. LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

| Frequencies<br>(MHz) | Field Strength<br>(micorvolts/meter) | Measurement Distance<br>(meters) |
|----------------------|--------------------------------------|----------------------------------|
| 0.009~0.490          | 2400/F(KHz)                          | 300                              |
| 0.490~1.705          | 24000/F(KHz)                         | 30                               |
| 1.705~30.0           | 30                                   | 30                               |
| 30~88                | 100                                  | 3                                |
| 88~216               | 150                                  | 3                                |
| 216~960              | 200                                  | 3                                |
| Above 960            | 500                                  | 3                                |

Note: All modes were tested For restricted band radiated emission,  
the test records reported below are the worst result compared to other modes.

### 10.4. TEST RESULT

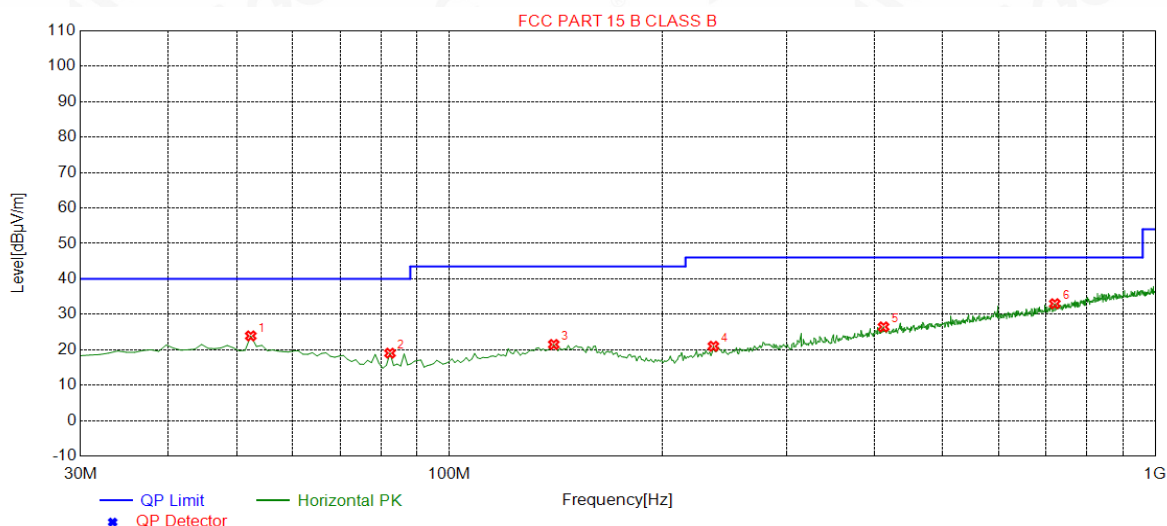
#### RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.



### RADIATED EMISSION BELOW 1GHZ

|             |         |                   |                |
|-------------|---------|-------------------|----------------|
| EUT         | E7/1000 | Model Name        | E7/1000        |
| Temperature | 25°C    | Relative Humidity | 55.4%          |
| Pressure    | 960hPa  | Test Voltage      | Normal Voltage |
| Test Mode   | Mode 4  | Antenna           | Horizontal     |



| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity   |
|-----|-------------|----------------|-------------|----------------|-------------|-------------|-----------|------------|
| 1   | 52.3100     | 23.90          | 14.49       | 40.00          | 16.10       | 200         | 252       | Horizontal |
| 2   | 82.3800     | 19.03          | 10.17       | 40.00          | 20.97       | 200         | 202       | Horizontal |
| 3   | 140.5800    | 21.49          | 14.88       | 43.50          | 22.01       | 200         | 124       | Horizontal |
| 4   | 236.6100    | 20.98          | 14.57       | 46.00          | 25.02       | 100         | 245       | Horizontal |
| 5   | 412.1800    | 26.45          | 20.06       | 46.00          | 19.55       | 200         | 1         | Horizontal |
| 6   | 720.6400    | 32.99          | 26.47       | 46.00          | 13.01       | 200         | 18        | Horizontal |

**RESULT: PASS**



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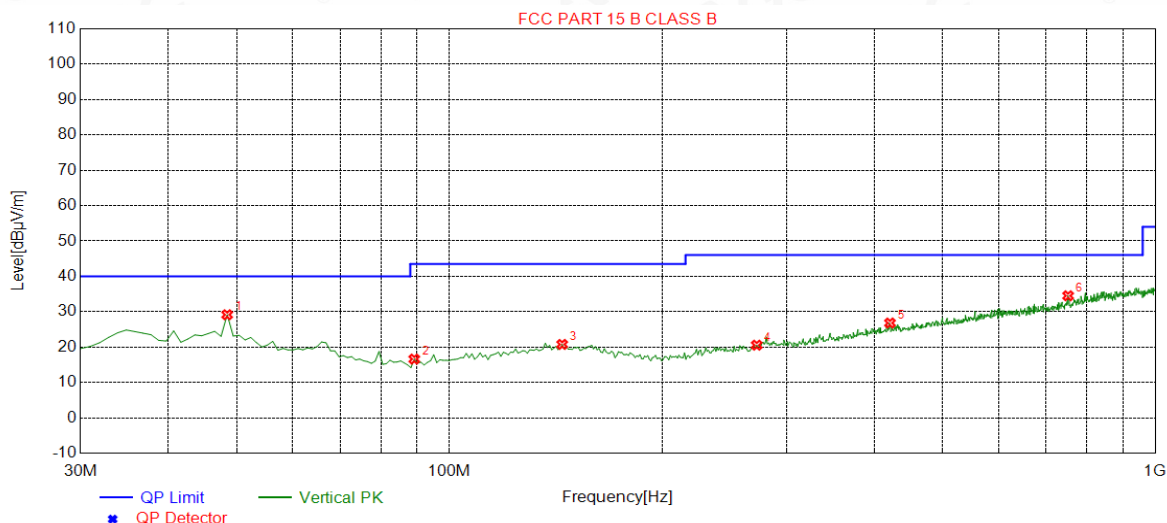
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Tel: +86-755 2523 4088

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|             |         |                   |                |
|-------------|---------|-------------------|----------------|
| EUT         | E7/1000 | Model Name        | E7/1000        |
| Temperature | 25°C    | Relative Humidity | 55.4%          |
| Pressure    | 960hPa  | Test Voltage      | Normal Voltage |
| Test Mode   | Mode 4  | Antenna           | Vertical       |



| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| 1   | 48.4300     | 29.15          | 14.71       | 40.00          | 10.85       | 100         | 356       | Vertical |
| 2   | 89.1700     | 16.61          | 10.26       | 43.50          | 26.89       | 100         | 273       | Vertical |
| 3   | 144.4600    | 20.76          | 14.88       | 43.50          | 22.74       | 100         | 227       | Vertical |
| 4   | 272.5000    | 20.55          | 15.63       | 46.00          | 25.45       | 100         | 345       | Vertical |
| 5   | 420.9100    | 26.81          | 20.28       | 46.00          | 19.19       | 100         | 357       | Vertical |
| 6   | 752.6500    | 34.51          | 27.28       | 46.00          | 11.49       | 100         | 195       | Vertical |

## RESULT: PASS

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. All test modes had been pre-tested. The mode 4 is the worst case and recorded in the report.

### RADIATED EMISSION ABOVE 1GHZ

|                    |         |                          |                |
|--------------------|---------|--------------------------|----------------|
| <b>EUT</b>         | E7/1000 | <b>Model Name</b>        | E7/1000        |
| <b>Temperature</b> | 25°C    | <b>Relative Humidity</b> | 55.4%          |
| <b>Pressure</b>    | 960hPa  | <b>Test Voltage</b>      | Normal Voltage |
| <b>Test Mode</b>   | Mode 1  | <b>Antenna</b>           | Horizontal     |

| Frequency<br>(MHz) | Meter Reading<br>(dBμV) | Factor<br>(dB) | Emission Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Value Type |
|--------------------|-------------------------|----------------|----------------------------|--------------------|----------------|------------|
| 4804.000           | 57.38                   | 0.08           | 57.46                      | 74                 | -16.54         | peak       |
| 4804.000           | 49.98                   | 0.08           | 50.06                      | 54                 | -3.94          | AVG        |
| 7206.000           | 47.09                   | 2.21           | 49.3                       | 74                 | -24.7          | peak       |
| 7206.000           | 39.13                   | 2.21           | 41.34                      | 54                 | -12.66         | AVG        |
|                    |                         |                |                            |                    |                |            |
|                    |                         |                |                            |                    |                |            |

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

|                    |         |                          |                |
|--------------------|---------|--------------------------|----------------|
| <b>EUT</b>         | E7/1000 | <b>Model Name</b>        | E7/1000        |
| <b>Temperature</b> | 25°C    | <b>Relative Humidity</b> | 55.4%          |
| <b>Pressure</b>    | 960hPa  | <b>Test Voltage</b>      | Normal Voltage |
| <b>Test Mode</b>   | Mode 1  | <b>Antenna</b>           | Vertical       |

| Frequency<br>(MHz) | Meter Reading<br>(dBμV) | Factor<br>(dB) | Emission Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Value Type |
|--------------------|-------------------------|----------------|----------------------------|--------------------|----------------|------------|
| 4804.000           | 55.58                   | 0.08           | 55.66                      | 74                 | -18.34         | peak       |
| 4804.000           | 47.64                   | 0.08           | 47.72                      | 54                 | -6.28          | AVG        |
| 7206.000           | 43.20                   | 2.21           | 45.41                      | 74                 | -28.59         | peak       |
| 7206.000           | 35.18                   | 2.21           | 37.39                      | 54                 | -16.61         | AVG        |
|                    |                         |                |                            |                    |                |            |
|                    |                         |                |                            |                    |                |            |

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

|                    |         |                          |                |
|--------------------|---------|--------------------------|----------------|
| <b>EUT</b>         | E7/1000 | <b>Model Name</b>        | E7/1000        |
| <b>Temperature</b> | 25°C    | <b>Relative Humidity</b> | 55.4%          |
| <b>Pressure</b>    | 960hPa  | <b>Test Voltage</b>      | Normal Voltage |
| <b>Test Mode</b>   | Mode 2  | <b>Antenna</b>           | Horizontal     |

| Frequency<br>(MHz) | Meter Reading<br>(dBμV) | Factor<br>(dB) | Emission Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Value Type |
|--------------------|-------------------------|----------------|----------------------------|--------------------|----------------|------------|
| 4882.000           | 55.84                   | 0.14           | 55.98                      | 74                 | -18.02         | peak       |
| 4882.000           | 47.34                   | 0.14           | 47.48                      | 54                 | -6.52          | AVG        |
| 7323.000           | 44.85                   | 2.36           | 47.21                      | 74                 | -26.79         | peak       |
| 7323.000           | 37.00                   | 2.36           | 39.36                      | 54                 | -14.64         | AVG        |
|                    |                         |                |                            |                    |                |            |

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

|                    |         |                          |                |
|--------------------|---------|--------------------------|----------------|
| <b>EUT</b>         | E7/1000 | <b>Model Name</b>        | E7/1000        |
| <b>Temperature</b> | 25°C    | <b>Relative Humidity</b> | 55.4%          |
| <b>Pressure</b>    | 960hPa  | <b>Test Voltage</b>      | Normal Voltage |
| <b>Test Mode</b>   | Mode 2  | <b>Antenna</b>           | Vertical       |

| Frequency<br>(MHz) | Meter Reading<br>(dBμV) | Factor<br>(dB) | Emission Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Value Type |
|--------------------|-------------------------|----------------|----------------------------|--------------------|----------------|------------|
| 4882.000           | 53.97                   | 0.14           | 54.11                      | 74                 | -19.89         | peak       |
| 4882.000           | 46.36                   | 0.14           | 46.5                       | 54                 | -7.5           | AVG        |
| 7323.000           | 43.23                   | 2.36           | 45.59                      | 74                 | -28.41         | peak       |
| 7323.000           | 35.82                   | 2.36           | 38.18                      | 54                 | -15.82         | AVG        |
|                    |                         |                |                            |                    |                |            |

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.