

# TEST REPORT

**FCC ID: RDR-Q11**

**Product: Bluetooth Headset**

**Model No.: Q11**

**Additional Model No.: N/A**

**Trade Mark: N/A**

**Report No.: TCT171206E003**

**Issued Date: Dec. 12, 2017**

Issued for:

**Dongguan Hele Electronics Co., Ltd.**

**Dalingya Industrial Zone, Daojiao Town, Dongguan City, Guangdong, China**

Issued By:

**Shenzhen Tongce Testing Lab.**

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Appendix A: Photographs of Test Setup

Appendix B: Photographs of EUT

## 1. Test Certification

<b>Product:</b>	Bluetooth Headset
<b>Model No.:</b>	Q11
<b>Additional Model:</b>	N/A
<b>Trade Mark:</b>	N/A
<b>Applicant:</b>	Dongguan Hele Electronics Co., Ltd.
<b>Address:</b>	Dalingya Industrial Zone, Daojiao Town, Dongguan City, Guangdong, China
<b>Manufacturer:</b>	Dongguan Hele Electronics Co., Ltd.
<b>Address:</b>	Dalingya Industrial Zone, Daojiao Town, Dongguan City, Guangdong, China
<b>Date of Test:</b>	Dec. 07, 2017 – Dec. 11, 2017
<b>Applicable Standards:</b>	FCC CFR Title 47 Part 15 Subpart C Section 15.247

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

**Tested By:**

*Garen*

Garen

**Date:**

Dec. 11, 2017

**Reviewed By:**

*Joe Zhou*

Joe Zhou

**Date:**

Dec. 12, 2017

**Approved By:**

*Tomsin*

Tomsin

**Date:**

Dec. 12, 2017



## 2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna Requirement	§15.203/§15.247 (c)	PASS
AC Power Line Conducted Emission	§15.207	PASS
Conducted Peak Output Power	§15.247 (b)(1) §2.1046	PASS
20dB Occupied Bandwidth	§15.247 (a)(1) §2.1049	PASS
Carrier Frequencies Separation	§15.247 (a)(1)	PASS
Hopping Channel Number	§15.247 (a)(1)	PASS
Dwell Time	§15.247 (a)(1)	PASS
Radiated Emission	§15.205/§15.209 §2.1053, §2.1057	PASS
Band Edge	§15.247(d) §2.1051, §2.1057	PASS

**Note:**

1. PASS: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.

### 3. EUT Description

<b>Product Name:</b>	Bluetooth Headset
<b>Model :</b>	Q11
<b>Additional Model:</b>	N/A
<b>Trade Mark:</b>	<b>N/A</b>
<b>Operation Frequency:</b>	2402MHz~2480MHz
<b>Transfer Rate:</b>	1/2/3 Mbits/s
<b>Number of Channel:</b>	79
<b>Modulation Type:</b>	GFSK, $\pi/4$ -DQPSK, 8DPSK
<b>Modulation Technology:</b>	FHSS
<b>Antenna Type:</b>	Internal Antenna
<b>Antenna Gain:</b>	2dBi
<b>Power Supply:</b>	Rechargeable Li-ion Battery DC3.7V

#### Operation Frequency each of channel for GFSK, $\pi/4$ -DQPSK, 8DPSK

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
...	...	...	...	...	...	...	...
10	2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
...	...	...	...	...	...	...	...
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz		-

Remark: Channel 0, 39 & 78 have been tested for GFSK,  $\pi/4$ -DQPSK, 8DPSK modulation mode.

## 4. Genera Information

### 4.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations with Fully-charged battery
<p>The sample was placed 0.8m &amp; 1.5m for the measurement below &amp; above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y &amp; Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.</p>	

### 4.2. Description of Support Units

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

Equipment	Model No.	Serial No.	FCC ID	Trade Name
/	/	/	/	/

**Note:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
3. For conducted measurements (Output Power, 20dB Occupied Bandwidth, Carrier Frequencies Separation, Hopping Channel Number, Dwell Time, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

## 5. Facilities and Accreditations

### 5.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 645098

Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

### 5.2. Location

Shenzhen Tongce Testing Lab

Address: 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China

Tel: 86-755-27673339

### 5.3. Measurement Uncertainty

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

No.	Item	MU
1	Conducted Emission	$\pm 2.56\text{dB}$
2	RF power, conducted	$\pm 0.12\text{dB}$
3	Spurious emissions, conducted	$\pm 0.11\text{dB}$
4	All emissions, radiated(<1G)	$\pm 3.92\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.28\text{dB}$
6	Temperature	$\pm 0.1^\circ\text{C}$
7	Humidity	$\pm 1.0\%$

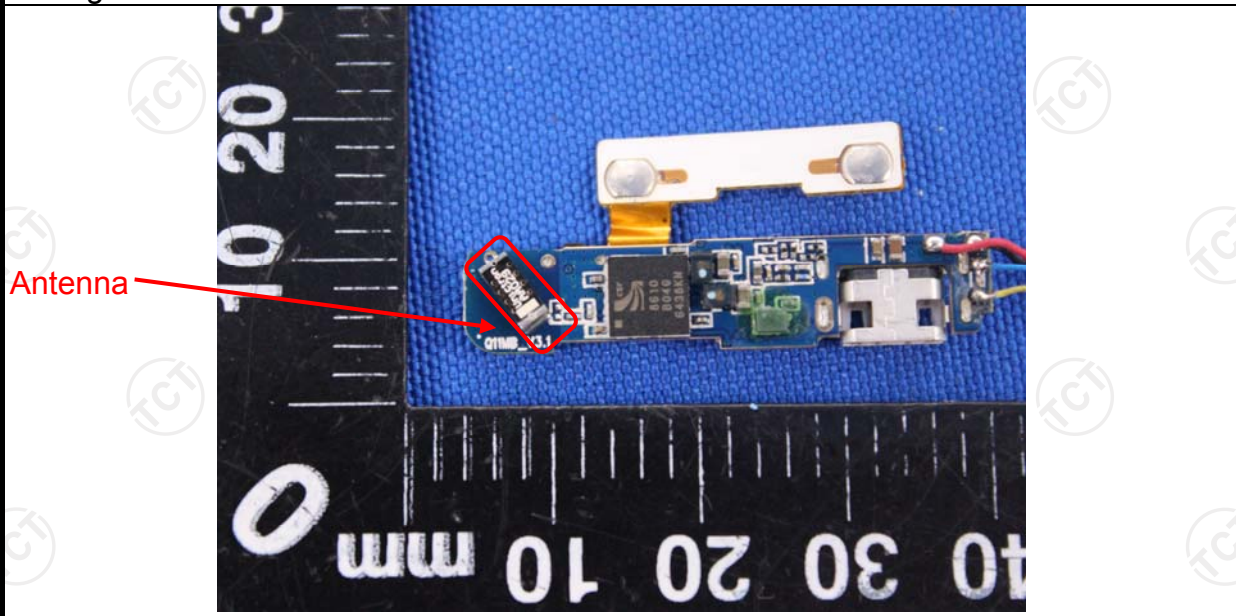


## 6. Test Results and Measurement Data

### 6.1. Antenna requirement

<b>Standard requirement:</b>	FCC Part15 C Section 15.203 /247(c)
<p>15.203 requirement: 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 an antenna 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.</p> <p>15.247(c) (1)(i) requirement: (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 6dBi 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 6dBi.</p>	

<b>E.U.T Antenna:</b>	
<p>The Bluetooth antenna is Internal antenna which permanently attached, and the best case gain of the antenna is 2dBi.</p>	





## 6.2. Conducted Emission

### 6.2.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.207														
<b>Test Method:</b>	ANSI C63.10:2013														
<b>Frequency Range:</b>	150 kHz to 30 MHz														
<b>Receiver setup:</b>	RBW=9 kHz, VBW=30 kHz, Sweep time=auto														
<b>Limits:</b>	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>	Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
<b>Test Setup:</b>	<p><i>Remark</i> E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>														
<b>Test Mode:</b>	Refer to item 4.1														
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The E.U.T is connected to an adapter through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.</li> </ol>														
<b>Test Result:</b>	PASS														

**6.2.2. Test Instruments**

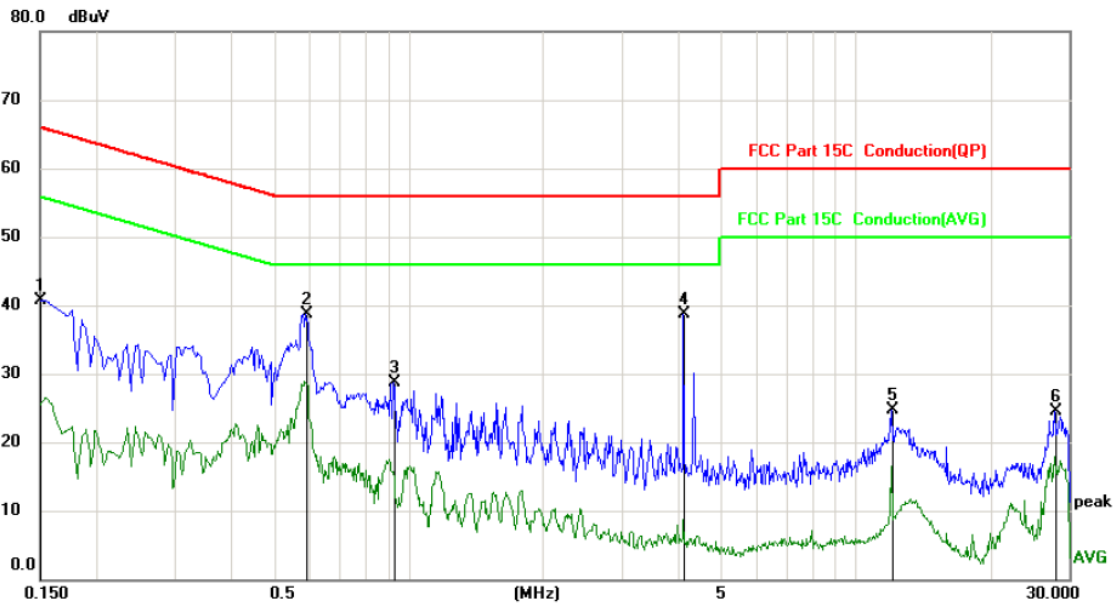
Conducted Emission Shielding Room Test Site (843)				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Test Receiver	R&S	ESPI	101401	Jun. 12, 2018
LISN	Schwarzbeck	NSLK 8126	8126453	Sep. 27, 2018
Coax cable (9KHz-30MHz)	TCT	CE-05	N/A	Sep. 27, 2018
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

**6.2.3. Test data**

Please refer to following diagram for individual

**Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)**



Site: Phase: **L1** Temperature: 25  
Limit: FCC Part 15C Conduction(QP) Power: AC 120V/60Hz Humidity: 55 %

No.	Mk.	Freq. MHz	Reading Level dBµV	Correct Factor dB	Measure- ment dBµV	Limit dBµV	Over dB	Detector	Comment
1		0.1500	29.29	11.50	40.79	66.00	-25.21	peak	
2		0.5910	27.44	11.27	38.71	56.00	-17.29	peak	
3		0.9240	17.54	11.22	28.76	56.00	-27.24	peak	
4	*	4.1280	27.83	10.93	38.76	56.00	-17.24	peak	
5		11.9985	13.31	11.47	24.78	60.00	-35.22	peak	
6		27.9105	13.68	10.73	24.41	60.00	-35.59	peak	

**Note:**

Freq. = Emission frequency in MHz

Reading level (dBµV) = Receiver reading

Corr. Factor (dB) = Antenna factor + Cable loss

Measurement (dBµV) = Reading level (dBµV) + Corr. Factor (dB)

Limit (dBµV) = Limit stated in standard

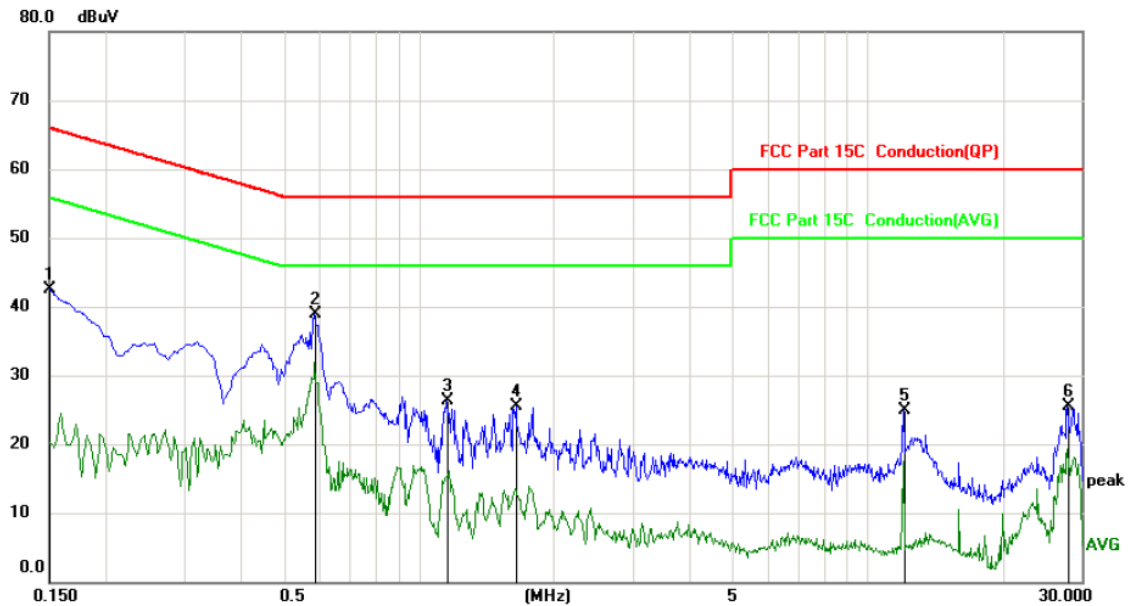
Margin (dB) = Measurement (dBµV) – Limits (dBµV)

Q.P. =Quasi-Peak

AVG =average

\* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz

**Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)**



Site: \_\_\_\_\_ Phase: **N** Temperature: 25  
 Limit: FCC Part 15C Conduction(QP) Power: AC 120V/60Hz Humidity: 55 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	31.10	11.50	42.60	66.00	-23.40	peak	
2	*	0.5865	27.62	11.28	38.90	56.00	-17.10	peak	
3		1.1580	15.09	11.28	26.37	56.00	-29.63	peak	
4		1.6530	14.04	11.53	25.57	56.00	-30.43	peak	
5		11.9985	13.34	11.47	24.81	60.00	-35.19	peak	
6		27.9105	14.82	10.73	25.55	60.00	-34.45	peak	

**Note1:**

- Freq. = Emission frequency in MHz
- Reading level (dBμV) = Receiver reading
- Corr. Factor (dB) = Antenna factor + Cable loss
- Measurement (dBμV) = Reading level (dBμV) + Corr. Factor (dB)
- Limit (dBμV) = Limit stated in standard
- Margin (dB) = Measurement (dBμV) – Limits (dBμV)
- Q.P. =Quasi-Peak AVG =average
- \* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.

**Note2:**

Measurements were conducted in all three channels (high, middle, low) and three modulation (GFSK, Pi/4 DQPSK, 8DPSK), and the worst case Mode (Middle channel and 8DPSK) was submitted only.



**6.3.3. Test Data**

GFSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	0.47	21.00	PASS
Middle	2.00	21.00	PASS
Highest	1.49	21.00	PASS

Pi/4DQPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	1.25	21.00	PASS
Middle	2.33	21.00	PASS
Highest	1.86	21.00	PASS

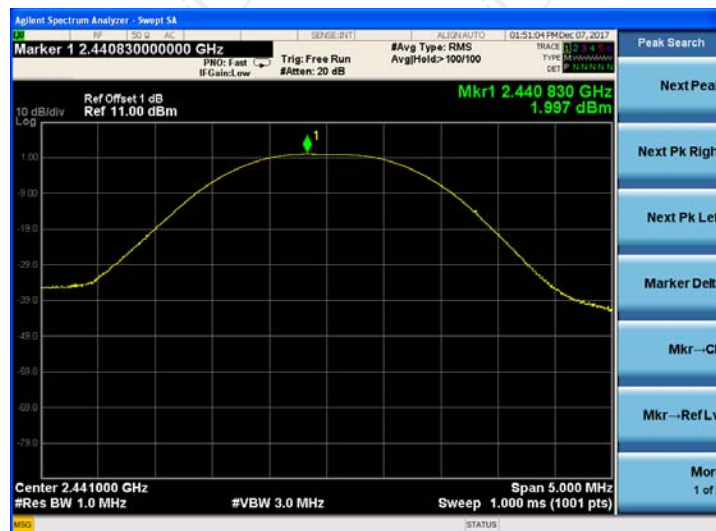
8DPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	1.56	21.00	PASS
Middle	2.59	21.00	PASS
Highest	2.17	21.00	PASS

Test plots as follows:

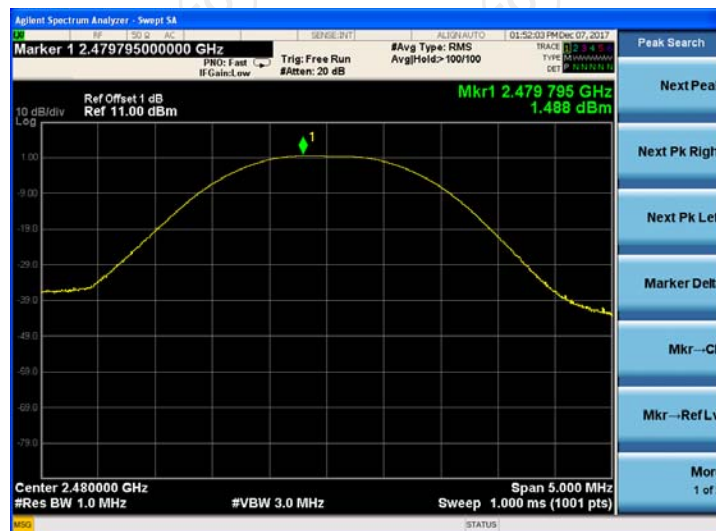
Lowest channel



Middle channel



Highest channel





Lowest channel



Middle channel



Highest channel



### Lowest channel



### Middle channel



### Highest channel



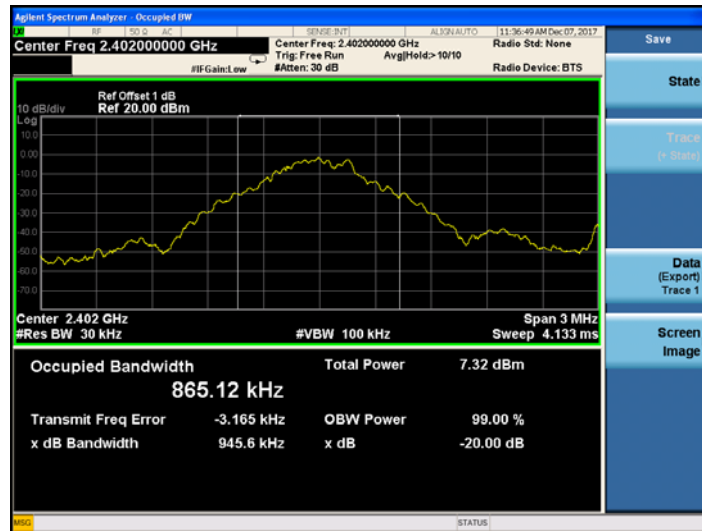


**6.4.3. Test data**

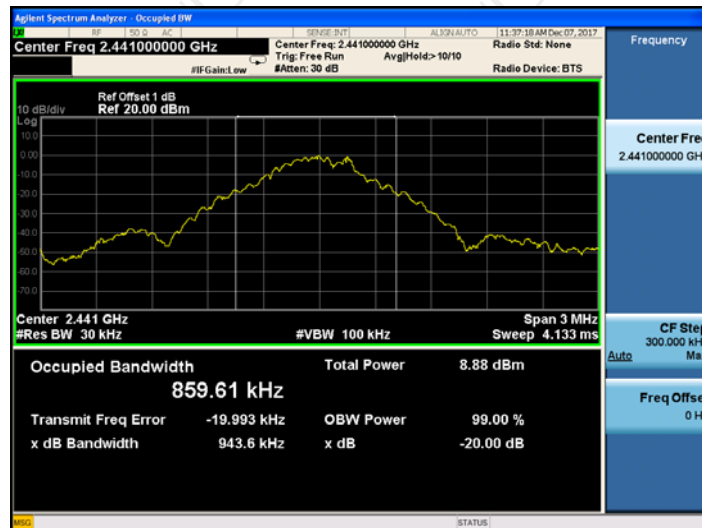
Test channel	20dB Occupy Bandwidth (kHz)			
	GFSK	$\pi/4$ -DQPSK	8DPSK	Conclusion
Lowest	945.60	1265.00	1285.00	PASS
Middle	943.60	1237.00	1269.00	PASS
Highest	944.70	1237.00	1264.00	PASS

Test plots as follows:

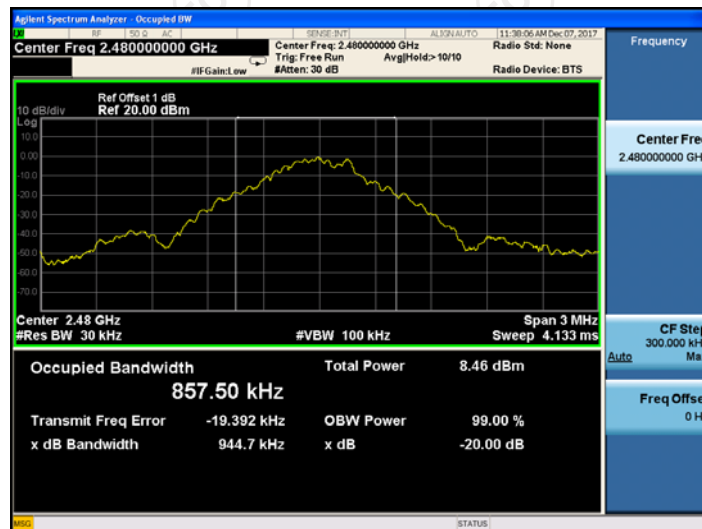
Lowest channel



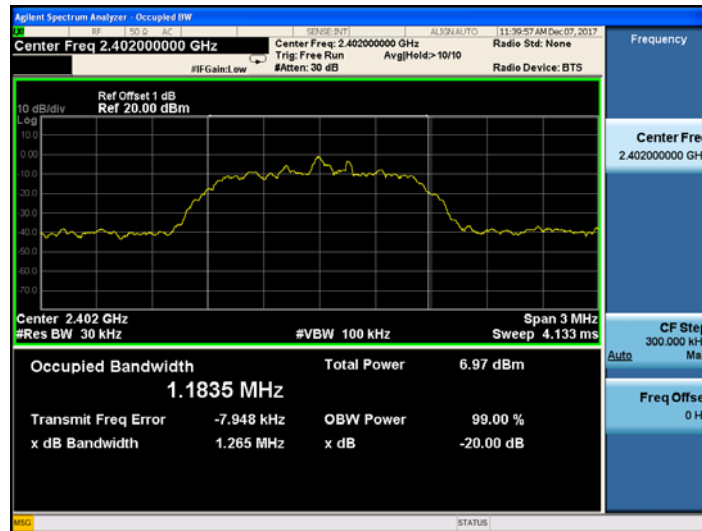
Middle channel



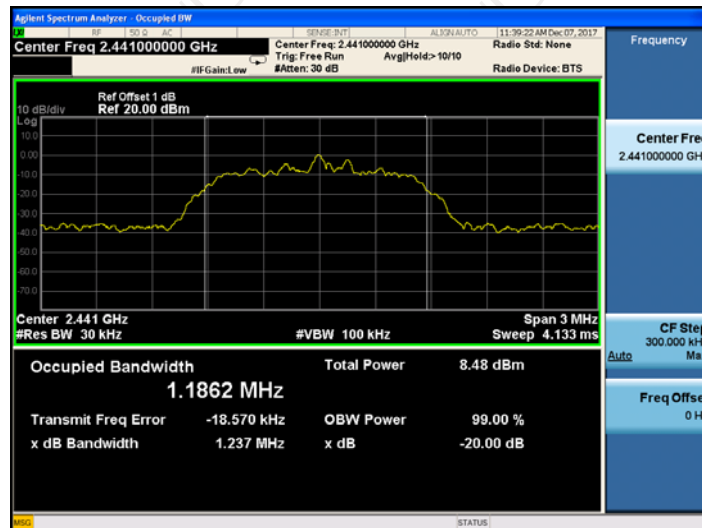
Highest channel



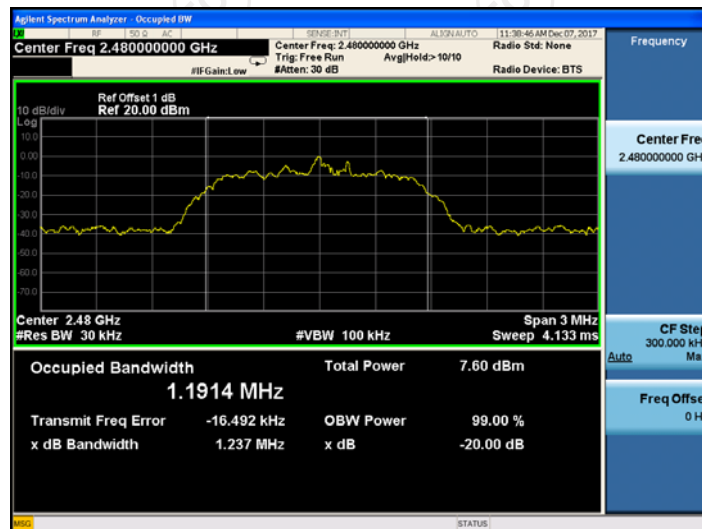
### Lowest channel



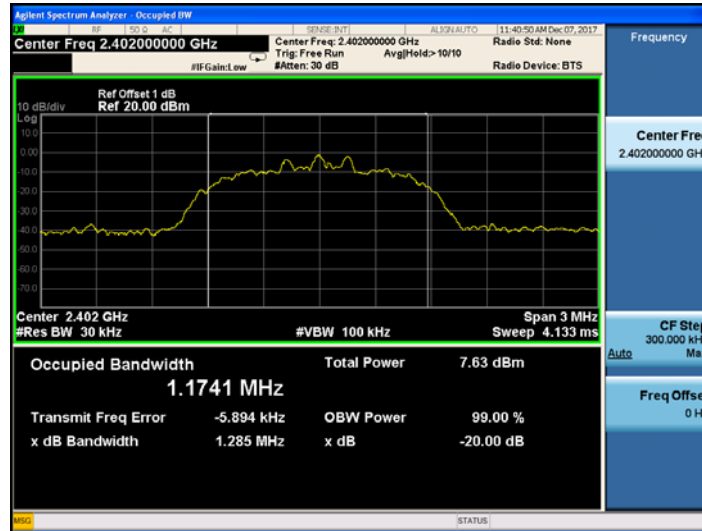
### Middle channel



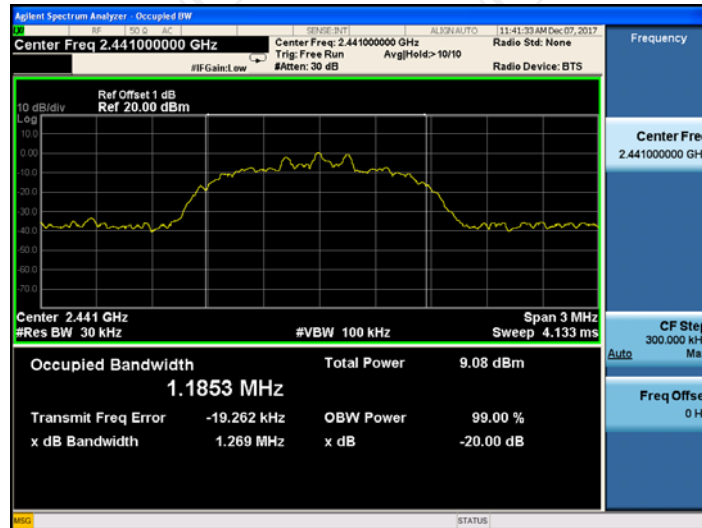
### Highest channel



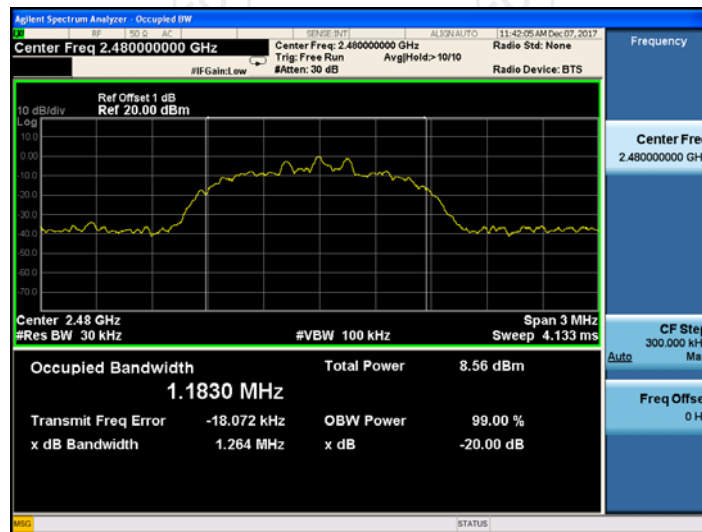
### Lowest channel



### Middle channel



### Highest channel







**6.5.3. Test data**

GFSK mode			
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	998.00	630.40	PASS
Middle	1000.00	630.40	PASS
Highest	1000.00	630.40	PASS

Pi/4 DQPSK mode			
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	1000.00	843.33	PASS
Middle	1000.00	843.33	PASS
Highest	1000.00	843.33	PASS

8DPSK mode			
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	1000.00	856.67	PASS
Middle	1000.00	856.67	PASS
Highest	1000.00	856.67	PASS

**Note: According to section 6.4**

Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
GFSK	945.60	630.40
$\pi/4$ -DQPSK	1265.00	843.33
8DPSK	1285.00	856.67

Test plots as follows:

Lowest channel



Middle channel



Highest channel



### Lowest channel



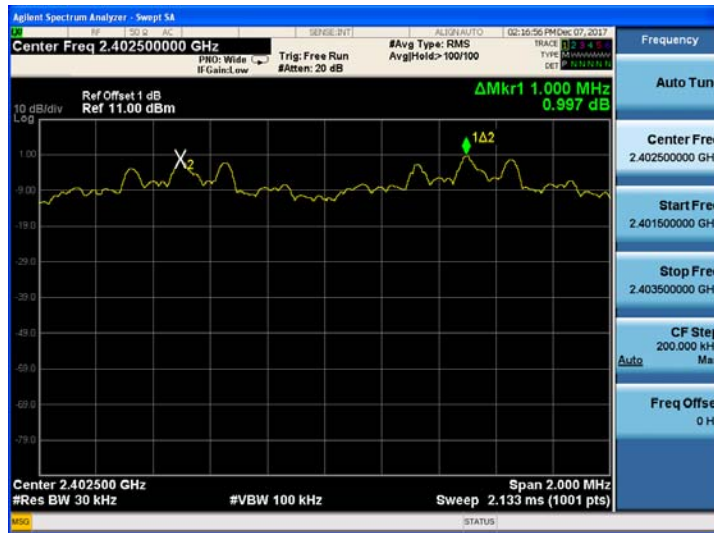
### Middle channel



### Highest channel



### Lowest channel



### Middle channel




### Highest channel





## 6.6. Hopping Channel Number

### 6.6.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.247 (a)(1)
<b>Test Method:</b>	ANSI C63.10:2013
<b>Limit:</b>	Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.
<b>Test Setup:</b>	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>
<b>Test Mode:</b>	Hopping mode
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The testing follows ANSI C63.10:2013 Measurement Guidelines.</li> <li>2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.</li> <li>3. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>4. Enable the EUT hopping function.</li> <li>5. Use the following spectrum analyzer settings: Span = the frequency band of operation; set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller; VBW<math>\geq</math>RBW; Sweep = auto; Detector function = peak; Trace = max hold.</li> <li>6. The number of hopping frequency used is defined as the number of total channel.</li> <li>7. Record the measurement data in report.</li> </ol>
<b>Test Result:</b>	PASS

### 6.6.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
RF Cable (9KHz-26.5GHz)	TCT	RE-06	N/A	Sep. 27, 2018
Antenna Connector	TCT	RFC-01	N/A	Sep. 27, 2018

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

**6.6.3. Test data**

Mode	Hopping channel numbers	Limit	Result
GFSK, P/4-DQPSK, 8DPSK	79	15	PASS

Test plots as follows:

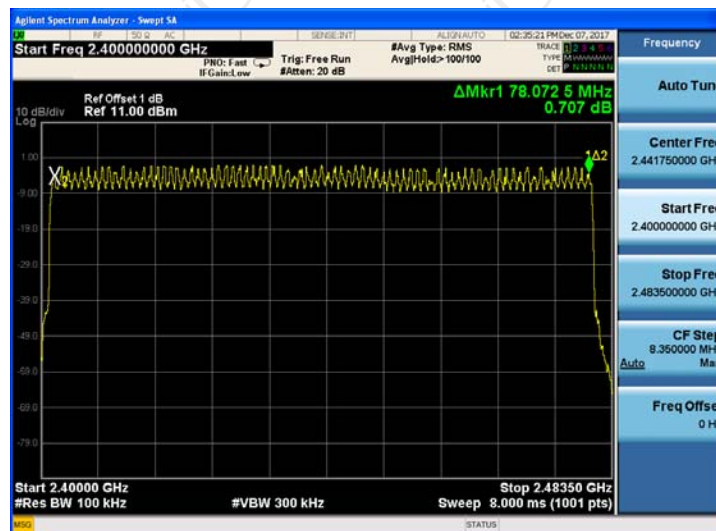




GFSK



Pi/4DQPSK



8DPSK

