

# TEST REPORT

**FCC ID: 2AIFYSD55**

**Product: MOBILE PHONE**

**Model No.: SD55**

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

**Trade Mark: UNEONE**

**Report No.: TCT171110E027**

**Issued Date: Nov. 15, 2017**

Issued for:

**Darmuoba, S.A. de C.V**

**Mar Negro 1, Col. Tacuba, CDMX. C.P 11410 Miguel Hidalgo, Distrito Federal,  
Mexico**

Issued By:

**Shenzhen Tongce Testing Lab.**

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

**TEL: +86-755-27673339**

**FAX: +86-755-27673332**

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**Appendix A: Photographs of Test Setup****Appendix B: Photographs of EUT**

## 1. Test Certification

<b>Product:</b>	MOBILE PHONE
<b>Model No.:</b>	SD55
<b>Additional Model No.:</b>	N/A
<b>Trade Mark:</b>	UNEONE
<b>Applicant:</b>	Darmuoba, S.A. de C.V
<b>Address:</b>	Mar Negro 1, Col. Tacuba, CDMX. C.P 11410 Miguel Hidalgo, Distrito Federal, Mexico
<b>Manufacturer:</b>	Z-TECH COMMUNICATION(SZ)CO., LTD
<b>Address:</b>	7/F BLK D BAO'AN ZHI'GU YIN'TIAN RD. NO.4 XI'XIANG ST' BAO'AN Shenzhen China
<b>Date of Test:</b>	Oct. 19 - 25, 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:

Brews Xu

Date: Oct. 19, 2017

Brews Xu

Reviewed By:



Date: Nov. 15, 2017

Approved By:

Tomsin

Date: Nov. 15, 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:</b>	MOBILE PHONE
<b>Model No.:</b>	SD55
<b>Additional Model No.:</b>	N/A
<b>Trade Mark:</b>	UNEONE
<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>	IFIA antenna
<b>Antenna gain:</b>	1.3dBi
<b>Power supply:</b>	Adaptador ca/cc Entrada: AC 100-240V Salida: DC 5.0V, 1A Or DC 3.8V 2500mAh Ion de Litio

#### 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. General 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
The sample was placed 0.8m & 1.5m for the measurement below & 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 & 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.	

### 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

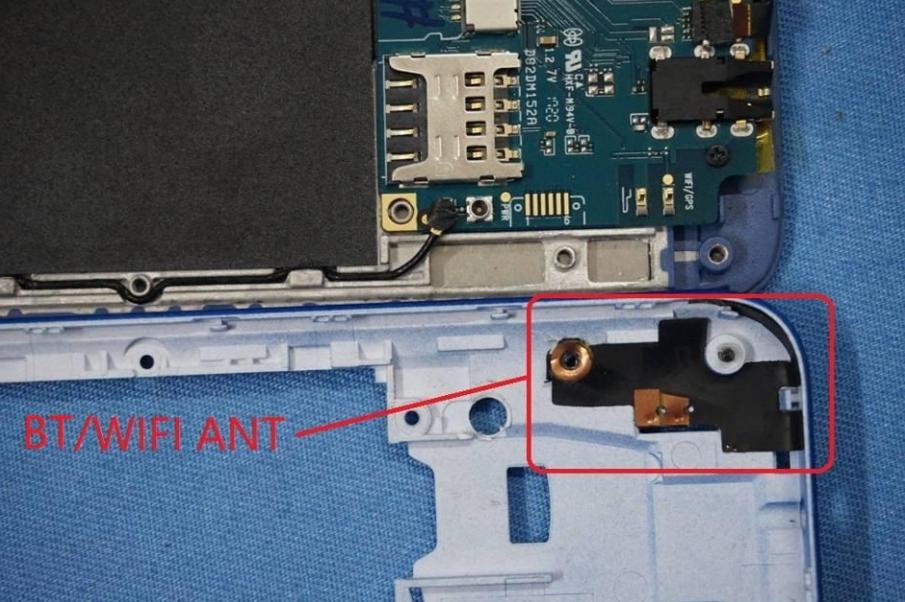
### 5.3. Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where 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 %.

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)
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.	
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.	
<b>E.U.T Antenna:</b>	
The Bluetooth antenna is IFIA antenna which permanently attached, and the best case gain of the antenna is 1.3dBi.	
	

## 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>Reference Plane</p>  <p>Remark: 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														

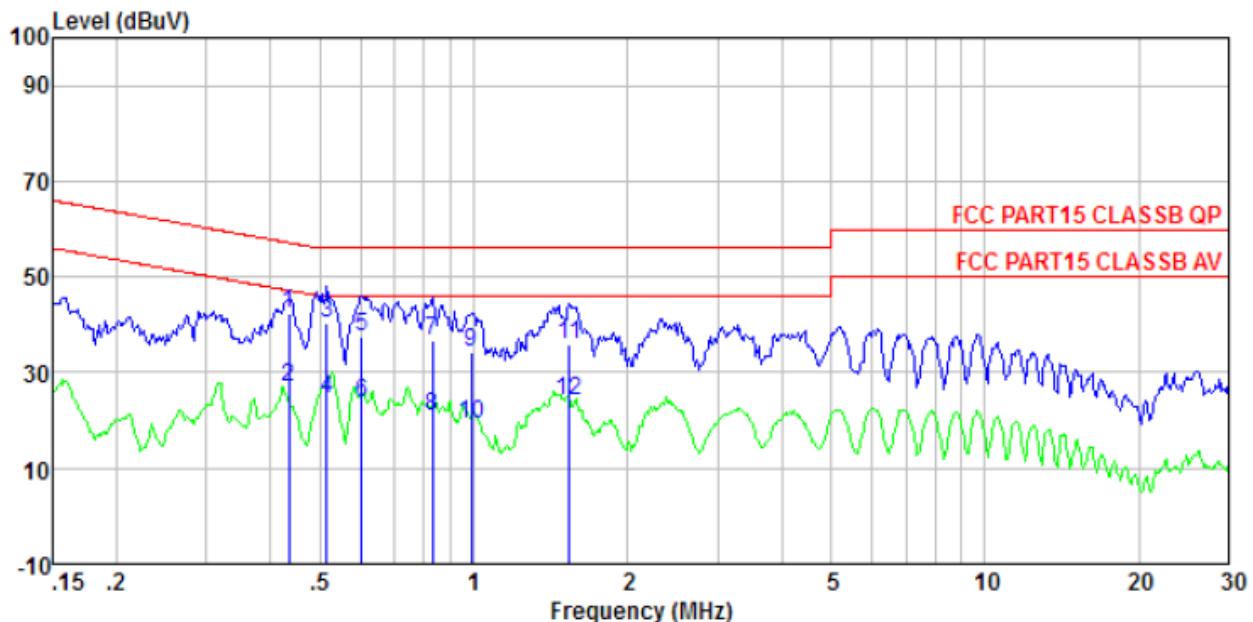
### 6.2.2. Test Instruments

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	Shurples 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)

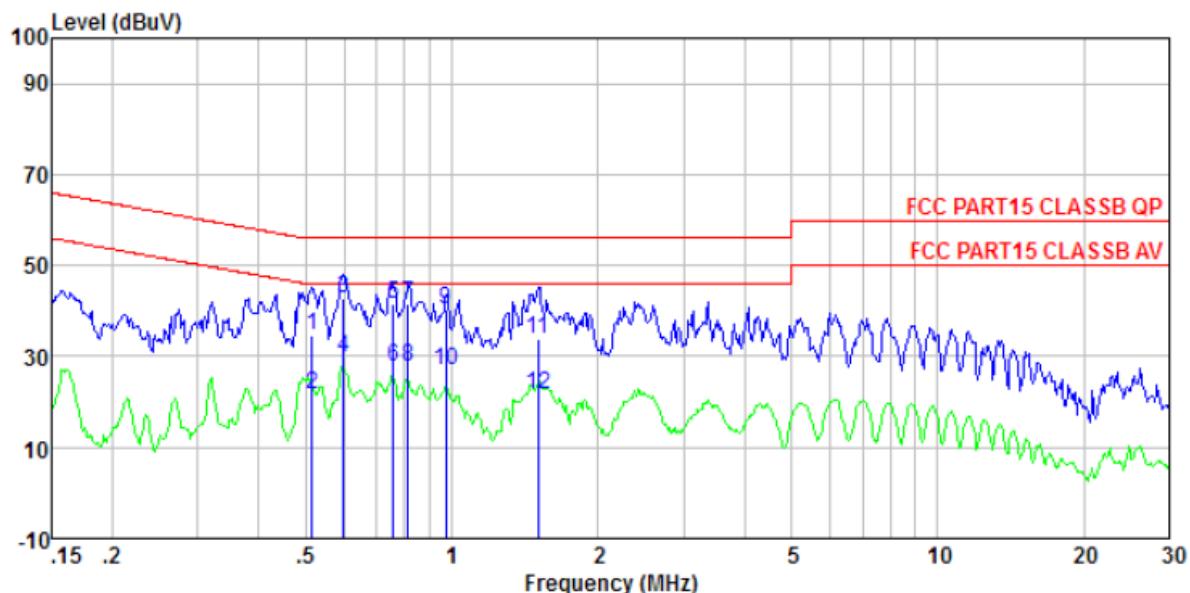


Freq MHz	Reading level dBuV	L1SN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.435	41.99	0.40	0.11	42.50	57.15	-14.65	QP
0.435	26.51	0.40	0.11	27.02	47.15	-20.13	Average
0.516	40.03	0.37	0.11	40.51	56.00	-15.49	QP
0.516	24.09	0.37	0.11	24.57	46.00	-21.43	Average
0.604	37.16	0.31	0.12	37.59	56.00	-18.41	QP
0.604	23.07	0.31	0.12	23.50	46.00	-22.50	Average
0.830	36.36	0.26	0.13	36.75	56.00	-19.25	QP
0.830	20.38	0.26	0.13	20.77	46.00	-25.23	Average
0.989	33.79	0.25	0.13	34.17	56.00	-21.83	QP
0.989	18.88	0.25	0.13	19.26	46.00	-26.74	Average
1.535	35.63	0.21	0.14	35.98	56.00	-20.02	QP
1.535	23.56	0.21	0.14	23.91	46.00	-22.09	Average

**Notes:**

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

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



Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.516	34.10	0.34	0.11	34.55	56.00	-21.45	QP
0.516	21.03	0.34	0.11	21.48	46.00	-24.52	Average
0.598	42.48	0.28	0.12	42.88	56.00	-13.12	QP
0.598	29.42	0.28	0.12	29.82	46.00	-16.18	Average
0.759	41.00	0.24	0.13	41.37	56.00	-14.63	QP
0.759	27.50	0.24	0.13	27.87	46.00	-18.13	Average
0.813	41.21	0.23	0.13	41.57	56.00	-14.43	QP
0.813	27.50	0.23	0.13	27.86	46.00	-18.14	Average
0.974	40.06	0.21	0.13	40.40	56.00	-15.60	QP
0.974	26.70	0.21	0.13	27.04	46.00	-18.96	Average
1.503	33.30	0.20	0.14	33.64	56.00	-22.36	QP
1.503	21.24	0.20	0.14	21.58	46.00	-24.42	Average

**Notes:**

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

### 6.3. Conducted Output Power

### 6.3.1. Test Specification

### 6.3.2. 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).

### 6.3.3. Test Data

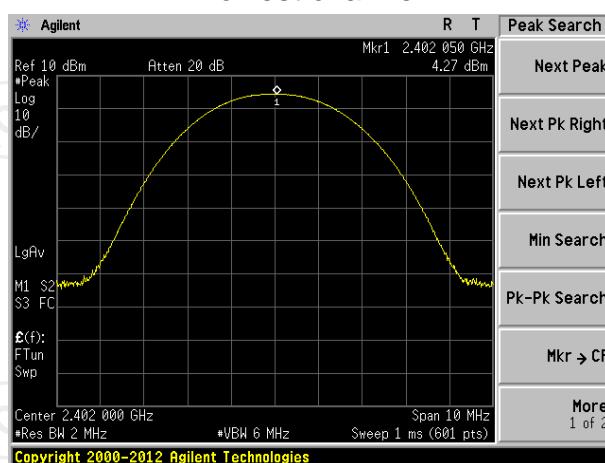
GFSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	4.27	30.00	PASS
Middle	4.32	30.00	PASS
Highest	4.55	30.00	PASS

Pi/4DQPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	3.72	21.00	PASS
Middle	3.74	21.00	PASS
Highest	3.92	21.00	PASS

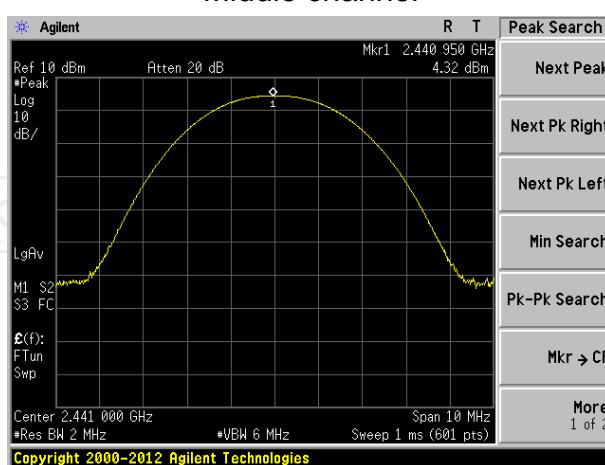
8DPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	3.71	21.00	PASS
Middle	3.75	21.00	PASS
Highest	3.91	21.00	PASS

Test plots as follows:

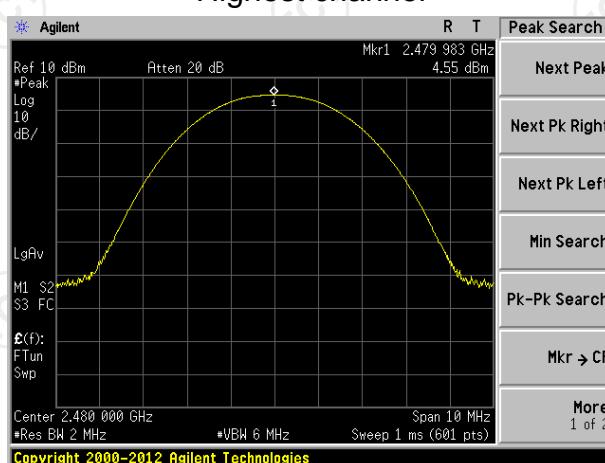
Lowest channel



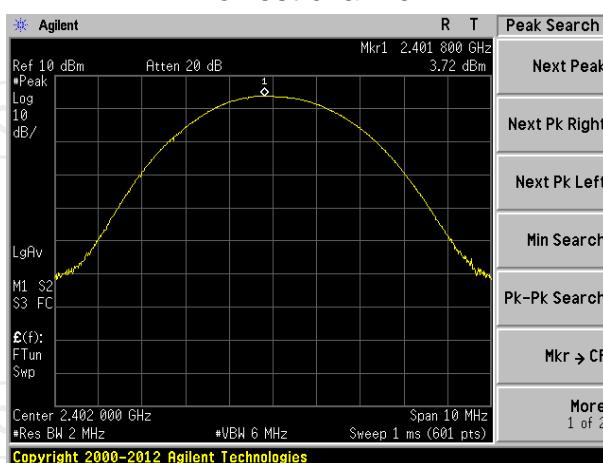
Middle channel



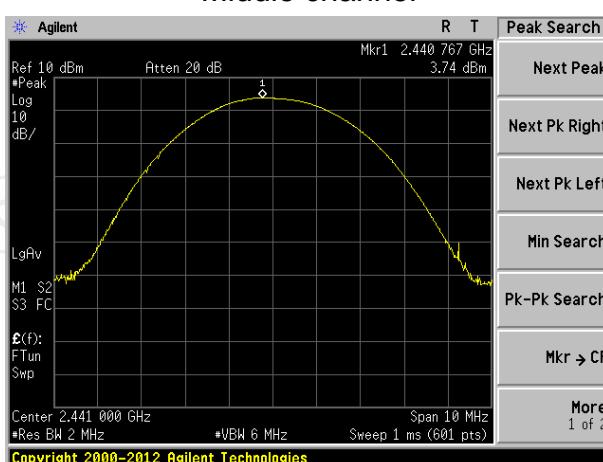
Highest channel



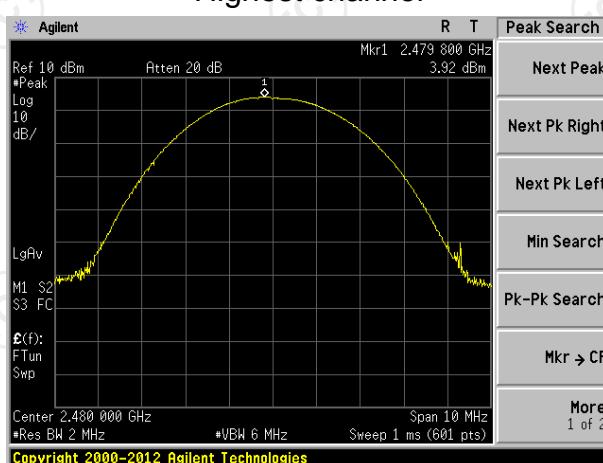
### Lowest channel



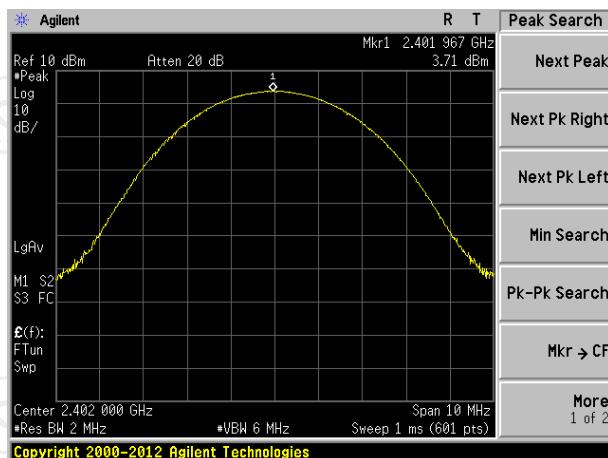
### Middle channel



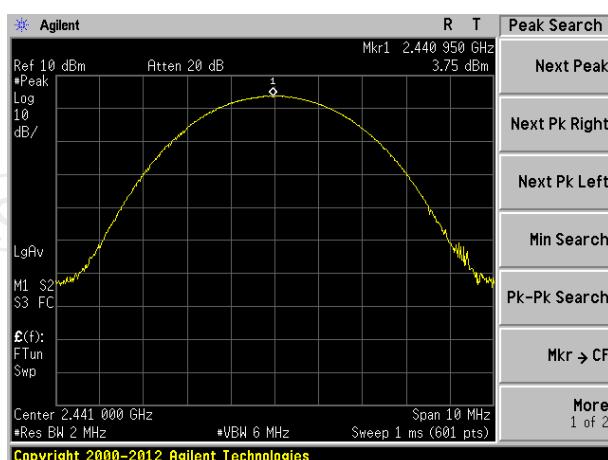
### Highest channel



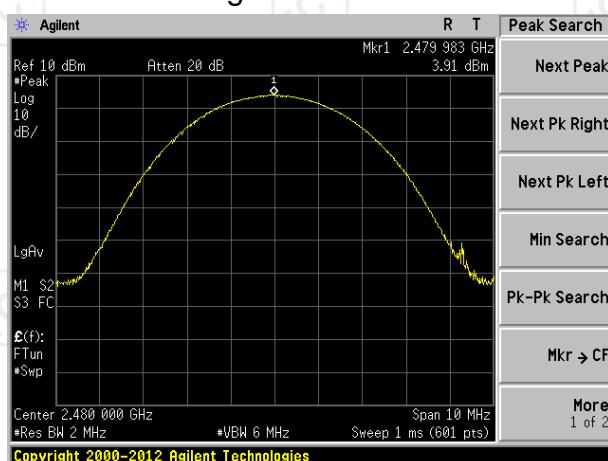
### Lowest channel



### Middle channel



### Highest channel



## 6.4. 20dB Occupy Bandwidth

### 6.4.1. 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>	N/A
<b>Test Setup:</b>	
<b>Test Mode:</b>	Transmitting mode with modulation
<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. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel; <math>1\% \leq RBW \leq 5\%</math> of the 20 dB bandwidth; <math>VBW \geq 3RBW</math>; Sweep = auto; Detector function = peak; Trace = max hold.</li> <li>5. Measure and record the results in the test report.</li> </ol>
<b>Test Result:</b>	PASS

### 6.4.2. 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).

**6.4.3. Test data**

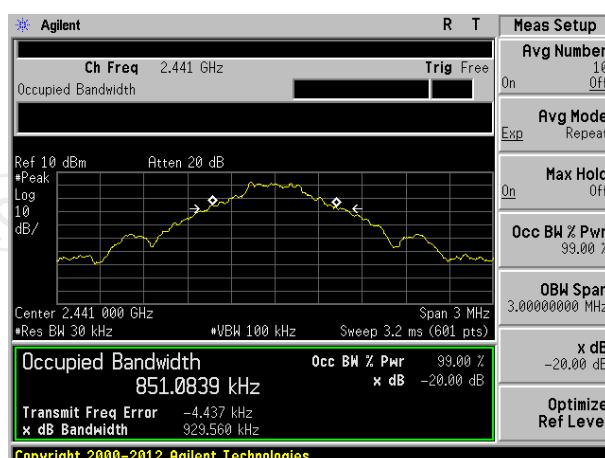
Test channel	20dB Occupy Bandwidth (MHz)			
	GFSK	$\pi/4$ -DQPSK	8DPSK	Conclusion
Lowest	0.826	1.260	1.163	PASS
Middle	0.930	1.254	1.167	PASS
Highest	0.923	1.262	1.161	PASS

**Test plots as follows:**

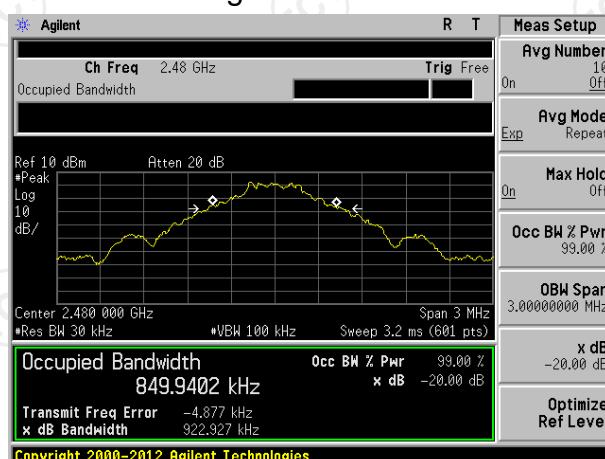
Lowest channel



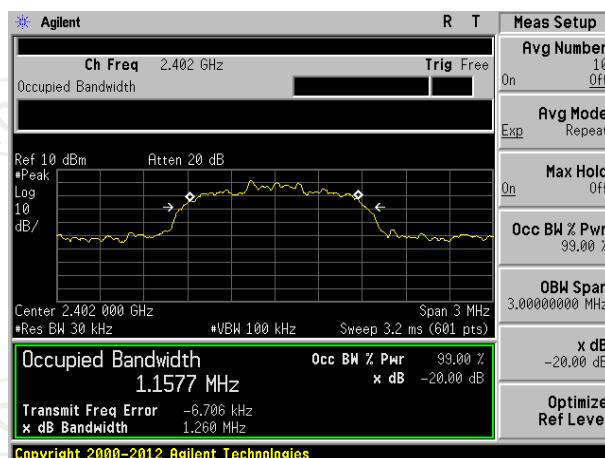
Middle channel



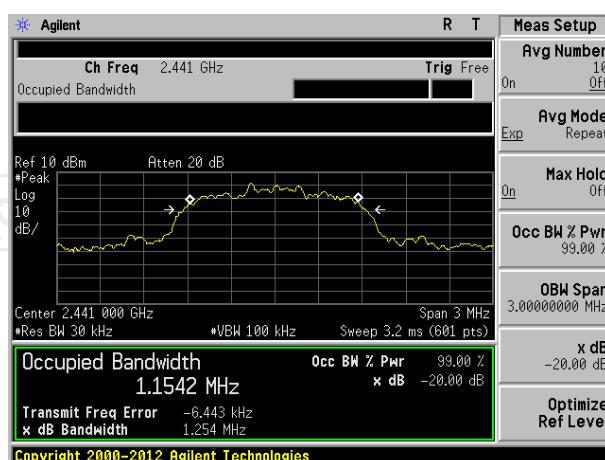
Highest channel



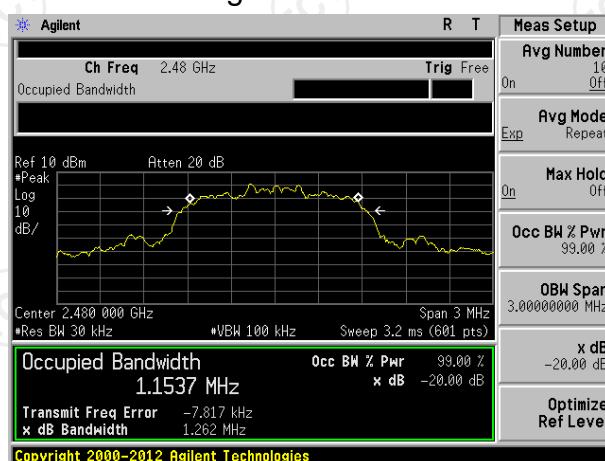
### Lowest channel



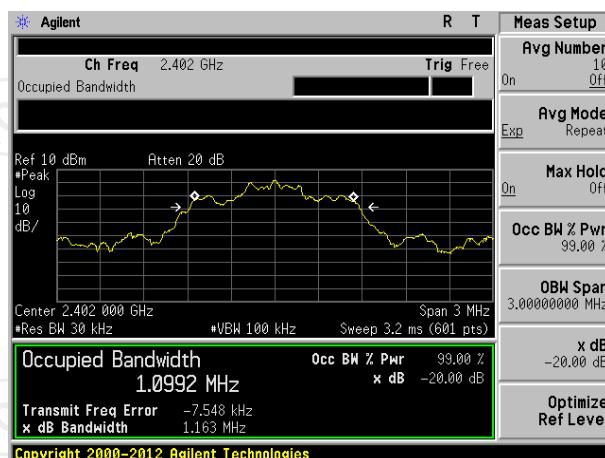
### Middle channel



### Highest channel



Lowest channel



Middle channel

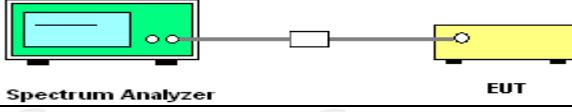


Highest channel



## 6.5. Carrier Frequencies Separation

### 6.5.1. 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 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.
<b>Test Setup:</b>	
<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 = wide enough to capture the peaks of two adjacent channels; RBW is set to approximately 30% of the channel spacing, adjust as necessary to best identify the center of each individual channel; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold.</li> <li>6. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Record the value in report.</li> </ol>
<b>Test Result:</b>	PASS

### 6.5.2. 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).

### 6.5.3. Test data

GFSK mode			
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	1010	930.00	PASS
Middle	1000	930.00	PASS
Highest	1010	930.00	PASS

Pi/4 DQPSK mode			
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	1000	841.33	PASS
Middle	1010	841.33	PASS
Highest	1010	841.33	PASS

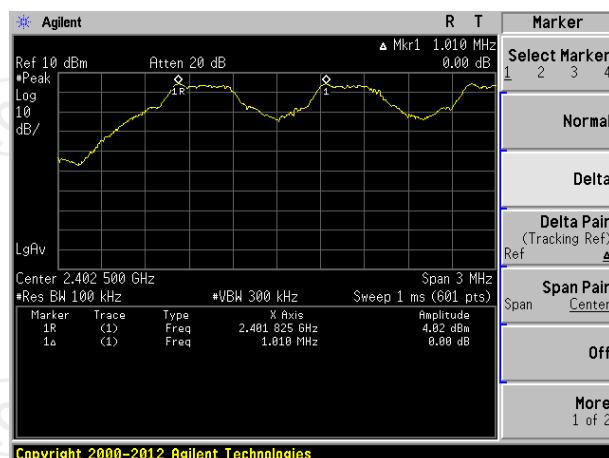
8DPSK mode			
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	1005	778.00	PASS
Middle	1005	778.00	PASS
Highest	1005	778.00	PASS

**Note: According to section 6.4**

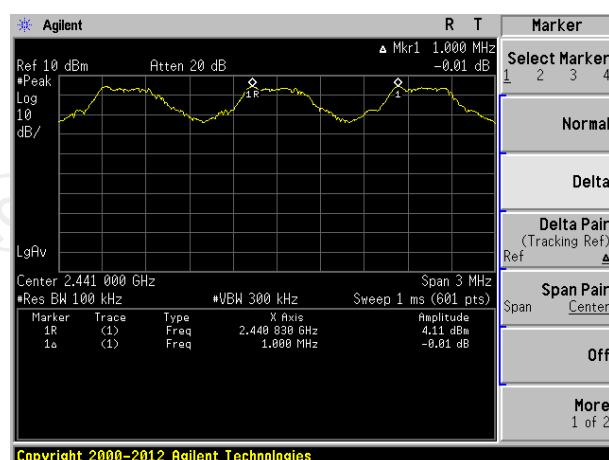
Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
GFSK	930	930.00
$\pi/4$ -DQPSK	1262	841.33
8DPSK	1167	778.00

**Test plots as follows:**

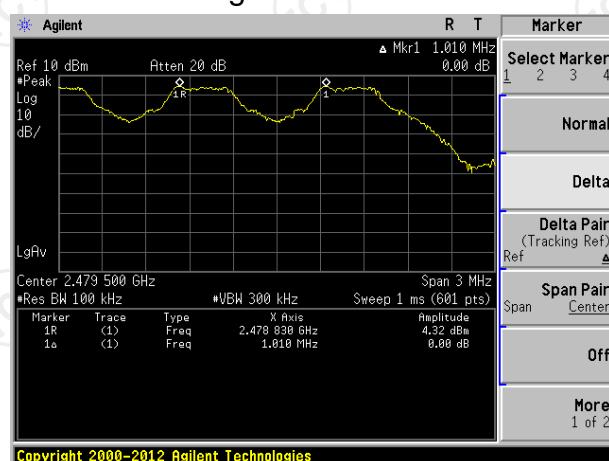
Lowest channel



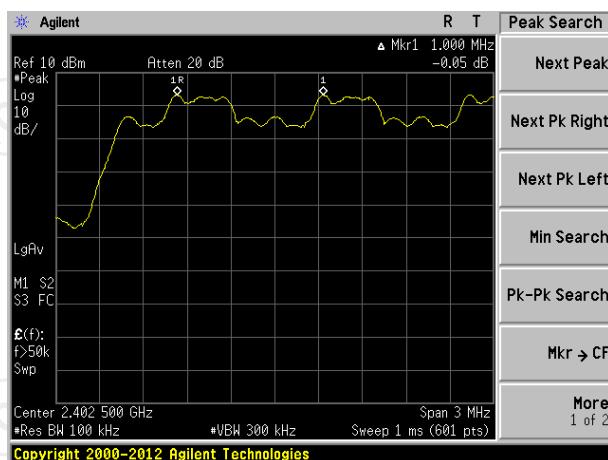
Middle channel



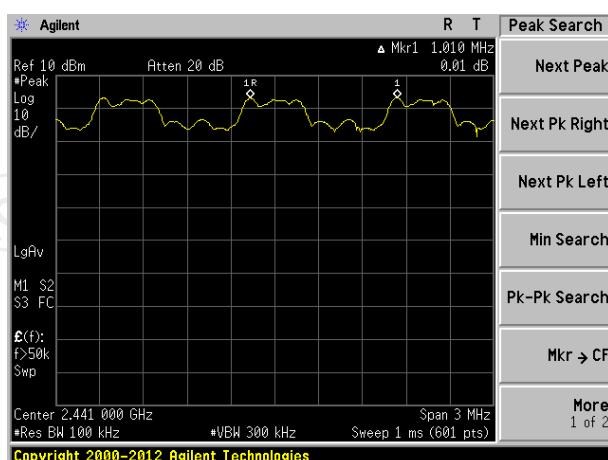
Highest channel



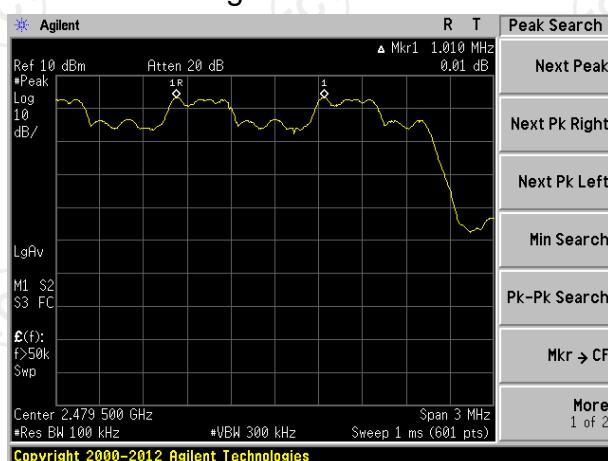
### Lowest channel



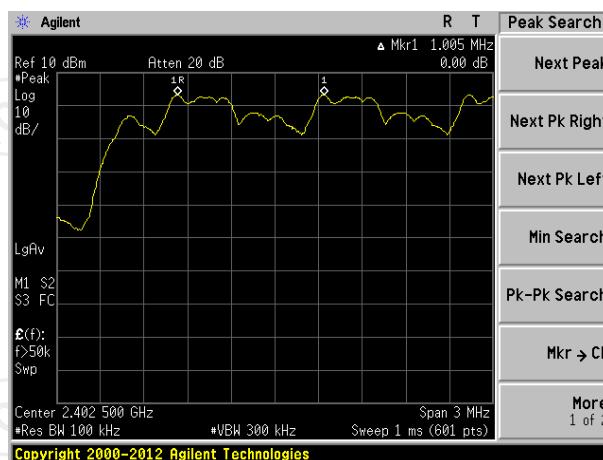
### Middle channel



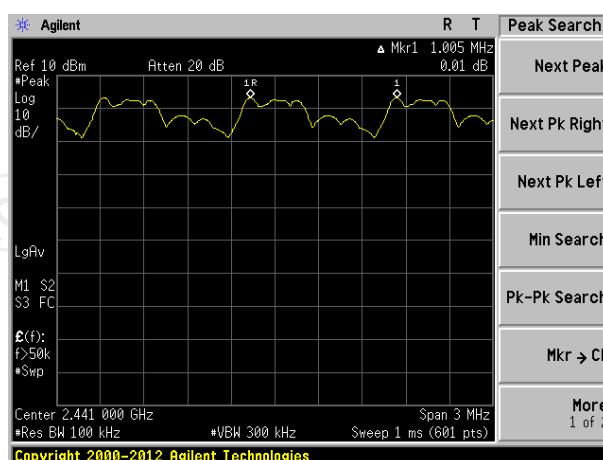
### Highest channel



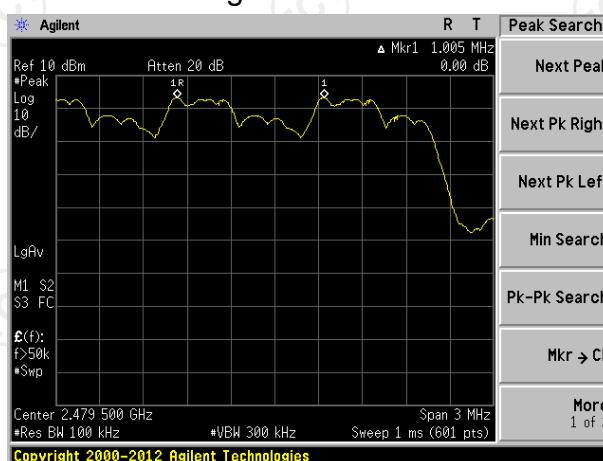
Lowest channel



Middle channel

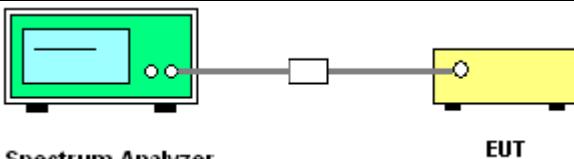


Highest channel



## 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;"><b>Spectrum Analyzer</b>                                   <b>EUT</b></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; <math>VBW \geq RBW</math>; 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

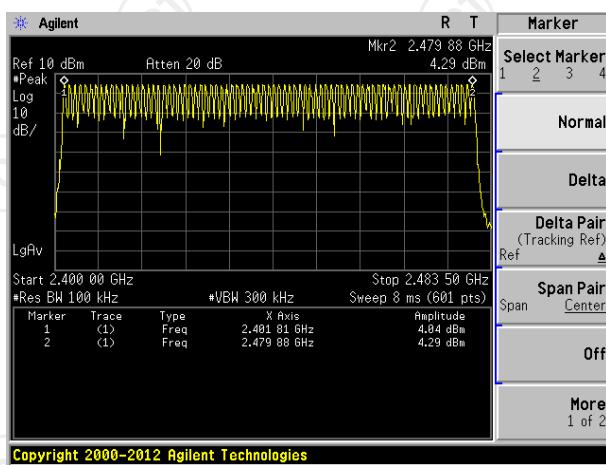
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
RF Cable (9KHz-26.5GHz)	TCT	RE-06	N/A	Sep. 27, 2018
Antenna Connector	TCT	RFC-01	N/A	Sep. 27, 2018

**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:



## 6.7. Dwell Time

### 6.7.1. 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>	The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.
<b>Test Setup:</b>	 <p>The diagram illustrates the test setup. A green box labeled "Spectrum Analyzer" is connected to a yellow box labeled "EUT" (Equipment Under Test) via a horizontal line representing an RF cable. A small white box representing an attenuator is placed between the two main components.</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 = zero span, centered on a hopping channel; RBW shall be <math>\leq</math> channel spacing and where possible RBW should be set <math>\gg 1 / T</math>, where T is the expected dwell time per channel; VBW<math>\geq</math>RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.</li><li>6. Measure and record the results in the test report.</li></ol>
<b>Test Result:</b>	PASS

## 6.7.2. 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).

### 6.7.3. Test Data

Frequency	Packet	Dwell time(ms)	Limit(ms)	Result
2402MHz	DH1/2-DH1/3-DH1	119.04	400	Pass
2441MHz	DH3/2-DH3/3-DH3	260.80	400	Pass
2480MHz	DH5/2-DH5/3-DH5	307.52	400	Pass

The test period:  $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$

Test channel: 2402MHz/2441MHz/2480MHz as blow

DH1/2-DH1/3-DH1 time slot=0.372(ms)\*(1600/ (2\*79))\*31.6=119.04ms

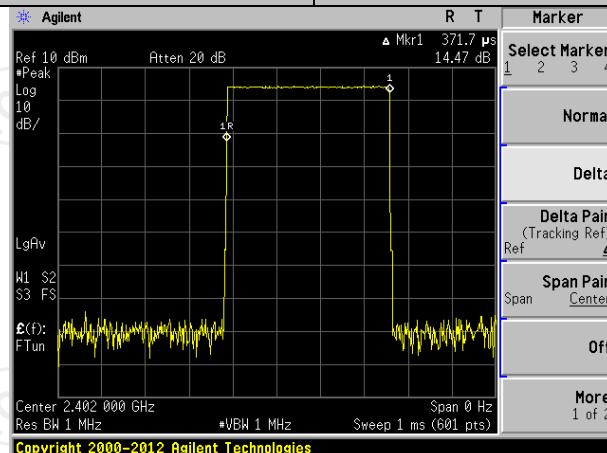
DH3/2-DH3/3-DH3 time slot=1.630(ms)\*(1600/ (4\*79))\*31.6=260.80ms

DH5/2-DH5/3-DH5 time slot=2.883(ms)\*(1600/ (6\*79))\*31.6=307.52ms

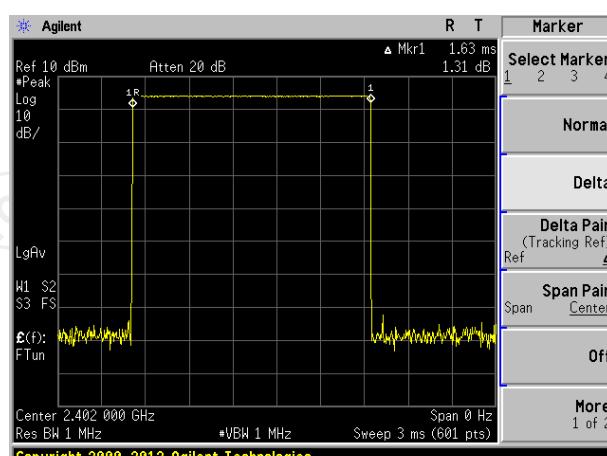
Test plots as follows:

Test channel:

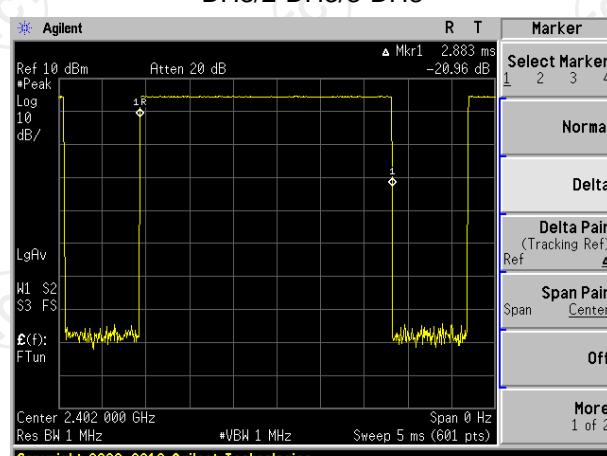
2402MHz/2441MHz/2480MHz



DH1/2-DH1/3-DH1



DH3/2-DH3/3-DH3



DH5/2-DH5/3-DH5

## 6.8. Pseudorandom Frequency Hopping Sequence

<b>Test Requirement:</b>	<b>FCC Part15 C Section 15.247 (a)(1) requirement:</b>
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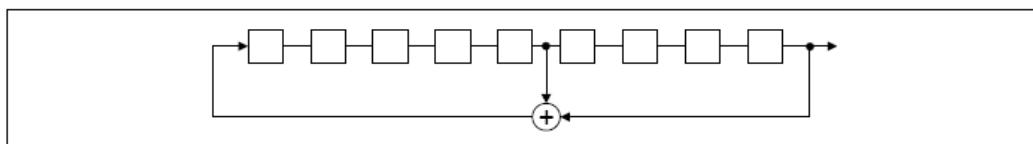
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

### EUT Pseudorandom Frequency Hopping Sequence

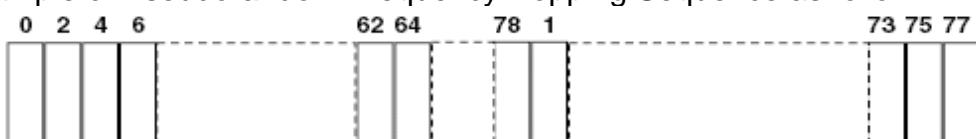
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive ones; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence:  $2^9 - 1 = 511$  bits
- Longest sequence of zeros: 8 (non-inverted signal)



*Linear Feedback Shift Register for Generation of the PRBS sequence*

An example of Pseudorandom Frequency Hopping Sequence as follow:

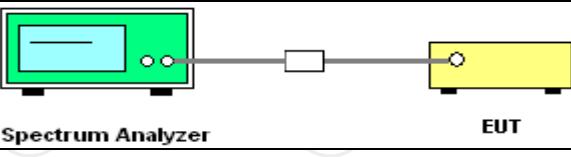


Each frequency used equally on the average by each transmitter.

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

## 6.9. Conducted Band Edge Measurement

### 6.9.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.247 (d)
<b>Test Method:</b>	ANSI C63.10:2013
<b>Limit:</b>	In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.
<b>Test Setup:</b>	 <p><b>Spectrum Analyzer</b>                                    <b>EUT</b></p>
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The testing follows the guidelines in Band-edge Compliance of RF Conducted Emissions of ANSI C63.10:2013 Measurement Guidelines.</li> <li>2. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>3. Set RBW = 100 kHz (<math>\geq 1\%</math> span=10MHz), VBW = 300 kHz (<math>\geq</math>RBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.</li> <li>4. Enable hopping function of the EUT and then repeat step 2 and 3.</li> <li>5. Measure and record the results in the test report.</li> </ol>
<b>Test Result:</b>	PASS

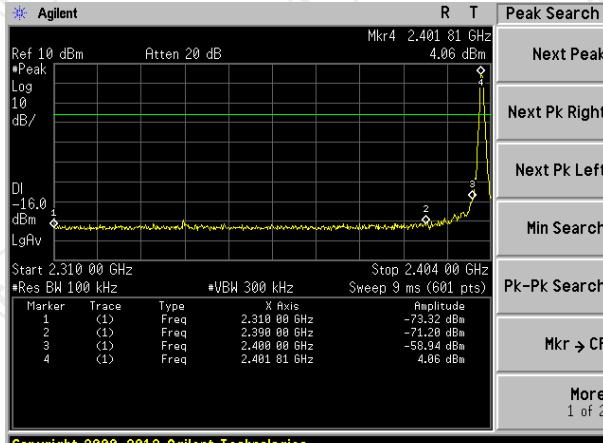
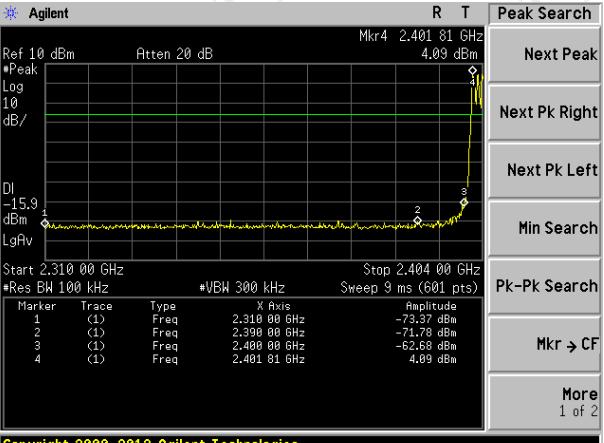
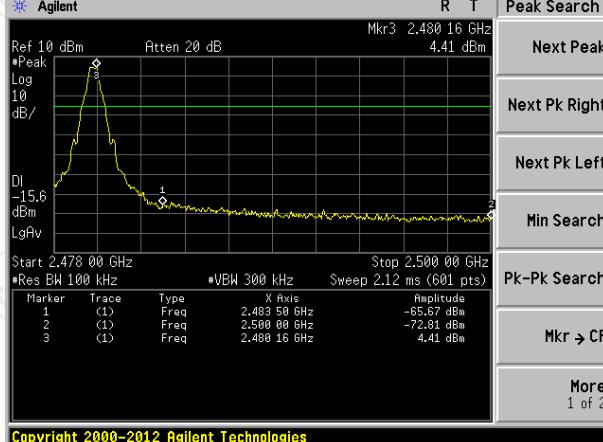
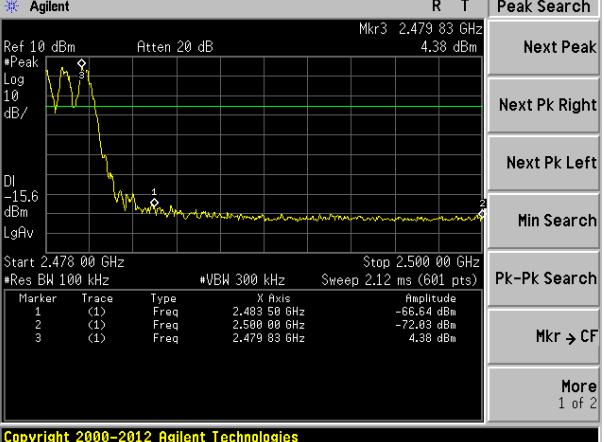
### 6.9.2. Test Instruments

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).

### 6.9.3. Test Data

#### GFSK Modulation

Test channel:		Lowest channel	
 <p>Copyright 2000-2012 Agilent Technologies</p>		 <p>Copyright 2000-2012 Agilent Technologies</p>	
No-hopping mode		Hopping mode	
Test channel:		Highest channel	
 <p>Copyright 2000-2012 Agilent Technologies</p>		 <p>Copyright 2000-2012 Agilent Technologies</p>	
No-hopping mode		Hopping mode	

## Pi/4DQPSK Modulation

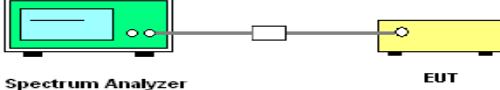
Test channel:		Lowest channel	
Copyright 2000-2012 Agilent Technologies		Copyright 2000-2012 Agilent Technologies	
No-hopping mode		Hopping mode	
Test channel:		Highest channel	
Copyright 2000-2012 Agilent Technologies		Copyright 2000-2012 Agilent Technologies	
No-hopping mode		Hopping mode	

## 8DPSK Modulation

Test channel:		Lowest channel	
No-hopping mode		Hopping mode	
Test channel:		Highest channel	
No-hopping mode		Hopping mode	

## 6.10. Conducted Spurious Emission Measurement

### 6.10.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.247 (d)
<b>Test Method:</b>	ANSI C63.10:2013
<b>Limit:</b>	In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.
<b>Test Setup:</b>	
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The testing follows the guidelines in Spurious RF Conducted Emissions of 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. Set RBW = 100 kHz, VBW = 300kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.</li> <li>5. Measure and record the results in the test report.</li> <li>6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.</li> </ol>
<b>Test Result:</b>	PASS

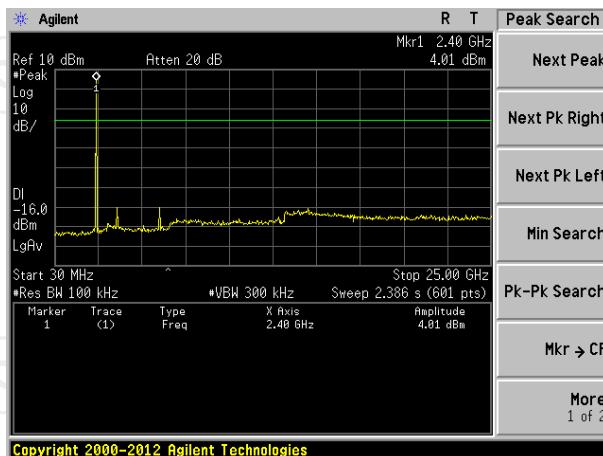
### 6.10.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
Spectrum Analyzer	ROHDE&SCHWARZ	FSQ	200061	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

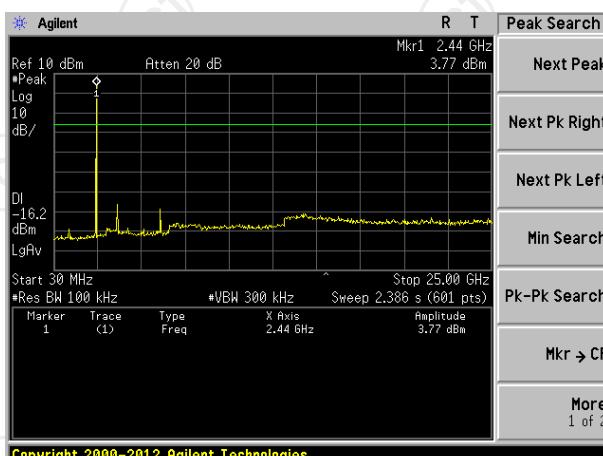
**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 6.10.3. Test Data

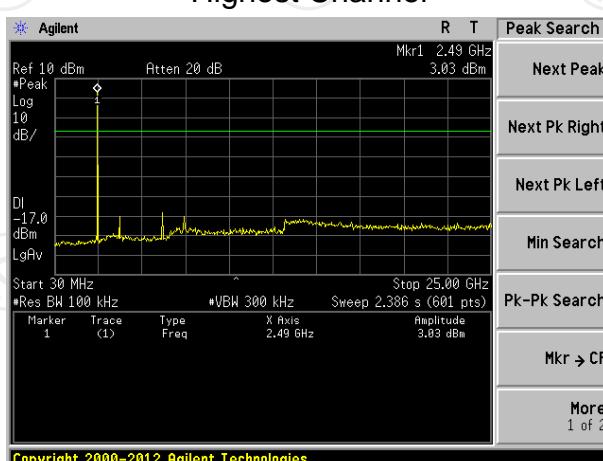
#### Lowest Channel



#### Middle Channel



#### Highest Channel



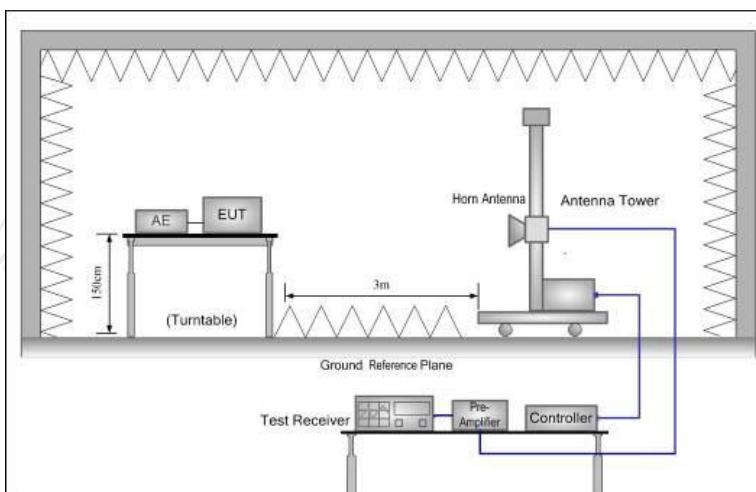
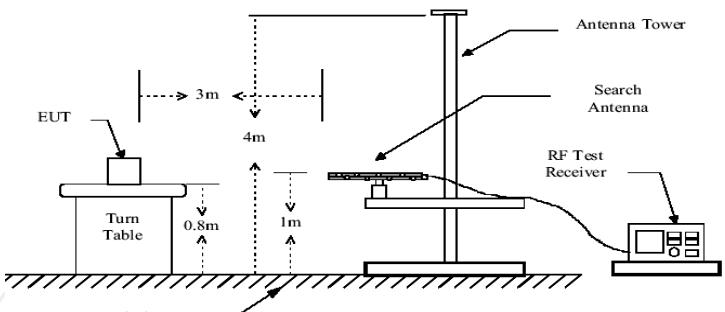
#### Remark:

During the test, pre-scan the GFSK, Pi/4QPSK, 8DPSK modulation, and found the GFSK modulation which it is worse case.

## 6.11. Radiated Spurious Emission Measurement

### 6.11.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.209																																							
<b>Test Method:</b>	ANSI C63.10:2013																																							
<b>Frequency Range:</b>	9 kHz to 25 GHz																																							
<b>Measurement Distance:</b>	3 m																																							
<b>Antenna Polarization:</b>	Horizontal & Vertical																																							
<b>Receiver Setup:</b>	<table border="1"> <thead> <tr> <th>Frequency</th> <th>Detector</th> <th>RBW</th> <th>VBW</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>9kHz- 150kHz</td> <td>Quasi-peak</td> <td>200Hz</td> <td>1kHz</td> <td>Quasi-peak Value</td> </tr> <tr> <td>150kHz- 30MHz</td> <td>Quasi-peak</td> <td>9kHz</td> <td>30kHz</td> <td>Quasi-peak Value</td> </tr> <tr> <td>30MHz-1GHz</td> <td>Quasi-peak</td> <td>100KHz</td> <td>300KHz</td> <td>Quasi-peak Value</td> </tr> <tr> <td rowspan="2">Above 1GHz</td><td>Peak</td> <td>1MHz</td> <td>3MHz</td> <td>Peak Value</td> </tr> <tr> <td>Peak</td> <td>1MHz</td> <td>10Hz</td> <td>Average Value</td> </tr> </tbody> </table>					Frequency	Detector	RBW	VBW	Remark	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value	150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value	Above 1GHz	Peak	1MHz	3MHz	Peak Value	Peak	1MHz	10Hz	Average Value						
Frequency	Detector	RBW	VBW	Remark																																				
9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value																																				
150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value																																				
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value																																				
Above 1GHz	Peak	1MHz	3MHz	Peak Value																																				
	Peak	1MHz	10Hz	Average Value																																				
<b>Limit:</b>	<table border="1"> <thead> <tr> <th>Frequency</th> <th>Field Strength (microvolts/meter)</th> <th>Measurement Distance (meters)</th> </tr> </thead> <tbody> <tr> <td>0.009-0.490</td> <td>2400/F(KHz)</td> <td>300</td> </tr> <tr> <td>0.490-1.705</td> <td>24000/F(KHz)</td> <td>30</td> </tr> <tr> <td>1.705-30</td> <td>30</td> <td>30</td> </tr> <tr> <td>30-88</td> <td>100</td> <td>3</td> </tr> <tr> <td>88-216</td> <td>150</td> <td>3</td> </tr> <tr> <td>216-960</td> <td>200</td> <td>3</td> </tr> <tr> <td>Above 960</td> <td>500</td> <td>3</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Frequency</th> <th>Field Strength (microvolts/meter)</th> <th>Measurement Distance (meters)</th> <th>Detector</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Above 1GHz</td><td>500</td> <td>3</td> <td>Average</td> </tr> <tr> <td>5000</td> <td>3</td> <td>Peak</td> </tr> </tbody> </table>					Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)	0.009-0.490	2400/F(KHz)	300	0.490-1.705	24000/F(KHz)	30	1.705-30	30	30	30-88	100	3	88-216	150	3	216-960	200	3	Above 960	500	3	Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)	Detector	Above 1GHz	500	3	Average	5000	3	Peak
Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)																																						
0.009-0.490	2400/F(KHz)	300																																						
0.490-1.705	24000/F(KHz)	30																																						
1.705-30	30	30																																						
30-88	100	3																																						
88-216	150	3																																						
216-960	200	3																																						
Above 960	500	3																																						
Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)	Detector																																					
Above 1GHz	500	3	Average																																					
	5000	3	Peak																																					
<b>Test setup:</b>	<p>For radiated emissions below 30MHz</p> <p>Distance = 3m</p> <p>30MHz to 1GHz</p>																																							



<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<p>1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10:2013 Measurement Guidelines.</p> <p>2. For the radiated emission test below 1GHz:          The EUT was placed on a turntable with 0.8 meter above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. 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.</p> <p>For the radiated emission test above 1GHz:          Place the measurement antenna on a turntable with 1.5 meter above ground, which is 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,</p>

	<p>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.</p> <ol style="list-style-type: none"> <li>3. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>4. Use the following spectrum analyzer settings:             <ol style="list-style-type: none"> <li>(1) Span shall wide enough to fully capture the emission being measured;</li> <li>(2) Set RBW=100 kHz for <math>f &lt; 1</math> GHz, RBW=1MHz for <math>f &gt; 1</math> GHz ; <math>VBW \geq RBW</math>; Sweep = auto; Detector function = peak; Trace = max hold for peak</li> <li>(3) For average measurement: use duty cycle correction factor method per 15.35(c). Duty cycle = On time/100 milliseconds On time = <math>N_1 \cdot L_1 + N_2 \cdot L_2 + \dots + N_{n-1} \cdot L_{n-1} + N_n \cdot L_n</math> Where <math>N_1</math> is number of type 1 pulses, <math>L_1</math> is length of type 1 pulses, etc. Average Emission Level = Peak Emission Level + <math>20 \cdot \log(\text{Duty cycle})</math> Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level</li> </ol> </li> </ol>
<b>Test results:</b>	PASS

### 6.11.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Test Receiver	ROHDE&SCHW ARZ	ESVD	100008	Sep. 27, 2018
Spectrum Analyzer	ROHDE&SCHW ARZ	FSQ	200061	Sep. 27, 2018
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 27, 2018
Pre-amplifier	HP	8447D	2727A05017	Sep. 27, 2018
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 27, 2018
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBH 9170	582	Jun. 07, 2018
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
Coax cable (9KHz-1GHz)	TCT	RE-low-01	N/A	Sep. 27, 2018
Coax cable (9KHz-40GHz)	TCT	RE-high-02	N/A	Sep. 27, 2018
Coax cable (9KHz-1GHz)	TCT	RE-low-03	N/A	Sep. 27, 2018
Coax cable (9KHz-40GHz)	TCT	RE-high-04	N/A	Sep. 27, 2018
EMI Test Software	Shurples 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).

**6.11.3. Test Data**

■ Below 1GHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
37.16	46.93	11.20	0.63	30.06	28.70	40.00	-11.30	Vertical
50.06	44.89	12.20	0.77	30.00	27.86	40.00	-12.14	Vertical
92.46	37.12	10.98	1.13	29.73	19.50	43.50	-24.00	Vertical
181.28	36.43	8.80	1.75	29.27	17.71	43.50	-25.79	Vertical
298.27	27.01	13.40	2.35	29.99	12.77	46.00	-33.23	Vertical
658.84	25.22	19.59	3.94	29.24	19.51	46.00	-26.49	Vertical
43.97	35.98	12.25	0.71	30.02	18.92	40.00	-21.08	Horizontal
58.82	36.54	11.40	0.85	29.93	18.86	40.00	-21.14	Horizontal
100.23	36.01	12.10	1.19	29.70	19.60	43.50	-23.90	Horizontal
202.10	34.39	10.30	1.85	29.22	17.32	43.50	-26.18	Horizontal
368.11	33.07	14.85	2.71	29.65	20.98	46.00	-25.02	Horizontal
744.87	25.41	20.48	4.26	29.20	20.95	46.00	-25.05	Horizontal

**Band Edge**

Test channel:	Lowest
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	44.58	27.59	5.38	30.18	47.37	74.00	-26.63	Horizontal
2400.00	49.61	27.58	5.39	30.18	52.40	74.00	-21.60	Horizontal
2390.00	45.29	27.59	5.38	30.18	48.08	74.00	-25.92	Vertical
2400.00	48.83	27.58	5.39	30.18	51.62	74.00	-22.38	Vertical

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	34.74	27.59	5.38	30.18	37.53	54.00	-16.47	Horizontal
2400.00	36.08	27.58	5.39	30.18	38.87	54.00	-15.13	Horizontal
2390.00	34.81	27.59	5.38	30.18	37.60	54.00	-16.40	Vertical
2400.00	36.89	27.58	5.39	30.18	39.68	54.00	-14.32	Vertical

Test channel:	Highest
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	46.88	27.53	5.47	29.93	49.95	74.00	-24.05	Horizontal
2500.00	45.73	27.55	5.49	29.93	48.84	74.00	-25.16	Horizontal
2483.50	48.01	27.53	5.47	29.93	51.08	74.00	-22.92	Vertical
2500.00	46.89	27.55	5.49	29.93	50.00	74.00	-24.00	Vertical

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	37.59	27.53	5.47	29.93	40.66	54.00	-13.34	Horizontal
2500.00	35.35	27.55	5.49	29.93	38.46	54.00	-15.54	Horizontal
2483.50	38.94	27.53	5.47	29.93	42.01	54.00	-11.99	Vertical
2500.00	35.41	27.55	5.49	29.93	38.52	54.00	-15.48	Vertical

**Note:**

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (dBuV/m)- limit (dBuV/m)
3. During the test, pre-scan the GFSK, Pi/4QPSK, 8DPSK modulation, and found the GFSK modulation which is worse case.

## ■ Above 1GHz

Test channel:	Lowest
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	30.72	31.78	8.60	32.09	39.01	74.00	-34.99	Vertical
7206.00	27.47	36.15	11.65	32.00	43.27	74.00	-30.73	Vertical
9608.00	27.58	37.95	14.14	31.62	48.05	74.00	-25.95	Vertical
12010.00	*					74.00		Vertical
14412.00	*					74.00		Vertical
4804.00	33.67	31.78	8.60	32.09	41.96	74.00	-32.04	Horizontal
7206.00	28.64	36.15	11.65	32.00	44.44	74.00	-29.56	Horizontal
9608.00	26.38	37.95	14.14	31.62	46.85	74.00	-27.15	Horizontal
12010.00	*					74.00		Horizontal
14412.00	*					74.00		Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	20.78	31.78	8.60	32.09	29.07	54.00	-24.93	Vertical
7206.00	16.90	36.15	11.65	32.00	32.70	54.00	-21.30	Vertical
9608.00	16.38	37.95	14.14	31.62	36.85	54.00	-17.15	Vertical
12010.00	*					54.00		Vertical
14412.00	*					54.00		Vertical
4804.00	24.28	31.78	8.60	32.09	32.57	54.00	-21.43	Horizontal
7206.00	18.63	36.15	11.65	32.00	34.43	54.00	-19.57	Horizontal
9608.00	15.57	37.95	14.14	31.62	36.04	54.00	-17.96	Horizontal
12010.00	*					54.00		Horizontal
14412.00	*					54.00		Horizontal

**Note:**

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (dB $\mu$ V/m)- limit (dB $\mu$ V/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
5. Data of measurement shown “\*” in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.
6. During the test, pre-scan the GFSK, Pi/4QPSK, 8DPSK modulation, and found the GFSK modulation which it is worse case.
7. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

Test channel:	Middle
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4882.00	30.80	31.85	8.67	32.12	39.20	74.00	-34.80	Vertical
7323.00	27.51	36.37	11.72	31.89	43.71	74.00	-30.29	Vertical
9764.00	27.63	38.35	14.25	31.62	48.61	74.00	-25.39	Vertical
12205.00	*					74.00		Vertical
14646.00	*					74.00		Vertical
4882.00	33.76	31.85	8.67	32.12	42.16	74.00	-31.84	Horizontal
7323.00	28.69	36.37	11.72	31.89	44.89	74.00	-29.11	Horizontal
9764.00	26.43	38.35	14.25	31.62	47.41	74.00	-26.59	Horizontal
12205.00	*					74.00		Horizontal
14646.00	*					74.00		Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4882.00	20.83	31.85	8.67	32.12	29.23	54.00	-24.77	Vertical
7323.00	16.92	36.37	11.72	31.89	33.12	54.00	-20.88	Vertical
9764.00	16.41	38.35	14.25	31.62	37.39	54.00	-16.61	Vertical
12205.00	*					54.00		Vertical
14646.00	*					54.00		Vertical
4882.00	24.33	31.85	8.67	32.12	32.73	54.00	-21.27	Horizontal
7323.00	18.67	36.37	11.72	31.89	34.87	54.00	-19.13	Horizontal
9764.00	15.60	38.35	14.25	31.62	36.58	54.00	-17.42	Horizontal
12205.00	*					54.00		Horizontal
14646.00	*					54.00		Horizontal

**Note:**

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (dB $\mu$ V/m)- limit (dB $\mu$ V/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
5. Data of measurement shown “\*” in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.
6. During the test, pre-scan the GFSK, Pi/4QPSK, 8DPSK modulation, and found the GFSK modulation which it is worse case.
7. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

Test channel:	Highest
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	31.54	31.93	8.73	32.16	40.04	74.00	-33.96	Vertical
7440.00	28.01	36.59	11.79	31.78	44.61	74.00	-29.39	Vertical
9920.00	28.07	38.81	14.38	31.88	49.38	74.00	-24.62	Vertical
12400.00	*					74.00		Vertical
14880.00	*					74.00		Vertical
4960.00	34.65	31.93	8.73	32.16	43.15	74.00	-30.85	Horizontal
7440.00	29.26	36.59	11.79	31.78	45.86	74.00	-28.14	Horizontal
9920.00	26.94	38.81	14.38	31.88	48.25	74.00	-25.75	Horizontal
12400.00	*					74.00		Horizontal
14880.00	*					74.00		Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	21.35	31.93	8.73	32.16	29.85	54.00	-24.15	Vertical
7440.00	17.28	36.59	11.79	31.78	33.88	54.00	-20.12	Vertical
9920.00	16.73	38.81	14.38	31.88	38.04	54.00	-15.96	Vertical
12400.00	*					54.00		Vertical
14880.00	*					54.00		Vertical
4960.00	24.93	31.93	8.73	32.16	33.43	54.00	-20.57	Horizontal
7440.00	19.07	36.59	11.79	31.78	35.67	54.00	-18.33	Horizontal
9920.00	15.97	38.81	14.38	31.88	37.28	54.00	-16.72	Horizontal
12400.00	*					54.00		Horizontal
14880.00	*					54.00		Horizontal

**Note:**

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (dB $\mu$ V/m)- limit (dB $\mu$ V/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
5. Data of measurement shown “\*” in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.
6. During the test, pre-scan the GFSK, Pi/4QPSK, 8DPSK modulation, and found the GFSK modulation which it is worse case.
7. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

## Appendix A: Photographs of Test Setup

Refer to test report TCT171110E013

## Appendix B: Photographs of EUT

Refer to test report TCT171110E013

\*\*\*\*\***END OF REPORT**\*\*\*\*\*