TEST REPORT

<table>
<tr>
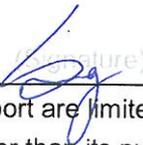<td>**Ⓤ Dt&C**</td>
<td>**DT&C Co., Ltd.**
42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042
Tel : 031-321-2664, Fax : 031-321-1664</td>
</tr>
</table>

1. Report No : DRTFCC1709-0205

2. Customer

   • Name : LG Electronics MobileComm USA, Inc.

   • Address : 1000 Sylvan Ave., Englewood Cliffs, New Jersey, United States, 07632

3. Use of Report : FCC Original Grant

4. Product Name / Model Name : Mobile Phone / QVR

   FCC ID : ZNFQVR

5. Test Method Used : ANSI C63.10-2013

   Test Specification : FCC Part 15 Subpart C.247

6. Date of Test : 2017.09.05 ~ 2017.09.27

7. Testing Environment : See appended test report.

8. Test Result : Refer to the attached test result.

<table>
<tr>
<td rowspan="2">Affirmation</td>
<td>Tested by</td>
<td rowspan="2">(Signature)</td>
<td>Technical Manager</td>
<td rowspan="2">(Signature)</td>
</tr>
<tr>
<td>Name : SunGeun Lee</td>
<td>Name : Geunki Son</td>
</tr>
</table>

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

2017 . 09 . 27 .

DT&C Co., Ltd.

Test Report Version

Test Report No.	Date	Description
DRTFCC1709-0205	Sep. 27, 2017	Initial issue

Table of Contents

1. General Information

1.1 Testing Laboratory

DT&C Co., Ltd.
The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The site is constructed in conformance with the requirements.   **- FCC MRA Accredited Test Firm No. : KR0034**

www.dtnc.net		
Telephone	:	+ 82-31-321-2664
FAX	:	+ 82-31-321-1664

1.2 Testing Environment

Ambient Condition	
▪ Temperature	+21 ℃ ~ +25 ℃
▪ Relative Humidity	40 % ~ 45 %

1.3 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C63.4-2014 and ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence.

Test items	**Measurement uncertainty**
Transmitter Output Power	0.7 dB (The confidence level is about 95 %, k = 2)
Conducted spurious emission	1.0 dB (The confidence level is about 95 %, k = 2)
AC conducted emission	2.4 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz Below)	5.1 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz ~ 18 GHz)	5.4 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (18 GHz Above)	5.3 dB (The confidence level is about 95 %, k = 2)

1.4 Details of Applicant

Applicant	:	LG Electronics MobileComm USA, Inc.
Address	:	1000 Sylvan Ave., Englewood Cliffs, New Jersey, United States, 07632
Contact person	:	Kyung-Su Han

1.5 Description of EUT

EUT	Mobile Phone
Model Name	QVR
Add Model Name	NA
Serial Number	Identical prototype
Power Supply	DC 3.85 V
Frequency Range	2402 MHz ~ 2480 MHz
Modulation Technique	GFSK, π/4DQPSK, 8DPSK
Number of Channels	79
Antenna Type	Internal Antenna
Antenna Gain	PK : -2.7 dBi

1.6 Declaration by the applicant / manufacturer

- NA

1.7 Information about the FHSS characteristics

- This Bluetooth module has been tested by a Bluetooth Qualification Lab, and we confirm the following :

    A) The hopping sequence is pseudorandom

    B) All channels are used equally on average

    C) The receiver input bandwidth equals the transmit bandwidth

    D) The receiver hops in sequence with the transmit signal

- 15.247(g) : In accordance with the Bluetooth Industry Standard, the system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) system.

- 15.247(h) : In accordance with the Bluetooth Industry Standard, the system does not coordinate its channels selection / hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

- 15.247(h) : The EUT employs Adaptive Frequency Hopping (AFH) which identifies sources of interference namely devices operating in 802.11 WLAN and excludes them from the list of available channels. The process of re-mapping reduces the number of test channels from 79 channels to a minimum number of 20 channels.

1.8 Test Equipment List

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	17/07/12	18/07/12	MY46471601
Spectrum Analyzer	Agilent Technologies	N9020A	16/10/11	17/10/11	MY46471251
Multimeter	FLUKE	17B	17/04/12	18/04/12	26030065WS
DC Power Supply	Agilent	66332A	17/01/11	18/01/11	US37473831
Signal Generator	Rohde Schwarz	SMBV100A	17/01/04	18/01/04	255571
Signal Generator	Rohde Schwarz	SMF100A	17/04/21	18/04/21	102341
Thermohygrometer	BODYCOM	BJ5478	17/04/11	18/04/11	120612-2
Power Splitter	Anritsu	K241B	17/01/11	18/01/11	1301183
Bluetooth Tester	TESCOM	TC-3000B	17/01/04	18/01/04	3000B770243
Loop Antenna	Schwarzbeck	FMZB1513	16/04/22	18/04/22	1513-128
BILOG ANTENNA	Schwarzbeck	VULB 9160	16/11/11	18/11/11	3151
Horn Antenna	ETS-LINDGREN	3117	16/05/03	18/05/03	00140394
Horn Antenna	A.H.Systems Inc.	SAS-574	17/07/31	19/07/31	155
PreAmplifier	Agilent	8449B	16/10/19	17/10/19	3008A002108
PreAmplifier	TSJ	MLA-010K01-B01-27	17/03/06	18/03/06	1844539
EMI Test Receiver	Rohde Schwarz	ESR7	17/02/16	18/02/16	101061
High-pass filter	Wainwright	WHKX12-2580-3000-18000-80SS	17/09/05	18/09/05	3
High-pass filter	Wainwright	WHNX6-6320-8000-26500-40CC	17/09/05	18/09/05	1
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A MA2411B	17/04/11	18/04/11	1338004 1306053
EMI Test Receiver	R&S	ESCI	17/02/26	18/02/16	100364
SINGLE-PHASE MASTER	NF	4420	17/09/01	18/09/01	3049354420023
LISN	SCHWARZBECK	NNLK 8121	17/04/03	18/04/03	6182

Note: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2006.

1.9 Summary of Test Results

FCC Part RSS Std.	Parameter	Limit (Using in 2400~ 2483.5 MHz)	Test Condition	Status Note 1
15.247(a) RSS-247(5.1)	Carrier Frequency Separation	>= 25 kHz or >= Two thirds of the 20 dB BW, whichever is greater.	Conducted	C
	Number of Hopping Frequencies	>= 15 hops		C
	20 dB Bandwidth	N/A		C
	Dwell Time	=< 0.4 seconds		C
15.247(b) RSS-247(5.4)	Transmitter Output Power	**For FCC** =< 1 Watt , if CHs >= 75 Others =< 0.125 W **For IC** if CHs >= 75 =< 1 Watt For Conducted Power =< 4 Watt For e.i.r.p, Others =< 0.125 W For Conducted Power. =< 0.5 Watt For e.i.r.p		C
15.247(d) RSS-247(5.5)	Conducted Spurious Emissions	The radiated emission to any 100 kHz of out-band shall be at least 20 dB below the highest in-band spectral density.		C
RSS Gen(6.6)	Occupied Bandwidth (99 %)	N/A		NA
15.247(d) 15.205 & 209 RSS-247(5.5) RSS-Gen (8.9 & 8.10)	Radiated Spurious Emissions	FCC 15.209 Limits RSS-Gen 8.9	Radiated	C Note2,3,4
15.207 RSS-Gen(8.8)	AC Conducted Emissions	FCC 15.207 Limits	AC Line Conducted	C
15.203 RSS-Gen(8.3)	Antenna Requirements	FCC 15.203	-	C

Note 1 : **C** = Comply **NC** = Not Comply **NT** = Not Tested **NA** = Not Applicable

Note 2 : This test item was performed in each axis and the worst case data was reported.

Note 3 : This device supports wireless charging capability.
   So per KDB 648474 D03 v01r04, the radiated test items were performed both normal and charging conditions. For wireless charging condition, the handset is placed on the representative charging pad under normal conditions and in a simulated call configuration.

Note 4: For radiated emission tests below 30 MHz were performed on semi-anechoic chamber which is correlated with OATS.

1.10 Conclusion of worst-case and operation mode

The EUT has three type of modulation (GFSK, π/4DQPSK and 8DPSK). Therefore all applicable requirements were tested with all the modulations. And packet type was tested at the worst case(DH5).

The field strength of spurious emission was measured in three orthogonal EUT positions (X-axis, Y-axis and Z-axis).

Tested frequency information,

- Hopping Function : Enable

	TX Frequency (MHz)	**RX Frequency (MHz)**
Hopping Band	2402 ~ 2480	2402 ~ 2480

- Hopping Function : Disable

	TX Frequency (MHz)	**RX Frequency (MHz)**
Lowest Channel	2402	2402
Middle Channel	2441	2441
Highest Channel	2480	2480

2. Maximum Peak Output Power Measurement

2.1 Test Setup

Refer to the APPENDIX I.

2.2 Limit

■ **FCC Requirements**

The maximum peak output power of the intentional radiator shall not exceed the following :

1. §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

2. §15.247(b)(1), For frequency hopping systems operating in the 2400 – 2483.5 MHz employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725 – 5805 MHz band : 1 Watt.

■ **IC Requirements**

1. RSS-247(5.4), For FHSS operating in the band 2400 - 2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W and the e.i.r.p. shall not exceed 4 W if the hopset uses 75 or more hopping channels the maximum peak conducted output power shall not exceed 0.125 W and the e.i.r.p. shall not exceed 0.5 W if the hopset uses less than 75 hopping channels

2.3 Test Procedure

1. The RF output power was measured with a spectrum analyzer connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency, A spectrum analyzer was used to record the shape of the transmit signal.

2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using ;

   Span = approximately 5 times of the 20 dB bandwidth, centered on a hopping channel

   RBW ≥ 20 dB BW

   VBW ≥ RBW

   Sweep = auto

   Detector function = peak

   Trace = max hold

## 2.4 Test Results

Modulation	Tested Channel	Burst Average Output Power		Peak Output Power	
		dBm	mW	dBm	mW
GFSK	Lowest	9.64	9.204	9.75	9.441
	Middle	**10.94**	**12.417**	**11.13**	**12.972**
	Highest	10.02	10.046	10.19	10.447
π/4DQPSK	Lowest	9.03	7.998	10.51	11.246
	Middle	**10.25**	**10.593**	**11.83**	**15.241**
	Highest	9.33	8.570	10.97	12.503
8DPSK	Lowest	9.04	8.017	10.65	11.614
	Middle	**10.25**	**10.593**	**11.98**	**15.776**
	Highest	9.33	8.570	11.14	13.002

Note 1 : The burst average output power was tested using an average power meter for reference only.
Note 2 : See next pages for actual measured spectrum plots.

Peak Output Power   *Lowest Channel & Modulation : GFSK*
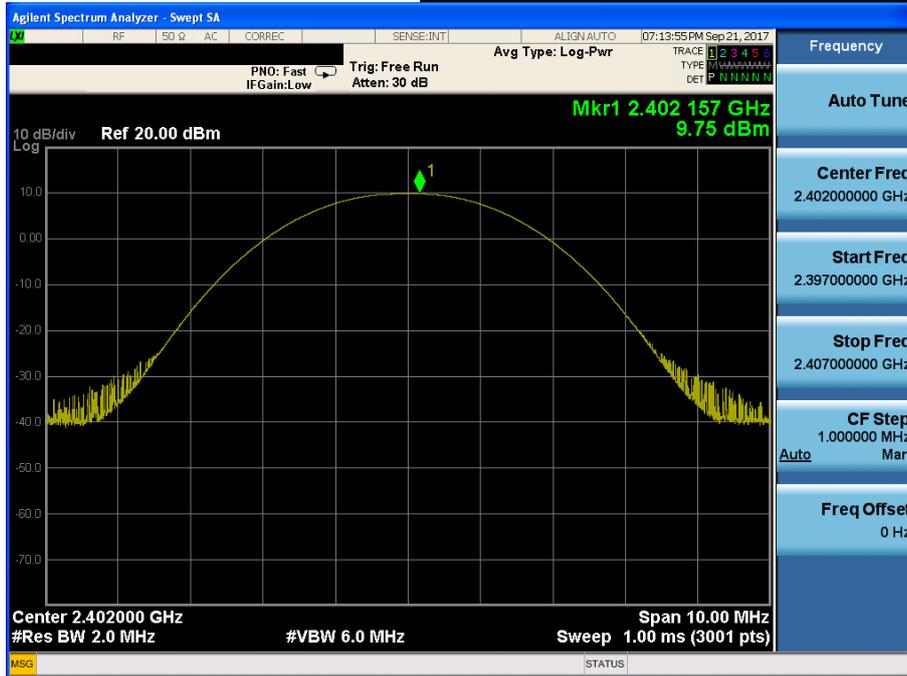
Peak Output Power   *Middle Channel & Modulation : GFSK*

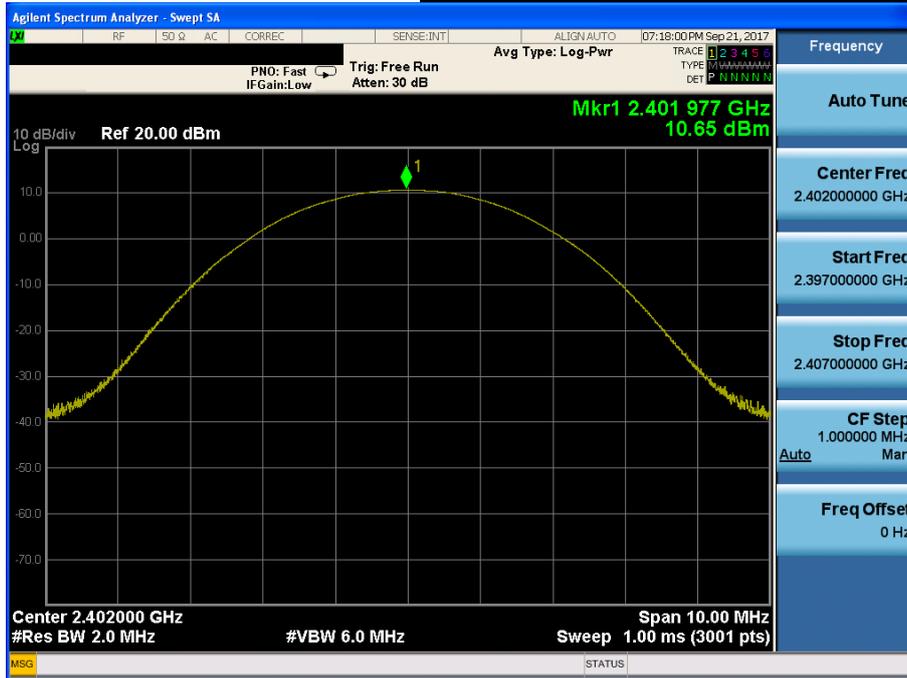## Peak Output Power   *Highest Channel & Modulation : GFSK*

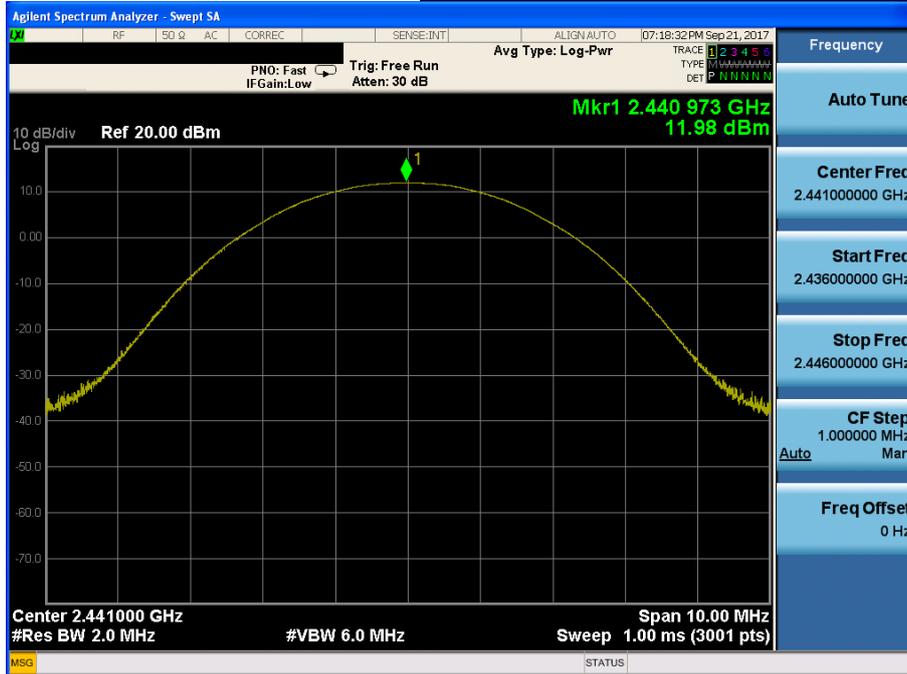## Peak Output Power   *Lowest Channel & Modulation : π/4DQPSK*
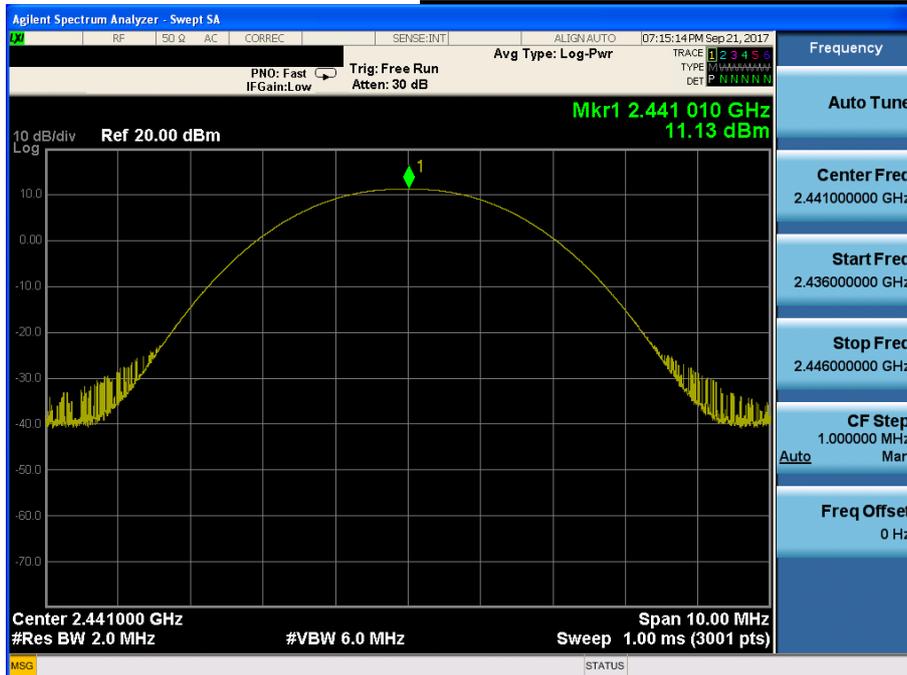
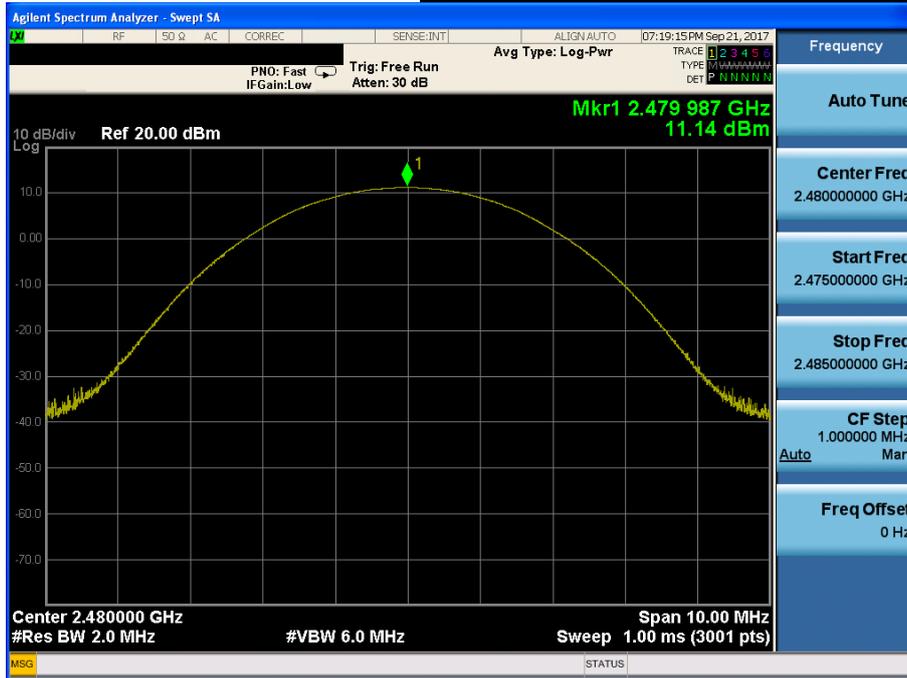**Peak Output Power**   *Middle Channel & Modulation : π/4DQPSK*
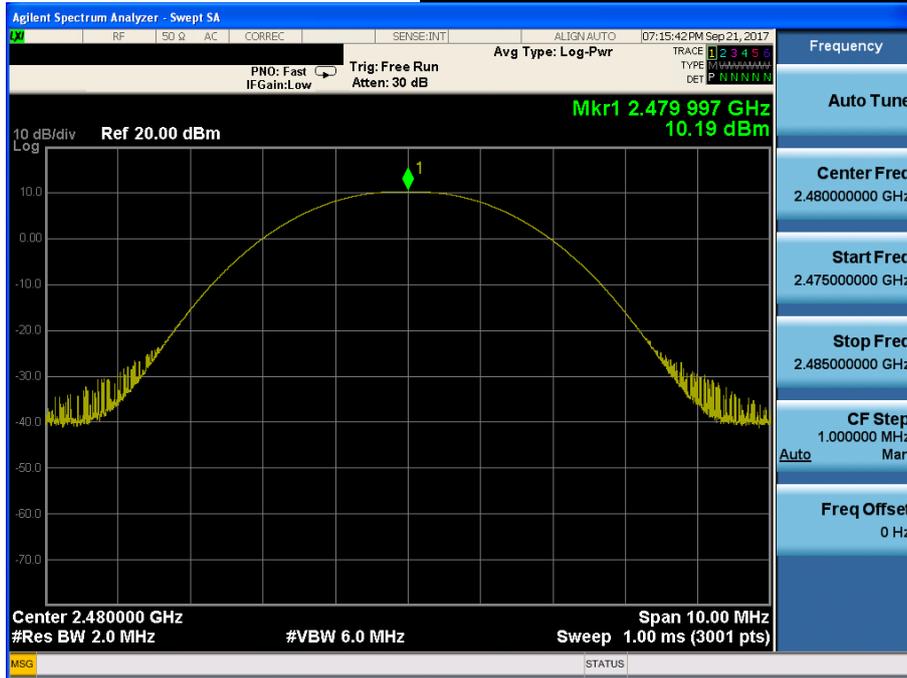
Peak Output Power   *Highest Channel & Modulation : π/4DQPSK*
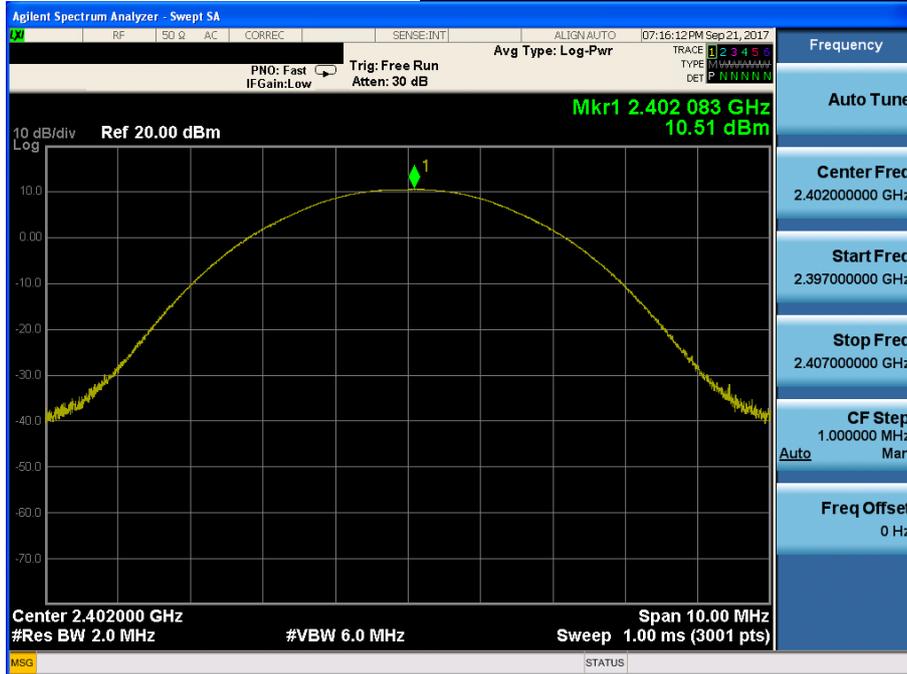
Peak Output Power   *Lowest Channel & Modulation : 8DPSK*

Peak Output Power   *Middle Channel & Modulation : 8DPSK*

Peak Output Power   *Highest Channel & Modulation : 8DPSK*

3. 20 dB BW

3.1 Test Setup

Refer to the APPENDIX I.

3.2 Limit

Limit : Not Applicable

3.3 Test Procedure

1. The 20 dB bandwidth were measured with a spectrum analyzer connected to RF antenna Connector (conducted measurement) while EUT was operating in transmit mode. The analyzer center frequency was set to the EUT carrier frequency, using the analyzer.

2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using below setting: RBW shall be in the range of 1% to 5% of the 20 dB bandwidth and VBW $\geq$ 3 × RBW, Span = between two times and five times the 20 dB bandwidth.

3.4 Test Results

Modulation	Tested Channel	20 dB BW (MHz)
GFSK	Lowest	0.885
	Middle	0.884
	Highest	**0.885**
π/4DQPSK	Lowest	1.337
	Middle	**1.339**
	Highest	1.338
8DPSK	Lowest	**1.333**
	Middle	**1.333**
	Highest	1.324

Note 1 : See next pages for actual measured spectrum plots.
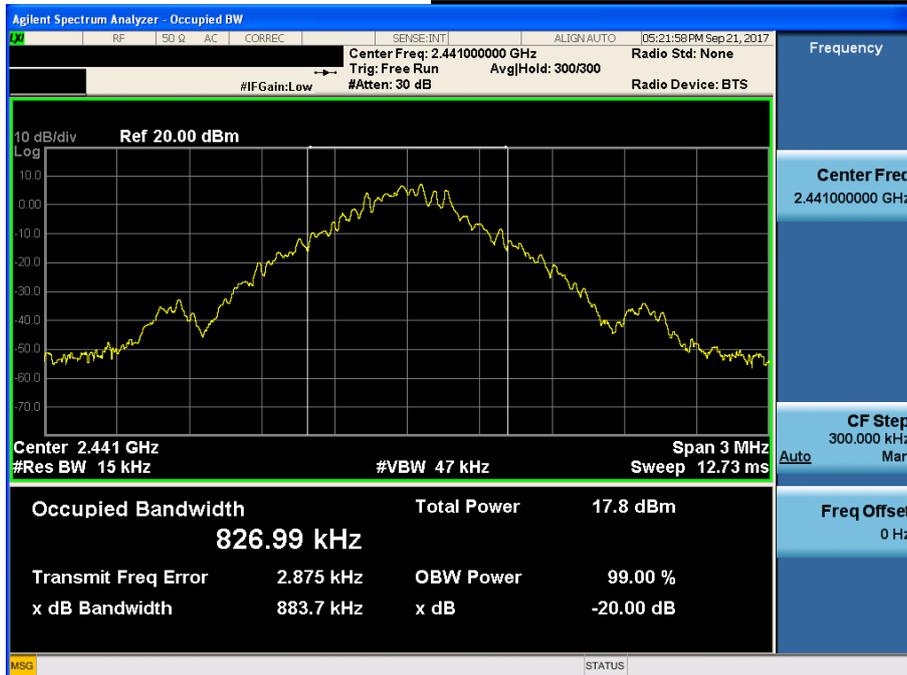
20 dB Bandwidth　　　　　　　　　*Lowest Channel & Modulation : GFSK*
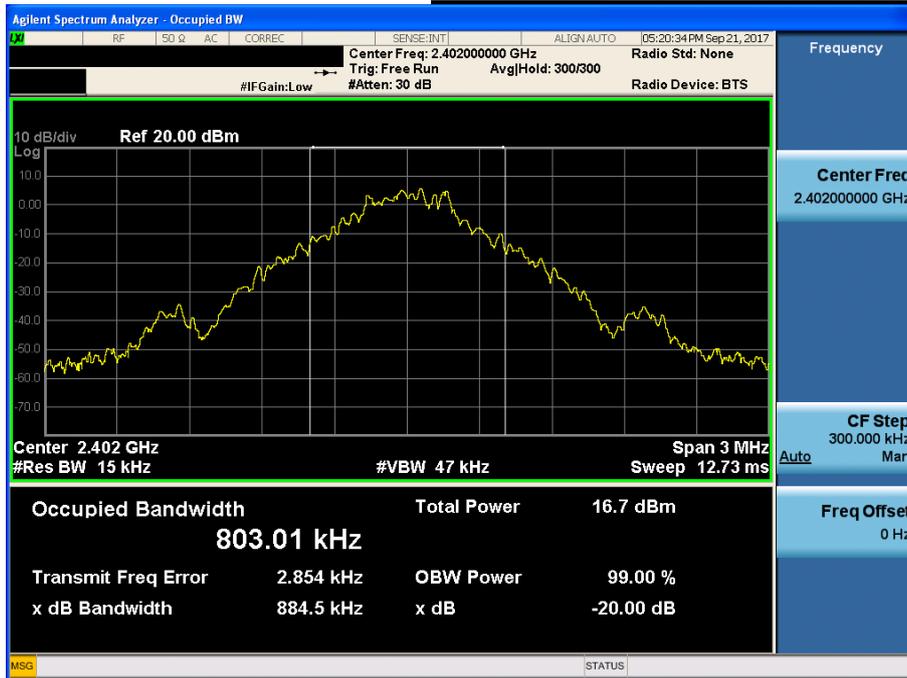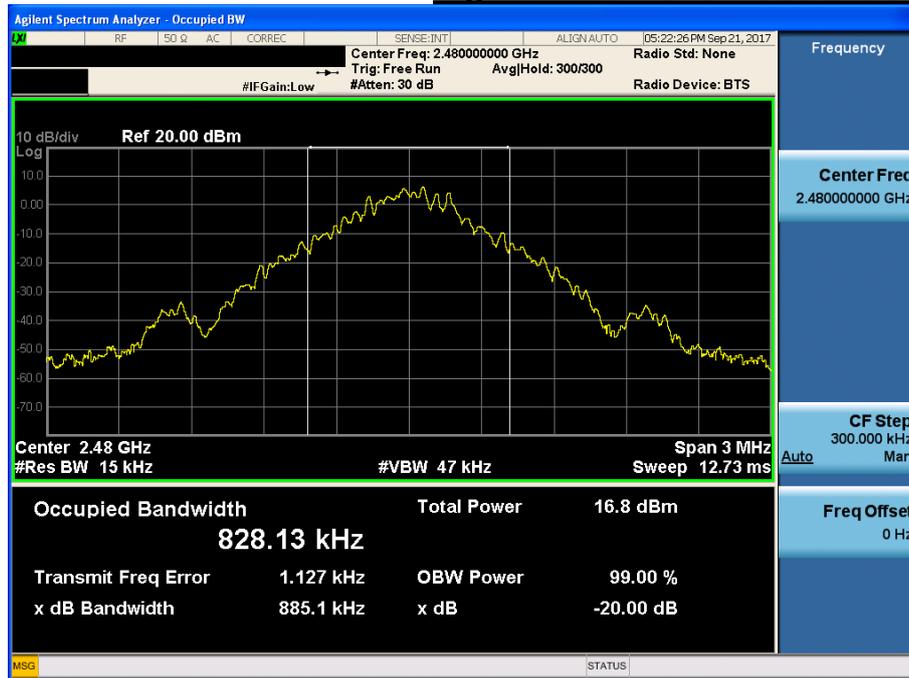

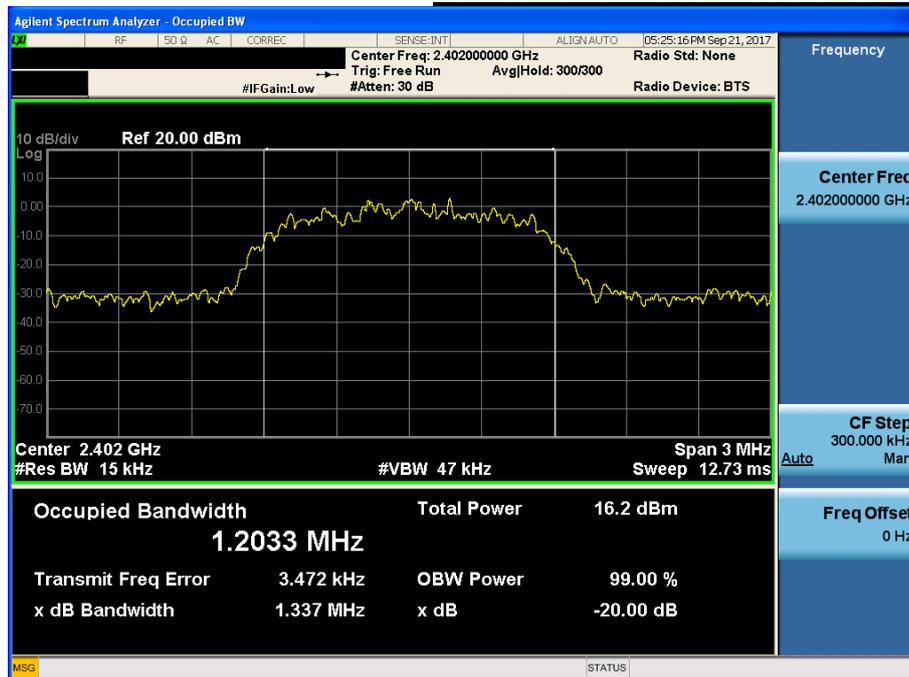## 20 dB Bandwidth　　　　　　　　　*Middle Channel & Modulation : GFSK*

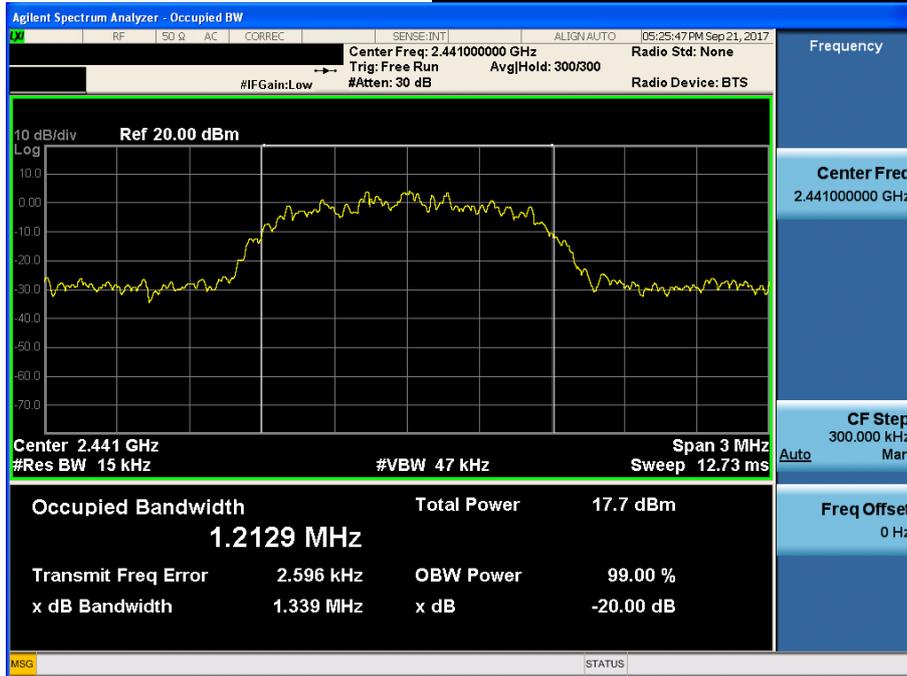## 20 dB Bandwidth　　　　　　　　*Highest Channel & Modulation : GFSK*

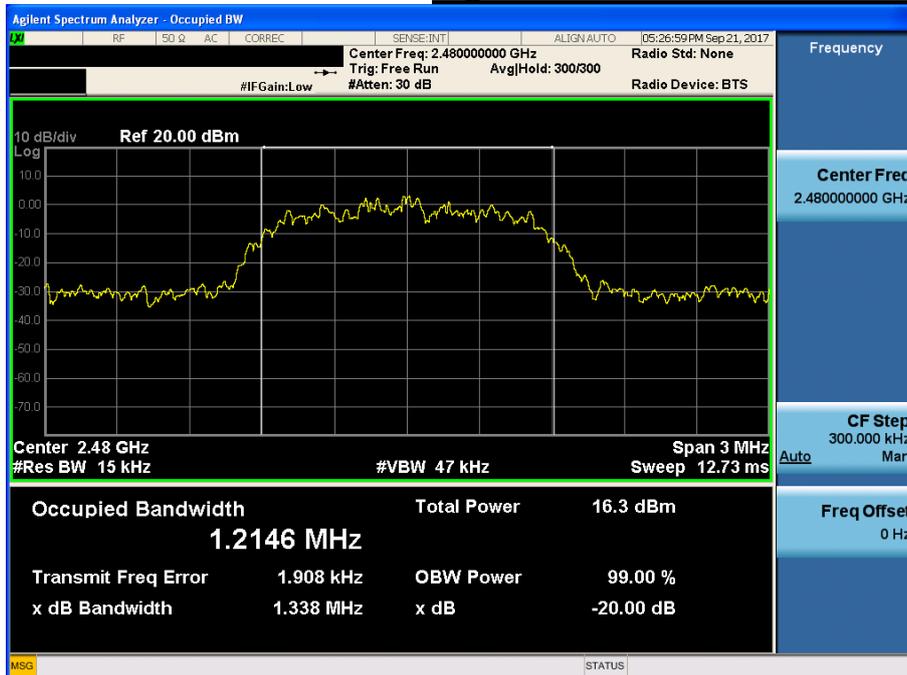## 20 dB Bandwidth　　　　　　　　*Lowest Channel & Modulation : π/4DQPSK*

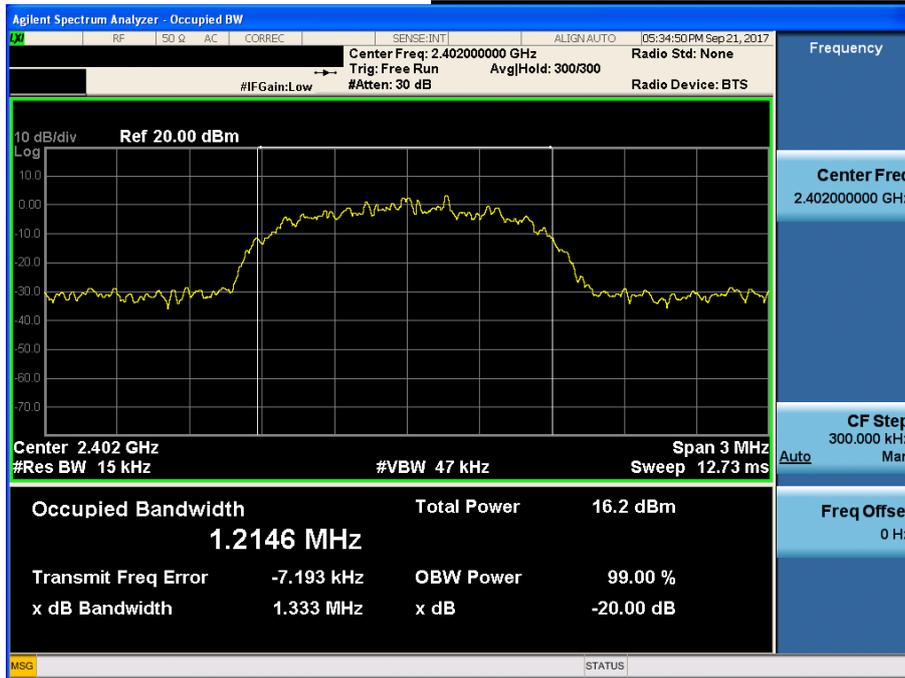## 20 dB Bandwidth   *Middle Channel & Modulation : π/4DQPSK*

20 dB Bandwidth   *Highest Channel & Modulation : π/4DQPSK*

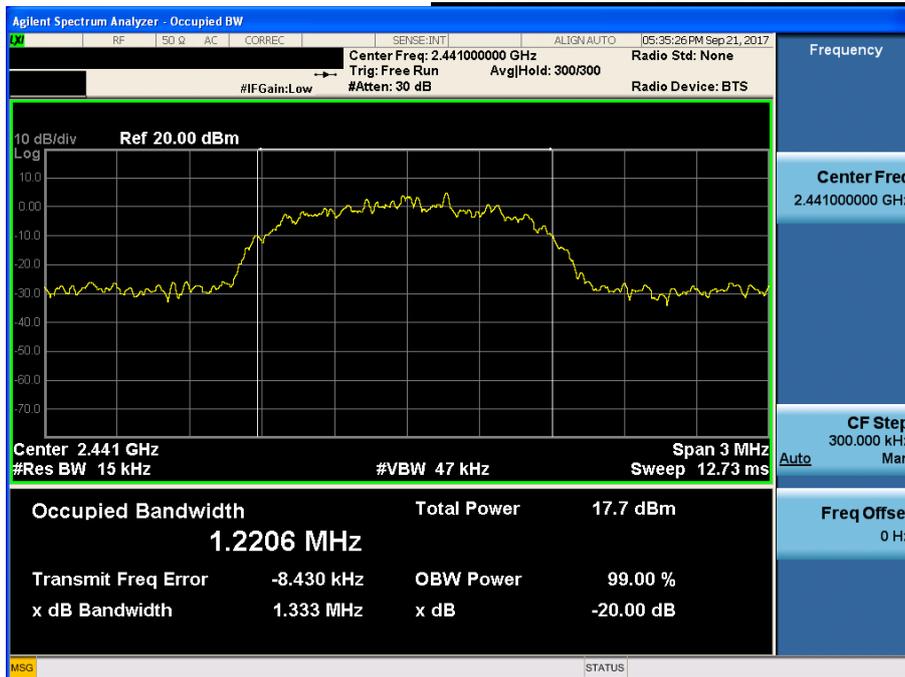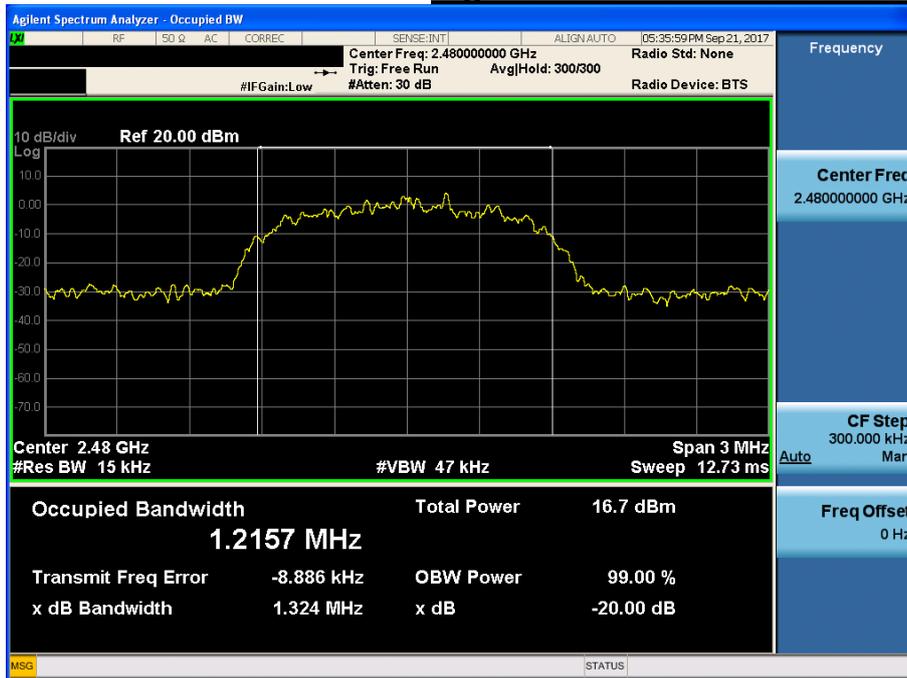## 20 dB Bandwidth   *Lowest Channel & Modulation : 8DPSK*

20 dB Bandwidth   *Middle Channel & Modulation : 8DPSK*

20 dB Bandwidth　　　　　　　　　　　*Highest Channel & Modulation : 8DPSK*

Agilent Spectrum Analyzer - Occupied BW

Center Freq: 2.480000000 GHz	Radio Std: None
Trig: Free Run　Avg|Hold: 300/300	
#Atten: 30 dB	Radio Device: BTS

Ref 20.00 dBm

Center 2.48 GHz　#Res BW 15 kHz　#VBW 47 kHz　Span 3 MHz　Sweep 12.73 ms

Occupied Bandwidth		Total Power	16.7 dBm
	1.2157 MHz		
Transmit Freq Error	-8.886 kHz	OBW Power	99.00 %
x dB Bandwidth	1.324 MHz	x dB	-20.00 dB

4. Carrier Frequency Separation

4.1 Test Setup

Refer to the APPENDIX I.

4.2 Limit

Limit : ≥ 25 kHz or ≥ Two-Thirds of the 20 dB BW whichever is greater.

4.3 Procedure

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.
After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.
　The spectrum analyzer is set to :
　　Span = wide enough to capture the peaks of two adjacent channels
　　RBW = Start with the RBW 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

4.4 Test Results

FH mode

Hopping Mode	Modulation	Peak of center channel (MHz)	Peak of adjacent Channel (MHz)	Test Result (MHz)
Enable	GFSK	2441.015	2442.015	1.000
	π/4DQPSK	2441.158	2442.158	1.000
	8DPSK	2441.167	2442.167	1.000

AFH mode

Hopping Mode	Modulation	Peak of center channel (MHz)	Peak of adjacent Channel (MHz)	Test Result (MHz)
Enable	GFSK	2411.013	2412.013	1.000
	π/4DQPSK	2411.157	2412.157	1.000
	8DPSK	2411.163	2412.163	1.000

Note 1 : See next pages for actual measured spectrum

- **Minimum Standard :**

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

Carrier Frequency Separation (FH) *Hopping mode : Enable & GFSK*

Carrier Frequency Separation (FH) *Hopping mode : Enable & π/4DQPSK*
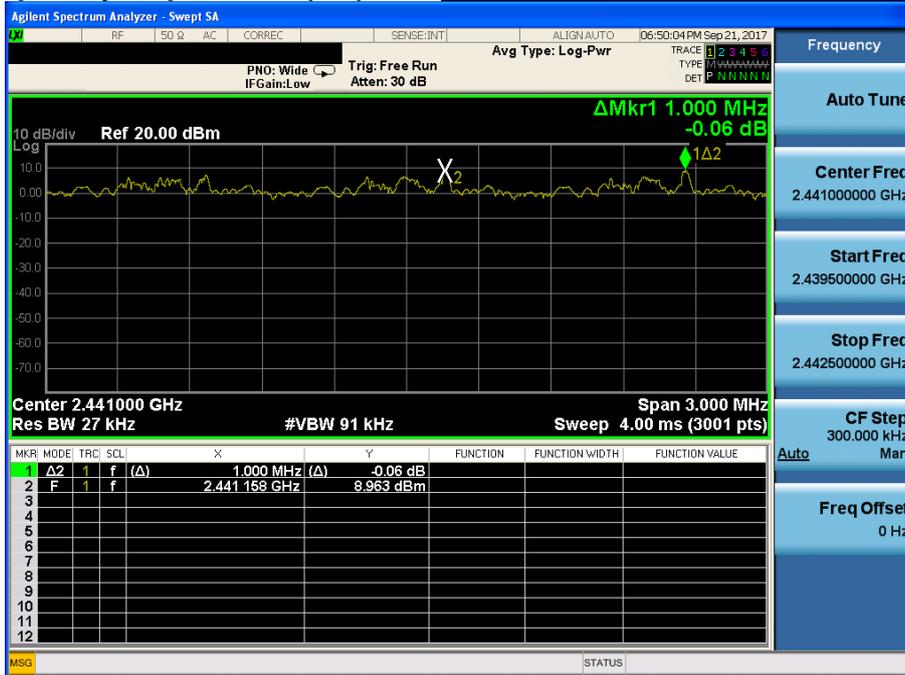
Carrier Frequency Separation (FH)　　*Hopping mode : Enable & 8DPSK*

Carrier Frequency Separation (AFH) *Hopping mode : Enable & GFSK*

Carrier Frequency Separation (AFH) *Hopping mode : Enable & π/4DQPSK*

Carrier Frequency Separation (AFH)   *Hopping mode : Enable & 8DPSK*
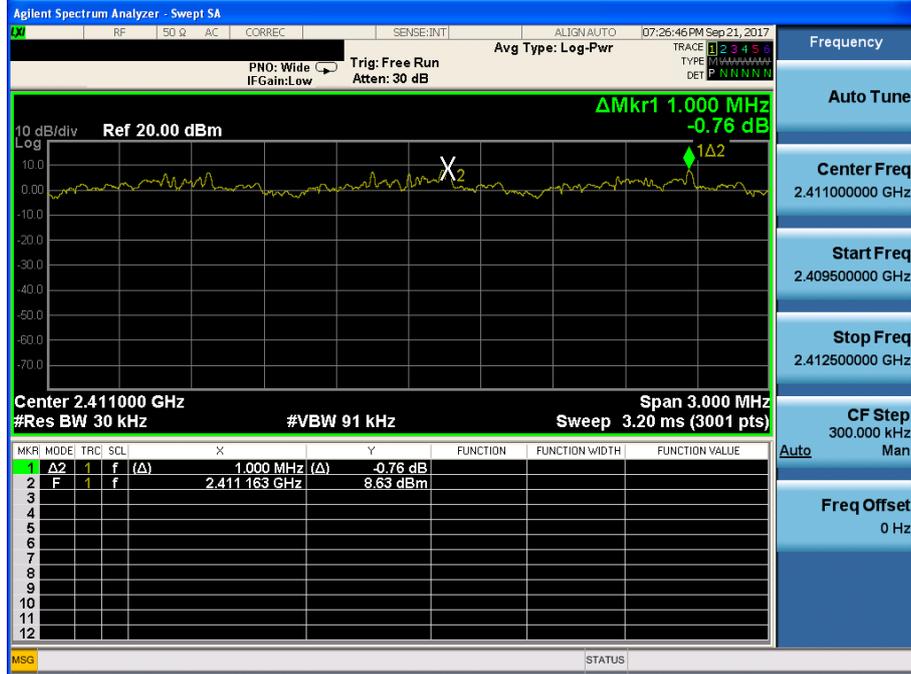
5. Number of Hopping Frequencies

5.1 Test Setup

Refer to the APPENDIX I.

5.2 Limit

Limit : >= 15 hops

5.3 Procedure

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

To get higher resolution, two frequency ranges for FH mode within the 2400 ~ 2483.5 MHz were examined.

The spectrum analyzer is set to :
Span = 50 MHz

Start Frequency = 2391.5 MHz,   Stop Frequency = 2441.5 MHz
Start Frequency = 2441.5 MHz,   Stop Frequency = 2491.5 MHz

RBW = To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.

VBW ≥ RBW   Sweep = auto
Detector function = peak   Trace = max hold

5.4 Test Results

FH mode

Hopping mode	Modulation	Test Result (Total Hops)
Enable	GFSK	79
	π/4DQPSK	79
	8DPSK	79

AFH mode

Hopping mode	Modulation	Test Result (Total Hops)
Enable	GFSK	20
	π/4DQPSK	20
	8DPSK	20

Note 1 : See next pages for actual measured spectrum plots.
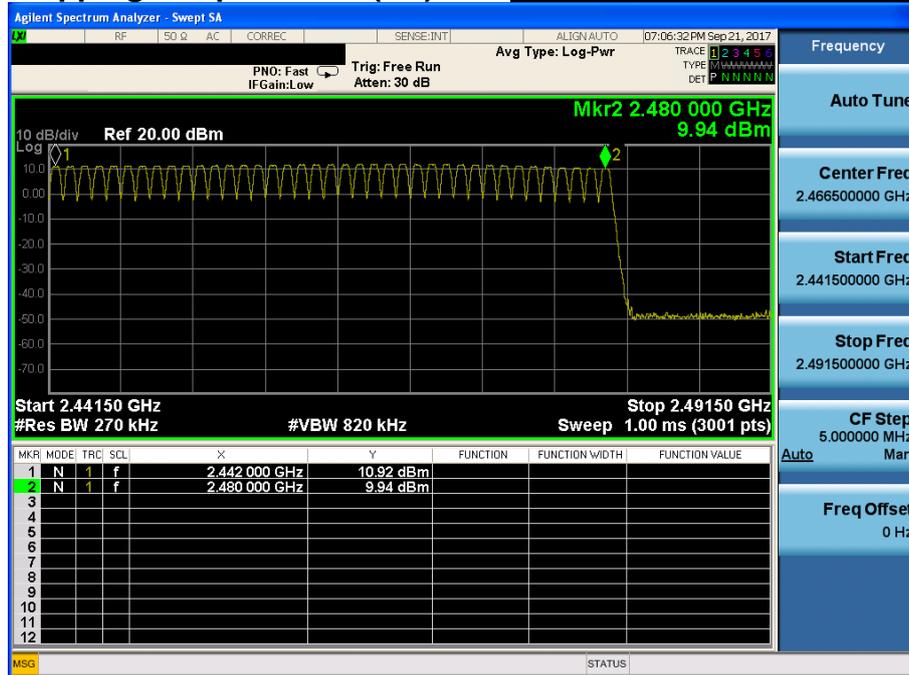
- Minimum Standard :

At least 15 hopes
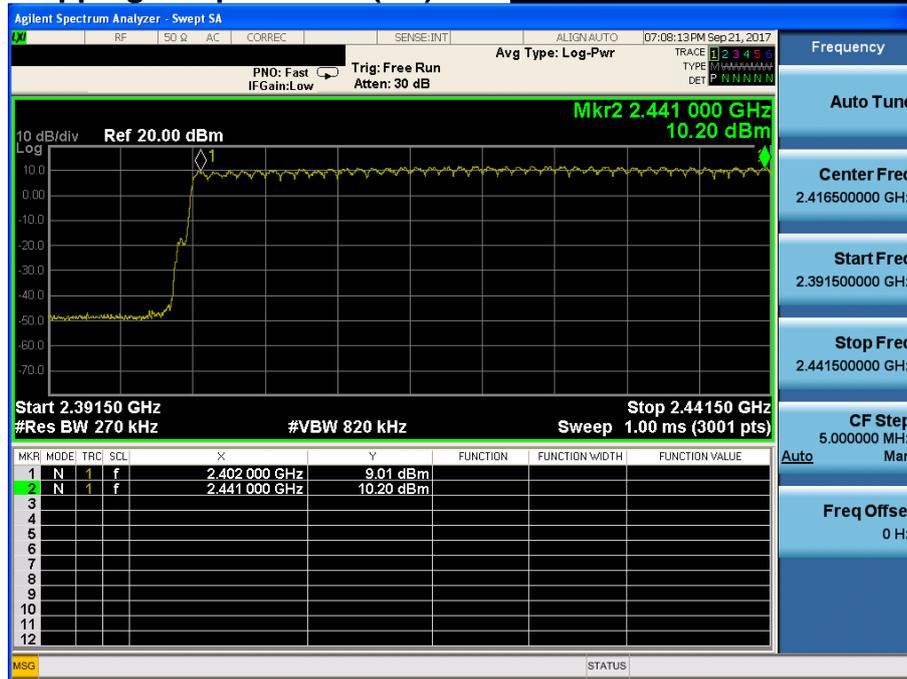
Number of Hopping Frequencies 1(FH)   *Hopping mode : Enable & GFSK*

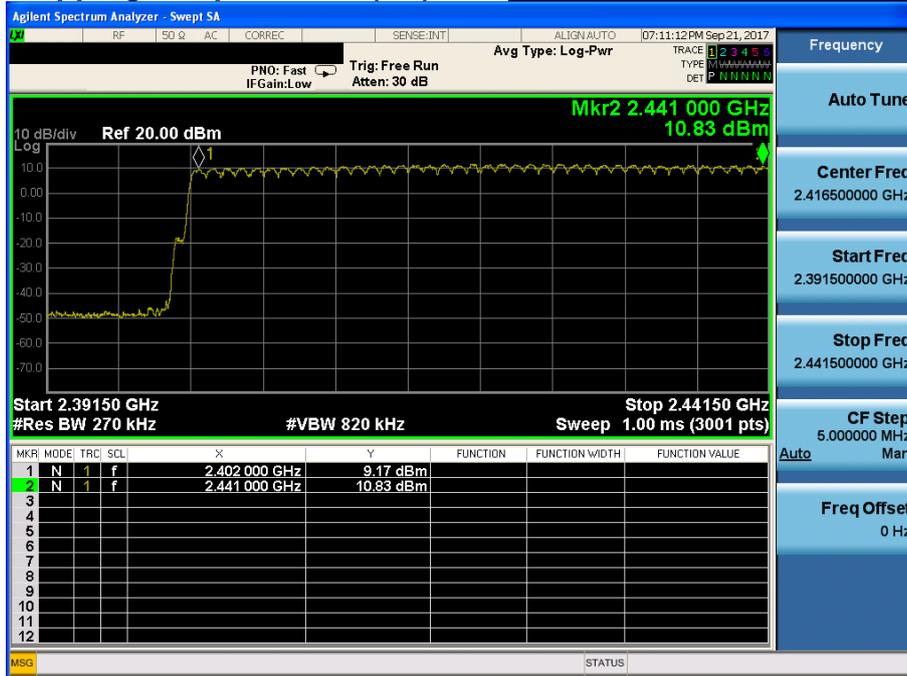## Number of Hopping Frequencies 2(FH)   *Hopping mode : Enable & GFSK*

Number of Hopping Frequencies 1(FH)   *Hopping mode : Enable & π/4DQPSK*
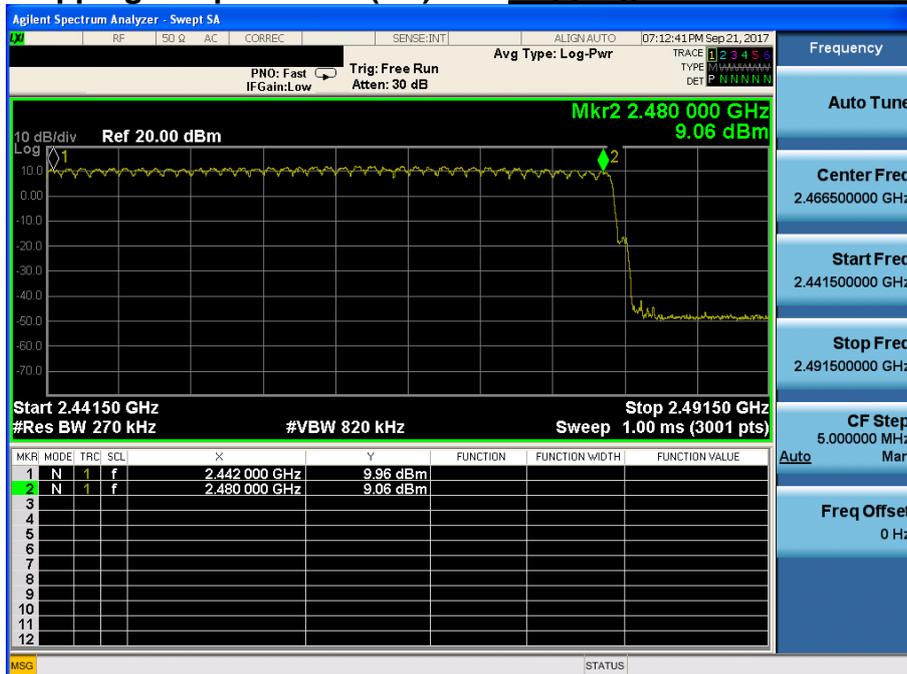

Number of Hopping Frequencies 2(FH)   *Hopping mode : Enable & π/4DQPSK*
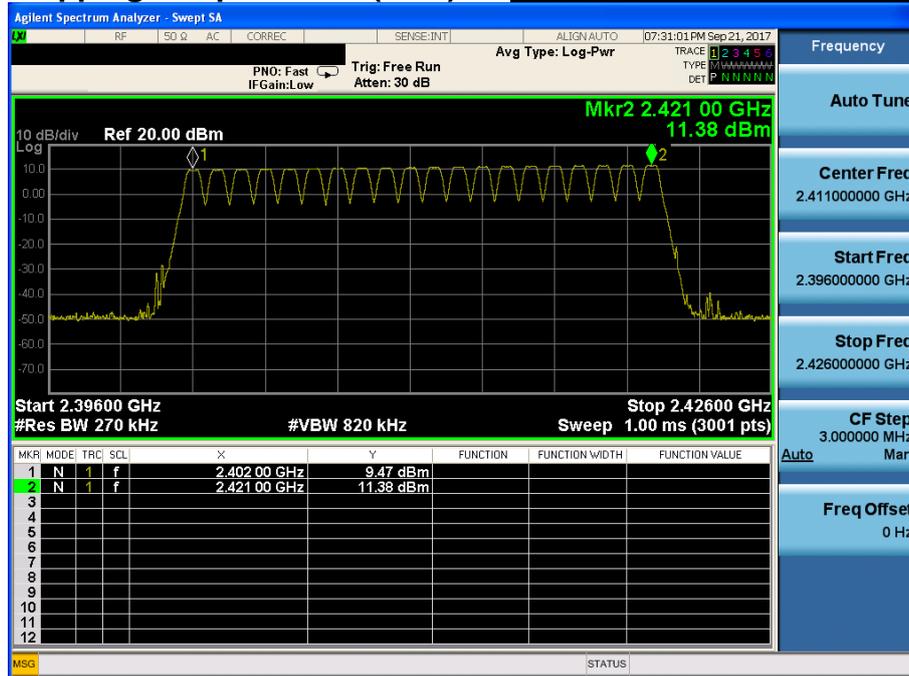
Number of Hopping Frequencies 1(FH)　　*Hopping mode : Enable & 8DPSK*

Number of Hopping Frequencies 2(FH)　　*Hopping mode : Enable & 8DPSK*

Number of Hopping Frequencies 1(AFH)   *Hopping mode : Enable & GFSK*

Number of Hopping Frequencies 1(AFH)   *Hopping mode : Enable & π/4DQPSK*

Number of Hopping Frequencies 1(AFH)   *Hopping mode : Enable & 8DPSK*