FCC TEST REPORT

FOR

Hopwell Electronics

CD/MP3

Test Model: BOSTON 100

Additional Model NO.: See Page 6.

Prepared for	:	Hopwell Electronics
Address	:	RM 1507, Tower A, Viking Technology & Business Centre, 93 Ta Chuen Ping St, Kwai Chung, Hong Kong
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
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Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	June 22, 2017
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	June 22, 2017~July 12, 2017
Date of Report	:	July 12, 2017

FCC TEST REPORT

FCC CFR 47 PART 15 C(15.247)

Report Reference No. ..... :		**LCS170731061AE**
Date of Issue ..... :		July 12, 2017
Testing Laboratory Name ..... :		**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address ..... :		1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure..... :		Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name..... :		**Hopwell Electronics**
Address ..... :		RM 1507, Tower A, Viking Technology & Business Centre, 93 Ta Chuen Ping St, Kwai Chung, Hong Kong
Test Specification		
Standard..... :		FCC CFR 47 PART 15 C(15.247)
Test Report Form No. ..... :		LCSEMC-1.0
TRF Originator ..... :		Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF ..... :		Dated 2011-03

Test Item Description. ..... :		**CD/MP3**
Trade Mark..... :		XO VISION & DP AUDIO & BLAUPUNKT
Model/ Type reference..... :		BOSTON 100
Ratings ..... :		DC 12V
Result ..... :		**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Dick Su	Galvin Weng	Gavin Liang
Dick Su/ File administrators	Galvin Weng/ Technique principal	Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : LCS170731061AE	July 12, 2017 Date of issue

Type / Model.....	: BOSTON 100
EUT.....	: CD/MP3
Applicant.....	**: Hopwell Electronics**
Address.....	: RM 1507, Tower A, Viking Technology & Business Centre, 93 Ta Chuen Ping St, Kwai Chung, Hong Kong
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: Hopwell Electronics**
Address.....	: A2 Builing, Hengchangrong High-tech Park,Shiyan Street, Bao'an District , Shenzhen, Guangdong, China
Telephone.....	: /
Fax.....	: /
Factory.....	: **Hopwell Electronics**
Address.....	: A2 Builing, Hengchangrong High-tech Park,Shiyan Street, Bao'an District , Shenzhen, Guangdong, China
Telephone.....	: /
Fax.....	: /

Test Result	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
00	July 12, 2017	Initial Issue	Gavin Liang

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1 Description of Device (EUT)

EUT	CD/MP3
Model Number	BOSTON 100, XR304, DETROIT 100BT, XR301, DPH9234BT, DETROIT 100BT, HW-5023 (Dallas 5023), DPH8534, XD107, DR106 , COLUMBUS100BT, XD103, New Jersey NJ8820-HW-8820, WASHINGTON100
Model Declaration	PCB board, structure and internal of these model(s) are the same,So no additional models were tested.
Test Model	BOSTON 100
Hardware version	ZLH5025V1.2.
Software version	SUM_8387V1.00.
Power Supply	DC 12V by battery
Bluetooth Technology	
Operation frequency	2402MHz-2480MHz
Modulation Type	GFSK, π/4-DQPSK , 8-DPSK(DSS)
Bluetooth Version	V2.1
Channel Number	79 Channels
Channel Spacing	1 MHz
Antenna Type	PCB Antenna
Antenna Gain	2.0dBi (Max.)
Extreme temp. Tolerance	-10°C to +55°C

1.2 Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
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1.3 External I/O Cable

I/O Port Description	Quantity	Cable
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1.4 Description of Test Facility

CNAS Registration Number. is L4595.
FCC Registration Number. is 899208.
Industry Canada Registration Number. is 9642A-1.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001
The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.5 Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.6 Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	3.10dB	(1)
		30MHz~200MHz	2.96dB	(1)
		200MHz~1000MHz	3.10dB	(1)
		1GHz~26.5GHz	3.80dB	(1)
		26.5GHz~40GHz	3.90dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	1.63dB	(1)
Power disturbance	:	30MHz~300MHz	1.60dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.7 Description of Test Modes

Bluetooth operates in the unlicensed ISM Band at 2.4GHz. With basic data rate feature, the data rates can be up to 1 Mb/s by modulating the RF carrier using GFSK techniques. The EUT works in the X-axis, Y-axis, Z-axis. The following operating modes were applied for the related test items. All test modes were tested, only the result of the worst case was recorded in the report.

Mode of Operations	Frequency Range (MHz)	Data Rate (Mbps)
BT	2402	1/2/3
	2441	1/2/3
	2480	1/2/3
For Conducted Emission		
Test Mode	TX Mode	
For Radiated Emission		
Test Mode	TX Mode	

Worst-case mode and channel used for 150 kHz-30 MHz power line conducted emissions was the mode and channel with the highest output power that was determined to be TX (1Mbps).

Worst-case mode and channel used for 9kHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be TX(1Mbps-Low Channel).

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR PART 15C 15.207, 15.209, 15.247 and DA 00-705.

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT was operated in the normal operating mode for Hopping Numbers and Dwell Time test and a continuous transmits mode for other tests.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209, 15.247 under the FCC Rules Part 15 Subpart C.

2.3 General Test Procedures

2.3.1 Conducted Emissions

The EUT is directly placed on the ground. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turntable, which is directly placed on the ground. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013

2.4. Test Sample

The application provides 2 samples to meet requirement;

Sample Number	Description
Sample 1	Engineer sample – continuous transmit
Sample 2	Normal sample – Intermittent transmit

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The system was configured for testing in a continuous transmits condition.

3.2 EUT Exercise Software

The system was configured for testing in a continuous transmits condition and change test channels by software (MP_Kit_Smart Tool) provided by application.

3.3 Special Accessories

Manufacturer	Description	Model	Serial Number	Certificate
Lenovo	PC	Ideapad	A131101550	DOC
Lenovo	Power adapter	CPA-A090	36200414	DOC

3.4 Block Diagram/Schematics

Please refer to the related document.

3.5 Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6 Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

Applied Standard: FCC Part 15 Subpart C			
FCC Rules	**Description of Test**	**Test Sample**	**Result**
§15.247(b)(1)	Maximum Conducted Output Power	Sample 1	Compliant
§15.247(c)	Frequency Separation And 20 dB Bandwidth	Sample 1	Compliant
§15.247(a)(1)(ii)	Number Of Hopping Frequency	Sample 2	Compliant
§15.247(a)(1)(iii)	Time Of Occupancy (Dwell Time)	Sample 2	Compliant
§15.209, §15.247(d)	Radiated and Conducted Spurious Emissions	Sample 1	Compliant
§15.205	Emissions at Restricted Band	Sample 1	Compliant
§15.207(a)	Conducted Emissions	Sample 1	Compliant
§15.203	Antenna Requirements	Sample 1	Compliant
§15.247(i)§2.1093	RF Exposure	N/A	Compliant

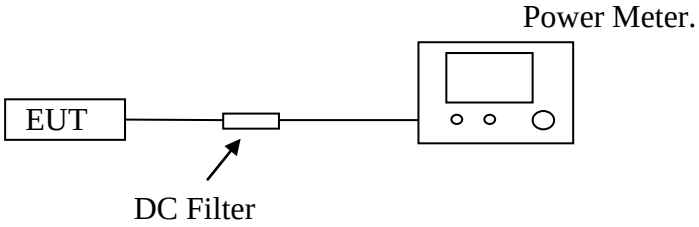
5. SUMMARY OF TEST EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Power Sensor	R&S	NRV-Z51	100458	2017-06-18	2018-06-17
2	Power Sensor	R&S	NRV-Z32	10057	2017-06-18	2018-06-17
3	Power Meter	R&S	NRVS	100444	2017-06-18	2018-06-17
4	DC Filter	MPE	23872C	N/A	2017-06-18	2018-06-17
5	RF Cable	Harbour Industries	1452	N/A	2017-06-18	2018-06-17
6	SMA Connector	Harbour Industries	9625	N/A	2017-06-18	2018-06-17
7	Spectrum Analyzer	Agilent	N9020A	MY50510140	2016-10-27	2017-10-26
8	Signal analyzer	Agilent	E4448A(External mixers to 40GHz)	US44300469	2017-06-16	2018-06-15
9	RF Cable	Hubersuhne	Sucoflex104	FP2RX2	2017-06-18	2018-06-17
10	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2017-06-18	2018-06-17
11	Amplifier	SCHAFFNER	COA9231A	18667	2017-06-18	2018-06-17
12	Amplifier	Agilent	8449B	3008A02120	2017-06-16	2018-06-15
13	Amplifier	MITEQ	AMF-6F-260400	9121372	2017-06-16	2018-06-15
14	Loop Antenna	R&S	HFH2-Z2	860004/001	2017-06-18	2018-06-17
15	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2017-06-10	2018-06-09
16	Horn Antenna	EMCO	3115	6741	2017-06-10	2018-06-09
17	Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	2017-06-10	2018-06-09
18	RF Cable-R03m	Jye Bao	RG142	CB021	2017-06-18	2018-06-17
19	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2017-06-18	2018-06-17
20	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	101142	2017-06-18	2018-06-17
21	Artificial Mains	ROHDE & SCHWARZ	ENV216	101288	2017-06-18	2018-06-17
22	EMI Test Software	AUDIX	E3	N/A	2017-06-18	2018-06-17

6. MEASUREMENT RESULTS

6.1 Peak Power

6.1.1 Block Diagram of Test Setup



6.1.2 Limit

According to §15.247(b)(1), For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

6.1.3 Test Procedure

The transmitter output is connected to the Power Meter.

6.1.4 Test Results

Test Mode	Channel	Frequency (MHz)	Measured Maximum Peak Power (dBm)	Limits (dBm)	Verdict
GFSK	0	2402	3.43	30	PASS
	39	2441	3.30		
	78	2480	3.15		
π/4DQPSK	0	2402	2.92	21	PASS
	39	2441	2.85		
	78	2480	2.60		
8DPSK	0	2402	1.98	21	PASS
	39	2441	1.92		
	78	2480	1.87		

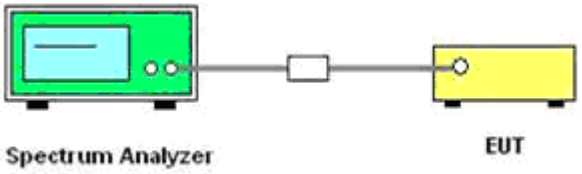
Remark:
1. *Test results including cable loss;*

6.2 Frequency Separation and 20 dB Bandwidth

6.2.1 Limit

According to §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.

6.2.2 Block Diagram of Test Setup



6.2.3 Test Procedure

Frequency separation test procedure：

1). Place the EUT on the table and set it in transmitting mode.

2). Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.

3). Set center frequency of Spectrum Analyzer = middle of hopping channel.

4). Set the Spectrum Analyzer as RBW = 100 kHz, VBW = 100 kHz, Span = wide enough to capture the peaks of two adjacent channels, Sweep = auto.

5). Max hold, mark 2 peaks of hopping channel and record the 2 peaks frequency.

20dB bandwidth test procedure：

1). Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel.

2). RBW ≥1% of the 20 dB bandwidth, VBW ≥RBW.

3). Detector function = peak.

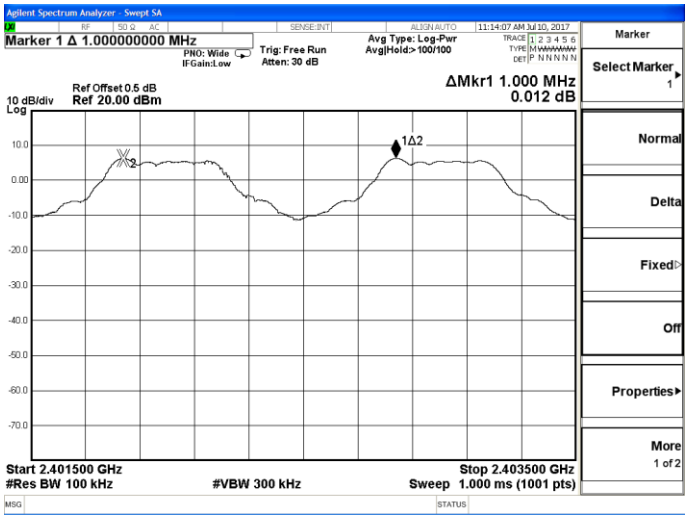
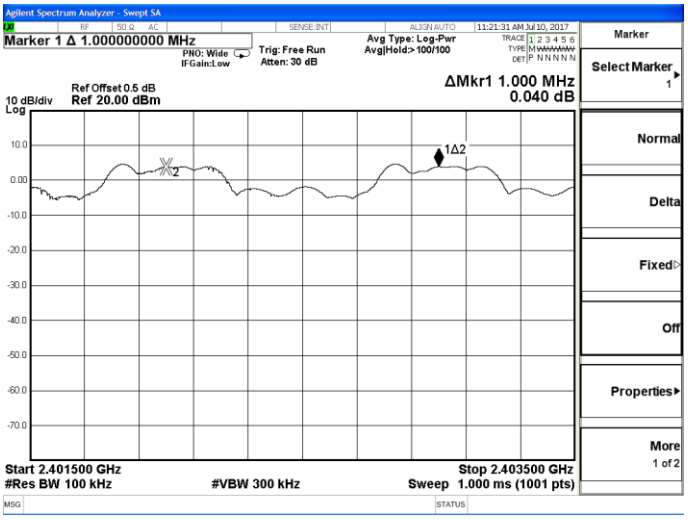
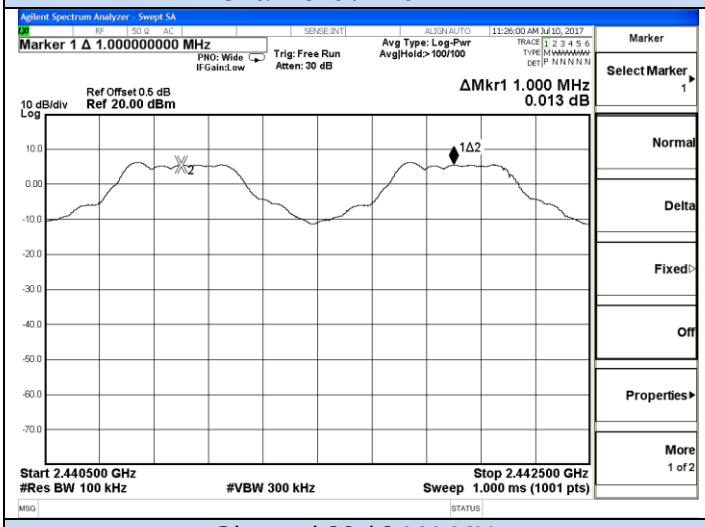
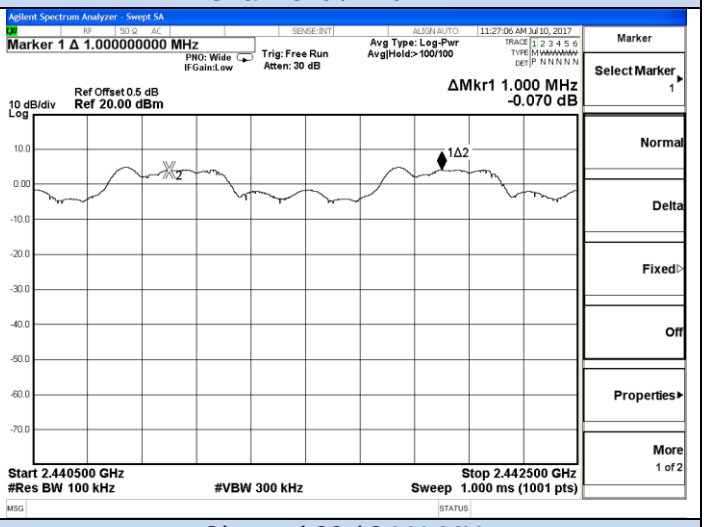
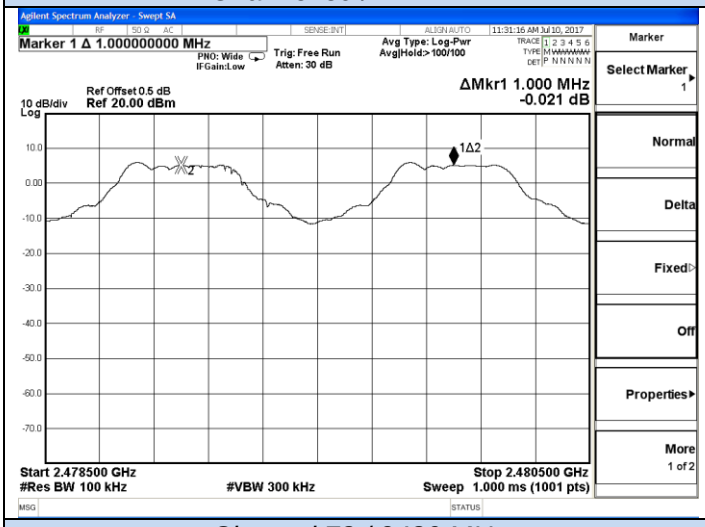
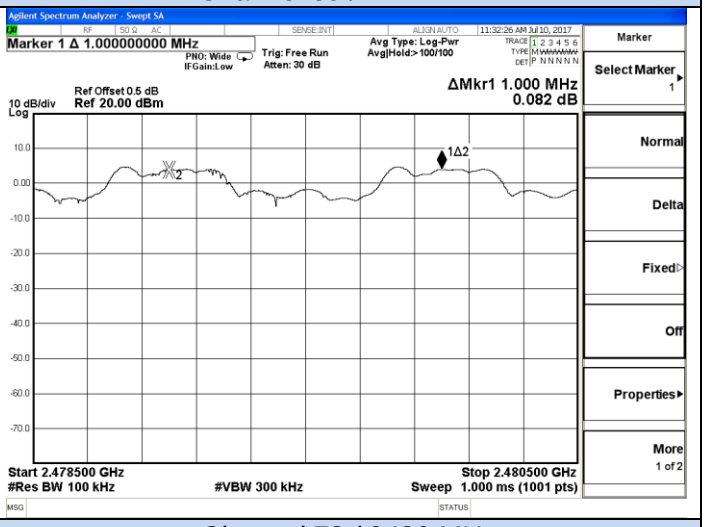
4). Trace = max hold.

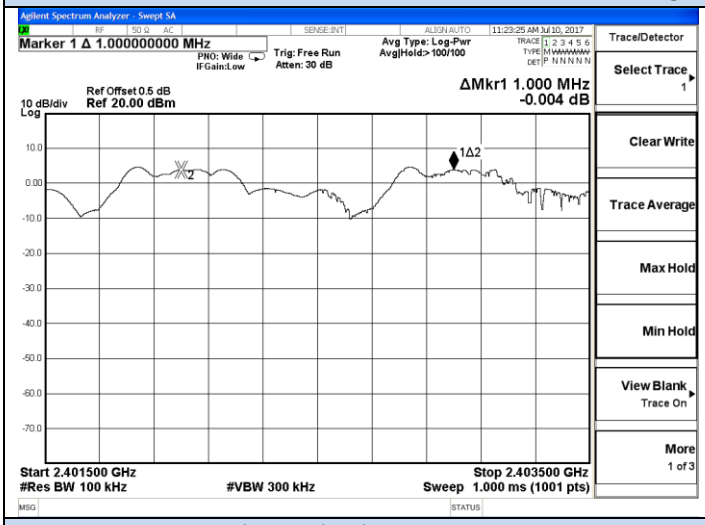
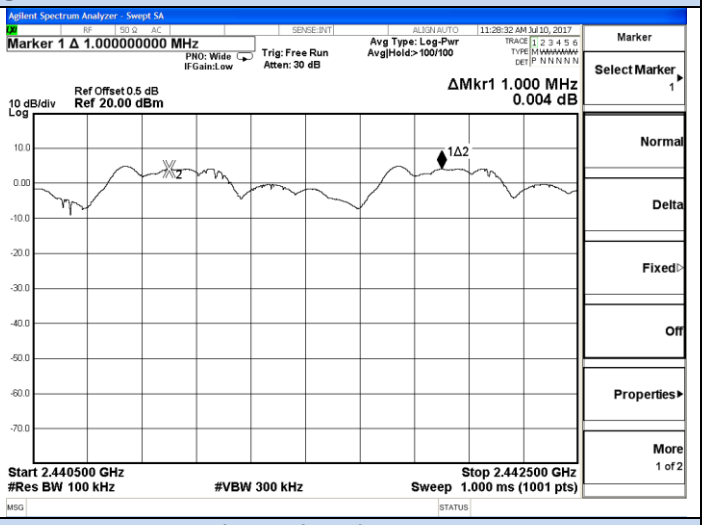
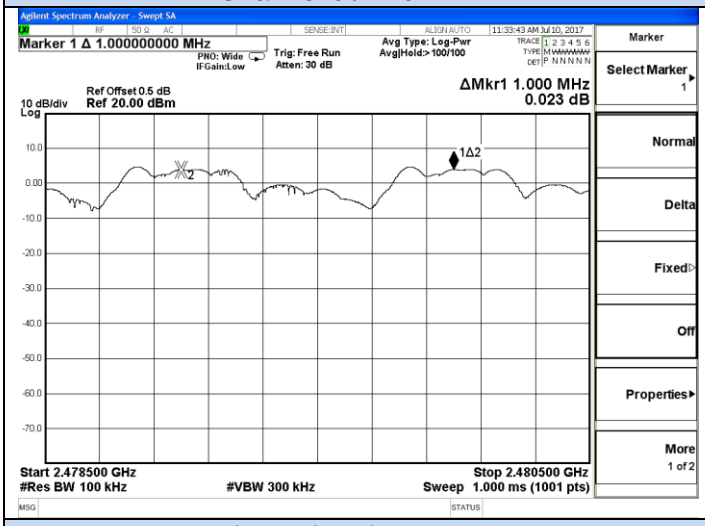
6.2.4 Test Results

The Measurement Result With 1Mbps For GFSK Modulation				
Channel	20dB Bandwidth (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low	0.7356	1.000	0.7356	Pass
Middle	0.7251		0.7251	Pass
High	0.7378		0.7378	Pass
The Measurement Result With 2Mbps For π/4-DQPSK Modulation				
Channel	20dB Bandwidth (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low	1.110	1.000	0.740	Pass
Middle	1.111		0.741	Pass
High	1.115		0.743	Pass
The Measurement Result With 3Mbps For 8-DPSK Modulation				
Channel	20dB Bandwidth (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low	1.135	1.000	0.757	Pass
Middle	1.133		0.755	Pass
High	1.132		0.755	Pass

Remark:

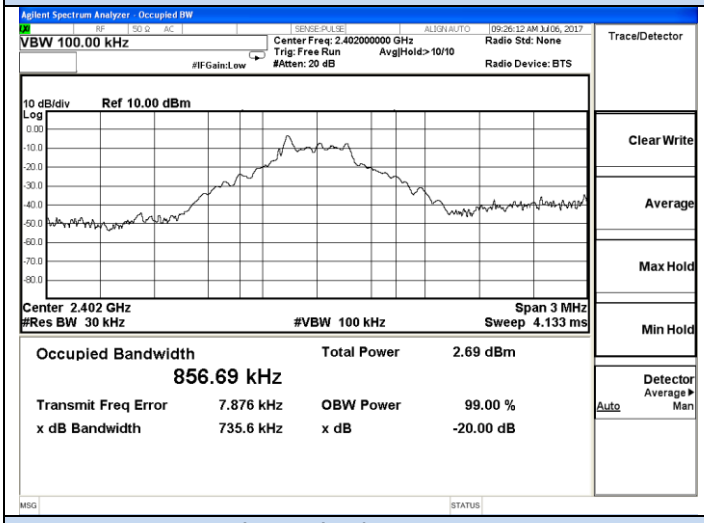
1. *Test results including cable loss;*
2. *please refer to following plots;*
3. *Measured at difference Packet Type for each mode and recorded worst case for each mode.*

Frequency Separation	
GFSK	π/4-DQPSK
	
Channel 0 / 2402 MHz	Channel 0 / 2402 MHz
	
Channel 39 / 2441 MHz	Channel 39 / 2441 MHz
	
Channel 78 / 2480 MHz	Channel 78 / 2480 MHz

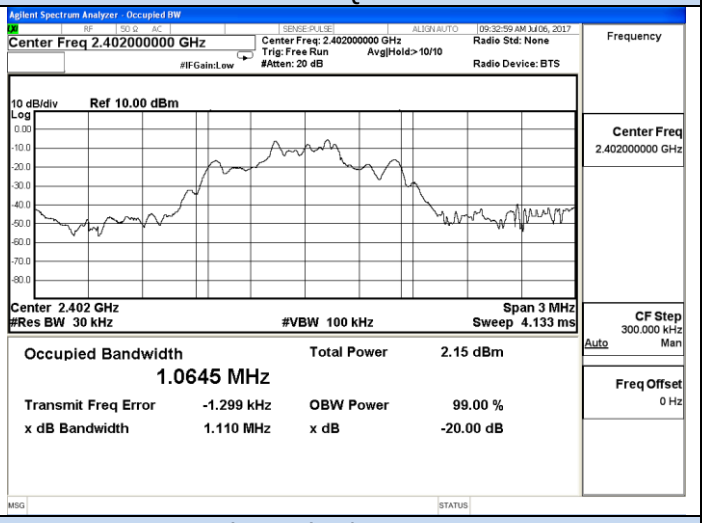
Frequency Separation	
8DPSK	
	
Channel 0 / 2402 MHz	Channel 39 / 2441 MHz
	
Channel 78 / 2480 MHz	

20dB Bandwidth

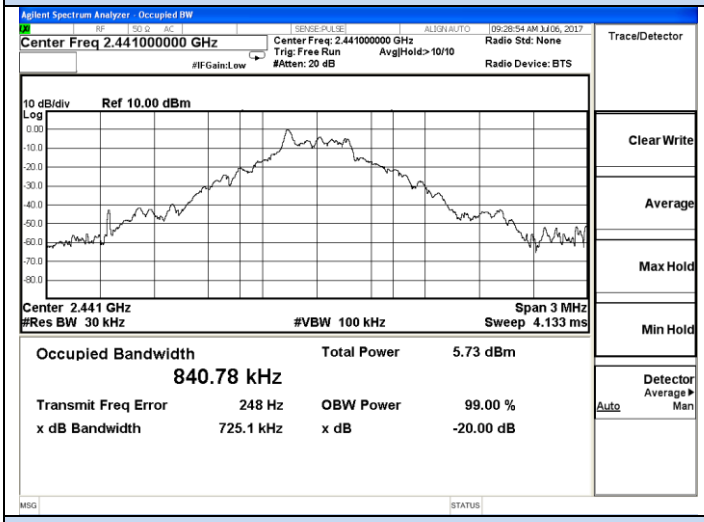
GFSK



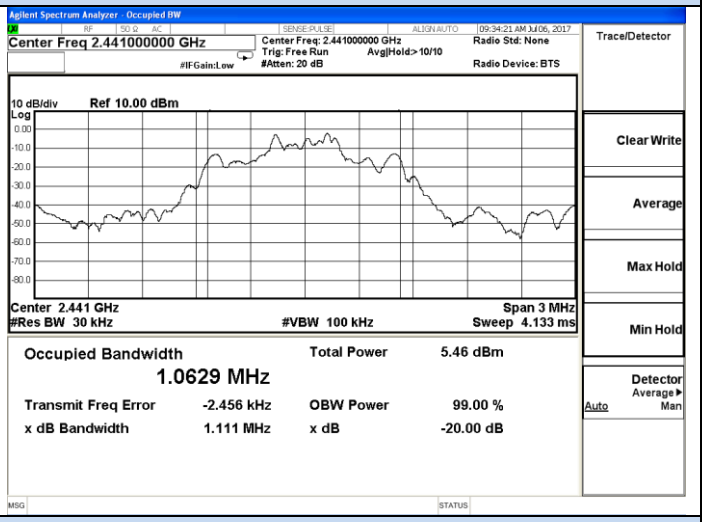
π/4-DQPSK



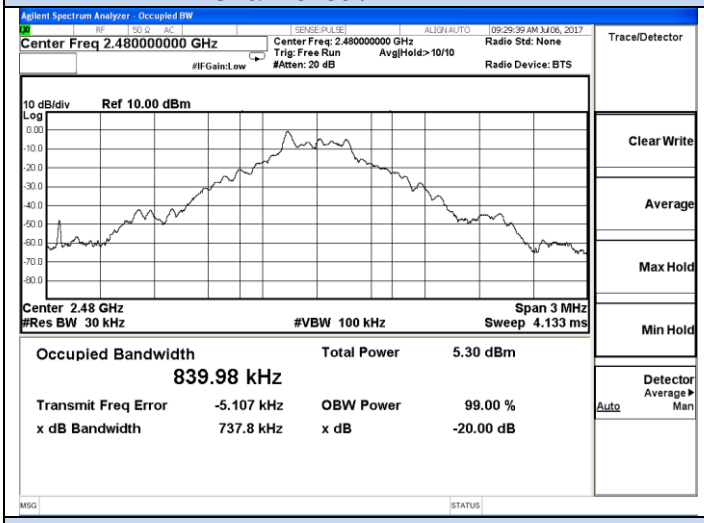
Channel 0 / 2402 MHz



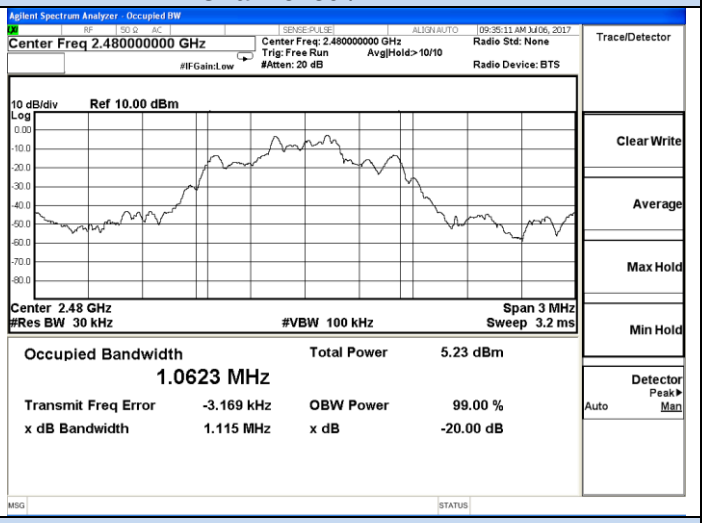
Channel 0 / 2402 MHz



Channel 39 / 2441 MHz

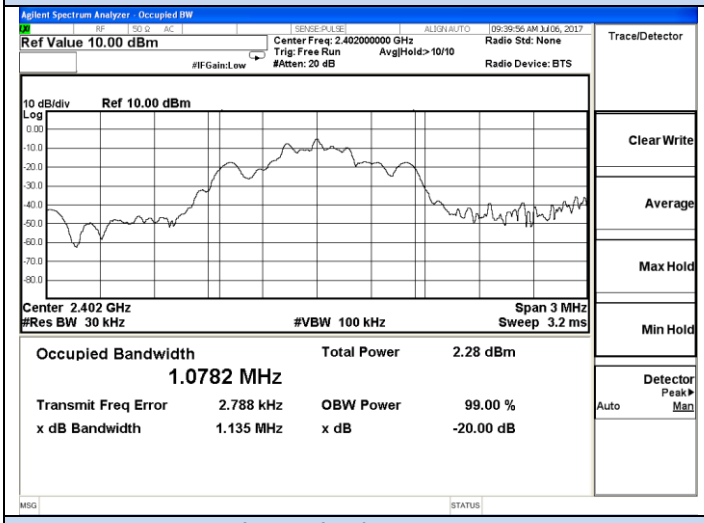
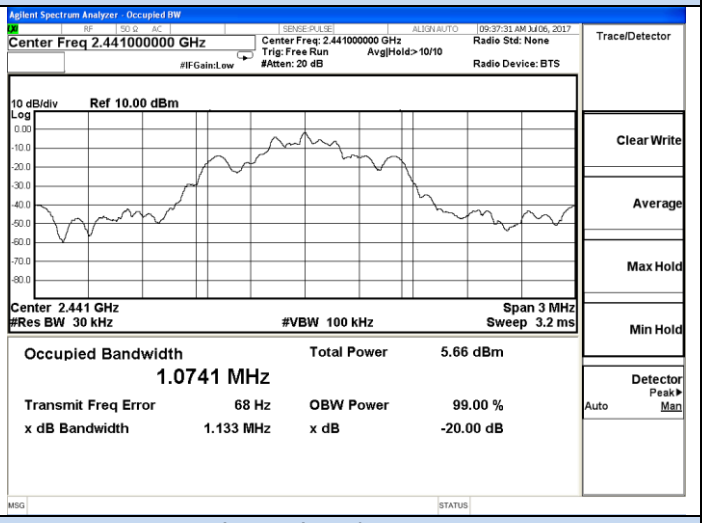
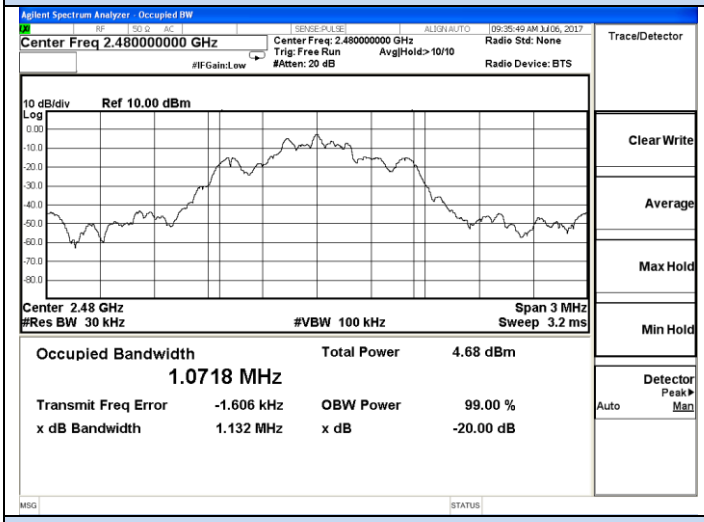


Channel 39 / 2441 MHz



Channel 78 / 2480 MHz

Channel 78 / 2480 MHz

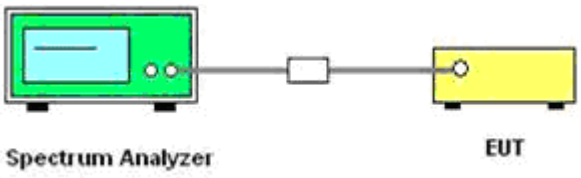
Test Plot of Test Result	
8DPSK	
	
Channel 0 / 2402 MHz	*Channel 39 / 2441 MHz*
	
Channel 78 / 2480 MHz	

6.3 Number of Hopping Frequency

6.3.1 Limit

According to §15.247(a)(1)(ii) or A8.1 (d), Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels.

6.3.2 Block Diagram of Test Setup



6.3.3 Test Procedure

1). Place the EUT on the table and set it in transmitting mode.

2). Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.

3). Set Spectrum Analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.

4). Set the Spectrum Analyzer as RBW, VBW=1MHz.

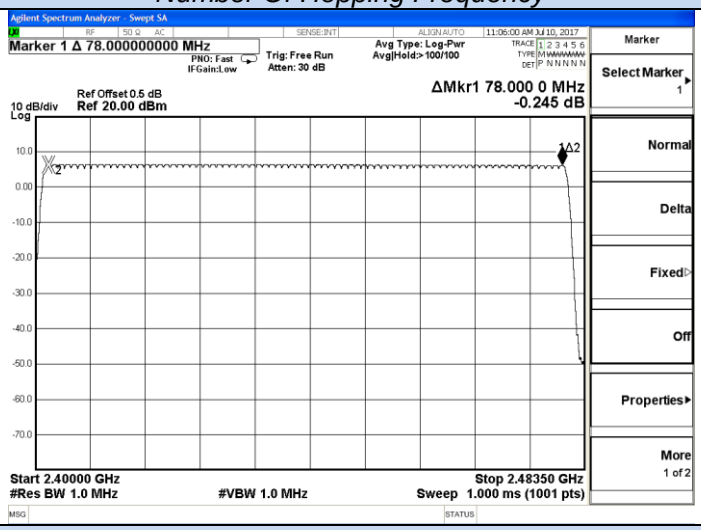
5). Max hold, view and count how many channel in the band.

6.3.4 Test Results

The Measurement Result With The Worst Case of 1Mbps For GFSK Modulation			
Total No. of Hopping Channel	Measurement Result (No. of Ch)	Limit (MHz)	Result
	79	≥15	Pass

Note: The test data refer to the following page.

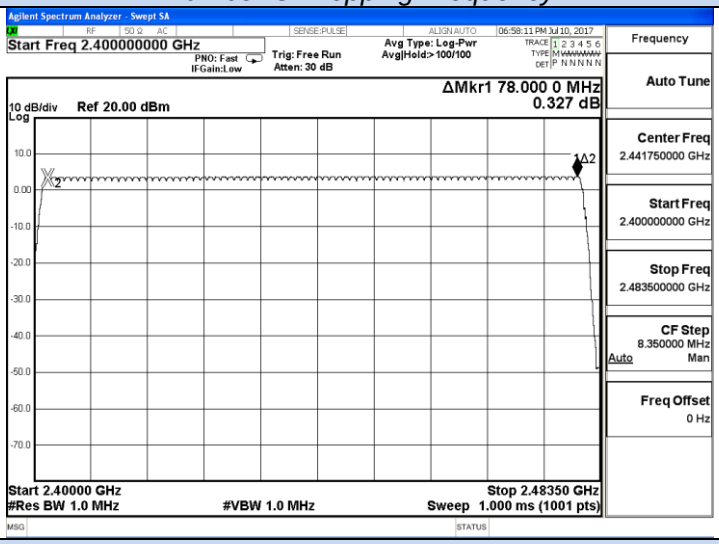
Number Of Hopping Frequency



GFSK

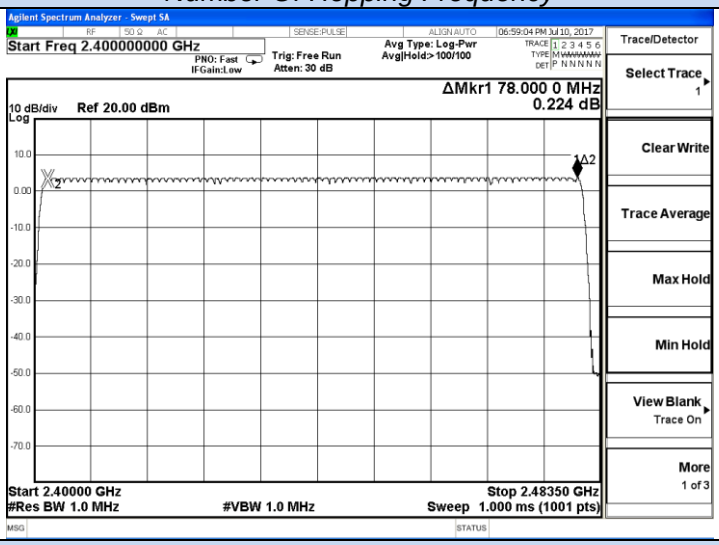
The Measurement Result With The Worst Case of 2Mbps For π/4-DQPSK Modulation			
Total No. of Hopping Channel	Measurement Result (No. of Ch)	Limit (MHz)	Result
	79	≥15	Pass

Note: The test data refer to the following page.

Number Of Hopping Frequency

π/4-DQPSK

The Measurement Result With The Worst Case of 3Mbps For 8DPSK Modulation			
Total No. of Hopping Channel	Measurement Result (No. of Ch)	Limit (MHz)	Result
	79	≥15	Pass

Note: The test data refer to the following page.

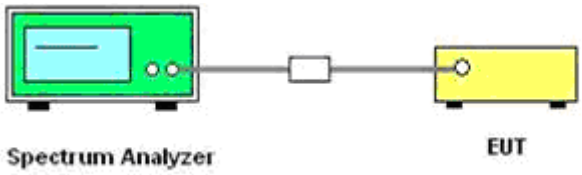
Number Of Hopping Frequency

8DPSK

6.4 Time of Occupancy (Dwell Time)

6.4.1 Limit

According to §15.247(a)(1)(iii) or A8.1 (d), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

6.4.2 Block Diagram of Test Setup



6.4.3 Test Procedure

1). Place the EUT on the table and set it in transmitting mode.

2). Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.

3). Set center frequency of Spectrum Analyzer = operating frequency.

4). Set the Spectrum Analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.

5). Repeat above procedures until all frequency measured was complete.

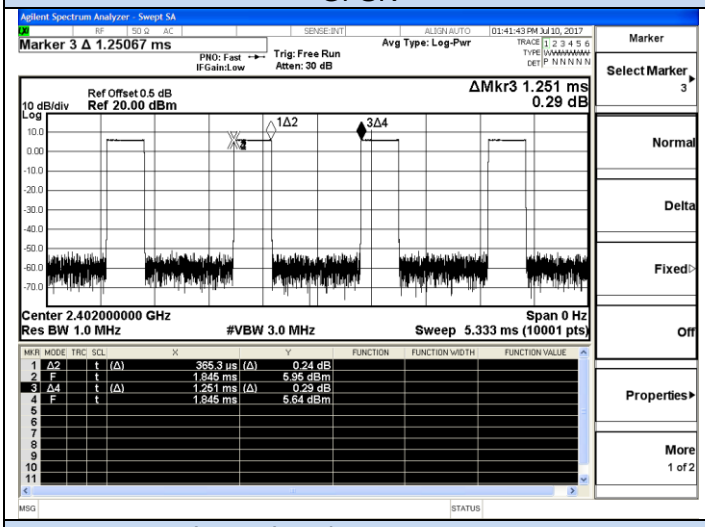
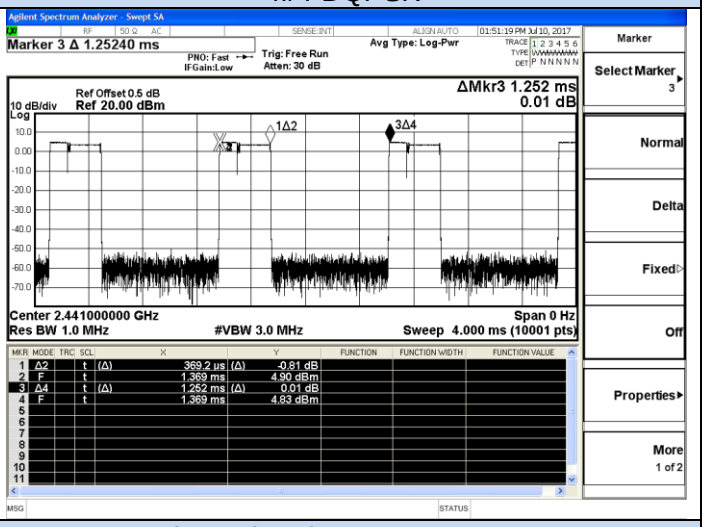
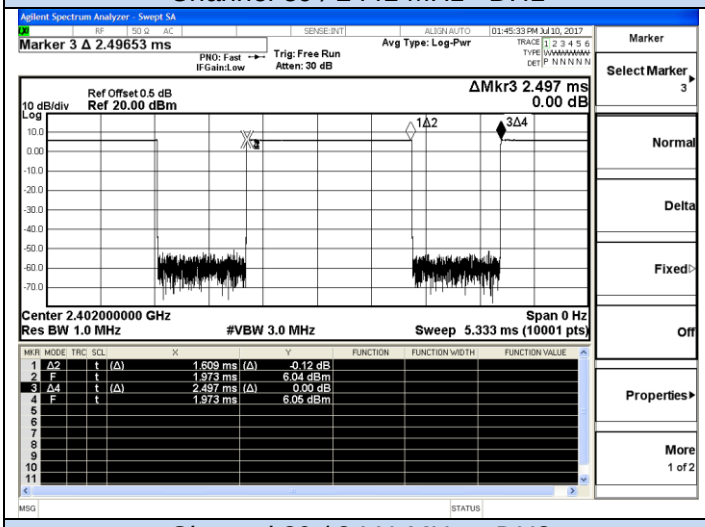
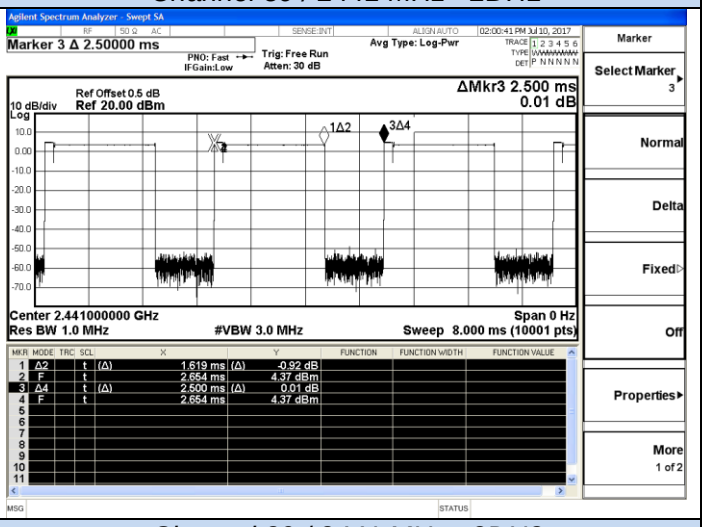
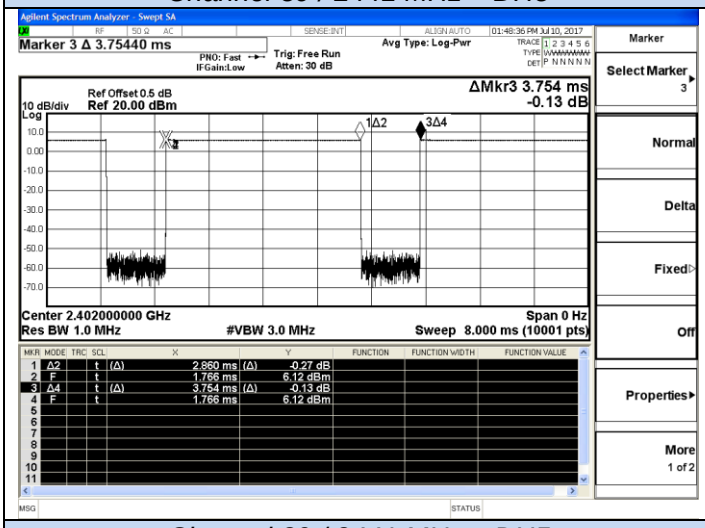
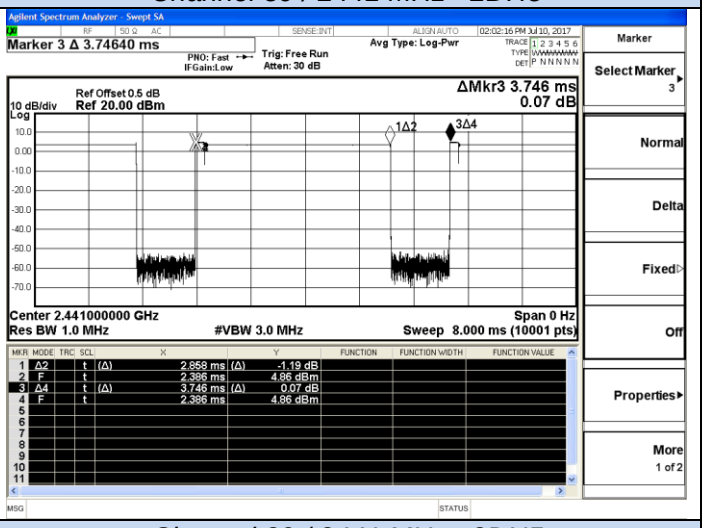
6.4.4 Test Results

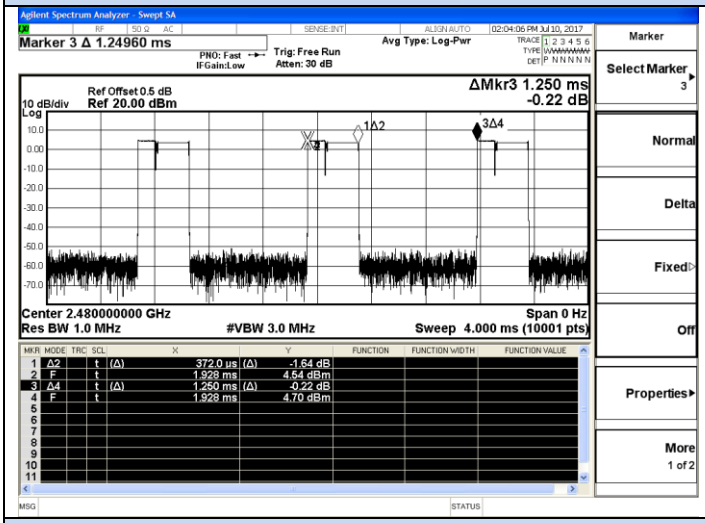
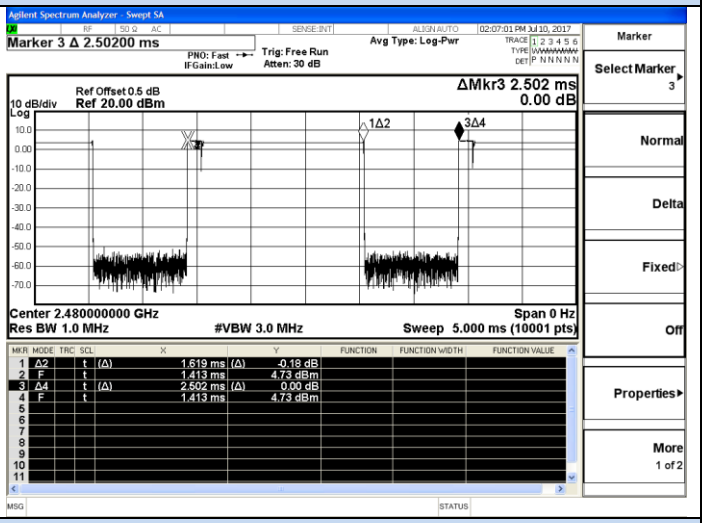
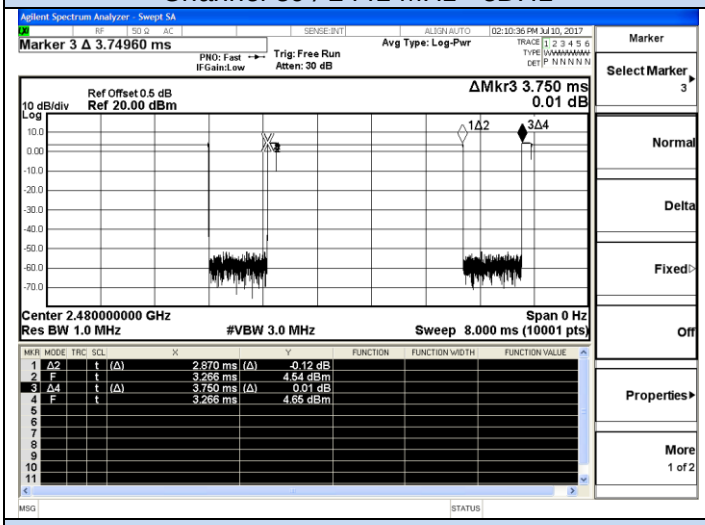
The Dwell Time=Burst Width*Total Hops. The detailed calculations are showed as follows:
The duration for dwell time calculation: 0.4[s]*hopping number=0.4[s]*79[ch]=31.6[s*ch];
The burst width [ms/hop/ch], which is directly measured, refers to the duration on one channel hop.
The hops per second for all channels: The selected EUT Conf uses a slot type of 5-Tx&1-Rx and a hopping rate of 1600 [ch*hop/s] for all channels. So the final hopping rate for all channels is 1600/6=266.67 [ch*hop/s]
The hops per second on one channel: 266.67 [ch*hops/s]/79 [ch]=3.38 [hop/s];
The total hops for all channels within the dwell time calculation duration: 3.38 [hop/s]*31.6[s*ch]=106.67 [hop*ch];
The dwell time for all channels hopping: 106.67 [hop*ch]*Burst Width [ms/hop/ch].

Mode	Frequency (MHz)	Burst Type	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Verdict
GFSK	2441	DH1	0.3653	0.117	0.4	PASS
		DH3	1.609	0.257		
		DH5	2.860	0.305		
π/4-DQPSK	2441	2DH1	0.3692	0.118	0.4	PASS
		2DH3	1.619	0.259		
		2DH5	2.858	0.305		
8DPSK	2441	3DH1	0.372	0.119	0.4	PASS
		3DH3	1.619	0.259		
		3DH5	2.870	0.306		

Remark:

1. *Test results including cable loss;*
2. *please refer to following plots;*
3. *Measured at difference Packet Type for each mode and recorded woest case for each mode.*
4. *Dwell Time Calculate formula:*
   DH1: Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second
   DH3: Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second
   DH5: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second
5. *Measured at low, middle and high channel, recorded worst at middle channel;*

Dwell time	
GFSK	π/4-DQPSK
	
Channel 39 / 2441 MHz - DH1	Channel 39 / 2441 MHz - 2DH1
	
Channel 39 / 2441 MHz – DH3	Channel 39 / 2441 MHz - 2DH3
	
Channel 39 / 2441 MHz – DH5	Channel 39 / 2441 MHz - 2DH5

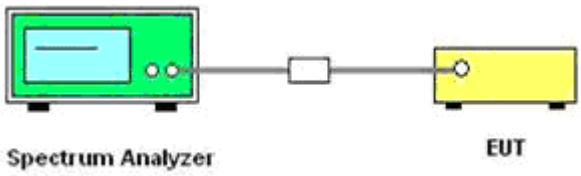
Dwell time	
8DPSK	
	
Channel 39 / 2441 MHz - 3DH1	Channel 39 / 2441 MHz - 3DH3
	
Channel 39 / 2441 MHz – 3DH5	

6.5 Conducted Spurious Emissions and Band Edges Test

6.5.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

6.5.2 Block Diagram of Test Setup



6.5.3 Test Procedure

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 KHz. The video bandwidth is set to 300 KHz.

Measurements are made over the 9 kHz to 26.5GHz range with the transmitter set to the lowest, middle, and highest channels

6.5.4 Test Results of Conducted Spurious Emissions

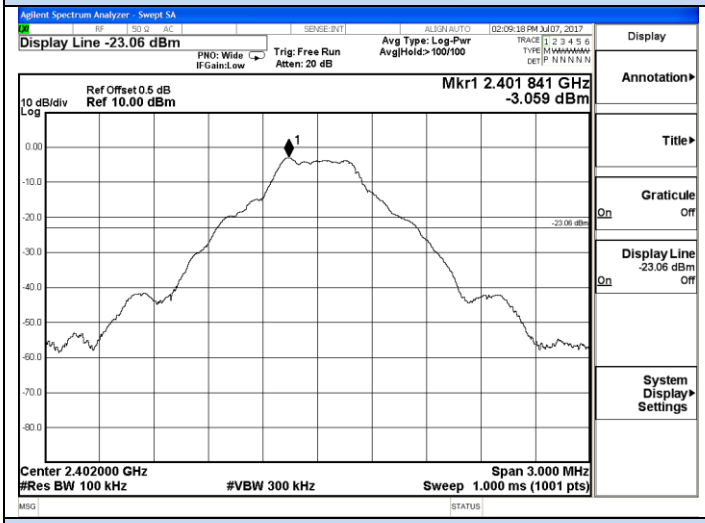
No non-compliance noted. Only record the worst test result in this report. The test data refer to the following page.

Test Mode	Channel	Frequency (MHz)	Spurious RF Conducted Emission (dBc)	Limits (dBc)	Verdict
GFSK	0	2402	<-20	-20	PASS
	39	2441	<-20		
	78	2480	<-20		
π/4-DQPSK	0	2402	<-20	-20	PASS
	39	2441	<-20		
	78	2480	<-20		
8DPSK	0	2402	<-20	-20	PASS
	39	2441	<-20		
	78	2480	<-20		

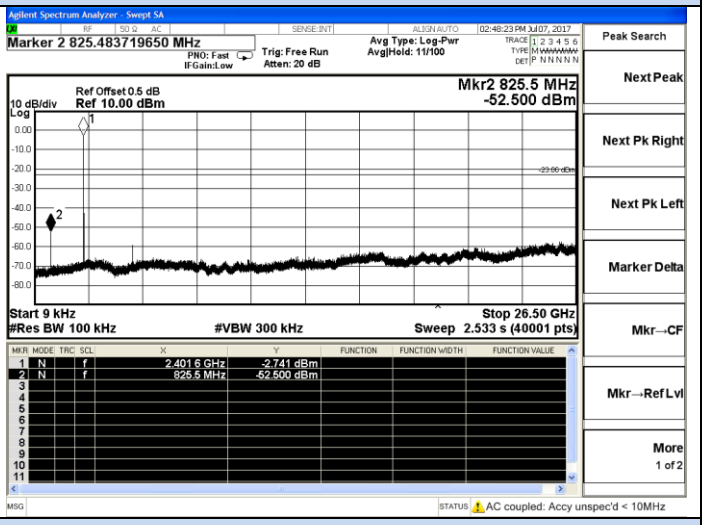
Remark:
1. *Test results including cable loss;*
2. *please refer to following plots;*
3. *Measured at difference Packet Type for each mode and recorded worst case for each mode.*

RF Conducted Spurious Emissions

GFSK – Channel 0 / 2402 MHz

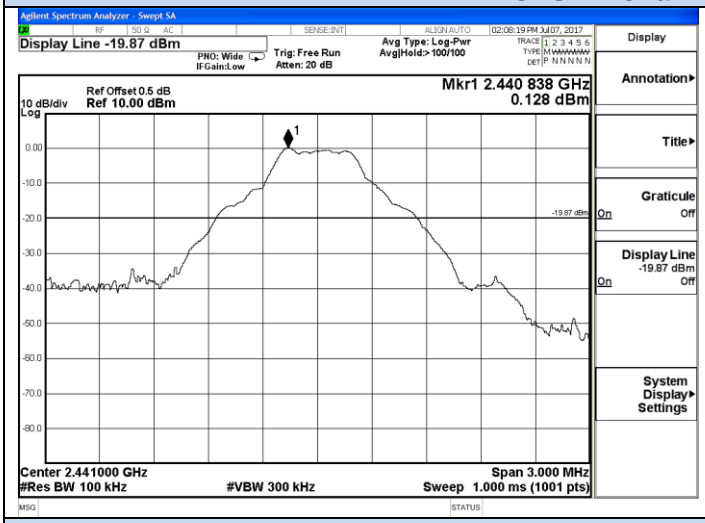


2399.5 – 2404.5 MHz

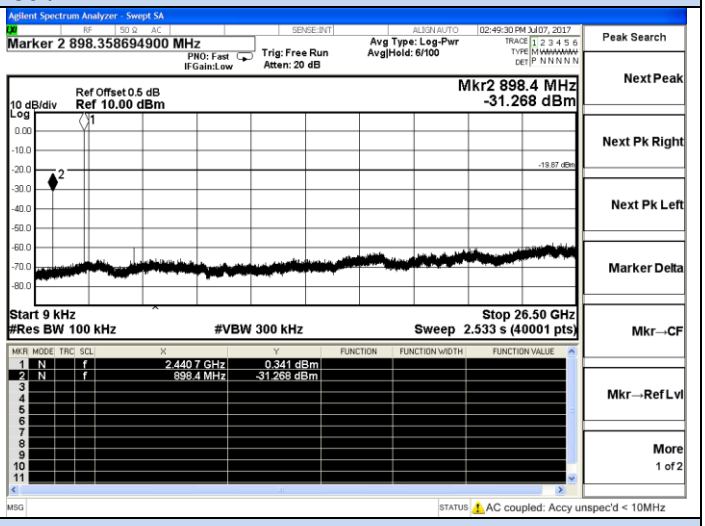


9 KHz – 26.5 GHz

GFSK – Channel 39 / 2441 MHz

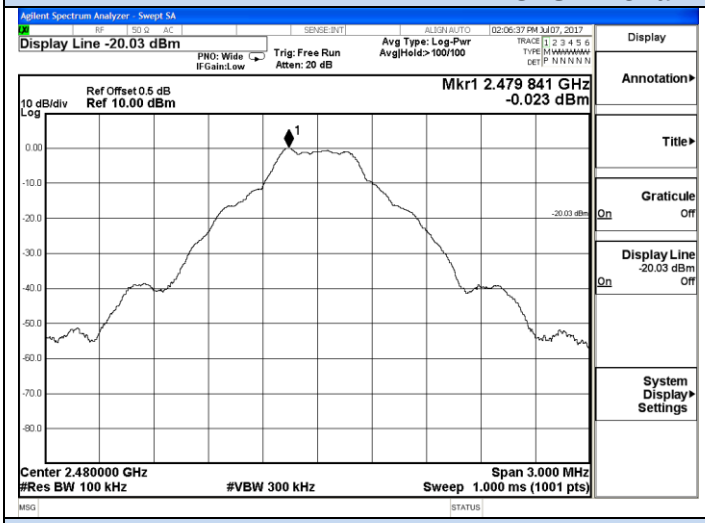


2438.5 – 2443.5 MHz

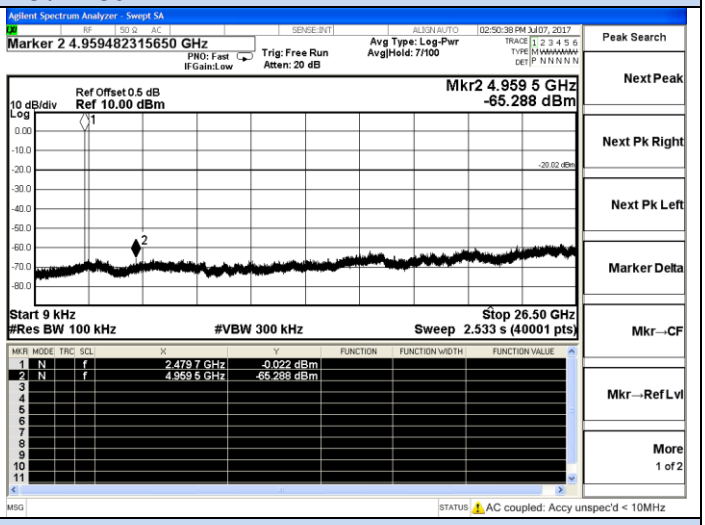


9 KHz – 26.5 GHz

GFSK – Channel 78 / 2480 MHz



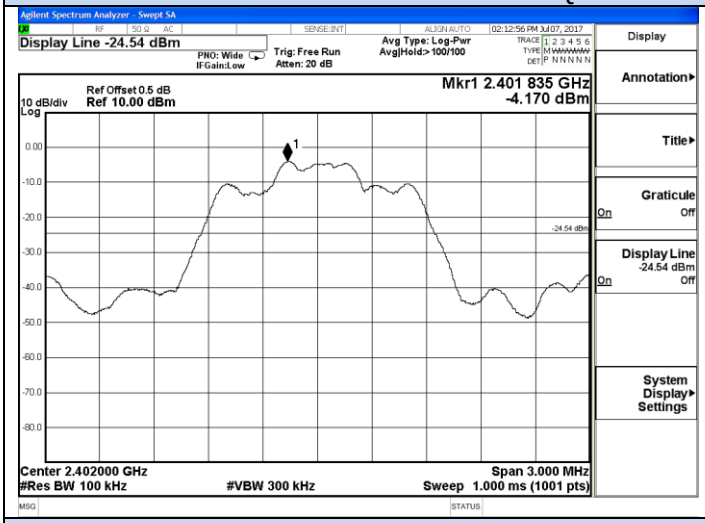
2477.5 – 2482.5 MHz



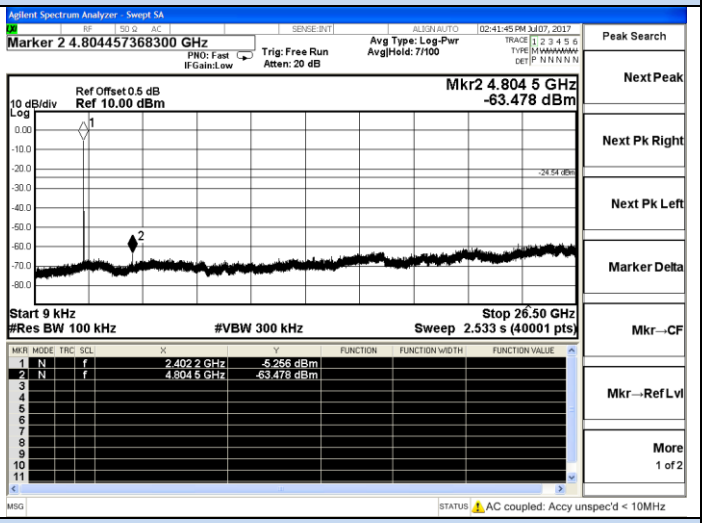
9 KHz – 26.5 GHz

RF Conducted Spurious Emissions

π/4-DQPSK - Channel 0 / 2402 MHz

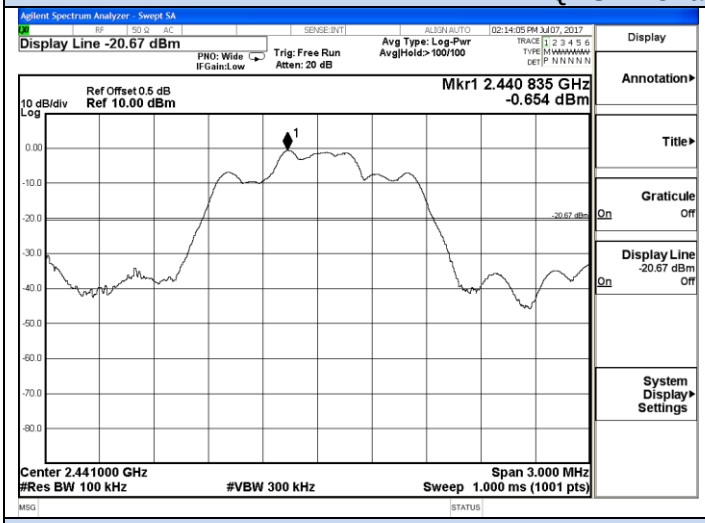


2399.5 – 2404.5 MHz

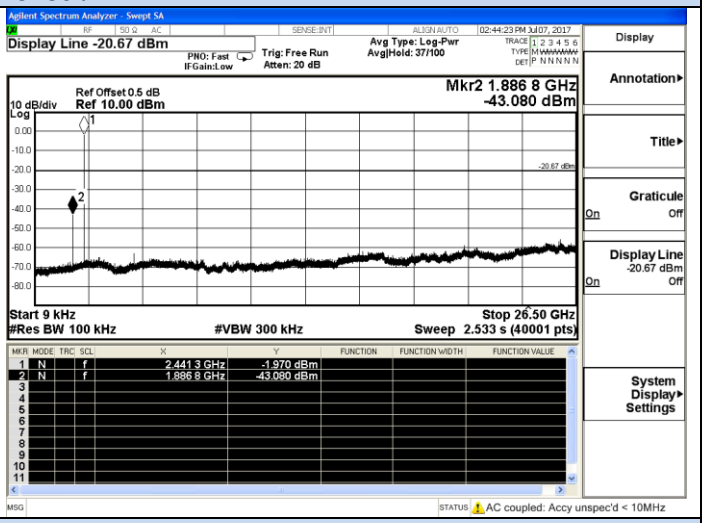


9 KHz – 26.5 GHz

π/4-DQPSK - Channel 39 / 2441 MHz

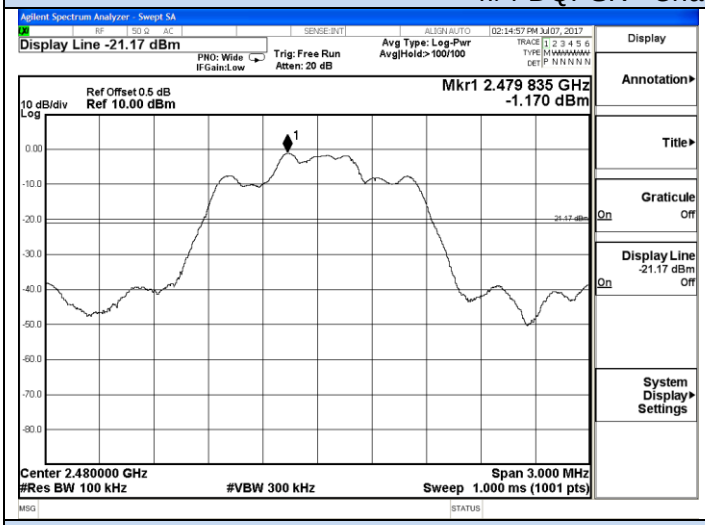


2438.5 – 2443.5 MHz

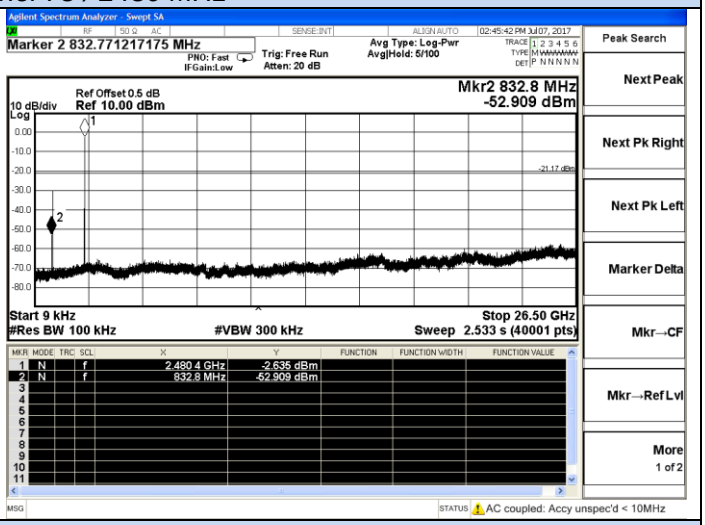


9 KHz – 26.5 GHz

π/4-DQPSK - Channel 78 / 2480 MHz



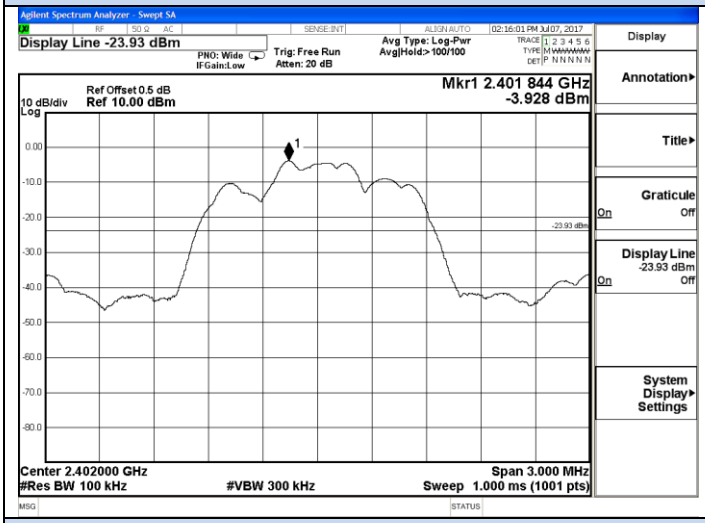
2477.5 – 2482.5 MHz



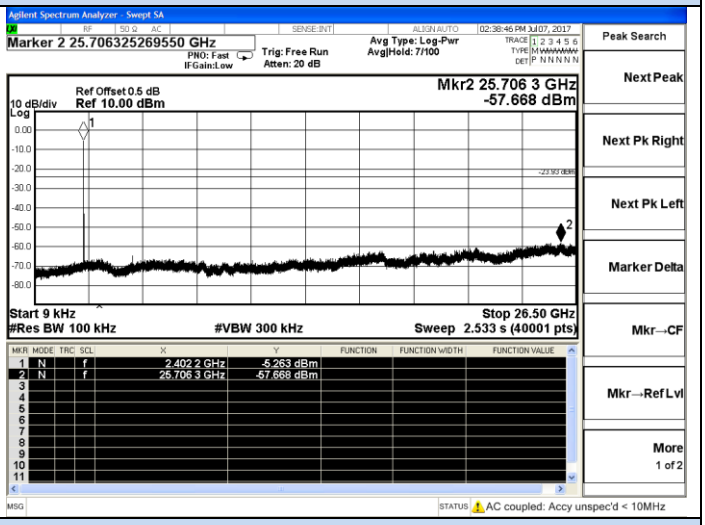
9 KHz – 26.5 GHz

RF Conducted Spurious Emissions

8DPSK - Channel 0 / 2402 MHz

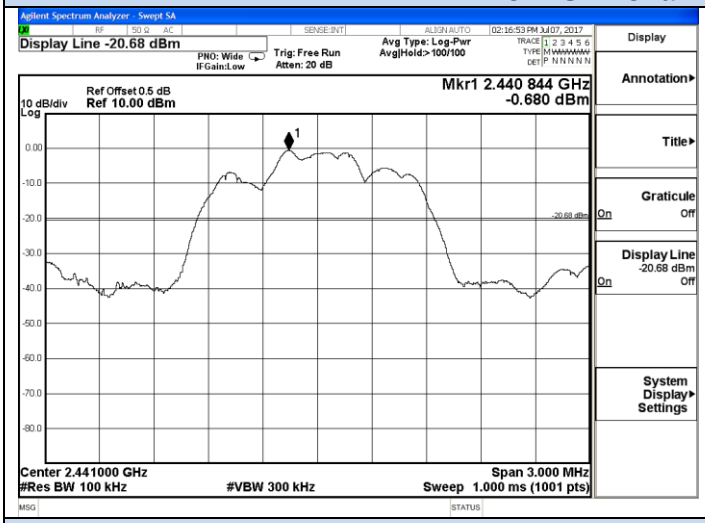


2399.5 – 2404.5 MHz

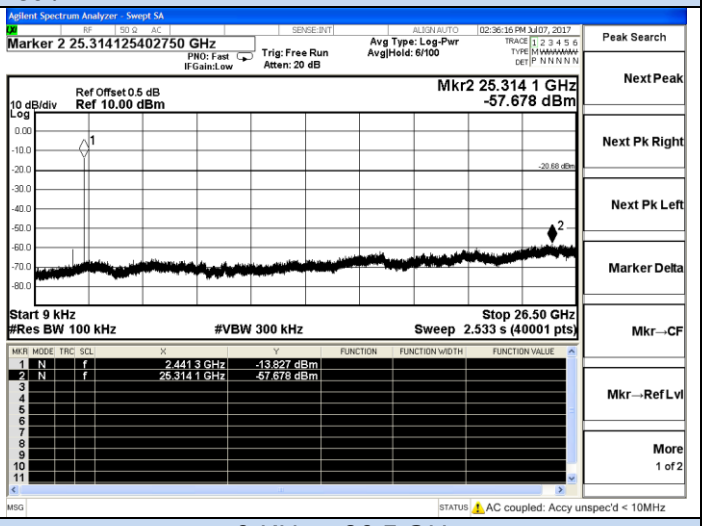


9 KHz – 26.5 GHz

8DPSK - Channel 39 / 2441 MHz

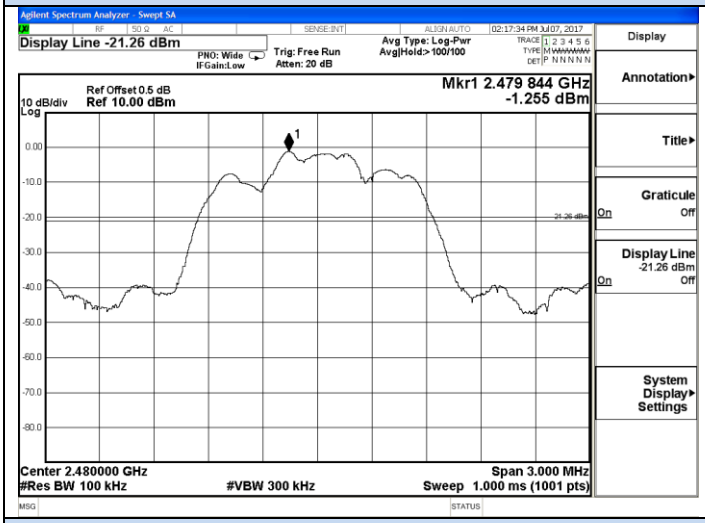


2438.5 – 2443.5 MHz

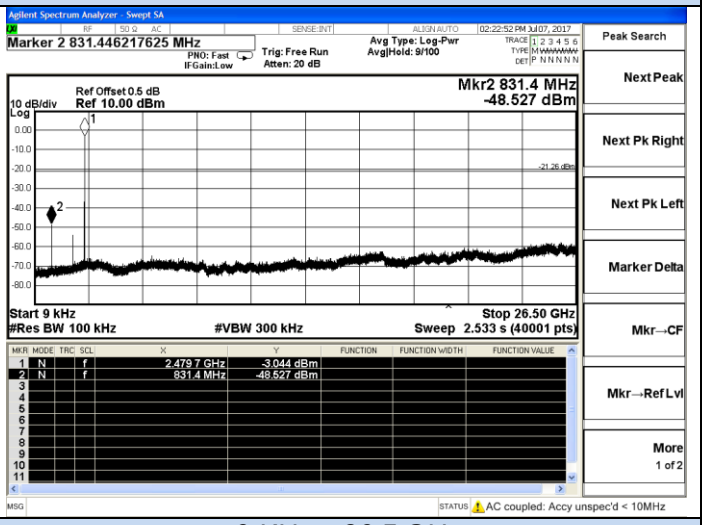


9 KHz – 26.5 GHz

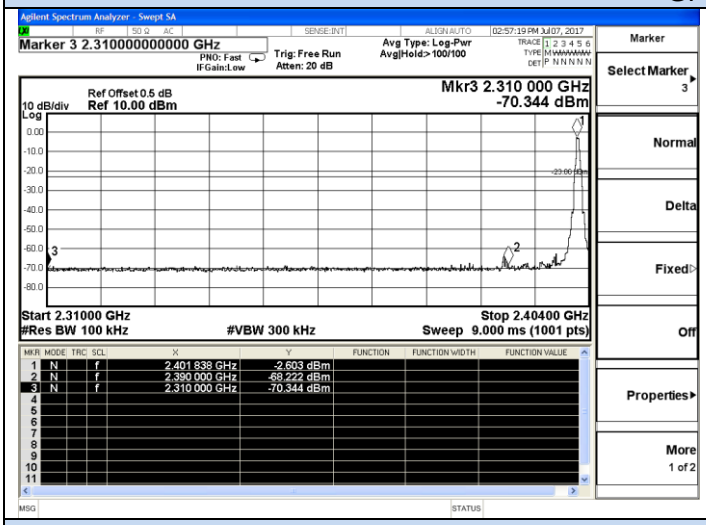
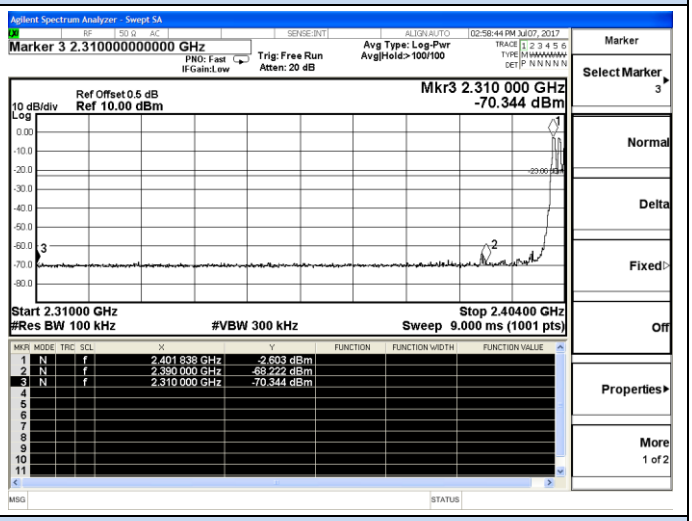
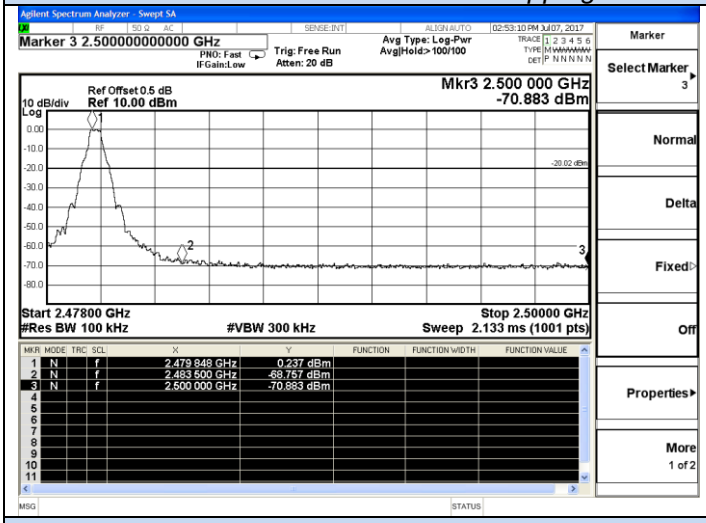
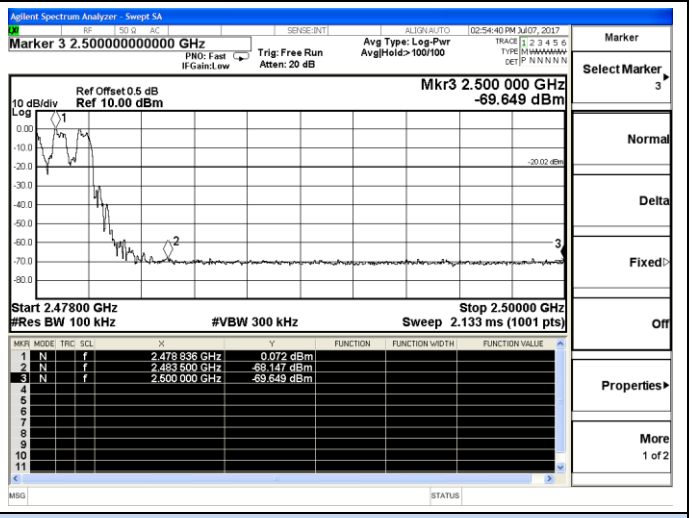
8DPSK - Channel 78 / 2480 MHz

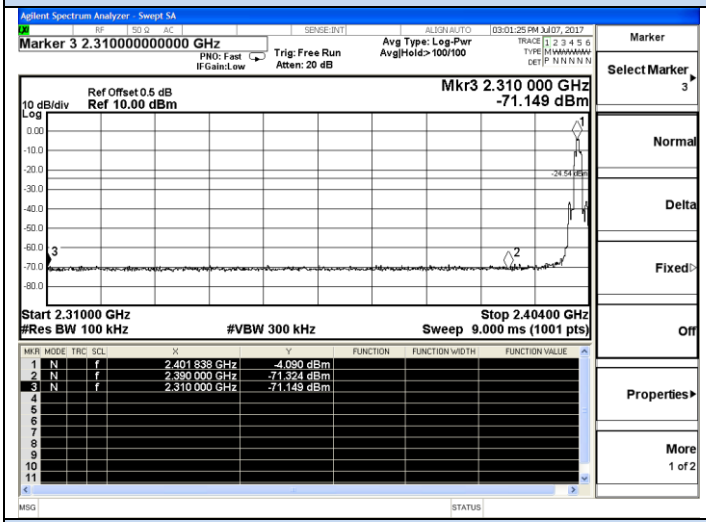
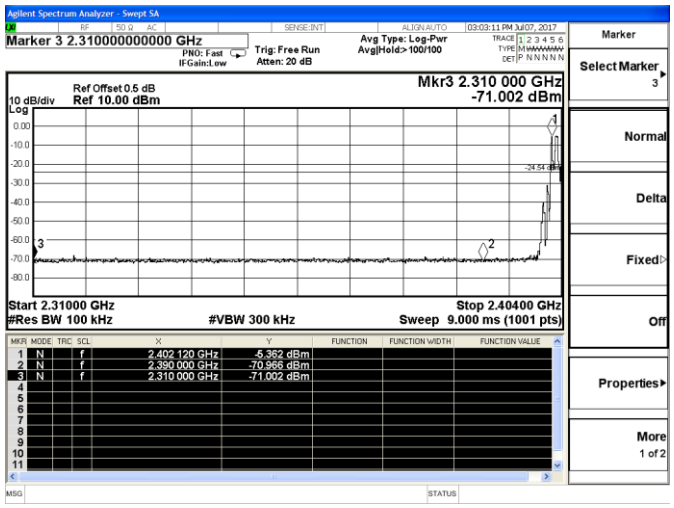


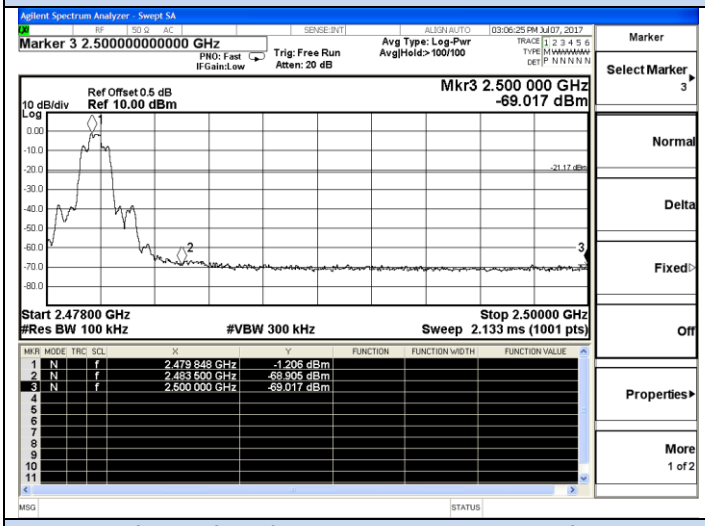
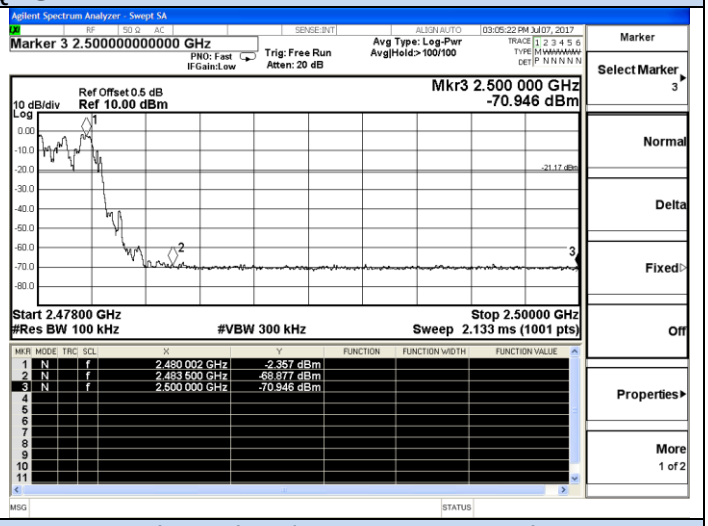
2477.5 – 2482.5 MHz

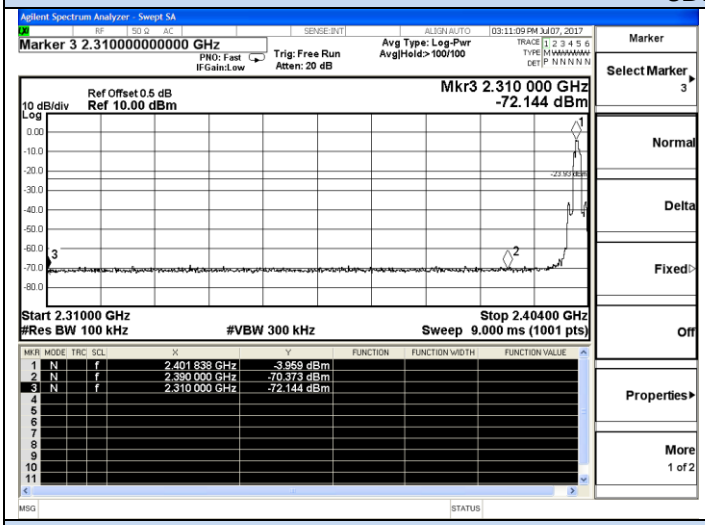
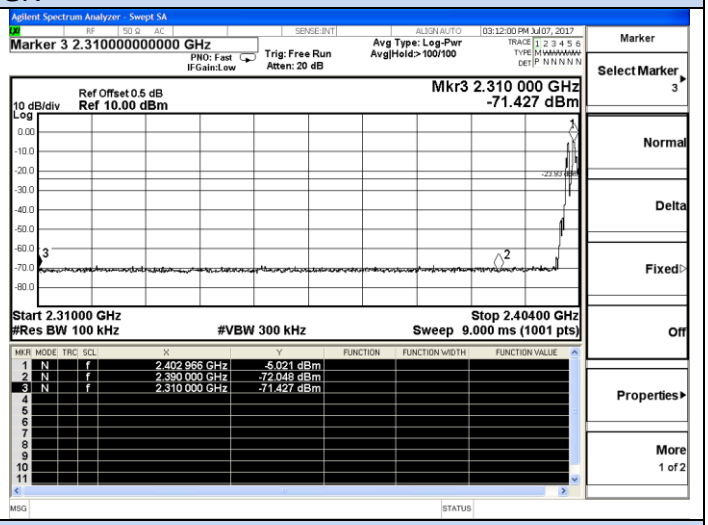
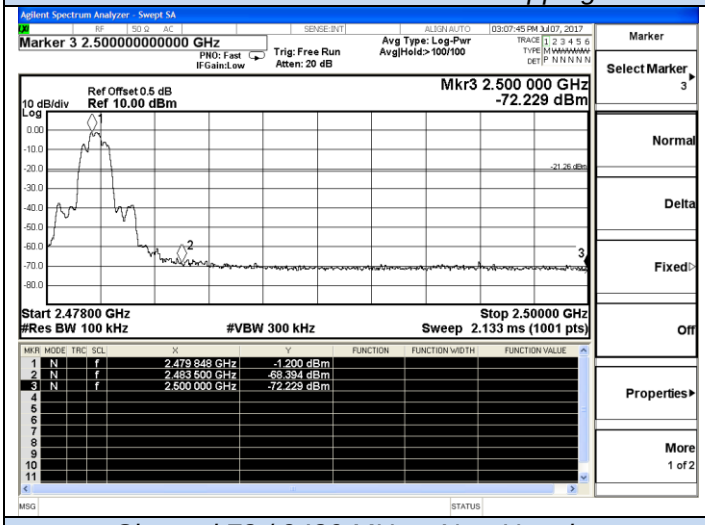
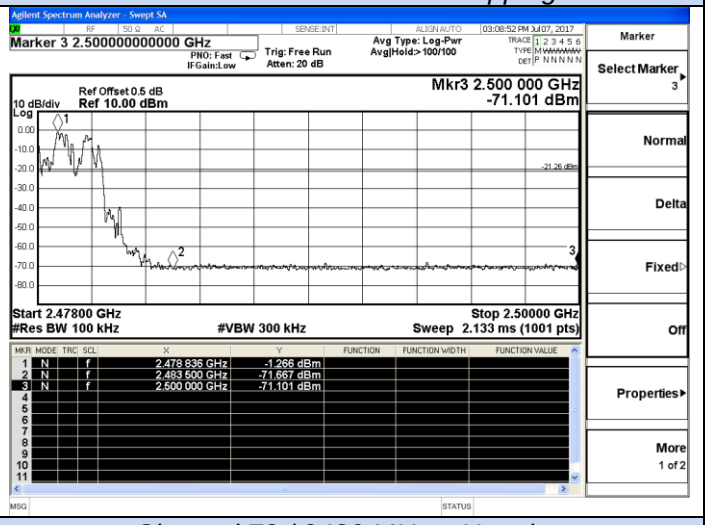


9 KHz – 26.5 GHz

Band-edge for RF conducted emissions	
GFSK	
	
Channel 0 / 2402 MHz – Non-Hopping	Channel 0 / 2402 MHz – Hopping
	
Channel 78 / 2480 MHz – Non-Hopping	Channel 78 / 2480 MHz – Hopping

π/4-DQPSK	
	
Channel 0 / 2402 MHz – Non-Hopping	Channel 0 / 2402 MHz – Hopping

Band-edge for RF conducted emissions	
π/4-DQPSK	
	
Channel 78 / 2480 MHz – Non-Hopping	Channel 78 / 2480 MHz – Hopping

8DPSK	
	
Channel 0 / 2402 MHz – Non-Hopping	Channel 0 / 2402 MHz – Hopping
	
Channel 78 / 2480 MHz – Non-Hopping	Channel 78 / 2480 MHz – Hopping