REPORT No. : KH18110102W07

TEST REPORT

APPLICANT	:	Xiamen Padmate Technology Co.,LTD
PRODUCT NAME	:	Bluetooth Headset
MODEL NAME	:	X12
BRAND NAME	:	Padmate
FCC ID	:	2AJEO-X12
STANDARD(S)	:	47 CFR Part 15 Subpart C
TEST DATE	:	2018-12-22 to 2018-12-26
ISSUE DATE	:	2018-12-28

Prepared by: Lion Xiao

Lion Xiao (Project Engineer)

Approved by:

Anne Liu(Supervisor)

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Kehu-Morlab Test Laboratory

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DIRECTORY

Change History		
Issue	**Date**	**Reason for change**
1.0	2018-12-28	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Xiamen Padmate Technology Co.,LTD
Applicant Address:	RM 201, Huli Park No.37, Industrial Zone, Tong'an District, Xiamen, China
Manufacturer:	Xiamen Padmate Technology Co.,LTD
Manufacturer Address:	RM 201, Huli Park No.37, Industrial Zone, Tong'an District, Xiamen, China

1.2. Equipment Under Test (EUT) Description

Product Name:	Bluetooth Headset
Serial No:	(N/A, marked #1 by test site)
Hardware Version:	V5.0
Software Version:	V28
Modulation Type:	Bluetooth: FHSS GFSK(1Mbps), π/4-DQPSK(EDR 2Mbps), 8-DPSK(EDR 3Mbps)
Operating Frequency Range:	The frequency range used is 2402MHz – 2480MHz (79 channels, at intervals of 1MHz); The frequency block is 2400MHz to 2483.5MHz.
Bluetooth Version:	Bluetooth classic
Antenna Type:	LDS Antenna
Antenna Gain:	-7.53dBi

Note 1: The EUT contains Bluetooth Module operating at 2.4GHz ISM band; the frequencies is F(MHz)=2402+1*n (0<=n<=78). The lowest, middle, highest channel numbers of the Bluetooth Module used and tested in this report are separately 0 (2402MHz), 39 (2441MHz) and 78 (2480MHz).

Note 2: The right headset and left headset are electrically identical, we selected right headset for fully conducted testing, the differences details was explained in the declaration letter.

Note 3: The right headset and left headset will work simultaneously during normal use, we selected right headset and left headset simultaneous transmission for fully radiated emission

testing.

Note 4: The EUT connected to the serial port of the computer with a serial communication cable, we use the dedicated software to control the EUT into the test mode.

Note 5: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 15 (10-1-15 Edition)	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section in CFR 47	Description	Test Date	Test Engineer	Result
1	15.203	Antenna Requirement	N/A	N/A	PASS
2	15.247(a)	Number of Hopping Frequency	Dec 22, 2018	Scott Chen	**PASS**
3	15.247(b)	Peak Output Power	Dec 22, 2018	Scott Chen	**PASS**
4	15.247(a)	20dB Bandwidth	Dec 22, 2018	Scott Chen	**PASS**
5	15.247(a)	Carrier Frequency Separation	Dec 22, 2018	Scott Chen	**PASS**
6	15.247(a)	Time of Occupancy (Dwell time)	Dec 22, 2018	Scott Chen	**PASS**
7	15.247(d)	Conducted Spurious Emission and Band Edge	Dec 22, 2018	Scott Chen	**PASS**
8	15.247(d)	Restricted Frequency Bands	Dec 26, 2018	Jinxin Huang	**PASS**
9	15.209, 15.247(d)	Radiated Emission	Dec 26, 2018	Jinxin Huang	**PASS**
10	15.207	Conducted Emission	Dec 26, 2018	Jinxin Huang	**PASS**
Note 1: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013.					

1.4. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

2. 47 CFR Part 15C Requirements

2.1. Antenna requirement

2.1.1. Applicable Standard

According to FCC 15.203, 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 shall be considered sufficient to comply with the provisions of this section.

2.1.2. Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

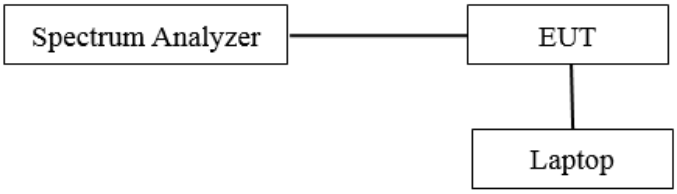
2.2. Number of Hopping Frequency

2.2.1. Requirement

According to FCC §15.247(a)(1)(iii), frequency hopping systems operating in the 2400MHz to 2483.5MHz bands shall use at least 15 hopping frequencies.

2.2.2. Test Description

A. Test Setup:



The EUT (Equipment under the test) is coupled to the Spectrum analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in Spectrum analyzer.

B. Equipments List:

Please reference ANNEX B(4).

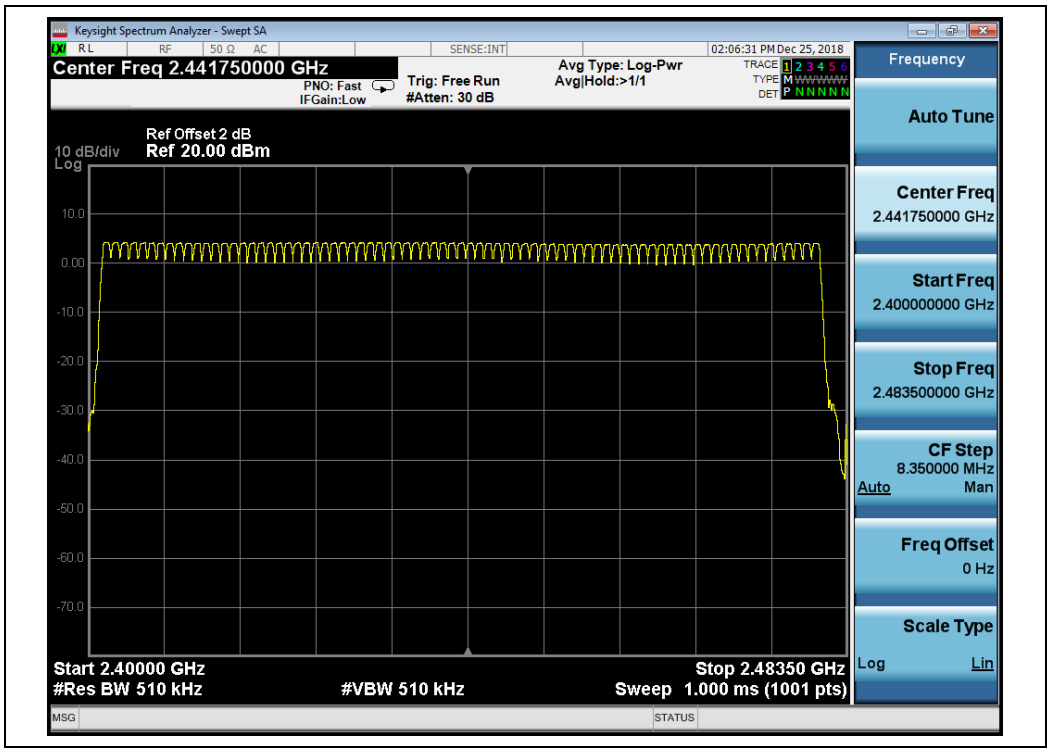
2.2.3. Test Result

The Bluetooth Module operates at hopping-on test mode; the frequencies number employed is counted to verify the Module's using the number of hopping frequency.

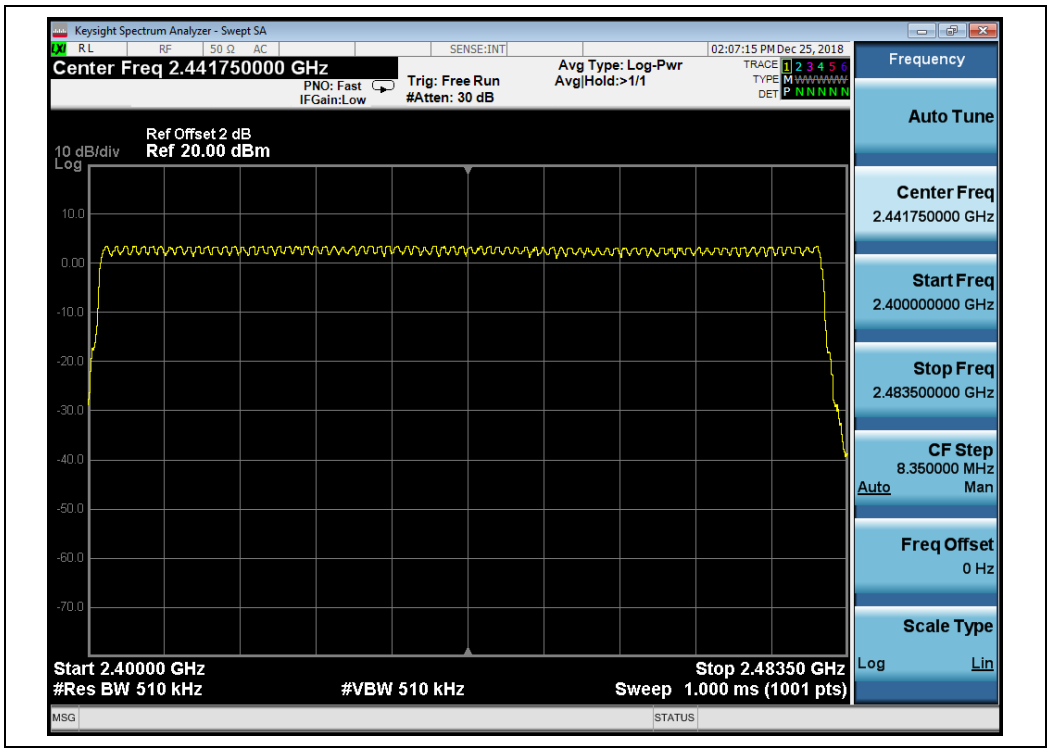
A. Test Verdict:

Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Verdict
GFSK	2400 - 2483.5	79	15	PASS
π/4-DQPSK	2400 - 2483.5	79	15	PASS
8-DPSK	2400 - 2483.5	79	15	PASS

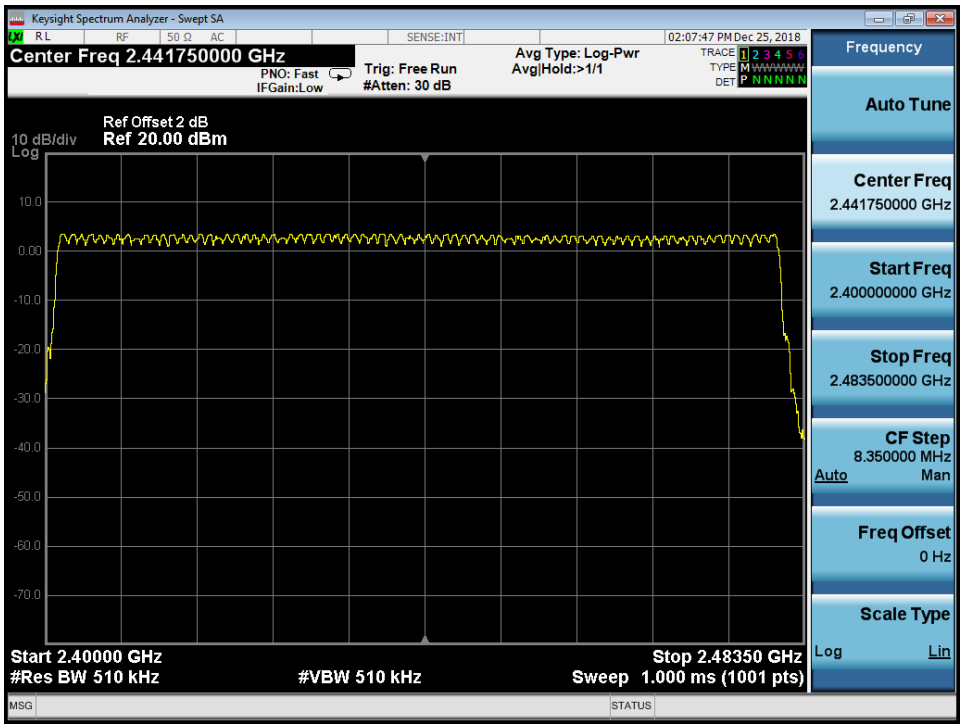
B. Test Plots:



(GFSK)



(π/4-DQPSK)


Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
02:07:47 PM Dec 25, 2018
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Ref Offset 2 dB
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Start 2.40000 GHz
#Res BW 510 kHz
#VBW 510 kHz
Stop 2.48350 GHz
Sweep 1.000 ms (1001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.441750000 GHz
Start Freq
2.400000000 GHz
Stop Freq
2.483500000 GHz
CF Step
8.350000 MHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

(8- DPSK)

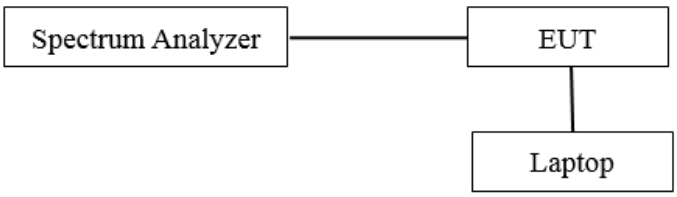
2.3. Peak Output Power

2.3.1. Requirement

According to FCC §15.247(b)(1), for frequency hopping systems that operates in the 2400MHz to 2483.5MHz band employing at least 75 hopping channels, the maximum peak output power of the intentional radiator shall not exceed 1Watt. For all other frequency hopping systems in the 2400MHz to 2483.5MHz band, it is 0.125Watts.

2.3.2. Test Description

A. Test Setup:



The EUT (Equipment under the test) is coupled to the Spectrum analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in Spectrum analyzer.

B. Equipments List:

Please refer ANNEX B(4).

2.3.3. Test Result

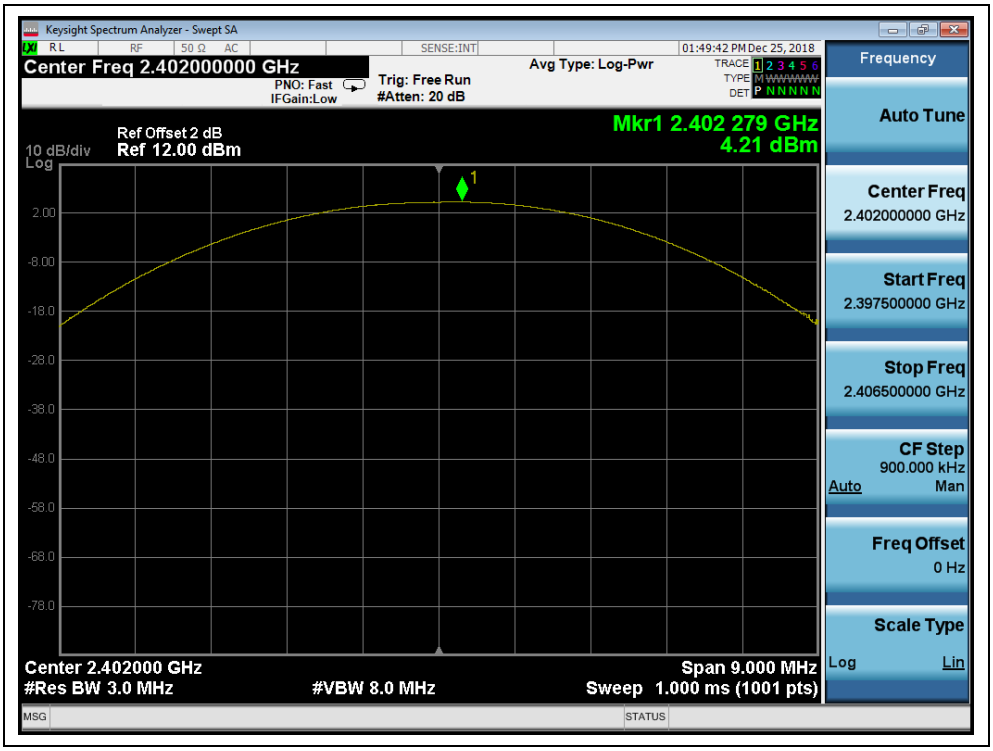
The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the module.

GFSK Mode

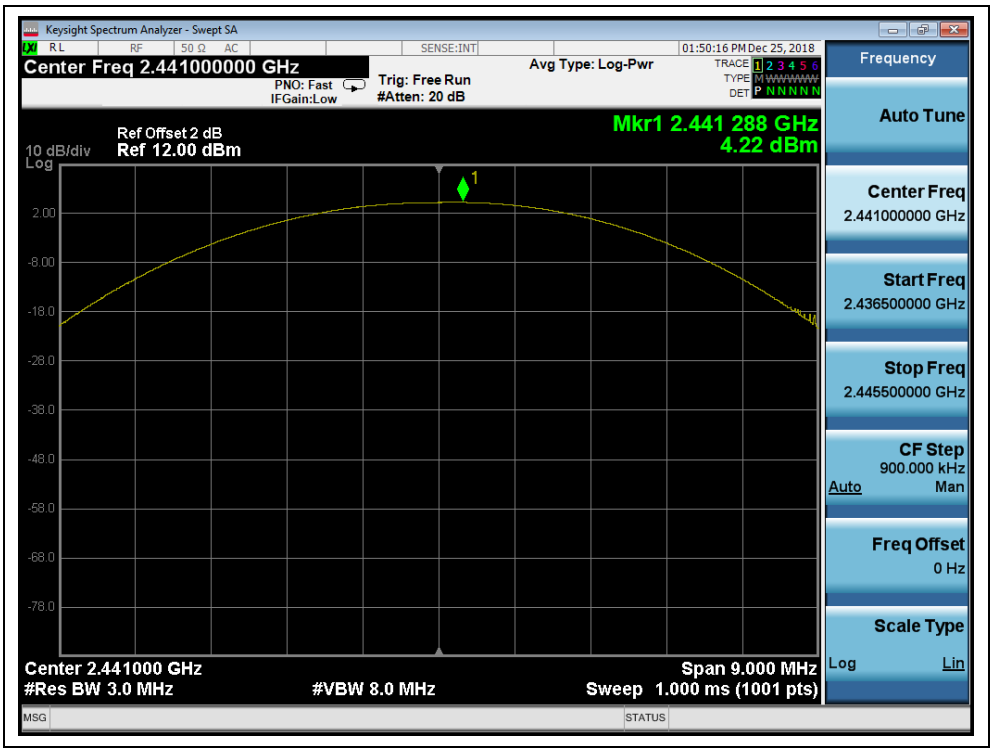
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	4.21	0.0026	21	0.125	PASS
39	2441	4.22	0.0026			PASS
78	2480	4.18	0.0026			PASS

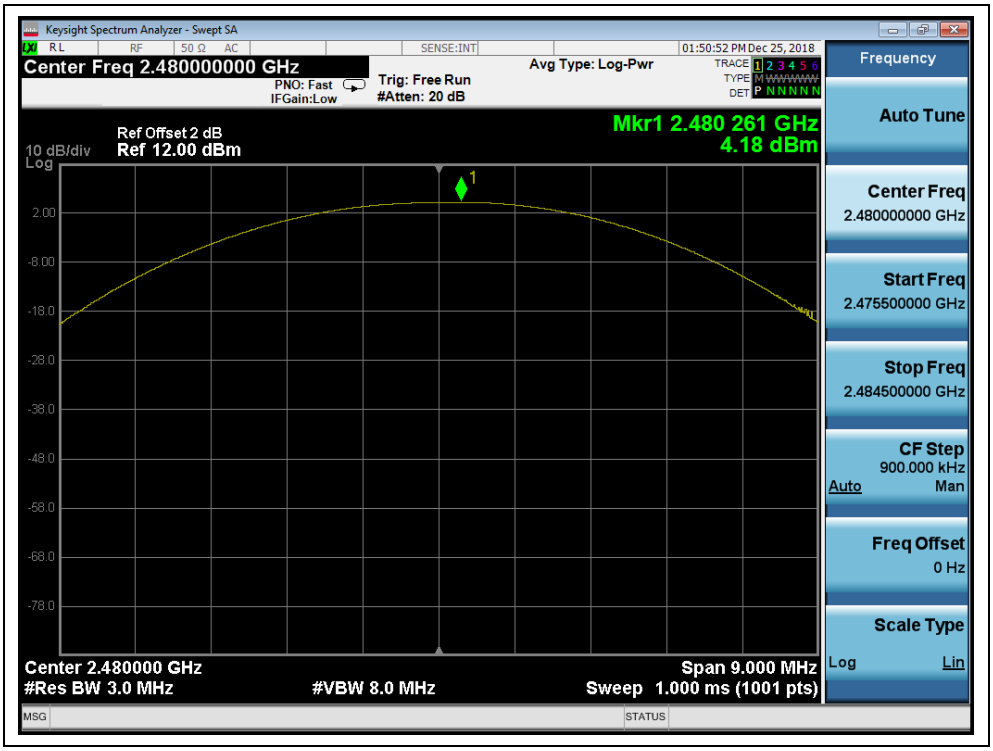
B. Test Plots:



(GFSK, Channel 0, 2402MHz)



(GFSK, Channel 39, 2441MHz)



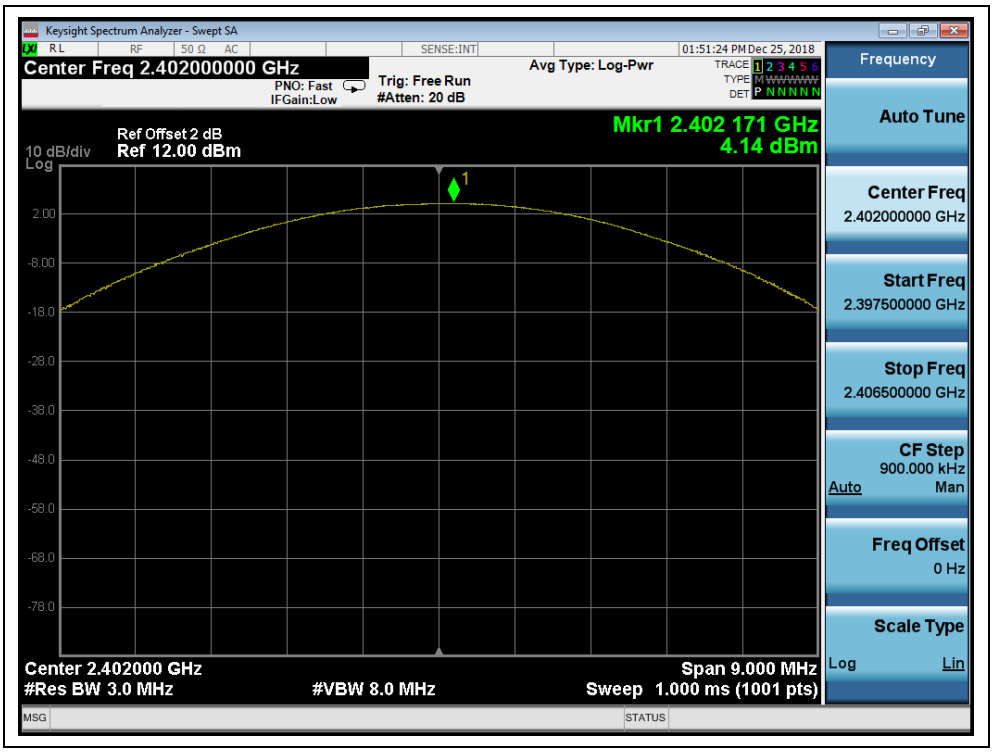
(GFSK, Channel 78, 2480MHz)

π/4-DQPSK Mode

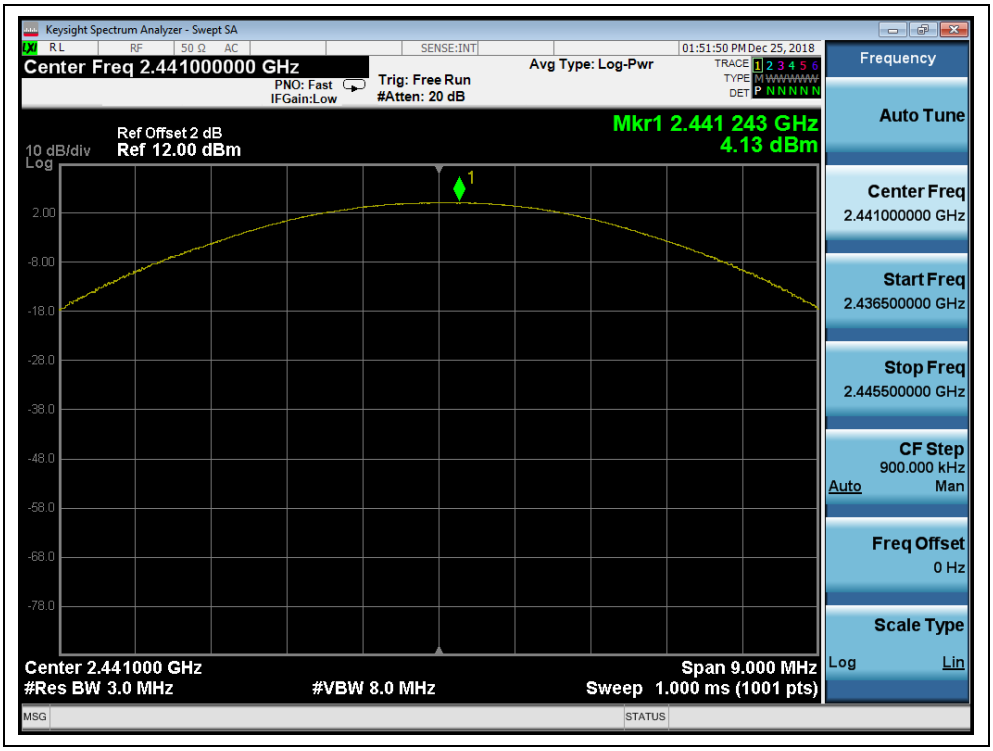
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	4.14	0.0026	21	0.125	PASS
39	2441	4.13	0.0026			PASS
78	2480	4.07	0.0026			PASS

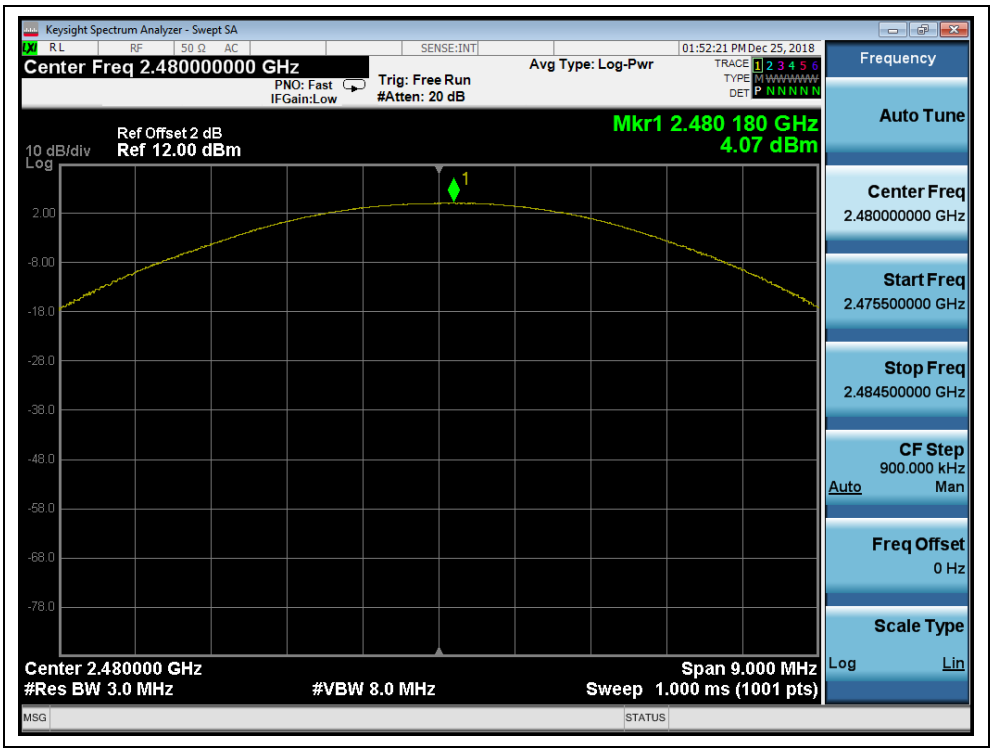
B. Test Plots:



(π/4-DQPSK, Channel 0, 2402MHz)



(π/4-DQPSK, Channel 39, 2441MHz)



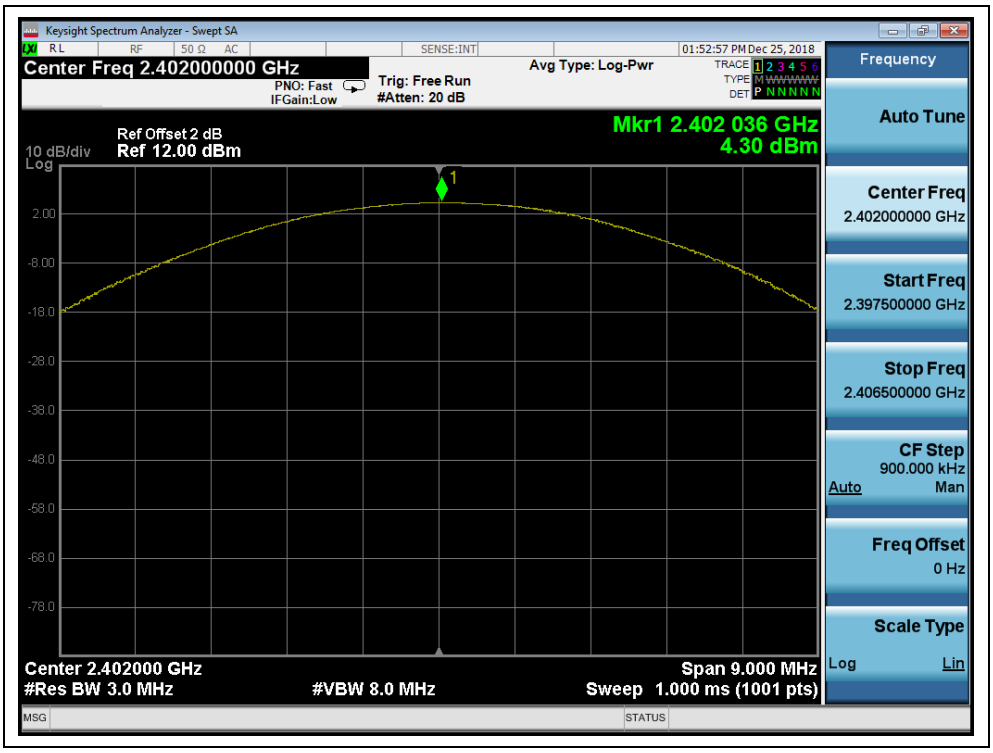
(π/4-DQPSK, Channel 78, 2480MHz)

8-DPSK Mode

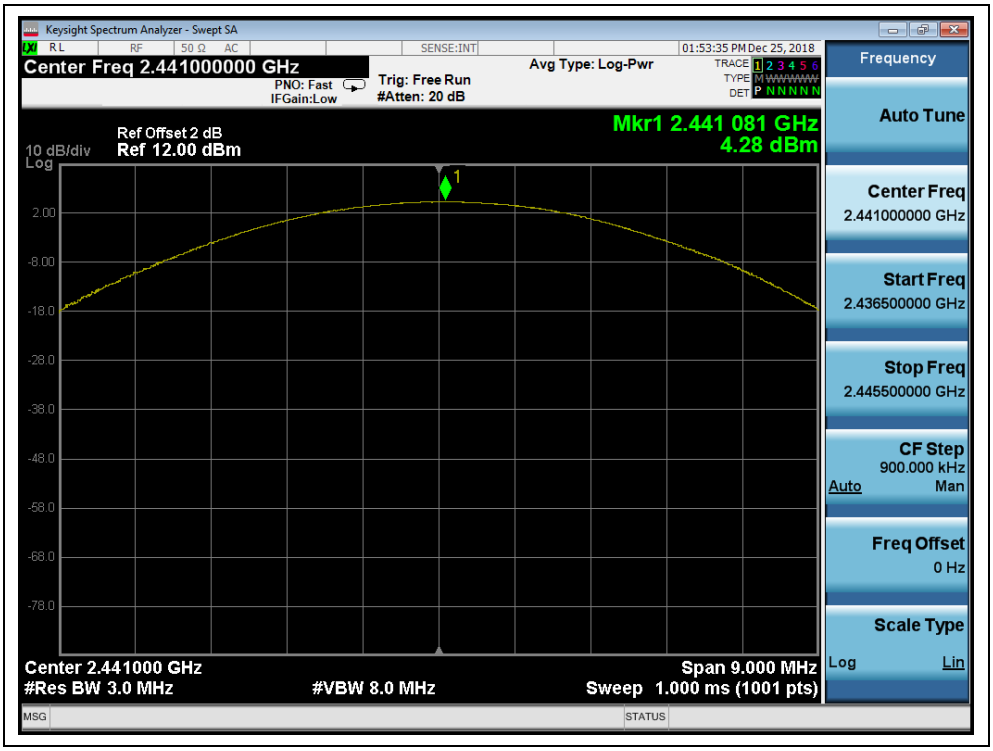
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	4.30	0.0027	21	0.125	PASS
39	2441	4.28	0.0027			PASS
78	2480	4.21	0.0026			PASS

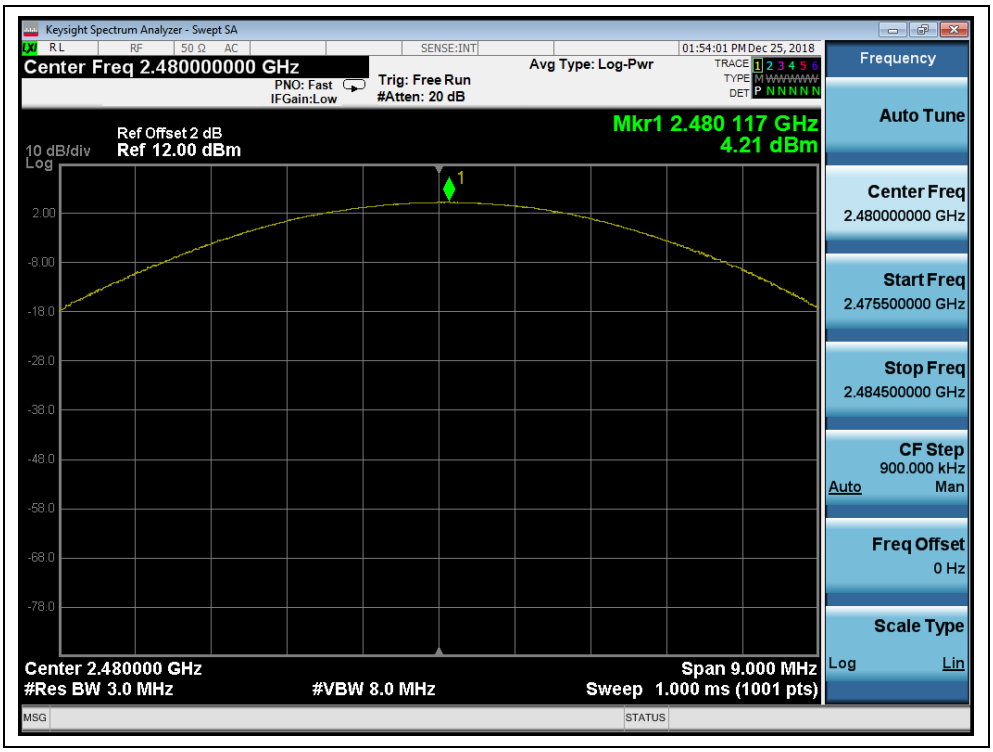
B. Test Plots:



(8-DPSK, Channel 0, 2402MHz)



(8-DPSK, Channel 39, 2441MHz)



(8-DPSK, Channel 78, 2480MHz)

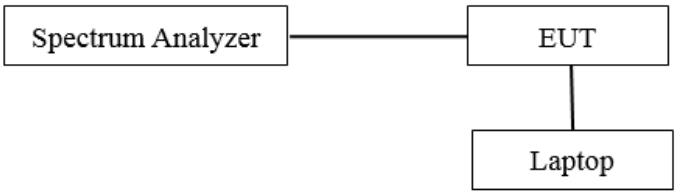
2.4. 20dB Bandwidth

2.4.1. Definition

According to FCC §15.247(a)(1), the 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth (10*log1% = 20dB) taking the total RF output power.

2.4.2. Test Description

A. Test Setup:



The EUT (Equipment under the test) is coupled to the Spectrum analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in Spectrum analyzer.

B. Equipments List:

Please refer ANNEX B(4).

2.4.3. Test Result

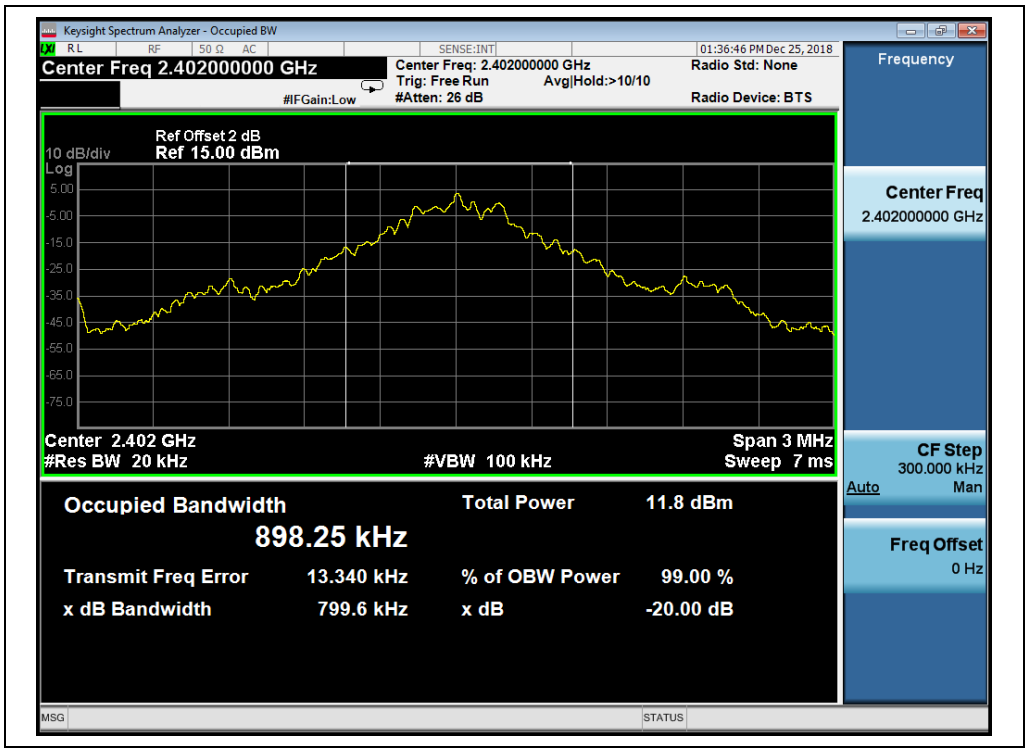
The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to record the 20dB bandwidth of the Module.

GFSK Mode

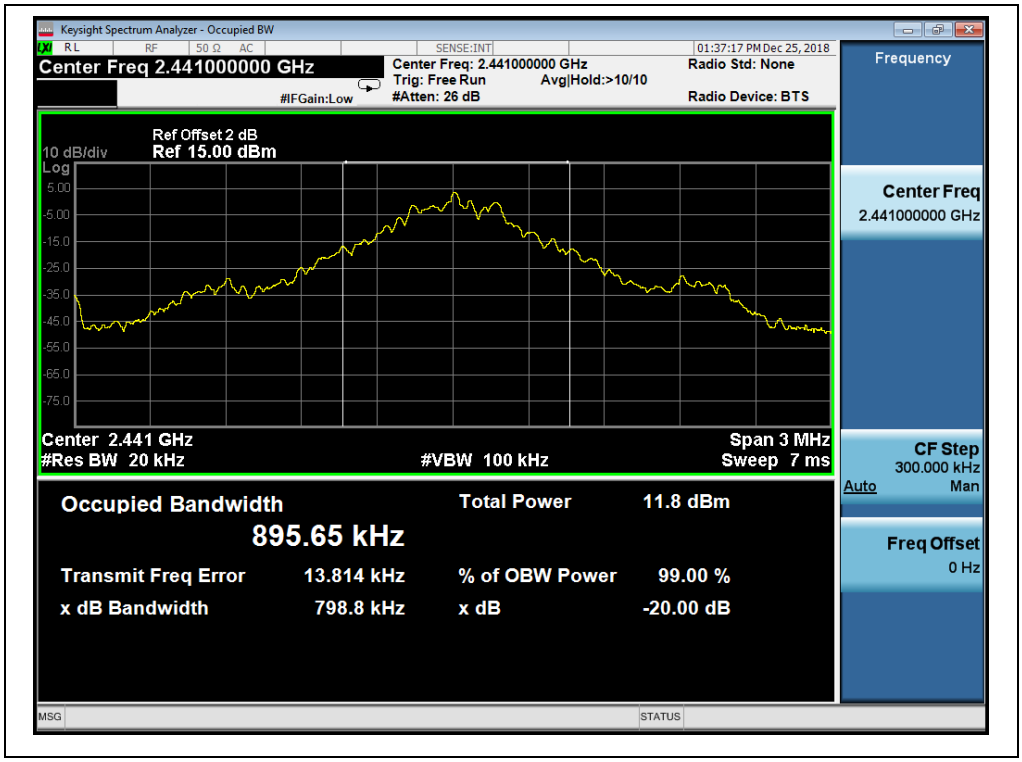
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
0	2402	0.7996	PASS
39	2441	0.7988	PASS
78	2480	0.7996	PASS

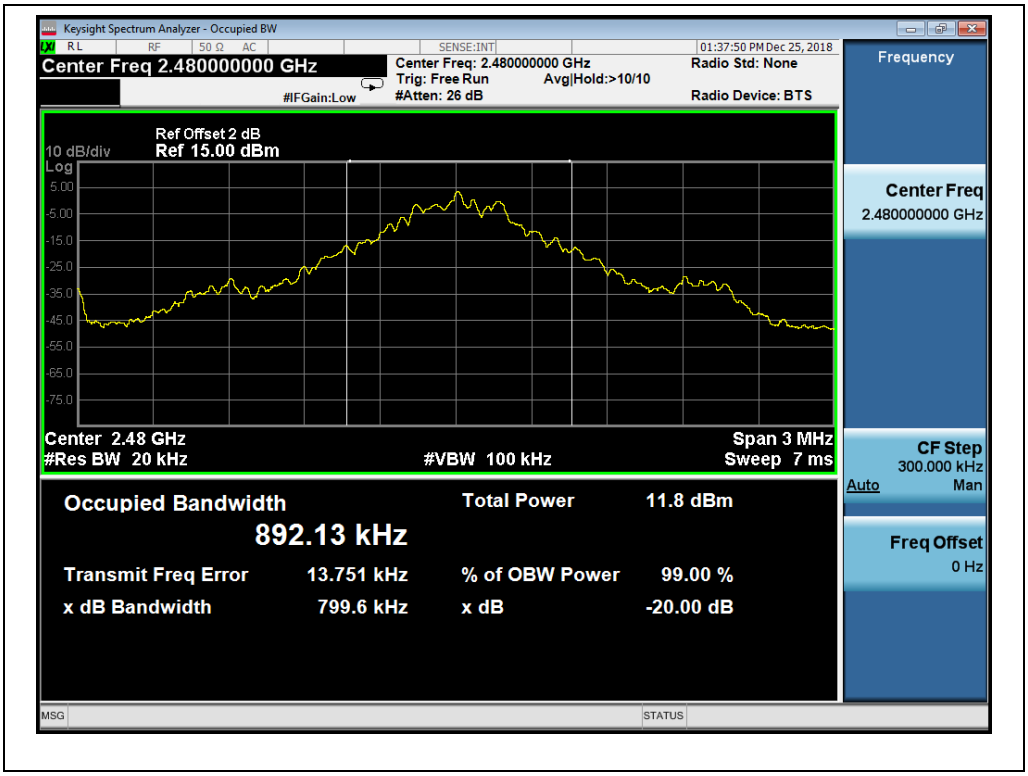
B. Test Plots:



(GFSK, Channel 0, 2402MHz)



(GFSK, Channel 39, 2441MHz)



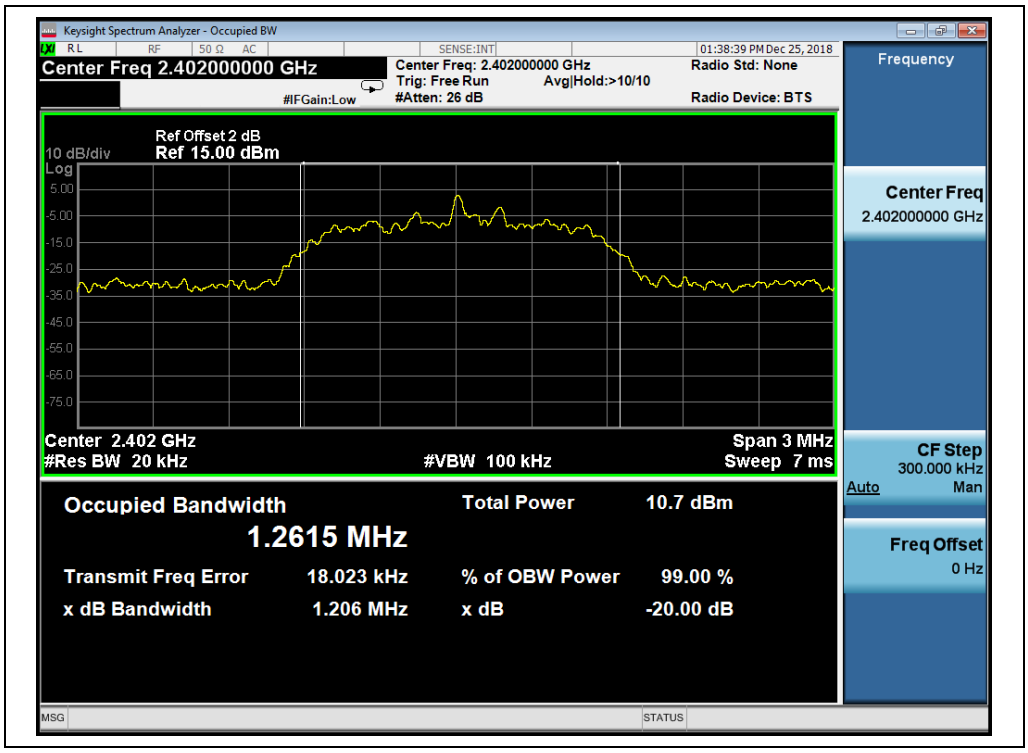
(GFSK, Channel 78, 2480MHz)

π/4-DQPSK Mode

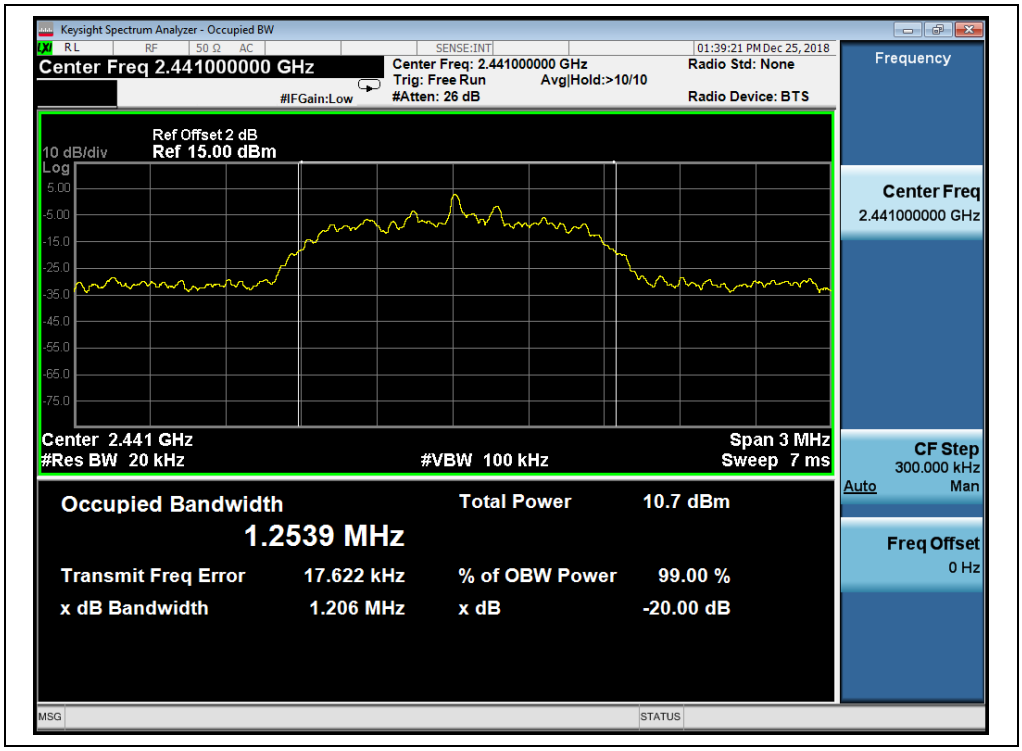
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
0	2402	1.206	PASS
39	2441	1.206	PASS
78	2480	1.206	PASS

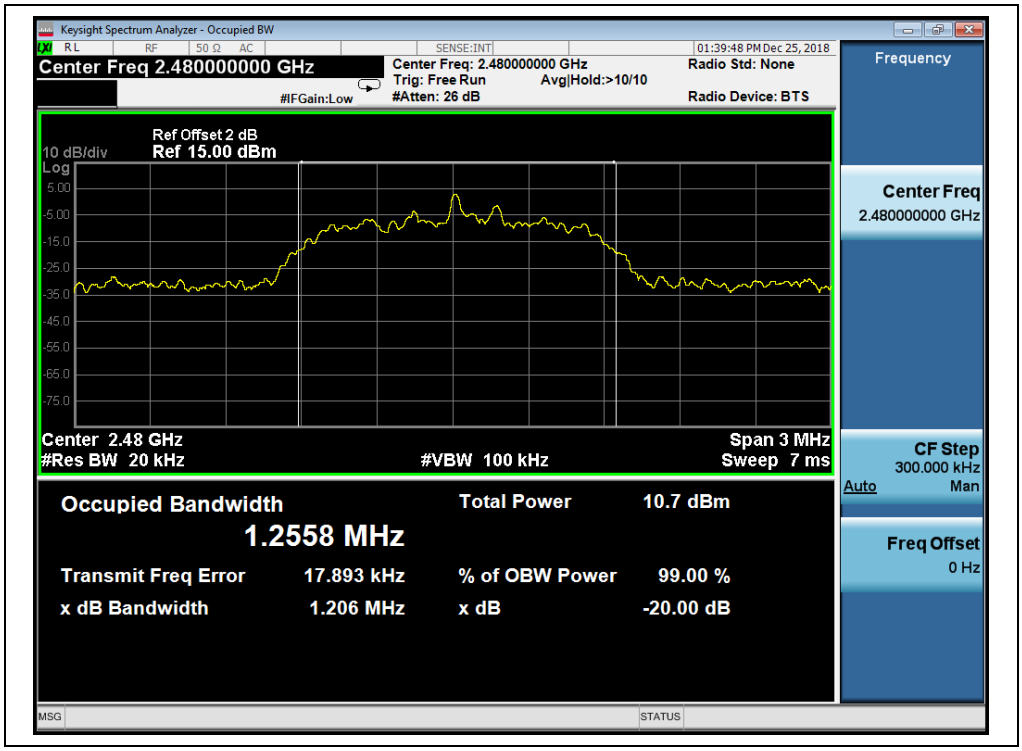
B. Test Plots:



(π/4-DQPSK, Channel 0, 2402MHz)



(π/4-DQPSK, Channel 39, 2441MHz)



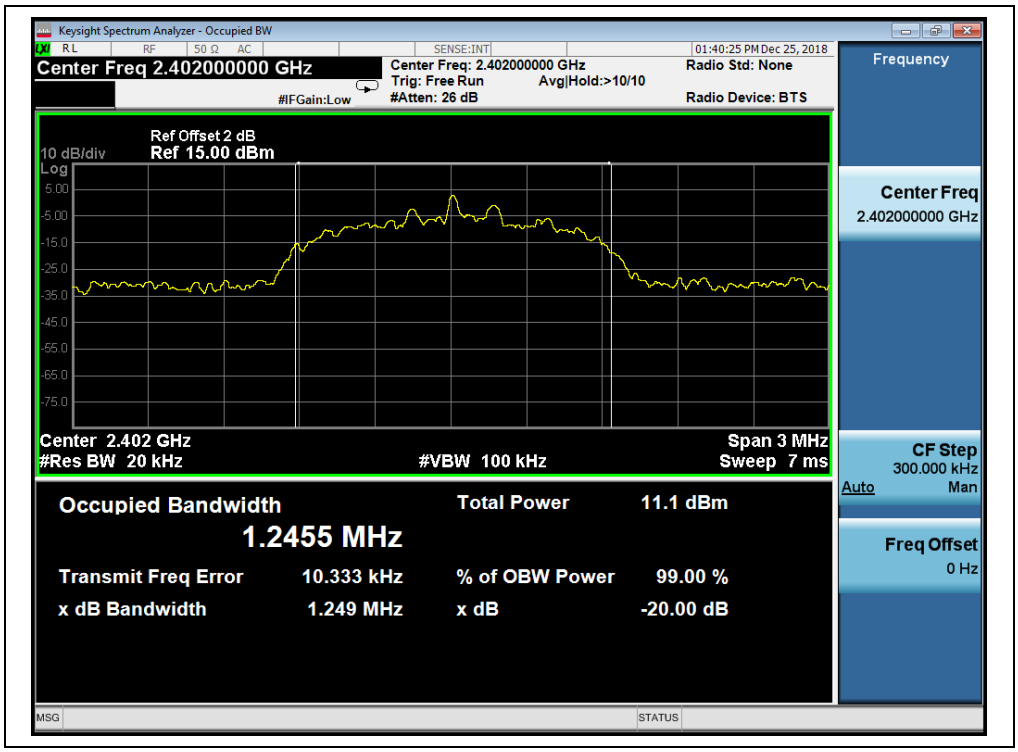
(π/4-DQPSK, Channel 78, 2480MHz)

8-DPSK Mode

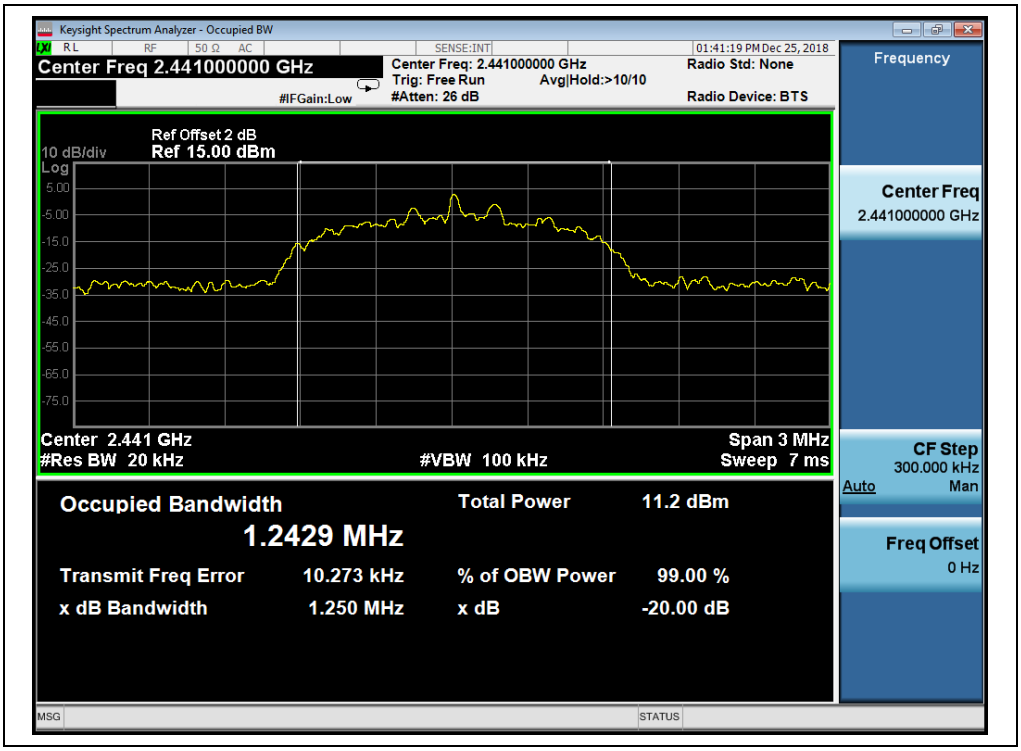
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
0	2402	1.249	PASS
39	2441	1.250	PASS
78	2480	1.250	PASS

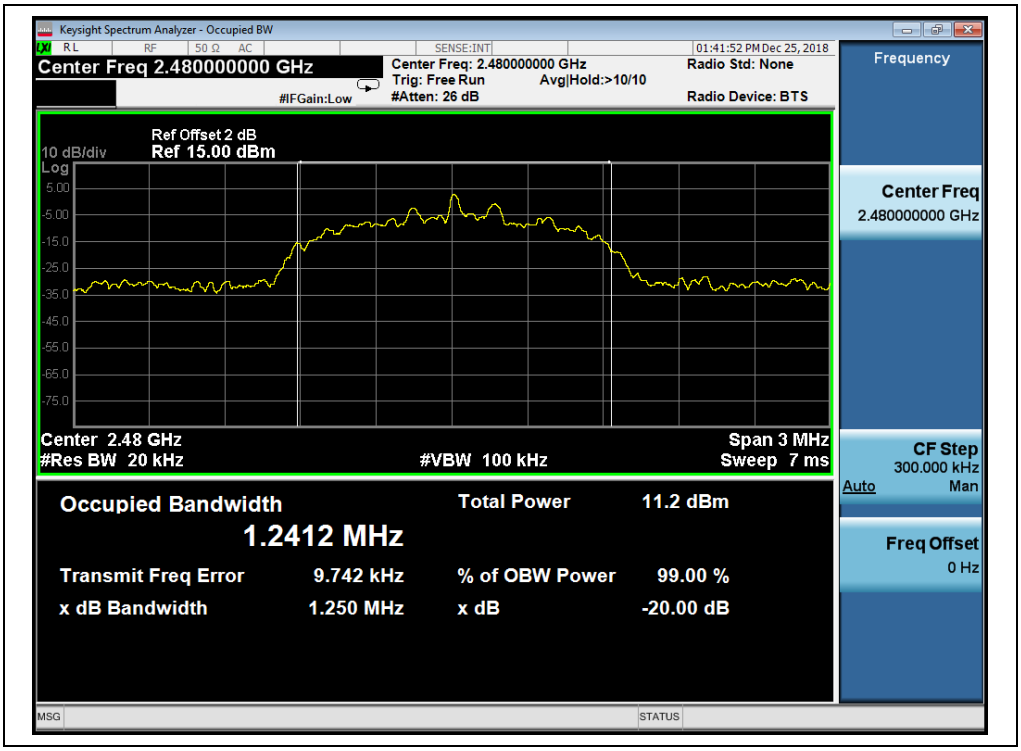
B. Test Plots:



(8-DPSK, Channel 0, 2402MHz)



(8-DPSK, Channel 39, 2441MHz)



(8-DPSK, Channel 78, 2480MHz)

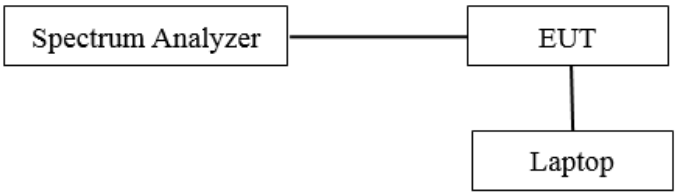
2.5. Carried Frequency Separation

2.5.1. Definition

According to FCC §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

2.5.2. Test Description

A. Test Setup:



The EUT (Equipment under the test) is coupled to the Spectrum analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in Spectrum analyzer.

B. Equipments List:

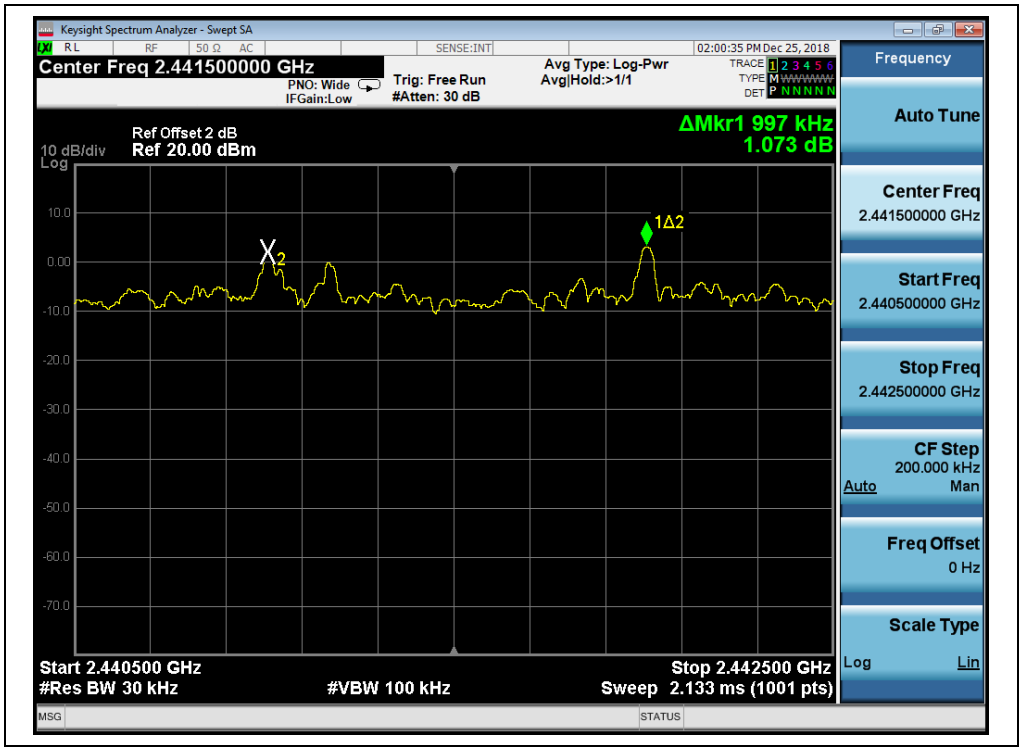
Please refer ANNEX B(4).

2.5.3. Test Result

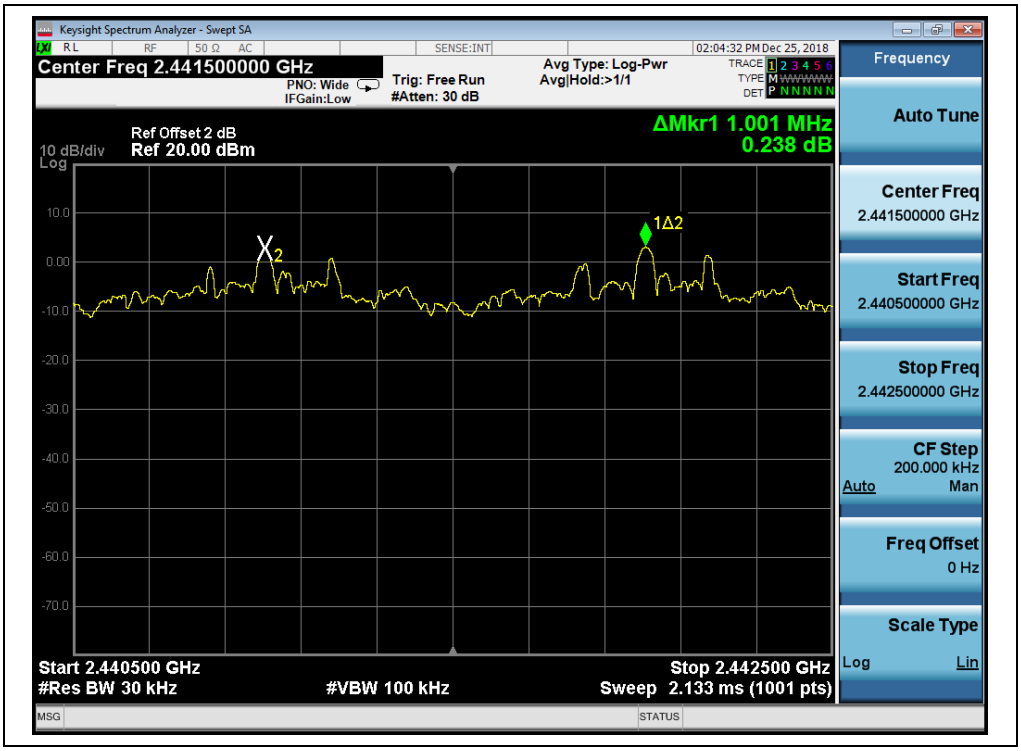
The Bluetooth Module operates at hopping-on test mode. For any adjacent channels (e.g. the channel 39 and 40 as showed below), the Module does have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel (refer to section 2.4.4), whichever is greater. So, the verdict is PASSING.

Test Mode	Measured Channel Numbers	Carried Frequency Separation(MHz)	20dB bandwidth (MHz)	Min. Limit	Verdict
GFSK	39 and 40	0.983	0.7988	two-thirds of the 20dB bandwidth	PASS
π/4-DQPSK	39 and 40	0.997	1.206		PASS
8-DPSK	39 and 40	1.001	1.250		PASS

(GFSK)



(π/4-DQPSK)


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.441500000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
02:04:32 PM Dec 25, 2018
Ref Offset 2 dB
10 dB/div
Log
Ref 20.00 dBm
ΔMkr1 1.001 MHz
0.238 dB
Start 2.440500 GHz
#Res BW 30 kHz
#VBW 100 kHz
Stop 2.442500 GHz
Sweep 2.133 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.441500000 GHz
Start Freq
2.440500000 GHz
Stop Freq
2.442500000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

(8-DPSK)

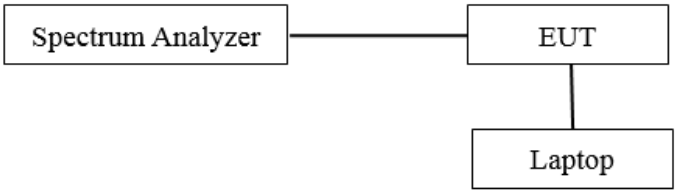
2.6. Time of Occupancy (Dwell time)

2.6.1. Requirement

According to FCC §15.247(a) (1) (iii), frequency hopping systems in the 2400 - 2483.5MHz band shall use at least 15 non-overlapping channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

2.6.2. Test Description

A. Test Setup:



The EUT (Equipment under the test) is coupled to the Spectrum analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in Spectrum analyzer.

The EUT was working in channel hopping; Spectrum SPAN was set as 0. Sweep was set as 0.4 * channel no.(s), the quantity of pulse was get from single sweep. In addition, the time of single pulses was tested.

Dwell time = time slot length * hop rate / number of hopping channels * 31.6s
Hop rate = 1600/s

B. Equipments List:

Please refer ANNEX B(4).

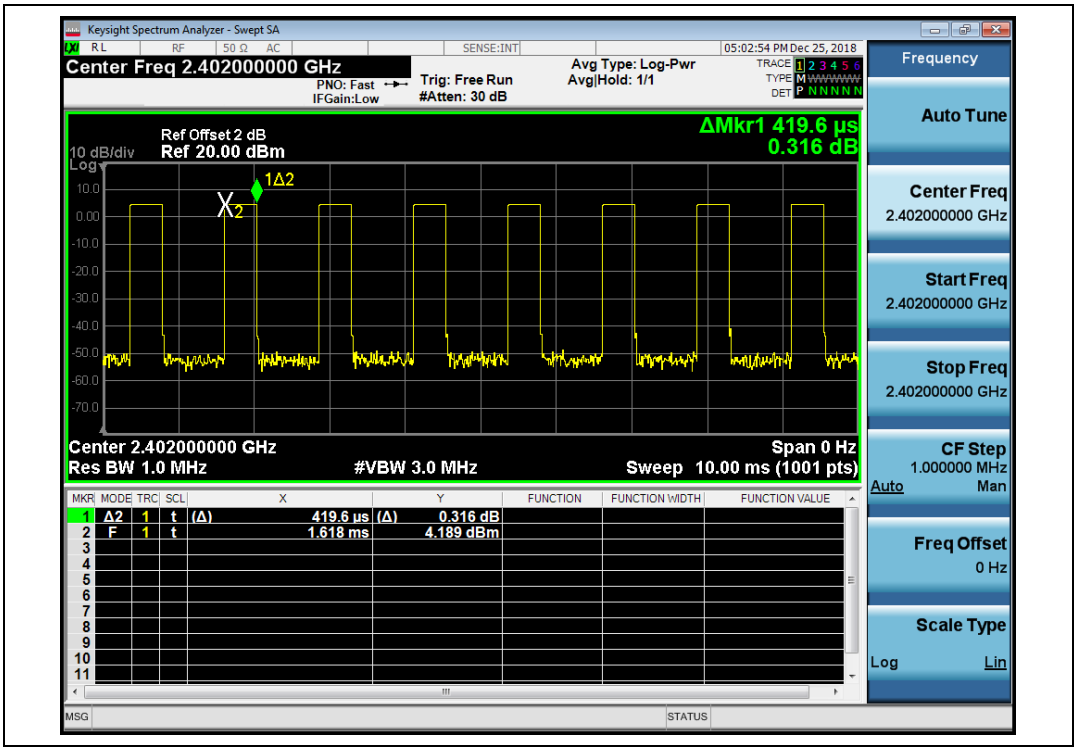
2.6.3. Test Result

GFSK Mode

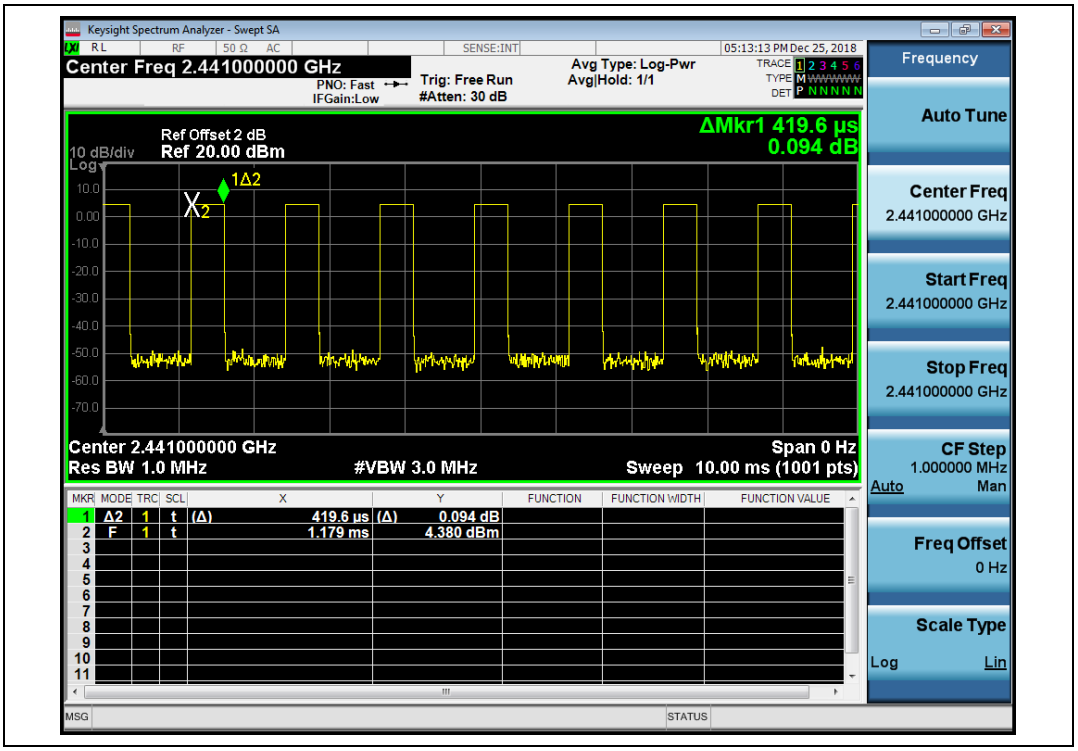
A. Test Verdict:

Mode	Frequency (MHz)	Pulse Width (ms)	Dwell Time (ms)	Limit (sec)	Verdict
DH1	2402	0.420	134.400	0.4	PASS
	2441	0.420	134.400		PASS
	2480	0.420	134.400		PASS
DH3	2402	1.678	268.480		PASS
	2441	1.678	268.480		PASS
	2480	1.678	268.480		PASS
DH5	2402	2.917	311.147		PASS
	2441	2.917	311.147		PASS
	2480	2.917	311.147		PASS

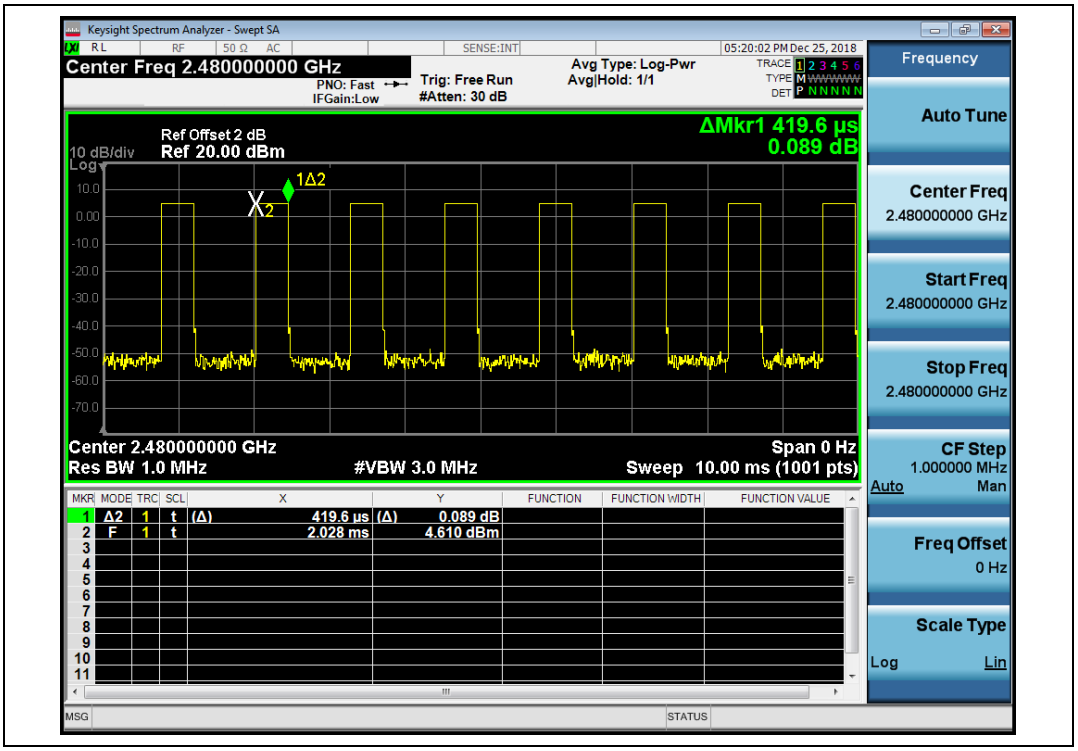
B. Test Plots:



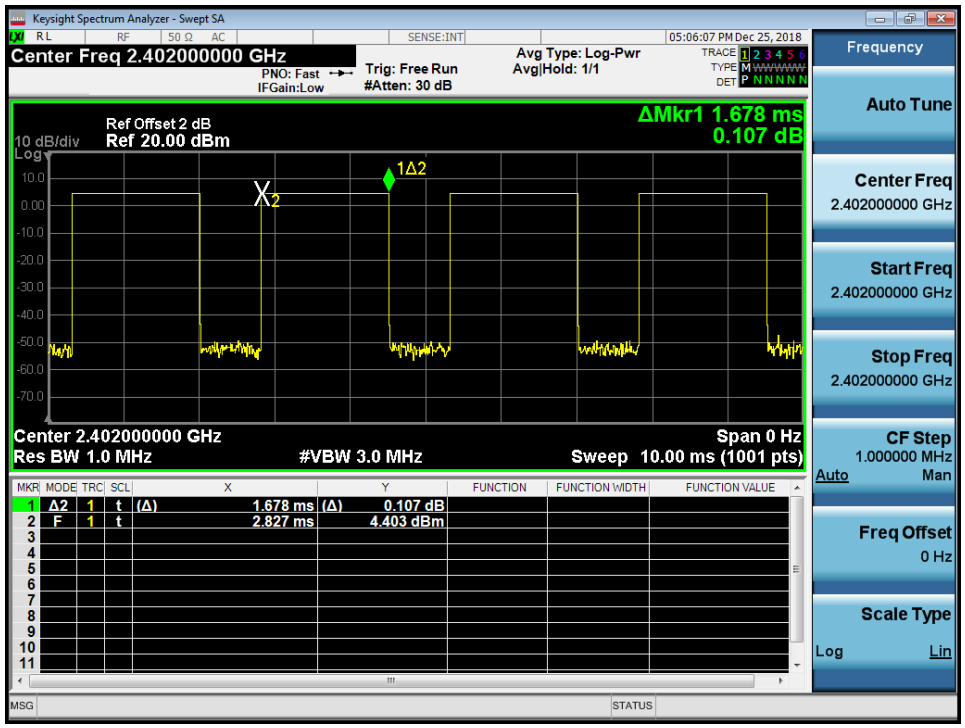
(DH1_2402MHz, GFSK)



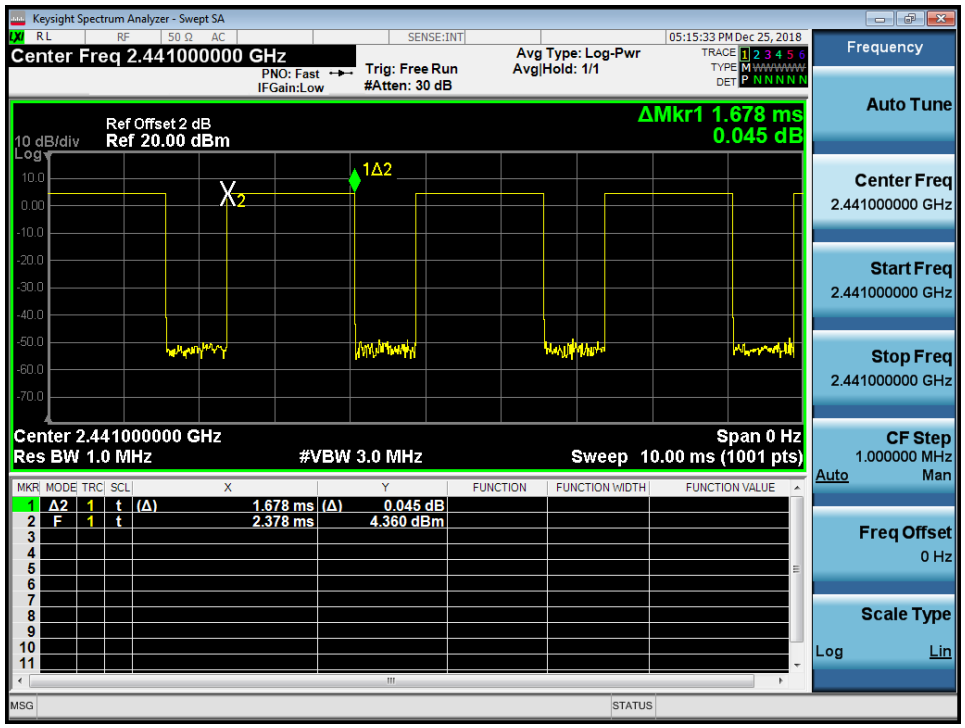
(DH1_2441M, GFSK)



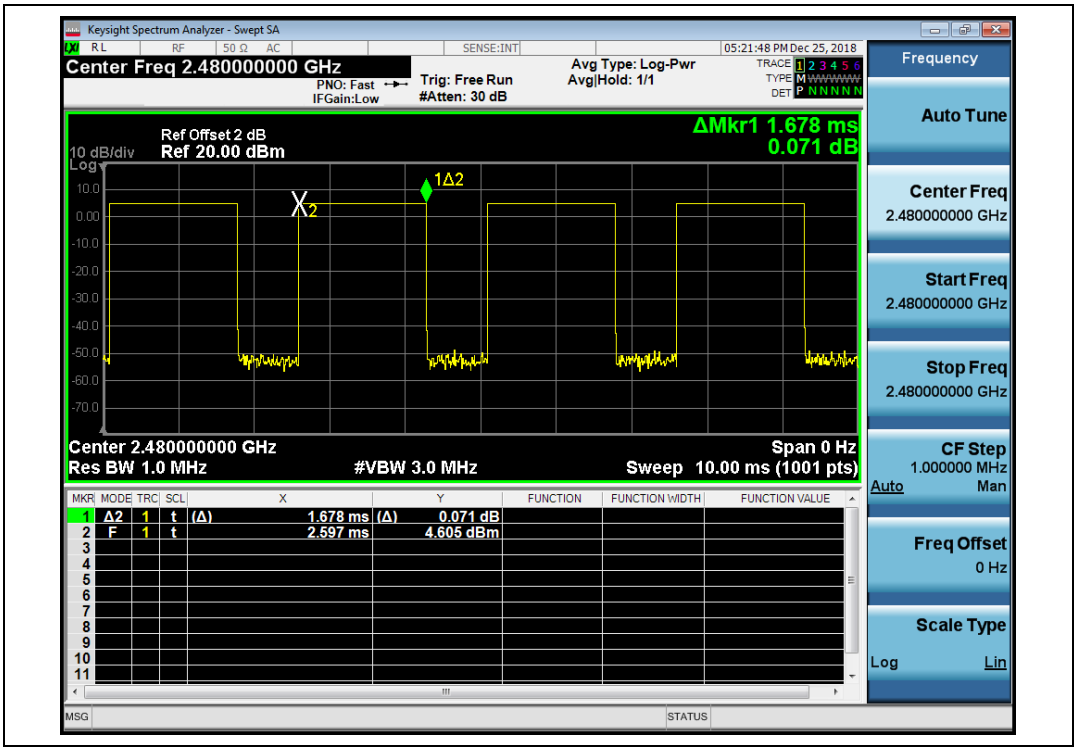
(DH1_2480M, GFSK)



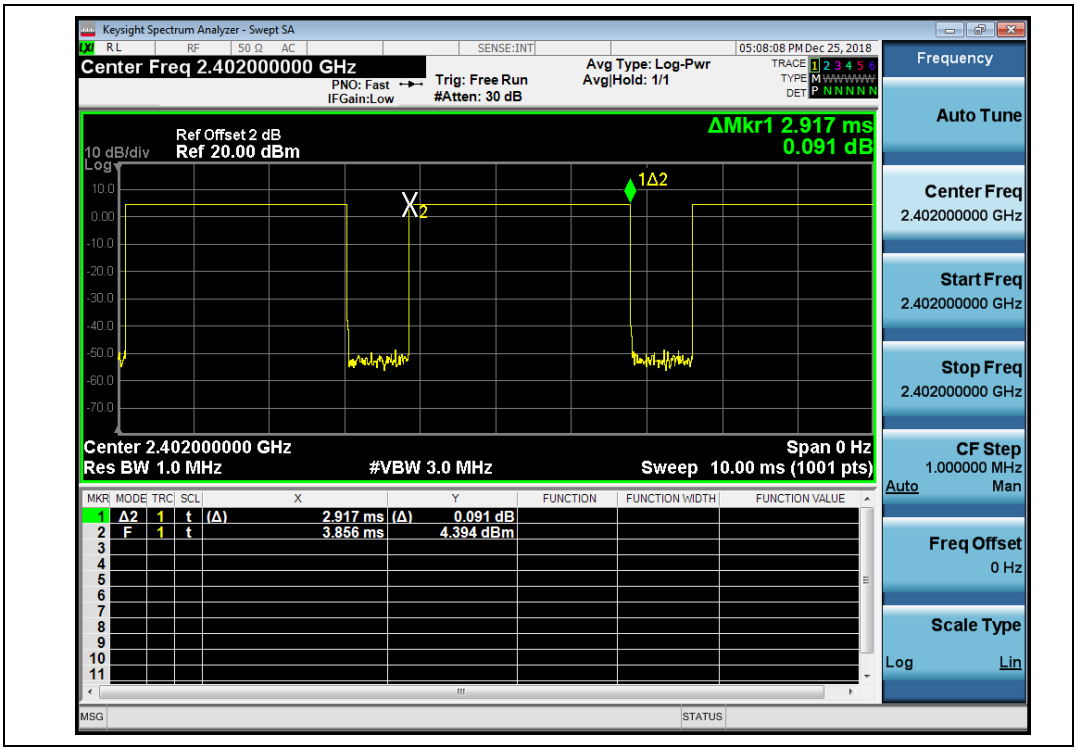
(DH3_2402M, GFSK)



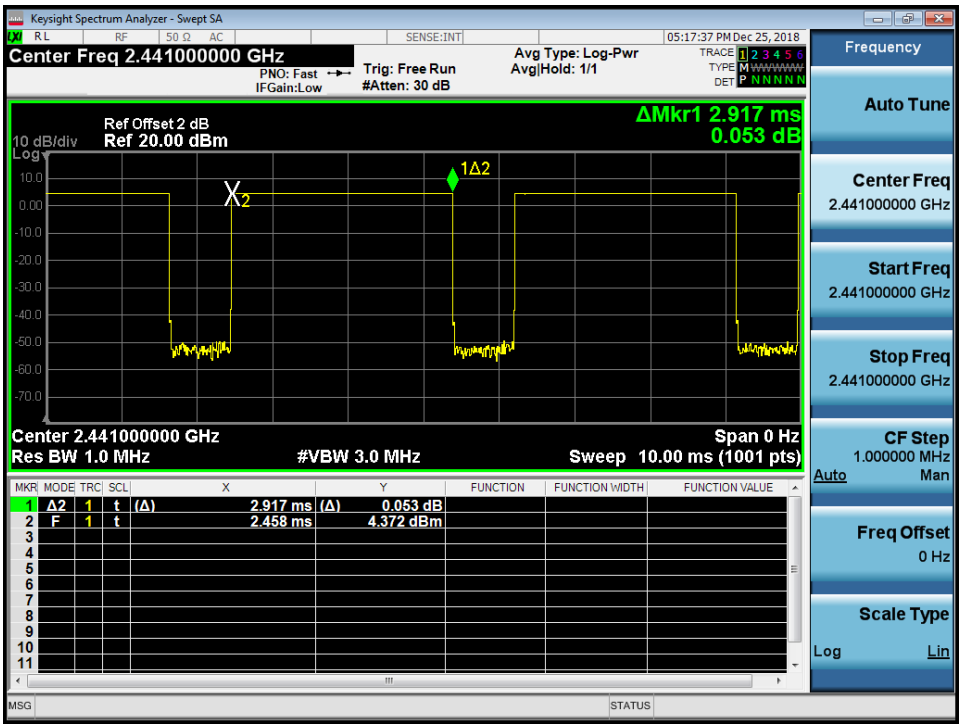
(DH3_2441M, GFSK)



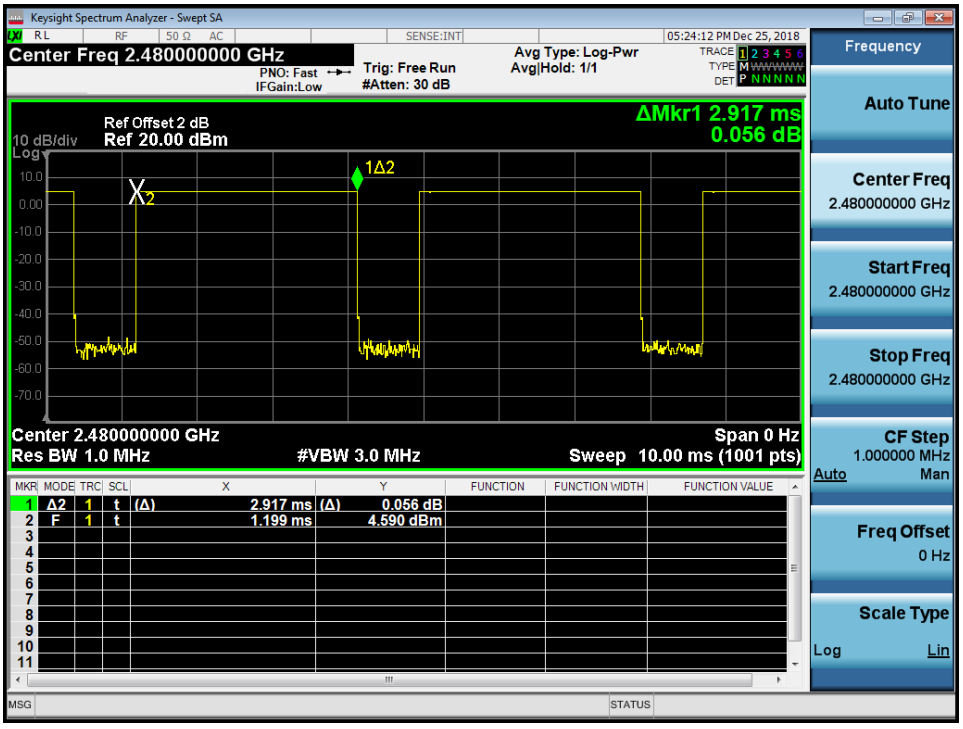
(DH3_2480M, GFSK)



(DH5_2402M, GFSK)



(DH5_2441M, GFSK)



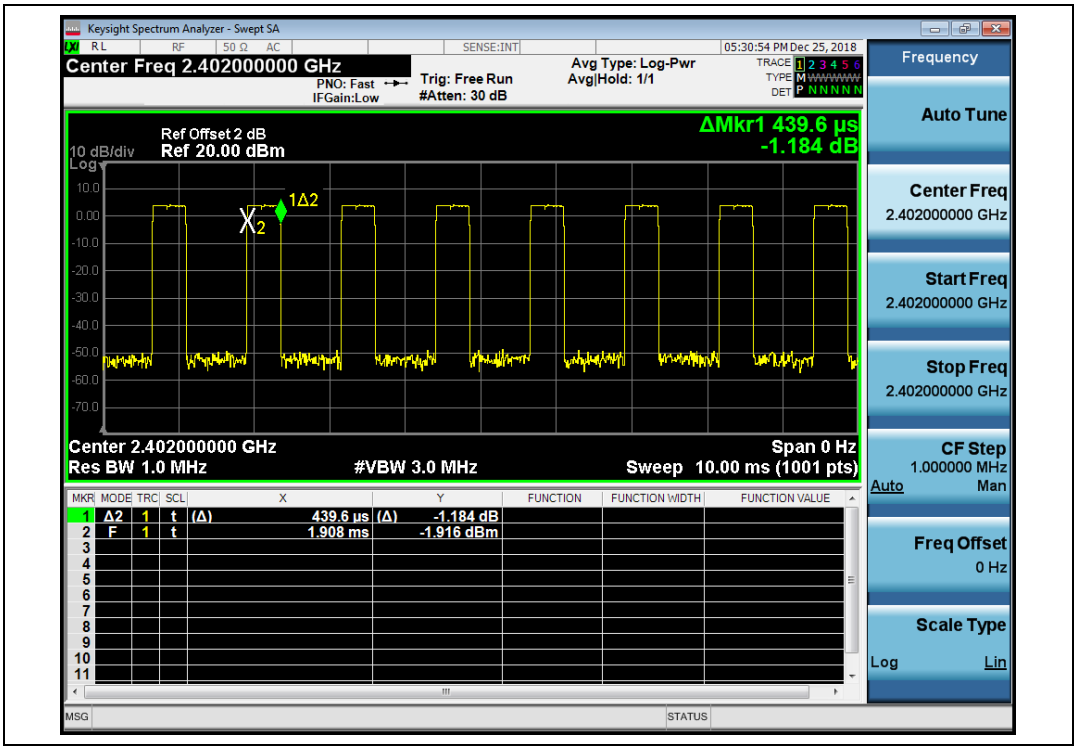
(DH5_2480M, GFSK)

π/4-DQPSK Mode

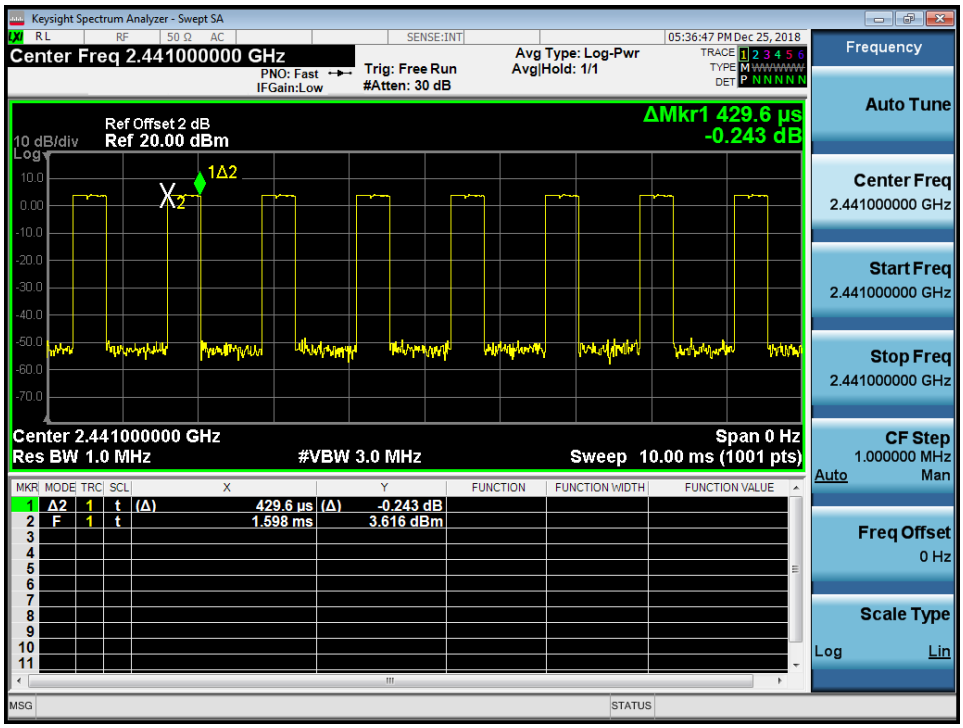
A. Test Verdict:

Mode	Frequency (MHz)	Pulse Width (ms)	Dwell Time (ms)	Limit (sec)	Verdict
2DH1	2402	0.440	140.800	0.4	PASS
	2441	0.430	137.600		PASS
	2480	0.430	137.600		PASS
2DH3	2402	1.678	268.480		PASS
	2441	1.678	268.480		PASS
	2480	1.688	270.080		PASS
2DH5	2402	2.927	312.213		PASS
	2441	2.927	312.213		PASS
	2480	2.927	312.213		PASS

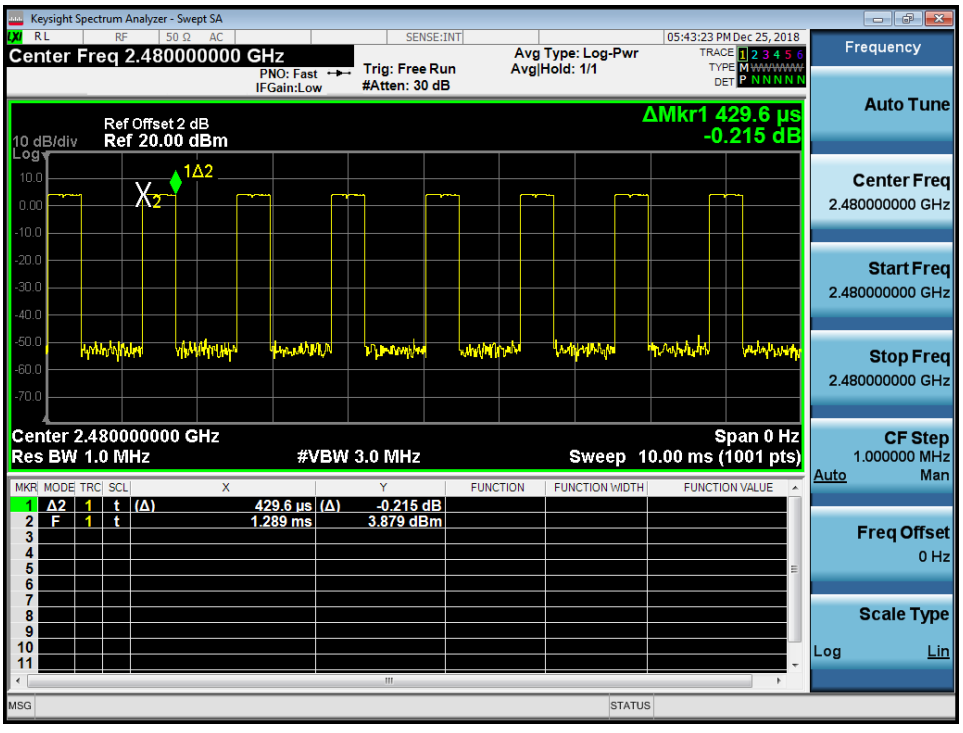
B. Test Plots:



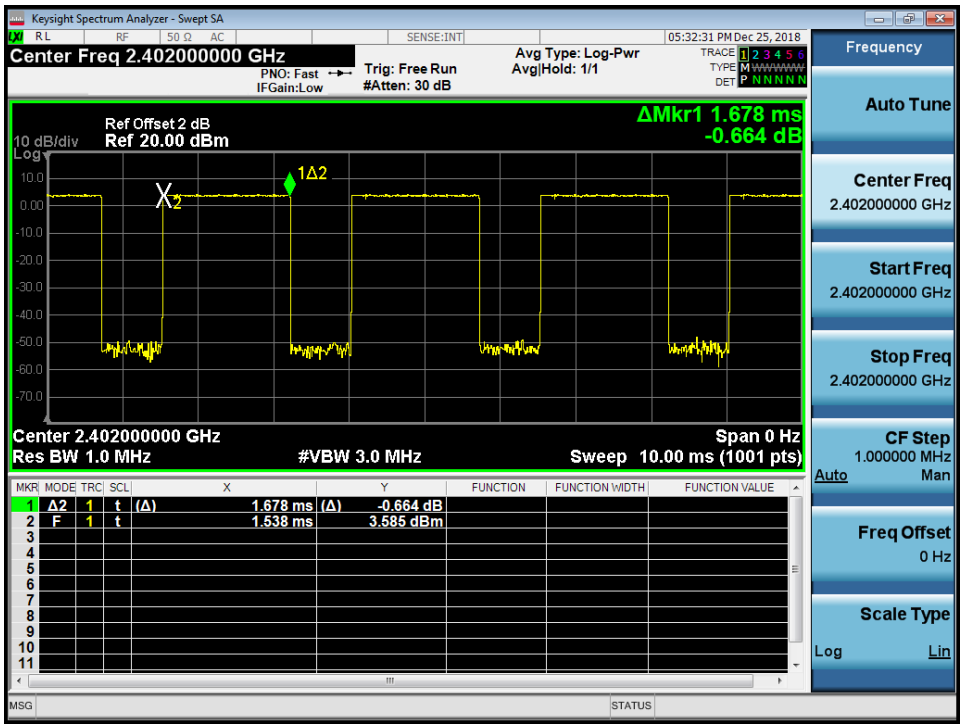
(2DH1_2402M, π/4-DQPSK)



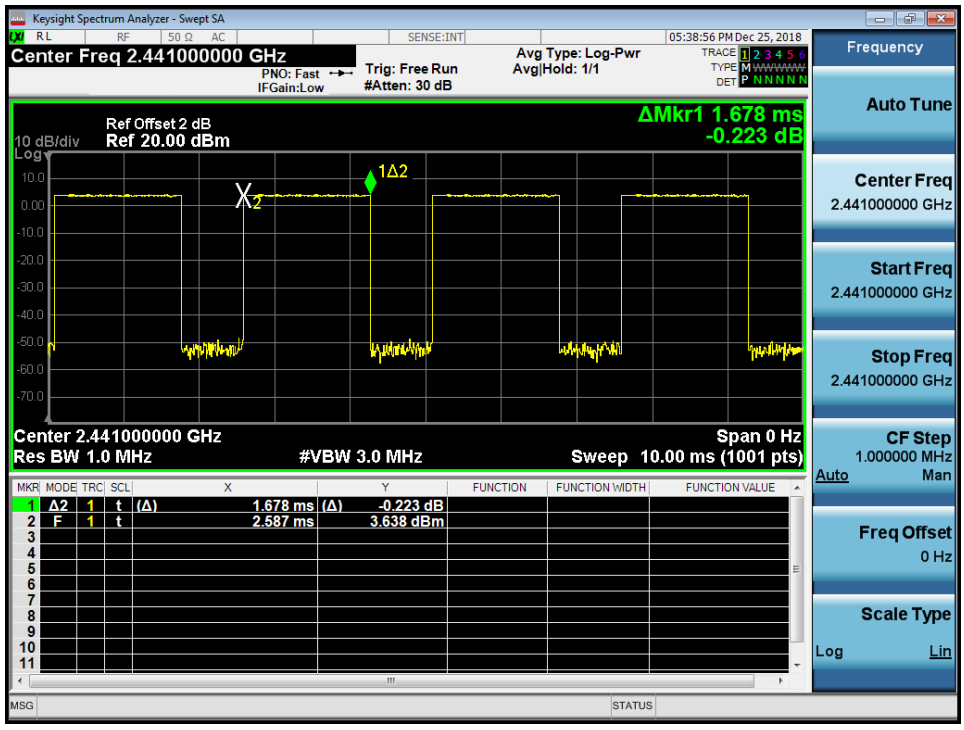
(2DH1_2441M, π/4-DQPSK)



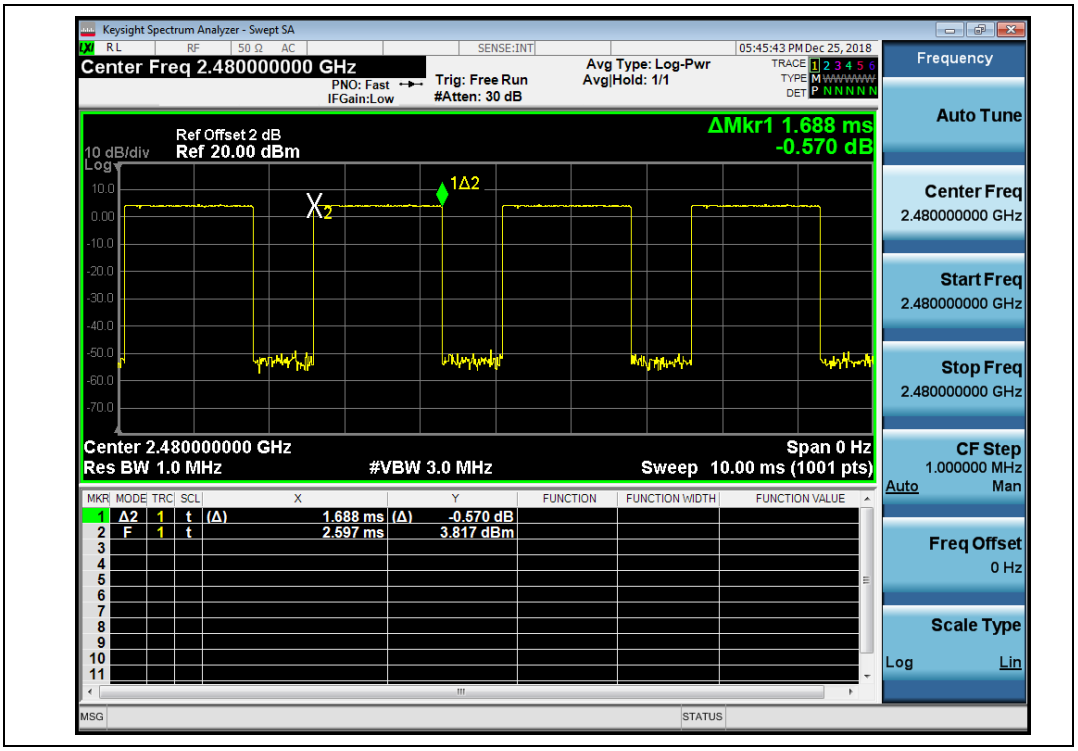
(2DH1_2480M, π/4-DQPSK)



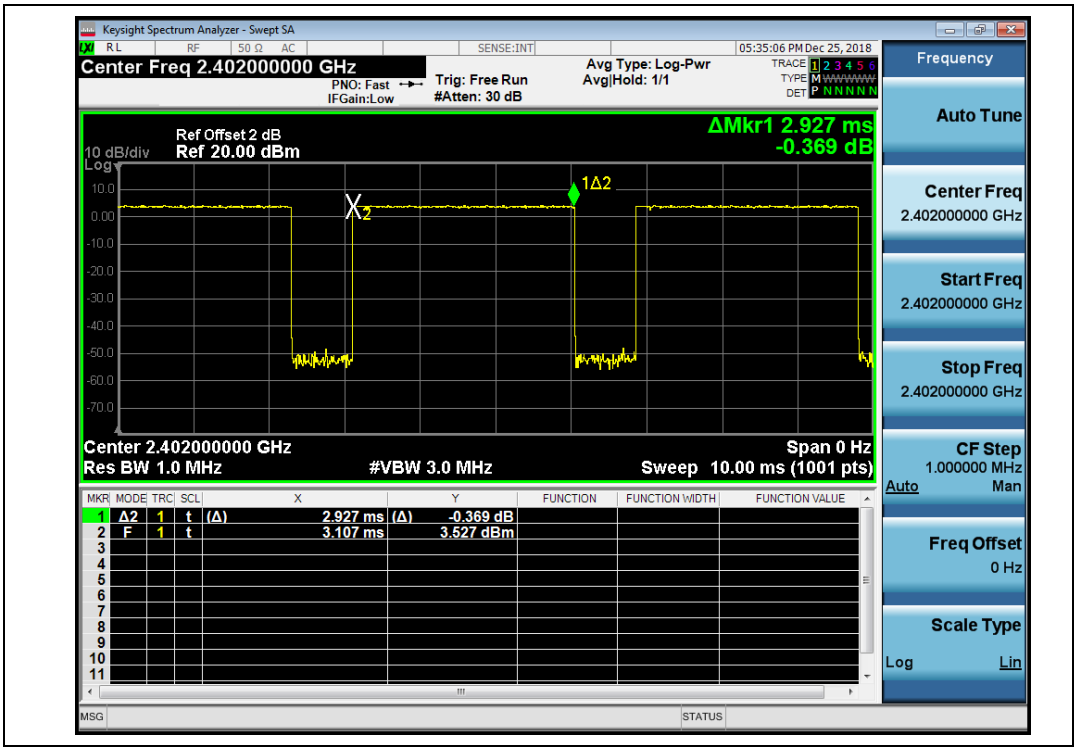
(2DH3_2402M, π/4-DQPSK)



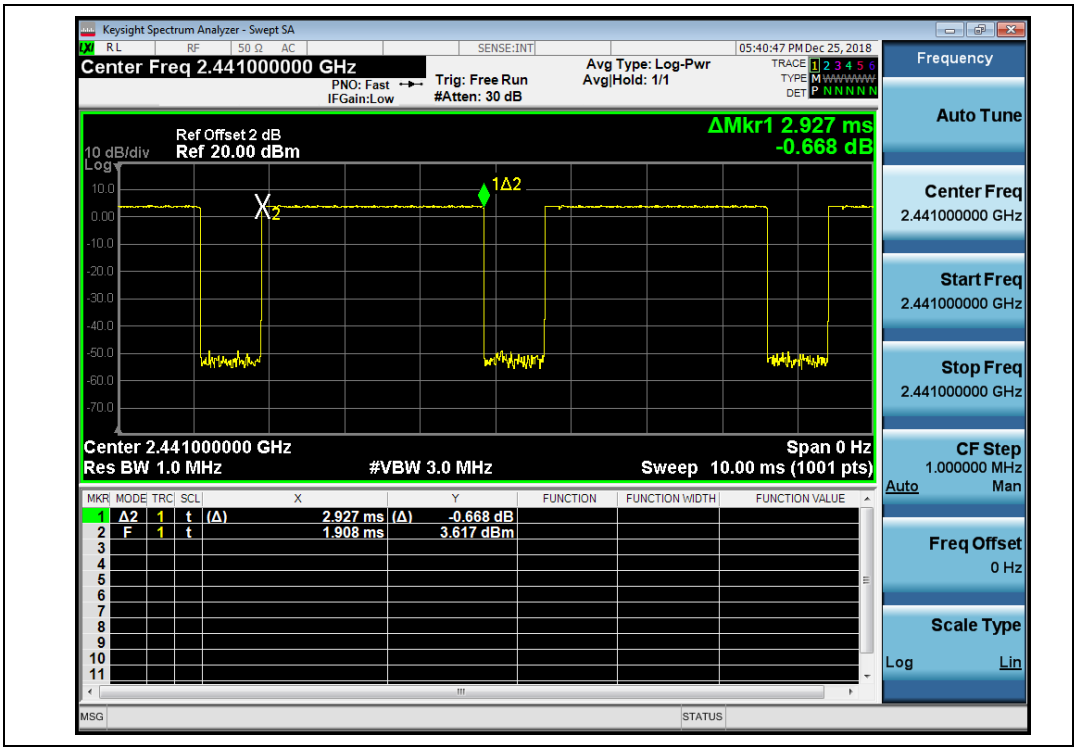
(2DH3_2441M, π/4-DQPSK)



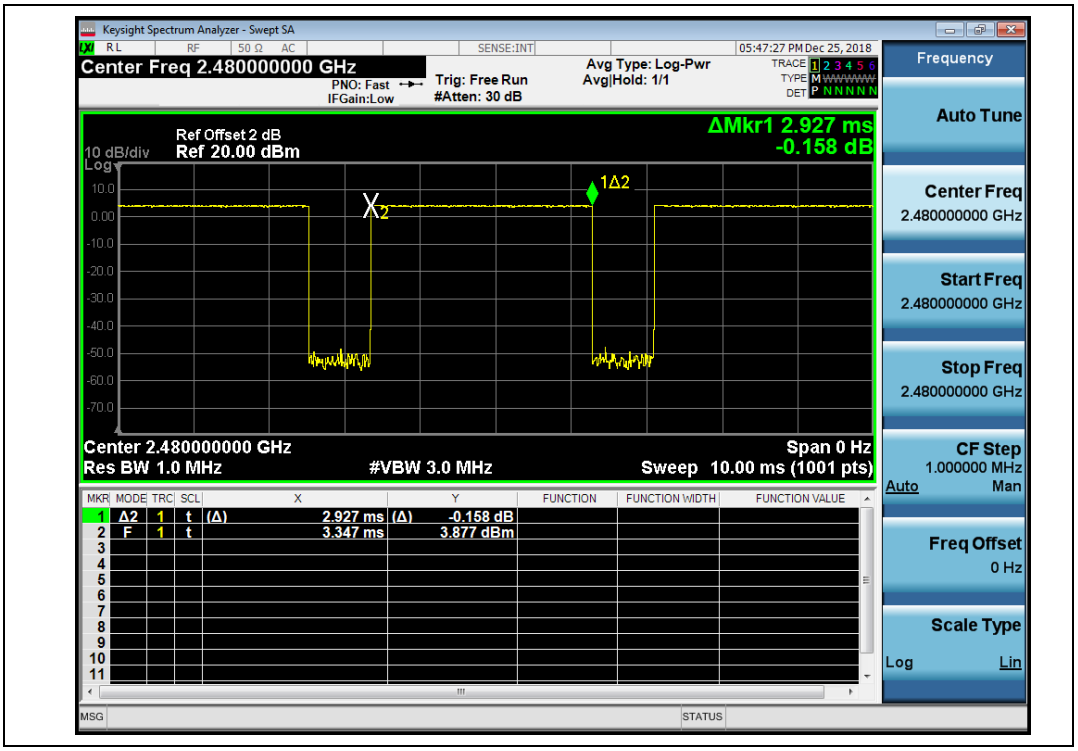
(2DH3_2480M, π/4-DQPSK)



(2DH5_2402M, π/4-DQPSK)



(2DH5_2441M, π/4-DQPSK)



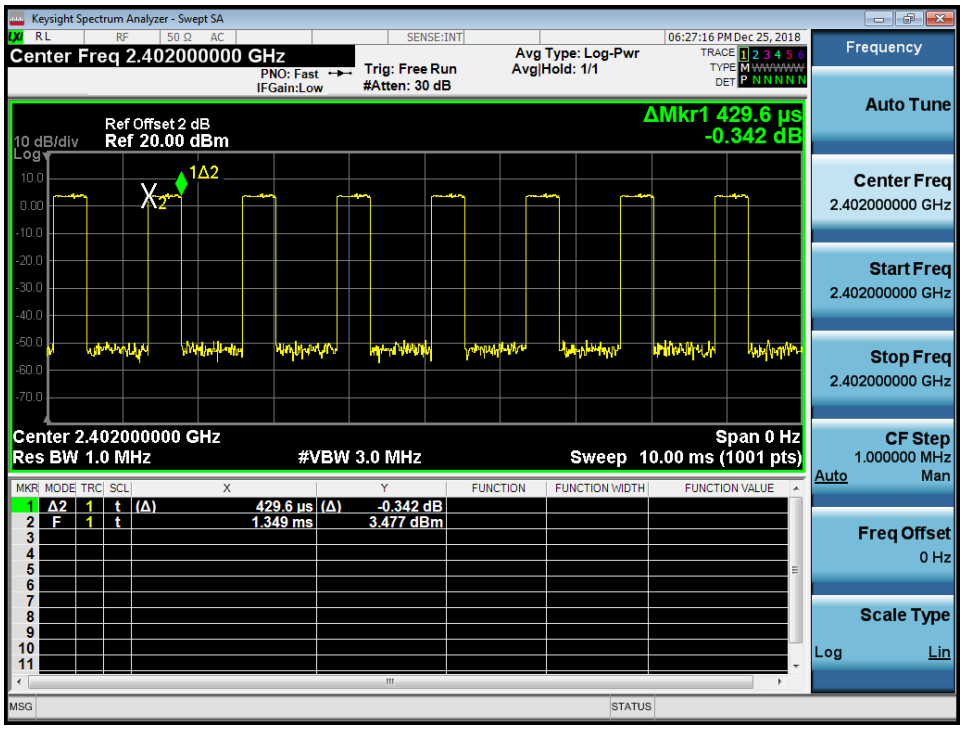
(2DH5_2480M, π/4-DQPSK)

8-DPSK mode

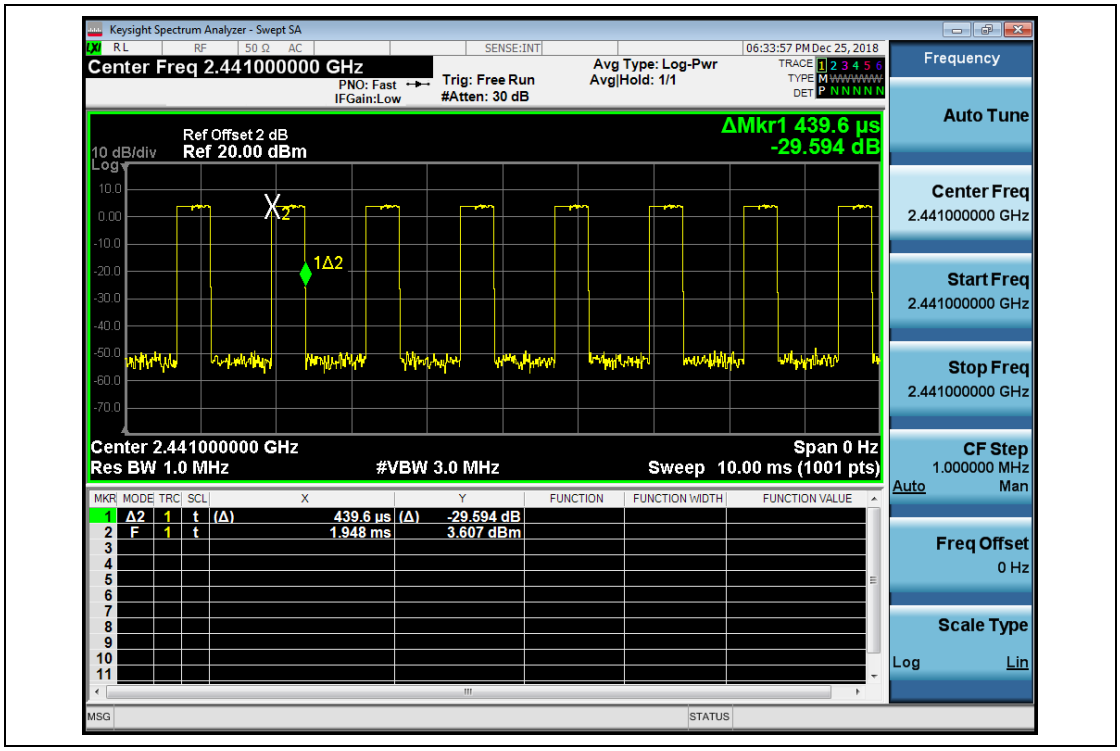
A. Test Verdict:

Mode	Frequency (MHz)	Pulse Width (ms)	Dwell Time (ms)	Limit (sec)	Verdict
3DH1	2402	0.430	137.600	0.4	PASS
	2441	0.440	140.800		PASS
	2480	0.430	137.600		PASS
3DH3	2402	1.678	268.480		PASS
	2441	1.678	268.480		PASS
	2480	1.678	268.480		PASS
3DH5	2402	2.927	312.213		PASS
	2441	2.927	312.213		PASS
	2480	2.927	312.213		PASS

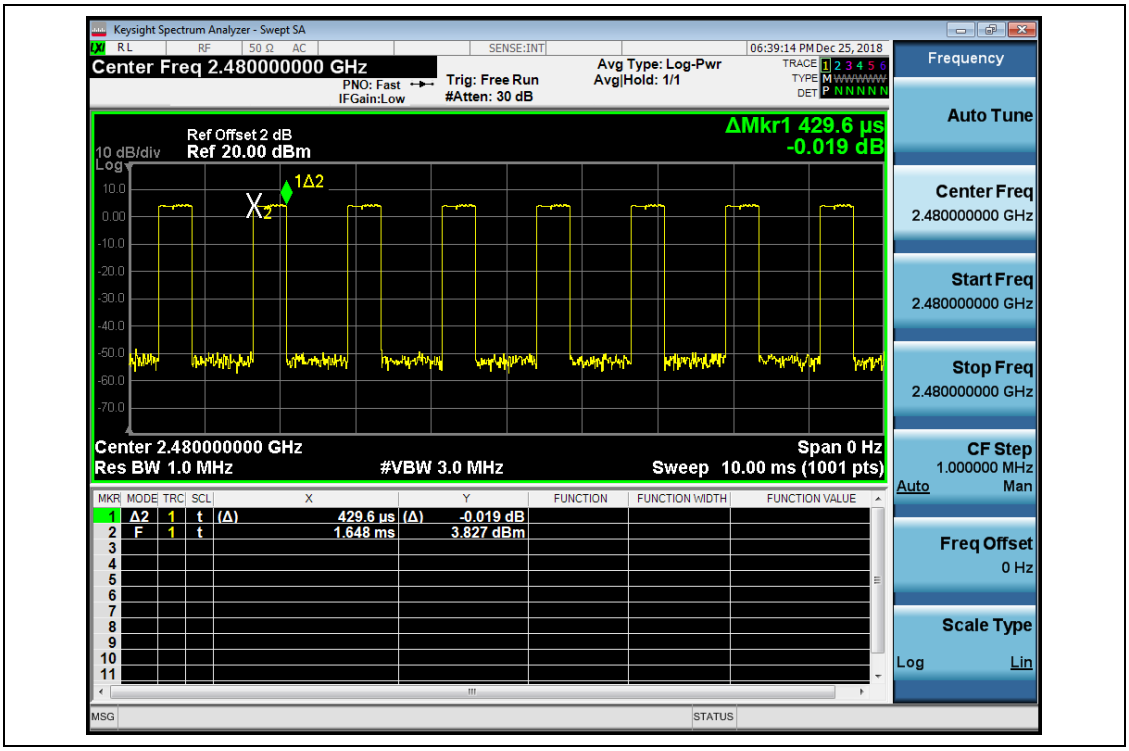
B. Test Plots:



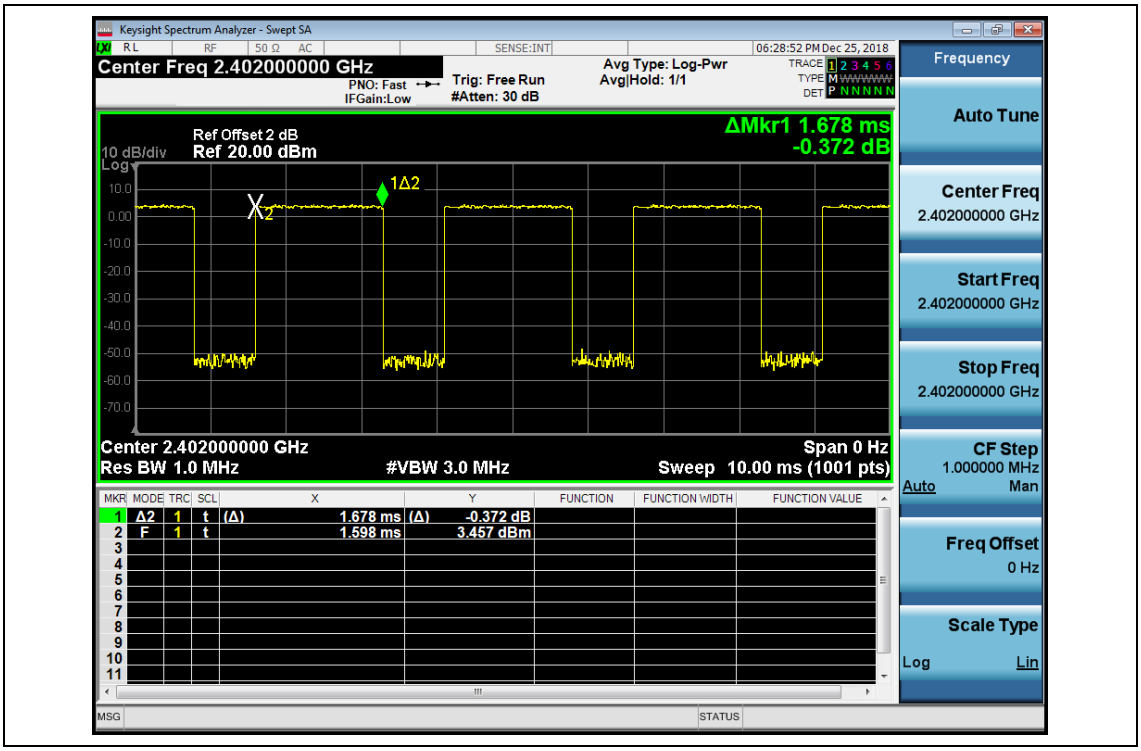
(3DH1_2402M, 8-DQPSK)



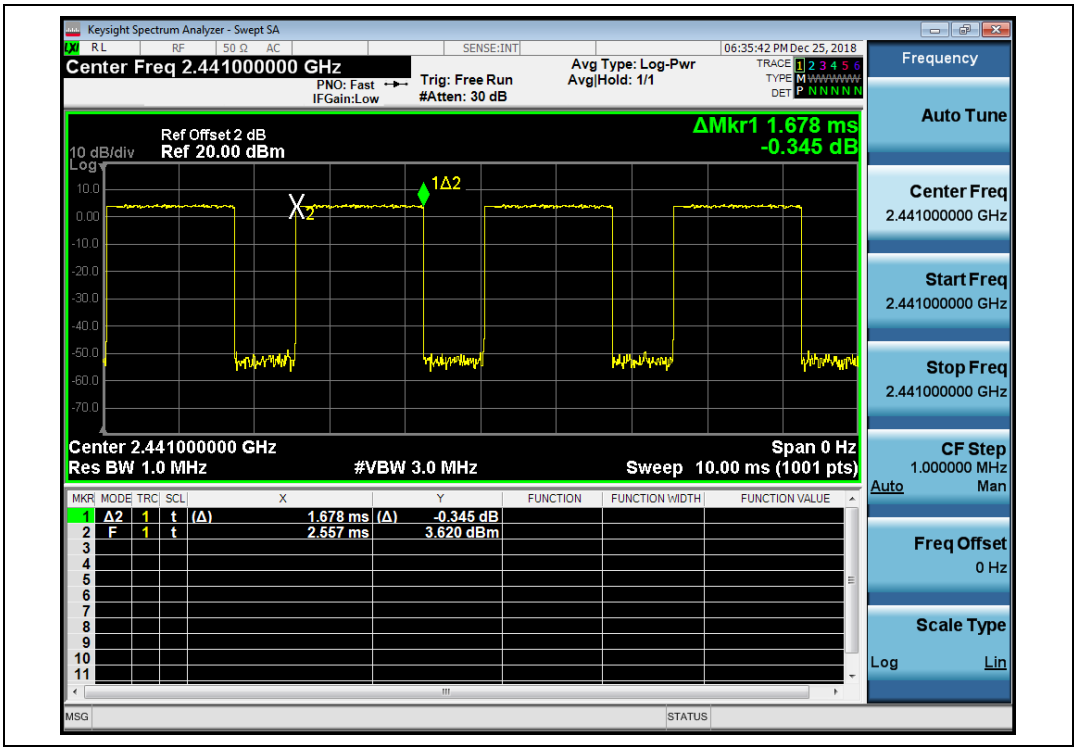
(3DH1_2441M, 8-DQPSK)



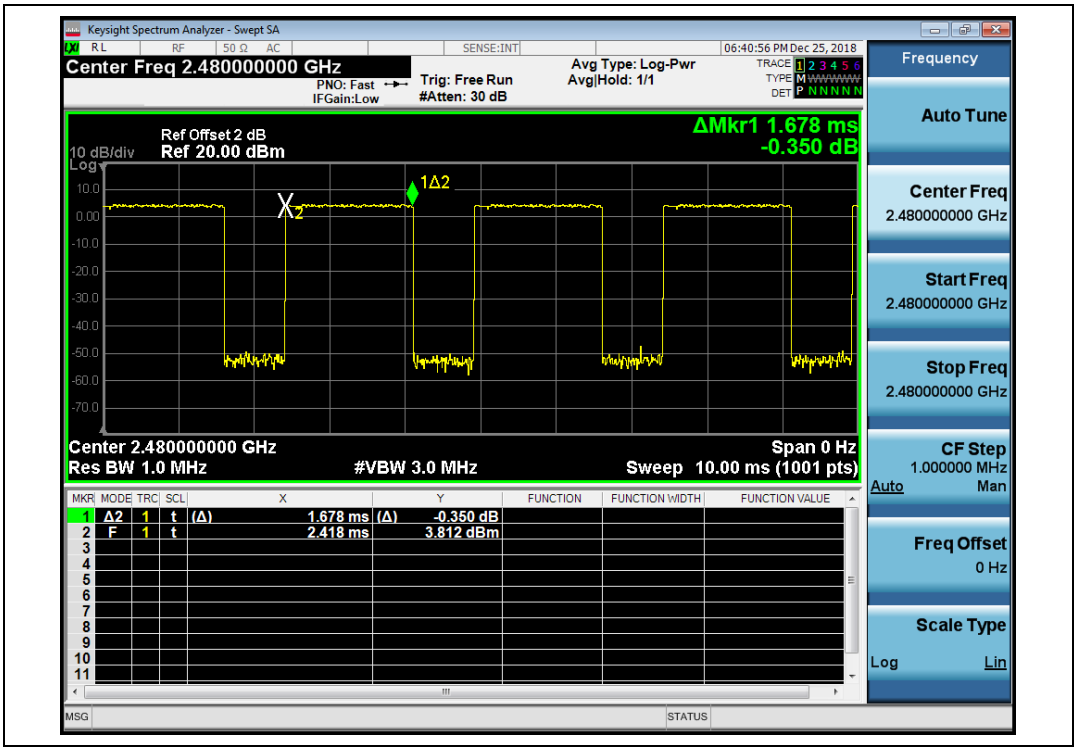
(3DH1_2480M, 8-DQPSK)



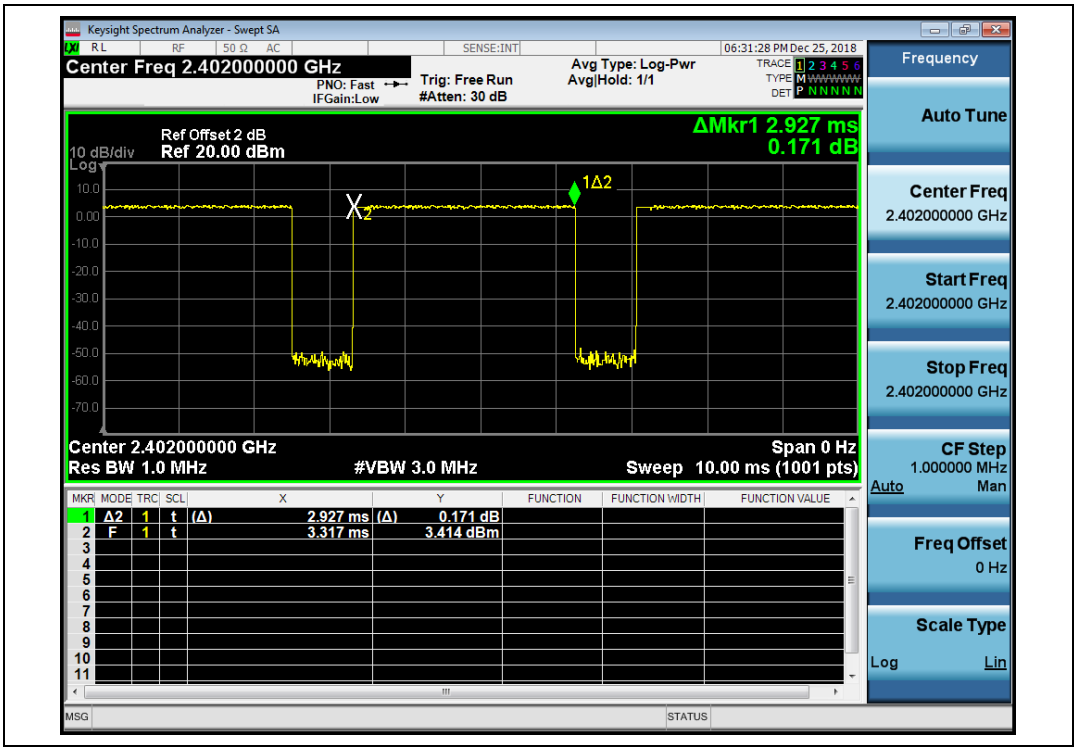
(3DH3_2402M, 8-DQPSK)



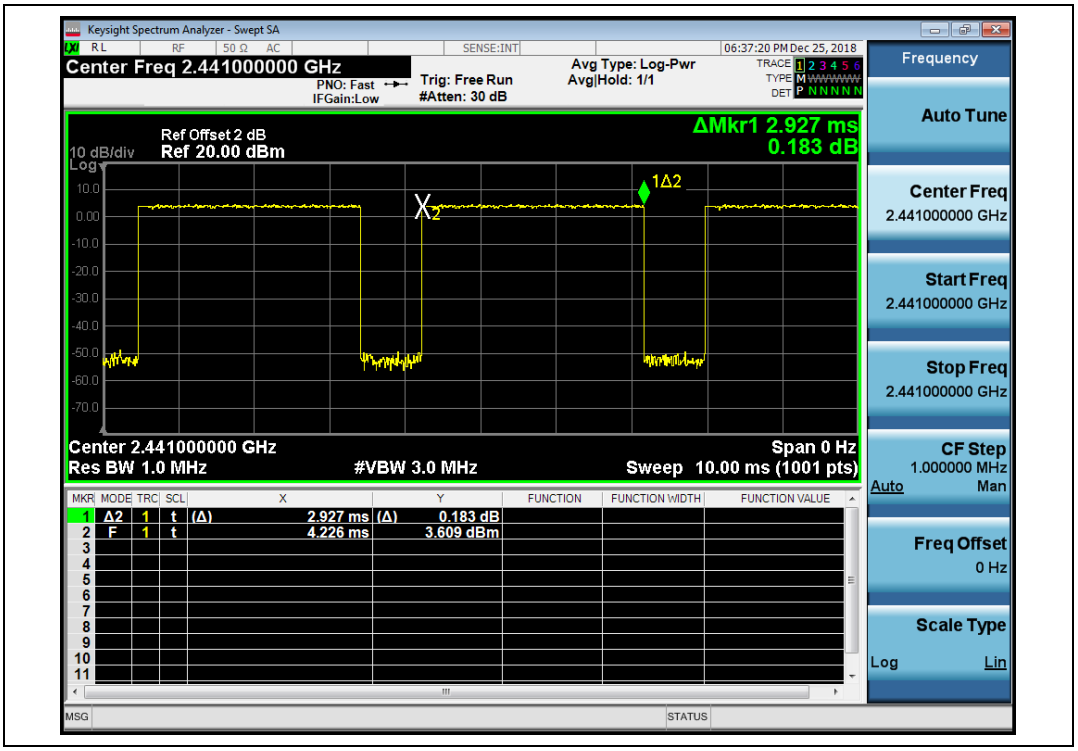
(3DH3_2441M, 8-DQPSK)



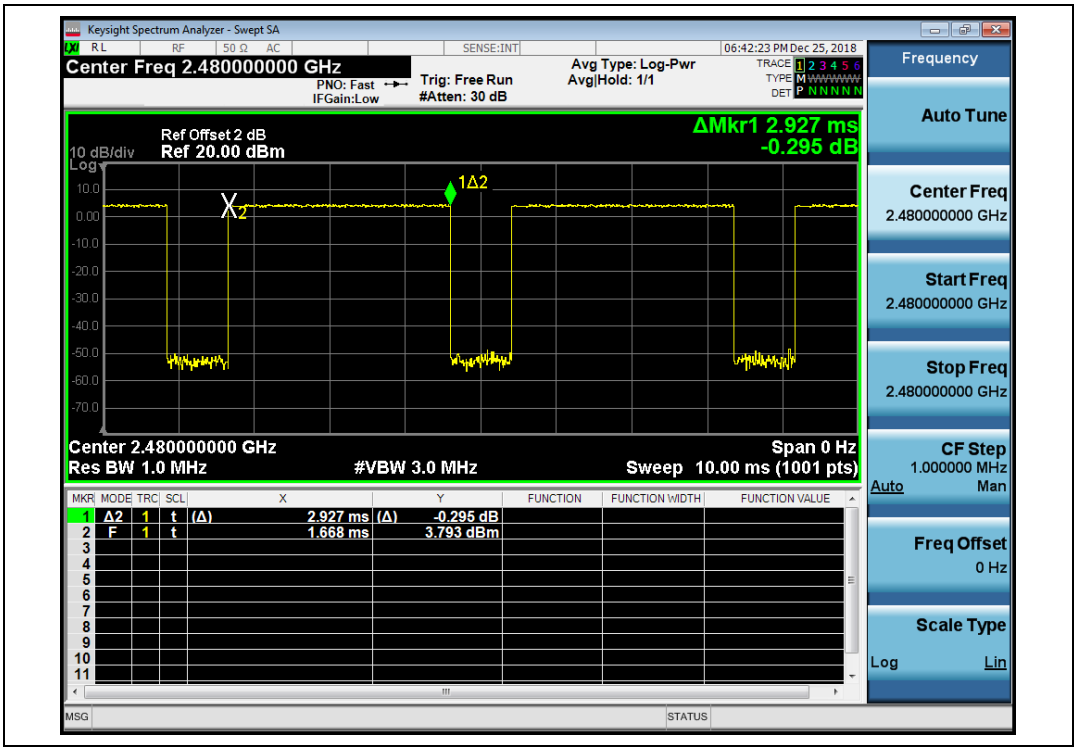
(3DH3_2480M, 8-DQPSK)



(3DH5_2402M, 8-DQPSK)



(3DH5_2441M, 8-DQPSK)



(3DH5_2480M, 8-DQPSK)

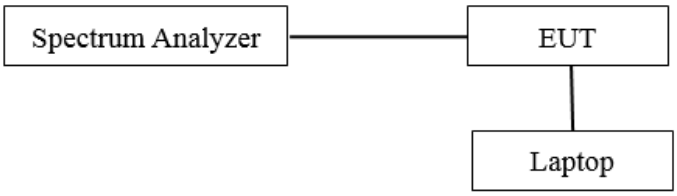
2.7. Conducted Spurious Emissions and Band Edge

2.7.1. Requirement

According to FCC §15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.7.2. Test Description

A. Test Setup:



The EUT (Equipment under the test) is coupled to the Spectrum analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in Spectrum analyzer.

B. Equipments List:

Please refer ANNEX B(4).

2.7.3. Test Result

The Bluetooth Module operates at hopping-off test mode. The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

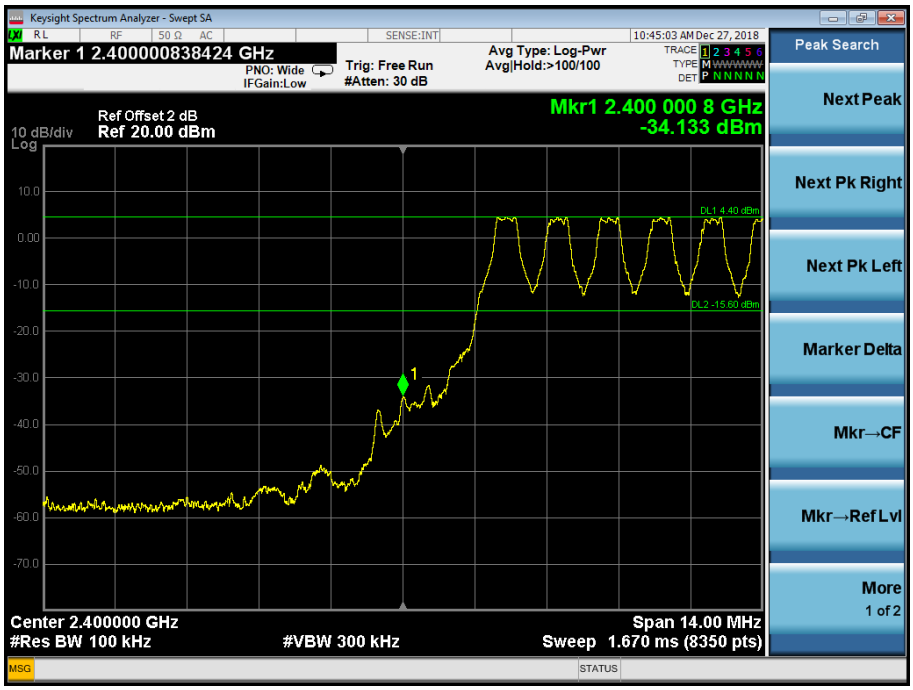
GFSK Mode

A. Test Plots:

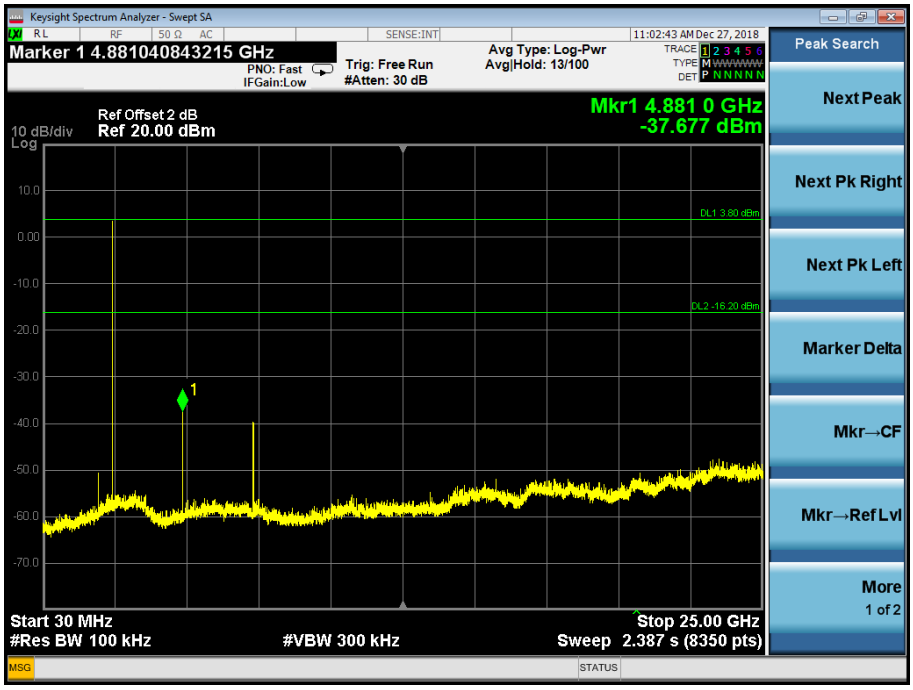
Note: The power of the Module transmitting frequency should be ignored.

(Channel = 0, 30MHz to 25GHz, GFSK Mode)

(Channel = 0, Band edge,GFSK Mode)



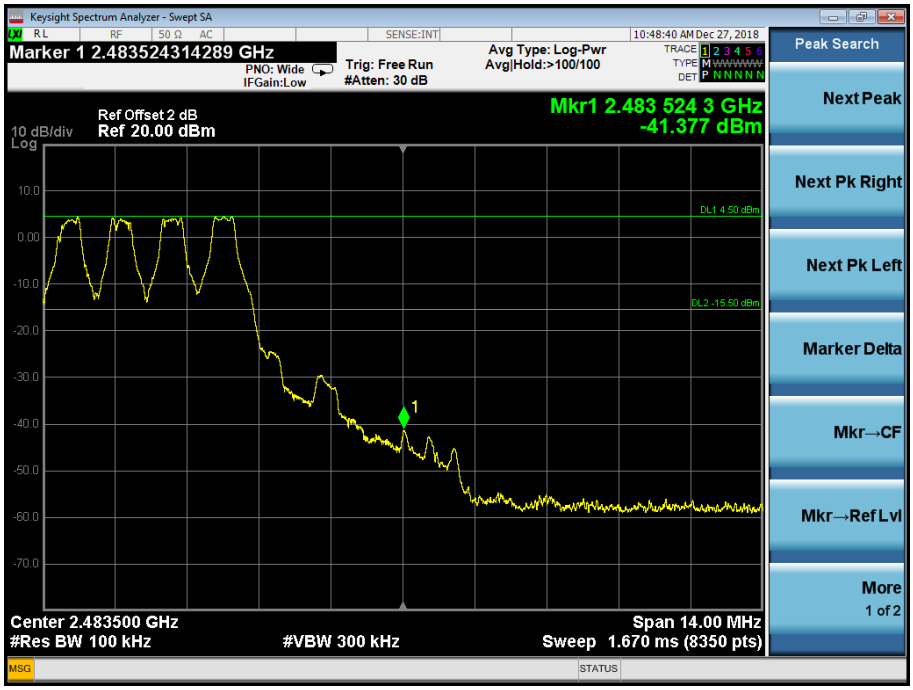
(Channel = 0, Band edge with hopping on, GFSK Mode)



(Channel = 39, 30MHz to 25GHz, GFSK Mode)

(Channel = 78, 30MHz to 25GHz, GFSK Mode)

(Channel = 78, Band edge, GFSK Mode)

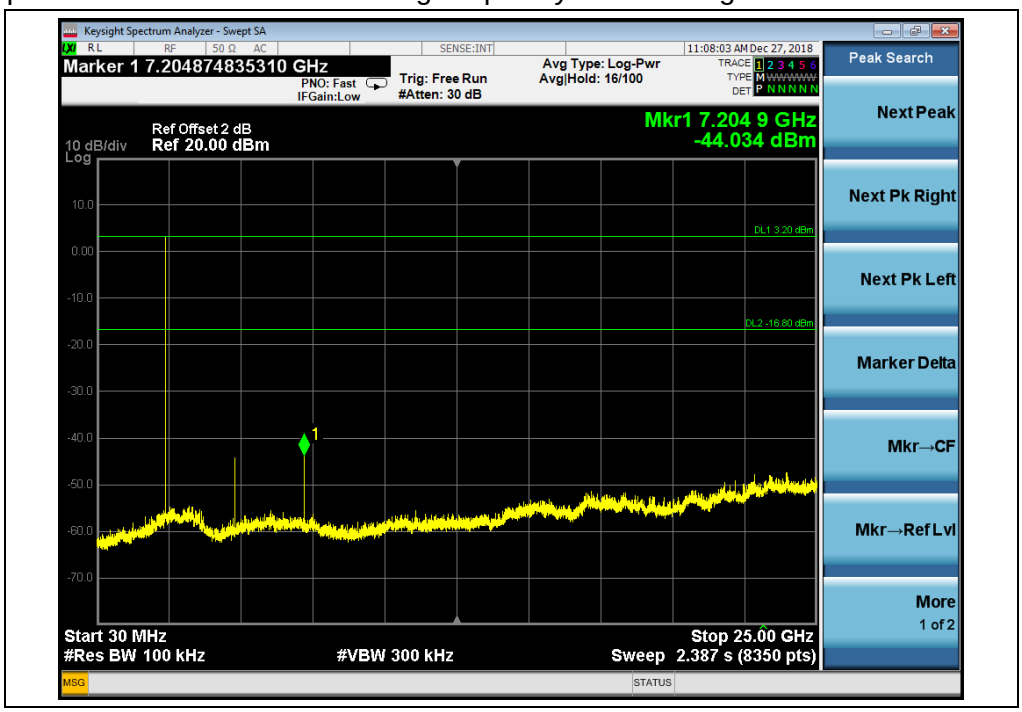


(Channel = 78, Band edge with hopping on, GFSK Mode)

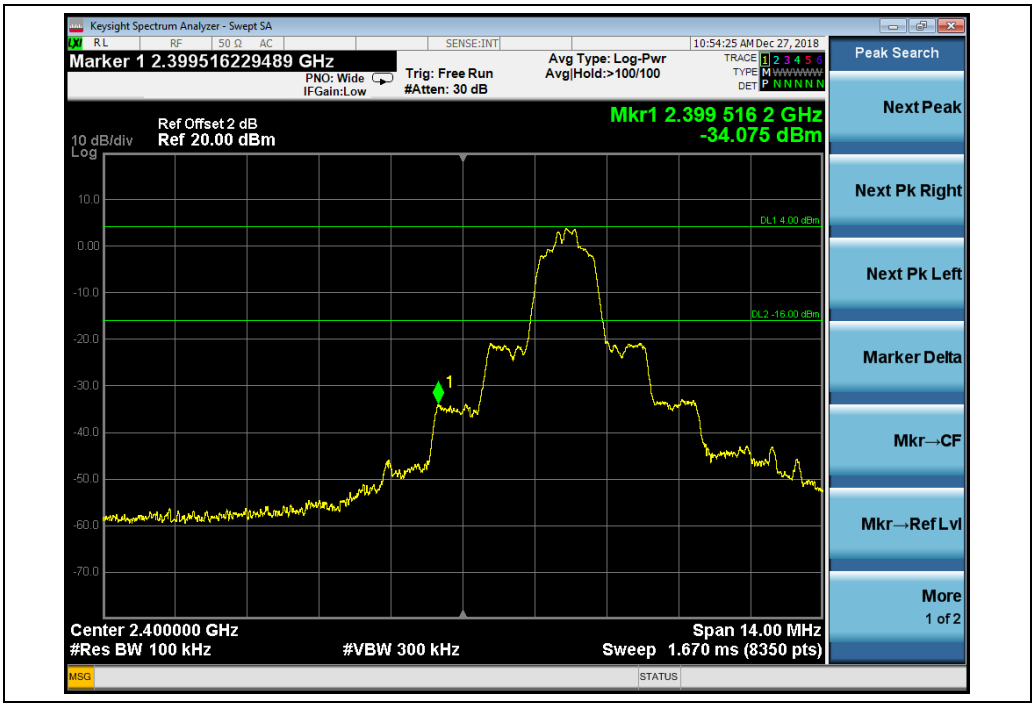
π/4-DQPSK Mode

A. Test Plots:

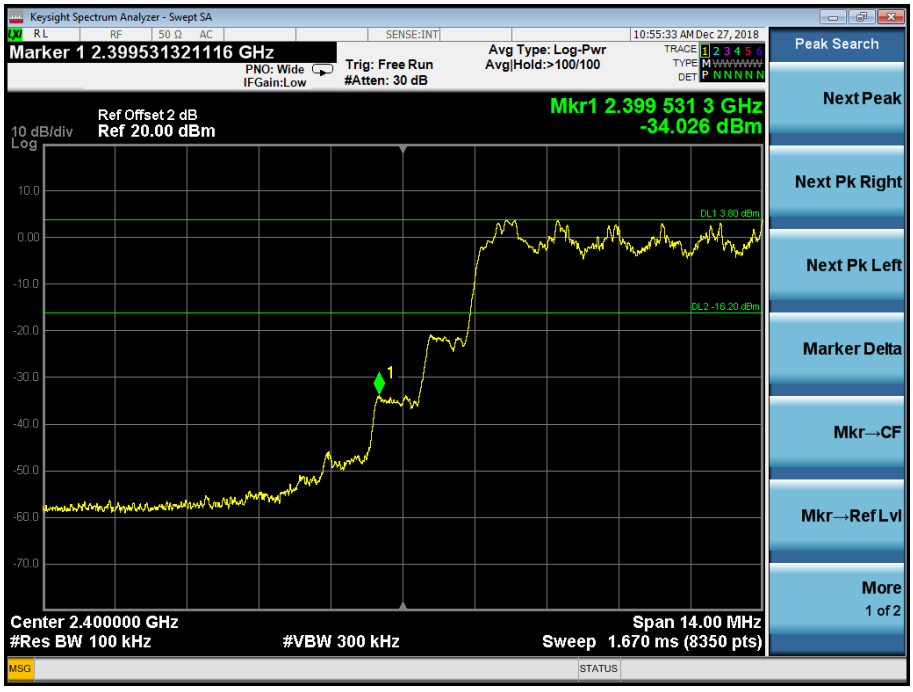
Note: the power of the Module transmitting frequency should be ignored.



(Channel = 0, 30MHz to 25GHz, π/4-DQPSK)



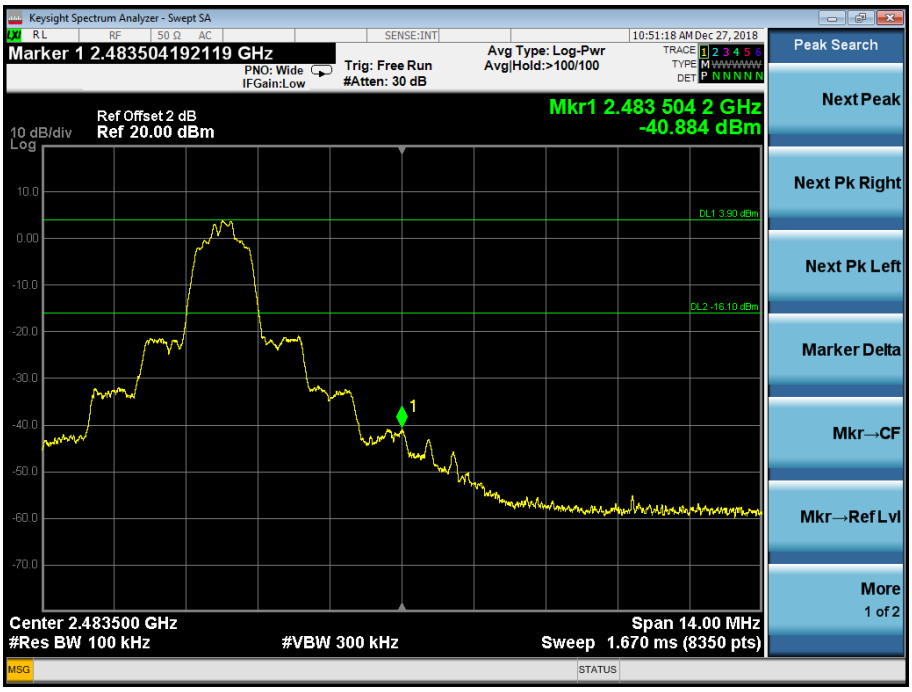
(Channel = 0, Band edge, π/4-DQPSK)



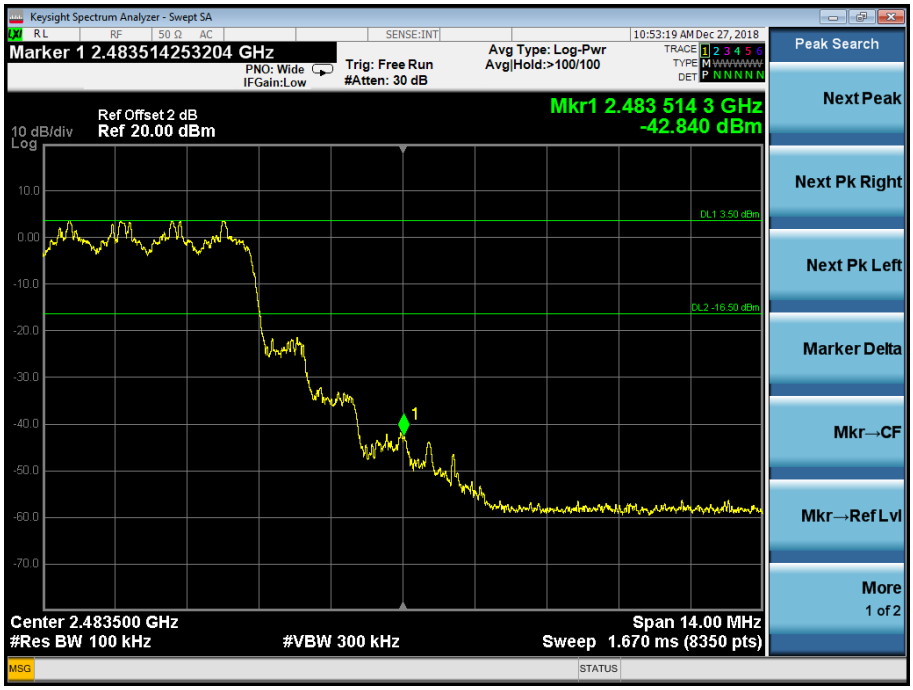
(Channel = 0, Band edge with hopping on, π/4-DQPSK)

(Channel = 39, 30MHz to 25GHz, π/4-DQPSK)

(Channel = 78, 30MHz to 25GHz, π/4-DQPSK)



(Channel = 78, Band edge, π/4-DQPSK)

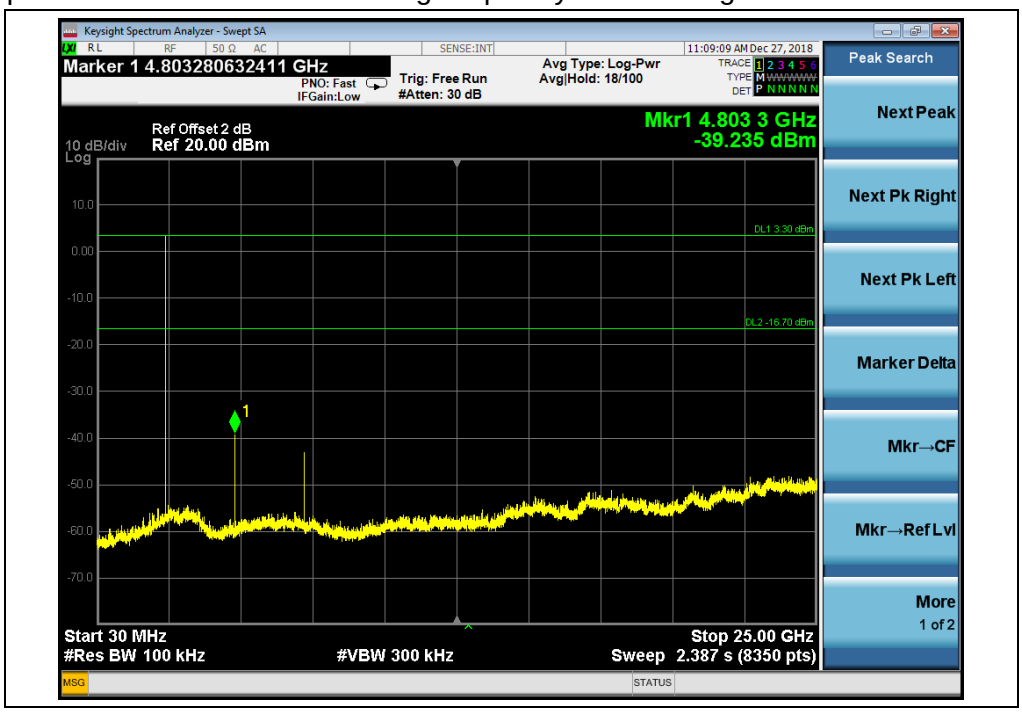


(Channel = 78, Band edge with hopping on, π/4-DQPSK)

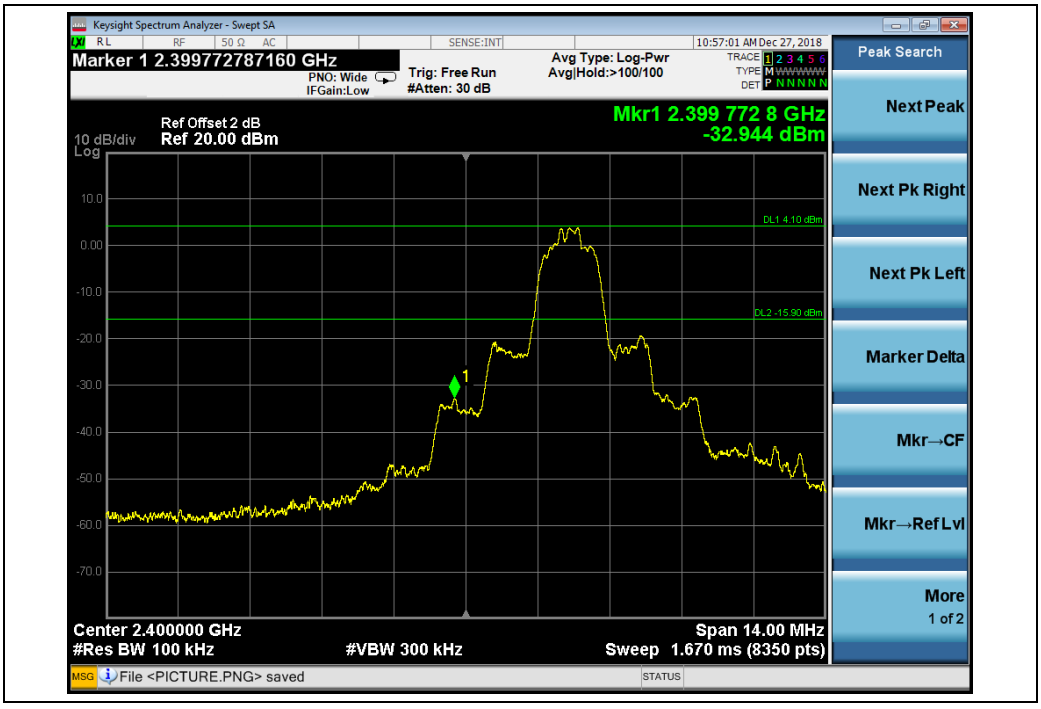
8-DPSK Mode

A. Test Plots:

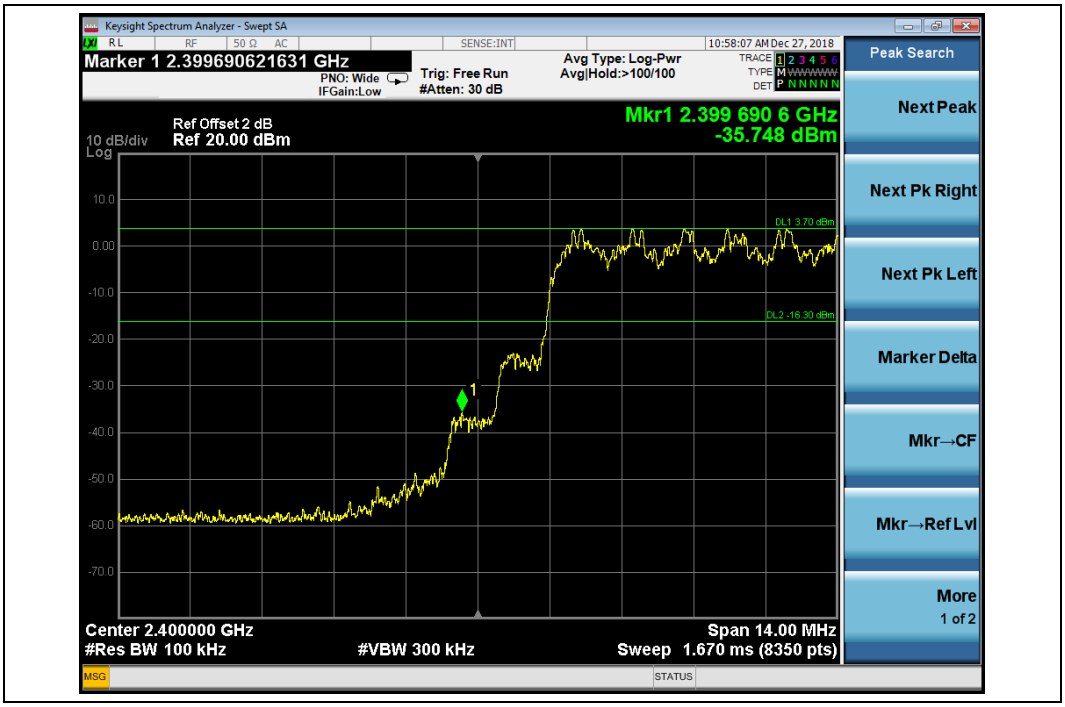
Note: the power of the Module transmitting frequency should be ignored.



(Channel = 0, 30MHz to 25GH, 8-DPSK)



(Channel = 0, Band edge, 8-DPSK)

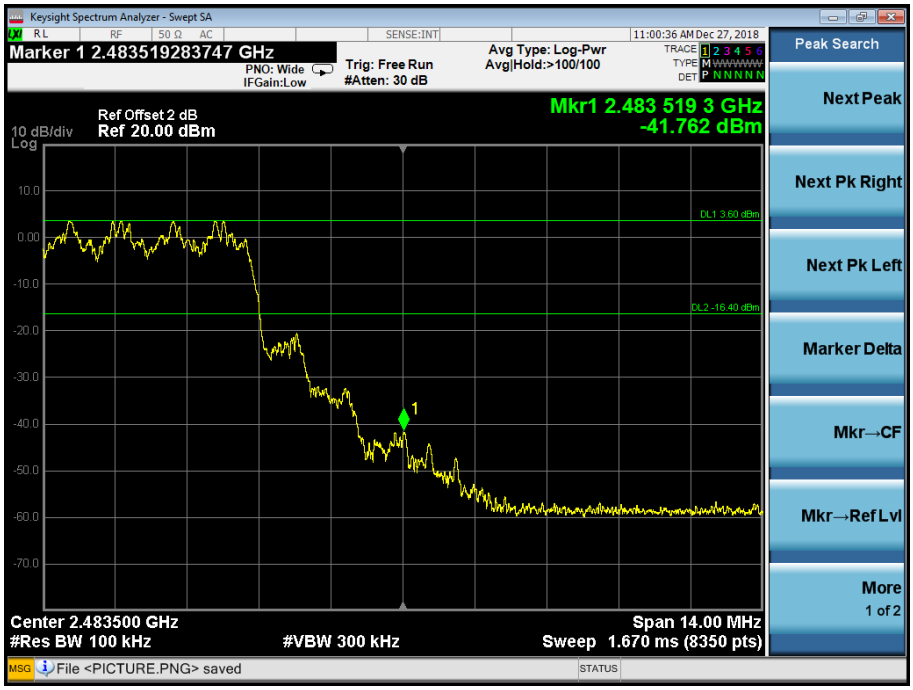


(Channel = 0, Band edge with hopping on, 8-DPSK)

(Channel = 39, 30MHz to 25GHz, 8-DPSK)

(Channel = 78, 30MHz to 25GH, 8-DPSK)

(Channel = 78, Band edge, 8-DPSK)



(Channel = 78, Band edge with hopping on, 8-DPSK)

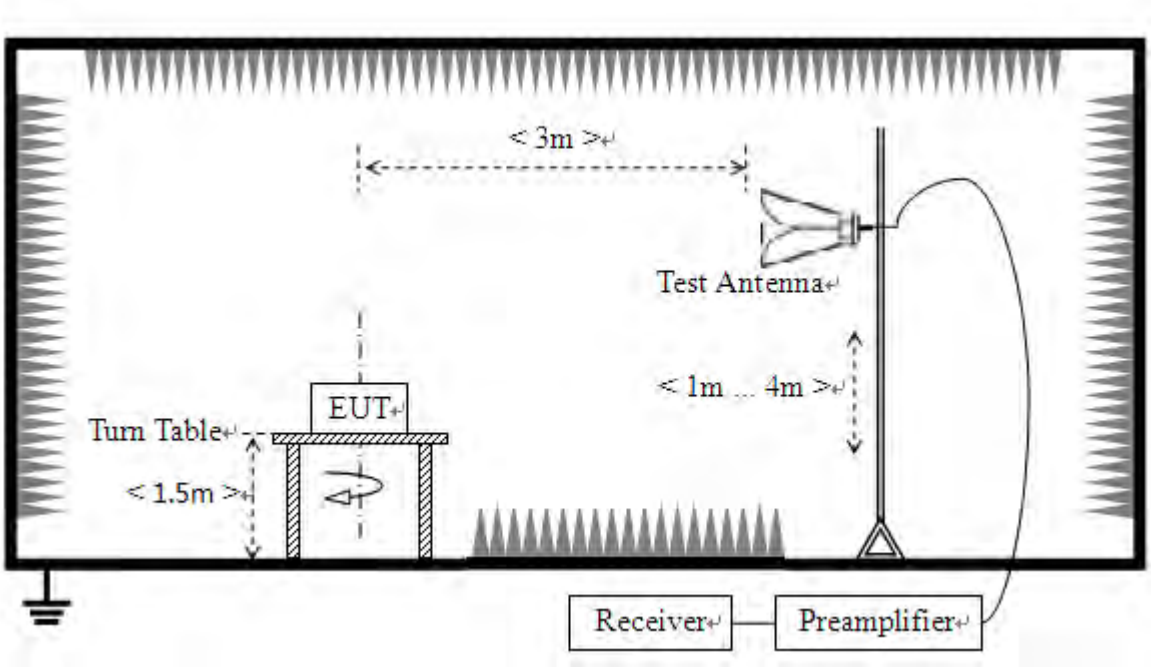
2.8. Restricted Frequency Bands

2.8.1. Requirement

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

2.8.2. Test Description

A. Test Setup:



The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under non hopping-on test mode transmitting 339 bytes DH5, 679 bytes 2DH5 and 1021 bytes 3DH5 packages at maximum power.
For the Test Antenna:

Horn Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

B. Equipments List:

Please refer ANNEX B(4).

2.8.3. Test Result

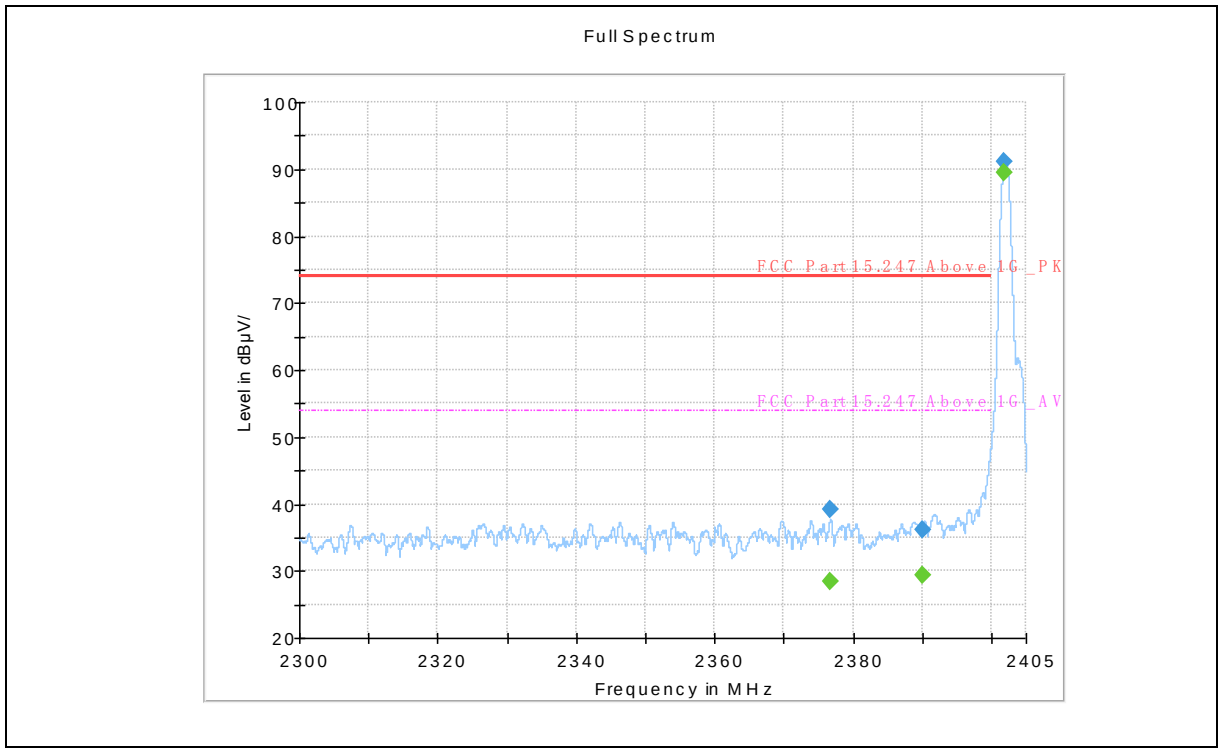
The lowest and highest channels are tested to verify Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] =U_R + A_T + A_{Factor} [dB]; AT =$L_{Cable\ loss}$ [dB]-G_{preamp} [dB]
AT: Total correction Factor except Antenna
UR: Receiver Reading
Gpreamp: Preamplifier Gain
AFactor: Antenna Factor at 3m

Note: The right headset and left headset will work simultaneously during normal use, we selected right headset and left headset simultaneous transmission for fully radiated emission testing.

Test Verdict:

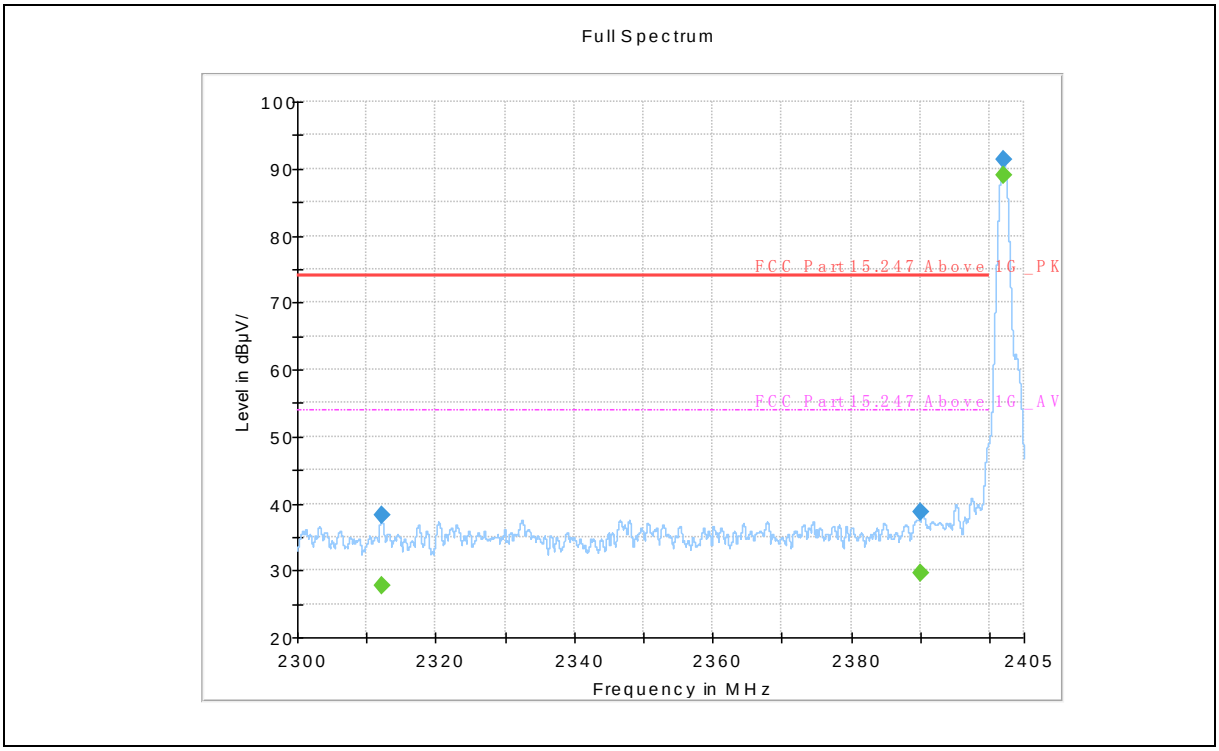
Mode	Channel	Limit (dBμV/m)	Antenna	Verdict
GFSK	0	PK: 74 AV: 54	Horizontal	Pass
	0		Vertical	Pass
	78		Horizontal	Pass
	78		Vertical	Pass
π/4-DQPSK	0		Horizontal	Pass
	0		Vertical	Pass
	78		Horizontal	Pass
	78		Vertical	Pass
8-DPSK	0		Horizontal	Pass
	0		Vertical	Pass
	78		Horizontal	Pass
	78		Vertical	Pass

GFSK Test mode



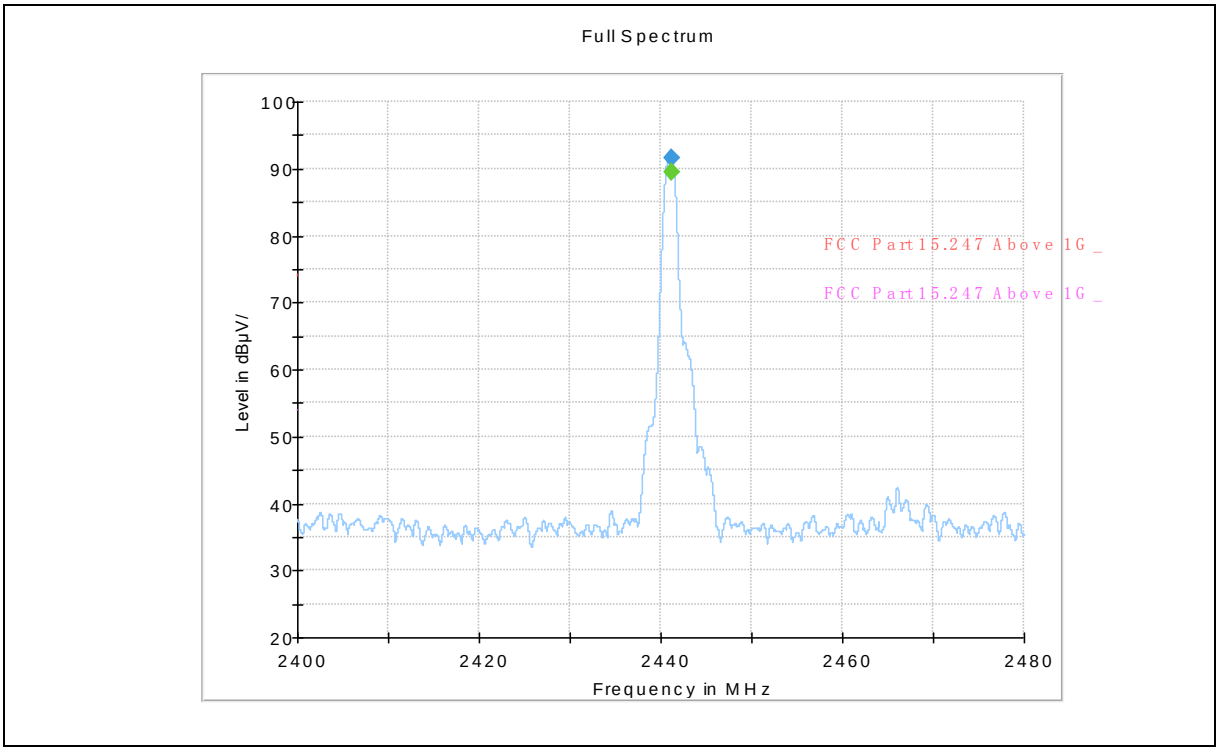
(GFSK _2402MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2376.743333	---	28.43	54.00	25.57	H	7.3
2376.743333	39.20	---	74.00	34.80	H	7.3
2390.002500	36.05	---	74.00	37.95	H	8.0
2390.002500	---	29.29	54.00	24.71	H	8.0
2401.925833	91.17	---	---	---	H	8.7
2401.925833	---	89.41	---	---	H	8.7



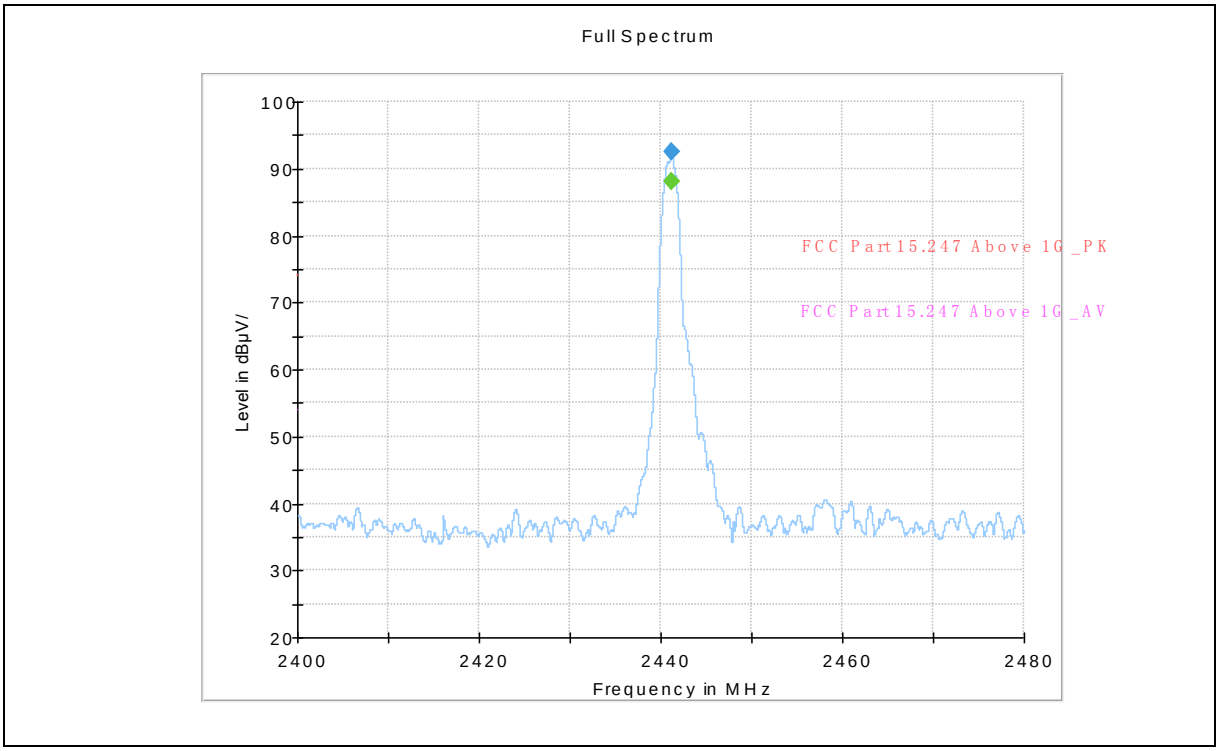
(GFSK _2402MHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2312.115833	38.16	---	74.00	35.84	V	6.8
2312.115833	---	27.66	54.00	26.34	V	6.8
2390.002500	38.69	---	74.00	35.31	V	8.0
2390.002500	---	29.54	54.00	24.46	V	8.0
2402.159167	---	88.94	---	---	V	8.7
2402.159167	91.27	---	---	---	V	8.7



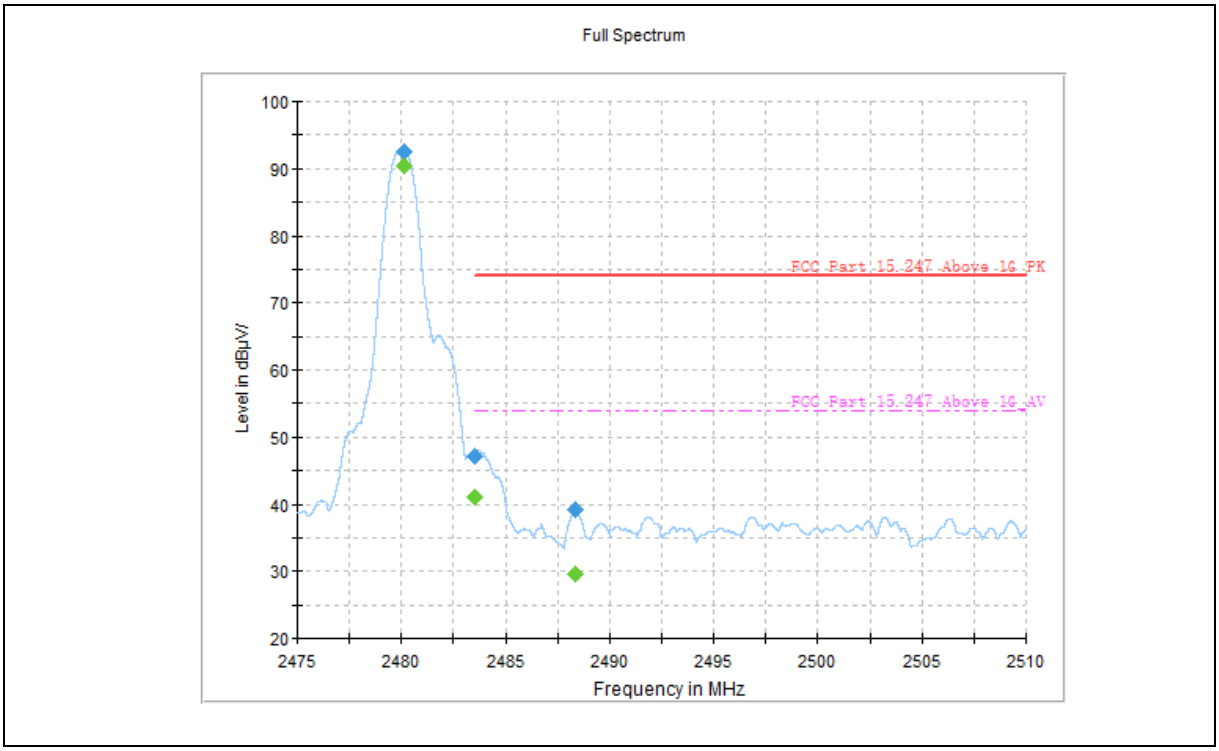
(GFSK _2441MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2441.133333	---	89.39	---	---	H	7.8
2441.133333	91.53	---	---	---	H	7.8



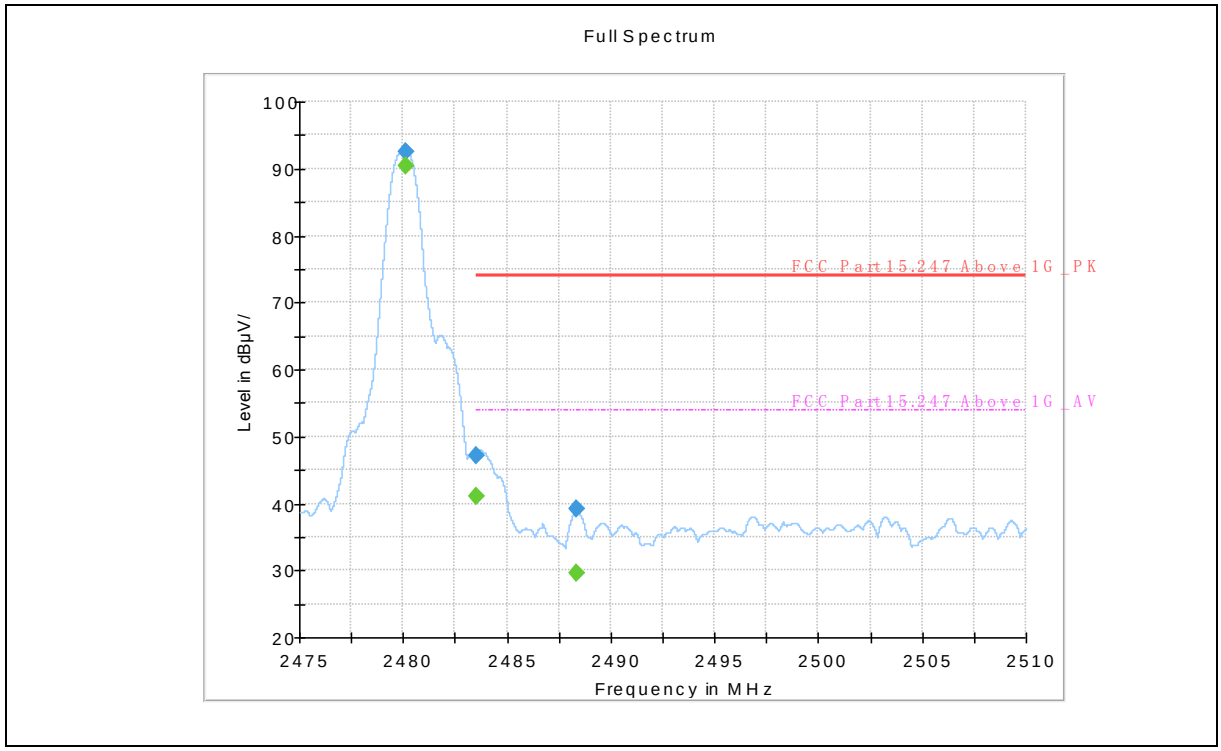
(GFSK _2441MHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2441.191111	---	88.01	---	---	V	7.8
2441.191111	92.56	---	---	---	V	7.8



(GFSK _2480MHz, Antenna Horizontal)

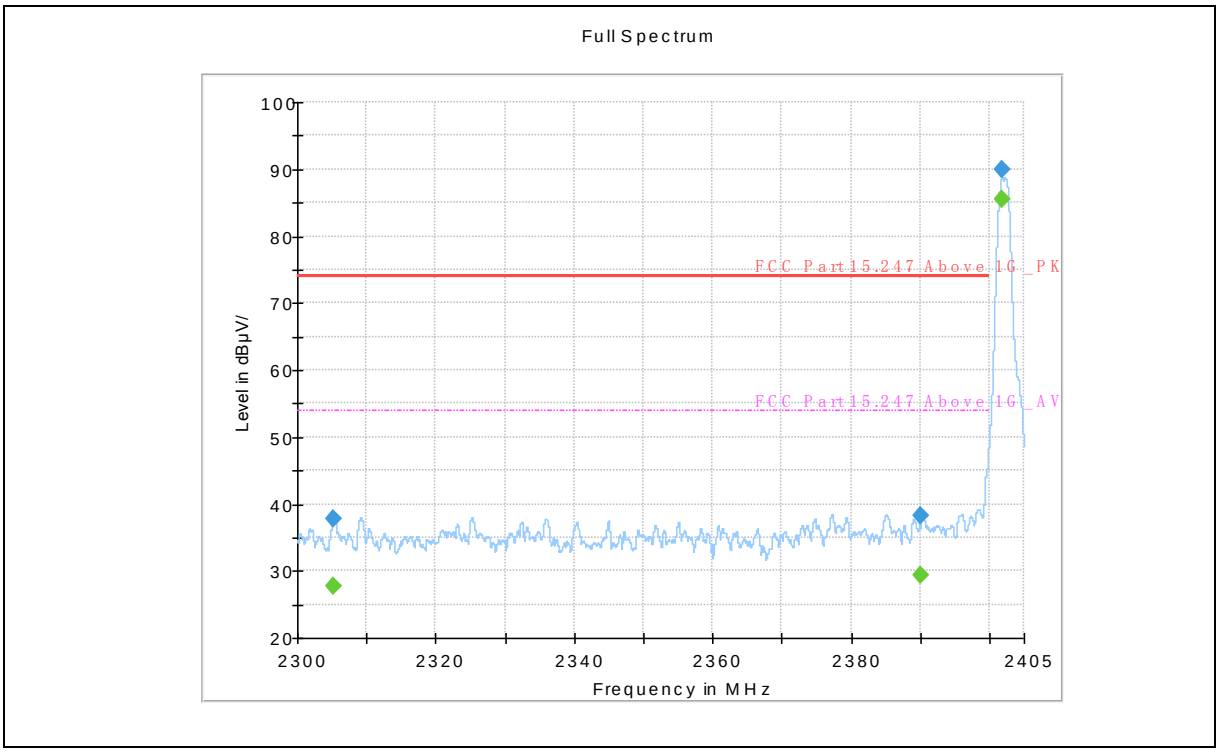
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2480.137222	92.61	---	---	---	H	8.2
2480.137222	---	90.41	---	---	H	8.2
2483.501111	---	41.11	54.00	12.89	H	8.3
2483.501111	47.03	---	74.00	26.97	H	8.3
2488.354445	39.17	---	74.00	34.83	H	8.4
2488.354445	---	29.62	54.00	24.38	H	8.4



(GFSK _2480MHz, Antenna Vertical)

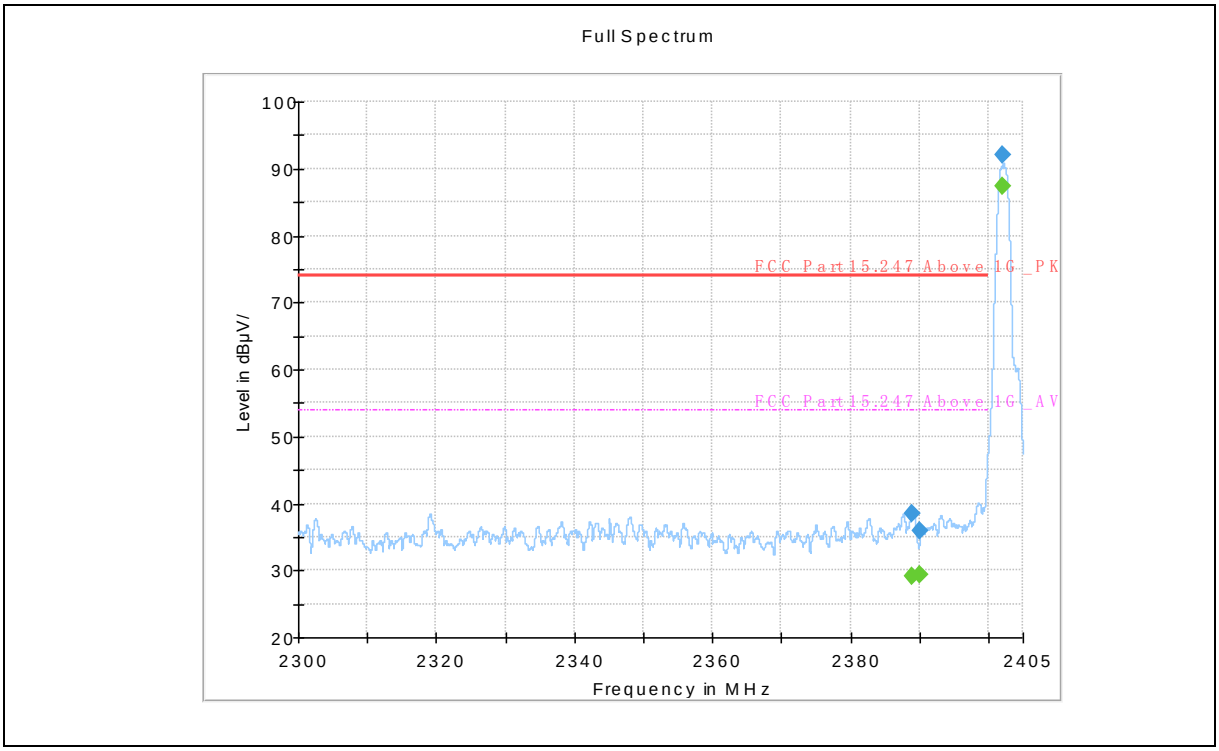
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2480.437824	92.41	---	---	---	V	8.2
2480.437524	---	90.32	---	---	V	8.2
2483.702179	---	41.91	54.00	12.89	V	8.3
2483.702179	47.52	---	74.00	26.97	V	8.3
2488.354665	39.24	---	74.00	34.83	V	8.4
2488.354665	---	29.71	54.00	24.38	V	8.4

π/4-DQPSK Test mode



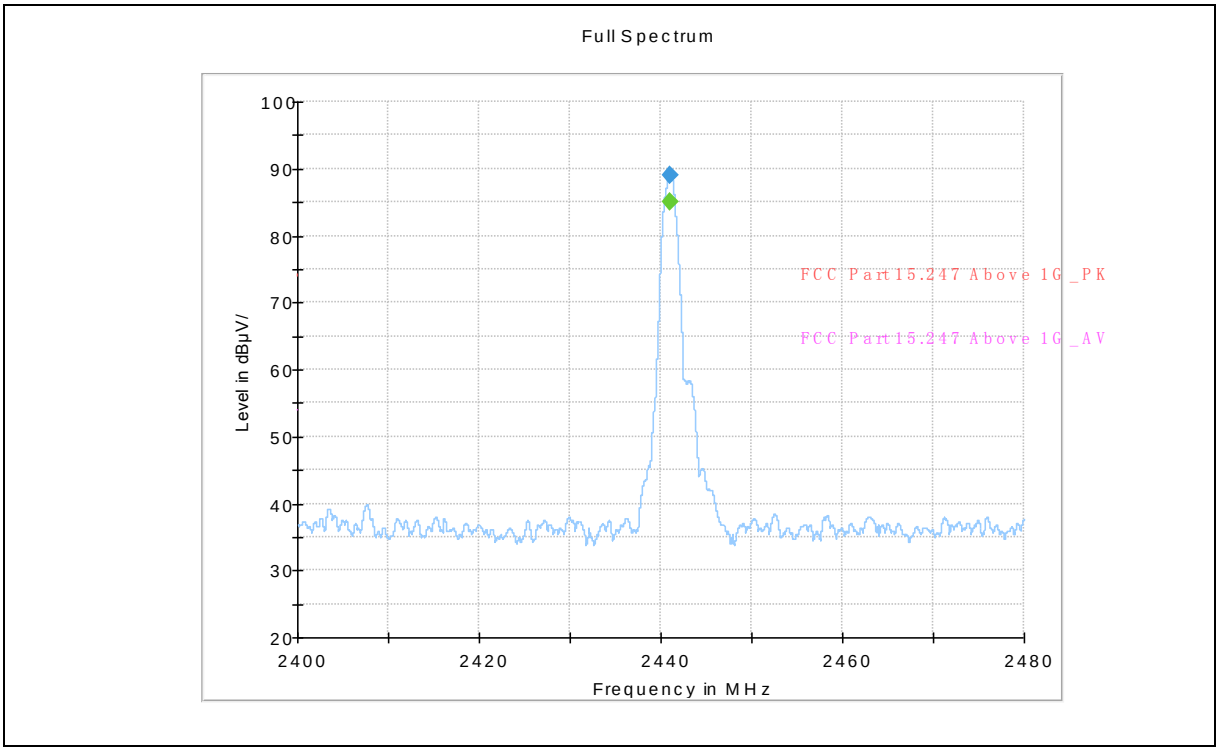
(π/4-DQPSK _2402MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2305.267500	---	27.83	54.00	26.17	H	6.6
2305.267500	37.79	---	74.00	36.21	H	6.6
2390.002500	38.25	---	74.00	35.75	H	8.0
2390.002500	---	29.46	54.00	24.54	H	8.0
2401.902500	89.84	---	---	---	H	8.7
2401.902500	---	85.60	---	---	H	8.7



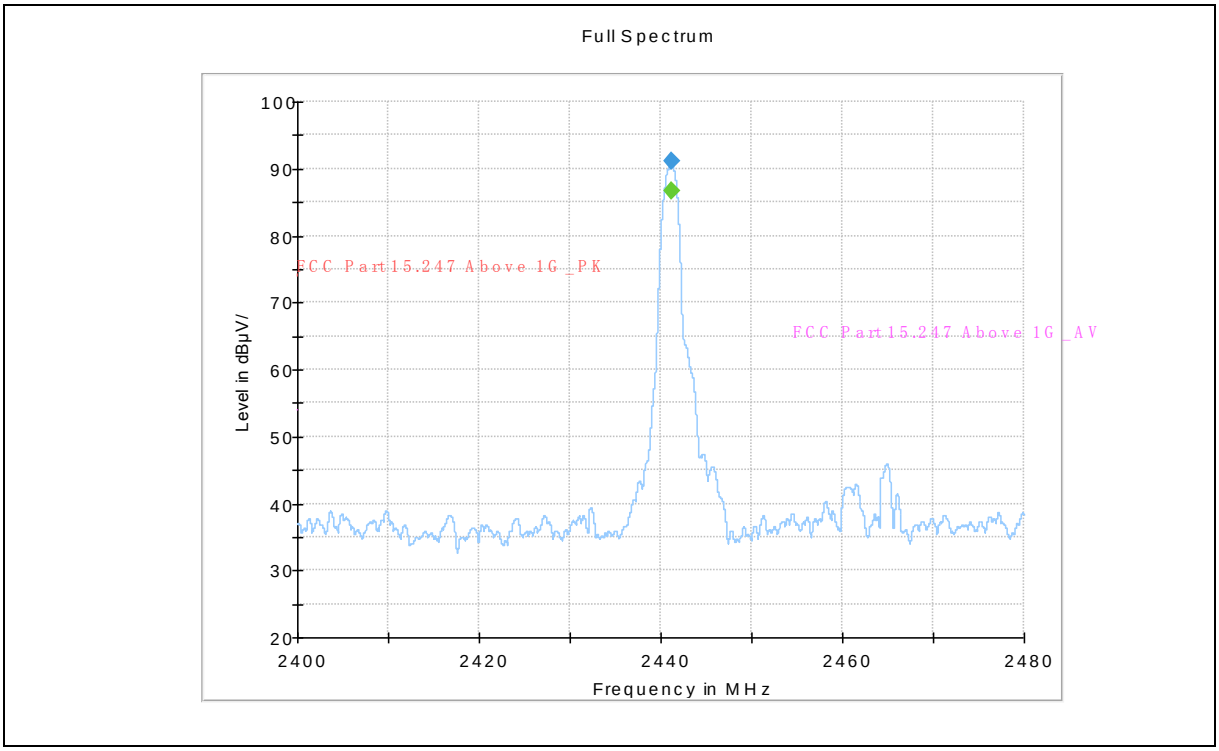
(π/4-DQPSK _2402MHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2389.034167	38.40	---	74.00	35.60	V	7.9
2389.034167	---	29.05	54.00	24.95	V	7.9
2390.002500	---	29.30	54.00	24.70	V	8.0
2390.002500	36.01	---	74.00	38.00	V	8.0
2402.165000	91.94	---	---	---	V	8.7
2402.165000	---	87.43	---	---	V	8.7



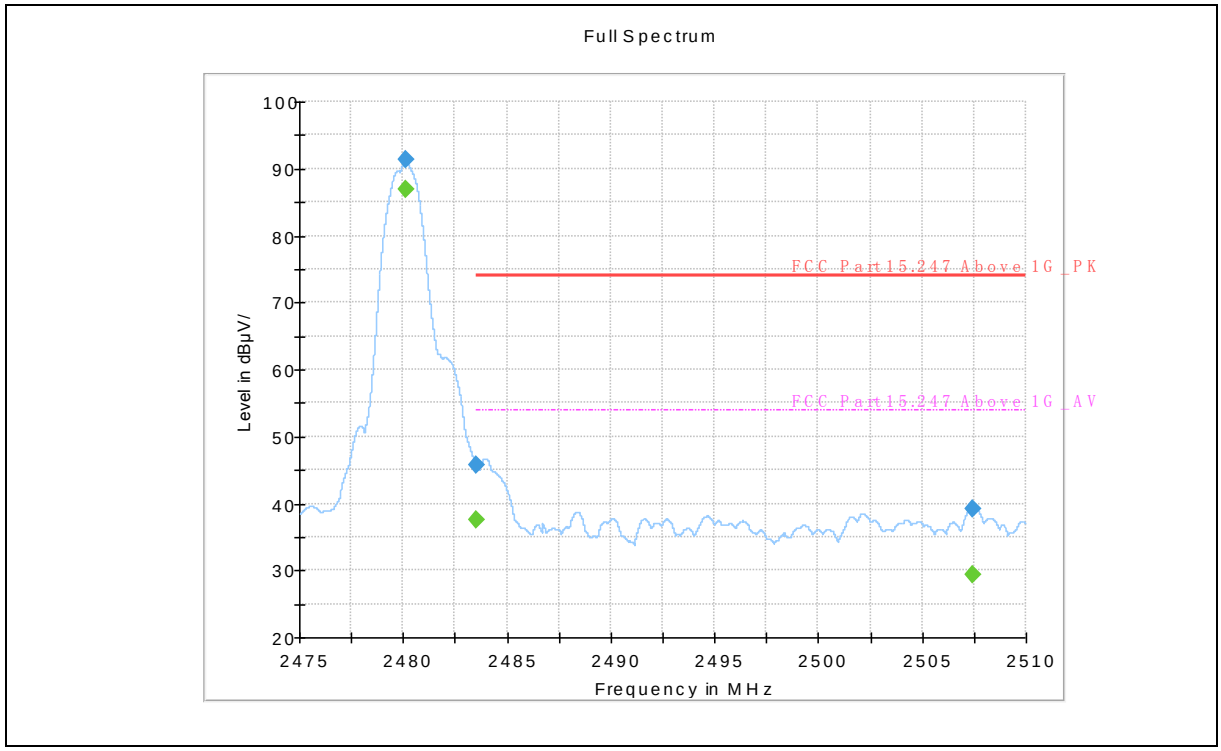
(π/4-DQPSK _2441MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2441.013333	---	84.98	---	---	H	7.8
2441.013333	89.03	---	---	---	H	7.8



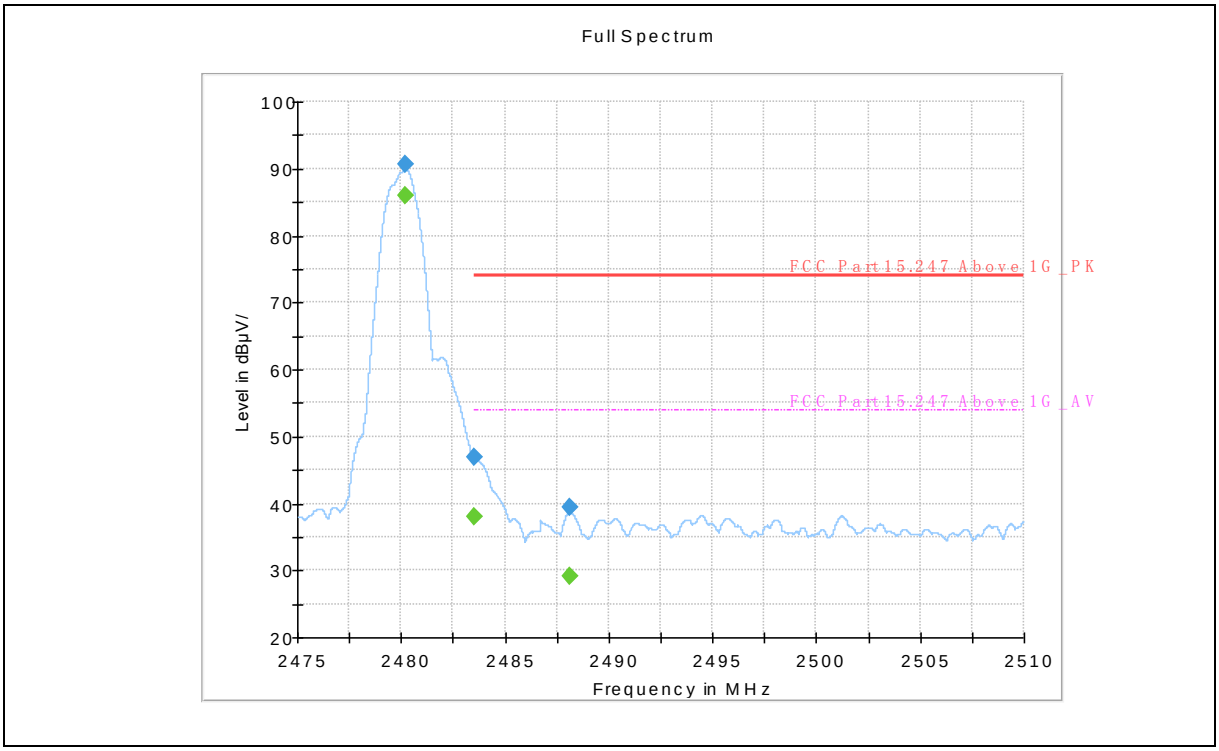
(π/4-DQPSK _2441MHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2441.231111	---	86.56	---	---	V	7.8
2441.231111	91.21	---	---	---	V	7.8



(π/4-DQPSK _2480MHz, Antenna Horizontal)

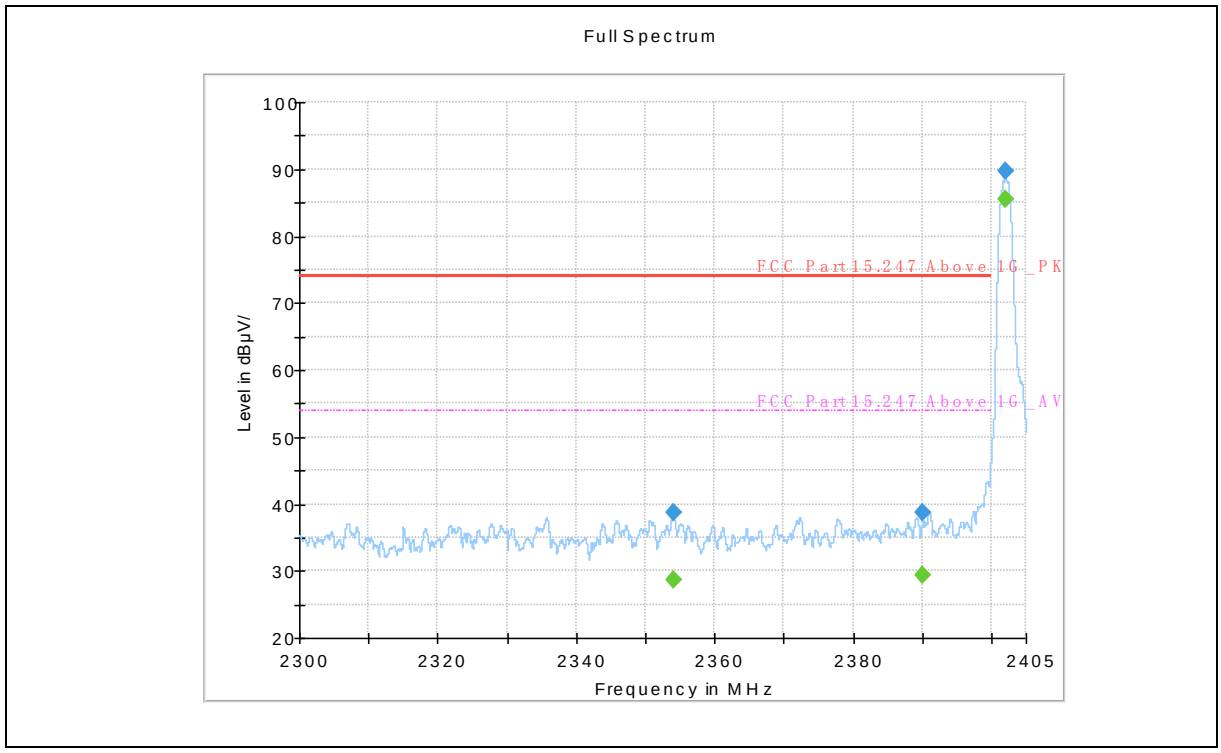
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2480.139167	---	86.85	---	---	H	8.2
2480.139167	91.31	---	---	---	H	8.2
2483.501111	45.69	---	74.00	28.31	H	8.3
2483.501111	---	37.44	54.00	16.56	H	8.3
2507.450833	39.28	---	74.00	34.72	H	8.3
2507.450833	---	29.31	54.00	24.69	H	8.3



(π/4-DQPSK _2480MHz, Antenna Vertical)

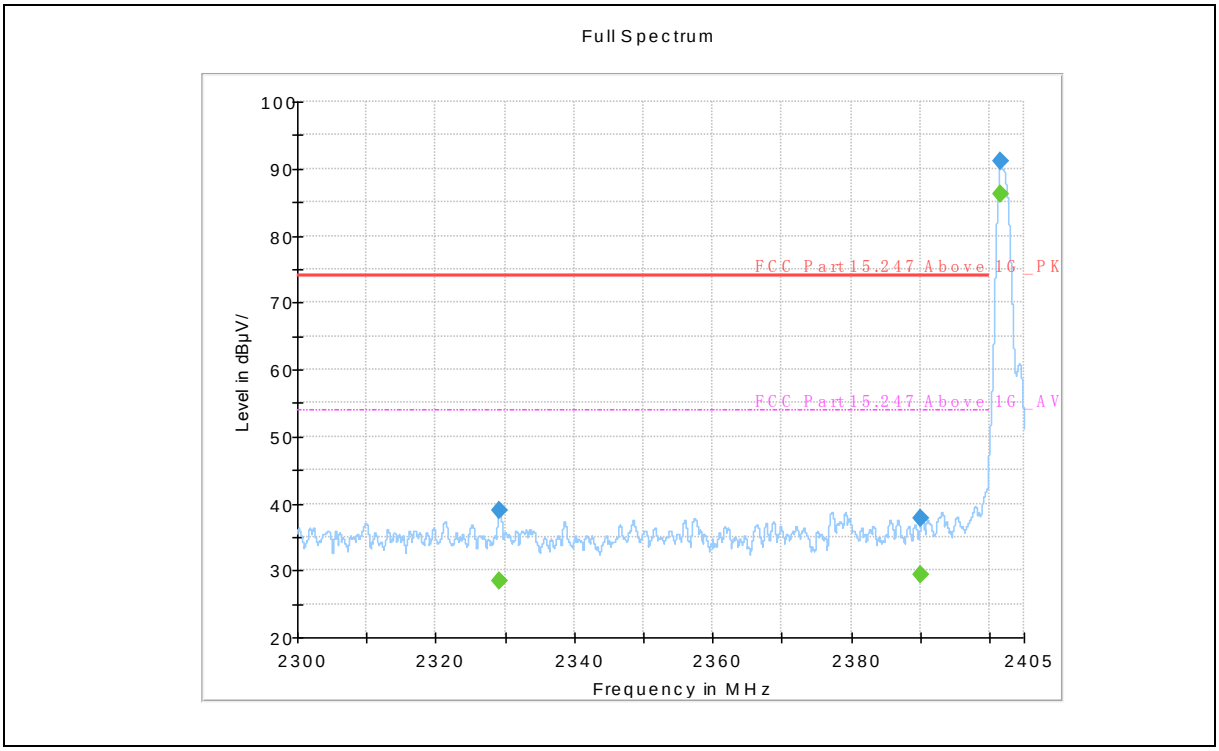
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2480.185833	90.64	---	---	---	V	8.2
2480.185833	---	86.05	---	---	V	8.2
2483.501111	46.82	---	74.00	27.18	V	8.3
2483.501111	---	37.99	54.00	16.01	V	8.3
2488.119167	---	29.05	54.00	24.95	V	8.4
2488.119167	39.46	---	74.00	34.54	V	8.4

8-DQPSK Test mode



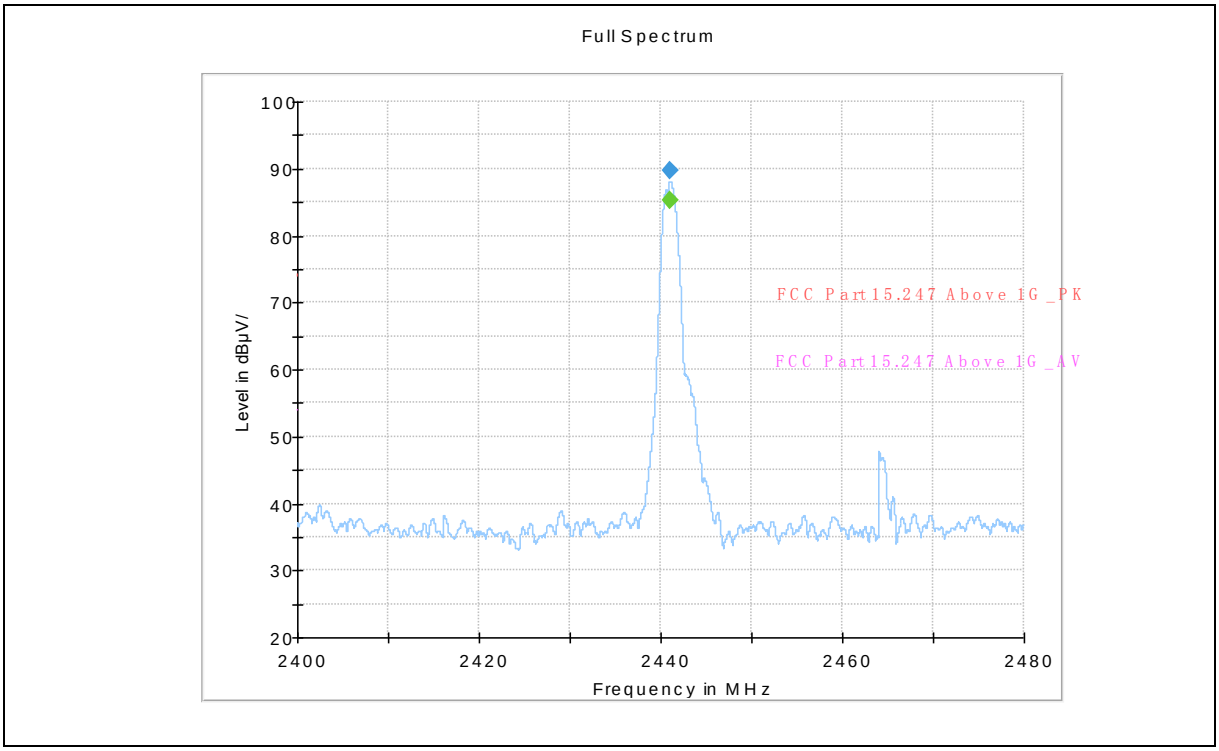
(8-DQPSK _2402MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2353.981667	---	28.60	54.00	25.40	H	7.7
2353.981667	38.76	---	74.00	35.24	H	7.7
2390.002500	38.77	---	74.00	35.23	H	8.0
2390.002500	---	29.31	54.00	24.69	H	8.0
2402.112500	89.76	---	---	---	H	8.7
2402.112500	---	85.47	---	---	H	8.7



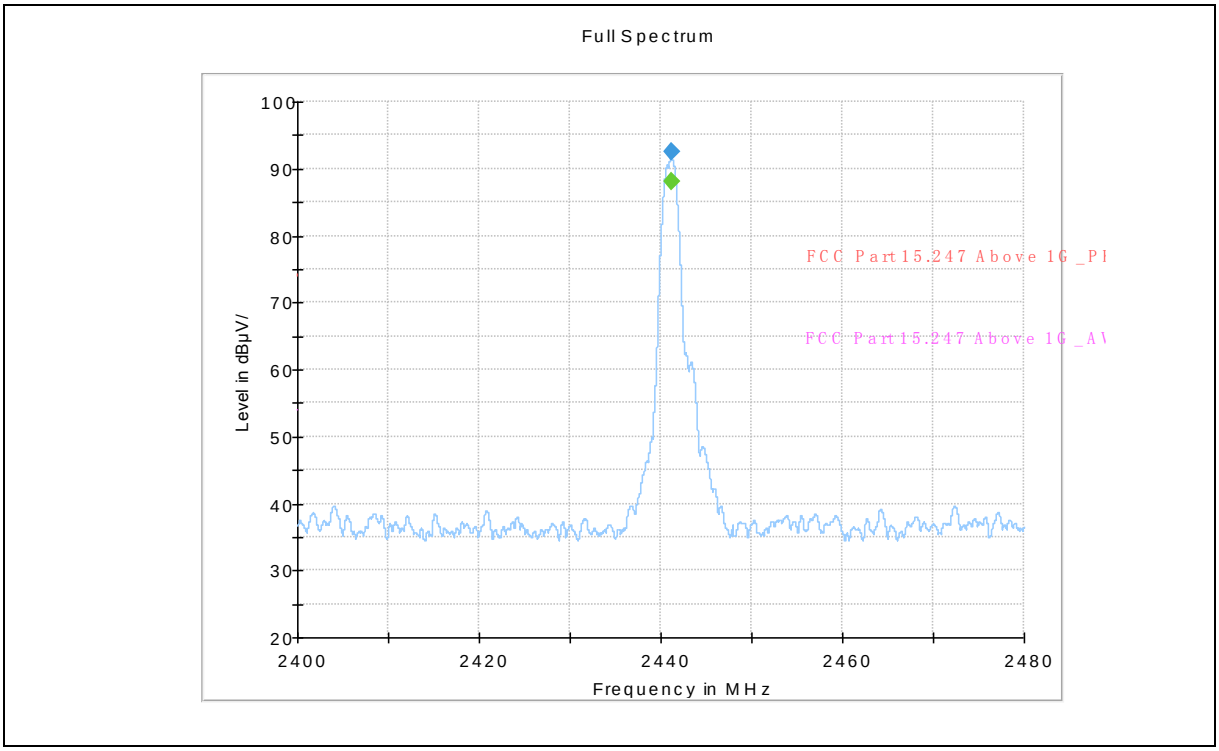
(8-DQPSK _2402MHz _2402MHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2329.213333	39.02	---	74.00	34.98	V	7.4
2329.213333	---	28.43	54.00	25.57	V	7.4
2390.002500	---	29.31	54.00	24.69	V	8.0
2390.002500	37.72	---	74.00	36.28	V	8.0
2401.680833	91.06	---	---	---	V	8.7
2401.680833	---	86.14	---	---	V	8.7



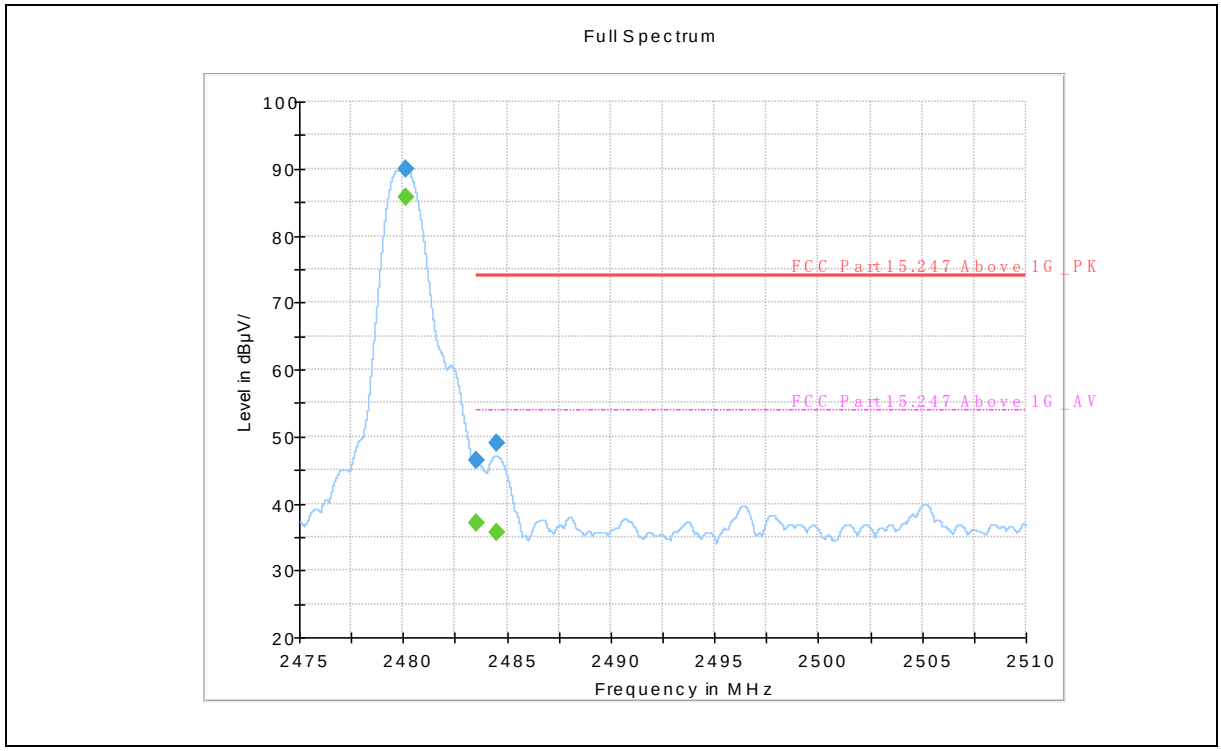
(8-DQPSK _2441MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2441.026667	---	85.34	---	---	H	7.8
2441.026667	89.63	---	---	---	H	7.8



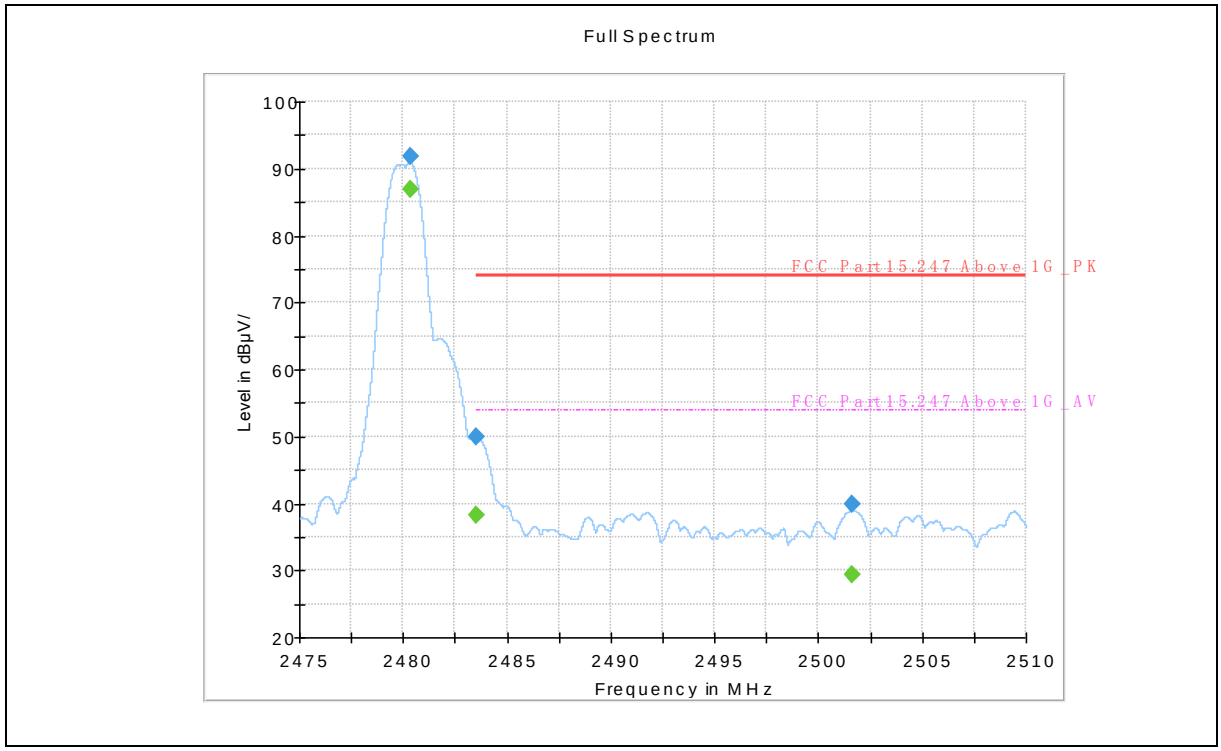
(8-DQPSK _2441MHz _2402MHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2441.164445	---	88.17	---	---	V	7.8
2441.164445	92.62	---	---	---	V	7.8



(8-DQPSK _2480MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2480.117778	89.97	---	---	---	H	8.2
2480.117778	---	85.64	---	---	H	8.2
2483.501111	46.53	---	74.00	27.47	H	8.3
2483.501111	---	37.16	54.00	16.84	H	8.3
2484.471389	---	35.64	54.00	18.36	H	8.3
2484.471389	48.89	---	74.00	25.11	H	8.3



(8-DQPSK _2480MHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2480.333611	---	86.95	---	---	V	8.2
2480.333611	91.86	---	---	---	V	8.2
2483.501111	49.96	---	74.00	24.04	V	8.3
2483.501111	---	38.26	54.00	15.74	V	8.3
2501.648611	39.88	---	74.00	34.12	V	8.3
2501.648611	---	29.45	54.00	24.55	V	8.3

2.9. Conducted Emission

2.9.1. Requirement

According to RSS-GEN section 8.8, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5- 30	60	50

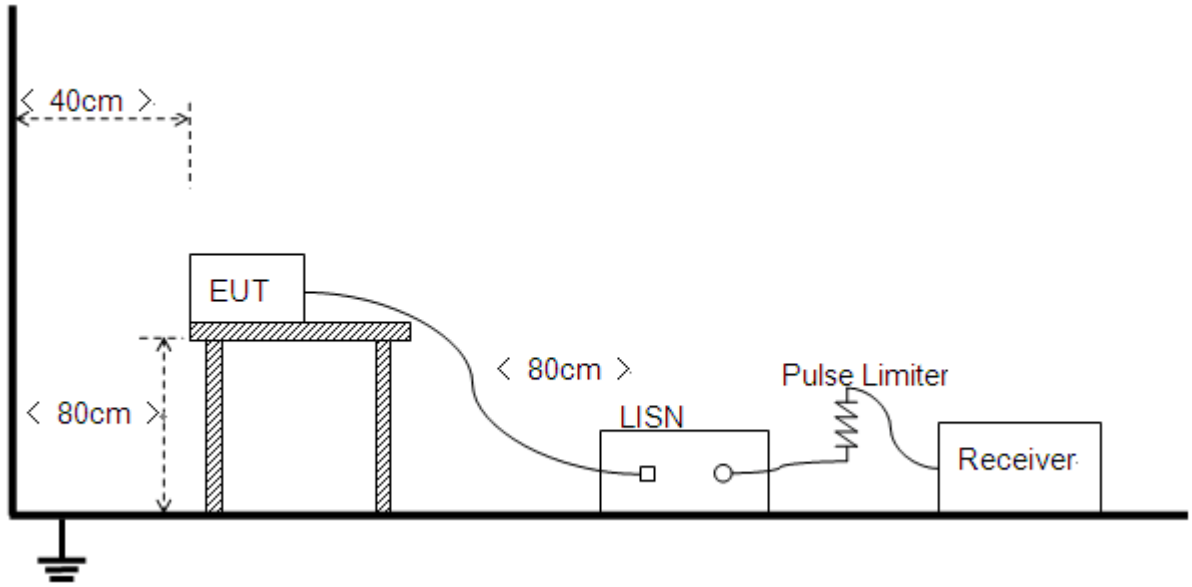
NOTE:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.9.2. Test Description

A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

The factors of the site are calibrated to correct the reading. During the measurement, the Bluetooth EUT is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under hopping-on test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Please refer ANNEX B(4).

2.9.3. Test Result

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

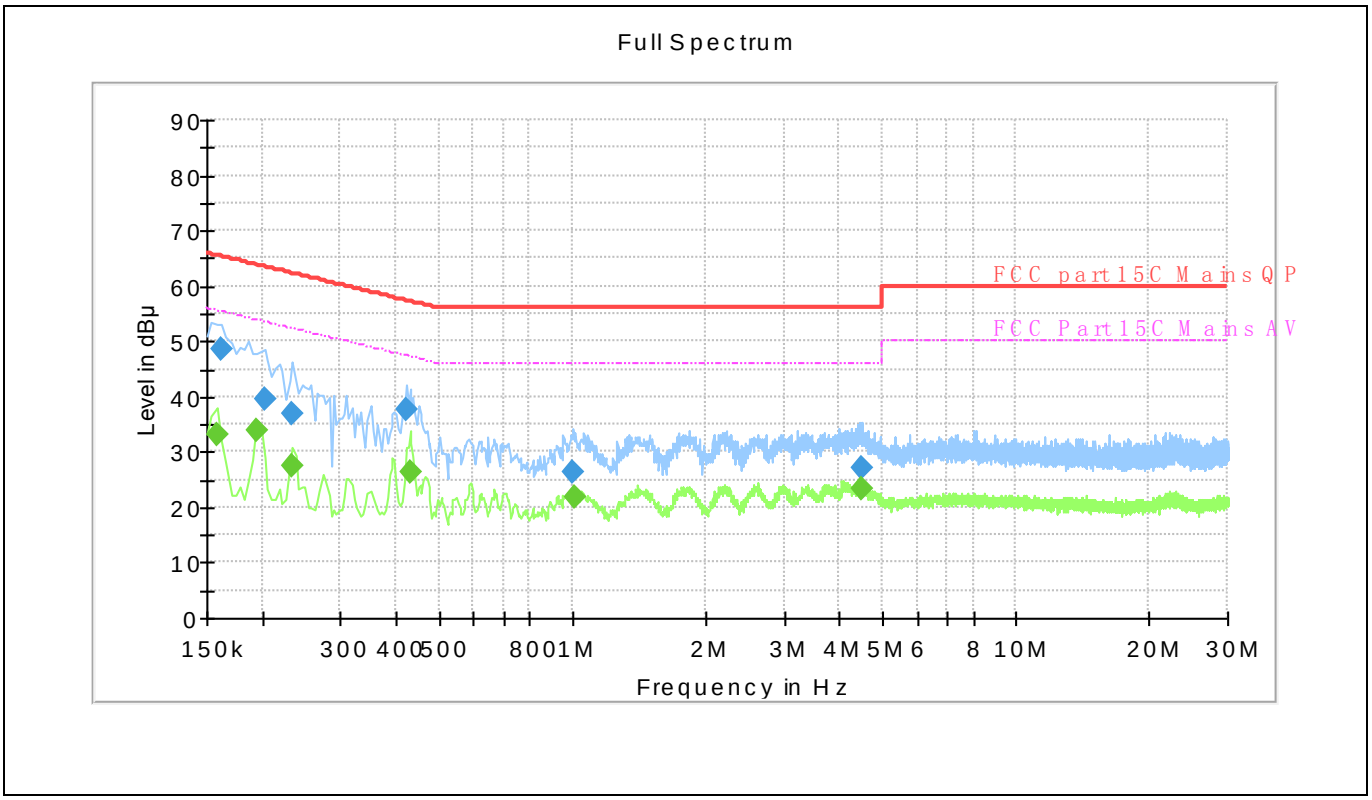
Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test setup:

The EUT configuration of the emission tests is EUT +Laptop.

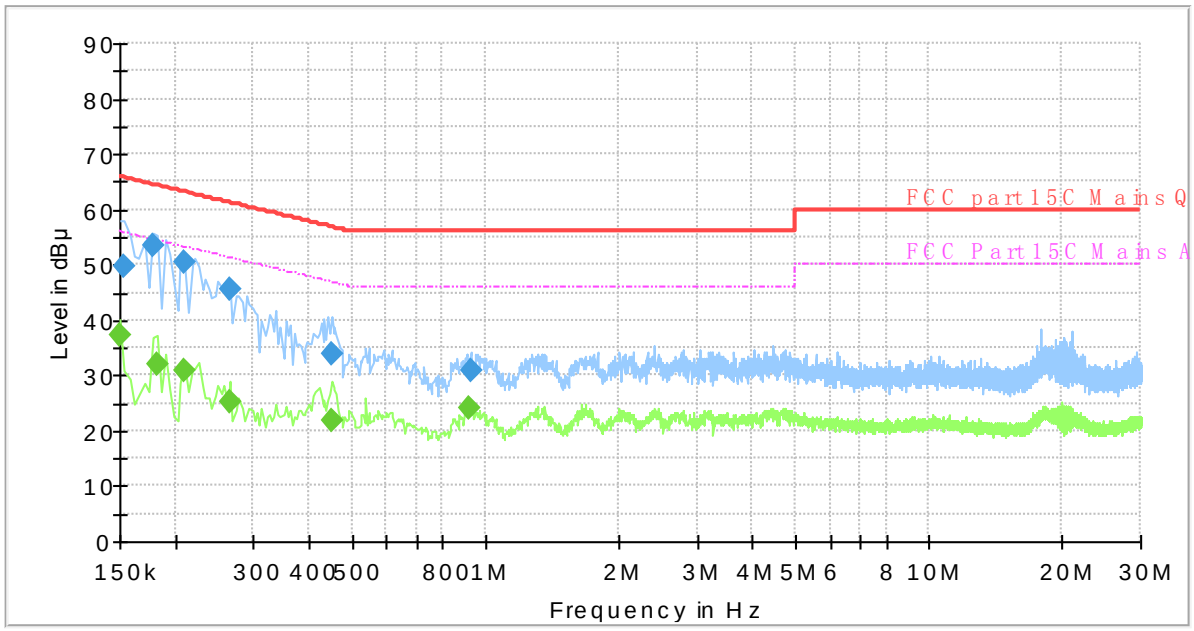
Note: The test voltage is AC 120V/60Hz.

B. Test Plots:



(Plot A: L Phase)

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.158000	---	33.25	55.57	22.32	L	10.2
0.162000	48.56	---	65.36	16.80	L	10.2
0.194000	---	33.83	53.86	20.04	L	10.2
0.202000	39.40	---	63.53	24.13	L	10.2
0.234000	---	27.62	52.31	24.69	L	10.2
0.234000	36.81	---	62.31	25.50	L	10.2
0.422000	37.52	---	57.41	19.89	L	10.2
0.430000	---	26.26	47.25	20.99	L	10.2
1.006000	26.47	---	56.00	29.53	L	10.3
1.014000	---	22.00	46.00	24.00	L	10.3
4.470000	---	23.36	46.00	22.64	L	10.4
4.502000	27.11	---	56.00	28.89	L	10.4



(Plot A: N Phase)

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.150000	---	37.15	56.00	18.85	N	10.2
0.154000	49.70	---	65.78	16.08	N	10.2
0.178000	53.55	---	64.58	11.03	N	10.2
0.182000	---	32.05	54.39	22.34	N	10.2
0.210000	---	30.80	53.21	22.40	N	10.2
0.210000	50.47	---	63.21	12.73	N	10.2
0.266000	45.66	---	61.24	15.58	N	10.2
0.266000	---	25.17	51.24	26.07	N	10.2
0.450000	33.98	---	56.88	22.89	N	10.2
0.450000	---	21.79	46.88	25.08	N	10.2
0.918000	---	24.02	46.00	21.98	N	10.3
0.926000	31.05	---	56.00	24.95	N	10.3