REPORT No.: SZ18090013W04

TEST REPORT

APPLICANT	:	PASCE Ltd
PRODUCT NAME	:	Bluetooth speaker with rechargeable battery
MODEL NAME	:	MRBT3
BRAND NAME	:	Minirig
FCC ID	:	2AD65MRBT3
STANDARD(S)	:	47 CFR Part 15 Subpart C
TEST DATE	:	2018-09-05 to 2018-09-18
ISSUE DATE	:	2018-09-19

Tested by: Su Hang

Su Hang (Test Engineer)

Approved by: Peng Huarui

Peng Huarui (Supervisor)

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MORLAB

SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road,
Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

Tel: 86-755-36698555 Fax: 86-755-36698525

Http://www.morlab.cn E-mail: service@morlab.cn

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Change History		
Issue	**Date**	**Reason for change**
1.0	2018-09-19	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	PASCE Ltd
Applicant Address:	Unit 4 City Business Park, Easton Way, Bristol, BS5 0SP,United Kingdom
Manufacturer:	PASCE Ltd
Manufacturer Address:	Unit 4 City Business Park, Easton Way, Bristol, BS5 0SP,United Kingdom

1.2. Equipment Under Test (EUT) Description

Product Name:	Bluetooth speaker with rechargeable battery
Serial No:	(N/A, marked #1 by test site)
Hardware Version:	1C
Software Version:	01
Modulation Type:	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);
Bluetooth Version:	Bluetooth classic
Antenna Type:	PCB Antenna
Antenna Gain:	1.9 dBi

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 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, and then use MT8852B base station to control the EUT continuous transmission.

Note 3: 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	Sep 05, 2018	Su Hang	PASS
3	15.247(b)	Peak Output Power	Sep 05, 2018	Su Hang	PASS
4	15.247(a)	20dB Bandwidth	Sep 05, 2018	Su Hang	PASS
5	15.247(a)	Carrier Frequency Separation	Sep 05, 2018	Su Hang	PASS
6	15.247(a)	Time of Occupancy (Dwell time)	Sep 05, 2018	Su Hang	PASS
7	15.247(d)	Conducted Spurious Emission	Sep 05, 2018	Su Hang	PASS
8	15.207	Conducted Emission	Sep 18, 2018	Wang Dalong	PASS
9	15.247(d)	Restricted Frequency Bands	Sep 10, 2018	Wang Dalong	PASS
10	15.209, 15.247(d)	Radiated Emission	Sep 10, 2018	Wang Dalong	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.

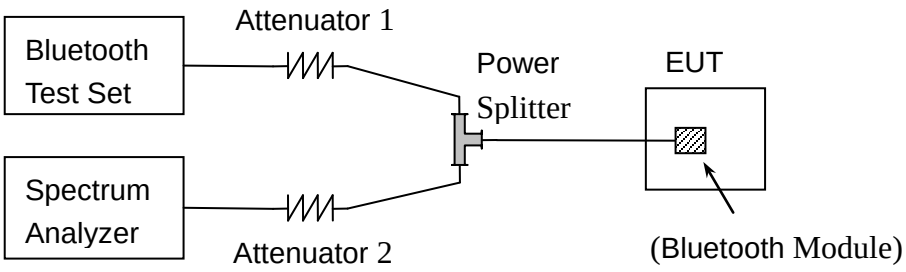
2.2. Number of Hopping Frequency

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 Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Please reference ANNEX A(1.5).

2.2.3. Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = the frequency band of operation
RBW ≥ 1% of the span
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize

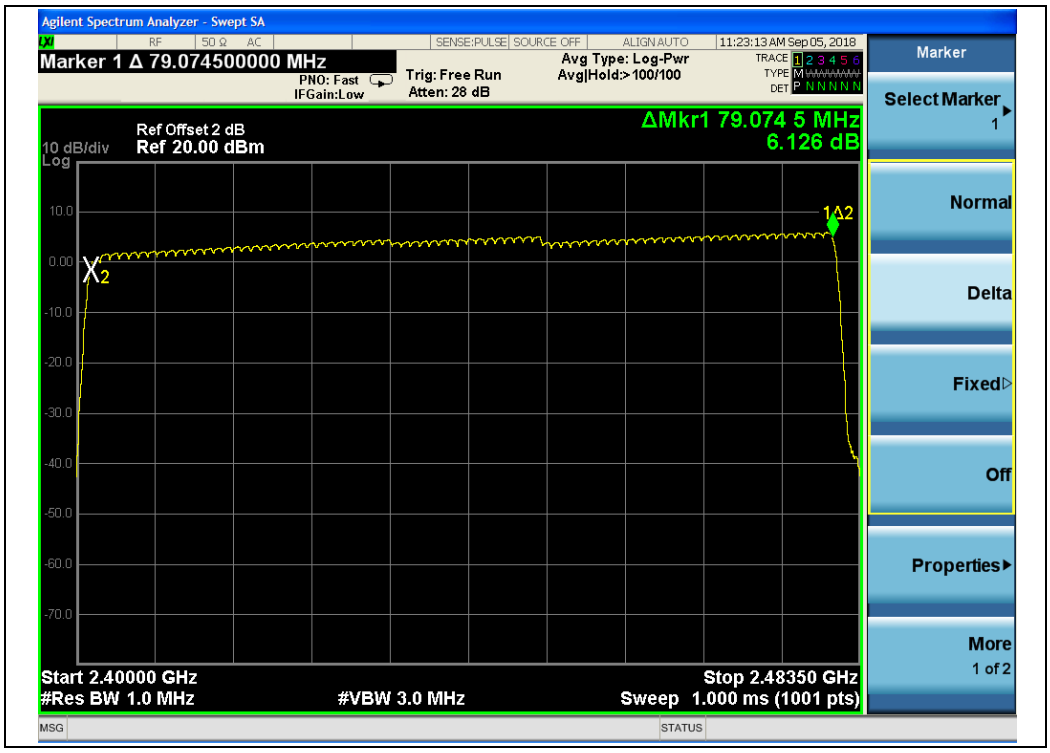
2.2.4. Test Result

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.

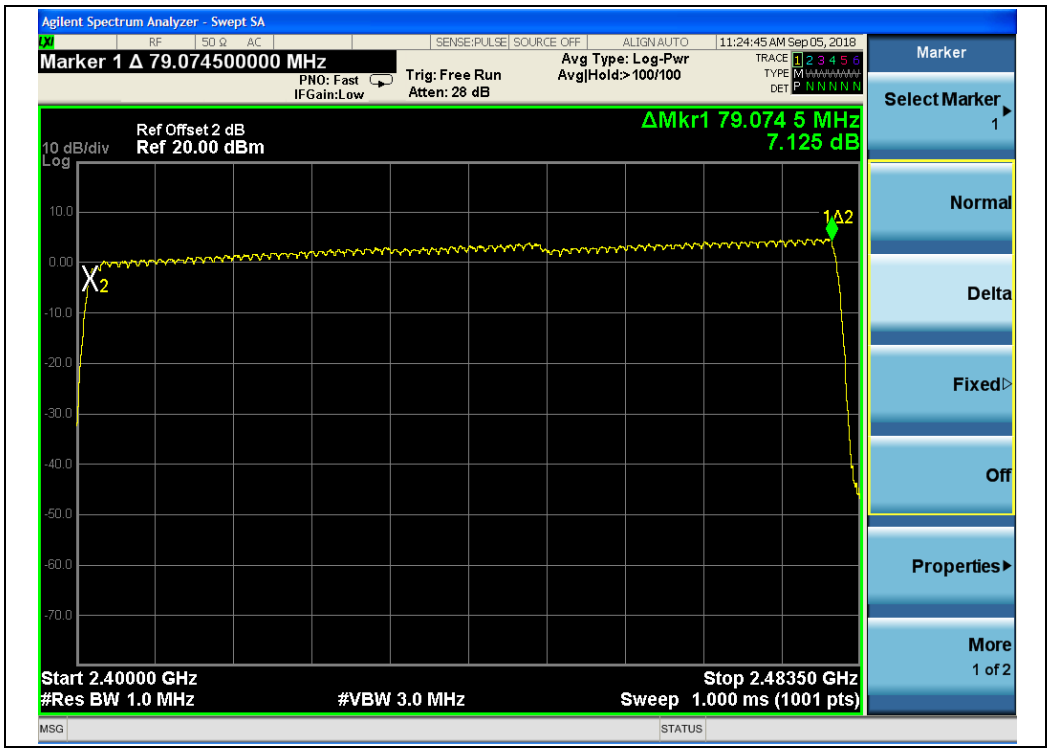
A. Test Verdict:

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

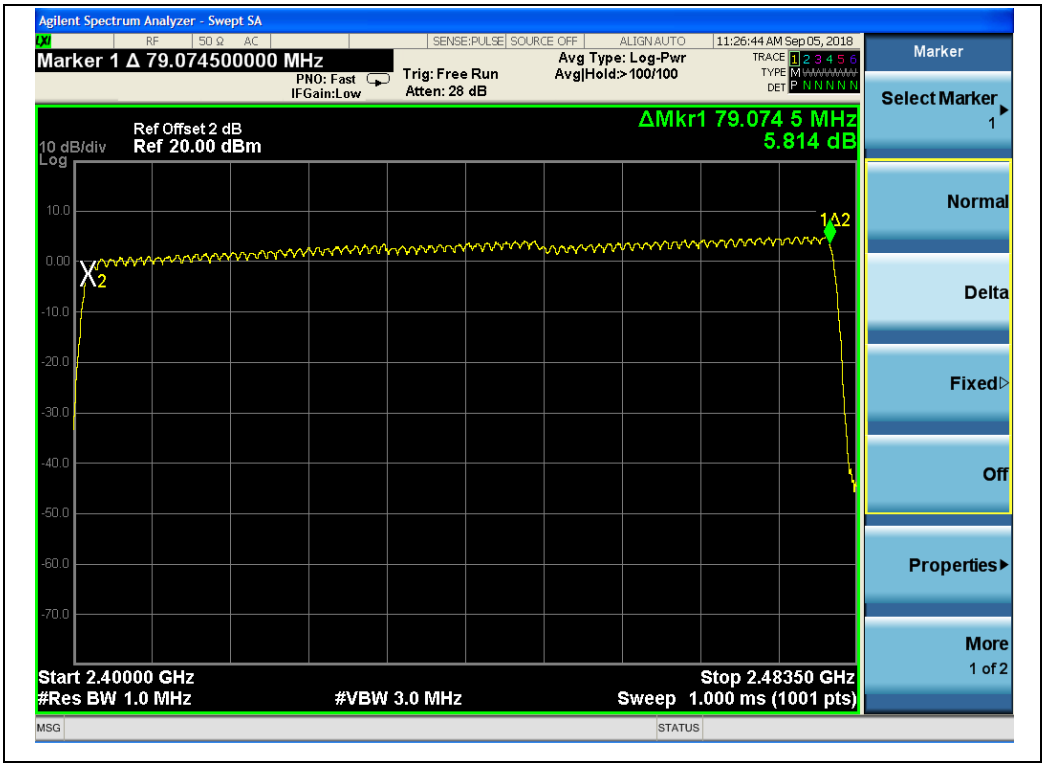
B. Test Plots:



(GFSK)



(π/4-DQPSK)


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 79.074500000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 28 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
11:26:44 AM Sep 05, 2018
Ref Offset 2 dB
10 dB/div
Ref 20.00 dBm
Log
ΔMkr1 79.074 5 MHz
5.814 dB
Start 2.40000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 2.48350 GHz
Sweep 1.000 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

(8- DPSK)

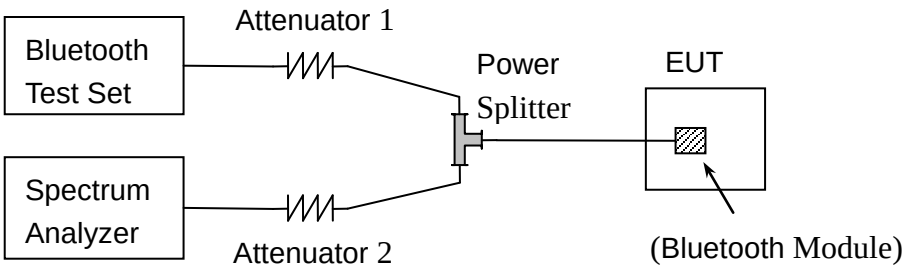
2.3. Peak Output Power

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 Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Please refer ANNEX A(1.5).

2.3.3. Test Result

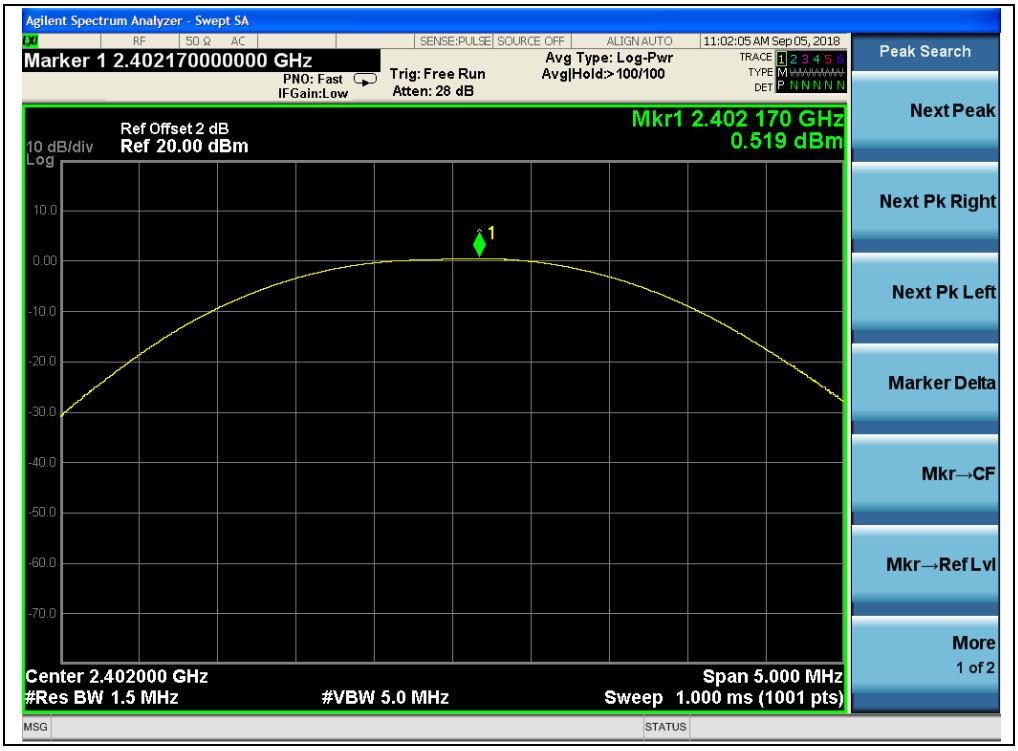
The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the module. The lowest, middle and highest channel were tested by USB Wideband Power Sensor.

GFSK Mode

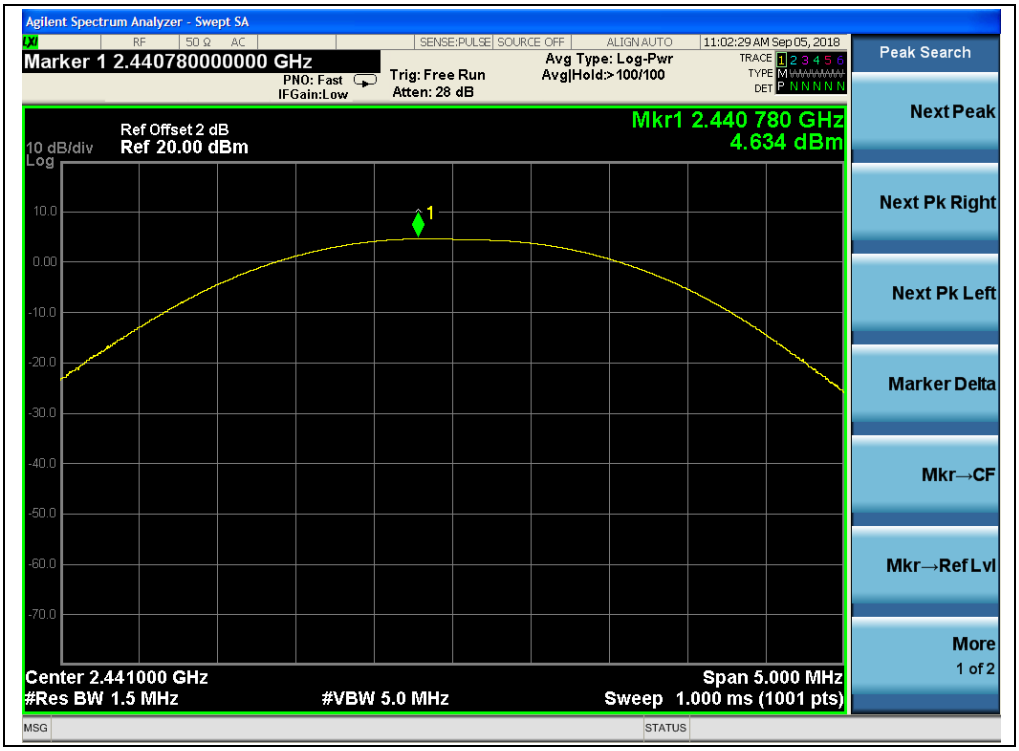
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	0.52	0.001	20.97	0.125	PASS
39	2441	4.63	0.003			PASS
78	2480	5.98	0.004			PASS

B. Test Plots:



(GFSK, Channel 0, 2402MHz)



(GFSK, Channel 39, 2441MHz)

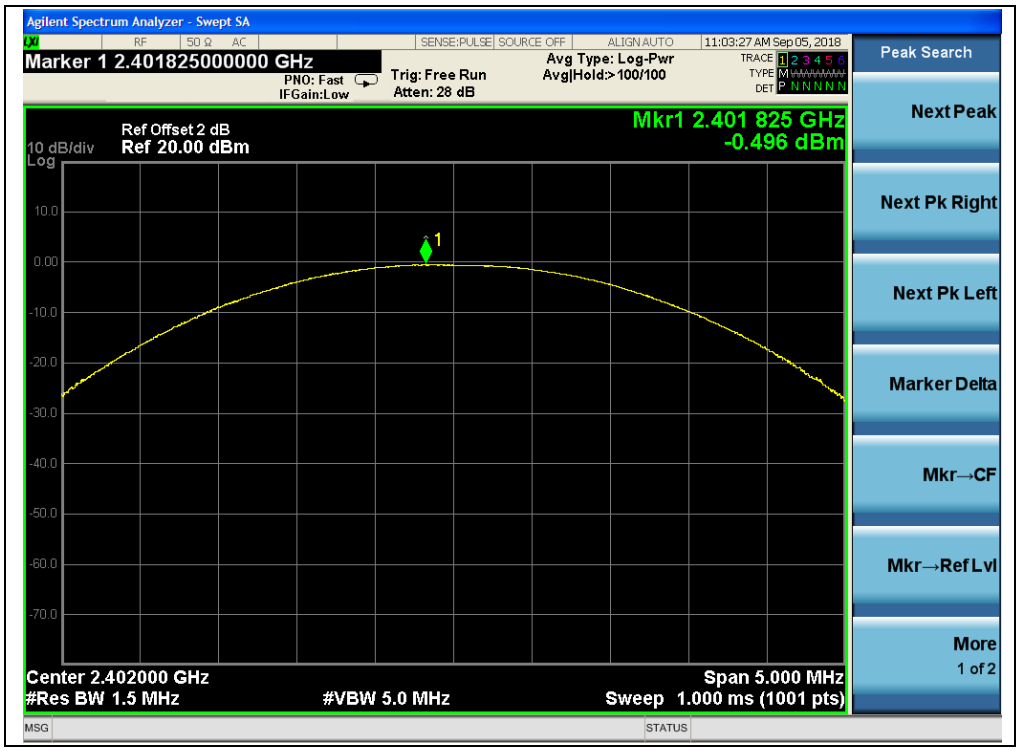
(GFSK, Channel 78, 2480MHz)

π/4-DQPSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	-0.50	0.001	20.97	0.125	PASS
39	2441	3.58	0.002			PASS
78	2480	5.10	0.003			PASS

B. Test Plots:



(π/4-DQPSK, Channel 0, 2402MHz)

(π/4-DQPSK, Channel 39, 2441MHz)

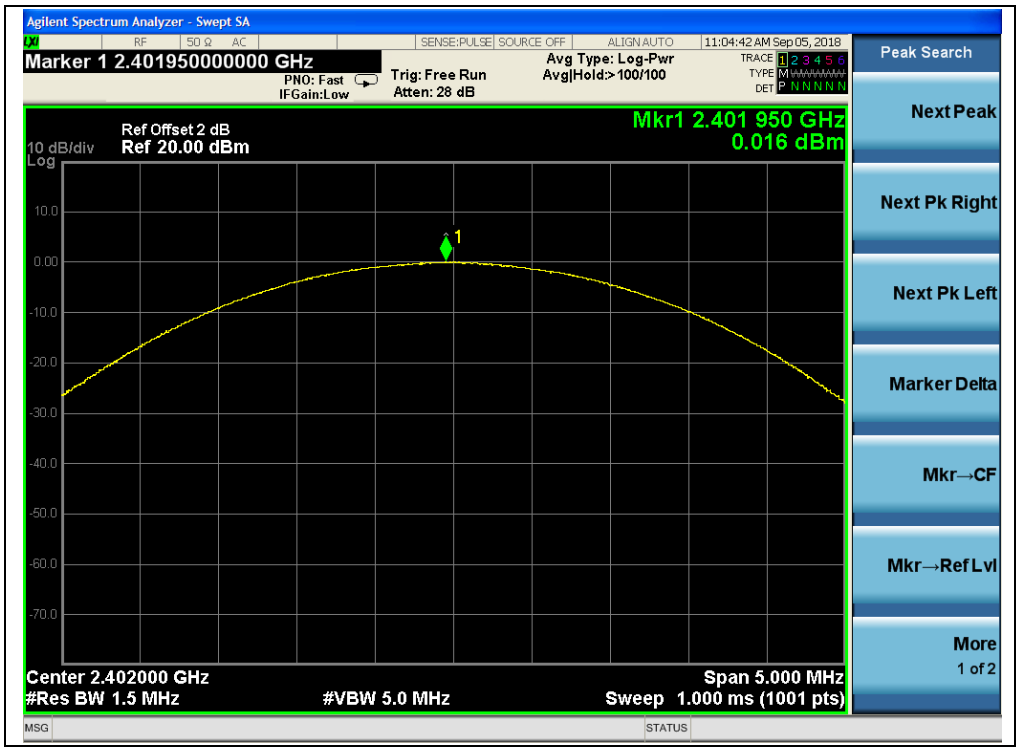
(π/4-DQPSK, Channel 78, 2480MHz)

8-DPSK Mode

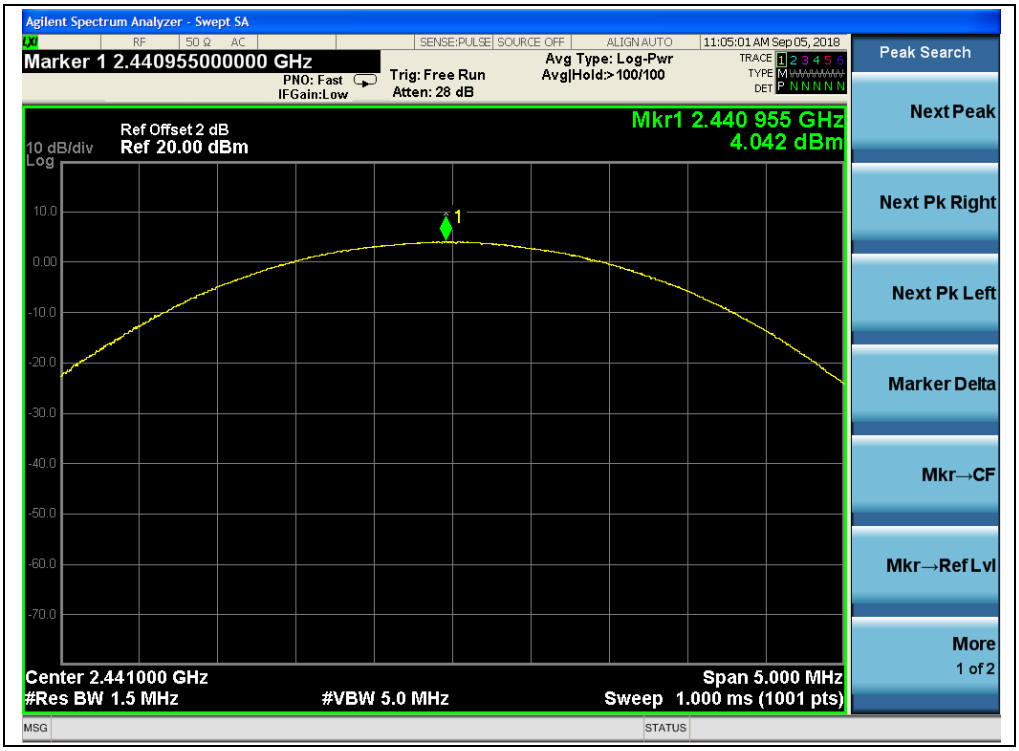
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	0.02	0.001	20.97	0.125	PASS
39	2441	4.04	0.003			PASS
78	2480	5.51	0.004			PASS

B. Test Plots:



(8-DPSK, Channel 0, 2402MHz)



(8-DPSK, Channel 39, 2441MHz)

(8-DPSK, Channel 78, 2480MHz)

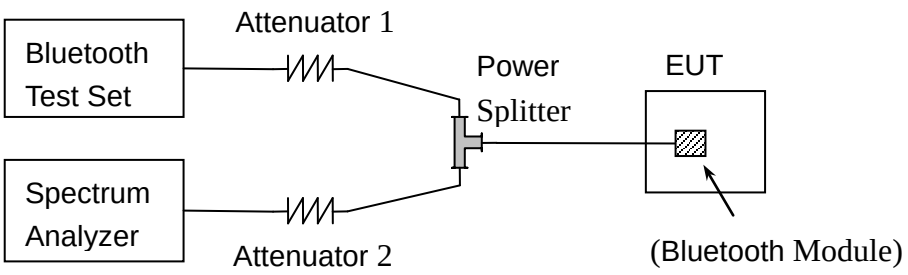
2.4. 20dB Bandwidth

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 Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Please refer ANNEX A(1.5).

2.4.3. Test Procedure

Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW ≥ 1% of the 20 dB bandwidth
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

2.4.4. Test Result

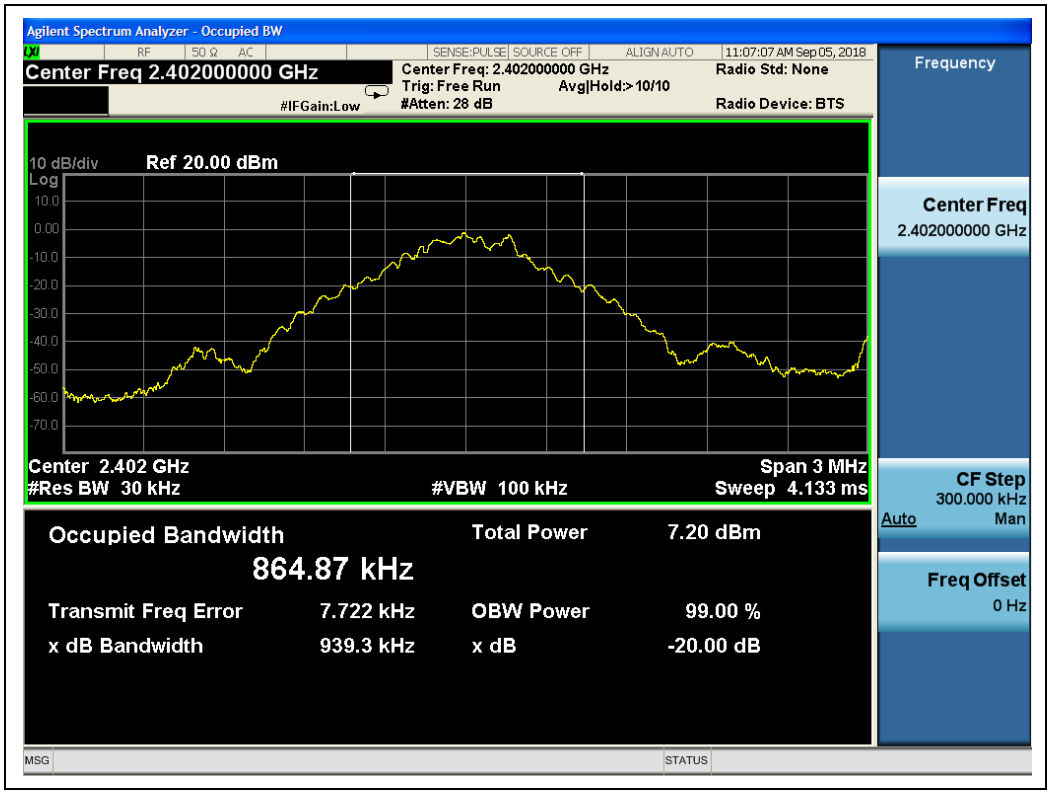
The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to record the 20dB bandwidth of the Module.

GFSK Mode

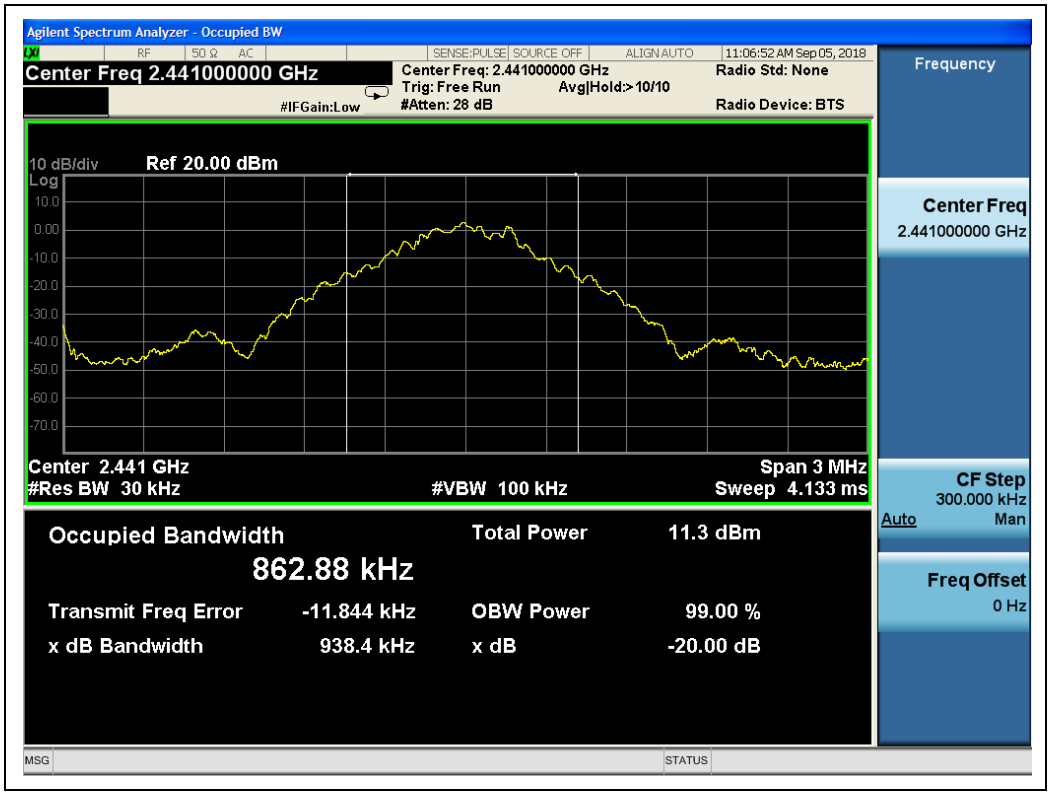
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
0	2402	0.9393	PASS
39	2441	0.9384	PASS
78	2480	0.9396	PASS

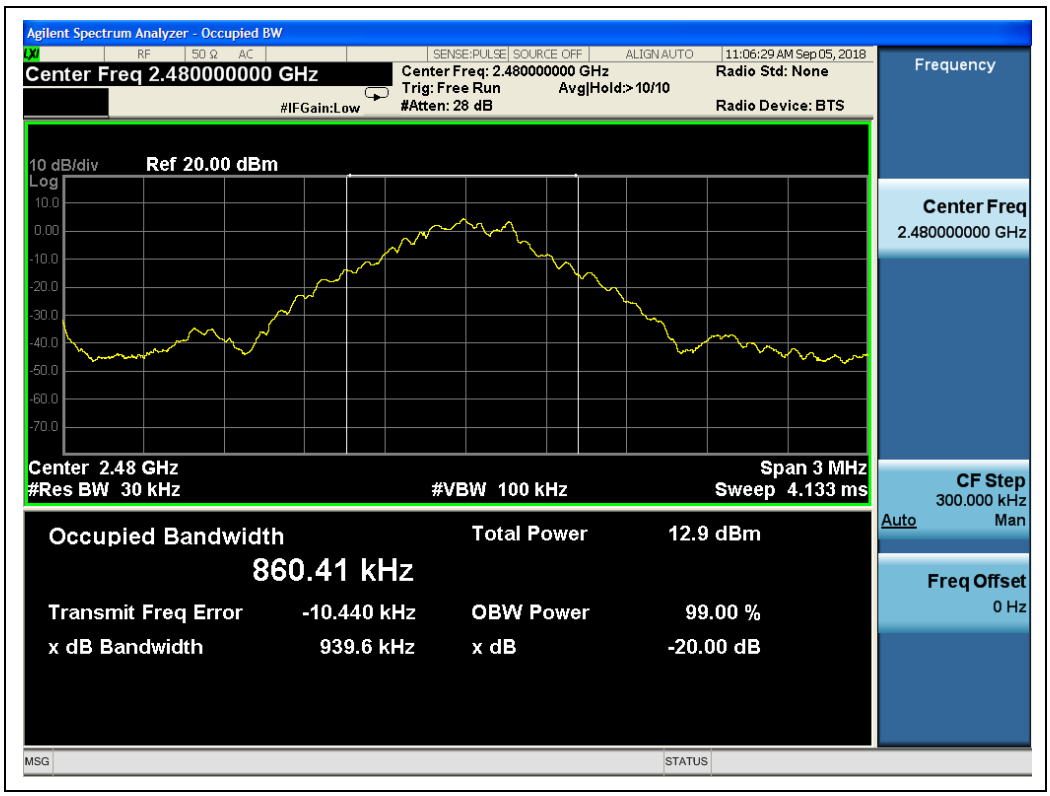
B. Test Plots:



(GFSK, Channel 0, 2402MHz)



(GFSK, Channel 39, 2441MHz)



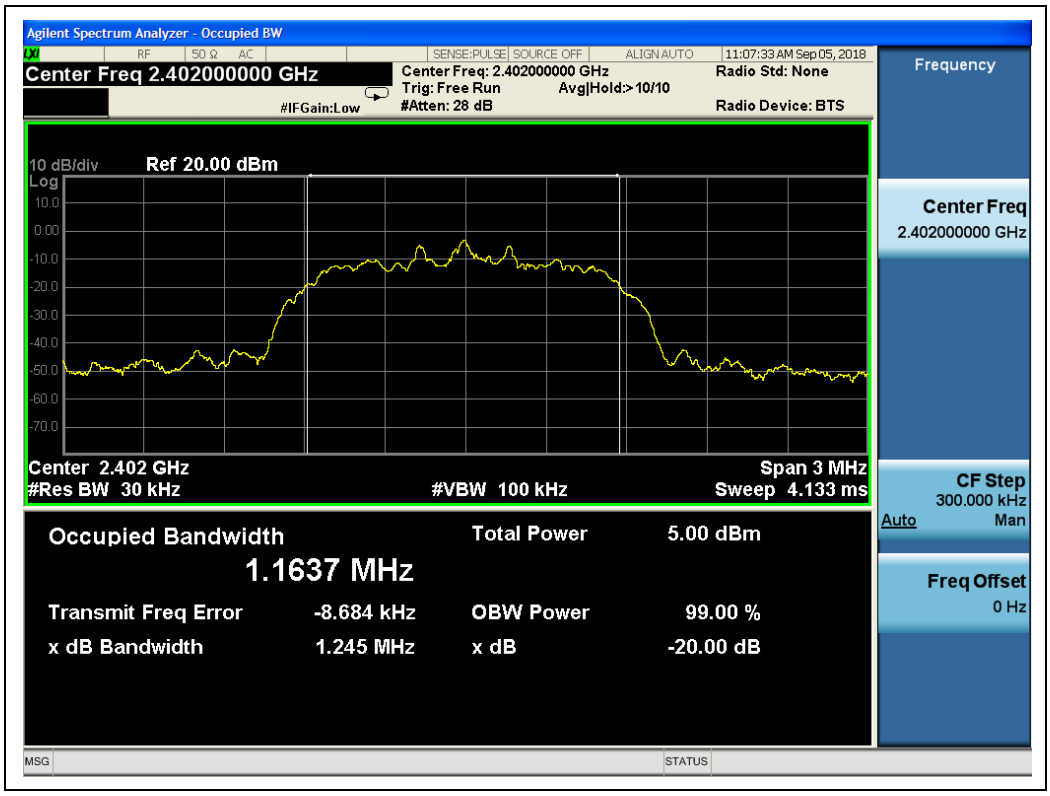
(GFSK, Channel 78, 2480MHz)

π/4-DQPSK Mode

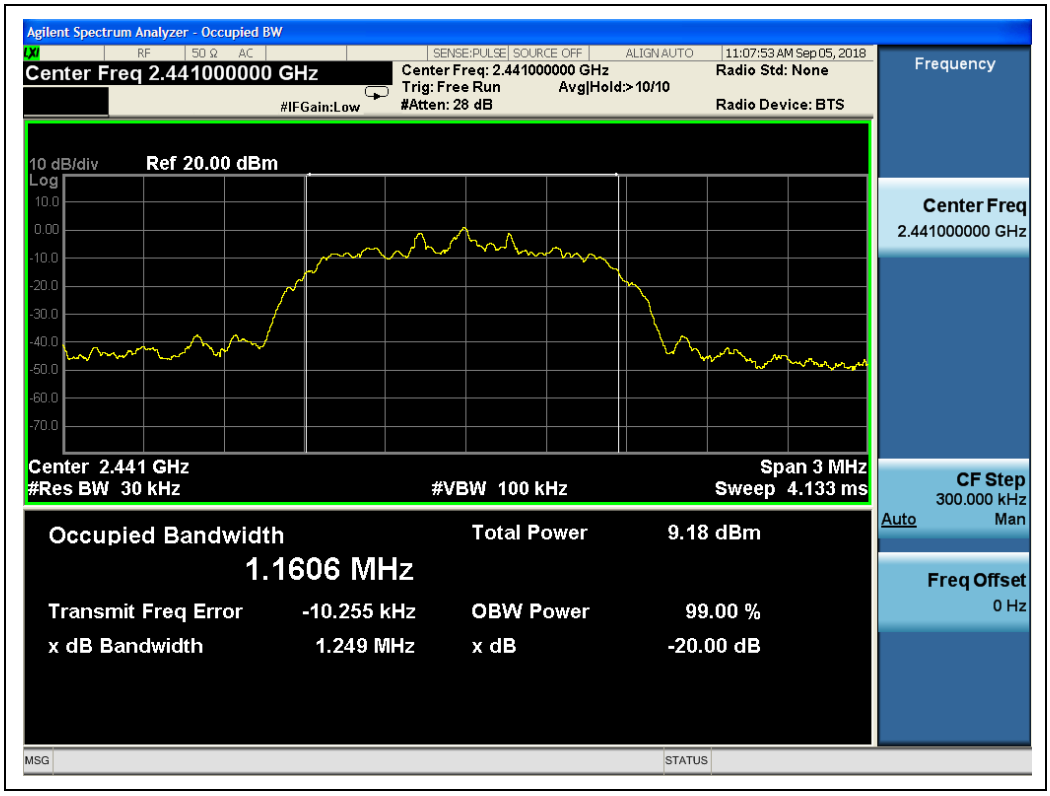
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
0	2402	1.245	PASS
39	2441	1.249	PASS
78	2480	1.246	PASS

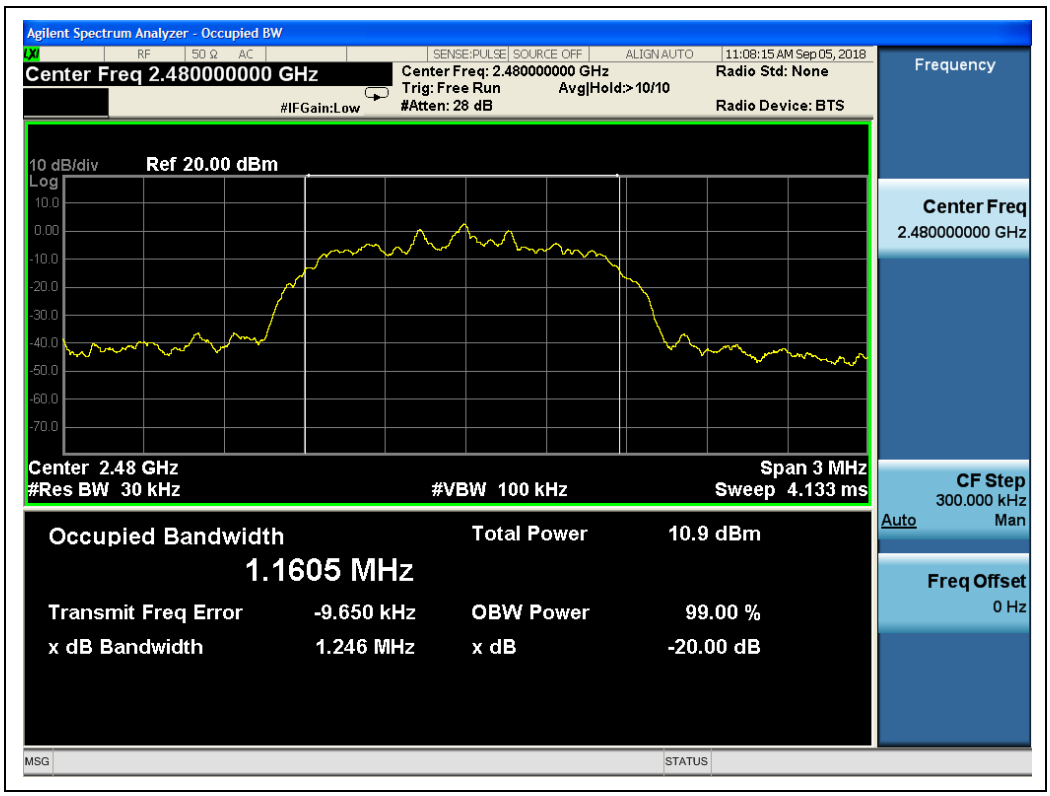
B. Test Plots:



(π/4-DQPSK, Channel 0, 2402MHz)



(π/4-DQPSK, Channel 39, 2441MHz)



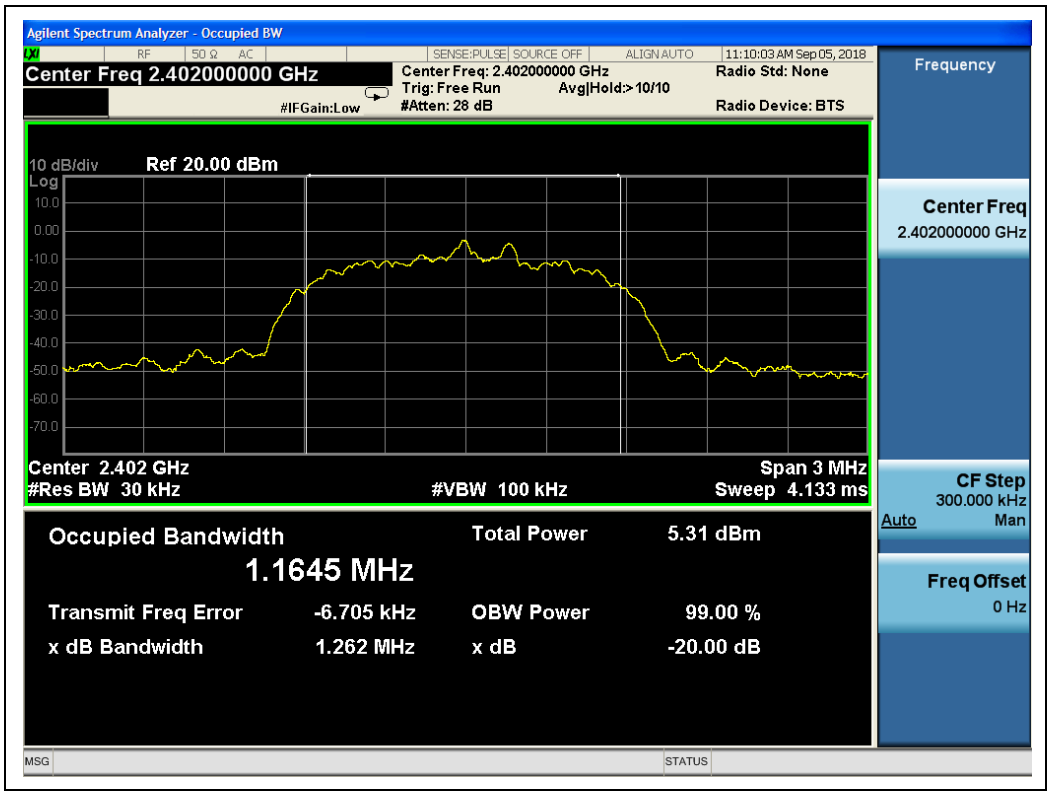
(π/4-DQPSK, Channel 78, 2480MHz)

8-DPSK Mode

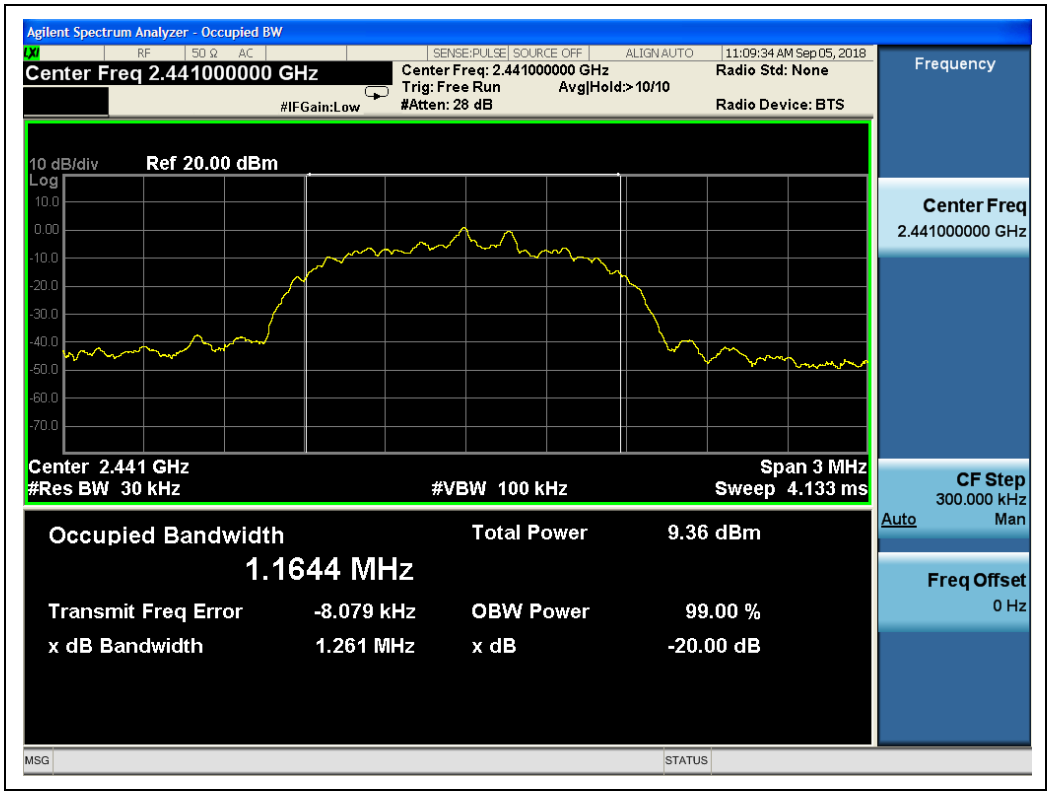
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
0	2402	1.262	PASS
39	2441	1.261	PASS
78	2480	1.260	PASS

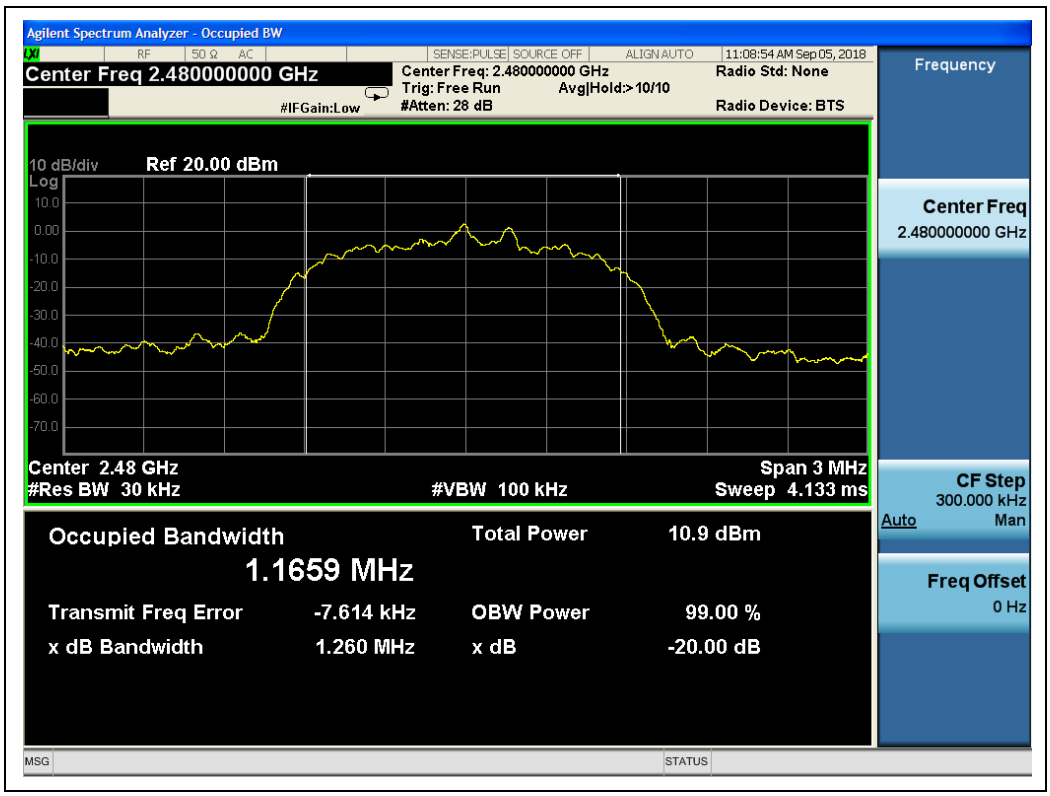
B. Test Plots:



(8-DPSK, Channel 0, 2402MHz)



(8-DPSK, Channel 39, 2441MHz)



(8-DPSK, Channel 78, 2480MHz)

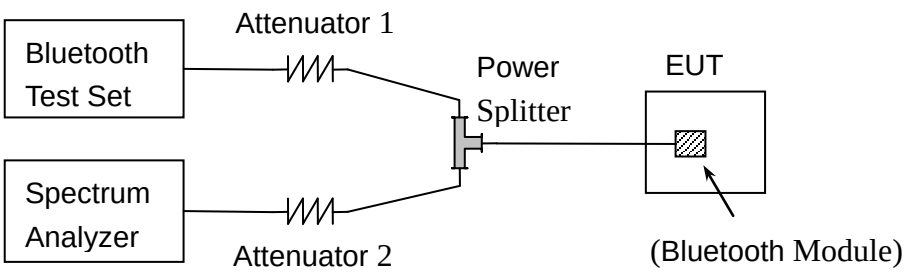
2.5. Carried Frequency Separation

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 Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm;the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Please refer ANNEX A(1.5).

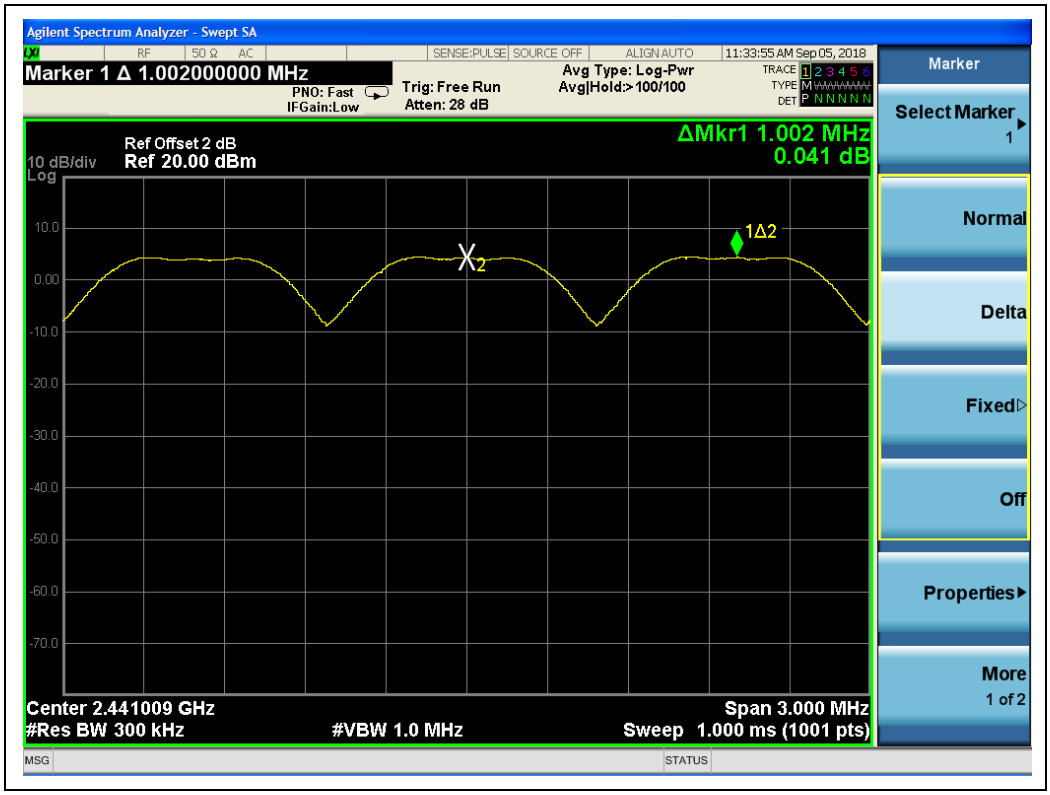
2.5.3. Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels
Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span
Video (or Average) Bandwidth (VBW) ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

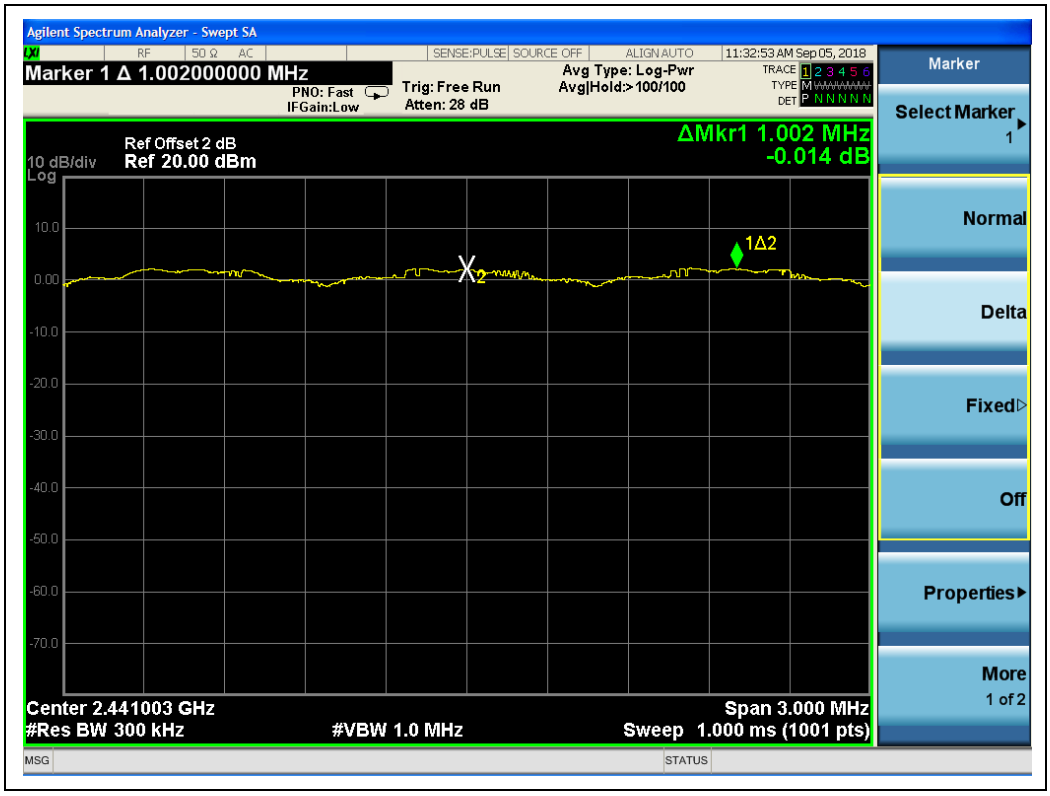
2.5.4. Test Result

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.

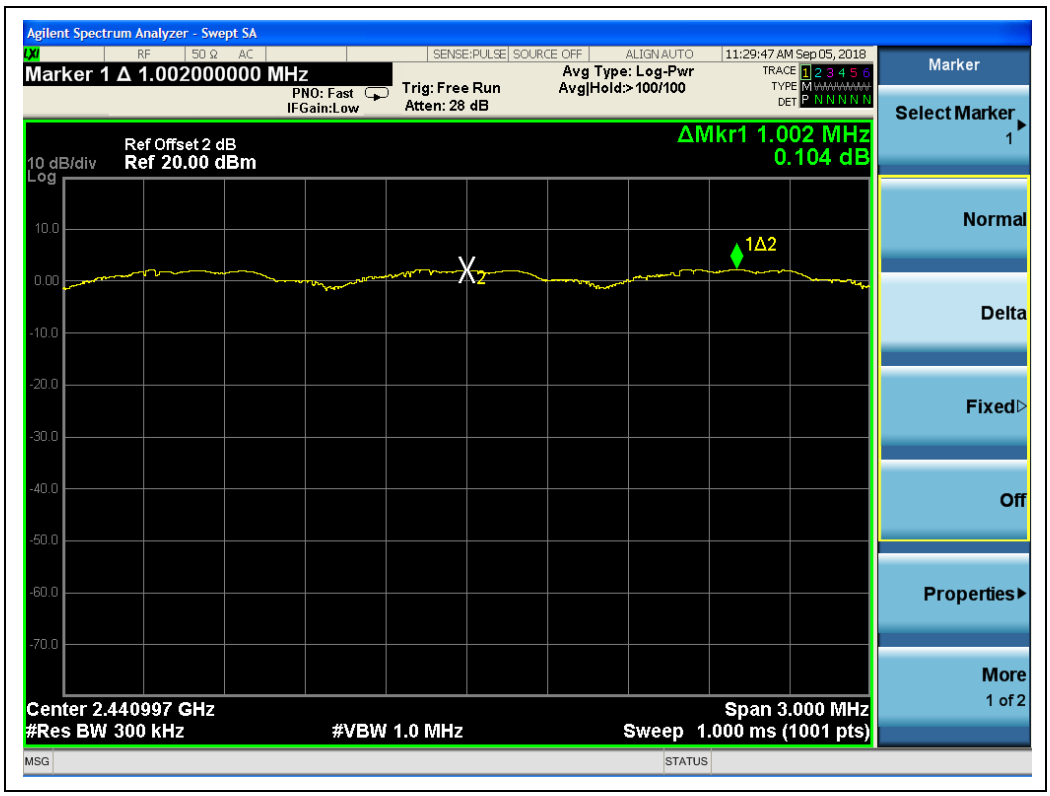
Test Mode	Measured Channel Numbers	Carried Frequency Separation	20dB bandwidth (MHz)	Min. Limit	Verdict
GFSK	39 and 40	1.002	0.9384	two-thirds of the 20dB bandwidth	PASS
π/4-DQPSK	39 and 40	1.002	1.245		PASS
8-DPSK	39 and 40	1.002	1.260		PASS



(GFSK)



(π/4-DQPSK)



(8-DPSK)

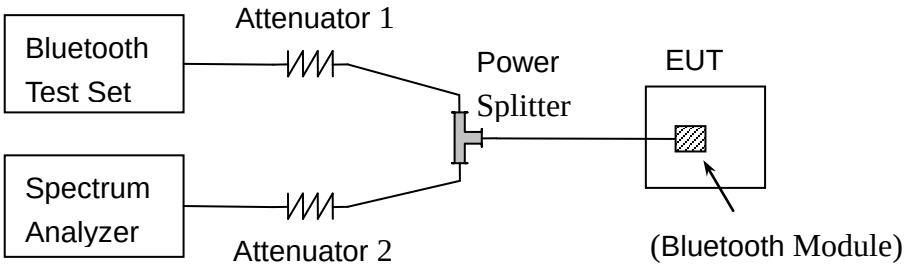
2.6. Time of Occupancy (Dwell time)

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 Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Please refer ANNEX A(1.5).

2.6.3. Test Procedure

Option 1:
DH1: Dwell time equal to Pulse time (ms) *(1600 / 2 /79)*31.6 Millisecond DH3: Dwell time equal to Pulse time (ms) * (1600 /4 /79) *31.6 Millisecond DH5: Dwell time equal to Pulse Time (ms)* (1600 / 6 /79) *31.6 Millisecond

AFH Mode:

DH1: Dwell time equal to Pulse time (ms) *(800 / 2 /20)*(0.4*20) Millisecond DH3: Dwell time equal to Pulse time (ms) * (800 / 4 /20)*(0.4*20) Millisecond DH5: Dwell time equal to Pulse Time (ms)* (800 / 6 /20)*(0.4*20) Millisecond

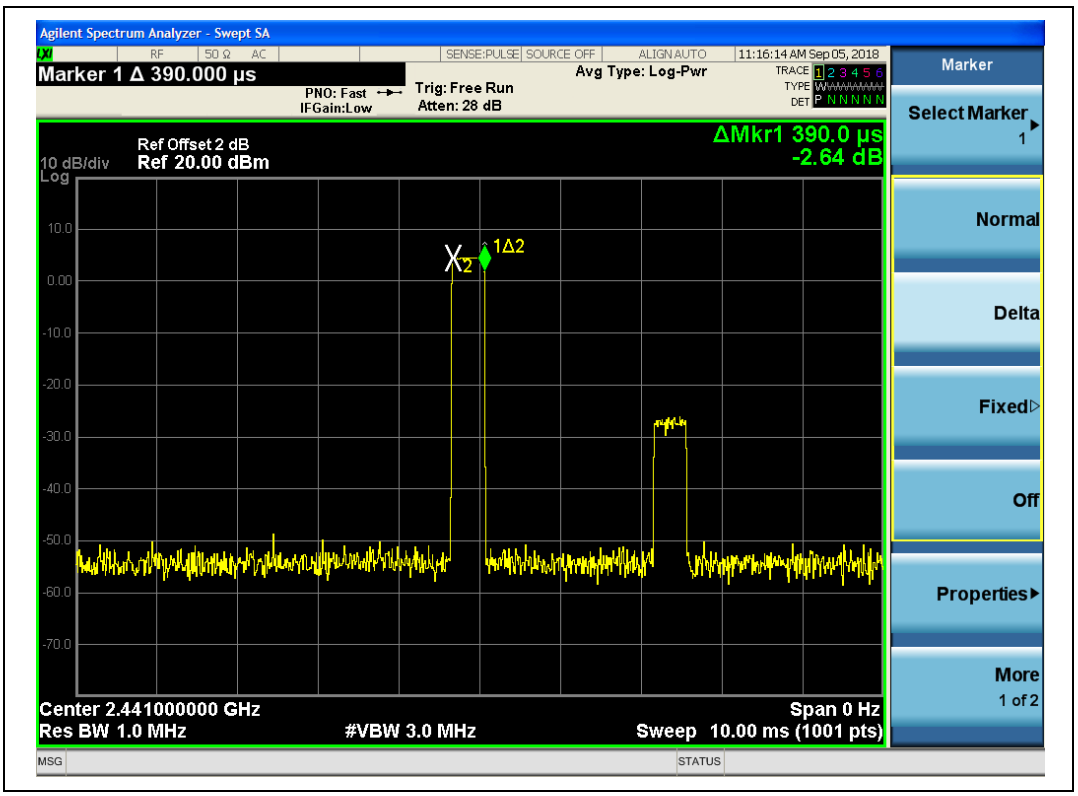
2.6.4. Test Result

GFSK Mode

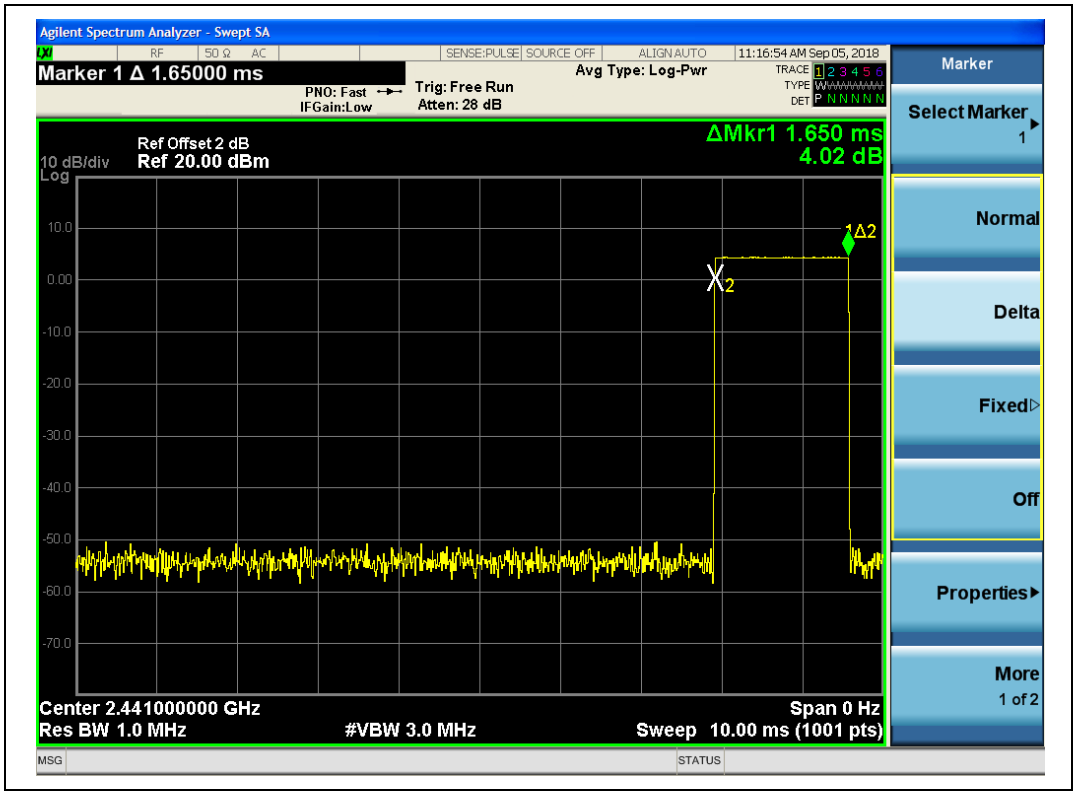
A. Test Verdict:

DH Packet	Pulse Width (ms)	Dwell Time (ms)		Limit (sec)	Verdict
		Normal Mode	AFH Mode		
DH1	0.39	124.80	62.40	0.4	PASS
DH3	1.65	264.00	132.00		PASS
DH5	2.89	308.27	154.13		PASS

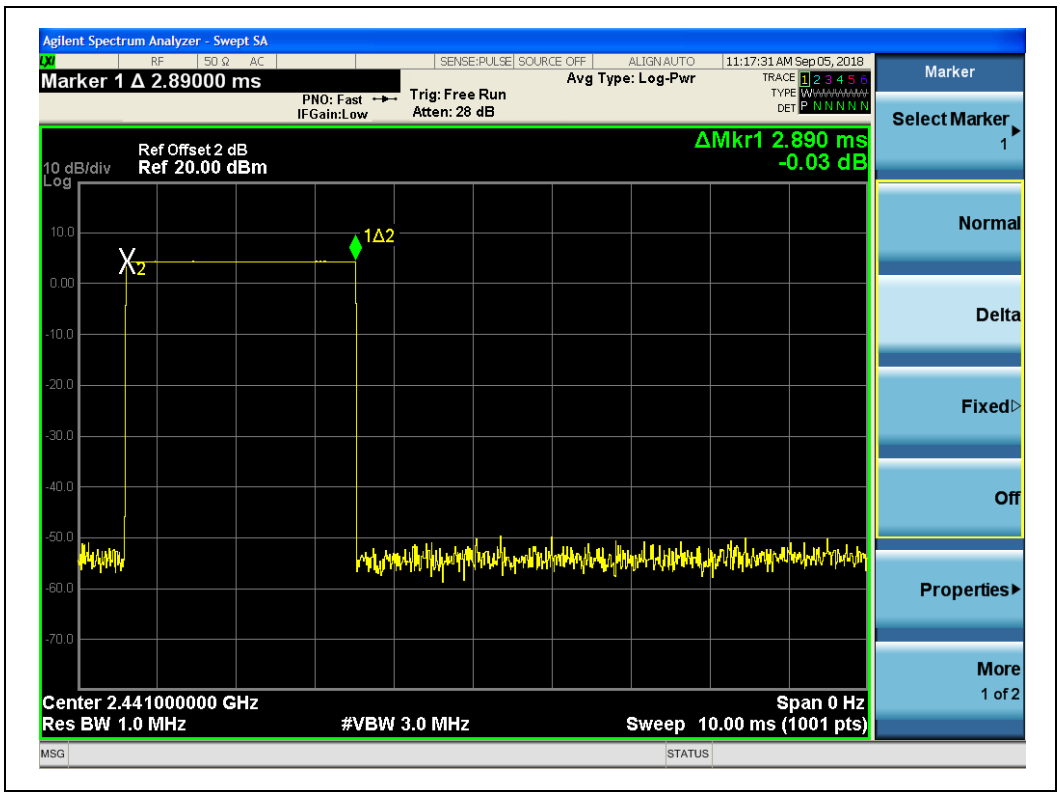
B. Test Plots:



(DH1, GFSK)



(DH3, GFSK)



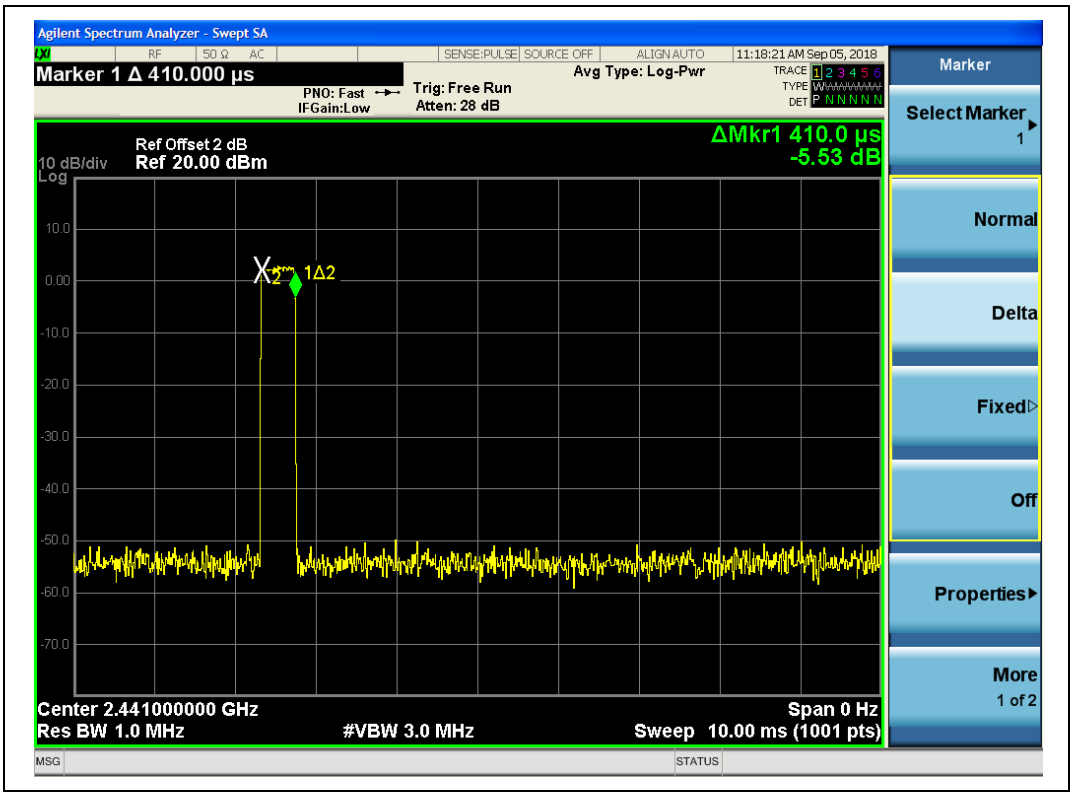
(DH5, GFSK)

π/4-DQPSK Mode

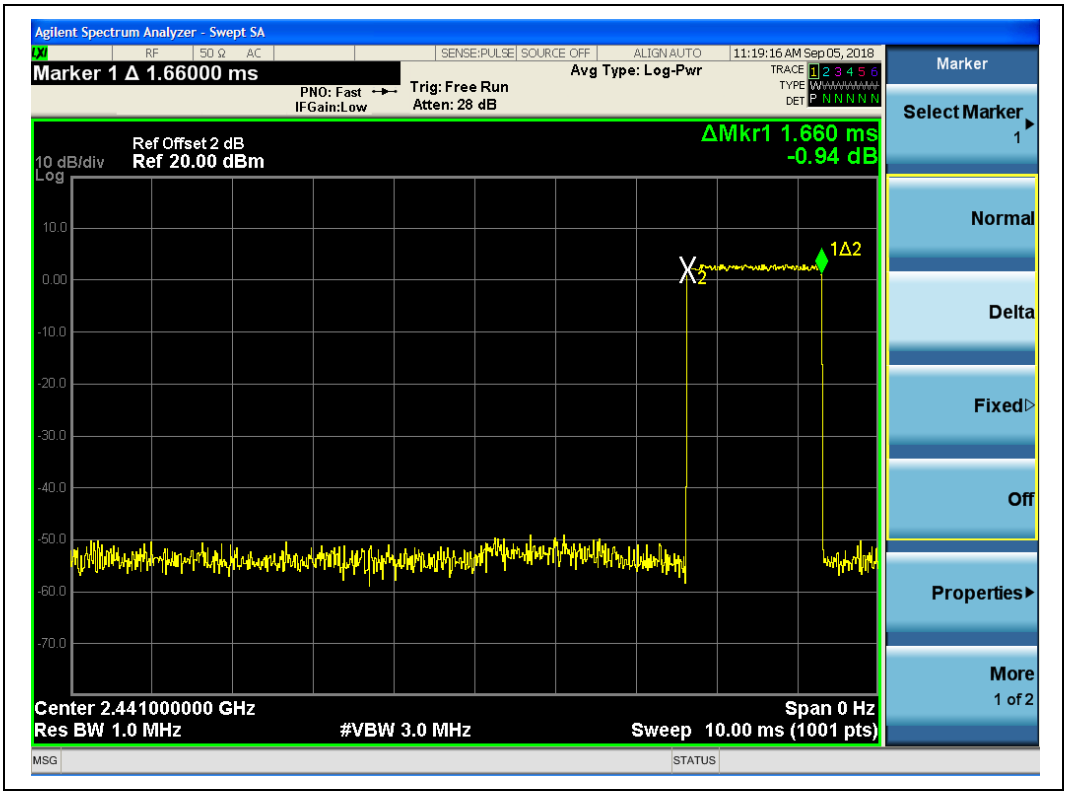
A. Test Verdict:

DH Packet	Pulse Width (ms)	Dwell Time (ms)		Limit (sec)	Verdict
		Normal Mode	AFH Mode		
DH1	0.41	131.20	65.60	0.4	PASS
DH3	1.66	265.60	132.80		PASS
DH5	2.90	309.33	154.67		PASS

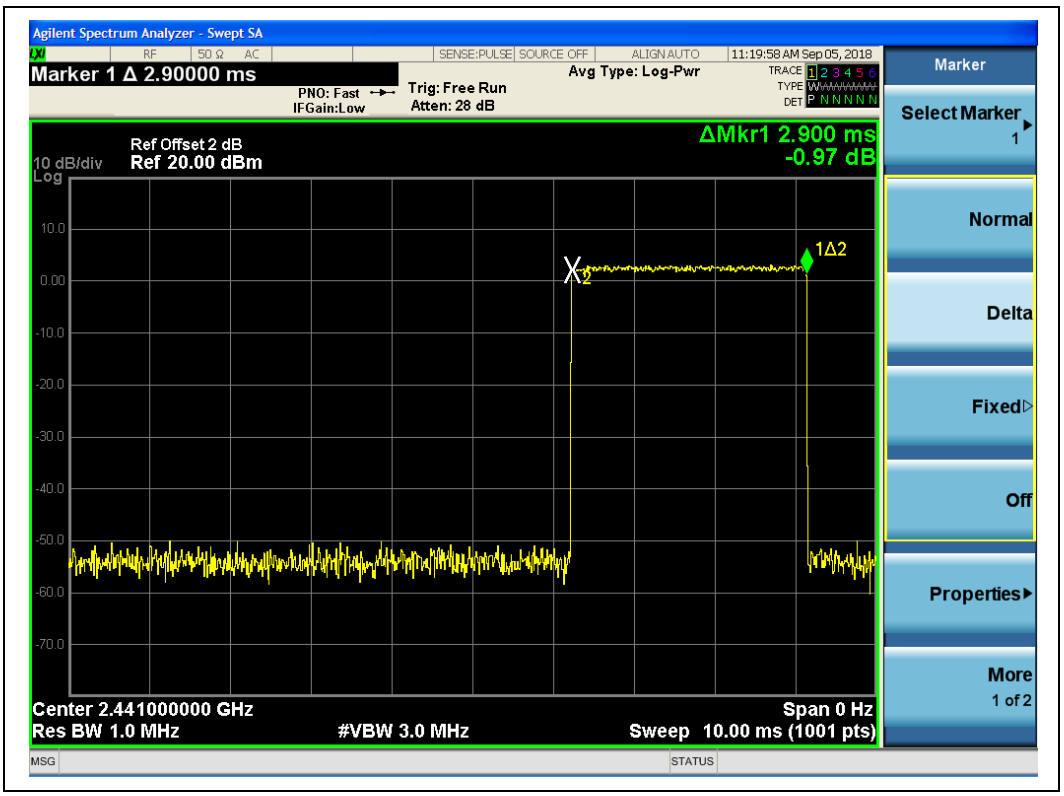
B. Test Plots:



(DH1, π/4-DQPSK)



(DH3, π/4-DQPSK)



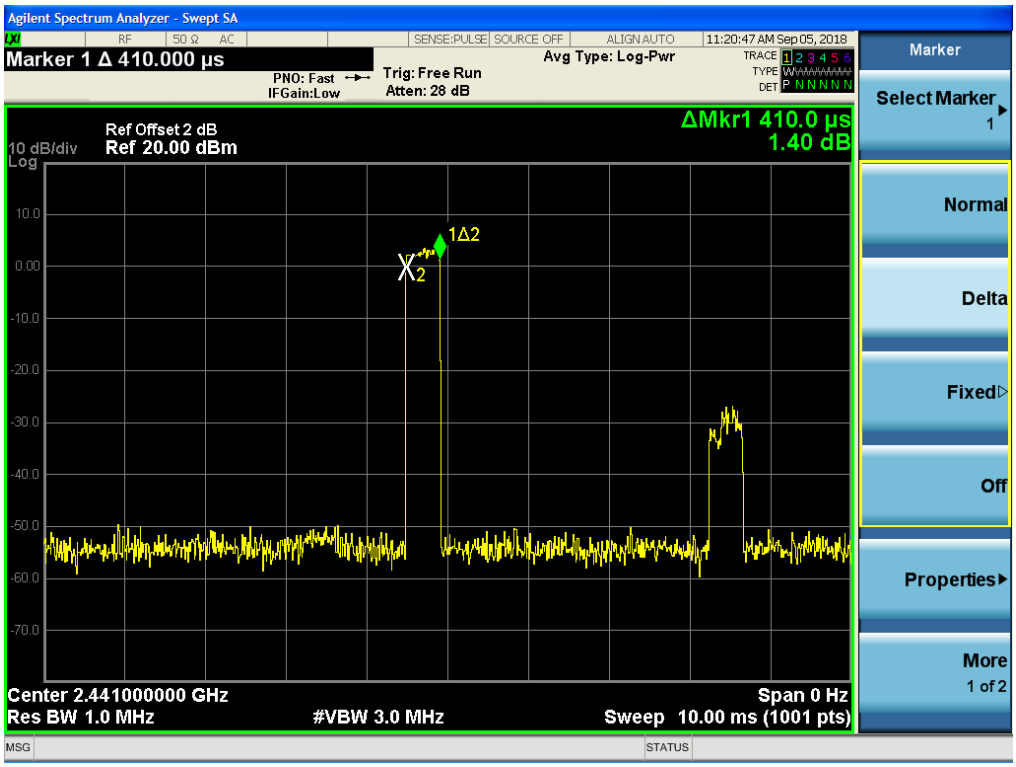
(DH5, π/4-DQPSK)

8-DPSK mode

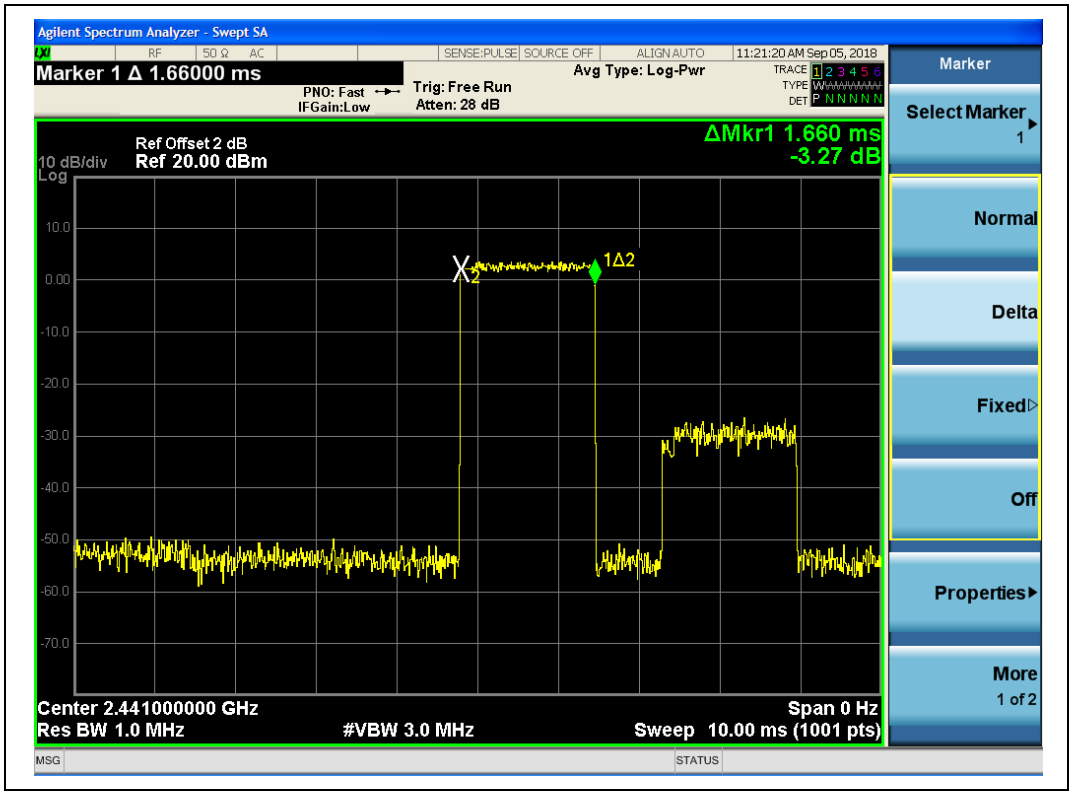
A. Test Verdict:

DH Packet	Pulse Width (ms)	Dwell Time (ms)		Limit (sec)	Verdict
		Normal Mode	AFH Mode		
DH1	0.41	131.20	65.60	0.4	PASS
DH3	1.66	265.60	132.80		PASS
DH5	2.91	310.40	155.20		PASS

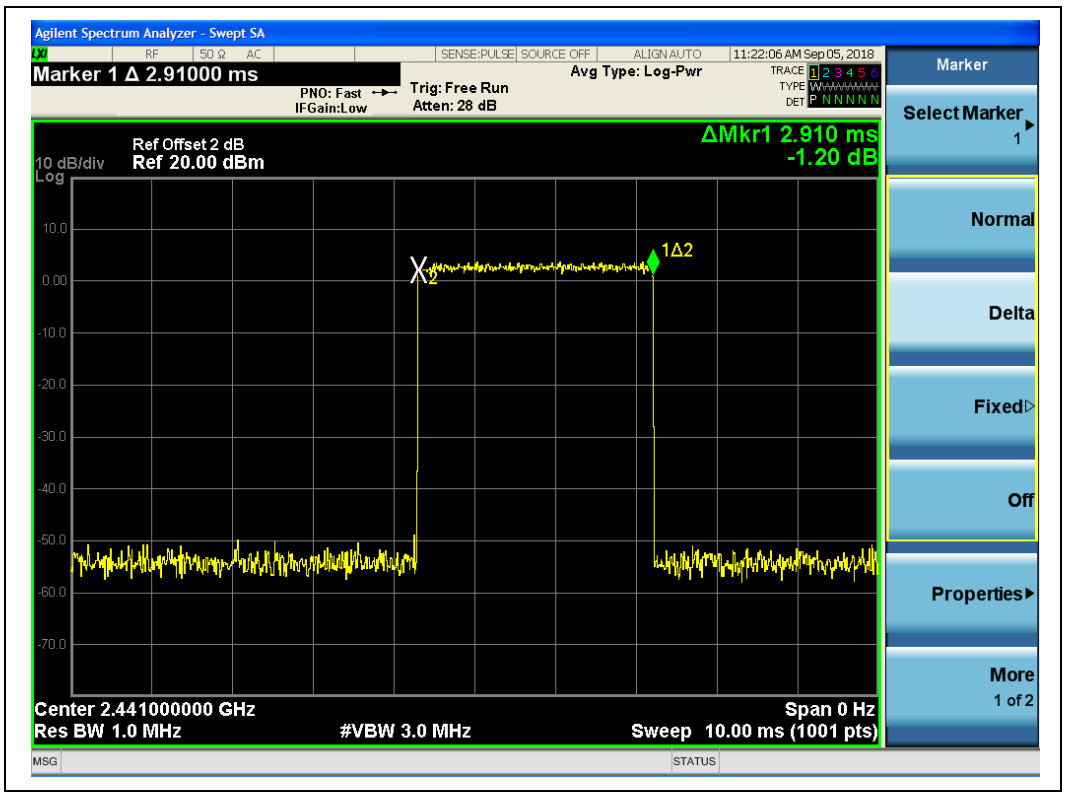
B. Test Plots:



(DH1, 8-DPSK)



(DH3, 8-DPSK)



(DH5, 8-DPSK)

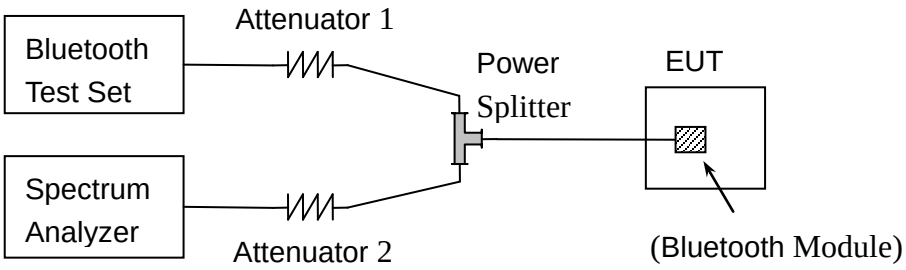
2.7. Conducted Spurious Emissions

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 Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm;the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Please refer ANNEX A(1.5).

2.7.3. Test Procedure

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

RBW = 100 kHz

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold
Allow the trace to stabilize.

2.7.4. 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

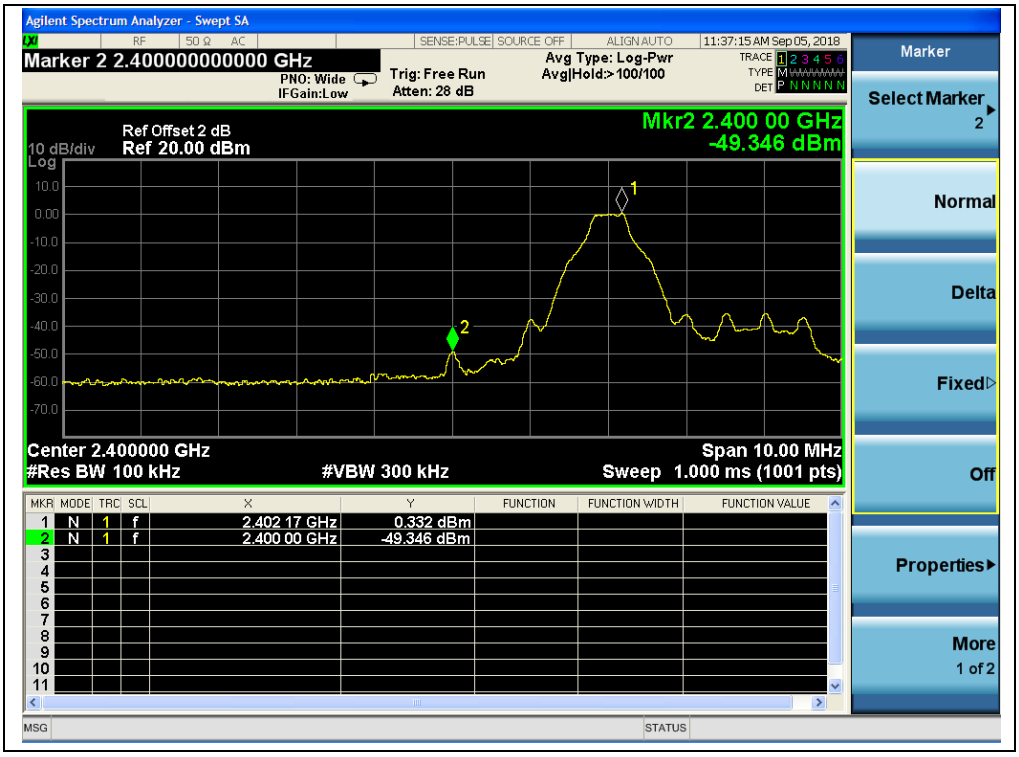
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
0	2402	-43.85	0.01	-19.99	PASS
39	2441	-43.12	4.05	-15.95	PASS
78	2480	-43.25	5.24	-14.76	PASS

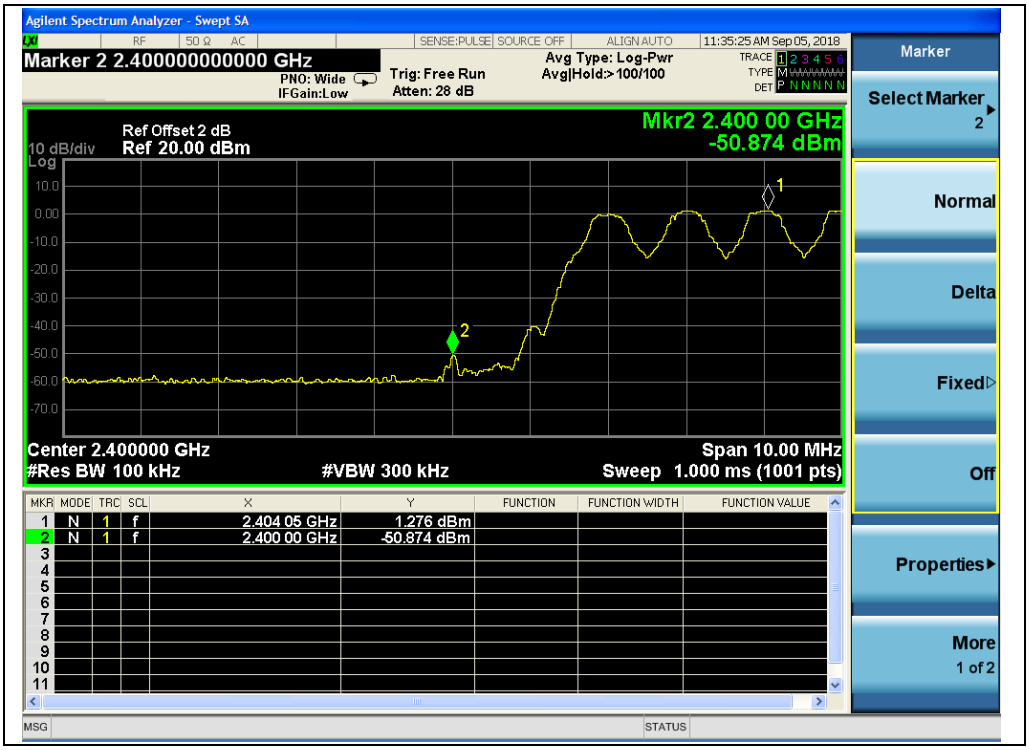
B. Test Plots:

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

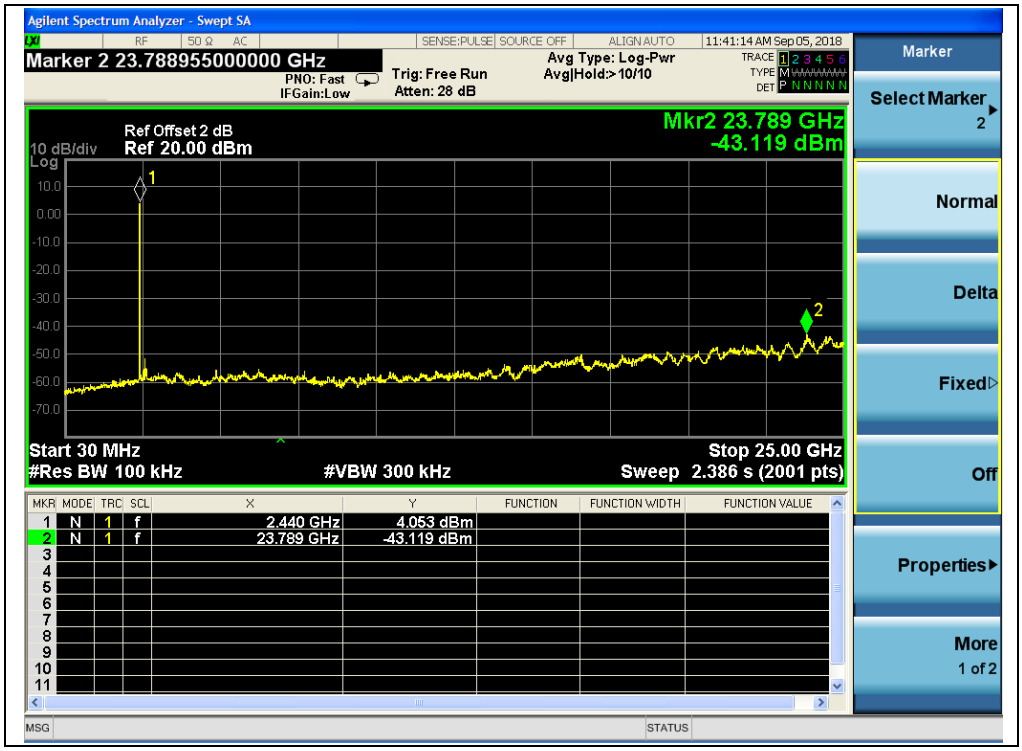
(Channel = 0, 30MHz to 25GHz, GFSK Mode)



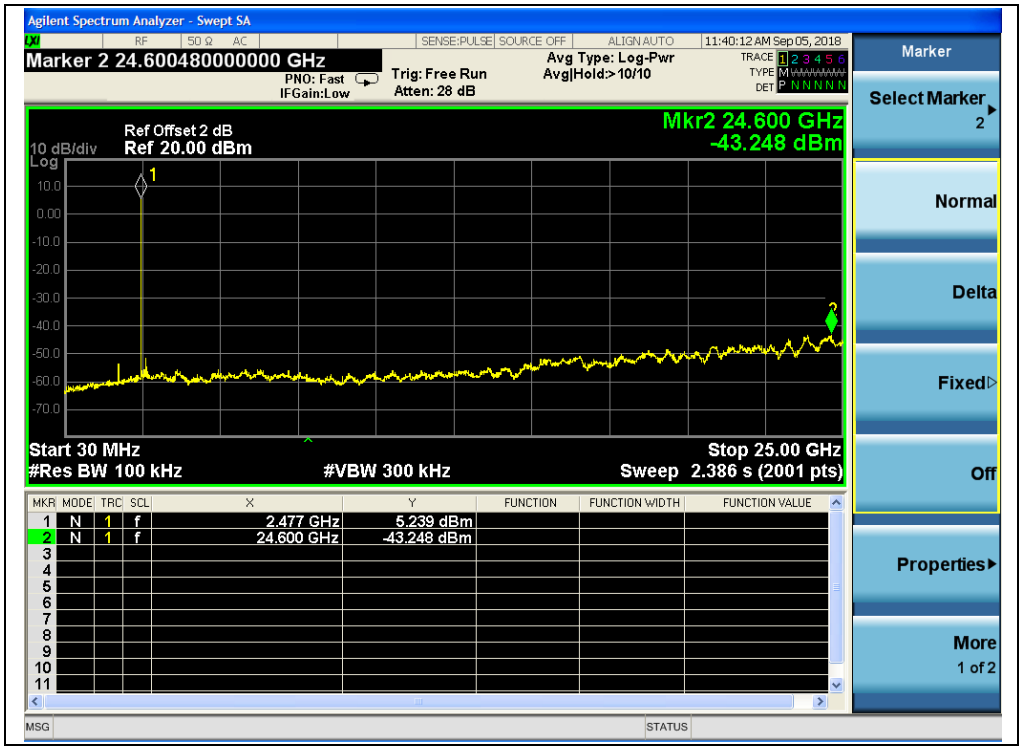
(Channel = 0, Band edge, GFSK Mode)



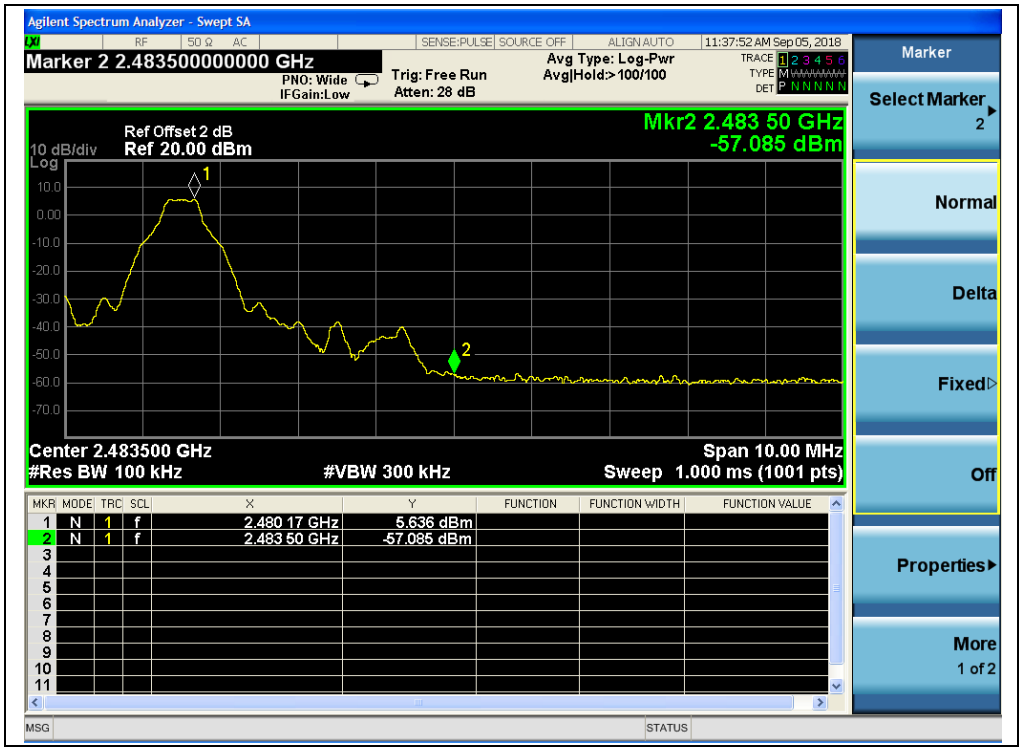
(Channel = 0, Band edge with hopping on, GFSK Mode)



(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)

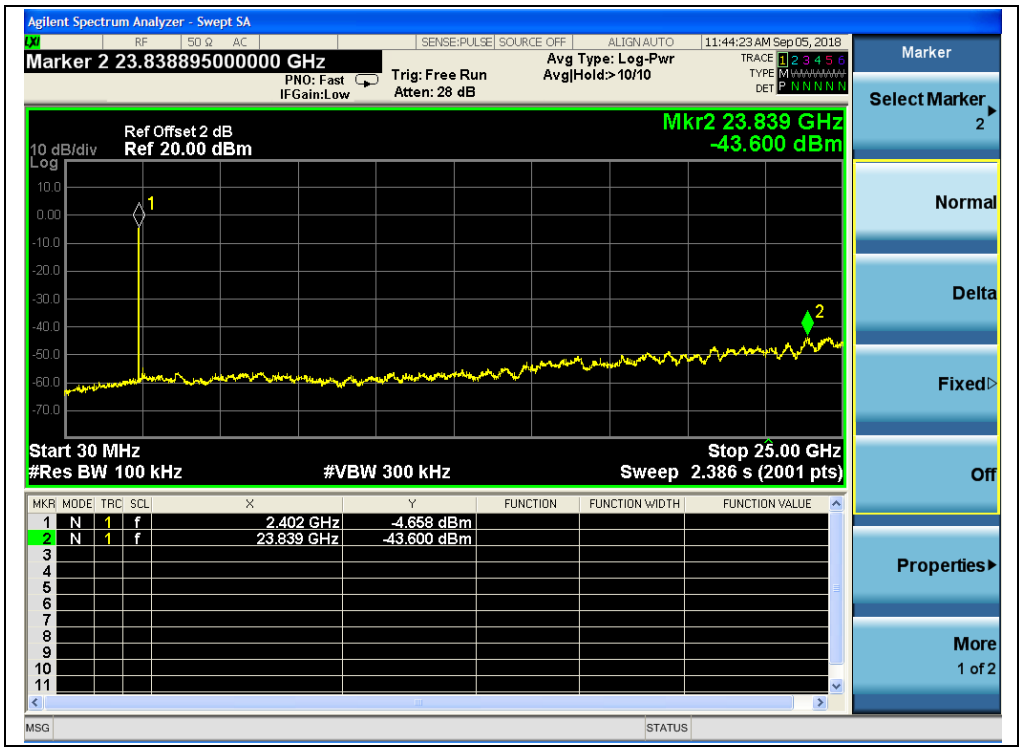
π/4-DQPSK Mode

A. Test Verdict:

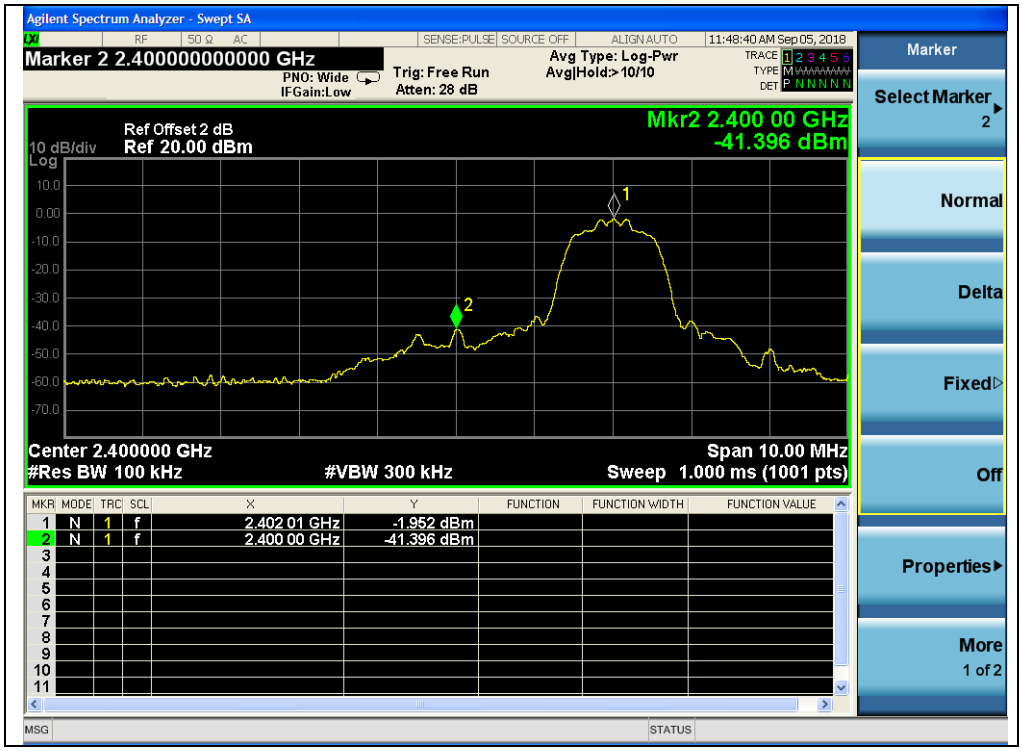
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
0	2402	-43.60	-4.66	-24.66	PASS
39	2441	-43.50	-0.90	-20.90	PASS
78	2480	-42.55	-0.04	-20.04	PASS

B. Test Plots:

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

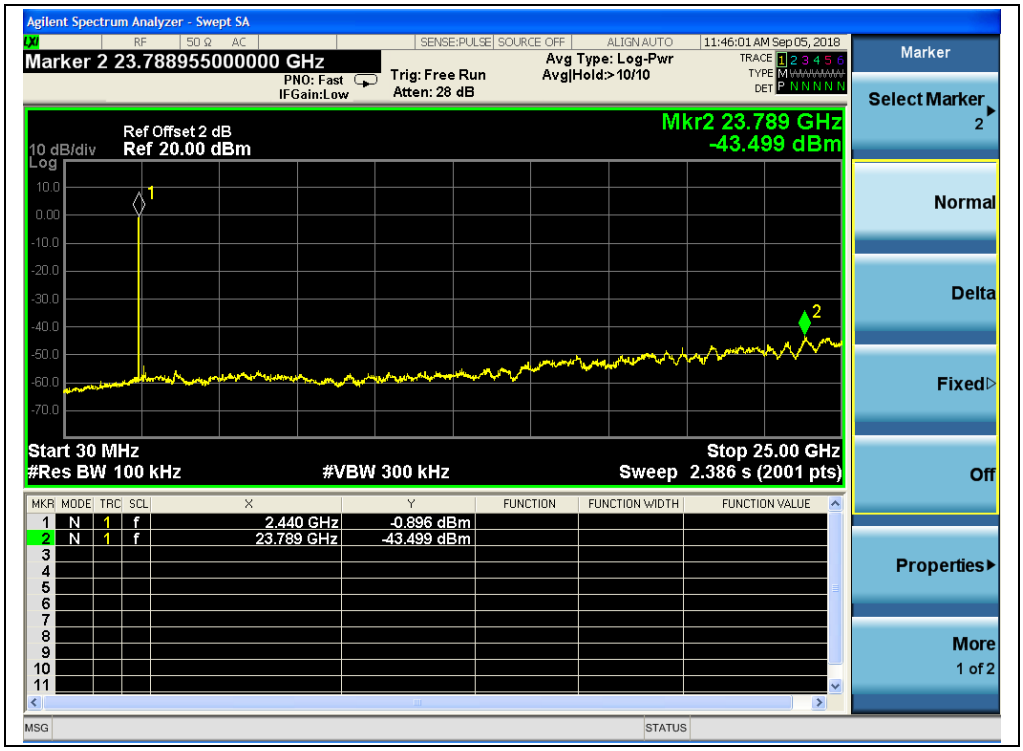


(Channel = 0, 30MHz to 25GHz, π/4-DQPSK)

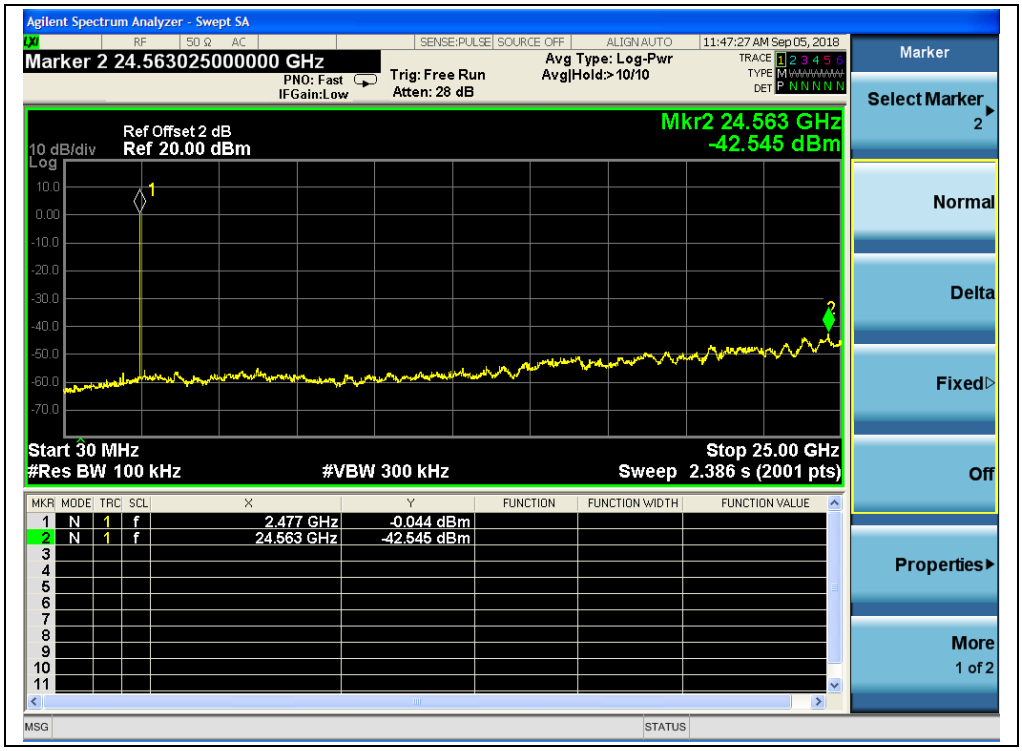


(Channel = 0, Band edge, π/4-DQPSK)

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

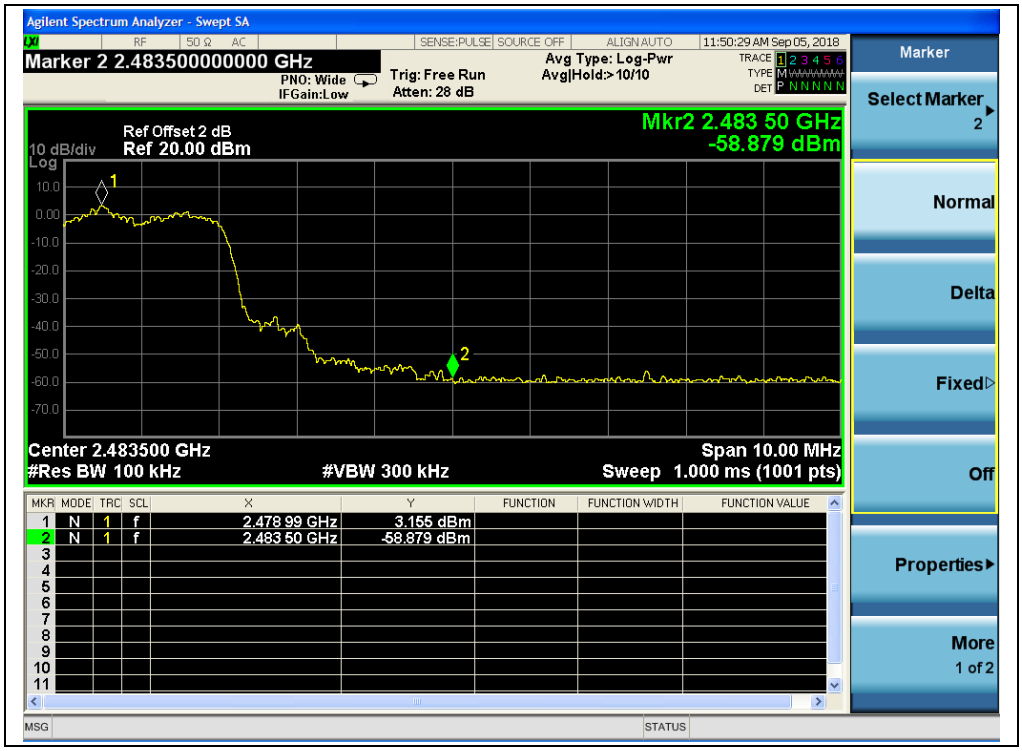


(Channel = 39, 30MHz to 25GHz, π/4-DQPSK)



(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)

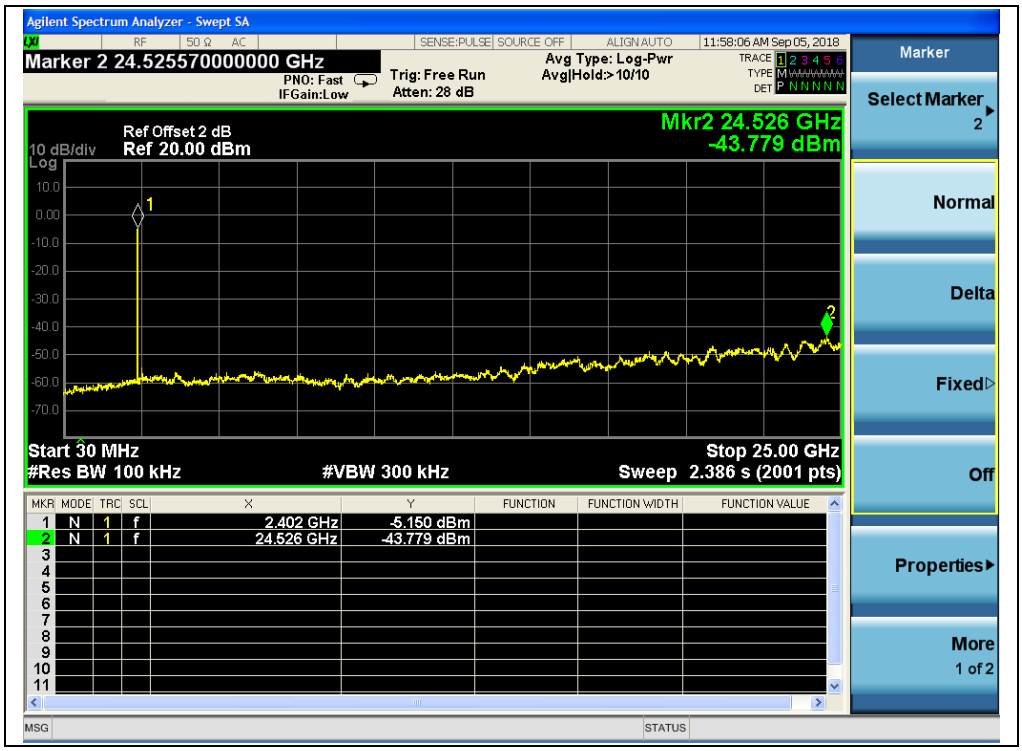
8-DPSK Mode

A. Test Verdict:

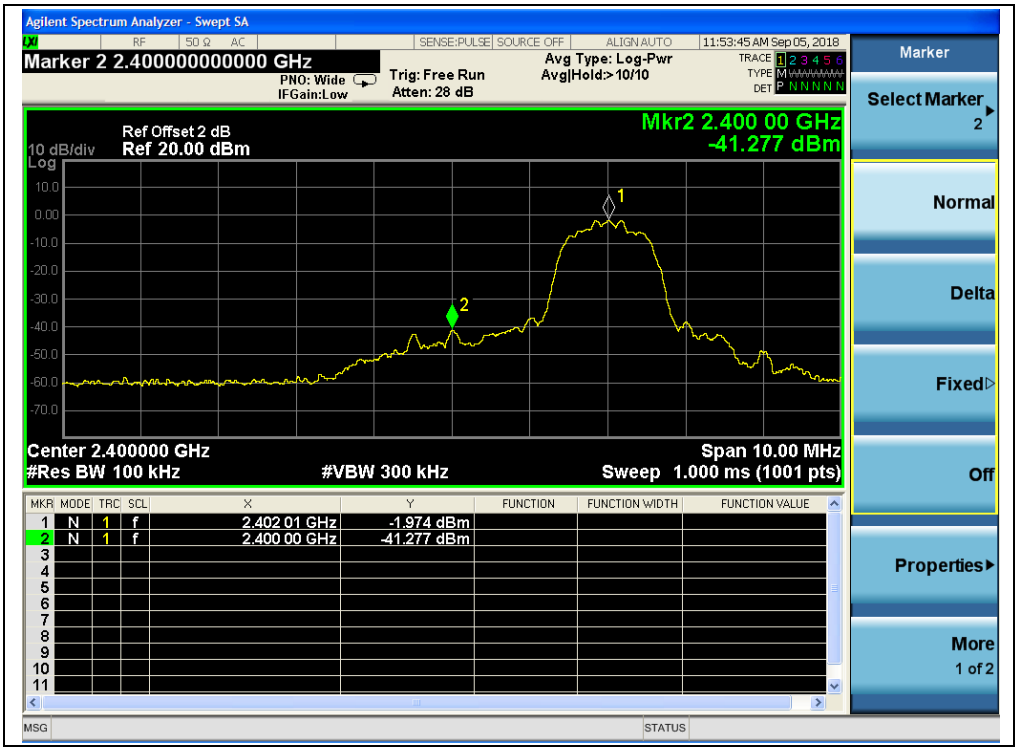
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
0	2402	-43.78	-5.15	-25.15	PASS
39	2441	-43.60	0.76	-19.24	PASS
78	2480	-43.62	3.46	-16.54	PASS

B. Test Plots:

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

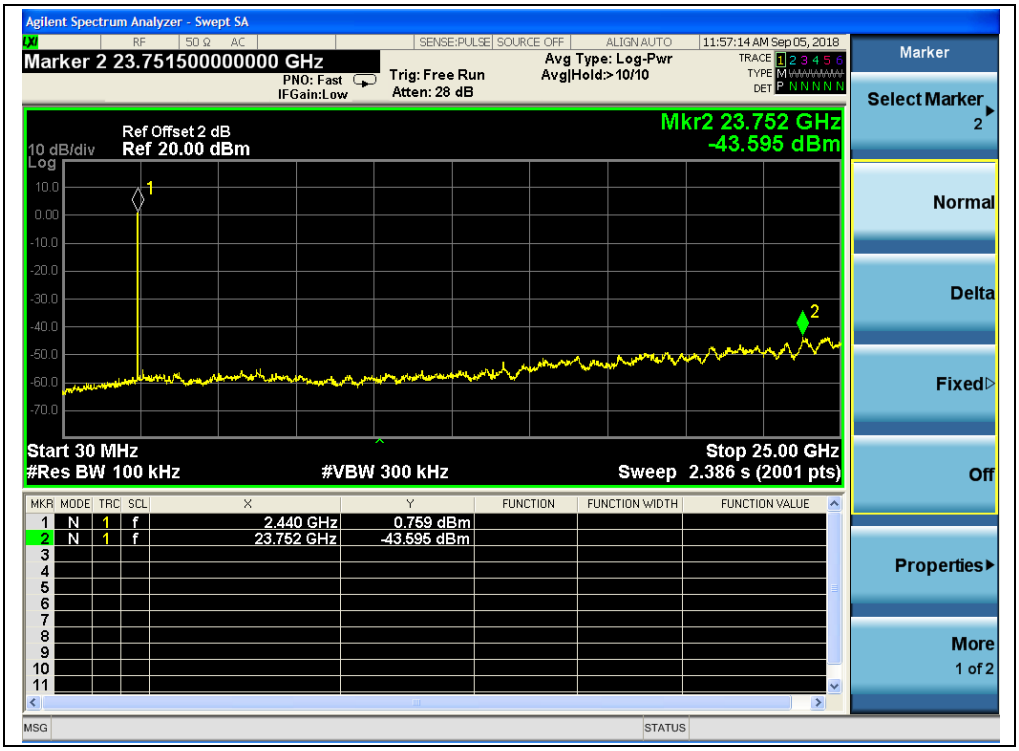


(Channel = 0, 30MHz to 25GH, 8-DPSK)

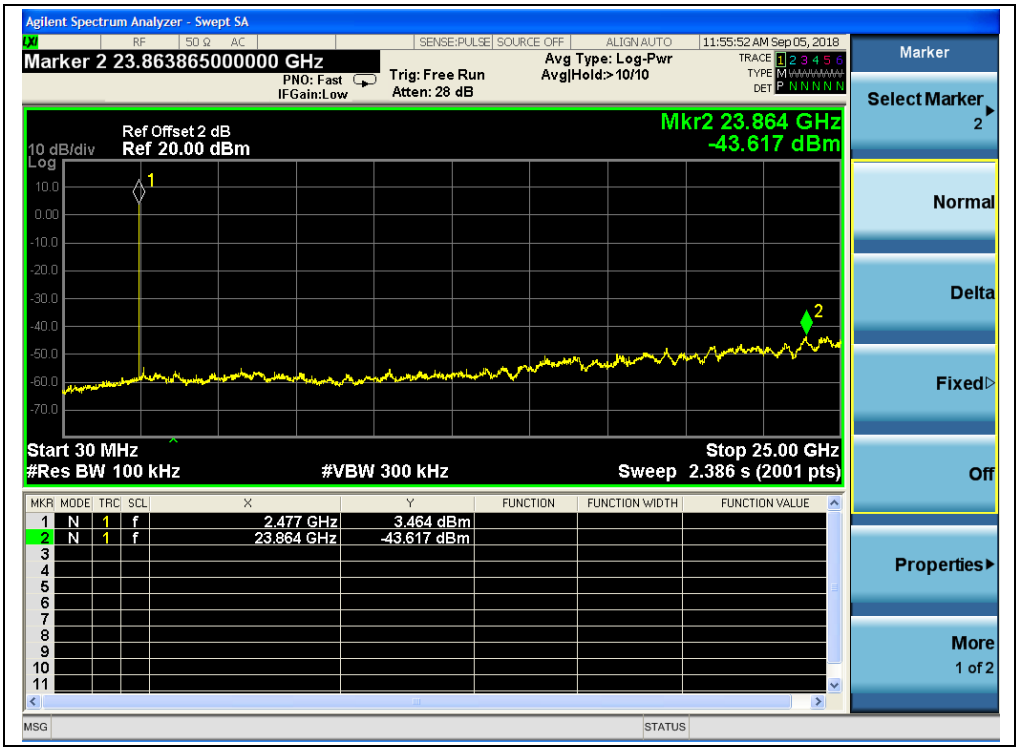


(Channel = 0, Band edge, 8-DPSK)

(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. Conducted Emission

2.8.1. Requirement

According to FCC section 15.207, 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

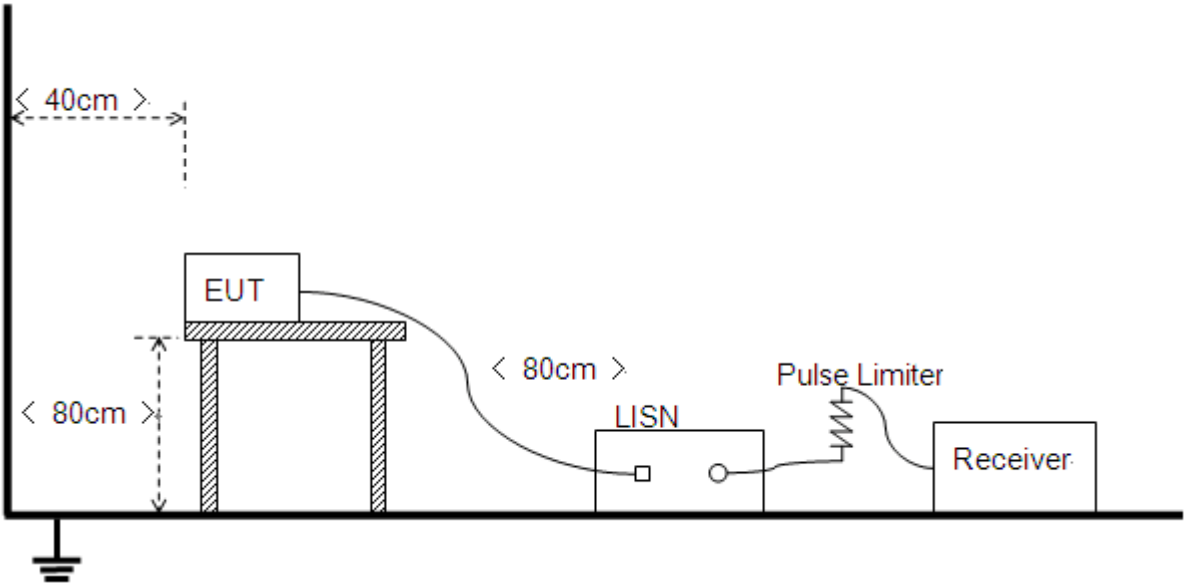
NOTE:

(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.

2.8.2. 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 reference ANNEX A(1.5).

2.8.3. 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.

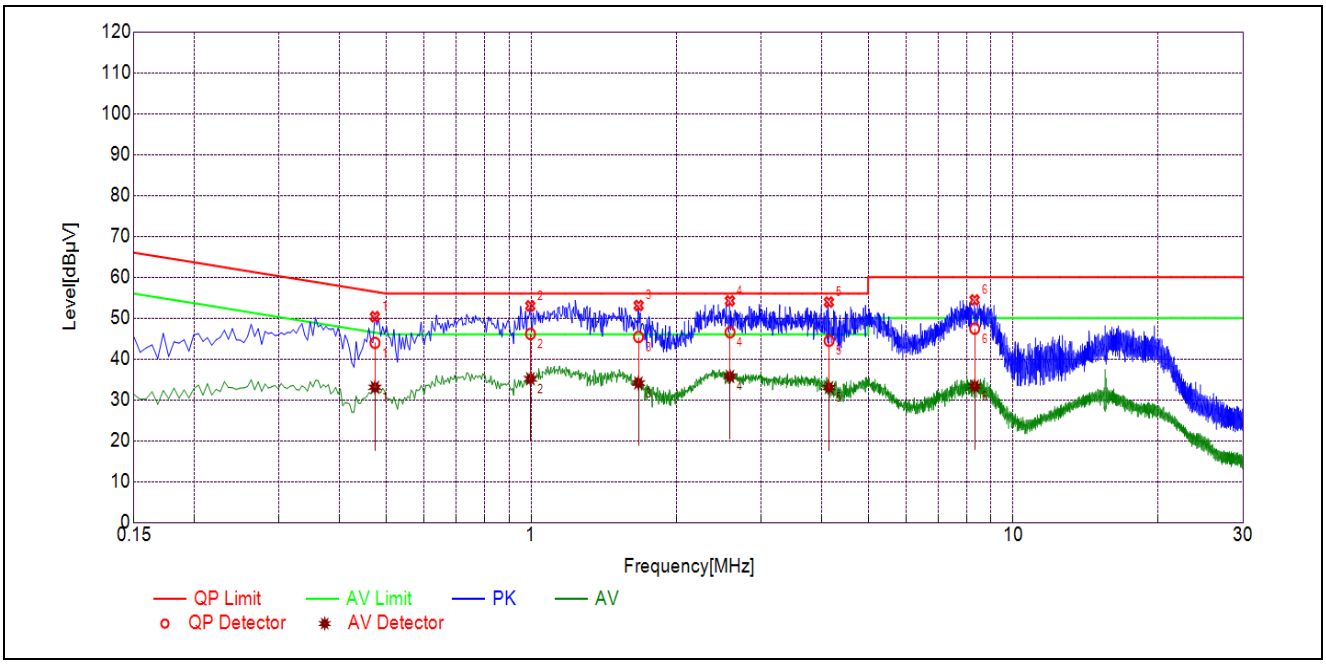
Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test setup:

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

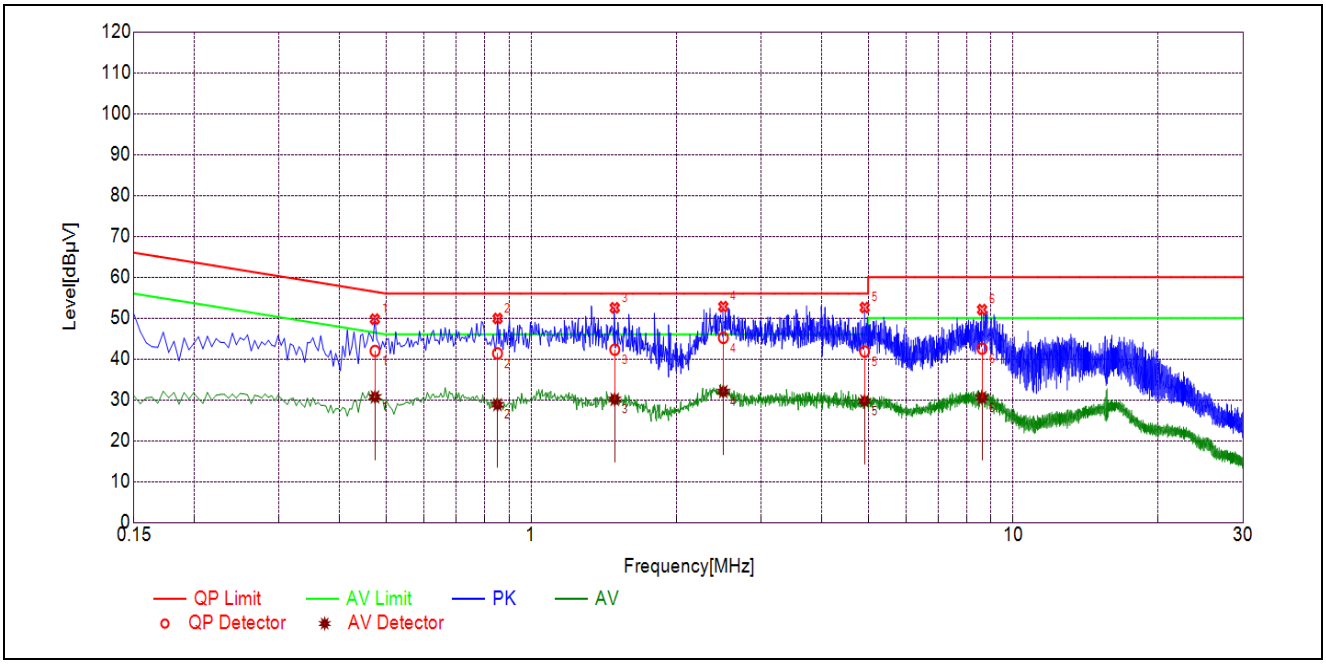
Note: The test voltage is AC 120V/60Hz.

B. Test Plots:



(L Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.4741	43.94	33.07	56.44	46.44	Line	PASS
2	0.9966	46.12	35.16	56.00	46.00		PASS
3	1.6694	45.39	34.11	56.00	46.00		PASS
4	2.5852	46.54	35.74	56.00	46.00		PASS
5	4.1494	44.46	33.02	56.00	46.00		PASS
6	8.3196	47.42	33.32	60.00	50.00		PASS



(N Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.4743	41.95	30.72	56.44	46.44	Neutral	PASS
2	0.8513	41.37	28.82	56.00	46.00		PASS
3	1.4908	42.28	30.11	56.00	46.00		PASS
4	2.5037	45.17	32.02	56.00	46.00		PASS
5	4.9168	41.82	29.69	56.00	46.00		PASS
6	8.6181	42.51	30.53	60.00	50.00		PASS

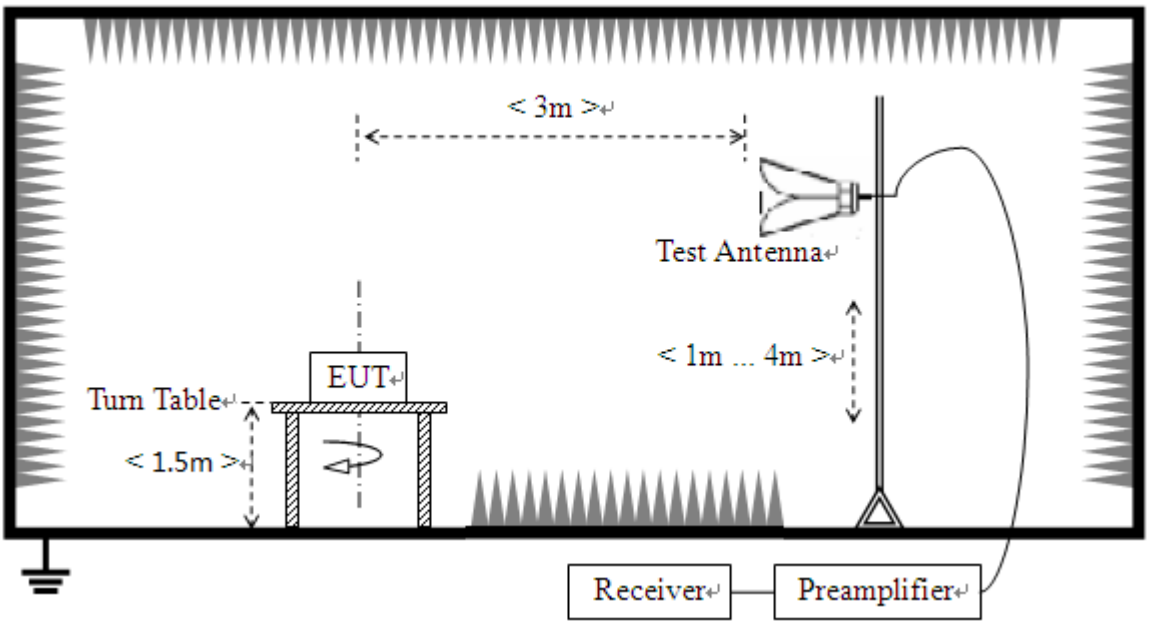
2.9. Restricted Frequency Bands

2.9.1. 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).

2.9.2. 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 A(1.5).

2.9.3. Test Procedure

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1GHz, 100 KHz for f < 1GHz
VBW = 3 MHz for peak and 10Hz for average
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize.

2.9.4. Test Result

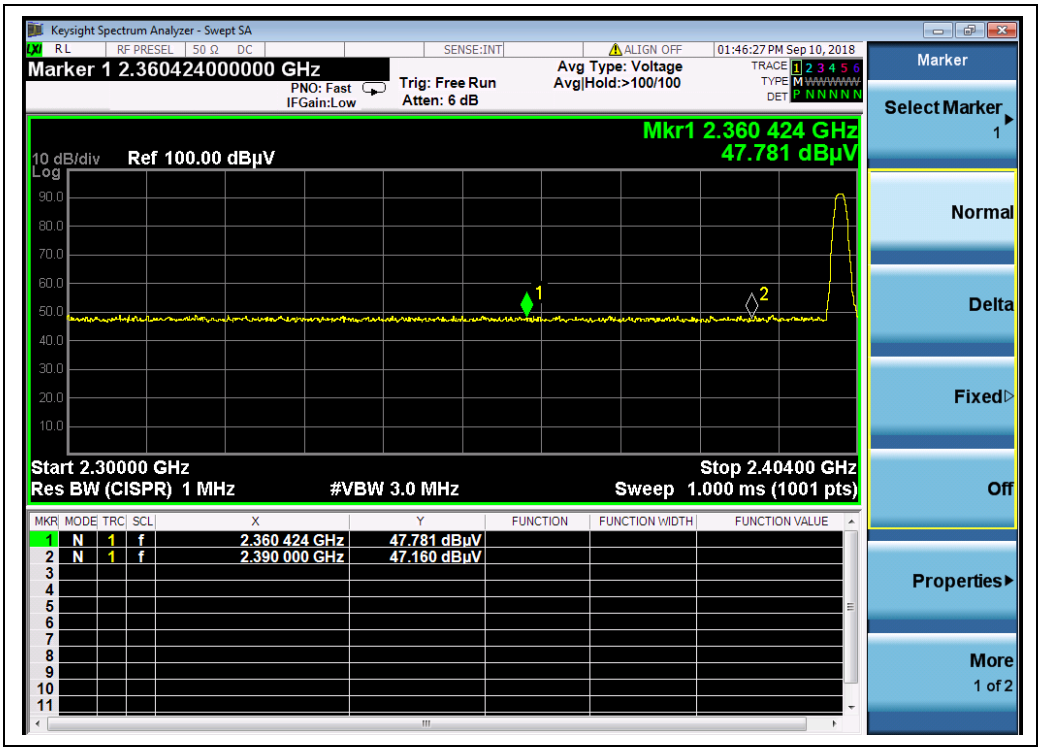
The lowest and highest channels are tested to verify Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] $=U_R + A_T + A_{Factor}$ [dB]; AT $=L_{Cable\ loss}$ [dB]-G_{preamp} [dB]
AT: Total correction Factor except Antenna
UR: Receiver Reading
Gpreamp: Preamplifier Gain
AFactor: Antenna Factor at 3m
Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

GFSK Mode

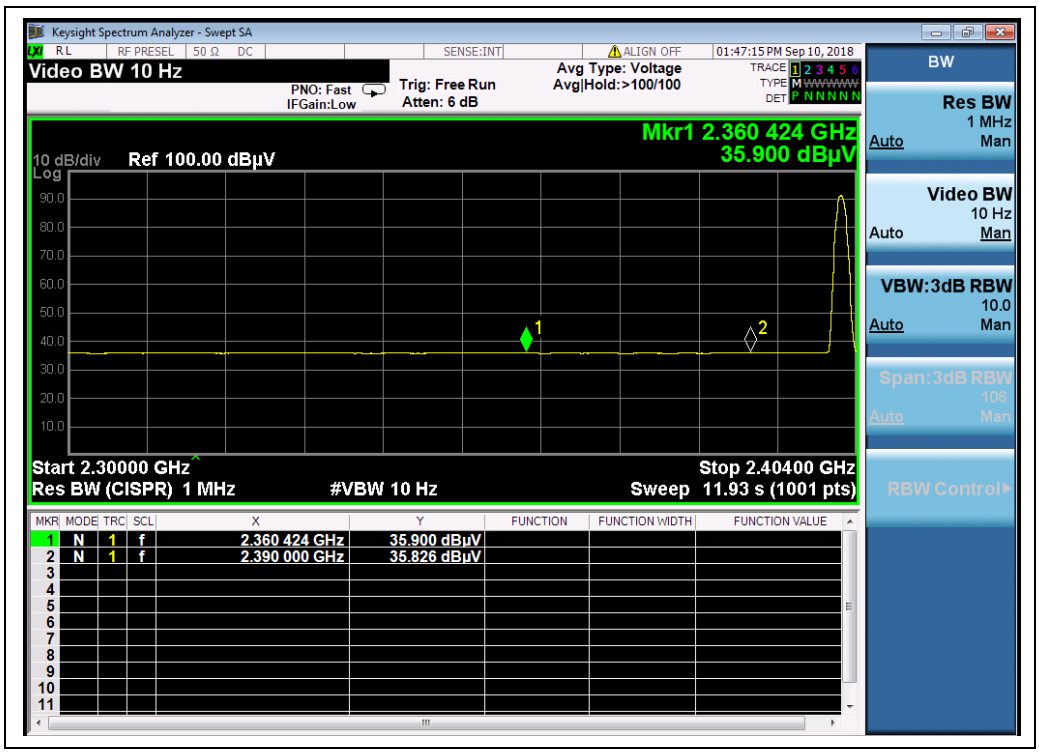
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
0	2360.42	PK	47.78	-29.67	32.56	46.71	74	Pass
0	2360.42	AV	35.90	-29.67	32.56	34.83	54	Pass
78	2487.15	PK	47.07	-29.67	32.56	49.96	74	Pass
78	2484.80	AV	35.83	-29.67	32.56	38.72	54	Pass

B. Test Plots:

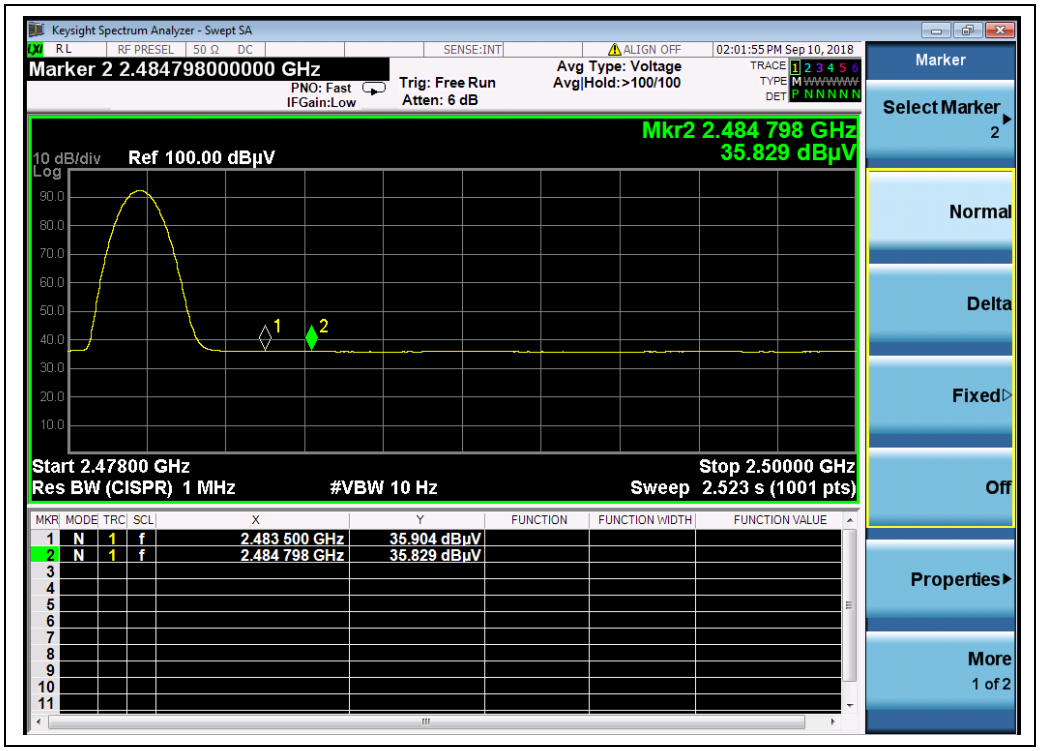


(Channel = 0, PEAK, GFSK)



(Channel = 0, AVERAGE, GFSK)

(Channel = 78, PEAK, GFSK)



(Channel = 78, AVERAGE, GFSK)

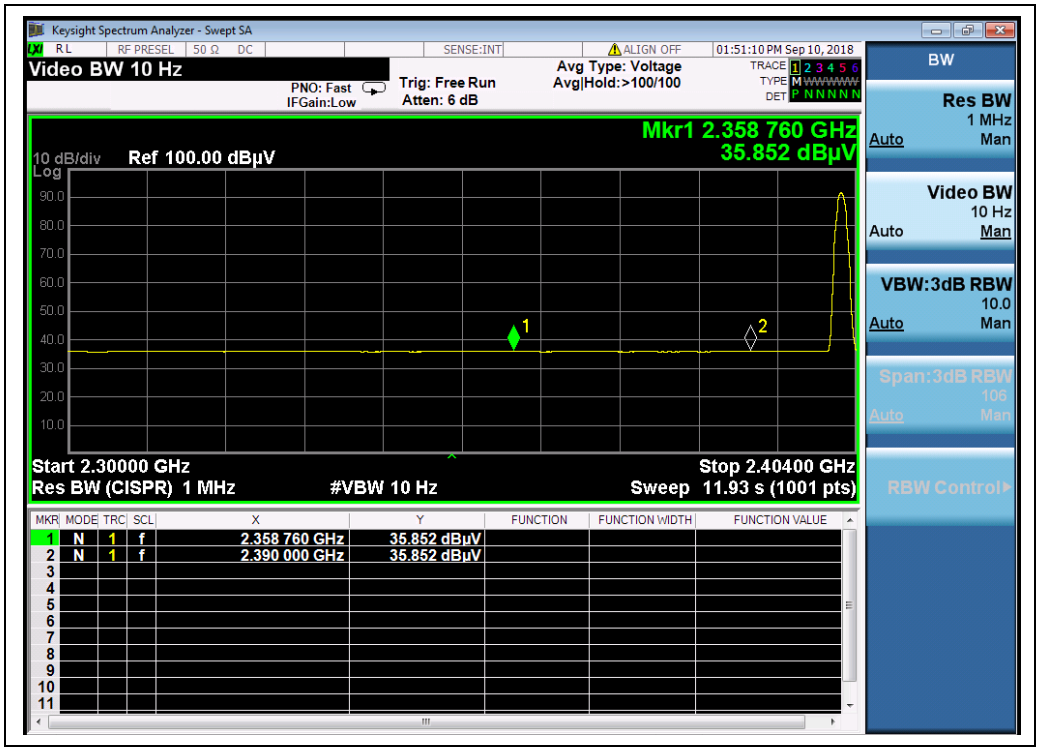
π/4-DQPSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
0	2358.76	PK	48.13	-29.67	32.56	51.02	74	Pass
0	2358.76	AV	35.85	-29.67	32.56	38.74	54	Pass
78	2490.45	PK	46.68	-29.67	32.56	49.57	74	Pass
78	2486.21	AV	35.77	-29.67	32.56	38.66	54	Pass

B. Test Plots:

(Channel = 0, PEAK, π/4-DQPSK)



(Channel = 0, AVERAGE, π/4-DQPSK)

(Channel = 78, PEAK, π/4-DQPSK)

(Channel = 78, AVERAGE, π/4-DQPSK)

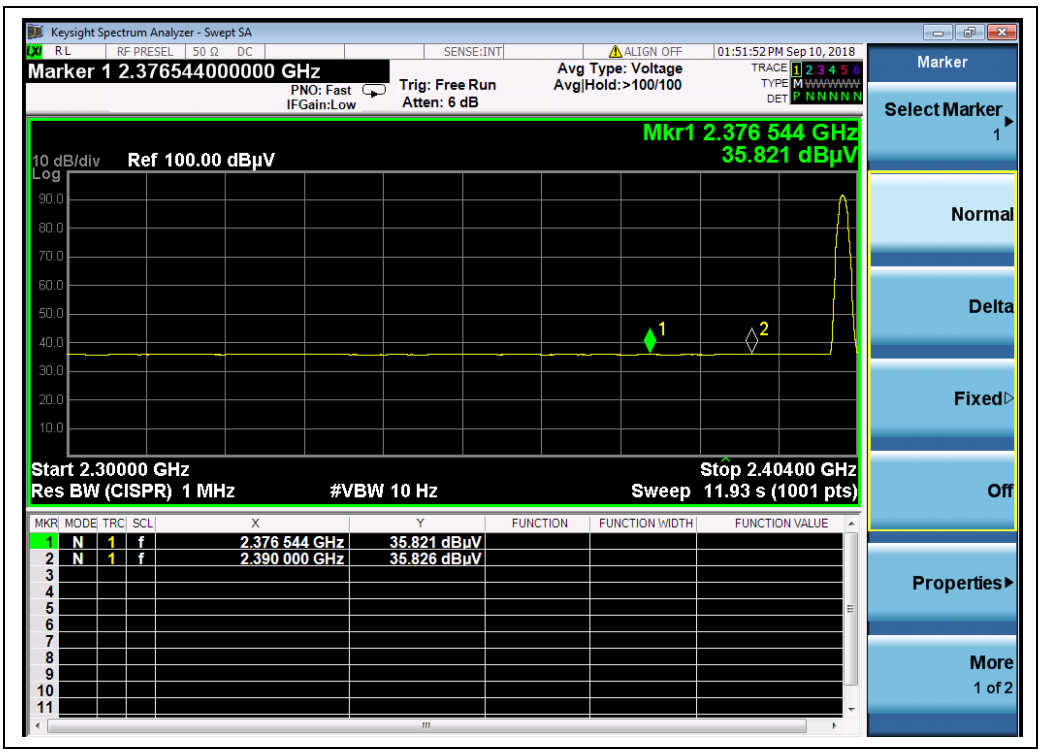
8-DPSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
0	2354.08	PK	47.35	-29.67	32.56	50.24	74	Pass
0	2376.54	AV	35.82	-29.67	32.56	38.71	54	Pass
78	2488.56	PK	47.57	-29.67	32.56	50.46	74	Pass
78	2488.56	AV	35.79	-29.67	32.56	38.68	54	Pass

B. Test Plots:

(Channel = 0, PEAK, 8-DPSK)



(Channel = 0, AVERAGE, 8-DPSK)

(Channel = 78, PEAK, 8-DPSK)

(Channel = 78, AVERAGE, 8-DPSK)

2.10. Radiated Emission

2.10.1. Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).
According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note:

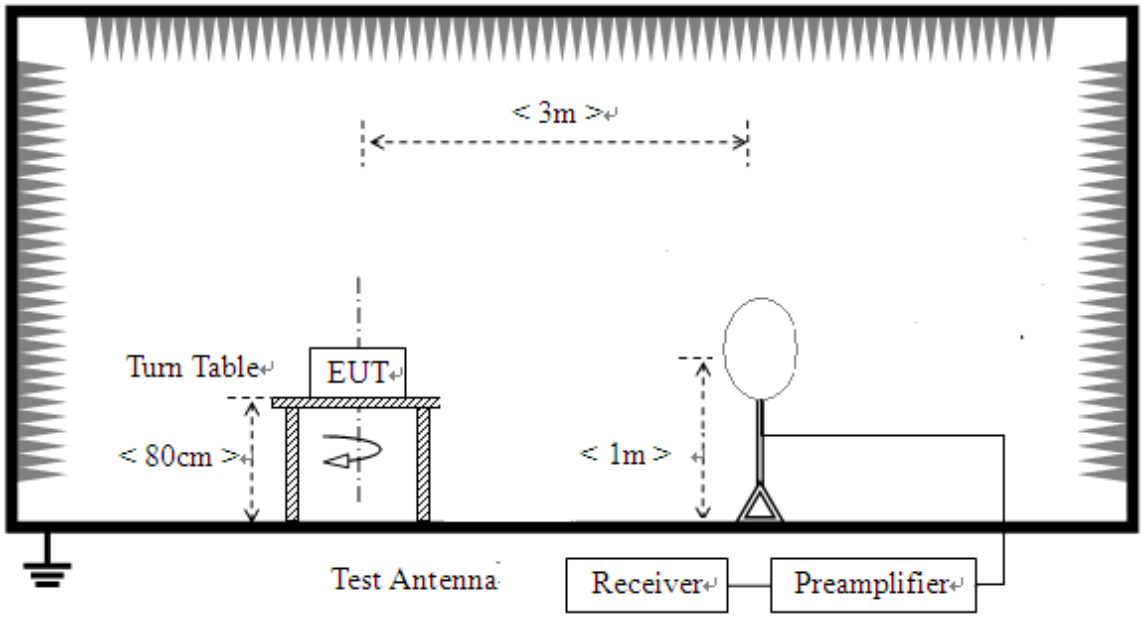
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

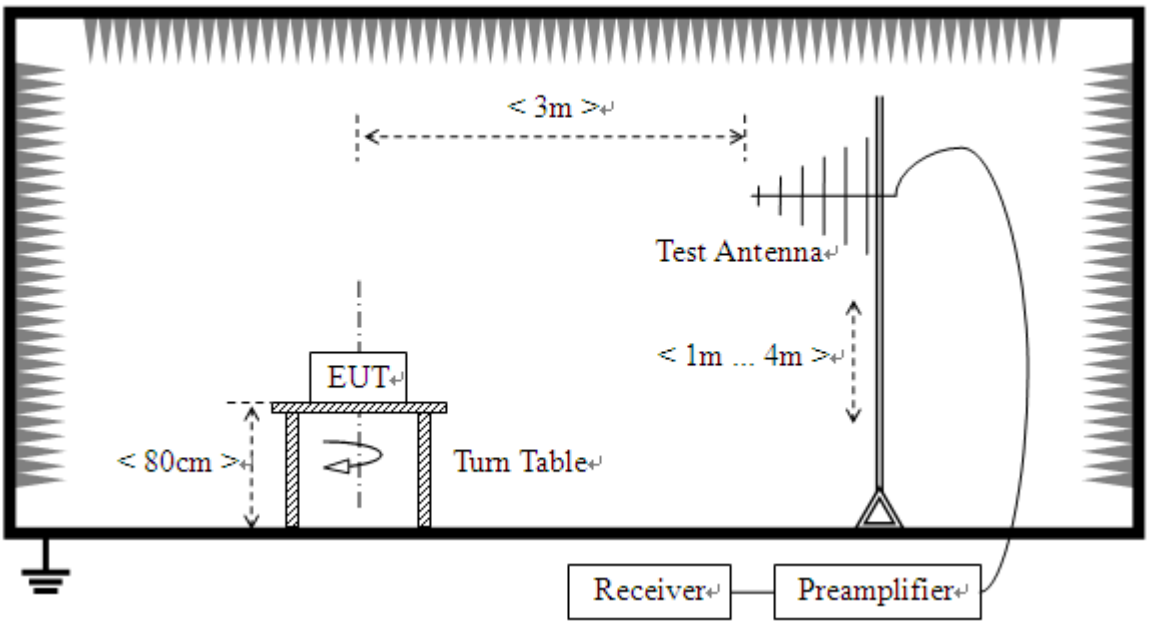
2.10.2. Test Description

A. Test Setup:

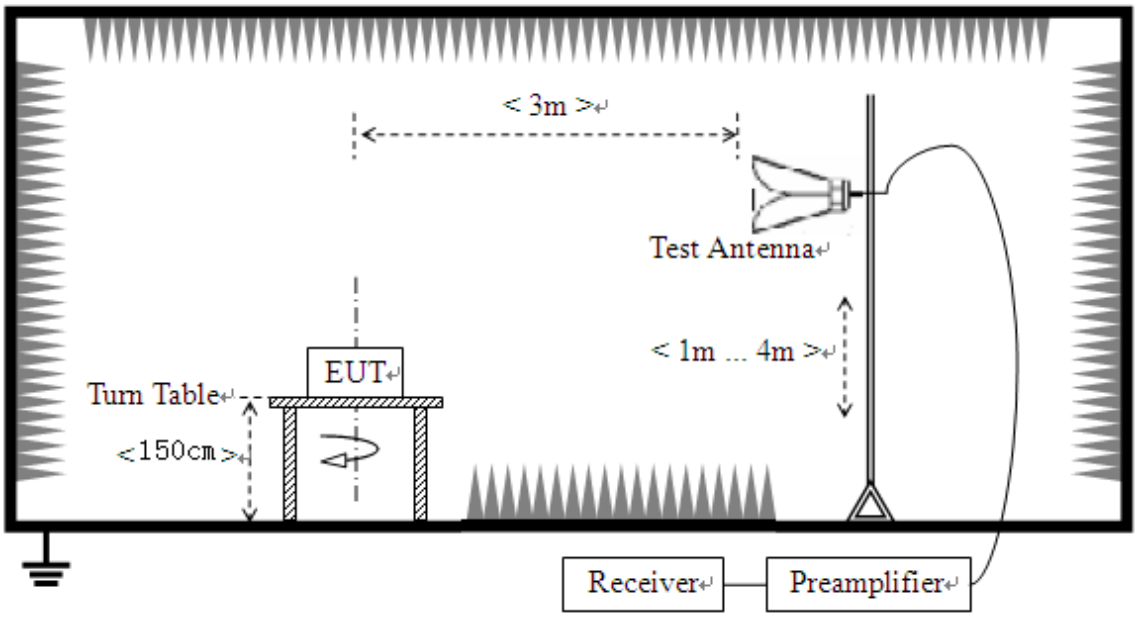
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The RF absorbing material used on the reference ground plane and on the turntable have a maximum height (thickness) of 30 cm (12 in) and have a minimum-rated attenuation of 20 dB at all frequencies from 1 GHz to 18 GHz.

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.10 (2013). For radiated emissions below or equal to 1GHz, the EUT was set-up on insulator 80cm above the Ground Plane, For radiated emissions above 1GHz, The EUT was set-up on insulator 150cm above the Ground Plane. The set-up and test methods were according to ANSI C63.10.

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.

For the Test Antenna:

(a) In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
(b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Place the test antenna at 3m away from area of the EUT, while keeping the test antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The test antenna may have to be

higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final test antenna elevation shall be that which maximizes the emissions. The test antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. The emission levels at both horizontal and vertical polarizations should be tested.

B. Equipments List:

Please reference ANNEX A(1.5).

2.10.3. Test Procedure

Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

2.10.4. Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

E [dBμV/m] $=U_R + A_T + A_{Factor}$ [dB]; $A_T = L_{Cable\ loss}$ [dB]$-G_{preamp}$ [dB]

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

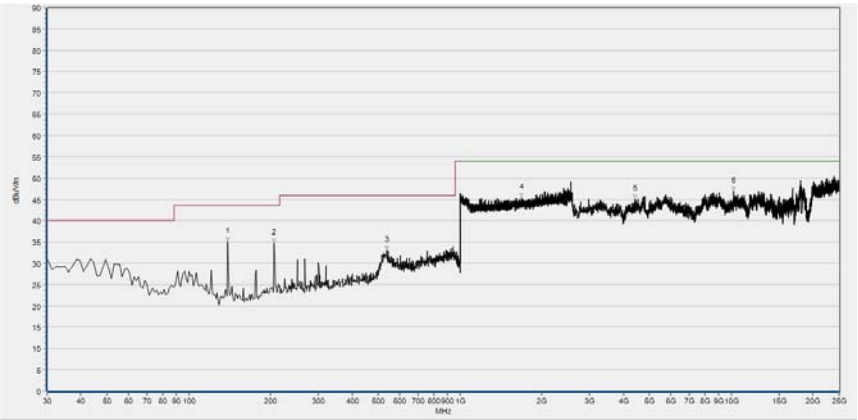
A_{Factor}: Antenna Factor at 3m

During the test, the total correction Factor AT and A_{Factor} were built in test software.

Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.
Note2: For the frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.
Note3: For the frequency, which started from 25GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

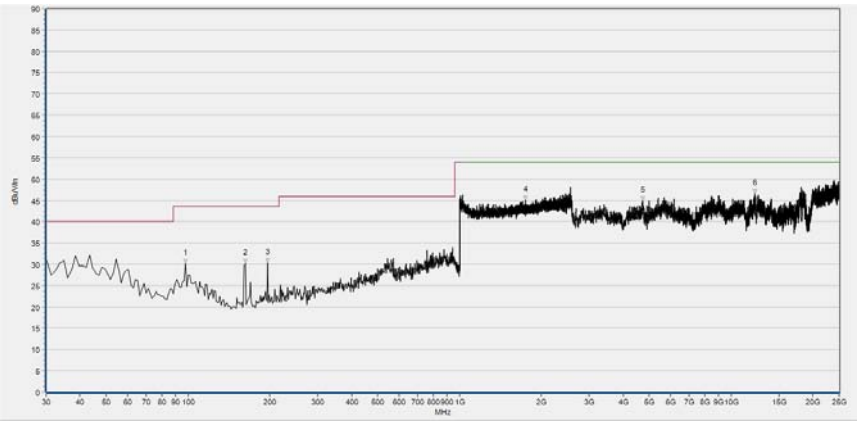
GFSK Mode

Plots for Channel = 0



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
139.262	35.00	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
206.033	34.65	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
536.245	33.01	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1686.355	45.47	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4416.767	45.08	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10209.238	46.94	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

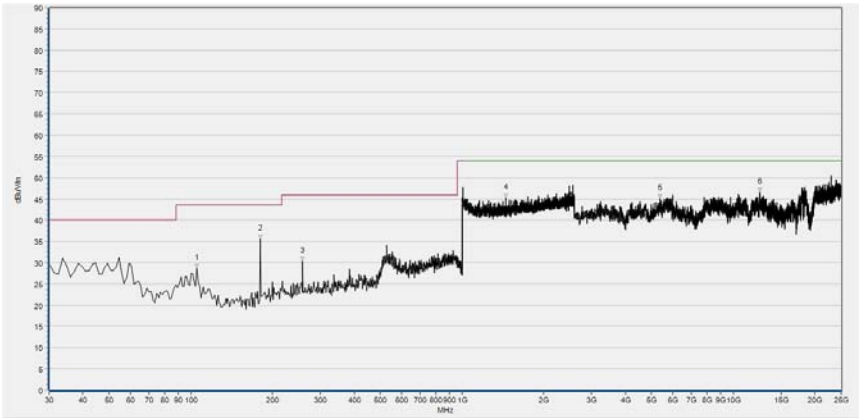
(30MHz to 25GHz, Antenna Horizontal, GFSK, channel 0)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
97.985	30.10	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
162.328	30.19	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
196.320	30.27	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
1753.581	45.01	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4718.203	44.83	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12205.237	46.56	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

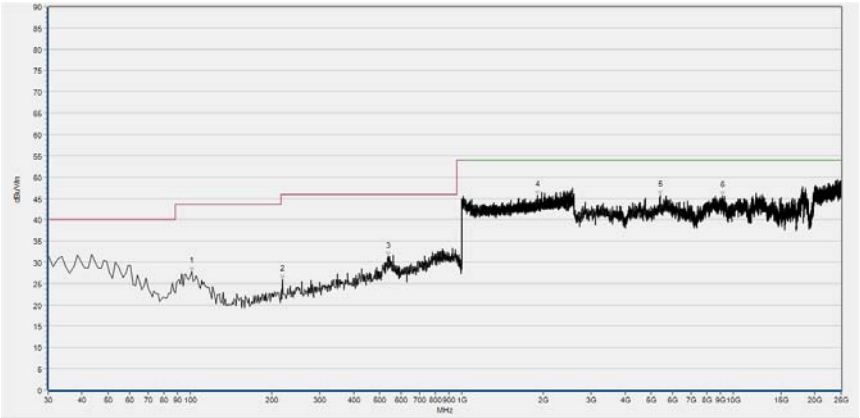
(30MHz to 25GHz, Antenna Vertical, GFSK, channel 0)

Plot for Channel = 39



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
105.269	28.66	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
180.538	35.53	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
258.235	30.29	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1446.259	45.33	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5378.105	45.02	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12518.894	46.52	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

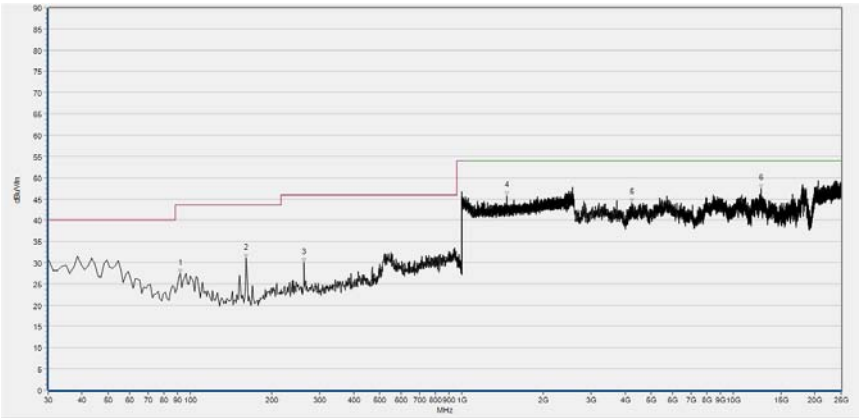
(30MHz to 25GHz, Antenna Horizontal, GFSK, channel 39)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
101.627	27.86	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
219.387	26.03	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
536.245	31.27	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1900.200	45.82	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5382.179	45.67	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
9121.622	45.55	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

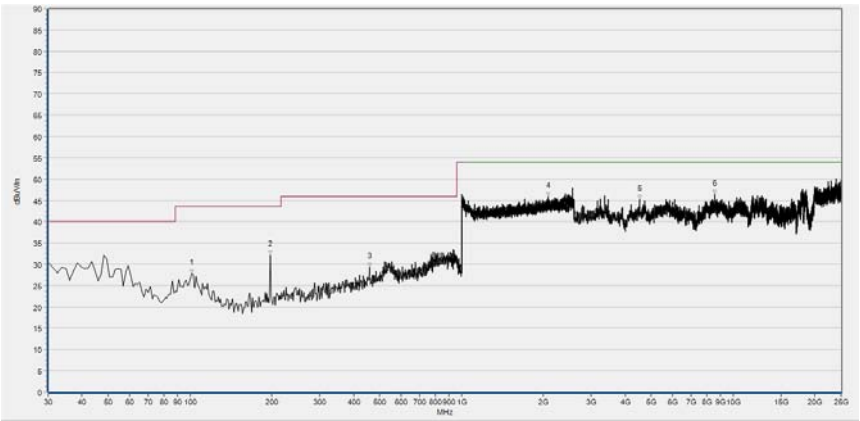
(30MHz to 25GHz, Antenna Vertical, GFSK, channel 39)

Plot for Channel = 78



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
91.915	27.42	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
161.114	30.99	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
263.091	30.07	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1466.747	45.73	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4225.314	44.16	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12681.833	47.46	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(30MHz to 25GHz, Antenna Horizontal, GFSK, channel 78)

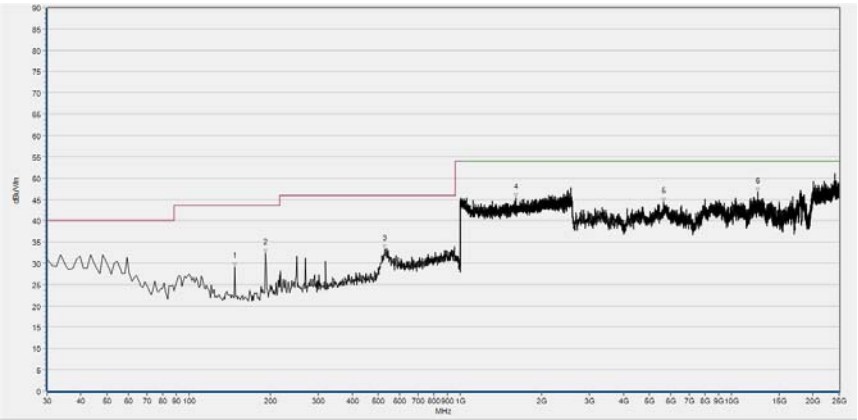


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
101.627	27.77	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
197.534	32.13	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
457.334	29.25	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2087.155	45.86	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4514.530	45.33	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8579.851	46.48	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(30MHz to 25GHz, Antenna Vertical, GFSK, channel 78)

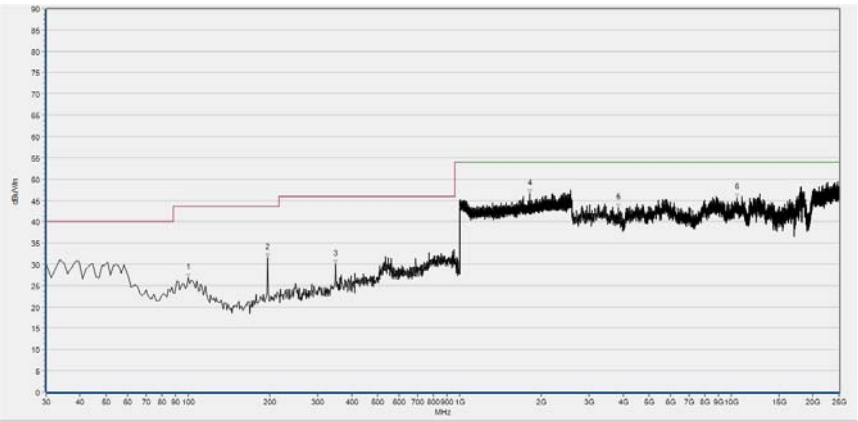
π/4-DQPSK Mode

Plots for Channel = 0



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
147.760	29.24	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
191.464	32.37	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
527.747	33.33	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1604.402	45.45	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5638.807	44.49	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12555.556	46.74	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

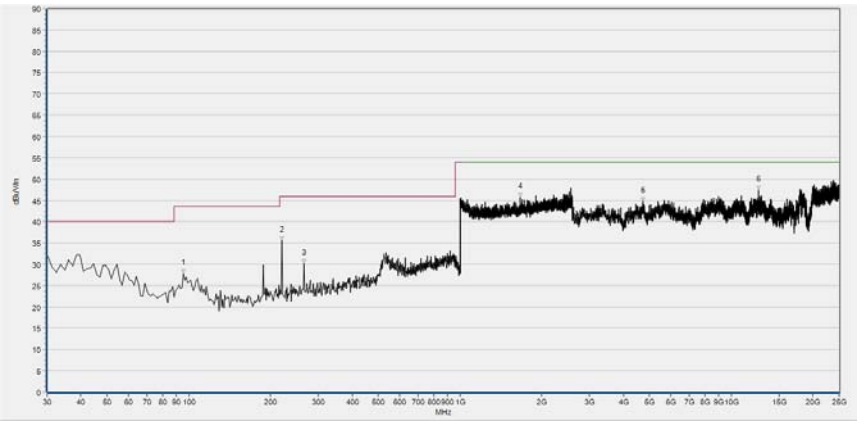
(30MHz to 25GHz, Antenna Horizontal @ π/4-DQPSK, channel 0)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
100.413	26.80	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
196.320	31.57	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
349.287	30.02	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1808.643	46.65	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3850.555	43.31	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10502.528	45.50	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

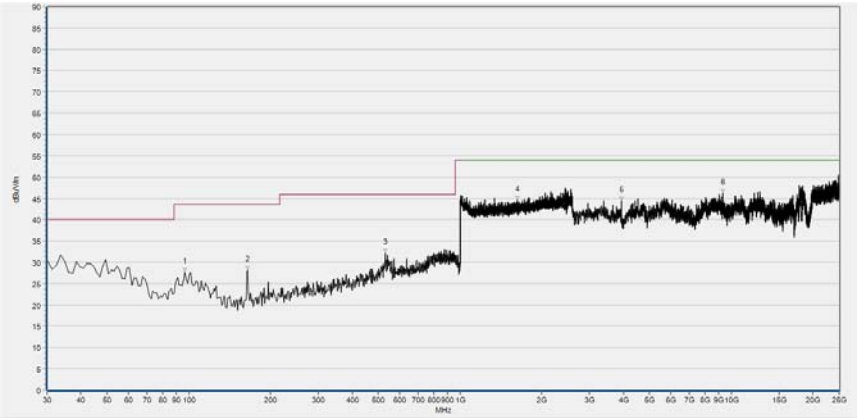
(30MHz to 25GHz, Antenna Vertical @ π/4-DQPSK, channel 0)

Plot for Channel = 39



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.557	27.87	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
220.601	35.57	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
265.519	30.24	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1669.068	45.81	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4714.130	44.68	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12616.658	47.50	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

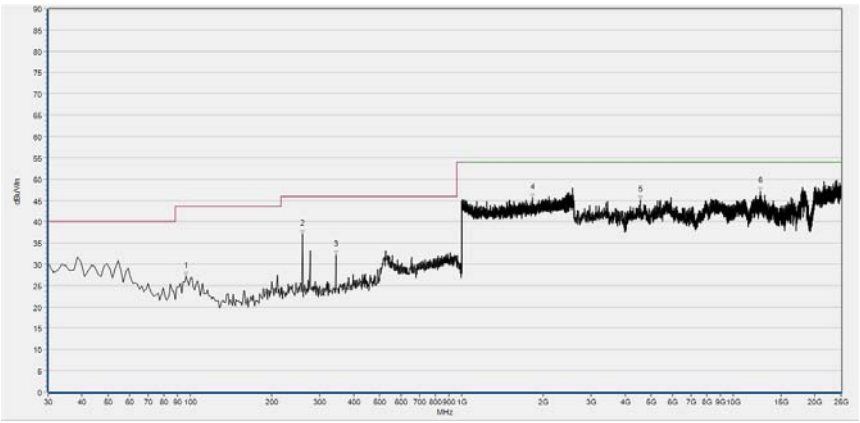
(30MHz to 25GHz, Antenna Horizontal @ π/4-DQPSK, channel 39)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
96.771	27.60	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
164.756	28.11	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
528.961	32.23	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1627.451	44.66	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3927.951	44.42	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
9333.442	46.33	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

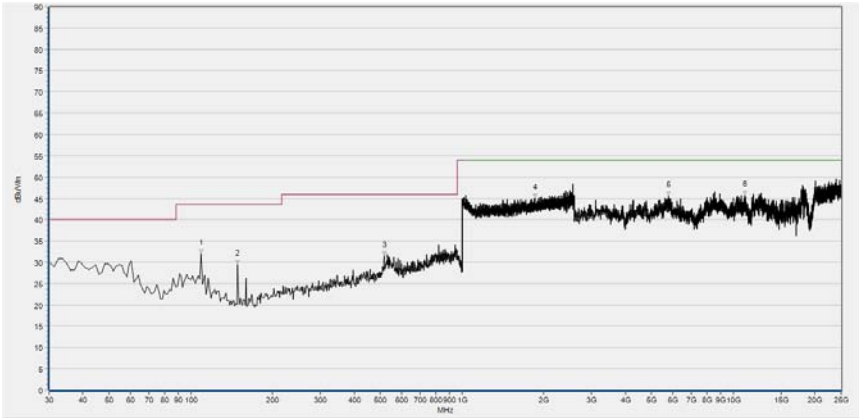
(30MHz to 25GHz, Antenna Vertical @ π/4-DQPSK, channel 39)

Plot for Channel = 78



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
96.771	27.09	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
259.449	37.00	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
344.431	32.17	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1825.290	45.51	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4559.338	45.02	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12600.364	47.08	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(30MHz to 25GHz, Antenna Horizontal @ π/4-DQPSK, channel 78)

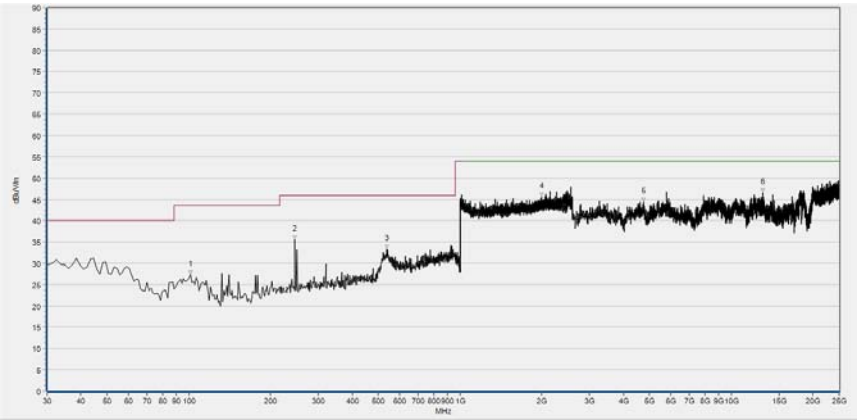


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
108.911	31.95	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
148.974	29.54	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
516.821	31.46	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1857.303	45.11	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5769.158	45.66	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
11019.858	45.82	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(30MHz to 25GHz, Antenna Vertical @ π/4-DQPSK, channel 78)

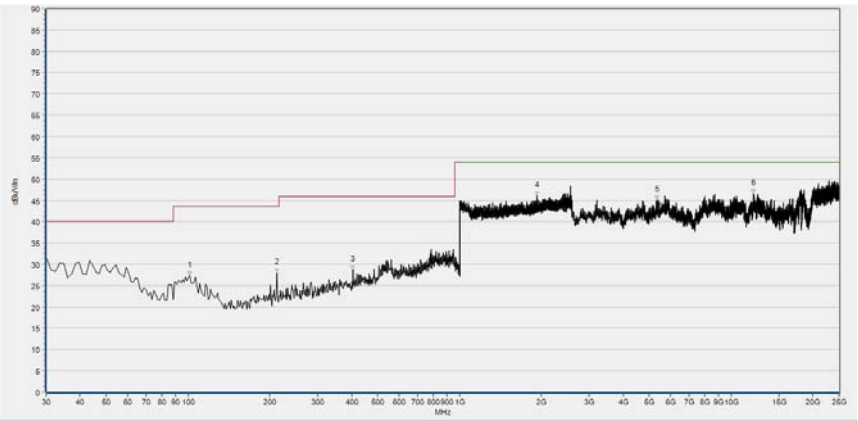
8-DPSK Mode

Plots for Channel = 0



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
101.627	27.29	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
246.095	35.46	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
536.245	33.41	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1998.800	45.63	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4758.938	44.36	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
13056.592	46.58	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

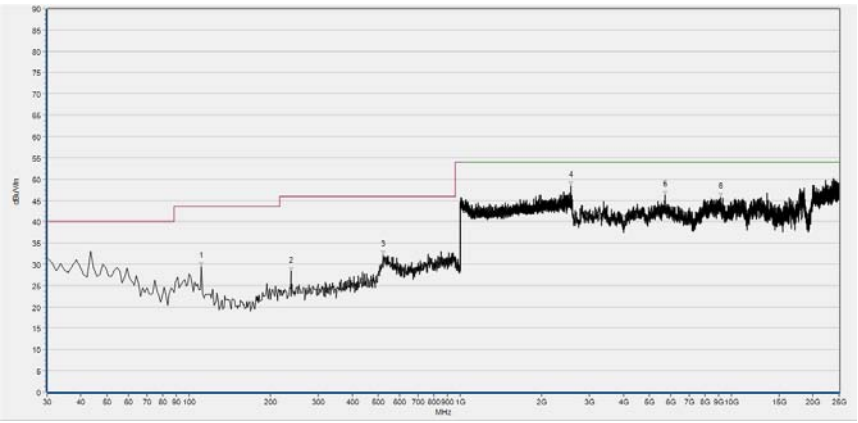
(30MHz to 25GHz, Antenna Horizontal @ 8-DPSK, channel 0)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
101.627	27.35	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
212.103	28.04	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
403.917	28.65	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1928.371	46.09	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5325.150	45.02	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12099.327	46.53	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

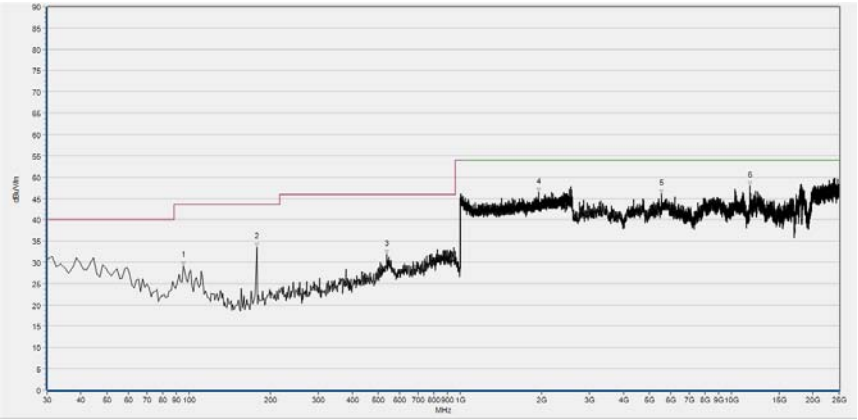
(30MHz to 25GHz, Antenna Vertical @ 8-DPSK, channel 0)

Plot for Channel = 39



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
111.339	29.52	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
237.597	28.36	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
520.463	32.26	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2557.743	48.46	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5691.762	46.18	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
9133.843	45.70	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

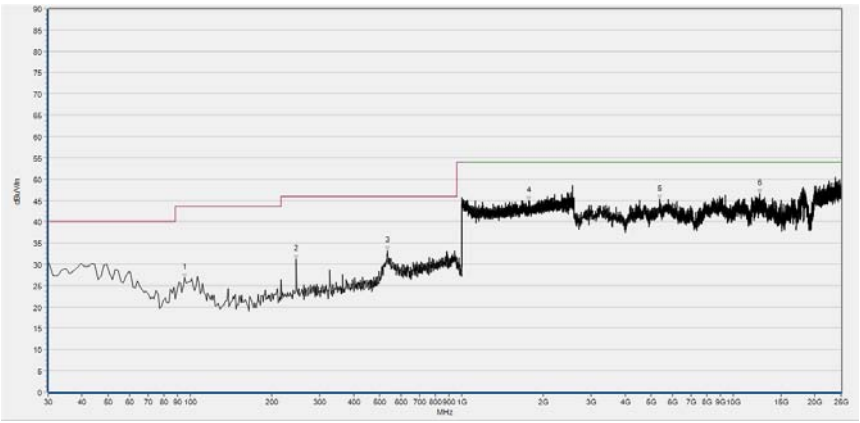
(30MHz to 25GHz, Antenna Horizontal @ 8-DPSK, channel 39)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.557	29.17	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
178.110	33.56	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
536.245	31.80	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1950.780	46.47	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5545.117	46.03	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
11744.935	48.00	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

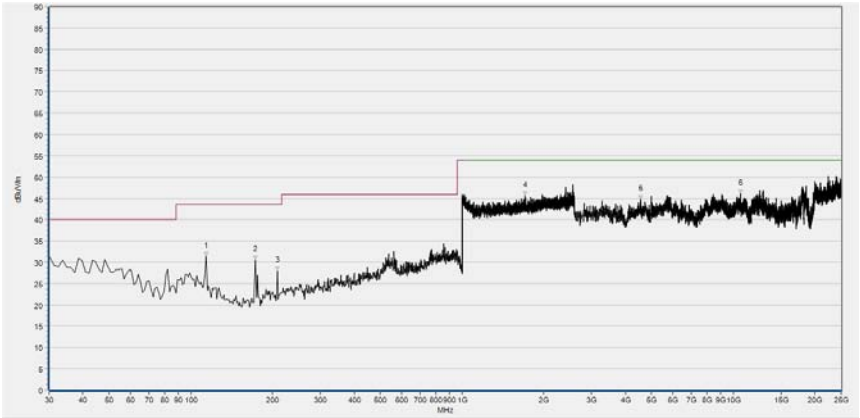
(30MHz to 25GHz, Antenna Vertical @ 8-DPSK, channel 39)

Plot for Channel = 78



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.557	26.83	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
246.095	31.09	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
533.817	33.25	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1765.746	44.91	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5369.958	45.22	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12506.674	46.61	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(30MHz to 25GHz, Antenna Horizontal @ 8-DPSK, channel 78)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
113.767	31.29	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
173.254	30.47	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
208.461	28.00	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
1705.562	45.52	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4543.044	44.71	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10649.173	46.11	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(30MHz to 25GHz, Antenna Vertical @ 8-DPSK, channel 78)

Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test items	Uncertainty
Number of Hopping Frequency	±5%
Peak Output Power	±2.22dB
20dB Bandwidth	±5%
Carrier Frequency Separation	±5%
Time of Occupancy (Dwell time)	±5%
Conducted Spurious Emission	±2.77 dB
Restricted Frequency Bands	±5%
Radiated Emission	±2.95dB
Conducted Emission	±2.44dB

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Responsible Test Lab Manager:	Mr. Su Feng
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.

4. Test Equipments Utilized

4.1 Conducted Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Bluetooth Base Station	6K00006210	MT8852B	Anritsu	2018.04.17	2019.04.16
Power Splitter	NW521	1506A	Weinschel	2018.04.17	2019.04.16
Attenuator 1	(N/A.)	10dB	Resnet	2018.04.17	2019.04.16
Attenuator 2	(N/A.)	3dB	Resnet	2018.04.17	2019.04.16
EXA Signal Analzyer	MY53470836	N9010A	Agilent	2017.12.03	2018.12.02
RF cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
Coaxial cable	CB02	RF02	Morlab	N/A	N/A
SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

4.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Receiver	MY56400093	N9038A	KEYSIGHT	2018.05.08	2019.05.07
LISN	812744	NSLK 8127	Schwarzbeck	2018.05.08	2019.05.07
Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2018.05.08	2019.05.07
Coaxial cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

4.3Auxiliary Test Equipment

Equipment Name	Model No.	Brand Name	Manufacturer	Cal.Date	Cal. Due
Computer	T430i	Think Pad	Lenovo	N/A	N/A

4.4 List of Software Used

Description	Manufacturer	Software Version
Test system	Tonscend	V2.6
Power Panel	Agilent	V3.8
MORLAB EMCR V1.2	MORLAB	V 1.0

4.5 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Receiver	MY54130016	N9038A	Agilent	2018.08.04	2019.08.03
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2018.05.18	2019.05.17
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2018.03.03	2019.03.02
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2018.08.06	2019.08.05
Test Antenna – Horn	BBHA9170 #774	BBHA9170	Schwarzbeck	2018.08.02	2019.08.01
Coaxial cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
1-18GHz pre-Amplifier	MA02	TS-PR18	Rohde& Schwarz	2018.05.08	2019.05.07
18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2018.05.08	2019.05.07
Anechoic Chamber	N/A	9m*6m*6m	CRT	2017.11.19	2020.11.18

END OF REPORT