REPORT No.: SZ19020019W05

TEST REPORT

APPLICANT	:	BLU Products, Inc.
PRODUCT NAME	:	Mobile phone
MODEL NAME	:	G5,V5,D701,STUDIO MINI
BRAND NAME	:	BLU
FCC ID	:	YHLBLUG5
STANDARD(S)	:	47 CFR Part 15 Subpart C
RECEIPT DATE	:	2019-03-13
TEST DATE	:	2019-03-27 to 2019-04-05
ISSUE DATE	:	2019-05-22

Edited by: Zeng Xiaoying (Rapporteur)

Approved by: Peng Huarui (Supervisor)

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MORLAB

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Change History		
Version	**Date**	**Reason for change**
1.0	2019-04-16	First edition
2.0	2019-05-22	Update the model name

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	BLU Products, Inc.
Applicant Address:	10814 NW 33rd St # 100 Doral, FL 33172, Doral, Florida, United States
Manufacturer:	BLU Products, Inc.
Manufacturer Address:	10814 NW 33rd St # 100 Doral, FL 33172, Doral, Florida, United States

1.2. Equipment Under Test (EUT) Description

Product Name:	Mobile phone	
Serial No:	(N/A, marked #1 by test site)	
Hardware Version:	FS171-MB-V0.1	
Software Version:	BLU_G0090_V9.0.01.00	
Equipment Type:	Bluetooth classic	
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);	
Antenna Type:	PIFA Antenna	
Antenna Gain:	0.5 dBi	
Accessory Information:	Battery	
	Brand Name:	BLU
	Model No.:	C835846300P
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	3000mAh
	Rated Voltage:	3.8V
	Charge Limit:	4.35 V

Accessory Information:	AC Adapter	
	Brand Name:	BLU
	Model No.:	US-NB-1504
	Serial No.:	(N/A, marked #1 by test site)
	Rated Input:	5V⎓1.5A
	Rated Output:	100-240V ～ 50/60Hz 0.3A

Note 1: According to the certificate holder, they declared that the models: G5, V5, D701, STUDIO MINI are accordant in both hardware and software. The two models only differ in the models name. The main measuring model is G5, only the results for G5 were recorded in this report.

Note 2: 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 3: 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 4: 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	Radio Frequency Devices

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

No.	Section	Description	Test Date	Test Engineer	Result
1	15.203	Antenna Requirement	N/A	N/A	**PASS**
2	15.247(a)	Number of Hopping Frequency	Mar 27, 2019	Wang Meng	**PASS**
3	15.247(b)	Maximum Peak Conducted Output Power	Mar 27, 2019	Wang Meng	**PASS**
4	15.247(b)	Maximum Average Conducted Output Power	Mar 27, 2019	Wang Meng	**PASS**
5	15.247(a)	20dB Bandwidth	Mar 27, 2019	Wang Meng	**PASS**
6	15.247(a)	Carrier Frequency Separation	Mar 27, 2019	Wang Meng	**PASS**
7	15.247(a)	Time of Occupancy (Dwell time)	Mar 27, 2019	Wang Meng	**PASS**
8	15.247(d)	Conducted Spurious Emission	Mar 27, 2019	Wang Meng	**PASS**
9	15.207	Conducted Emission	Apr 04, 2019	Wu Zhongwen	**PASS**
10	15.247(d)	Restricted Frequency Bands	Apr 05, 2019	Wu Zhongwen	**PASS**
11	15.209, 15.247(d)	Radiated Emission	Apr 02, 2019	Wu Zhongwen	**PASS**

Note 1: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013.

Note 2: The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The Ref offset 1.5dB means the cable loss is 1.5dB.

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.

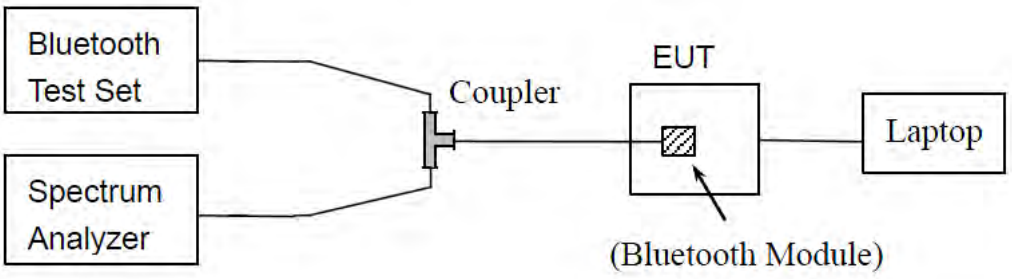
2.2. Number of Hopping Frequency

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 through the coupler; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

B. Equipments List:

Please reference ANNEX B(4).

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

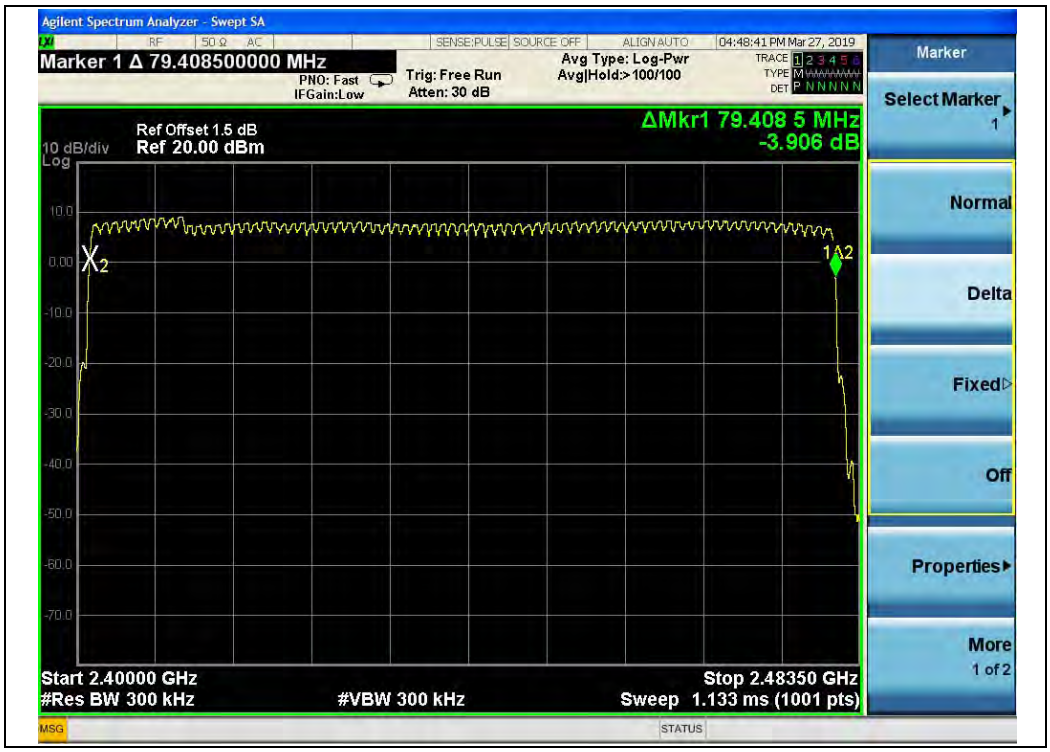
The Bluetooth Module operates at hopping-on test mode; the frequencies number employed is counted to verify the Module's using the number of hopping frequency.

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 79.408500000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
04:56:18 PM Mar 27, 2019
Ref Offset 1.5 dB
10 dB/div
Log
Ref 20.00 dBm
ΔMkr1 79.408 5 MHz
-3.656 dB
Start 2.40000 GHz
#Res BW 300 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 1.133 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2
MSG
STATUS

(8- DPSK)

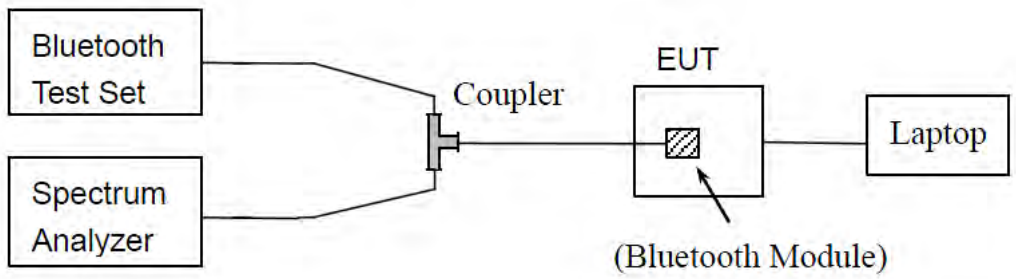
2.3. Maximum Peak Conducted Output Power

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 through the coupler; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

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	7.71	0.006	20.96	0.125	PASS
39	2441	7.74	0.006			PASS
78	2480	7.07	0.005			PASS

B. Test Plots:

(GFSK, Channel 0, 2402MHz)

(GFSK, Channel 39, 2441MHz)

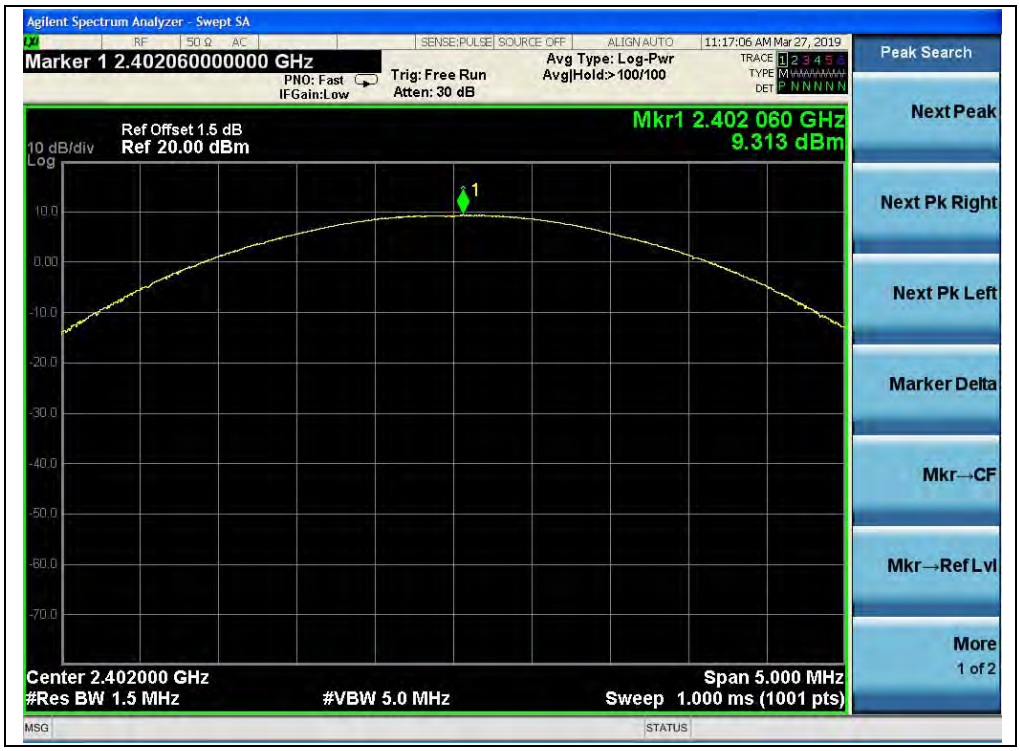
(GFSK, Channel 78, 2480MHz)

π/4-DQPSK Mode

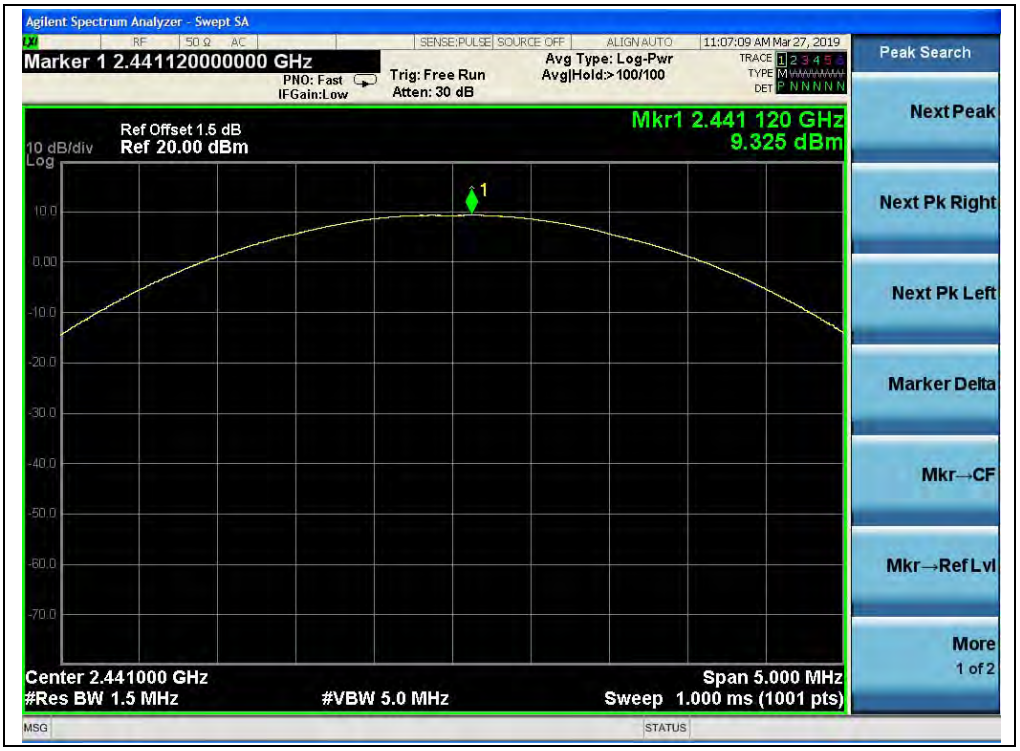
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	9.31	0.009	20.96	0.125	PASS
39	2441	9.33	0.009			PASS
78	2480	8.50	0.007			PASS

B. Test Plots:



(π/4-DQPSK, Channel 0, 2402MHz)



(π/4-DQPSK, Channel 39, 2441MHz)

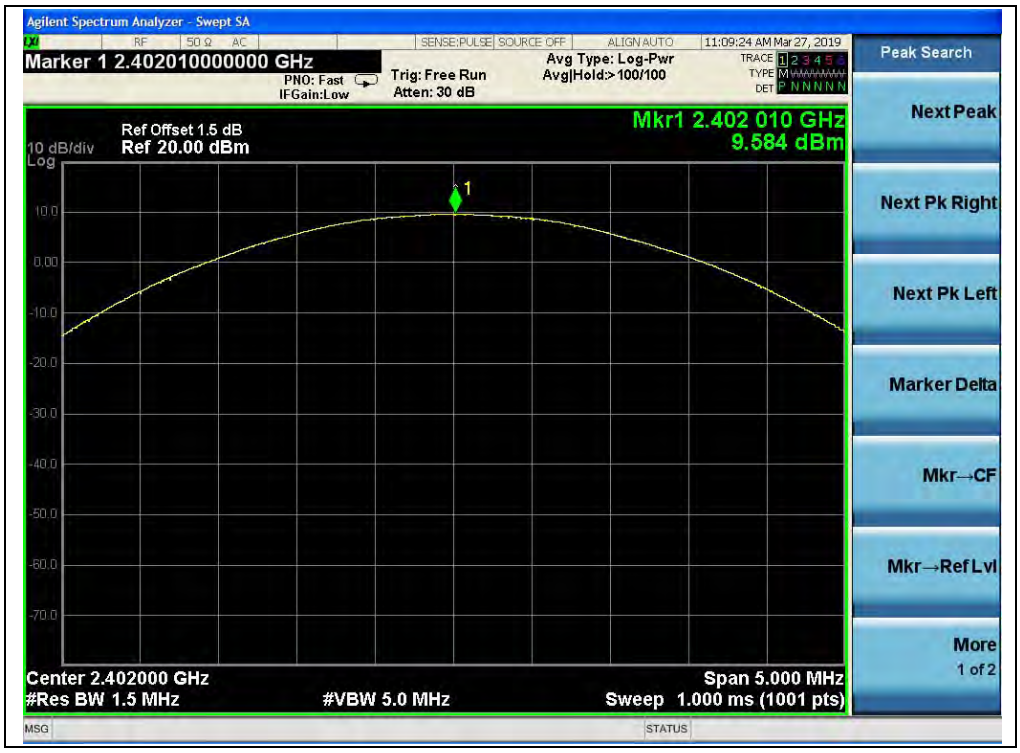
(π/4-DQPSK, Channel 78, 2480MHz)

8-DPSK Mode

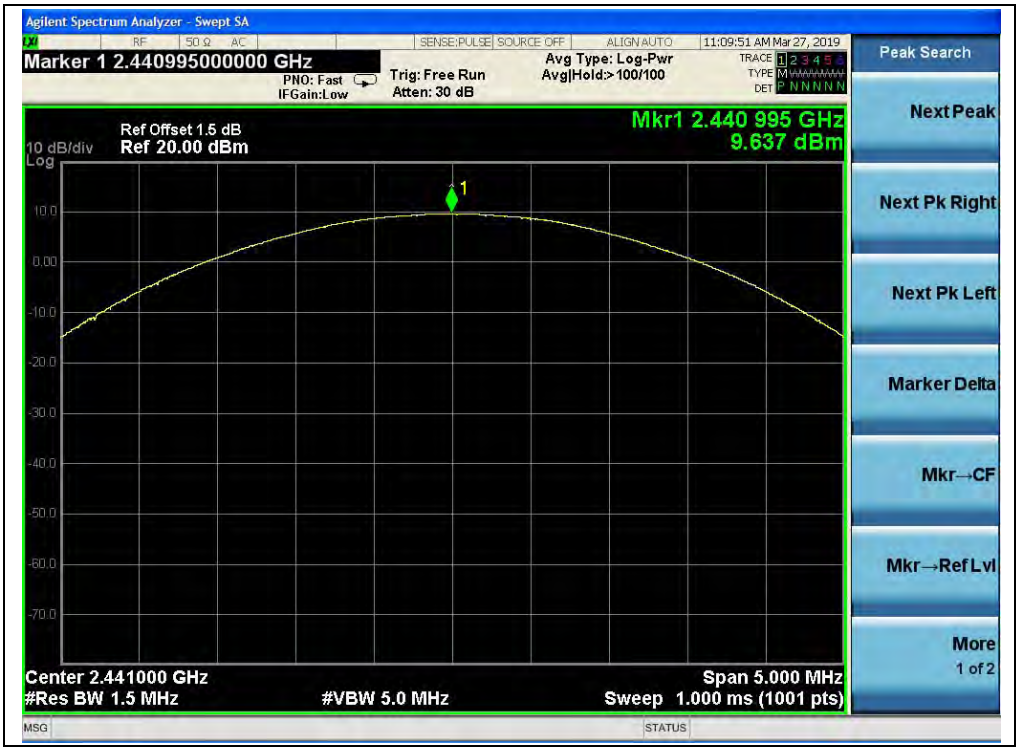
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	9.58	0.009	20.96	0.125	PASS
39	2441	9.64	0.009			PASS
78	2480	8.80	0.008			PASS

B. Test Plots:



(8-DPSK, Channel 0, 2402MHz)



(8-DPSK, Channel 39, 2441MHz)

(8-DPSK, Channel 78, 2480MHz)

2.4. Maximum Average Conducted Output Power

2.4.1. Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum average conducted output power of the intentional radiator shall not exceed 1 Watt.

2.4.2. Test Description

The measured output power was calculated by the reading of the USB Wideband Power Sensor and calibration.

A. Test Setup:

The EUT (Equipment under the test) which is coupled to the USB Wideband Power Sensor; 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 power meter.

A. Equipments List:

Please refer ANNEX B (4).

2.4.3. Test procedure

The test procedure is according to section 8.3.2 in KDB 558074 D01.

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 verify the conducted RF output peak power of the module.

GFSK Mode

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	5.94	0.004	20.96	0.125	PASS
39	2441	6.37	0.004			PASS
78	2480	5.67	0.004			PASS

π/4-DQPSK Mode

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	5.25	0.003	20.96	0.125	PASS
39	2441	5.79	0.004			PASS
78	2480	5.10	0.003			PASS

8-DPSK Mode

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	5.32	0.003	20.96	0.125	PASS
39	2441	5.81	0.004			PASS
78	2480	5.14	0.003			PASS

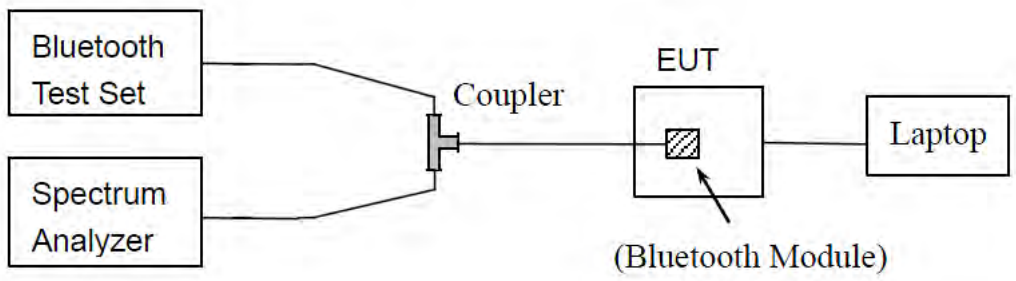
2.5. 20dB Bandwidth

2.5.1. 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.

2.5.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

B. Equipments List:

Please refer ANNEX B(4).

2.5.3. 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

2.5.4. Test Result

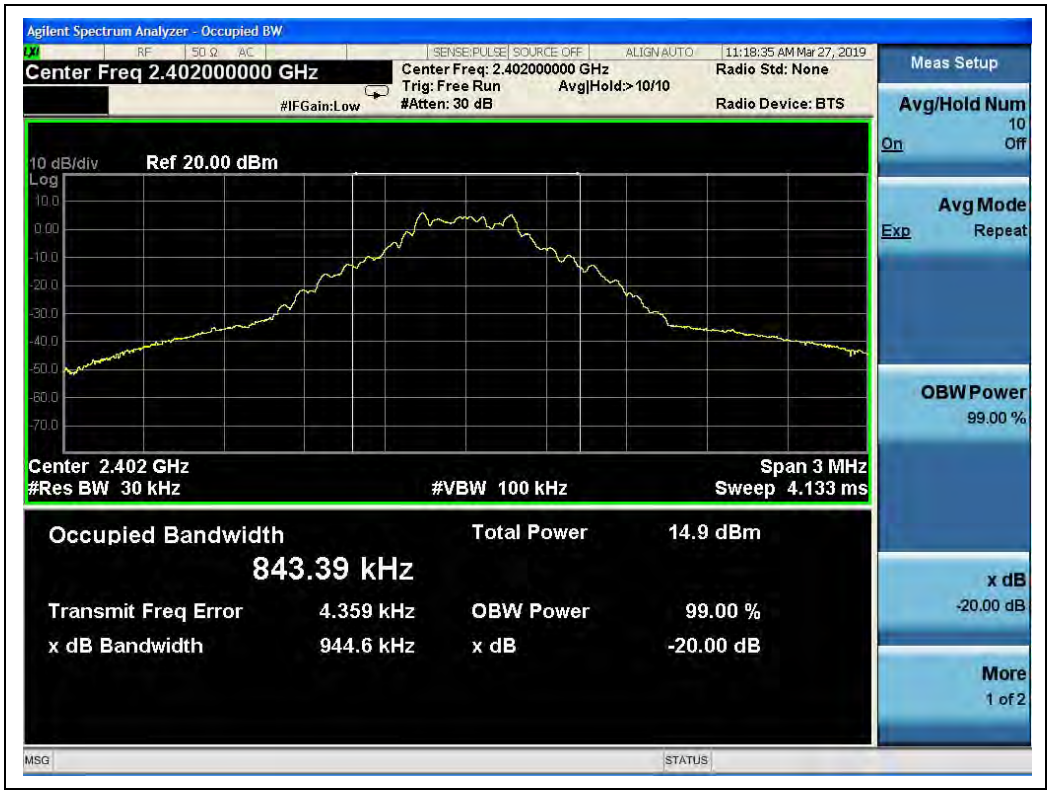
The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to record the 20dB bandwidth of the Module.

GFSK Mode

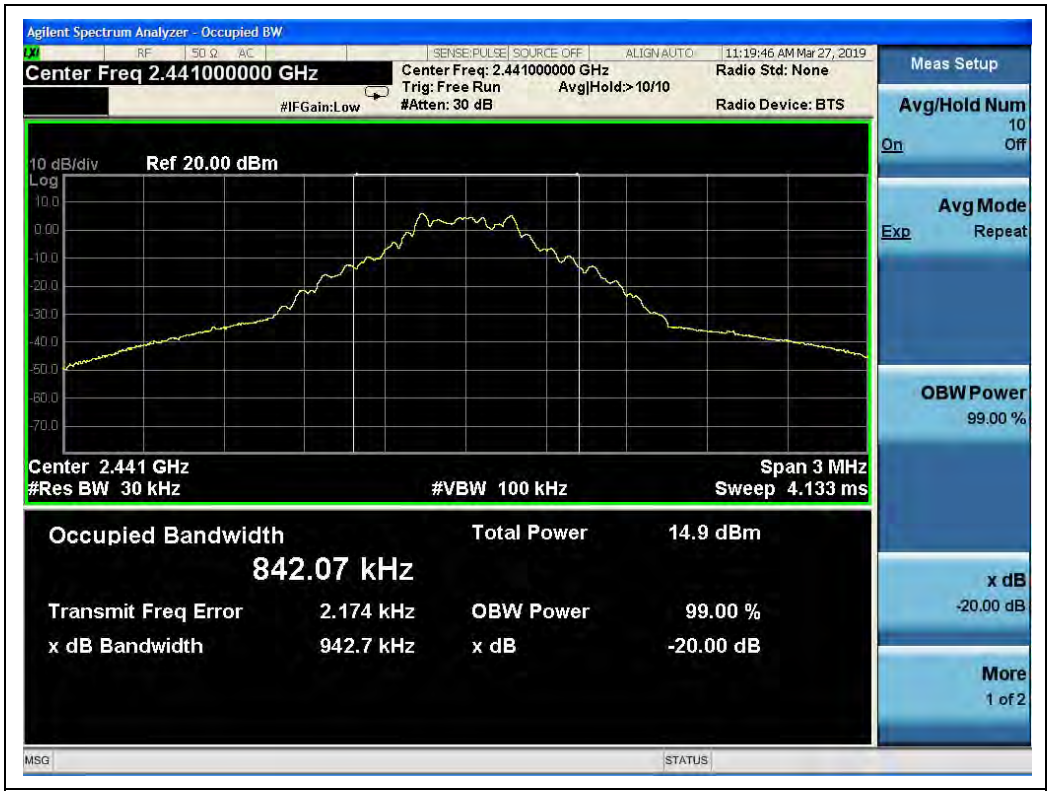
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
0	2402	0.945	PASS
39	2441	0.943	PASS
78	2480	0.941	PASS

B. Test Plots:



(GFSK, Channel 0, 2402MHz)



(GFSK, Channel 39, 2441MHz)

(GFSK, Channel 78, 2480MHz)

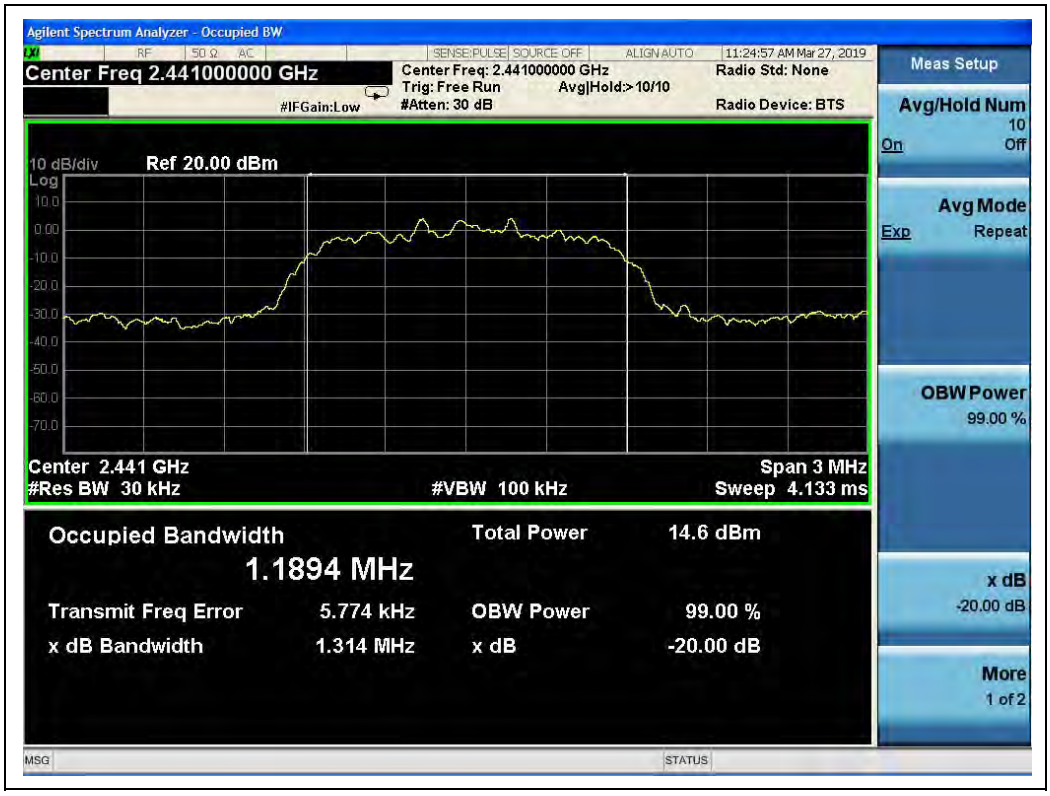
π/4-DQPSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
0	2402	1.295	PASS
39	2441	1.314	PASS
78	2480	1.315	PASS

B. Test Plots:

(π/4-DQPSK, Channel 0, 2402MHz)



(π/4-DQPSK, Channel 39, 2441MHz)

(π/4-DQPSK, Channel 78, 2480MHz)

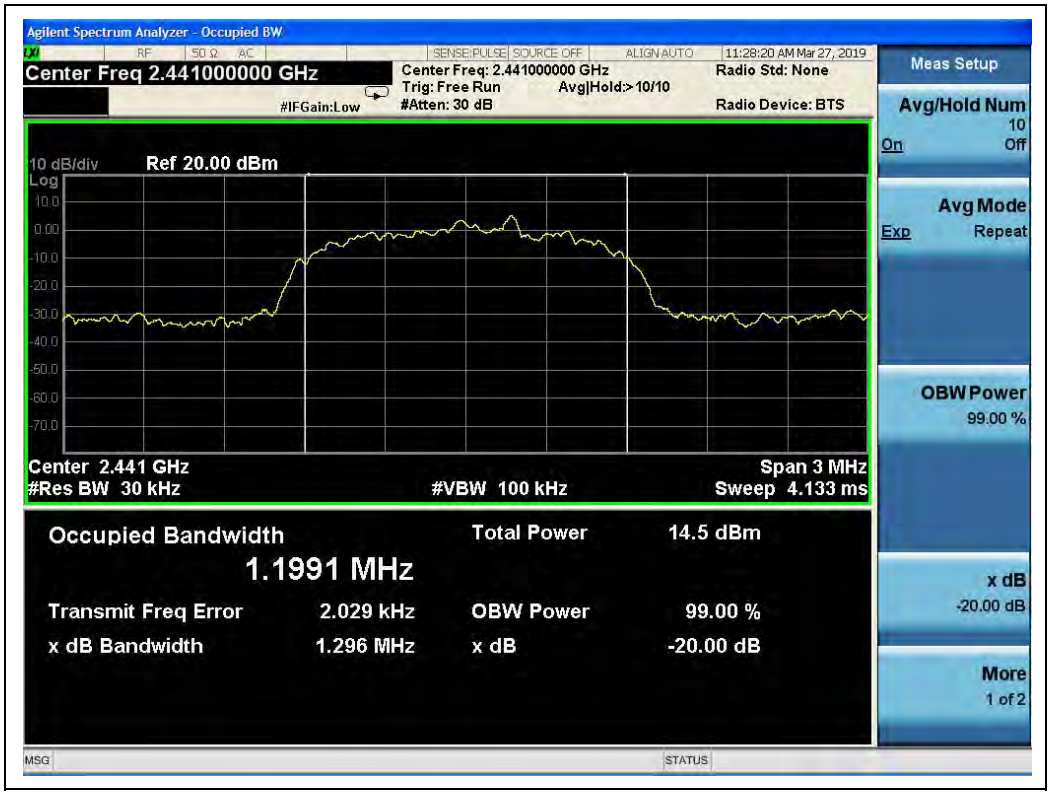
8-DPSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
0	2402	1.294	PASS
39	2441	1.296	PASS
78	2480	1.297	PASS

B. Test Plots:

(8-DPSK, Channel 0, 2402MHz)



(8-DPSK, Channel 39, 2441MHz)

(8-DPSK, Channel 78, 2480MHz)

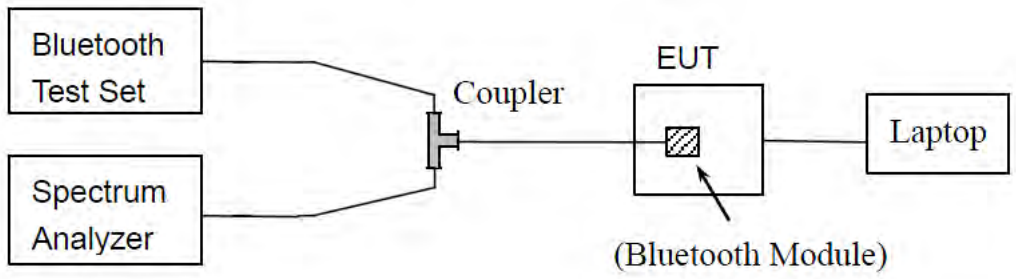
2.6. Carried Frequency Separation

2.6.1. 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.

2.6.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

B. Equipments List:

Please refer ANNEX B(4).

2.6.3. 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.

2.6.4. 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	0.941	two-thirds of the 20dB bandwidth	PASS
π/4-DQPSK	39 and 40	1.002	1.295		PASS
8-DPSK	39 and 40	1.020	1.294		PASS

(GFSK)

(π/4-DQPSK)

(8-DPSK)

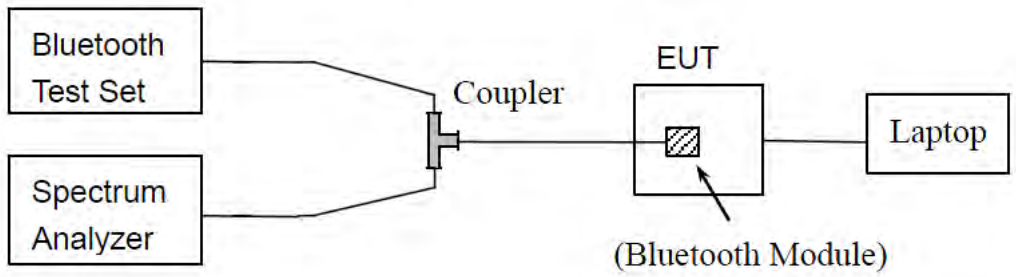
2.7. Time of Occupancy (Dwell time)

2.7.1. 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.

2.7.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

B. Equipments List:

Please refer ANNEX B(4).

2.7.3. 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

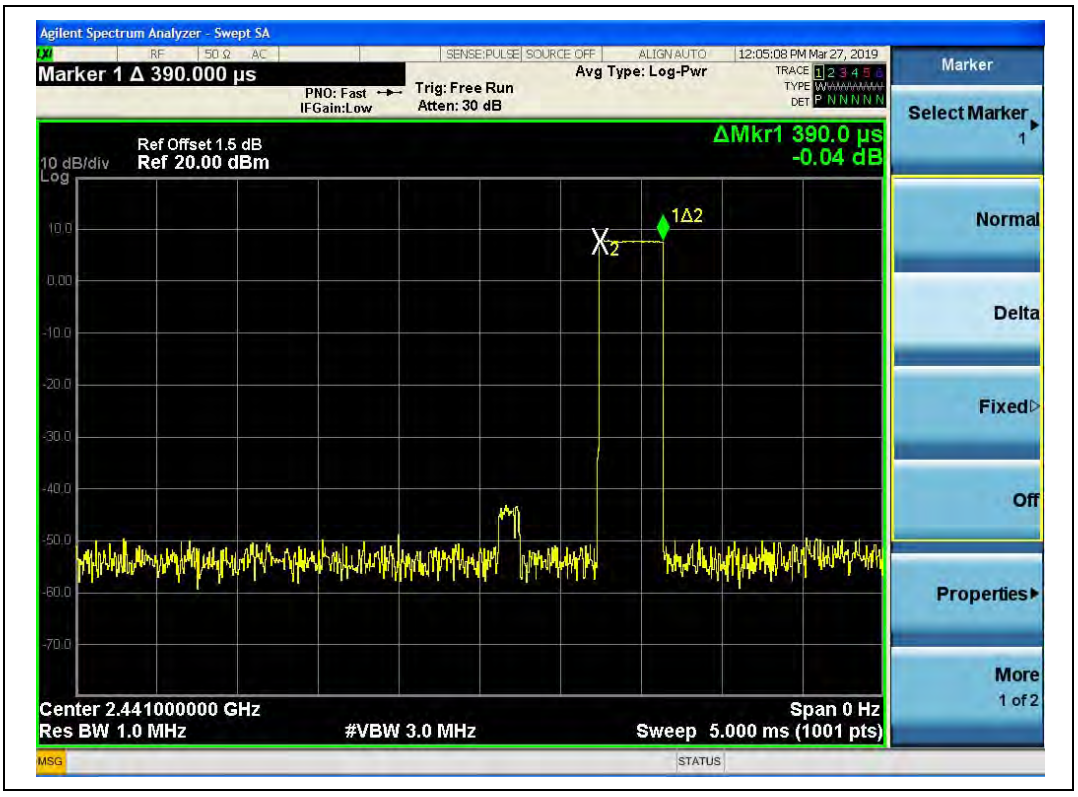
2.7.4. Test Result

GFSK Mode

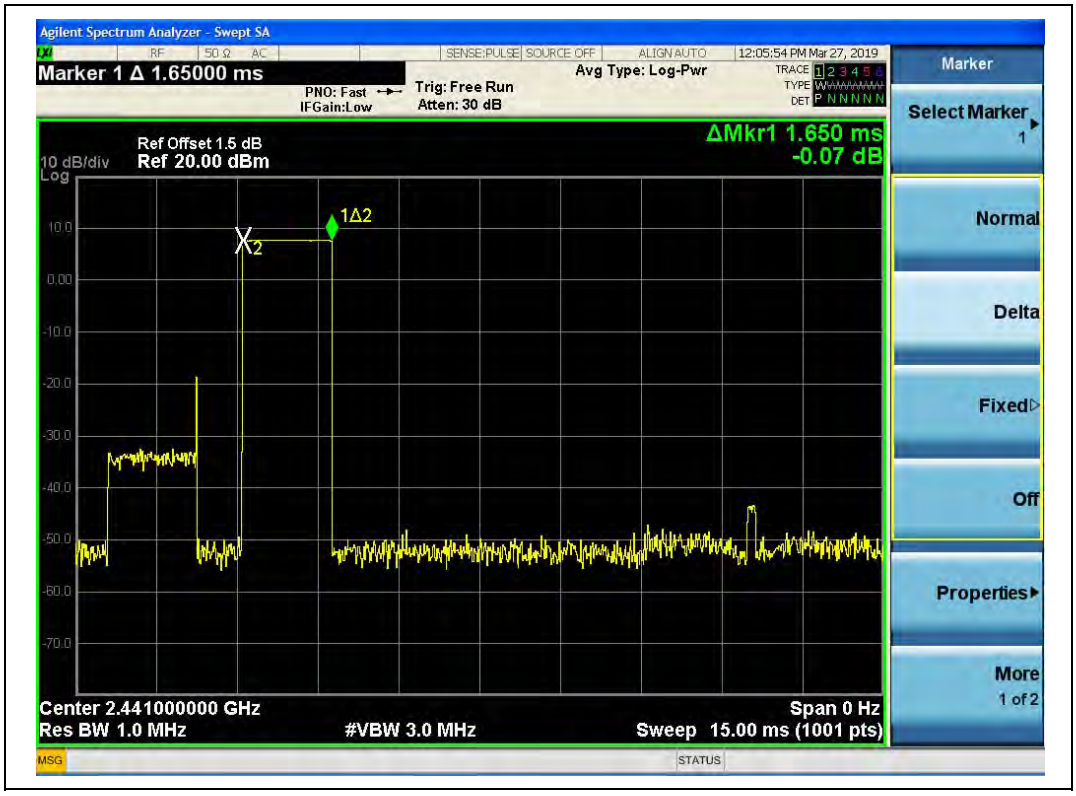
A. Test Verdict:

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	2.90	309.33	154.67		PASS

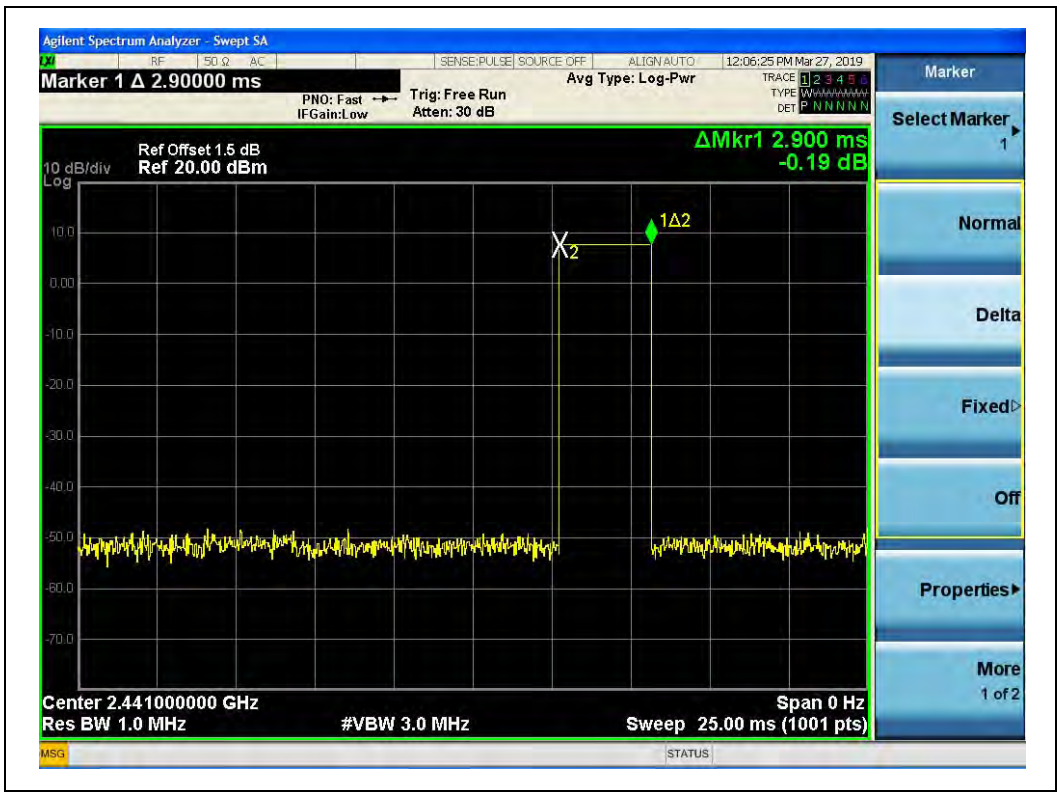
B. Test Plots:



(DH1, GFSK)



(DH3, GFSK)



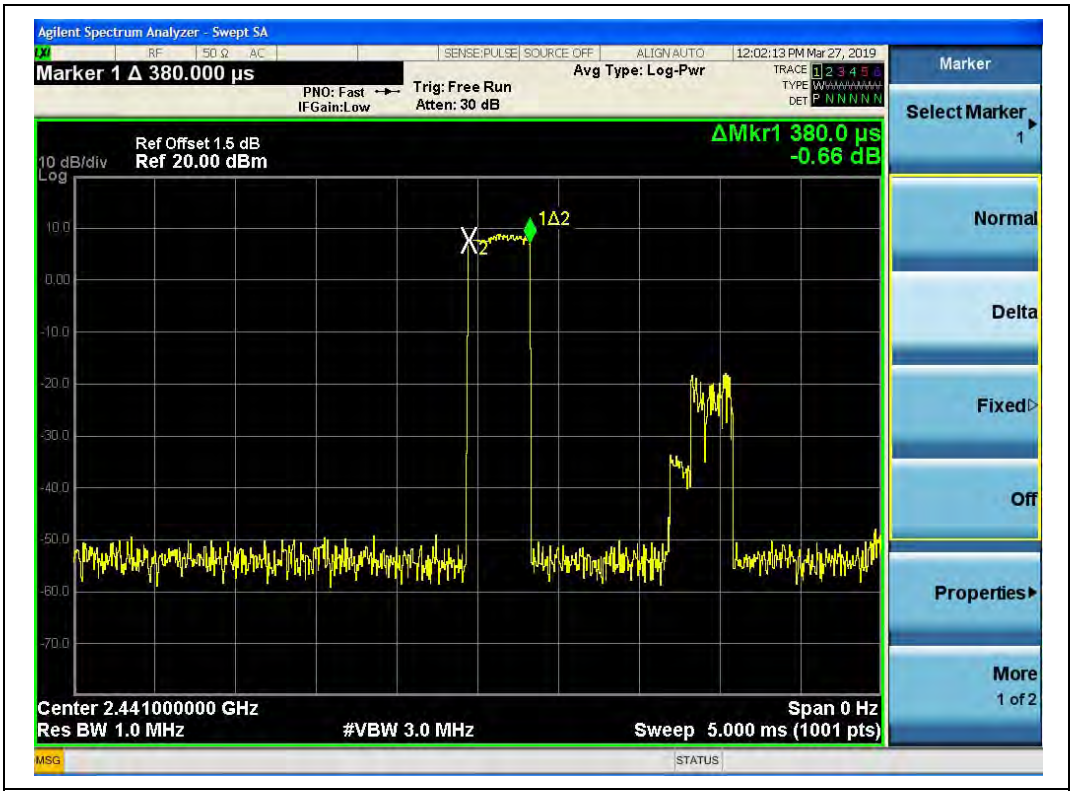
(DH5, GFSK)

π/4-DQPSK Mode

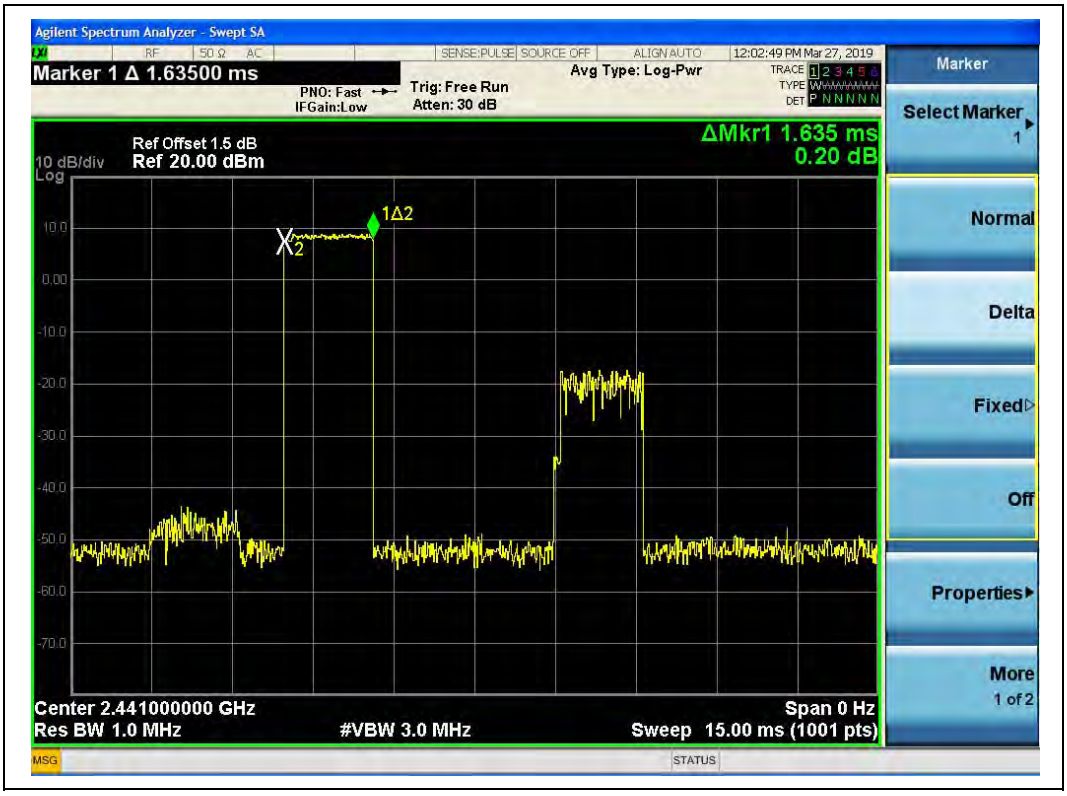
A. Test Verdict:

DH Packet	Pulse Width (ms)	Dwell Time (ms)		Limit (sec)	Verdict
		Normal Mode	AFH Mode		
DH1	0.38	121.60	60.80	0.4	PASS
DH3	1.64	262.40	131.20		PASS
DH5	2.88	307.20	153.60		PASS

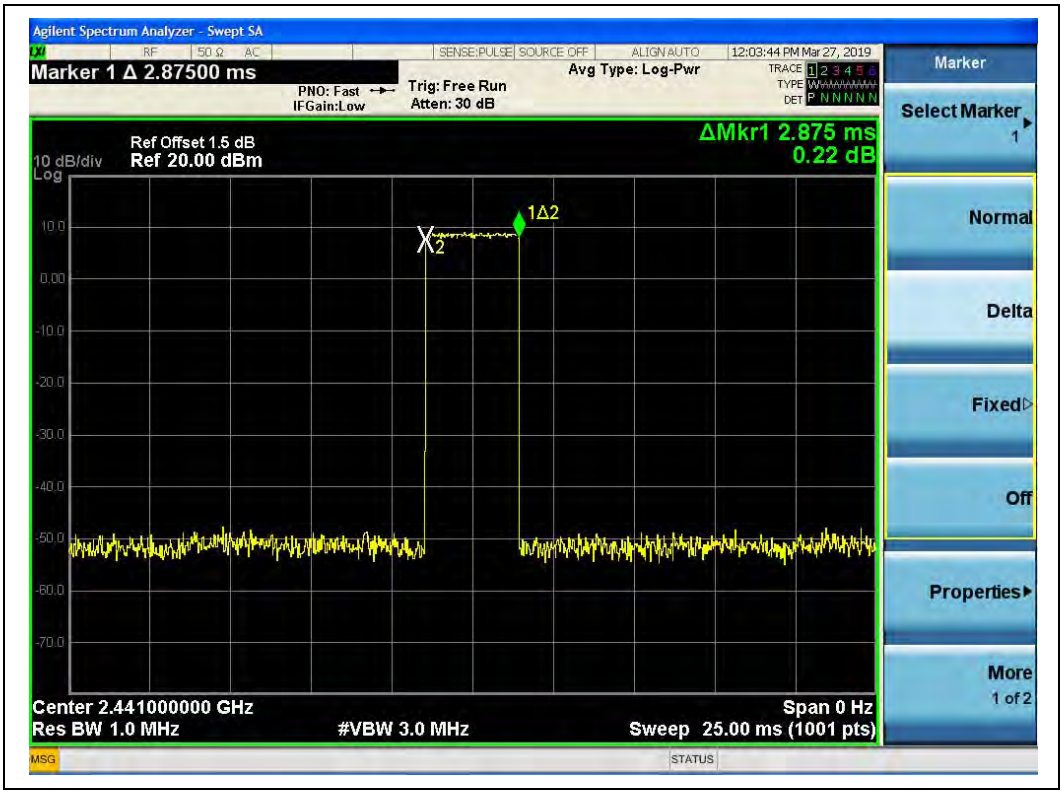
B. Test Plots:



(DH1, π/4-DQPSK)



(DH3, π/4-DQPSK)



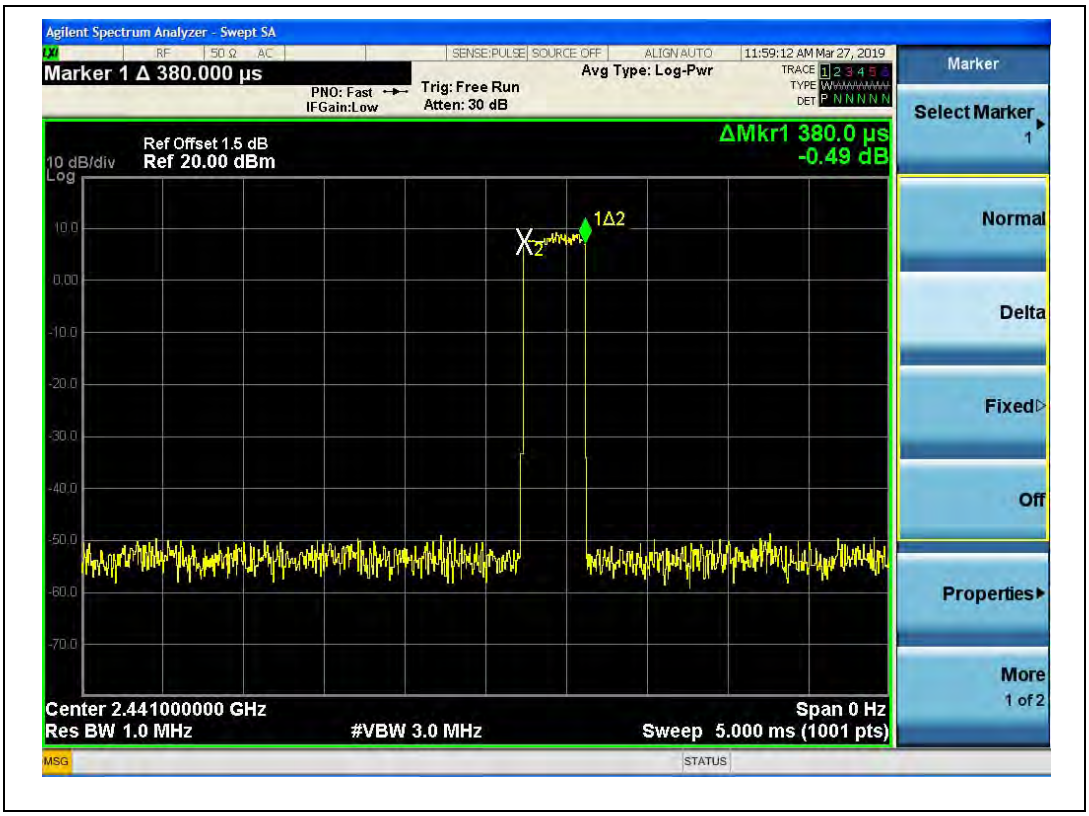
(DH5, π/4-DQPSK)

8-DPSK mode

A. Test Verdict:

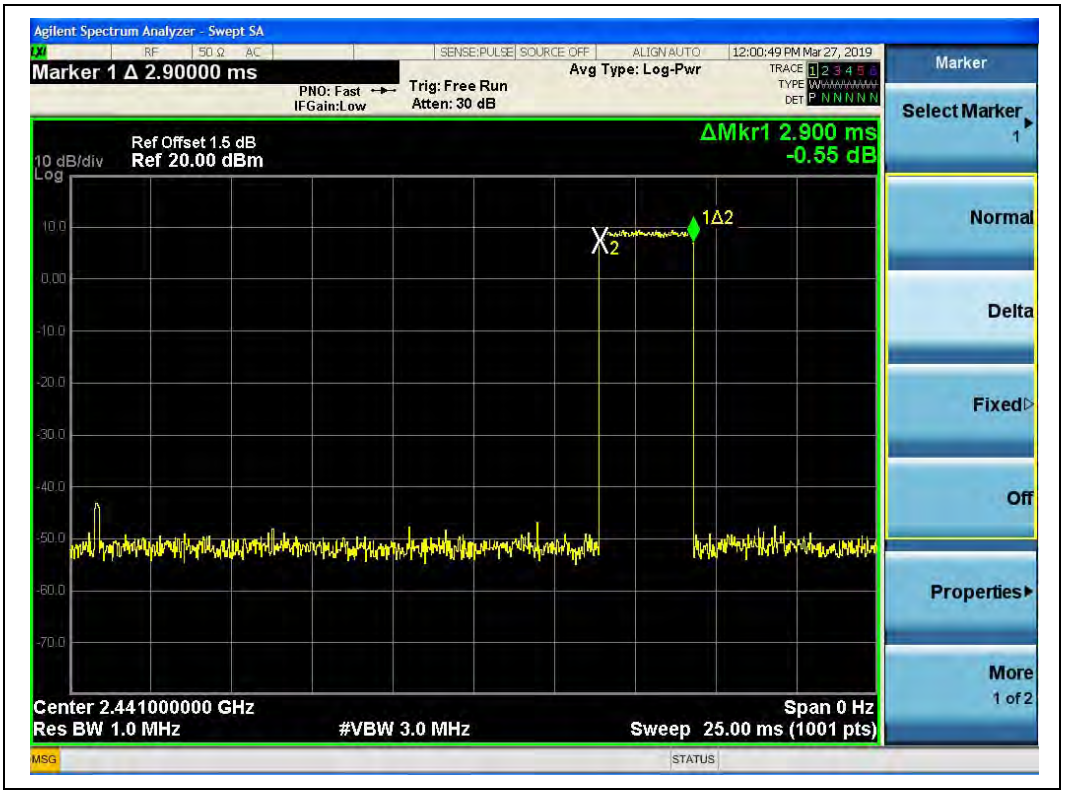
DH Packet	Pulse Width (ms)	Dwell Time (ms)		Limit (sec)	Verdict
		Normal Mode	AFH Mode		
DH1	0.38	121.60	60.80	0.4	PASS
DH3	1.64	262.40	131.20		PASS
DH5	2.90	309.33	154.67		PASS

B. Test Plots:



(DH1, 8-DPSK)

(DH3, 8-DPSK)



(DH5, 8-DPSK)

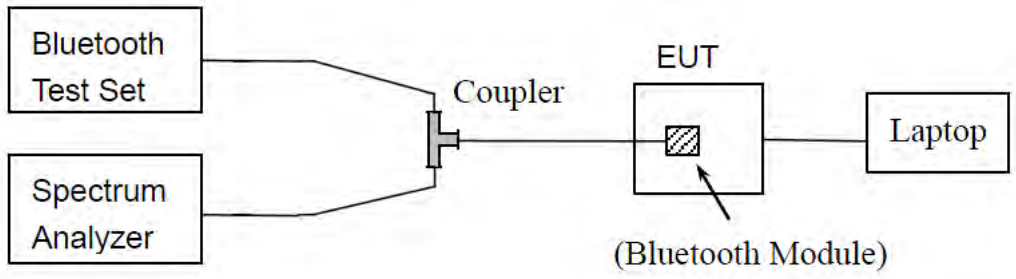
2.8. Conducted Spurious Emissions

2.8.1. 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.

2.8.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

B. Equipments List:

Please refer ANNEX B(4).

2.8.3. 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.

2.8.4. 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:

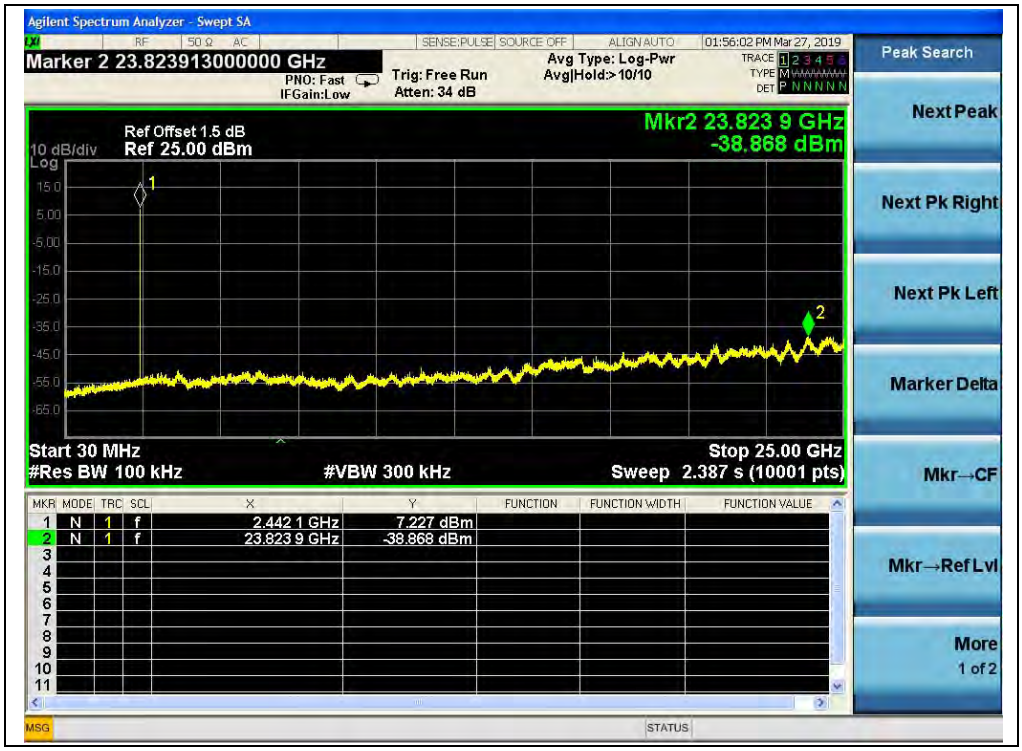
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
0	2402	-39.09	7.31	-12.69	PASS
39	2441	-38.87	7.23	-12.77	PASS
78	2480	-39.38	5.95	-14.05	PASS

B. Test Plots:

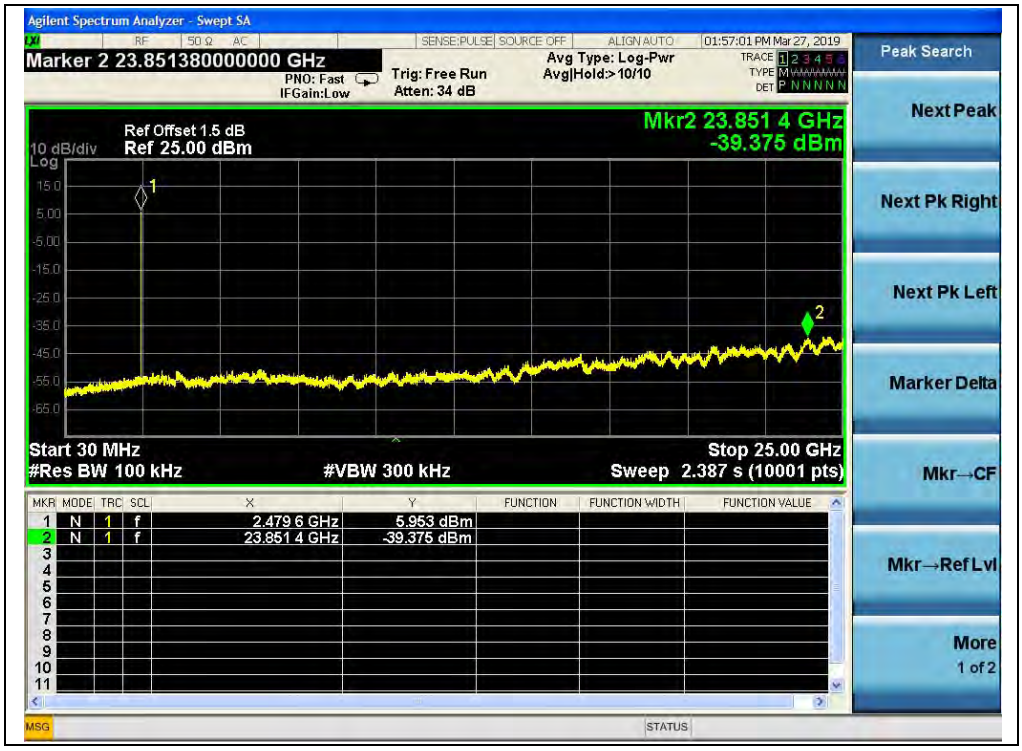
(Channel = 0, 30MHz to 25GHz, GFSK Mode)

(Channel = 0, Band edge, GFSK Mode)

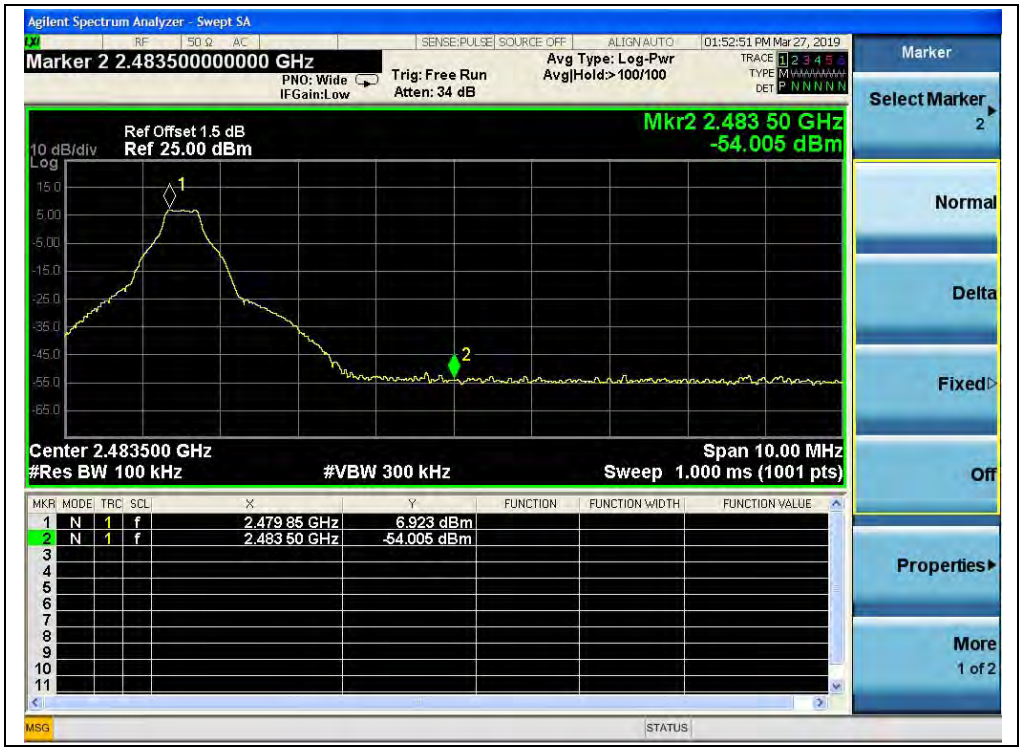
(Channel = 0, Band edge with hopping on, GFSK Mode)



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



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



(Channel = 78, Band edge, GFSK Mode)

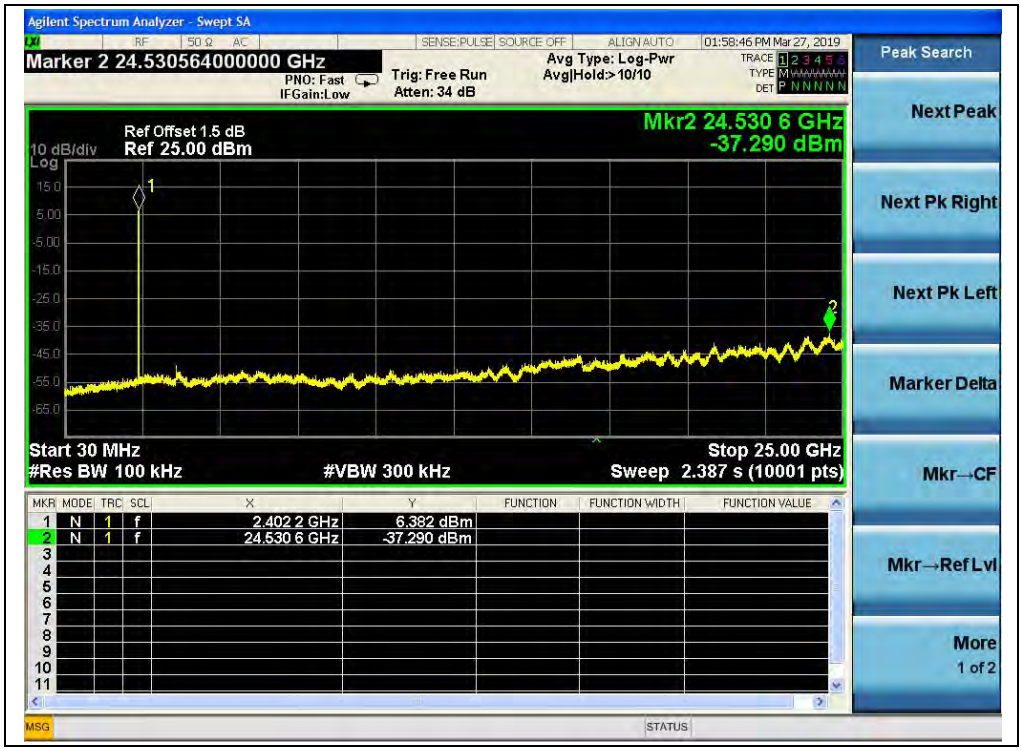
(Channel = 78, Band edge with hopping on, GFSK Mode)

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	-37.29	6.38	-13.62	PASS
39	2441	-37.73	4.48	-15.52	PASS
78	2480	-38.56	5.12	-14.88	PASS

B. Test Plots:



(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)

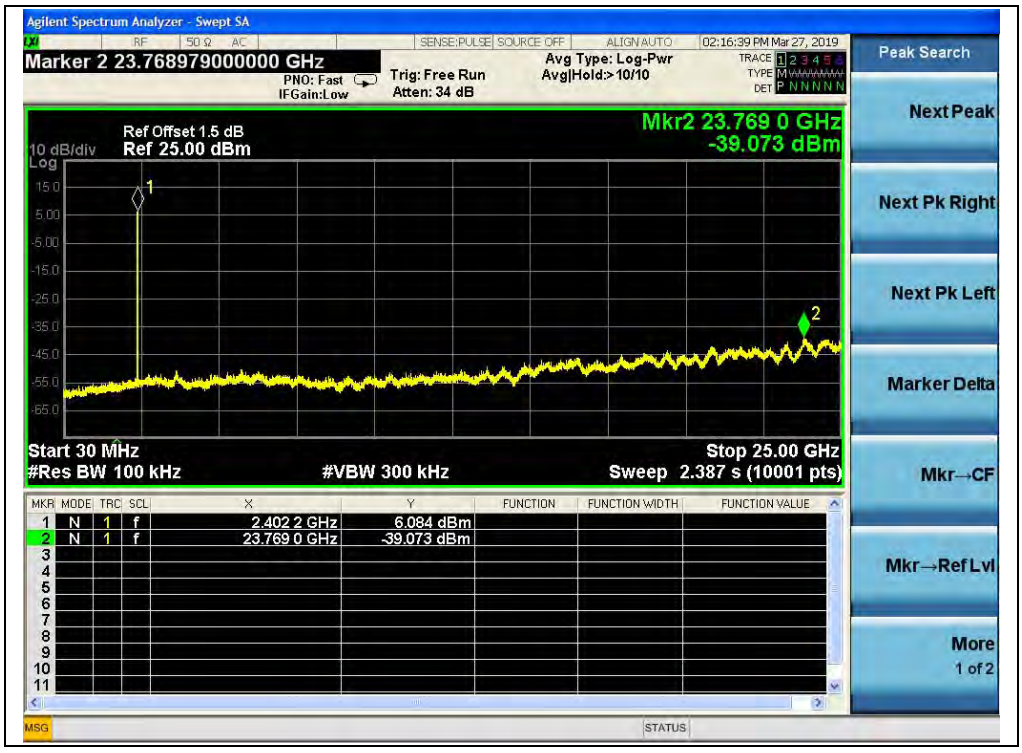
(Channel = 78, Band edge with hopping on, π/4-DQPSK)

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	-39.07	6.08	-13.92	PASS
39	2441	-37.39	4.82	-15.18	PASS
78	2480	-38.79	3.59	-16.41	PASS

B. Test Plots:



(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)

2.9. Conducted Emission

2.9.1. 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

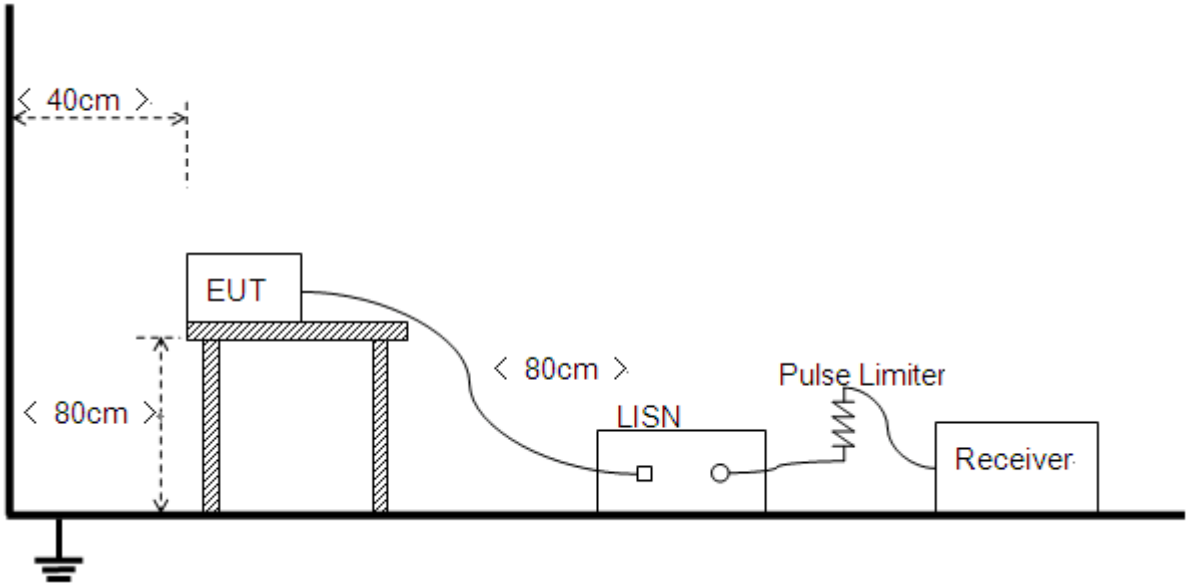
NOTE:

(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.

2.9.2. 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 reference 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:

Test Mode: EUT+USB cable+Adapter+camera+earphone+ BT TX

Test voltage: AC 120V/60Hz

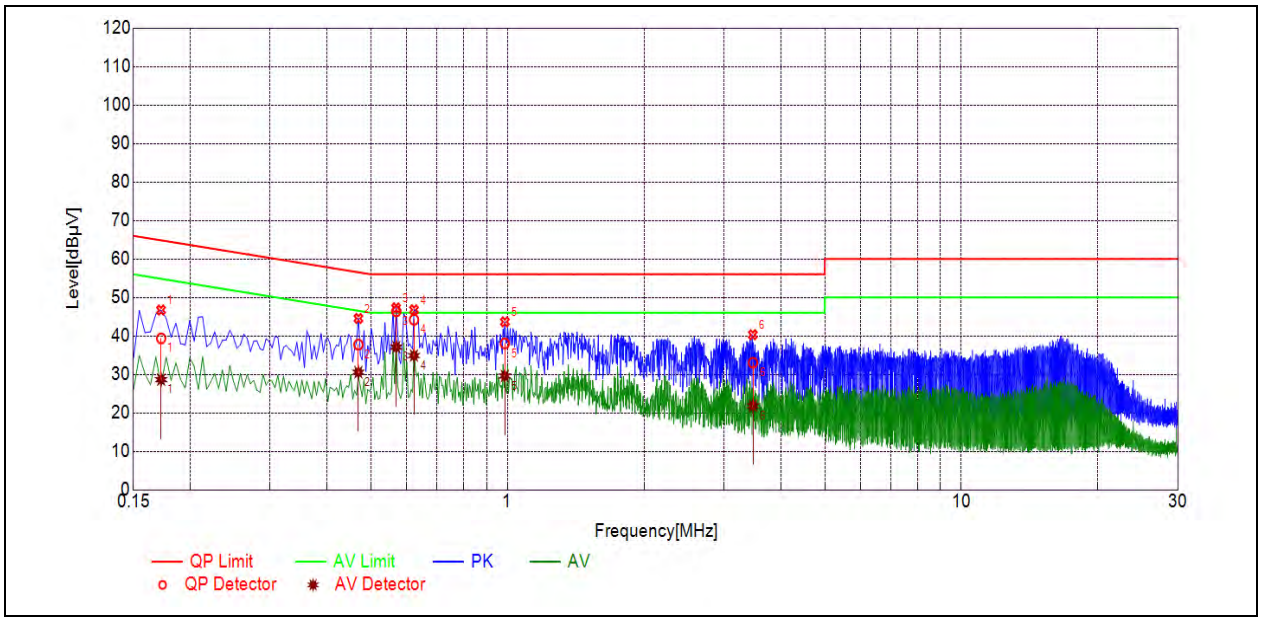
The measurement results are obtained as below:

$E\ [dB\mu V] = U_R + L_{Cable\ loss}\ [dB] + A_{Factor}$

U_R: Receiver Reading

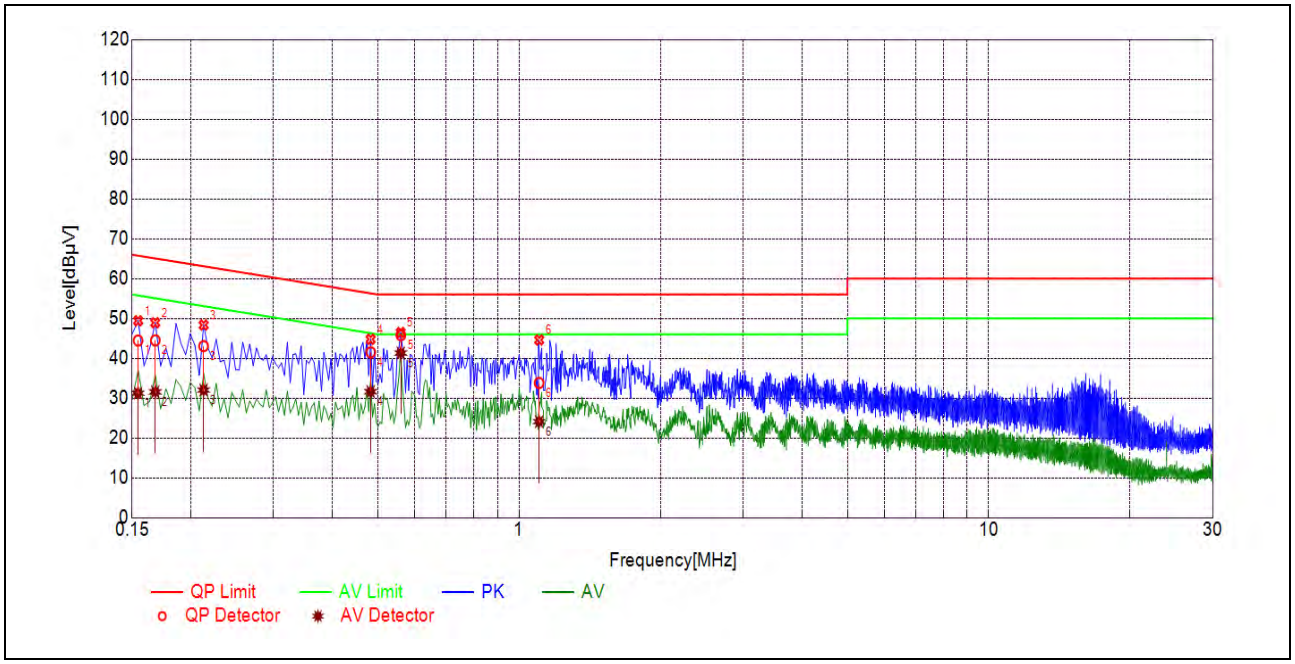
A_{Factor}: Voltage division factor of LISN

B. Test Plots:



(L Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1726	39.36	28.63	64.84	54.84	Line	PASS
2	0.4694	37.74	30.56	56.53	46.53		PASS
3	0.5689	46.39	37.09	56.00	46.00		PASS
4	0.6223	44.21	34.88	56.00	46.00		PASS
5	0.9864	38.04	29.58	56.00	46.00		PASS
6	3.4737	33.03	21.86	56.00	46.00		PASS



(N Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1544	44.47	31.27	65.76	55.76	Neutral	PASS
2	0.1680	44.52	31.58	65.06	55.06		PASS
3	0.2129	43.06	32.05	63.09	53.09		PASS
4	0.4830	41.52	31.64	56.29	46.29		PASS
5	0.5599	45.79	41.32	56.00	46.00		PASS
6	1.1029	33.81	24.10	56.00	46.00		PASS

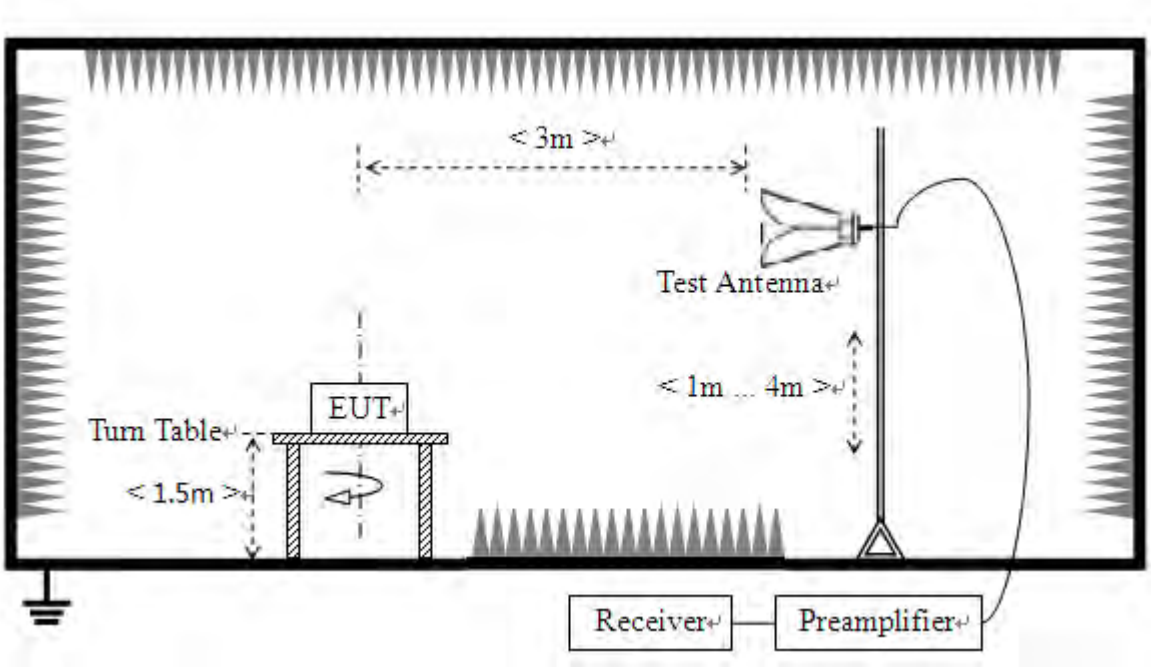
2.10. Restricted Frequency Bands

2.10.1. 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).

2.10.2. 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).

2.10.3. 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.

2.10.4. Test Result

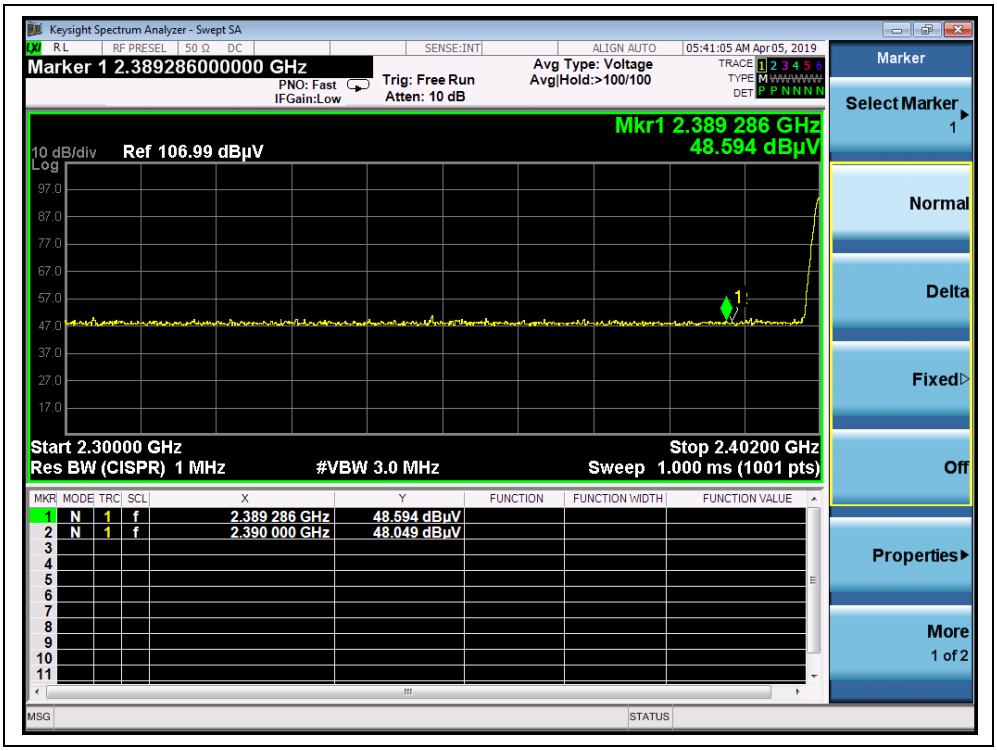
The lowest and highest channels are tested to verify Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] =U_R + A_T + A_{Factor} [dB]; AT =$L_{Cable\ loss}$ [dB]-G_{preamp} [dB]
AT: Total correction Factor except Antenna
UR: Receiver Reading
Gpreamp: Preamplifier Gain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

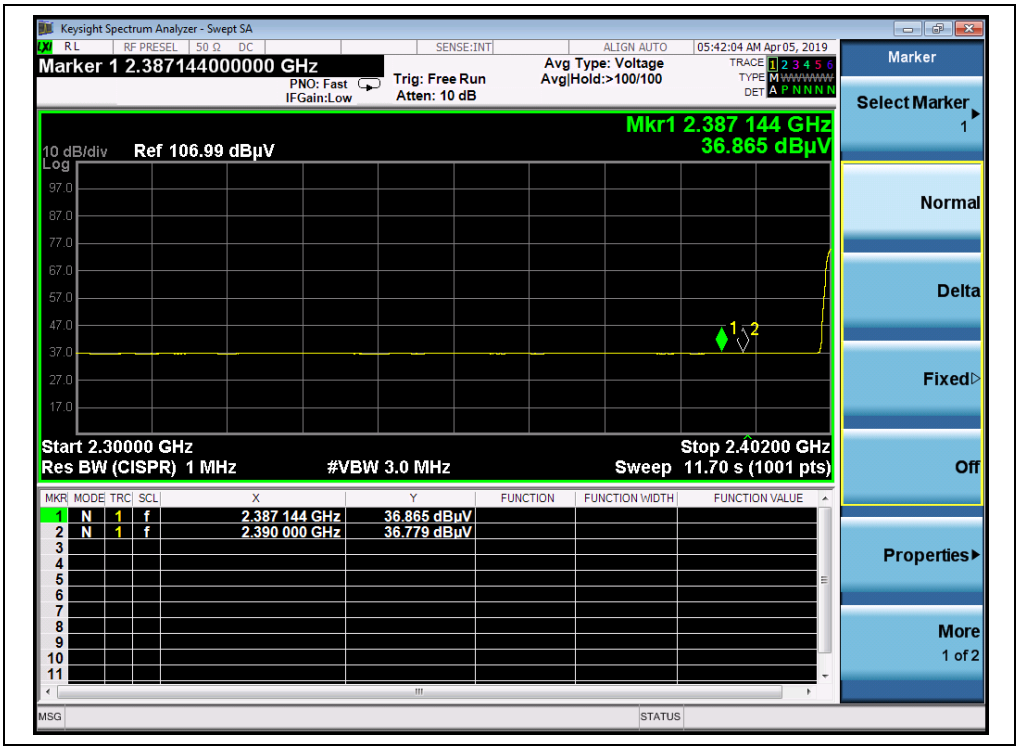
A. Test Verdict:

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	2389.29	PK	48.59	-29.67	32.56	51.48	74	PASS
0	2387.14	AV	36.87	-29.67	32.56	39.76	54	PASS
78	2483.82	PK	48.78	-29.67	32.56	51.67	74	PASS
78	2483.92	AV	36.55	-29.67	32.56	39.44	54	PASS

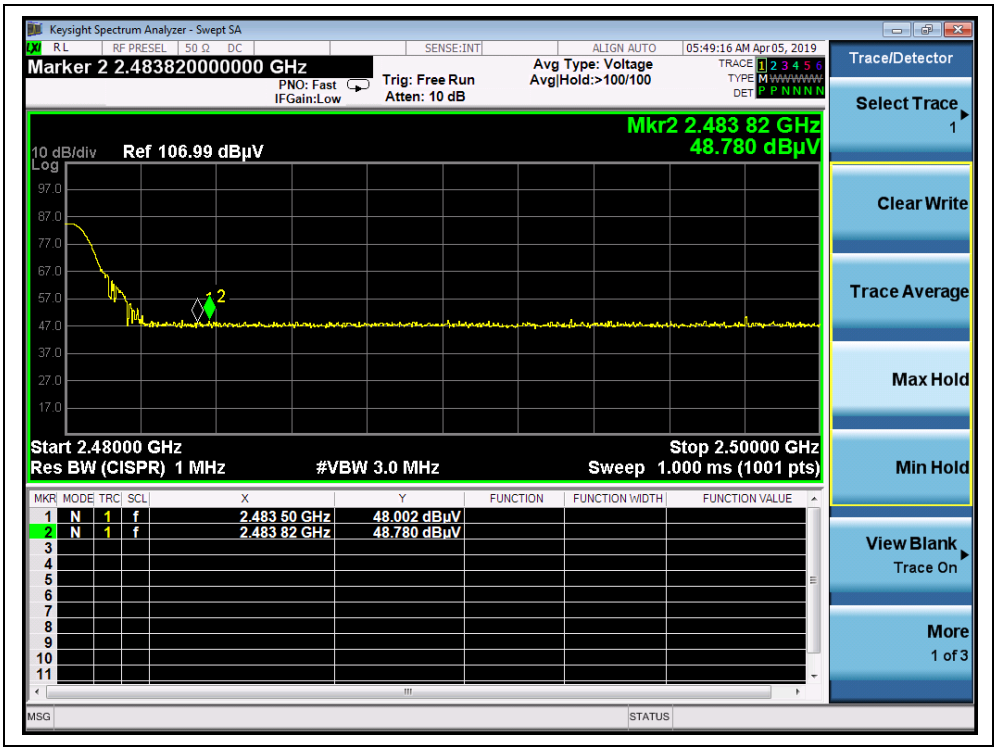
B. Test Plots:



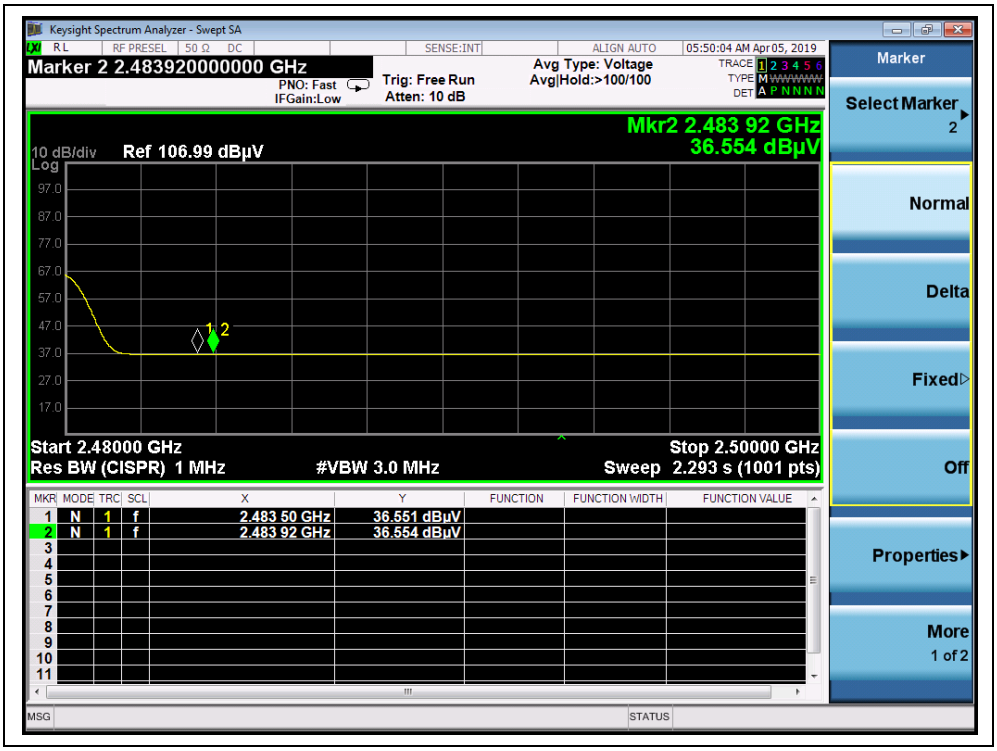
(Channel = 0, PEAK, GFSK)



(Channel = 0, AVERAGE, GFSK)



(Channel = 78, PEAK, GFSK)



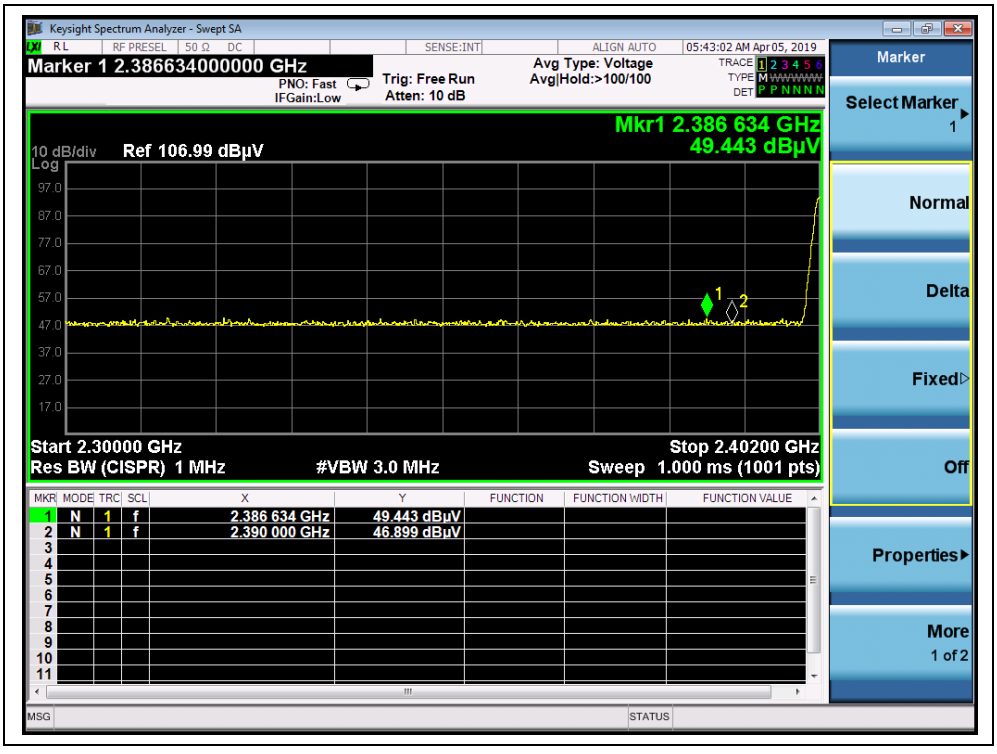
(Channel = 78, AVERAGE, GFSK)

π/4-DQPSK Mode

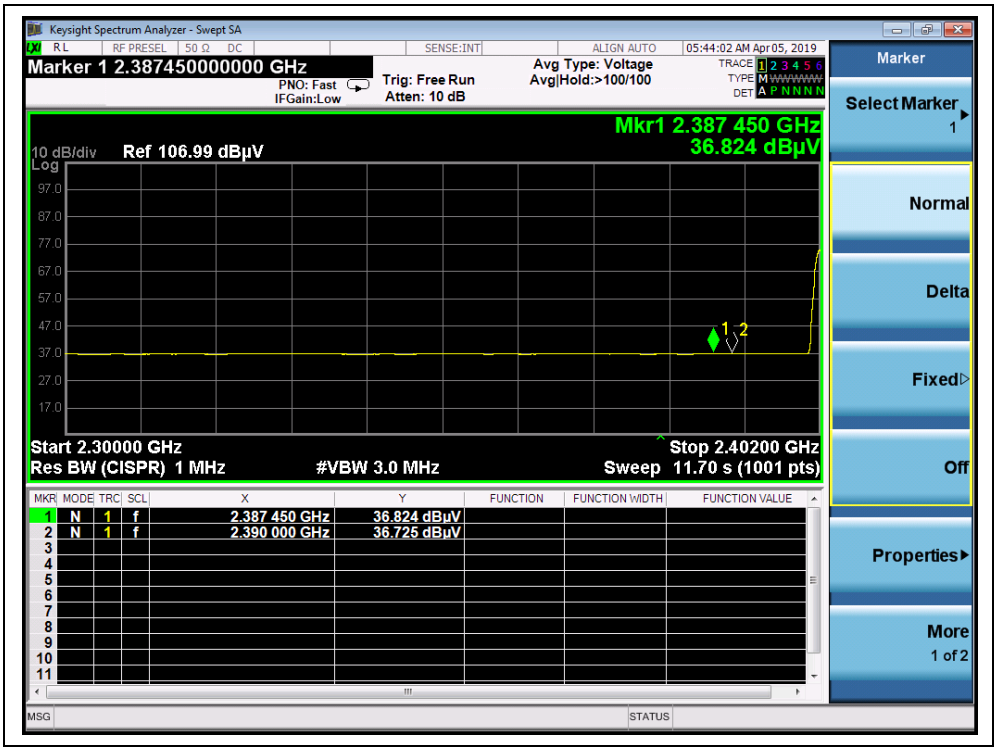
A. Test Verdict:

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	2386.63	PK	49.44	-29.67	32.56	52.33	74	PASS
0	2387.45	AV	36.82	-29.67	32.56	39.71	54	PASS
78	2484.52	PK	49.15	-29.67	32.56	52.04	74	PASS
78	2484.10	AV	36.54	-29.67	32.56	39.43	54	PASS

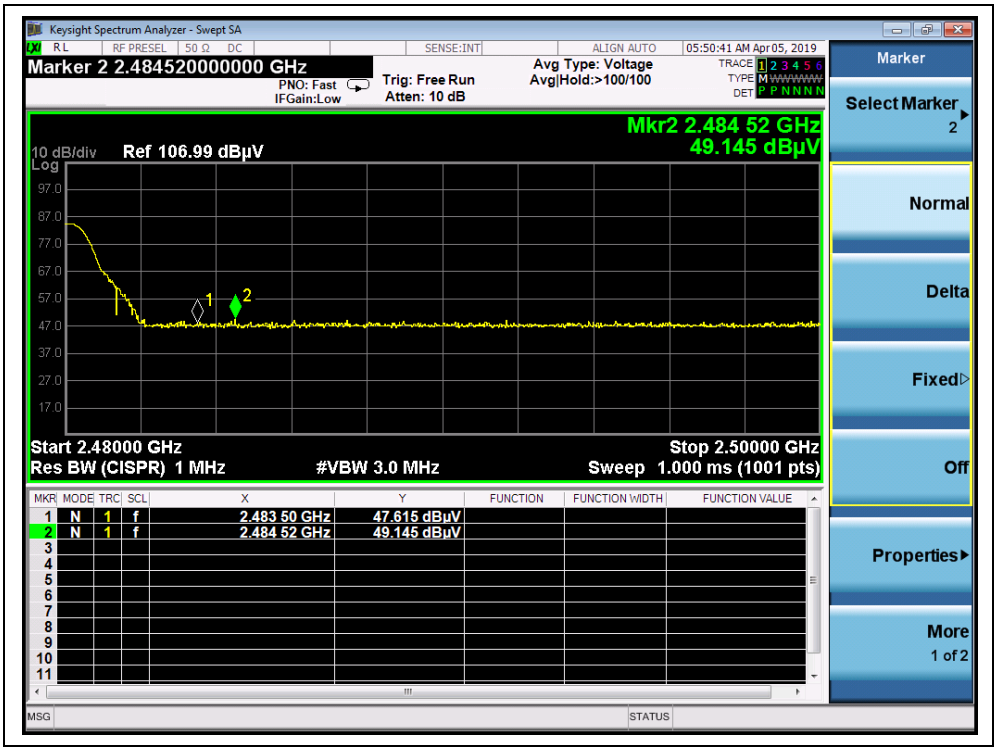
B. Test Plots:



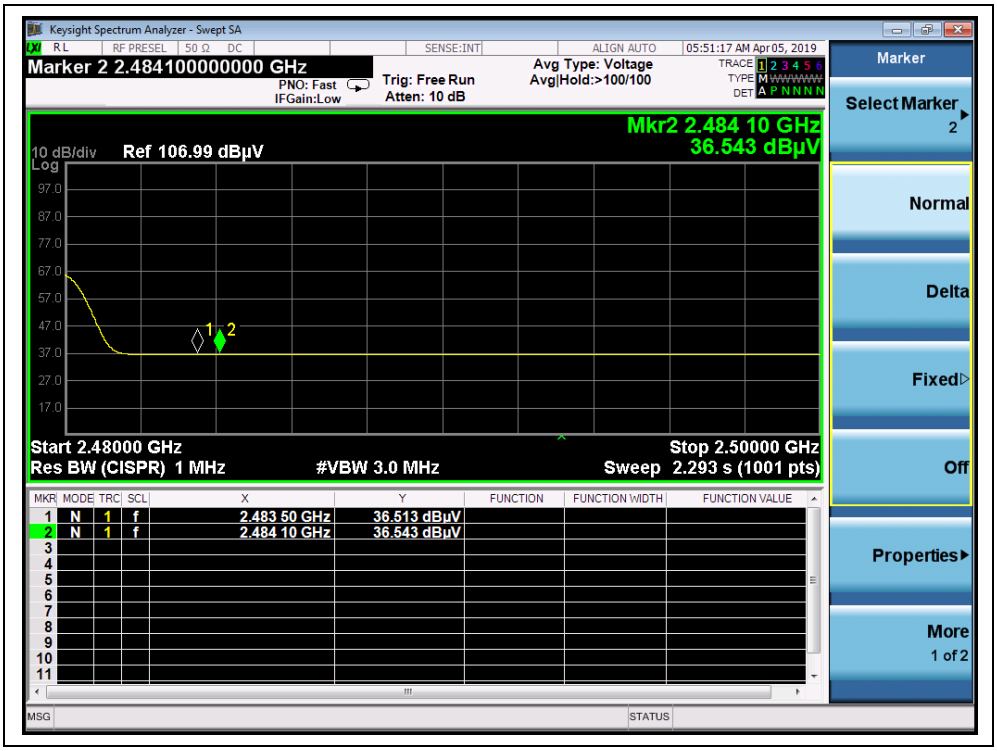
(Channel = 0, PEAK, π/4-DQPSK)



(Channel = 0, AVERAGE, π/4-DQPSK)



(Channel = 78, PEAK, π/4-DQPSK)



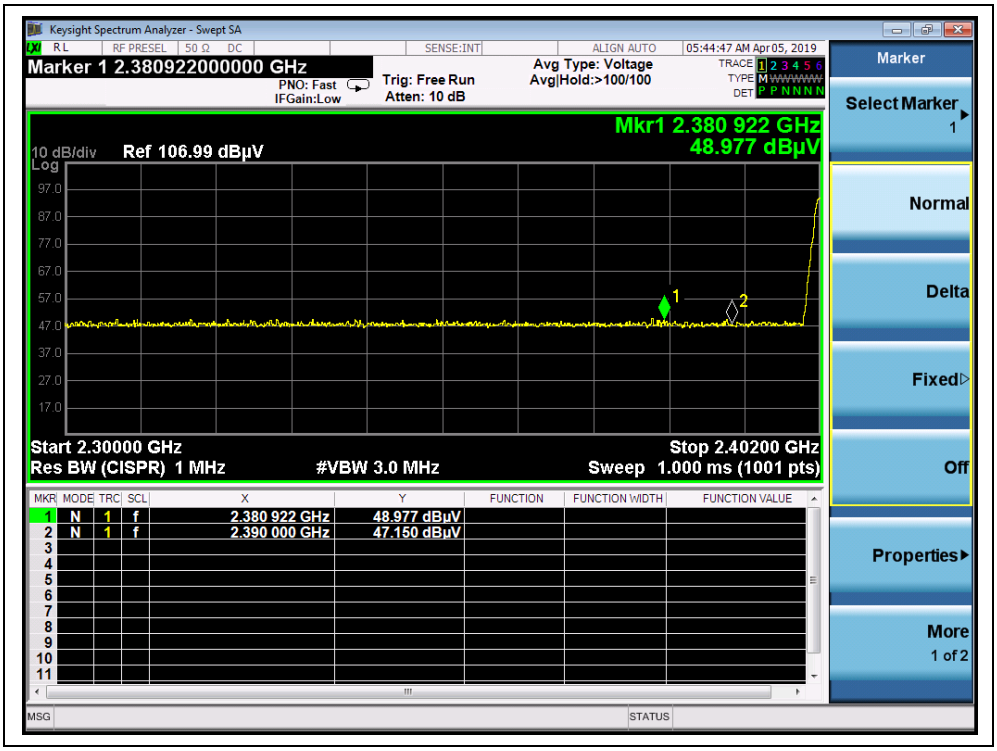
(Channel = 78, AVERAGE, π/4-DQPSK)

8-DPSK Mode

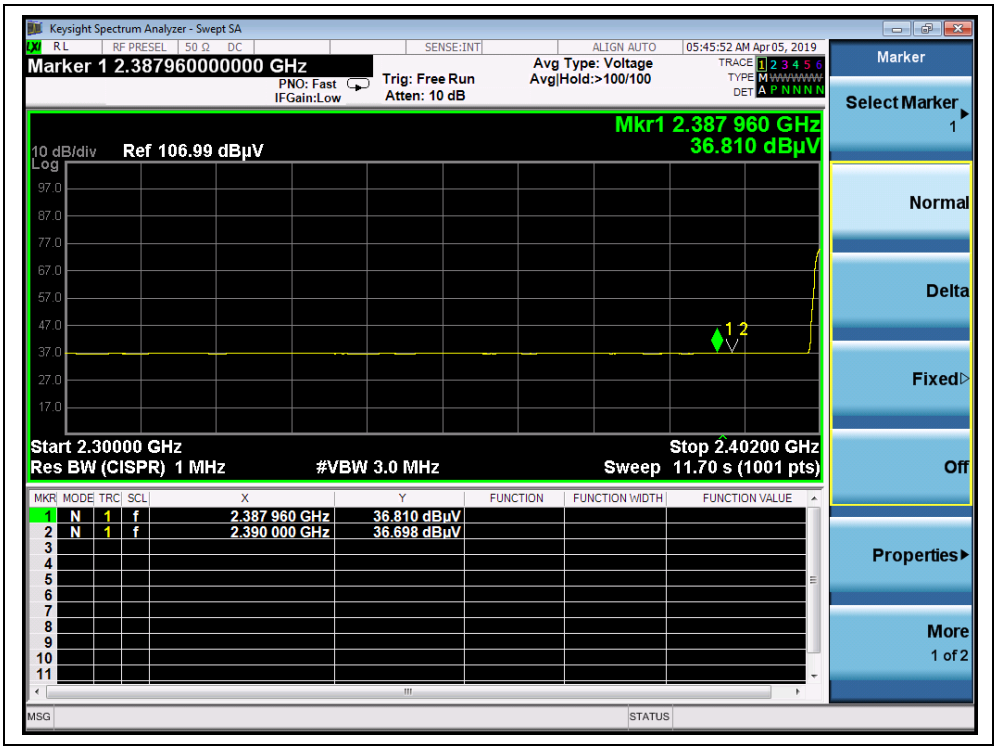
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
		PK/ AV						
0	2380.92	PK	48.98	-29.67	32.56	51.87	74	PASS
0	2387.96	AV	36.81	-29.67	32.56	39.70	54	PASS
78	2495.02	PK	50.15	-29.67	32.56	53.04	74	PASS
78	2484.48	AV	36.57	-29.67	32.56	39.46	54	PASS

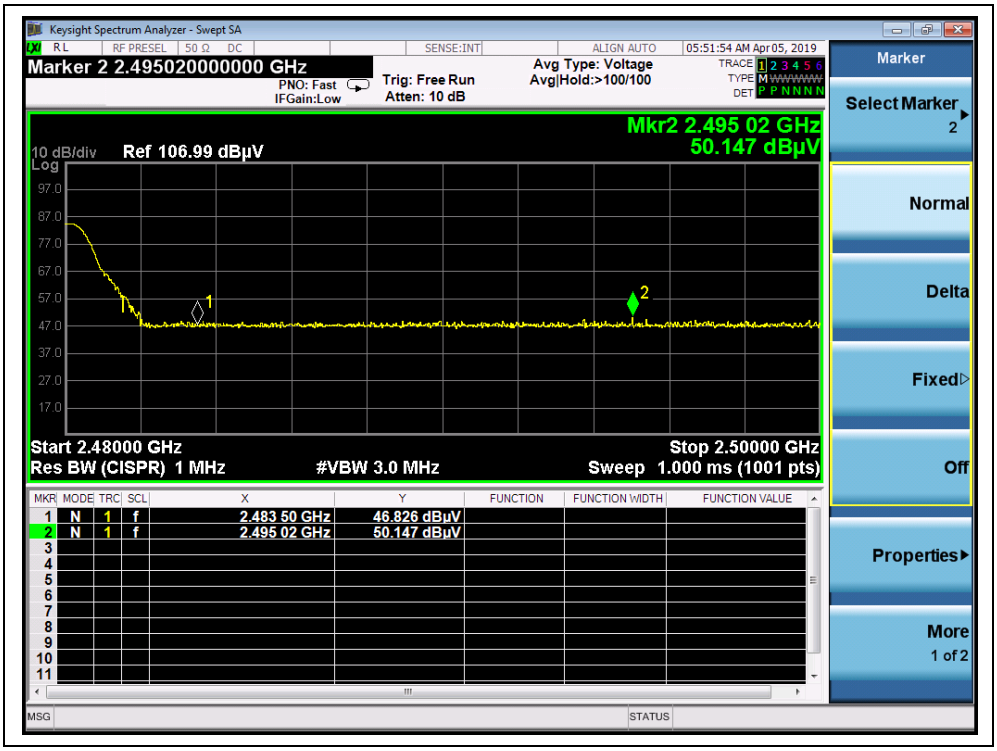
B. Test Plots:



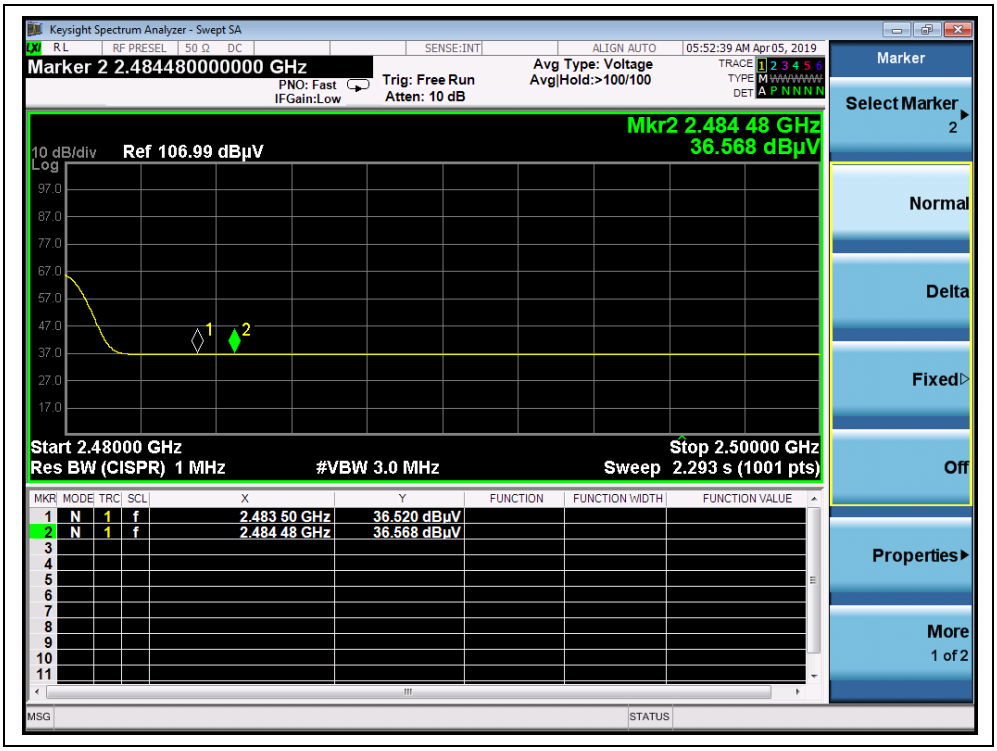
(Channel = 0, PEAK, 8-DPSK)



(Channel = 0, AVERAGE, 8-DPSK)



(Channel = 78, PEAK, 8-DPSK)



(Channel = 78, AVERAGE, 8-DPSK)

2.11. Radiated Emission

2.11.1. 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:

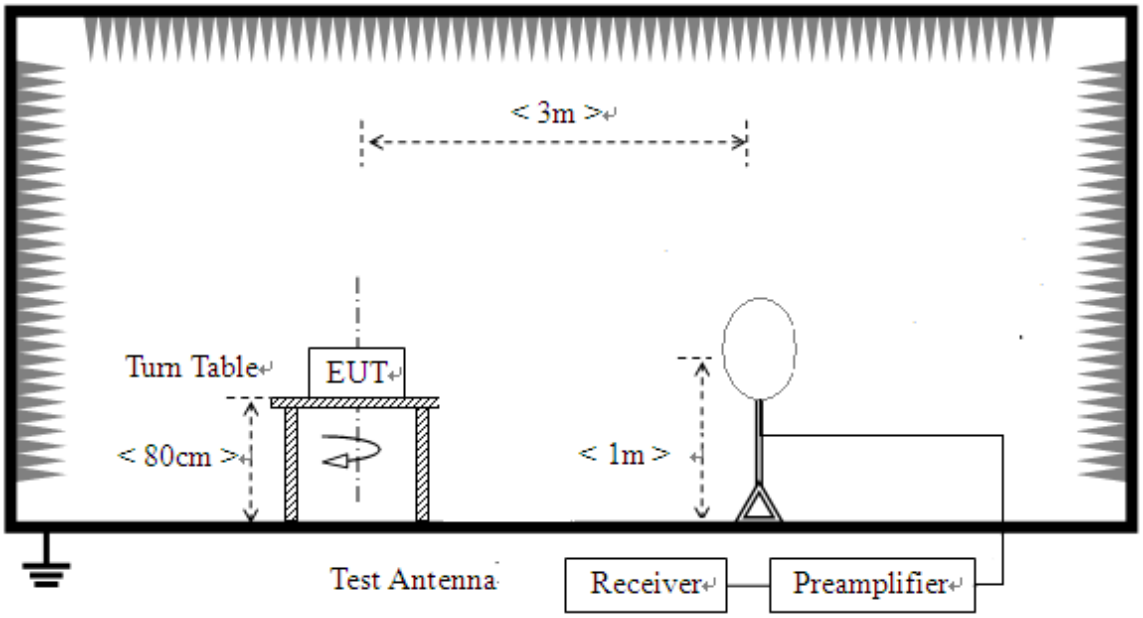
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength 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)

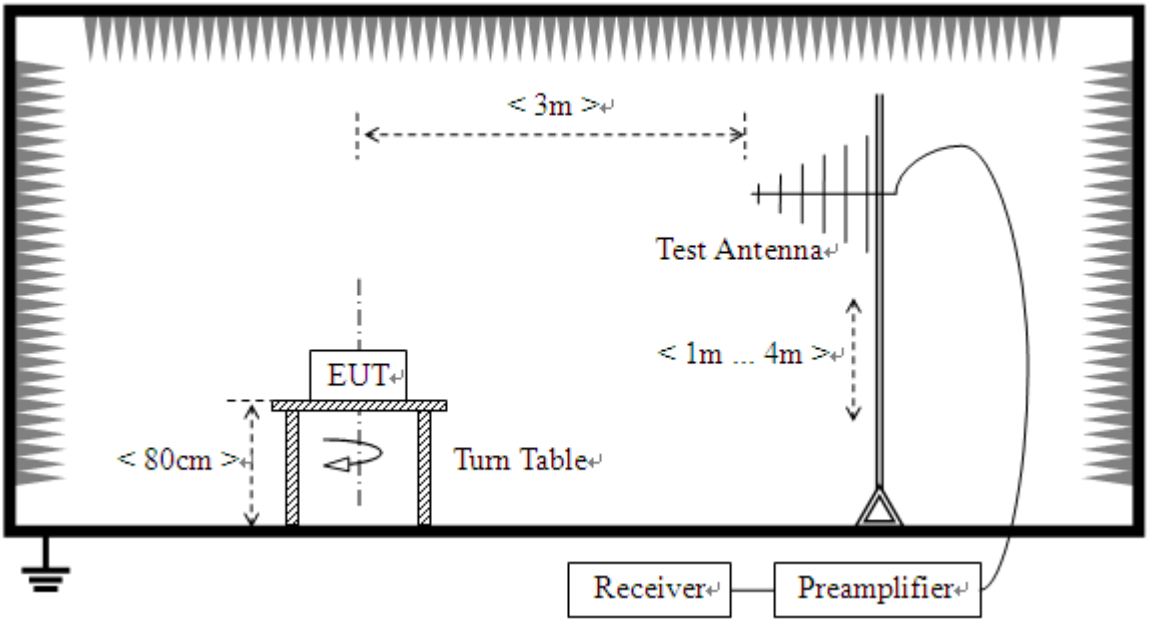
2.11.2. Test Description

A. Test Setup:

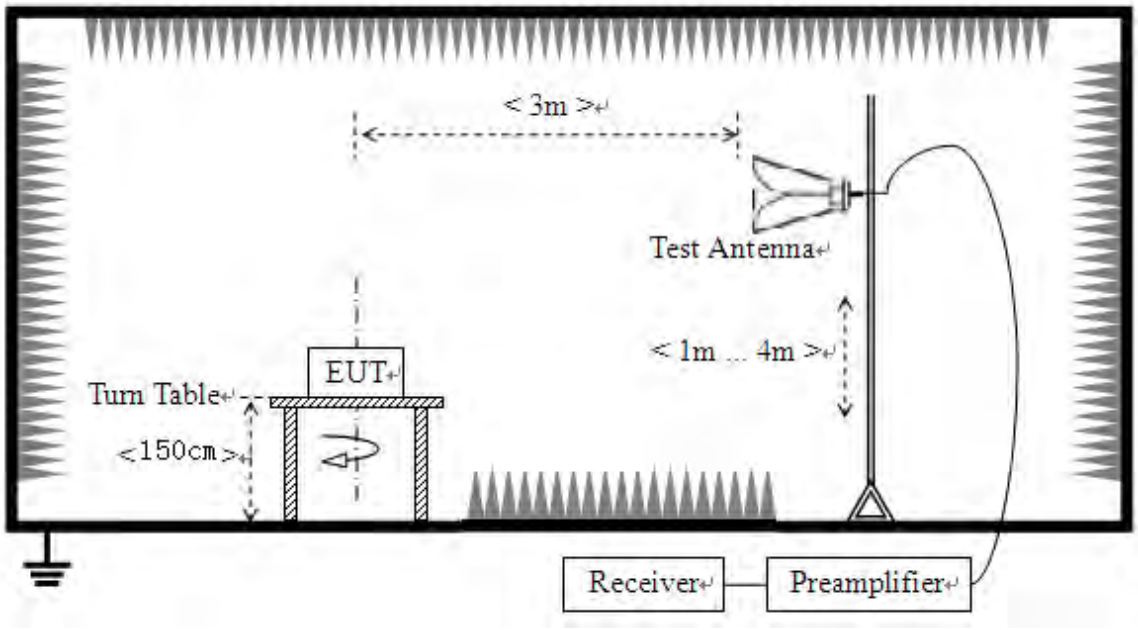
1) For radiated emissions from 9kHz to 30MHz



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 B(4).

2.11.3. 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

2.11.4. 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:

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

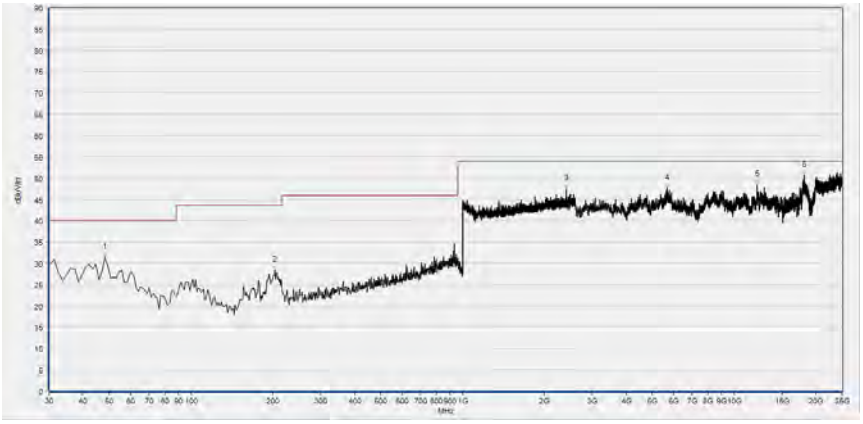
A_T: Total correction Factor except Antenna
U_R: Receiver Reading
G_{preamp}: Preamplifier Gain
A_{Factor}: Antenna Factor at 3m

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.

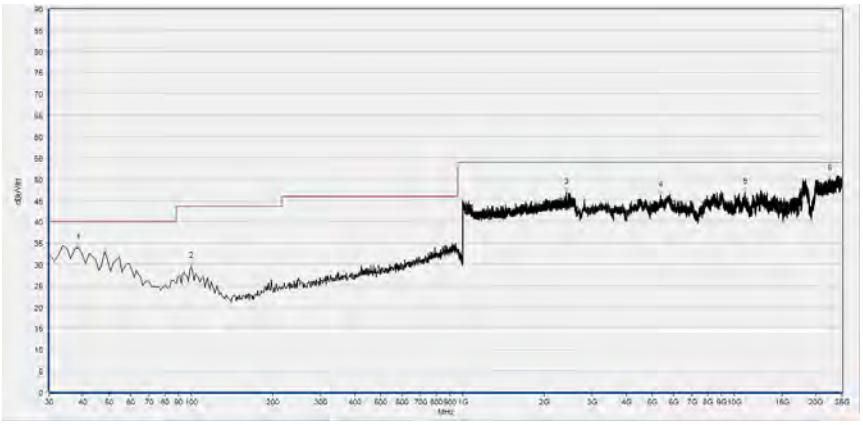
GFSK Mode

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
48.210	31.26	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
203.605	28.34	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2410.484	47.46	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5675.468	47.59	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12131.915	48.42	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
18164.721	50.55	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

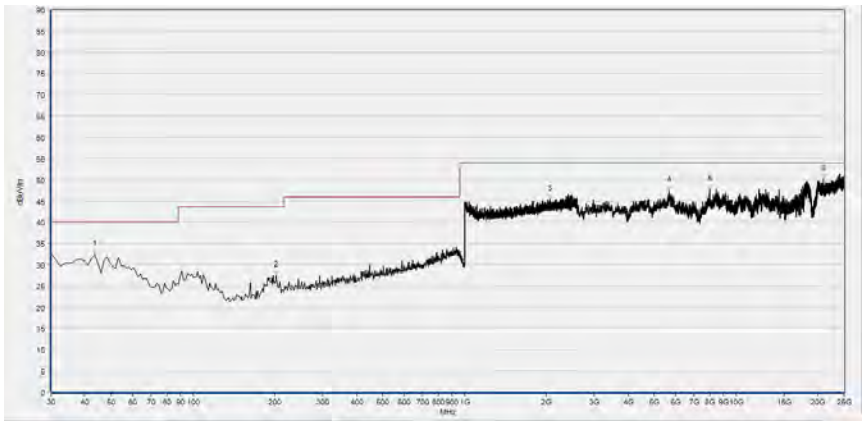
(30MHz to 25GHz, Antenna Horizontal, GFSK, channel 0)



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
38.498	33.92	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
100.413	29.45	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
2404.722	46.94	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5361.811	46.20	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10991.344	46.94	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
22539.625	50.06	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

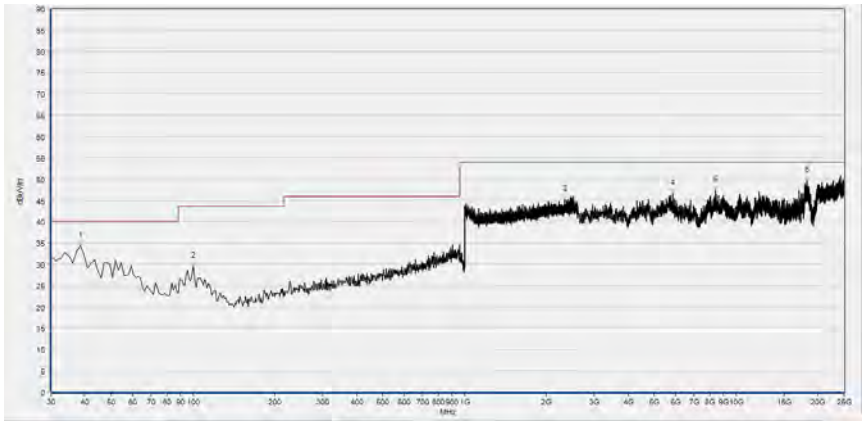
(30MHz to 25GHz, Antenna Vertical, GFSK, channel 0)

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
43.354	32.30	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
202.390	27.45	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2060.904	45.41	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5675.468	47.39	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
7997.345	47.71	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
20946.899	50.06	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

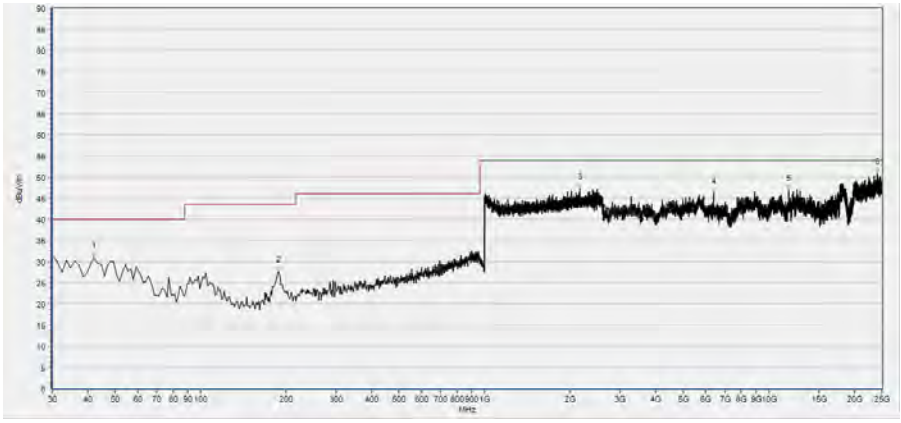
(30MHz to 25GHz, Antenna Horizontal, GFSK, channel 39)



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
38.498	34.29	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
100.413	29.42	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
2341.977	45.18	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5842.480	46.54	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8416.912	47.45	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
18213.602	49.62	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

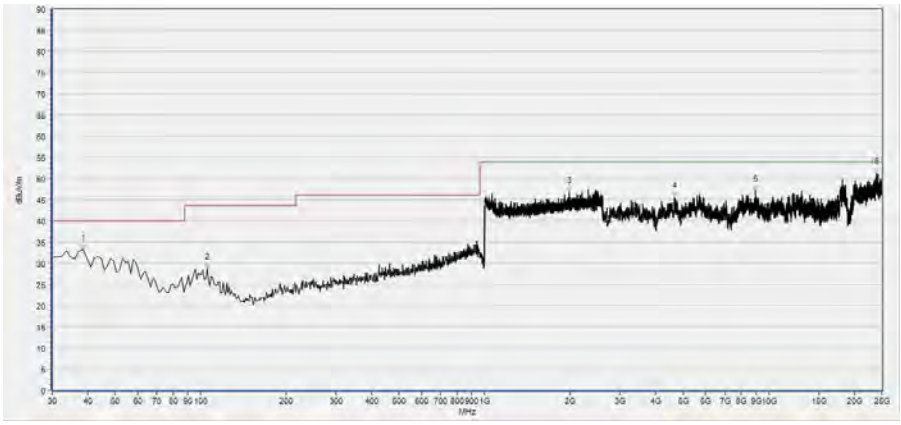
(30MHz to 25GHz, Antenna Vertical, GFSK, channel 39)

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
42.140	30.96	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
187.822	27.66	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2163.986	47.24	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
6384.252	46.17	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
11744.935	46.99	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
24030.515	50.87	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

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

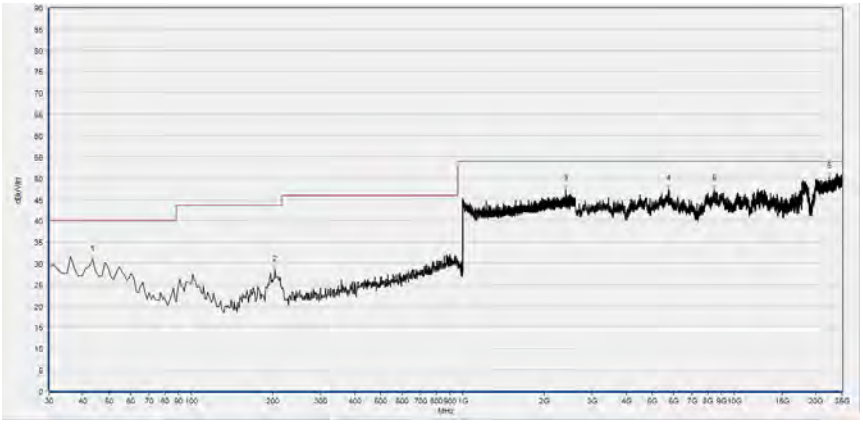


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
38.498	33.27	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
105.269	28.77	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
1978.311	46.77	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4644.881	45.55	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8970.904	47.17	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
23977.560	51.34	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

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

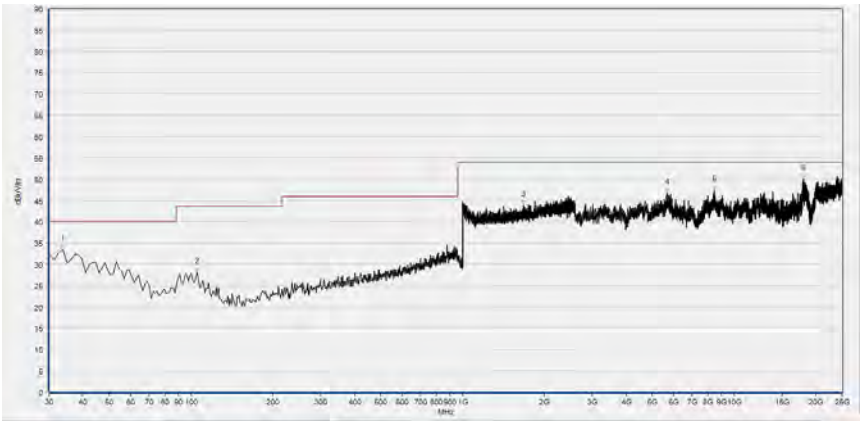
π/4-DQPSK Mode

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
43.354	30.87	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
203.605	28.57	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2401.521	47.37	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5744.717	47.40	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8457.647	47.40	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
22437.789	50.26	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

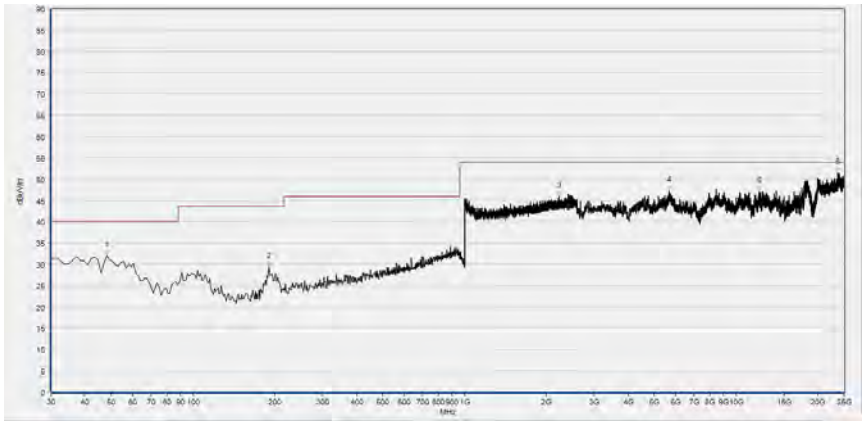
(30MHz to 25GHz, Antenna Horizontal, π/4-DQPSK, channel 0)



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
33.642	33.58	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
105.269	28.10	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
1673.549	43.89	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5659.174	46.72	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8461.720	47.40	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
17997.709	50.04	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

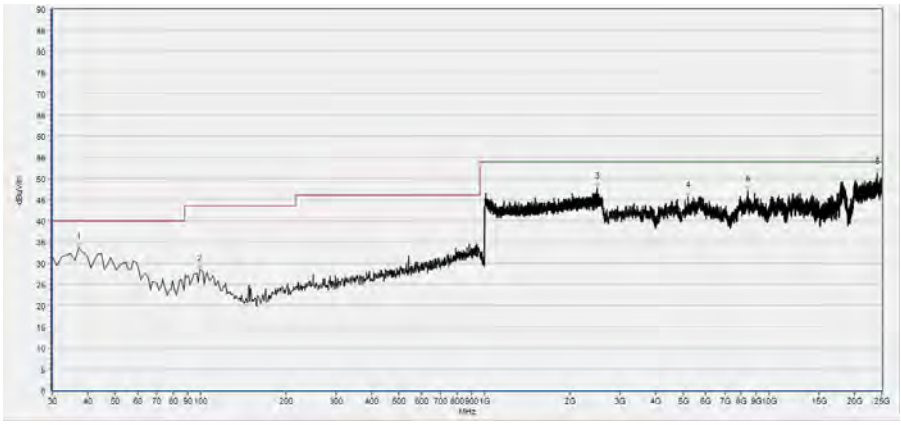
(30MHz to 25GHz, Antenna Vertical, π/4-DQPSK, channel 0)

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
48.210	31.98	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
190.250	29.34	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2222.249	45.89	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5679.542	47.21	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12144.135	47.08	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
23716.858	51.38	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

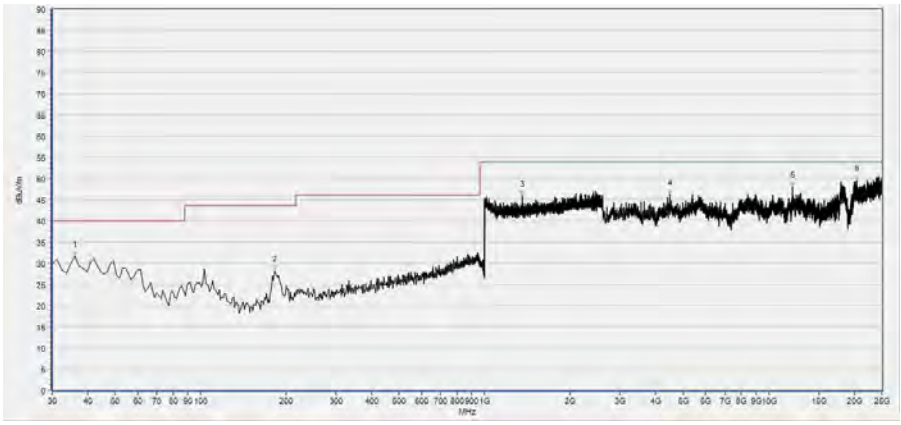
(30MHz to 25GHz, Antenna Horizontal, π/4-DQPSK, channel 39)



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
37.284	33.57	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
99.199	28.30	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
2486.675	47.83	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5202.946	45.71	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8453.573	47.20	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
24152.719	51.32	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

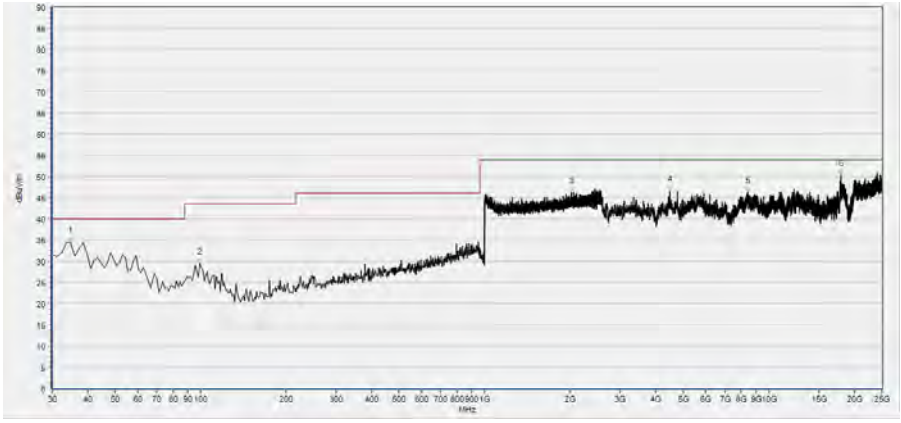
(30MHz to 25GHz, Antenna Vertical, π/4-DQPSK, channel 39)

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
36.070	31.58	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
181.752	28.28	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
1355.342	45.94	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4494.163	46.28	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12140.062	48.11	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
20445.863	49.66	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

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

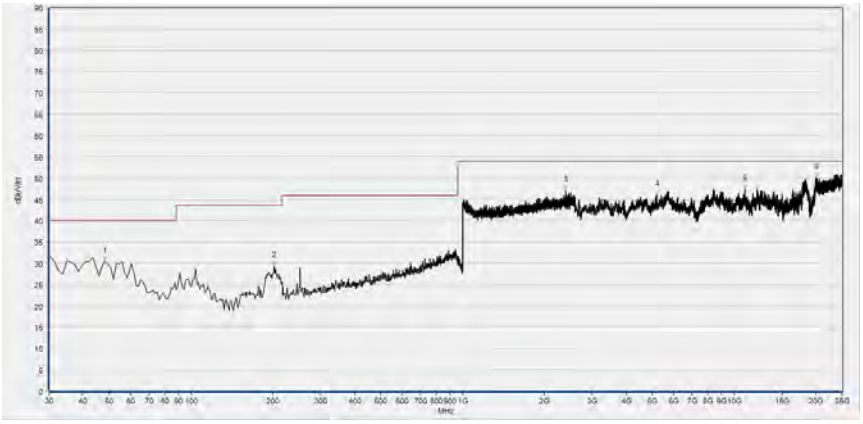


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
34.856	34.44	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
99.199	29.50	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
2025.050	46.25	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4490.089	46.54	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8416.912	46.31	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
17977.341	50.36	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

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

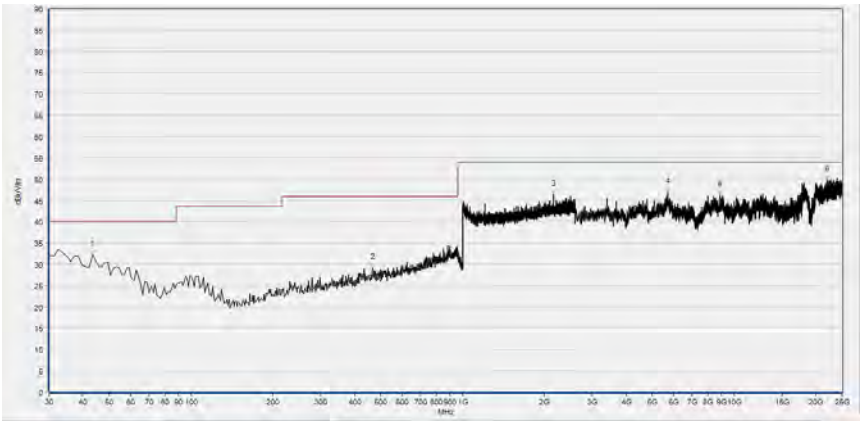
8-DPSK Mode

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
48.210	30.57	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
202.390	29.33	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2402.161	47.09	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5190.726	46.10	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10979.123	47.44	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
20103.692	50.04	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

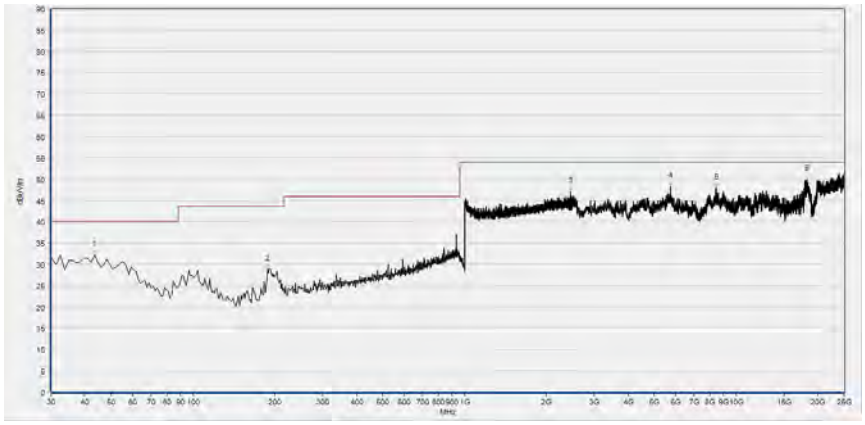
(30MHz to 25GHz, Antenna Horizontal, 8-DPSK, channel 0)



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
43.354	32.18	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
465.832	29.23	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2167.827	46.49	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5695.836	46.99	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8881.288	46.19	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
21985.634	49.71	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

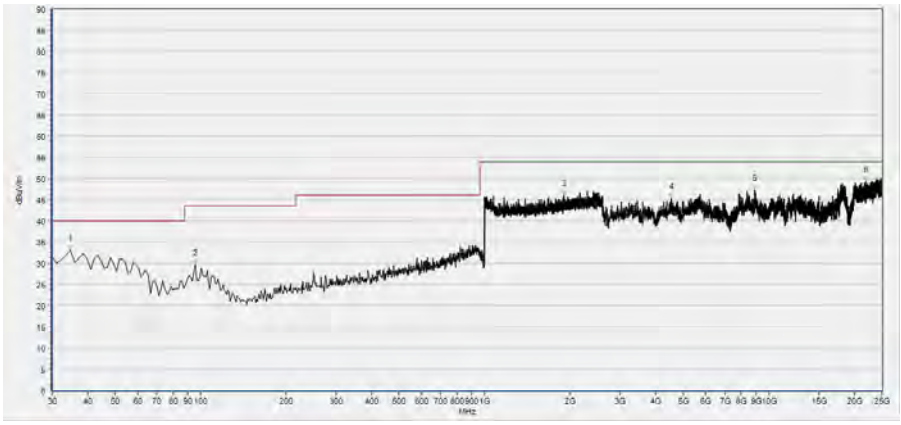
(30MHz to 25GHz, Antenna Vertical, 8-DPSK, channel 0)

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
43.354	32.15	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
187.822	28.90	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2460.424	47.05	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5740.644	48.19	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8445.426	47.87	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
18242.117	50.02	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

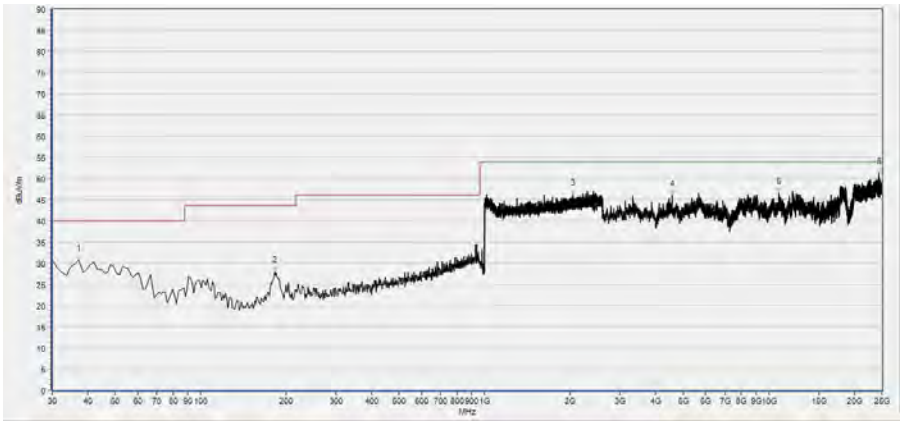
(30MHz to 25GHz, Antenna Horizontal, 8-DPSK, channel 39)



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
34.856	33.01	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
95.557	29.57	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
1902.761	46.12	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4526.750	45.42	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8930.169	47.29	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
21928.605	49.37	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

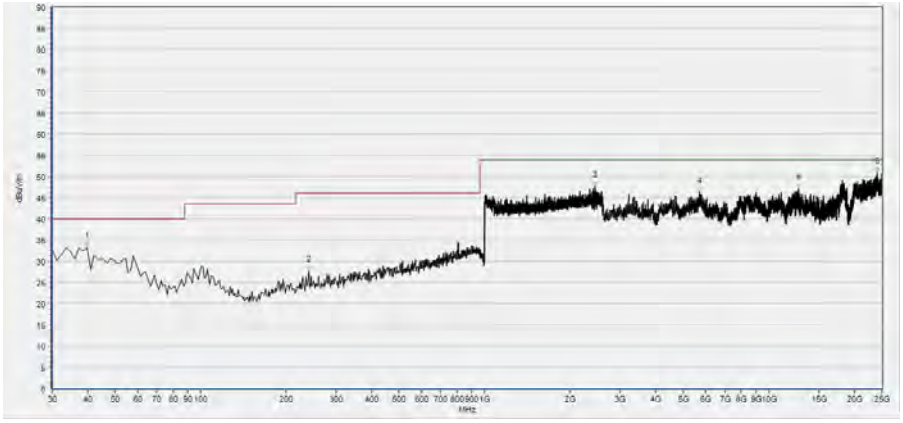
(30MHz to 25GHz, Antenna Vertical, 8-DPSK, channel 39)

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
37.284	30.68	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
181.752	27.97	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2048.099	46.19	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4567.485	46.06	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10869.140	46.66	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
24409.347	51.27	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
39.712	33.14	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
240.025	27.66	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2449.540	47.69	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5687.689	46.21	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12747.009	47.11	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
24075.323	50.81	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

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Laboratory Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
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
Directional coupler	17041703	DTO-5-30	ShangHai Huaxiang	N/A	N/A
EXA Signal Analzyer	MY53470836	N9010A	Agilent	2018.11.06	2019.11.05
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
USB Wideband Power Sensor	MY54210011	U2021XA	Agilent	2018.04.17	2019.04.16
Computer	T430i	Think Pad	Lenovo	N/A	N/A

4.2 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

4.3 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	2019.02.15	2020.02.14
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
Notch Filter	N/A	WRCG-2400-2483.5-60SS	Wainwright	2018.12.01	2019.11.30
Anechoic Chamber	N/A	9m*6m*6m	CRT	2017.11.19	2020.11.18

END OF REPORT