REPORT No. : SZ21050037W04

TEST REPORT

APPLICANT	:	Nortek Security & Control LLC
PRODUCT NAME	:	Edge Panel
MODEL NAME	:	2GIG-EDG-NA-V
BRAND NAME	:	2GIG
FCC ID	:	EF400220
STANDARD(S)	:	47 CFR Part 15 Subpart C
RECEIPT DATE	:	2021-05-10
TEST DATE	:	2021-05-14 to 2021-05-28
ISSUE DATE	:	2021-06-16

Edited by: Peng Mi (Rapporteur)

Approved by: Peng Huarui (Supervisor)

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MORLAB

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DIRECTORY

Change History		
Version	Date	Reason for change
1.0	2021-06-16	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Nortek Security & Control LLC
Applicant Address:	5919 Sea Otter Place, Carlsbad, CA 92010, United States
Manufacturer:	Flextronics Electronics Technology (Shenzhen) Co., Ltd
Manufacturer Address:	89 Yong Fu Road, Tong Fu Yu Industrial Park, Fu Yong Town, Bao An District, Shenzhen, Guangdong, 518103, China

1.2. Equipment Under Test (EUT) Description

Product Name:	Edge Panel	
Serial No.:	(N/A, marked #1 by test site)	
Hardware Version:	A	
Software Version:	0	
Equipment Type:	Bluetooth classic	
Bluetooth Version:	5.0	
Modulation Type:	FHSS (GFSK(1Mbps),π/4-DQPSK(EDR 2Mbps), 8-DPSK(EDR 3Mbps))	
Operating Frequency Range:	2402MHz – 2480MHz	
Antenna Type:	FPC Antenna	
Antenna Gain:	3.13dBi	
Accessory Information:	Battery	
	Brand Name:	Highpower
	Model No.:	115150
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	4020mAh
	Rated Voltage:	3.80V
	Charge Limit:	4.40V
	Manufacturer:	Huizhou Highpower Technology Co.,LTD.

Accessory Information:	Adaptor	
	Brand Name:	ZBPOWER
	Model No.:	ZB-H140017
	Serial No.:	(N/A, marked #1 by test site)
	Rated Output:	14.00V⎓1.70A
	Rated Input:	100-240V～50/60Hz, Max 0.6A
	Manufacturer:	Huizhou Zhong bang electronics co., ltd.

Note 1: This test report is variant from the original report (Report No.: SZ21050036W04), based on the similarity between before, only the LTE module is replaced and the others are the same as before. No other changes. The changes do not affect the results in this report.

Note 2: 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. The Channel Number and Frequency

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	**2402**	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	**78**	**2480**
19	2421	**39**	**2441**	59	2461		

Note 1: The Lowest Channel 0, Middle 39 and Highest 78 were selected for test in the report.

1.4. 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	Method Determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS$_{Note1}$	No deviation
2	15.247(a)1 15.247(h)	Hopping Mechanism	N/A	N/A	PASS$_{Note1}$	No deviation
3	15.247(a)	Number of Hopping Frequency	May 14, 2021	Liu Bo	PASS$_{Note1}$	No deviation
4	N/A	Duty Cycle	May 14, 2021	Liu Bo	PASS$_{Note1}$	No deviation
5	15.247(b)	Maximum Peak Conducted Output Power	May 14, 2021	Liu Bo	PASS$_{Note1}$	No deviation
6	15.247(b)	Maximum Average Conducted Output Power	May 14, 2021	Liu Bo	PASS$_{Note1}$	No deviation
7	15.247(a)	20dB Bandwidth	May 14, 2021	Liu Bo	PASS$_{Note1}$	No deviation
8	15.247(a)	Carrier Frequency Separation	May 14, 2021	Liu Bo	PASS$_{Note1}$	No deviation
9	15.247(a)	Time of Occupancy (Dwell time)	May 14, 2021	Liu Bo	PASS$_{Note1}$	No deviation
10	15.247(d)	Conducted Spurious Emission	May 14, 2021	Liu Bo	PASS$_{Note1}$	No deviation
11	15.207	Conducted Emission	May 19, 2021	Wu Runfeng	PASS$_{Note1}$	No deviation
12	15.247(d)	Restricted Frequency Bands	May 19&28, 2021	Lin Jiayong	PASS$_{Note1}$	No deviation

13	15.209, 15.247(d)	Radiated Emission	May 19, 2021	Lin Jiayong	$PASS_{Note1}$	No deviation

Note 1: The test results of these test items in this report refer to the test report (Report No.: SZ21050036W04).

Note 2: The tests were performed according to the method of measurements prescribed in ANSIC63.10-2013 and KDB558074 D01 v05r02.

Note 3: 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.

Note 4: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 5: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% risk level.

1.5. 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. Hopping Mechanism

2.2.1. Requirement

According to FCC §15.247(a)(1),a frequency hopping spread spectrum system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

According to FCC §15.247(h), the incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

2.2.2. Result: Compliant

The hopping mechanism of the EUT is in compliance with the document "***Bluetooth core specification v5.1***".

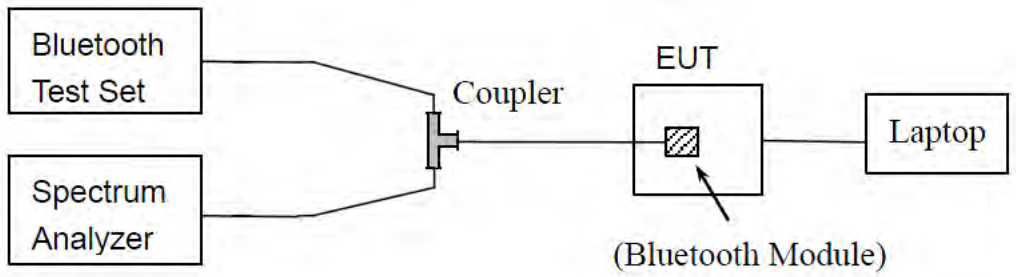
2.3. Number of Hopping Frequency

2.3.1. 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.

2.3.2. Test Description

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.

2.3.3. 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

2.3.4. 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.

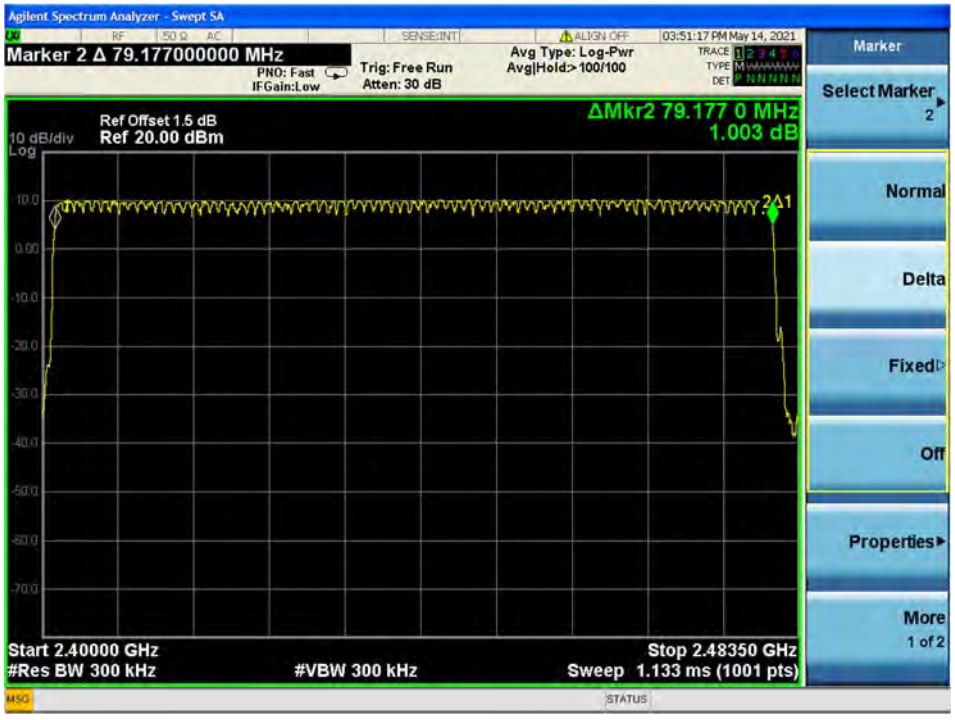
A. Test Verdict:

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 Plot:

(GFSK)

(π/4-DQPSK)



(8- DPSK)

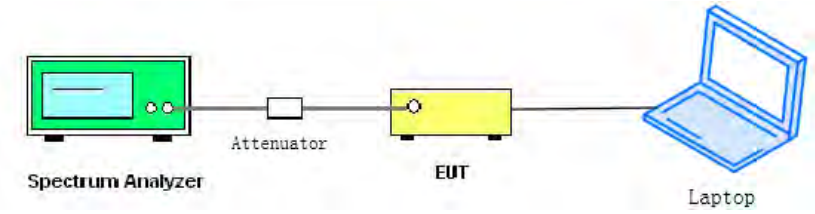
2.4. Duty Cycle of Test Signal

2.4.1. Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%).When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration(T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e.,no transmitter OFF-time is to be considered).
When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this sub clause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than ±2%; otherwise, the duty cycle is considered to be nonconstant.

2.4.2. Test Description

Test Setup:



ANSI C63.10 2013 Clause 11.6 was used in order to prove compliance.

2.4.3. Test Result

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*lg[1/D])
GFSK	77.07	1.13
π/4-DQPSK	77.07	1.13
8-DPSK	77.07	1.13

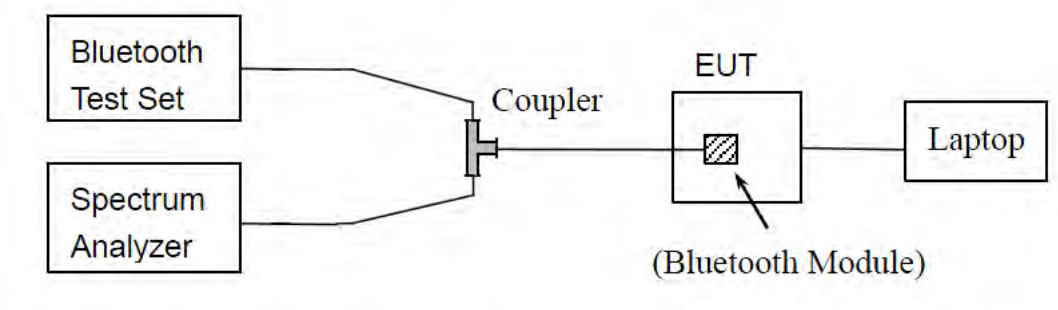
2.5. Maximum Peak Conducted Output Power

2.5.1. 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.

2.5.2. Test Description

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.

2.5.3. Test Result

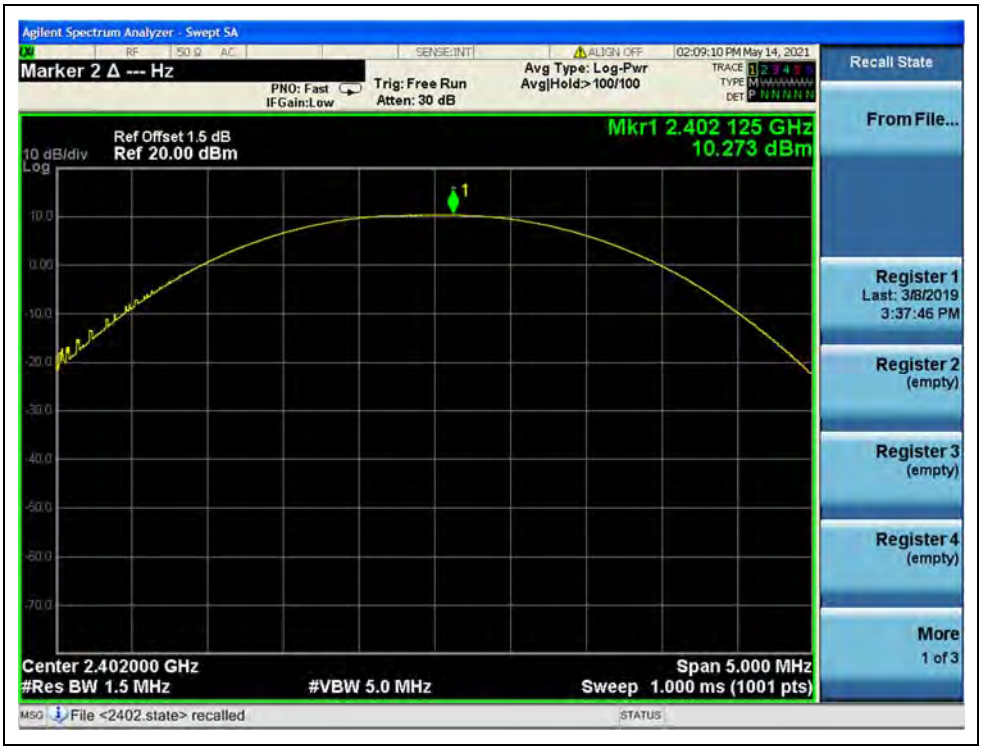
The Bluetooth Module operates at hopping-off test mode.The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the module.

GFSK Mode

A. Test Verdict:

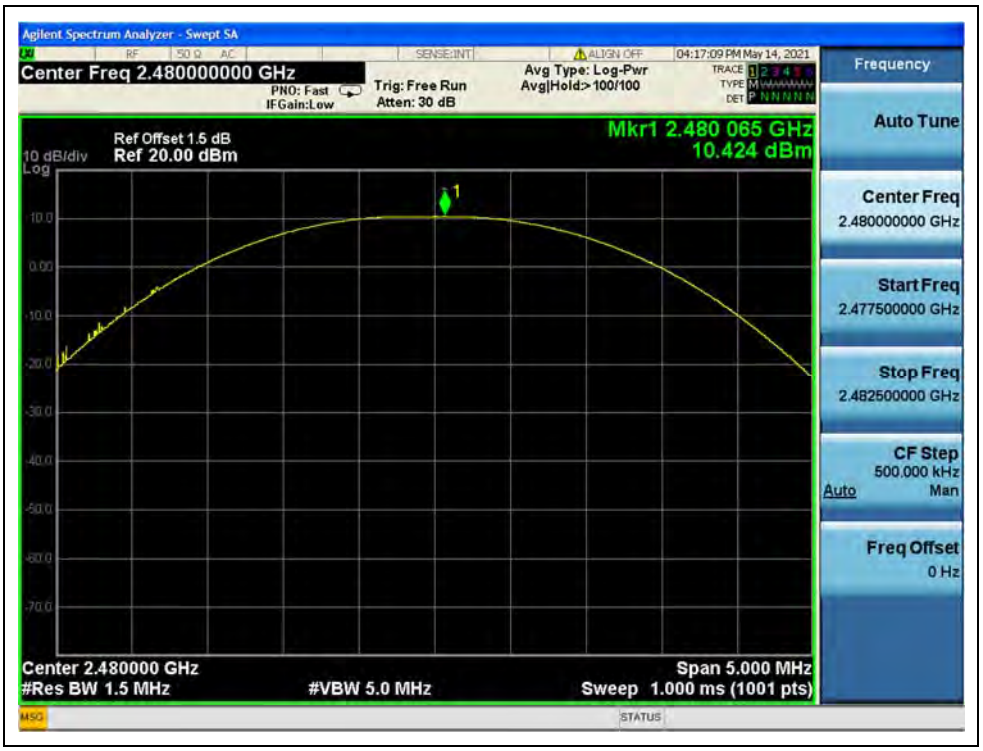
Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	10.27	0.011	20.96	0.125	PASS
39	2441	10.73	0.012			PASS
78	2480	10.42	0.011			PASS

B. Test Plot:



(GFSK, Channel 0, 2402MHz)

(GFSK, Channel 39, 2441MHz)



(GFSK, Channel 78, 2480MHz)

π/4-DQPSK Mode

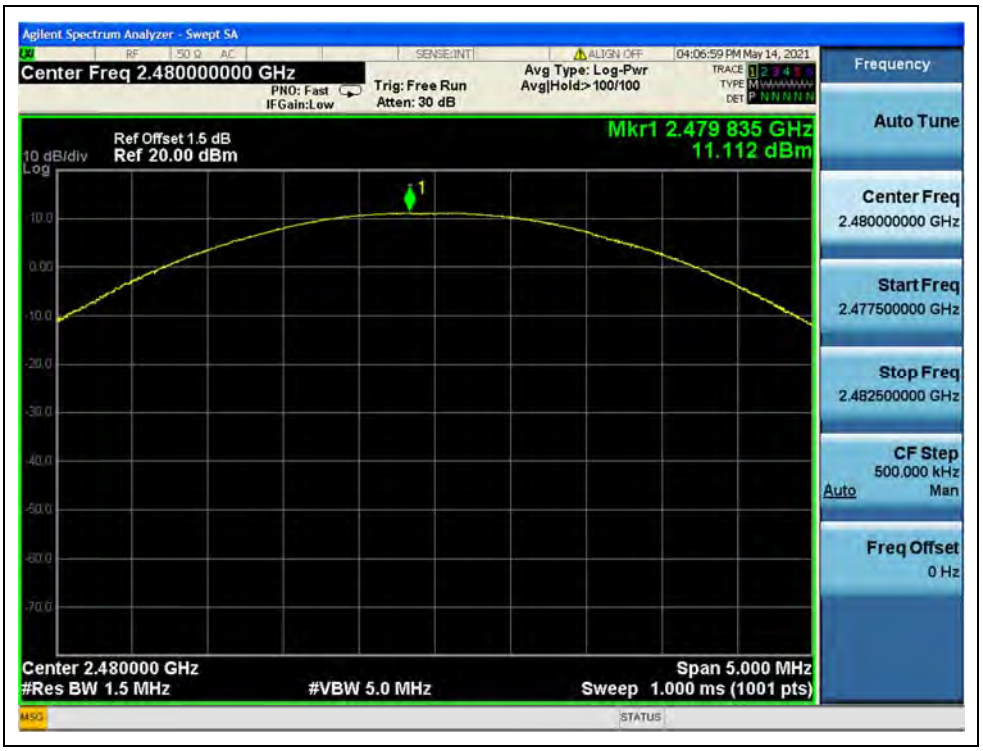
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	11.66	0.015	20.96	0.125	PASS
39	2441	11.56	0.014			PASS
78	2480	11.11	0.013			PASS

B. Test Plot:

(π/4-DQPSK,Channel 0, 2402MHz)

(π/4-DQPSK,Channel 39, 2441MHz)



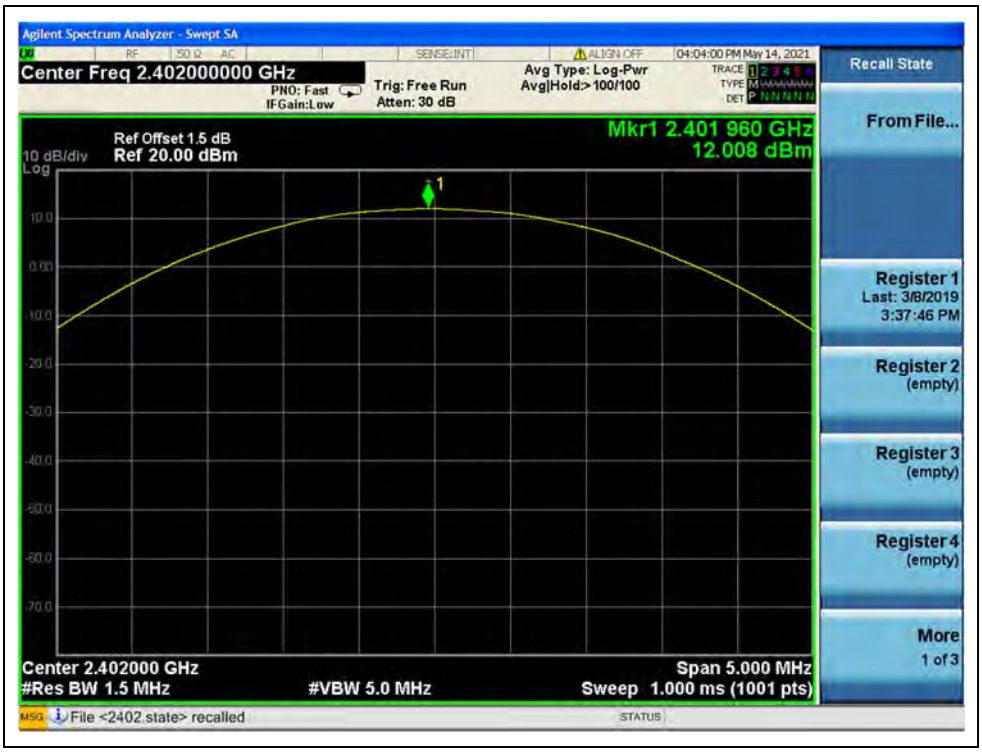
(π/4-DQPSK,Channel 78, 2480MHz)

8-DPSK Mode

A. Test Verdict:

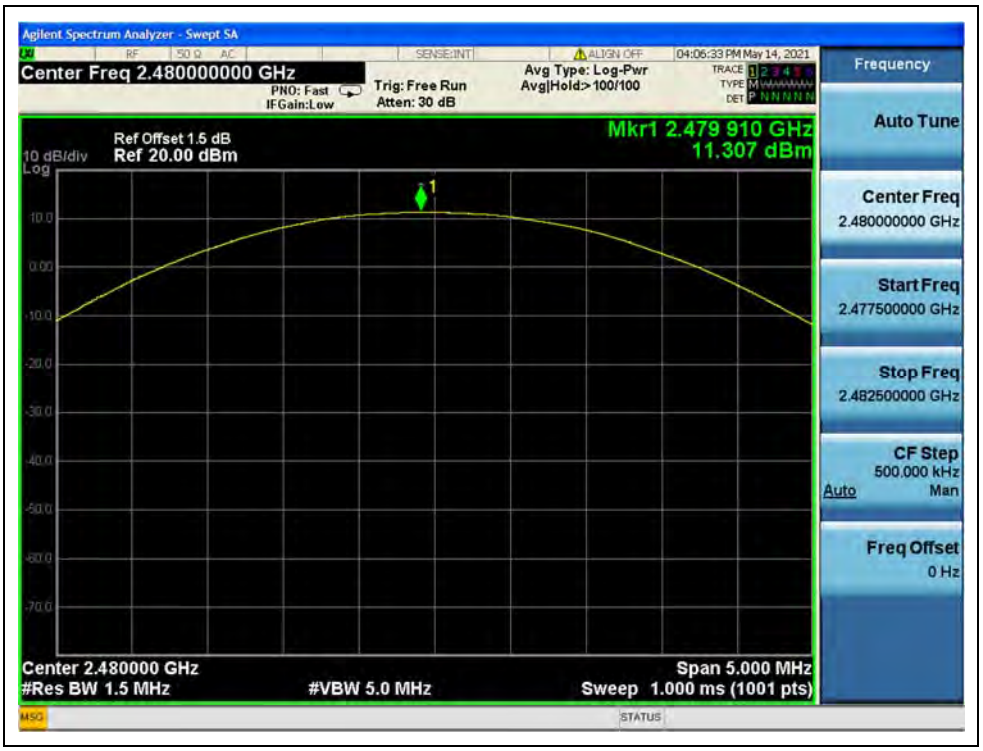
Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	**12.01**	**0.016**	20.96	0.125	PASS
39	2441	11.81	0.015			PASS
78	2480	11.31	0.014			PASS

B. Test Plot:



(8-DPSK,Channel 0, 2402MHz)

(8-DPSK, Channel 39, 2441MHz)



(8-DPSK, Channel 78, 2480MHz)

2.6. Maximum Average Conducted Output Power

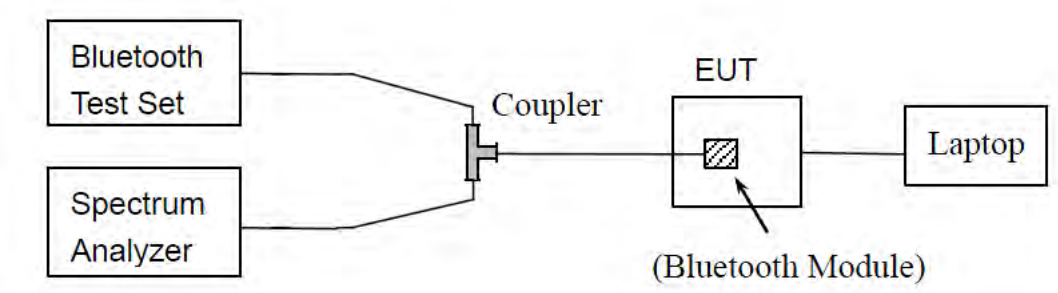
2.6.1. Requirement

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.

2.6.2. Test Description

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

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.

2.6.3. Test Procedure

KDB 558074 Section 8.3.2 was used in order to prove compliance.

2.6.4. 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)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty Factor Calculated		Limit		Verdict
		dBm		dBm	W	dBm	W	
0	2402	9.04	1.13	10.17	0.010	20.96	0.125	PASS
39	2441	9.28		**10.41**	**0.011**			PASS
78	2480	9.02		10.15	0.010			PASS

π/4-DQPSK Mode

Channel	Frequency (MHz)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty Factor Calculated		Limit		Verdict
		dBm		dBm	W	dBm	W	
0	2402	7.95	1.13	9.08	0.008	20.96	0.125	PASS
39	2441	8.13		9.26	0.008			PASS
78	2480	7.77		8.90	0.008			PASS

8-DPSK Mode

Channel	Frequency (MHz)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty Factor Calculated		Limit		Verdict
		dBm		dBm	W	dBm	W	
0	2402	7.93	1.13	9.06	0.008	20.96	0.125	PASS
39	2441	8.01		9.14	0.008			PASS
78	2480	7.80		8.93	0.008			PASS

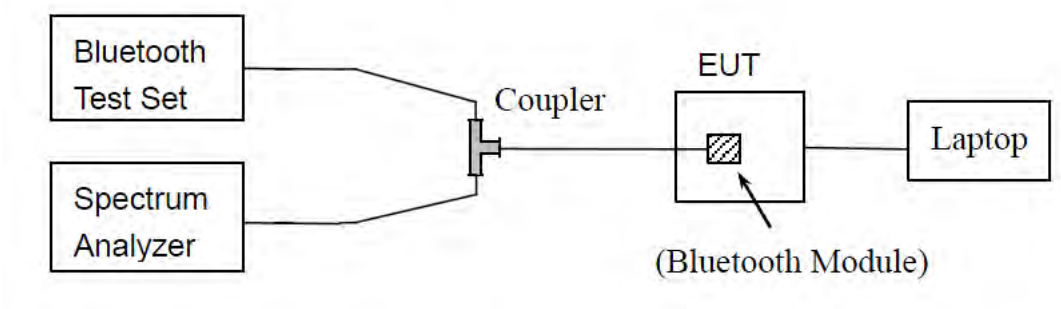
2.7. 20dB Bandwidth

2.7.1. 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.

2.7.2. Test Description

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.

2.7.3. 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

2.7.4. 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.

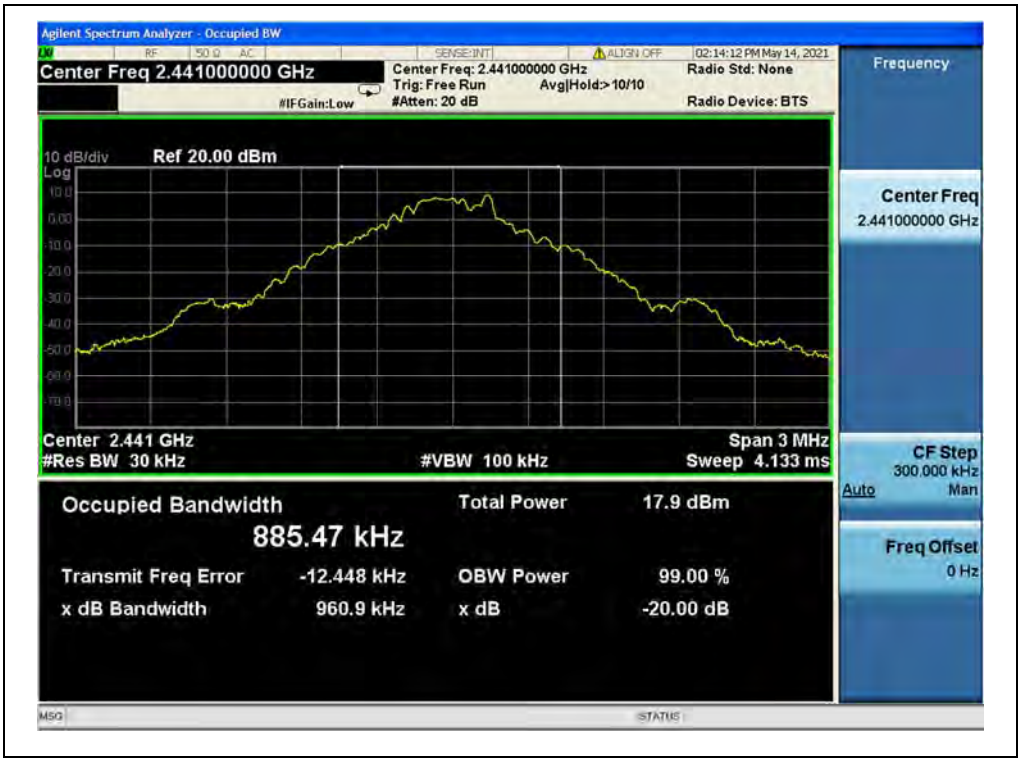
GFSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
0	2402	0.962	PASS
39	2441	0.961	PASS
78	2480	0.962	PASS

B. Test Plot:

(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	1.352	PASS
39	2441	1.355	PASS
78	2480	1.351	PASS

B. Test Plot:

(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	1.310	PASS
39	2441	1.309	PASS
78	2480	1.322	PASS

B. Test Plot:

(8-DPSK, Channel 0, 2402MHz)

(8-DPSK, Channel 39, 2441MHz)

(8-DPSK, Channel 78, 2480MHz)

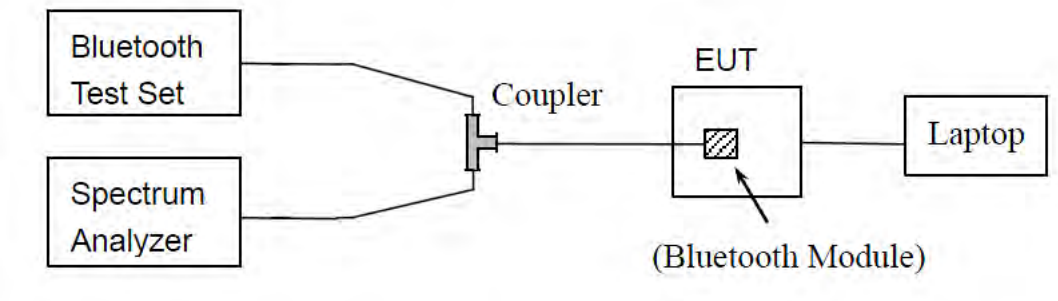
2.8. Carried Frequency Separation

2.8.1. 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.

2.8.2. Test Description

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.

2.8.3. 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.

2.8.4. 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	20dBBand width (MHz)	Min. Limit	Verdict
GFSK	39 and 40	0.999	0.962	two-thirdsof the 20dBbandwidth	PASS
π/4-DQPSK	39 and 40	1.005	1.355		PASS
8-DPSK	39 and 40	1.002	1.322		PASS

Test Plot:

(GFSK)

(π/4-DQPSK)

(8-DPSK)

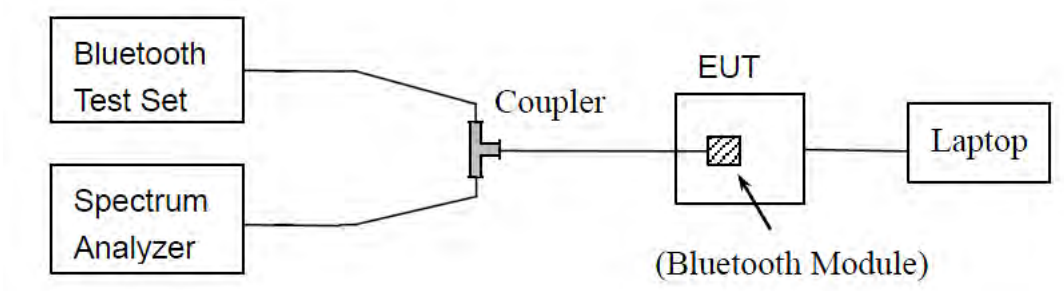
2.9. Time of Occupancy (Dwell time)

2.9.1. 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.

2.9.2. Test Description

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.

2.9.3. 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

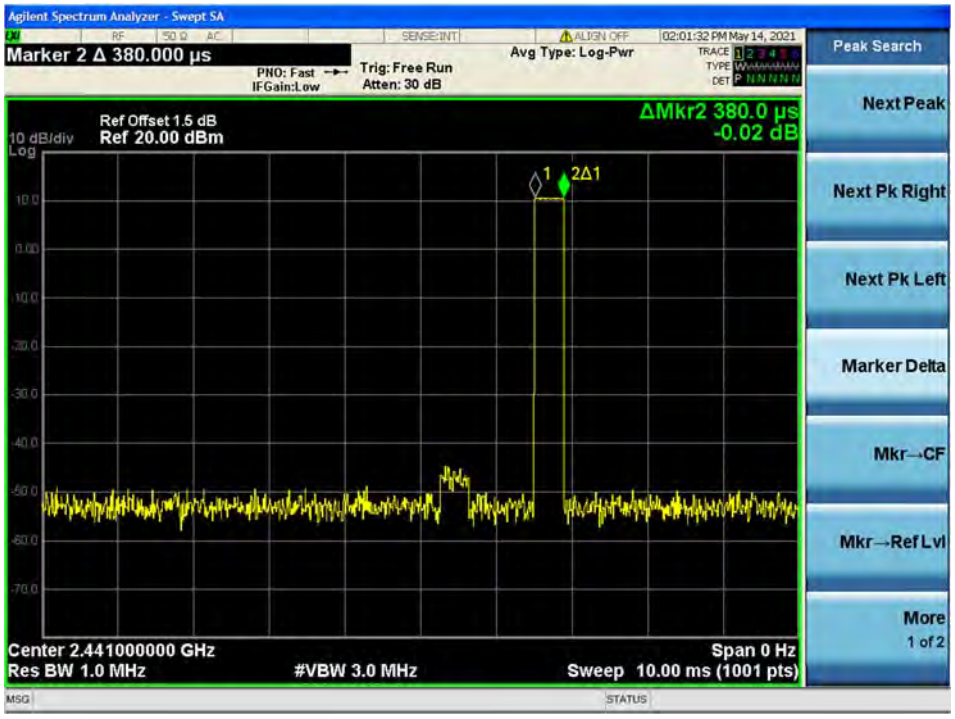
2.9.4. Test Result

GFSK Mode

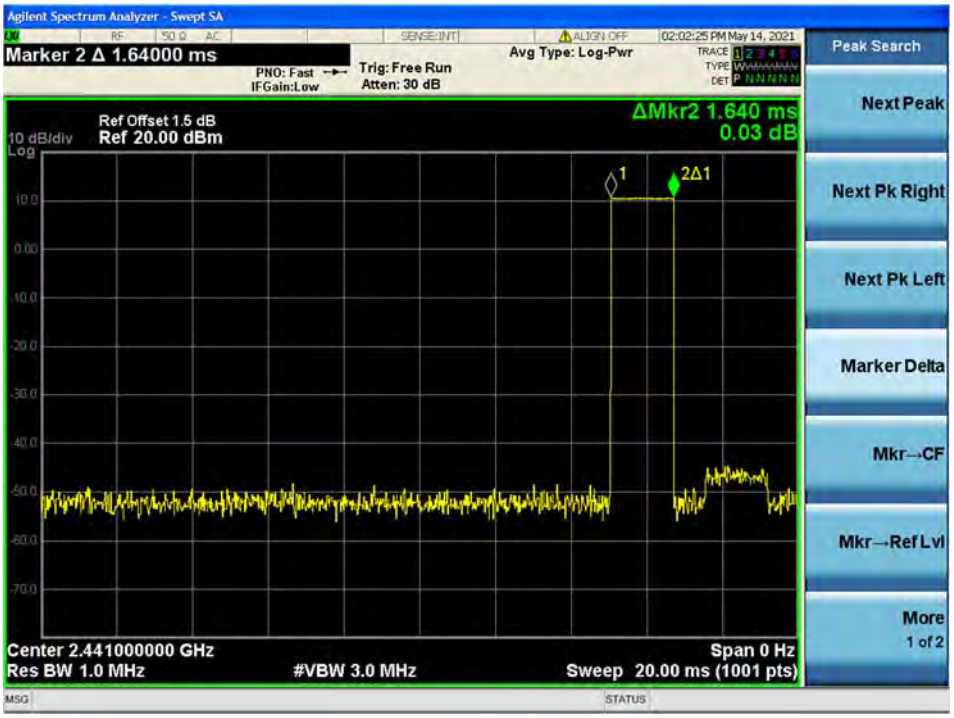
A. Test Verdict:

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

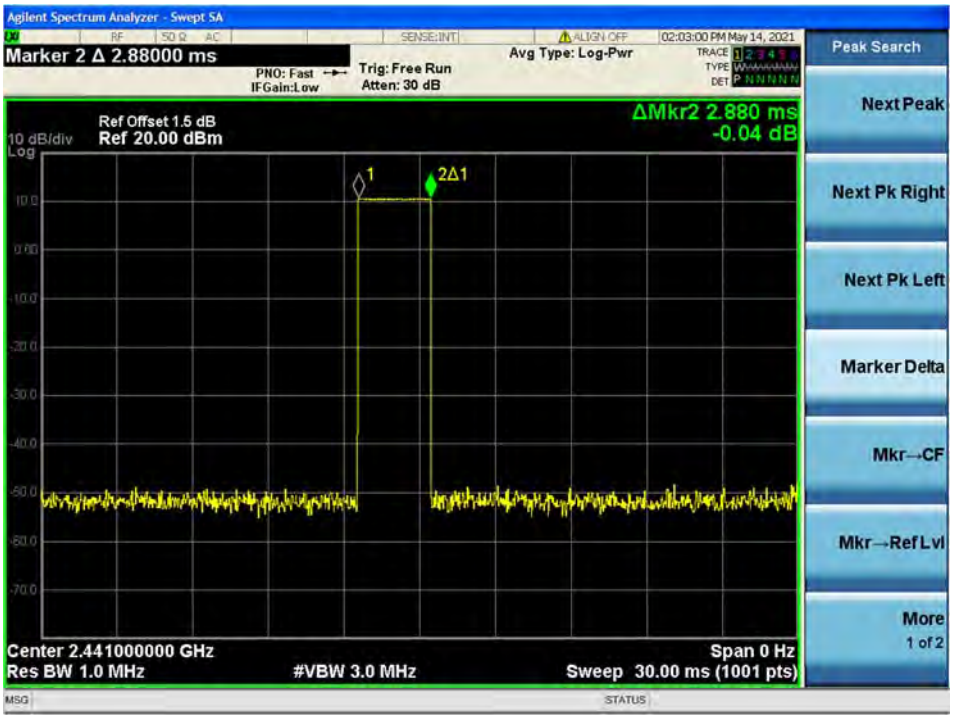
B. Test Plot:



(DH1, GFSK)



(DH3, GFSK)



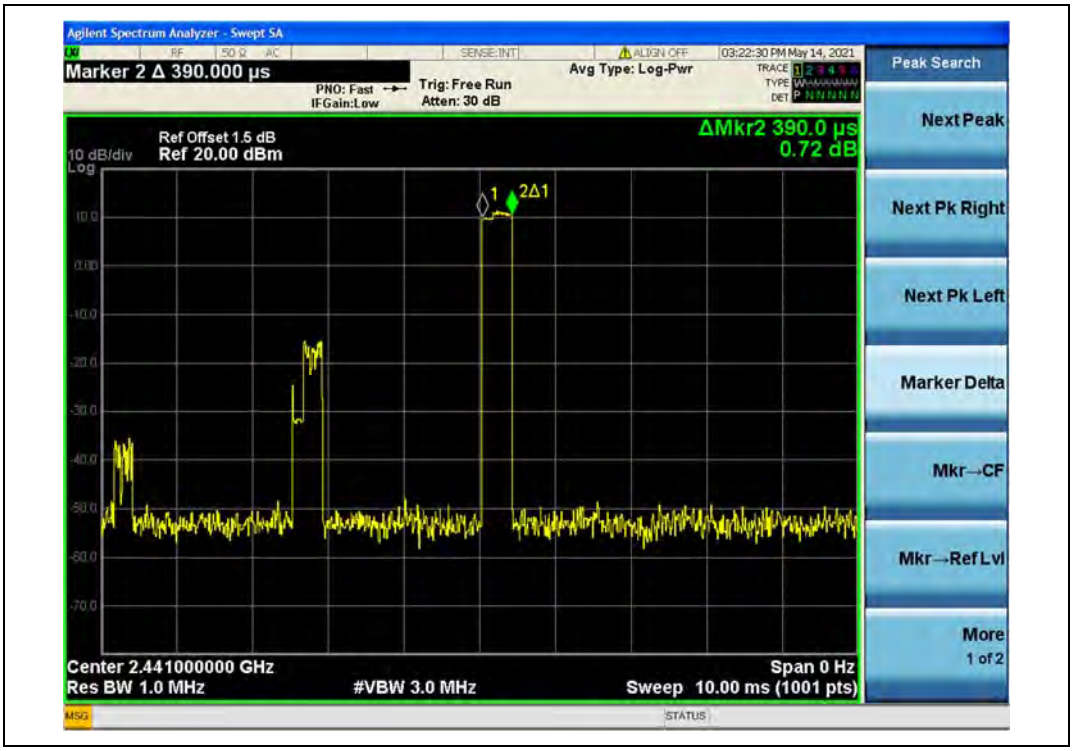
(DH5, GFSK)

π/4-DQPSK Mode

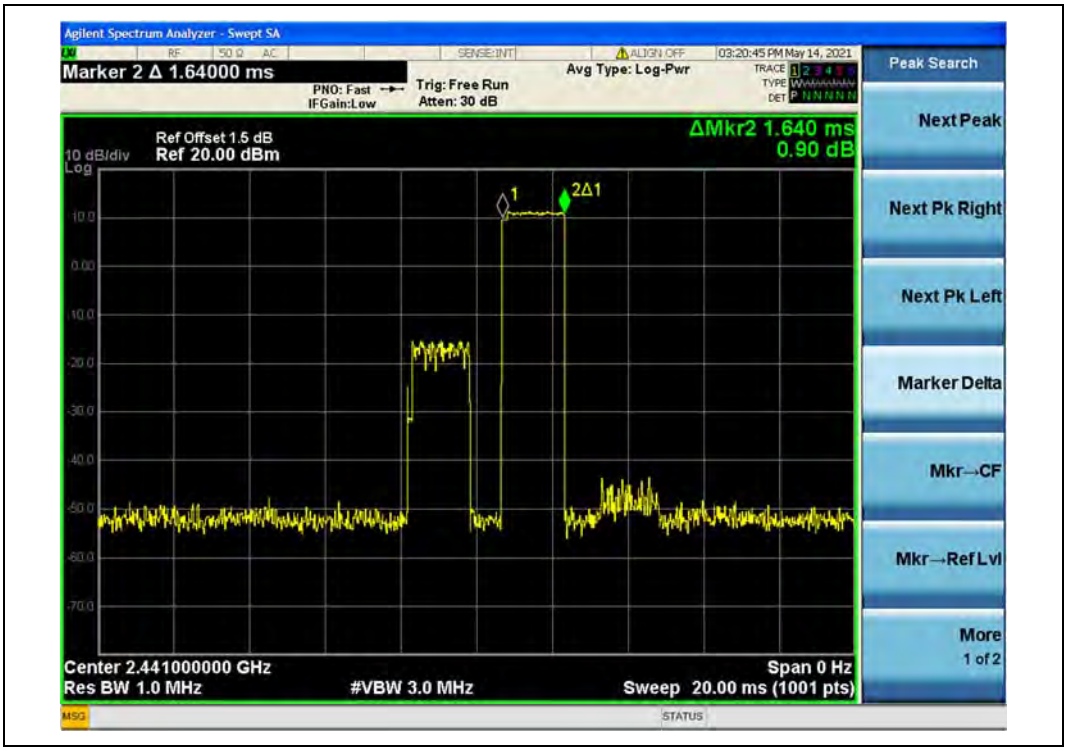
A. Test Verdict:

DH Packet	Pulse Width (ms)	Dwell Time (ms)		Limit (sec)	Verdict
		Normal Mode	AFH Mode		
DH1	0.39	124.80	62.40	0.4	PASS
DH3	1.64	262.40	131.20		PASS
DH5	2.92	311.47	155.73		PASS

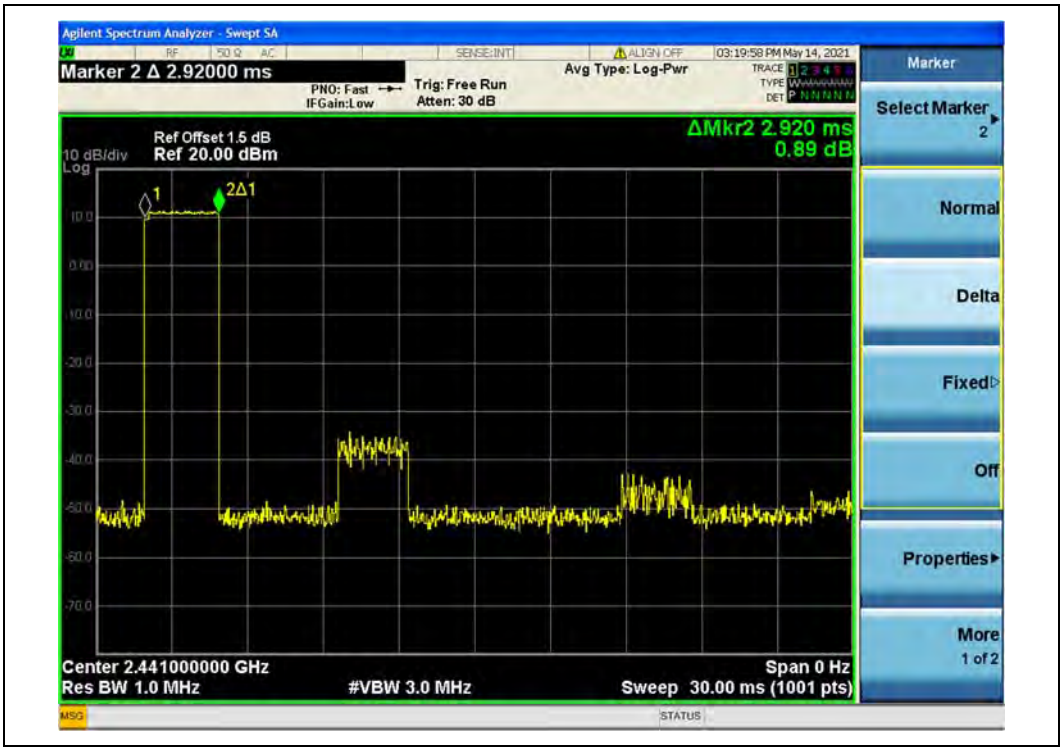
B. Test Plot:



(DH1,π/4-DQPSK)



(DH3,π/4-DQPSK)



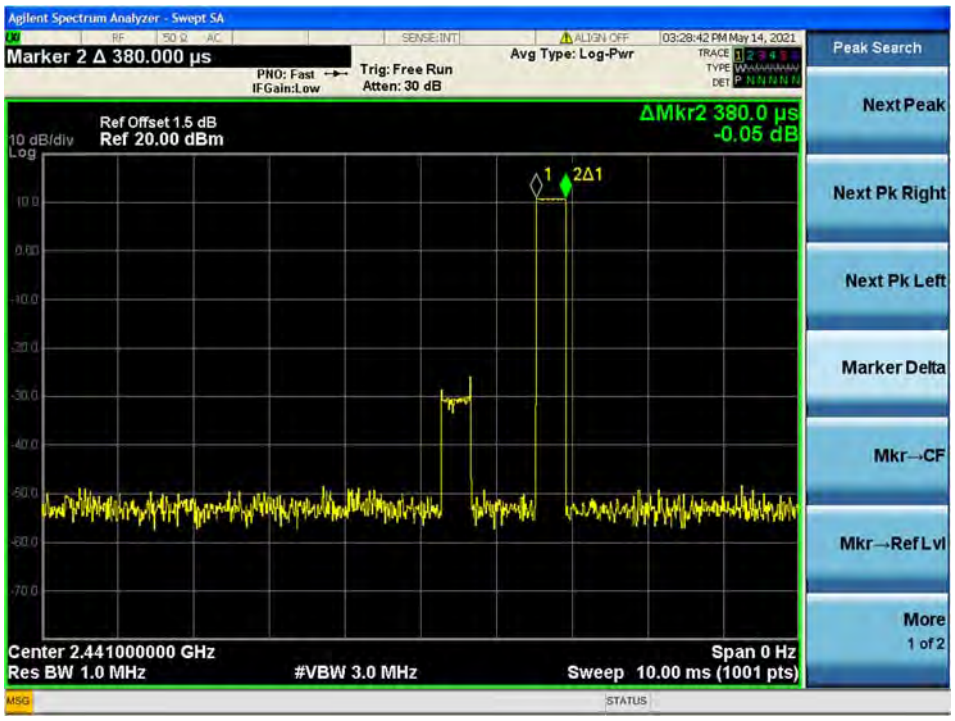
(DH5,π/4-DQPSK)

8-DPSK mode

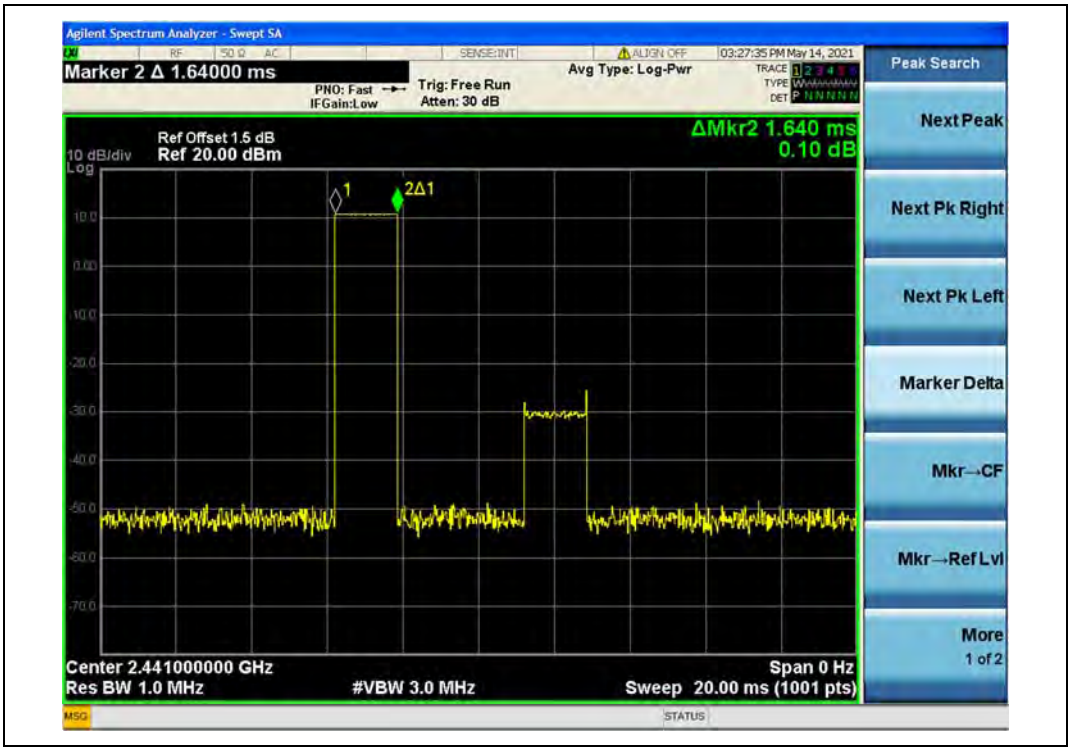
A. Test Verdict:

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	2.88	307.20	153.60		PASS

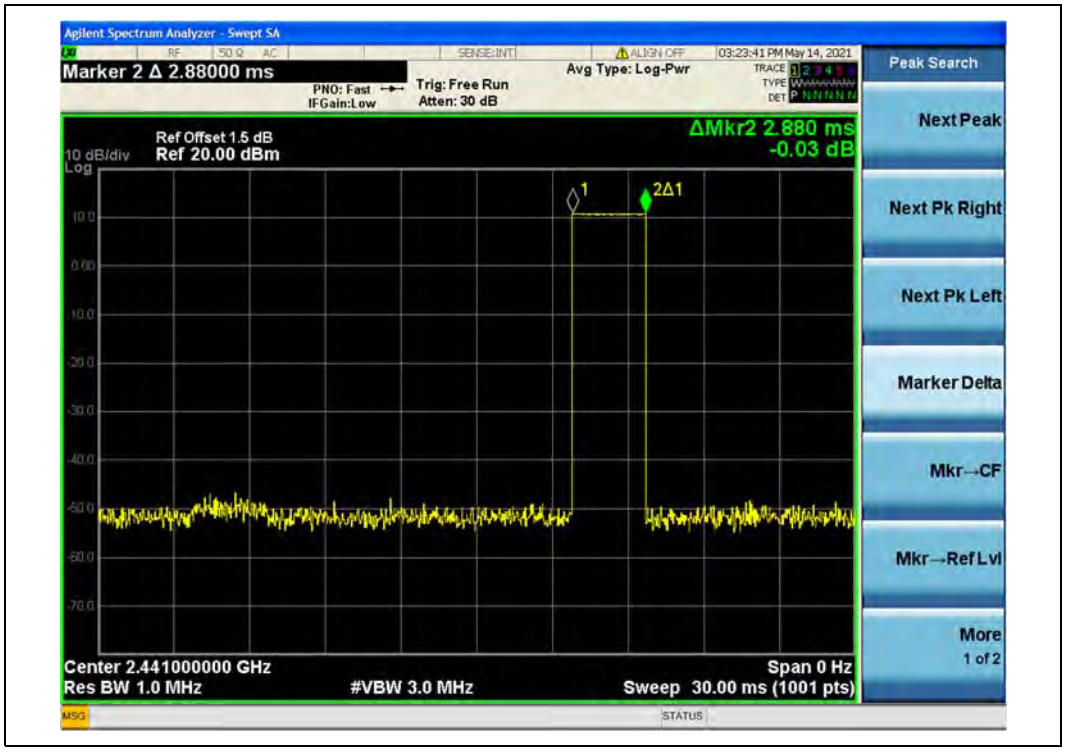
B. Test Plot:



(DH1, 8-DPSK)



(DH3, 8-DPSK)



(DH5, 8-DPSK)

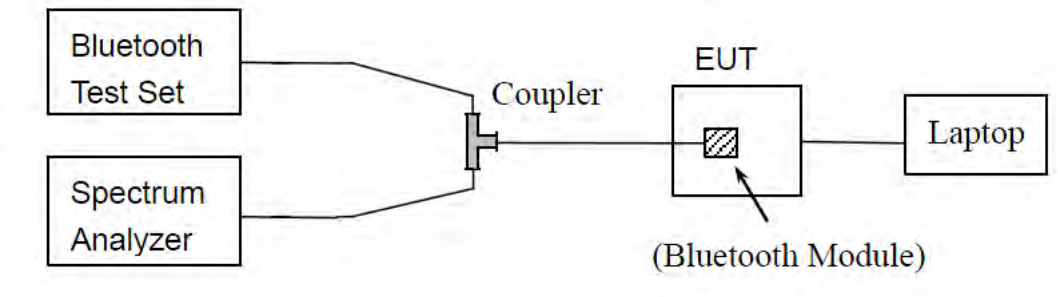
2.10. Conducted Spurious Emissions

2.10.1. 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.

2.10.2. Test Description

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.

2.10.3. 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.

2.10.4. 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.

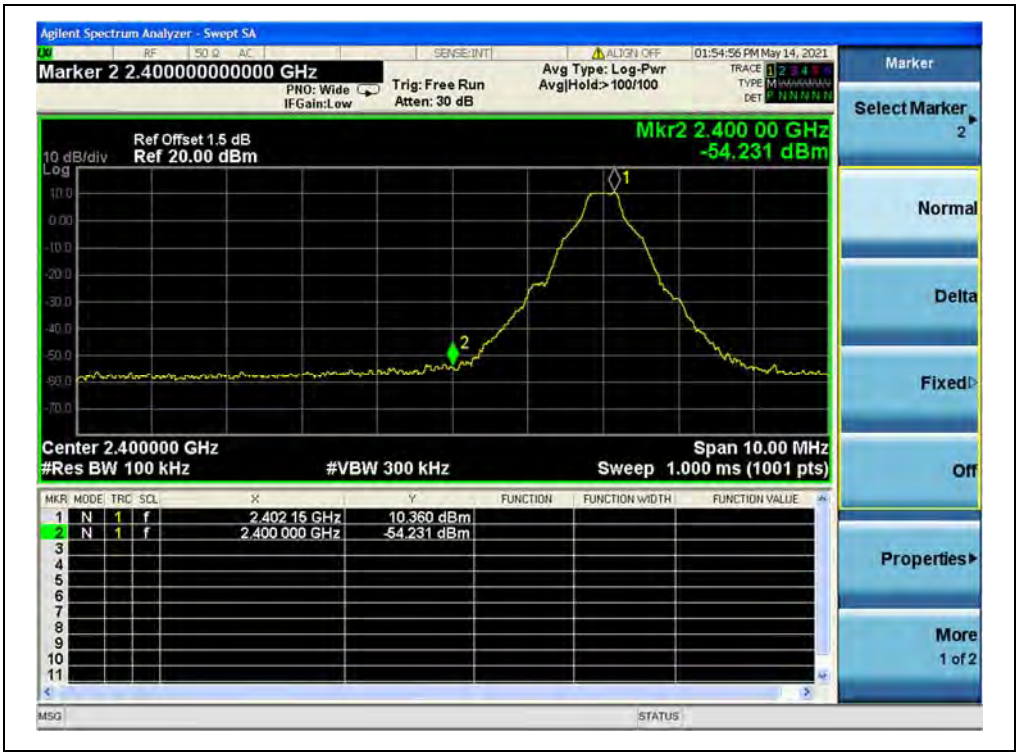
GFSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
0	2402	-37.38	9.66	-10.34	PASS
39	2441	-41.15	9.43	-10.57	PASS
78	2480	-41.56	10.05	-9.95	PASS

B. Test Plot:

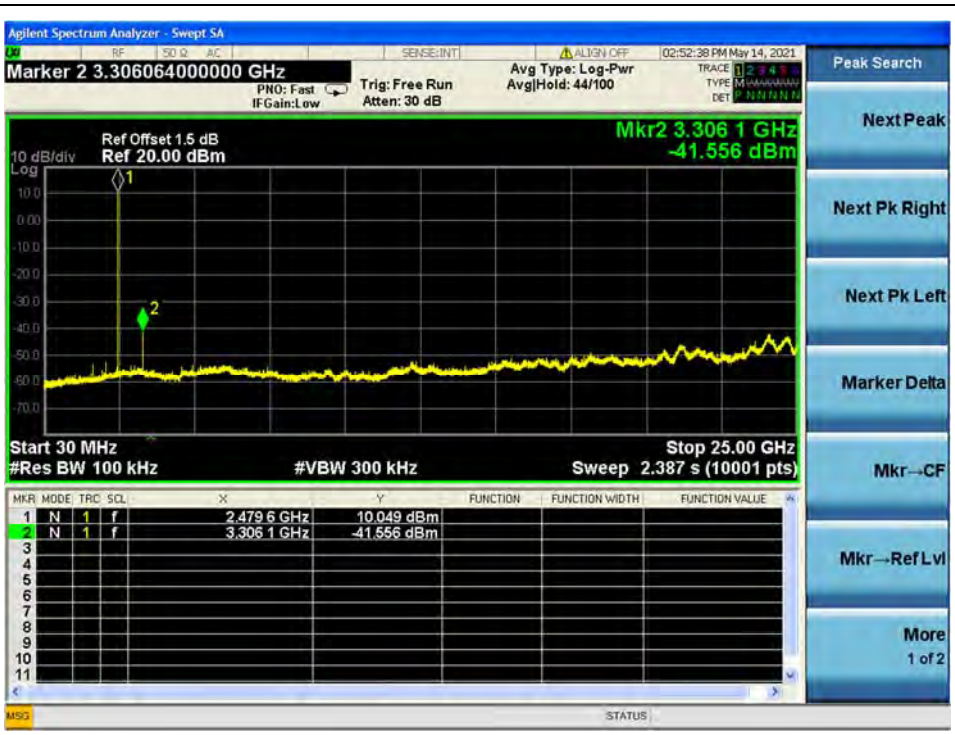
(Channel = 0, 30MHz to 25GHz, GFSK Mode)



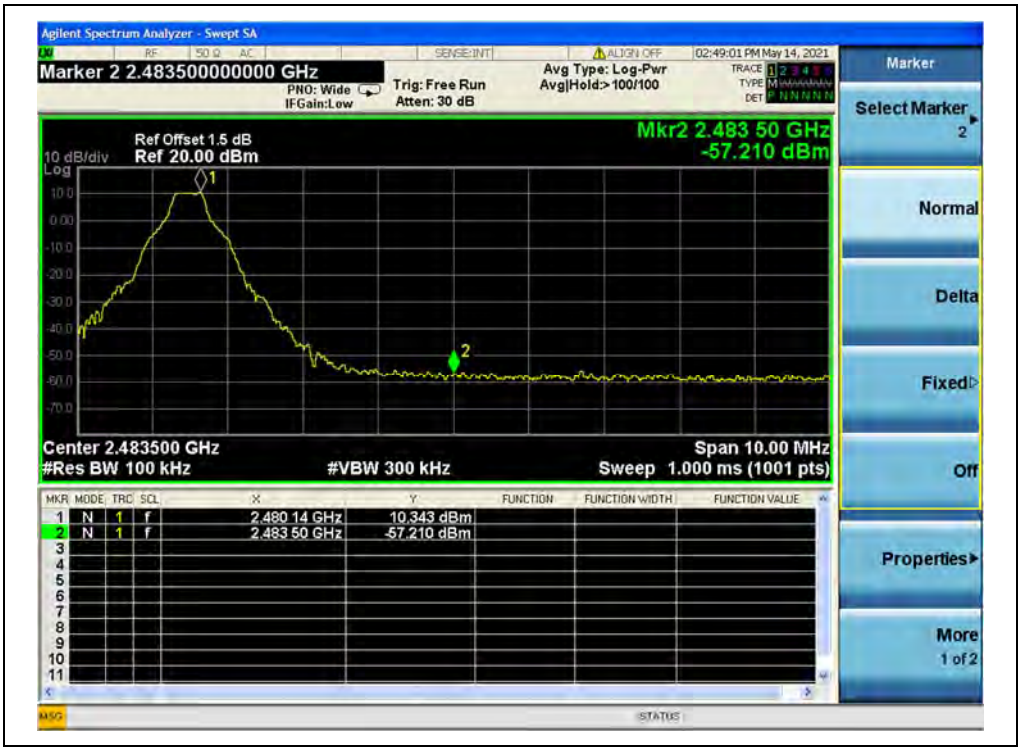
(Channel = 0, Band edge,GFSK Mode)

(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)

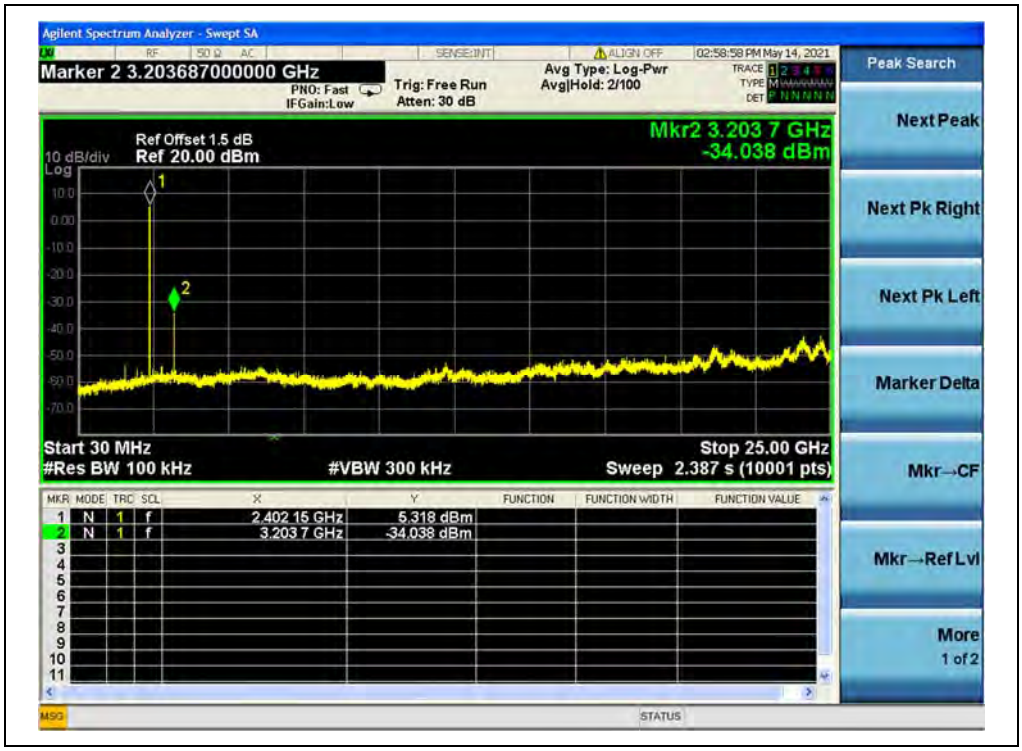
(Channel = 78, Band edge with hopping on, GFSK Mode)

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	-34.04	5.32	-14.68	PASS
39	2441	-37.47	6.97	-13.03	PASS
78	2480	-40.24	7.39	-12.61	PASS

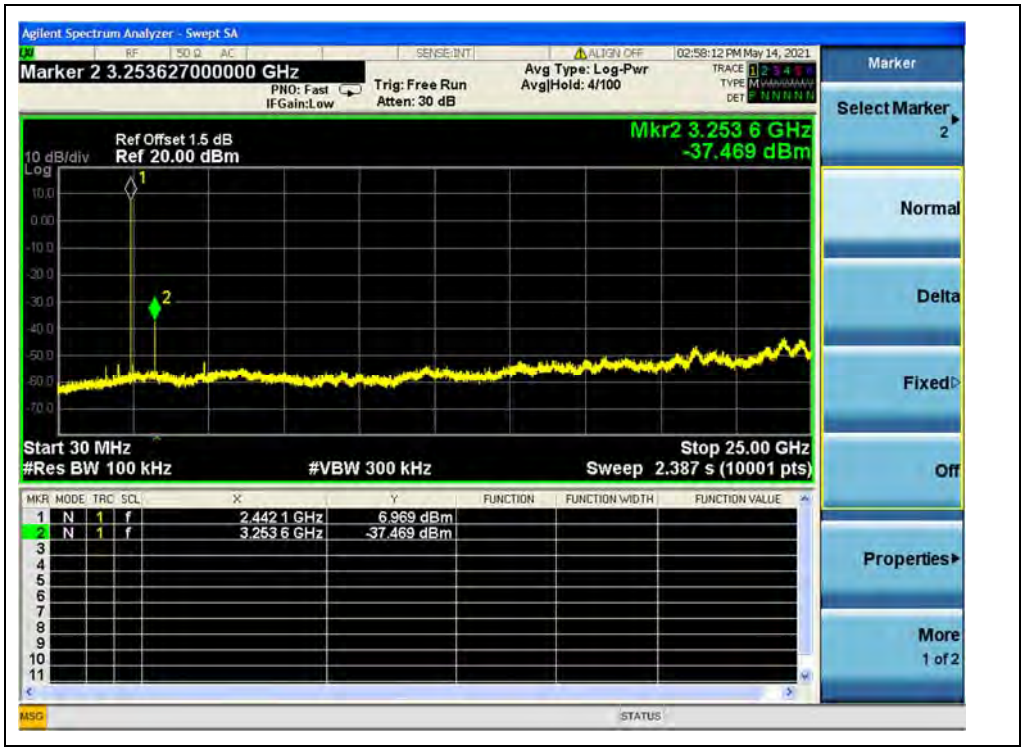
B. Test Plot:



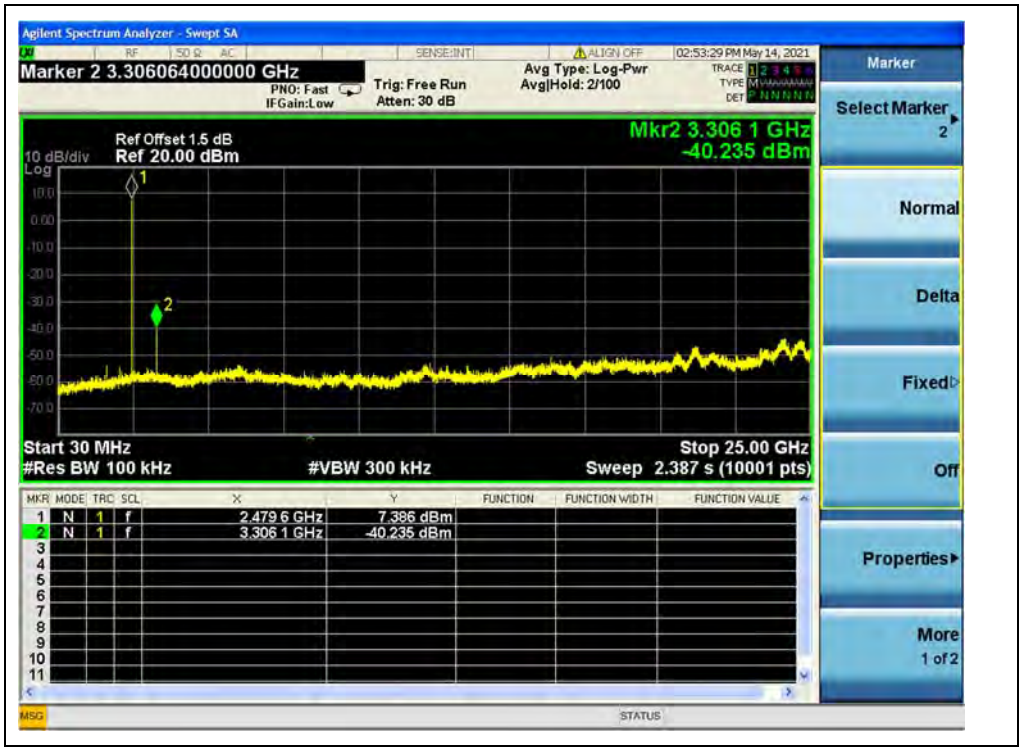
(Channel = 0, 30MHz to 25GHz, π/4-DQPSK)

(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)

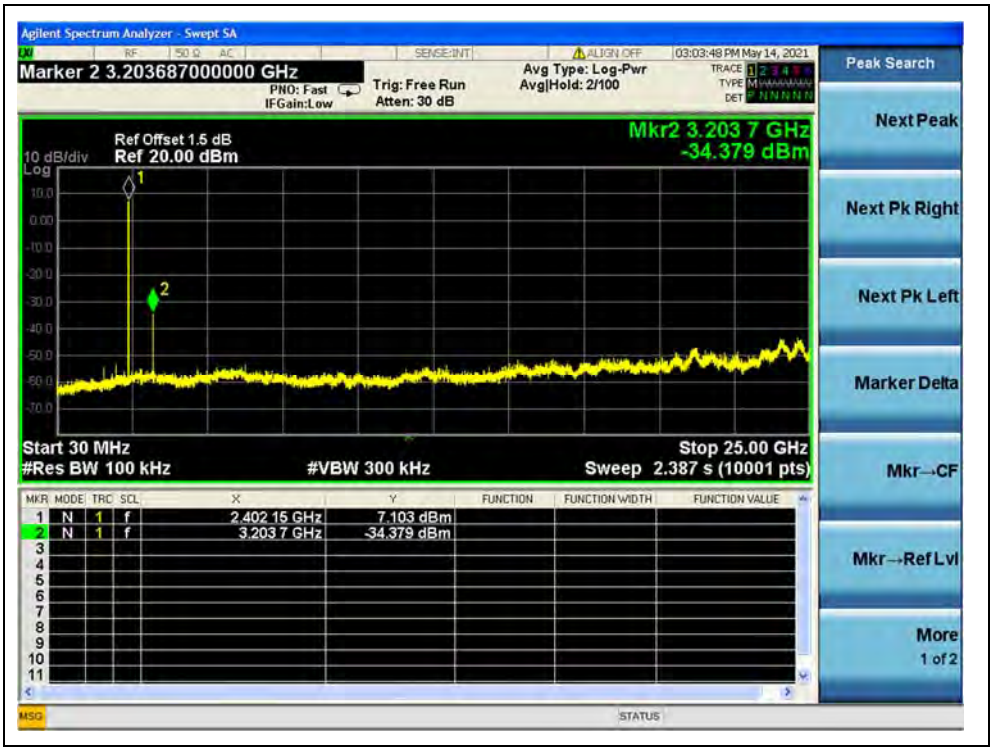
(Channel = 78, Band edge with hopping on,π/4-DQPSK)

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	-34.38	7.10	-12.90	PASS
39	2441	-37.81	6.09	-13.91	PASS
78	2480	-39.40	7.62	-12.38	PASS

B. Test Plot:



(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)

2.11. Conducted Emission

2.11.1. 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

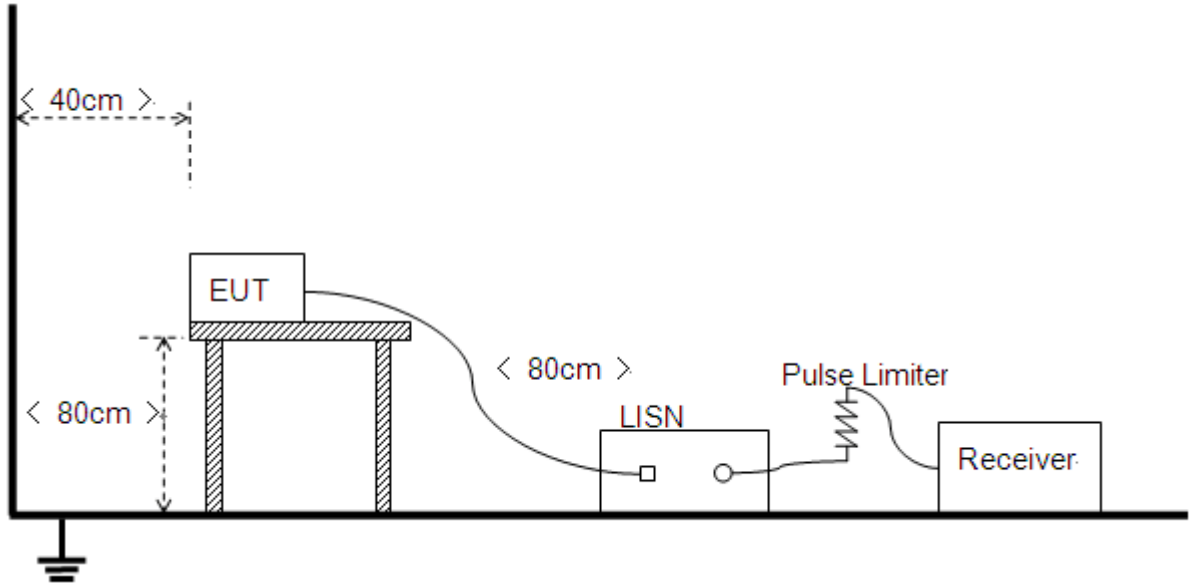
NOTE:

(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.

2.11.2. Test Description

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.

2.11.3. 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/50Hzwere considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test Setup:

Test Mode1: EUT+ADAPTER+BT TX

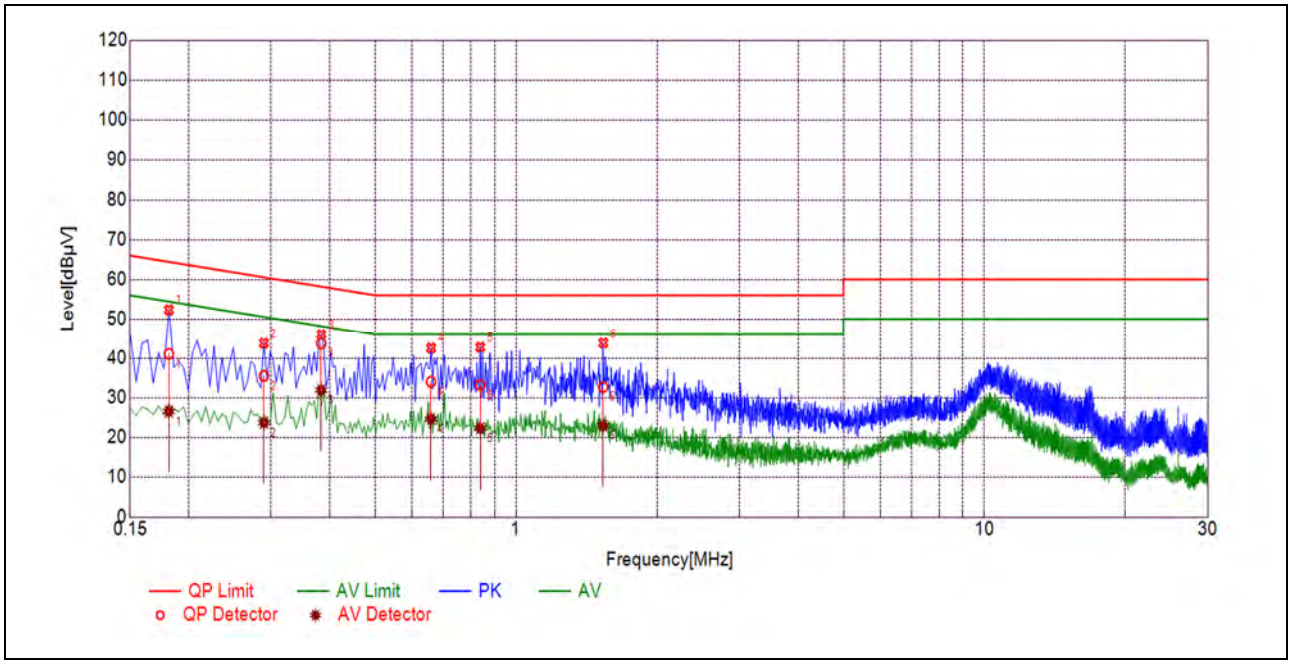
Test Voltage: AC 120V/60Hz

The measurement results are obtained as below:

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

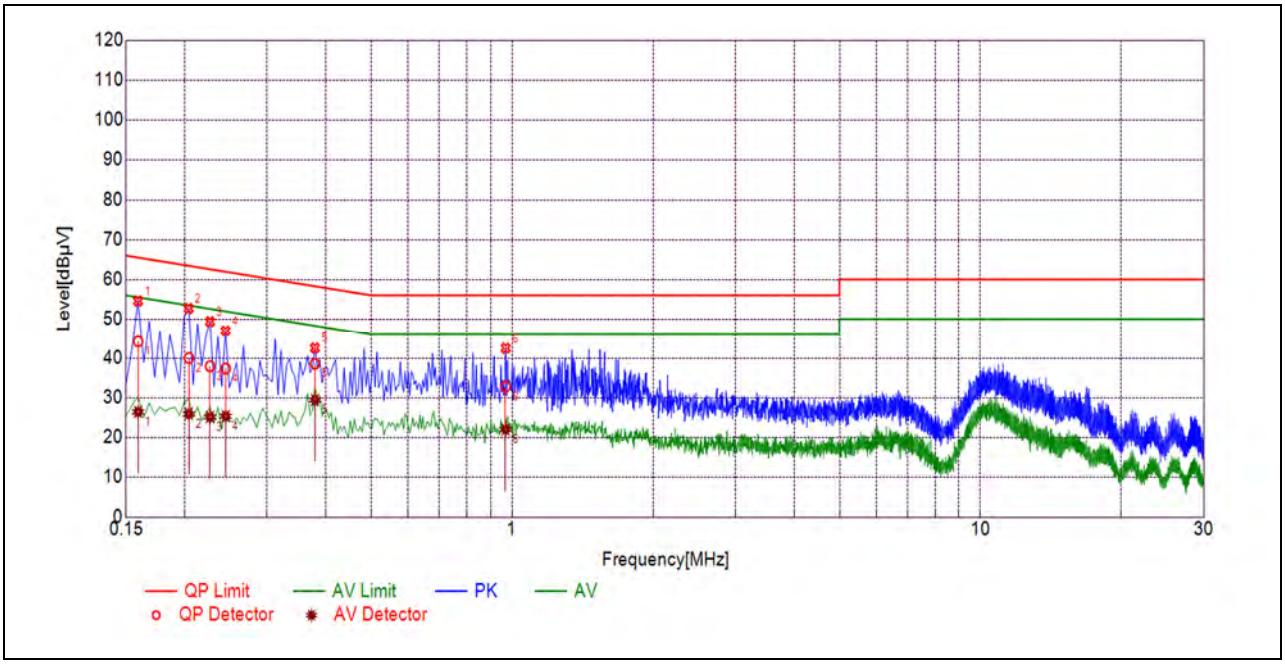
U_R: Receiver Reading

A_{Factor}: Voltage division factor of LISN



(L Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1814	41.07	26.50	64.42	54.42	Line	PASS
2	0.2895	35.48	23.66	60.54	50.54		PASS
3	0.3837	43.71	31.90	58.20	48.20		PASS
4	0.6581	34.01	24.60	56.00	46.00		PASS
5	0.8382	33.17	22.28	56.00	46.00		PASS
6	1.5347	32.67	22.92	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	0.1591	44.23	26.40	65.51	55.51	Neutral	PASS
2	0.2041	40.02	25.90	63.44	53.44		PASS
3	0.2265	37.93	25.12	62.58	52.58		PASS
4	0.2447	37.36	25.31	61.94	51.94		PASS
5	0.3794	38.56	29.42	58.29	48.29		PASS
6	0.9687	32.75	21.94	56.00	46.00		PASS

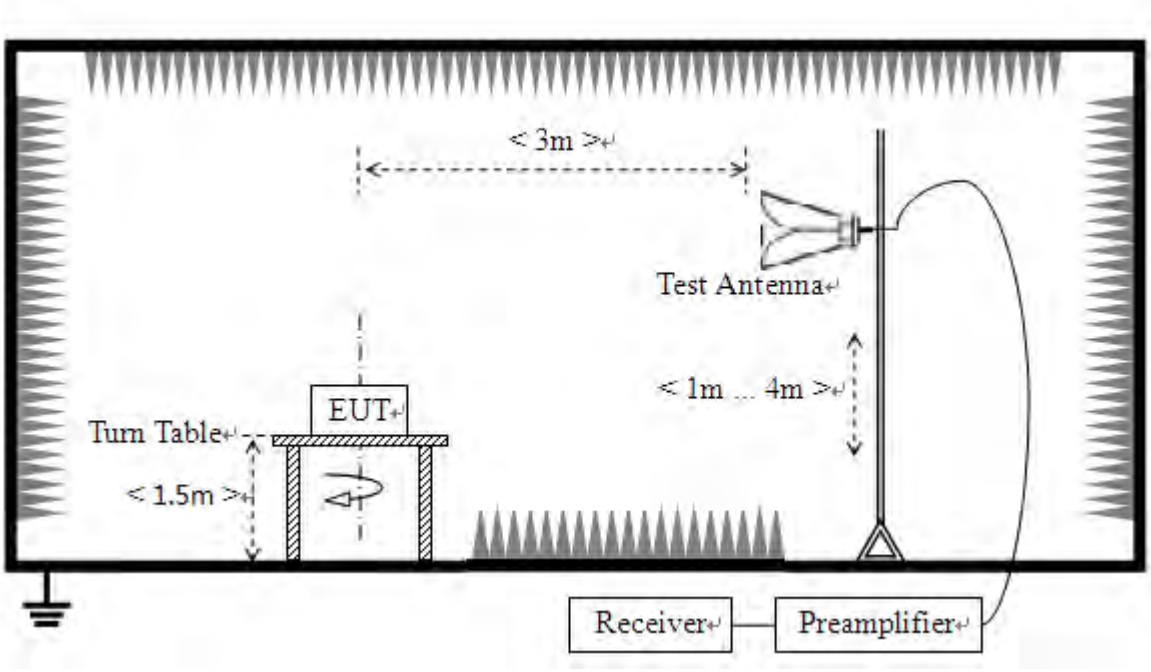
2.12. Restricted Frequency Bands

2.12.1. 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).

2.12.2. Test Description

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.

2.12.3. 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.

2.12.4. Test Result

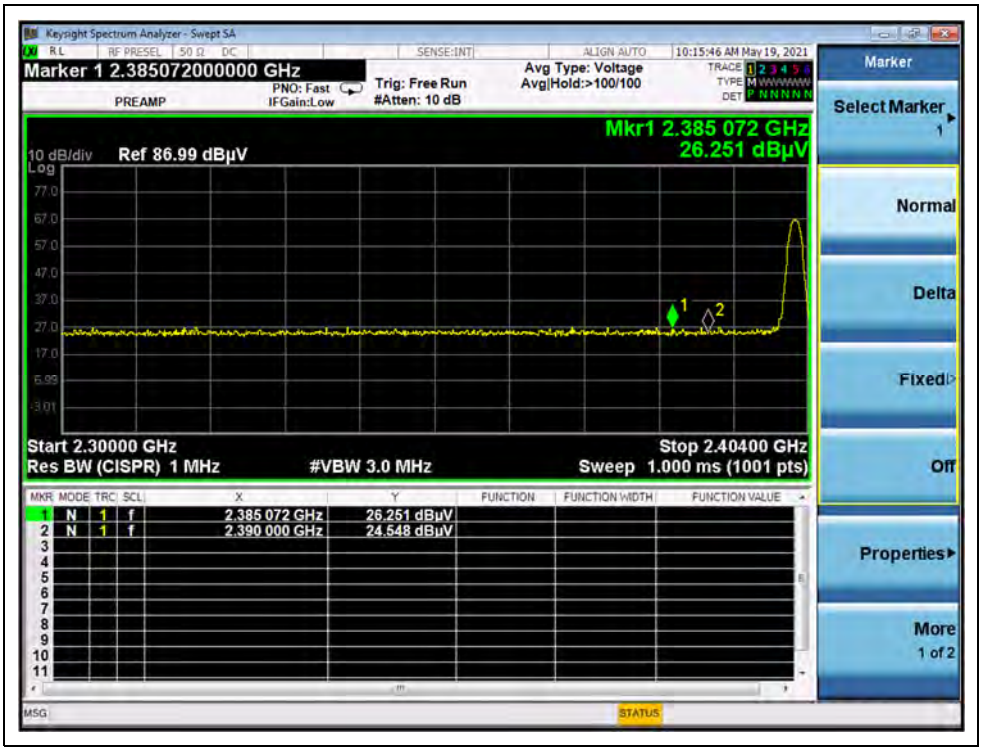
The lowest and highest channels are tested to verify Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] =U_R + A_T + A_{Factor} [dB]; AT =$L_{Cable\ loss}$ [dB]-G_{preamp} [dB]
AT: Total correction Factor except Antenna
UR: Receiver Reading
G_{preamp}: Preamplifier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

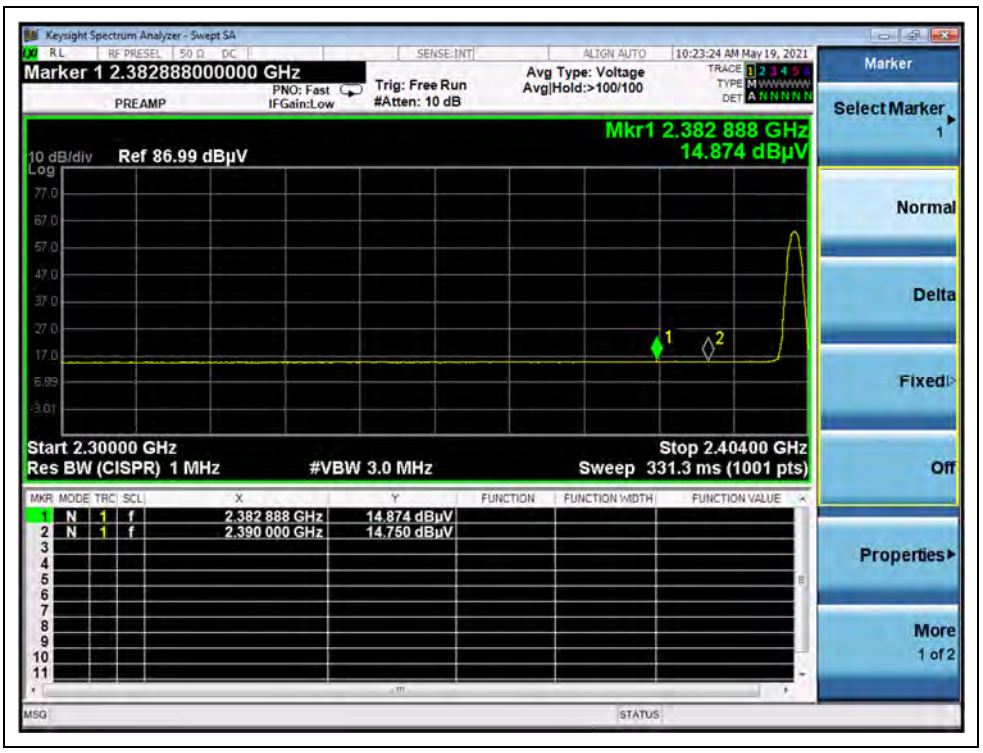
A. Test Verdict:

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	2385.07	PK	26.25	6.74	27.20	60.19	74	PASS
0	2382.89	AV	14.87	6.74	27.20	48.81	54	PASS
78	2483.50	PK	22.26	6.74	27.20	56.20	74	PASS
78	2483.50	AV	15.06	6.74	27.20	49.00	54	PASS

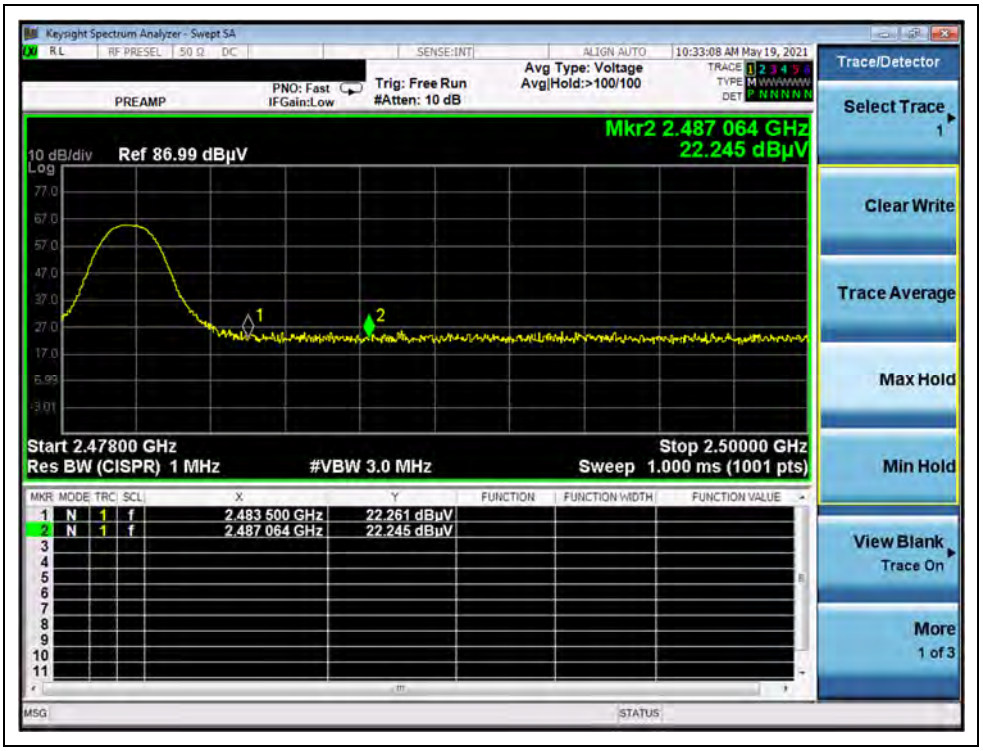
B. Test Plot:



(PEAK, Channel = 0, GFSK)



(AVERAGE, Channel = 0,GFSK)



(PEAK, Channel = 78,GFSK)

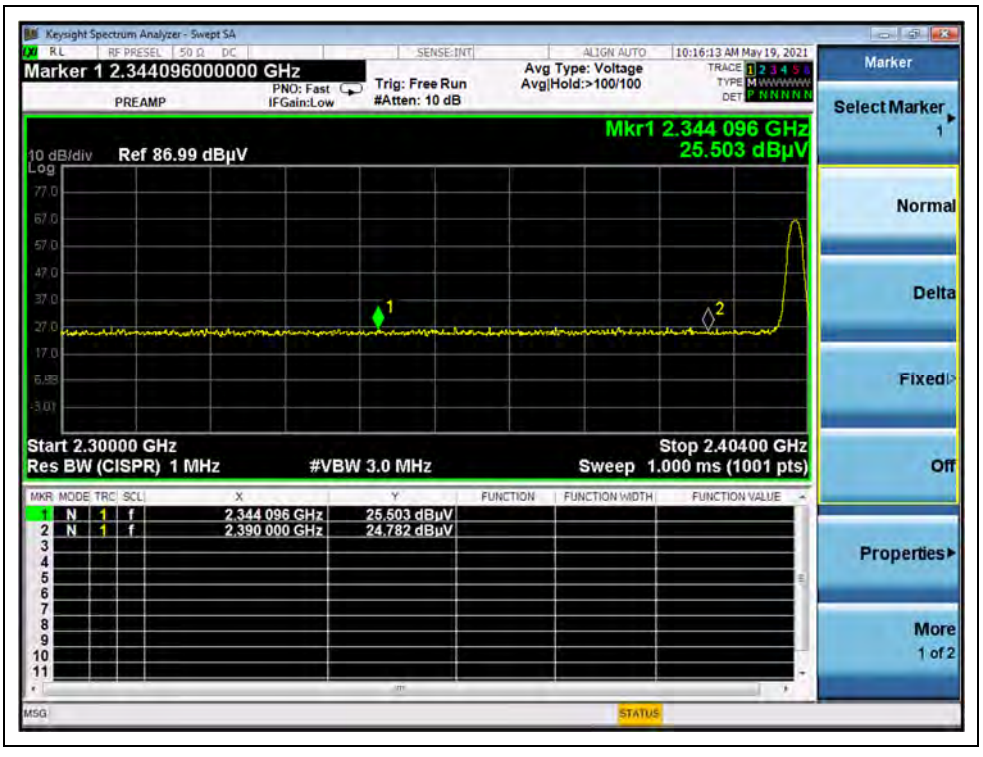
(AVERAGE, Channel = 78, GFSK)

π/4-DQPSK Mode

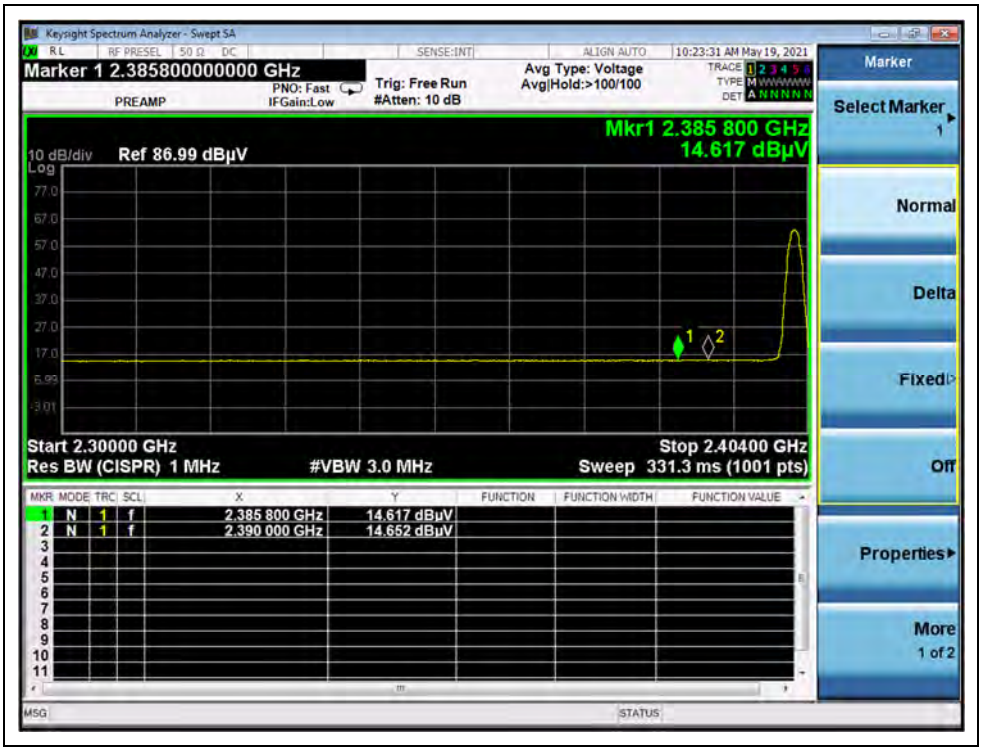
A. Test Verdict:

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	2344.10	PK	25.50	6.74	27.20	59.44	74	PASS
0	2390.00	AV	14.65	6.74	27.20	48.59	54	PASS
78	2488.76	PK	26.35	6.74	27.20	60.29	74	PASS
78	2483.50	AV	15.21	6.74	27.20	49.15	54	PASS

B. Test Plot:



(PEAK, Channel = 0,π/4-DQPSK)



(AVERAGE, Channel = 0,π/4-DQPSK)

(PEAK,Channel = 78,π/4-DQPSK)

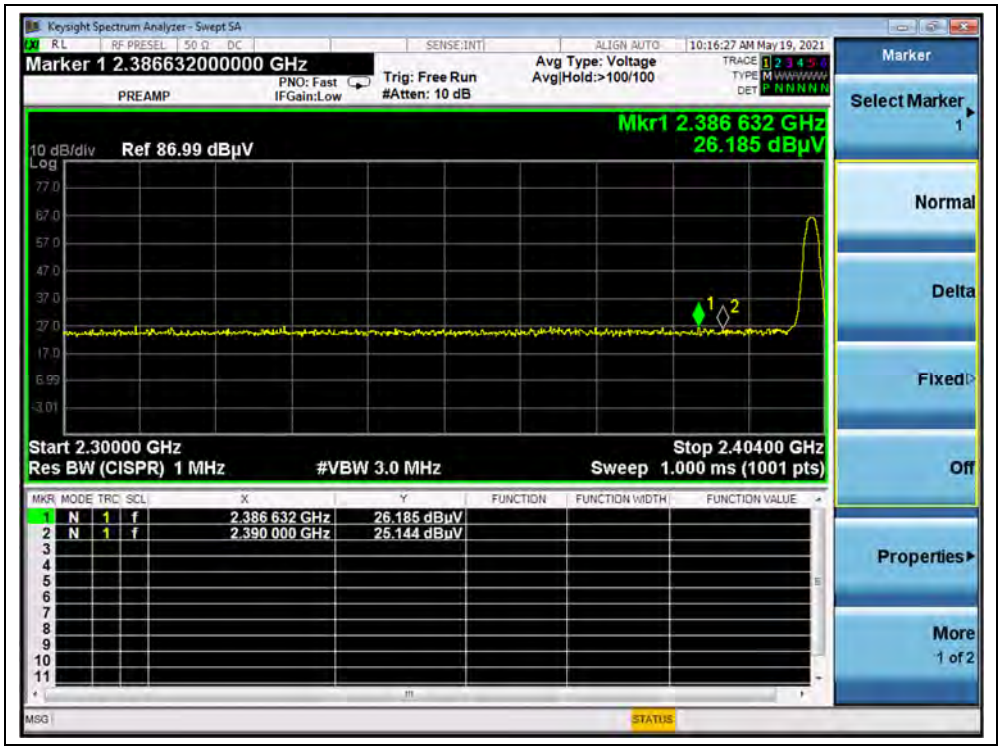
(AVERAGE, Channel = 78,π/4-DQPSK)

8-DPSK Mode

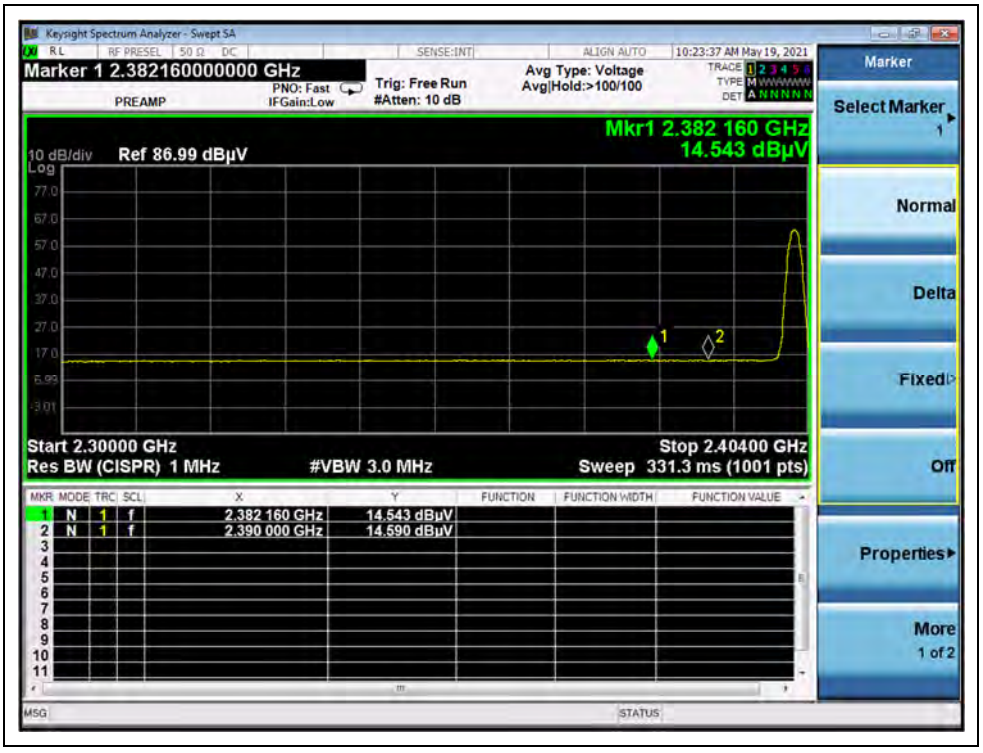
A. Test Verdict:

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	2386.63	PK	26.19	6.74	27.20	60.13	74	PASS
0	2390.00	AV	14.59	6.74	27.20	48.53	54	PASS
78	2486.84	PK	26.11	6.74	27.20	60.05	74	PASS
78	2483.50	AV	15.21	6.74	27.20	49.15	54	PASS

B. Test Plot:



(PEAK, Channel = 0, 8-DPSK)



(AVERAGE, Channel = 0, 8-DPSK)

(PEAK, Channel = 78, 8-DPSK)

(AVERAGE, Channel = 78, 8-DPSK)

2.13. Radiated Emission

2.13.1. 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:

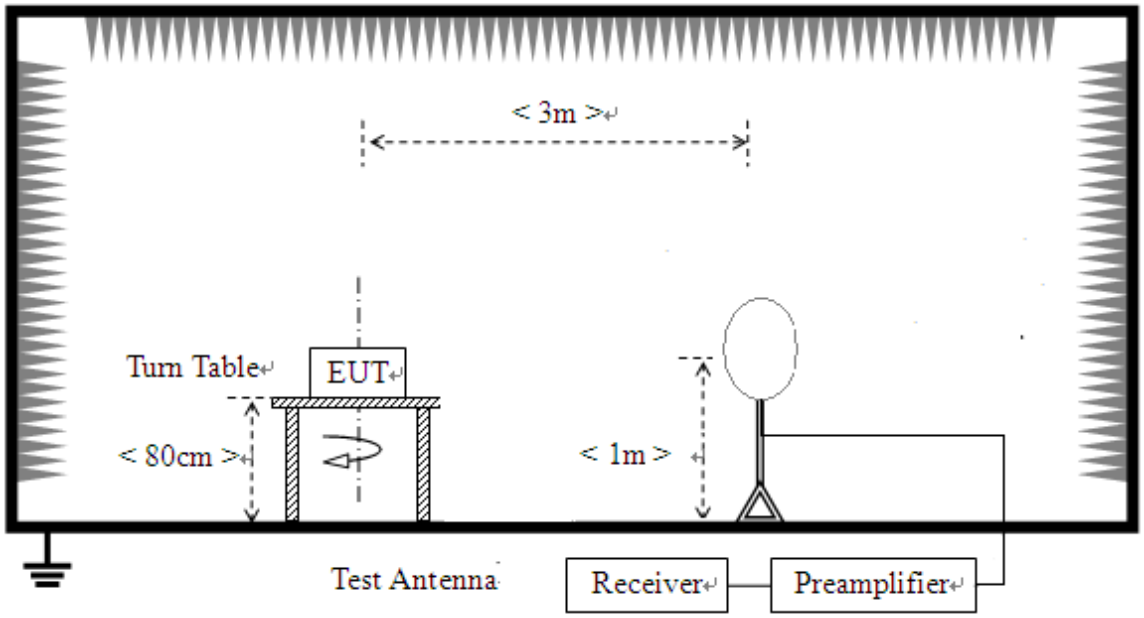
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

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.
Note 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)

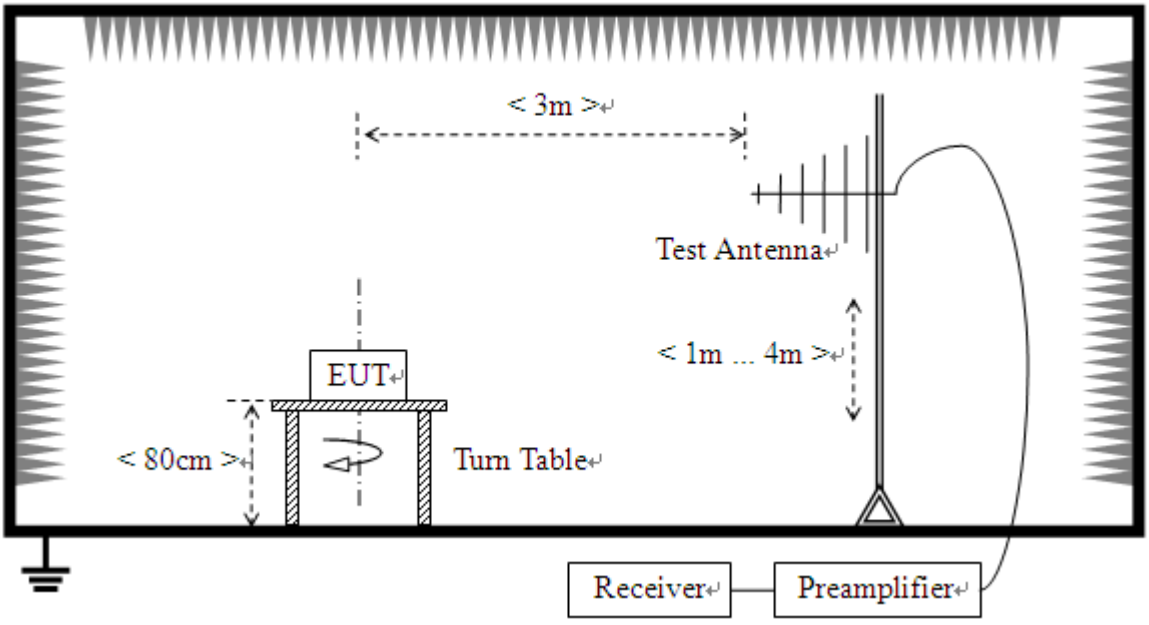
2.13.2. Test Description

Test Setup:

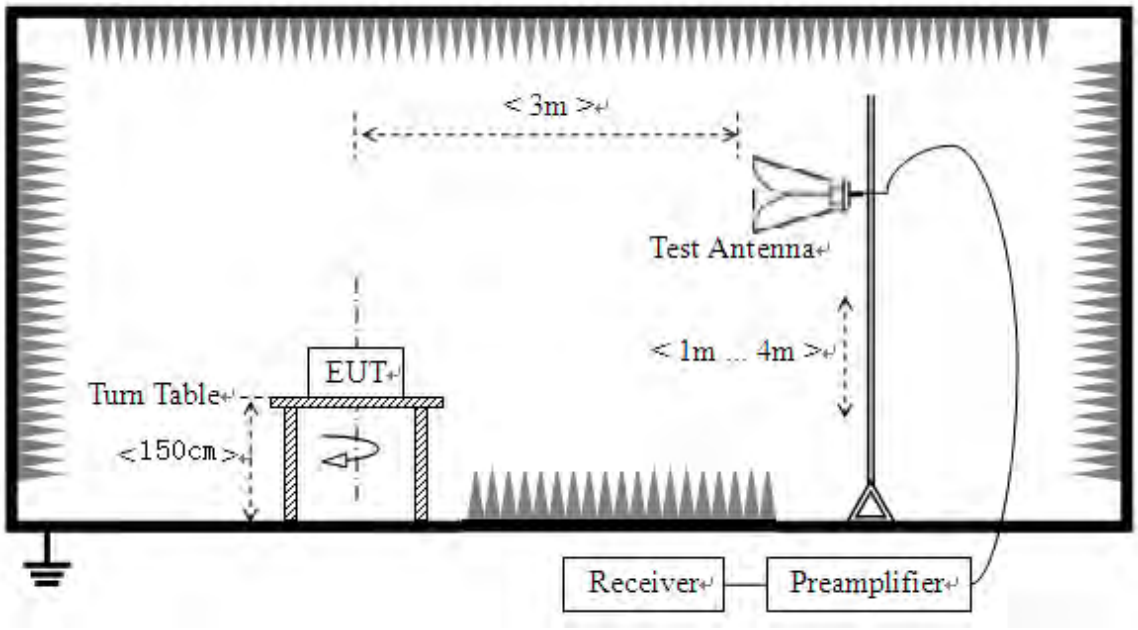
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz.The antenna to EUT distance is 3meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 30MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9kHz-90 kHz, 110kHz-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

2.13.3. Test Result

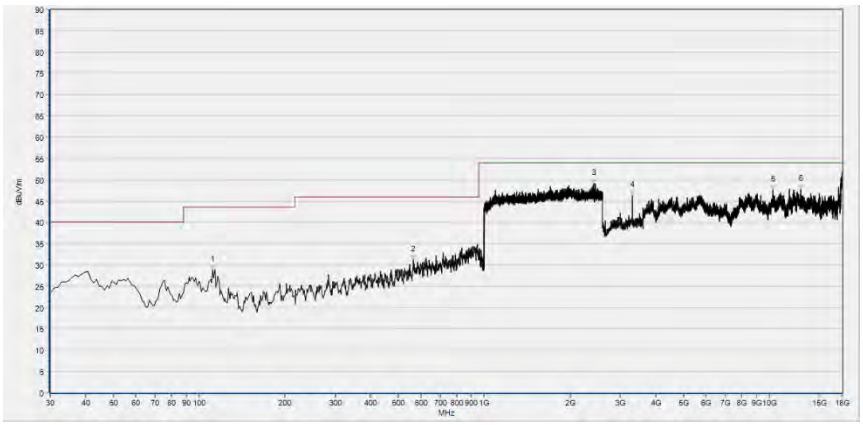
According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with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

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 9kHz 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 18GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

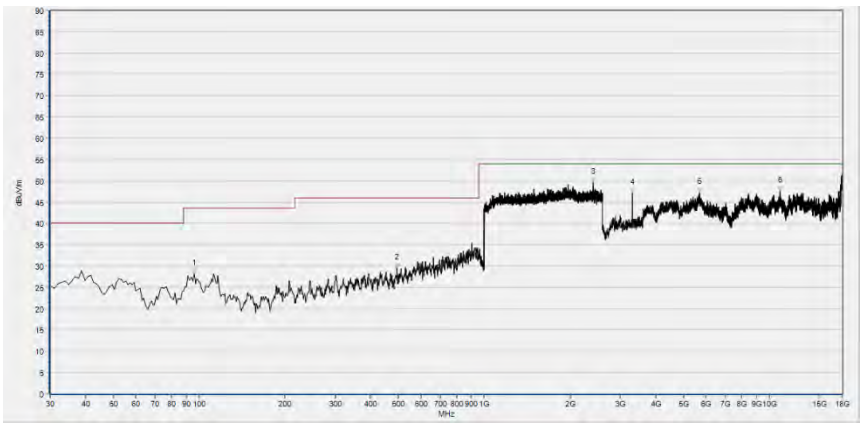
GFSK Mode

Plot 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
111.480	28.77	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
563.500	31.17	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2416.000	49.07	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3308.400	46.31	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10296.920	47.54	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12896.440	47.83	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

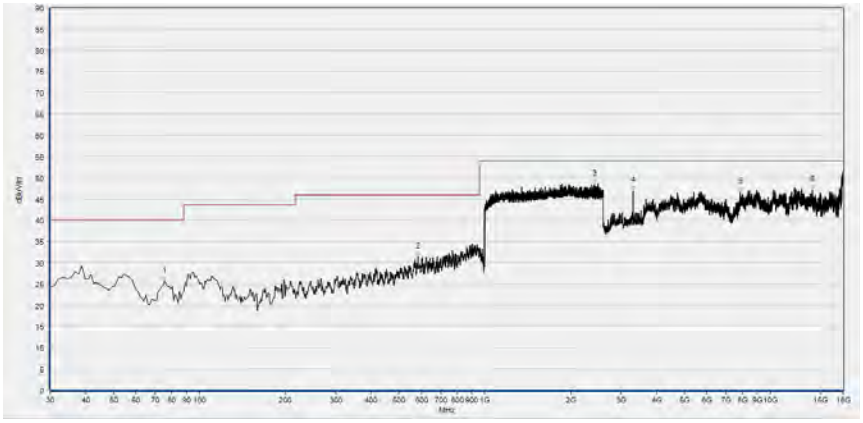
(30MHz to 18GHz, Antenna Horizontal, GFSK, channel 0)



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
95.960	28.22	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
494.630	29.53	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2415.467	49.59	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3308.400	47.15	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5698.480	47.27	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10872.880	47.63	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

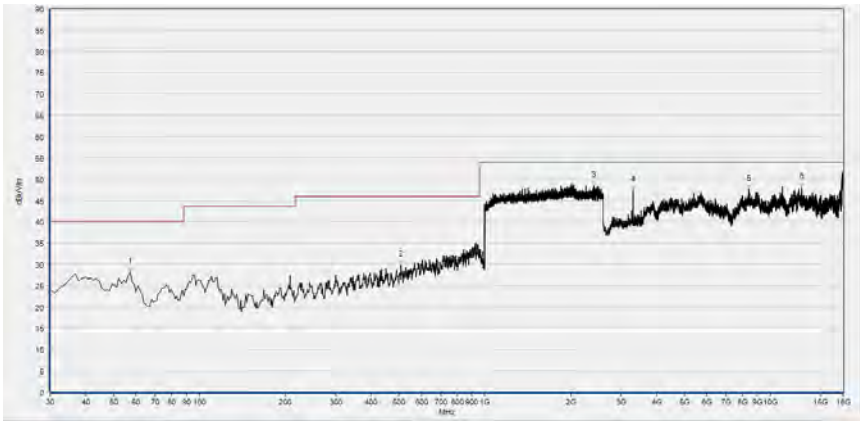
(30MHz to 18GHz, Antenna Vertical, GFSK, channel 0)

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
75.590	25.70	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
582.900	31.32	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2418.133	48.49	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3308.400	46.85	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
7860.640	46.54	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
14020.640	47.10	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

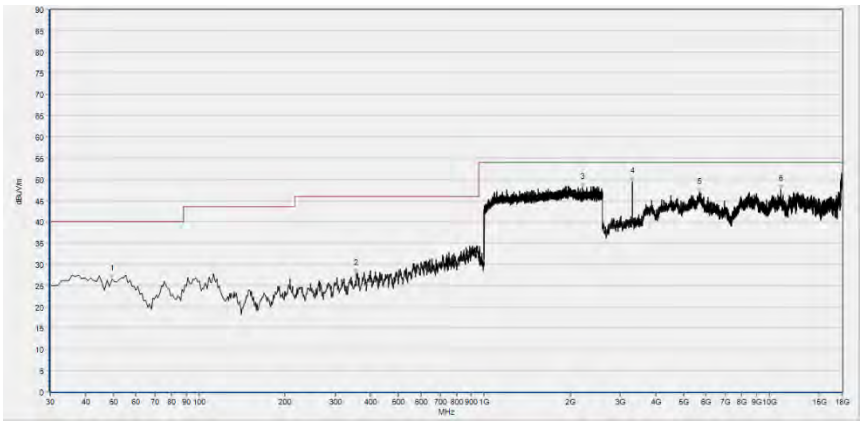
(30MHz to 18GHz, Antenna Horizontal, GFSK, channel 39)



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
57.160	28.23	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
508.210	29.83	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2414.400	48.40	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3308.400	47.44	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8405.800	47.62	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12896.440	48.06	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

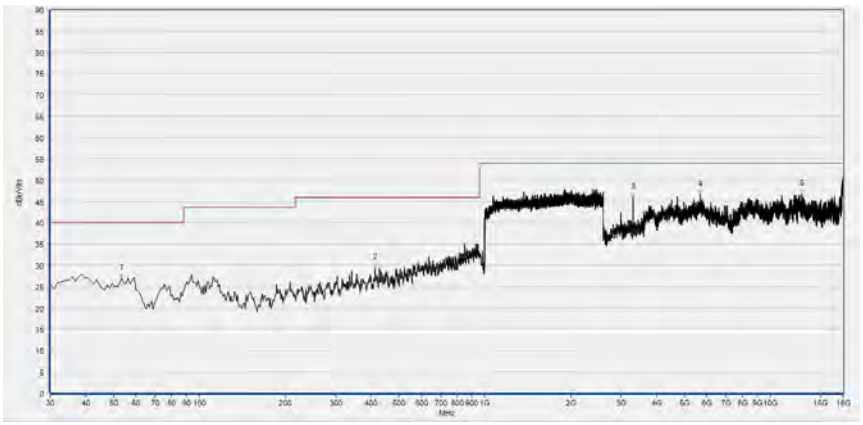
(30MHz to 18GHz, Antenna Vertical, GFSK, channel 39)

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
49.400	26.41	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
355.920	27.76	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2204.800	48.11	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3308.400	49.44	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5670.760	46.89	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10980.680	47.52	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(30MHz to 18GHz, Antenna Horizontal, GFSK, channel 78)

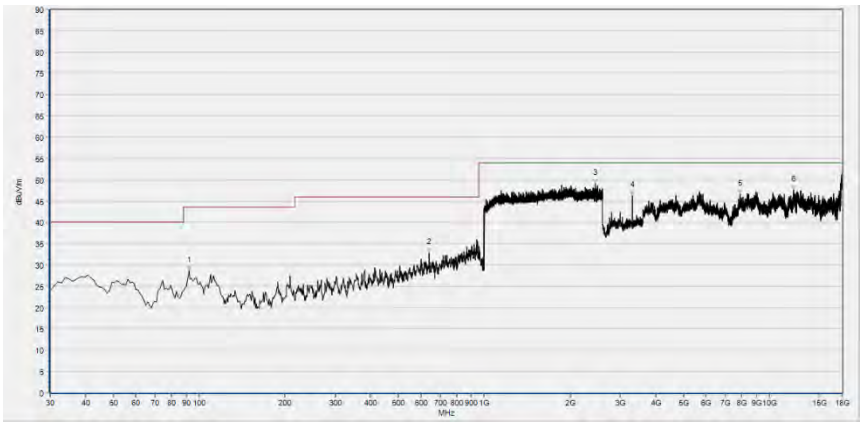


Fre. (MHz)	PK (dBμV m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
53.280	26.98	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
412.180	29.27	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3308.400	45.90	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5673.840	46.57	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12868.720	46.71	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(30MHz to 18GHz, Antenna Vertical, GFSK, channel 78)

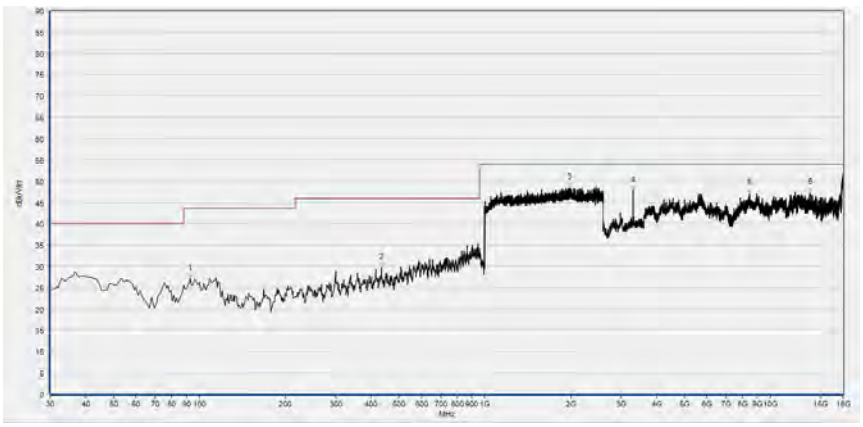
π/4-DQPSK Mode

Plot 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
92.080	28.70	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
641.100	32.84	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2451.733	49.02	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3308.400	46.20	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
7879.120	46.65	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12163.400	47.51	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

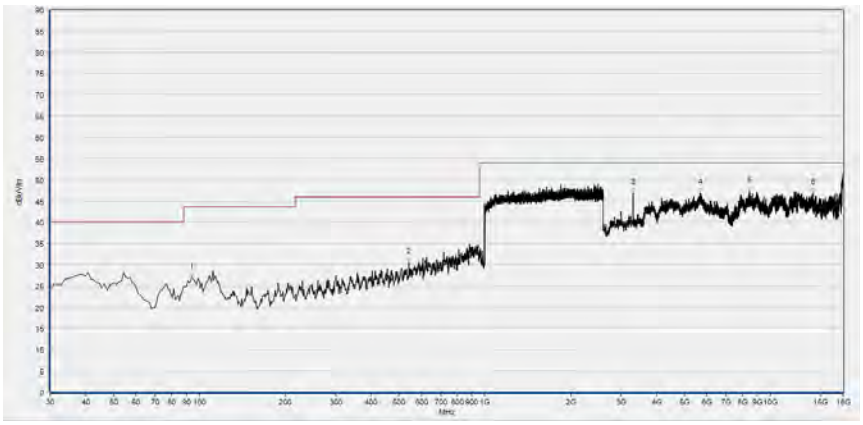
(30MHz to 18GHz, Antenna Horizontal, π/4-DQPSK, channel 0)



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
93.050	27.21	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
434.490	29.64	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1985.600	48.36	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3308.400	47.83	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8464.320	47.16	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
13842.000	47.31	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

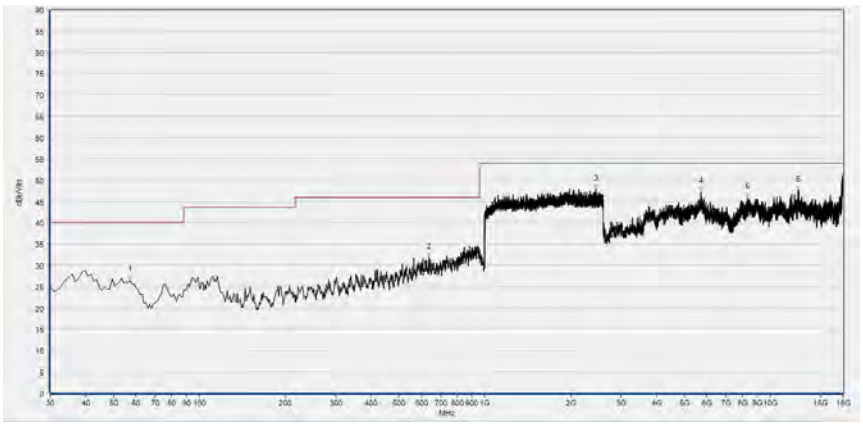
(30MHz to 18GHz, Antenna Vertical,π/4-DQPSK, channel 0)

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
94.020	26.97	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
542.160	30.47	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3308.400	46.91	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5676.920	47.00	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8448.920	47.42	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
14091.480	46.96	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

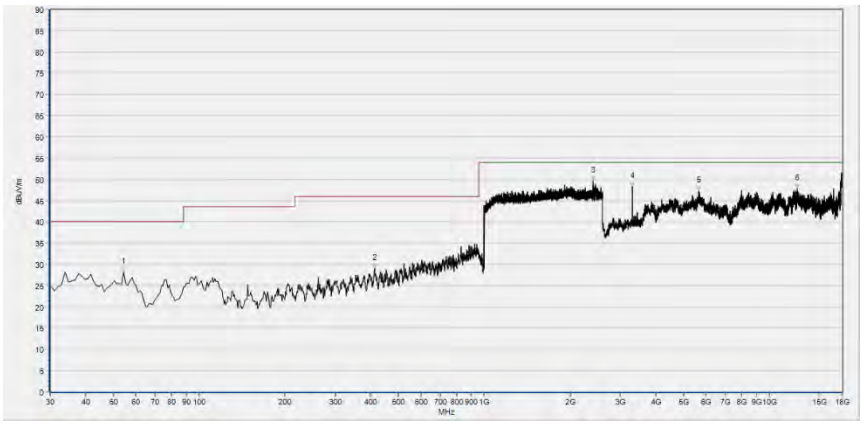
(30MHz to 18GHz, Antenna Horizontal, π/4-DQPSK, channel 39)



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
57.160	26.45	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
635.280	31.84	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2448.000	47.99	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5726.200	47.32	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8319.560	45.99	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12502.200	47.56	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

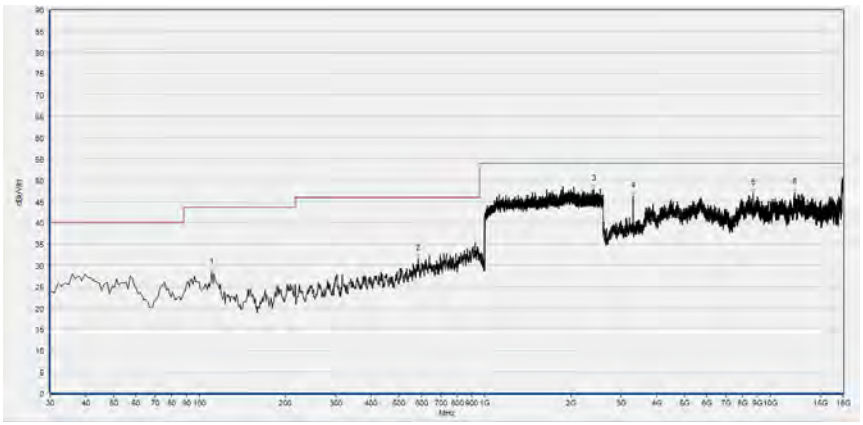
(30MHz to 18GHz, Antenna Vertical, π/4-DQPSK, channel 39)

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
54.250	28.09	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
412.180	28.99	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2414.933	49.64	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3308.400	48.23	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5652.280	47.23	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12508.360	47.69	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(30MHz to 18GHz, Antenna Horizontal,π/4-DQPSK, channel 78)

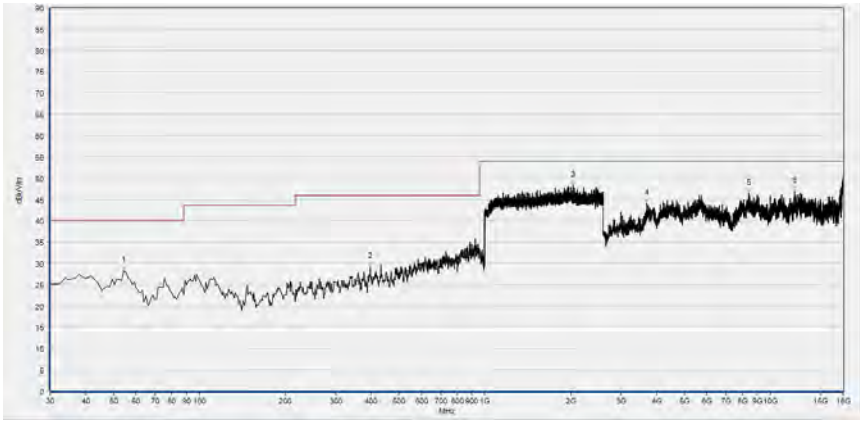


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
110.510	28.25	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
584.840	31.51	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2414.400	47.87	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3308.400	46.22	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8732.280	46.96	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12191.120	47.03	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(30MHz to 18GHz, Antenna Vertical, π/4-DQPSK, channel 78)

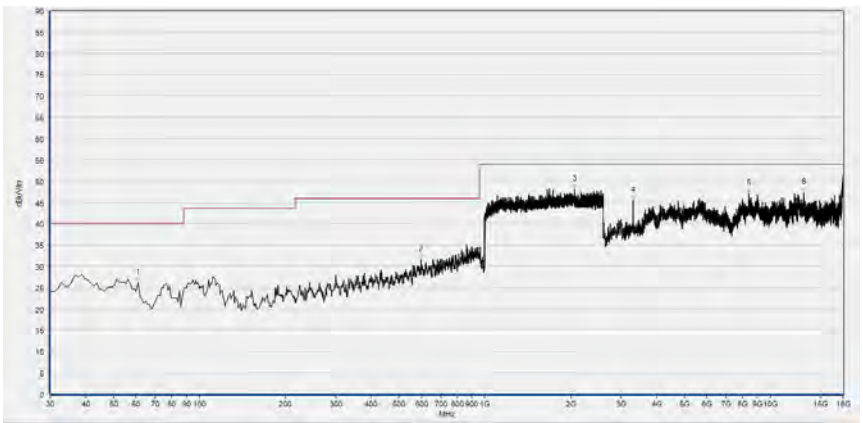
8-DPSK Mode

Plot 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
54.250	28.21	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
397.630	29.10	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2043.200	48.24	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3699.560	44.16	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8433.520	46.49	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12191.120	46.93	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

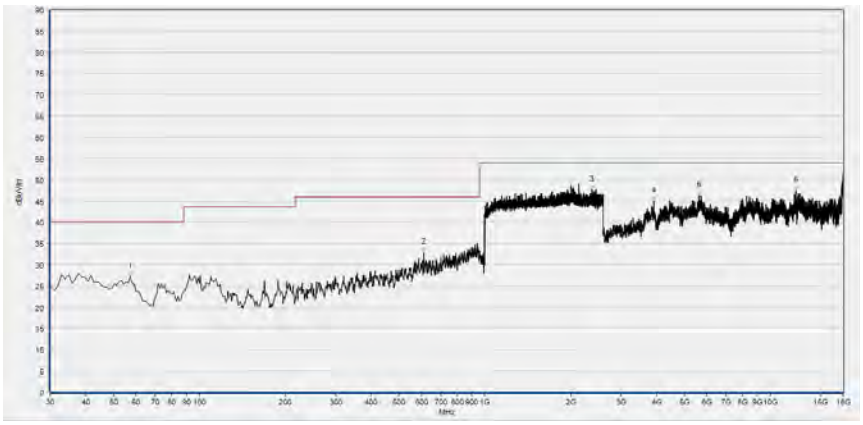
(30MHz to 18GHz, Antenna Horizontal,8-DPSK, channel 0)



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
61.040	26.09	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
598.420	31.57	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2065.600	48.07	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3308.400	45.35	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8402.720	47.08	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
13081.240	47.22	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

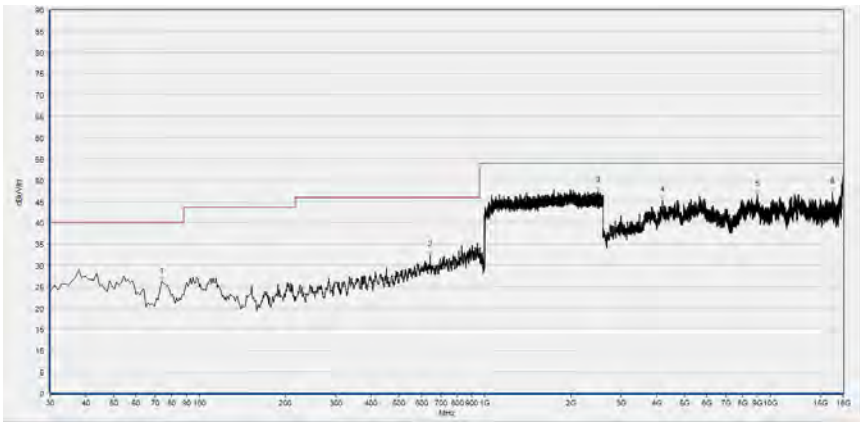
(30MHz to 18GHz, Antenna Vertical,8-DPSK, channel 0)

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
57.160	27.12	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
612.000	32.86	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2373.867	47.57	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3905.920	44.98	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5606.080	46.24	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12292.760	47.42	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

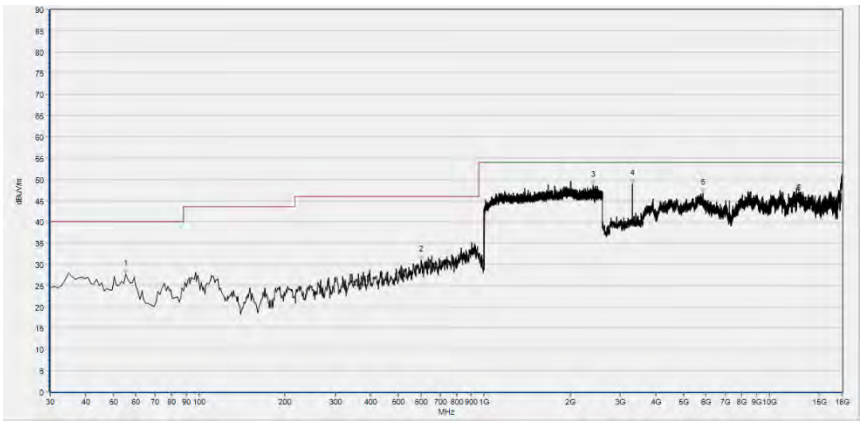
(30MHz to 18GHz, Antenna Horizontal,8-DPSK, channel 39)



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
73.650	26.22	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
644.010	32.32	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2493.867	47.43	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4198.520	45.17	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
9000.240	46.53	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
16543.160	47.01	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

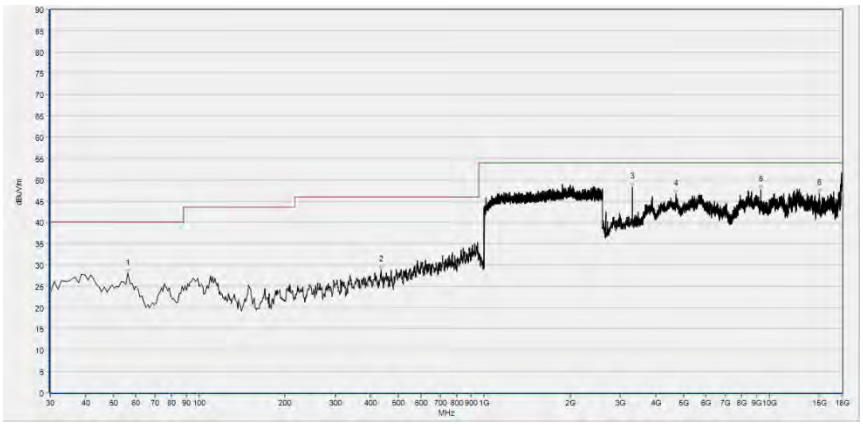
(30MHz to 18GHz, Antenna Vertical,8-DPSK, channel 39)

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
55.220	27.63	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
602.300	31.01	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2405.867	48.55	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3308.400	49.02	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5858.640	46.82	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12668.520	47.80	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(30MHz to 18GHz, 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
56.190	27.99	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
435.460	28.79	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3308.400	48.32	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4709.800	46.59	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
9332.880	47.56	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
15003.160	46.74	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(30MHz to 18GHz, 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	±2.77dB

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:	Morlab Laboratory of Shenzhen Morlab Communications Technology Co., Ltd.
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:	Morlab Laboratory of Shenzhen Morlab Communications Technology Co., Ltd.
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 C63.10-2013and 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	Due Date
Bluetooth Base Station	6K00006210	MT8852B	Anritsu	2021.03.25	2022.03.24
Directional coupler	17041703	DTO-5-30	ShangHaiHuaxiang	N/A	N/A
EXA Signal Analzyer	MY53470836	N9010A	Agilent	2021.03.25	2022.03.24
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
Computer	T430i	Think Pad	Lenovo	N/A	N/A

4.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2021.03.09	2022.03.08
LISN	8127449	NSLK 8127	Schwarzbeck	2021.03.09	2022.03.08
Pulse Limiter (10dB)	VTSD 9561 F-B #206	VTSD 9561-F	Schwarzbeck	2020.07.24	2021.07.23
Coaxial cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

4.3 List of Software Used

Description	Manufacturer	Software Version
Test system	Tonscend	V2.6
Power Panel	Agilent	V3.8
MorlabEMCR V1.2	Morlab	V1.0

4.4 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY54130016	N9038A	Agilent	2020.07.21	2021.07.20
Test Antenna - Bi-Log	9163-520	VULB 9163	Schwarzbeck	2019.05.24	2022.05.23
Test Antenna - Loop	1520-022	FMZB1520	Schwarzbeck	2019.02.14	2022.02.13
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2019.07.26	2022.07.25
Test Antenna – Horn	BBHA9170 #774	BBHA9170	Schwarzbeck	2019.07.26	2022.07.25
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	61171/61172	S020180L3203	Tonscend	2020.07.21	2021.07.20
18-26.5GHz pre-Amplifier	46732	S10M100L3802	Tonscend	2020.07.21	2021.07.20
26-40GHz pre-Amplifier	56774	S40M400L4002	Tonscend	2020.07.21	2021.07.20
Notch Filter	N/A	WRCG-2400-2483.5-60SS	Wainwright	2020.07.21	2021.07.20
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05

END OF REPORT