REPORT No.：SZ17110154W02

TEST REPORT

APPLICANT	:	ShenZhen Gospell Smarthome Electronic Co., Ltd.
PRODUCT NAME	:	Full HD Remote Home Surveillance
MODEL NAME	:	GD8122
BRAND NAME	:	N/A
FCC ID	:	TW5GD8122
STANDARD(S)	:	47 CFR Part 15 Subpart C
TEST DATE	:	2017-12-27 to 2018-01-11
ISSUE DATE	:	2018-01-11

Tested by: Li Jingzong

Li Jingzong (Test Engineer)

Approved by: Andy Yeh

Andy Yeh (Technical Director)

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MORLAB

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

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

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

DIRECTORY

Change History		
Issue	**Date**	**Reason for change**
1.0	2018-01-11	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	ShenZhen Gospell Smarthome Electronic Co., Ltd.
Applicant Address:	5Floor/Block 2, Vision (SZ) Park, Hi-Tech Industrial Park, Shenzhen, China
Manufacturer:	ShenZhen Gospell Smarthome Electronic Co., Ltd.
Manufacturer Address:	East of 01st-04st Floor,Block A,No.1 Industrial park, Fenghuanggang, South of No.1 Baotian Road, Xixiang street, Bao'an District, Shenzhen City, Guangdong Province 518126,P.R.China

1.2. Equipment Under Test (EUT) Description

Product Name:	Full HD Remote Home Surveillance
Serial No:	(N/A, marked #1 by test site)
Hardware Version:	GD8122M03
Software Version:	V992
Modulation Type:	BPSK, QPSK, 16QAM
Operating Frequency Range:	The frequency range used is 2406MHz – 2475MHz (24 channels, at intervals of 3MHz);
Antenna Type:	Dipole Antenna
Antenna Gain:	2.0 dBi

Note 1: The EUT is operating at 2.4GHz ISM band; the frequencies is F(MHz)=2406+3*(n-1) (1<=n<=24). The lowest, middle, highest channel numbers of the EUT tested in this report are separately 1 (2406MHz), 13 (2442MHz) and 24 (2475MHz).

Note 2: The EUT connected to the serial port of the computer with a serial communication cable, we use the dedicated software to control the EUT into the test mode, and then use MT8852B base station to control the EUT continuous transmission.

Note 3: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. The channel number and frequency of EUT

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	**2406**	**13**	**2442**
2	2409	14	2445
3	2412	15	2448
4	2415	16	2451
5	2418	17	2454
6	2421	18	2457
7	2424	19	2460
8	2427	20	2463
9	2430	21	2466
10	2433	22	2469
11	2436	23	2472
12	2439	**24**	**2475**

Note: The Lowest Channel 1, Middle Channel 13 and Highest Channel 24 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 (10-1-15 Edition)	Radio Frequency Devices

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

No.	Section in CFR 47	Description	Test Date	Test Engineer	Result
1	15.203	Antenna Requirement	N/A	N/A	PASS
2	15.247(a)	Number of Hopping Frequency	Nov 27, 2017	Li Jingzong	PASS
3	15.247(b)	Peak Output Power	Nov 27, 2017 Jan 10, 2018	Li Jingzong	PASS
4	15.247(a)	20dB Bandwidth	Nov 27, 2017 Jan 10, 2018	Li Jingzong	PASS
5	15.247(a)	Carrier Frequency Separation	Nov 27, 2017	Li Jingzong	PASS
6	15.247(a)	Time of Occupancy (Dwell time)	Nov 27, 2017	Li Jingzong	PASS
7	15.247(d)	Conducted Spurious Emission	Nov 27, 2017 Jan 10, 2018	Li Jingzong	PASS
8	15.247(d)	Restricted Frequency Bands	Jan 03&11, 2018	Wu Zhongwen	PASS
9	15.209, 15.247(d)	Radiated Emission	Jan 11, 2018	Wu Zhongwen	PASS
10	15.207	Conducted Emission	Jan 04, 2018	Wu Zhongwen	PASS

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

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.

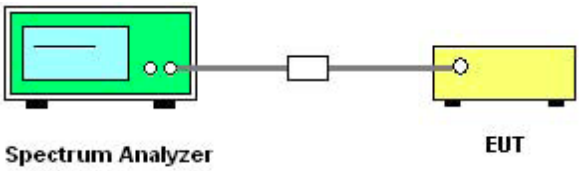
2.2. Number of Hopping Frequency

2.2.1. Requirement

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

2.2.2. Test Description

A. Test Setup:



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

B. Equipments List:

Please reference ANNEX A(1.5).

2.2.3. Test Procedure

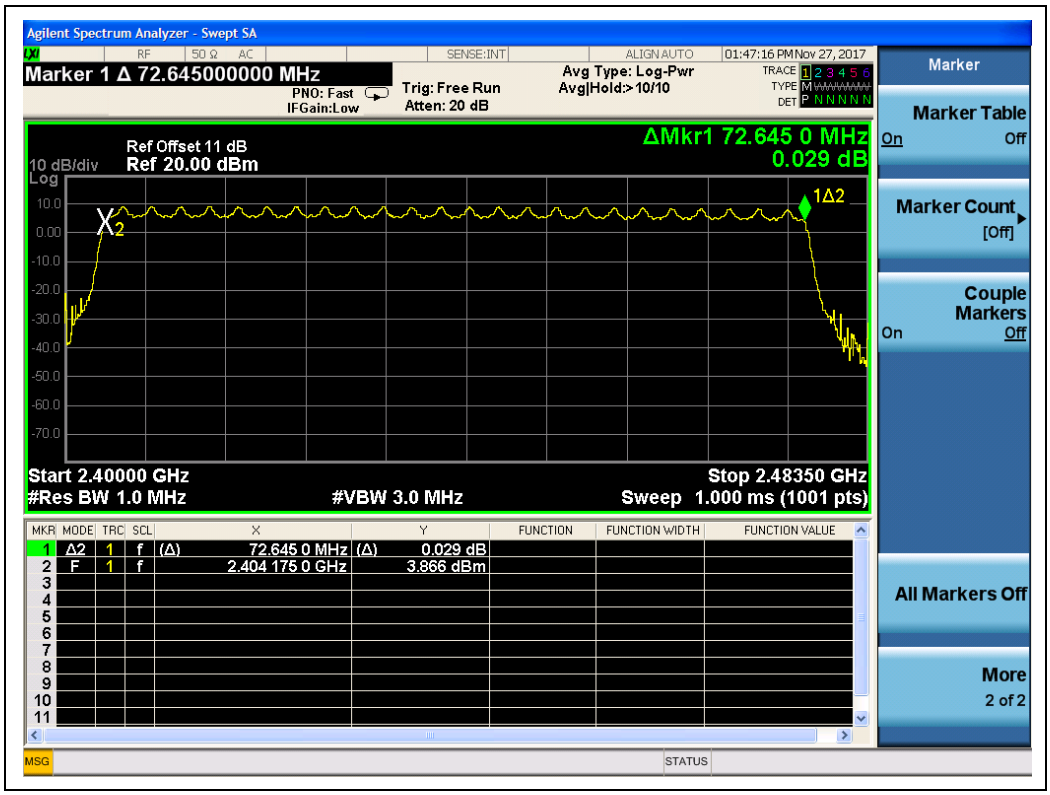
The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = the frequency band of operation
RBW ≥ 1% of the span
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize

2.2.4. Test Result

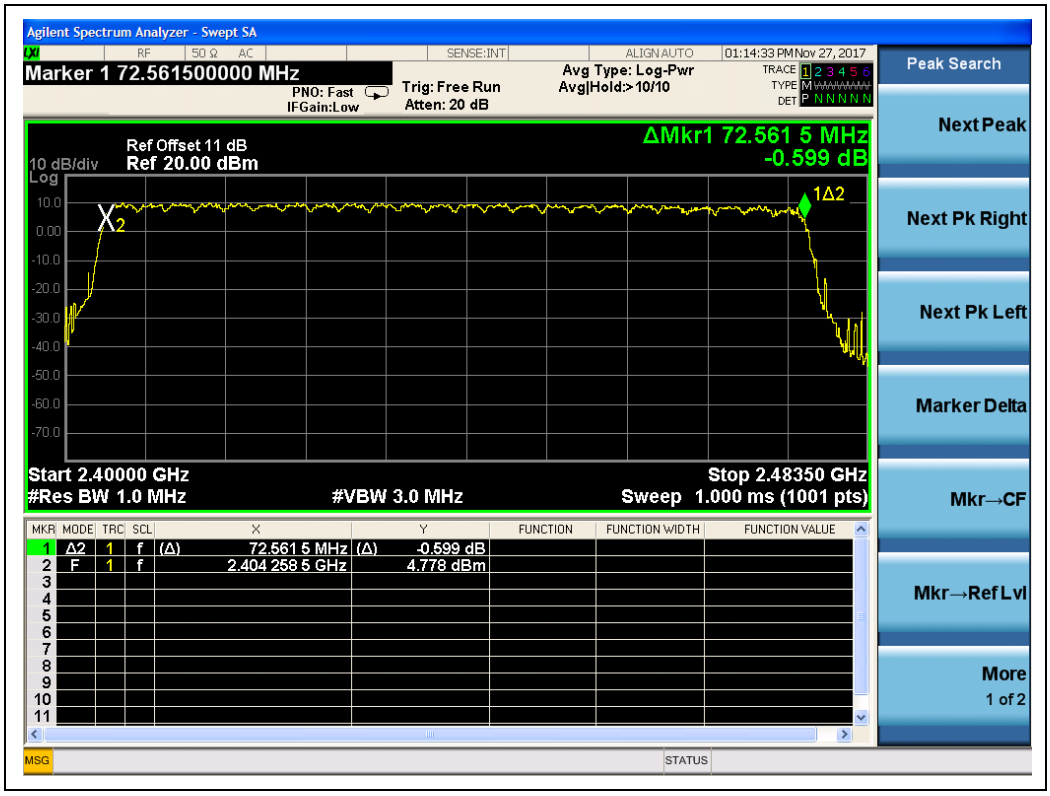
A. Test Verdict:

Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Verdict
BPSK	2400 - 2483.5	24	15	PASS
QPSK	2400 - 2483.5	24	15	PASS
16QAM	2400 - 2483.5	24	15	PASS

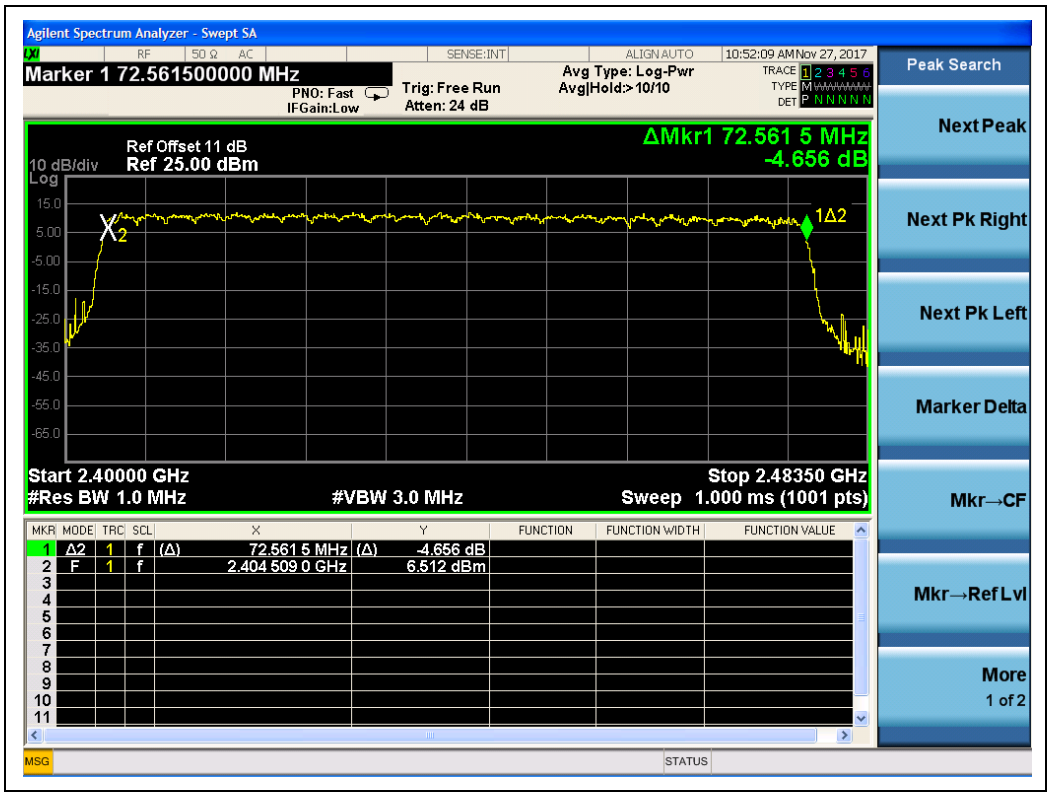
B. Test Plots:



(BPSK)


Agilent Spectrum Analyzer - Swept SA
Marker 1 72.561500000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
01:14:33 PM Nov 27, 2017
Ref Offset 11 dB
10 dB/div
Ref 20.00 dBm
ΔMkr1 72.561 5 MHz
-0.599 dB
Start 2.40000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 2.48350 GHz
Sweep 1.000 ms (1001 pts)
1 Δ2 1 f (Δ) 72.561 5 MHz (Δ) -0.599 dB
2 F 1 f 2.404 258 5 GHz 4.778 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

(QPSK)


Agilent Spectrum Analyzer - Swept SA
Marker 1 72.561500000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 24 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
10:52:09 AM Nov 27, 2017
Ref Offset 11 dB
10 dB/div
Ref 25.00 dBm
ΔMkr1 72.561 5 MHz
-4.656 dB
Start 2.40000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 2.48350 GHz
Sweep 1.000 ms (1001 pts)
1 Δ2 1 f (Δ) 72.561 5 MHz (Δ) -4.656 dB
2 F 1 f 2.404 509 0 GHz 6.512 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

(16QAM)

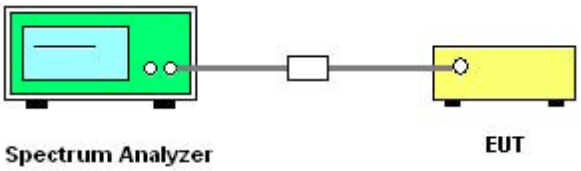
2.3. Peak Output Power

2.3.1. Requirement

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

2.3.2. Test Description

A. Test Setup:



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

B. Equipments List:

Please reference ANNEX A(1.5).

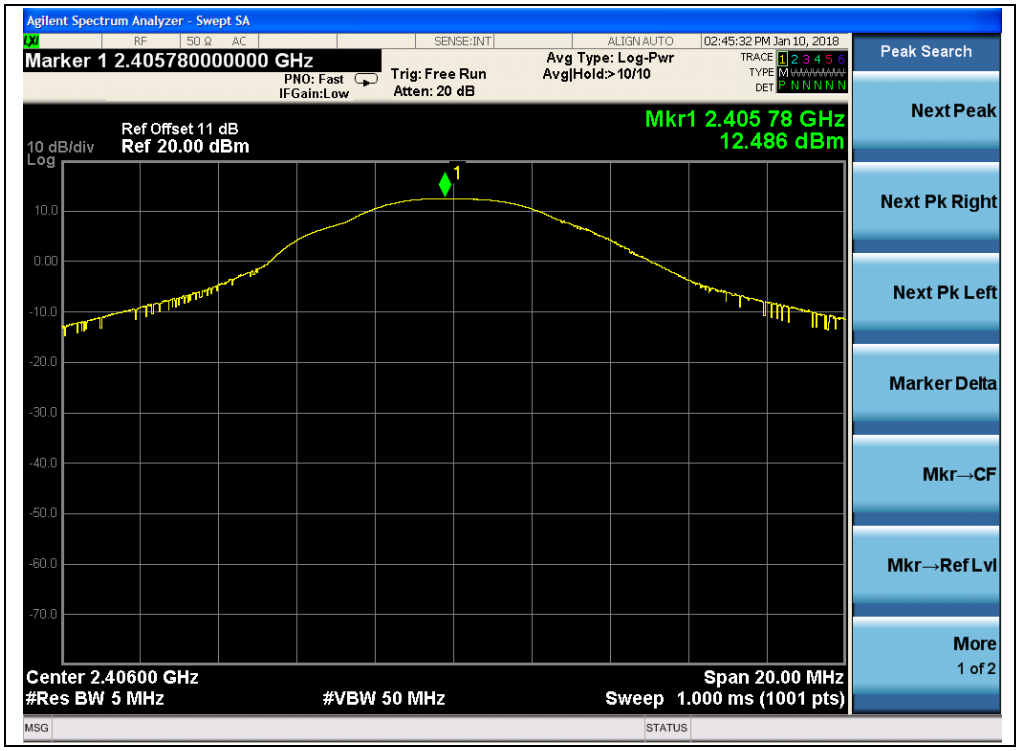
2.3.3. Test Result

BPSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2406	12.49	0.01774	30	1	PASS
13	2442	11.65	0.01462			PASS
24	2475	10.51	0.01125			PASS

B. Test Plots:



(BPSK, Channel 1, 2406MHz)

(BPSK, Channel 13, 2442MHz)

(BPSK, Channel 24, 2475MHz)

QPSK Mode

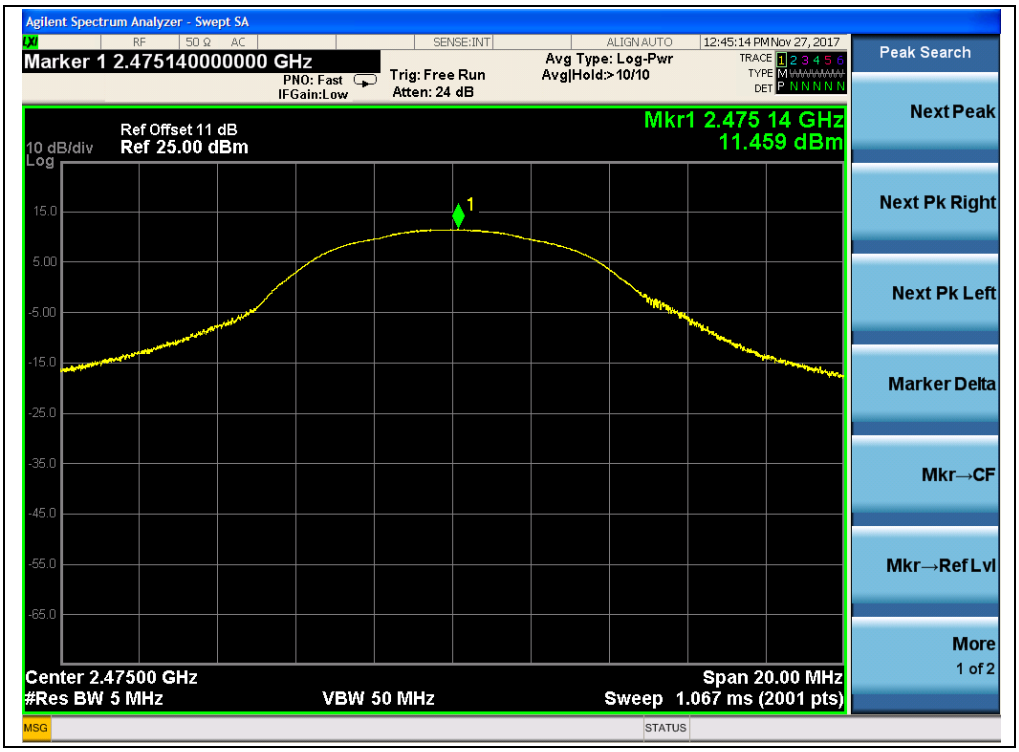
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2406	13.18	0.02080	30	1	PASS
13	2442	12.40	0.01738			PASS
24	2475	11.46	0.01400			PASS

B. Test Plots:

(QPSK, Channel 1, 2406MHz)

(QPSK, Channel 13, 2442MHz)



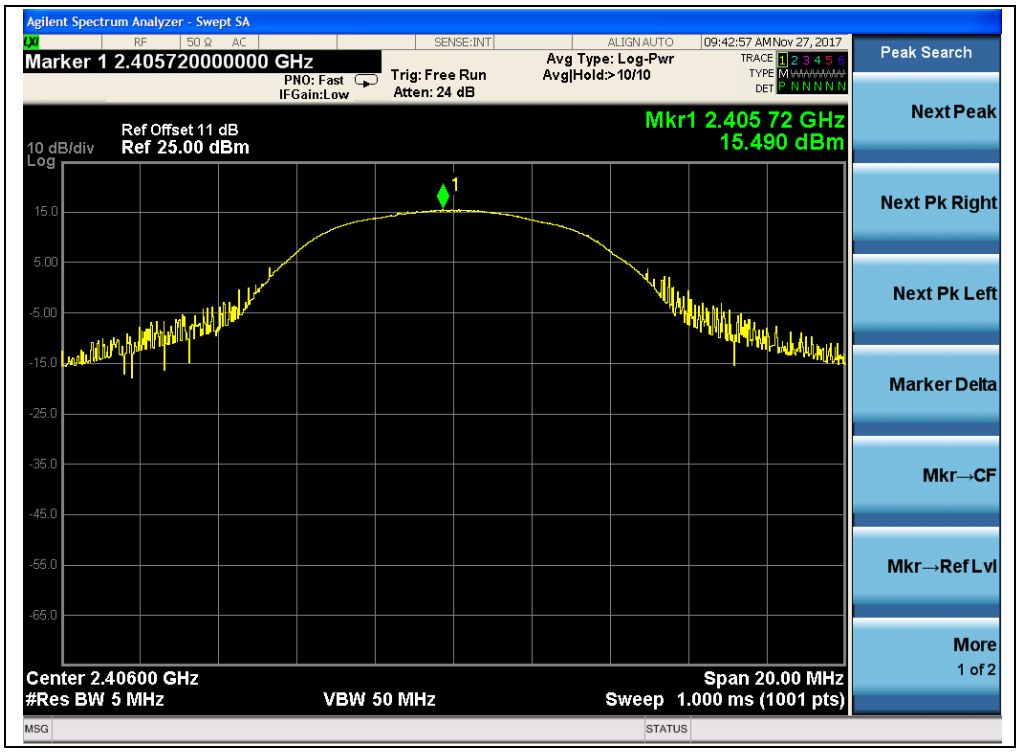
(QPSK, Channel 24, 2475MHz)

16QAM Mode

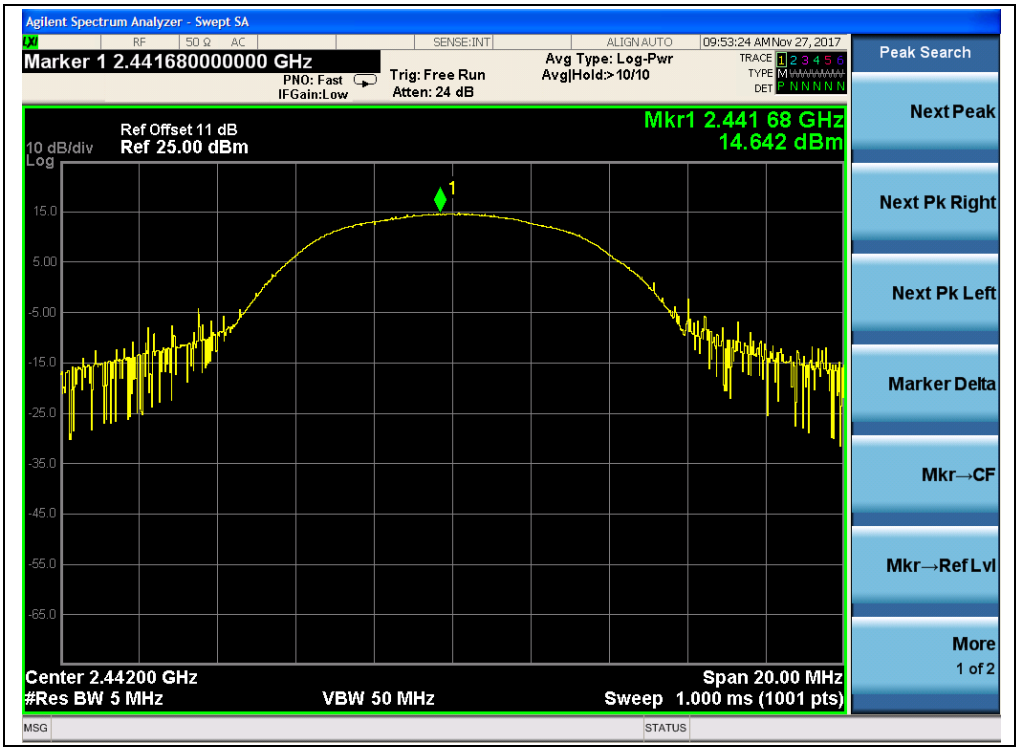
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2406	15.49	0.03540	30	1	PASS
13	2442	14.64	0.02911			PASS
24	2475	13.58	0.02280			PASS

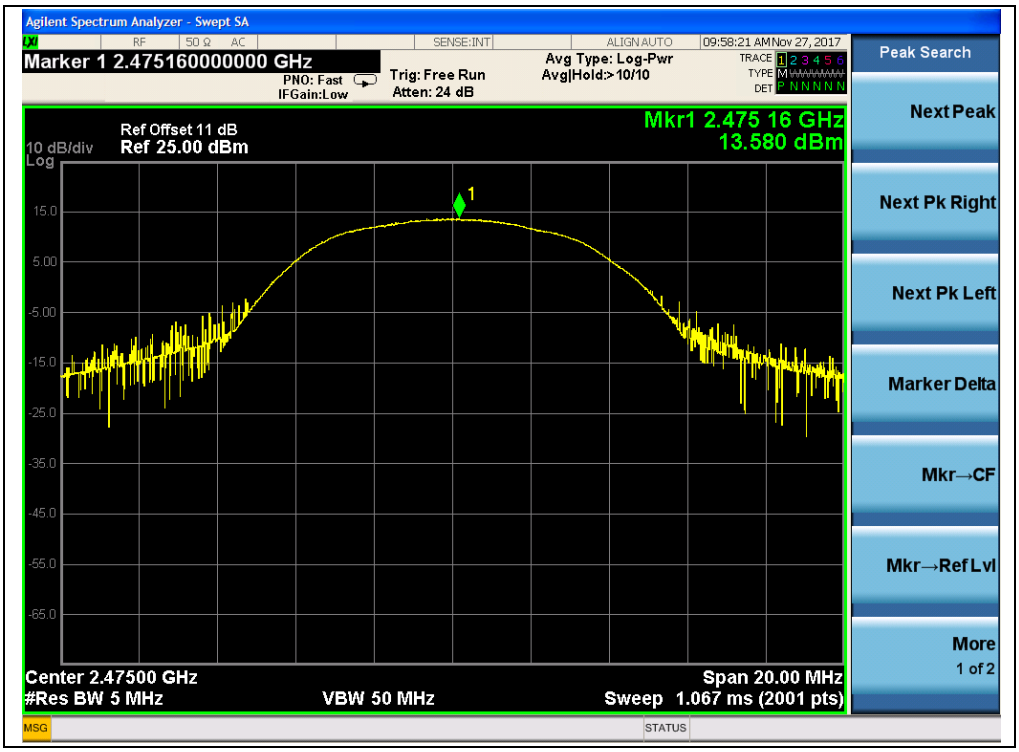
B. Test Plots:



(16QAM, Channel 1, 2406MHz)



(16QAM, Channel 13, 2442MHz)



(16QAM, Channel 24, 2475MHz)

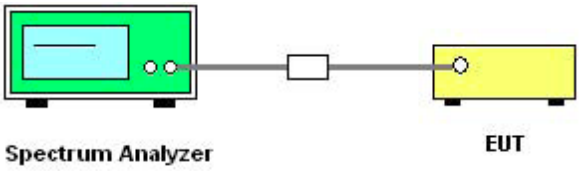
2.4. 20dB Bandwidth

2.4.1. Definition

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

2.4.2. Test Description

A. Test Setup:



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

B. Equipments List:

Please reference ANNEX A(1.5).

2.4.3. Test Procedure

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

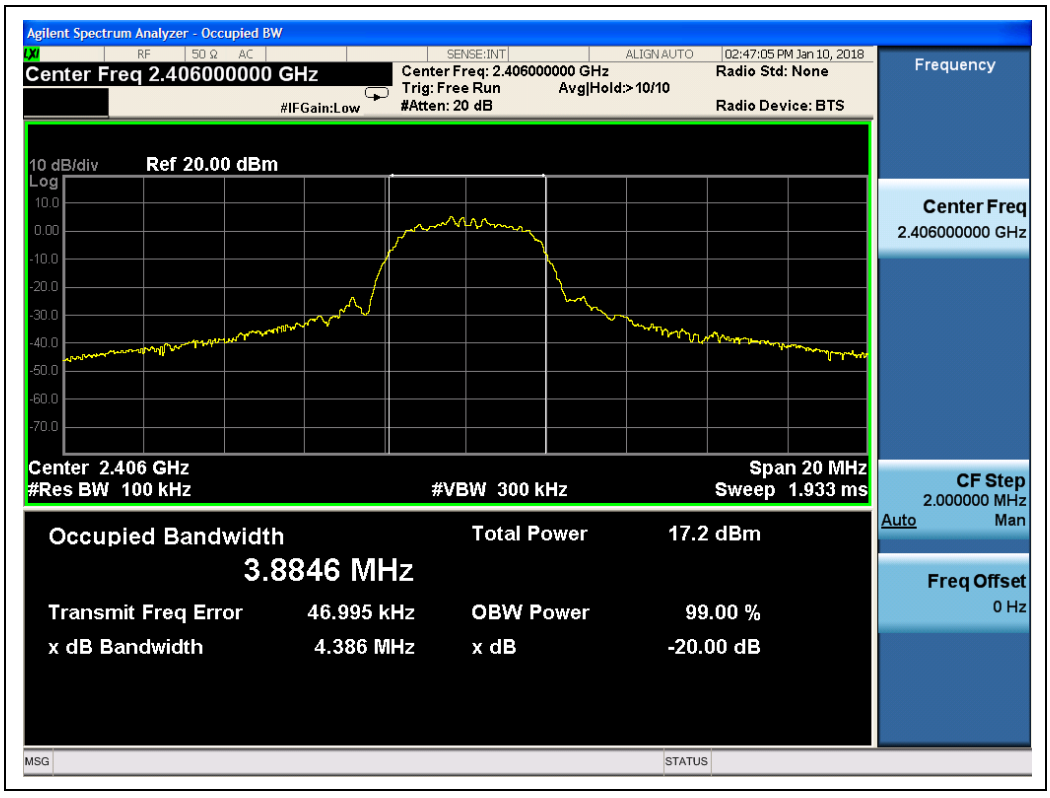
2.4.4. Test Result

BPSK Mode

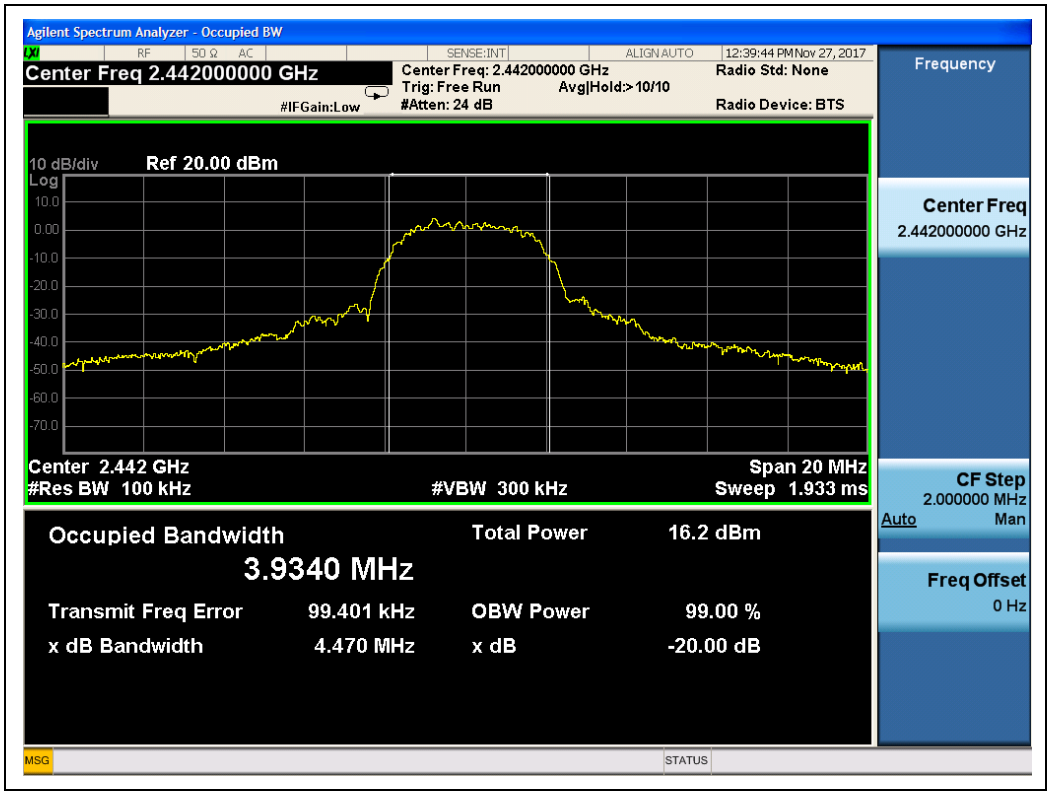
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
1	2406	4.39	PASS
13	2442	4.47	PASS
24	2475	4.41	PASS

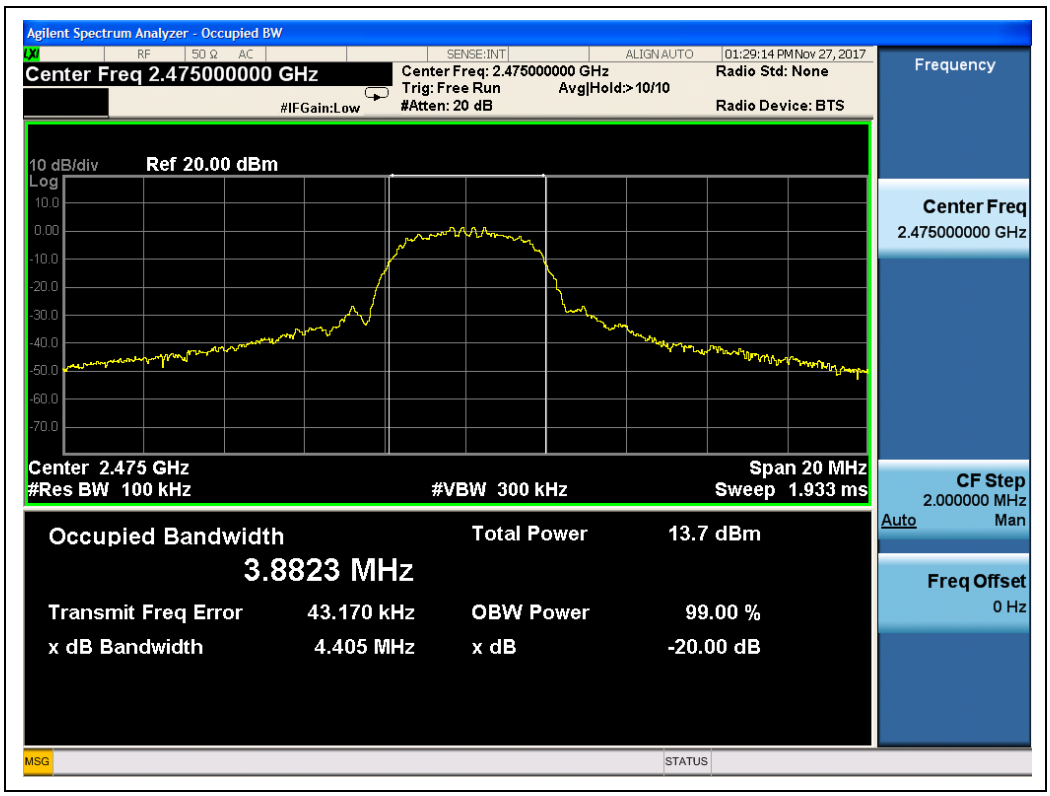
B. Test Plots:



(BPSK, Channel 1, 2406MHz)



(BPSK, Channel 13, 2442MHz)



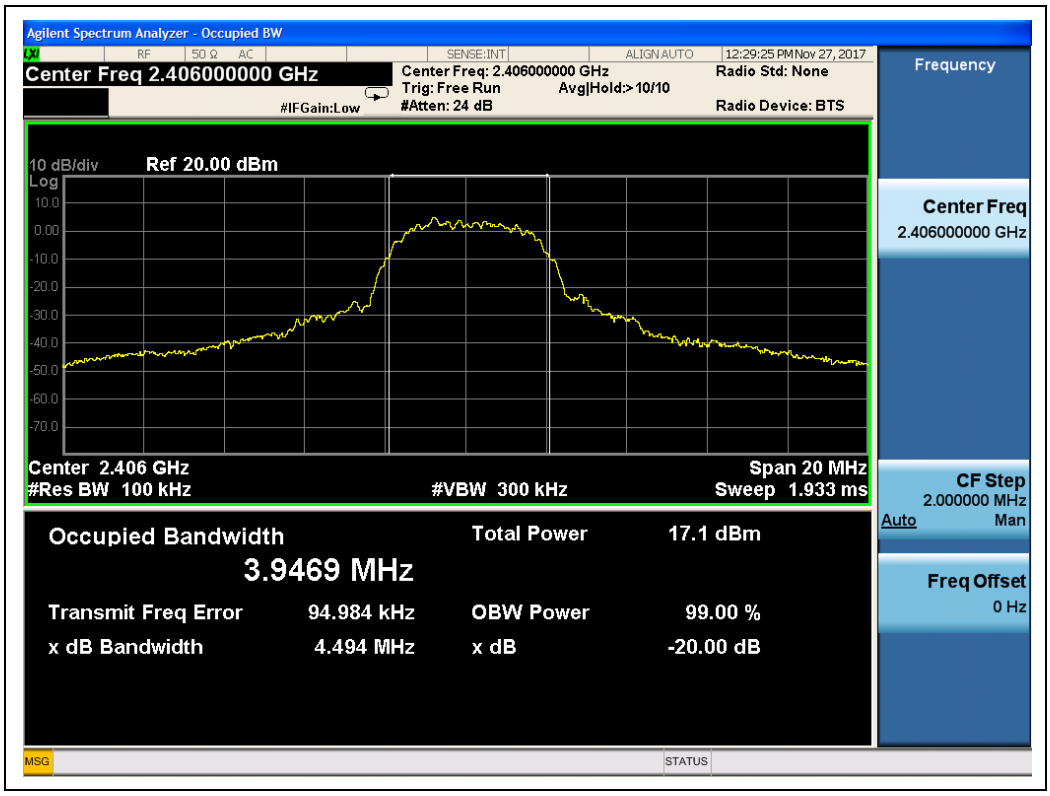
(BPSK, Channel 24, 2475MHz)

QPSK Mode

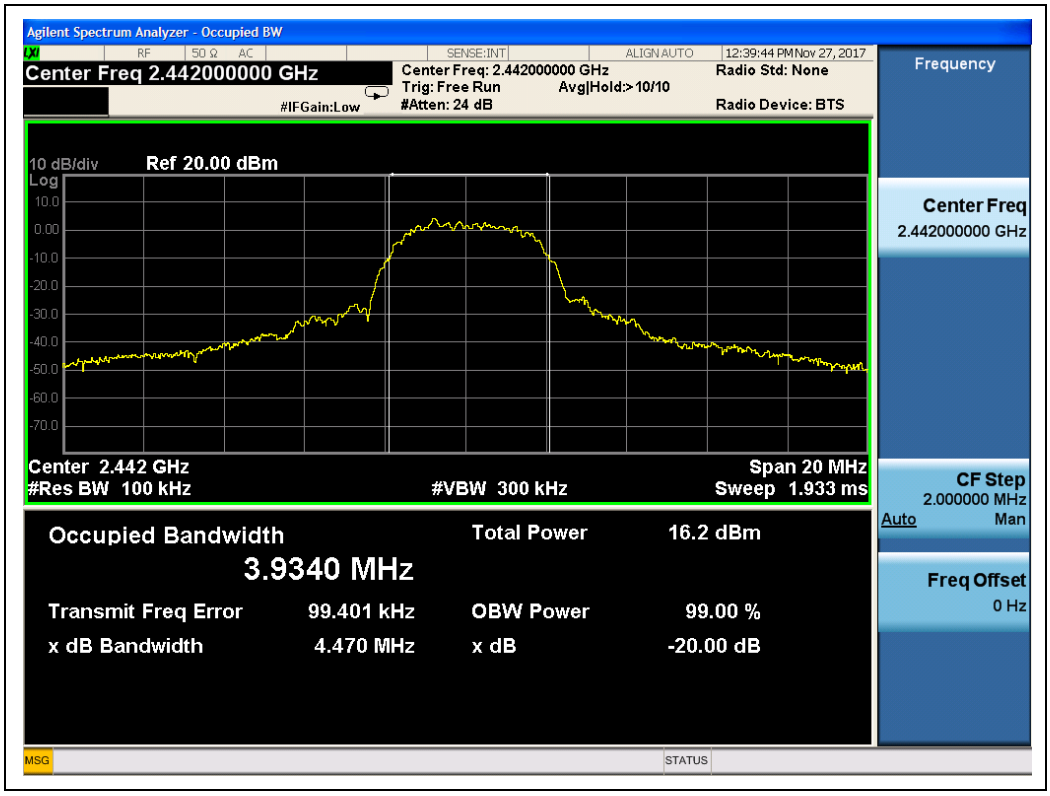
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
1	2406	4.49	PASS
13	2442	4.47	PASS
24	2475	4.48	PASS

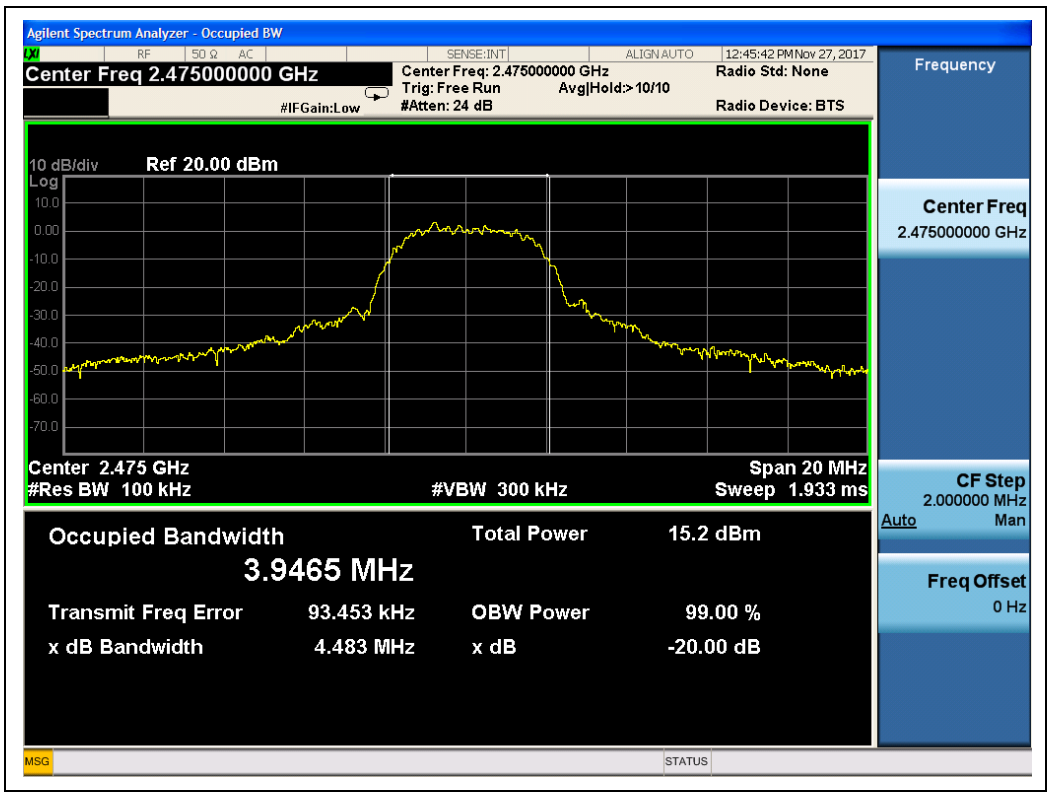
B. Test Plots:



(QPSK, Channel 1, 2406MHz)



(QPSK, Channel 13, 2442MHz)



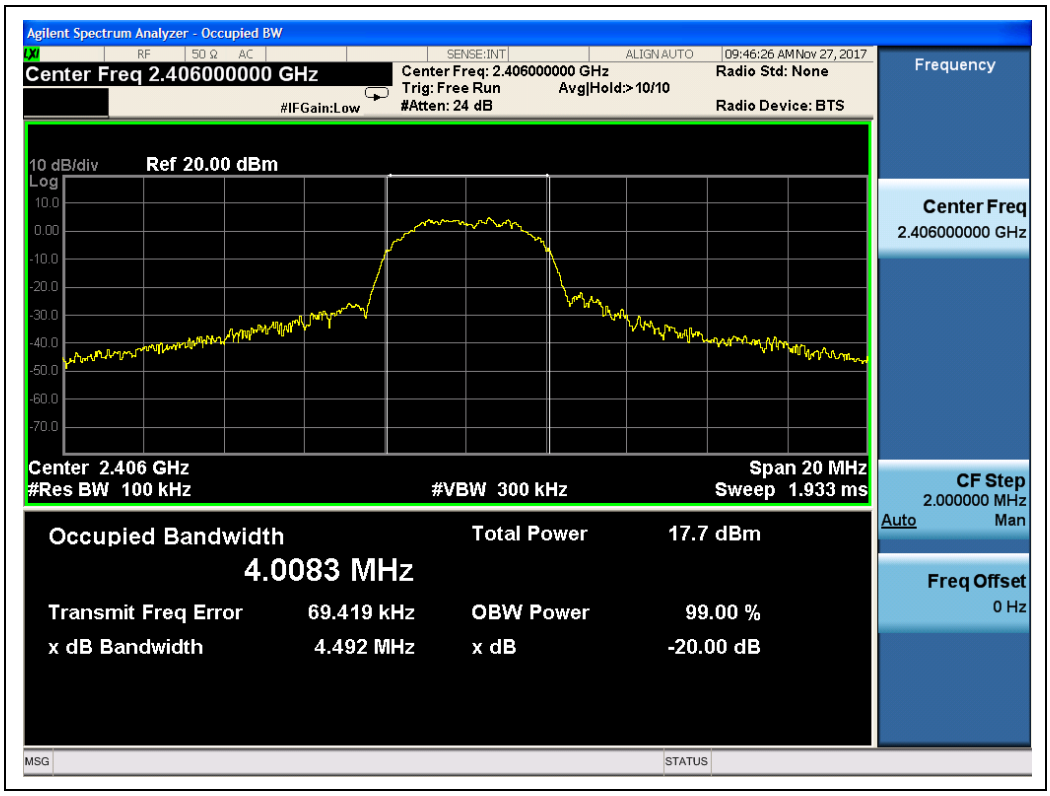
(QPSK, Channel 24, 2475MHz)

16QAM Mode

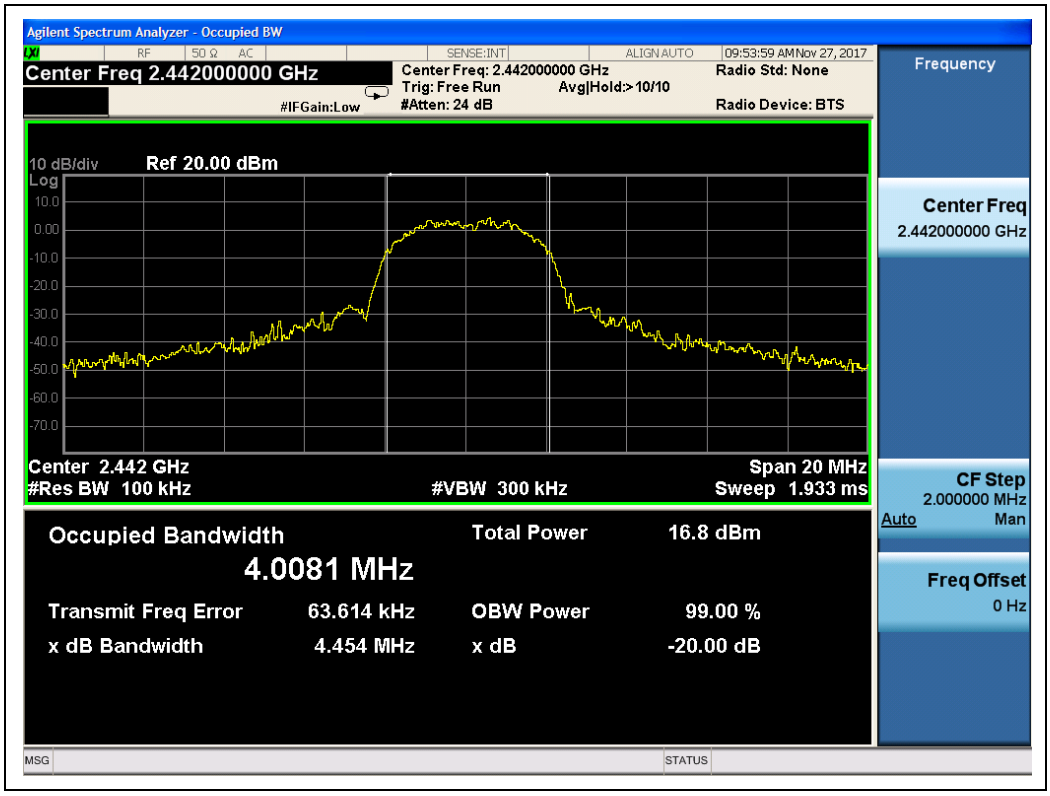
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
1	2406	4.49	PASS
13	2442	4.45	PASS
24	2475	4.51	PASS

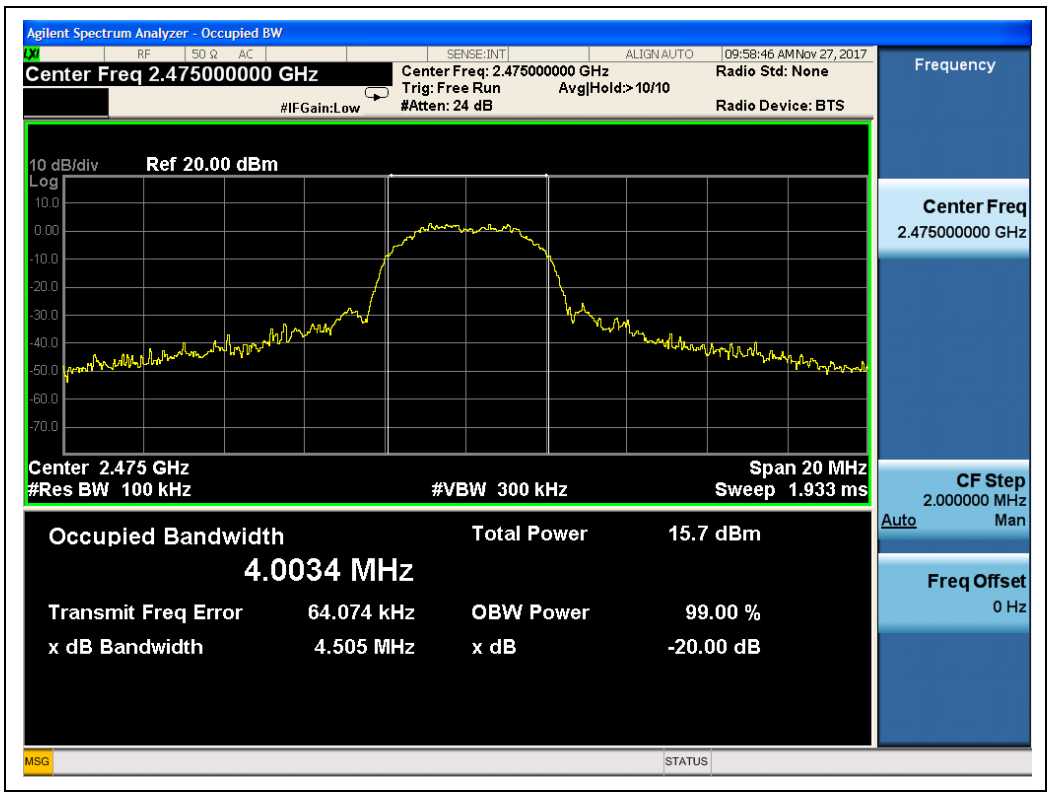
B. Test Plots:



(16QAM, Channel 1, 2406MHz)



(16QAM, Channel 13, 2442MHz)



(16QAM, Channel 24, 2475MHz)

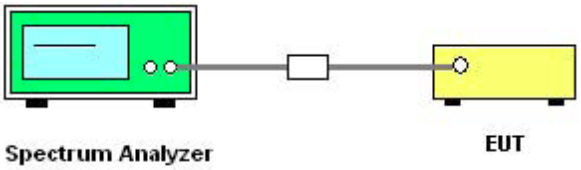
2.5. Carried Frequency Separation

2.5.1. Definition

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

2.5.2. Test Description

A. Test Setup:



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

B. Equipments List:

Please reference ANNEX A(1.5).

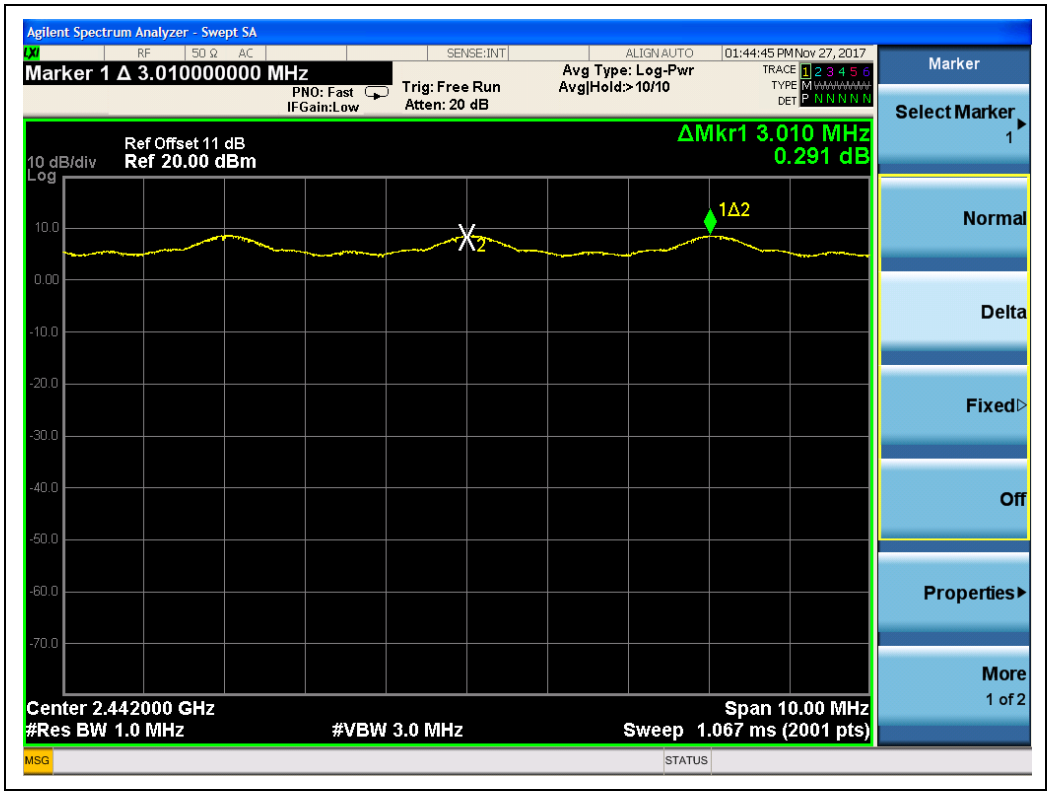
2.5.3. Test Procedure

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

2.5.4. Test Result

The Bluetooth Module operates at hopping-on test mode. For any adjacent channels (e.g. the channel 39 and 40 as showed in the Plot A), 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

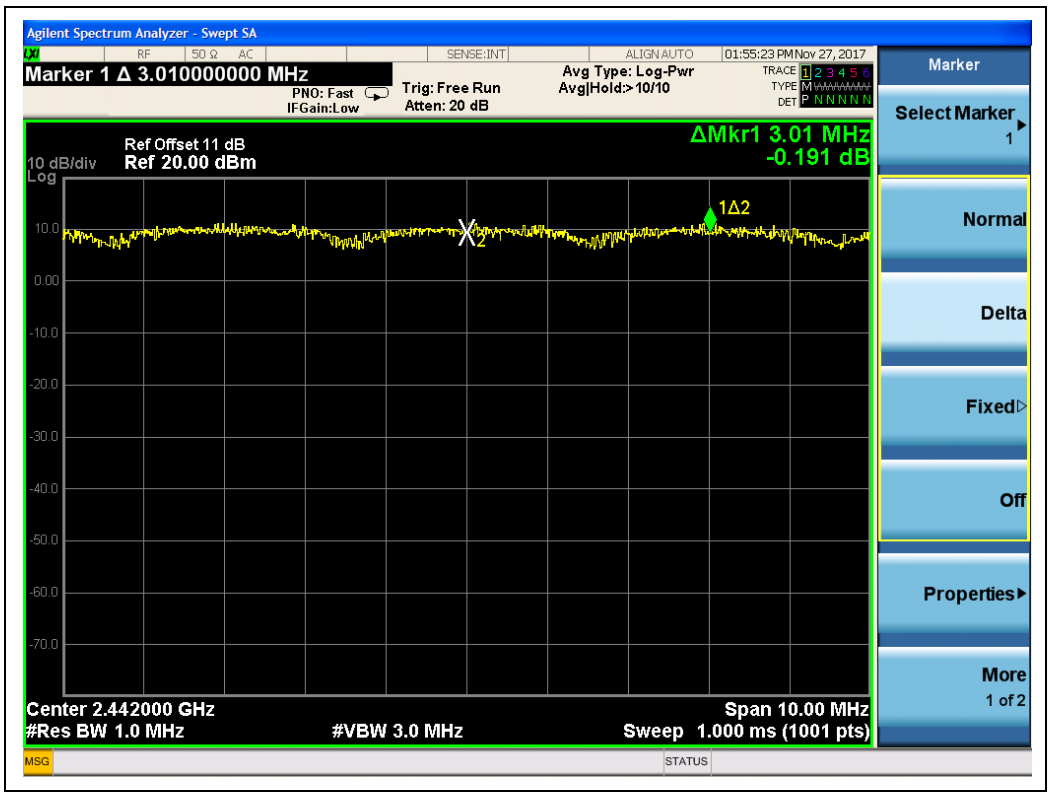
Test Mode	Measured Channel Numbers	Carried Frequency Separation	20dB bandwidth (MHz)	Min. Limit	Verdict
BPSK	12 and 13	3.01	4.39	two-thirds of the 20dB bandwidth	PASS
QPSK	12 and 13	3.01	4.47		PASS
16QAM	12 and 13	3.01	4.45		PASS



(BPSK)


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 3.010000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
01:09:38 PM Nov 27, 2017
Ref Offset 11 dB
10 dB/div
Ref 20.00 dBm
ΔMkr1 3.01 MHz
0.068 dB
Center 2.442000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

(QPSK)


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 3.010000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
01:55:23 PM Nov 27, 2017
Ref Offset 11 dB
10 dB/div
Ref 20.00 dBm
ΔMkr1 3.01 MHz
-0.191 dB
Center 2.442000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

(16QAM)

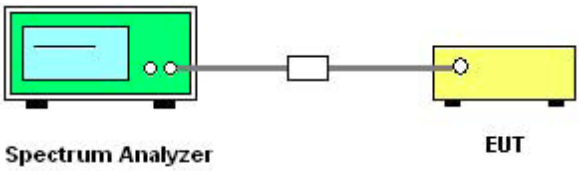
2.6. Time of Occupancy (Dwell time)

2.6.1. Requirement

According to FCC §15.247(a) (1) (iii), frequency hopping systems in the 2400 - 2483.5MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

2.6.2. Test Description

A. Test Setup:



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

B. Equipments List:

Please reference ANNEX A(1.5).

2.6.3. Test Procedure

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channel * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

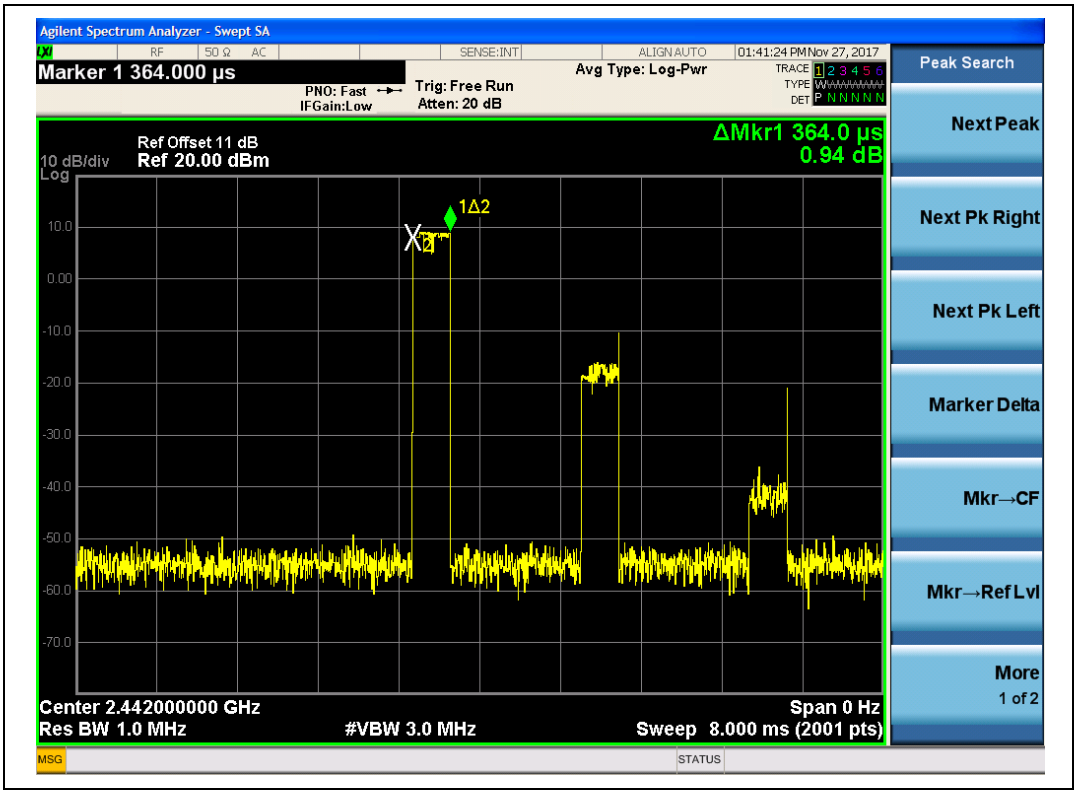
2.6.4. Test Result

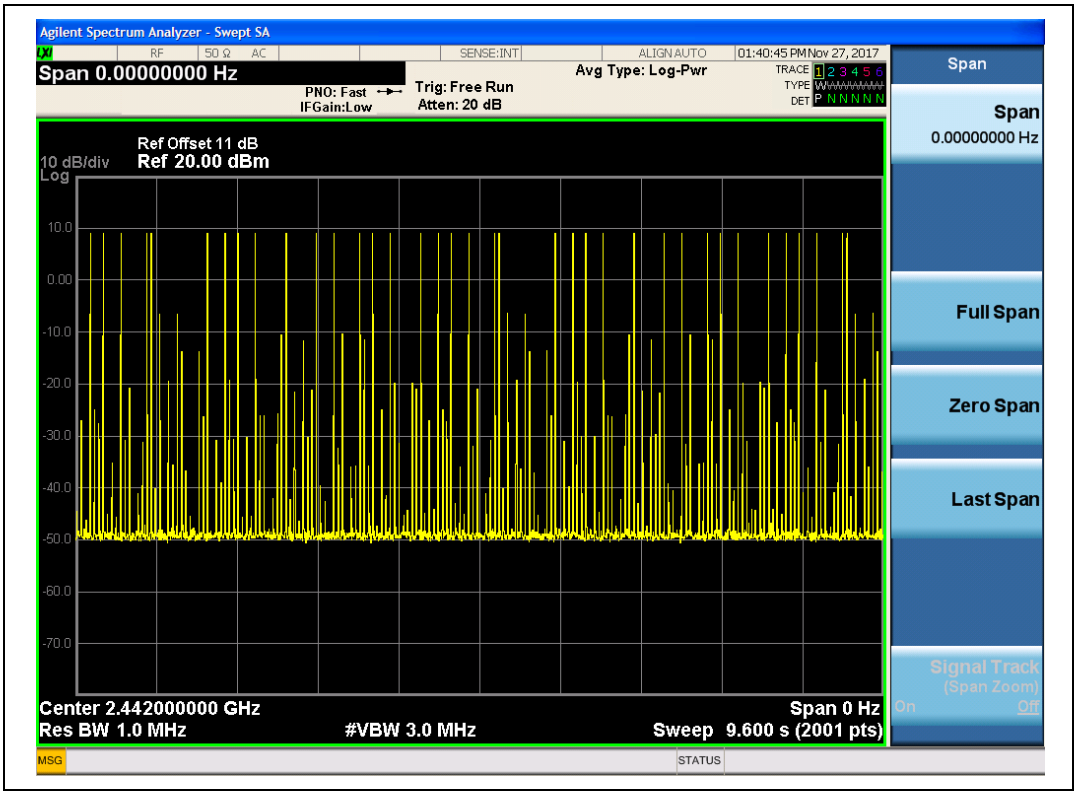
BPSK Mode

A. Test Verdict:

Pulse Width (msec)	Number of pulse in 3.16 seconds	Average Time of Occupancy in 3.16 seconds (sec)	Average Time of Occupancy in 31.6 seconds (sec)	Limit (sec)	Verdict
0.36	37	0.01332	0.1332	0.4	PASS

B. Test Plots:





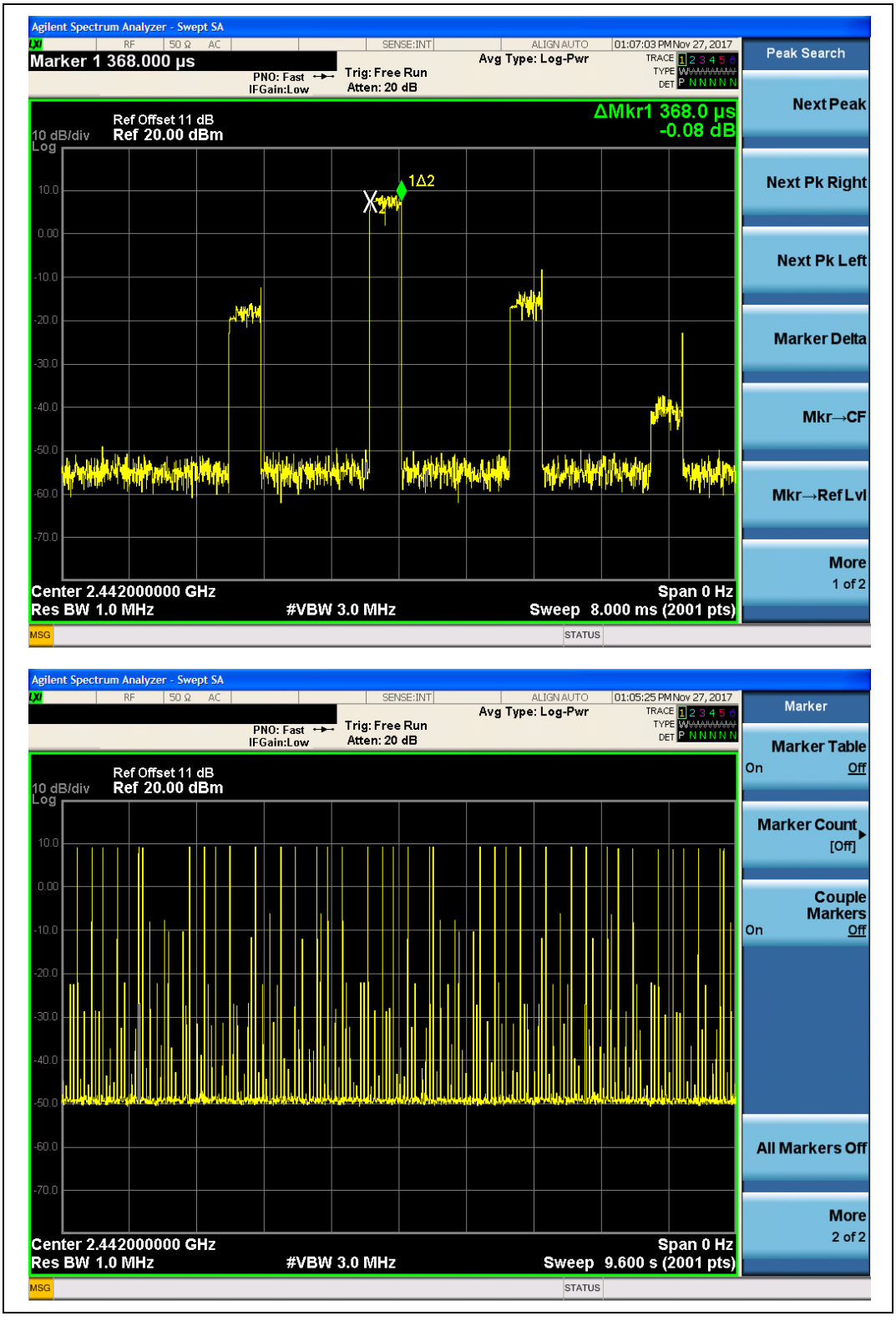
(BPSK)

QPSK Mode

A. Test Verdict:

Pulse Width (msec)	Number of pulse in 3.16 seconds	Average Time of Occupancy in 3.16 seconds (sec)	Average Time of Occupancy in 31.6 seconds (sec)	Limit (sec)	Verdict
0.37	38	0.01406	0.1406	0.4	PASS

B. Test Plots:



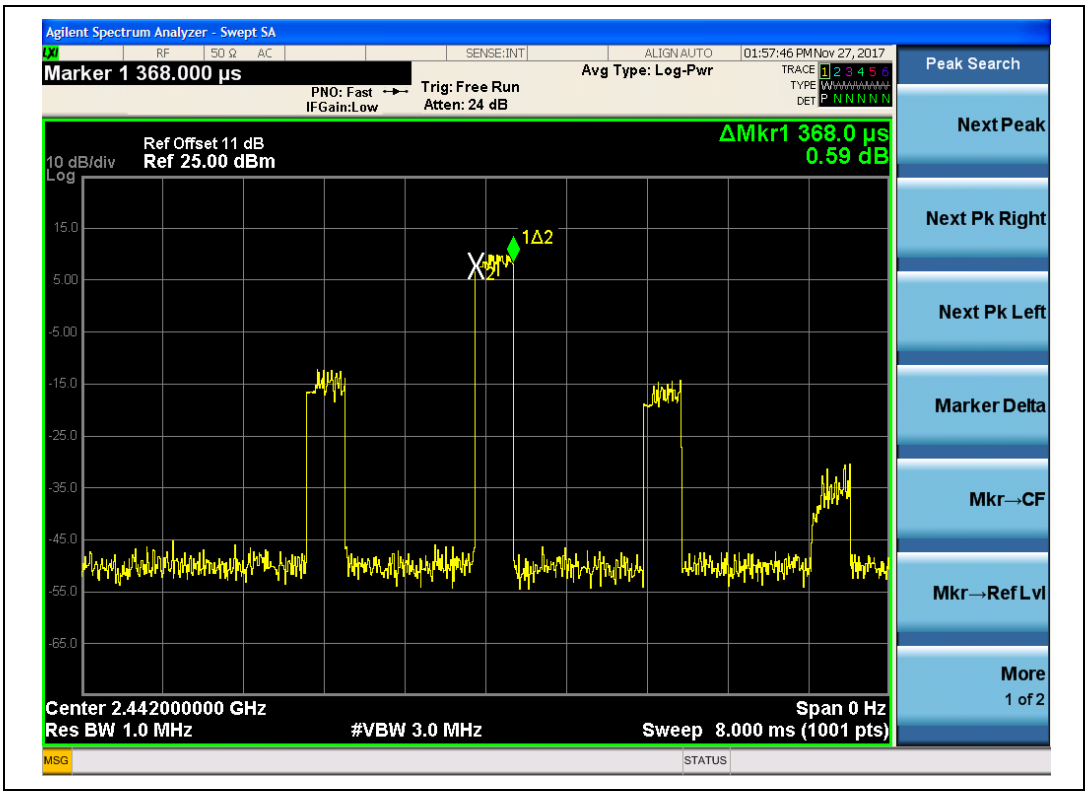
(QPSK)

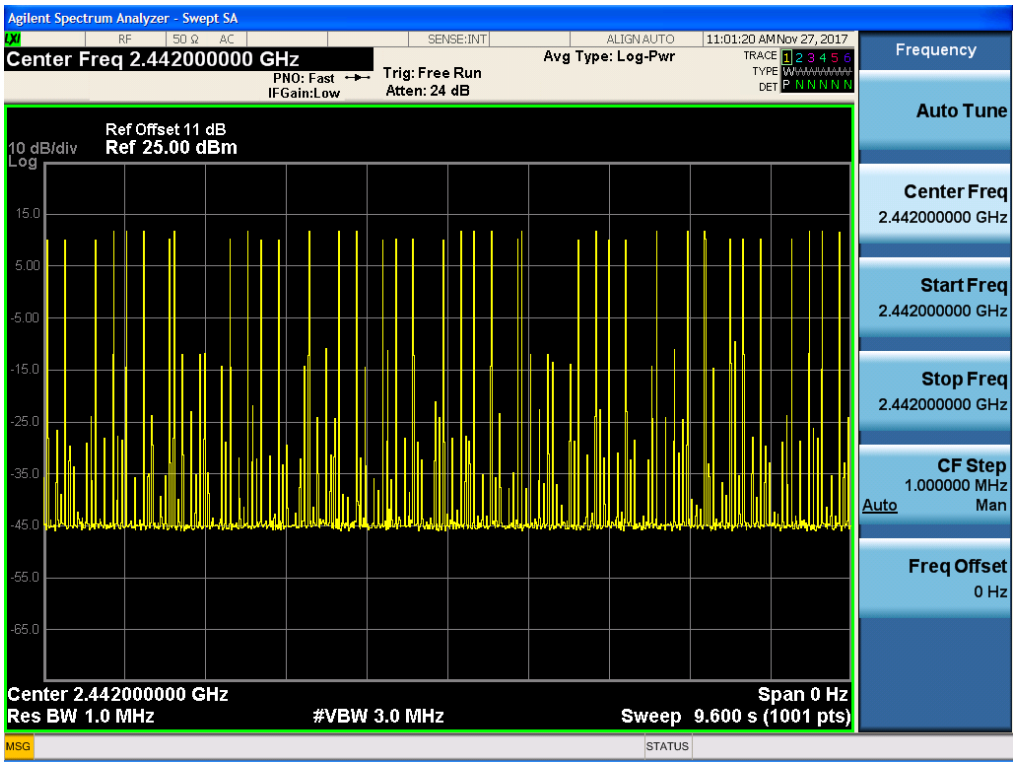
16QAM mode

A. Test Verdict:

Pulse Width (msec)	Number of pulse in 3.16 seconds	Average Time of Occupancy in 3.16 seconds (sec)	Average Time of Occupancy in 31.6 seconds (sec)	Limit (sec)	Verdict
0.37	38	0.01406	0.1406	0.4	PASS

B. Test Plots:




Agilent Spectrum Analyzer - Swept SA
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
11:01:20 AM Nov 27, 2017
Center Freq 2.442000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 24 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W
DET P N N N N N
Ref Offset 11 dB
10 dB/div
Log
Ref 25.00 dBm
15.0
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
Center 2.442000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 9.600 s (1001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.442000000 GHz
Start Freq
2.442000000 GHz
Stop Freq
2.442000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz

(16QAM)

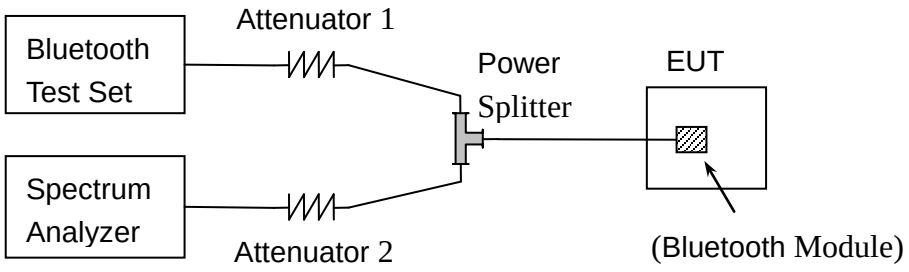
2.7. Conducted Spurious Emissions

2.7.1. Requirement

According to FCC §15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.7.2. Test Description

A. Test Setup:



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

B. Equipments List:

Please reference ANNEX A(1.5).

2.7.3. Test Procedure

Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz
VBW ≥ RBW
Sweep = auto
Detector function = peak

Trace = max hold
Allow the trace to stabilize.

2.7.4. Test Result

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

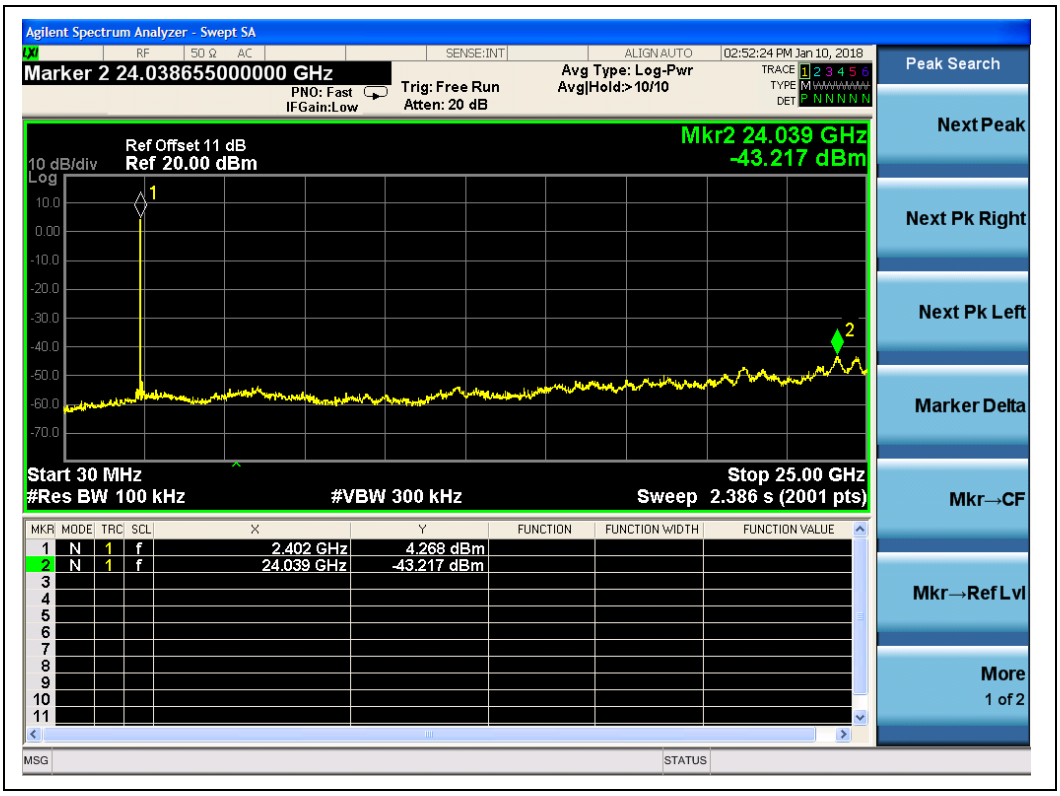
BPSK Mode

A. Test Verdict:

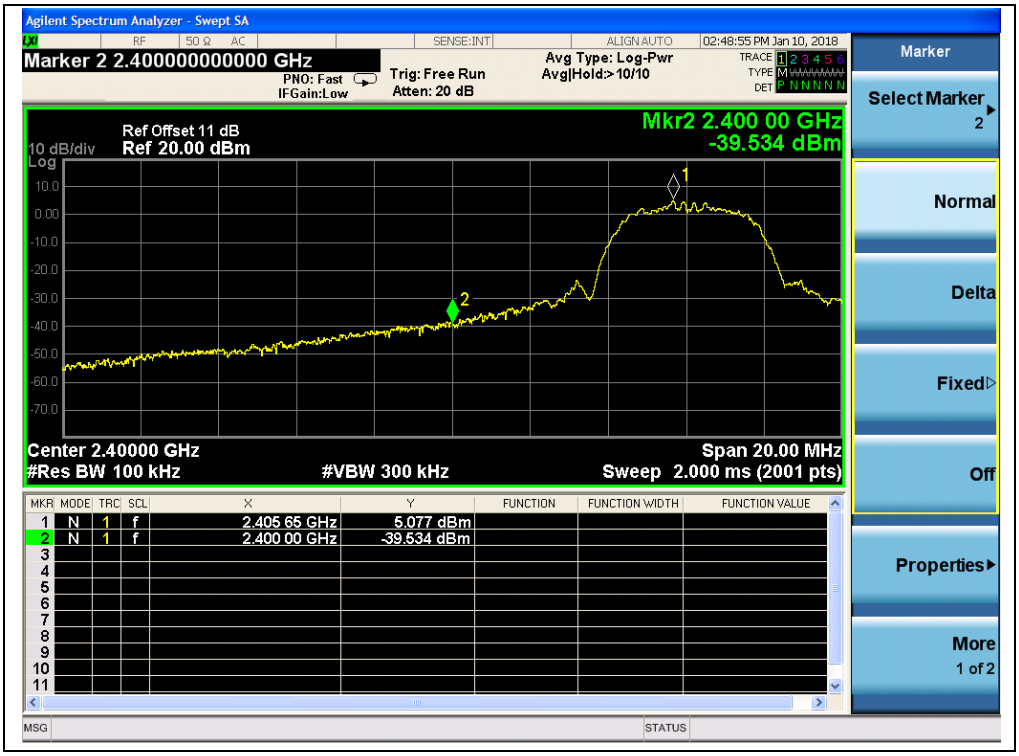
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2406	-43.22	4.27	-15.73	PASS
13	2442	-43.62	1.75	-18.25	PASS
24	2475	-43.75	1.09	-18.91	PASS

B. Test Plots:

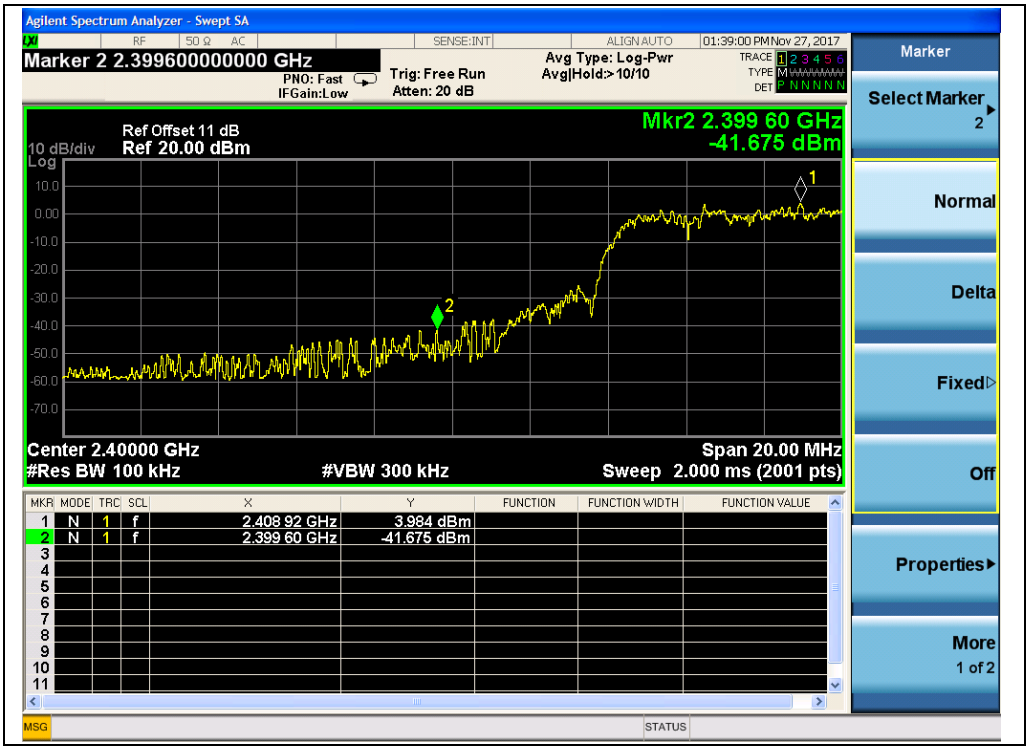
Note: the power of the Module transmitting frequency should be ignored.



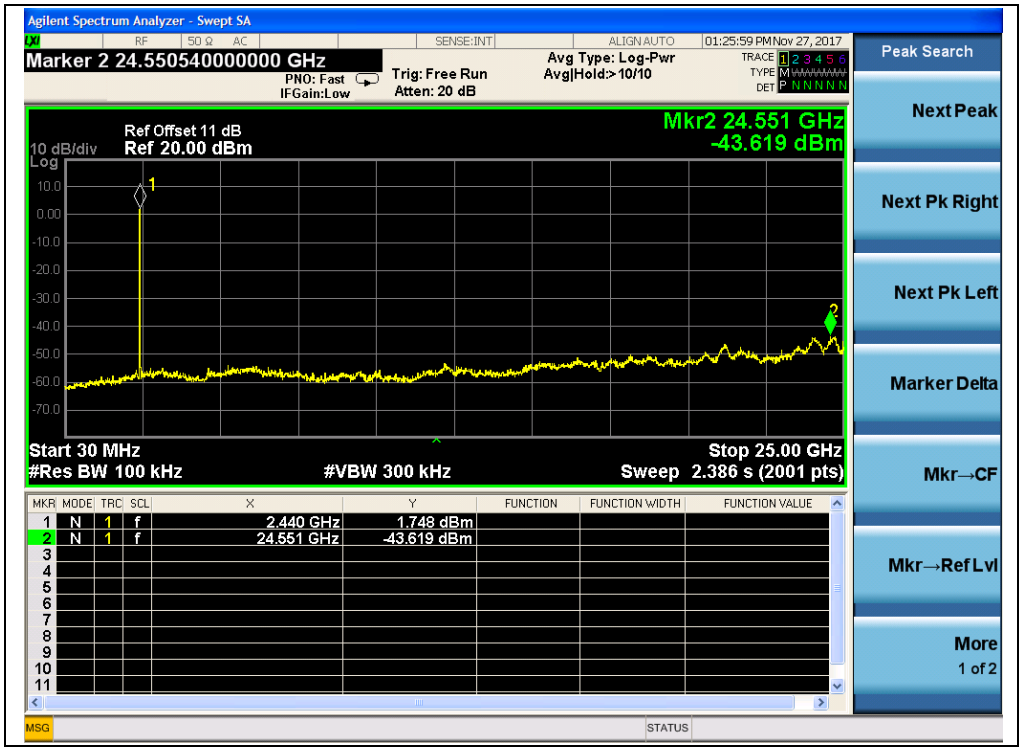
(BPSK, Channel = 1, 30MHz to 25GHz,)



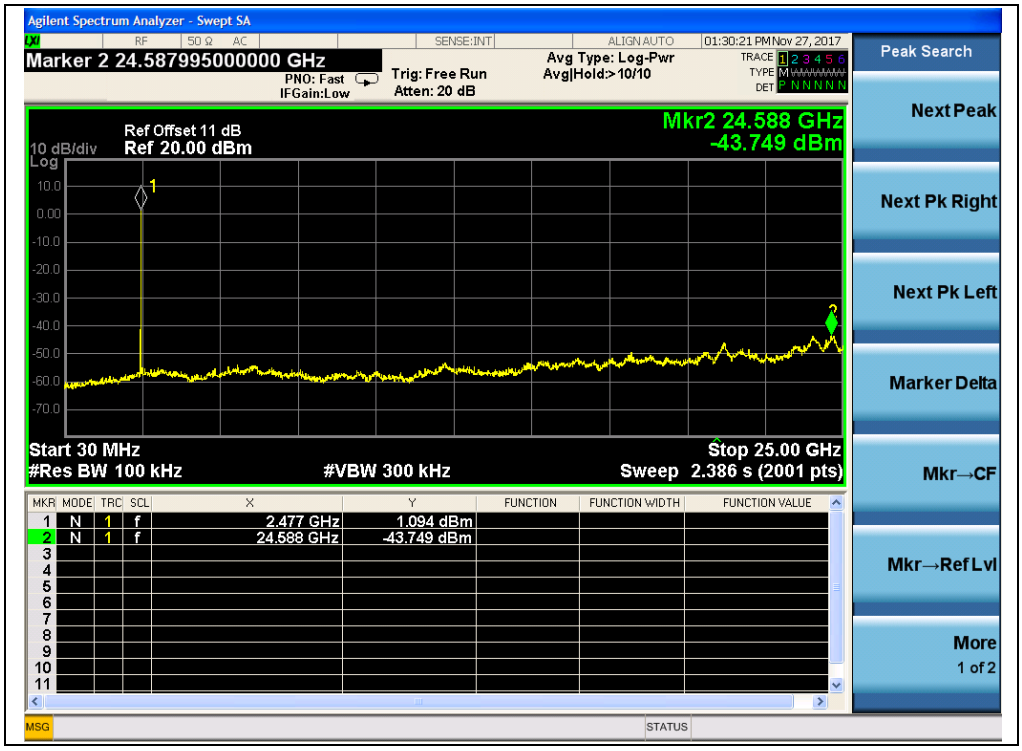
(BPSK, Channel = 1, Band edge)



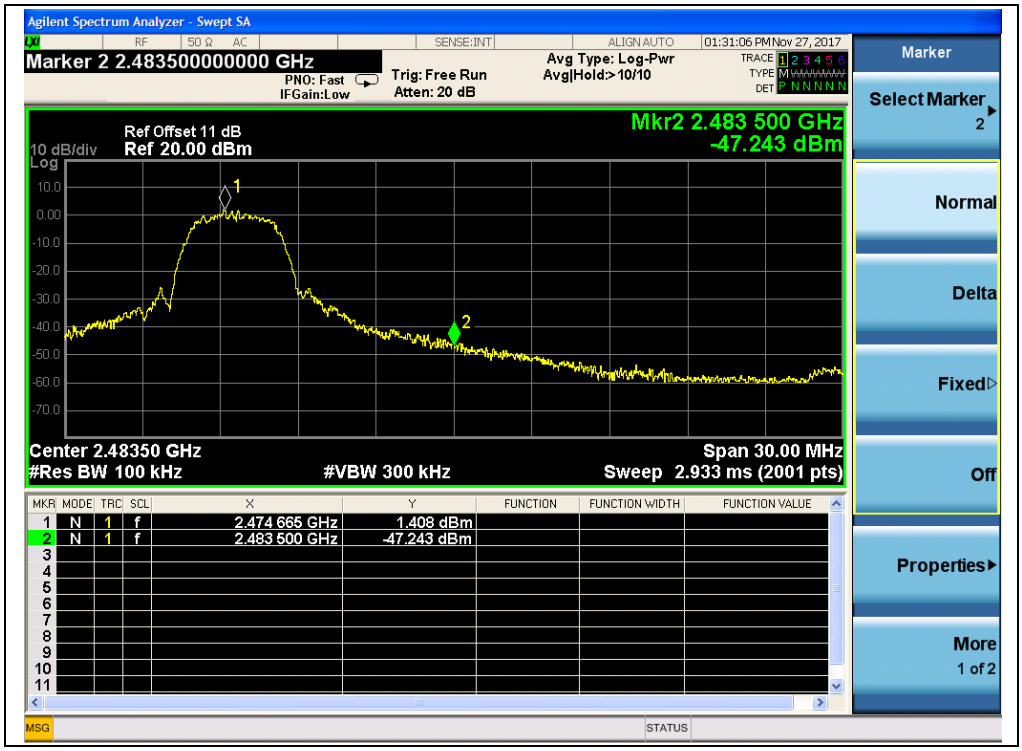
(BPSK, Channel = 1, Band edge with hopping on)



(BPSK, Channel = 13, 30MHz to 25GHz)



(BPSK Channel = 24, 30MHz to 25GHz)



(BPSK, Channel = 24, Band edge)

(BPSK ,Channel = 24, Band edge with hopping on)

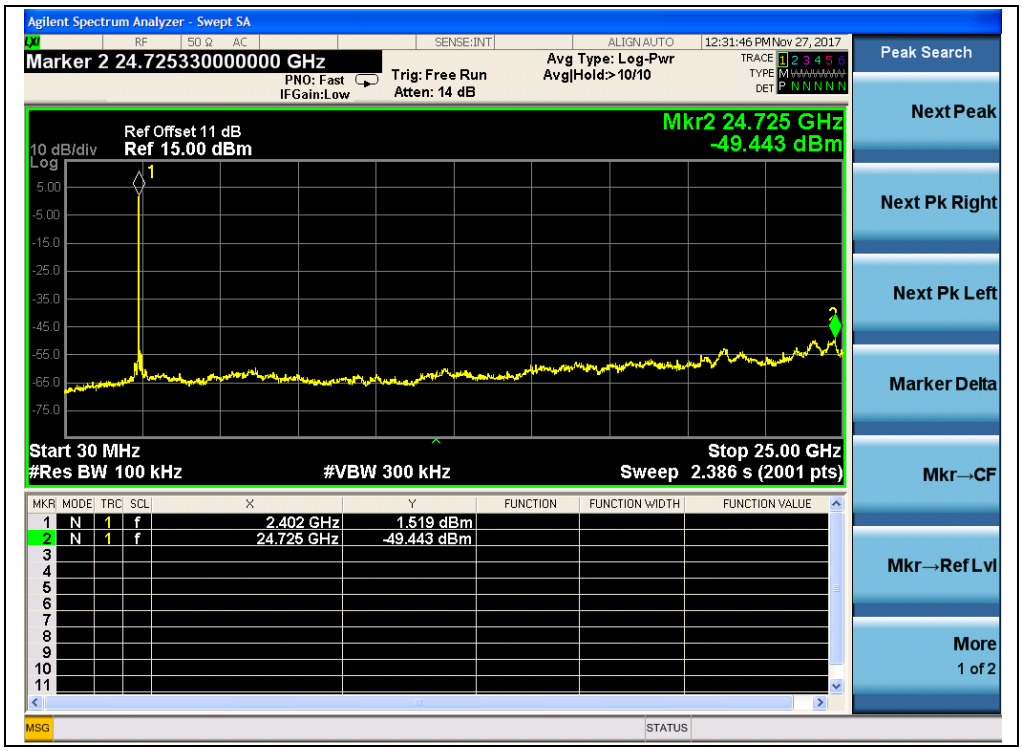
QPSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2406	-49.44	1.52	-18.48	PASS
13	2442	-48.96	0.70	-19.30	PASS
24	2475	-49.94	0.14	-19.86	PASS

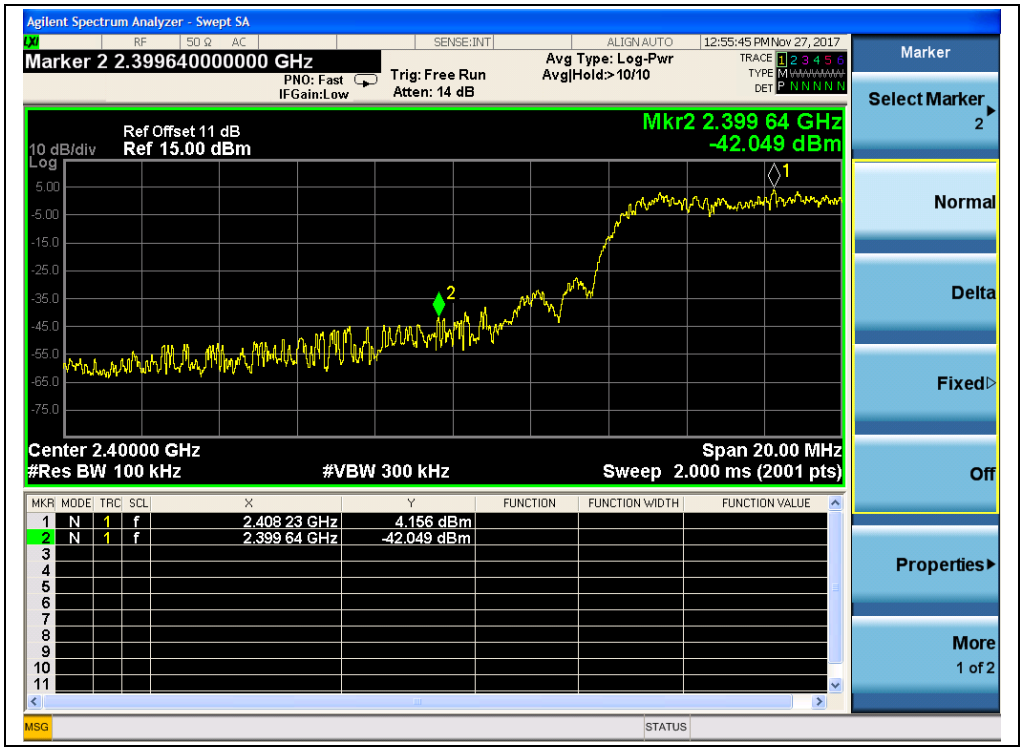
B. Test Plots:

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

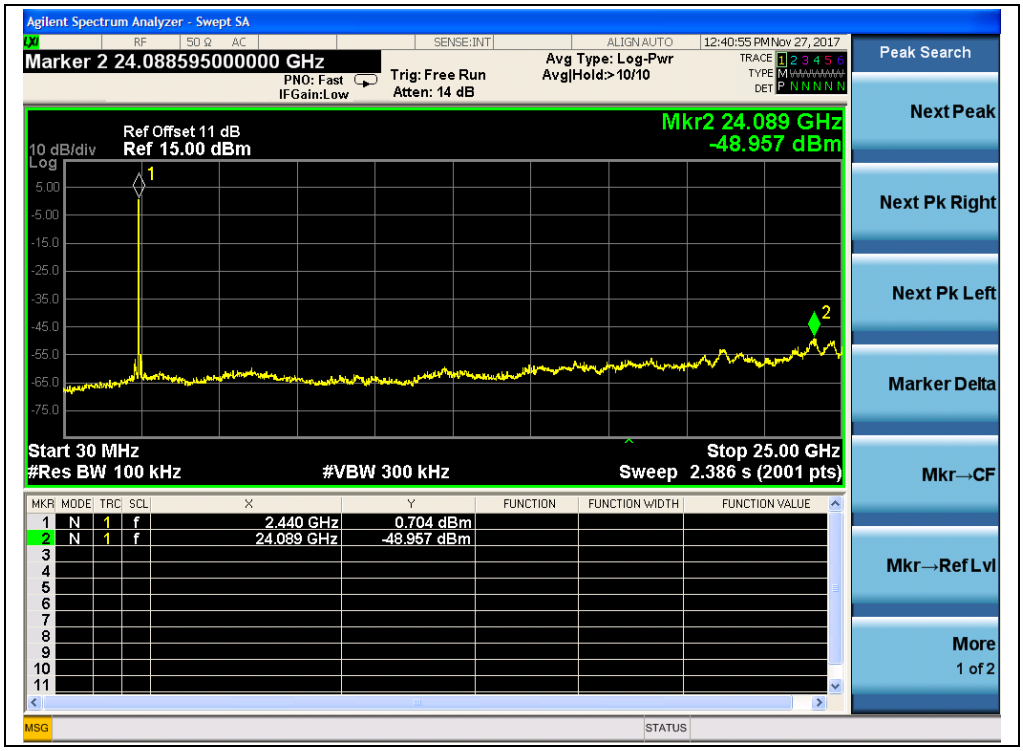


(QPSK, Channel = 1, 30MHz to 25GHz)

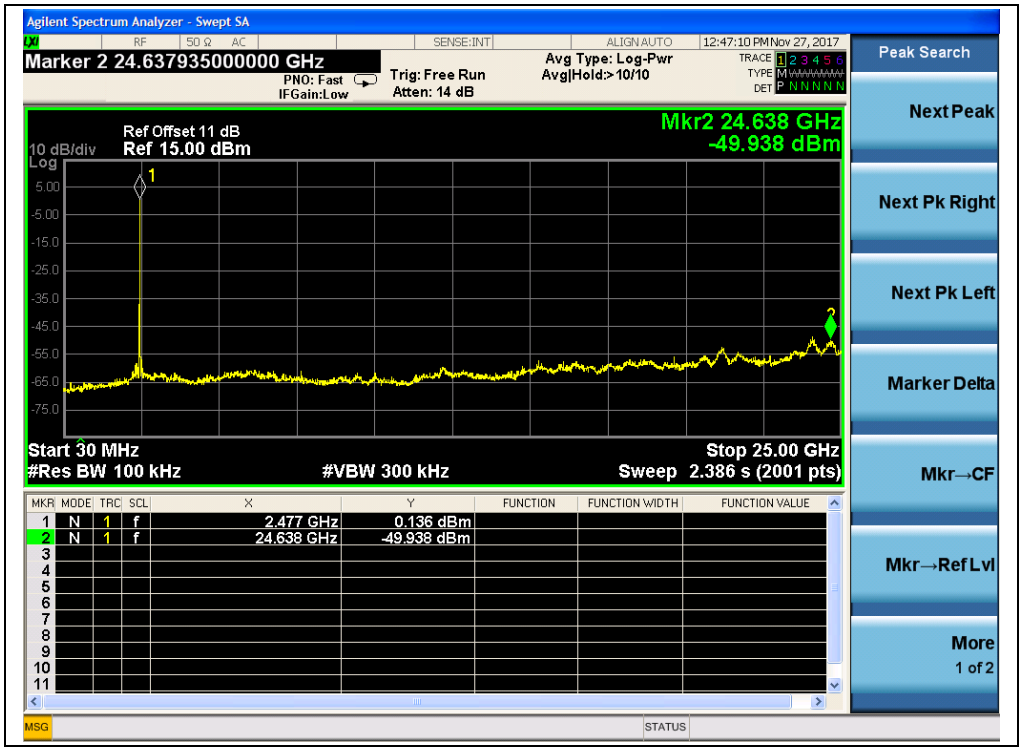
(QPSK, Channel = 1, Band edge)



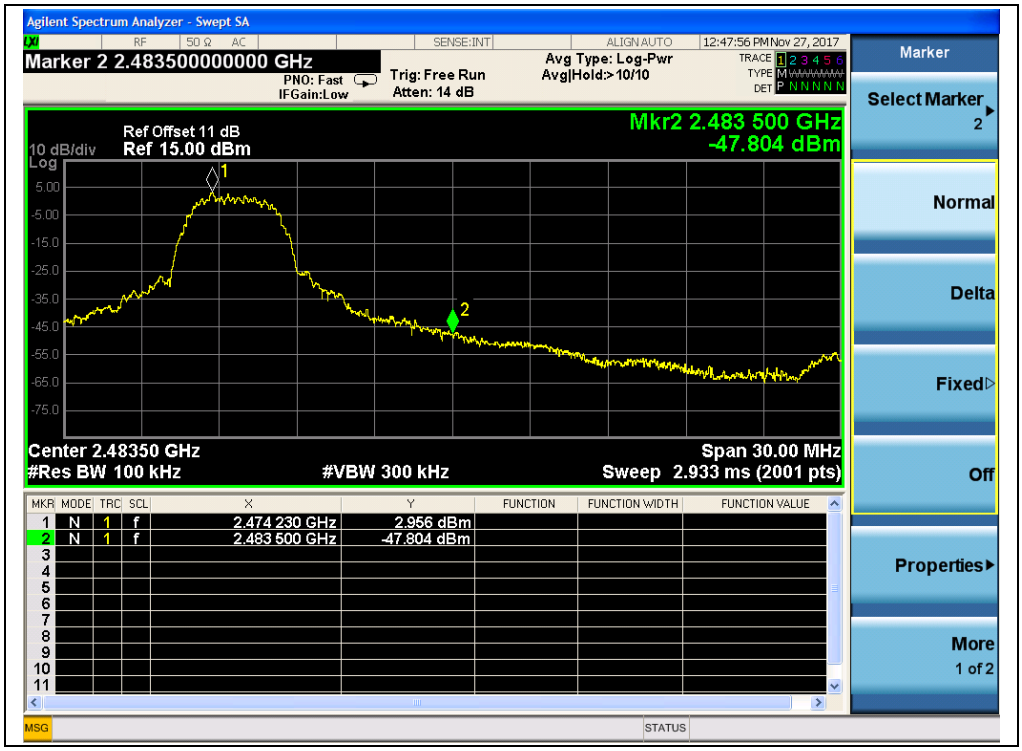
(QPSK, Channel = 1, Band edge with hopping on)



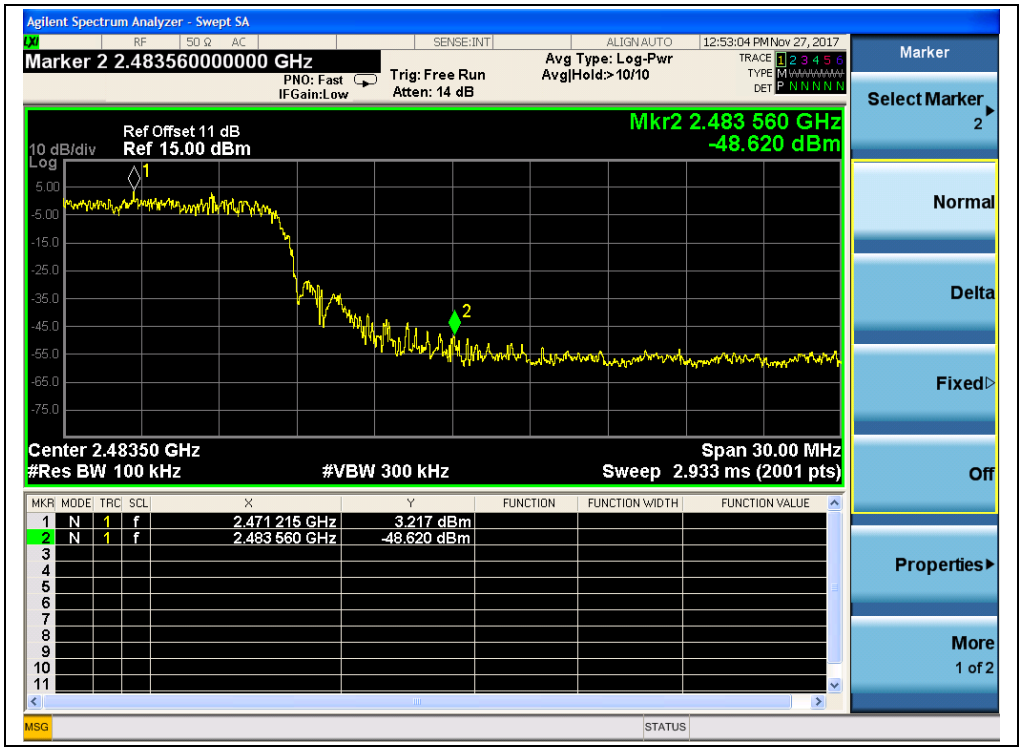
(QPSK, Channel = 13, 30MHz to 25GHz)



(QPSK, Channel = 24, 30MHz to 25GHz,)



(QPSK, Channel = 24, Band edge)



(QPSK, Channel = 24, Band edge with hopping on)

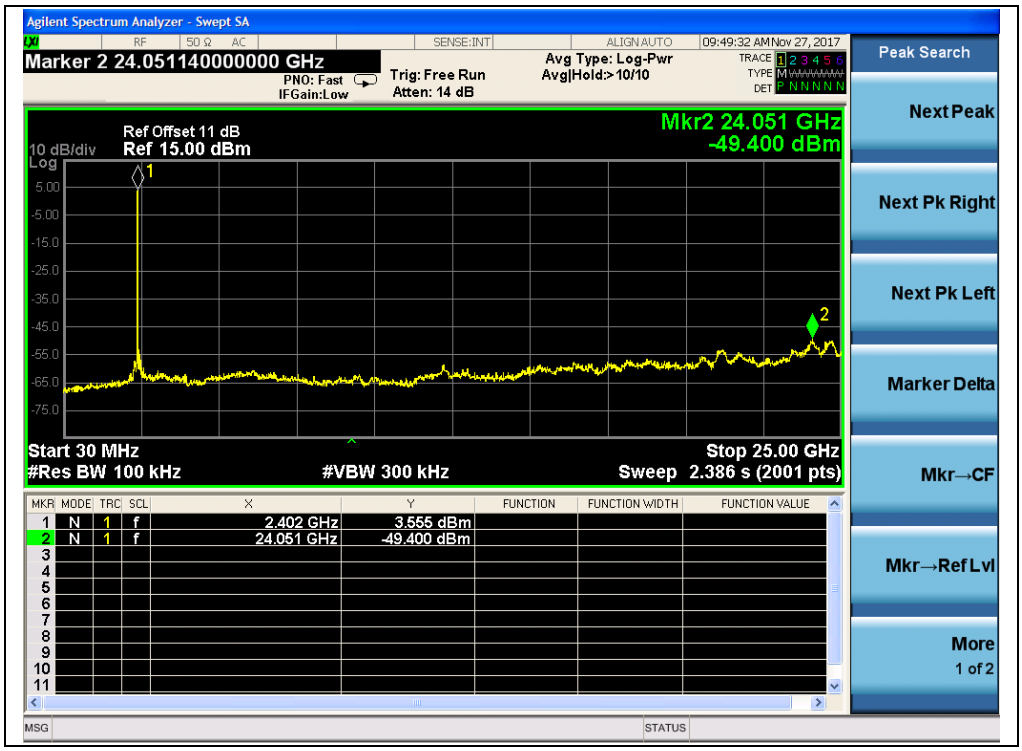
16QAM Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2406	-49.40	3.56	-16.44	PASS
13	2442	-48.94	1.86	-18.14	PASS
24	2475	-48.84	0.58	-19.42	PASS

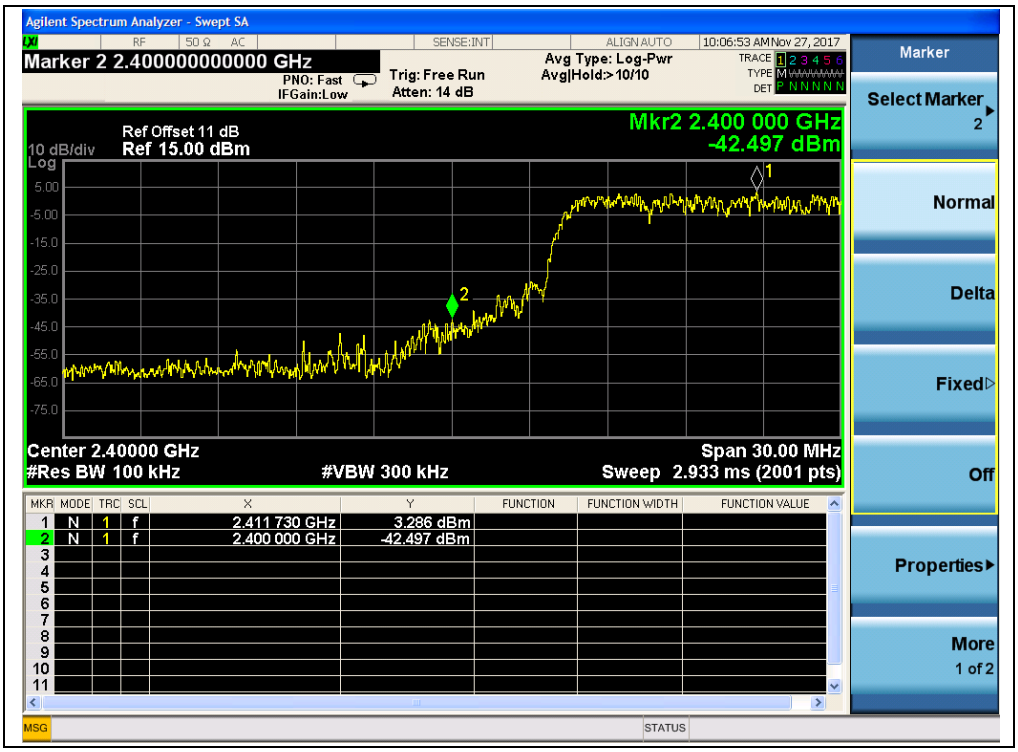
B. Test Plots:

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

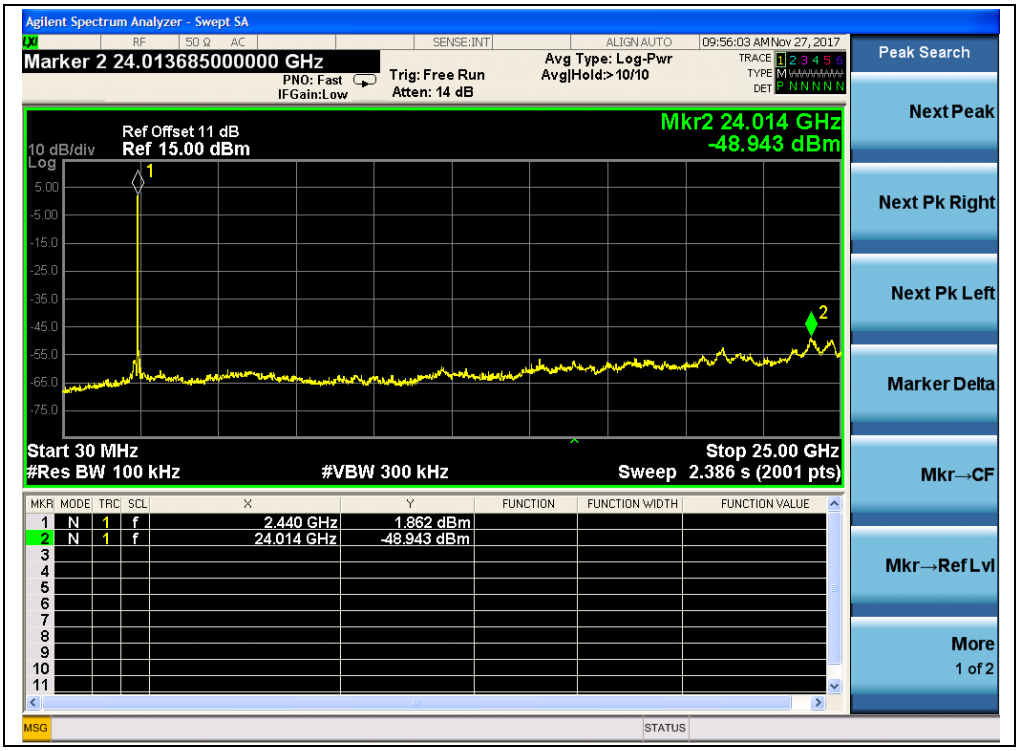


(16QAM, Channel = 1, 30MHz to 25GH)

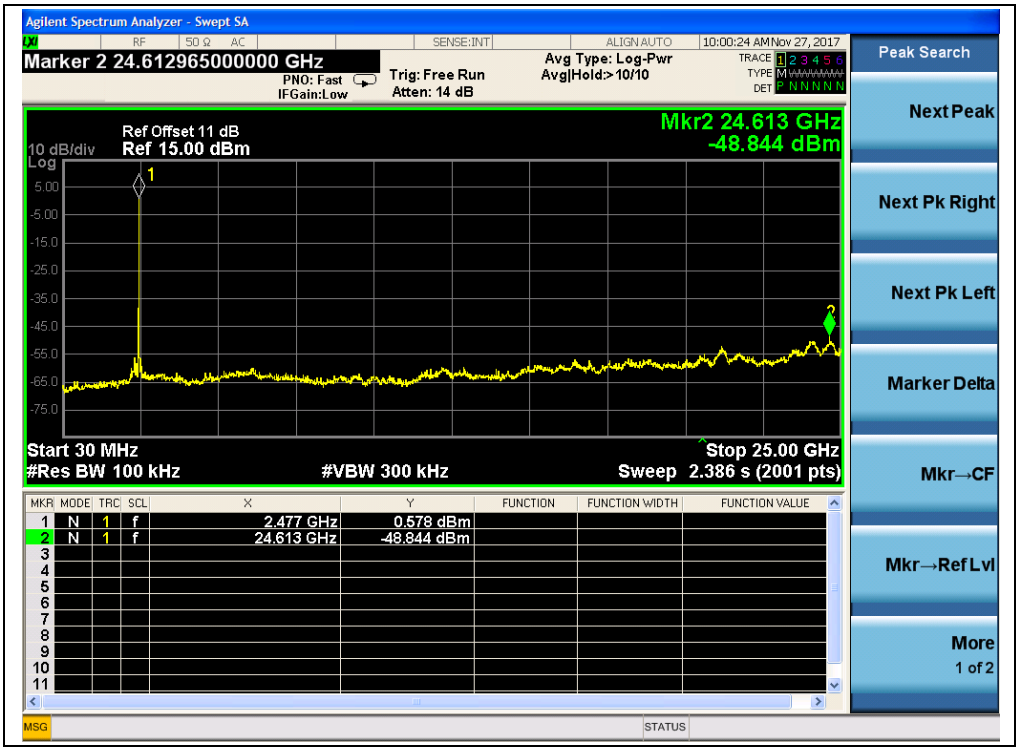
(16QAM, Channel = 1, Band edge)



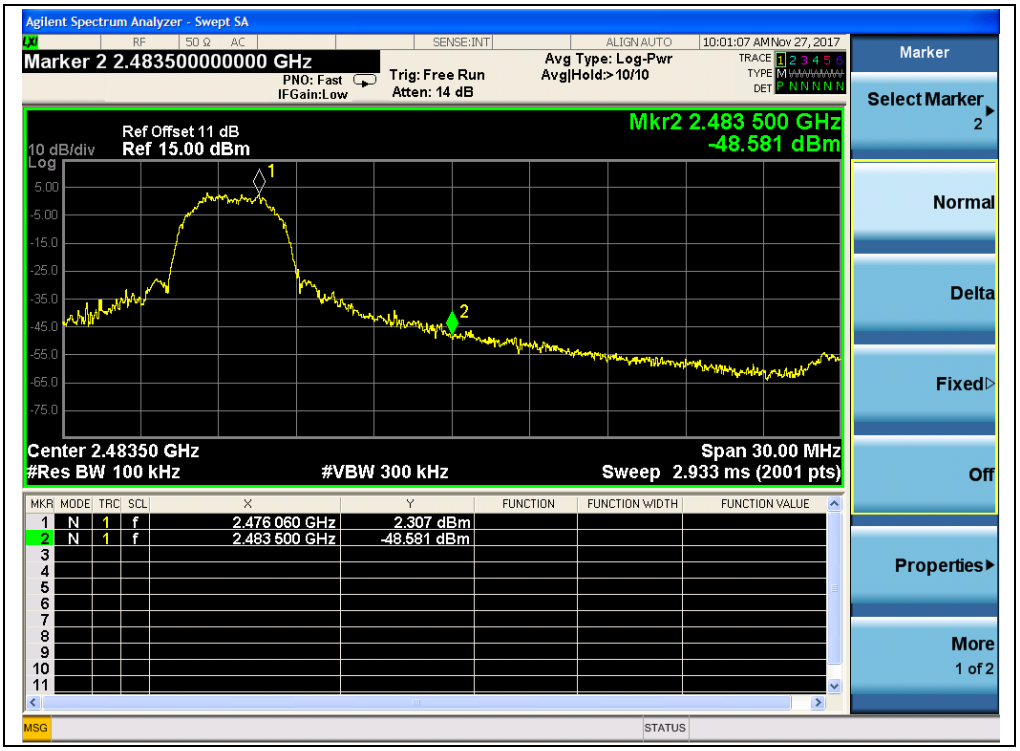
(16QAM, Channel = 1, Band edge with hopping on)



(16QAM, Channel = 24, 30MHz to 25GHz)



(16QAM, Channel = 24, 30MHz to 25GH)



(16QAM, Channel = 24, Band edge)

(16QAM, Channel = 24, Band edge with hopping on)

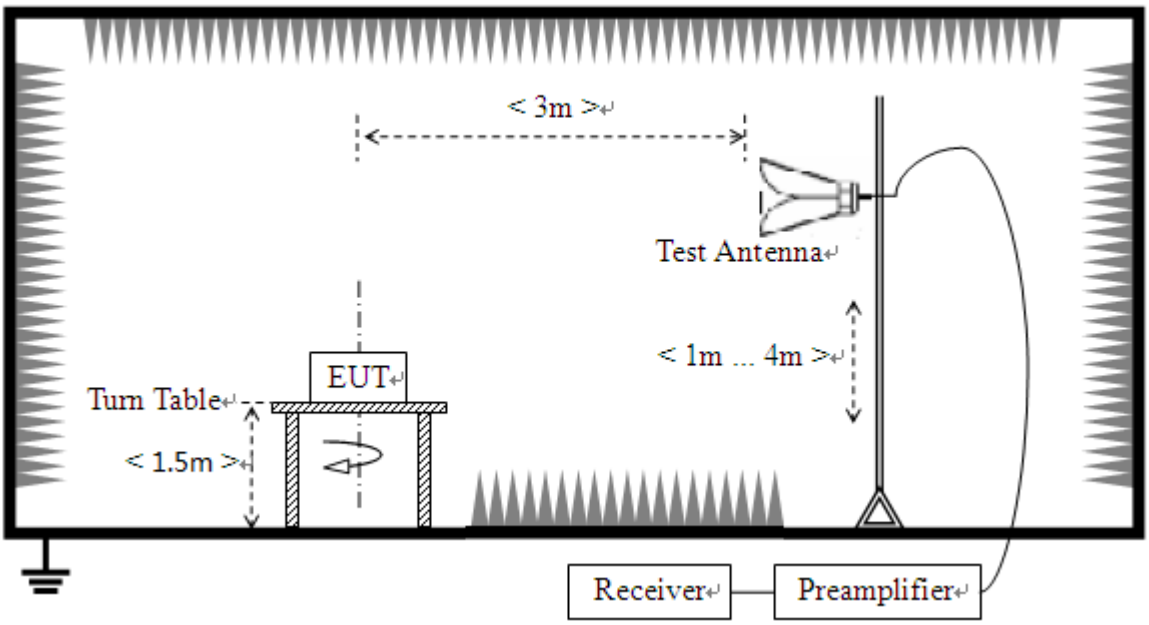
2.8. Restricted Frequency Bands

2.8.1. Requirement

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

2.8.2. Test Description

A. Test Setup:



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

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

B. Equipments List:

Please reference ANNEX A(1.5).

2.8.3. 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.

2.8.4. Test Result

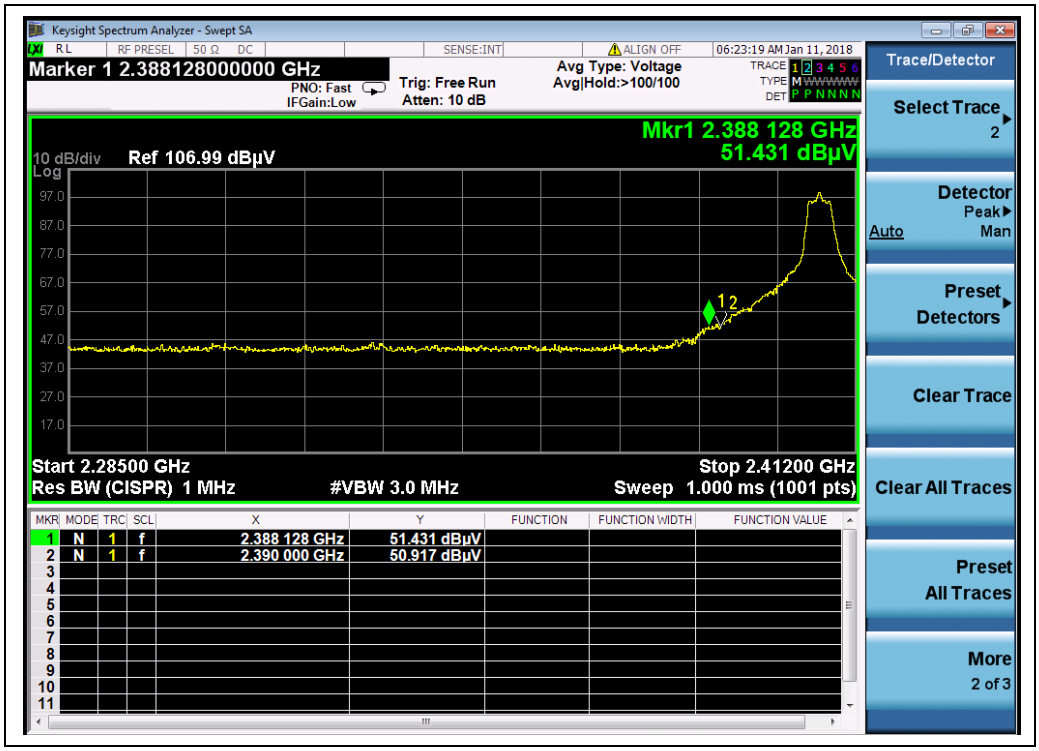
The lowest and highest channels are tested to verify Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] =U_R + A_T + A_{Factor} [dB]; AT =$L_{Cable\ loss}$ [dB]-G_{preamp} [dB]
AT: Total correction Factor except Antenna
UR: Receiver Reading
Gpreamp: Preamplifier Gain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

BPSK Mode

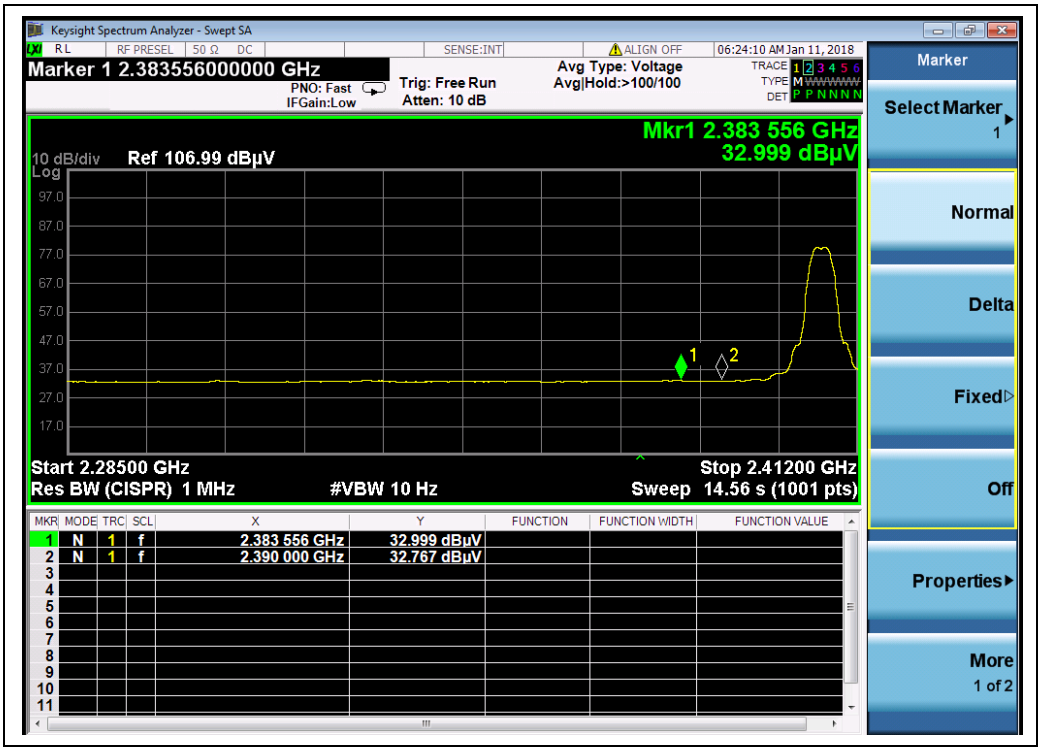
A. Test Verdict:

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
1	2388.13	PK	51.43	-33.63	32.56	50.36	74	Pass
1	2383.56	AV	33.00	-33.63	32.56	31.93	54	Pass
24	2484.33	PK	58.00	-33.18	32.5	57.32	74	Pass
24	2483.70	AV	33.00	-33.18	32.5	32.32	54	Pass

B. Test Plots:

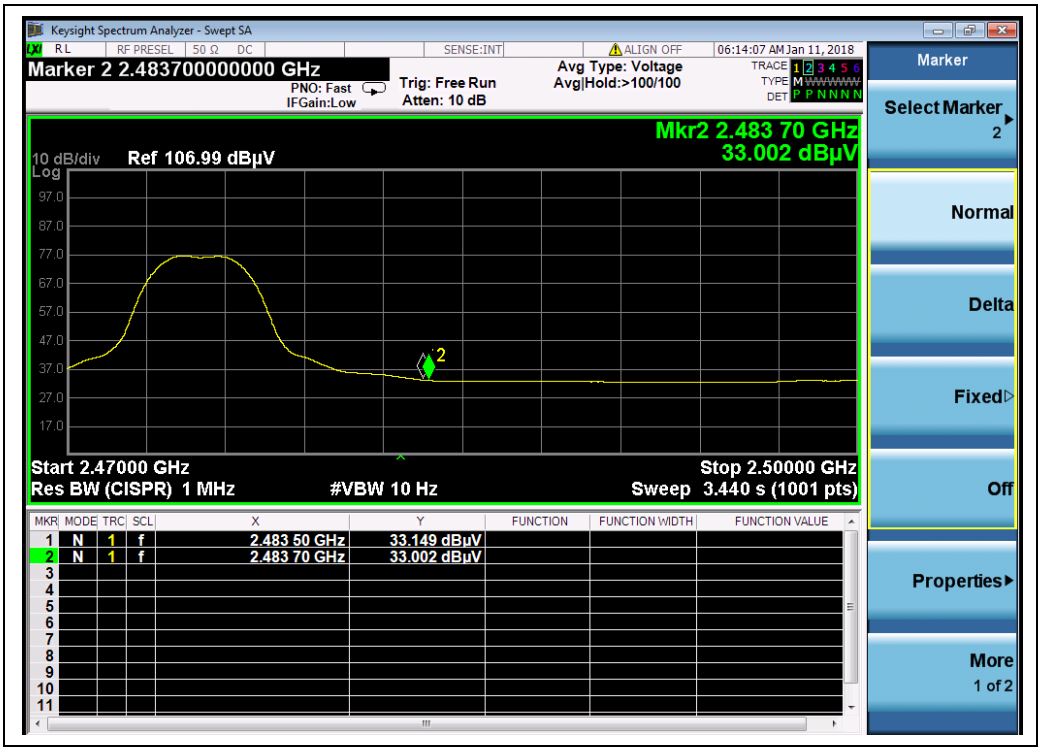


(Channel = 1, PEAK, BPSK)



(Channel = 1, AVERAGE, BPSK)

(Channel = 24, PEAK, BPSK)



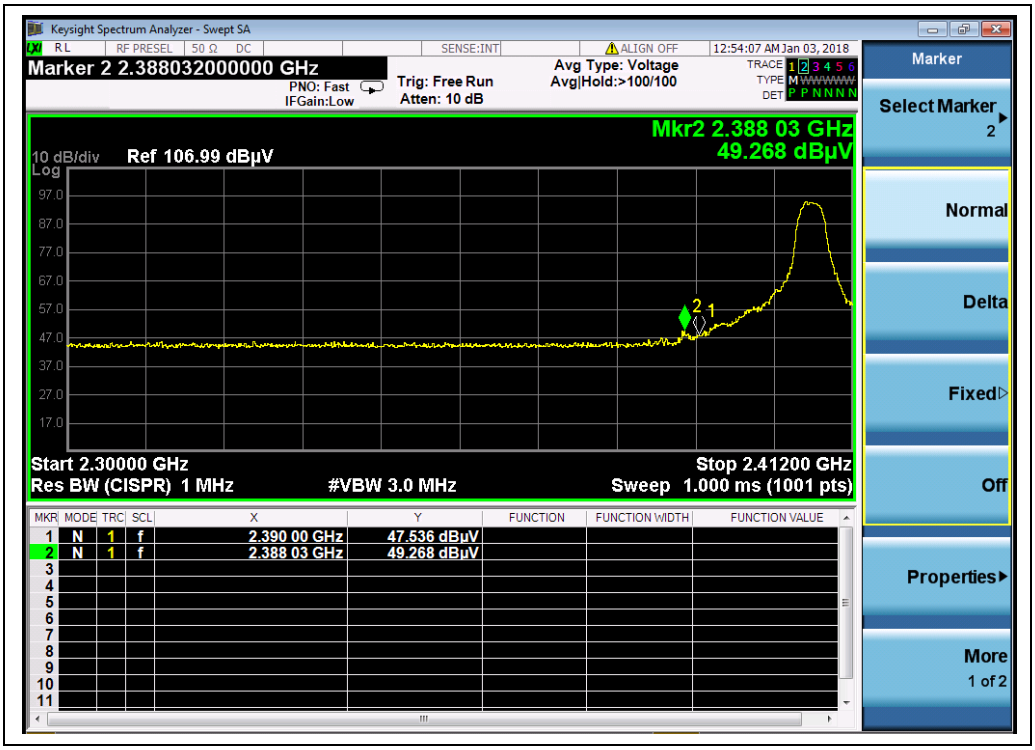
(Channel = 24, AVERAGE, BPSK)

QPSK Mode

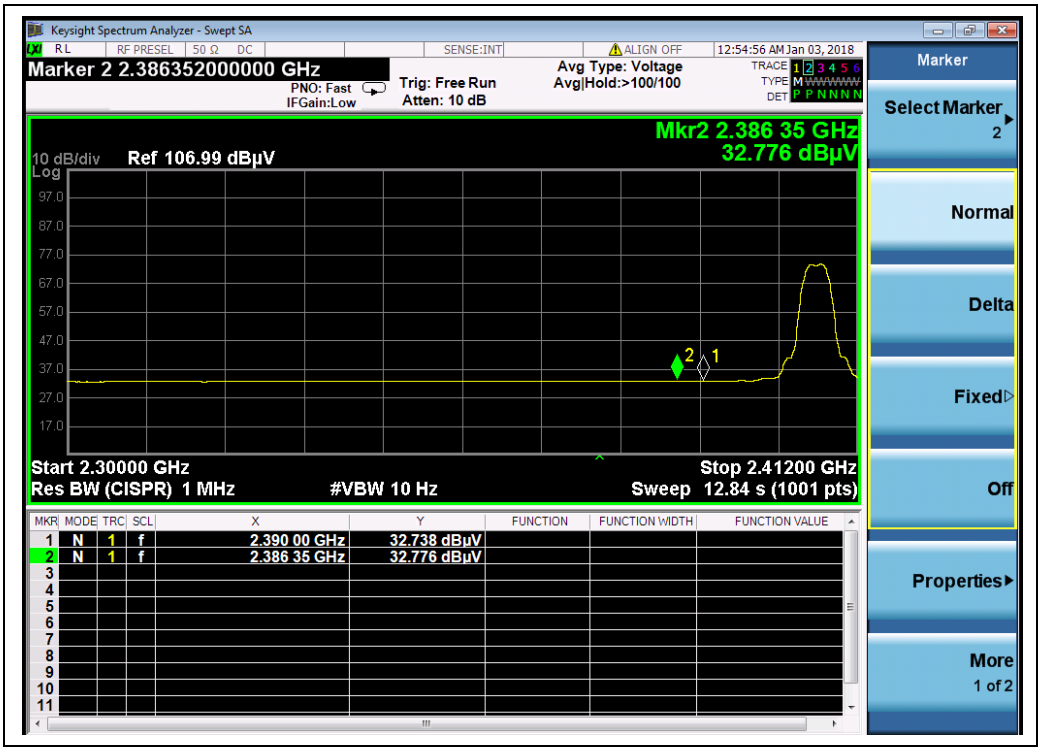
A. Test Verdict:

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
1	2388.03	PK	49.27	-33.63	32.56	48.20	74	Pass
1	2386.35	AV	32.78	-33.63	32.56	31.71	54	Pass
24	2484.24	PK	50.54	-33.18	32.5	49.86	74	Pass
24	2484.21	AV	32.60	-33.18	32.5	31.92	54	Pass

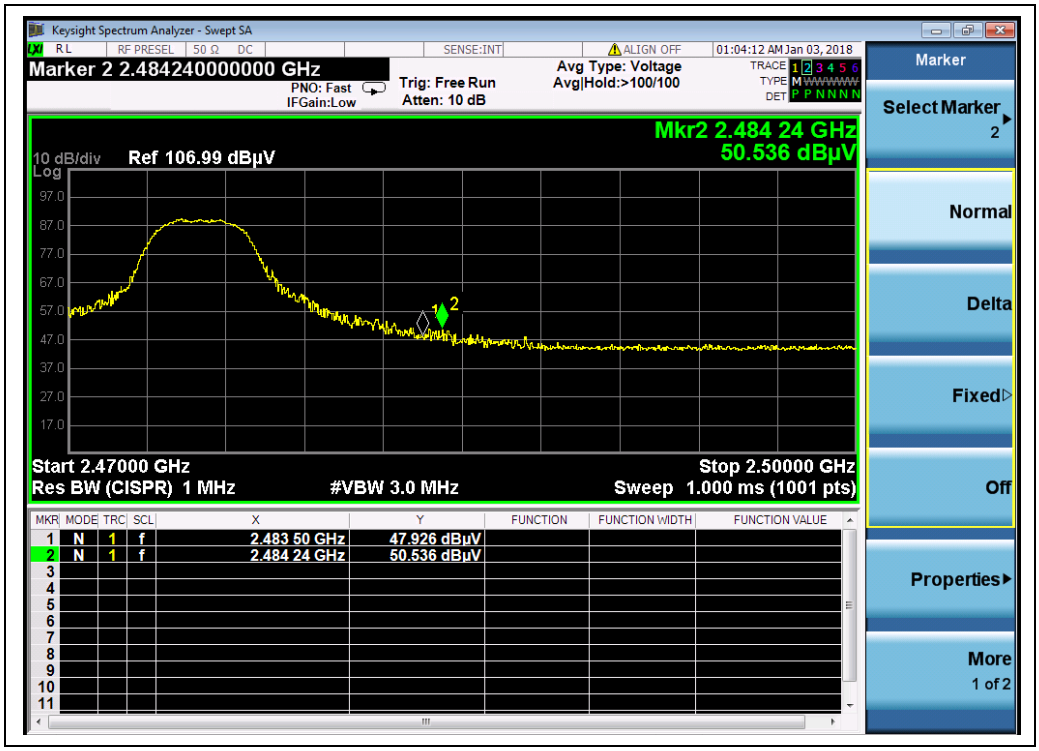
B. Test Plots:



(Channel = 1, PEAK, QPSK)



(Channel = 1, AVERAGE, QPSK)



(Channel = 24, PEAK, QPSK)

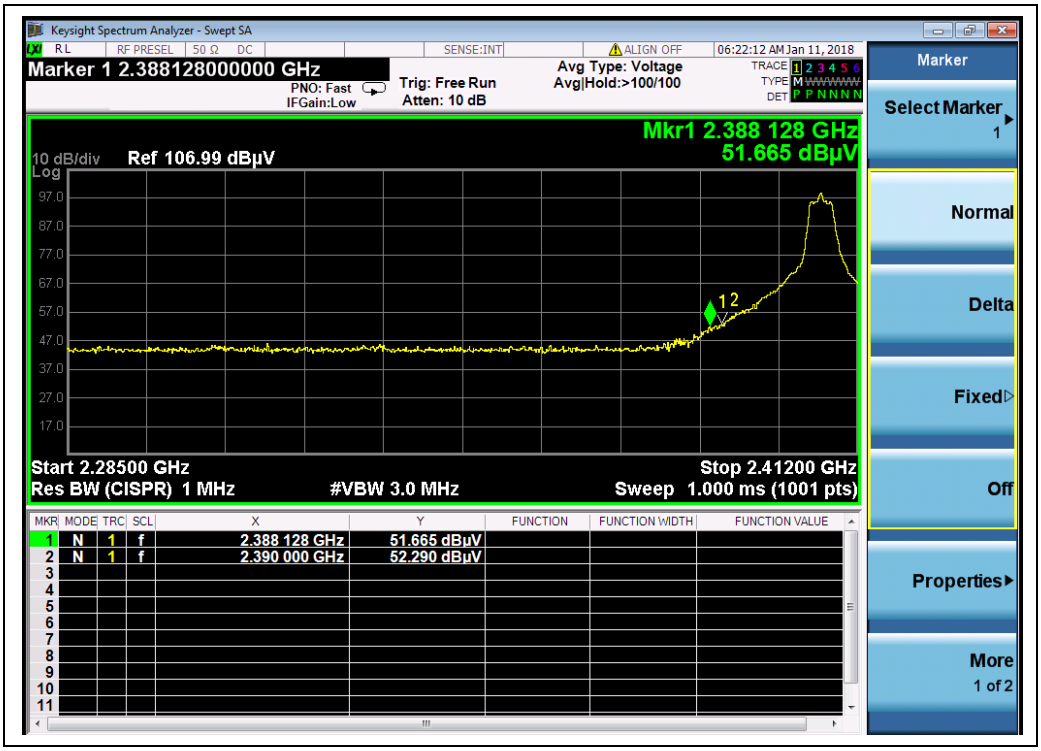
(Channel = 24, AVERAGE, QPSK)

16QAM Mode

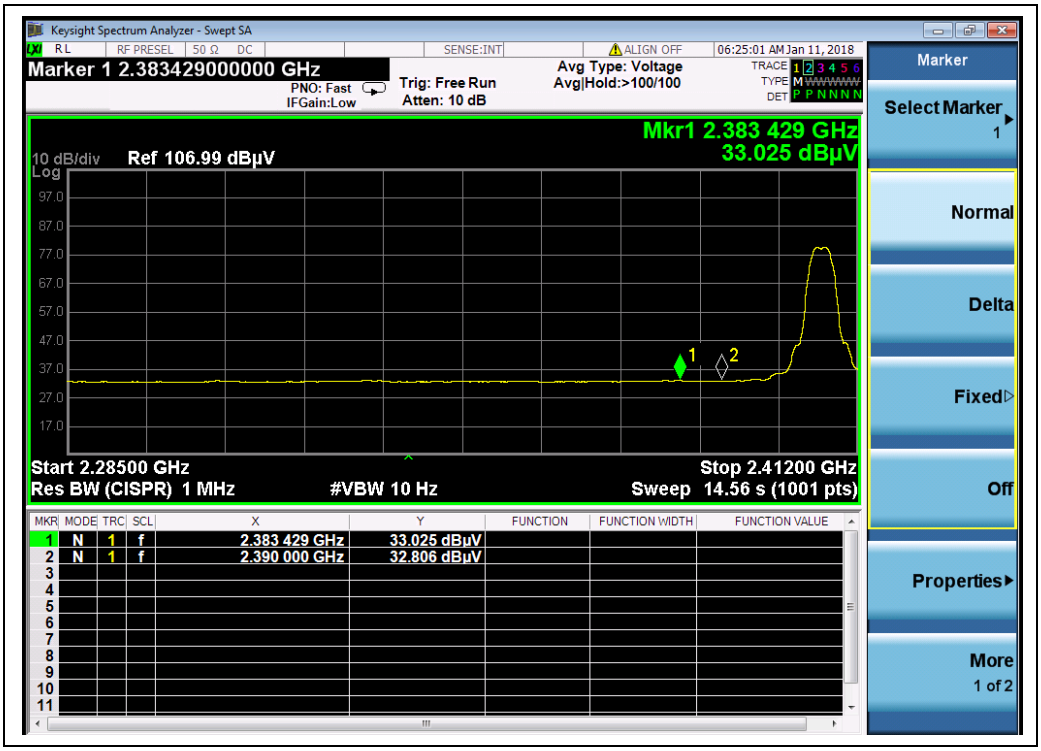
A. Test Verdict:

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						
1	2388.13	PK	51.67	-33.63	32.56	50.60	74	Pass
1	2383.43	AV	33.03	-33.63	32.56	31.96	54	Pass
24	2483.64	PK	59.24	-33.18	32.5	58.56	74	Pass
24	2483.82	AV	32.94	-33.18	32.5	32.26	54	Pass

B. Test Plots:

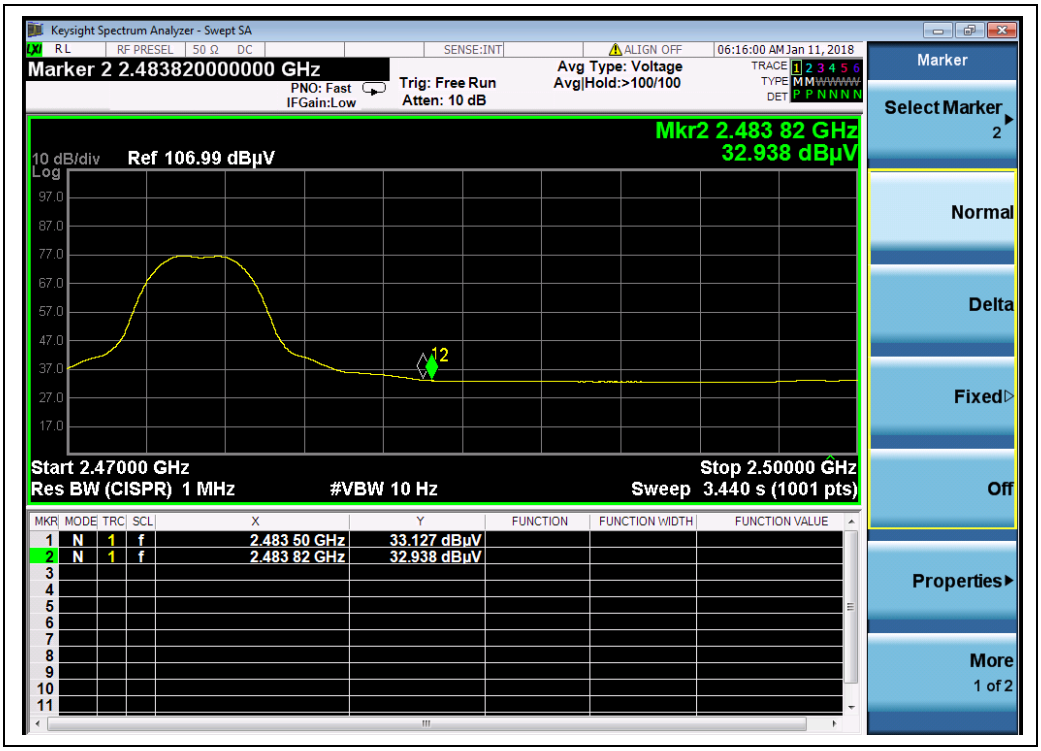


(Channel = 1, PEAK, 16QAM)



(Channel = 1, AVERAGE, 16QAM)

(Channel = 24, PEAK, 16QAM)



(Channel = 24, AVERAGE, 16QAM)

2.9. Conducted Emission

2.9.1. Requirement

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

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

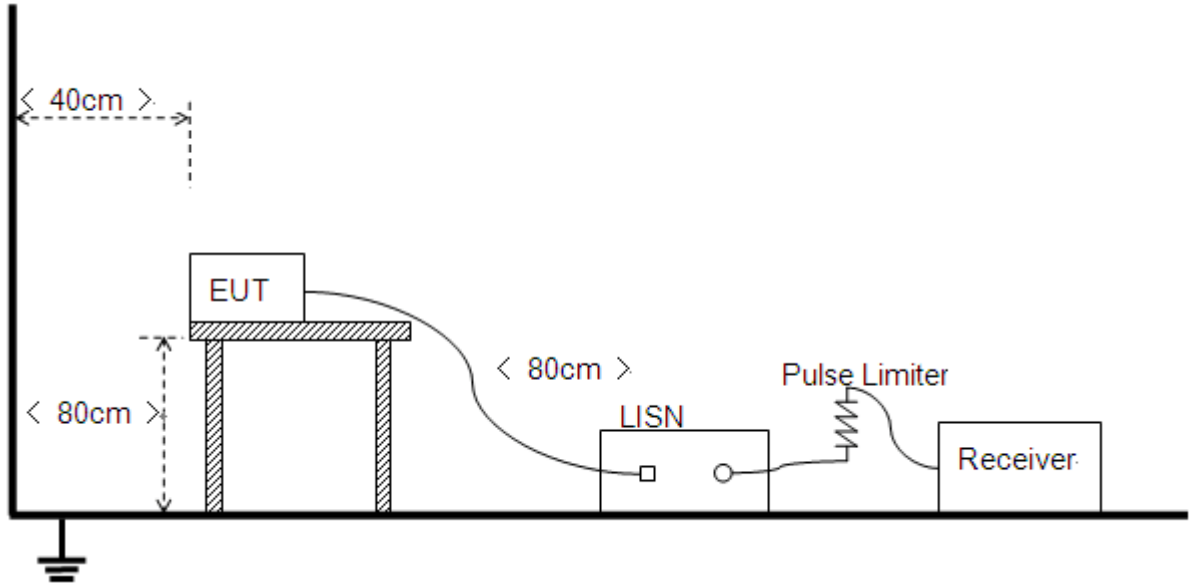
NOTE:

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

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

2.9.2. Test Description

A. Test Setup:



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

The factors of the site are calibrated to correct the reading. During the measurement, the Bluetooth

EUT is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under hopping-on test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Please reference ANNEX A(1.5).

2.9.3. Test Result

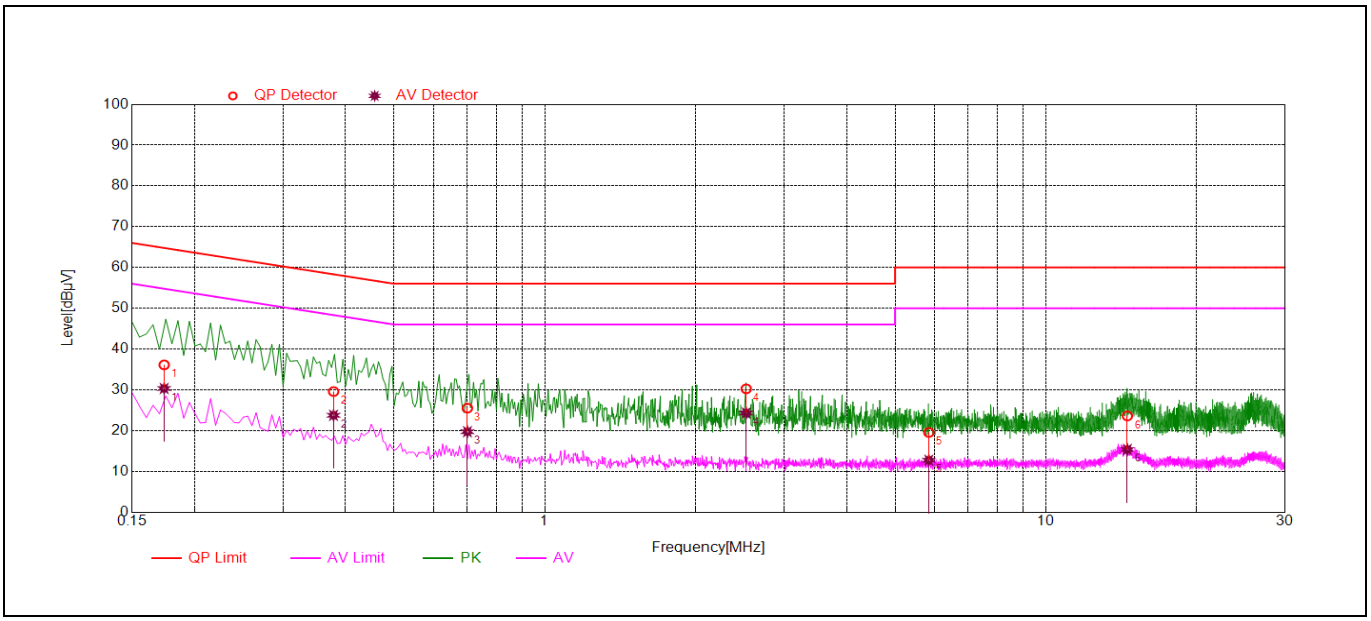
The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT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

A. Test setup:

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

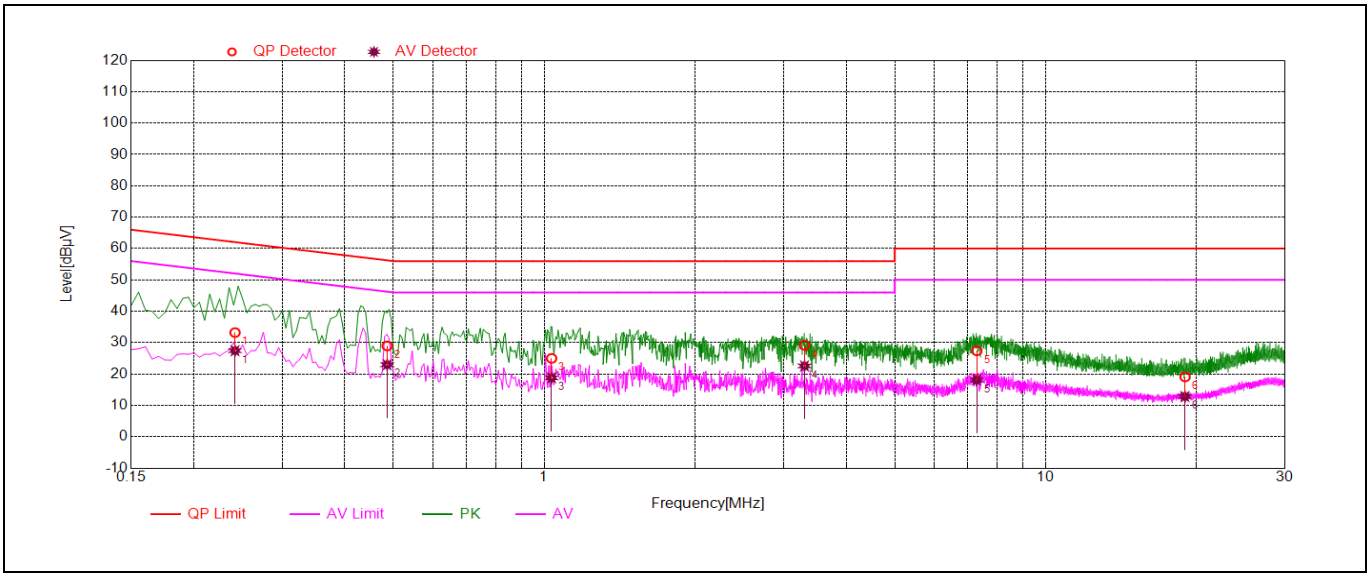
Note: The test voltage is AC 120V/60Hz.

B. Test Plots:



(Plot A: L Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.17	36.11	30.32	64.78	54.78	Line	PASS
2	0.38	29.56	23.75	58.32	48.32		PASS
3	0.70	25.51	19.72	56.00	46.00		PASS
4	2.52	30.23	24.31	56.00	46.00		PASS
5	5.84	19.53	12.73	60.00	50.00		PASS
6	14.55	23.59	15.35	60.00	50.00		PASS



(Plot B: N Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.24	33.21	27.44	62.05	52.05	Neutral	PASS
2	0.29	28.97	22.96	56.24	46.24		PASS
3	1.03	24.98	18.79	56.00	46.00		PASS
4	3.30	29.16	22.57	56.00	46.00		PASS
5	7.29	27.40	18.09	60.00	50.00		PASS
6	18.97	19.08	12.79	60.00	50.00		PASS

2.10. Radiated Emission

2.10.1. Requirement

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

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

Note:

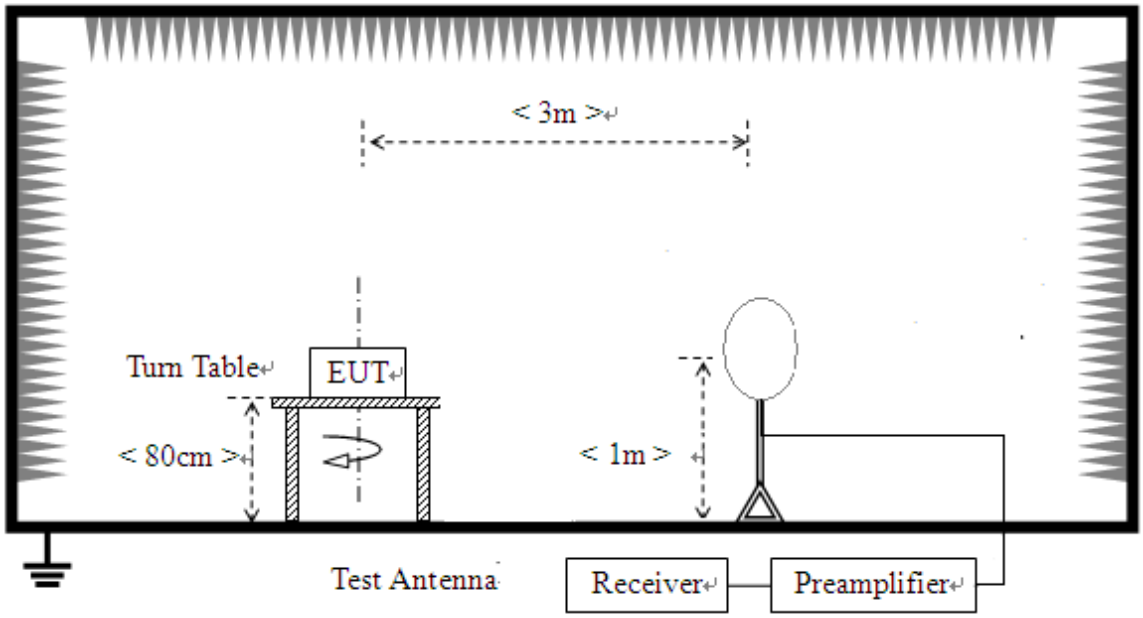
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength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

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

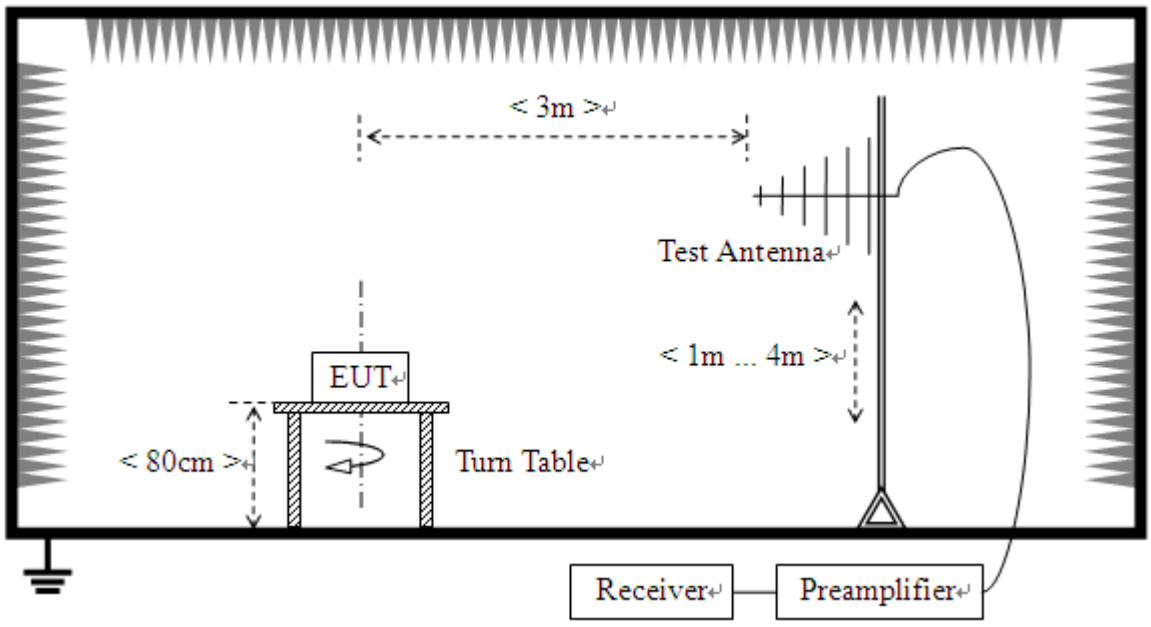
2.10.2. Test Description

A. Test Setup:

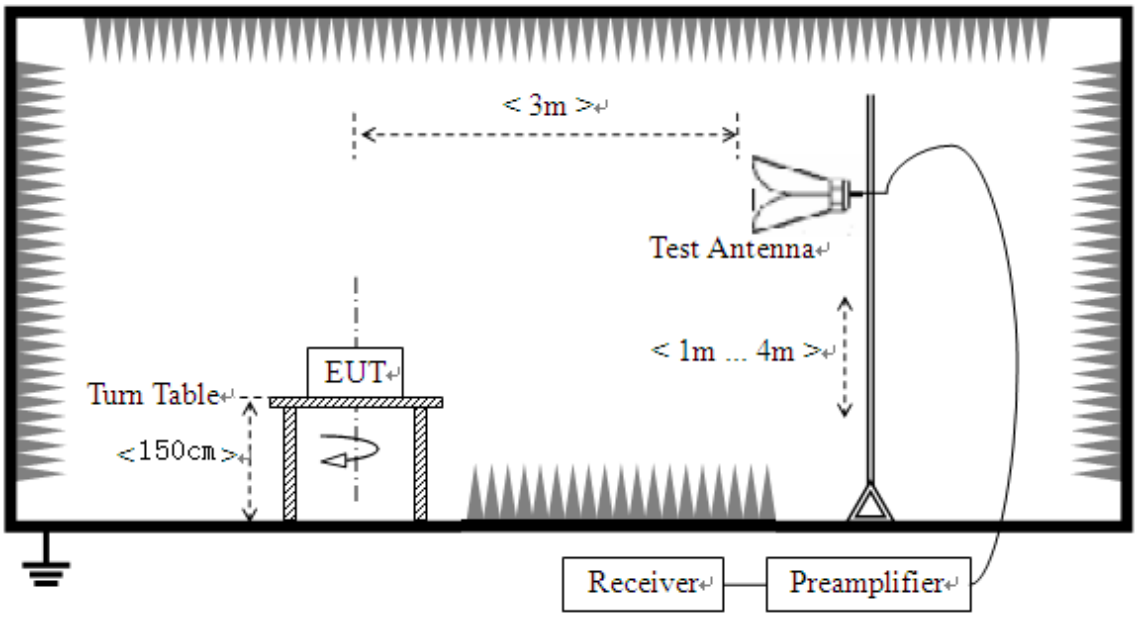
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



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

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

The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

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

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

B. Equipments List:

Please reference ANNEX A(1.5).

2.10.3. Test Procedure

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

2.10.4. Test Result

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

The measurement results are obtained as below:

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

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

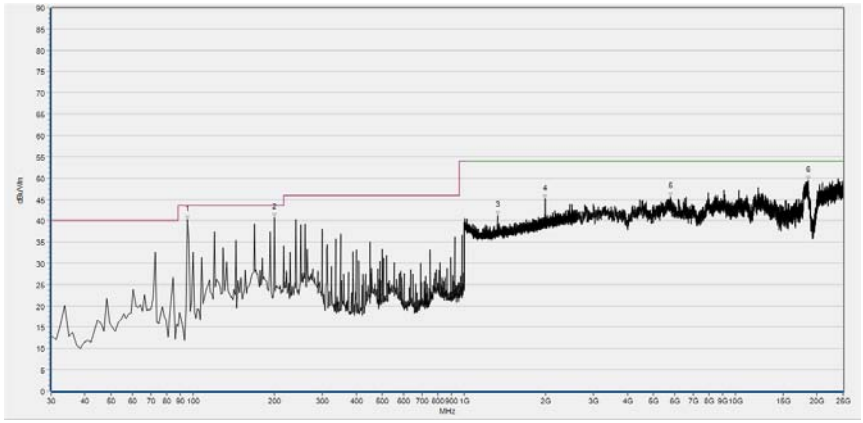
During the test, the total correction Factor AT and A_{Factor} were built in test software.

Note: 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.

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

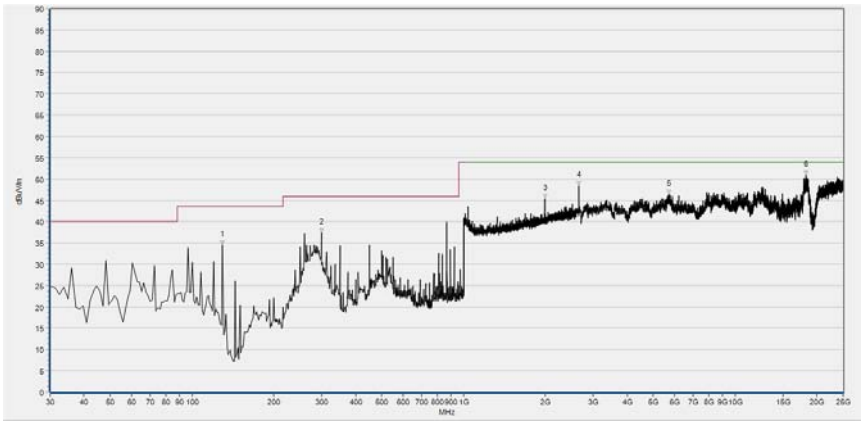
BPSK Mode：

Plots for Channel = 1



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.557	41.22	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
199.962	40.71	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
1327.811	41.28	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
1991.757	45.16	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
5761.011	45.56	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
18576.141	49.52	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS

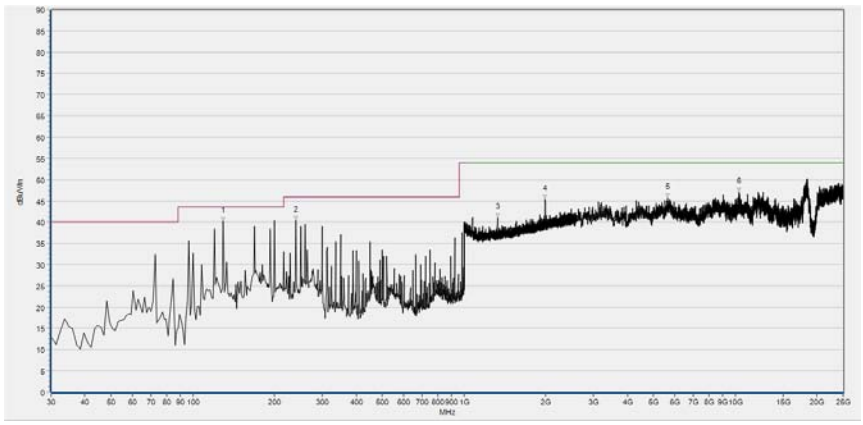
(30MHz to 25GHz, Antenna Horizontal, BPSK)



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
129.549	34.59	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
299.512	37.38	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1992.397	45.46	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
2657.029	48.45	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
5716.203	46.44	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
18278.778	50.99	N/A	N/A	74.0	N/A	54.00	Vertical	PASS

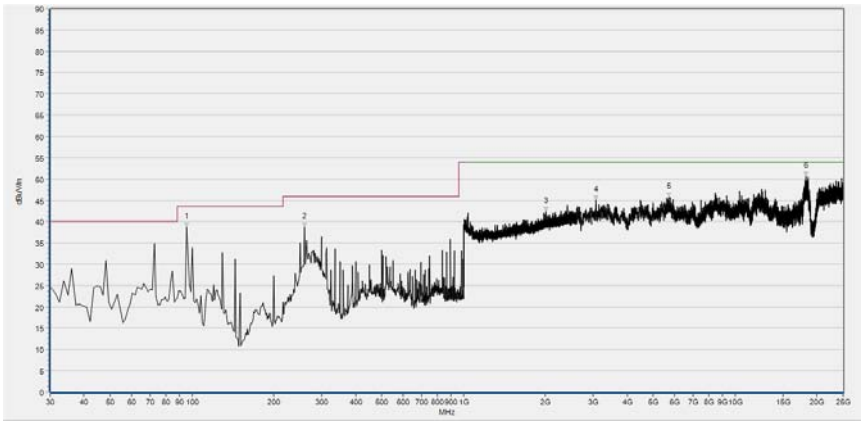
(30MHz to 25GHz, Antenna Vertical, BPSK)

Plot for Channel = 13



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
129.549	40.21	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
240.025	40.37	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1327.811	41.10	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
1991.757	45.37	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
5642.881	45.81	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
10311.075	47.03	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS

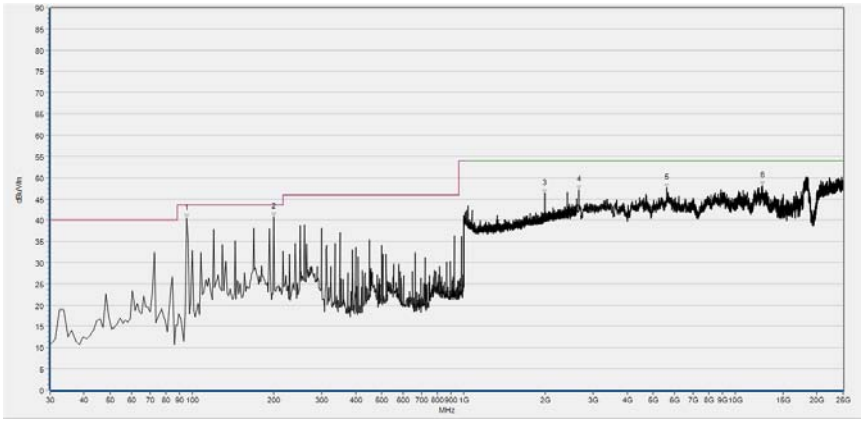
(30MHz to 25GHz, Antenna Horizontal, BPSK)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.557	38.65	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
259.449	38.65	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2005.202	42.38	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
3072.522	45.08	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
5683.615	45.70	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
18213.602	50.62	N/A	N/A	74.0	N/A	54.00	Vertical	PASS

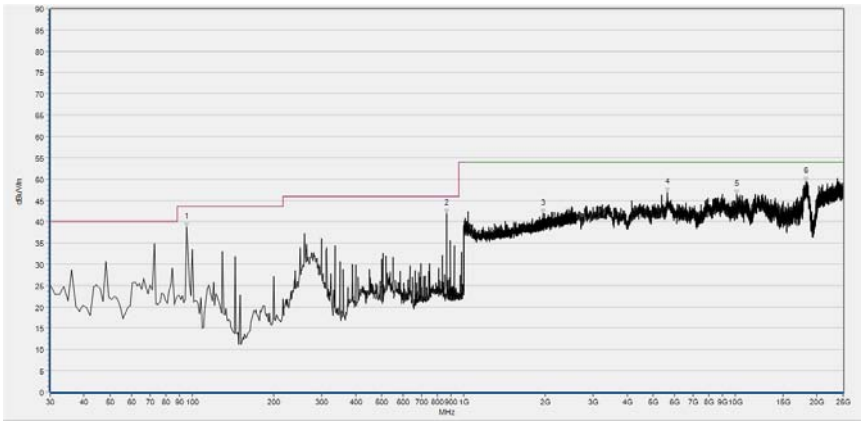
(30MHz to 25GHz, Antenna Vertical, BPSK)

Plot for Channel = 24



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.557	41.37	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
199.962	40.79	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
1991.757	46.25	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
2657.029	47.05	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
5606.219	47.52	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
12584.070	48.05	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS

(30MHz to 25GHz, Antenna Horizontal, BPSK)

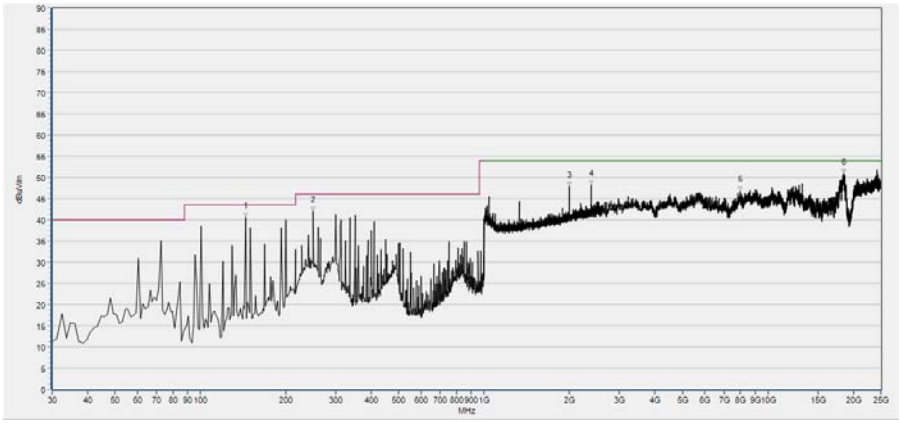


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.557	38.64	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
865.244	41.97	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1963.585	41.88	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
5618.440	46.87	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
10139.989	46.35	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
18270.631	49.44	N/A	N/A	74.0	N/A	54.00	Vertical	PASS

(30MHz to 25GHz, Antenna Vertical, BPSK)

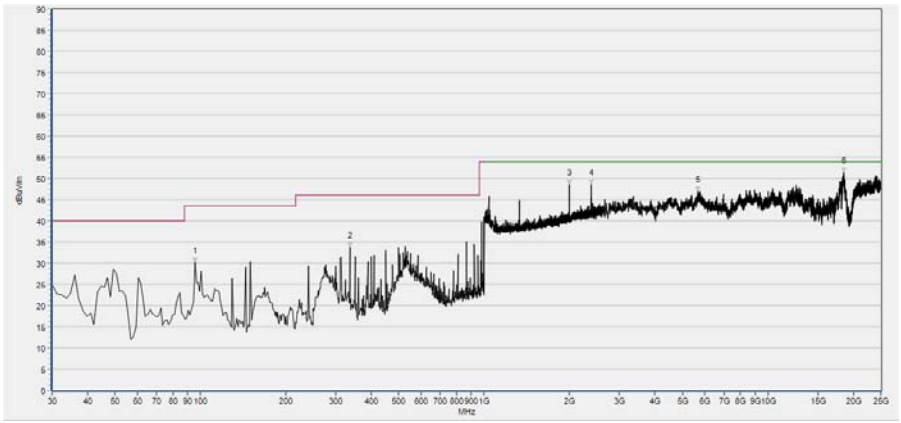
QPSK Mode：

Plots for Channel = 1



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
144.118	40.46	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
249.737	41.93	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1992.397	47.80	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
2384.234	48.24	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
7976.978	46.74	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
18555.774	50.96	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS

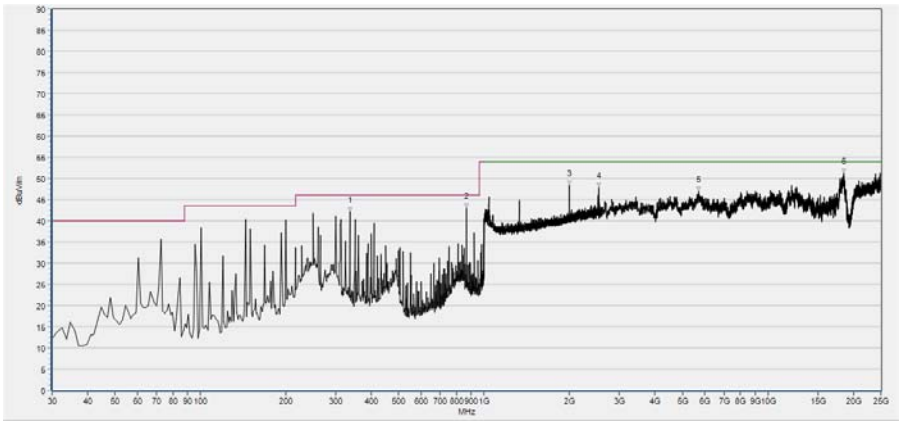
(30MHz to 25GHz, Antenna Horizontal, QPSK)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.557	30.15	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
335.932	33.70	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1991.757	48.49	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
2386.795	48.49	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
5671.395	46.93	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
18539.480	51.48	N/A	N/A	74.0	N/A	54.00	Vertical	PASS

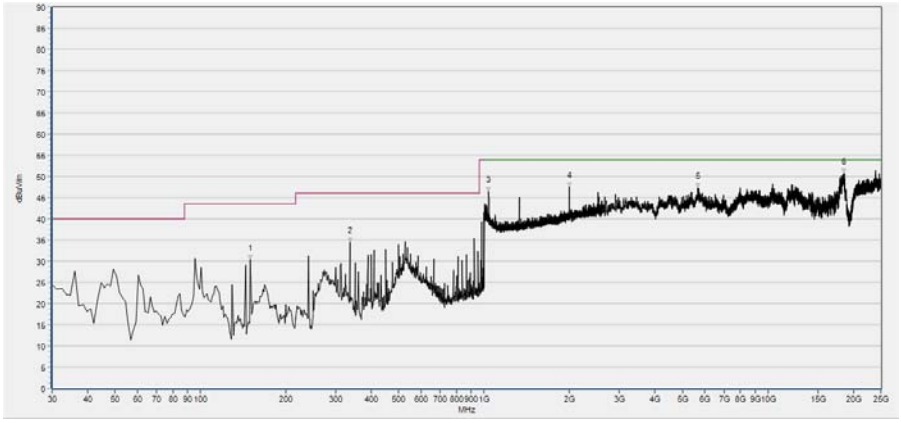
(30MHz to 25GHz, Antenna Vertical, QPSK)

Plot for Channel = 13



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
335.932	42.15	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
865.244	42.97	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1991.757	48.48	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
2539.176	47.87	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
5687.689	46.90	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
18551.700	51.28	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS

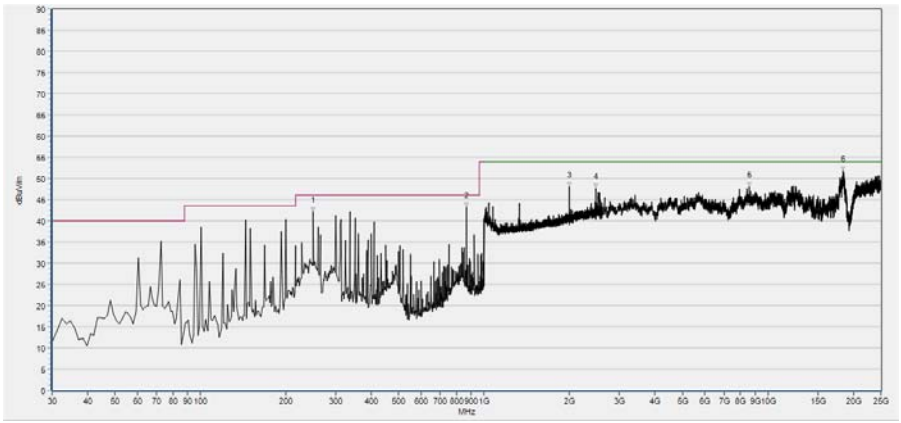
(30MHz to 25GHz, Antenna Horizontal, QPSK)



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
150.188	30.27	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
335.932	34.51	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1037.135	46.47	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
1991.757	47.52	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
5663.248	47.27	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
18494.672	50.76	N/A	N/A	74.0	N/A	54.00	Vertical	PASS

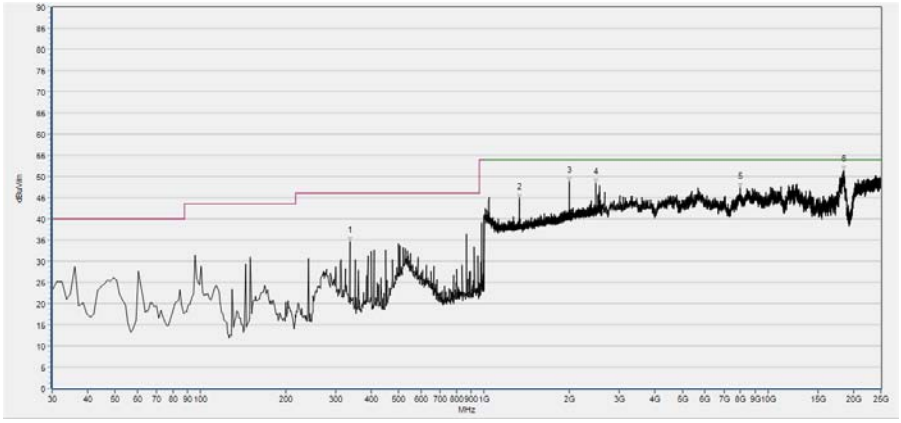
(30MHz to 25GHz, Antenna Vertical, QPSK)

Plot for Channel = 24



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
249.737	42.21	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
865.244	43.26	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1991.757	48.09	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
2474.510	47.73	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
8596.145	48.05	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
18409.129	51.70	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS

(30MHz to 25GHz, Antenna Horizontal, QPSK)

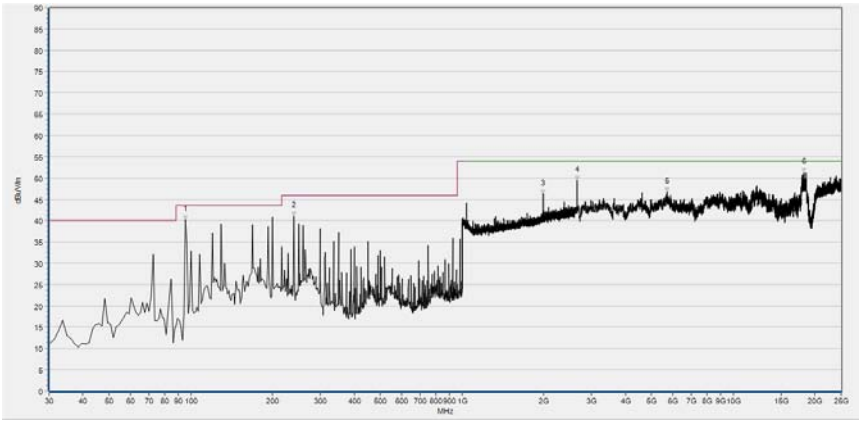


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
335.932	34.71	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1327.811	44.85	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
1991.757	48.83	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
2475.150	48.42	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
7976.978	47.32	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
18535.406	51.34	N/A	N/A	74.0	N/A	54.00	Vertical	PASS

(30MHz to 25GHz, Antenna Vertical, QPSK)

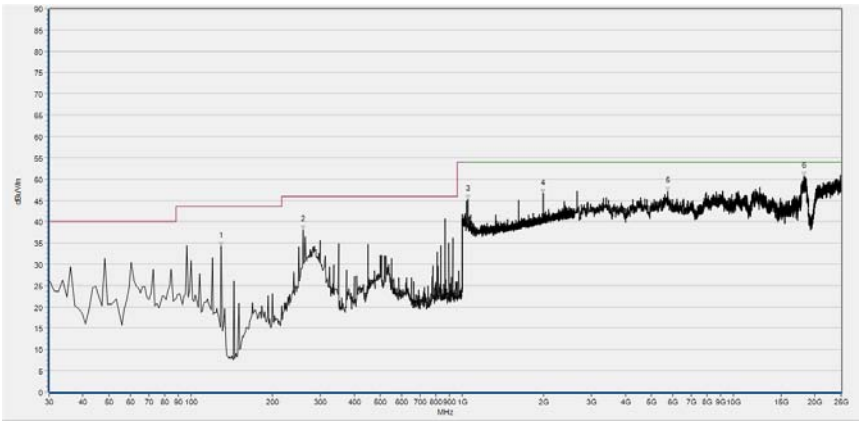
16QAM Mode:

Plots for Channel = 1



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.557	40.19	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
240.025	41.07	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1991.757	46.31	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
2657.029	49.47	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
5691.762	46.78	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
18197.309	51.24	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS

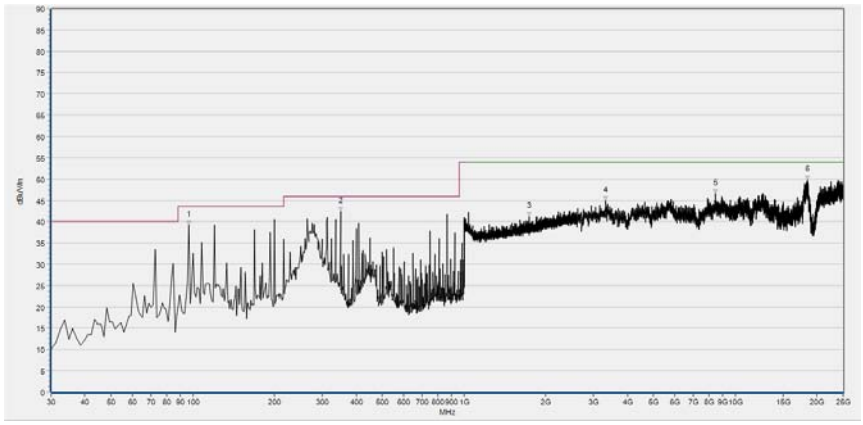
(30MHz to 25GHz, Antenna Horizontal, 16QAM)



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
129.549	34.17	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
259.449	37.98	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1050.580	45.19	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
1991.757	46.61	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
5732.497	47.14	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
18221.749	50.65	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS

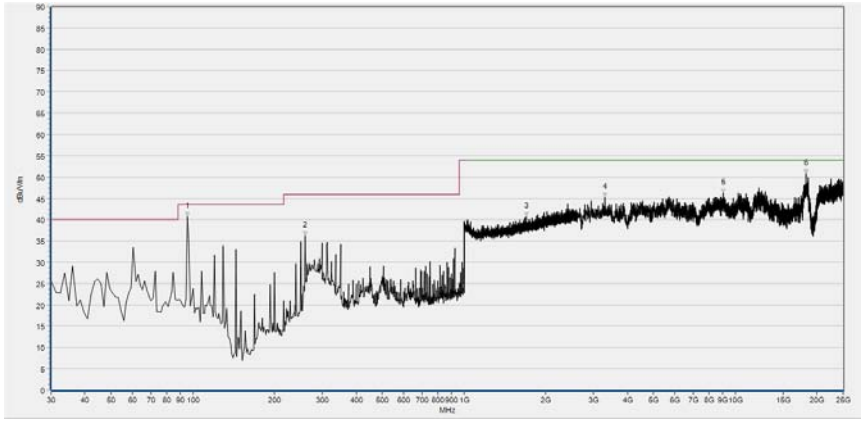
(30MHz to 25GHz, Antenna Vertical , 16QAM)

Plot for Channel = 13



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
96.771	39.28	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
350.501	42.34	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1740.776	41.21	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
3333.224	44.91	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
8441.353	46.66	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
18458.011	49.73	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

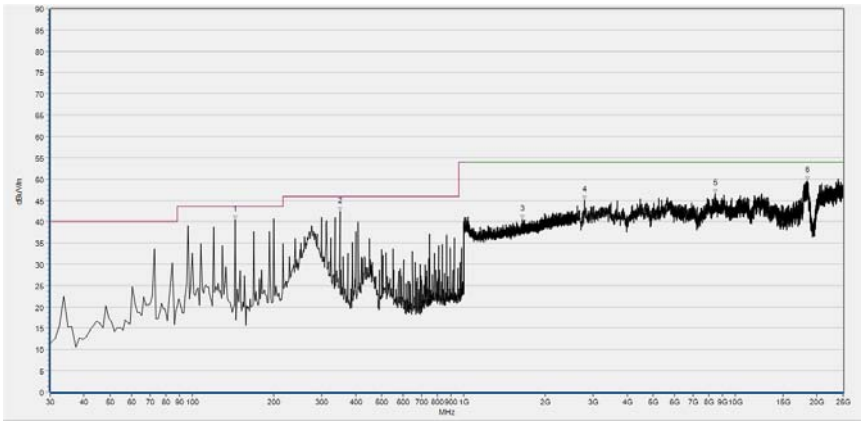
(30MHz to 25GHz, Antenna Horizontal, 16QAM)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.557	40.69	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
259.449	36.22	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1701.721	40.65	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
3312.857	45.33	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
9048.300	46.23	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
18290.998	50.78	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

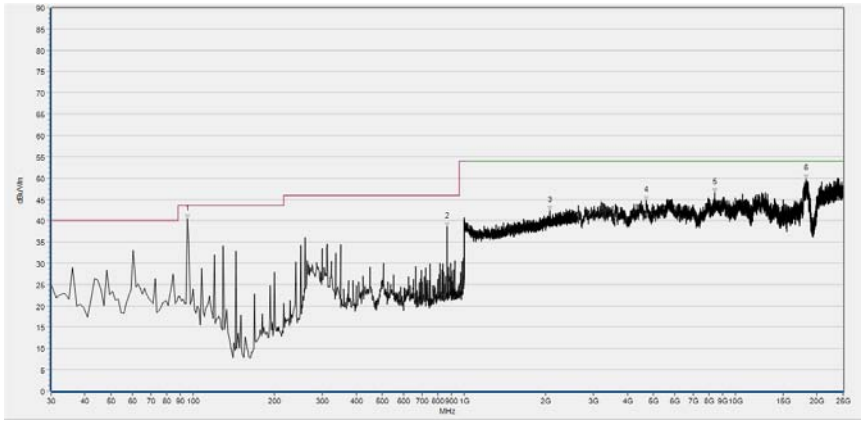
(30MHz to 25GHz, Antenna Vertical, 16QAM)

Plot for Channel = 24



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
144.118	40.37	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
350.501	42.40	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1643.457	40.52	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
2787.380	45.13	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
8465.794	46.64	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
18474.304	49.59	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS

(30MHz to 25GHz, Antenna Horizontal, 16QAM)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
95.557	40.42	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
865.244	38.50	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2077.551	42.35	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
4701.909	44.77	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
8400.618	46.60	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
18242.117	49.82	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

(30MHz to 25GHz, Antenna Vertical, 16QAM)

Annex A Test Uncertainty

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

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

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

Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

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

2. Identification of the Responsible Testing Location

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

3. Facilities and Accreditations

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

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	2017.05.24	2018.05.23
Power Splitter	NW521	1506A	Weinschel	2017.05.24	2018.05.23
Attenuator 1	(N/A.)	10dB	Resnet	2017.05.24	2018.05.23
Attenuator 2	(N/A.)	3dB	Resnet	2017.05.24	2018.05.23
EXA Signal Analzyer	MY53470836	N9010A	Agilent	2017.11.03	2018.11.02
RF cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
Coaxial cable	CB02	RF02	Morlab	N/A	N/A
SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

4.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Receiver	MY56400093	N9038A	KEYSIGHT	2017.07.13	2018.07.12
LISN	812744	NSLK 8127	Schwarzbeck	2017.05.17	2018.05.16
Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2017.05.17	2018.05.16
Coaxial cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

4.3Auxiliary Test Equipment

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

4.4 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Receiver	MY54130016	N9038A	Agilent	2017.05.17	2018.05.16
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2017.05.14	2018.05.13
Test Antenna - Horn	9170C-531	BBHA9170	Schwarzbeck	2017.09.13	2018.09.12
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2017.03.07	2018.03.06
Test Antenna - Horn	01774	BBHA 9120D	Schwarzbeck	2017.09.13	2018.09.12
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	2017.05.17	2018.05.16
18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2017.05.17	2018.05.16
Anechoic Chamber	N/A	9m*6m*6m	CRT	2017.11.19	2020.11.18

END OF REPORT