FCC TEST REPORT
No. 151201254SHA-002

Applicant	:	COMPAGNIE GLOBE ELECTRIQUE INC 150 ONEIDA MONTREAL, QC, H9R 1A8, CA
Manufacturer site	:	Ningbo Weijia Electronics Technology Co., Ltd. No. 188, Industry Park, Simen Town, Yuyao City, Zhejiang 315470, P. R. China
Product Name	:	Flood Light, portable
Type/Model	:	66208
TEST RESULT	**:**	**PASS**

SUMMARY

The equipment complies with the requirements according to the following standard(s) or specification:

47CFR Part 15 (2014): Radio Frequency Devices

ANSI C63.10 (2013): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

RSS-247 Issue 1 (May 2015): Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

RSS-Gen Issue 4 (December 2014): General Requirements for Compliance of Radio Apparatus

Date of issue: January 4, 2016

Prepared by: Reviewed by:

Nemo Li (*Project Engineer*) Daniel Zhao (*Reviewer*)

FCC ID: 2AG4S66208
IC: 21005-66208

Description of Test Facility

Name: Intertek Testing Service Limited Shanghai
Address: Building No.86, 1198 Qinzhou Road(North), Shanghai 200233, P.R. China

FCC Registration Number: 236597
IC Assigned Code: 2402B-1

Name of contact: Jonny Jing
Tel: 86 21 61278271
Fax: 86 21 54262353

Content

1 GENERAL INFORMATION

1.1 Description of Client

Applicant	:	COMPAGNIE GLOBE ELECTRIQUE INC
		150 ONEIDA MONTREAL, QC, H9R 1A8, CA
Manufacturer	:	Ningbo Weijia Electronics Technology Co., Ltd.
		No. 188, Industry Park, Simen Town, Yuyao City, Zhejiang 315470, P. R. China

1.2 Identification of the EUT

Product Name	:	Flood Light, portable
Type/model	:	66208
FCC	:	2AG4S66208
IC	:	21005-66208

1.3 Technical Specification

Operation Frequency Band	:	2400 – 2483.5 MHz
Protocol	:	Bluetooth Base Rate + EDR
Type of Modulation	:	GFSK, π/4-DQPSK, 8DPSK
Channel Number	:	79 channels
Description of EUT	:	EUT is portable flood light, it has only one model. It can be powered from internal battery pack or DC 12V or two types of adaptor. All the modes were tested and the worst data was listed in the report.
Antenna		PCB antenna, 4.52dBi
Rating		20W, with 7,4V d.c., 4,4 Ah battery pack and class II adaptor; USB: 5V, 2A Adaptor model: LGSPSA120060UL Input: 100-240V~, 50/60Hz, 0.19A Output: DC 12V, 600mA Adaptor model: TEKA006-1200600UKC Input: 100-240V~, 50/60Hz, 0.3A Output: DC 12V, 0.6A
Category of EUT	:	Class B
EUT type	:	☒ Table top ☐ Floor standing
Sample received date	:	2015.12.22
Date of test	:	2015.12.22 ~ 2015.12.30

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2014)
RSS-247 Issue 1 (May 2015)
RSS-Gen Issue 4 (December 2014)
ANSI C63.10 (2013)

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the engineering mode and continuously transmission was applied.

The lowest, middle and highest channel were tested as representatives.

Freq. Band (MHz)	Modulation	Lowest (MHz)	Middle (MHz)	Highest (MHz)
2400-2483.5	GFSK	2402	2441	2480
	π/4-DQPSK	2402	2441	2480
	8DPSK	2402	2441	2480

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

2.4 Instrument list

Selected	Instrument	EC no.	Model	Valid until date
☒	Shielded room	EC 2838	GB88	2016-1-8
☒	EMI test receiver	EC 2107	ESCS 30	2016-10-19
☒	A.M.N.	EC 3119	ESH2-Z5	2016-12-16
☒	A.M.N.	EC 3394	ENV 216	2016-8-1
☒	Semi anechoic chamber	EC 3048	-	2016-5-11
☒	EMI test receiver	EC 3045	ESIB26	2016-10-19
☒	Broadband antenna	EC 4206	CBL 6112D	2016-4-27
☒	Horn antenna	EC 3049	HF906	2016-4-27
☐	Horn antenna	EC 4792-1	3117	2016-4-21
☒	Horn antenna	EC 4792-3	HAP18-26W	2016-6-11
☐	Pre-amplifier	EC 5262	pre-amp 18	2016-5-25
☒	Pre-amplifier	EC 4792-2	TPA0118-40	2016-4-10
☐	High Pass Filter	EC 4797-1	WHKX 1.0/15G-10SS	2016-1-8
☒	High Pass Filter	EC 4797-2	WHKX 2.8/18G-12SS	2016-1-8
☐	High Pass Filter	EC 4797-3	WHKX 7.0/1.8G-8SS	2016-1-8
☐	Band Reject Filter	EC 4797-4	WRCGV2400/2483/10SS	2016-1-8
☐	Test Receiver	EC 4501	ESCI 7	2016-1-13
☒	PXA Signal Analyzer	EC5338	N9030A	2016-5-14
☒	Power sensor/Power meter	EC4318	N1911A/N1921A	2016-4-8
☐	Power sensor	EC5338-1	U2021XA	2016-3-5
☐	MXG Analog Signal Generator	EC5338-2	N5181A	2016-3-5
☐	MXG Vector Signal Generator	EC5175	N51812B	2016-1-8

2.5 Test Summary

This report applies to tested sample only. The test results have been compared directly with the limits, and the measurement uncertainty is recorded. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
20 dB Bandwidth	15.247(a)(1)	RSS-247 Issue 1 Clause 5.1	Tested
Carrier Frequency Separation	15.247(a)(1)	RSS-247 Issue 1 Clause 5.1	Pass
Maximum peak output power	15.247(b)(1)	RSS-247 Issue 1 Clause 5.4	Pass
Radiated Emissions in restricted frequency bands	15.205 & 15.209	RSS-Gen Issue 4 Clause 8.9	Pass
Emission outside the frequency band	15.247(d)	RSS-247 Issue 1 Clause 5.5	Pass
Number of Hopping Frequencies	15.247(a)(1)(iii)	RSS-247 Issue 1 Clause 5.1	Pass
Dwell time	15.247(a)(1)(iii)	RSS-247 Issue 1 Clause 5.1	Pass
Power line conducted emission	15.207	RSS-Gen Issue 4 Clause 8.8	Pass
Occupied bandwidth	-	RSS-Gen Issue 4 Clause 6.6	Tested

Notes: 1: NA =Not Applicable

2: This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

2.6 Measurement uncertainty

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

TEST ITEM	MEASUREMENT UNCERTAINTY
Maximum peak output power	± 0.74dB
Radiated Emissions in restricted frequency bands below 1GHz	± 4.90dB
Radiated Emissions in restricted frequency bands above 1GHz	± 5.02dB
Emission outside the frequency band	± 2.89dB
Power line conducted emission	± 3.19dB

3 20 dB Bandwidth

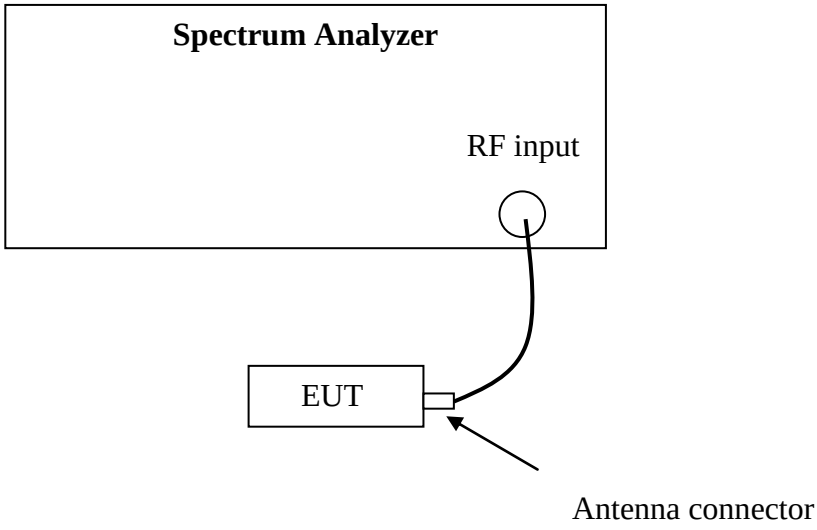
Test result: Pass

3.1 Limit

☒ Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

☐ Frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

3.2 Test Configuration



3.3 Test Procedure and test setup

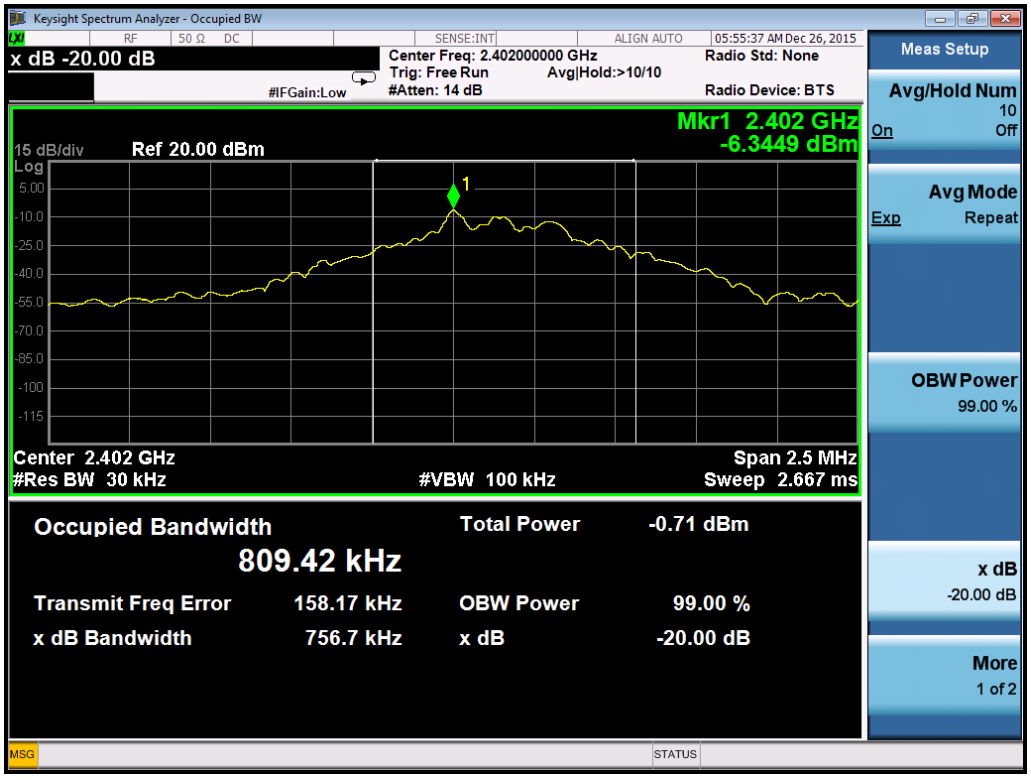
The 20 bandwidth per FCC § 15.247(a)(1) is measured using the Spectrum Analyzer with Span = 2 to 3 times the 20 dB bandwidth, RBW≥1% of the 20 dB bandwidth, VBW≥RBW, Sweep = auto, Detector = peak, Trace = max hold.
The test was performed at 3 channels (lowest, middle and highest channel).
The EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems)

3.4 Test Protocol

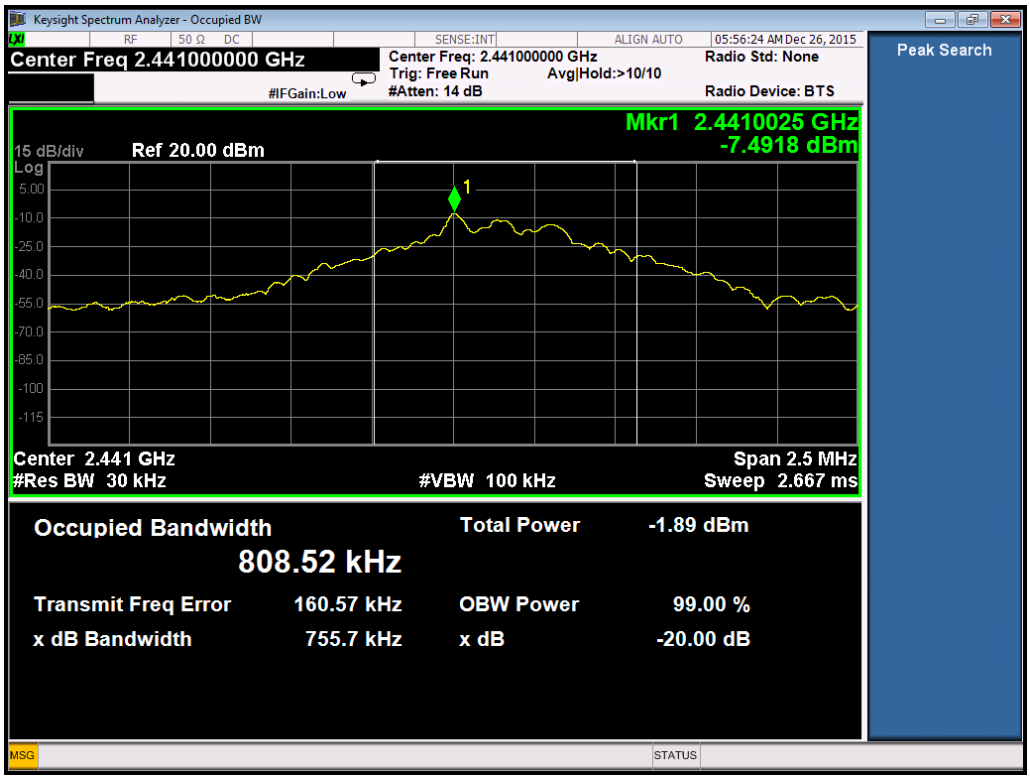
Temperature: 22°C
Relative Humidity: 54%

Modulation	Channel	20dB Bandwidth (kHz)
GFSK	L	756.7
	M	755.7
	H	756.7

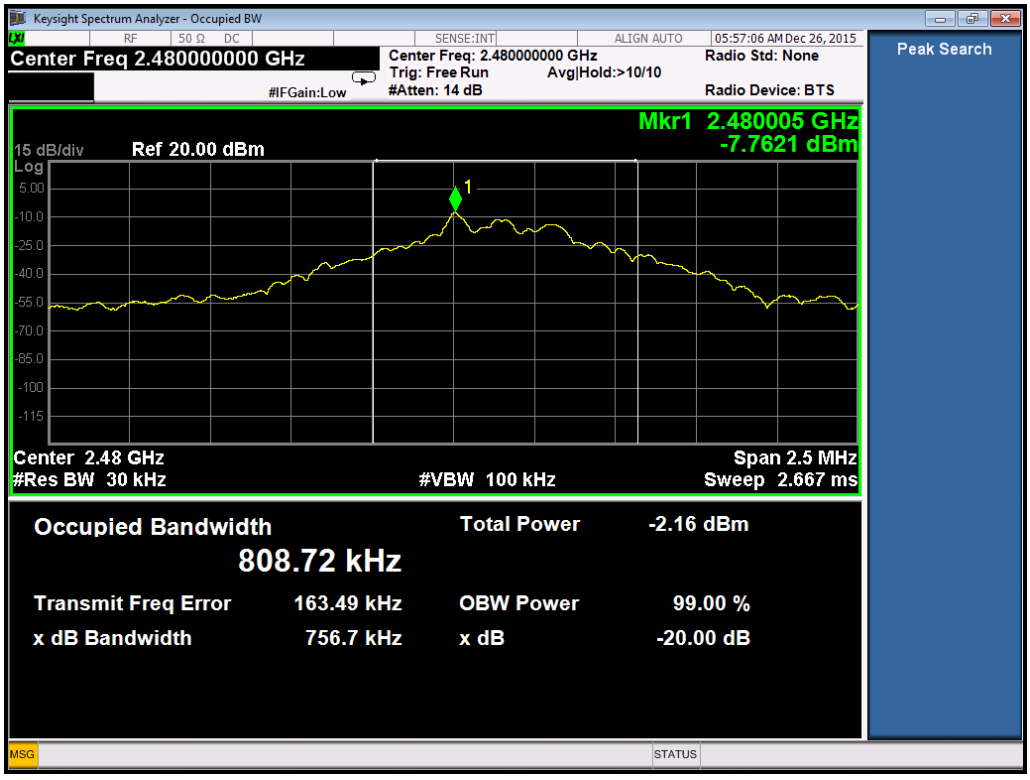
Channel L



Channel M

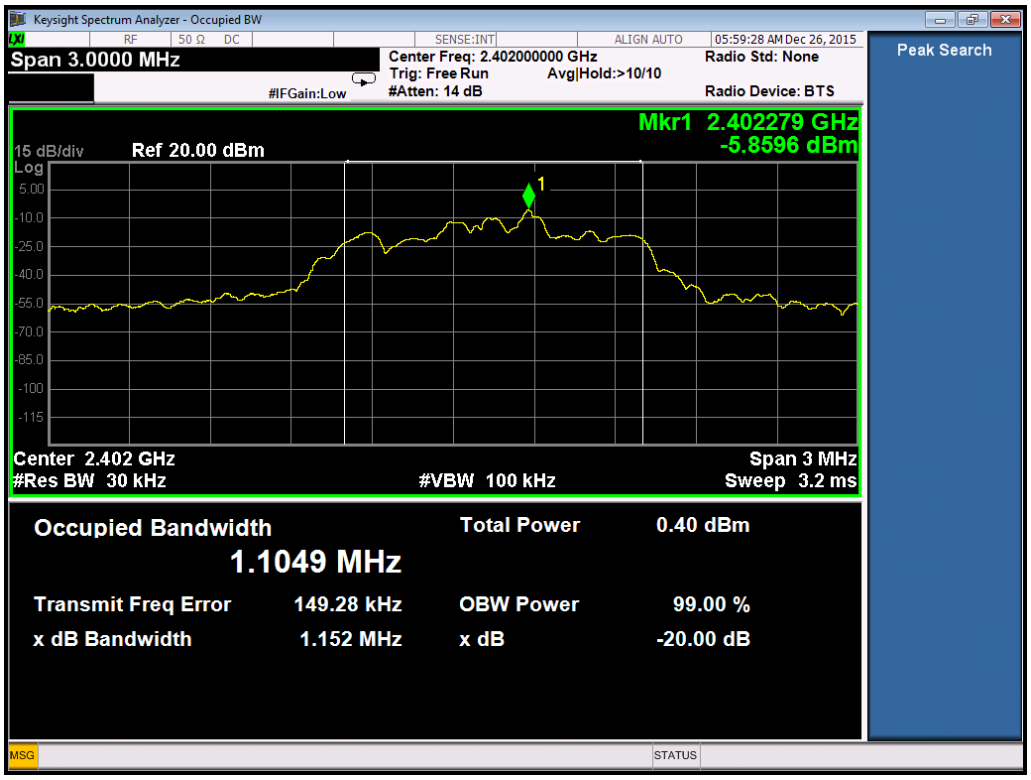


Channel H

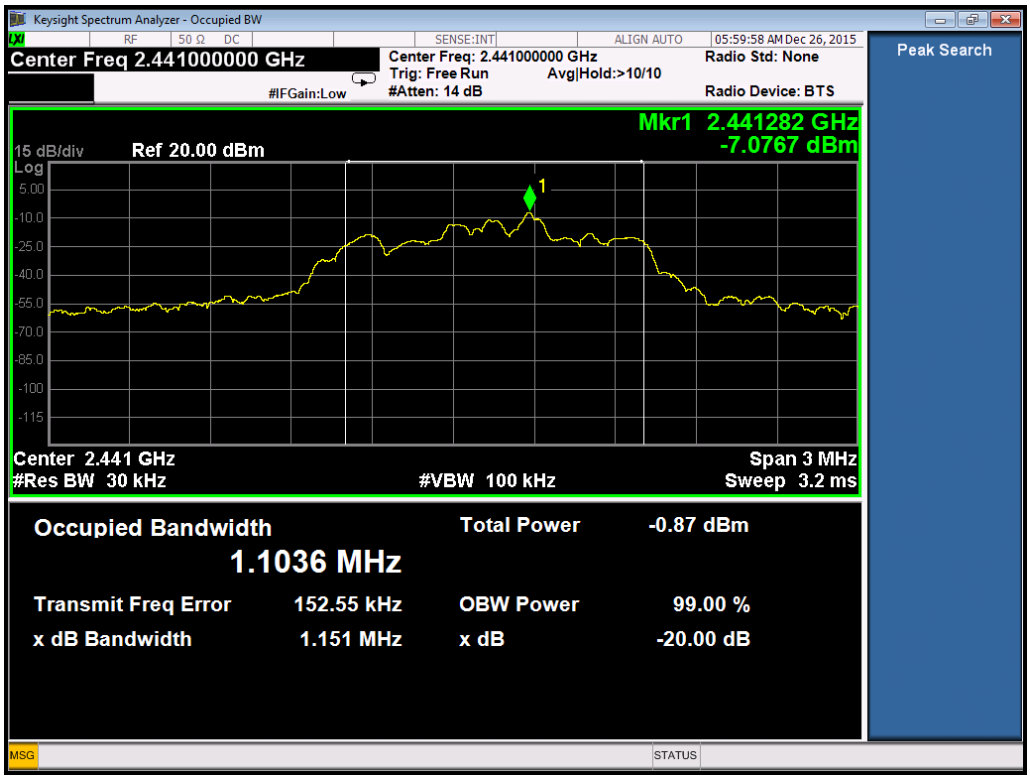


Modulation	Channel	20dB Bandwidth (kHz)	Two-thirds of Bandwidth (kHz)
π/4-DQPSK	L	1152	768.0
	M	1151	767.3
	H	1152	768.0

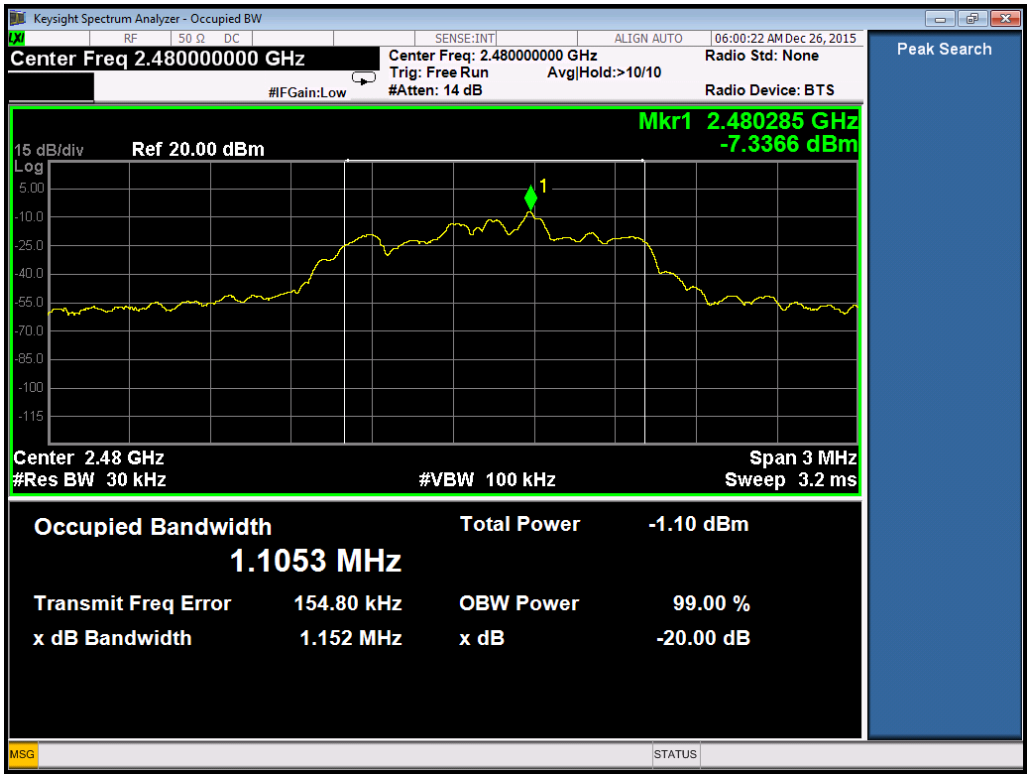
Channel L



Channel M

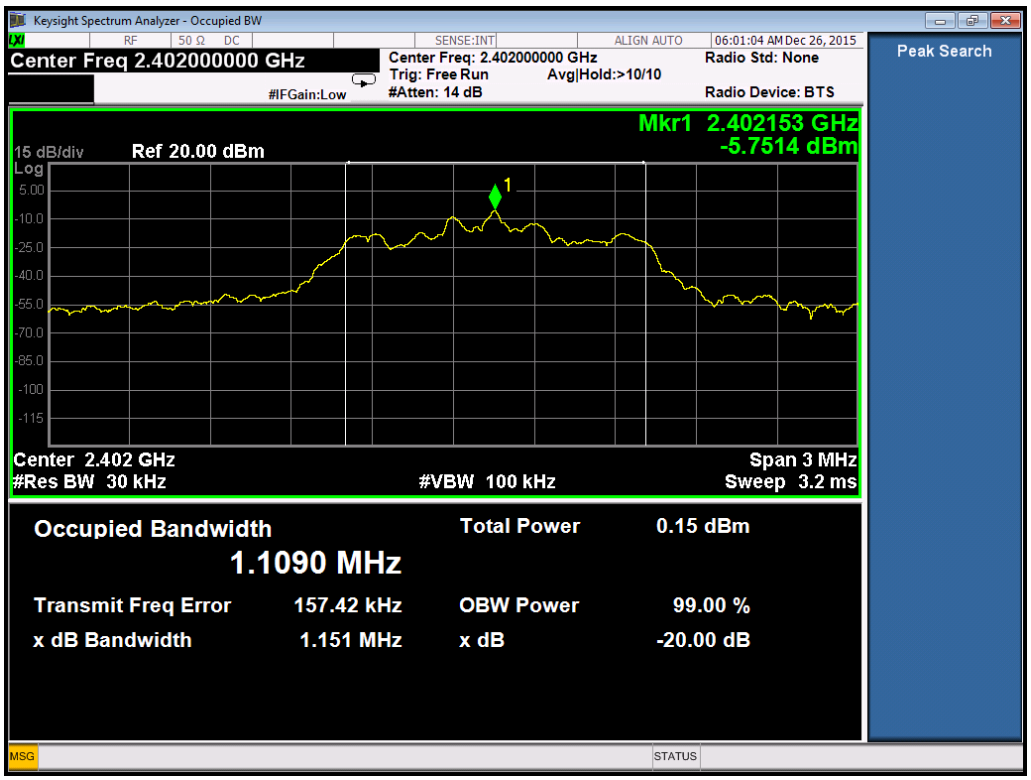


Channel H

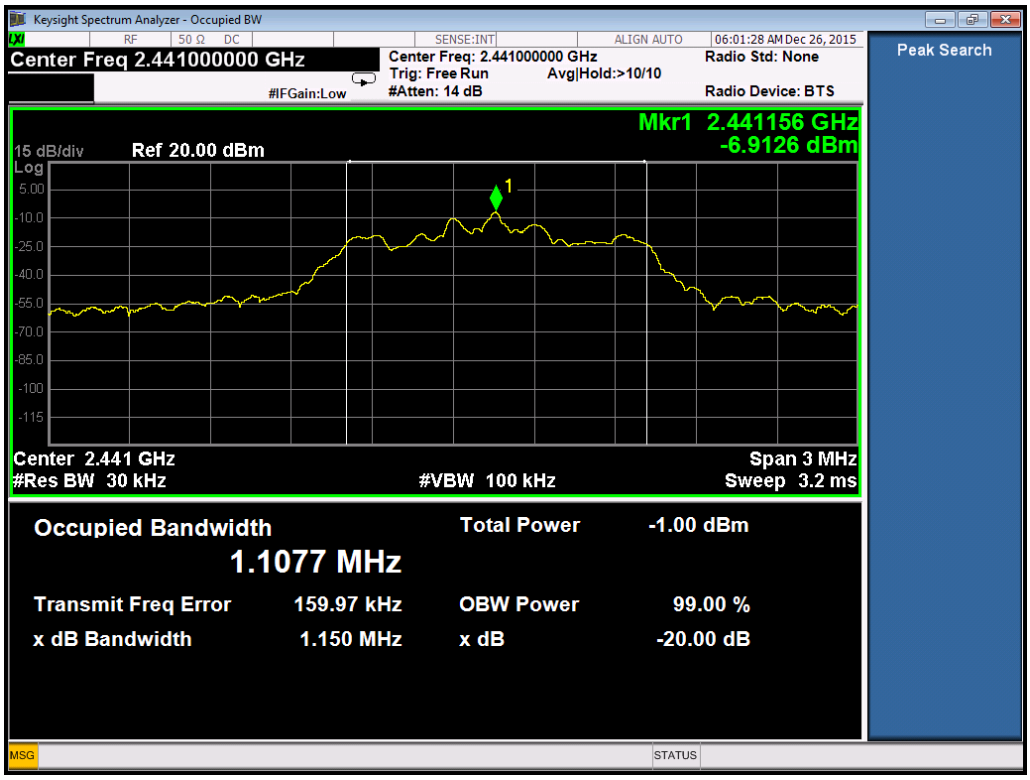


Modulation	Channel	20dB Bandwidth (kHz)	Two-thirds of Bandwidth (kHz)
8DPSK	L	1151	767.3
	M	1150	766.7
	H	1151	767.3

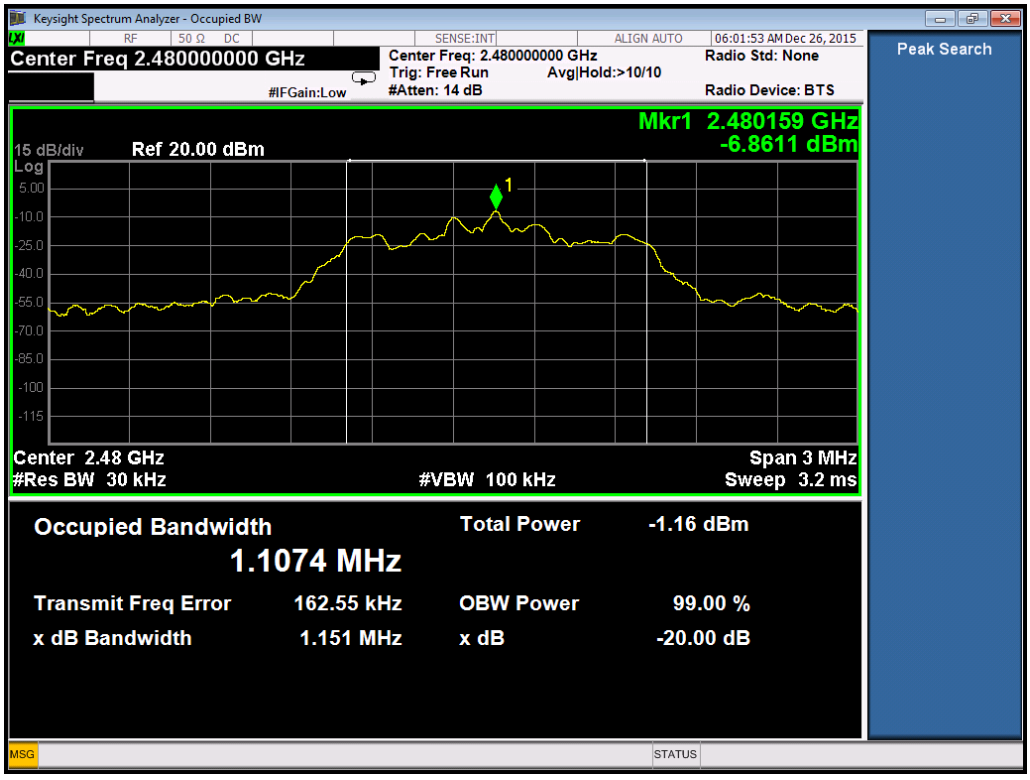
Channel L



Channel M



Channel H



4 Carrier Frequency Separation

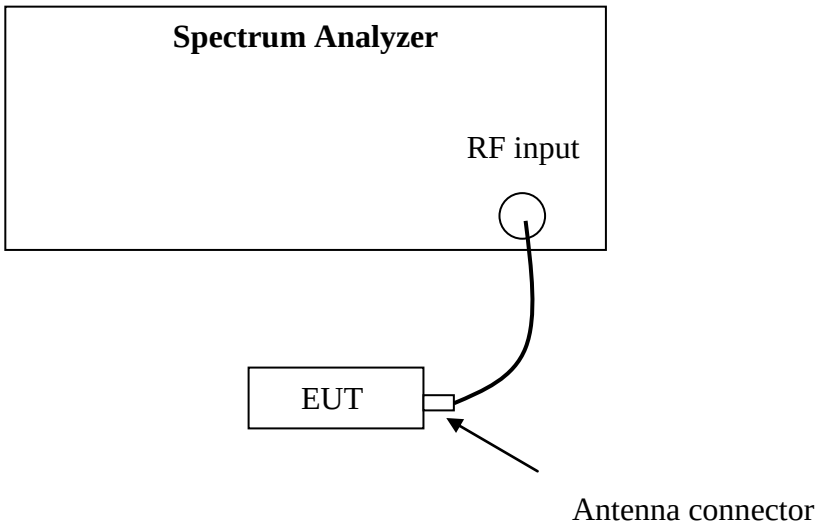
Test result: Pass

4.1 Test limit

☒ Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

☐ Frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

4.2 Test Configuration



4.3 Test procedure and test setup

The Carrier Frequency Separation per FCC § 15.247(a)(1) is measured using the Spectrum Analyzer with Span can capture two adjacent channels, RBW≥1% of the span, VBW≥RBW, Sweep = auto, Detector = peak, Trace = max hold.
The test was performed at 3 channels (lowest, middle and highest channel).
The EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems)

4.4 Test protocol

Temperature: 22 °C
Relative Humidity: 54 %

Channel	Frequency Separation (kHz)	Result
L	1000	Pass
M	1000	Pass
H	1000	Pass

Channel L

Channel M

Channel H

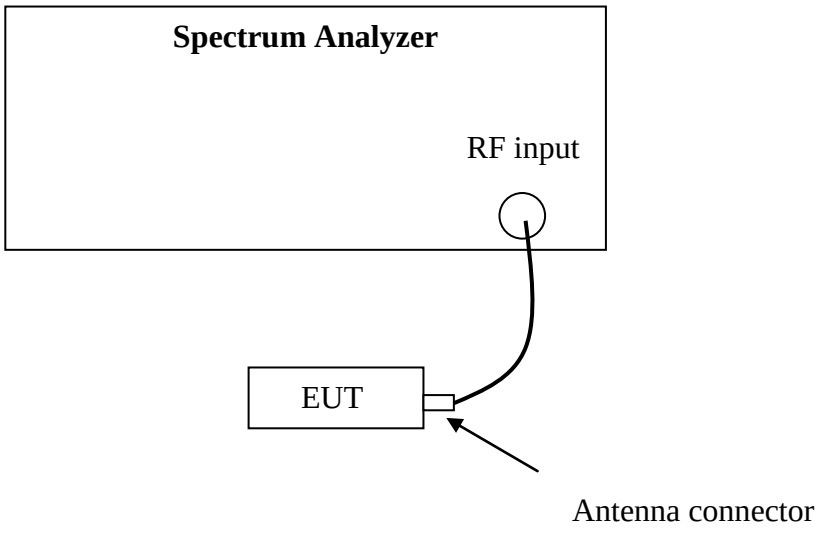
5 Maximum peak output power

Test result: Pass

5.1 Test limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt
For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts
If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

5.2 Test Configuration



5.3 Test procedure and test setup

The Maximum peak output power per FCC § 15.247(b) is measured using the Spectrum Analyzer with Span = 5 times the 20 dB bandwidth, RBW≥ the 20 dB bandwidth, VBW≥RBW, Sweep = auto, Detector = peak, Trace = max hold.
The test was performed at 3 channels (lowest, middle and highest channel).
The EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems)

5.4 Test Protocol

Temperature: 22°C
Relative Humidity: 54%

Modulation	Channel	Conducted Power (dBm)	Limit (dBm)
GFSK	L	-6.10	≤ 21.00
	M	-6.15	≤ 21.00
	H	-6.00	≤ 21.00

Modulation	Channel	Conducted Power (dBm)	Limit (dBm)
π/4-DQPSK	L	-6.20	≤ 21.00
	M	-6.35	≤ 21.00
	H	-6.15	≤ 21.00

Modulation	Channel	Conducted Power (dBm)	Limit (dBm)
8DPSK	L	-6.25	≤ 21.00
	M	-6.45	≤ 21.00
	H	-6.20	≤ 21.00

Conclusion: The maximum EIRP = -6.00dBm+4.52dBi = 0.71mW which is lower than the limit of 4W listed in RSS-247.

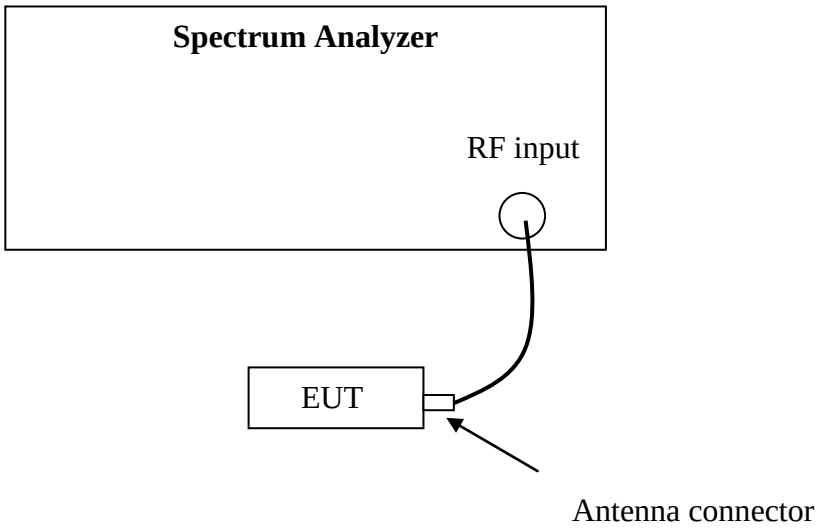
6 Emission outside the frequency band

Test result: **Pass**

6.1 Test limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

6.2 Test Configuration



6.3 Test procedure and test setup

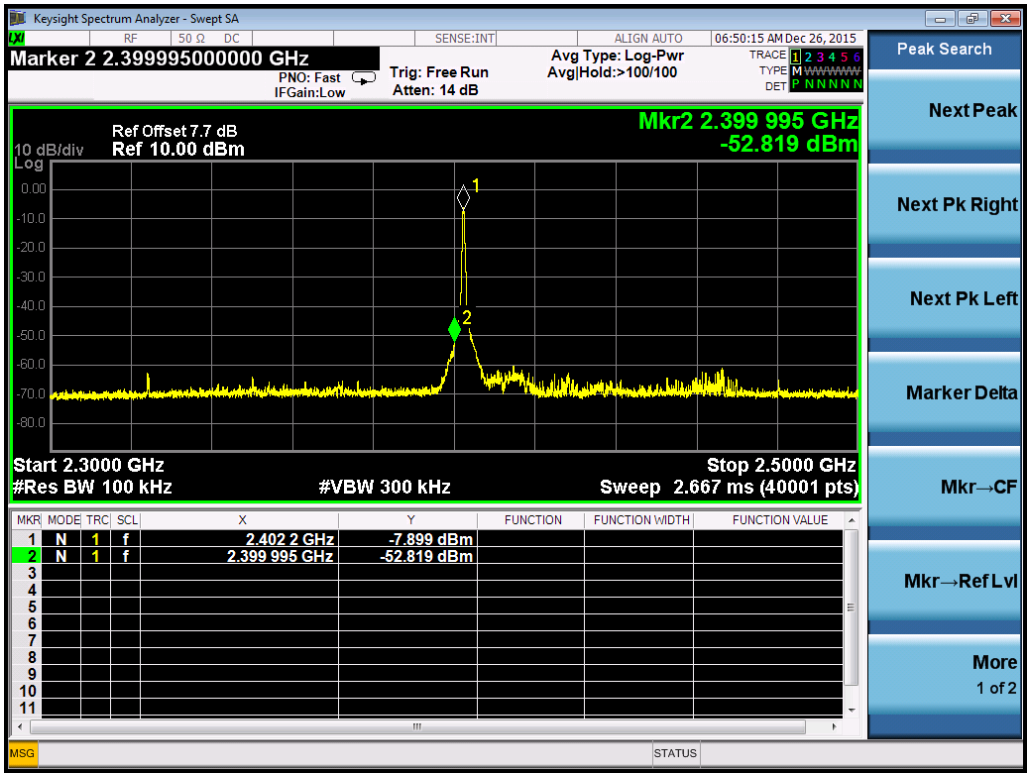
The Emission outside the frequency band per FCC § 15.247(d) is measured using the Spectrum Analyzer with Span wide enough capturing all spurious from the lowest emission frequency of the EUT up to 10th harmonics, RBW = 100kHz, VBW≥RBW, Sweep = auto, Detector = peak, Trace = max hold.
The test was performed at 3 channels (lowest, middle and highest channel).
The EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems)

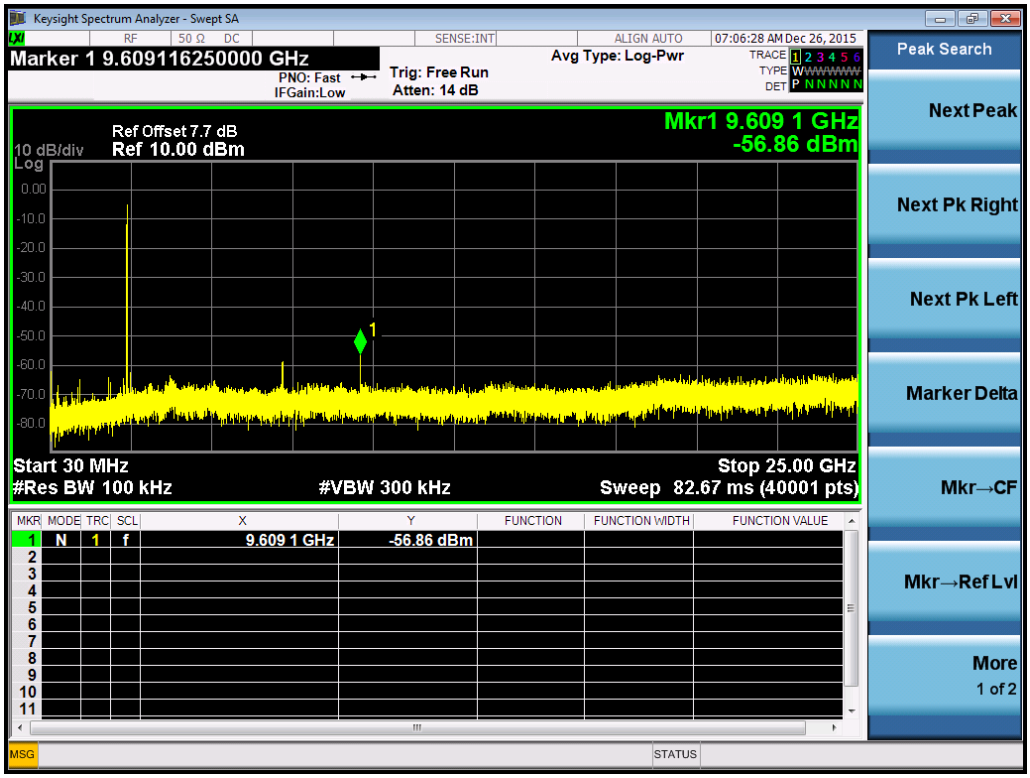
6.4 Test Protocol

Temperature: 22°C
Relative Humidity: 54%

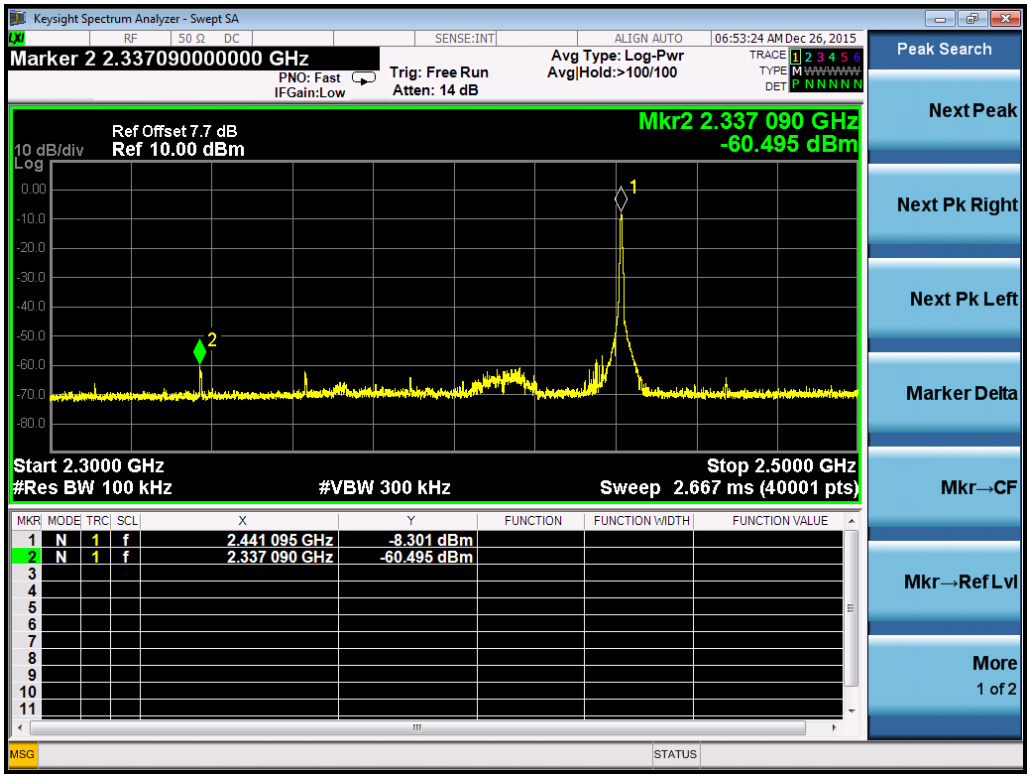
Modulation	Channel	Results	Limit (dBm)
GFSK	L	Pass	≥20
	M	Pass	≥20
	H	Pass	≥20
	Hopping	Pass	≥20

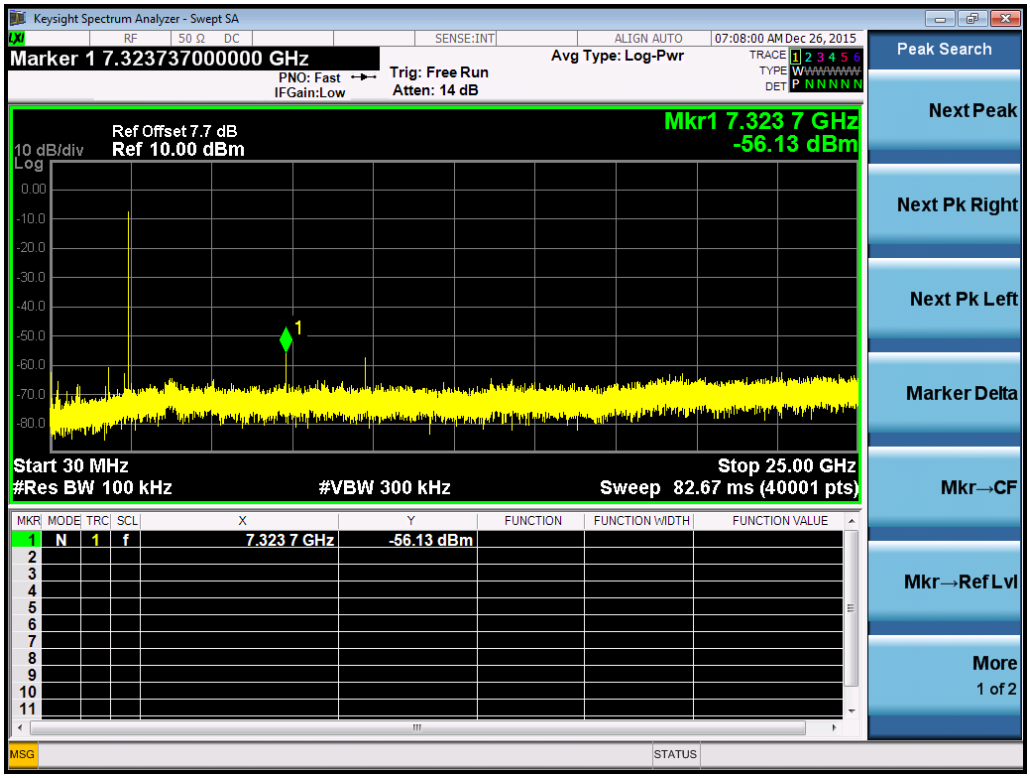
Channel L



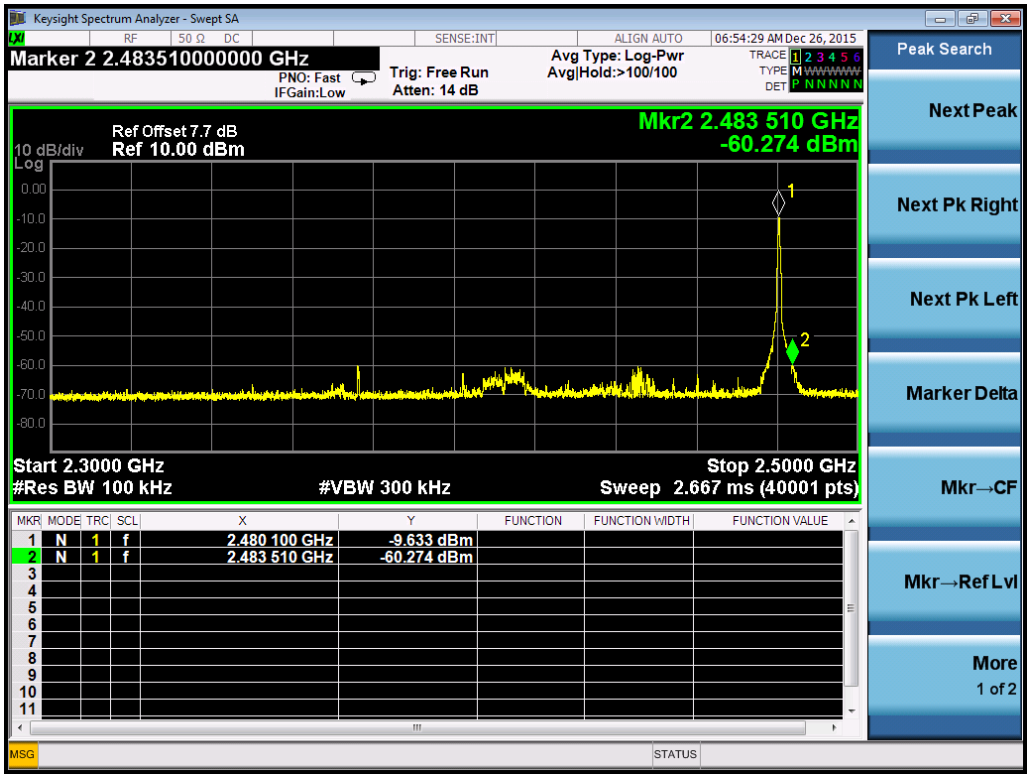

Keysight Spectrum Analyzer - Swept SA
Marker 1 9.609116250000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 14 dB
Avg Type: Log-Pwr
07:06:28 AM Dec 26, 2015
Ref Offset 7.7 dB
10 dB/div
Ref 10.00 dBm
Log
Mkr1 9.609 1 GHz
-56.86 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 82.67 ms (40001 pts)
1 N 1 f 9.609 1 GHz -56.86 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

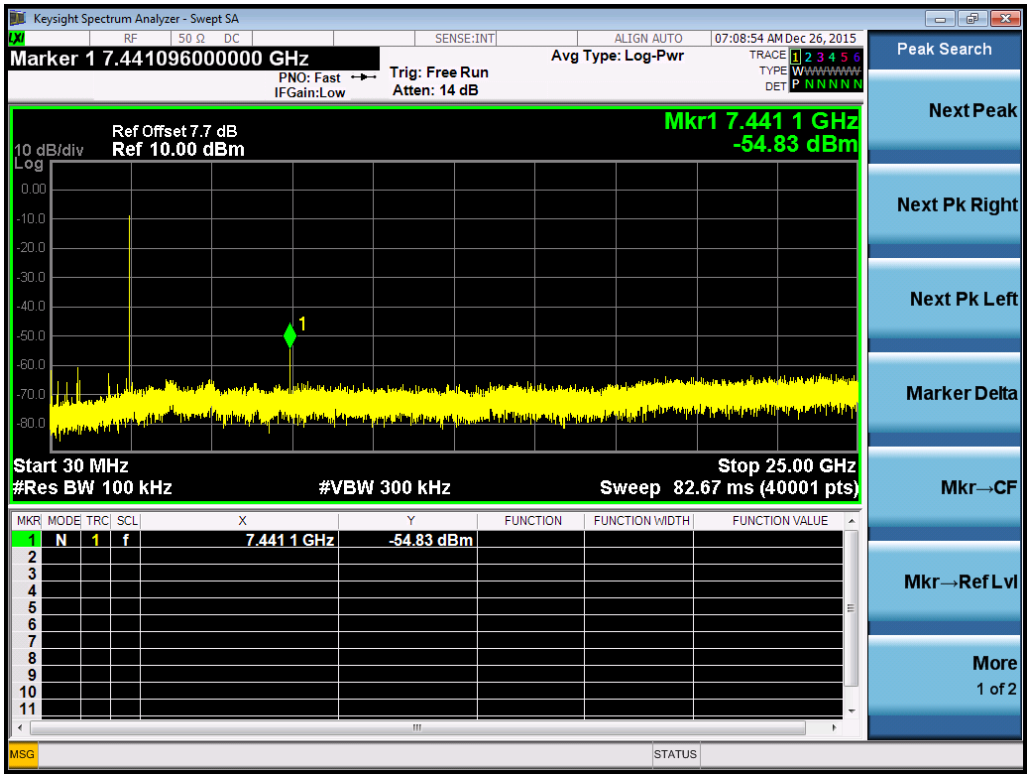
Channel M


Keysight Spectrum Analyzer - Swept SA
Marker 2 2.337090000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 14 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:53:24 AM Dec 26, 2015
Ref Offset 7.7 dB
10 dB/div
Ref 10.00 dBm
Log
Mkr2 2.337 090 GHz
-60.495 dBm
Start 2.3000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.5000 GHz
Sweep 2.667 ms (40001 pts)
1 N 1 f 2.441 095 GHz -8.301 dBm
2 N 1 f 2.337 090 GHz -60.495 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

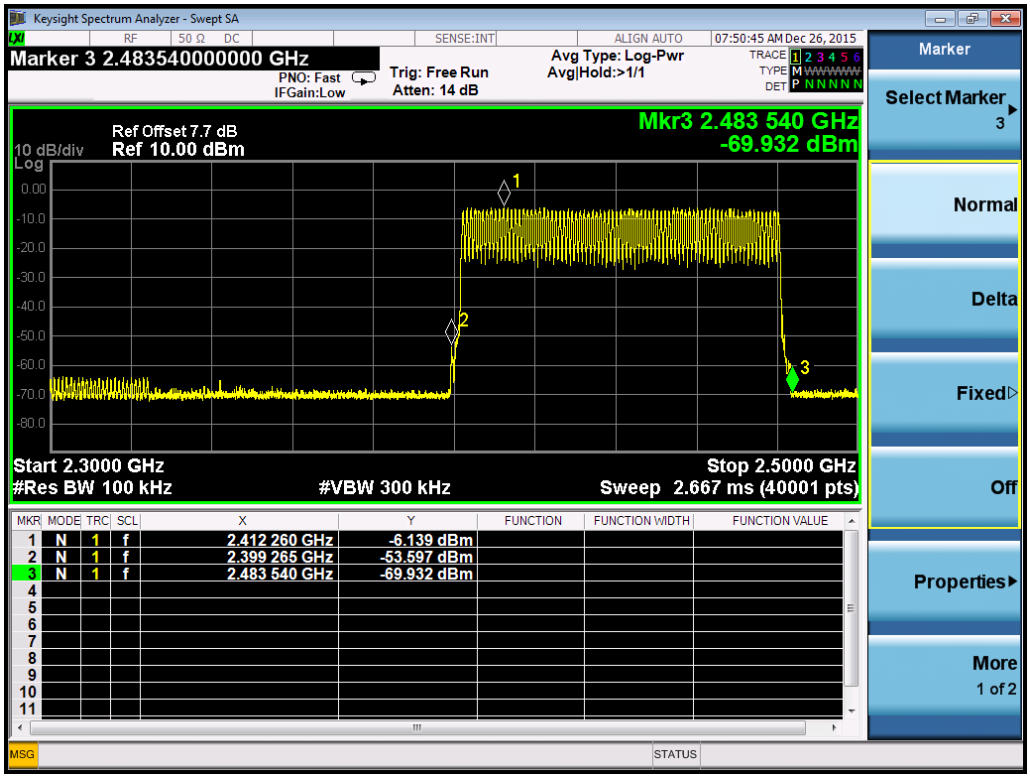


Channel H



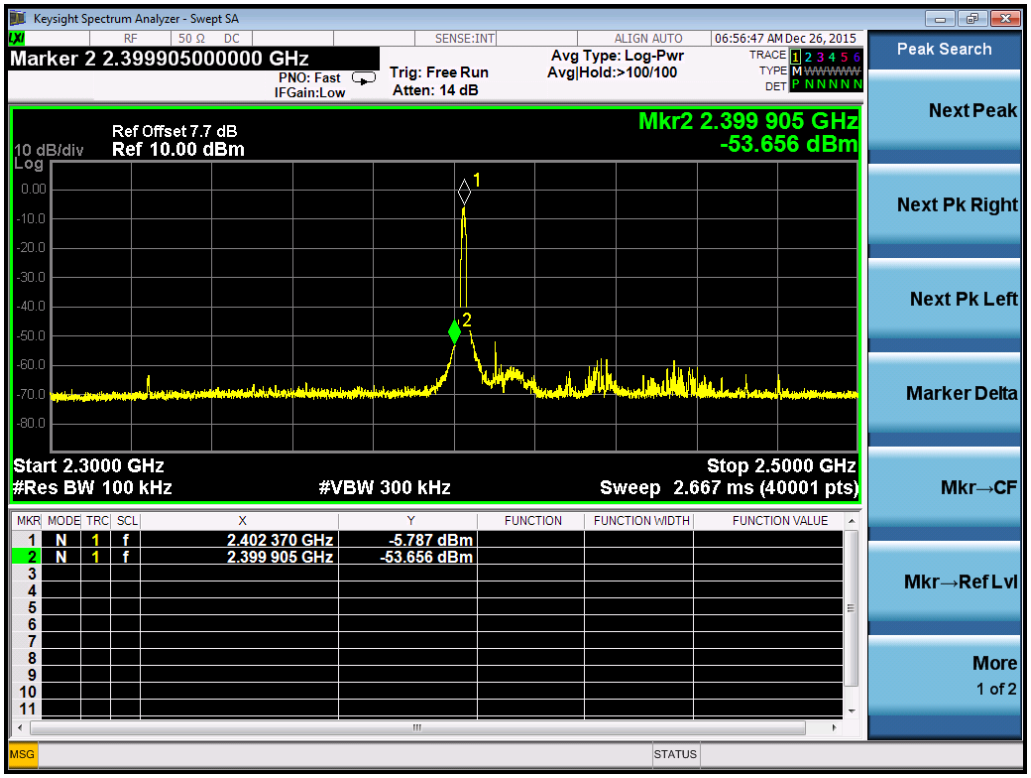


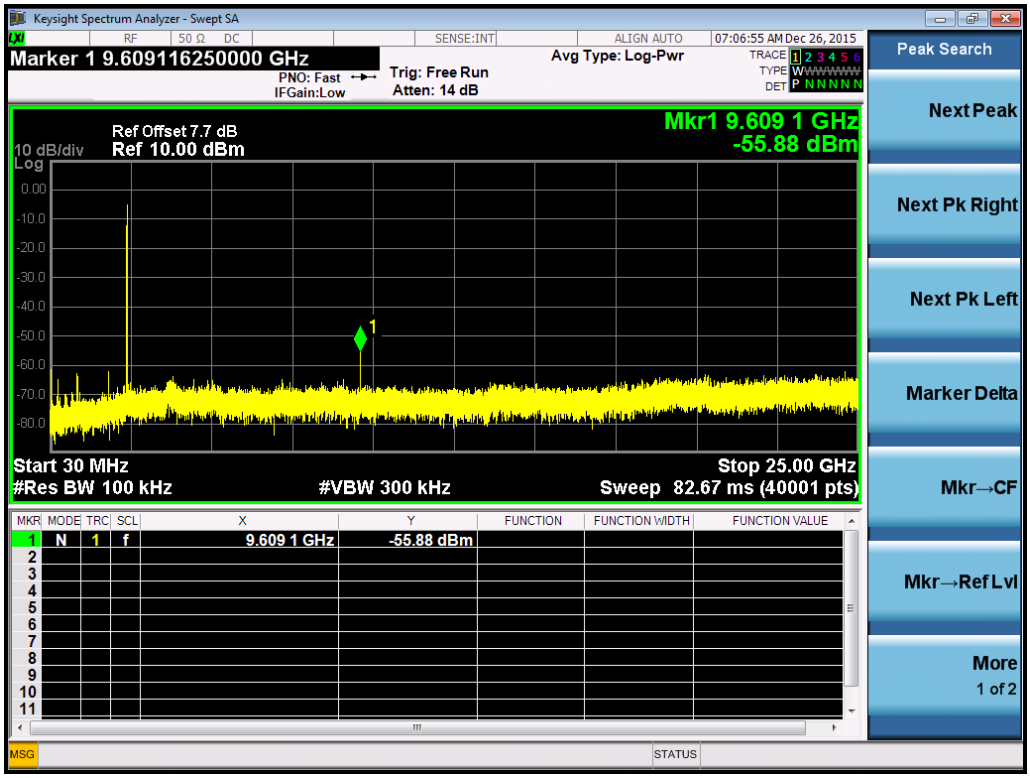
Hopping



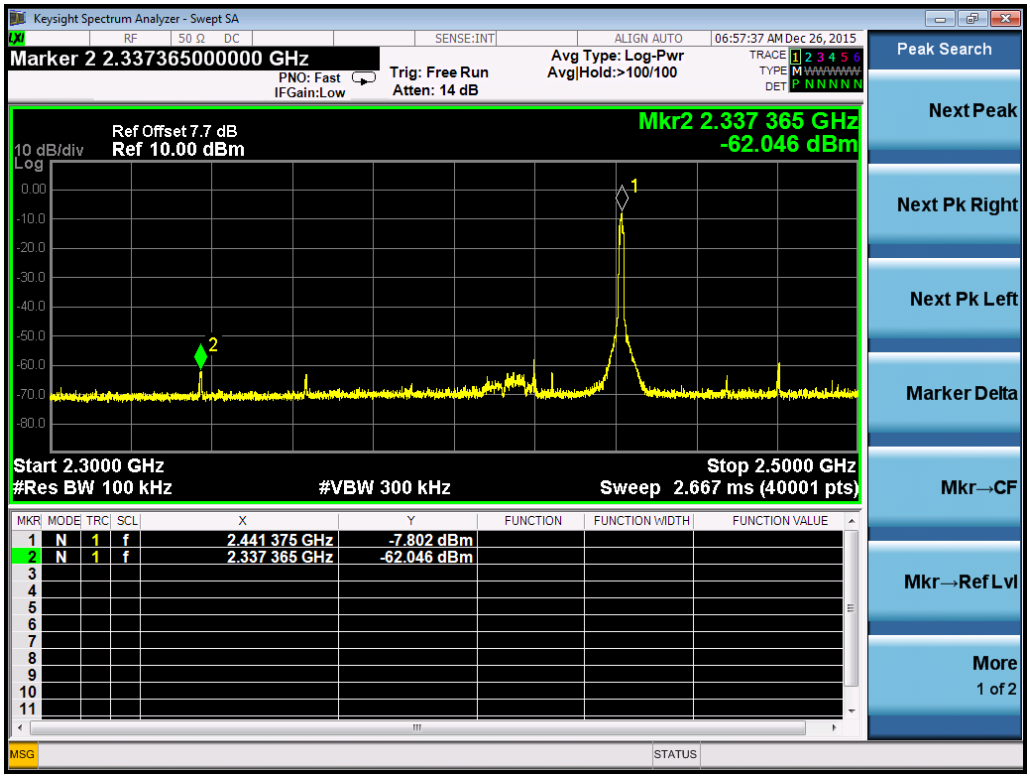
Modulation	Channel	Results	Limit (dBm)
π/4-DQPSK	L	Pass	≥20
	M	Pass	≥20
	H	Pass	≥20
	Hopping	Pass	≥20

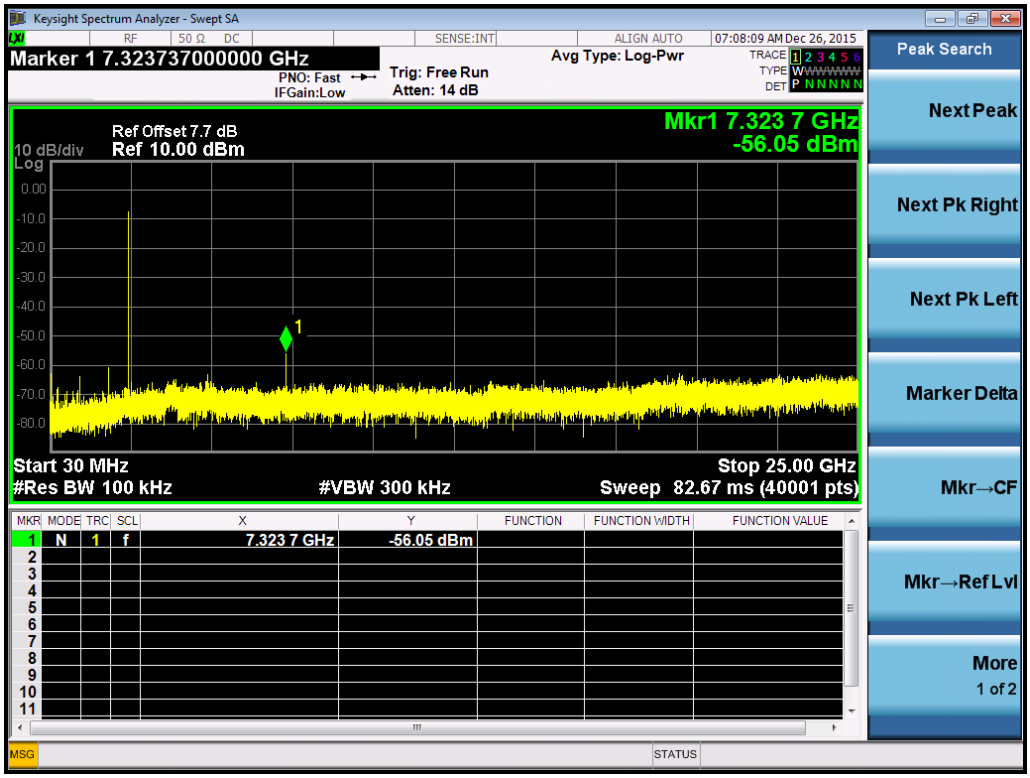
Channel L



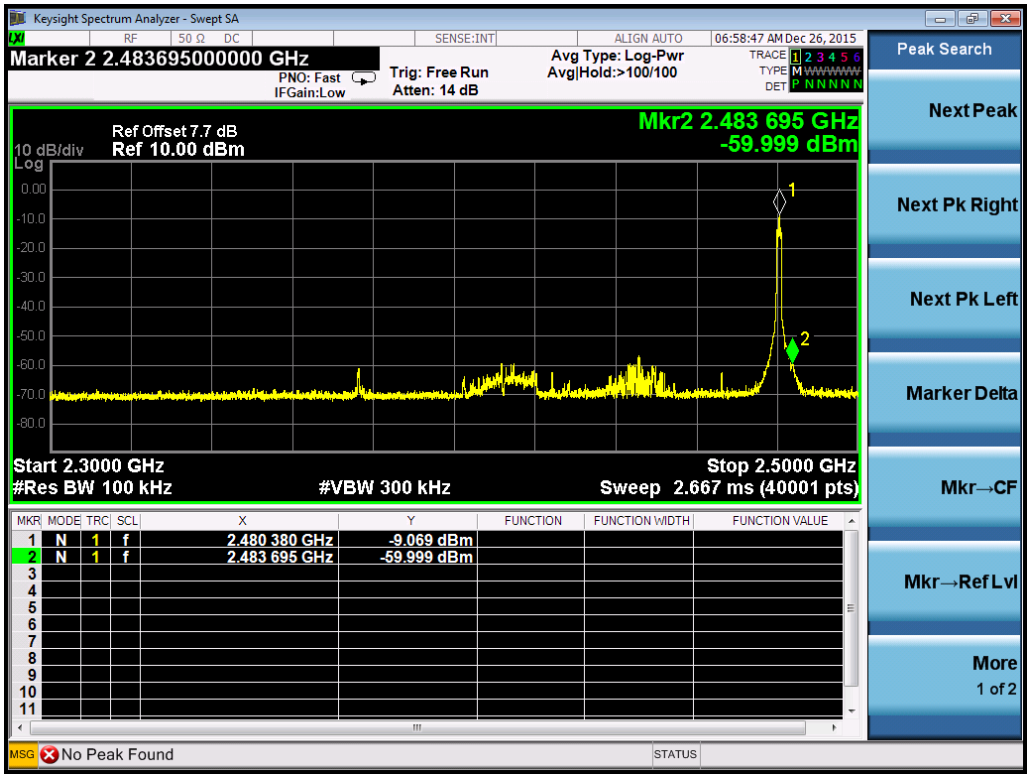


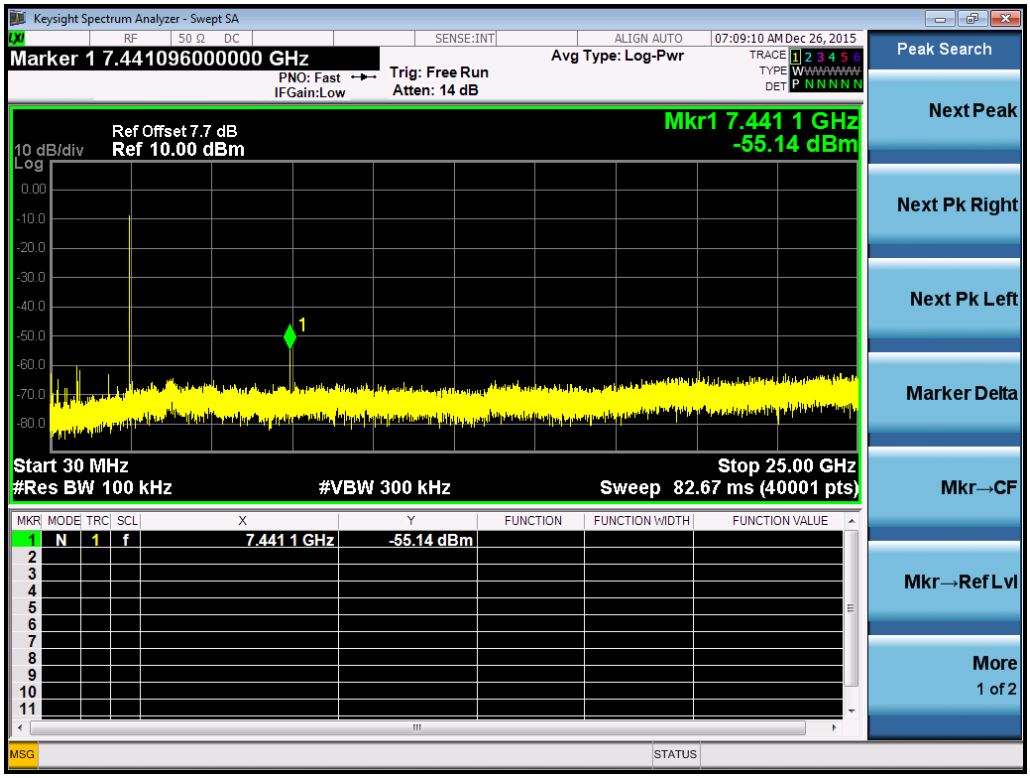
Channel M



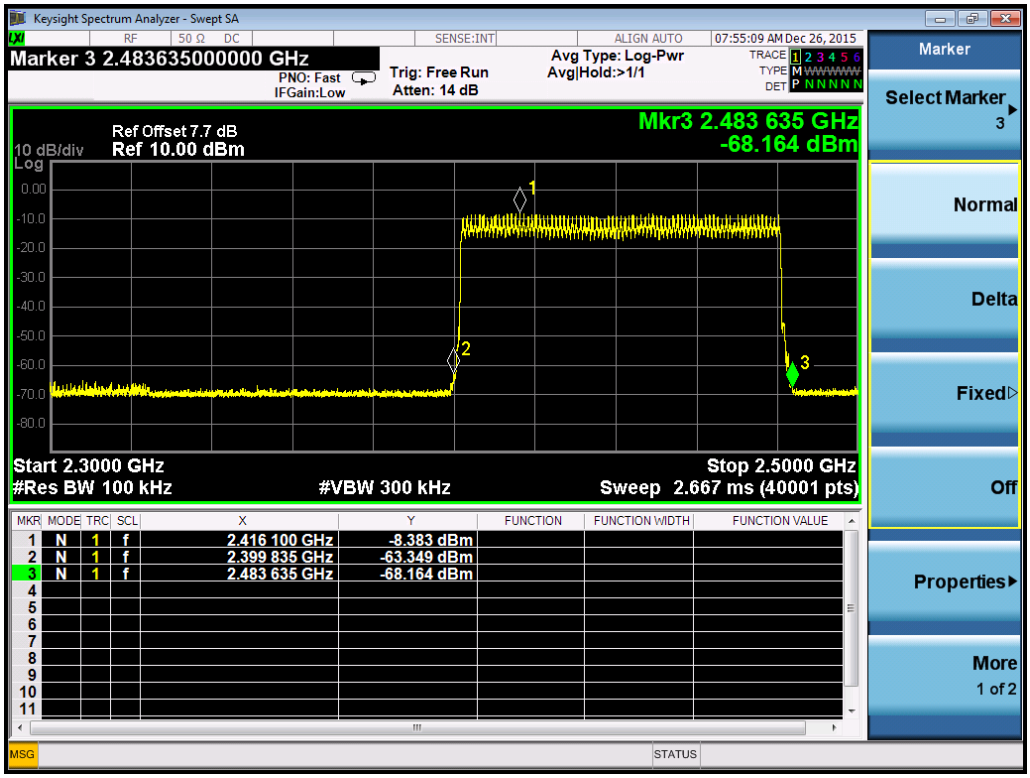


Channel H



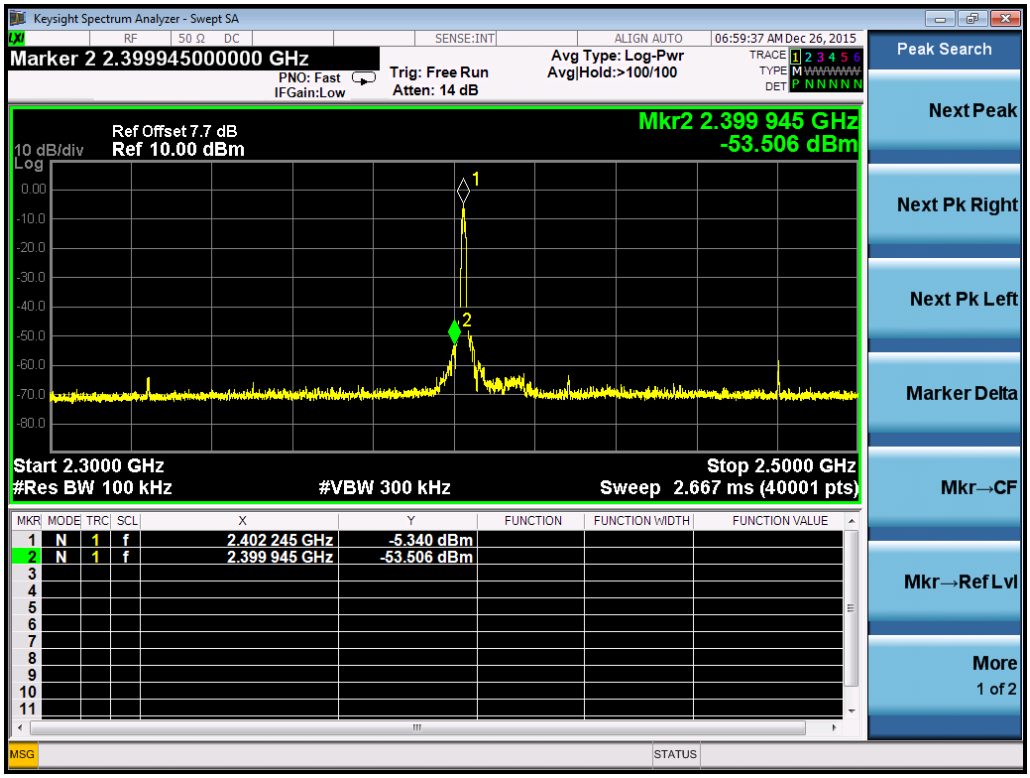

Keysight Spectrum Analyzer - Swept SA
Marker 1 7.441096000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 14 dB
Avg Type: Log-Pwr
07:09:10 AM Dec 26, 2015
Ref Offset 7.7 dB
10 dB/div
Ref 10.00 dBm
Log
Mkr1 7.441 1 GHz
-55.14 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 82.67 ms (40001 pts)
1 N 1 f 7.441 1 GHz -55.14 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

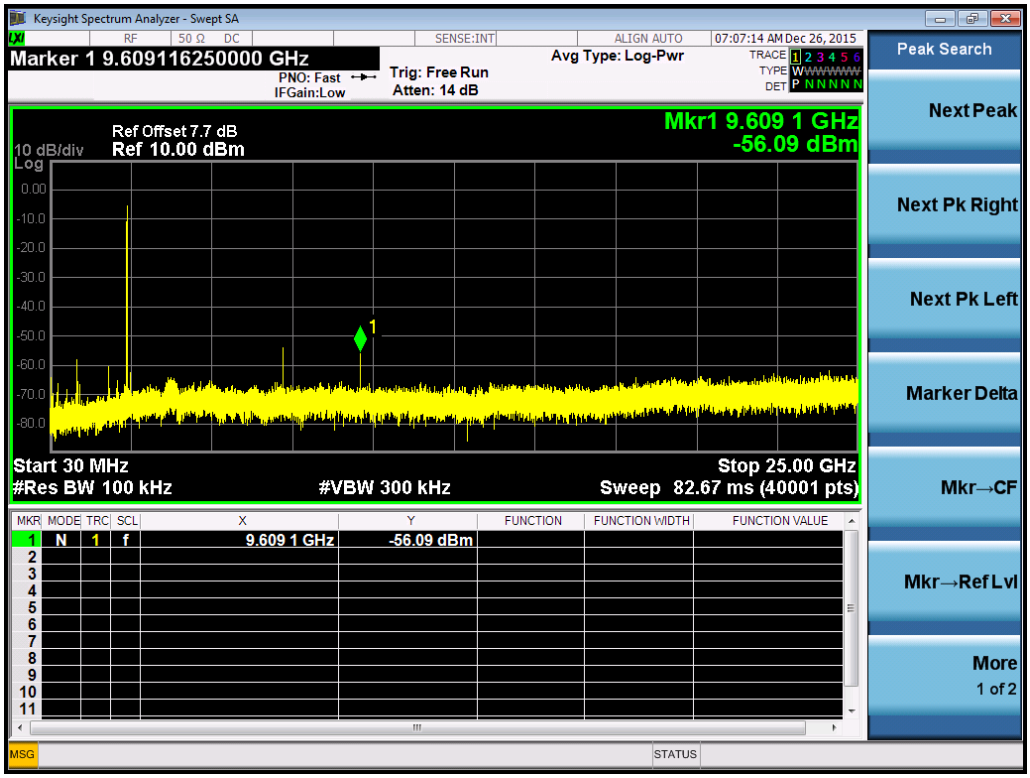
Hopping


Keysight Spectrum Analyzer - Swept SA
Marker 3 2.483635000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 14 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
07:55:09 AM Dec 26, 2015
Ref Offset 7.7 dB
10 dB/div
Ref 10.00 dBm
Log
Mkr3 2.483 635 GHz
-68.164 dBm
Start 2.3000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.5000 GHz
Sweep 2.667 ms (40001 pts)
1 N 1 f 2.416 100 GHz -8.383 dBm
2 N 1 f 2.399 835 GHz -63.349 dBm
3 N 1 f 2.483 635 GHz -68.164 dBm
Marker
Select Marker 3
Normal
Delta
Fixed
Off
Properties
More
1 of 2

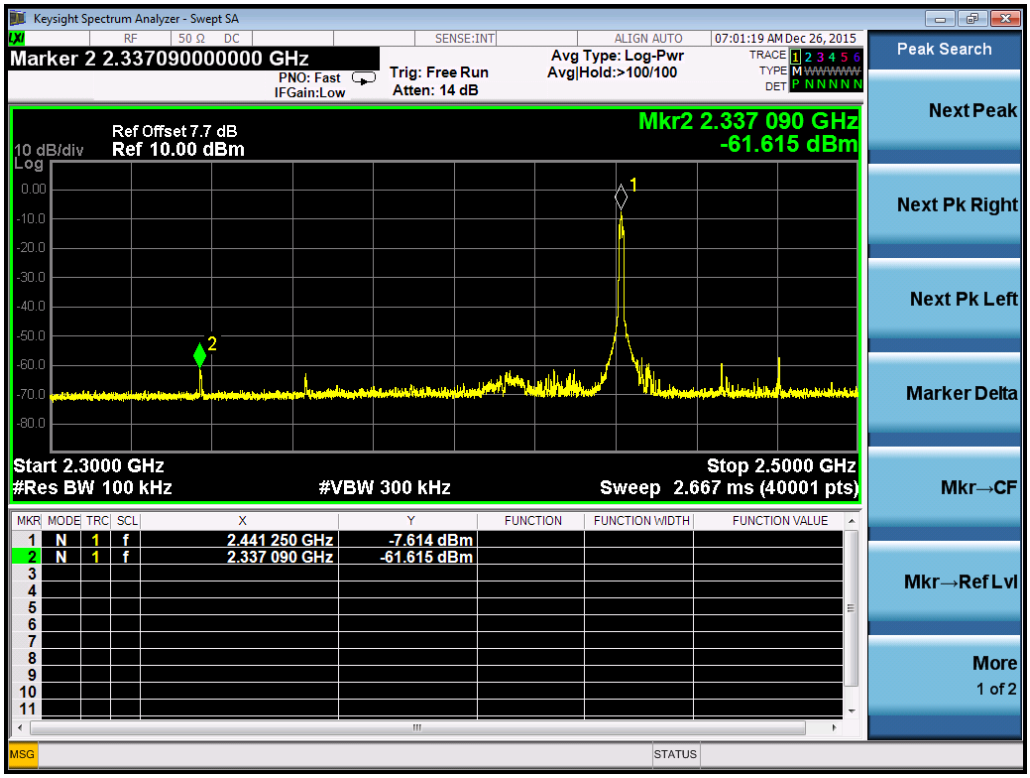
Modulation	Channel	Results	Limit (dBm)
8DPSK	L	Pass	≥20
	M	Pass	≥20
	H	Pass	≥20
	Hopping	Pass	≥20

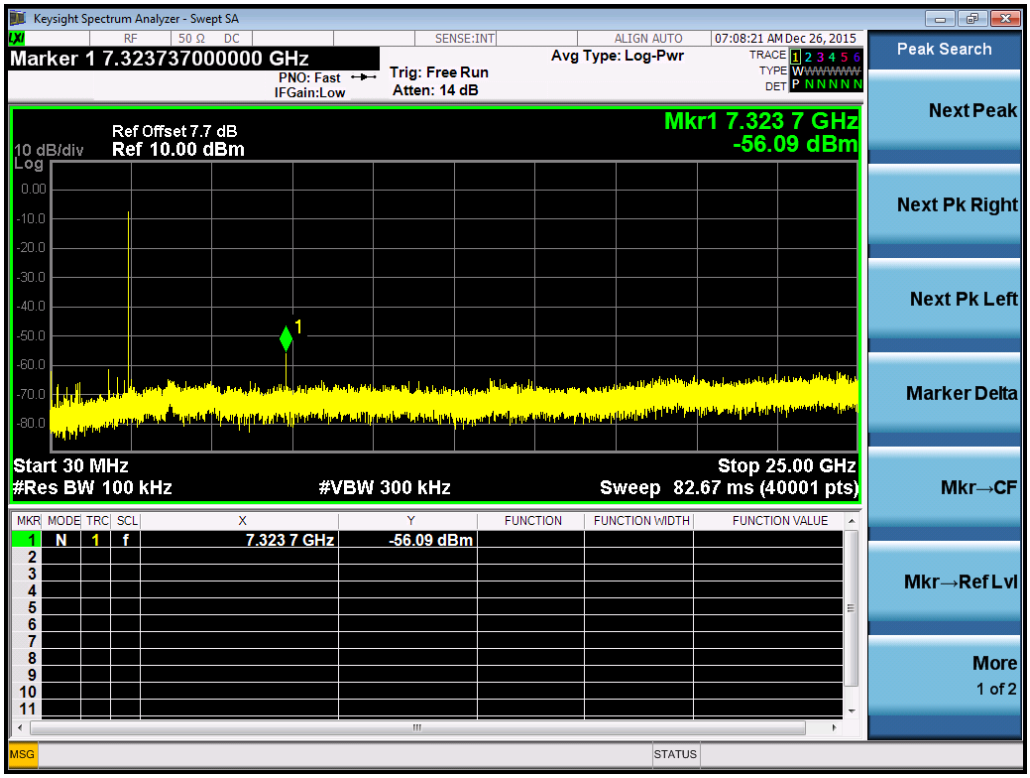
Channel L



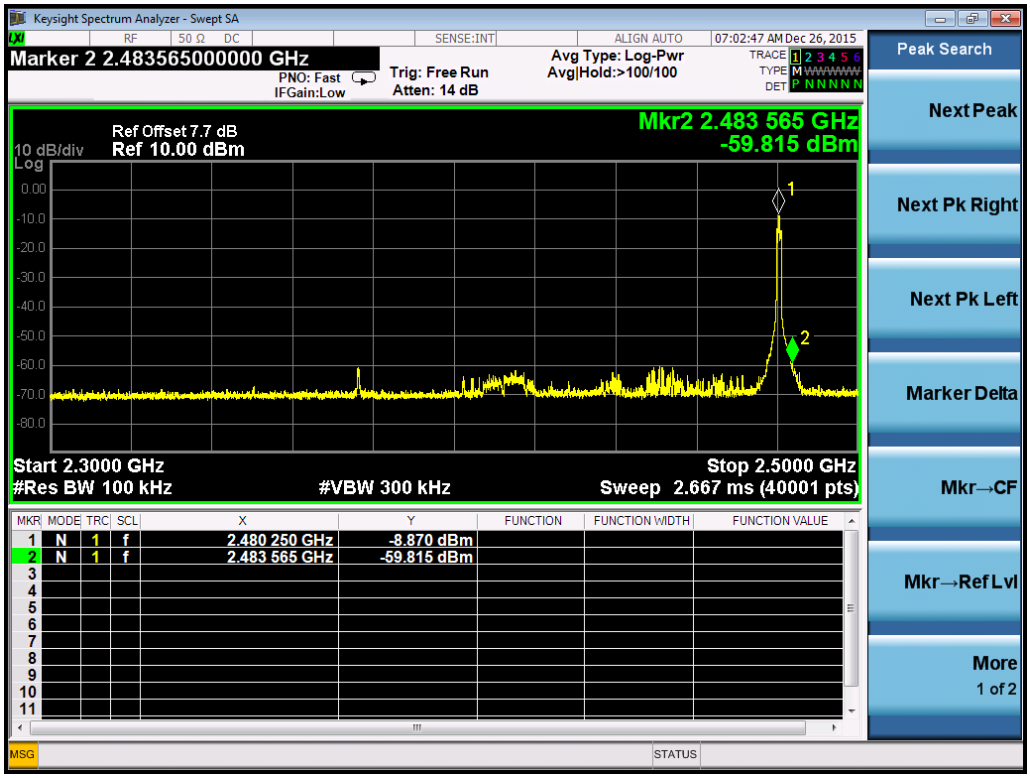

Keysight Spectrum Analyzer - Swept SA
Marker 1 9.609116250000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 14 dB
Avg Type: Log-Pwr
07:07:14 AM Dec 26, 2015
Ref Offset 7.7 dB
10 dB/div
Ref 10.00 dBm
Log
Mkr1 9.609 1 GHz
-56.09 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 82.67 ms (40001 pts)
1 N 1 f 9.609 1 GHz -56.09 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

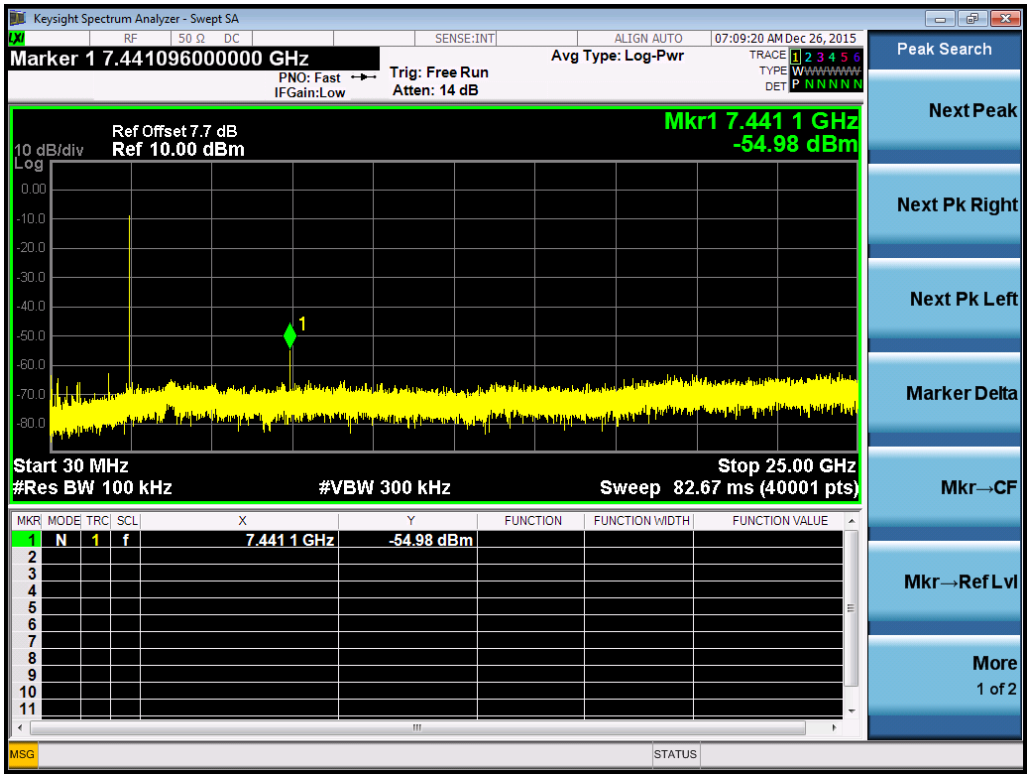
Channel M


Keysight Spectrum Analyzer - Swept SA
Marker 2 2.337090000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 14 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:01:19 AM Dec 26, 2015
Ref Offset 7.7 dB
10 dB/div
Ref 10.00 dBm
Log
Mkr2 2.337 090 GHz
-61.615 dBm
Start 2.3000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.5000 GHz
Sweep 2.667 ms (40001 pts)
1 N 1 f 2.441 250 GHz -7.614 dBm
2 N 1 f 2.337 090 GHz -61.615 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

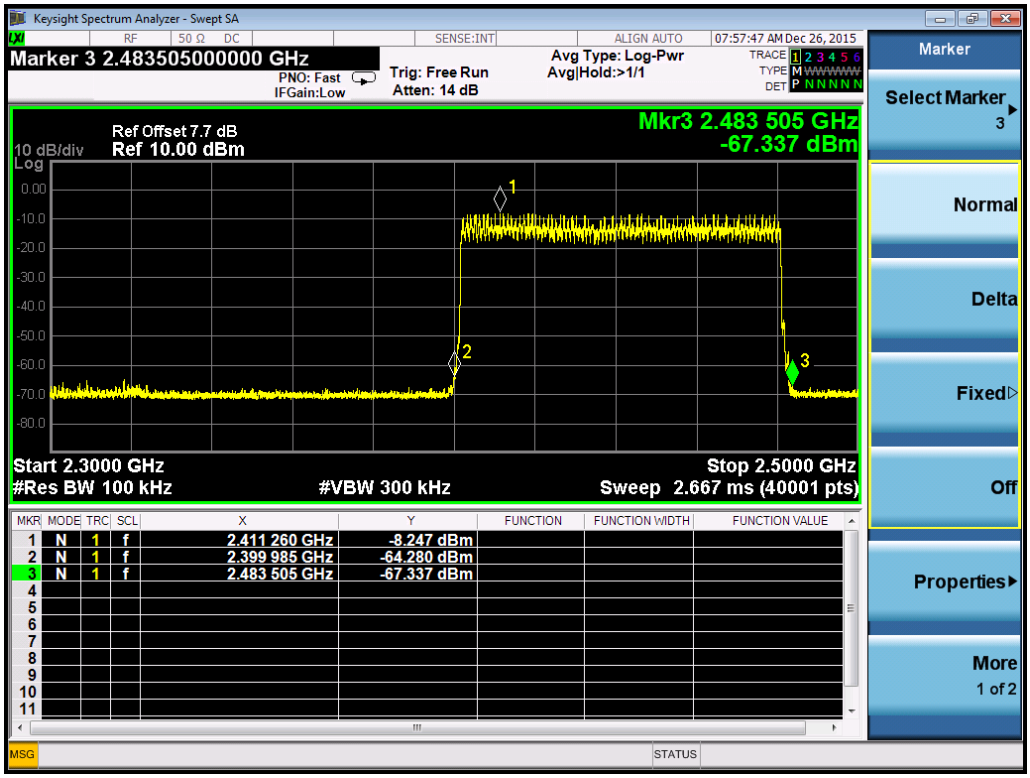

Keysight Spectrum Analyzer - Swept SA
Marker 1 7.323737000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 14 dB
Avg Type: Log-Pwr
07:08:21 AM Dec 26, 2015
Ref Offset 7.7 dB
10 dB/div
Ref 10.00 dBm
Log
Mkr1 7.323 7 GHz
-56.09 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 82.67 ms (40001 pts)
1 N 1 f 7.323 7 GHz -56.09 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Channel H


Keysight Spectrum Analyzer - Swept SA
Marker 2 2.483565000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 14 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:02:47 AM Dec 26, 2015
Ref Offset 7.7 dB
10 dB/div
Ref 10.00 dBm
Log
Mkr2 2.483 565 GHz
-59.815 dBm
Start 2.3000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.5000 GHz
Sweep 2.667 ms (40001 pts)
1 N 1 f 2.480 250 GHz -8.870 dBm
2 N 1 f 2.483 565 GHz -59.815 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2


Keysight Spectrum Analyzer - Swept SA
Marker 1 7.441096000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 14 dB
Avg Type: Log-Pwr
07:09:20 AM Dec 26, 2015
Ref Offset 7.7 dB
10 dB/div
Ref 10.00 dBm
Log
Mkr1 7.441 1 GHz
-54.98 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 82.67 ms (40001 pts)
1 N 1 f 7.441 1 GHz -54.98 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Hopping


Keysight Spectrum Analyzer - Swept SA
Marker 3 2.483505000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 14 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
07:57:47 AM Dec 26, 2015
Ref Offset 7.7 dB
10 dB/div
Ref 10.00 dBm
Log
Mkr3 2.483 505 GHz
-67.337 dBm
Start 2.3000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.5000 GHz
Sweep 2.667 ms (40001 pts)
1 N 1 f 2.411 260 GHz -8.247 dBm
2 N 1 f 2.399 985 GHz -64.280 dBm
3 N 1 f 2.483 505 GHz -67.337 dBm
Marker
Select Marker 3
Normal
Delta
Fixed
Off
Properties
More
1 of 2

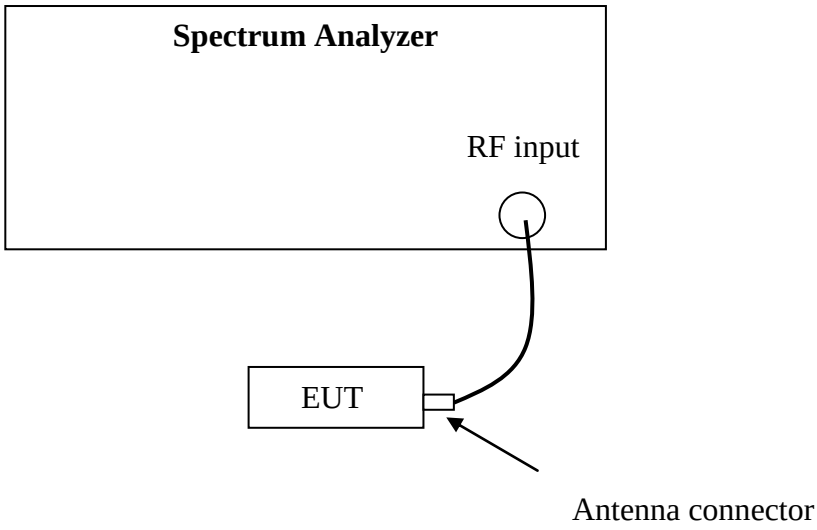
7 Number of Hopping Frequencies

Test result: **Pass**

7.1 Test limit

Number of Hopping Frequencies in the 2400-2483.5 MHz band shall use at least 15 channels.

7.2 Test Configuration



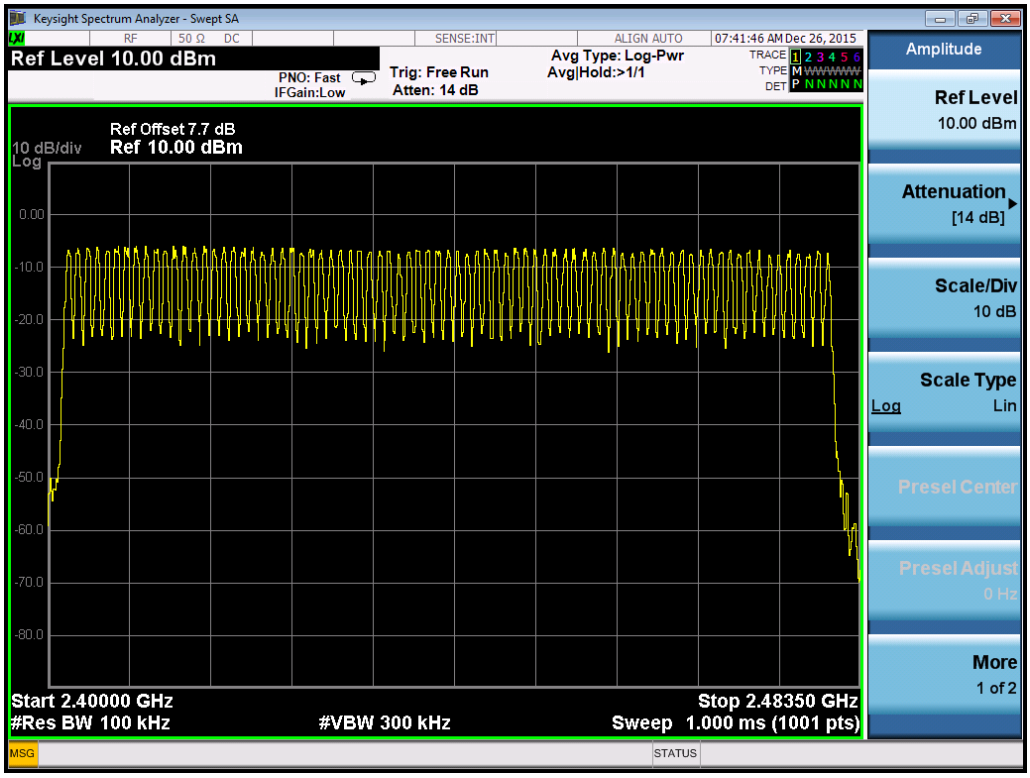
7.3 Test procedure and test setup

The Number of Hopping Frequencies per FCC § 15.247(a)(1)(iii) is measured using the Spectrum Analyzer with RBW=100kHz, VBW≥RBW, Sweep = auto, Detector = peak, Trace = max hold.
The EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems).

7.4 Test Protocol

Temperature: 22°C
Relative Humidity: 54%

Number of Hopping Frequencies	Limit
79	≥15



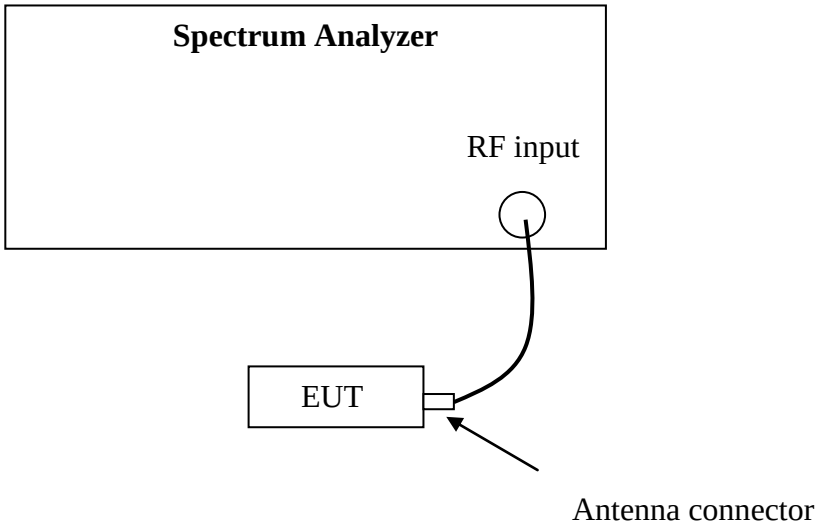
8 Dwell Time

Test result: **Pass**

8.1 Test limit

The dwell time 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.

8.2 Test Configuration



8.3 Test procedure and test setup

Dwell time per FCC § 15.247(a)(1)(iii) is measured using the Spectrum Analyzer with Span = 0, RBW=1MHz, VBW≥RBW, Sweep can capture the entire dwell time, Detector = peak, Trace = max hold.
The EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems).

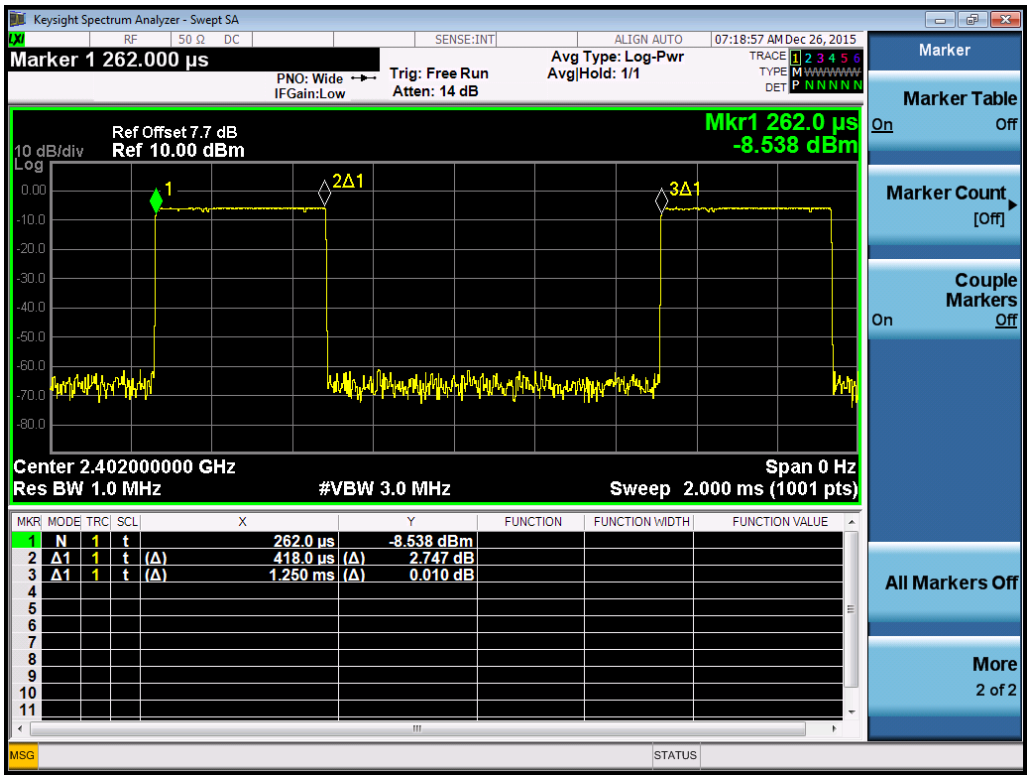
8.4 Test Protocol

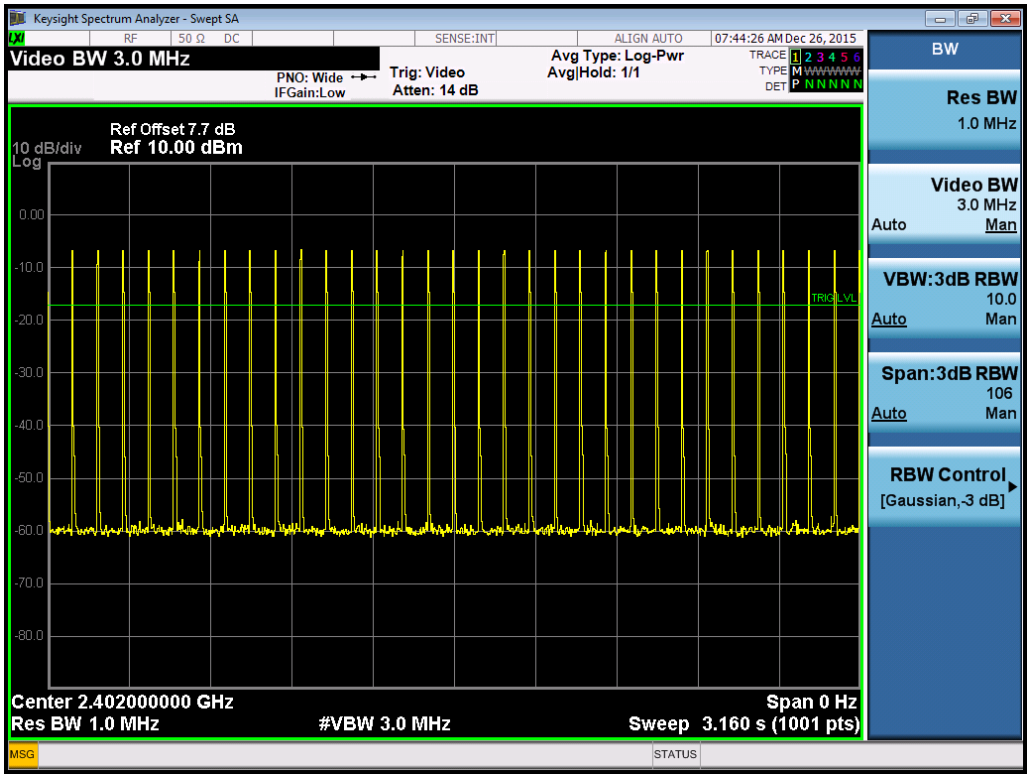
Temperature: 22°C
Relative Humidity: 54%

Packet	Occupancy time for single hop (ms) O	Channel	Real observed period (s) P	Hops among Observed period I	Dwell time (ms) T	Limit (s)
DH1	0.418	L	3.16	32	133.76	≤0.4
		M	3.16	32	133.76	
		H	3.16	32	133.76	
DH3	1.678	L	3.16	16	268.48	
		M	3.16	16	268.48	
		H	3.16	16	268.48	
DH5	2.928	L	3.16	11	322.08	
		M	3.16	11	322.08	
		H	3.16	11	322.08	

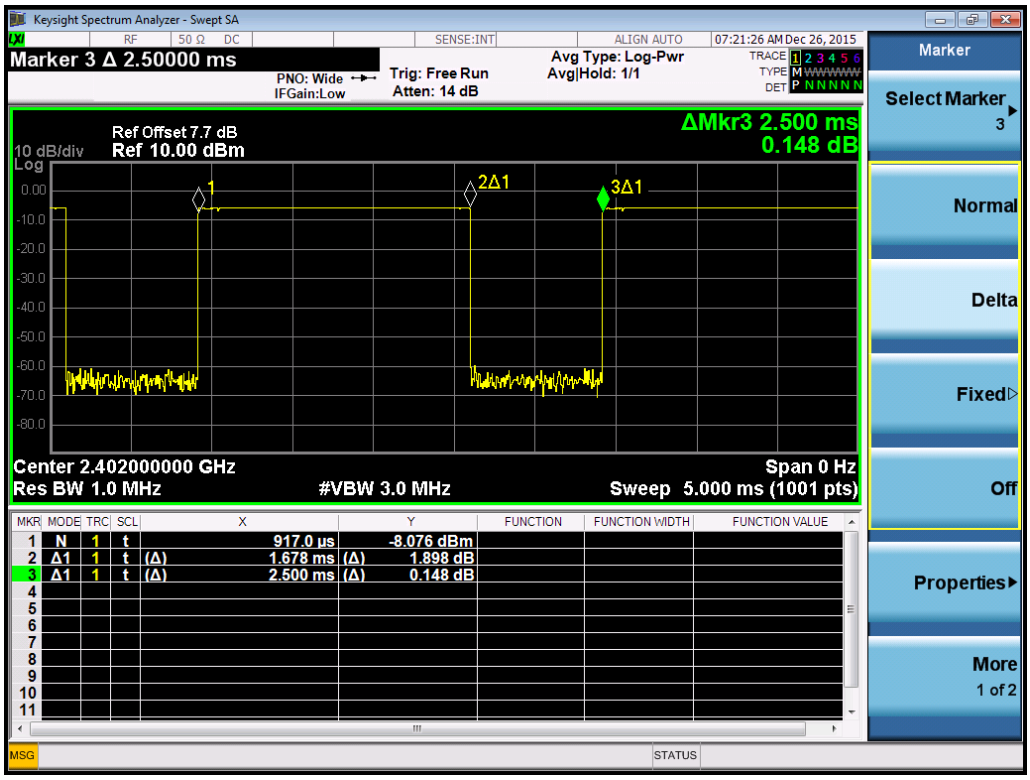
Remark: 1. There are 79 channels in all. So the complete observed period P = 0.4 * 79 = 31.6 s.
2. Average time of occupancy **T = O *I * 31.6 / P**

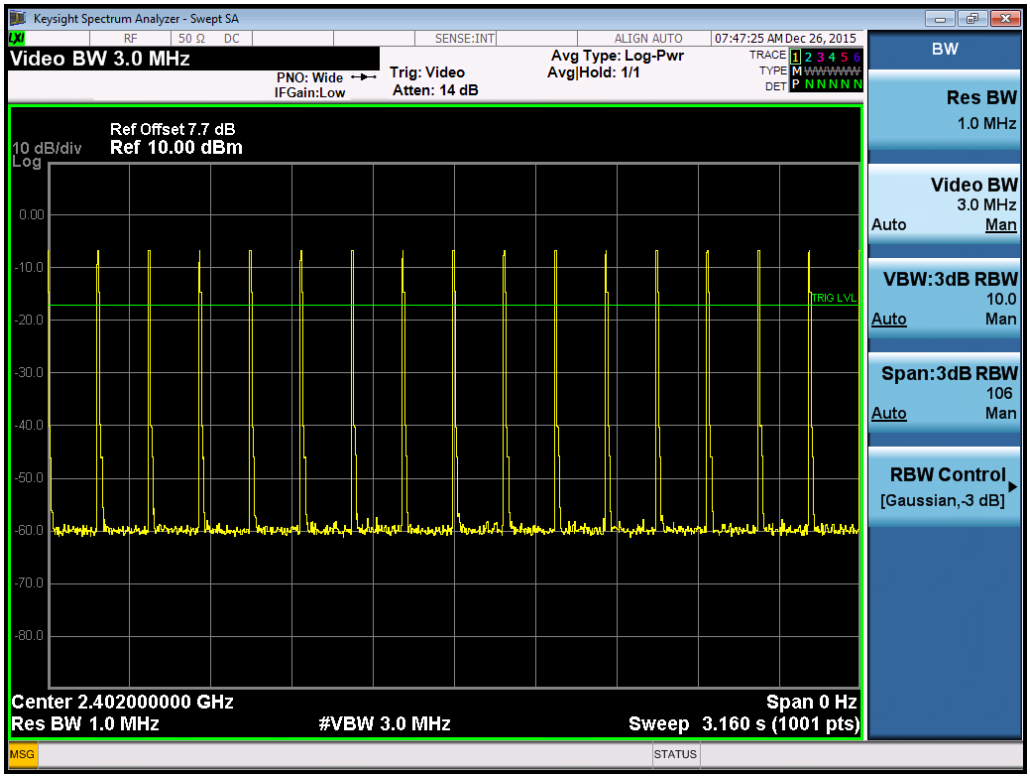
DH1



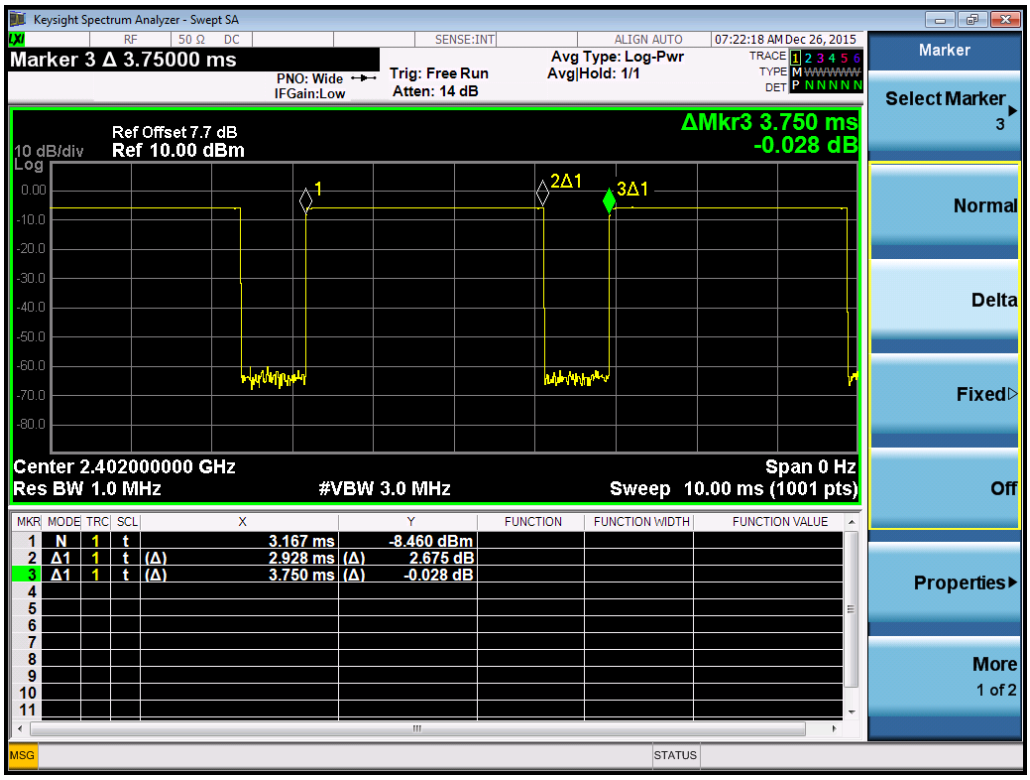


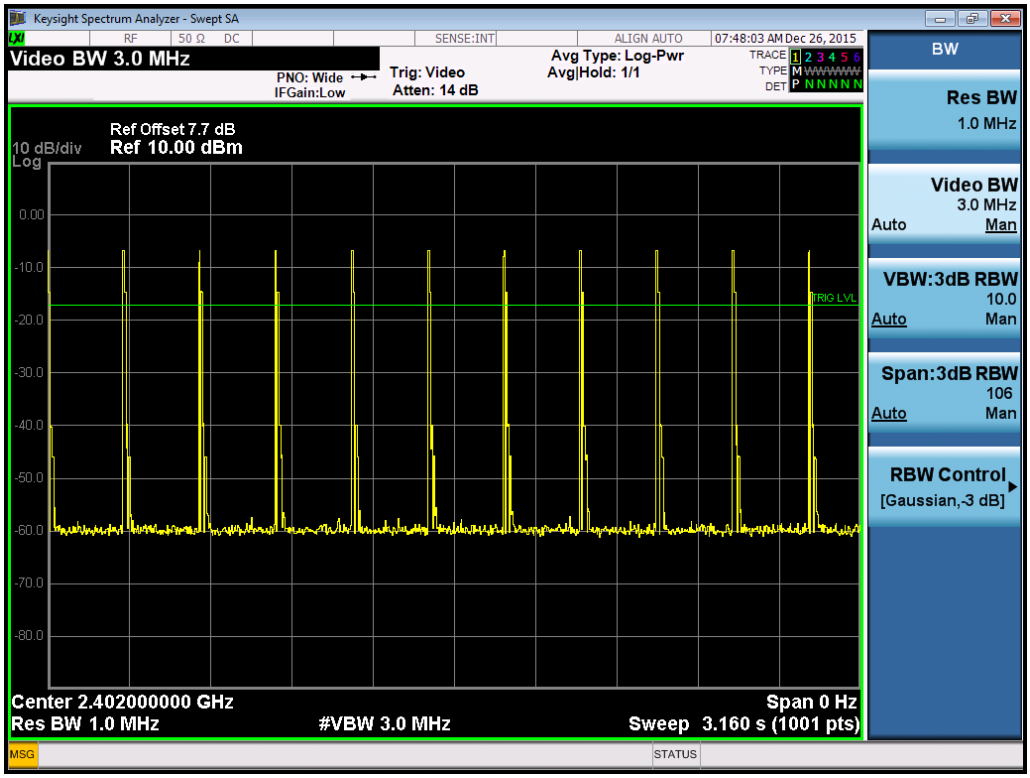
DH3





DH5





9 Radiated Emissions in restricted frequency bands

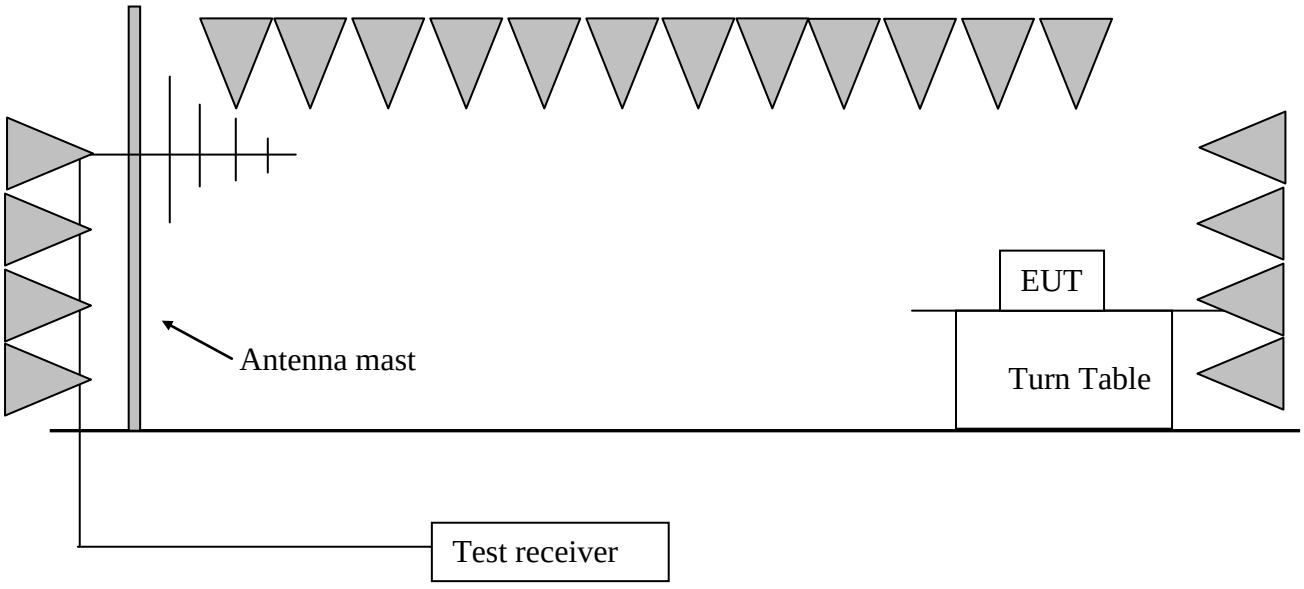
Test result: **Pass**

9.1 Test limit

The 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) showed as below:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
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

9.2 Test Configuration



9.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.

Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m.

The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

RBW = 300 Hz, VBW = 1 kHz (9 kHz~150 kHz);
RBW = 10 kHz, VBW = 30 kHz (150 kHz~30MHz);
RBW = 100 kHz, VBW = 300 kHz (30MHz~1GHz for PK)
RBW = 1MHz, VBW = 3MHz (>1GHz for PK);

Remark:
1. Factor= Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Measured level= Original Receiver Reading + Factor
3. Margin = Limit – Measured level
4. If the PK measured level is lower than AV limit, the AV test can be elided.

Example:

Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV.
Then Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Measured level = 10dBuV + 0.20dB/m = 10.20dBuV/m
Assuming limit = 54dBuV/m,
Measured level = 10.20dBuV/m, then Margin = 54 - 10.20 = 43.80dBuV/m.

9.4 Test Protocol

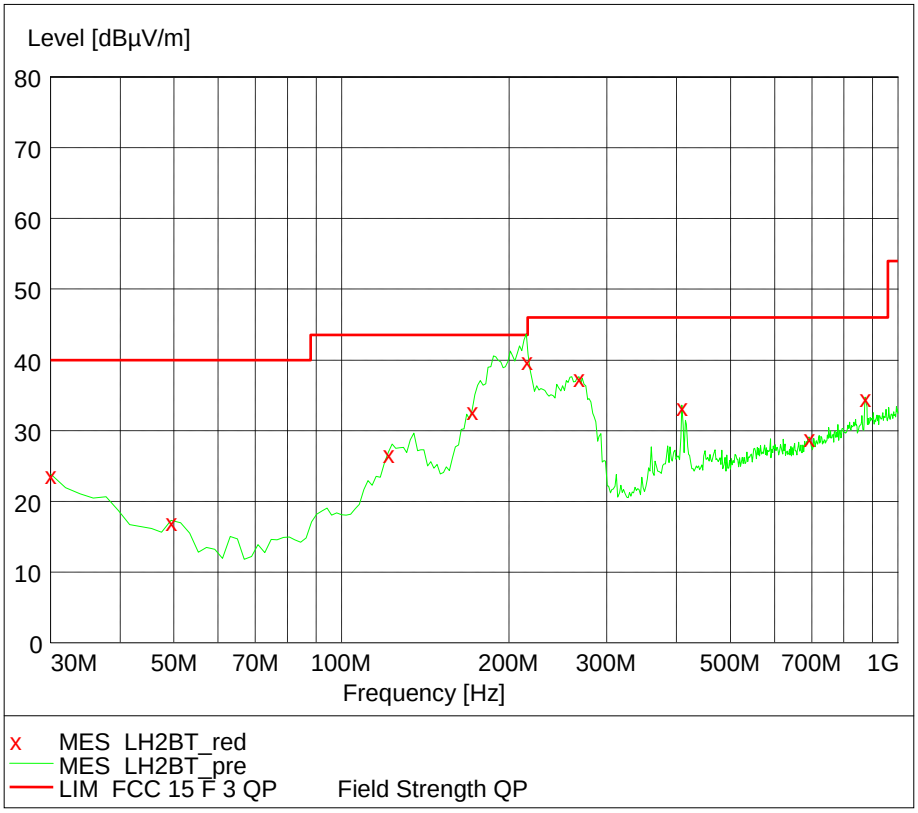
Temperature:	22°C
Relative Humidity:	54%

The product was tested in three axes (X, Y and Z) and all the two models of product were tested, the worst data was listed in the report.

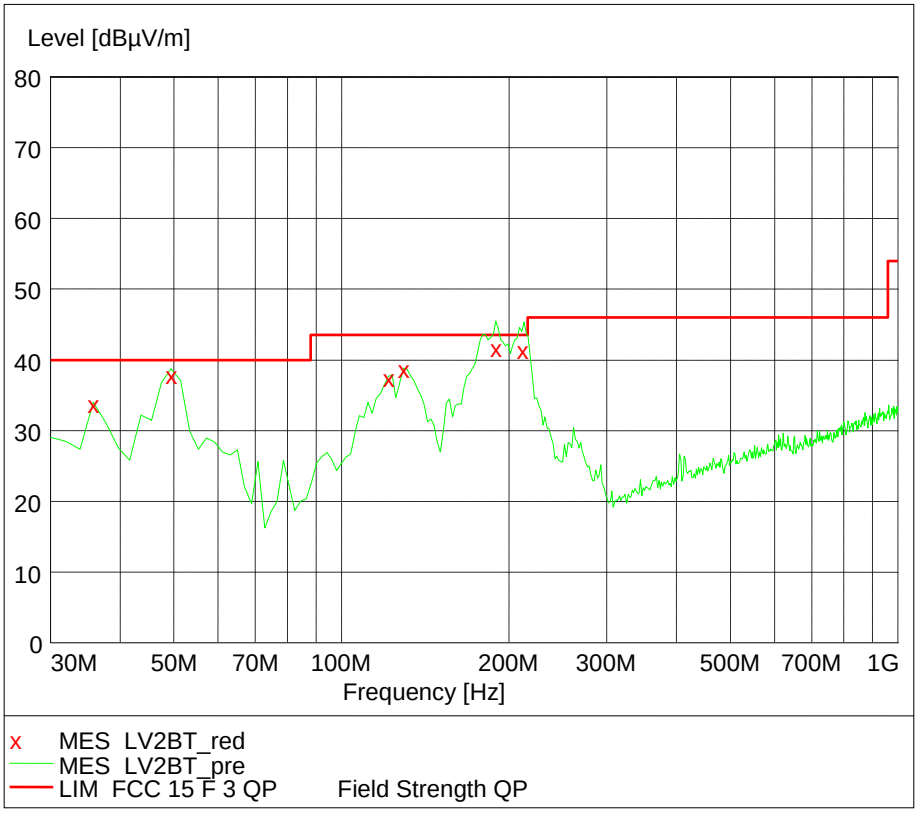
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

The worst waveform from 30MHz to 1000MHz is listed as below:

Horizontal



Vertical



Test data from 30MHz to 1000MHz:

Polarization	Frequency (MHz)	Measured level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector
H	215.17	40.10	43.50	3.40	PK
	267.15	37.60	46.00	8.40	PK
	873.65	34.80	46.00	11.20	PK
V	49.44	38.10	40.00	1.90	QP
	129.14	38.90	43.50	4.60	PK
	189.57	41.80	43.50	1.70	QP
	211.73	41.50	43.50	2.00	QP

Note: The worst test result (30MHz to 1000MHz) of channel H (GFSK 2480MHz) was chosen to list in the report as representative.

Test result above 1GHz:

GFSK:

Channel	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	V	2402.20	90.90	34.34	Fundamental	/	PK
	V	2378.76	52.20	34.29	74.00	21.80	PK
	V	7206.42	66.20	2.30	74.00	7.80	PK
	V	7206.42	40.00	2.30	54.00	14.00	AV
	V	9606.52	57.50	4.90	74.00	16.50	PK
	V	9606.52	38.50	4.90	54.00	15.50	AV
M	V	2441.20	91.00	34.60	Fundamental	/	PK
	V	7323.45	59.00	2.40	74.00	15.00	PK
	V	7323.45	51.50	2.40	54.00	2.50	AV
	V	9764.52	57.00	5.00	74.00	17.00	PK
	V	9764.52	49.50	5.00	54.00	4.50	AV
H	V	2480.20	91.20	34.62	Fundamental	/	PK
	V	2483.98	52.50	34.63	74.00	21.50	PK
	V	7440.40	59.20	2.50	74.00	15.00	PK
	V	7440.40	52.50	2.50	54.00	1.50	AV
	V	9920.35	57.00	5.00	74.00	17.00	PK
	V	9920.35	51.00	5.00	54.00	3.00	AV

π/4-DQPSK:

Channel	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	V	2402.20	90.80	34.34	Fundamental	/	PK
	V	2378.45	52.30	34.29	74.00	21.70	PK
	V	7206.42	56.70	2.30	74.00	17.30	PK
	V	7206.42	51.50	2.30	54.00	2.50	AV
	V	9606.52	55.80	4.90	74.00	18.20	PK
	V	9606.52	50.00	4.90	54.00	4.00	AV
M	V	2441.20	90.90	34.60	Fundamental	/	PK
	V	7323.45	59.50	2.40	74.00	14.50	PK
	V	7323.45	52.00	2.40	54.00	2.00	AV
	V	9764.52	56.50	5.00	74.00	17.50	PK
	V	9764.52	49.50	5.00	54.00	4.50	AV
H	V	2480.20	90.90	34.62	Fundamental	/	PK
	V	2483.85	52.50	34.63	74.00	21.50	PK
	V	7440.40	59.70	2.50	74.00	14.30	PK
	V	7440.40	53.00	2.50	54.00	1.00	AV
	V	9920.35	55.00	5.00	74.00	19.00	PK
	V	9920.35	51.50	5.00	54.00	2.50	AV

8DPSK:

Channel	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	V	2402.20	90.70	34.34	Fundamental	/	PK
	V	2378.85	52.30	34.29	74.00	21.70	PK
	V	7206.42	57.30	2.30	74.00	16.70	PK
	V	7206.42	52.00	2.30	54.00	2.00	AV
	V	9606.52	56.30	4.90	74.00	17.70	PK
	V	9606.52	50.50	4.90	54.00	3.50	AV
M	V	2441.20	90.60	34.60	Fundamental	/	PK
	V	7323.45	60.20	2.40	74.00	13.80	PK
	V	7323.45	53.50	2.40	54.00	0.50	AV
	V	9764.52	55.50	5.00	74.00	18.50	PK
	V	9764.52	49.50	5.00	54.00	4.50	AV
H	V	2480.20	90.80	34.62	Fundamental	/	PK
	V	2483.78	52.50	34.63	74.00	21.50	PK
	V	7440.40	60.10	2.50	74.00	13.90	PK
	V	7440.40	53.50	2.50	54.00	0.50	AV
	V	9920.35	55.00	5.00	74.00	19.00	PK
	V	9920.35	52.00	5.00	54.00	2.00	AV

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = limit – Corrected Reading

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV.
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m; Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m
Assuming limit = 54dBuV/m, Corrected Reading = 10.20dBuV/m, then
Margin = 54 -10.20 = 43.80dBuV/m

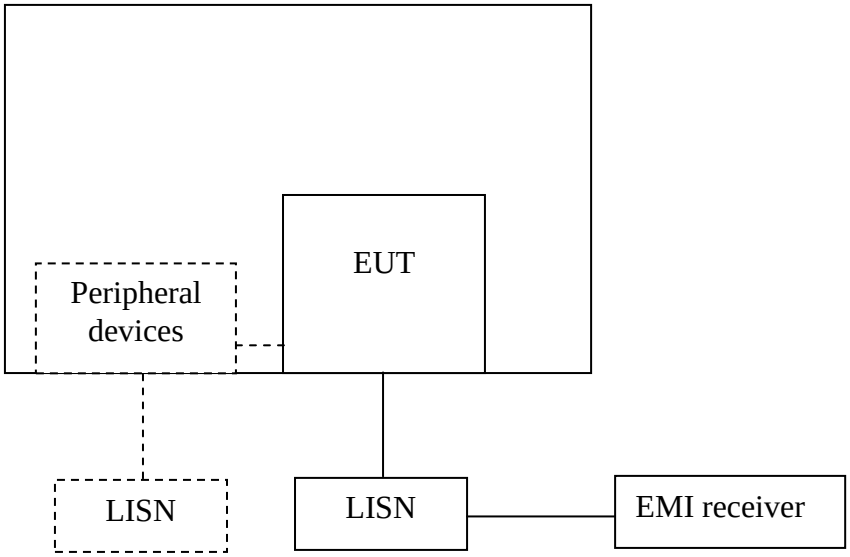
10 Power line conducted emission

Test result: **Pass**

10.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

10.2 Test configuration



☒ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

10.3 Test procedure and test set up

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

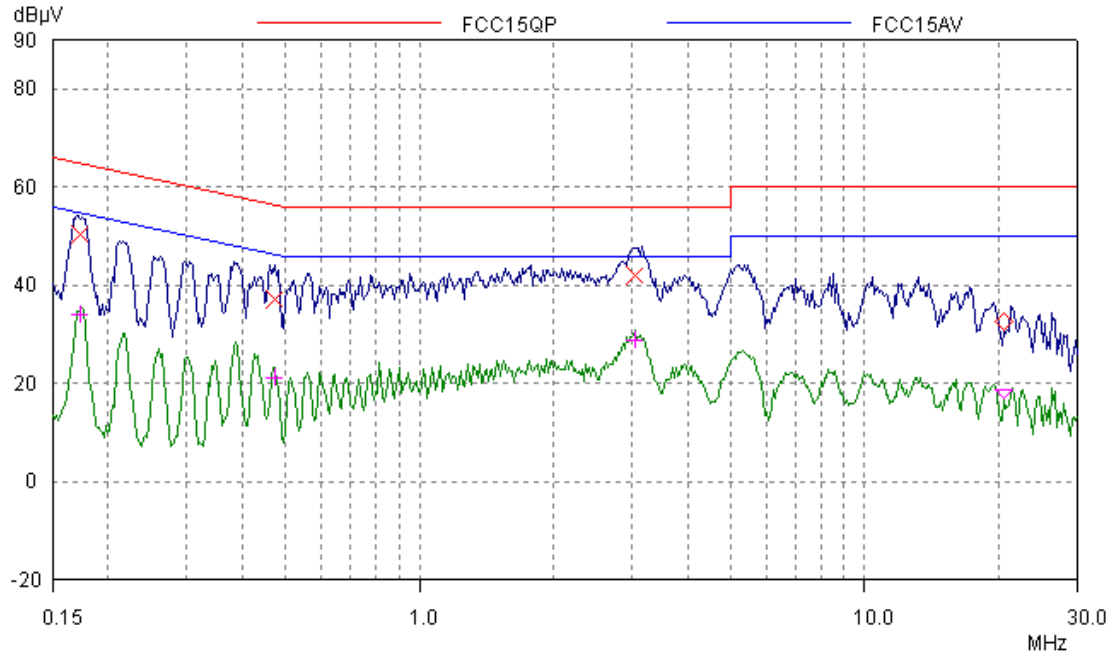
Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

10.4 Test protocol

Temperature: 22°C
Relative Humidity: 54%

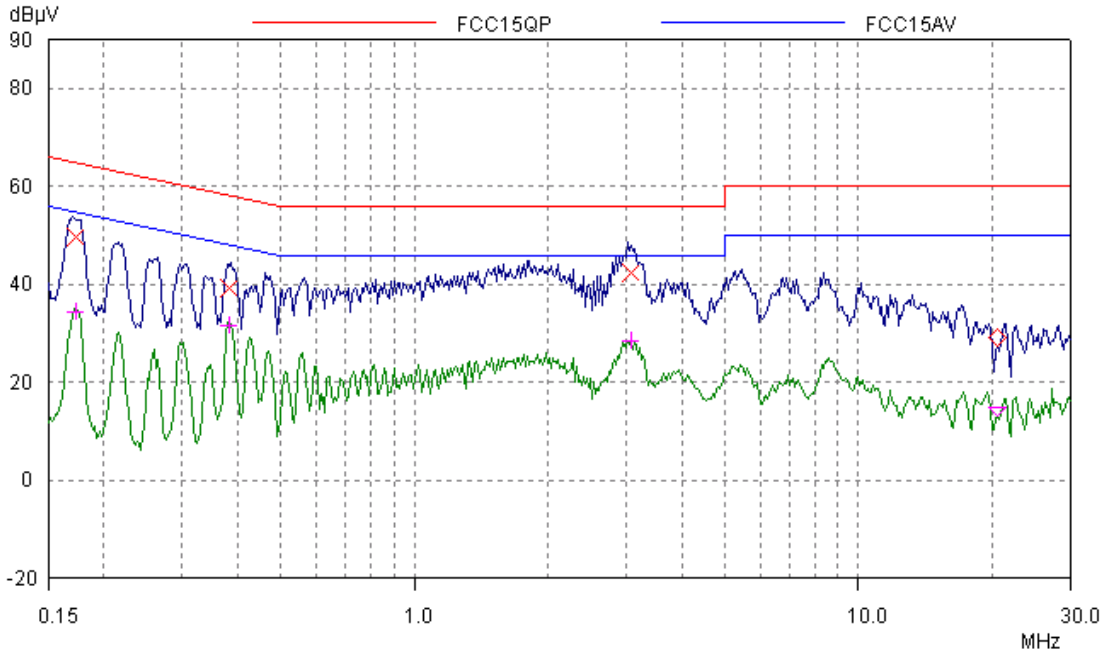
L line:



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(µV)	Limit dB(µV)	Margin (dB)	level dB(µV)	limit dB(µV)	Margin (dB)
0172	50.45	64.87	14.42	*	54.87	*
0.472	37.26	56.48	19.22	*	46.48	*
3.043	41.93	56.00	14.07	28.79	46.00	17.21
Remark: If the margin higher than 20dB, it would be marked as *.						

N line:



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(µV)	Limit dB(µV)	Margin (dB)	level dB(µV)	limit dB(µV)	Margin (dB)
0.172	49.85	64.87	15.02	*	54.87	*
0.382	39.45	58.24	18.79	31.71	48.24	16.53
3.067	42.49	56.00	13.51	28.53	46.00	17.47
Remark: If the margin higher than 20dB, it would be marked as *.						

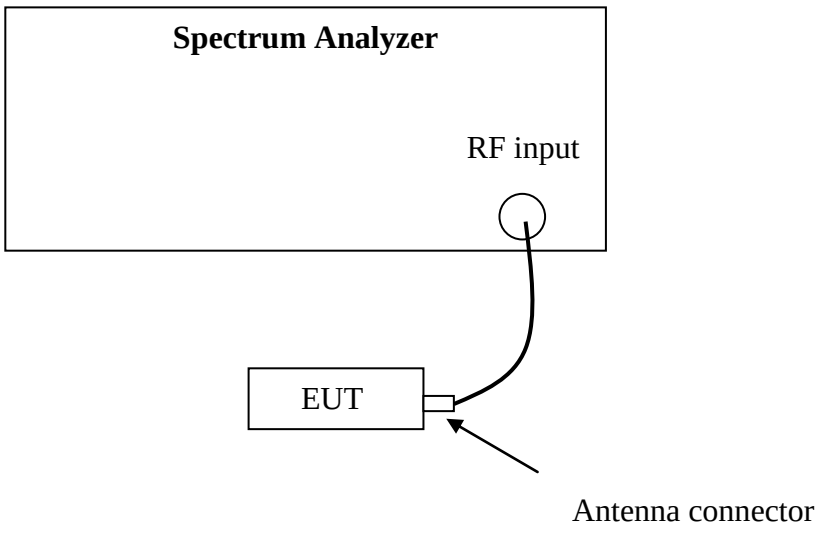
11 Occupied Bandwidth

Test Status: Tested

11.1 Test limit

None

11.2 Test Configuration



11.3 Test procedure and test setup

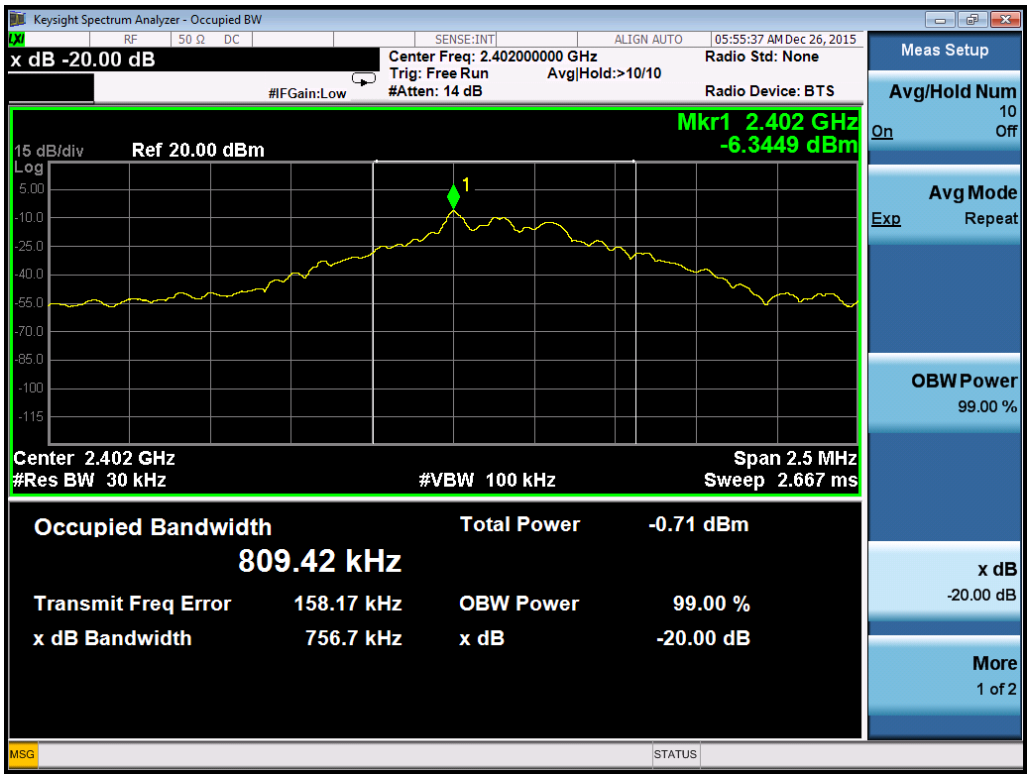
The occupied bandwidth per RSS-Gen Issue 4 Clause 6.6 was measured using the Spectrum Analyzer.

11.4 Test protocol

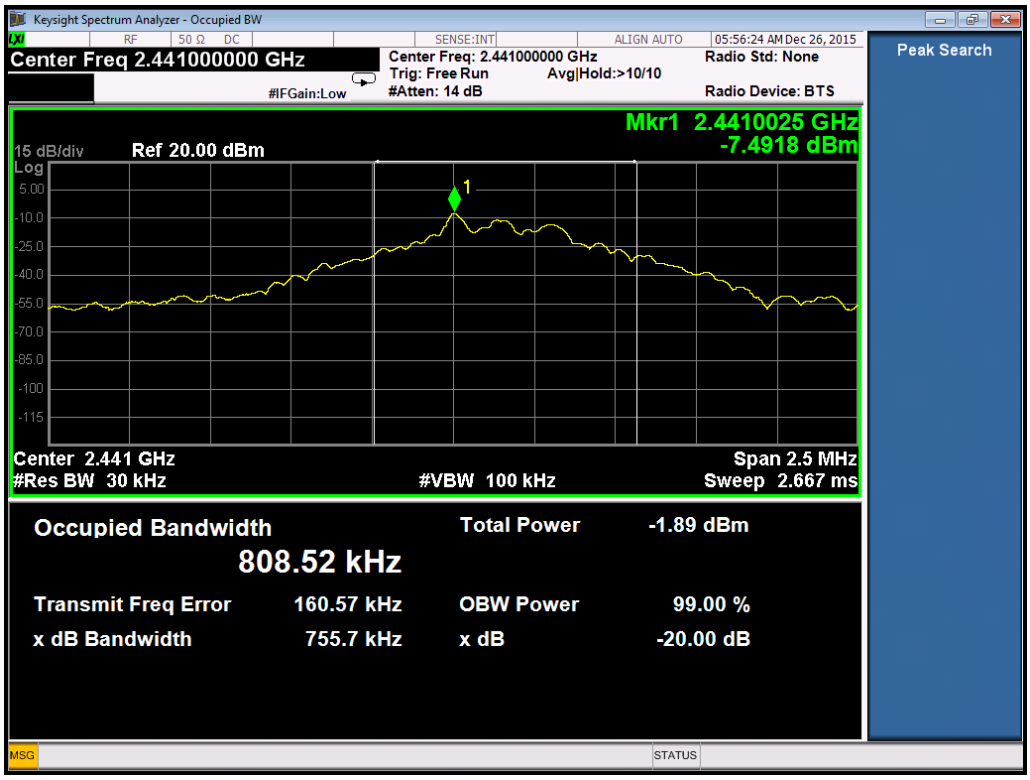
Temperature : 25 °C
Relative Humidity : 55 %

Modulation	Mode	99% Bandwidth (kHz)
GFSK	L	809.42
	M	808.52
	H	808.72

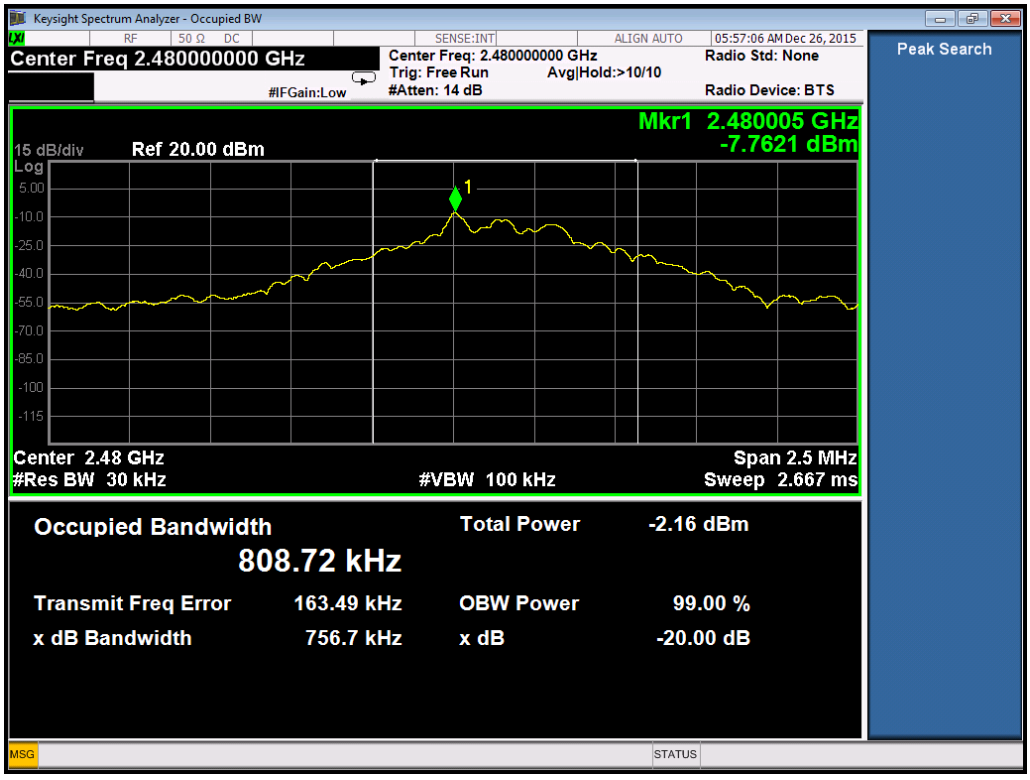
Channel L



Channel M

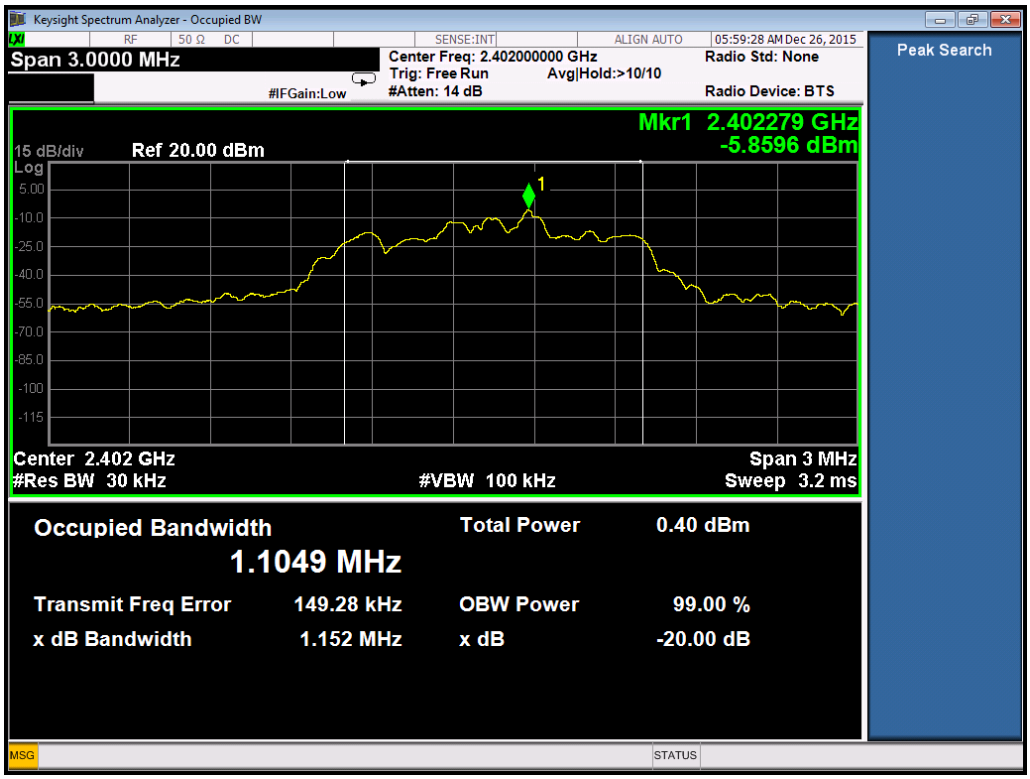


Channel H

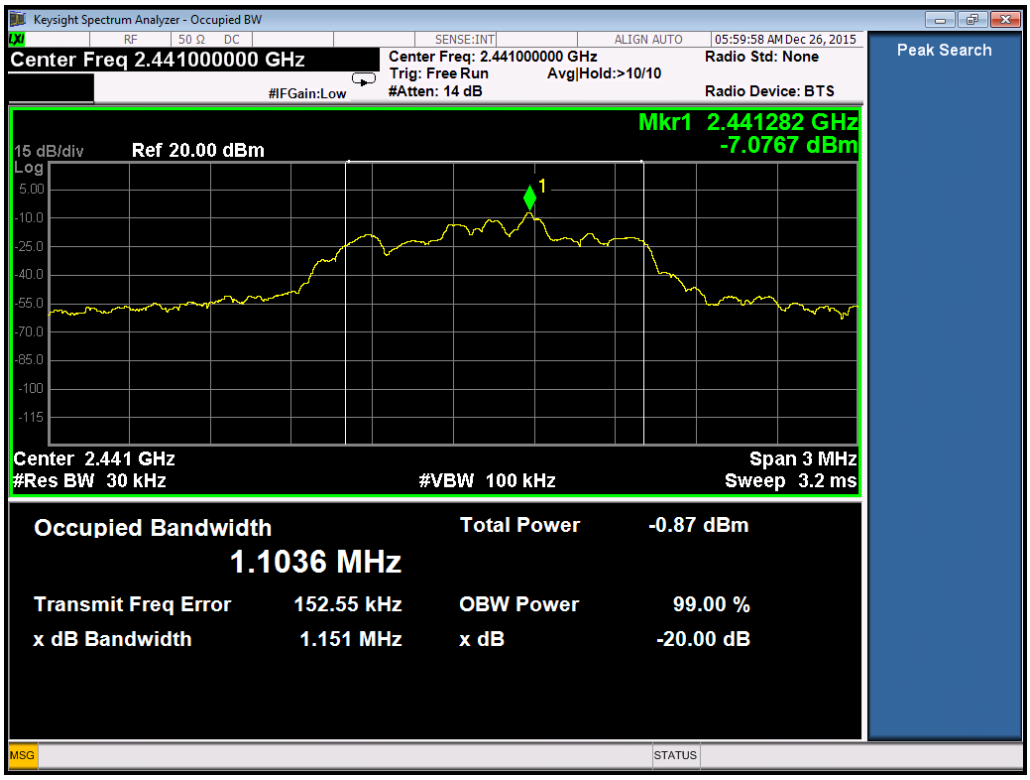


Modulation	Mode	99% Bandwidth (MHz)
π/4-DQPSK	L	1.1049
	M	1.1036
	H	1.1053

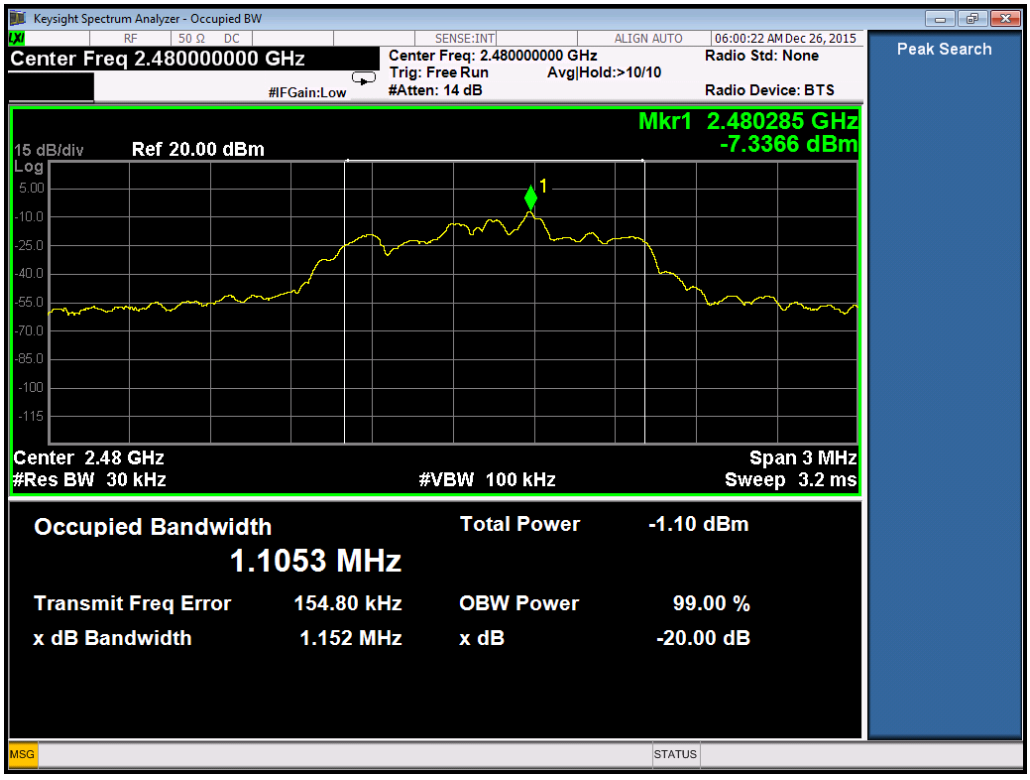
Channel L



Channel M

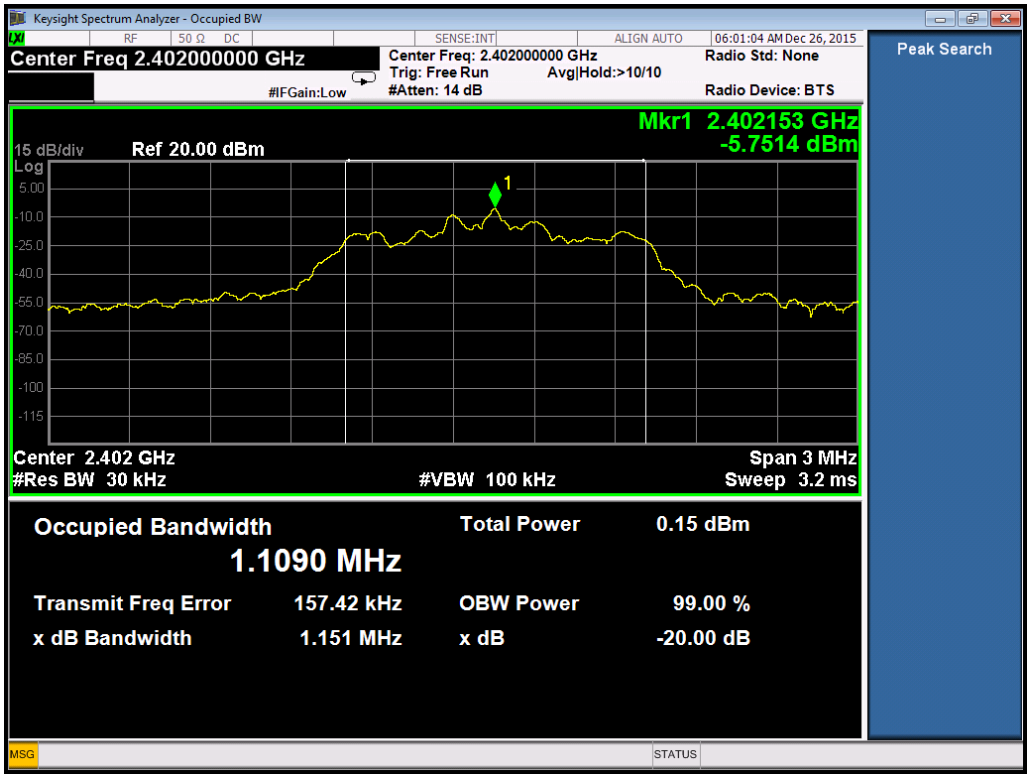


Channel H

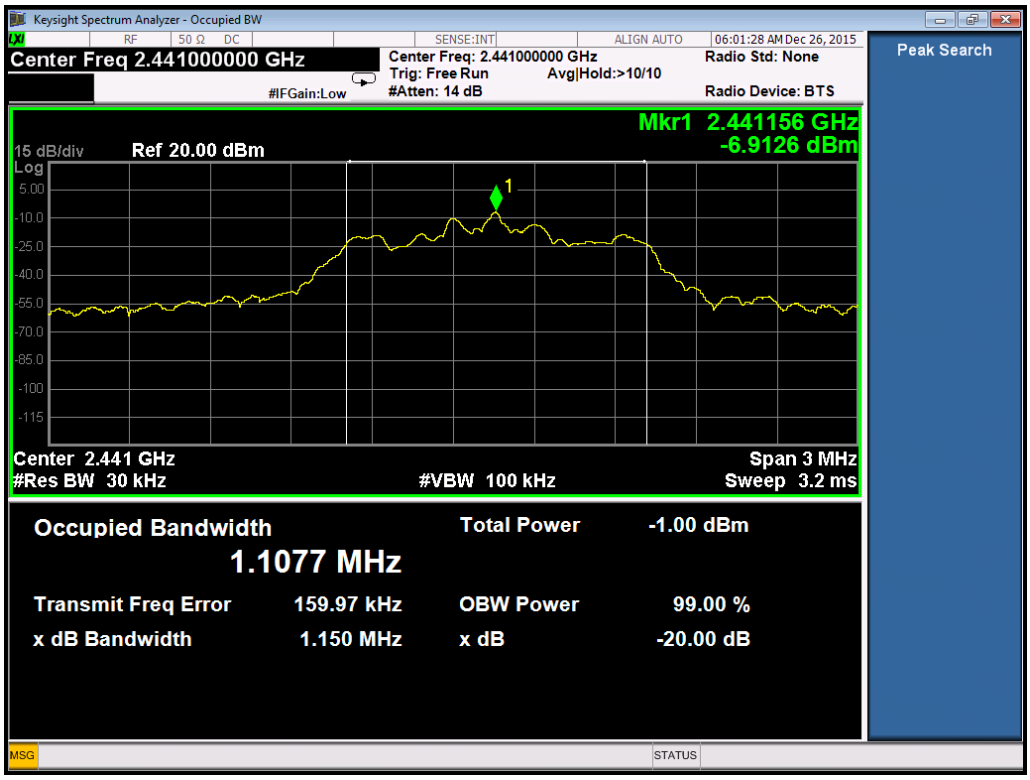


Modulation	Mode	99% Bandwidth (MHz)
8DPSK	L	1.1090
	M	1.1077
	H	1.1074

Channel L



Channel M



Channel H