EMC
TEST REPORT

Report No.: 160300002TWN-001
Model No.: PLTN-RB1V1
Issued Date: Apr. 15, 2016

Applicant:	**Peloton Interactive LLC** **158 West 27th Street Fourth Floor New York, NY 10001**
Test Method/ Standard:	**47 CFR FCC Part 15.247 & ANSI C63.10 2013** **DA 00-705**
Registration No.:	**93910**
Test By:	**Intertek Testing Services Taiwan Ltd.** **No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,** **Shiang-Shan District, Hsinchu City, Taiwan**

Testing Laboratory
0597

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Revision History

Report No.	Issue Date	Revision Summary
160300002TWN-001	Apr. 15, 2016	Original report

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Summary of Tests

Test Item	Reference	Results
20dB Bandwidth Test	15.247(a)(1)	Pass
Carrier Frequency Separation Test	15.247(a)(1)	Pass
Number of Hopping Frequencies Test	15.247(a)(1)	Pass
Time of Occupancy (Dwell Time) Test	15.247(a)(1)(iii)	Pass
Maximum Output Power Test	15.247(b)	Pass
RF Antenna Conducted Spurious Test	15.247(d)	Pass
Radiated Spurious Emission Test	15.205, 15.209	Pass
Emission on the Band Edge Test	15.247(d)	Pass
AC Power Line Conducted Emission Test	15.207	Pass
Antenna Requirement	15.203	Pass

1. General Information

1.1 Identification of the EUT

Product:	Peloton Console
Model No.:	PLTN-RB1V1
Frequency Range:	2402MHz~2480MHz
Total Hopping Channel No:	79 channels
Frequency of Each Channel:	2402+1k MHz, k＝0~78
Type of Modulation:	GFSK, π/4DQPSK, 8DPSK
Rated Power:	DC 12 from adapter
Power Cord:	N/A
Data Cable:	N/A
Sample Received:	Mar. 01, 2016
Sample condition:	Workable
Test Date(s):	Mar. 02, 2016 ~ Mar. 18, 2016
Note 1:	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.
Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.

1.2 Description of EUT

The EUT is a Peloton Console, and was defined as information technology equipment.

Product SW version :	eng.RUBY.211
Product HW version :	FP
Radio SW version :	eng.RUBY.211
Radio HW version :	FP
Test SW Version :	eng.RUBY.211

For more detail features, please refer to user's Manual.

1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain	: -3.76 dBi
Antenna Type	: PIFA Antenna
Connector Type	: I-PEX

1.4 Peripherals equipment

Peripherals	Brand	Model No.	Serial No.	Data cable
Notebook PC	HP	HP Compaq nc2400	CNF6413CGN	RS232 0.5 meter × 1
Adapter	N/A	LSE0107A1240	N/A	N/A

2. Test Specifications

2.1 Test Standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section §15.205, §15.207, §15.209, §15.247, DA 00-705 and ANSI C63.10:2013.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band was all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation Mode

The EUT is supplied with DC 12 V from adapter (Test voltage: 120Vac, 60Hz).

TX-MODE is based on “Engineer mode” and the program can select different frequency and modulation.

The signal is maximized through rotation and placement in the three orthogonal axes.

X axis

Y axis

Z axis

After verifying three axes, we found the maximum electromagnetic field was occurred at Y axis. The final test data was executed under this configuration.

2.3 Applied test modes and channels

Test items	Mode	Channel	Antenna
20 dB Bandwidth	GFSK	Low , Middle , High	Chain0
	π/4DQPSK	Low , Middle , High	
	8DPSK	Low , Middle , High	
Maximum peak conducted output power	GFSK	Low , Middle , High	Chain0
	π/4DQPSK	Low , Middle , High	
	8DPSK	Low , Middle , High	
Carrier Frequency Separation	GFSK	Low , Middle , High	Chain0
	π/4DQPSK	Low , Middle , High	
	8DPSK	Low , Middle , High	
Number of Hopping Frequencies	GFSK	Normal Operation	Chain0
	π/4DQPSK		
	8DPSK		
Dwell Time	GFSK	Low	Chain0
	π/4DQPSK	Low	
	8DPSK	Low	
Conducted Spurious	GFSK	Low , Middle , High	Chain0
	π/4DQPSK	Low , Middle , High	
	8DPSK	Low , Middle , High	
Radiated spurious Emission 30MHz~1GHz	GFSK	Low , Middle , High	Chain0
	π/4DQPSK	Low , Middle , High	
	8DPSK	Low , Middle , High	
Radiated Spurious Emission 10GHz~10th Harmonic	GFSK	Low , Middle , High	Chain0
	π/4DQPSK	Low , Middle , High	
	8DPSK	Low , Middle , High	
Emission on the Band Edge	GFSK	Low , Middle , High	Chain0
	π/4DQPSK	Low , Middle , High	
	8DPSK	Low , Middle , High	
AC Power Line Conducted Emission	Normal Link		Chain0

3. 20dB Bandwidth Test

3.1 Operating Environment

Temperature:	25	℃
Relative Humidity:	55	%
Atmospheric Pressure:	1008	hPa
Test Date:	Mar. 09, 2016	

3.2 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.

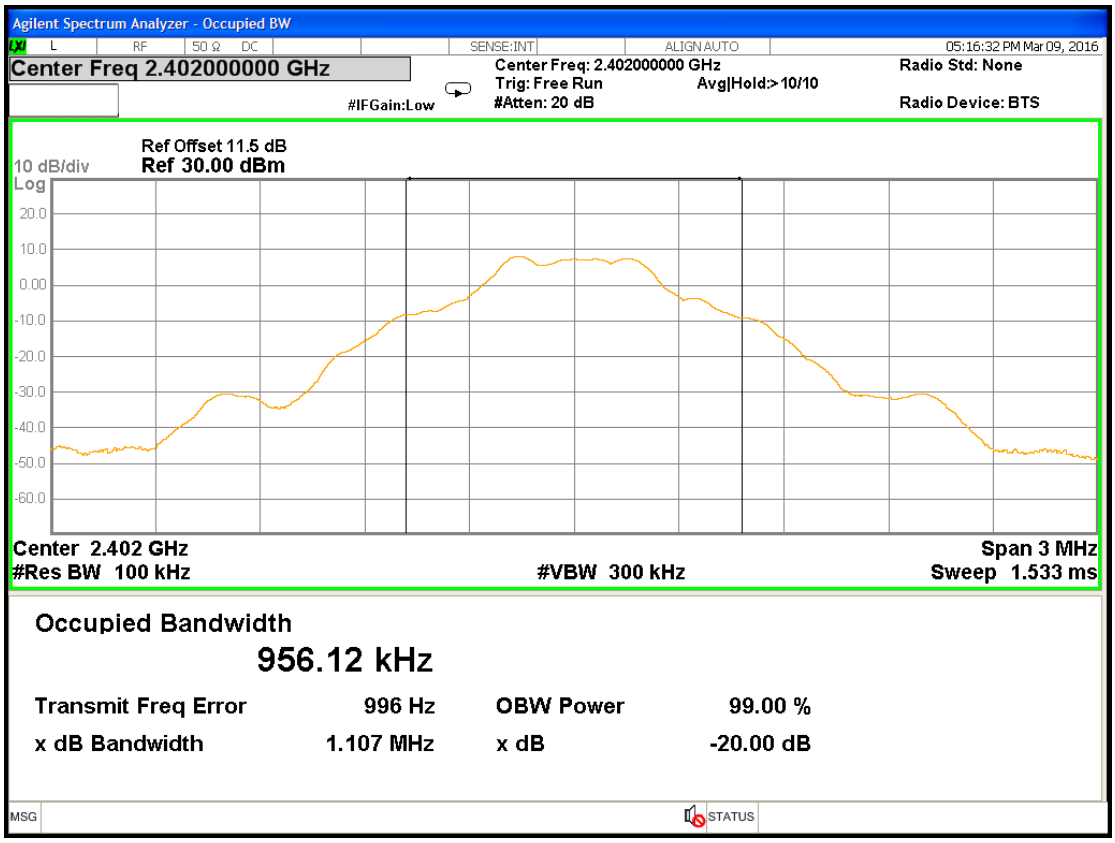
The 20dB bandwidth per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set≧1% of 20dB Bandwidth, the video bandwidth ≧ RBW, and the SPAN may equal to approximately 2 to 3 times the 20dB bandwidth. The test was performed at 3 channels (lowest, middle and highest channel). The maximum 20dB modulation bandwidth is in the following Table.

3.3 Measured Data of Modulated Bandwidth Test Results

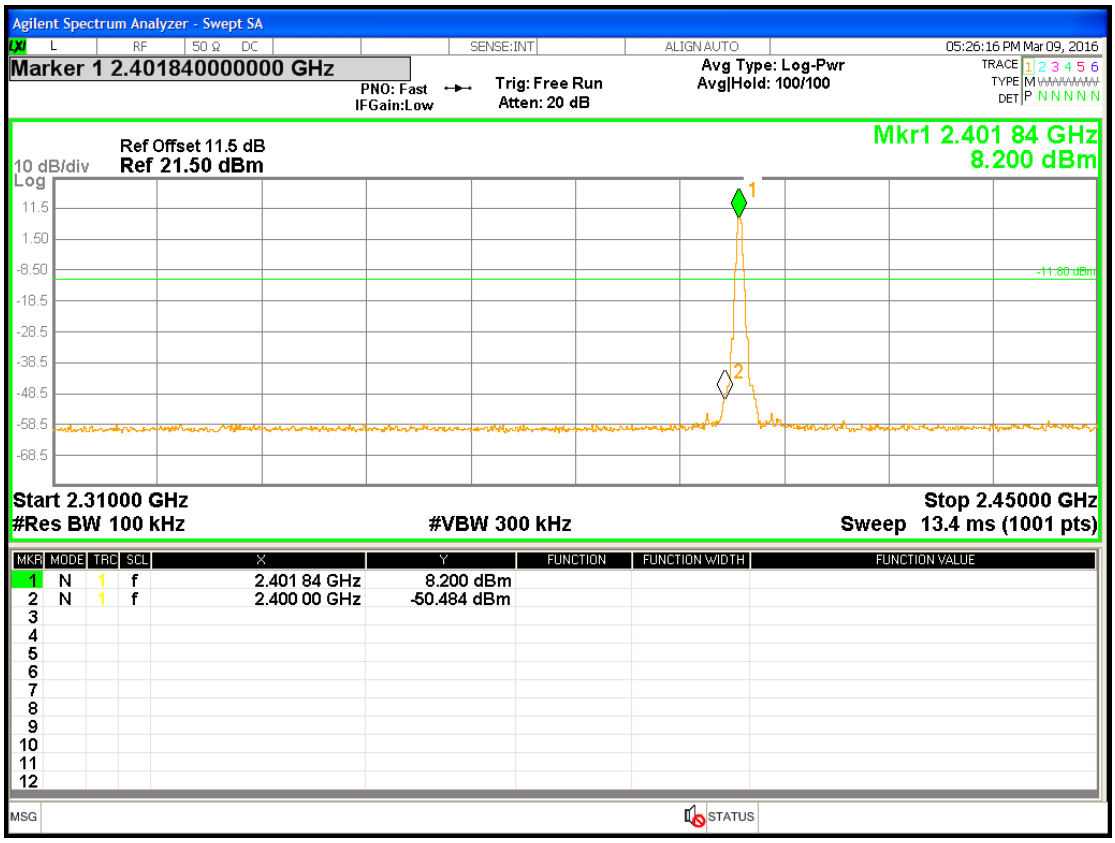
Mode	Channel	Frequency (MHz)	20dB Bandwidth (MHz)
GFSK	Low	2402	1.107
	Middle	2441	1.105
	High	2480	1.104
π/4DQPSK	Low	2402	1.261
	Middle	2441	1.279
	High	2480	1.279
8DPSK	Low	2402	1.270
	Middle	2441	1.272
	High	2480	1.272

Please see the plot below.

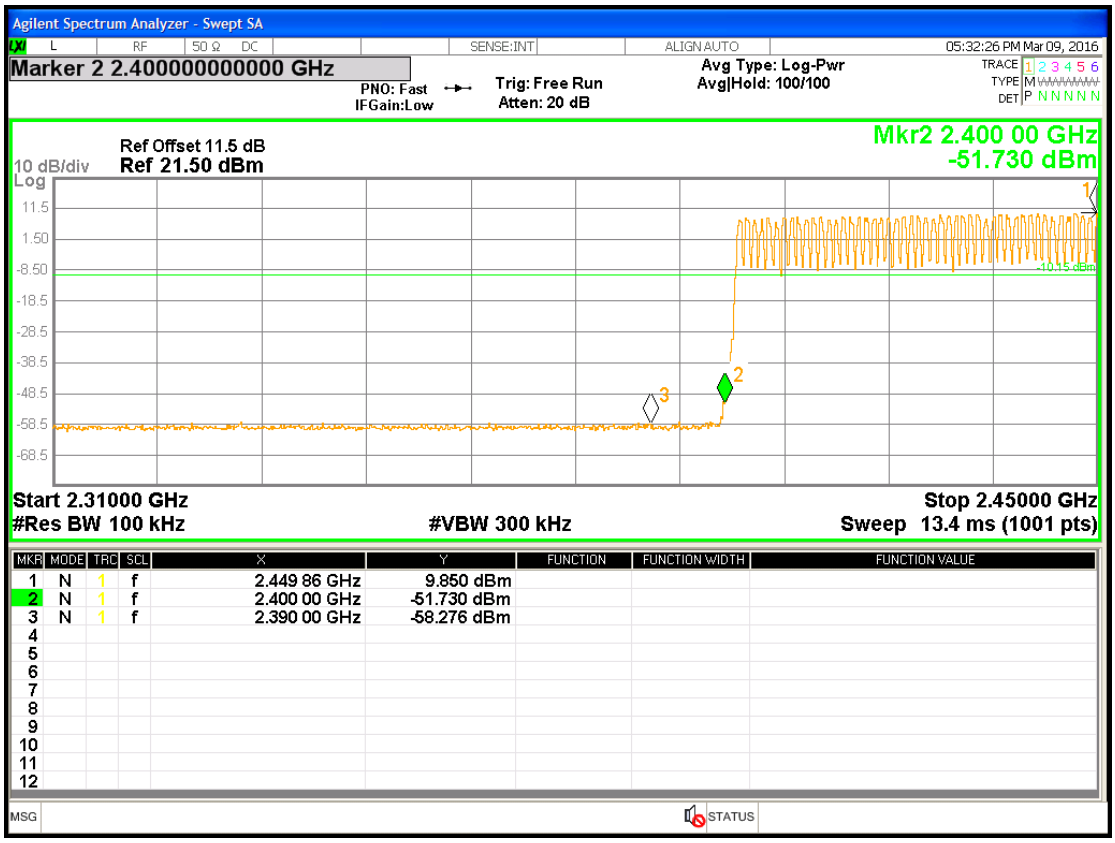
Chain0 : 20dB Occupied Bandwidth @ DH1 Ch Low



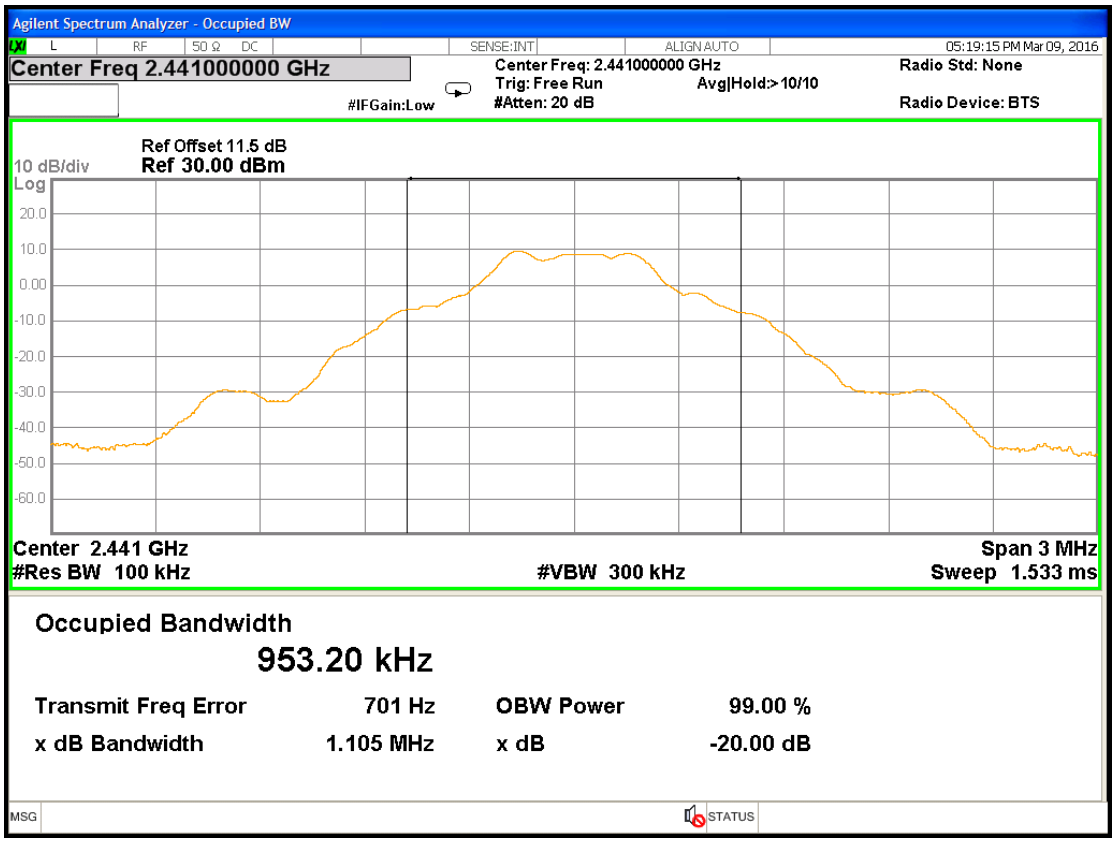
Chain0 : Lowest Band edge @ DH-1 Ch Low Hopping Disable



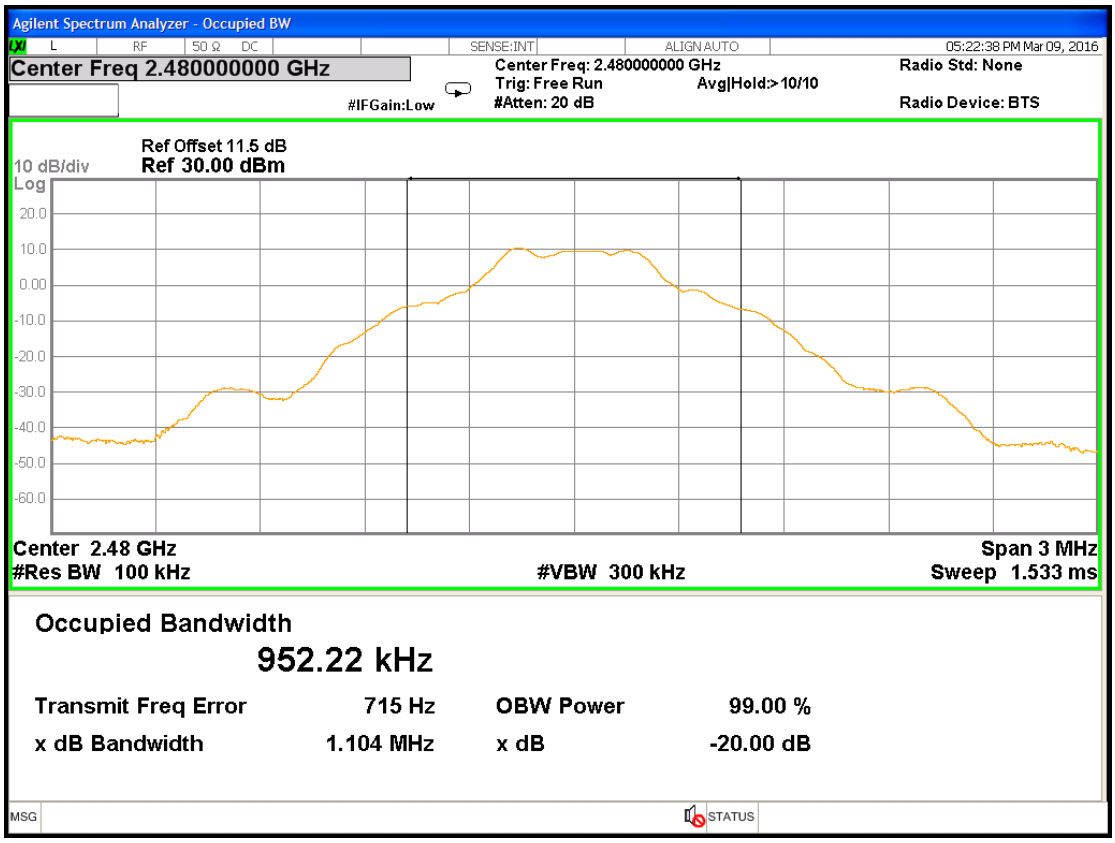
Chain0 : Lowest Band edge @ DH-1 Ch Low Hopping Enable



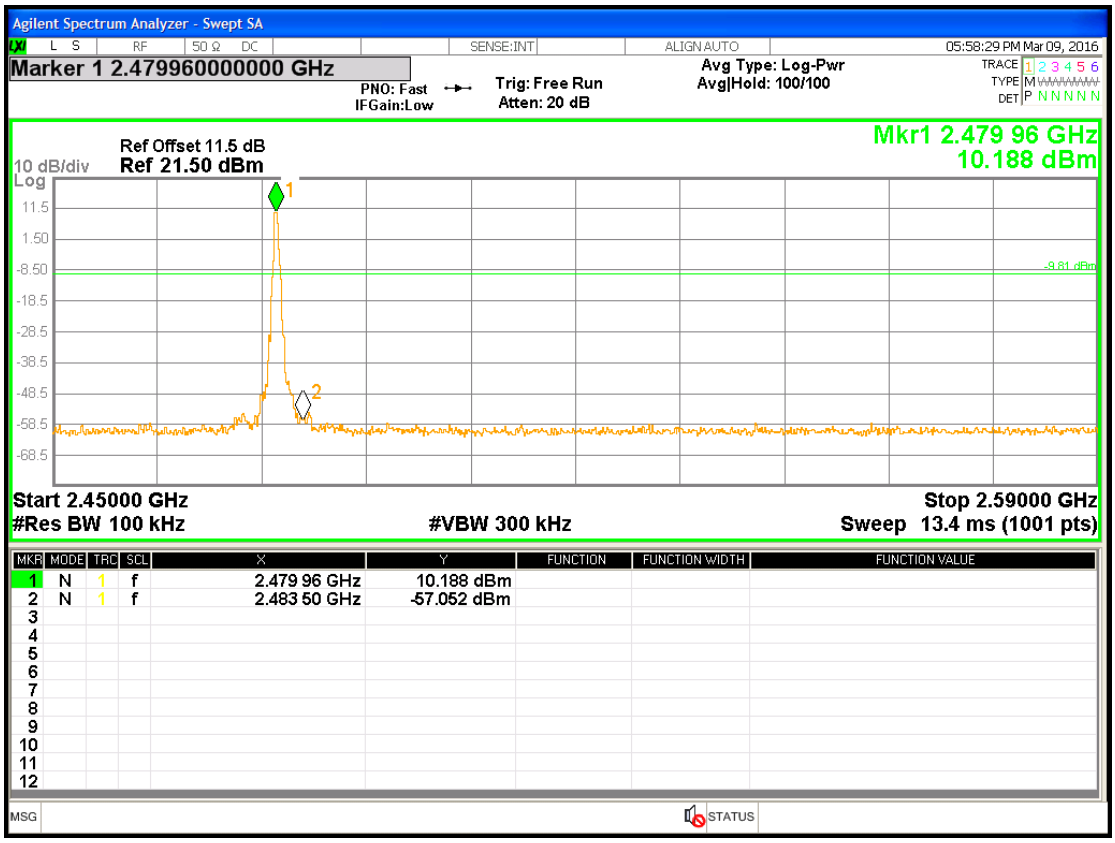
Chain0 : 20dB Occupied Bandwidth @ DH1 Ch Middle



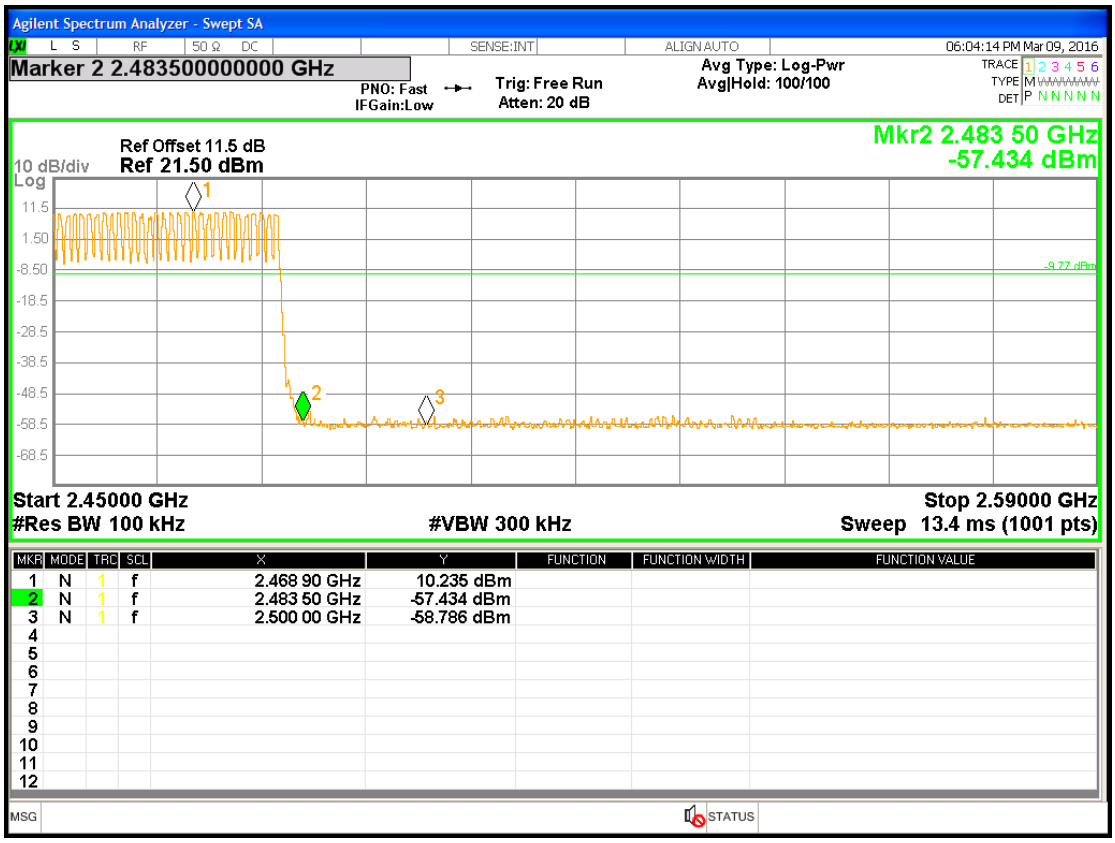
Chain0 : 20dB Occupied Bandwidth @ DH1 Ch High



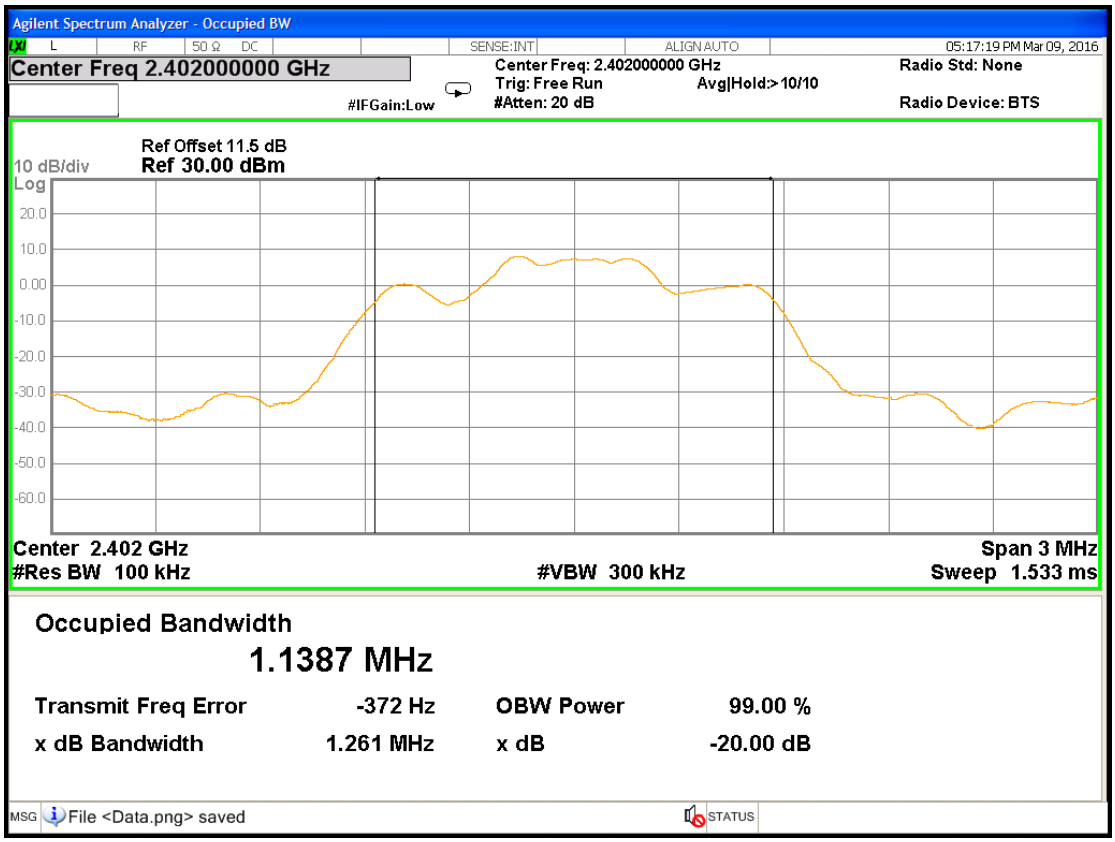
Chain0 : Highest Band edge @ DH-1 Ch High Hopping Disable



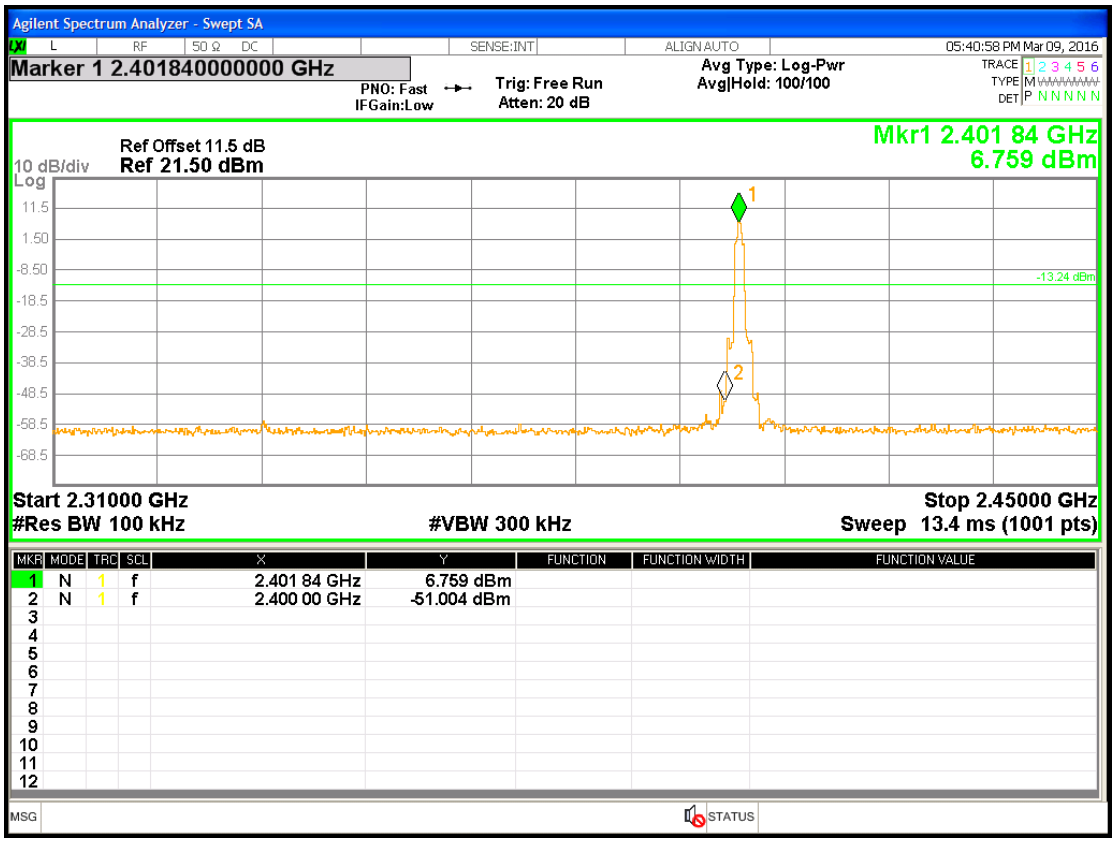
Chain0 : Highest Band edge @ DH-1 Ch Low Hopping Enable



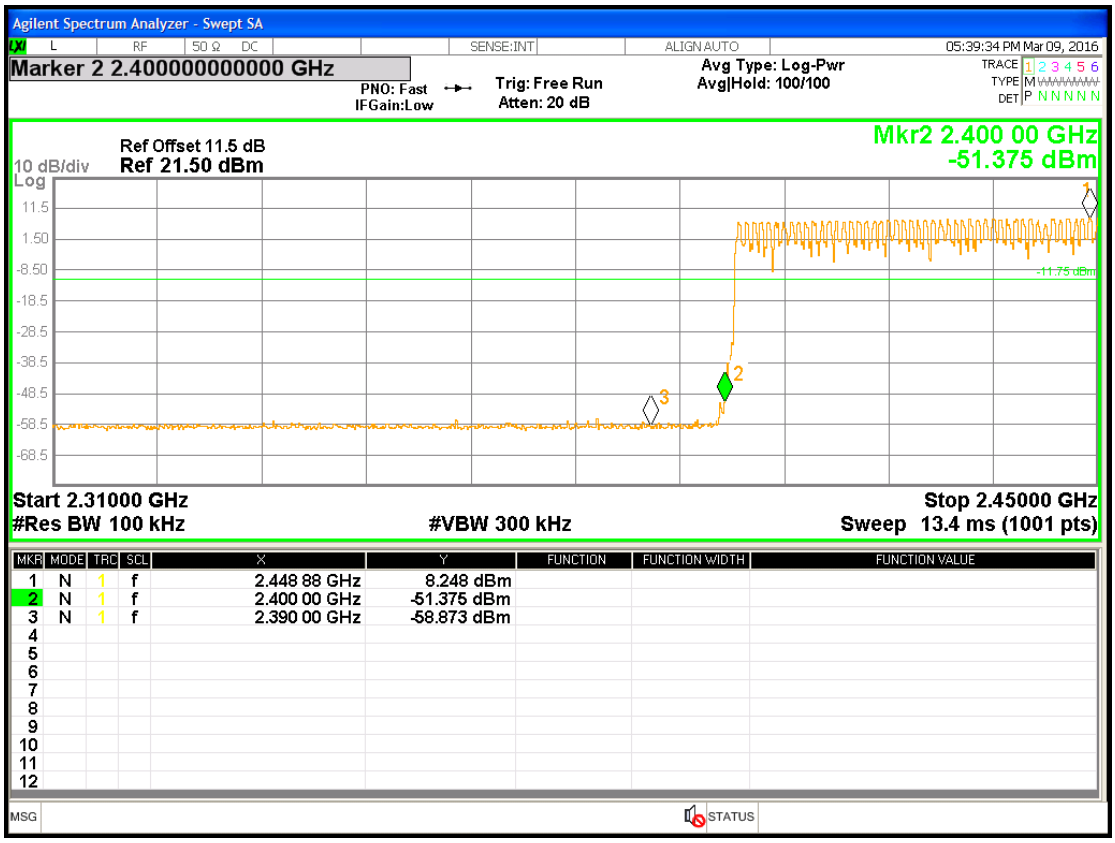
Chain0 : 20dB Occupied Bandwidth @ 2DH1 Ch Low



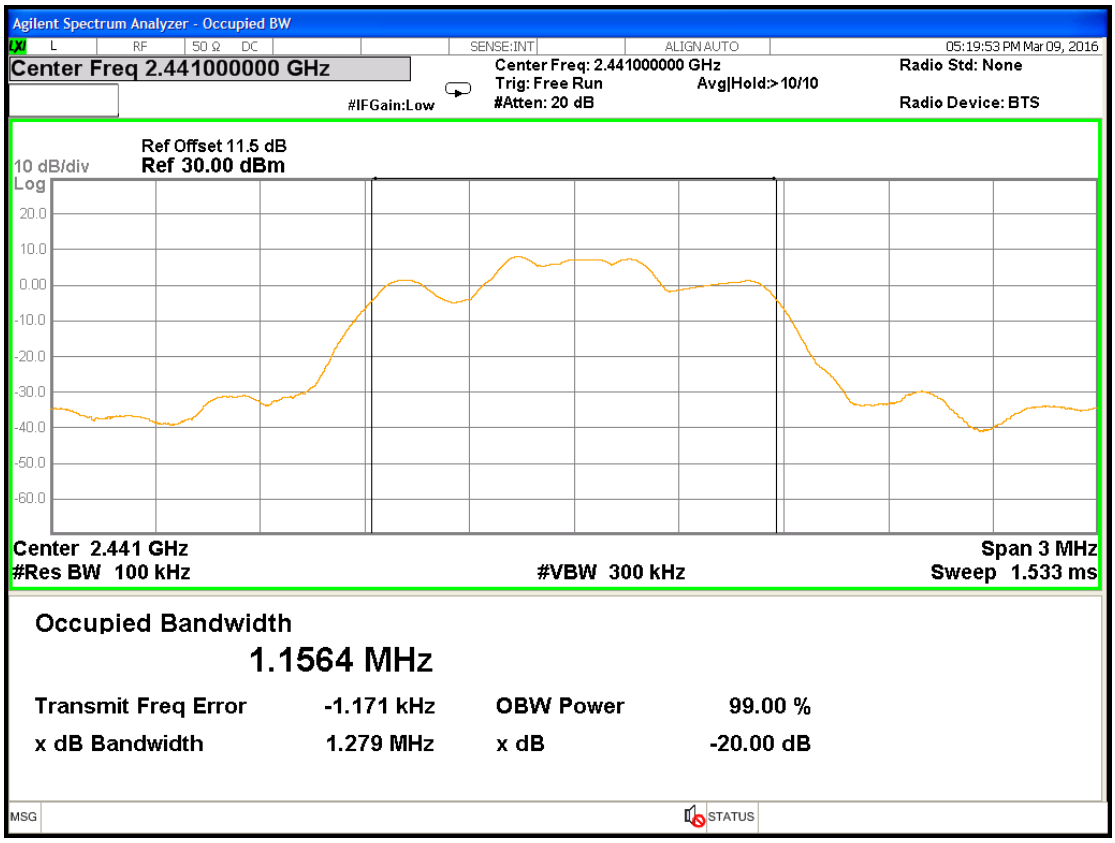
Chain0 : Lowest Band edge @ 2DH-1 Ch Low Hopping Disable



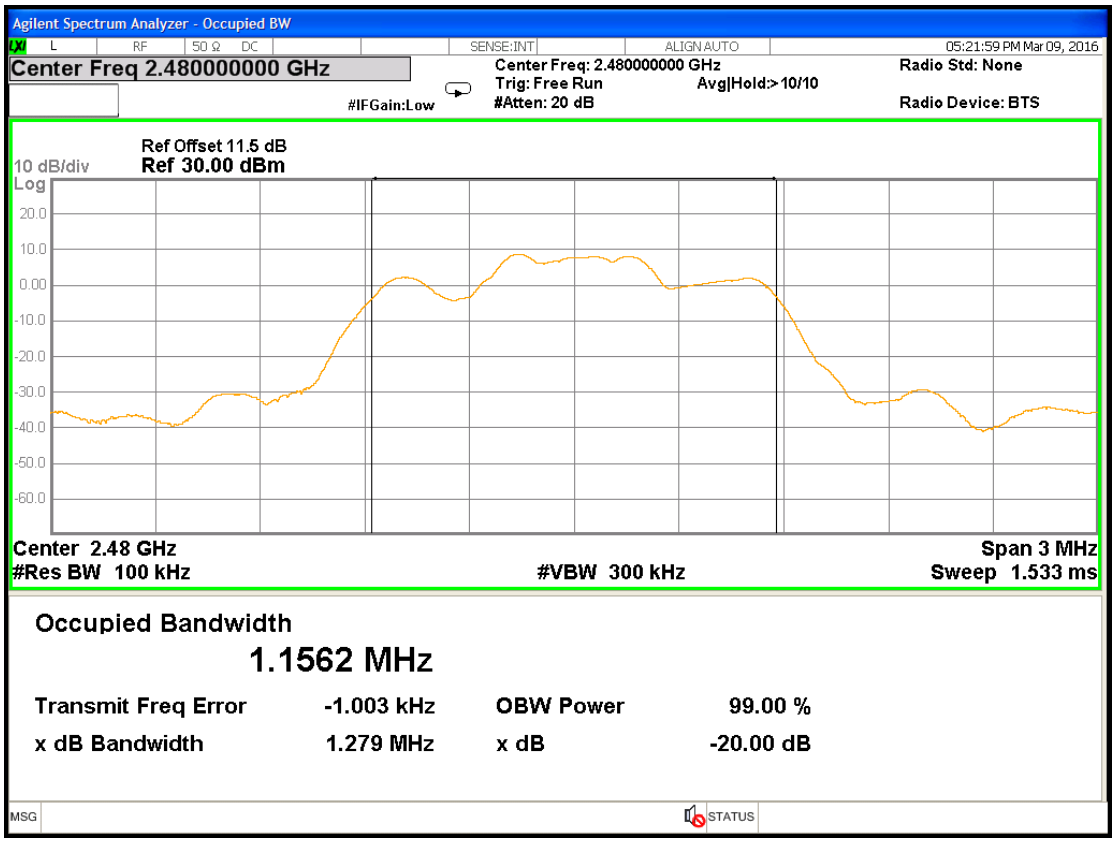
Chain0 : Lowest Band edge @ 2DH-1 Ch Low Hopping Enable



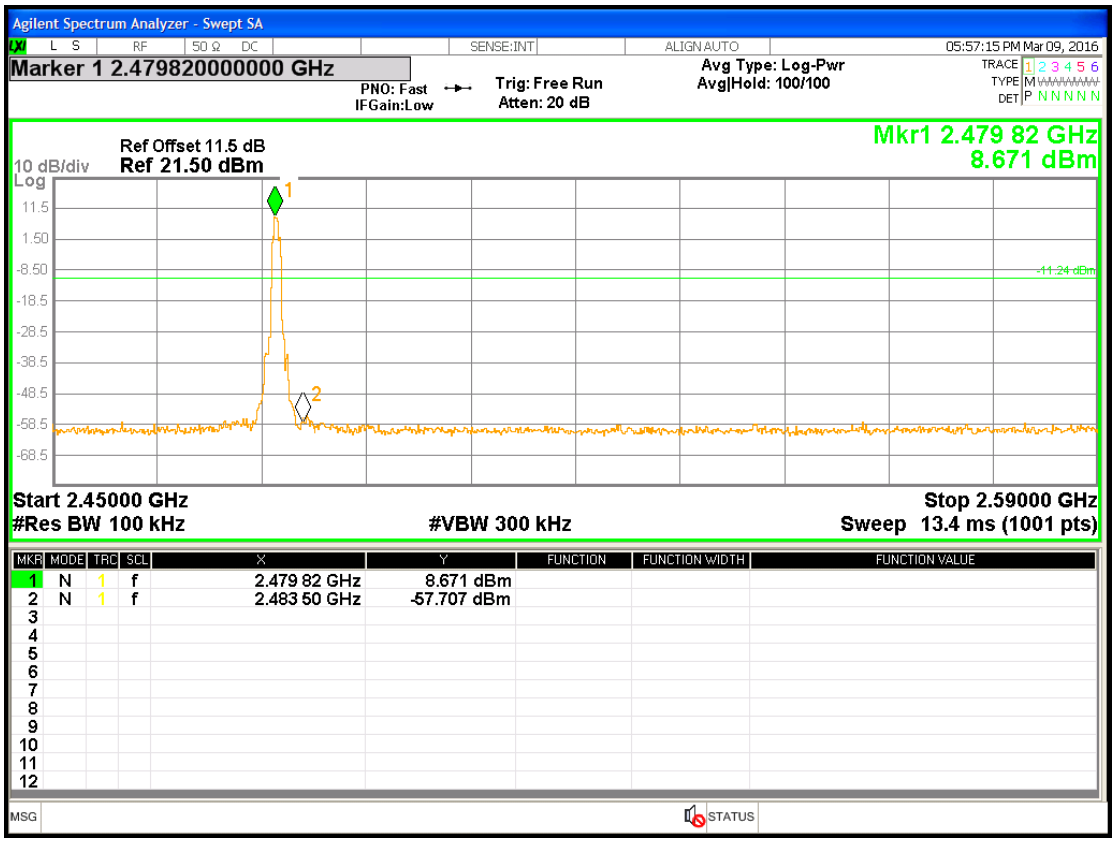
Chain0 : 20dB Occupied Bandwidth @ 2DH1 Ch Middle



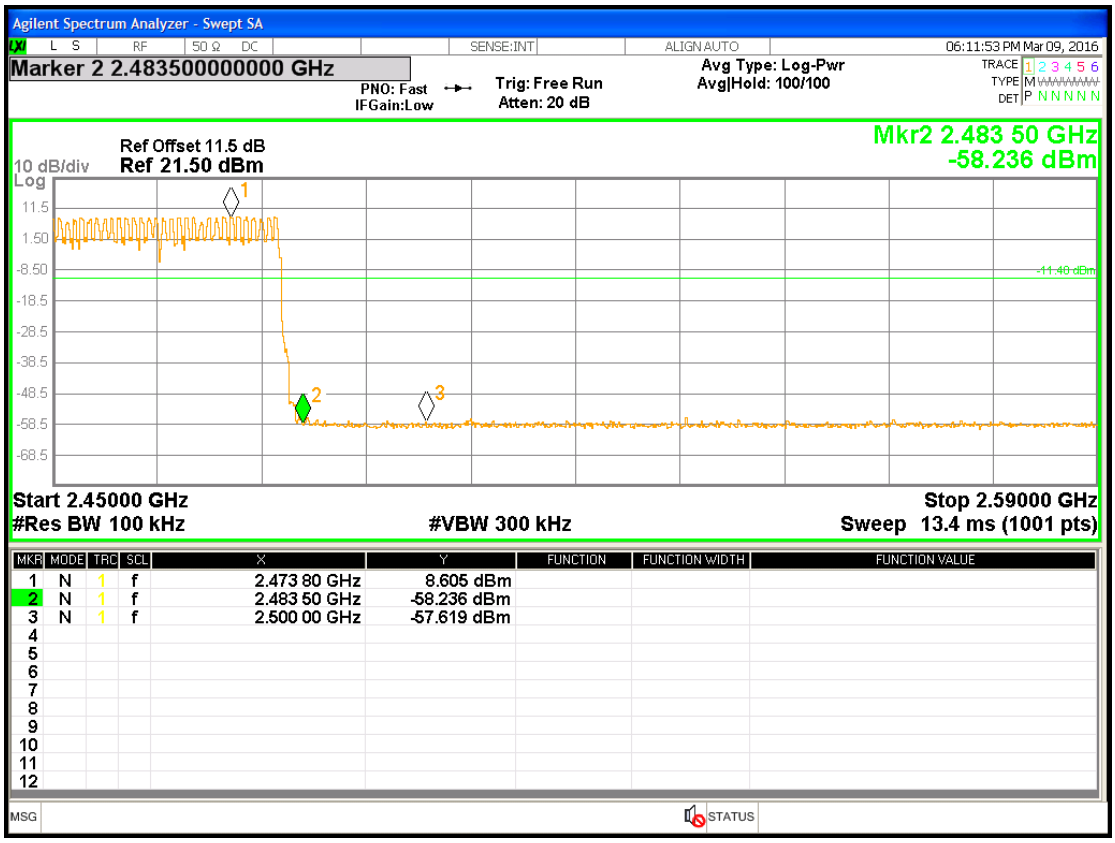
Chain0 : 20dB Occupied Bandwidth @ 2DH1 Ch High



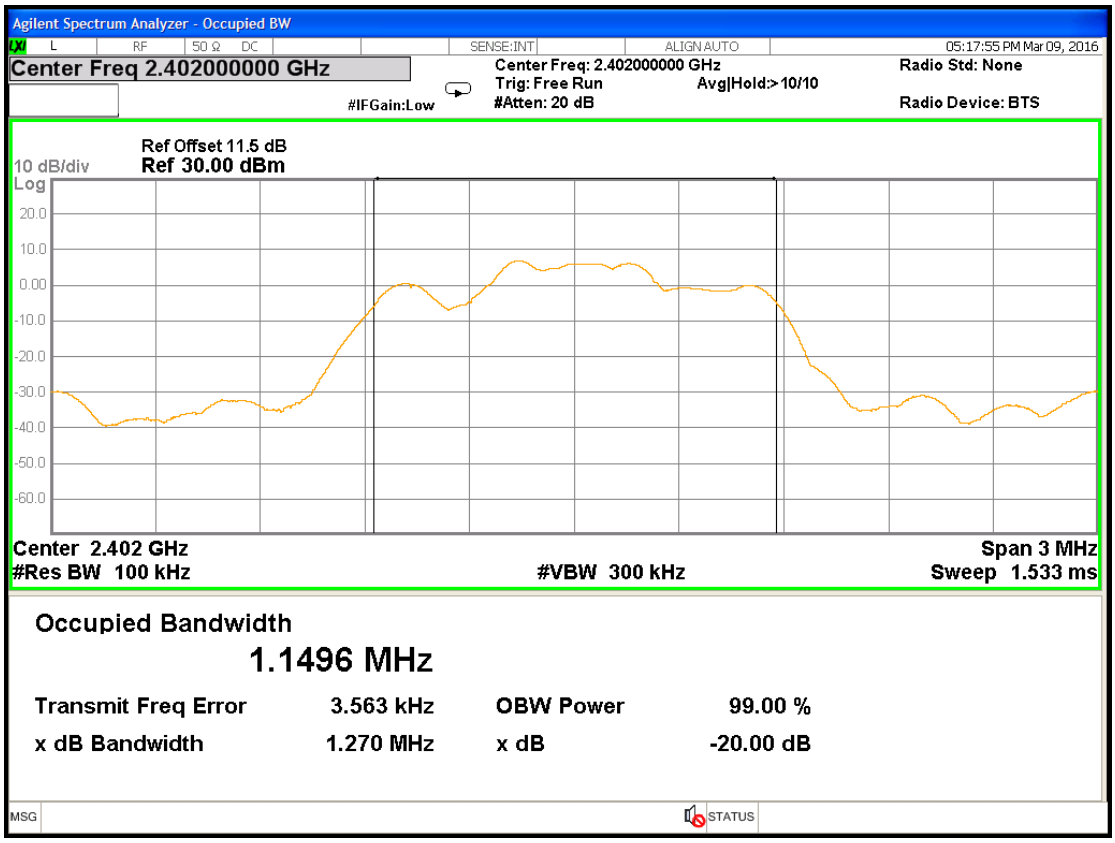
Chain0 : Highest Band edge @ 2DH-1 Ch High Hopping Disable



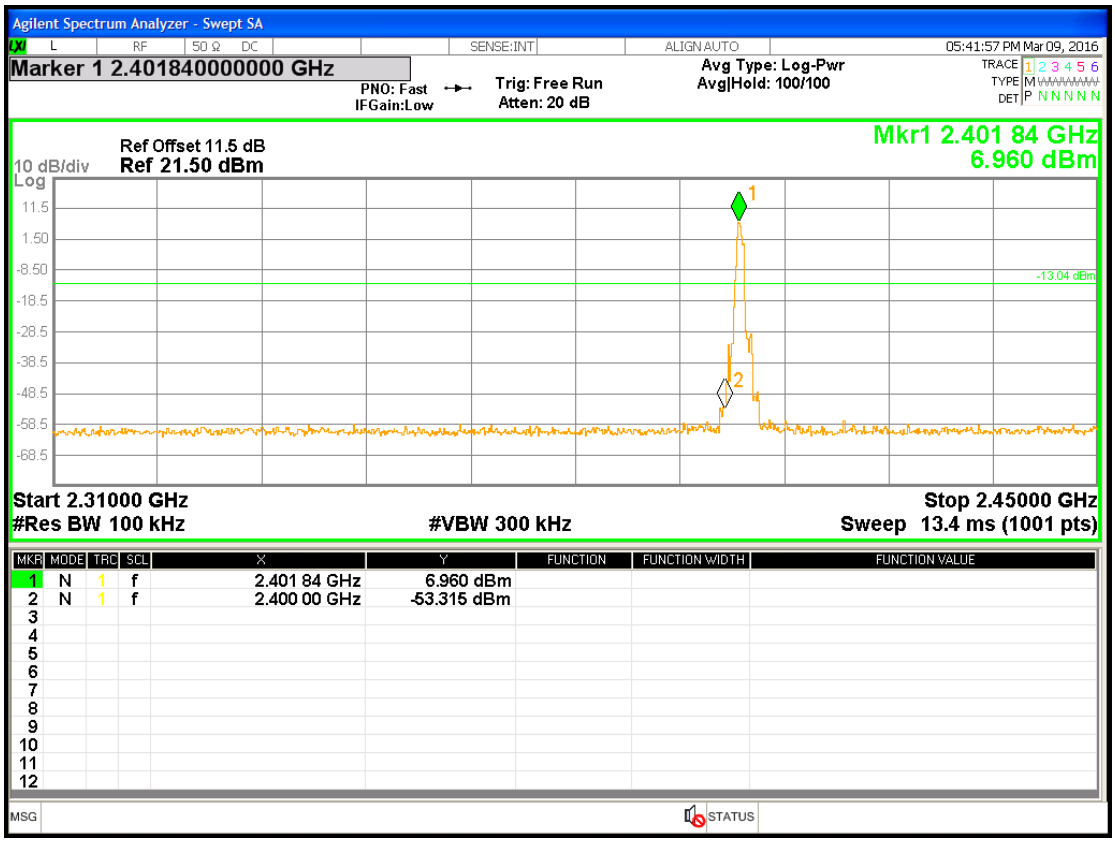
Chain0 : Highest Band edge @ 2DH-1 Ch High Hopping Enable



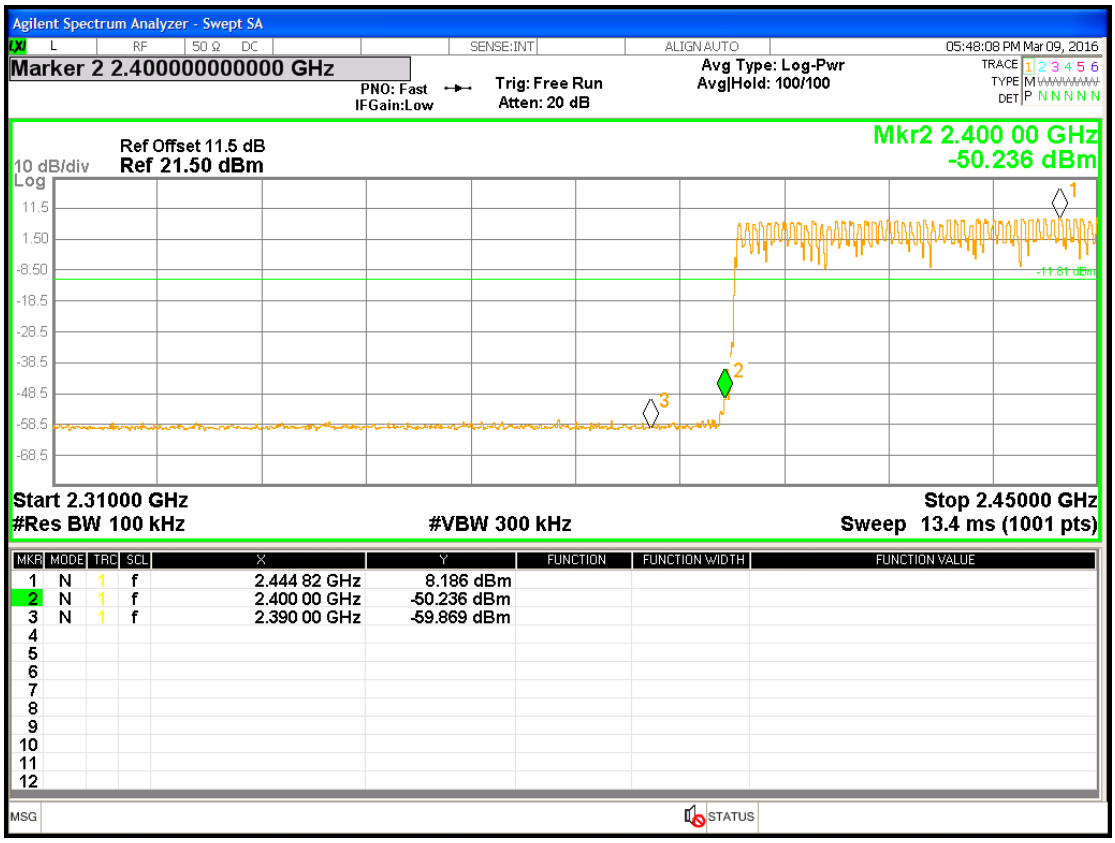
Chain0 : 20dB Occupied Bandwidth @ 3DH1 Ch Low



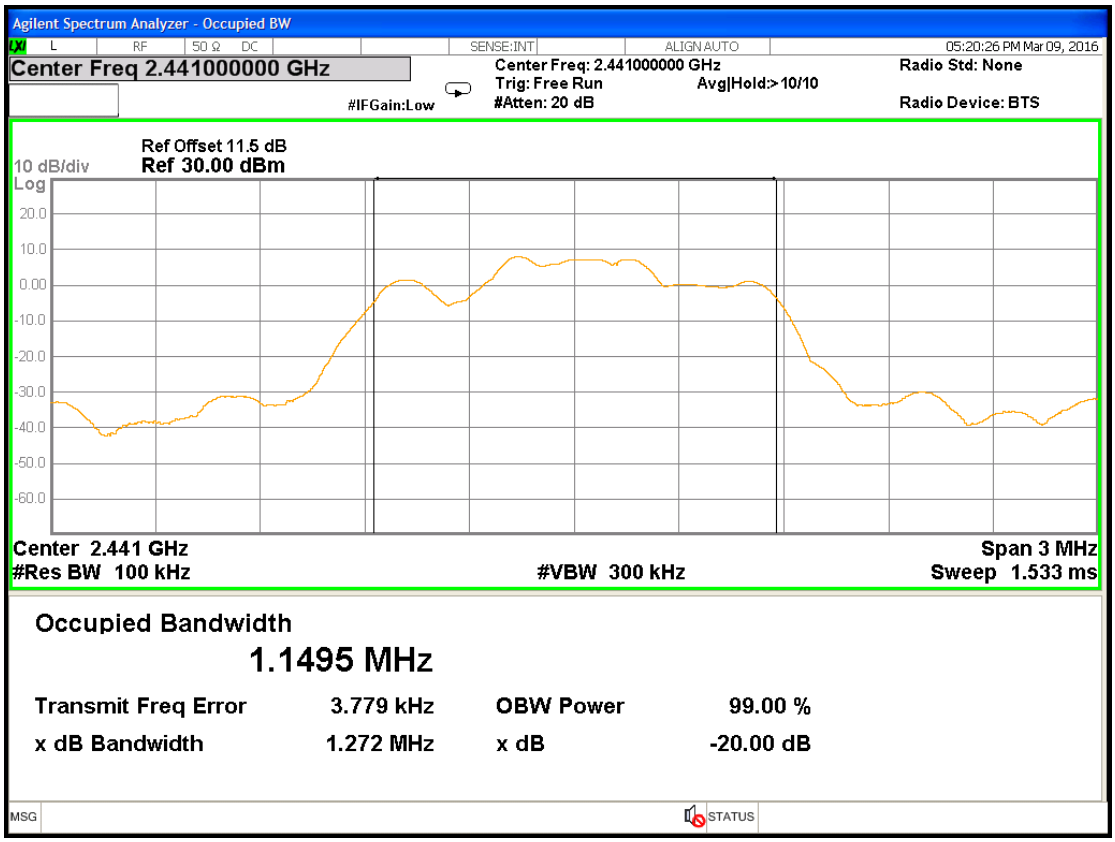
Chain0 : Lowest Band edge @ 3DH-1 Ch Low Hopping Disable



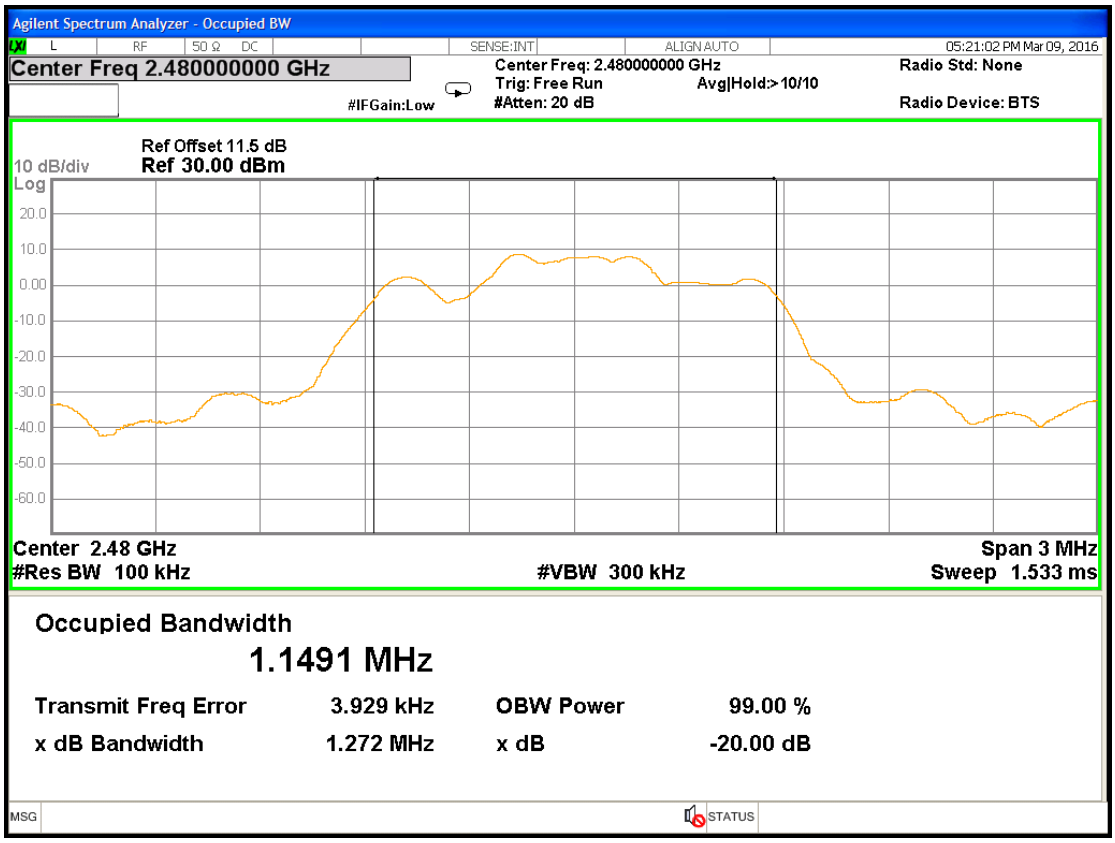
Chain0 : Lowest Band edge @ 3DH-1 Ch Low Hopping Enable



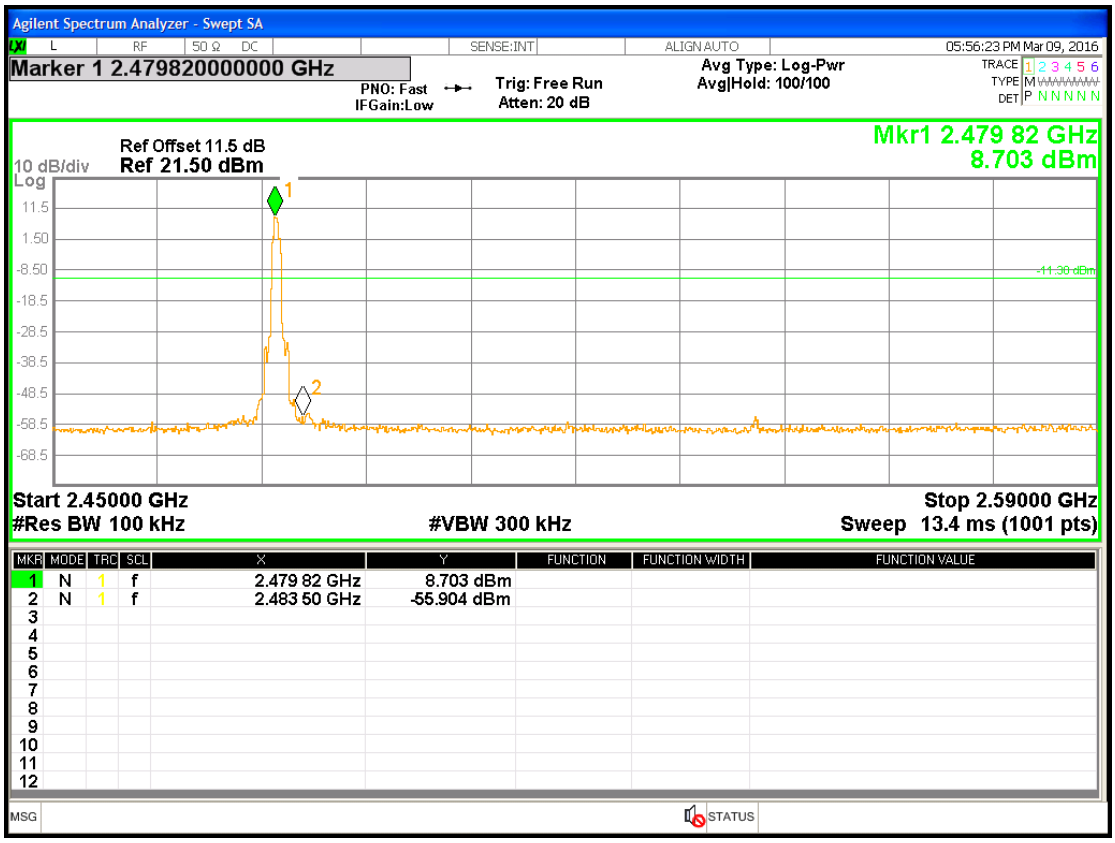
Chain0 : 20dB Occupied Bandwidth @ 3DH1 Ch Middle



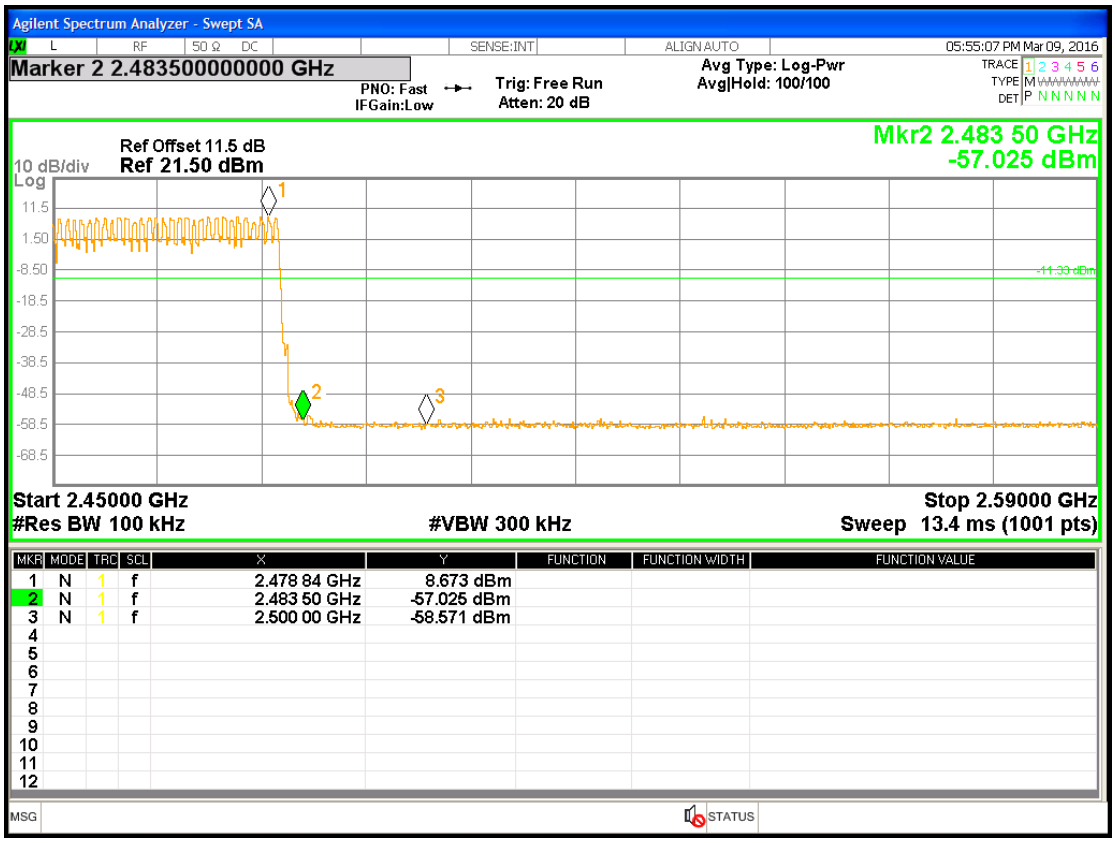
Chain0 : 20dB Occupied Bandwidth @ 3DH1 Ch High



Chain0 : Highest Band edge @ 3DH-1 Ch High Hopping Disable



Chain0 : Highest Band edge @ 3DH-1 Ch High Hopping Enable



4. Carrier Frequency Separation Test

4.1 Operating Environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure:	1008	hPa
Test Date:	Mar. 02, 2016	

4.2 Test Setup & Procedure

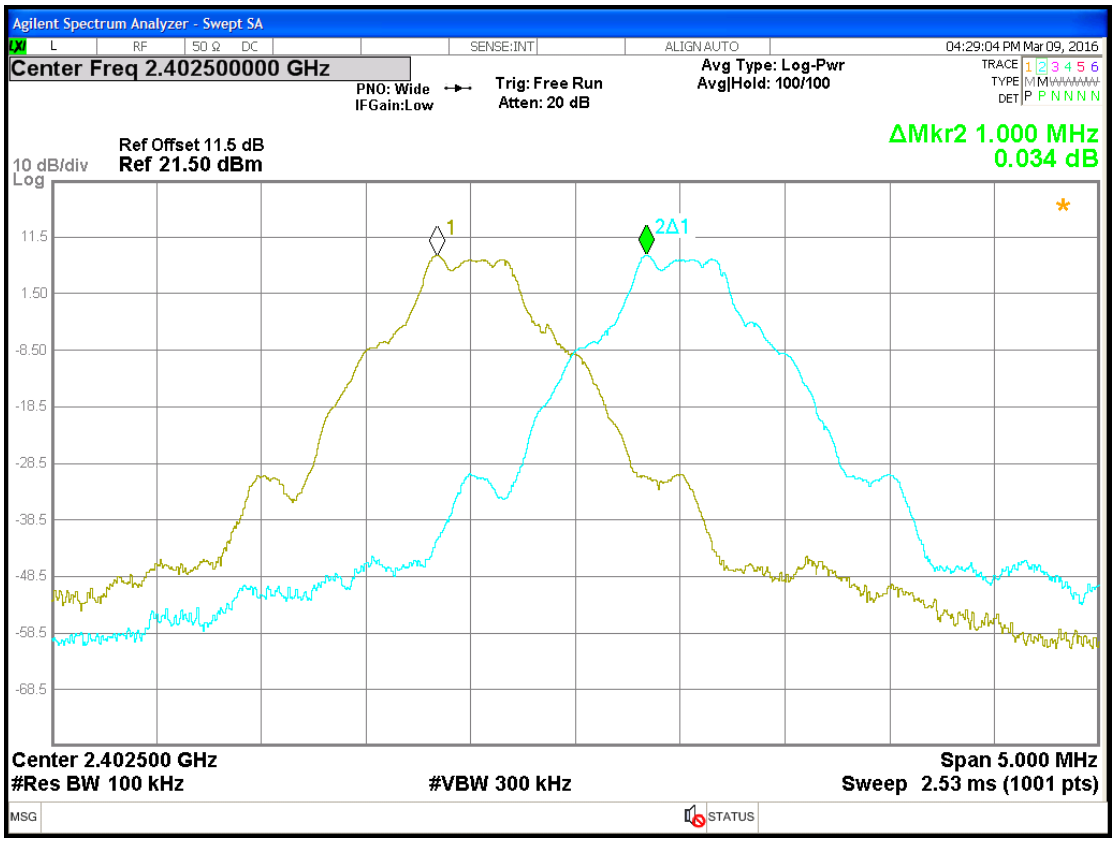
The test procedure was according to FCC measurement guidelines DA 00-705.
The carrier frequency separation per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at ≧ 1% of the span, the video bandwidth ≧ RBW, and the SPAN was wide enough to capture the peaks of two adjacent channels. The carrier frequency separation result is in the following Table.

4.3 Measured Data of Carrier Frequency Separation Test Results

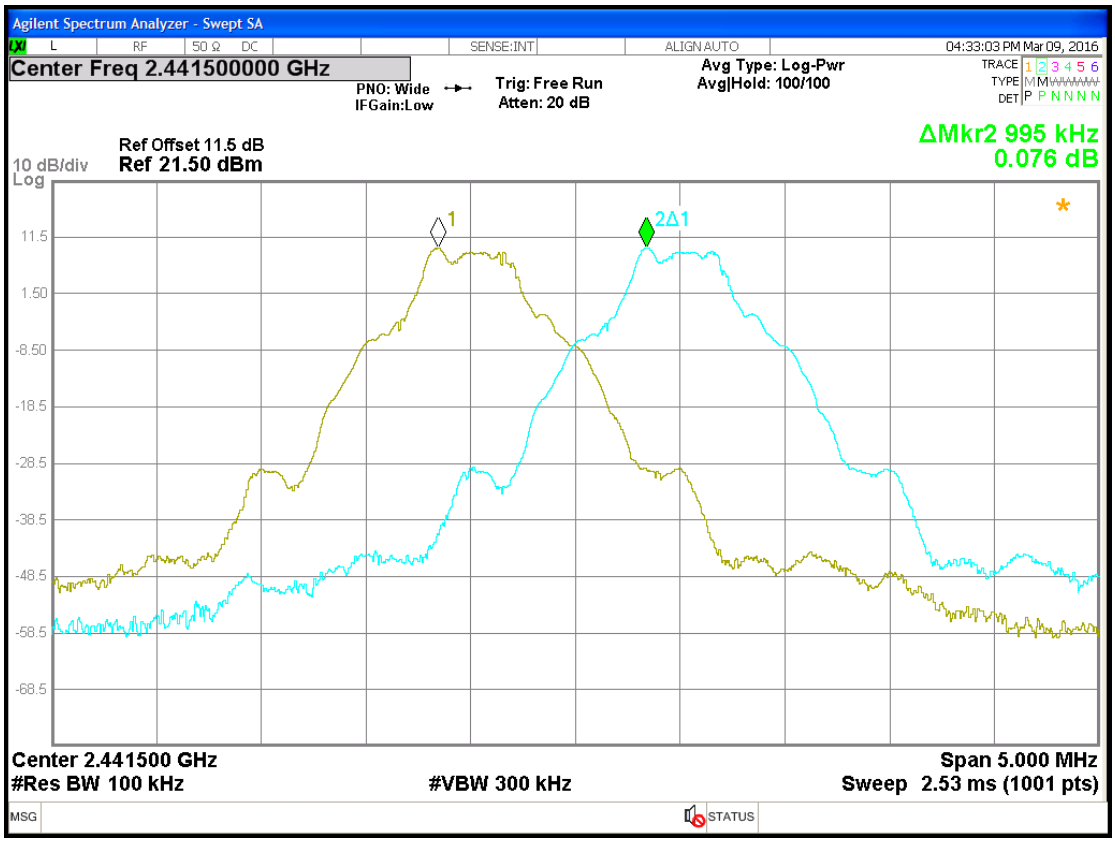
Mode	Channel	Frequency (MHz)	Adjacent channel separation (MHz)	Limit (MHz)
GFSK	Low	2402	1	0.738
	Middle	2441	0.995	0.737
	High	2480	1	0.736
π/4DQPSK	Low	2402	1.005	0.841
	Middle	2441	1	0.853
	High	2480	1.005	0.853
8DPSK	Low	2402	1	0.847
	Middle	2441	0.995	0.848
	High	2480	0.995	0.848

Please see the spectrum plots of worst value below.

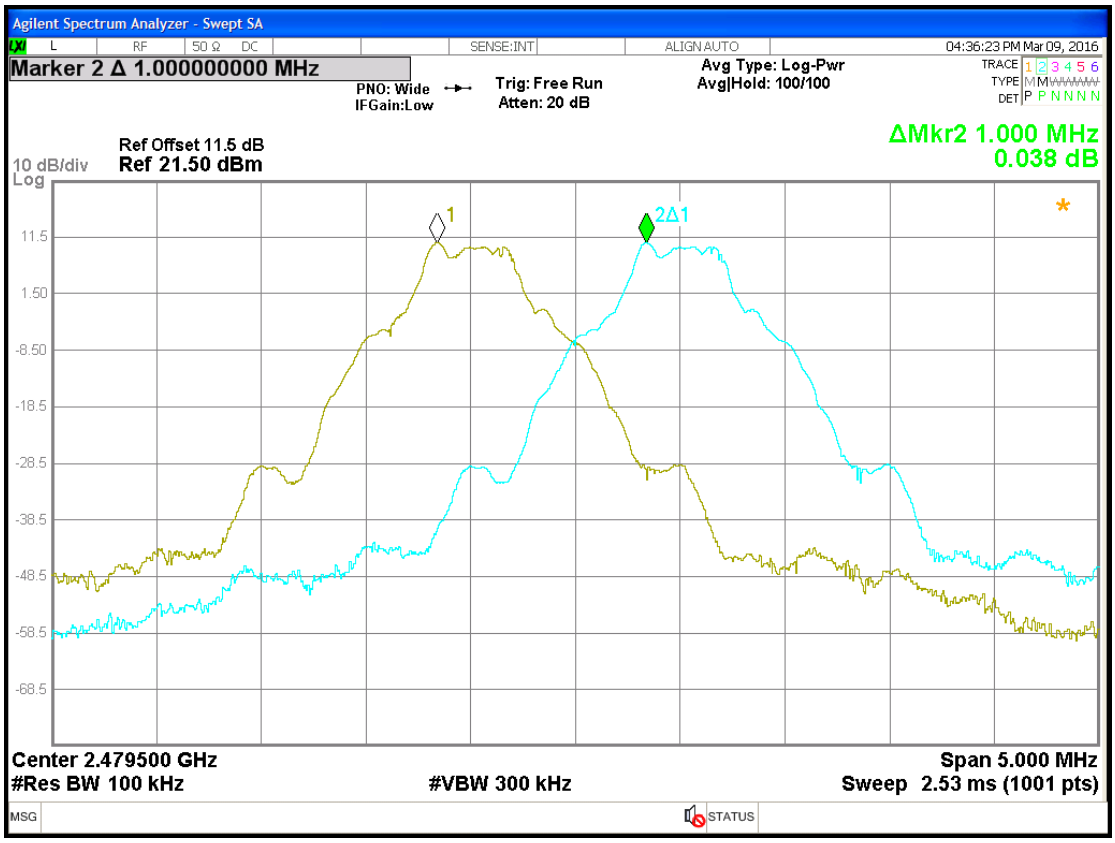
Chain0 : Carrier Frequency Separation @ DH1 Ch Low



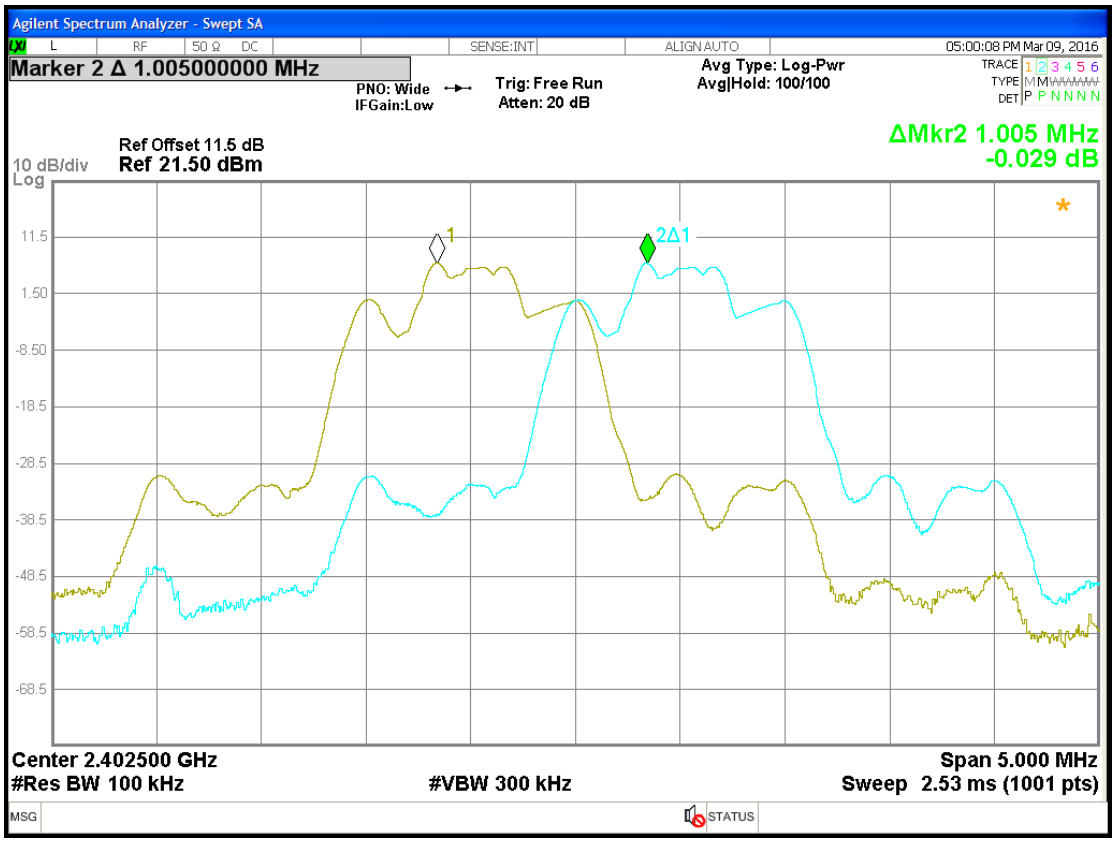
Chain0 : Carrier Frequency Separation @ DH1 Ch Middle



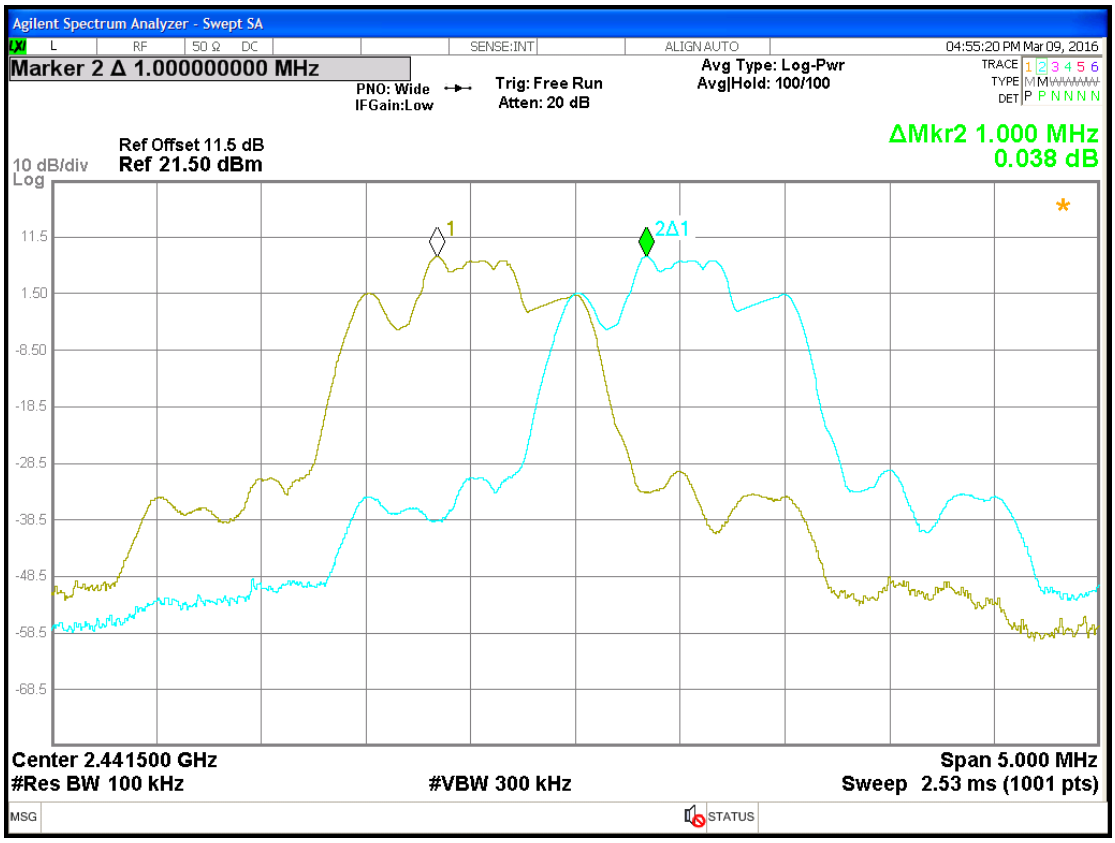
Chain0 : Carrier Frequency Separation @ DH1 Ch High



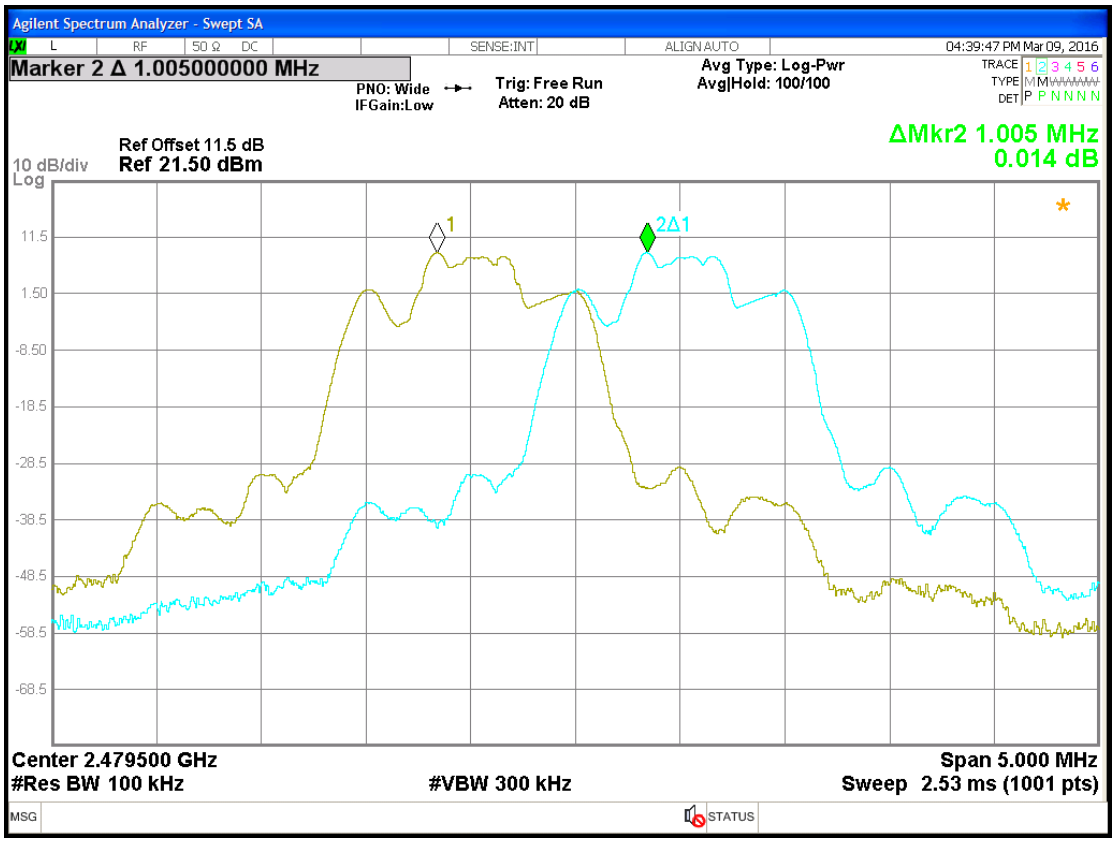
Chain0 : Carrier Frequency Separation @ 2DH1 Ch Low



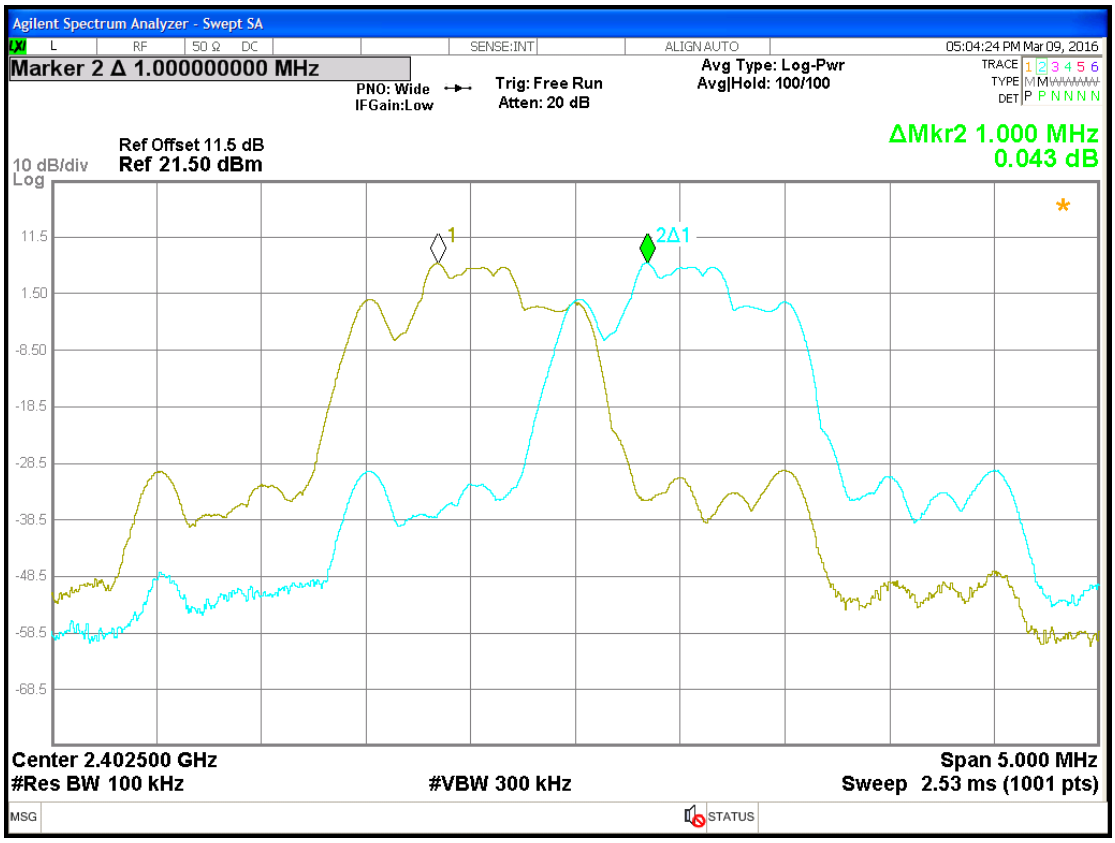
Chain0 : Carrier Frequency Separation @ 2DH1 Ch Middle



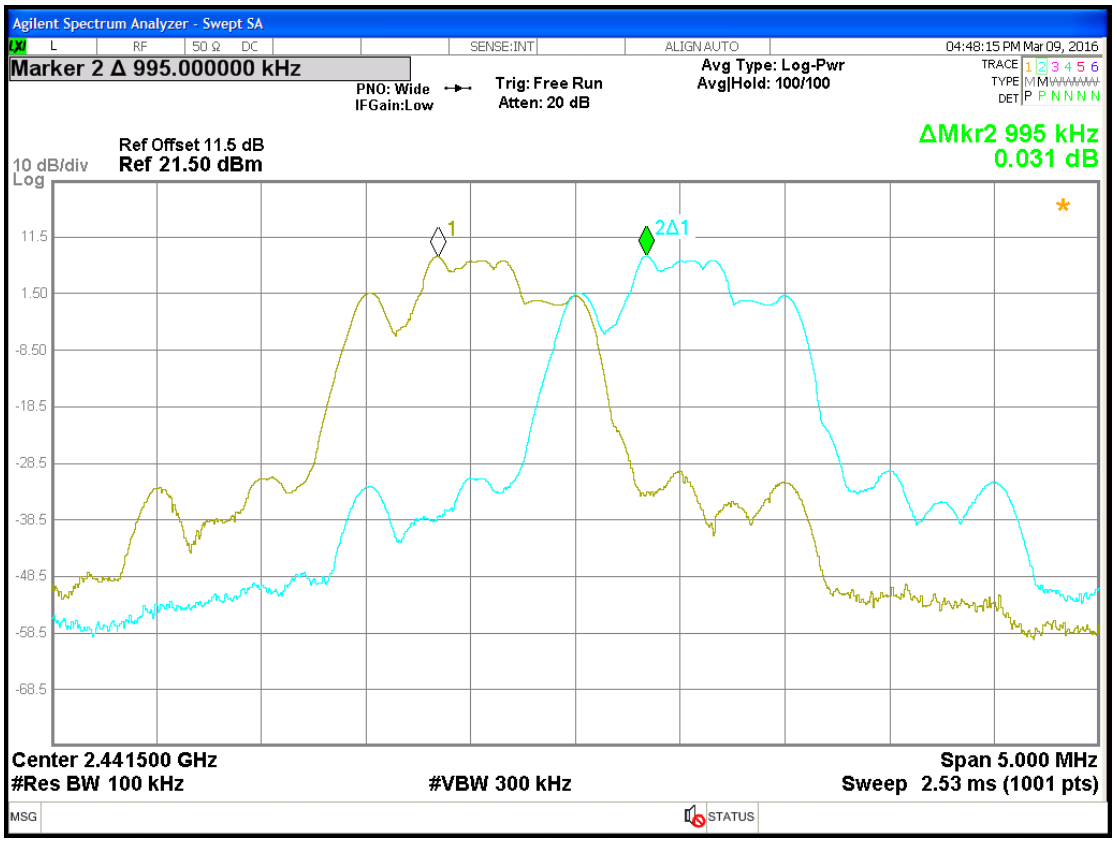
Chain0 : Carrier Frequency Separation @ 2DH1 Ch High



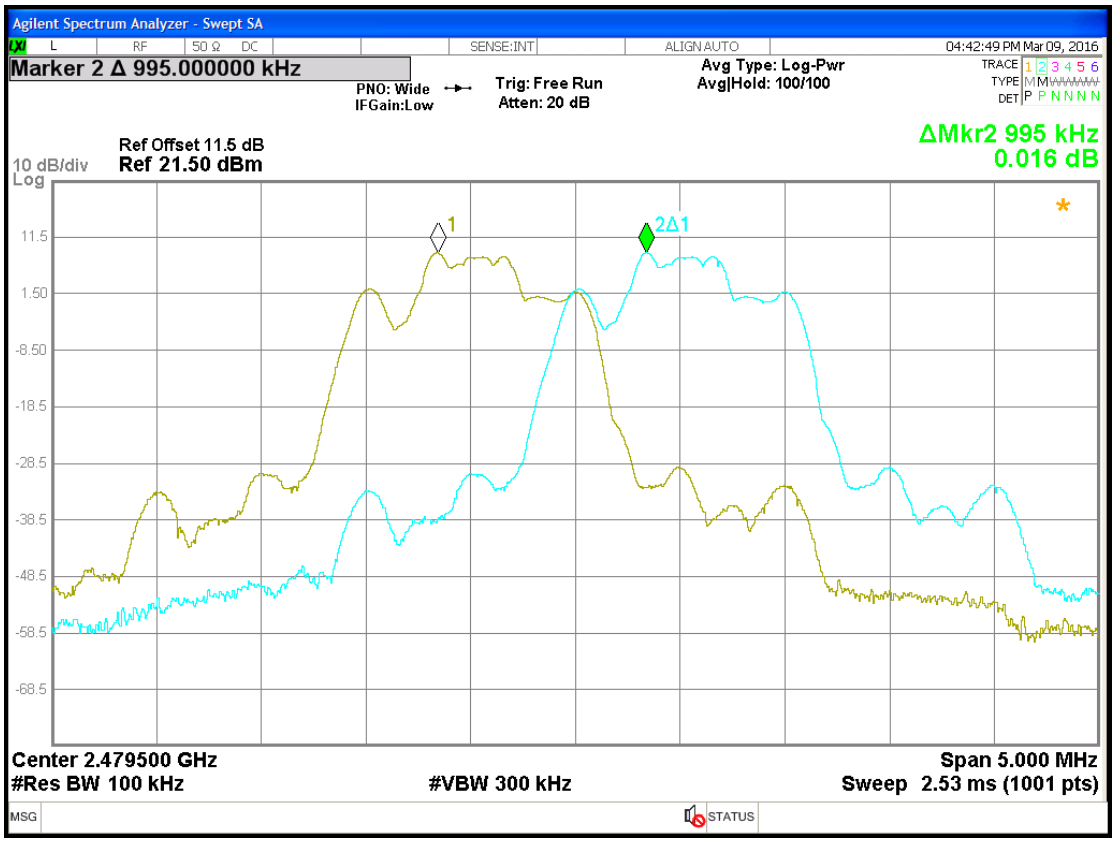
Chain0 : Carrier Frequency Separation @ 3DH1 Ch Low



Chain0 : Carrier Frequency Separation @ 3DH1 Ch Middle



Chain0 : Carrier Frequency Separation @ 3DH1 Ch High



5. Number of Hopping Frequencies Test

5.1 Operating Environment

Temperature:	24	℃
Relative Humidity:	55	%
Atmospheric Pressure:	1008	hPa
Test Date:	Mar. 09, 2016	

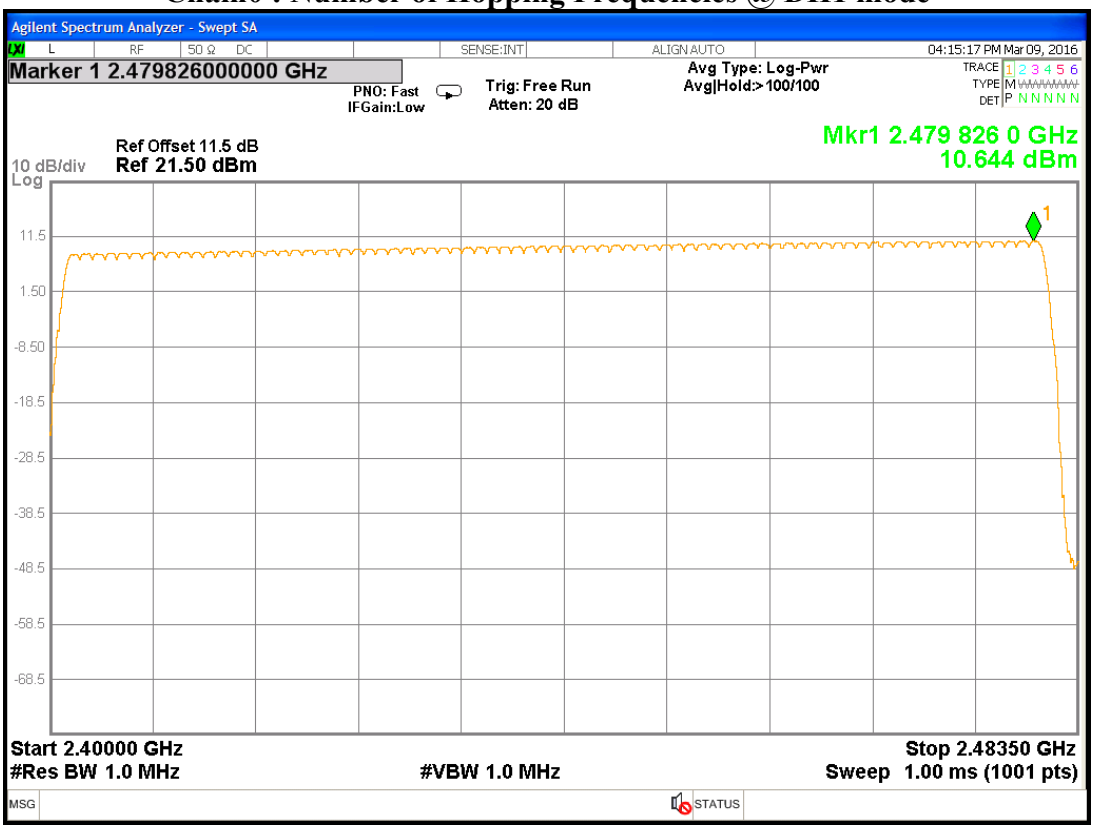
5.2 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.
The number of hopping frequencies per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at ≧1% of the span, the video bandwidth ≧ RBW, and the SPAN was the frequency band of operation. The carrier frequency separation result is in the following Table.

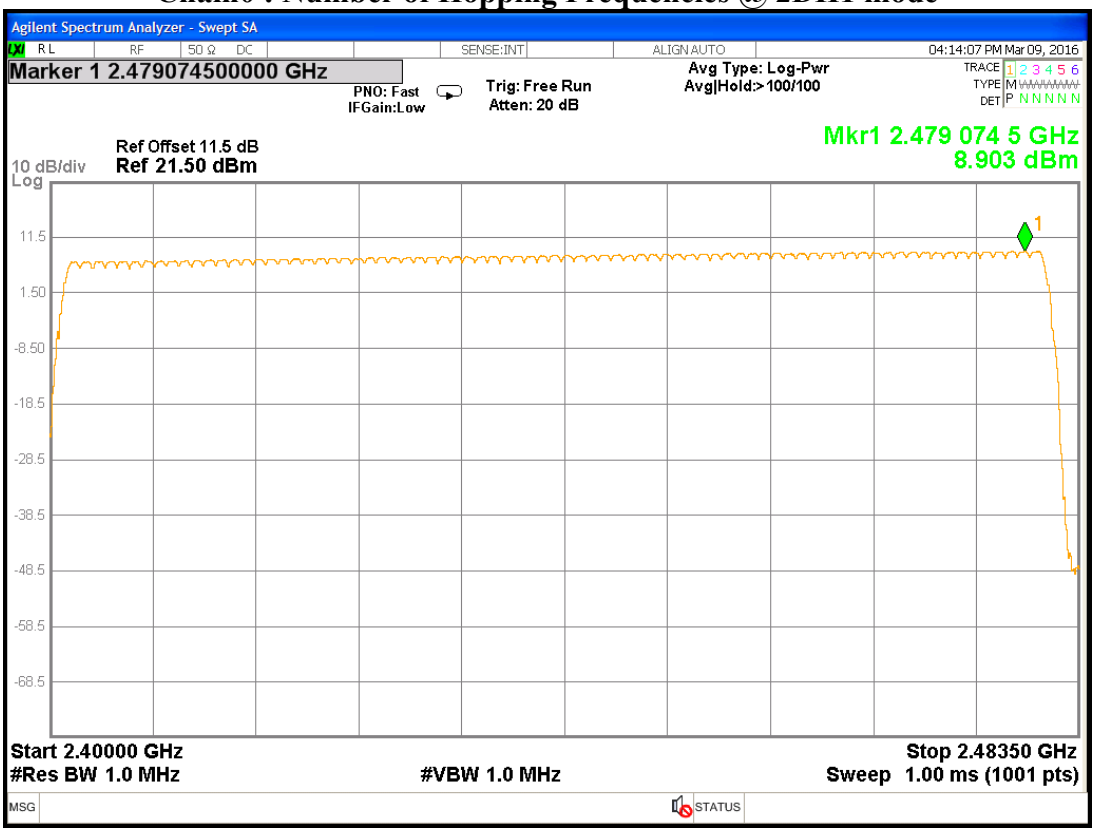
5.3 Measured Data of Number of Hopping Frequencies Test Results

Frequency Range (MHz)	Hopping Channels
2402~2480	79

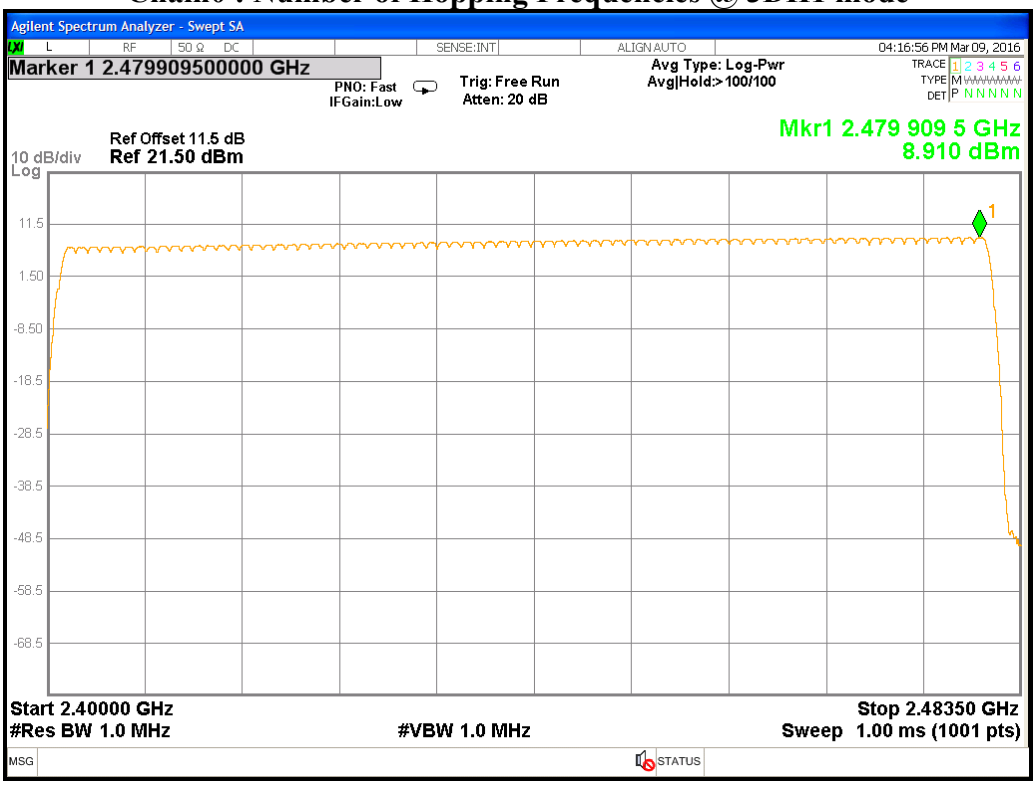
Chain0 : Number of Hopping Frequencies @ DH1 mode



Chain0 : Number of Hopping Frequencies @ 2DH1 mode



Chain0 : Number of Hopping Frequencies @ 3DH1 mode



6. Time of Occupancy (Dwell Time)

6.1 Operating Environment

Temperature:	25	℃
Relative Humidity:	55	%
Atmospheric Pressure:	1008	hPa
Test Date:	Mar. 02, 2016	

6.2 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.

The time of occupancy (dwell time) per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 1MHz, the video bandwidth ≧ RBW, and the zero span function of spectrum analyzer was enable. The EUT has its hopping function enable.

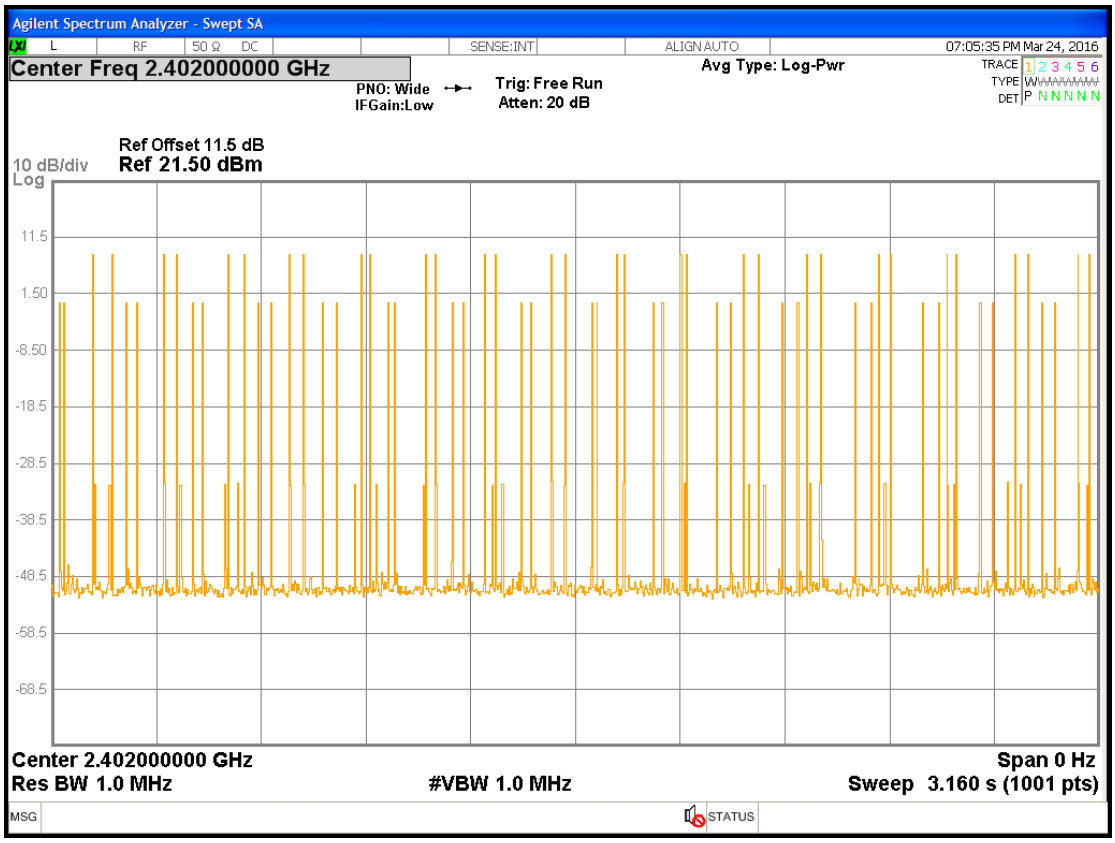
6.3 Measured Data of Maximum Output Power Test Results

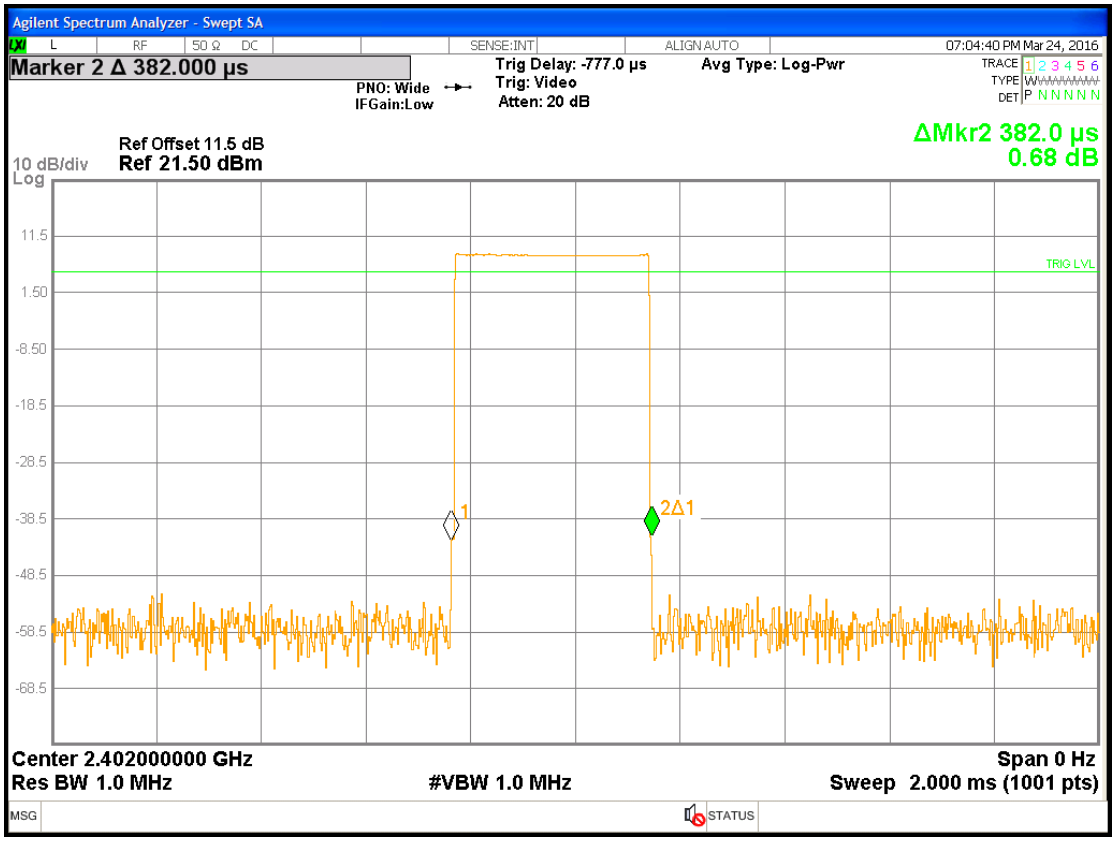
The total sweep time is 0.4×79 Channels =31.6 seconds
Due to the number of hops in the 31.6s sweep, we determined to reduce the sweep time to 5s, count the number of hops and multiply by 6.32. The total number of hops will be multiplied by the measured time of one pulse.

Mode	Pulse duration (ms)	Number of pulse	Measure time (s)	Dwell time (s)	Limit (s)	Data Rate
GFSK	0.382	32	3.16	0.1222	0.4	DH-1
	1.638	15	3.16	0.2457	0.4	DH-3
	2.89	12	3.16	0.3468	0.4	DH-5
π/4DQPSK	0.391	31	3.16	0.1212	0.4	2DH-1
	1.648	13	3.16	0.2142	0.4	2DH-3
	2.89	10	3.16	0.2890	0.4	2DH-5
8DPSK	0.388	32	3.16	0.1242	0.4	3DH-1
	1.639	17	3.16	0.2786	0.4	3DH-3
	2.89	13	3.16	0.3757	0.4	3DH-5

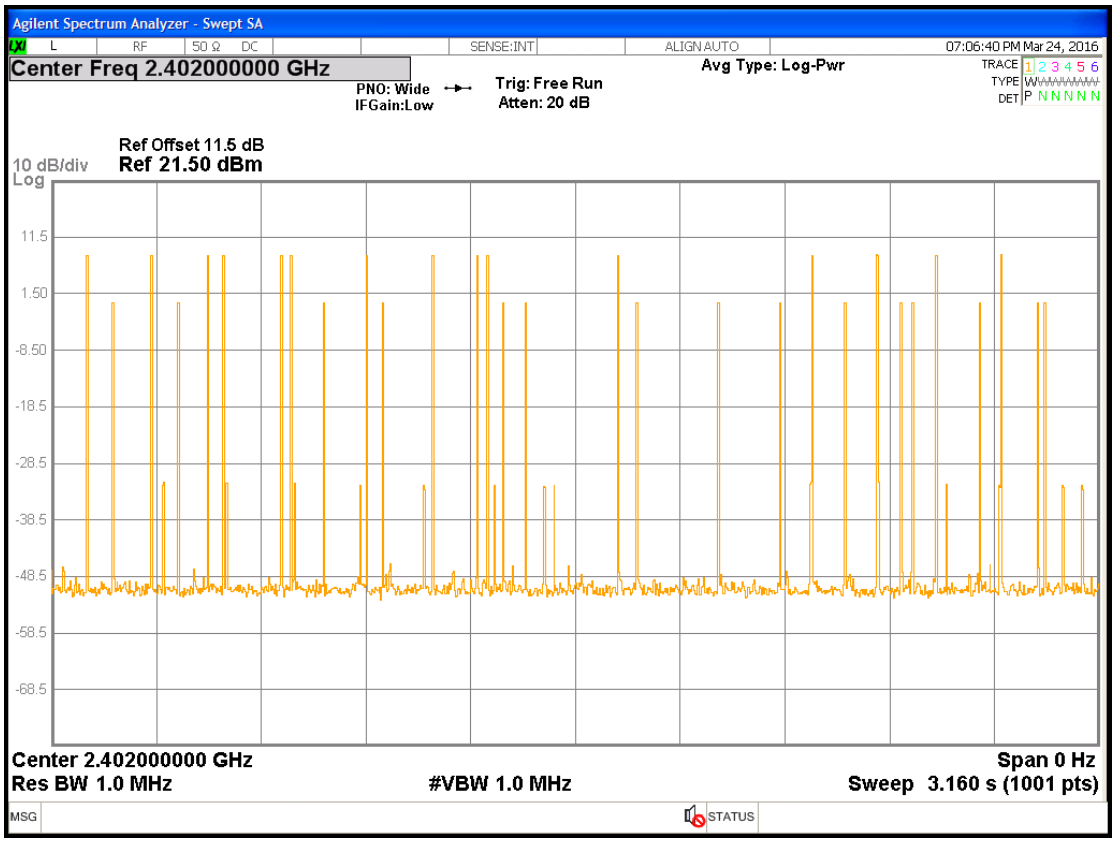
Please see the plots below.

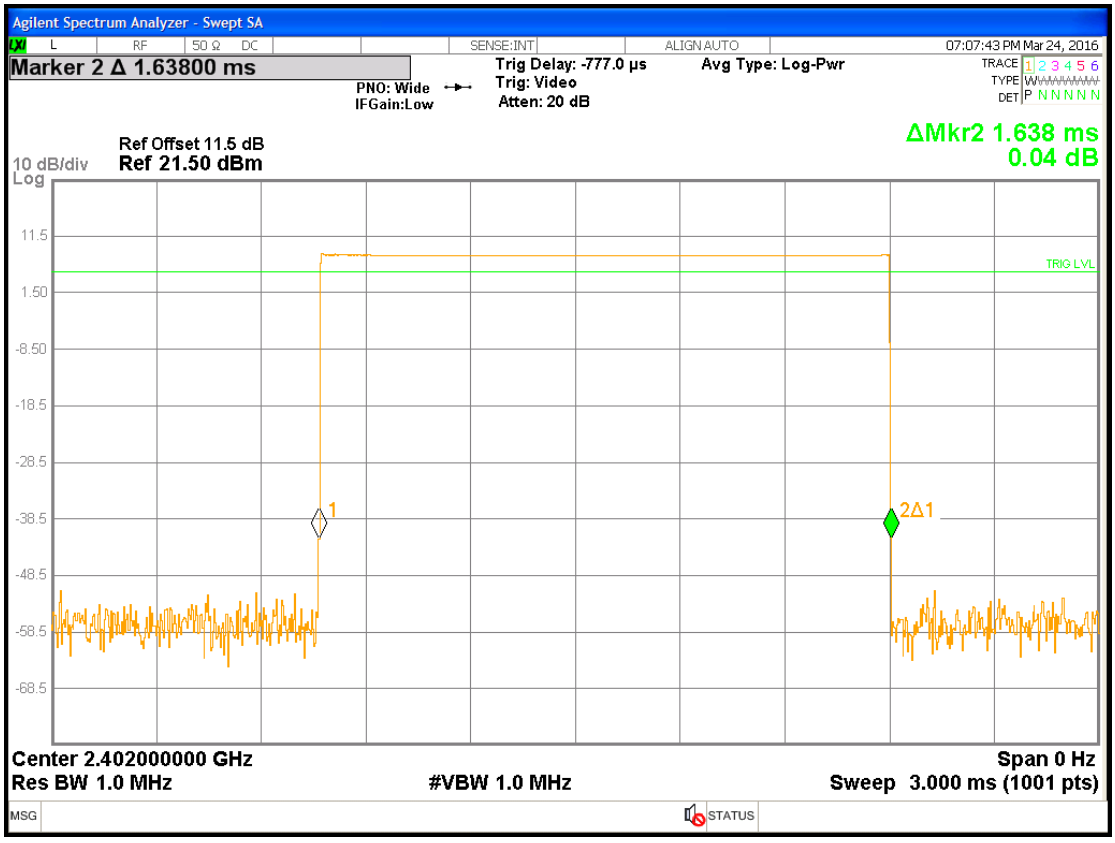
Chain0 : Dwell Time @ DH1 Ch low



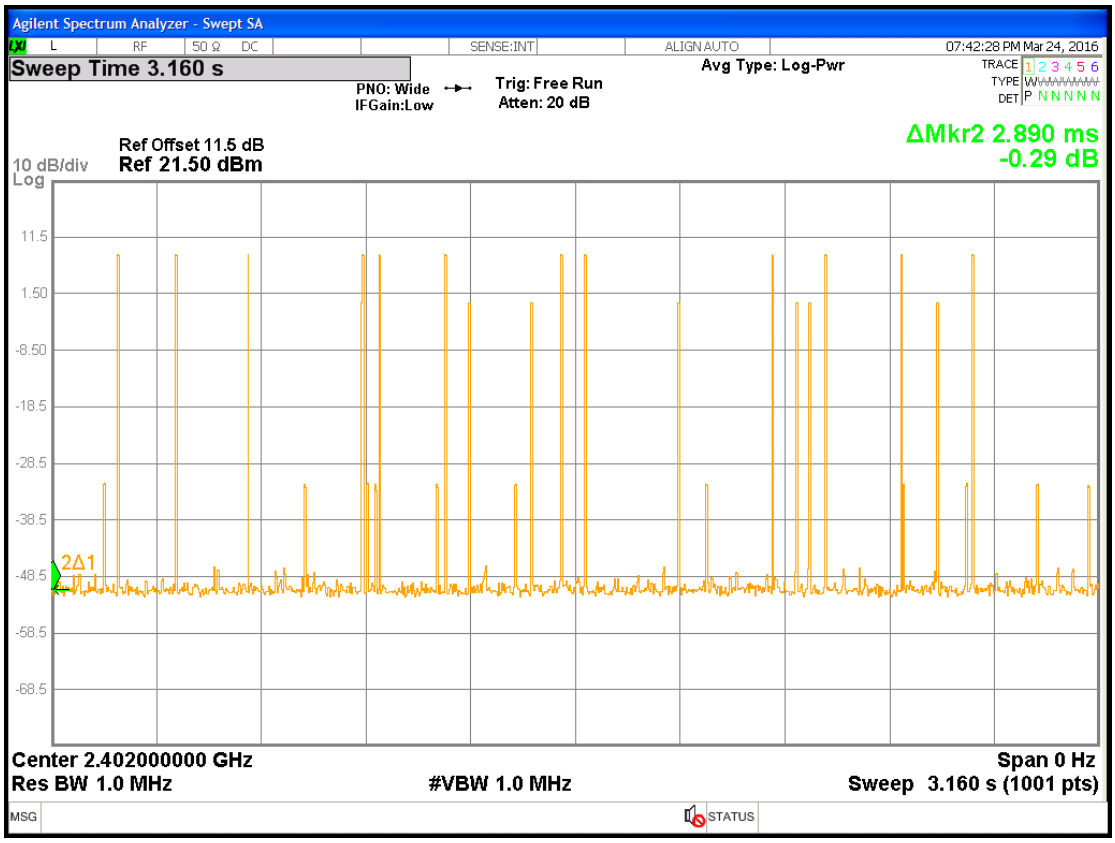


Chain0 : Dwell Time @ DH3 Ch low

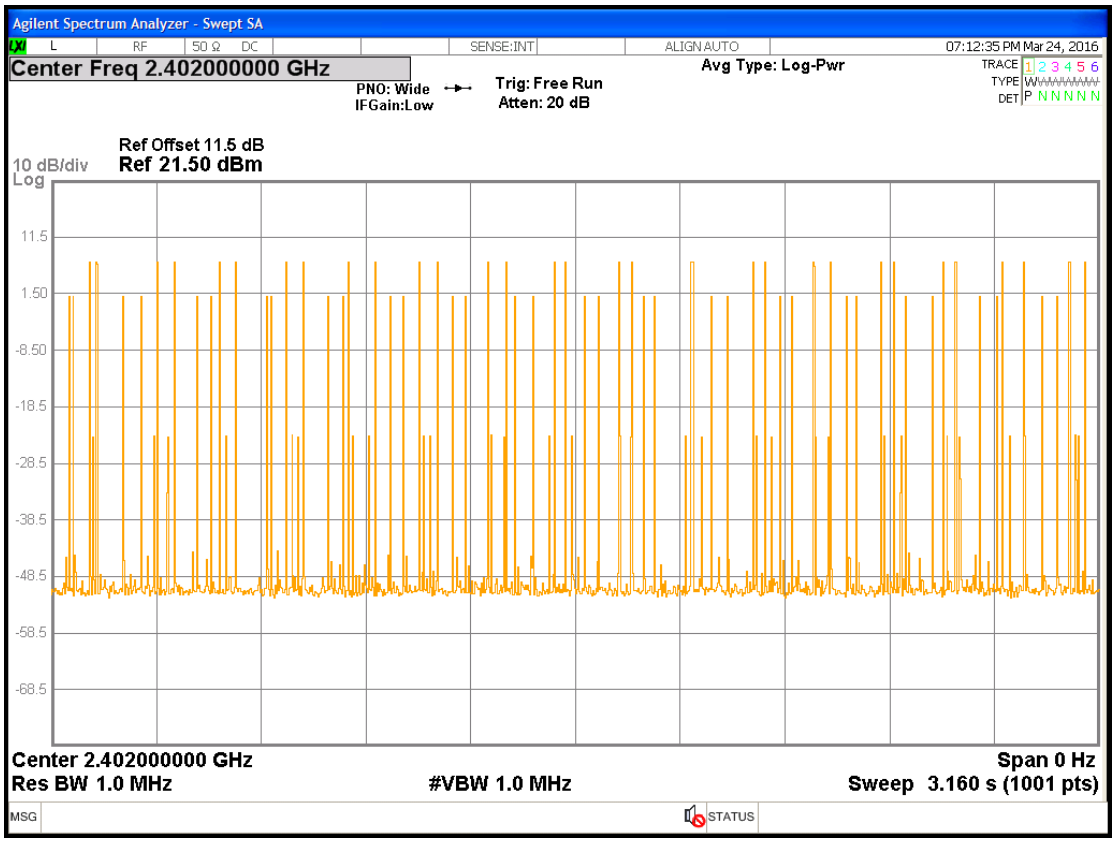


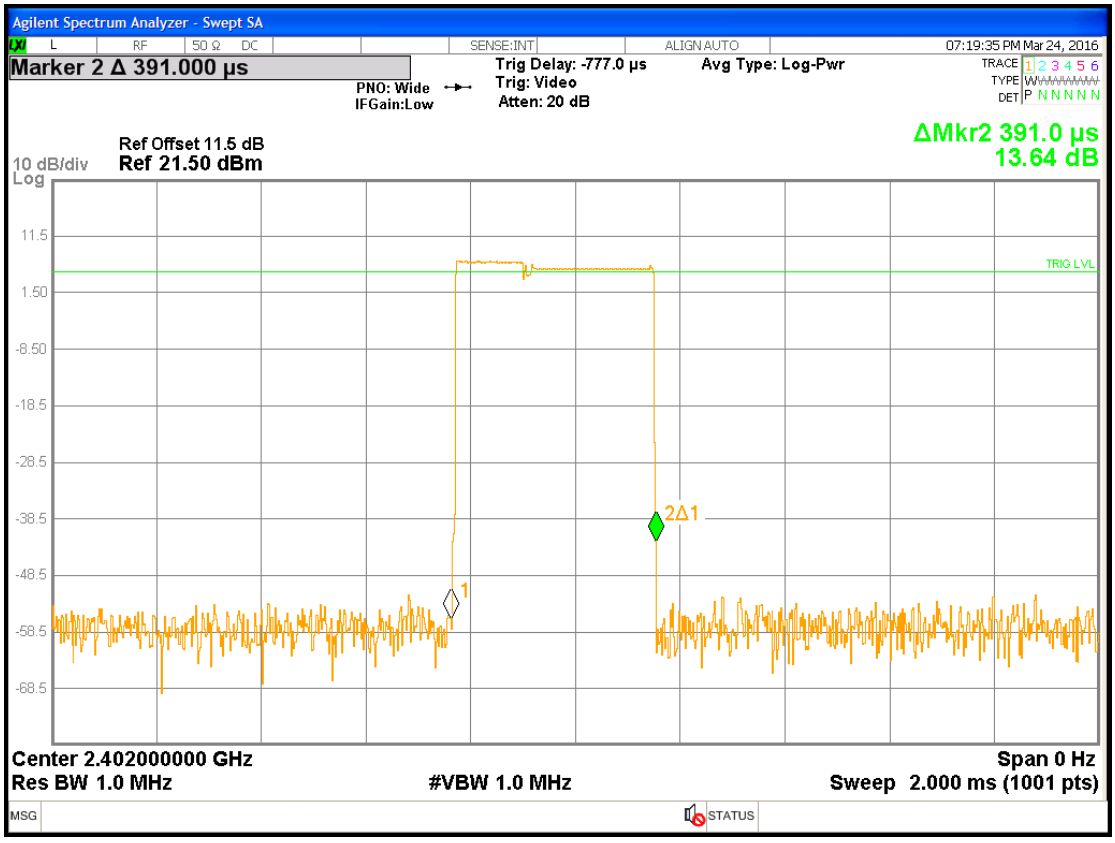


Chain0 : Dwell Time @ DH5 Ch low

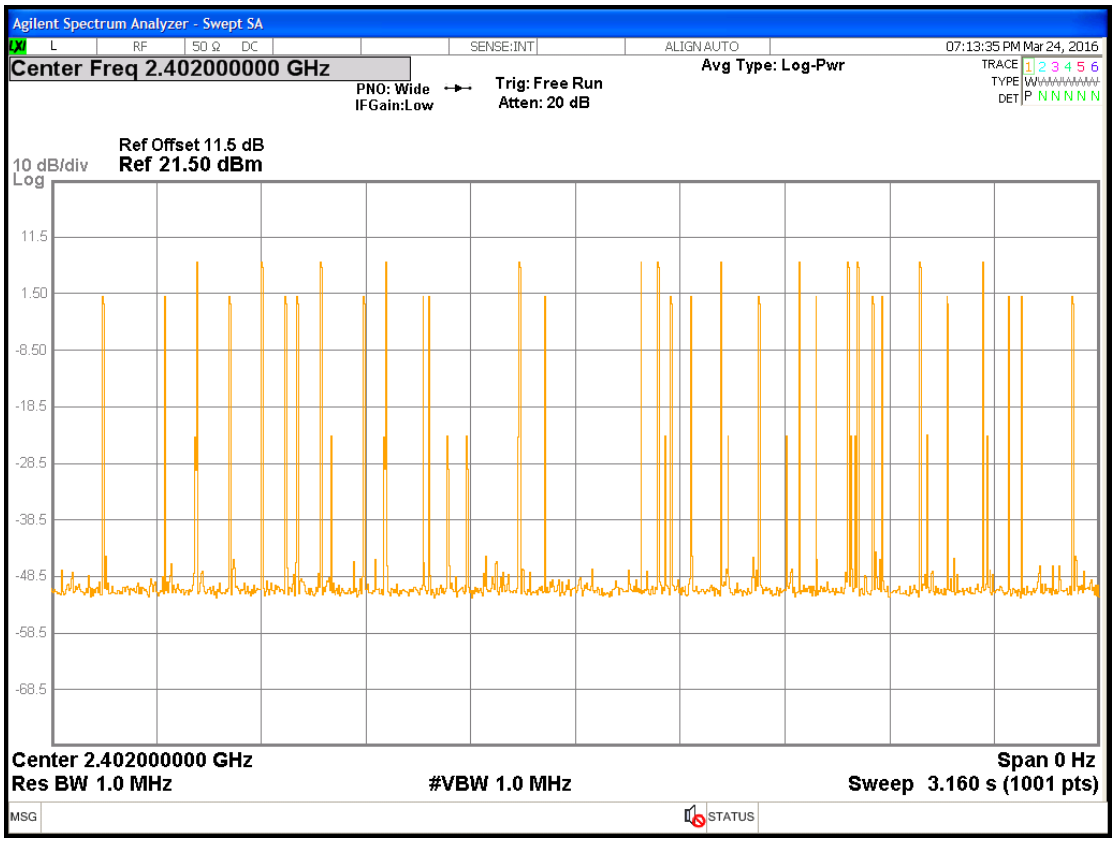


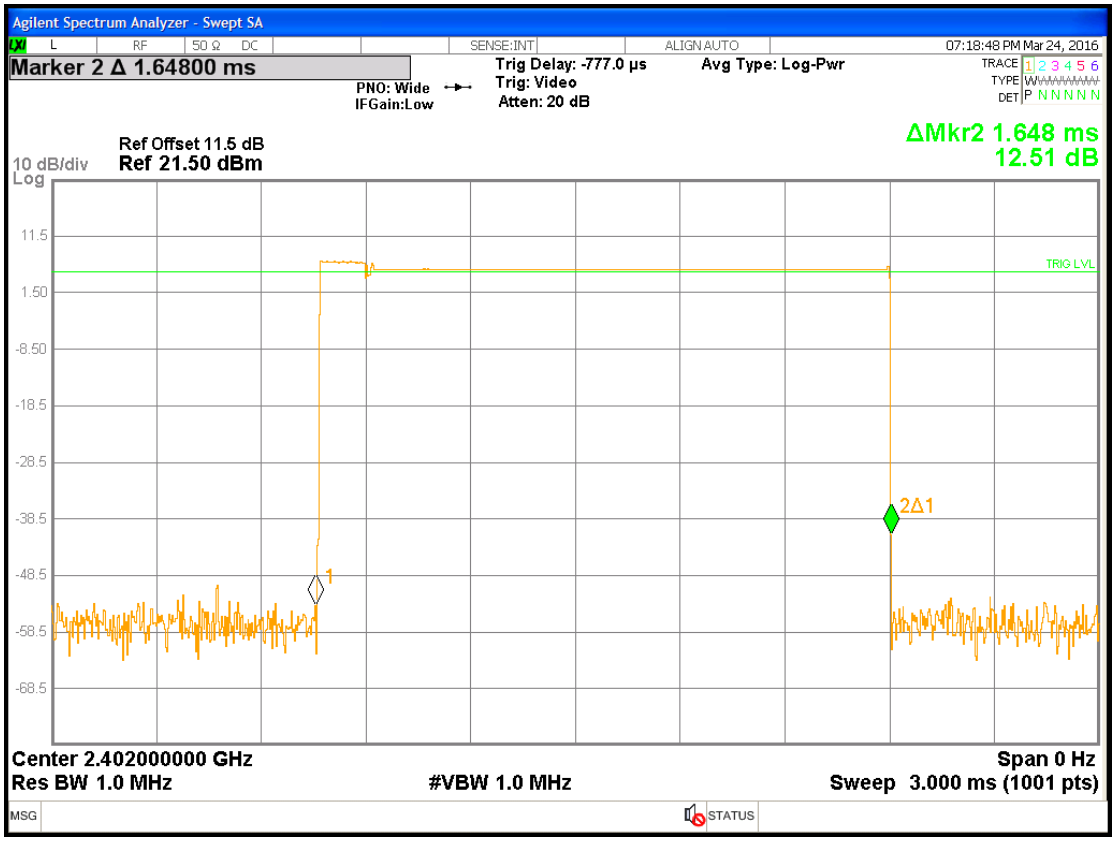
Chain0 : Dwell Time @ 2DH1 Ch low



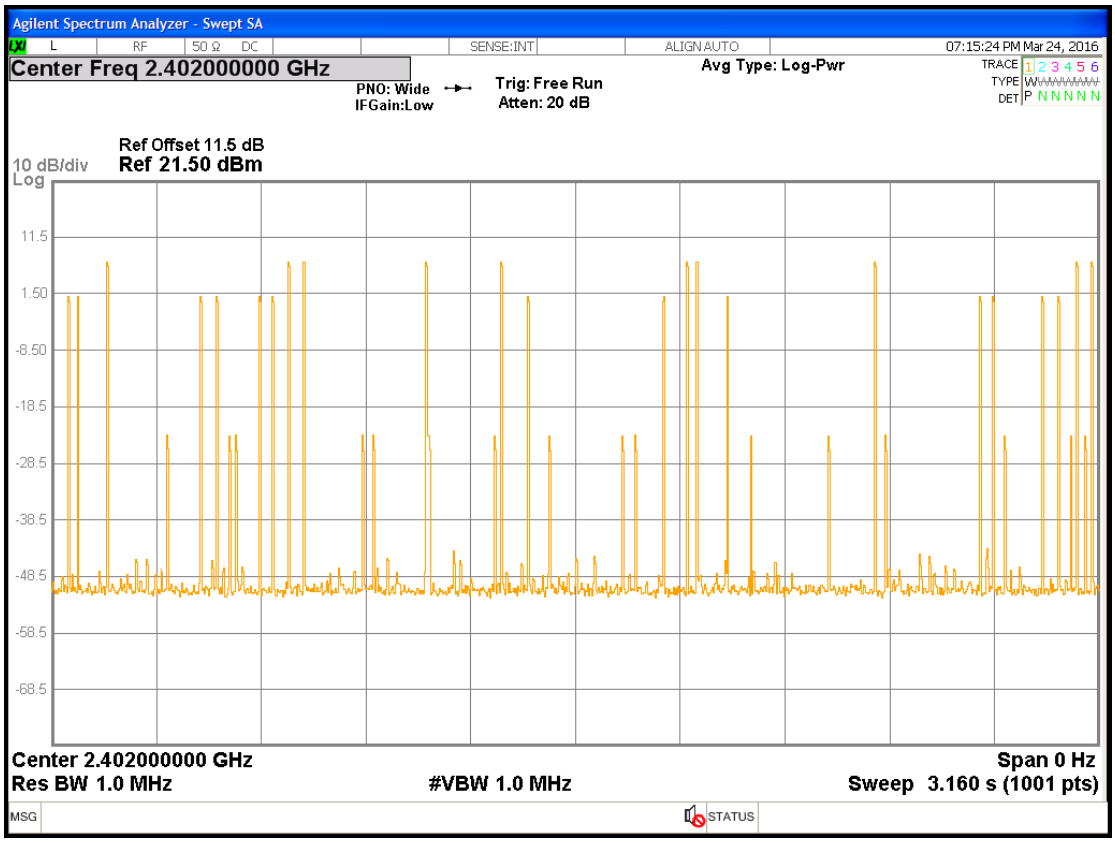


Chain0 : Dwell Time @ 2DH3 Ch low

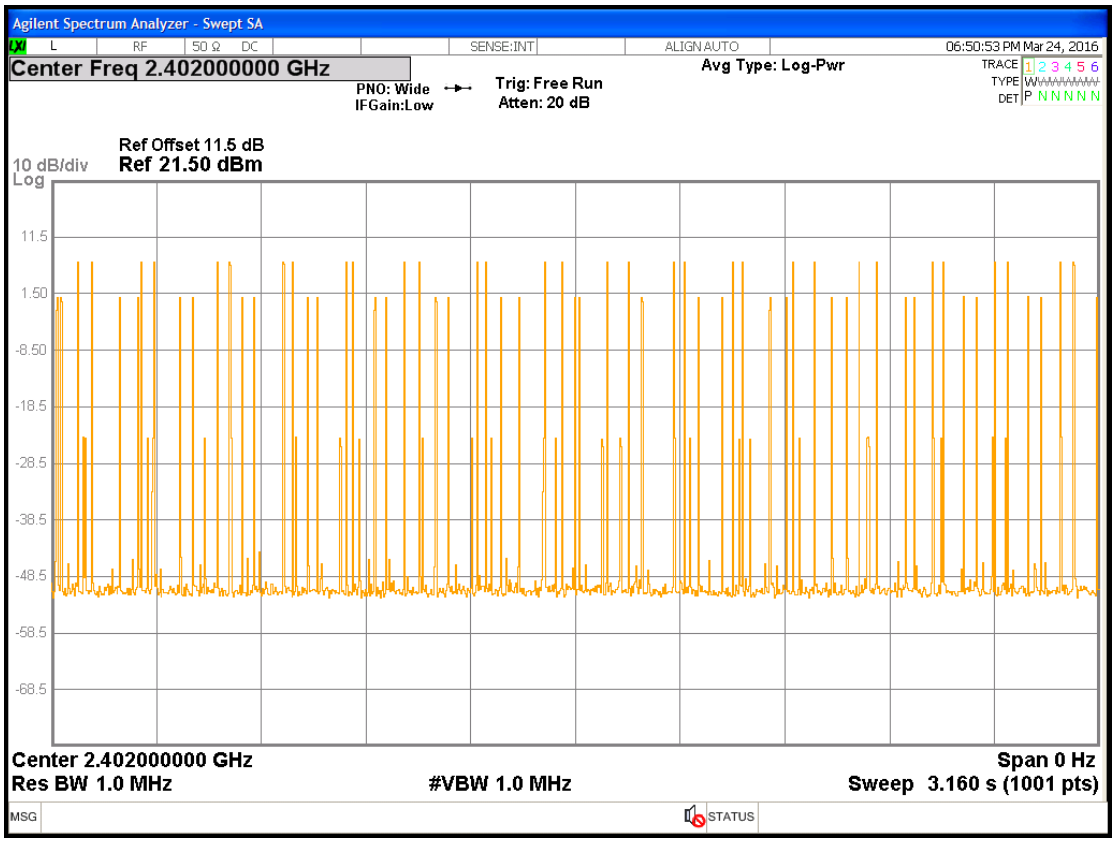


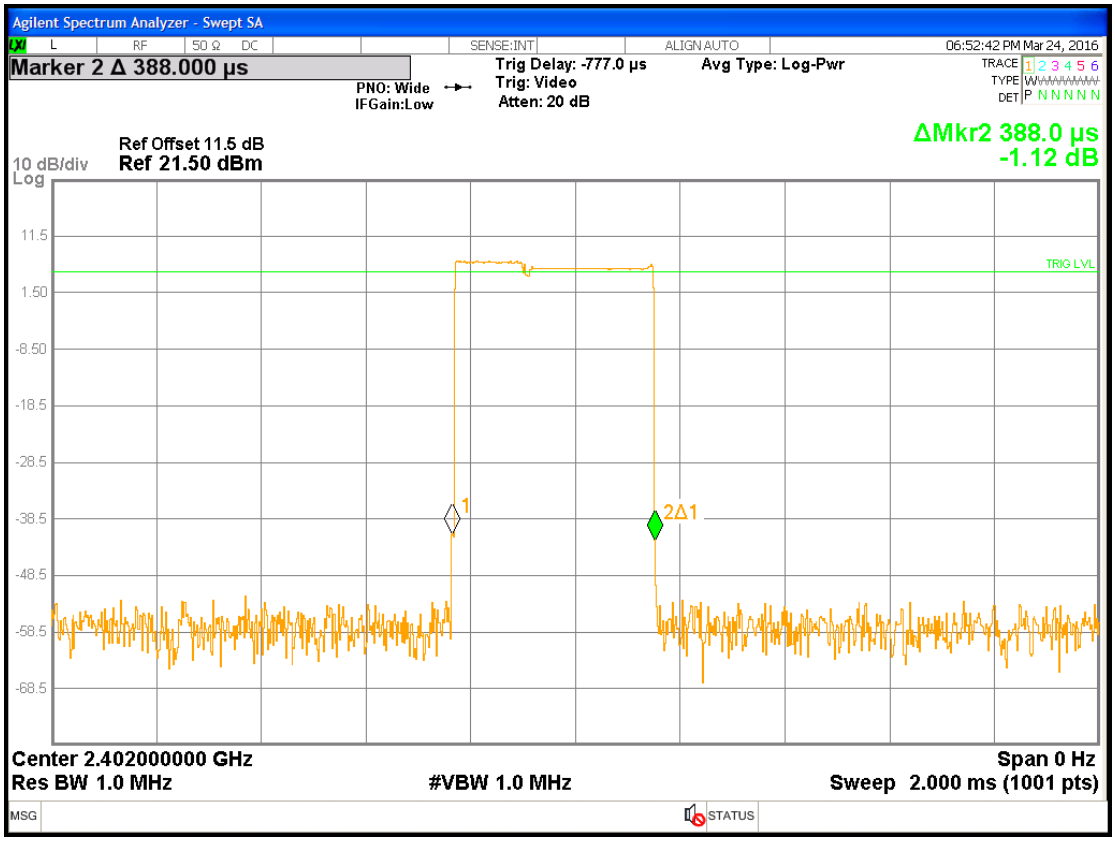


Chain0 : Dwell Time @ 2DH5 Ch high

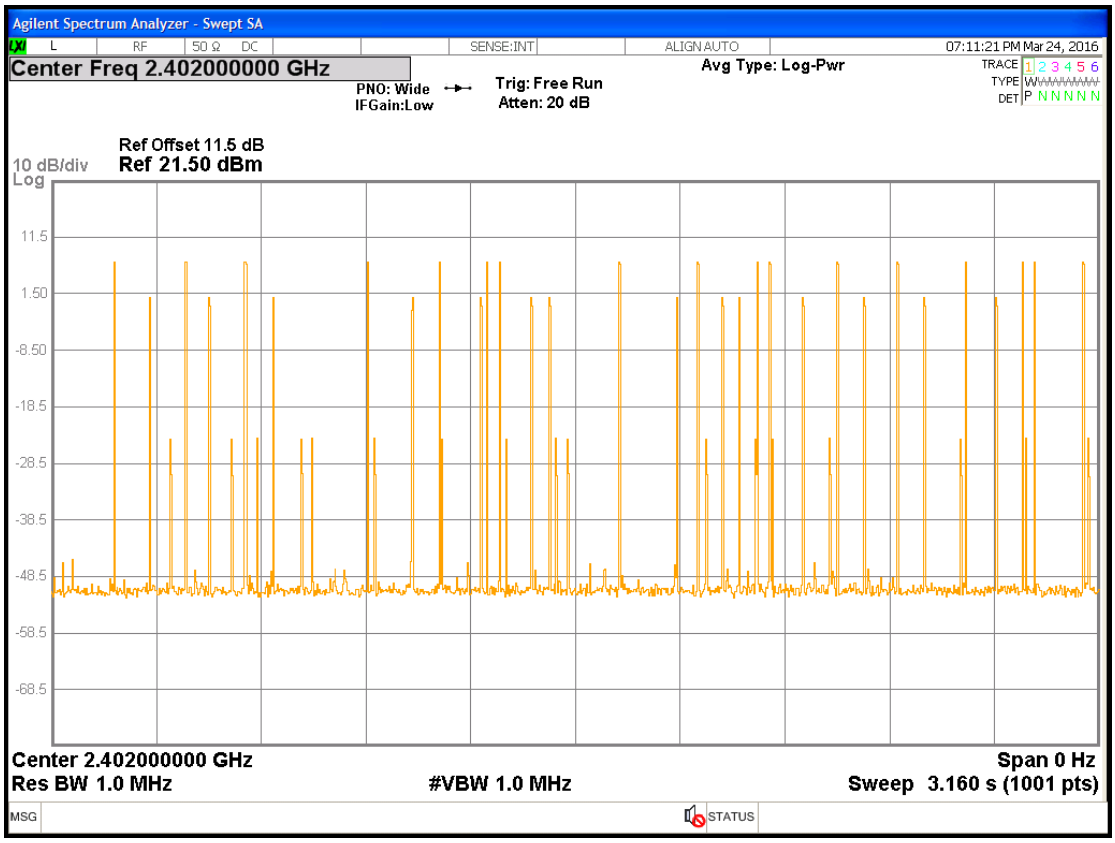


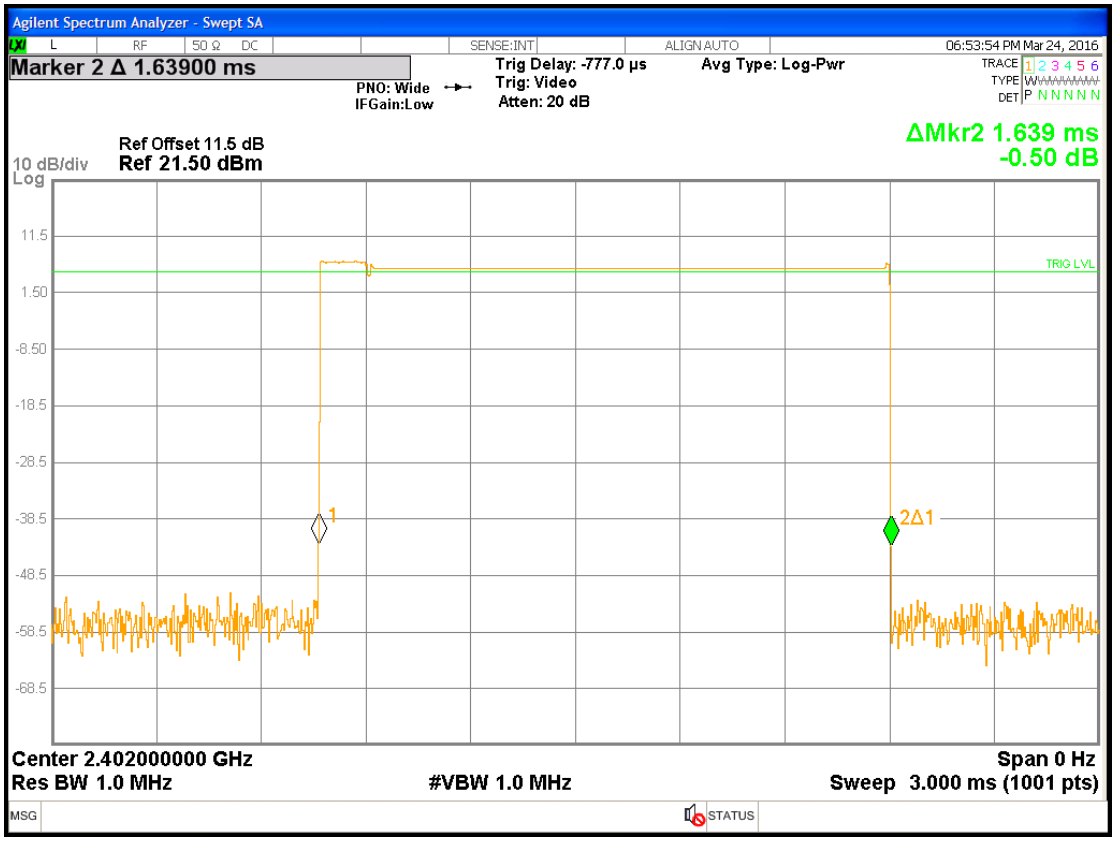
Chain0 : Dwell Time @ 3DH1 Ch low



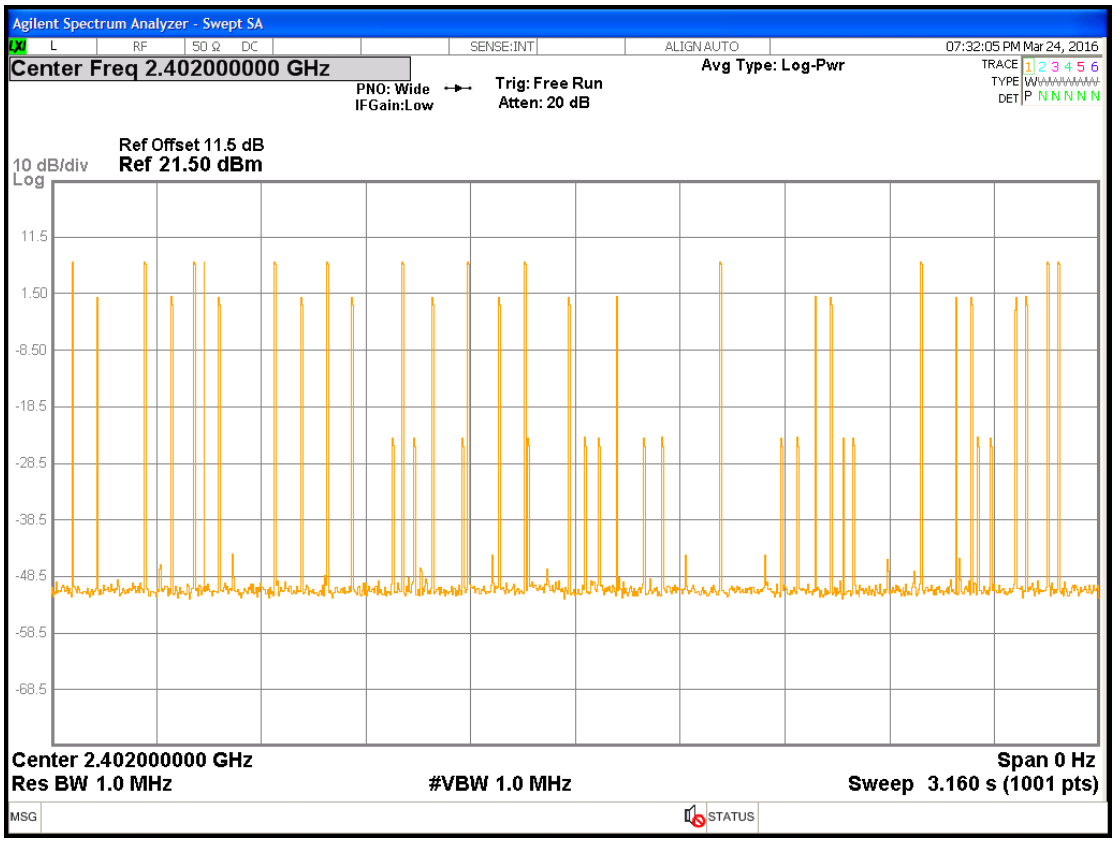


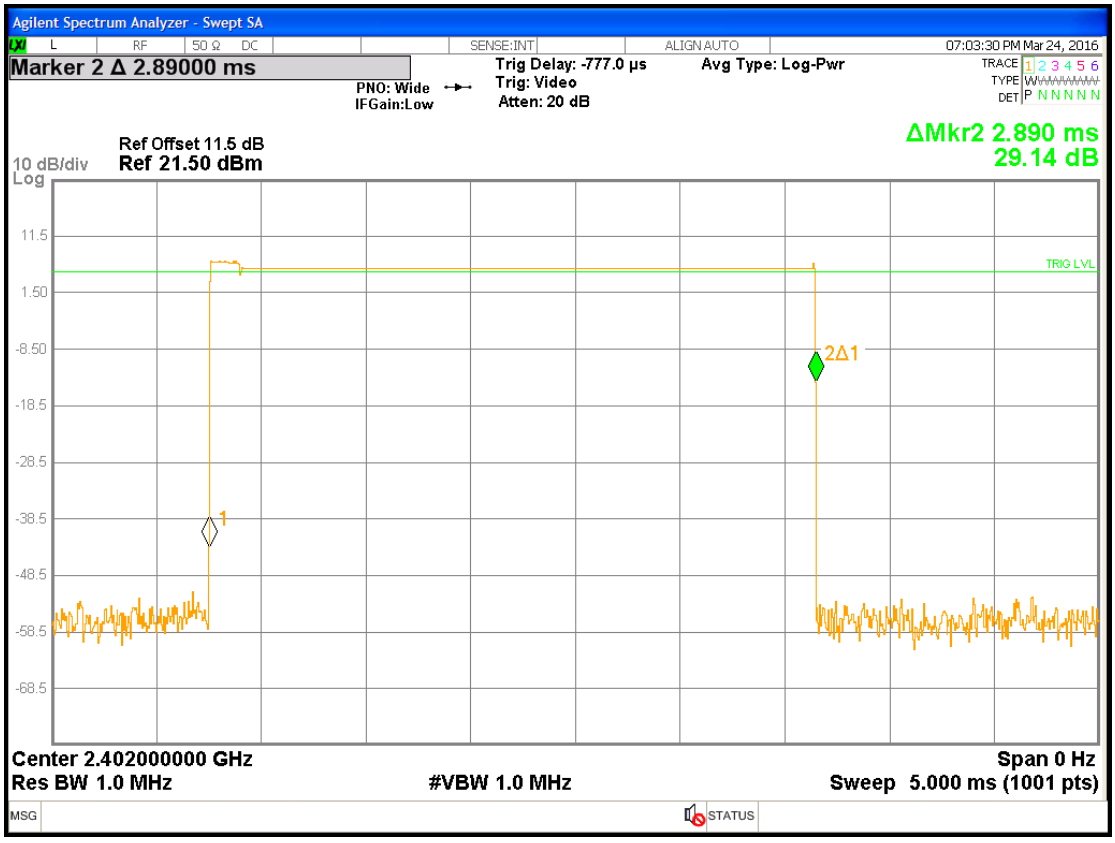
Chain0 : Dwell Time @ 3DH3 Ch low





Chain0 : Dwell Time @ 3DH5 Ch low





7. Maximum Output Power Test

7.1 Operating Environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure:	1008	hPa
Test Date:	Mar. 02, 2016	

7.2 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.
The power output per FCC §15.247(b) was measured on the EUT using a 50 ohm SMA cable connected to peak power meter via power sensor. Power was read directly and cable loss correction (2 dB) was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel).

7.3 Measured Data of Maximum Output Power Test Results

Mode	Channel	Frequency (MHz)	Output Power (AV) (dBm)	Total Power (AV) (mW)	Maximum power (PK) (dBm)	Maximum power (PK) (mW)	Limit (dBm)	Margin (dB)
GFSK	Low	2402	7.93	6.21	8.13	6.50	21	-12.87
	Middle	2441	9.35	8.61	9.57	9.06	21	-11.43
	High	2480	10.32	10.76	10.57	11.40	21	-10.43
π/4DQPSK	Low	2402	6.62	4.59	6.93	4.93	21	-14.07
	Middle	2441	7.76	5.97	8.07	6.41	21	-12.93
	High	2480	8.58	7.21	8.89	7.74	21	-12.11
8DPSK	Low	2402	6.34	4.31	6.59	4.56	21	-14.41
	Middle	2441	7.78	6.00	8.07	6.41	21	-12.93
	High	2480	8.59	7.23	8.86	7.69	21	-12.14

8. RF Antenna Conducted Spurious Test

8.1 Operating Environment

Temperature:	25	℃
Relative Humidity:	55	%
Atmospheric Pressure:	1008	hPa
Test Date:	Mar. 17, 2016	

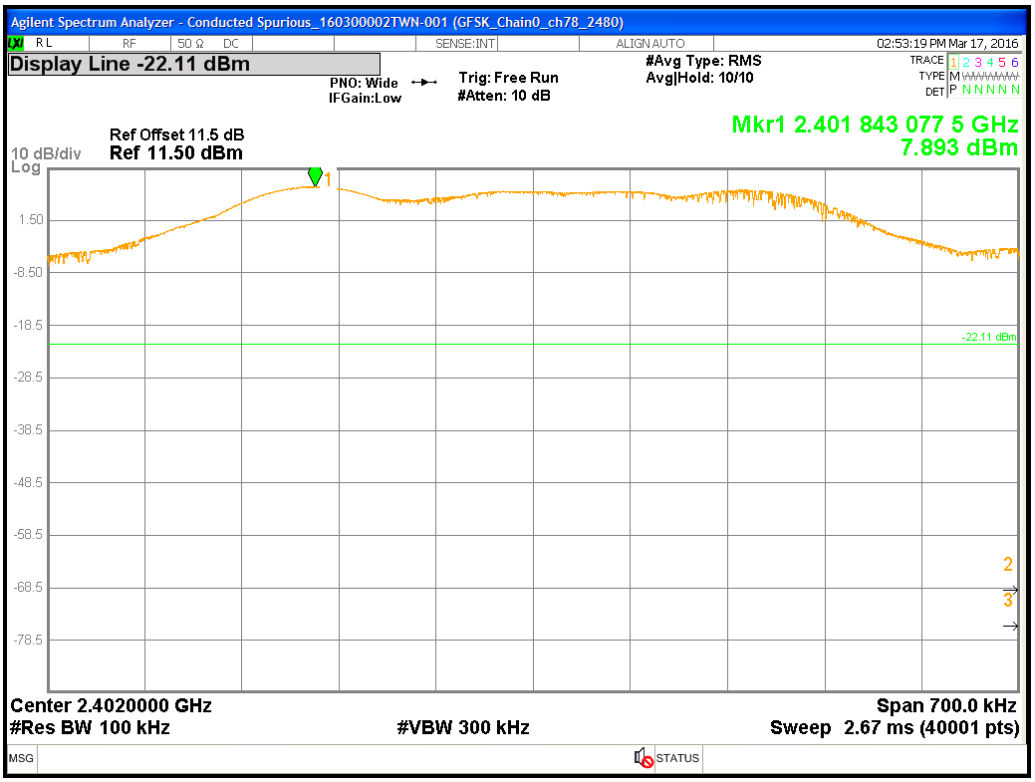
8.2 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.

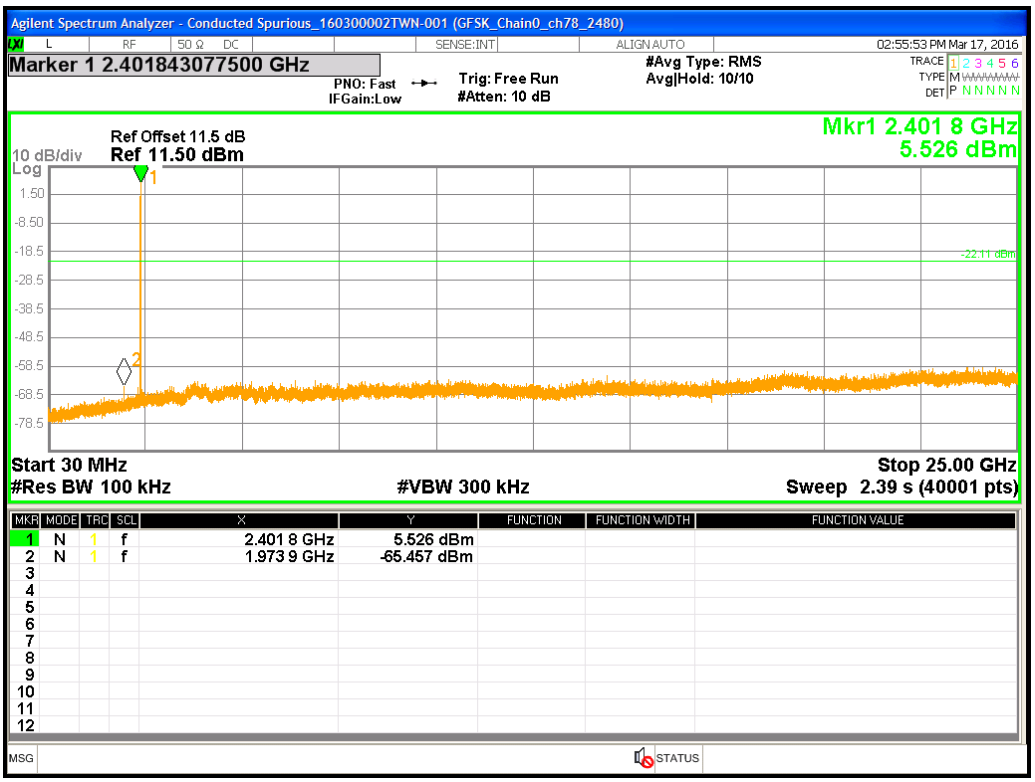
The measurements were performed from 30MHz to 25GHz RF antenna conducted per FCC 15.247 (c) was measured from the EUT antenna port using a 50ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz.
Harmonics and spurious noise must be at least 20dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

8.3 Measured Data of the Highest RF Antenna Conducted Spurious Test Results

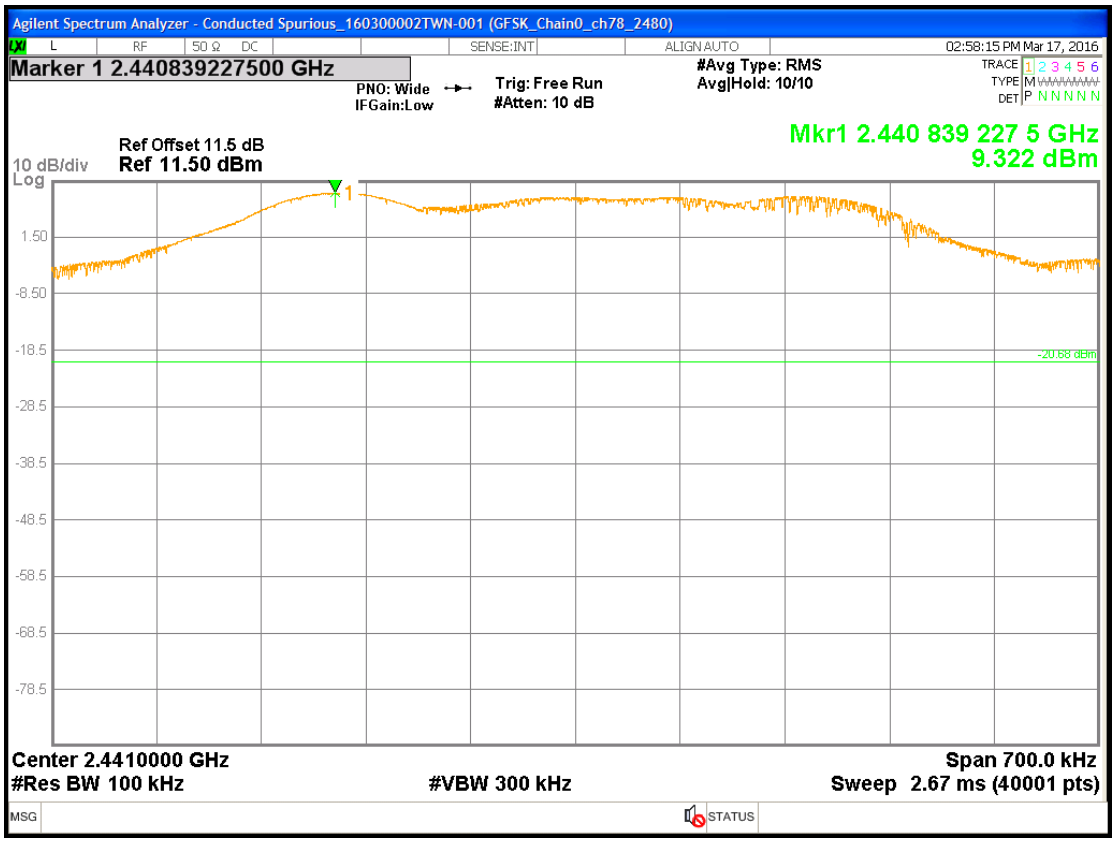
Chain0 : Conducted Spurious @ DH1_Ch Low



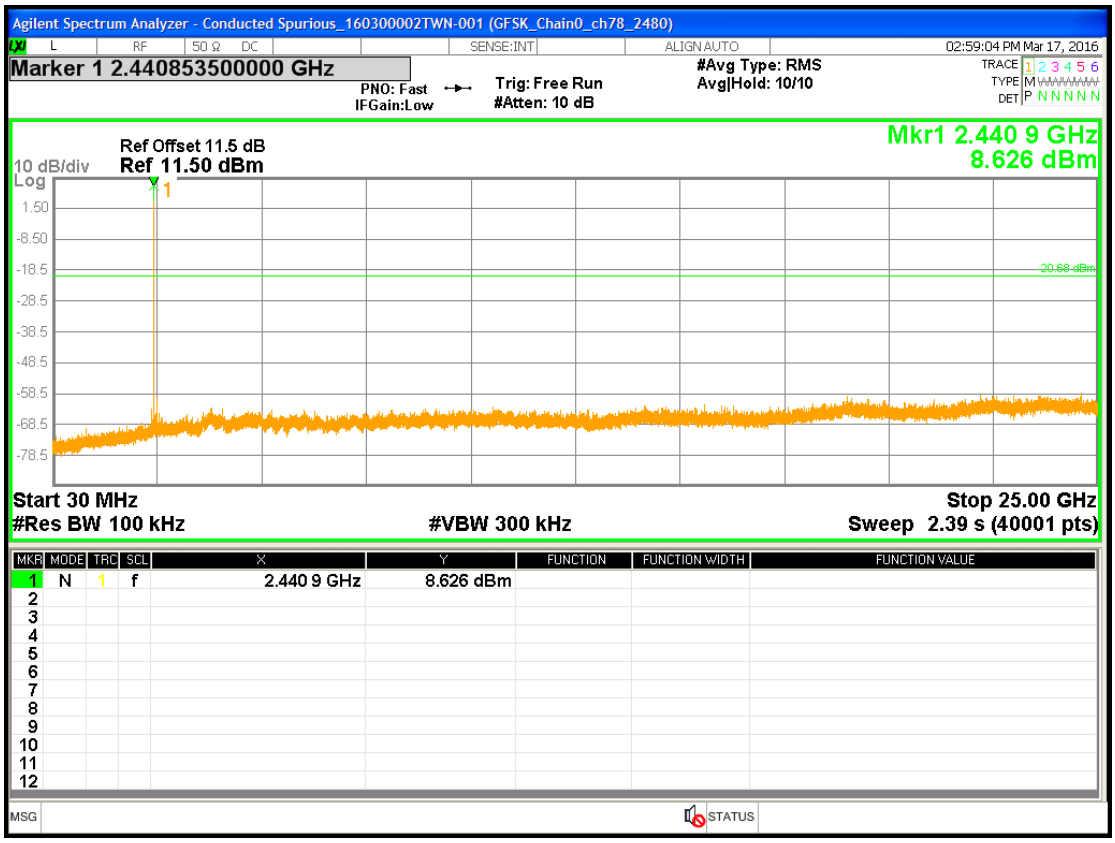
Chain0 : Conducted Spurious @ DH1_Ch Low



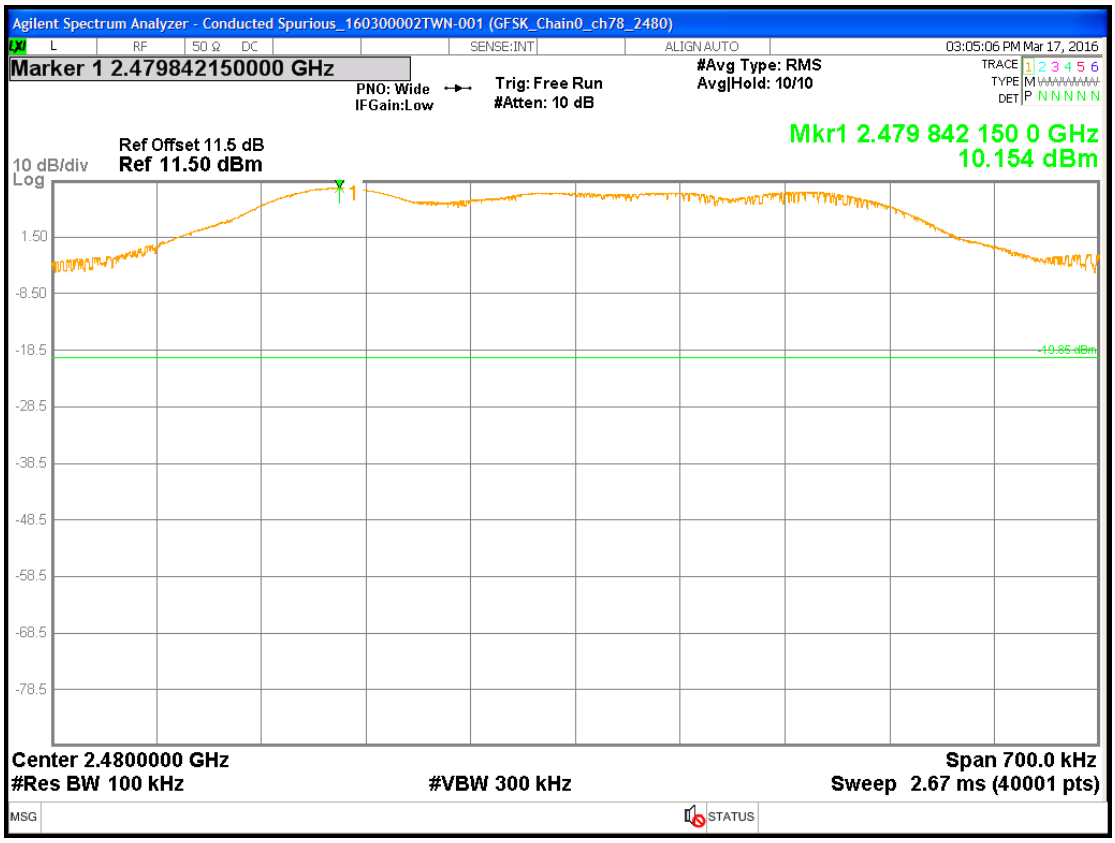
Chain0 : Conducted Spurious @ DH1_Ch middle



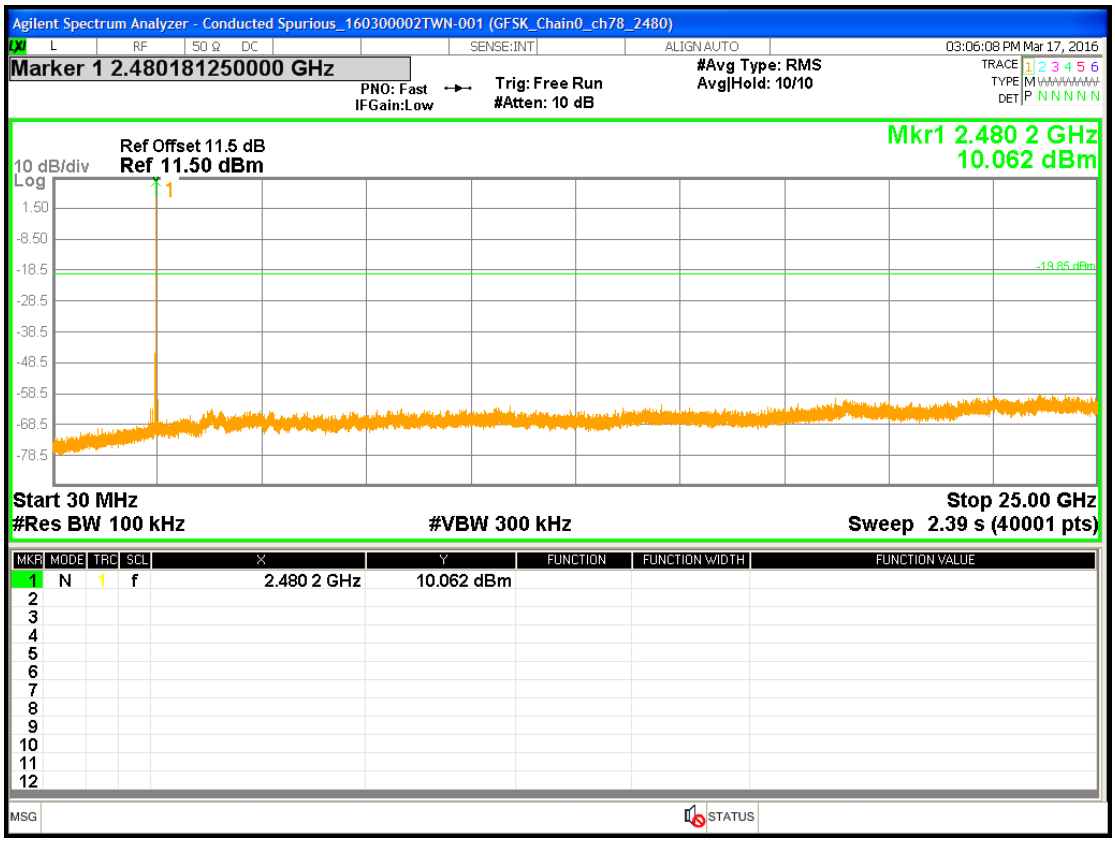
Chain0 : Conducted Spurious @ DH1_Ch middle



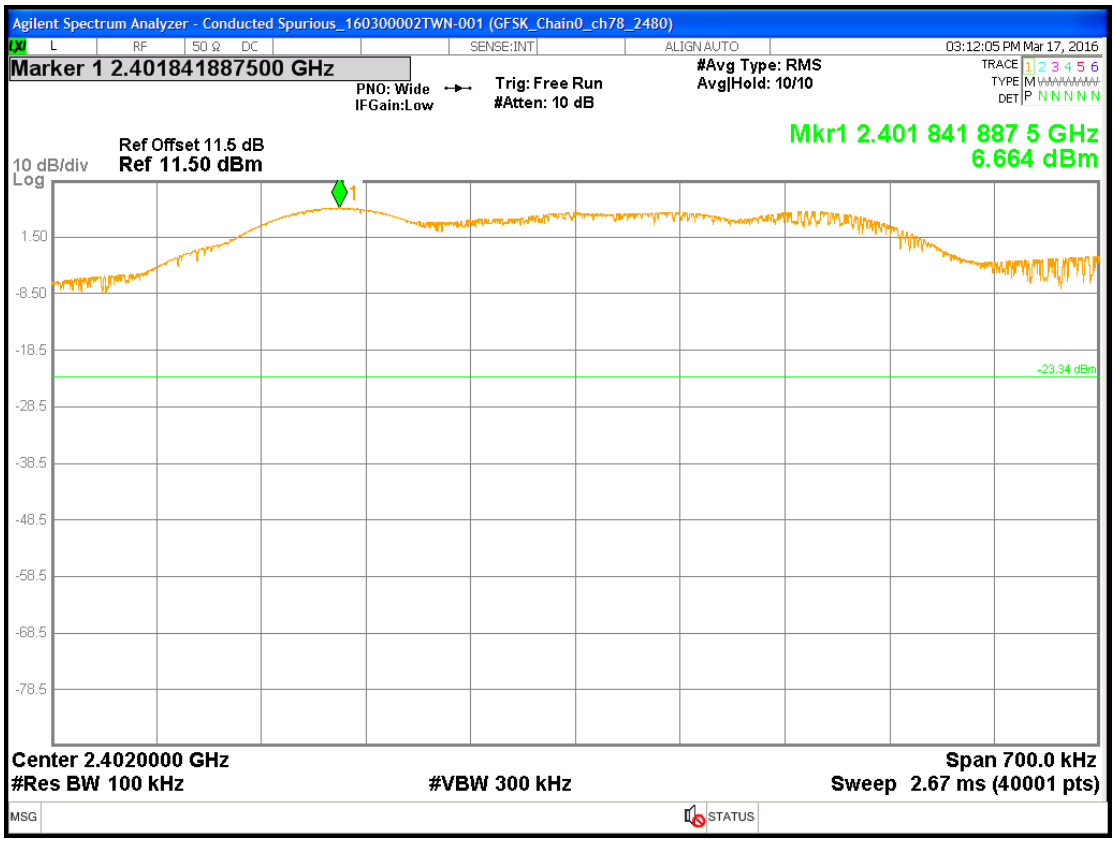
Chain0 : Conducted Spurious @ DH1_Ch high



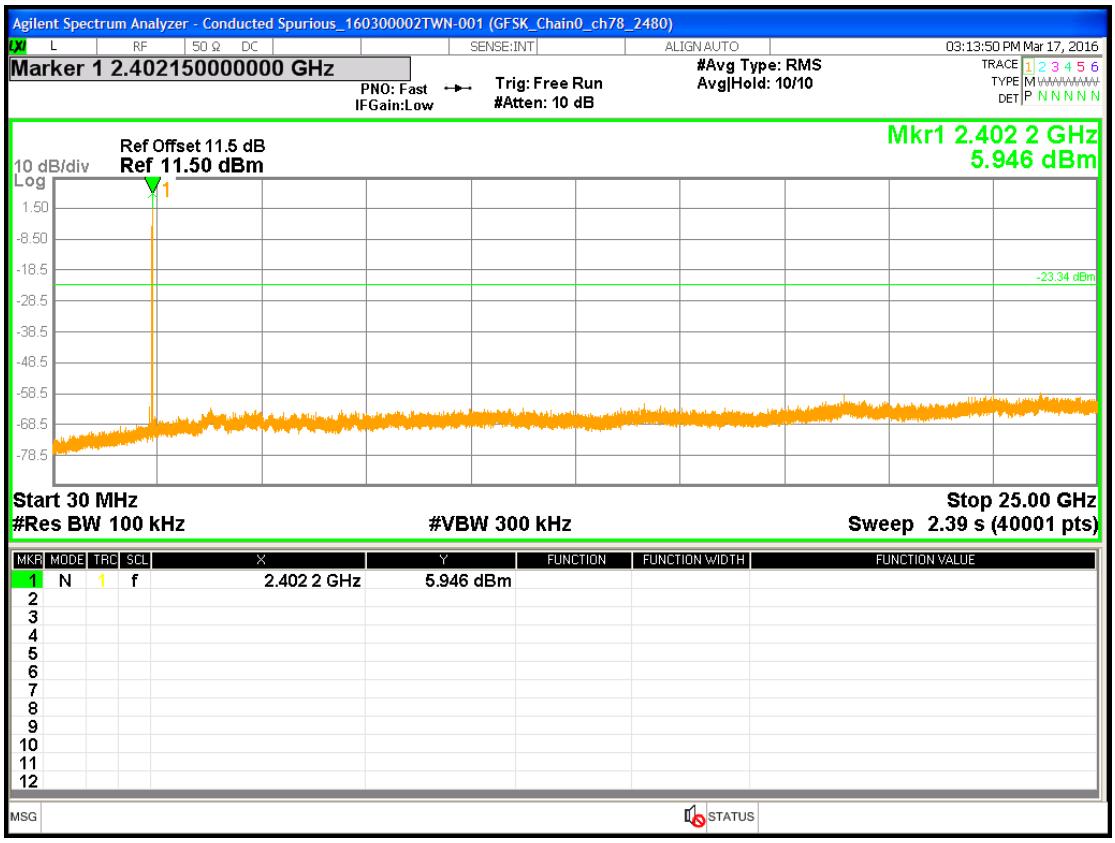
Chain0 : Conducted Spurious @ DH1_Ch high



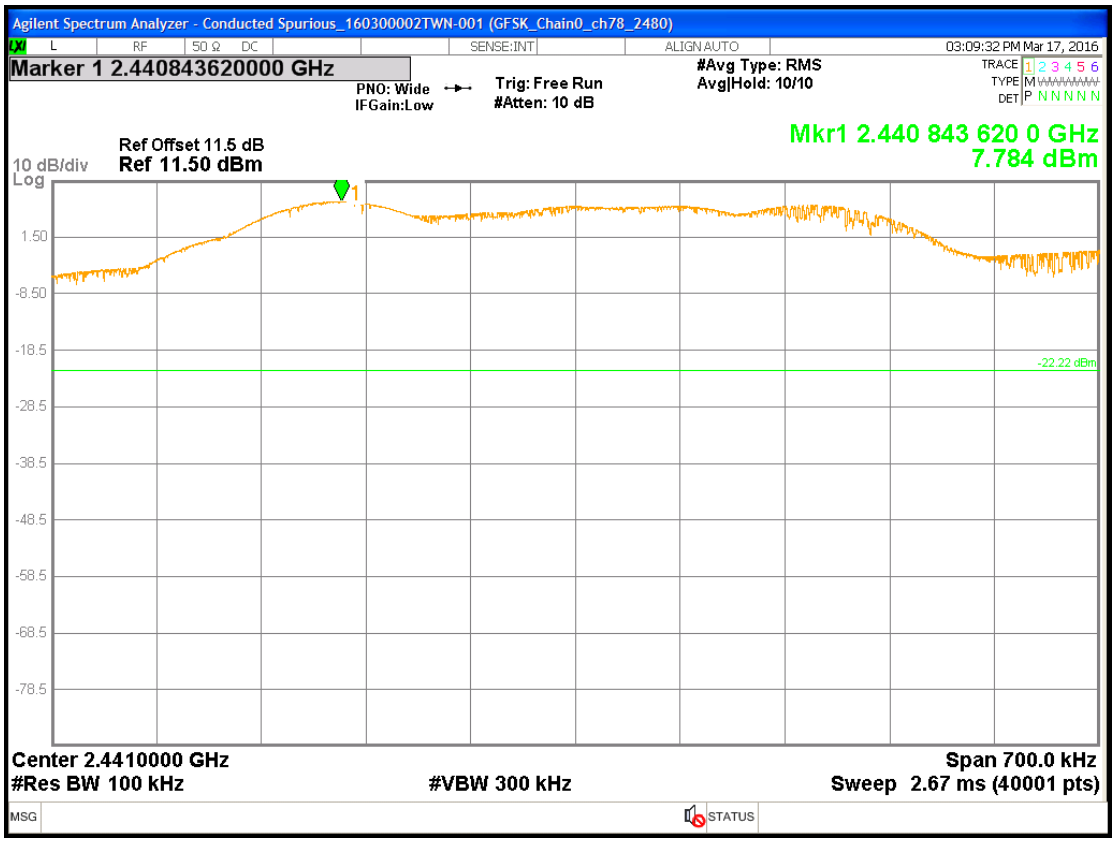
Chain0 : Conducted Spurious @ 2DH1_Ch Low



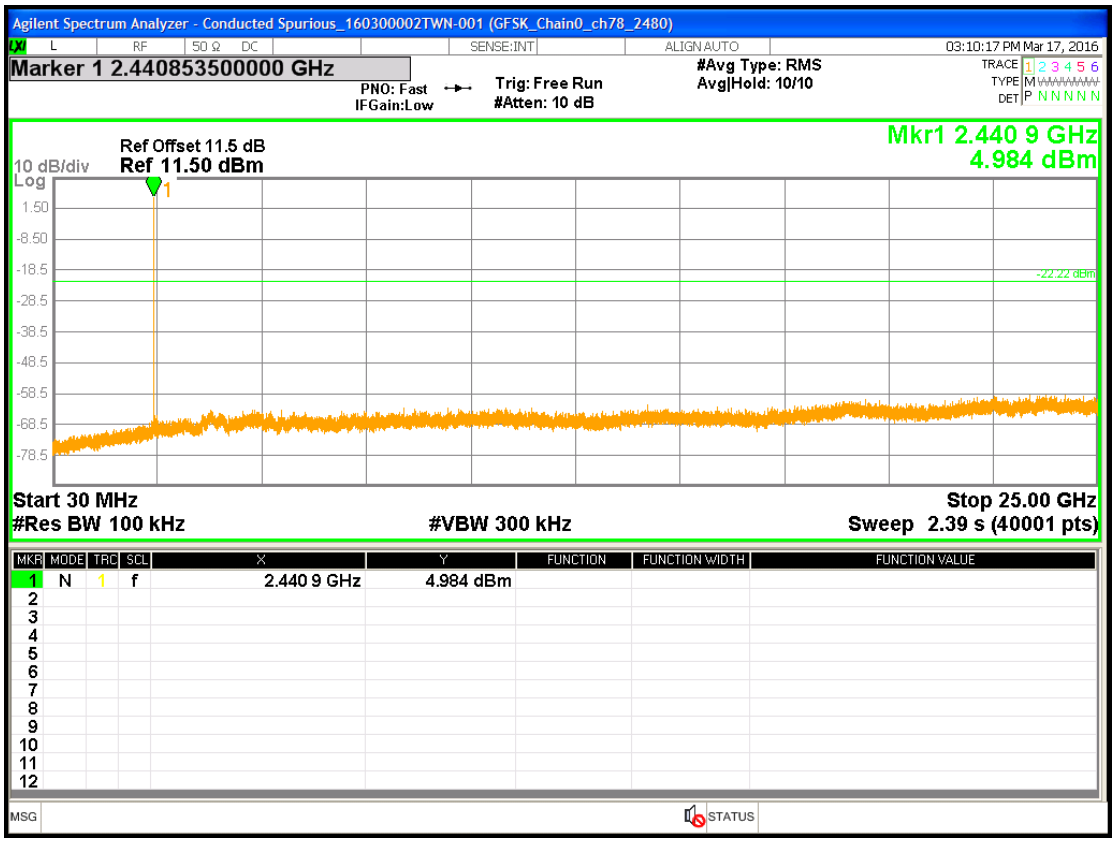
Chain0 : Conducted Spurious @ 2DH1_Ch Low



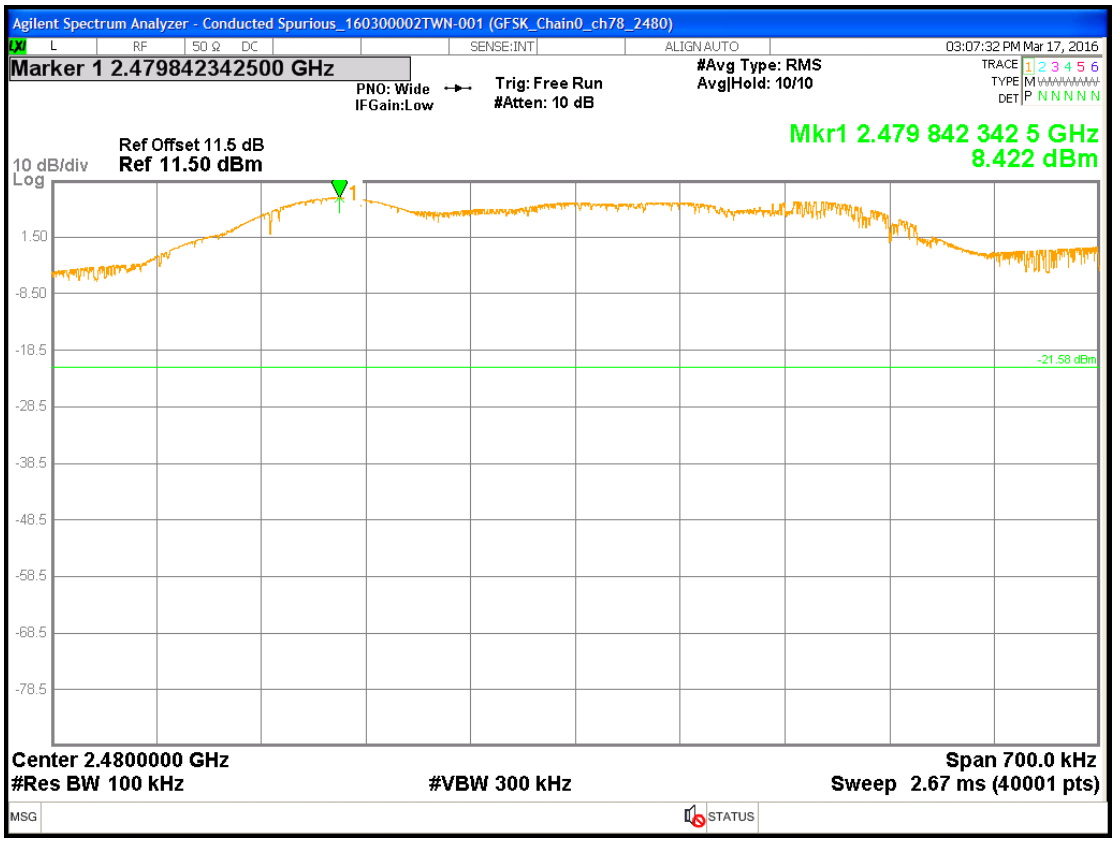
Chain0 : Conducted Spurious @ 2DH1_Ch middle



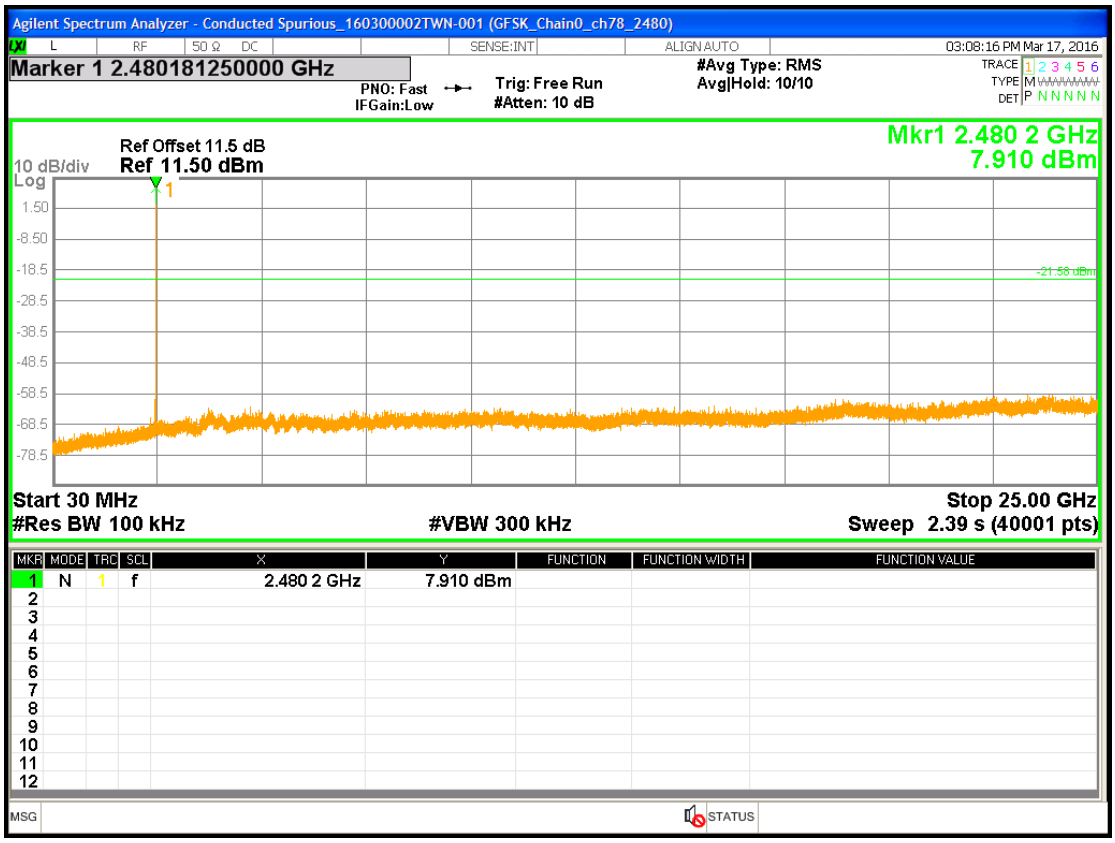
Chain0 : Conducted Spurious @ 2DH1_Ch middle



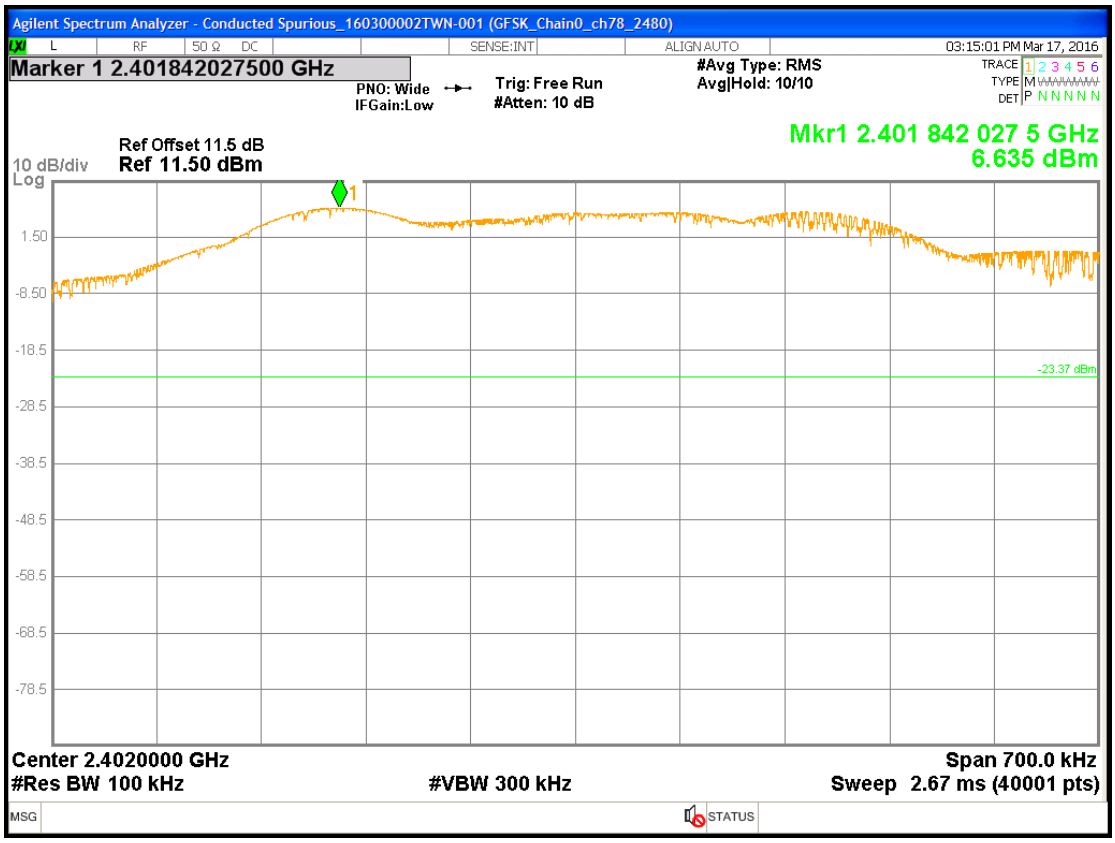
Chain0 : Conducted Spurious @ 2DH1_Ch high



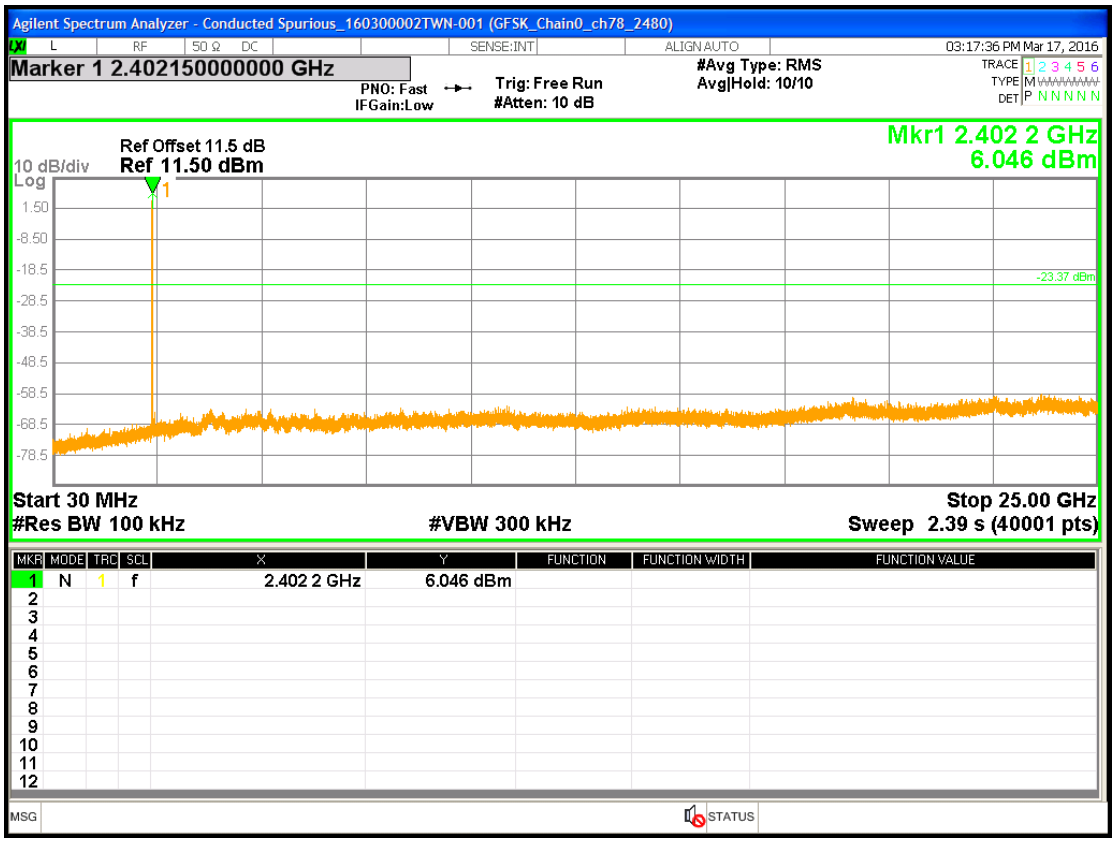
Chain0 : Conducted Spurious @ 2DH1_Ch high



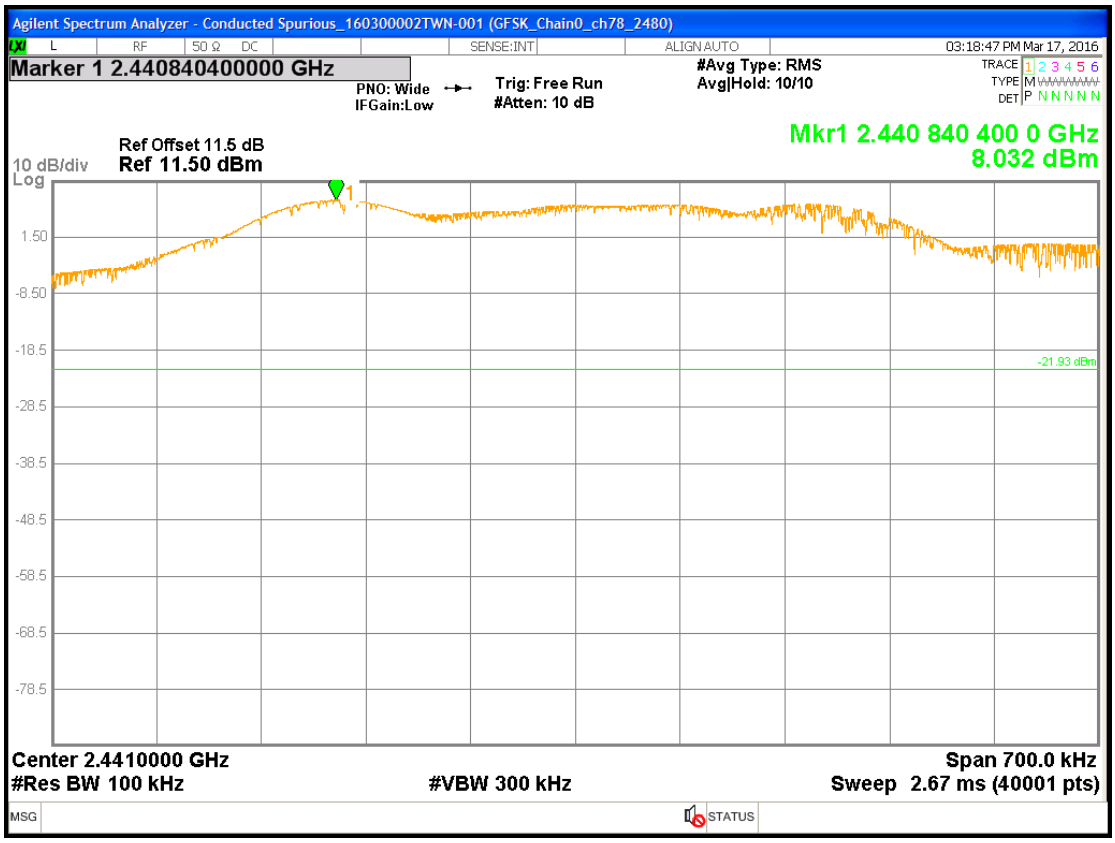
Chain0 : Conducted Spurious @ 3DH1_Ch Low



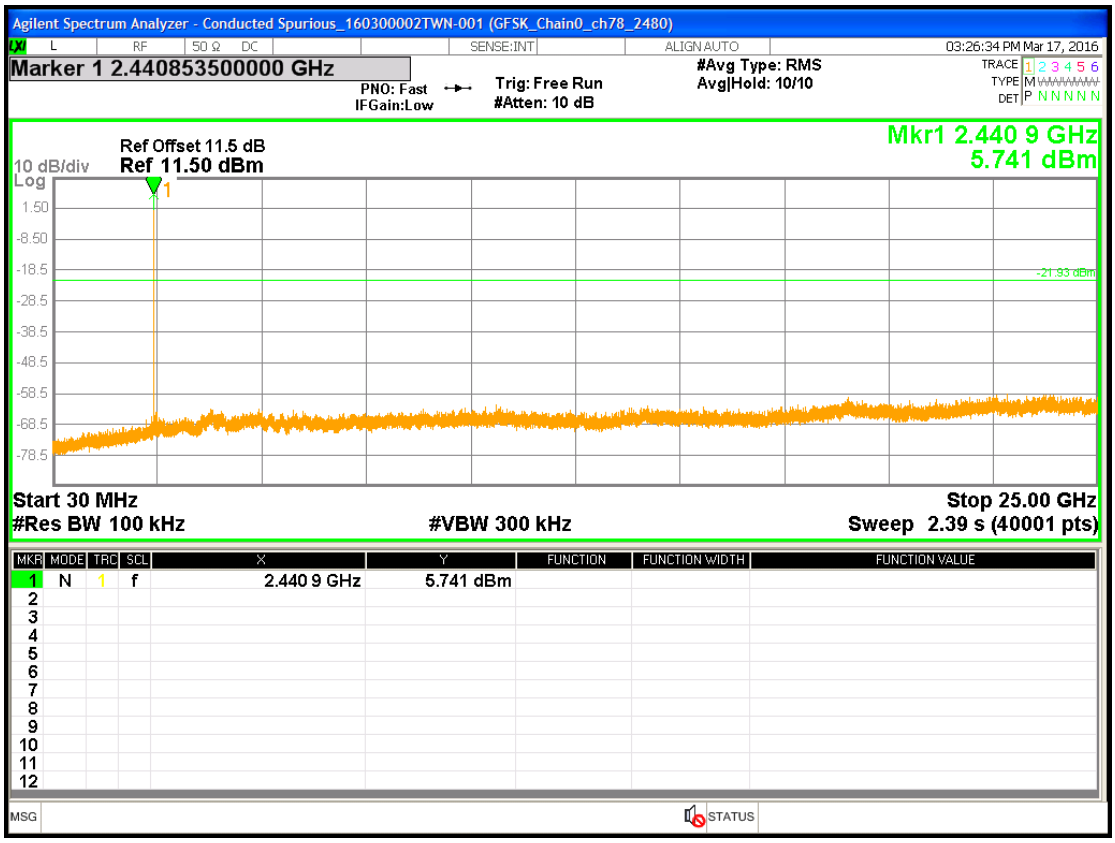
Chain0 : Conducted Spurious @ 3DH1_Ch Low



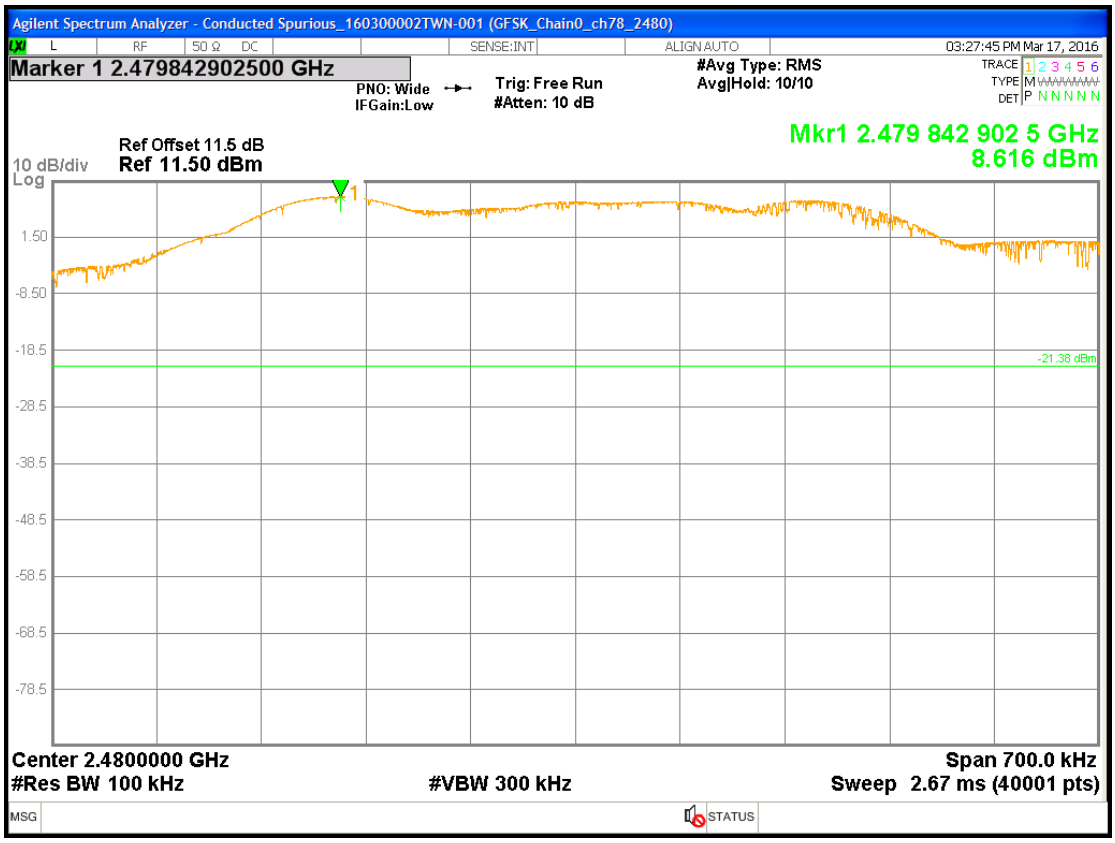
Chain0 : Conducted Spurious @ 3DH1_Ch middle



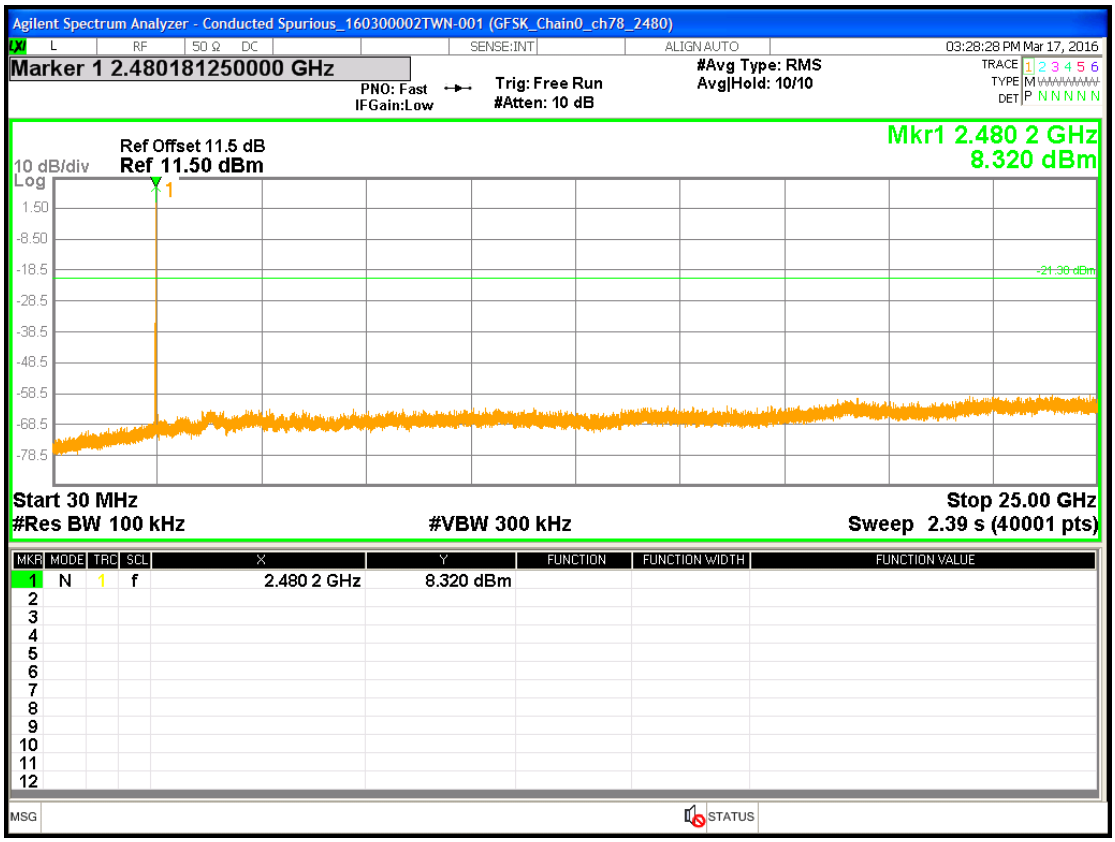
Chain0 : Conducted Spurious @ 3DH1_Ch middle



Chain0 : Conducted Spurious @ 3DH1_Ch high



Chain0 : Conducted Spurious @ 3DH1_Ch high



9. Radiated Emission Test

9.1 Operating Environment

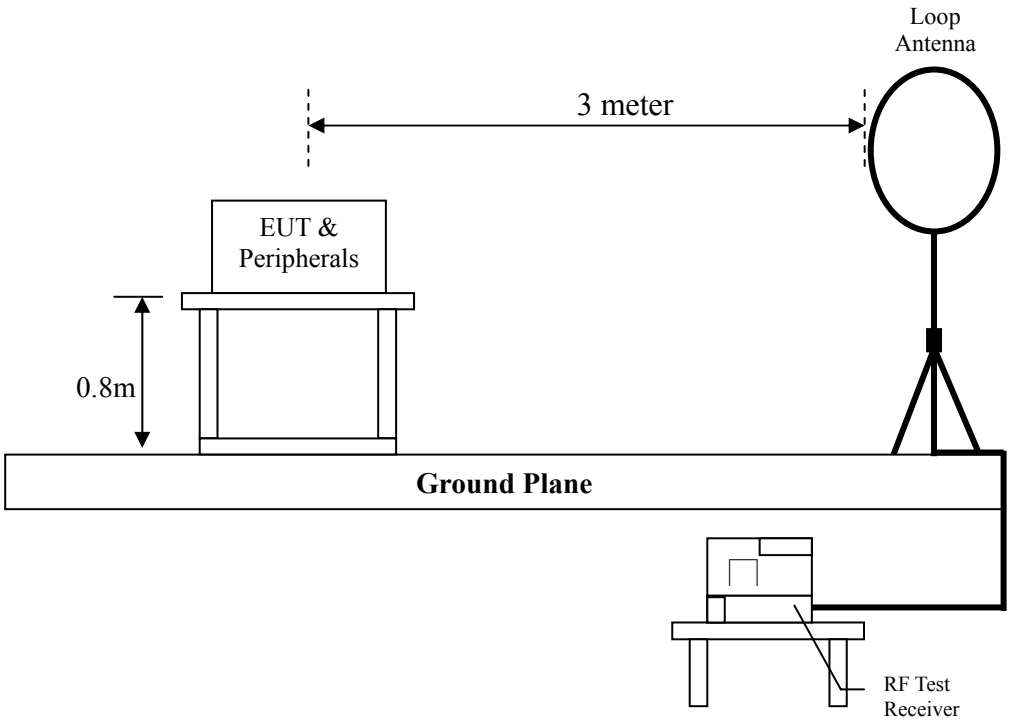
Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure:	1008	hPa
Test Date:	Mar. 04, 2016	

9.2 Test Setup & Procedure

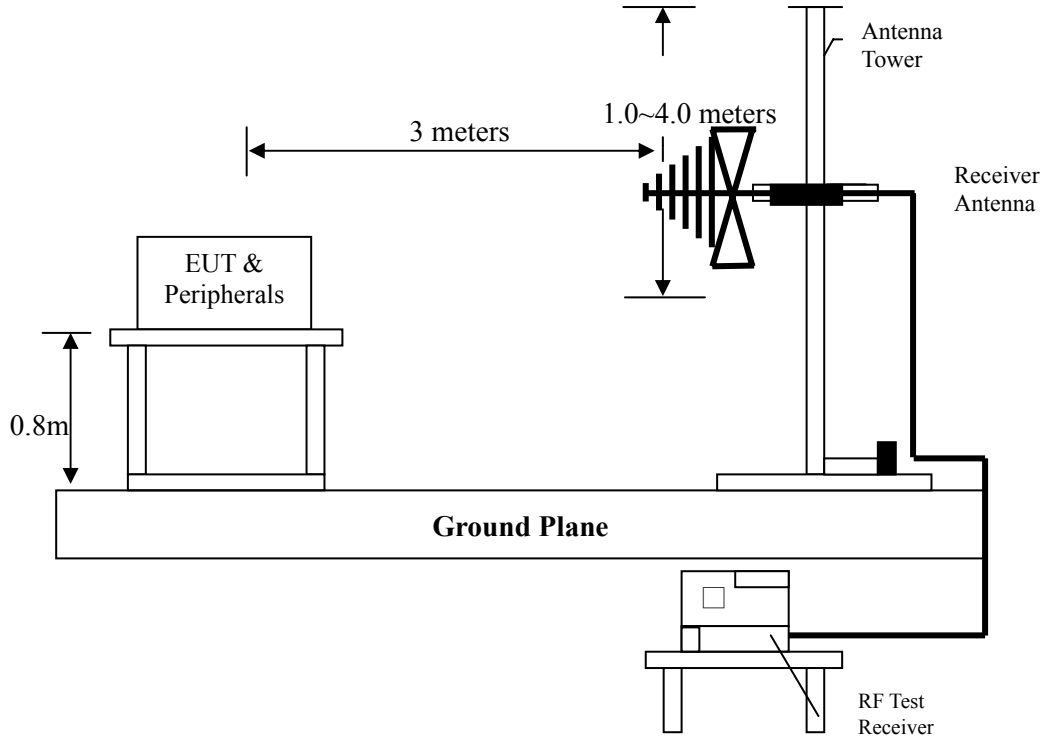
The test procedure was according to FCC measurement guidelines DA 00-705 and ANSI C63.10:2013.

The Diagram below shows the test setup, which is utilized to make these measurements.

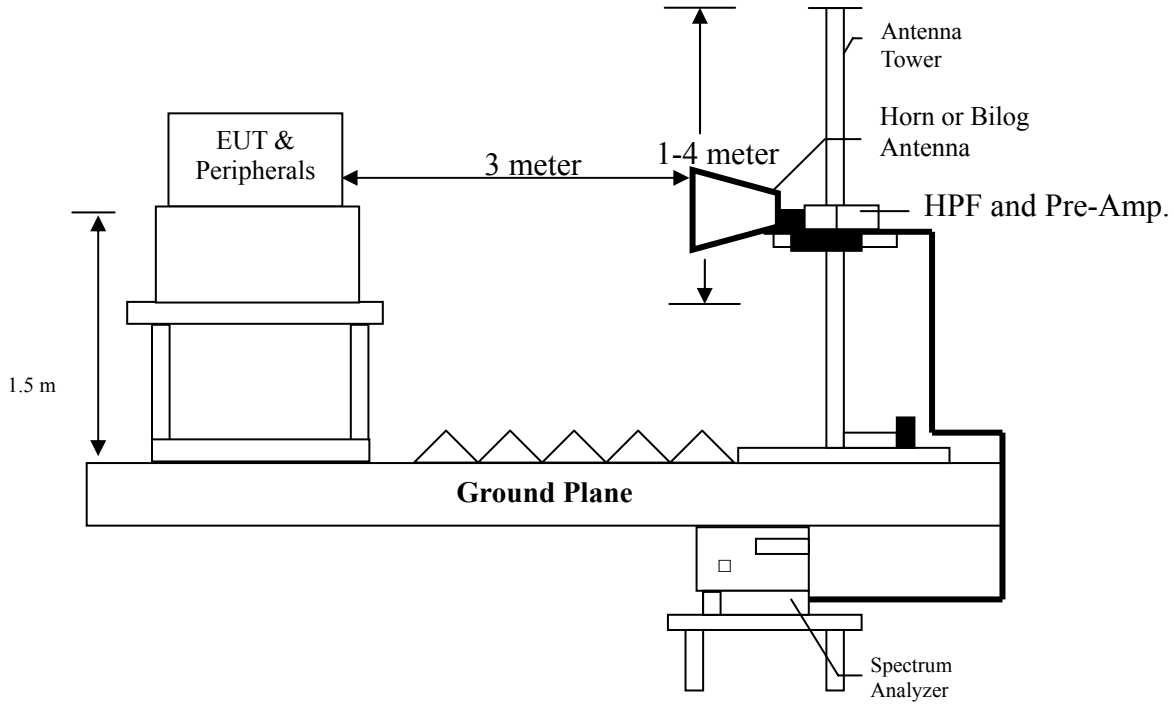
Radiated emission from 9kHz to 30MHz uses Loop Antenna:



Radiated emission from 30MHz to 1GHz uses Bi-log Antenna:



Radiated emission above 1 GHz uses Horn Antenna:



According to §15.33(a), the spectrum shall be investigated from the lowest radio frequency signal generated in the device, to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Spectrum Analyzer Resolution Bandwidth is 100kHz or greater for frequencies 30MHz to 1GHz, 1MHz – for frequencies above 1GHz.

Configure the EUT according to ANSI C63.10: 2013 The EUT was placed on the top of the turntable 1.5 meter above ground for above 1GHz and placed on the top of the turntable 0.8 meter above ground for below 1GHz. The center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent 3 meter reading using inverse scaling with distance.

9.3 Emission Limits

The spurious Emission shall test through the 10th harmonic. 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).

Frequency (MHz)	Field Strength (microvolts/meter)
0.009~0.490	2400/F(kHz)
0.490~1.705	2400/F(kHz)
1.705~30	30
30-88	100
88-216	150
216-960	200
Above 960	500

Remark:
1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

9.4 Radiated Spurious Emission Test Data

9.4.1Measurement results: frequency range from 9kHz to 30MHz

Frequency (MHz)	Detection value	Factor (dB/m)	Reading (dBμV)	Value (dBμV/m)	Limit @ 3m (dBμV/m)	Tolerance (dB)
0.12	QP	20.77	9.35	30.12	106.02	-75.90
1.94	QP	21.38	14.92	36.30	69.54	-33.24
24.99	QP	22.19	15.03	37.22	69.54	-32.32

9.4.2 Measurement Results: Frequencies Equal to or Less than 1 GHz

The test was performed on EUT under GFSK, π/4DQPSK, 8DPSK mode. The worst case occurred at GFSK mode at Low channel

EUT : PLTN-RB1V1
Worst Case : GFSK mode at Low channel

Antenna Polarized (V/H)	Freq. (MHz)	Receiver Detector	Corr. Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
Vertical	43.58	QP	14.49	12.87	27.37	40.00	-12.63
Vertical	138.64	QP	13.97	25.18	39.15	43.50	-4.35
Vertical	253.10	QP	14.17	20.67	34.84	46.00	-11.16
Vertical	346.22	QP	17.02	10.77	27.79	46.00	-18.21
Vertical	518.88	QP	20.94	12.55	33.50	46.00	-12.50
Vertical	792.42	QP	25.91	6.68	32.59	46.00	-13.41
Horizontal	135.29	QP	13.59	22.91	36.50	43.50	-7.00
Horizontal	206.54	QP	12.54	20.88	33.42	43.50	-10.08
Horizontal	255.04	QP	14.19	26.94	41.13	46.00	-4.87
Horizontal	289.96	QP	15.36	18.10	33.46	46.00	-12.54
Horizontal	344.28	QP	16.97	12.20	29.16	46.00	-16.84
Horizontal	794.36	QP	25.94	8.62	34.56	46.00	-11.44

Remark:1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

9.4.3 Measurement Results: Frequency above 1GHz

EUT : PLTN-RB1V1

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
GFSK Ch Low	4804	PK	V	40.13	-0.10	44.07	43.97	54.00	-10.03
	4804	PK	H	40.13	-0.10	47.93	47.83	54.00	-6.17
GFSK Ch Middle	4882	PK	V	39.99	0.16	44.43	44.59	54.00	-9.41
	4882	PK	H	39.99	0.16	46.57	46.73	54.00	-7.27
GFSK Ch High	4960	PK	V	39.84	0.41	47.74	48.15	54.00	-5.85
	4960	PK	H	39.84	0.41	48.29	48.70	54.00	-5.30

Remark:

1. Correction Factor = Antenna Factor + Cable Loss– Preamp. Gain
2. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

EUT : PLTN-RB1V1

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
π/4DQPSK Ch Low	4804	PK	V	40.13	-0.10	45.66	45.56	54.00	-8.44
	4804	PK	H	40.13	-0.10	46.43	46.33	54.00	-7.67
π/4DQPSK Ch Middle	4882	PK	V	39.99	0.16	47.51	47.67	54.00	-6.33
	4882	PK	H	39.99	0.16	48.10	48.26	54.00	-5.74
π/4DQPSK Ch High	4960	PK	V	39.84	0.41	46.26	46.67	54.00	-7.33
	4960	PK	H	39.84	0.41	46.23	46.64	54.00	-7.36

Remark:

1. Correction Factor = Antenna Factor + Cable Loss– Preamp. Gain
2. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

EUT : PLTN-RB1V1

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBµV)	Corrected Reading (dBµV/m)	Limit @ 3 m (dBµV/m)	Margin (dB)
8DPSK Ch Low	4804	PK	V	40.13	-0.10	43.53	43.43	54.00	-10.57
	4804	PK	H	40.13	-0.10	45.03	44.93	54.00	-9.07
8DPSK Ch Middle	4882	PK	V	39.99	0.16	49.96	50.12	54.00	-3.88
	4882	PK	H	39.99	0.16	50.43	50.59	54.00	-3.41
8DPSK Ch High	4960	PK	V	39.84	0.41	47.71	48.12	54.00	-5.88
	4960	PK	H	39.84	0.41	48.58	48.99	54.00	-5.01

Remark:

1. Correction Factor = Antenna Factor + Cable Loss– Preamp. Gain
2. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

10. Emission on the Band Edge §FCC 15.247(d)

Radiated emissions were invested cover the frequency range from 30 MHz to 1000 MHz using a receiver RBW of 120 kHz record QP reading, and the frequency over 1 GHz using a spectrum analyzer RBW of 1 MHz and 10 Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz / 3MHz; RBW / VBW) recorded also on the report.

10.1 Operating Environment

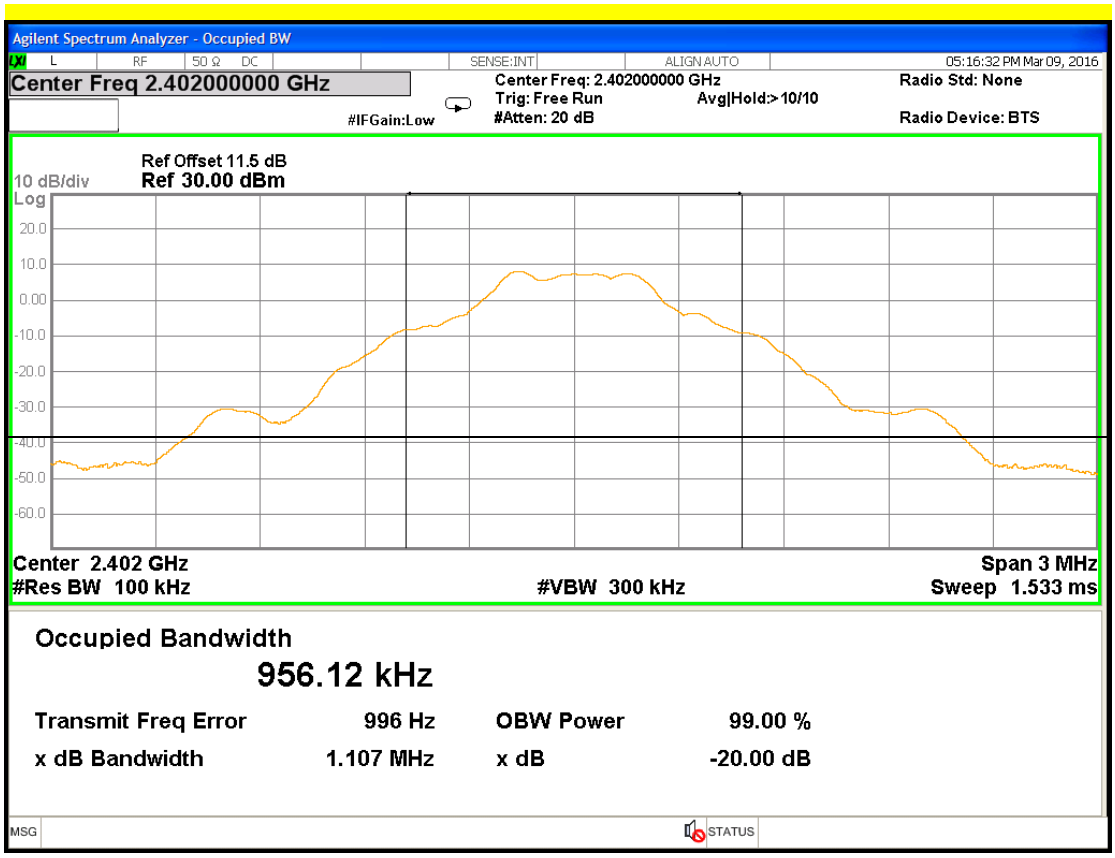
Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure:	1008	hPa
Test Date:	Mar. 04, 2016	

10.2 Test Setup & Procedure

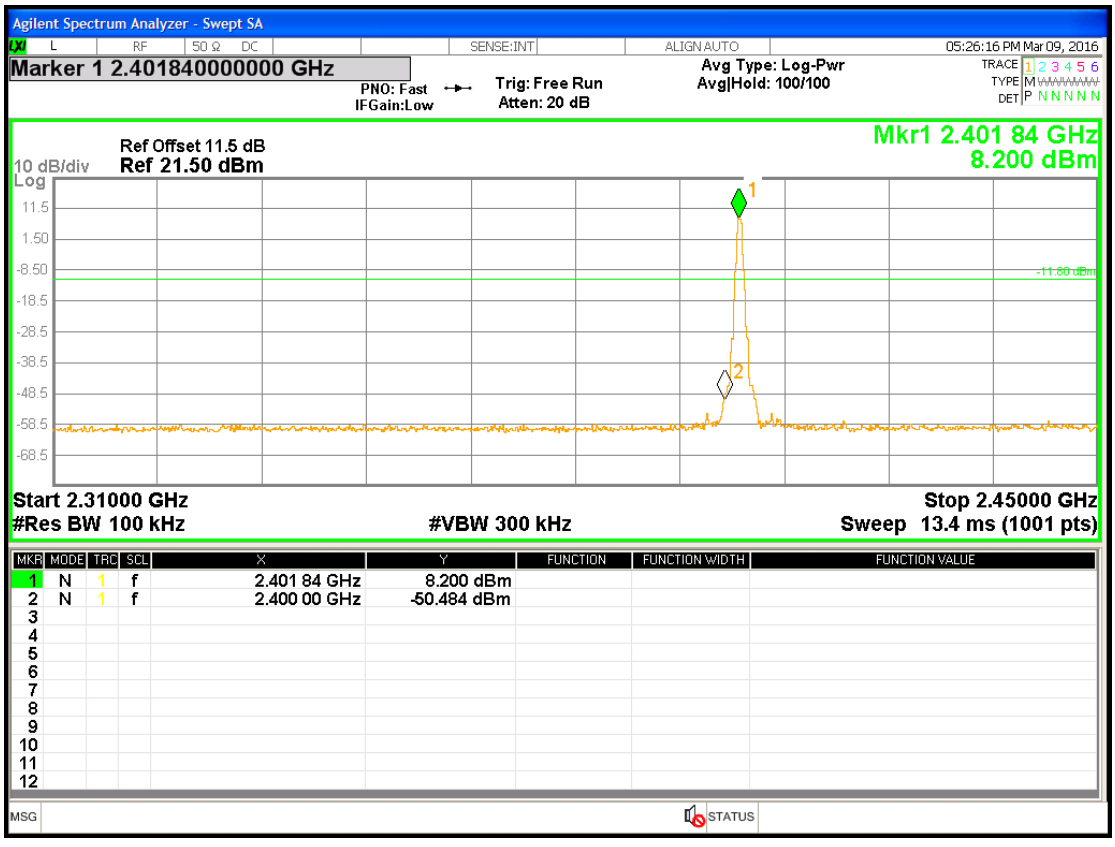
Please refer to the section 9.2 of this report.

10.3 Test Results

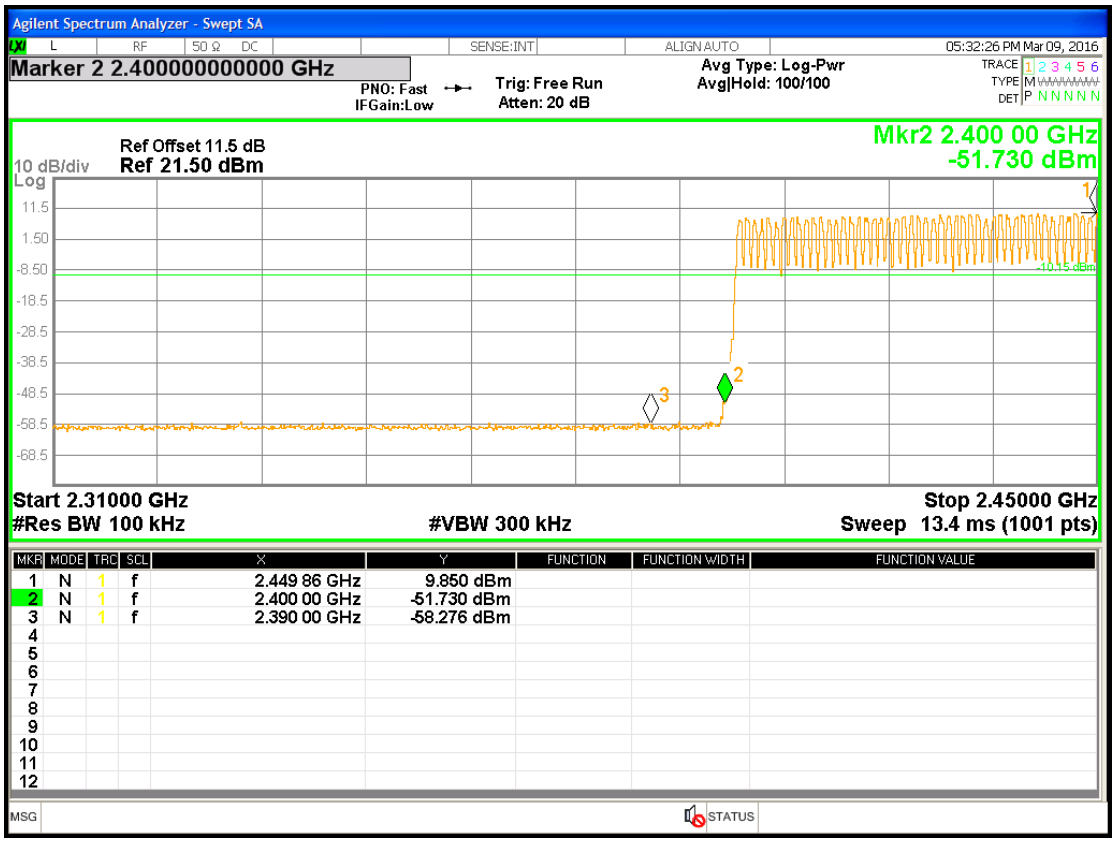
Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
GFSK	2375.37	PK	V	33.78	19.61	53.39	74	-20.61	2310~2390
	2390.00	AV	V	33.85	6.17	40.02	54	-13.98	
	2484.19	PK	V	34.30	20.56	54.86	74	-19.14	2483.5~2500
	2483.50	AV	V	34.30	6.69	40.99	54	-13.01	
π/4-DPSK	2380.62	PK	V	33.81	19.95	53.76	74	-20.24	2310~2390
	2390.00	AV	V	33.85	6.14	39.99	54	-14.01	
	2486.69	PK	V	34.32	19.62	53.94	74	-20.06	2483.5~2500
	2483.50	AV	V	34.30	6.67	40.97	54	-13.03	
8-DPSK	2388.20	PK	V	33.84	19.48	53.32	74	-20.68	2310~2390
	2390.00	AV	V	33.85	6.14	39.99	54	-14.01	
	2484.44	PK	V	34.31	20.38	54.69	74	-19.31	2483.5~2500
	2483.50	AV	V	34.30	6.61	40.91	54	-13.09	

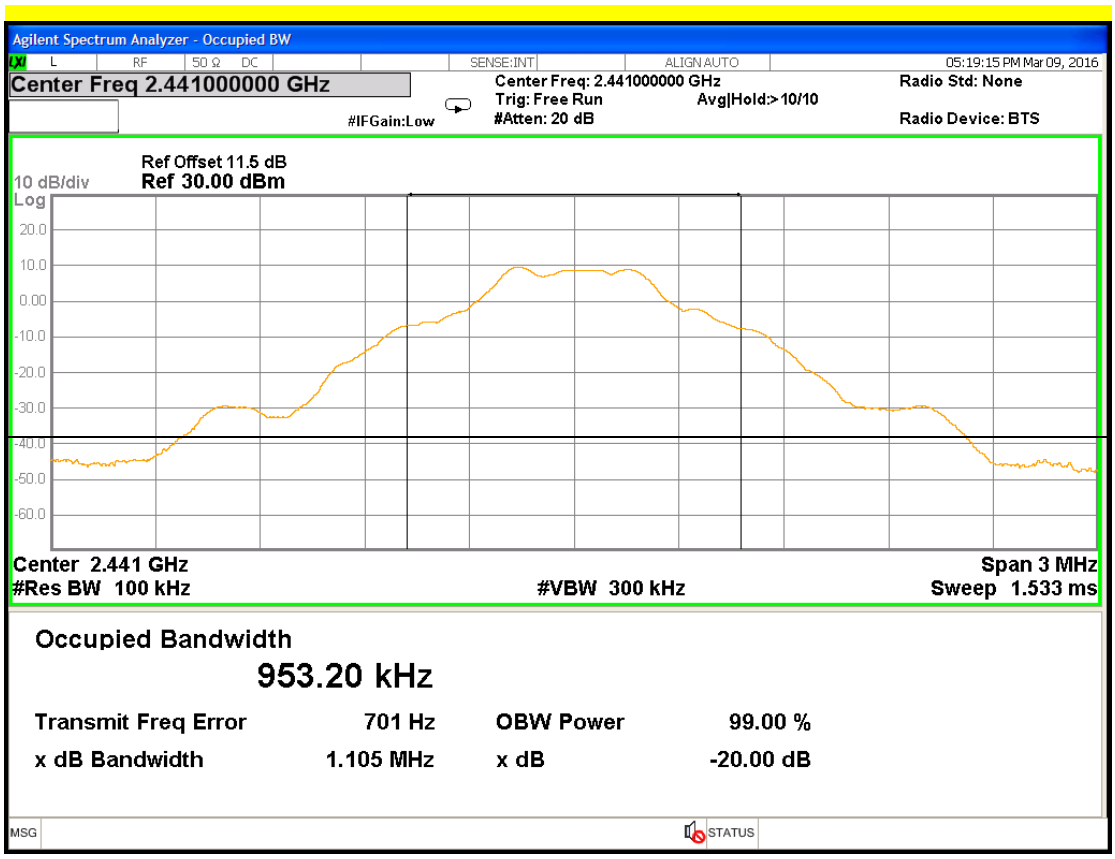


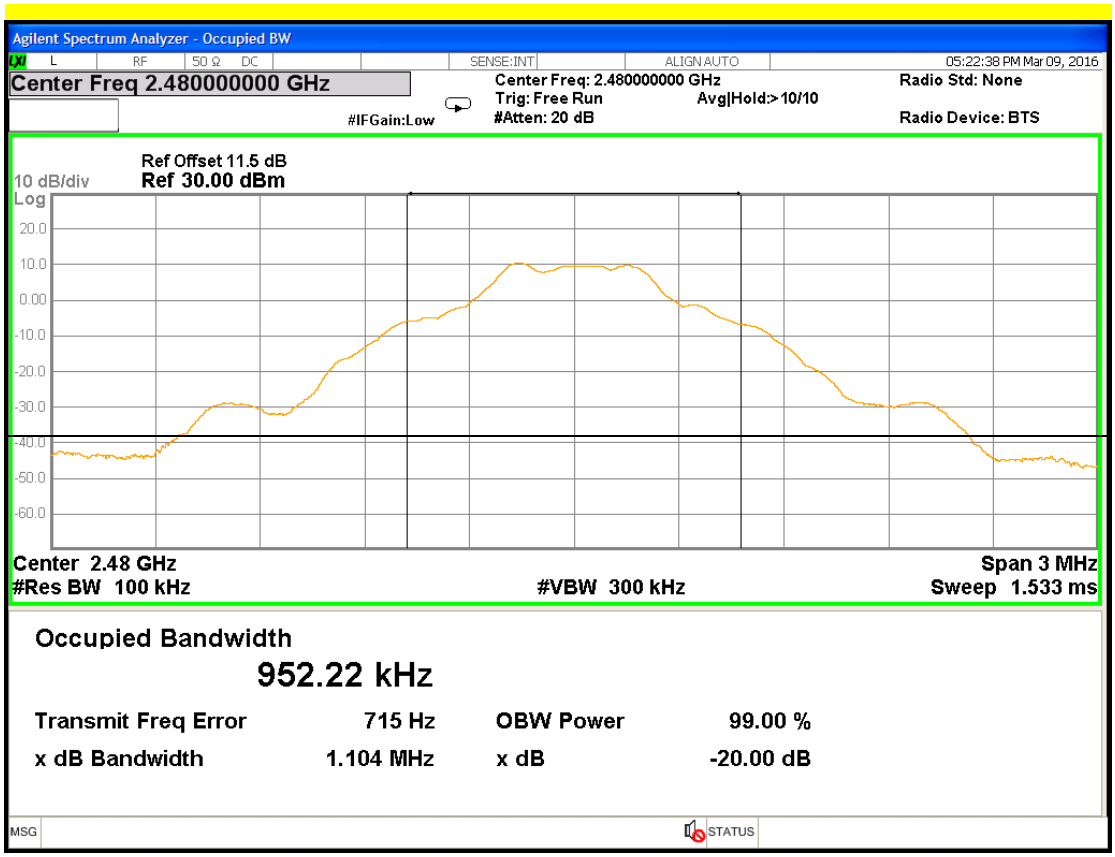
Chain0 : Lowest Band edge @ DH-1 Ch Low Hopping Disable



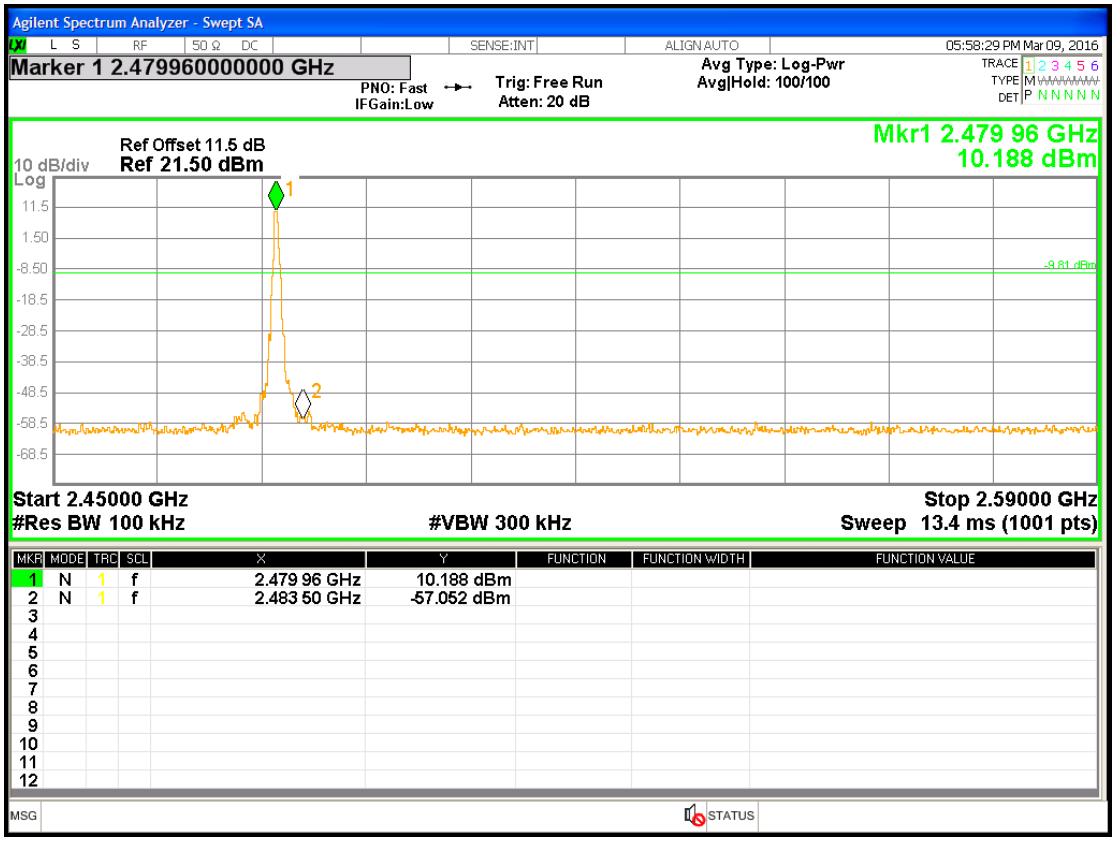
Chain0 : Lowest Band edge @ DH-1 Ch Low Hopping Enable



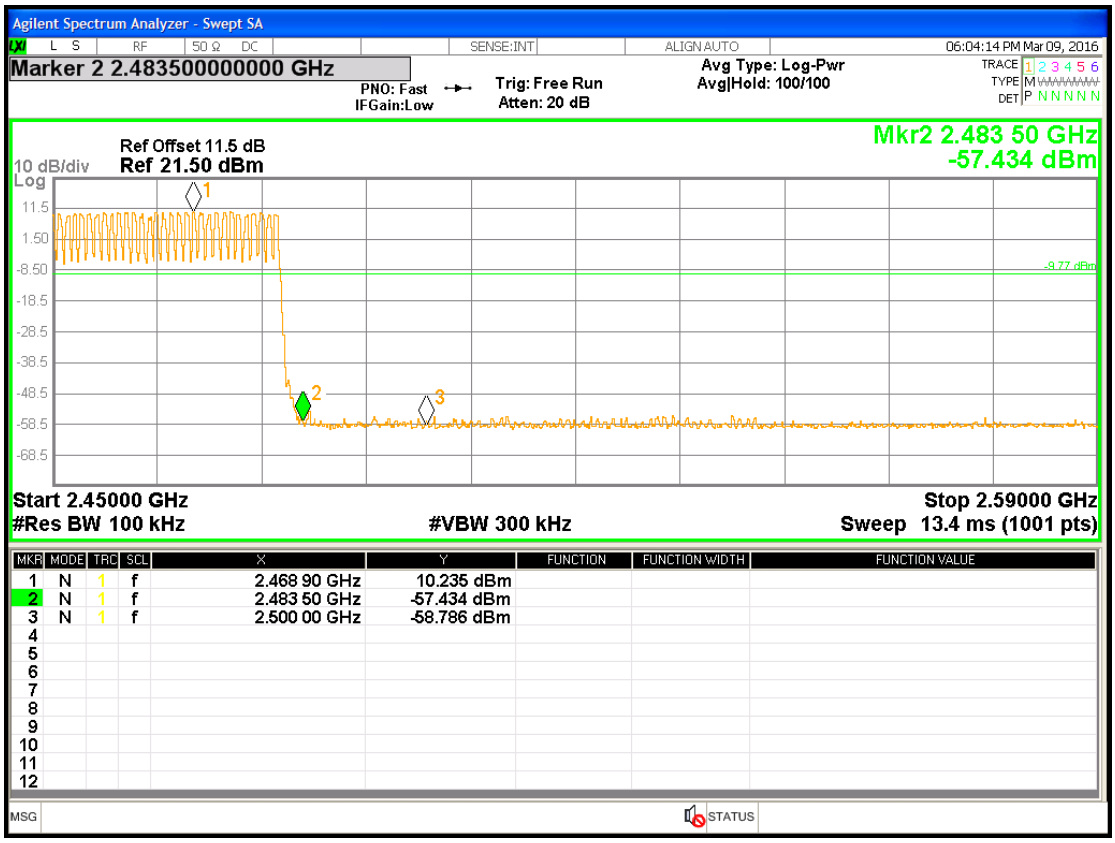


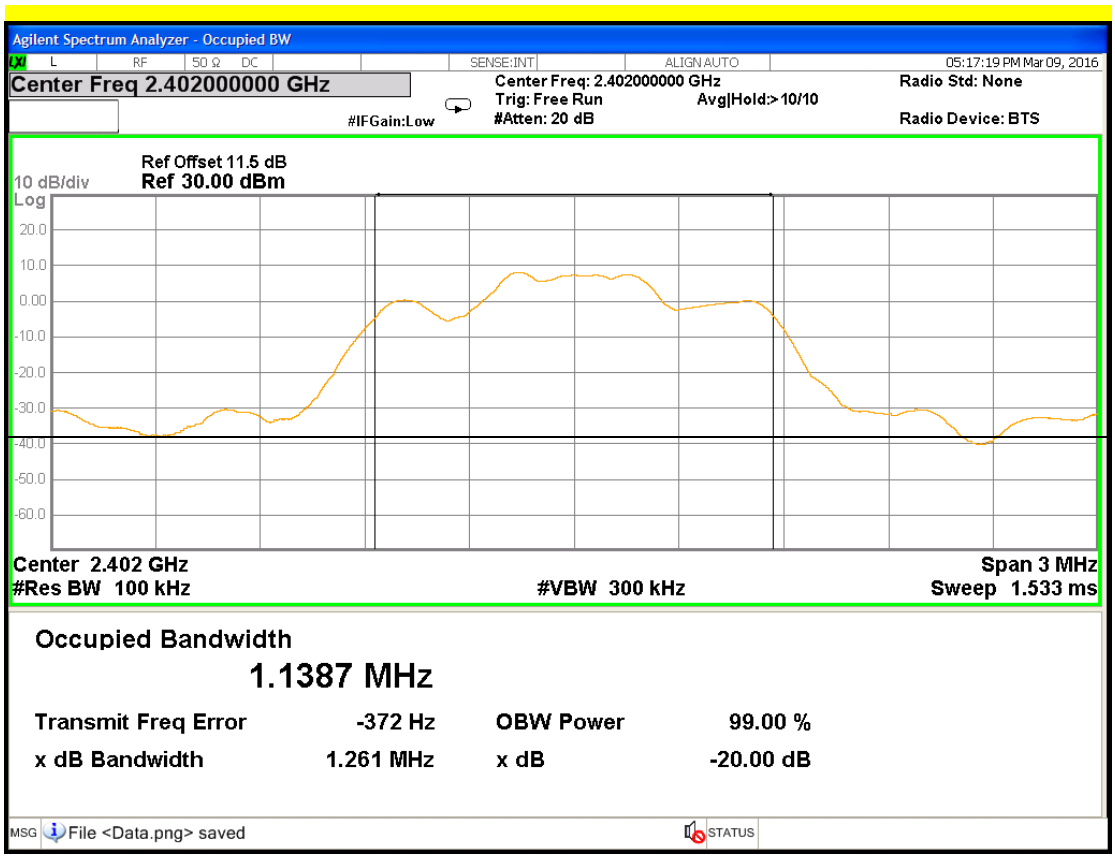


Chain0 : Highest Band edge @ DH-1 Ch High Hopping Disable

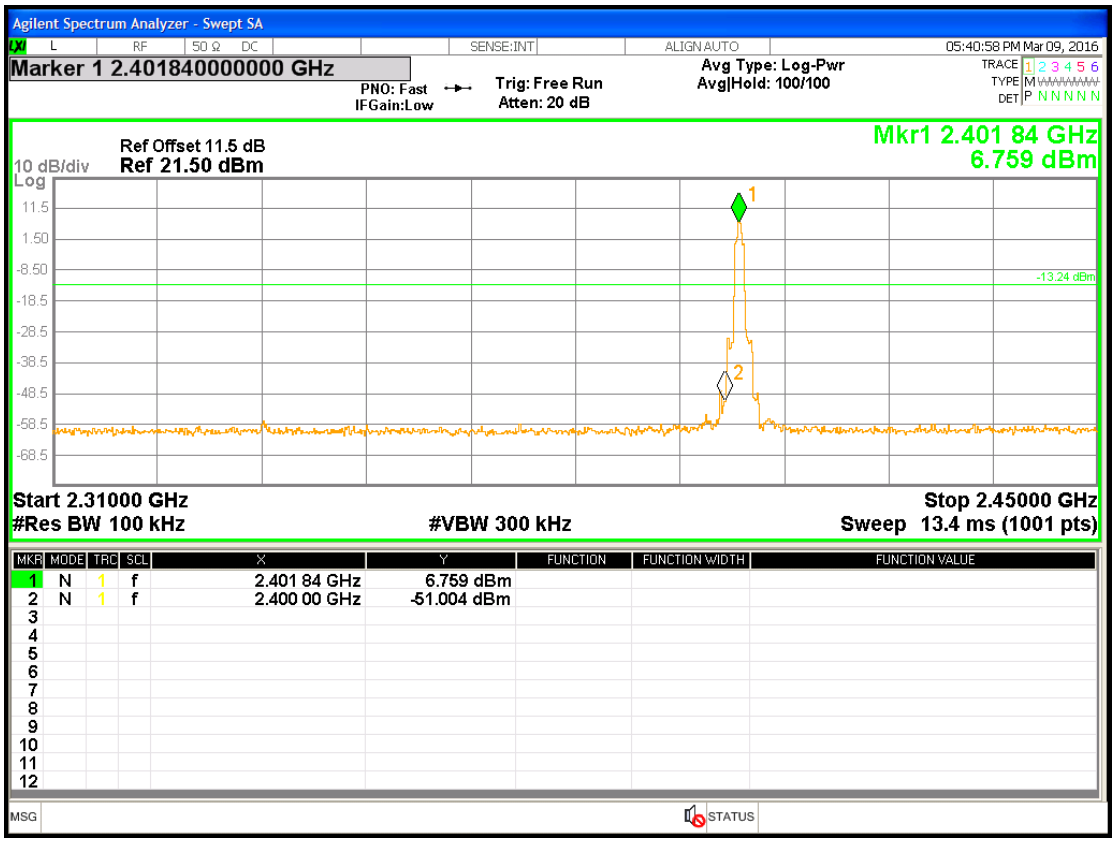


Chain0 : Highest Band edge @ DH-1 Ch Low Hopping Enable

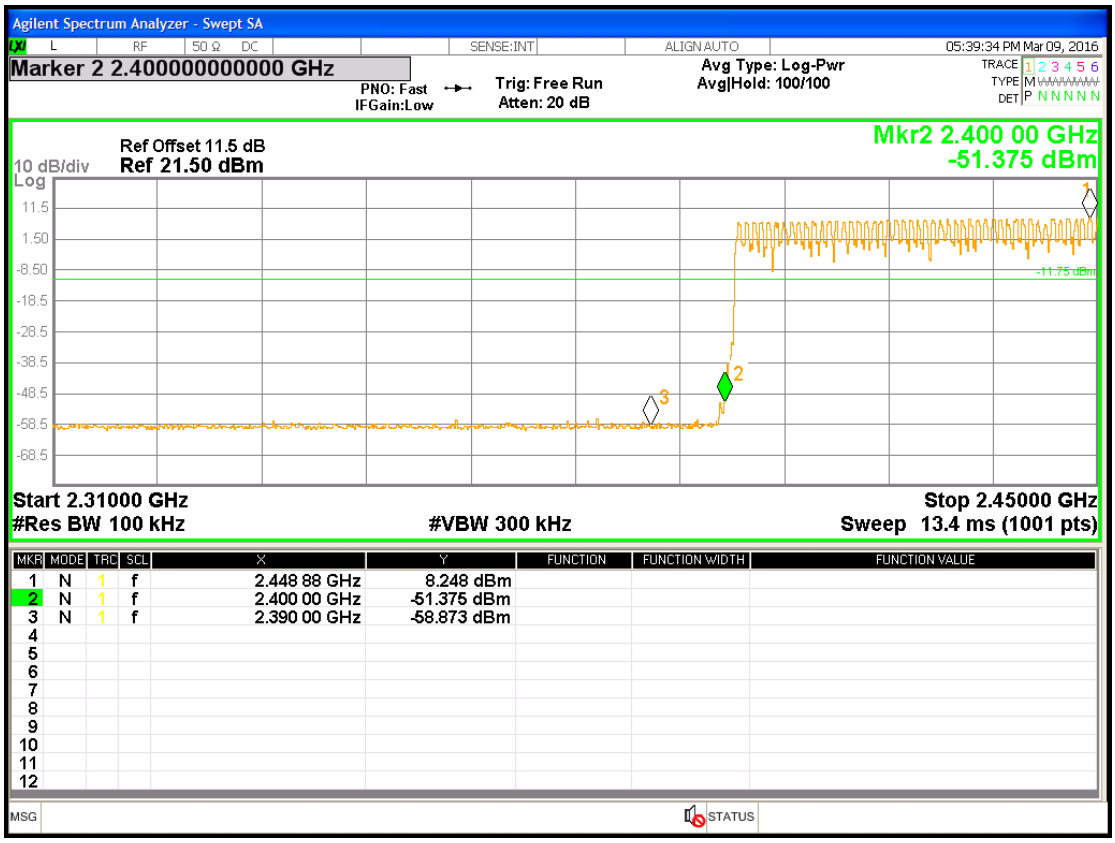


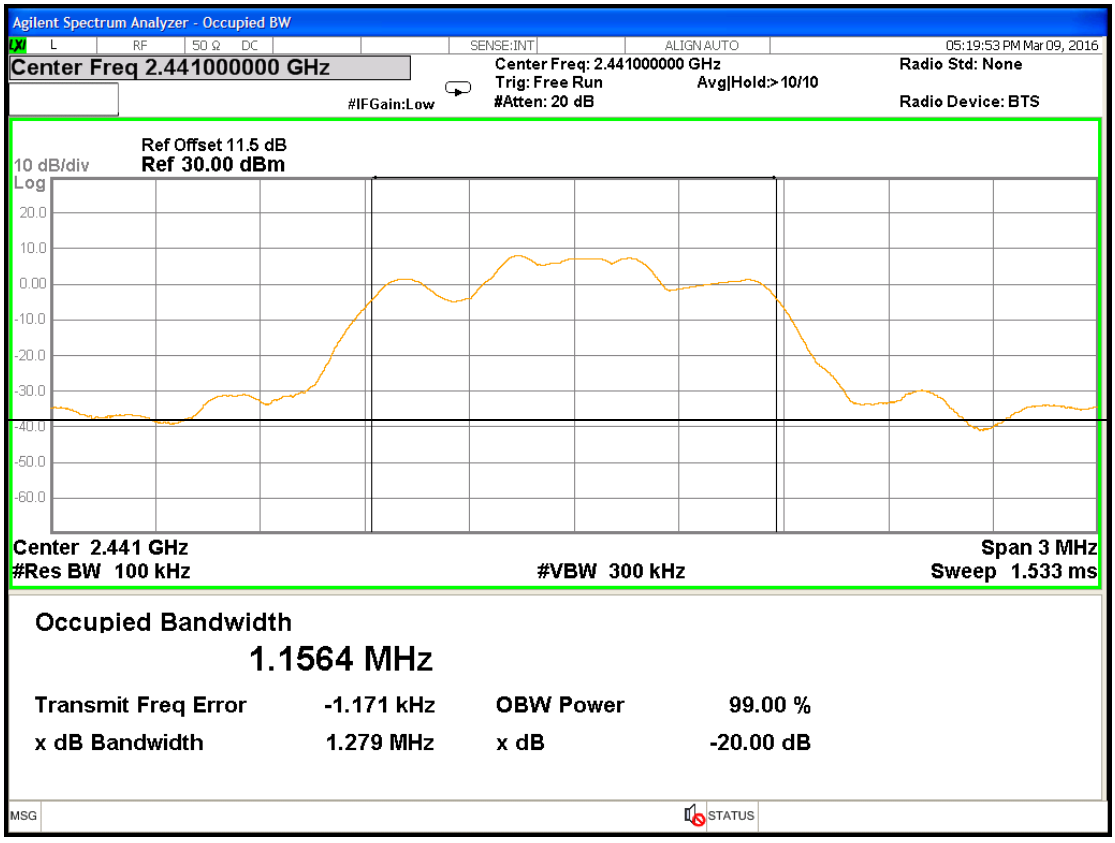


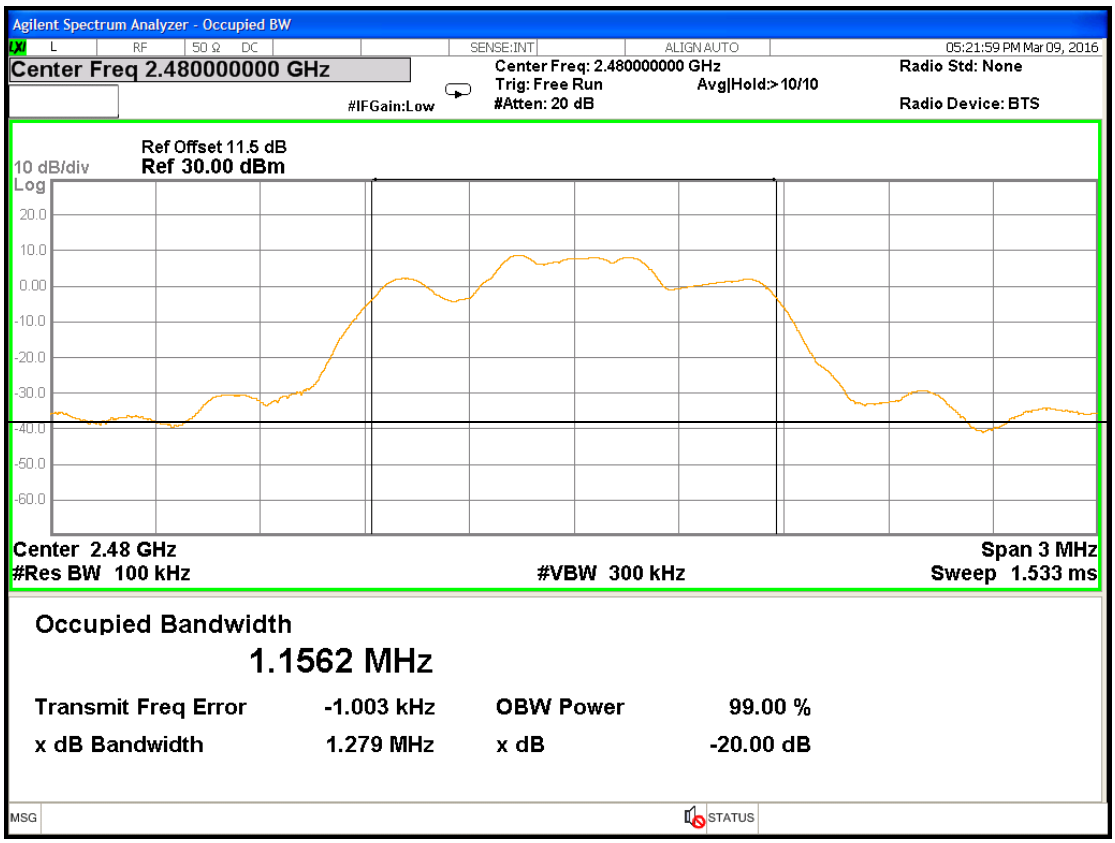
Chain0 : Lowest Band edge @ 2DH-1 Ch Low Hopping Disable



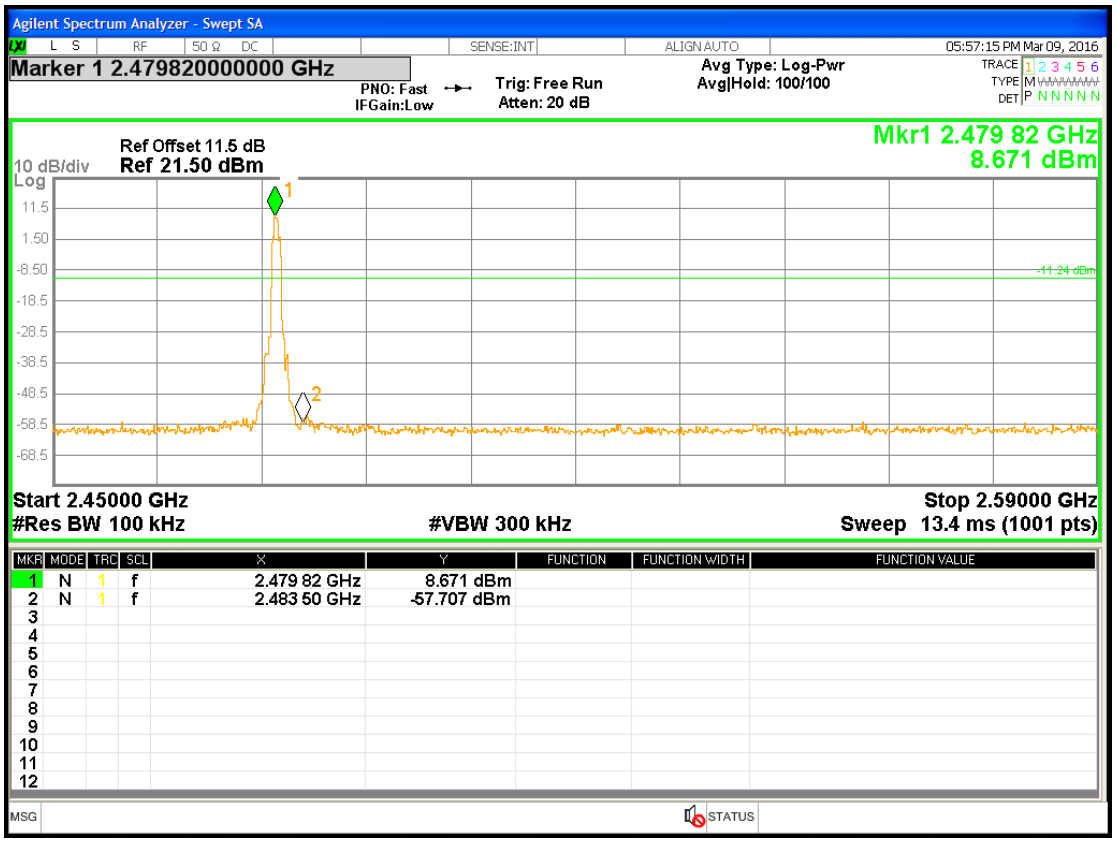
Chain0 : Lowest Band edge @ 2DH-1 Ch Low Hopping Enable



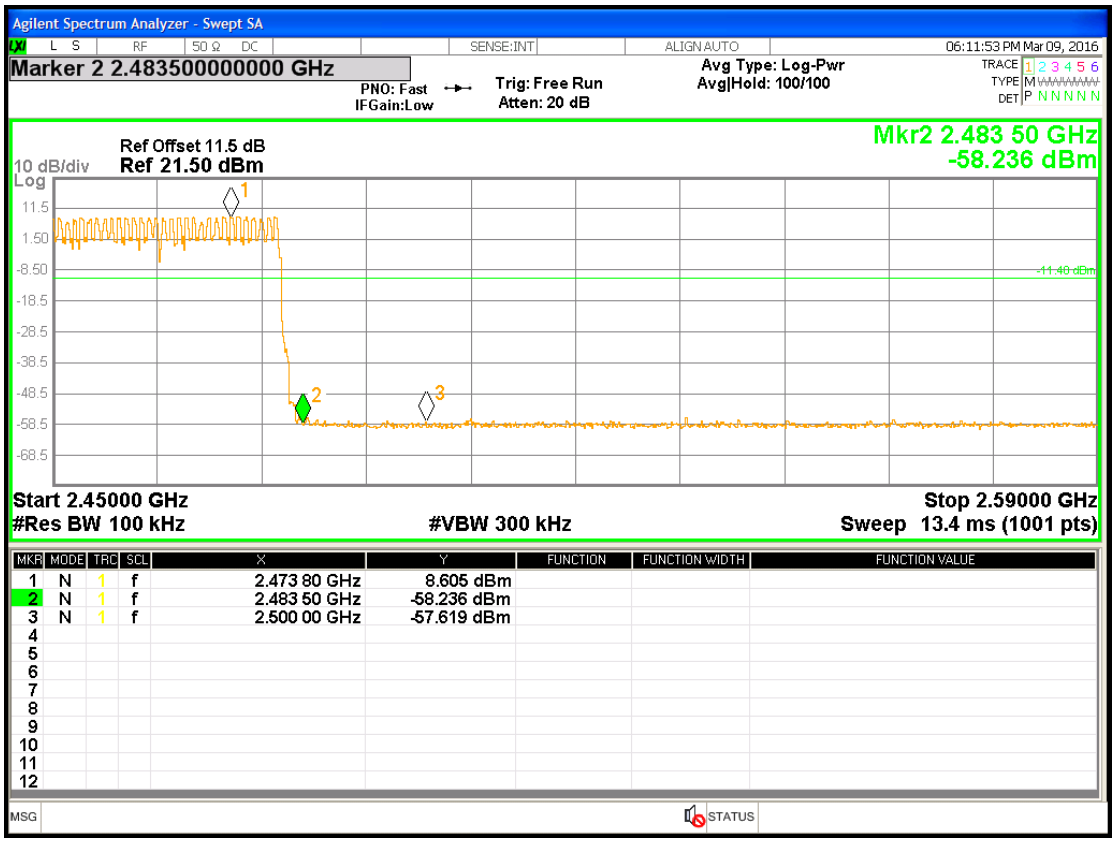

Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.441000000 GHz
Center Freq: 2.441000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 20 dB
#IFGain:Low
05:19:53 PM Mar 09, 2016
Radio Std: None
Radio Device: BTS
Ref Offset 11.5 dB
10 dB/div
Ref 30.00 dBm
Log
Center 2.441 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1.533 ms
Occupied Bandwidth
1.1564 MHz
Transmit Freq Error -1.171 kHz
OBW Power 99.00 %
x dB Bandwidth 1.279 MHz
x dB -20.00 dB
MSG
STATUS

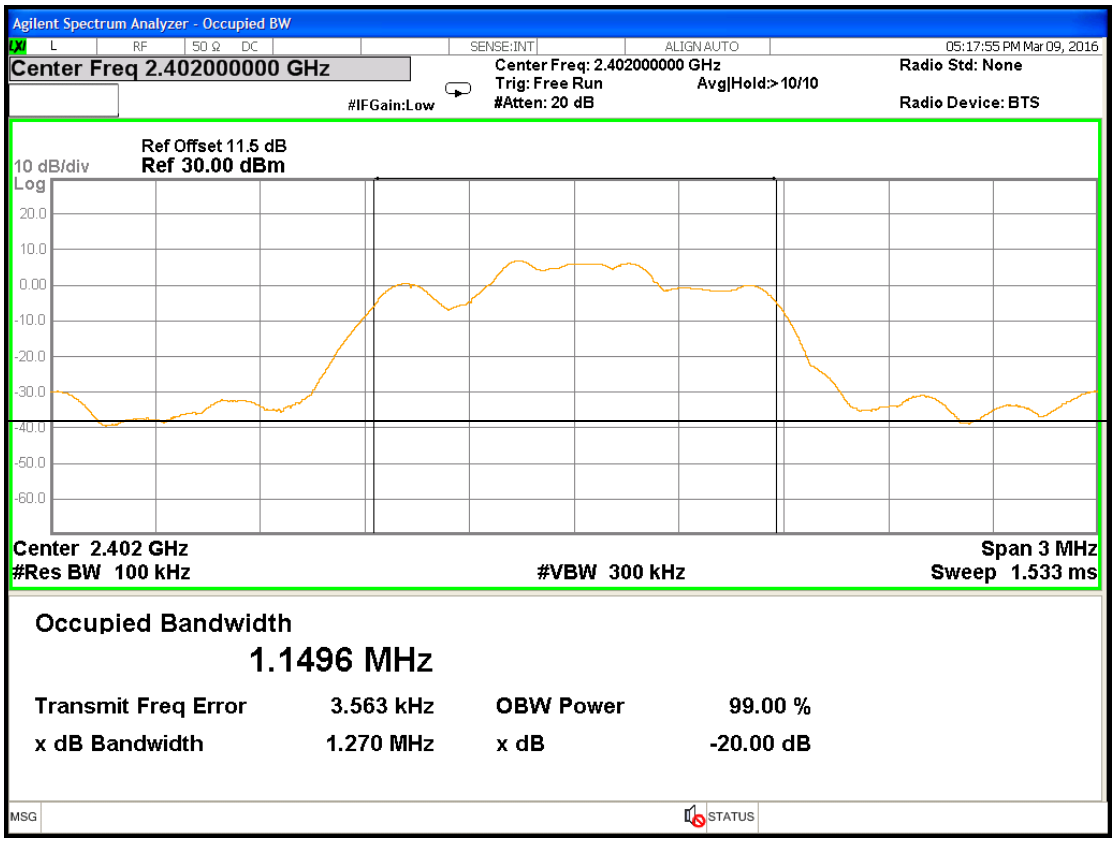

Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 20 dB
#IFGain:Low
05:21:59 PM Mar 09, 2016
Radio Std: None
Radio Device: BTS
Ref Offset 11.5 dB
10 dB/div
Ref 30.00 dBm
Log
Center 2.48 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1.533 ms
Occupied Bandwidth
1.1562 MHz
Transmit Freq Error -1.003 kHz
OBW Power 99.00 %
x dB Bandwidth 1.279 MHz
x dB -20.00 dB
MSG
STATUS

Chain0 : Highest Band edge @ 2DH-1 Ch High Hopping Disable

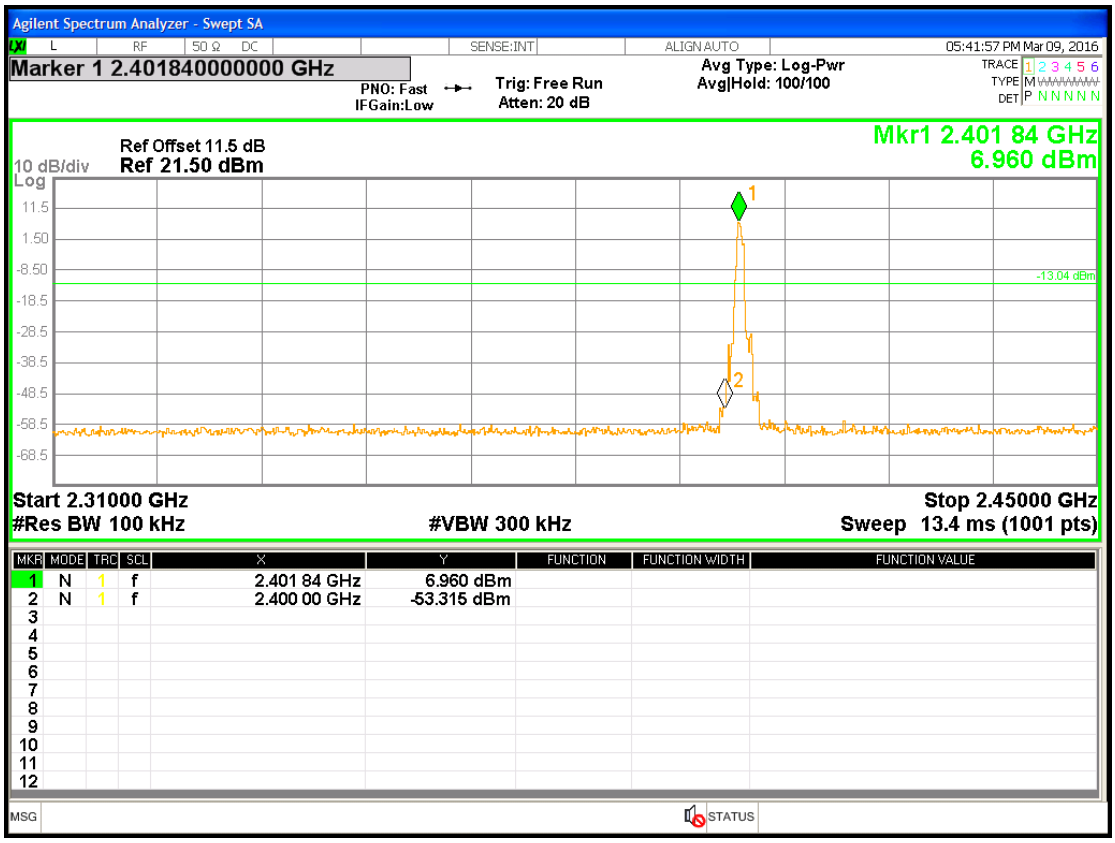


Chain0 : Highest Band edge @ 2DH-1 Ch High Hopping Enable

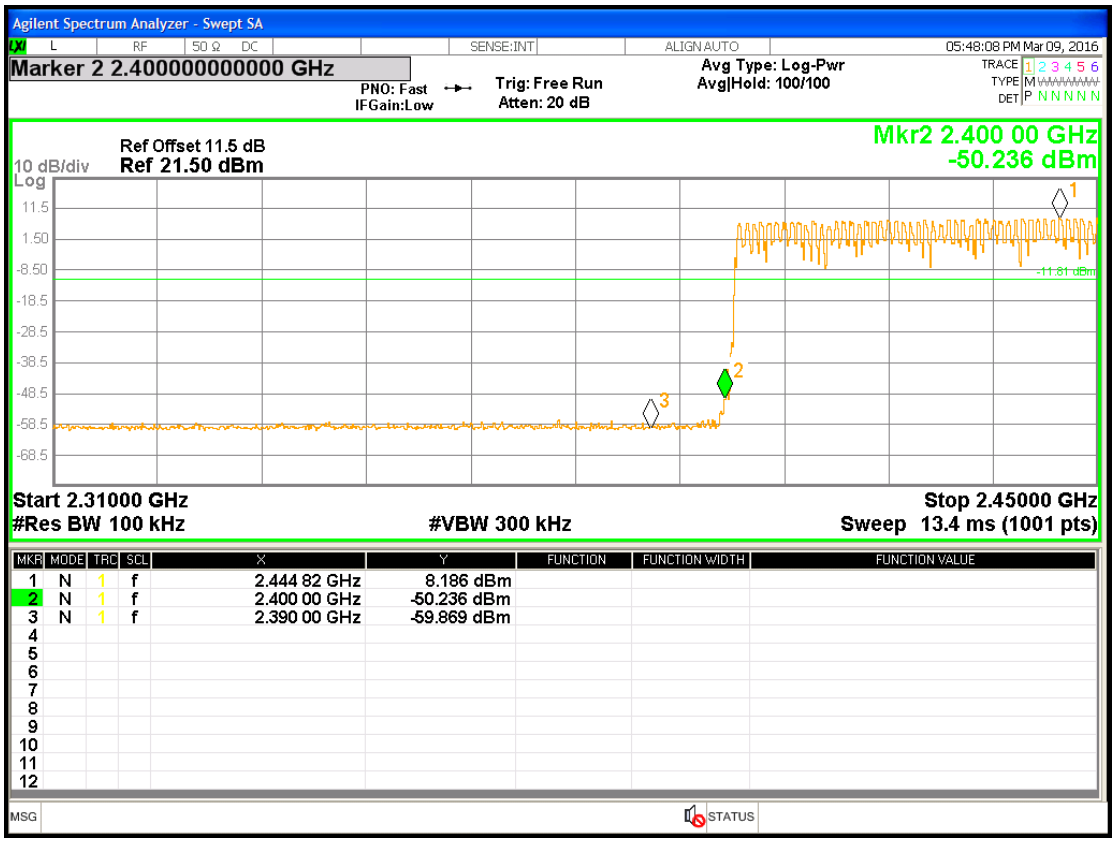


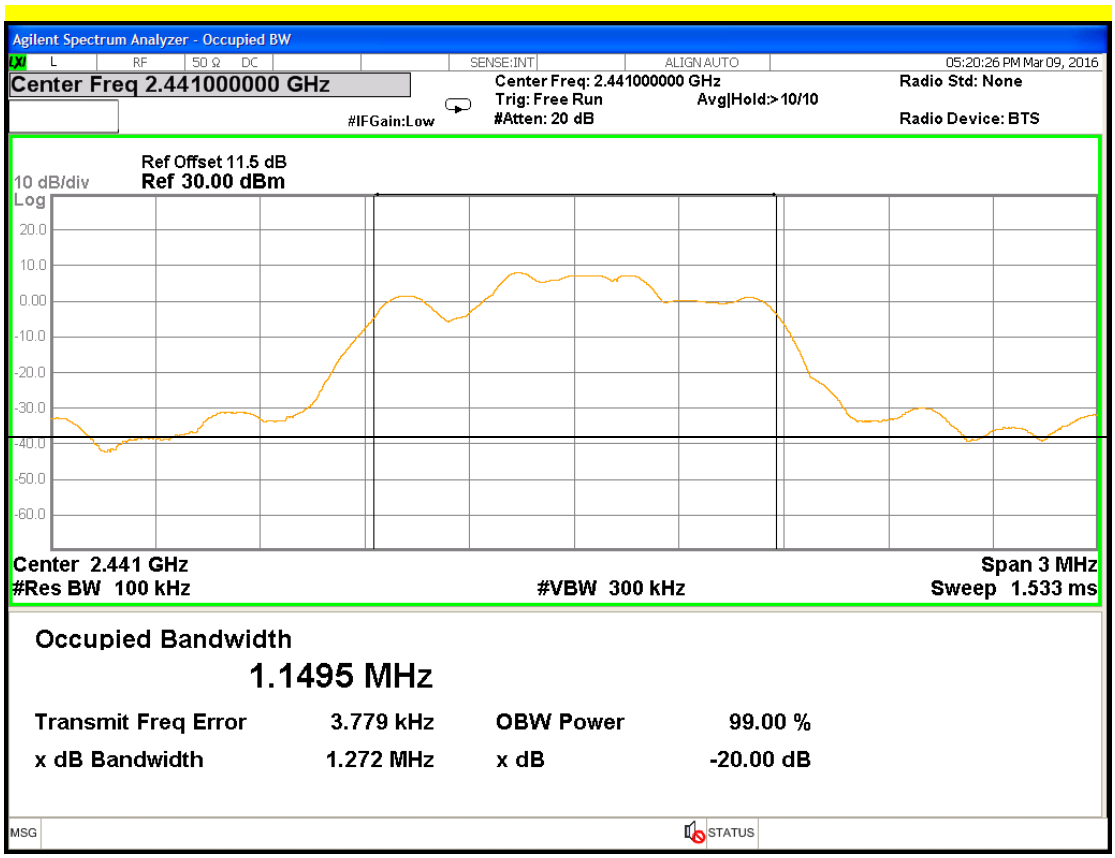


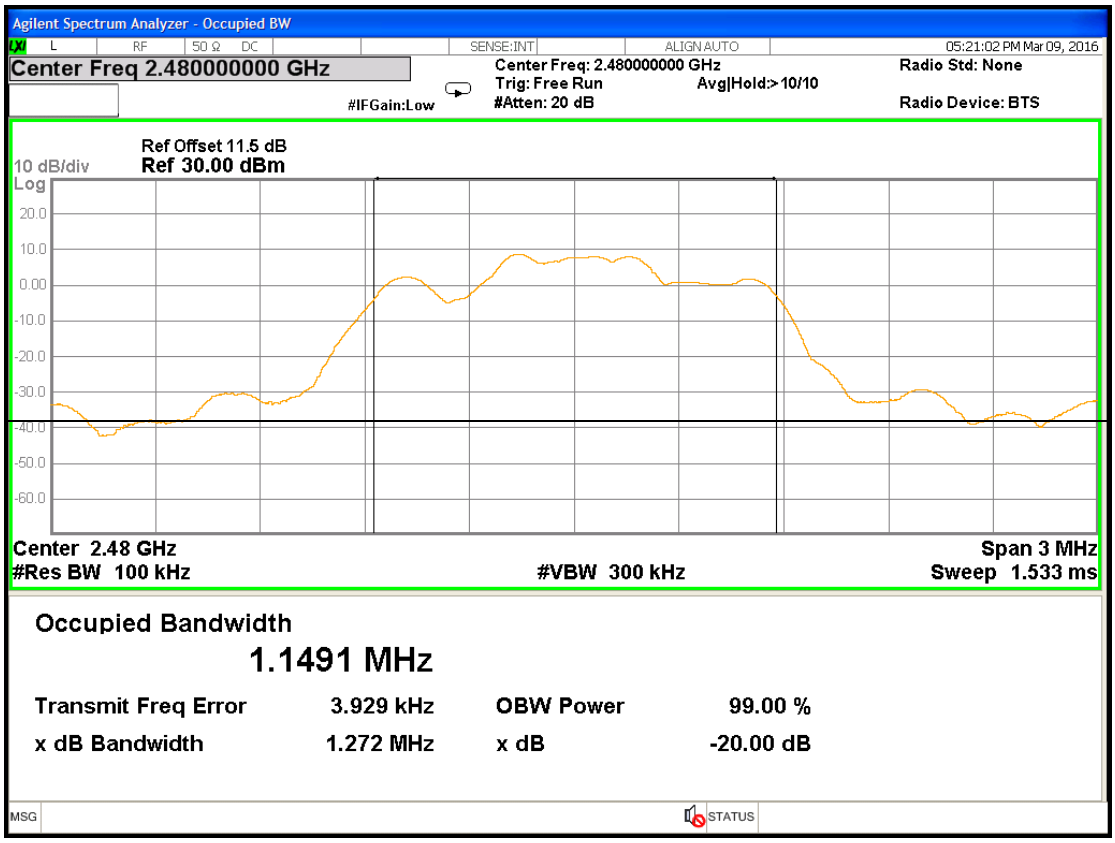
Chain0 : Lowest Band edge @ 3DH-1 Ch Low Hopping Disable



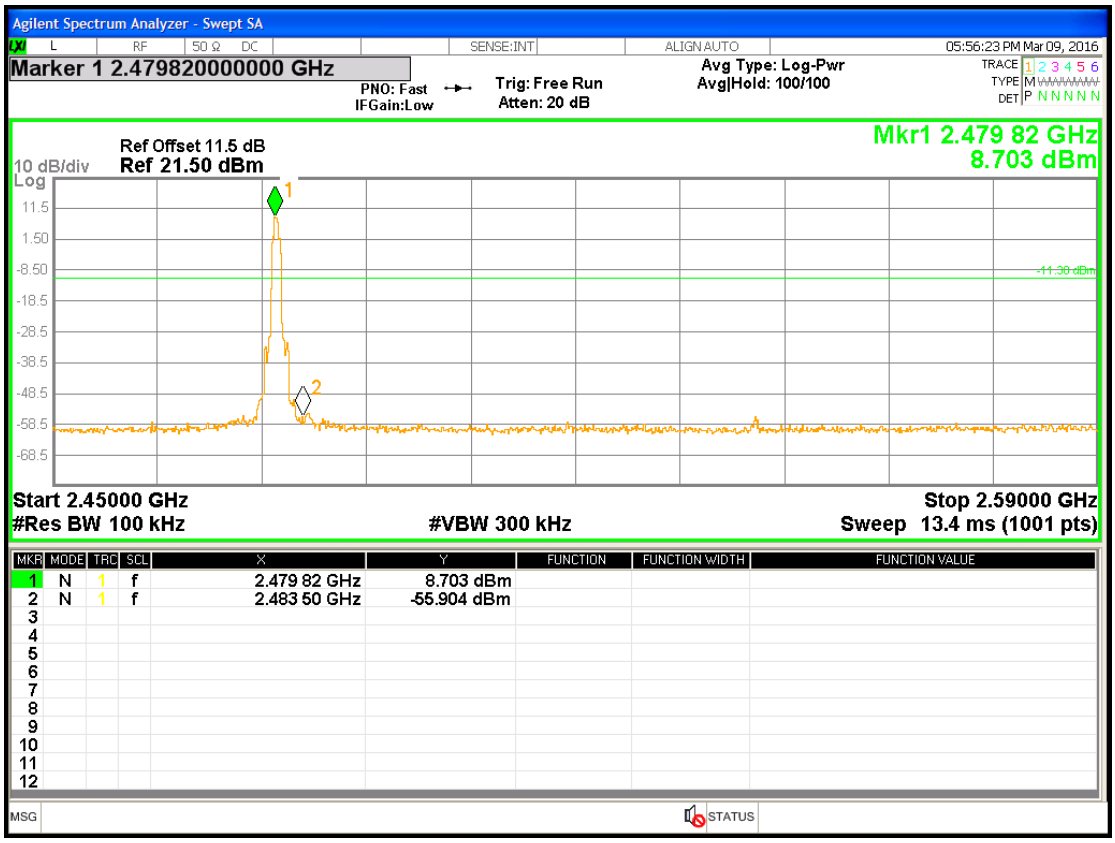
Chain0 : Lowest Band edge @ 3DH-1 Ch Low Hopping Enable



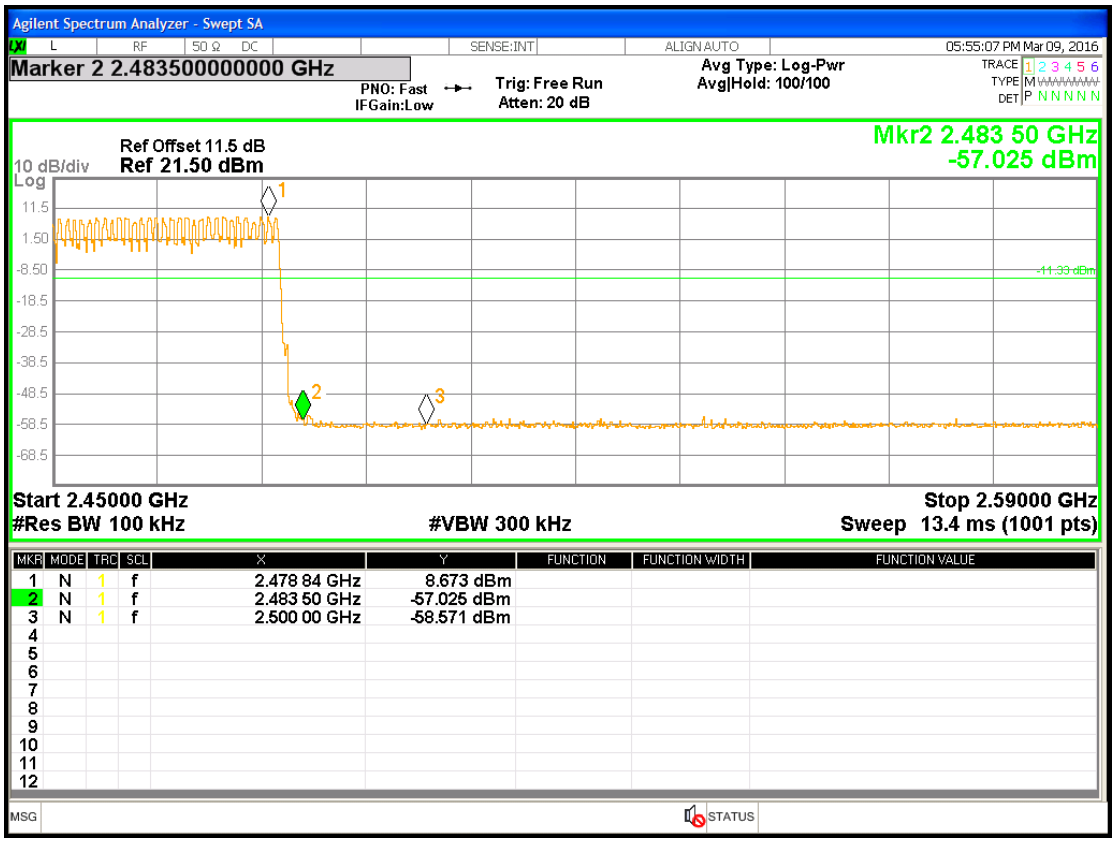




Chain0 : Highest Band edge @ 3DH-1 Ch High Hopping Disable



Chain0 : Highest Band edge @ 3DH-1 Ch High Hopping Enable

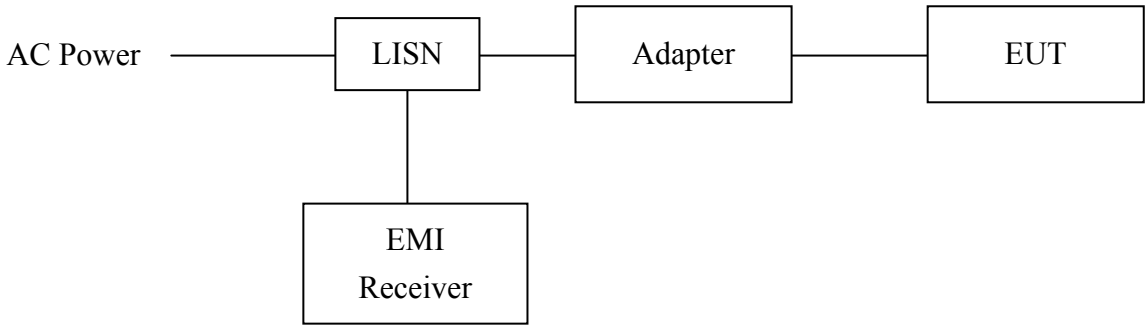


11. Power Line Conducted Emission Test §FCC 15.207

11.1 Operating Environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure:	1008	hPa
Test date:	Mar. 07, 2016	

11.2 Test Setup & Procedure



The test procedure was according to ANSI C63.10:2013.

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm/50uH coupling impedance with 50 ohm termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.
The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9 kHz.

The EUT configuration refers to the “Conducted set-up photo.pdf”.

11.3 Emission Limit

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

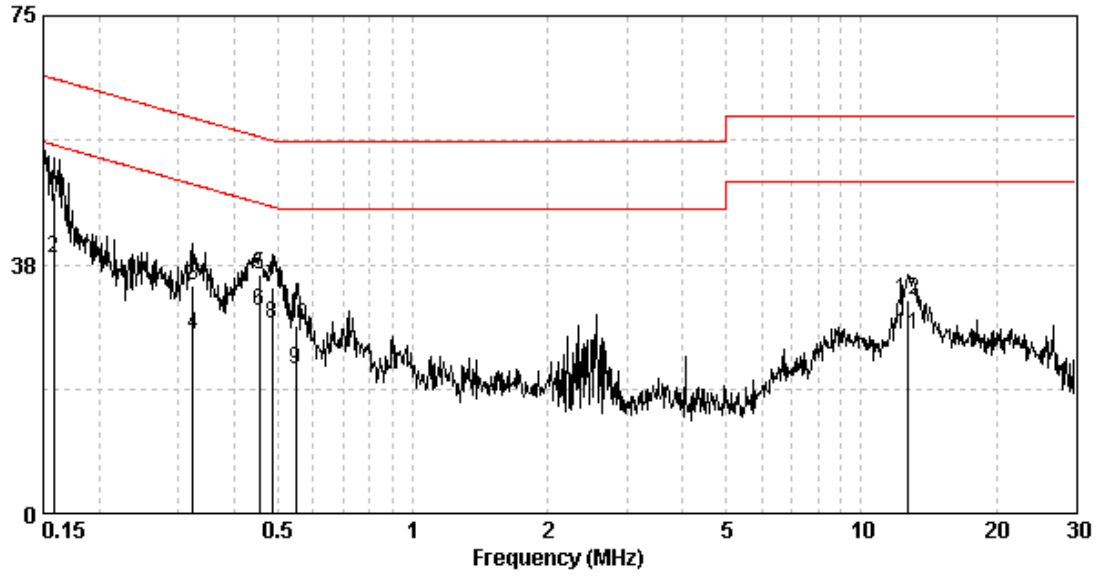
*Decreases with the logarithm of the frequency.

11.4 Power Line Conducted Emission Test Data

Phase: Live Line
Model No.: PLTN-RB1V1
Test Condition: Normal communication

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Av
0.158	9.74	48.46	65.56	38.34	55.56	-17.10	-17.22
0.323	9.73	34.28	59.62	26.80	49.62	-25.33	-22.82
0.454	9.73	35.99	56.80	30.55	46.80	-20.81	-16.26
0.486	9.73	34.09	56.23	28.65	46.23	-22.14	-17.58
0.549	9.75	28.33	56.00	21.59	46.00	-27.67	-24.41
12.649	9.89	32.20	60.00	26.79	50.00	-27.80	-23.21

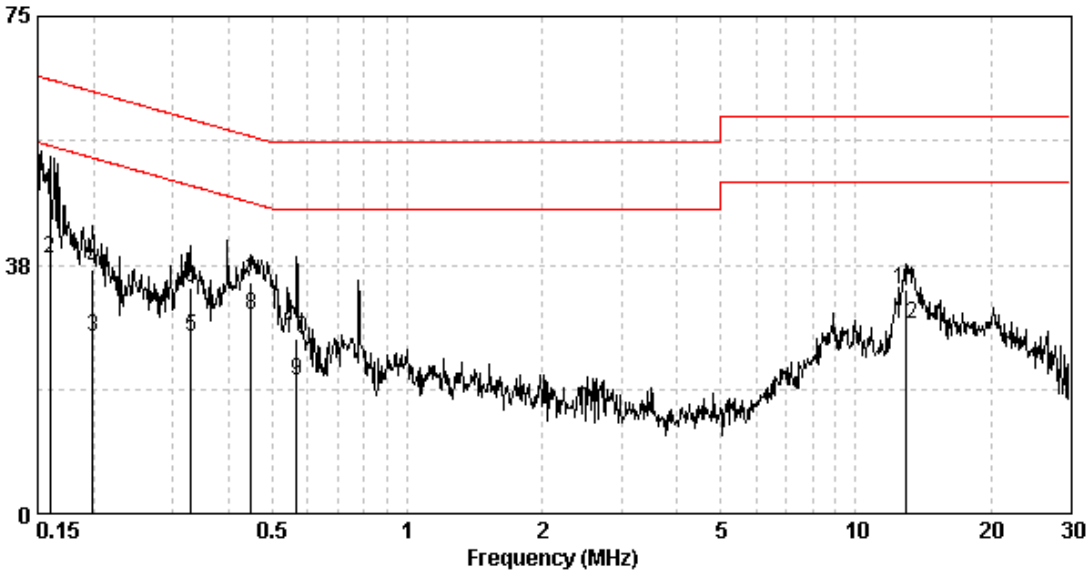
Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase: Neutral Line
Model No.: PLTN-RB1V1
Test Condition: Normal communication

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Av
0.160	9.74	47.34	65.47	38.39	55.47	-18.13	-17.08
0.199	9.74	36.83	63.67	26.64	53.67	-26.84	-27.02
0.330	9.73	34.01	59.44	26.74	49.44	-25.43	-22.70
0.449	9.73	34.91	56.89	30.03	46.89	-21.98	-16.86
0.567	9.75	26.35	56.00	19.96	46.00	-29.65	-26.04
12.920	9.92	33.85	60.00	28.46	50.00	-26.15	-21.54

Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Appendix A: Test equipment list

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
ESCI EMI Test Receiver	Rohde & Schwarz	ESCI	100018	2015/12/02	2016/11/30
Spectrum Analyzer	Rohde & Schwarz	FSP30	100137	2015/08/18	2016/08/16
Horn Antenna (1-18G)	SHWARZBECK	BBHA 9120 D	9120D-456	2014/08/29	2017/08/27
Horn Antenna (14-42G)	SHWARZBECK	BBHA 9170	BBHA9170159	2014/09/16	2017/09/14
Broadband Antenna	SHWARZBECK	VULB 9168	9168-172	2013/08/08	2016/08/06
Pre-Amplifier	EMC Co.	EMC12635SE	980205	2015/10/7	2016/10/05
Pre-Amplifier	MITEQ	JS4-26004000--27-8A	828825	2015/09/15	2016/09/13
Power Meter	Anritsu	ML2495A	0844001	2015/11/11	2016/11/09
Power Sensor	Anritsu	MA2411B	0738452	2015/11/11	2016/11/09
Two-Line V-Network	Rohde & Schwarz	ENV216	101159	2015/06/08	2016/06/06
Artificial Mains Network (LISN)	Schaffner	MN2050D	1586	2015/05/27	2016/05/25
CON-1 Cable	SUHNER	BNC / RG-58	1521946	2015/05/09	2016/05/07
Test software	Audix	e3	4.2004-1-12k	NCR	NCR
Signal Analyzer	Agilent	N9030A	MY51380492	2015/09/21	2016/09/19
966-2(A) Cable 9kHz~26.5GHz	SUHNER	SMA / EX 100	N/A	2015/05/06	2016/05/05
966-2(B) Cable 9kHz~26.5GHz	SUHNER	SMA / SUCOFLEX 104P	CB0005	2015/05/06	2016/05/04

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
RF Cable 9kHz~26.5GHz	SUHNER	SUCOFLEX 102	CB0006	2015/05/06	2016/05/05
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2016/02/24	2017/02/22
Hight Pass Filter	Reactel	7HS-3G/18G-S11	N/A	2015/06/06	2016/06/04
Active Loop Antenna	SCHWARZBECK MESS-ELEKTRONIC	FMZB1519	1519-067	2016/03/03	2017/03/02
EMI Test Receiver	Rohde & Schwarz	ESR-7	101232	2015/12/02	2016/11/30
Test software	ADT	Radiated test system	7.5.14	NCR	NCR

Note: No Calibration Required (NCR).

Appendix B:Measurement Uncertainty

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

Item	Uncertainty
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.14 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.22 dB
Vertically polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.64 dB
Horizontally polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.64 dB
Vertically polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	2.7 dB
Horizontally polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	2.7 dB
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	3.53 dB
Emission on the Band Edge Test	3.64 dB
RF Antenna Conducted Spurious Test	0.85 dB
Maximum Output Power Test	0.42 dB
20dB Bandwidth Test	0.85 dB
Carrier Frequency Separation Test	0.85 dB
Number of Hopping Frequencies Test	0.85 dB
Time of Occupancy (Dwell Time) Test	0.85 dB
AC Power Line Conducted Emission	2.47 dB