

FCC TEST REPORT

No. 150900353SHA-002

Applicant : China Hualu Group Co., Ltd.
No.1 Hua Road, Qixianling Hi-Tech Zone, Dalian,
China

Manufacturer : Dalian Golden Hualu Digital Technology Co., Ltd.
No.1 Hua Road, Qixianling Hi-Tech Zone, Dalian,
China

Product Name : Blu-ray disc player and receiver

Type/Model : SOLO MOVIE, SOLO MOVIE 2.1, SOLO MUSIC

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 20, 2016

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1 GENERAL INFORMATION

1.1 Description of Client

Applicant : China Hualu Group Co., Ltd
No.1 Hua Road Qixianling Hi-tech Zone, Dalian, China

Name of contact : Che Yongjin

Tel : 86 0411 84790599

Fax : 86 0411 84790944

Email : cheyj@hualu.com.cn

Manufacturer : Dalian Golden Hualu Digital Technology Co., Ltd.
No.1 Hua Road, Qixianling Hi-Tech Zone, Dalian, China

1.2 Identification of the EUT

Product Name : Blu-ray disc player and receiver

Type/model : SOLO MOVIE, SOLO MOVIE 2.1, SOLO MUSIC

FCC ID : YLZ-BTM869

IC : 9088A-BTM869

1.3 Technical Specification

Operation Frequency : 2400 – 2483.5 MHz
Band
Protocol : Bluetooth Base Rate + EDR
Type of Modulation : GFSK, $\pi/4$ -DQPSK, 8DPSK
Channel Number : 79 channels
Description of EUT : EUT is a Blu-Ray disc player and receiver, and has three models. The models of SOLO MOVIE and SOLO MOVIE 2.1 are the same except that audio circuit. The models of SOLO MOVIE 2.1 and SOLO MUSIC are the same except that SOLO MUSIC was disabled to play BD/DVD disc. The SOLO MOVIE was chosen to perform the full tests and the model of SOLO MOVIE 2.1 and SOLO MUSIC were chosen to perform the test items of conducted emission and radiated emission, and the worst data was listed in the report.

Antenna : Pole antenna with reverse connector, 2.5dBi max
Rating : 110-120V $\sim$ or 220-240V $\sim$, 50-60Hz, 1kW MAX., Class II
Category of EUT : Class B
EUT type : ☒ Table top
☐ Floor standing
Sample received date : September 9, 2015
Date of test : September 9, 2015 – October 12, 2015

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 internal modulation and continuously transmission was applied.

The radiated emission and conducted emission has been tested with Bluetooth and WiFi transmitting continuously at the same time.

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
	$\pi/4$ -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 Test peripherals list

Item No.	Name	Band and Model	Description
1	Laptop computer	HP, EliteBook 2530P	-
2	LCD TV	SONY KLV-32V200A	-
3	Resistor	-	-
4	SPI-USB	-	-

2.5 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

2.6 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 REFERENCE	IC REFERENCE	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	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

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2.7 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	$\pm 0.74\text{dB}$
Radiated Emissions in restricted frequency bands below 1GHz	$\pm 4.90\text{dB}$
Radiated Emissions in restricted frequency bands above 1GHz	$\pm 5.02\text{dB}$
Emission outside the frequency band	$\pm 2.89\text{dB}$
Power line conducted emission	$\pm 3.19\text{dB}$

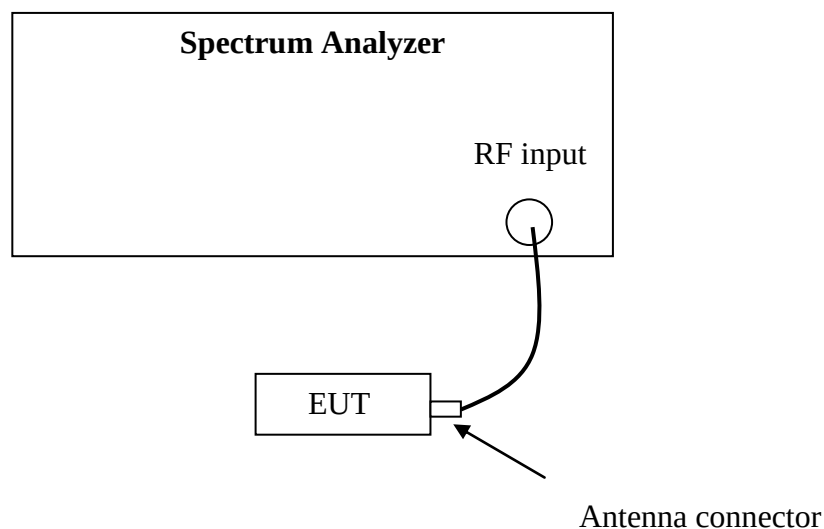
3 20 dB Bandwidth

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 EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems)

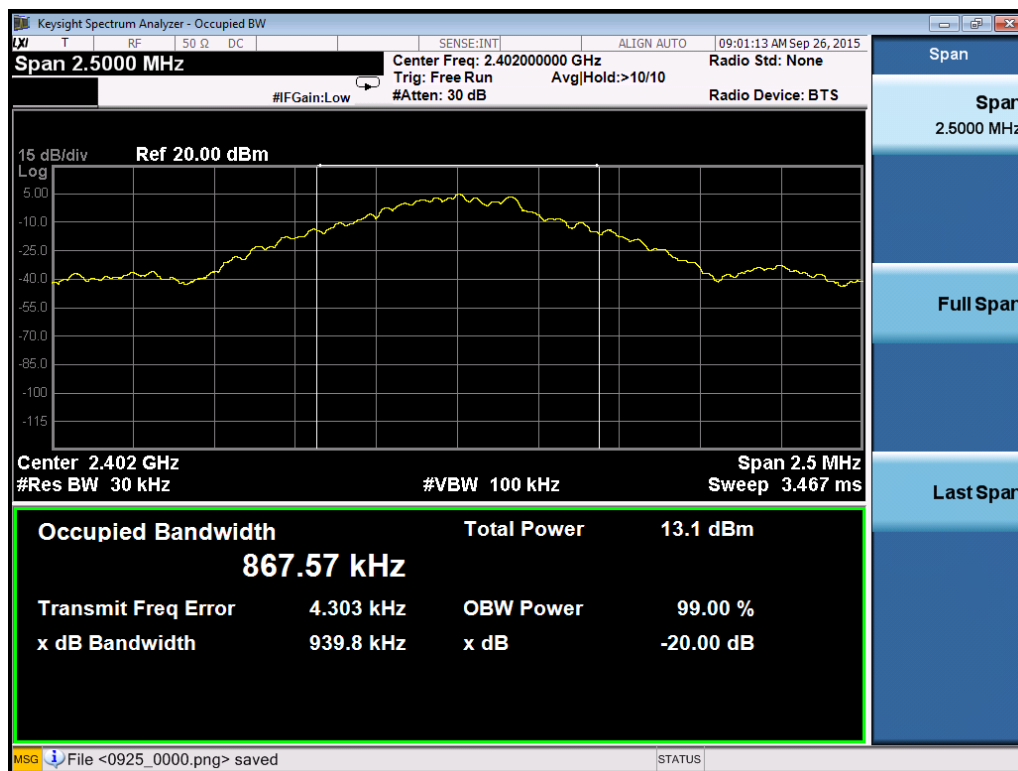
The 20 bandwidth per FCC § 15.247(a)(1) is measured using the Spectrum Analyzer with Span = 2 to 3 times the 20 dB bandwidth, $RBW \geq 1\%$ of the 20 dB bandwidth, $VBW \geq RBW$, Sweep = auto, Detector = peak, Trace = max hold.
The test was performed at 3 channels (lowest, middle and highest channel).

3.4 Test Protocol

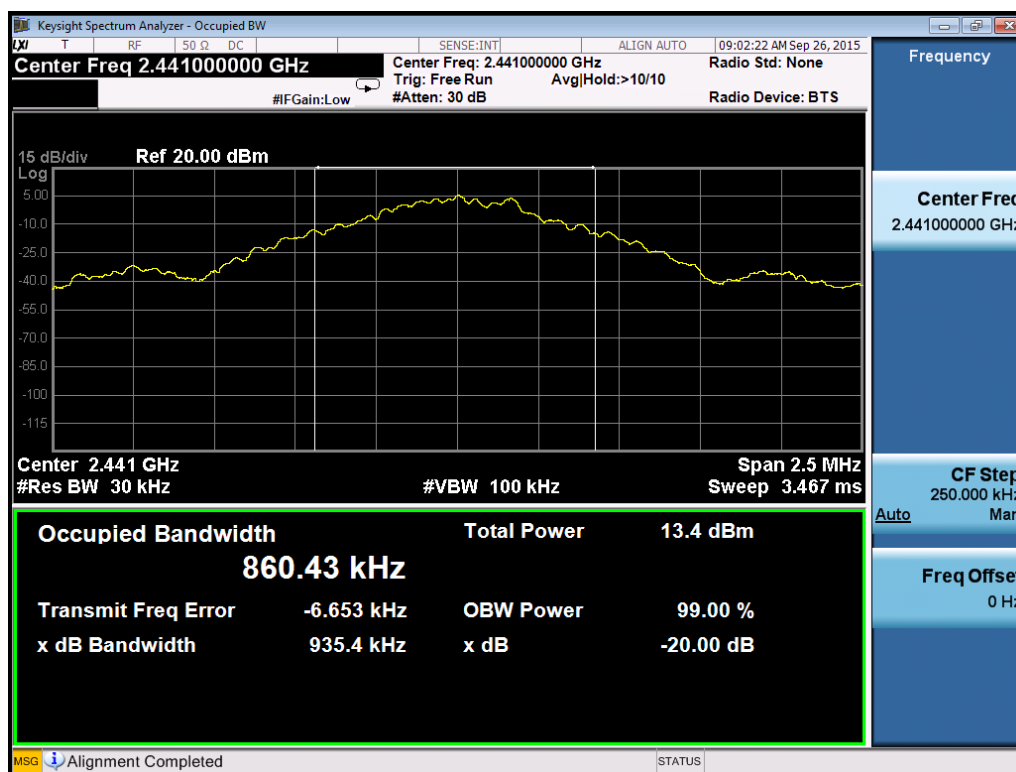
Temperature: 22°C
Relative Humidity: 54%

Modulation	Channel	20dB Bandwidth (kHz)	Two-thirds of Bandwidth (kHz)
GFSK	L	939.8	626.5
	M	935.4	623.6
	H	936.9	624.6

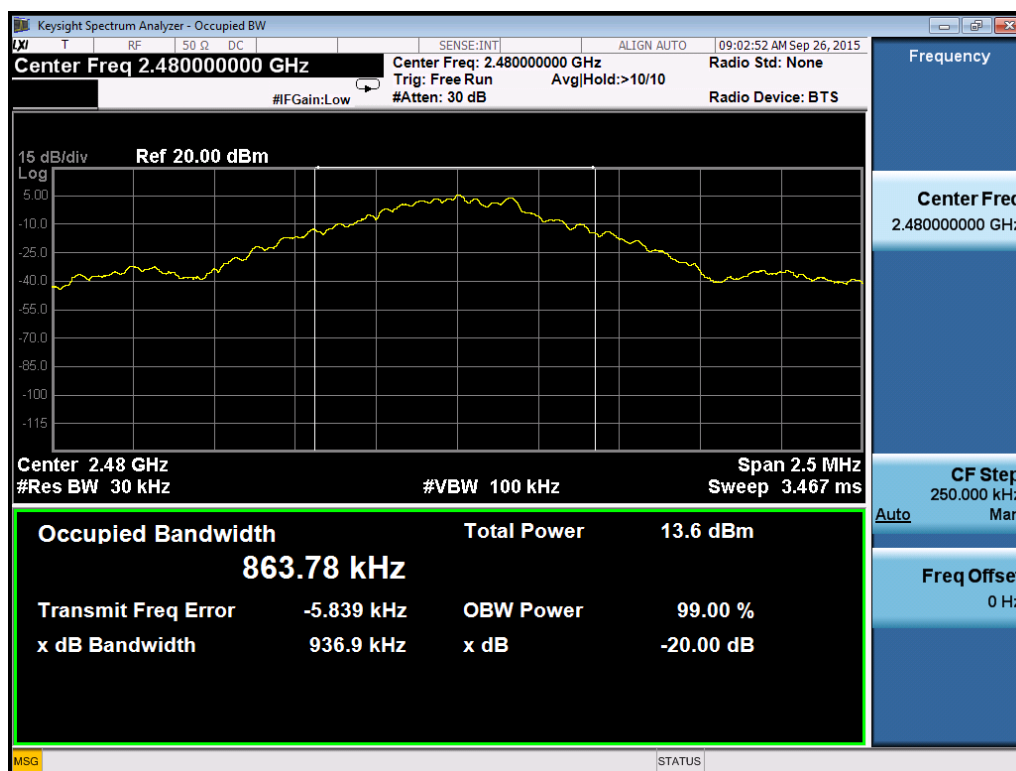
Channel L



Channel M

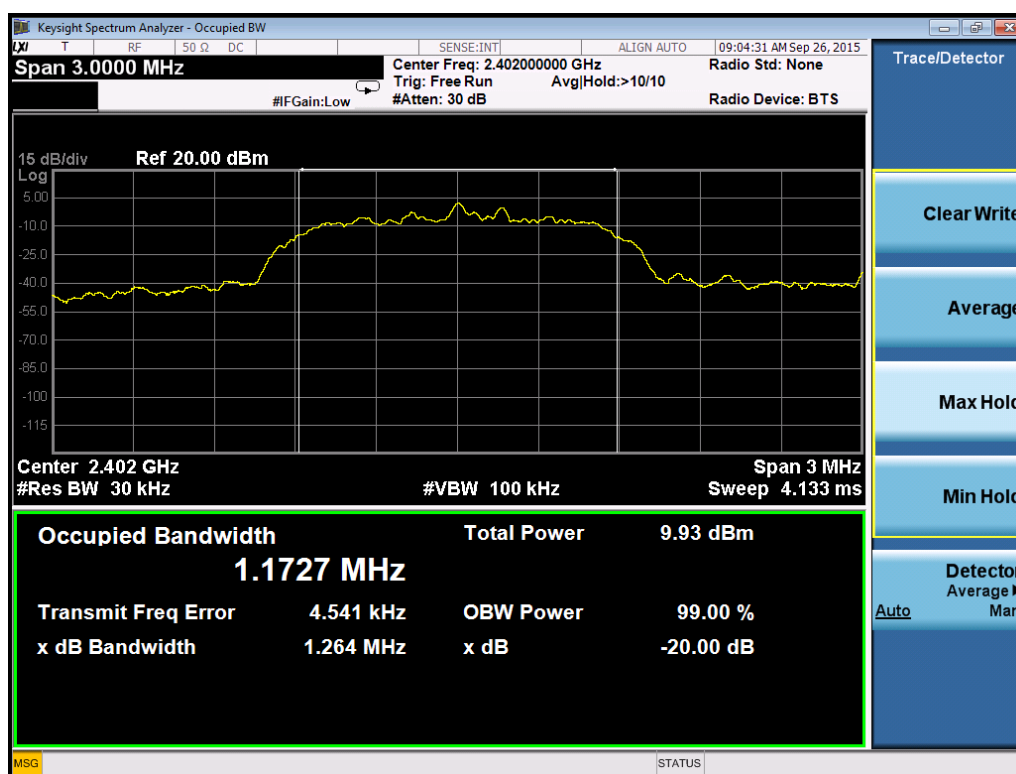


Channel H

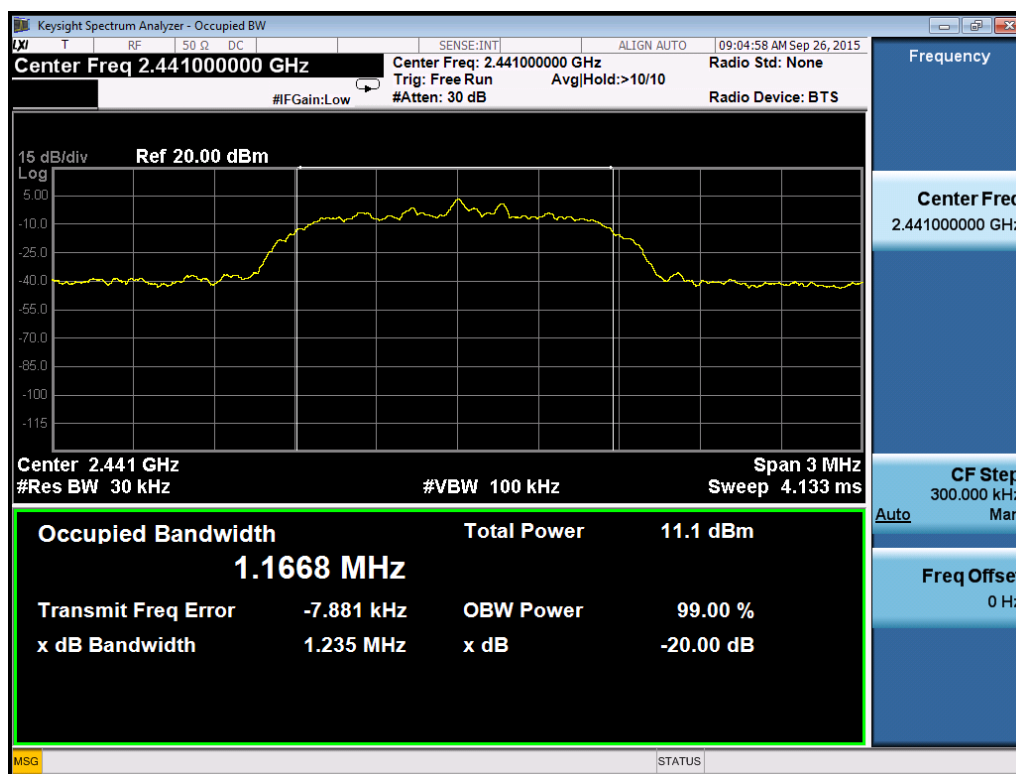


Modulation	Channel	20dB Bandwidth (kHz)	Two-thirds of Bandwidth (kHz)
$\pi/4$ -DQPSK	L	1264	842.7
	M	1235	823.3
	H	1237	824.7

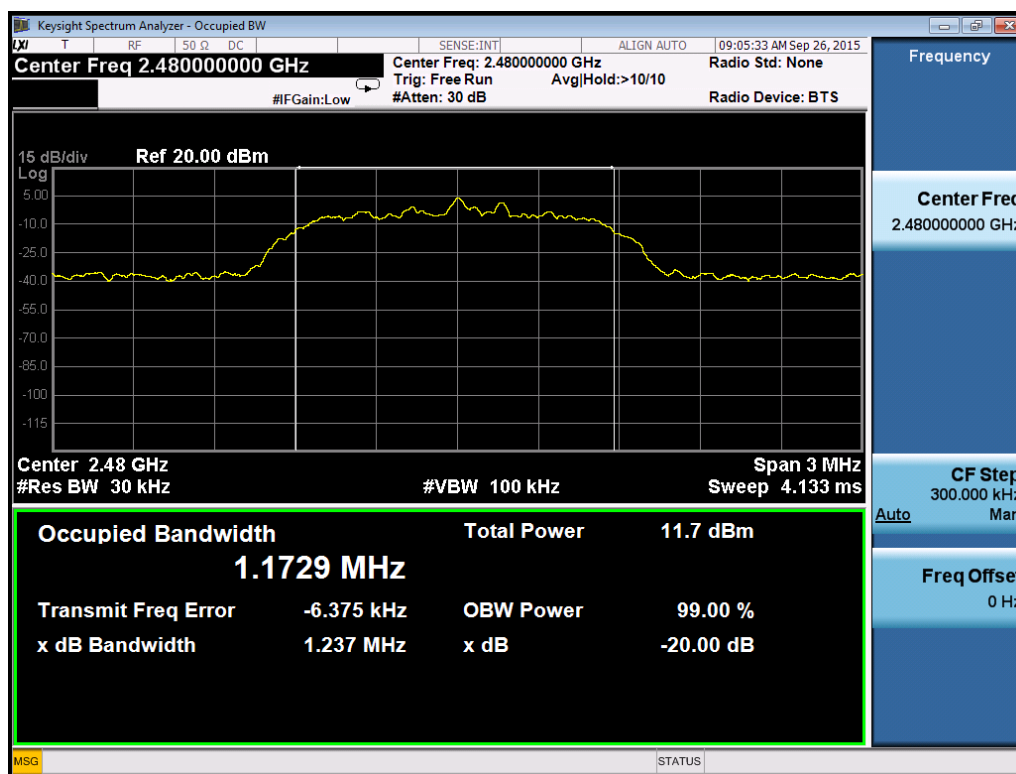
Channel L



Channel M

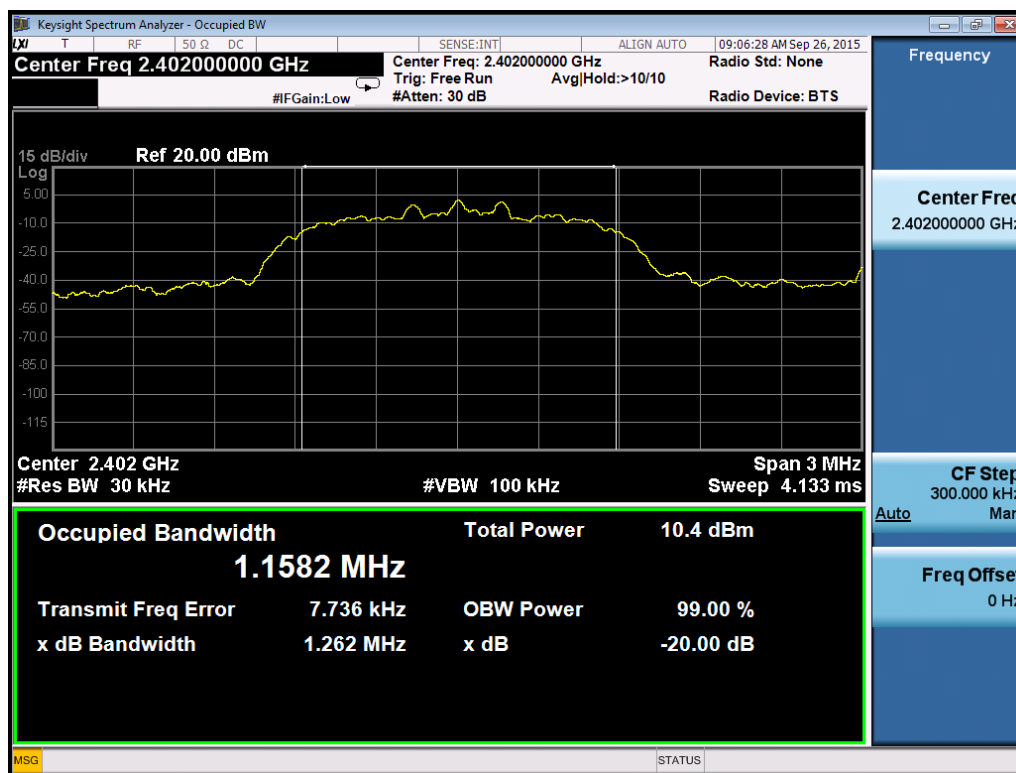


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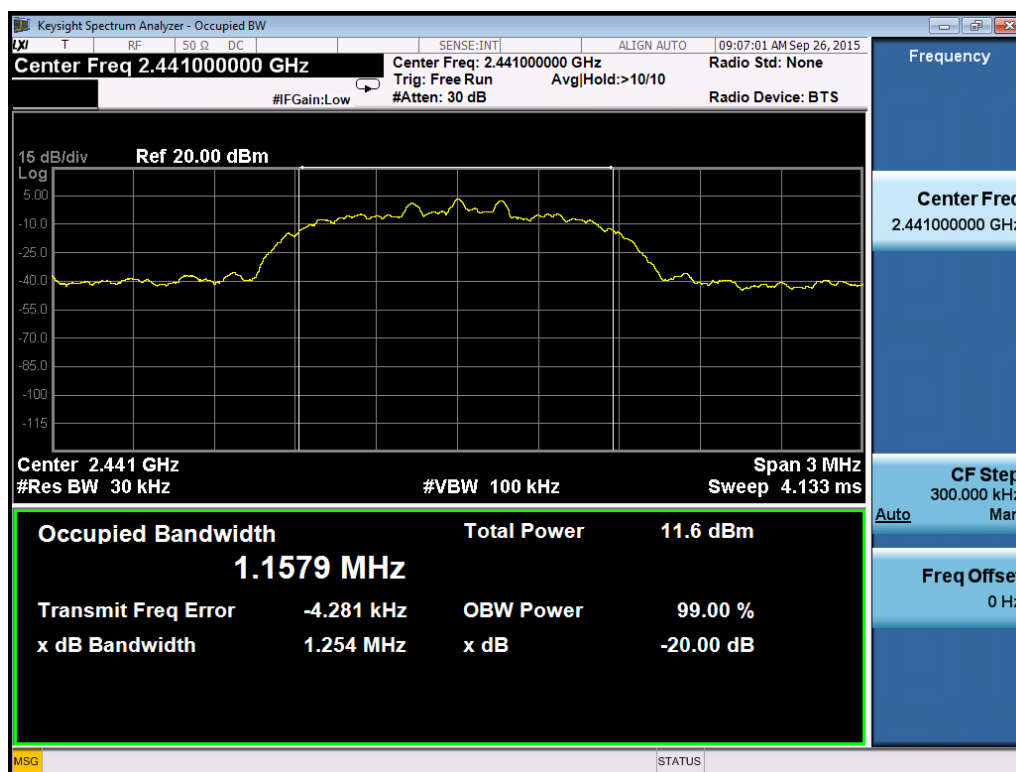


Modulation	Channel	20dB Bandwidth (kHz)	Two-thirds of Bandwidth (kHz)
8DPSK	L	1262	841.3
	M	1254	836.0
	H	1255	836.7

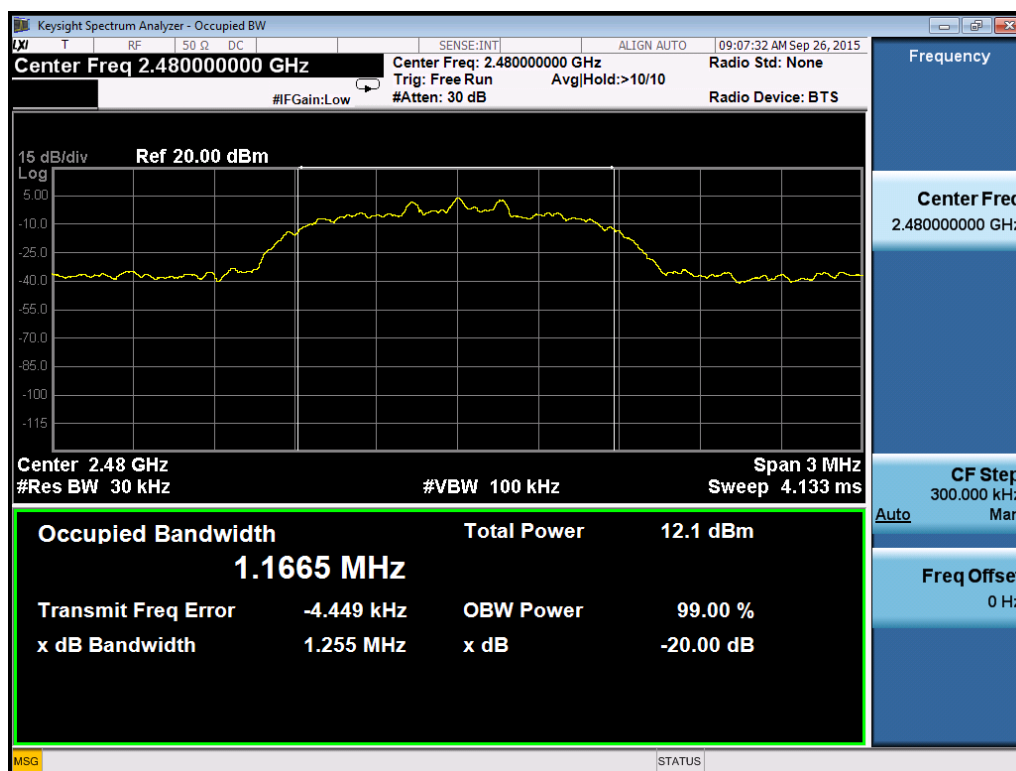
Channel L



Channel M



Channel H



4 Carrier frequency separation

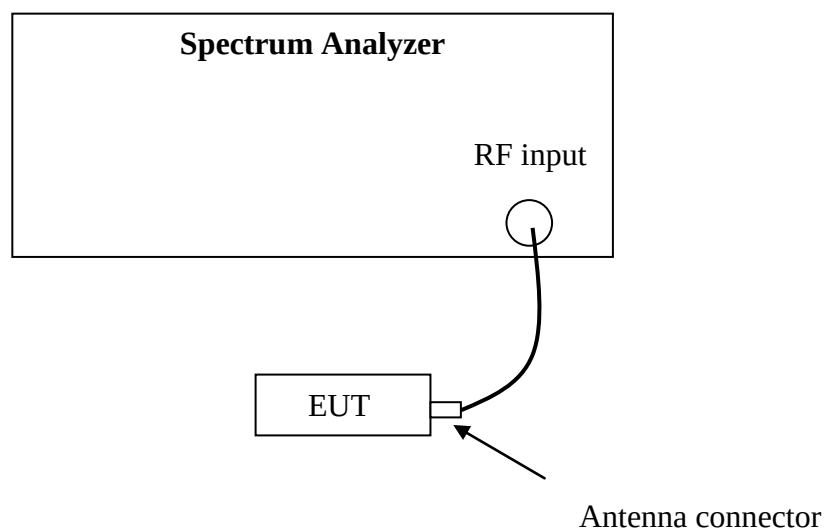
Test result: Pass

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 EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems)

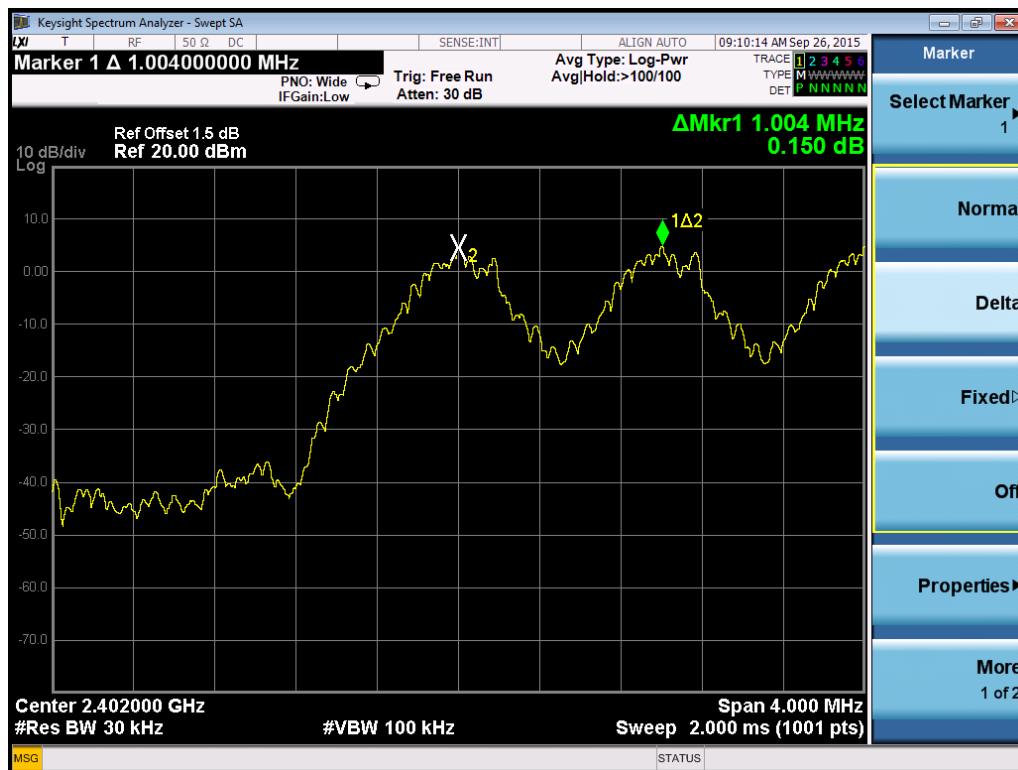
The Carrier frequency separation per FCC § 15.247(a)(1) is measured using the Spectrum Analyzer with Span can capture two adjacent channels, $RBW \geq 1\%$ of the span, $VBW \geq RBW$, Sweep = auto, Detector = peak, Trace = max hold. The test was performed at 3 channels (lowest, middle and highest channel).

4.4 Test protocol

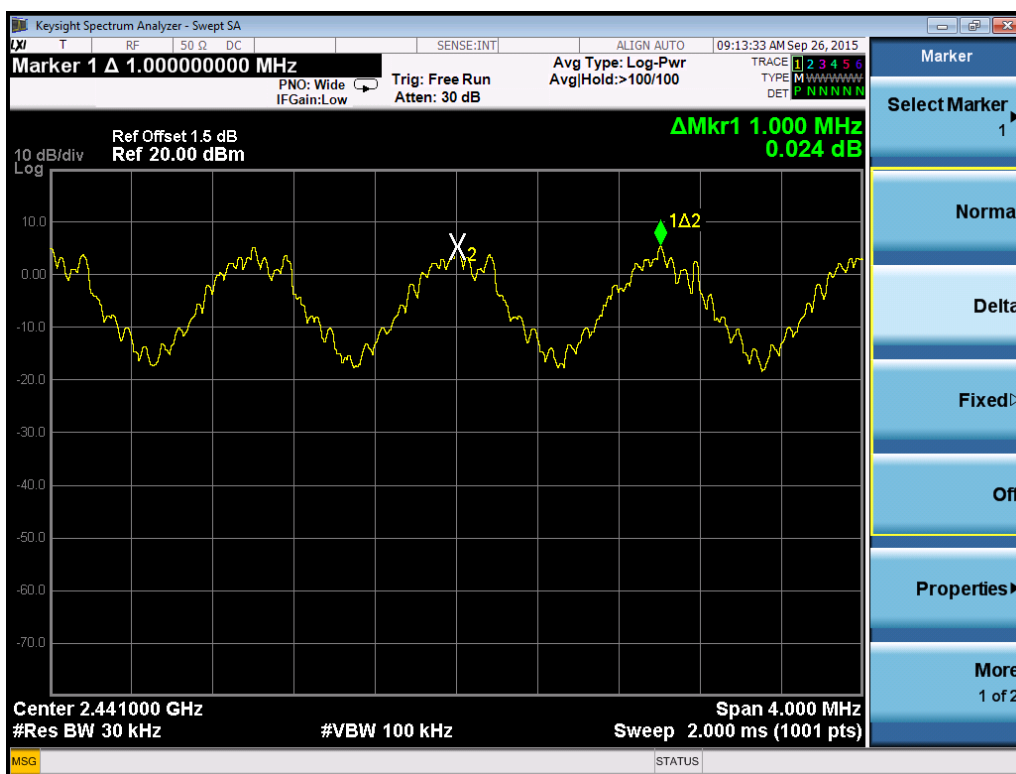
Temperature: 22 °C
Relative Humidity: 54 %

Modulation	Channel	Frequency Separation (kHz)	Limit (kHz)
GFSK	L	1004	≥ 626.5
	M	1000	≥ 623.6
	H	1004	≥ 624.6

Channel L



Channel M

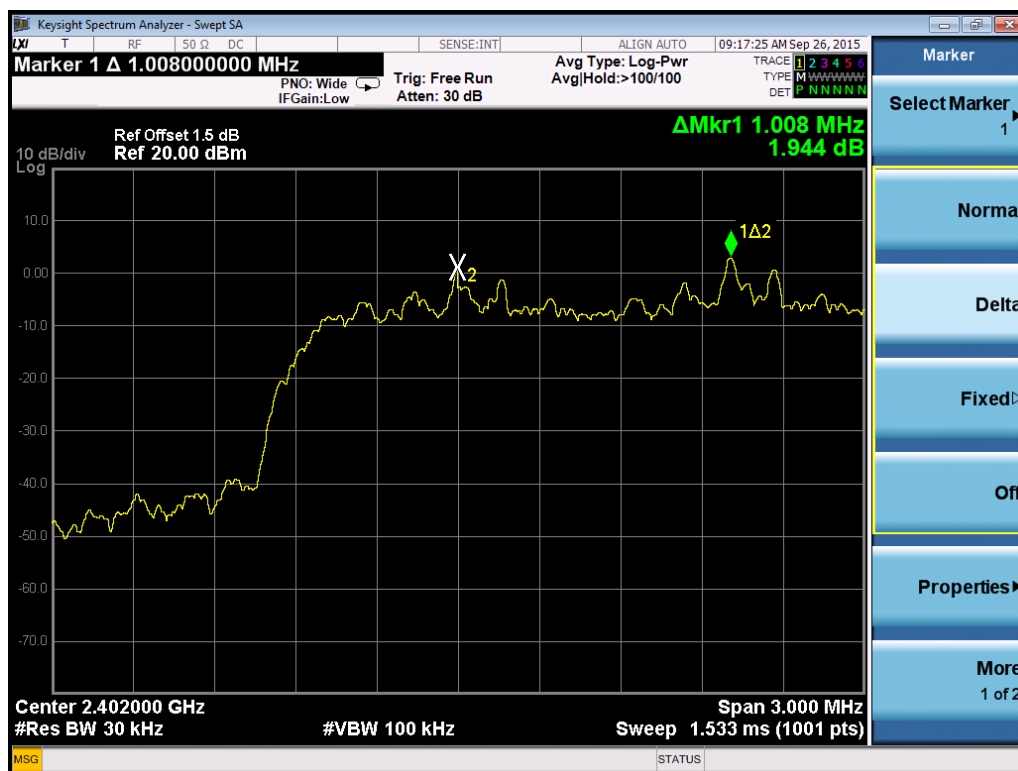


Channel H

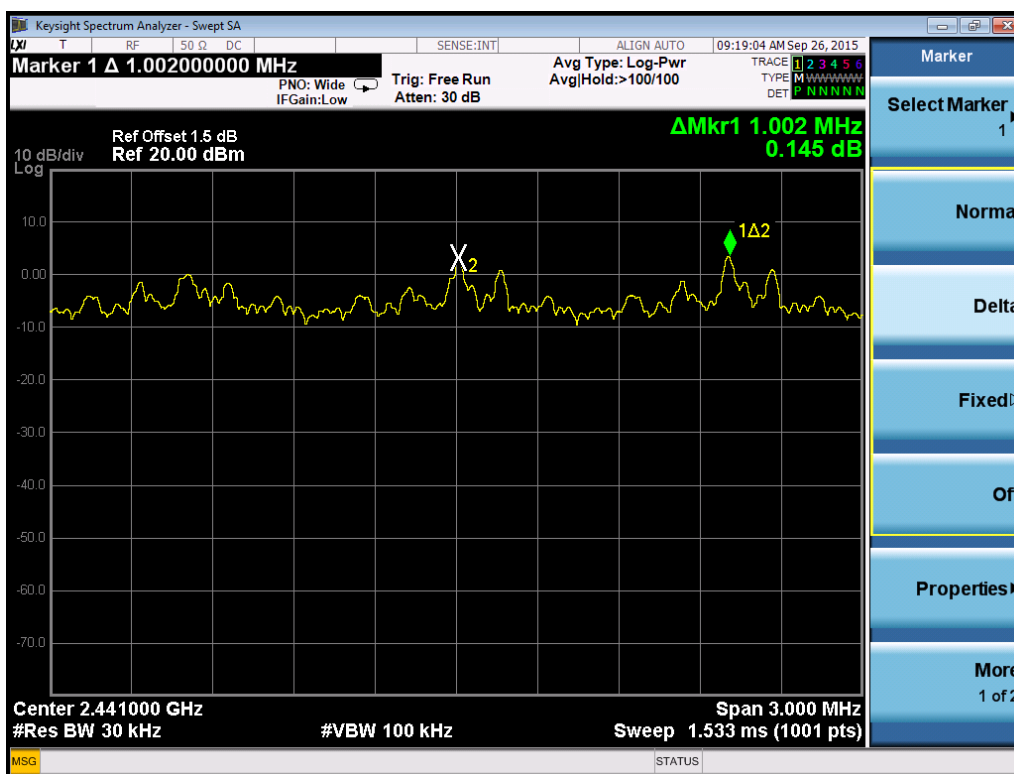


Modulation	Channel	Frequency Separation (kHz)	Limit (kHz)
$\pi/4$ -DQPSK	L	1008	≥ 842.7
	M	1002	≥ 823.3
	H	1002	≥ 824.7

Channel L



Channel M



Channel H



Modulation	Channel	Frequency Separation (kHz)	Limit (kHz)
8DPSK	L	1005	≥ 841.3
	M	1002	≥ 836.0
	H	1002	≥ 836.7

Channel L



Channel M



Channel H



5 Maximum peak output power

Test result: Pass

5.1 Test limit

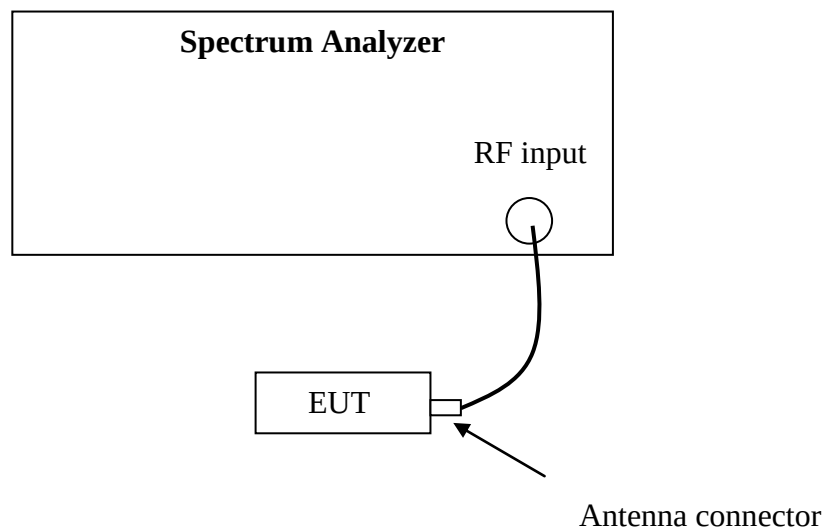
For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt

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 EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems)

The Maximum peak output power per FCC § 15.247(b) is measured using the Spectrum Analyzer with Span = 5 times the 20 dB bandwidth, $RBW \geq$ the 20 dB bandwidth, $VBW \geq RBW$, Sweep = auto, Detector = peak, Trace = max hold. The test was performed at 3 channels (lowest, middle and highest channel).

5.4 Test Protocol

Temperature: 22°C
Relative Humidity: 54%

Modulation	Channel	Conducted Power (dBm)	Limit (dBm)
GFSK	L	6.60	≤ 21.00
	M	6.83	≤ 21.00
	H	7.01	≤ 21.00

Conclusion: The maximum EIRP = 7.01dBm+2.5dBi = 8.93mW which is lower than the limit of 4W listed in RSS-247.

Modulation	Channel	Conducted Power (dBm)	Limit (dBm)
$\pi/4$ -DQPSK	L	5.03	≤ 21.00
	M	5.80	≤ 21.00
	H	6.22	≤ 21.00

Conclusion: The maximum EIRP = 6.22dBm+2.5dBi = 7.45mW which is lower than the limit of 4W listed in RSS-247.

Modulation	Channel	Conducted Power (dBm)	Limit (dBm)
8DPSK	L	5.50	≤ 21.00
	M	6.15	≤ 21.00
	H	6.45	≤ 21.00

Conclusion: The maximum EIRP = 6.45dBm+2.5dBi = 7.85mW which is lower than the limit of 4W listed in RSS-247.

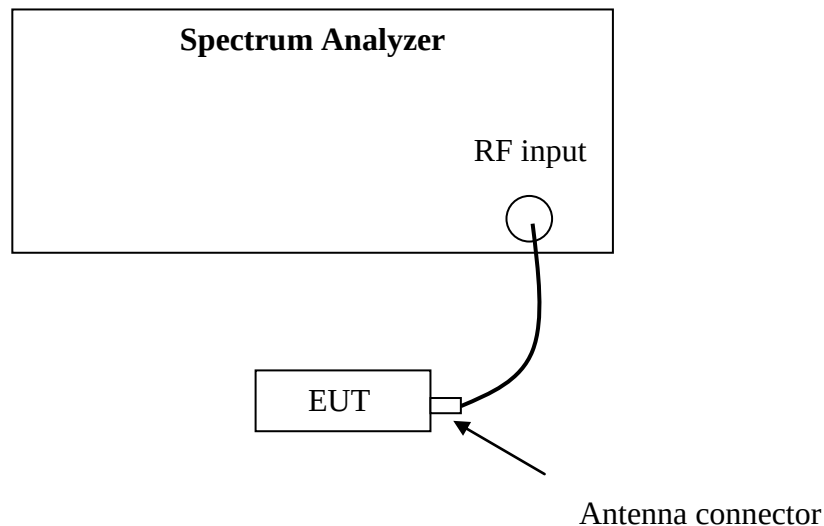
6 Emission outside the frequency band

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 EUT was tested according to DA 00-705 (Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems)

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).

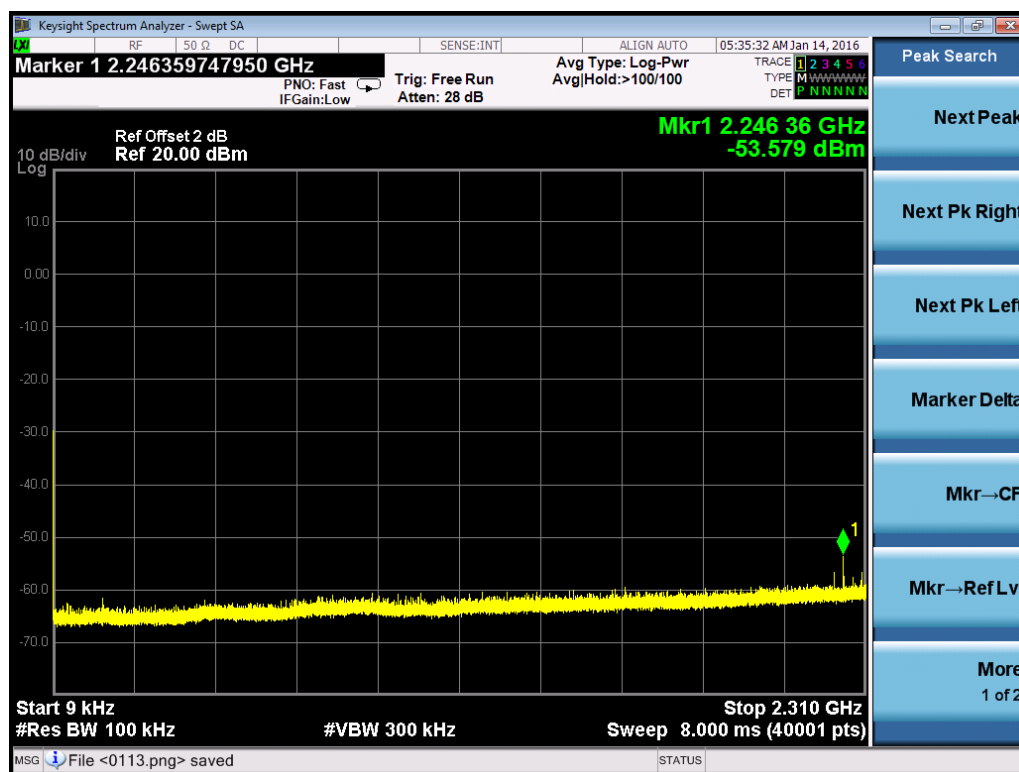
6.4 Test Protocol

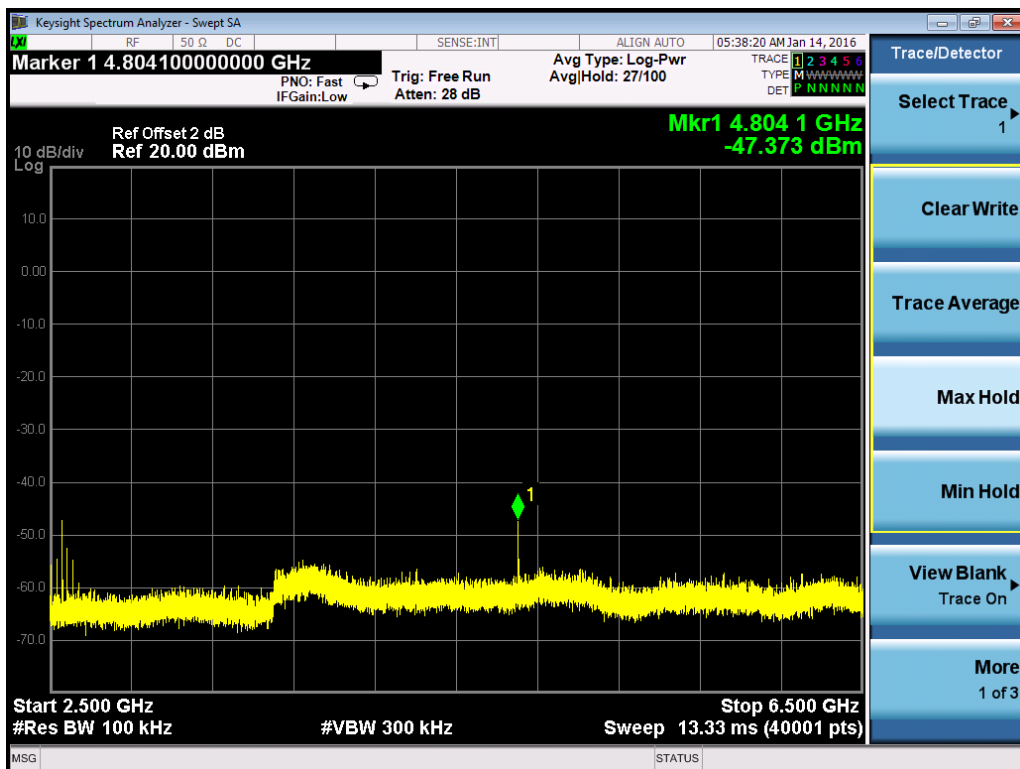
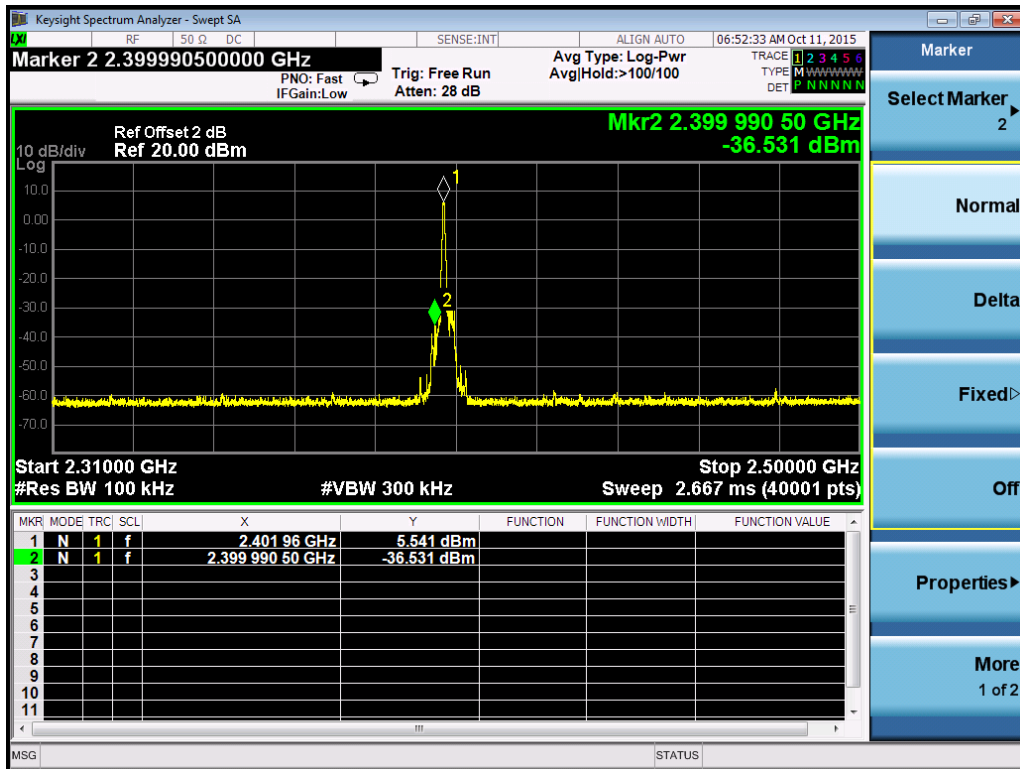
Temperature: 22°C

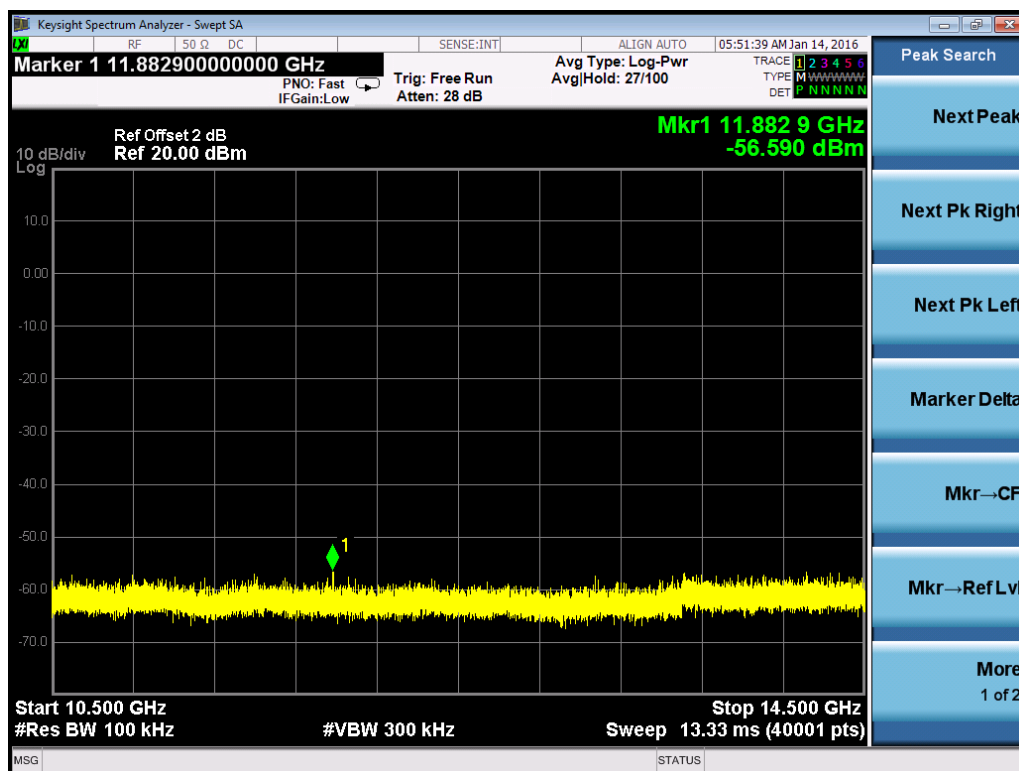
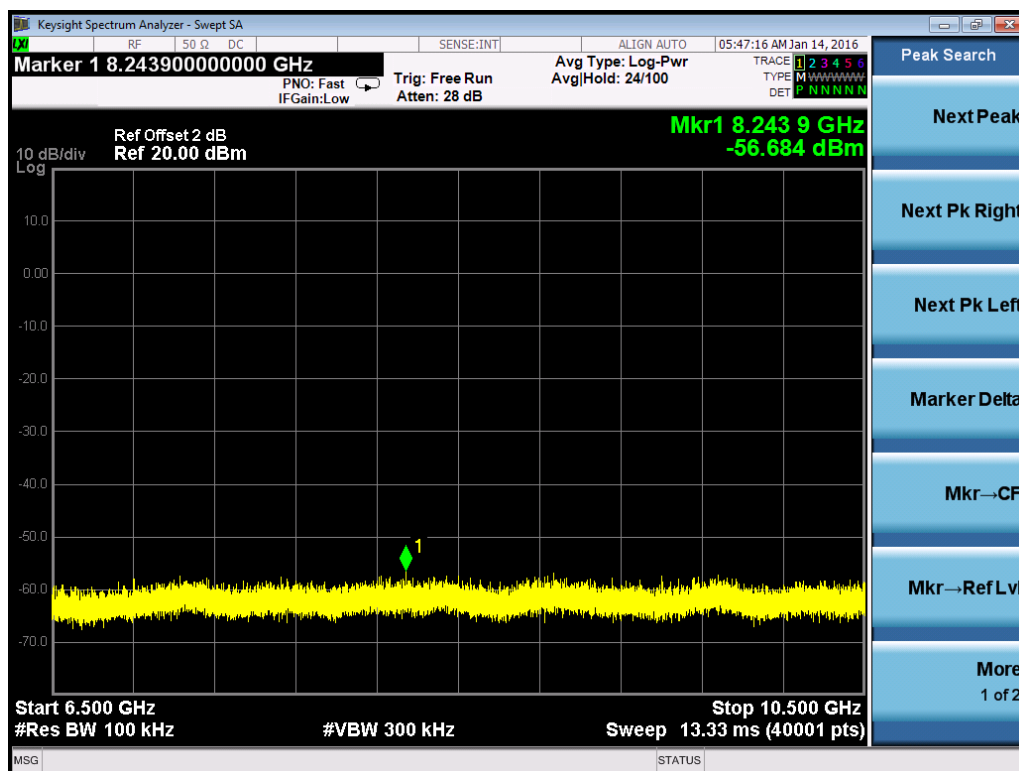
Relative Humidity: 54%

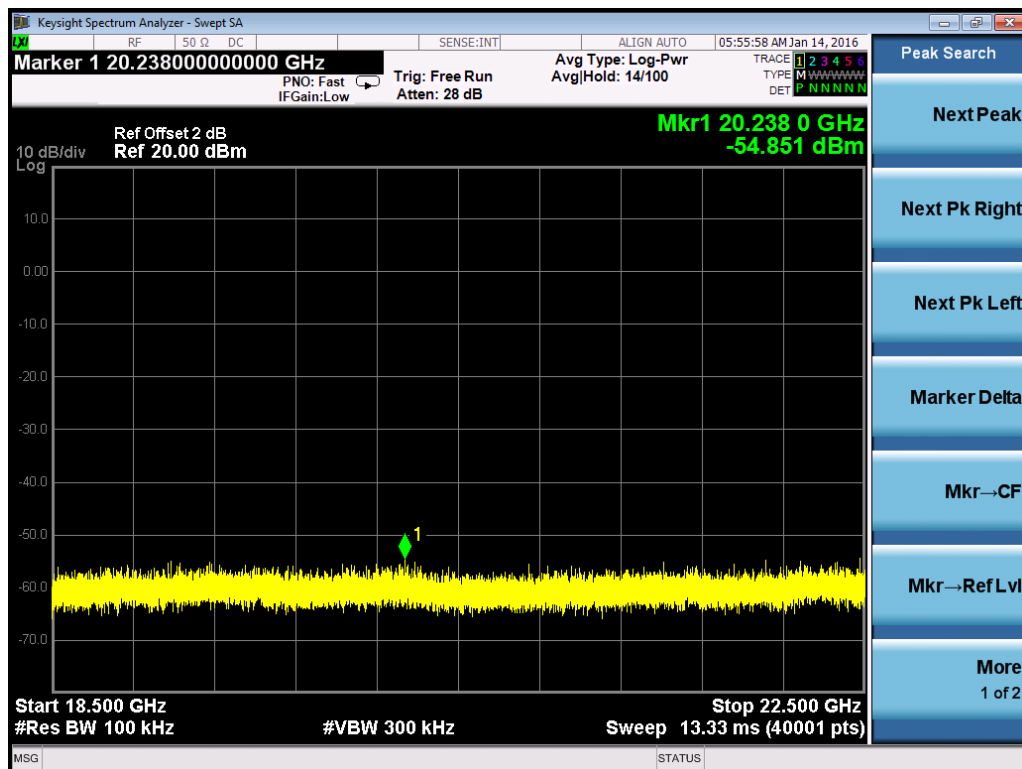
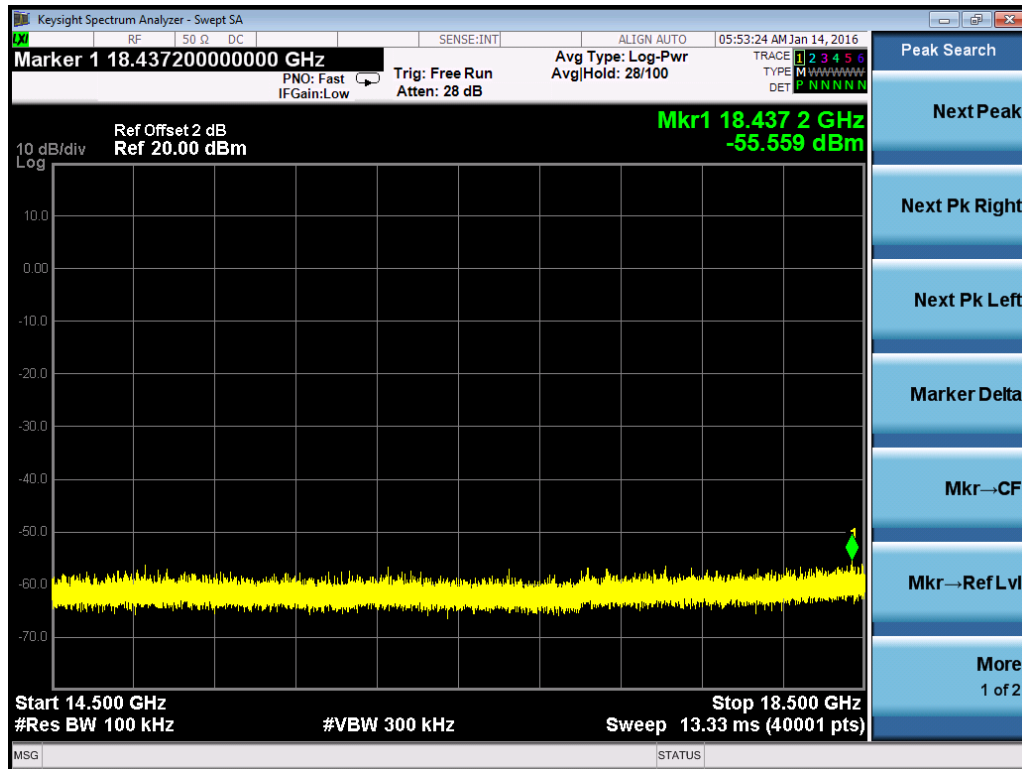
Modulation	Channel	Max reading among band (dBm)	Results	Limit (dBm)
GFSK	L	5.541	Pass	≥ 20
	M	6.718	Pass	≥ 20
	H	6.740	Pass	≥ 20
	Hopping	6.594	Pass	≥ 20

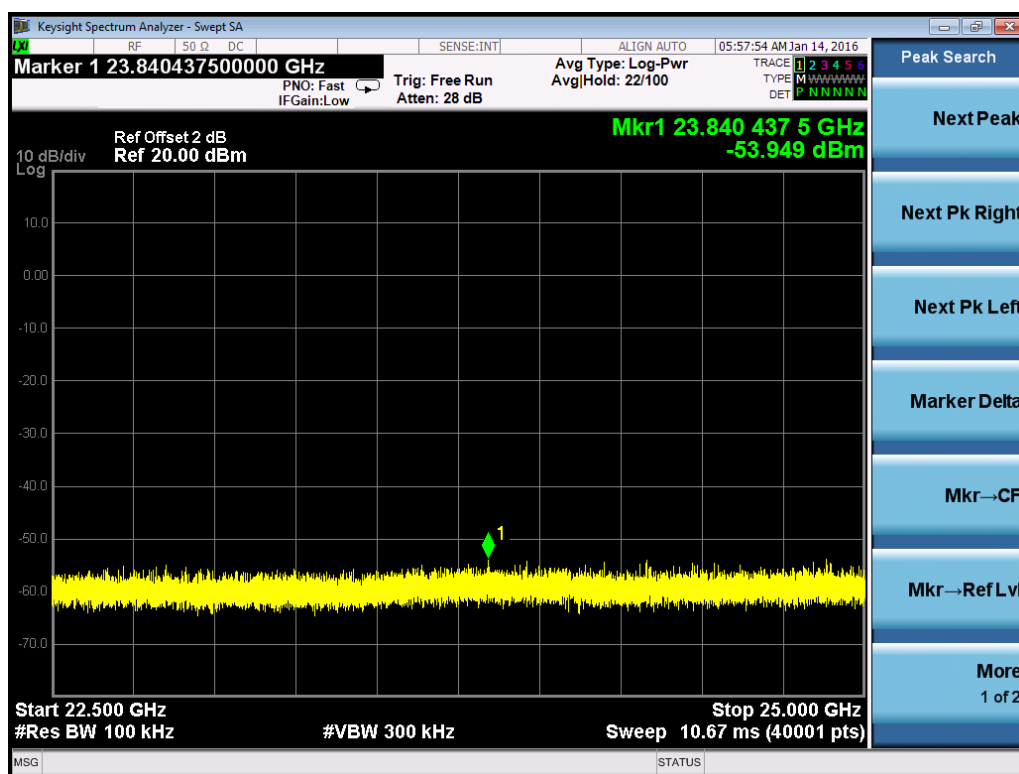
Channel L



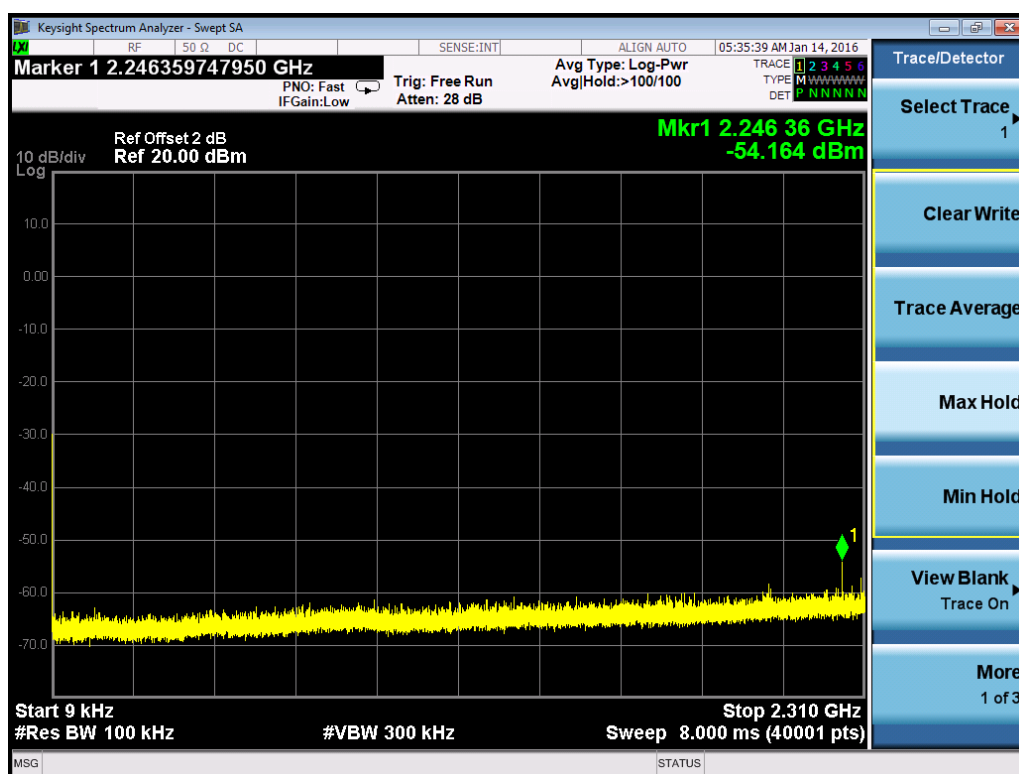


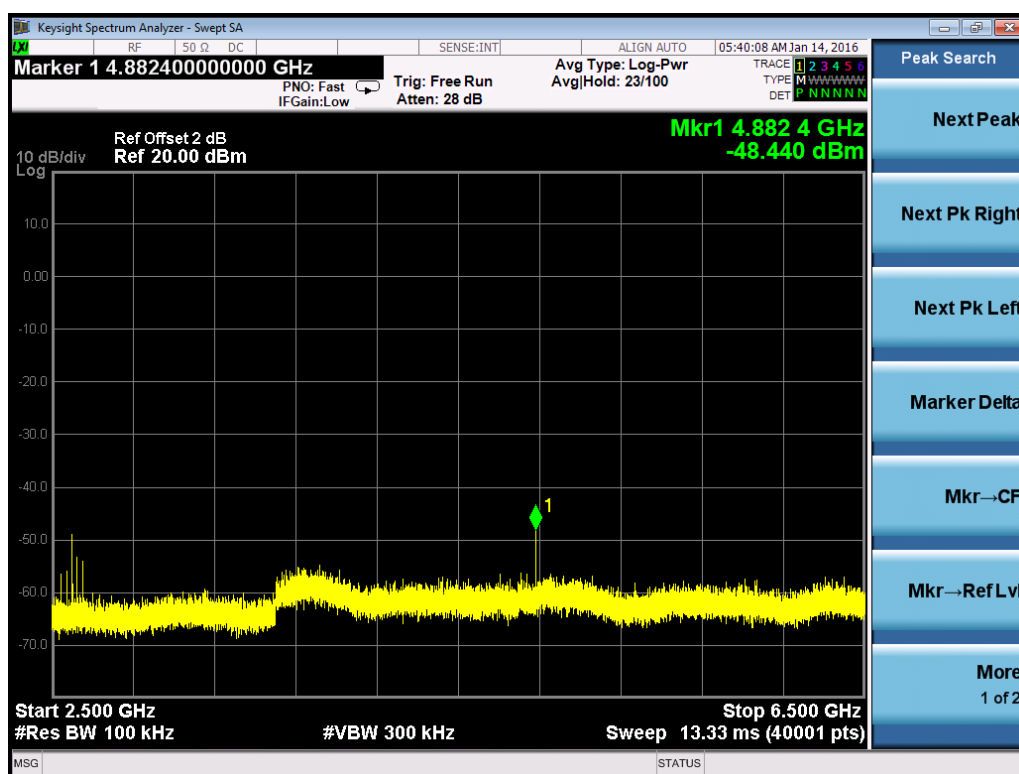
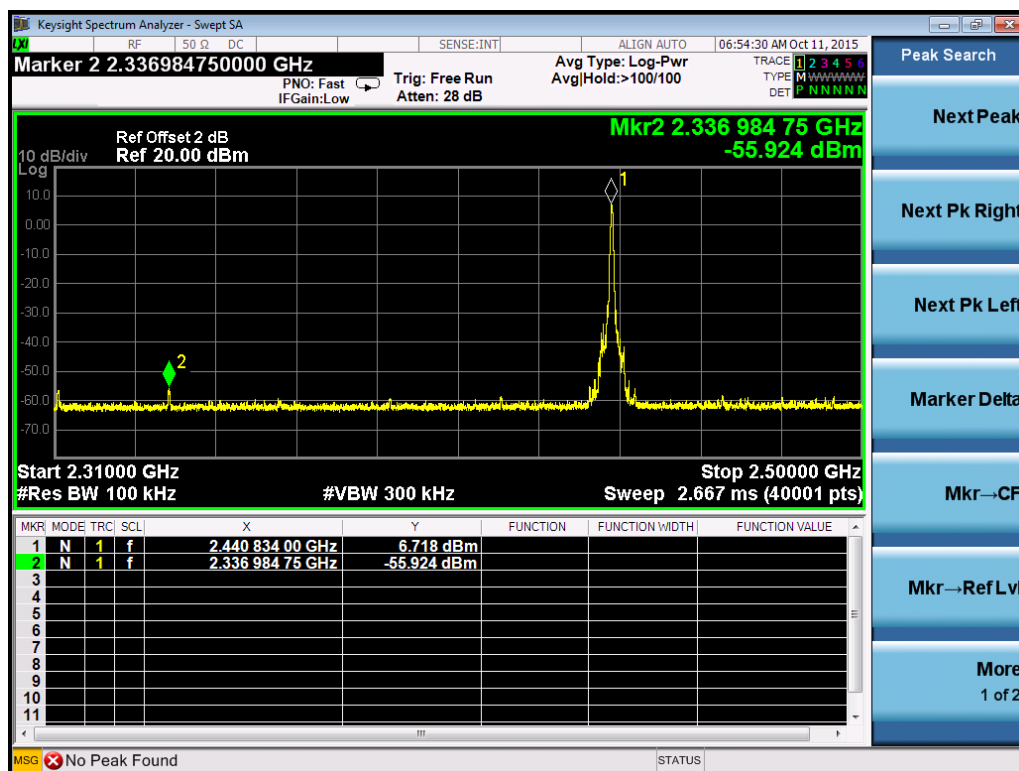


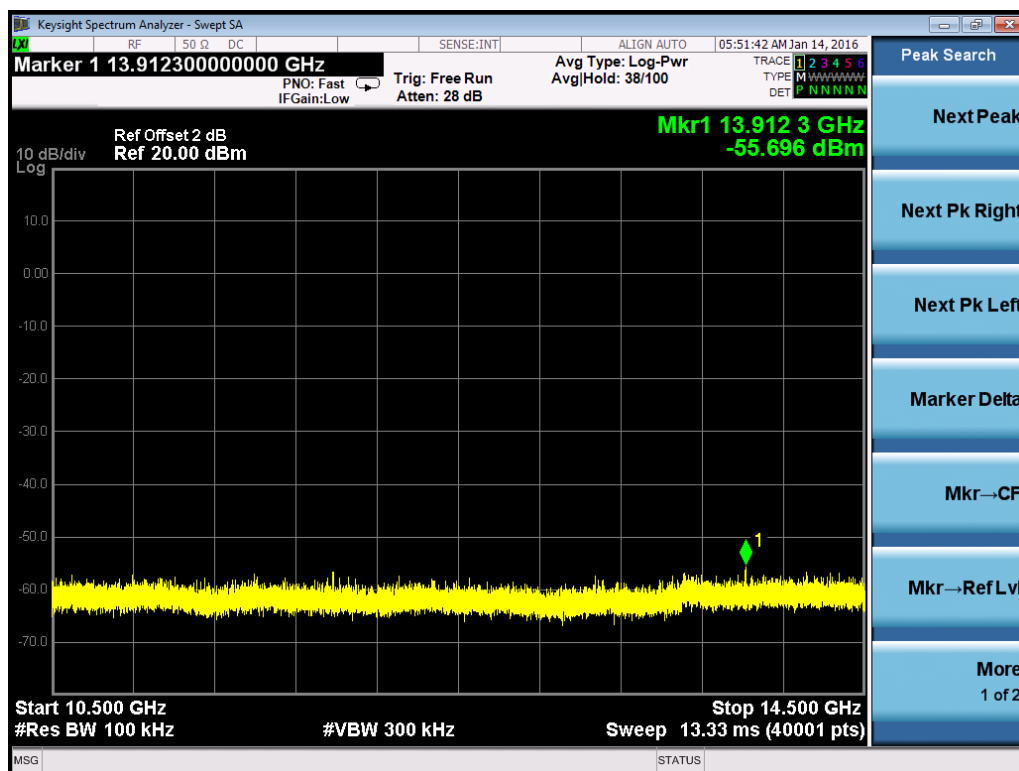
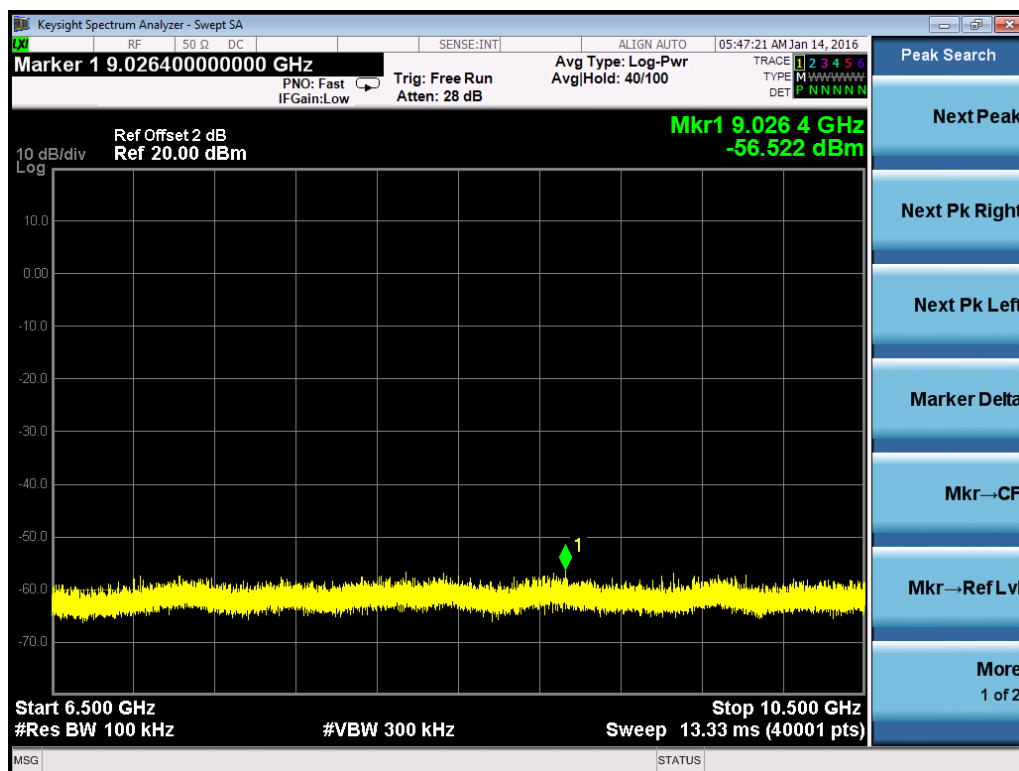


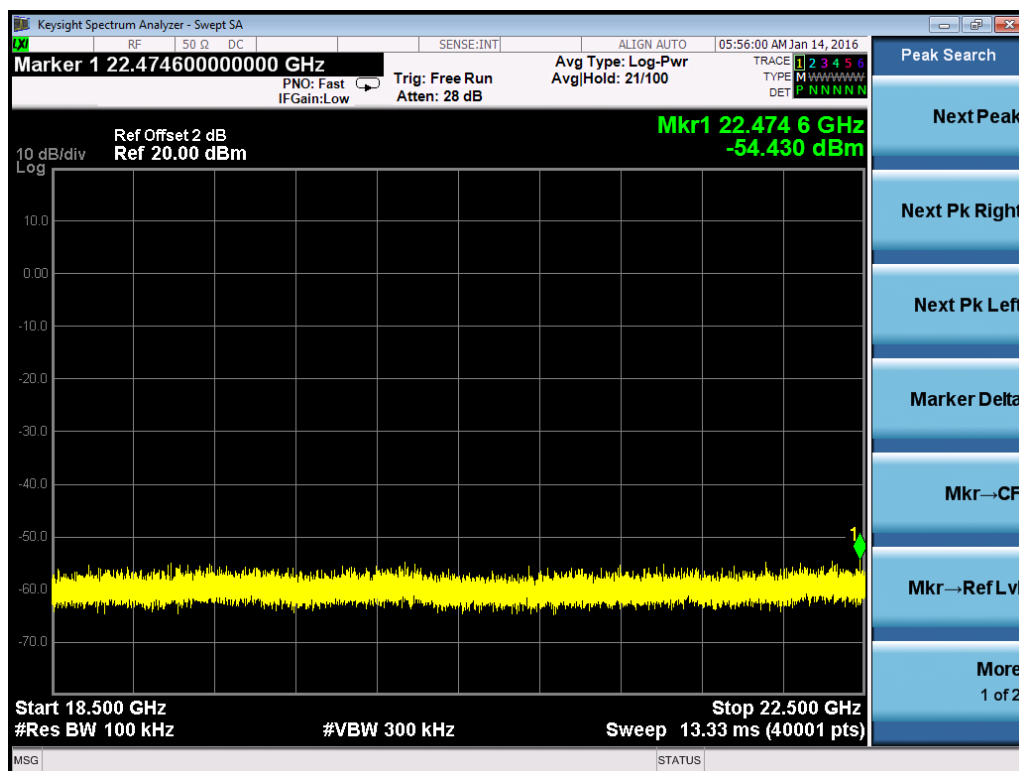
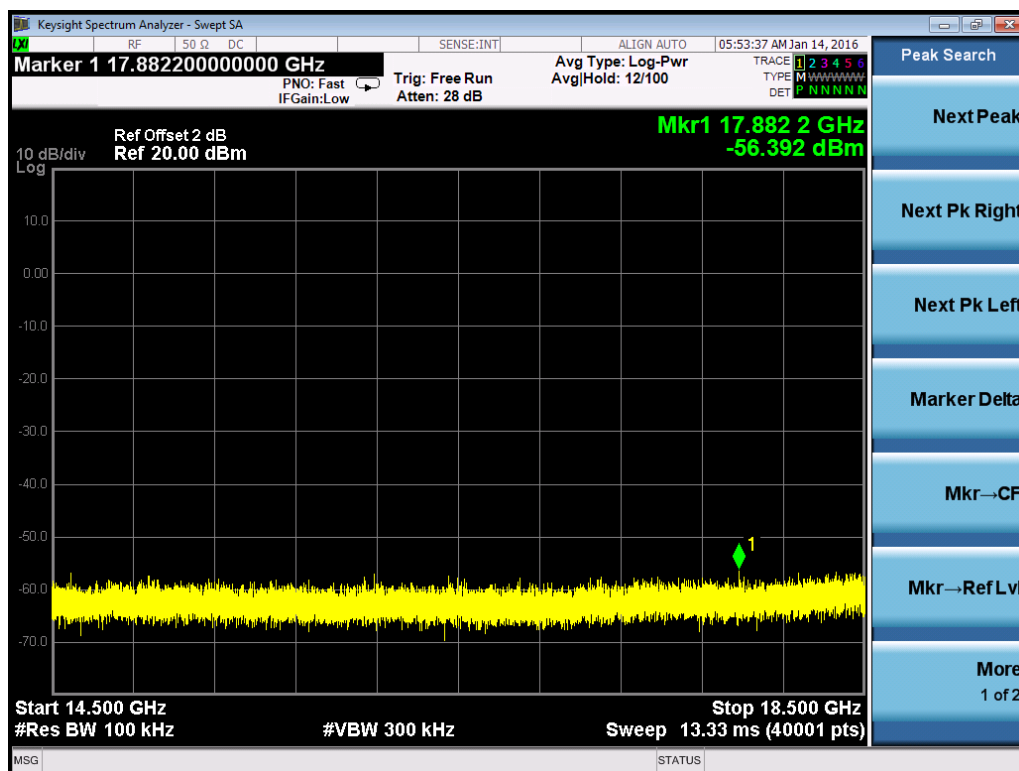


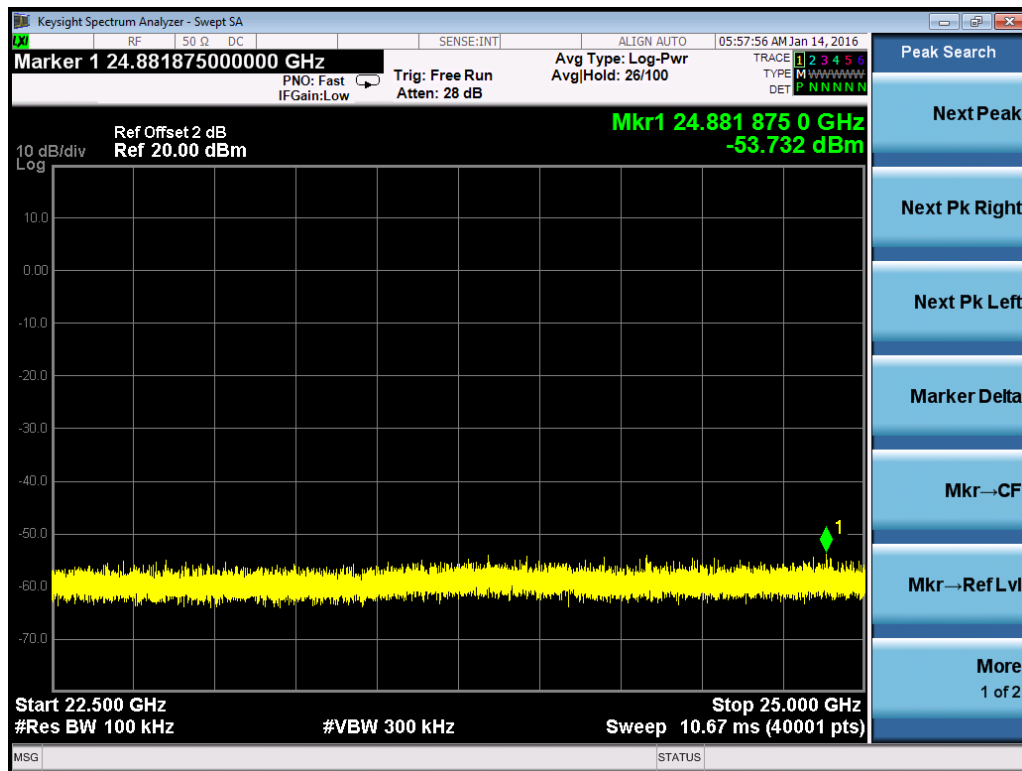
Channel M



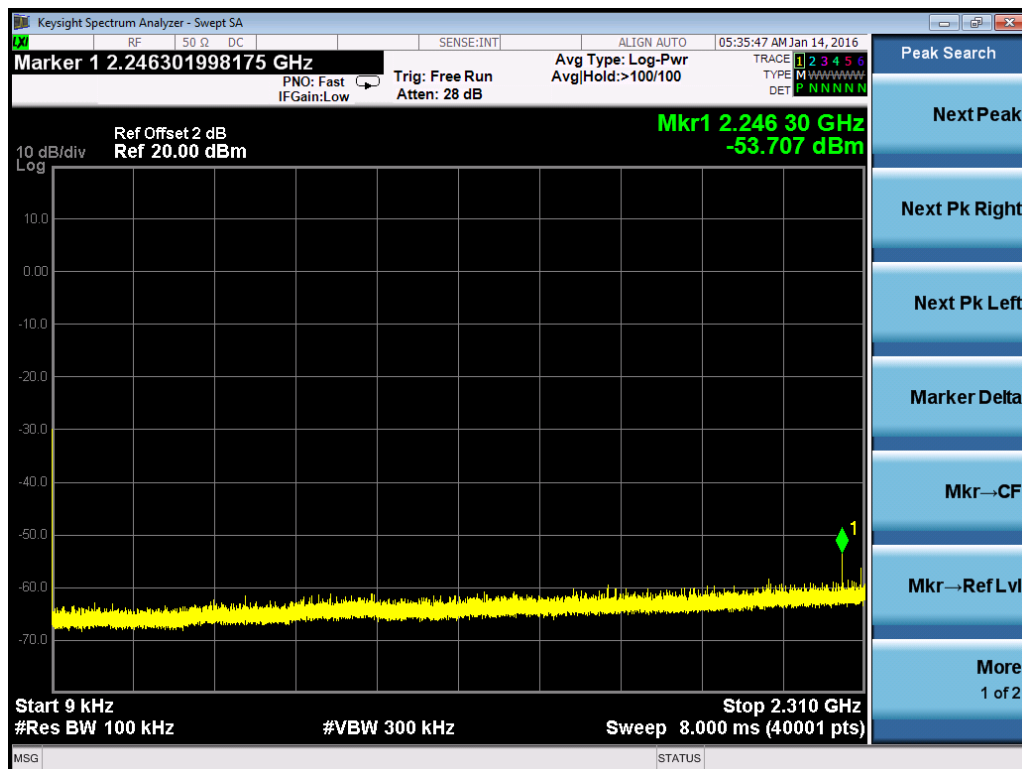


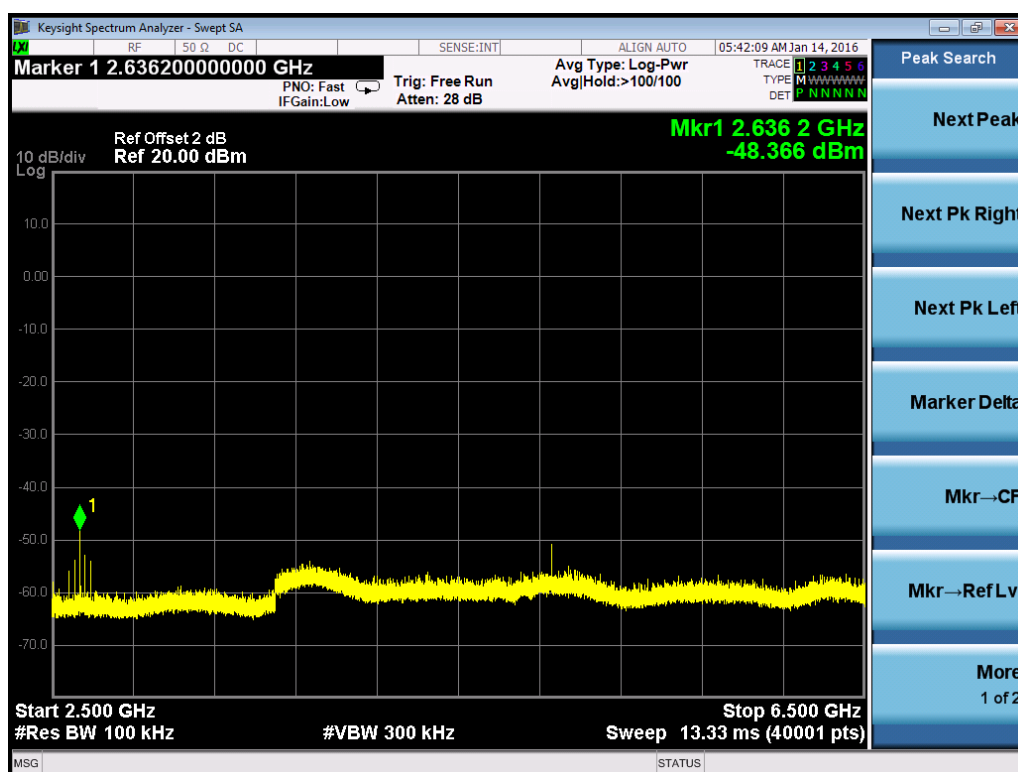
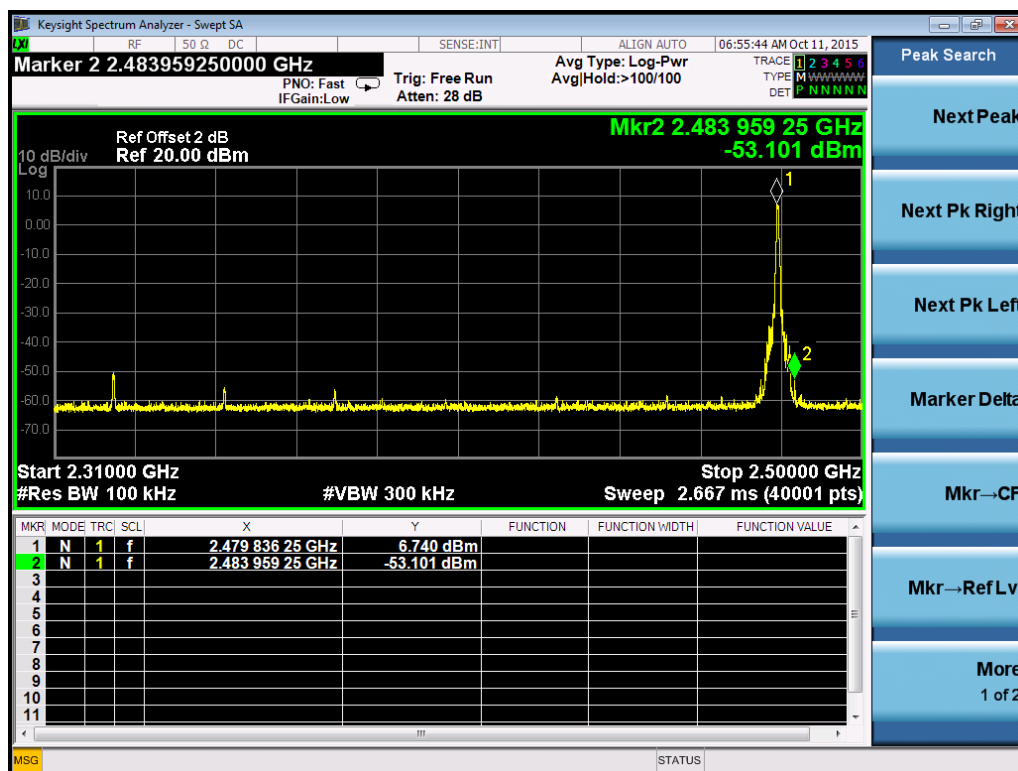


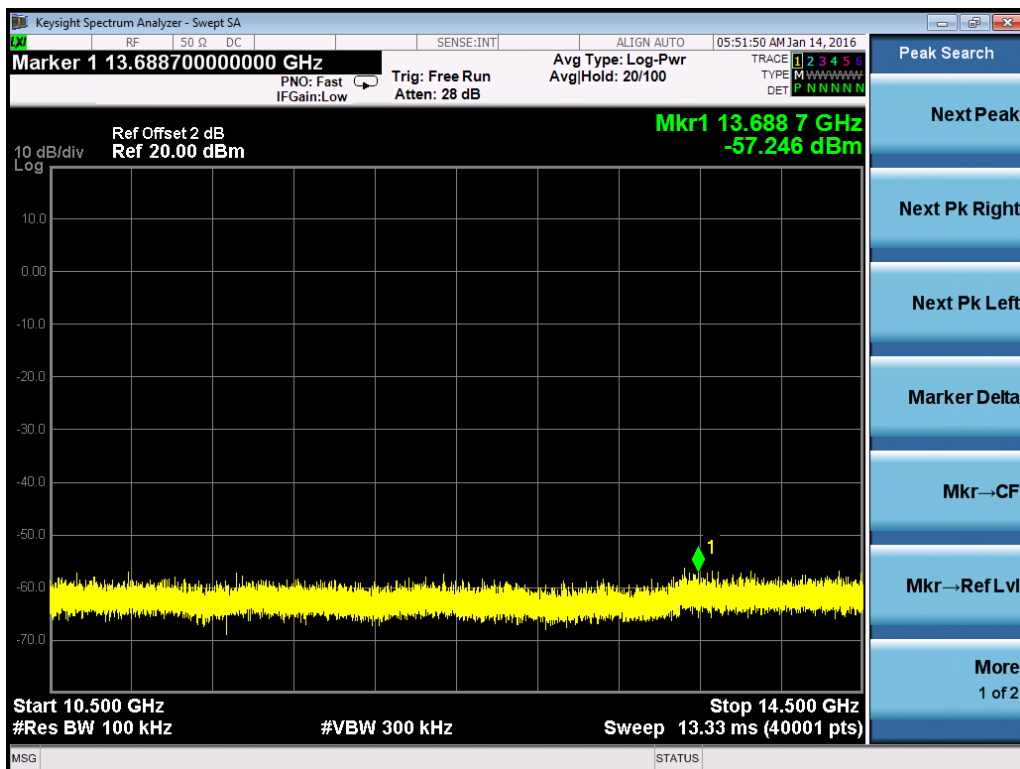
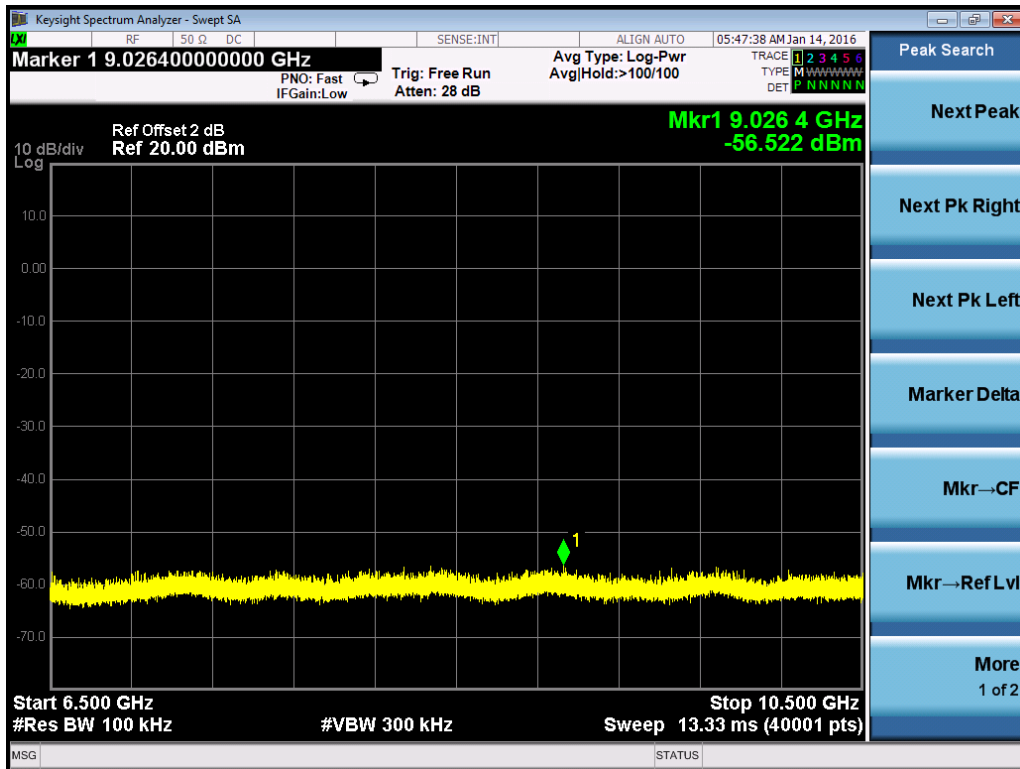


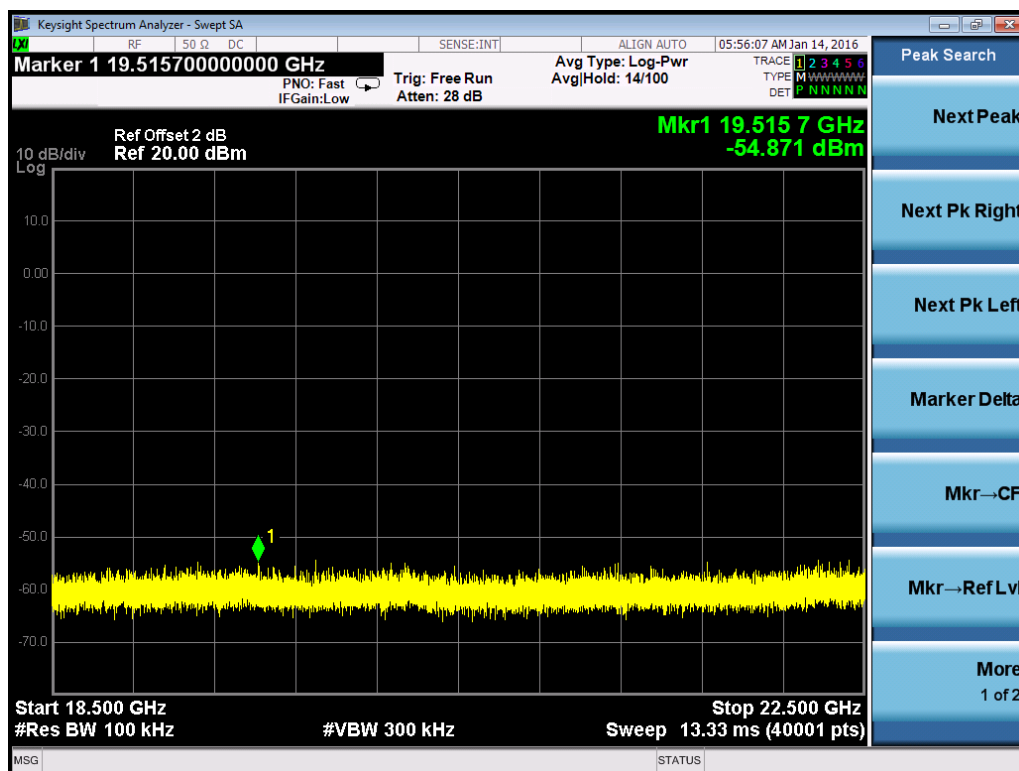
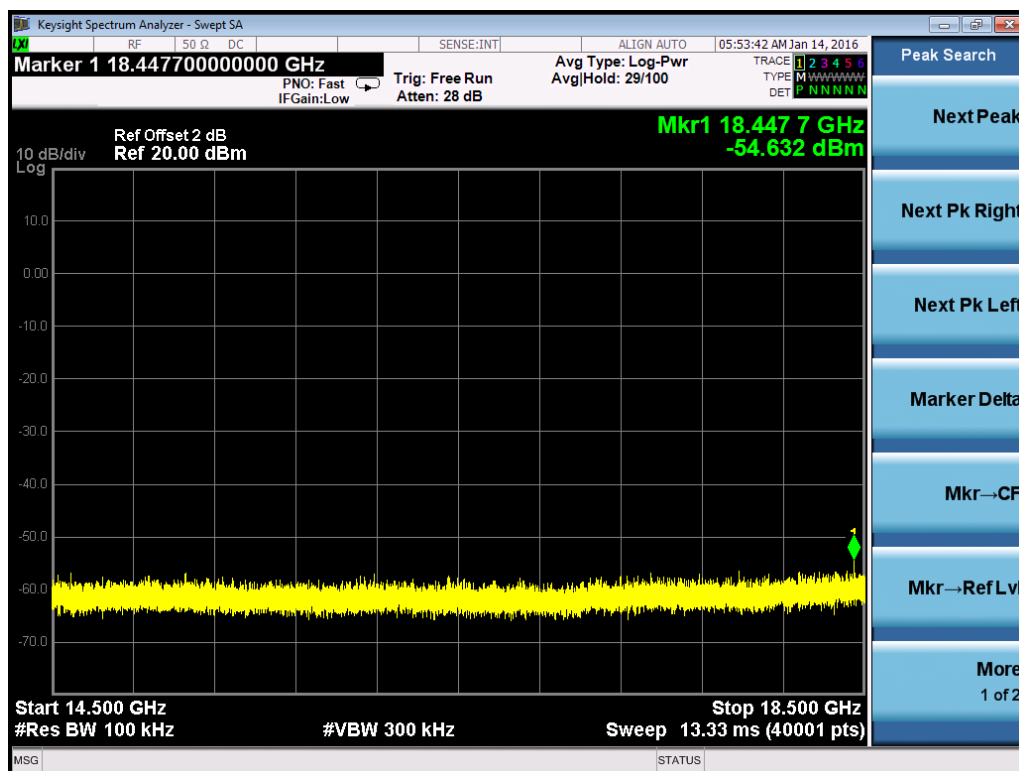


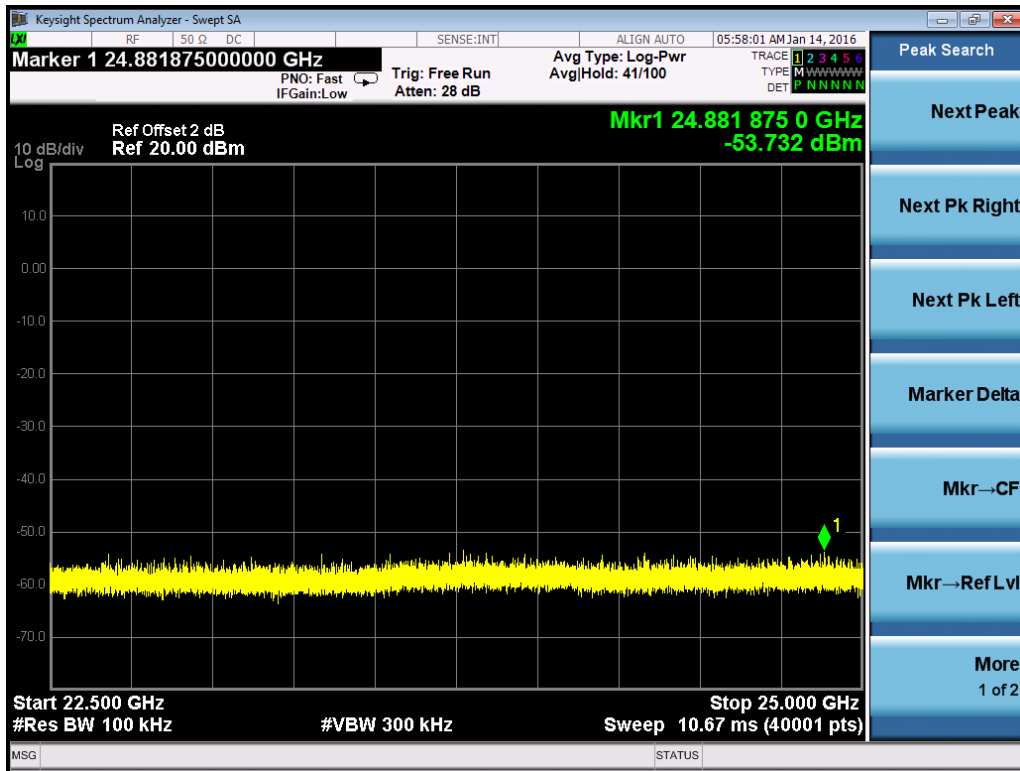
Channel H



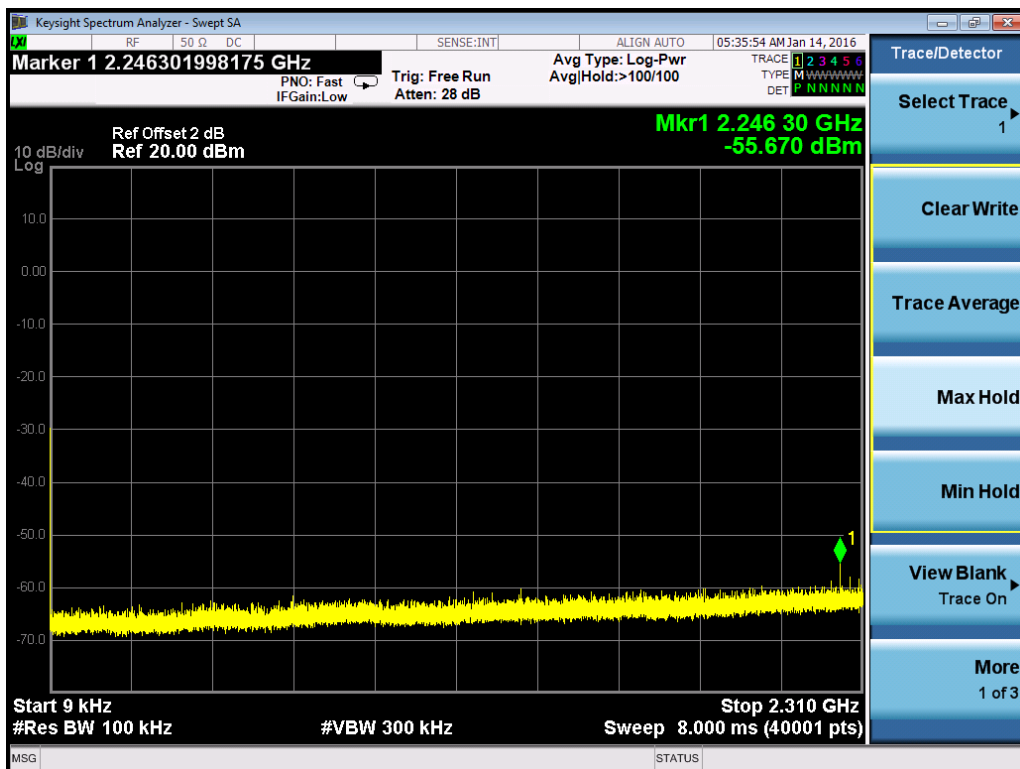


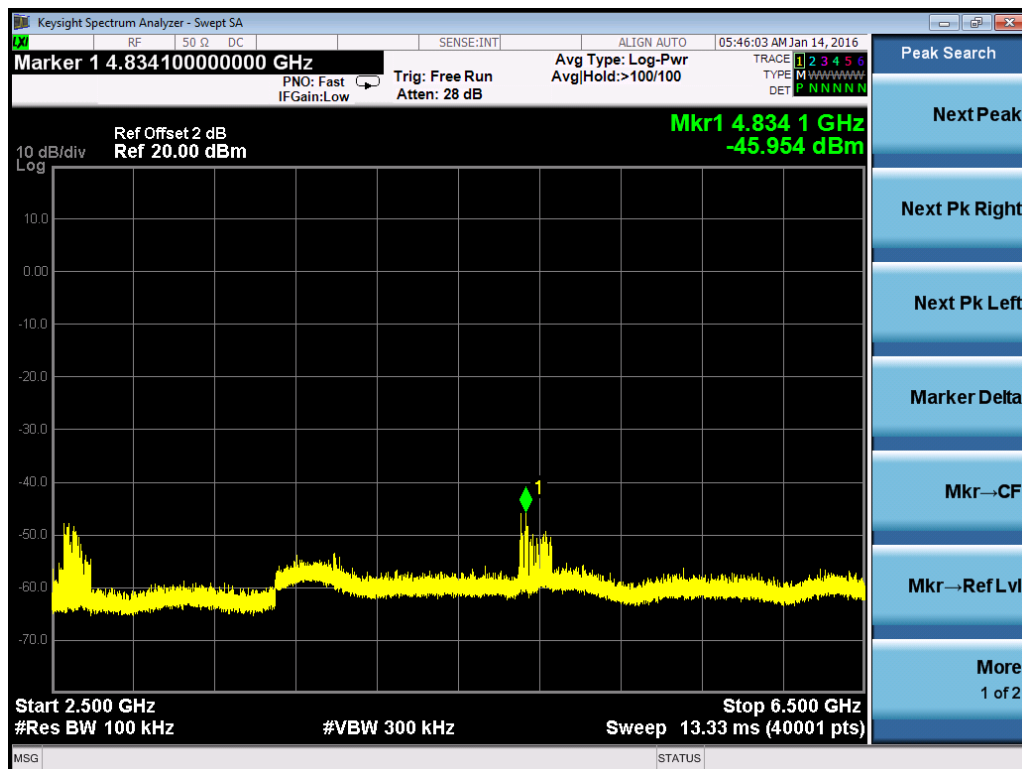
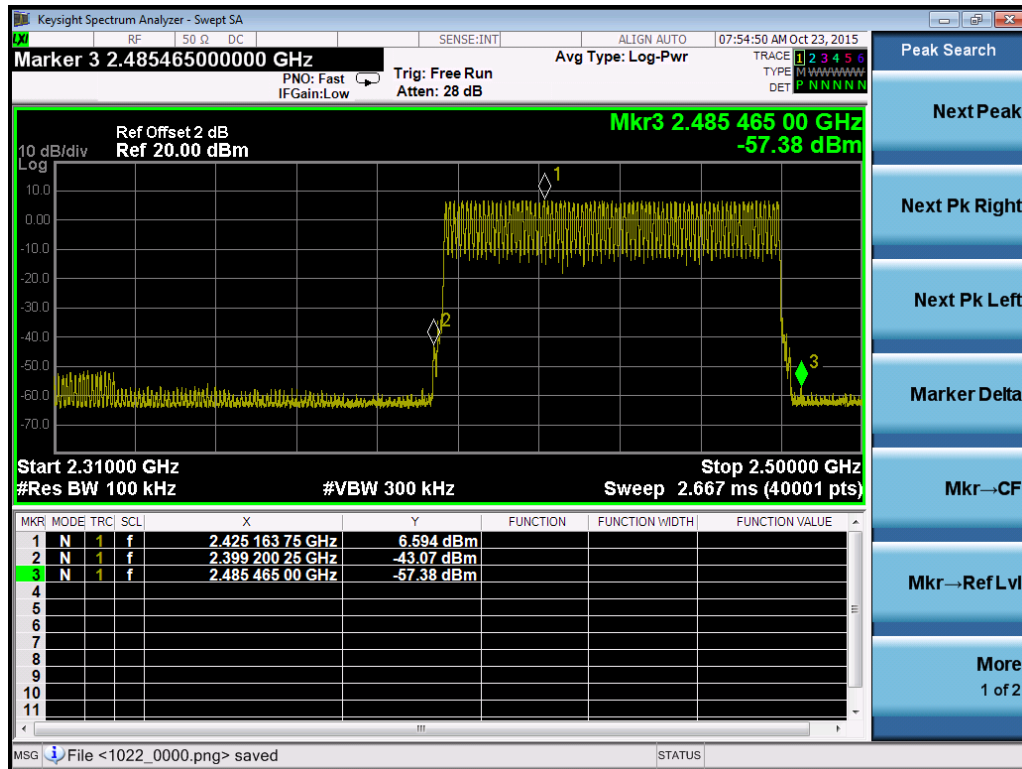


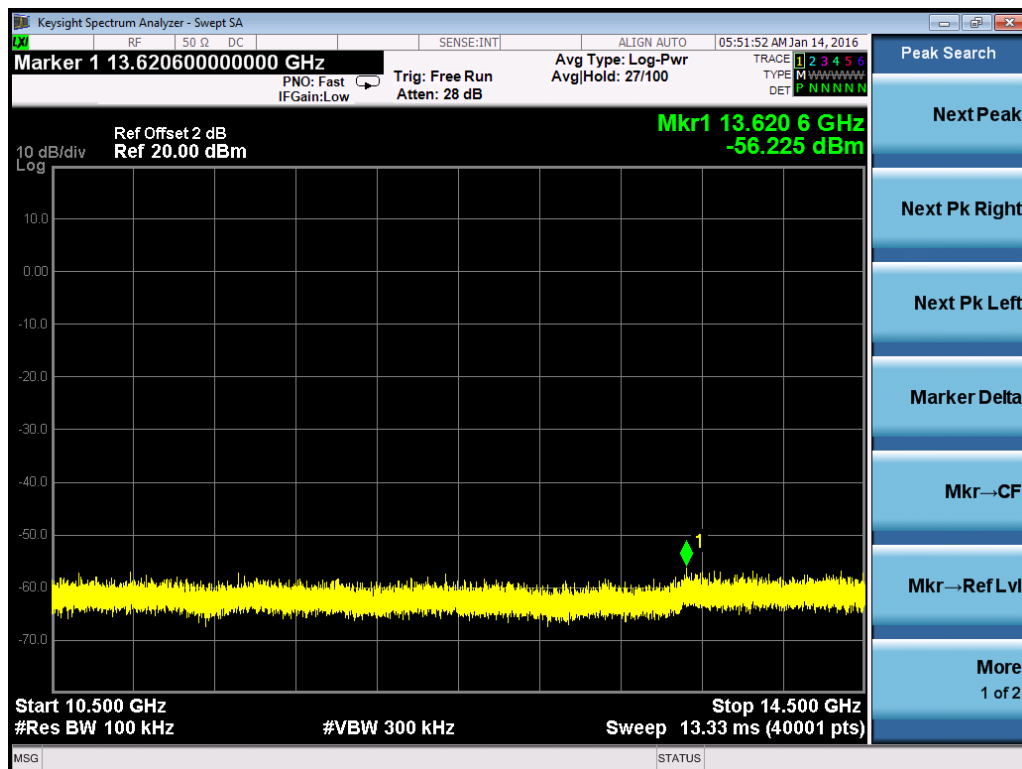
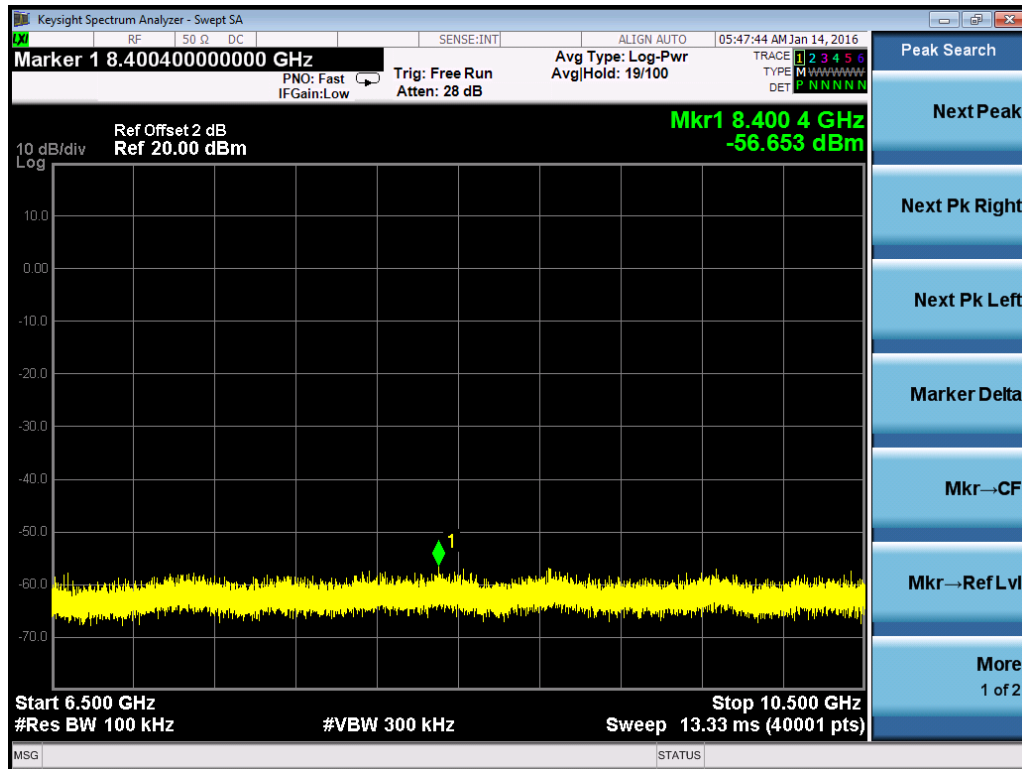


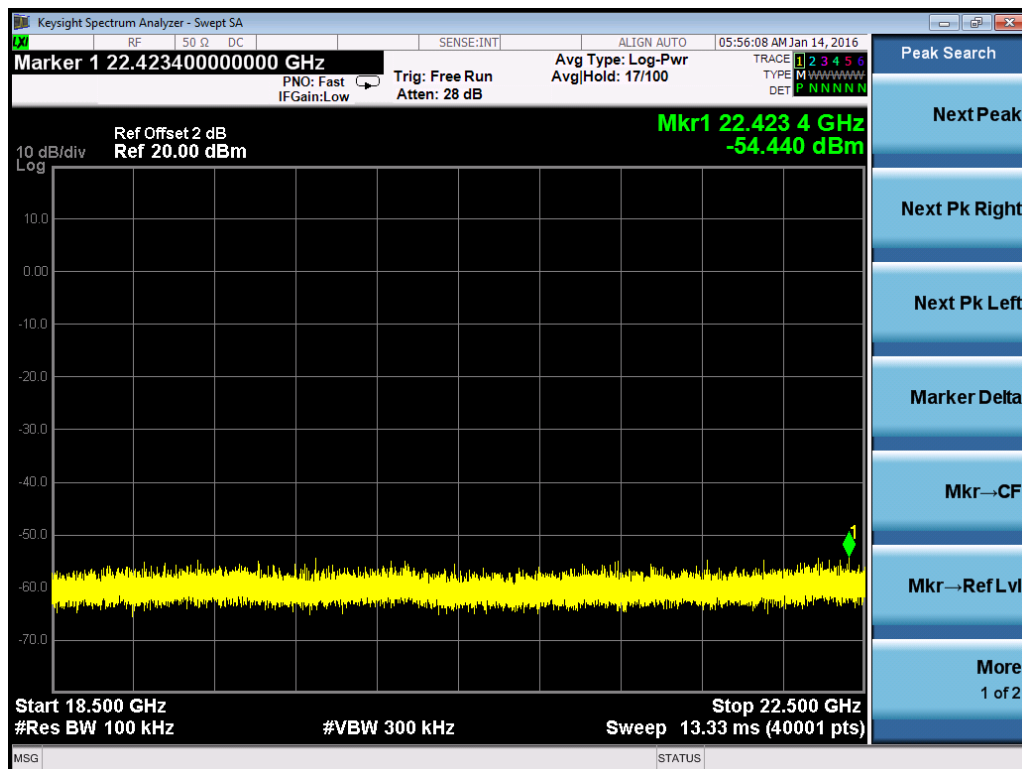
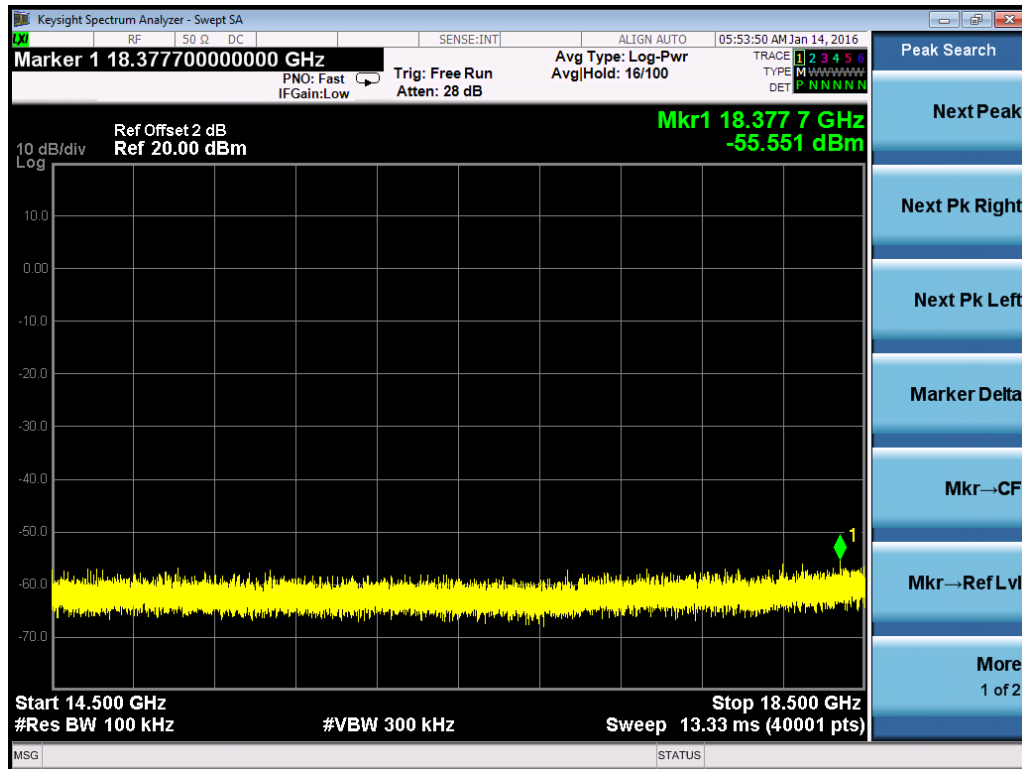


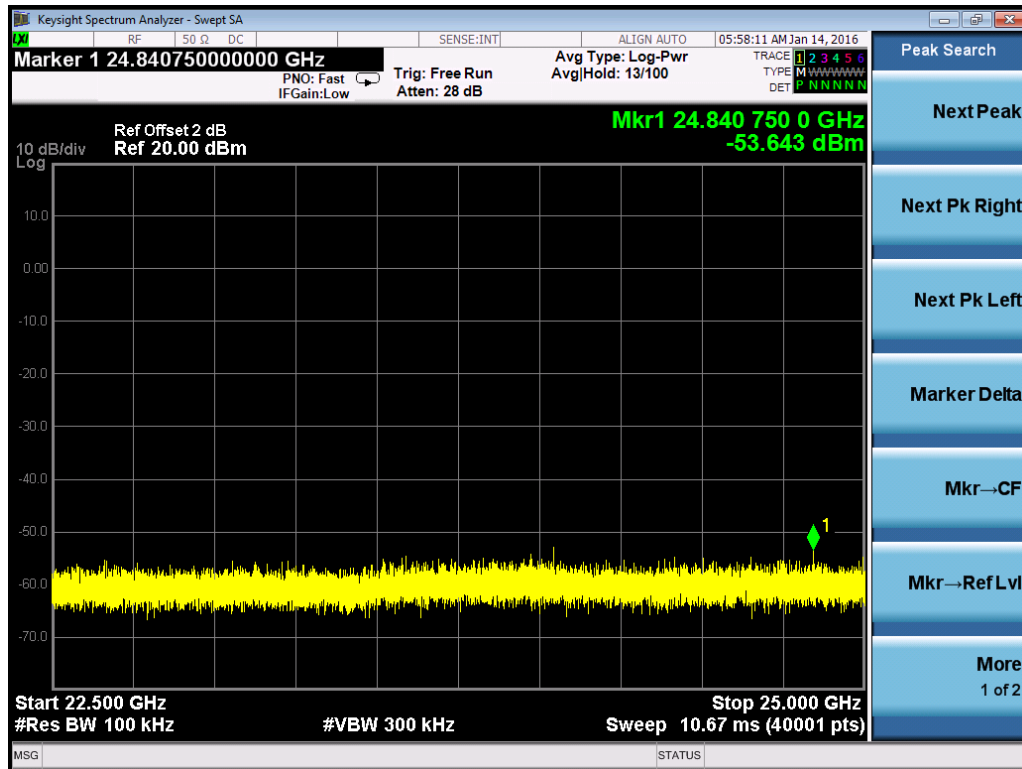
Hopping





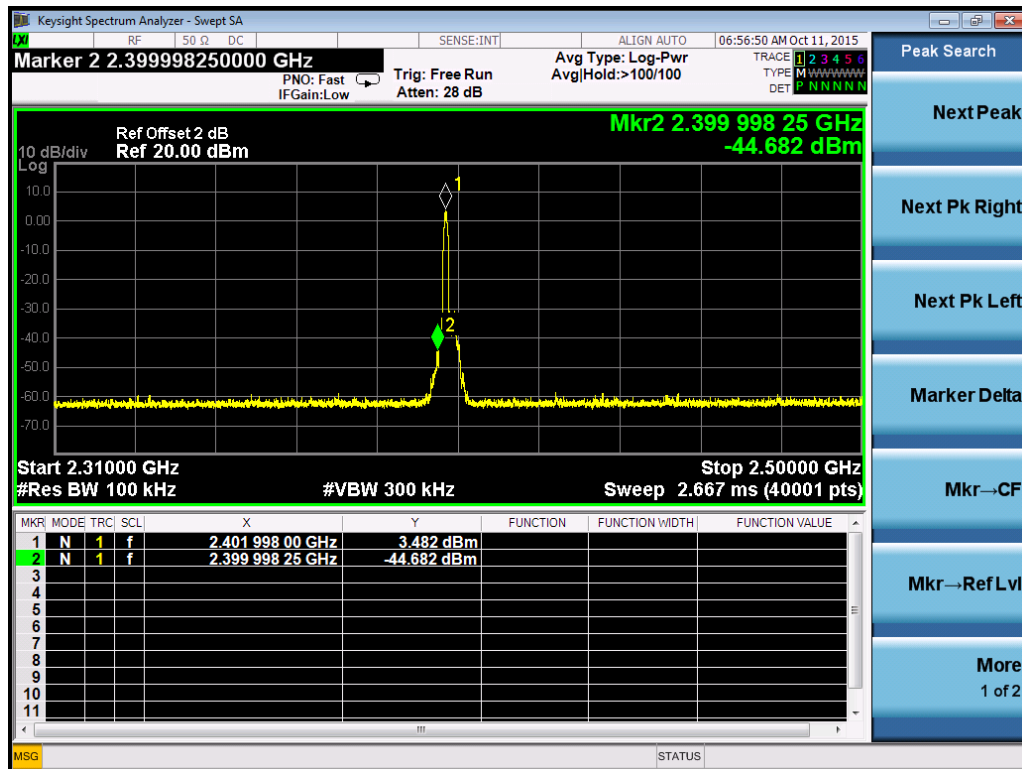
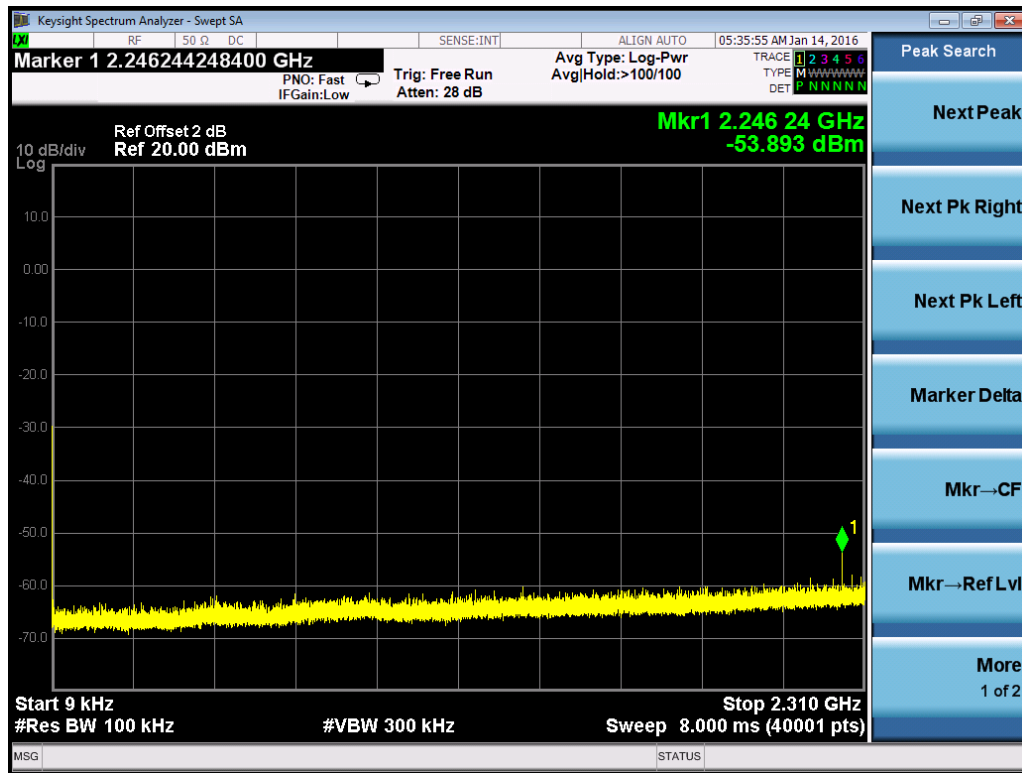


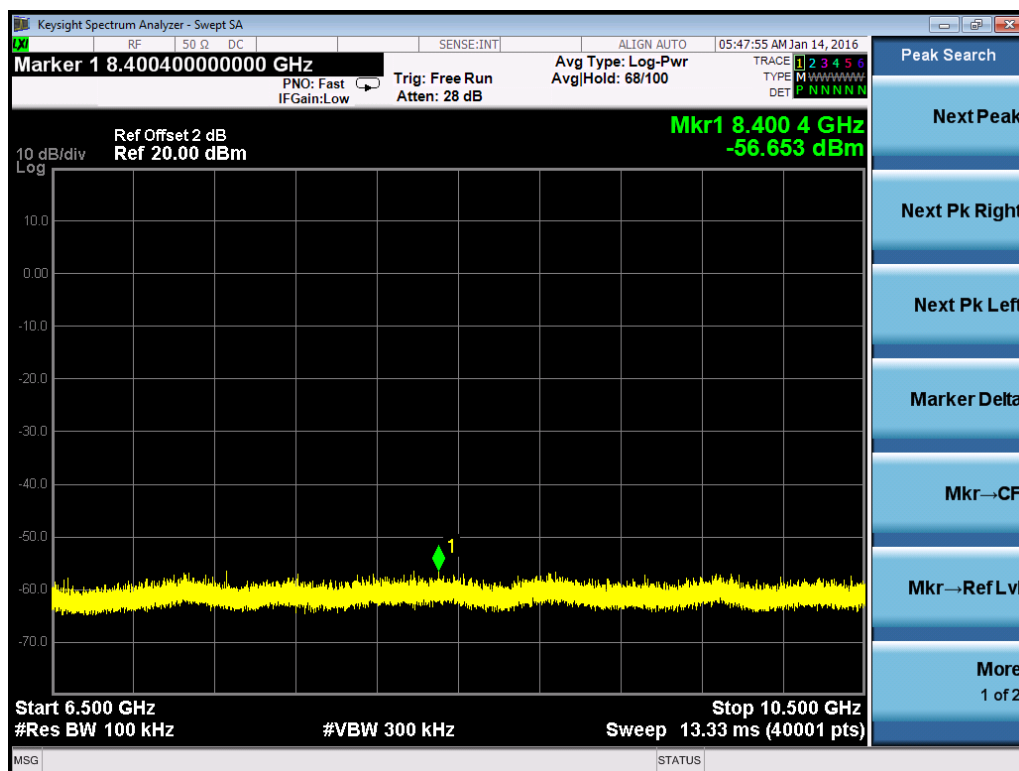
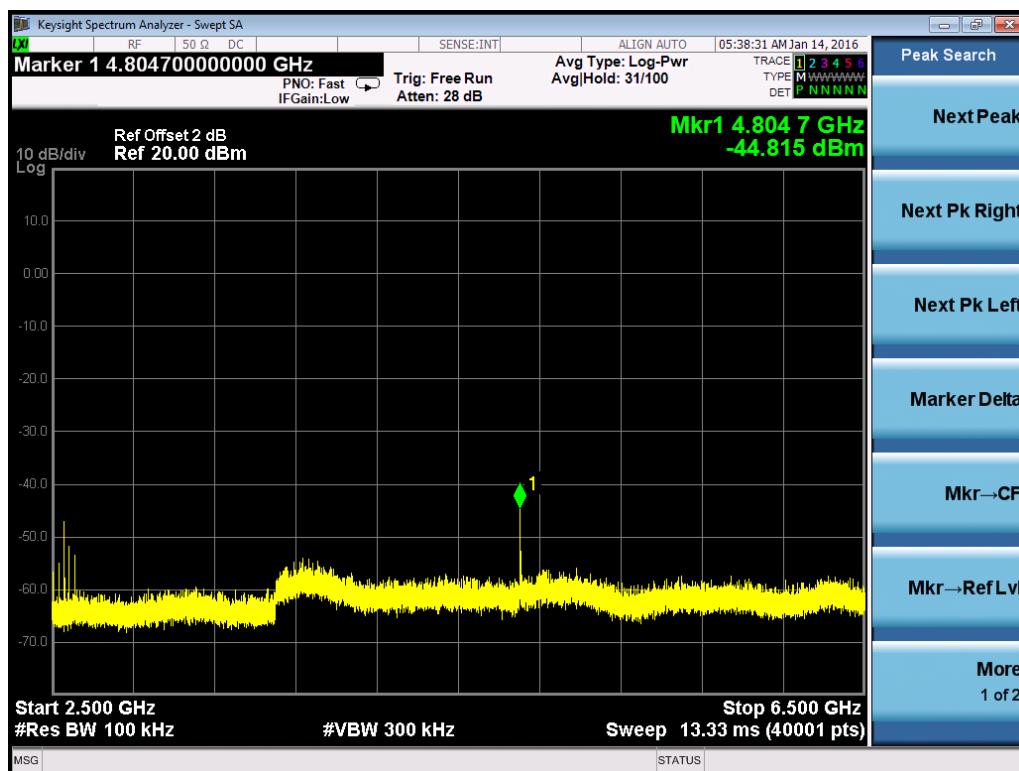


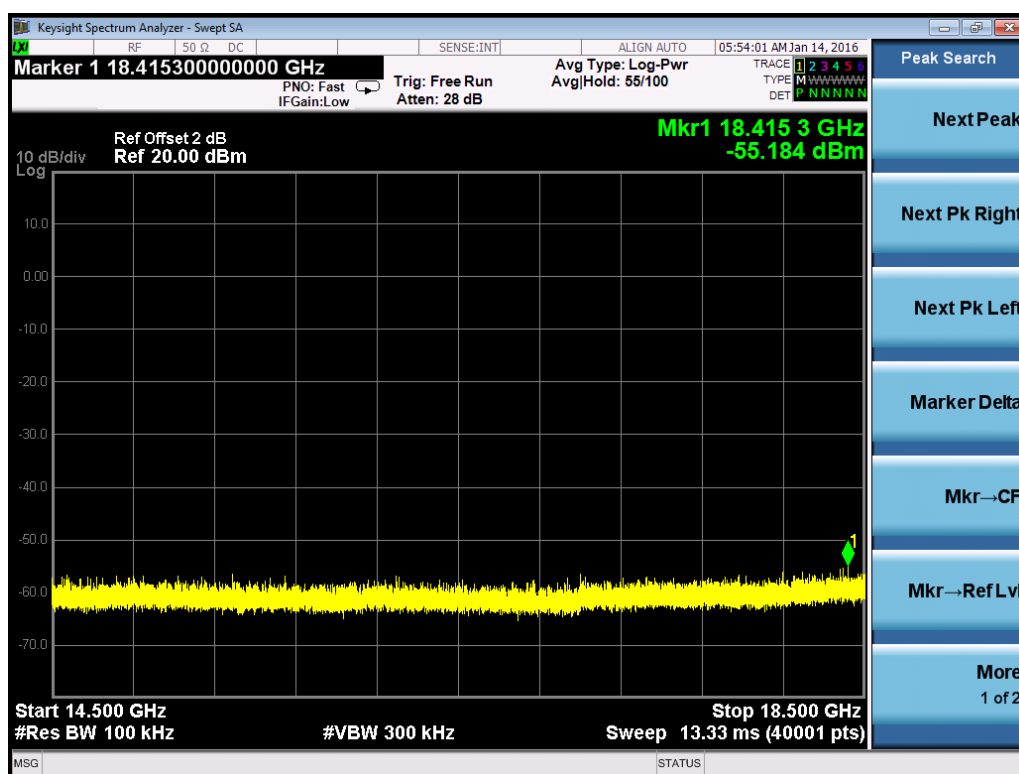
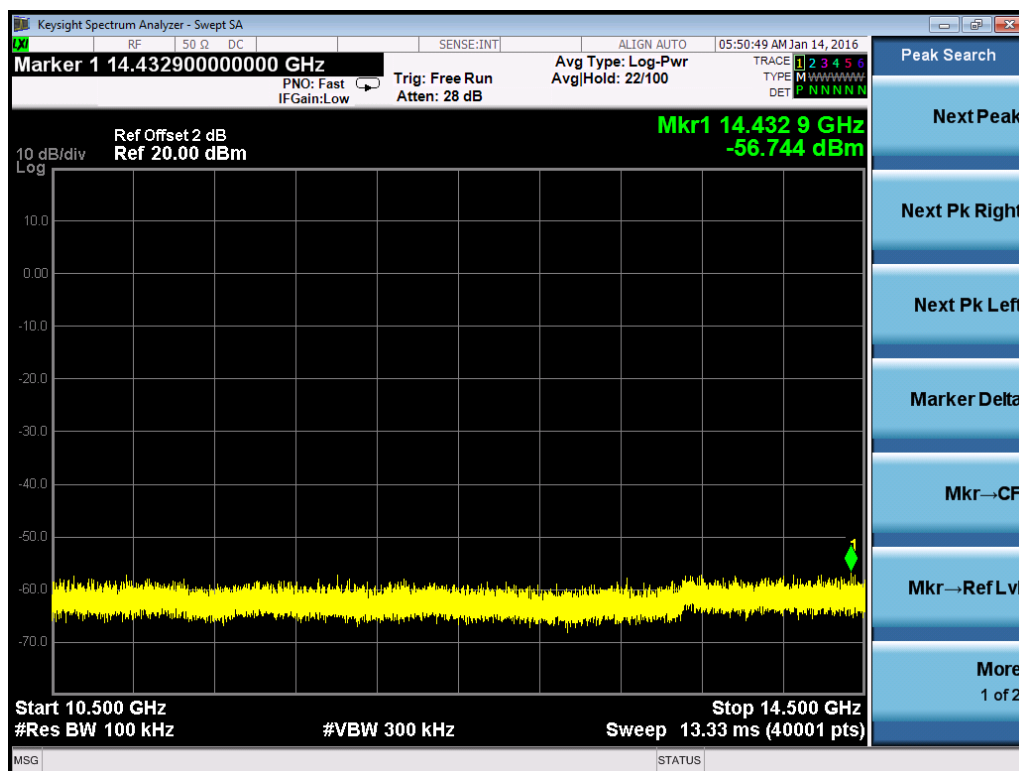


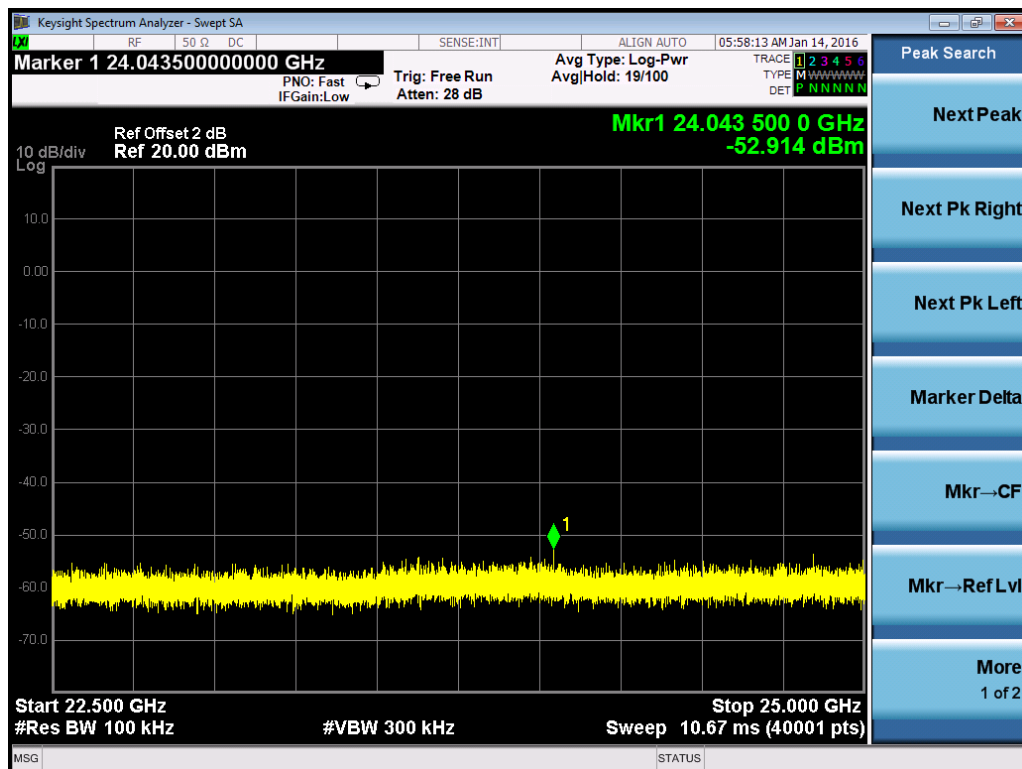
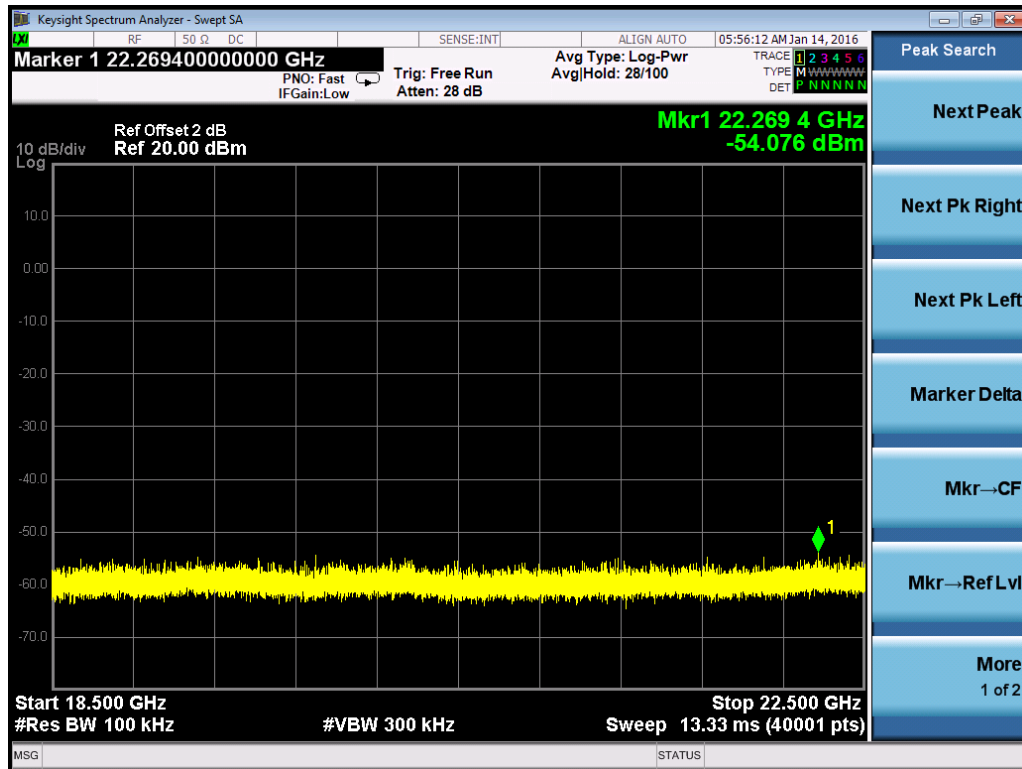
Modulation	Channel	Max reading among band (dBm)	Results	Limit (dBm)
$\pi/4$ -DQPSK	L	3.482	Pass	≥ 20
	M	4.542	Pass	≥ 20
	H	5.044	Pass	≥ 20
	Hopping	4.662	Pass	≥ 20

Channel L









Channel M

