


TEST REPORT

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1. Customer

- Name : PARTRON CO., LTD.
- Address : 22-6 Seoku-dong, Hwaseong-si, Gyeonggi-do, Korea

2. Use of Report : FCC Original Grant

3. Product Name (FCC ID) : WLAN, Bluetooth and Zigbee Module (2AD5K-CZ3730A)



4. Date of Test : 2015-09-14 ~ 2015-10-02

5. Test Method Used: FCC Part 15 Subpart C.247

6. Testing Environment : See appended test report

7. Test Result : Pass Fail

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by Name : JaeJin Lee  (Signature)	Technical Manager Name : GeunKi Son  (Signature)
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2015. 11. 27

DT&C Co., Ltd.

Test Report Version

Test Report No.	Date	Description
DRTFCC1511-0245	Nov. 27, 2015	Initial issue

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1. EUT DESCRIPTION

Product	WLAN, Bluetooth and Zigbee Module
Model Name	CZ3730A
Power Supply	DC 3.3 V
Hardware version	Rev_0.2
Software version	r8.a8.04_32
Frequency Range	2.4GHz Band <ul style="list-style-type: none"> ▪ 802.11b/g/n(20 MHz) : 2412 MHz ~ 2462 MHz ▪ 802.11n(40 MHz) : 2422 MHz ~ 2452 MHz
Max. RF Output Power	2.4GHz Band <ul style="list-style-type: none"> ▪ 802.11b : 17.25 dBm ▪ 802.11g : 21.37 dBm ▪ 802.11n (HT20) : 23.72 dBm ▪ 802.11n (HT40) : 20.34 dBm
Modulation Type	802.11b : DSSS/CCK 802.11g/n : OFDM
Antenna Specification	<p>Antenna type: Chip Antenna</p> <p>Antenna gain</p> <ul style="list-style-type: none"> ▪ ANT 1: -1.07 dBi & ANT 2: 1.63 dBi <p>Antenna configuration</p> <ul style="list-style-type: none"> ▪ 802.11b/g : Single Transmitting (ANT 1 or ANT 2) ▪ 802.11n HT20(MCS0 ~ 7): Single Transmitting (ANT 1 or ANT 2) ▪ 802.11n HT20(MCS8 ~ 15): Multiple Transmitting (ANT 1 and ANT 2) ▪ 802.11n HT40(MCS0 ~ 7): Single Transmitting (ANT 1 or ANT 2)

2. INFORMATION ABOUT TESTING

2.1 Test mode

Test mode	Worst case data rate	Tested Frequency (MHz)		
		Lowest	Middle	Highest
TM 1	802.11b 1 Mbps	2412	2437	2462
TM 2	802.11g 6 Mbps	2412	2437	2462
TM 3	802.11n(HT20) MCS 0, MCS 8	2412	2437	2462
TM 4	802.11n(HT40) MCS 0	2422	2437	2452

Note 1: The worst case data rate is determined as above test mode according to the power measurements. And all test items were performed at the worst case data rate.

2.2 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

2.3 Tested environment

Temperature	: 23 ~ 24 °C
Relative humidity content	: 42 ~ 45 % R.H.
Details of power supply	: DC 3.3 V

2.4 EMI suppression Device(s) / Modifications

EMI suppression device(s) added and/or modifications made during testing
→ None

3. SUMMARY OF TESTS

FCC Part Section(s)	Parameter	Limit	Test Condition	Status Note 1
15.247(a)	6 dB Bandwidth	> 500 kHz	Conducted	C
15.247(b)	Transmitter Output Power	< 1 Watt		C
15.247(d)	Out of Band Emissions / Band Edge	20 dBc in any 100 kHz BW		C
15.247(e)	Transmitter Power Spectral Density	< 8 dBm/3kHz		C
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	FCC 15.209 limits	Radiated	C Note 2
15.207	AC Conducted Emissions	FCC 15.207 limits	AC Line Conducted	C
15.203	Antenna Requirements	FCC 15.203	-	C

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

Note 2: This test item was performed in each axis and the worst case data was reported.

4. TEST METHODOLOGY

Generally the tests were performed according to the KDB558074 v03r03. And ANSI C63.10-2013 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing.

4.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT EXERCISE

The EUT was operated in the test mode to fix the TX frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

4.3 GENERAL TEST PROCEDURES

Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB 558074. So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10.

The EUT is placed on the wooden table, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and Average detector.

Radiated Emissions

Basically the radiated tests were performed with KDB 558074. But some requirements and procedures like test site requirements, EUT setup and maximizing procedure were fulfilled with the requirements in Section 5 and 6 of the ANSI C63.10 as stated on section 12.1 of the KDB 558074.

The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the highest emission, the relative positions of the EUT were rotated through three orthogonal axes.

4.4 DESCRIPTION OF TEST MODES

The EUT has been tested with all modes of operating conditions to determine the worst case emission characteristics. A test program is used to control the EUT for staying in continuous transmitting mode.

5. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

6. FACILITIES AND ACCREDITATIONS

6.1 FACILITIES

The open area test site (OATS) or semi anechoic chamber and conducted measurement facility used to collect the radiated and conducted test data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935. The site is constructed in conformance with the requirements.

- **Semi anechoic chamber registration Number: 165783(FCC)**

6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and peak, quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

7. ANTENNA REQUIREMENTS

7.1 According to FCC 47 CFR §15.203:

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The antenna is permanently attached to the end product using the soldering. Therefore this E.U.T Complies with the requirement of §15.203.

7.2 Directional antenna gain for MIMO :

Bands	ANT 1 [dBi]	ANT 2 [dBi]	Directional Gain for uncorrelated signals [dBi]
2.4 GHz	-1.070	1.630	0.487 ^{Note 2.}

Note 1. Directional gain(correlated signal with unequal antenna gain and equal transmit power)

$$10 \log [(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N^{ANT}] \text{ dBi}$$

Note 2. Directional gain(completely uncorrelated signal with unequal antenna gain and equal transmit power)

$$10 \log [(10^{G_1/10} + 10^{G_2/10} + \dots + 10^{G_N/10}) / N^{ANT}] \text{ dBi}$$

Note 3. Directional gain(spatial multiplexing)

$$G_{ANT\ MAX} + 10 \log (N_{ANT} / N_{SS}) \text{ dBi}$$

8. TEST RESULT

8.1 6 dB Bandwidth

Test Requirements and limit, §15.247(a)

The bandwidth at 6 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

The minimum permissible 6 dB bandwidth is 500 kHz.

■ TEST CONFIGURATION

Refer to the APPENDIX I.

■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB558074**

1. Set resolution bandwidth (RBW) = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
(RBW : 100 kHz / VBW : 300 kHz)
3. Detector = **Peak**.
4. Trace mode = **Max hold**.
5. Sweep = **Auto couple**.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

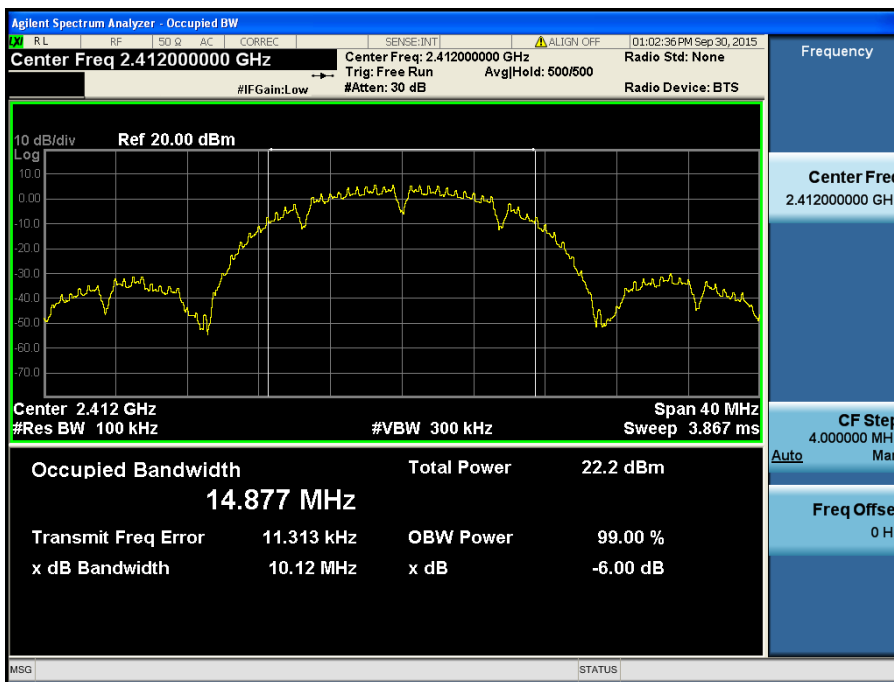
■ TEST RESULTS: **Comply**

Test Mode	Frequency	Test Results[MHz]	
		ANT 1	ANT 2
TM 1	Lowest	10.12	10.09
	Middle	10.09	10.05
	Highest	10.08	10.10
TM 2	Lowest	15.10	15.13
	Middle	15.12	15.08
	Highest	15.11	15.14
TM 3	Lowest	15.13	15.16
	Middle	15.11	15.12
	Highest	15.13	15.11
TM 4	Lowest	35.12	35.11
	Middle	35.10	35.09
	Highest	35.02	35.12

RESULT PLOTS

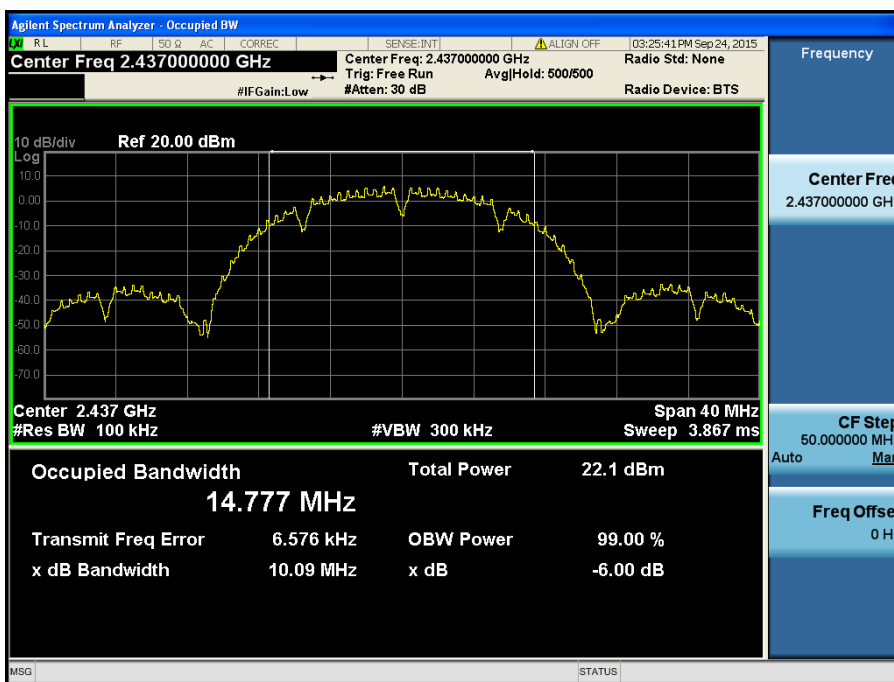
6 dB Bandwidth

TM 1 & ANT 1 & Lowest



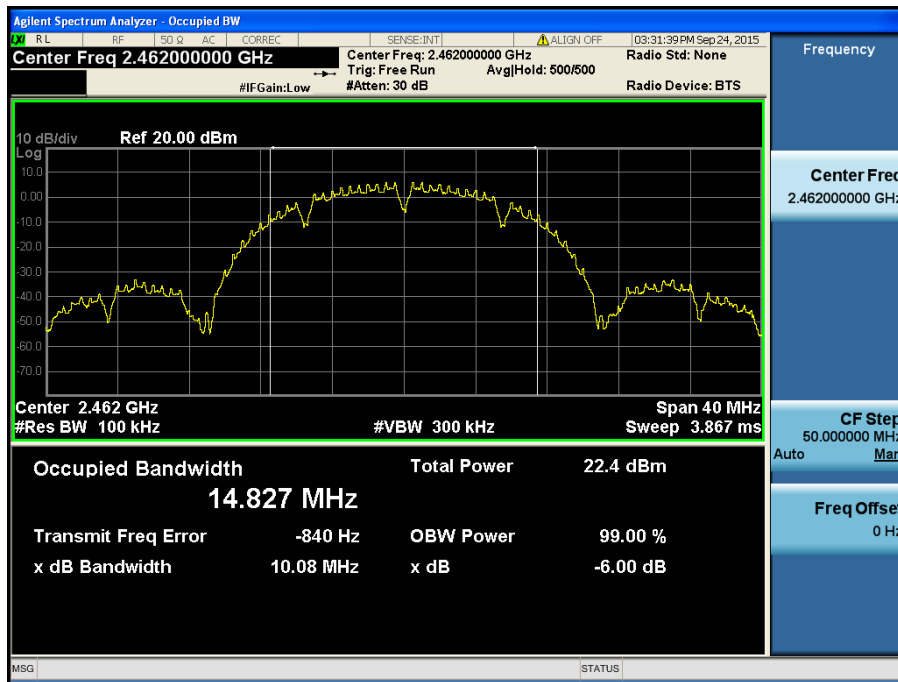
6 dB Bandwidth

TM 1 & ANT 1 & Middle



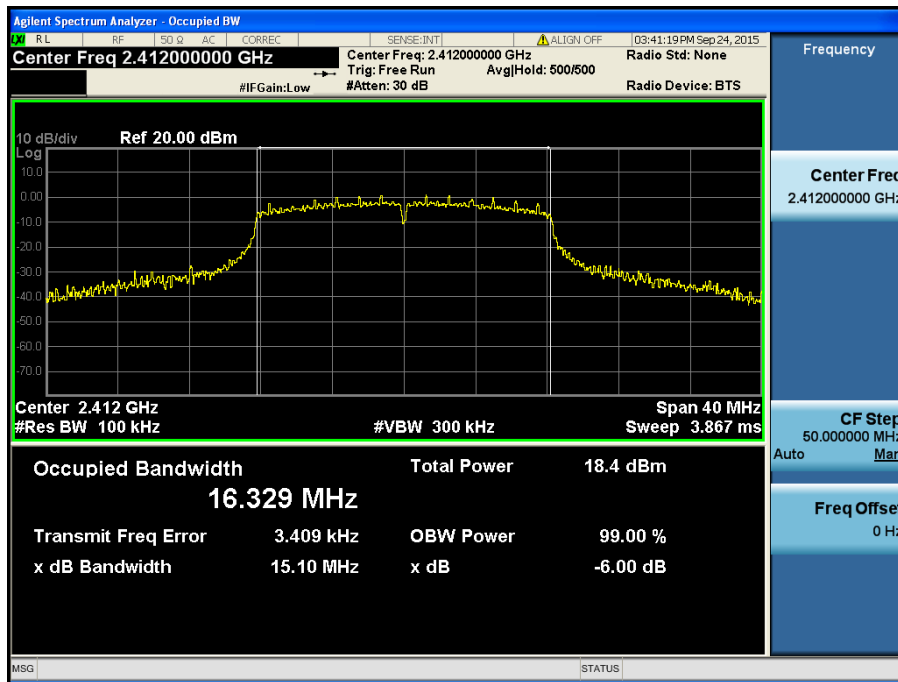
6 dB Bandwidth

TM 1 & ANT 1 & Highest



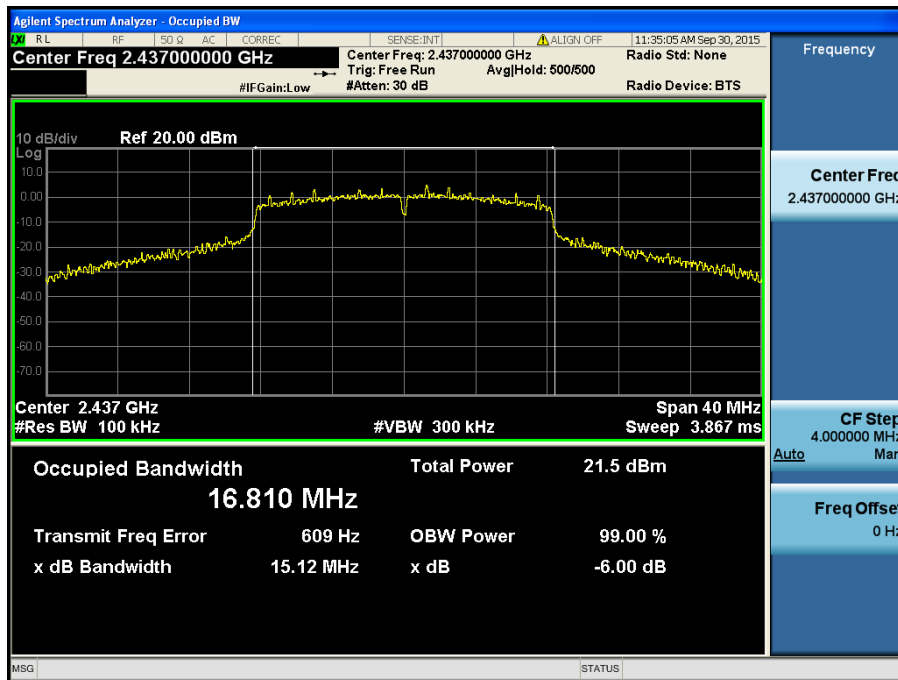
6 dB Bandwidth

TM 2 & ANT 1 & Lowest



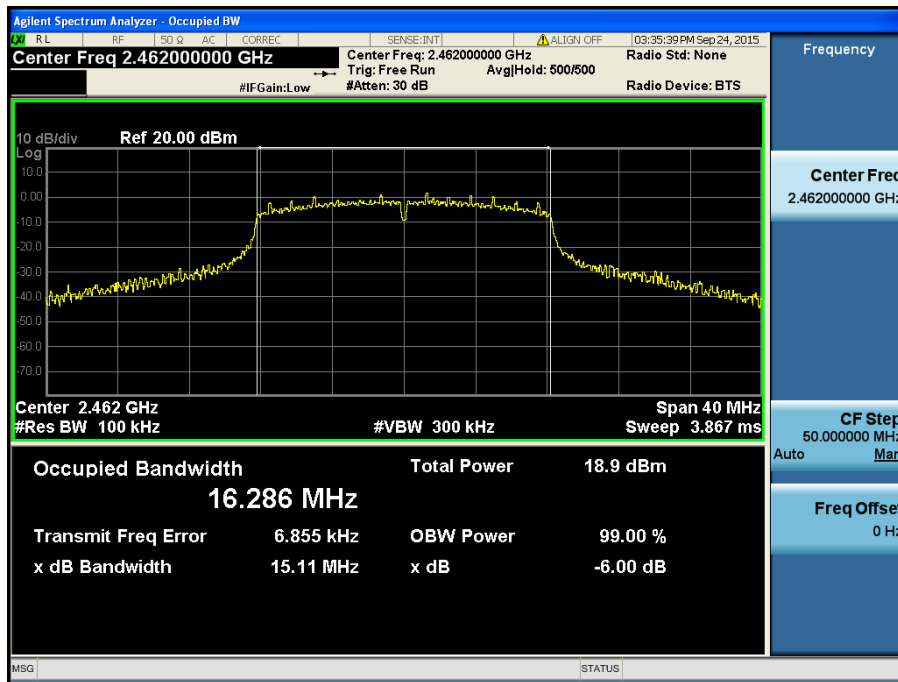
6 dB Bandwidth

TM 2 & ANT 1 & Middle



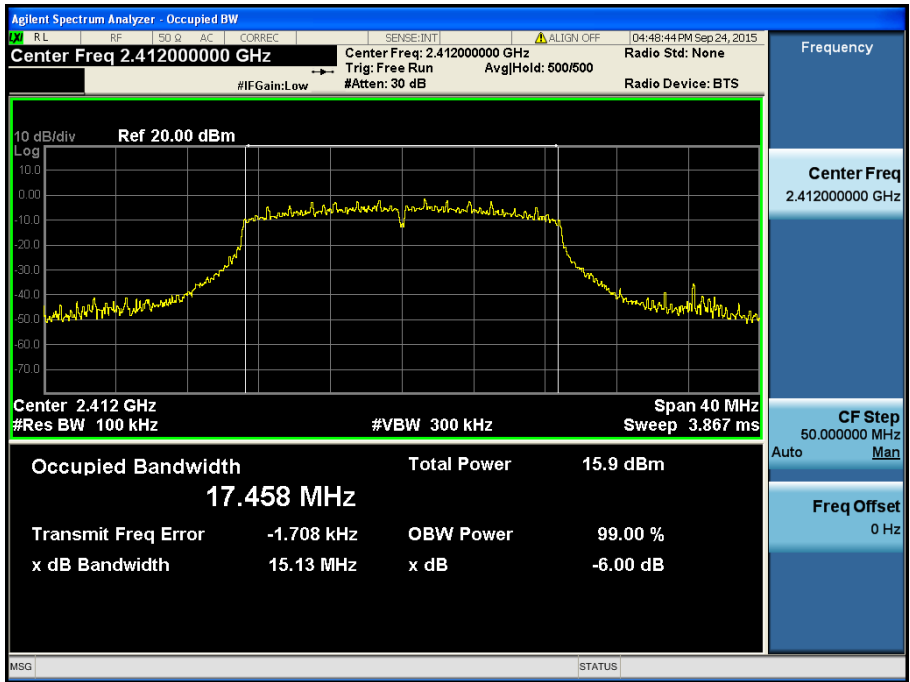
6 dB Bandwidth

TM 2 & ANT 1 & Highest



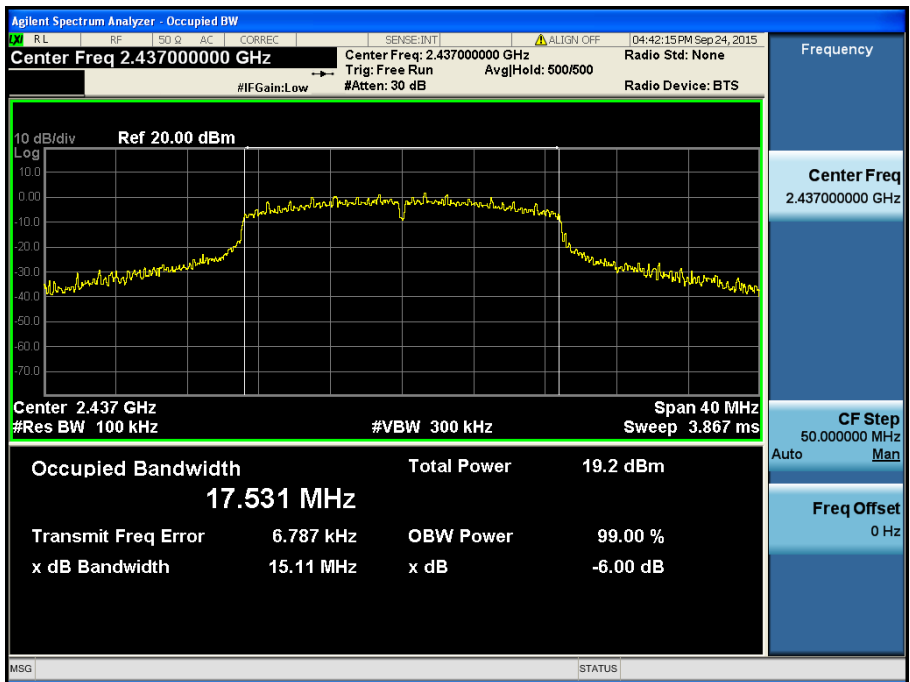
6 dB Bandwidth

TM 3 & ANT 1 & Lowest



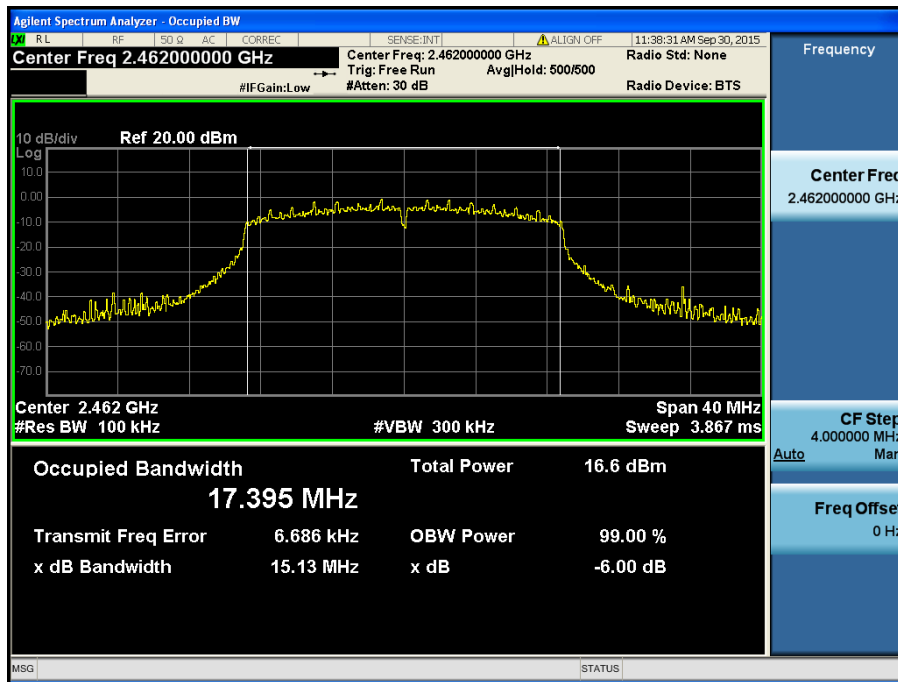
6 dB Bandwidth

TM 3 & ANT 1 & Middle



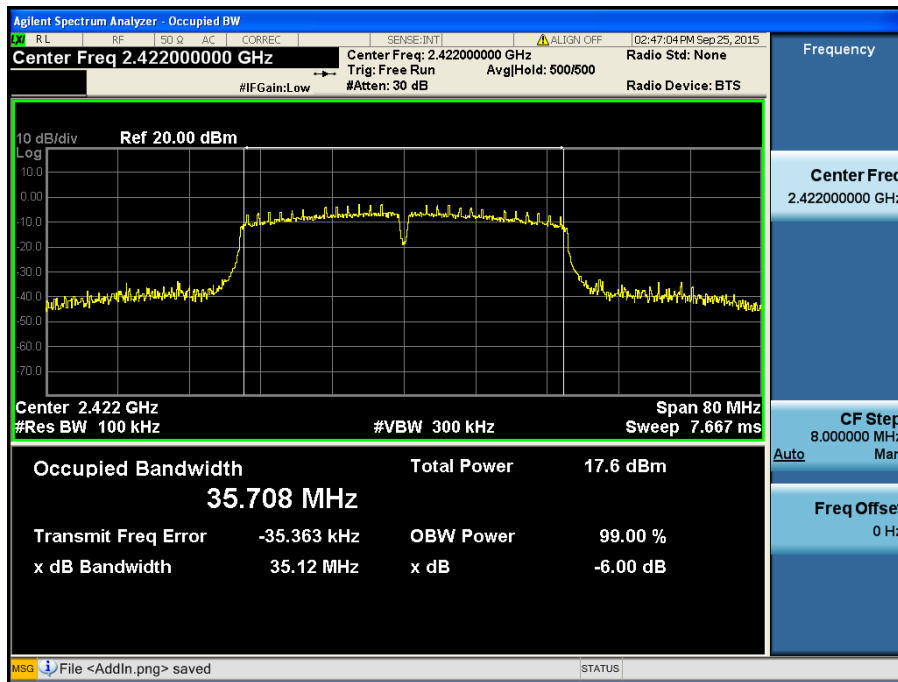
6 dB Bandwidth

TM 3 & ANT 1 & Highest



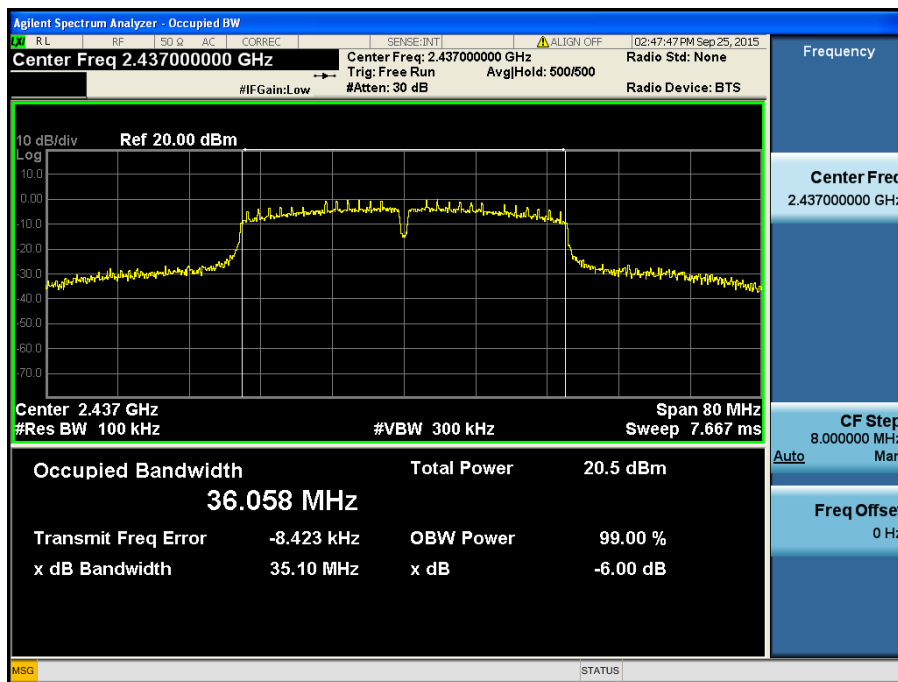
6 dB Bandwidth

TM 4 & ANT 1 & Lowest



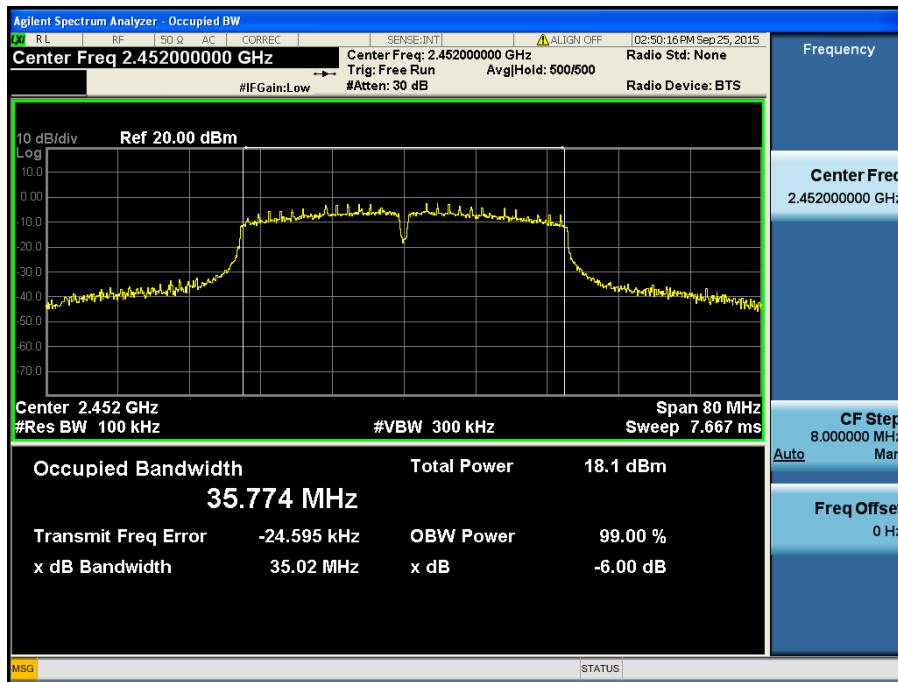
6 dB Bandwidth

TM 4 & ANT 1 & Middle



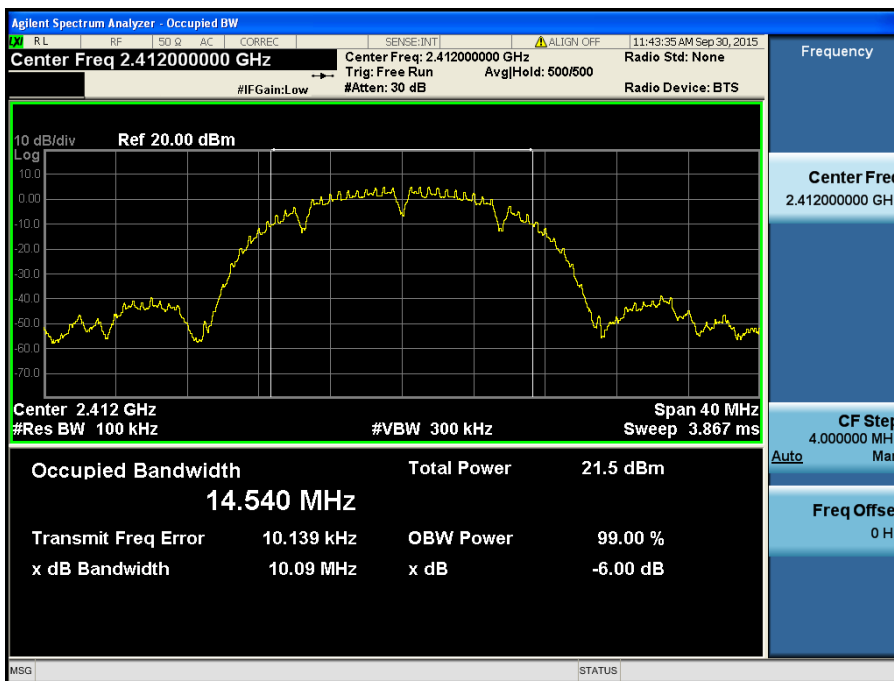
6 dB Bandwidth

TM 4 & ANT 1 & Highest



6 dB Bandwidth

TM 1 & ANT 2 & Lowest



6 dB Bandwidth

TM 1 & ANT 2 & Middle



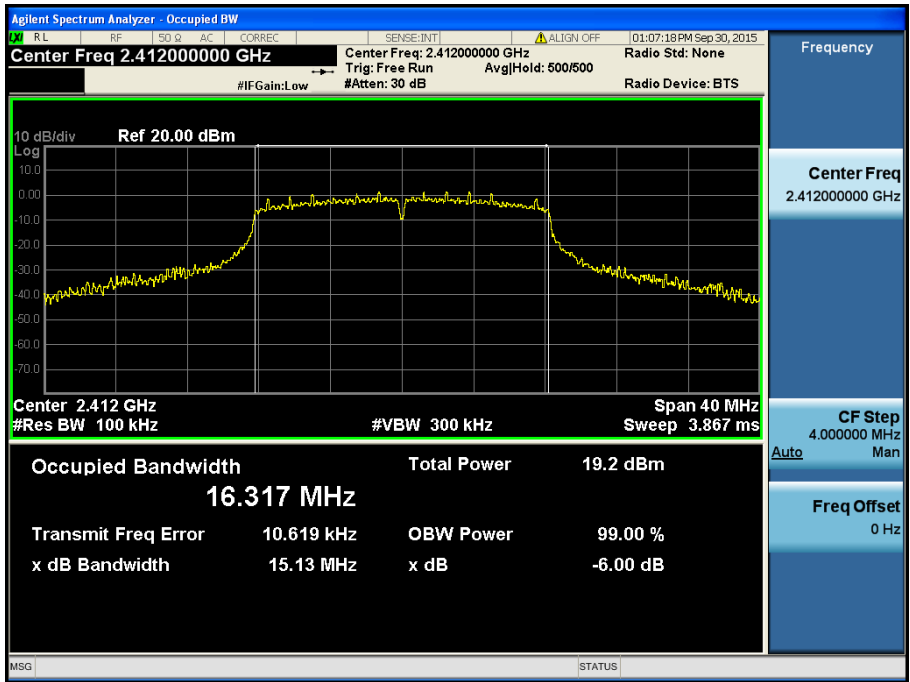
6 dB Bandwidth

TM 1 & ANT 2 & Highest



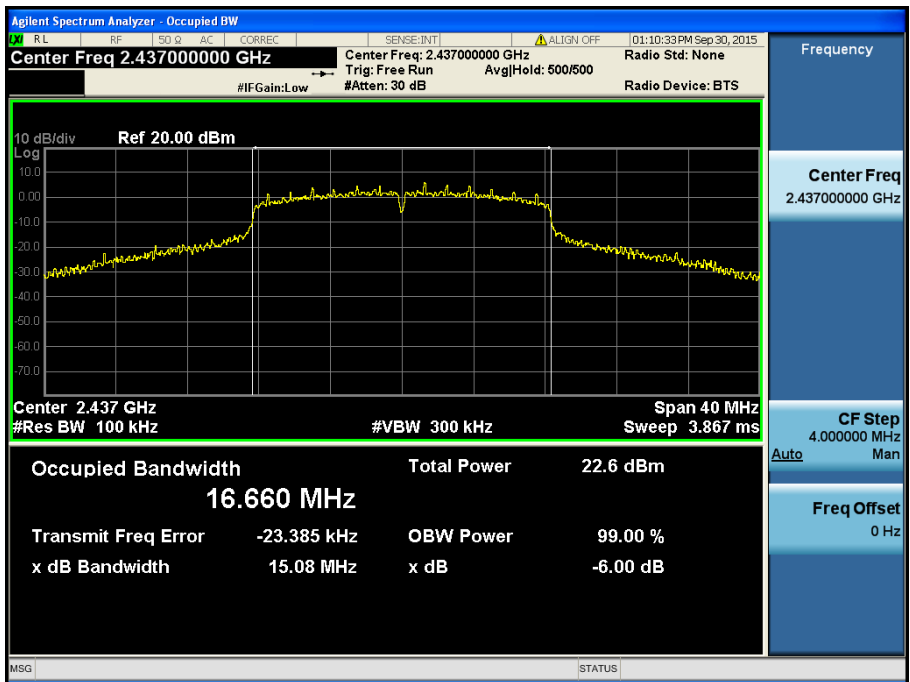
6 dB Bandwidth

TM 2 & ANT 2 & Lowest



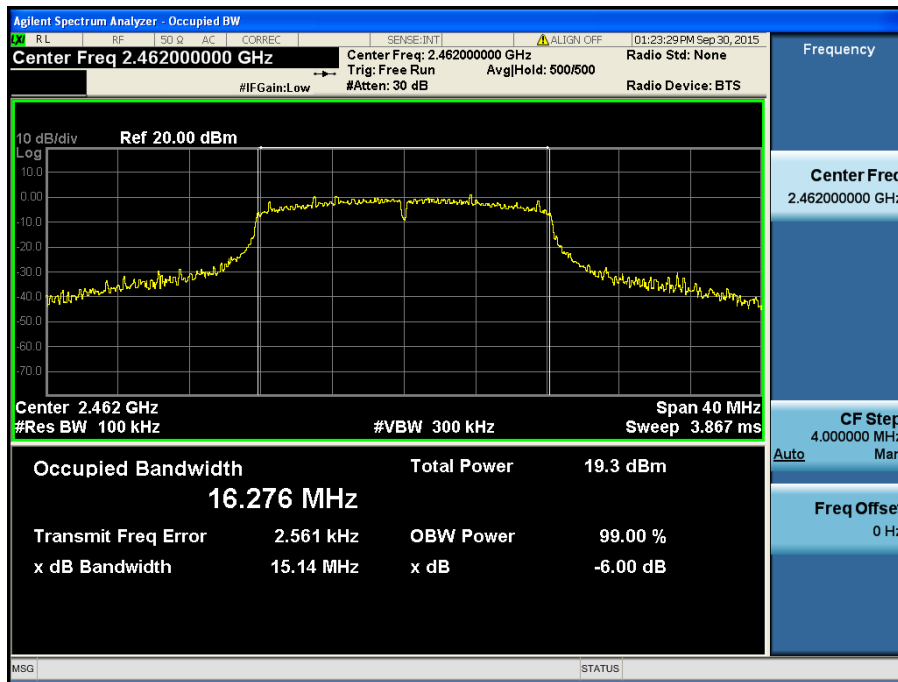
6 dB Bandwidth

TM 2 & ANT 2 & Middle



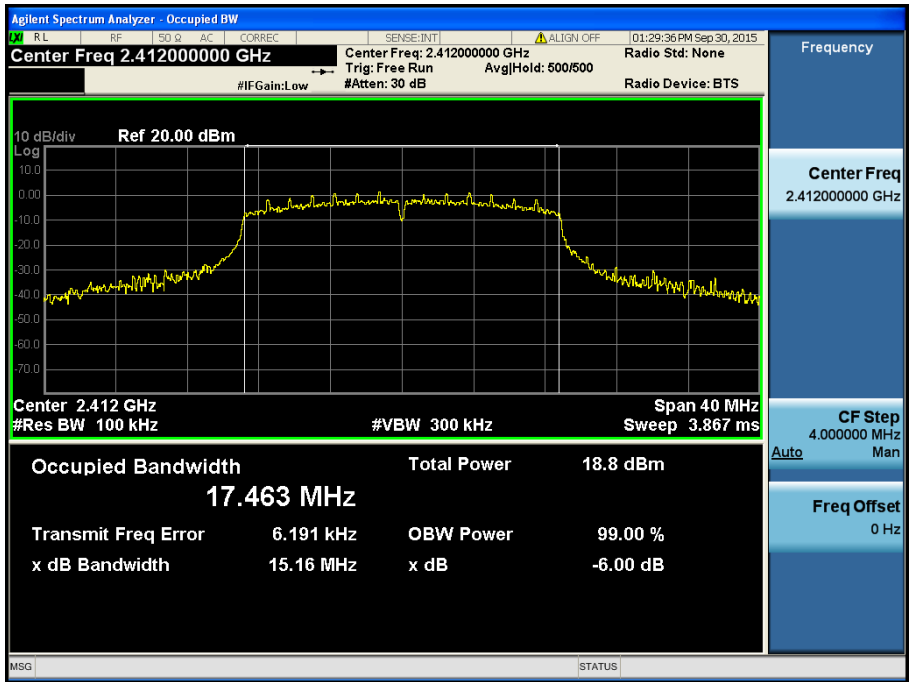
6 dB Bandwidth

TM 2 & ANT 2 & Highest



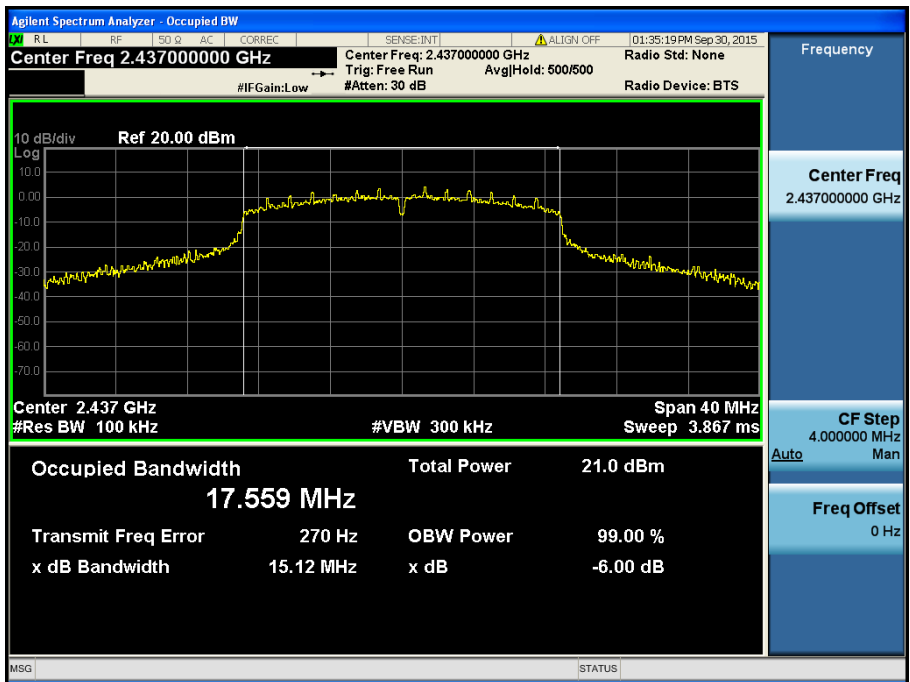
6 dB Bandwidth

TM 3 & ANT 2 & Lowest



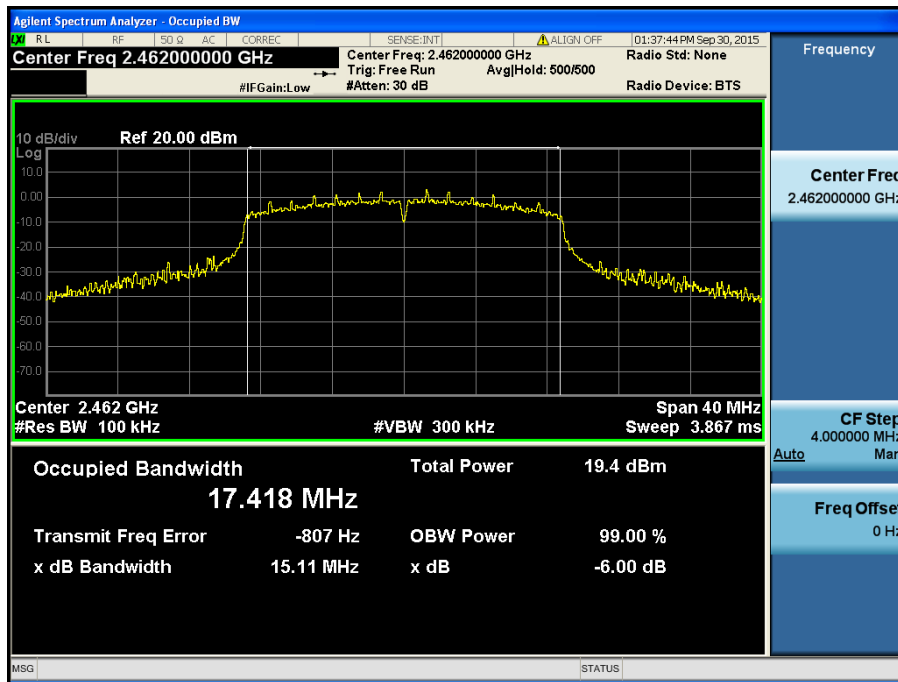
6 dB Bandwidth

TM 3 & ANT 2 & Middle



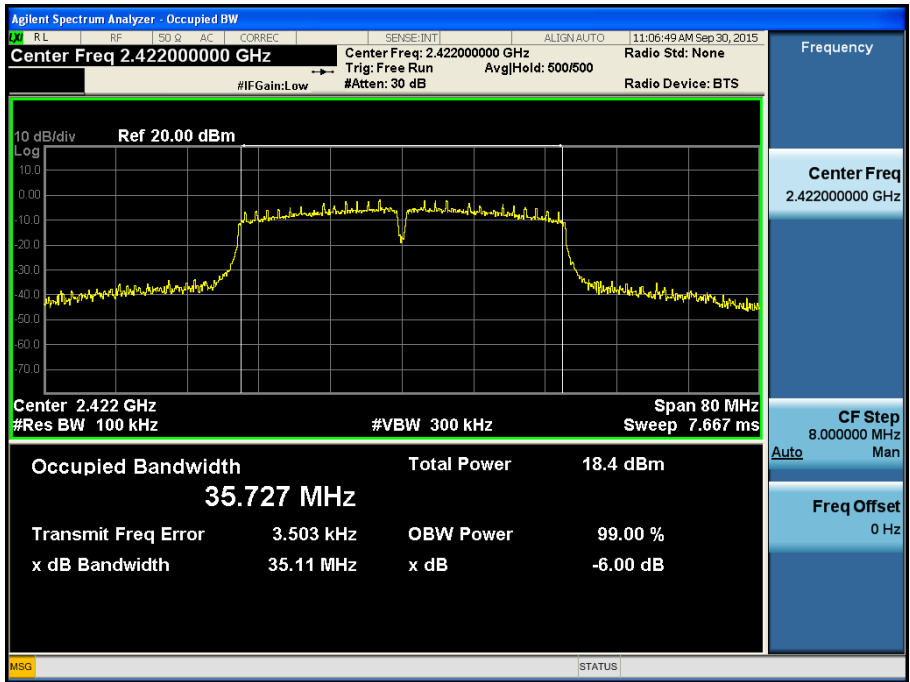
6 dB Bandwidth

TM 3 & ANT 2 & Highest



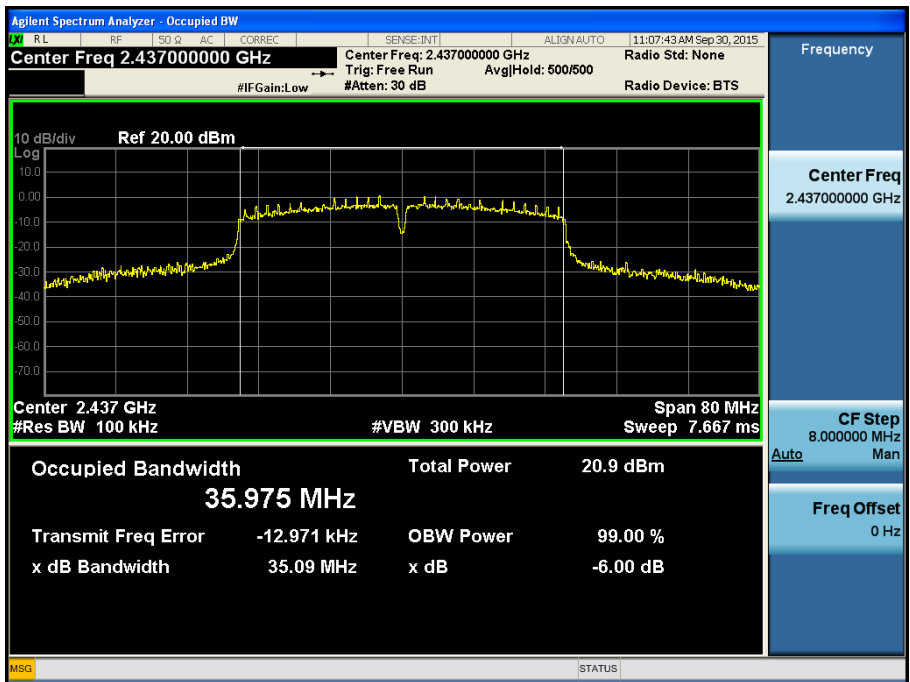
6 dB Bandwidth

TM 4 & ANT 2 & Lowest



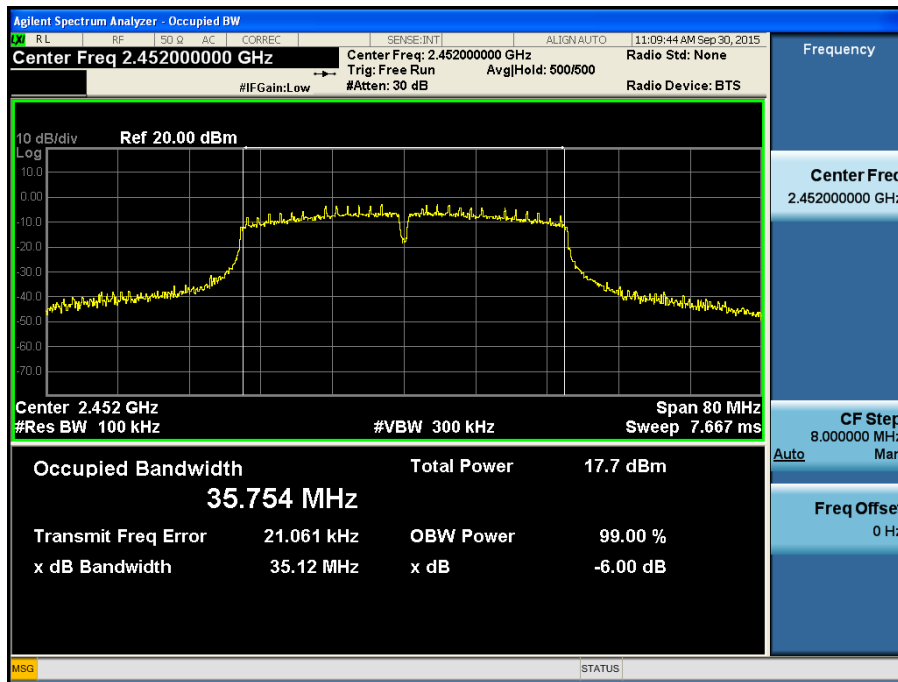
6 dB Bandwidth

TM 4 & ANT 2 & Middle



6 dB Bandwidth

TM 4 & ANT 2 & Highest

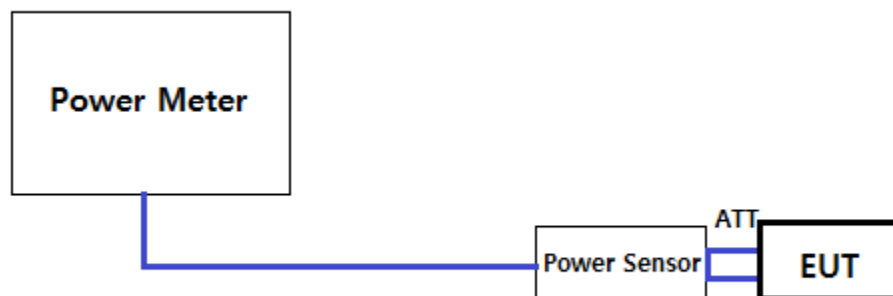


8.2 Maximum Peak Conducted Output Power

Test Requirements and limit, §15.247(b)

The maximum permissible conducted output power is **1 Watt**.

■ TEST CONFIGURATION



■ TEST PROCEDURE

1. PKPM1 Peak power meter method of KDB558074

The maximum conducted output powers were measured using a broadband peak RF power meter which has greater video bandwidth than DUT's DTS bandwidth and utilize a fast-responding diode detector.

2. Method AVGPM-G (Measurement using a gated RF average power meter) of KDB558074

The average conducted output powers were measured using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

■ **TEST RESULTS: Comply**

▪ **Single transmitting**

ANT	Freq. (MHz)	Det.	Maximum Peak Conducted Output Power (dBm) for <u>802.11b</u>			
			Data Rate [Mbps]			
			1	2	5.5	11
ANT 1	2412	PK	16.77	16.70	16.77	16.74
		AV	14.88	14.84	14.89	14.77
	2437	PK	17.25	17.11	17.24	17.23
		AV	15.15	15.11	15.10	15.11
	2462	PK	17.19	16.99	17.15	17.13
		AV	15.31	15.17	15.33	15.29
ANT 2	2412	PK	16.64	16.57	16.64	16.61
		AV	14.82	14.78	14.83	14.71
	2437	PK	16.82	16.79	16.73	16.71
		AV	15.12	15.08	14.97	14.98
	2462	PK	16.52	16.32	16.55	16.46
		AV	14.65	14.51	14.61	14.58

ANT	Freq. (MHz)	Det.	Maximum Peak Conducted Output Power (dBm) for <u>802.11g</u>							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
ANT 1	2412	PK	20.25	20.23	20.07	20.23	20.15	20.15	20.19	20.25
		AV	12.02	11.98	11.98	11.95	11.82	12.00	12.00	11.96
	2437	PK	21.18	20.72	21.05	21.05	21.12	21.17	21.09	21.06
		AV	14.93	14.69	14.91	14.85	14.80	14.81	14.41	14.77
	2462	PK	20.43	20.32	20.32	20.31	20.44	20.43	20.22	20.38
		AV	12.36	12.34	12.35	12.36	12.13	12.32	12.31	12.36
ANT 2	2412	PK	20.51	20.30	20.32	20.30	20.42	20.42	20.46	20.52
		AV	12.58	12.54	12.54	12.51	12.38	12.36	12.36	12.42
	2437	PK	21.37	20.96	21.29	21.29	21.36	21.31	21.33	21.30
		AV	15.59	15.45	15.57	15.51	15.36	15.37	15.27	15.33
	2462	PK	20.78	20.57	20.57	20.56	20.69	20.71	20.73	20.73
		AV	12.58	12.41	12.32	12.53	12.10	12.29	12.28	12.35

ANT	Freq. (MHz)	Det.	Maximum Peak Conducted Output Power (dBm) for <u>802.11n (HT20)</u>							
			Data Rate [MCS]							
			0	1	2	3	4	5	6	7
ANT 1	2412	PK	19.76	19.67	19.74	19.73	19.64	19.65	19.53	19.68
		AV	11.88	11.83	11.82	11.76	11.61	11.67	11.69	11.76
	2437	PK	20.58	20.37	20.35	20.45	20.41	20.56	20.34	20.08
		AV	14.79	14.47	14.72	14.74	14.60	14.33	14.49	14.65
	2462	PK	20.36	20.36	20.37	20.20	20.22	20.30	20.31	20.31
		AV	12.35	12.28	12.32	12.31	12.24	12.22	12.02	12.30
ANT 2	2412	PK	20.43	20.34	20.21	20.20	20.31	20.42	20.40	20.35
		AV	12.40	12.35	12.34	12.28	12.13	12.19	12.21	12.28
	2437	PK	21.36	21.05	21.03	21.13	21.09	21.24	21.02	21.16
		AV	15.52	15.37	15.49	15.44	15.40	15.13	15.29	15.45
	2462	PK	20.84	20.64	20.65	20.68	20.70	20.78	20.79	20.79
		AV	12.70	12.63	12.64	12.66	12.59	12.57	12.66	12.71

ANT	Freq. (MHz)	Det.	Maximum Peak Conducted Output Power (dBm) for <u>802.11n (HT40)</u>							
			Data Rate [MCS]							
			0	1	2	3	4	5	6	7
ANT 1	2422	PK	19.06	18.86	18.78	18.90	18.98	18.68	18.52	18.58
		AV	10.52	10.46	10.46	10.52	10.51	10.52	10.47	10.30
	2437	PK	19.84	19.68	19.72	19.77	19.71	19.81	19.47	19.70
		AV	13.49	13.41	13.43	13.49	13.22	13.22	13.19	13.28
	2452	PK	19.26	18.92	18.89	19.07	19.03	18.92	18.73	19.22
		AV	10.93	10.88	10.85	10.91	10.64	10.72	10.58	10.83
ANT 2	2422	PK	19.40	19.20	19.32	19.34	19.31	19.22	19.06	19.12
		AV	10.60	10.60	10.40	10.56	10.37	10.46	10.58	10.24
	2437	PK	20.34	20.21	20.25	20.30	20.24	20.34	20.00	20.03
		AV	13.43	13.30	13.24	13.30	13.03	13.03	13.10	13.30
	2452	PK	19.64	19.50	19.37	19.55	19.61	19.50	19.51	19.58
		AV	10.74	10.69	10.66	10.72	10.45	10.53	10.39	10.44

▪ Multiple transmitting

ANT	Freq. (MHz)	Det.	Maximum Peak Conducted Output Power (dBm) for <u>802.11n(HT20)</u>							
			Modulation and Coding Scheme [MCS]							
			8	9	10	11	12	13	14	15
ANT 1	2412	PK	18.02	17.80	17.85	17.98	17.94	18.04	17.92	18.09
		AV	8.76	8.73	8.63	8.71	8.76	8.79	8.36	8.73
	2437	PK	20.21	20.05	20.09	20.12	20.07	20.04	19.50	19.51
		AV	11.84	11.81	11.75	11.66	11.77	11.43	11.34	11.45
	2462	PK	18.39	18.12	18.11	18.29	18.36	18.34	18.30	18.33
		AV	9.27	9.14	9.25	9.20	9.31	9.29	8.97	9.19
ANT 2	2412	PK	19.95	19.73	19.58	19.71	19.67	19.77	19.65	19.32
		AV	11.89	11.86	11.86	11.74	11.79	11.69	11.29	11.16
	2437	PK	21.16	21.10	21.04	21.07	21.02	21.09	20.81	20.95
		AV	13.96	13.83	13.87	13.78	13.79	13.75	13.57	13.67
	2462	PK	20.78	20.71	20.50	20.48	20.55	20.63	20.59	20.69
		AV	12.59	12.56	12.47	12.62	12.53	12.51	12.19	12.41
Sum (ANT 1+2)	2412	PK	22.10	21.88	21.81	21.94	21.90	22.00	21.88	21.76
	2437	PK	23.72	23.62	23.60	23.63	23.58	23.61	23.22	23.30
	2462	PK	22.76	22.62	22.48	22.53	22.60	22.65	22.61	22.68

8.3 Maximum Power Spectral Density

Test requirements and limit, §15.247(e)

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

■ TEST CONFIGURATION

Refer to the APPENDIX I.

■ Test Procedure

Method PKPSD of KDB558074 is used.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to **1.5 times** the DTS bandwidth.
3. Set the RBW to : **3 kHz ≤ RBW ≤ 100 kHz**
4. Set the VBW ≥ **3 x RBW**
5. Detector = **Peak**
6. Sweep time = **Auto couple**
7. Trace mode = **Max hold.**
8. Allow trace to fully stabilize.
9. Use the **peak marker function** to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

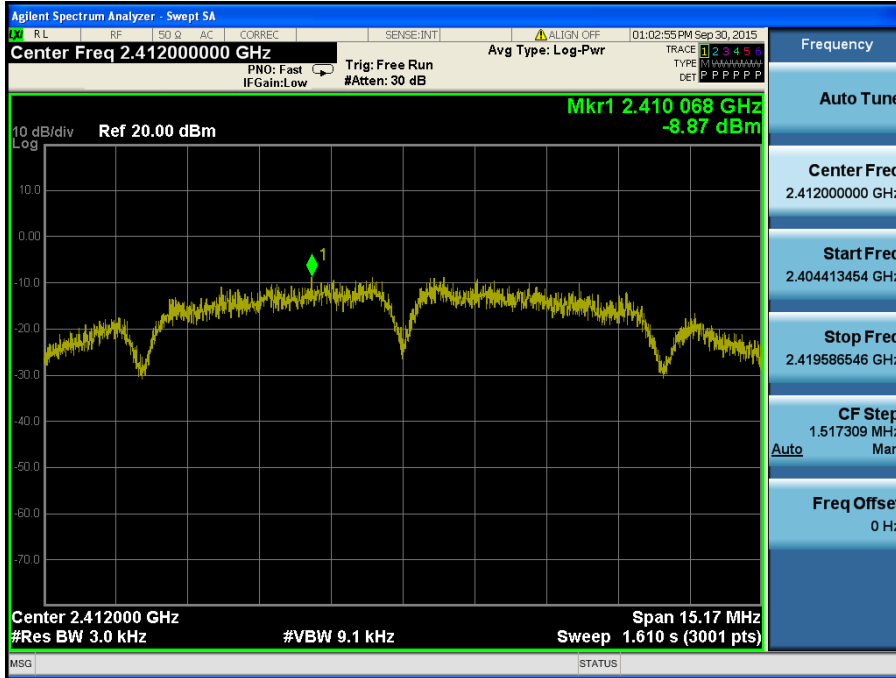
■ TEST RESULTS: **Comply**

Test Mode	Frequency	RBW	PKPSD [dBm]		
			ANT 1	ANT 2	SUM (ANT 1 + ANT 2)
TM 1	Lowest	3 kHz	-8.870	-7.590	-
	Middle	3 kHz	-8.750	-8.690	-
	Highest	3 kHz	-7.720	-7.520	-
TM 2	Lowest	3 kHz	-13.230	-12.140	-
	Middle	3 kHz	-10.100	-9.860	-
	Highest	3 kHz	-12.880	-12.090	-
TM 3	Lowest	3 kHz	-15.940	-12.900	-11.149
	Middle	3 kHz	-11.679	-10.880	-8.251
	Highest	3 kHz	-15.520	-12.710	-10.882
TM 4	Lowest	3 kHz	-16.440	-17.267	-
	Middle	3 kHz	-14.187	-13.442	-
	Highest	3 kHz	-17.797	-17.540	-

RESULT PLOTS

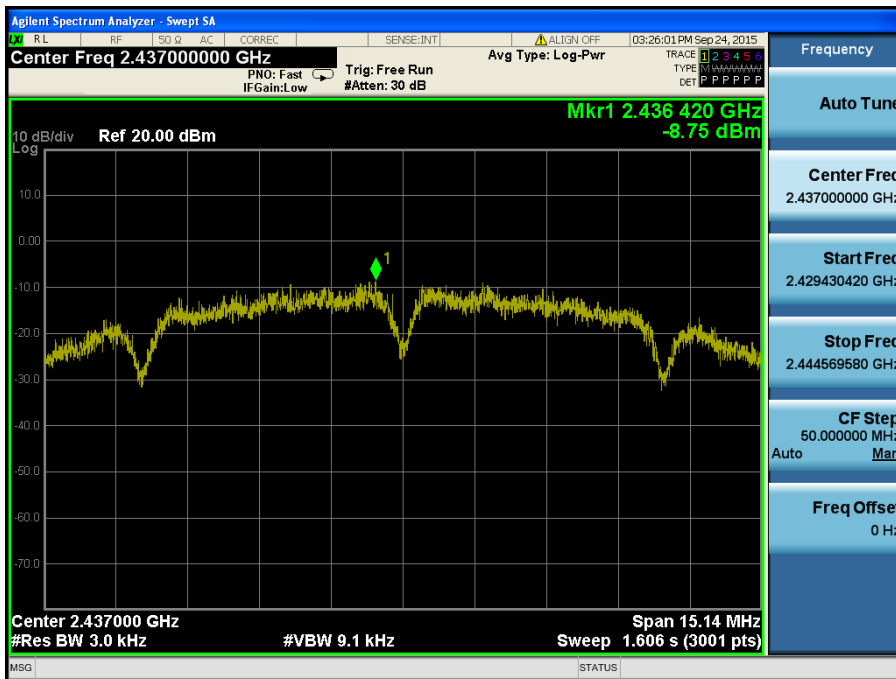
Maximum PKPSD

TM 1 & ANT 1 & Lowest



Maximum PKPSD

TM 1 & ANT 1 & Middle



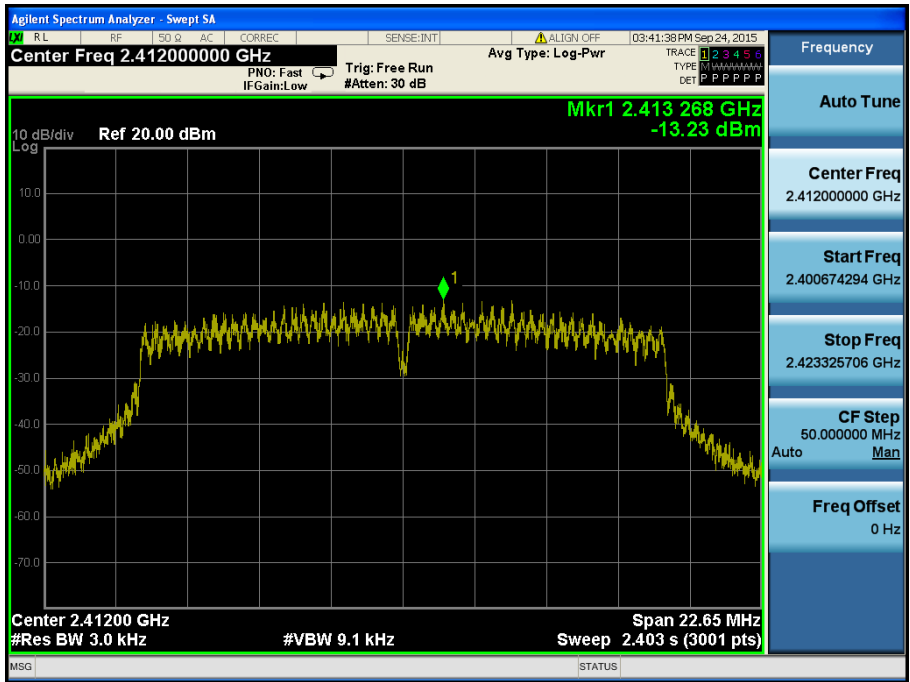
Maximum PKPSD

TM 1 & ANT 1 & Highest



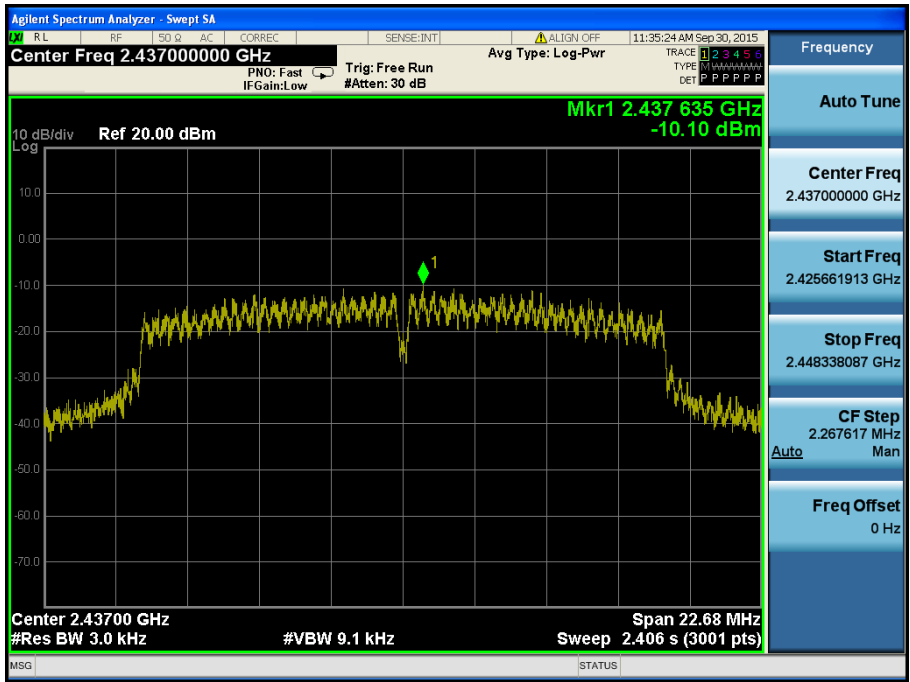
Maximum PKPSD

TM 2 & ANT 1 & Lowest



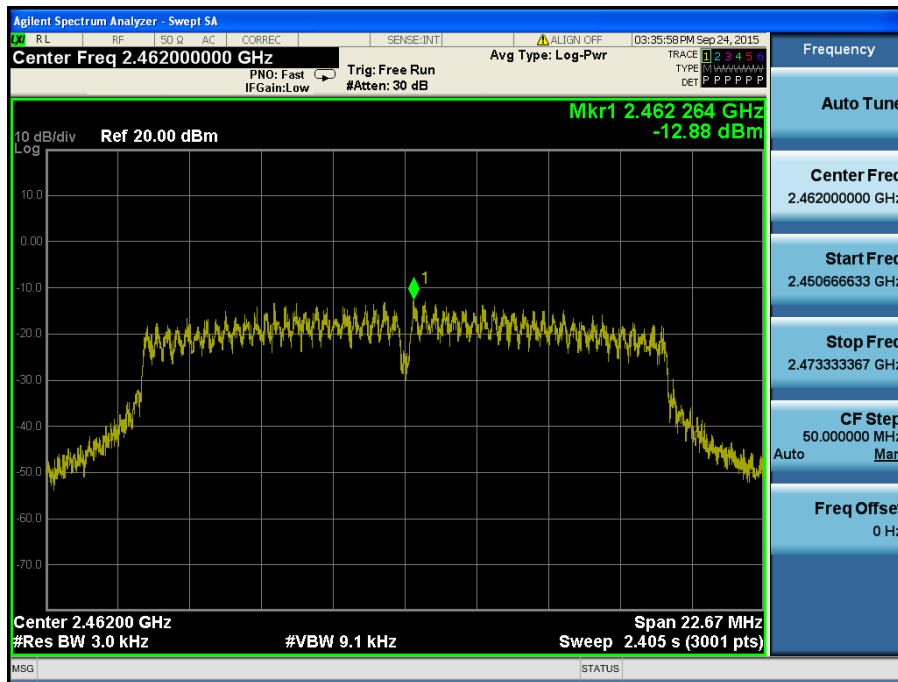
Maximum PKPSD

TM 2 & ANT 1 & Middle



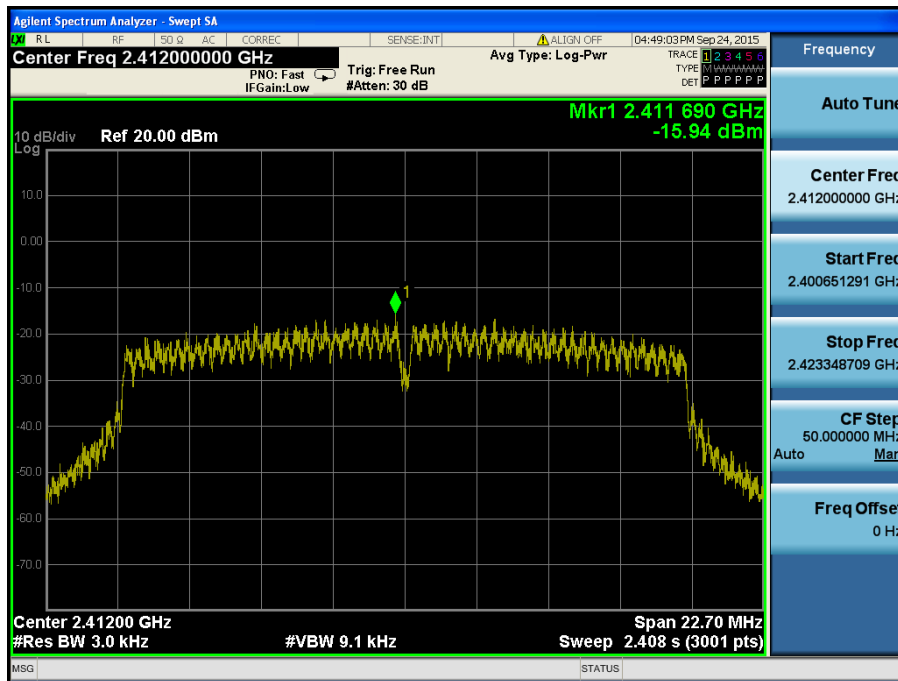
Maximum PKPSD

TM 2 & ANT 1 & Highest



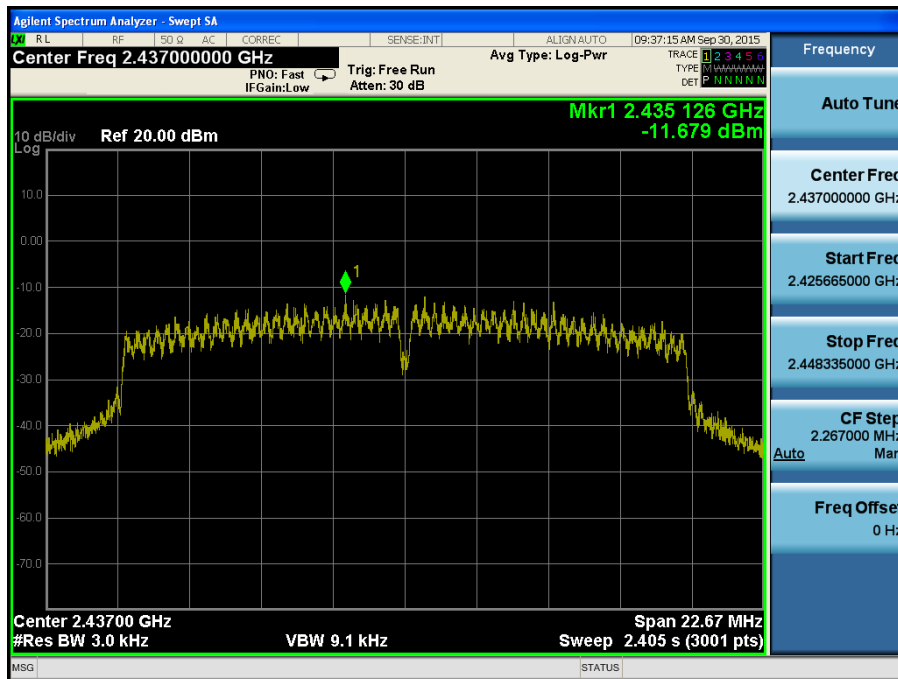
Maximum PKPSD

TM 3 & ANT 1 & Lowest



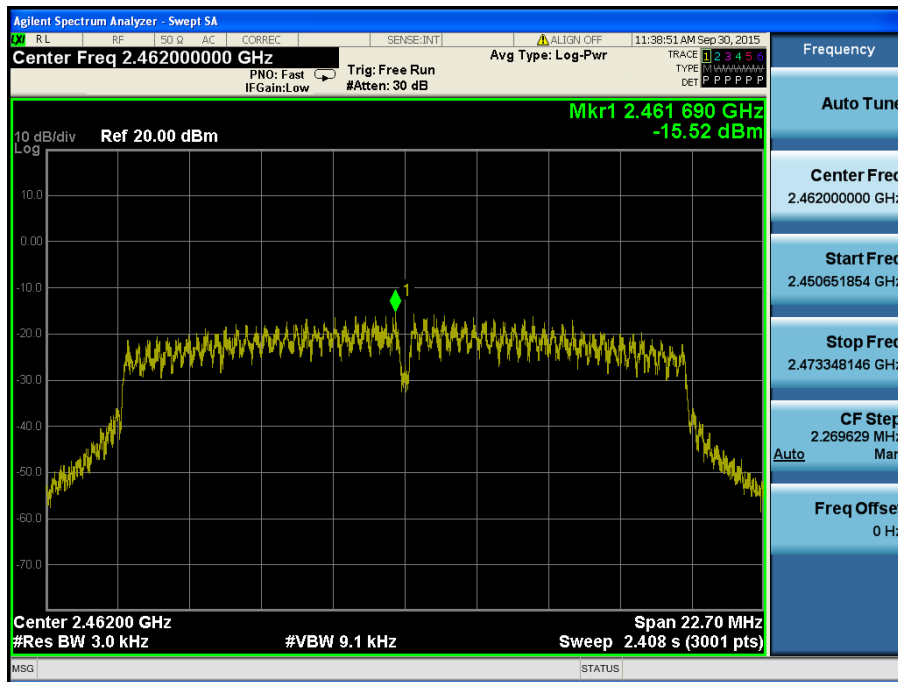
Maximum PKPSD

TM 3 & ANT 1 & Middle



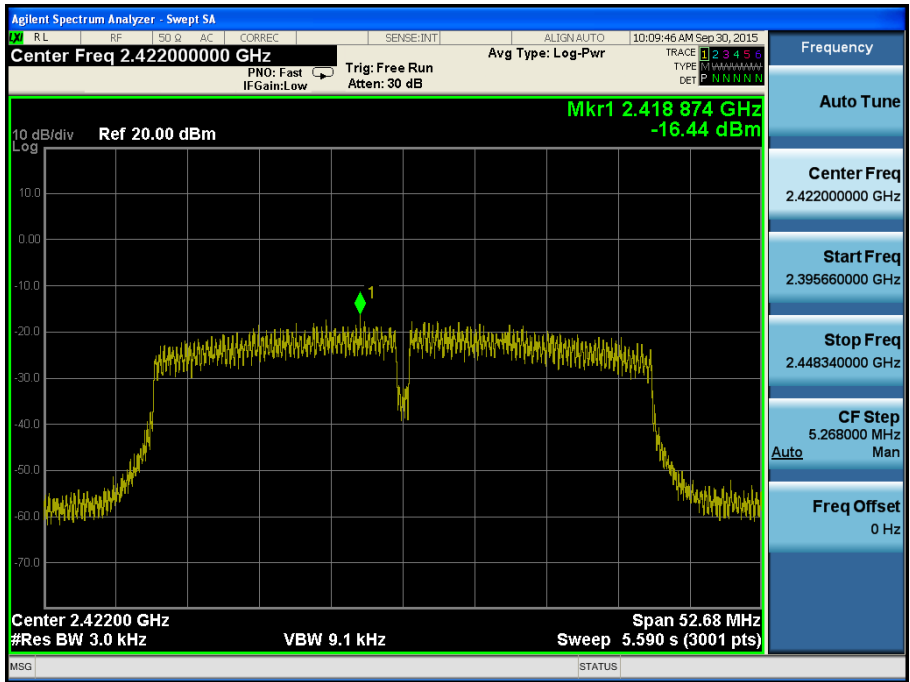
Maximum PKPSD

TM 3 & ANT 1 & Highest



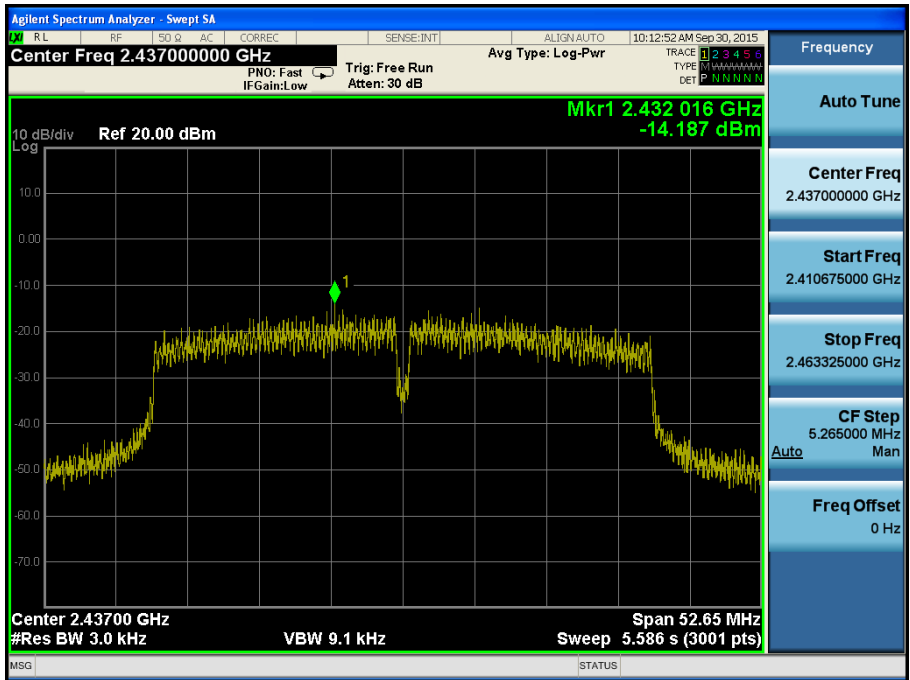
Maximum PKPSD

TM 4 & ANT 1 & Lowest



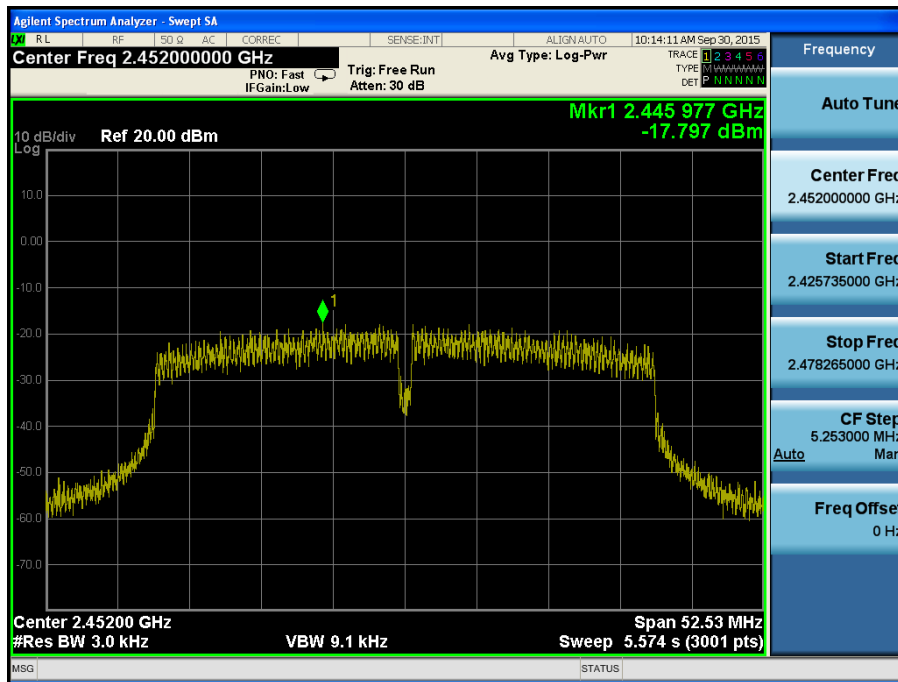
Maximum PKPSD

TM 4 & ANT 1 & Middle



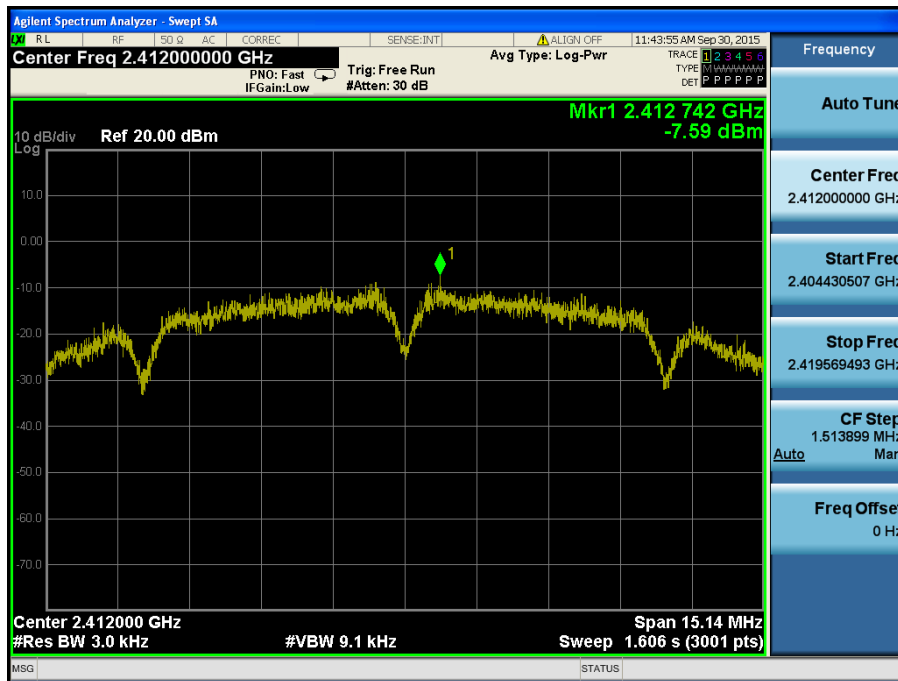
Maximum PKPSD

TM 4 & ANT 1 & Highest



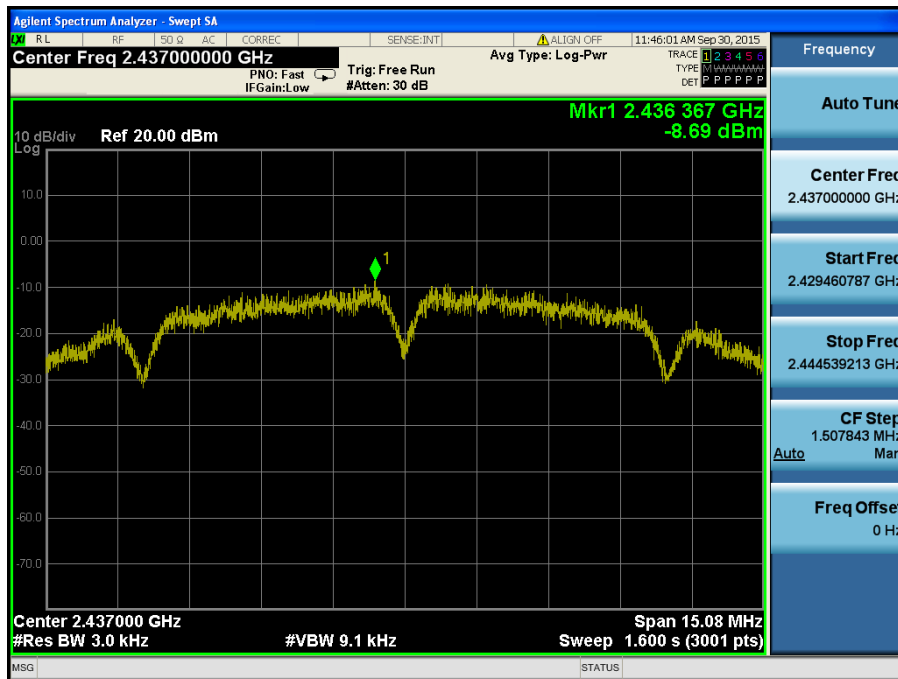
Maximum PKPSD

TM 1 & ANT 2 & Lowest



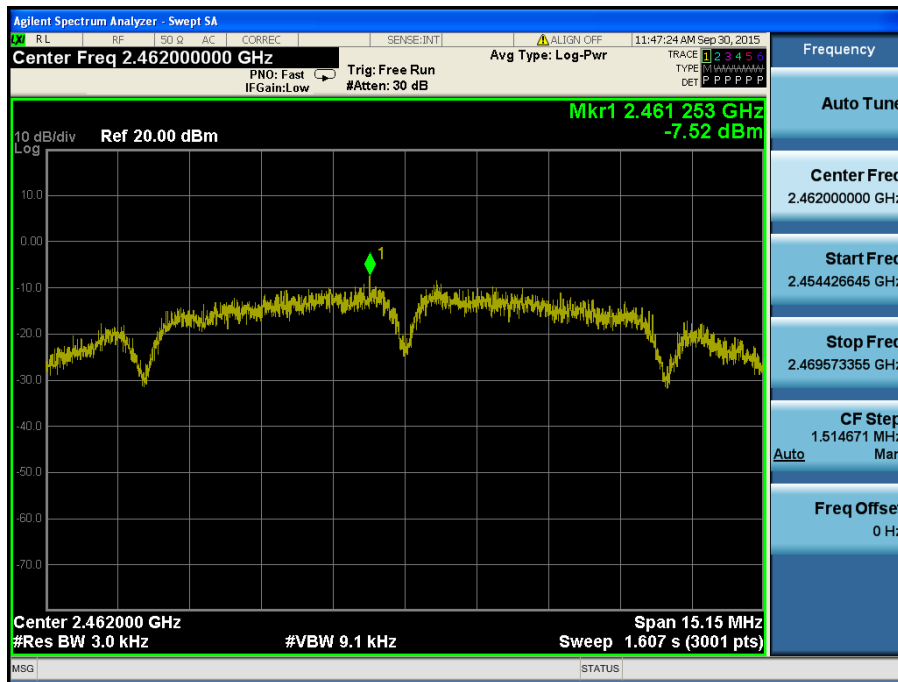
Maximum PKPSD

TM 1 & ANT 2 & Middle



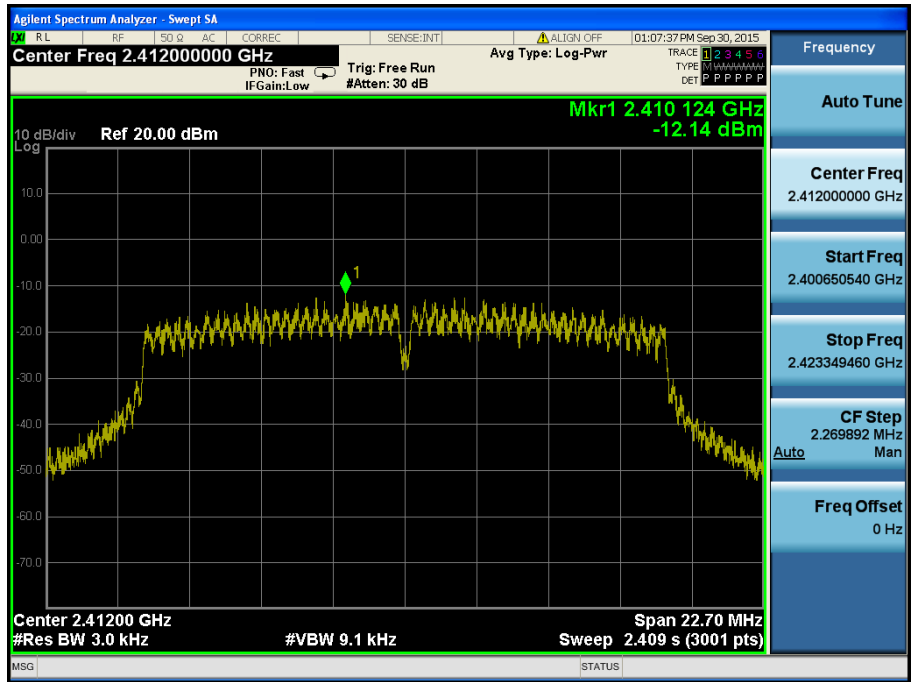
Maximum PKPSD

TM 1 & ANT 2 & Highest



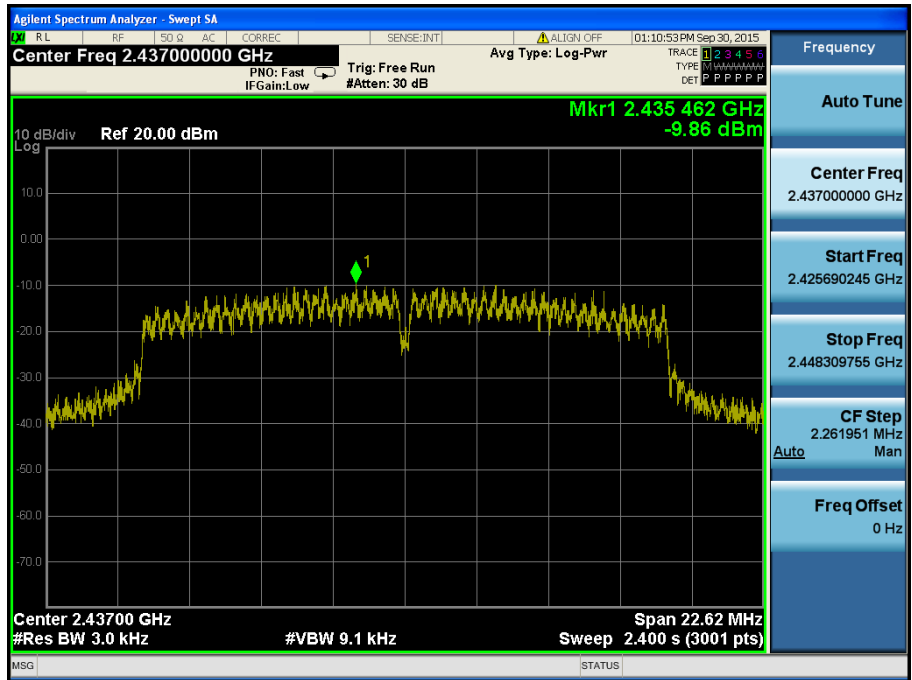
Maximum PKPSD

TM 2 & ANT 2 & Lowest



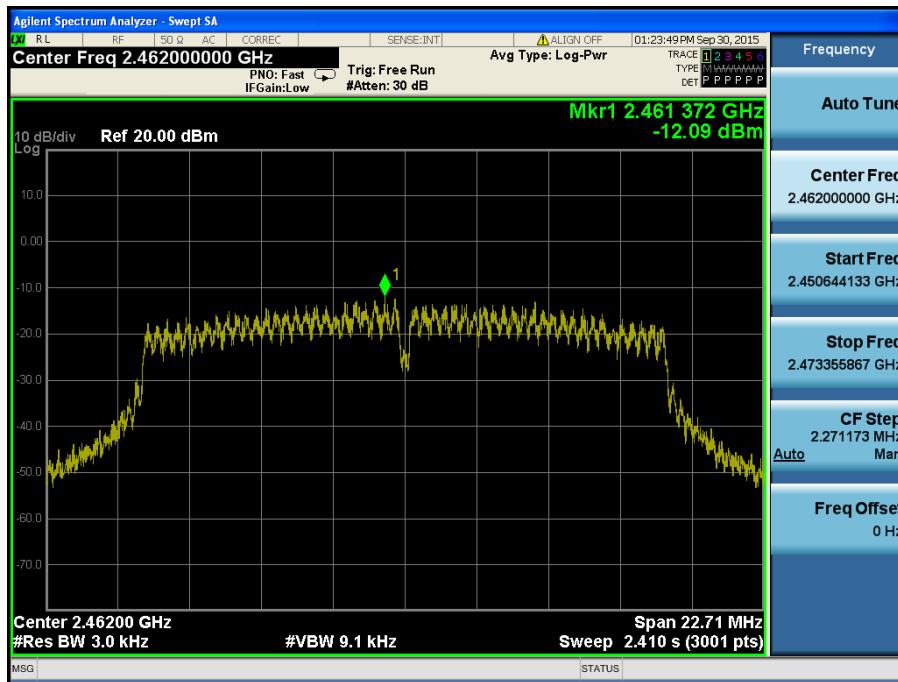
Maximum PKPSD

TM 2 & ANT 2 & Middle



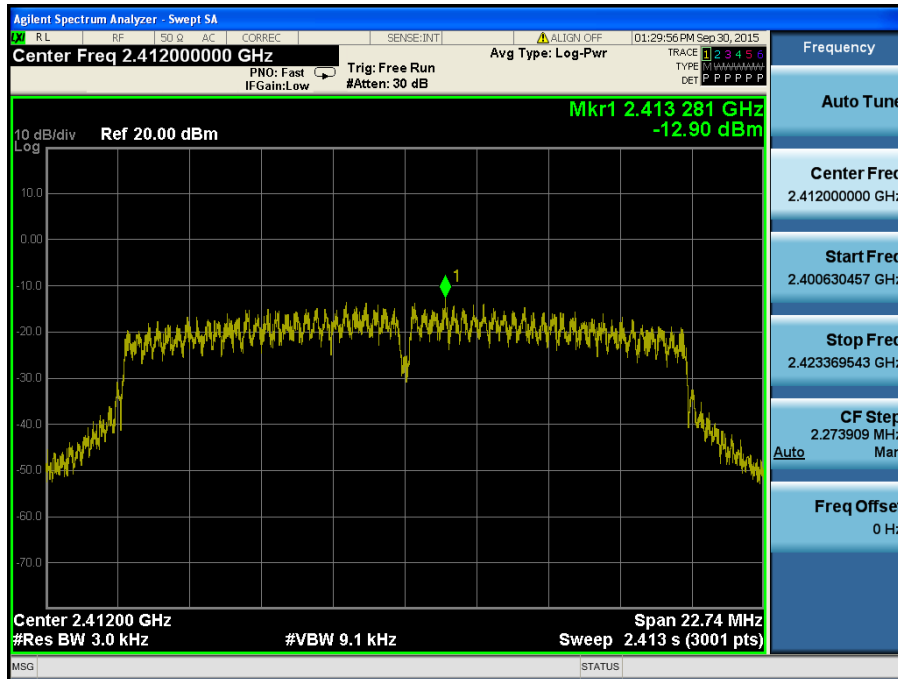
Maximum PKPSD

TM 2 & ANT 2 & Highest



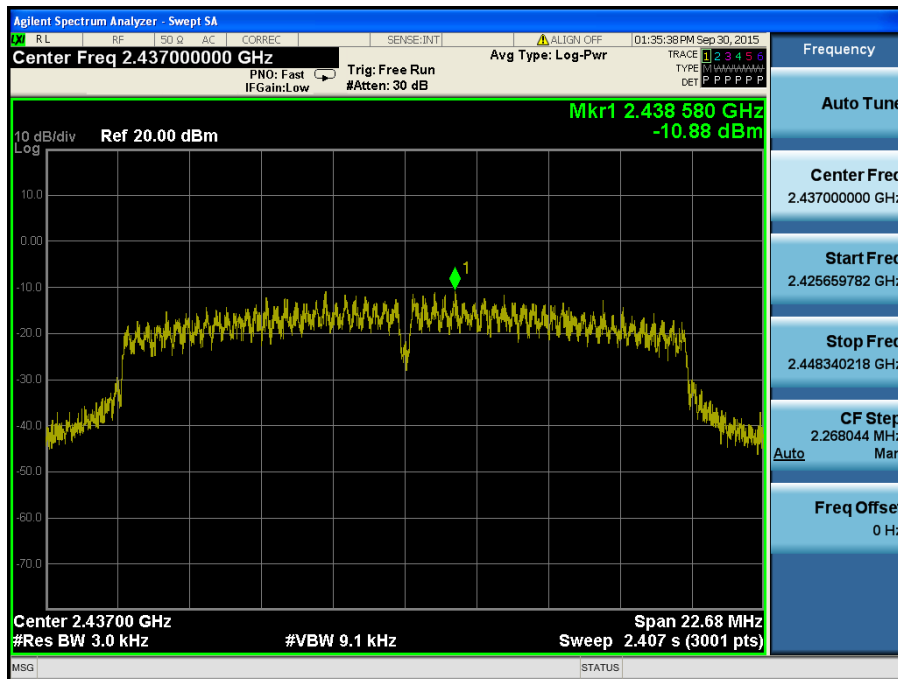
Maximum PKPSD

TM 3 & ANT 2 & Lowest



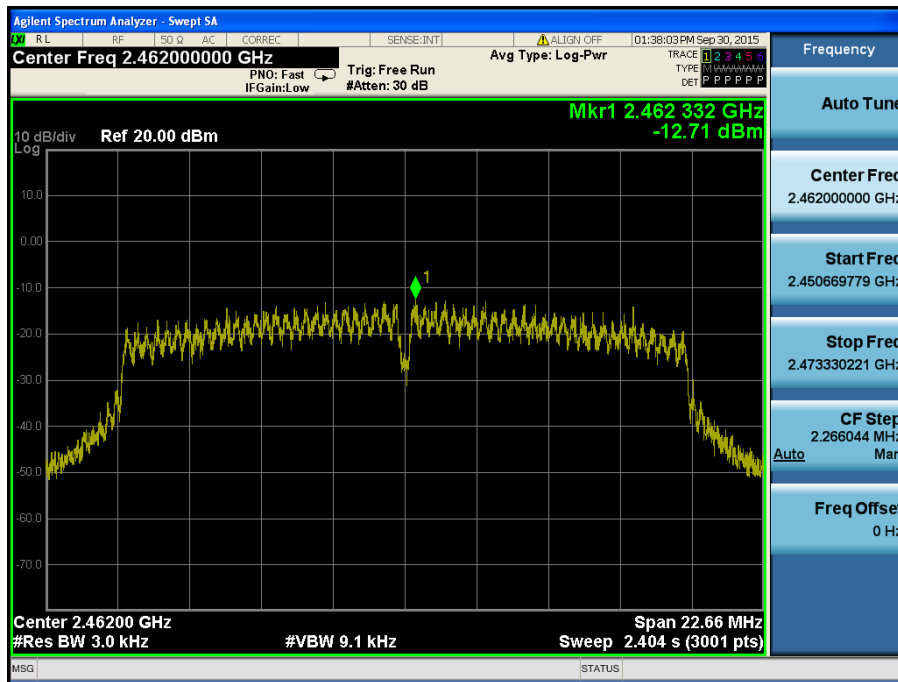
Maximum PKPSD

TM 3 & ANT 2 & Middle



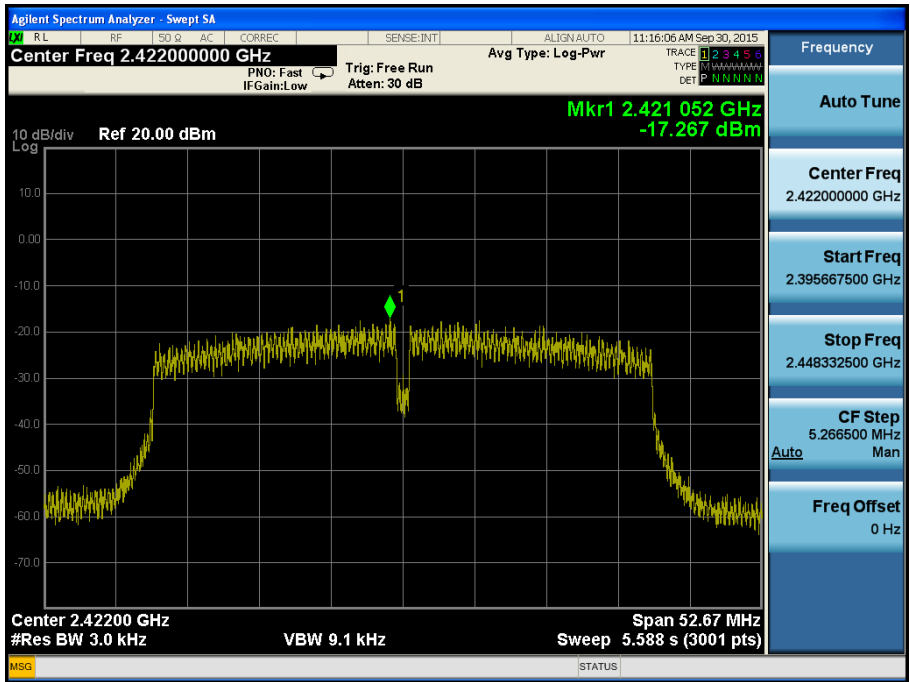
Maximum PKPSD

TM 3 & ANT 2 & Highest



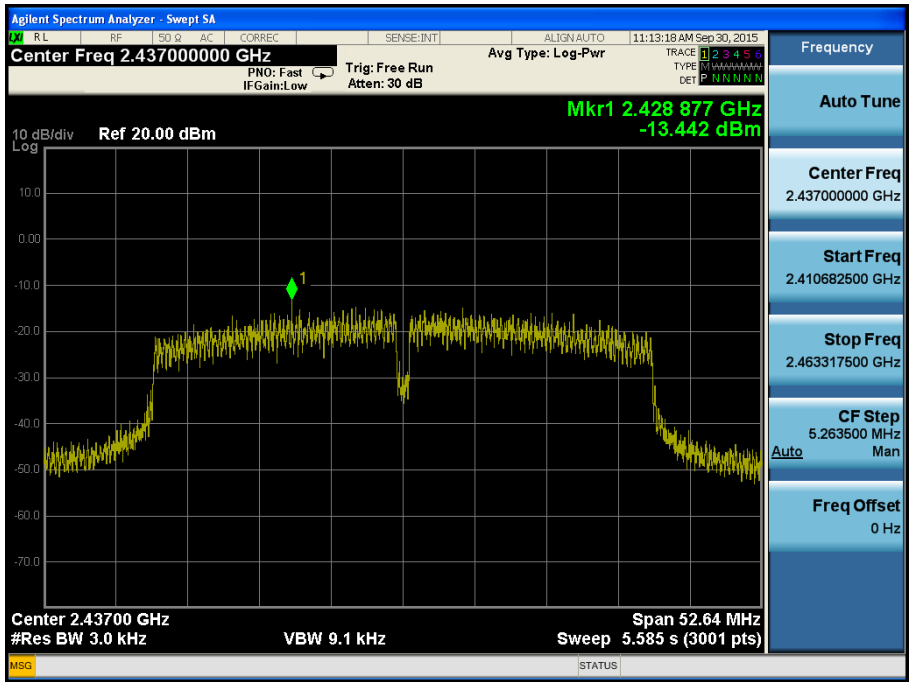
Maximum PKPSD

TM 4 & ANT 2 & Lowest



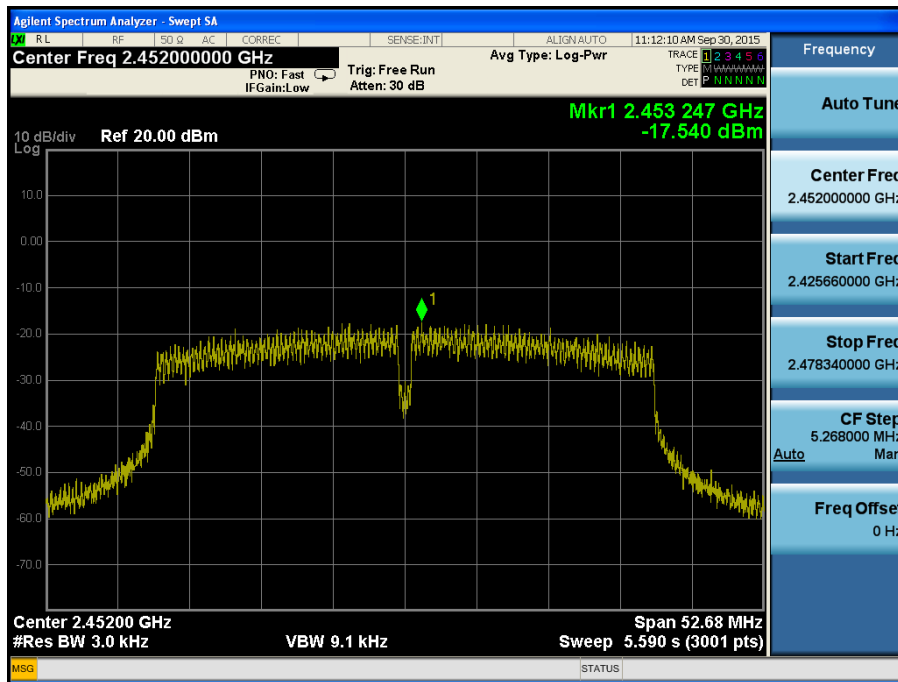
Maximum PKPSD

TM 4 & ANT 2 & Middle



Maximum PKPSD

TM 4 & ANT 2 & Highest



8.4 Out of Band Emissions at the Band Edge / Conducted Spurious Emissions

Test requirements and limit, §15.247(d)

§15.247(d) specifies that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions :

If **the peak output power procedure** is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated **by at least 20 dB** relative to the maximum measured in-band peak PSD level.

If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured inband average PSD level.

In either case, attenuation to levels below the general emission limits specified in **§15.209(a)** is not required.

■ TEST CONFIGURATION

Refer to the APPENDIX I.

■ TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer.

- Measurement Procedure 1 – Reference Level

1. Set instrument center frequency to DTS channel center frequency.
2. Set the span to ≥ 1.5 times the DTS bandwidth.
3. Set the RBW = 100 kHz.
4. Set the VBW $\geq 3 \times$ RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum PSD level
LIMIT LINE = 20 dB below of the reference level.

- Measurement Procedure 2 - Unwanted Emissions

1. Set the center frequency and span to encompass frequency range to be measured.
2. Set the RBW = **100 kHz.(Actual 1 MHz , See below note)**
3. Set the VBW $\geq 3 \times$ RBW.**(Actual 3 MHz, See below note)**
4. Detector = **peak**.
5. Ensure that the number of measurement points \geq span / RBW
6. Sweep time = **auto couple**.
7. Trace mode = **max hold**.
8. **Allow the trace to stabilize** (this may take some time, depending on the extent of the span).
9. Use the peak marker function to determine the maximum amplitude level.

Note : The conducted spurious emission was tested with below settings.

Frequency range	RBW	VBW	Detector	Trace	Sweep Point
9 kHz ~ 30 MHz	100 kHz	300 kHz	Peak	Max Hold	40001
30 MHz ~ 10 GHz	1 MHz	3 MHz			
10 GHz ~ 25 GHz	1 MHz	3 MHz			

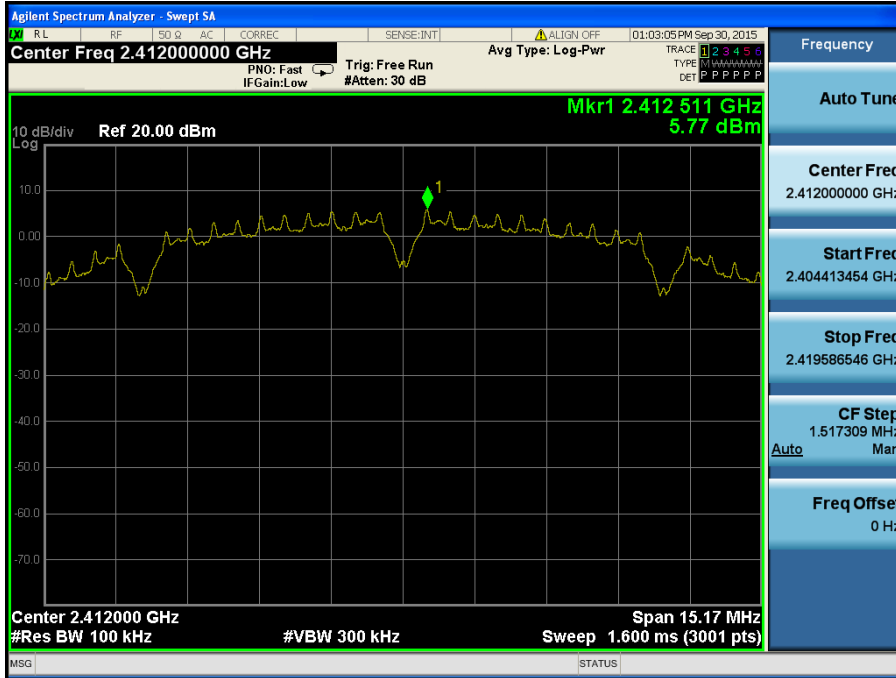
If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 kHz, VBW = 300 kHz, SPAN = 100 MHz and BINS = 2001 to get accurate emission level within 100 kHz BW.

I of this test report.

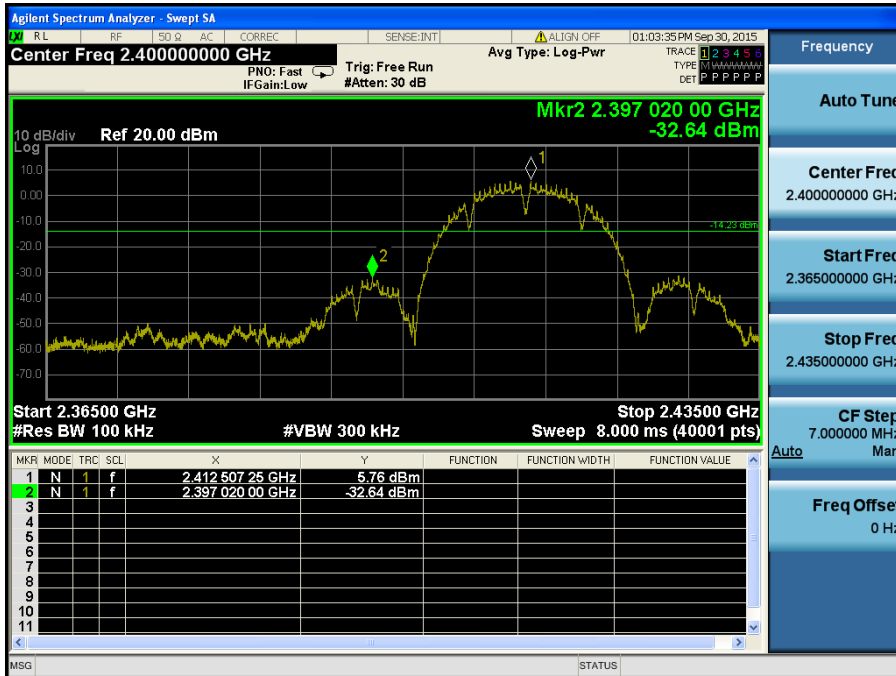
RESULT PLOTS

TM 1 & ANT 1 & Lowest

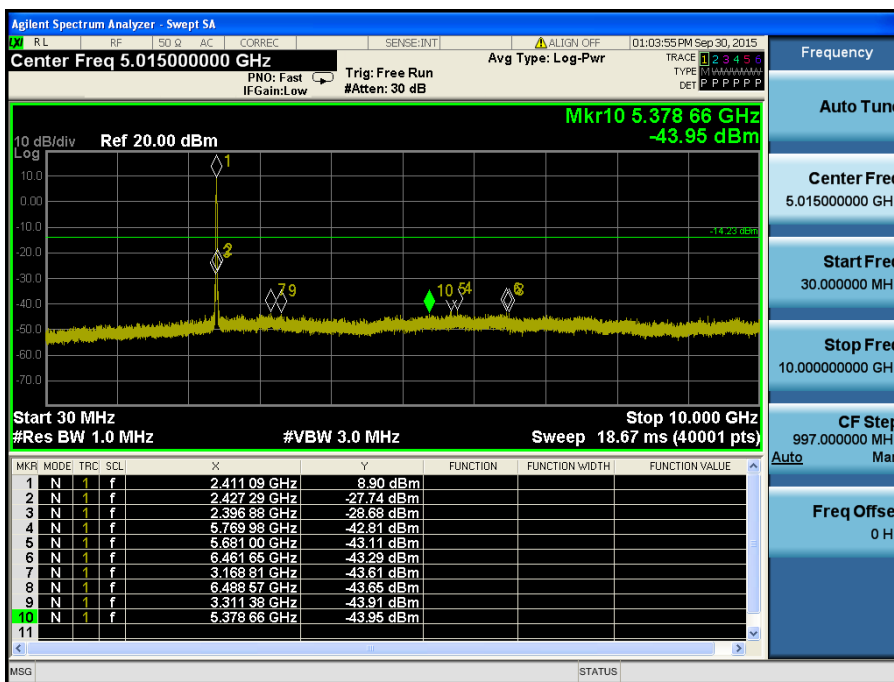
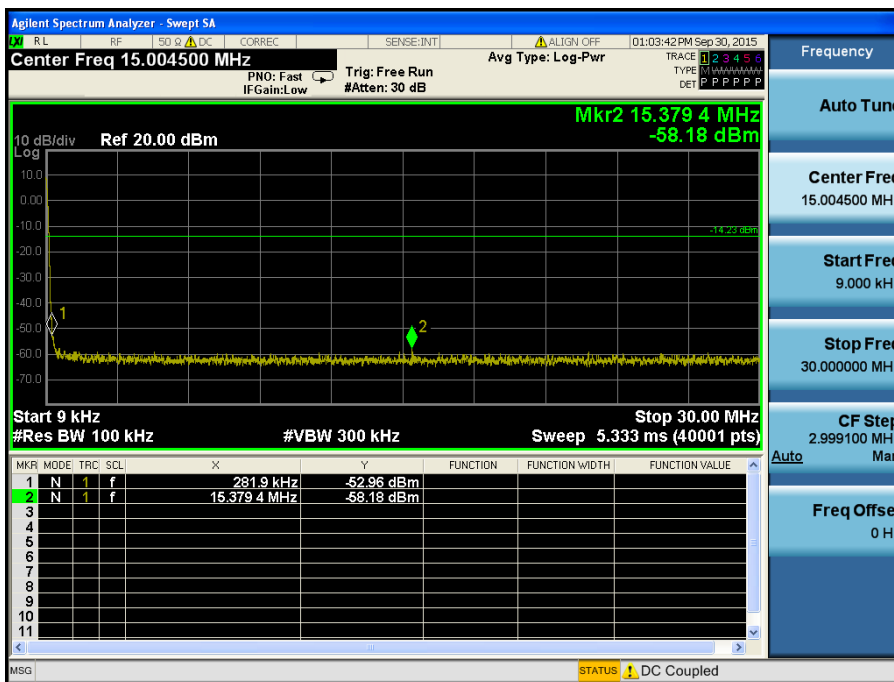
Reference



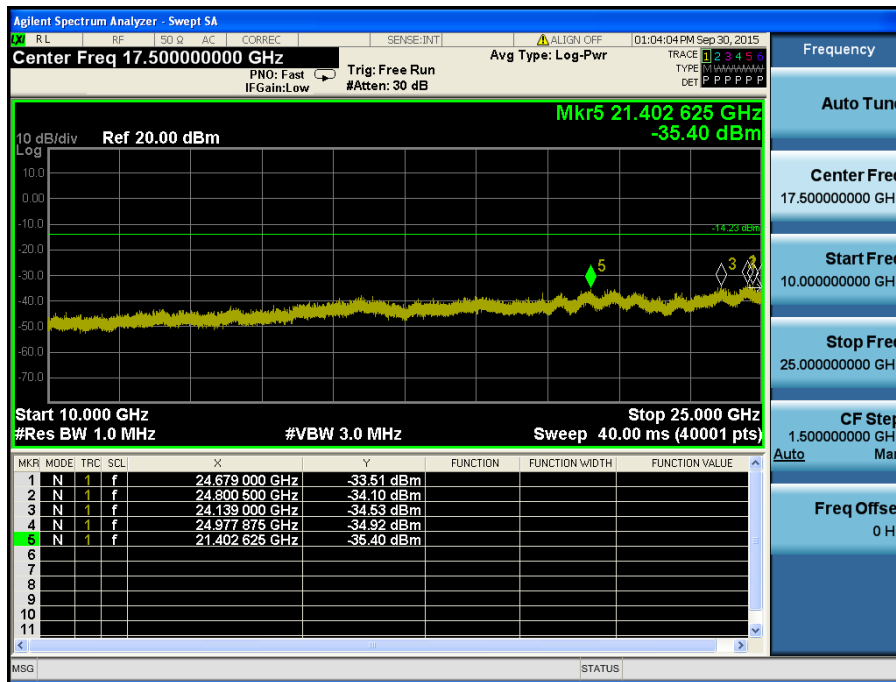
Low Band-edge



Conducted Spurious Emissions

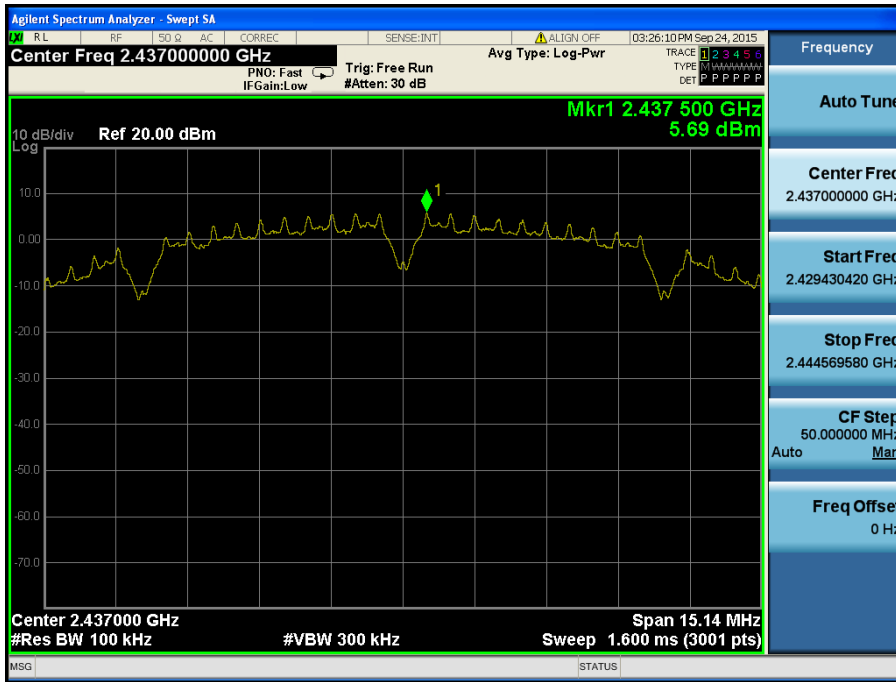


Conducted Spurious Emissions

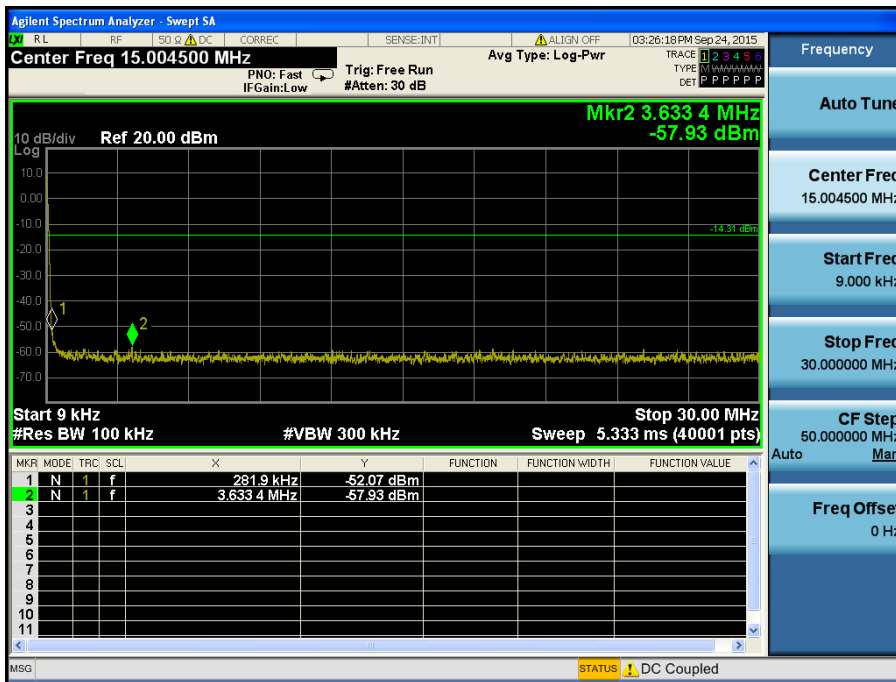


TM 1 & ANT 1 & Middle

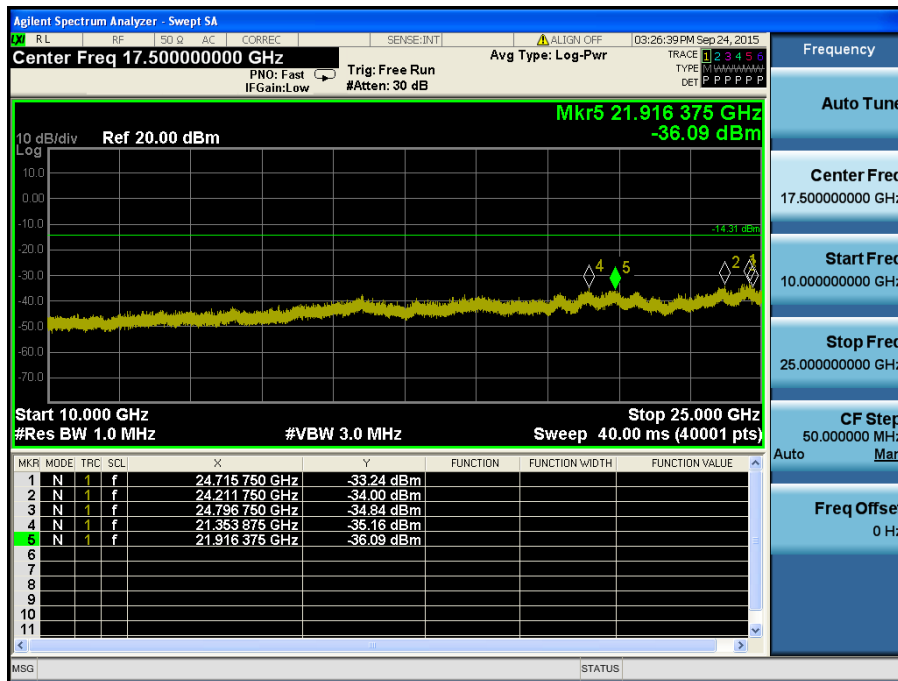
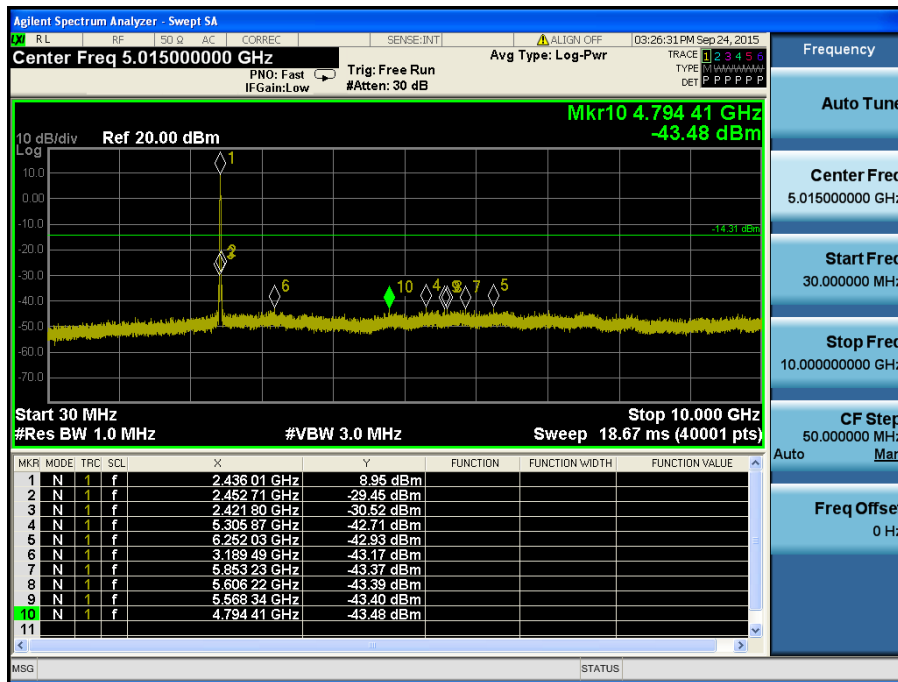
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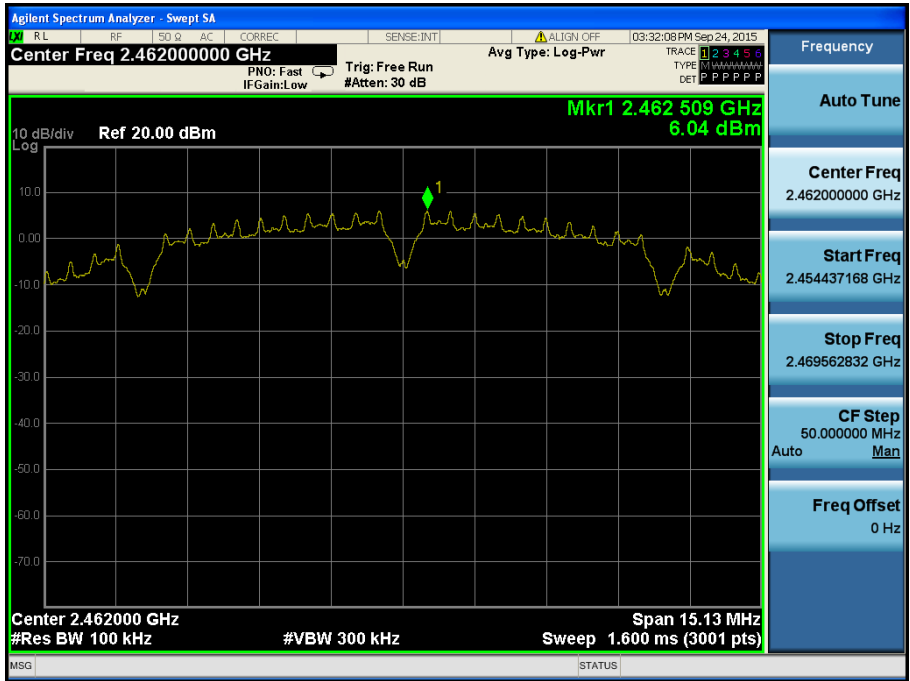
Conducted Spurious Emissions



Conducted Spurious Emissions



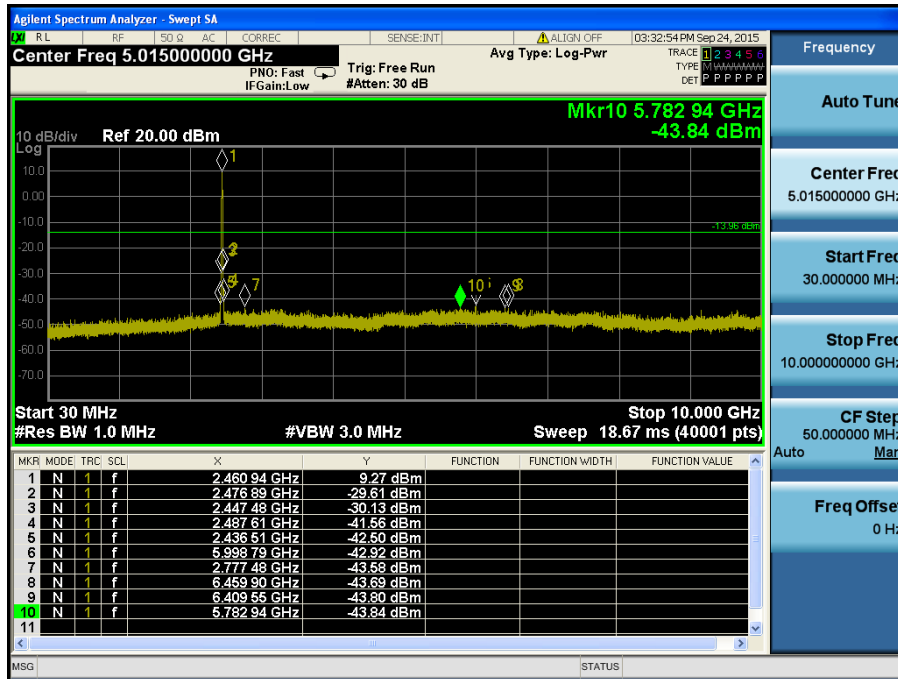
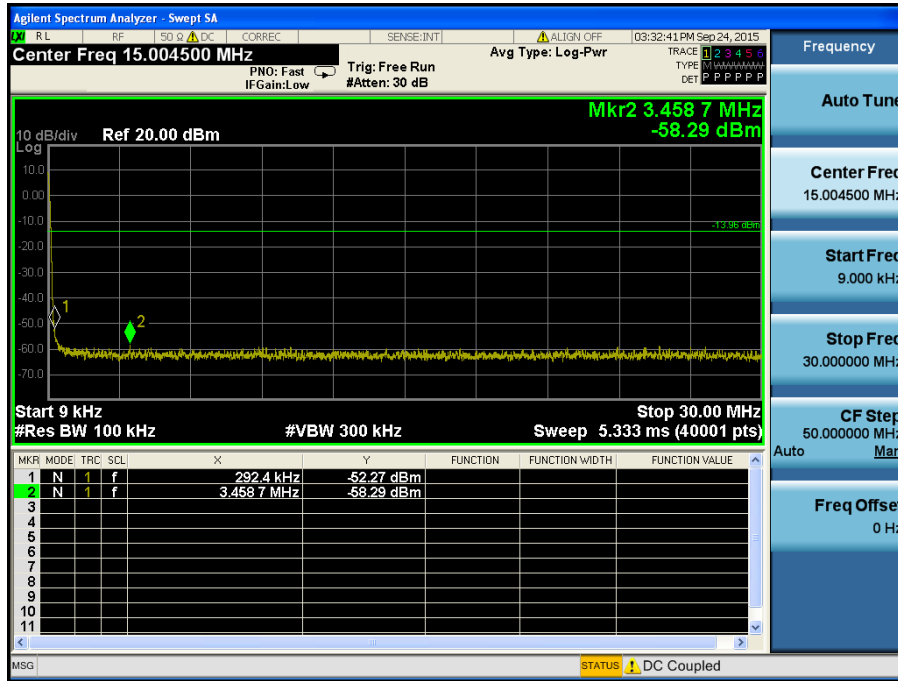
**TM 1 & ANT 1 & Highest
Reference**



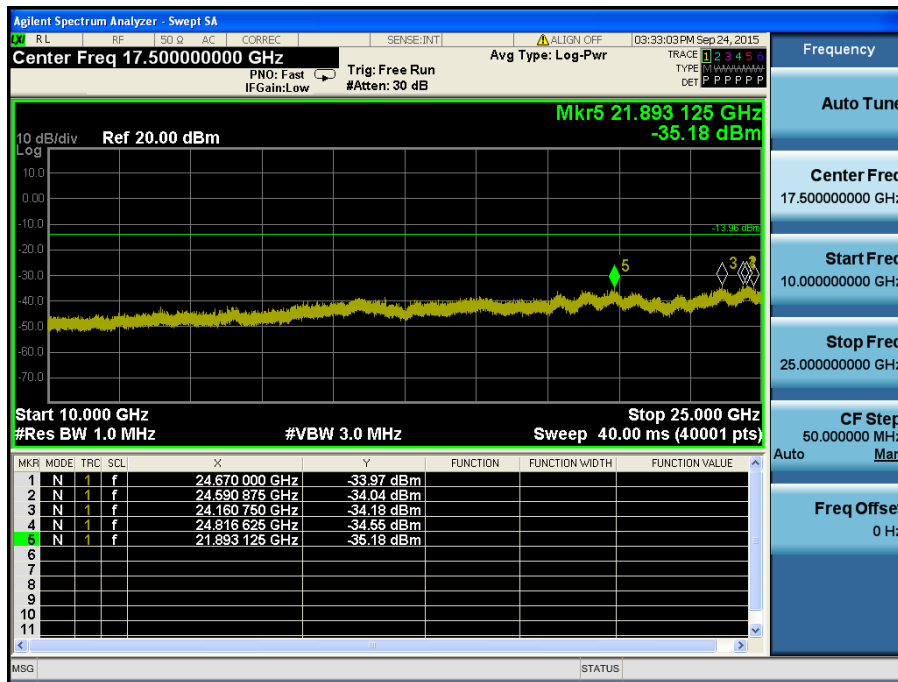
High Band-edge



Conducted Spurious Emissions

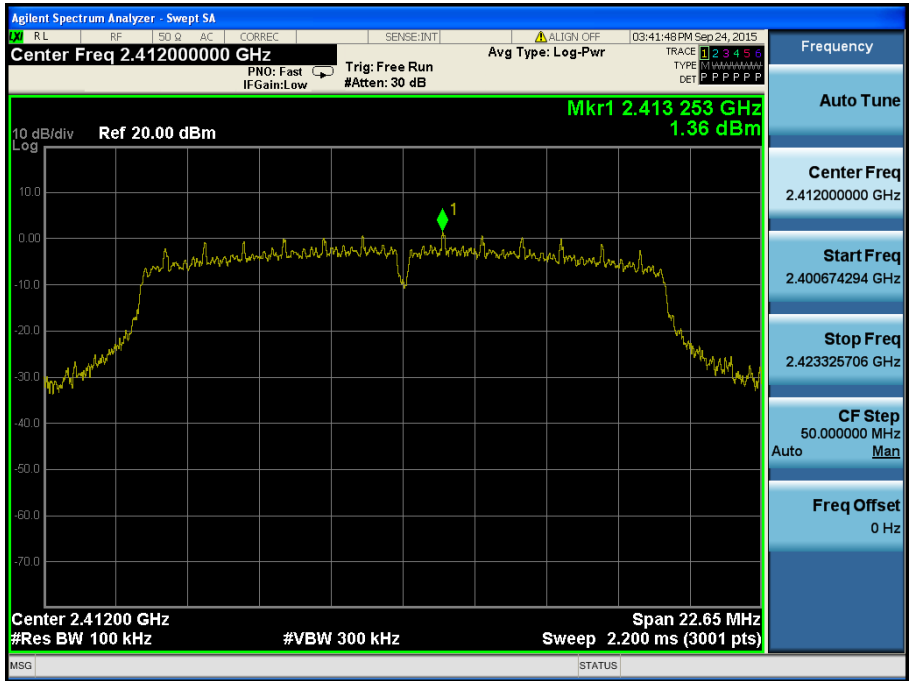


Conducted Spurious Emissions

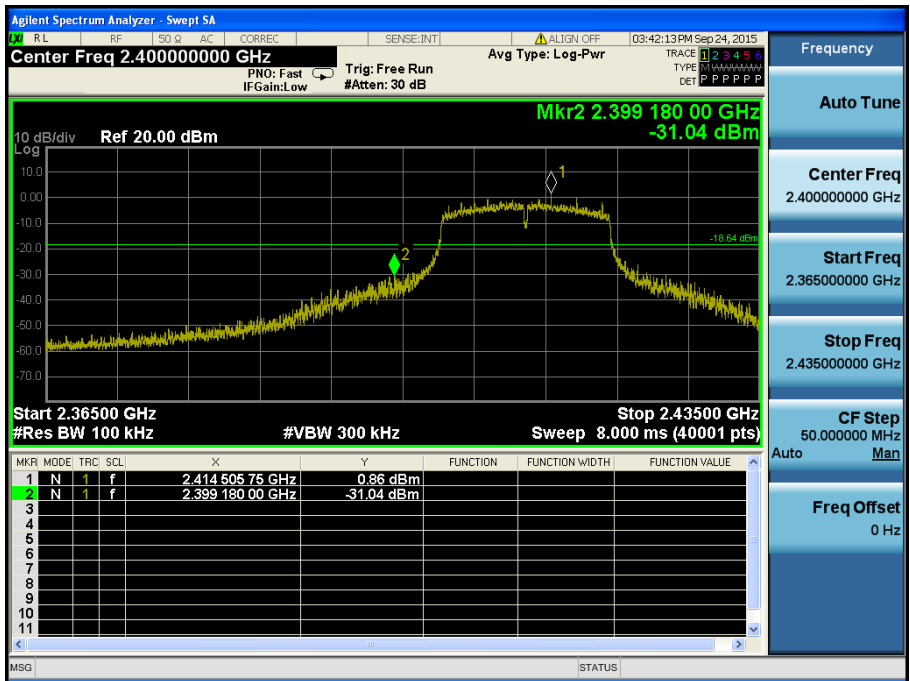


TM 2 & ANT 1 & Lowest

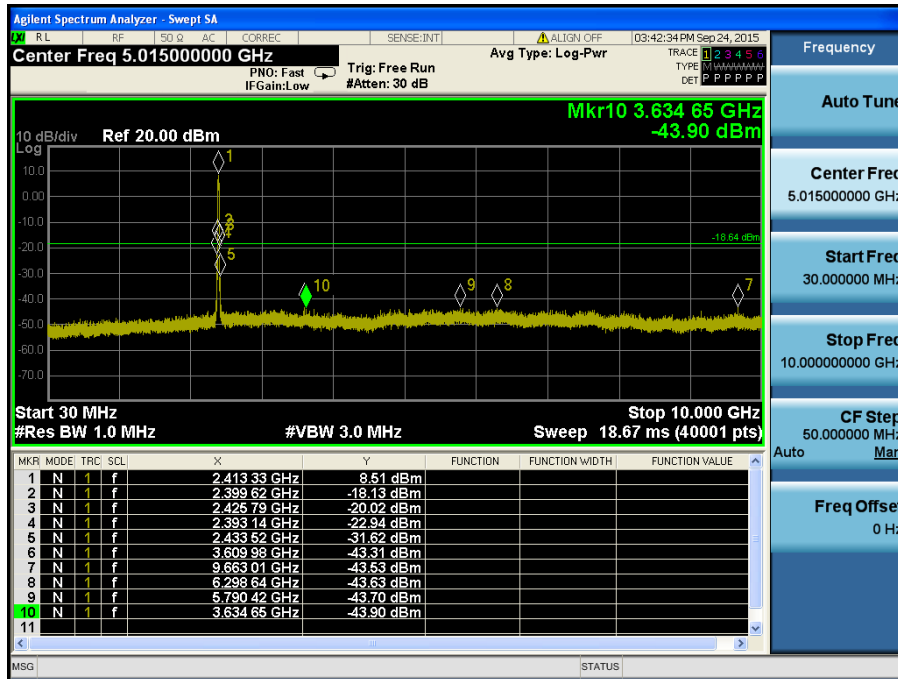
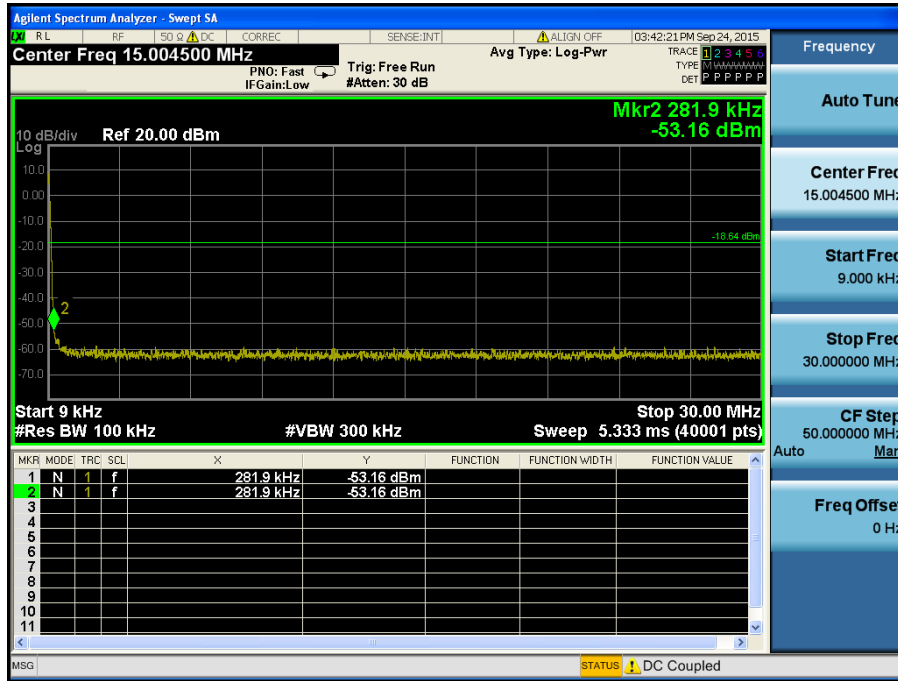
Reference



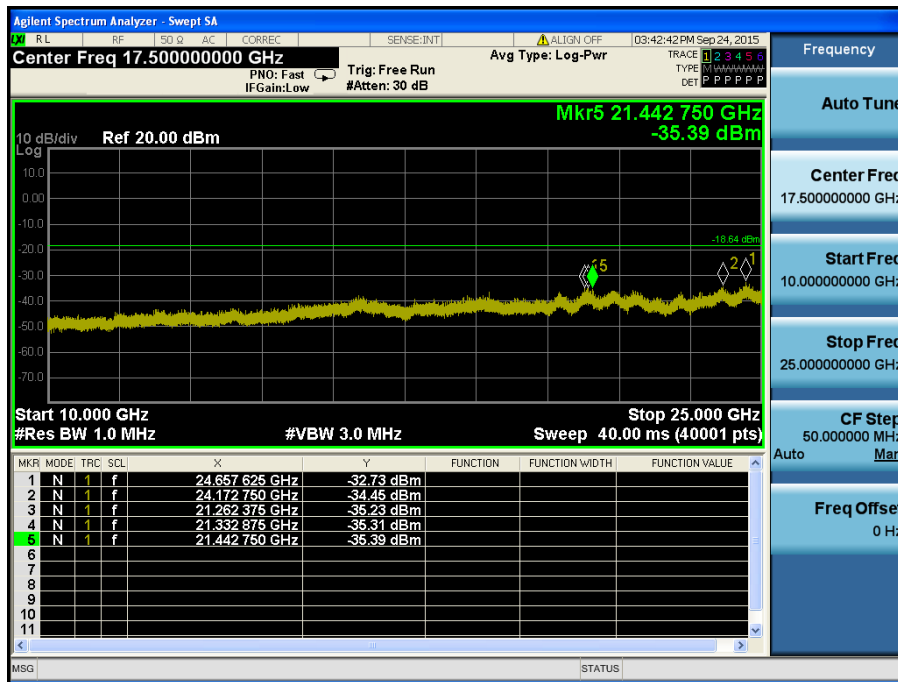
Low Band-edge



Conducted Spurious Emissions

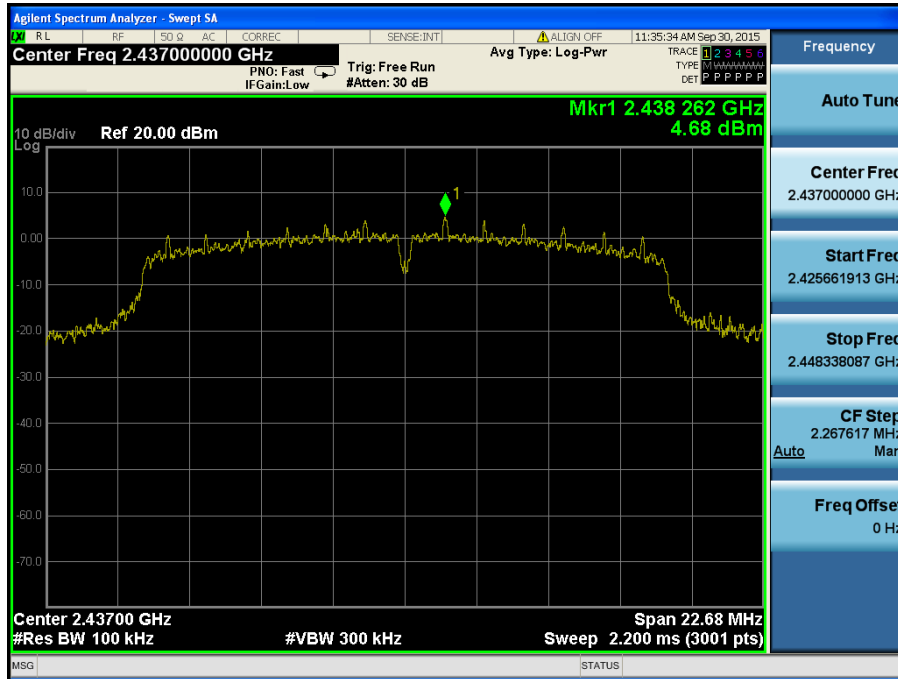


Conducted Spurious Emissions

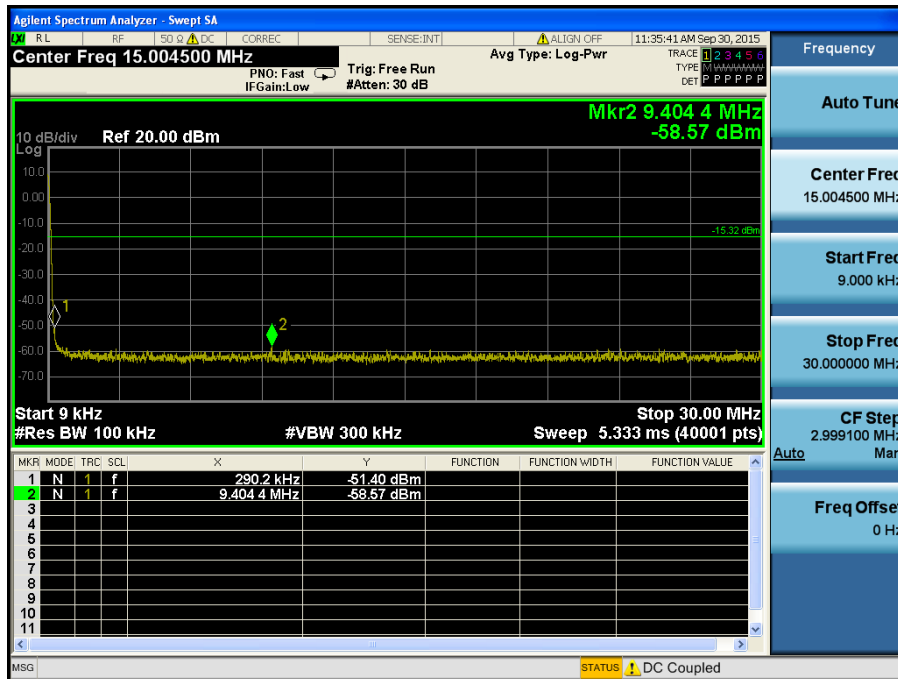


TM 2 & ANT 1 & Middle

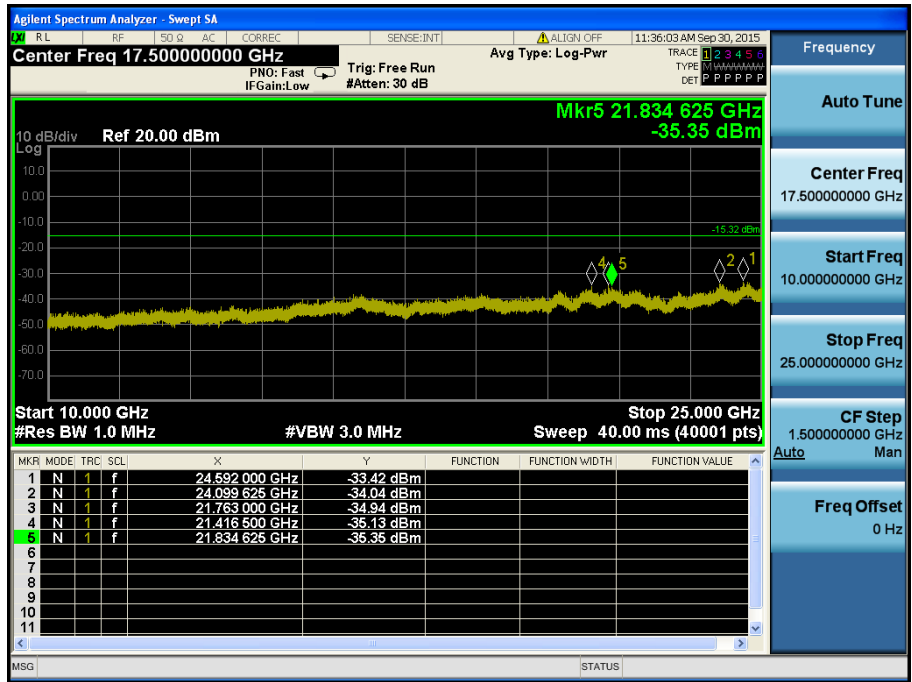
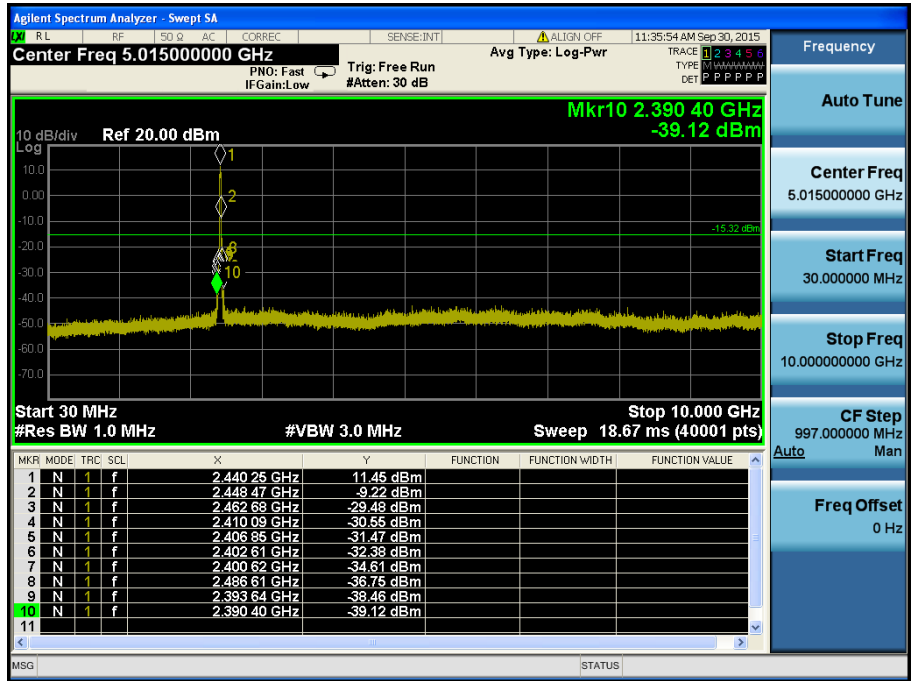
Reference



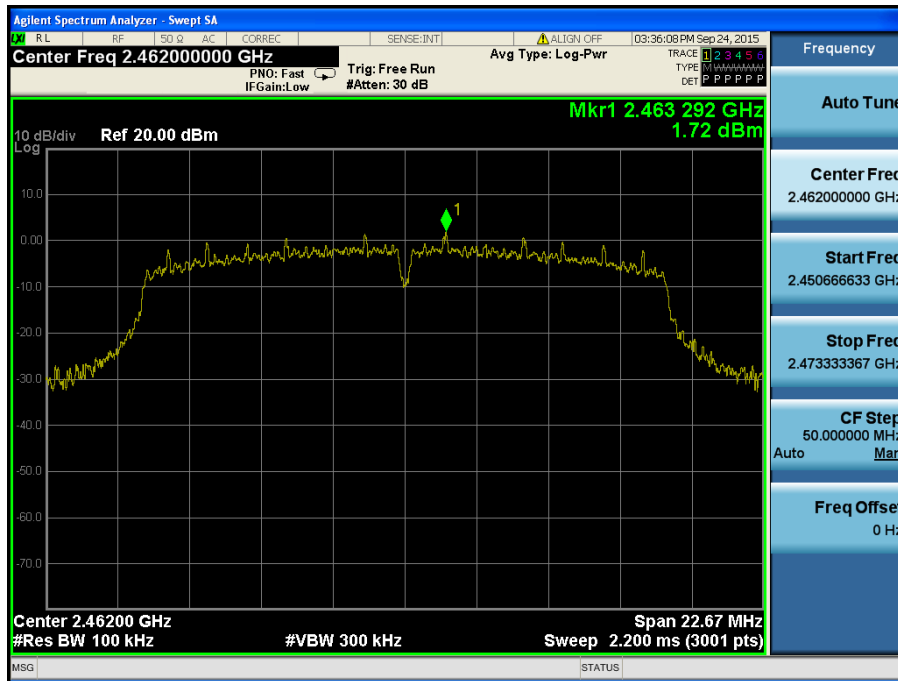
Conducted Spurious Emissions



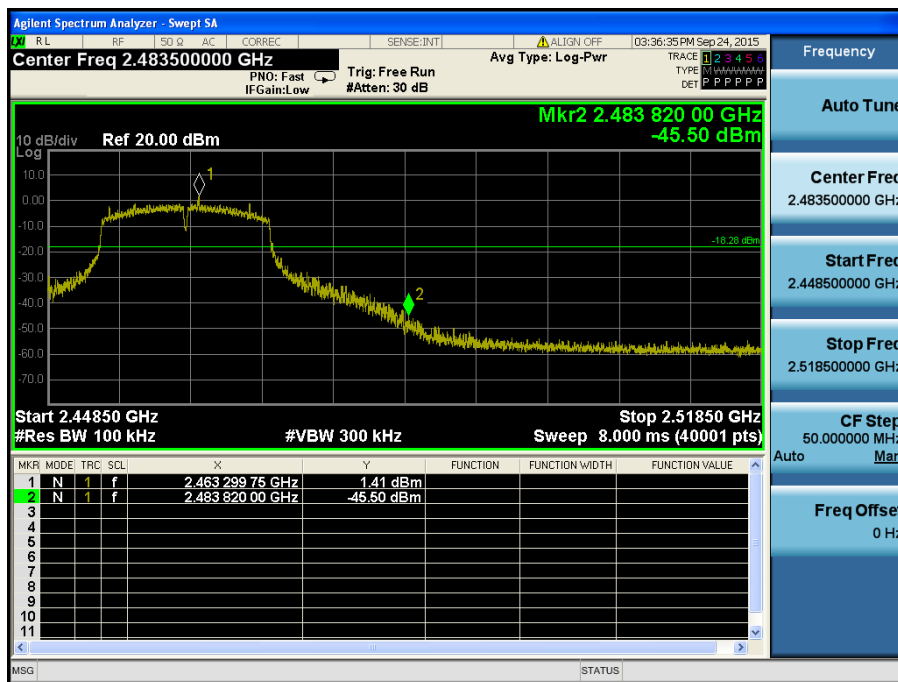
Conducted Spurious Emissions



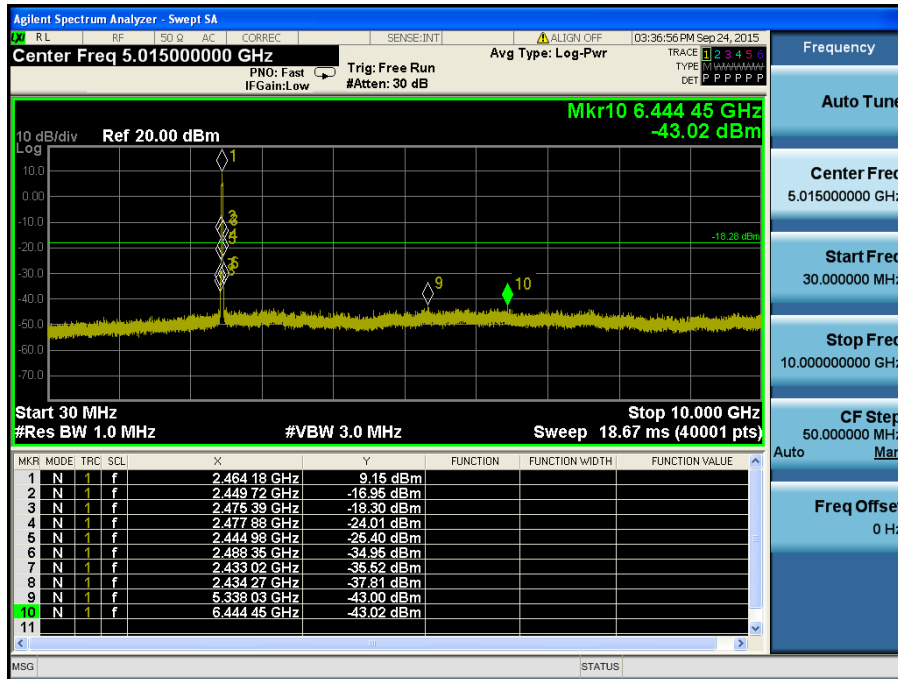
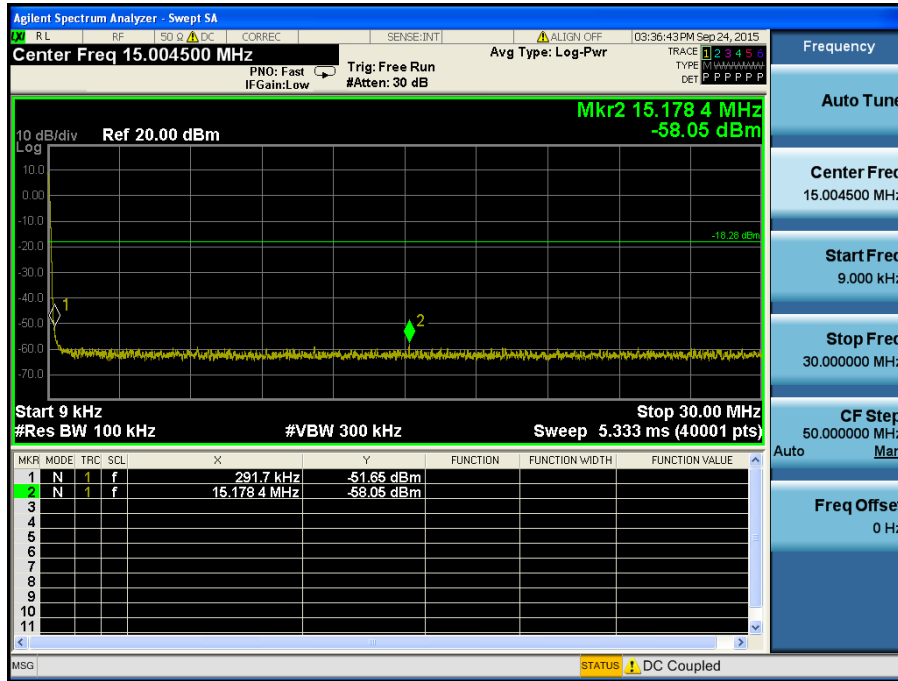
TM 2 & ANT 1 & Highest Reference



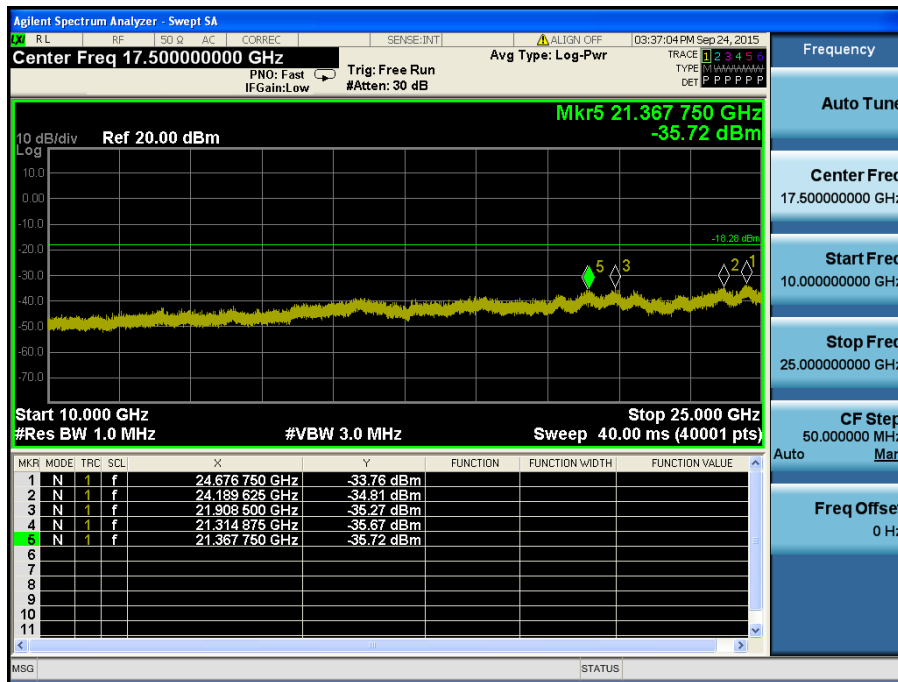
High Band-edge



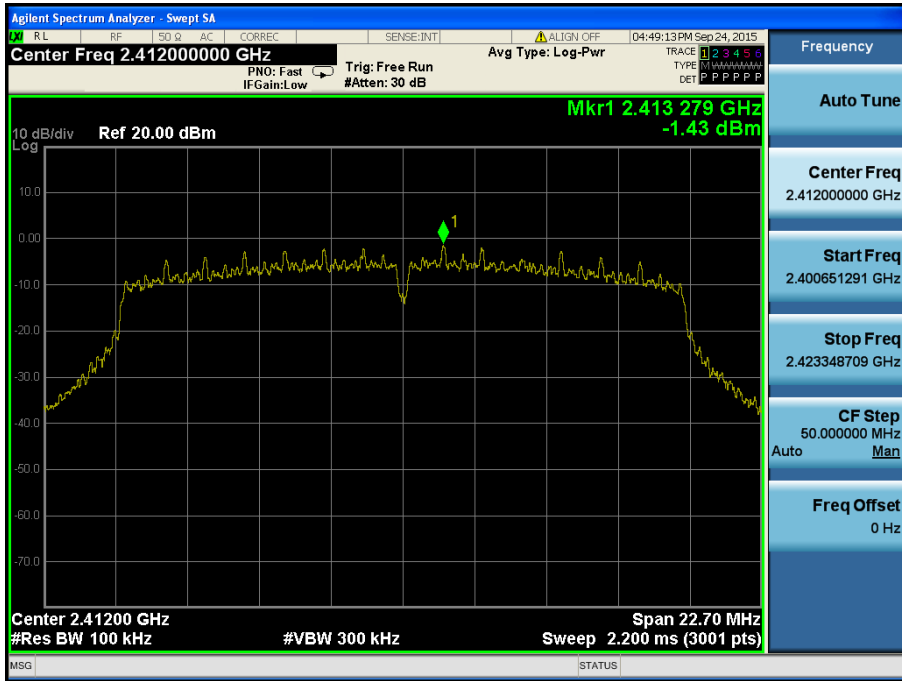
Conducted Spurious Emissions



Conducted Spurious Emissions



TM 3 & ANT 1 & Lowest
Reference



Low Band-edge

