TEST REPORT

DT&C Co., Ltd. 42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel : 031-321-2664, Fax : 031-321-1664	Report No : DRTFCC1609-0124 Pages:(1) / (121) page	Dt&C

1. Customer

   • Name : LG Electronics USA

   • Address : 1000 Sylvan Avenue, Englewood Cliffs, New Jersey 07632

2. Use of Report : FCC & IC Original Grant

3. Product Name (FCC ID / IC): RF Module (BEJLGSWFAC71 / 2703H-LGSWFAC71)

4. Date of Test : 2016-08-08 ~ 2016-09-02

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

   RSS-247 Issue 1 (2015-05), RSS-GEN Issue 4 (2014-11)

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 : JungWoo Kim (Signature)	Technical Manager Name : GeunKi Son (Signature)

2016 . 09 . 09 .

DT&C Co., Ltd.

* If this test report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description
DRTFCC1609-0124	Sep. 09, 2016	Initial issue

Table of Contents

1. EUT DESCRIPTION

FCC Equipment Class	Digital Transmission System(DTS)
Product	RF Module
Model Name	LGSWFAC71
Add Model Name	N/A
Software version	1.0
Hardware version	1.0
Serial Number	Identical prototype
Power Supply	DC 3.3 V
Frequency Range	▪ 802.11b/g/n(20 MHz) : 2412 MHz ~ 2462 MHz
Modulation Type	▪ 802.11b: CCK, DSSS ▪ 802.11g/n: OFDM
Transmissions category	Completely uncorrelated signal
Antenna Specification	**Antenna type**: Metal Antenna **Antenna gain** ▪ 2.4 GHz Band: ANT 1 : 1.400 dBi & ANT 2 : 1.370 dBi **Antenna configuration** ▪ 802.11b/g: Single Transmitting (ANT 1 or ANT 2) ▪ 802.11b/g: Multiple Transmitting (ANT 1 and ANT 2) ▪ 802.11n(MCS 0 ~ 7): Single Transmitting (ANT 1 or ANT 2) ▪ 802.11n(MCS 8 ~ 15): Multiple Transmitting (ANT 1 and 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 (Multiple transmitting)	2412	2437	2462
TM 2	802.11g 6 Mbps (Multiple transmitting)	2412	2437	2462
TM 3	802.11n(HT20) MCS 8 (Multiple transmitting)	2412	2437	2462

Note 1: The worst case data rate is determined as above test mode according to the power measurements. And radiated spurious emission was performed at the worst case data rate.
Note 2: In case of radiated test, we have done all tx case. And in case of 802.11b/g/n mode, we attached the result of only MIMO mode(Worst case).

2.2 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Laptop	X230i	R9-XKTHT	Lenovo	-
-	-	-	-	-

2.3 Tested environment

Temperature	:	23 ~ 26 ºC
Relative humidity content	:	38 ~ 43 % 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

2.5 Measurement Uncertainty

Test items	Measurement uncertainty
Transmitter Output Power	0.71 dB (The confidence level is about 95 %, k = 2)
Conducted spurious emission	0.94 dB (The confidence level is about 95 %, k = 2)
AC conducted emission	2.36 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz Below)	5.1 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz ~ 18 GHz)	5.4 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (18 GHz Above)	5.3 dB (The confidence level is about 95 %, k = 2)

3. SUMMARY OF TESTS

FCC Part	RSS Std.	Parameter	Limit	Test Condition	Status Note 1
15.247(a)	RSS-247 [5.2]	6 dB Bandwidth	> 500 kHz	Conducted	C
15.247(b)	RSS-247 [5.4]	Transmitter Output Power	< 1 Watt		C
15.247(d)	RSS-247 [5.5]	Out of Band Emissions / Band Edge	20 dBc in any 100 kHz BW		C
15.247(e)	RSS-247 [5.2]	Transmitter Power Spectral Density	< 8 dBm/3 kHz		C
-	RSS-Gen [6.6]	Occupied Bandwidth (99 %)	RSS-Gen(6.6)		C
15.247(d) 15.205 15.209	RSS-247 [5.5] RSS-GEN [8.9] RSS-GEN [8.10]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	FCC 15.209 limits	Radiated	C Note 2
15.207	RSS-Gen [8.8]	AC Line 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 v03r05, KDB662911 D01 v02r01 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) & 5740A-3(IC)

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, loop, 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 EUT used two unique antennas.

Therefore this module complies with the requirement of §15.203.

7.2 Directional antenna gain(worst case):

Bands	ANT 1 [dBi]	ANT 2 [dBi]	Directional Gain [dBi]
2.4 GHz	1.400	1.370	1.385 Note 2.

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

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

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

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

Note 3. Directional gain(spatial multiplexing)

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

8. TEST RESULT

8.1 6dB bandwidth

▣ Test Requirements and limit, §15.247(a) & RSS-247 [5.2]

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.

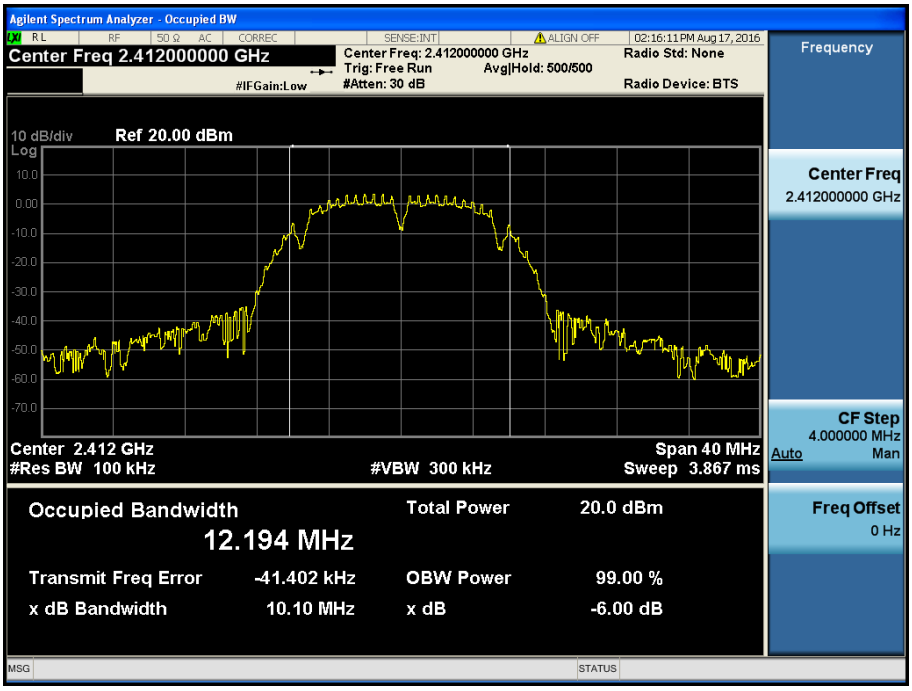
▣ Test Results: Comply

Test Mode	Frequency	Test Results[MHz]	
		ANT 1	ANT 2
TM 1	Lowest	10.100	9.628
	Middle	10.090	10.090
	Highest	10.080	9.625
TM 2	Lowest	15.990	16.080
	Middle	15.810	16.110
	Highest	16.320	16.070
TM 3	Lowest	17.150	16.990
	Middle	16.570	16.540
	Highest	16.970	17.300

▣ RESULT PLOTS

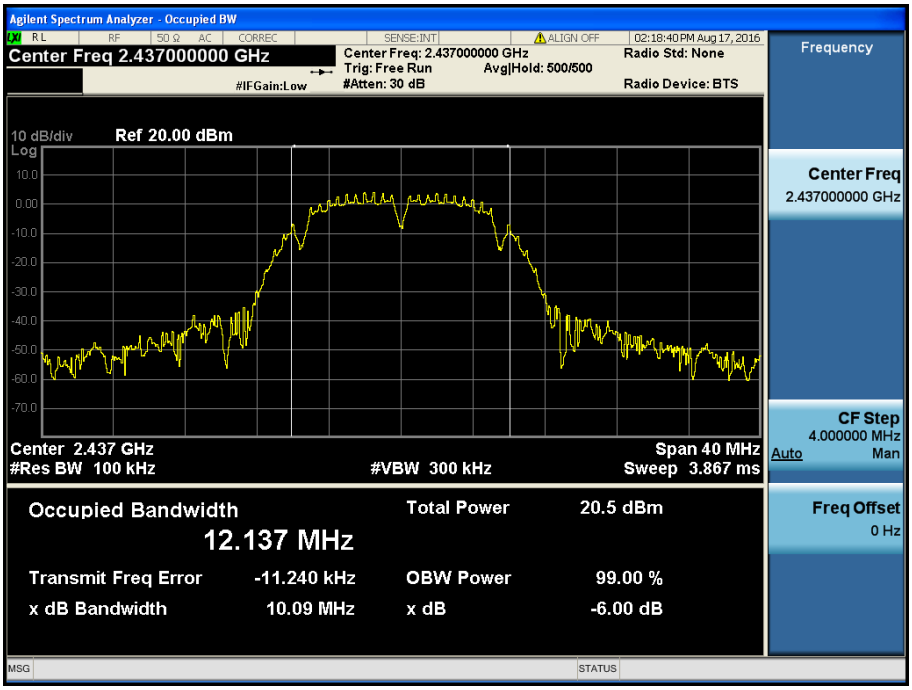
6 dB Bandwidth

TM 1 & ANT 1 & Lowest



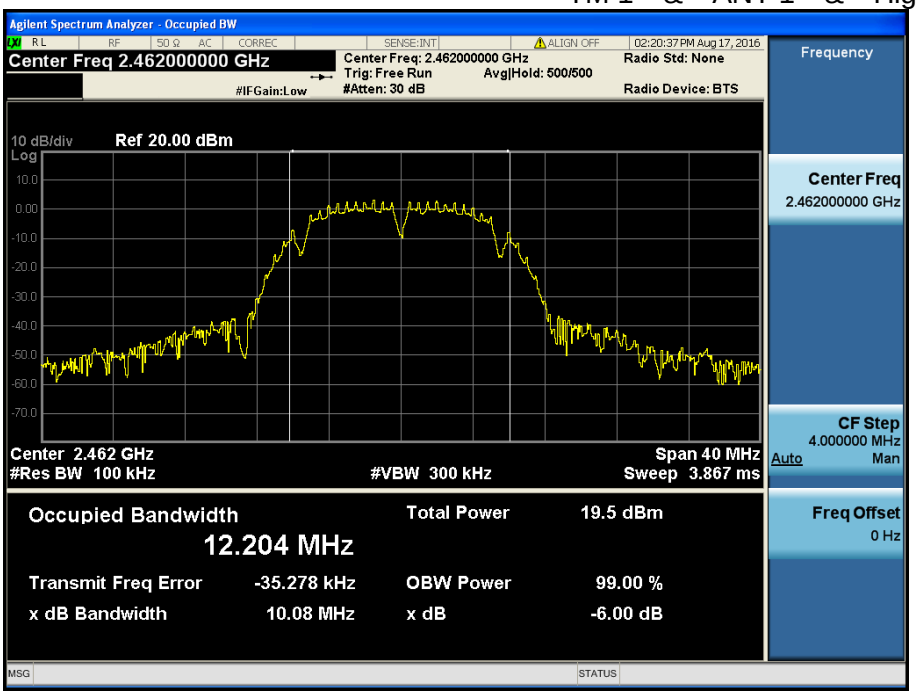
6 dB Bandwidth

TM 1 & ANT 1 & Middle



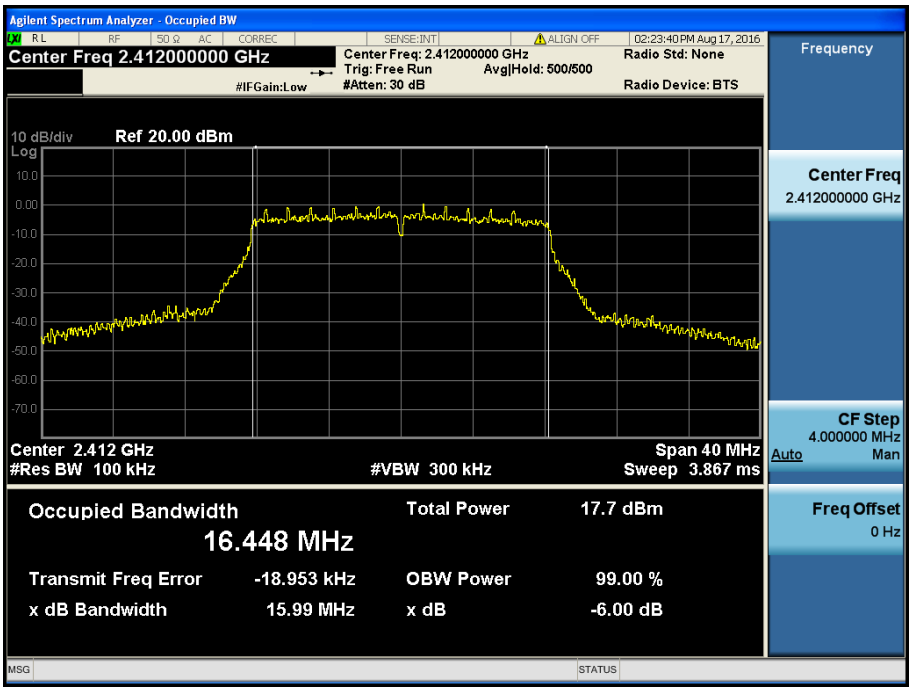
6 dB Bandwidth

TM 1 & ANT 1 & Highest



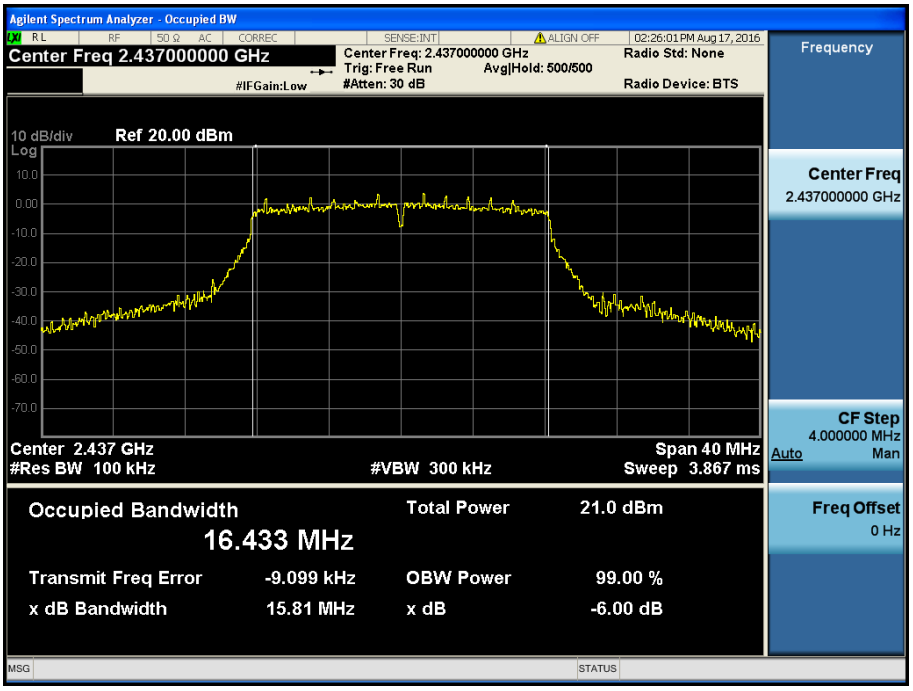
6 dB Bandwidth

TM 2 & ANT 1 & Lowest



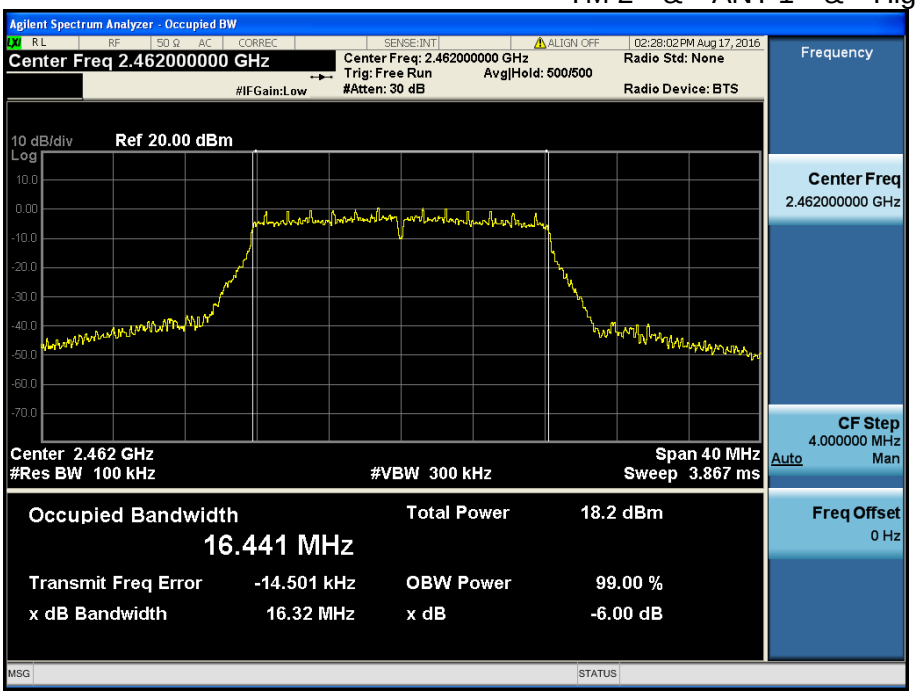
6 dB Bandwidth

TM 2 & ANT 1 & Middle



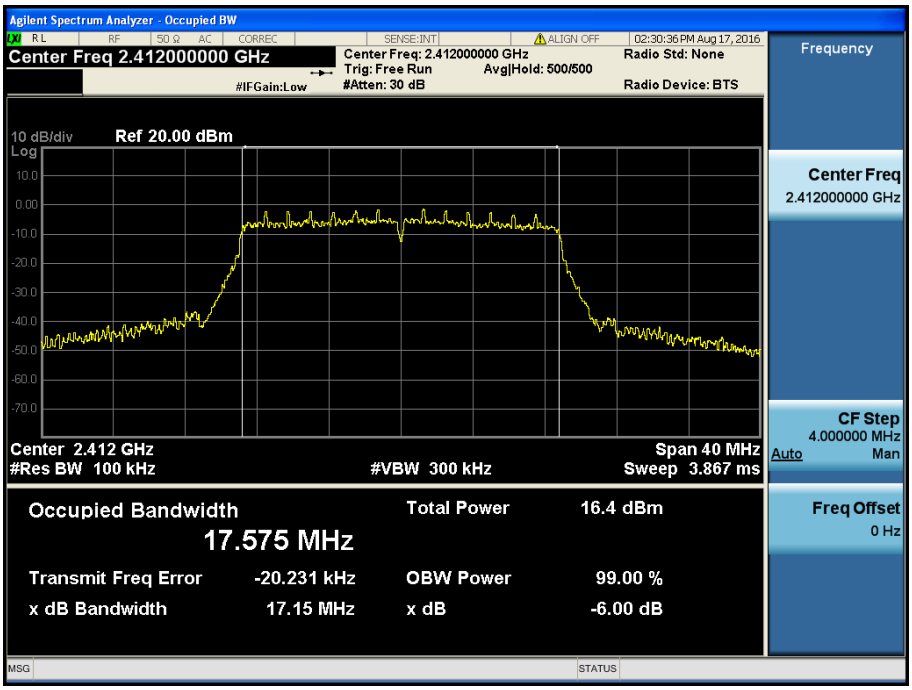
6 dB Bandwidth

TM 2 & ANT 1 & Highest



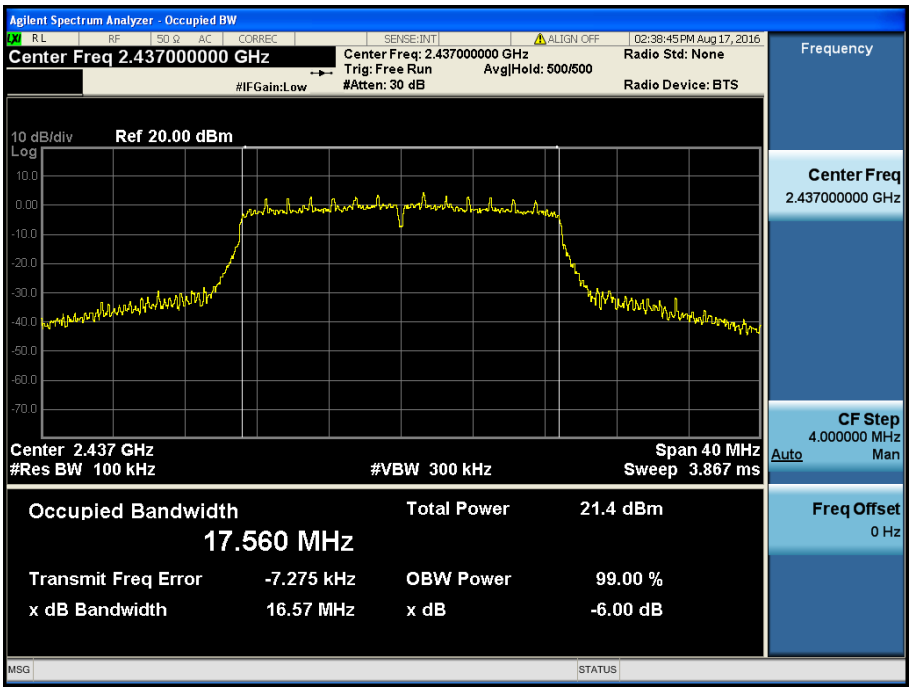
6 dB Bandwidth

TM 3 & ANT 1 & Lowest



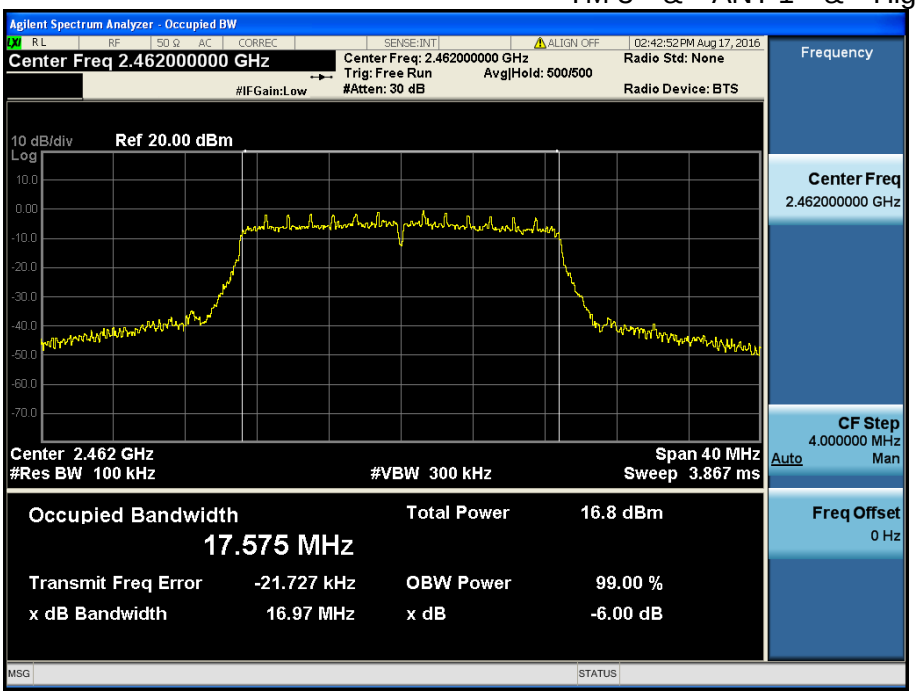
6 dB Bandwidth

TM 3 & ANT 1 & Middle



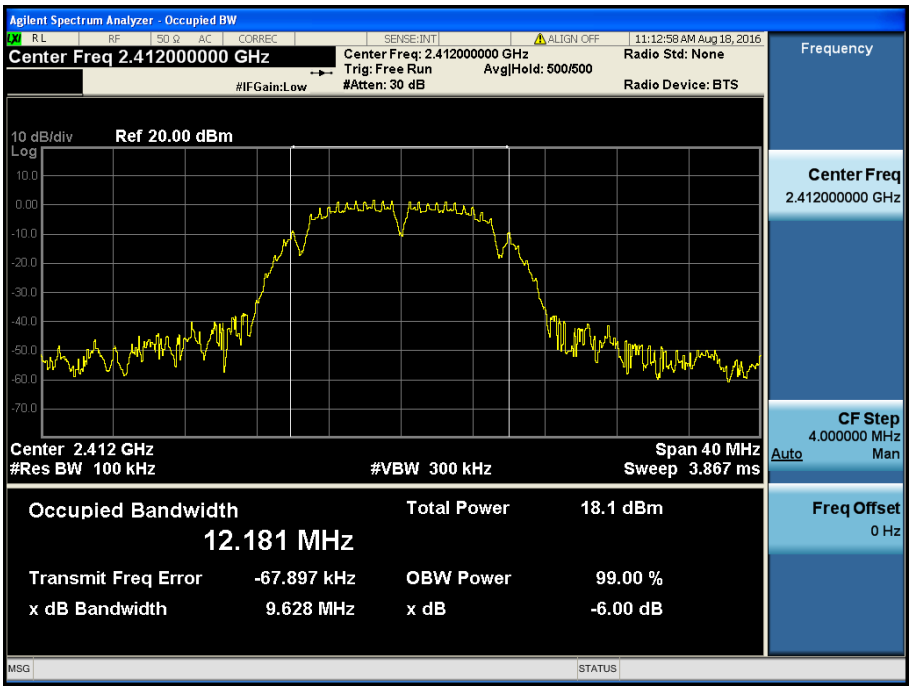
6 dB Bandwidth

TM 3 & ANT 1 & Highest



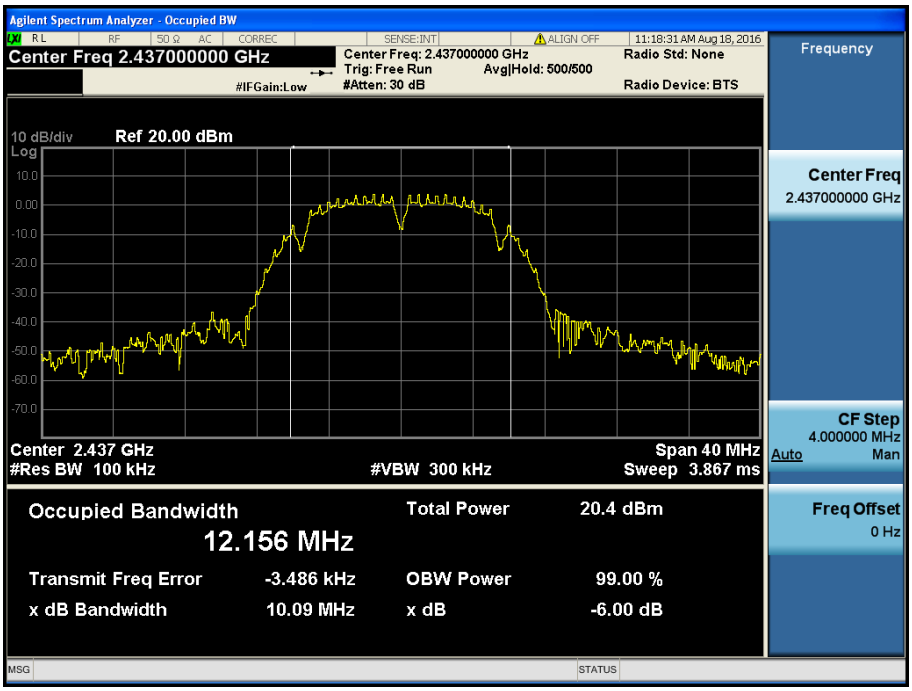
6 dB Bandwidth

TM 1 & ANT 2 & Lowest



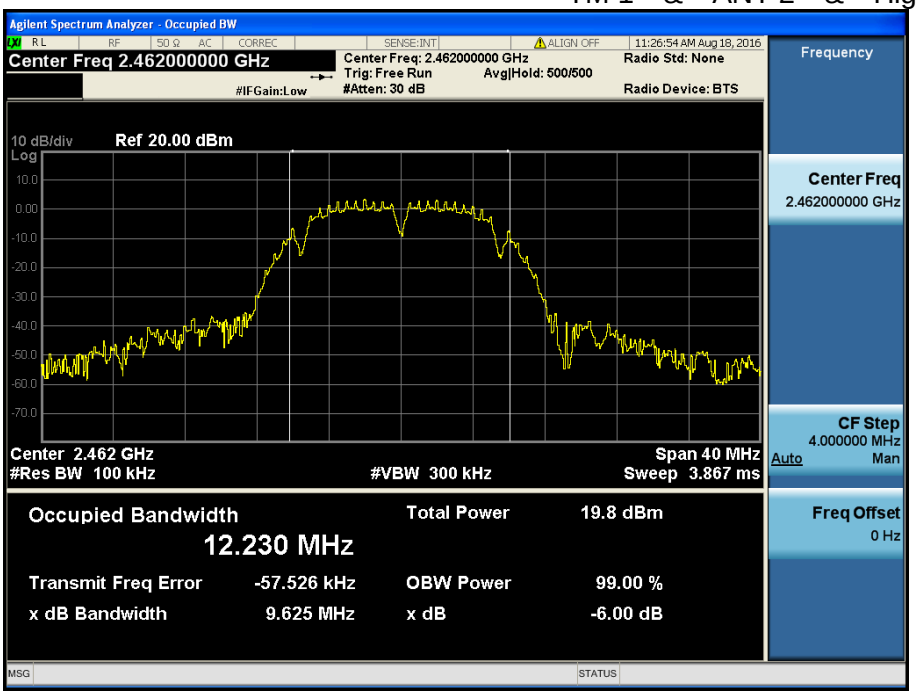
6 dB Bandwidth

TM 1 & ANT 2 & Middle



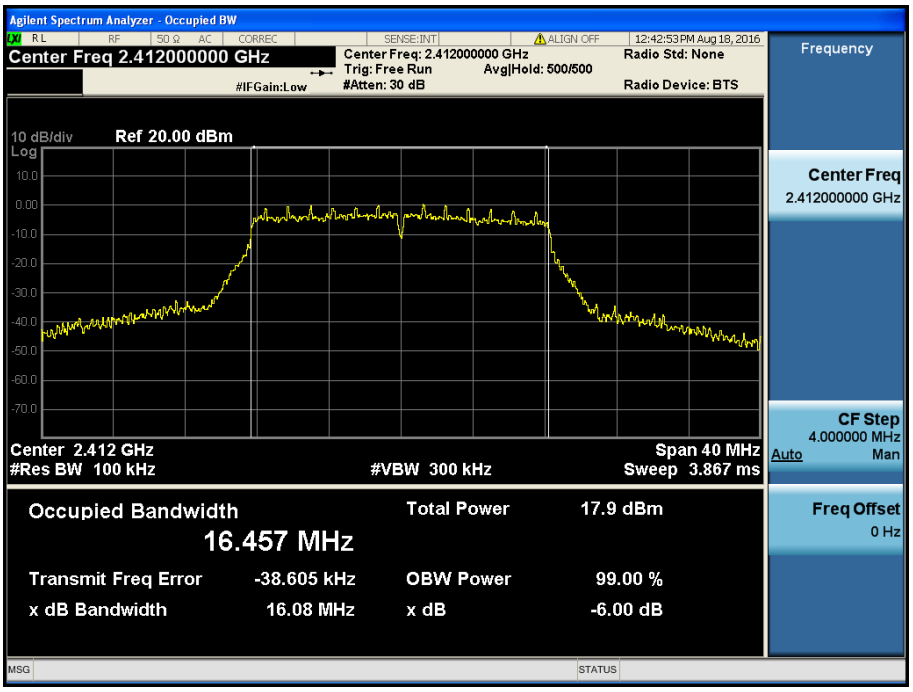
6 dB Bandwidth

TM 1 & ANT 2 & Highest



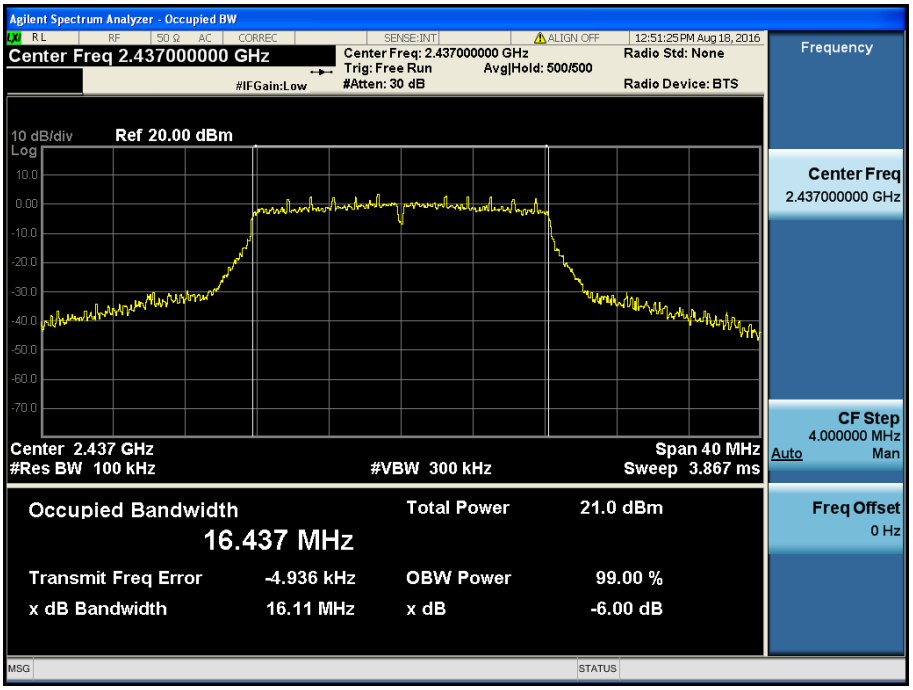
6 dB Bandwidth

TM 2 & ANT 2 & Lowest



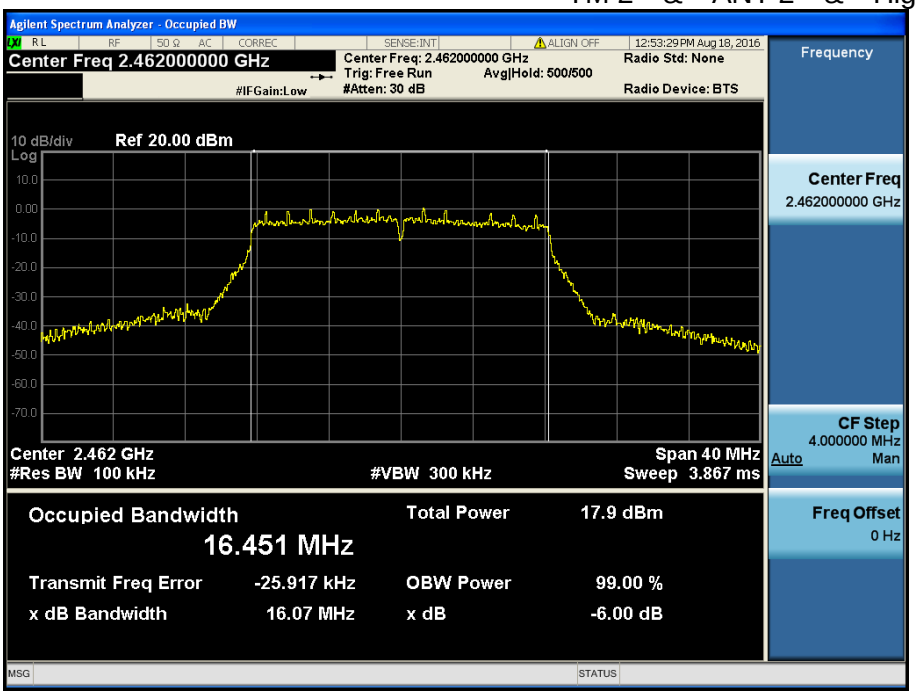
6 dB Bandwidth

TM 2 & ANT 2 & Middle



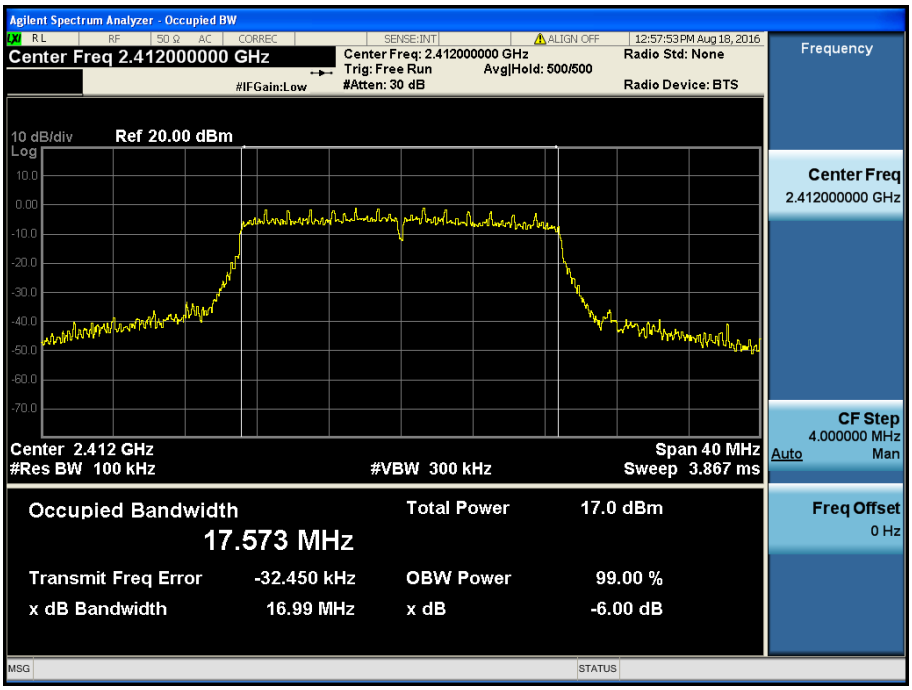
6 dB Bandwidth

TM 2 & ANT 2 & Highest



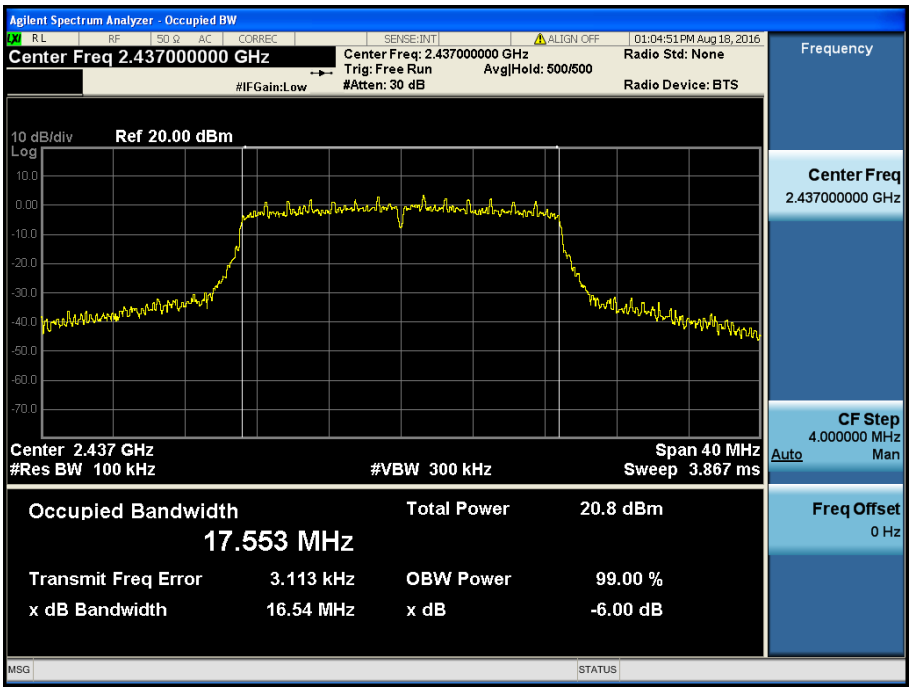
6 dB Bandwidth

TM 3 & ANT 2 & Lowest



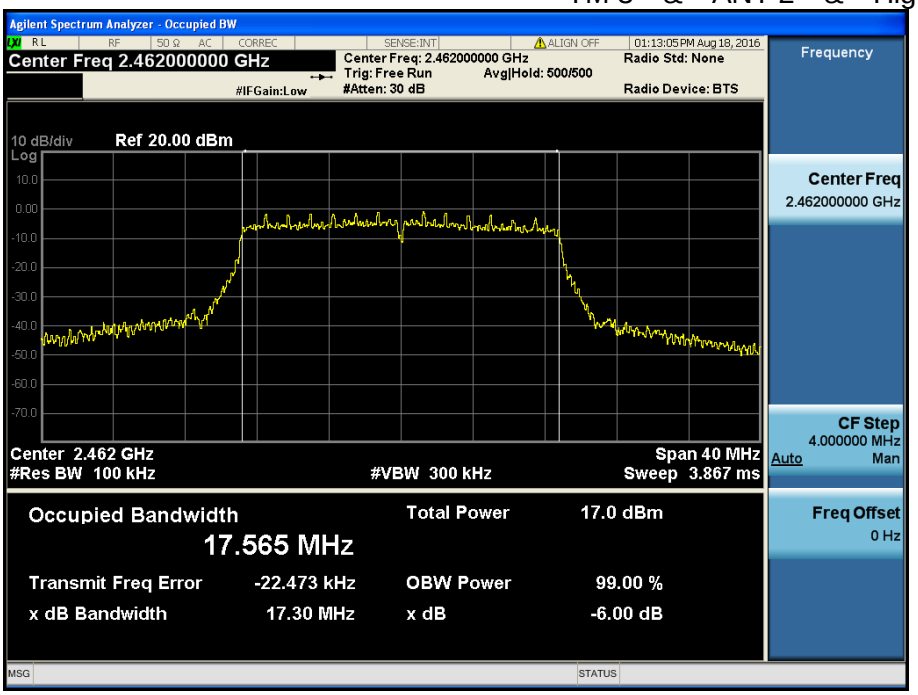
6 dB Bandwidth

TM 3 & ANT 2 & Middle



6 dB Bandwidth

TM 3 & ANT 2 & Highest

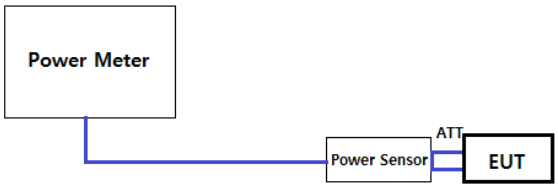


8.2 Maximum peak conducted output power

▣ Test Requirements and limit, §15.247(b) & RSS-247 [5.4]

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.

   Note: The measure-and-sum technique is used for test mode with multiple transmitting.

▣ Test Results: Comply

- **Single transmitting mode**
  - **Single transmitting**

ANT	Freq. (MHz)	Det.	Maximum Peak Conducted Output Power (dBm) for *802.11b*			
			Data Rate [Mbps]			
			1	2	5.5	11
ANT 1	2412	PK	**19.98**	19.84	19.81	19.72
		AV	16.66	16.59	16.55	16.48
	2437	PK	19.97	19.85	19.80	19.70
		AV	16.55	16.45	16.44	16.38
	2462	PK	19.65	19.59	19.57	19.51
		AV	16.20	16.17	16.14	16.08
ANT 2	2412	PK	19.86	19.84	19.74	19.56
		AV	16.59	16.55	16.53	16.48
	2437	PK	**20.03**	19.97	19.90	19.88
		AV	16.68	16.66	16.58	16.55
	2462	PK	19.78	19.77	19.70	19.68
		AV	16.41	16.40	16.38	16.31

ANT	Freq. (MHz)	Det.	Maximum Peak Conducted Output Power (dBm) for *802.11g*							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
ANT 1	2412	PK	19.95	19.93	19.91	19.89	19.88	19.83	19.82	19.82
		AV	11.20	11.17	11.15	11.14	11.12	11.12	11.06	10.99
	2437	PK	**22.68**	22.65	22.64	22.59	22.52	22.49	22.42	22.42
		AV	14.00	13.98	13.98	13.95	13.92	13.87	13.83	13.79
	2462	PK	21.11	21.06	20.99	20.94	20.94	20.91	20.83	20.83
		AV	11.72	11.68	11.67	11.65	11.59	11.51	11.46	11.43
ANT 2	2412	PK	20.55	20.54	20.52	20.49	20.46	20.44	20.42	20.40
		AV	11.72	11.67	11.62	11.55	11.49	11.49	11.46	11.38
	2437	PK	**22.91**	22.87	22.83	22.79	22.77	22.77	22.76	22.74
		AV	14.10	14.06	14.06	14.05	14.02	13.95	13.87	13.87
	2462	PK	20.34	20.33	20.27	20.26	20.22	20.18	20.15	20.11
		AV	11.41	11.35	11.30	11.26	11.18	11.13	11.05	11.01

ANT	Freq. (MHz)	Det.	Maximum Peak Conducted Output Power (dBm) for ***802.11n(HT20)***							
			Data Rate [MCS]							
			8	9	10	11	12	13	14	15
ANT 1	2412	PK	19.670	19.650	19.630	19.610	19.590	19.580	19.540	19.530
		AV	10.170	10.110	10.050	10.000	9.920	9.910	9.850	9.840
	2437	PK	**23.020**	23.000	22.990	22.910	22.900	22.850	22.790	22.730
		AV	14.800	14.740	14.740	14.720	14.670	14.640	14.580	14.540
	2462	PK	19.820	19.770	19.750	19.690	19.620	19.560	19.520	19.470
		AV	10.550	10.500	10.490	10.430	10.410	10.400	10.380	10.380
ANT 2	2412	PK	19.990	19.980	19.980	19.970	19.940	19.920	19.910	19.890
		AV	10.870	10.850	10.800	10.720	10.720	10.720	10.710	10.630
	2437	PK	**22.220**	22.210	22.170	22.110	22.100	22.070	22.050	22.040
		AV	14.260	14.250	14.180	14.120	14.050	14.040	13.970	13.890
	2462	PK	19.710	19.700	19.690	19.630	19.590	19.560	19.540	19.490
		AV	10.780	10.760	10.690	10.620	10.560	10.550	10.500	10.430

- **Multiple transmitting**

ANT	Freq. (MHz)	Det.	Maximum Peak Conducted Output Power (dBm) for ***802.11b***			
			Data Rate [Mbps]			
			1	2	5.5	11
ANT 1	2412	PK	**16.920**	16.890	16.880	16.840
		AV	13.490	13.440	13.410	13.400
	2437	PK	16.810	16.780	16.750	16.700
		AV	13.380	13.360	13.350	13.310
	2462	PK	16.260	16.210	16.200	16.140
		AV	12.880	12.830	12.810	12.760
ANT 2	2412	PK	**17.230**	17.200	17.190	17.170
		AV	13.860	13.840	13.790	13.770
	2437	PK	17.220	17.170	17.110	17.040
		AV	13.840	13.780	13.710	13.700
	2462	PK	17.020	17.000	16.940	16.920
		AV	13.620	13.590	13.570	13.560
Sum (ANT 1+2)	2412	PK	**20.089**	20.059	20.049	20.019
	2437	PK	20.031	19.990	19.945	19.884
	2462	PK	19.667	19.634	19.597	19.558

ANT	Freq. (MHz)	Det.	Maximum Peak Conducted Output Power (dBm) for ***802.11g***							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
ANT 1	2412	PK	20.150	20.120	20.080	20.070	20.050	20.040	20.010	19.980
		AV	11.510	11.470	11.430	11.360	11.310	11.300	11.250	11.170
	2437	PK	**22.930**	22.910	22.870	22.840	22.810	22.750	22.710	22.640
		AV	14.270	14.260	14.250	14.200	14.120	14.110	14.040	13.970
	2462	PK	21.370	21.330	21.280	21.260	21.220	21.210	21.130	21.100
		AV	11.970	11.920	11.920	11.920	11.850	11.800	11.780	11.750
ANT 2	2412	PK	20.720	20.690	20.660	20.650	20.640	20.640	20.620	20.610
		AV	11.970	11.920	11.890	11.880	11.850	11.820	11.780	11.720
	2437	PK	**23.220**	23.200	23.200	23.170	23.120	23.060	22.990	22.910
		AV	14.340	14.290	14.230	14.220	14.210	14.200	14.160	14.130
	2462	PK	20.560	20.530	20.500	20.450	20.420	20.390	20.390	20.370
		AV	11.760	11.710	11.690	11.680	11.610	11.530	11.530	11.530
Sum (ANT 1+2)	2412	PK	23.455	23.425	23.390	23.380	23.366	23.361	23.337	23.317
	2437	PK	**26.088**	26.068	26.049	26.019	25.979	25.919	25.863	25.788
	2462	PK	23.995	23.959	23.918	23.885	23.849	23.830	23.787	23.761

ANT	Freq. (MHz)	Det.	Maximum Peak Conducted Output Power (dBm) for ***802.11n(HT20)***							
			Data Rate [MCS]							
			8	9	10	11	12	13	14	15
ANT 1	2412	PK	19.740	19.720	19.700	19.680	19.660	19.620	19.590	19.580
		AV	10.270	10.210	10.150	10.150	10.120	10.070	10.040	10.000
	2437	PK	**23.180**	23.150	23.090	23.020	22.950	22.870	22.860	22.830
		AV	14.890	14.830	14.830	14.760	14.740	14.660	14.590	14.540
	2462	PK	19.940	19.930	19.900	19.860	19.840	19.820	19.800	19.780
		AV	10.630	10.570	10.560	10.520	10.490	10.430	10.400	10.380
ANT 2	2412	PK	20.030	20.020	19.980	19.970	19.960	19.930	19.920	19.900
		AV	10.920	10.870	10.840	10.830	10.780	10.760	10.670	10.640
	2437	PK	**22.360**	22.310	22.300	22.250	22.240	22.180	22.170	22.120
		AV	14.360	14.350	14.350	14.310	14.300	14.230	14.150	14.080
	2462	PK	19.850	19.830	19.770	19.720	19.710	19.650	19.580	19.550
		AV	10.840	10.830	10.770	10.710	10.670	10.600	10.530	10.460
Sum (ANT 1+2)	2412	PK	22.898	22.883	22.853	22.838	22.823	22.789	22.769	22.754
	2437	PK	**25.800**	25.761	25.724	25.663	25.620	25.549	25.539	25.500
	2462	PK	22.906	22.891	22.846	22.801	22.786	22.747	22.702	22.677

8.3 Maximum power spectral density

▣ Test requirements and limit, §15.247(e) & RSS-247 [5.2]

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	-9.810	-10.880	-7.302
	Middle	3 kHz	-9.400	-10.190	-6.767
	Highest	3 kHz	-9.990	-10.550	-7.251
TM 2	Lowest	3 kHz	-13.370	-14.150	-10.733
	Middle	3 kHz	-10.770	-9.940	-7.325
	Highest	3 kHz	-14.330	-14.110	-11.209
TM 3	Lowest	3 kHz	-16.400	-14.860	-12.552
	Middle	3 kHz	-10.490	-11.230	-7.834
	Highest	3 kHz	-16.130	-15.780	-12.942

▣ RESULT PLOTS

Maximum PPSD

TM 1 & ANT 1 & Lowest

Maximum PPSD

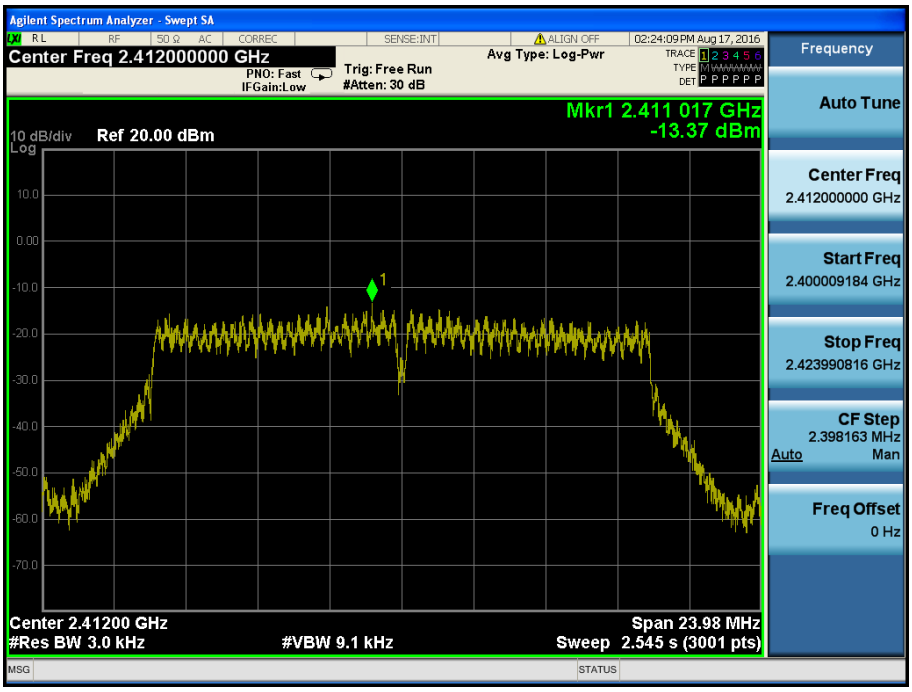
TM 1 & ANT 1 & Middle

Maximum PPSD

TM 1 & ANT 1 & Highest

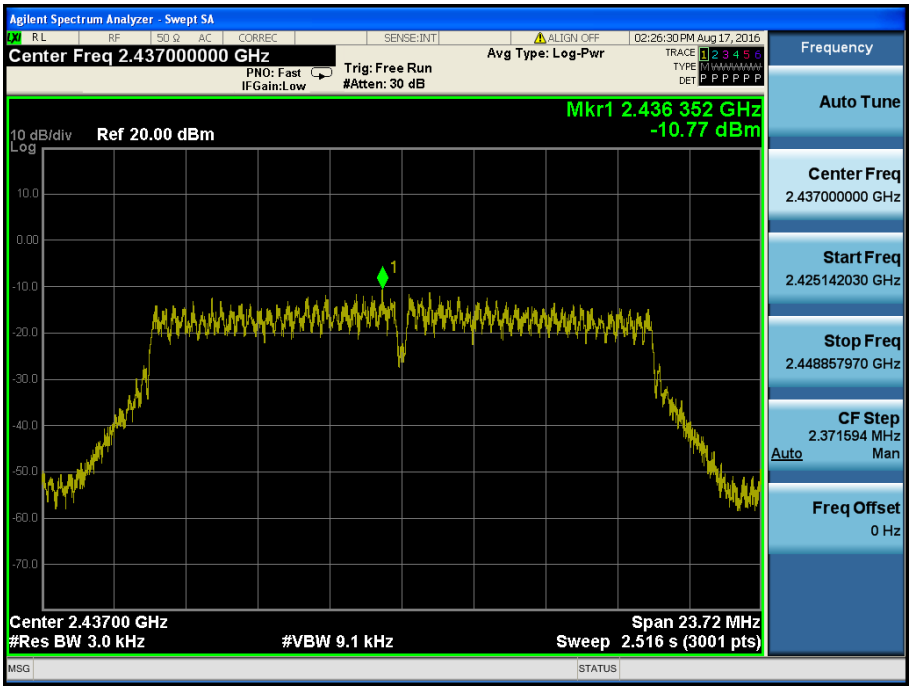
Maximum PPSD

TM 2 & ANT 1 & Lowest



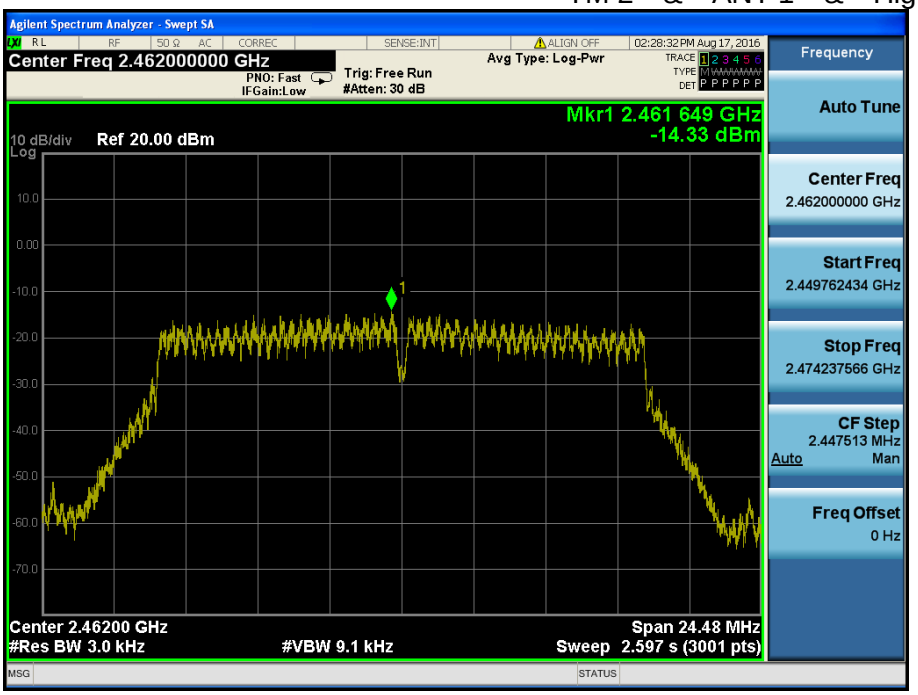
Maximum PPSD

TM 2 & ANT 1 & Middle



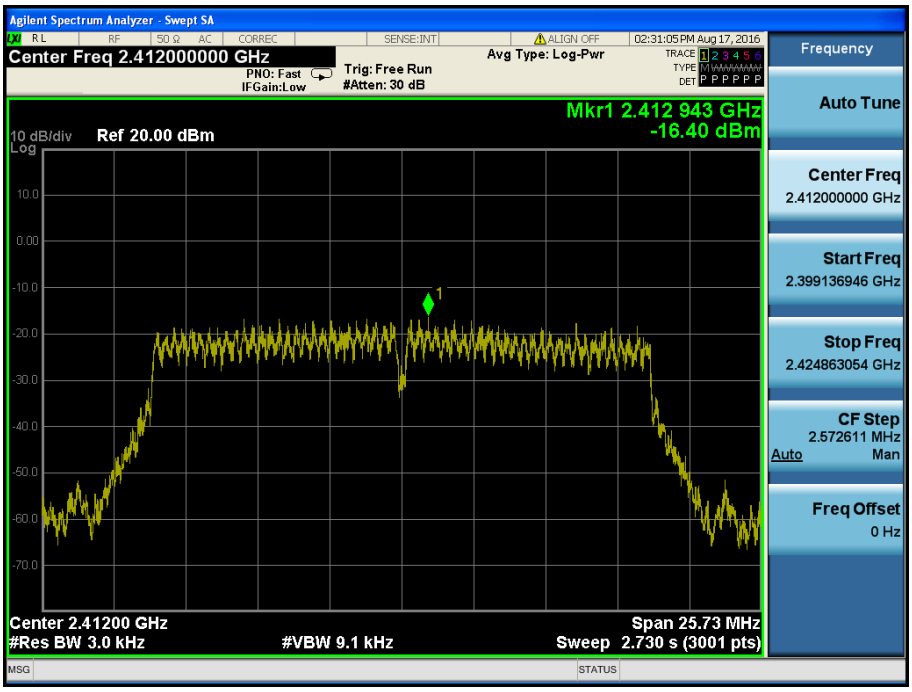
Maximum PPSD

TM 2 & ANT 1 & Highest



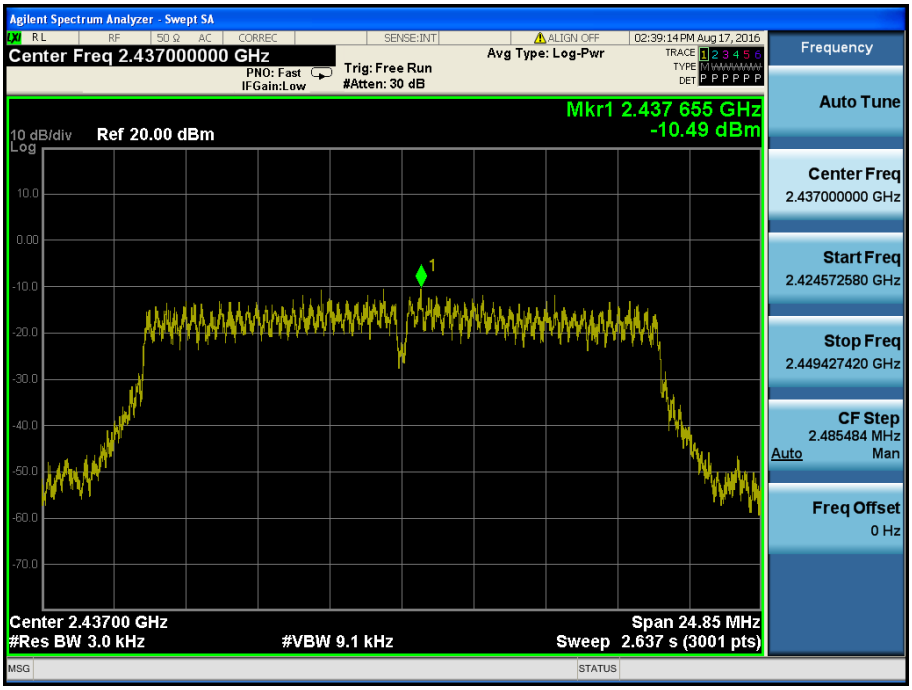
Maximum PPSD

TM 3 & ANT 1 & Lowest



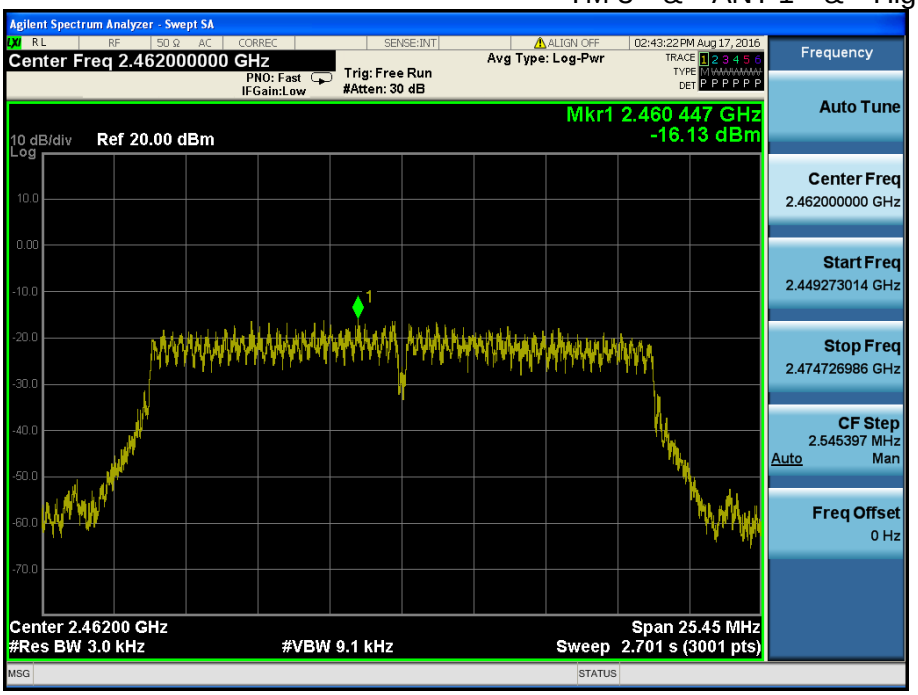
Maximum PPSD

TM 3 & ANT 1 & Middle



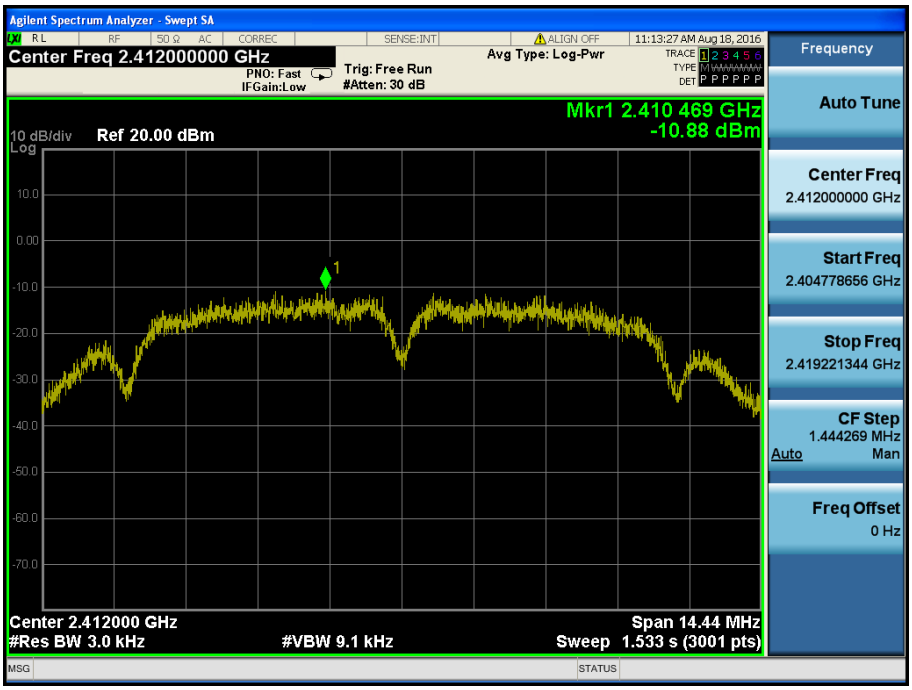
Maximum PPSD

TM 3 & ANT 1 & Highest



Maximum PPSD

TM 1 & ANT 2 & Lowest



Maximum PPSD

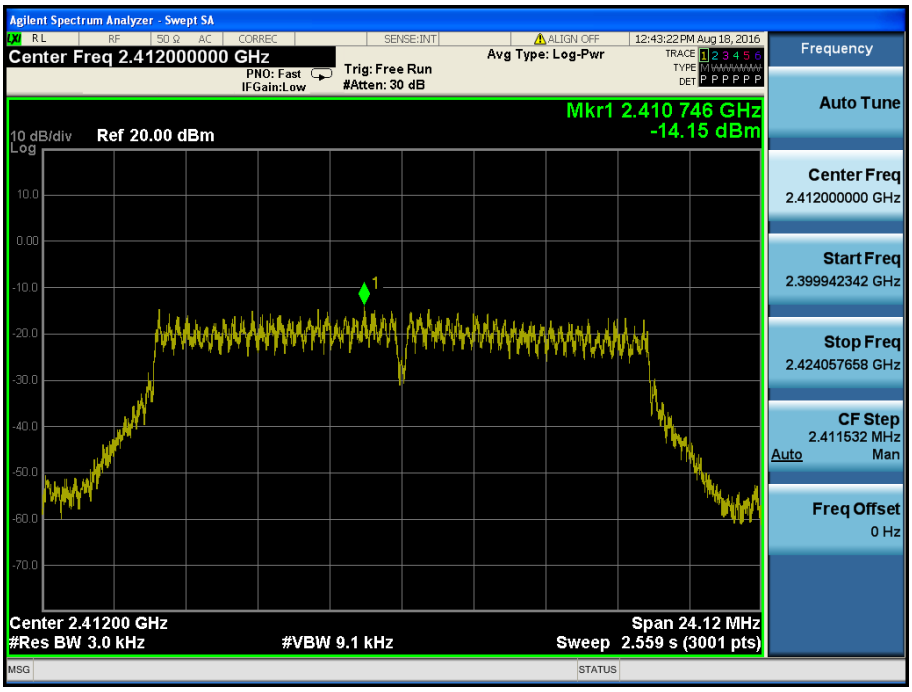
TM 1 & ANT 2 & Middle

Maximum PPSD

TM 1 & ANT 2 & Highest

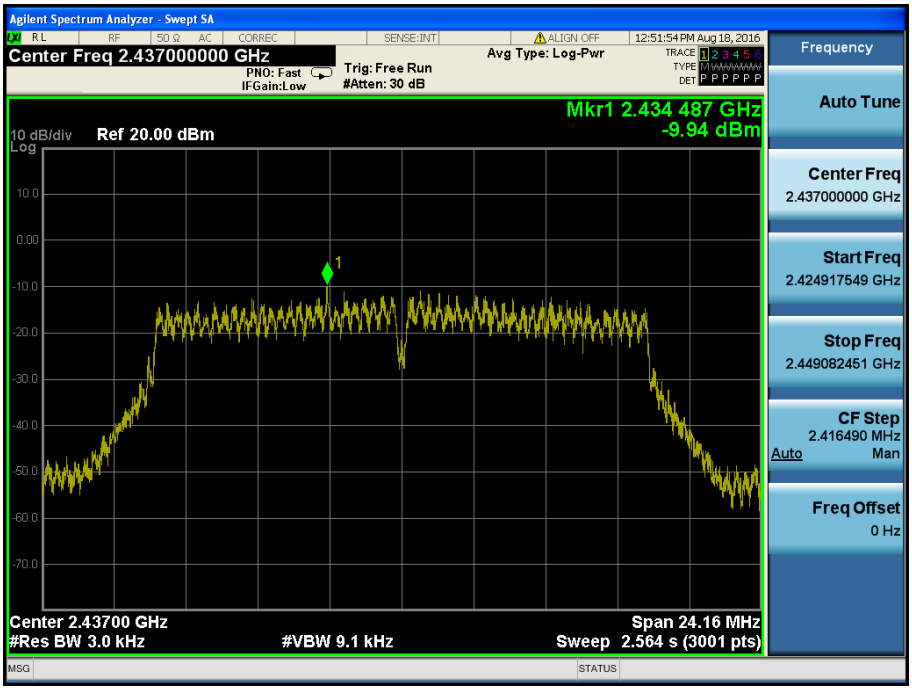
Maximum PPSD

TM 2 & ANT 2 & Lowest



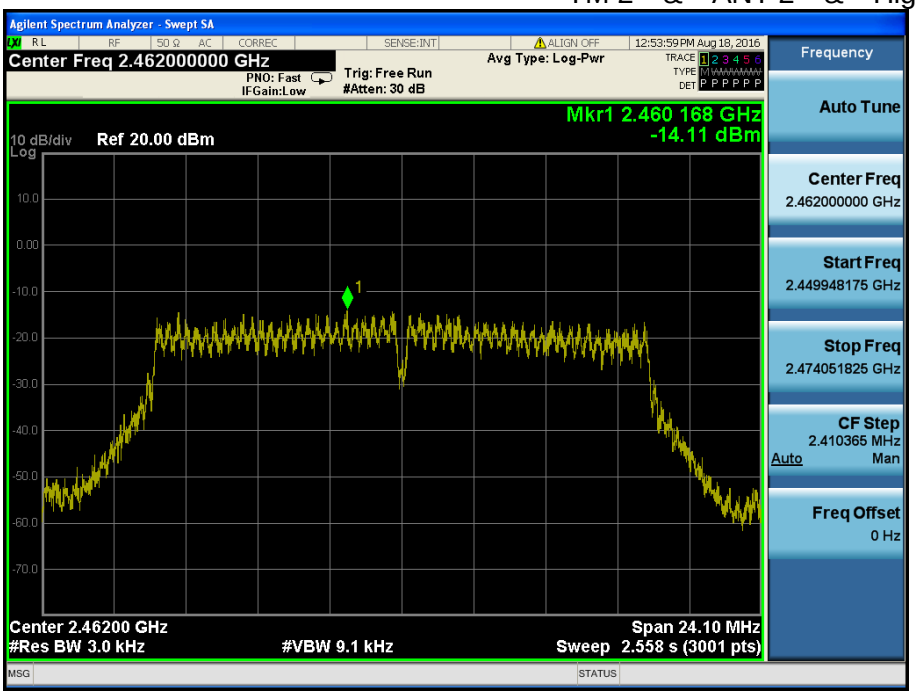
Maximum PPSD

TM 2 & ANT 2 & Middle



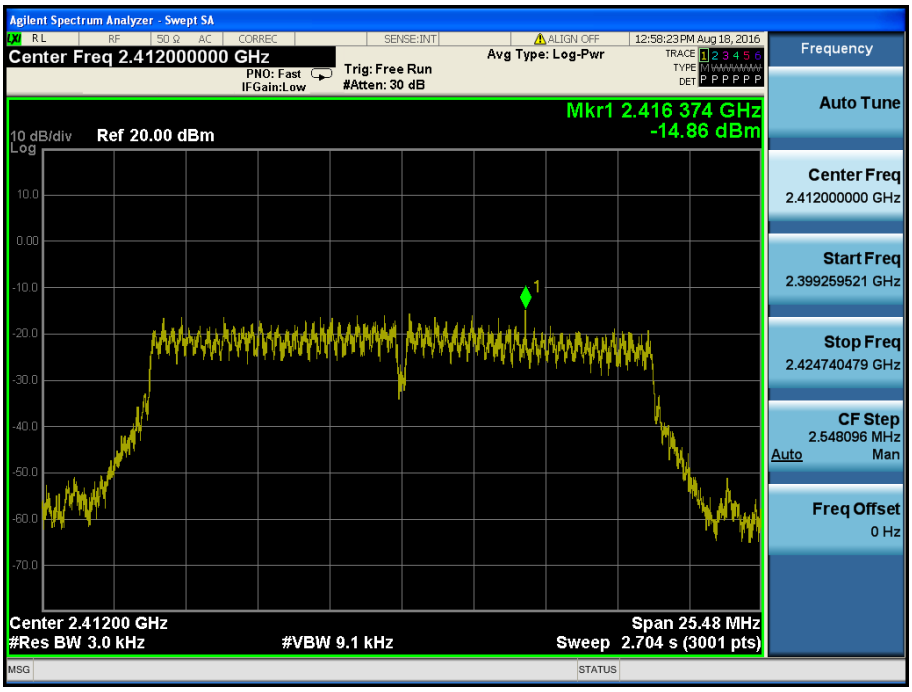
Maximum PPSD

TM 2 & ANT 2 & Highest



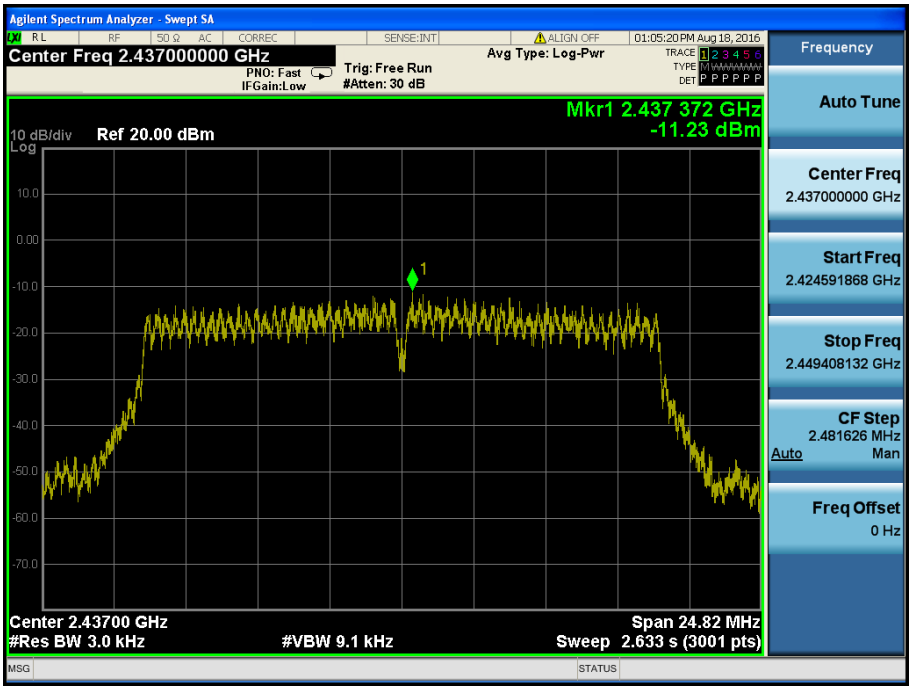
Maximum PPSD

TM 3 & ANT 2 & Lowest



Maximum PPSD

TM 3 & ANT 2 & Middle



Maximum PPSD

TM 3 & ANT 2 & Highest

8.4 Out of band emissions at the band edge / conducted spurious emissions

▣ Test requirements and limit, §15.247(d) & RSS-247 [5.5]

§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 in band 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 **≥ 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 PSD 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 **≥ 3 x RBW. (Actual 3 MHz, See below note)**
4. Detector = **Peak**.
5. Ensure that the number of measurement points ≥ 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: 9 kHz ~ 30 MHz
RBW = 100 kHz, VBW = 300 kHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT : 40001

Frequency range: 30 MHz ~ 10 GHz, 10 GHz ~25 GHz
RBW = 1 MHz, VBW = 3 MHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT : 40001

LIMIT LINE = 20 dB below of the reference level of above measurement procedure Step 2. (RBW = 100 kHz, VBW = 300 kHz)

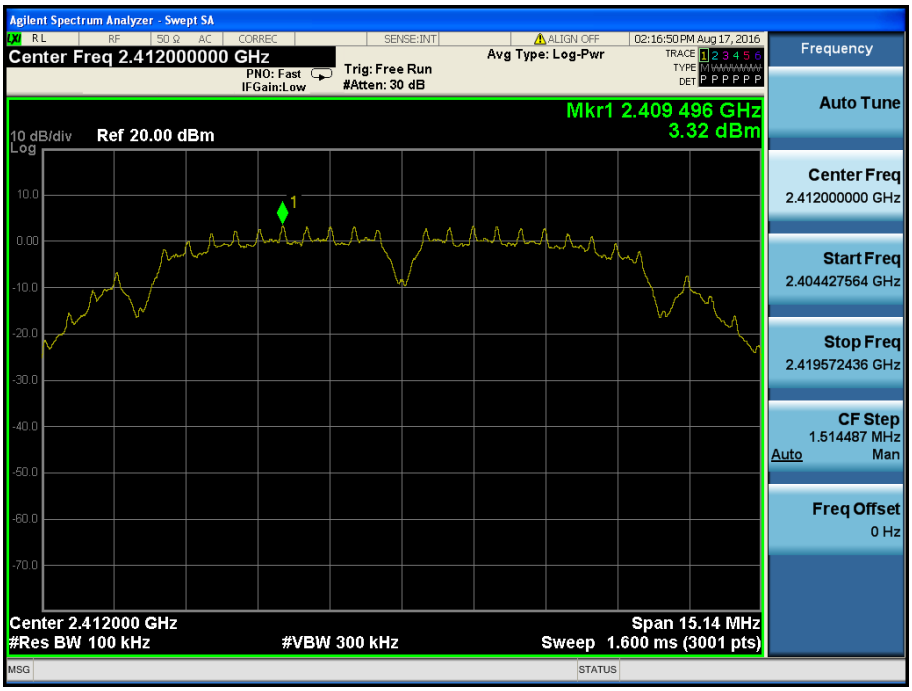
If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 kHz, VBW = 300 kHz, SPAN = 100 MHz and BINS = 2001 to get accurate emission level within 100 kHz BW.

Also the path loss for conducted measurement setup was used as described on the Appendix I of this test report.

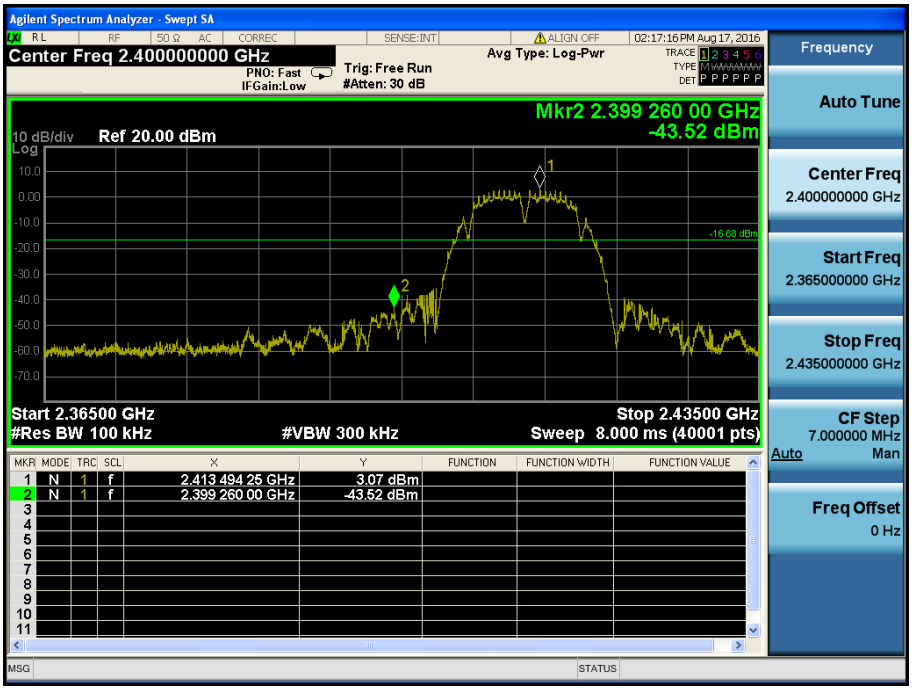
▣ RESULT PLOTS

TM 1 & ANT 1 & Lowest

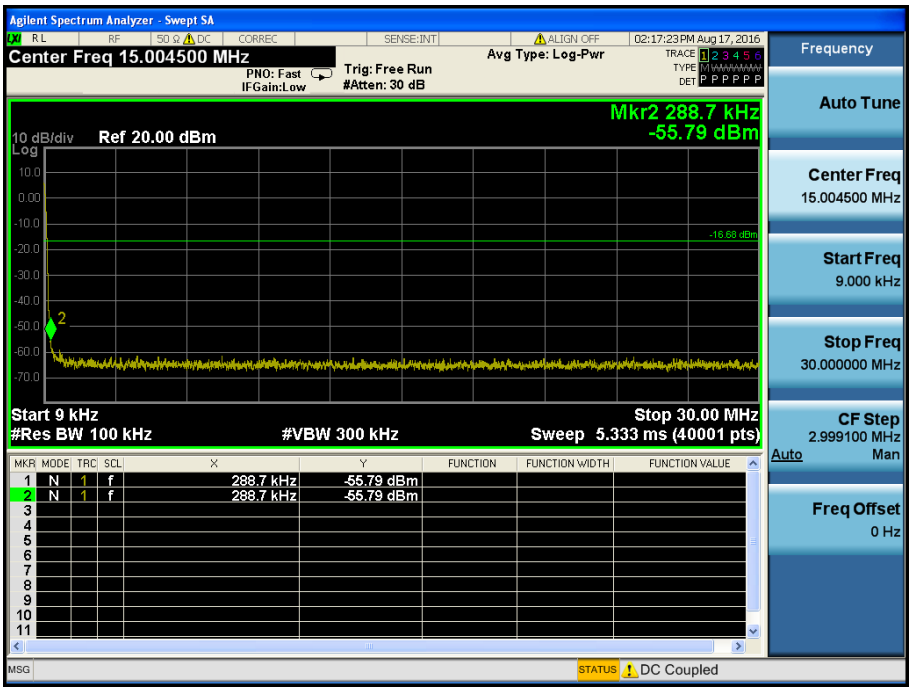
Reference

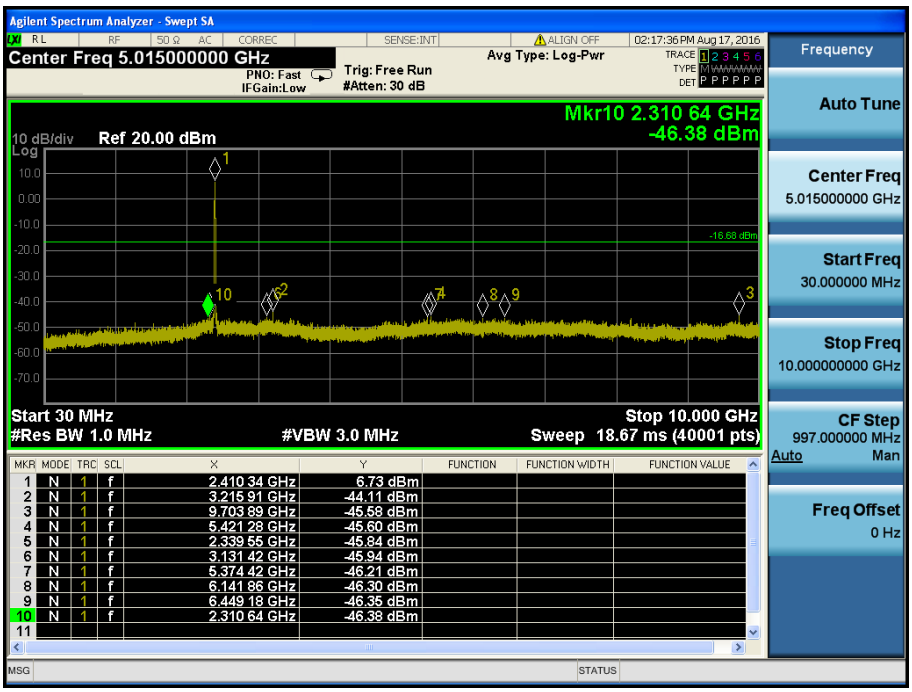


Low Band-edge

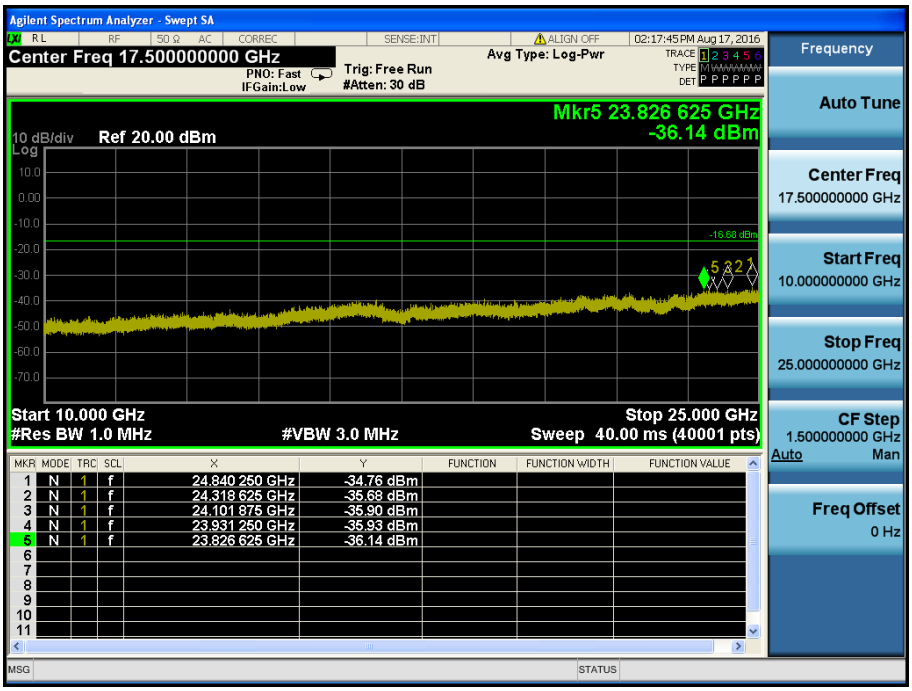


Conducted Spurious Emissions



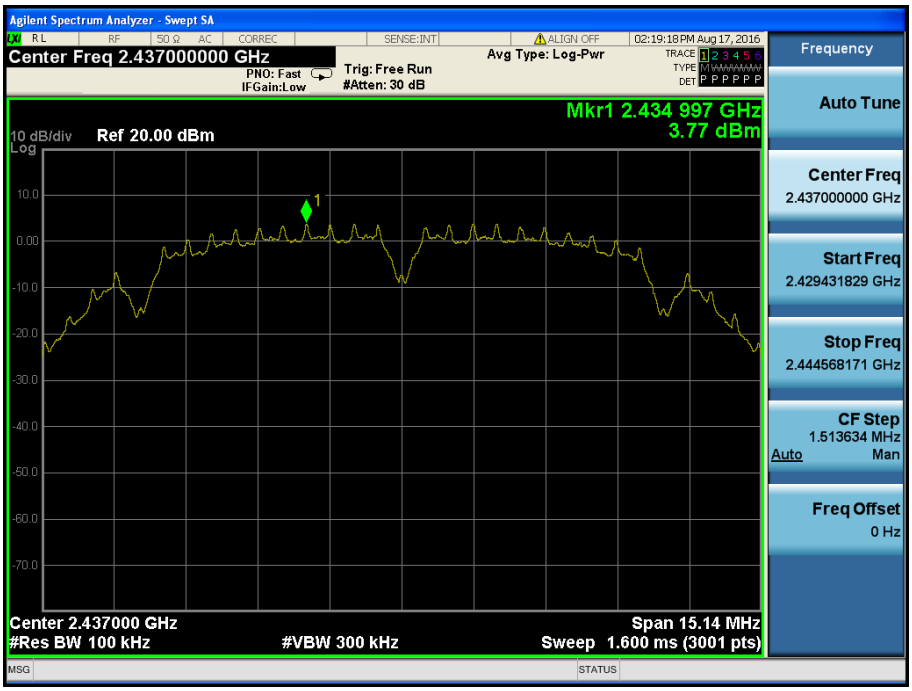


Conducted Spurious Emissions

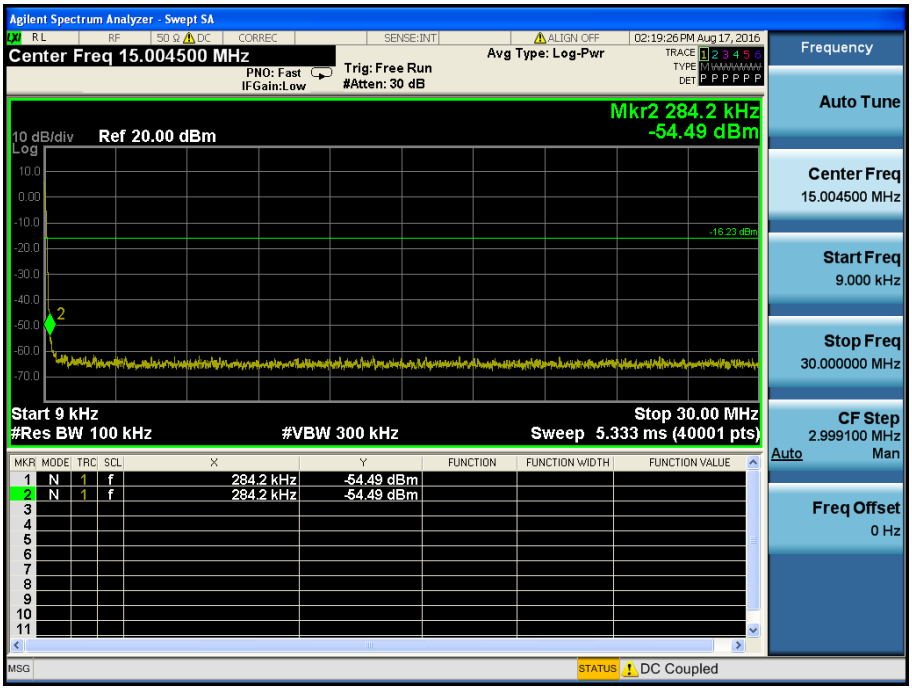


TM 1 & ANT 1 & Middle

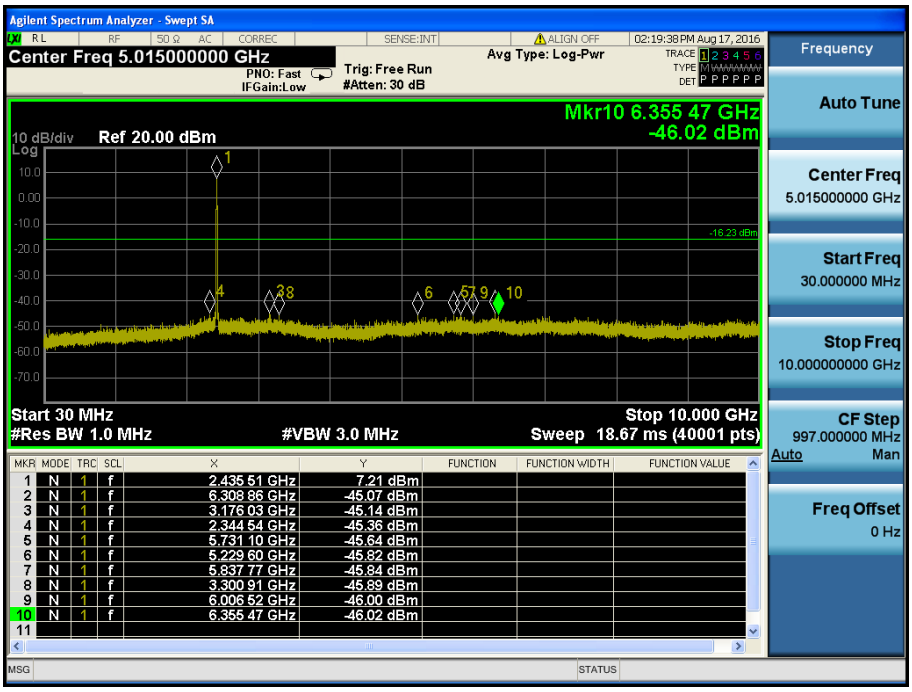
Reference

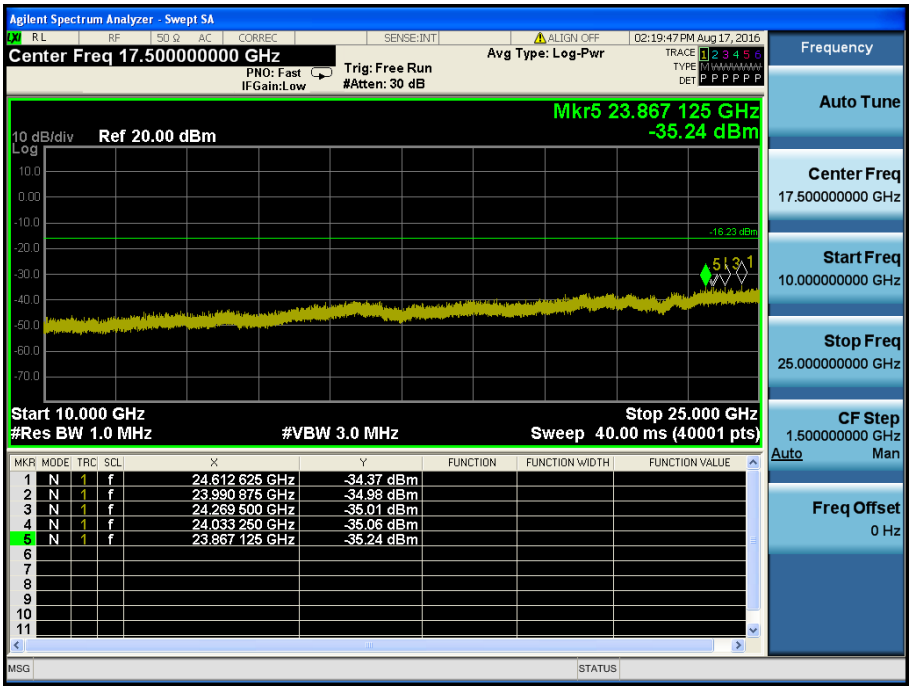


Conducted Spurious Emissions



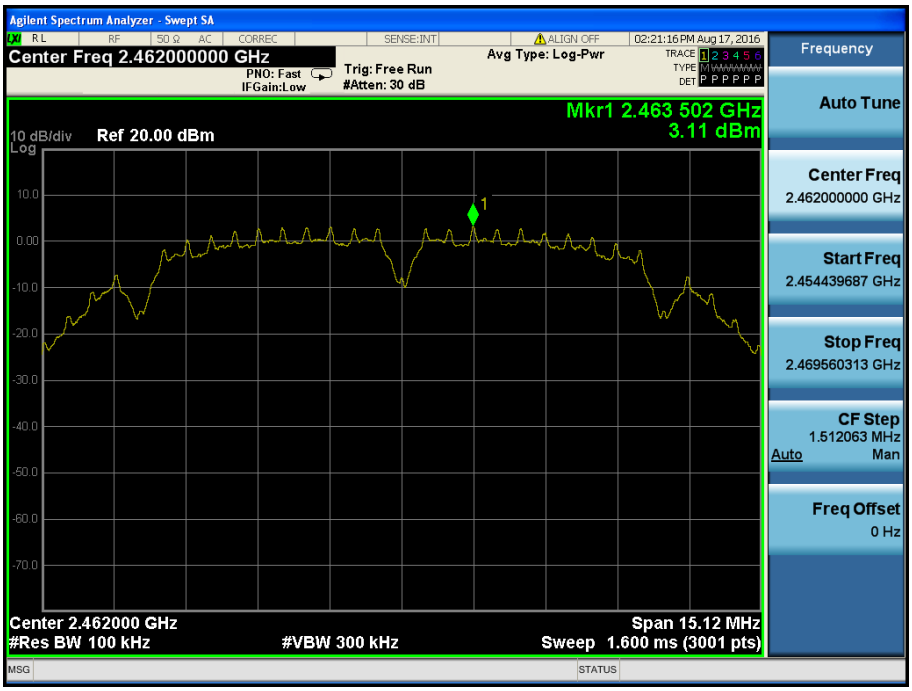
Conducted Spurious Emissions



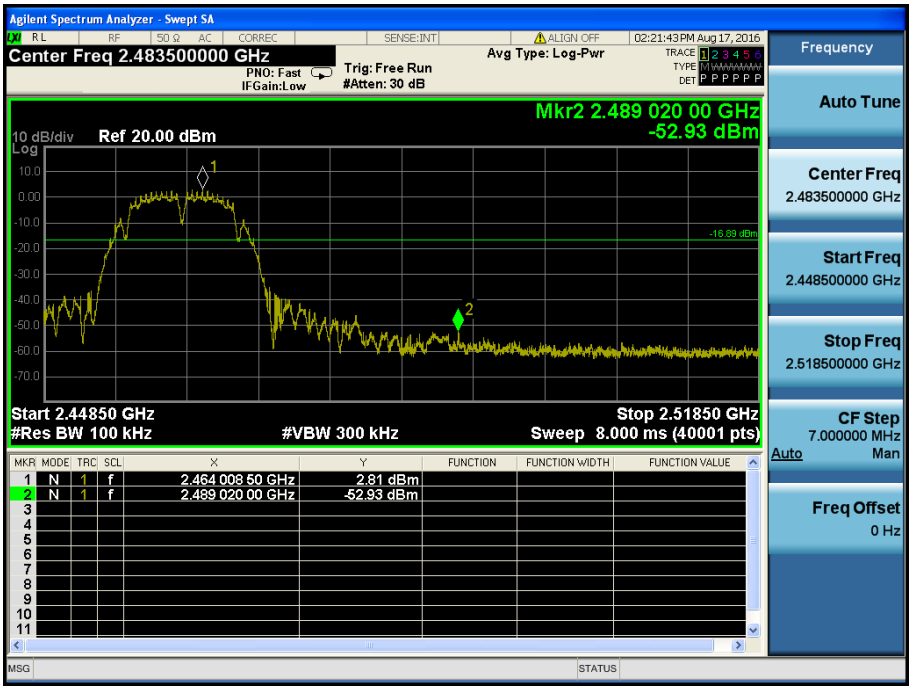


TM 1 & ANT 1 & Highest

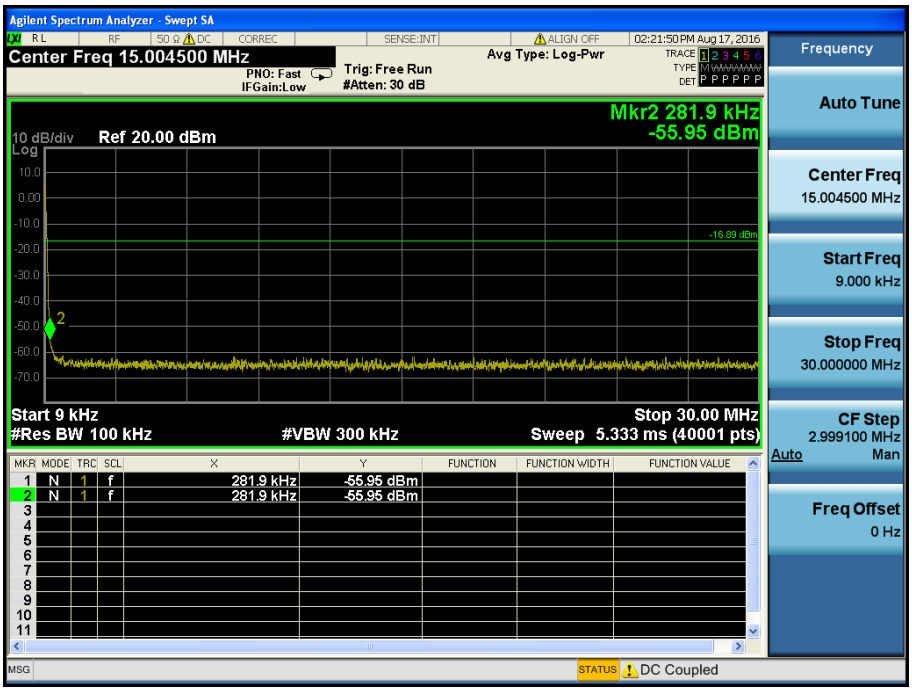
Reference

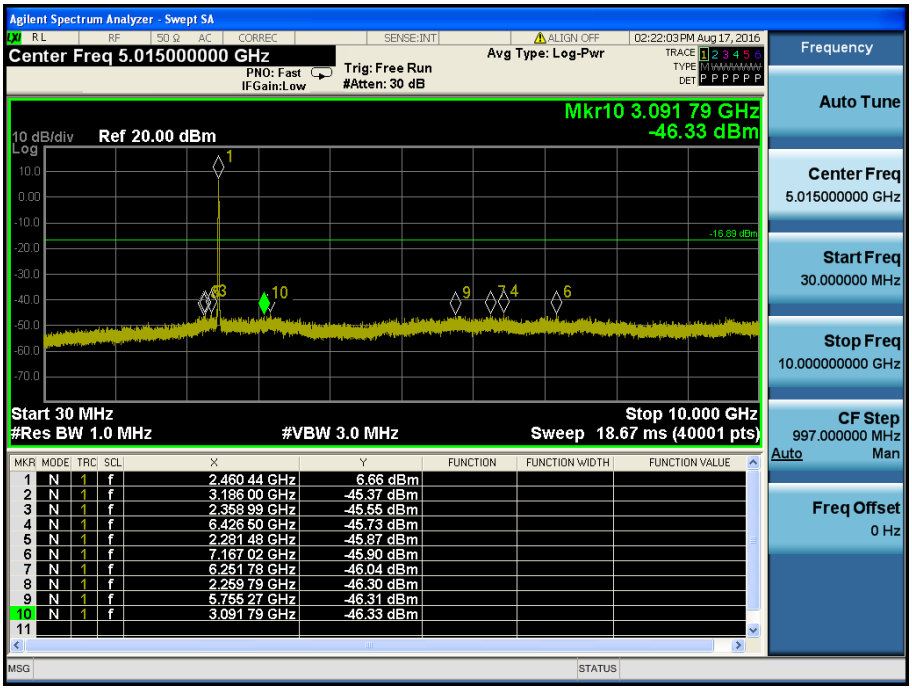


High Band-edge

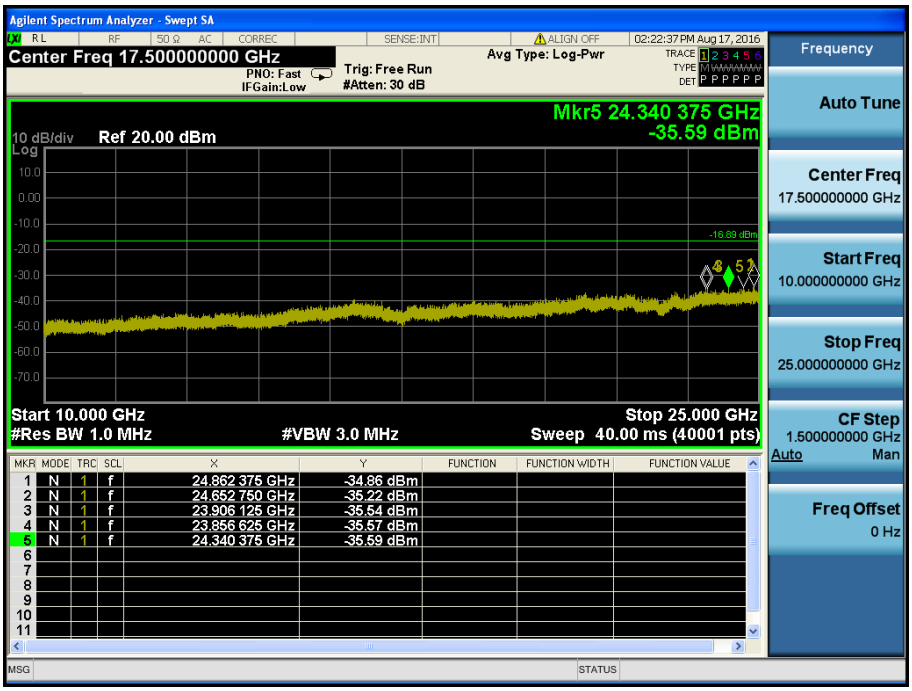


Conducted Spurious Emissions



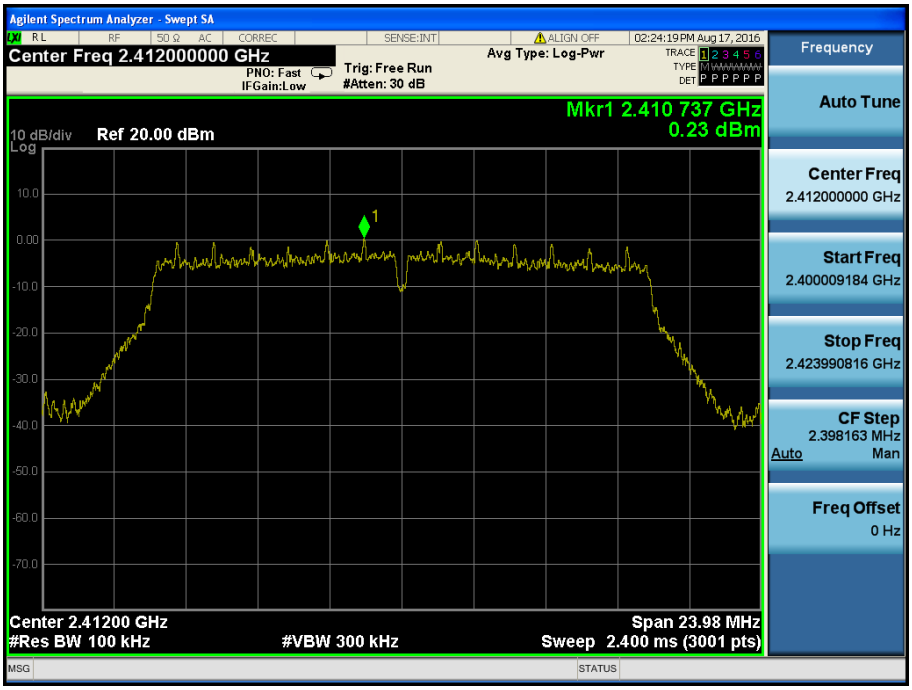


Conducted Spurious Emissions

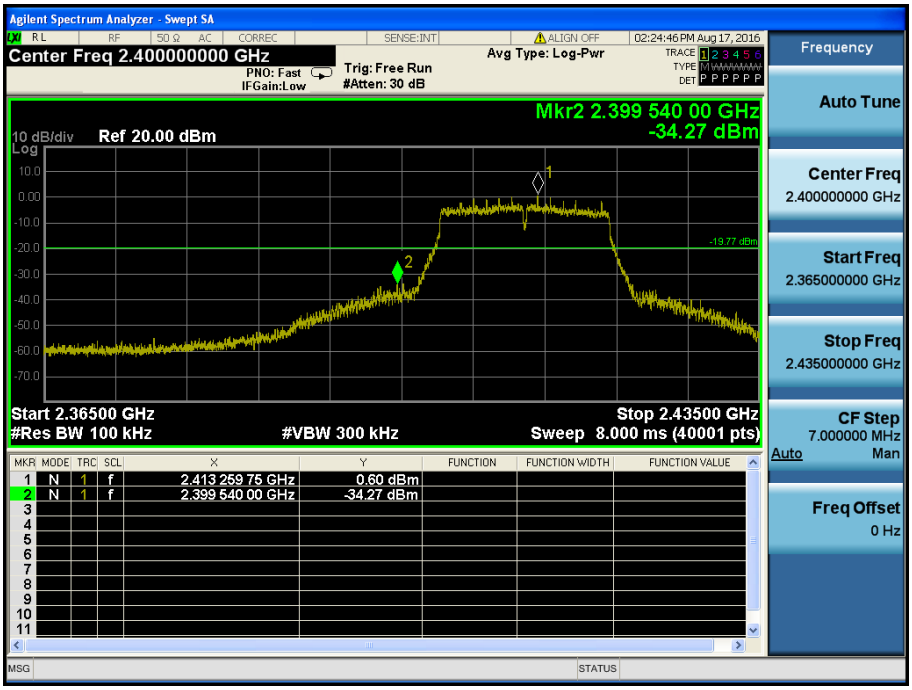


TM 2 & ANT 1 & Lowest

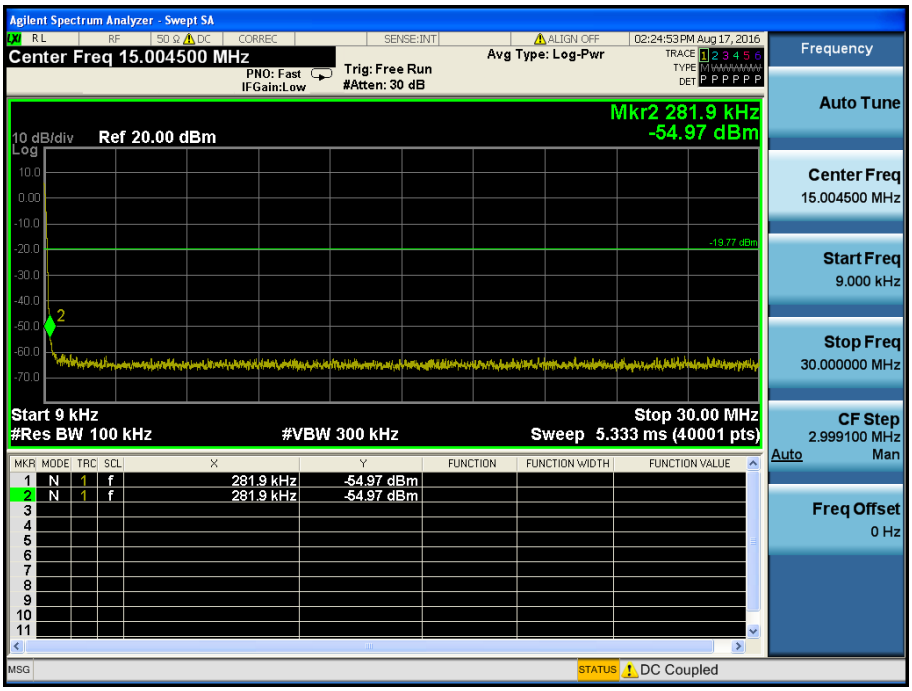
Reference

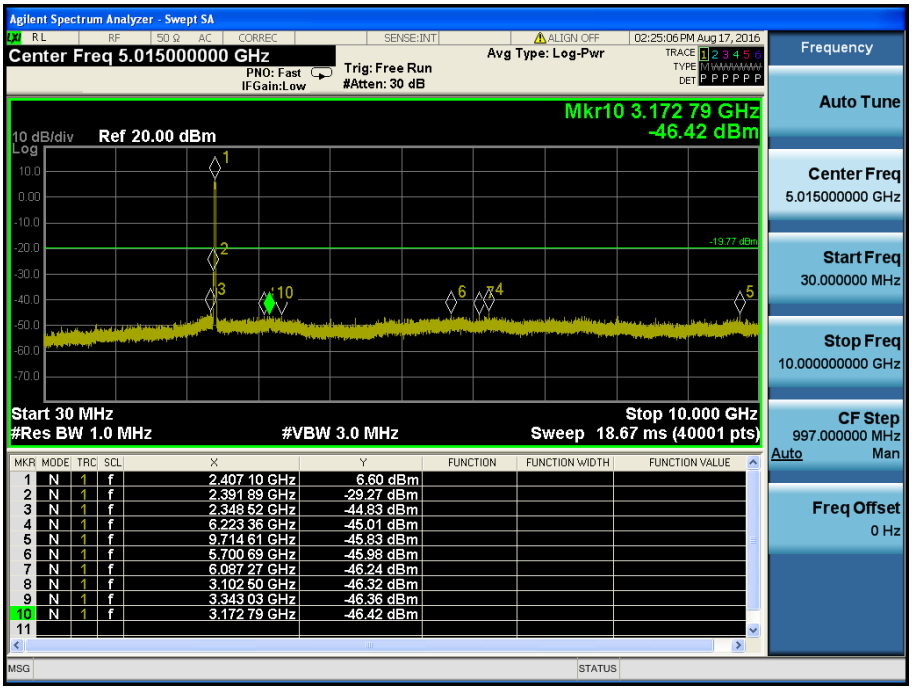


Low Band-edge

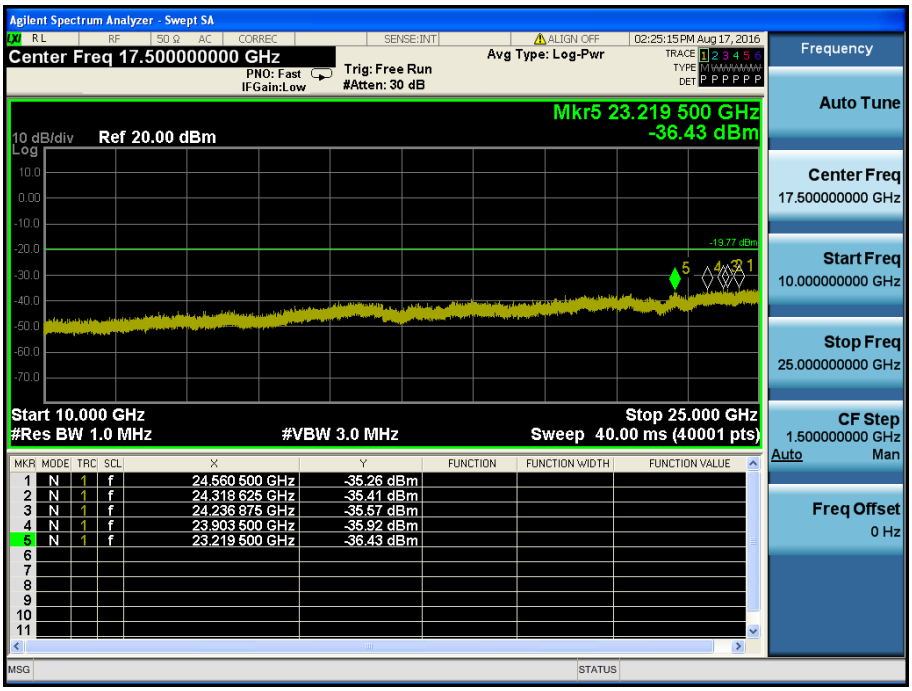


Conducted Spurious Emissions



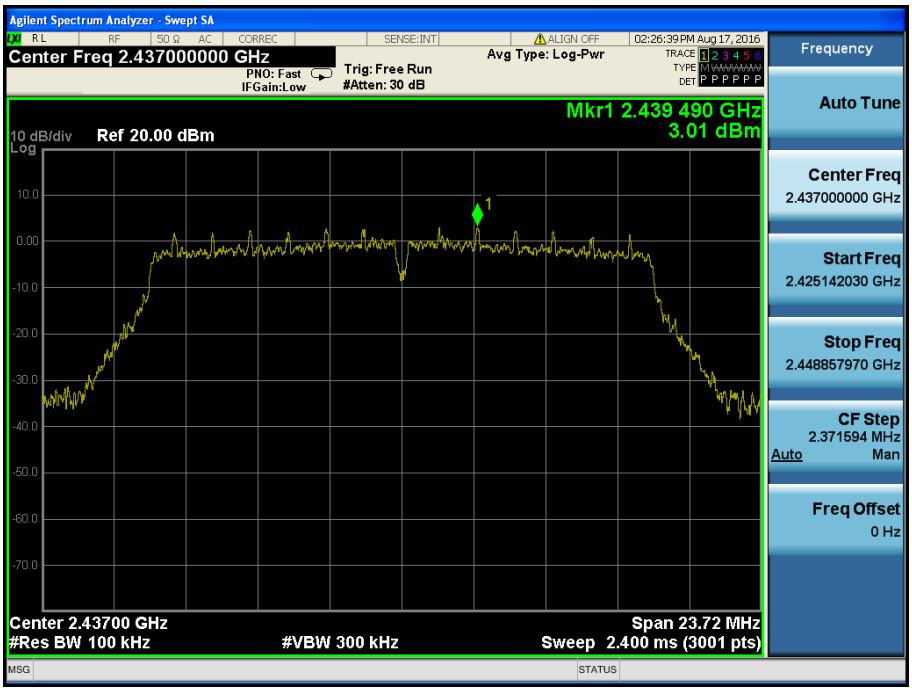


Conducted Spurious Emissions

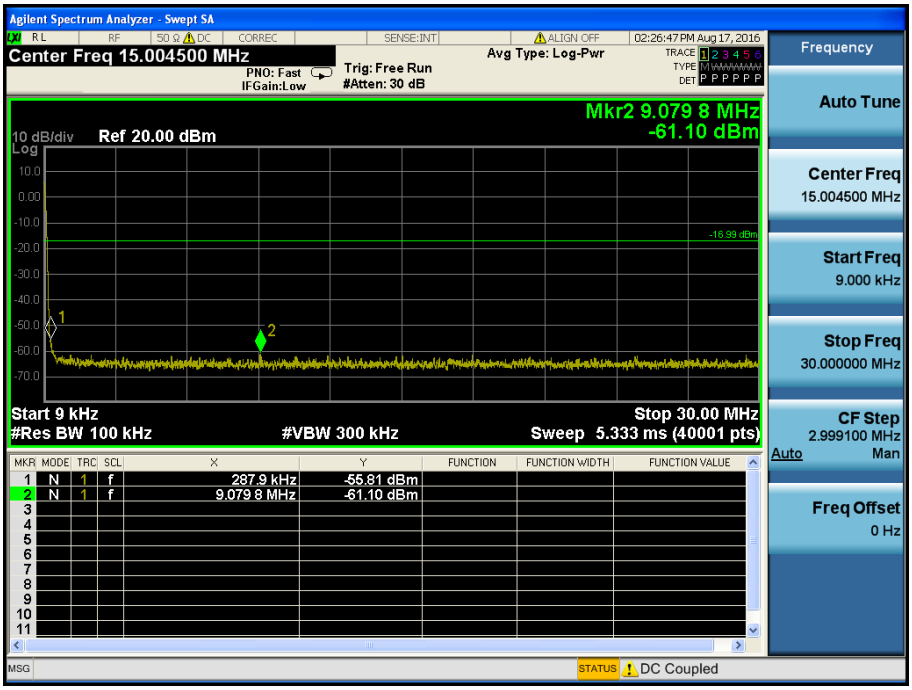


TM 2 & ANT 1 & Middle

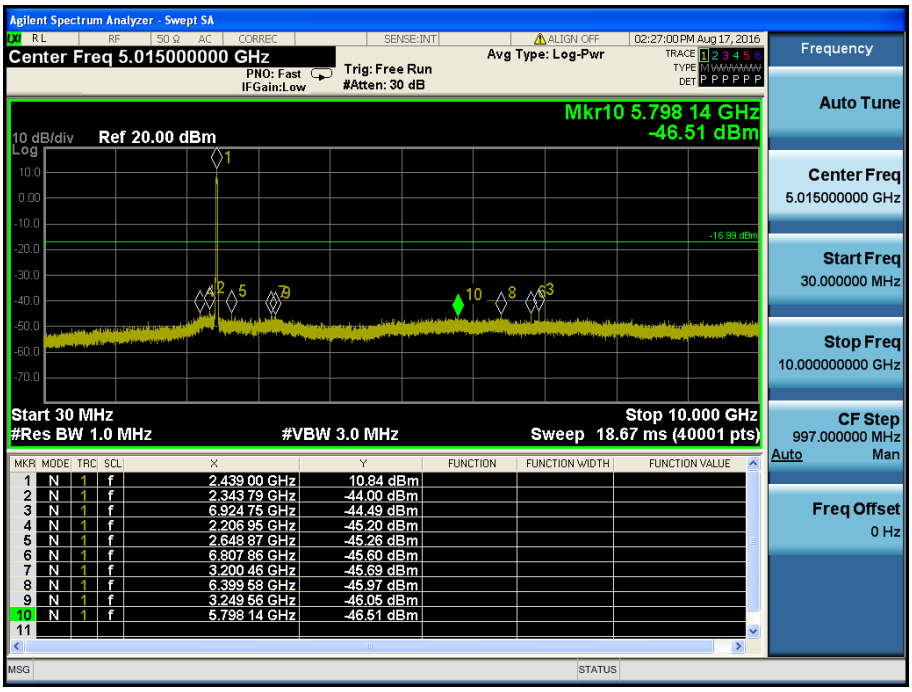
Reference

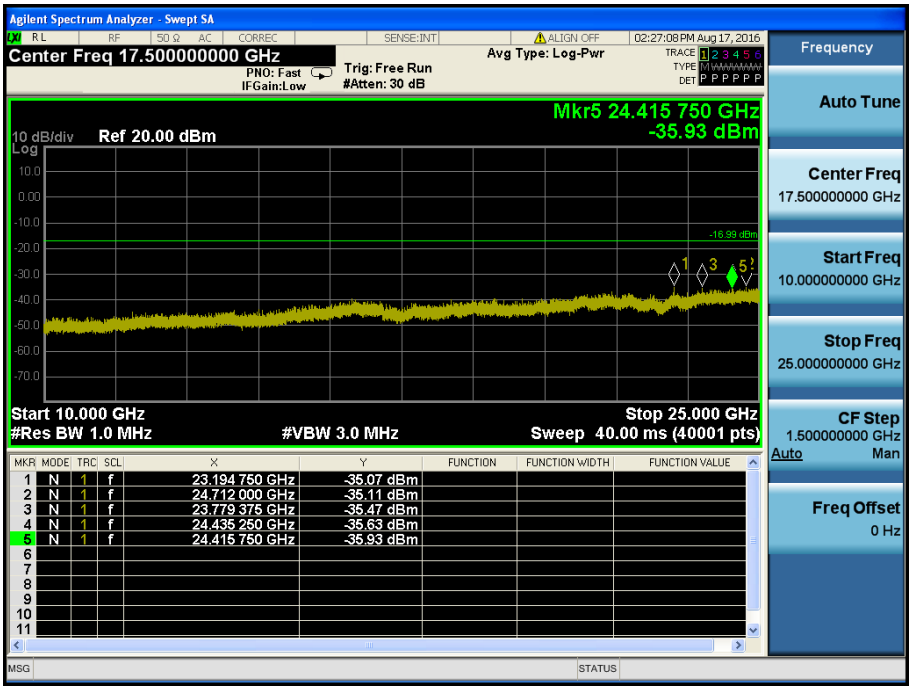


Conducted Spurious Emissions



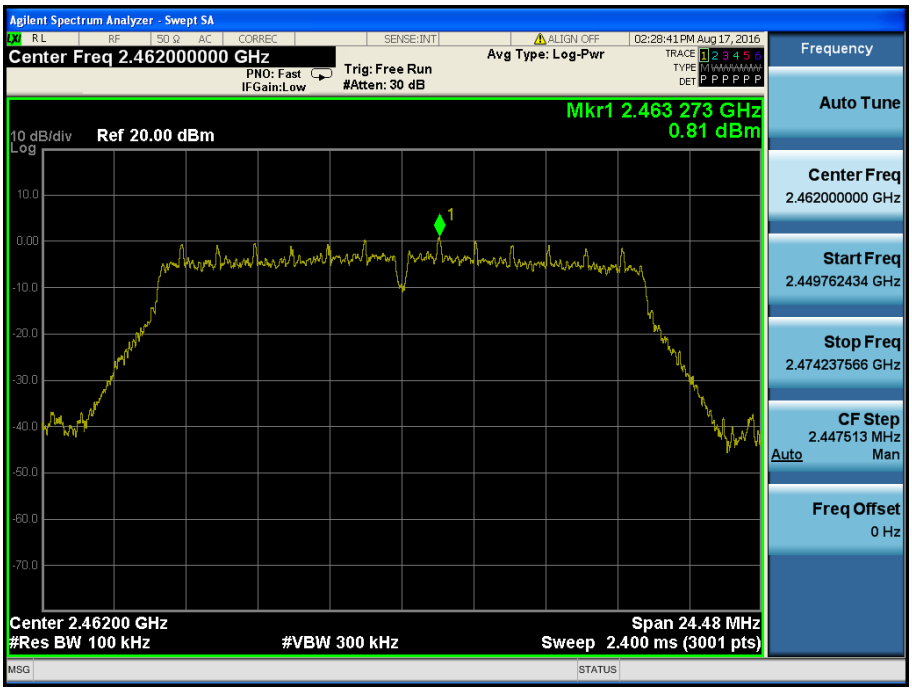
Conducted Spurious Emissions



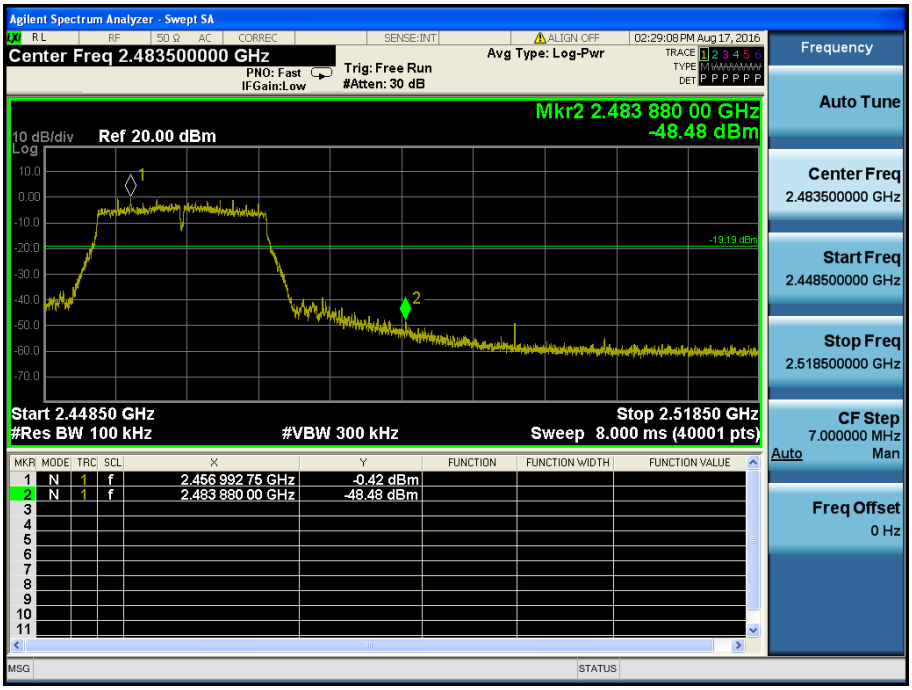


TM 2 & ANT 1 & Highest

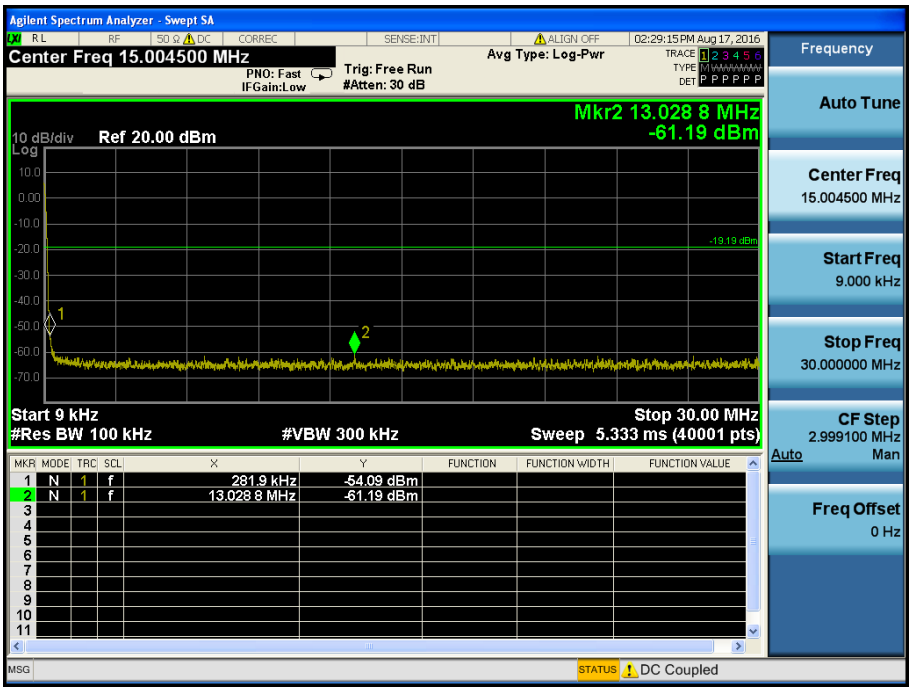
Reference

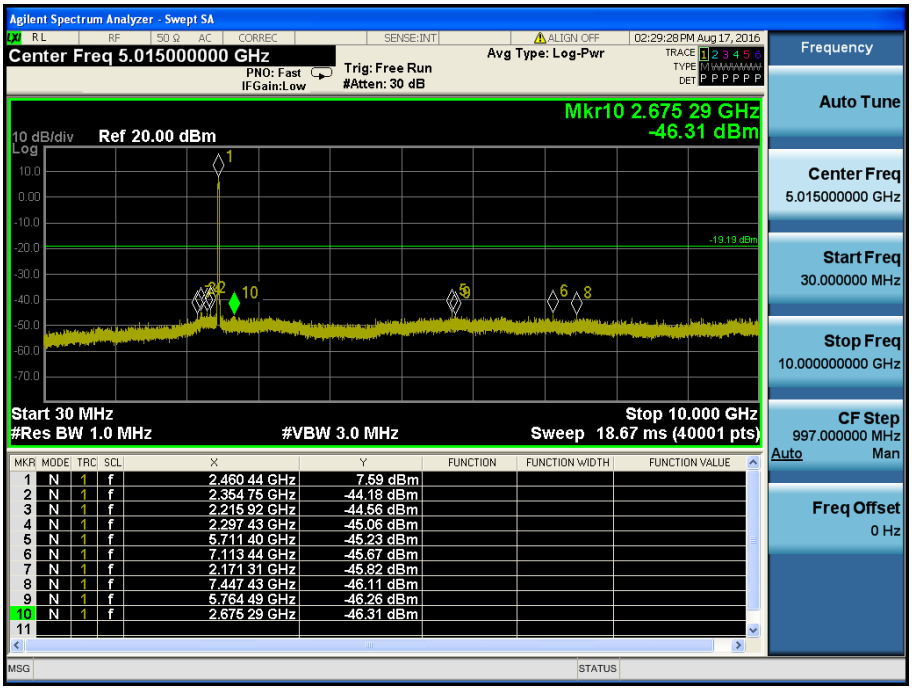


High Band-edge

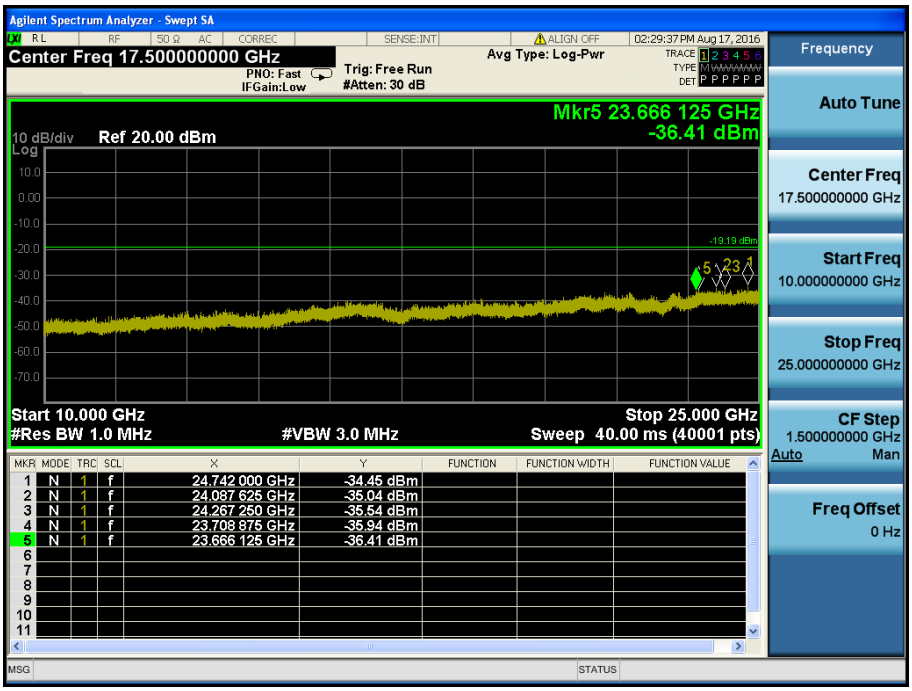


Conducted Spurious Emissions





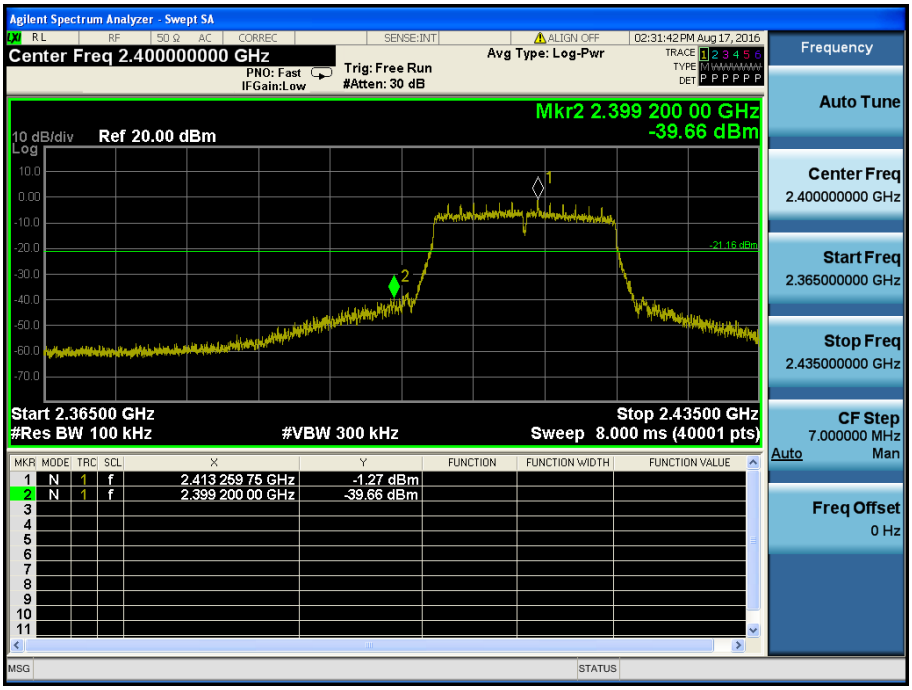
Conducted Spurious Emissions



TM 3 & ANT 1 & Lowest

Reference

Low Band-edge



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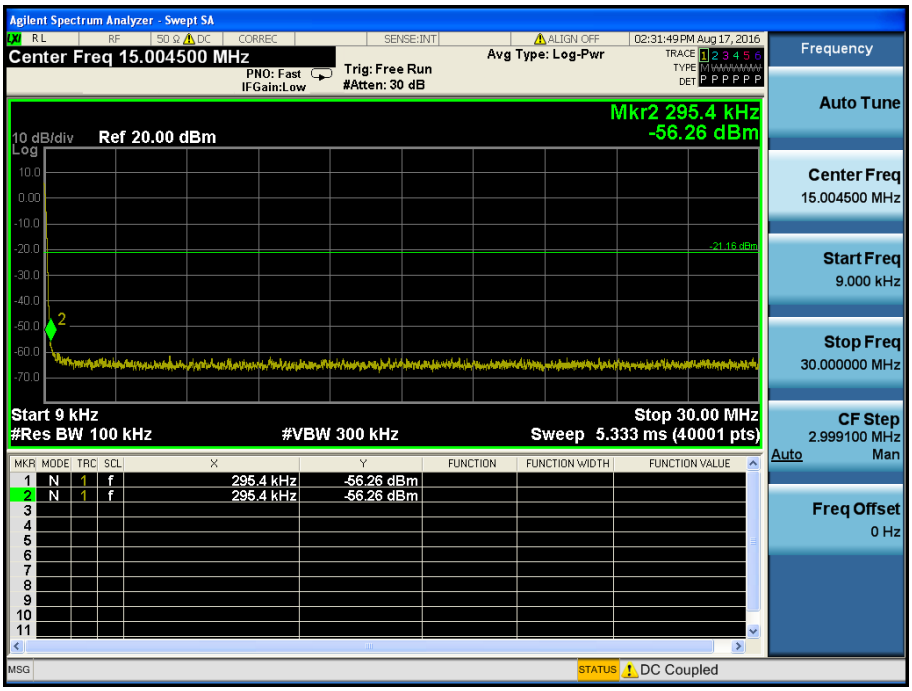
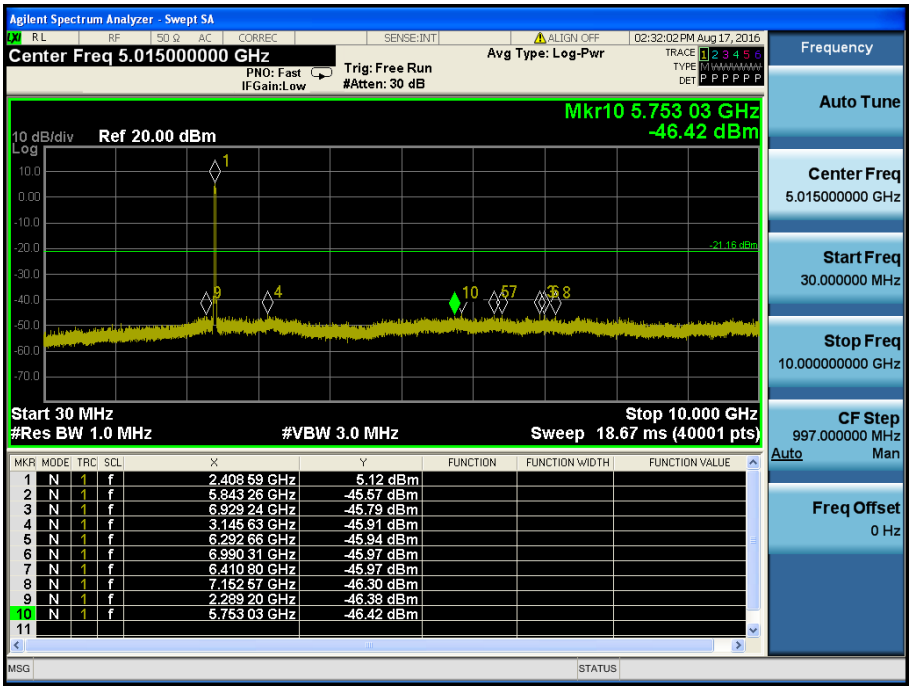
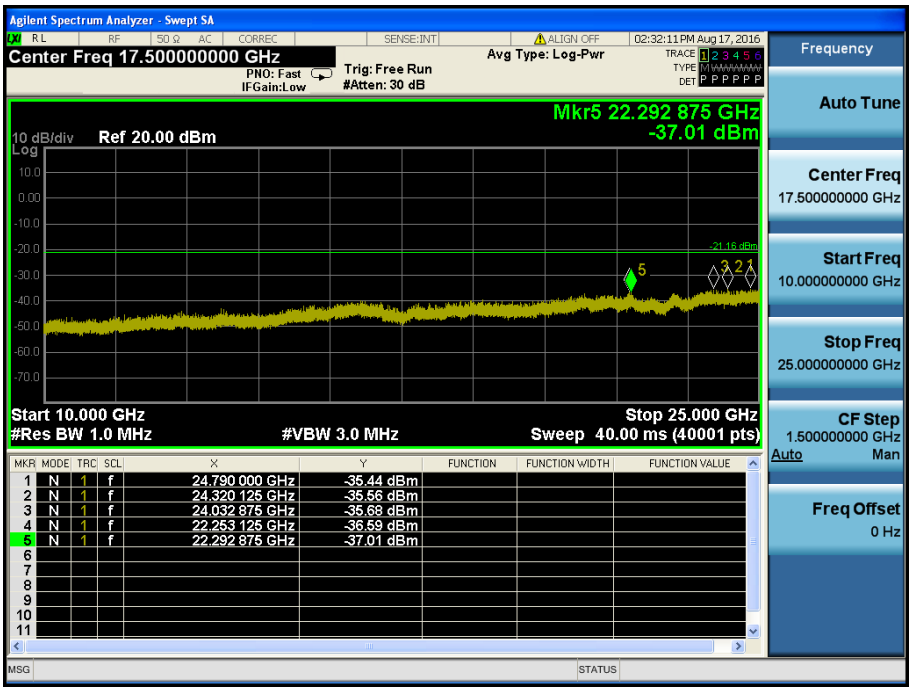


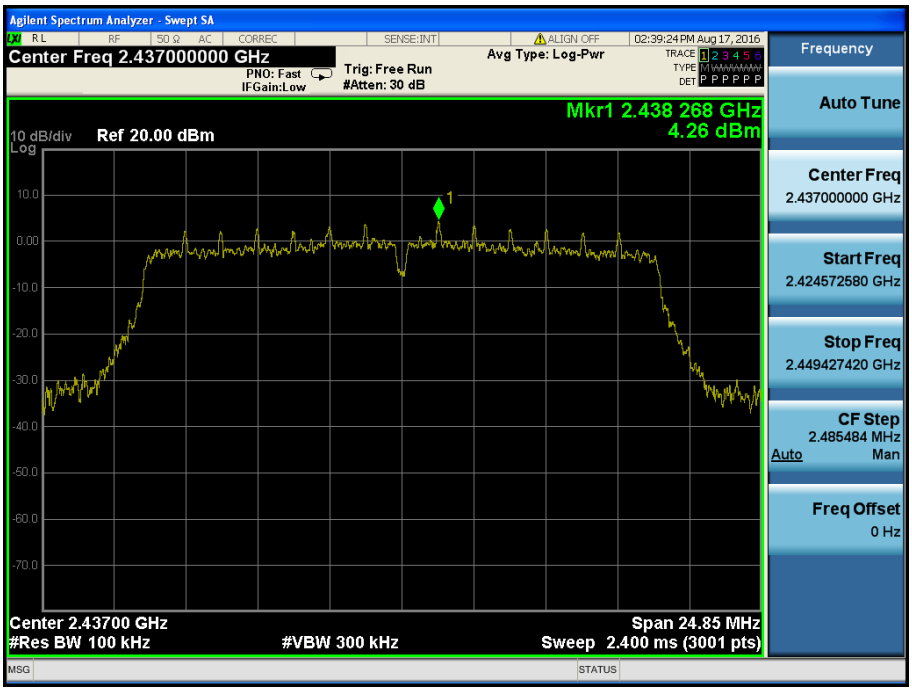


Conducted Spurious Emissions



TM 3 & ANT 1 & Middle

Reference



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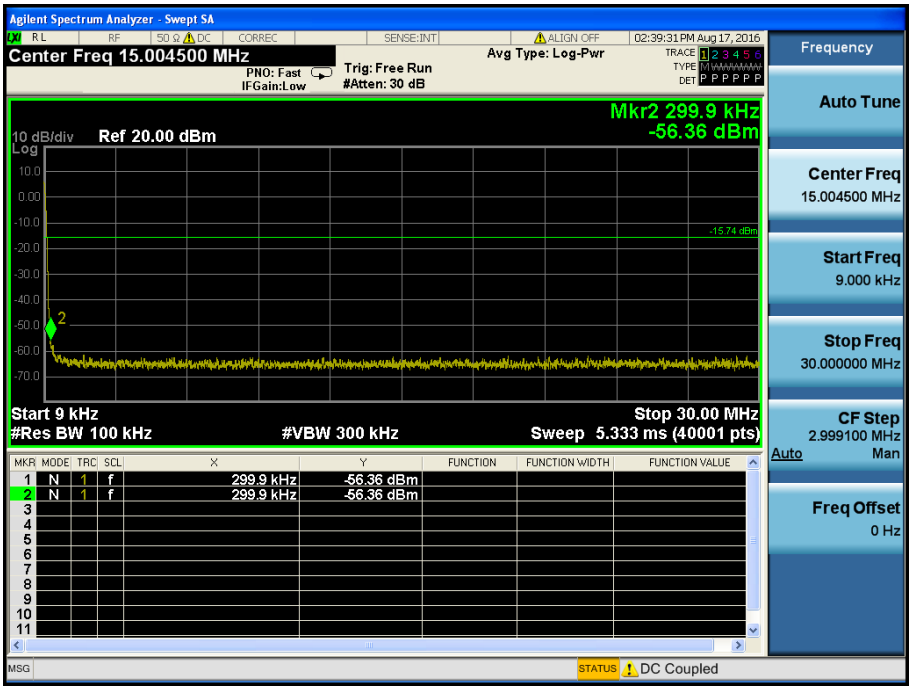

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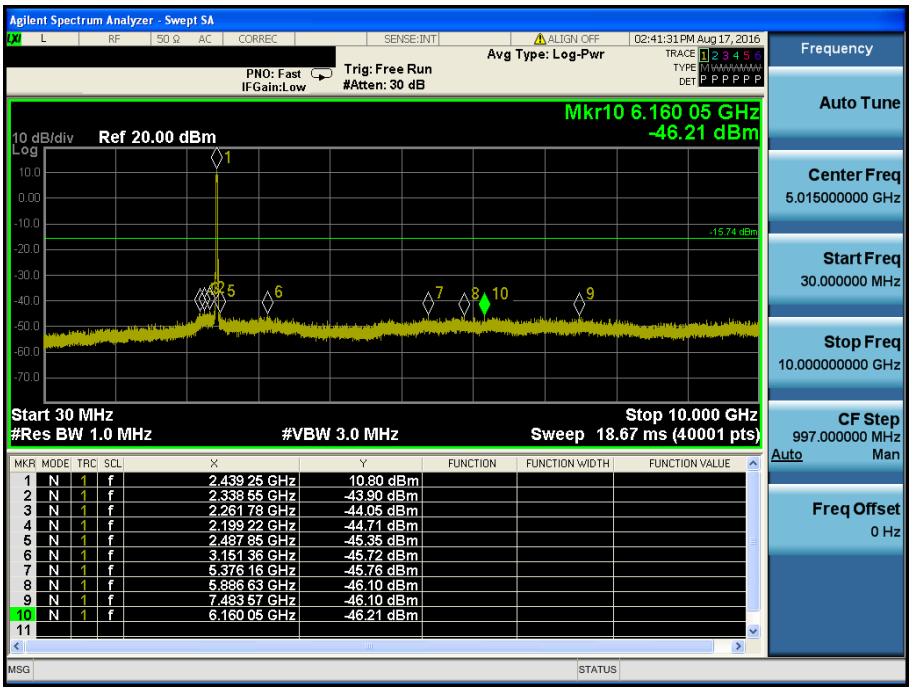
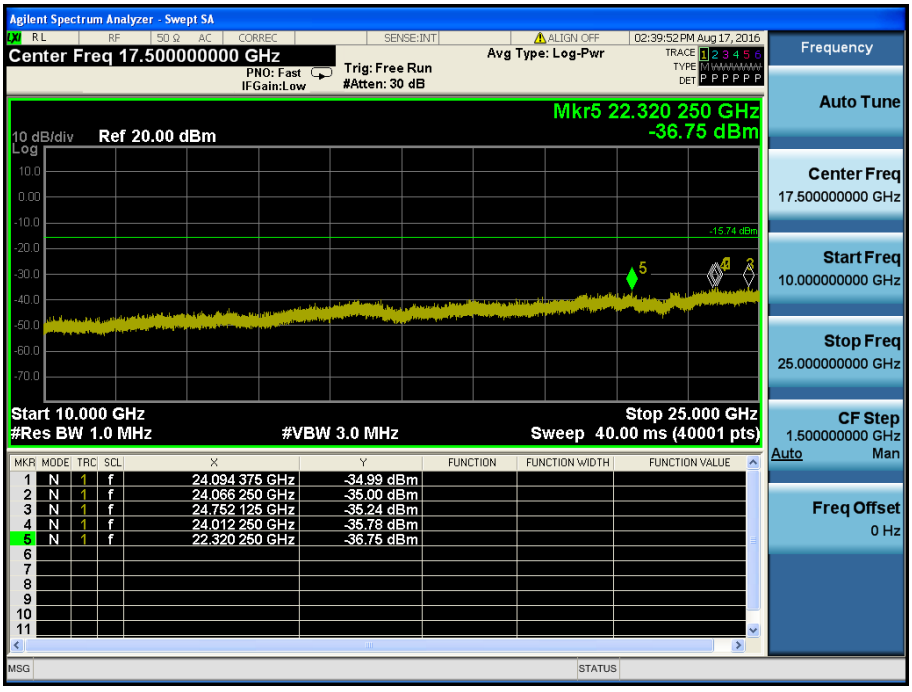
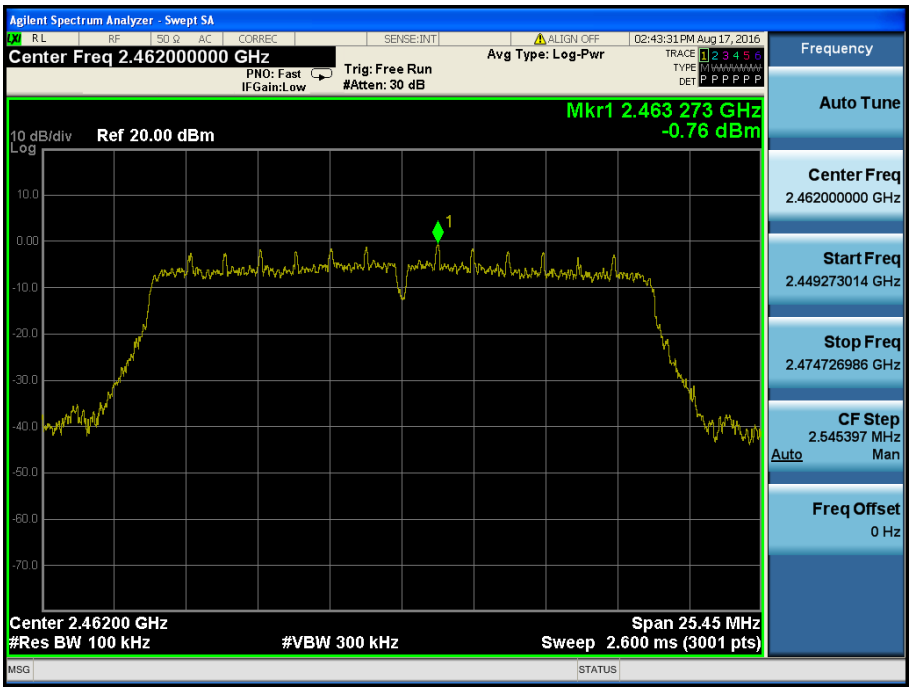


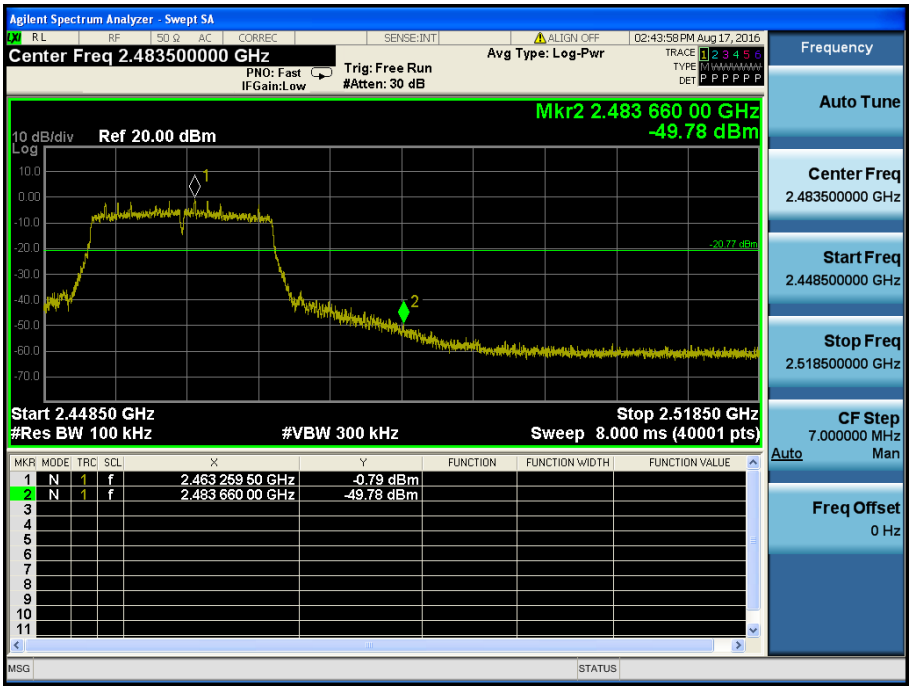


TM 3 & ANT 1 & Highest

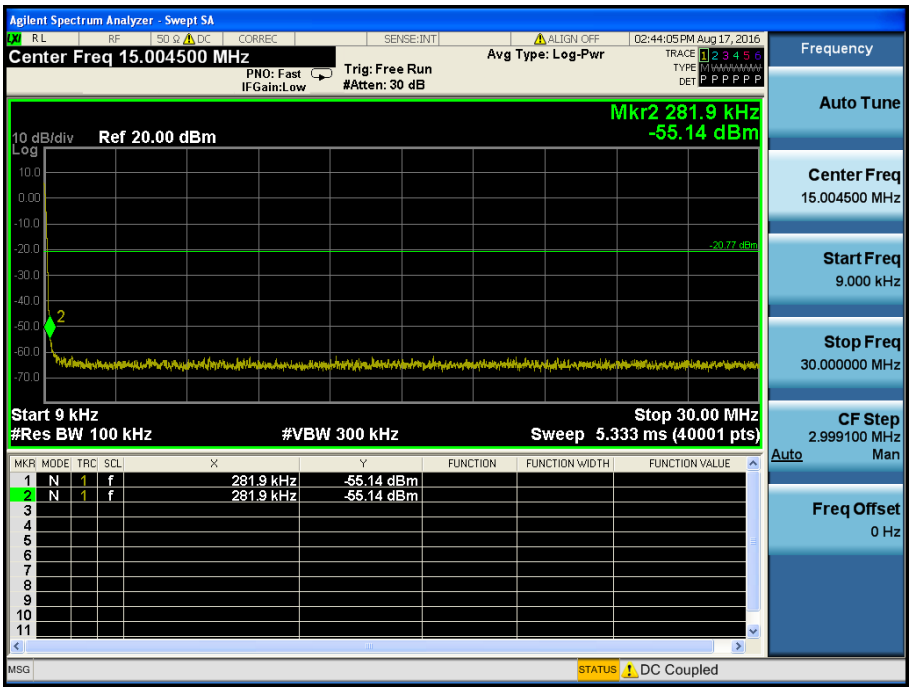
Reference

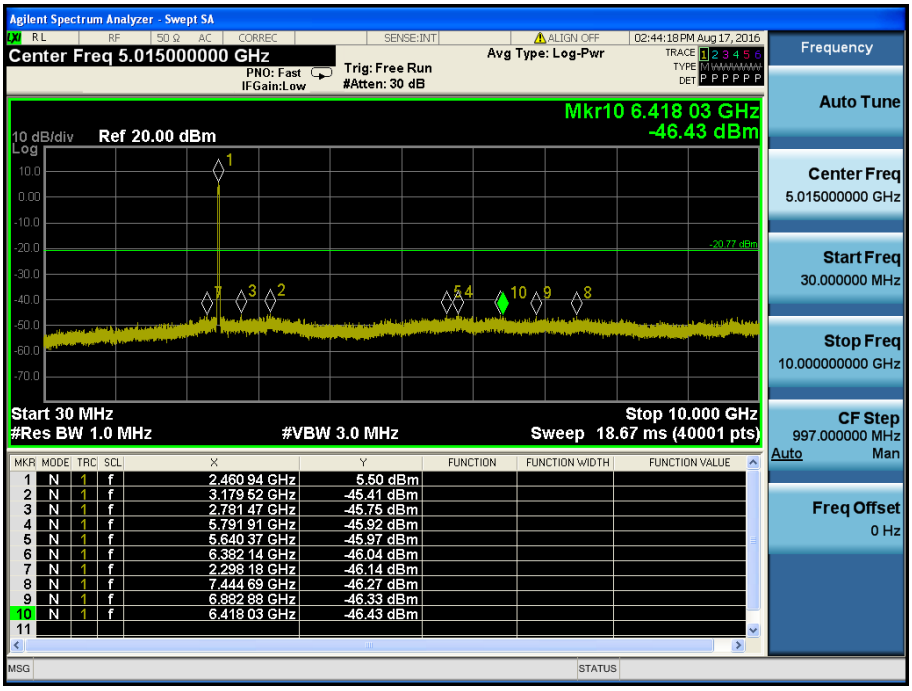


High Band-edge

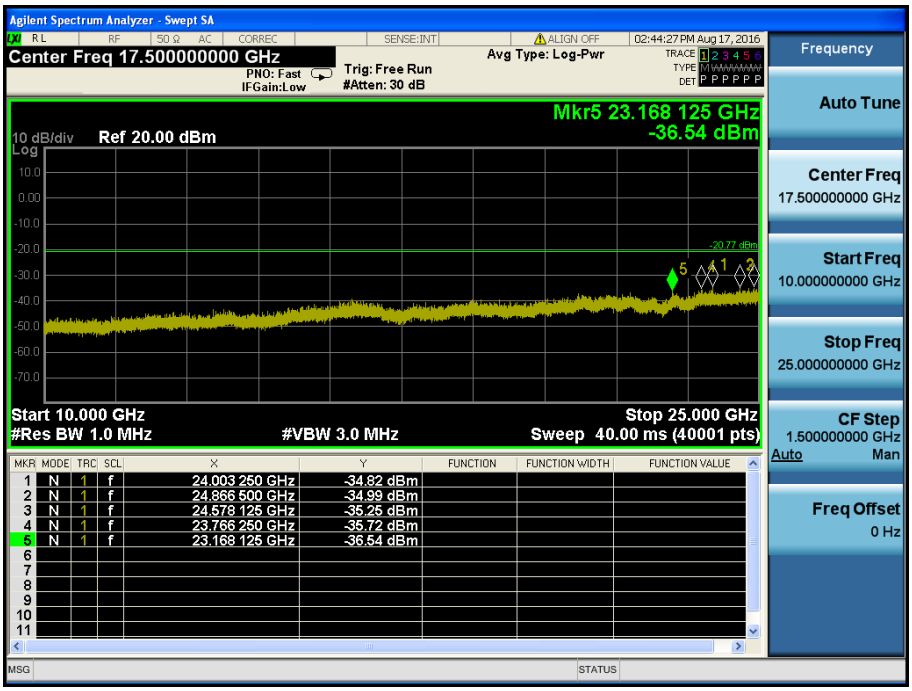


Conducted Spurious Emissions



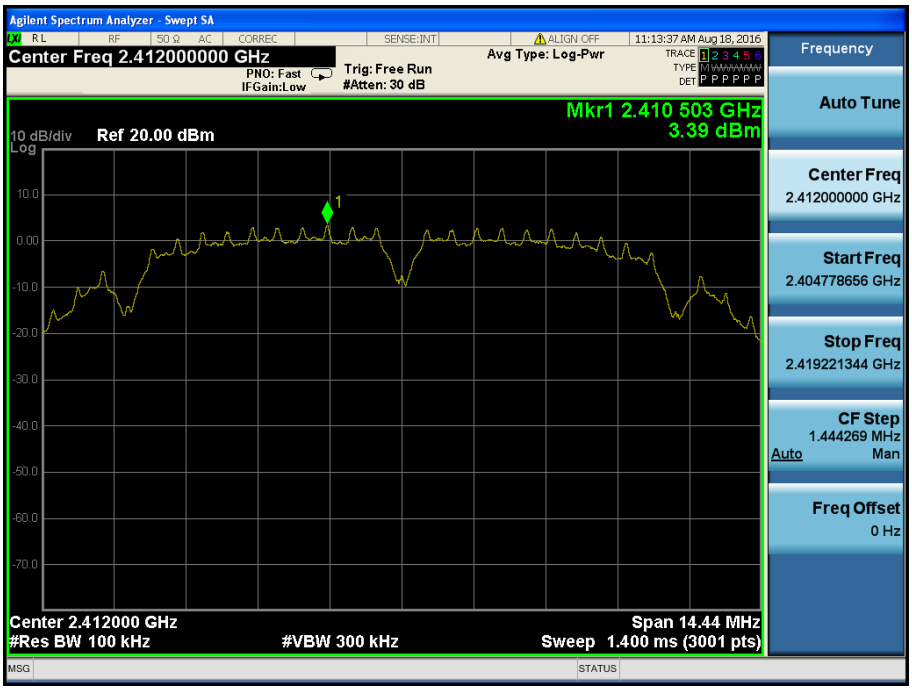


Conducted Spurious Emissions

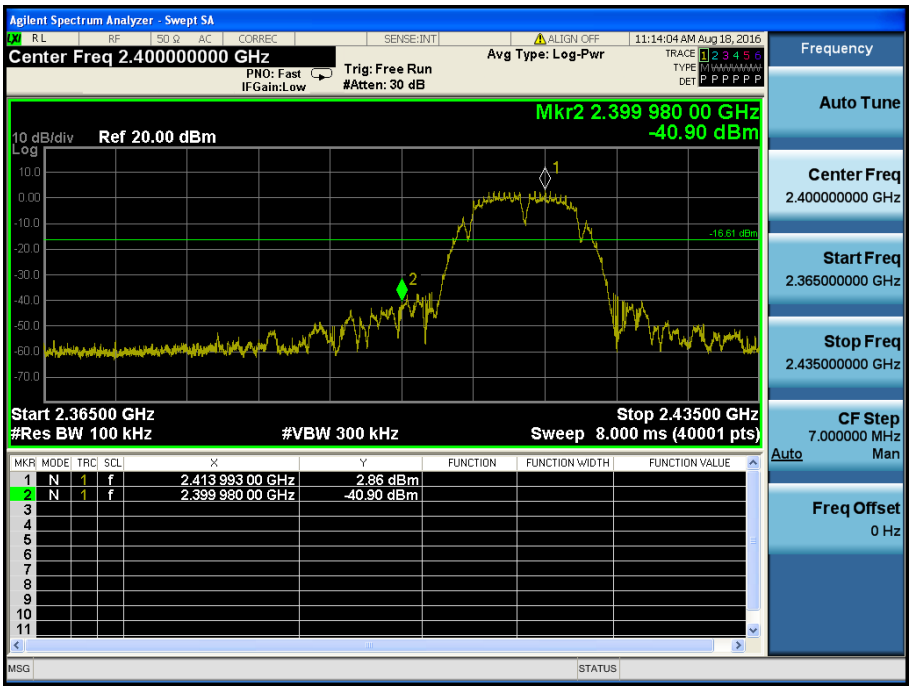


TM 1 & ANT 2 & Lowest

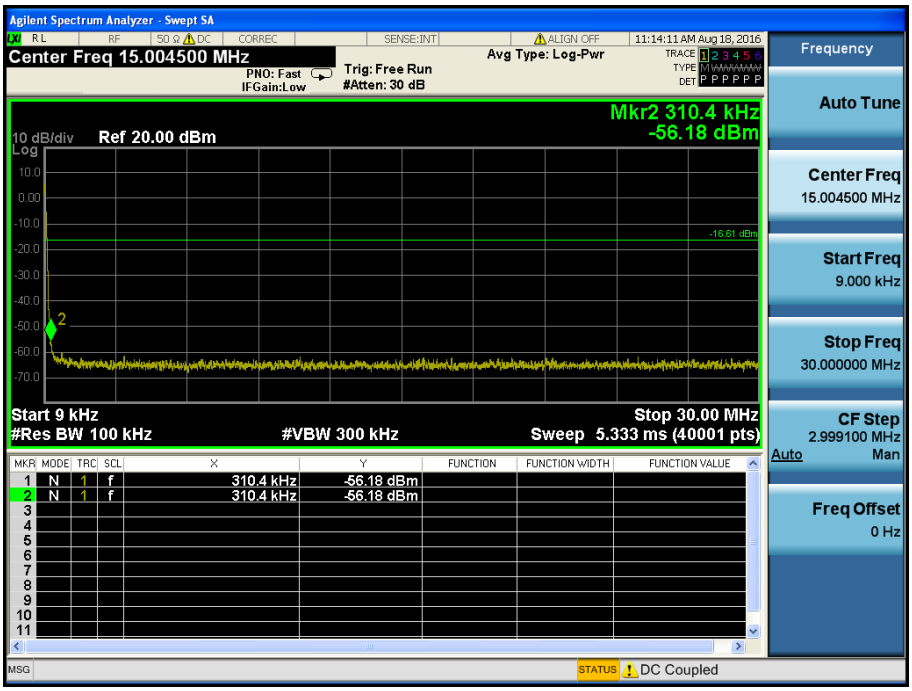
Reference

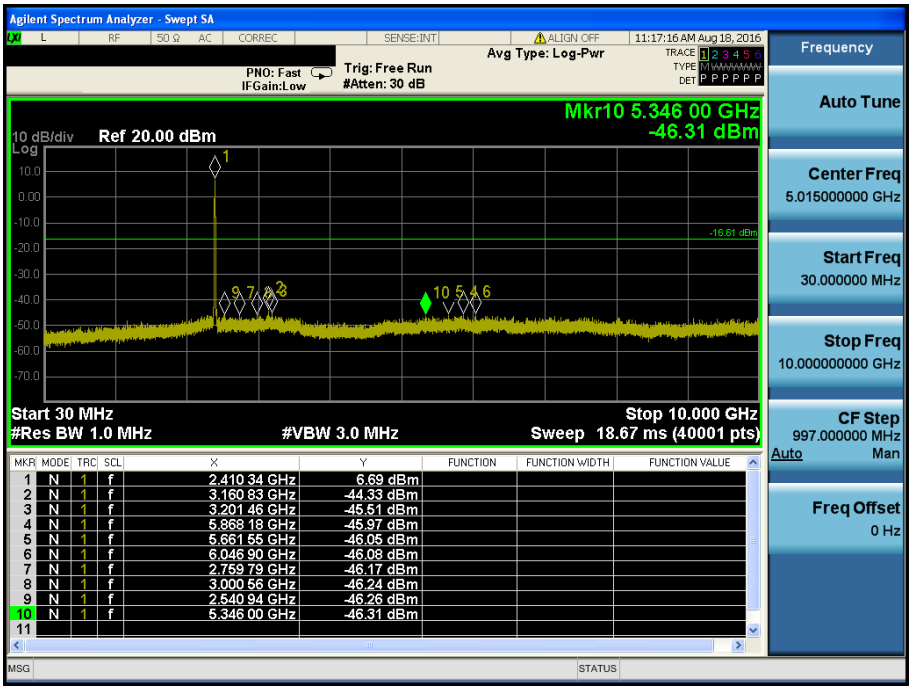


Low Band-edge

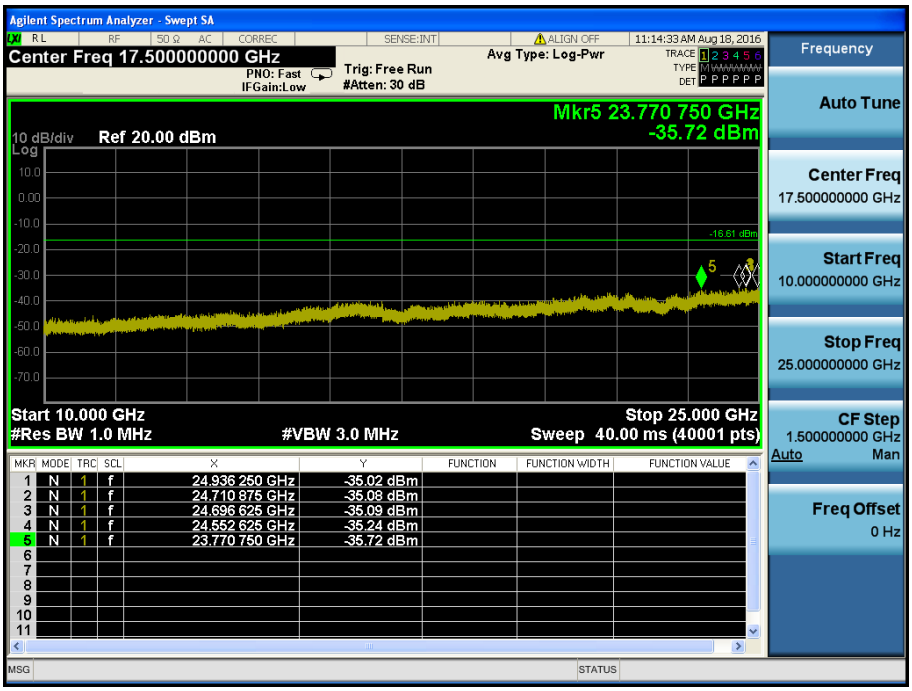


Conducted Spurious Emissions



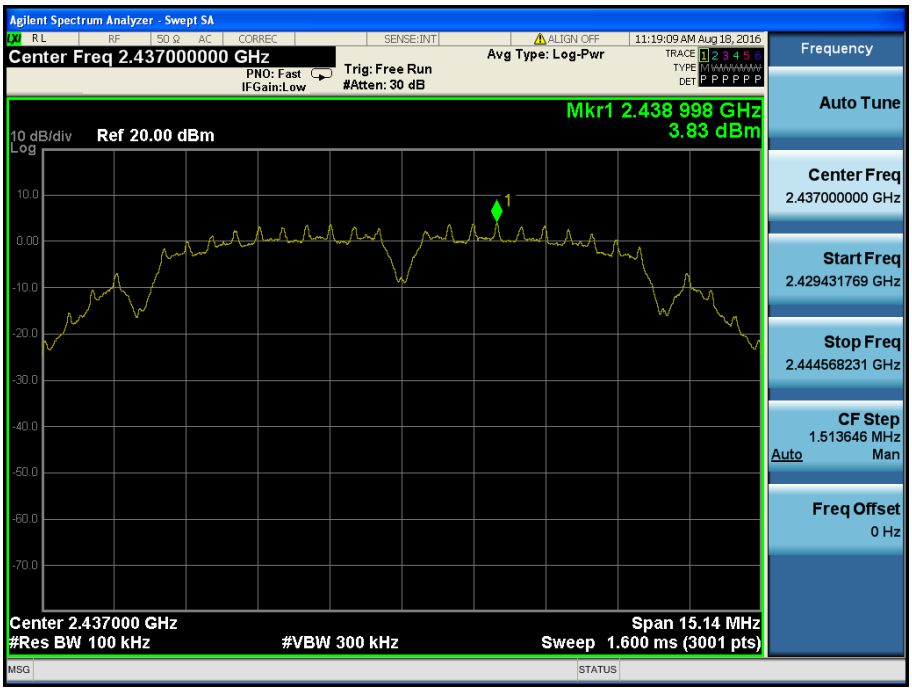


Conducted Spurious Emissions



TM 1 & ANT 2 & Middle

Reference



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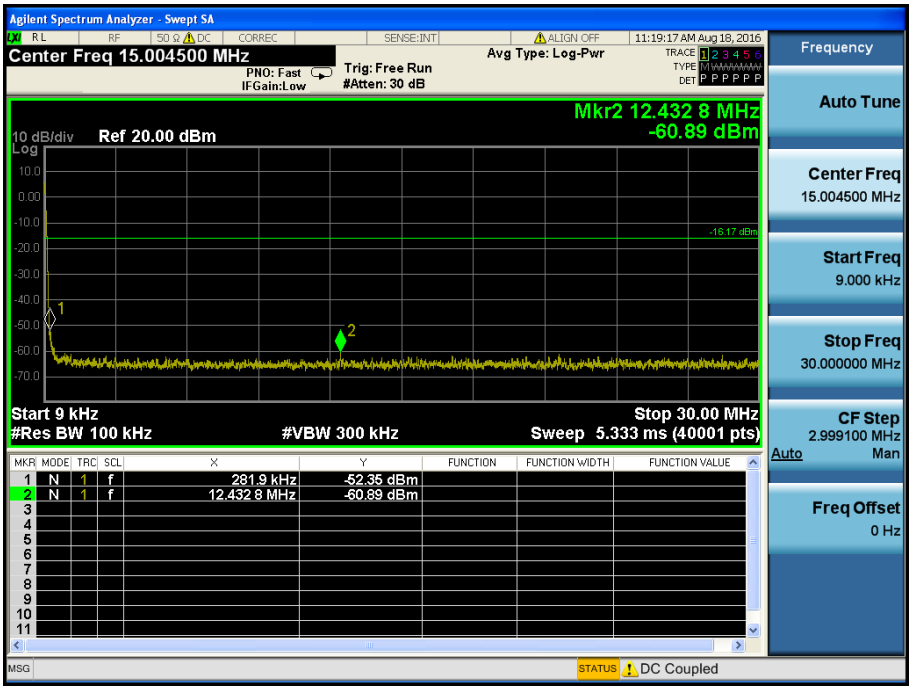
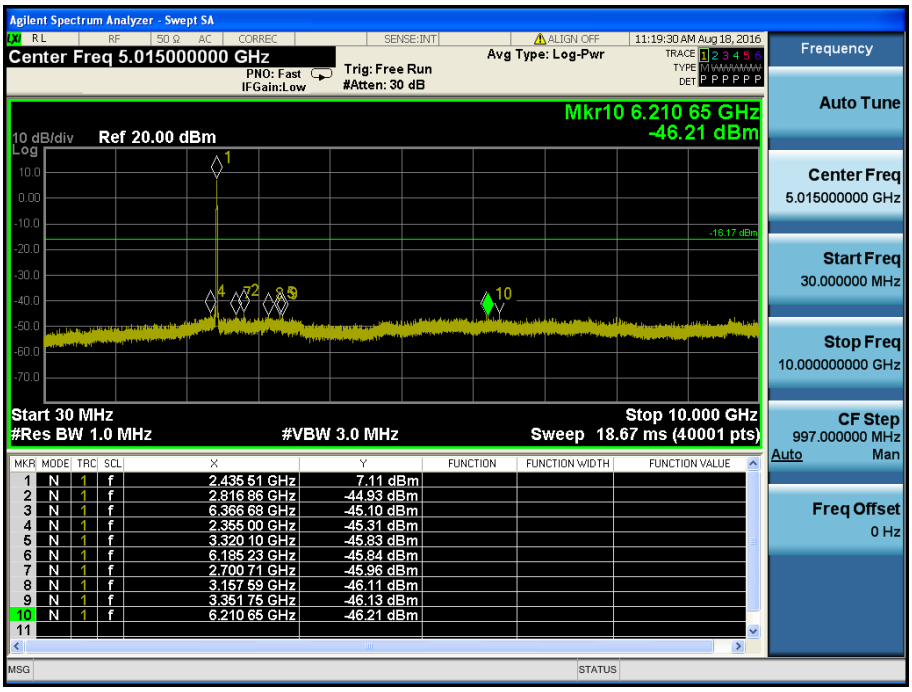
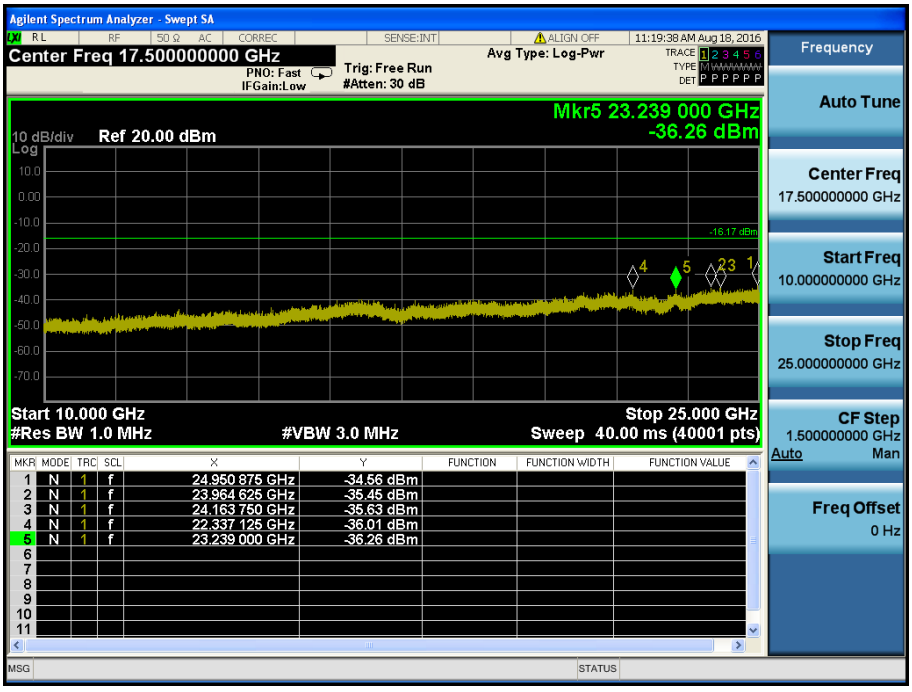


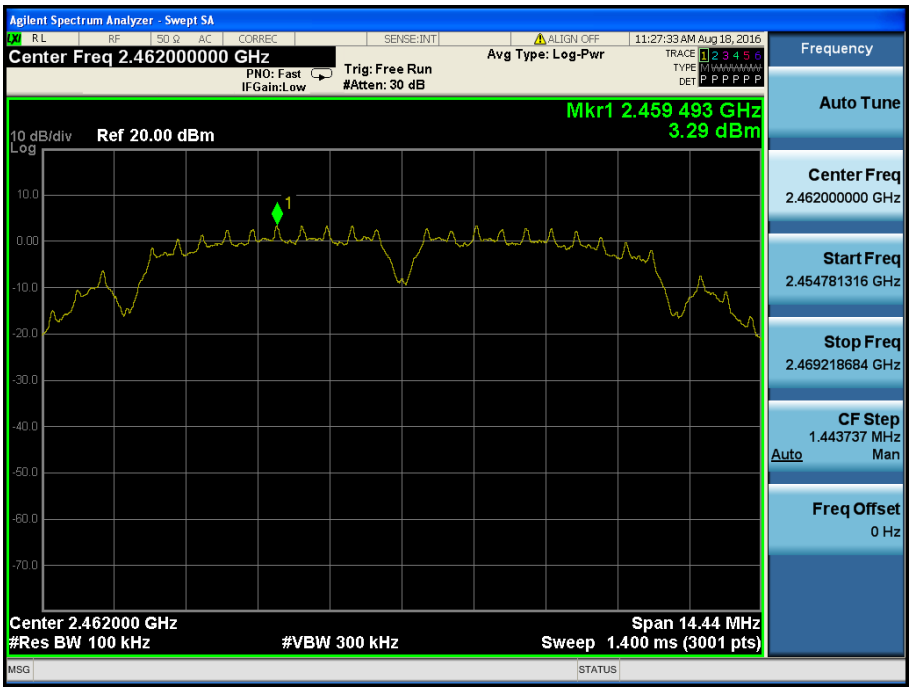
Conducted Spurious Emissions



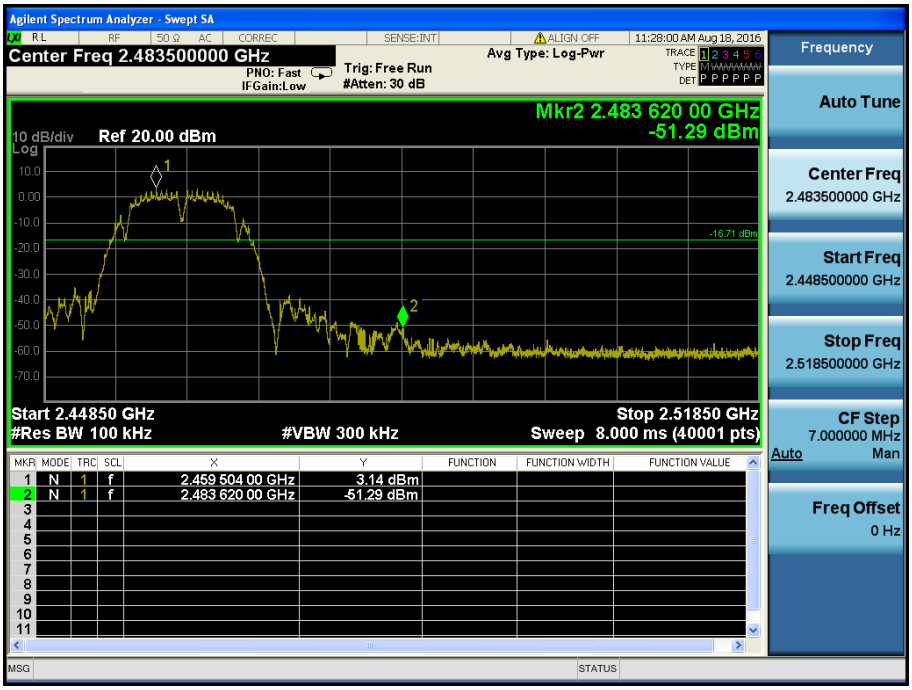


TM 1 & ANT 2 & Highest

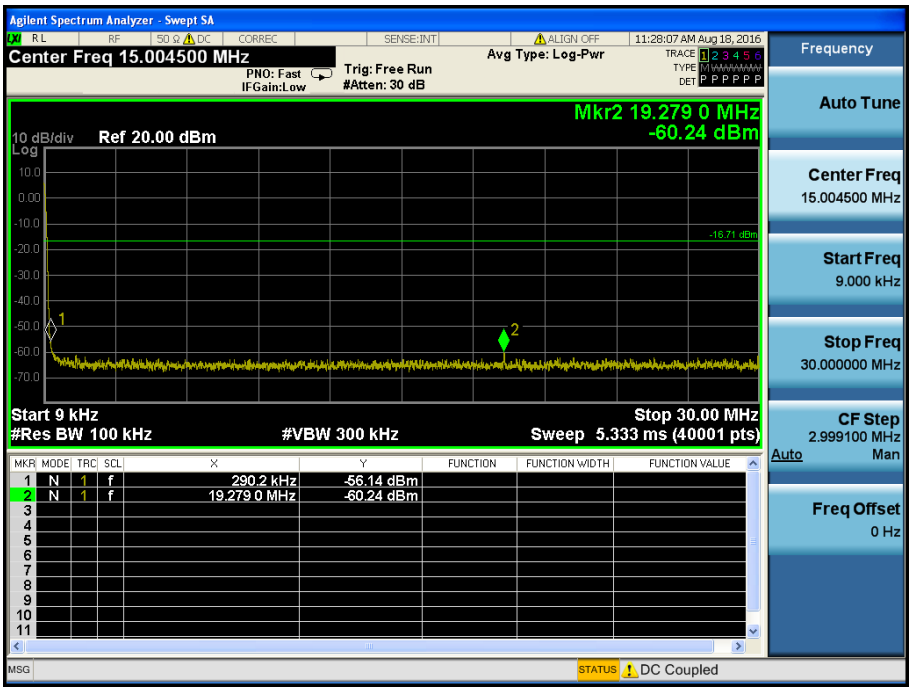
Reference

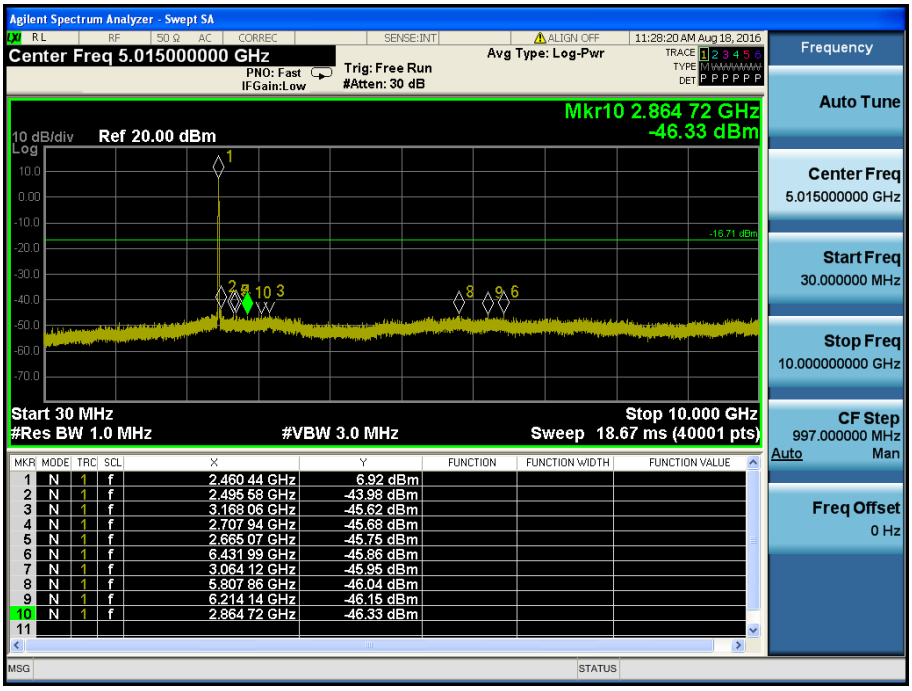


High Band-edge



Conducted Spurious Emissions





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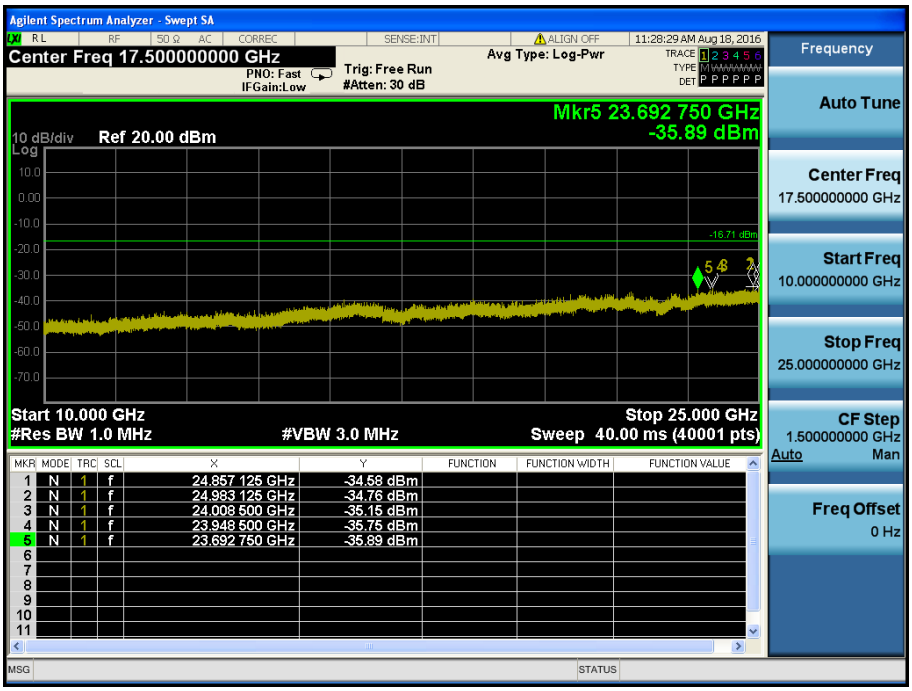
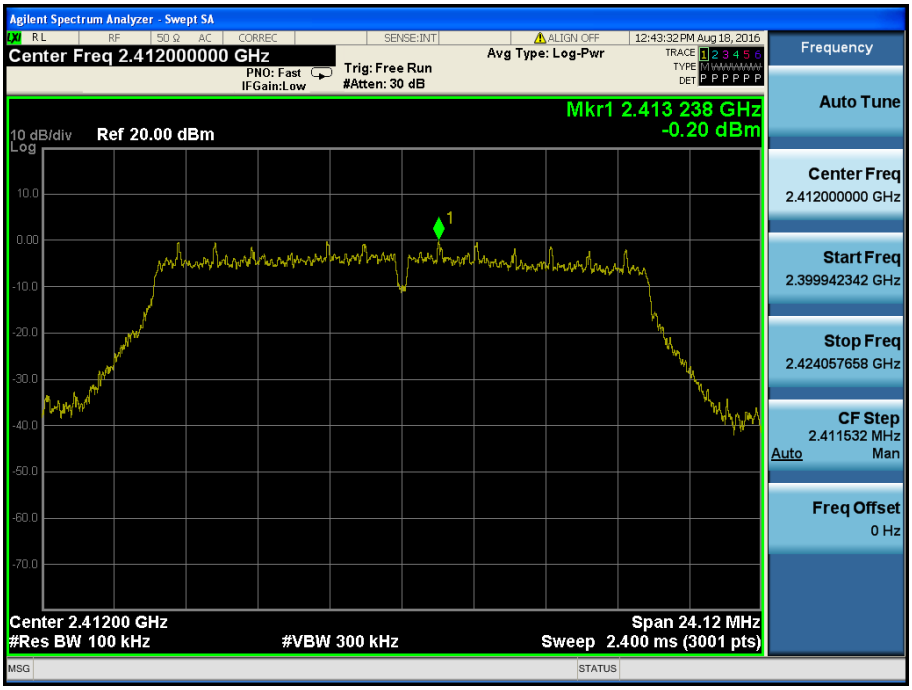
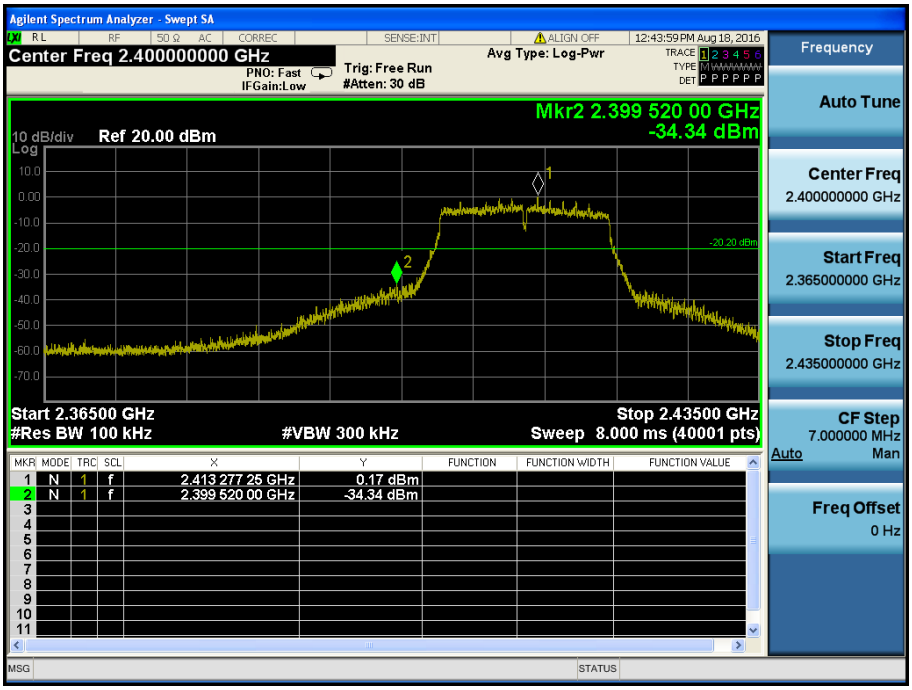


TM 2 & ANT 2 & Lowest

Reference



Low Band-edge



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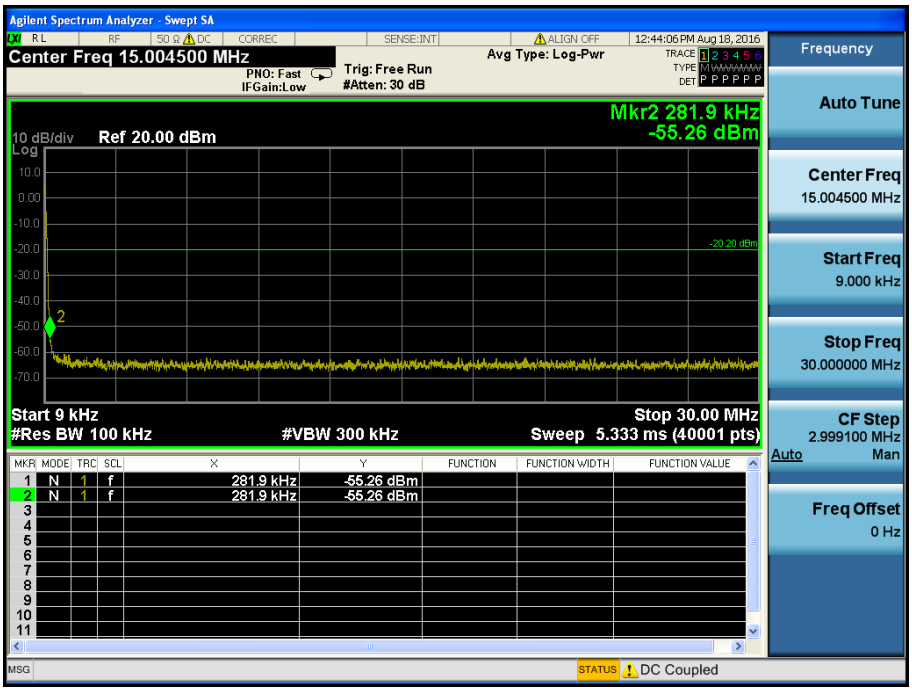

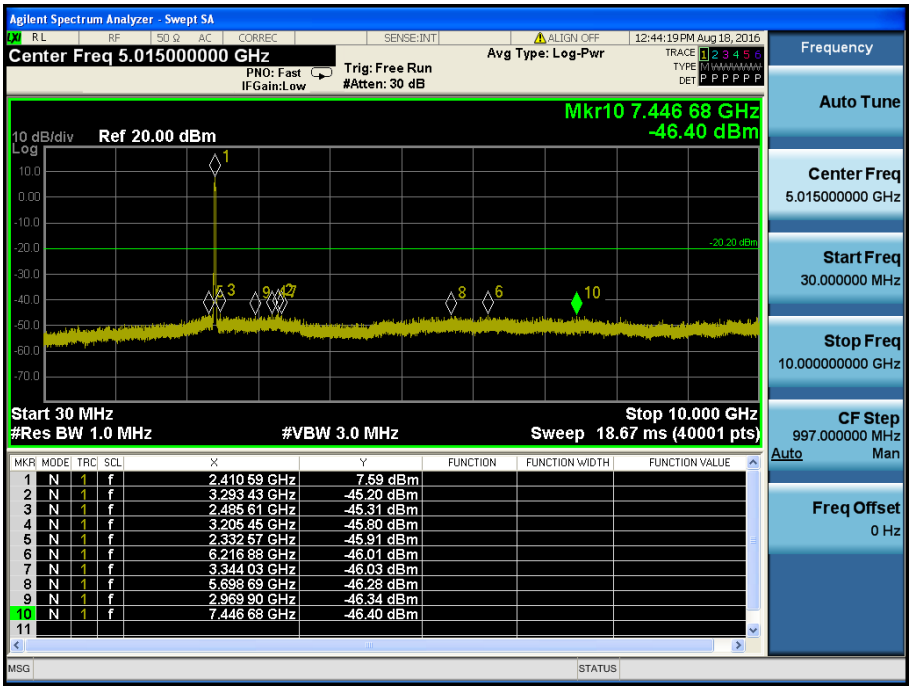

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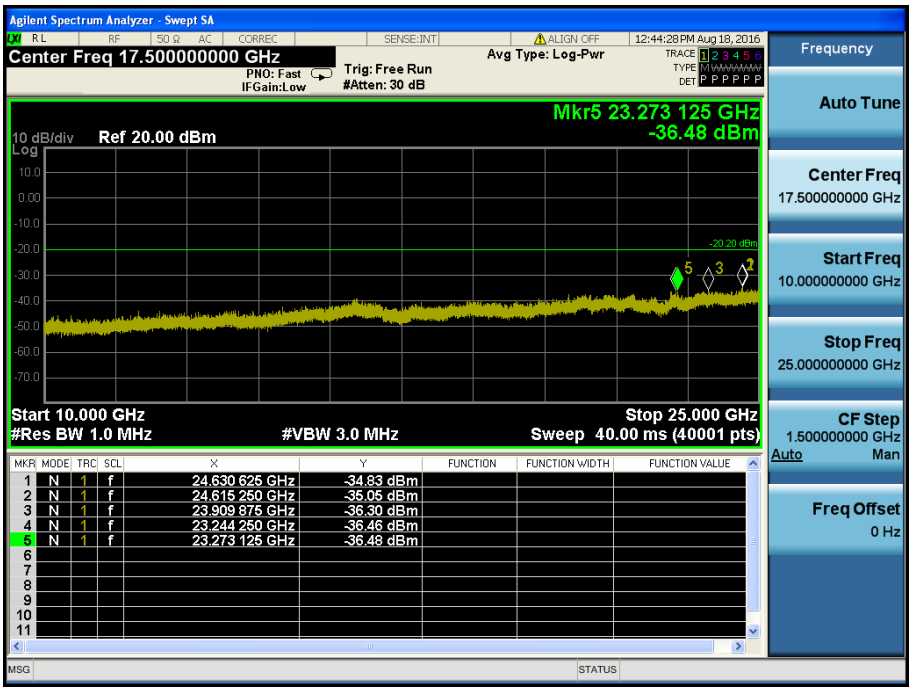
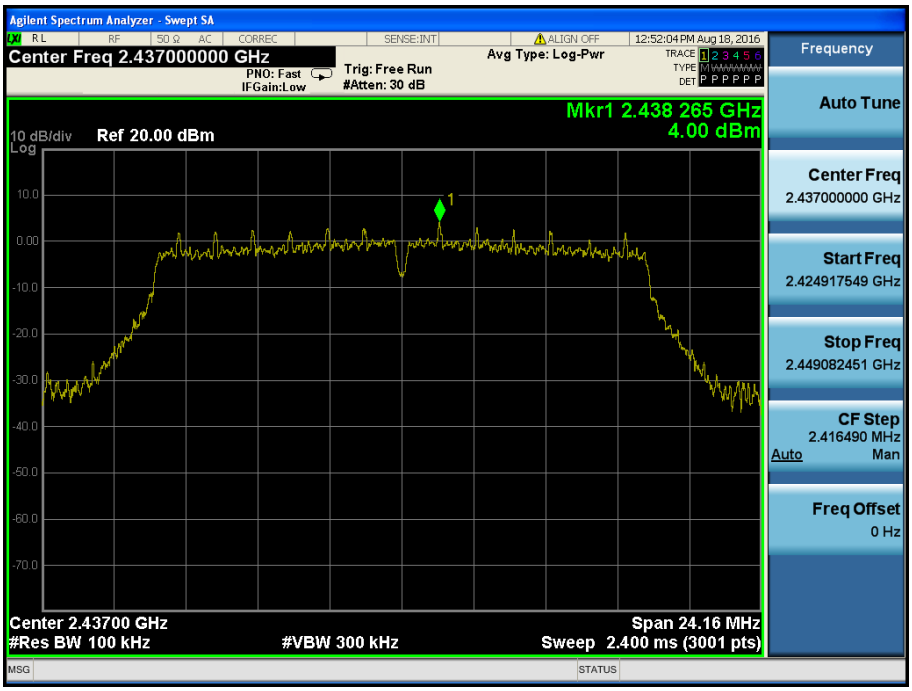


TM 2 & ANT 2 & Middle

Reference



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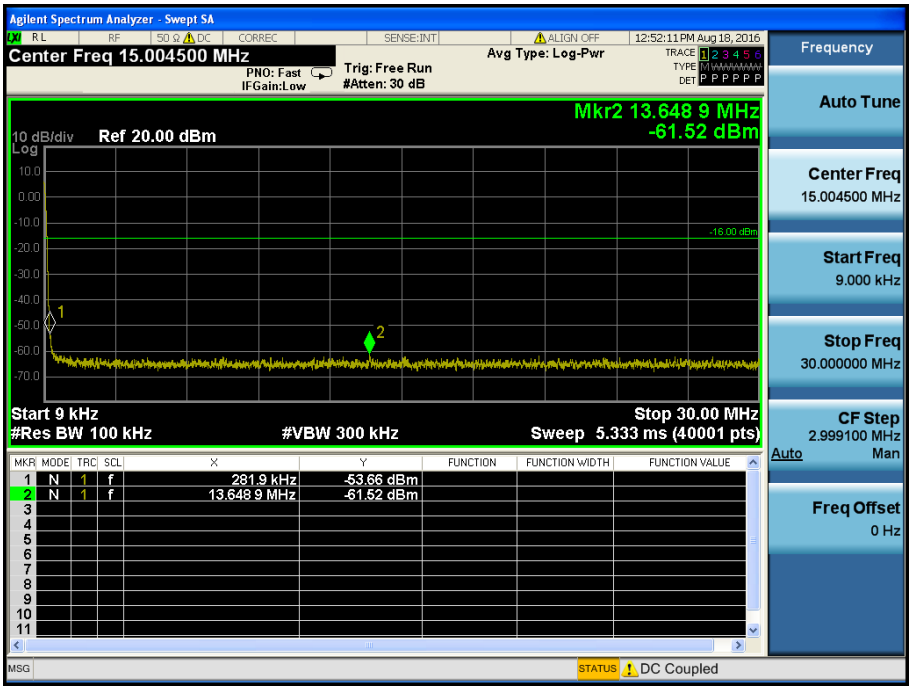
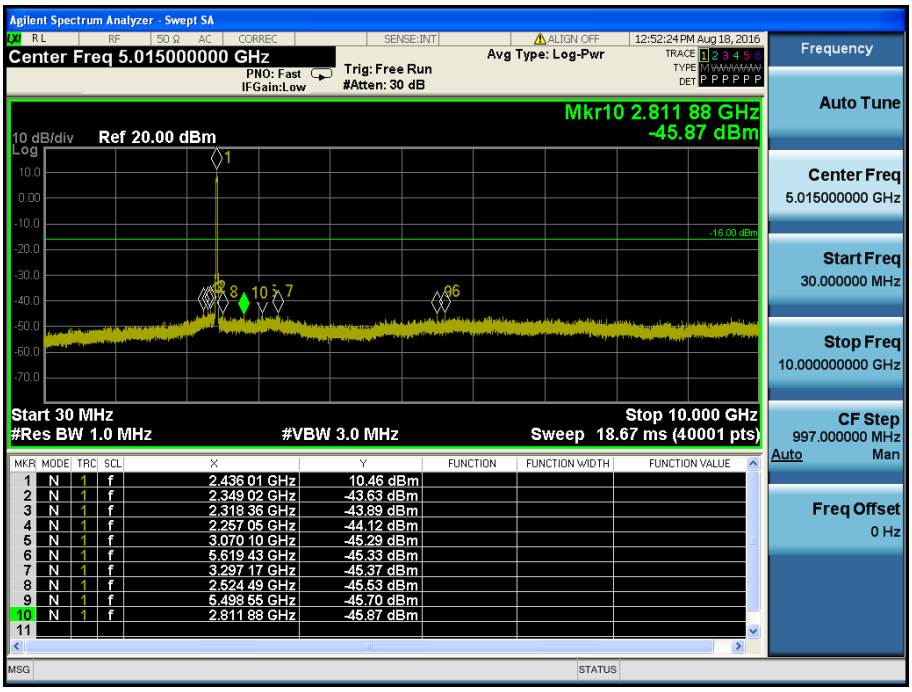
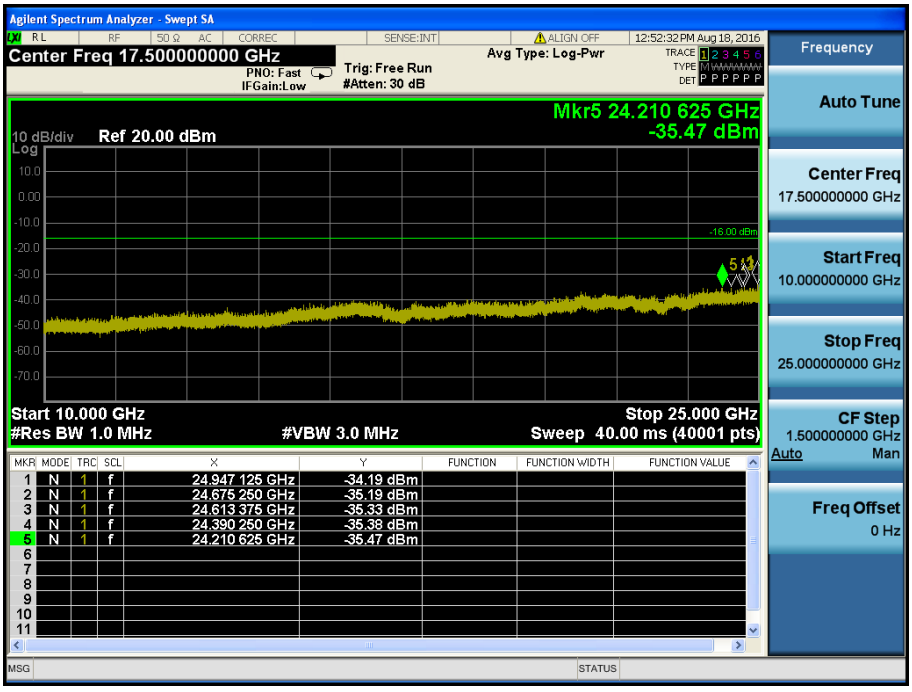


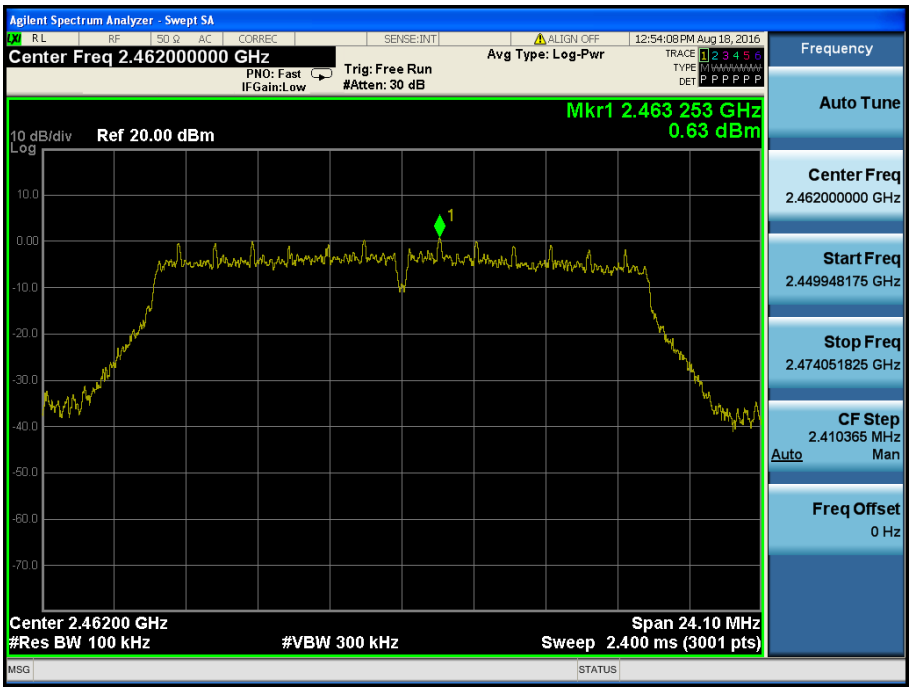
Conducted Spurious Emissions



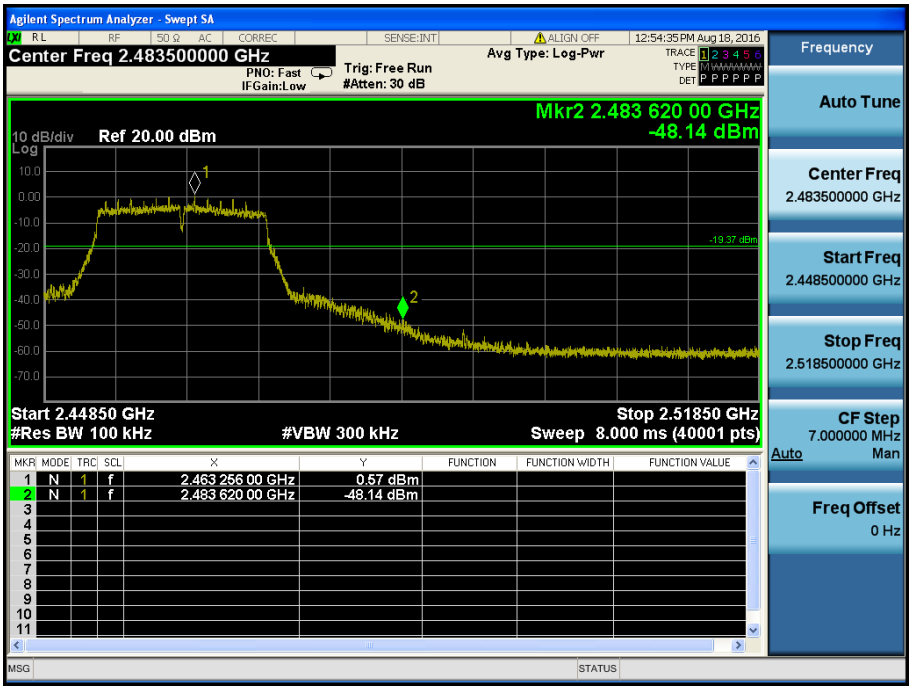


TM 2 & ANT 2 & Highest

Reference



High Band-edge



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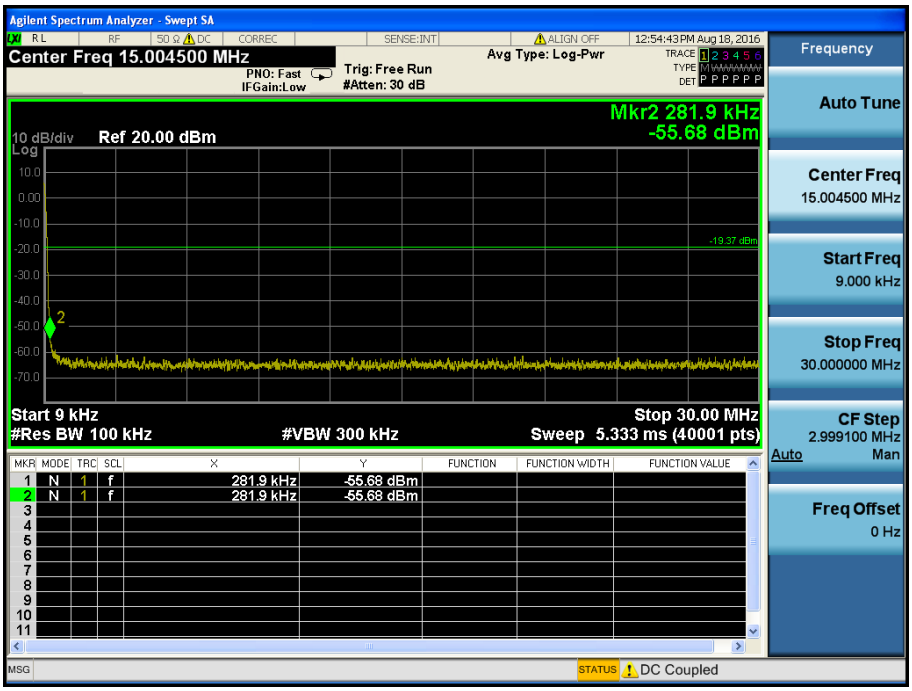

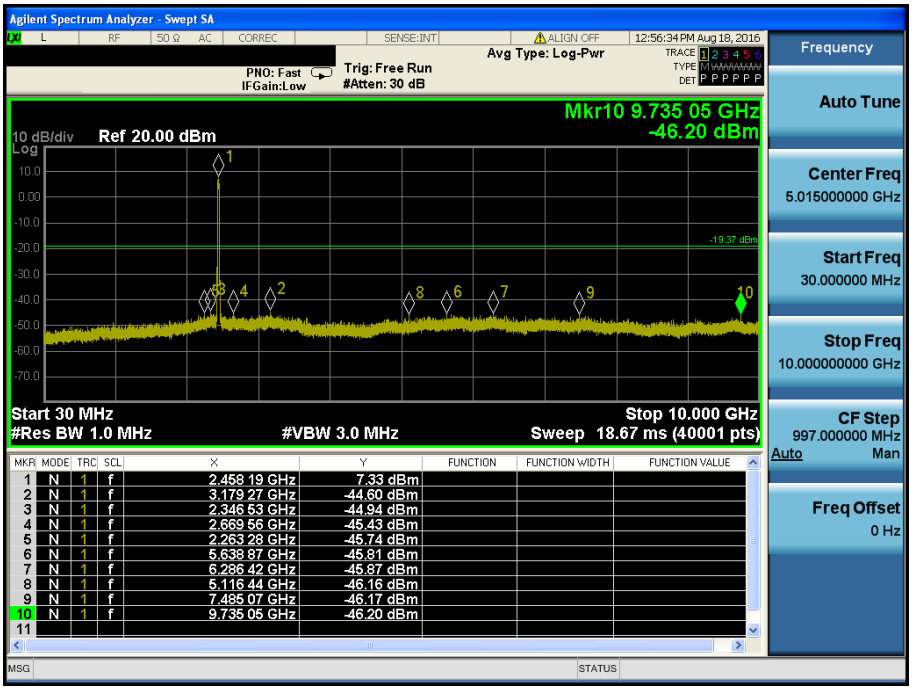

Conducted Spurious Emissions