

TEST REPORT

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Report No : DRTFCC1607-0098
Pages:(1) / (208) page

**1. Customer**

- Name : LG Electronics USA, Inc.
- Address : 1000 Sylvan Avenue, Englewood Cliffs, New Jersey 07632

2. Use of Report : FCC Original Grant**3. Product Name (FCC ID): RF Module (BEJLGSBWAC72)****4. Date of Test : 2016-04-19 ~ 2016-07-05****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	Technical Manager
	Name : DongHyun Kang (Signature)	Name : WonJung Lee (Signature)

2016 . 07 . 18 .

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
DRTFCC1607-0098	Jul. 18, 2016	Initial issue

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1. EUT DESCRIPTION

FCC Equipment Class	Digital Transmission System(DTS)
Product	RF Module
Model Name	LGSBWAC72
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: Internal Antenna Antenna gain ▪ 2.4 GHz Band: ANT 1 : 1.040 dBi & ANT 2 : 1.350 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 (Single transmitting)	2412	2437	2462
TM 2	802.11g 6 Mbps (Single transmitting)	2412	2437	2462
TM 3	802.11n(HT20) MCS 0 (Single transmitting)	2412	2437	2462
TM 4	802.11b 1 Mbps (Multiple transmitting)	2412	2437	2462
TM 5	802.11g 6 Mbps (Multiple transmitting)	2412	2437	2462
TM 6	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. We attached the result of Ant1(Worst case) for 802.11b SISO mode. And in case of 802.11g/n mode, we attached the result of only MIMO mode(Worst case).

2.2 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Laptop	Satellite C50-A	YD068849Q	TOSHIBA	FCC ID: TX2-RTL8188EE
-	-	-	-	-

2.3 Tested environment

Temperature	: 21 ~ 26 °C
Relative humidity content	: 37 ~ 44 % 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	0.93 dB (The confidence level is about 95 %, k = 2)
Conducted spurious emission	1.0 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 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 / 3 kHz		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 limits	-	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	1.040	1.350	1.198 ^{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)

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

8. TEST RESULT

8.1 6dB 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) $\geq 3 \times$ 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.

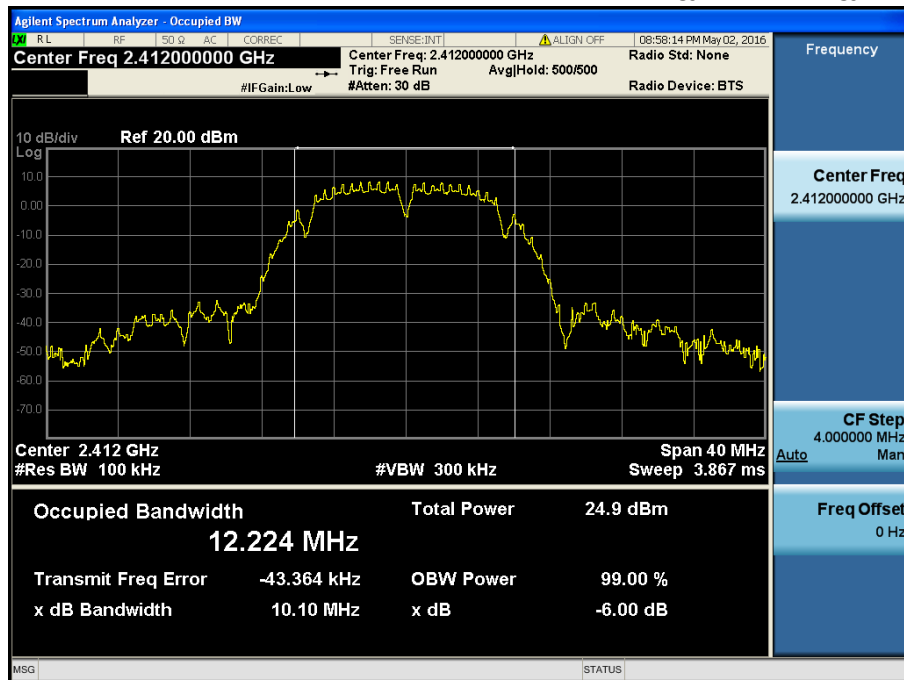
■ Test Results: **Comply**

Test Mode	Frequency	Test Results[MHz]	
		ANT 1	ANT 2
TM 1	Lowest	10.100	10.070
	Middle	10.070	9.613
	Highest	10.040	10.080
TM 2	Lowest	16.370	16.360
	Middle	15.960	15.940
	Highest	16.320	16.290
TM 3	Lowest	17.080	17.090
	Middle	17.180	16.140
	Highest	16.930	16.300
TM 4	Lowest	10.070	9.632
	Middle	10.100	10.080
	Highest	10.060	10.100
TM 5	Lowest	16.350	16.310
	Middle	16.330	15.950
	Highest	16.040	16.370
TM 6	Lowest	16.980	17.530
	Middle	16.960	17.560
	Highest	16.320	17.080

■ RESULT PLOTS

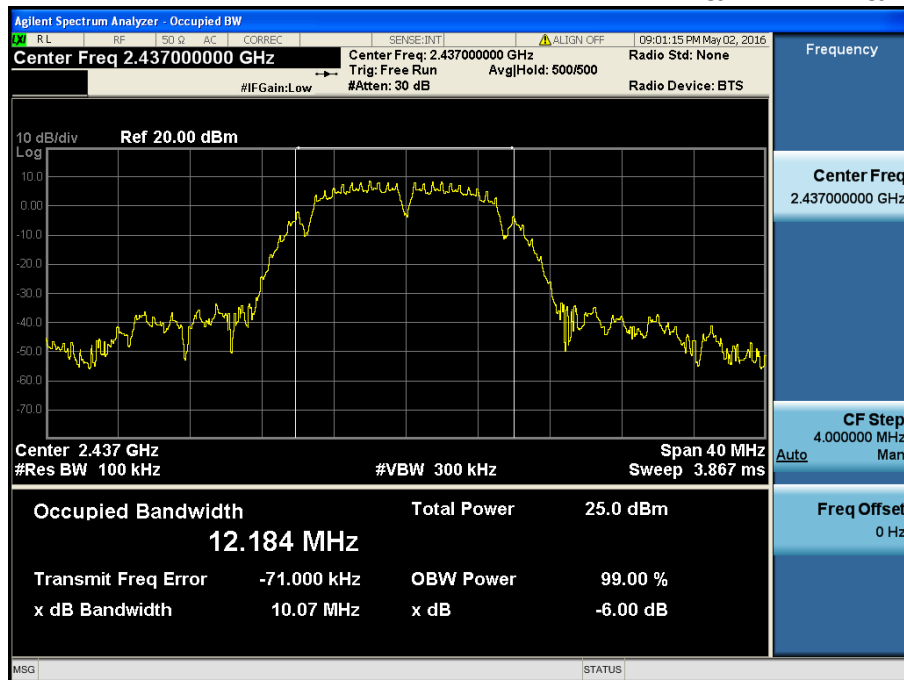
6 dB Bandwidth

TM 1 & ANT 1 & Lowest



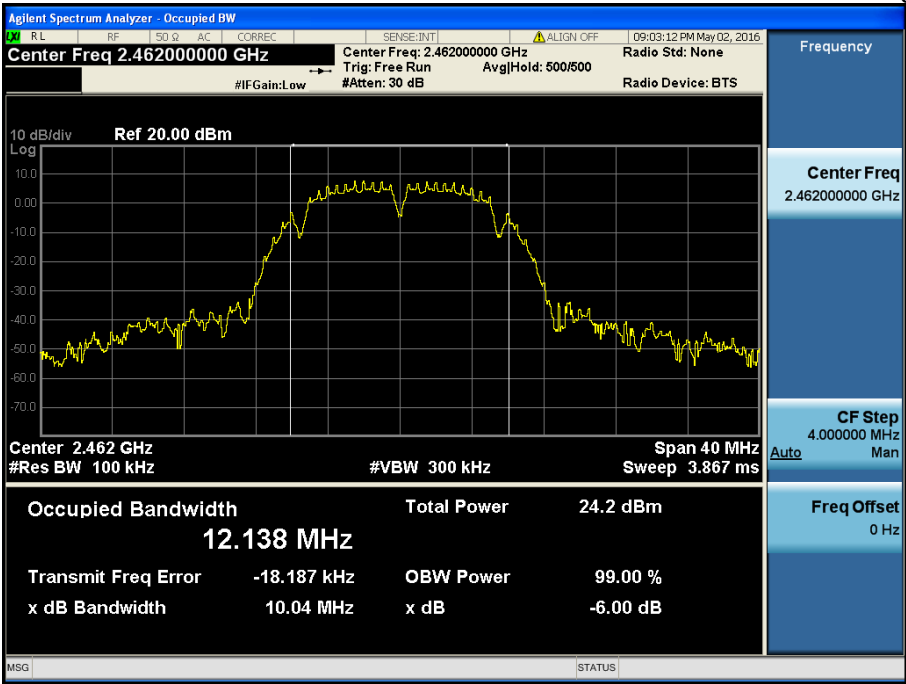
6 dB Bandwidth

TM 1 & ANT 1 & Middle



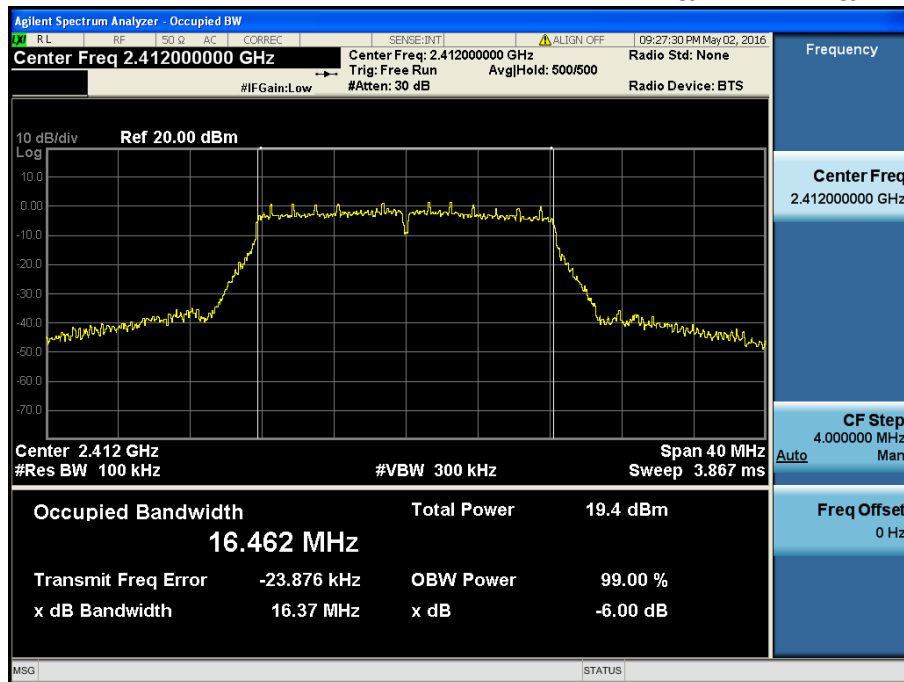
6 dB Bandwidth

TM 1 & ANT 1 & Highest



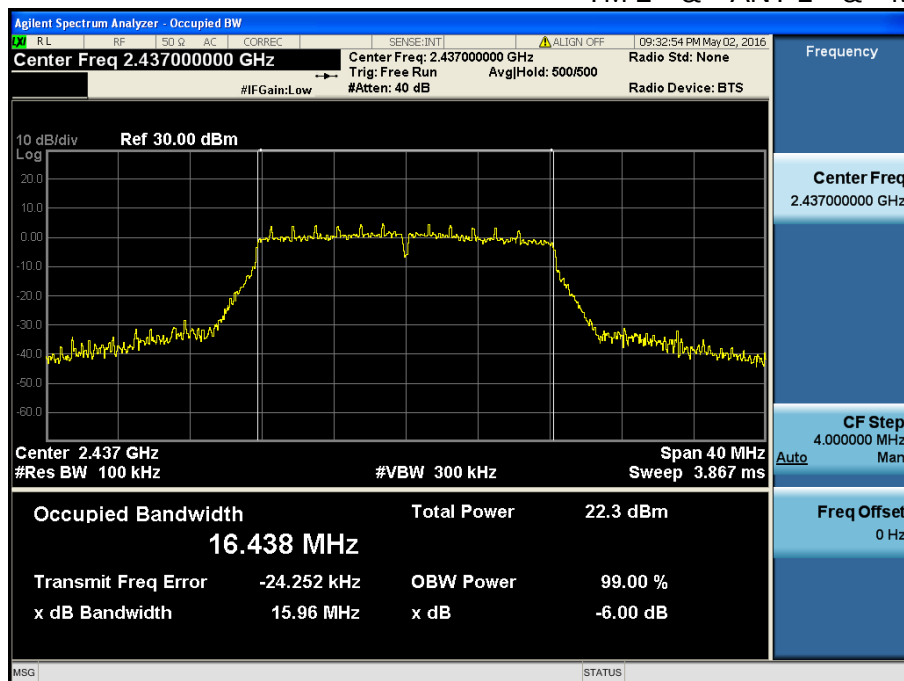
6 dB Bandwidth

TM 2 & ANT 1 & Lowest



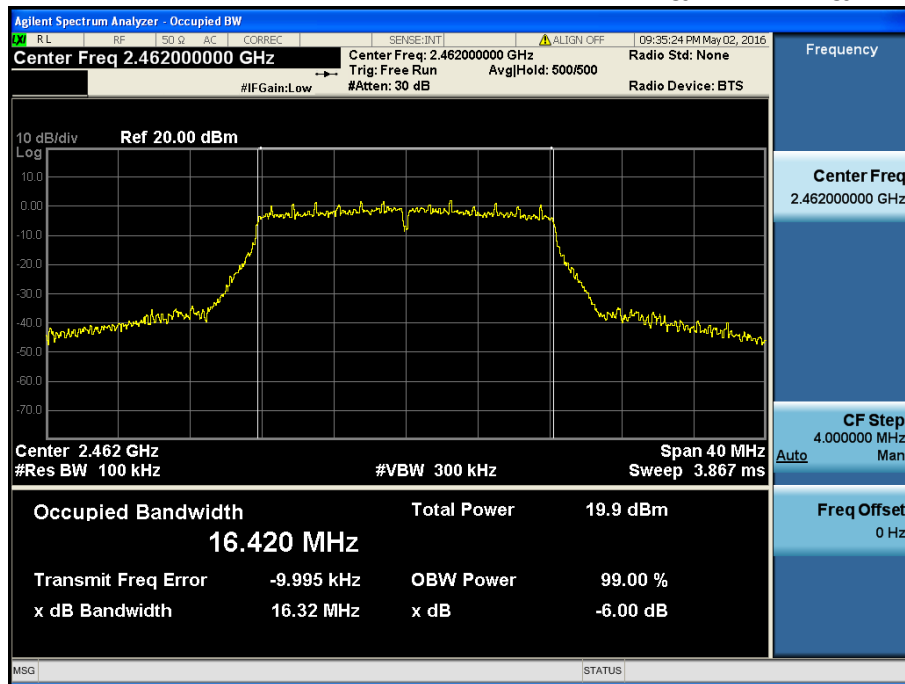
6 dB Bandwidth

TM 2 & ANT 1 & Middle



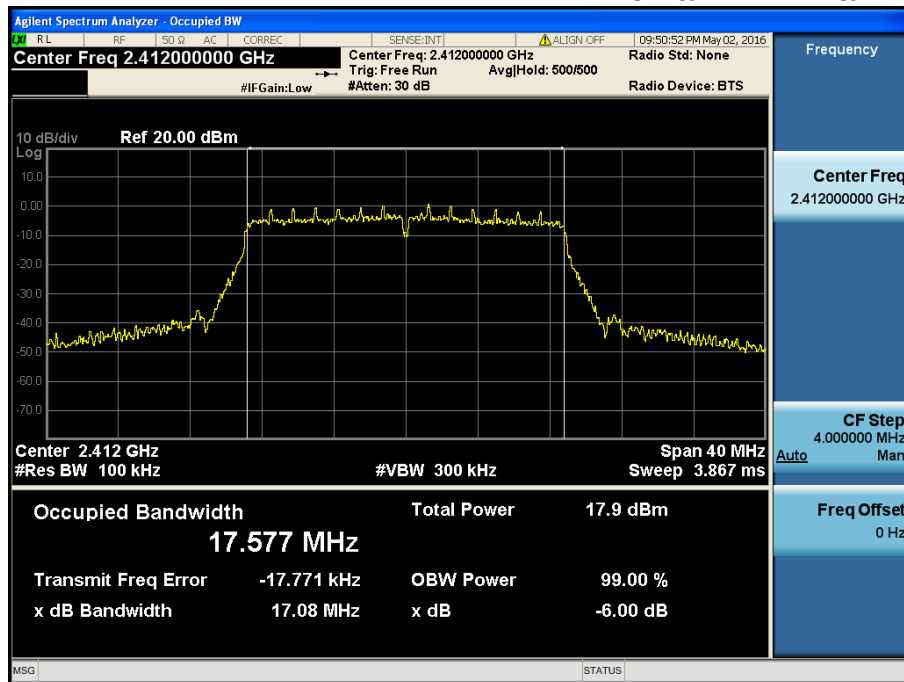
6 dB Bandwidth

TM 2 & ANT 1 & Highest



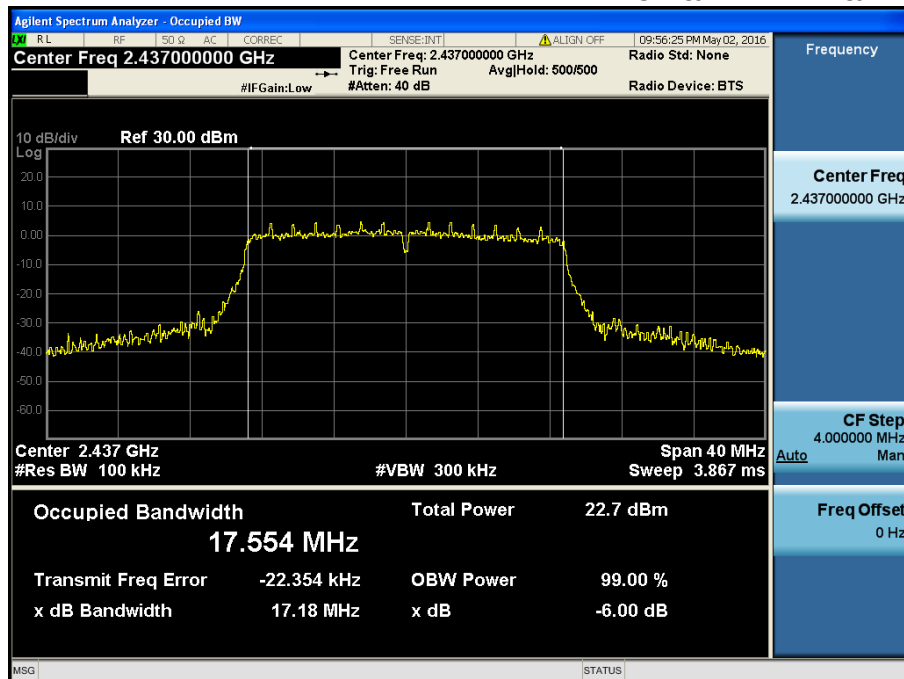
6 dB Bandwidth

TM 3 & ANT 1 & Lowest



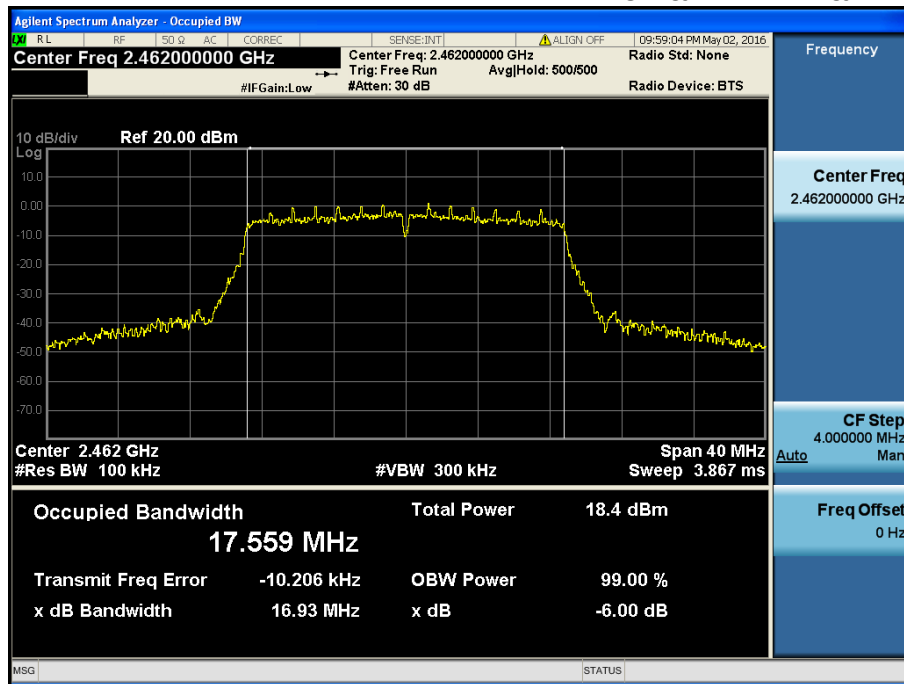
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TM 3 & ANT 1 & Middle



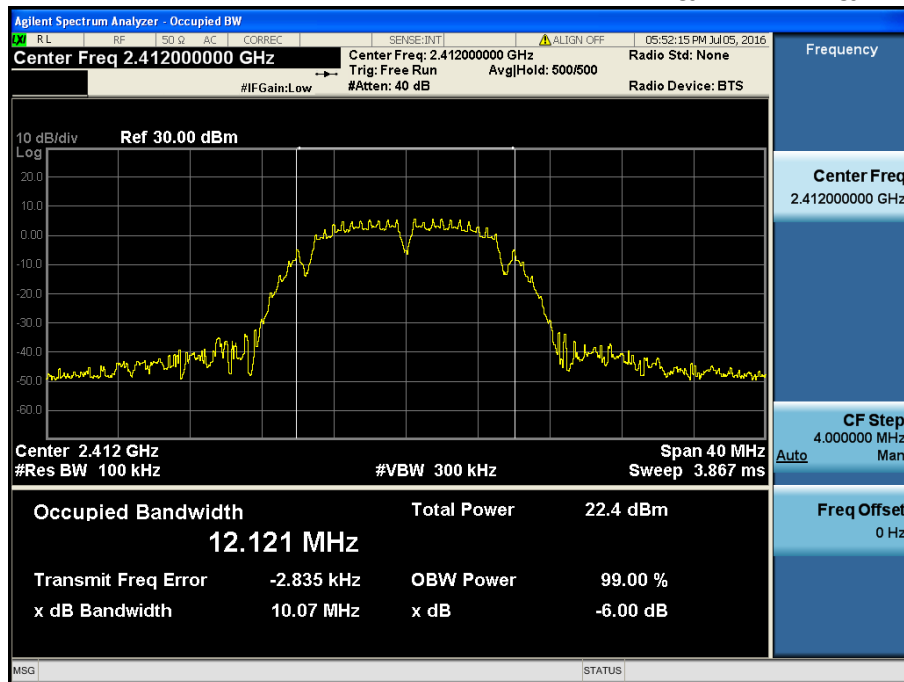
6 dB Bandwidth

TM 3 & ANT 1 & Highest



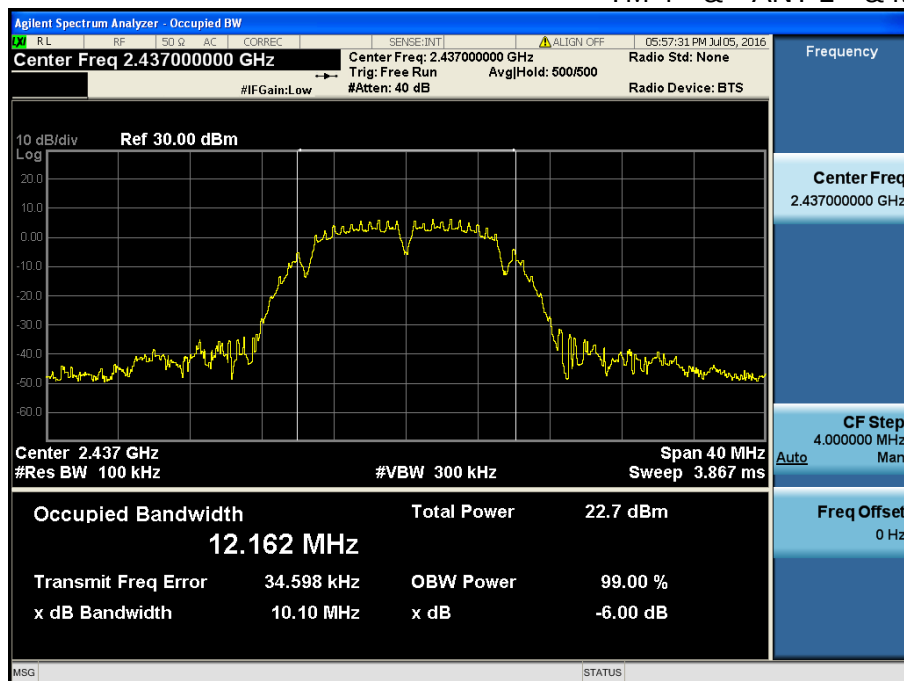
6 dB Bandwidth

TM 4 & ANT 1 & Lowest



6 dB Bandwidth

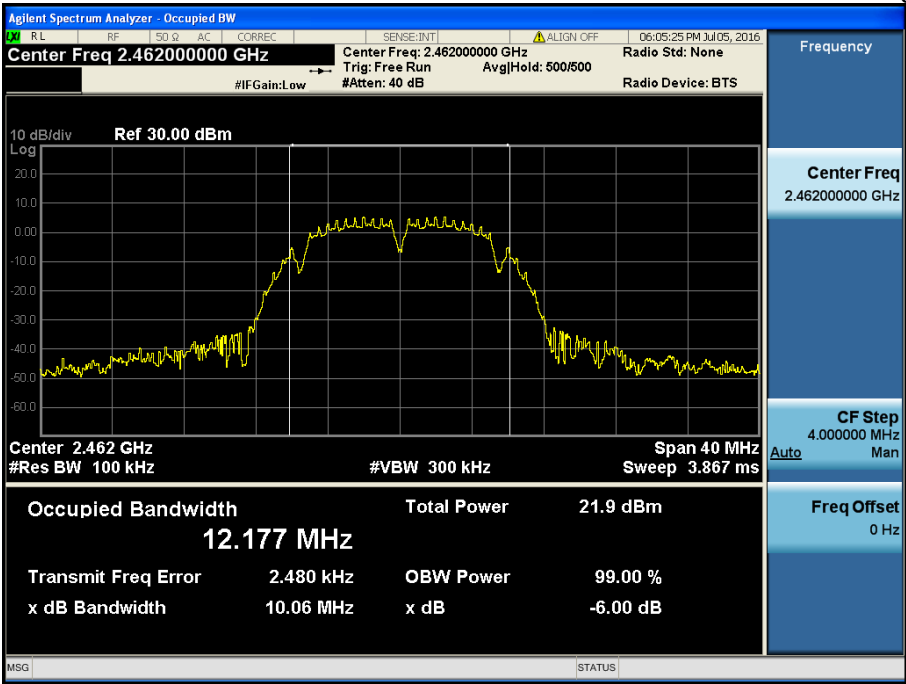
TM 4 & ANT 1 & Middle





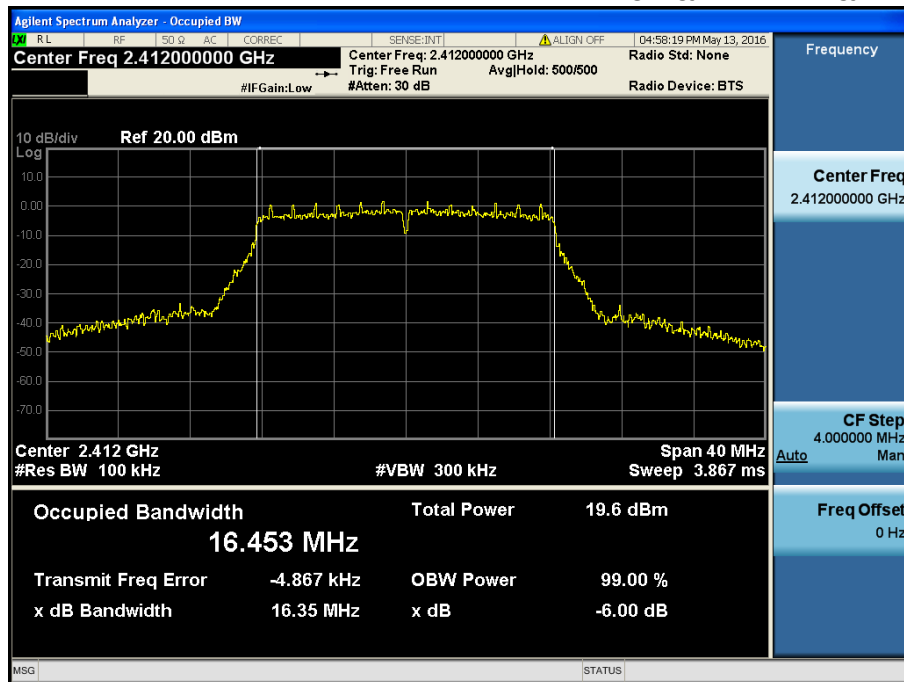
6 dB Bandwidth

TM 4 & ANT 1 & Highest



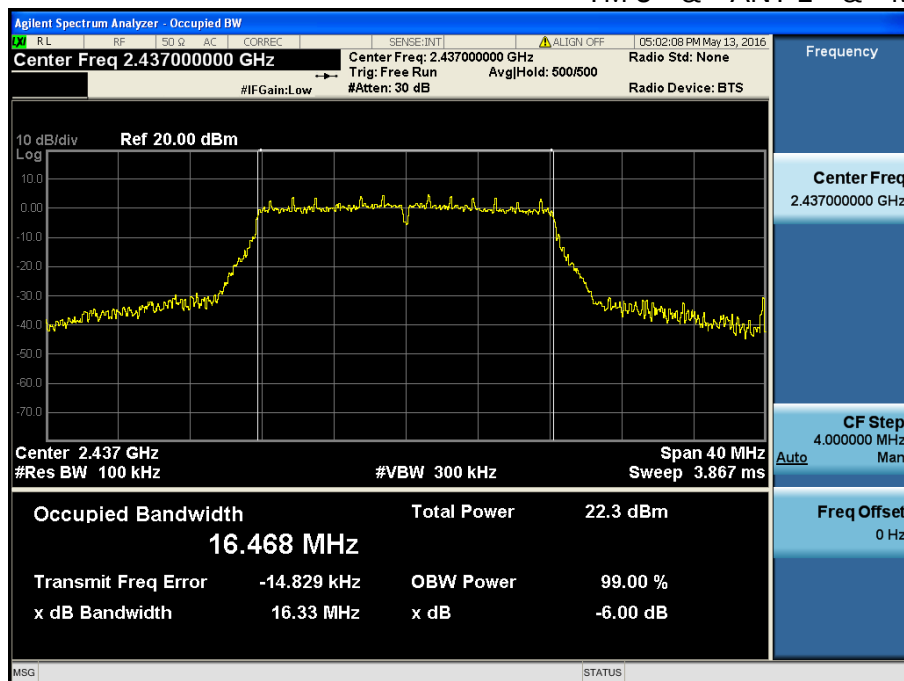
6 dB Bandwidth

TM 5 & ANT 1 & Lowest



6 dB Bandwidth

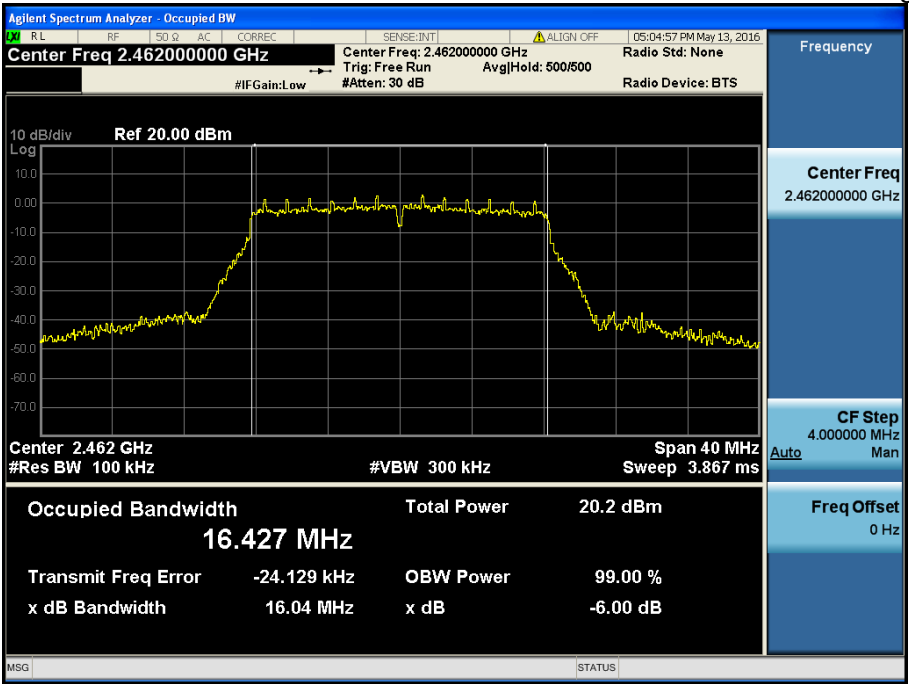
TM 5 & ANT 1 & Middle





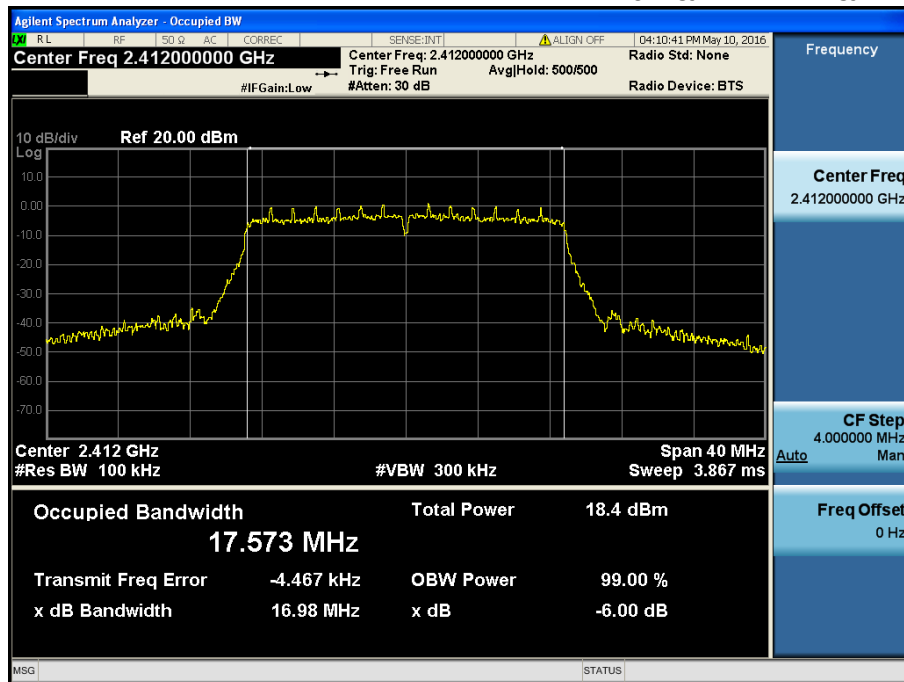
6 dB Bandwidth

TM 5 & ANT 1 & Highest



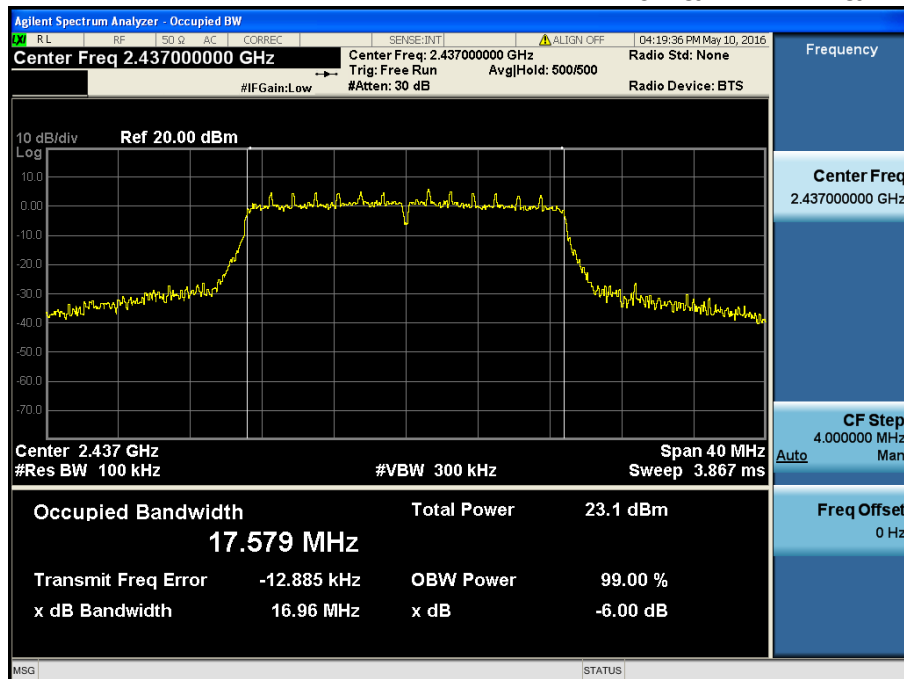
6 dB Bandwidth

TM 6 & ANT 1 & Lowest



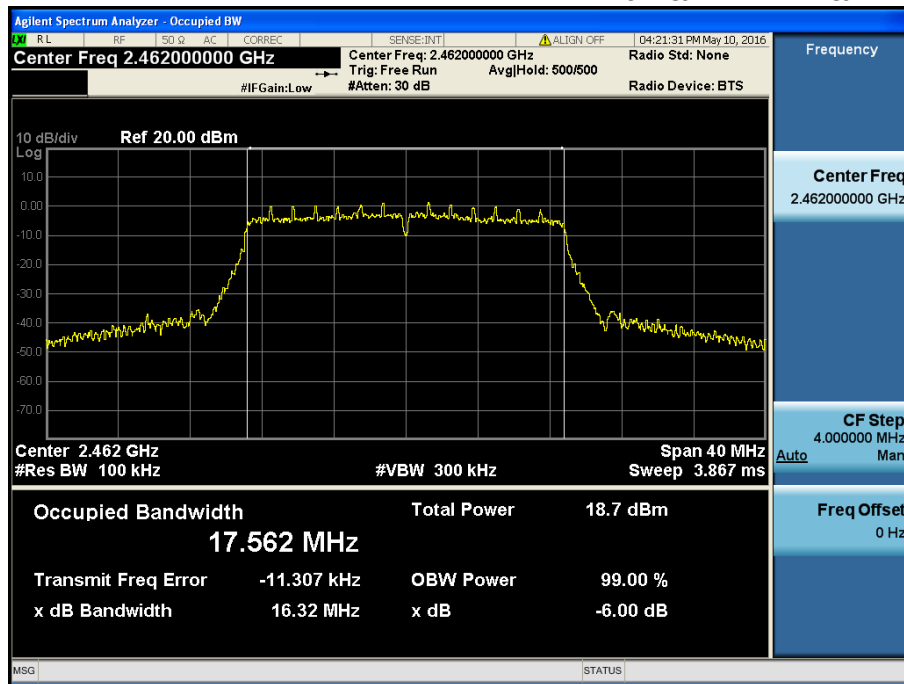
6 dB Bandwidth

TM 6 & ANT 1 & Middle



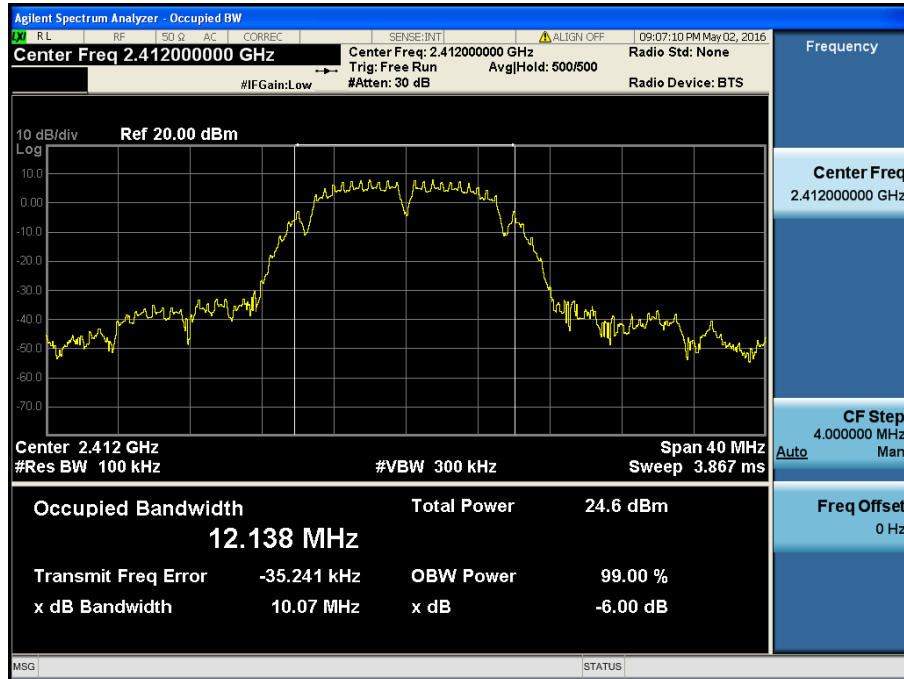
6 dB Bandwidth

TM 6 & ANT 1 & Highest



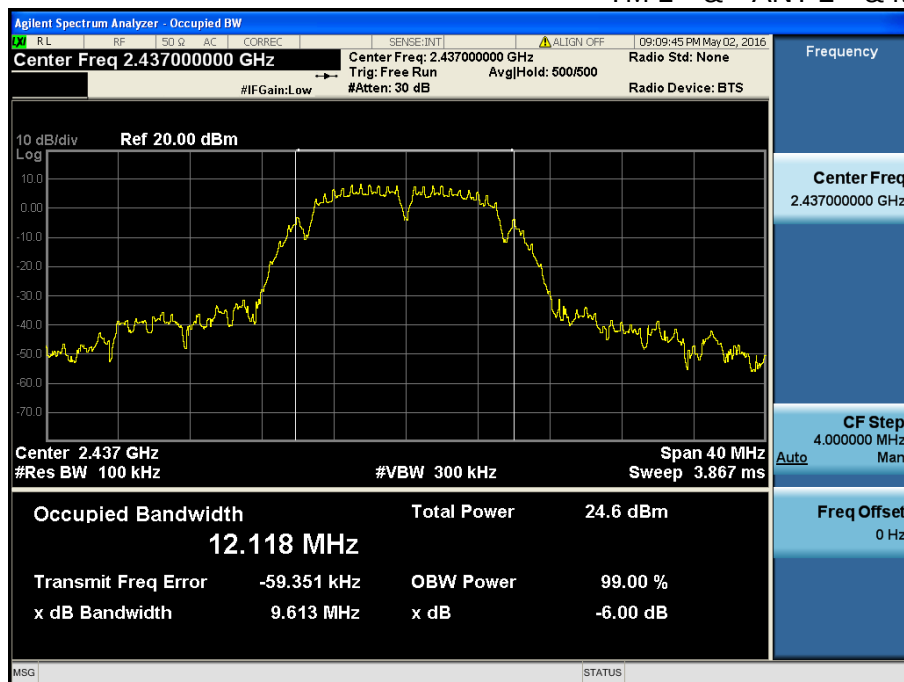
6 dB Bandwidth

TM 1 & ANT 2 & Lowest



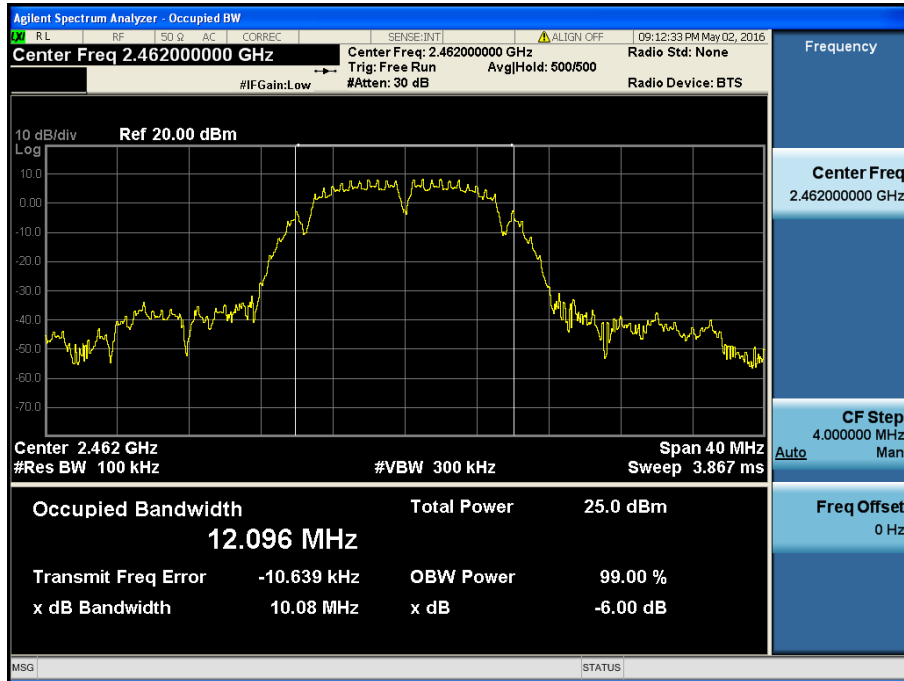
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TM 1 & ANT 2 & Middle



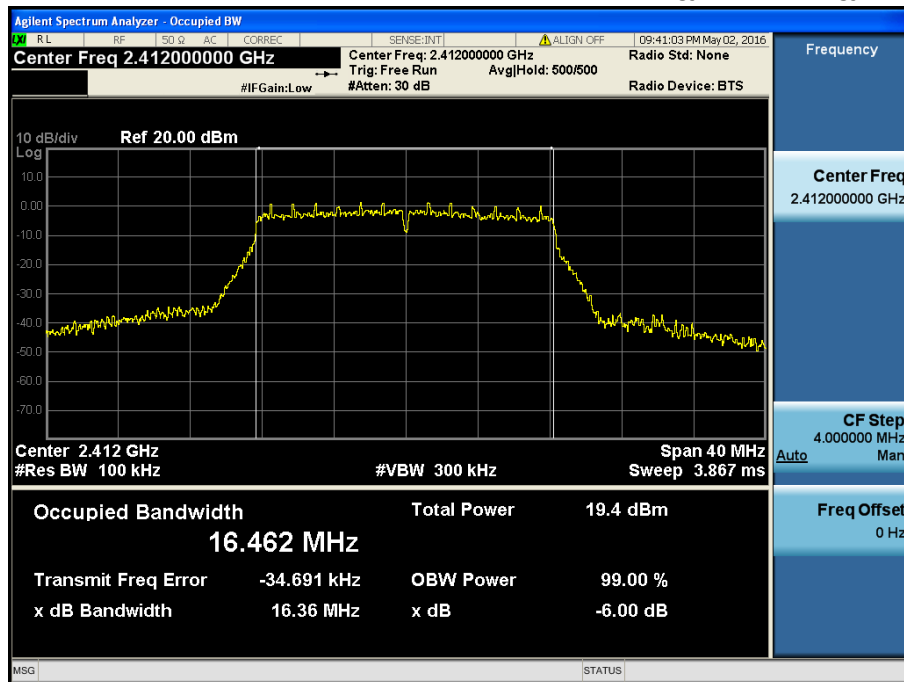
6 dB Bandwidth

TM 1 & ANT 2 & Highest



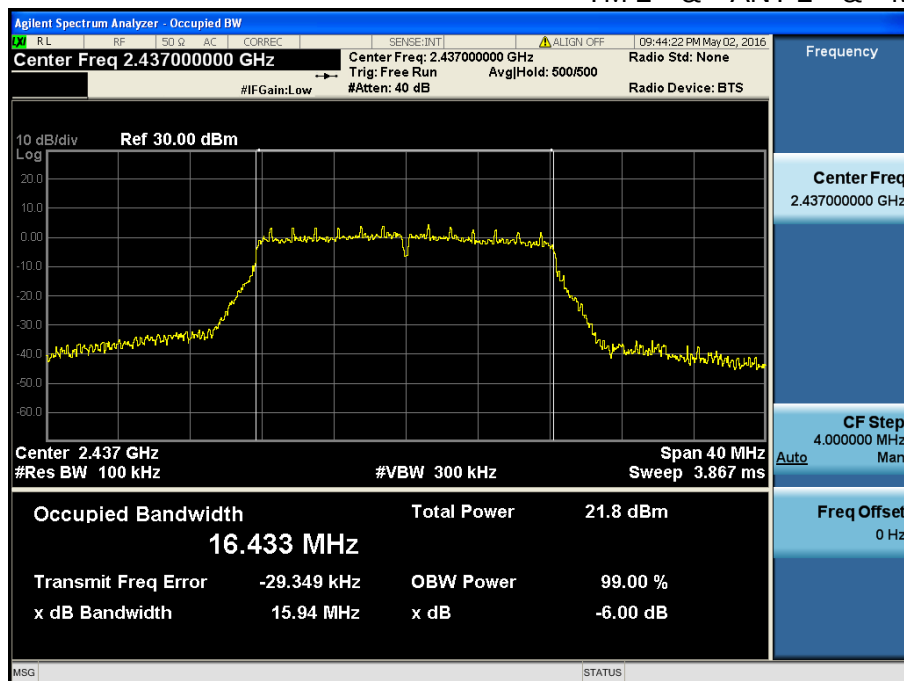
6 dB Bandwidth

TM 2 & ANT 2 & Lowest



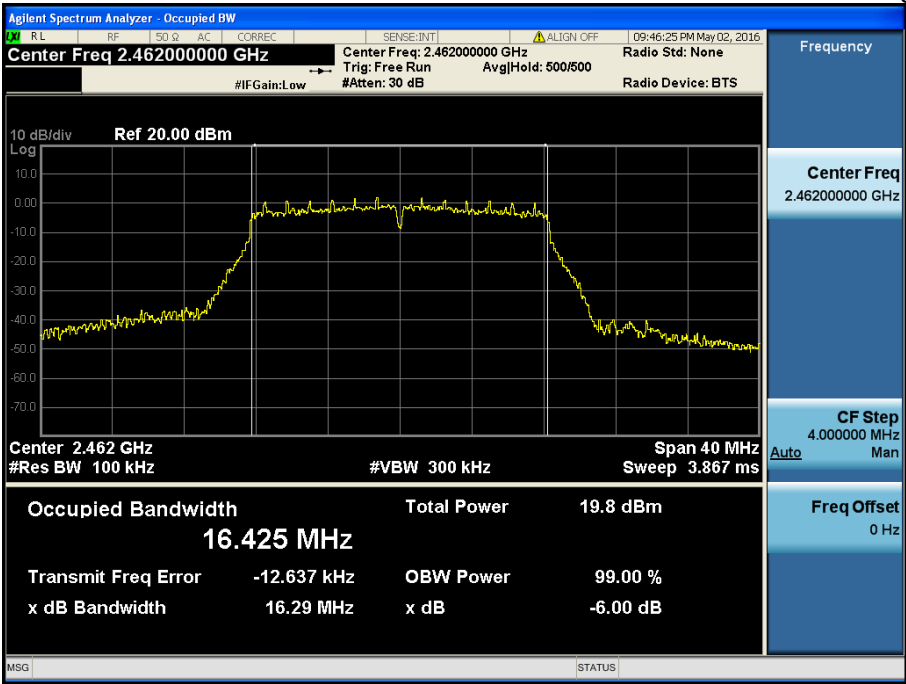
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TM 2 & ANT 2 & Middle



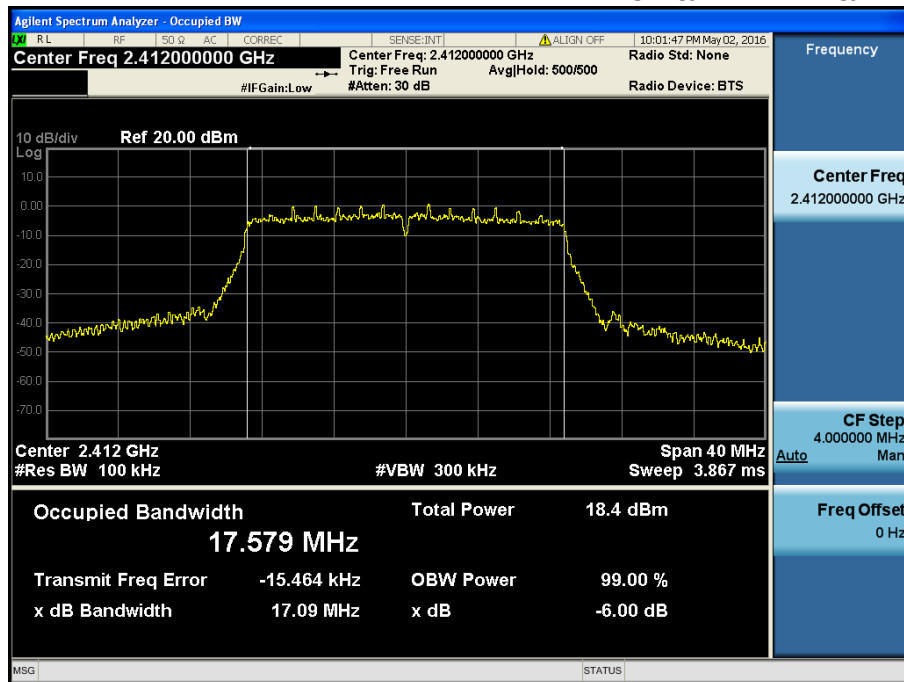
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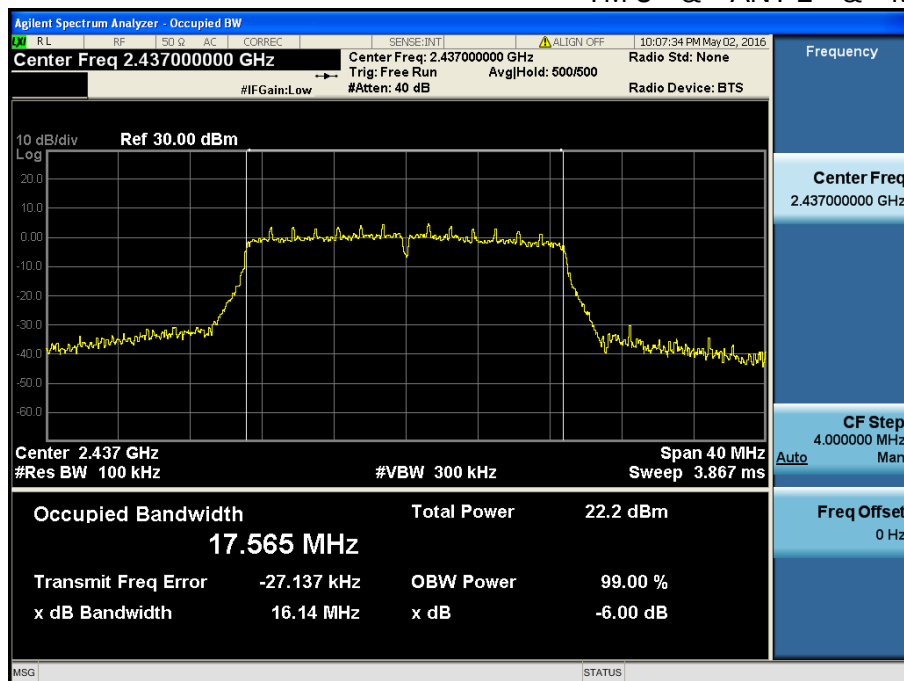
6 dB Bandwidth

TM 3 & ANT 2 & Lowest



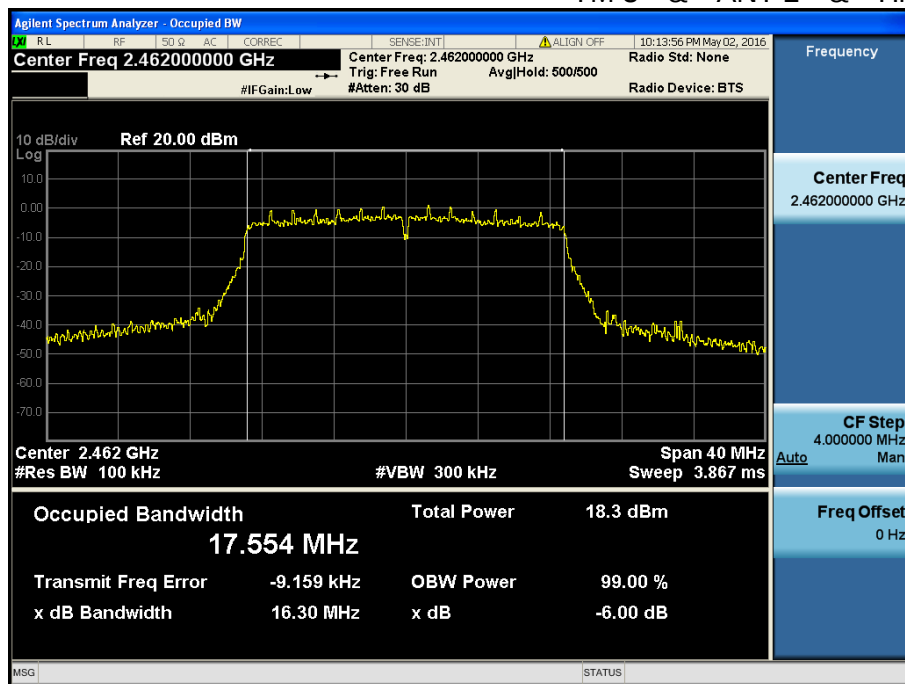
6 dB Bandwidth

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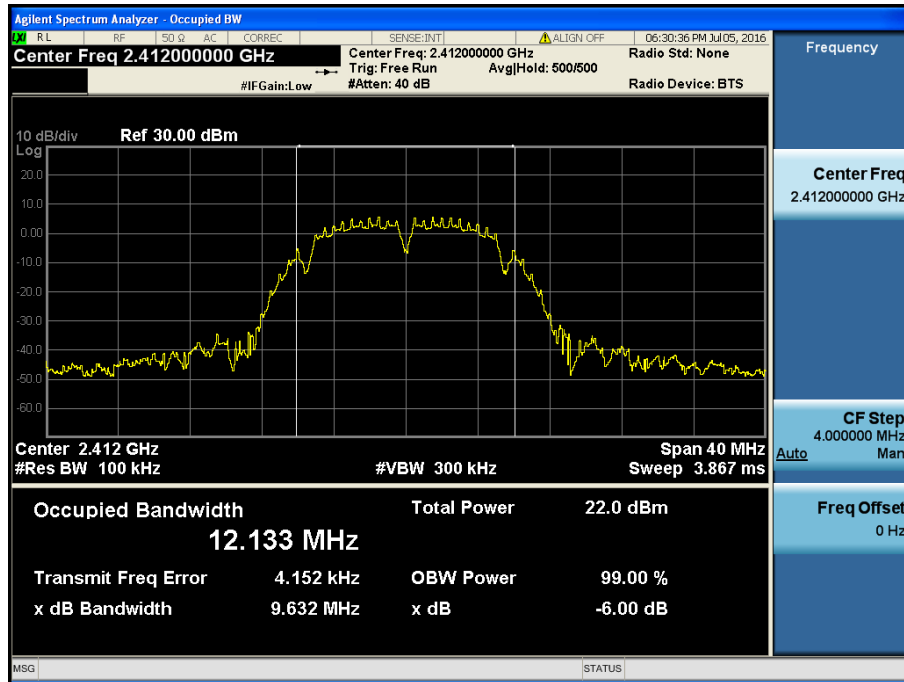
6 dB Bandwidth

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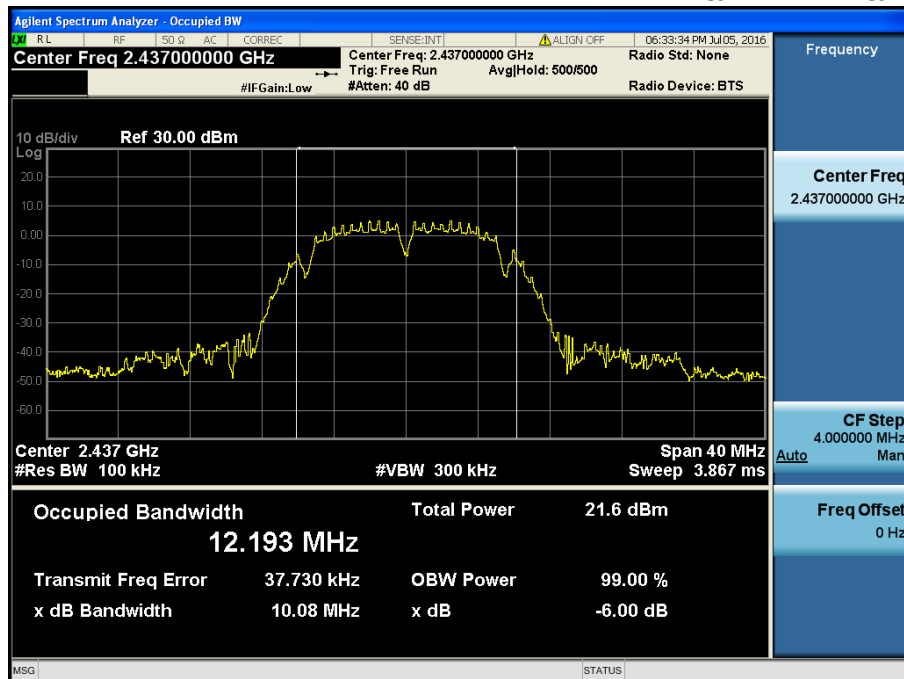
6 dB Bandwidth

TM 4 & ANT 2 & Lowest



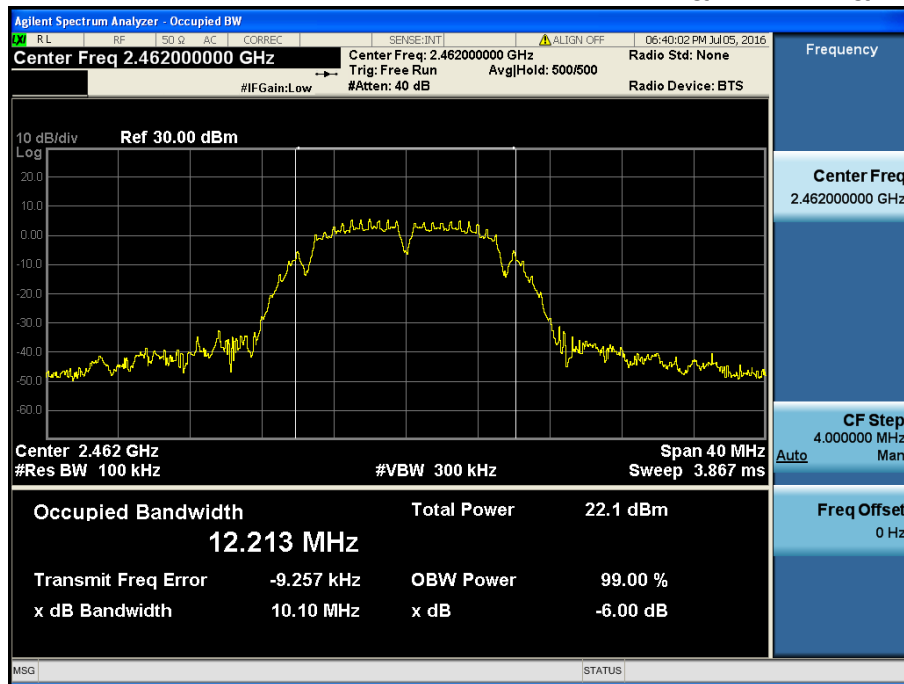
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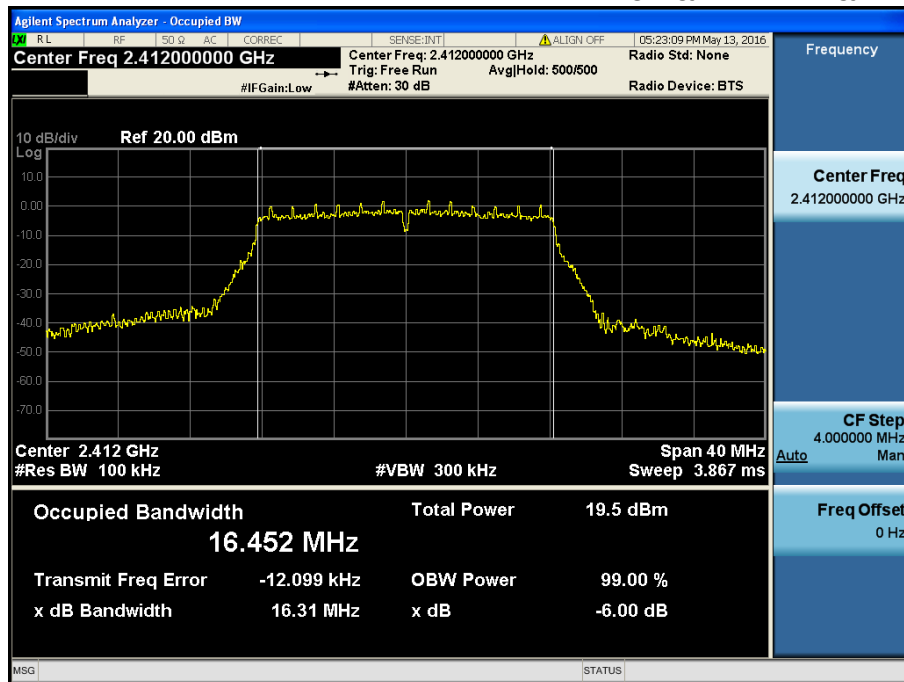
6 dB Bandwidth

TM 4 & ANT 2 & Highest



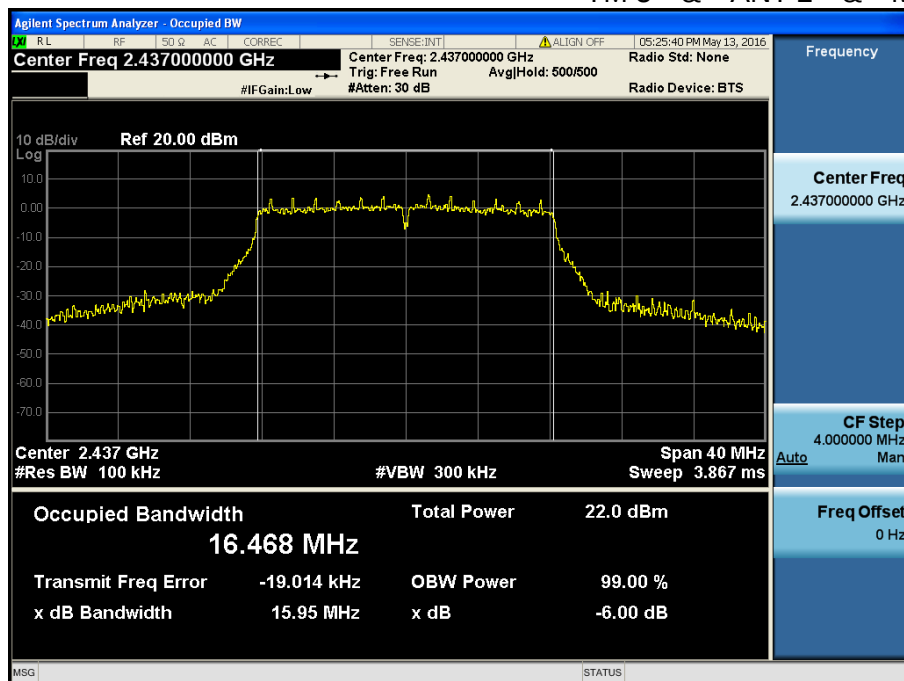
6 dB Bandwidth

TM 5 & ANT 2 & Lowest



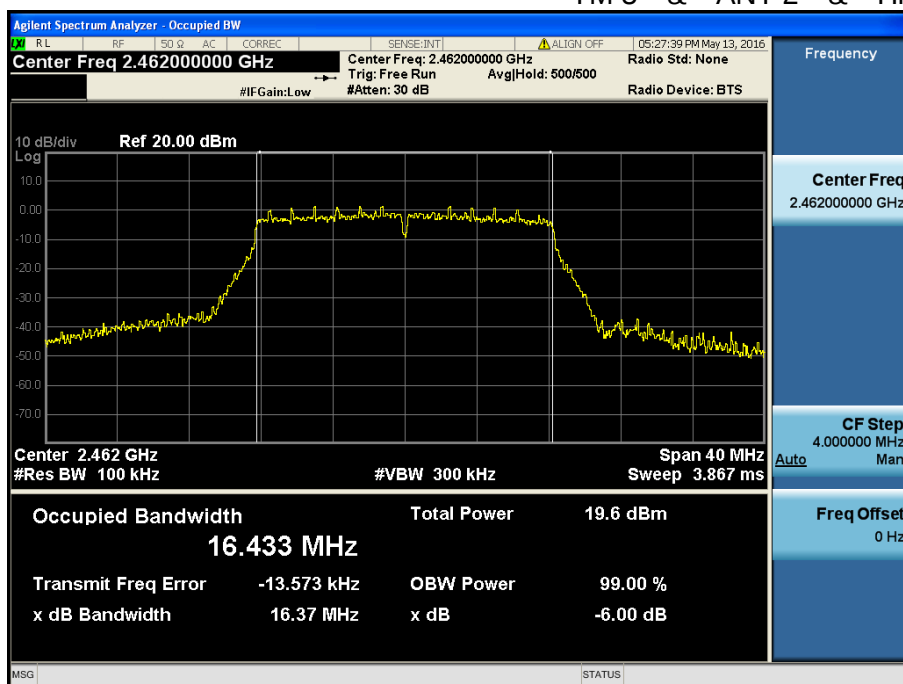
6 dB Bandwidth

TM 5 & ANT 2 & Middle



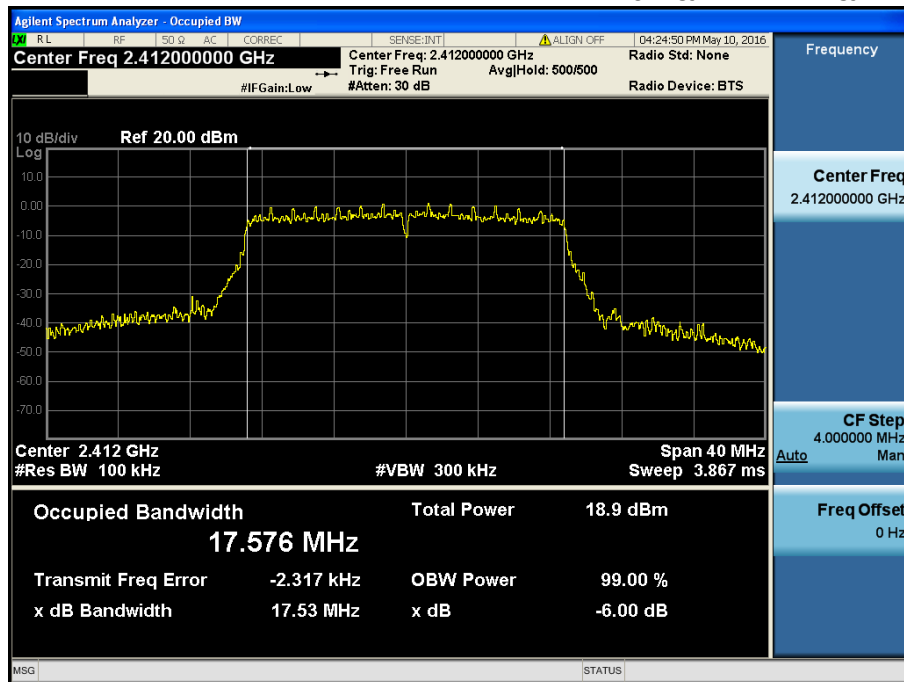
6 dB Bandwidth

TM 5 & ANT 2 & Highest



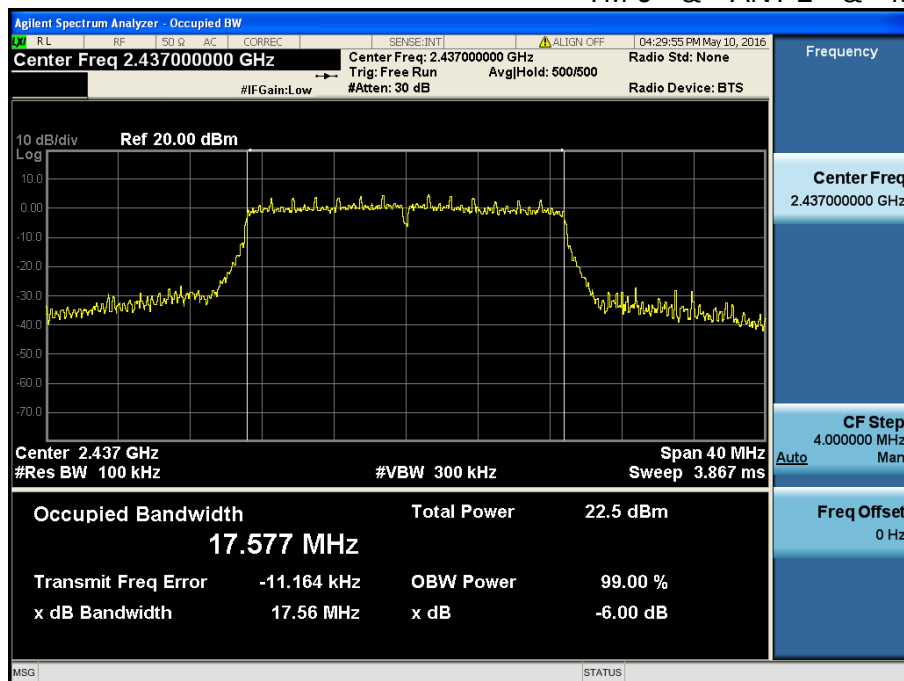
6 dB Bandwidth

TM 6 & ANT 2 & Lowest



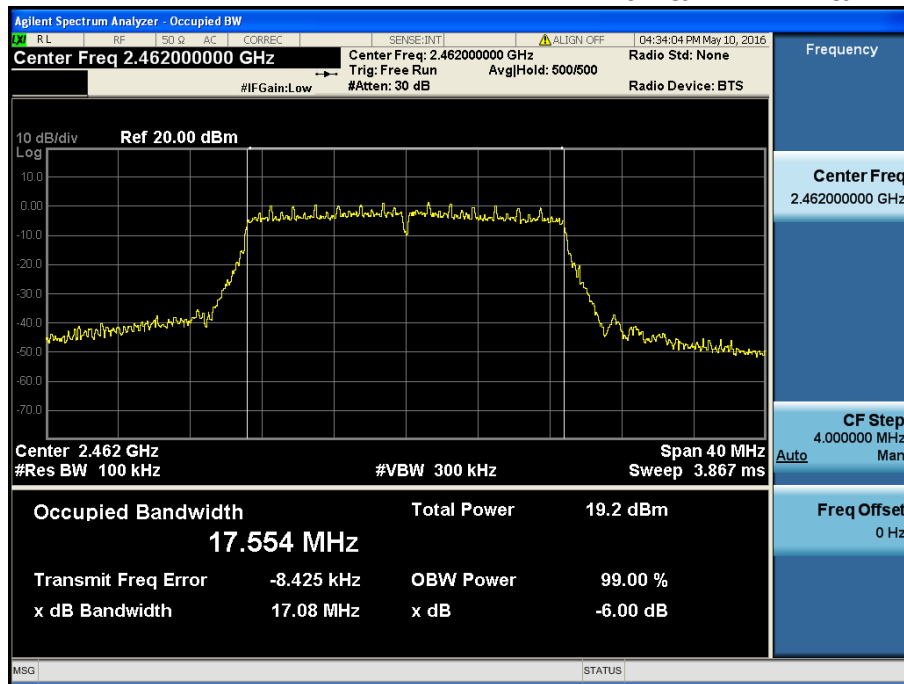
6 dB Bandwidth

TM 6 & ANT 2 & Middle



6 dB Bandwidth

TM 6 & ANT 2 & Highest

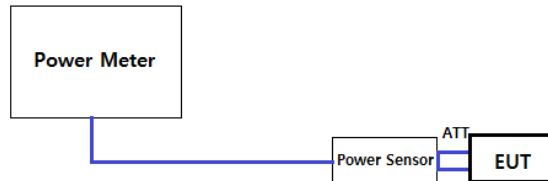


8.2 Maximum peak conducted output power

■ 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.

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	21.62	21.61	21.60	21.59
		AV	17.24	17.23	17.22	17.17
	2437	PK	21.48	21.47	21.46	21.45
		AV	17.46	17.43	17.42	17.42
	2462	PK	21.39	21.39	21.38	21.37
		AV	16.72	16.70	16.69	16.68
ANT 2	2412	PK	21.75	21.73	21.73	21.72
		AV	17.04	17.03	16.99	16.96
	2437	PK	21.45	21.43	21.42	21.41
		AV	17.03	17.02	17.02	17.01
	2462	PK	21.63	21.62	21.62	21.61
		AV	17.17	17.16	17.15	17.12

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	22.19	22.19	22.18	22.16	22.16	22.14	22.13	22.13
		AV	12.51	12.51	12.50	12.48	12.47	12.43	12.32	12.06
	2437	PK	24.43	24.42	21.42	21.41	24.39	24.36	24.35	24.35
		AV	15.06	15.05	15.04	15.04	15.03	15.02	15.02	15.01
	2462	PK	22.45	22.45	22.44	22.43	22.42	22.41	22.41	22.40
		AV	12.42	12.41	12.41	12.40	12.38	12.37	12.36	12.35
ANT 2	2412	PK	22.75	22.74	22.73	22.72	22.70	22.69	22.68	22.68
		AV	12.12	12.11	12.11	12.11	12.10	12.09	12.08	12.05
	2437	PK	24.05	24.03	24.03	24.03	24.01	23.09	23.08	23.08
		AV	14.89	14.89	14.88	14.88	14.86	14.84	14.80	14.80
	2462	PK	23.07	23.06	23.05	23.04	23.03	23.03	23.02	23.01
		AV	12.55	12.54	12.51	12.50	12.49	12.49	12.47	12.46

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	21.35	21.35	21.33	21.32	21.30	21.29	21.28	21.27
		AV	11.04	11.03	11.02	11.02	11.02	10.99	10.99	10.98
	2437	PK	24.75	24.73	24.72	24.72	24.70	24.69	24.66	24.65
		AV	15.41	15.41	15.40	15.39	15.39	15.37	15.36	15.35
	2462	PK	21.08	21.06	21.06	21.05	21.49	21.48	21.48	21.46
		AV	10.98	10.97	10.96	10.95	10.95	10.94	10.92	10.92
ANT 2	2412	PK	21.54	21.52	21.52	21.51	21.50	21.50	21.48	21.48
		AV	11.12	11.11	11.10	11.09	11.09	11.09	11.08	11.08
	2437	PK	24.27	24.26	24.25	24.24	24.23	24.23	24.21	24.21
		AV	14.54	14.54	14.53	14.53	14.52	14.51	14.48	14.47
	2462	PK	21.64	21.63	21.63	21.61	21.60	21.60	21.59	21.58
		AV	11.28	11.27	11.27	11.26	11.24	11.22	11.21	11.19

▪ Multiple 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	18.001	17.785	17.777	17.723
		AV	14.254	14.239	14.223	14.206
	2437	PK	17.823	17.809	17.792	17.776
		AV	14.272	14.270	14.266	14.243
	2462	PK	17.470	17.463	17.455	17.431
		AV	13.538	13.538	13.521	13.511
ANT 2	2412	PK	17.647	17.632	17.627	17.613
		AV	14.101	14.096	14.086	14.073
	2437	PK	17.643	17.631	17.620	17.596
		AV	14.169	14.154	14.152	14.144
	2462	PK	17.575	17.561	17.554	17.533
		AV	14.002	14.005	13.991	13.988
Sum (ANT 1+2)	2412	PK	20.838	20.720	20.713	20.679
	2437	PK	20.745	20.732	20.718	20.698
	2462	PK	20.534	20.523	20.516	20.493

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	22.111	22.102	22.084	22.076	22.061	22.054	22.042	22.031
		AV	12.724	12.704	12.653	12.644	12.631	12.599	12.578	12.555
	2437	PK	24.433	24.424	24.416	24.408	24.394	24.381	24.368	24.354
		AV	15.313	15.304	15.301	15.294	15.289	15.275	15.262	15.253
	2462	PK	22.567	22.558	22.542	22.531	22.528	22.511	22.504	22.498
		AV	12.543	12.537	12.523	12.498	12.478	12.456	12.451	12.448
ANT 2	2412	PK	22.602	22.587	22.561	22.553	22.549	22.542	22.538	22.530
		AV	12.527	12.513	12.511	12.507	12.499	12.487	12.478	12.462
	2437	PK	24.331	24.324	24.319	24.311	24.303	24.295	24.286	24.279
		AV	14.848	14.838	14.834	14.838	14.827	14.818	14.813	14.801
	2462	PK	22.507	22.502	22.496	22.480	22.473	22.462	22.458	22.445
		AV	12.134	12.121	12.111	12.108	12.096	12.067	12.060	12.045
Sum (ANT 1+2)	2412	PK	25.374	25.362	25.340	25.332	25.323	25.316	25.308	25.298
	2437	PK	27.393	27.385	27.379	27.371	27.360	27.349	27.338	27.327
	2462	PK	25.548	25.541	25.530	25.516	25.511	25.497	25.492	25.482

ANT	Freq. (MHz)	Det.	Maximum Peak Conducted Output Power (dBm) for <u>802.11n(HT20)</u>							
			Data Rate [MCS]							
			8	9	10	11	12	13	14	15
ANT 1	2412	PK	21.213	21.201	21.187	21.175	21.168	21.158	21.143	12.132
		AV	11.157	11.121	11.115	11.048	11.021	10.997	10.984	10.975
	2437	PK	24.412	24.405	24.389	24.381	24.376	24.366	24.354	24.343
		AV	15.711	15.705	15.701	15.694	15.687	15.672	15.665	15.604
	2462	PK	21.133	21.121	21.116	21.105	21.092	21.084	21.077	21.063
		AV	11.196	11.175	11.168	11.154	11.147	11.136	11.124	11.112
ANT 2	2412	PK	21.597	21.591	21.582	21.576	21.568	21.554	21.542	21.533
		AV	11.189	11.186	11.181	11.178	11.164	11.153	11.148	11.141
	2437	PK	24.239	24.228	24.221	24.213	24.202	24.188	24.176	24.164
		AV	14.499	14.487	14.479	14.464	14.458	14.446	14.438	14.431
	2462	PK	21.828	21.816	21.803	21.796	21.788	21.780	21.773	21.762
		AV	11.309	11.295	11.287	11.273	11.268	11.245	11.237	11.225
Sum (ANT 1+2)	2412	PK	24.420	24.411	24.400	24.391	24.383	24.371	24.358	22.005
	2437	PK	27.337	27.328	27.317	27.309	27.301	27.289	27.277	27.265
	2462	PK	24.505	24.493	24.484	24.475	24.465	24.457	24.450	24.437

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.

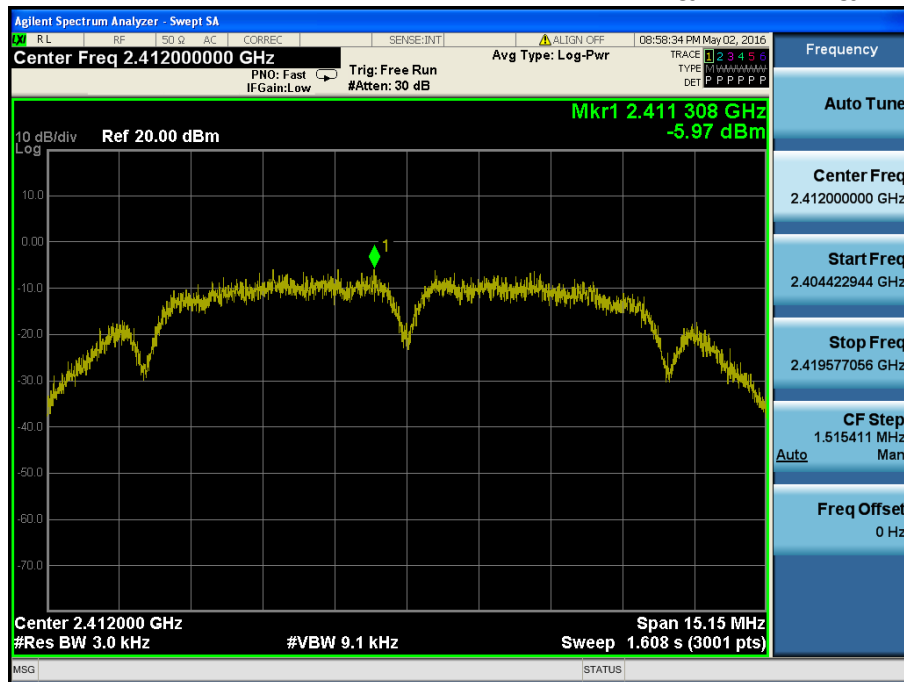
■ Test Results: **Comply**

Test Mode	Frequency	RBW	PKPSD [dBm]		
			ANT 1	ANT 2	SUM (ANT 1 + ANT 2)
TM 1	Lowest	3 kHz	-5.97	-6.74	-
	Middle	3 kHz	-5.58	-5.67	-
	Highest	3 kHz	-5.09	-5.77	-
TM 2	Lowest	3 kHz	-12.43	-11.28	-
	Middle	3 kHz	-8.84	-10.49	-
	Highest	3 kHz	-11.77	-11.18	-
TM 3	Lowest	3 kHz	-14.94	-12.88	-
	Middle	3 kHz	-9.16	-10.17	-
	Highest	3 kHz	-13.13	-13.07	-
TM 4	Lowest	3 kHz	-7.590	-8.730	-5.113
	Middle	3 kHz	-8.520	-8.540	-5.520
	Highest	3 kHz	-8.440	-7.800	-5.098
TM 5	Lowest	3 kHz	-11.610	-12.940	-9.214
	Middle	3 kHz	-8.820	-8.330	-5.558
	Highest	3 kHz	-11.460	-12.460	-8.921
TM 6	Lowest	3 kHz	-14.090	-13.630	-10.844
	Middle	3 kHz	-8.550	-9.740	-6.095
	Highest	3 kHz	-13.280	-12.710	-9.976

■ RESULT PLOTS

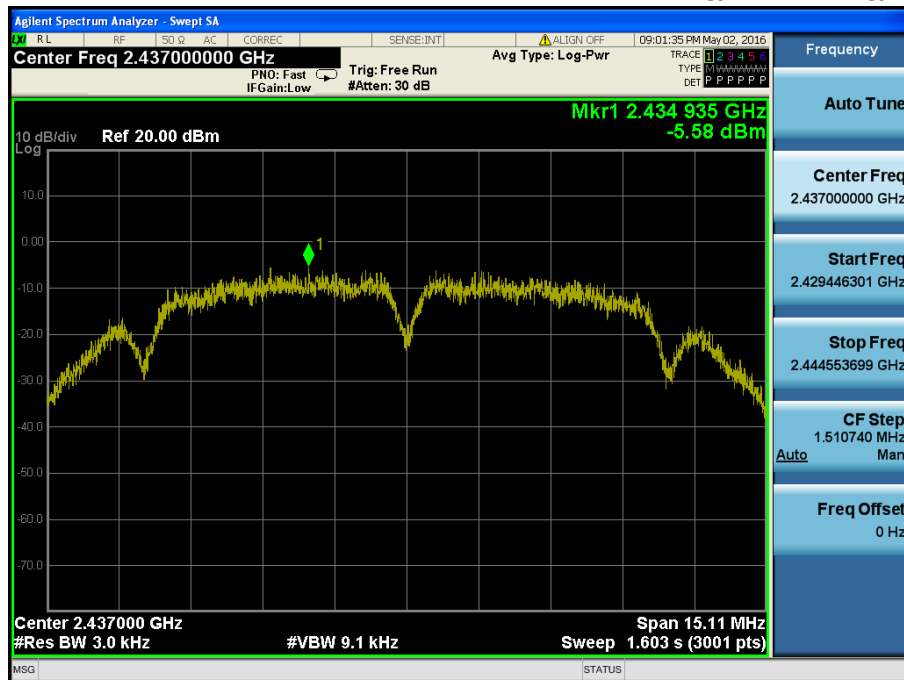
Maximum PPSP

TM 1 & ANT 1 & Lowest



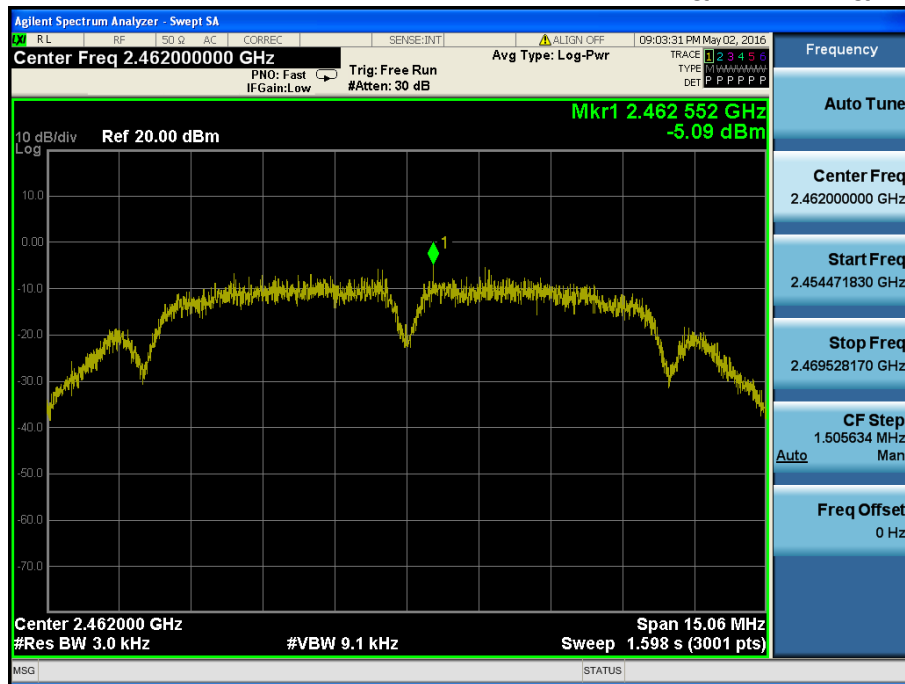
Maximum PPSP

TM 1 & ANT 1 & Middle



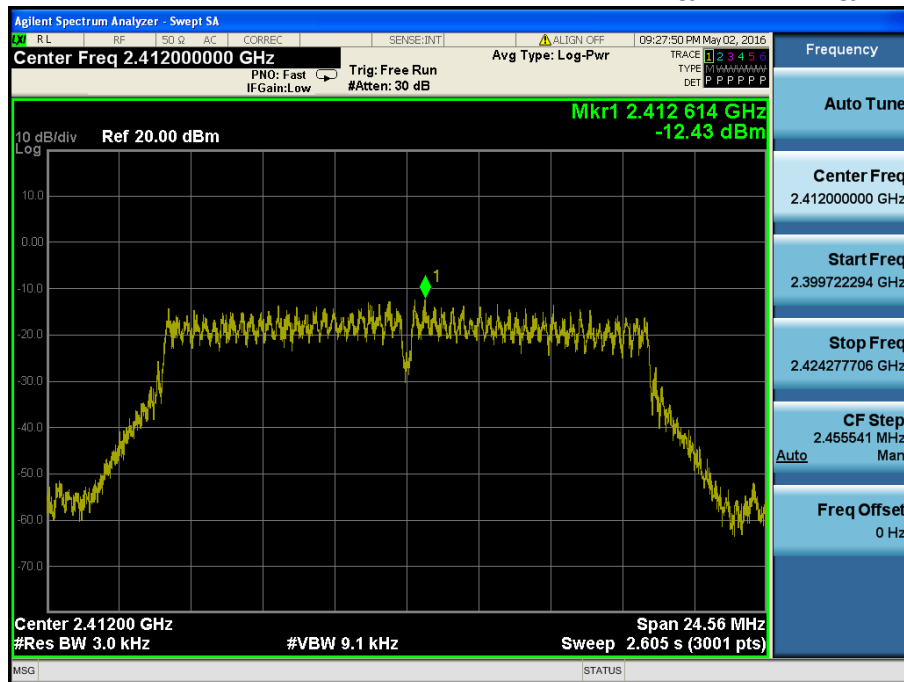
Maximum PPSD

TM 1 & ANT 1 & Highest



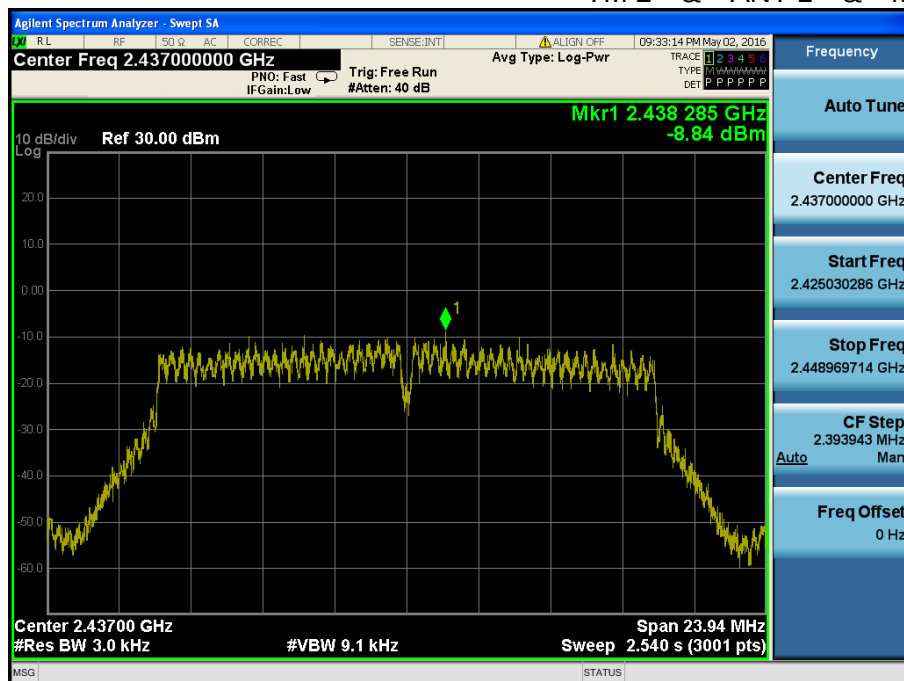
Maximum PPSD

TM 2 & ANT 1 & Lowest



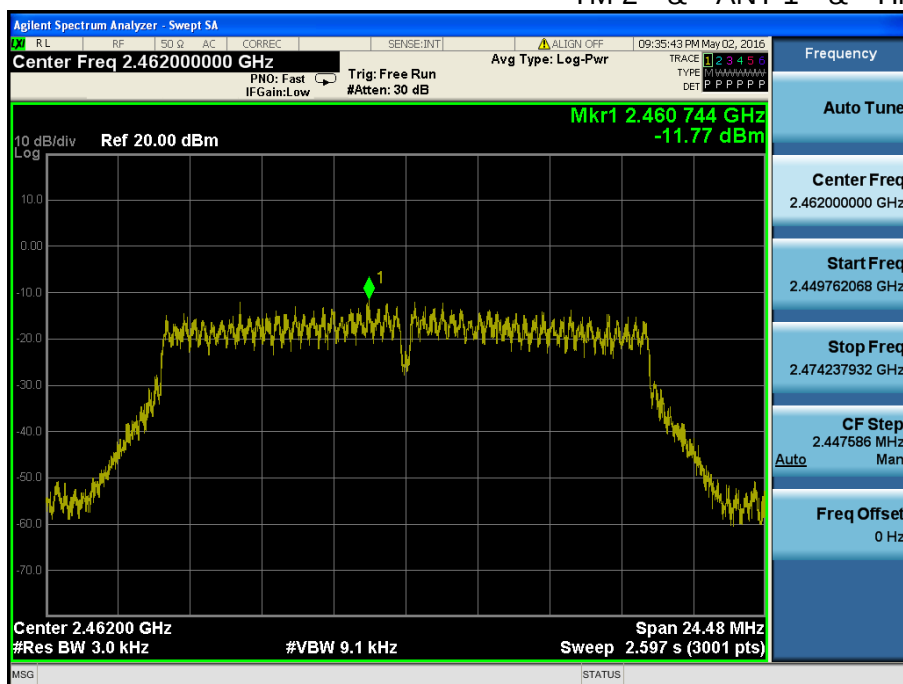
Maximum PPSD

TM 2 & ANT 1 & Middle



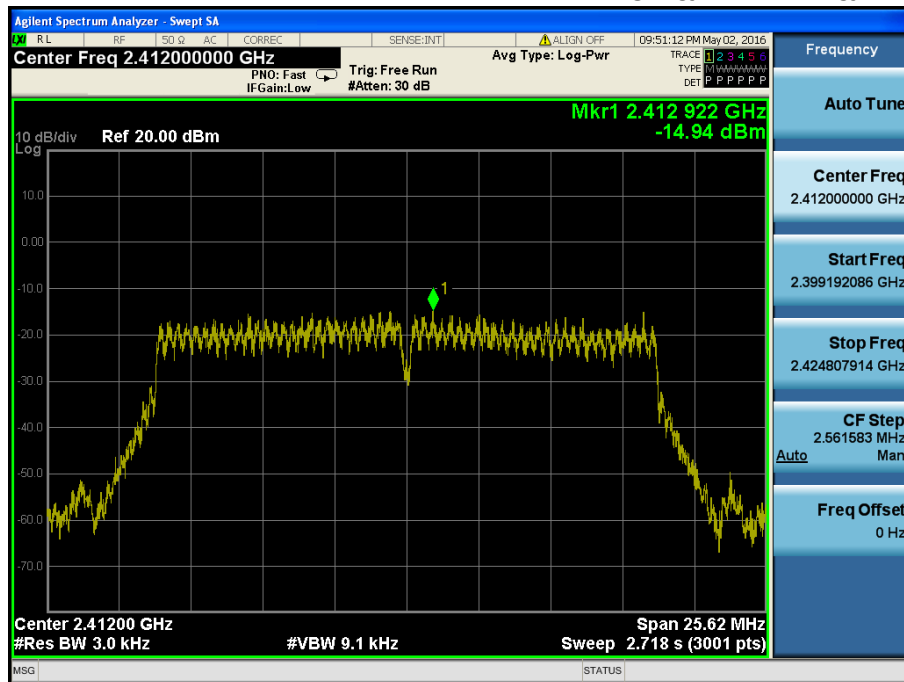
Maximum PPSD

TM 2 & ANT 1 & Highest



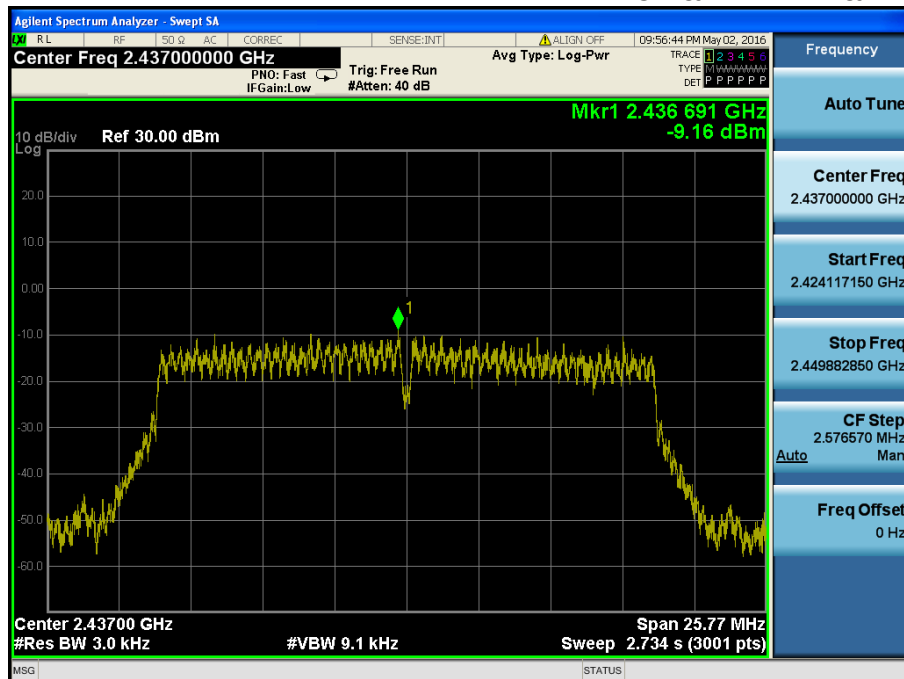
Maximum PPSD

TM 3 & ANT 1 & Lowest



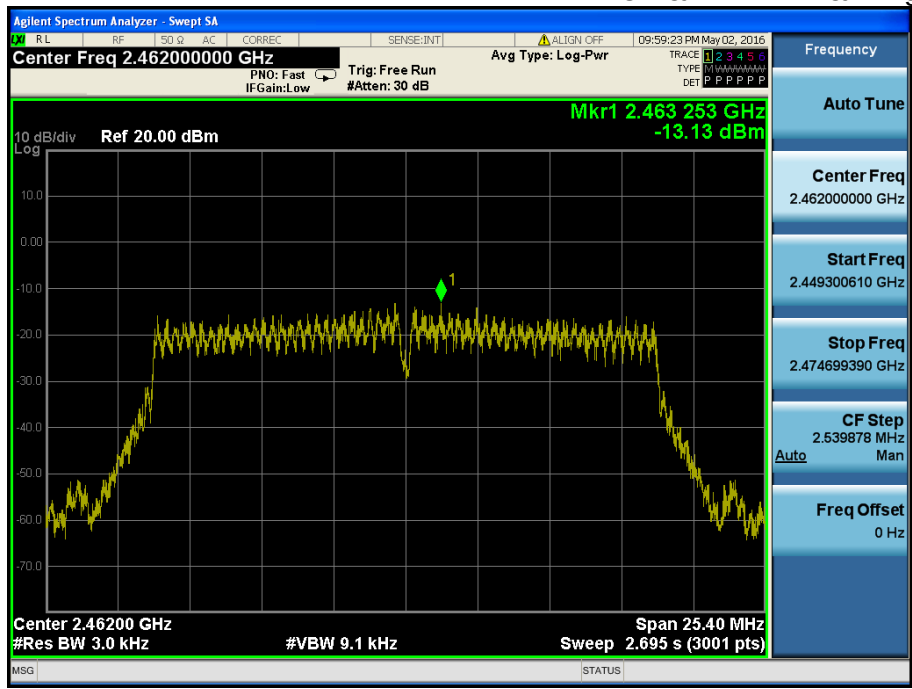
Maximum PPSD

TM 3 & ANT 1 & Middle



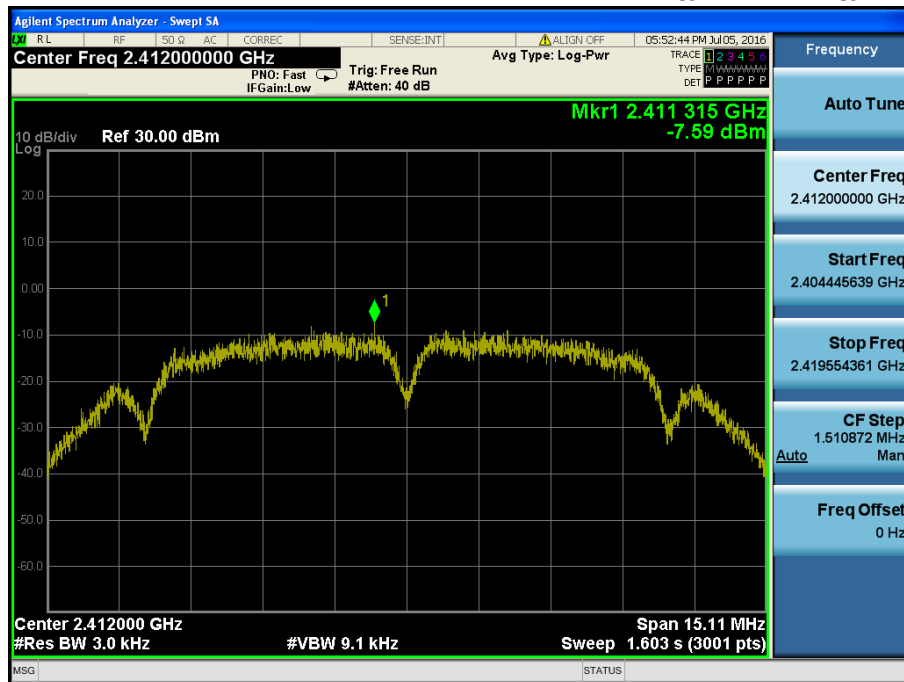
Maximum PPSD

TM 3 & ANT 1 & Highest



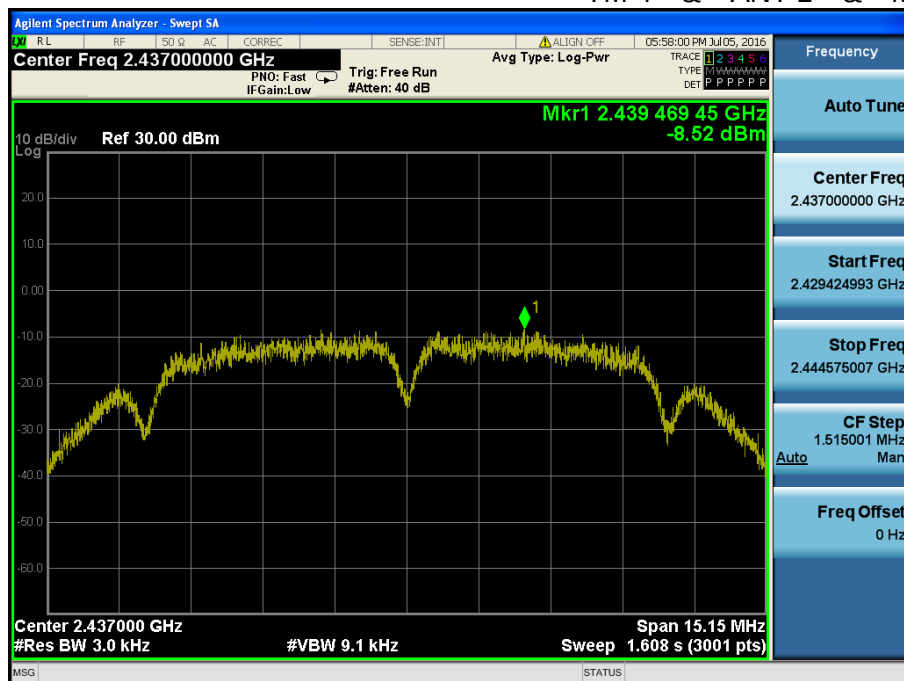
Maximum PPSD

TM 4 & ANT 1 & Lowest



Maximum PPSD

TM 4 & ANT 1 & Middle



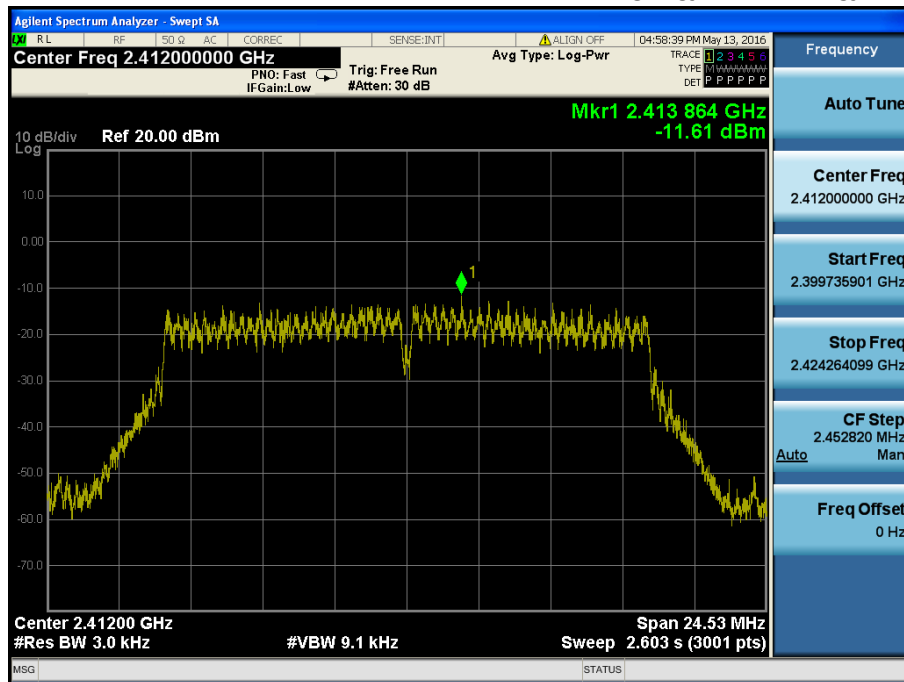
Maximum PPSD

TM 4 & ANT 1 & Highest



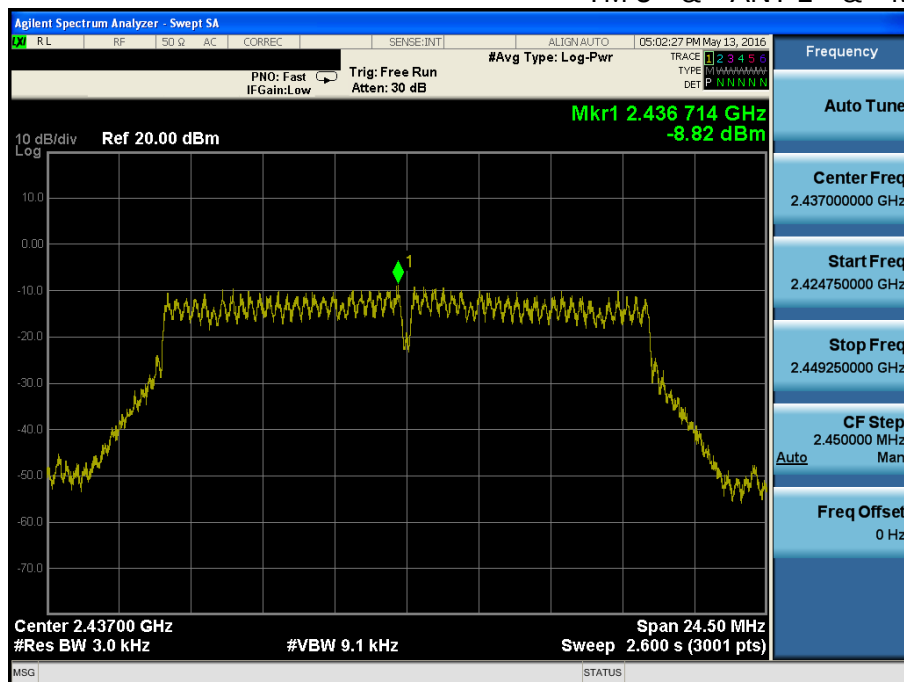
Maximum PPSD

TM 5 & ANT 1 & Lowest



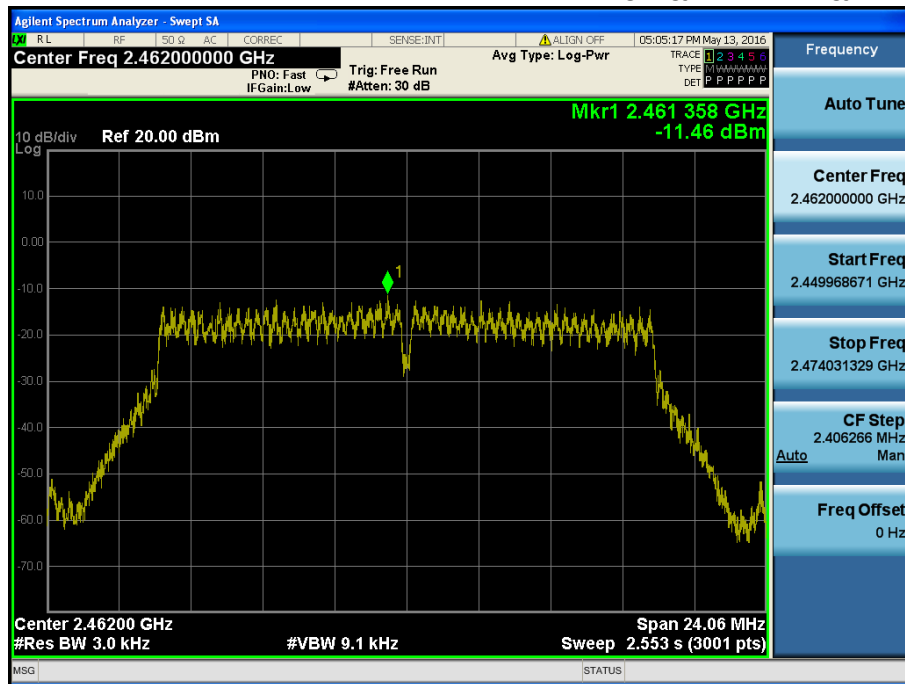
Maximum PPSD

TM 5 & ANT 1 & Middle



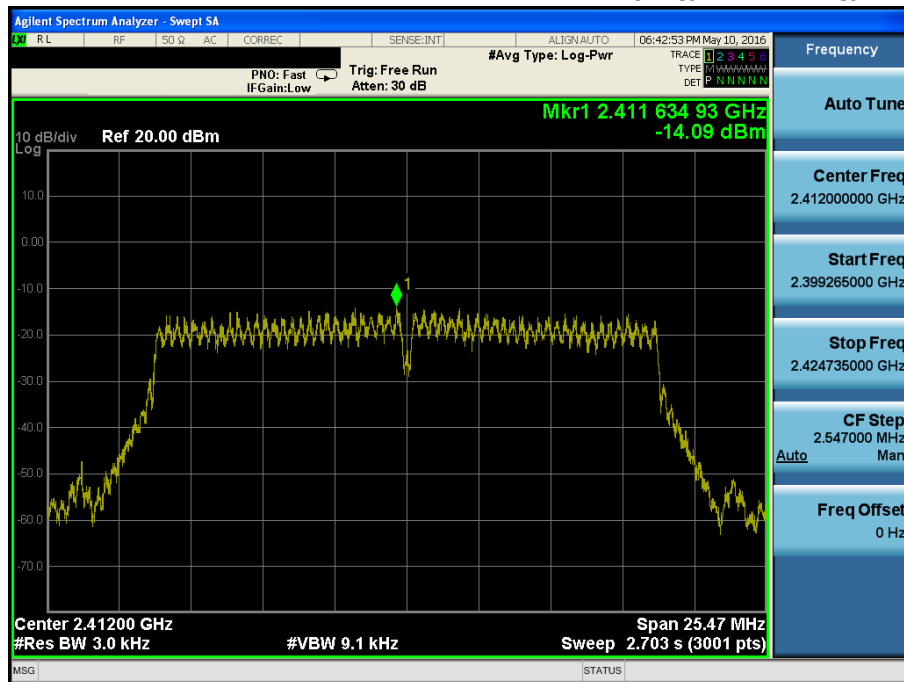
Maximum PPSD

TM 5 & ANT 1 & Highest



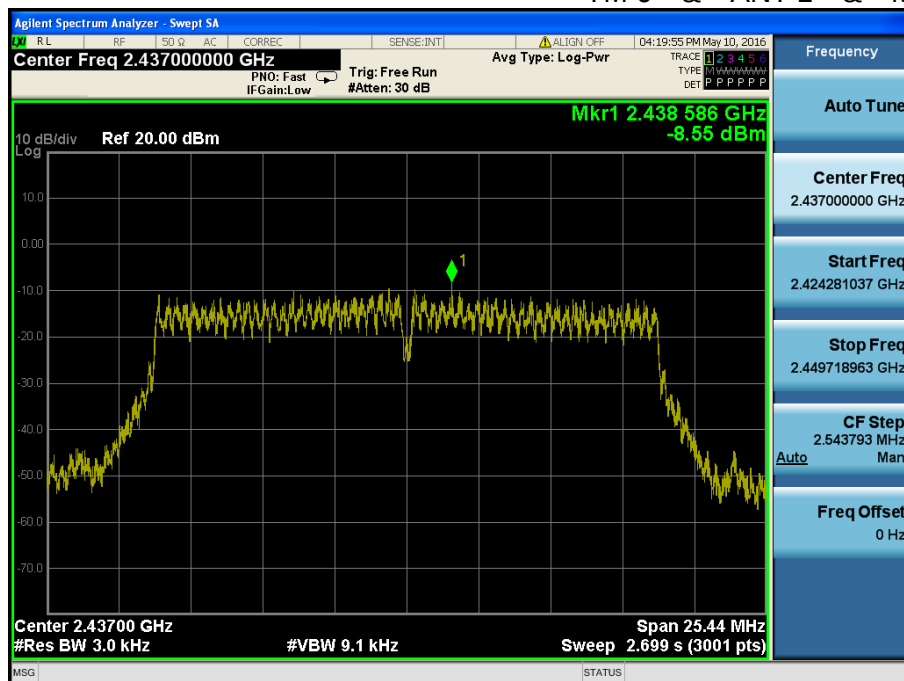
Maximum PPSD

TM 6 & ANT 1 & Lowest



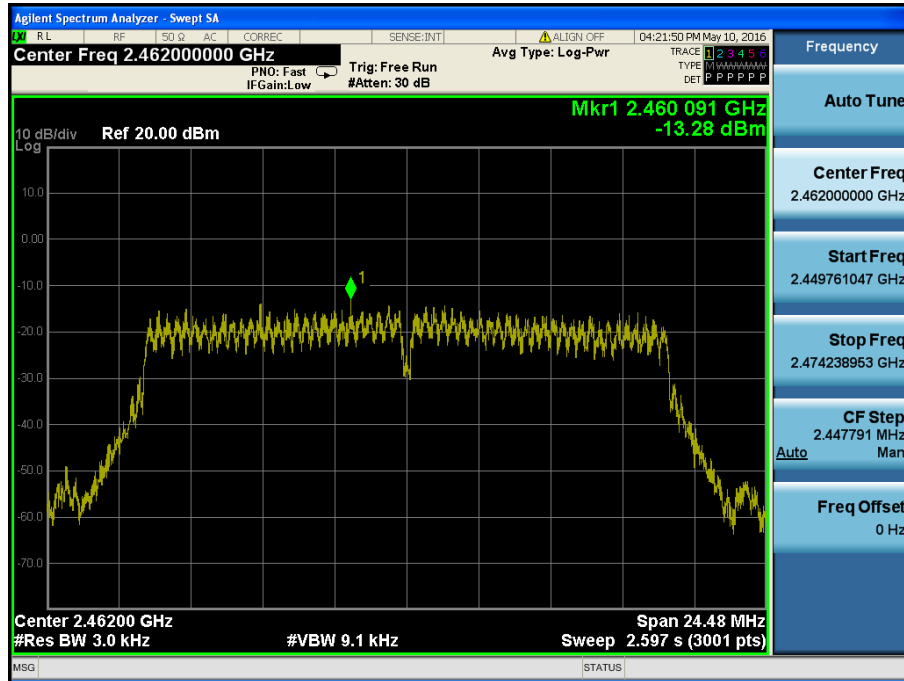
Maximum PPSD

TM 6 & ANT 1 & Middle



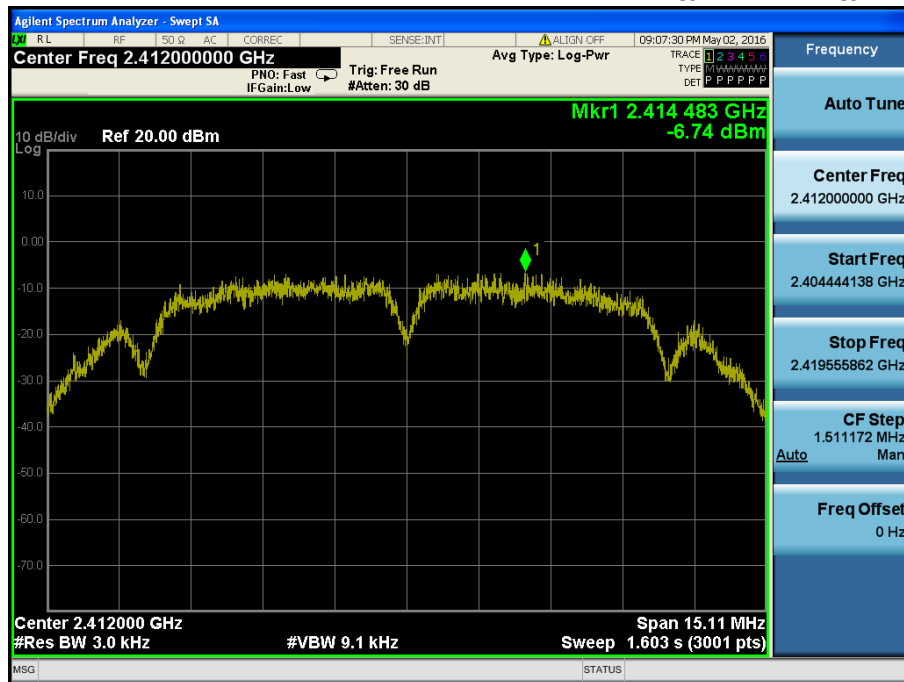
Maximum PPSD

TM 6 & ANT 1 & Highest



Maximum PPSD

TM 1 & ANT 2 & Lowest



Maximum PPSD

TM 1 & ANT 2 & Middle



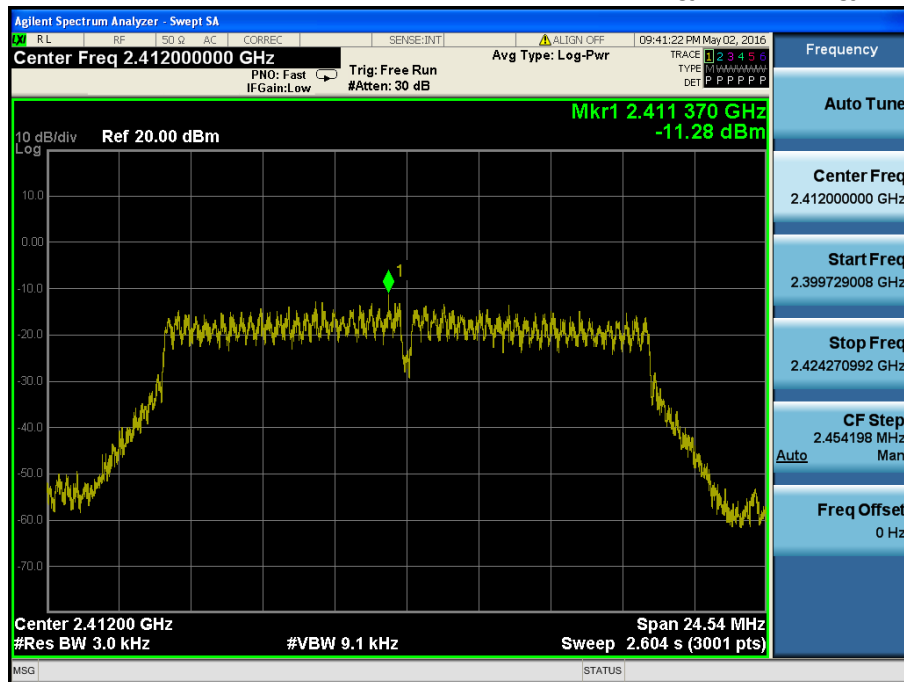
Maximum PPSD

TM 1 & ANT 2 & Highest



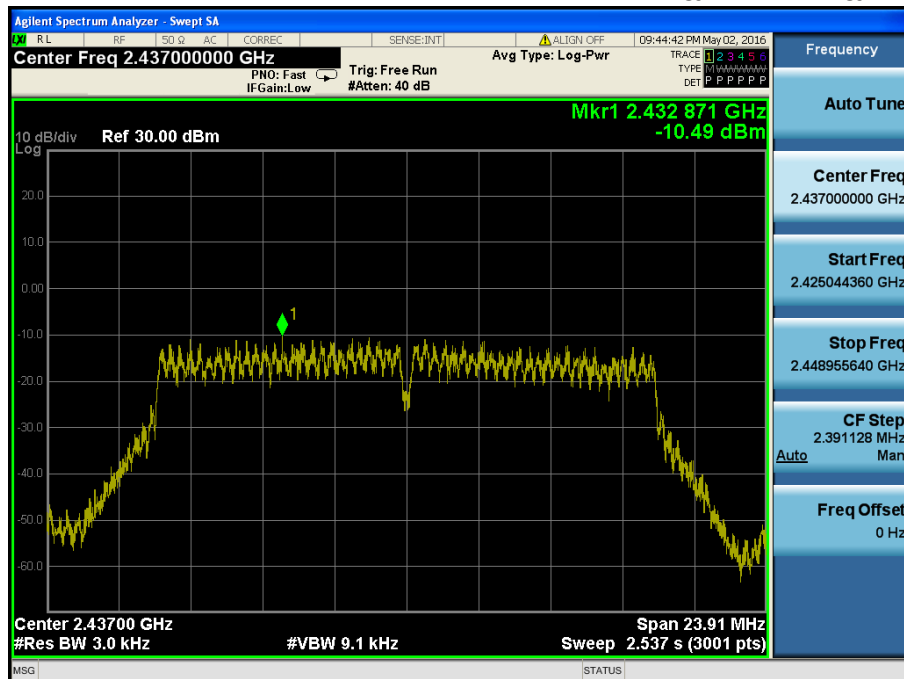
Maximum PPSD

TM 2 & ANT 2 & Lowest



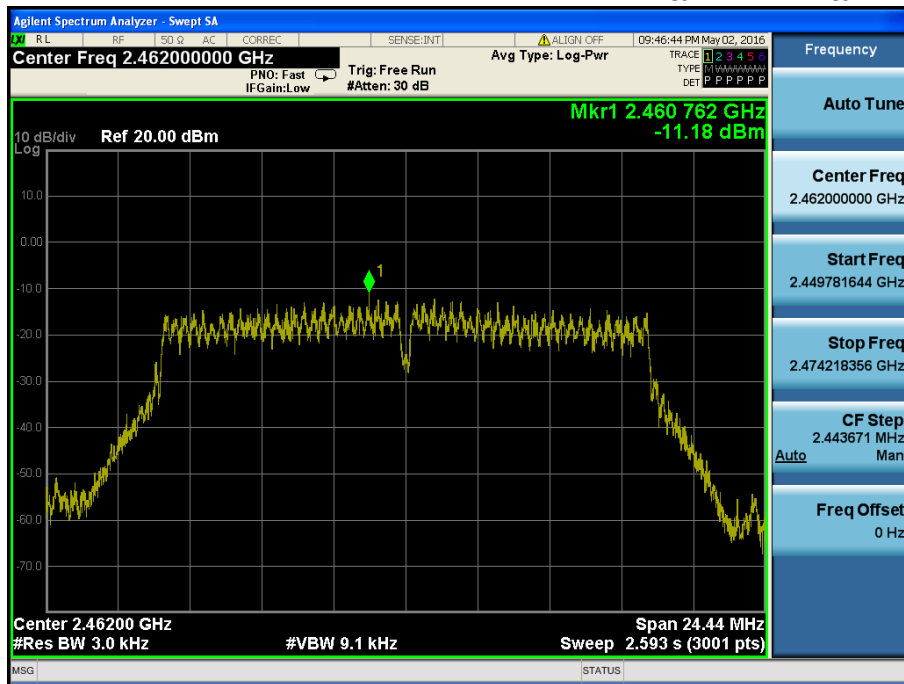
Maximum PPSD

TM 2 & ANT 2 & Middle



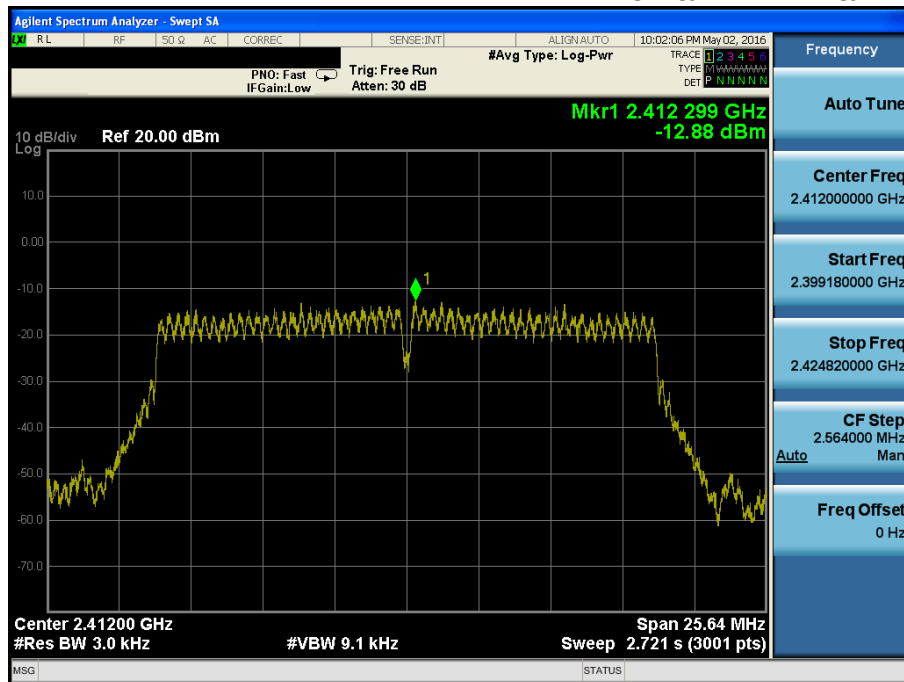
Maximum PPSD

TM 2 & ANT 2 & Highest



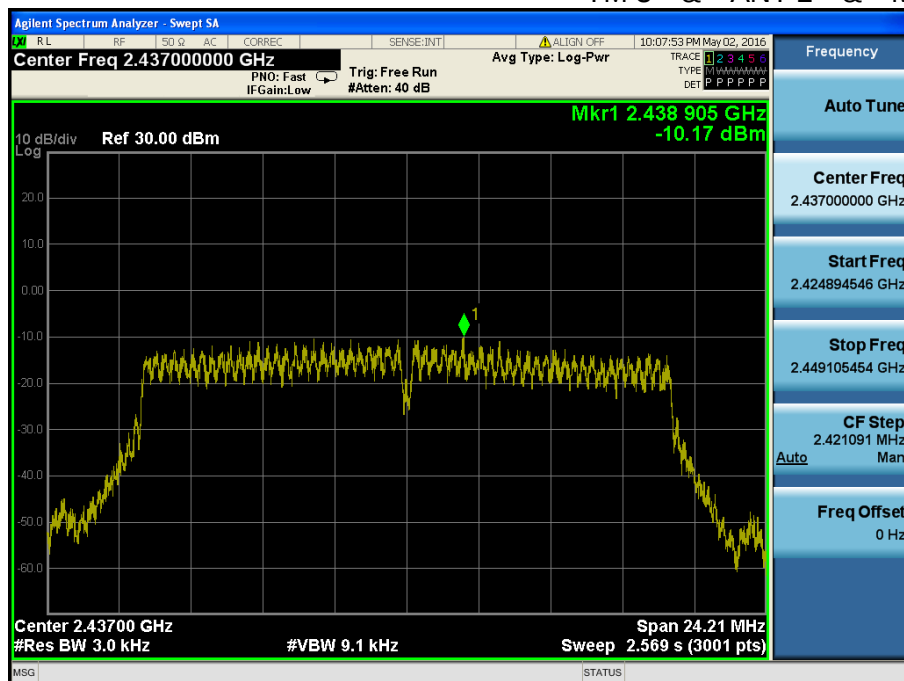
Maximum PPSD

TM 3 & ANT 2 & Lowest



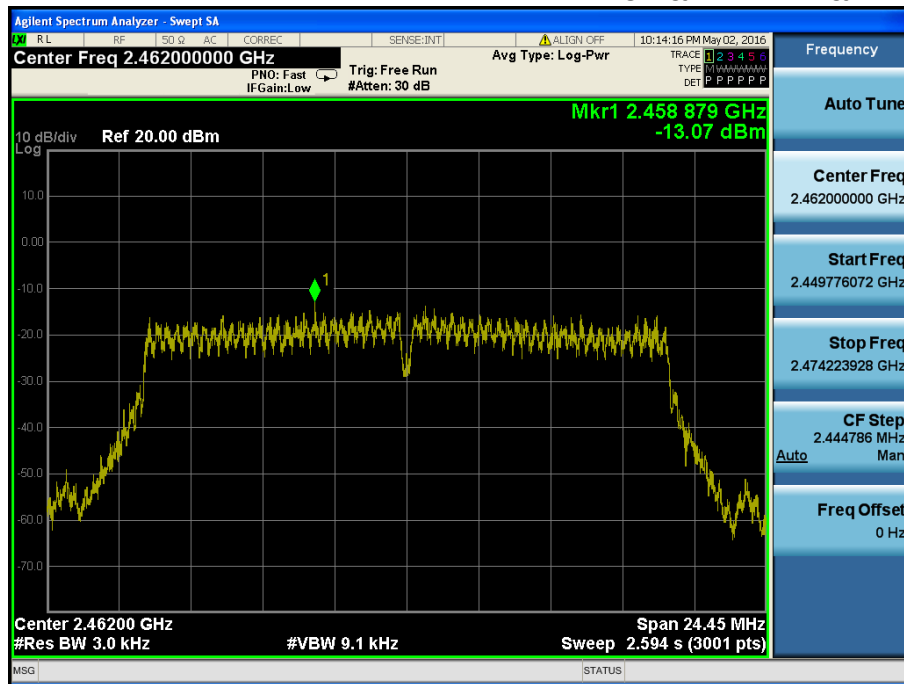
Maximum PPSD

TM 3 & ANT 2 & Middle



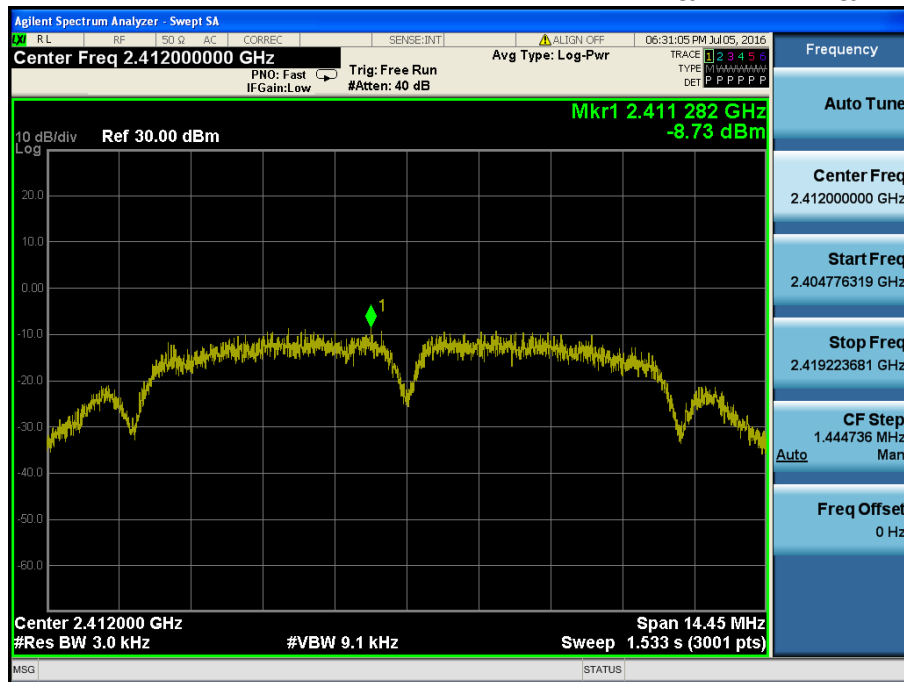
Maximum PPSD

TM 3 & ANT 2 & Highest



Maximum PPSD

TM 4 & ANT 2 & Lowest



Maximum PPSD

TM 4 & ANT 2 & Middle



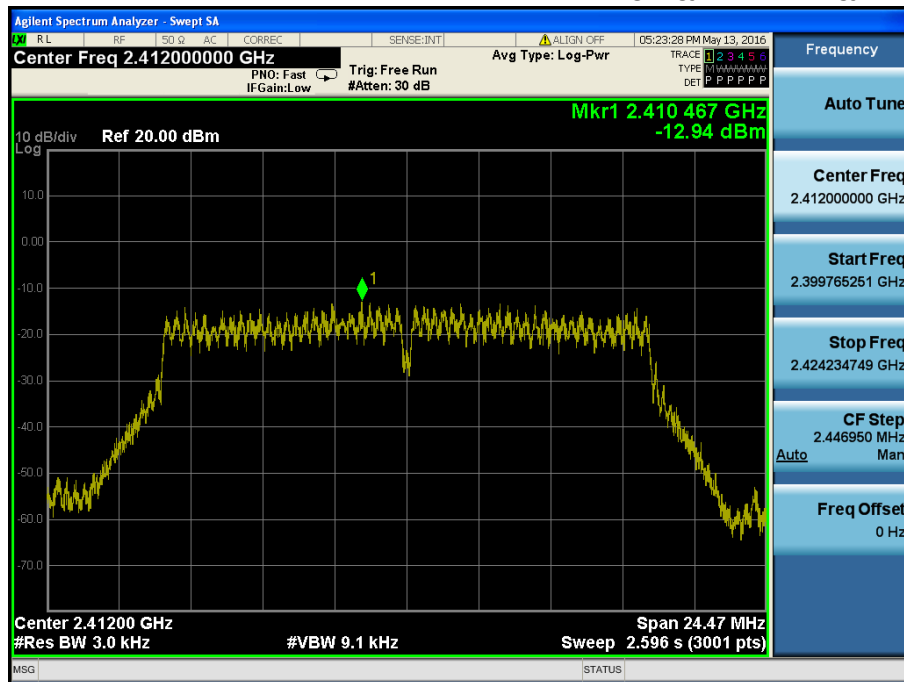
Maximum PPSD

TM 4 & ANT 2 & Highest



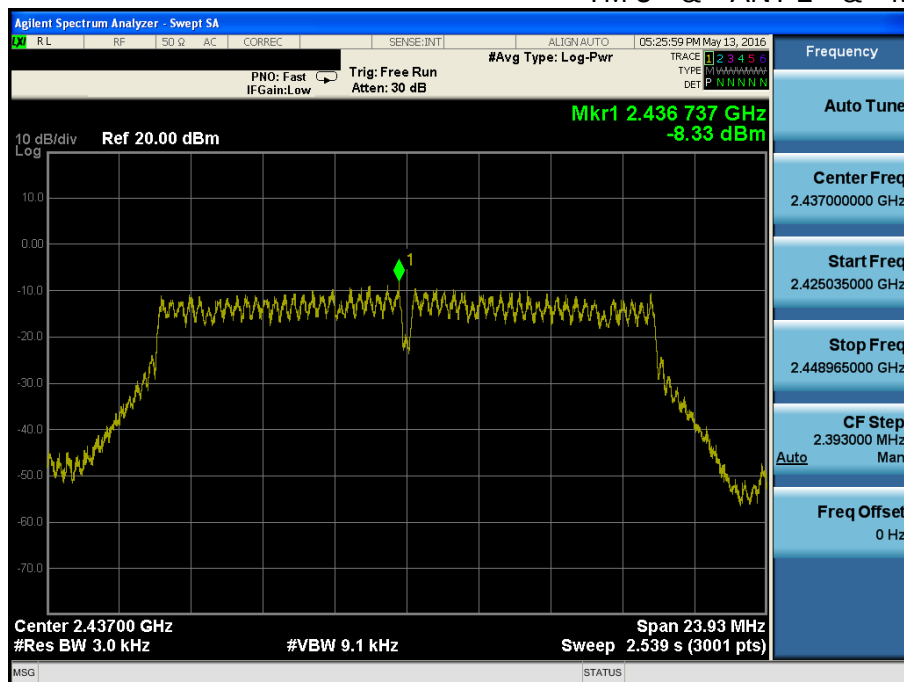
Maximum PPSD

TM 5 & ANT 2 & Lowest



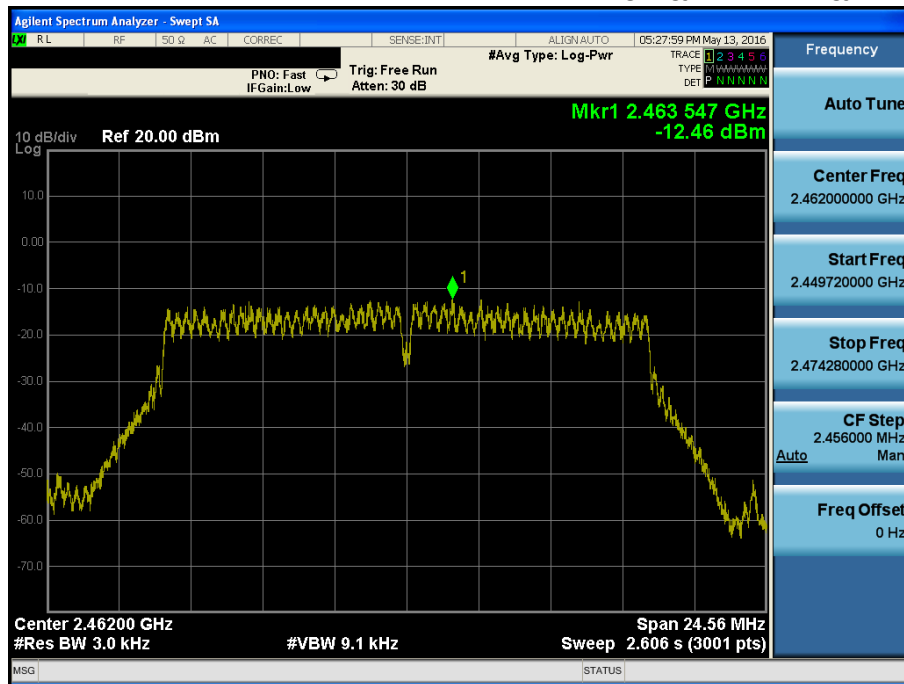
Maximum PPSD

TM 5 & ANT 2 & Middle



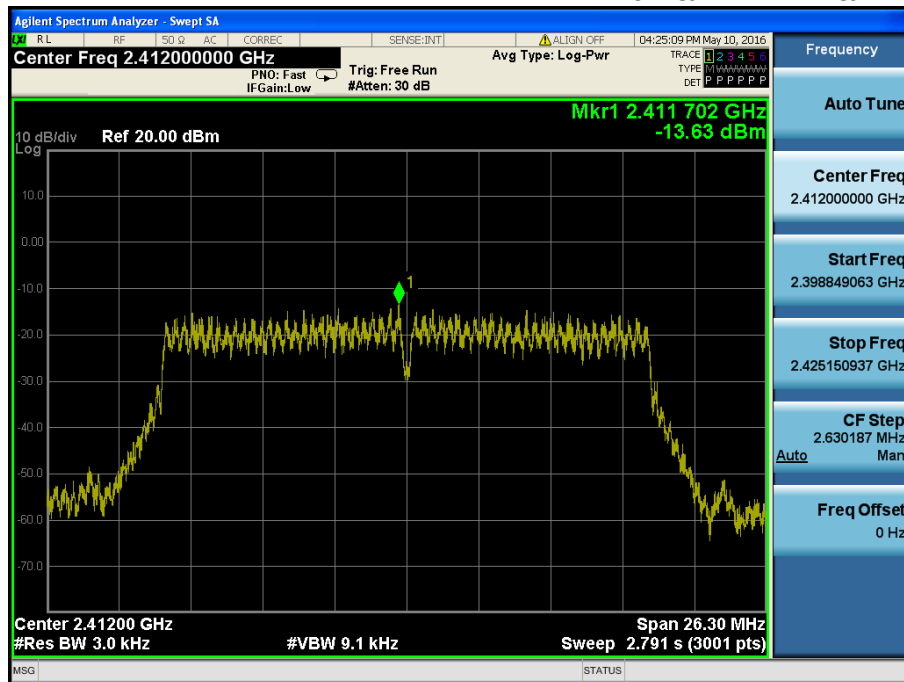
Maximum PPSD

TM 5 & ANT 2 & Highest



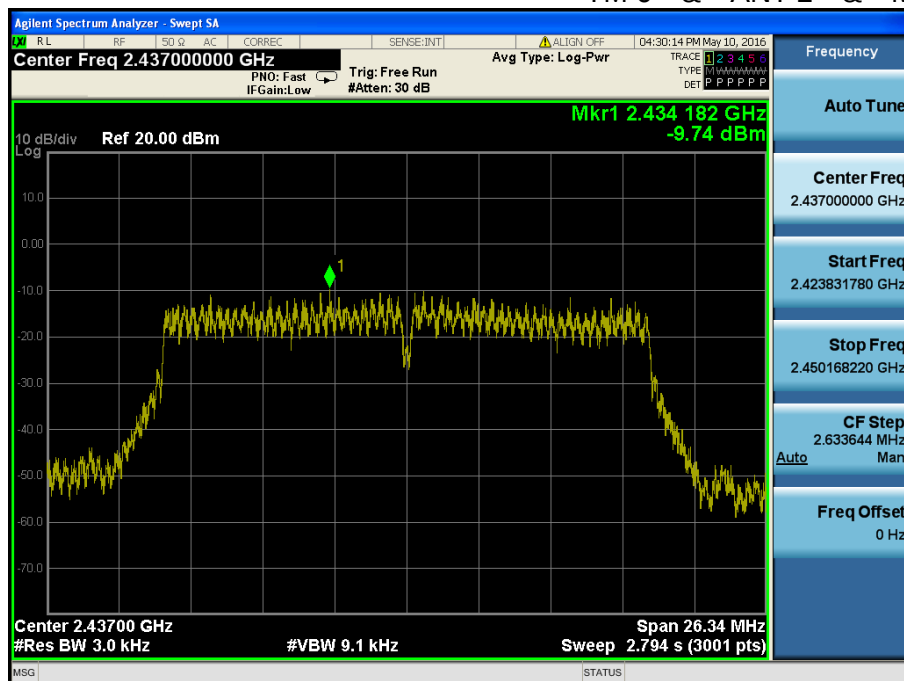
Maximum PPSD

TM 6 & ANT 2 & Lowest



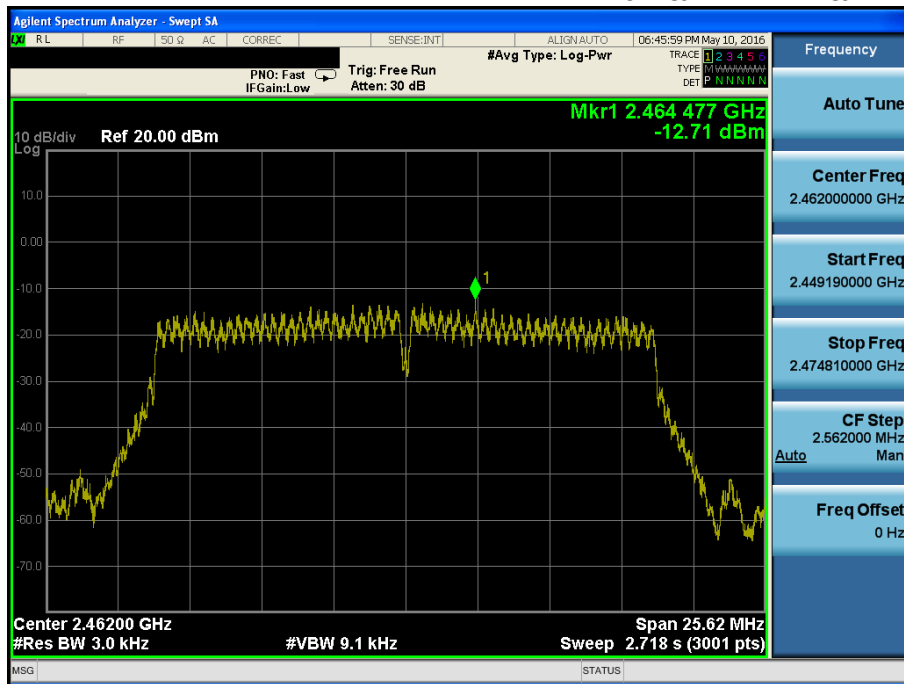
Maximum PPSD

TM 6 & ANT 2 & Middle



Maximum PPSD

TM 6 & 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 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 $\geq 3 \times$ 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.

- 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: 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)

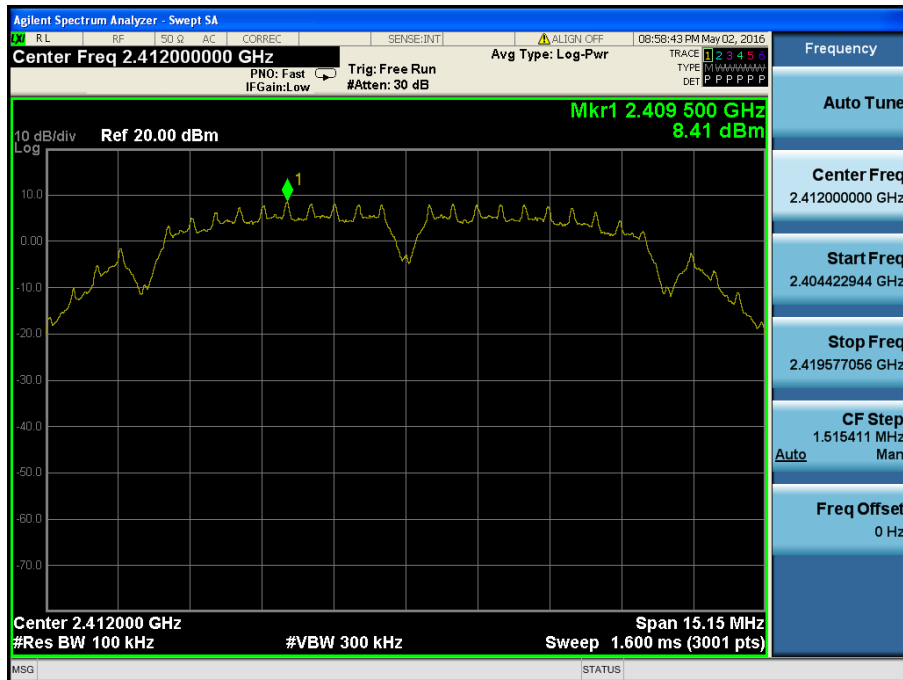
If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 kHz, VBW = 300 kHz, SPAN = 100 MHz and BINS = 2001 to get accurate emission level within 100 kHz BW.

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

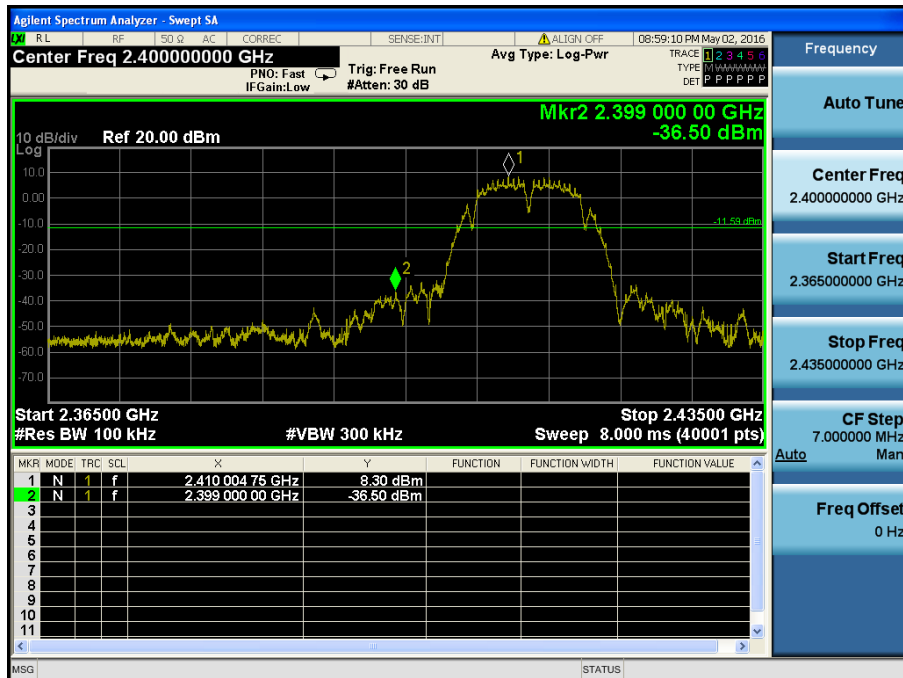
■ RESULT PLOTS

TM 1 & ANT 1 & Lowest

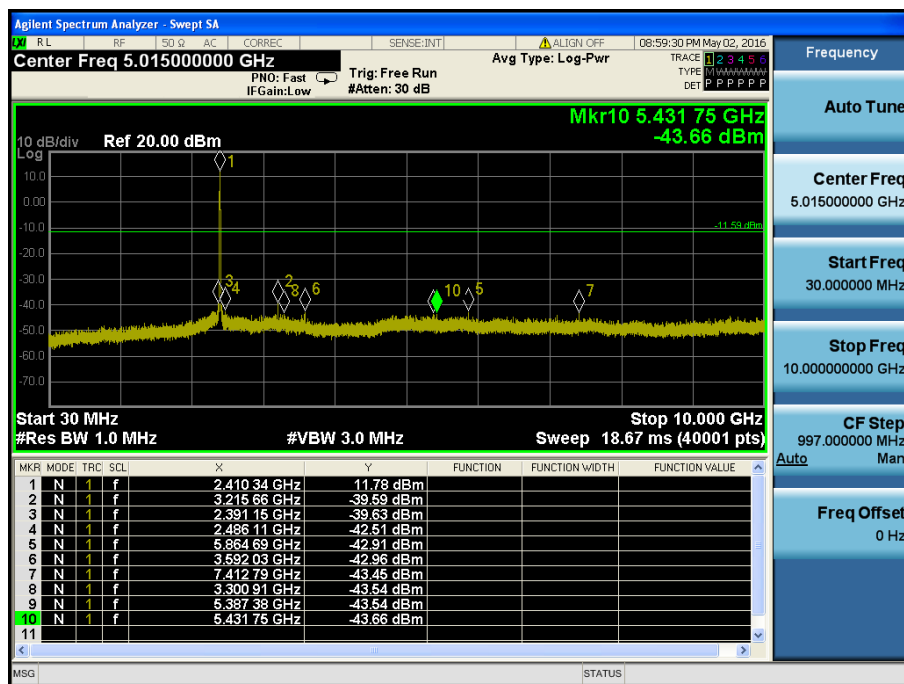
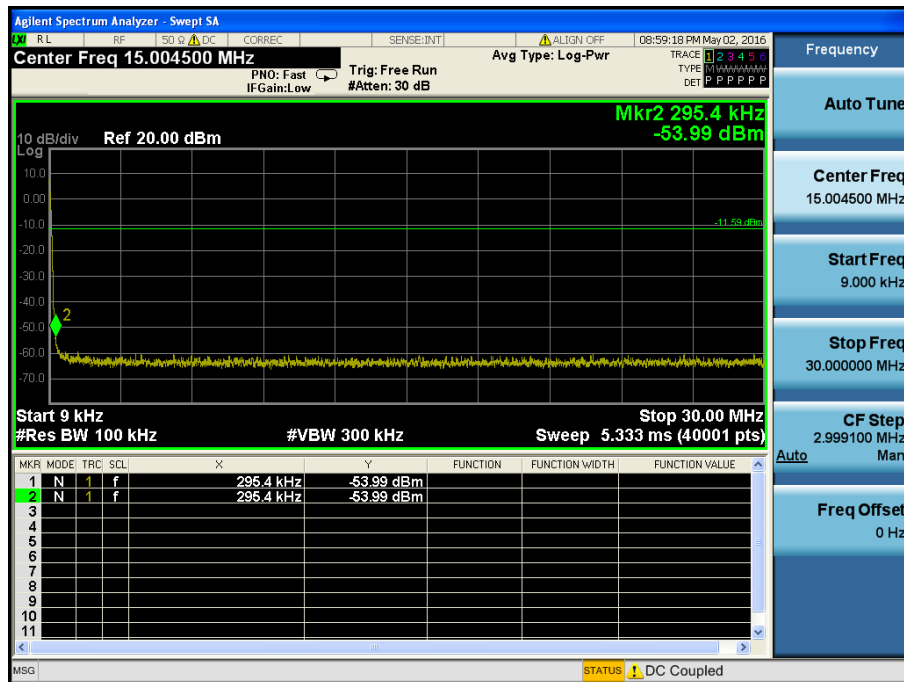
Reference



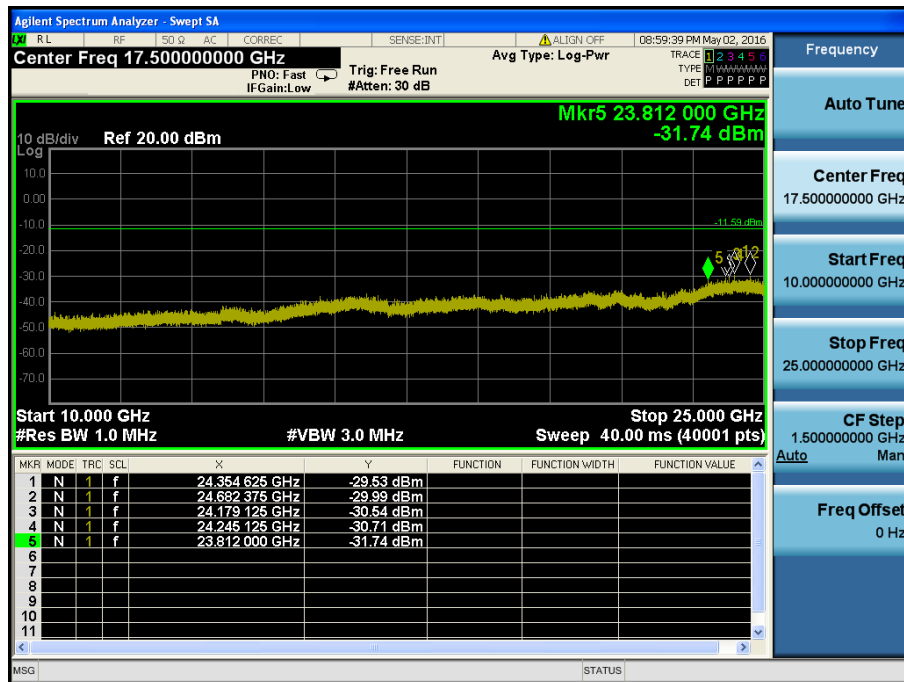
Low Band-edge



Conducted Spurious Emissions

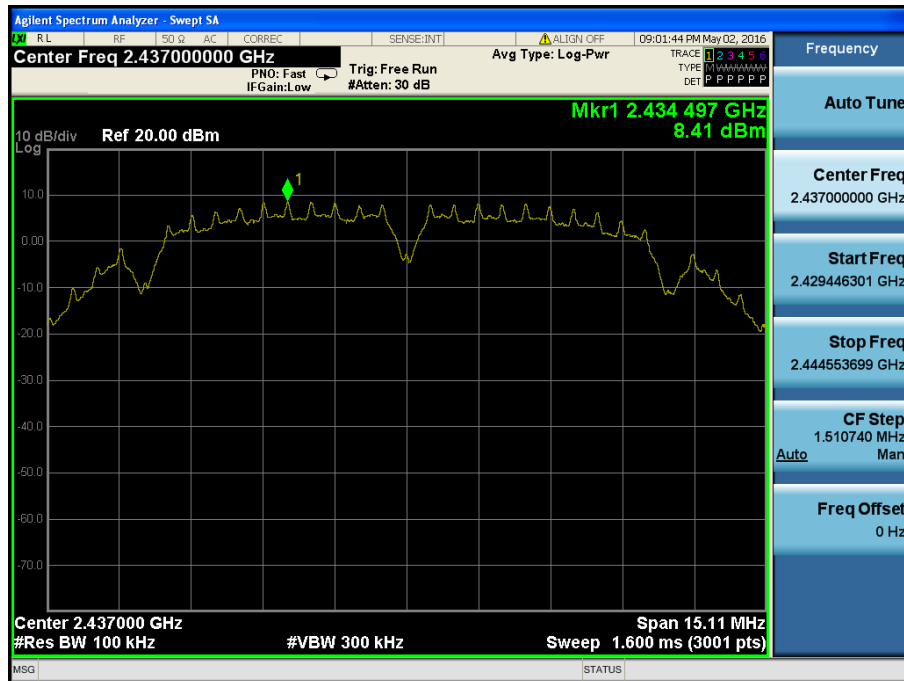


Conducted Spurious Emissions

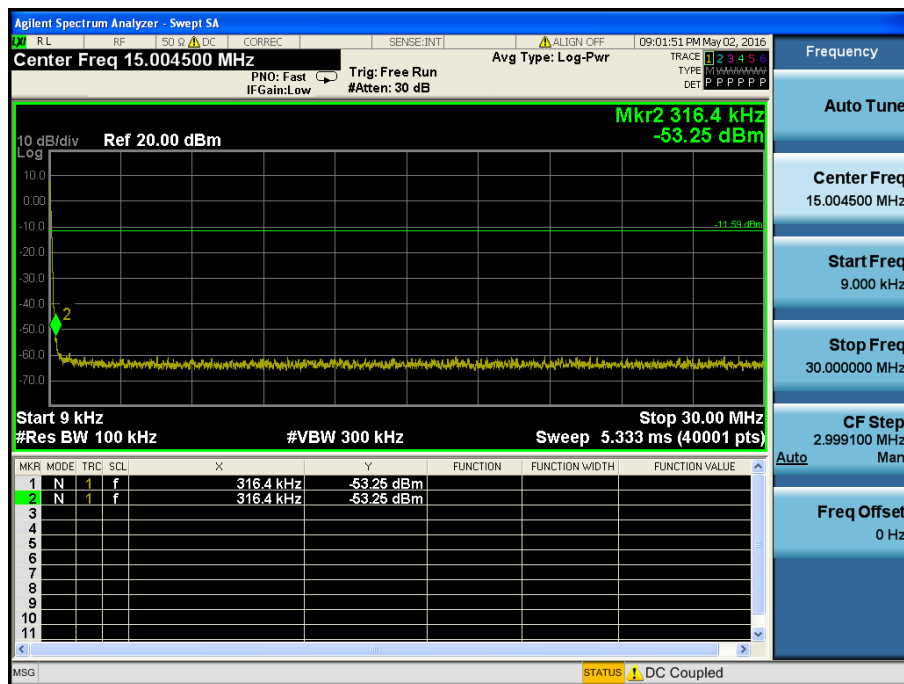


TM 1 & ANT 1 & Middle

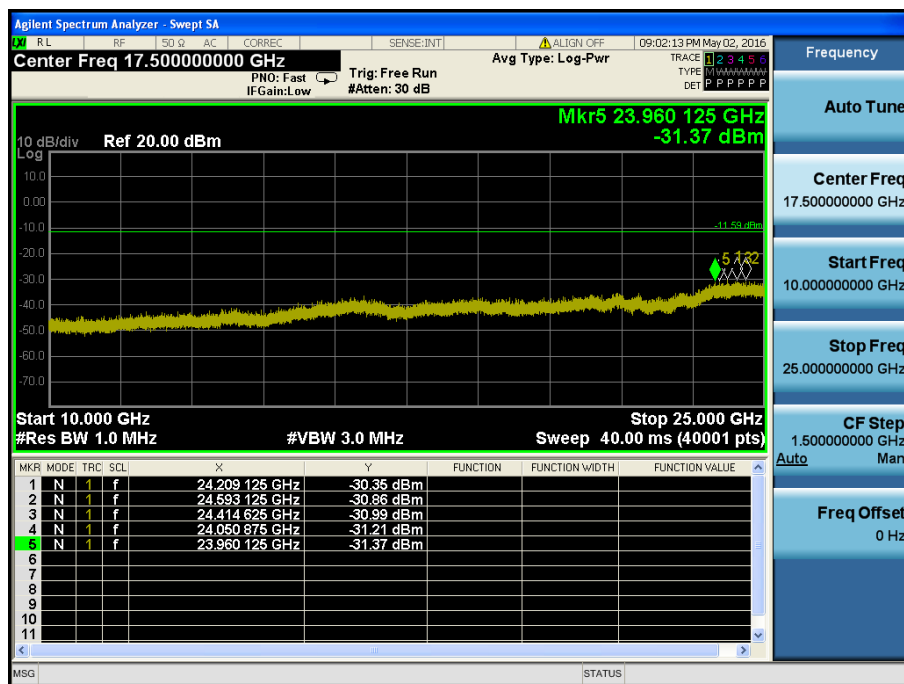
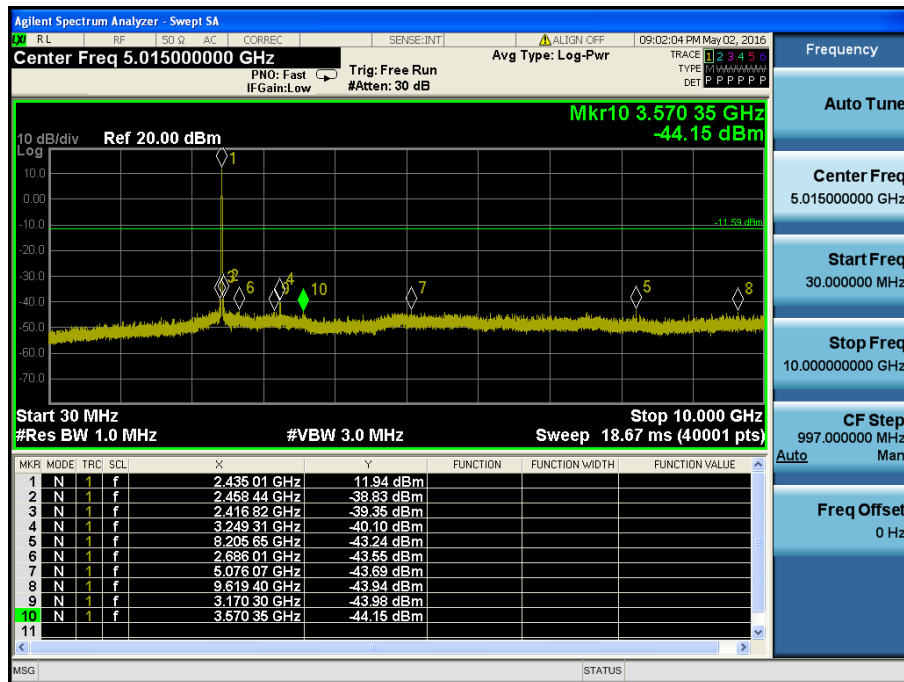
Reference



Conducted Spurious Emissions

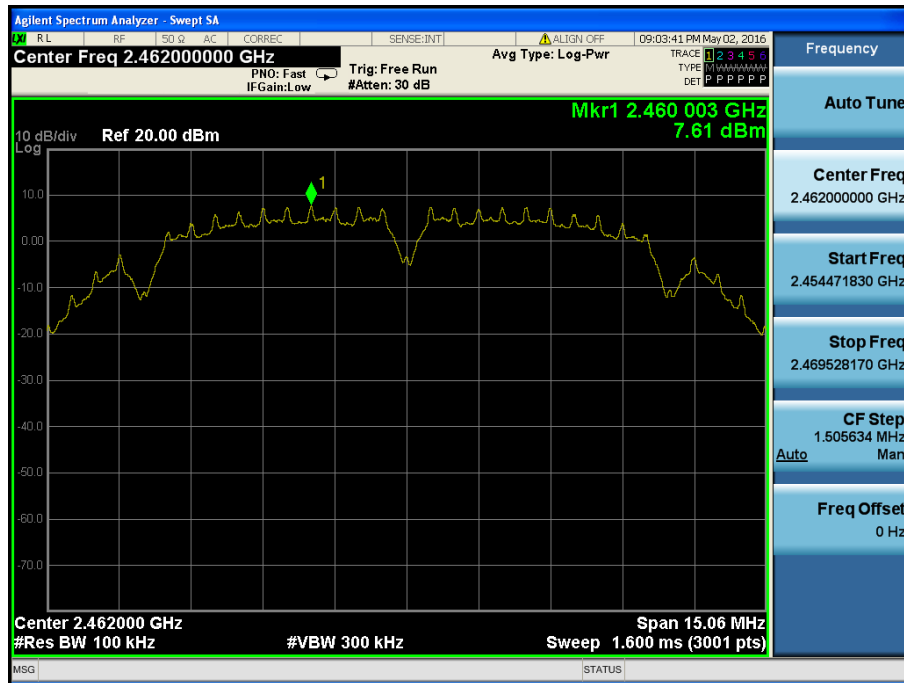


Conducted Spurious Emissions



TM 1 & ANT 1 & Highest

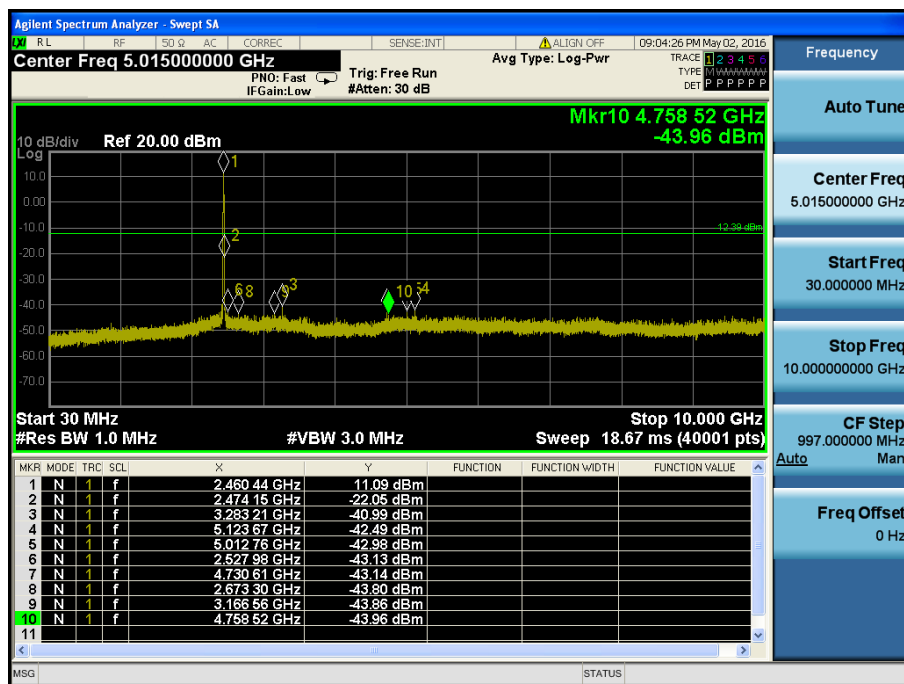
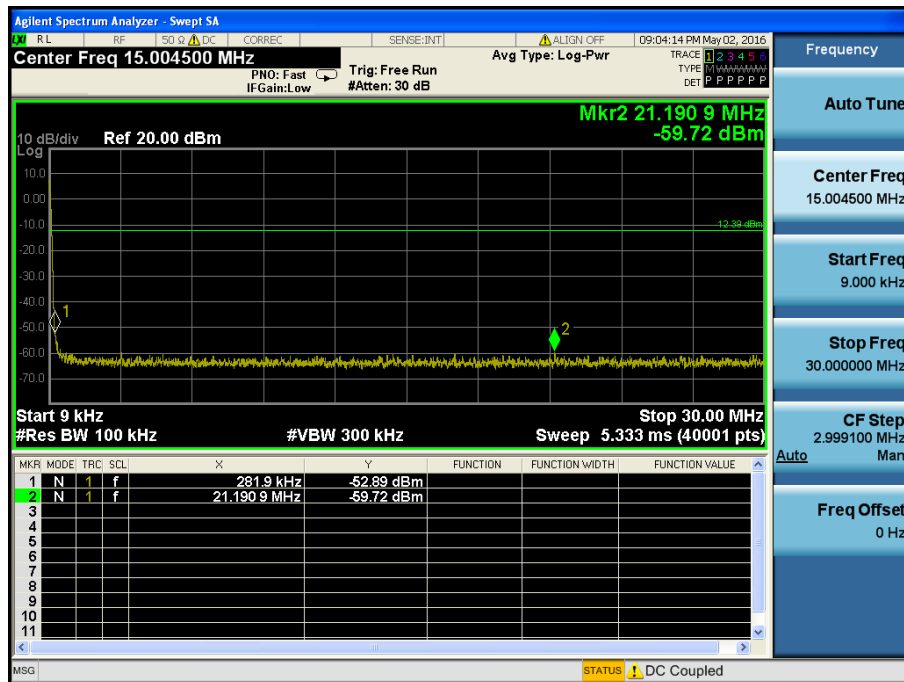
Reference



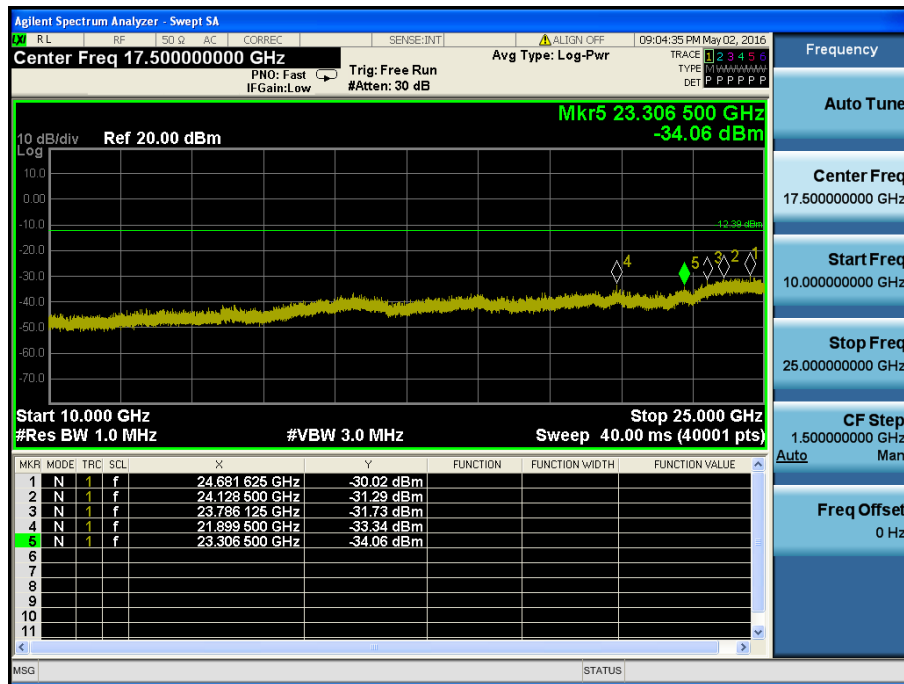
High Band-edge



Conducted Spurious Emissions

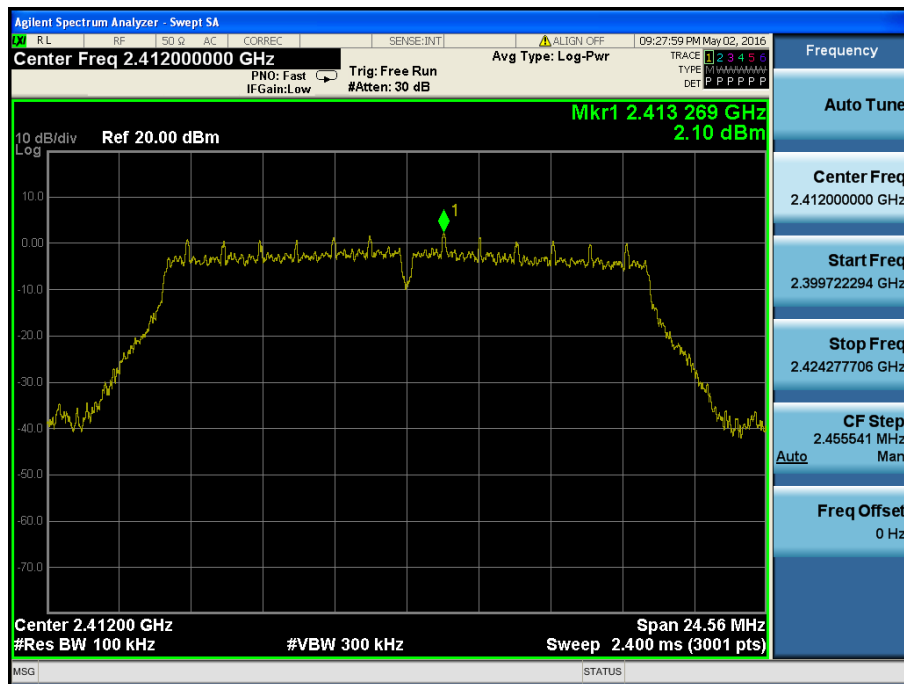


Conducted Spurious Emissions



TM 2 & ANT 1 & Lowest

Reference



Low Band-edge

