

RF TEST REPORT

Test item : Wi-Fi Transmitter
Model No. : WEH720B
Order No. : DTNC1412-05482, DTNC1412-05483
Date of receipt : 2014-12-10
Test duration : 2014-12-10 ~ 2014-12-26
Date of issue : 2015-01-20
Use of report : FCC & IC Original Grant

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Test specification : FCC Part 15 Subpart C 247
RSS-210 Issue 8: 2010

Test environment : See appended test report

Test result : ☒ Pass ☐ Fail

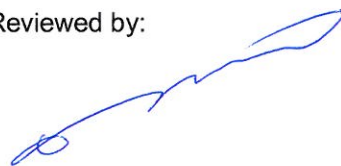
The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

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Test Report Version

Test Report No.	Date	Description
DRTFCC1501-0008	Jan. 20, 2014	Initial issue

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1. EUT DESCRIPTION

FCC Equipment Class	Digital Transmission System(DTS)
Product	Wi-Fi Transmitter
Model Name	WEH720B
Add Model Name	NA
Power Supply	DC 5 V
Frequency Range	2.4 GHz Band ▪ 802.11b/g/n(HT20): 2412 MHz ~ 2462 MHz ▪ 802.11n(HT40): 2422 MHz ~ 2452 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 : 2.200 dBi & ANT 2 : 1.900 dBi Antenna configuration ▪ 802.11b/g: Single Transmitting (ANT 1) ▪ 802.11n(MCS0 ~ 7) : Single Transmitting (ANT 1 or ANT 2) ▪ 802.11n(MCS8 ~ 15): Multiple Transmitting (ANT 1 and ANT 2)

2. INFORMATION ABOUT TESTING

2.1 Test mode

Transmitting Mode	Test mode	Worst case data rate	Tested Frequency(MHz)		
			Lowest	Middle	Highest
Single	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	2412	2437	2462
	TM 4	802.11n(HT40) MCS 0	2422	2437	2452
Multiple	TM 5	802.11n(HT20) MCS 8	2412	2437	2462
	TM 6	802.11n(HT40) MCS 8	2422	2437	2452

Note 1: The worst case data rate is determined as above test mode. And all tests conducted in this report were made at the worst case data rate.

Note 2: The test mode 5(TM 5) and 6(TM 6) are tested for measure-and-sum technique of multiple transmitting mode.

2.3 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Notebook PC	20095	WB06116969	Lenovo	DOC
-	-	-	-	-

2.4 Tested environment

Temperature	: 22 ~ 23 °C
Relative humidity content	: 41 ~ 46 % R.H.
Details of power supply	: DC 5.0 V

2.5 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)	RSS Section(s)	Parameter	Limit	Test Condition	Status Note 1
I. Transmitter Mode (TX)					
15.247(a)	RSS-210 [A8.2]	6 dB Bandwidth	> 500 kHz	Conducted	C
15.247(b)	RSS-210 [A8.4]	Transmitter Output Power	< 1 Watt		C
15.247(d)	RSS-210 [A8.5]	Out of Band Emissions / Band Edge	20 dBc in any 100 kHz BW		C
15.247(e)	RSS-210 [A8.2]	Transmitter Power Spectral Density	< 8 dBm / 3 kHz		C
-	RSS Gen [6.6]	Occupied Bandwidth (99%)	RSS-Gen		C
15.205 15.209	RSS-210 [A8.5]	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 Conducted Emissions	FCC 15.207 limits	AC Line Conducted	C
15.203	RSS-Gen [6.7]	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 KDB 558074 D01 DTS Meas. Guidance v03r2 and KDB 662911 D01 v02r01 for the measure-and-sum technique. And ANSI C63.10-2009 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 D01 DTS Meas. Guidance v03r2. So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10.

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

Radiated Emissions

Basically the radiated tests were performed with KDB 558074 D01 DTS Meas. Guidance v03r2. 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 D01 DTS Meas. Guidance v03r2.

The EUT is placed on a non-conductive table, which is 0.8 m above ground plane. The turn table 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 axis.

4.4 Description of test modes

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: 678747

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& RSS-Gen [6.7]:

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 internal antenna of this E.U.T is permanently attached on the main PCB.(Refer to Internal Photo.) 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	2.200	1.900	5.062 Note 1.

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

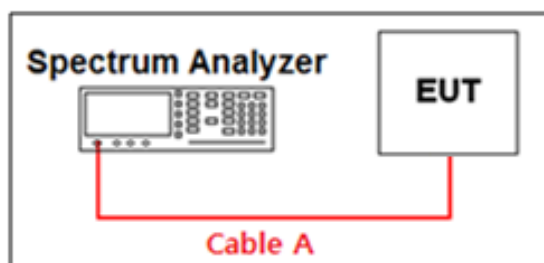
8.1 6dB bandwidth

■ Test Requirements and limit, §15.247(a) & RSS-210 [A8.2]

The bandwidth at 6dB 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 6dB bandwidth is 500 kHz.

■ Test Configuration



■ Test Procedure: KDB 558074 D01 DTS Meas. Guidance v03r2

1. Set resolution bandwidth (RBW) = 100 kHz & video bandwidth (VBW) $\geq 3 \times$ RBW.
(RBW: 100kHz & VBW: 300 kHz)
2. Detector = **Peak**.
3. Trace mode = **max hold**.
4. Sweep = **auto couple**.
5. Allow the trace to stabilize.
6. 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.

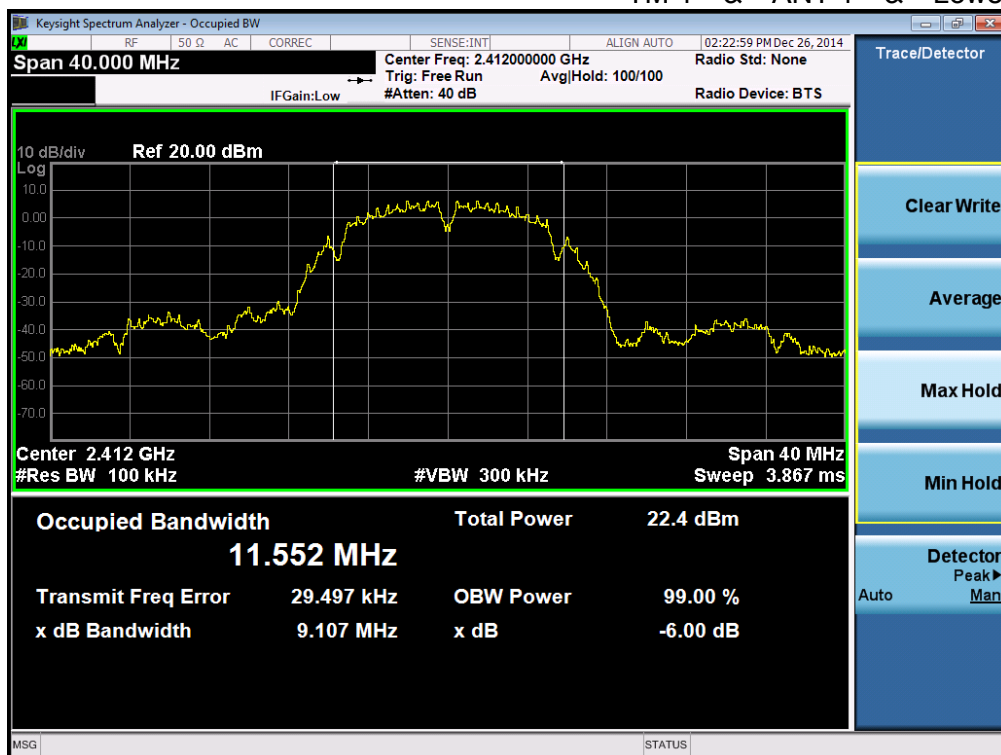
■ Test Results: **Comply**

Test Mode	Frequency	6dB Bandwidth[MHz]	
		ANT 1	ANT 2
TM 1	Lowest	9.107	-
	Middle	8.578	-
	Highest	8.636	-
TM 2	Lowest	16.400	-
	Middle	16.360	-
	Highest	16.390	-
TM 3	Lowest	17.350	17.620
	Middle	17.610	17.600
	Highest	17.600	17.600
TM 4	Lowest	36.180	36.110
	Middle	36.130	36.370
	Highest	36.160	36.370
TM 5	Lowest	17.610	17.650
	Middle	17.620	17.660
	Highest	17.620	17.670
TM 6	Lowest	36.150	36.440
	Middle	36.390	36.410
	Highest	36.380	36.450

■ Result Plots

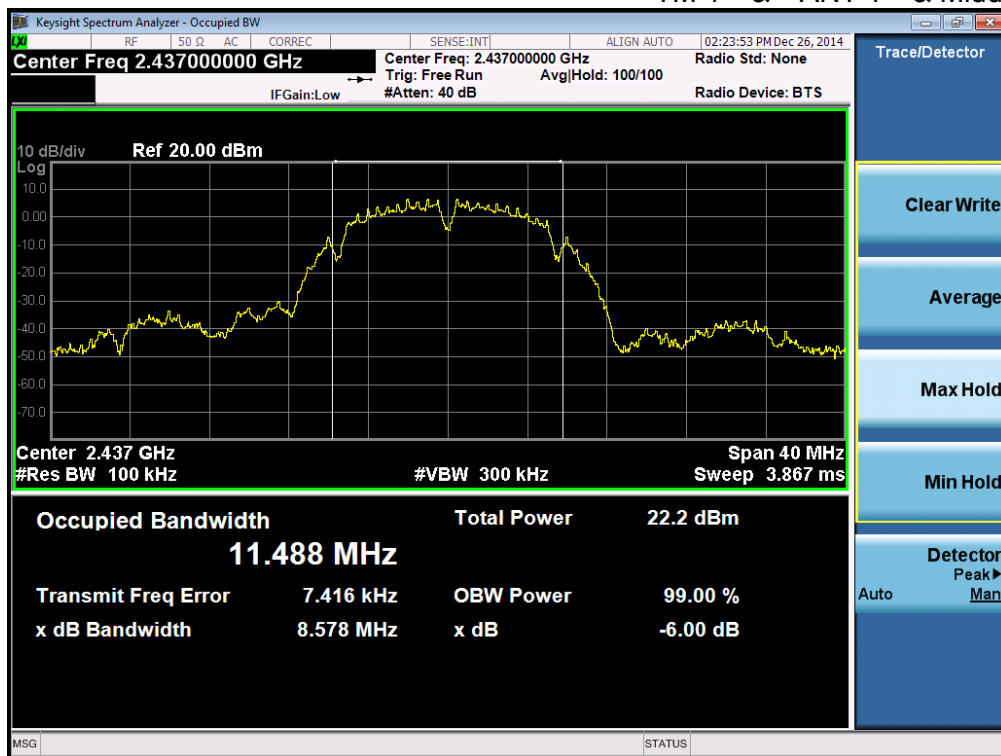
6 dB Bandwidth

TM 1 & ANT 1 & Lowest

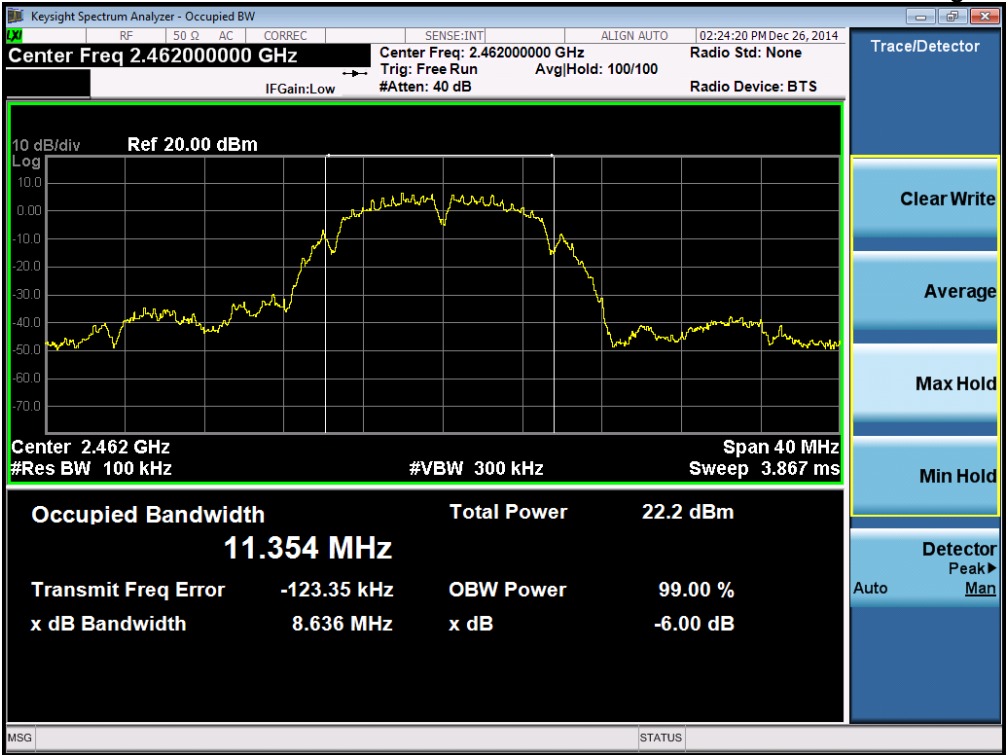


6 dB Bandwidth

TM 1 & ANT 1 & Middle

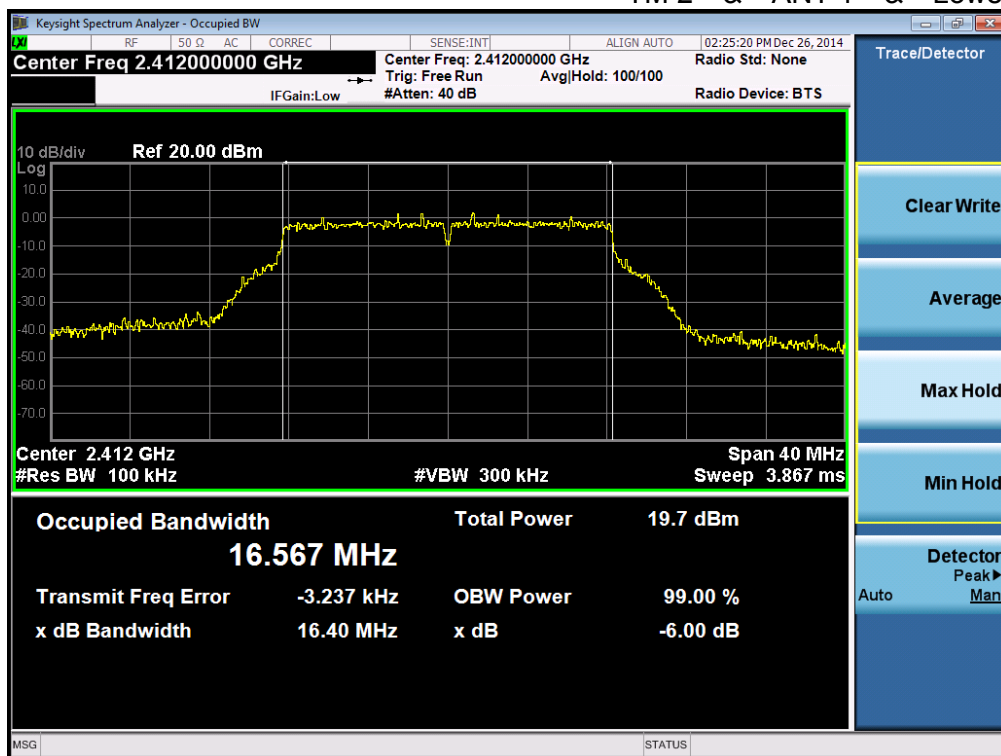


6 dB Bandwidth TM 1 & ANT 1 & Highest



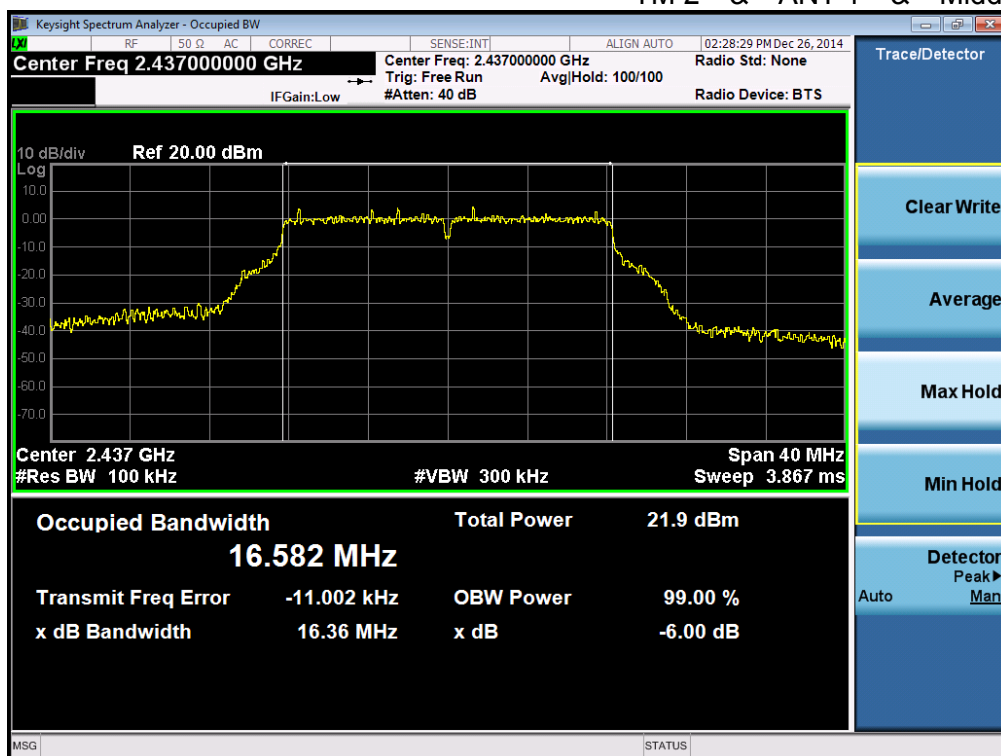
6 dB Bandwidth

TM 2 & ANT 1 & Lowest



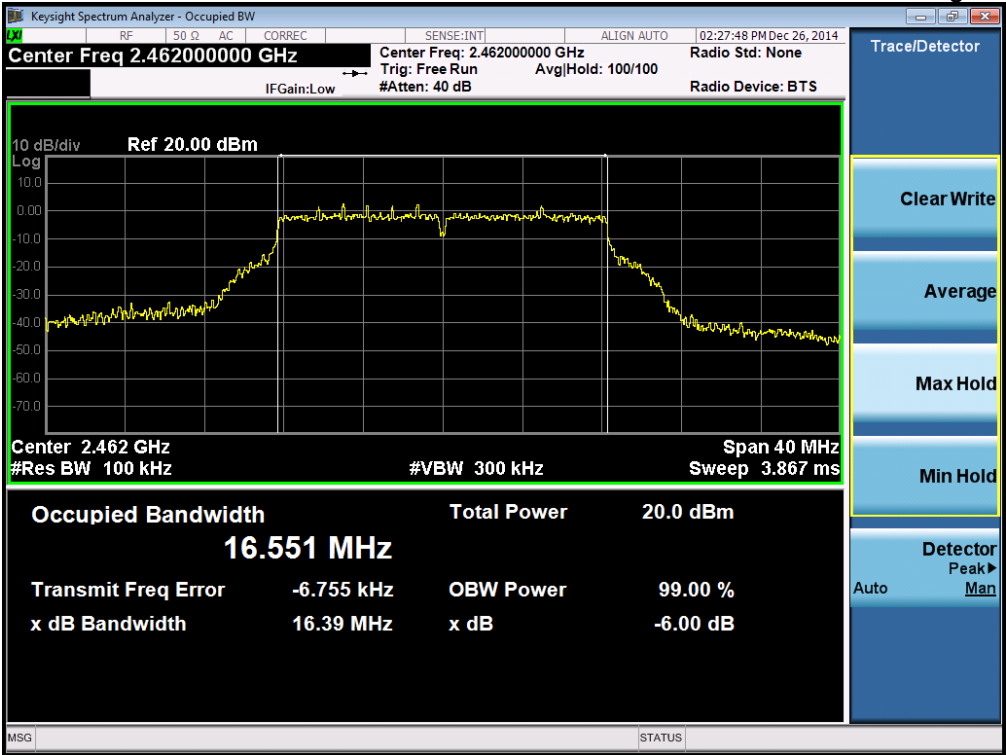
6 dB Bandwidth

TM 2 & ANT 1 & Middle



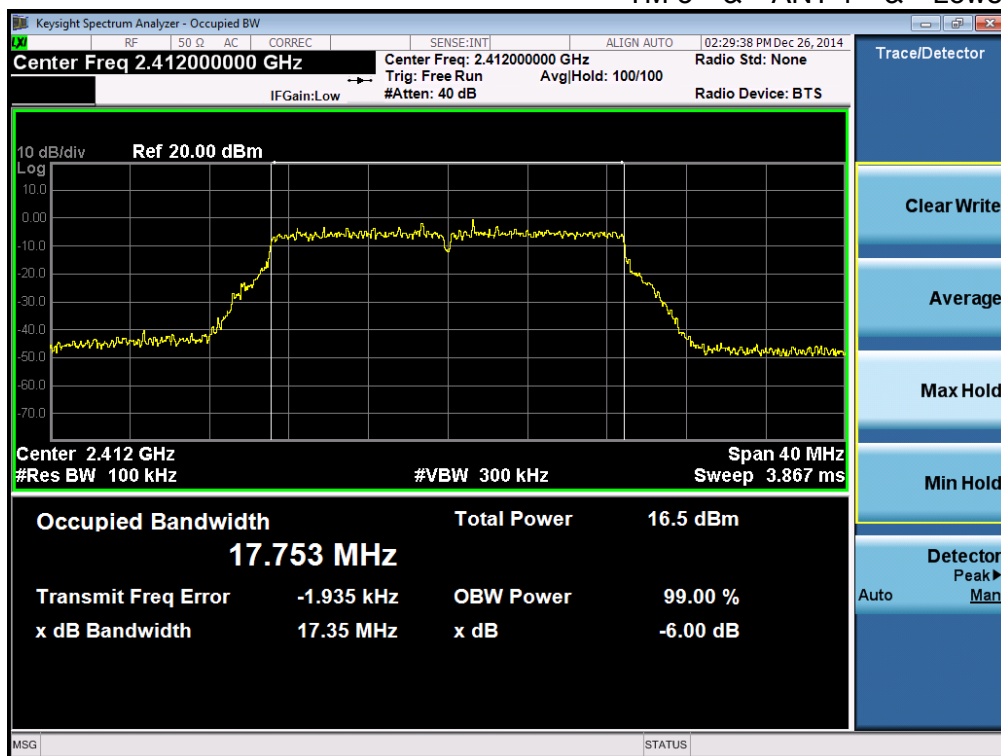
6 dB Bandwidth

TM 2 & ANT 1 & Highest



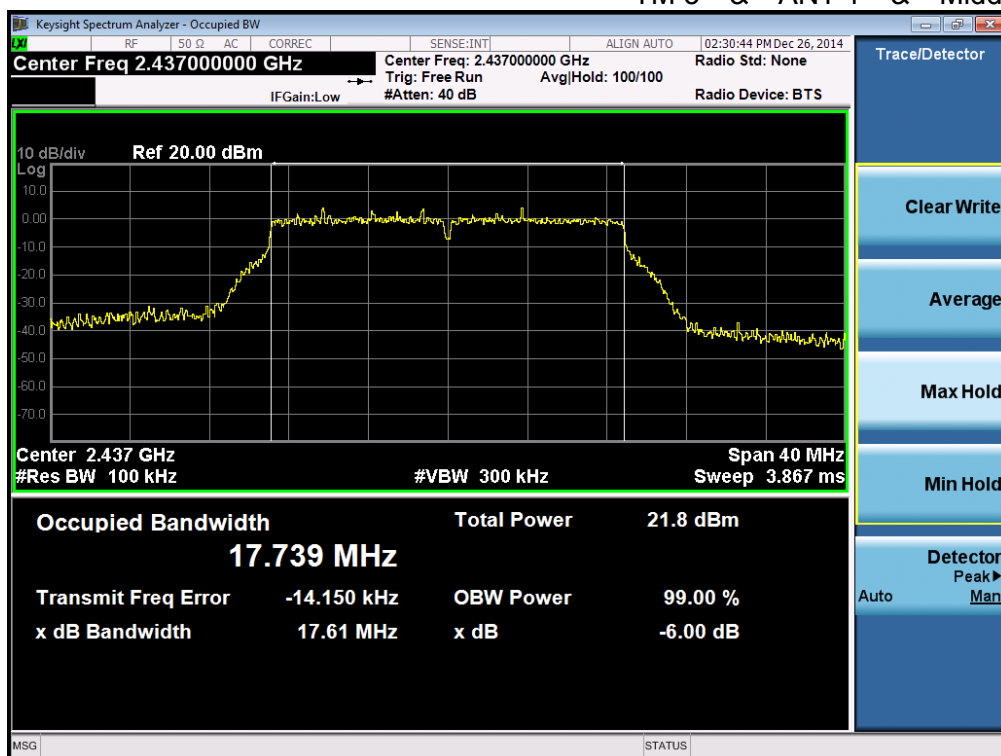
6 dB Bandwidth

TM 3 & ANT 1 & Lowest

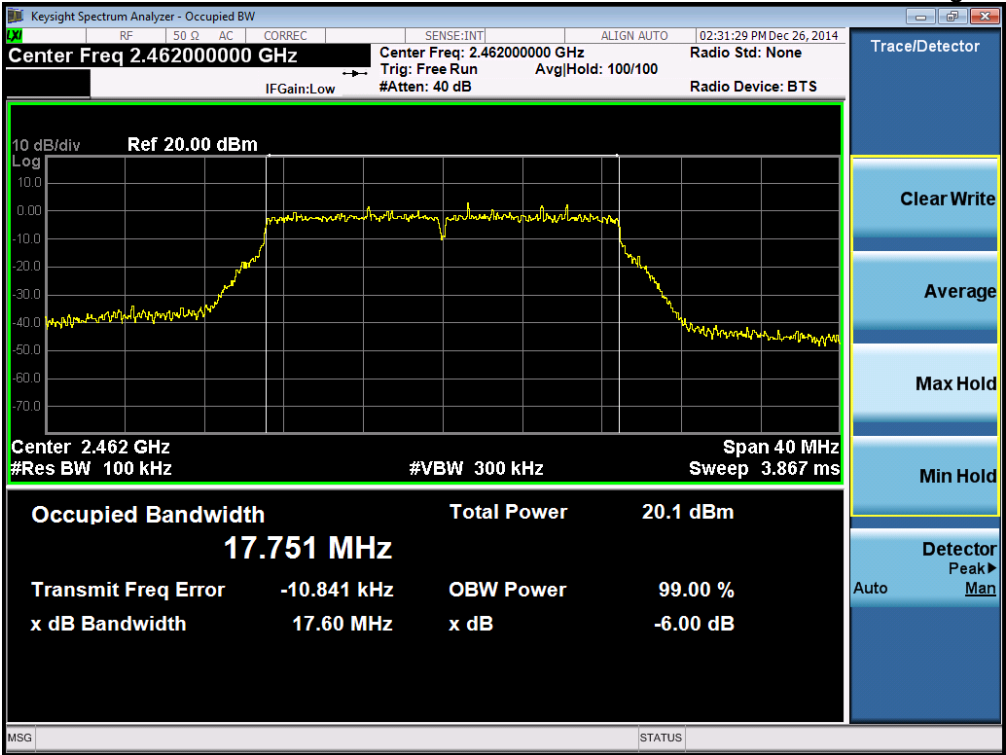


6 dB Bandwidth

TM 3 & ANT 1 & Middle

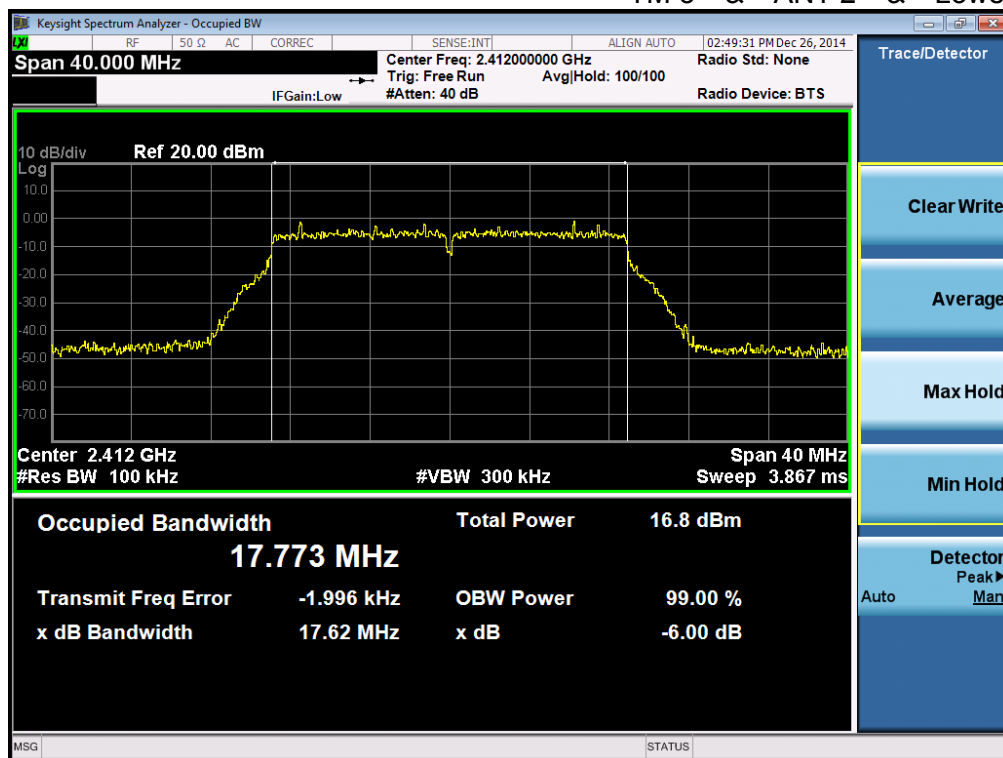


6 dB Bandwidth TM 3 & ANT 1 & Highest



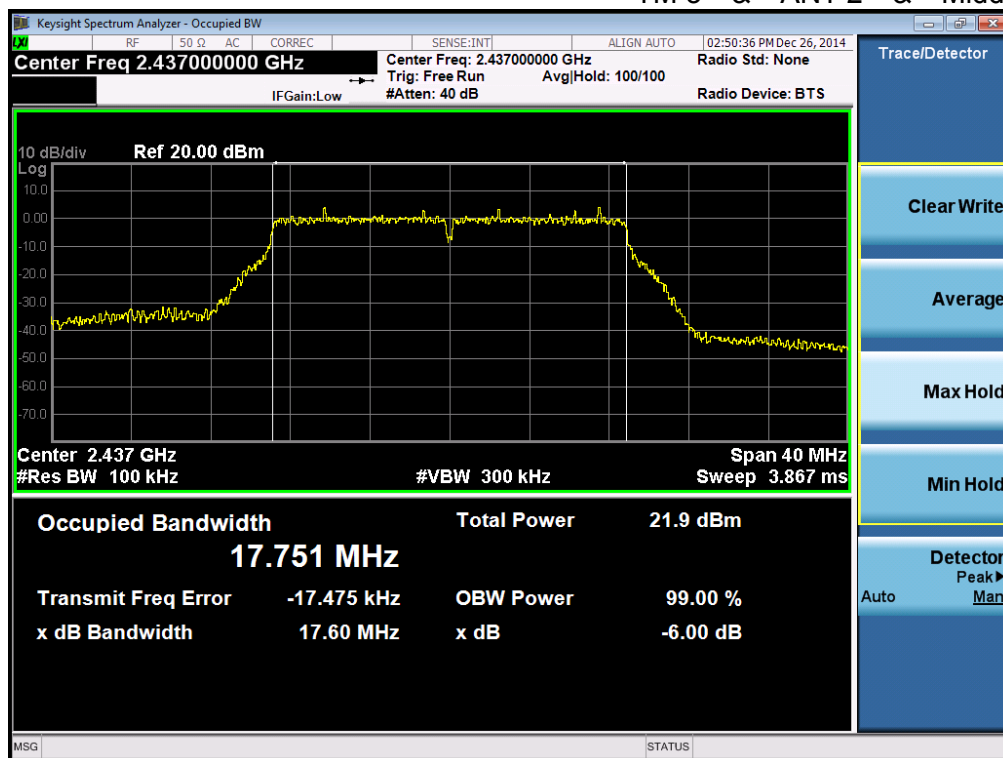
6 dB Bandwidth

TM 3 & ANT 2 & Lowest

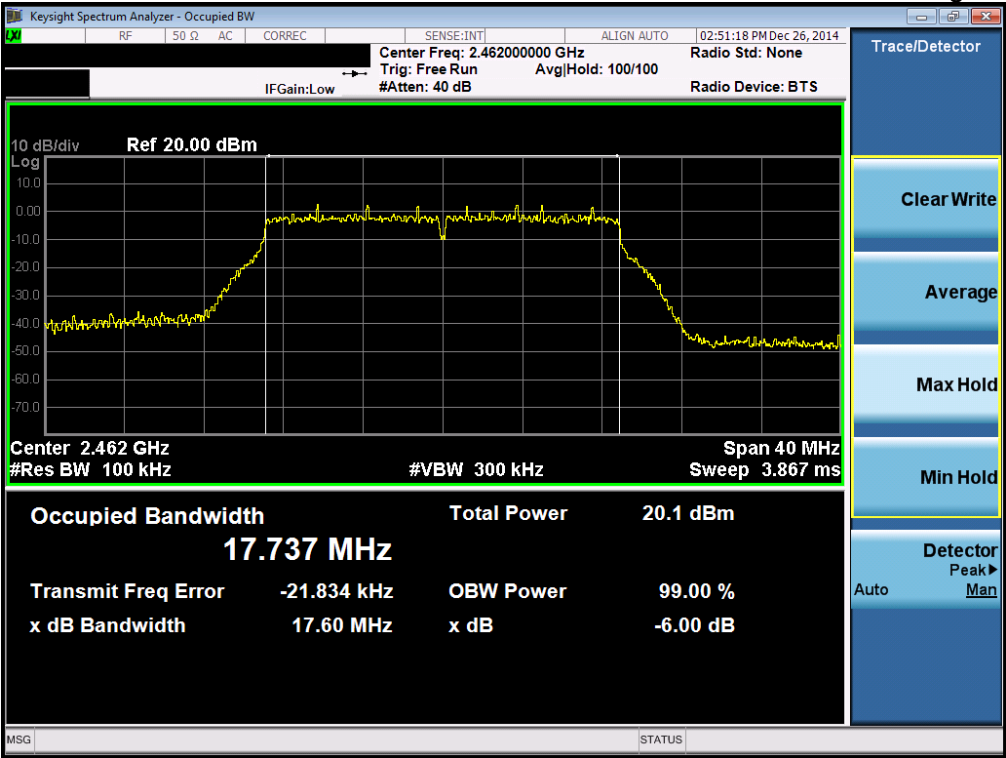


6 dB Bandwidth

TM 3 & ANT 2 & Middle

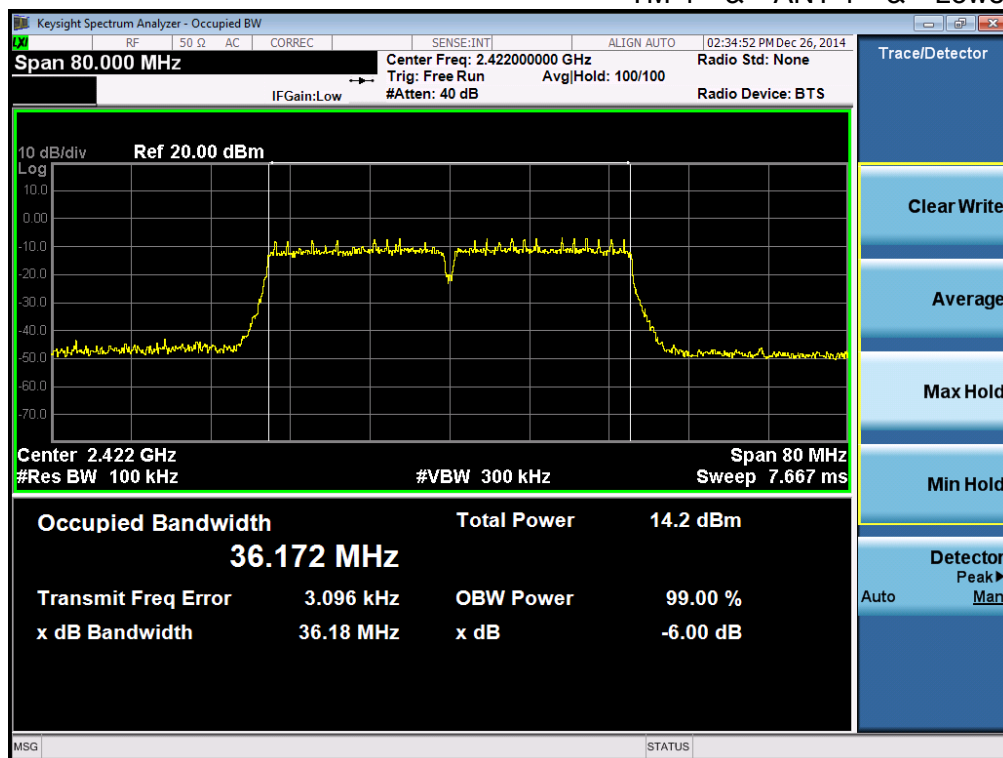


6 dB Bandwidth TM 3 & ANT 2 & Highest



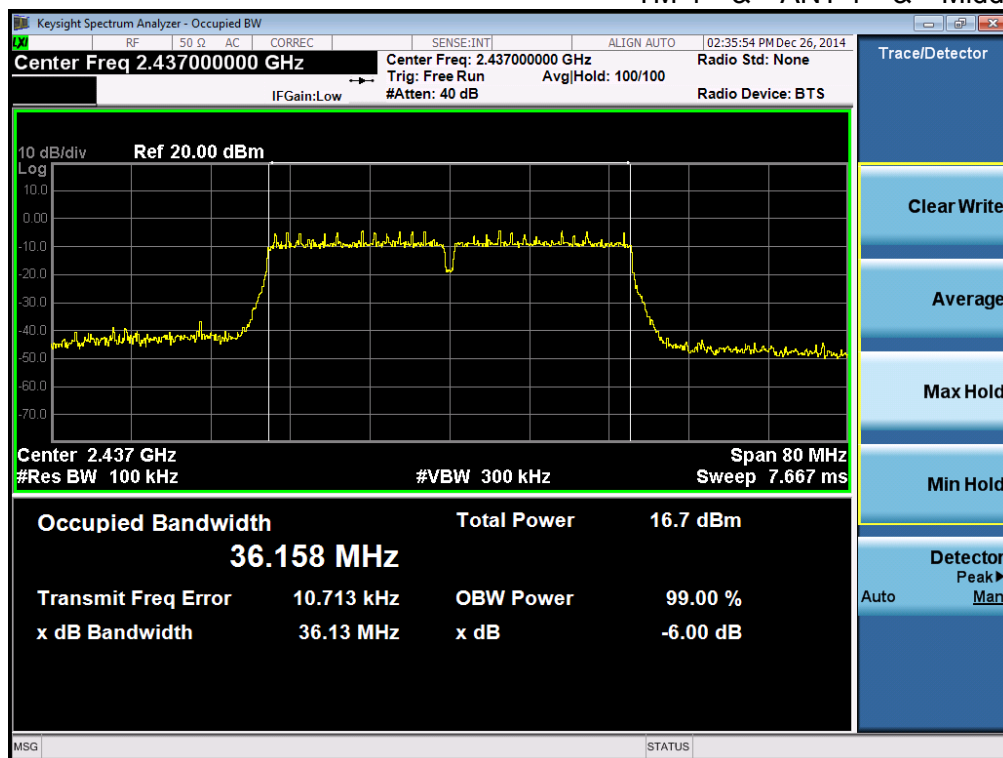
6 dB Bandwidth

TM 4 & ANT 1 & Lowest



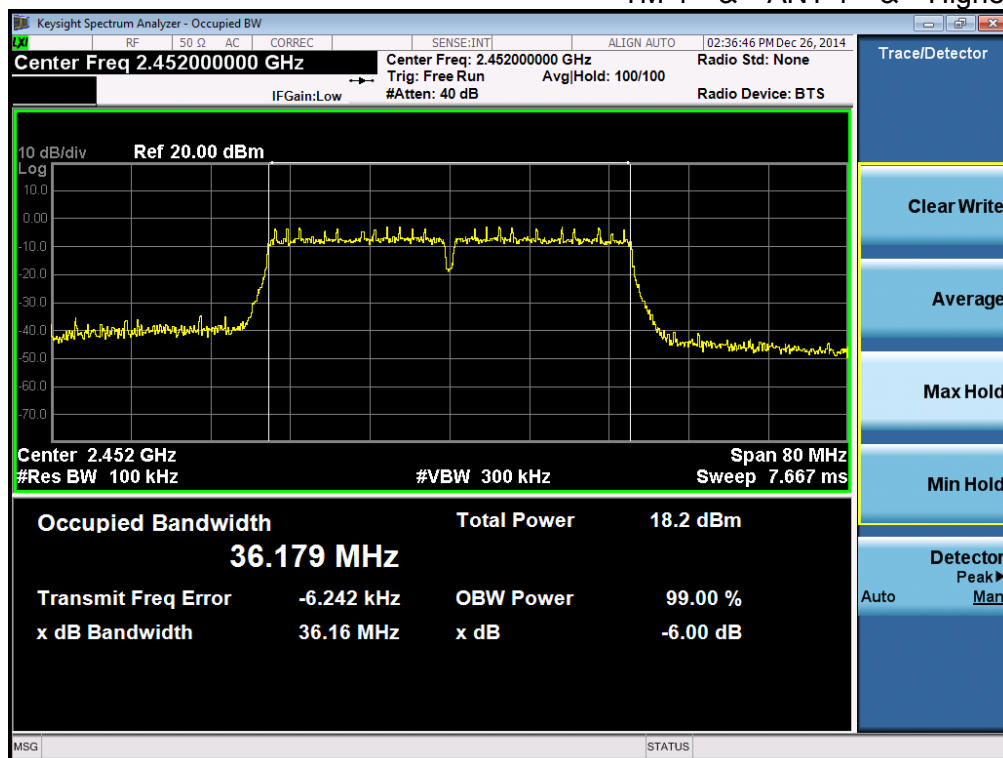
6 dB Bandwidth

TM 4 & ANT 1 & Middle



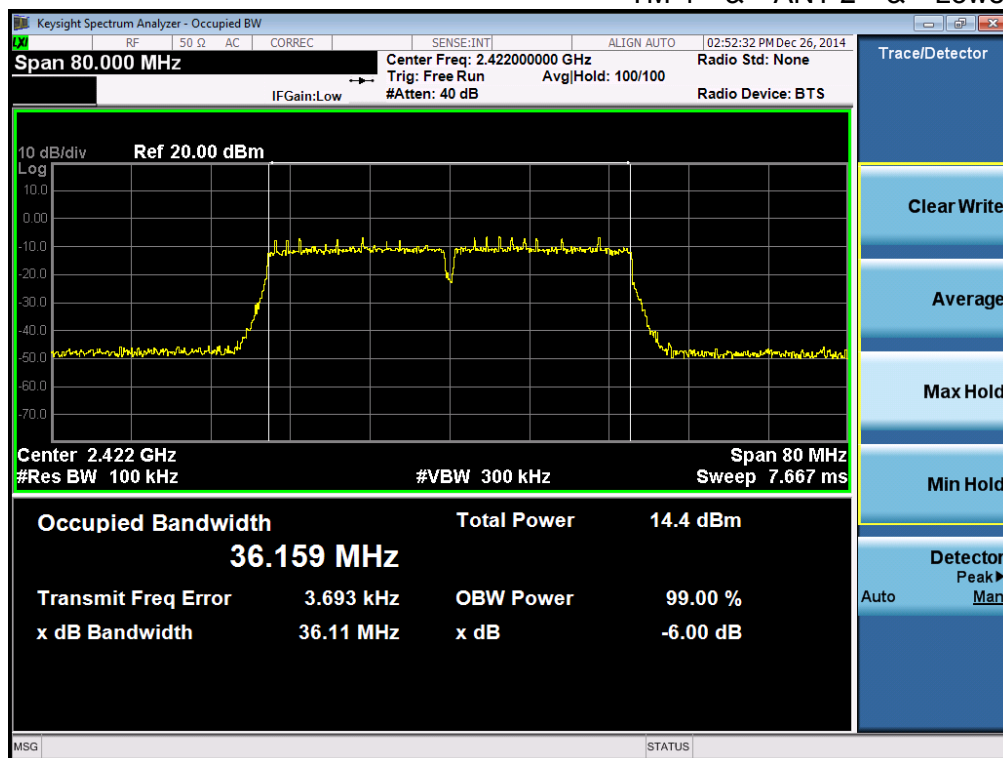
6 dB Bandwidth

TM 4 & ANT 1 & Highest



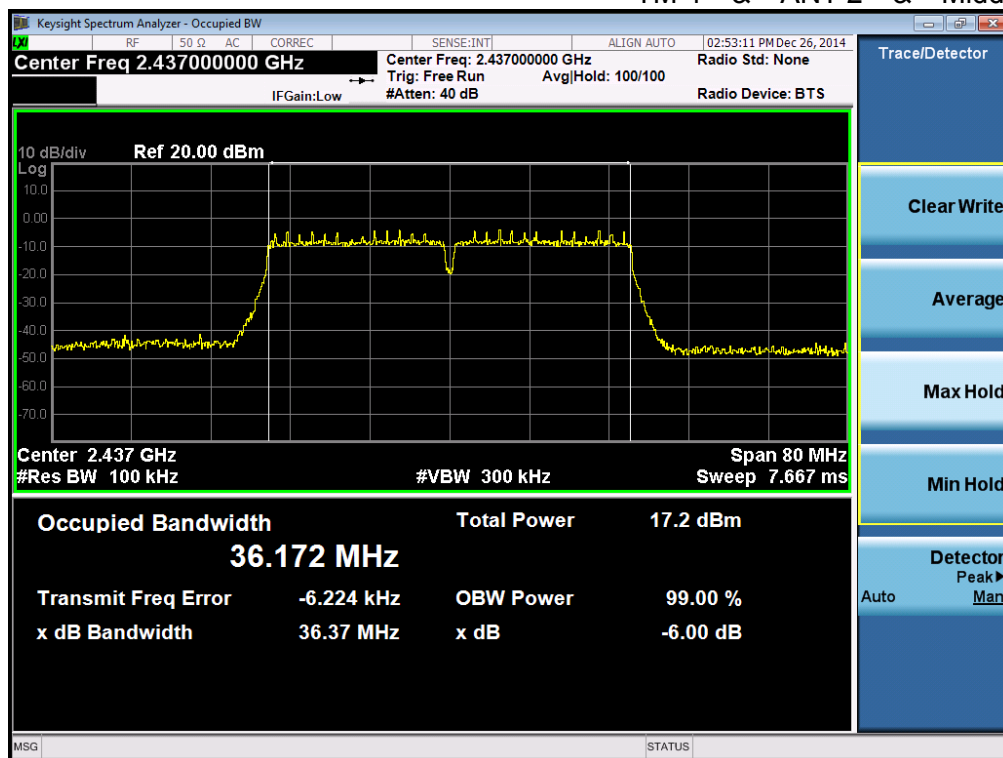
6 dB Bandwidth

TM 4 & ANT 2 & Lowest



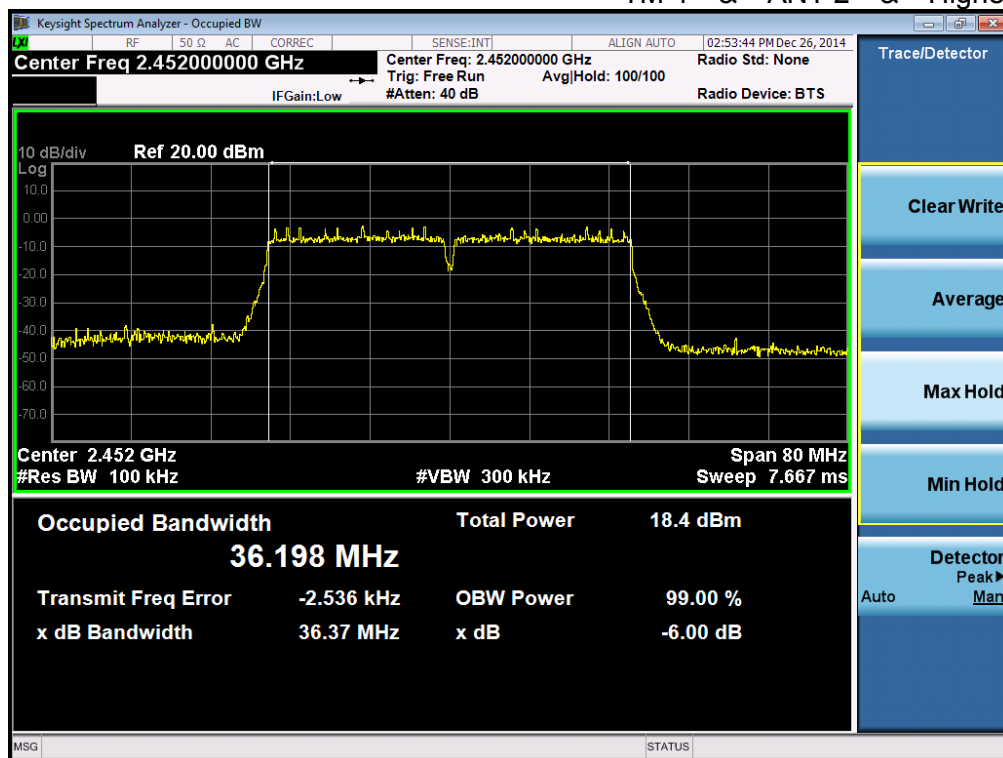
6 dB Bandwidth

TM 4 & ANT 2 & Middle



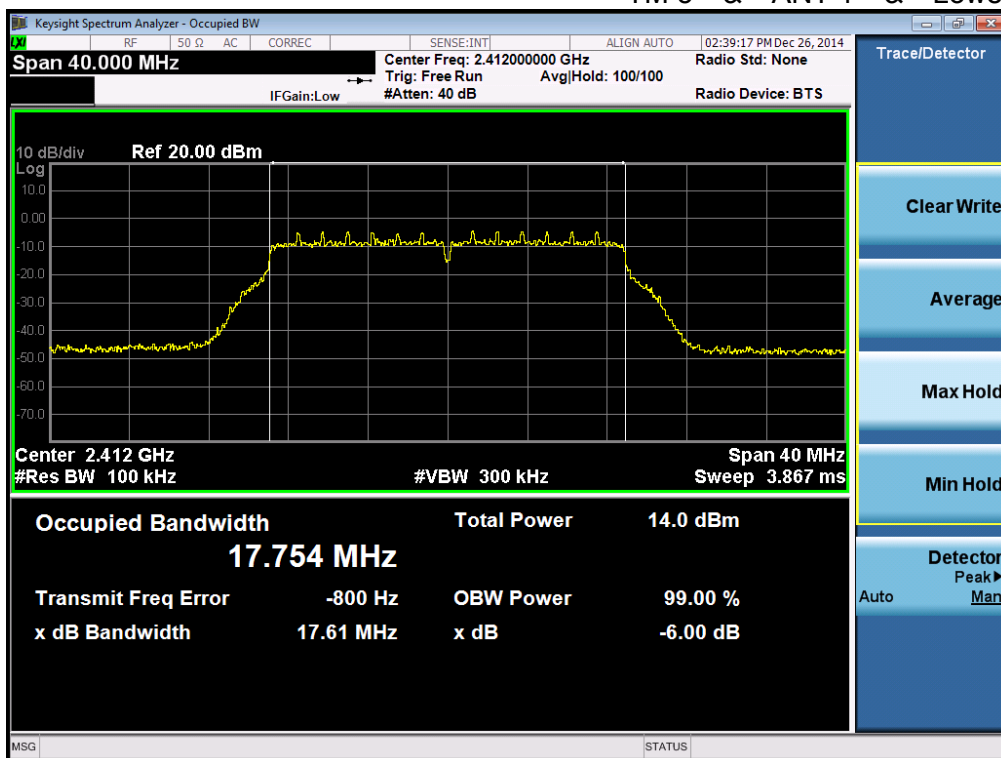
6 dB Bandwidth

TM 4 & ANT 2 & Highest



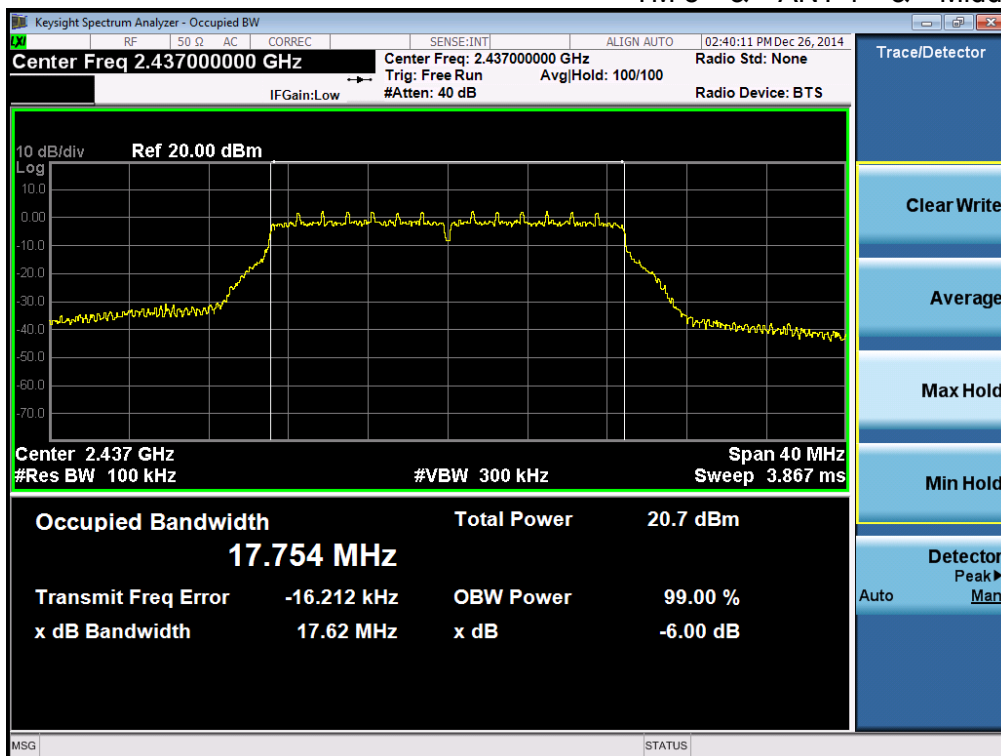
6 dB Bandwidth

TM 5 & ANT 1 & Lowest



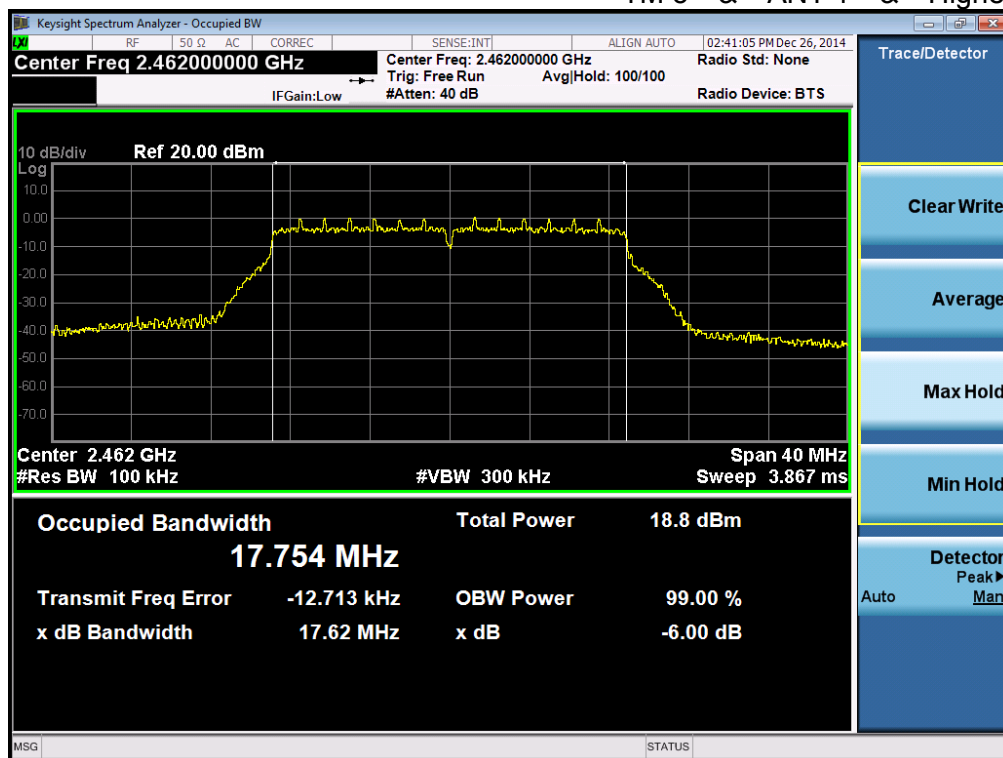
6 dB Bandwidth

TM 5 & ANT 1 & Middle



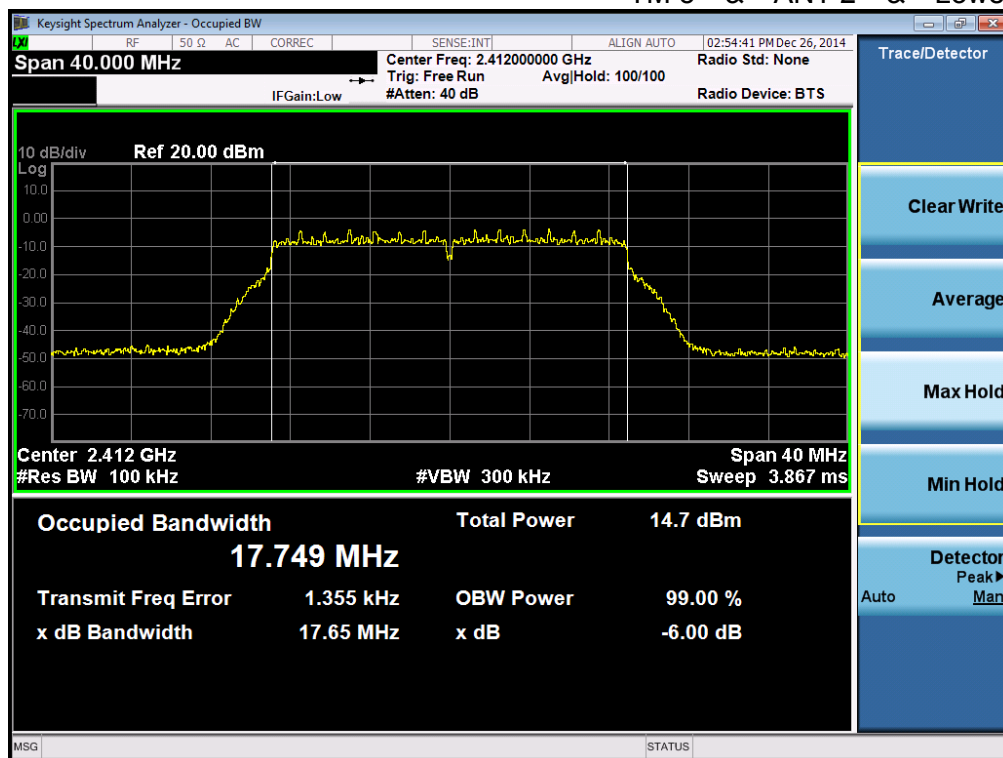
6 dB Bandwidth

TM 5 & ANT 1 & Highest



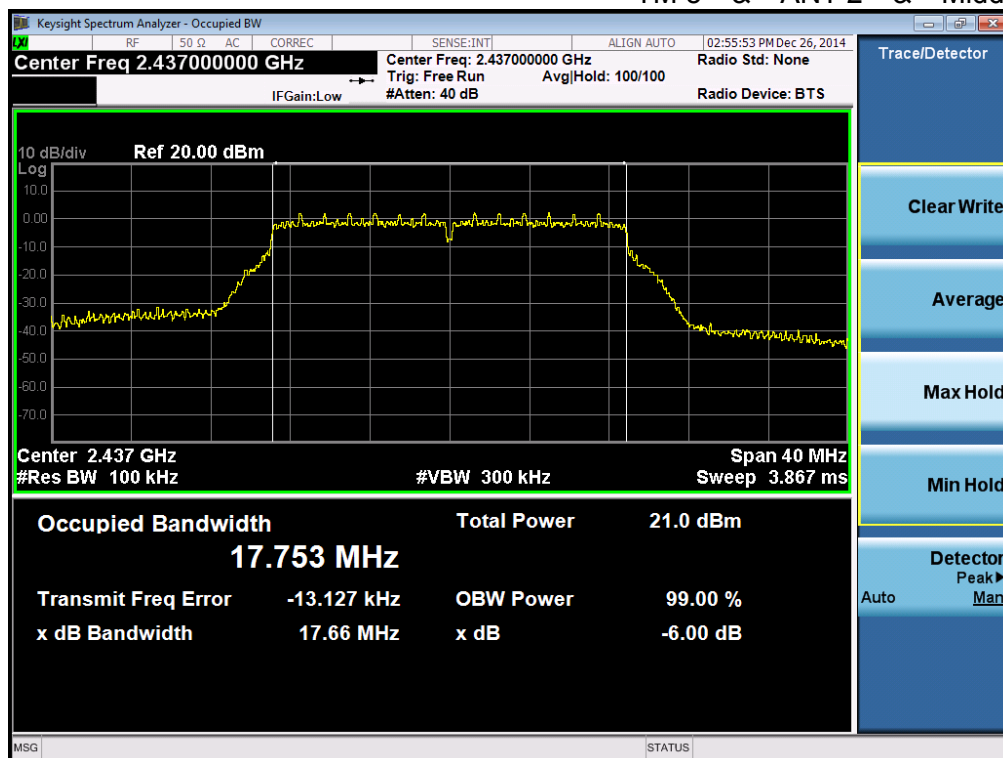
6 dB Bandwidth

TM 5 & ANT 2 & Lowest



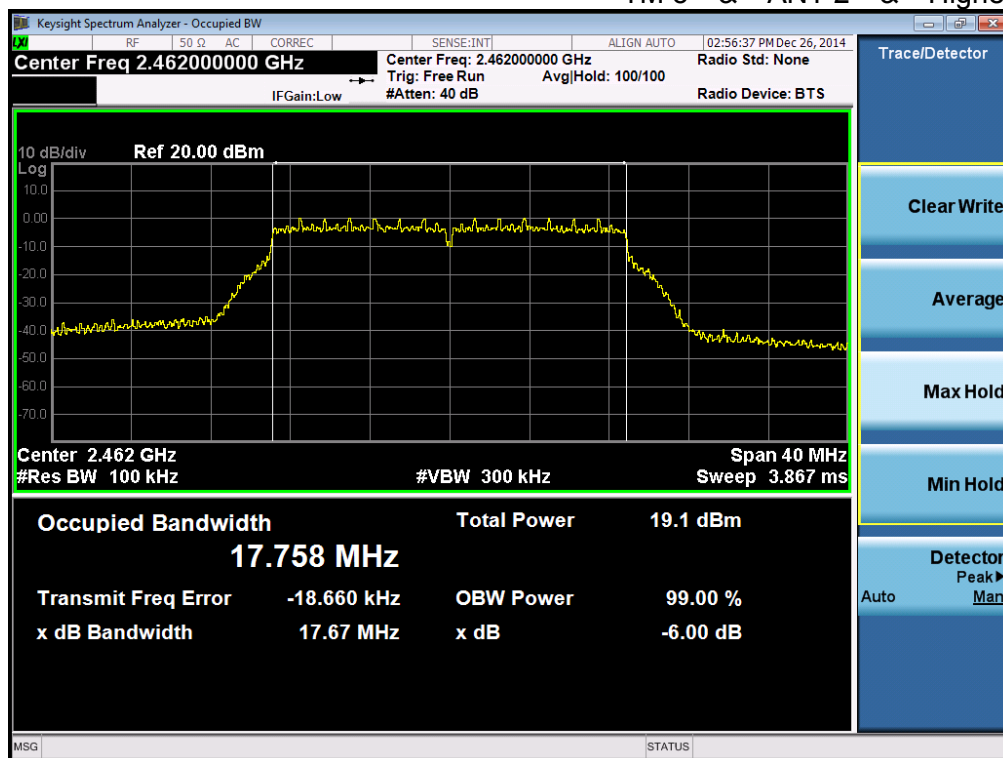
6 dB Bandwidth

TM 5 & ANT 2 & Middle



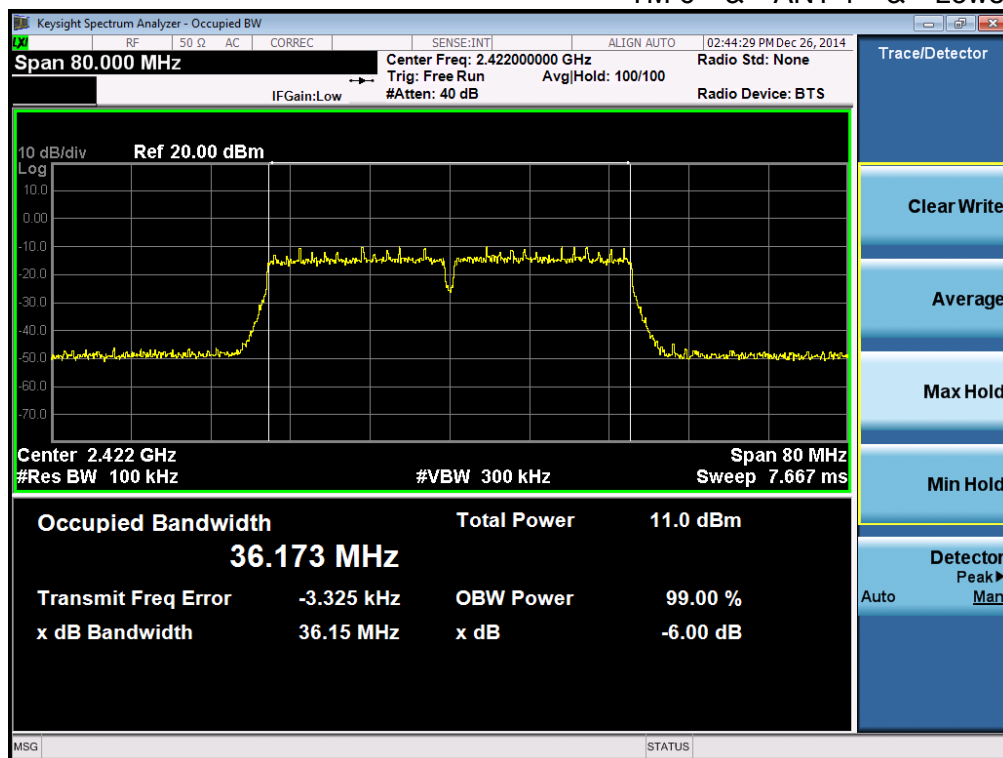
6 dB Bandwidth

TM 5 & ANT 2 & Highest



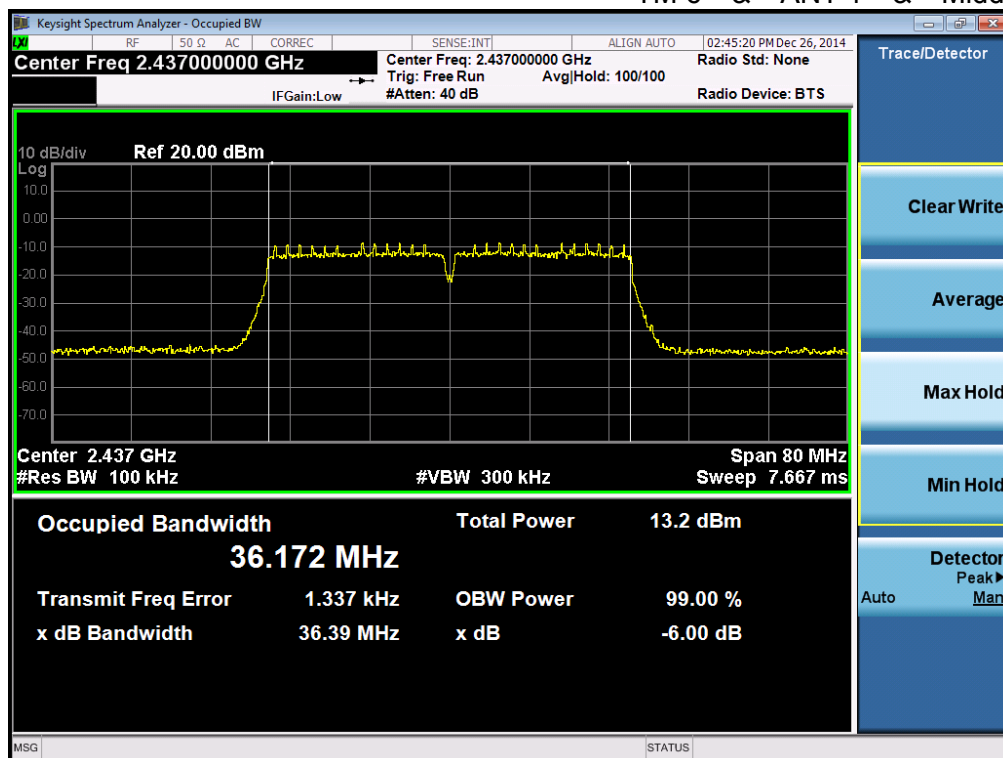
6 dB Bandwidth

TM 6 & ANT 1 & Lowest



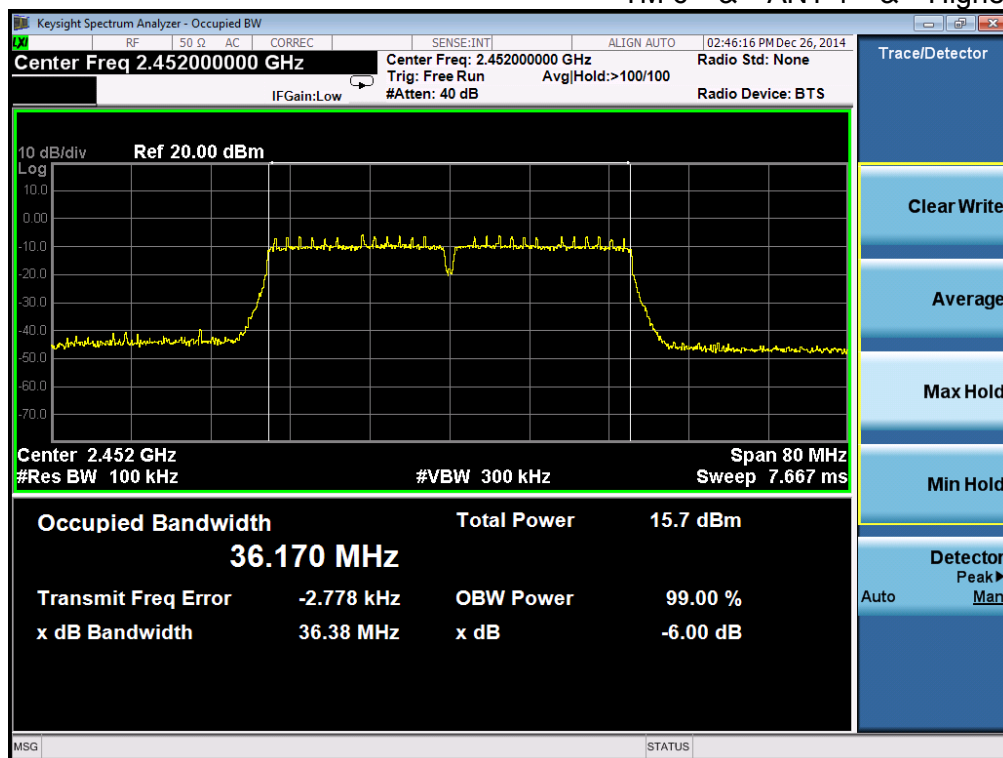
6 dB Bandwidth

TM 6 & ANT 1 & Middle



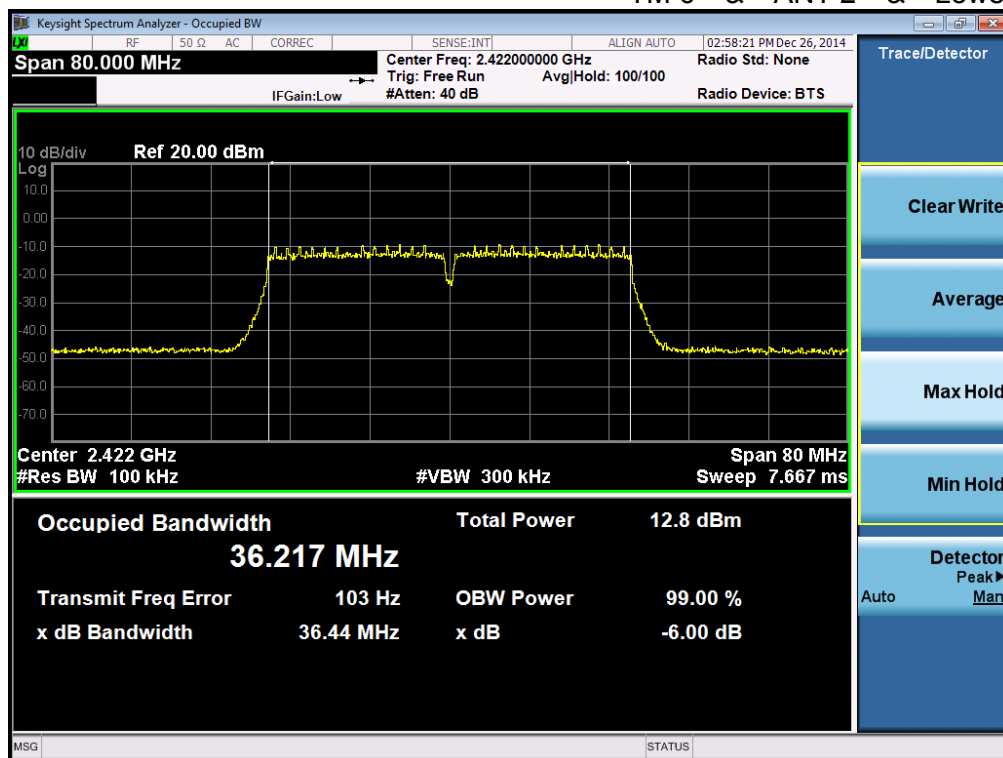
6 dB Bandwidth

TM 6 & ANT 1 & Highest



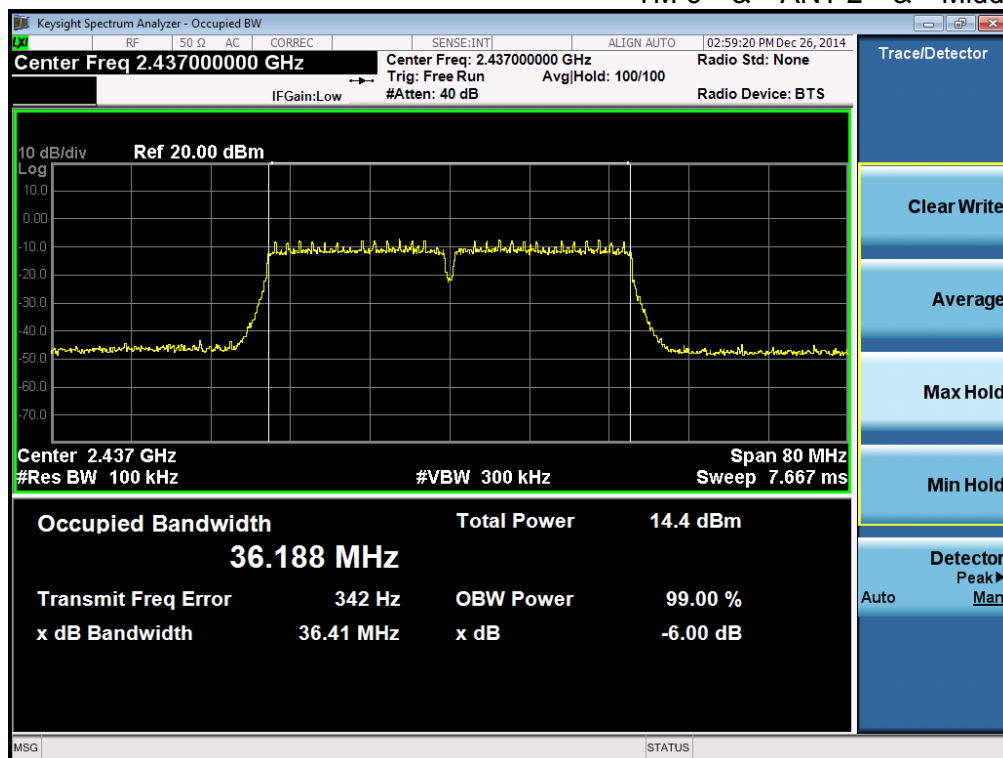
6 dB Bandwidth

TM 6 & ANT 2 & Lowest



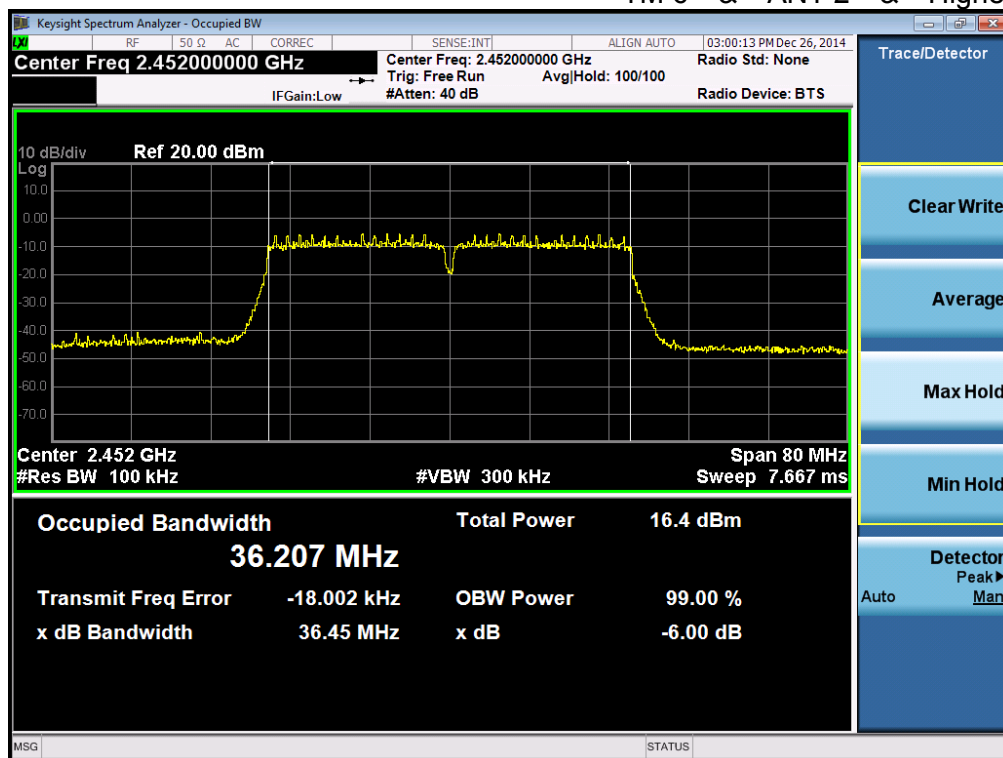
6 dB Bandwidth

TM 6 & ANT 2 & Middle



6 dB Bandwidth

TM 6 & ANT 2 & Highest

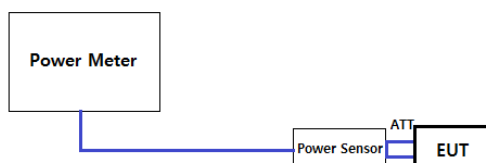


8.2 Maximum peak conducted output power

■ Test Requirements and limit, §15.247(b) & RSS-210 [A8.4]

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

■ Test Configuration



■ Test Procedure: KDB 558074 D01 DTS Meas. Guidance v03r2

1. PKPM1 Peak power meter method

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)

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 mode

ANT	Freq. (MHz)	Det.	Test Results (dBm) for 802.11b			
			Data Rate [Mbps]			
			1	2	5.5	11
ANT 1	2412	PK	18.648	18.570	18.567	18.628
		AV	14.488	14.451	14.444	14.467
	2437	PK	18.589	18.447	18.431	18.444
		AV	14.476	14.413	14.440	14.373
	2462	PK	18.427	18.331	18.290	18.279
		AV	14.337	14.273	14.184	14.218

ANT	Freq. (MHz)	Det.	Test Result(dBm) for 802.11g							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
ANT 1	2412	PK	20.246	20.111	20.141	20.103	20.085	20.165	20.062	20.073
		AV	12.831	12.824	12.787	12.753	12.751	12.814	12.828	12.803
	2437	PK	21.820	21.713	21.692	21.659	21.737	21.696	21.755	21.725
		AV	14.583	14.514	14.546	14.532	14.591	14.626	14.570	14.552
	2462	PK	20.541	20.459	20.436	20.434	20.417	20.433	20.386	20.498
		AV	13.300	13.212	13.173	13.165	13.212	13.232	13.202	13.205

ANT	Freq. (MHz)	Det.	Test Results (dBm) for 802.11n(HT20)							
			Modulation and Coding Scheme [MCS]							
			0	1	2	3	4	5	6	7
ANT 1	2412	PK	17.609	17.521	17.539	17.581	17.532	17.520	17.574	17.563
		AV	9.906	9.810	9.781	9.735	9.782	9.733	9.744	9.790
	2437	PK	22.067	21.989	22.032	22.031	22.045	21.982	22.031	22.045
		AV	14.983	15.014	14.917	14.986	14.954	14.999	14.966	14.983
	2462	PK	20.471	20.366	20.447	20.420	20.445	20.370	20.461	20.407
		AV	13.066	12.914	12.944	13.023	12.965	12.972	12.999	12.905
ANT 2	2412	PK	17.703	17.625	17.602	17.655	17.642	17.580	17.674	17.669
		AV	10.148	10.164	10.070	10.094	10.111	10.139	10.062	10.119
	2437	PK	22.223	22.140	22.170	22.151	22.197	21.229	22.213	22.155
		AV	15.053	14.961	14.952	14.893	14.926	15.010	14.901	14.964
	2462	PK	20.562	20.491	20.528	20.513	20.504	20.495	20.535	20.509
		AV	13.255	13.186	13.194	13.230	13.167	13.136	13.191	13.215

ANT	Freq. (MHz)	Det.	Test Results (dBm) for 802.11n(HT40)							
			Modulation and Coding Scheme [MCS]							
			0	1	2	3	4	5	6	7
ANT 1	2422	PK	14.659	14.599	14.608	14.554	14.603	14.556	14.581	14.569
		AV	7.060	7.004	7.070	6.955	7.012	7.035	7.039	6.949
	2437	PK	17.283	17.145	17.201	17.195	17.243	17.185	17.239	17.136
		AV	9.614	9.562	9.557	9.549	9.574	9.590	9.485	9.497
	2452	PK	18.044	17.952	17.988	17.975	17.923	17.999	17.988	18.011
		AV	10.813	10.730	10.682	10.696	10.707	10.686	10.754	10.674
ANT 2	2422	PK	15.107	15.071	14.994	15.015	15.084	15.089	14.982	15.074
		AV	7.599	7.546	7.566	7.545	7.617	7.568	7.568	7.575
	2437	PK	17.184	17.054	17.105	17.093	17.030	17.054	17.124	17.073
		AV	9.676	9.682	9.646	9.604	9.623	9.618	9.608	9.687
	2452	PK	18.559	18.547	18.527	18.525	18.476	18.553	18.557	18.541
		AV	11.293	11.211	11.232	11.238	11.193	11.199	11.182	11.220

▪ Multiple transmitting mode

ANT	Freq. (MHz)	Det.	Test Results (dBm) for 802.11n(HT20)							
			Modulation and Coding Scheme [MCS]							
			8	9	10	11	12	13	14	15
ANT 1	2412	PK	13.291	13.209	13.160	13.192	13.189	13.192	13.169	13.231
		AV	6.916	6.850	6.842	6.816	6.835	6.803	6.817	6.860
	2437	PK	18.915	18.832	18.888	18.840	18.835	18.827	18.834	18.856
		AV	12.770	12.702	12.697	12.672	12.663	12.665	12.689	12.668
	2462	PK	16.864	16.799	16.819	16.776	16.780	16.800	16.816	16.851
		AV	10.739	10.647	10.664	10.684	10.662	10.610	10.657	10.669
ANT 2	2412	PK	13.895	13.837	13.857	13.838	13.817	13.816	13.869	13.850
		AV	7.101	7.004	7.061	7.081	7.029	7.053	7.047	7.041
	2437	PK	19.216	19.167	19.158	19.140	19.154	19.177	19.178	19.167
		AV	12.945	12.879	12.859	12.882	12.921	12.855	12.840	12.884
	2462	PK	17.774	17.680	17.672	17.636	17.673	17.686	17.659	17.677
		AV	11.169	11.075	11.115	11.124	11.117	11.082	11.072	11.115
Sum (ANT 1+2)	2412	PK	16.614	16.545	16.533	16.538	16.525	16.526	16.544	16.562
	2437	PK	22.079	22.014	22.036	22.003	22.008	22.016	22.020	22.025
	2462	PK	20.354	20.273	20.277	20.238	20.260	20.276	20.269	20.294

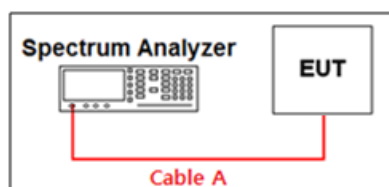
ANT	Freq. (MHz)	Det.	Test Results (dBm) for 802.11n(HT40)							
			Modulation and Coding Scheme [MCS]							
			8	9	10	11	12	13	14	15
ANT 1	2422	PK	11.567	11.489	11.430	11.472	11.441	11.507	11.492	11.443
		AV	4.713	4.690	4.659	4.649	4.686	4.658	4.650	4.607
	2437	PK	12.388	12.308	12.328	12.354	12.325	12.280	12.327	12.319
		AV	5.746	5.661	5.661	5.689	5.667	5.656	5.654	5.679
	2452	PK	14.872	14.782	14.809	14.821	14.775	14.770	14.789	14.798
		AV	7.979	7.914	7.921	7.906	7.905	7.905	7.908	7.922
ANT 2	2422	PK	11.620	11.530	11.544	11.528	11.535	11.507	11.549	11.544
		AV	5.564	5.483	5.529	5.531	5.527	5.508	5.506	5.477
	2437	PK	13.402	13.346	13.364	13.376	13.364	13.305	13.341	13.343
		AV	6.608	6.545	6.550	6.552	6.529	6.569	6.519	6.527
	2452	PK	15.206	15.097	15.096	15.087	15.103	15.105	15.117	15.120
		AV	8.552	8.460	8.431	8.485	8.469	8.449	8.470	8.449
Sum (ANT 1+2)	2422	PK	14.604	14.520	14.498	14.511	14.499	14.518	14.531	14.505
	2437	PK	15.935	15.869	15.888	15.906	15.886	15.833	15.874	15.872
	2452	PK	18.053	17.953	17.966	17.967	17.953	17.952	17.967	17.973

8.3 Maximum power spectral density

■ Test requirements and limit, §15.247(e) & RSS-210 [A8.2]

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



■ Test Procedure: *KDB 558074 D01 DTS Meas. Guidance v03r2*

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.

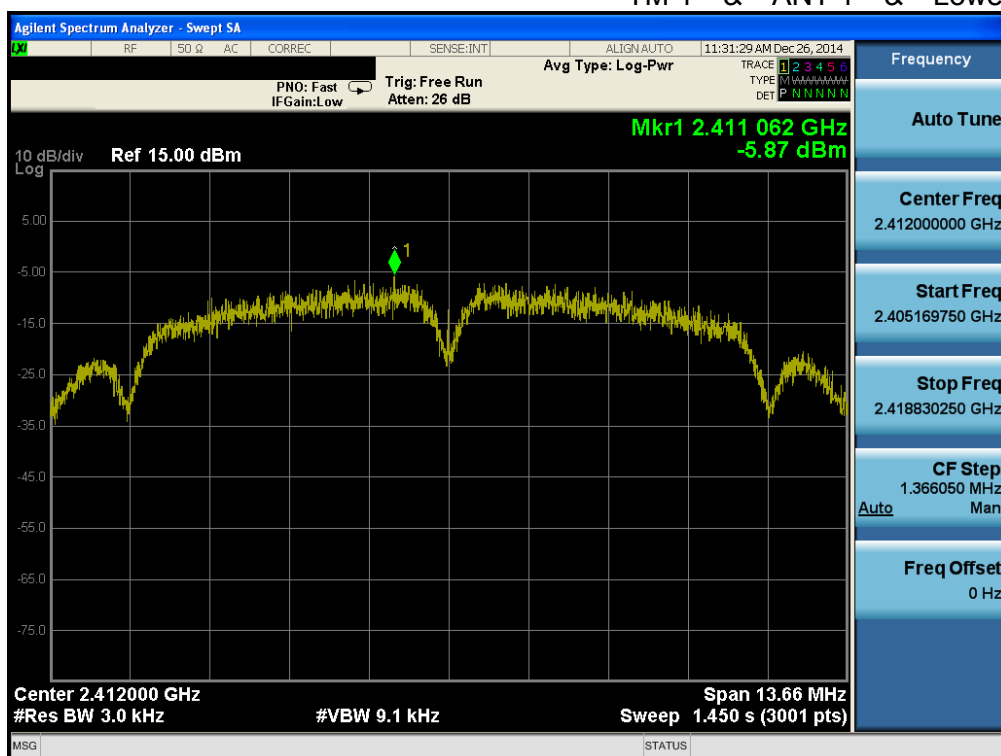
■ Test Results: **Comply**

Test Mode	Frequency	RBW	PKPSD [dBm]		
			ANT 1	ANT 2	SUM (ANT 1 + ANT 2)
TM 1	Lowest	3 kHz	-5.870	-	-
	Middle	3 kHz	-6.350	-	-
	Highest	3 kHz	-6.340	-	-
TM 2	Lowest	3 kHz	-11.330	-	-
	Middle	3 kHz	-9.010	-	-
	Highest	3 kHz	-10.180	-	-
TM 3	Lowest	3 kHz	-15.520	-14.560	-
	Middle	3 kHz	-9.920	-9.110	-
	Highest	3 kHz	-11.340	-11.030	-
TM 4	Lowest	3 kHz	-20.440	-20.460	-
	Middle	3 kHz	-16.620	-17.230	-
	Highest	3 kHz	-17.080	-16.310	-
TM 5	Lowest	3 kHz	-18.310	-18.200	-15.245
	Middle	3 kHz	-13.630	-13.370	-10.488
	Highest	3 kHz	-14.600	-14.010	-11.285
TM 6	Lowest	3 kHz	-24.950	-25.060	-21.995
	Middle	3 kHz	-23.170	-22.520	-19.823
	Highest	3 kHz	-22.070	-21.340	-18.680

■ Result Plots

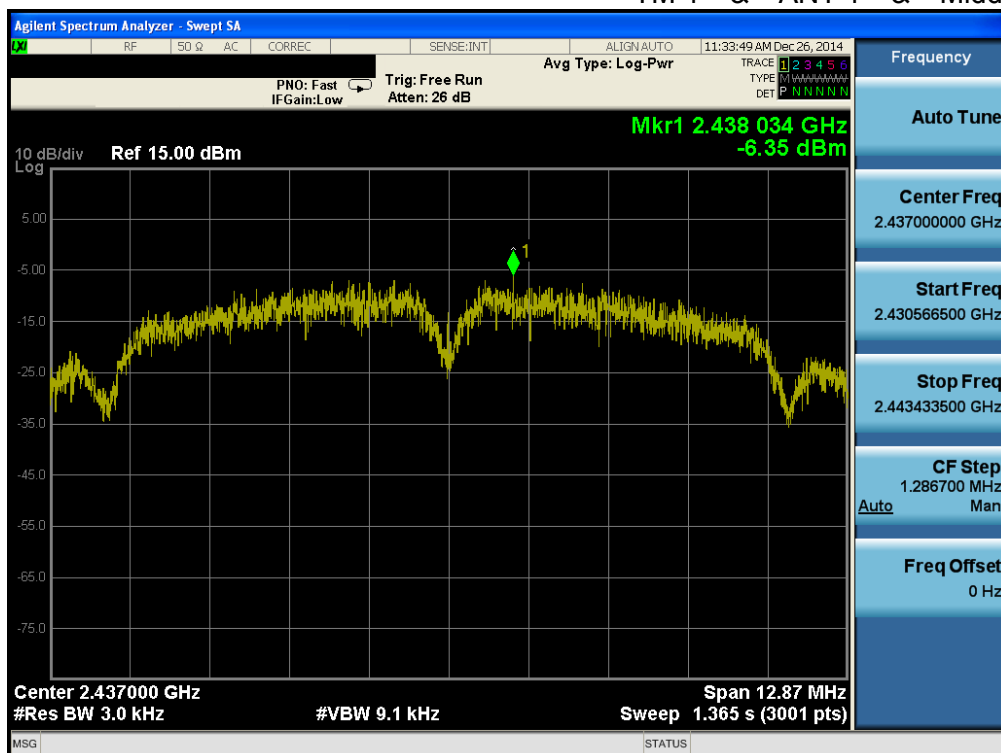
Maximum PPSD

TM 1 & ANT 1 & Lowest



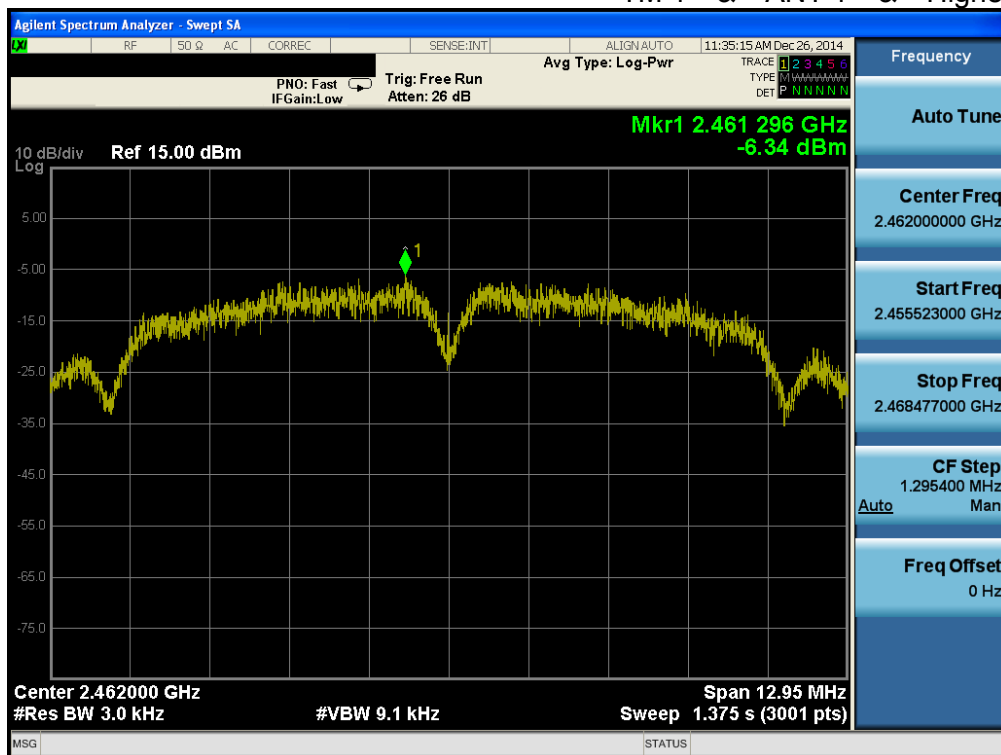
Maximum PPSD

TM 1 & ANT 1 & Middle



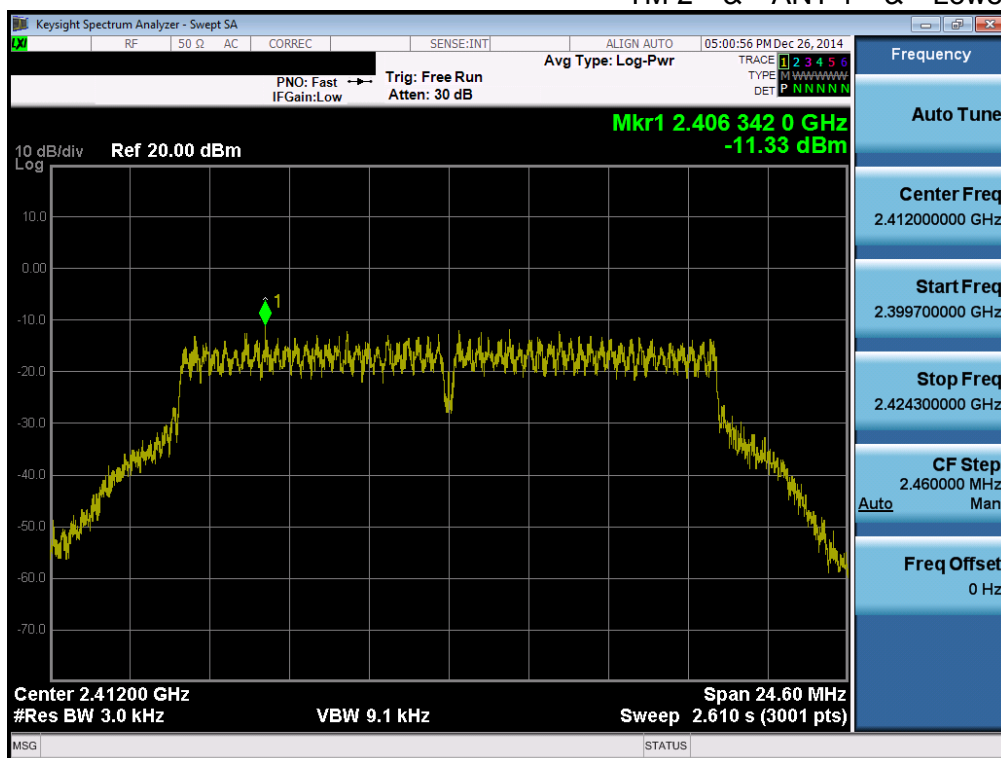
Maximum PPSD

TM 1 & ANT 1 & Highest



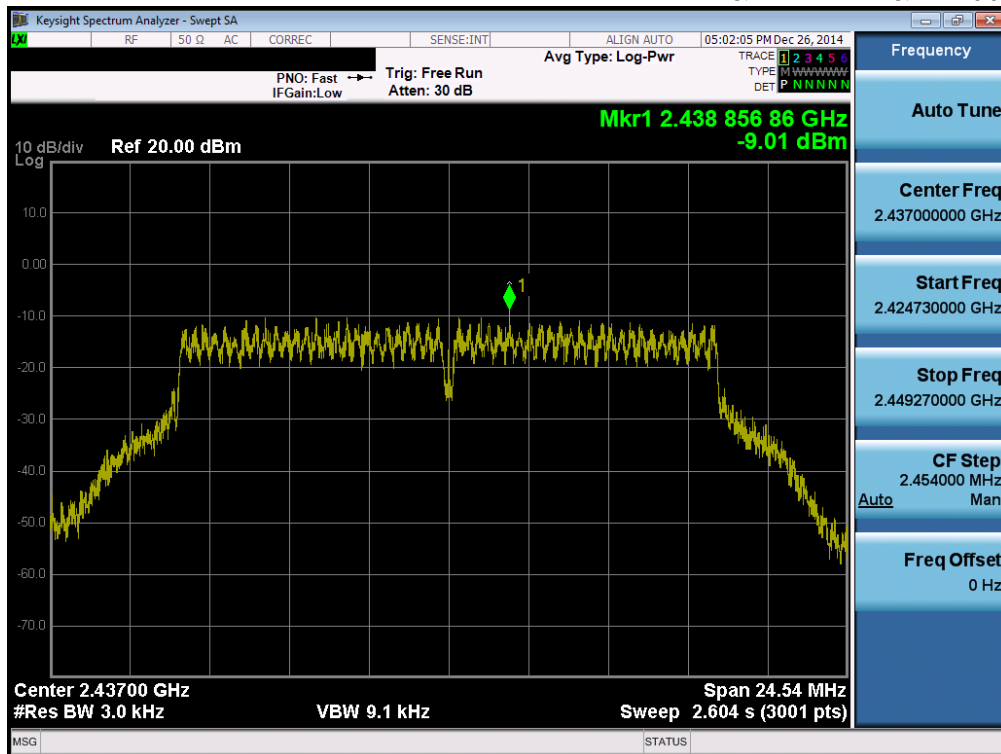
Maximum PPSD

TM 2 & ANT 1 & Lowest



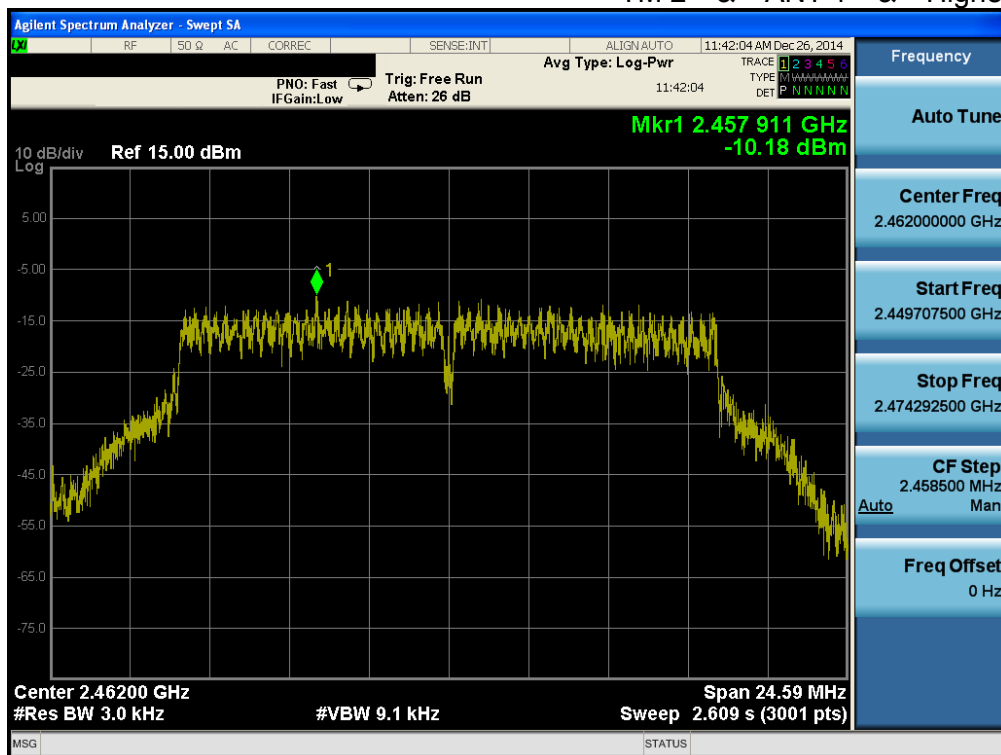
Maximum PPSD

TM 2 & ANT 1 & Middle



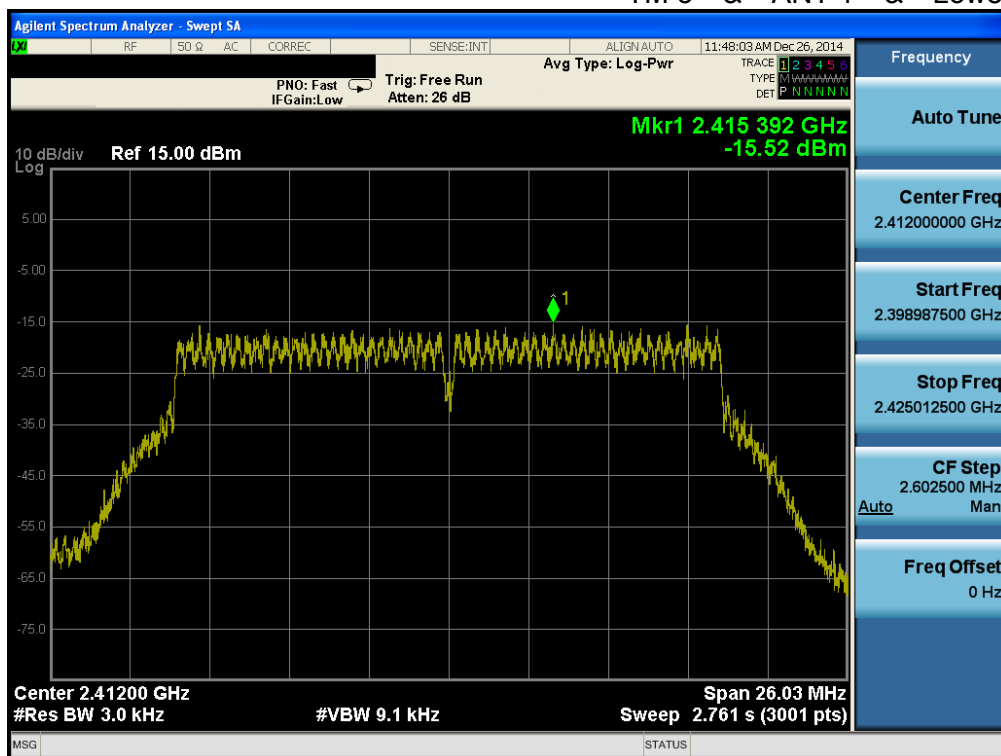
Maximum PPSD

TM 2 & ANT 1 & Highest



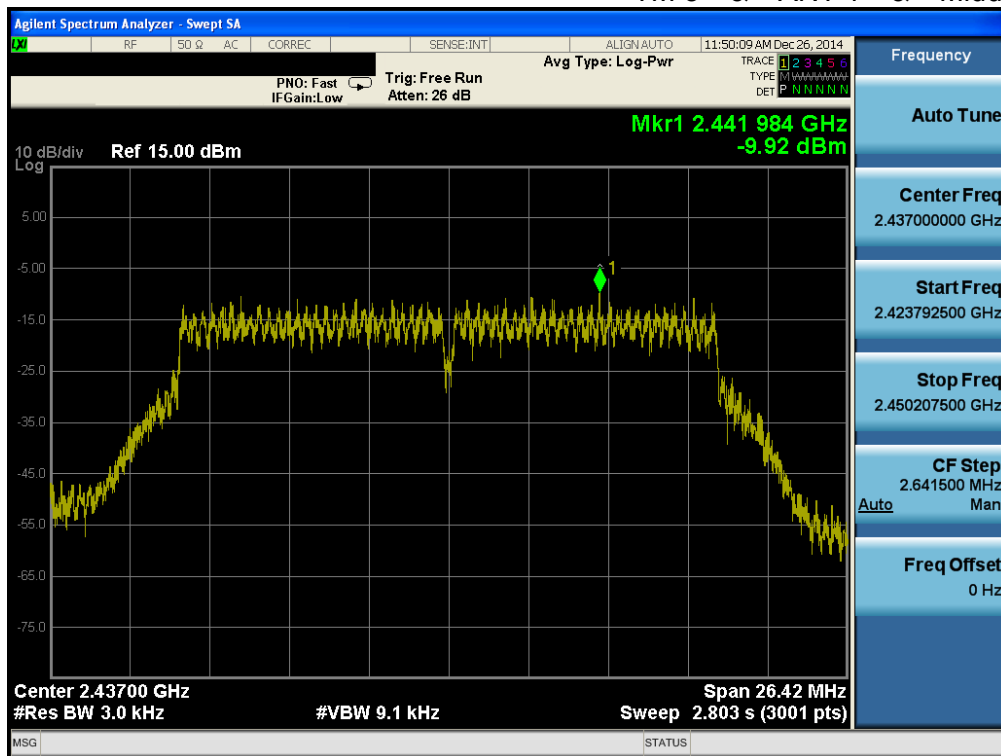
Maximum PPSD

TM 3 & ANT 1 & Lowest

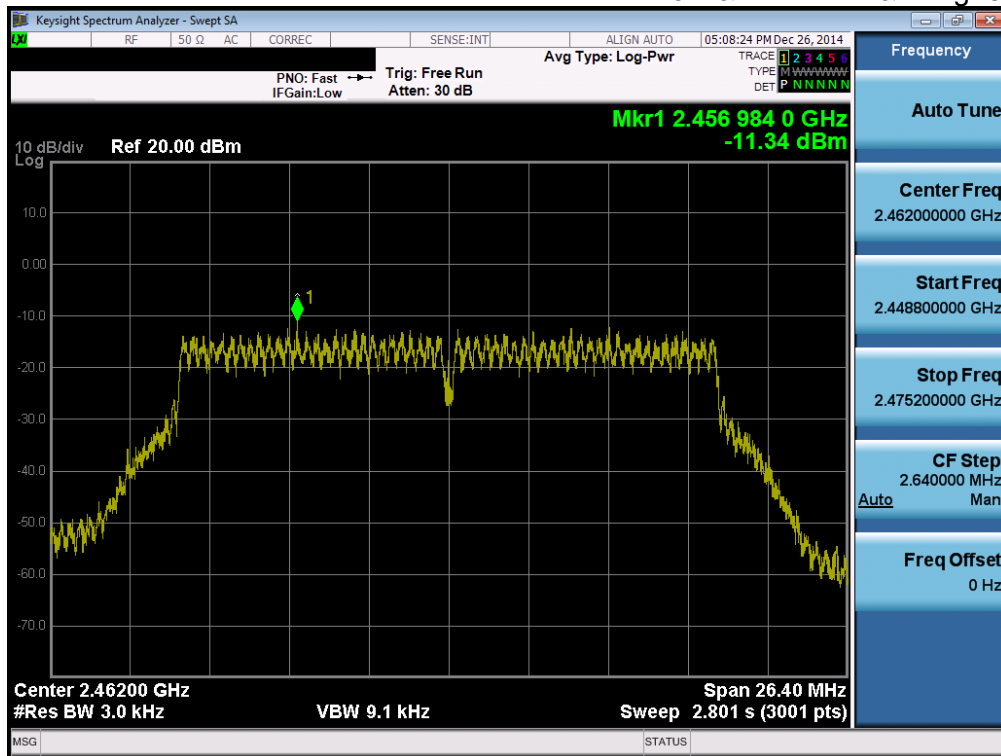


Maximum PPSD

TM 3 & ANT 1 & Middle

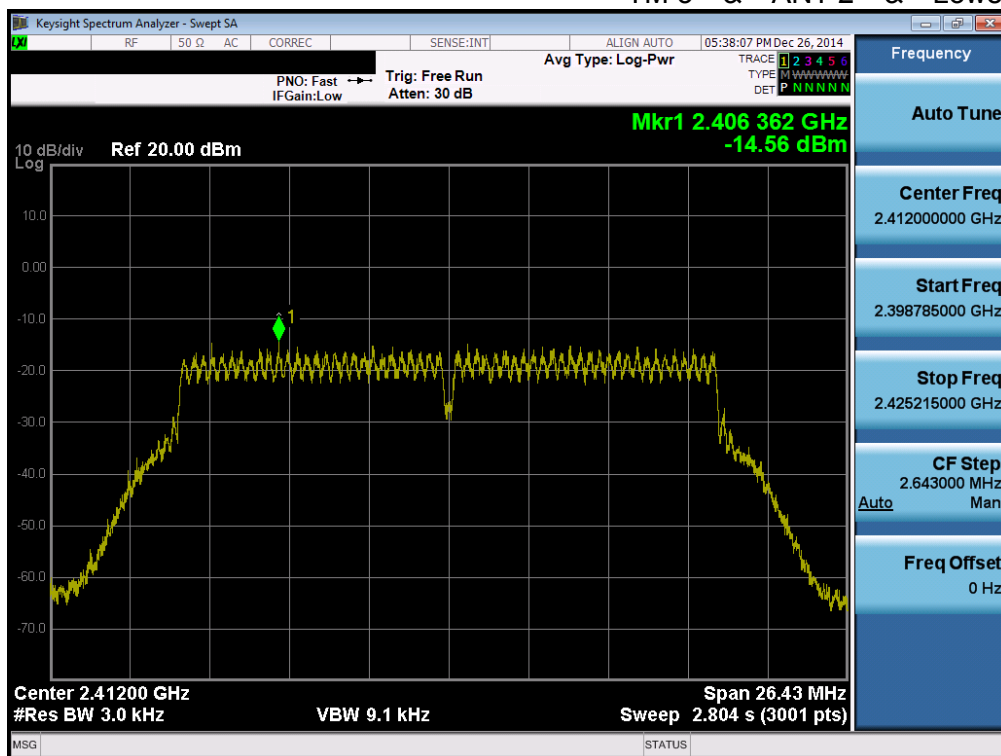


TM 3 & ANT 1 & Highest



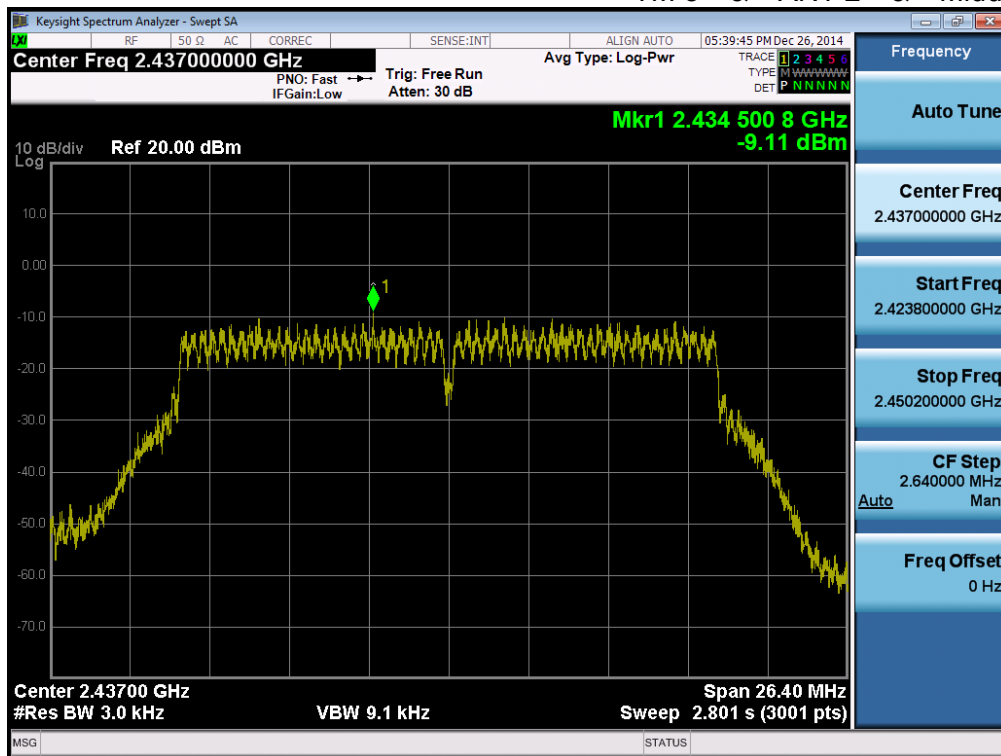
Maximum PPSD

TM 3 & ANT 2 & Lowest



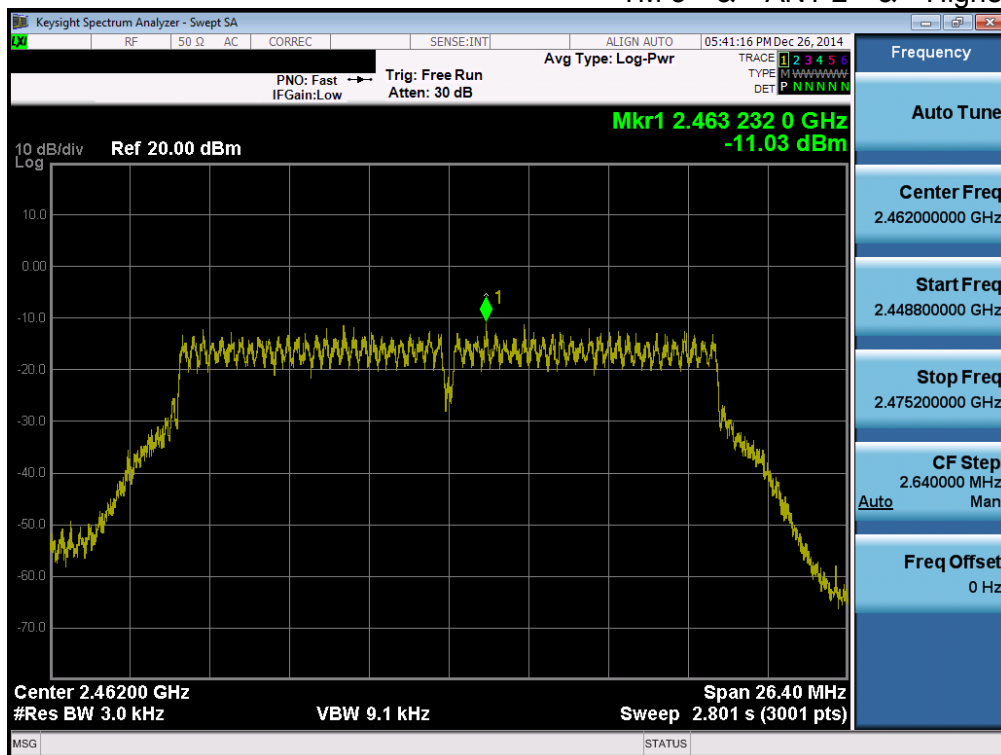
Maximum PPSD

TM 3 & ANT 2 & Middle



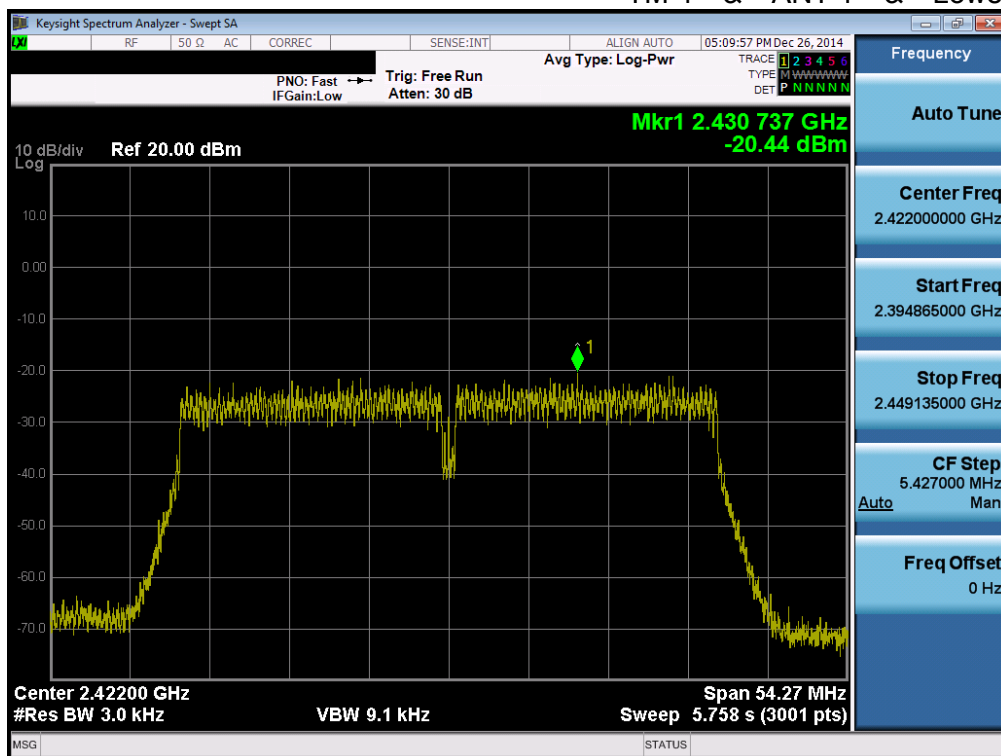
Maximum PPSD

TM 3 & ANT 2 & Highest



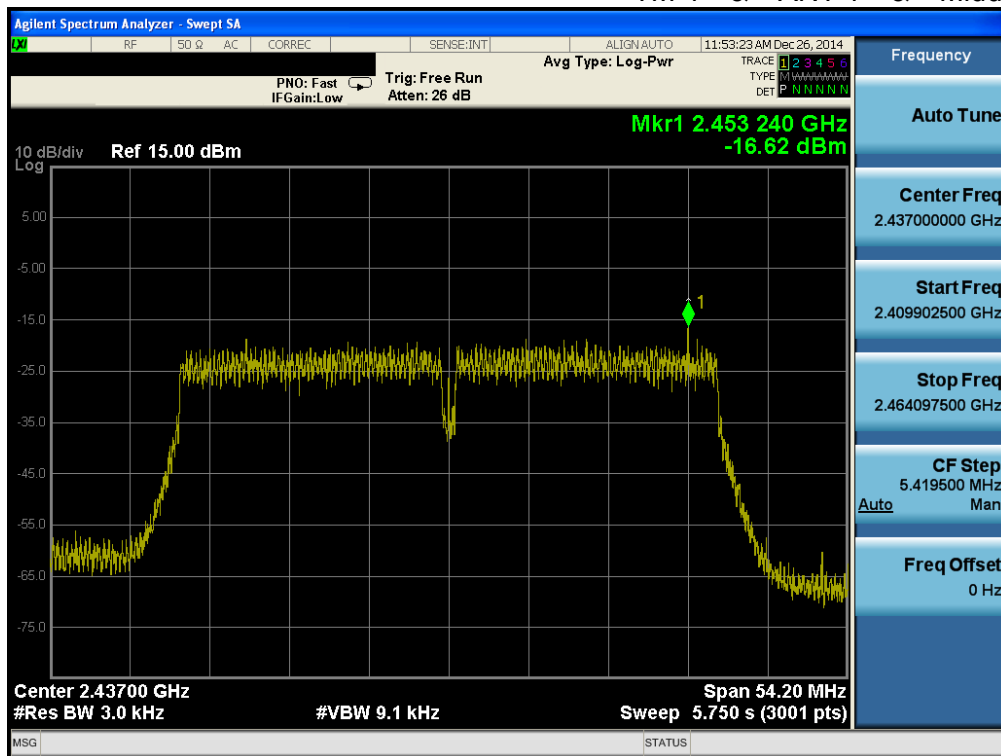
Maximum PPSD

TM 4 & ANT 1 & Lowest



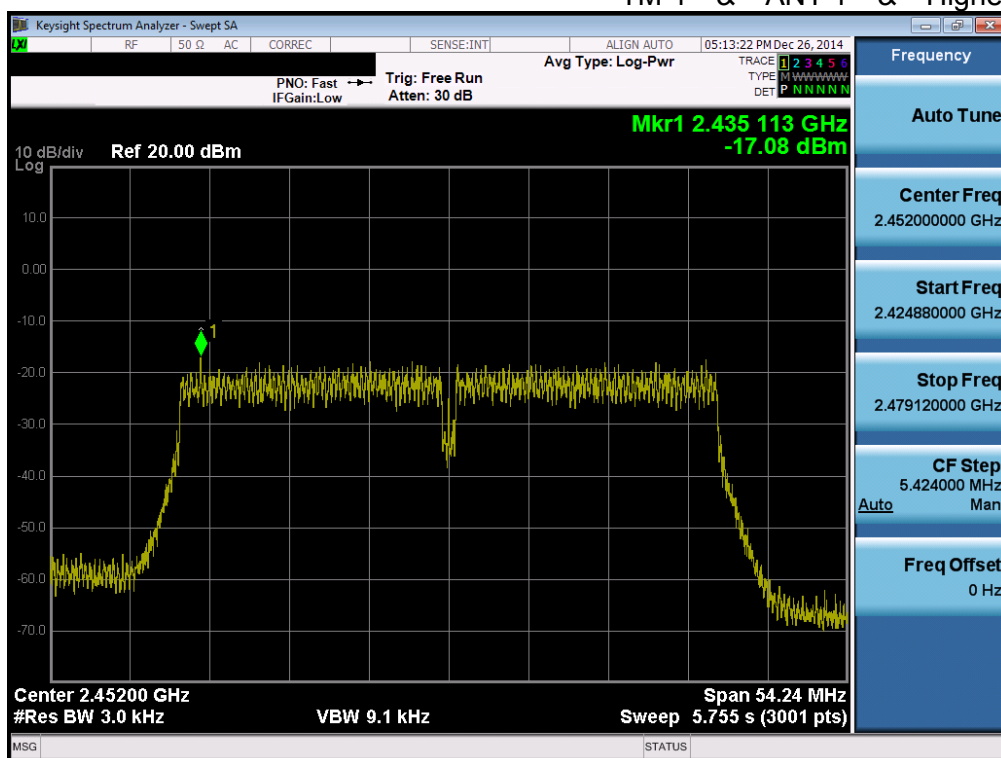
Maximum PPSD

TM 4 & ANT 1 & Middle



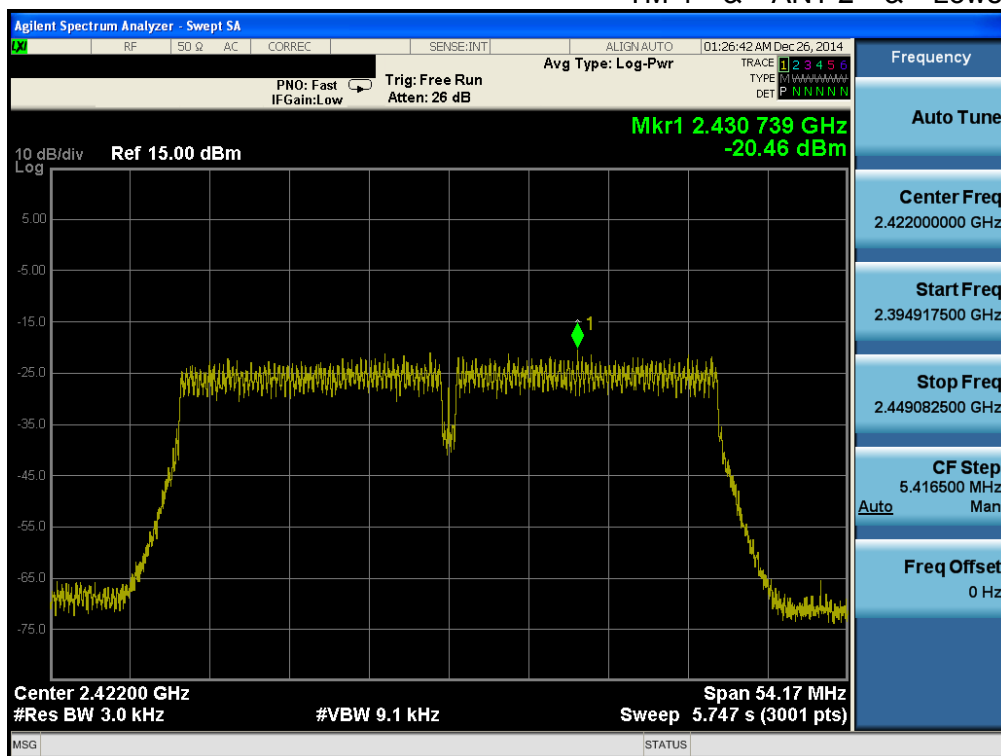
Maximum PPSD

TM 4 & ANT 1 & Highest



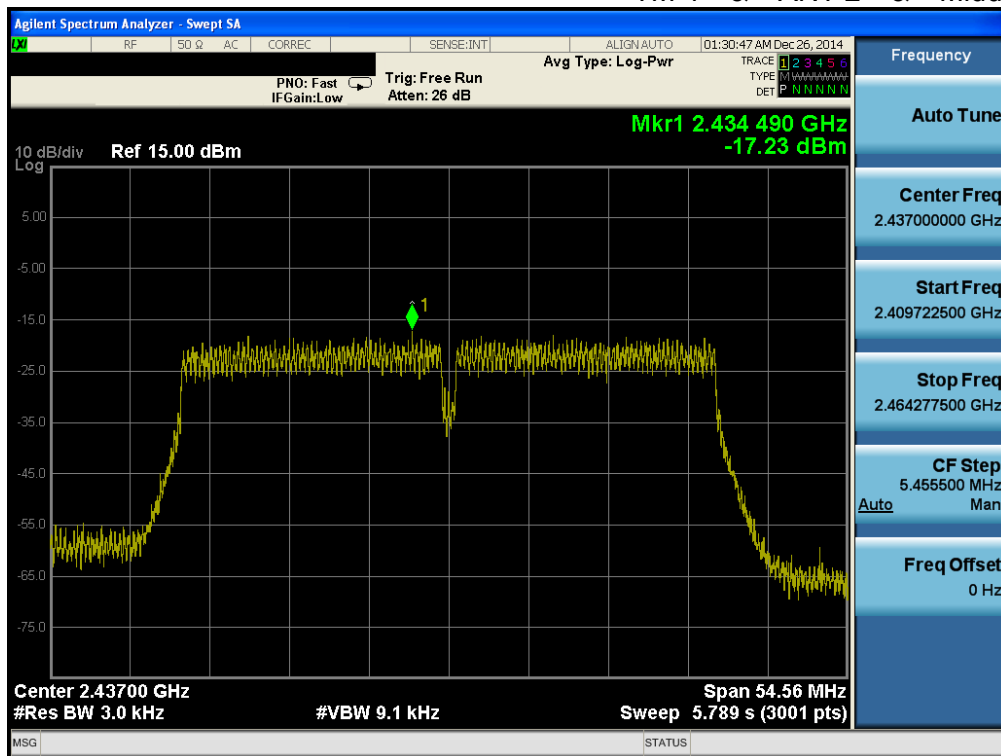
Maximum PPSD

TM 4 & ANT 2 & Lowest



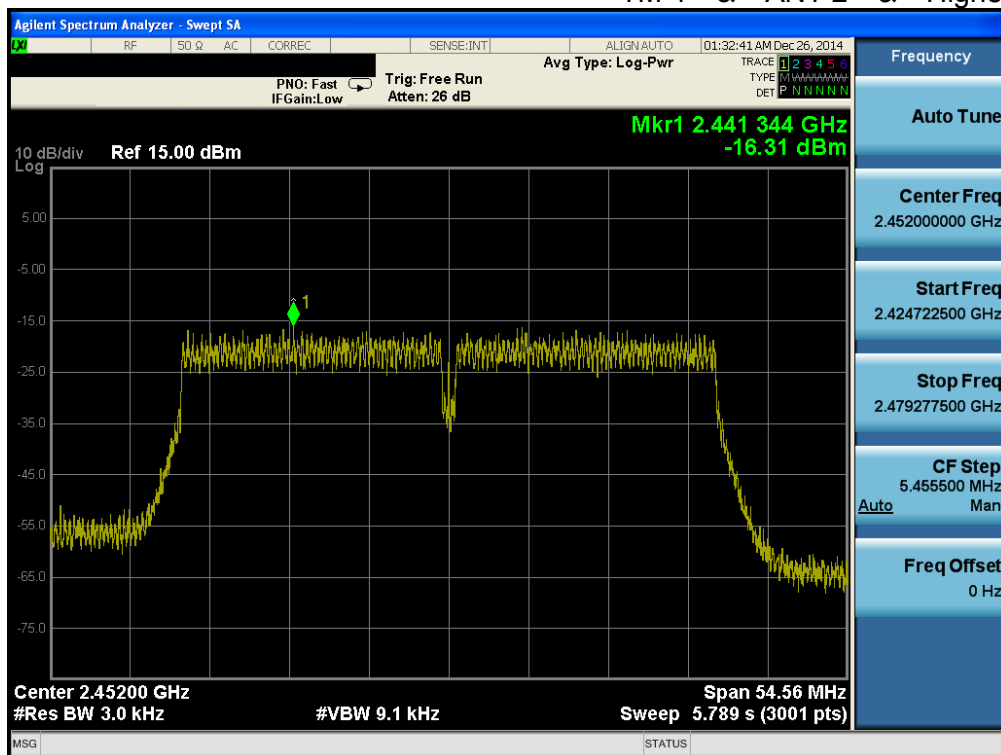
Maximum PPSD

TM 4 & ANT 2 & Middle



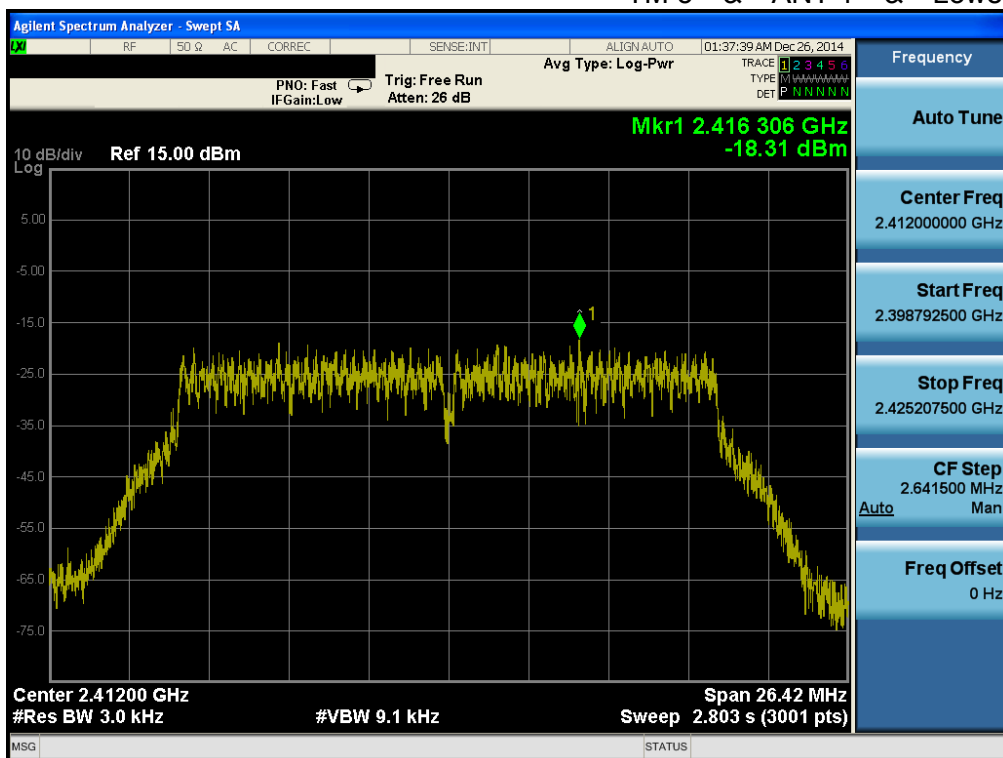
Maximum PPSD

TM 4 & ANT 2 & Highest



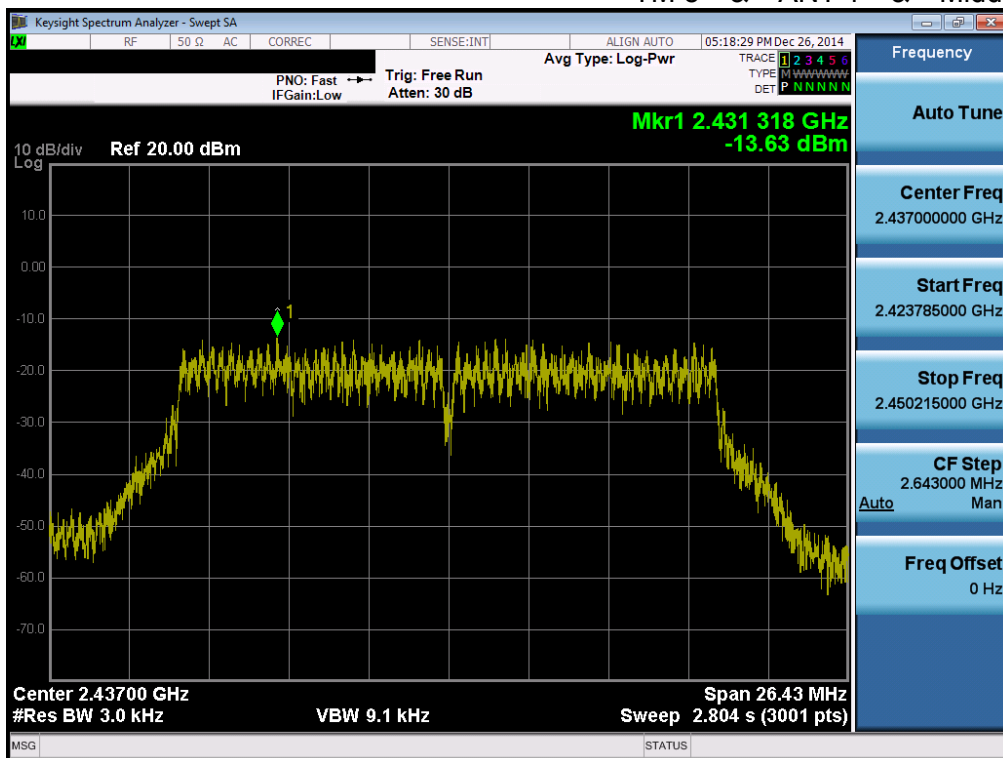
Maximum PPSD

TM 5 & ANT 1 & Lowest



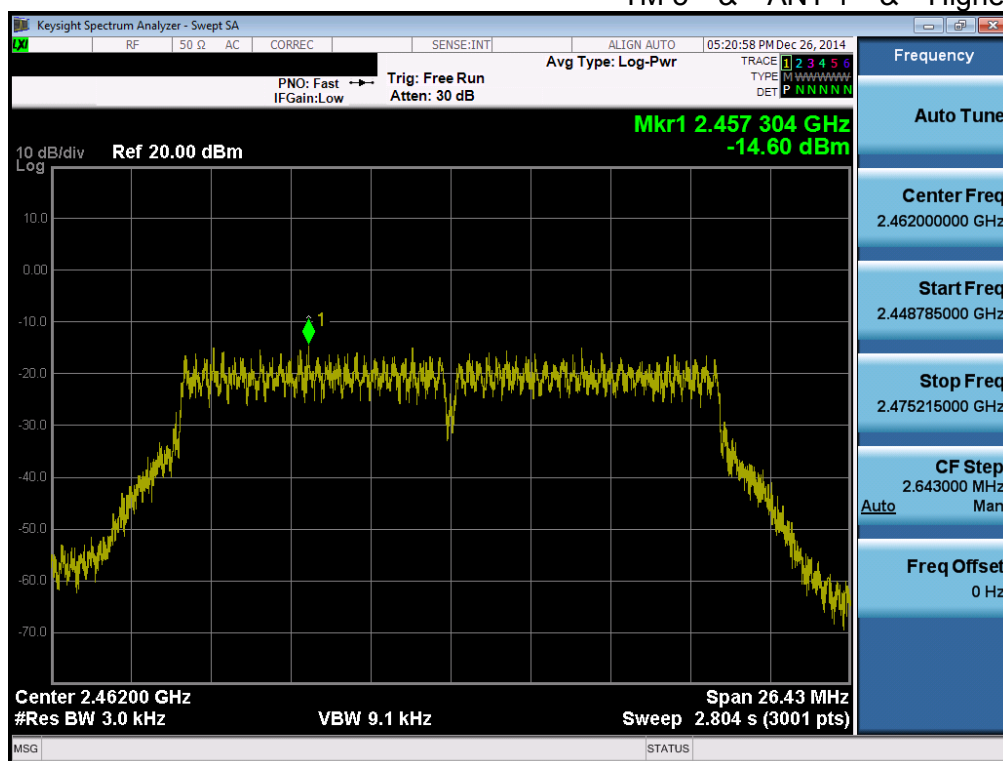
Maximum PPSD

TM 5 & ANT 1 & Middle



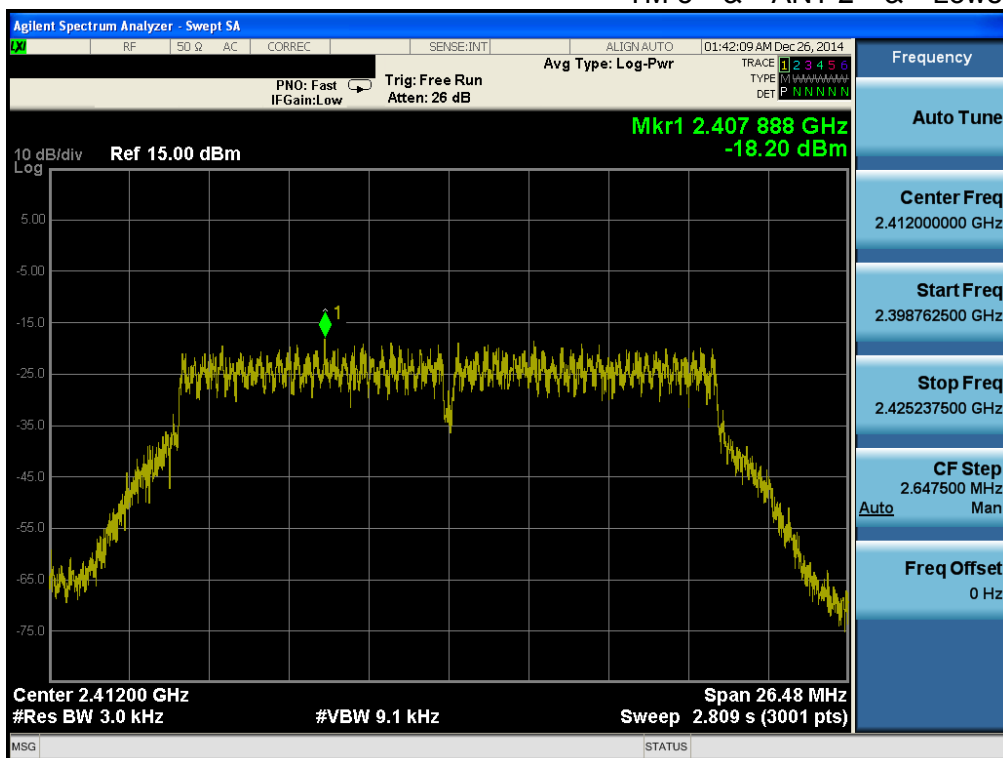
Maximum PPSD

TM 5 & ANT 1 & Highest



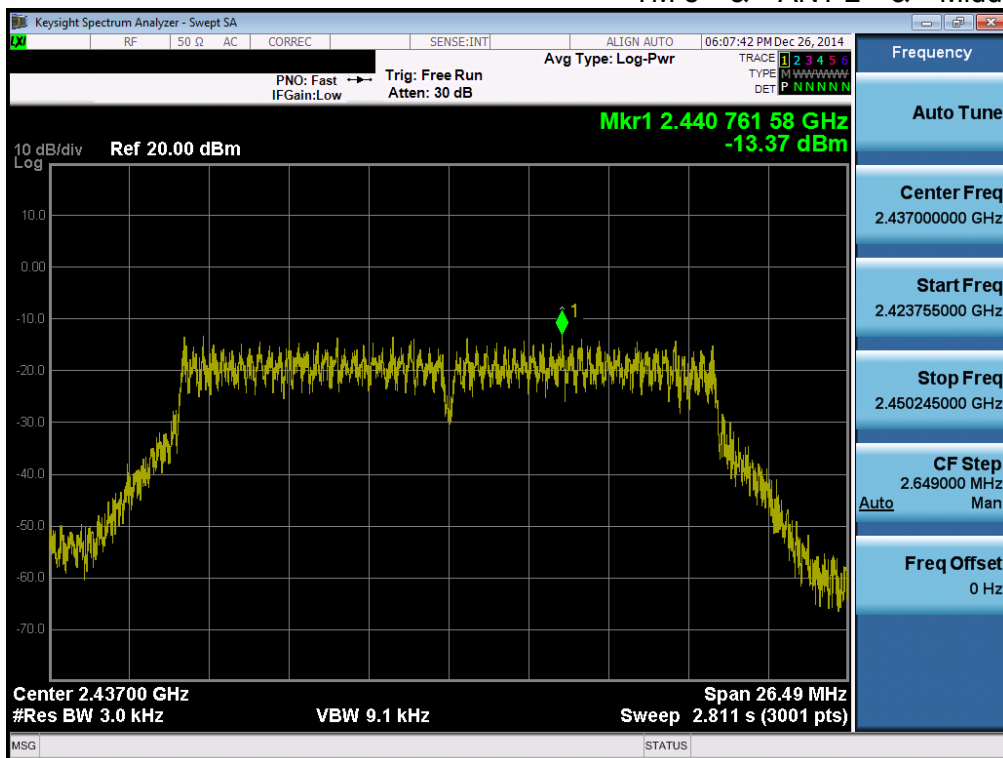
Maximum PPSD

TM 5 & ANT 2 & Lowest

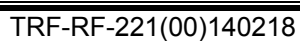


Maximum PPSD

TM 5 & ANT 2 & Middle

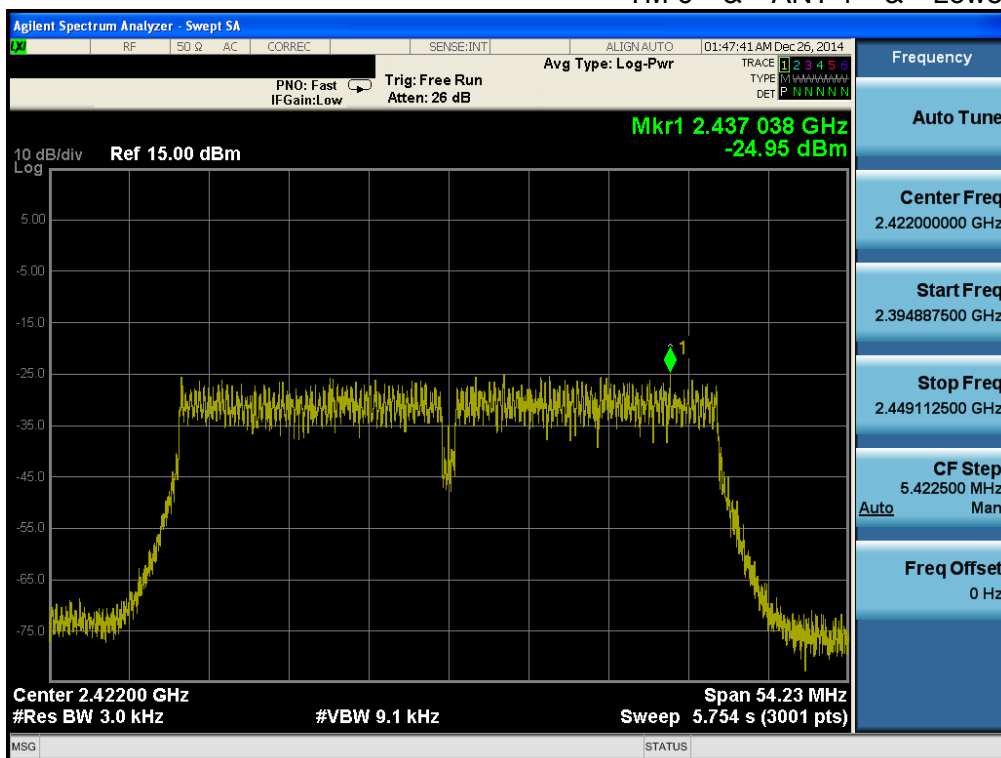


TM 5 & ANT 2 & Highest



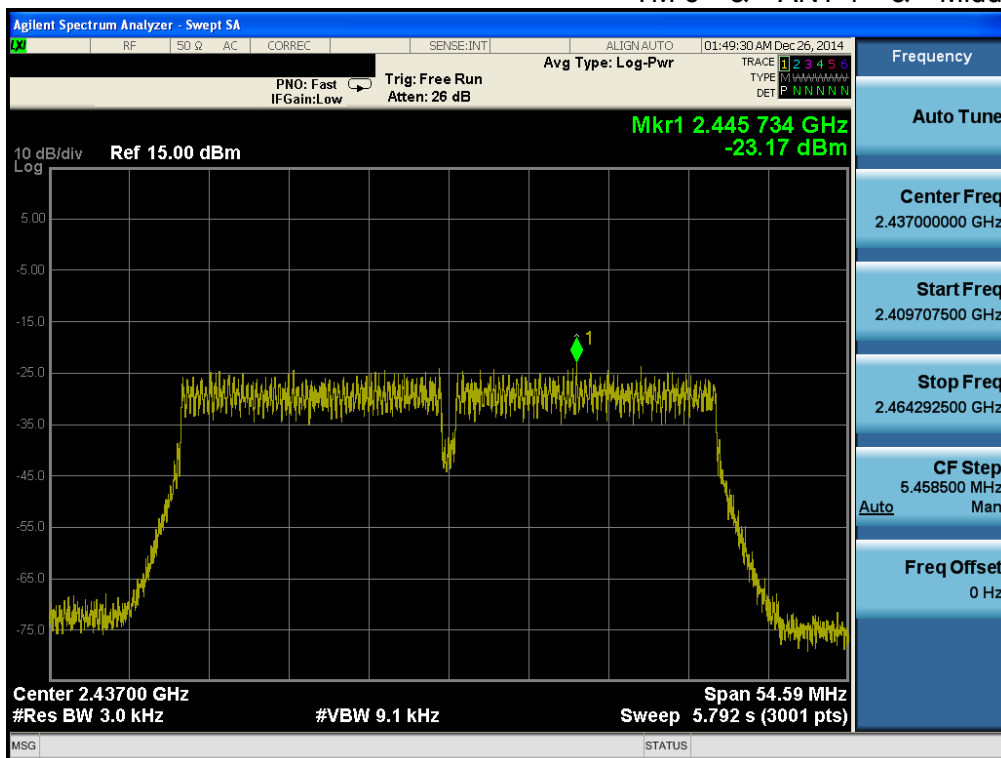
Maximum PPSD

TM 6 & ANT 1 & Lowest



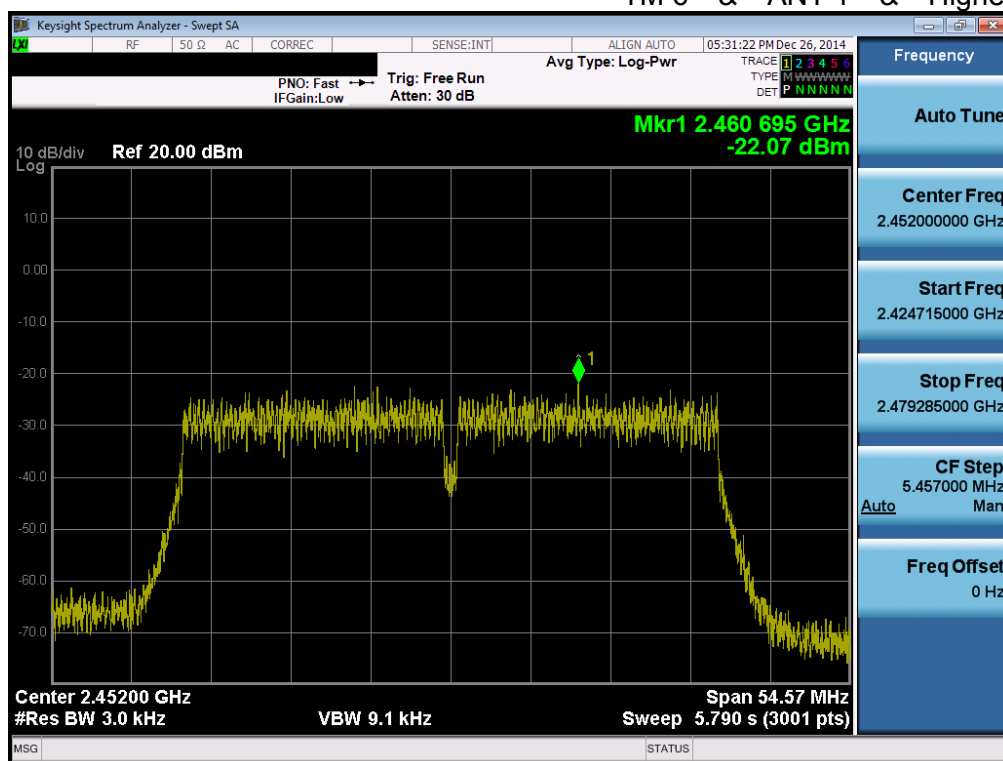
Maximum PPSD

TM 6 & ANT 1 & Middle



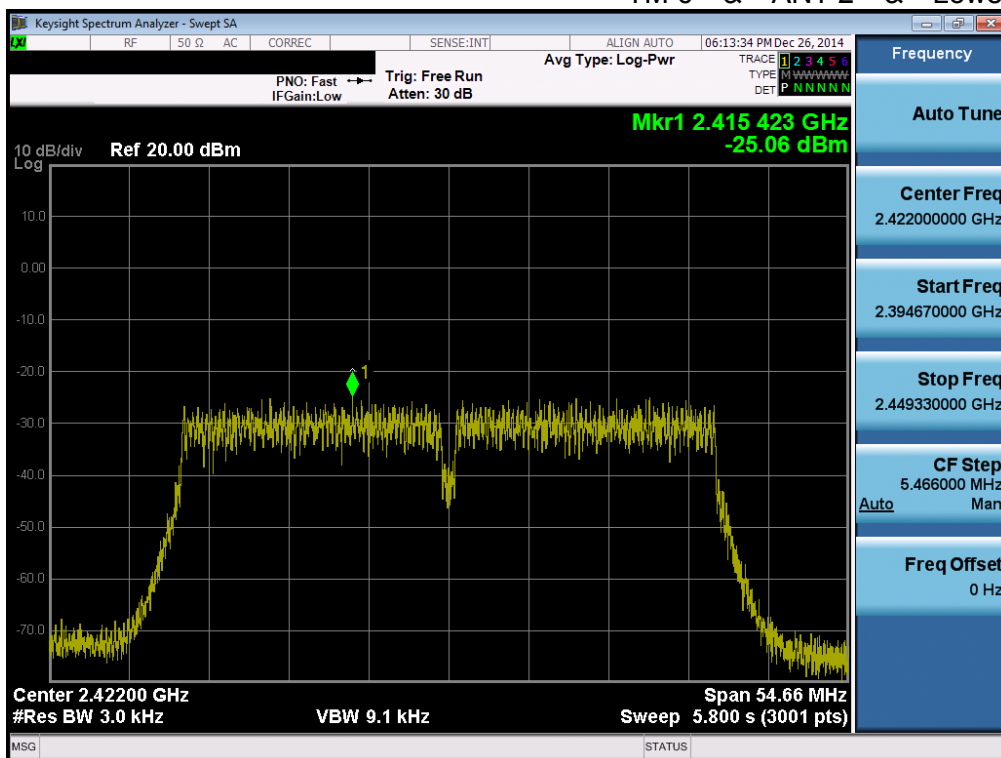
Maximum PPSD

TM 6 & ANT 1 & Highest



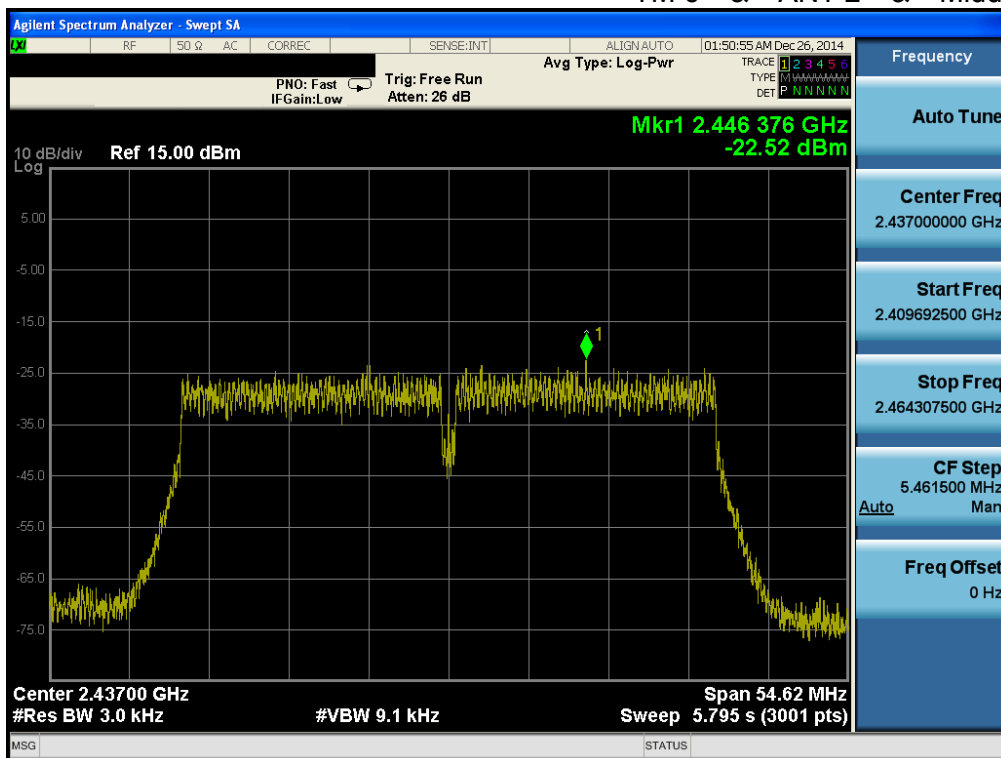
Maximum PPSD

TM 6 & ANT 2 & Lowest



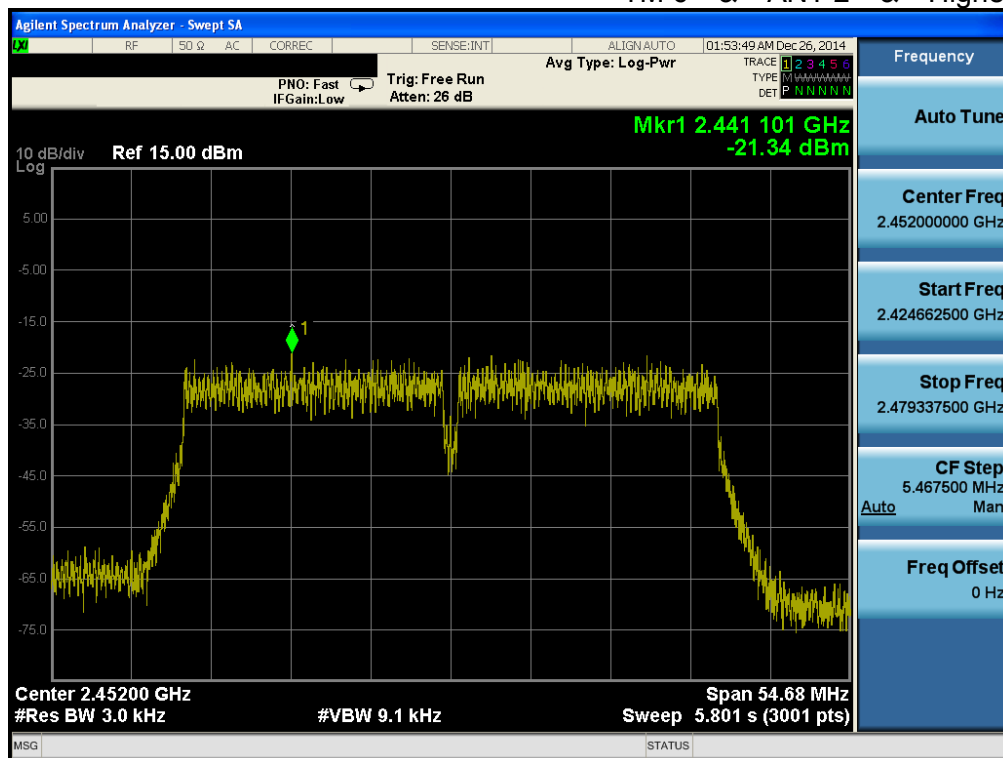
Maximum PPSD

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) & RSS-210 [A8.5]

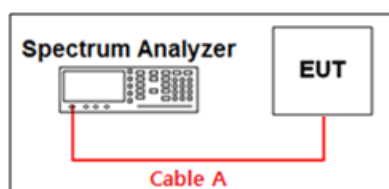
§15.247(d) specifies that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

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



■ Test Procedure: KDB 558074 D01 DTS Meas. Guidance v03r2

- 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 for below 1 GHz, 1 MHz for above 1 GHz(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

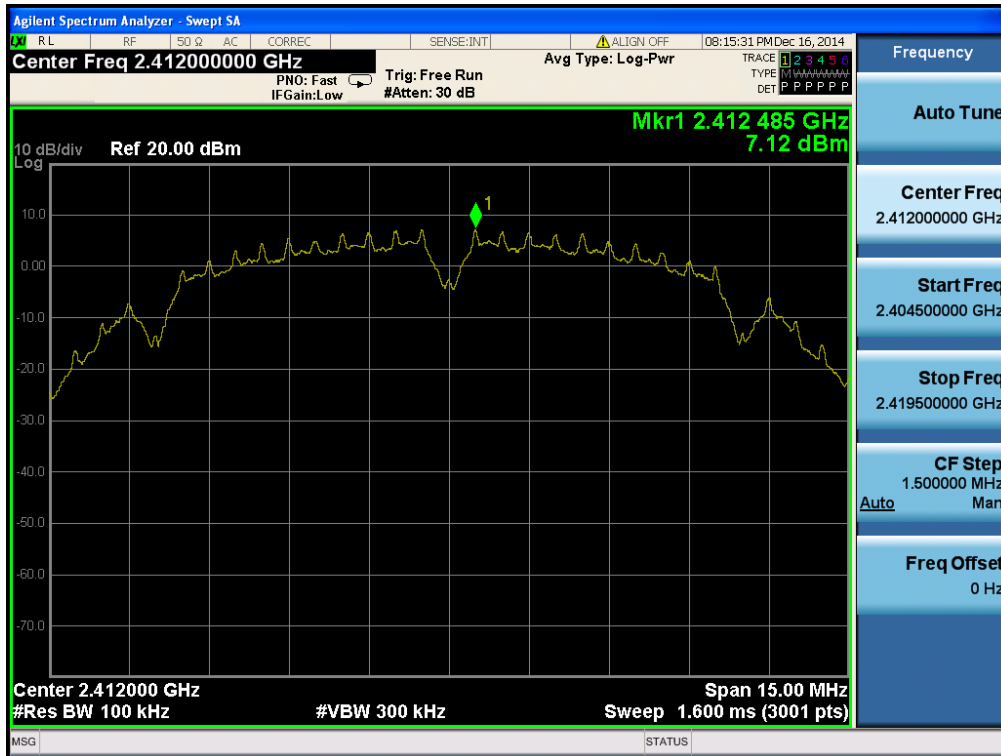
RBW= 1MHz, VBW= 3 MHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT: 40001

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

■ Result Plots

TM 1 & ANT 1 & Lowest

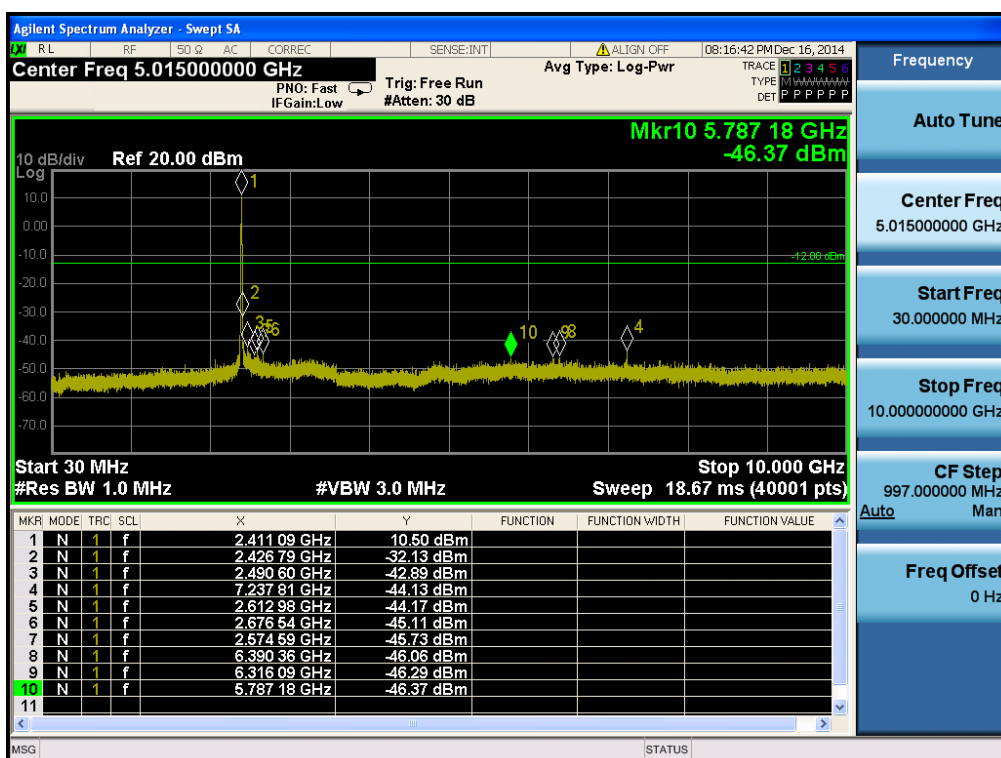
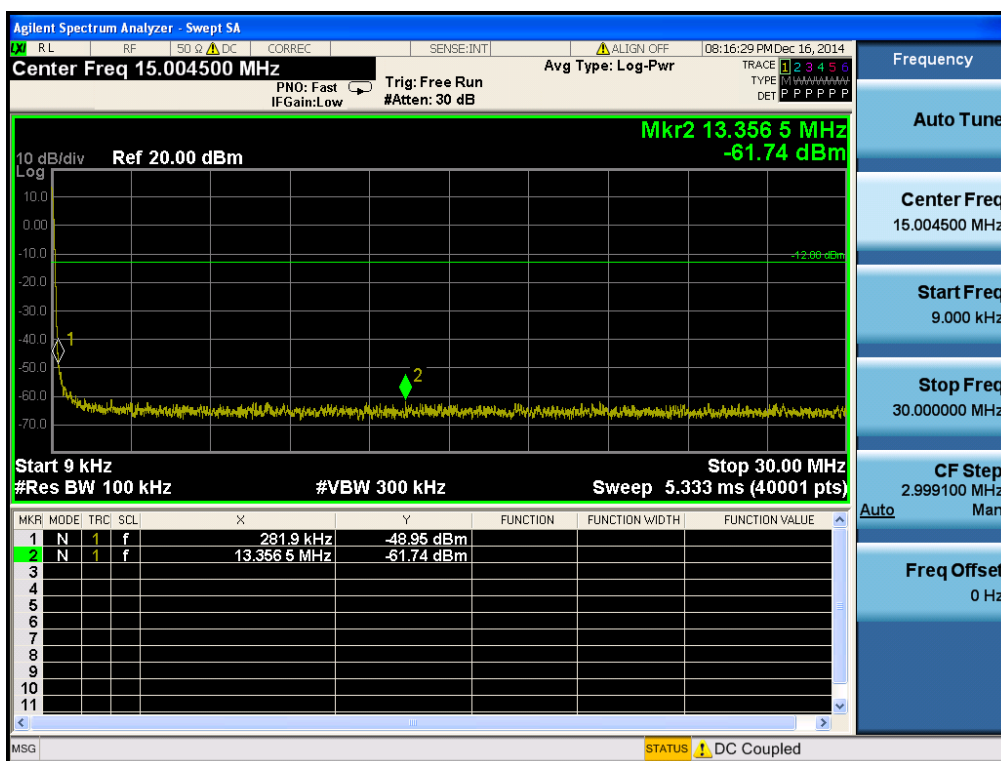
Reference



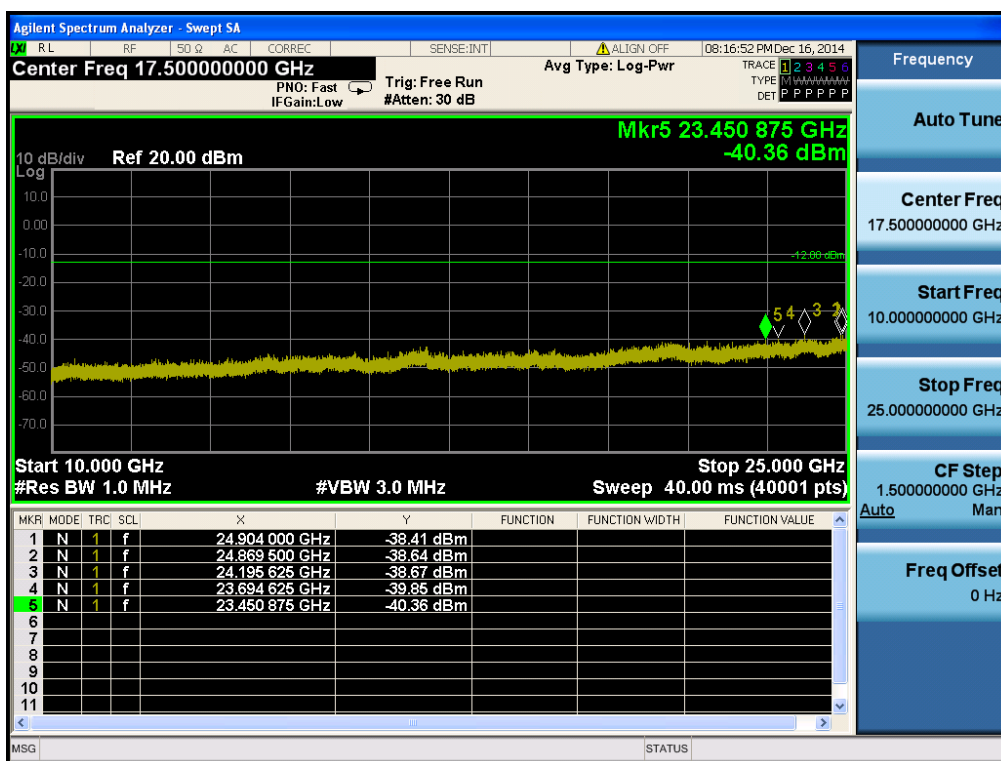
Low Band-edge



Conducted Spurious Emissions

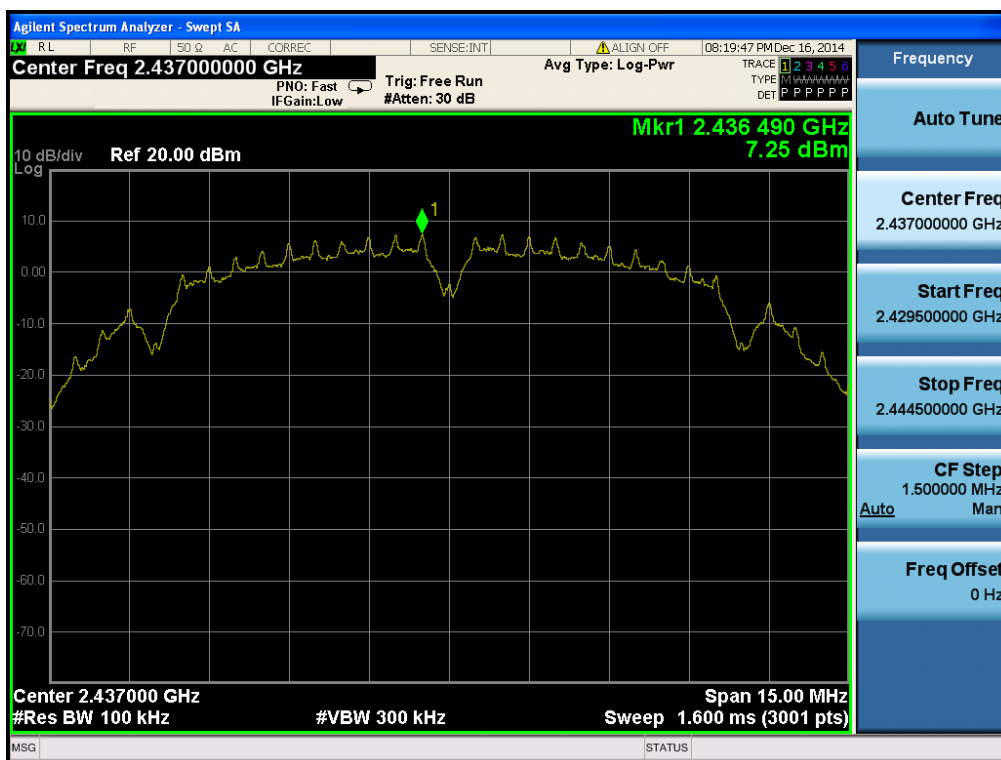


Conducted Spurious Emissions

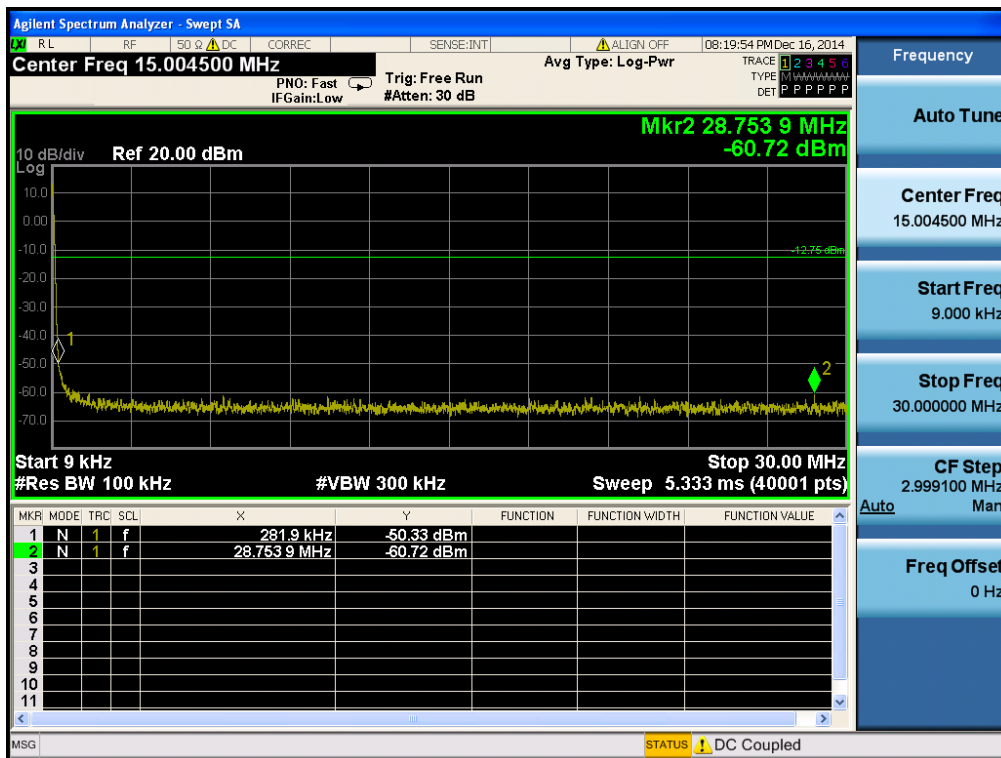


TM 1 & ANT 1 & Middle

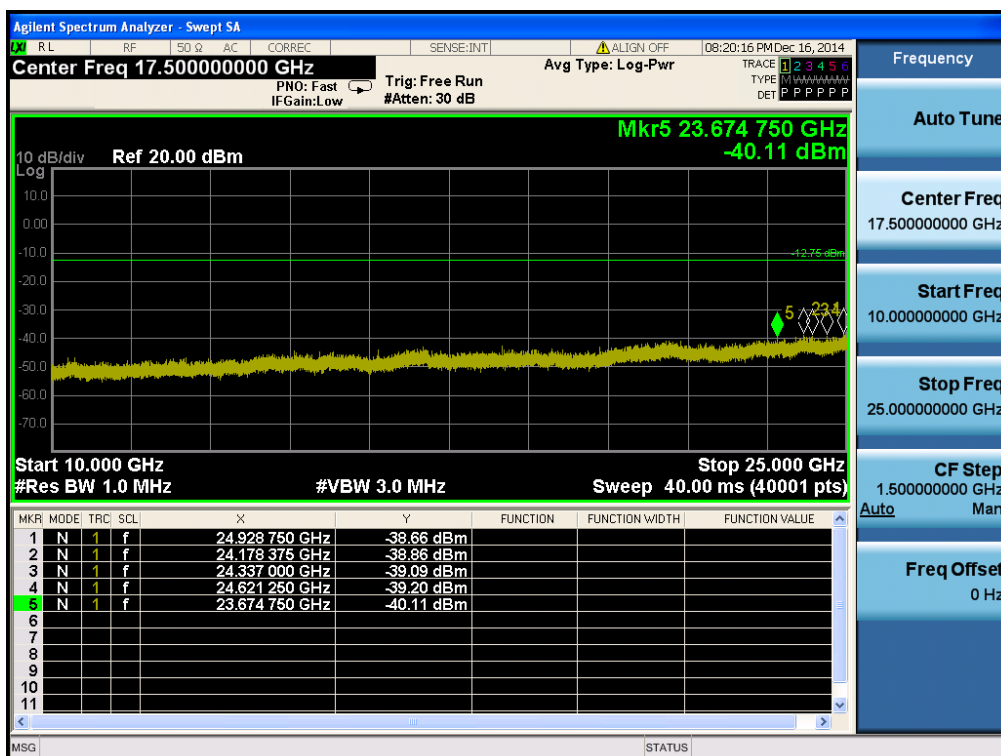
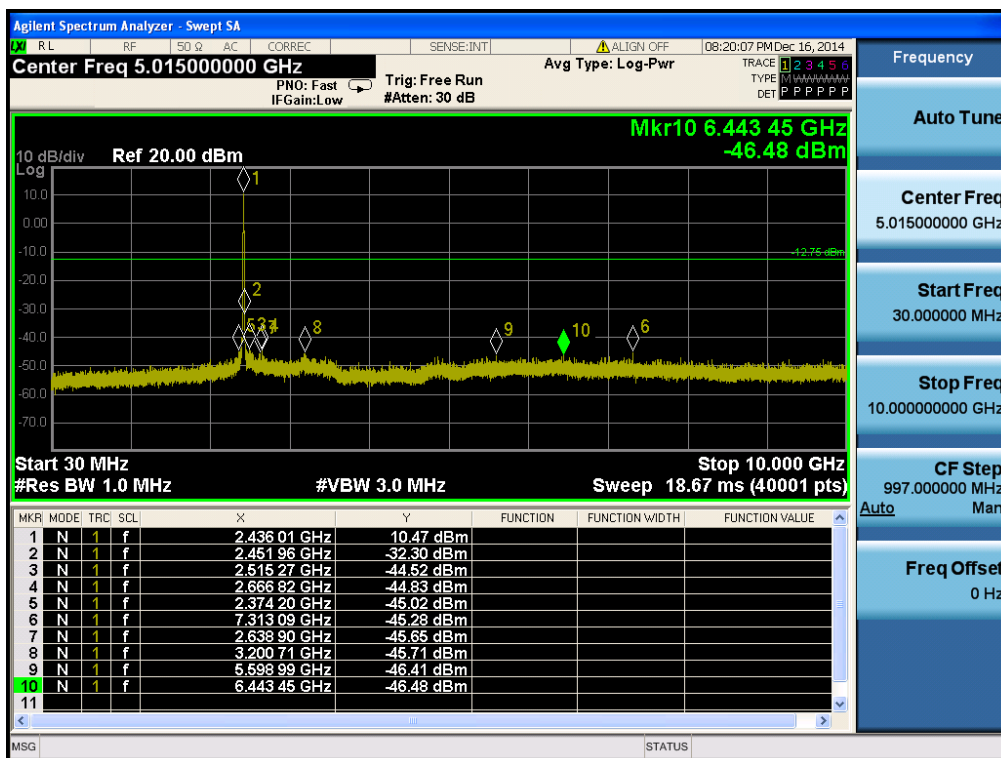
Reference



Conducted Spurious Emissions

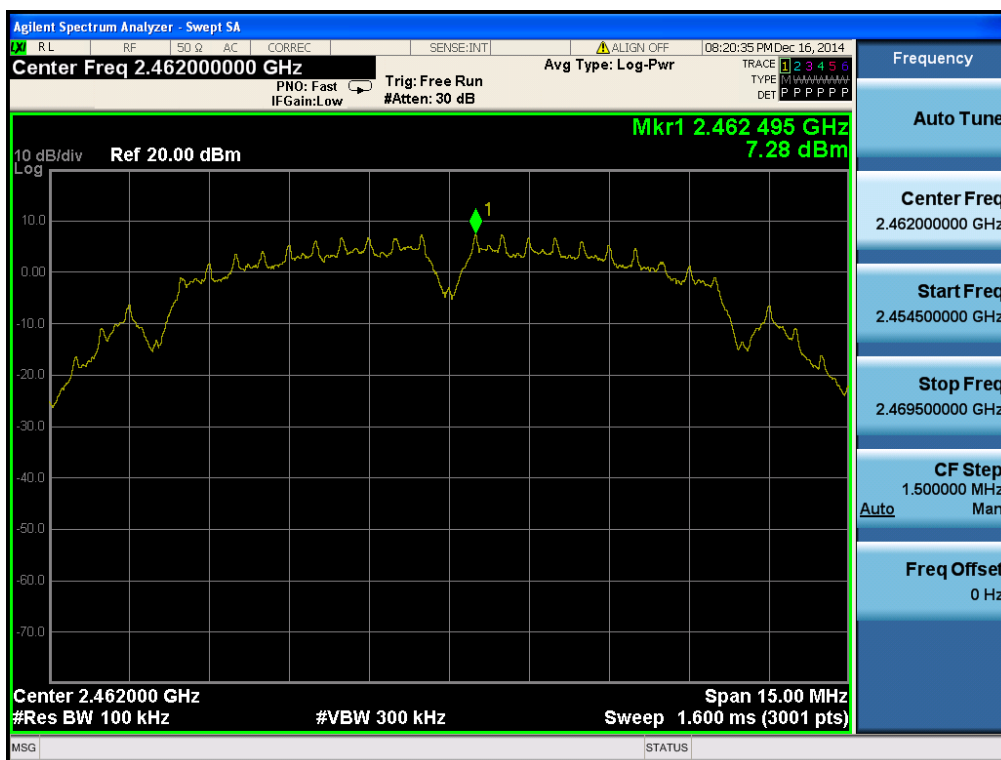


Conducted Spurious Emissions

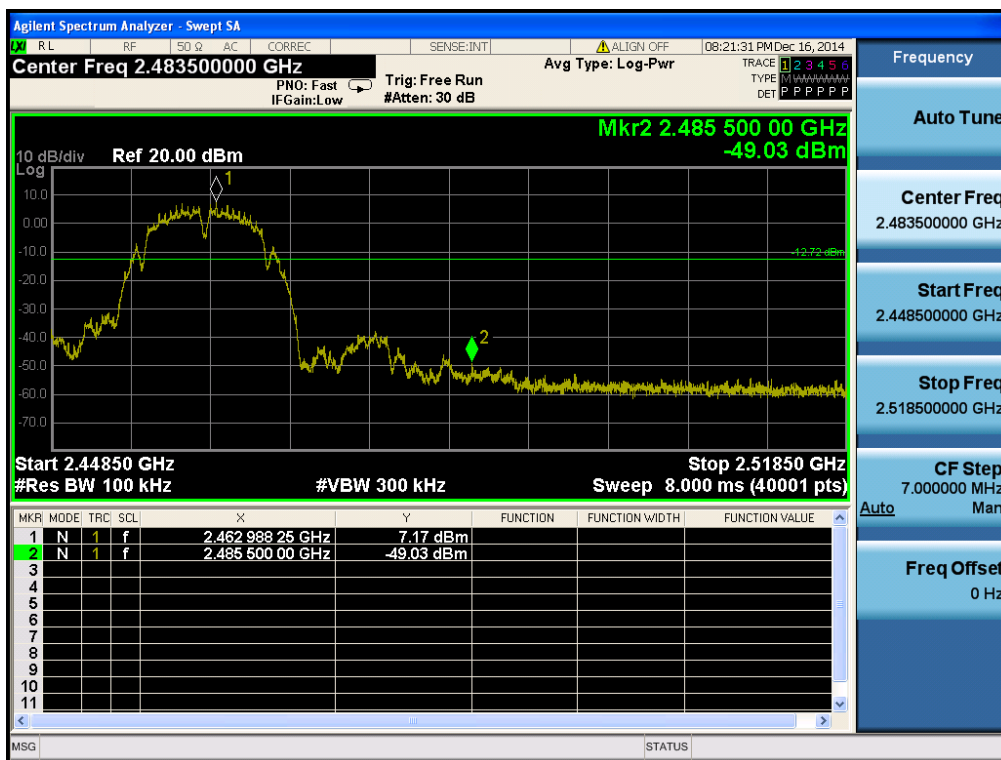


TM 1 & ANT 1 & Highest

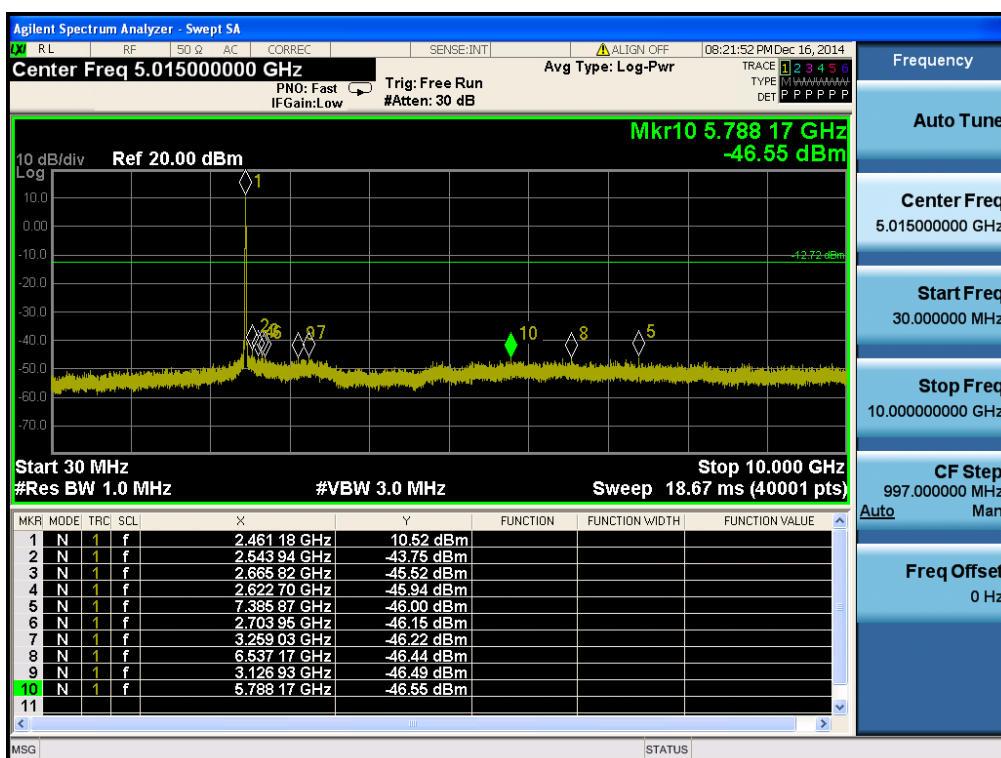
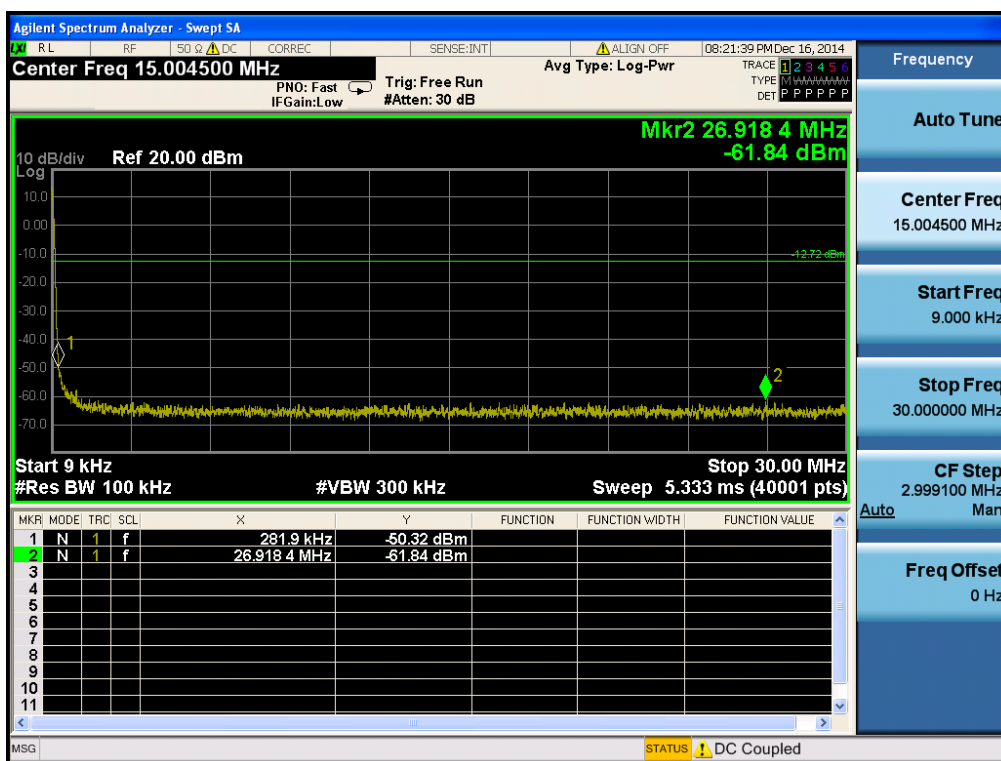
Reference



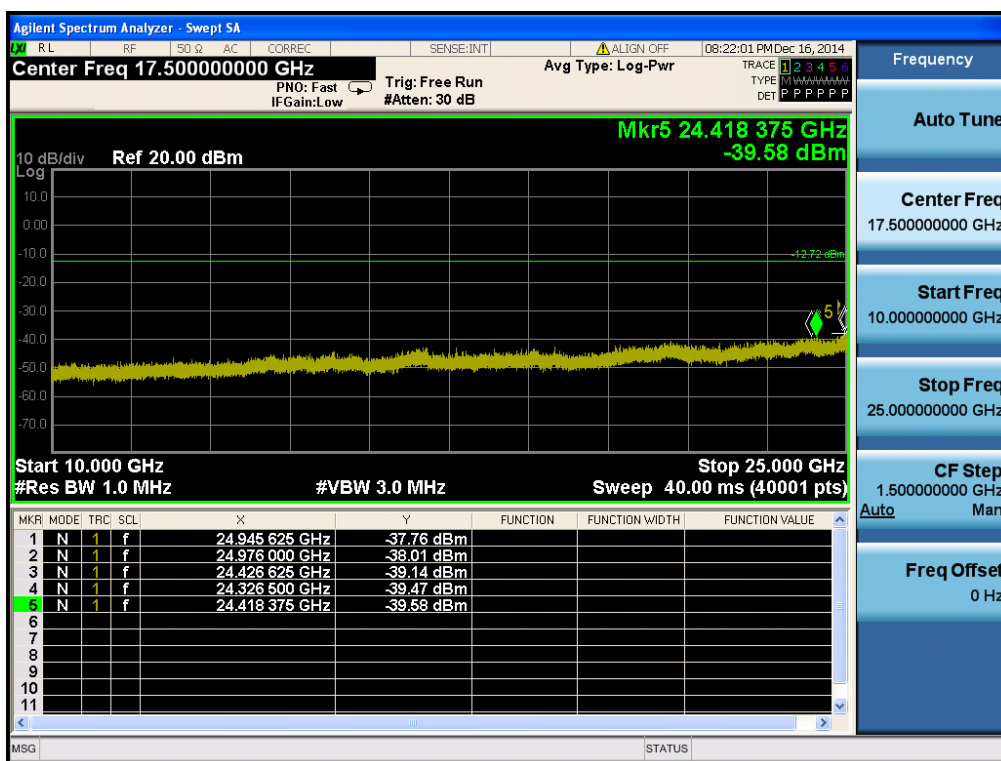
High Band-edge



Conducted Spurious Emissions

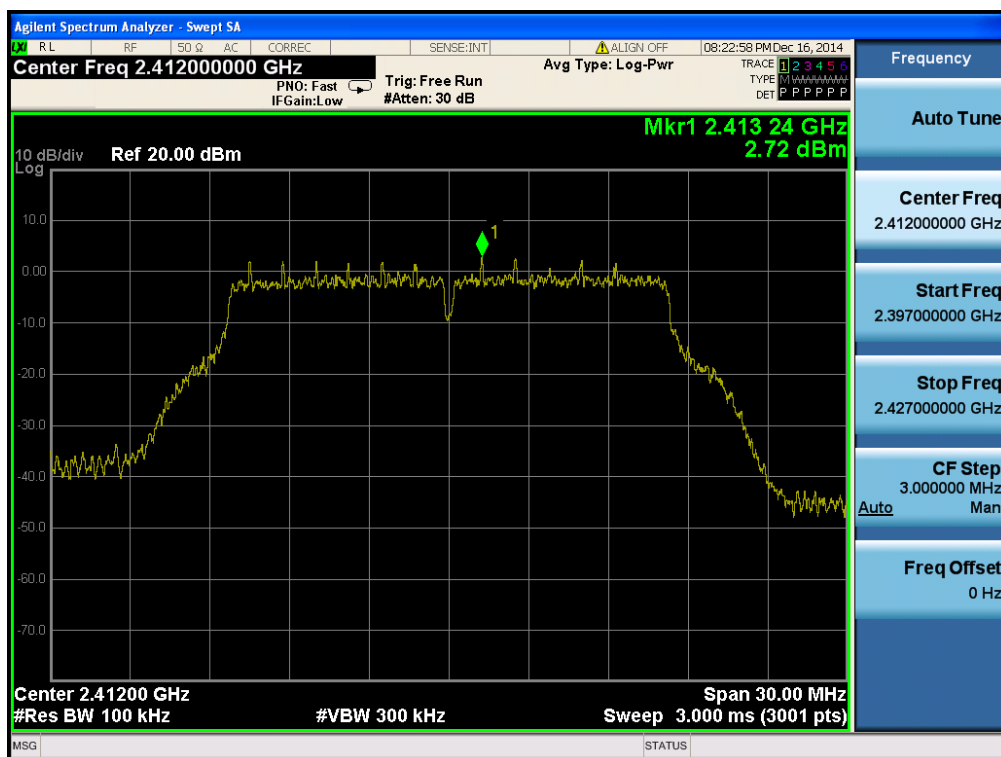


Conducted Spurious Emissions

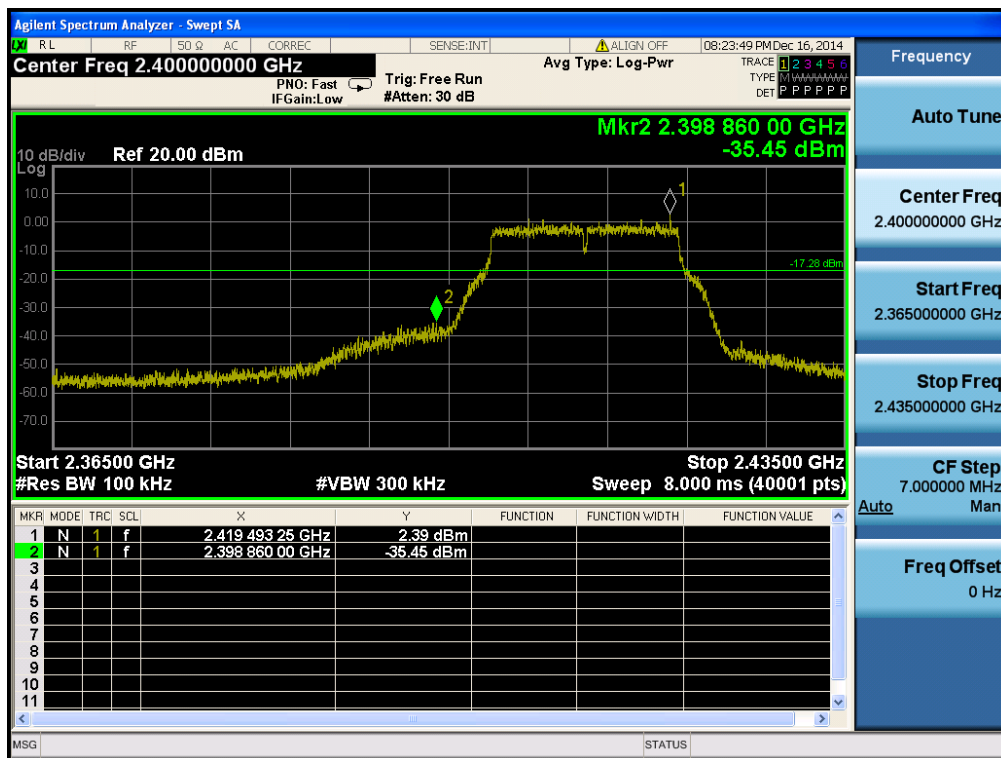


TM 2 & ANT 1 & Lowest

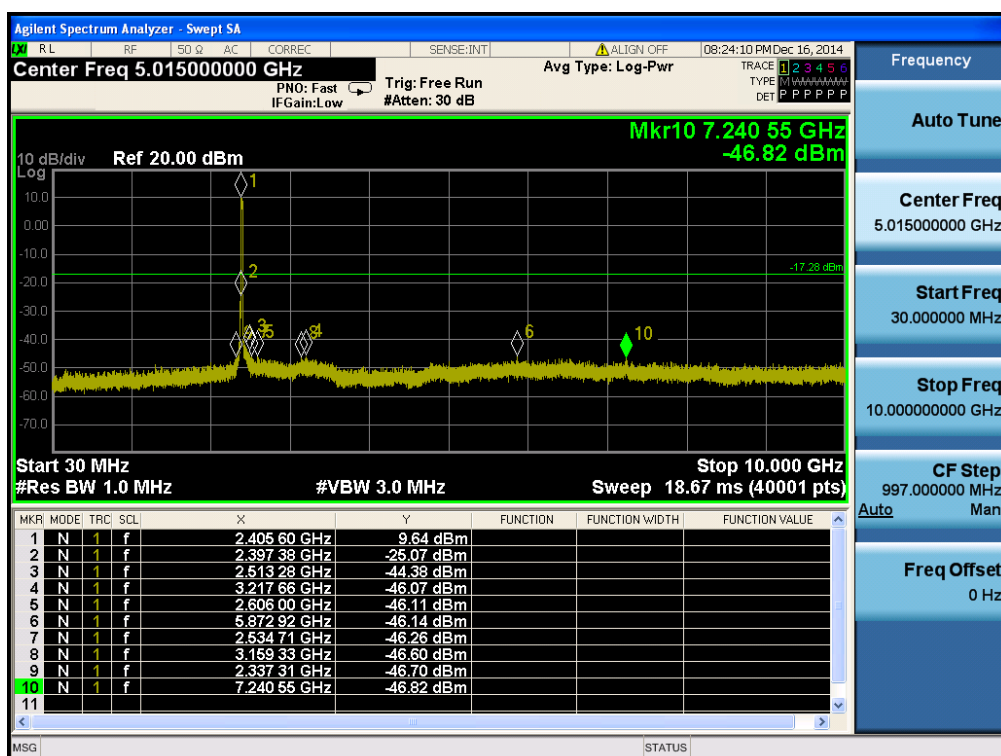
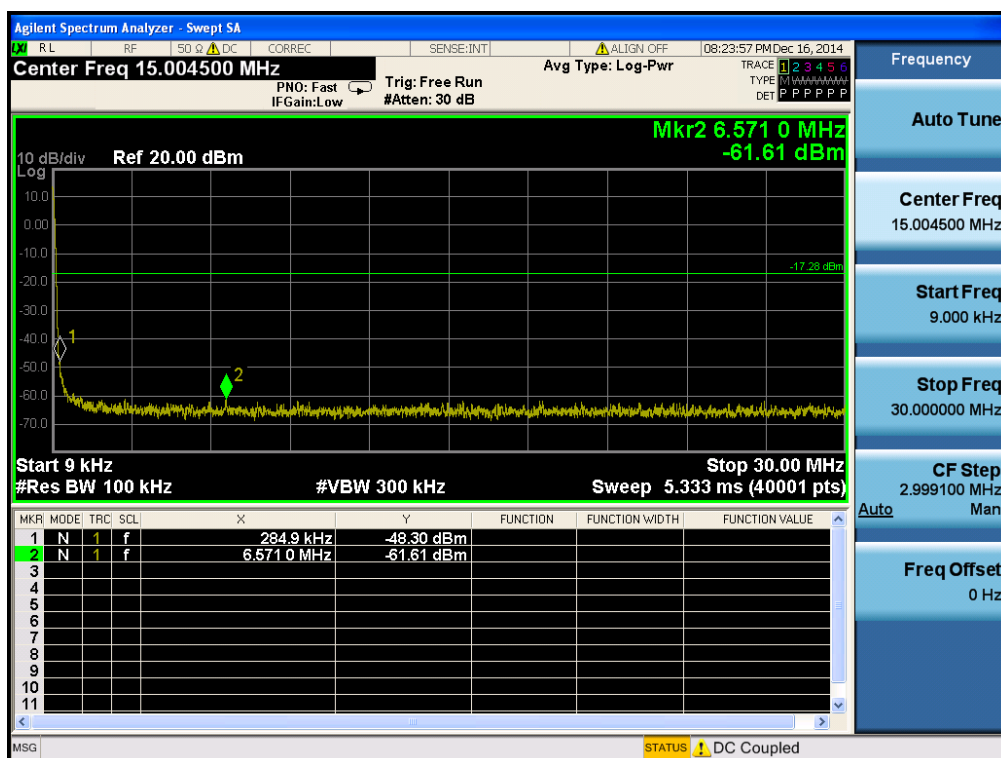
Reference



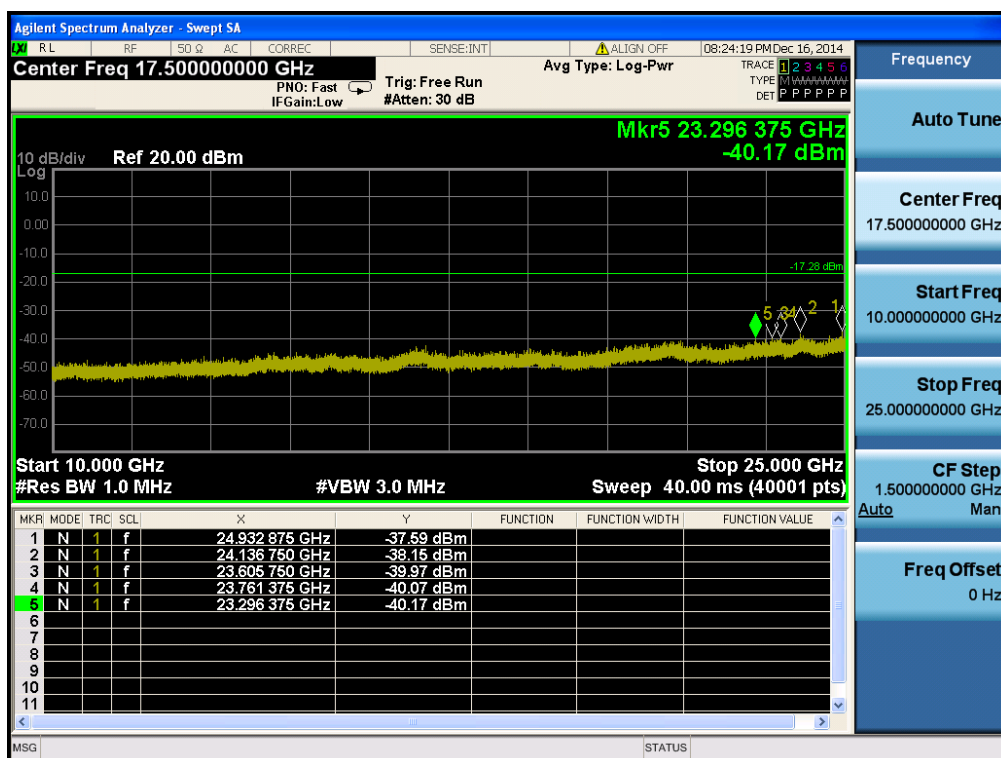
Low Band-edge



Conducted Spurious Emissions

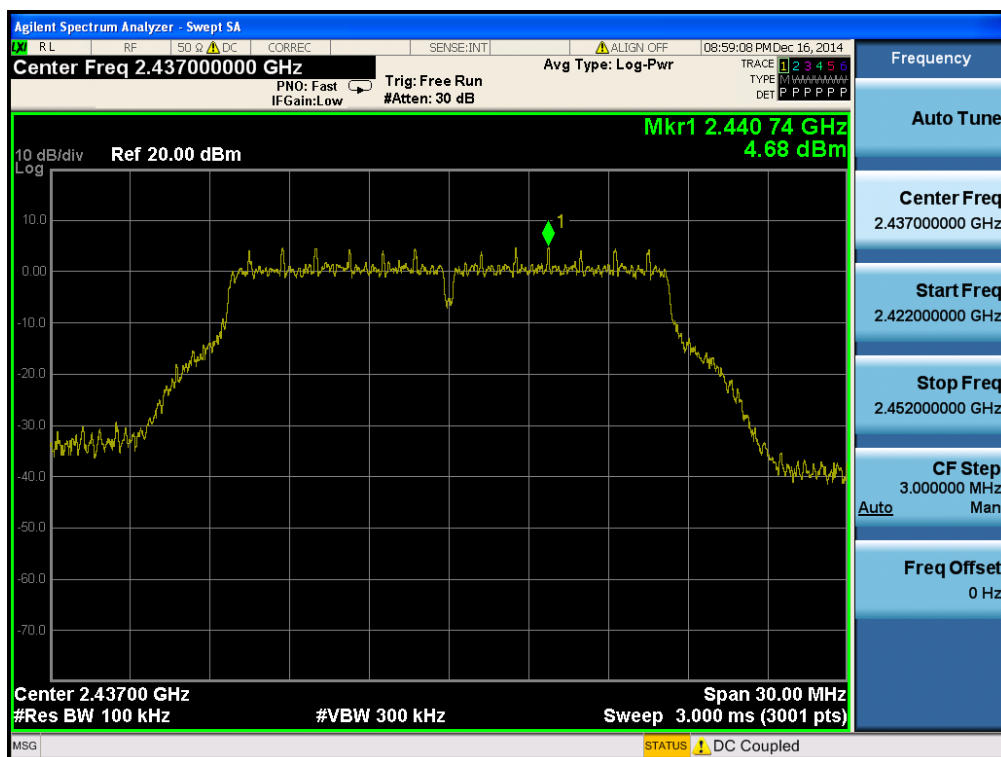


Conducted Spurious Emissions

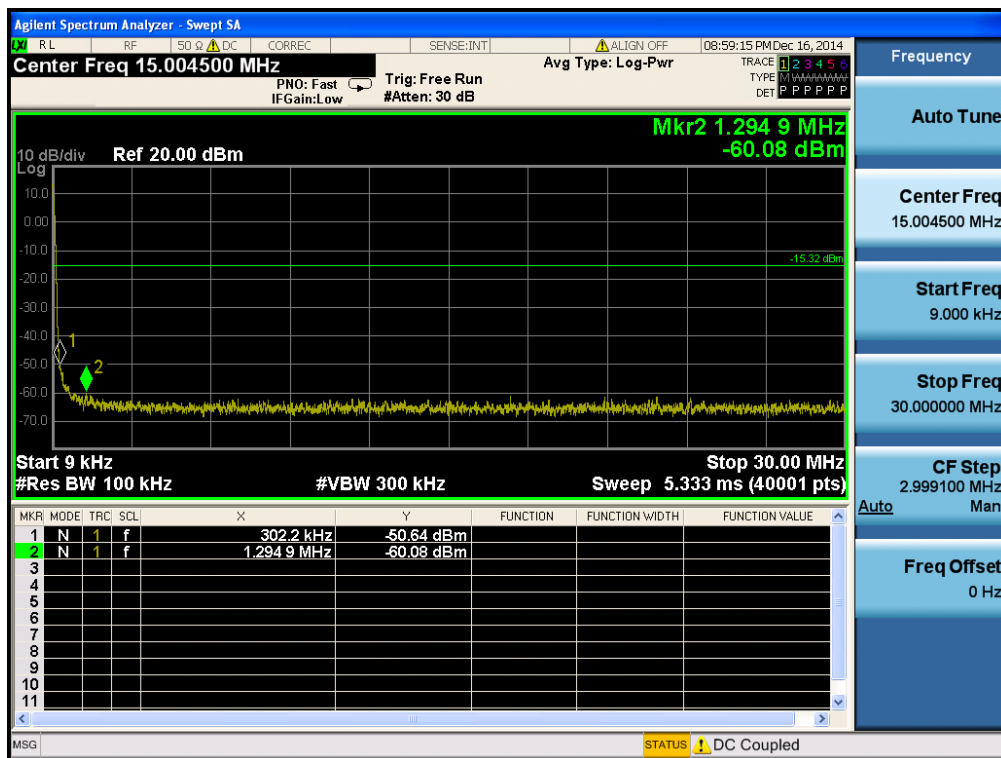


TM 2 & ANT 1 & Middle

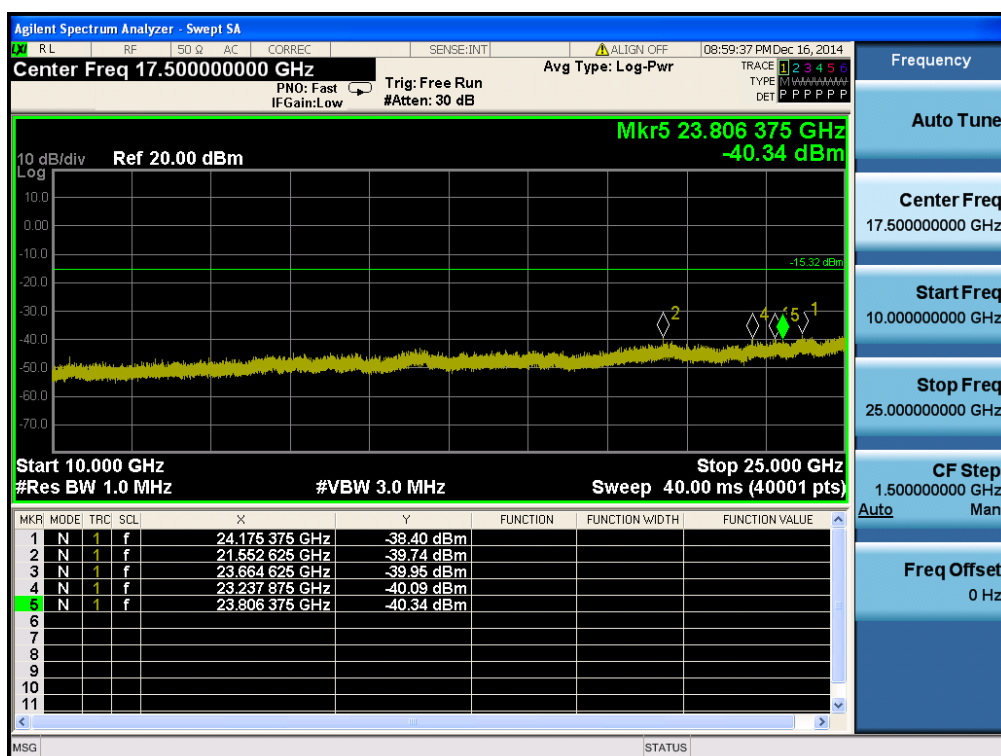
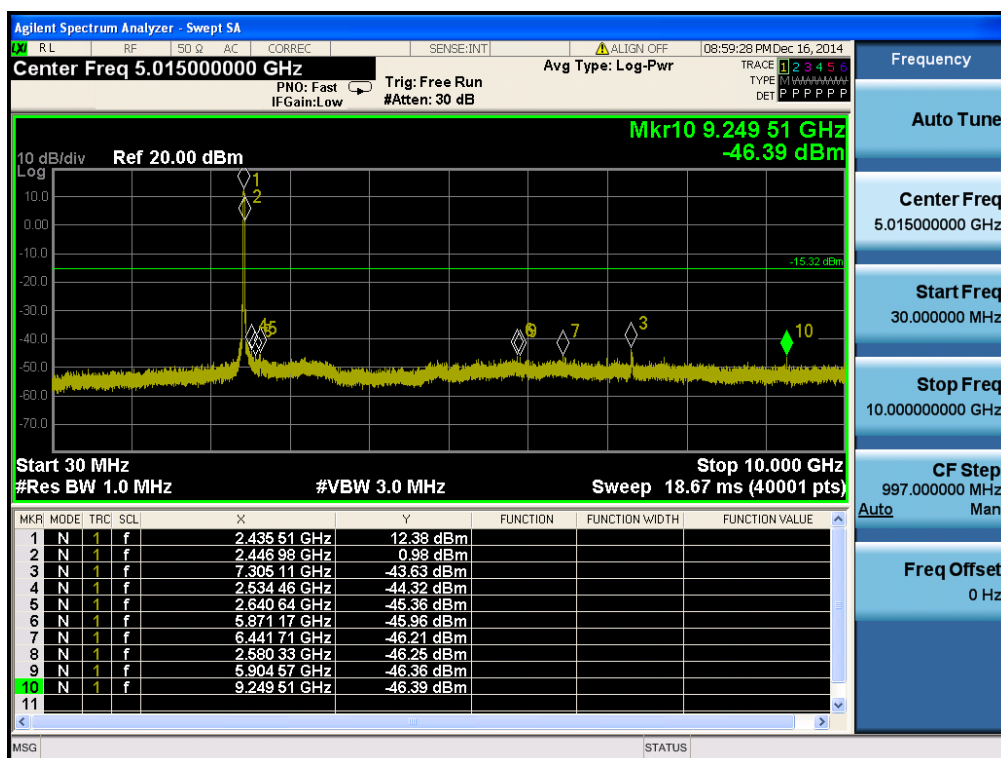
Reference



Conducted Spurious Emissions

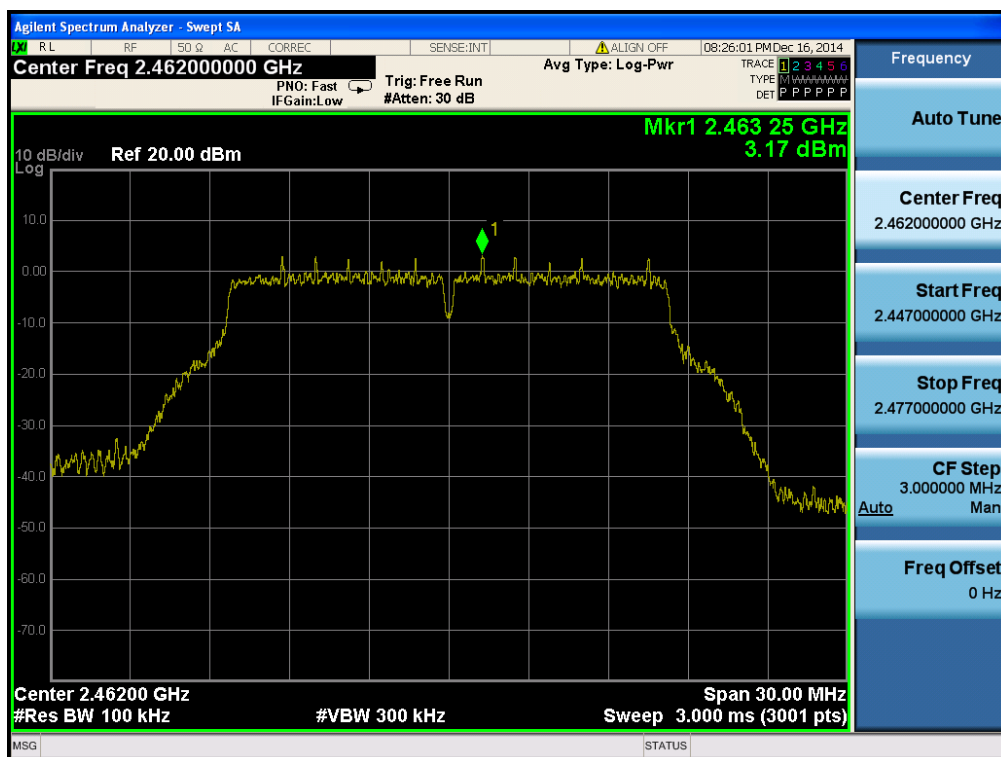


Conducted Spurious Emissions

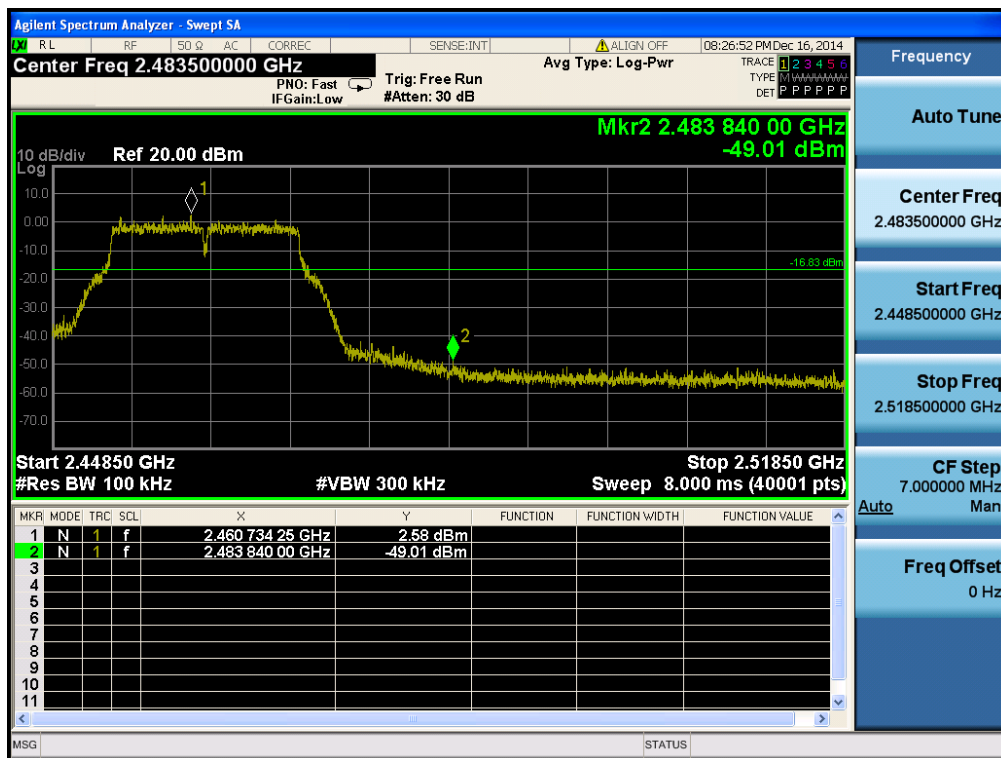


TM 2 & ANT 1 & Highest

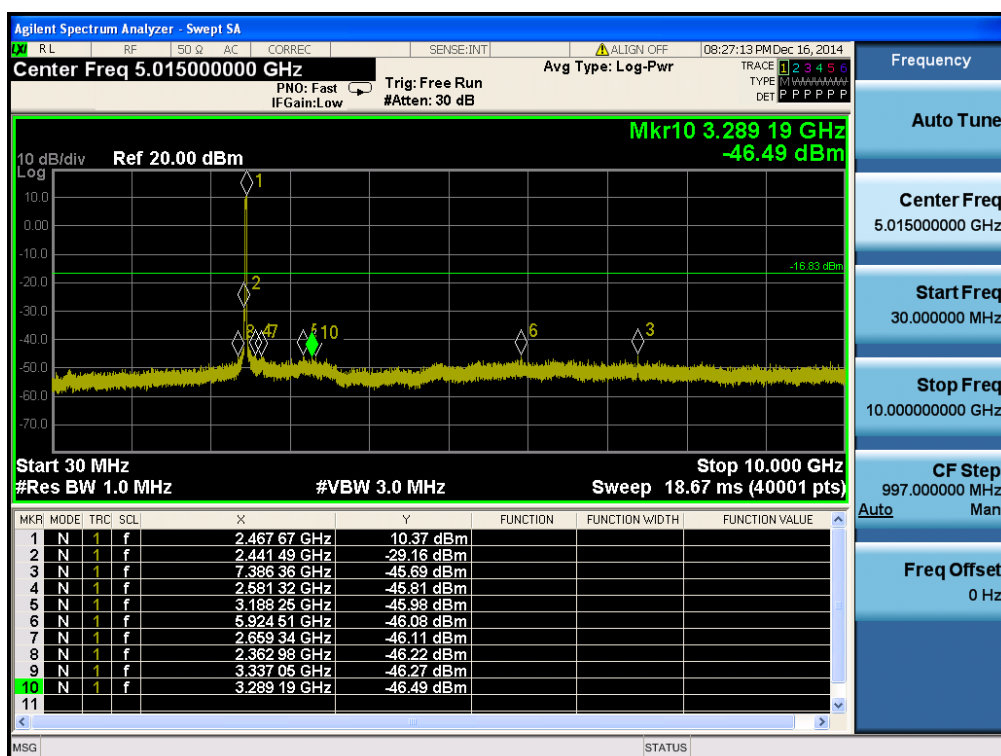
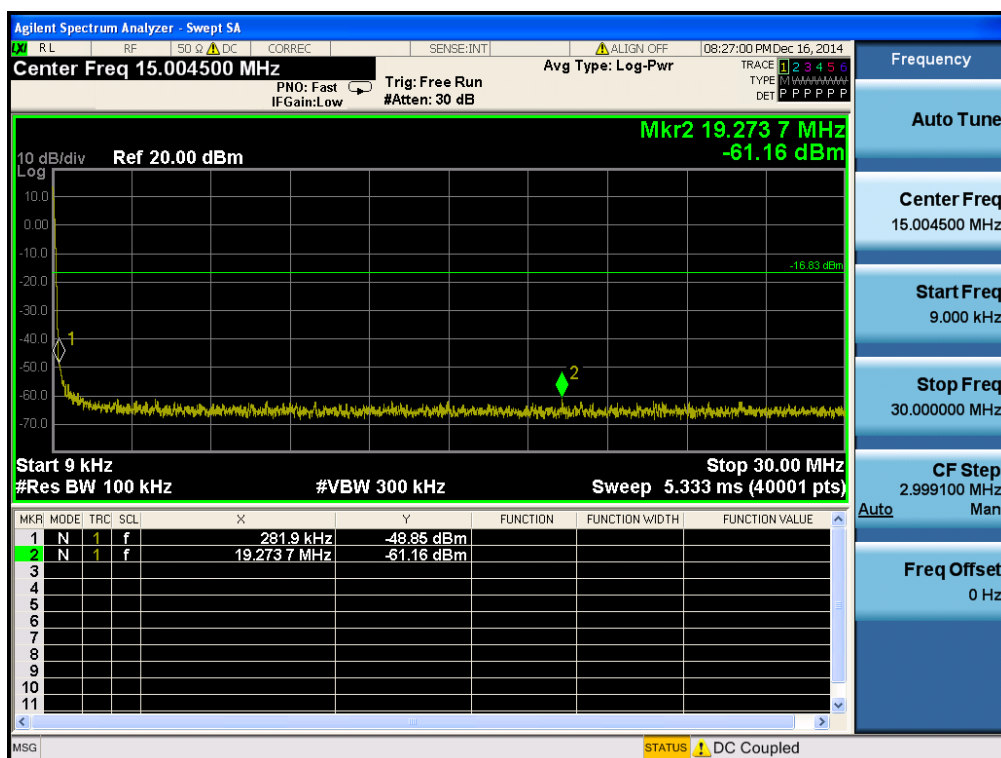
Reference



High Band-edge



Conducted Spurious Emissions



Conducted Spurious Emissions

