

RF TEST REPORT

Test item : Internet Phone
Model No. : SMT-i6021, SMT-i6011
Order No. : DTNC1504-02133, DTNC1504-02134
Date of receipt : 2015-04-29
Test duration : 2015-05-06 ~ 2015-06-10
Date of issue : 2015-06-19
Use of report : FCC & IC Original Grant

Applicant : Samsung Electronics Co., Ltd.
19 Chapin Rd., Building D Pine Brook New Jersey USA

Test laboratory : DT&C Co., Ltd.
42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935

Test specification : FCC Part 15 Subpart C 247
RSS-247 Issue 1 & RSS-Gen Issue 4

Test environment : See appended test report

Test result : ☒ Pass ☐ Fail

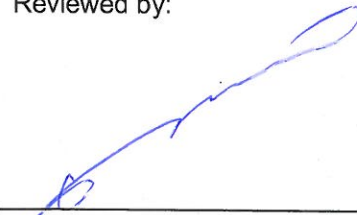
The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

Tested by:



Engineer
Hoonpyo Lee

Reviewed by:



Technical Manager
WonJung Lee

Test Report Version

Test Report No.	Date	Description
DRTFCC1506-0121	Jun. 19, 2015	Initial issue

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1. GENERAL INFORMATION

Applicant : Samsung Electronics Co., Ltd.
Address : 19 Chapin Rd., Building D Pine Brook New Jersey USA
FCC ID : A3LSMTI6021
IC : 649E-SMTI6021
EUT : Internet Phone
Model : SMT-i6021
Additional Model(s) : SMT-i6011
Date of Test : 2015-05-06 ~ 2015-06-10
Contact person : Chan Ho Youn

2. EUT DESCRIPTION

Product	Internet Phone
Model Name	SMT-i6021, SMT-i6011
Power Supply	DC 12 V(Adaptor), DC 48 V(PoE)
Battery type	N/A
Frequency Range	802.11b/g/n(20 MHz): 2412 MHz ~ 2462 MHz
Max. RF Output Power	802.11b: 19.023dBm 802.11g: 19.601dBm 802.11n(HT20): 19.122 dBm
Modulation Type	802.11b: DSSS/CCK 802.11g/n: OFDM
Antenna Specification	PCB Pattern Antenna (1TX/1RX), peak gain : 2.77 dBi

Note: The applicant declares that there is some difference between the models.
For detailed information, please refer to the ID letter.

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)		NA
15.205 15.209	RSS-247 [5.5]	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 Line Conducted Emissions	< FCC 15.207 limits	AC Line Conducted	C
15.203	RSS-Gen [6.7]	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. Note 3: The sample was tested according to the KDB558074, ANSI C63.10. (Please refer to clause 4.) Note 4: The test items using conducted measurement were performed using only the main model(SMT-i6021) with the adapter. And the radiated measurement was performed using both model with the adaptor and PoE.					

4. TEST METHODOLOGY

Generally the tests were performed according to the KDB558074 v03r02.

And ANSI C63.10-2013 for IC and ANSI C63.10-2009 for FCC were used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission.

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 0.15MHz and 30MHz 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, which is 0.8 m above ground plane. 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 equipment, 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, 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 antenna is permanently attached. Please refer to the internal photo.

Therefore this module Complies with the requirement of §15.203

8. TEST RESULT

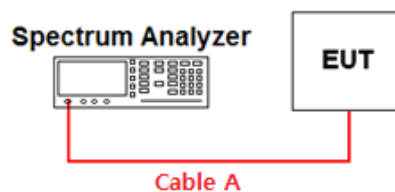
8.1 6 dB Bandwidth

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

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

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) $\geq 3 \times \text{RBW}$. = **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 outer most amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

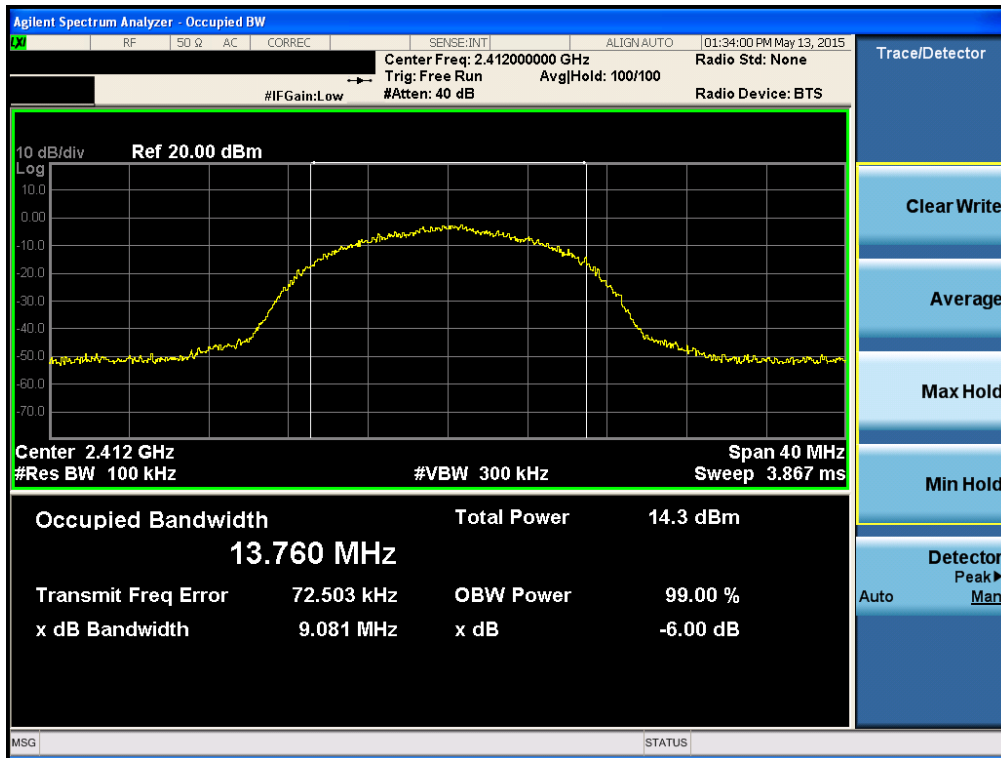
■ TEST RESULTS: **Comply**

Test Mode	Data Rate	Frequency [MHz]	Test Results[MHz]
802.11b	5.5 Mbps	2412	9.081
		2437	8.486
		2462	7.951
802.11g	54 Mbps	2412	15.980
		2437	15.400
		2462	15.360
802.11n (20 MHz)	MCS 7	2412	16.630
		2437	16.320
		2462	16.630

■ **RESULT PLOTS**

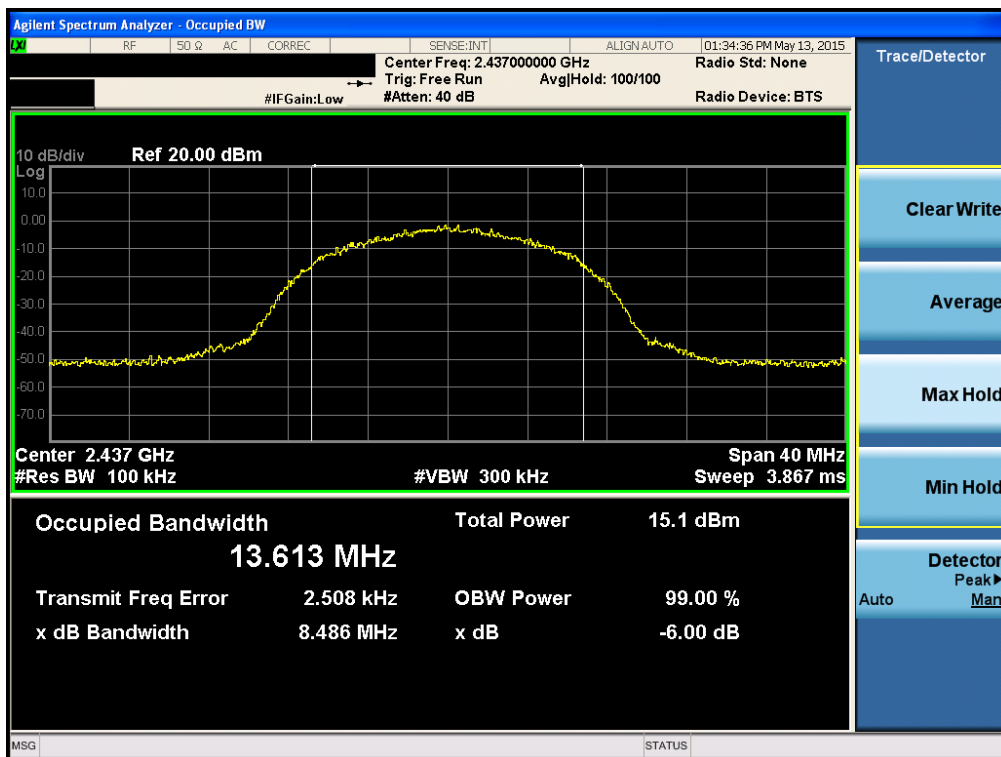
6 dB Bandwidth

Test Mode: 802.11b & 5.5 Mbps & 2412 MHz



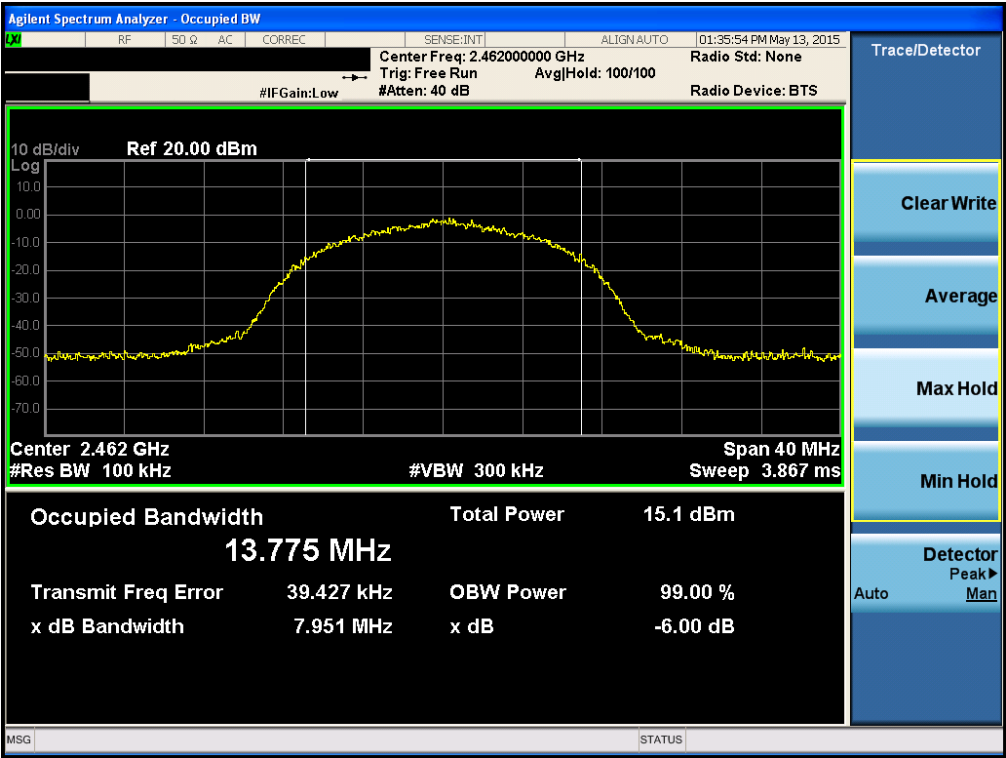
6 dB Bandwidth

Test Mode: 802.11b & 5.5 Mbps & 2437 MHz



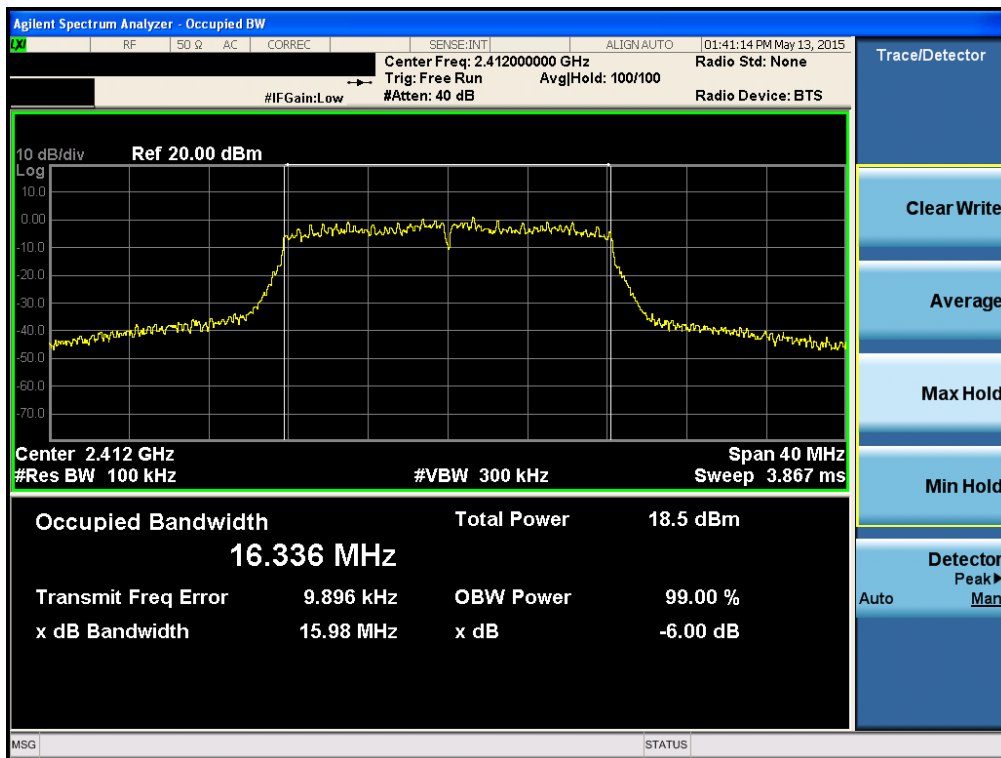
6 dB Bandwidth

Test Mode: 802.11b & 5.5 Mbps & 2462 MHz



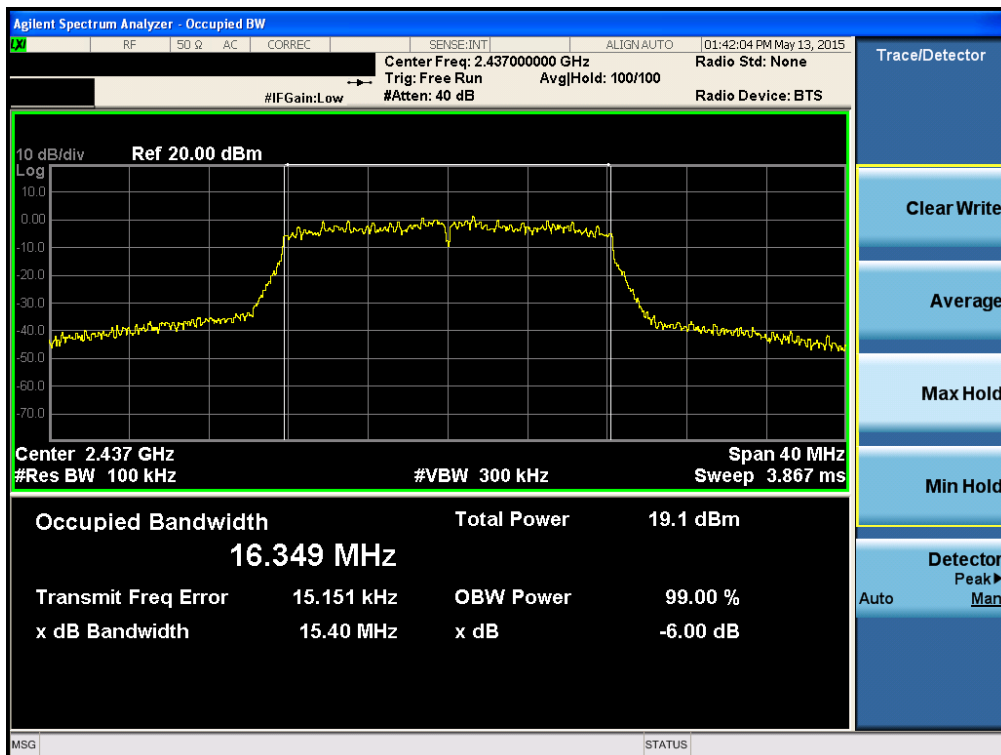
6 dB Bandwidth

Test Mode: 802.11g & 54 Mbps & 2412 MHz



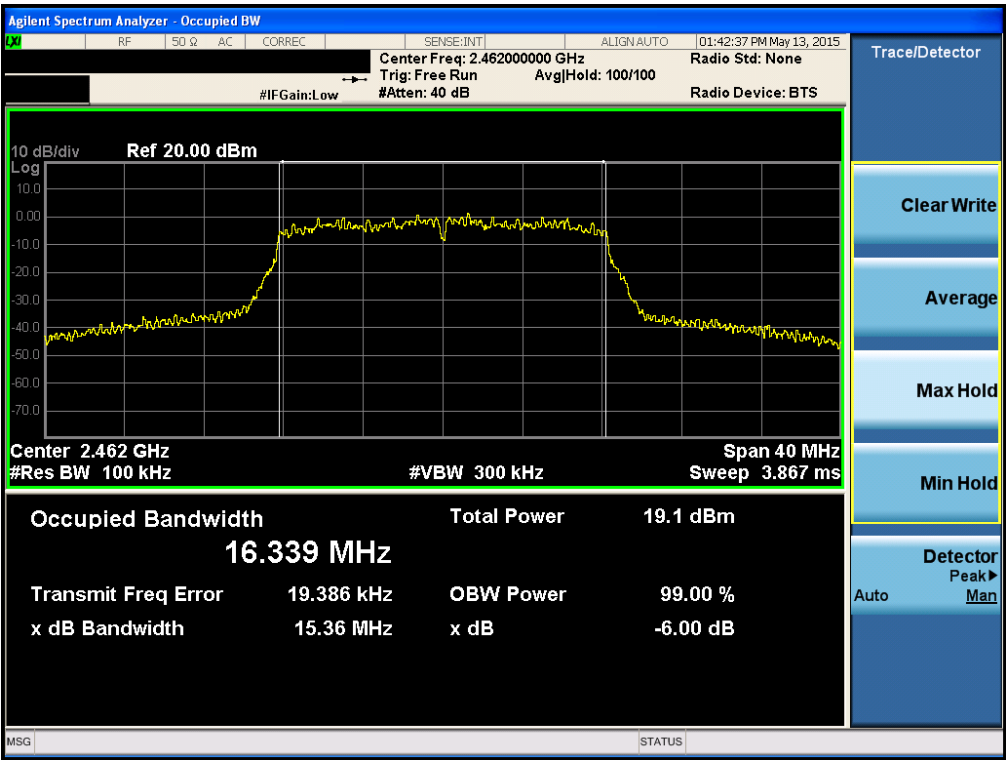
6 dB Bandwidth

Test Mode: 802.11g & 54 Mbps & 2437 MHz



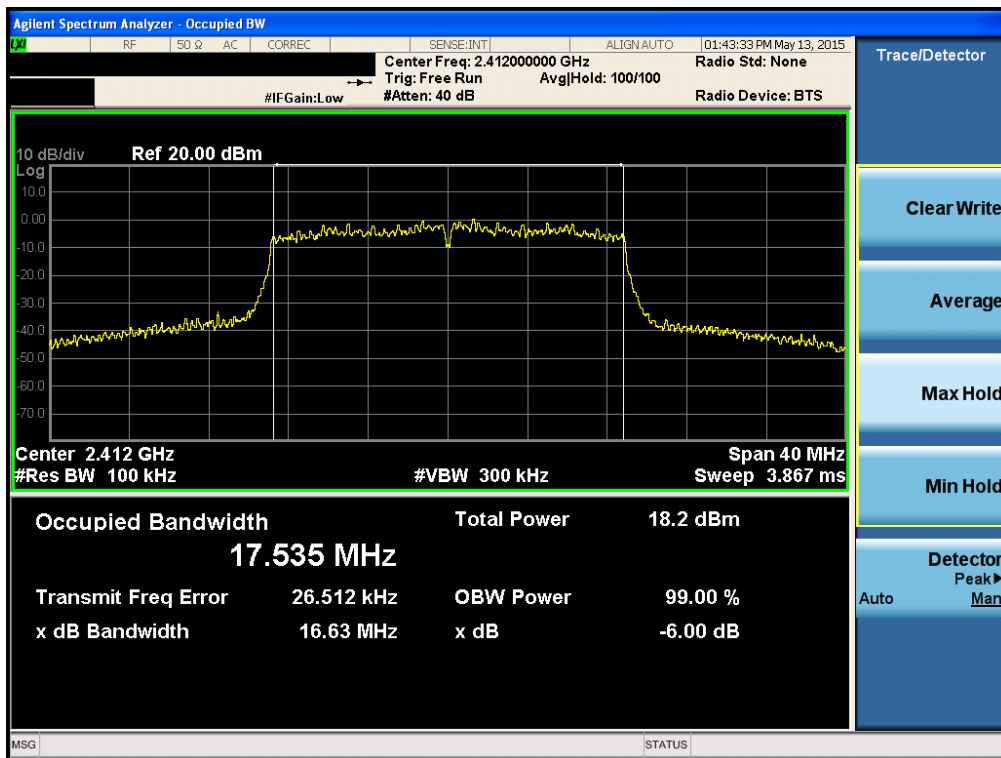
6 dB Bandwidth

Test Mode: 802.11g & 54 Mbps & 2462 MHz



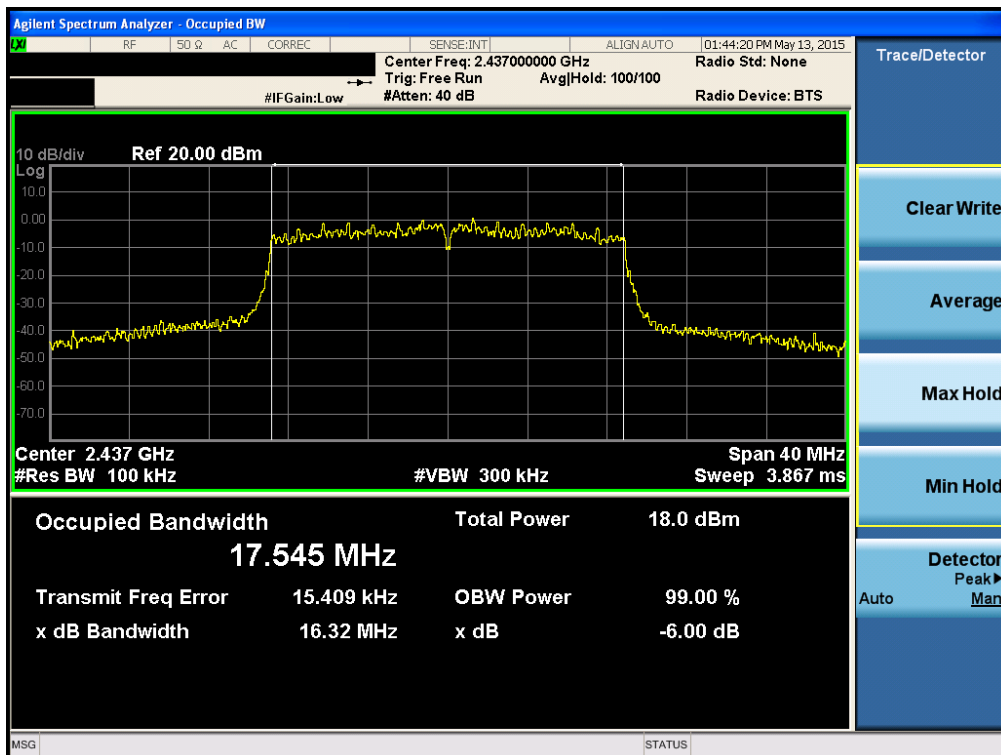
6 dB Bandwidth

Test Mode: 802.11n(HT20) & MCS 7 & 2412 MHz



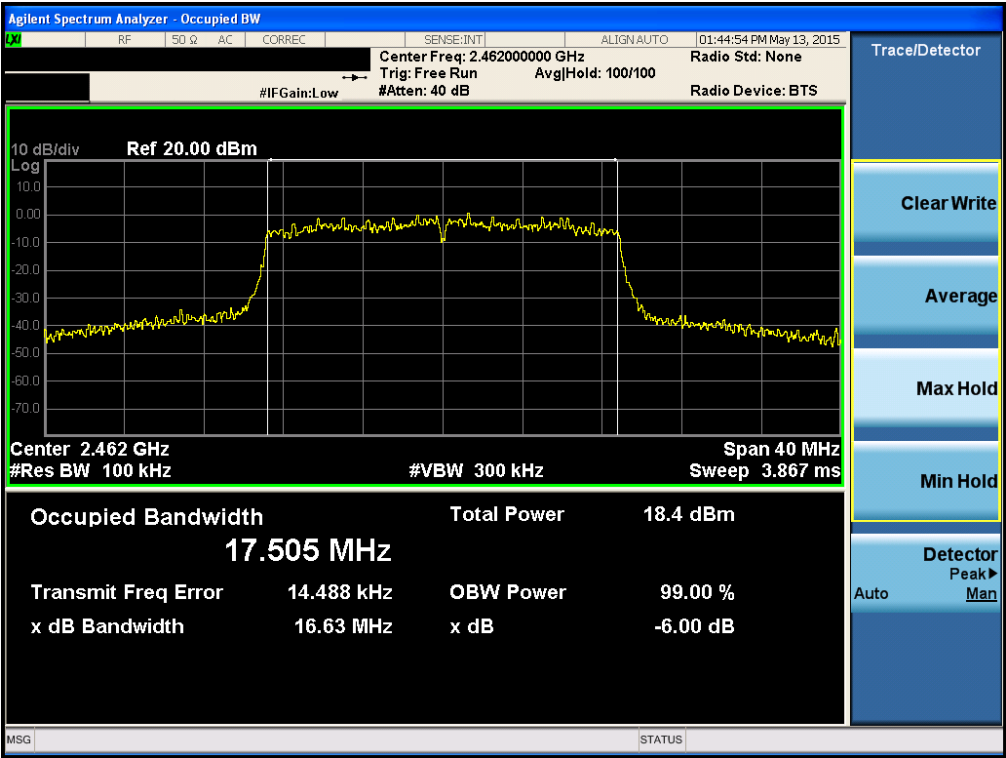
6 dB Bandwidth

Test Mode: 802.11n(HT20) & MCS 7 & 2437 MHz



6 dB Bandwidth

Test Mode: 802.11n(HT20) & MCS 7 & 2462 MHz

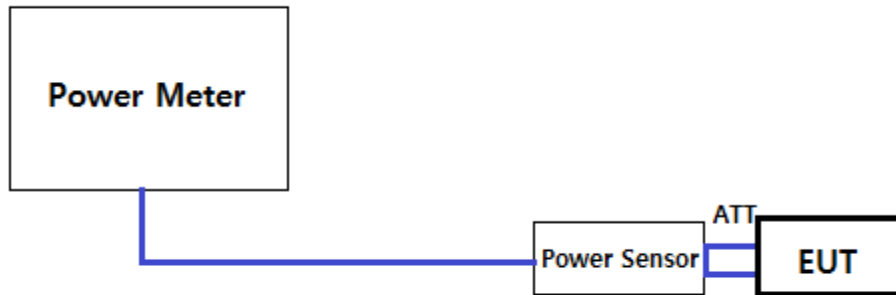


8.2 Maximum Peak Conducted Output Power

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.

■ **TEST RESULTS: Comply**

Mode	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
				DATA RATE [Mbps]							
				1	2	5.5	11	NA	NA	NA	NA
802.11b	1	2412	PK	18.052	17.829	18.265	18.113	-	-	-	-
			AV	15.249	15.366	15.539	15.359	-	-	-	-
	6	2437	PK	18.333	18.209	18.639	18.270	-	-	-	-
			AV	15.663	15.951	16.055	15.637	-	-	-	-
	11	2462	PK	18.531	18.692	19.023	18.828	-	-	-	-
			AV	16.126	16.201	16.417	15.931	-	-	-	-

Mode	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
				DATA RATE [Mbps]							
				6	9	12	18	24	36	48	54
802.11g	1	2412	PK	18.440	18.518	18.333	18.531	18.289	18.556	18.428	18.735
			AV	9.016	8.987	9.018	9.352	9.272	9.094	9.072	9.477
	6	2437	PK	18.963	18.735	18.816	18.800	18.711	18.694	18.714	19.187
			AV	9.215	9.335	9.401	9.367	9.542	9.472	9.485	9.644
	11	2462	PK	19.303	19.282	19.331	19.300	19.398	19.289	19.368	19.601
			AV	9.750	9.959	9.641	9.618	9.633	9.662	9.968	10.080

Mode	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
				DATA RATE [MCS]							
				0	1	2	3	4	5	6	7
802.11n (HT20)	1	2412	PK	18.286	18.237	18.368	18.413	18.428	18.413	18.321	18.626
			AV	8.265	8.541	8.283	8.334	8.287	8.588	8.325	8.715
	6	2437	PK	18.747	18.754	18.688	18.782	18.712	18.664	18.715	19.016
			AV	8.811	8.514	8.798	8.654	8.560	8.814	8.733	9.014
	11	2462	PK	19.022	18.888	18.776	18.833	18.637	18.753	18.980	19.122
			AV	9.153	9.178	9.061	9.364	9.259	9.414	9.145	9.557

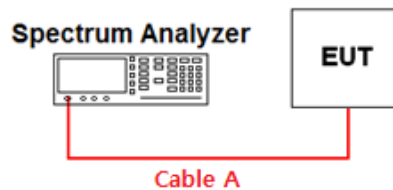
8.3 Maximum Power Spectral Density

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

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

Minimum Standard – specifies a conducted power spectral density (PSD) limit of 8 dBm in any 3 kHz Band segment within the fundamental EBW during any time interval of continuous transmission.

■ TEST CONFIGURATION



■ 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.

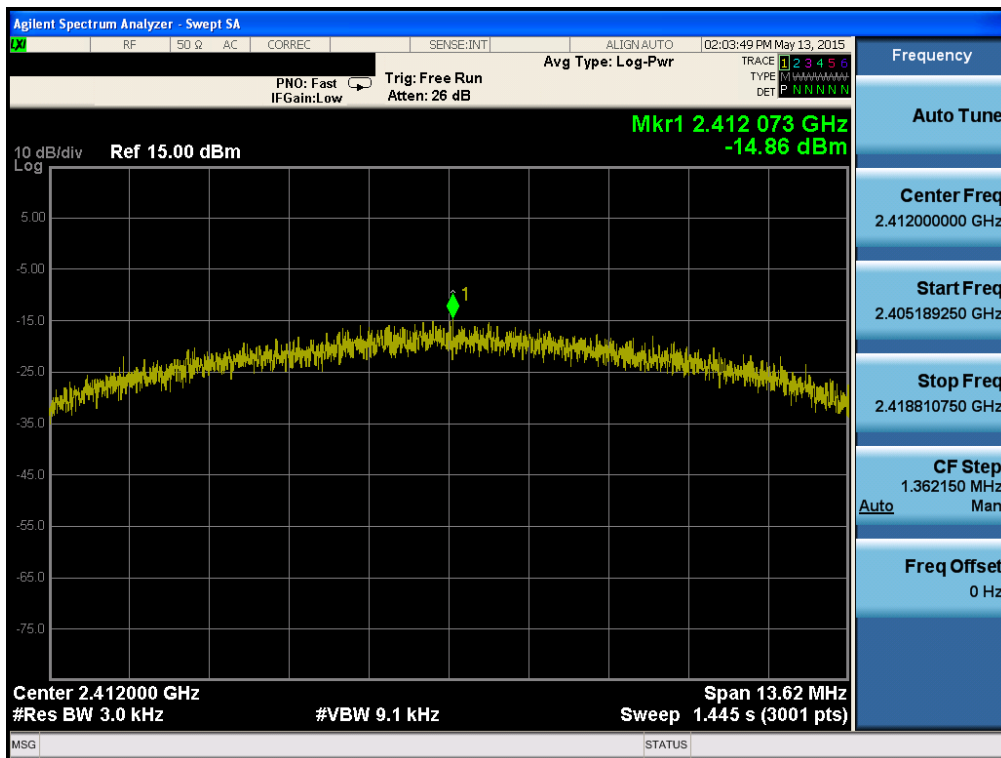
■ TEST RESULTS: **Comply**

Test Mode	Data Rate	Frequency [MHz]	RBW	PKPSD [dBm]
802.11b	5.5 Mbps	2412	3 kHz	-14.86
		2437	3 kHz	-13.87
		2462	3 kHz	-12.33
802.11g	54 Mbps	2412	3 kHz	-13.52
		2437	3 kHz	-13.57
		2462	3 kHz	-14.30
802.11n HT20	MCS 7	2412	3 kHz	-15.81
		2437	3 kHz	-15.52
		2462	3 kHz	-14.41

■ **RESULT PLOTS**

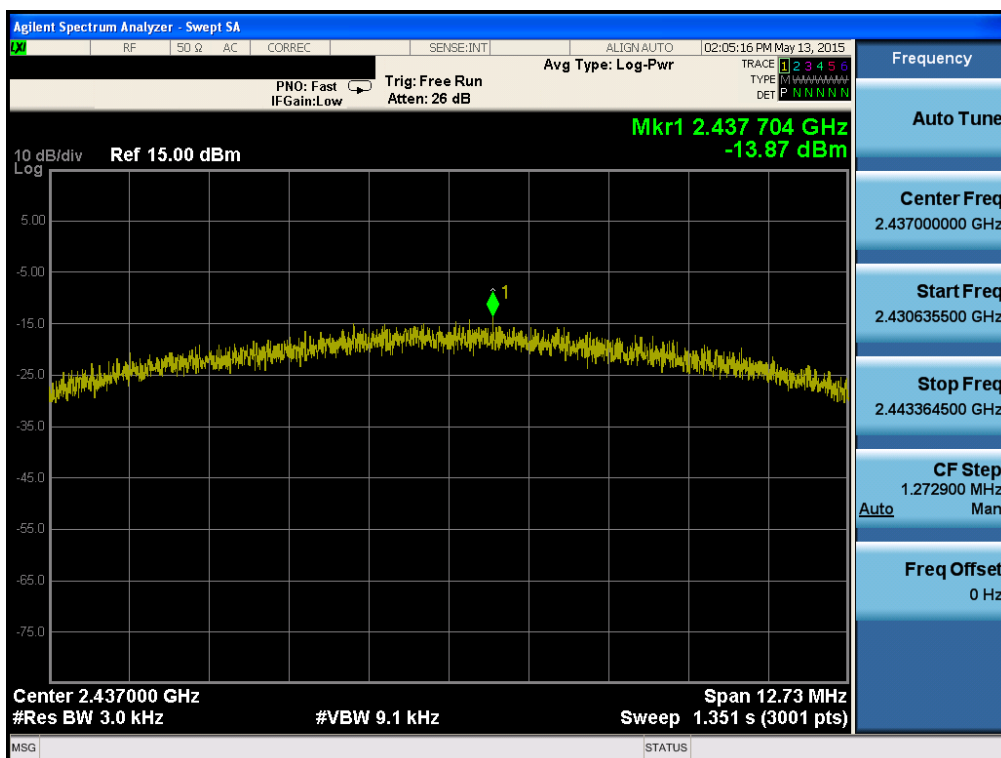
Maximum PKPSD

Test Mode: 802.11b & 5.5 Mbps & 2412 MHz



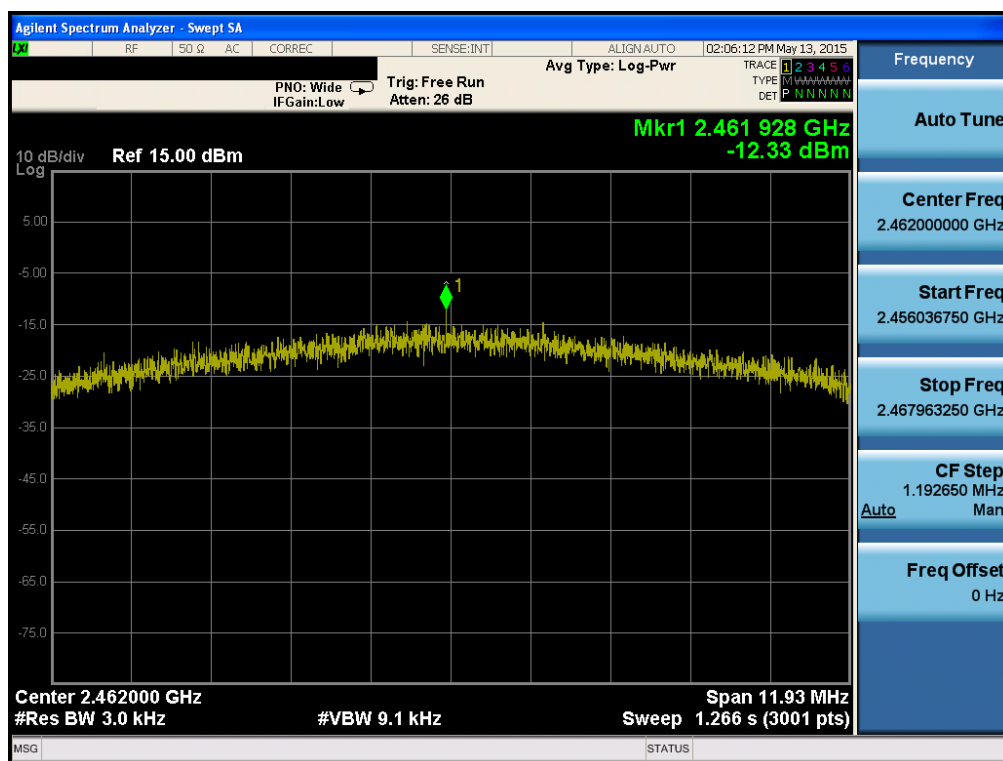
Maximum PKPSD

Test Mode: 802.11b & 5.5 Mbps & 2437 MHz



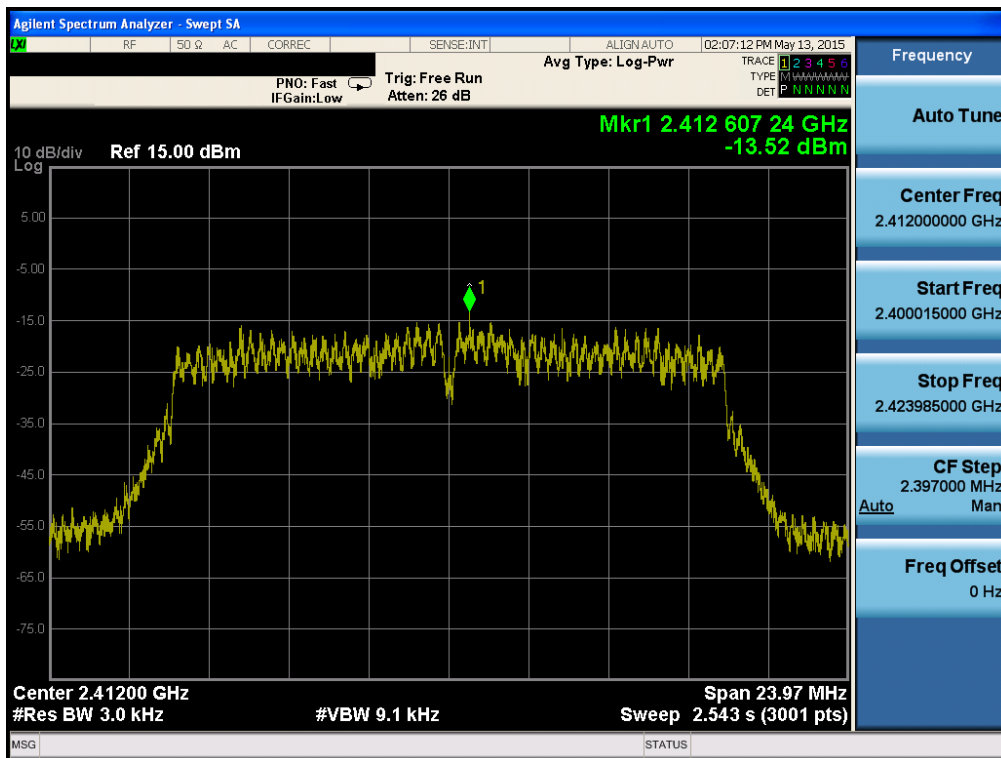
Maximum PKPSD

Test Mode: 802.11b & 5.5 Mbps & 2462 MHz



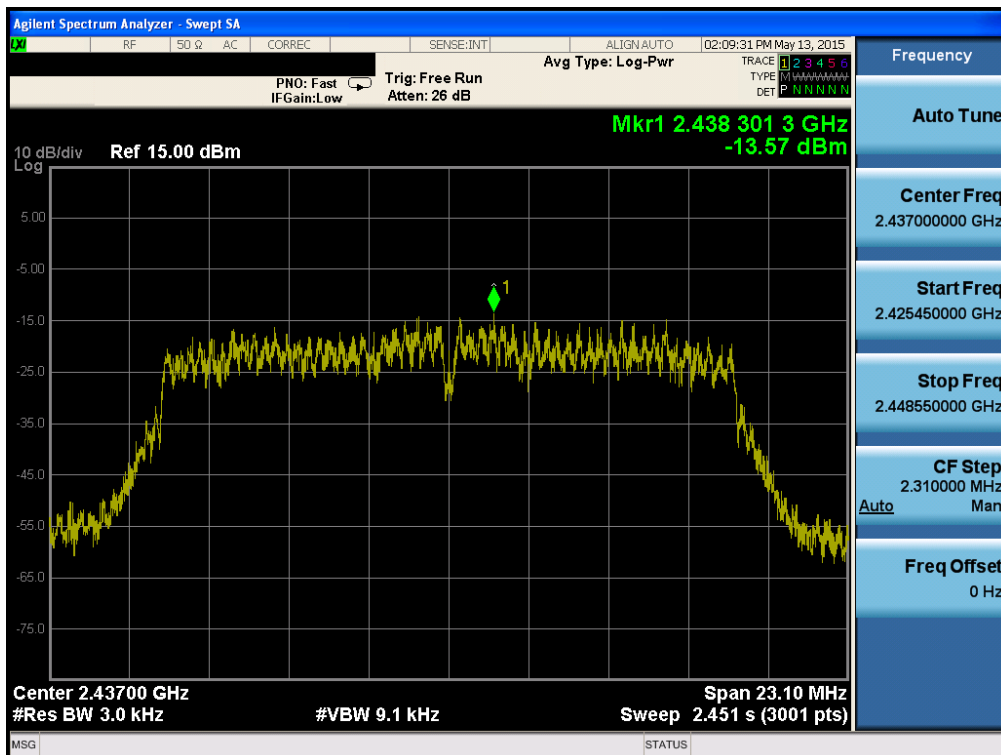
Maximum PKPSD

Test Mode: 802.11g & 54 Mbps & 2412 MHz



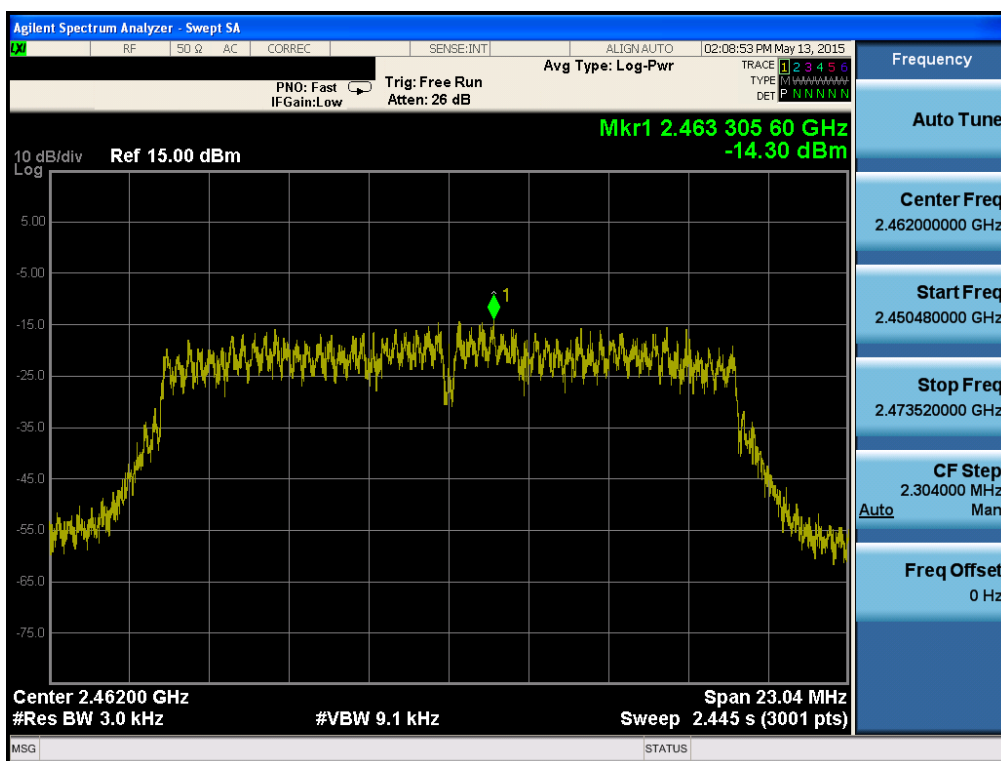
Maximum PKPSD

Test Mode: 802.11g & 54 Mbps & 2437 MHz



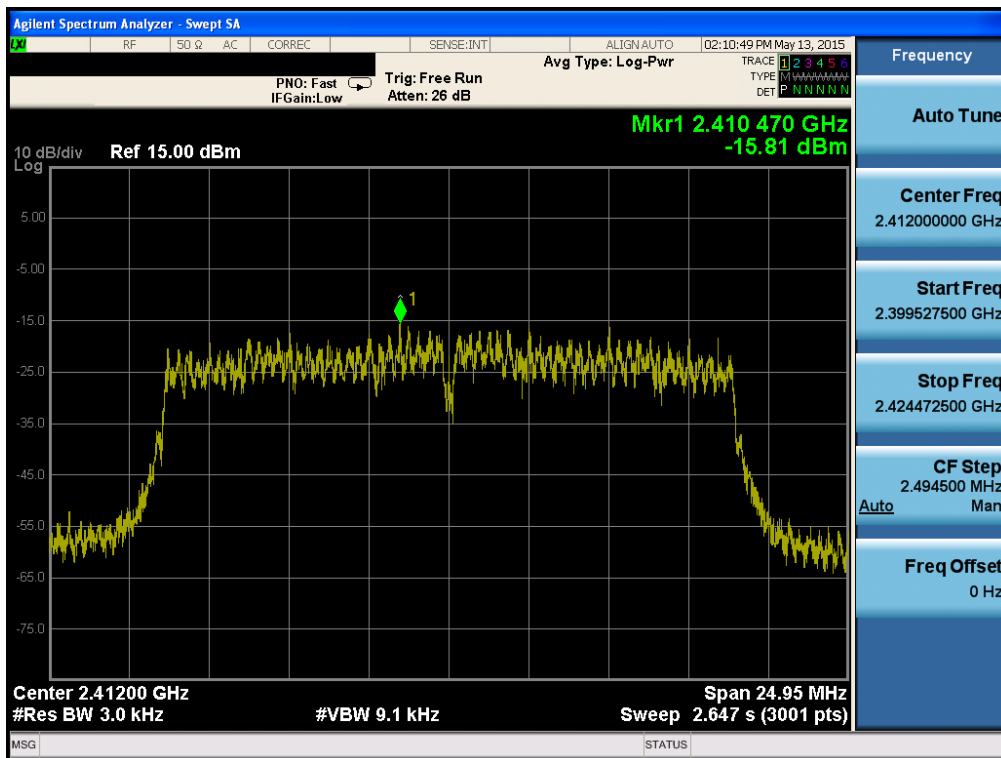
Maximum PKPSD

Test Mode: 802.11g & 54 Mbps & 2462 MHz



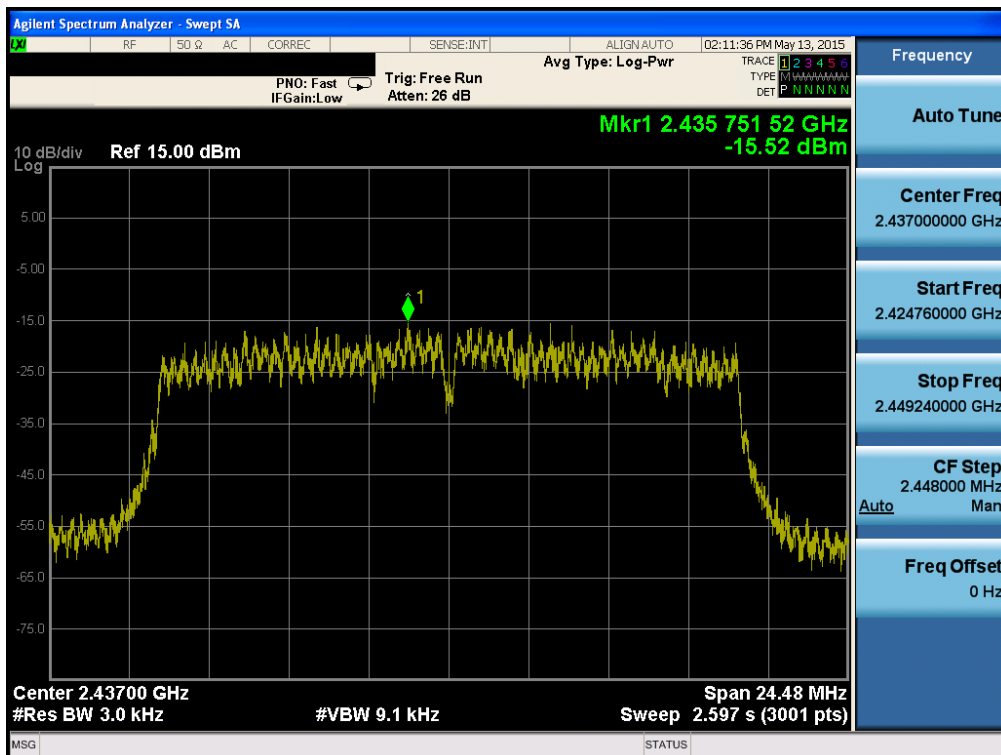
Maximum PKPSD

Test Mode: 802.11n(HT20) & MCS 7 & 2412 MHz



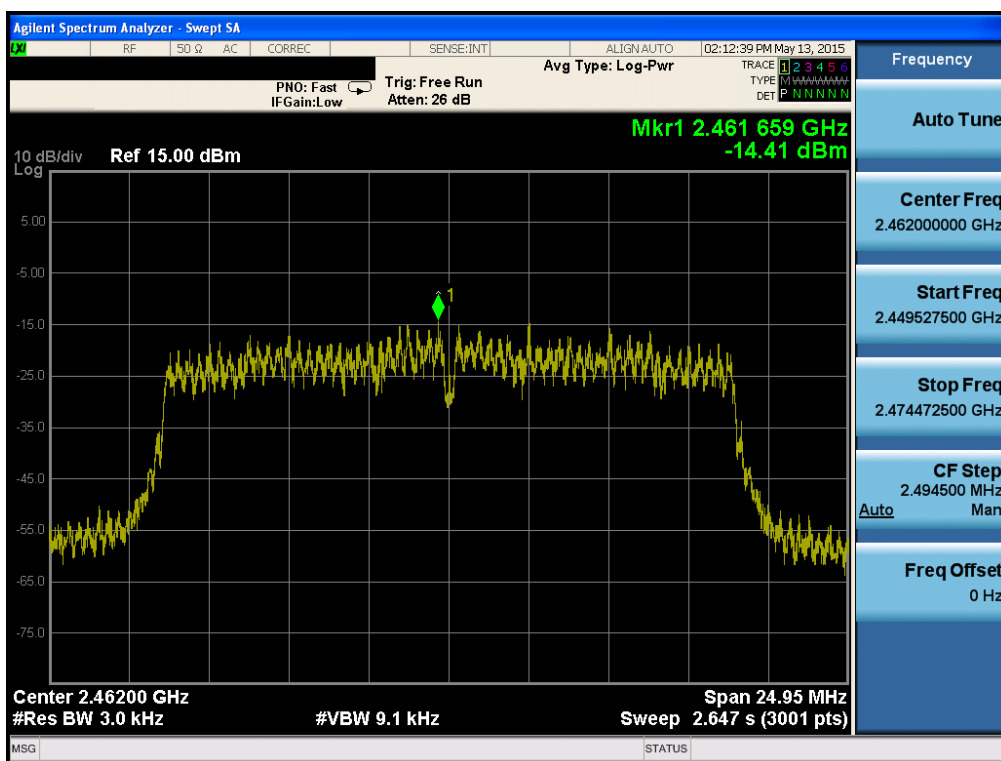
Maximum PKPSD

Test Mode: 802.11n(HT20) & MCS 7 & 2437 MHz



Maximum PKPSD

Test Mode: 802.11n(HT20) & MCS 7 & 2462 MHz



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

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

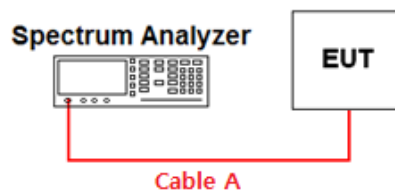
§15.247(d) specifies that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

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



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

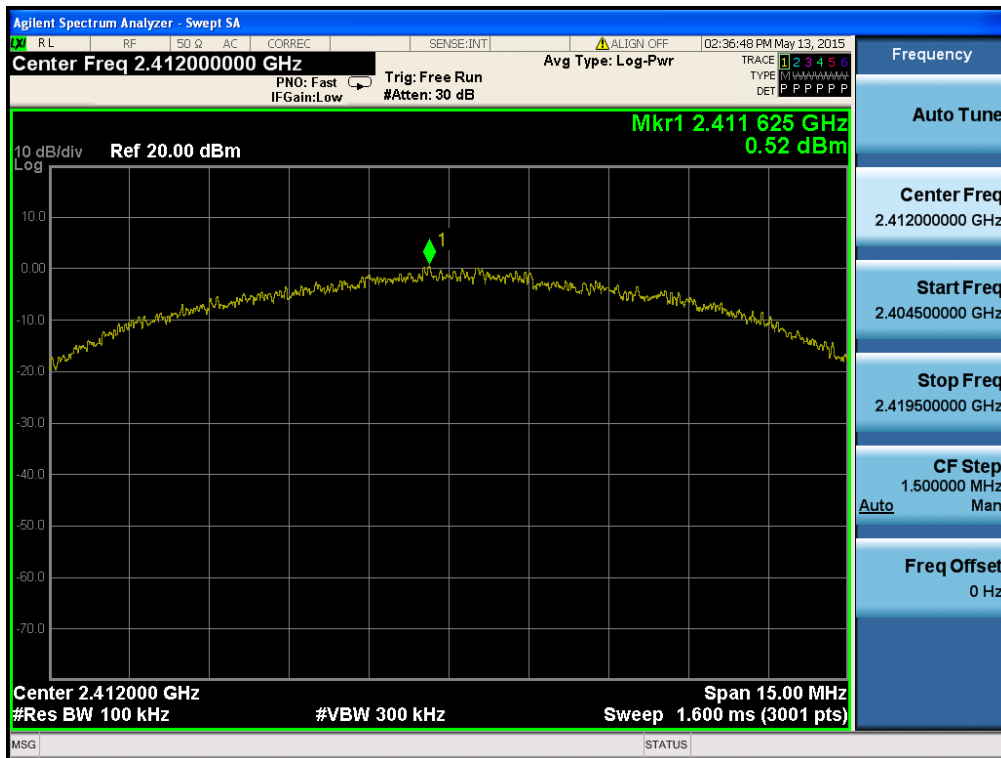
LIMIT LINE = 20 dB below of the reference level of above measurement procedure Step 2. (RBW = 100 kHz, VBW = 300 kHz)

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, SAPN = 100 MHz and BINS = 2001 to get accurate emission level within 100 kHz BW.

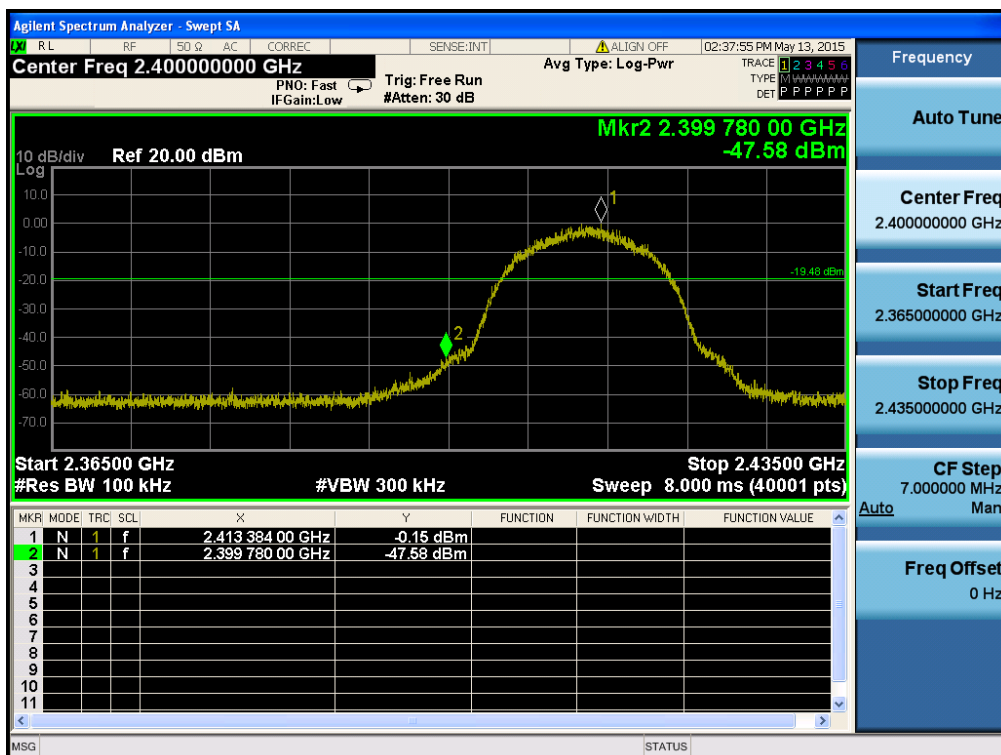
■ **RESULT PLOTS**

802.11b & 5.5 Mbps & 2412 MHz

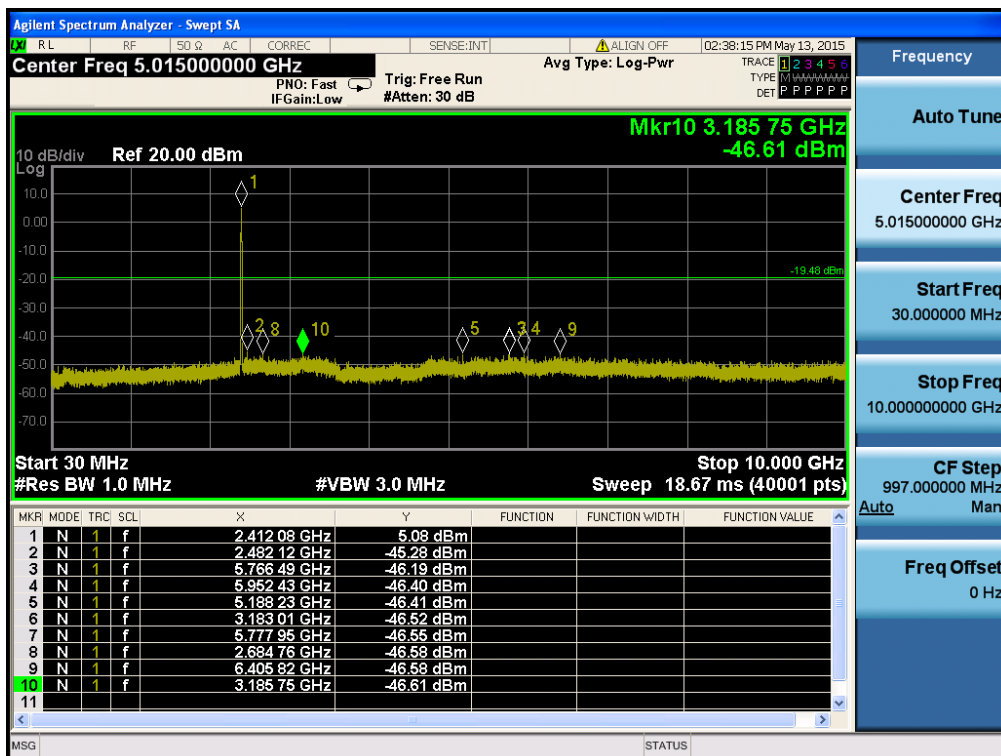
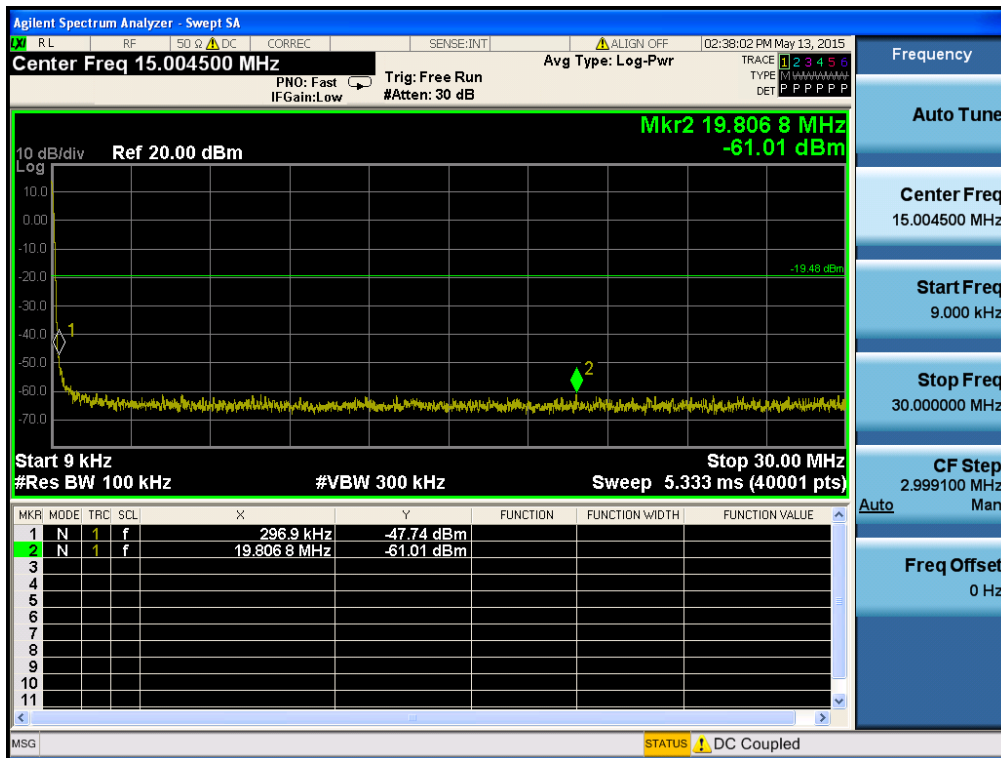
Reference



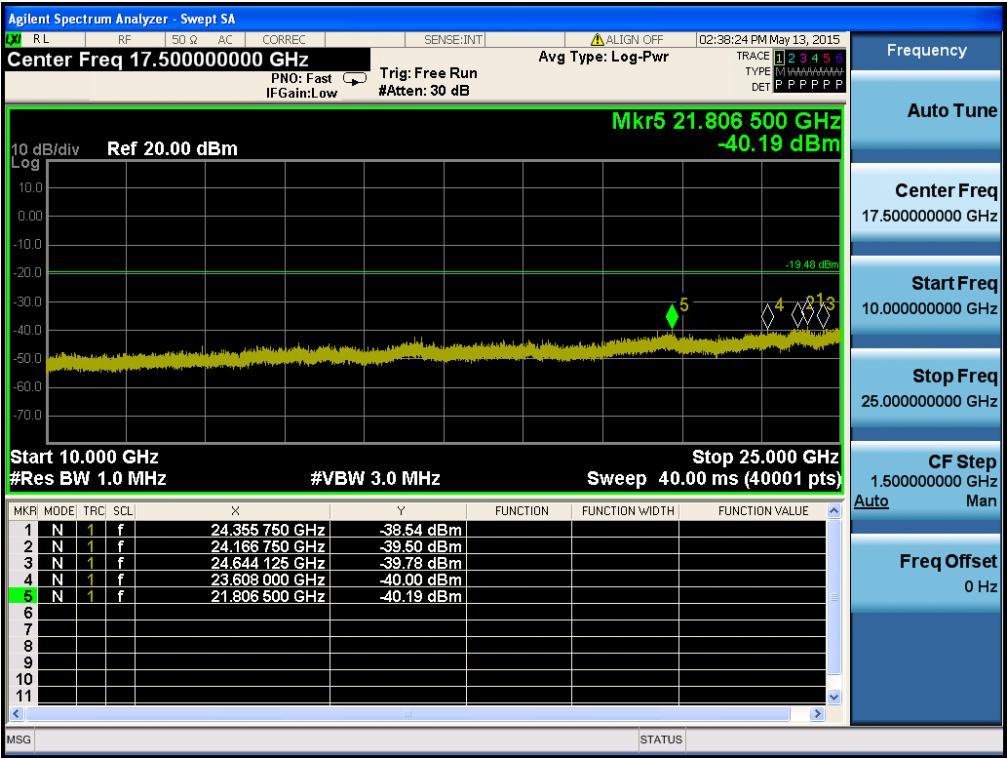
Low Band-edge



Conducted Spurious Emissions

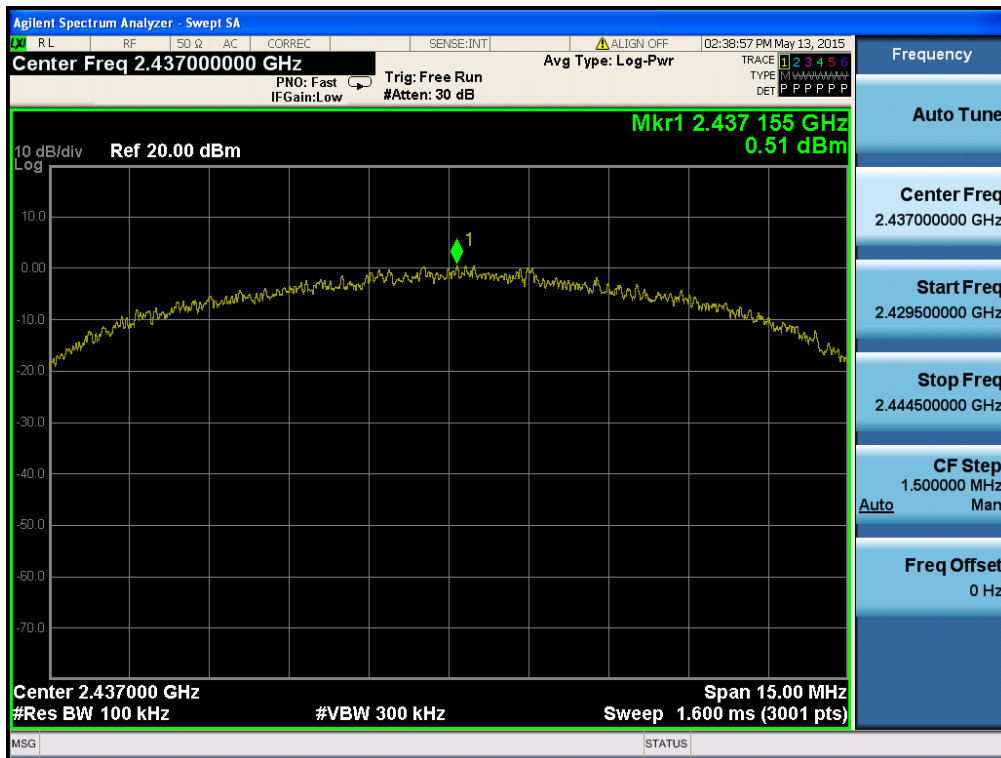


Conducted Spurious Emissions

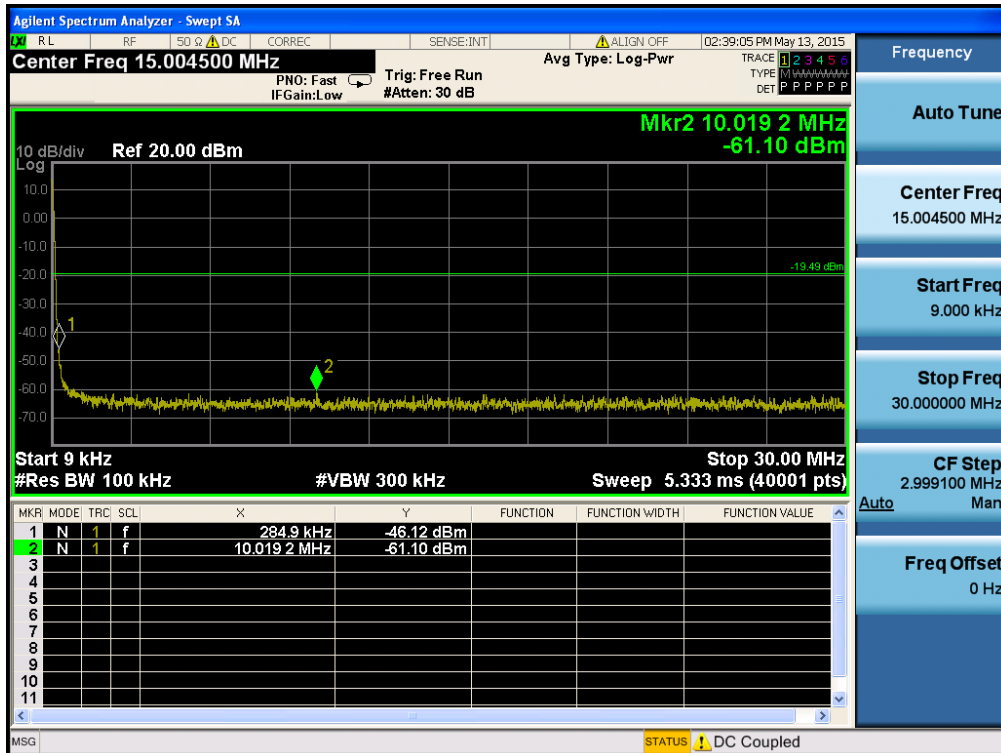


802.11b & 5.5 Mbps & 2437 MHz

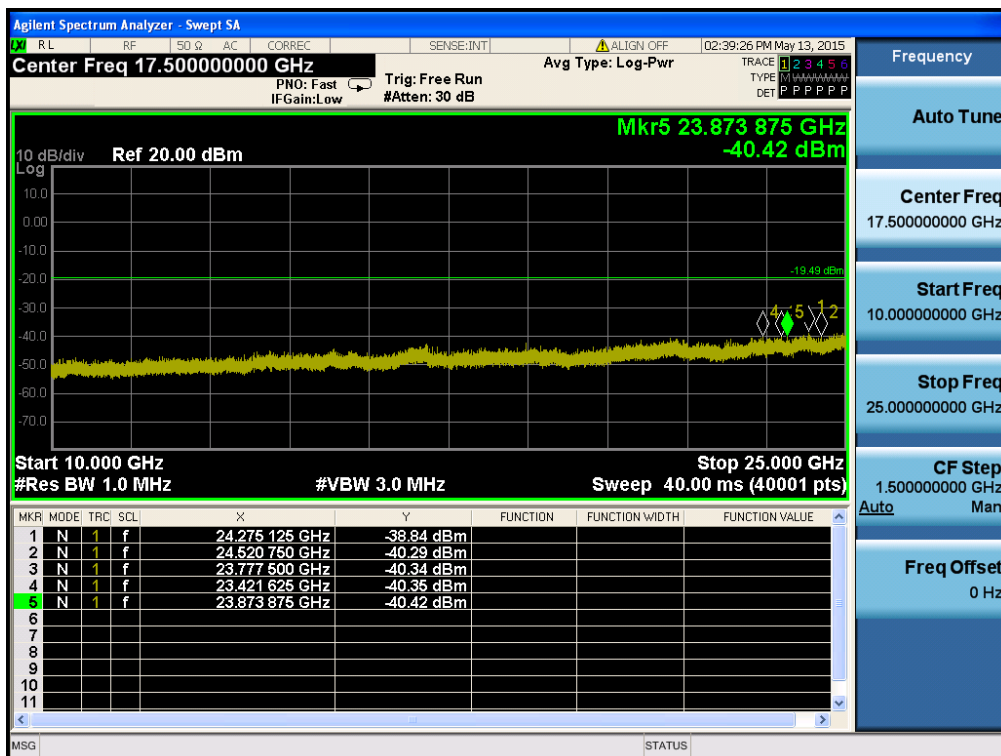
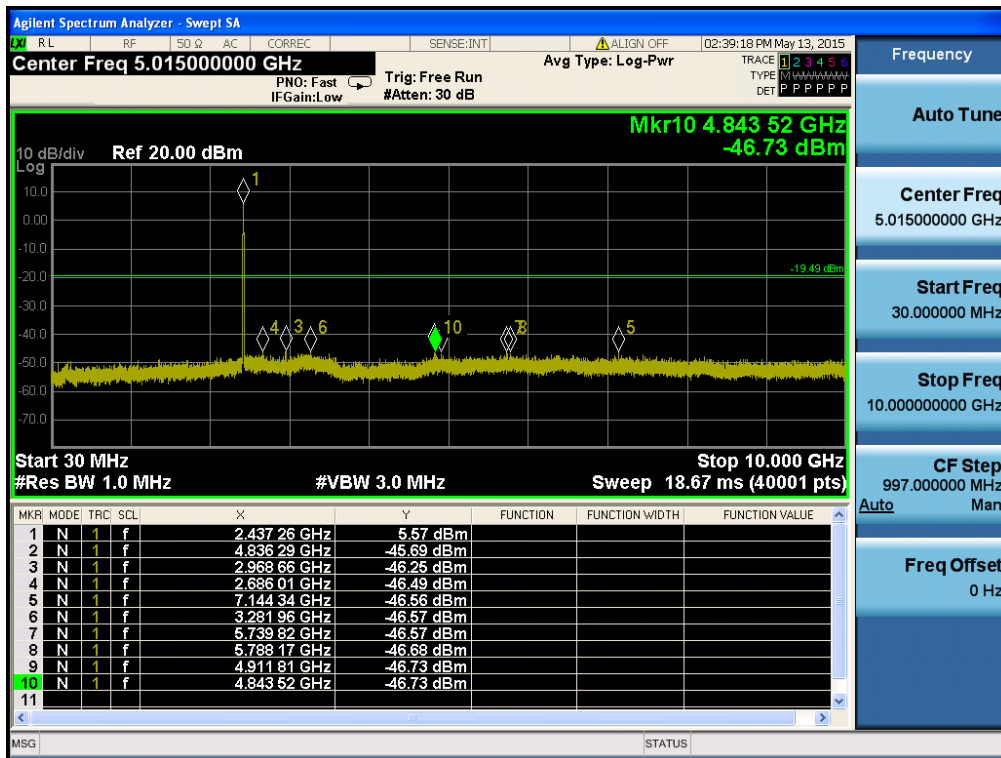
Reference



Conducted Spurious Emissions



Conducted Spurious Emissions

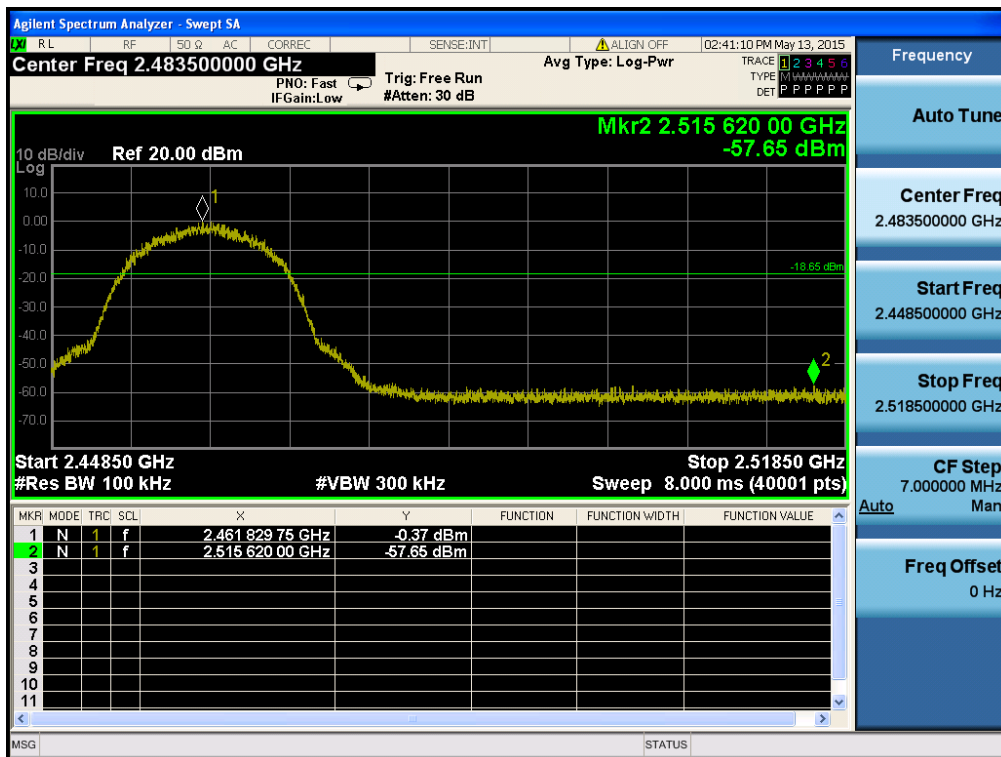


802.11b & 5.5 Mbps & 2462 MHz

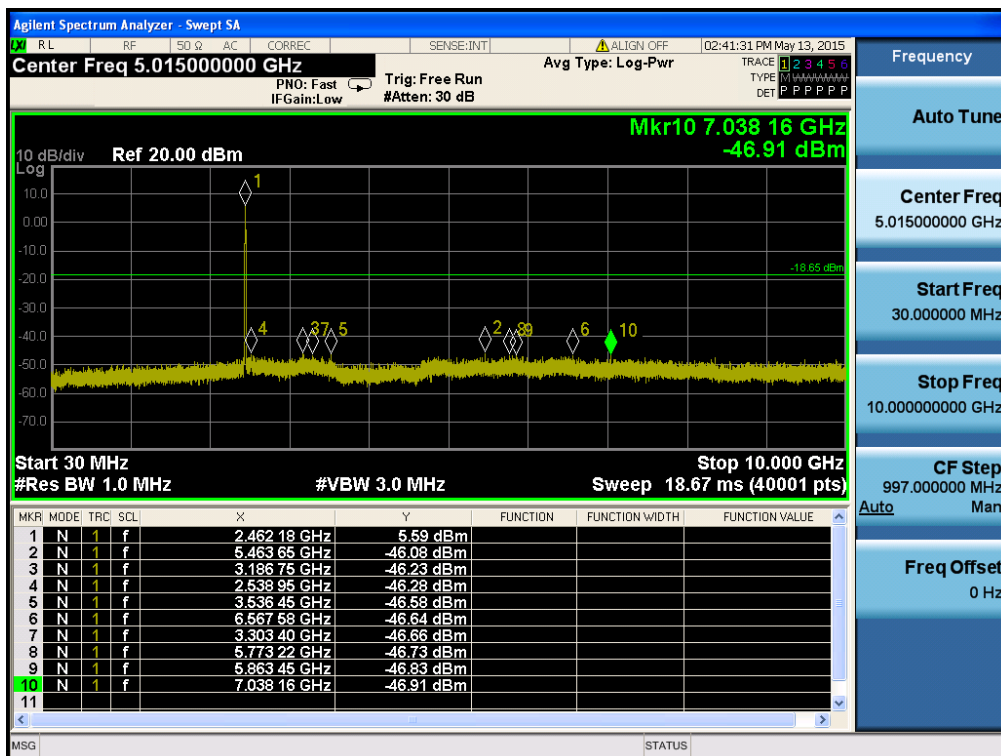
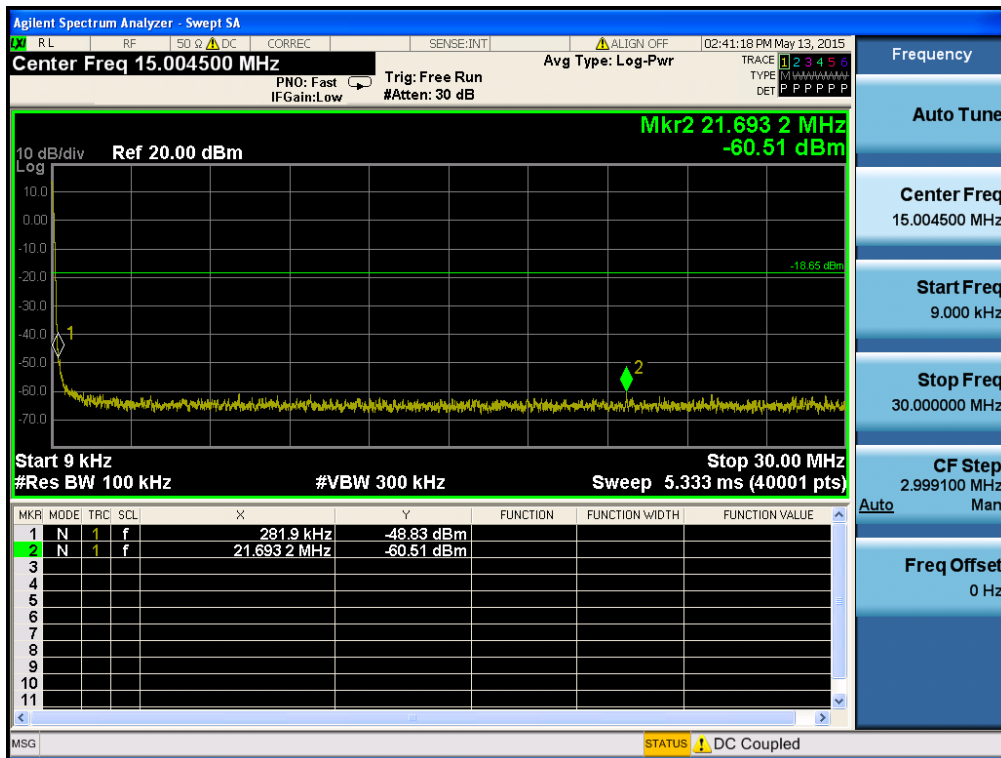
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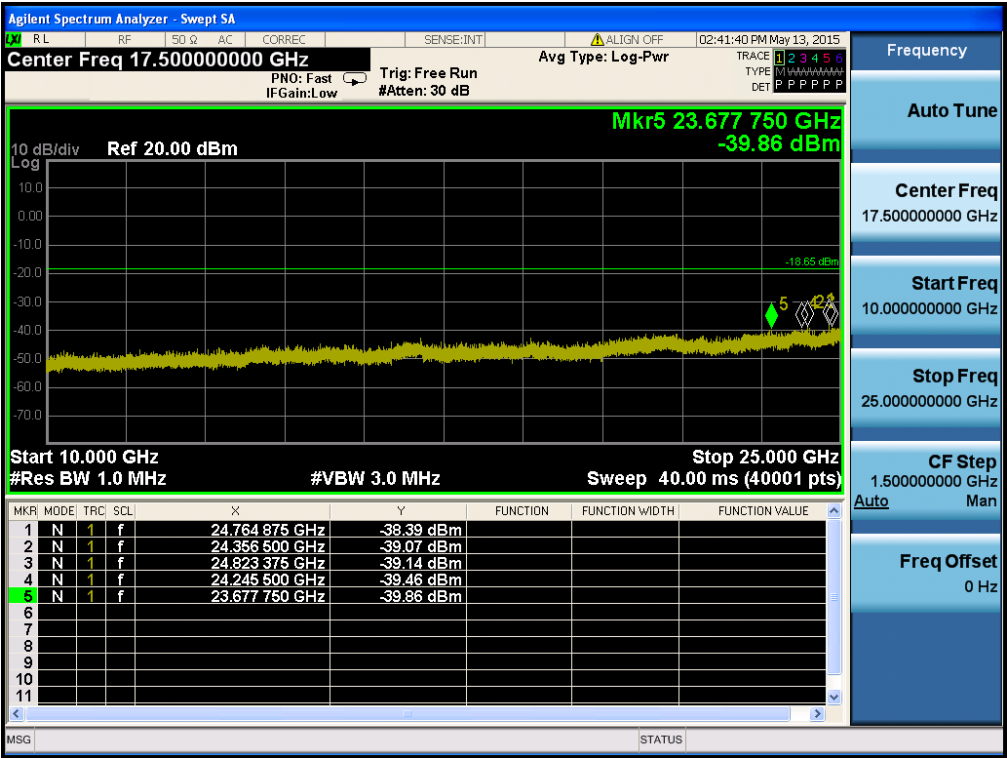
High Band-edge



Conducted Spurious Emissions

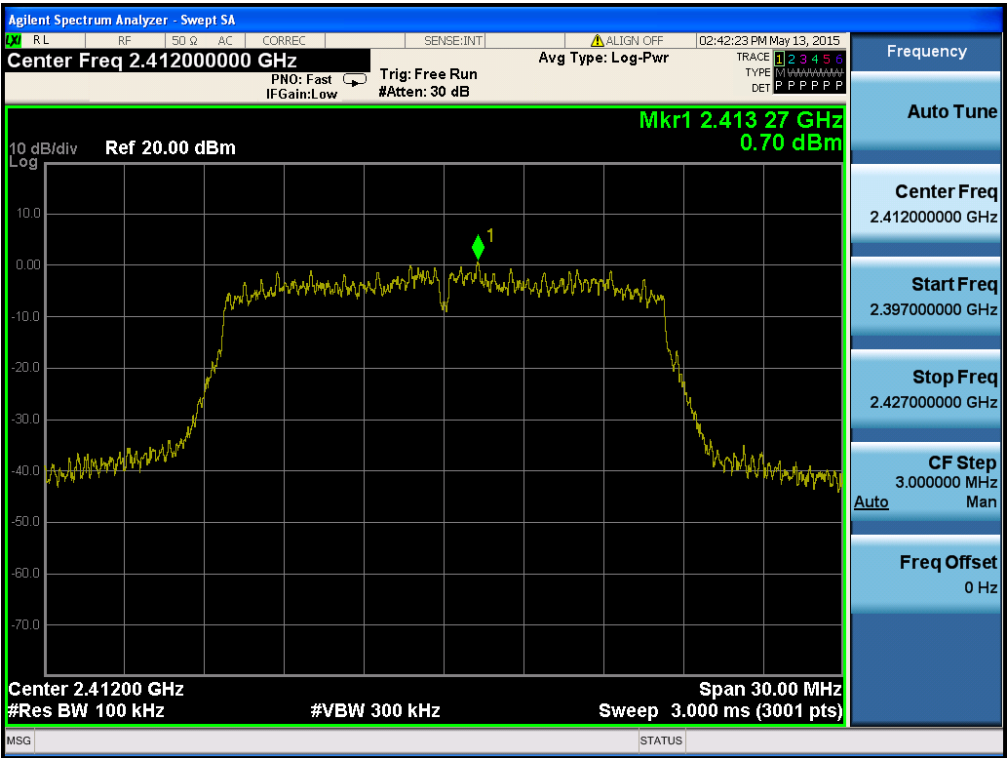


Conducted Spurious Emissions

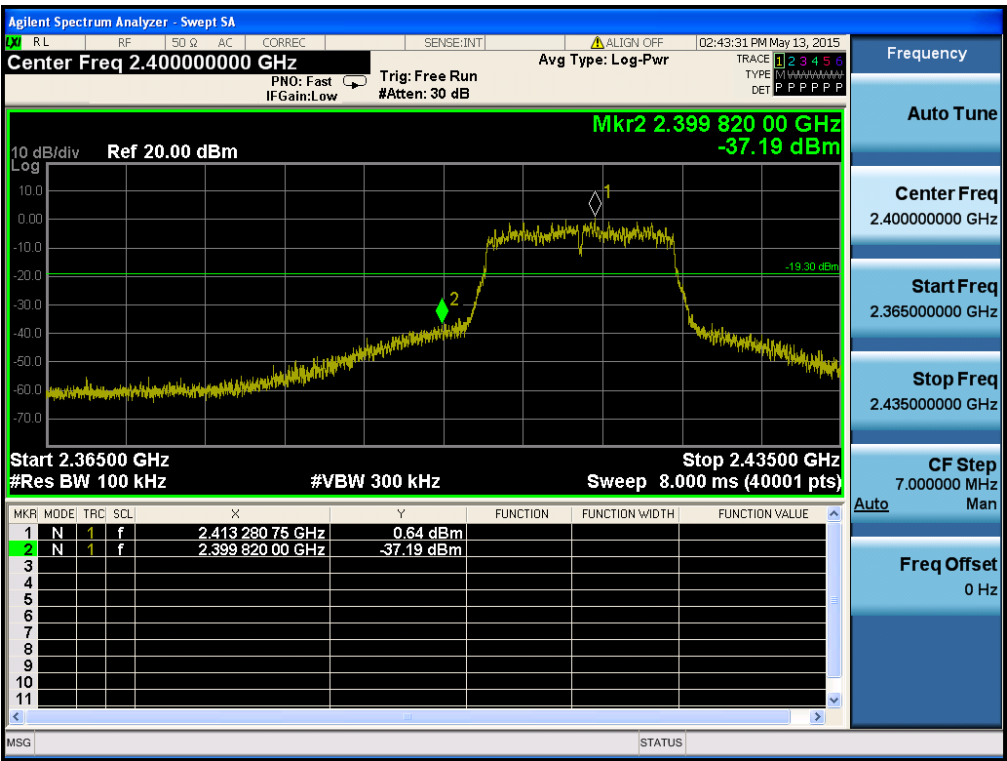


802.11g & 54 Mbps & 2412 MHz

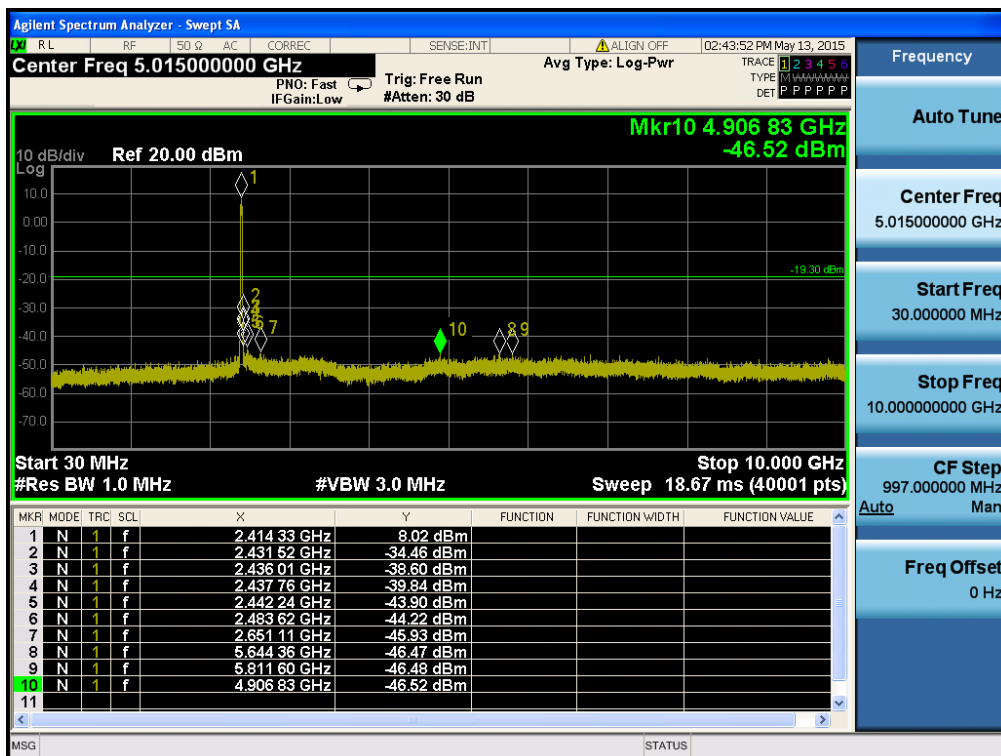
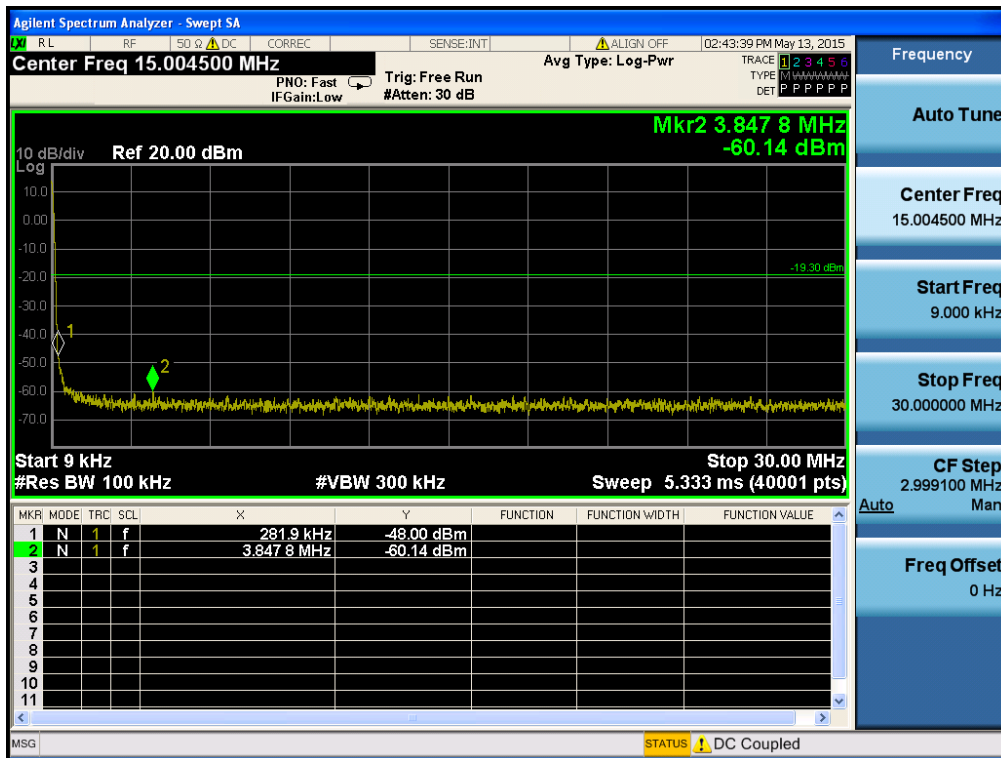
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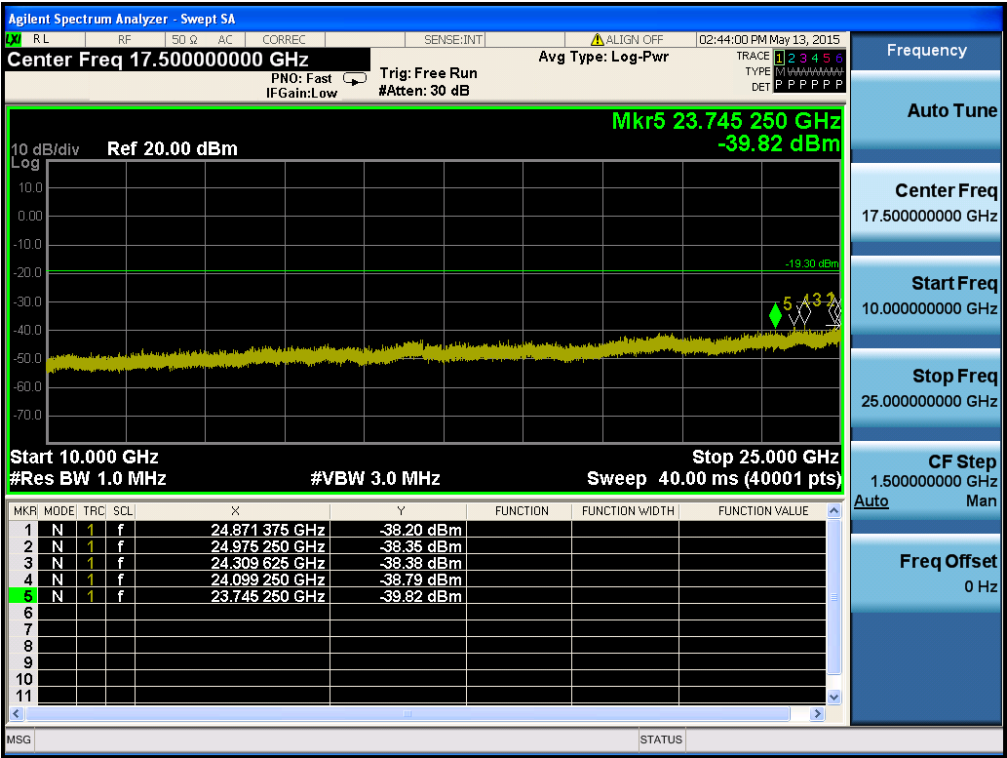
Low Band-edge



Conducted Spurious Emissions

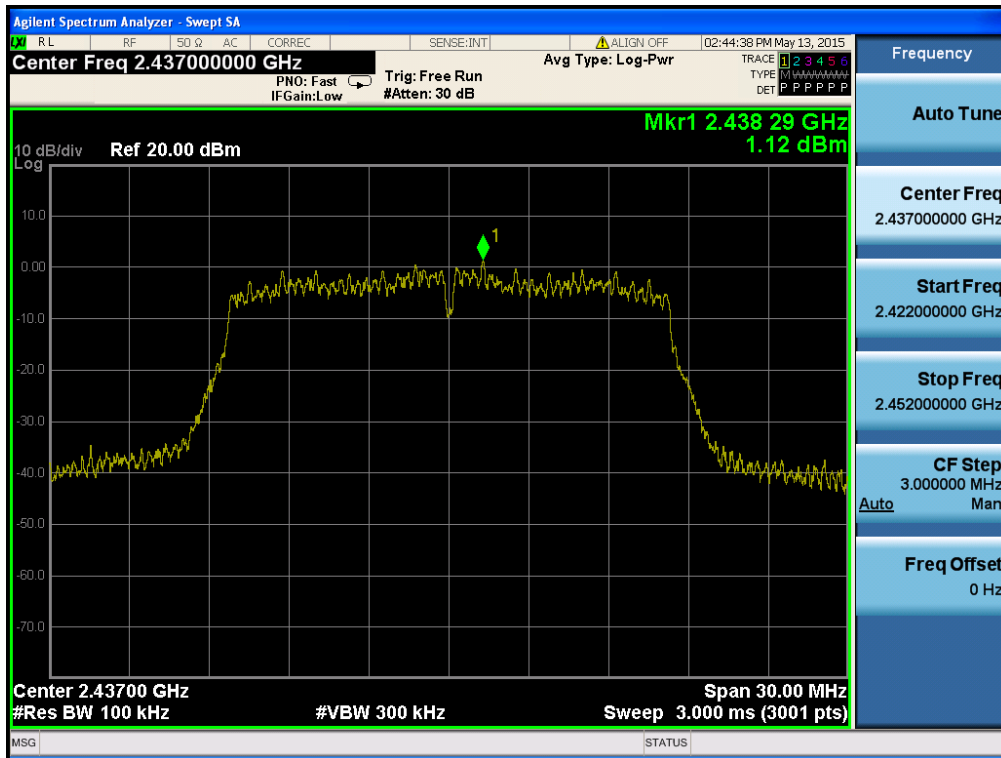


Conducted Spurious Emissions

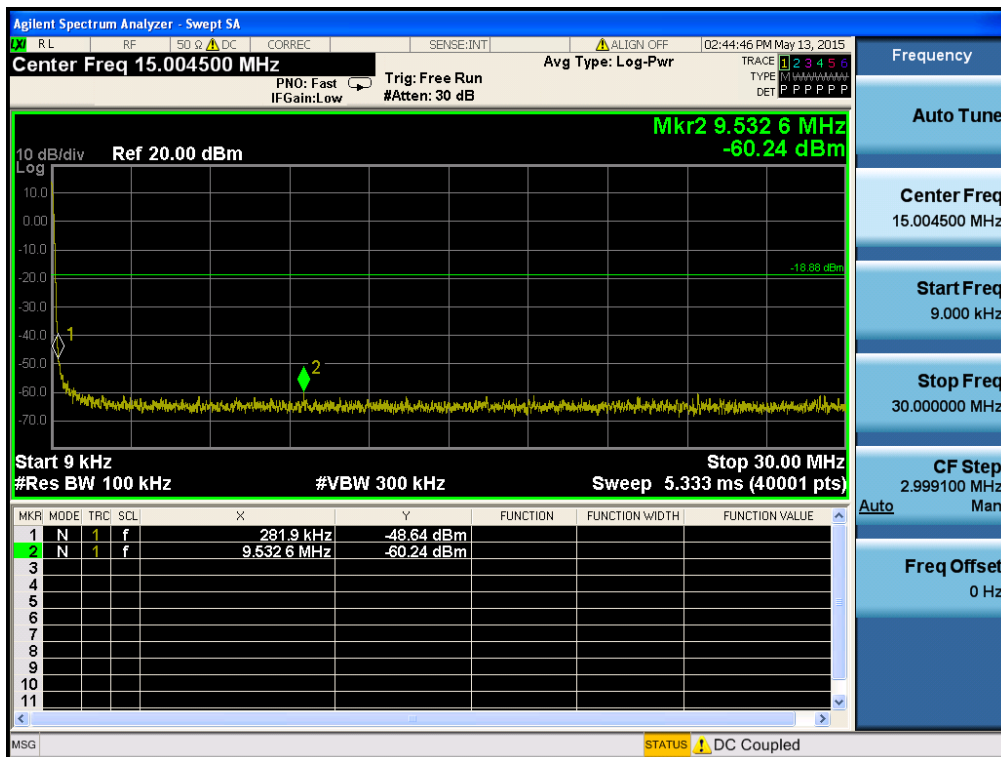


802.11g & 54 Mbps & 2437 MHz

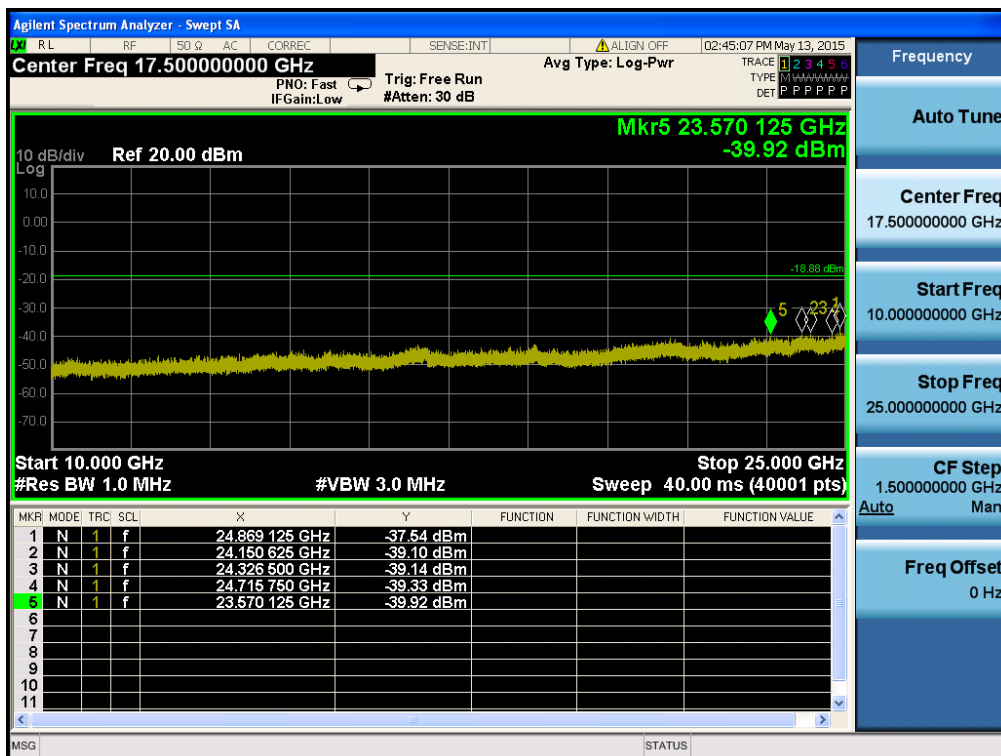
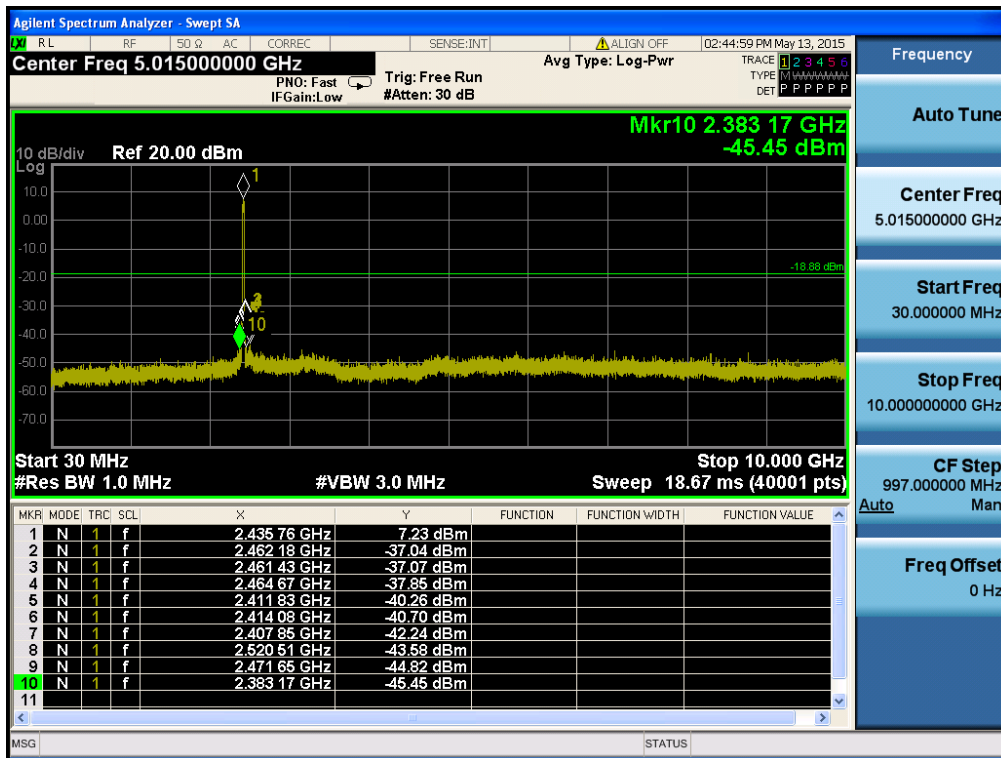
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Conducted Spurious Emissions

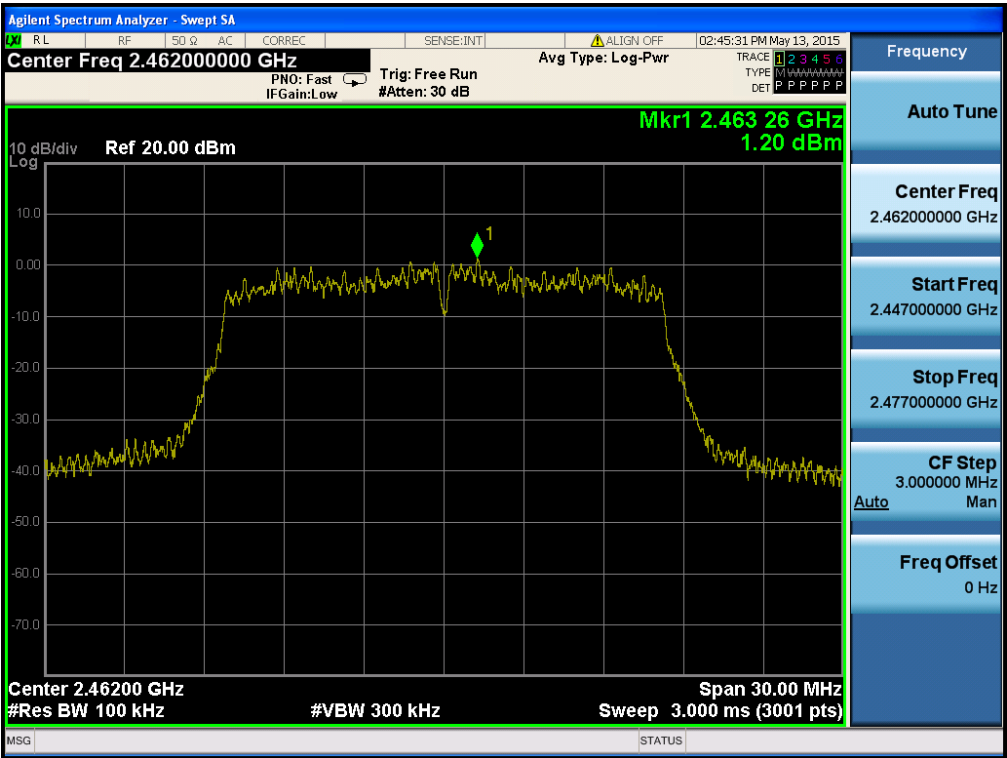


Conducted Spurious Emissions

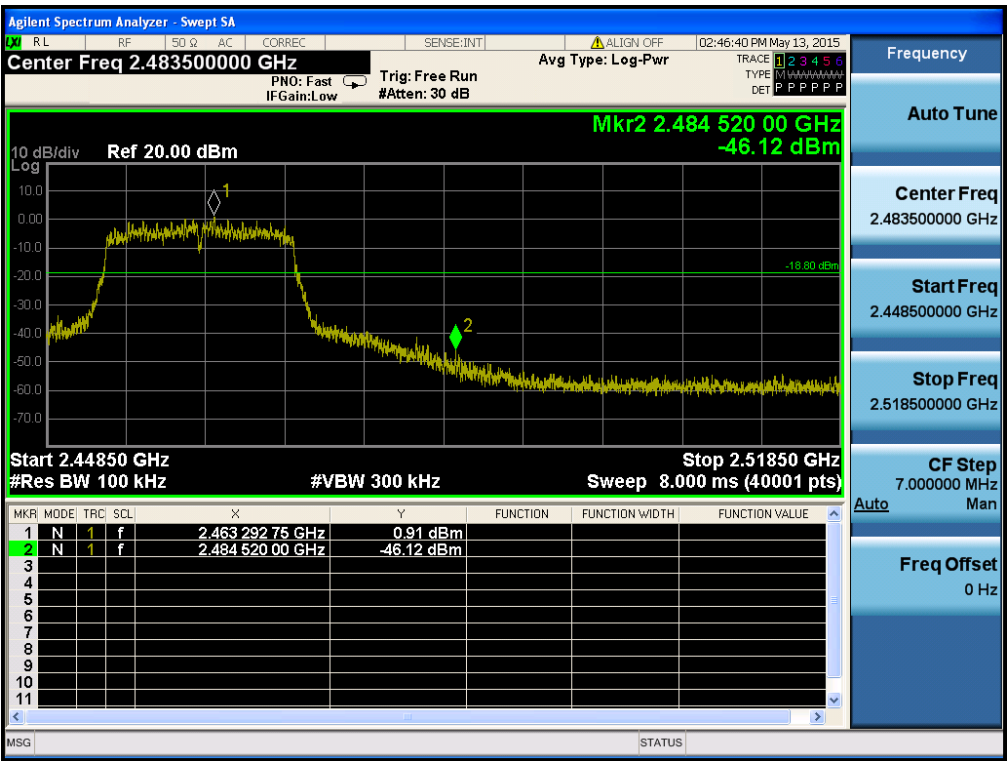


802.11g & 54 Mbps & 2462 MHz

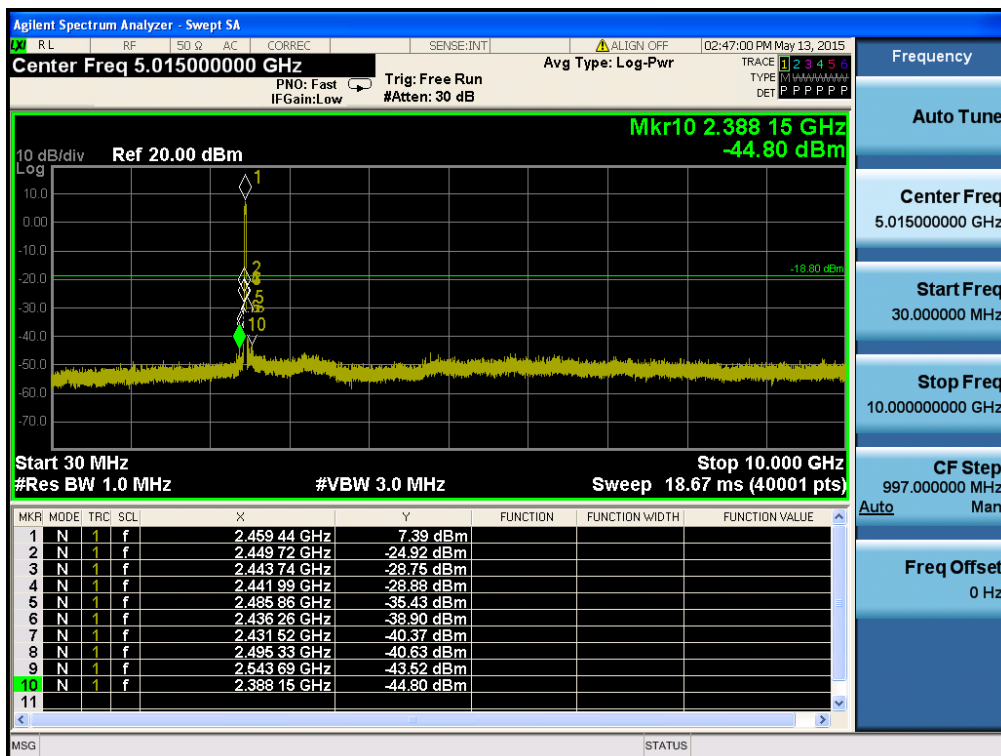
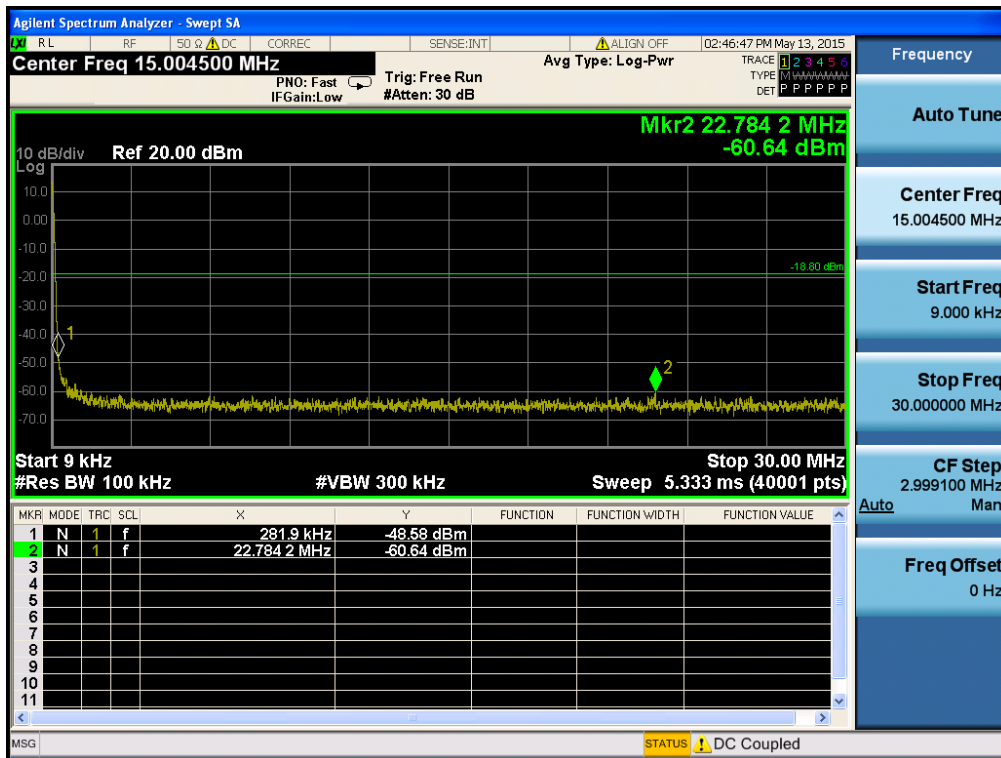
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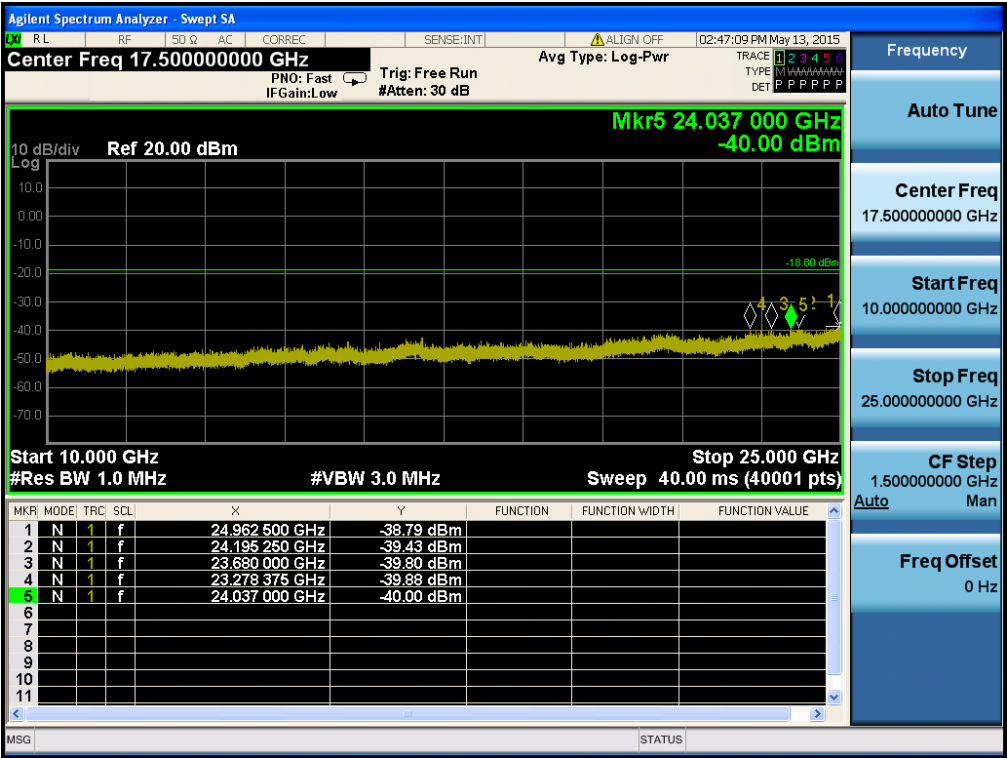
High Band-edge



Conducted Spurious Emissions

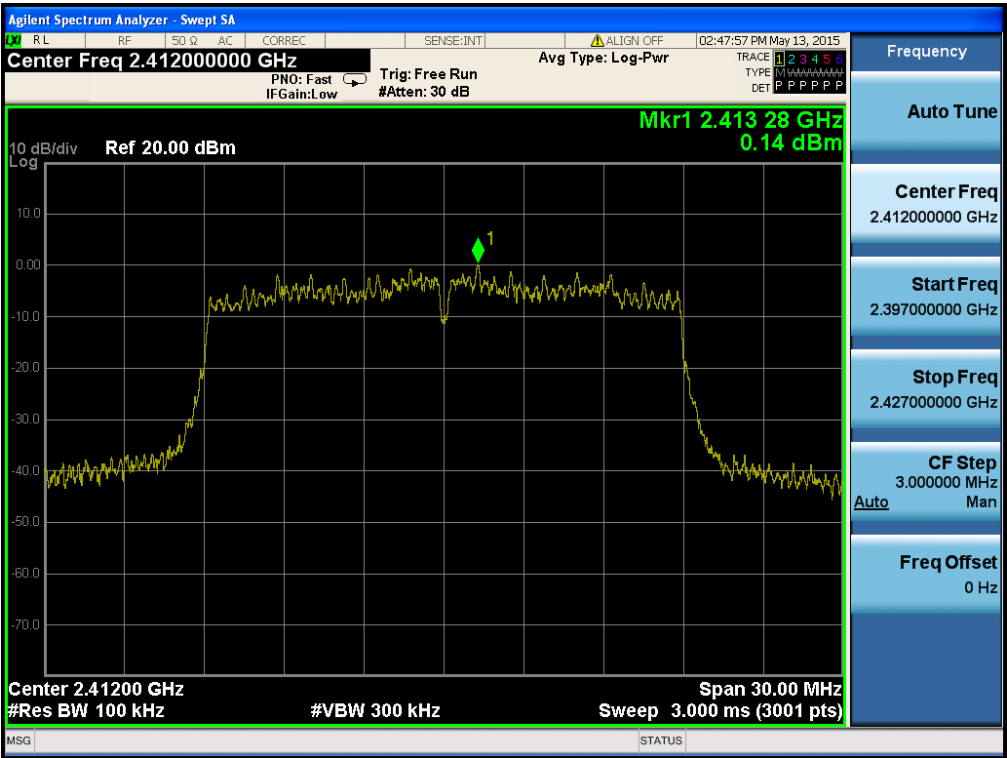


Conducted Spurious Emissions

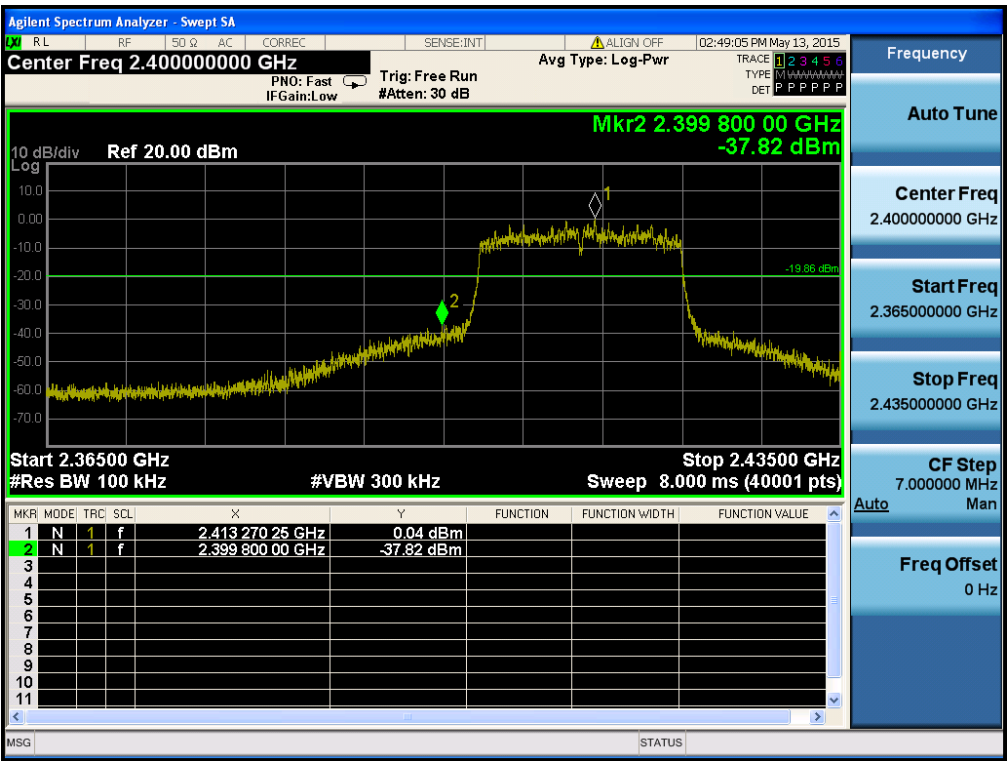


802.11n(HT20) & MCS 7 & 2412 MHz

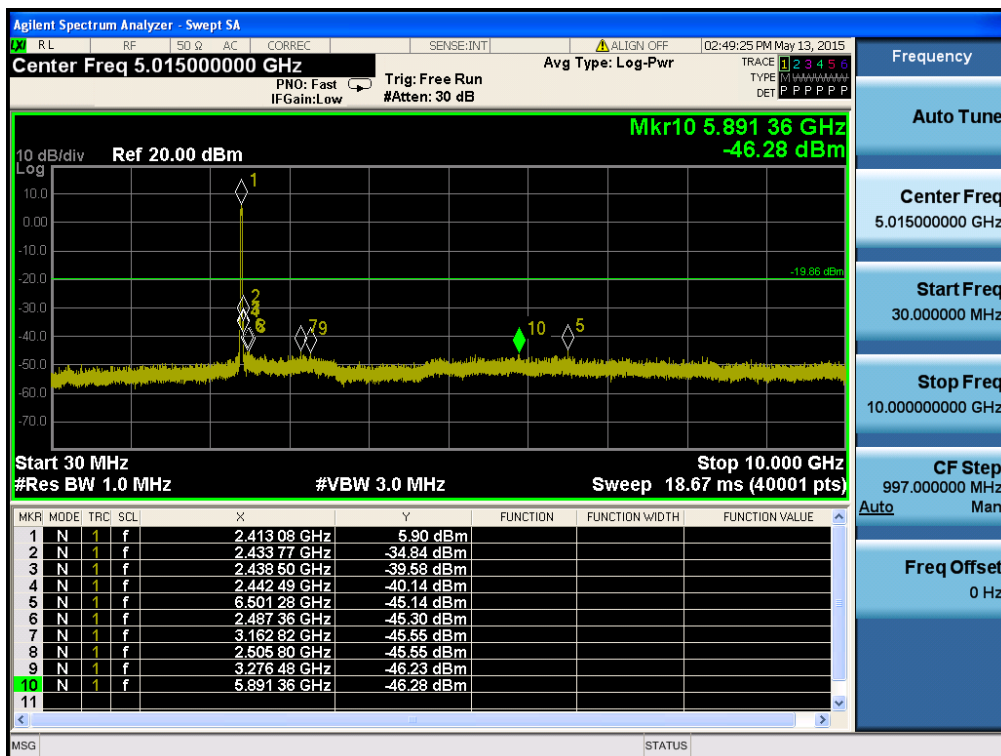
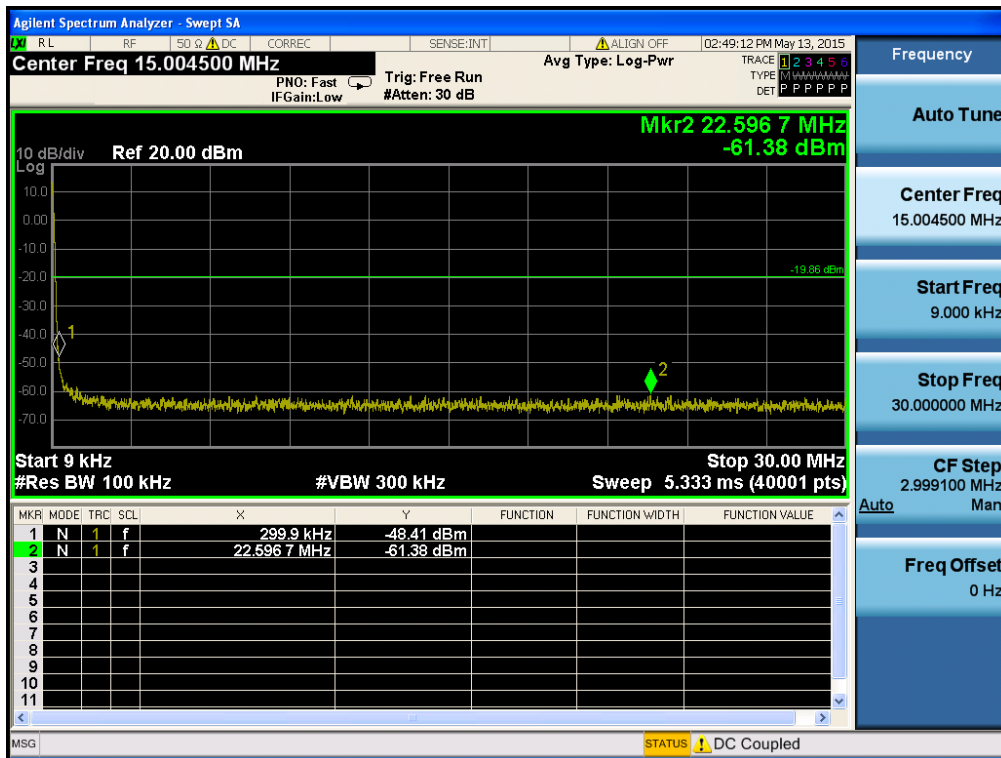
Reference



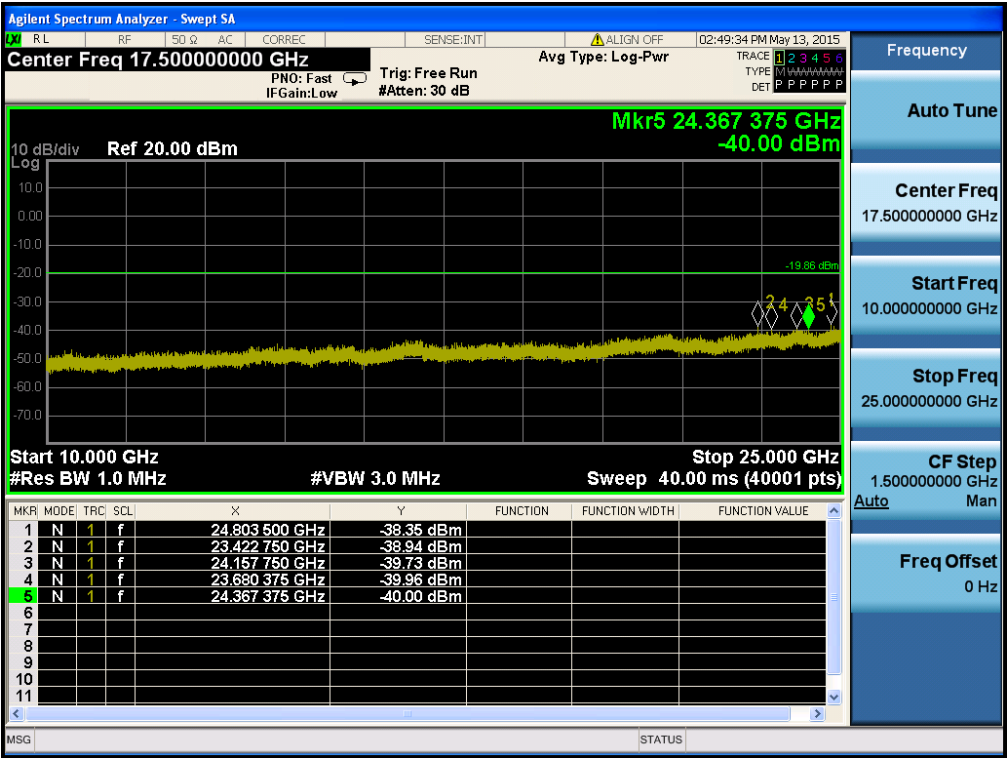
Low Band-edge



Conducted Spurious Emissions

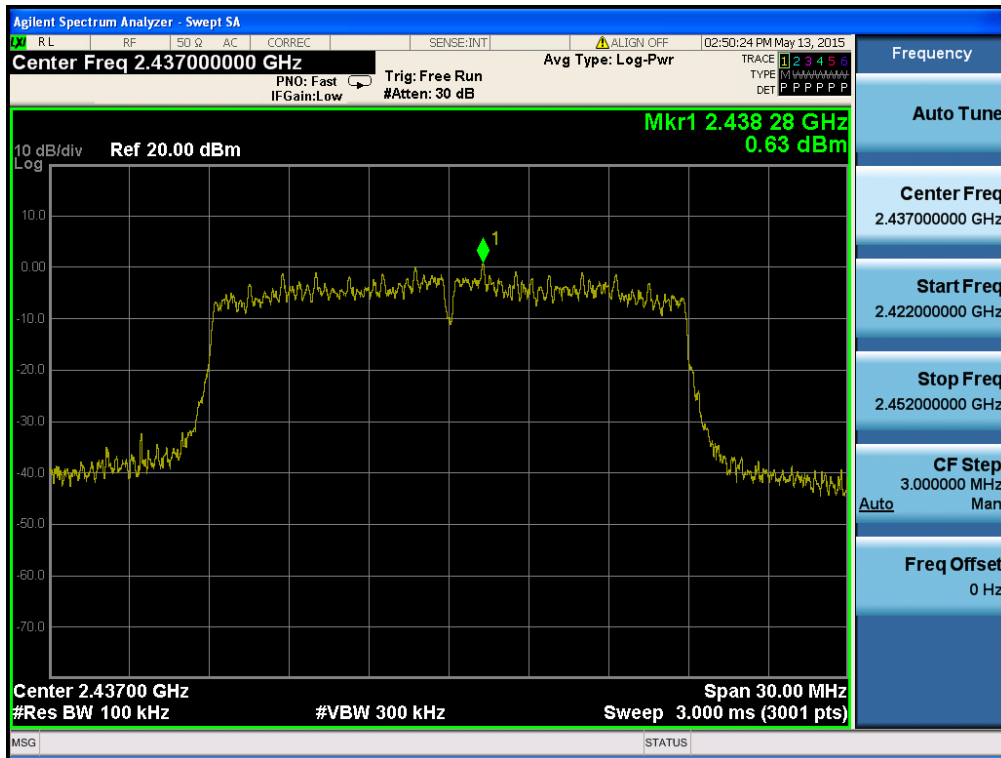


Conducted Spurious Emissions

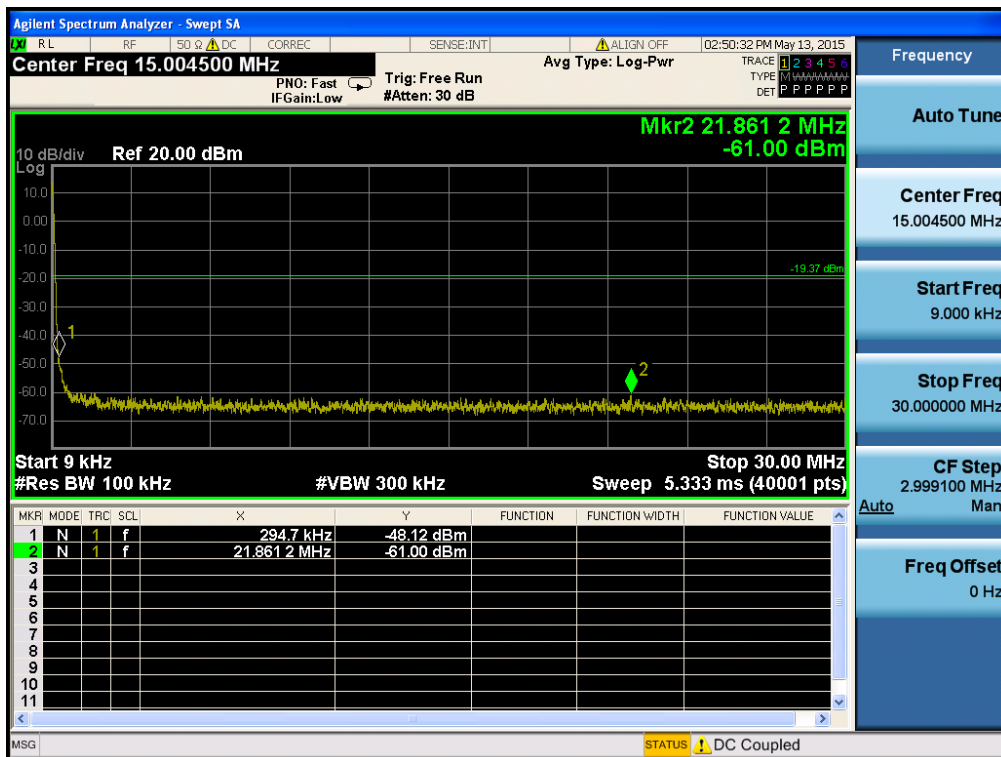


802.11n(HT20) & MCS 7 & 2437 MHz

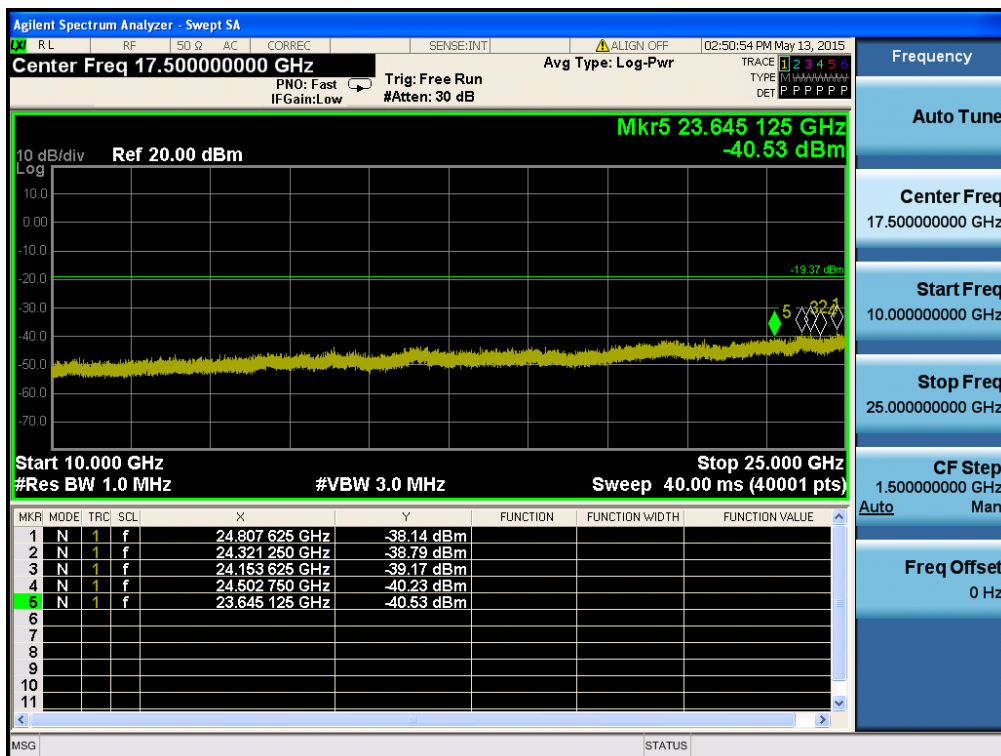
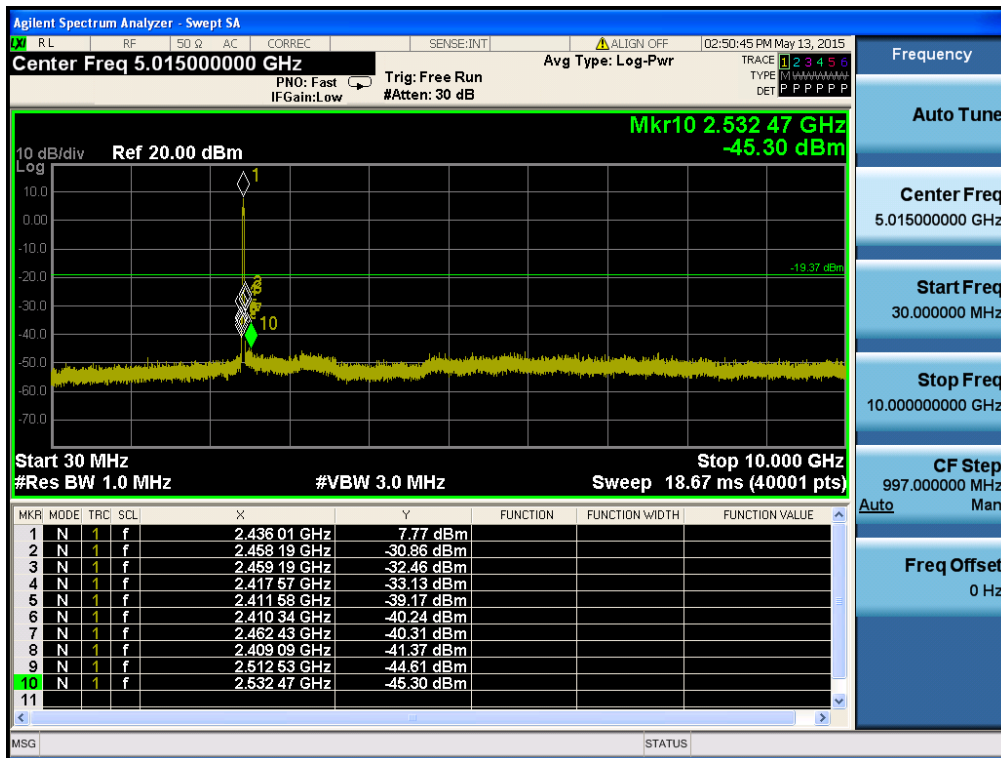
Reference



Conducted Spurious Emissions

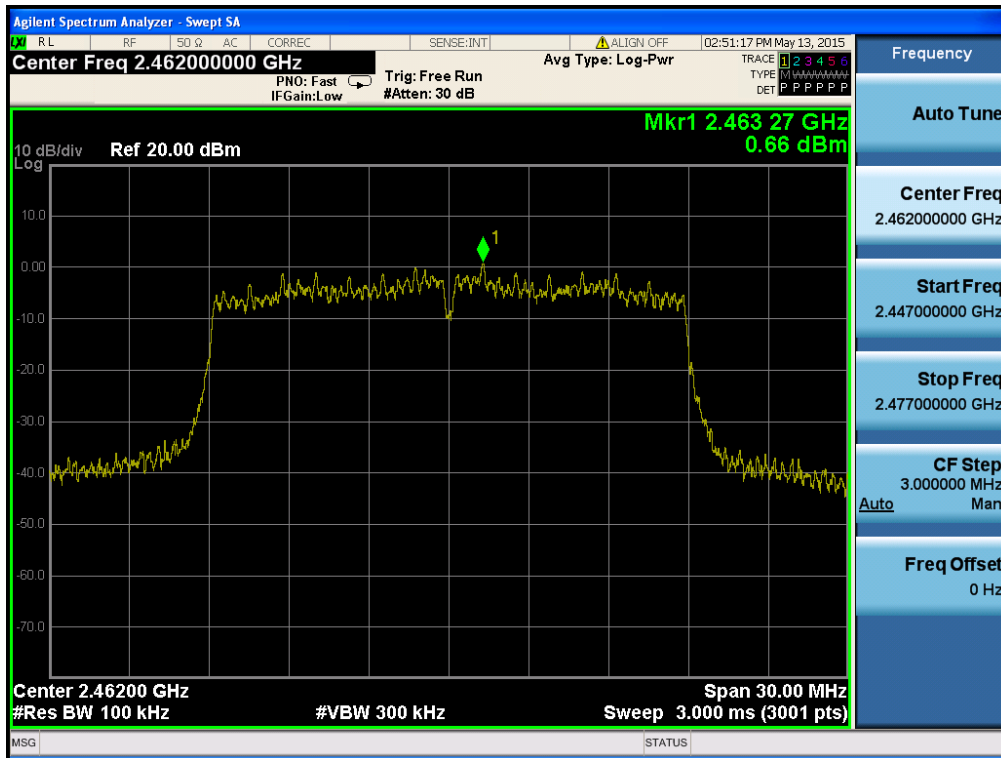


Conducted Spurious Emissions

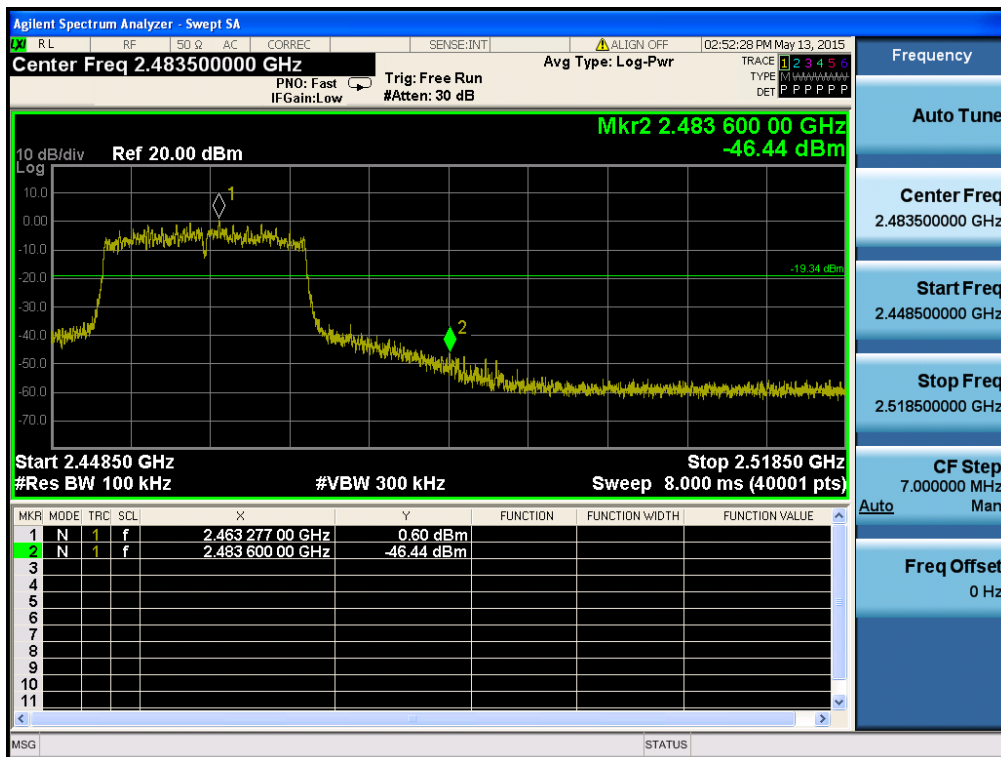


802.11n(HT20) & MCS 7 & 2462 MHz

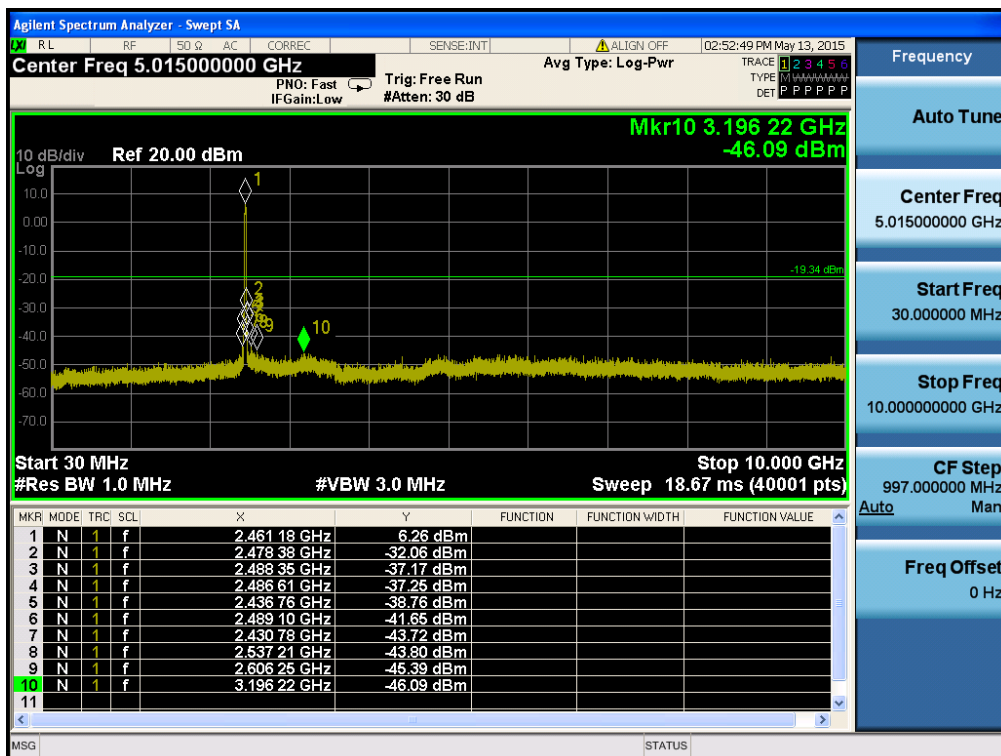
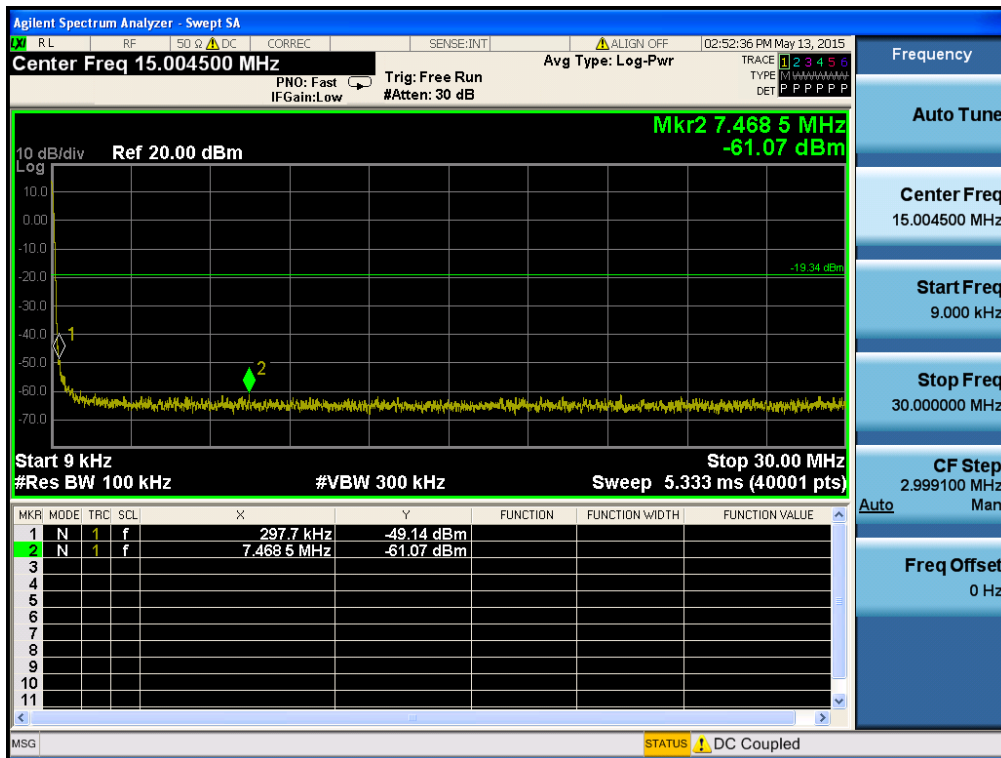
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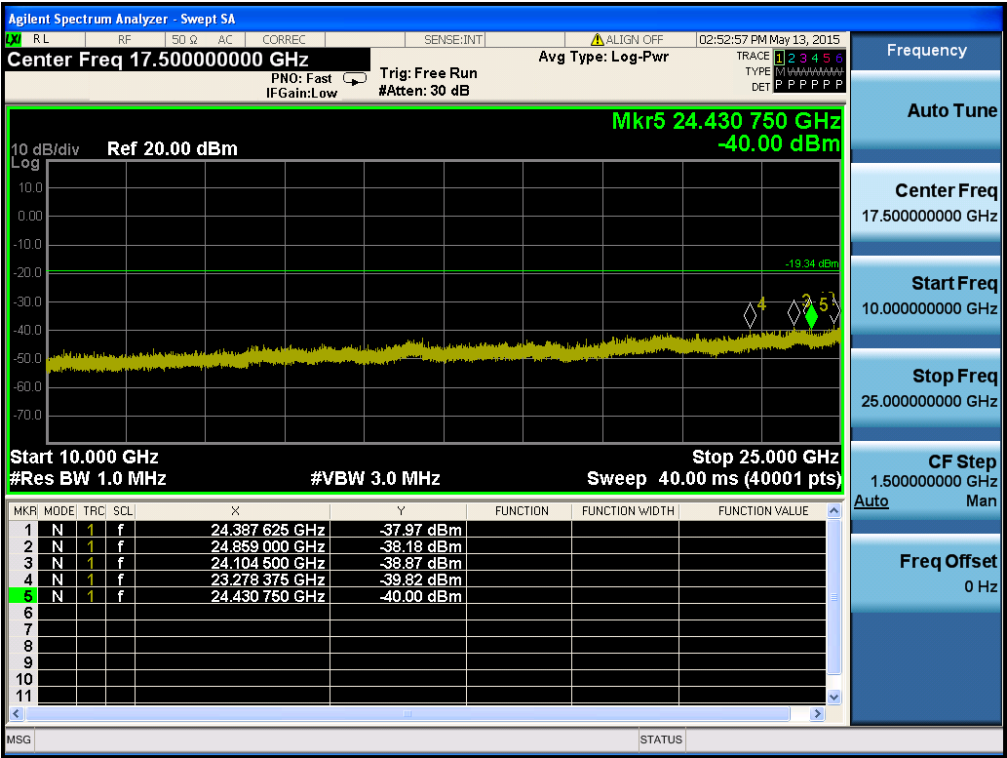
High Band-edge



Conducted Spurious Emissions



Conducted Spurious Emissions



8.5 Radiated Spurious Emissions

Test Requirements and limit, §15.247(d), §15.205 & 209, RSS-247 [5.5], RSS-Gen [8.9 & 8.10]

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a) and (b), then the 15.209(a) limit in the table below has to be followed.

▪ FCC Part 15.209(a) and (b)

Frequency(MHz)	Limit(uV/m)	Measurement Distance(meter)
0.009 – 0.490	2400/F(KHz)	300
0.490 – 1.705	24000/F(KHz)	30
1.705 – 30.0	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

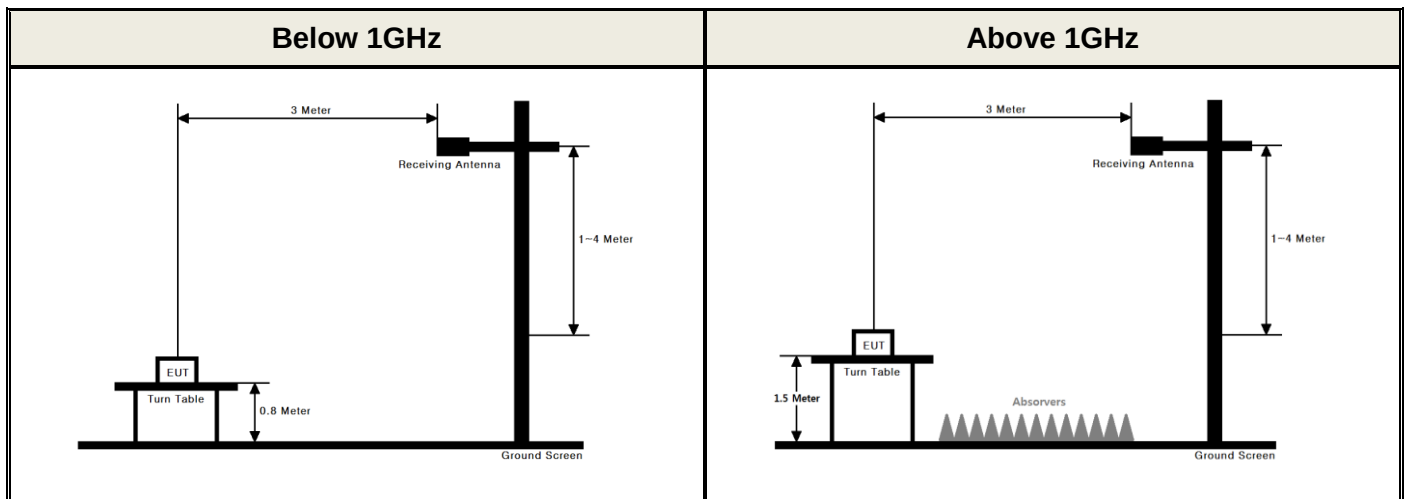
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

▪ FCC Part 15.205 (a): Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.52025	156.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	12.57675 ~	156.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	12.57725	156.7 ~ 156.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	13.36 ~ 13.41	162.0125 ~ 167.17	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.42 ~ 16.423	167.72 ~ 173.2	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	16.69475 ~	240 ~ 285	2655 ~ 2900		
8.291 ~ 8.294	16.69525	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	16.80425 ~	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	16.80475	608 ~ 614	3345.8 ~ 3358		
	25.5 ~ 25.67	960 ~ 1240	3600 ~ 4400		
	37.5 ~ 38.25				
	73 ~ 74.6				
	74.8 ~ 75.2				

▪ **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

■ Test Configuration



■ Test Procedure

1. 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.
(Instead of 0.8m EUT height above 1GHz for FCC, 1.5m EUT height was used as allowed by FCC December 2014 TCB conference call.)
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until the measurements for all frequencies are complete.

■ Measurement Instrument Setting for Radiated Emission Measurements

The radiated emission was tested according to KDB 558074.

Peak Measurement :

RBW = As specified in below table , VBW $\geq 3 \times$ RBW, Sweep = Auto, Detector = Peak, Trace mode = Max Hold until the trace stabilizes.

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

Average Measurement :

1. RBW = 1 MHz (unless otherwise specified).
2. VBW $\geq 3 \times$ RBW.
3. Detector = RMS (Number of points $\geq 2 \times$ Span / RBW)
4. Averaging type = power (i.e., RMS).
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.
7. A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
 - 1) If power averaging (RMS) mode was used in step 4, then the applicable correction factor is $10 \log(1/x)$, where x is the duty cycle.
 - 2) If linear voltage averaging mode was used in step 4, then the applicable correction factor is $20 \log(1/x)$, where x is the duty cycle.
 - 3) If a specific emission is demonstrated to be continuous (≥ 98 percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

Duty Cycle Corrections (Refer to appendix II for duty cycle measurement procedure and plots)

Band	Duty Cycle(%)	T _{on} (ms)	T _{on} + T _{off} (ms)	DCF = $10\log(1/\text{Duty})$ (dB)
802.11b	94.19	1.620	1.720	0.26
802.11g	64.52	0.180	0.279	1.90
802.11n(HT20)	62.31	0.167	0.268	2.05

9 kHz ~ 25 GHz Data(M/N: SMT-i6021 & 802.11b(5.5 Mbps) & Adaptor = DC 12V)

▪ **Lowest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2337.338	H	X	PK	53.84	1.94	N/A	N/A	55.78	74.00	18.22
2336.964	H	X	AV	45.17	1.93	0.26	N/A	47.36	54.00	6.64
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Middle Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7311.096	H	X	PK	45.82	16.27	N/A	-9.54	52.55	74.00	21.45
7310.904	H	X	AV	36.76	16.27	0.26	-9.54	43.75	54.00	10.25
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Highest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2484.765	H	X	PK	54.20	2.80	N/A	N/A	57.00	74.00	17.00
2484.482	H	X	AV	44.35	2.80	0.26	N/A	47.41	54.00	6.59
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m.

In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = $20\log(\text{applied distance} / \text{required distance}) = 20\log(1\text{m} / 3\text{m}) = -9.54\text{dB}$

When distance factor is "N/A", the distance is 3m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.

9 kHz ~ 25 GHz Data(M/N: SMT-i6021 & 802.11g(54 Mbps) & Adaptor = DC 12V)

▪ **Lowest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2389.080	H	X	PK	66.14	2.75	N/A	N/A	68.89	74.00	5.11
2389.680	H	X	AV	48.38	2.76	1.90	N/A	53.04	54.00	0.96
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Middle Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7311.030	H	X	PK	45.46	16.27	N/A	-9.54	52.19	74.00	21.81
7310.974	H	X	AV	36.40	16.27	1.90	-9.54	45.03	54.00	8.97
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Highest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.852	H	X	PK	65.74	2.80	N/A	N/A	68.54	74.00	5.46
2484.185	H	X	AV	47.69	2.80	1.90	N/A	52.39	54.00	1.61
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m.

In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = $20\log(\text{applied distance} / \text{required distance}) = 20\log(1\text{m} / 3\text{m}) = -9.54\text{dB}$

When distance factor is "N/A", the distance is 3m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.

9 kHz ~ 25 GHz Data(M/N: SMT-i6021 & 802.11n HT20(MCS 7) & Adaptor = DC 12V)

▪ **Lowest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2388.88	H	X	PK	67.05	2.74	N/A	N/A	69.79	74.00	4.21
2390.00	H	X	AV	47.31	2.76	2.05	N/A	52.12	54.00	1.88
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Middle Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7310.823	H	X	PK	46.57	16.27	N/A	-9.54	53.30	74.00	20.70
7311.146	H	X	AV	36.19	16.27	2.05	-9.54	44.97	54.00	9.03
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Highest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.73	H	X	PK	64.32	2.80	N/A	N/A	67.12	74.00	6.88
2484.09	H	X	AV	46.12	2.80	2.05	N/A	50.97	54.00	3.03
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m.

In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = $20\log(\text{applied distance} / \text{required distance}) = 20\log(1\text{m} / 3\text{m}) = -9.54\text{dB}$

When distance factor is "N/A", the distance is 3m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.

9 kHz ~ 25 GHz Data(M/N: SMT-i6021 & 802.11b(5.5 Mbps) & PoE = DC 48V)

▪ **Lowest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2338.231	H	X	PK	53.54	1.95	N/A	N/A	55.49	74.00	18.51
2338.151	H	X	AV	45.03	1.95	0.26	N/A	47.24	54.00	6.76
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Middle Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7310.889	H	X	PK	46.81	16.27	N/A	-9.54	53.54	74.00	20.46
7311.128	H	X	AV	36.77	16.27	0.26	-9.54	43.76	54.00	10.24
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Highest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2484.122	H	X	PK	54.54	2.80	N/A	N/A	57.34	74.00	16.66
2484.333	H	X	AV	44.37	2.80	0.26	N/A	47.43	54.00	6.57
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m.

In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = $20\log(\text{applied distance} / \text{required distance}) = 20\log(1\text{m} / 3\text{m}) = -9.54\text{dB}$

When distance factor is "N/A", the distance is 3m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.

9 kHz ~ 25 GHz Data(M/N: SMT-i6021 & 802.11g(54 Mbps) & PoE = DC 48V)

▪ **Lowest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2389.267	H	X	PK	66.80	2.75	N/A	N/A	69.55	74.00	4.45
2390.000	H	X	AV	47.98	2.76	1.90	N/A	52.64	54.00	1.36
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Middle Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7310.922	H	X	PK	45.94	16.27	N/A	-9.54	52.67	74.00	21.33
7310.928	H	X	AV	36.25	16.27	1.90	-9.54	44.88	54.00	9.12
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Highest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.522	H	X	PK	66.12	2.80	N/A	N/A	68.92	74.00	5.08
2483.750	H	X	AV	47.49	2.80	1.90	N/A	52.19	54.00	1.81
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m.

In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = $20\log(\text{applied distance} / \text{required distance}) = 20\log(1\text{m} / 3\text{m}) = -9.54\text{dB}$

When distance factor is "N/A", the distance is 3m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.

9 kHz ~ 25 GHz Data(M/N: SMT-i6021 & 802.11n HT20(MCS 7) & PoE = DC 48V)

▪ **Lowest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2388.28	H	X	PK	67.16	2.73	N/A	N/A	69.89	74.00	4.11
2389.81	H	X	AV	46.70	2.76	2.05	N/A	51.51	54.00	2.49
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Middle Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7311.553	H	X	PK	45.53	16.27	N/A	-9.54	52.26	74.00	21.74
7311.023	H	X	AV	36.15	16.27	2.05	-9.54	44.93	54.00	9.07
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Highest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.52	H	X	PK	65.24	2.80	N/A	N/A	68.04	74.00	5.96
2483.53	H	X	AV	47.31	2.80	2.05	N/A	52.16	54.00	1.84
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m.

In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = $20\log(\text{applied distance} / \text{required distance}) = 20\log(1\text{m} / 3\text{m}) = -9.54\text{dB}$

When distance factor is "N/A", the distance is 3m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.

9 kHz ~ 25 GHz Data(M/N: SMT-i6011 & 802.11b(5.5 Mbps) & Adaptor = DC 12V)

▪ **Lowest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2388.600	H	X	PK	56.42	2.74	N/A	N/A	59.16	74.00	14.85
2389.000	H	X	AV	46.99	2.75	0.26	N/A	50.00	54.00	4.00
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Middle Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7311.668	H	X	PK	45.32	16.27	N/A	-9.54	52.05	74.00	21.95
7310.917	H	X	AV	36.92	16.27	0.26	-9.54	43.91	54.00	10.09
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Highest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2484.985	H	X	PK	55.34	2.80	N/A	N/A	58.14	74.00	15.86
2484.486	H	X	AV	46.24	2.80	0.26	N/A	49.30	54.00	4.70
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m.

In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = $20\log(\text{applied distance} / \text{required distance}) = 20\log(1\text{m} / 3\text{m}) = -9.54\text{dB}$

When distance factor is "N/A", the distance is 3m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.

9 kHz ~ 25 GHz Data(M/N: SMT-i6011 & 802.11g(54 Mbps) & Adaptor = DC 12V)

▪ **Lowest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2389.580	V	Y	PK	63.59	2.75	N/A	N/A	66.34	74.00	7.66
2389.620	V	Y	AV	45.26	2.76	1.90	N/A	49.92	54.00	4.08
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Middle Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7310.792	H	X	PK	45.47	16.27	N/A	-9.54	52.20	74.00	21.80
7310.992	H	X	AV	37.89	16.27	1.90	-9.54	46.52	54.00	7.48
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Highest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2484.107	H	X	PK	66.52	2.80	N/A	N/A	69.32	74.00	4.68
2483.583	H	X	AV	48.75	2.80	1.90	N/A	53.45	54.00	0.55
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m.

In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = $20\log(\text{applied distance} / \text{required distance}) = 20\log(1\text{m} / 3\text{m}) = -9.54\text{dB}$

When distance factor is "N/A", the distance is 3m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.

9 kHz ~ 25 GHz Data(M/N: SMT-i6011 & 802.11n HT20(MCS 7) & Adaptor = DC 12V)

▪ **Lowest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2389.70	H	X	PK	66.21	2.76	N/A	N/A	68.97	74.00	5.03
2389.90	H	X	AV	46.18	2.76	2.05	N/A	50.99	54.00	3.01
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Middle Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7310.752	H	X	PK	46.03	16.27	N/A	-9.54	52.76	74.00	21.24
7310.837	H	X	AV	37.41	16.27	2.05	-9.54	46.19	54.00	7.81
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Highest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2484.16	H	Z	PK	67.25	2.80	N/A	N/A	70.05	74.00	3.95
2483.67	H	Z	AV	48.41	2.80	2.05	N/A	53.26	54.00	0.74
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m.

In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = $20\log(\text{applied distance} / \text{required distance}) = 20\log(1\text{m} / 3\text{m}) = -9.54\text{dB}$

When distance factor is "N/A", the distance is 3m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.

9 kHz ~ 25 GHz Data(M/N: SMT-i6011 & 802.11b(5.5 Mbps) & PoE = DC 48V)

▪ **Lowest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2389.100	H	X	PK	55.85	2.75	N/A	N/A	58.60	74.00	15.40
2389.620	H	X	AV	47.10	2.76	0.26	N/A	50.12	54.00	3.88
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Middle Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7310.802	H	X	PK	46.22	16.27	N/A	-9.54	52.95	74.00	21.05
7310.947	H	X	AV	37.26	16.27	0.26	-9.54	44.25	54.00	9.75
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Highest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2484.049	H	X	PK	55.51	2.80	N/A	N/A	58.31	74.00	15.69
2484.664	H	X	AV	46.37	2.80	0.26	N/A	49.43	54.00	4.57
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m.

In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = $20\log(\text{applied distance} / \text{required distance}) = 20\log(1\text{m} / 3\text{m}) = -9.54\text{dB}$

When distance factor is "N/A", the distance is 3m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.

9 kHz ~ 25 GHz Data(M/N: SMT-i6011 & 802.11g(54 Mbps) & PoE = DC 48V)

▪ **Lowest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2389.340	V	Y	PK	61.75	2.75	N/A	N/A	64.50	74.00	9.50
2389.700	V	Y	AV	45.57	2.76	1.90	N/A	50.23	54.00	3.77
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Middle Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7310.947	H	X	PK	46.65	16.27	N/A	-9.54	53.38	74.00	20.62
7311.143	H	X	AV	37.82	16.27	1.90	-9.54	46.45	54.00	7.55
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Highest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.574	H	X	PK	65.86	2.80	N/A	N/A	68.66	74.00	5.34
2483.913	H	X	AV	48.04	2.80	1.90	N/A	52.74	54.00	1.26
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m.

In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = $20\log(\text{applied distance} / \text{required distance}) = 20\log(1\text{m} / 3\text{m}) = -9.54\text{dB}$

When distance factor is "N/A", the distance is 3m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.

9 kHz ~ 25 GHz Data(M/N: SMT-i6011 & 802.11n HT20(MCS 7) & PoE = DC 48V)

▪ **Lowest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2389.70	H	X	PK	66.21	2.76	N/A	N/A	68.97	74.00	5.03
2389.90	H	X	AV	46.18	2.76	2.05	N/A	50.99	54.00	3.01
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Middle Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7311.193	H	X	PK	45.80	16.27	N/A	-9.54	52.53	74.00	21.47
7311.003	H	X	AV	37.40	16.27	2.05	-9.54	46.18	54.00	7.82
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ **Highest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2484.08	V	Y	PK	65.08	2.80	N/A	N/A	67.88	74.00	6.12
2483.89	V	Y	AV	46.96	2.80	2.05	N/A	51.81	54.00	2.19
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m.

In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = $20\log(\text{applied distance} / \text{required distance}) = 20\log(1\text{m} / 3\text{m}) = -9.54\text{dB}$

When distance factor is "N/A", the distance is 3m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.

8.6 AC-line conducted emissions

Test Requirements and limit, §15.207& RSS-Gen [8.8]

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

■ TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to the test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

■ Test Results: **Comply**(Refer to next page.)

The worst data was reported.

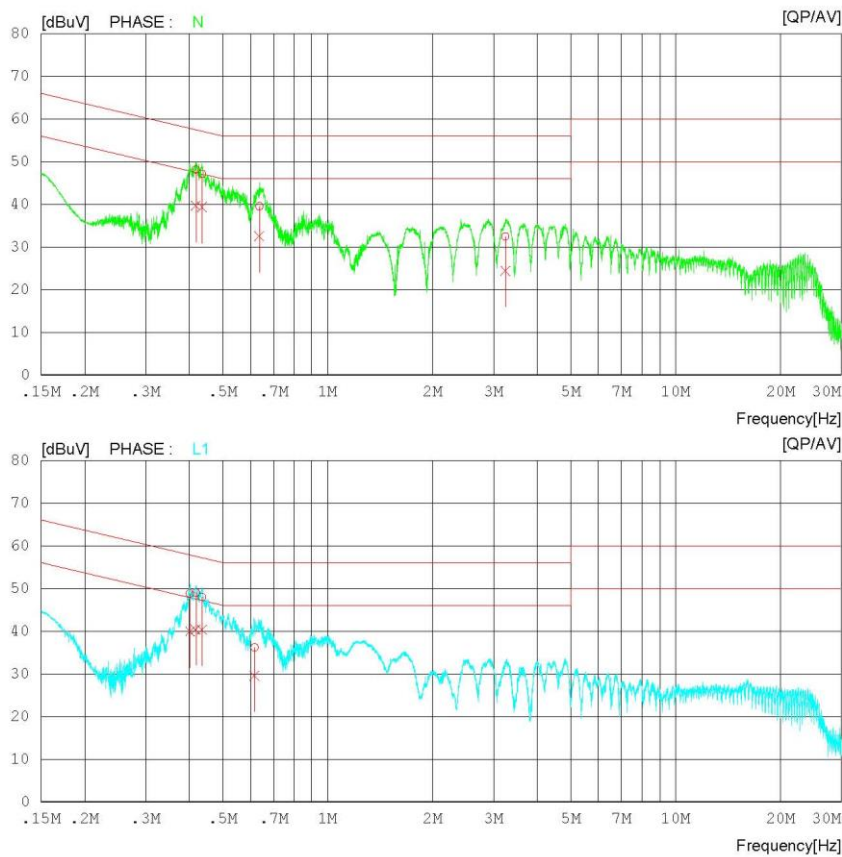
■ **RESULT PLOTS**

AC Line Conducted Emissions (Graph)

Test Mode: 802.11b & 5.5 Mbps & 2437 MHz & Adaptor mode(DC 12V)

Results of Conducted Emission

DT&C
Date : 2015-05-27
Order No. :
Model No. : SMT-i6021 / Adaptor
Serial No. :
Test Condition :
Reference No. :
Power Supply : 120 V 60 Hz
Temp/Humi. : 20 °C 45 % R.H.
Operator : Hoonpyo Lee
Memo : 2.4GHz_802.11b_2437
LIMIT : FCC P15.207 QP
FCC P15.207 AV



AC Line Conducted Emissions (List)

Test Mode: 802.11b & 5.5 Mbps & 2437 MHz & Adaptor mode(DC 12V)

Results of Conducted Emission

DT&C

Date : 2015-05-27

Order No.	:		Reference No.	:	
Model No.	:	SMT-i6021 / Adaptor	Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi.	:	20 °C 45 % R.H.
Test Condition	:		Operator	:	Hoonpyo Lee

Memo : 2.4GHz_802.11b_2437

LIMIT : FCC P15.207 QP
FCC P15.207 AV

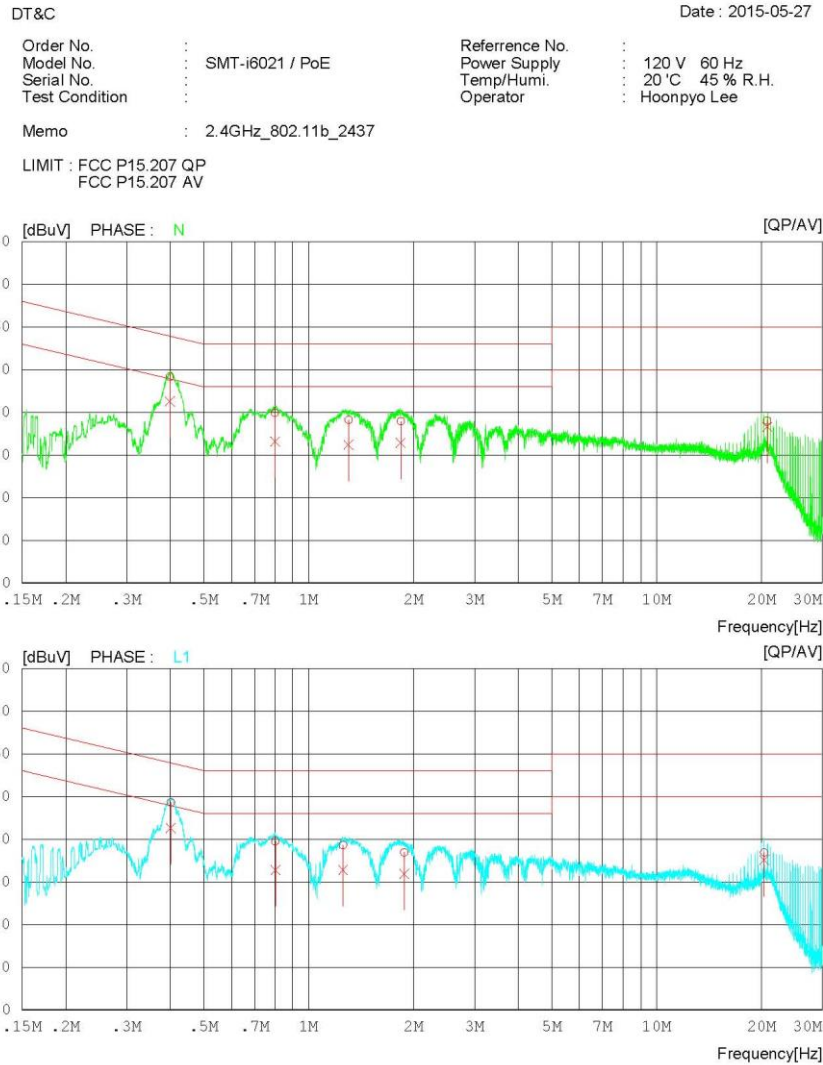
NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.41788	47.2	38.7	0.9	48.1	39.6	57.5	47.5	9.4	7.9	N
2	0.43528	46.2	38.4	0.9	47.1	39.3	57.2	47.2	10.1	7.9	N
3	0.63614	38.8	31.7	0.7	39.5	32.4	56.0	46.0	16.5	13.6	N
4	3.24200	31.9	23.9	0.5	32.4	24.4	56.0	46.0	23.6	21.6	N
5	0.40195	47.8	39.0	0.9	48.7	39.9	57.8	47.8	9.1	7.9	L1
6	0.41794	48.1	39.5	0.9	49.0	40.4	57.5	47.5	8.5	7.1	L1
7	0.43525	47.1	39.4	0.9	48.0	40.3	57.2	47.2	9.2	6.9	L1
8	0.61632	35.4	28.8	0.7	36.1	29.5	56.0	46.0	19.9	16.5	L1

■ **RESULT PLOTS**

AC Line Conducted Emissions (Graph)

Test Mode: 802.11g & 5.5 Mbps & 2437 MHz & PoE mode(DC 48V)

Results of Conducted Emission



AC Line Conducted Emissions (List)

Test Mode: 802.11g & 5.5 Mbps & 2437 MHz & PoE mode(DC 48V)

Results of Conducted Emission

DT&C

Date : 2015-05-27

Order No. :
Model No. : SMT-i6021 / PoE
Serial No. :
Test Condition :

Reference No. :
Power Supply : 120 V 60 Hz
Temp/Humi. : 20 °C 45 % R.H.
Operator : Hoonpyo Lee

Memo : 2.4GHz_802.11b_2437

LIMIT : FCC P15.207 QP
FCC P15.207 AV

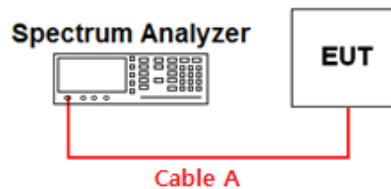
NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.39920	47.4	41.6	0.9	48.3	42.5	57.9	47.9	9.6	5.4	N
2	0.80023	39.3	32.6	0.6	39.9	33.2	56.0	46.0	16.1	12.8	N
3	1.30240	37.7	31.9	0.5	38.2	32.4	56.0	46.0	17.8	13.6	N
4	1.84000	37.4	32.3	0.5	37.9	32.8	56.0	46.0	18.1	13.2	N
5	20.83560	37.3	35.9	0.7	38.0	36.6	60.0	50.0	22.0	13.4	N
6	0.40161	47.6	41.6	0.9	48.5	42.5	57.8	47.8	9.3	5.3	L1
7	0.80257	38.8	32.1	0.6	39.4	32.7	56.0	46.0	16.6	13.3	L1
8	1.25600	38.0	32.2	0.5	38.5	32.7	56.0	46.0	17.5	13.3	L1
9	1.88200	36.3	31.3	0.5	36.8	31.8	56.0	46.0	19.2	14.2	L1
10	20.40960	36.1	34.4	0.7	36.8	35.1	60.0	50.0	23.2	14.9	L1

8.7 Occupied bandwidth

Test Requirements, RSS-Gen [6.6]

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99 % emission bandwidth, as calculated or measured.

■ TEST CONFIGURATION



■ TEST PROCEDURE

- The 99% power bandwidth was measured with a calibrated spectrum analyzer.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3×RBW.
- Spectrum analyzer plots are included on the following pages.

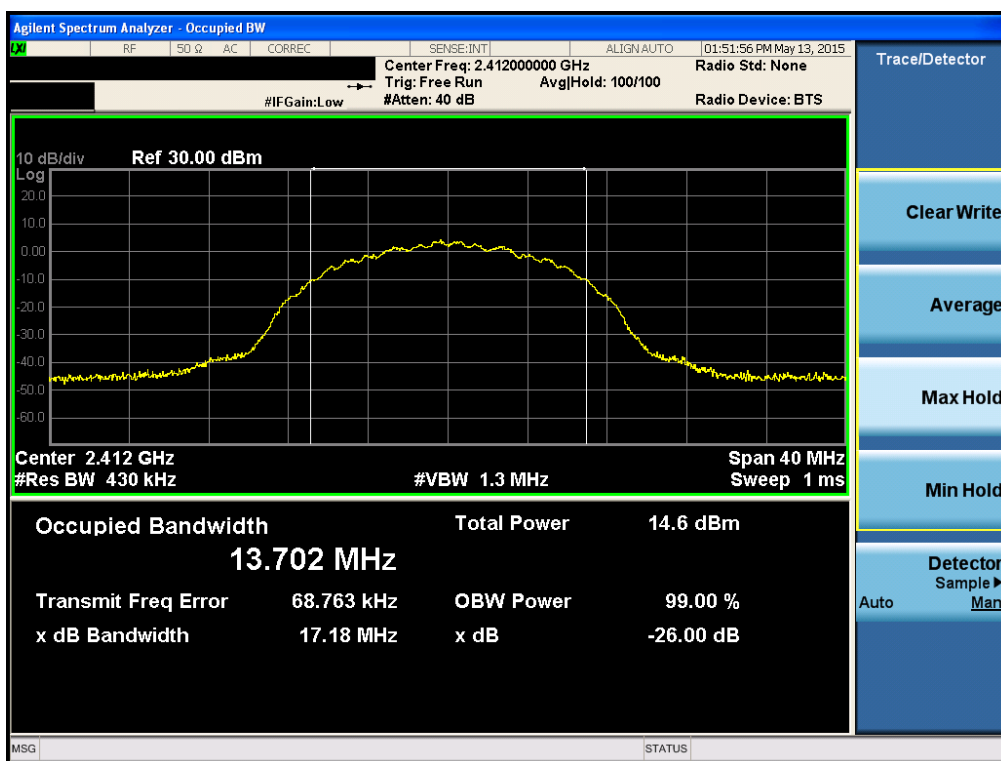
■ TEST RESULTS: **Comply**

Test Mode	Data Rate	Frequency [MHz]	Test Results[MHz]
802.11b	5.5Mbps	2412	13.702
		2437	13.726
		2462	13.754
802.11g	54Mbps	2412	16.566
		2437	16.583
		2462	16.597
802.11n (HT20)	MCS7	2412	17.636
		2437	17.642
		2462	17.623

Note 1: See next pages for actual measured spectrum plots.

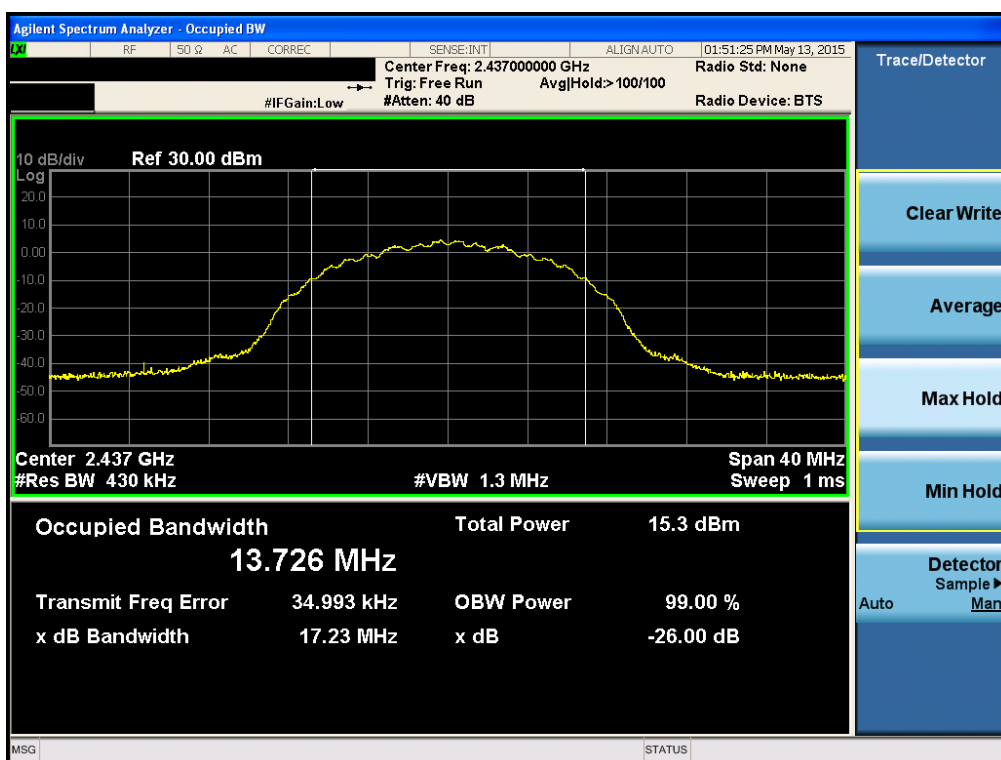
Occupied Bandwidth (99%)

802.11b & 5.5 Mbps & 2412 MHz



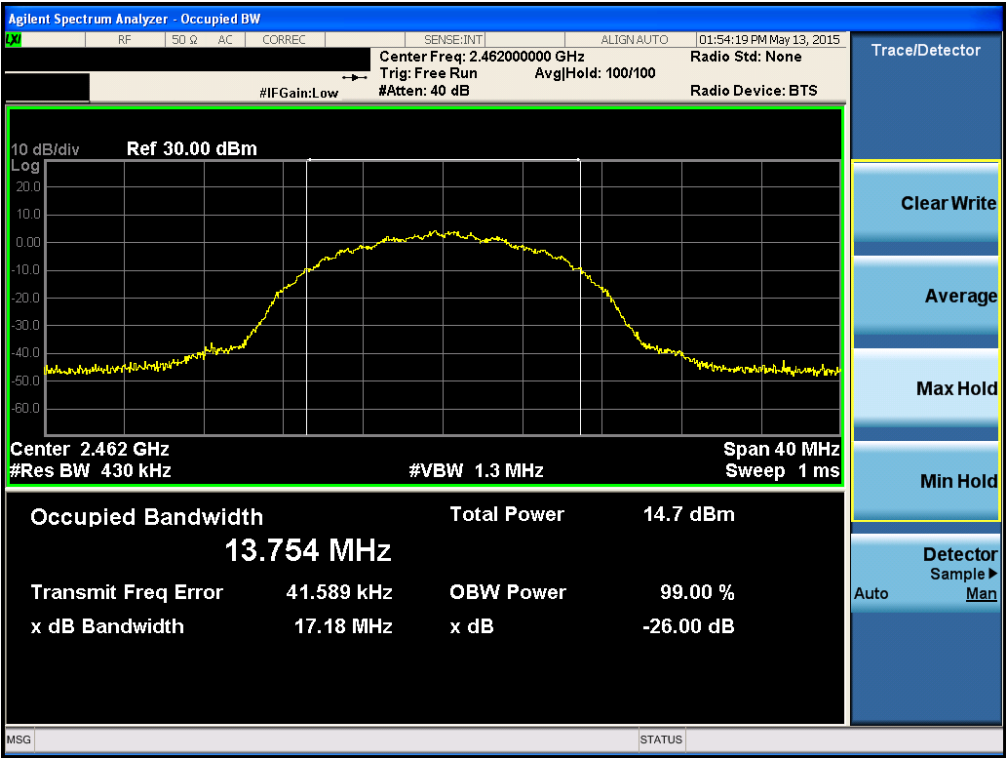
Occupied Bandwidth (99%)

802.11b & 5.5 Mbps & 2437 MHz



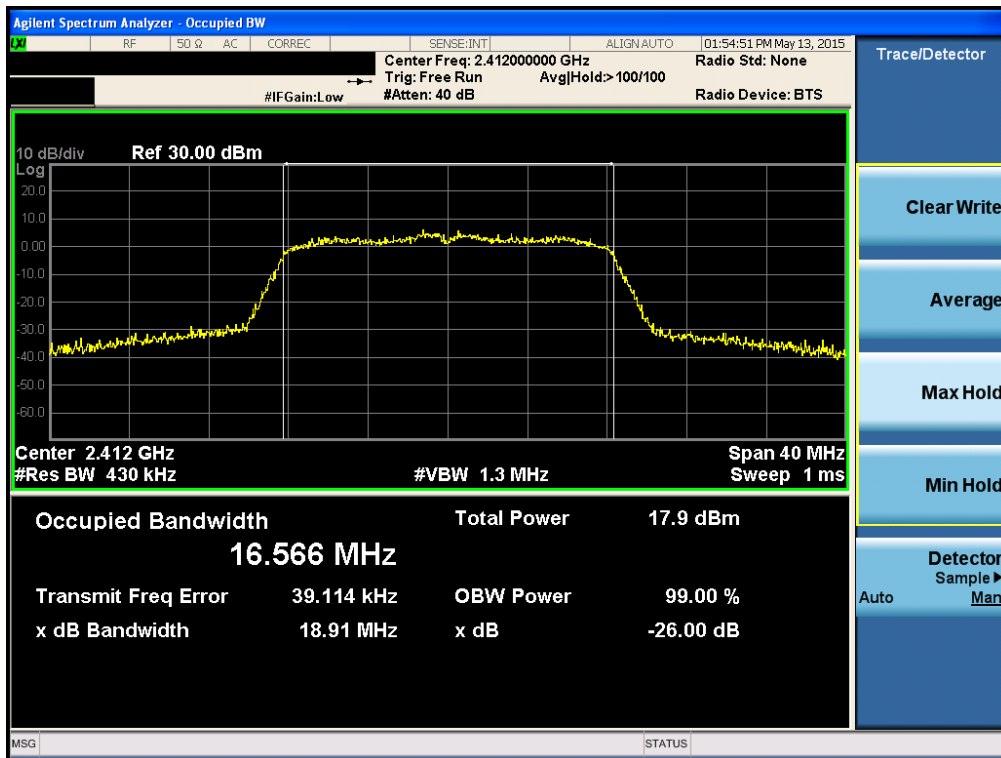
Occupied Bandwidth (99%)

802.11b & 5.5 Mbps & 2462 MHz



Occupied Bandwidth (99%)

802.11g & 54 Mbps & 2412MHz

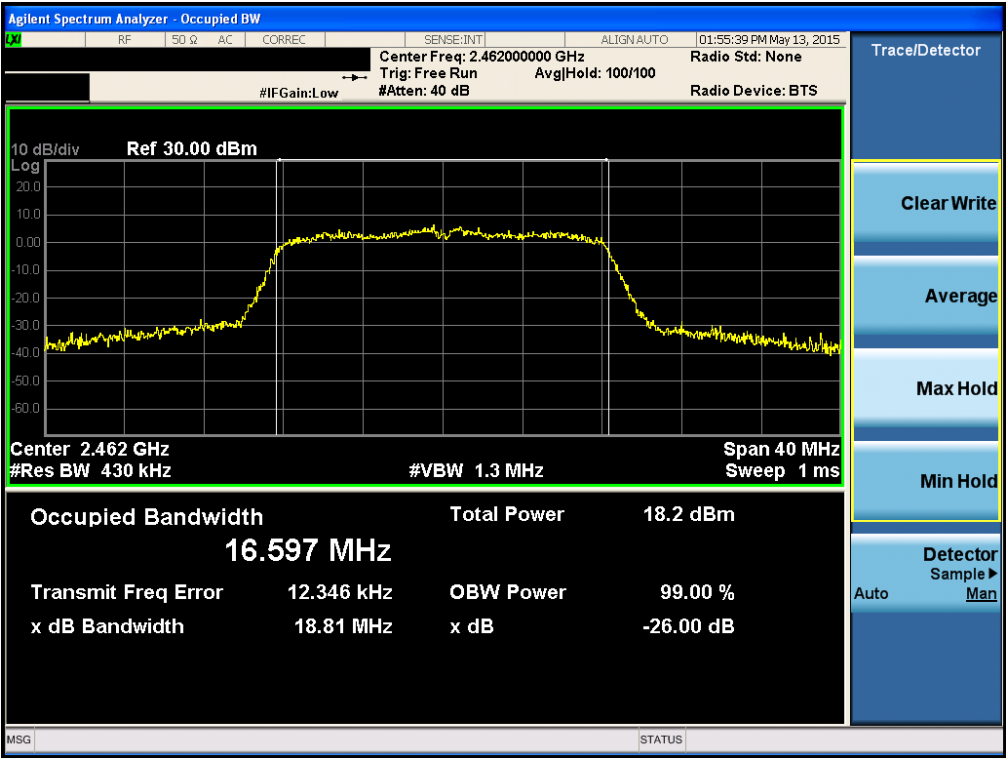


Occupied Bandwidth (99%)

802.11g & 54 Mbps & 2437MHz

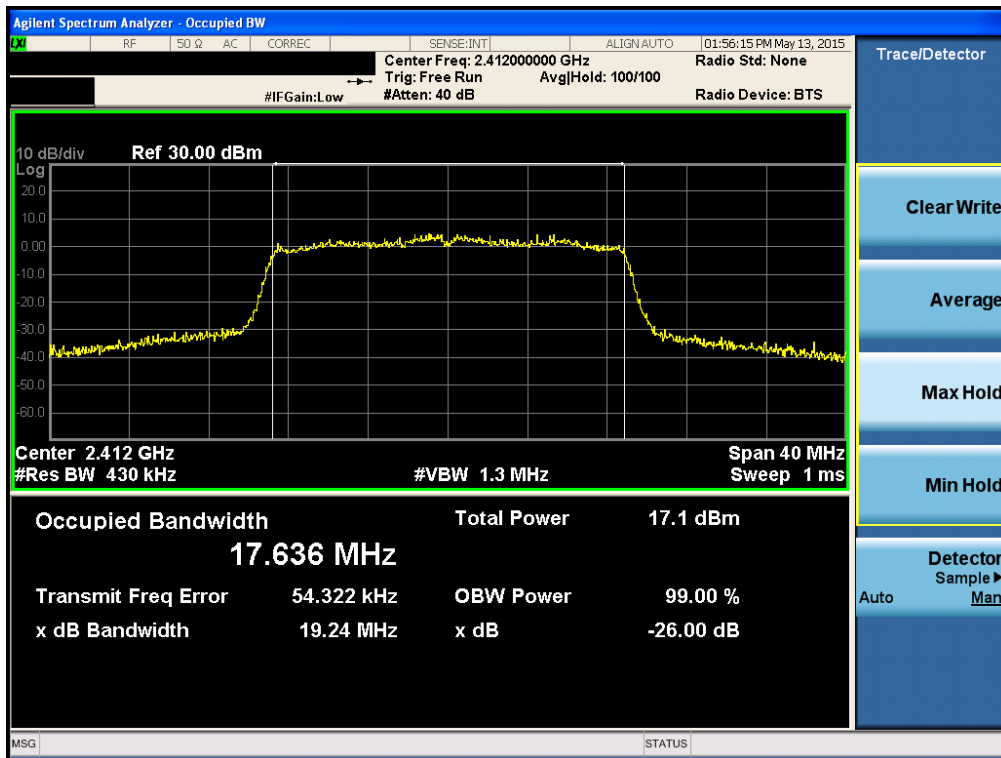


Occupied Bandwidth (99%) 802.11g & 54Mbps & 2462MHz



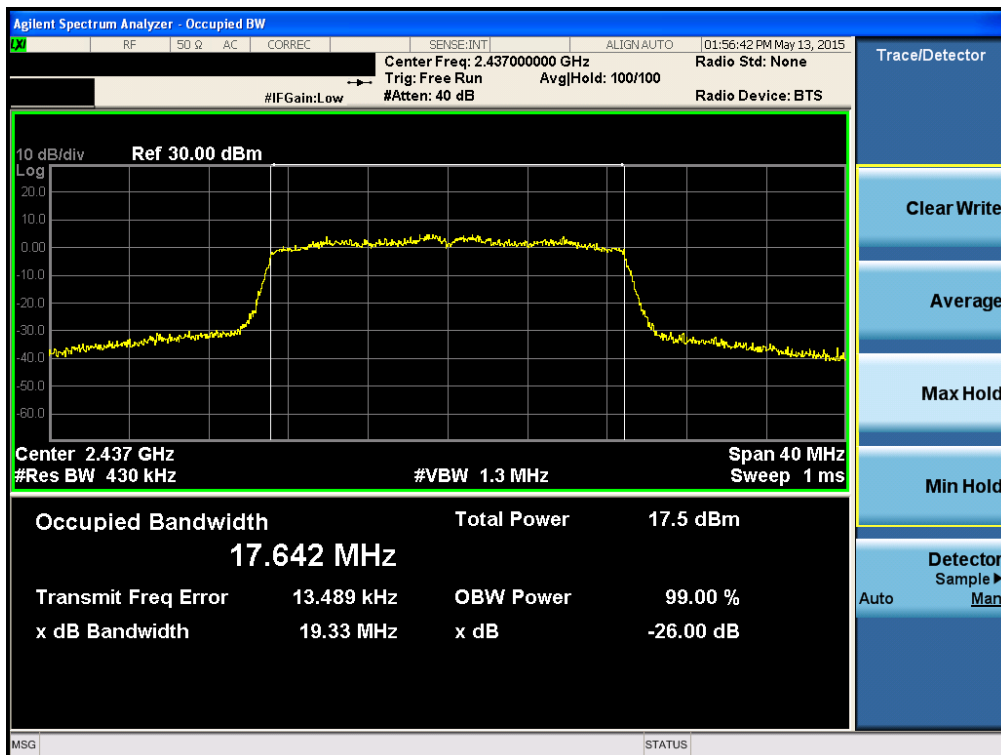
Occupied Bandwidth (99%)

802.11n(HT20) & MCS 7 & 2412 MHz



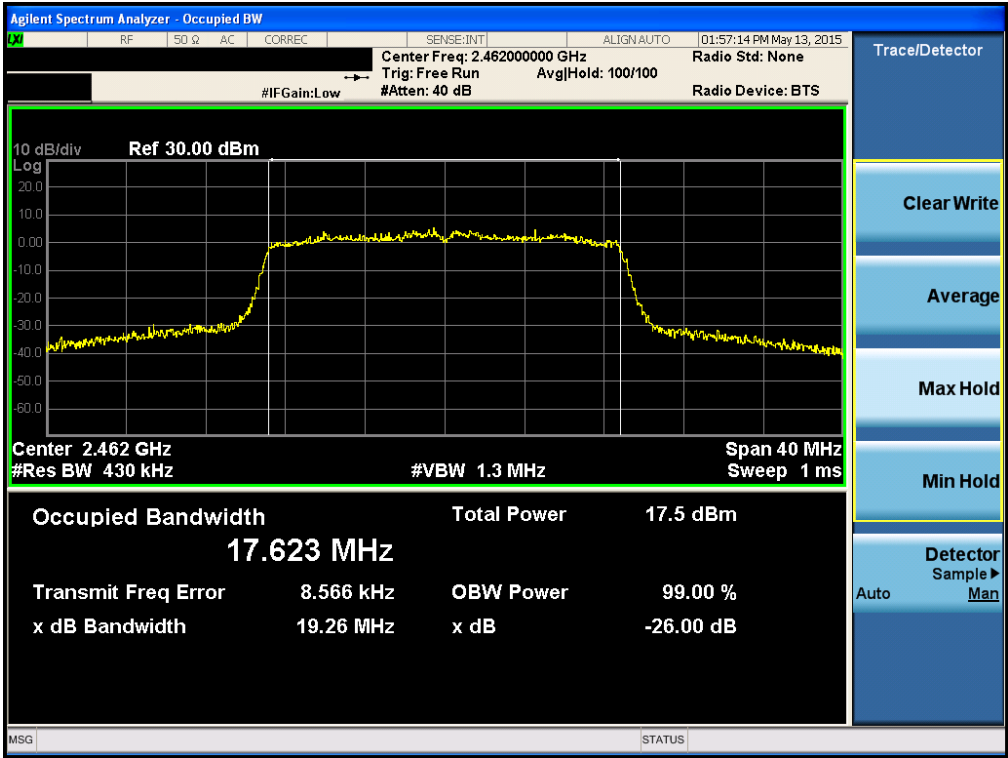
Occupied Bandwidth (99%)

802.11n(HT20) & MCS 7 & 2437 MHz



Occupied Bandwidth (99%)

802.11n(HT20) & MCS 7 & 2462 MHz



9. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
MXA Signal Analyzer	Agilent Technologies	N9020A	15/01/06	16/01/06	MY49100833
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2495A MA2490A	15/03/26	16/03/26	1306007 1249001
Signal Generator	Rohde Schwarz	SMF100A	14/07/01	15/07/01	102341
Dynamic Measurement DC Source	Agilent Technologies	66332A	14/10/20	15/10/20	MY43000394
Multimeter	HP	34401A	15/02/25	16/02/25	3146A13475
Thermohygrometer	BODYCOM	BJ5478	15/02/26	16/02/26	1209
Thermohygrometer	BODYCOM	BJ5478	15/05/08	16/05/08	120612-1
Loop Antenna	Schwarzbeck	FMZB1513	14/04/29	16/04/29	1513-128
BILOG ANTENNA	SCHWARZBECK	VULB9160	14/04/04	16/04/04	3357
Horn Antenna	ETS-LINDGREN	3115	15/02/09	17/02/09	9202-3820
Horn Antenna	A.H.Systems Inc.	SAS-574	15/04/30	17/04/30	154
High-pass filter	Wainwright Instruments	WHKX12-2580-3000-18000-80SS	14/10/17	15/10/17	1
Highpass Filter	Wainwright Instruments	WHNX6-6320-8000-26500-40CC	14/10/17	15/10/17	3
PreAmplifier	TSJ	MLA-010K01-B01-27	15/04/09	16/04/09	1844539
PreAmplifier	Agilent	8449B	14/11/06	15/11/06	3008A02108
PreAmplifier	A.H. SYSTEMS	PAM-1840VH	14/12/12	15/12/12	163
EMI TEST RECEIVER	R&S	DSR7	14/10/21	15/10/21	101109
EMI TEST RECEIVER	R&S	ESCI	15/02/25	16/02/25	100364
SINGLE-PHASE MASTER	NF	4420	14/09/11	15/09/11	3049354420023
Artificial Mains Network	Narda S.T.S. / PMM	PMM L2-16B	14/06/26	15/06/26	000WX20305

APPENDIX I

Duty cycle plots

■ TEST PROCEDURE

Duty Cycle measured using **section 6.0 b) of KDB558074** :

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal.

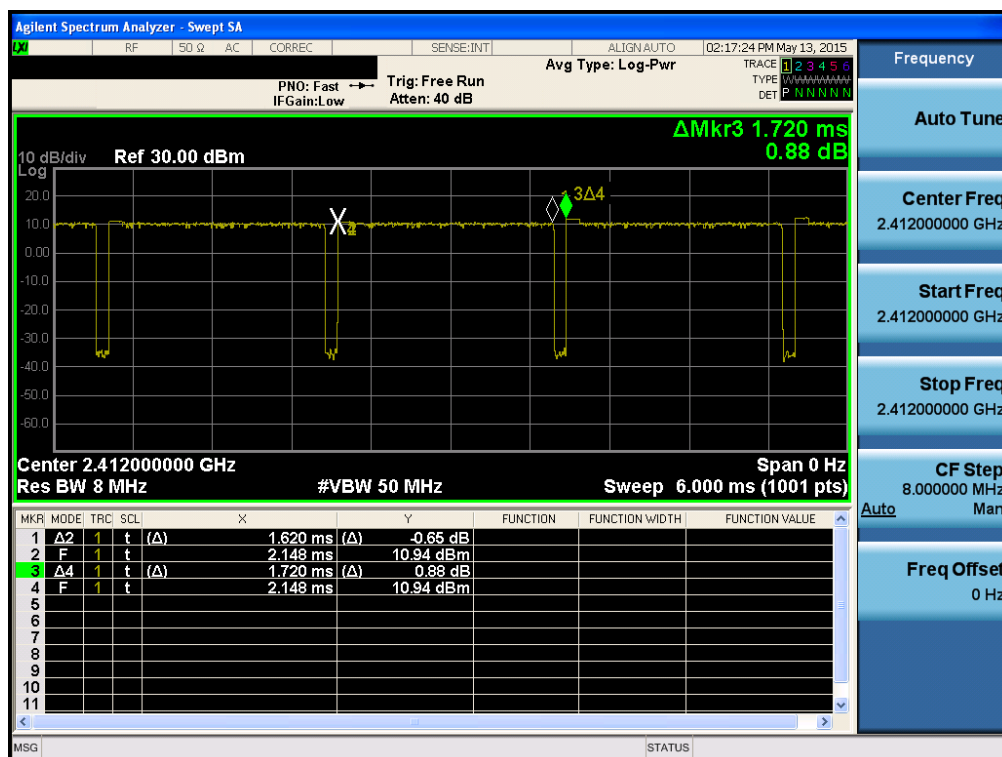
Set the center frequency of the instrument to the center frequency of the transmission. Set RBW $\geq$ OBW if possible; otherwise, set RBW to the largest available value. Set VBW $\geq$ RBW. Set detector = peak or average.

The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

Test Plots :

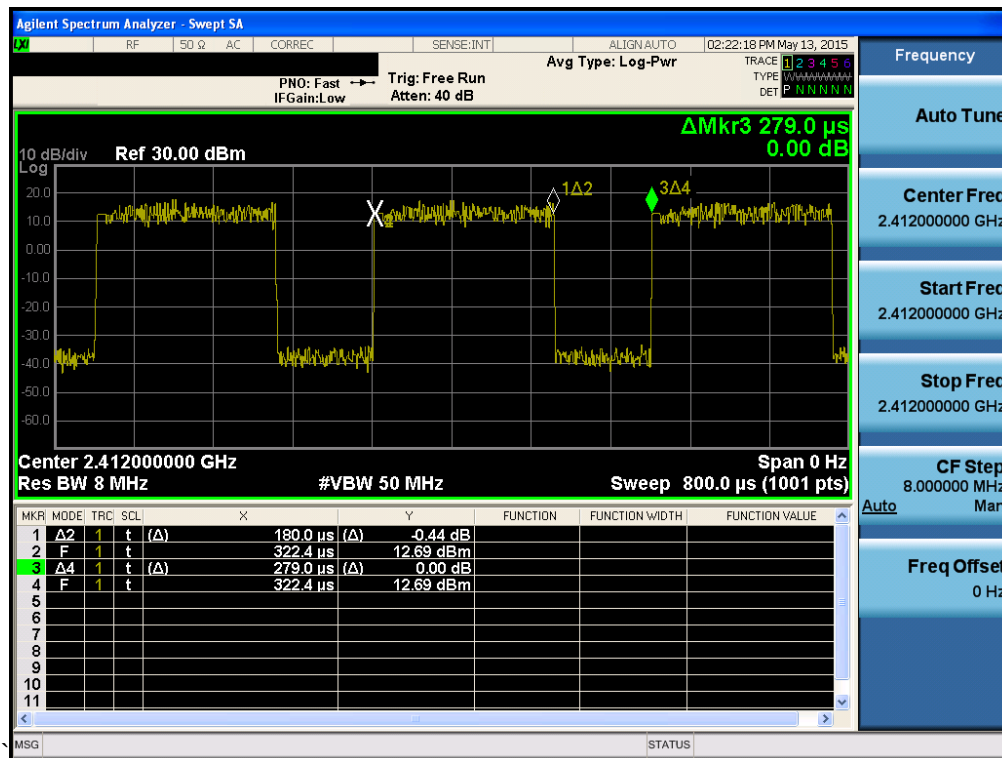
Duty Cycle

Test Mode: 802.11b & 5.5 Mbps & 2437 MHz



Duty Cycle

Test Mode: 802.11g & 54 Mbps & 2437 MHz



Duty Cycle

Test Mode: 802.11n(HT20) & MCS 7 & 2437 MHz

