

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT OF

Product Name: Vehicle Mount Terminal
Marketing Name: Thor VM2
Brand Name: Honeywell
Model No.: VM2W
Model Difference: N/A
FCC ID: KDZVM2W01
Report No.: EH/2012/A0037-01
Issue Date: Mar. 04, 2016
FCC Rule Part: §15.407
Prepared for: Honeywell International Inc.,
Honeywell Scanning and Mobility
9680 Old Bailes Road, Fort Mill, SC 29707,
USA
Prepared by: SGS Taiwan Ltd.
Electronics & Communication Laboratory
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VERIFICATION OF COMPLIANCE

Applicant: Honeywell International Inc.,
Honeywell Scanning and Mobility
9680 Old Bailes Road, Fort Mill, SC 29707, USA

Product Name: Vehicle Mount Terminal

Brand Name: Honeywell

Marketing Name: Thor VM2

Model No.: VM2W

Model Difference: N/A

FCC ID: KDZVM2W01

File Number: EH/2012/A0037-01

Date of test: Oct. 05, 2012 ~ Feb. 22, 2016

Date of EUT Received: Oct. 05, 2012

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Test By:**Date:**

Mar. 04, 2016

*Marcus Tseng / Engineer***Prepared By:****Date:**

Mar. 04, 2016

*Yuri Tsai / Clerk***Approved By:****Date:**

Mar. 04, 2016

Jim Chang / Asst. Manager

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Revision History

Report Number	Revision	Description	Issue Date
EH/2012/A0037-01	Rev.00	Initial creation of document	Mar. 04, 2016

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1. GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	Vehicle Mount Terminal		
Marketing Name:	Thor VM2		
Brand Name:	Honeywell		
Model No.:	VM2W		
Model Difference:	N/A		
Hardware Version:	N/A		
WLAN Driver Version:	3.4.0.50		
Power Supply:	10.8Vdc Li-ion battery or 100-240Vdc from AC/DC adapter		
	Battery:	Model No.: OVT310L1R00 Supplier: TOTEX International Limited	
	Adapter:	Model No.:GT-81081-6015-T3, Supplier: GlobTek, Inc.	
Class II Permissive change:	The purpose in the permissive change is to certify U-NII-3 band under new U-NII rule per adopted under Docket No. 13-49		

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WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Avg.)	Modulation Technology	
11a	5725-5850	5	11.02dBm	OFDM	
11n	HT20 5725-5850	5	13.61dBm (MIMO Chain 0+1)	OFDM	
11n	HT40 5725-5850	2	12.18dBm (MIMO Chain 0+1)	OFDM	
Antenna Designation		<p>Internal: PIFA Antenna Model No.: 40120512 5GHz: 4.97dBi</p> <p>External: Dipole Antenna Model No.: WTS 2450 5GHz: 0.77dBi Model No.: R380500314 5GHz: 4.85dBi</p>			
Modulation type		64QAM, 16QAM, QPSK, BPSK for OFDM			
Transition Rate:		802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 144.4Mbps 802.11 n_40MHz: 13.5 – 300Mbps			

The EUT is compliance with IEEE 802.11 a /n Standard.

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01

FCC KDB 662311 D01 Multiple Transmitter Output

FCC KDB 644545 D03 Guidance for IEEE 802.11ac v01

ANSI C63.10:2013

Note:

1. All test items have been performed and record as per the above standards.
2. The composite system is compliance with FCC Subpart B is authorized under the certification procedure.
3. The EUT was placed 1.5m height for frequency above 1GHz in accordance with ANSI C63.10:2013.

1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803 (TAF code 0513)

FCC Registration Numbers are: 990257

1.4 Special Accessories

There are no special accessories used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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2. SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m 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 max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

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2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Following shows an offset computation example with cable loss 2.4dB for a/n_20, 5.4dB for n_40 and 10dB attenuator.

Single mode offset

= RF cable loss (dB)+ attenuation factor(dB) +duty factor =12.4(dB)

N20 MIMO mode offset

= RF cable loss (dB)+ attenuation factor(dB)+ 10 log(NANT) dB+duty factor=12.4(dB)

N40 MIMO mode offset

= RF cable loss (dB)+ attenuation factor(dB)+ 10 log(NANT) dB+duty factor=15.4(dB)

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2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission Configuration

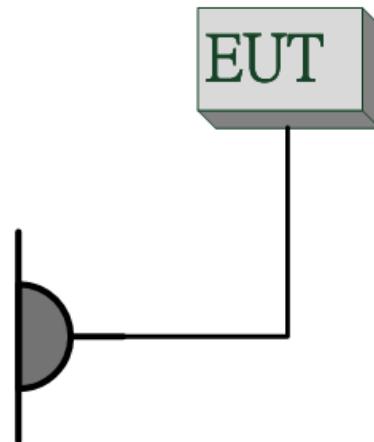


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	SCU	v3.03.08	N/A	N/A	N/A

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3. SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	26 dB & 6dB Emission Bandwidth	Compliant
§15.407(a)	Maximum Conducted Output Power	Compliant
§15.407(a)	Power Spectral Density	Compliant
§15.407(b)	Undesirable Radiated Emissions	Compliant
§15.407(c)	Transmission in case of Absence of Information	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.203 §15.407(a)	Antenna Requirement	Compliant

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4. DESCRIPTION OF TEST MODES

4.1 Operated in U-NII Bands

Operated band in 5725 MHz ~5850 MHz:

4 channels are provided for 802.11a, 802.11n_HT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n_HT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190 MHz	46	5230 MHz

Operated band in 5725 MHz ~5850 MHz:

5 channels are provided for 802.11a, 802.11n_HT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

2 channels are provided for 802.11n_HT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755 MHz	159	5795 MHz

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4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case.

RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5745~5825	149 to 165	157	OFDM	6	MAIN
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS8	MIMO
RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	MAIN
802.11n_HT20				OFDM	MCS8	MIMO
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS8	MIMO

Note:

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11a/n WLAN Transmitter for channel Low, Mid and High, the worst case H position was reported.

Pre-scanned was done on external antenna: WTS 2450 and antenna R380500314, and antenna R380500314 results higher emission at 5GHz. Therefore, the completed set of measurement was done on antenna: R380500314 to presented on this test report.

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	MAIN
802.11n_HT20				OFDM	MCS8	MIMO
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS8	MIMO

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5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26dB Emission Bandwidth	+/- 123.36 Hz
The Maximum Output Power Measurement	+/- 0.96 dB
Peak Power Spectral Density Measurement	+/- 1.67 dB
Frequency Stability	+/- 123.36 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC=+/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : Vertical)	9kHz-30MHz: +/- 2.87dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : Horizontal)	9kHz-30MHz: +/- 2.87dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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6. DUTY CYCLE TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

Formula:

$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$$

Measurement Procedure:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

Duty Cycle:

	Duty Cycle	Duty Factor (dB)
802.11a	92.17%	0.35
802.11n_20 (MIMO)	85.41%	0.68
802.11n_40 (MIMO)	75%	1.25

$$\text{Duty Cycle Factor: } 10 * \log (1/0.9217) = 0.35$$

$$\text{Duty Cycle Factor: } 10 * \log (1/0.8541) = 0.68$$

$$\text{Duty Cycle Factor: } 10 * \log (1/0.75) = 1.25$$

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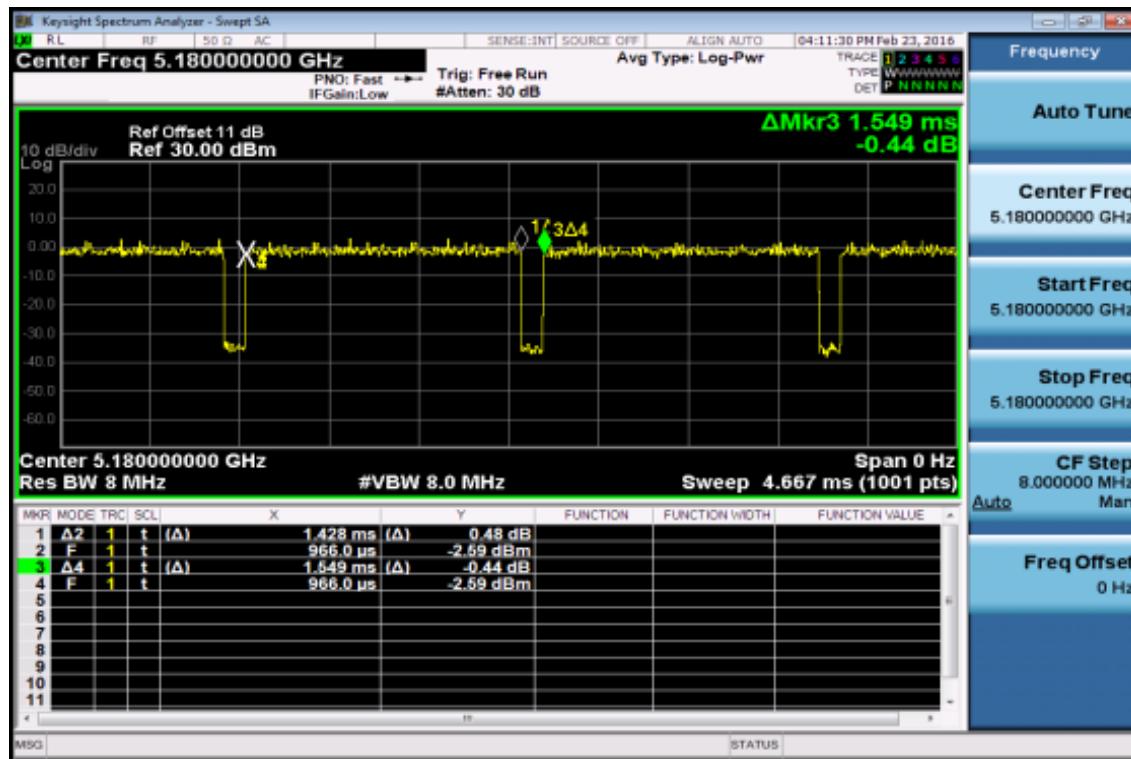
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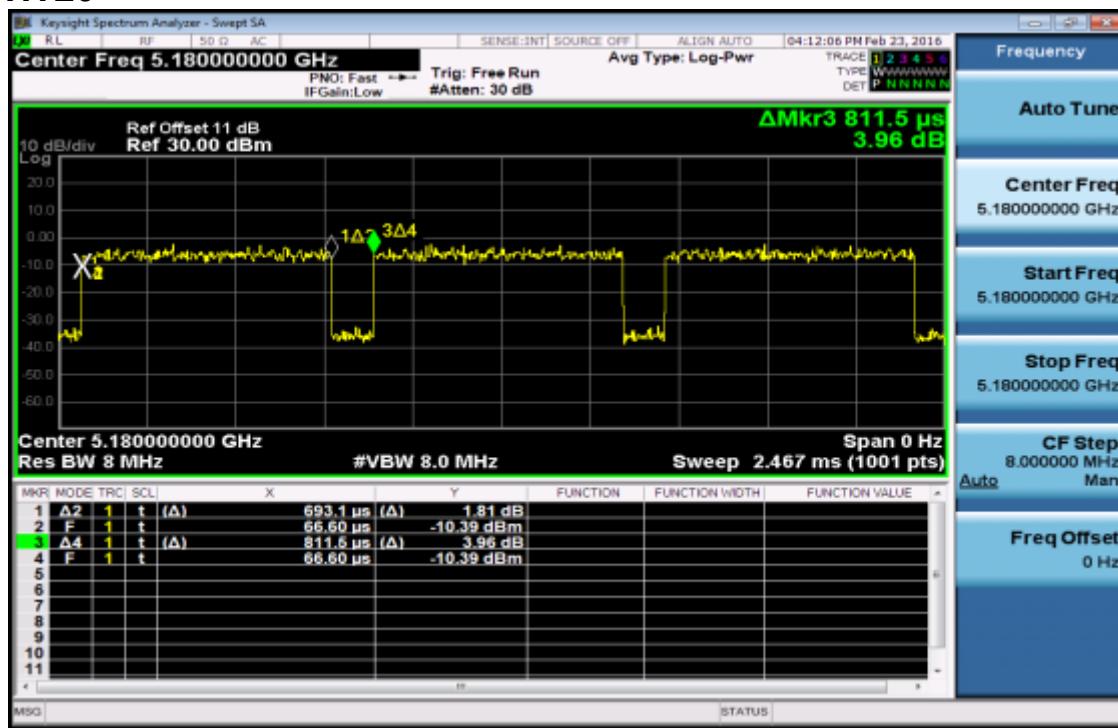
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DUTY CYCLE TEST SIGNAL Measurement Result

802.11a



802.11n HT20



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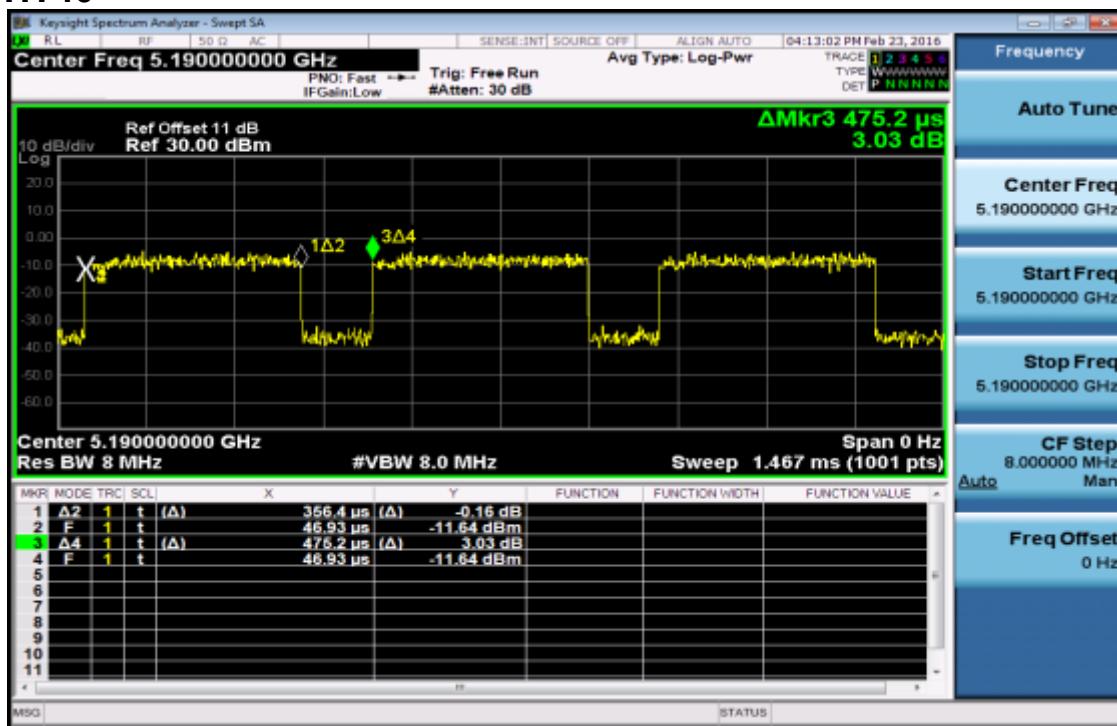
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802.11n HT40



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7. 6dB EMISSION BANDWIDTH MEASUREMENT

7.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

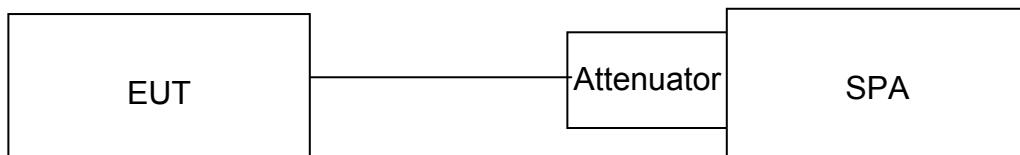
7.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
 - a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto, Detector = Peak, Trace Mode = Max Hold, Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
 - b. Mark the peak frequency and -26dB (upper and lower) frequency.
4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
 - a. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3*RBW, Span = 30M/50MHz, Detector=Peak, Sweep=auto
 - b. Mark the peak frequency and -6dB (upper and lower) frequency.
6. Repeat above procedures until all test default channel measured were complete.

7.3 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY51100003	01/28/2016	01/27/2017
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2016	01/01/2017
Attenuator	Mini-Circuit	BW-S10W2+	002	01/02/2016	01/01/2017
Splitter	Agilent	11636B	N/A	01/02/2016	01/01/2017

7.4 Test Set-up



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7.5 Measurement Result

6dB Bandwidth (5725 MHz~ 5850 MHz)

802.11a

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5745	16.380	12.14
5785	16.380	12.14
5825	16.370	12.14

802.11n_HT20 (Main)

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5745	17.580	12.45
5785	17.580	12.45
5825	17.570	12.45

802.11n_HT20 (Aux)

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5745	17.340	12.39
5785	17.210	12.36
5825	17.320	12.39

802.11n_HT40 (Main)

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5755	35.670	15.52
5795	36.330	15.60

802.11n_HT40 (Aux)

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5755	36.060	15.57
5795	35.760	15.53

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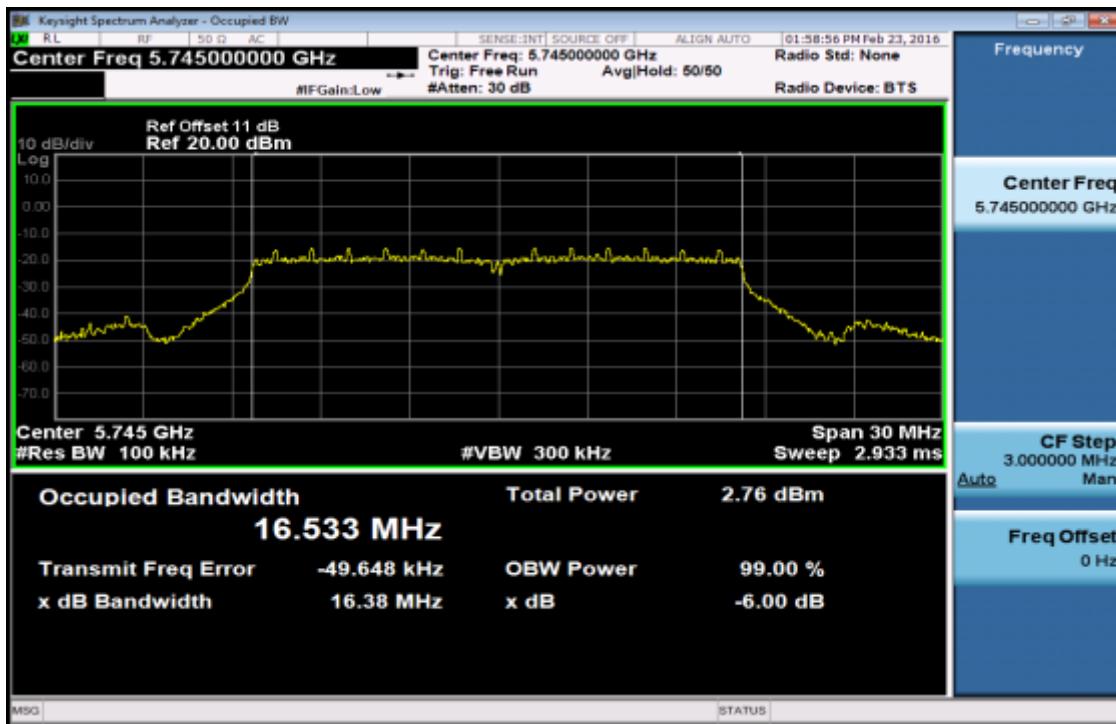
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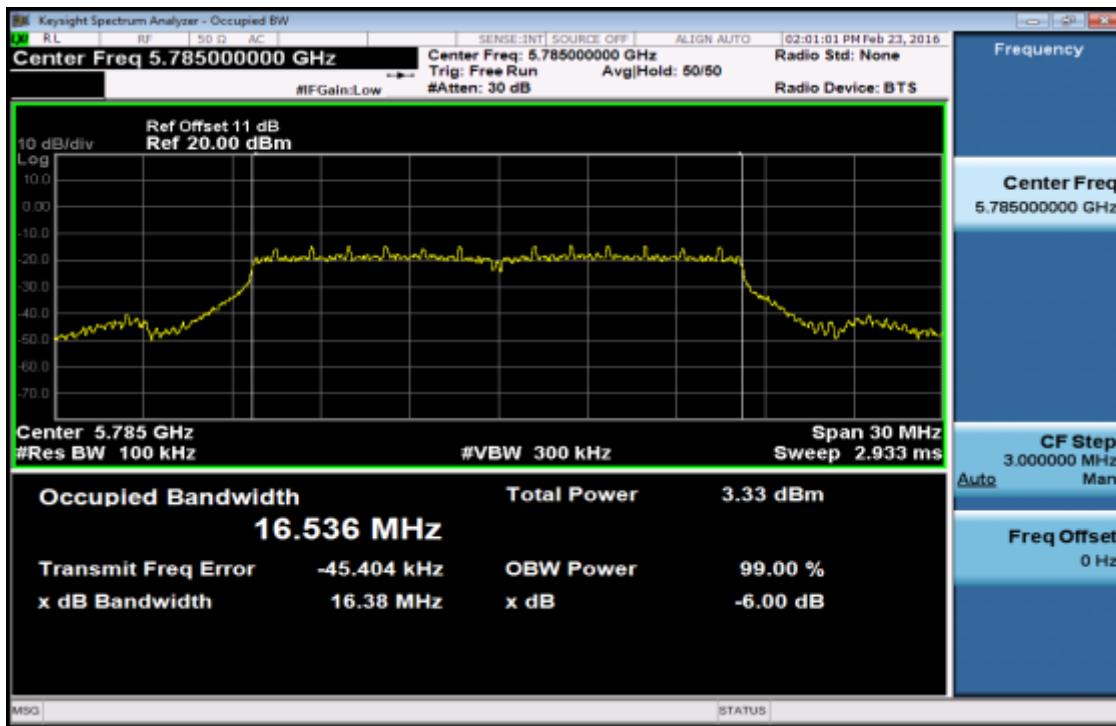
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802.11a, 5725~5850 MHz

6dB Band Width Test Data CH-Low (5745 MHz)



6dB Band Width Test Data CH-Mid (5785 MHz)



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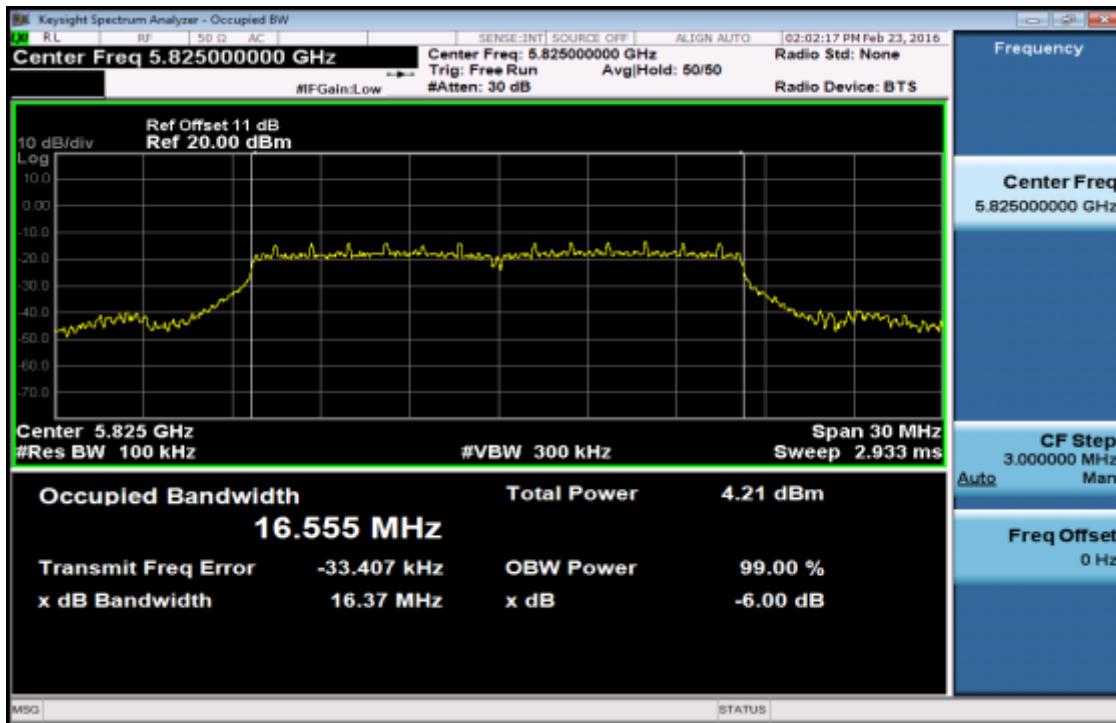
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6dB Band Width Test Data CH-High (5825 MHz)



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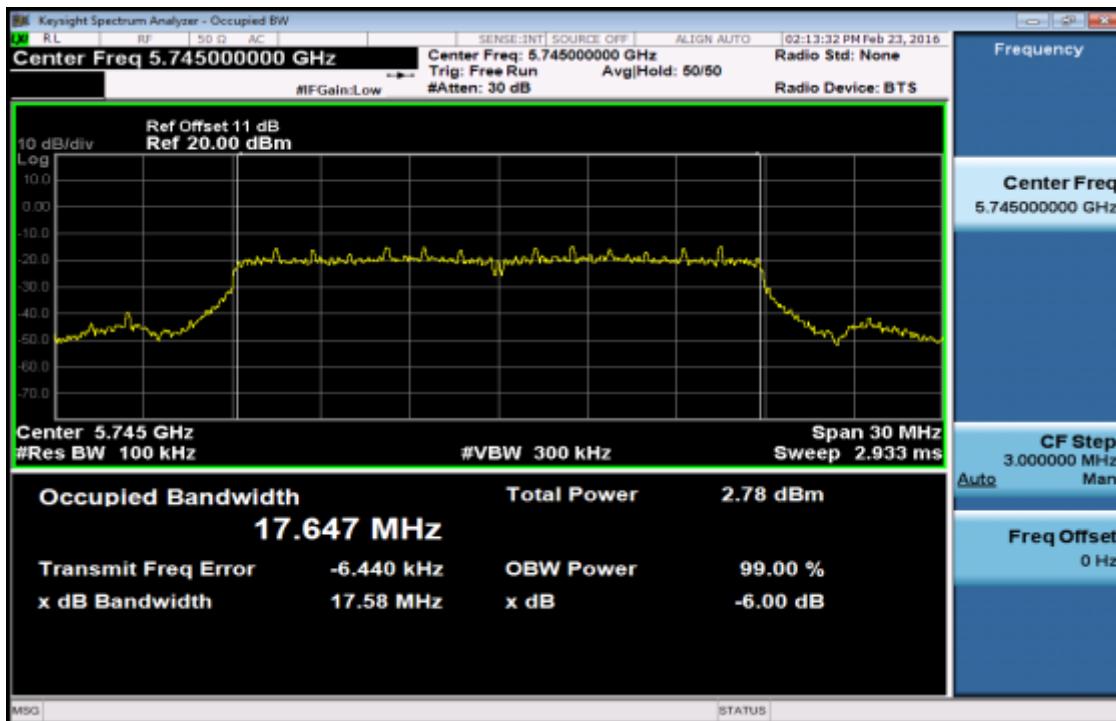
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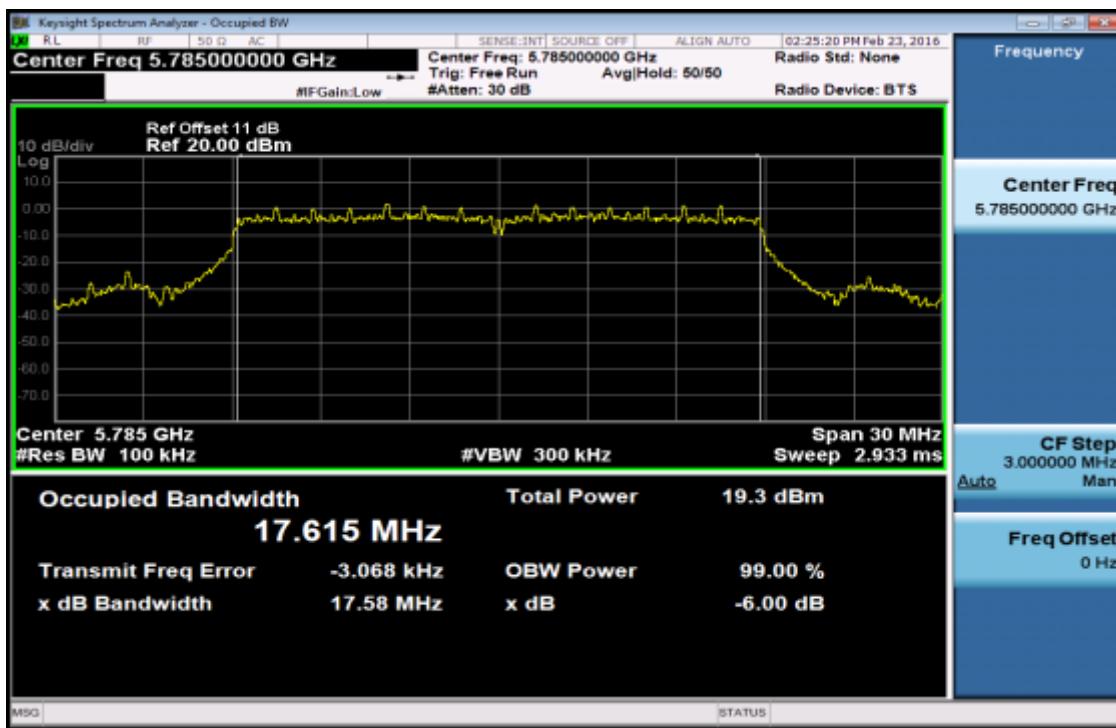
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802.11n HT20, 5725~5850 MHz (Main) 6dB Band Width Test Data CH-Low (5745 MHz)



6dB Band Width Test Data CH-Mid (5785 MHz)



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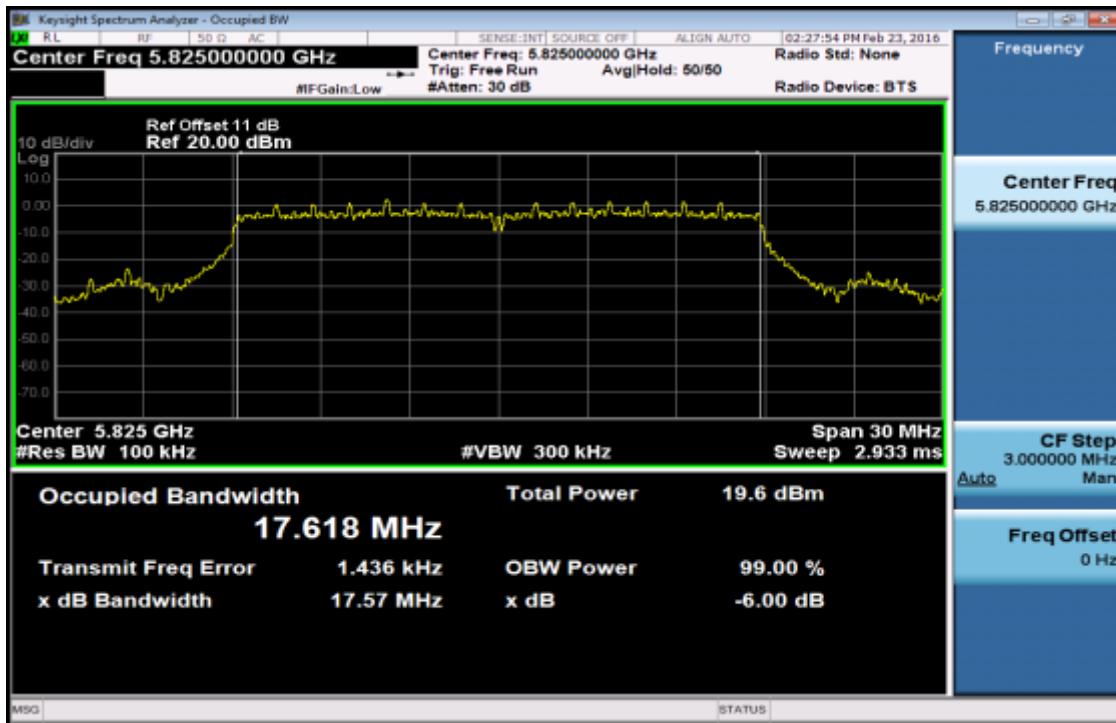
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6dB Band Width Test Data CH-High (5825 MHz)



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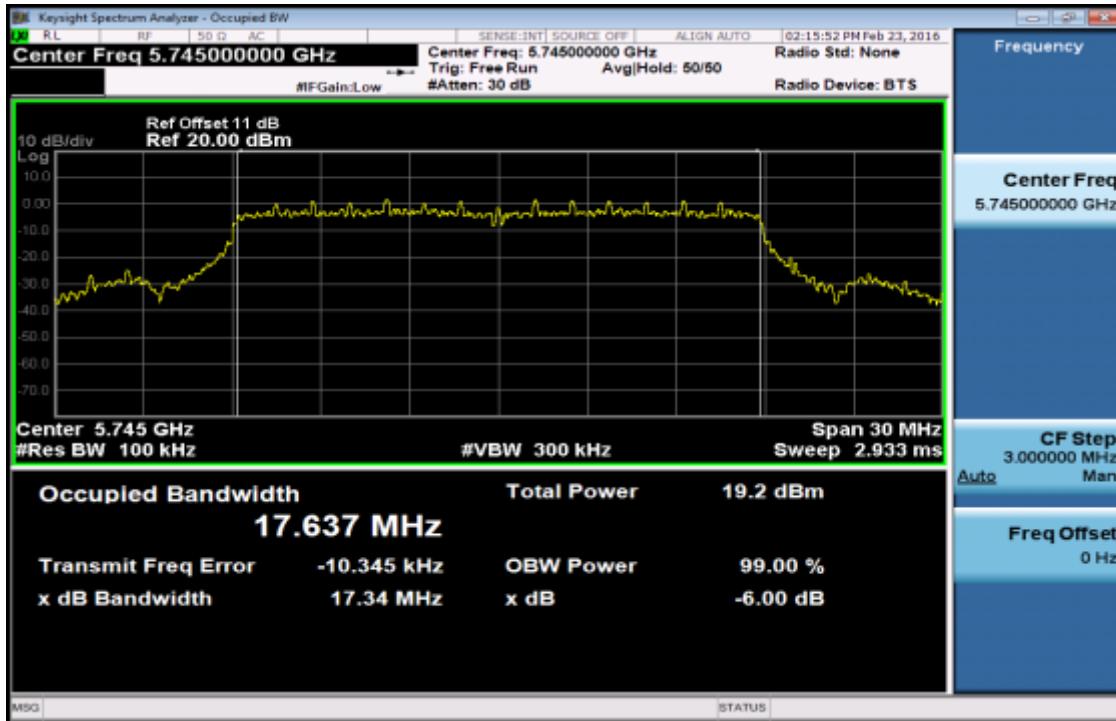
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f (886-2) 2298-0488

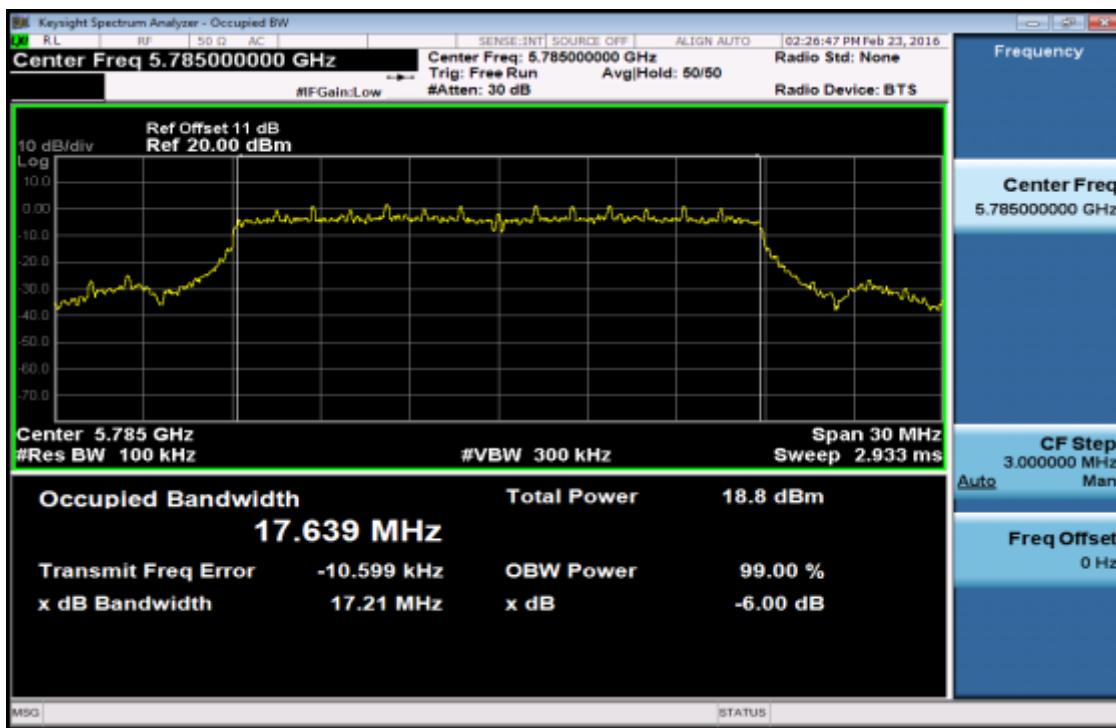
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802.11n HT20, 5725~5850 MHz (Aux) 6dB Band Width Test Data CH-Low (5745 MHz)



6dB Band Width Test Data CH-Mid (5785 MHz)



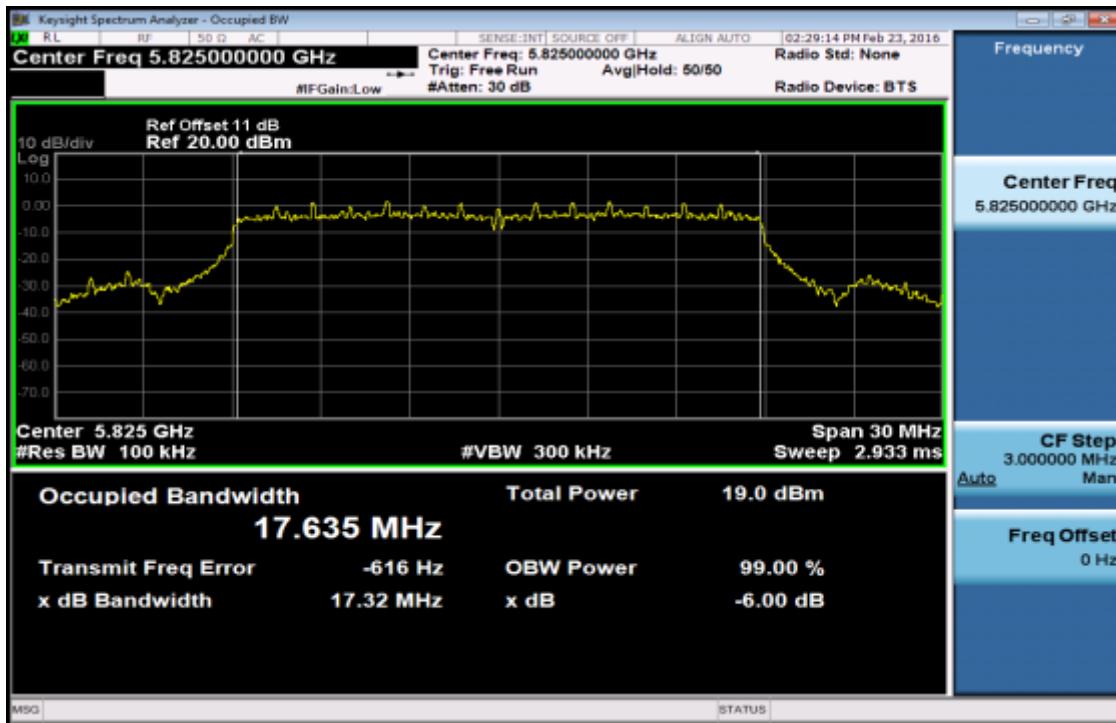
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6dB Band Width Test Data CH-High (5825 MHz)



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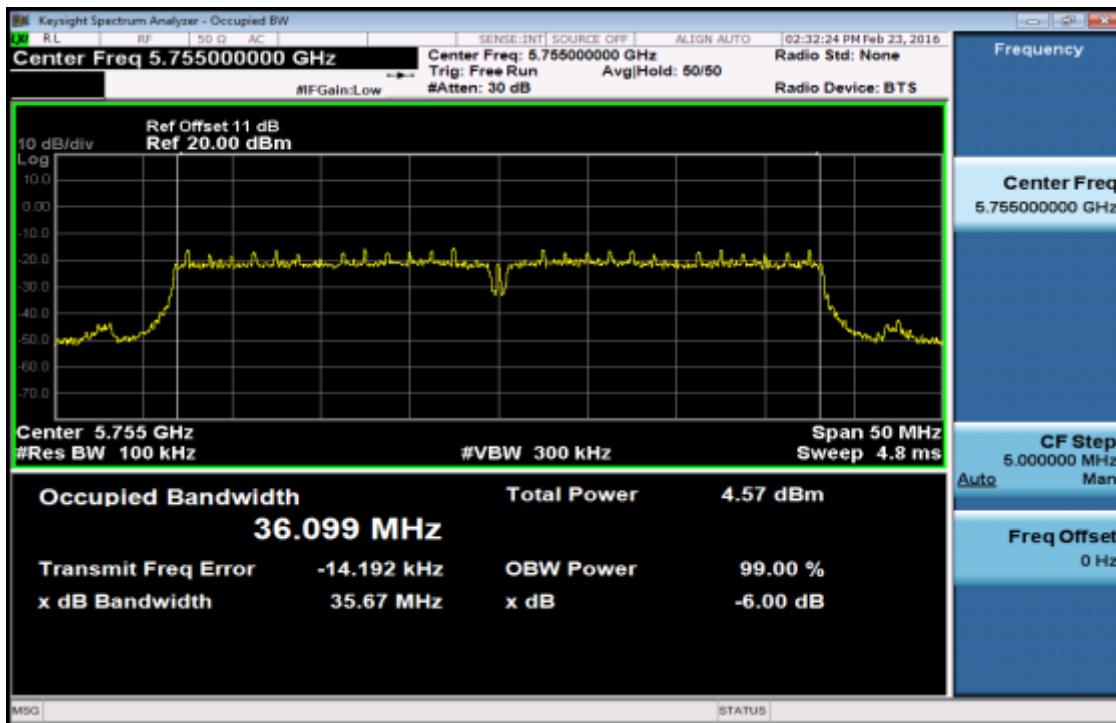
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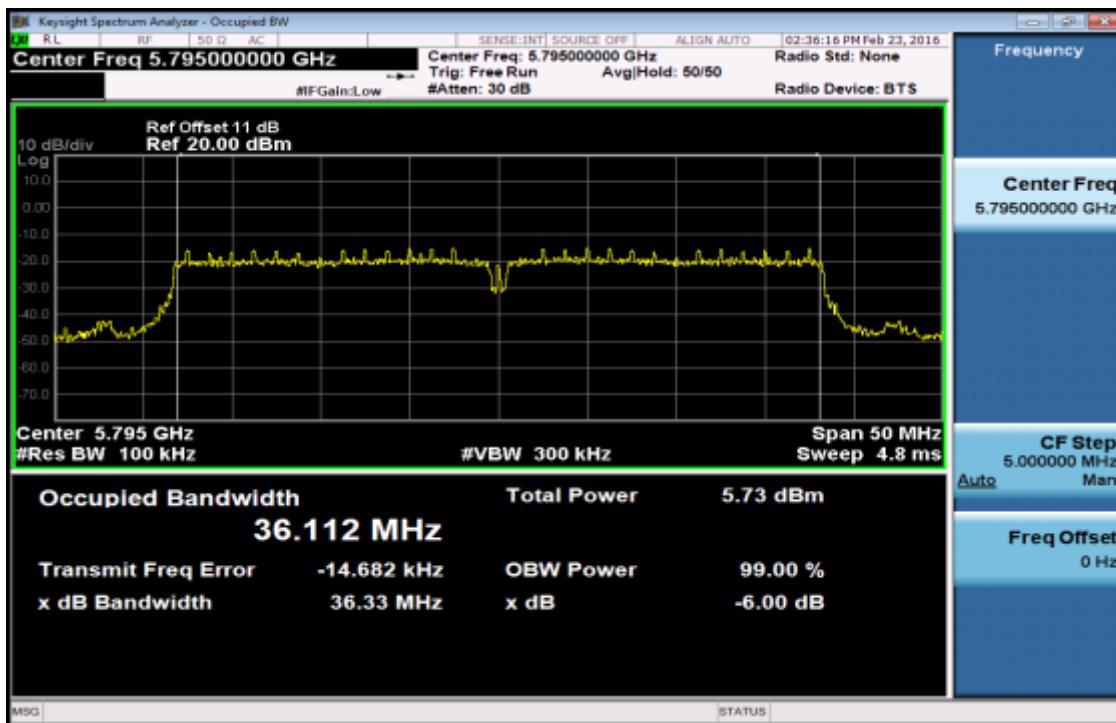
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802.11n HT40, 5725~5850 MHz (Main) 6dB Band Width Test Data CH-Low (5755 MHz)



6dB Band Width Test Data CH-High (5795 MHz)



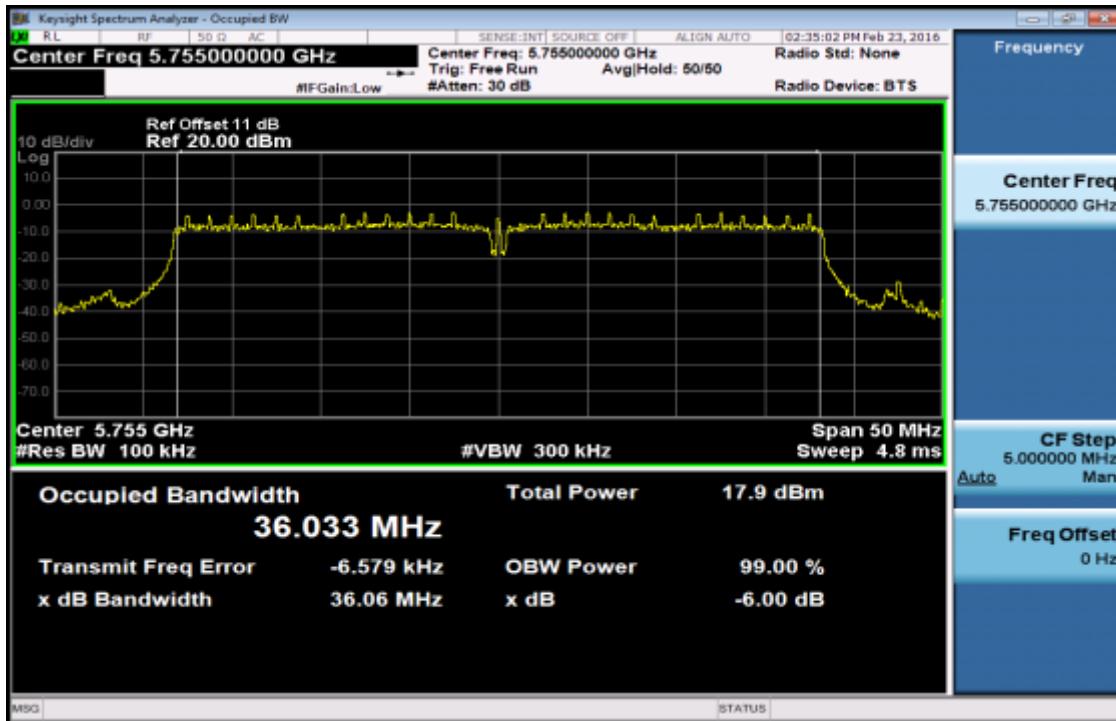
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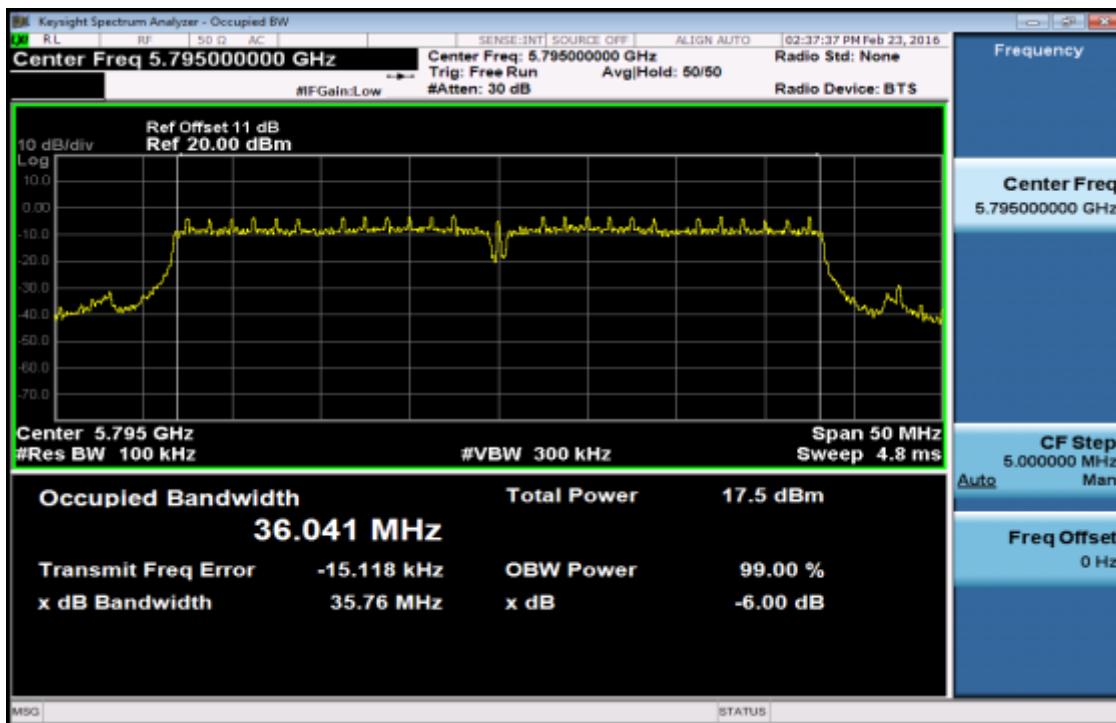
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802.11n HT40, 5725~5850 MHz (Aux) 6dB Band Width Test Data CH-Low (5755 MHz)



6dB Band Width Test Data CH-High (5795 MHz)



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8. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

8.1 Standard Applicable

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1		Access Point (Mater device)	1 Watt(30dBm)
		Fixed point-to-point Acess Ponit	1 Watt(30dBm)
		Mobile and portable clinet device	250mW(23.98dBm)
U-NII-2A			250mW(23.98dBm) or 11dBm+10 log B
U-NII-2C			250mW(23.98dBm) or 11dBm+10 log B
U-NII-3	√		1 Watt(30dBm)

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

The antenna gain is greater than 6dBi in MIMO mode the limit reduce as below:

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

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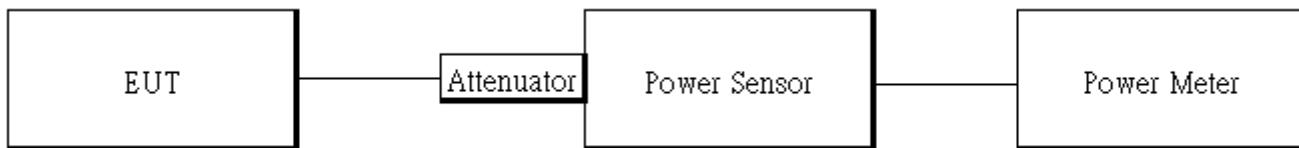
8.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
4. Power Meter is used as the auxiliary test equipment to conduct the output power measurement.
5. Record the max. reading and add $10 \log(1/\text{duty cycle})$.
6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

8.3 Measurement Equipment Used

Refer to section 7.3 for details.

8.4 Test Set-up



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8.5 Measurement Result

802.11a

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
149	5745	10.68	11.695	30	PASS
157	5785	10.52	11.272	30	PASS
165	5825	11.02	12.647	30	PASS

802.11n HT20 (MIMO)

CH	Frequency (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
		CHAIN 0	CHAIN 1				
149	5745	10.26	10.19	13.24	21.064	28.02	PASS
157	5785	10.74	10.46	13.61	22.975	28.02	PASS
165	5825	10.42	10.37	13.41	21.905	28.02	PASS

802.11n HT40 (MIMO)

CH	Frequency (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
		CHAIN 0	CHAIN 1				
151	5755	9.34	8.99	12.18	16.515	28.02	PASS
159	5795	9.28	8.60	11.96	15.717	28.02	PASS

*** Note: The duty cycle factor is compensated to obtain the maximum value of measurement in average.**

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9. PEAK POWER SPECTRAL DENSITY

9.1 Standard Applicable

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1		Access Point (Mater device)	17dBm/ MHz
		Fixed point-to-point Acess Ponit	
		Mobile and portable clinet device	11dBm/ MHz
U-NII-2A			11dBm/ MHz
U-NII-2C			11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Note: The antenna gain is granter than 6 dBi in MIMO mode the limit reduce as below:

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

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9.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
4. **For U-NII1 Band:**

Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

For U-NII-3 Band:

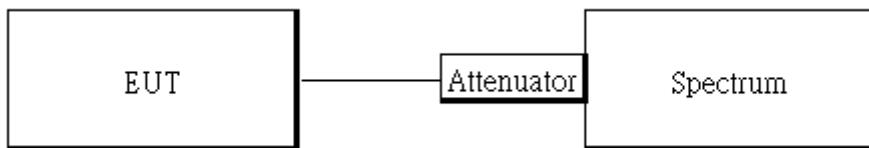
Set RBW=510 kHz, VBW= 3*RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

5. User the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add $10 \log(1/\text{duty cycle})$.
7. MIMO Mode: offset is set following “measure and add $10 \log (N)$ ” on spectrum to measure the PSD for MIMO mode. Offset = cable loss + $10 \log (N)$, where N is number of transmitting antenna. N=2 for this given application.
8. Repeat above procedures until all default test channel (low, middle, and high) was complete.

9.3 Measurement Equipment Used

Refer to section 7.3 for details

9.4 Test Set-up



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9.5 Measurement Result

802.11a

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5745	-10.28	28.02	-38.30
5785	-10.17	28.02	-38.19
5825	-9.05	28.02	-37.07

802.11n HT20 (MIMO)

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5745	-6.23	30	-36.23
5785	9.39	30	-20.61
5825	10.63	30	-19.37

802.11n HT40 (MIMO)

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5755	-7.90	30	-37.90
5795	-7.55	30	-37.55

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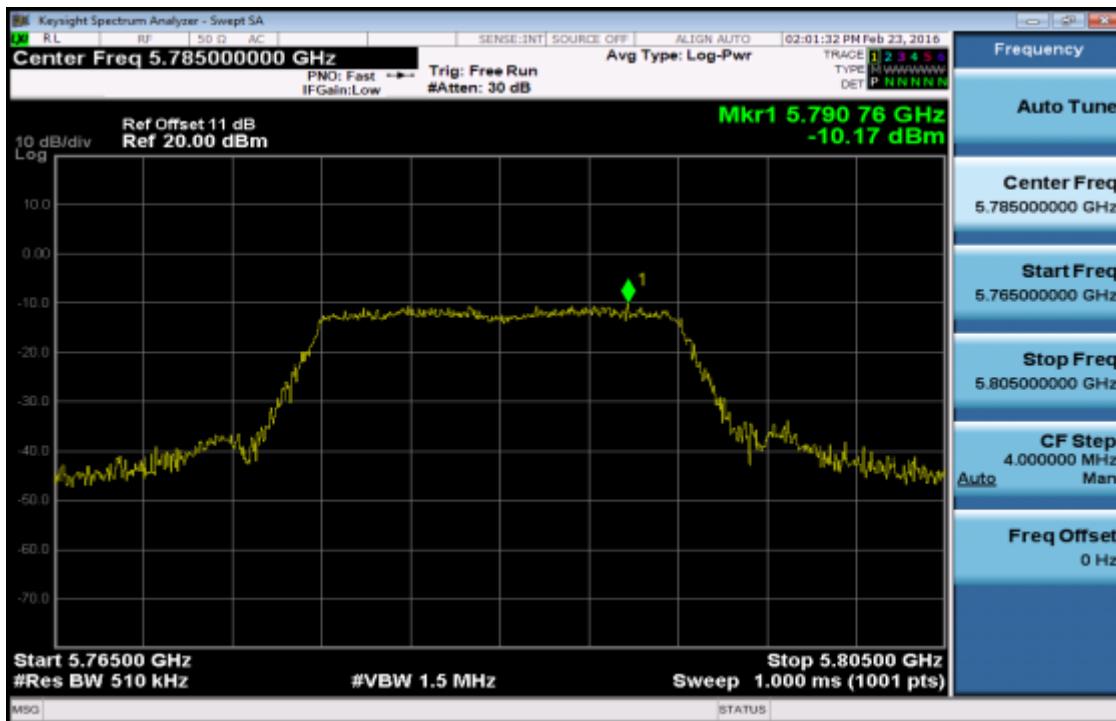
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802.11a, 5725~5850 MHz

Peak Power Spectral Density Data Plot (CH Low 5745 MHz)



Peak Power Spectral Density Data Plot (CH Mid 5785 MHz)



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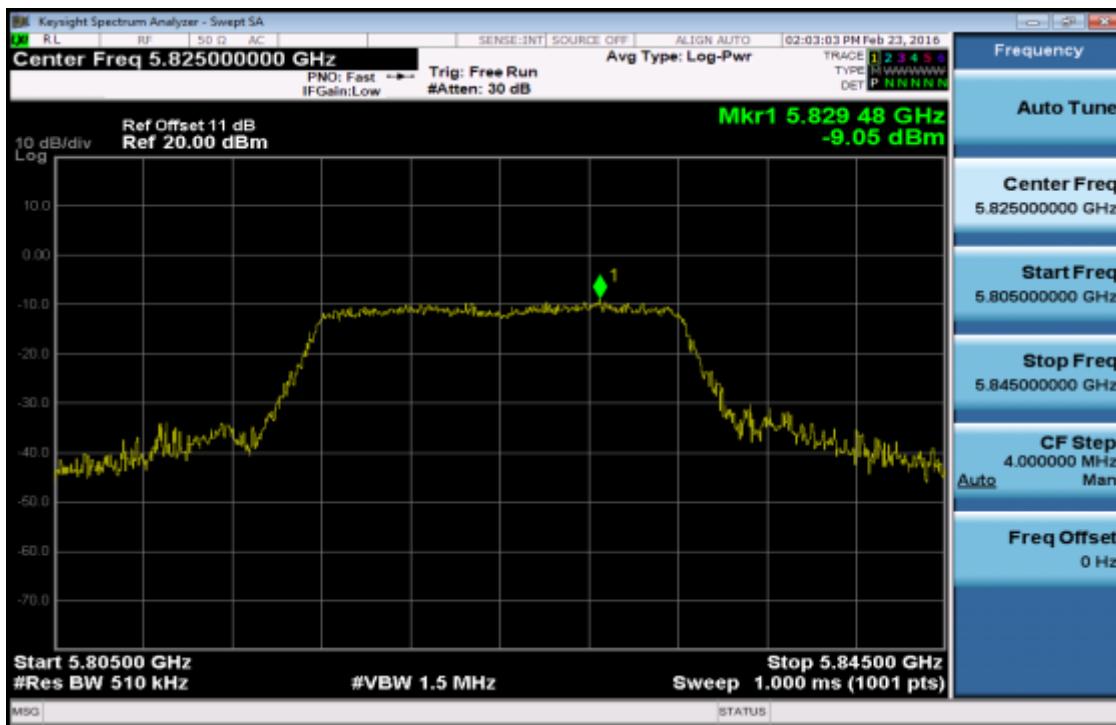
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Peak Power Spectral Density Data Plot (CH High 5825 MHz)



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802.11n HT20, 5725~5850 MHz (MIMO)

Peak Power Spectral Density Data Plot (CH Low 5745 MHz)



Peak Power Spectral Density Data Plot (CH Mid 5785 MHz)



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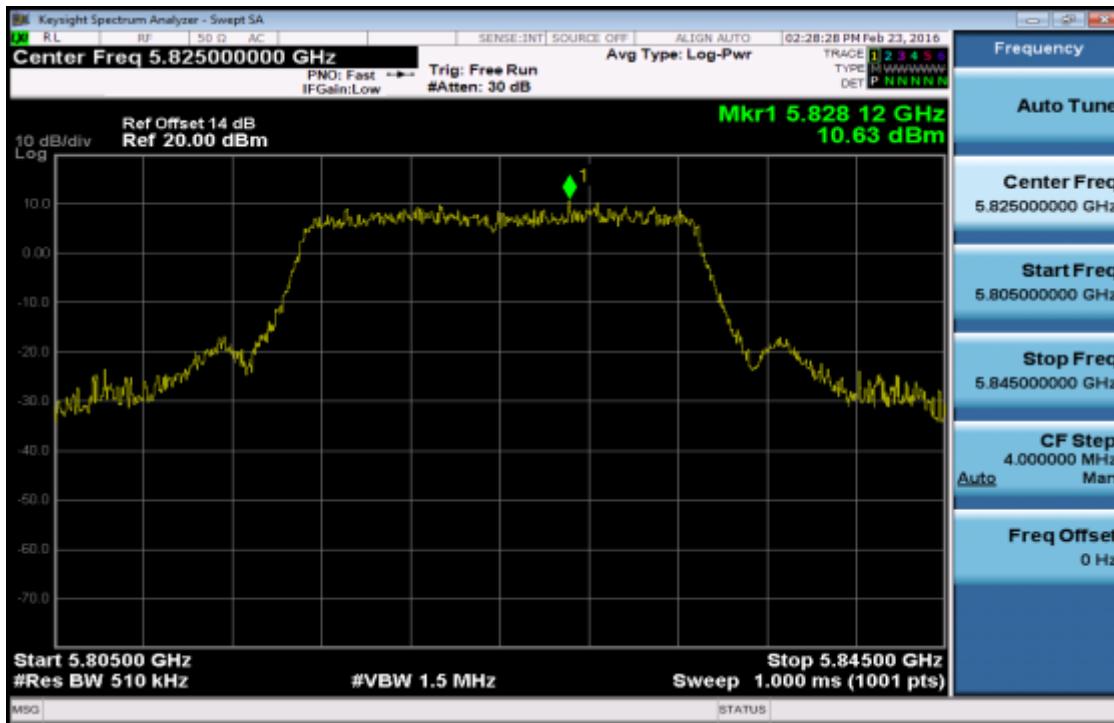
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Peak Power Spectral Density Data Plot (CH High 5825 MHz)



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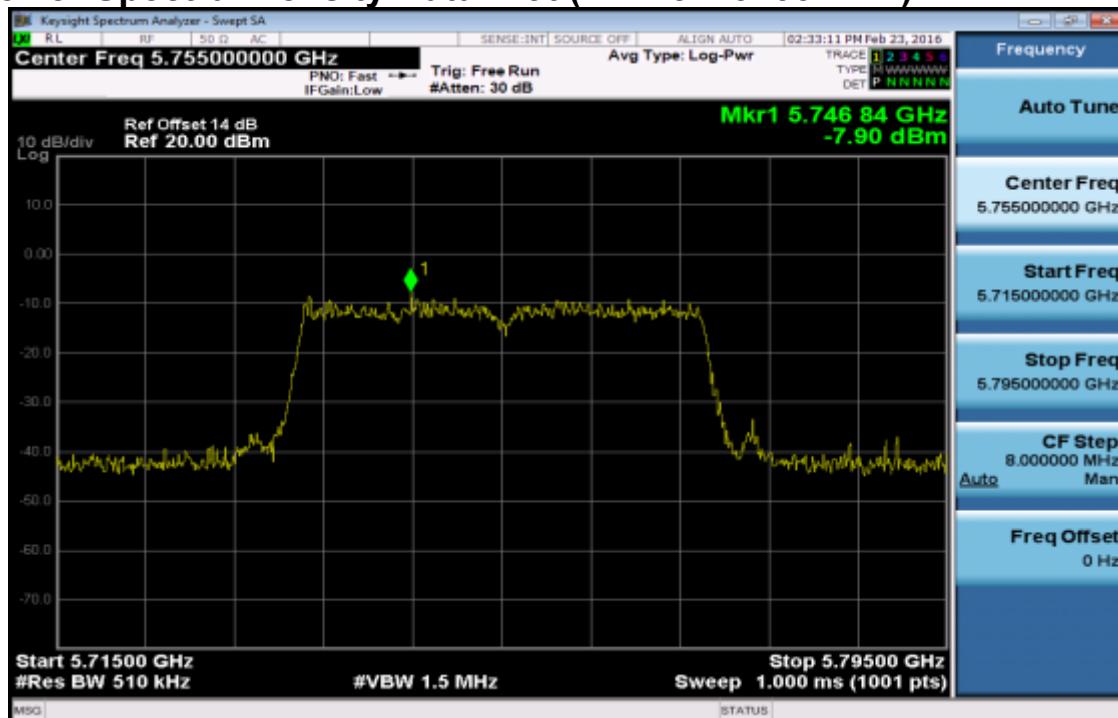
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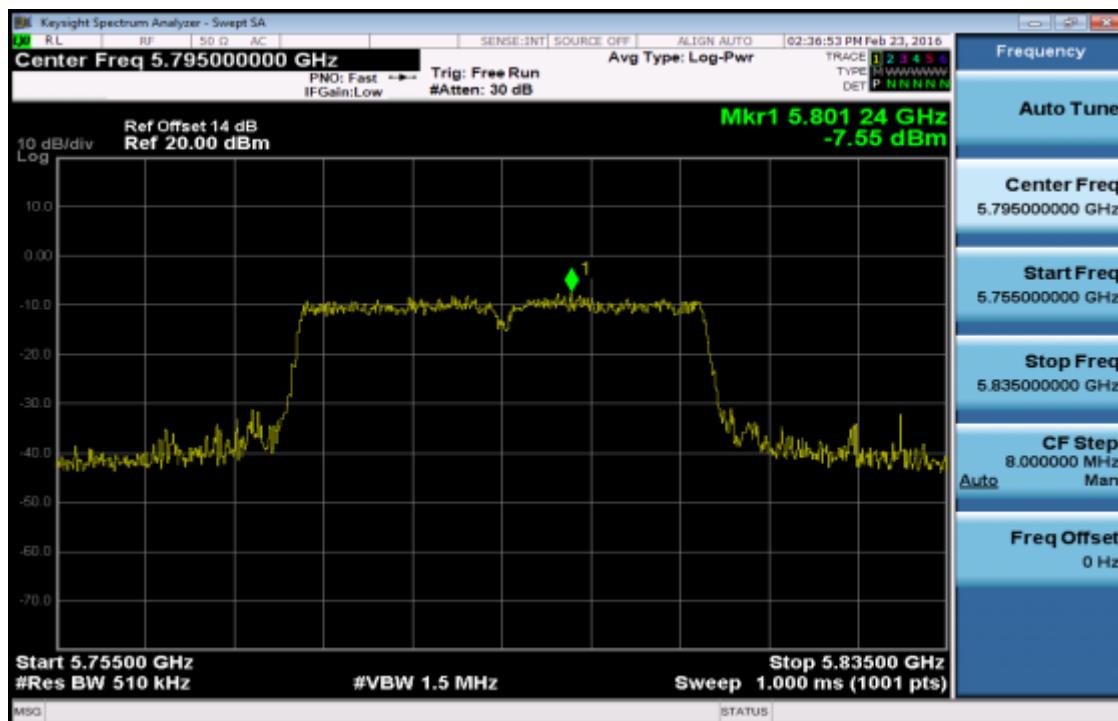
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**802.11n HT40, 5725~5850 MHz (MIMO)
 Peak Power Spectral Density Data Plot (CH Low 5755 MHz)**



Peak Power Spectral Density Data Plot (CH High 5795 MHz)



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10. UNDESIRABLE RADIATED EMISSION MEASUREMENT1

10.1 Standard Applicable

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

1. For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
2. For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
3. For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
4. For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

APPLICABLE TO	LIMIT	
FCC KDB 789033 D02 General UNII Test Procedures New Rules v01	FIELD STRENGTH AT 3m	
	PK: 74 (dB μ V/m)	AV 54 (dB μ V/m)
APPLICABLE TO	EIRP LIMIT	FIELD STRENGTH AT 3m
15.407(b)(1)		
15.407(b)(2)	PK: -27 (dBm/MHz)	PK: 68.3 (dB μ V/m)
15.407(b)(3)		
15.407(b)(4)	PK: -27 (dBm/MHz) PK: -17 (dBm/MHz)	PK: 68.3 (dB μ V/m) PK: 78.2 (dB μ V/m)

EIRP = $((E^*d)^2) / 30$, where E is the field in V/m, d is the measurement distance (3m), EIRP is the equivalent isotropically radiated power in Watts.

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Unwanted spurious emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB μ V/m) = 20 log Emission level (dB μ V/m)

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10.2 Measurement Equipment Used

SGS 966 Chamber No.C					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI Test Receiver	R&S	ESCI7	100760	05/04/2015	05/03/2016
Spectrum Analyzer	Agilent	E4446A	MY51100003	01/28/2016	01/27/2017
Spectrum Analyzer	R&S	FSV-30	101398	09/23/2015	09/22/2016
Loop Antenna	ETS.LINDGREN	6502	00148045	09/07/2015	09/06/2016
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/14/2015	12/13/2016
Horn antenna	ETS.LINDGREN	3117	123995	05/05/2015	05/04/2016
Horn Antenna	Schwarzbeck	BBHA9170	184	12/12/2015	12/11/2016
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/02/2016	01/01/2017
Pre-Amplifier	Agilent	8447D	2944A07676	01/02/2016	01/01/2017
Pre-Amplifier	Agilent	8449B	3008A00578	01/02/2016	01/01/2017
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/02/2016	01/01/2017
5150-5350 Band Reject Filter	Micro-Tronics	BRM50703	1	01/02/2016	01/01/2017
5470-5725 Band Reject Filter	Micro-Tronics	BRM50704	1	01/02/2016	01/01/2017
5725-5875 Band Reject Filter	Micro-Tronics	BRM50705	1	01/02/2016	01/01/2017
1GHz High Pass Filter	Micro-Tronics	HPM50108	32	01/02/2016	01/01/2017
2GHz High Pass Filter	Micro-Tronics	HPM50110	36	01/02/2016	01/01/2017
Attenuator	Mini-Circuit	BW-S10W2+	002	01/02/2016	01/01/2017
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	ChamPro	AM-BS-4500-B	060776-ABS	N.C.R	N.C.R
Controller	ChamPro	EM1000	060776	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_Rx	9	01/02/2016	01/01/2017
3m Site NSA	SGS	966 chamber	N/A	07/01/2015	06/30/2016

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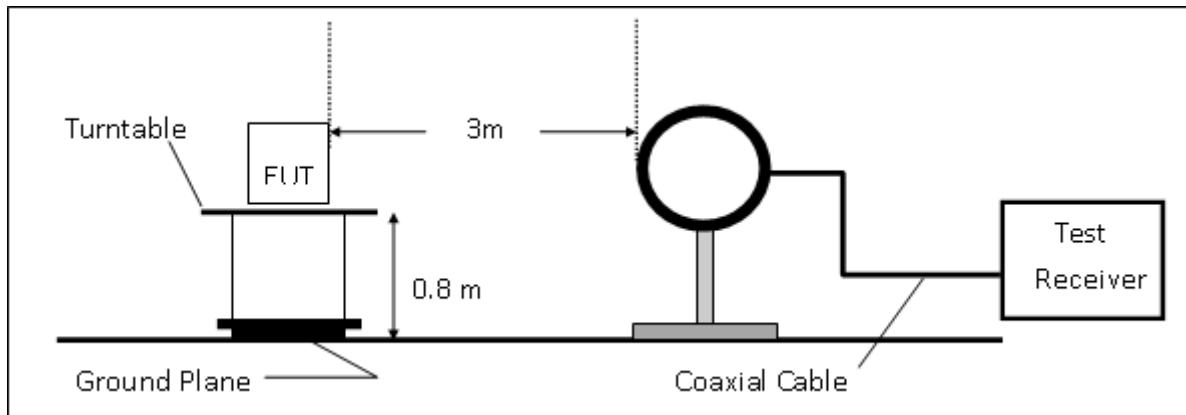
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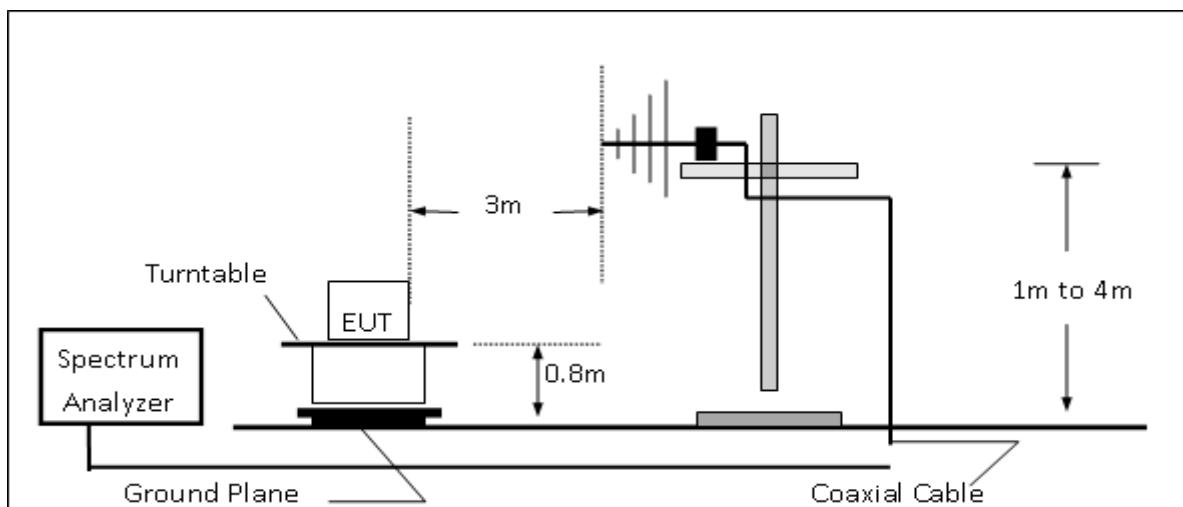
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10.3 Test SET-UP

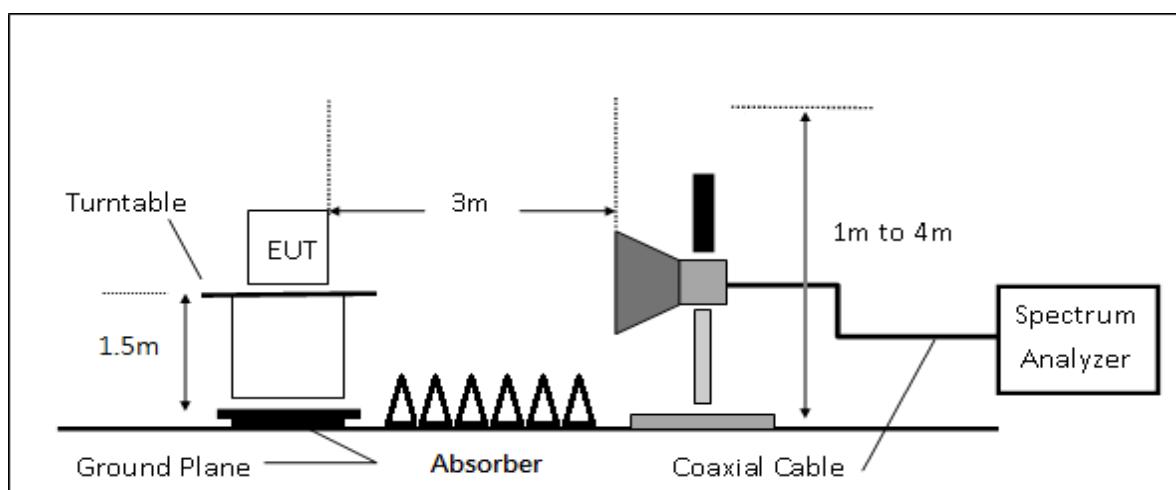
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(B) Radiated Emission Test Set-UP, Frequency from 30MHz to 1000MHz



(C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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10.4 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01.
3. The EUT was placed on a turn table with 0.8m for frequency < 1GHz and 1.5m for frequency > 1GHz above ground plane.
4. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
5. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
6. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
8. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW \geq 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
9. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
11. Repeat above procedures until all frequency measured were complete.

10.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

Actual FS(dB μ V/m) = SPA. Reading level(dB μ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note :

“F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

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“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

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10.6 Test Results of Radiated Spurious Emissions from 9 kHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

10.7 Measurement Result

Refer to attach tabular data sheets.

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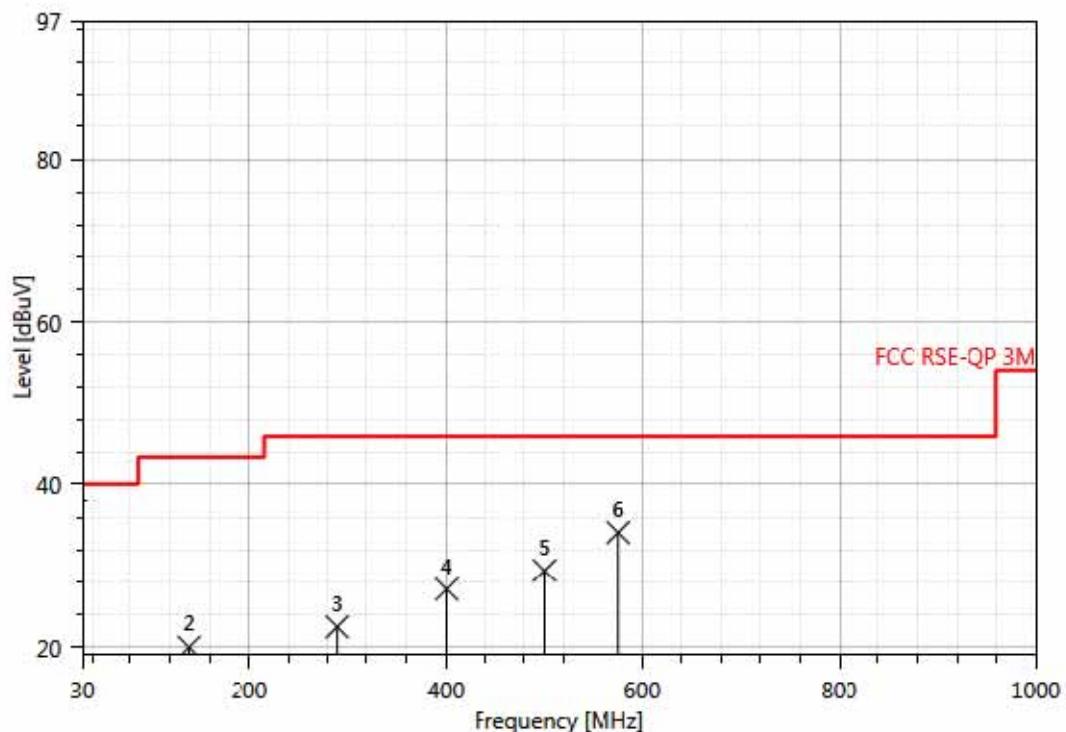
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Radiated Spurious Emission Measurement Result (Below 1GHz)

802.11a, 5725~5850 MHz (External Antenna)

Operation Mode : 802.11aB4 Test Date : 02/23/2016 01:37:36
 Fundamental Frequency : 5785 MHz Temp. / Humi. : 21 deg_C / 62 RH
 Operation Band : Tx CH MID Test Engineer : Tin
 EUT Pol. : E2 Plane Measurement Antenna Pol. : VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level		Factor dB	Limit @3m dBuV/m	Margin dB
			Level dBuV	Reading Level dBuV			
30.00	S	35.89	45.07		-9.19	40.00	-4.11
138.64	S	20.03	28.52		-8.49	43.50	-23.47
288.99	S	22.51	28.59		-6.08	46.00	-23.49
400.54	S	27.13	31.06		-3.94	46.00	-18.87
500.45	S	29.47	32.15		-2.69	46.00	-16.53
576.11	S	34.13	34.78		-0.64	46.00	-11.87

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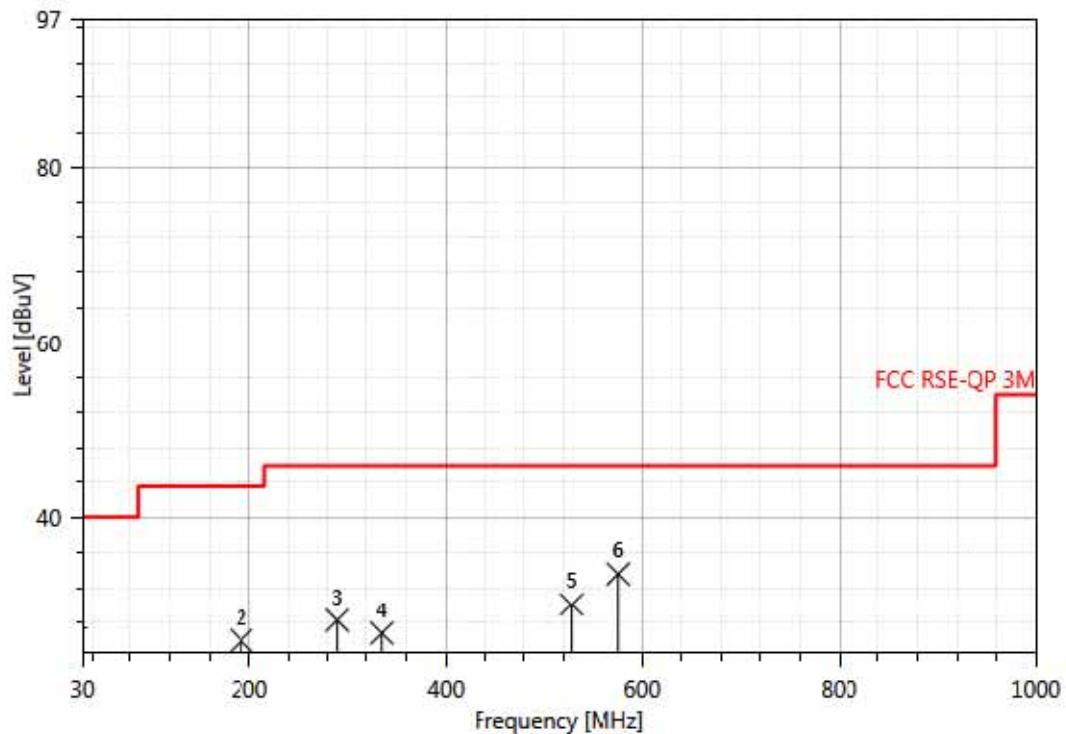
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Operation Mode : 802.11aB4
 Fundamental Frequency : 5785 MHz
 Operation Band : Tx CH MID
 EUT Pol. : E2 Plane

Test Date : 02/23/2016 01:37:37
 Temp. / Humi. : 21 deg_C / 62 RH
 Test Engineer : Tin
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission		Spectrum		Factor dB	Limit @3m dBuV/m	Margin dB
		Level dBuV/m	Reading Level dBuV	Level dBuV	Reading Level dBuV			
30.00	S	25.36	34.55	-9.19	40.00	-14.64		
191.99	S	25.92	35.34	-9.42	43.50	-17.58		
288.99	S	28.23	34.31	-6.08	46.00	-17.77		
335.55	S	26.75	32.07	-5.32	46.00	-19.25		
527.61	S	30.07	31.38	-1.32	46.00	-15.93		
576.11	S	33.58	34.23	-0.64	46.00	-12.42		

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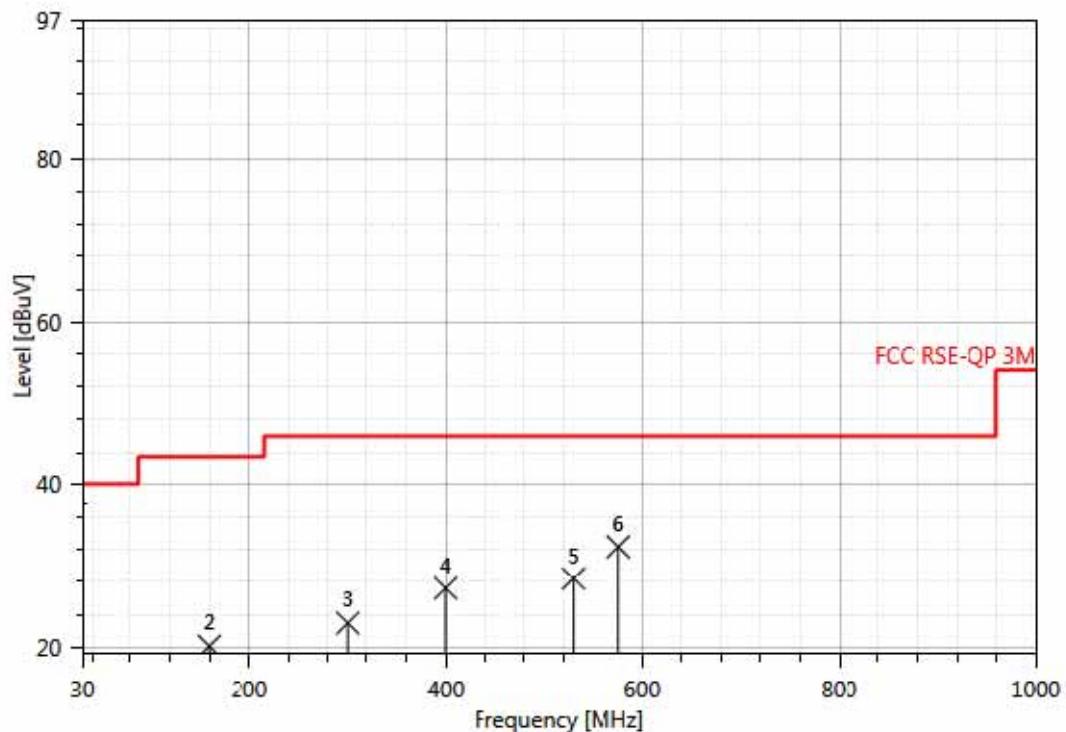
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802.11n HT40, 5725~5850 MHz (MIMO)

Operation Mode : 802.11n40B4 Test Date : 02/23/2016 01:37:38
 Fundamental Frequency : 5755 MHz Temp. / Humi. : 21 deg_C / 62 RH
 Operation Band : Tx CH LOW Test Engineer : Tin
 EUT Pol. : E2 Plane Measurement Antenna Pol. : VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level	Reading Level			
30.00	S	35.48	44.67	44.67	-9.19	40.00	-4.52
159.01	S	20.16	27.54	27.54	-7.38	43.50	-23.34
299.66	S	22.99	28.92	28.92	-5.93	46.00	-23.01
399.57	S	27.23	31.16	31.16	-3.93	46.00	-18.77
529.55	S	28.45	29.70	29.70	-1.25	46.00	-17.55
576.11	S	32.39	33.04	33.04	-0.64	46.00	-13.61

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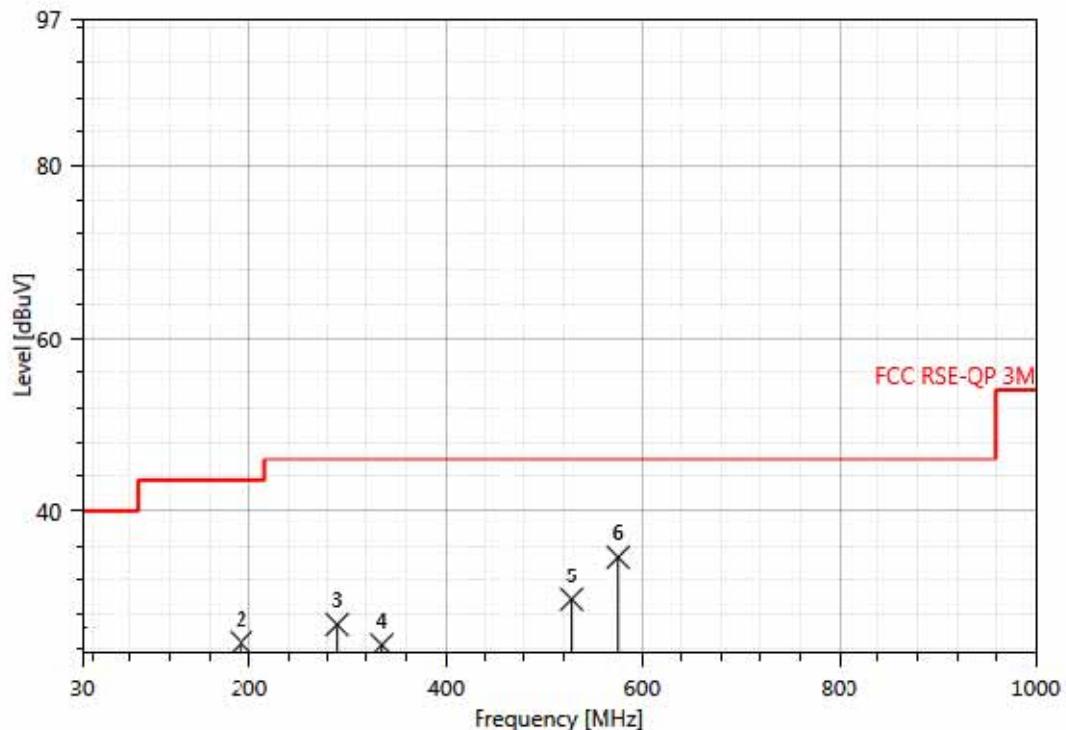
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Operation Mode : 802.11n40B4
 Fundamental Frequency : 5755 MHz
 Operation Band : Tx CH LOW
 EUT Pol. : E2 Plane

Test Date : 02/23/2016 01:37:39
 Temp. / Humi. : 21 deg_C / 62 RH
 Test Engineer : Tin
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission		Spectrum		Factor dB	Limit @3m dBuV/m	Margin dB
		Level dBuV/m	Reading Level dBuV	Level dBuV	Reading Level dBuV			
30.00	S	24.45	33.64	-9.19	40.00	-15.55		
191.99	S	24.74	34.16	-9.42	43.50	-18.76		
288.99	S	26.81	32.89	-6.08	46.00	-19.19		
335.55	S	24.49	29.81	-5.32	46.00	-21.51		
527.61	S	29.71	31.03	-1.32	46.00	-16.29		
576.11	S	34.70	35.34	-0.64	46.00	-11.30		

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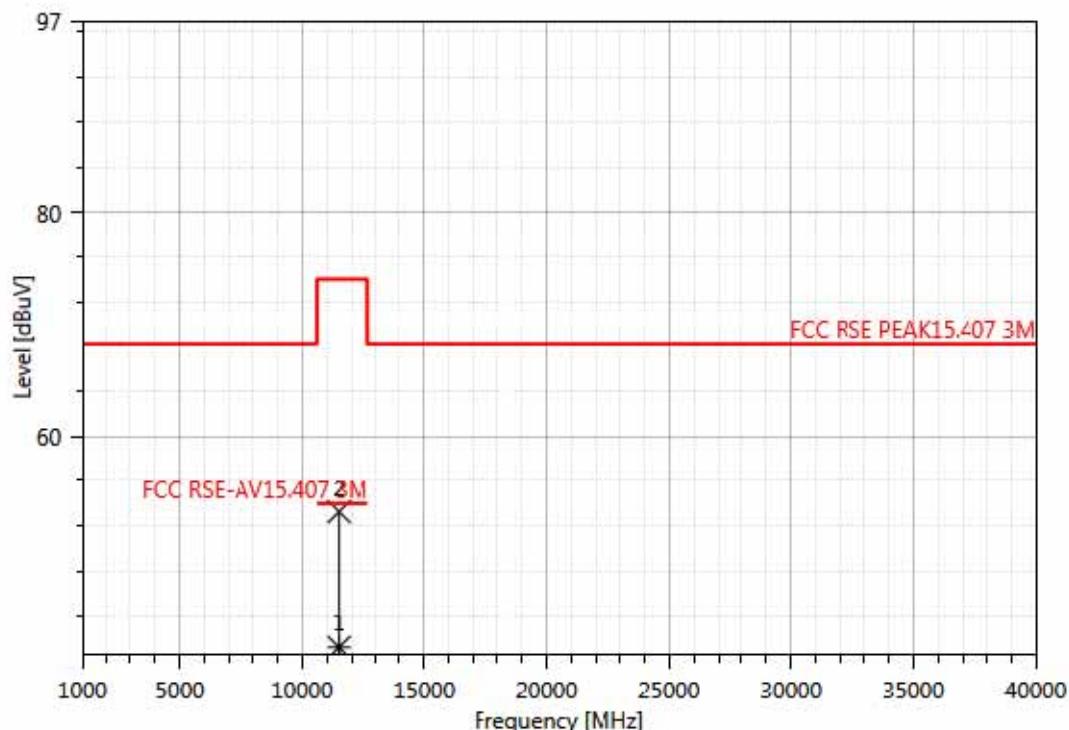
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Radiated Spurious Emission Measurement Result (Above 1GHz)

802.11a, 5725~5850 MHz (External Antenna)

Operation Mode : 802.11aB4 Test Date : 02/23/2016 00:48:23
Fundamental Frequency : 5745 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Tx CH LOW Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Factor dB	Limit @3m dBuV/m			
11490.00	H	41.20	20.78	20.42	54.00	54.00	-12.80
11490.00	H	53.27	32.85	20.42	74.00	74.00	-20.73

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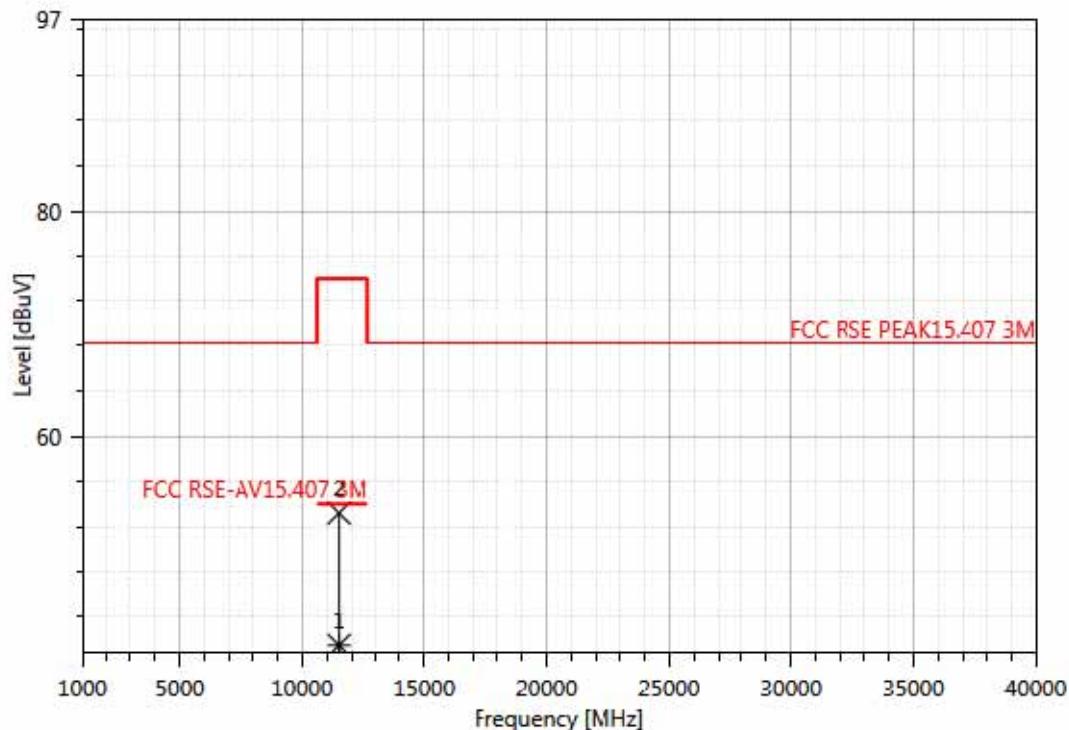
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Operation Mode : 802.11aB4
Fundamental Frequency : 5745 MHz
Operation Band : Tx CH LOW
EUT Pol. : E2 Plane

Test Date : 02/23/2016 00:48:34
Temp. / Humi. : 21 deg_C / 62 RH
Test Engineer : Tin
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
11490.00	H	41.50	21.08		20.42	54.00	-12.50
11490.00	H	53.21	32.79		20.42	74.00	-20.79

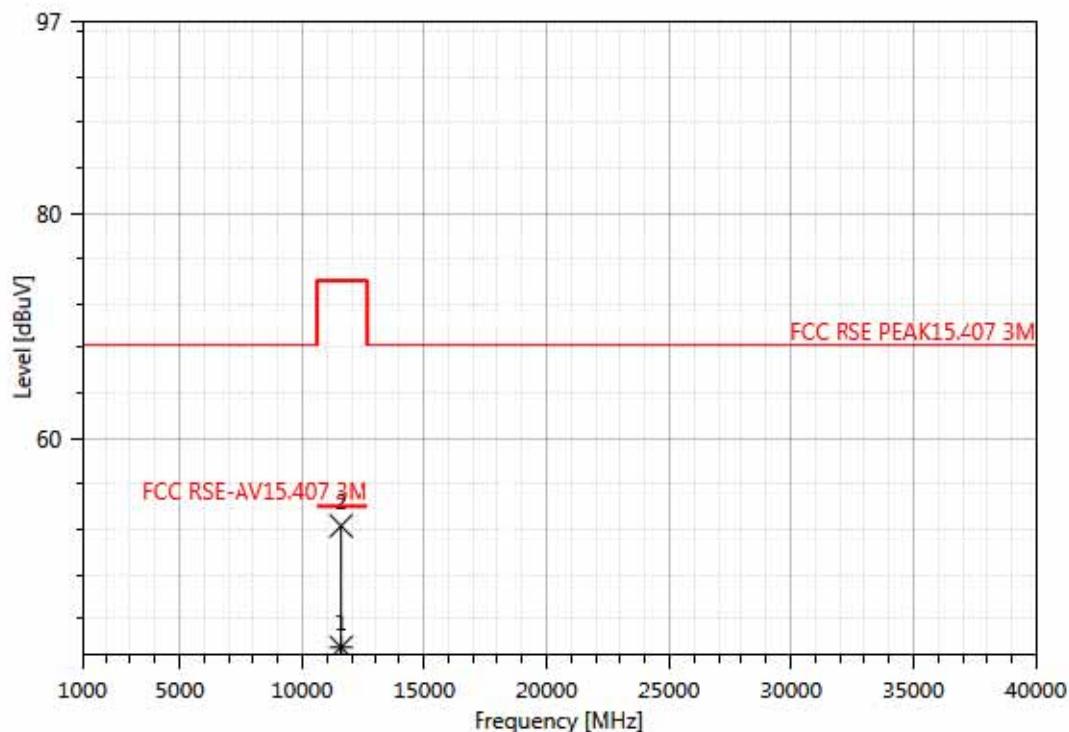
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Operation Mode : 802.11aB4
Fundamental Frequency : 5785 MHz
Operation Band : Tx CH MID
EUT Pol. : E2 Plane

Test Date : 02/23/2016 00:52:46
Temp. / Humi. : 21 deg_C / 62 RH
Test Engineer : Tin
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level dBuV/m	Reading Level dBuV			
11570.00	H	41.52	20.93	20.93	20.59	54.00	-12.48
11570.00	H	52.27	31.68	31.68	20.59	74.00	-21.73

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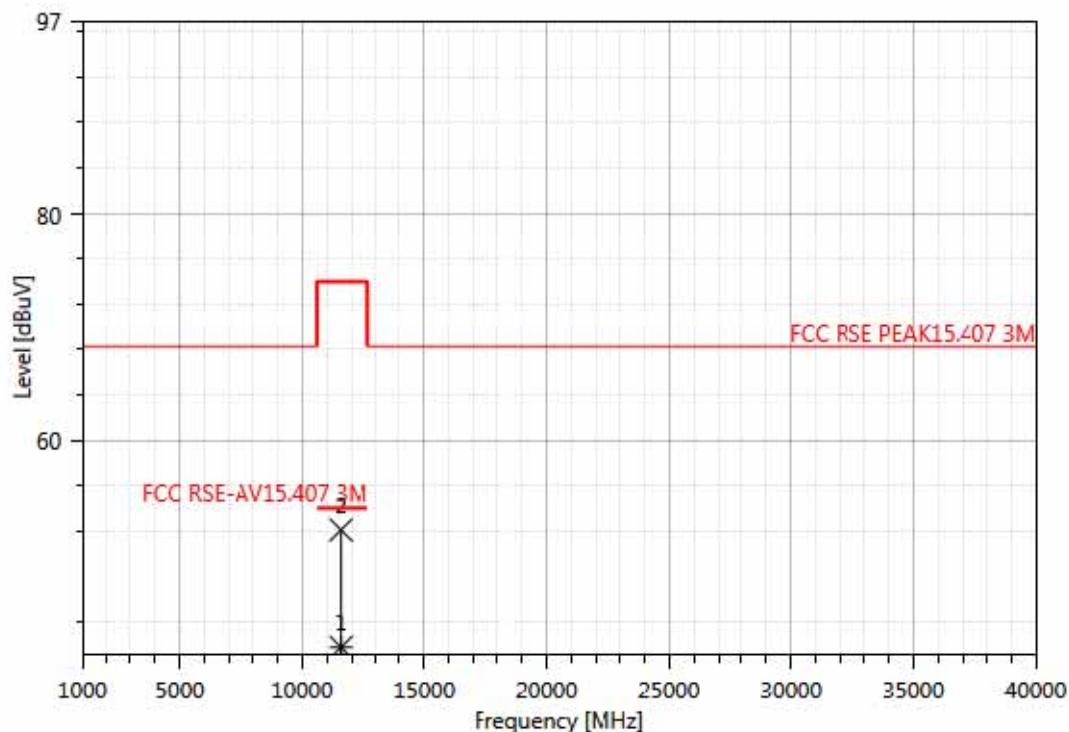
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Operation Mode : 802.11aB4
Fundamental Frequency : 5785 MHz
Operation Band : Tx CH MID
EUT Pol. : E2 Plane

Test Date : 02/23/2016 00:52:57
Temp. / Humi. : 21 deg_C / 62 RH
Test Engineer : Tin
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level dBuV/m	Reading Level dBuV			
11570.00	H	41.75	21.16	21.16	20.59	54.00	-12.25
11570.00	H	52.10	31.51	31.51	20.59	74.00	-21.90

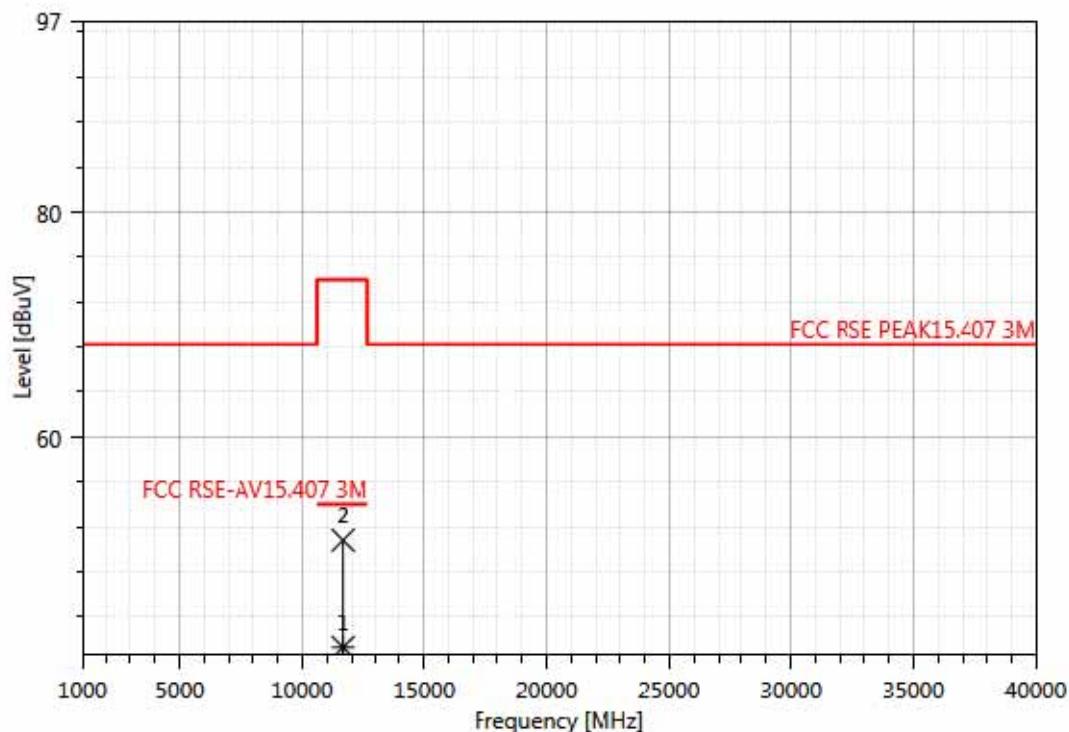
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Operation Mode : 802.11aB4
Fundamental Frequency : 5825 MHz
Operation Band : Tx CH HIGH
EUT Pol. : E2 Plane

Test Date : 02/23/2016 00:54:52
Temp. / Humi. : 21 deg_C / 62 RH
Test Engineer : Tin
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level dBuV/m	Reading Level dBuV			
11650.00	H	41.31	20.88	20.43	20.43	54.00	-12.69
11650.00	H	50.85	30.42	20.43	20.43	74.00	-23.15

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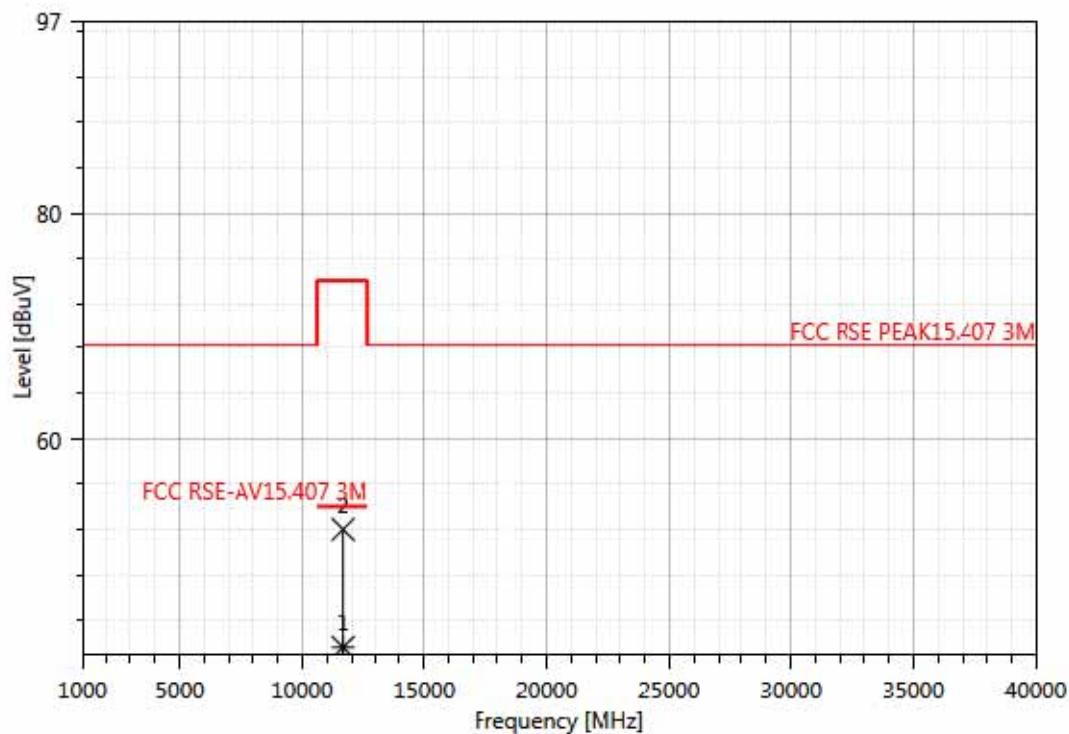
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Operation Mode : 802.11aB4
Fundamental Frequency : 5825 MHz
Operation Band : Tx CH HIGH
EUT Pol. : E2 Plane

Test Date : 02/23/2016 00:55:03
Temp. / Humi. : 21 deg_C / 62 RH
Test Engineer : Tin
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level	Reading Level			
11650.00	H	41.54	21.11	21.11	20.43	54.00	-12.46
11650.00	H	51.99	31.56	31.56	20.43	74.00	-22.01

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Band edge falling to restricted band

Operation Mode : 802.11aB4 Test Date : 02/22/2016 21:08:28
Fundamental Frequency : 5745 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Bandedge CH LOW Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : VERTICAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5725.00	E	68.67	62.08	6.59	78.20	-9.53

Operation Mode : 802.11aB4 Test Date : 02/22/2016 21:12:15
Fundamental Frequency : 5745 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Bandedge CH LOW Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : HORIZONTAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5725.00	E	59.47	52.88	6.59	78.20	-18.73

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Operation Mode : 802.11aB4 Test Date : 02/22/2016 21:16:22
Fundamental Frequency : 5825 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Bandedge CH HIGH Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : VERTICAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5850.00	E	64.52	57.23	7.28	78.20	-13.68

Operation Mode : 802.11aB4 Test Date : 02/22/2016 21:21:04
Fundamental Frequency : 5825 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Bandedge CH HIGH Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : HORIZONTAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5850.00	E	59.59	52.31	7.28	78.20	-18.61

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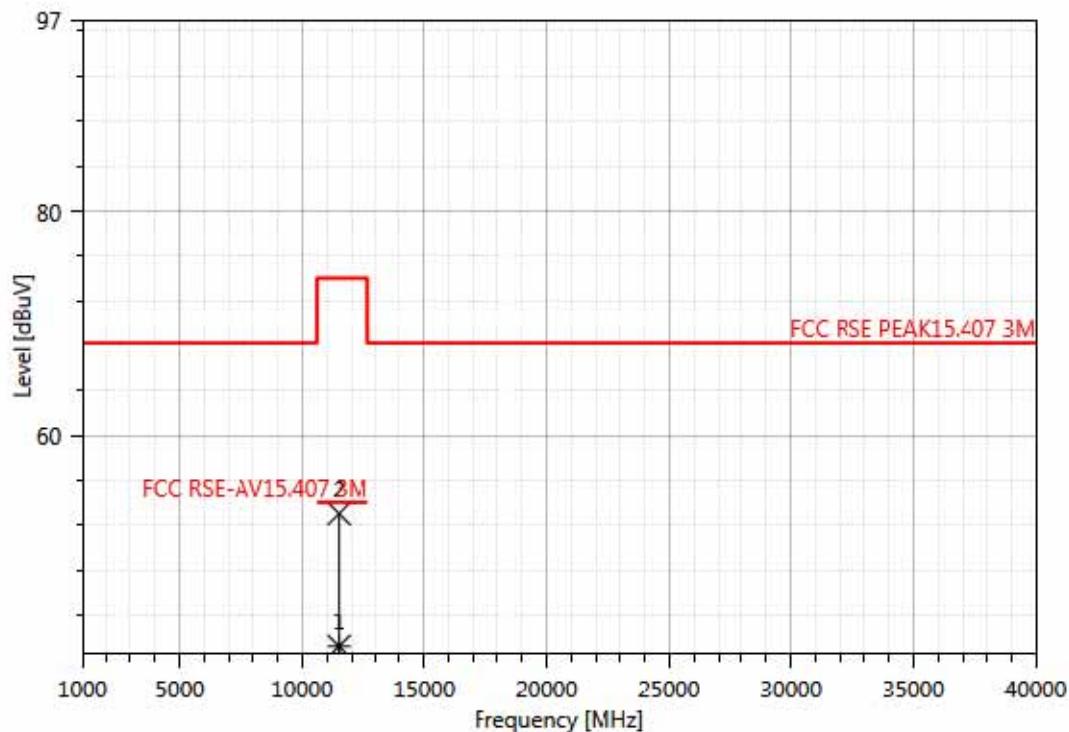
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5725~5850 MHz (MIMO)

Operation Mode : 802.11n20B4 Test Date : 02/23/2016 00:58:09
Fundamental Frequency : 5745 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Tx CH LOW Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level		Factor dB	Limit @3m dBuV/m	Margin dB
			Level dBuV	Reading Level dBuV			
11490.00	H	41.21	20.79	20.42	20.42	54.00	-12.79
11490.00	H	53.02	32.60	20.42	20.42	74.00	-20.98

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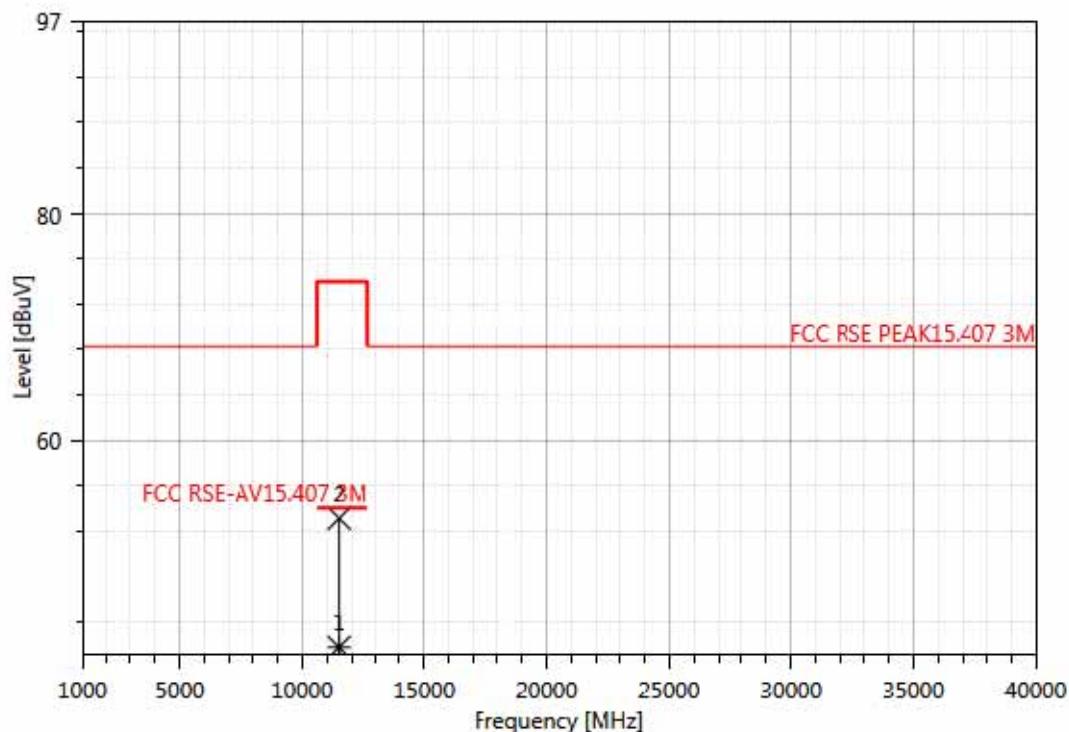
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Operation Mode : 802.11n20B4
Fundamental Frequency : 5745 MHz
Operation Band : Tx CH LOW
EUT Pol. : E2 Plane

Test Date : 02/23/2016 00:58:21
Temp. / Humi. : 21 deg_C / 62 RH
Test Engineer : Tin
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level	Reading Level			
11490.00	H	41.72		21.30	20.42	54.00	-12.28
11490.00	H	53.10		32.68	20.42	74.00	-20.90

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

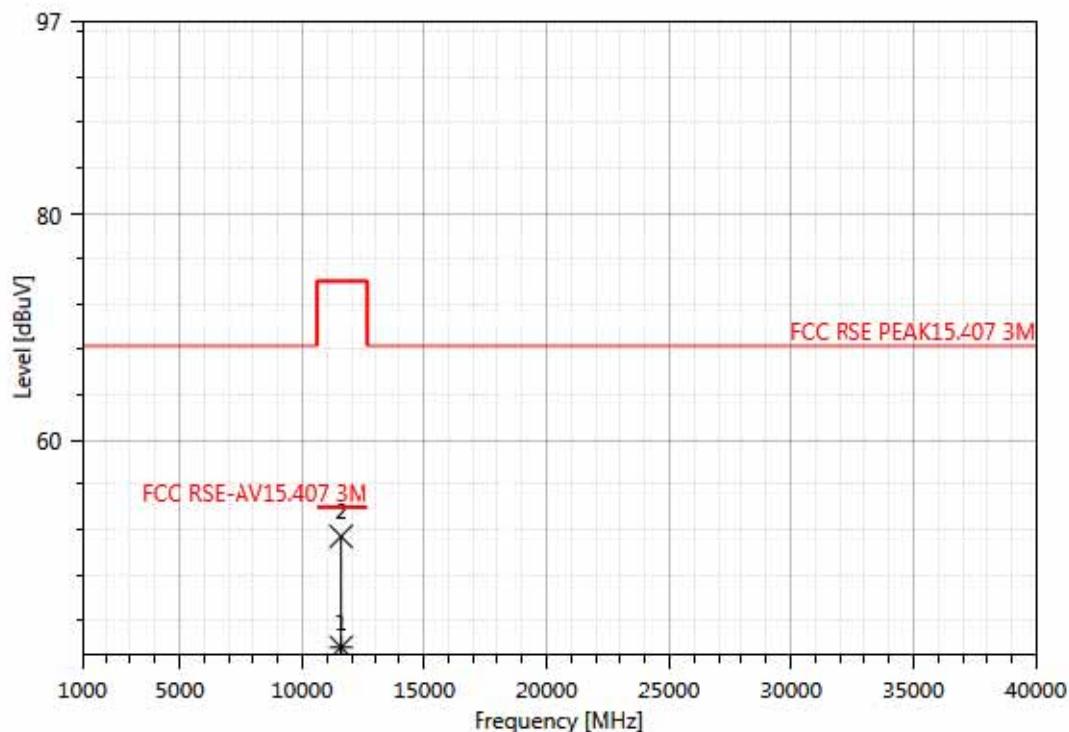
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Operation Mode : 802.11n20B4
Fundamental Frequency : 5785 MHz
Operation Band : Tx CH MID
EUT Pol. : E2 Plane

Test Date : 02/23/2016 01:02:16
Temp. / Humi. : 21 deg_C / 62 RH
Test Engineer : Tin
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level	Reading Level			
11570.00	H	41.65	21.06	21.06	20.59	54.00	-12.35
11570.00	H	51.47	30.88	30.88	20.59	74.00	-22.53

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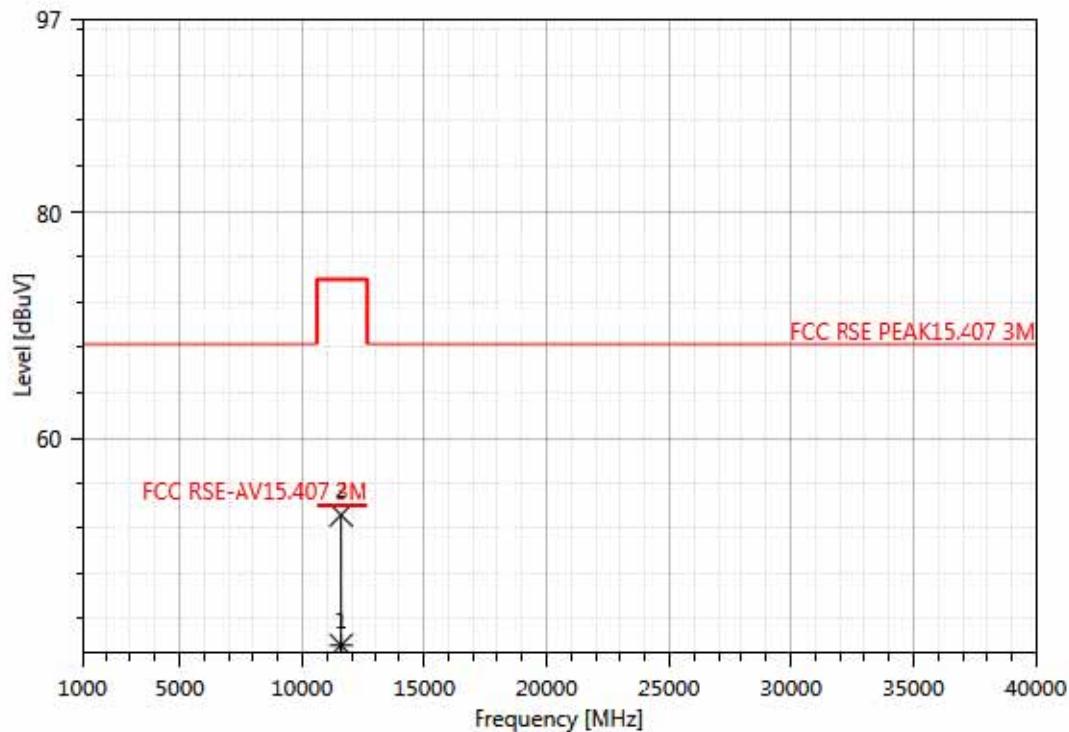
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Operation Mode : 802.11n20B4
Fundamental Frequency : 5785 MHz
Operation Band : Tx CH MID
EUT Pol. : E2 Plane

Test Date : 02/23/2016 01:02:27
Temp. / Humi. : 21 deg_C / 62 RH
Test Engineer : Tin
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level	Reading Level			
11570.00	H	41.68	21.09	21.09	20.59	54.00	-12.32
11570.00	H	53.17	32.59	32.59	20.59	74.00	-20.83

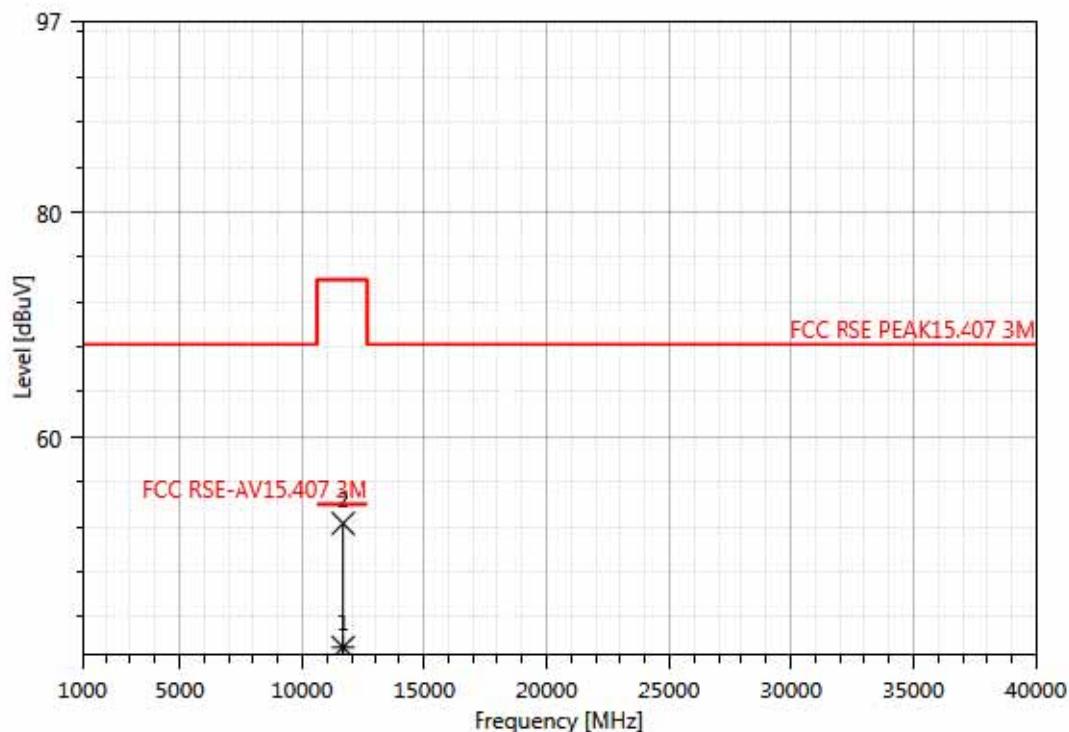
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Operation Mode : 802.11n20B4
Fundamental Frequency : 5825 MHz
Operation Band : Tx CH HIGH
EUT Pol. : E2 Plane

Test Date : 02/23/2016 01:04:24
Temp. / Humi. : 21 deg_C / 62 RH
Test Engineer : Tin
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level dBuV/m	Reading Level dBuV			
11650.00	H	41.31	20.88	20.88	20.43	54.00	-12.69
11650.00	H	52.33	31.90	31.90	20.43	74.00	-21.67

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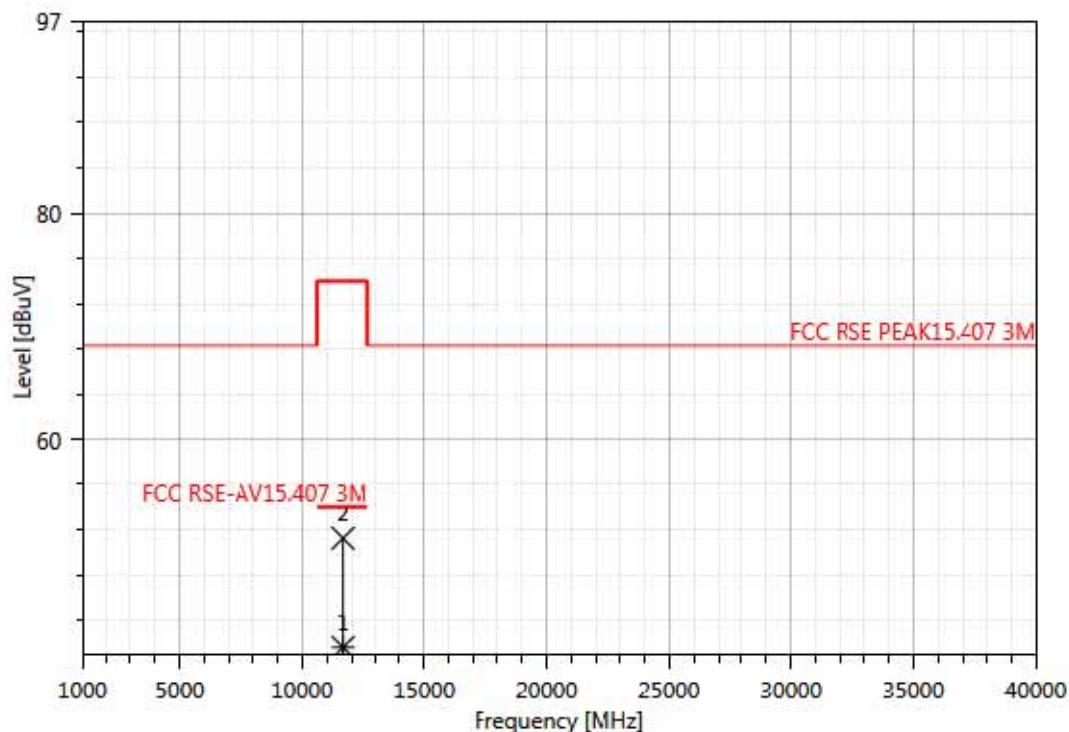
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Operation Mode : 802.11n20B4
Fundamental Frequency : 5825 MHz
Operation Band : Tx CH HIGH
EUT Pol. : E2 Plane

Test Date : 02/23/2016 01:04:35
Temp. / Humi. : 21 deg_C / 62 RH
Test Engineer : Tin
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level	Reading Level			
11650.00	H	41.62	21.19	21.19	20.43	54.00	-12.38
11650.00	H	51.28	30.85	30.85	20.43	74.00	-22.72

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Band edge falling to restricted band

Operation Mode : 802.11n20B4 Test Date : 02/22/2016 21:26:21
Fundamental Frequency : 5745 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Bandedge CH LOW Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : VERTICAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5725.00	E	68.36	61.77	6.59	78.20	-9.84

Operation Mode : 802.11n20B4 Test Date : 02/22/2016 21:33:50
Fundamental Frequency : 5745 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Bandedge CH LOW Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : HORIZONTAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5725.00	E	64.21	57.62	6.59	78.20	-13.99

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Operation Mode : 802.11n20B4 Test Date : 02/23/2016 00:22:54
Fundamental Frequency : 5825 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Bandedge CH HIGH Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : VERTICAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5850.00	E	68.18	60.90	7.28	78.20	-10.02

Operation Mode : 802.11n20B4 Test Date : 02/23/2016 00:28:18
Fundamental Frequency : 5825 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Bandedge CH HIGH Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : HORIZONTAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5850.00	E	64.00	56.72	7.28	78.20	-14.20

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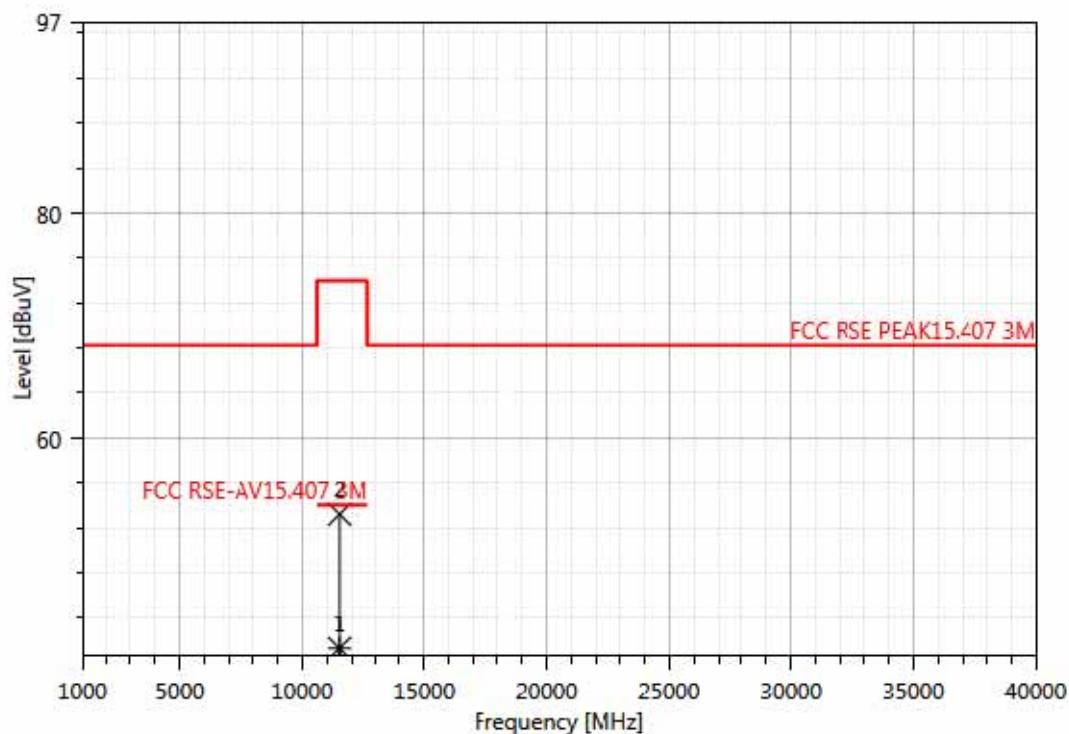
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5725~5850 MHz (MIMO)

Operation Mode : 802.11n40B4 Test Date : 02/23/2016 01:07:08
Fundamental Frequency : 5755 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Tx CH LOW Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level		Factor dB	Limit @3m dBuV/m	Margin dB
			Level dBuV	Reading Level dBuV			
11510.00	H	41.30	20.91	20.39	20.39	54.00	-12.70
11510.00	H	53.21	32.82	20.39	20.39	74.00	-20.79

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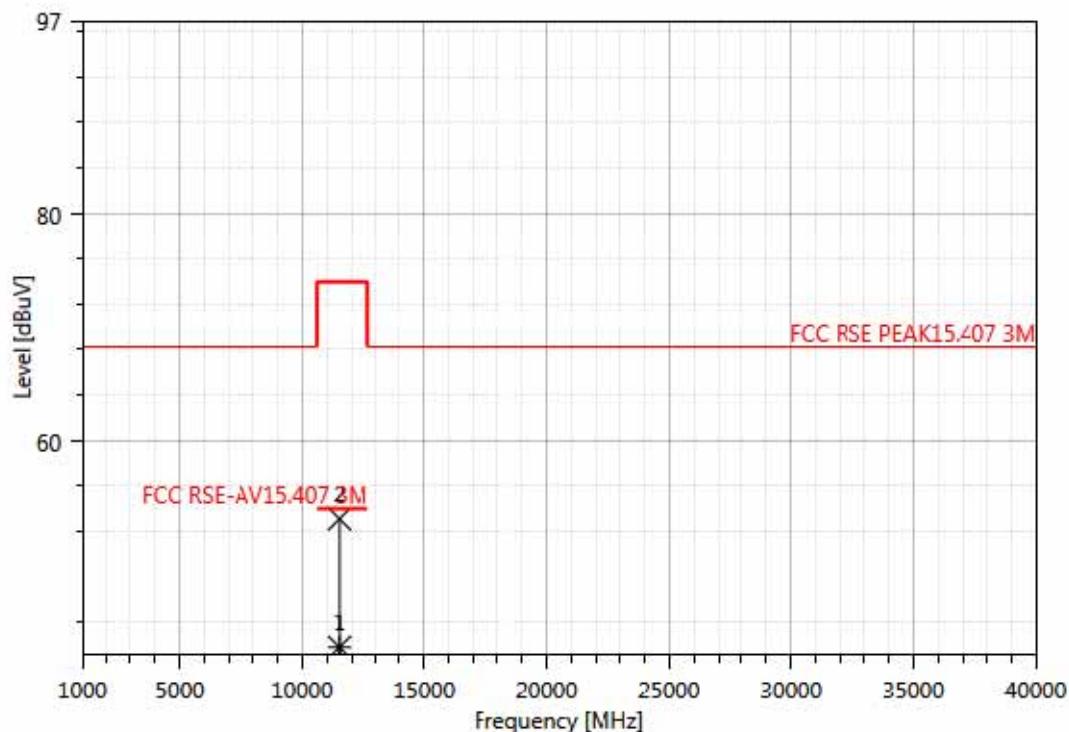
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Operation Mode : 802.11n40B4
Fundamental Frequency : 5755 MHz
Operation Band : Tx CH LOW
EUT Pol. : E2 Plane

Test Date : 02/23/2016 01:07:19
Temp. / Humi. : 21 deg_C / 62 RH
Test Engineer : Tin
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level dBuV/m	Reading Level dBuV			
11510.00	H	41.80	21.41	21.41	20.39	54.00	-12.20
11510.00	H	53.11	32.72	32.72	20.39	74.00	-20.89

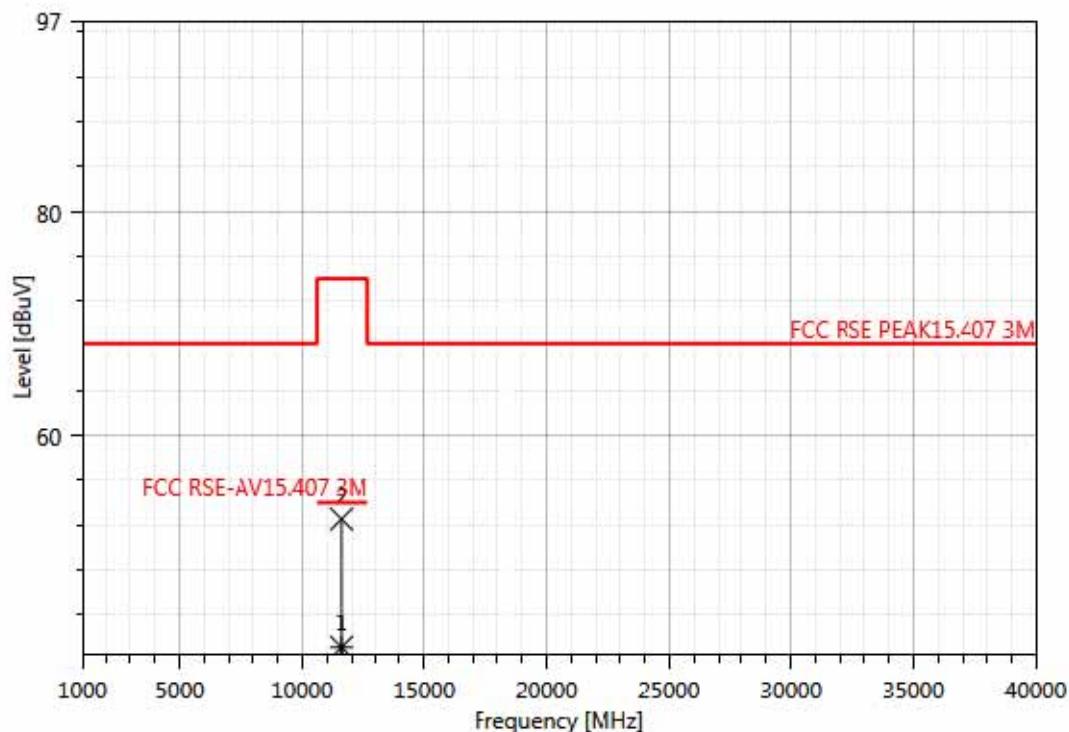
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Operation Mode : 802.11n40B4
Fundamental Frequency : 5795 MHz
Operation Band : Tx CH HIGH
EUT Pol. : E2 Plane

Test Date : 02/23/2016 01:11:10
Temp. / Humi. : 21 deg_C / 62 RH
Test Engineer : Tin
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level	Reading Level			
11590.00	H	41.12	20.69	20.69	20.43	54.00	-12.88
11590.00	H	52.55	32.12	32.12	20.43	74.00	-21.45

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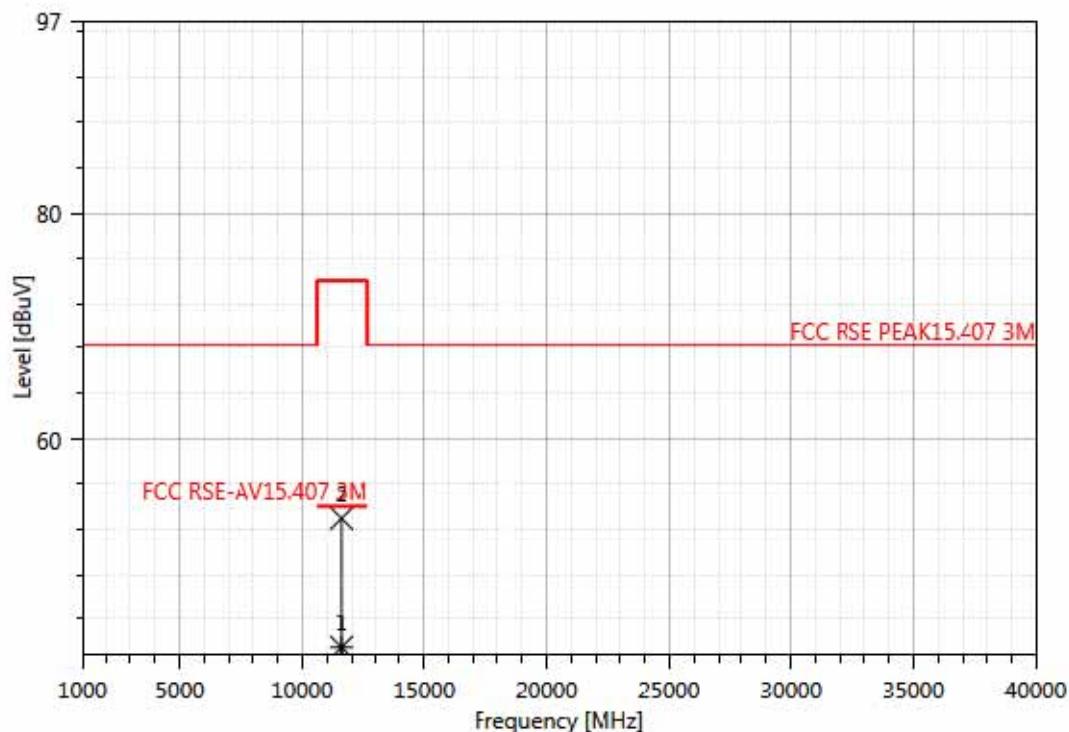
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Operation Mode : 802.11n40B4
Fundamental Frequency : 5795 MHz
Operation Band : Tx CH HIGH
EUT Pol. : E2 Plane

Test Date : 02/23/2016 01:11:21
Temp. / Humi. : 21 deg_C / 62 RH
Test Engineer : Tin
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level dBuV/m	Reading Level dBuV			
11590.00	H	41.52	21.09	21.09	20.43	54.00	-12.48
11590.00	H	52.92	32.49	32.49	20.43	74.00	-21.08

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Band edge falling to restricted band

Operation Mode : 802.11n40B4 Test Date : 02/23/2016 00:33:12
Fundamental Frequency : 5755 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Bandedge CH LOW Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : VERTICAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5725.00	E	67.07	60.48	6.59	78.20	-11.13

Operation Mode : 802.11n40B4 Test Date : 02/23/2016 00:37:18
Fundamental Frequency : 5755 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Bandedge CH LOW Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : HORIZONTAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5725.00	E	64.12	57.53	6.59	78.20	-14.08

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Operation Mode : 802.11n40B4 Test Date : 02/23/2016 00:42:06
Fundamental Frequency : 5795 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Bandedge CH HIGH Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : VERTICAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5850.00	E	58.74	51.46	7.28	78.20	-19.46

Operation Mode : 802.11n40B4 Test Date : 02/23/2016 00:46:06
Fundamental Frequency : 5795 MHz Temp. / Humi. : 21 deg_C / 62 RH
Operation Band : Bandedge CH HIGH Test Engineer : Tin
EUT Pol. : E2 Plane Measurement Antenna Pol. : HORIZONTAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5850.00	E	55.57	48.29	7.28	78.20	-22.63

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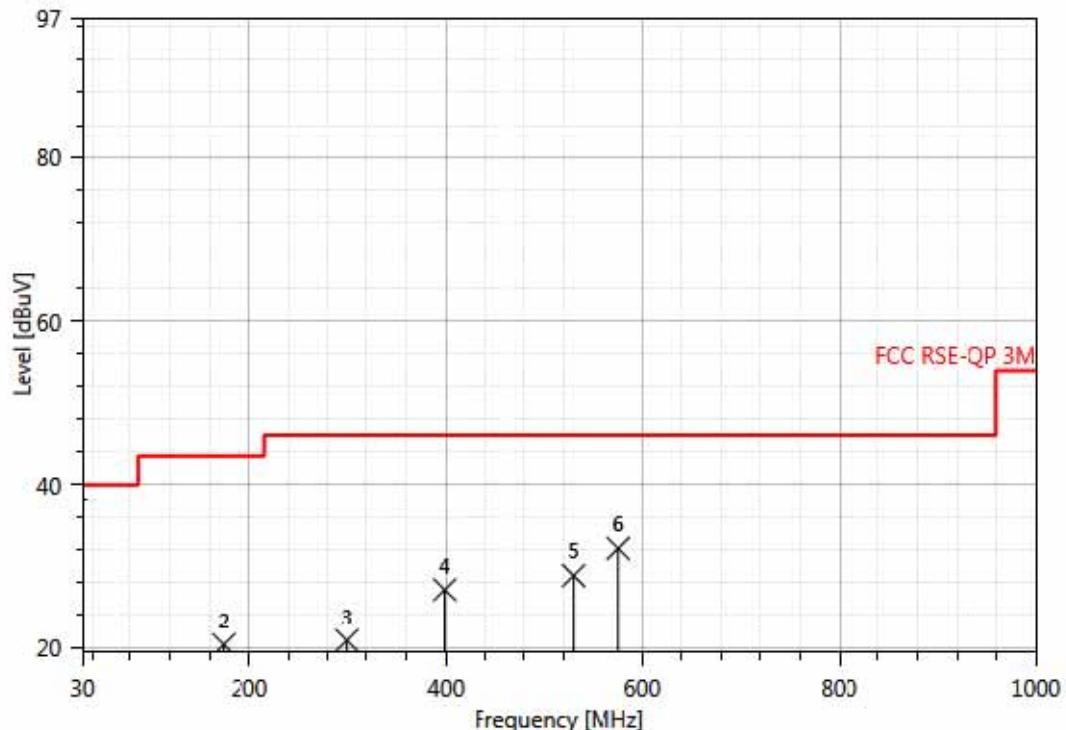
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Radiated Spurious Emission Measurement Result (Below 1GHz)

802.11a, 5725~5850 MHz (Internal Antenna)

Operation Band	:802.11aB4	Test Date	:2016-02-23
Fundamental Frequency	:5785 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Tin
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level		Factor dB	Limit @3m dBuV/m	Margin dB
			Level dBuV	Reading Level dBuV			
30.00	S	36.02	45.21	-9.19	40.00	-3.98	
173.56	S	20.34	28.30	-7.96	43.50	-23.16	
298.69	S	20.86	26.81	-5.95	46.00	-25.14	
398.60	S	27.13	31.10	-3.97	46.00	-18.87	
529.55	S	28.85	30.10	-1.25	46.00	-17.15	
576.11	S	32.13	32.77	-0.64	46.00	-13.87	

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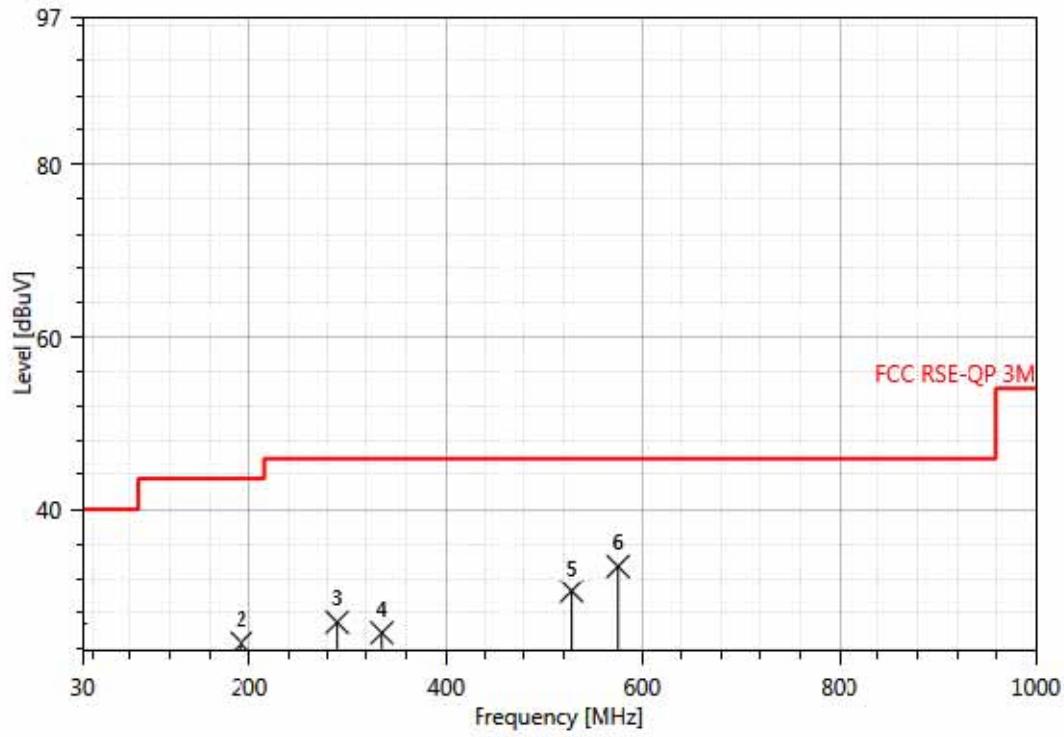
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Operation Band :802.11aB4
 Fundamental Frequency :5785 MHz
 Operation Mode :Tx CH MID
 EUT Pol. :E2 Plane

Test Date :2016-02-23
 Temp./Humi. :21 deg_C / 62 RH
 Engineer :Tin
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor dB	Limit @3m dBuV/m	Margin dB
		dBuV/m	dBuV			
30.00	S	24.77	33.96	-9.19	40.00	-15.23
191.99	S	24.52	33.94	-9.42	43.50	-18.98
288.99	S	26.93	33.01	-6.08	46.00	-19.07
335.55	S	25.72	31.04	-5.32	46.00	-20.28
527.61	S	30.50	31.81	-1.32	46.00	-15.50
576.11	S	33.50	34.14	-0.64	46.00	-12.50

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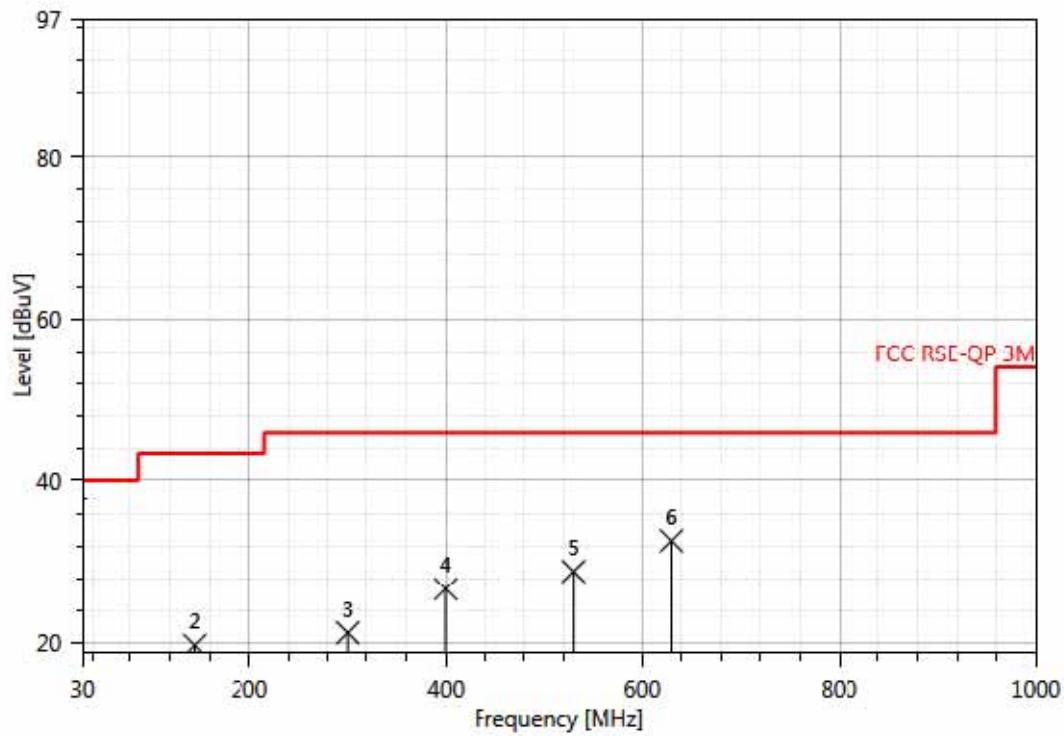
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802.11n HT40, 5725~5850 MHz (MIMO)

Operation Band :802.11n40B4
 Fundamental Frequency :5755 MHz
 Operation Mode : Tx CH LOW
 EUT Pol. :E2 Plane

Test Date :2016-02-23
 Temp./Humi. :21 deg_C / 62 RH
 Engineer :Tin
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level	Reading Level			
30.00	S	35.70	44.88		-9.19	40.00	-4.30
144.46	S	19.72	27.79		-8.07	43.50	-23.78
299.66	S	21.26	27.18		-5.93	46.00	-24.74
399.57	S	26.66	30.59		-3.93	46.00	-19.34
529.55	S	28.86	30.11		-1.25	46.00	-17.14
629.46	S	32.64	32.49		0.15	46.00	-13.36

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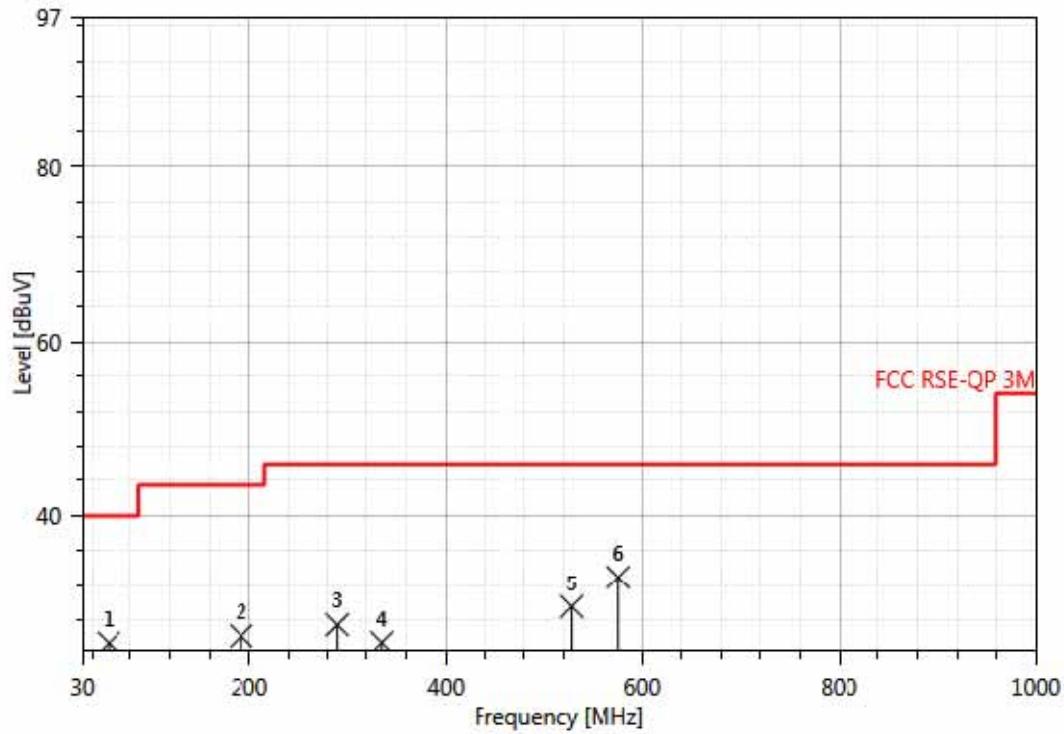
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Operation Band : 802.11aB4
 Fundamental Frequency : 5755 MHz
 Operation Mode : Tx CH LOW
 EUT Pol. : E2 Plane

Test Date : 2016-02-23
 Temp./Humi. : 21 deg_C / 62 RH
 Engineer : Tin
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV			
57.16	S	25.46	33.43	-7.97	40.00	-14.54
191.99	S	26.29	35.71	-9.42	43.50	-17.21
288.99	S	27.55	33.63	-6.08	46.00	-18.45
335.55	S	25.52	30.85	-5.32	46.00	-20.48
527.61	S	29.63	30.94	-1.32	46.00	-16.37
576.11	S	33.01	33.65	-0.64	46.00	-12.99

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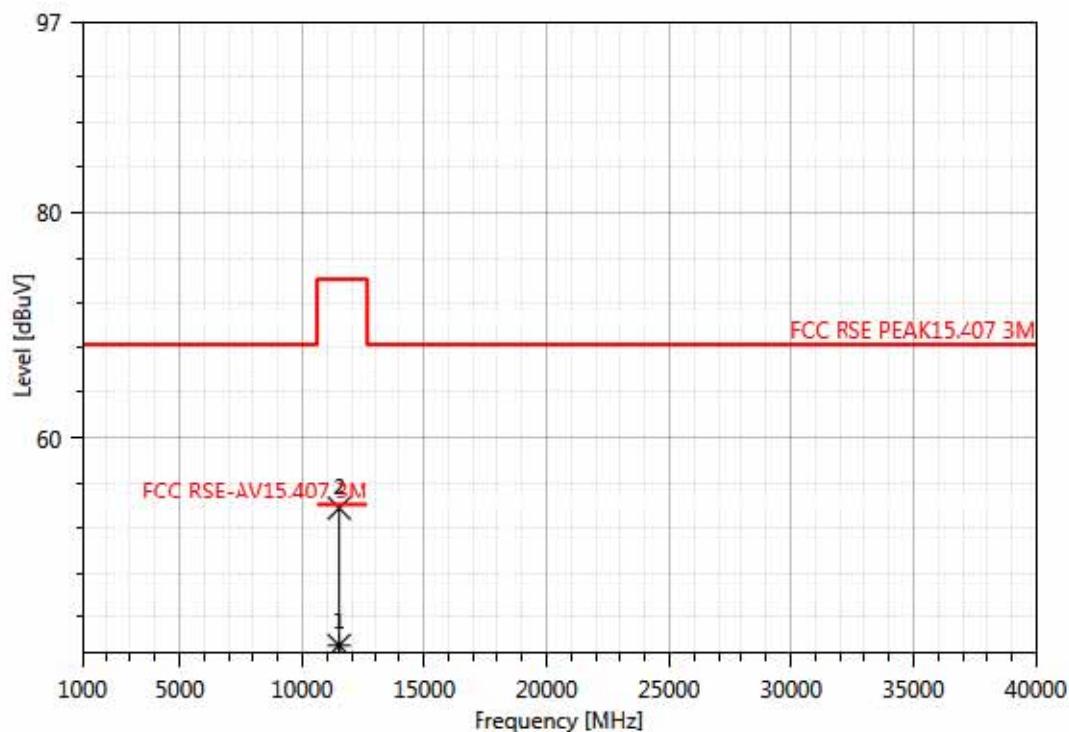
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Radiated Spurious Emission Measurement Result (Above 1GHz)

802.11a, 5725~5850 MHz (Internal Antenna)

Operation Band	:802.11 aB4	Test Date	:2016-02-22
Fundamental Frequency	:5745 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:TX CHLOW	Engineer	:Tin
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
11490.00	H	41.53	21.11	20.42	54.00	54.00	-12.47
11490.00	H	53.68	33.26	20.42	74.00	74.00	-20.32

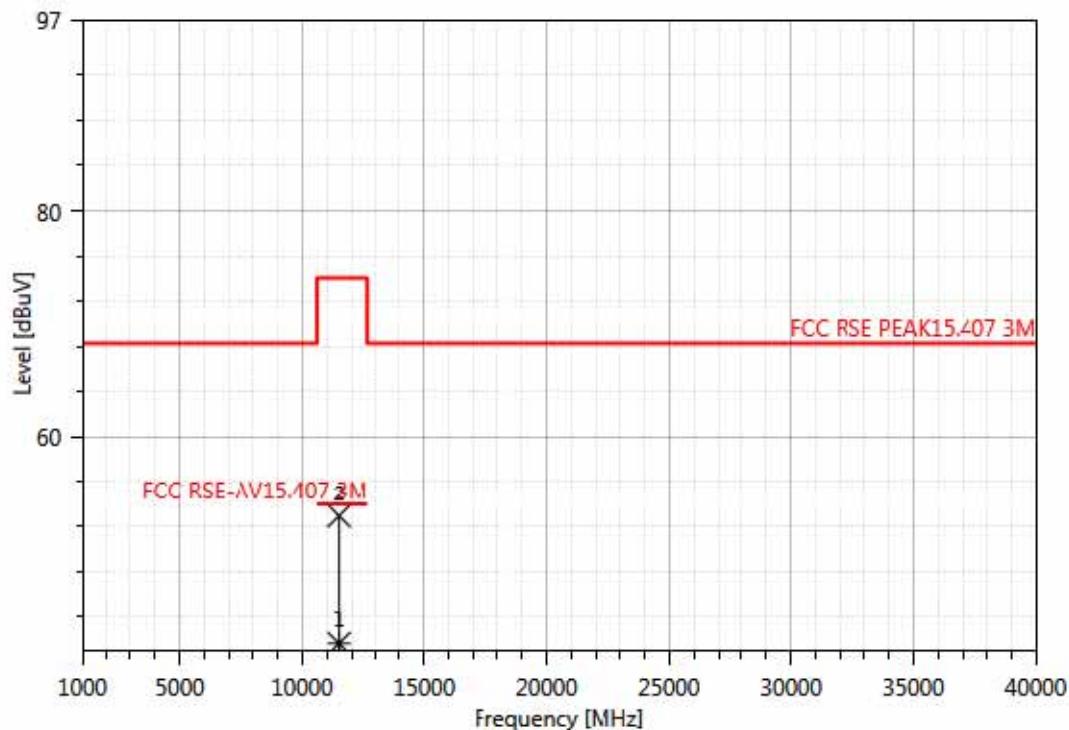
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Operation Band :802.11 aB4
 Fundamental Frequency :5745 MHz
 Operation Mode :TX CHLOW
 EUT Pol. :E2 Plane

Test Date :2016-02-22
 Temp./Humi. :21 deg_C / 62 RH
 Engineer :Tin
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Factor @3m dB				
11490.00	H	41.65	21.23		20.42	54.00	-12.35
11490.00	H	52.95	32.53		20.42	74.00	-21.05

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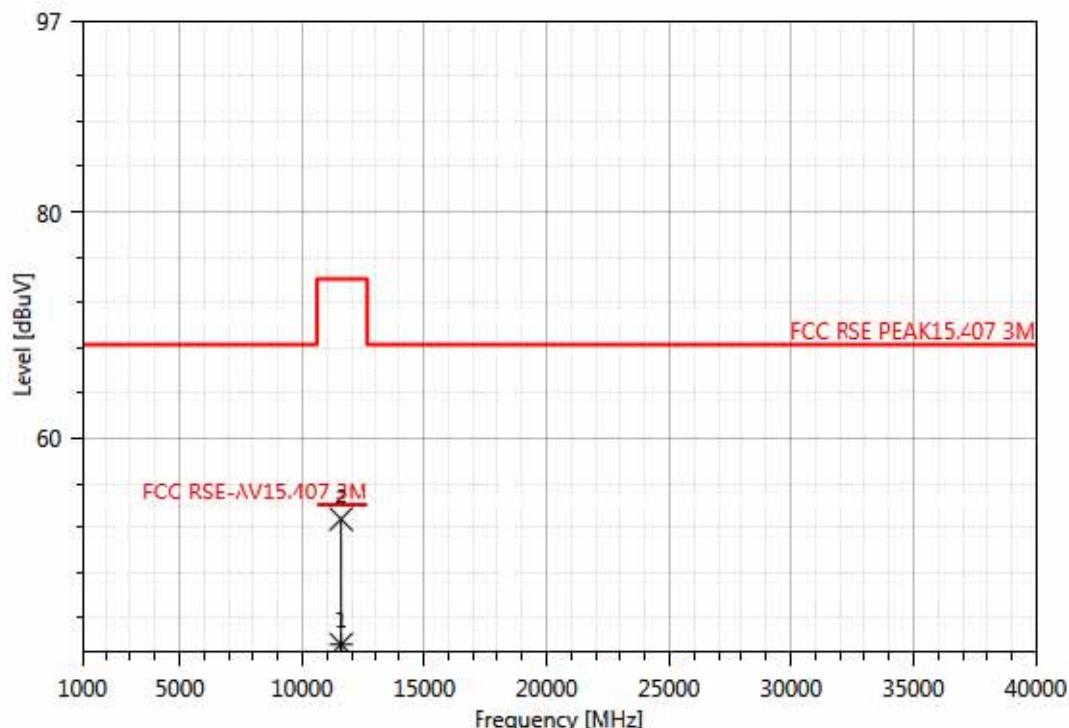
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Operation Band :802.11 aB4
Fundamental Frequency :5785 MHz
Operation Mode :TX CH MID
EUT Pol. :E2 Plane

Test Date :2016-02-22
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Factor dB	Limit @3m dBuV/m			
11570.00	H	41.68	21.09	20.59	54.00	54.00	-12.32
11570.00	H	52.76	32.17	20.59	74.00	74.00	-21.24

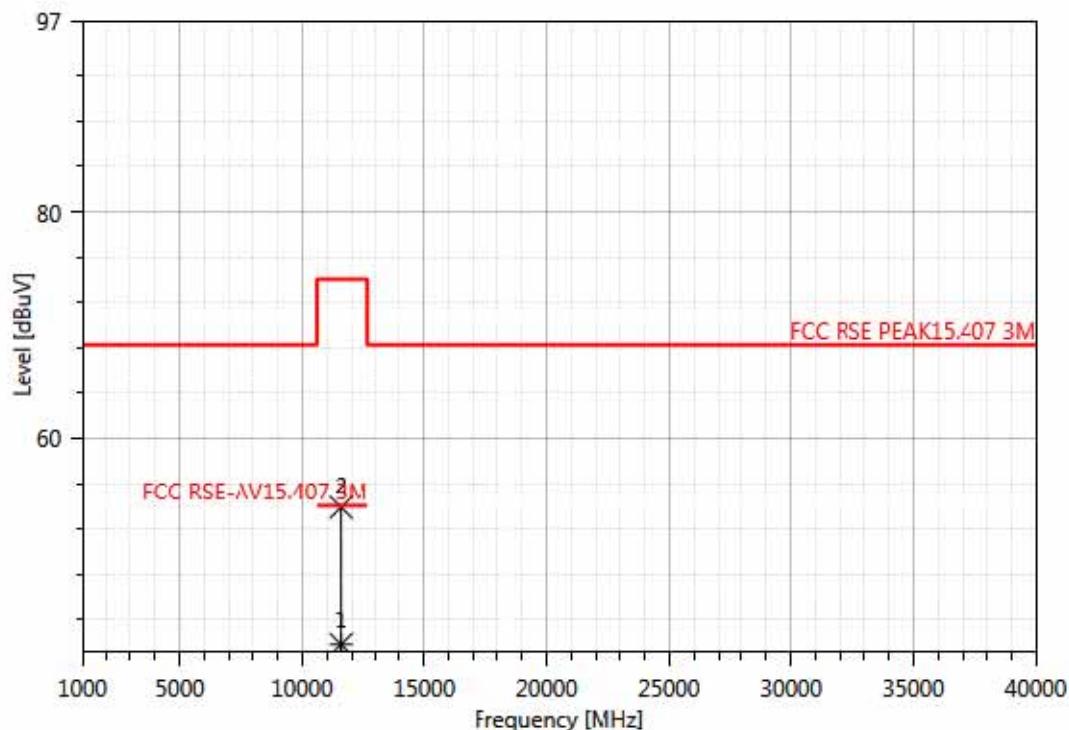
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Operation Band :802.11 aB4
Fundamental Frequency :5785 MHz
Operation Mode :TX CH MID
EUT Pol. :E2 Plane

Test Date :2016-02-22
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum		Factor	Limit @3m dBuV/m	Margin dB
			Level dBuV	Reading Level dBuV			
11570.00	H	41.75	21.16	21.16	20.59	54.00	-12.25
11570.00	H	53.86	33.28	33.28	20.59	74.00	-20.14

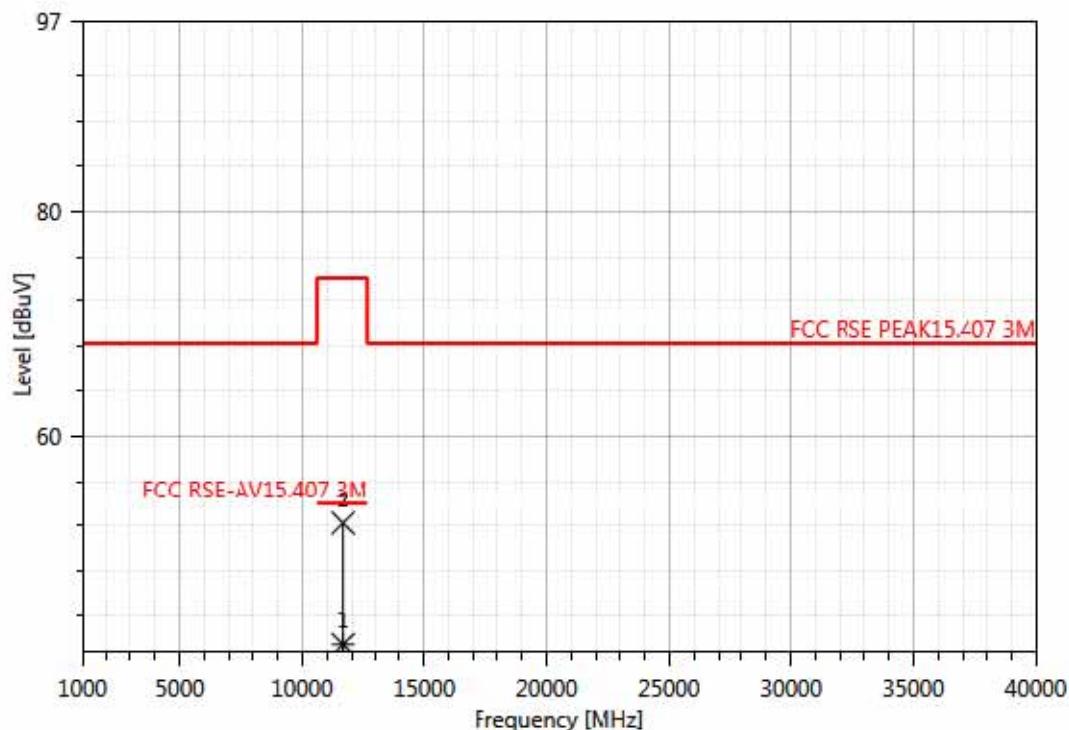
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Operation Band :802.11 aB4
Fundamental Frequency :5825 MHz
Operation Mode :TX CH HIGH
EUT Pol. :E2 Plane

Test Date :2016-02-22
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level	Reading Level			
11650.00	H	41.47	21.04	21.04	20.43	54.00	-12.53
11650.00	H	52.27	31.84	31.84	20.43	74.00	-21.73

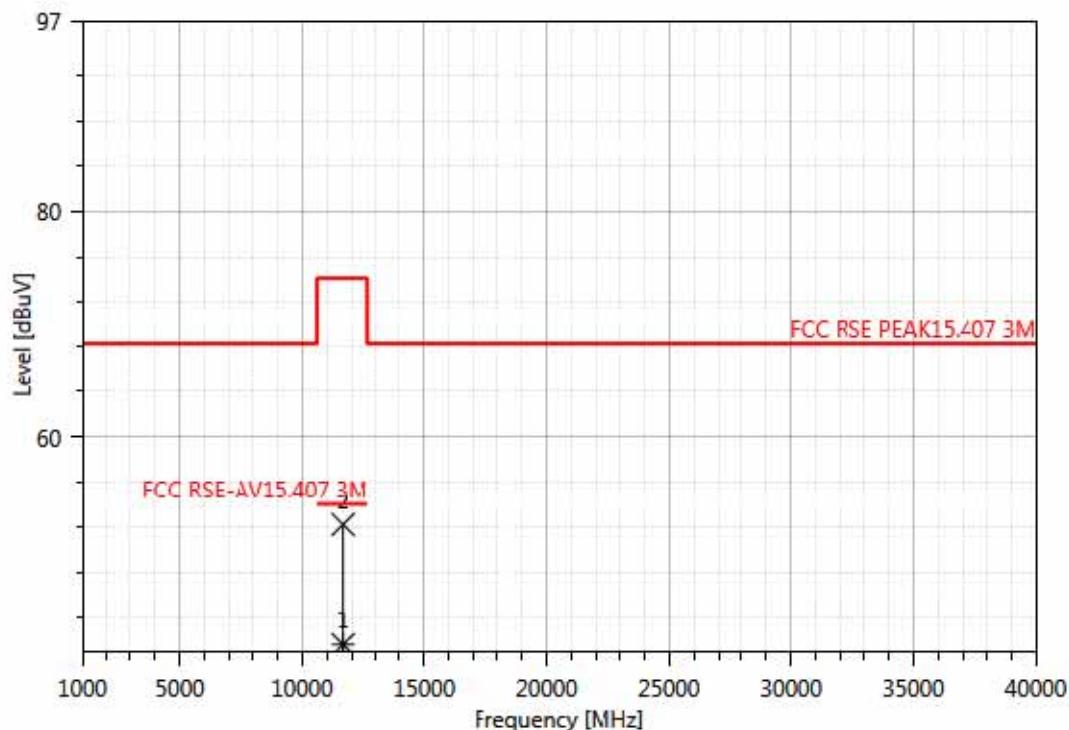
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Operation Band : 802.11aB4
Fundamental Frequency : 5825 MHz
Operation Mode : TX CH HIGH
EUT Pol. : E2 Plane

Test Date : 2016-02-22
Temp./Humi. : 21 deg_C / 62 RH
Engineer : Tin
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level dBuV/m	Reading Level dBuV			
11650.00	H	41.54		21.11	20.43	54.00	-12.46
11650.00	H	52.18		31.75	20.43	74.00	-21.82

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Band edge falling to restricted band

Operation Band	:802.11 aB4	Test Date	:2016-02-22
Fundamental Frequency	:5745 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Band Edge CH LOW	Engineer	:Tin
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5725.00	E	69.31	62.72	6.59	78.20	-8.89

Operation Band	:802.11 aB4	Test Date	:2016-02-22
Fundamental Frequency	:5745 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Band Edge CH LOW	Engineer	:Tin
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5725.00	E	61.41	54.82	6.59	78.20	-16.79

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Operation Band :802.11 aB4 Test Date :2016-02-22
Fundamental Frequency :5825 MHz Temp./Humi. :21 deg_C / 62 RH
Operation Mode :Band Edge CH HIGH Engineer :Tin
EUT Pol. :E2 Plane Measurement Antenna Pol. :VERTICAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5850.00	E	68.09	60.81	7.28	78.20	-10.11

Operation Band :802.11 aB4 Test Date :2016-02-22
Fundamental Frequency :5825 MHz Temp./Humi. :21 deg_C / 62 RH
Operation Mode :Band Edge CH HIGH Engineer :Tin
EUT Pol. :E2 Plane Measurement Antenna Pol. :HORIZONTAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5850.00	E	59.40	52.12	7.28	78.20	-18.80

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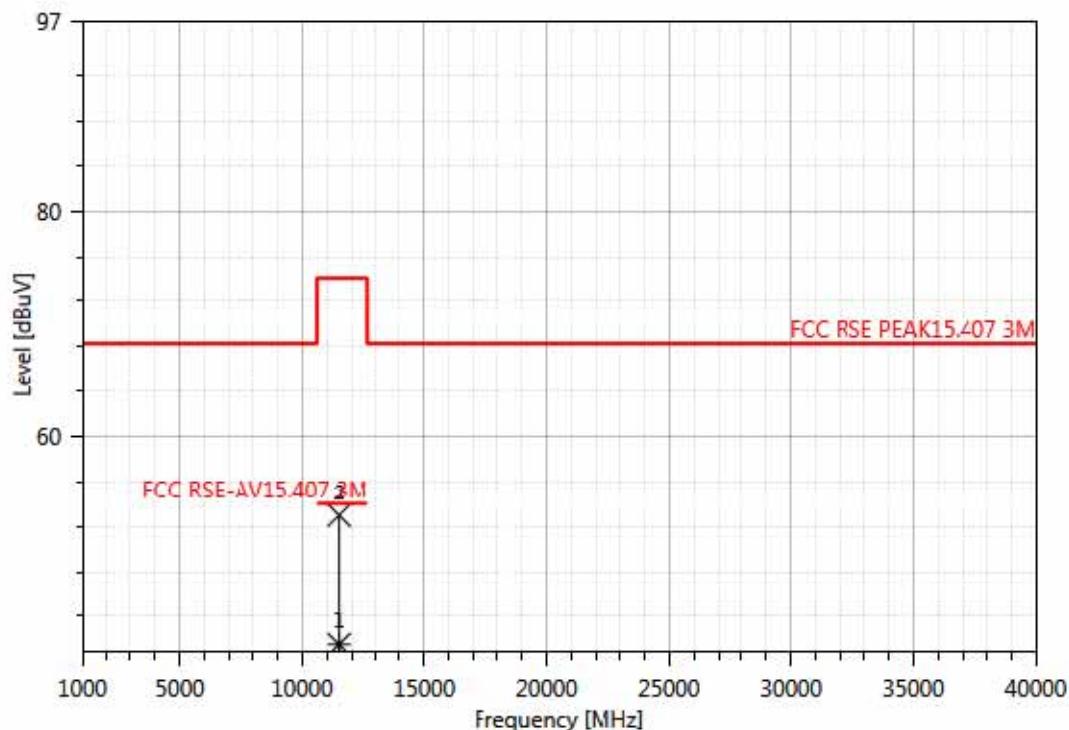
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Member of SGS Group

Radiated Spurious Emission Measurement Result 802.11n HT20, 5725~5850 MHz (MIMO)

Operation Band :802.11 n20M B4 Test Date :2016-02-22
 Fundamental Frequency :5745 MHz Temp./Humi. :21 deg_C / 62 RH
 Operation Mode :TX CH LOW Engineer :Tin
 EUT Pol. :E2 Plan Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level		Factor dB	Limit @3m dBuV/m	Margin dB
			Factor dB	Limit @3m dBuV/m			
11490.00	H	41.51	21.09	20.42	54.00	54.00	-12.49
11490.00	H	52.98	32.56	20.42	74.00	74.00	-21.02

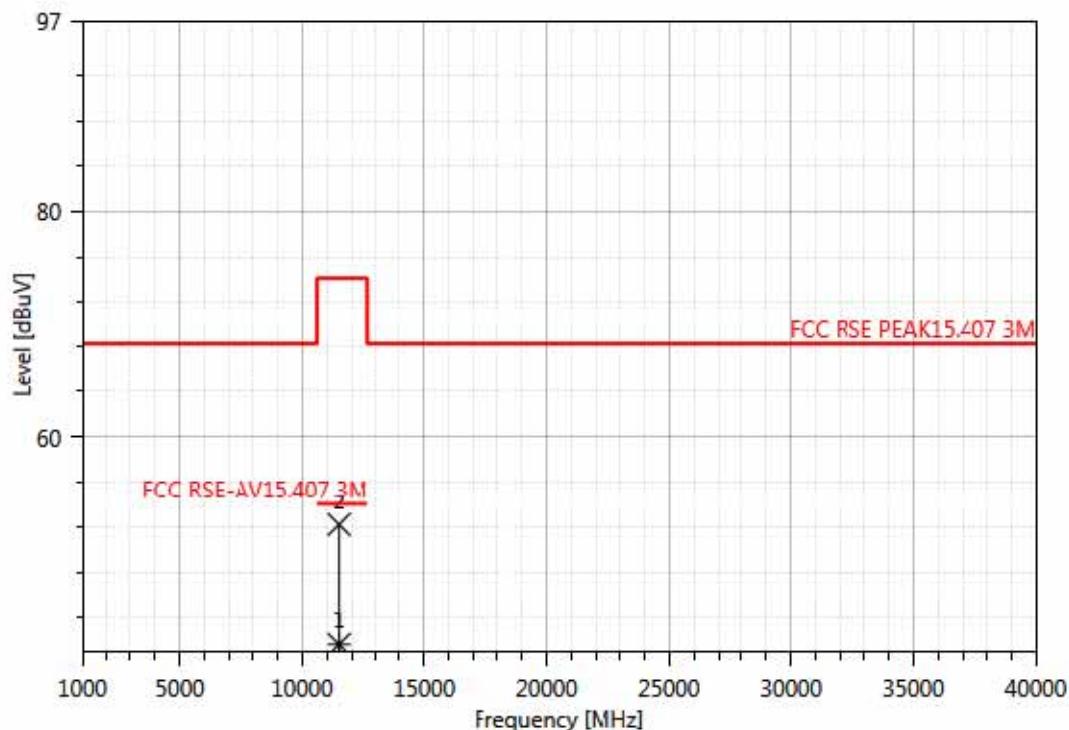
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Operation Band :802.11 n20M B4
Fundamental Frequency :5745 MHz
Operation Mode :TX CH LOW
EUT Pol. :E2 Plane

Test Date :2016-02-22
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



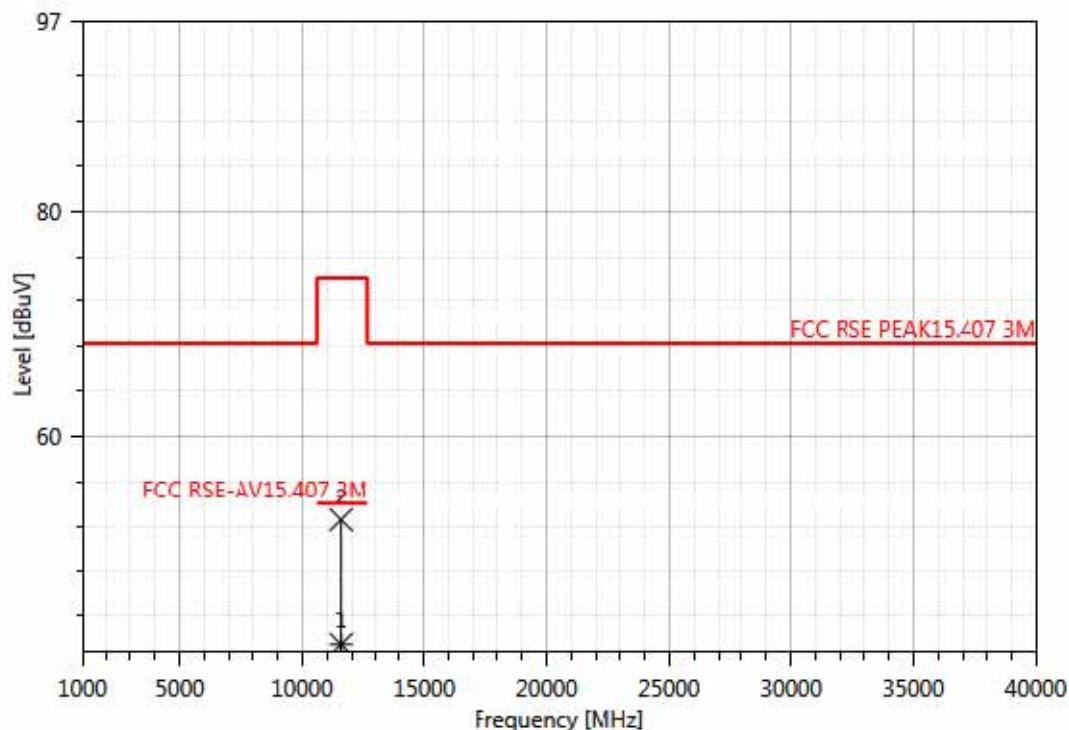
Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum		Factor dB	Limit @3m dBuV/m	Margin dB
			Level dBuV	Reading Level dBuV			
11490.00	H	41.54	21.12	21.12	20.42	54.00	-12.46
11490.00	H	52.19	31.77	31.77	20.42	74.00	-21.81

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Operation Band :802.11 n20M B4
Fundamental Frequency :5785 MHz
Operation Mode :TX CH MID
EUT Pol. :E2 Plane
Test Date :2016-02-22
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



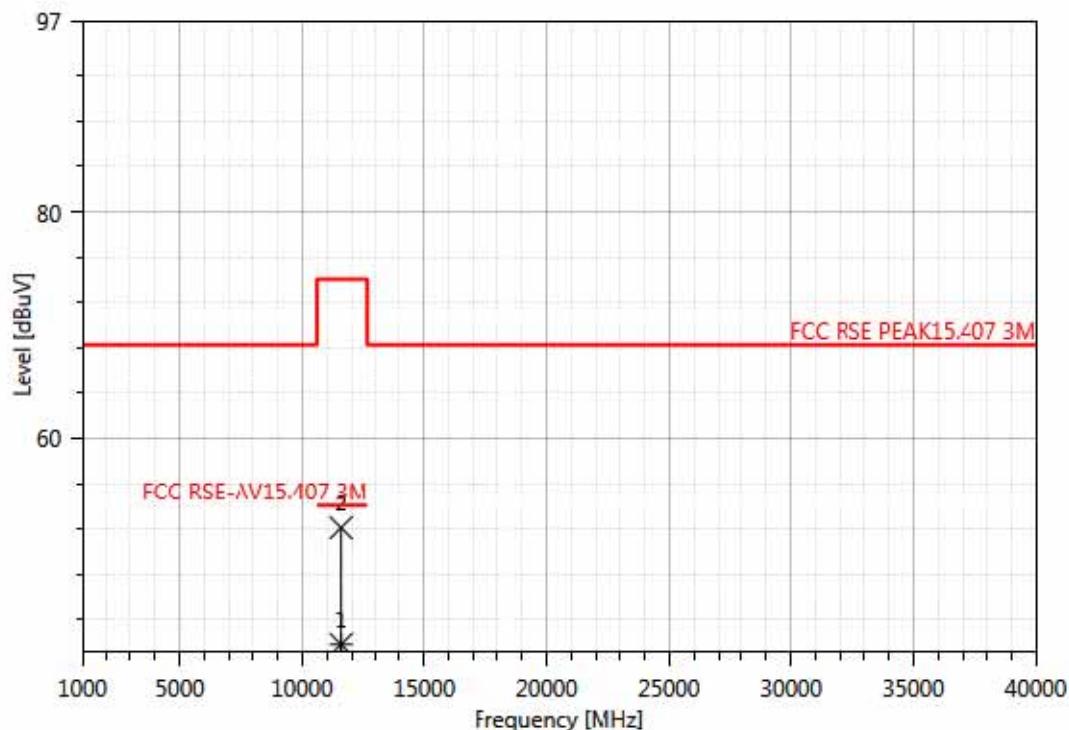
Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level dBuV/m	Reading Level dBuV			
11570.00	H	41.48		20.89	20.59	54.00	-12.52
11570.00	H	52.56		31.97	20.59	74.00	-21.44

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Operation Band :802.11 n20M B4
Fundamental Frequency :5785 MHz
Operation Mode :TX CH MID
EUT Pol. :E2 Plane
Test Date :2016-02-22
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



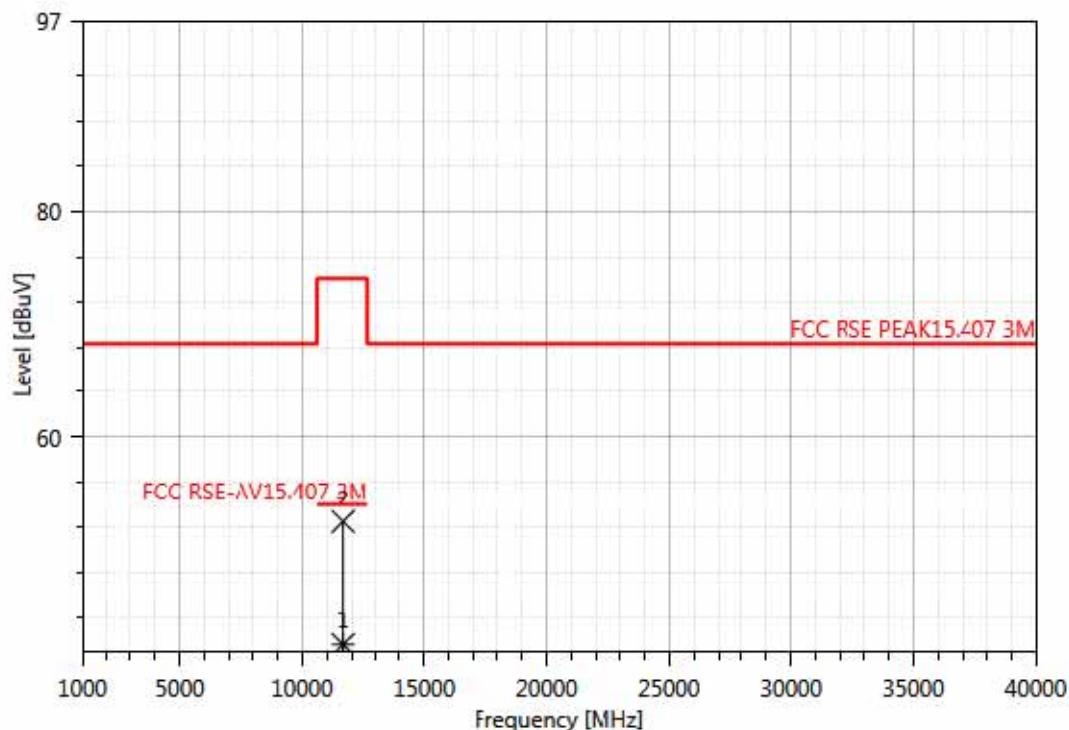
Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Factor dB	Limit @3m dBuV/m			
11570.00	H	41.72	21.13	20.59	54.00	-12.28	
11570.00	H	52.04	31.45	20.59	74.00	-21.96	

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Operation Band :802.11 n20M B4
Fundamental Frequency :5825 MHz
Operation Mode :TX CH HIGH
EUT Pol. :E2 Plane
Test Date :2016-02-22
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



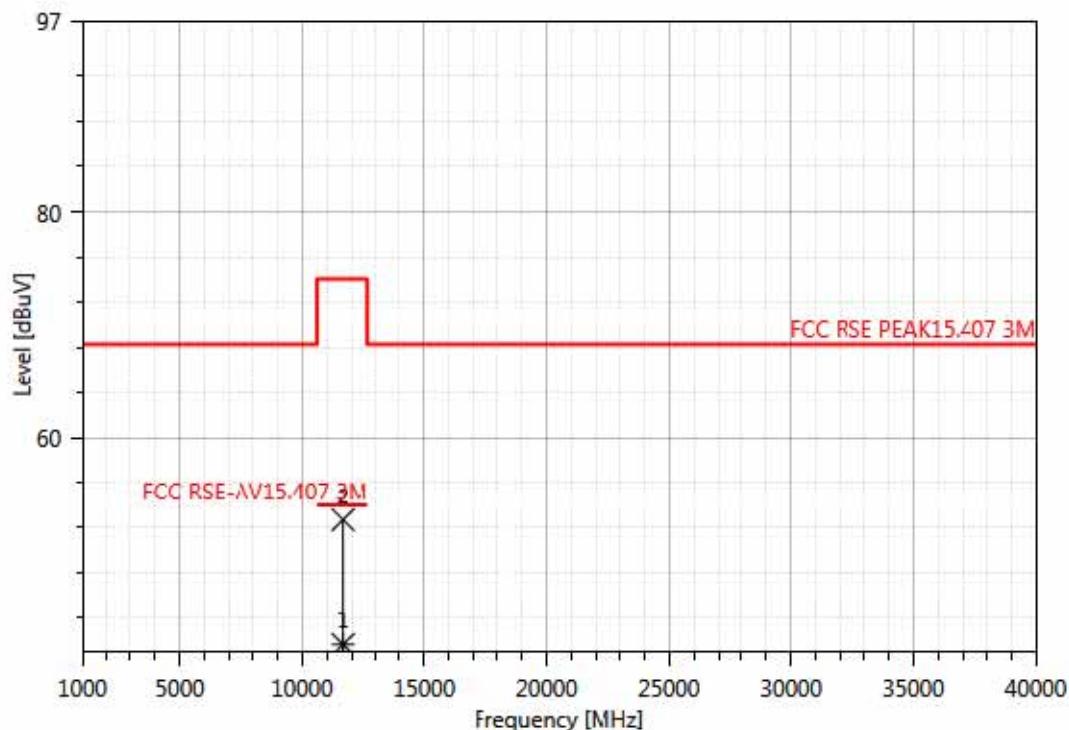
Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Factor dB	Limit @3m dBuV/m			
11650.00	H	41.58	21.15	20.43	54.00	54.00	-12.42
11650.00	H	52.49	32.06	20.43	74.00	74.00	-21.51

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Operation Band :802.11 n20M B4
Fundamental Frequency :5825 MHz
Operation Mode :TX CH HIGH
EUT Pol. :E2 Plane
Test Date :2016-02-22
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum		Factor	Limit @3m dBuV/m	Margin dB
			Level dBuV	Reading Level dBuV			
11650.00	H	41.65	21.22	21.22	20.43	54.00	-12.35
11650.00	H	52.69	32.26	32.26	20.43	74.00	-21.31

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Band edge falling to restricted band

Operation Band :802.11 n20M B4 Test Date :2016-02-22
Fundamental Frequency :5745 MHz Temp./Humi. :21 deg_C / 62 RH
Operation Mode :Band Edge CH LOW Engineer :Tin
EUT Pol. :E2 Plane Measurement Antenna Pol. :VERTICAL

Freq.	Note	Emission	Spectrum	Factor	Limit	Margin
		Level	Reading Level		@3m	
MHz	F/H/E/S	dBuV/m	dBuV	dB	dBuV/m	dB
5725.00	E	68.73	62.14	6.59	78.20	-9.47

Operation Band :802.11 n20M B4 Test Date :2016-02-22
Fundamental Frequency :5745 MHz Temp./Humi. :21 deg_C / 62 RH
Operation Mode :Band Edge CH LOW Engineer :Tin
EUT Pol. :E2 Plane Measurement Antenna Pol. :HORIZONTAL

Freq.	Note	Emission	Spectrum	Factor	Limit	Margin
		Level	Reading Level		@3m	
MHz	F/H/E/S	dBuV/m	dBuV	dB	dBuV/m	dB
5725.00	E	70.35	63.76	6.59	78.20	-7.85

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Operation Band :802.11 n20M B4 Test Date :2016-02-22
Fundamental Frequency :5825 MHz Temp./Humi. :21 deg_C / 62 RH
Operation Mode :Band Edge CH HIGH Engineer :Tin
EUT Pol. :E2 Plane Measurement Antenna Pol. :VERTICAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5850.00	E	69.31	62.03	7.28	78.20	-8.89

Operation Band :802.11 n20M B4 Test Date :2016-02-22
Fundamental Frequency :5825 MHz Temp./Humi. :21 deg_C / 62 RH
Operation Mode :Band Edge CH HIGH Engineer :Tin
EUT Pol. :E2 Plane Measurement Antenna Pol. :HORIZONTAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5850.00	E	70.03	62.75	7.28	78.20	-8.17

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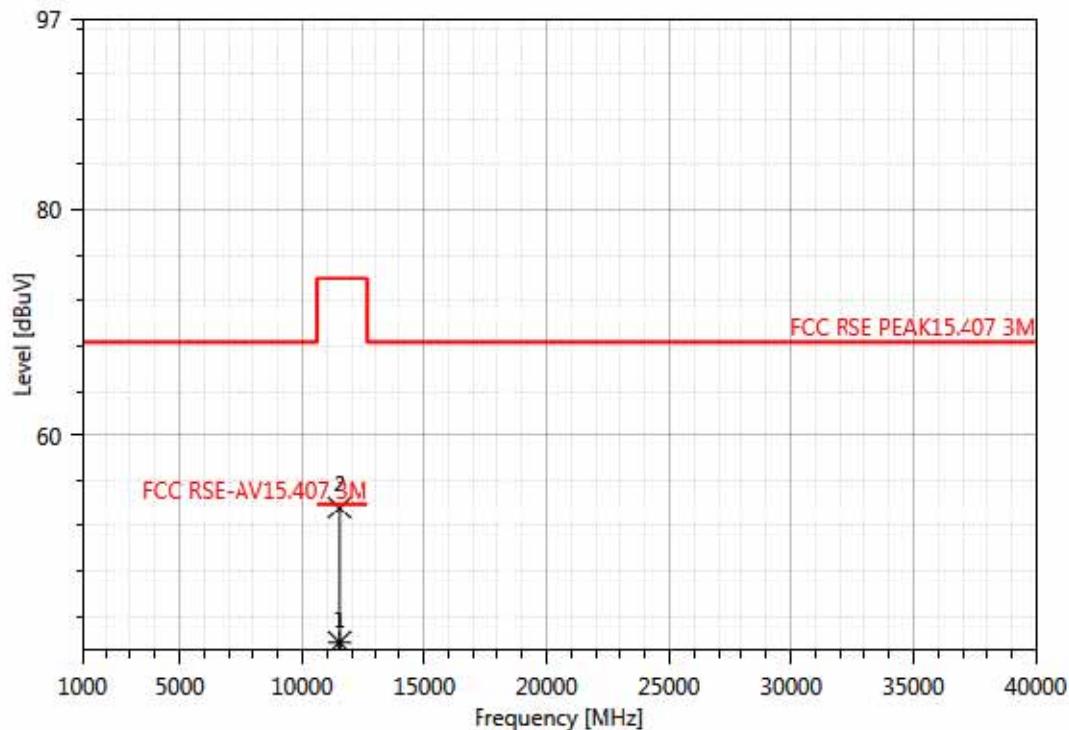
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5725~5850 MHz (MIMO)

Operation Band :802.11 n40M B4 Test Date :2016-02-22
 Fundamental Frequency :5755 MHz Temp./Humi. :23deg_C / 58 RH
 Operation Mode :TX CH LOW Engineer :Tin
 EUT Pol. :E2 Plane Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Factor dB	Limit @3m dBuV/m			
11510.00	H	41.61	21.22	20.39	54.00	-12.39	
11510.00	H	53.63	33.24	20.39	74.00	-20.37	

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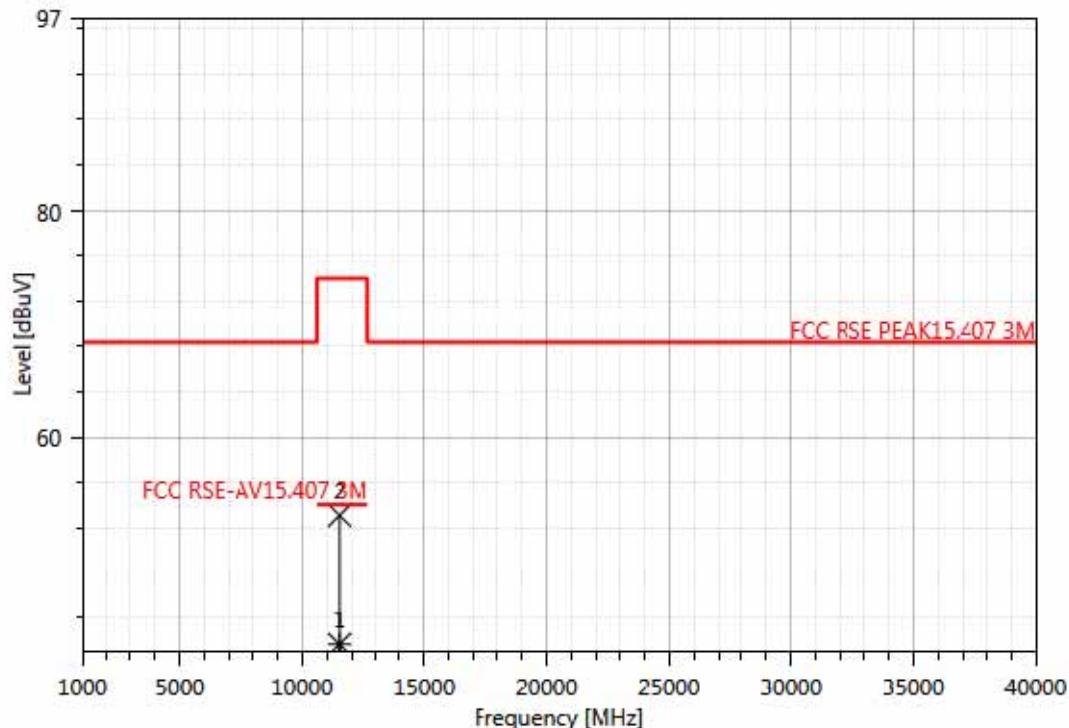
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Operation Band :802.11 n40M B4
Fundamental Frequency :5755 MHz
Operation Mode :TX CH LOW
EUT Pol. :E2 Plane

Test Date :2016-02-22
Temp./Humi. :23deg_C / 58 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



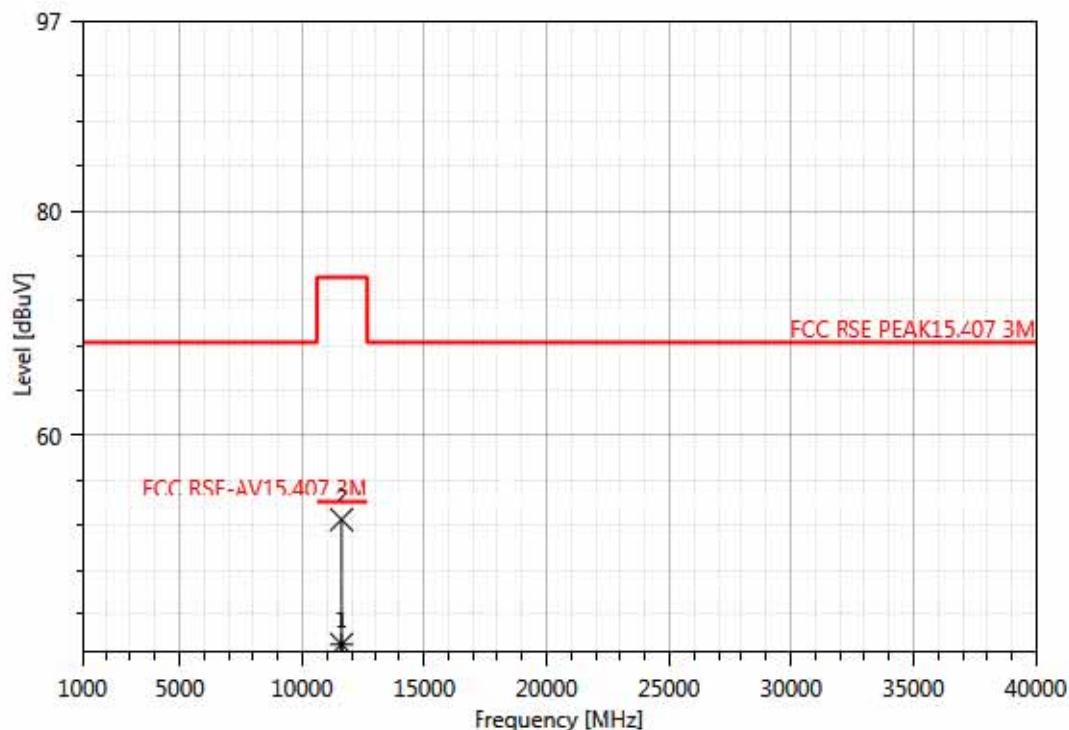
Freq. MHz	Note F/H/E/S	Emission		Spectrum		Factor	Limit @3m	Margin
		Level dBuV/m	Reading Level dBuV	Level dB	dBuV/m			
11510.00	H	41.70	21.31	20.39	54.00			-12.30
11510.00	H	53.07	32.68	20.39	74.00			-20.93

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Operation Band :802.11 n40M B4
Fundamental Frequency :5795 MHz
Operation Mode :TX CH HIGH
EUT Pol. :E2 Plane
Test Date :2016-02-22
Temp./Humi. :23deg_C / 58 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum Reading Level dBuV		Factor dB	Limit @3m dBuV/m	Margin dB
			Level dBuV/m	Reading Level dBuV			
11590.00	H	41.34		20.91	20.43	54.00	-12.66
11590.00	H	52.45		32.01	20.43	74.00	-21.55

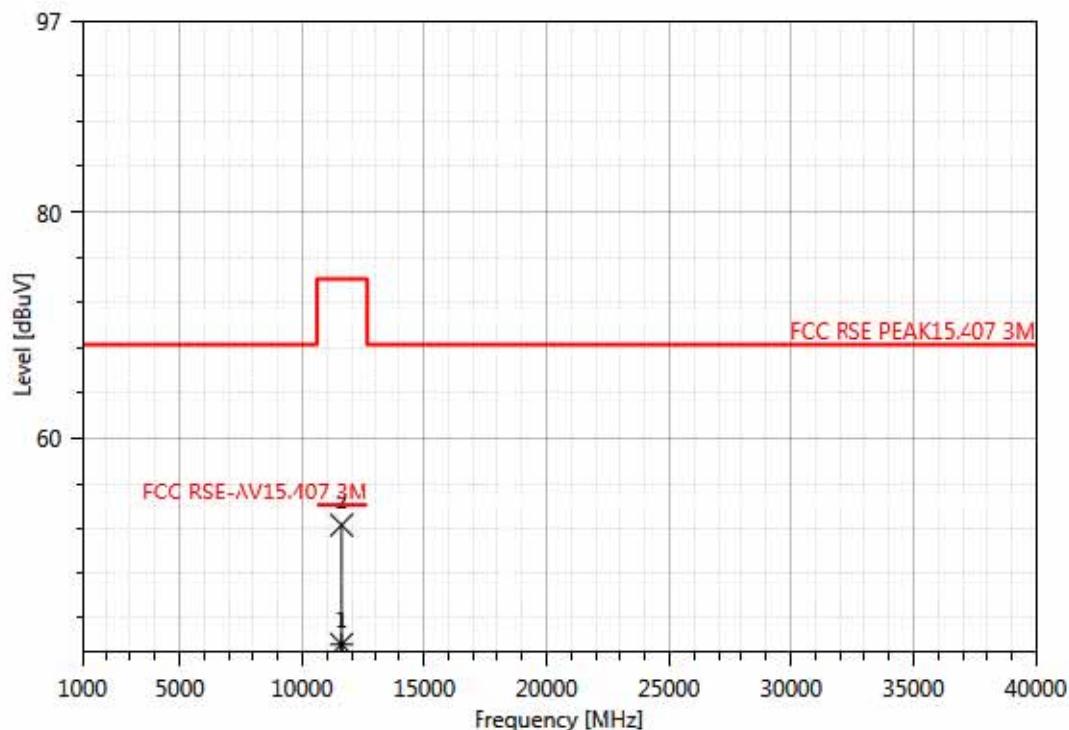
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Operation Band :802.11 n40M B4
 Fundamental Frequency :5795 MHz
 Operation Mode :TX CH HIGH
 EUT Pol. :E2 Plane

Test Date :2016-02-22
 Temp./Humi. :23deg_C / 58 RH
 Engineer :Tin
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Emission Level dBuV/m	Spectrum		Factor	Limit @3m dBuV/m	Margin dB
			Reading	Level dBuV			
11590.00	H	41.68	21.25	21.25	20.43	54.00	-12.32
11590.00	H	52.24	31.81	31.81	20.43	74.00	-21.76

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Band edge falling to restricted band

Operation Band :802.11 n40M B4 Test Date :2016-02-22
 Fundamental Frequency :5755 MHz Temp./Humi. :23deg_C / 58 RH
 Operation Mode :Band Edge CH LOW Engineer :Tin
 EUT Pol. :E2 Plane Measurement Antenna Pol. :VERTICAL

Freq.	Note	Emission		Spectrum		Factor	Limit	Margin
		Level	Reading Level	dBuV	dB			
MHz	F/H/E/S	dBuV/m	dBuV	dB	dBuV/m	dB		
5725.00	E	74.35	67.76	6.59	78.20		-3.85	

Operation Band :802.11 n40M B4 Test Date :2016-02-22
 Fundamental Frequency :5755 MHz Temp./Humi. :23deg_C / 58 RH
 Operation Mode :Band Edge CH LOW Engineer :Tin
 EUT Pol. :E2 Plane Measurement Antenna Pol. :HORIZONTAL

Freq.	Note	Emission		Spectrum		Factor	Limit	Margin
		Level	Reading Level	dBuV	dB			
MHz	F/H/E/S	dBuV/m	dBuV	dB	dBuV/m	dB		
5725.00	E	68.98	62.39	6.59	78.20		-9.22	

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Operation Band :802.11 n40M B4
 Fundamental Frequency :5795 MHz
 Operation Mode :Band Edge CH HIGH
 EUT Pol. :E2 Plane

Test Date :2016-02-22
 Temp./Humi. :23deg_C / 58 RH
 Engineer :Tin
 Measurement Antenna Pol. :VERTICAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5850.00	E	62.49	55.21	7.28	78.20	-15.71

Operation Band :802.11 n40M B4
 Fundamental Frequency :5795 MHz
 Operation Mode :Band Edge CH HIGH
 EUT Pol. :E2 Plane

Test Date :2016-02-22
 Temp./Humi. :23deg_C / 58 RH
 Engineer :Tin
 Measurement Antenna Pol. :HORIZONTAL

Freq. MHz	Note F/H/E/S	Emission Level	Spectrum Reading Level	Factor	Limit @3m	Margin
		dBuV/m	dBuV	dB	dBuV/m	dB
5850.00	E	57.52	50.23	7.28	78.20	-20.68

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11. TRANSMISSION IN THE ABSENCE OF DATA

11.1 Standard Applicable

According to §15.407(c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

11.2 Result

No non-compliance noted:

Refer to the theory of operation.

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12. FREQUENCY STABILITY

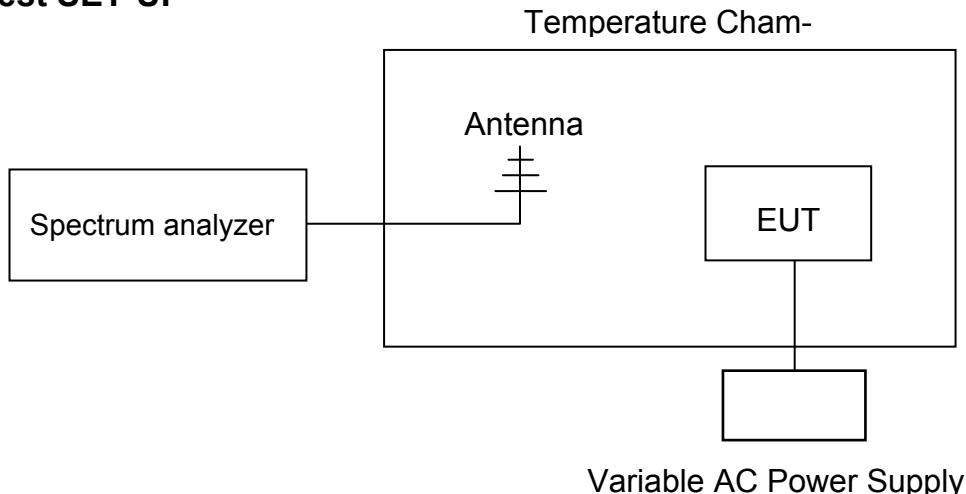
12.1 Standard Applicable

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

12.2 Measurement Procedure

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
2. Set EUT as normal operation.
3. Turn the EUT on and couple its output to spectrum.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
6. Repeat step with the temperature chamber set to the lowest temperature.

12.3 Test SET-UP



12.4 Measurement Equipment Used

Refer to section 7.3 for details

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12.5 Measurement Result

Operation Mode	802.11a	Test Date	2016.02.24
Temperature	24	Test By	Curry
Humidity	65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10	3.63V	149	5745	5,744.97244	0.00000480
		157	5785	5,784.97233	0.00000478
		165	5825	5,824.97417	0.00000443
	2.97V	149	5745	5,744.97146	0.00000497
		157	5785	5,784.97304	0.00000466
		165	5825	5,824.97184	0.00000483
25	3.3V	149	5745	5,744.97295	0.00000471
		157	5785	5,784.97020	0.00000515
		165	5825	5,824.97040	0.00000508
55	3.63V	149	5745	5,744.97243	0.00000480
		157	5785	5,784.97383	0.00000452
		165	5825	5,824.97422	0.00000443
	2.97V	149	5745	5,744.97256	0.00000478
		157	5785	5,784.97371	0.00000454
		165	5825	5,824.97345	0.00000456

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Operation Mode	802.11n40	Test Date	2016.02.24
Temperature	24	Test By	Curry
Humidity	65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10	3.63V	151	5755	5,755.02490	-0.00000433
		159	5795	5,795.04981	-0.00000859
	2.97V	151	5755	5,755.04981	-0.00000865
		159	5795	5,795.04981	-0.00000859
25	3.3V	151	5755	5,755.02490	-0.00000433
		159	5795	5,795.04981	-0.00000859
	3.63V	151	5755	5,755.02490	-0.00000433
		159	5795	5,795.04981	-0.00000859
55	2.97V	151	5755	5,755.04981	-0.00000865
		159	5795	5,795.04981	-0.00000859

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ANTENNA REQUIREMENT

13.1 Standard Applicable

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

According to §15.407, If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

13.2 Antenna Connected Construction

An embedded-in antenna design is used.

The antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.

The antenna gain is less than 6dBi. Therefore, it is not necessary to reduce maximum output power power limit.

~ End of Report ~

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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