

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT

OF

Product Name: Wireless Interactive Presentation Gateway
Brand Name: wePresent
Type No.: WiPG-1600w
Model Difference: N/A
FCC ID: 2AAEDWP16W17
Report No.: E2/2017/40098
Issue Date: Jun. 03, 2017
FCC Rule Part: §15.407
Prepared for: Barco NV
President Kennedypark 35, 8500 Kortrijk,
Belgium
Prepared by: SGS Taiwan Ltd.
Electronics & Communication Laboratory
No.2, Keji 1st Rd., Guishan Township,
Taoyuan County, Taiwan 333



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VERIFICATION OF COMPLIANCE

Applicant: Barco NV
President Kennedypark 35, 8500 Kortrijk, Belgium

Product Name: Wireless Interactive Presentation Gateway

Brand Name: wePresent

Type No.: WiPG-1600w

Model Difference: N/A

FCC ID: 2AAEDWP16W17

File Number: E2/2017/40098

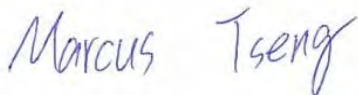
Date of test: Feb. 09, 2015 ~ Aug. 12, 2015, Jun. 03, 2017

Date of EUT Received: Feb. 09, 2015

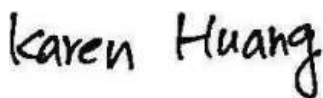
We hereby certify that:

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.

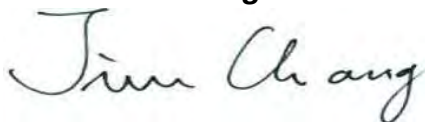
The test results of this report relate only to the tested sample identified in this report.

Test By:**Date:**

Jun. 03, 2017

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

Jun. 03, 2017

Karen Huang / Clerk**Approved By:****Date:**

Jun. 03, 2017

Jim Chang / Asst. Manager

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Revision History

Report Number	Revision	Description	Issue Date
E2/2017/40098	Rev.00	Initial creation of document	Jun. 03, 2017

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1. GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	Wireless Interactive Presentation Gateway	
Brand Name:	wePresent	
Type No.:	WiPG-1600w	
Model Difference:	N/A	
Product SW/HW version:	N/A / WM8750-1 ver:1.0	
Radio SW/HW version:	N/A	
Test SW Version:	N/A	
RF power setting in TEST SW:	N/A	
Power Supply:	5Vdc from AC/DC adapter	
	Adapter:	1. Model No.: 3A-154WP05 Supplier.: ENG Electronics 2. Model No.: 6A-161WP05 Supplier:ENG Electronics

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WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Avg. Power	Modulation Technology
11a	5150~5250	4	16.70dBm	OFDM
	5725-5850	5	14.16dBm	
11n	HT20 5150~5250	4	HT20: 17.56dBm	OFDM
	HT20 5725-5850	5	HT20: 16.34dBm	
11n	HT40 5150~5250	2	HT40: 12.05dBm	OFDM
	HT40 5725-5850	2	HT40: 16.92dBm	
Antenna Designation	Omni directional Antenna, 5GHz Gain: 2.0dBi			
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 – 65.0Mbps 802.11 n_40MHz: 13.5 – 135.0Mbps			

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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 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.2, Keji 1st Rd.,
Guishan District, Taoyuan City, Taiwan. (TAF code 0513)

FCC Registration Numbers are: 735305

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 30 MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.107. The two LISNs provide 50 ohm/50 uH 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 which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 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.

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 0.9 dB and 10 dB attenuator.

Offset = RF cable loss (dB) + attenuation factor (dB) = 0.9 + 10 = 10.9 (dB)

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2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission & AC Power Line Conducted

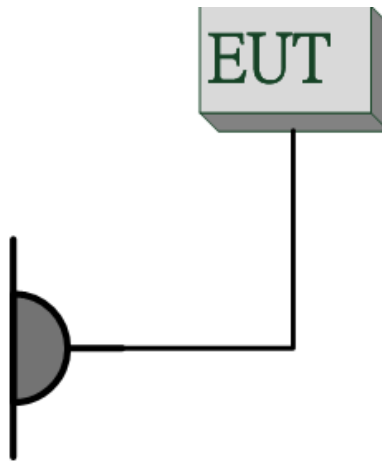


Fig. 2-2 Conducted (Antenna Port) Configuration

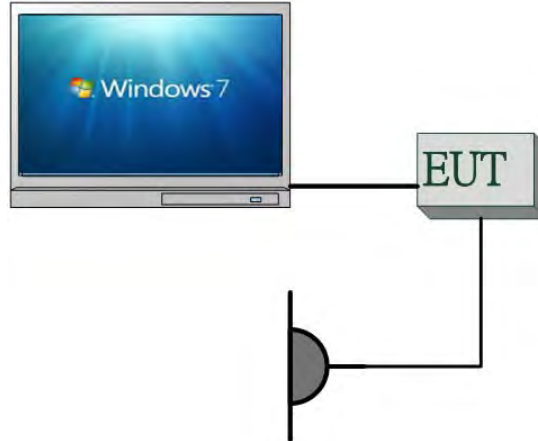


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	L430	R9-YYG88	Shielded	Unshielded

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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 5150 MHz ~5250 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	5180~5240	36 to 48	44	OFDM	6	MAIN
802.11a	5745~5825	149 to 165	157	OFDM	6	MAIN
RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	MAIN
802.11_HT20				OFDM	MCS0	MAIN
802.11a_HT40	5190~5230	38 to 46	38,46	OFDM	MCS0	MAIN
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	MAIN
802.11n_HT20				OFDM	MCS0	MAIN
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS0	MAIN

Note:

The field strength of radiation emission was measured as lie down position (E2 mode) for 802.11a/n WLAN Transmitter for channel Low, Mid and High.

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ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	MAIN
802.11n_HT20				OFDM	MCS0	MAIN
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS0	MAIN
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	MAIN
802.11n_HT20				OFDM	MCS0	MAIN
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS0	MAIN

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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)	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)	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. CONDUCTED EMISSION TEST

6.1. Standard Applicable

Frequency range within 150 kHz to 30 MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

- 1.The lower limit shall apply at the transition frequencies
- 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

6.2. Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI 3	101311	06/20/2014	06/19/2015
Coaxial Cables	N/A	N30N30-1042-150 cm	N/A	01/06/2015	01/07/2016
LISN	Schwarzbeck	NSLK 8127	8127-648	06/10/2014	06/09/2015
LISN	Rolf-Heine	NNB-2/16Z	99012	03/26/2014	03/25/2015

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI 7	100950	12/12/2014	12/11/2015
LISN	Schwarzbeck	NSLK 8127	8127-648	06/09/2015	06/08/2016
LISN	Rolf-Heine	NNB-2/16Z	99012	03/04/2015	03/03/2016
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.

Note: The measurement was taken place with the long duration of the time, and additional equipment list as shown above indicate those equipment of which has been subject to undertake the calibration in intermediate period of time of the measurement.

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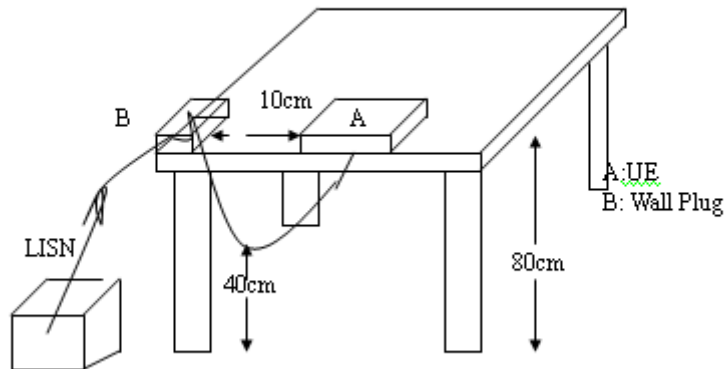
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6.3. EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz power source.

6.4. Test SET-UP



6.5. Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed.

6.6. Measurement Result

Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that that closet to the limit

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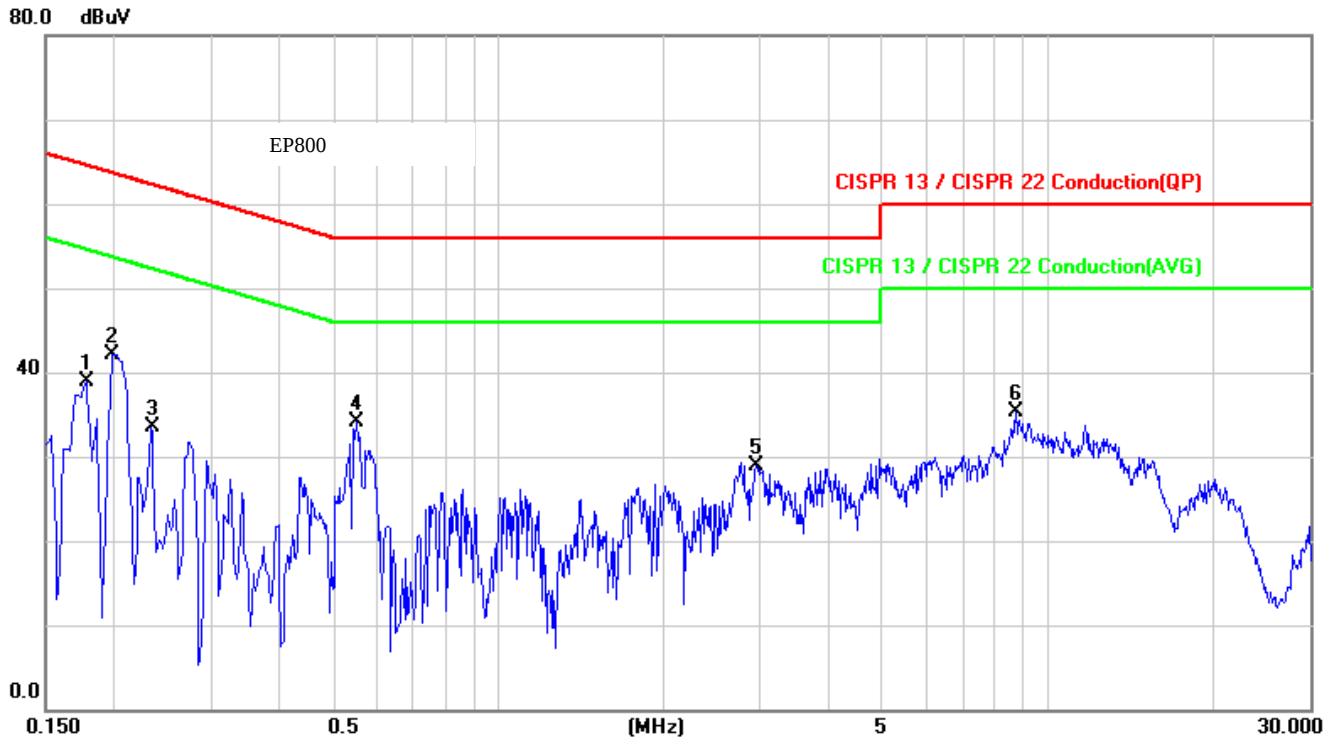
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode			Test Date:	Mar. 02, 2015
Temperature:	19 °C	Humidity:	62 %	Test By:	Vito
Adapter	3A-154WP05				



No.	Mk.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1		0.1780	38.94	0.05	38.99	64.58	-25.59	peak	
2	*	0.1980	42.11	0.04	42.15	63.69	-21.54	peak	
3		0.2340	33.37	0.05	33.42	62.31	-28.89	peak	
4		0.5540	33.96	0.20	34.16	56.00	-21.84	peak	
5		2.9580	28.43	0.51	28.94	56.00	-27.06	peak	
6		8.7660	34.87	0.48	35.35	60.00	-24.65	peak	

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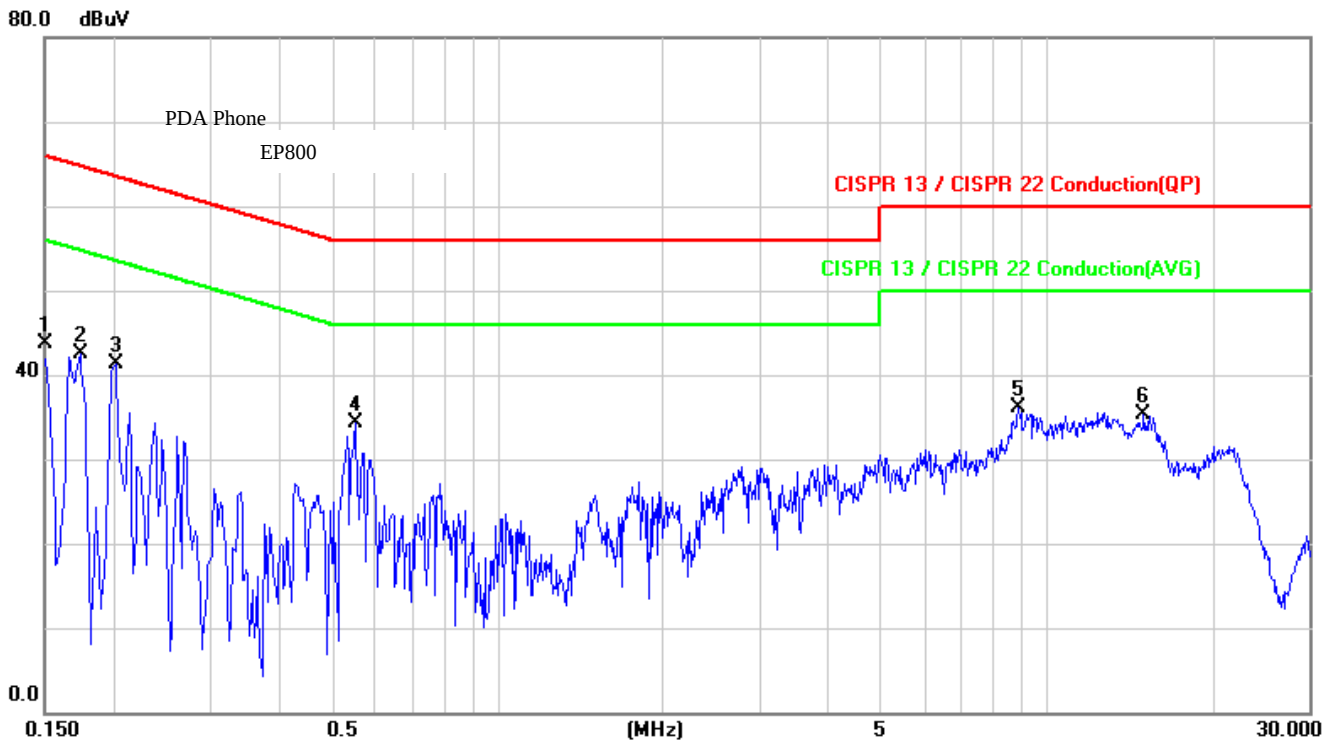
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No.	Mk.	Freq. (MHz)	Reading dBuV	Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1		0.1500	43.67	0.05	43.72	66.00	-22.28	peak	
2		0.1740	42.37	0.05	42.42	64.77	-22.35	peak	
3		0.2020	41.35	0.04	41.39	63.53	-22.14	peak	
4	*	0.5540	34.04	0.20	34.24	56.00	-21.76	peak	
5		8.8820	35.60	0.48	36.08	60.00	-23.92	peak	
6		15.0100	34.93	0.32	35.25	60.00	-24.75	peak	

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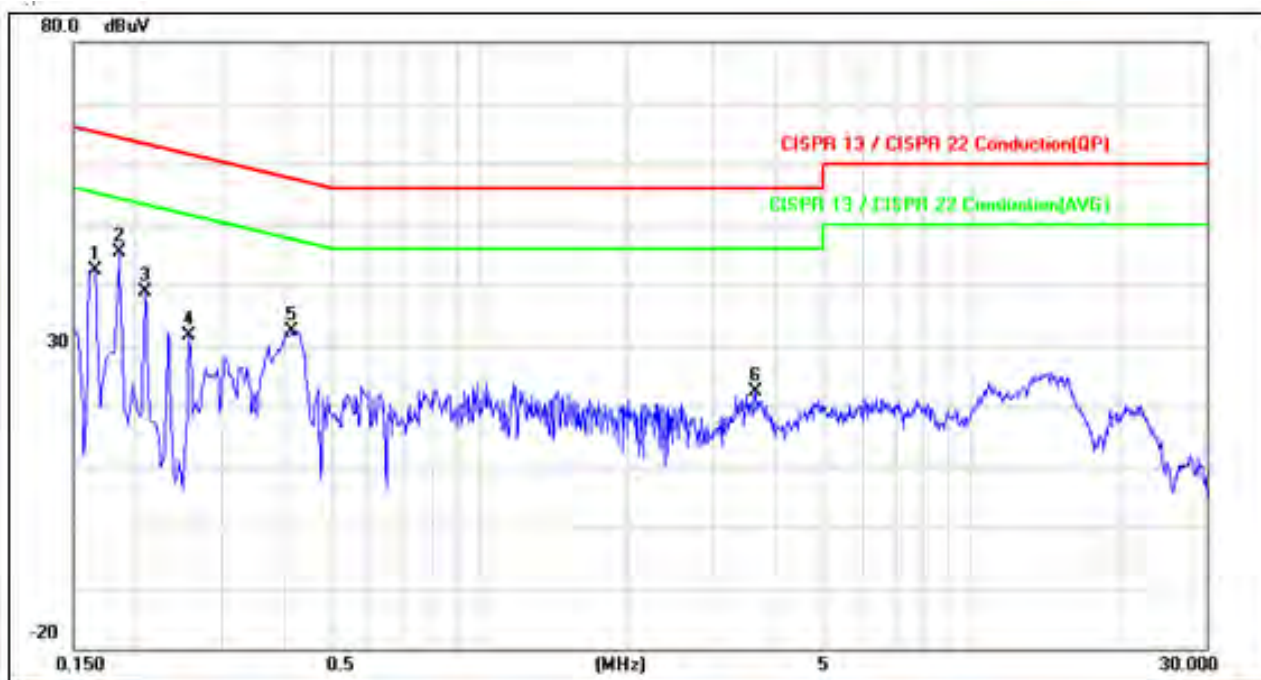
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Operation Mode:	Operation mode			Test Date:	Aug. 06, 2015
Temperature:	19 °C	Humidity:	62 %	Test By:	Tin
Adapter:	6A-161WP05				



No.	Alt.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1		0.1660	42.40	0.08	42.48	65.16	-22.68	peak	
2	*	0.1860	45.21	0.07	45.28	64.21	-18.93	peak	
3		0.2100	38.90	0.07	38.97	63.21	-24.24	peak	
4		0.2580	31.52	0.10	31.62	61.50	-29.88	peak	
5		0.4180	32.29	0.17	32.46	57.49	-25.03	peak	
6		3.6460	21.81	0.60	22.41	56.00	-33.59	peak	

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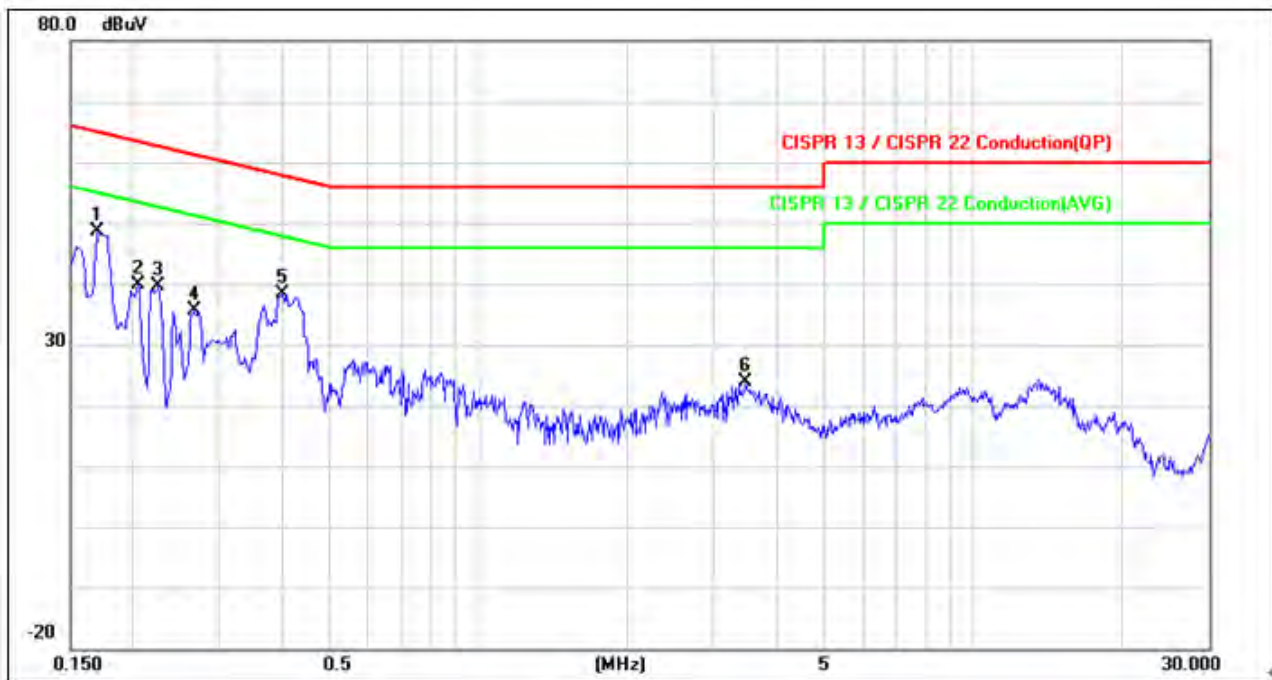
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No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
		(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)		
1	*	0.1700	48.57	0.14	48.71	64.96	-16.25	peak	
2		0.2060	39.79	0.13	39.92	63.37	-23.45	peak	
3		0.2260	39.52	0.14	39.66	62.60	-22.94	peak	
4		0.2660	35.35	0.16	35.51	61.24	-25.73	peak	
5		0.4020	38.04	0.22	38.26	57.81	-19.55	peak	
6		3.4860	23.32	0.65	23.97	56.00	-32.03	peak	

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7. 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 Fator (dB)
802.11a	1	0.04
802.11n_20	1	0.04
802.11n_40	1	0.04

$$\text{Duty Cycle Factor: } 10 * \log (1/0.99) = 0.04$$

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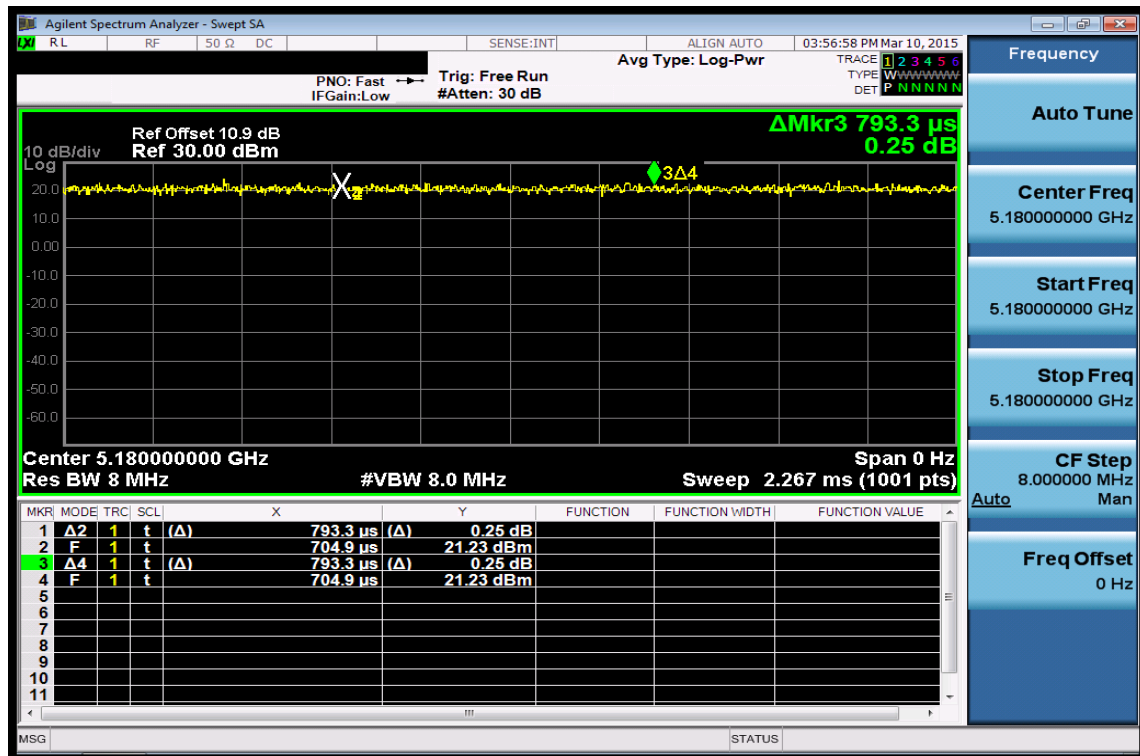
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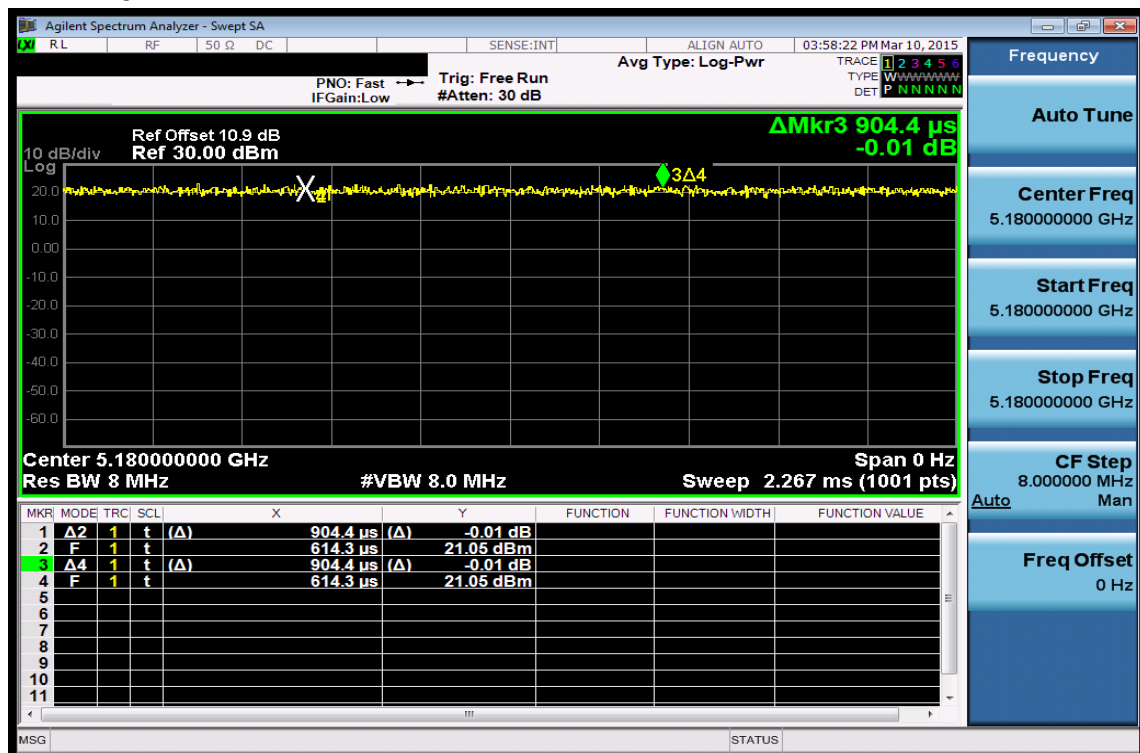
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DUTY CYCLE TEST SIGNAL Measurement Result

802.11a



802.11n HT20



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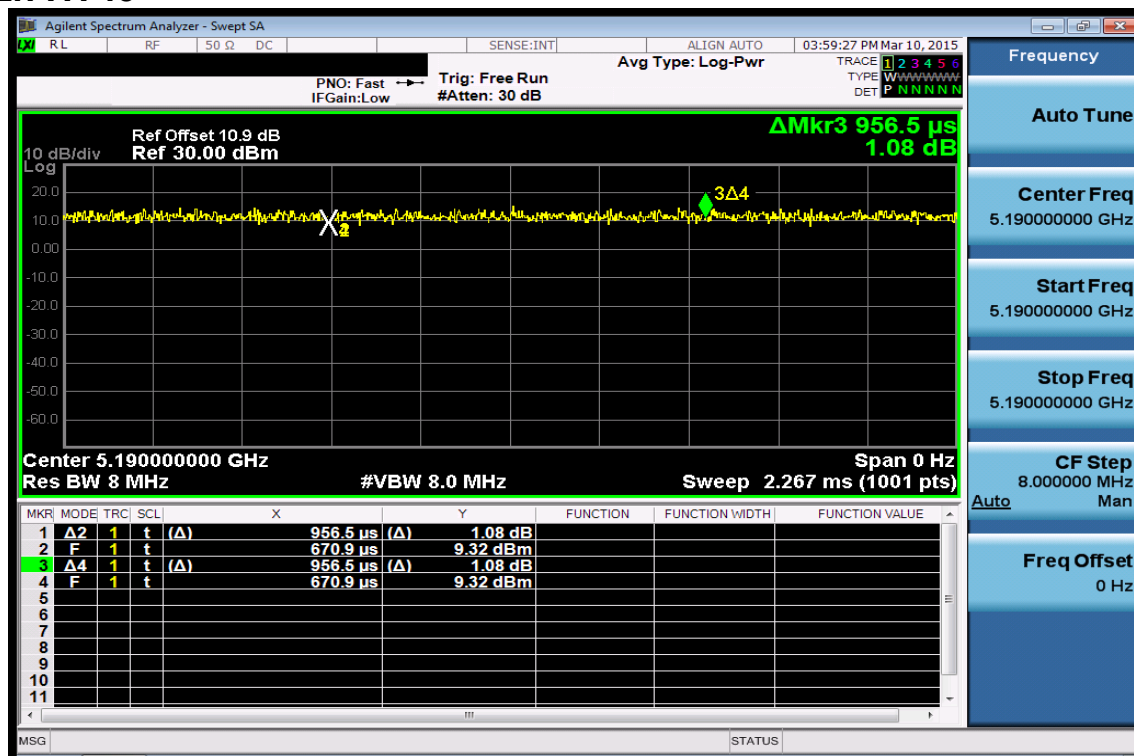
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802.11n HT40



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8. 26dB & 6dB EMISSION BANDWIDTH MEASUREMENT

8.1 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

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 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.

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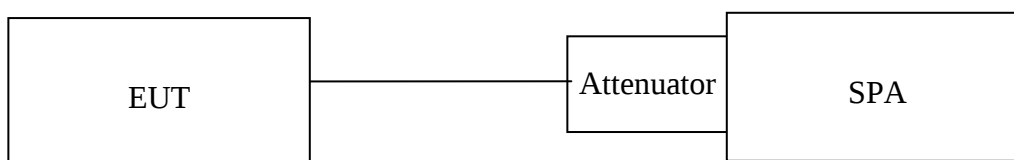
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8.3 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
Power Meter	Anritsu	ML2496A	1326001	06/21/2014	06/20/2015
DC Block	PASTERNAK	PE8210	RF29	12/19/2014	12/18/2015
Splitter	RF-LAMBDA	RFLT2W1G18G	RF35	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015

8.4 Test Set-up



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8.5 Measurement Result

26dB Bandwidth

802.11a

Frequency (MHz)	26dB Bandwidth (B) (MHz)	10 Log (B) (dB)
5180	27.360	14.37
5220	28.170	14.50
5240	31.360	14.96

802.11n_HT20

Frequency (MHz)	26dB Bandwidth (B) (MHz)	10 Log (B) (dB)
5180	33.430	15.24
5220	32.170	15.07
5240	30.710	14.87

802.11n_HT40

Frequency (MHz)	26dB Bandwidth (B) (MHz)	10 Log (B) (dB)
5190	43.500	16.38
5230	40.150	16.04

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6dB Bandwidth (5725 MHz~ 5850 MHz)

802.11a

Frequency (MHz)	6dB Bandwidth (B) (MHz)	10 Log (B) (dB)
5745	16.420	12.15
5785	16.410	12.15
5825	16.400	12.15

802.11n_HT20

Frequency (MHz)	6dB Bandwidth (B) (MHz)	10 Log (B) (dB)
5745	17.570	12.45
5785	17.590	12.45
5825	17.570	12.45

802.11n_HT40

Frequency (MHz)	6dB Bandwidth (B) (MHz)	10 Log (B) (dB)
5755	36.320	15.60
5795	36.330	15.60

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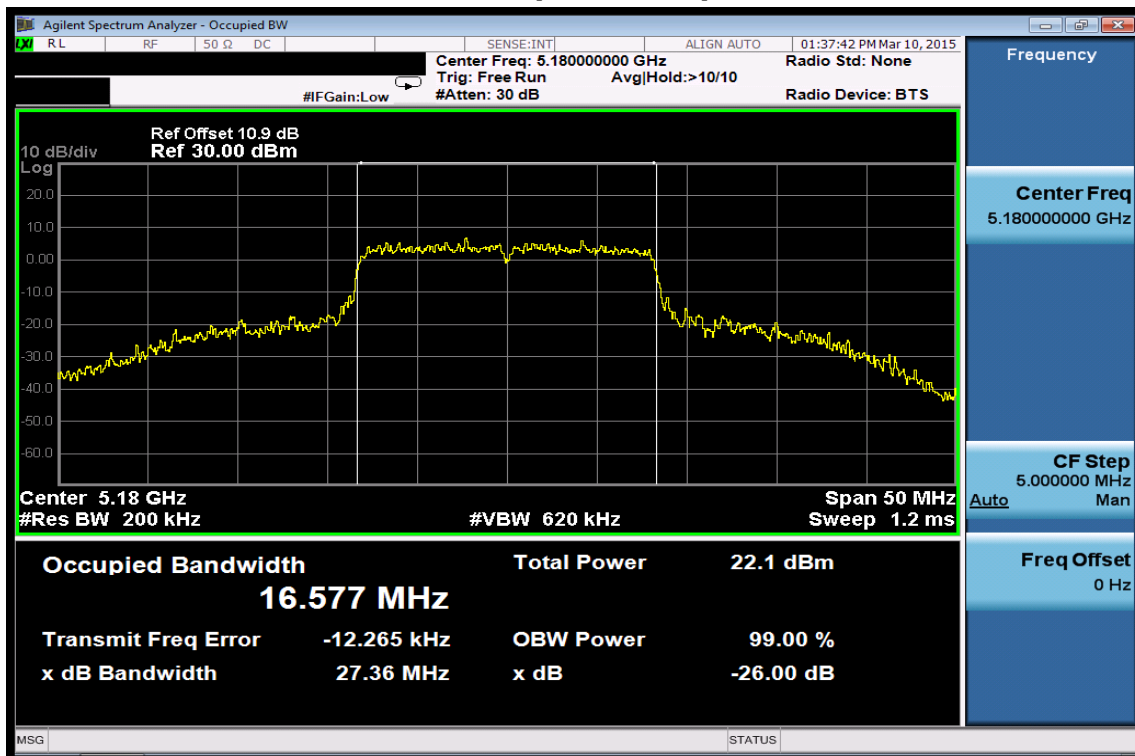
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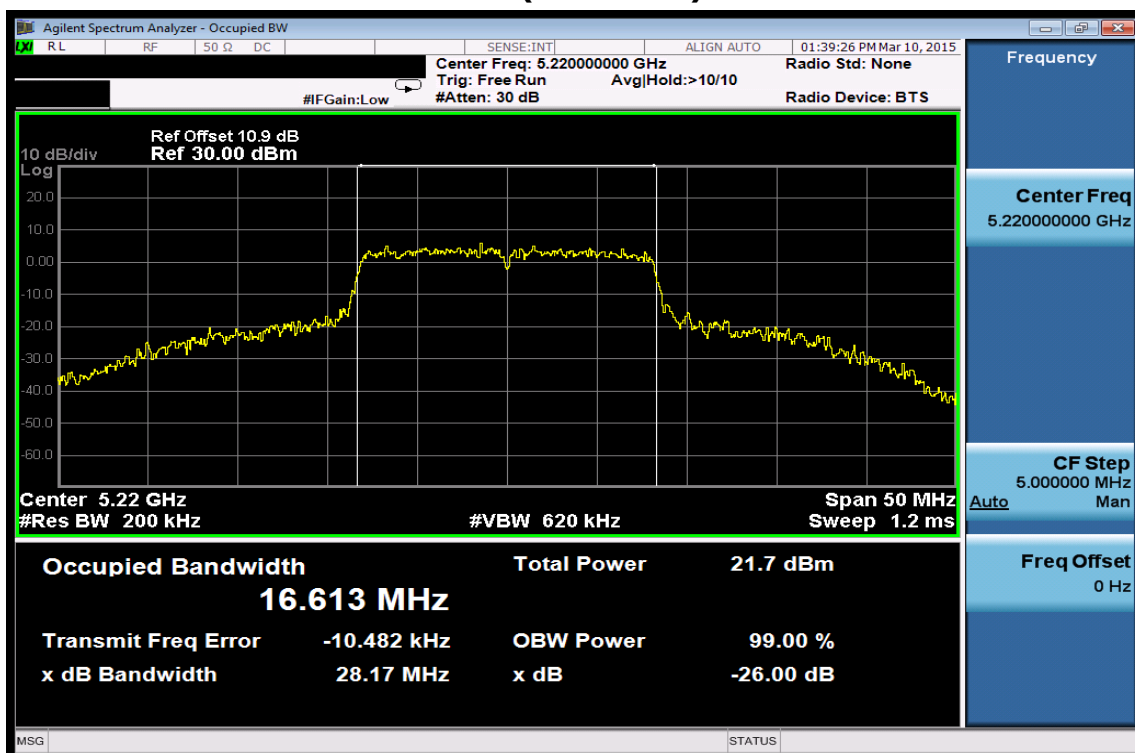
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802.11a, 5150~5250 MHz 26dB Band Width Test Data CH-Low (5180MHz)



26dB Band Width Test Data CH-Mid (5220MHz)



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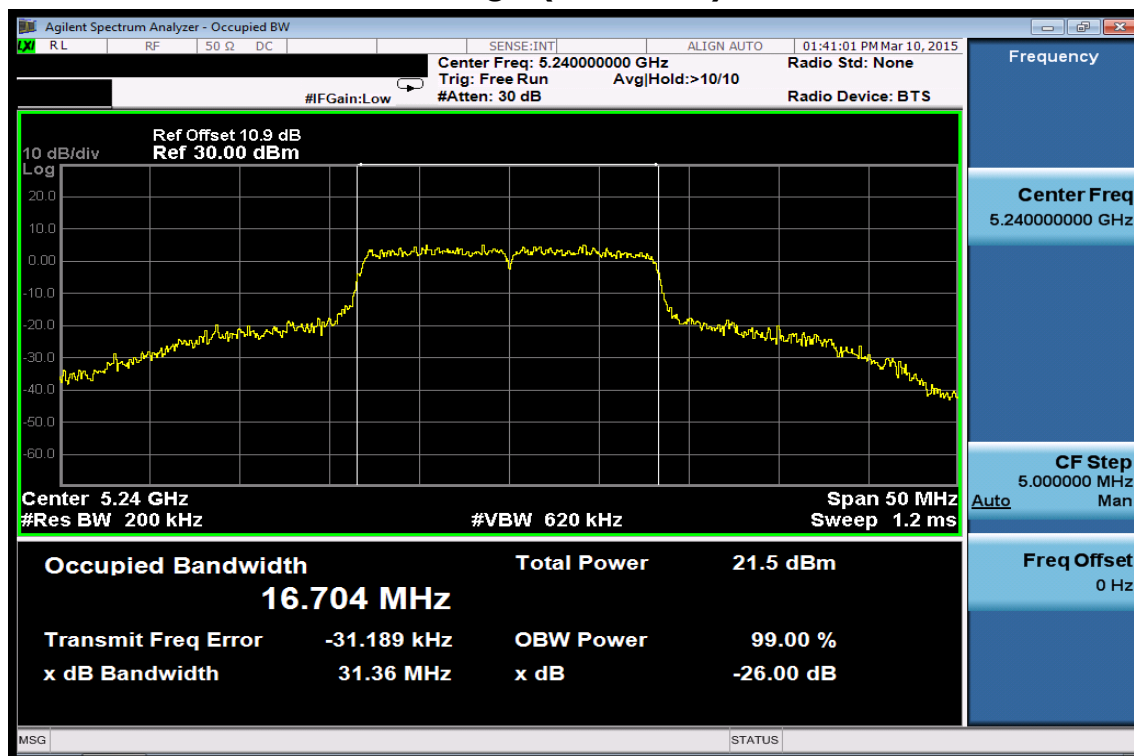
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26dB Band Width Test Data CH-High (5240MHz)



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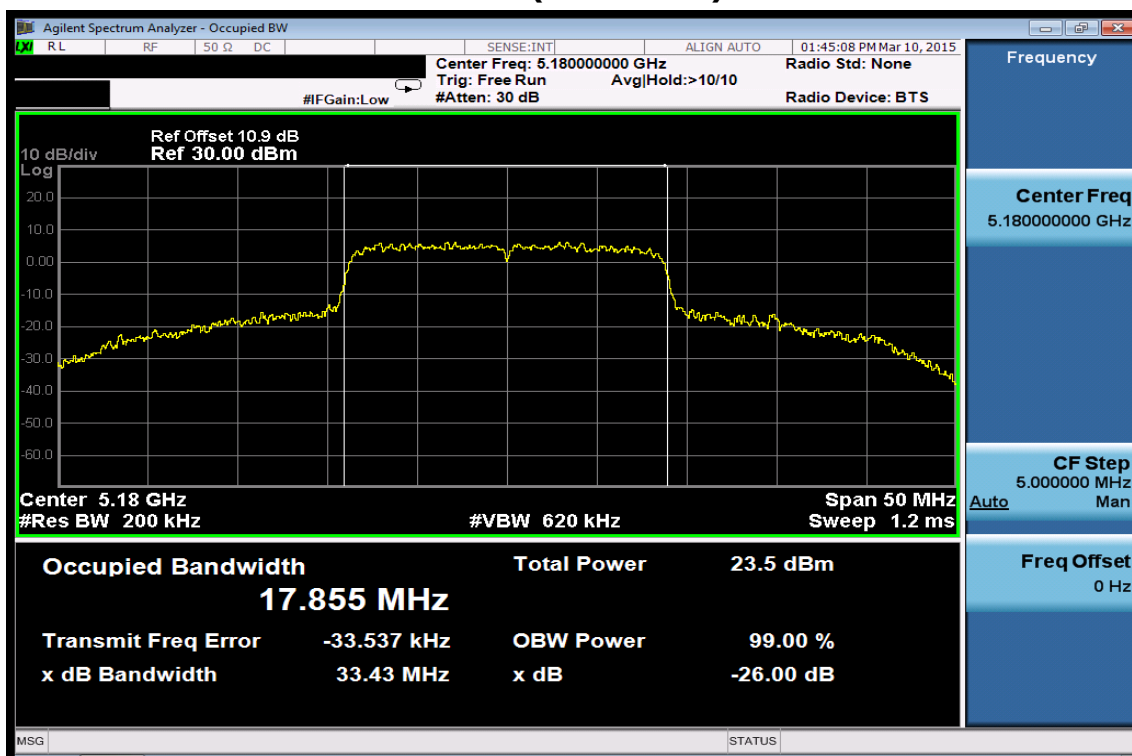
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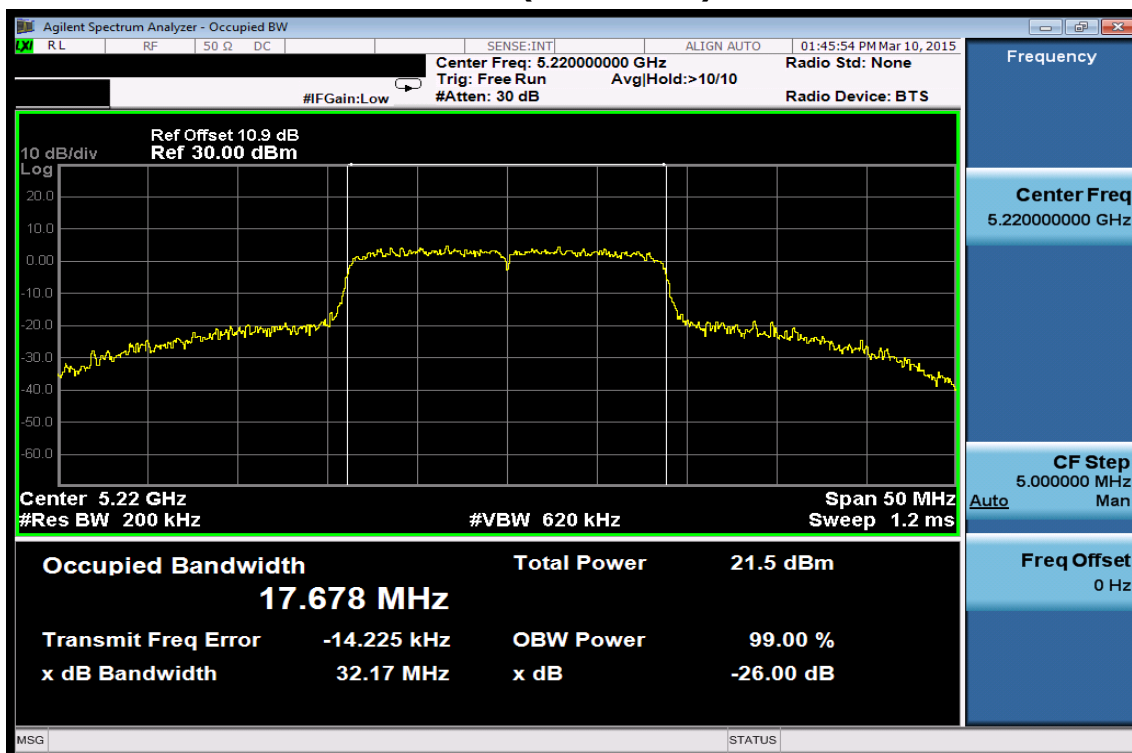
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802.11n HT20, 5150~5250 MHz 26dB Band Width Test Data CH-Low (5180 MHz)



26dB Band Width Test Data CH-Mid (5220 MHz)



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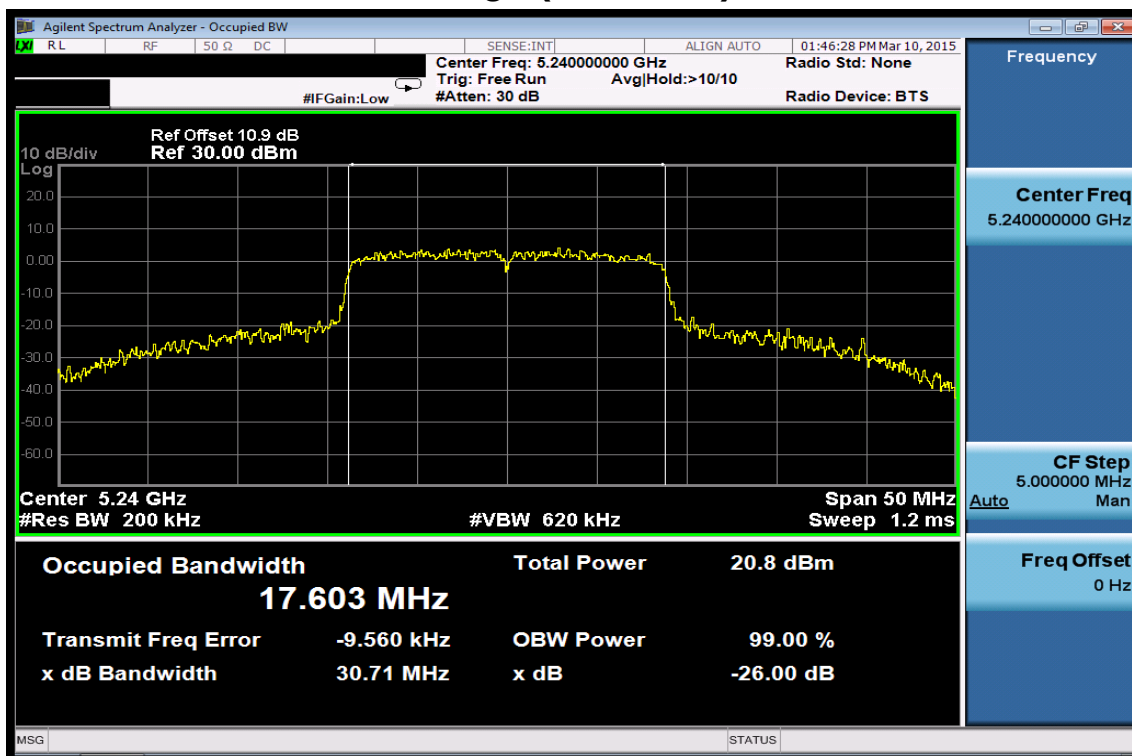
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26dB Band Width Test Data CH-High (5240 MHz)



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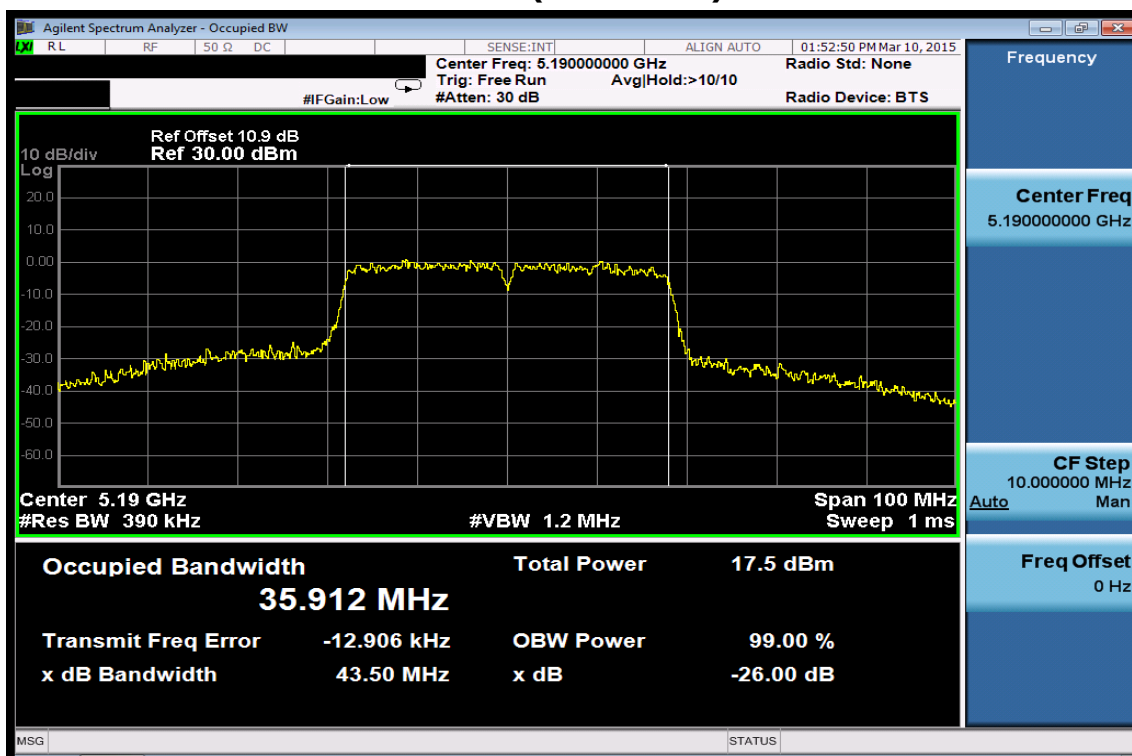
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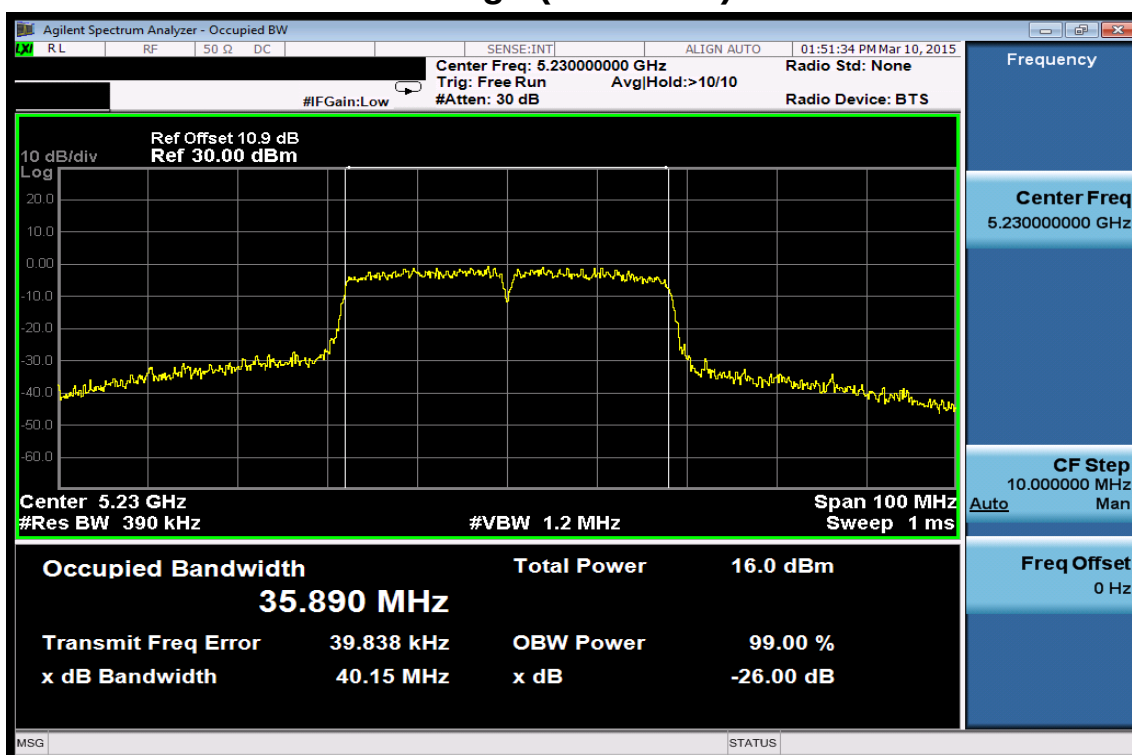
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802.11n HT40, 5150~5250 MHz 26dB Band Width Test Data CH-Low (5190 MHz)



26dB Band Width Test Data CH-High (5230 MHz)



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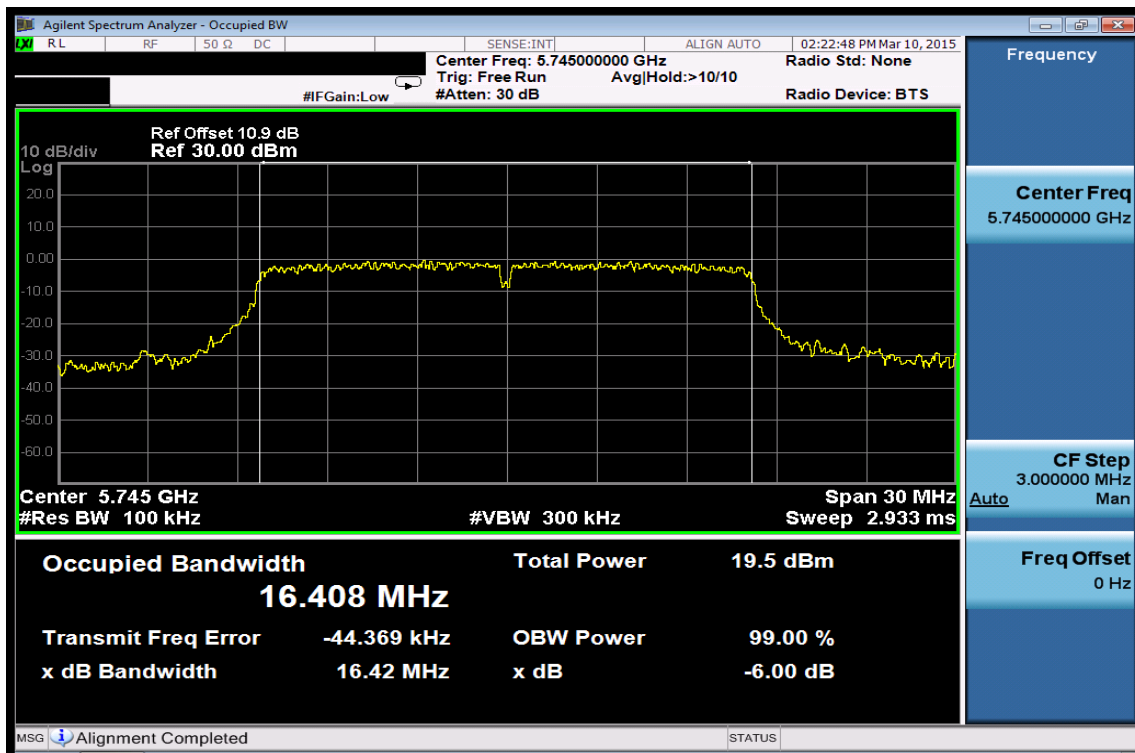
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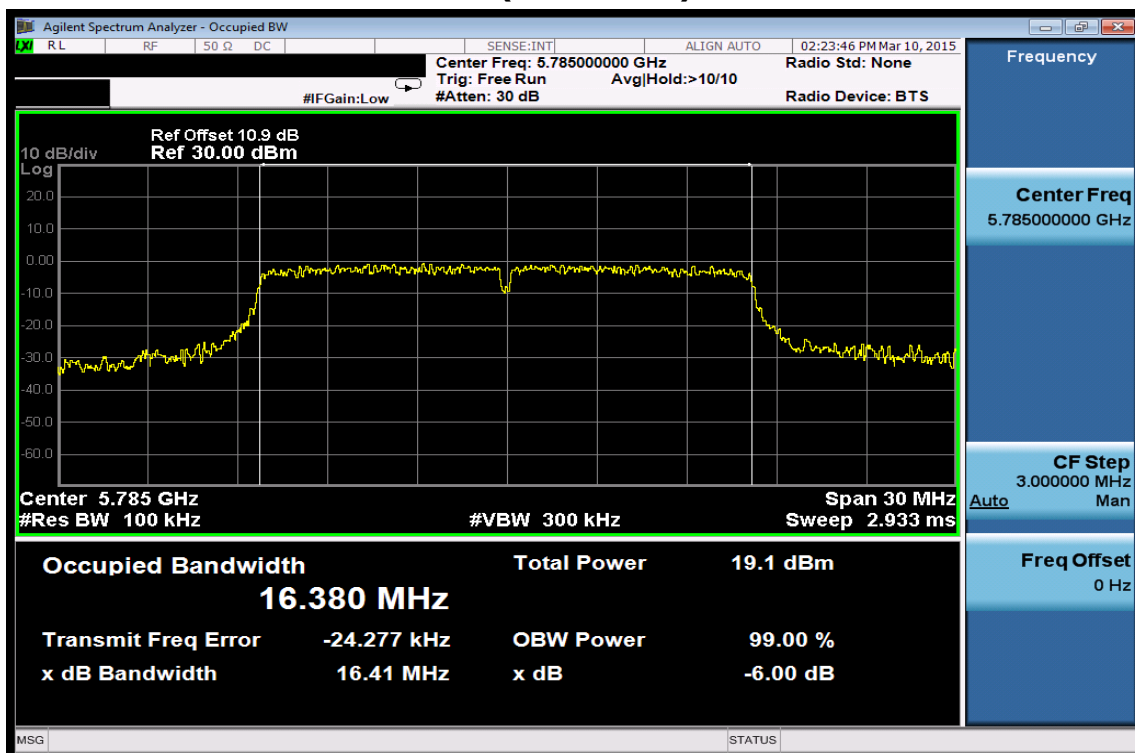
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802.11a, 5725~5850 MHz 6dB Band Width Test Data CH-Low (5745 MHz)



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



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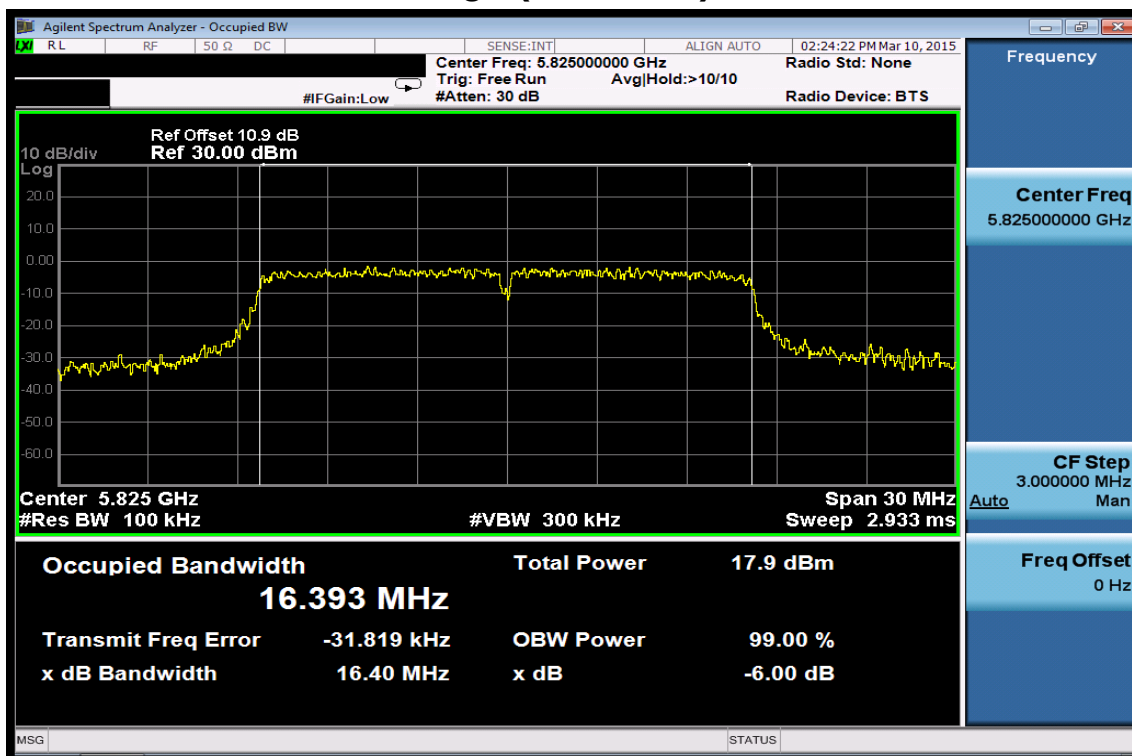
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6dB Band Width Test Data CH-High (5825 MHz)



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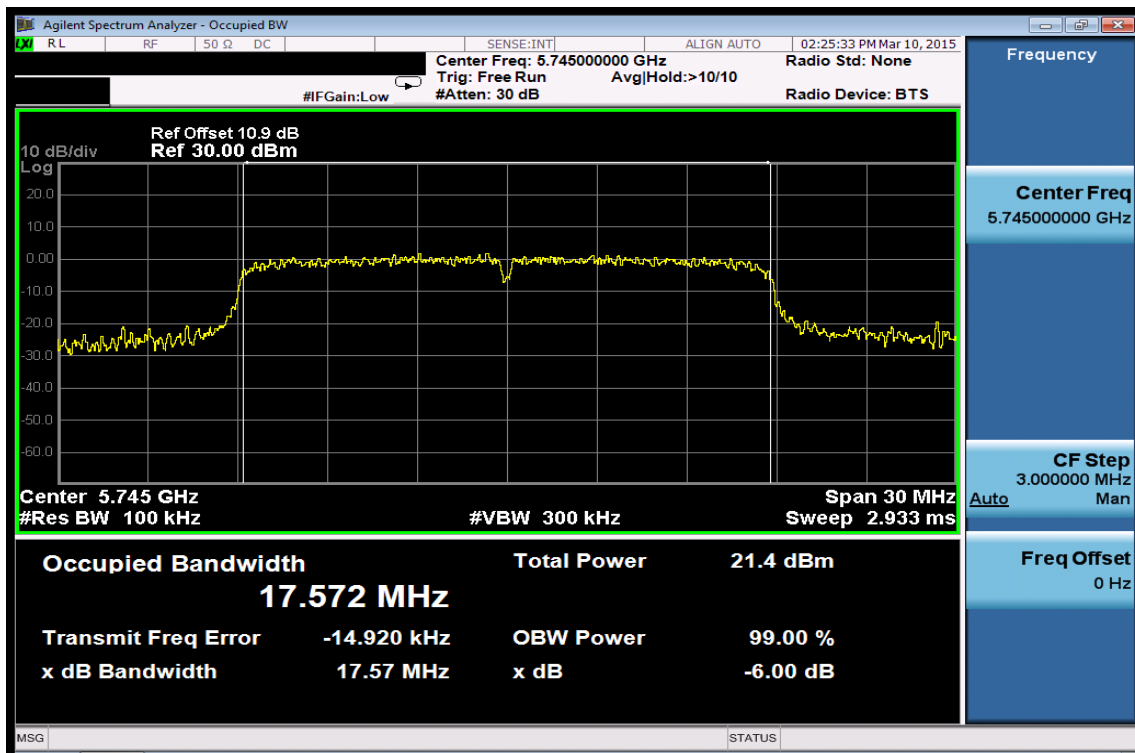
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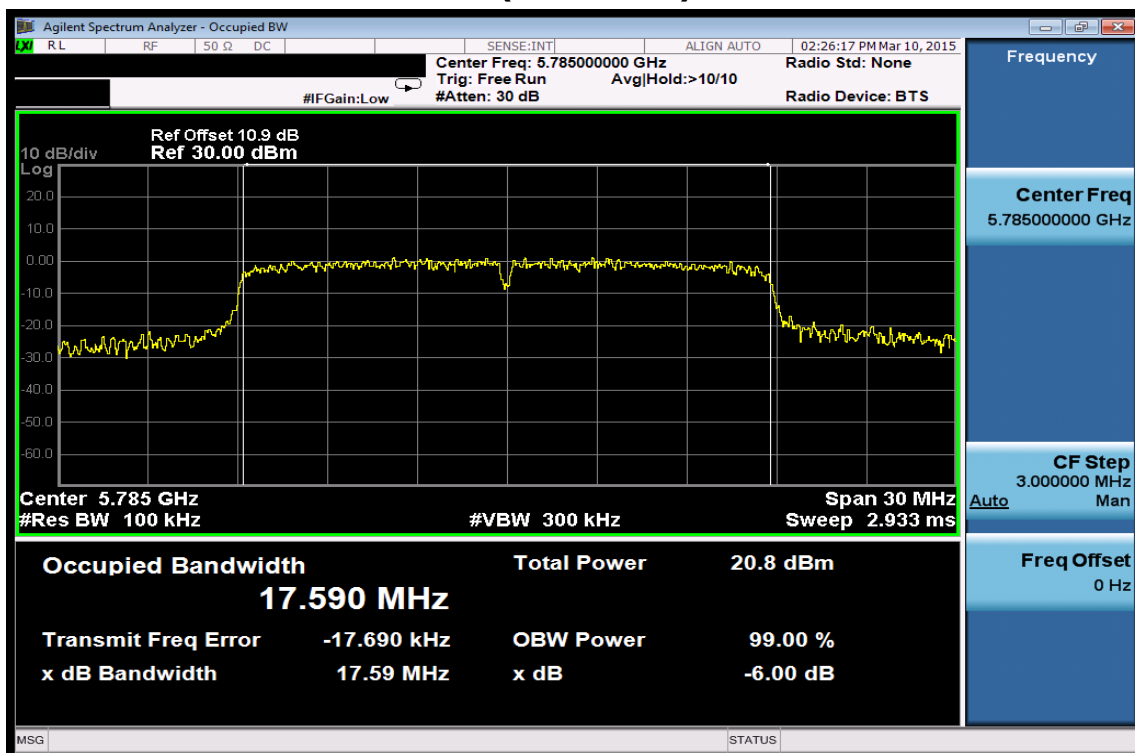
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802.11n HT20, 5725~5850 MHz 6dB Band Width Test Data CH-Low (5745 MHz)



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



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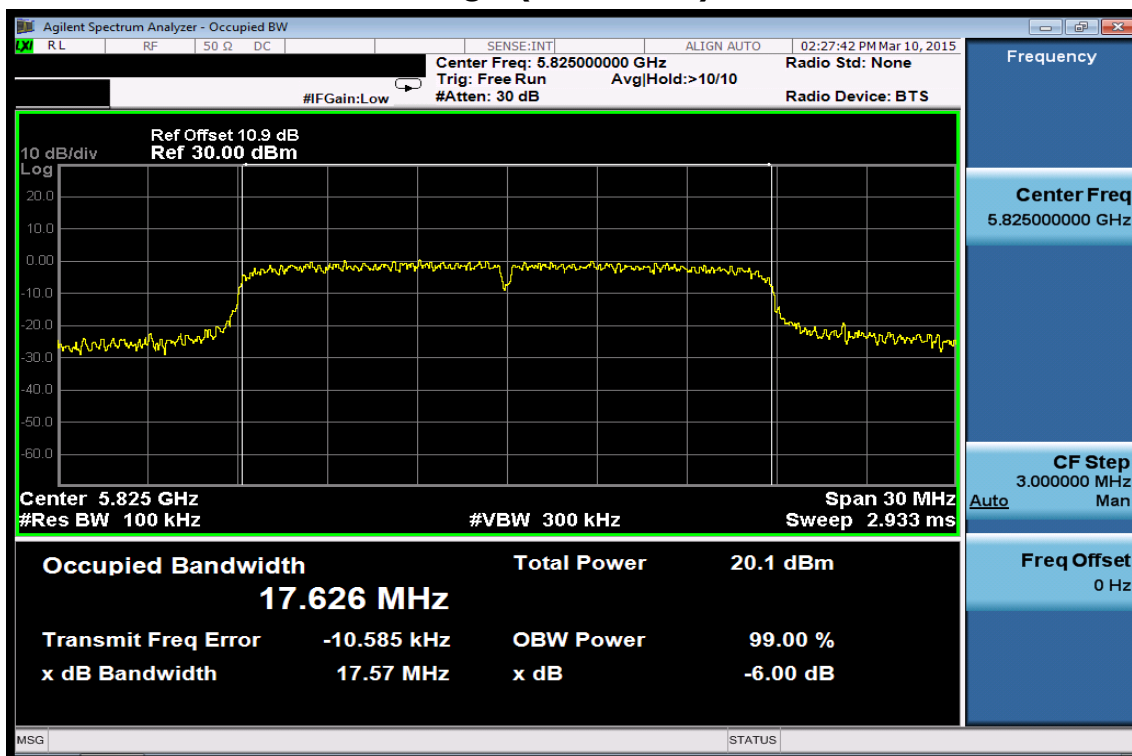
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6dB Band Width Test Data CH-High (5825 MHz)



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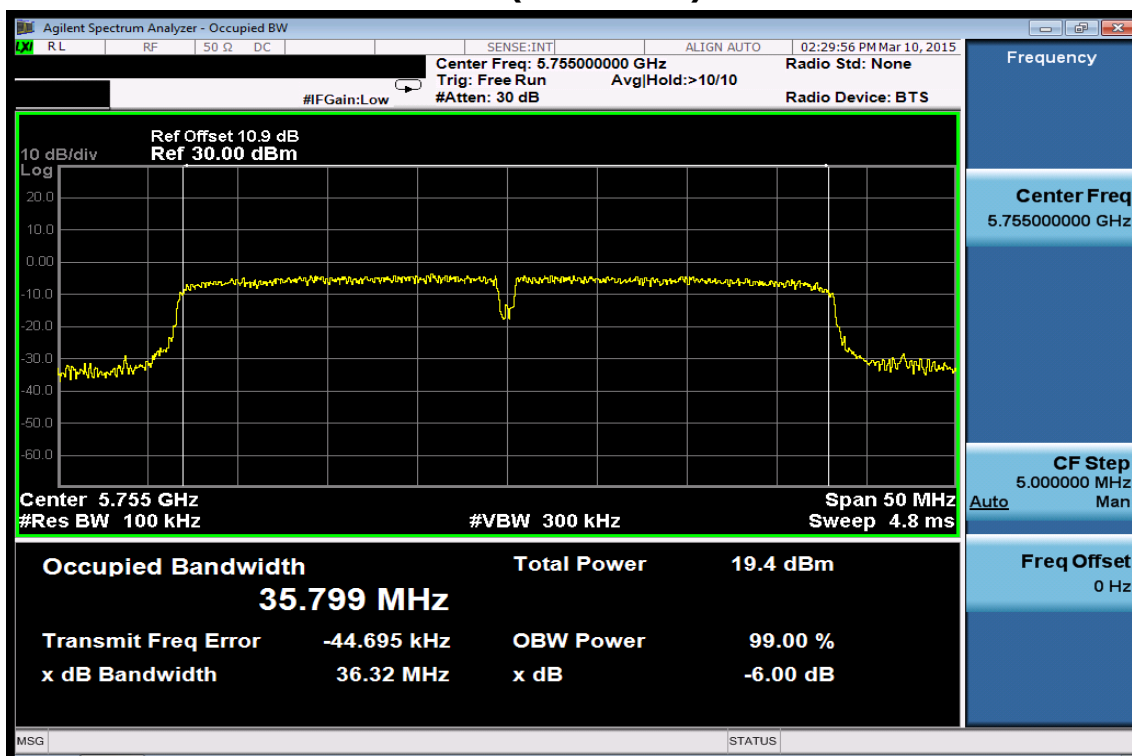
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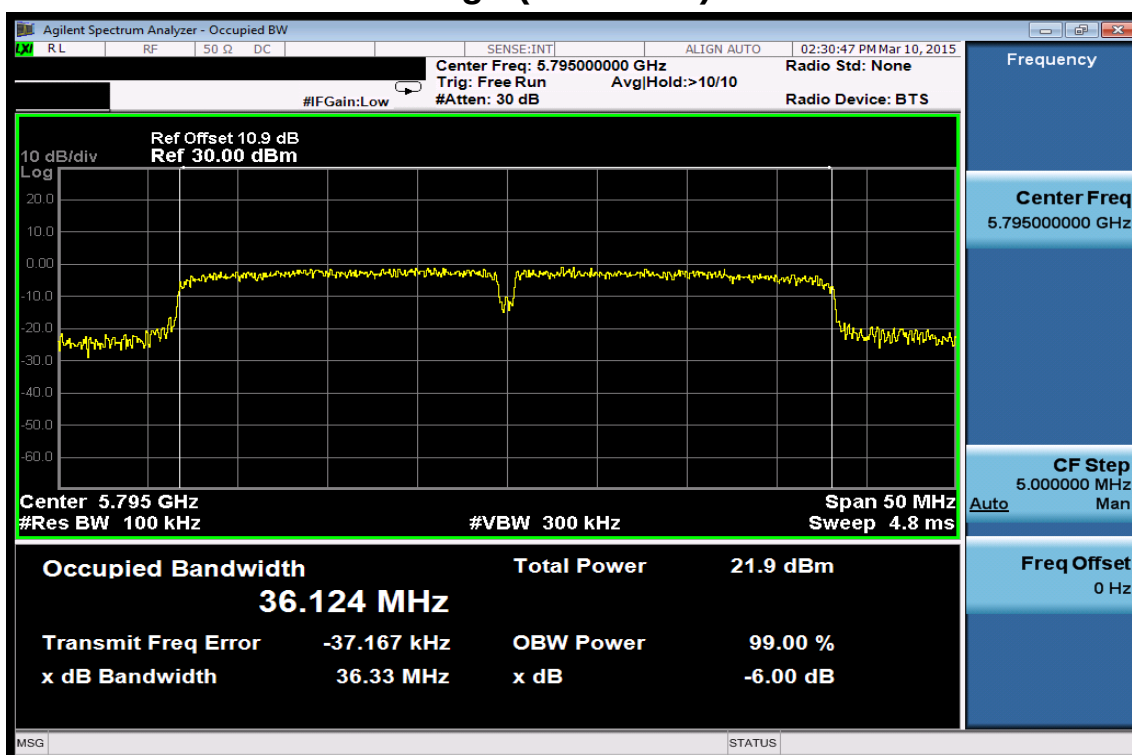
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802.11n HT40, 5725~5850 MHz for Main 6dB Band Width Test Data CH-Low (5755 MHz)



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



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9. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

9.1 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)

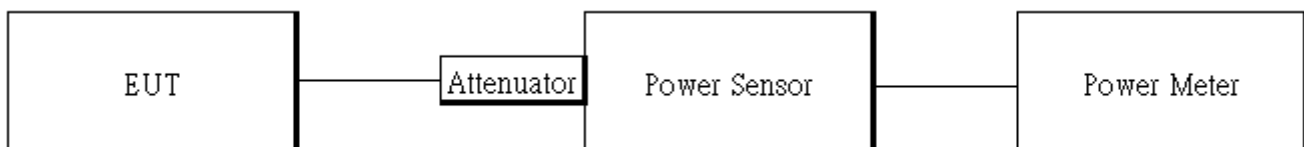
9.2 Measurement Procedure

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 v01.
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/duty cycle).
6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

9.3 Measurement Equipment Used

Refer to section 8.3 for details.

9.4 Test Set-up



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9.5 Measurement Result

802.11a

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	16.7	46.774	23.98	PASS
44	5220	16.47	44.361	23.98	PASS
48	5240	15.75	37.584	23.98	PASS
149	5745	13.87	24.378	30	PASS
157	5785	14.16	26.062	30	PASS
165	5825	13.42	21.979	30	PASS

802.11n HT20

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	17.56	57.016	23.98	PASS
44	5220	16.46	44.259	23.98	PASS
48	5240	16.57	45.394	23.98	PASS
149	5745	16.34	43.053	30	PASS
157	5785	16.09	40.644	30	PASS
165	5825	15.25	33.497	30	PASS

802.11n HT40

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	12.05	16.032	23.98	PASS
46	5230	11.15	13.032	23.98	PASS
151	5755	14.64	29.107	30	PASS
159	5795	16.92	49.204	30	PASS

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10. PEAK POWER SPECTRAL DENSITY

10.1 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 6 dBi 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 6 dBi.

10.2 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 Spectrum.
4. **For U-NII1, U-NII-2A, U-NII-2C 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=500 kHz, VBW $\geq$ 3RBW, 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. Use the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add 10 log(1/duty cycle).
7. Repeat above procedures until all default test channel (low, middle, and high) was complete.

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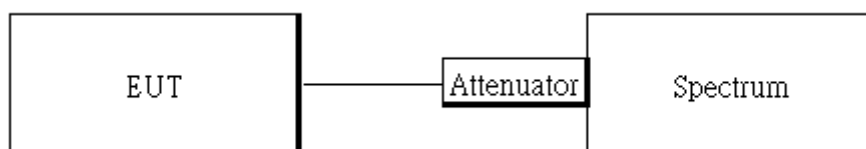
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10.3 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
DC Block	PASTERNAK	PE8210	RF29	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015

10.4 Test Set-up



10.5 Measurement Result

802.11a

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5180	4.12	11.00	-6.88
5220	3.77	11.00	-7.23
5240	2.43	11.00	-8.57
5745	-2.55	30.00	-32.55
5785	-2.79	30.00	-32.79
5825	-2.95	30.00	-32.95

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802.11n HT20

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5180	4.17	11.00	-6.83
5220	3.33	11.00	-7.67
5240	2.46	11.00	-8.54
5745	0.16	30.00	-29.84
5785	-0.14	30.00	-30.14
5825	-0.96	30.00	-30.96

802.11n HT40

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5190	-4.47	11.00	-15.47
5230	-5.40	11.00	-16.40
5755	-5.14	30.00	-35.14
5795	-2.61	30.00	-32.61

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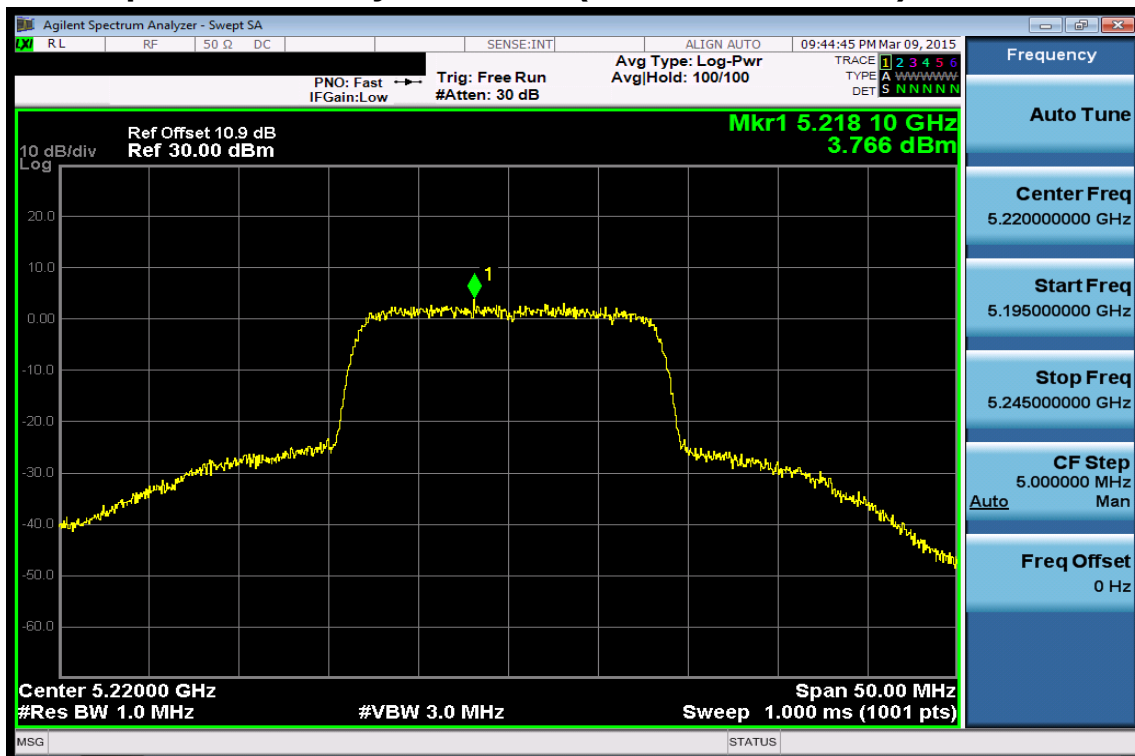
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802.11a, 5150~5250 MHz

Peak Power Spectral Density Data Plot (CH Low 5180 MHz)



Peak Power Spectral Density Data Plot (CH Mid 5220 MHz)



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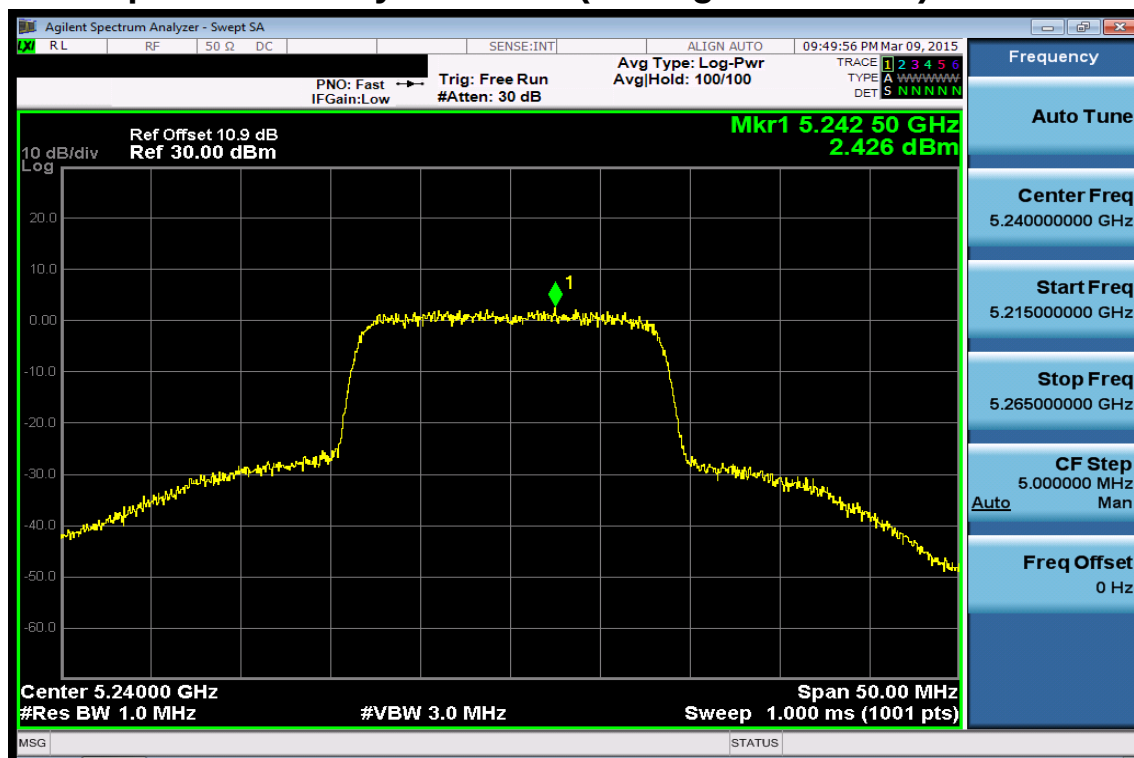
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Peak Power Spectral Density Data Plot (CH High 5240 MHz)



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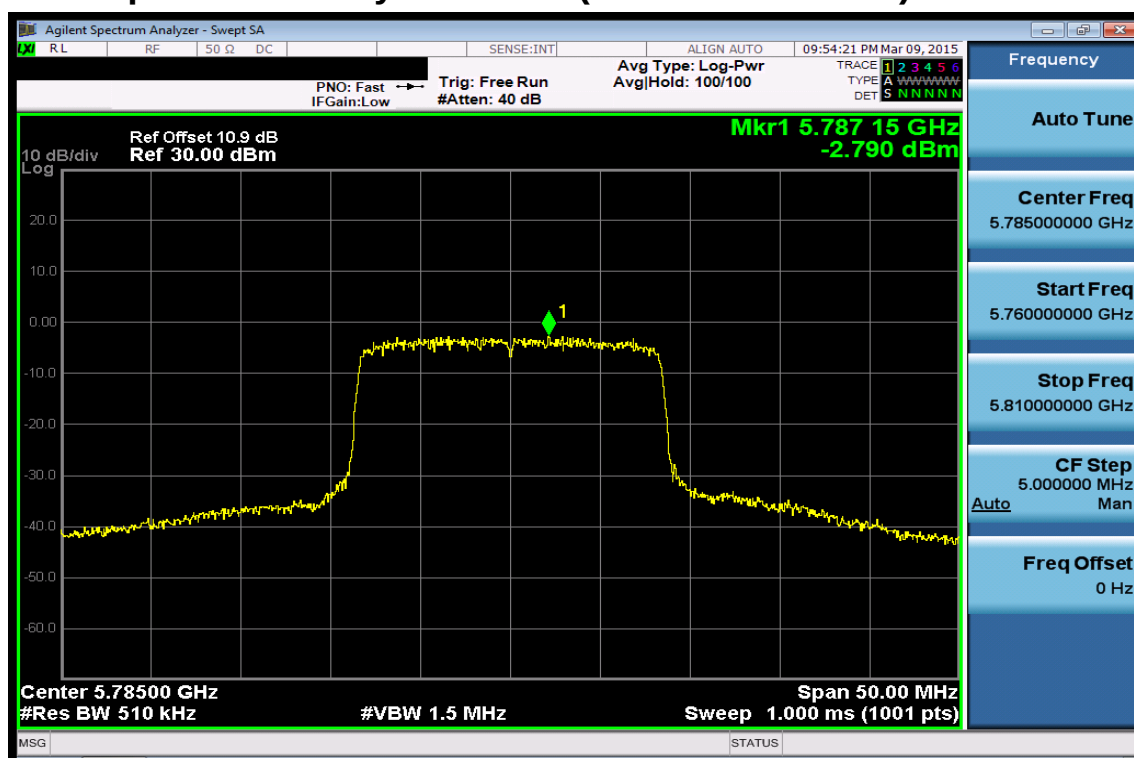
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802.11a, 5725~5850 MHz

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



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



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



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802.11n HT20, 5150~5250 MHz Peak Power Spectral Density Data Plot (CH Low 5180 MHz)



Peak Power Spectral Density Data Plot (CH Mid 5220 MHz)



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Peak Power Spectral Density Data Plot (CH High 5240 MHz)



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本文件為說明。此批發合約書本僅對兩城之賬目負責。同時此批發合約書僅對本人。本報告本經本公司審閱同意。不予研究復核。

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802.11n HT20, 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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Peak Power Spectral Density Data Plot (CH High 5825 MHz)



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802.11n HT40, 5150~5250 MHz Peak Power Spectral Density Data Plot (CH Low 5190 MHz)



Peak Power Spectral Density Data Plot (CH High 5230 MHz)



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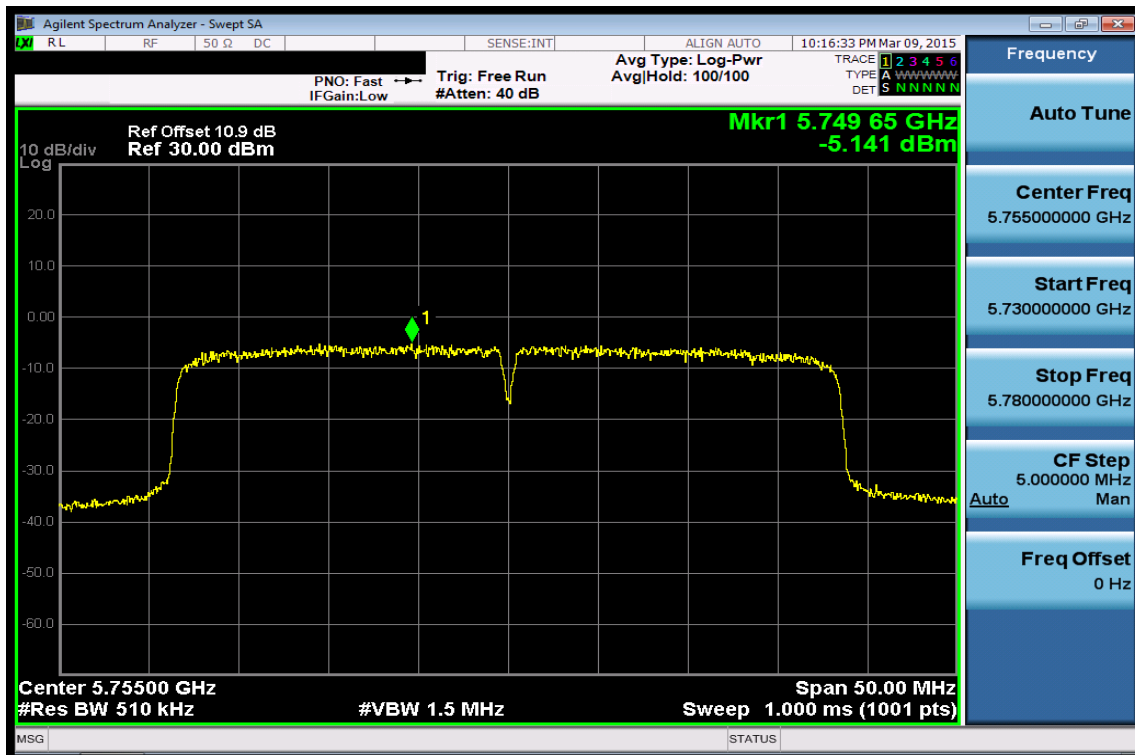
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802.11n HT40, 5725~5850 MHz



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



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11. UNDESIRABLE RADIATED EMISSION MEASUREMENT1

11.1 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.

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APPLICABLE TO	LIMIT	
FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01	FIELD STRENGTH AT 3m	
	PK: 74 (dBμV/m)	AV 54 (dBμV/m)
APPLICABLE TO	EIRP LIMIT	FIELD STRENGTH AT 3m
15.407(b)(1)	PK: -27 (dBm/MHz)	PK: 68.3 (dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	PK: -27 (dBm/MHz) PK: -17 (dBm/MHz)	PK: 68.3 (dBμV/m) PK: 78.2 (dBμV/m)
15.407(b)(4)(i)	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK:105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK:122.2 (dBμV/m) *4
*1 beyond 75 MHz or more above of the bandedge. *2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. *3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. *4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.		

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

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 (dBμV/m) = 20 log Emission level (dBμV/m)

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11.2 Measurement Equipment Used

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESU 40	100363	04/12/2014	04/11/2015
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
Loop Antenna	ETS-Lindgren	6502	00143303	12/09/2014	12/08/2015
Broadband Antenna	TESEQ	CBL 6112D	35240	12/05/2014	12/04/2015
Horn Antenna	ETS-Lindgren	3117	00143272	12/08/2014	12/07/2015
Horn Antenna	ETS-Lindgren	3160-09	00117911	11/13/2014	11/12/2015
Horn Antenna	ETS-Lindgren	3160-10	00117783	11/13/2014	11/12/2015
Pre Amplifier	EMC Instruments	EMC330	980096	12/19/2014	12/18/2015
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/19/2014	12/18/2015
Pre Amplifier	R&S	SCU-18	10204	12/19/2014	12/18/2015
Pre Amplifier	R&S	SCU-26	100780	12/19/2014	12/18/2015
Pre Amplifier	R&S	SCU-40	100356	12/19/2014	12/18/2015
Pre Amplifier	EMC Instruments	EMC184045B	980135	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF27	12/19/2014	12/18/2015
Site NSA	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016
Site VSWR	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016
DC Power Supply	HOLA	DP-3003	D7070035	05/31/2014	05/30/2015
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.

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EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
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Loop Antenna	ETS-Lindgren	6502	00143303	12/23/2016	12/22/2017
Broadband Antenna	TESEQ	CBL 6112D	35240	11/03/2016	11/02/2017
Horn Antenna	ETS-Lindgren	3117	00143272	12/15/2016	12/16/2017
Horn Antenna	Schwarzbeck	BBHA9170	185	07/24/2016	07/23/2017
Pre Amplifier	EMC Instruments	EMC330	980096	12/12/2016	12/11/2017
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/12/2016	12/11/2017
Pre Amplifier	R&S	SCU-18	10204	12/12/2016	12/11/2017
Pre Amplifier	EMC Instruments	EMC184045B	980135	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/12/2016	12/11/2017
Attenuator	WOKEN	218FS-10	RF27	12/12/2016	12/11/2017
Site NSA	SGS	966 Chamber C	SAC-C	03/02/2017	03/01/2018
Site VSWR	SGS	966 Chamber C	SAC-C	03/02/2017	03/01/2018
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2017	05/03/2018

Remark: Please note that the duration to conduct the test took place in the mean time when the calibration for several equipments is due, and therefore extra tables of equipment calibration is constructed to indicate the calibration work is still maintained.

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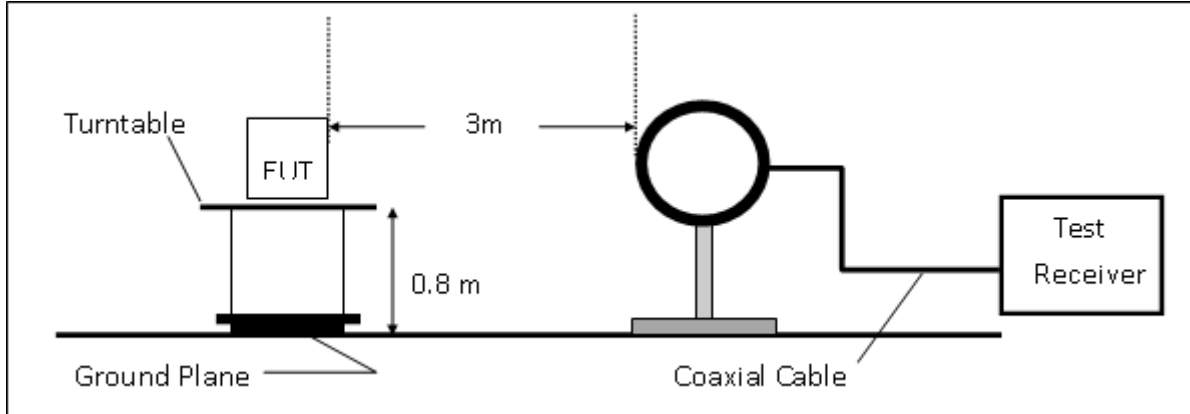
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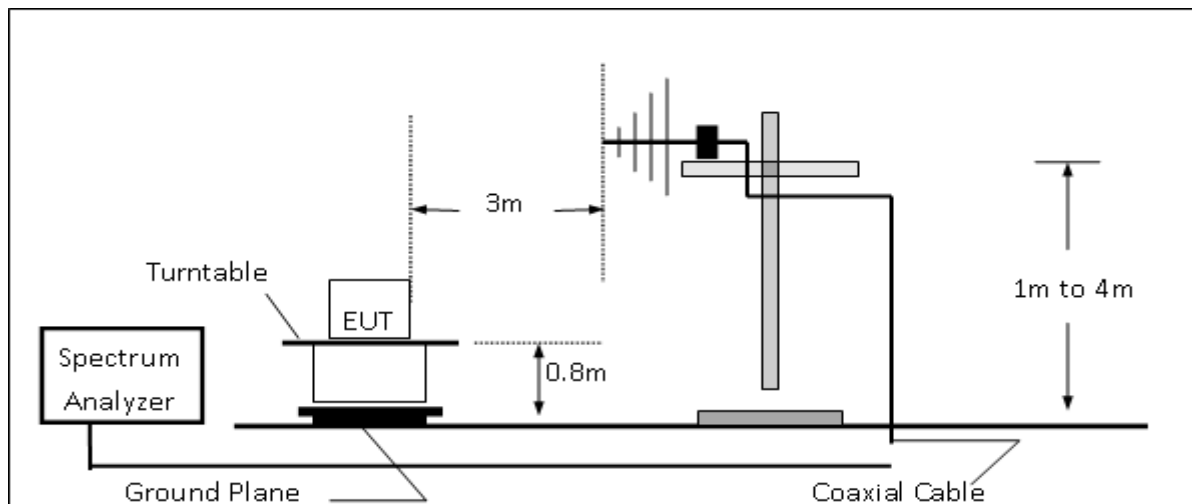
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11.3 Test SET-UP

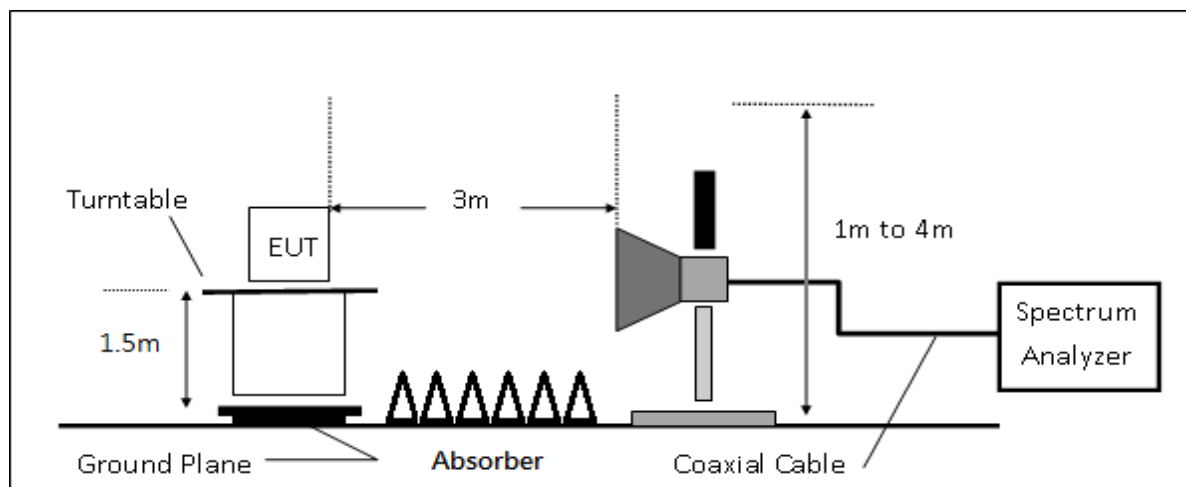
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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11.4 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 v01.
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 ≥ 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.

11.5 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(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

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

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Note :

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

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

11.6 Test Results of Radiated Spurious Emissions form 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.

11.7 Measurement Result

Refer to attach tabular data sheets.

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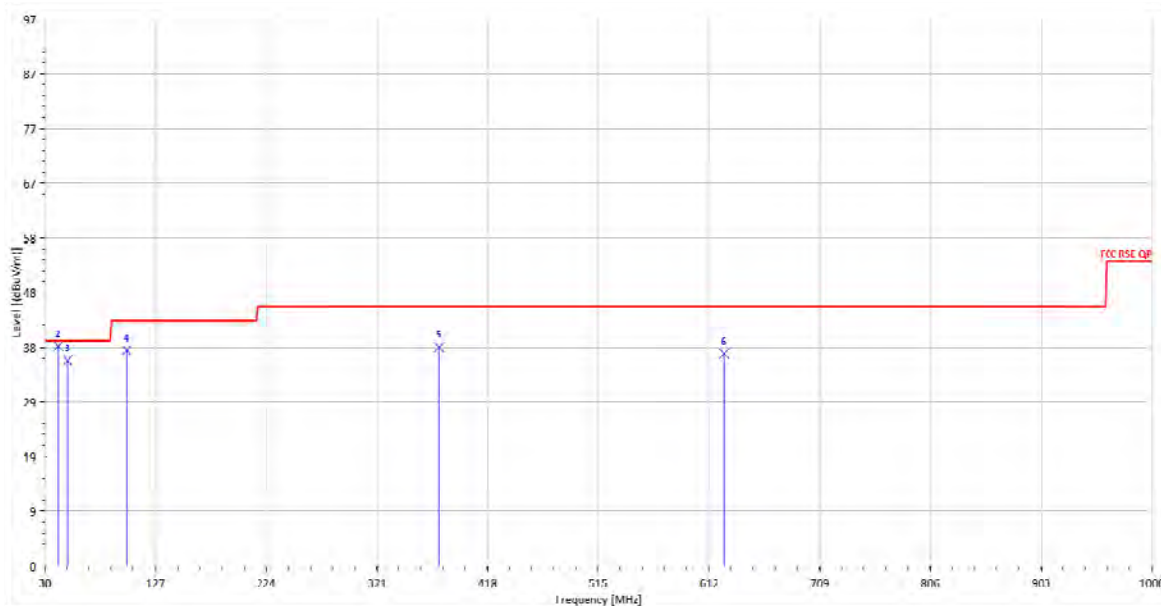
Radiated Spurious Emission Measurement Result

Below 1GHz Worst-Case Data:

802.11a, 5150~5250 MHz

Operation Band :802.11 a
Fundamental Frequency :5220 MHz
Operation Mode :TX MID
EUT Pol. :E2 Plane

Test Date :2015-03-09
Temp./Humi. :22.7 deg_C / 57 RH
Engineer :Ashton
Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
Mode			Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
30.00	QP	S	30.84	-13.11	17.73	40.00	-22.27
41.58	QP	S	58.42	-19.43	38.99	40.00	-1.01
50.36	QP	S	62.10	-25.65	36.45	40.00	-3.55
101.78	QP	S	61.80	-23.54	38.26	43.50	-5.24
375.32	Peak	S	55.45	-16.68	38.77	46.00	-7.23
625.58	Peak	S	49.70	-12.06	37.64	46.00	-8.36

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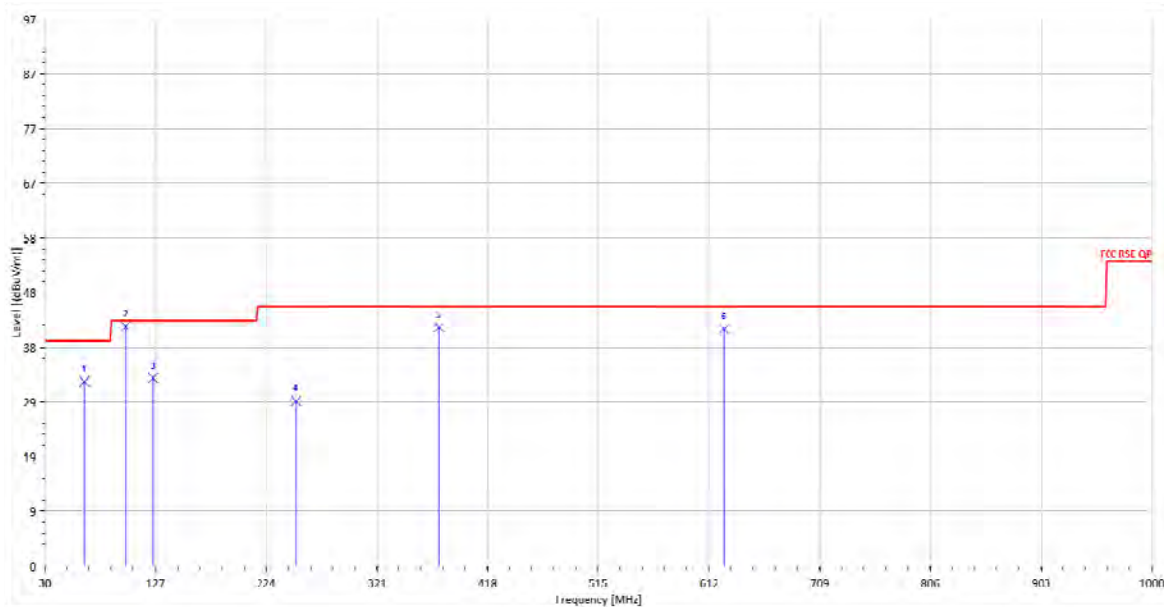
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Operation Band :802.11 a
Fundamental Frequency :5220 MHz
Operation Mode :TX MID
EUT Pol. :E2 Plane

Test Date :2015-03-09
Temp./Humi. :22.7 deg_C / 57 RH
Engineer :Ashton
Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
64.92	Peak	S	60.89	-28.16	32.73	40.00	-7.27
100.70	QP	S	66.30	-23.84	42.46	43.50	-1.04
125.06	Peak	S	54.73	-21.38	33.35	43.50	-10.15
250.19	Peak	S	49.72	-20.45	29.27	46.00	-16.73
375.32	Peak	S	59.05	-16.68	42.37	46.00	-3.63
625.58	Peak	S	54.07	-12.06	42.01	46.00	-3.99

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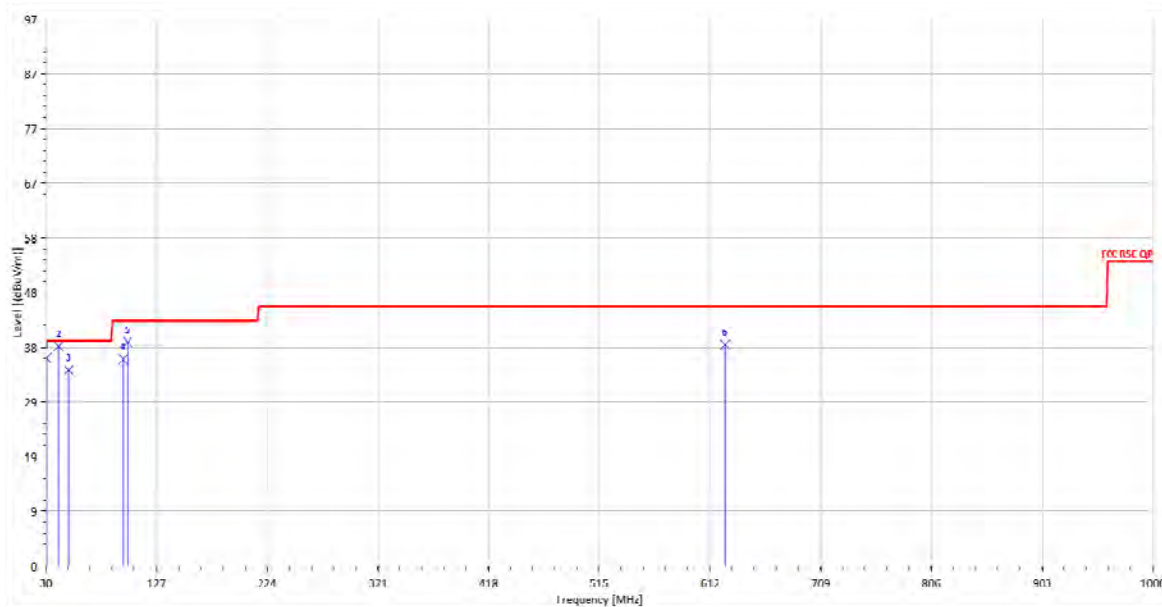
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802.11a, 5725~5850 MHz

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

Test Date :2015-03-09
Temp./Humi. :22.7 deg_C / 57 RH
Engineer :Ashton
Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
30.70	QP	S	50.39	-13.49	36.90	40.00	-3.10
41.10	QP	S	58.70	-19.72	38.98	40.00	-1.02
50.37	QP	S	60.41	-25.65	34.76	40.00	-5.24
97.68	QP	S	60.89	-24.23	36.66	43.50	-6.84
101.74	QP	S	63.27	-23.55	39.73	43.50	-3.77
625.58	Peak	S	51.35	-12.06	39.30	46.00	-6.70

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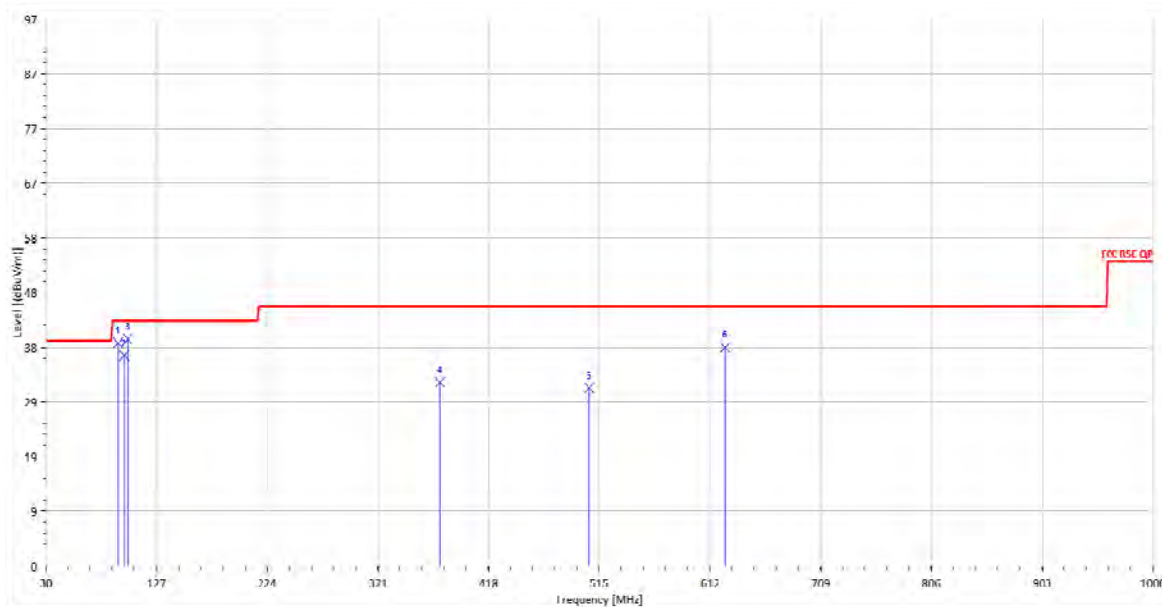
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Operation Band :802.11 a
Fundamental Frequency :5785 MHz
Operation Mode :TX MID
EUT Pol. :E2 Plane

Test Date :2015-03-09
Temp./Humi. :22.7 deg_C / 57 RH
Engineer :Ashton
Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
93.17	QP	S	64.60	-25.04	39.56	43.50	-3.94
98.55	QP	S	61.40	-24.07	37.33	43.50	-6.17
101.78	Peak	S	63.80	-23.54	40.26	43.50	-3.24
375.32	Peak	S	49.30	-16.68	32.62	46.00	-13.38
506.27	Peak	S	45.65	-14.06	31.59	46.00	-14.41
625.58	Peak	S	50.80	-12.06	38.74	46.00	-7.26

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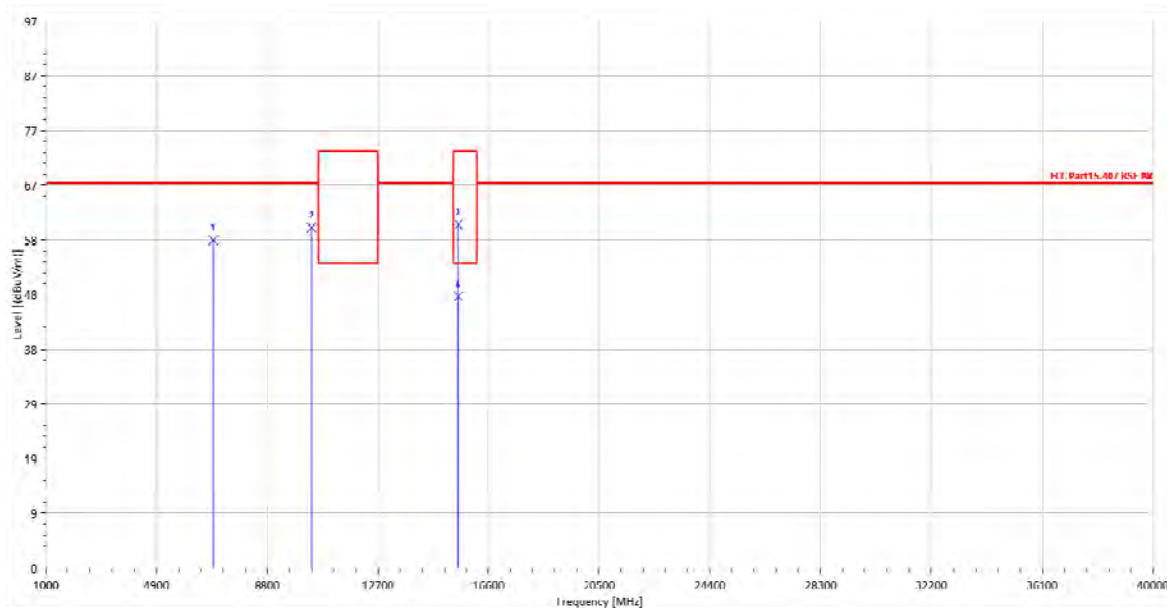
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Above 1GHz Data:

802.11a, 5150~5250 MHz

Operation Band :802.11 a
Fundamental Frequency :5180 MHz
Operation Mode :TX LOW
EUT Pol. :E2 Plane

Test Date :2015-03-09
Temp./Humi. :22.7 deg_C / 57 RH
Engineer :Ashton
Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
6908.00	Peak	S	43.41	14.73	58.14	68.30	-10.16
10360.00	Peak	H	41.46	18.94	60.40	68.30	-7.90
15540.00	Peak	H	35.14	25.80	60.94	74.00	-13.06
15540.00	Average	H	22.36	25.80	48.16	54.00	-5.84

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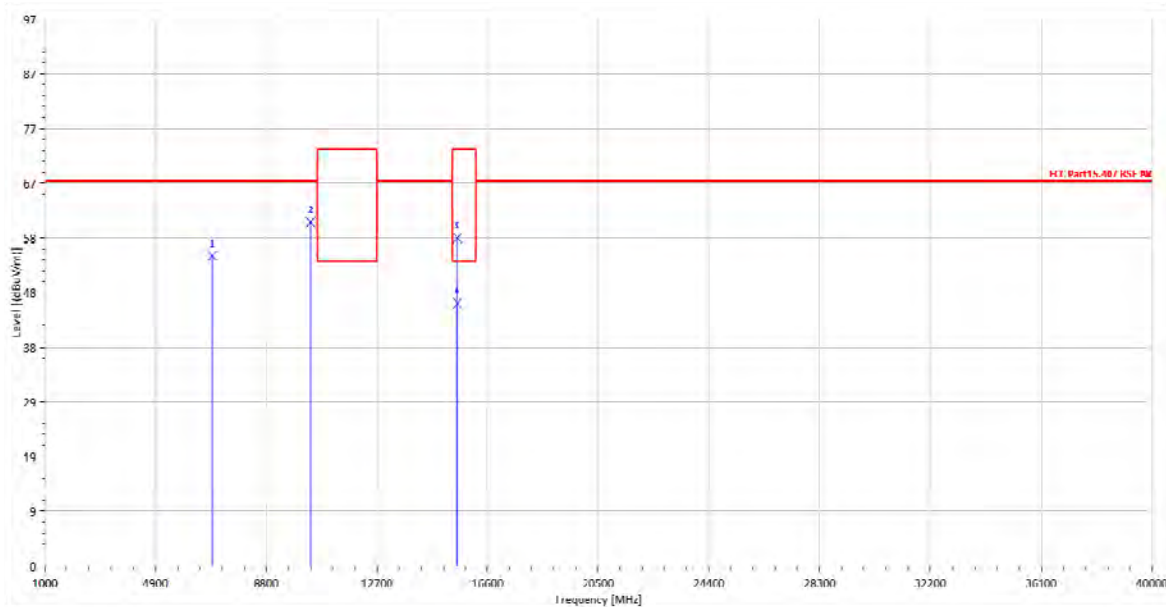
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Operation Band :802.11 a
Fundamental Frequency :5180 MHz
Operation Mode :TX LOW
EUT Pol. :E2 Plane

Test Date :2015-03-09
Temp./Humi. :22.7 deg_C / 57 RH
Engineer :Ashton
Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
6908.00	Peak	S	40.25	14.73	54.98	68.30	-13.32
10360.00	Peak	H	42.04	18.94	60.98	68.30	-7.32
15540.00	Peak	H	32.39	25.80	58.19	74.00	-15.81
15540.00	Average	H	20.79	25.80	46.59	54.00	-7.41

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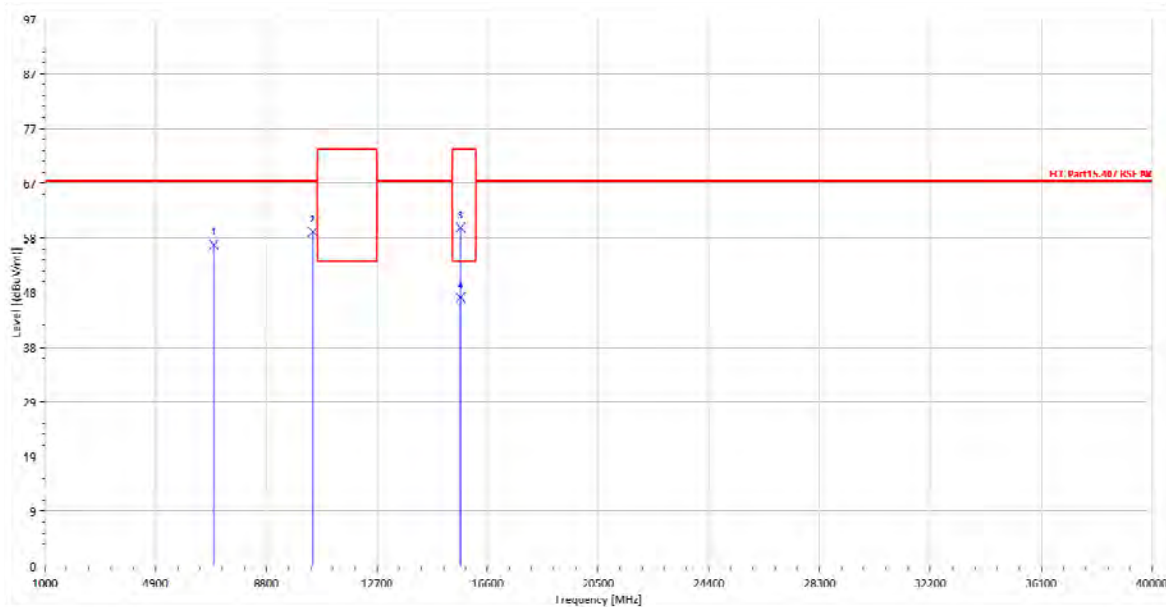
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Operation Band :802.11 a
Fundamental Frequency :5220 MHz
Operation Mode :TX MID
EUT Pol. :E2 Plane

Test Date :2015-03-09
Temp./Humi. :22.7 deg_C / 57 RH
Engineer :Ashton
Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
6964.00	Peak	S	42.27	14.72	56.99	68.30	-11.31
10440.00	Peak	H	40.25	19.03	59.28	68.30	-9.02
15660.00	Peak	H	33.98	26.06	60.05	74.00	-13.95
15660.00	Average	H	21.54	26.06	47.60	54.00	-6.40

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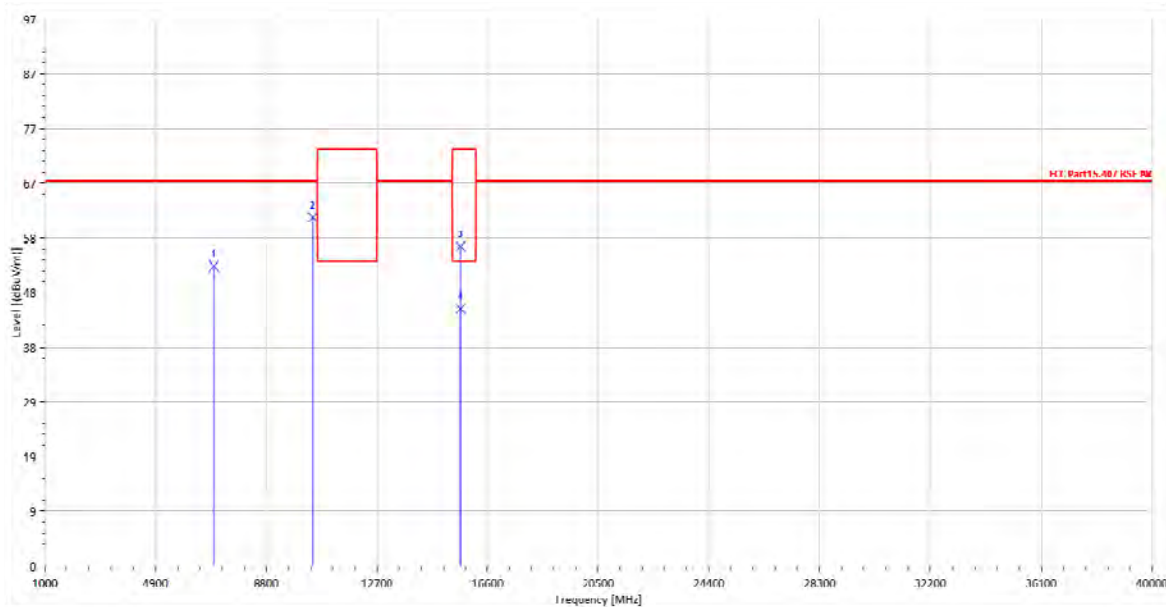
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Operation Band :802.11 a
Fundamental Frequency :5220 MHz
Operation Mode :TX MID
EUT Pol. :E2 Plane

Test Date :2015-03-09
Temp./Humi. :22.7 deg_C / 57 RH
Engineer :Ashton
Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
6964.00	Peak	S	38.47	14.72	53.19	68.30	-15.11
10440.00	Peak	H	42.76	19.03	61.78	68.30	-6.52
15660.00	Peak	H	30.63	26.06	56.70	74.00	-17.30
15660.00	Average	H	19.56	26.06	45.62	54.00	-8.38

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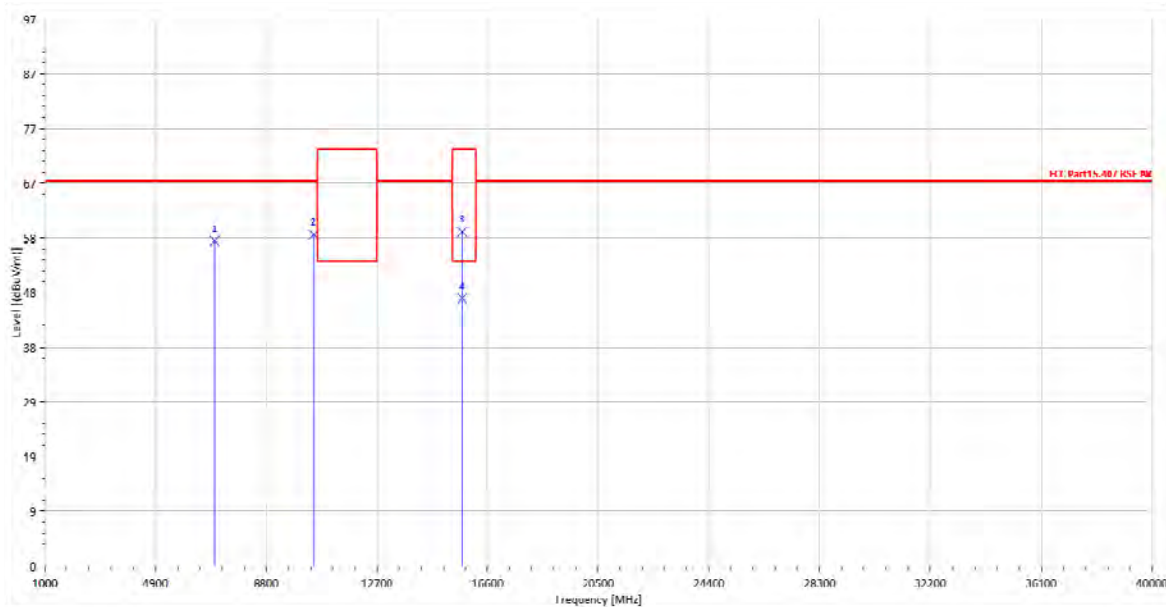
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Operation Band	:802.11 a	Test Date	:2015-03-09
Fundamental Frequency	:5240 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
6992.00	Peak	S	42.87	14.81	57.68	68.30	-10.62
10480.00	Peak	H	39.62	19.16	58.78	68.30	-9.52
15720.00	Peak	H	33.15	26.13	59.28	74.00	-14.72
15720.00	Average	H	21.33	26.13	47.46	54.00	-6.54

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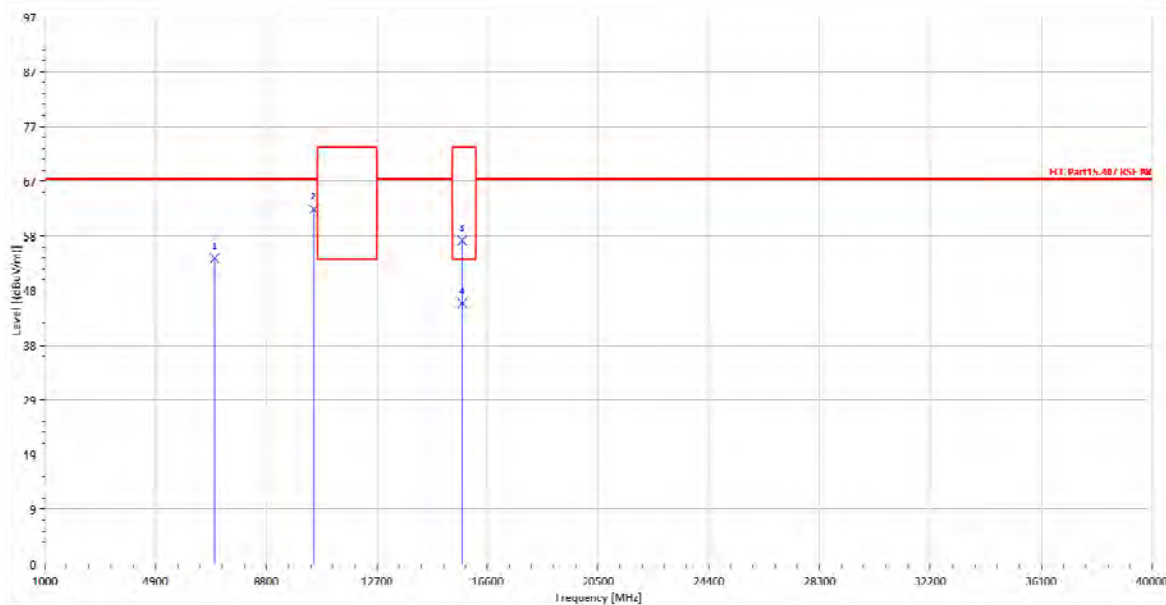
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Operation Band :802.11 a
Fundamental Frequency :5240 MHz
Operation Mode :TX HIGH
EUT Pol. :E2 Plane

Test Date :2015-03-09
Temp./Humi. :22.7 deg_C / 57 RH
Engineer :Ashton
Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
6992.00	Peak	S	39.41	14.81	54.23	68.30	-14.07
10480.00	Peak	H	43.78	19.13	62.91	68.30	-5.39
15720.00	Peak	H	31.21	26.20	57.41	74.00	-16.59
15720.00	Average	H	20.13	26.13	46.26	54.00	-7.74

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Band edge falling to restricted band

Operation Band	:802.11 a	Test Date	:2014-11-17
Fundamental Frequency	:5180 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Average	39.31	7.54	46.85	54.00	-7.15
5150.00	E	Peak	55.43	7.54	62.97	74.00	-11.03

Operation Band	:802.11 a	Test Date	:2014-11-17
Fundamental Frequency	:5180 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Average	41.41	7.54	48.95	54.00	-5.05
5150.00	E	Peak	62.61	7.54	70.15	74.00	-3.85

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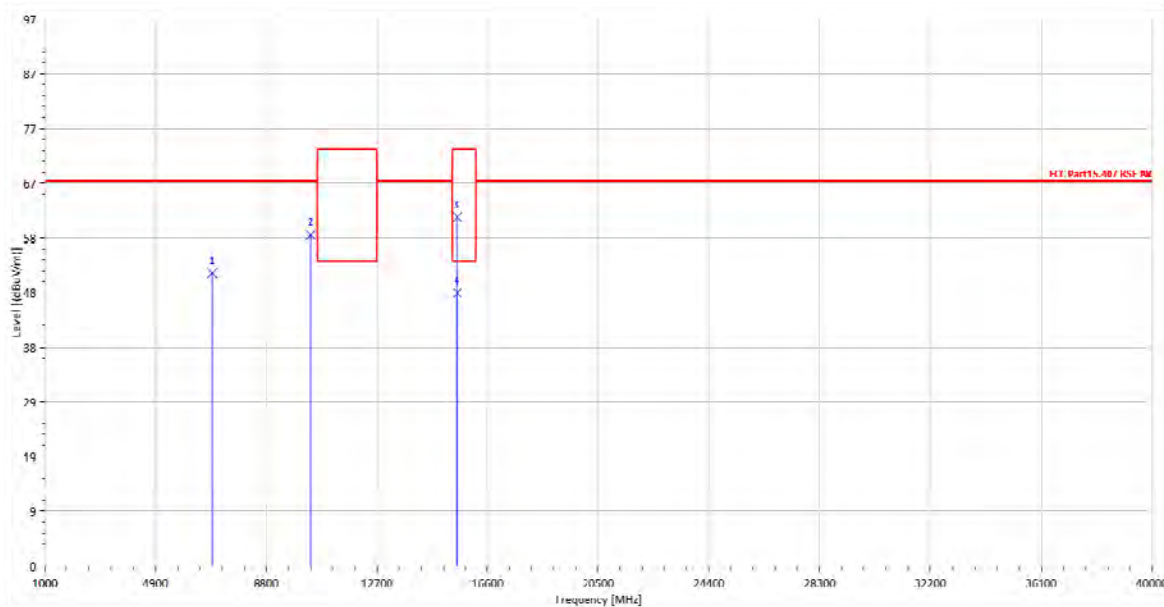
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802.11n HT20, 5150~5250 MHz

Operation Band :802.11 n20M
Fundamental Frequency :5180 MHz
Operation Mode :TX LOW
EUT Pol. :E2 Plane

Test Date :2015-03-09
Temp./Humi. :22.7 deg_C / 57 RH
Engineer :Ashton
Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
6908.00	Peak	S	37.21	14.73	51.94	68.30	-16.36
10360.00	Peak	H	39.79	18.94	58.73	68.30	-9.57
15540.00	Peak	H	36.06	25.80	61.86	74.00	-12.14
15540.00	Average	H	22.64	25.80	48.44	54.00	-5.56

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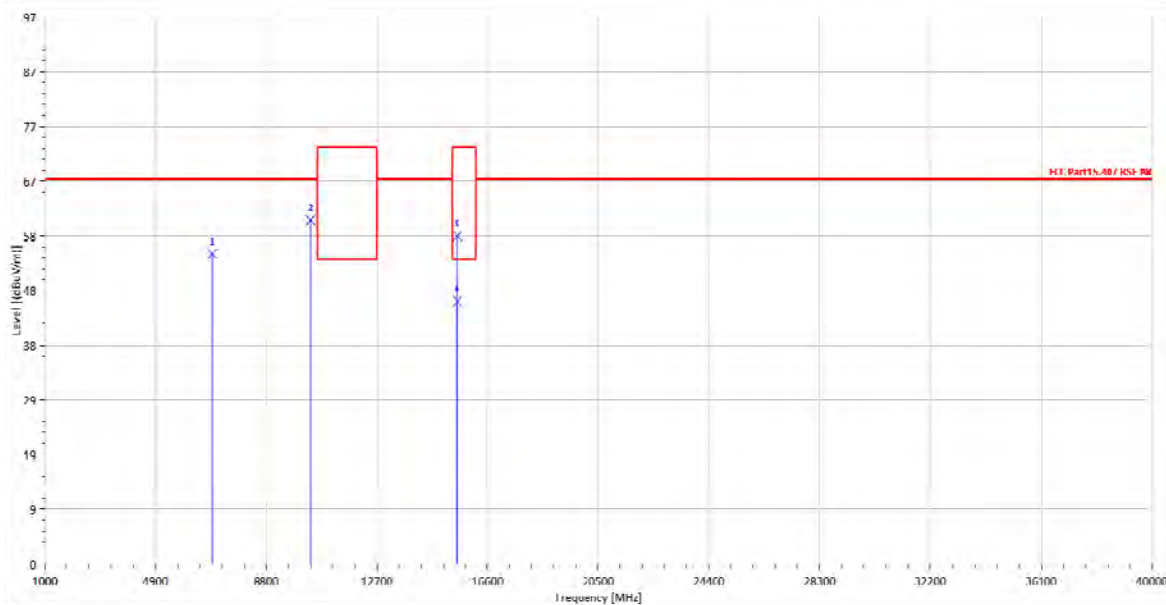
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Operation Band	:802.11 n20M	Test Date	:2015-03-09
Fundamental Frequency	:5180 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
6908.00	Peak	S	37.52	14.73	52.25	68.30	-16.05
10360.00	Peak	H	42.34	18.94	61.28	68.30	-7.02
15540.00	Peak	H	34.06	25.88	59.94	74.00	-14.06
15540.00	Average	H	19.75	25.80	45.55	54.00	-8.45

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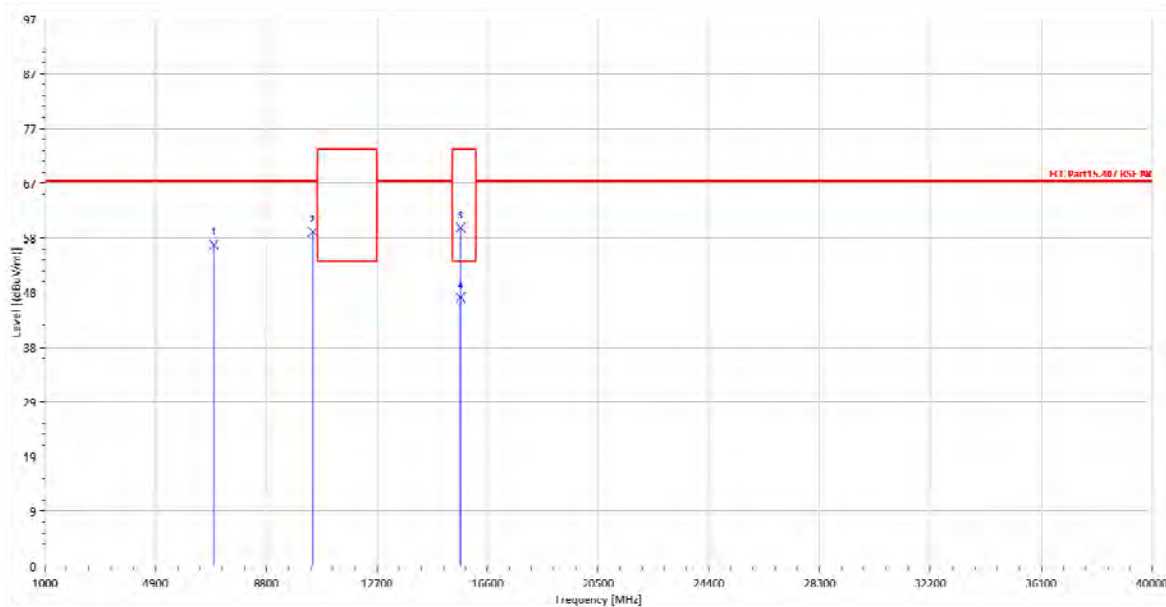
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Operation Band	:802.11 n20M	Test Date	:2015-03-09
Fundamental Frequency	:5220 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
6964.00	Peak	S	38.35	14.72	53.07	68.30	-15.23
10440.00	Peak	H	36.11	18.99	55.10	68.30	-13.20
15660.00	Average	H	21.44	26.06	47.50	54.00	-6.50
15660.00	Peak	H	34.10	26.06	60.16	74.00	-13.84

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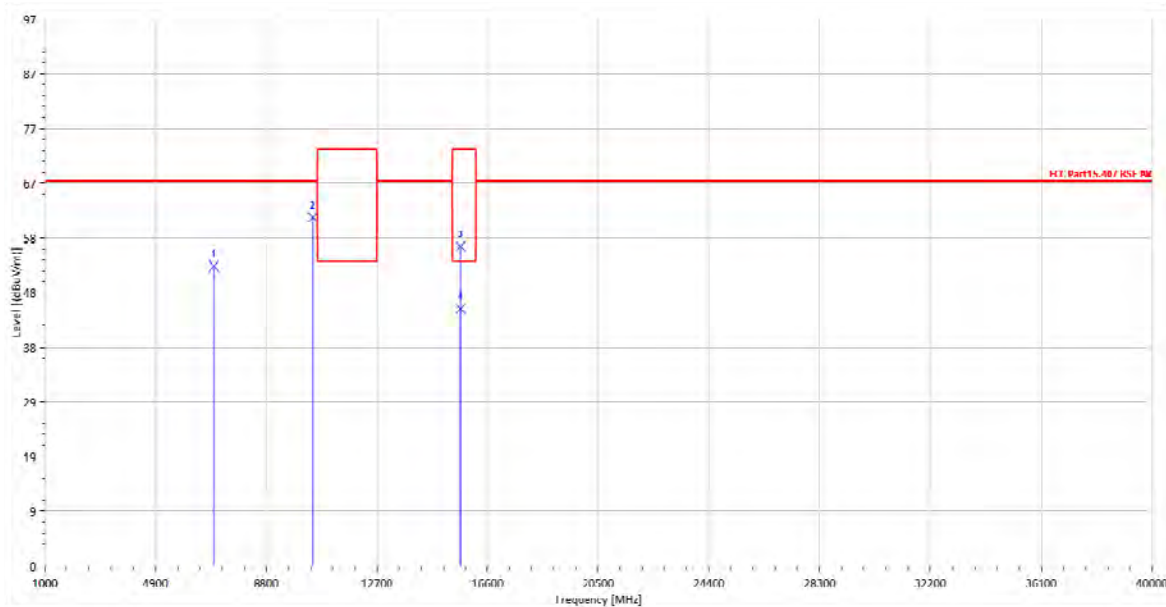
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Operation Band	:802.11 n20M	Test Date	:2015-03-09
Fundamental Frequency	:5220 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
6964.00	Peak	S	35.70	14.72	50.42	68.30	-17.88
10440.00	Peak	H	43.34	19.03	62.36	68.30	-5.94
15660.00	Peak	H	34.09	26.06	60.15	74.00	-13.85
15660.00	Average	H	19.51	26.06	45.57	54.00	-8.43

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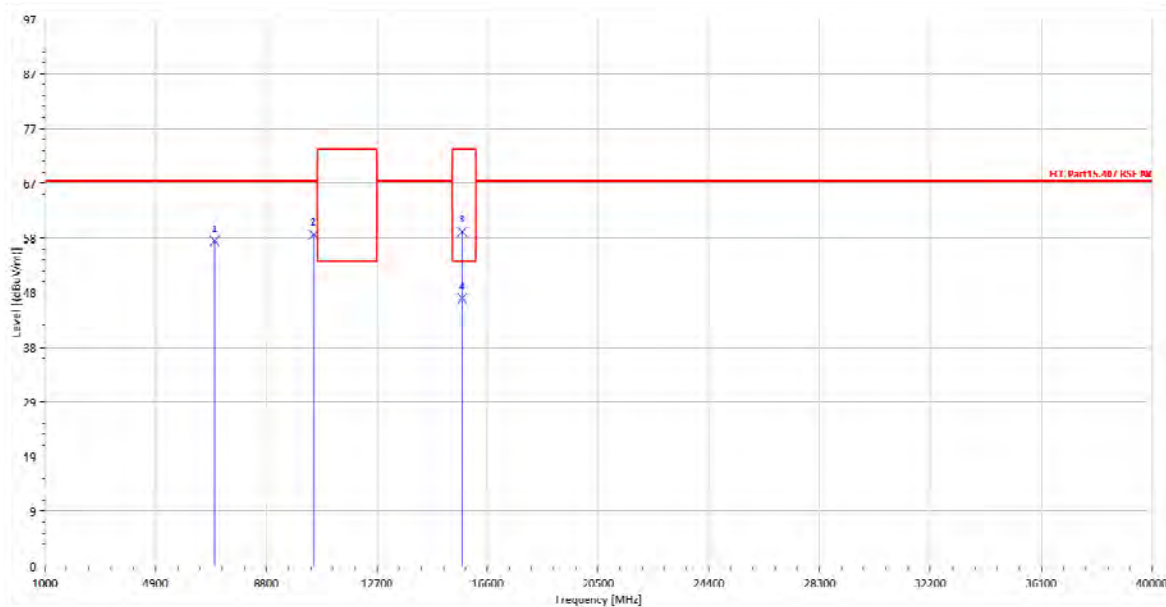
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Operation Band	:802.11 n20M	Test Date	:2015-03-09
Fundamental Frequency	:5240 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
6992.00	Peak	S	38.69	14.81	53.51	68.30	-14.79
10480.00	Peak	H	36.09	19.13	55.22	68.30	-13.08
15720.00	Peak	H	36.14	26.11	62.26	74.00	-11.74
15720.00	Average	H	21.73	26.13	47.86	54.00	-6.14

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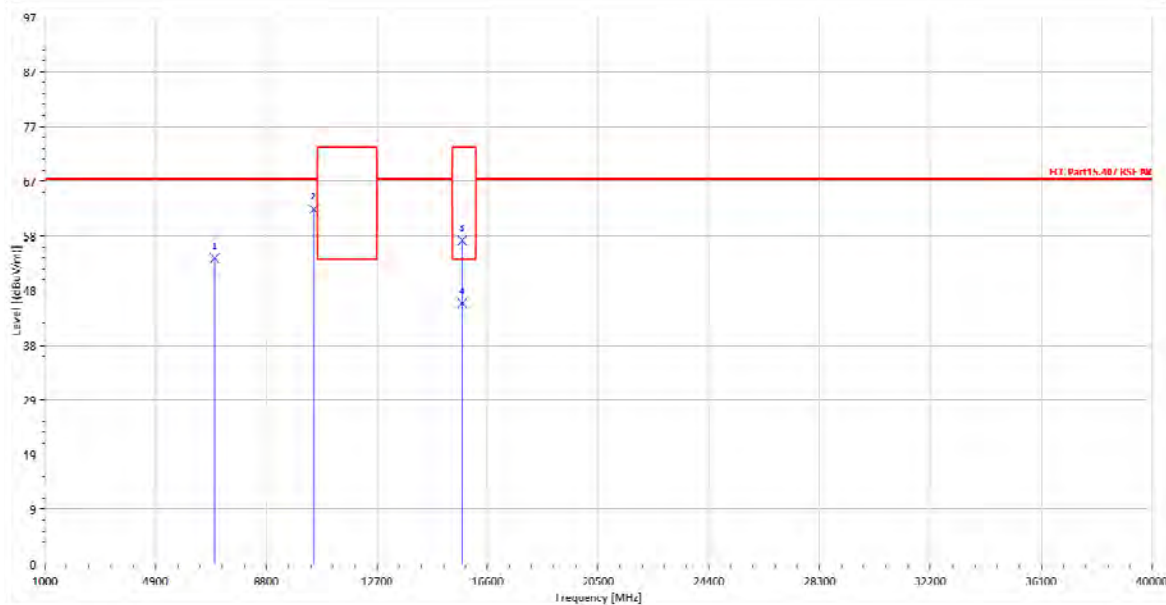
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Operation Band	:802.11 n20M	Test Date	:2015-03-09
Fundamental Frequency	:5240 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
6992.00	Peak	S	37.50	14.81	52.31	68.30	-15.99
10480.00	Peak	H	41.98	19.16	61.14	68.30	-7.16
15720.00	Peak	H	31.64	26.11	57.76	74.00	-16.24
15720.00	Average	H	19.42	26.13	45.55	54.00	-8.45

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Band edge falling to restricted band

Operation Band	:802.11 n20M	Test Date	:2014-11-17
Fundamental Frequency	:5180 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	Peak	E	57.76	11.14	68.90	74.00	-5.10
5150.00	Average	E	41.34	11.14	52.48	54.00	-1.52

Operation Band	:802.11 n20M	Test Date	:2014-11-17
Fundamental Frequency	:5180 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	Peak	E	49.70	11.14	60.84	74.00	-13.16
5150.00	Average	E	33.51	11.14	44.65	54.00	-9.35

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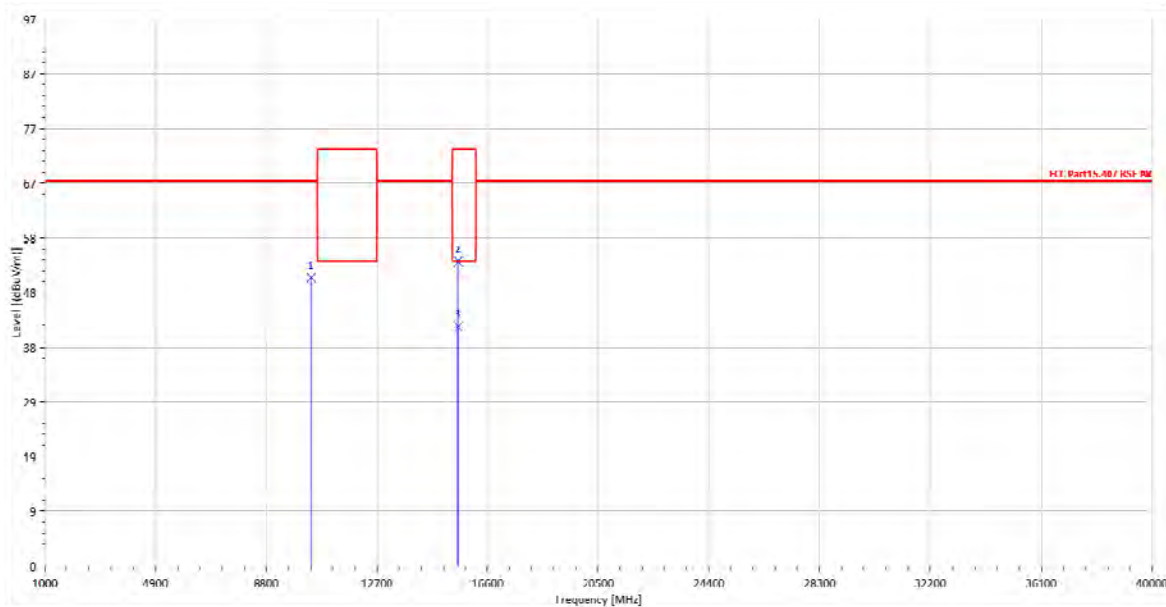
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5150~5250 MHz

Operation Band	:802.11 n40M	Test Date	:2015-03-09
Fundamental Frequency	:5190 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
10380.00	Peak	H	32.09	19.01	51.11	68.30	-17.19
15570.00	Peak	H	28.26	25.80	54.06	74.00	-19.94
15570.00	Average	H	16.66	25.80	42.46	54.00	-11.54

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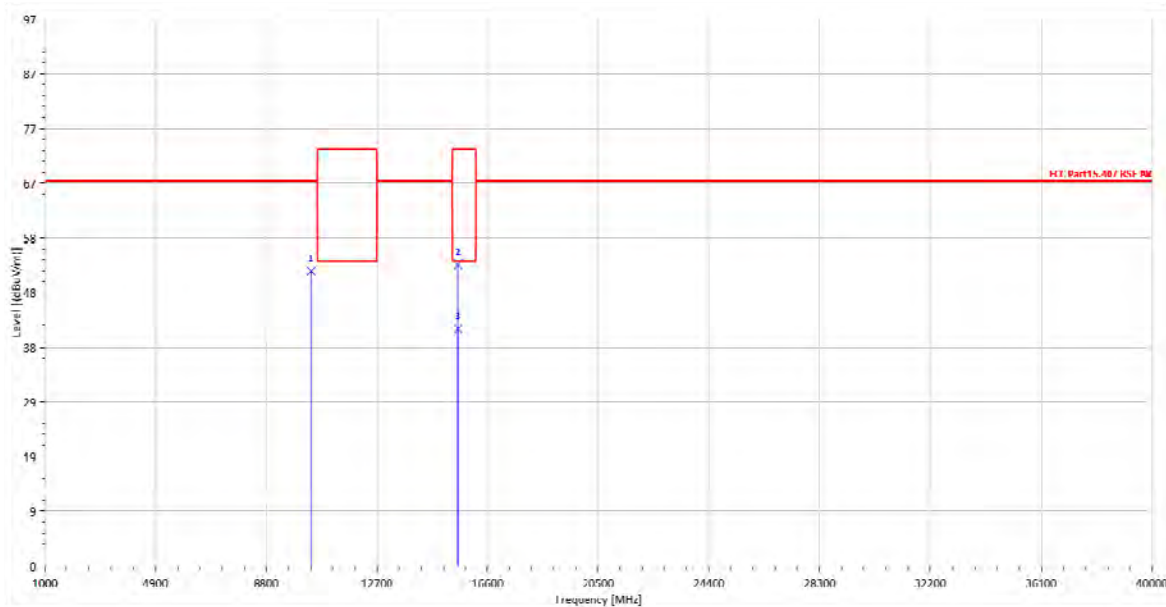
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Operation Band	:802.11 n40M	Test Date	:2015-03-09
Fundamental Frequency	:5190 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
10380.00	Peak	H	33.29	19.01	52.30	68.30	-16.00
15570.00	Peak	H	27.67	25.80	53.48	74.00	-20.52
15570.00	Average	H	16.26	25.80	42.06	54.00	-11.94

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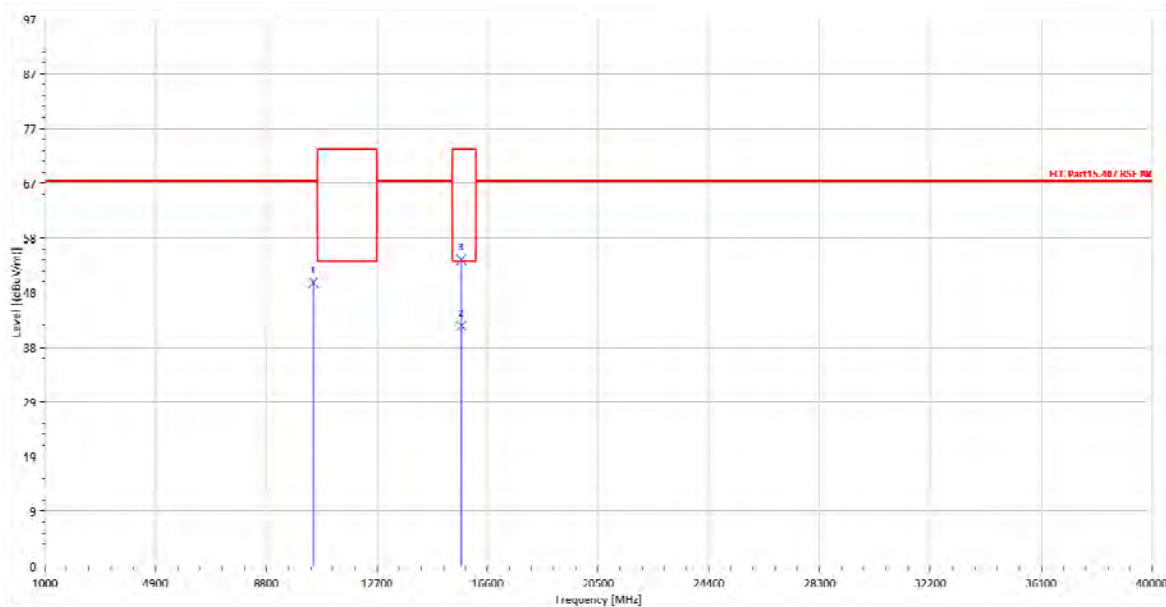
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Operation Band	:802.11 n40M	Test Date	:2015-03-09
Fundamental Frequency	:5230 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
10460.00	Peak	H	31.13	19.11	50.25	68.30	-18.05
15690.00	Average	H	16.54	26.05	42.59	54.00	-11.41
15690.00	Peak	H	28.27	26.05	54.32	74.00	-19.68

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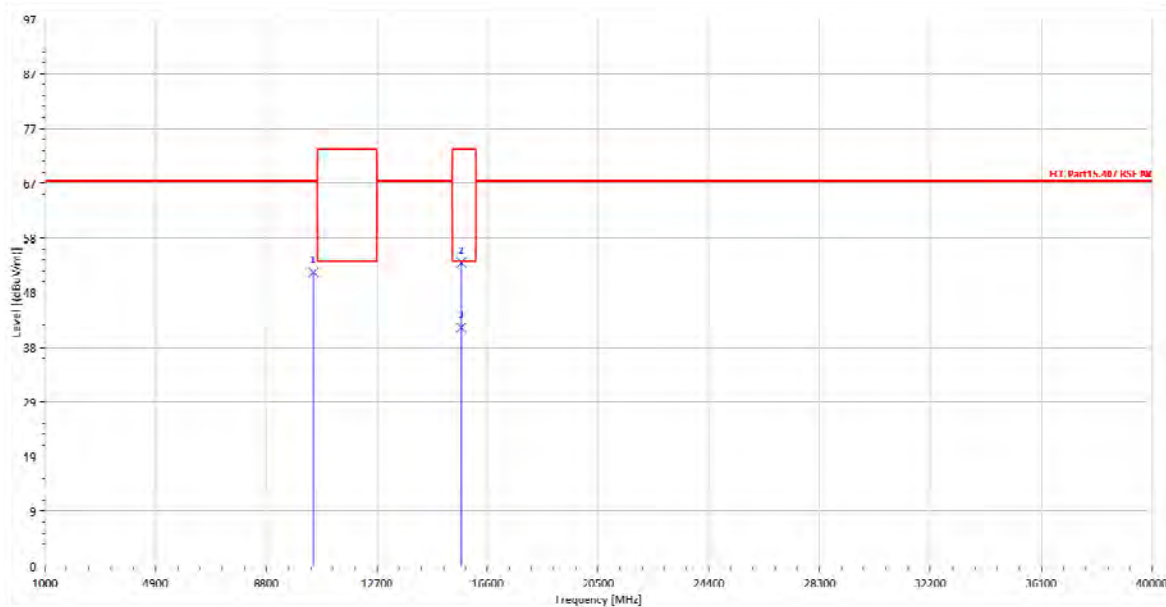
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Operation Band	:802.11 n40M	Test Date	:2015-03-09
Fundamental Frequency	:5230 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
10460.00	Peak	H	32.96	19.11	52.08	68.30	-16.22
15690.00	Peak	H	27.77	26.05	53.82	74.00	-20.18
15690.00	Average	H	16.28	26.05	42.33	54.00	-11.67

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Band edge falling to restricted band

Operation Band	:802.11 n40M	Test Date	:2015-03-09
Fundamental Frequency	:5190 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	Peak	E	56.75	11.14	67.90	74.00	-6.10
5150.00	Average	E	41.49	11.14	52.63	54.00	-1.37

Operation Band	:802.11 n40M	Test Date	:2015-03-09
Fundamental Frequency	:5190 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	Peak	E	48.88	11.14	60.03	74.00	-13.97
5150.00	Average	E	33.99	11.14	45.13	54.00	-8.87

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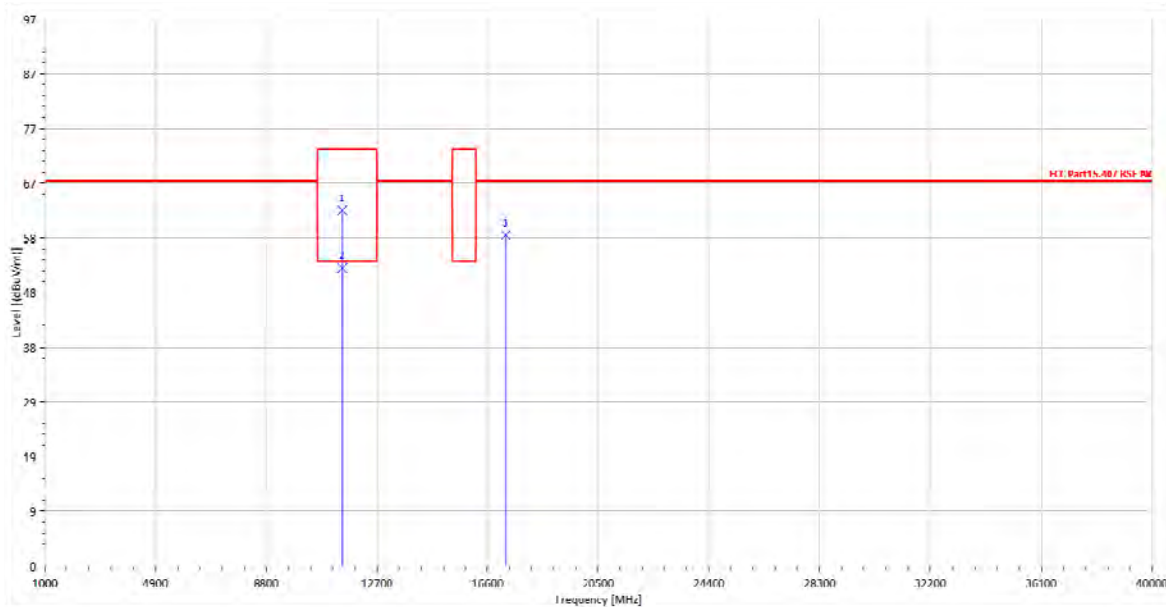
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Radiated Spurious Emission Measurement Result 802.11a, 5725~5850 MHz

Operation Band	:802.11 a	Test Date	:2015-03-09
Fundamental Frequency	:5745 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
11490.00	Peak	H	42.02	21.08	63.10	74.00	-10.90
11490.00	Average	H	31.82	21.08	52.90	54.00	-1.10
17235.00	Peak	H	30.64	28.06	58.70	68.30	-9.60

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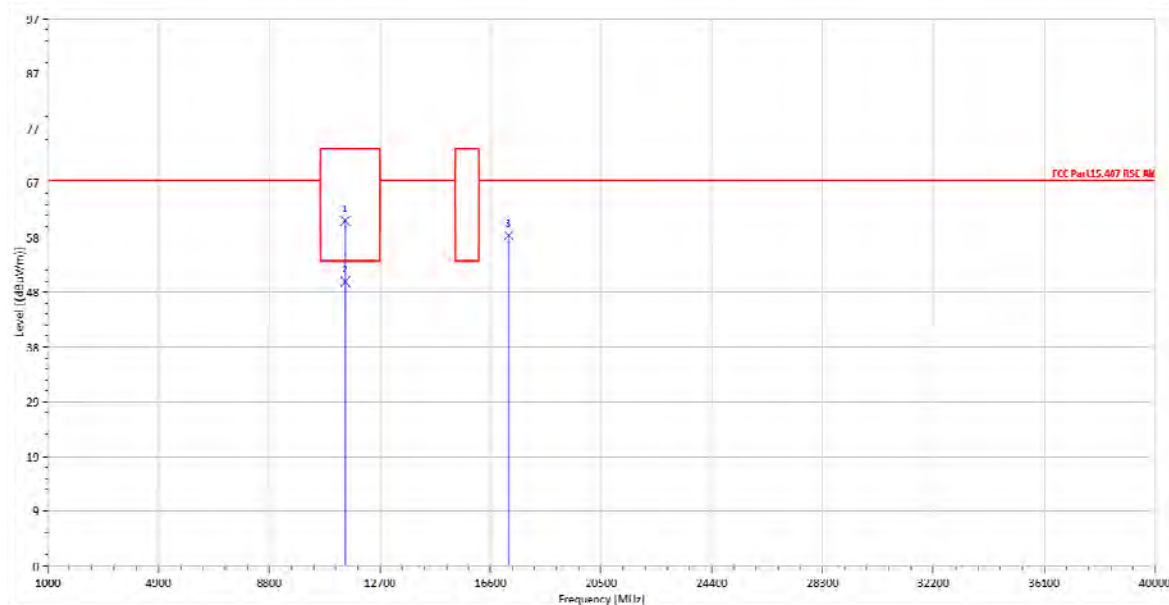
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Operation Band :802.11 a
Fundamental Frequency :5745 MHz
Operation Mode :TX LOW
EUT Pol. :E2 Plane

Test Date :2015-03-09
Temp./Humi. :22.7 deg_C / 57 RH
Engineer :Ashton
Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	PK/QP/AV	F/H/E/S	Reading Level	dB	FS	@3m	dB
11490.00	Peak	H	40.07	21.08	61.15	74.00	-12.85
11490.00	Average	H	29.27	21.08	50.35	54.00	-3.65
17235.00	Peak	H	30.48	28.06	58.53	68.30	-9.77

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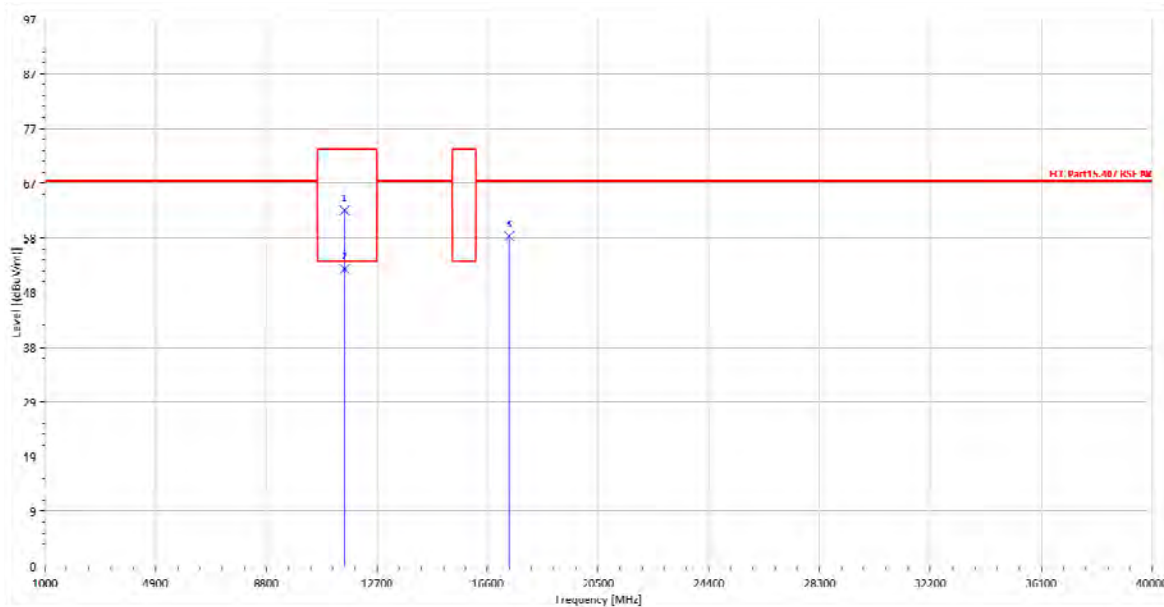
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Operation Band	:802.11 a	Test Date	:2015-03-09
Fundamental Frequency	:5785 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
11570.00	Peak	H	41.96	21.14	63.09	74.00	-10.91
11570.00	Average	H	31.53	21.14	52.67	54.00	-1.33
17355.00	Peak	H	30.61	27.87	58.48	68.30	-9.82

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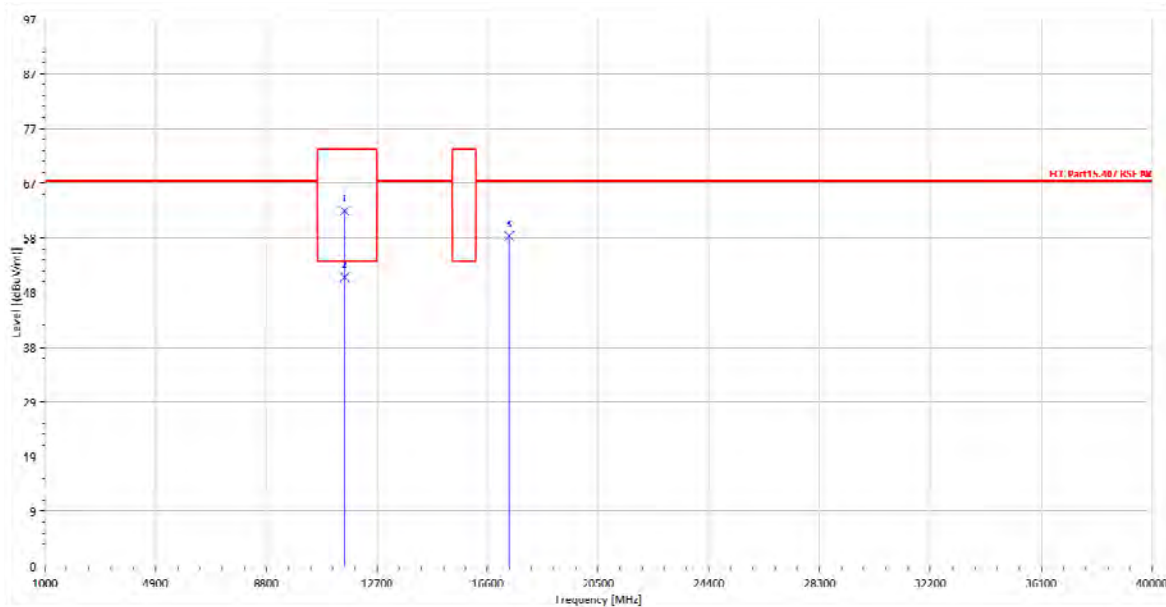
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Operation Band	:802.11 a	Test Date	:2015-03-09
Fundamental Frequency	:5785 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
11570.00	Peak	H	41.84	21.14	62.98	74.00	-11.02
11570.00	Average	H	30.05	21.14	51.19	54.00	-2.81
17355.00	Peak	H	30.67	27.87	58.54	68.30	-9.76

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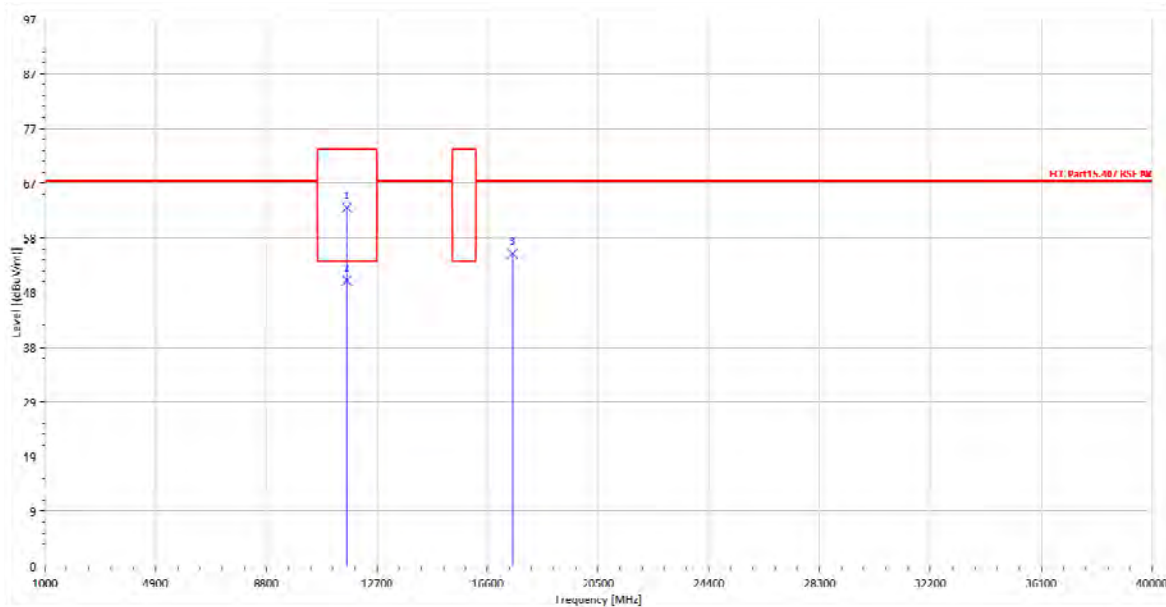
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Operation Band	:802.11 a	Test Date	:2015-03-09
Fundamental Frequency	:5825 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
11650.00	Peak	H	42.31	21.27	63.58	74.00	-10.42
11650.00	Average	H	29.40	21.27	50.67	54.00	-3.33
17475.00	Peak	H	27.75	27.65	55.40	68.30	-12.90

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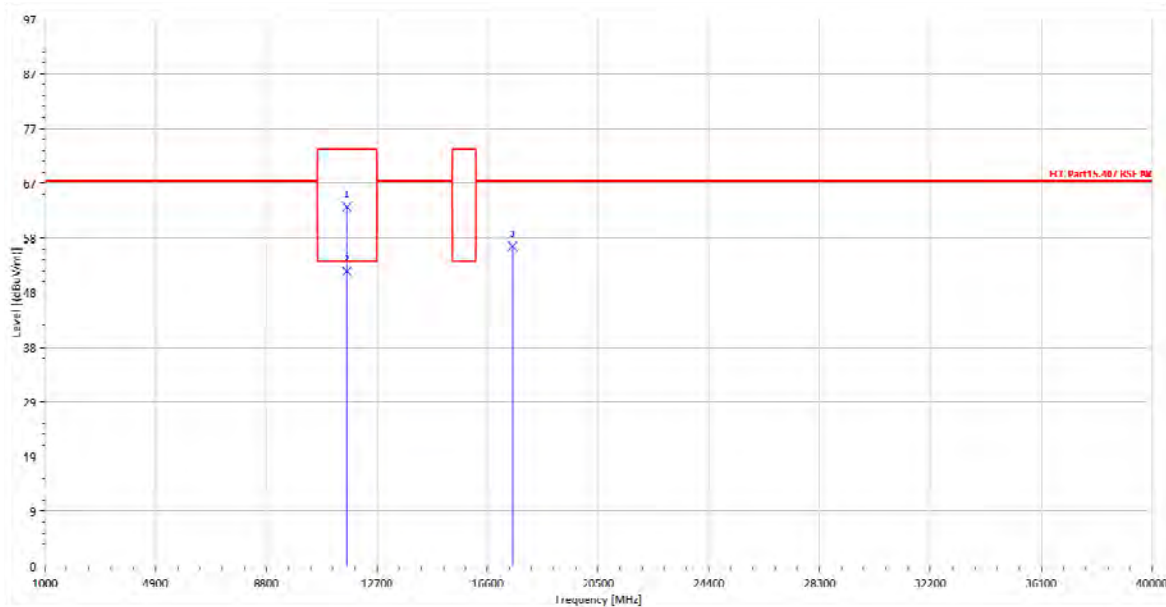
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Operation Band	:802.11 a	Test Date	:2015-03-09
Fundamental Frequency	:5825 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
11650.00	Peak	H	42.41	21.27	63.69	74.00	-10.31
11650.00	Average	H	30.97	21.27	52.24	54.00	-1.76
17475.00	Peak	H	29.08	27.65	56.73	68.30	-11.57

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Band edge falling to restricted band

Operation Band	:802.11 a	Test Date	:2017-06-03
Fundamental Frequency	:5745 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5700.00	S	Peak	60.44	2.46	62.90	105.23	-42.33
5714.90	S	Peak	54.42	12.30	66.72	109.4014	-42.68
5720.00	S	Peak	65.40	2.49	67.89	110.83	-42.94
5725.00	E	Peak	63.86	12.27	76.13	122.23	-46.10

Operation Band	:802.11 a	Test Date	: 2017-06-03
Fundamental Frequency	:5745 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5700.00	S	Peak	47.60	12.29	59.90	105.23	5700.00
5715.90	S	Peak	55.35	12.30	67.65	109.682	5715.90
5720.00	S	Peak	53.31	12.29	65.59	110.83	5720.00
5725.00	E	Peak	60.87	12.27	73.14	122.23	5725.00

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Operation Band	:802.11 a	Test Date	:2017-06-03
Fundamental Frequency	:5825 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5850.00	E	Peak	61.40	12.61	74.01	122.23	-48.22
5851.00	S	Peak	61.94	12.62	74.56	119.95	-45.39
5855.00	S	Peak	55.82	12.66	68.48	110.83	-42.35
5875.00	S	Peak	44.86	12.78	57.65	105.23	-47.58

Operation Band	:802.11 a	Test Date	: 2017-06-03
Fundamental Frequency	:5825 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5850.00	E	Peak	57.15	12.61	69.76	122.23	-52.47
5851.30	S	Peak	57.31	12.62	69.93	119.2664	-49.34
5855.00	S	Peak	51.79	12.66	64.45	110.83	-46.38
5875.00	S	Peak	42.03	12.78	54.81	105.23	-50.42

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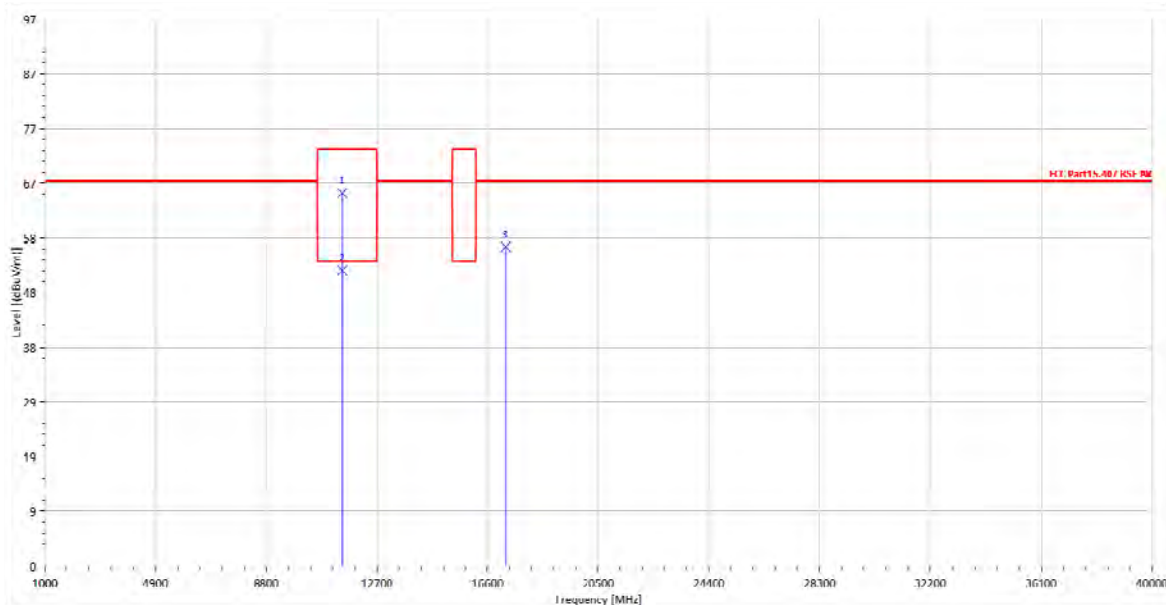
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5725~5850 MHz

Operation Band	:802.11 n20M	Test Date	:2015-03-09
Fundamental Frequency	:5745 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
11490.00	Peak	H	45.07	21.08	66.16	74.00	-7.84
11490.00	Average	H	31.35	21.08	52.43	54.00	-1.57
17235.00	Peak	H	28.58	28.06	56.64	68.30	-11.66

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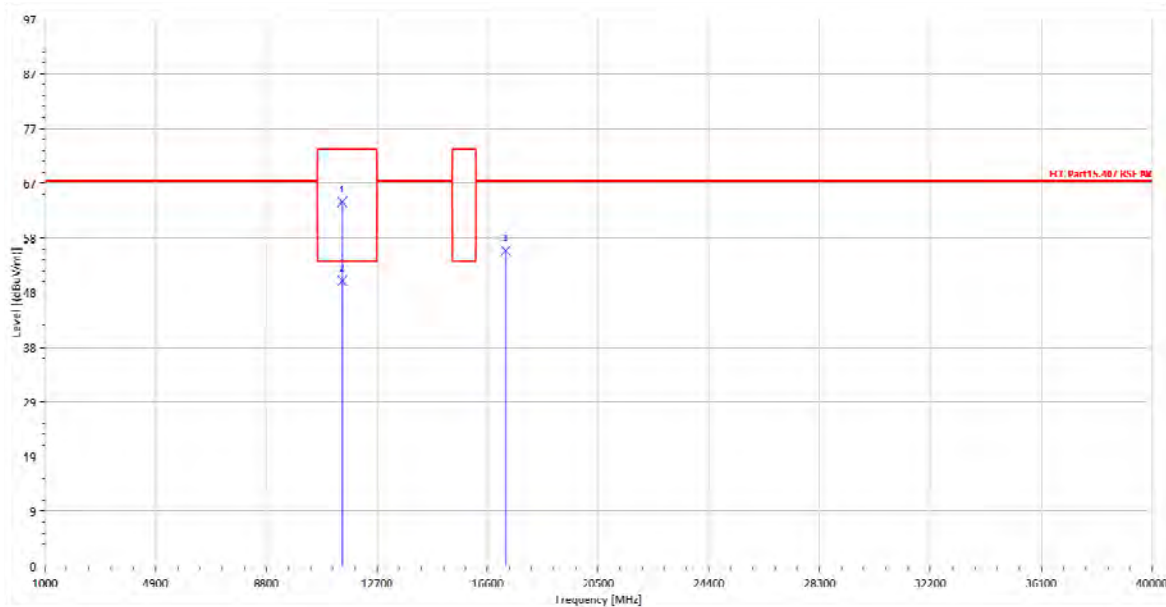
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Operation Band	:802.11 n20M	Test Date	:2015-03-09
Fundamental Frequency	:5745 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
11490.00	Peak	H	43.48	21.08	64.56	74.00	-9.44
11490.00	Average	H	29.51	21.08	50.59	54.00	-3.41
17235.00	Peak	H	27.87	28.06	55.93	68.30	-12.37

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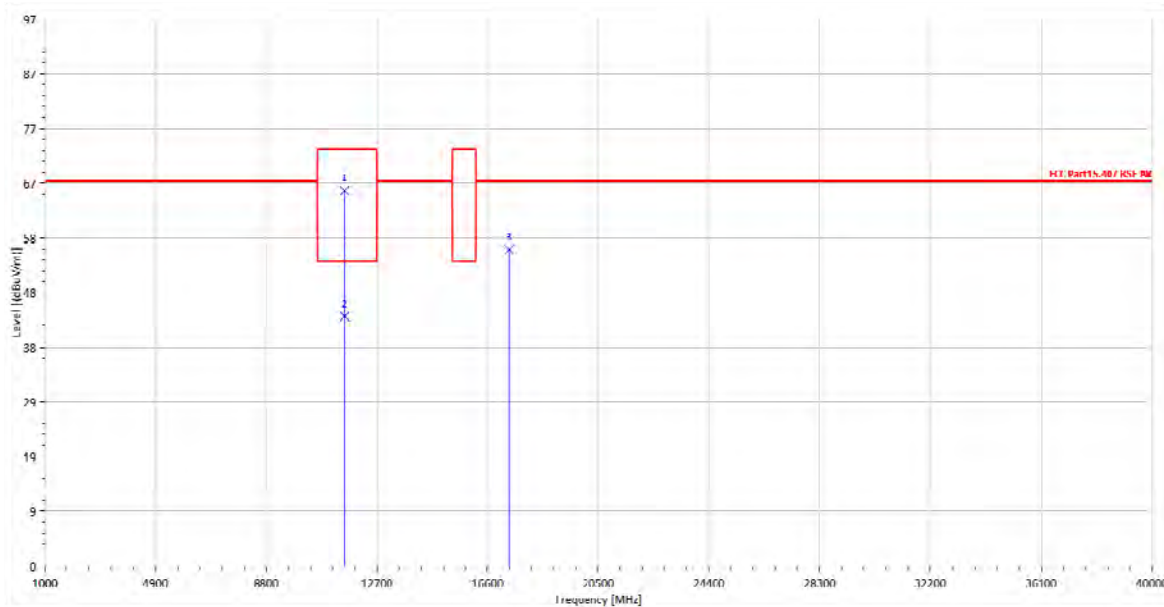
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Operation Band	:802.11 n20M	Test Date	:2015-03-09
Fundamental Frequency	:5785 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
11570.00	Peak	H	45.46	21.14	66.60	74.00	-7.40
11570.00	Average	H	23.13	21.14	44.26	54.00	-9.74
17355.00	Peak	H	28.24	27.87	56.12	68.30	-12.18

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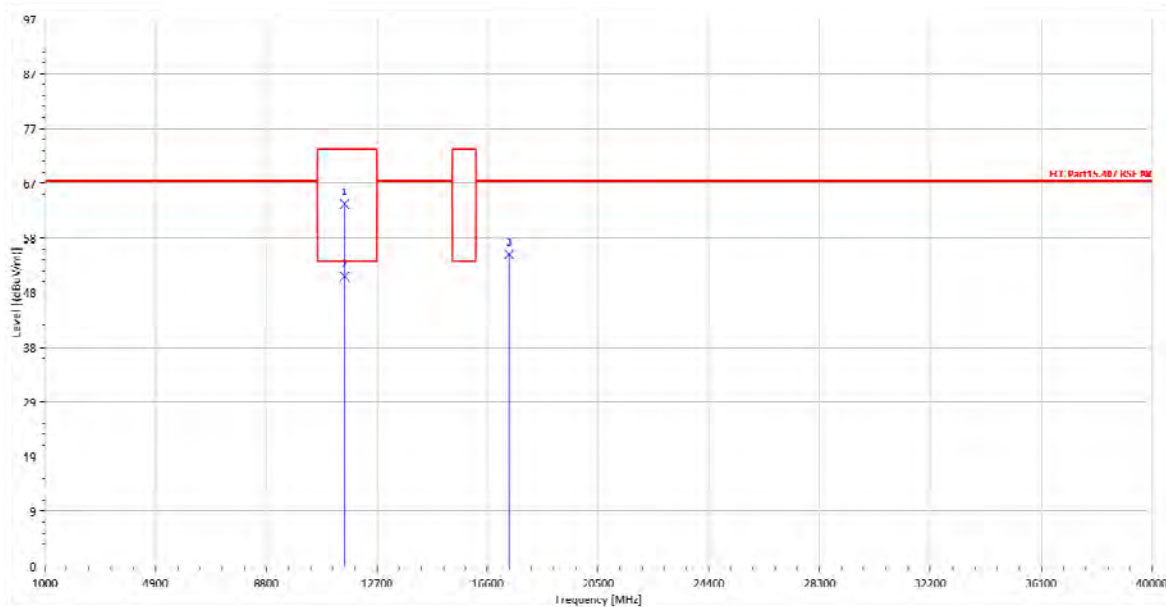
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Operation Band	:802.11 n20M	Test Date	:2015-03-09
Fundamental Frequency	:5785 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
11570.00	Peak	H	43.02	21.14	64.16	74.00	-9.84
11570.00	Average	H	30.18	21.14	51.32	54.00	-2.68
17355.00	Peak	H	27.40	27.87	55.28	68.30	-13.02

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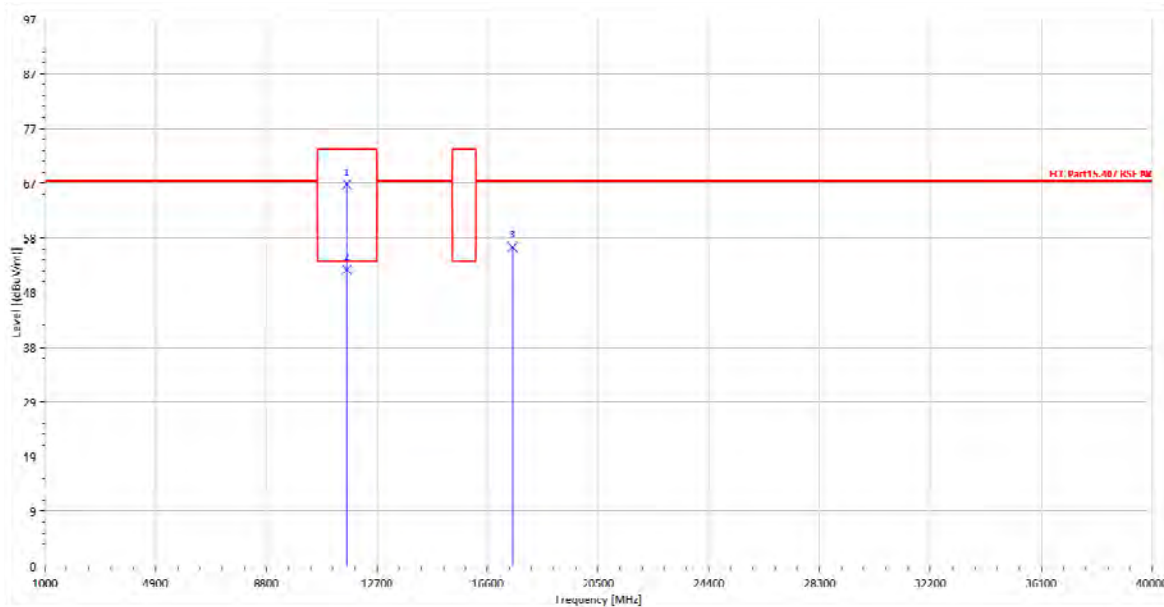
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Operation Band	:802.11 n20M	Test Date	:2015-03-09
Fundamental Frequency	:5825 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
11650.00	Peak	H	46.46	21.27	67.73	74.00	-6.27
11650.00	Average	H	31.29	21.27	52.56	54.00	-1.44
17475.00	Peak	H	28.91	27.65	56.56	68.30	-11.74

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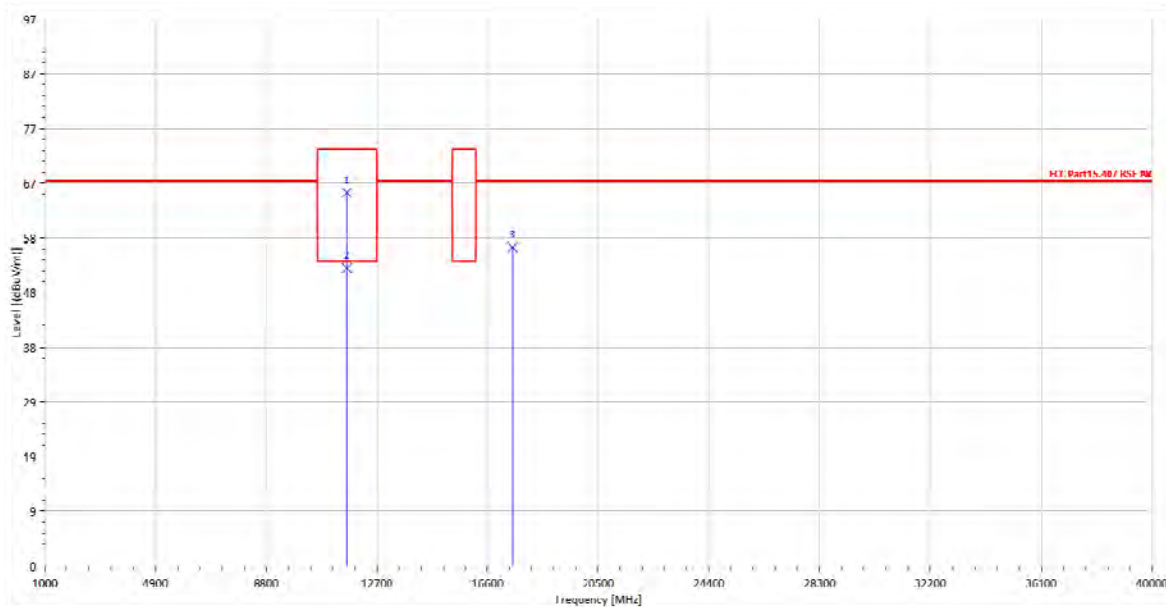
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Operation Band	:802.11 n20M	Test Date	:2015-03-09
Fundamental Frequency	:5825 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
11650.00	Peak	H	44.97	21.27	66.24	74.00	-7.76
11650.00	Average	H	31.60	21.27	52.87	54.00	-1.13
17475.00	Peak	H	28.89	27.65	56.54	68.30	-11.76

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Band edge falling to restricted band

Operation Band	:802.11 n20M	Test Date	:2017-06-03
Fundamental Frequency	:5745 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5700.00	S	Peak	46.29	12.29	58.58	105.23	-46.65
5720.00	S	Peak	56.21	12.29	68.50	110.83	-42.33
5723.90	S	Peak	63.16	12.27	75.43	119.7218	-44.29
5725.00	E	Peak	62.42	12.27	74.69	122.23	-47.54

Operation Band	:802.11 n20M	Test Date	:2017-06-03
Fundamental Frequency	:5745 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5700.00	S	Peak	43.55	12.29	55.85	105.23	-49.38
5720.00	S	Peak	53.58	12.29	65.87	110.83	-44.96
5723.60	S	Peak	59.59	12.27	71.87	119.0382	-47.17
5725.00	E	Peak	58.82	12.27	71.09	122.23	-51.14

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Operation Band	:802.11 n20M	Test Date	:2017-06-03
Fundamental Frequency	:5825 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5850.00	E	Peak	60.45	12.61	73.06	122.23	-49.17
5851.90	S	Peak	60.11	12.63	72.73	117.8982	-45.16
5855.00	S	Peak	54.73	12.66	67.39	110.83	-43.44
5875.00	S	Peak	43.40	12.78	56.18	105.23	-49.05

Operation Band	:802.11 n20M	Test Date	:2017-06-03
Fundamental Frequency	:5825 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5850.00	E	Peak	56.47	12.61	69.08	122.23	-53.15
5852.00	S	Peak	55.82	12.63	68.45	117.67	-49.22
5855.00	S	Peak	50.81	12.66	63.46	110.83	-47.37
5875.00	S	Peak	40.08	12.78	52.86	105.23	-52.37

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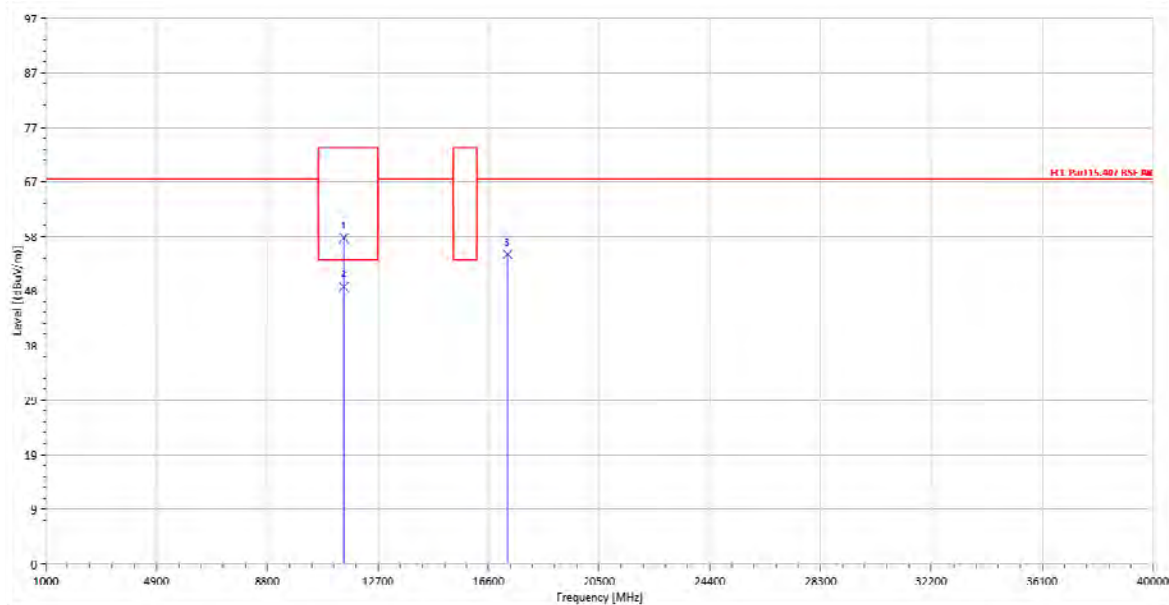
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Radiated Spurious Emission Measurement Result (802.11n (5GHz)_40M)

Operation Band	:802.11 n40M	Test Date	:2015-03-09
Fundamental Frequency	:5755 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
11510.00	Peak	H	36.72	21.17	57.89	74.00	-16.11
11510.00	Average	H	28.08	21.17	49.25	54.00	-4.75
17265.00	Peak	H	27.17	27.82	54.99	68.30	-13.31

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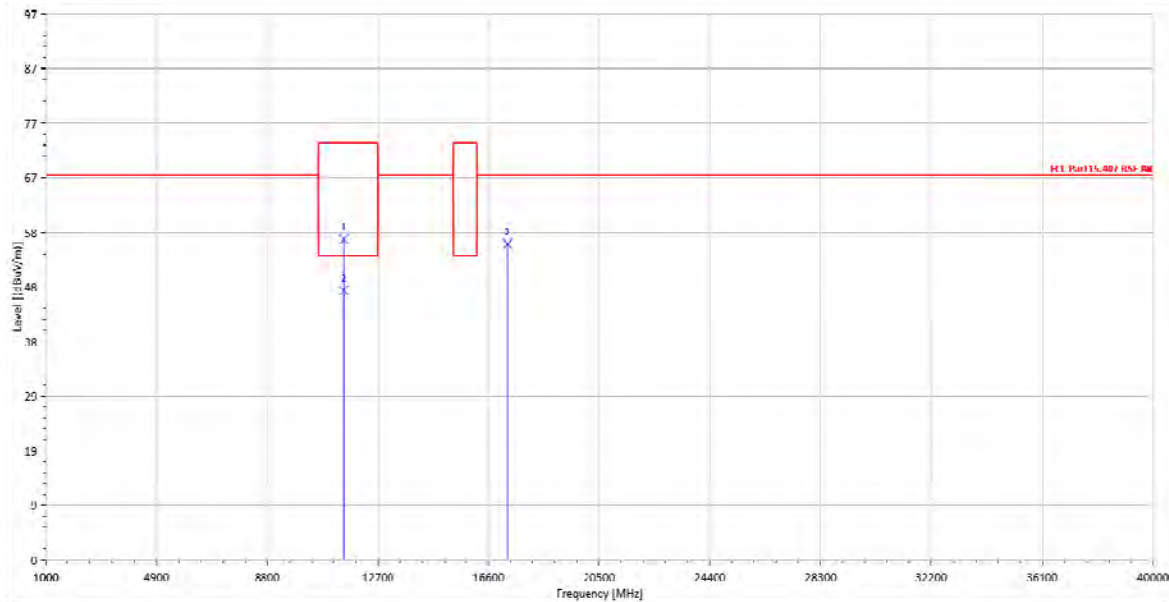
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Operation Band	:802.11 n40M	Test Date	:2015-03-09
Fundamental Frequency	:5755 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Detector Mode	Note F/H/E/S	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11510.00	Peak	H	35.81	21.17	56.98	74.00	-17.02
11510.00	Average	H	26.68	21.17	47.85	54.00	-6.15
17265.00	Peak	H	28.32	27.82	56.14	68.30	-12.16

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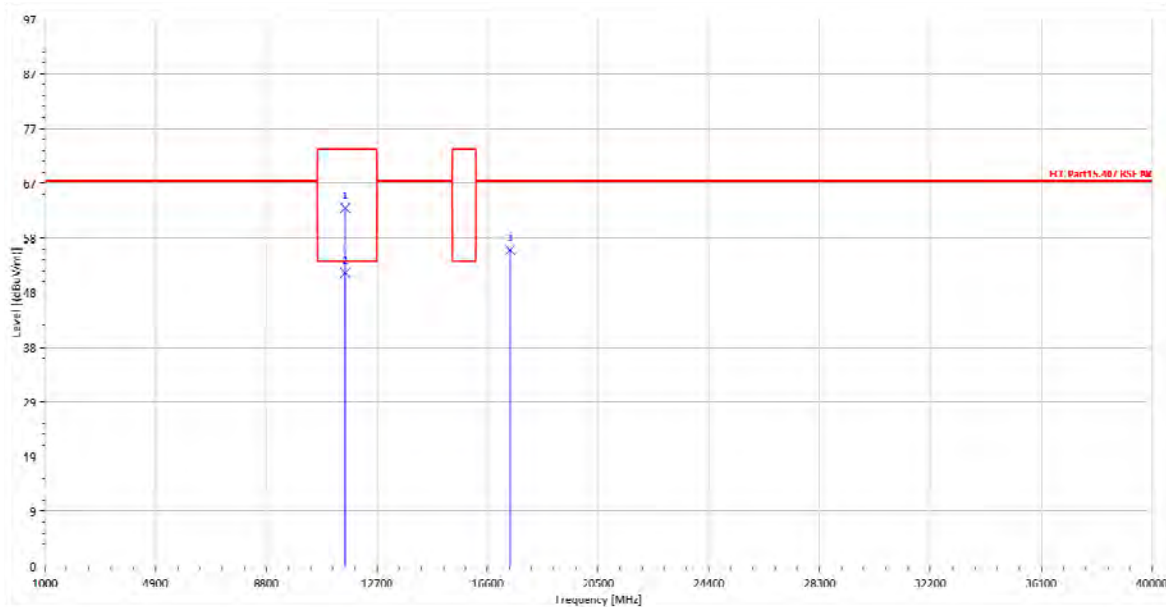
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Operation Band	:802.11 n40M	Test Date	:2015-03-09
Fundamental Frequency	:5795 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
11590.00	Peak	H	42.25	21.28	63.52	74.00	-10.48
11590.00	Average	H	30.72	21.28	52.00	54.00	-2.00
17385.00	Peak	H	56.04	0.00	56.04	68.30	-12.26

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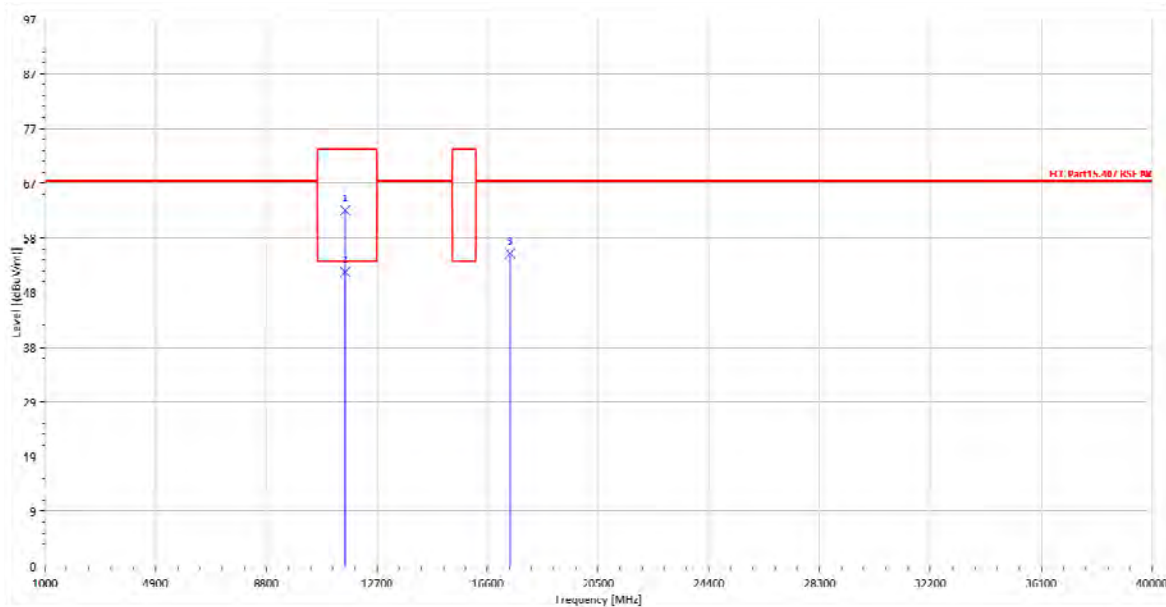
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Operation Band	:802.11 n40M	Test Date	:2015-03-09
Fundamental Frequency	:5795 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV/m	dBμV/m	dB
11590.00	Peak	H	41.82	21.28	63.10	74.00	-10.90
11590.00	Average	H	30.85	21.28	52.13	54.00	-1.87
17385.00	Peak	H	55.43	0.00	55.43	68.30	-12.87

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Band edge falling to restricted band

Operation Band	:802.11 n40M	Test Date	:2017-06-03
Fundamental Frequency	:5755 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5700.00	S	Peak	49.37	12.29	61.66	105.23	-43.57
5718.90	S	Peak	59.18	12.29	71.47	110.522	-39.06
5720.00	S	Peak	57.88	12.29	70.17	110.83	-40.66
5725.00	E	Peak	58.23	12.27	70.50	122.23	-51.73

Operation Band	:802.11 n40M	Test Date	:2017-06-03
Fundamental Frequency	:5755 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5700.00	S	Peak	45.46	12.29	57.76	105.23	-47.47
5719.20	S	Peak	56.38	12.29	68.67	110.6061	-41.94
5720.00	S	Peak	55.14	12.29	67.43	110.83	-43.40
5725.00	E	Peak	55.31	12.27	67.58	122.23	-54.65

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Operation Band	:802.11 n40M	Test Date	:2017-06-03
Fundamental Frequency	:5795 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5850.00	E	Peak	56.22	12.61	68.83	122.23	-53.40
5855.00	S	Peak	52.99	12.66	65.64	110.83	-45.19
5875.00	S	Peak	47.98	12.78	60.76	105.23	-44.47

Operation Band	:802.11 n40M	Test Date	:2017-06-03
Fundamental Frequency	:5795 MHz	Temp./Humi.	:22.7 deg_C / 57 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5850.00	E	Peak	51.18	12.61	63.79	122.23	-58.44
5855.00	S	Peak	48.65	12.66	61.31	110.83	-49.52
5875.00	S	Peak	42.80	12.78	55.58	105.23	-49.65

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12. TRANSMISSION IN THE ABSENCE OF DATA

12.1 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.

12.2 Result

No non-compliance noted:

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. the EUT can detect the controlling signal of ASK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

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13. FREQUENCY STABILITY

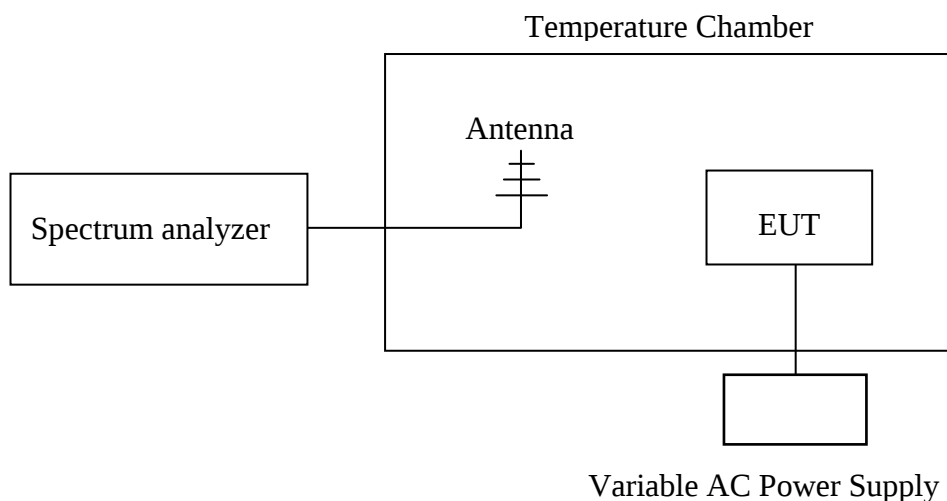
13.1 Standard Applicable

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.

13.2 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.

13.3 Test SET-UP



13.4 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/18/2014	06/17/2015
DC Power Supply	Agilent	E3640A	MY53140006	05/31/2014	05/30/2015

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13.5 Measurement Result

Operation Mode	802.11 a	Test Date	2015,03,10
Temperature	:22 °C	Test By	Henry
Humidity	56 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0 °C	5.5V	36	5180.0000	5,179.961880	0.0381
		44	5220.0000	5,219.960500	0.0395
		48	5240.0000	5,239.957970	0.0420
		149	5745.0000	5,744.976950	0.0230
		157	5785.0000	5,784.975770	0.0242
		165	5825.0000	5,824.975440	0.0246
0 °C	4.5V	36	5180.0000	5,179.961080	0.0389
		44	5220.0000	5,219.959040	0.0410
		48	5240.0000	5,239.957380	0.0426
		149	5745.0000	5,744.977170	0.0228
		157	5785.0000	5,784.975490	0.0245
		165	5825.0000	5,824.976000	0.0240
25 °C	5V	36	5180.0000	5,179.960210	0.0398
		44	5220.0000	5,219.958780	0.0412
		48	5240.0000	5,239.957060	0.0429
		149	5745.0000	5,744.976730	0.0233
		157	5785.0000	5,784.975410	0.0246
		165	5825.0000	5,824.974390	0.0256
40 °C	5.5V	36	5180.0000	5,179.960050	0.0399
		44	5220.0000	5,219.957710	0.0423
		48	5240.0000	5,239.955840	0.0442
		149	5745.0000	5,744.975230	0.0248
		157	5785.0000	5,784.975140	0.0249
		165	5825.0000	5,824.973940	0.0261

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40 °C	4.5V	36	5180.0000	5,179.959760	0.0402
		44	5220.0000	5,219.956990	0.0430
		48	5240.0000	5,239.956970	0.0430
		149	5745.0000	5,744.975840	0.0242
		157	5785.0000	5,784.974690	0.0253
		165	5825.0000	5,824.973860	0.0261

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Operation Mode	802.11 n_HT20	Test Date	2015,03,10
Temperature	22 °C	Test By	Henry
Humidity	56 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0 °C	5.5V	36	5180.0000	5,179.958830	0.0412
		44	5220.0000	5,219.960490	0.0395
		48	5240.0000	5,239.975670	0.0243
		149	5745.0000	5,744.975080	0.0249
		157	5785.0000	5,784.973330	0.0267
		165	5825.0000	5,824.970830	0.0292
0 °C	4.5V	36	5180.0000	5,179.961080	0.0389
		44	5220.0000	5,219.959040	0.0410
		48	5240.0000	5,239.957380	0.0426
		149	5745.0000	5,744.975370	0.0246
		157	5785.0000	5,784.973060	0.0269
		165	5825.0000	5,824.970860	0.0291
25 °C	5V	36	5180.0000	5,179.960210	0.0398
		44	5220.0000	5,219.958780	0.0412
		48	5240.0000	5,239.957060	0.0429
		149	5745.0000	5,744.974620	0.0254
		157	5785.0000	5,784.971590	0.0284
		165	5825.0000	5,824.970450	0.0296
40 °C	5.5V	36	5180.0000	5,179.960050	0.0399
		44	5220.0000	5,219.957710	0.0423
		48	5240.0000	5,239.955840	0.0442
		149	5745.0000	5,744.974360	0.0256
		157	5785.0000	5,784.970960	0.0290
		165	5825.0000	5,824.970100	0.0299

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40 °C	4.5V	36	5180.0000	5,179.959760	0.0402
		44	5220.0000	5,219.956990	0.0430
		48	5240.0000	5,239.956970	0.0430
		149	5745.0000	5,744.974200	0.0258
		157	5785.0000	5,784.971590	0.0284
		165	5825.0000	5,824.969590	0.0304

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Operation Mode	802.11 n_HT40	Test Date	2015,03,10
Temperature	:25 °C	Test By	Henry
Humidity	:56 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0 °C	5.5V	38	5190.0000	5,189.969170	0.0308
		46	5230.0000	5,229.972320	0.0277
		151	5755.0000	5,754.968510	0.0315
		159	5795.0000	5,794.969760	0.0302
0 °C	4.5V	38	5190.0000	5,189.968160	0.0318
		46	5230.0000	5,229.972280	0.0277
		151	5755.0000	5,754.970020	0.0300
		159	5795.0000	5,794.969280	0.0307
25 °C	5V	38	5190.0000	5,189.967360	0.0326
		46	5230.0000	5,229.970520	0.0295
		151	5755.0000	5,754.968070	0.0319
		159	5795.0000	5,794.968920	0.0311
40 °C	5.5V	38	5190.0000	5,189.967160	0.0328
		46	5230.0000	5,229.969140	0.0309
		151	5755.0000	5,754.966830	0.0332
		159	5795.0000	5,794.967590	0.0324
40 °C	4.5V	38	5190.0000	5,189.965590	0.0344
		46	5230.0000	5,229.970140	0.0299
		151	5755.0000	5,754.967710	0.0323
		159	5795.0000	5,794.968200	0.0318

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14. ANTENNA REQUIREMENT

14.1 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.

14.2 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 ~

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