

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT

OF

Product Name: Wireless Cable Gateway

Brand Name: Castlenet

Model No.: CBV3843ZU1M, CBW3843GU1M,
CBV383ZU1M, CBW383GU1M

Model Difference: CBW3843GU1M: without VOIP
CBV383ZU1M, CBW383GU1M: for marketing
purpose used

FCC ID: RK9-CBV3843ZU1M

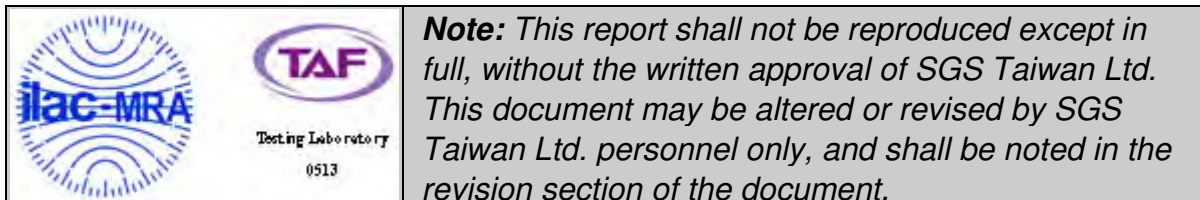
Report No.: E2/2016/60031

Issue Date: Jun. 30, 2016

FCC Rule Part: §15.407

Prepared for: CastleNet Technology Inc.
No.64, Chung-Shan Rd., Tu-Cheng District,
New Taipei City, 23680 Taiwan

Prepared by: SGS Taiwan Ltd.
Electronics & Communication Laboratory
No.2, Keji 1st Rd., Guishan District, Taoyuan
City, Taiwan 333



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VERIFICATION OF COMPLIANCE

Applicant: CastleNet Technology Inc.
No.64, Chung-Shan Rd., Tu-Cheng District, New Taipei City,
23680 Taiwan

Product Name: Wireless Cable Gateway

Brand Name: Castlenet

Model No.: CBV3843ZU1M, CBW3843GU1M, CBV383ZU1M, CBW383GU1M

Model Difference: CBW3843GU1M: without VOIP
CBV383ZU1M, CBW383GU1M: for marketing purpose used

FCC ID: RK9-CBV3843ZU1M

File Number: E2/2016/60031

Date of Test: Jun. 04, 2016 ~ Jun. 24, 2016

Date of EUT Received: Jun. 04, 2016

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.

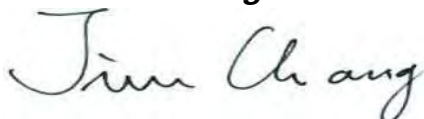
The test results of this report relate only to the tested sample identified in this report.

Test By:  **Date:** Jun. 30, 2016

Tin Lin / Engineer

Prepared By:  **Date:** Jun. 30, 2016

Karen Huang / Clerk

Approved By:  **Date:** Jun. 30, 2016

Jim Chang / Asst. Manager

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Revision History

Report Number	Revision	Description	Issue Date
E2/2016/60031	Rev.00	Initial creation of document	Jun. 30, 2016

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1. GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	Wireless Cable Gateway	
Brand Name:	Castlenet	
Model No.:	CBV3843ZU1M, CBW3843GU1M, CBV383ZU1M, CBW383GU1M	
Model Difference:	CBW3843GU1M: without VOIP CBV383ZU1M, CBW383GU1M: for marketing purpose used	
Product SW/HW version:	N/A/ N/A	
Radio SW/HW version:	N/A/ N/A	
Test SW Version:	N/A	
RF power setting in TEST SW:	N/A	
RJ45 LAN CABLE:	Model No.: JY01-C066, Supplier: EKSON	
RJ11 PHONE CABLE:	Model No.: PF01-C097, Supplier: EKSON	
Power Supply:	12Vdc from Adapter	
	Adapter:	Model No.: ADS0306-W120250, Supplier: AOEM

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WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Avg.)	Modulation Technology
11a	5150~5250	4	14.87 dBm	OFDM
	5725-5850	5	14.85 dBm	
11n / ac_20M	HT20 / VHT20 5150~5250	4	HT: 14.96 dBm (Worst Case)	OFDM
	HT20 / VHT20 5725-5850	5	HT: 14.87 dBm (Worst Case)	
11n / ac_40M	HT40 / VHT40 5150~5250	2	HT: 14.99 dBm (Worst Case)	OFDM
	HT40 / VHT40 5725-5850	2	HT: 14.98 dBm (Worst Case)	
11ac_80M	VHT80 5150~5250	1	14.98 dBm	OFDM
	VHT80 5725-5850	1	14.86 dBm	
Antenna Designation	PIFA Antenna, Supplier: Taiwan Anjie Electronics Co. Ltd. 1. Main: Partl No.: AJDP1J-W0009, Gain: 4.38dBi (5150~5250MHz) 3.84dBi (5725~5850MHz) 2. Aux 1: Partl No.: AJDP1J-W0007, Gain: 4.22dBi (5150~5250MHz) 5.50dBi (5725~5850MHz) 3. Aux 2: Partl No.: AJDP1J-W0008, Gain: 5.53dBi (5150~5250MHz) 4.51dBi (5725~5850MHz)			
Modulation type	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only			
Transition Rate:	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 216.7Mbps 802.11 n_40MHz: 13.5 – 450.0Mbps 802.11 ac_20MHz: 6.5 – 288.9Mbps 802.11 ac_40MHz: 13.5 – 600.0Mbps 802.11 ac_80MHz: 29.3 – 1300.0Mbps			

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1.2 Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is supporting, Wi-Fi 802.11a/b/g/n & ac features, and below is details of information.

Product Feature	
Product Name:	Wireless Cable Gateway
Brand Name:	Castlenet
Model No.:	CBV3843ZU1M, CBW3843GU1M, CBV383ZU1M, CBW383GU1M
Model Difference:	CBW3843GU1M: without VOIP CBV383ZU1M, CBW383GU1M: for marketing purpose used
FCC ID:	RK9-CBV3843ZU1M
Wi-Fi Specification	802.11a/b/g/n/ac

Note: The above EUT information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules

FCC KDB 662911 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.

1.4 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd.,
Guishan District, Taoyuan City, Taiwan 333. (TAF code 0513)

FCC Registration Numbers are: 735305

Canada Registration Number: 4620A-5.

1.5 Special Accessories

There are no special accessories used while test was conducted.

1.6 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 plan. 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 2.0dB, and 10dB attenuator.

SISO mode offset

= RF cable loss (dB)+ attenuation factor(dB)+ 10 log(N_{ANT}) dB =12.0(dB)

MIMO mode offset

= RF cable loss (dB)+ attenuation factor(dB)+ 10 log(N_{ANT}) dB =16.8(dB)

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2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission

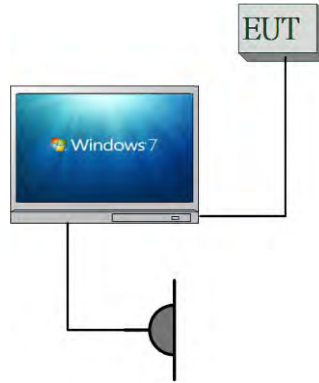


Fig. 2-2 Conducted (Antenna Port) Configuration Emission

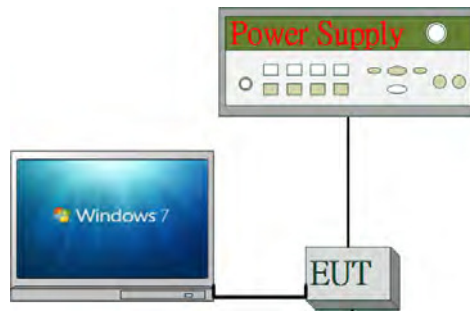


Fig. 2-3 Conduction Emission

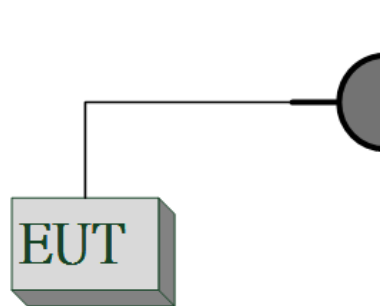


Table 2-1 Equipment Used in Tested System

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	L420	LR-7HXZA	N/A	Un-shielded
3.	DC Power Supply	HP	E3640A	KR93300208	N/A	Un-shielded

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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 & 99% 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:

802.11a / n HT20 Mode, 802.11ac VHT20 Mode	
Channel	Frequency
36	5180
40	5200
44	5220
48	5240

802.11 n HT40 Mode, 802.11ac VHT40 Mode	
channel	Frequency
38	5190
46	5230

802.11ac VHT80 Mode	
channel	Frequency
42	5210

Operated band in 5725 MHz ~5850 MHz:

802.11a / n HT20 Mode, 802.11ac VHT20 Mode	
Channel	Frequency
149	5745
153	5765
157	5785
161	5805
165	5825

802.11 n HT40 Mode, 802.11ac VHT40 Mode	
channel	Frequency
151	5755
159	5795

802.11ac VHT80 Mode	
channel	Frequency
155	5775

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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	36,44,48	OFDM	6	Aux2
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Aux2
802.11ac_VHT80	5775	155	155	OFDM	MCS0	MIMO
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	Aux2
802.11n_HT20				OFDM	MCS16	MIMO
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS16	MIMO
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Aux2
802.11n_HT20				OFDM	MCS16	MIMO
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS16	MIMO
802.11ac_VHT80	5775	155	155	OFDM	MCS0	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/ac WLAN Transmitter for channel Low, Mid and High, the worst case H position was reported.

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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	Aux2
802.11n_HT20 802.11ac_VHT20				OFDM	MCS16	MIMO
802.11n_HT40 802.11ac_VHT40	5190~5230	38 to 46	38,46	OFDM	MCS16	MIMO
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Aux2
802.11n_HT20 802.11ac_VHT20				OFDM	MCS16	MIMO
802.11n_HT40 802.11ac_VHT40	5755~5795	151 to 159	151,159	OFDM	MCS16	MIMO
802.11ac_VHT80	5775	155	155	OFDM	MCS0	MIMO

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5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26dB & 6dB 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. 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 7	100950	12/12/2015	12/11/2016
Coaxial Cables	N/A	N30N30-1042-1 50cm	N/A	02/07/2016	02/06/2017
LISN	Schwarzbeck	NSLK 8127	8127-648	03/11/2016	03/10/2017
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.

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.

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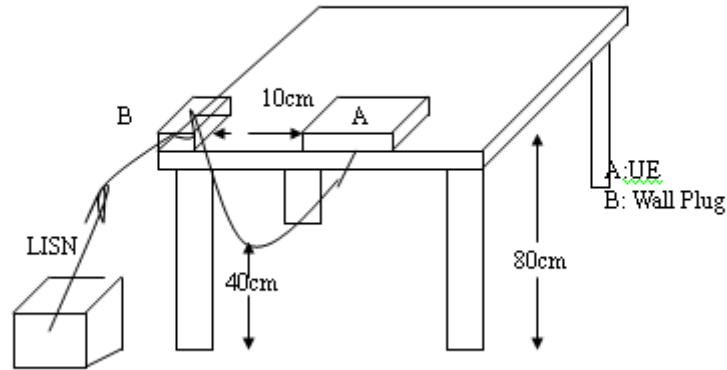
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6.4. Test SET-UP



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 closet to the limit

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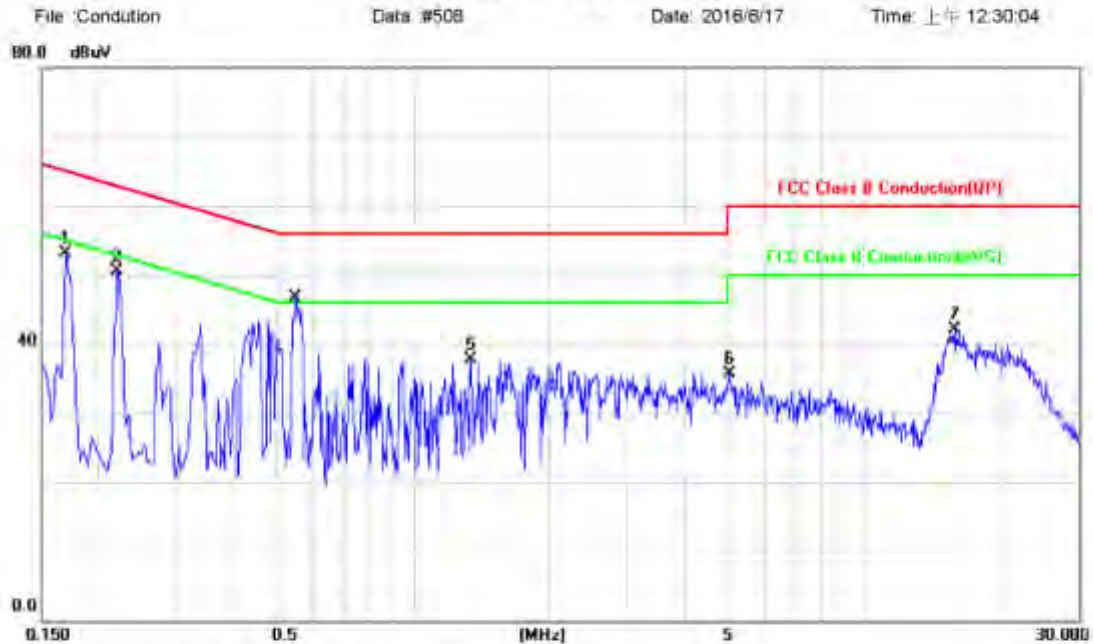
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode: operation mode	Test By: Aken Huang
--------------------------------	---------------------

Site: Conduction Room	Phase: L1	Temperature: 26 °C
Limit: FCC Class B Conduction(QP)	Power: AC 120V/60Hz	Humidity: 67 %
Mode: CBV3843ZU1M-AC1600		
Note: ADS0306-W120250		

Conducted Emission



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1700	33.54	19.64	53.18	64.96	-11.78	peak	
2		0.2220	30.92	19.62	50.54	62.74	-12.20	peak	
3		0.5500	24.40	19.71	44.11	56.00	-11.89	QP	
4	*	0.5500	17.70	19.71	37.41	46.00	-8.59	AVG	
5		1.3460	18.26	19.53	37.79	56.00	-18.21	peak	
6		5.0380	16.20	19.42	35.62	60.00	-24.38	peak	
7		15.9020	22.36	19.74	42.10	60.00	-17.90	peak	

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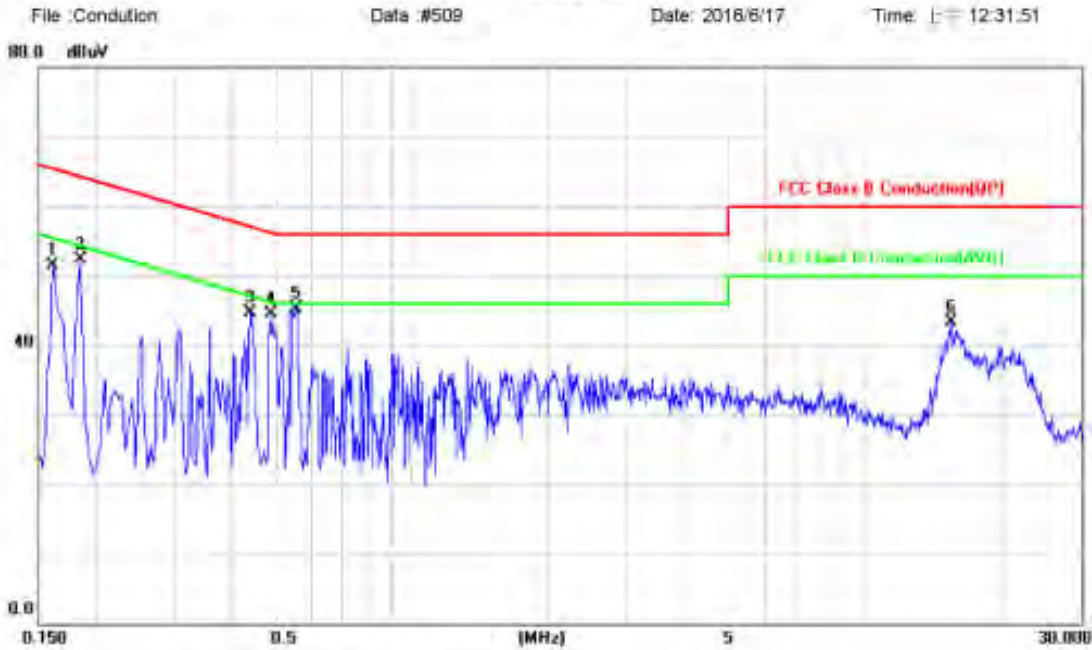
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Site : Conduction Room Phase: **N** Temperature: 26 °C
 Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 67 %
 Mode: CBV3843ZU1M-AC1600
 Note: ADS0306-W120250

Conducted Emission



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1620	31.83	19.65	51.48	65.36	-13.88	peak	
2		0.1860	32.67	19.63	52.30	64.21	-11.91	peak	
3		0.4420	25.03	19.71	44.74	57.02	-12.28	peak	
4		0.4900	24.84	19.74	44.58	56.17	-11.59	peak	
5 *		0.5580	25.64	19.71	45.35	56.00	-10.65	peak	
6		15.5180	23.41	19.80	43.21	60.00	-16.79	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:

Mode	Duty Cycle (%)	Duty Factor (dB) = $10 * \log (1/\text{Duty Cycle})$
802.11a	95.16	0.22
802.11n_20	87.08	0.60
802.11n_40	78.22	1.07
802.11ac_80	92.45	0.34

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9516) = 0.22$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.8708) = 0.6$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.7822) = 1.07$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9245) = 0.34$$

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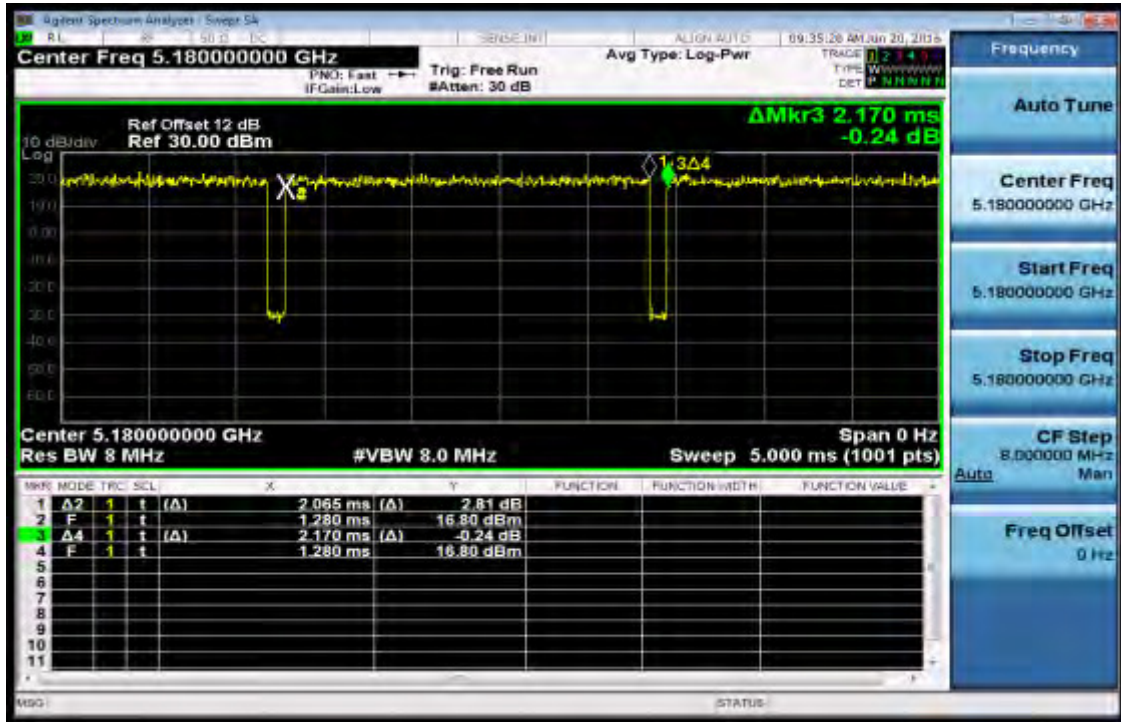
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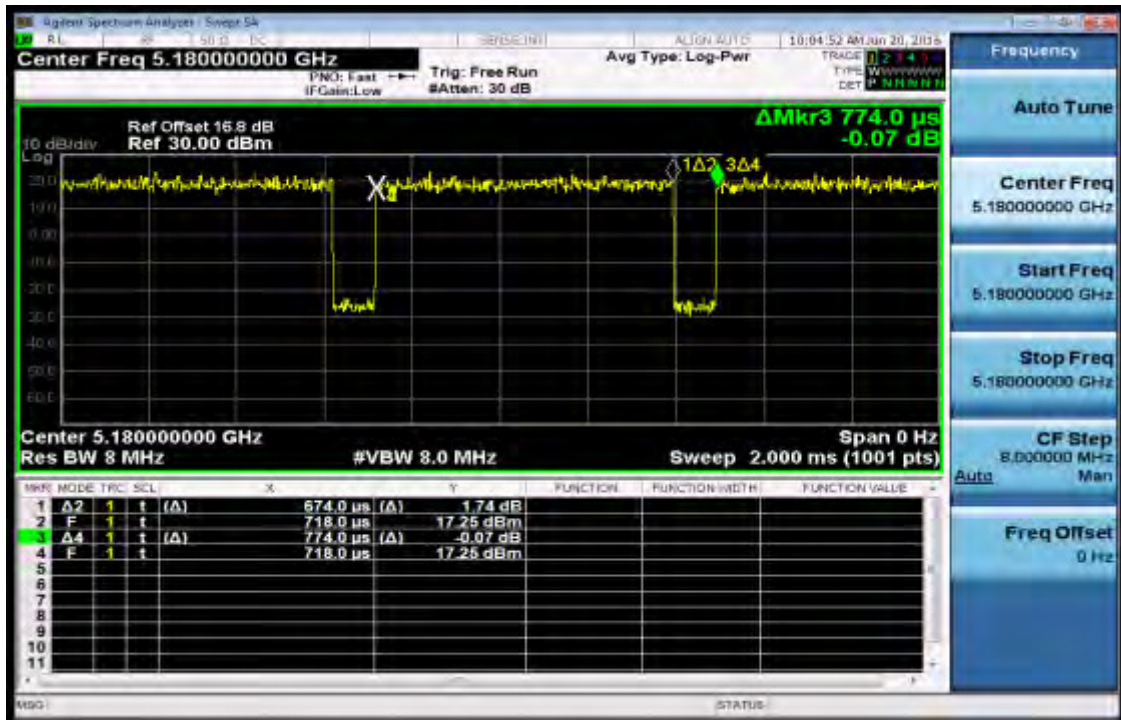
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DUTY CYCLE TEST SIGNAL Measurement Result 802.11a



802.11n HT20



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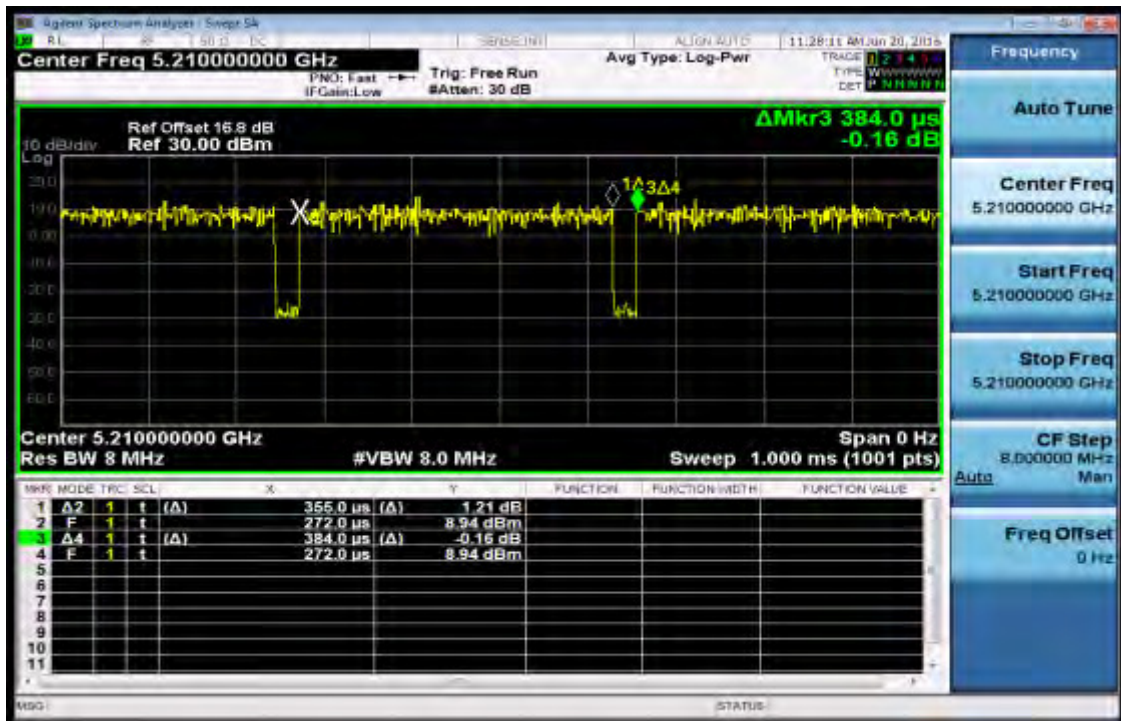
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802.11n HT 40



802.11 ac VHT 80



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8. 26dB & 6dB & 99% 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.
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. For 99% Bandwidth:

Set the spectrum analyzer as RBW=1%, VBW = 3*RBW, Span = 30M/50MHz, Detector=Sample, Sweep=auto.
7. Turn on the 99% bandwidth function, max reading.
8. Repeat above procedures until all frequency of interest measured was complete.

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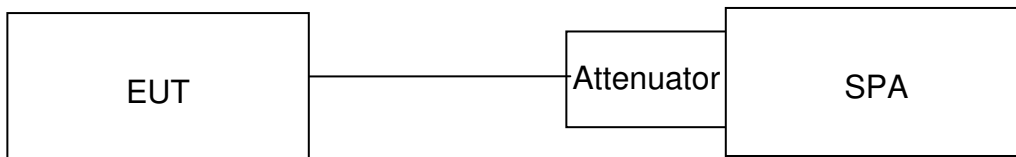
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8.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Power Meter	Anritsu	ML2496A	1326001	06/23/2015	06/22/2016
Power Sensor	Anritsu	MA2411B	1315048	06/23/2015	06/22/2016
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
DC Block	PASTERNAK	PE8210	RF29	12/12/2015	12/11/2016
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/12/2015	12/11/2016
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/12/2015	12/11/2016
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/23/2015	06/22/2016

8.4 Test Set-up



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8.5 Measurement Result

26dB Bandwidth

802.11a_Aux2

Frequency (MHz)	26dB Bandwidth (MHz)	10 Log (B) (dB)
5180	20.04	13.019
5220	19.95	12.999
5240	19.98	13.006

802.11n_HT20_Main

Frequency (MHz)	26dB Bandwidth (MHz)	10 Log (B) (dB)
5180	20.14	13.041
5220	20.23	13.061
5240	20.12	13.036

802.11n_HT20_Aux1

Frequency (MHz)	26dB Bandwidth (MHz)	10 Log (B) (dB)
5180	20.08	13.028
5220	20.38	13.091
5240	20.32	13.079

802.11n_HT20_Aux2

Frequency (MHz)	26dB Bandwidth (MHz)	10 Log (B) (dB)
5180	20.23	13.060
5220	20.24	13.061
5240	20.16	13.045

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802.11n_HT40_Main

Frequency (MHz)	26dB Bandwidth (MHz)	10 Log (B) (dB)
5190	39.63	15.980
5230	39.88	16.008

802.11n_HT40_Aux1

Frequency (MHz)	26dB Bandwidth (MHz)	10 Log (B) (dB)
5190	38.81	15.890
5230	39.23	15.936

802.11n_HT40_Aux2

Frequency (MHz)	26dB Bandwidth (MHz)	10 Log (B) (dB)
5190	39.16	15.928
5230	39.37	15.952

802.11ac_VHT80_Main

Frequency (MHz)	26dB Bandwidth (MHz)	10 Log (B) (dB)
5210	82.35	19.157

802.11ac_VHT80_Aux1

Frequency (MHz)	26dB Bandwidth (MHz)	10 Log (B) (dB)
5210	80.79	19.074

802.11ac_VHT80_Aux2

Frequency (MHz)	26dB Bandwidth (MHz)	10 Log (B) (dB)
5210	80.97	19.083

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6dB Bandwidth (5725 MHz~ 5850 MHz) measure with Peak detector for FCC
802.11a_Aux2

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5745	16.36	12.138
5785	16.37	12.139
5825	16.37	12.140

802.11n_HT20_Main

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5745	17.59	12.453
5785	17.60	12.455
5825	17.59	12.451

802.11n_HT20_Aux1

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5745	17.62	12.459
5785	17.62	12.461
5825	17.63	12.464

802.11n_HT20_Aux2

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5745	17.60	12.455
5785	17.58	12.450
5825	17.62	12.459

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802.11n HT40 Main

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5755	35.57	15.511
5795	36.34	15.604

802.11n HT40 Aux1

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5755	36.28	15.597
5795	36.38	15.608

802.11n HT40 Aux2

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5755	36.31	15.600
5795	35.56	15.509

802.11ac VHT80 Main

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5775	75.35	18.771

802.11ac VHT80 Aux1

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5775	75.91	18.803

802.11ac VHT80 Aux2

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5775	75.32	18.769

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99% Bandwidth
(5150~5250 MHz)
802.11a

Aux2

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.28	< 5250

802.11n HT20

Main

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.79	< 5250

Aux1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.79	< 5250

Aux2

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.82	< 5250

802.11n HT40

Main

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5230	5248.10	< 5250

Aux1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5230	5248.15	< 5250

Aux2

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5230	5248.10	< 5250

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802.11ac VHT80

Main

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5210	5247.90	< 5250

Aux1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5210	5247.90	< 5250

Aux2

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5210	5247.90	< 5250

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5725~5850MHz

802.11a

Aux2

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5745	5736.66	> 5725

802.11n HT20

Main

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5745	5736.09	> 5725

Aux1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5745	5736.09	> 5725

Aux2

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5745	5736.12	> 5725

802.11n HT40

Main

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5755	5736.85	> 5725

Aux1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5755	5736.70	> 5725

Aux2

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5755	5736.80	> 5725

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802.11ac VHT80

Main

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5775	5737.10	> 5725

Aux1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5775	5737.20	> 5725

Aux2

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5775	5737.10	> 5725

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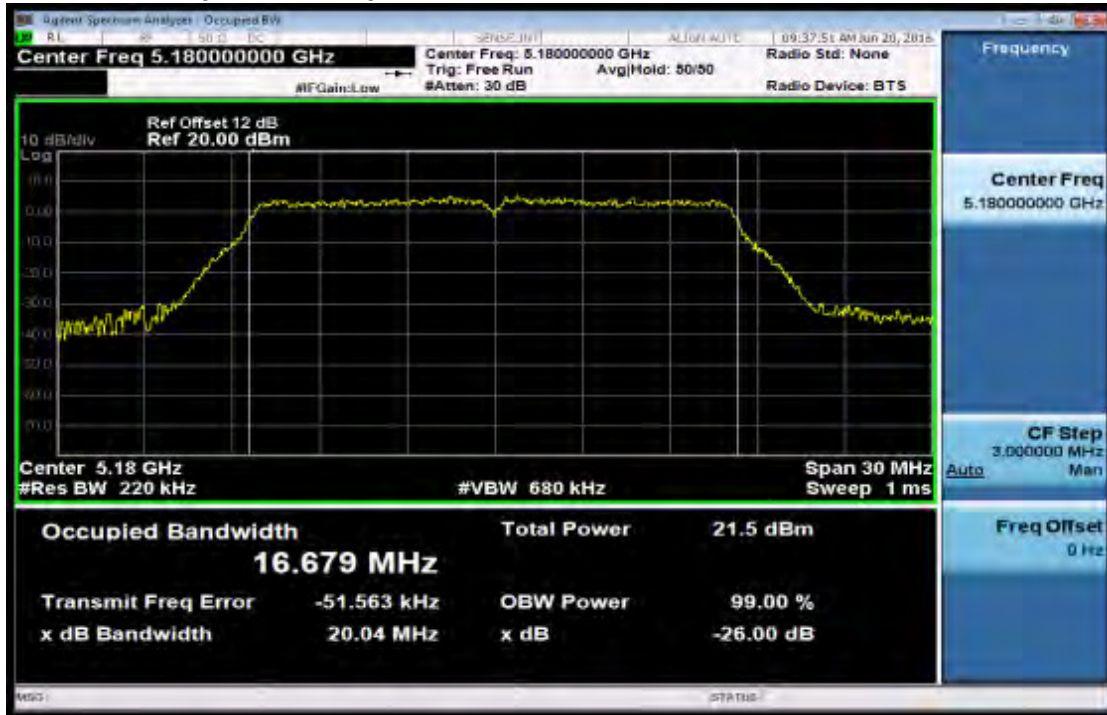
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26dB & 99% Bandwidth
802.11a, 5150~5250 MHz (Aux2)
Test Data CH-Low (5180MHz)



Test Data CH-Mid (5220MHz)



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Test Data CH-High (5240MHz)



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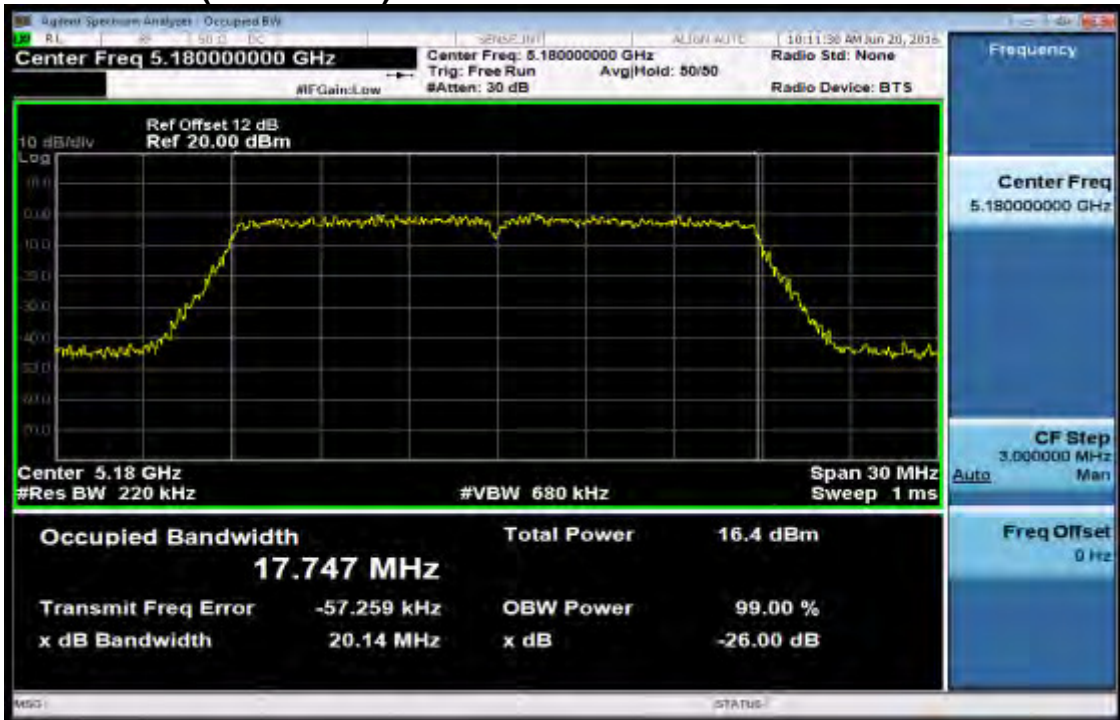
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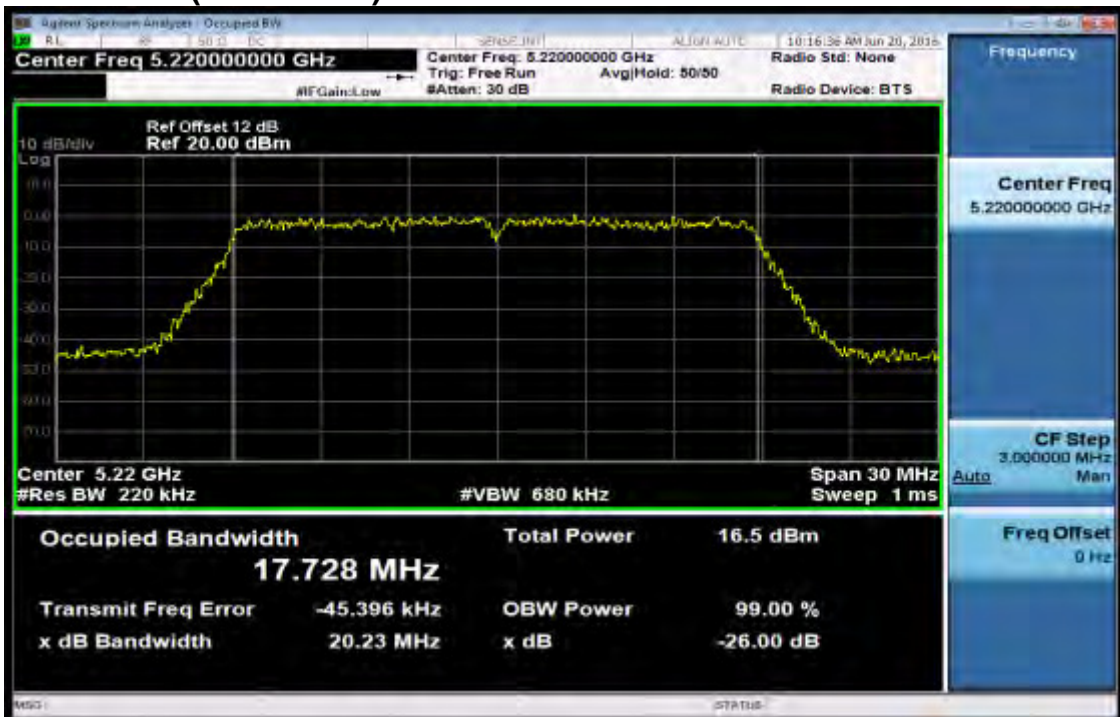
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802.11n HT20, 5150~5250 MHz (Main)
Test Data CH-Low (5180 MHz)



Test Data CH-Mid (5220 MHz)



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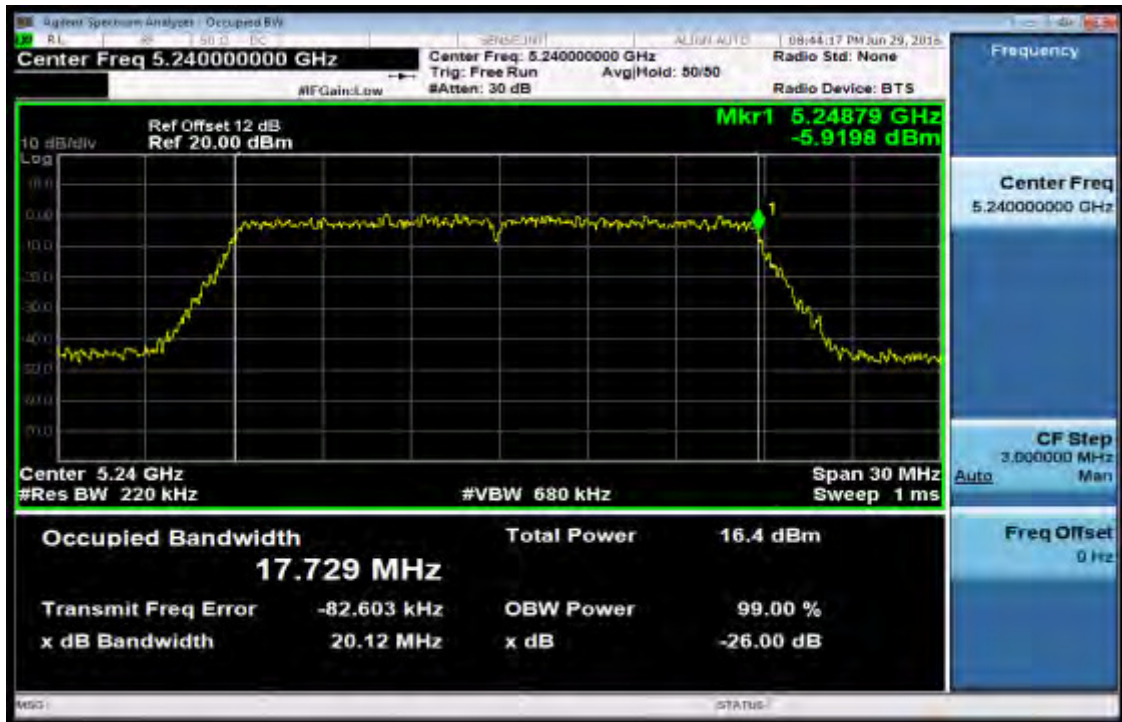
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Test Data CH-High (5240 MHz)



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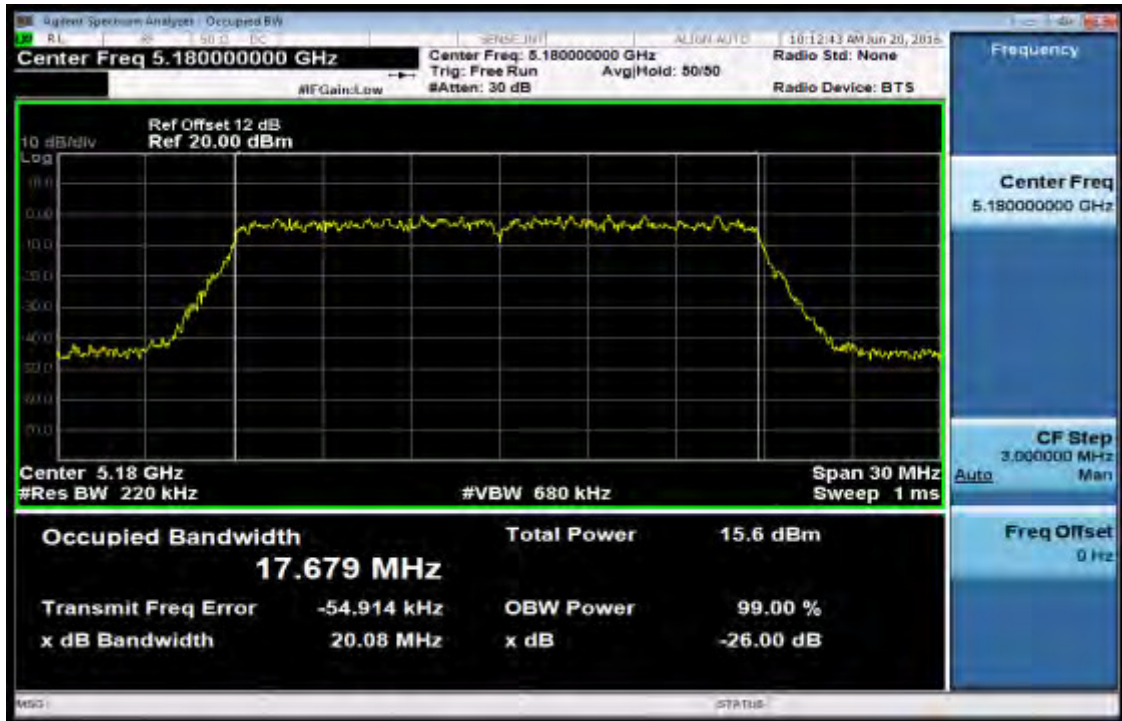
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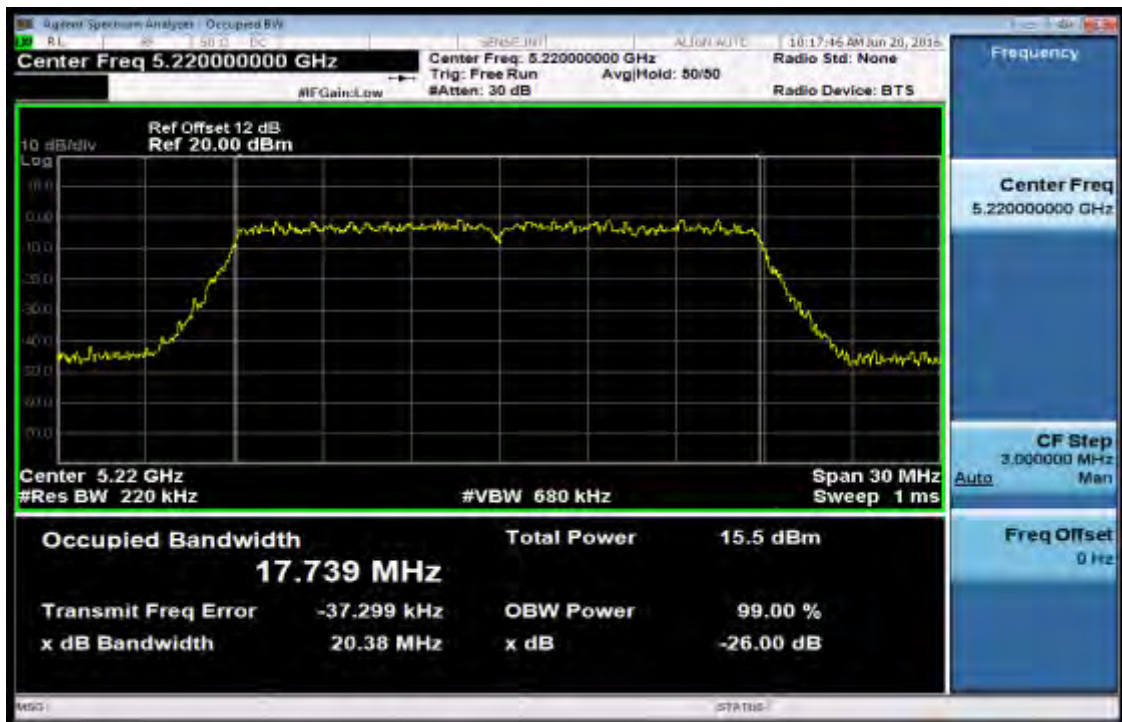
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802.11n HT20, 5150~5250 MHz (Aux1)
Test Data CH-Low (5180 MHz)



Test Data CH-Mid (5220 MHz)



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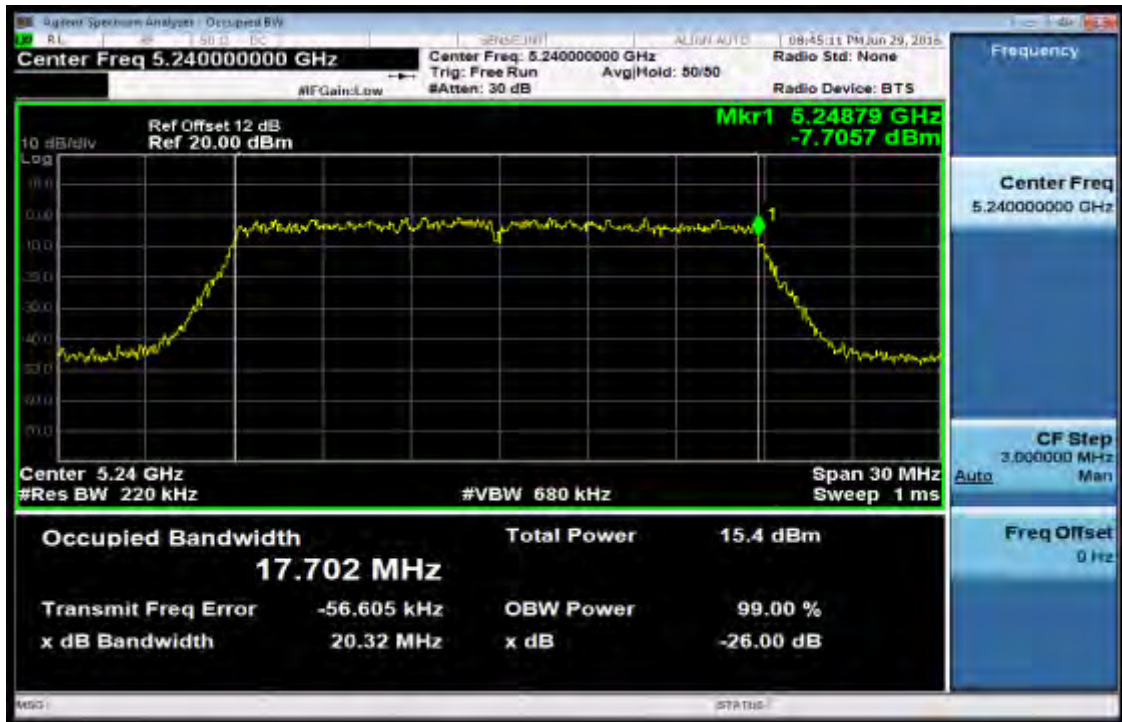
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Test Data CH-High (5240 MHz)



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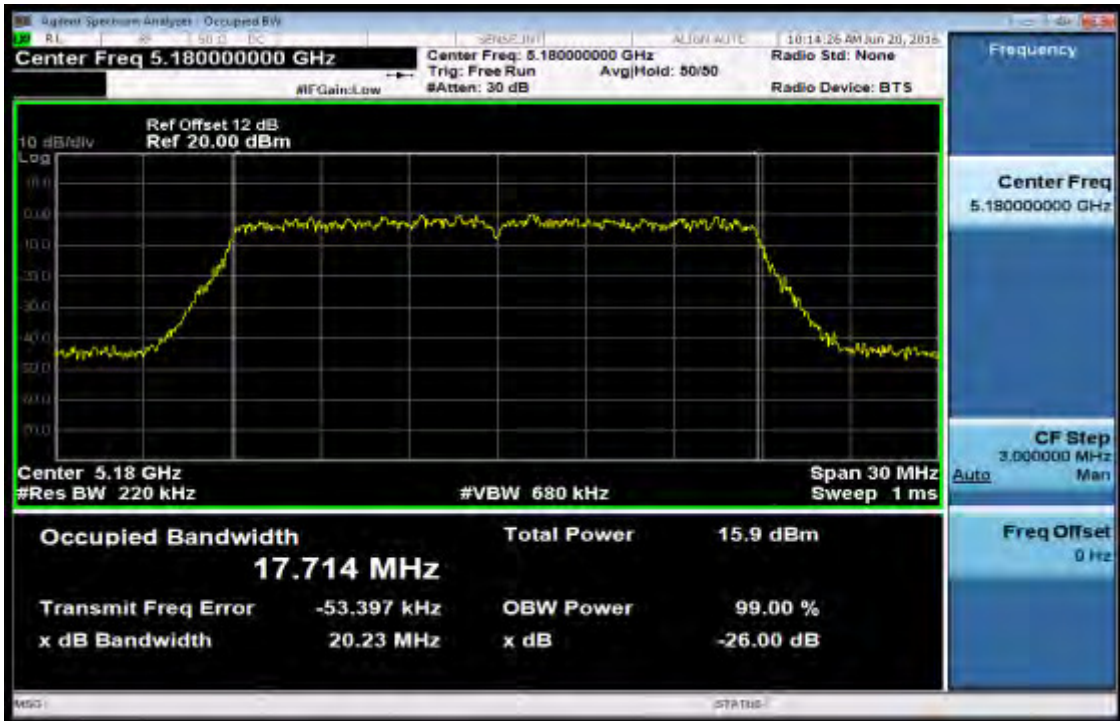
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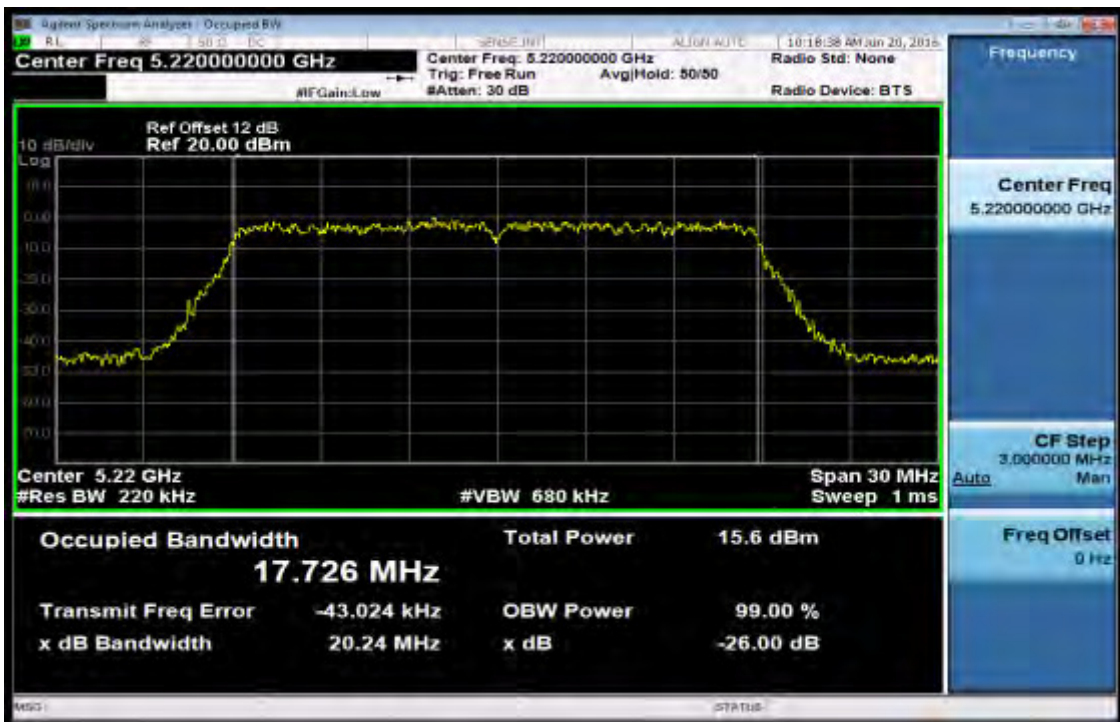
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802.11n HT20, 5150~5250 MHz (Aux2)
Test Data CH-Low (5180 MHz)



Test Data CH-Mid (5220 MHz)



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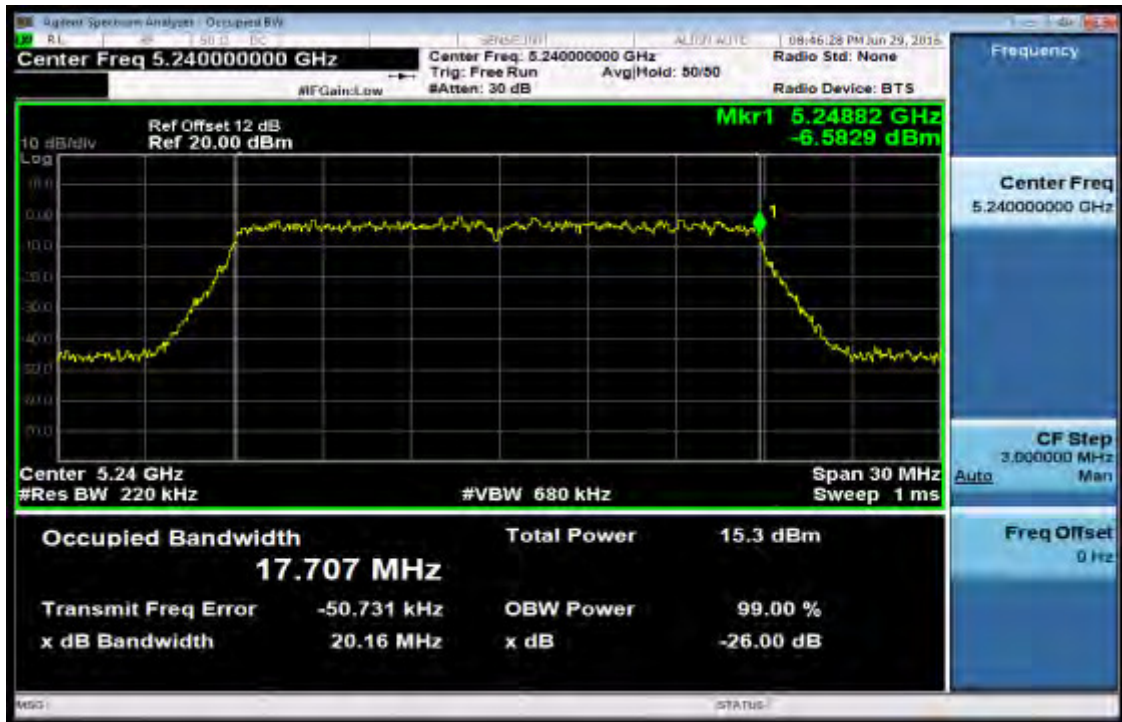
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Test Data CH-High (5240 MHz)



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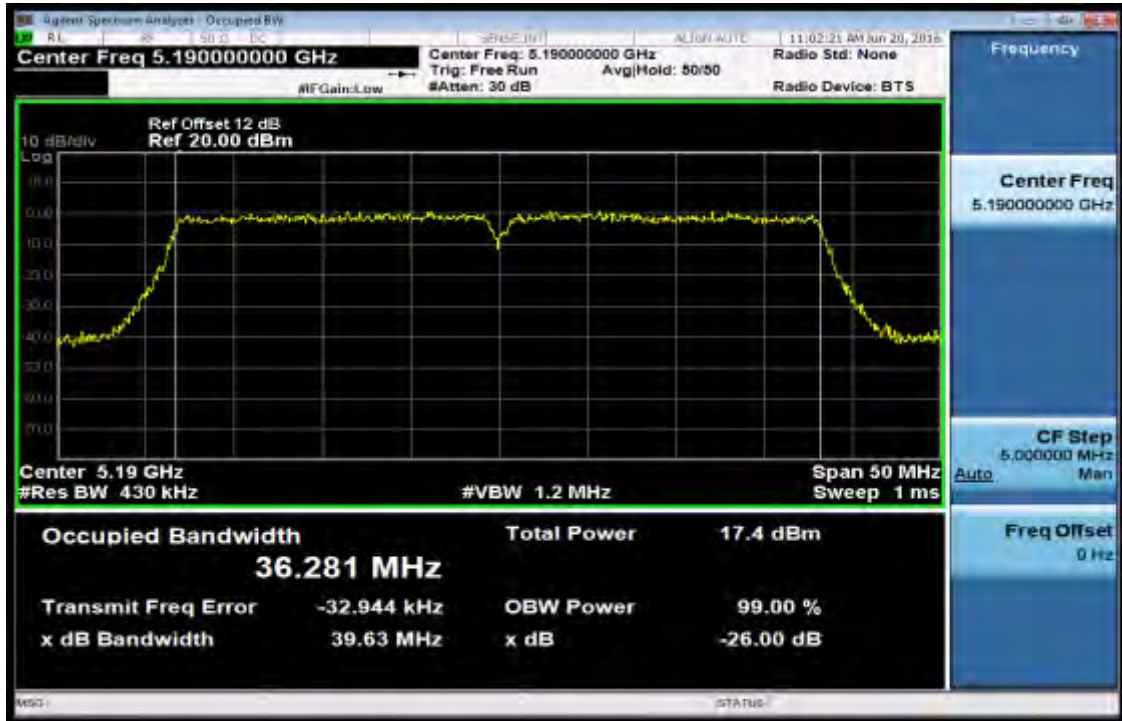
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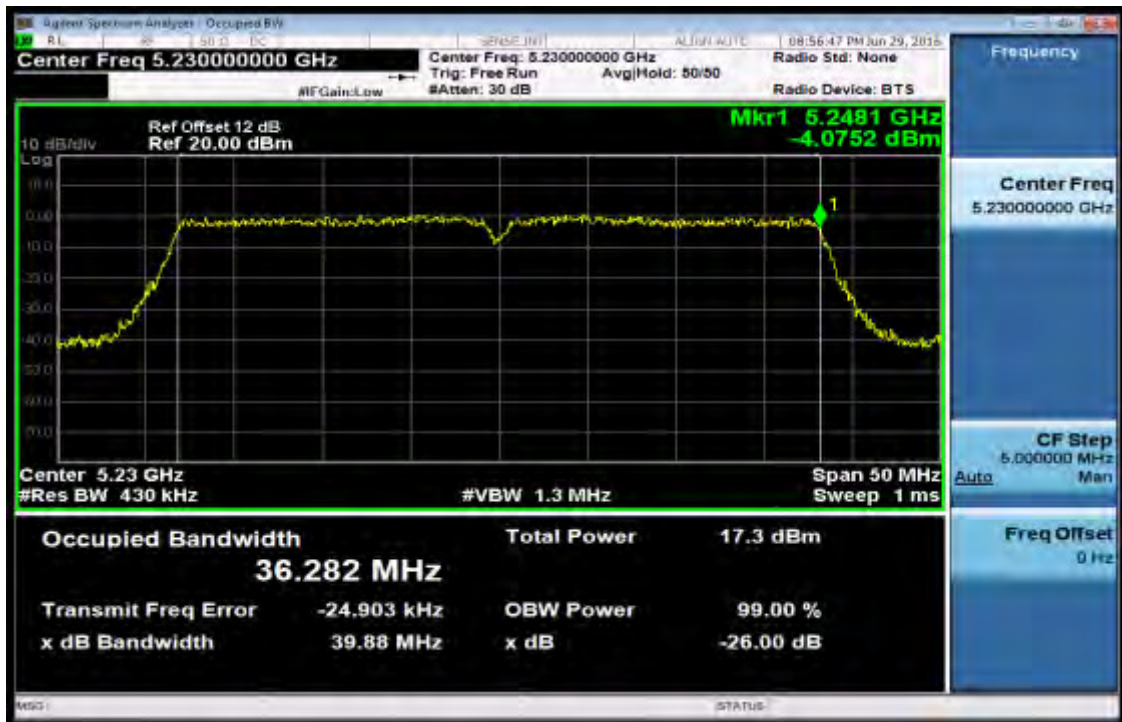
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802.11n HT40, 5150~5250 MHz (Main) Test Data CH-Low (5190 MHz)



Test Data CH-High (5230 MHz)

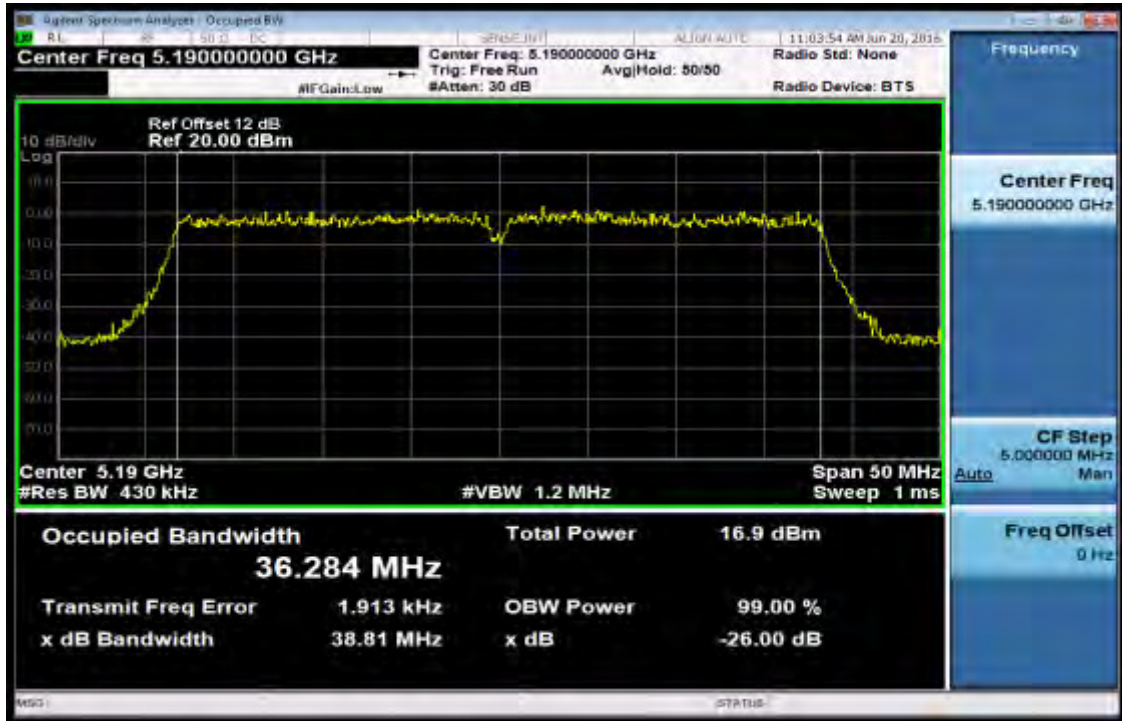


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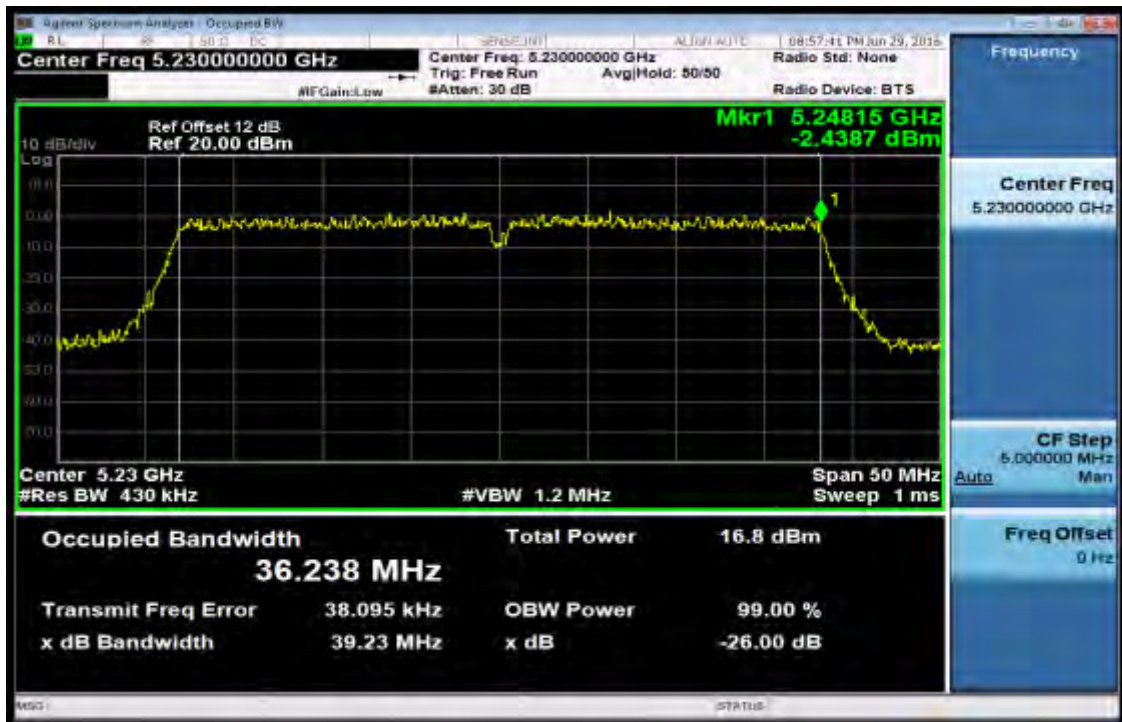
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802.11n HT40, 5150~5250 MHz (Aux1) Test Data CH-Low (5190 MHz)



Test Data CH-High (5230 MHz)

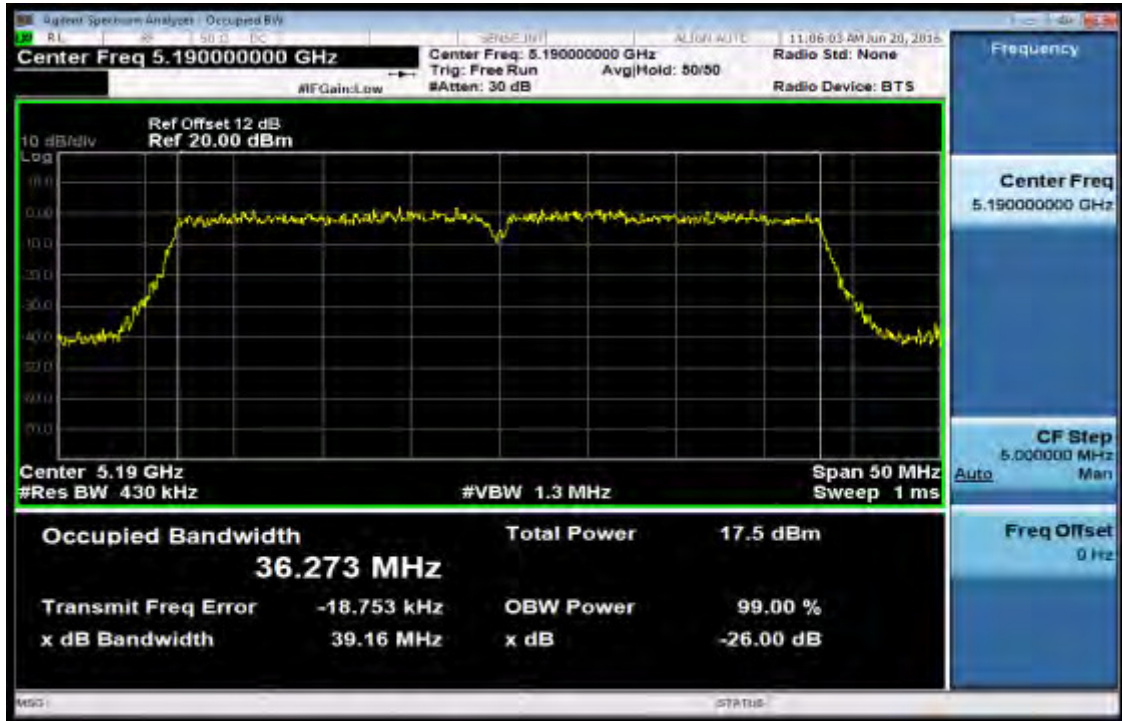


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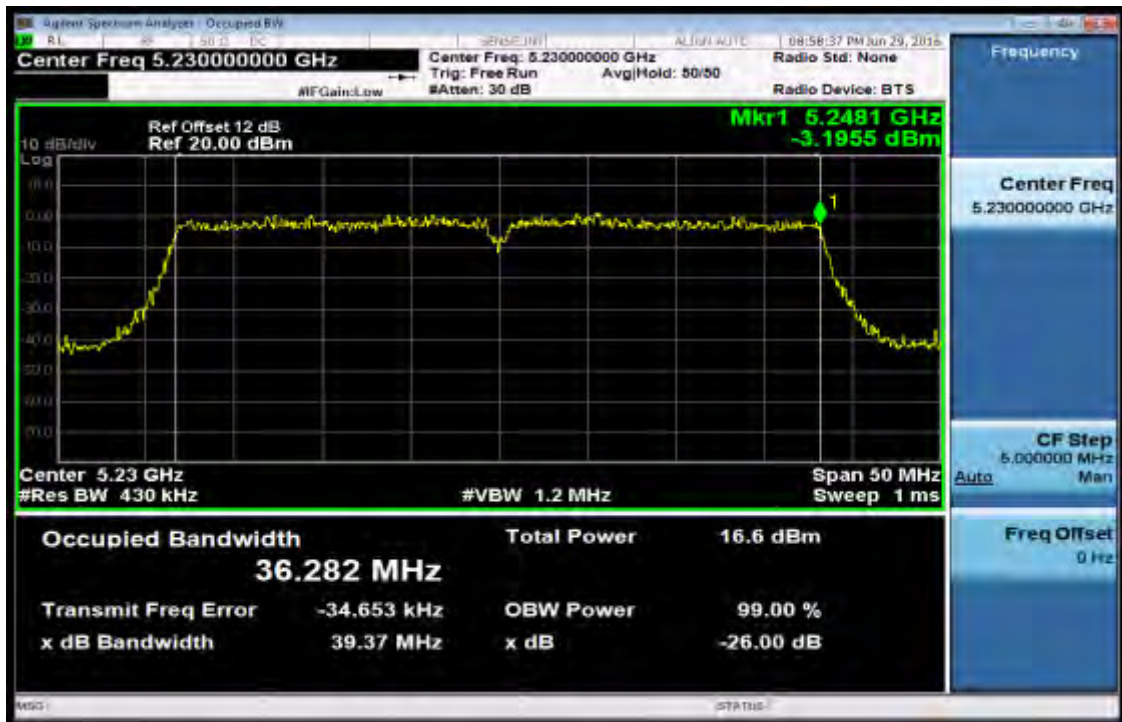
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802.11n HT40, 5150~5250 MHz (Aux2)
Test Data CH-Low (5190 MHz)



Test Data CH-High (5230 MHz)

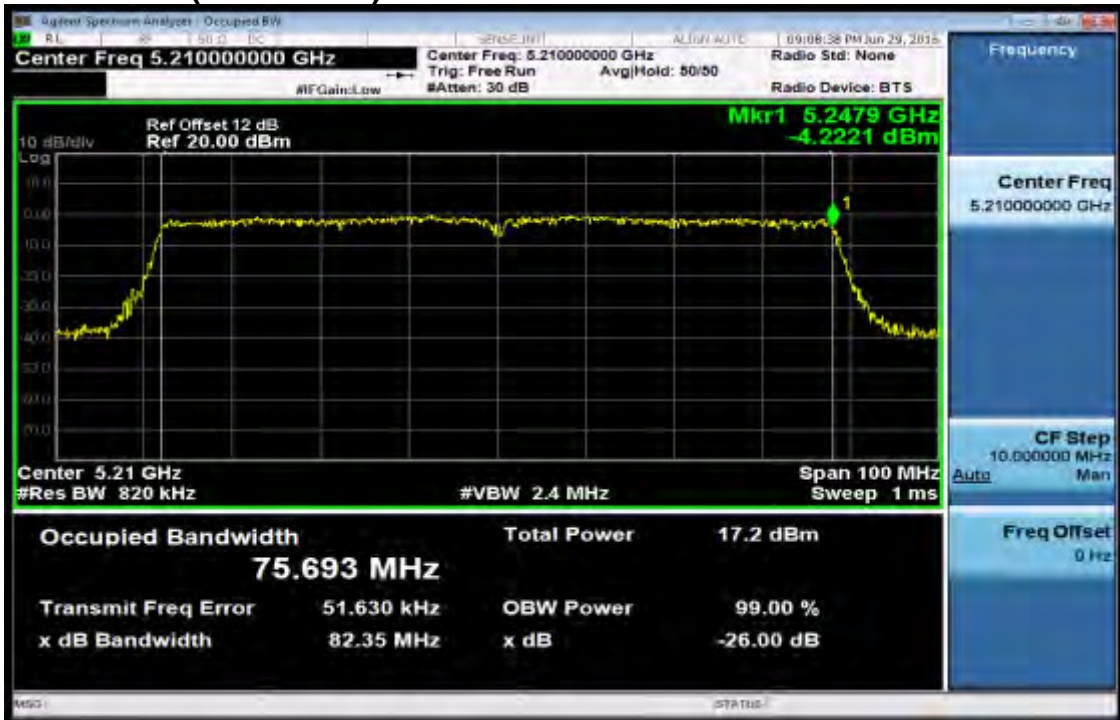


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802.11ac VHT80, 5150~5250 MHz (Main)
Test Data CH-Mid (5210 MHz)



802.11ac VHT80, 5150~5250 MHz (Aux1)
Test Data CH-Mid (5210 MHz)



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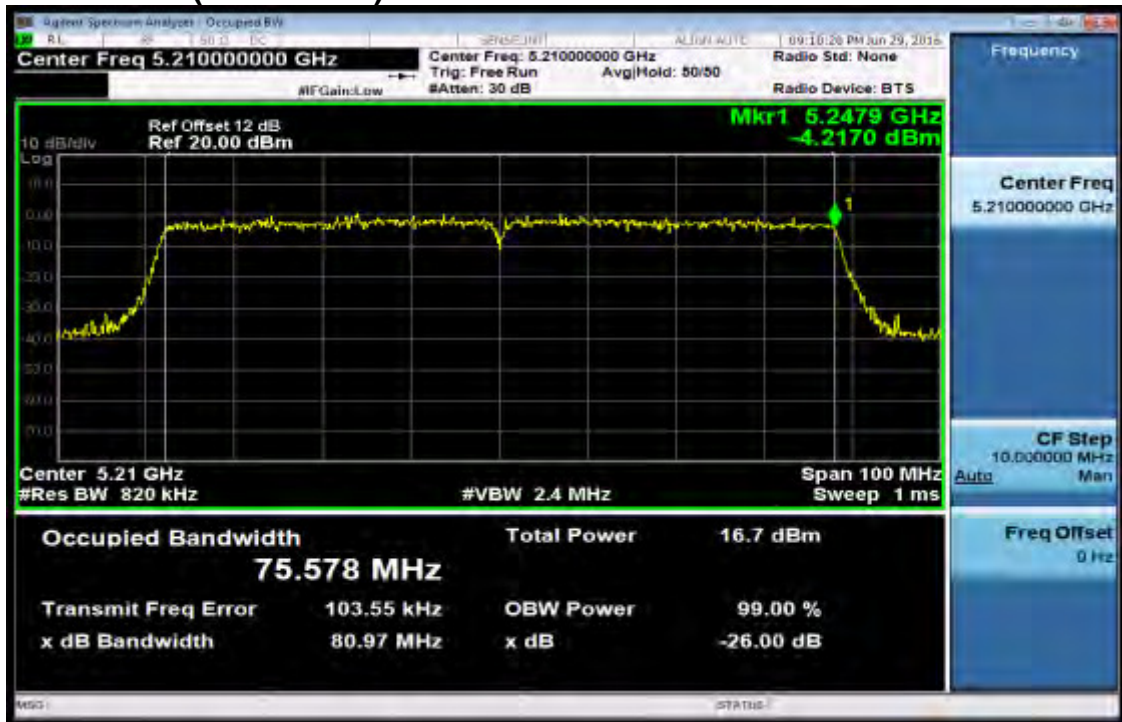
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Member of SGS Group

802.11ac VHT80, 5150~5250 MHz (Aux2)
Test Data CH-Mid (5210 MHz)



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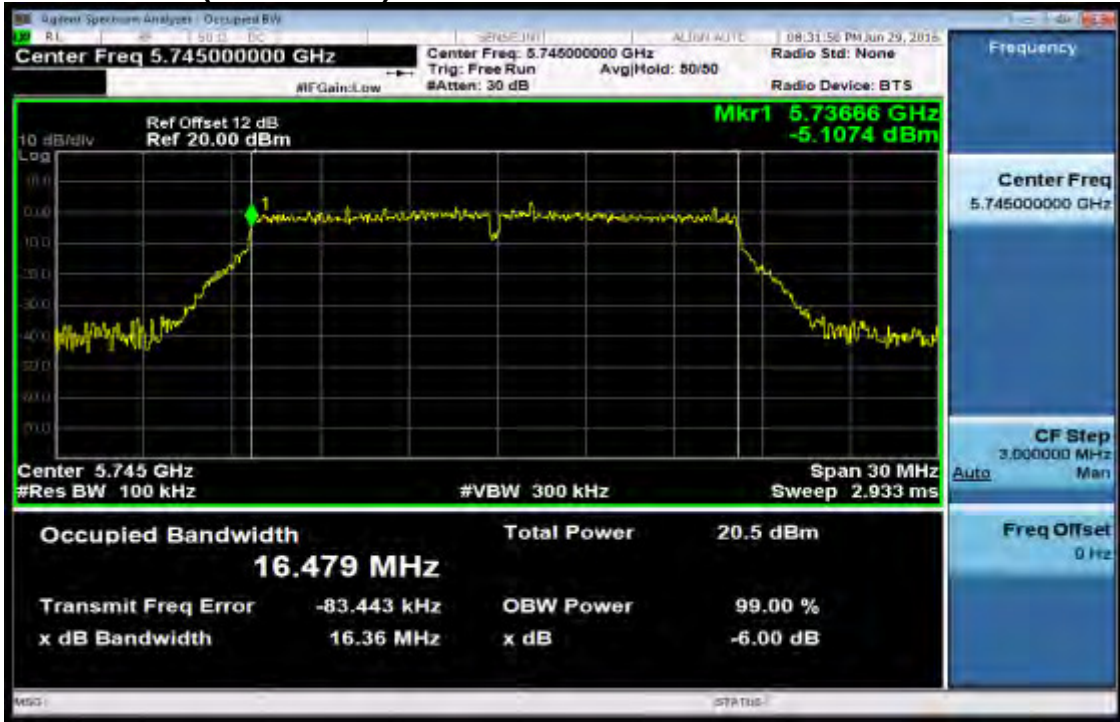
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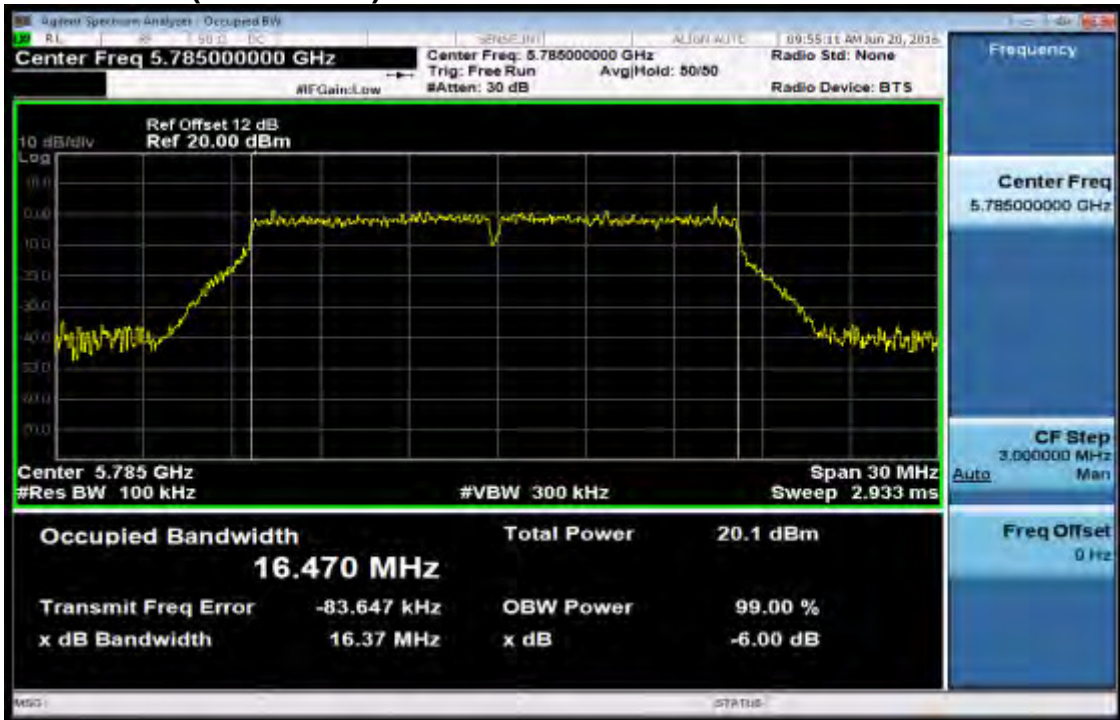
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6dB & 99% Bandwidth
802.11a, 5725~5850 MHz (Aux2)
Test Data CH-Low (5745 MHz)



Test Data CH-Mid (5785 MHz)



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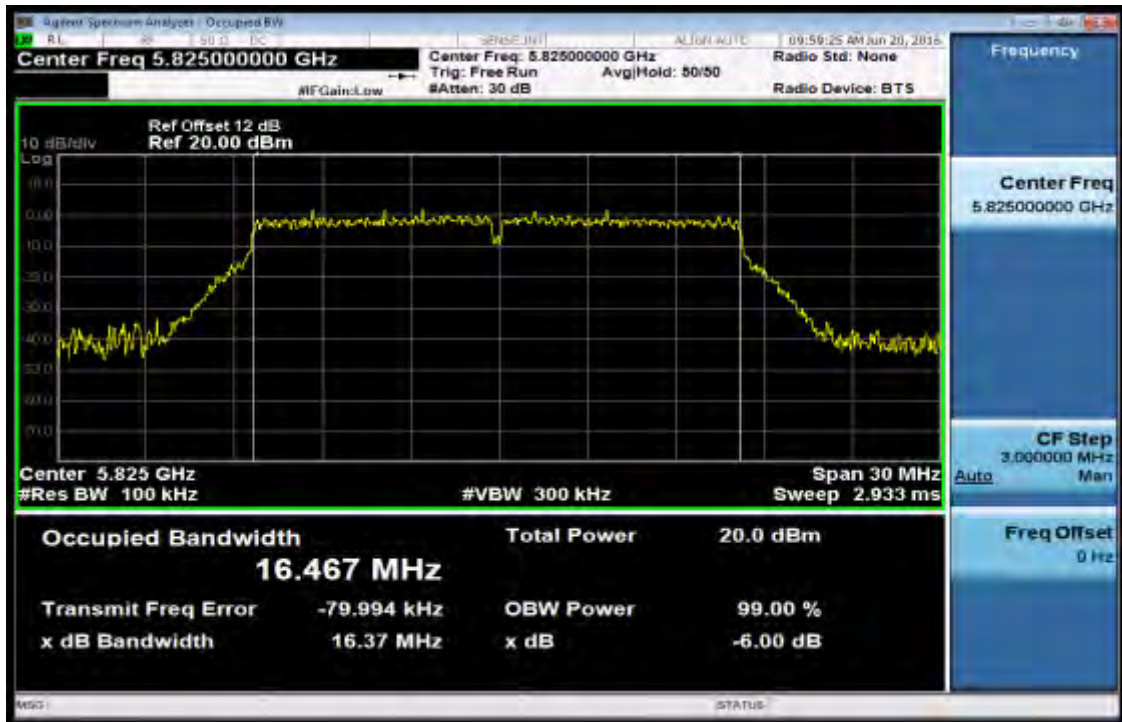
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Test Data CH-High (5825 MHz)



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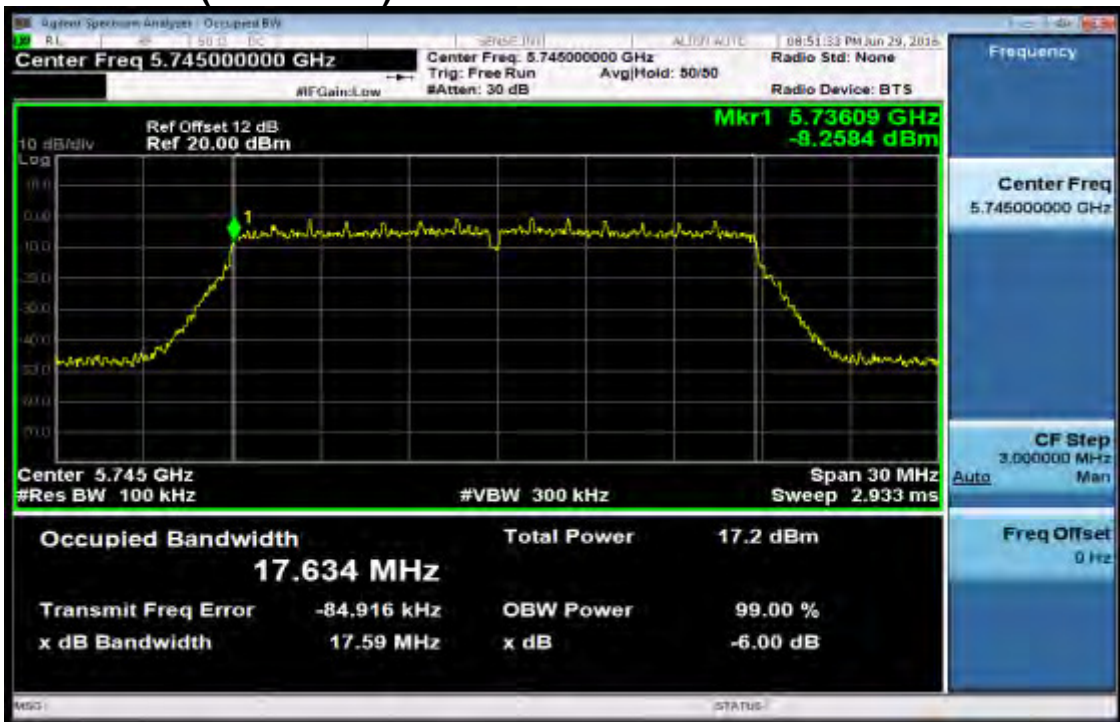
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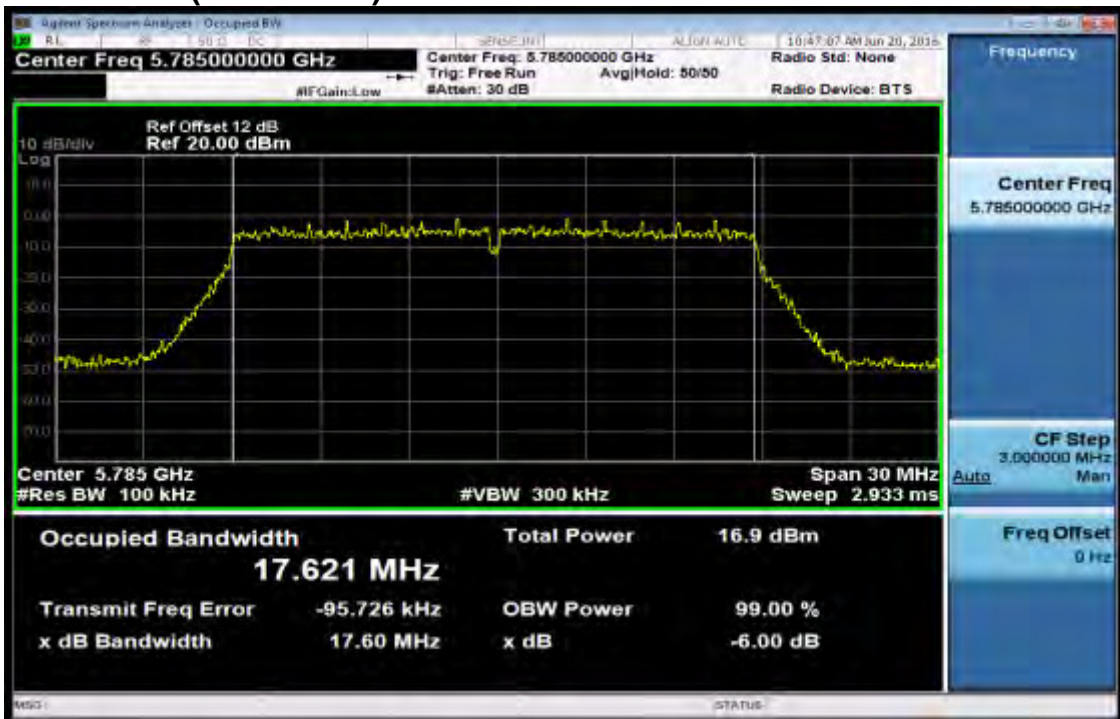
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802.11n_HT20, 5725~5850 MHz (Main)
Test Data CH-Low (5745 MHz)



Test Data CH-Mid (5785 MHz)



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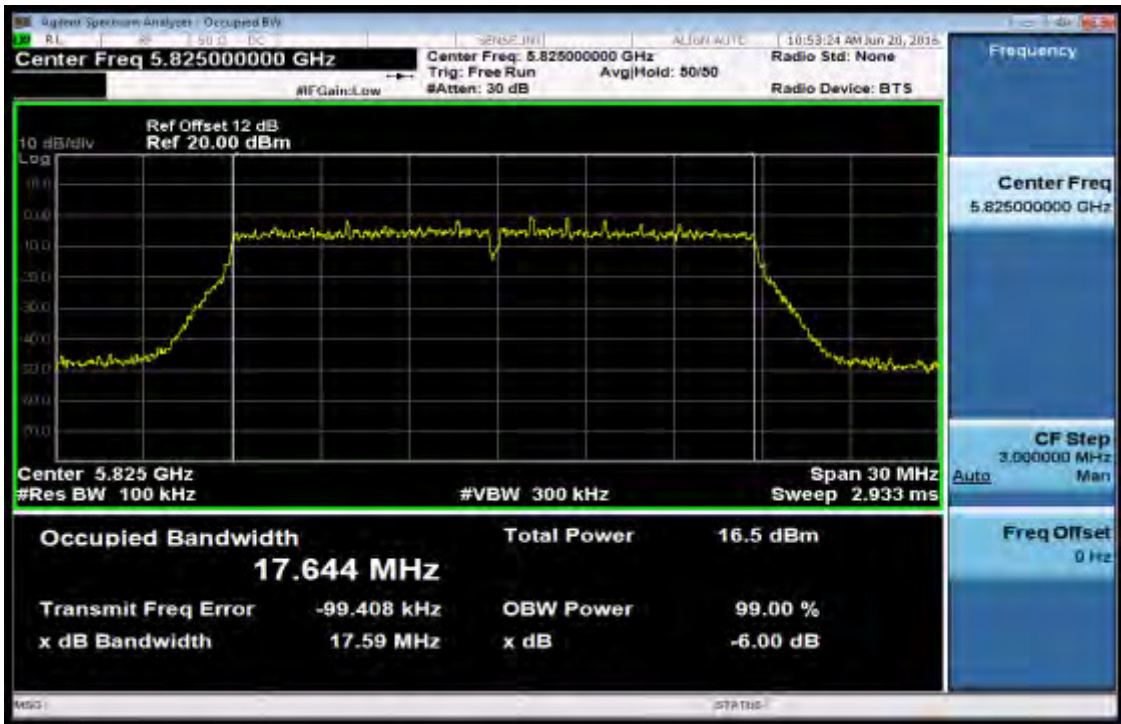
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Test Data CH-High (5825 MHz)



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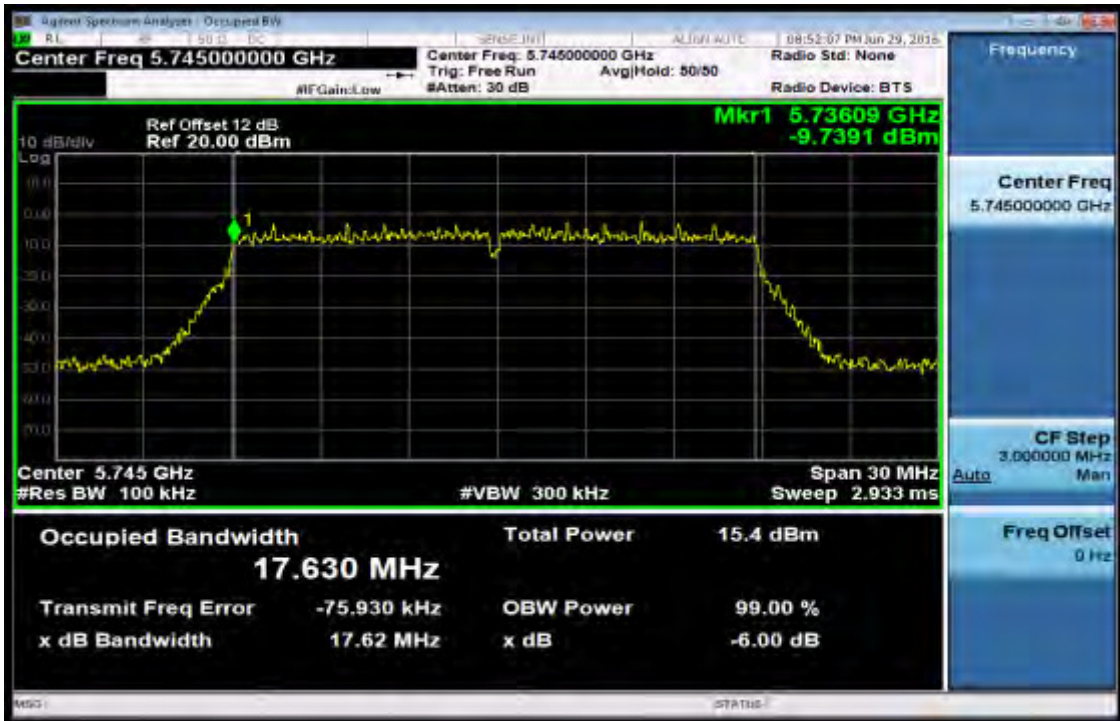
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802.11n_HT20, 5725~5850 MHz (Aux1)
Test Data CH-Low (5745 MHz)



Test Data CH-Mid (5785 MHz)



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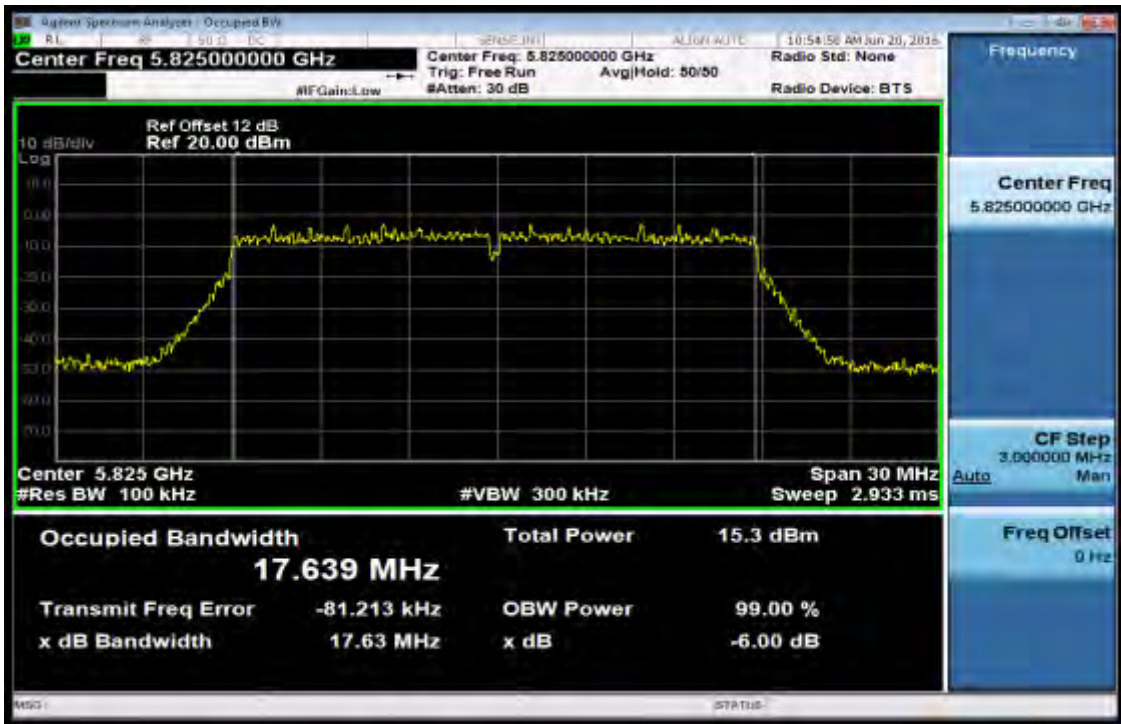
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Test Data CH-High (5825 MHz)



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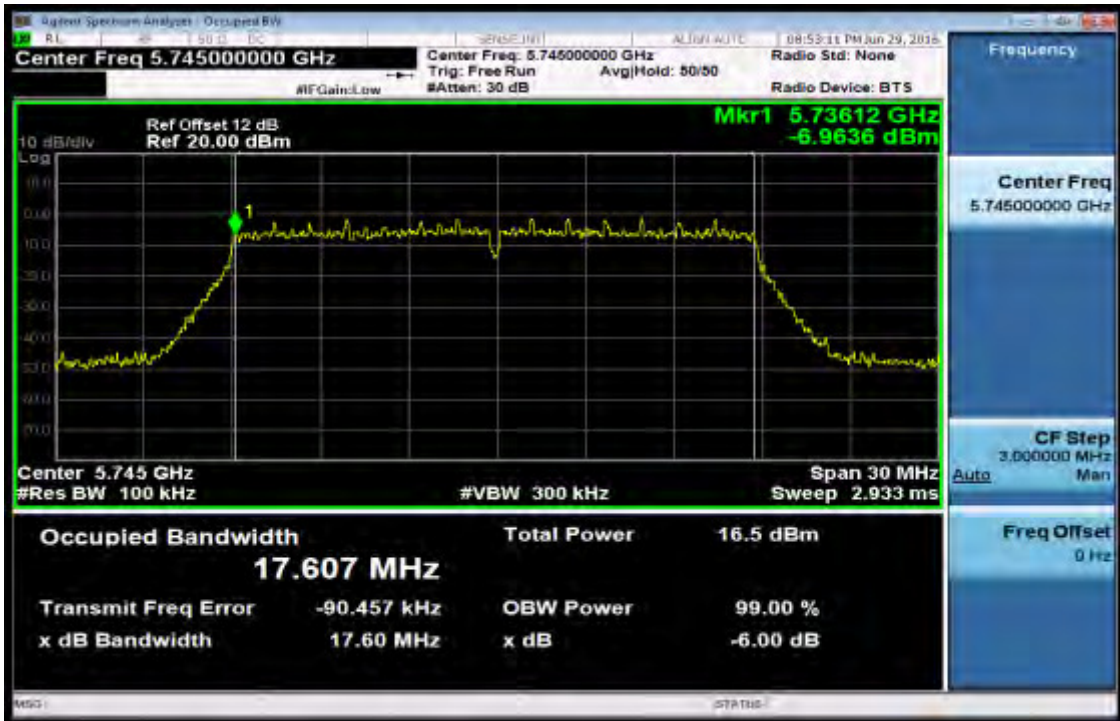
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802.11n_HT20, 5725~5850 MHz (Aux2)
Test Data CH-Low (5745 MHz)



Test Data CH-Mid (5785 MHz)



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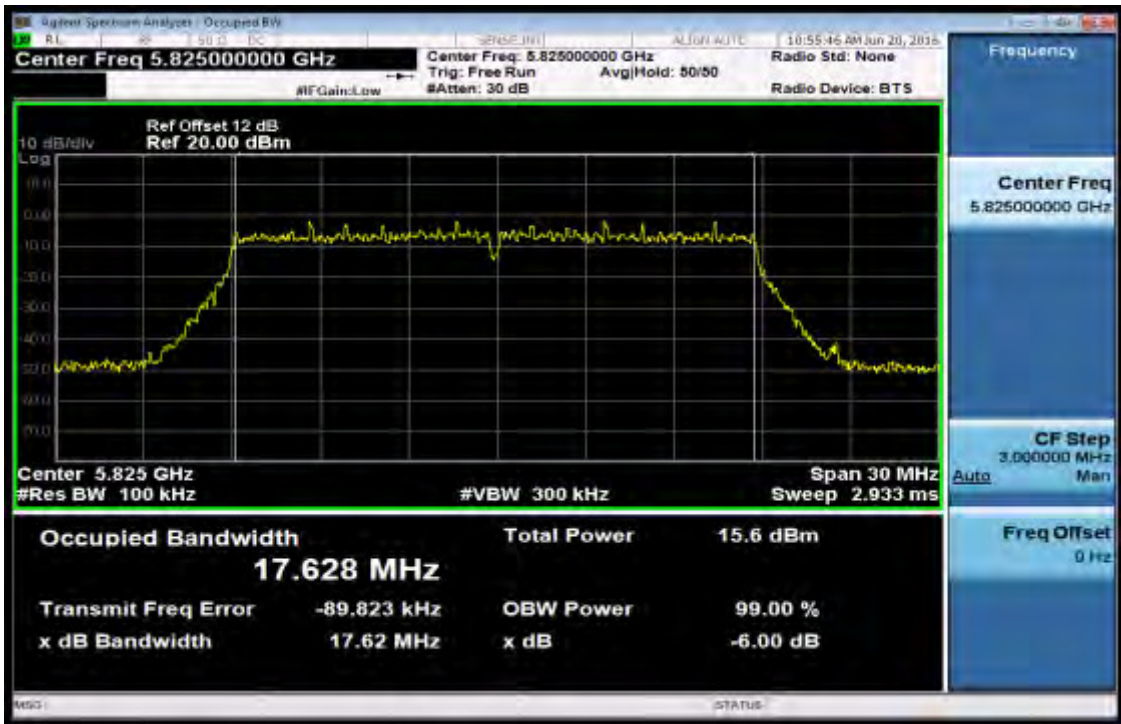
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Test Data CH-High (5825 MHz)



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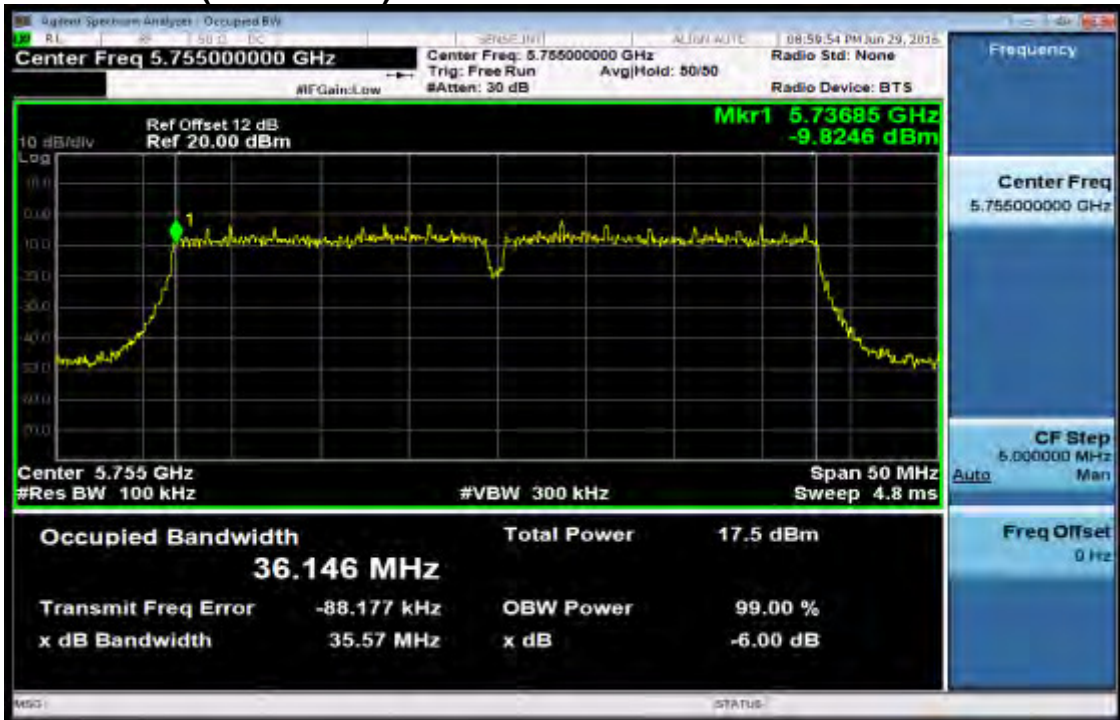
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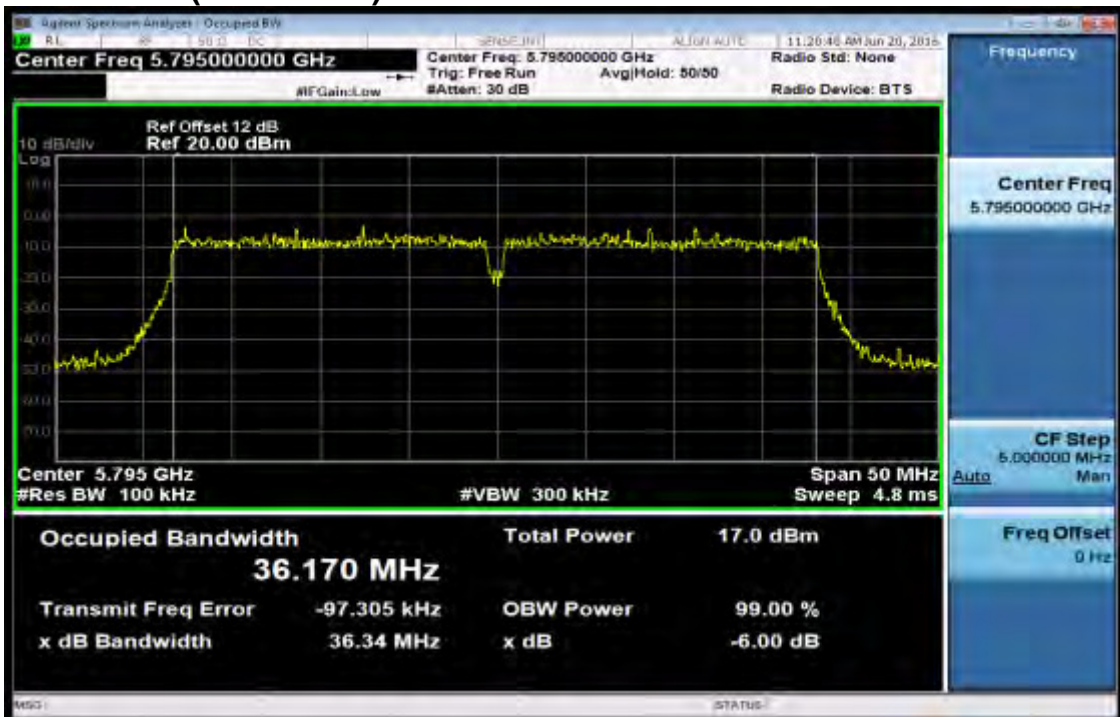
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802.11n_HT40, 5725~5850 MHz (Main)
Test Data CH-Low (5755 MHz)



Test Data CH-Mid (5795 MHz)



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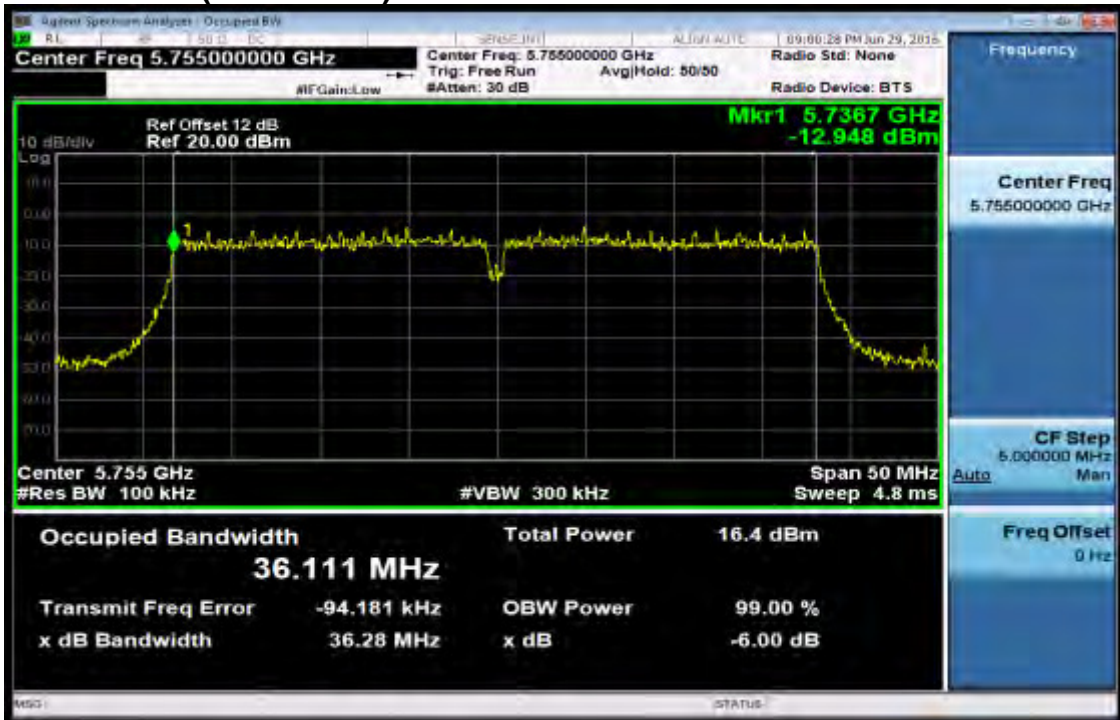
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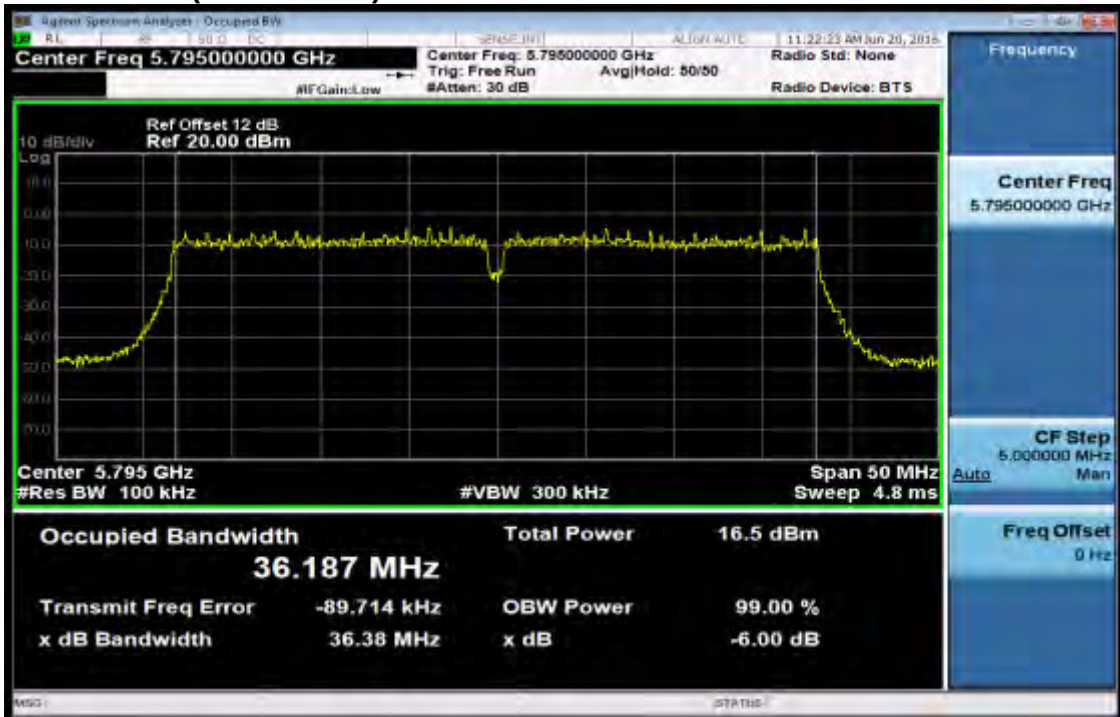
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802.11n_HT40, 5725~5850 MHz (Aux1)
Test Data CH-Low (5755 MHz)



Test Data CH-Mid (5795 MHz)



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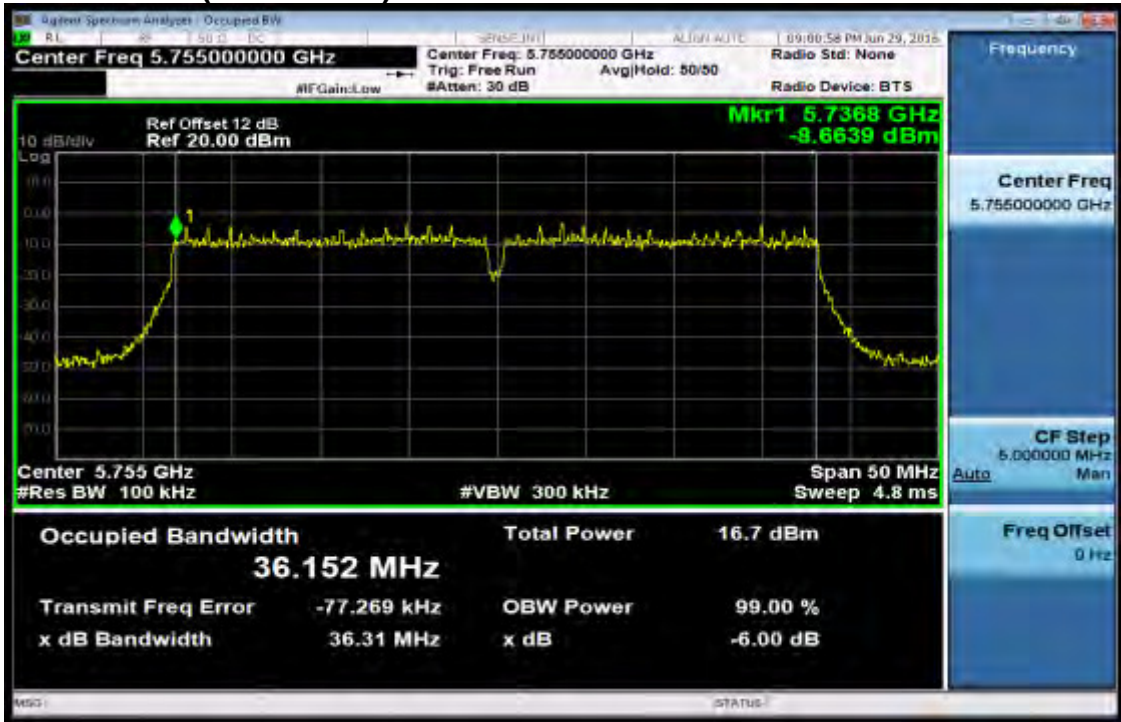
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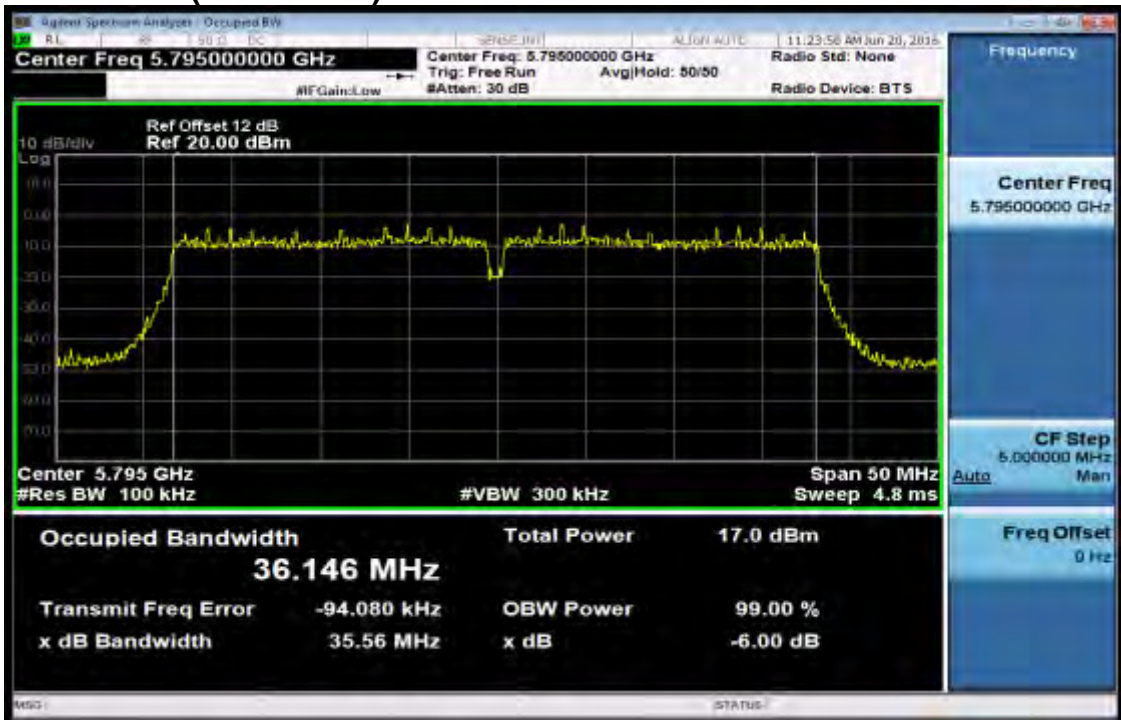
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802.11n_HT40, 5725~5850 MHz (Aux2)
Test Data CH-Low (5755 MHz)



Test Data CH-Mid (5795 MHz)



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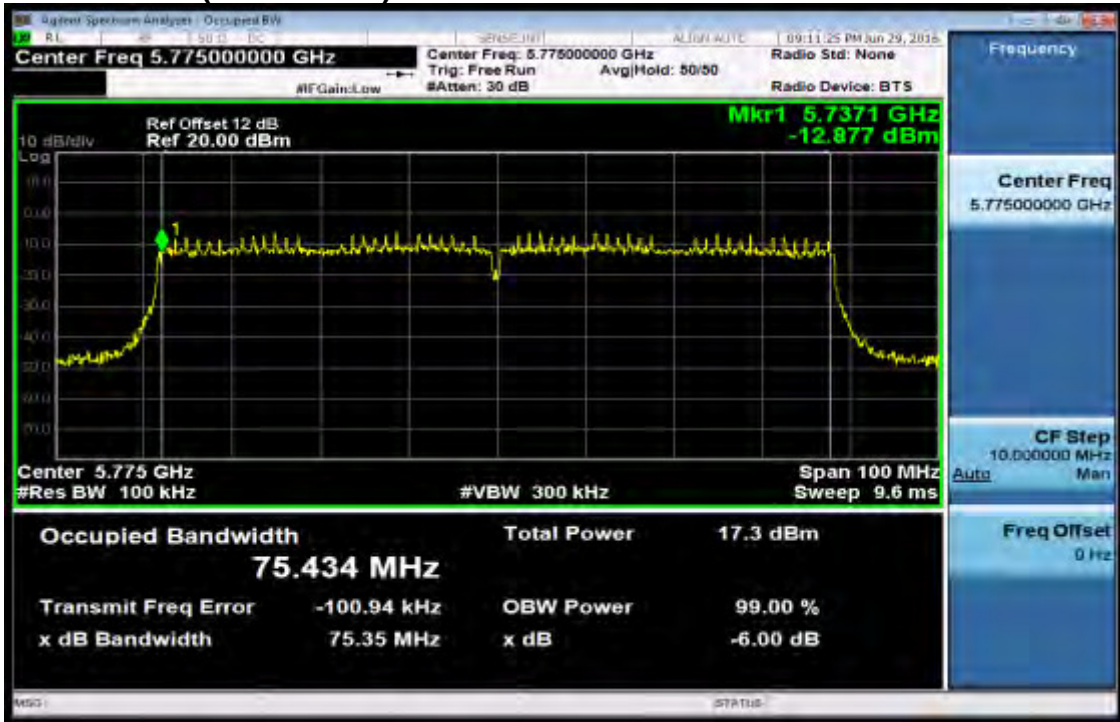
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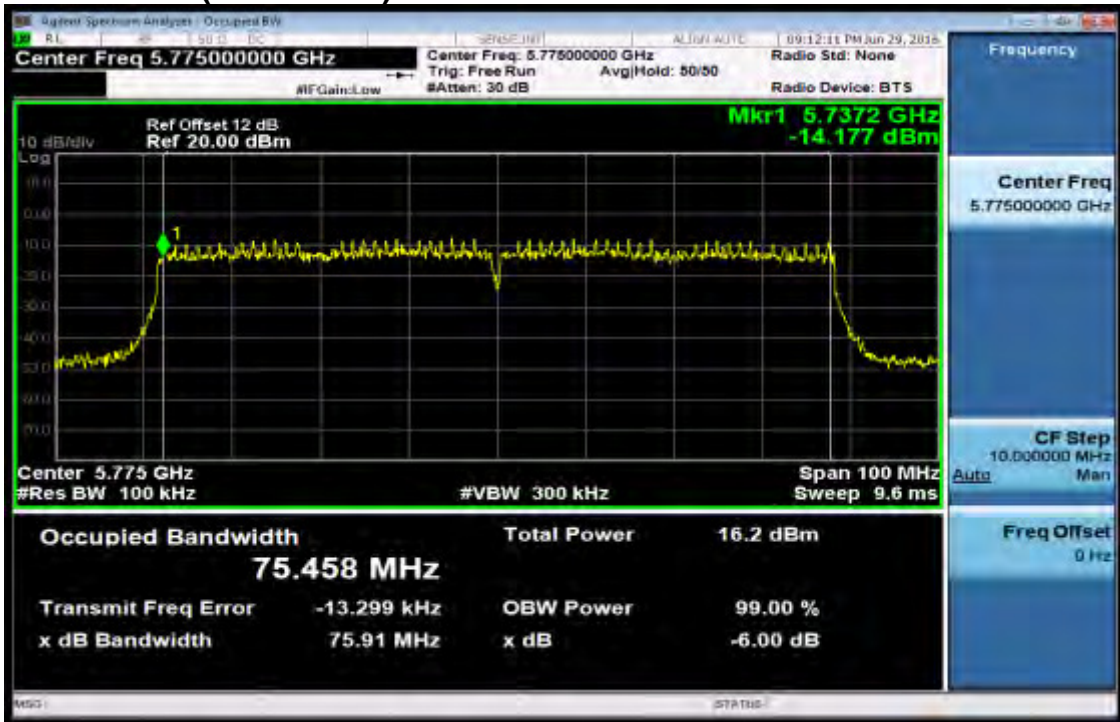
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802.11ac VHT80, 5725~5850 MHz (Main)
Test Data CH-Low (5775 MHz)



802.11ac VHT80, 5725~5850 MHz (Aux1)
Test Data CH-Low (5775 MHz)



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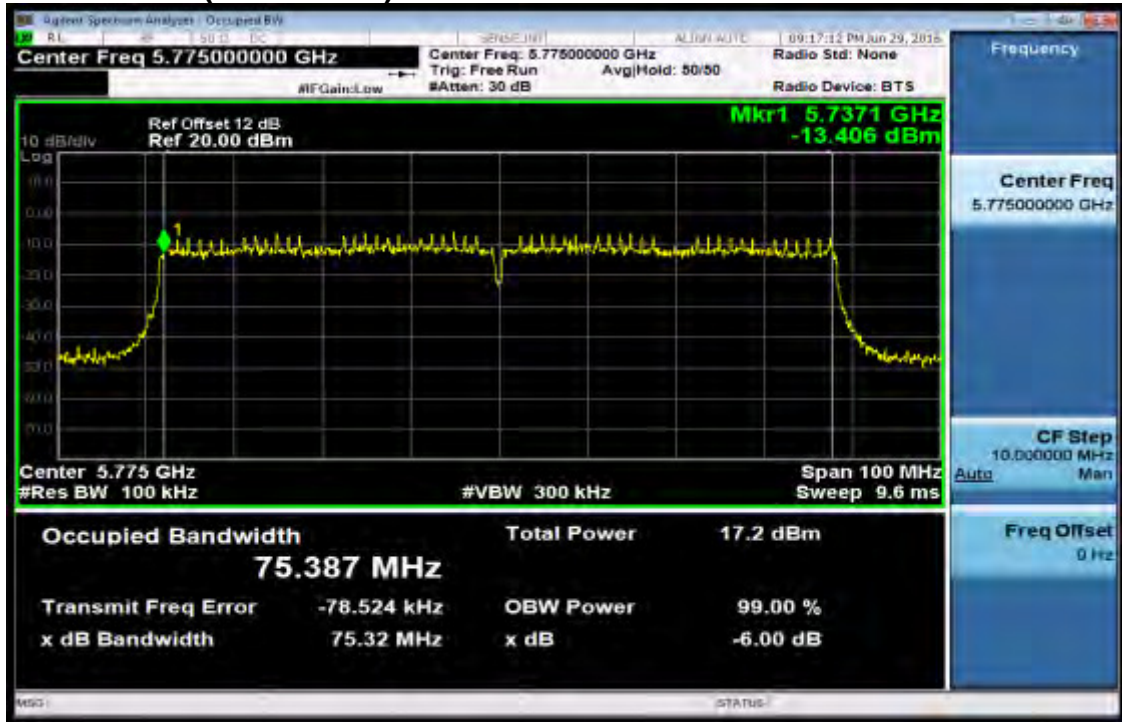
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802.11ac VHT80, 5725~5850 MHz (Aux2)
Test Data CH-Low (5775 MHz)



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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)

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.

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)

	Effective Legacy Gain (dBi)	Limit
UNII-1	5.53+4.77=10.3dBi	23.98dBm – (10.3 – 6 dBi) = 19.68dBm
U-NII-3	5.50+4.77=10.27dBi	30 dBm – (10.27 – 6 dBi) = 25.73dBm

Therefore the limit needs to reduce for the UNII-1 and U-NII-3 band.

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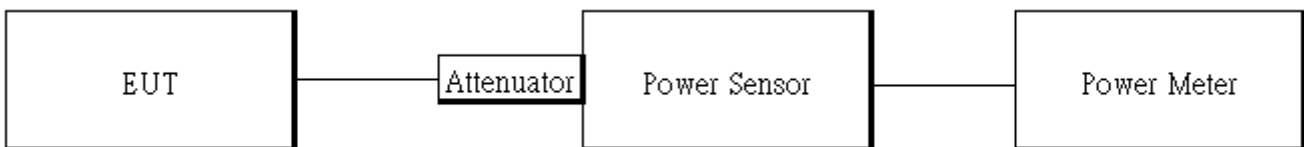
9.2 Measurement Procedure

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.
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

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Power Meter	Anritsu	ML2496A	1326001	06/23/2015	06/22/2016
Power Sensor	Anritsu	MA2411B	1315048	06/23/2015	06/22/2016
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
DC Block	PASTERNAK	PE8210	RF29	12/12/2015	12/11/2016
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/12/2015	12/11/2016
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/12/2015	12/11/2016
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/23/2015	06/22/2016

9.4 Test Set-up



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9.5 Measurement Result

Conducted output power

802.11a_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	14.81	30.269	23.98	PASS
44	5220	MCS0	14.87	30.690	23.98	PASS
48	5240	MCS0	14.80	30.200	23.98	PASS
149	5745	MCS0	14.84	30.479	30	PASS
157	5785	MCS0	14.81	30.269	30	PASS
165	5825	MCS0	14.85	30.549	30	PASS

802.11n_HT20_MIMO

CH	Frequency (MHz)	Data Rate	AVERAGE POWER (dBm)			TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1	CH 2				
36	5180	MCS16	10.44	9.81	10.09	14.89	30.848	19.68	PASS
44	5220	MCS16	10.49	9.94	10.13	14.96	31.361	19.68	PASS
48	5240	MCS16	10.44	9.9	10.14	14.94	31.166	19.68	PASS
149	5745	MCS16	10.93	9.36	9.84	14.87	30.656	25.73	PASS
157	5785	MCS16	10.76	9.26	9.82	14.76	29.940	25.73	PASS
165	5825	MCS16	10.79	9.27	9.9	14.80	30.220	25.73	PASS

802.11n_HT40_MIMO

CH	Frequency (MHz)	Data Rate	AVERAGE POWER (dBm)			TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1	CH 2				
38	5190	MCS16	10.11	9.51	10.59	14.86	30.645	19.68	PASS
46	5230	MCS16	10.31	9.69	10.6	14.99	31.533	19.68	PASS
151	5755	MCS16	10.65	9.61	10.31	14.98	31.496	25.73	PASS
159	5795	MCS16	10.58	9.37	10.32	14.89	30.843	25.73	PASS

802.11ac_VHT80_MIMO

CH	Frequency (MHz)	Data Rate	AVERAGE POWER (dBm)			TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1	CH 2				
42	5210	MCS0	10.63	9.57	10.35	14.98	31.458	19.68	PASS
155	5775	MCS0	10.45	9.38	10.37	14.86	30.651	25.73	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.

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)

	Effective Legacy Gain (dBi)	Limit
UNII-1	5.53+4.77=10.30dBi	17dBm – (10.3 – 6 dBi) = 12.70dBm
U-NII-3	5.50+4.77=10.27dBi	30dBm – (10.27 – 6 dBi) = 25.73dBm

Therefore the limit needs to reduce for the UNII-1 and U-NII-3 band.

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10.2 Measurement Procedure

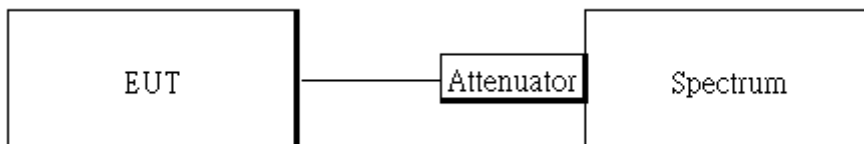
1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
4. **For U-NII1, U-NII-2A, U-NII-2C Band:**
Set RBW=1MHz,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

Note: For the test of PSD at MIMO mode, the highest emission of worst case employing Measure and add 10 log (N) technical is reported on this report after the comparison between Main Antenna at single transmitting mode and Aux that yields the higher value. The MIMO transmitting mode produces higher value of outcome

10.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
DC Block	PASTERNAK	PE8210	RF29	12/12/2015	12/11/2016
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016

10.4 Test Set-up



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10.5 Measurement Result

POWER DENSITY 802.11a MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5180	1.38	17	-15.62
5220	1.56	17	-15.44
5240	1.66	17	-15.34
5745	8.16	30	-21.84
5785	8.17	30	-21.83
5825	7.63	30	-22.37

POWER DENSITY 802.11n HT20 MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5180	-0.57	12.7	-13.27
5220	0.50	12.7	-12.20
5240	-1.06	12.7	-13.76
5745	9.10	25.73	-16.63
5785	8.61	25.73	-17.12
5825	8.87	25.73	-16.86

POWER DENSITY 802.11n HT40 MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5190	-2.96	12.7	-15.66
5230	-7.04	12.7	-19.74
5755	7.02	25.73	-18.71
5795	6.76	25.73	-18.97

POWER DENSITY 802.11ac VHT80 MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5210	-4.74	12.7	-17.44
5775	3.12	25.73	-22.61

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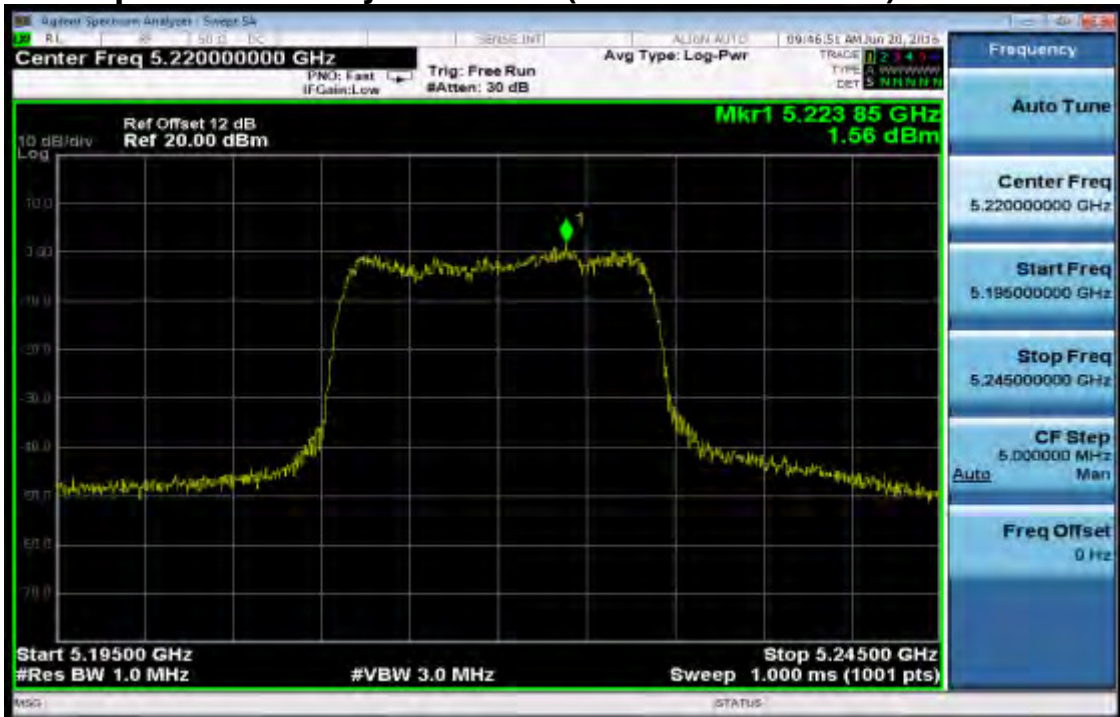
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802.11a 5150~5250 MHz
Peak Power Spectral Density Data Plot (CH Low 5180 MHz)



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



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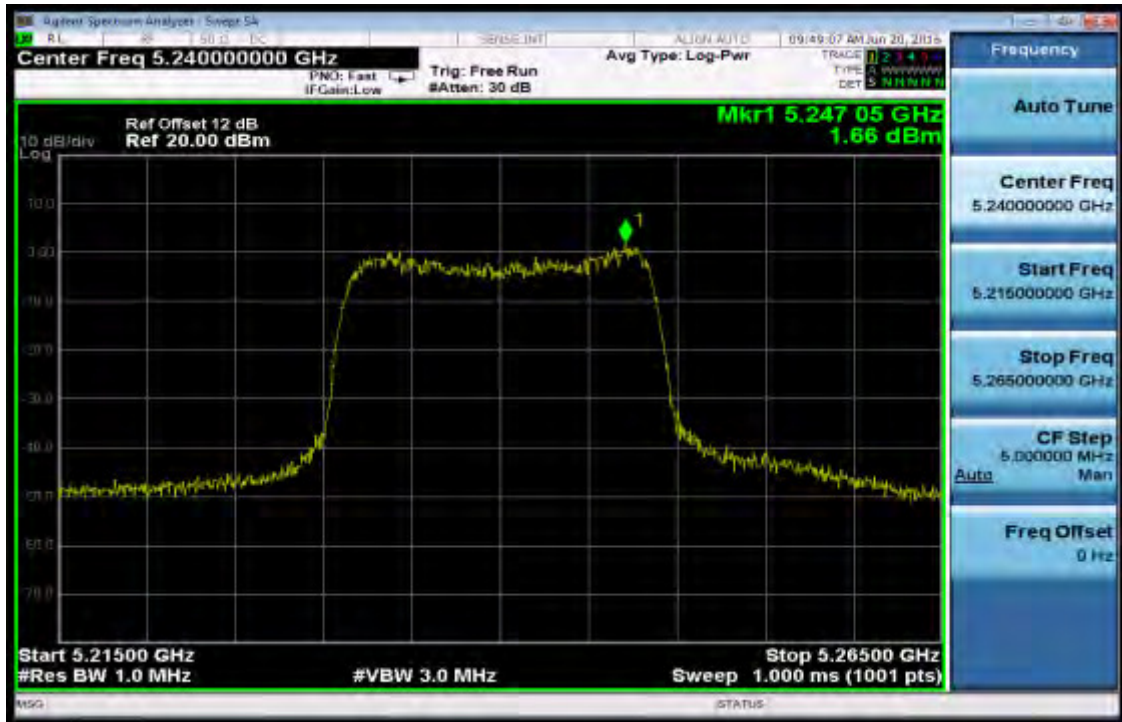
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Peak Power Spectral Density Data Plot (CH High 5240 MHz)



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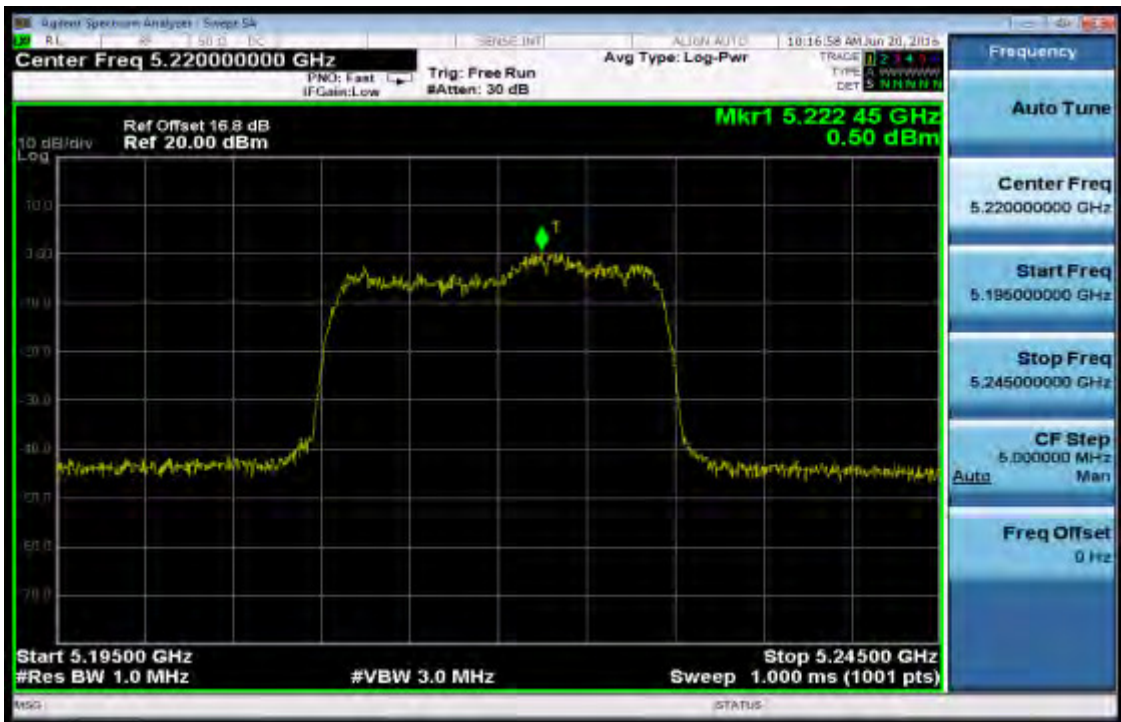
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802.11n HT20, 5150~5250 MHz
Peak Power Spectral Density Data Plot (CH Low 5180 MHz)



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



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



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802.11ac VHT80, 5150~5250 MHz
Peak Power Spectral Density Data Plot (CH Mid 5210 MHz)



802.11ac VHT80, 5725~5850 MHz
Peak Power Spectral Density Data Plot (CH Mid 5775 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 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

APPLICABLE TO	LIMIT	
FCC KDB 789033 D02 General UNII Test Procedures New Rules	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)(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.

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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)

11.2 Measurement Equipment Used

SGS SAC-III					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI Test Receiver	R&S	ESU 40	100363	04/12/2016	04/11/2017
Loop Antenna	ETS-Lindgren	6502	00143303	12/23/2015	12/22/2016
Broadband Antenna	TESEQ	CBL 6112D	35240	10/28/2015	10/27/2016
Horn Antenna	ETS-Lindgren	3117	00143272	12/16/2015	12/15/2016
Horn Antenna	Schwarzbeck	BBHA9170	185	07/24/2015	07/23/2016
Pre Amplifier	EMC Instruments	EMC330	980096	12/12/2015	12/11/2016
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/12/2015	12/11/2016
Pre Amplifier	R&S	SCU-18	10204	12/12/2015	12/11/2016
Pre Amplifier	EMC Instruments	EMC184045B	980135	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/12/2015	12/11/2016

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Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/12/2015	12/11/2016
Attenuator	WOKEN	218FS-10	RF27	12/12/2015	12/11/2016
Site NSA	SGS	966 Chamber C	SAC-C	03/04/2016	03/03/2017
Site VSWR	SGS	966 Chamber C	SAC-C	03/04/2016	03/03/2017
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2016	05/03/2017
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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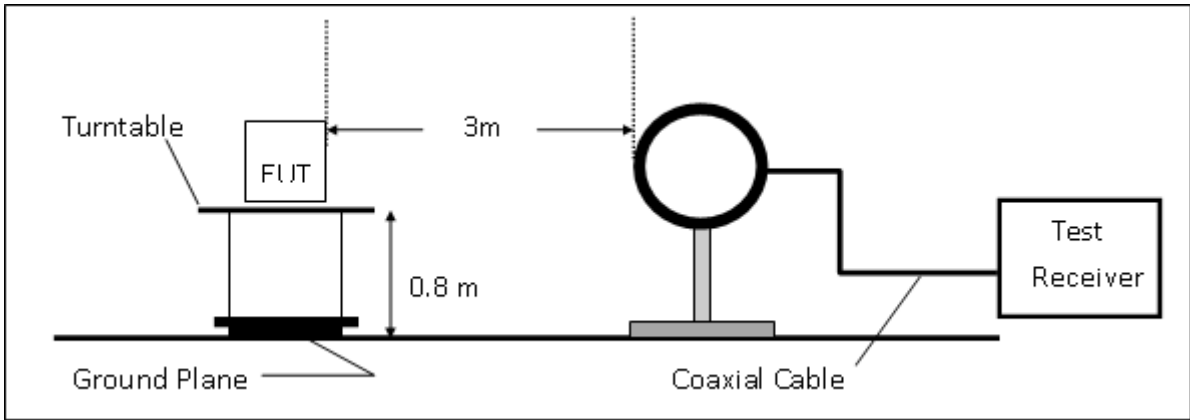
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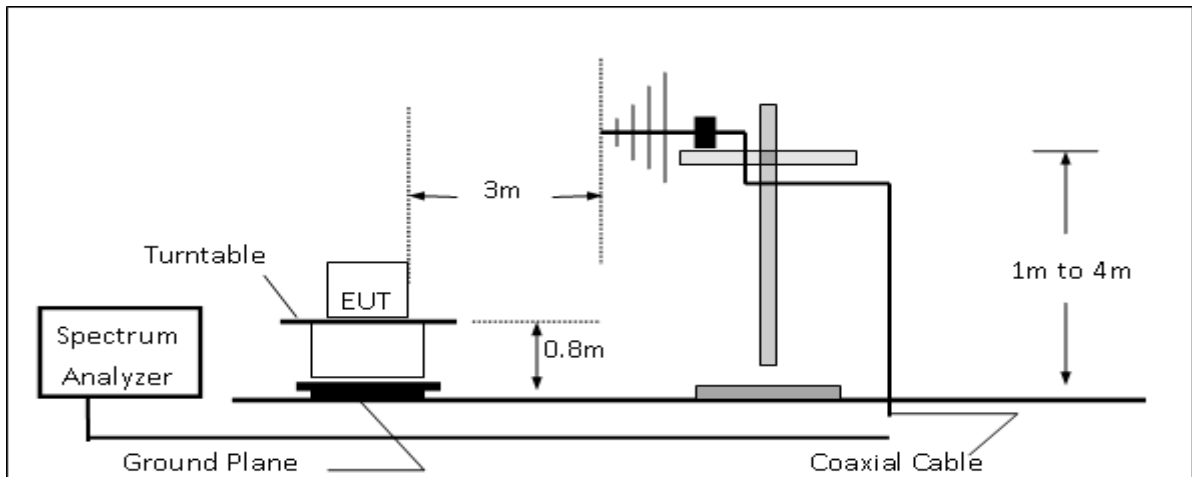
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11.3 Test SET-UP

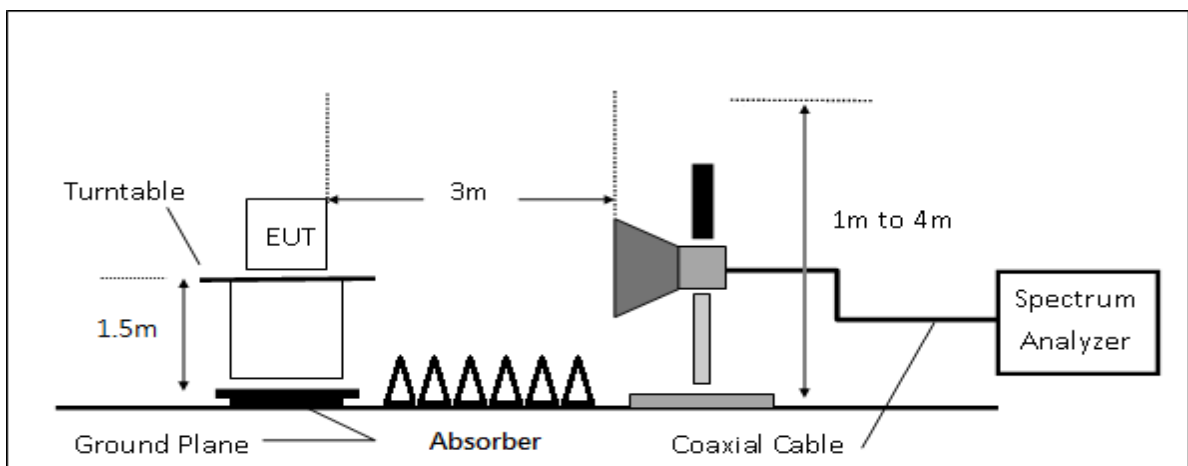
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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.
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	

$$\text{Actual FS(dB}\mu\text{V/m)} = \text{SPA. Reading level(dB}\mu\text{V)} + \text{Factor(dB)}$$

$$\text{Factor(dB)} = \text{Antenna Factor(dB}\mu\text{V/m)} + \text{Cable Loss(dB)} - \text{Pre_Amplifier Gain(dB)}$$

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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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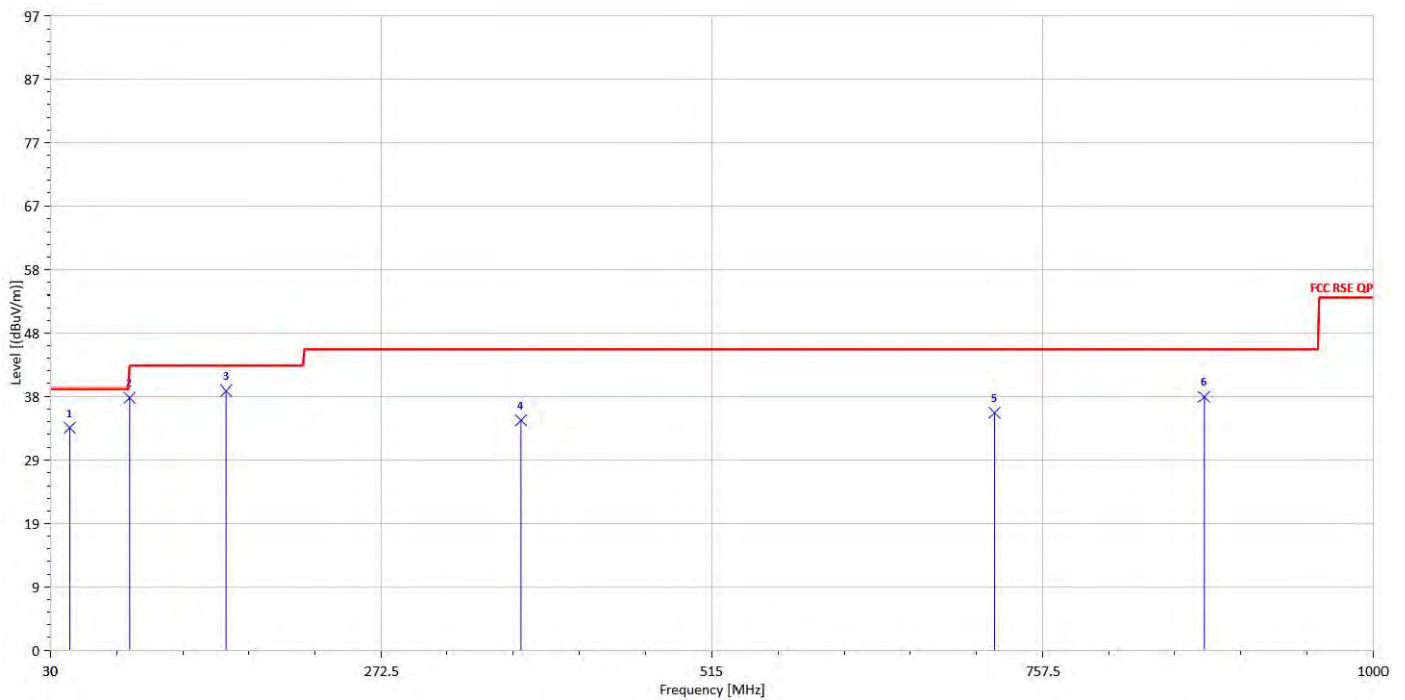
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Radiated Spurious Emission Measurement Result

Below 1GHz Worst-Case Data:

802.11a 5150~5250 MHz

Operation Mode :	802.11a	Test Date :	2016/6/15
Fundamental Frequency :	5220 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Pony
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
44.55	S	QP	50.10	-16.05	34.05	40	-5.95
88.20	S	Peak	58.44	-19.77	38.67	43.5	-4.83
159.01	S	Peak	57.22	-17.50	39.72	43.5	-3.78
375.32	S	Peak	45.72	-10.53	35.20	46	-10.80
722.58	S	Peak	41.53	-5.16	36.37	46	-9.63
875.84	S	Peak	41.61	-2.80	38.81	46	-7.19

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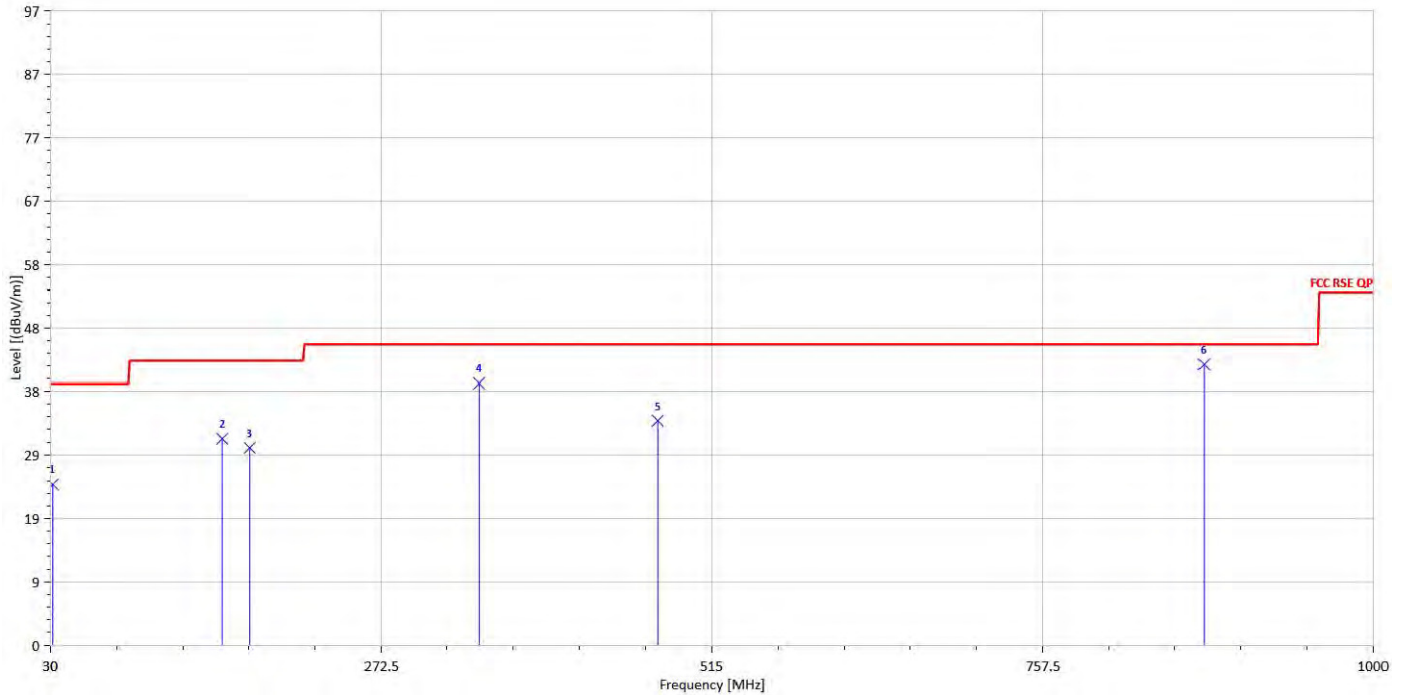
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Operation Mode : 802.11a Test Date : 2016/6/15
 Fundamental Frequency : 5220 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
31.94	S	Peak	32.89	-8.22	24.67	40	-15.33
156.10	S	Peak	48.71	-17.14	31.57	43.5	-11.93
176.47	S	Peak	48.70	-18.52	30.18	43.5	-13.32
344.28	S	Peak	51.55	-11.50	40.04	46	-5.96
475.23	S	Peak	42.41	-8.05	34.36	46	-11.64
875.84	S	Peak	45.71	-2.80	42.91	46	-3.09

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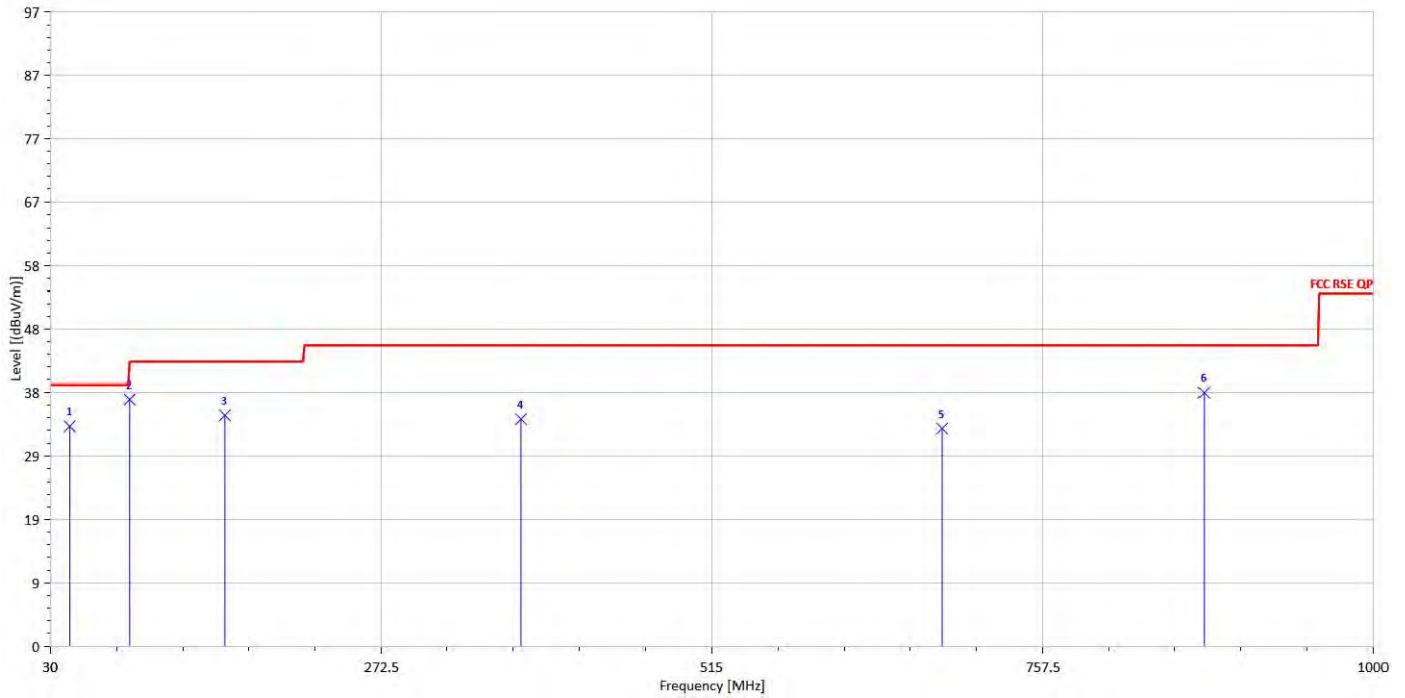
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802.11a, 5725~5850 MHz

Operation Mode :	802.11a	Test Date :	2016/6/15
Fundamental Frequency :	5785 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Pony
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
44.55	S	QP	49.70	-16.05	33.65	40	-6.35
88.20	S	Peak	57.56	-19.77	37.79	43.5	-5.71
158.04	S	QP	52.73	-17.40	35.33	43.5	-8.17
375.32	S	Peak	45.28	-10.53	34.75	46	-11.25
683.78	S	Peak	38.87	-5.55	33.32	46	-12.68
875.84	S	Peak	41.63	-2.80	38.83	46	-7.17

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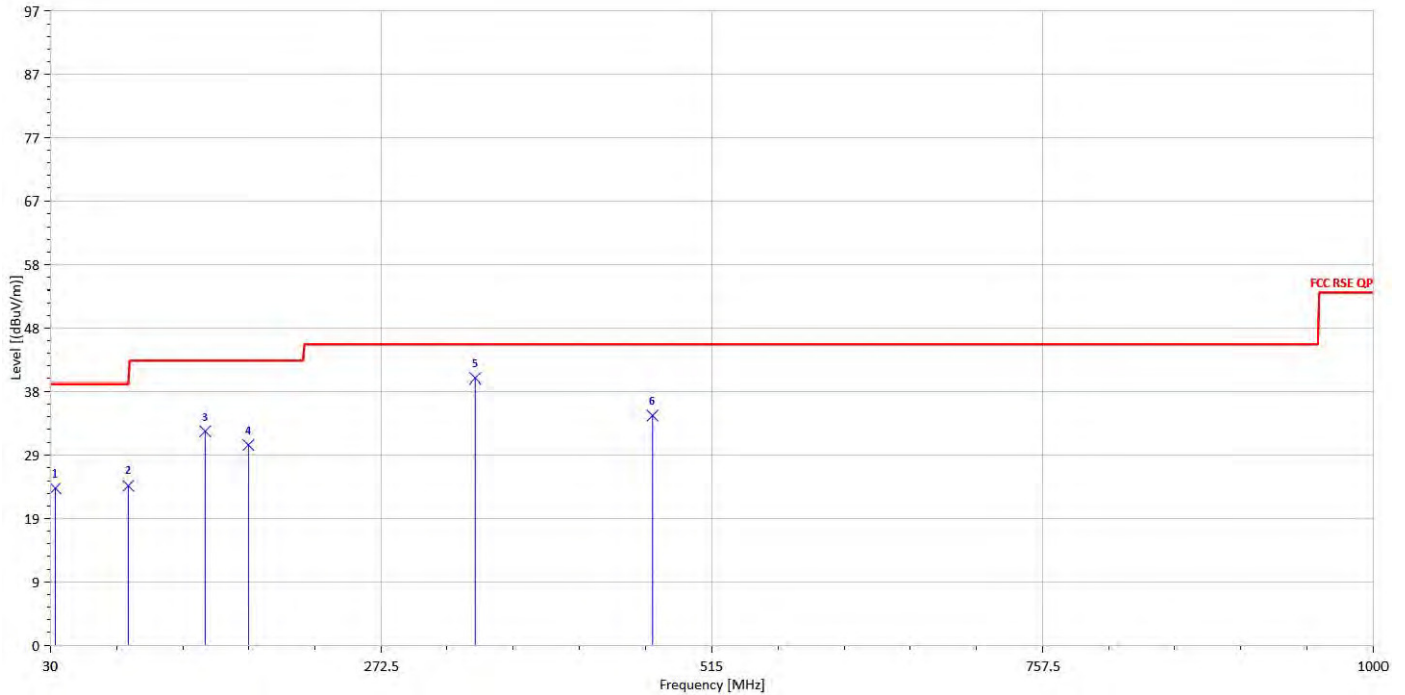
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Operation Mode : 802.11a Test Date : 2016/6/15
 Fundamental Frequency : 5785 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
33.88	S	Peak	33.34	-9.27	24.07	40	-15.93
87.23	S	Peak	44.36	-19.92	24.44	40	-15.56
143.49	S	Peak	49.04	-16.32	32.72	43.5	-10.78
175.50	S	Peak	49.13	-18.51	30.62	43.5	-12.88
341.37	S	Peak	52.47	-11.66	40.81	46	-5.19
471.35	S	Peak	42.96	-7.81	35.15	46	-10.85

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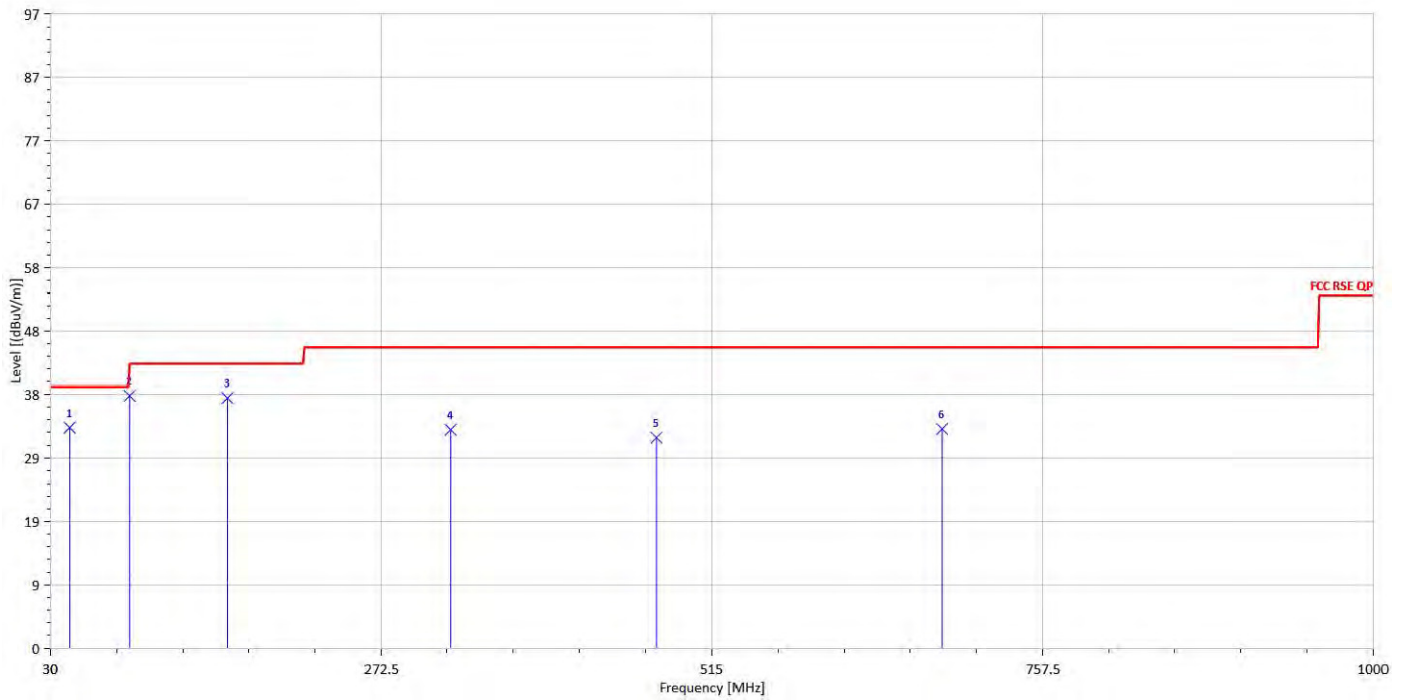
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802.11ac VHT80, 5150~5250 MHz

Operation Mode :	802.11ac80	Test Date :	2016/6/15
Fundamental Frequency :	5210 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Pony
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
44.55	S	QP	49.80	-16.05	33.75	40	-6.25
88.20	S	Peak	58.41	-19.77	38.64	43.5	-4.86
159.98	S	QP	55.83	-17.52	38.31	43.5	-5.19
323.91	S	Peak	45.30	-11.87	33.43	46	-12.57
474.26	S	Peak	40.29	-8.09	32.20	46	-13.80
683.78	S	Peak	39.10	-5.55	33.55	46	-12.45

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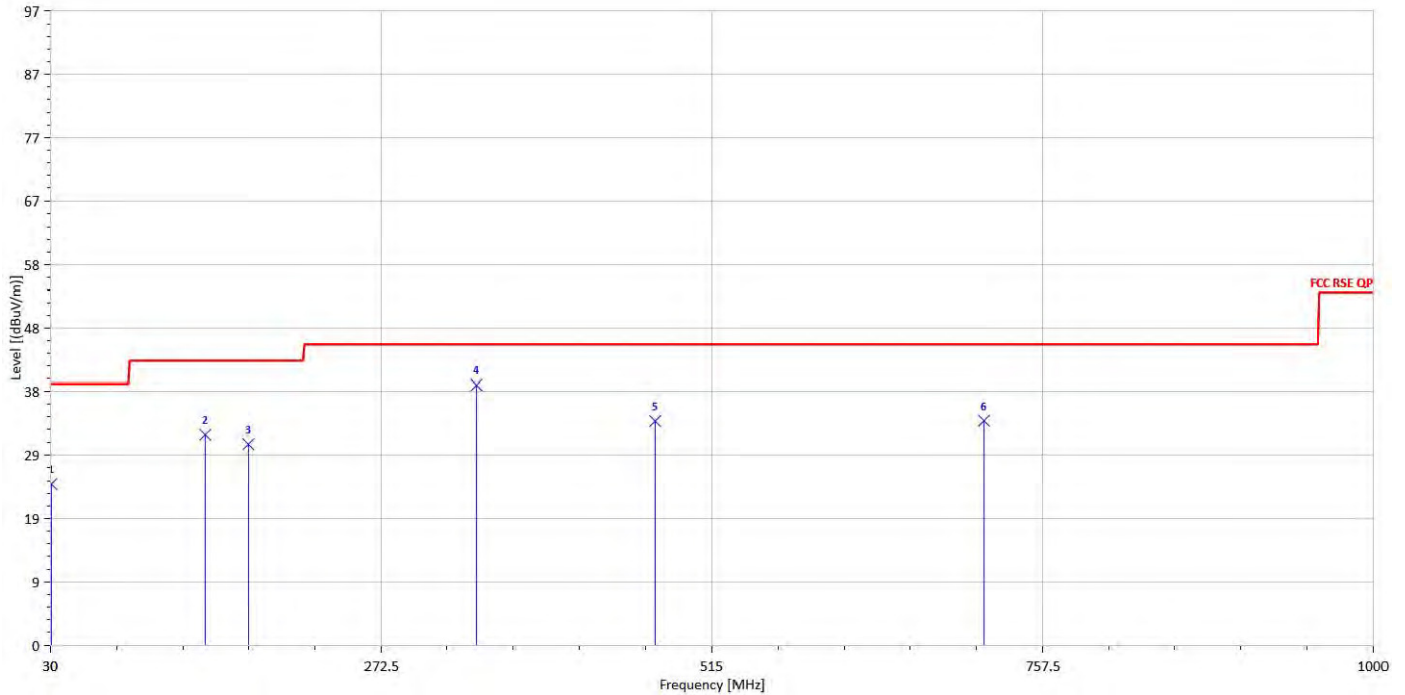
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Operation Mode : 802.11ac80 Test Date : 2016/6/15
 Fundamental Frequency : 5210 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
30.97	S	Peak	32.42	-7.70	24.72	40	-15.28
143.49	S	Peak	48.51	-16.32	32.19	43.5	-11.31
175.50	S	Peak	49.23	-18.51	30.72	43.5	-12.78
342.34	S	Peak	51.42	-11.62	39.80	46	-6.20
473.29	S	Peak	42.30	-7.99	34.31	46	-11.69
714.82	S	Peak	39.79	-5.42	34.36	46	-11.64

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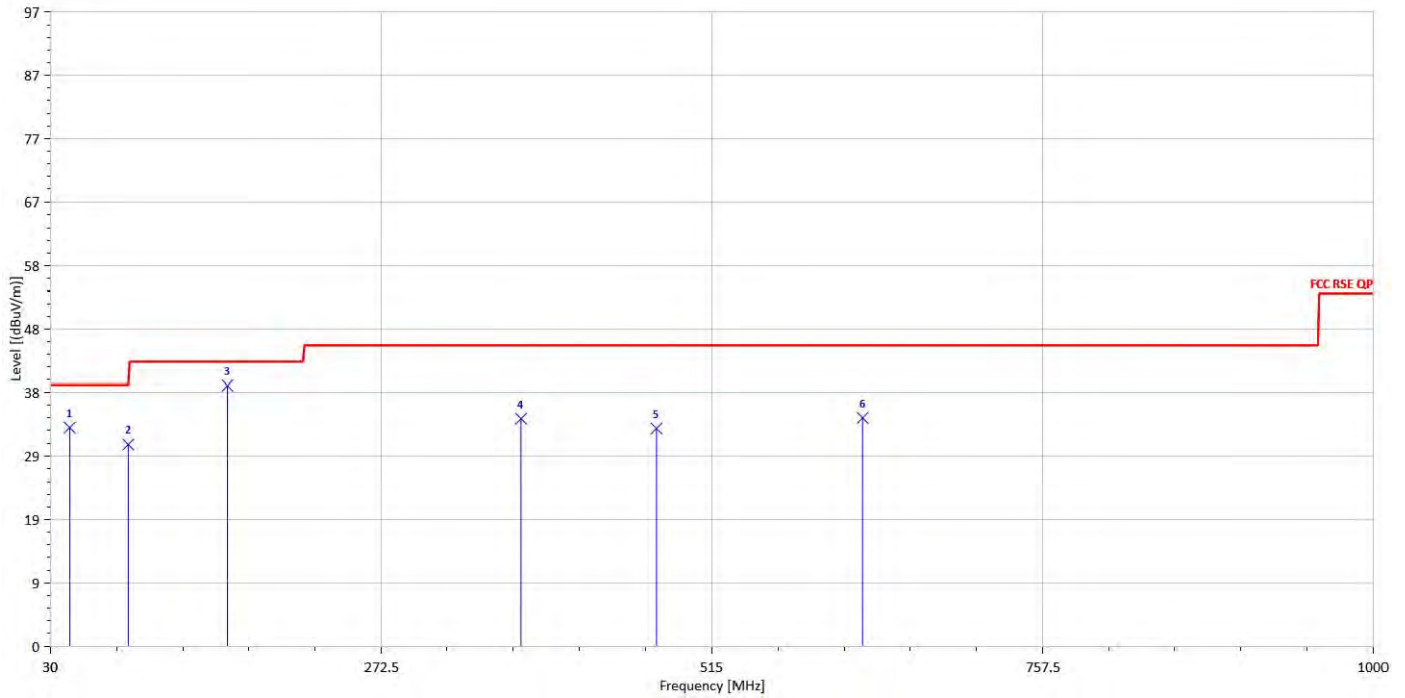
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802.11ac VHT80, 5725~5850 MHz

Operation Mode :	802.11ac80	Test Date :	2016/6/15
Fundamental Frequency :	5775 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Pony
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
44.55	S	QP	49.50	-16.05	33.45	40	-6.55
87.23	S	QP	50.75	-19.92	30.83	40	-9.17
159.98	S	Peak	57.39	-17.52	39.87	43.5	-3.63
375.32	S	Peak	45.35	-10.53	34.82	46	-11.18
474.26	S	Peak	41.39	-8.09	33.31	46	-12.69
625.58	S	Peak	41.04	-6.10	34.94	46	-11.06

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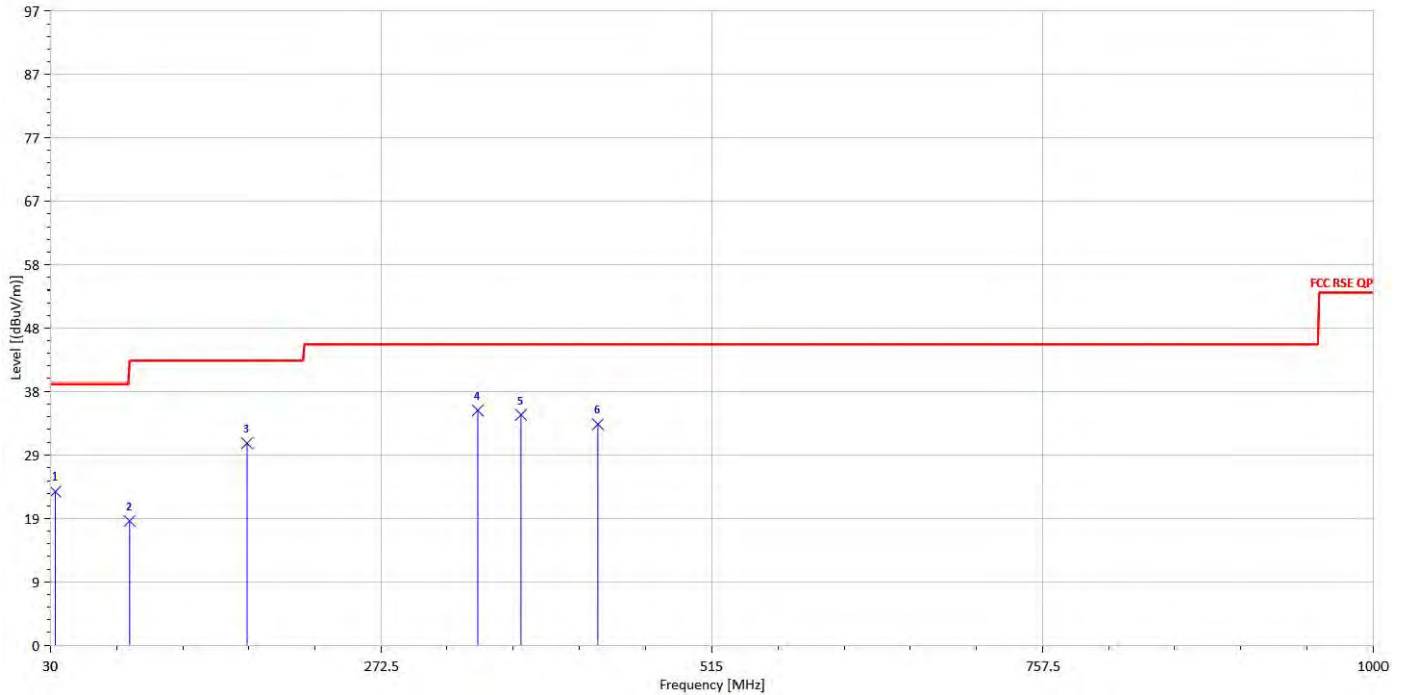
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 Fundamental Frequency : 5775 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
33.88	S	Peak	32.83	-9.27	23.56	40	-16.44
88.20	S	Peak	38.78	-19.77	19.02	43.5	-24.48
174.53	S	Peak	49.30	-18.42	30.88	43.5	-12.62
343.31	S	Peak	47.55	-11.61	35.94	46	-10.06
375.32	S	Peak	45.80	-10.53	35.27	46	-10.73
431.58	S	Peak	43.20	-9.39	33.81	46	-12.19

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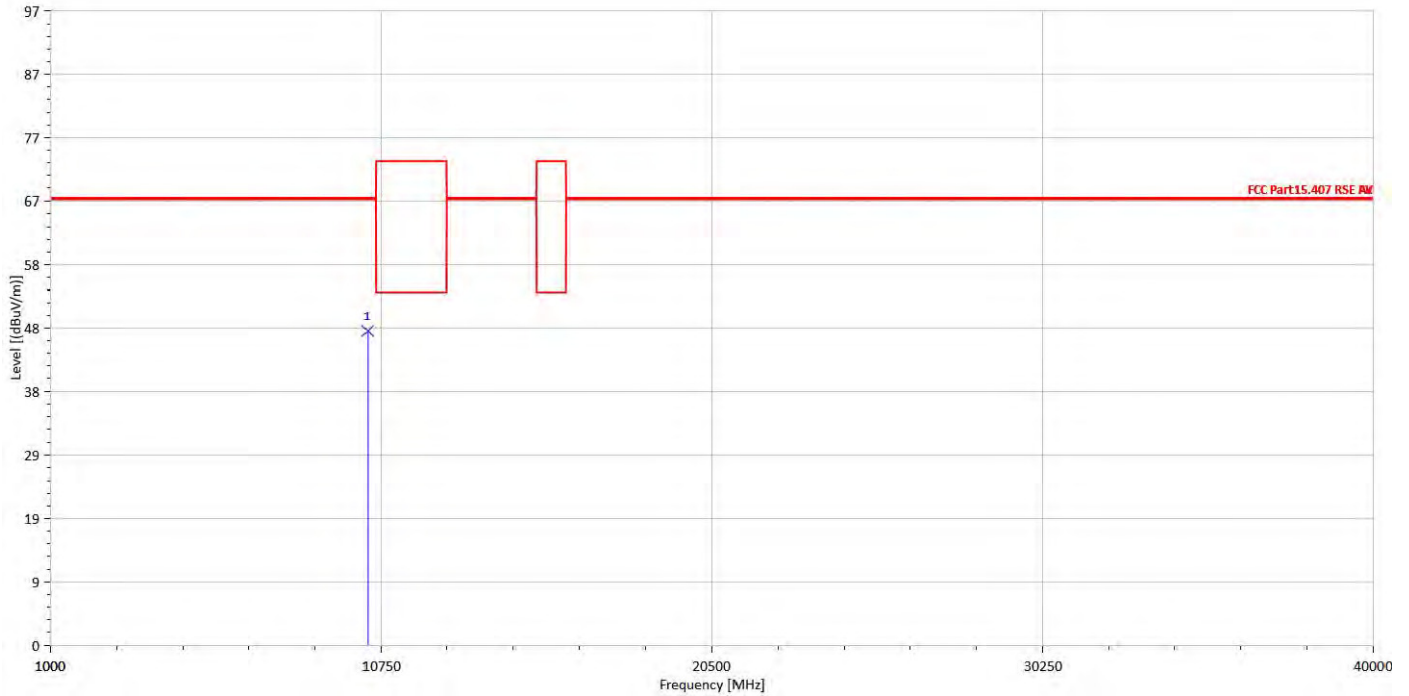
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Above 1GHz Worst-Case Data:

Radiated Spurious Emission Measurement Result 802.11a, 5150~5250 MHz

Operation Mode :	802.11a	Test Date :	2016/6/15
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10360.00	H	Peak	30.45	17.62	48.07	68.3	-20.23

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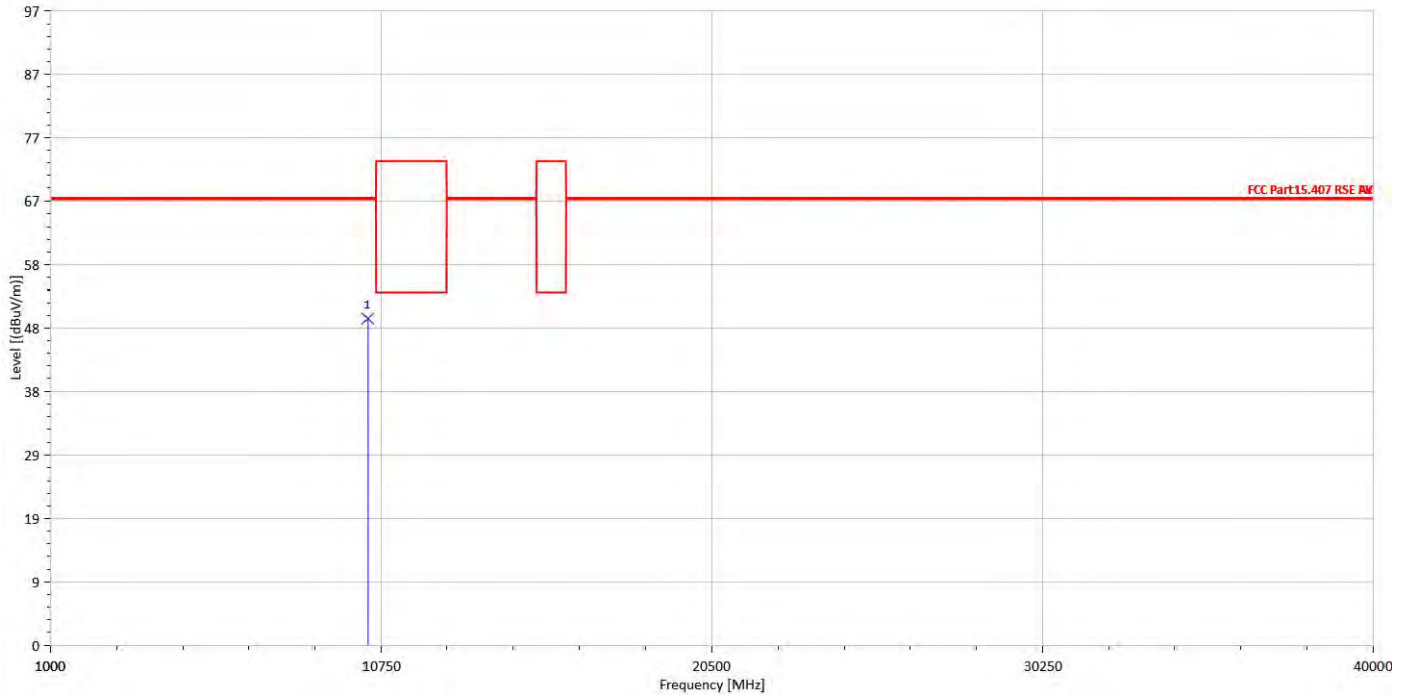
t (886-2) 2299-3279

f (886-2) 2298-0488

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Operation Mode : 802.11a Test Date : 2016/6/15
 Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10360.00	H	Peak	32.37	17.62	49.98	68.3	-18.32

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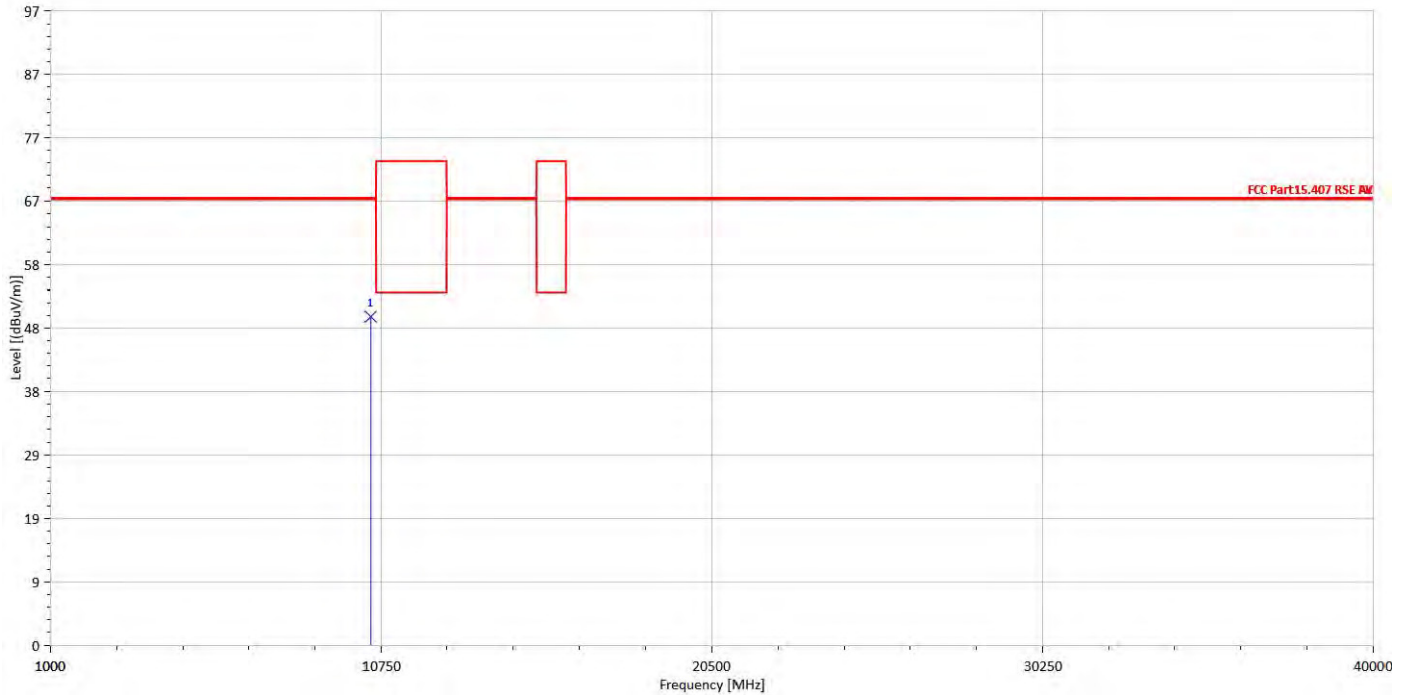
t (886-2) 2299-3279

f (886-2) 2298-0488

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Operation Mode : 802.11a Test Date : 2016/6/15
 Fundamental Frequency : 5220 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10440.00	H	Peak	32.62	17.65	50.27	68.3	-18.03

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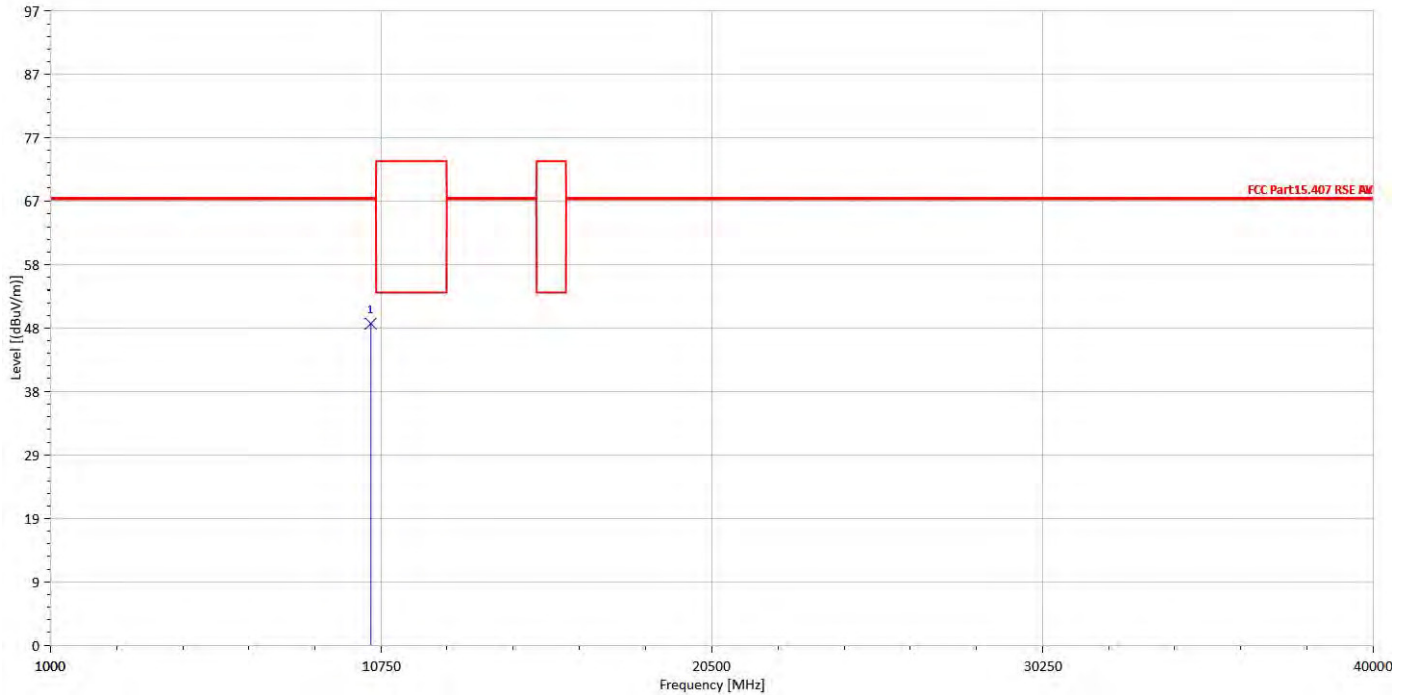
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f (886-2) 2298-0488

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Operation Mode : 802.11a Test Date : 2016/6/15
 Fundamental Frequency : 5220 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10440.00	H	Peak	31.55	17.65	49.20	68.3	-19.10

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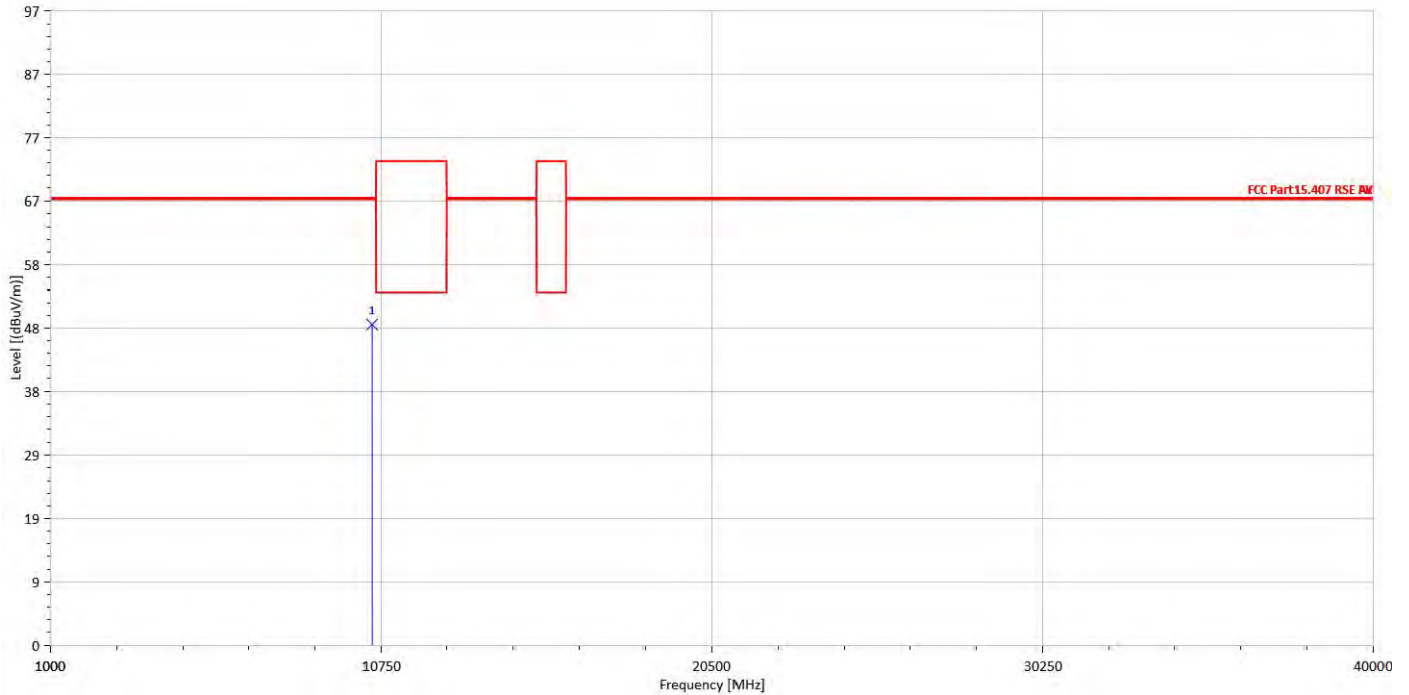
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Operation Mode :	802.11a	Test Date :	2016/6/15
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10480.00	H	Peak	31.07	18.00	49.07	68.3	-19.23

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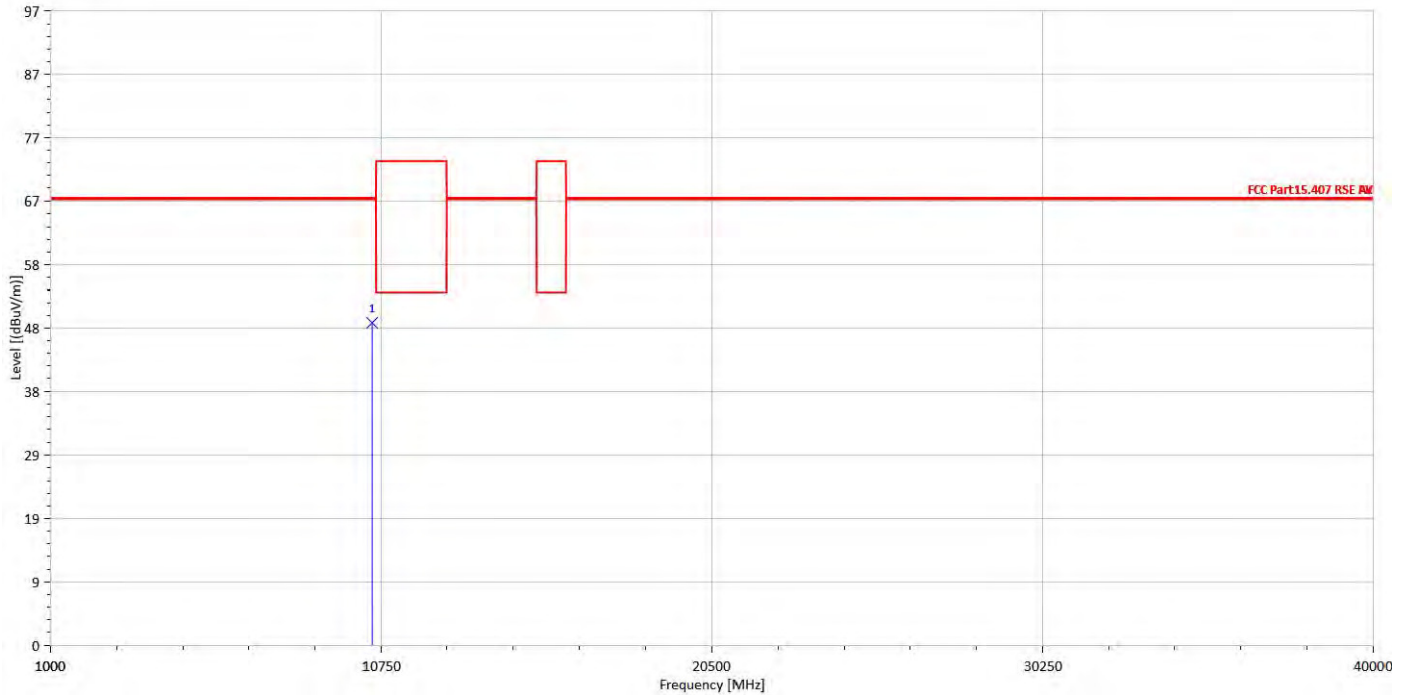
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Operation Mode :	802.11a	Test Date :	2016/6/15
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10480.00	H	Peak	31.33	18.00	49.33	68.3	-18.97

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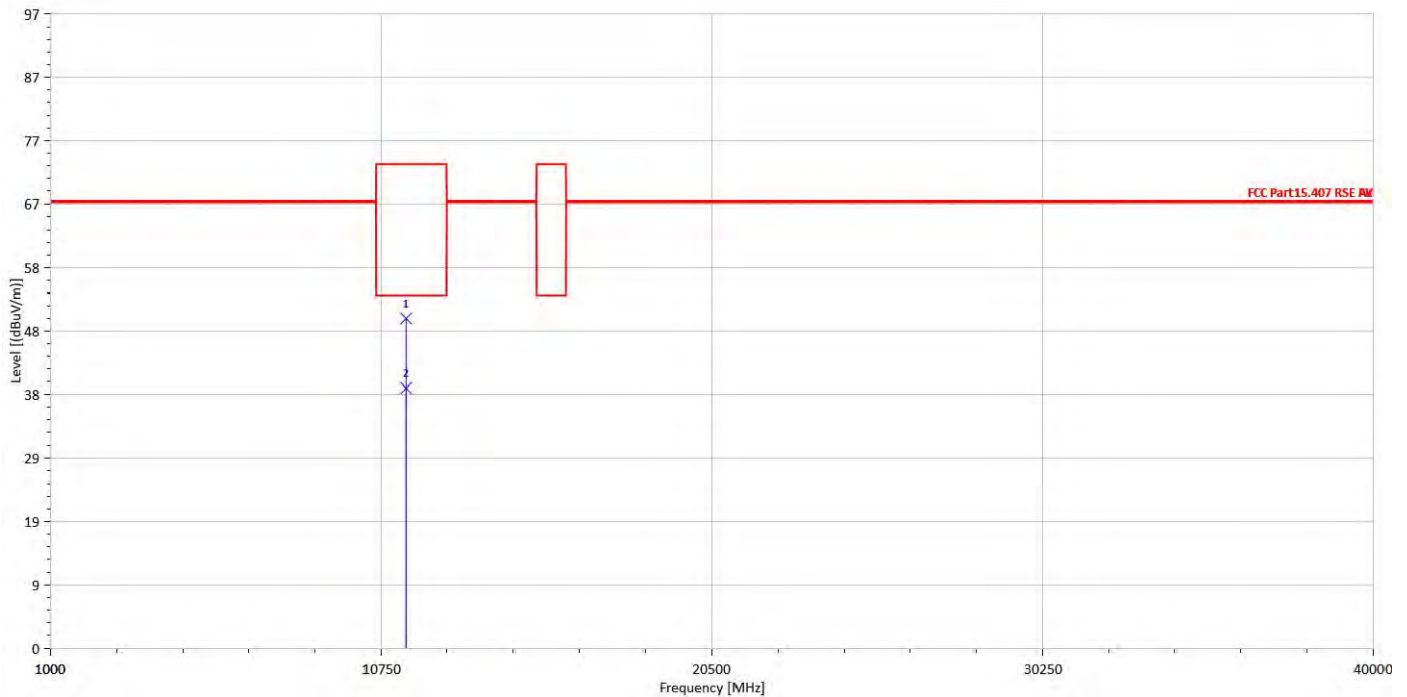
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Radiated Spurious Emission Measurement Result 802.11a, 5725~5850 MHz

Operation Mode :	802.11a	Test Date :	2016/6/15
Fundamental Frequency :	5785 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11490.00	H	Peak	32.06	18.39	50.45	74	-23.55
11490.00	H	Average	21.39	18.39	39.78	54	-14.22

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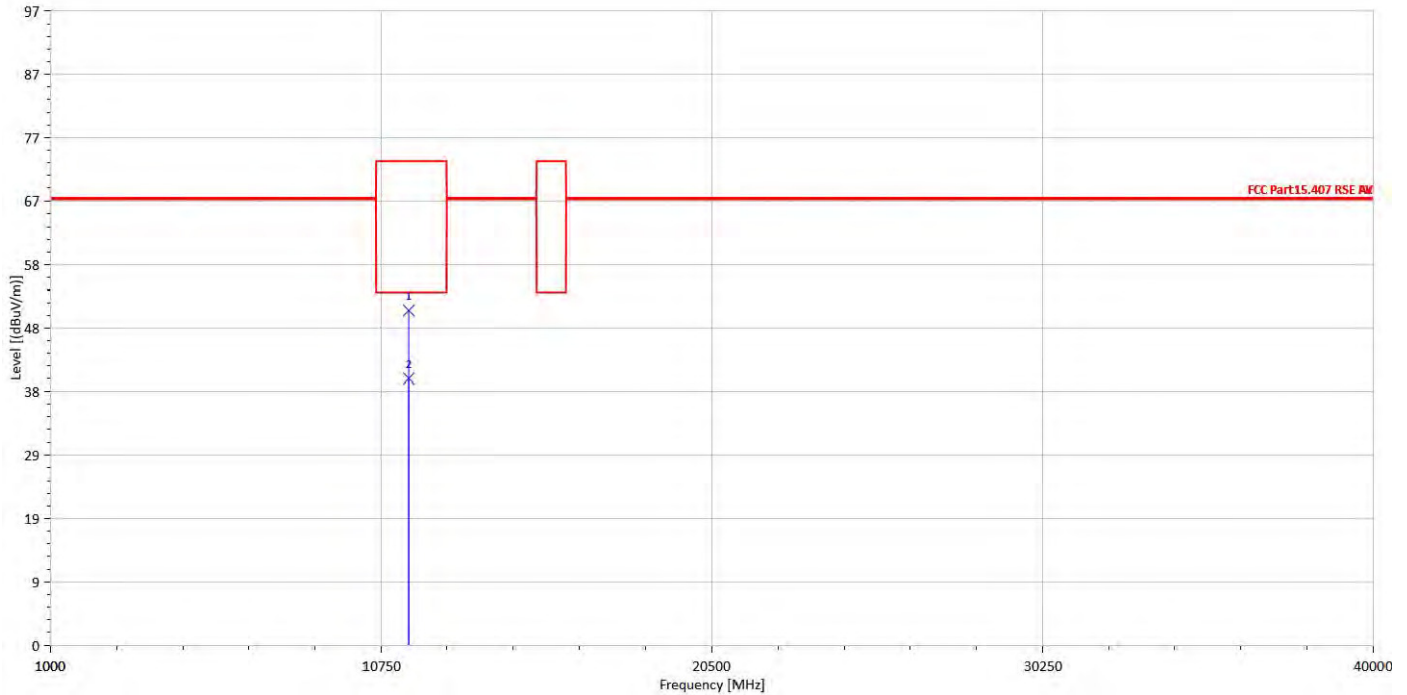
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f (886-2) 2298-0488

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Operation Mode : 802.11a Test Date : 2016/6/15
 Fundamental Frequency : 5785 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11570.00	H	Peak	31.85	19.38	51.23	74	-22.77
11570.00	H	Average	21.39	19.38	40.77	54	-13.23

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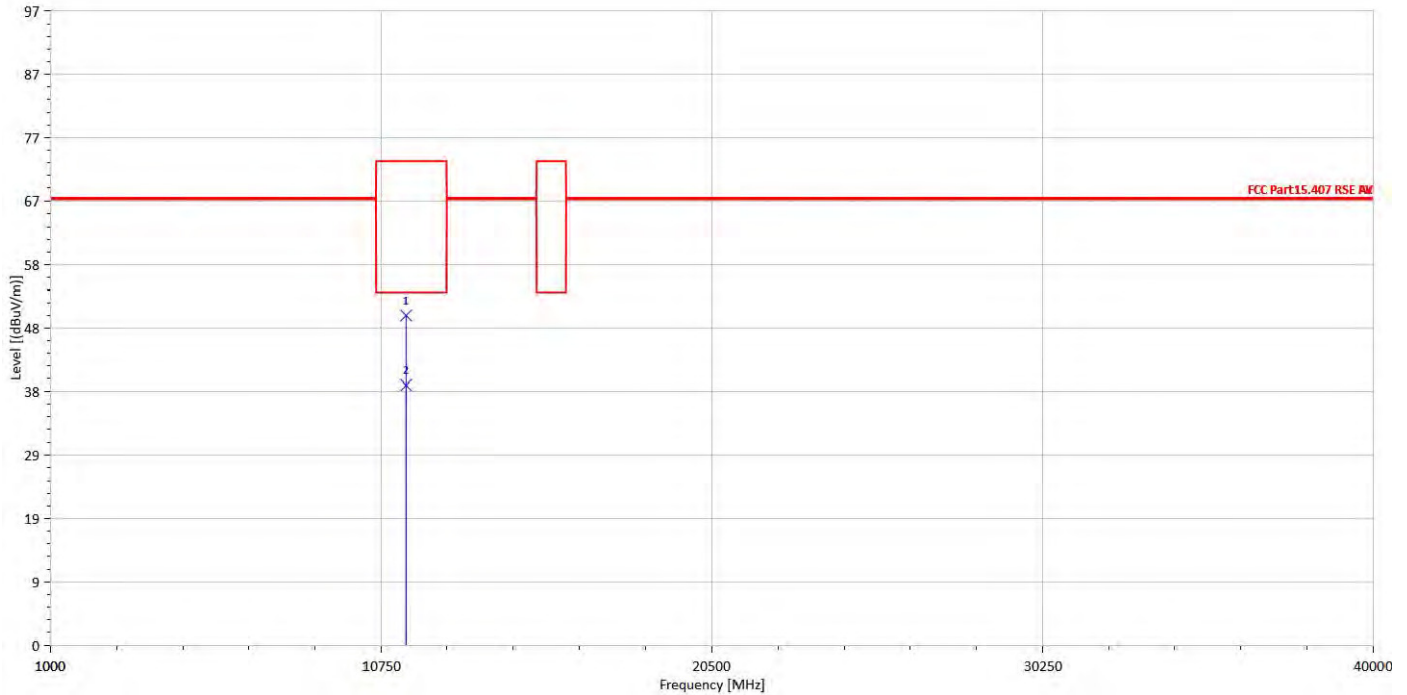
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Operation Mode : 802.11a Test Date : 2016/6/15
 Fundamental Frequency : 5785 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11490.00	H	Peak	32.06	18.39	50.45	74	-23.55
11490.00	H	Average	21.39	18.39	39.78	54	-14.22

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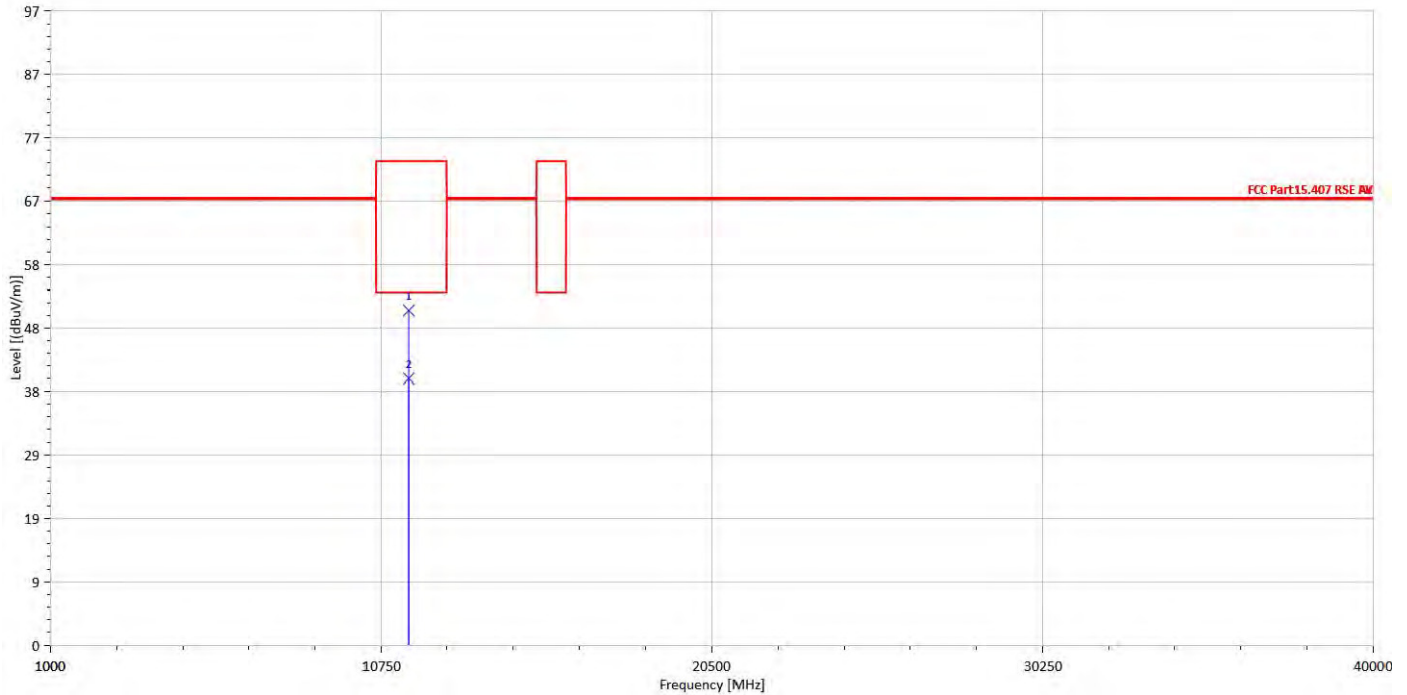
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Operation Mode : 802.11a Test Date : 2016/6/15
 Fundamental Frequency : 5785 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11570.00	H	Peak	31.85	19.38	51.23	74	-22.77
11570.00	H	Average	21.39	19.38	40.77	54	-13.23

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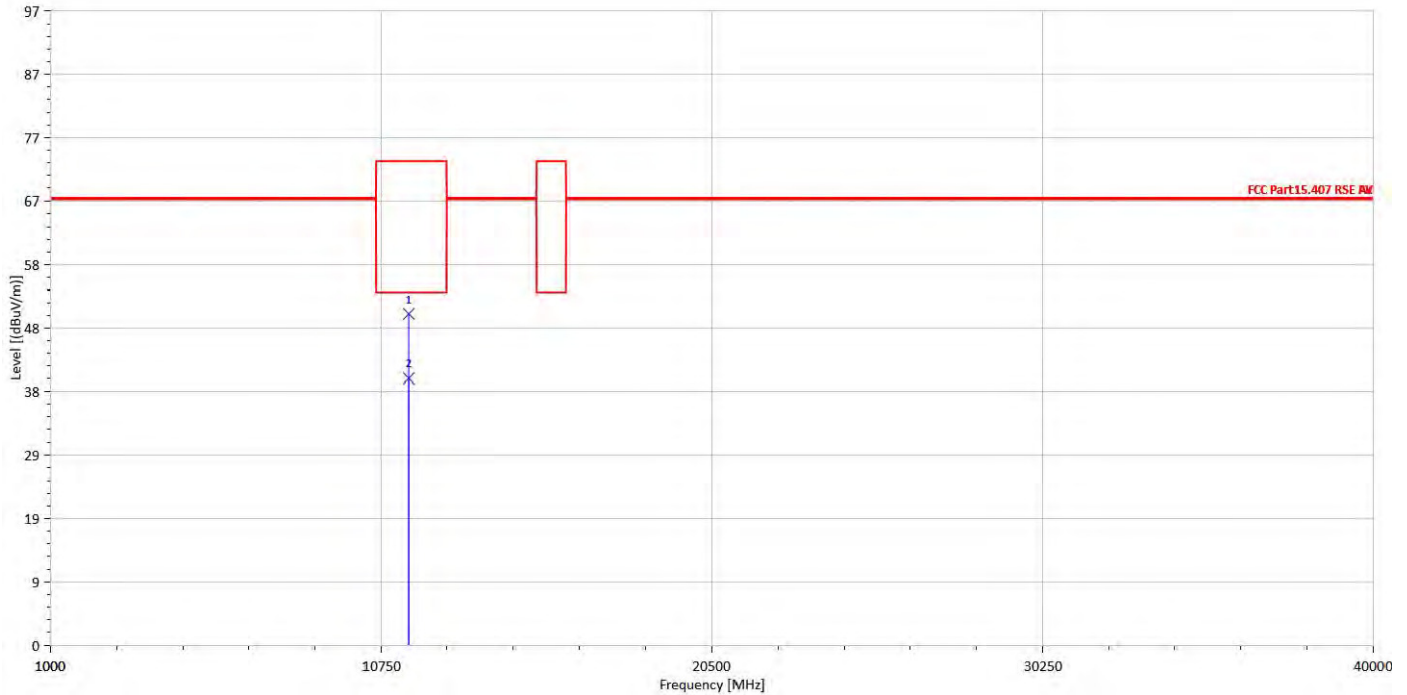
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Operation Mode : 802.11a Test Date : 2016/6/15
 Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11570.00	H	Peak	31.33	19.38	50.71	74	-23.29
11570.00	H	Average	21.41	19.38	40.79	54	-13.21

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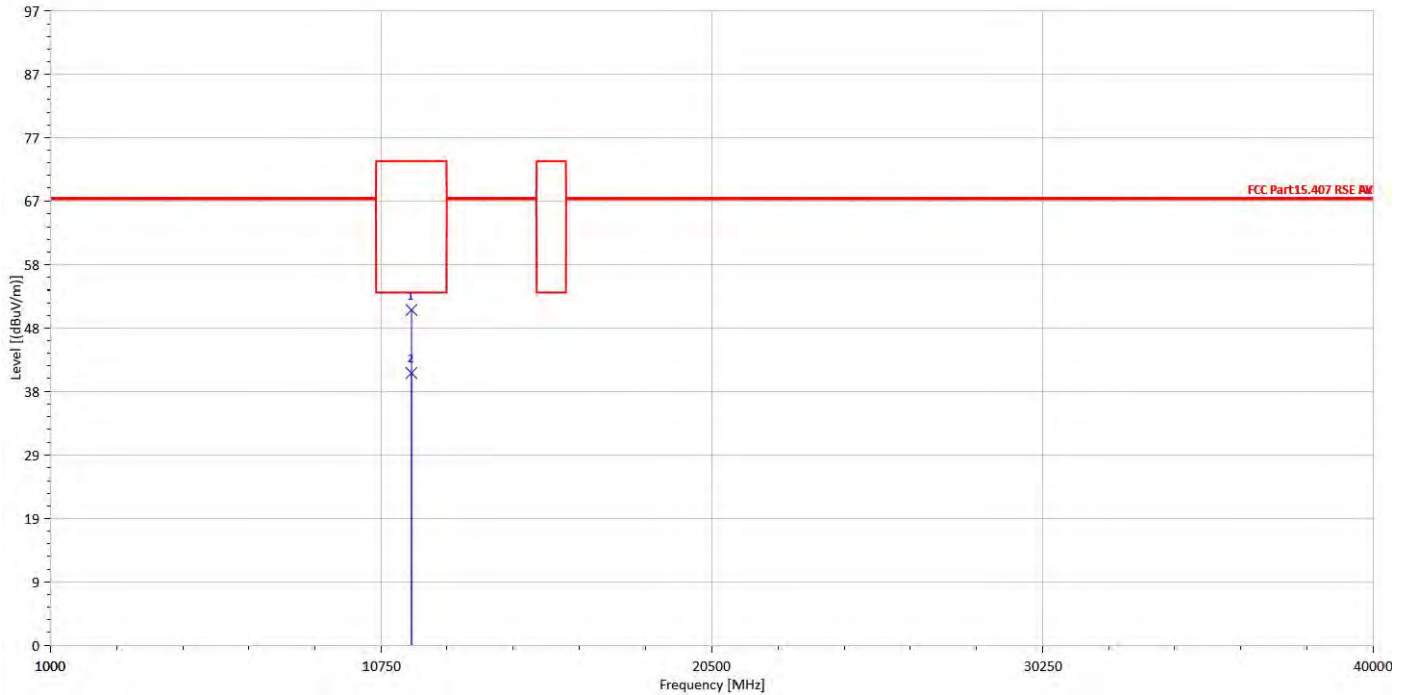
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Operation Mode :	802.11a	Test Date :	2016/6/15
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11650.00	H	Peak	31.08	20.23	51.31	74	-22.69
11650.00	H	Average	21.35	20.23	41.58	54	-12.42

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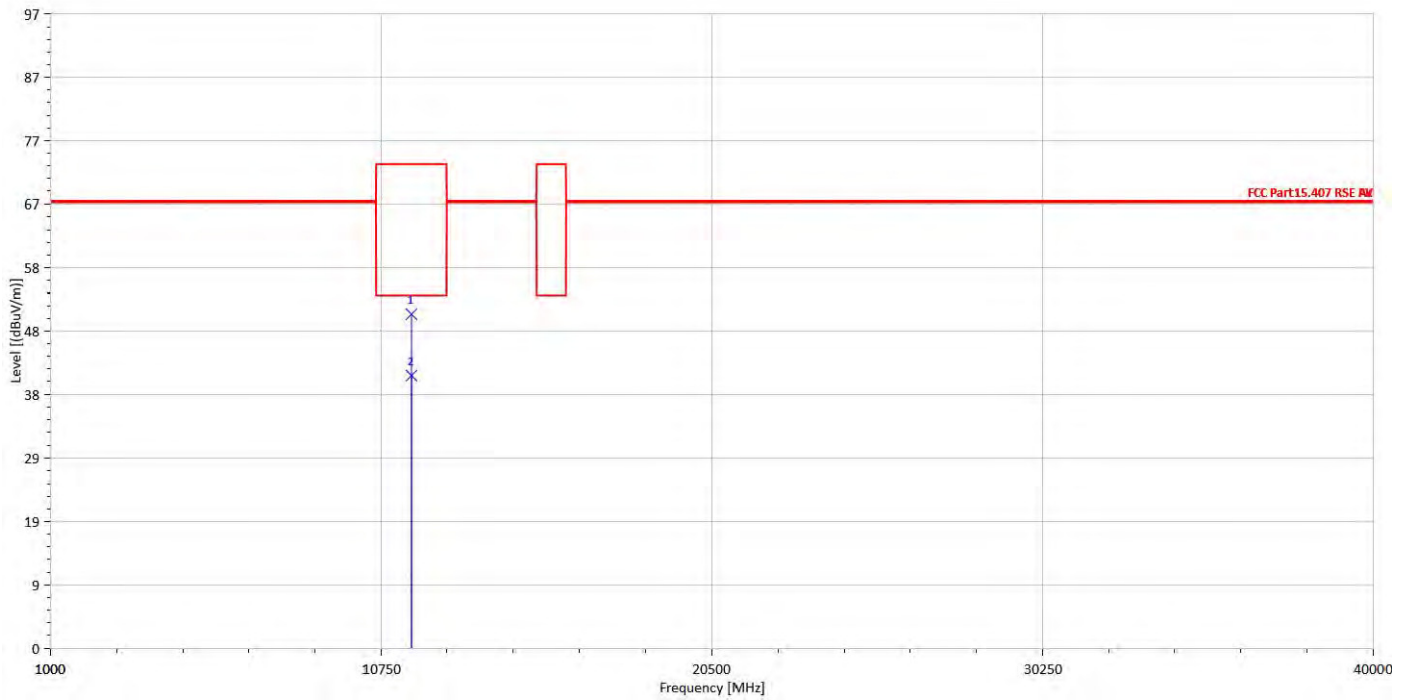
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5150~5250 MHz

Operation Mode :	802.11n20	Test Date :	2016/6/15
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11650.00	H	Peak	30.89	20.23	51.12	74	-22.88
11650.00	H	Average	21.42	20.23	41.65	54	-12.35

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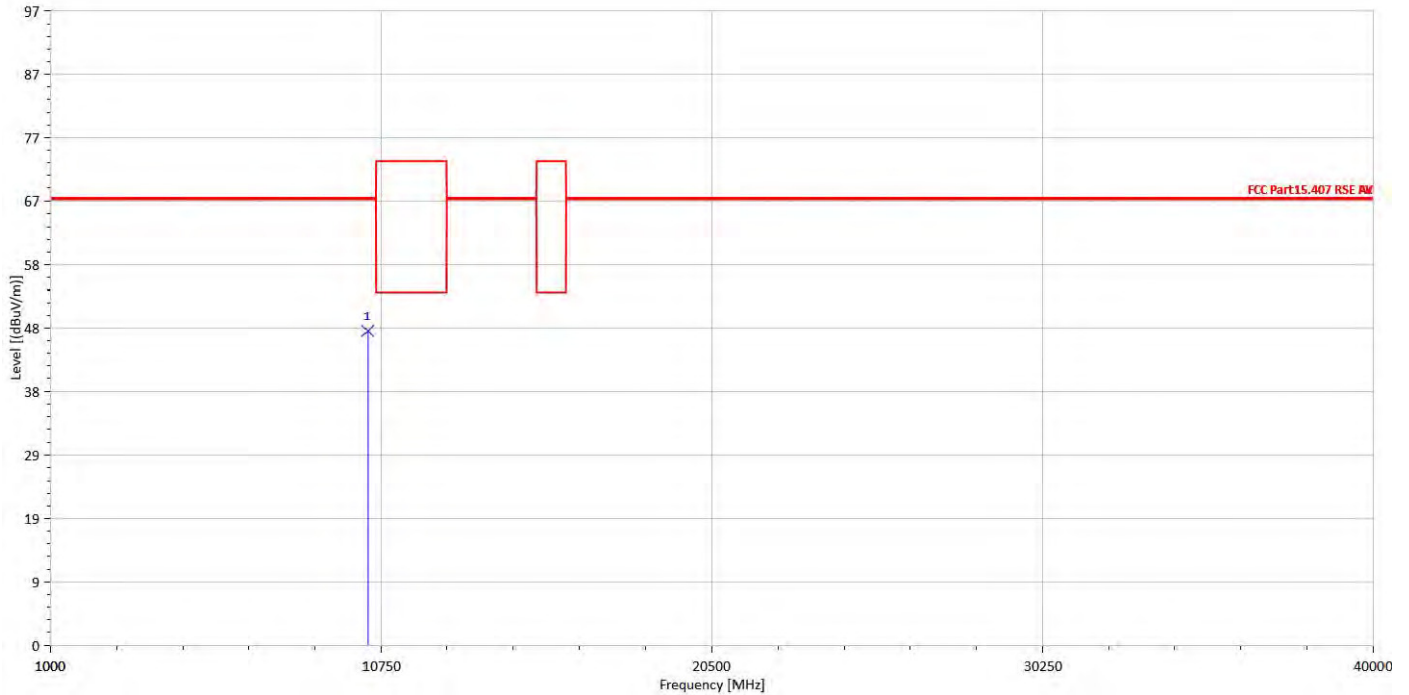
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Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10360.00	H	Peak	30.45	17.62	48.06	68.3	-20.24

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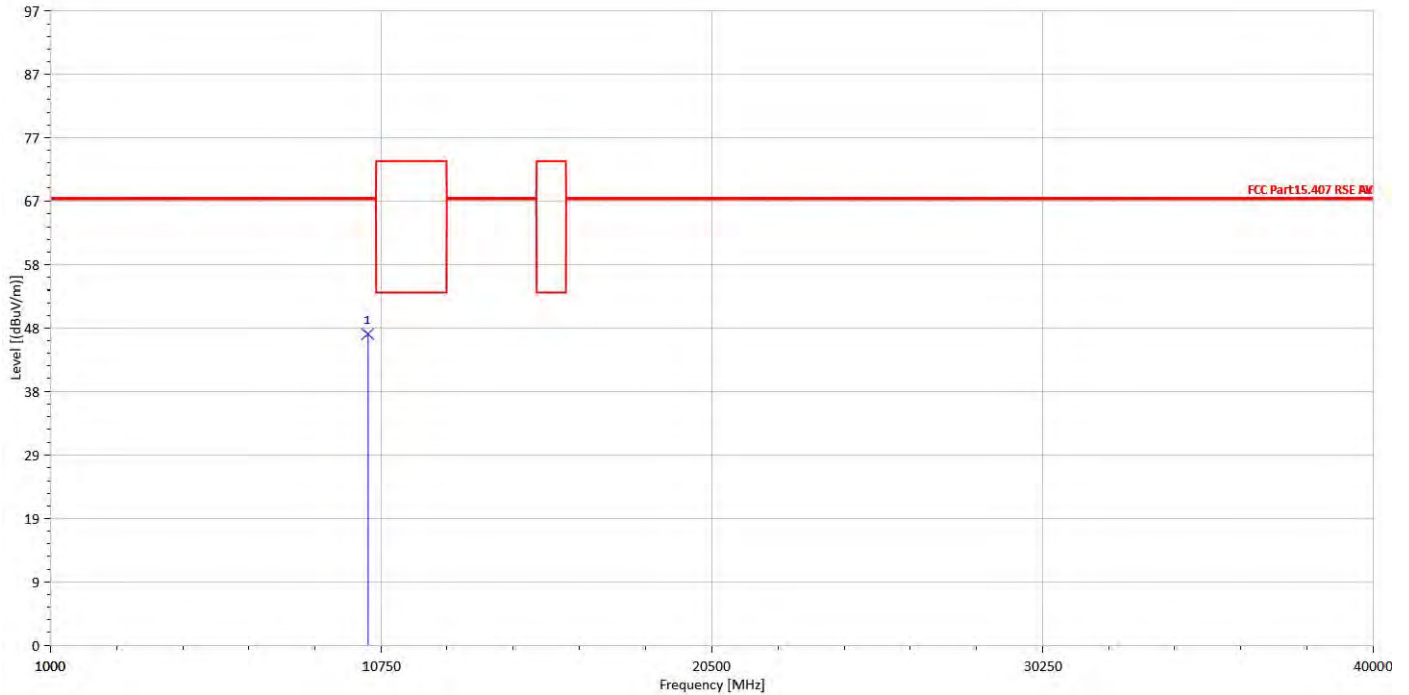
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Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5220 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10360.00	H	Peak	29.99	17.62	47.60	68.3	-20.70

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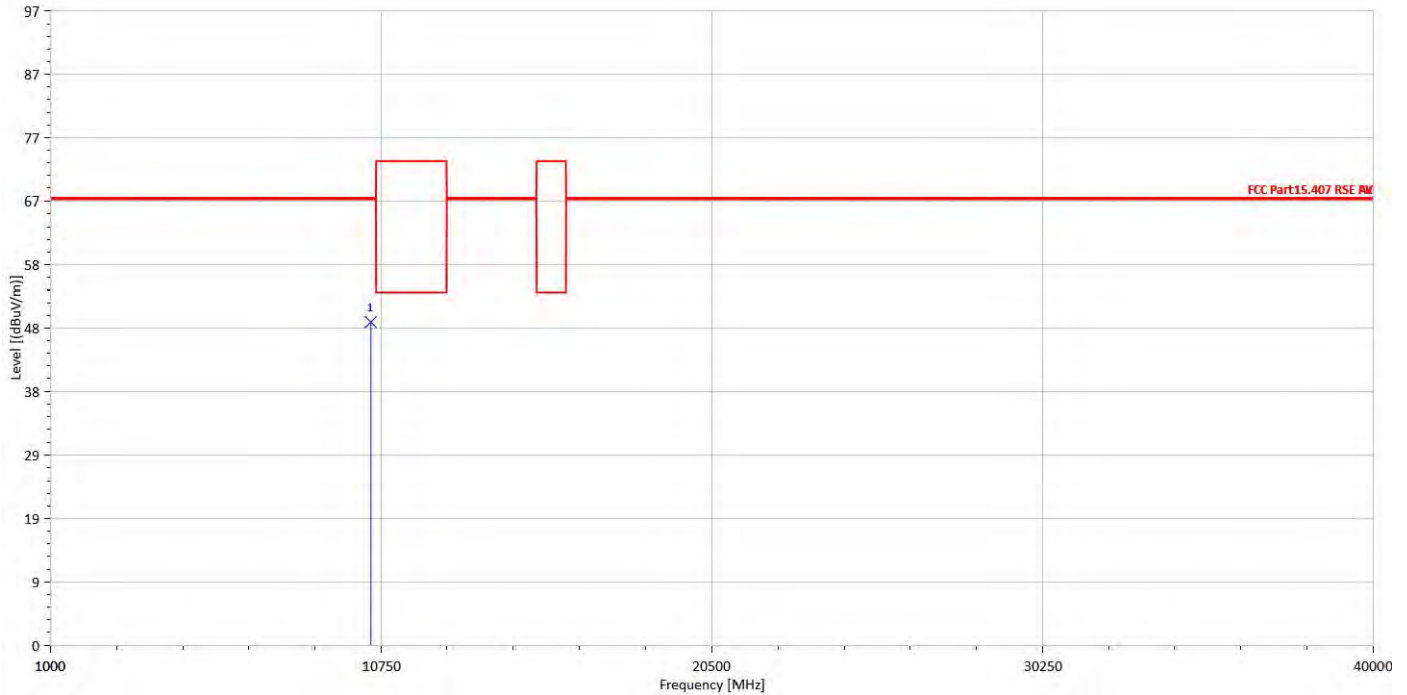
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Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5220 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10440.00	H	Peak	31.79	17.65	49.44	68.3	-18.86

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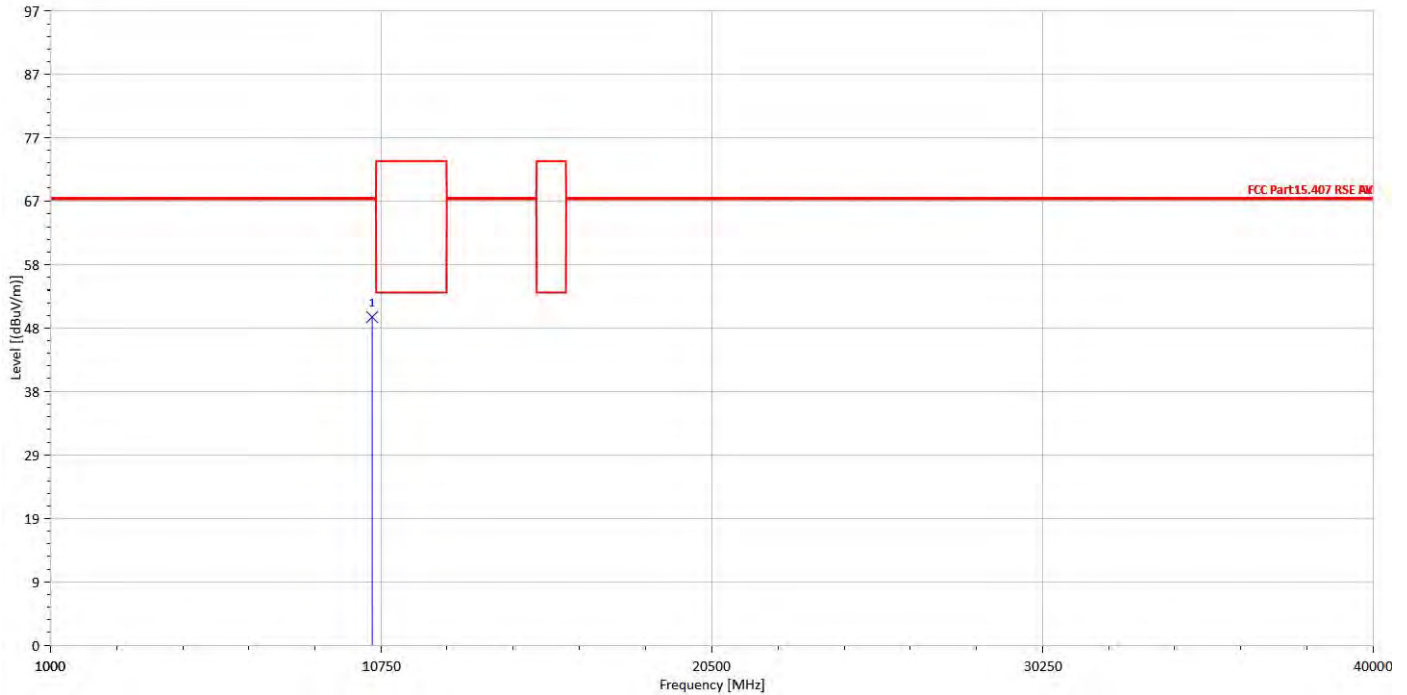
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Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5240 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10480.00	H	Peak	32.22	18.00	50.22	68.3	-18.08

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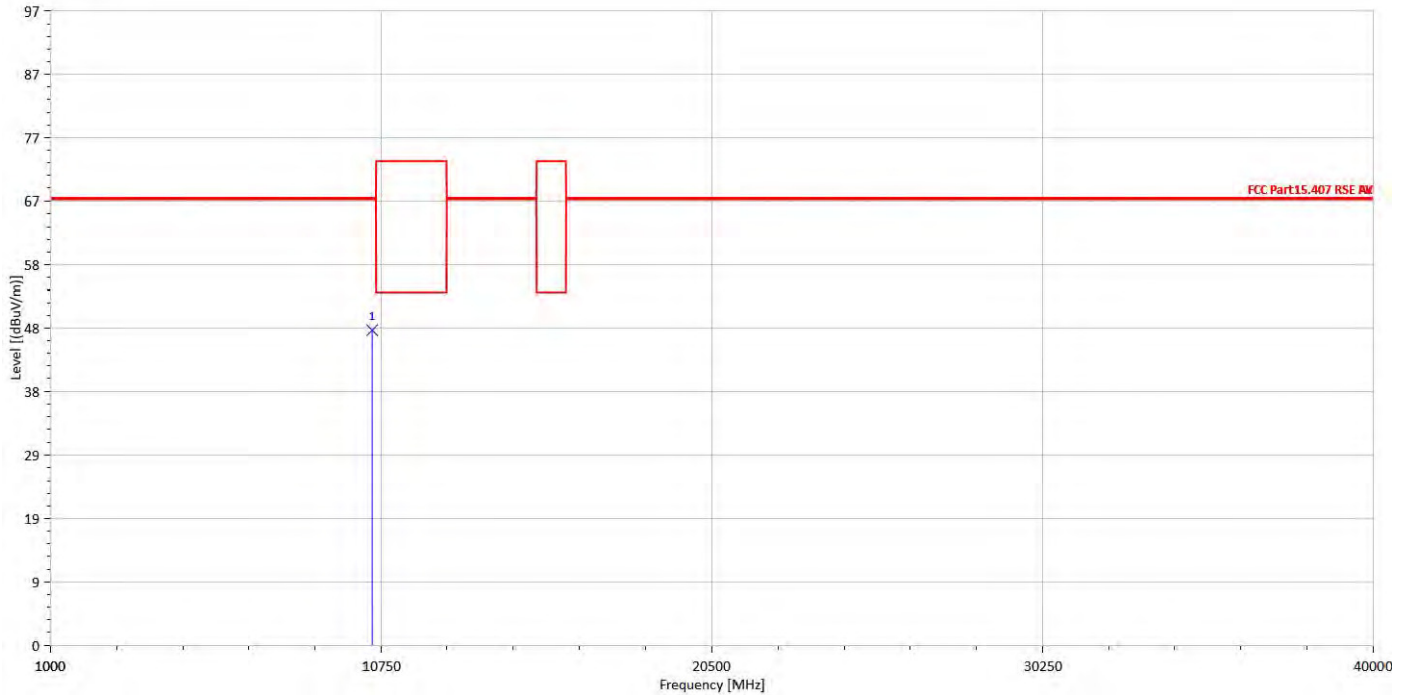
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Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5240 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10480.00	H	Peak	30.19	18.00	48.19	68.3	-20.11

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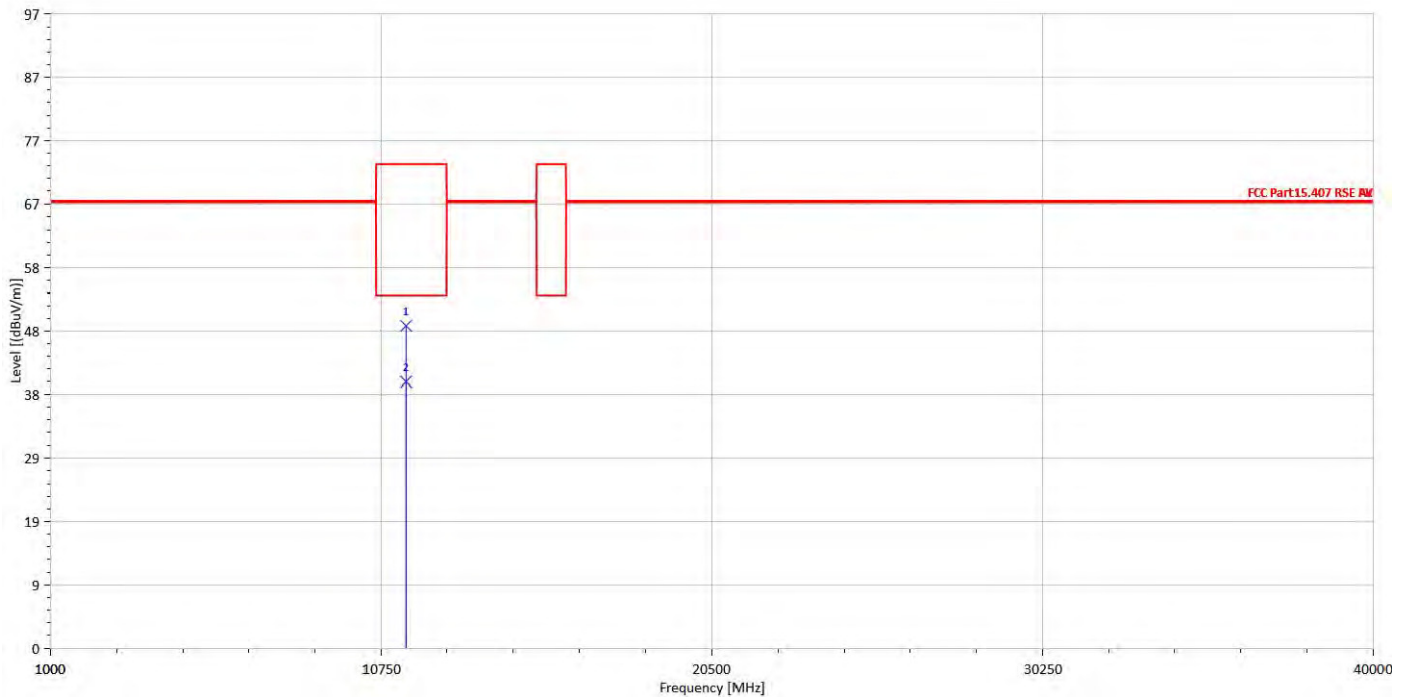
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5725~5850 MHz

Operation Mode :	802.11n20	Test Date :	2016/6/15
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11490.00	H	Peak	30.93	18.39	49.32	74	-24.68
11490.00	H	Average	22.35	18.39	40.74	54	-13.26

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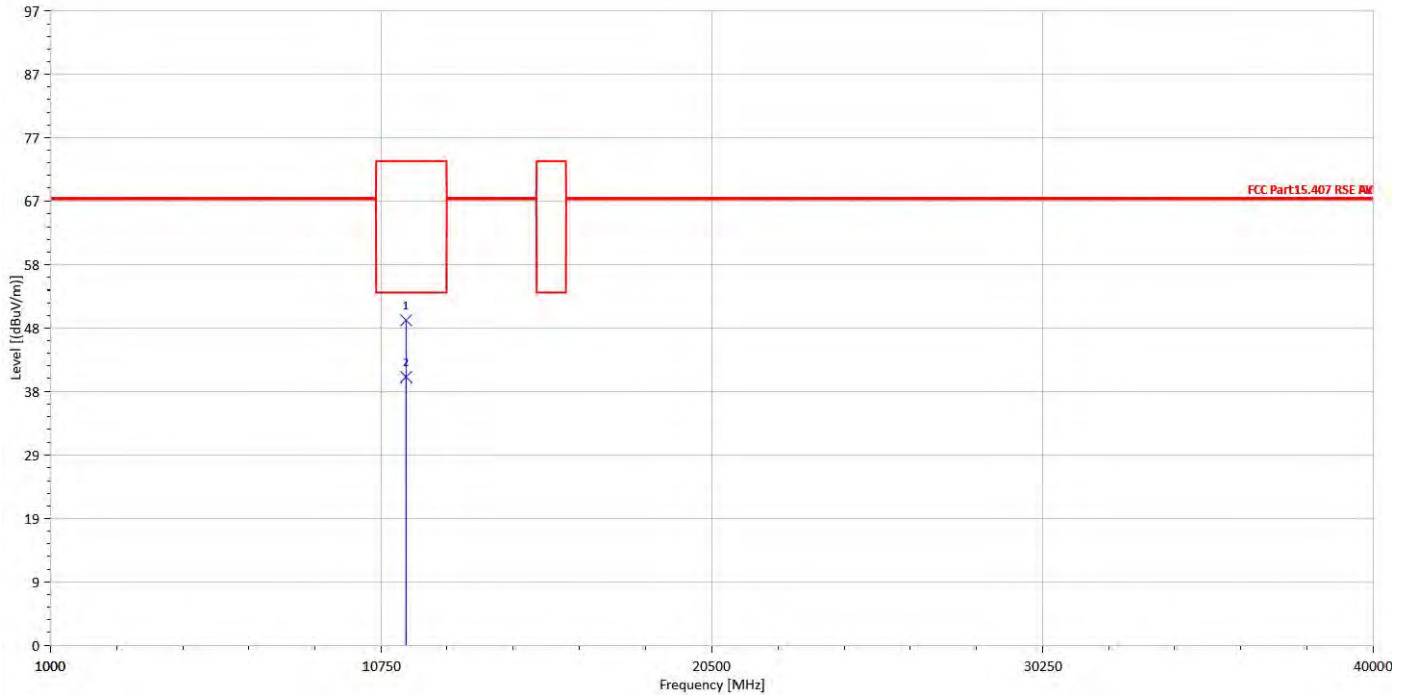
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Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11490.00	H	Peak	31.34	18.39	49.73	74	-24.27
11490.00	H	Average	22.58	18.39	40.97	54	-13.03

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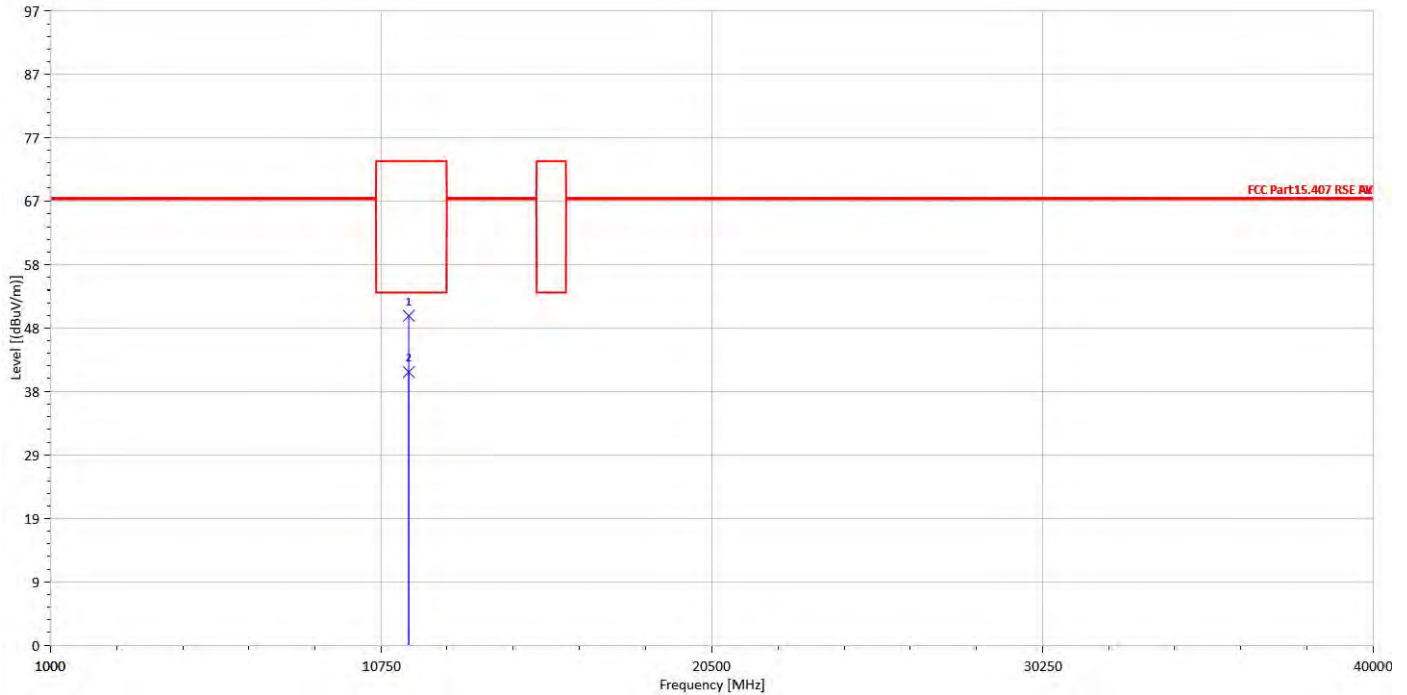
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Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5785 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11570.00	H	Peak	31.03	19.38	50.42	74	-23.58
11570.00	H	Average	22.34	19.38	41.72	54	-12.28

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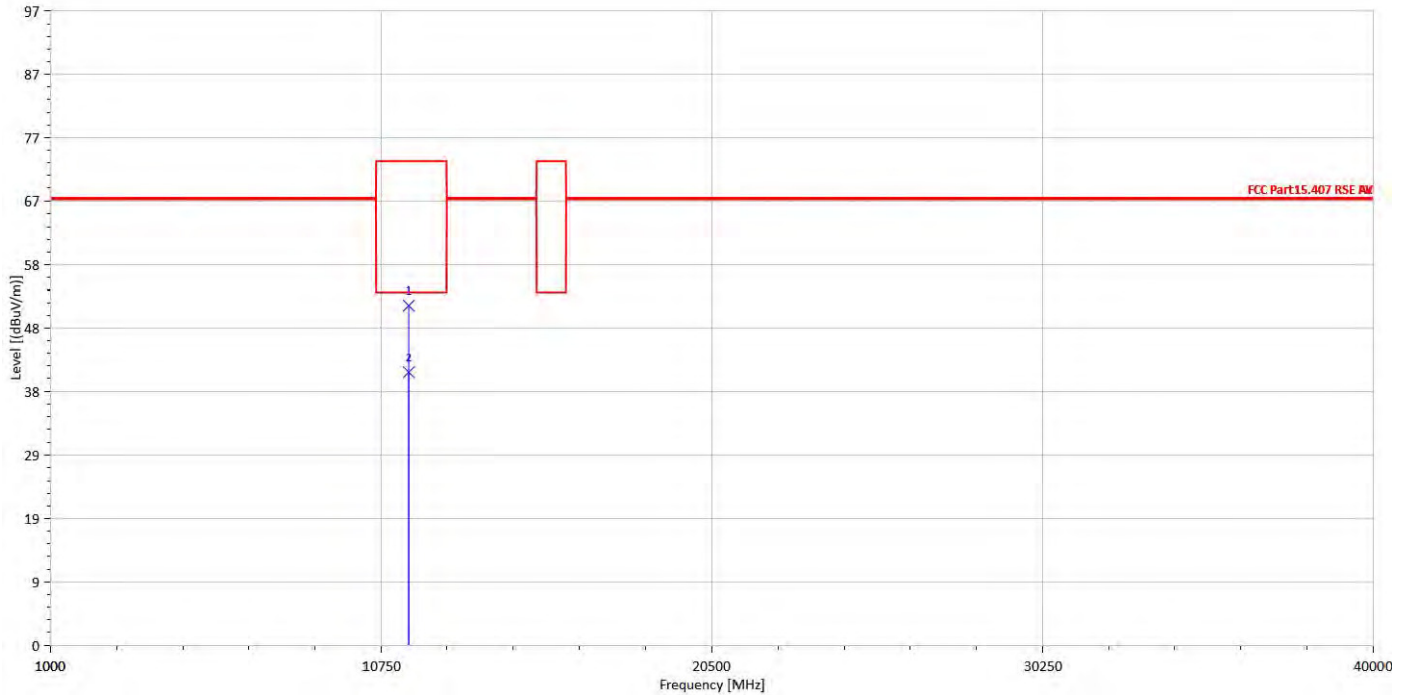
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Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5785 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11570.00	H	Peak	32.60	19.38	51.98	74	-22.02
11570.00	H	Average	22.33	19.38	41.71	54	-12.29

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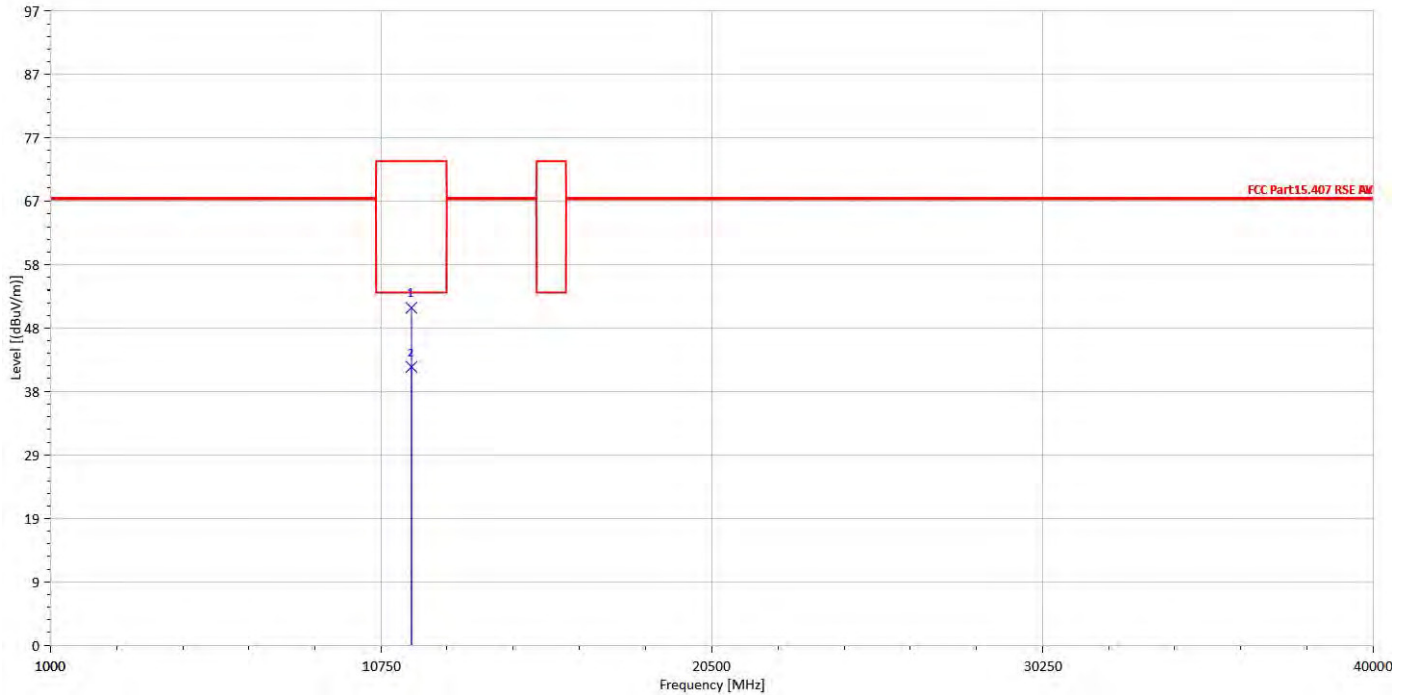
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Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11650.00	H	Peak	31.42	20.23	51.65	74	-22.35
11650.00	H	Average	22.29	20.23	42.52	54	-11.48

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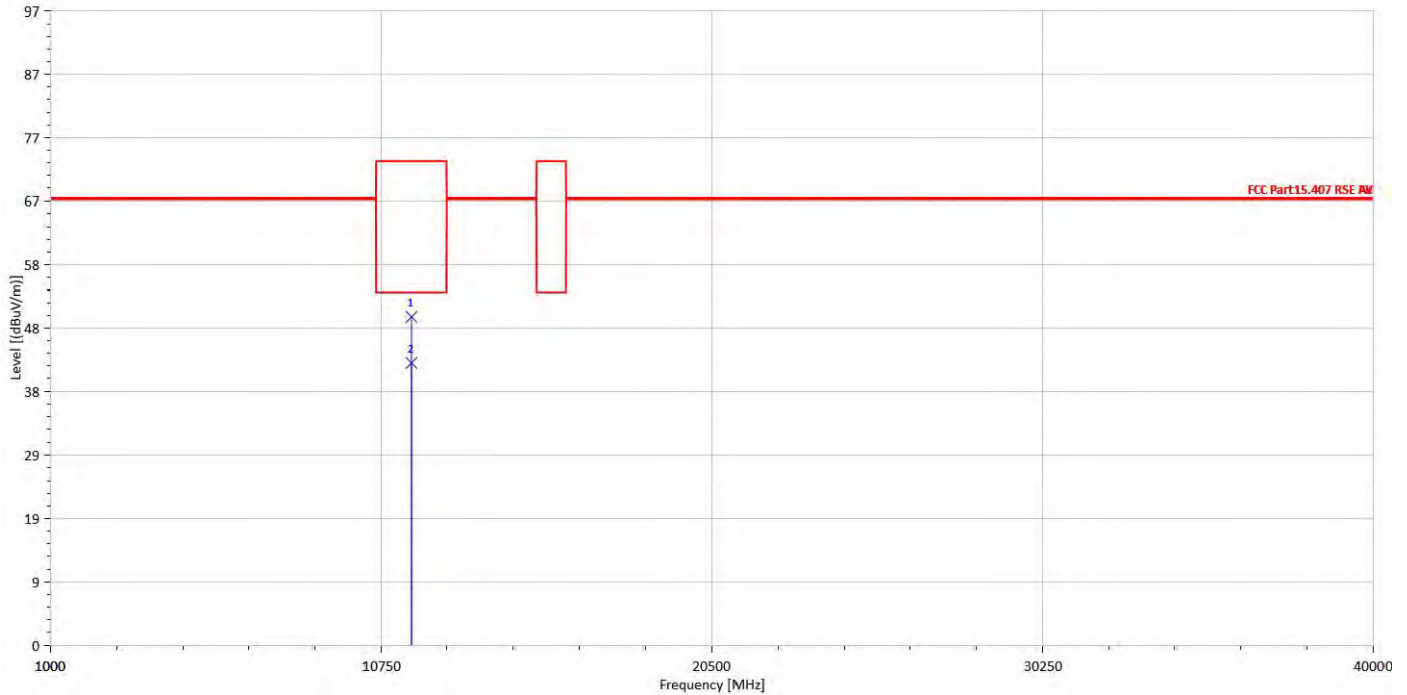
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Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11650.00	H	Peak	30.01	20.23	50.24	74	-23.76
11650.00	H	Average	22.90	20.23	43.13	54	-10.87

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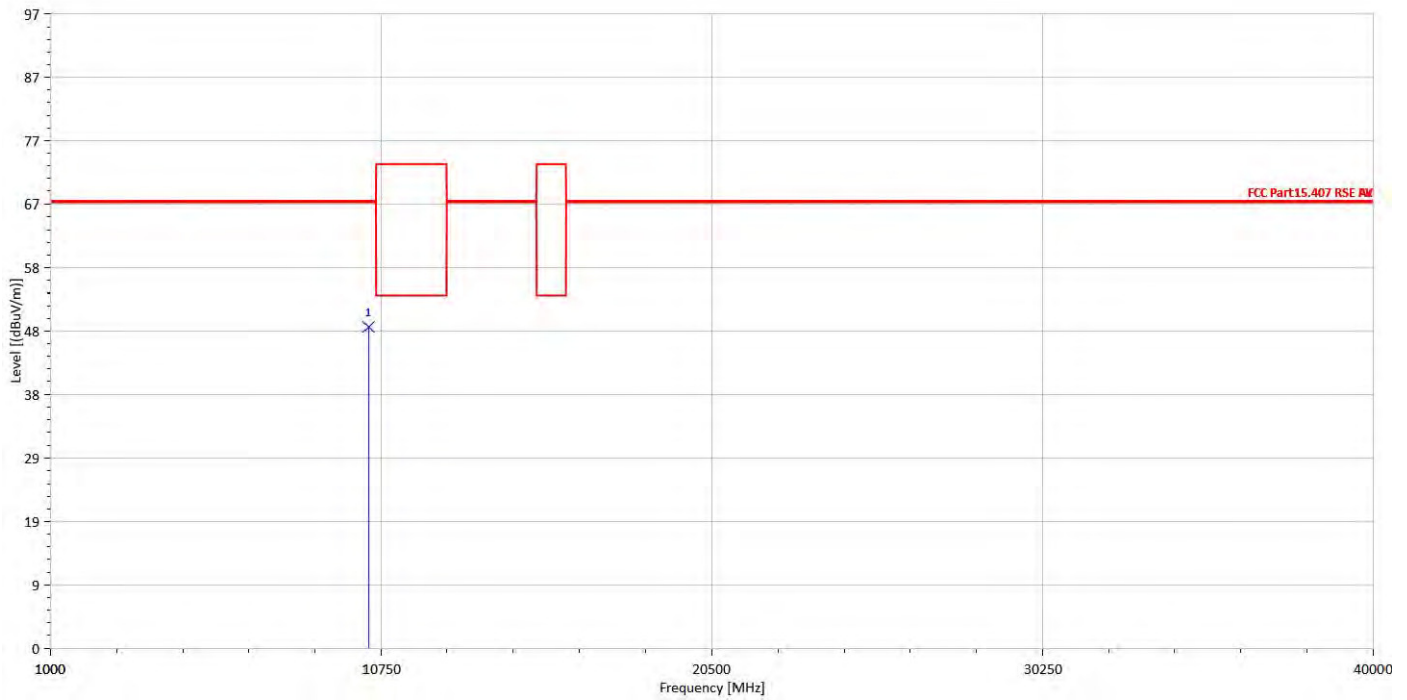
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5150~5250 MHz

Operation Mode :	802.11n40	Test Date :	2016/6/15
Fundamental Frequency :	5190 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
10380.00	H	Peak	30.78	18.37	49.15	68.3	-19.15

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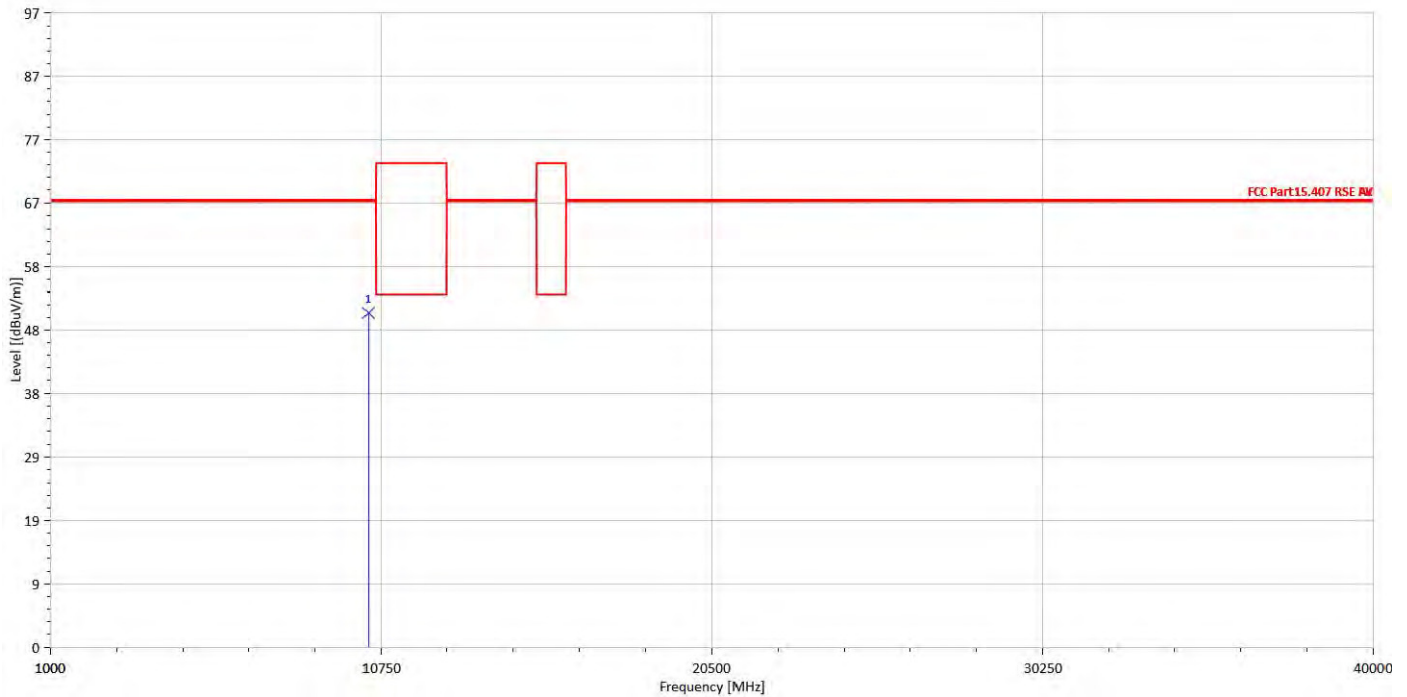
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Operation Mode : 802.11n40 Test Date : 2016/6/15
 Fundamental Frequency : 5190 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10380.00	H	Peak	32.80	18.37	51.17	68.3	-17.13

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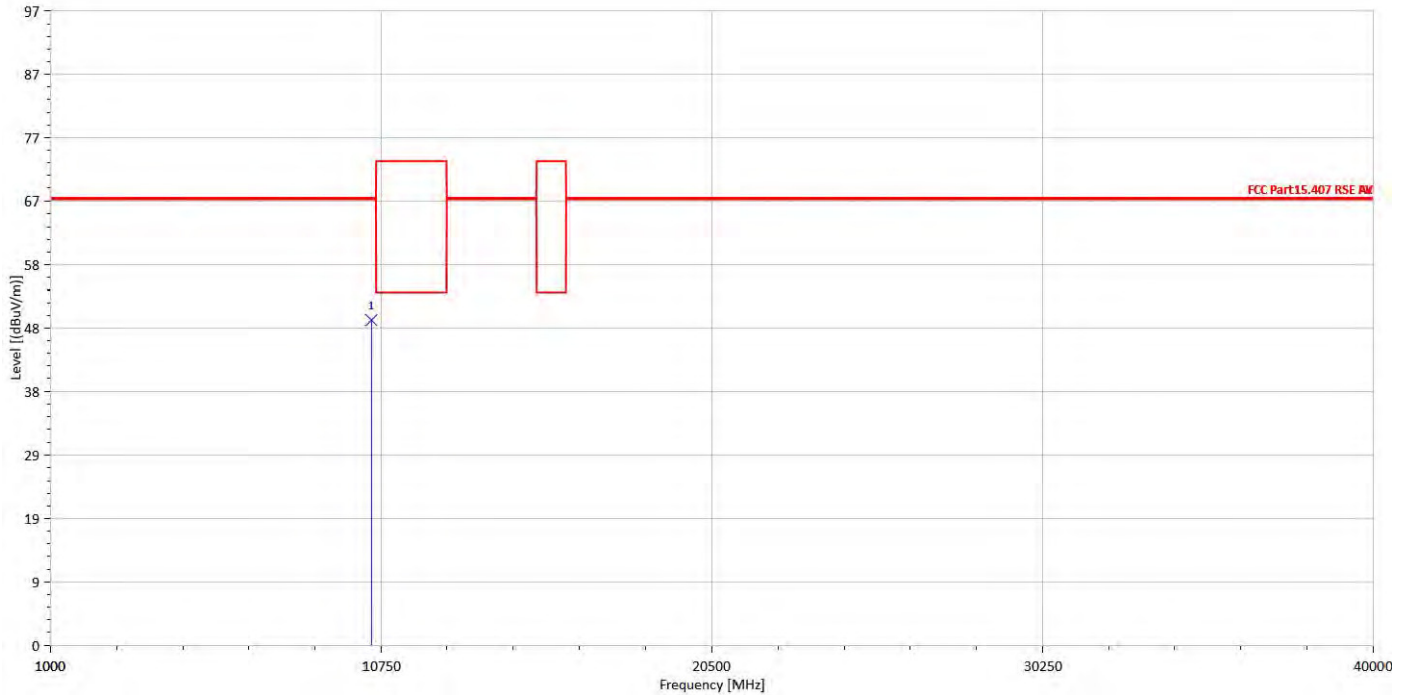
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Operation Mode : 802.11n40 Test Date : 2016/6/15
 Fundamental Frequency : 5230 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10460.00	H	Peak	31.46	18.29	49.75	68.3	-18.55

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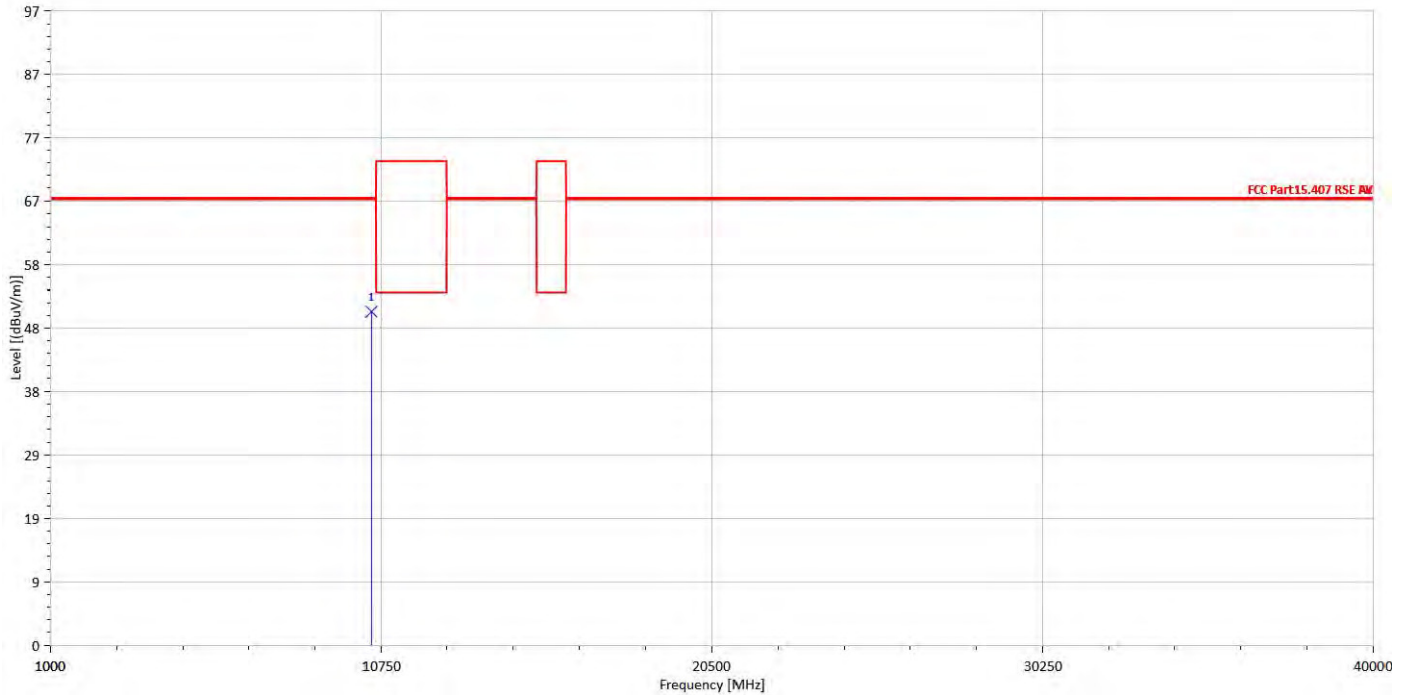
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Operation Mode : 802.11n40 Test Date : 2016/6/15
 Fundamental Frequency : 5230 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10460.00	H	Peak	32.76	18.29	51.05	68.3	-17.25

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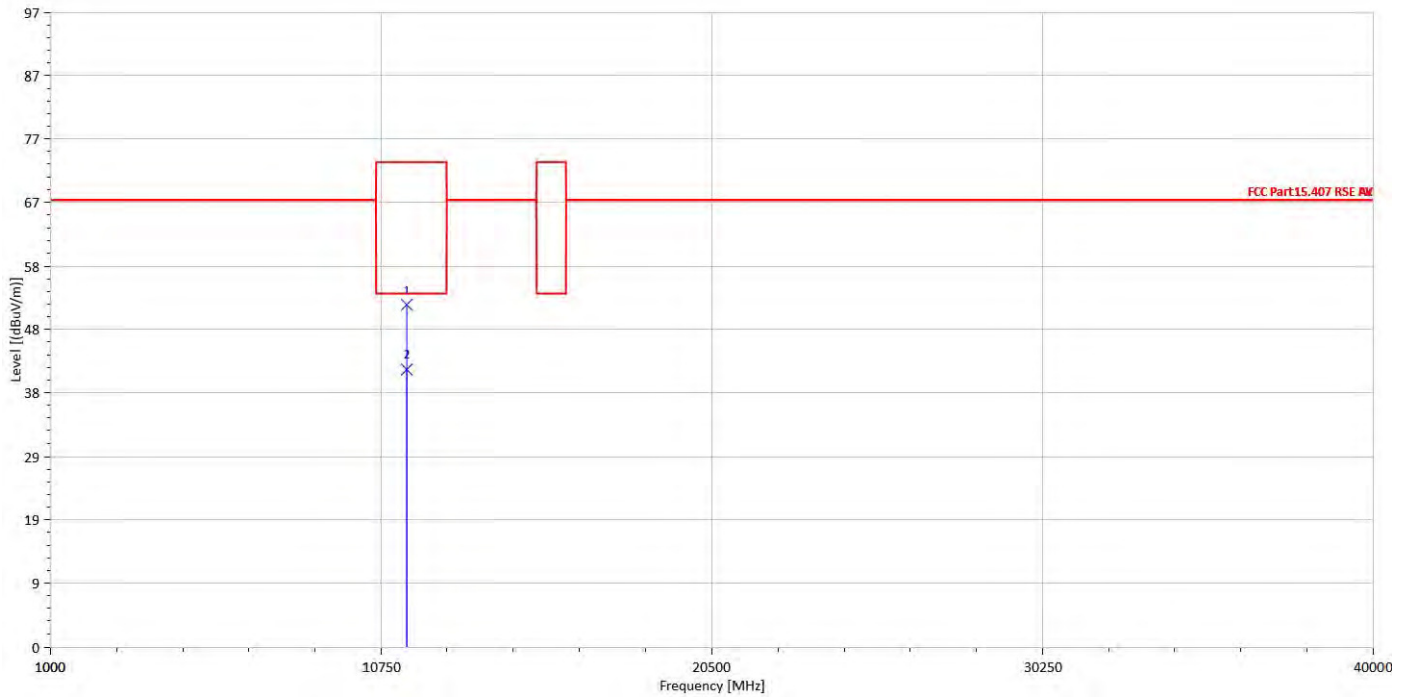
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5725~5850 MHz

Operation Mode :	802.11n40	Test Date :	2016/6/15
Fundamental Frequency :	5755 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11510.00	H	Peak	32.37	19.90	52.27	74	-21.73
11510.00	H	Average	22.52	19.90	42.42	54	-11.58

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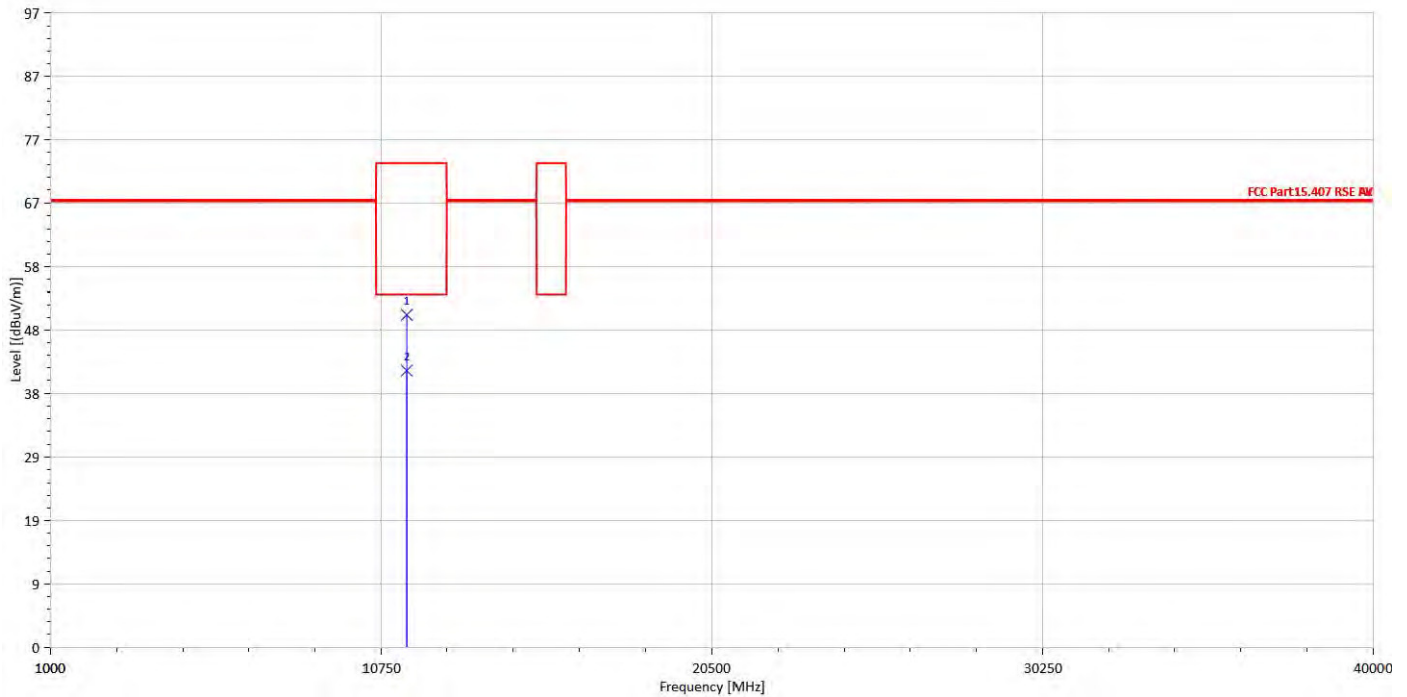
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Operation Mode : 802.11n40 Test Date : 2016/6/15
 Fundamental Frequency : 5755 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11510.00	H	Peak	30.97	19.90	50.87	74	-23.13
11510.00	H	Average	22.36	19.90	42.26	54	-11.74

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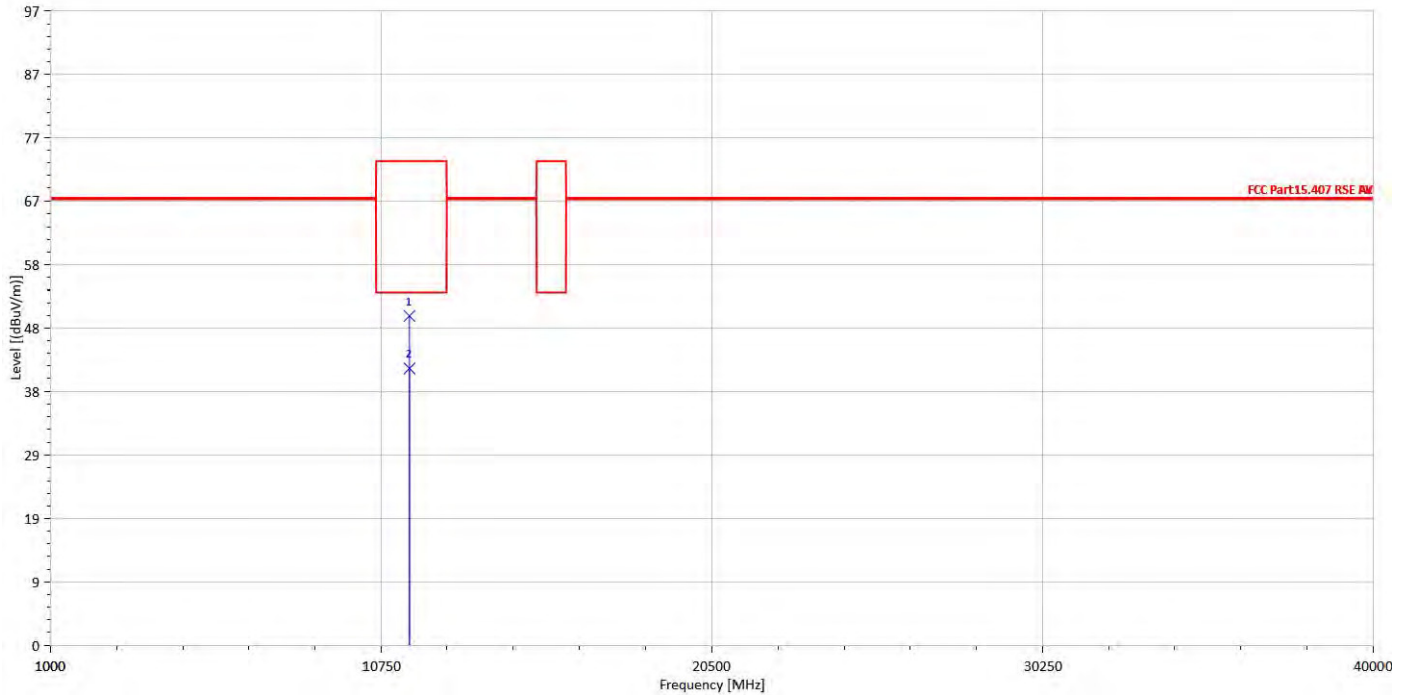
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Operation Mode : 802.11n40 Test Date : 2016/6/15
 Fundamental Frequency : 5795 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11590.00	H	Peak	30.54	19.85	50.39	74	-23.61
11590.00	H	Average	22.43	19.85	42.28	54	-11.72

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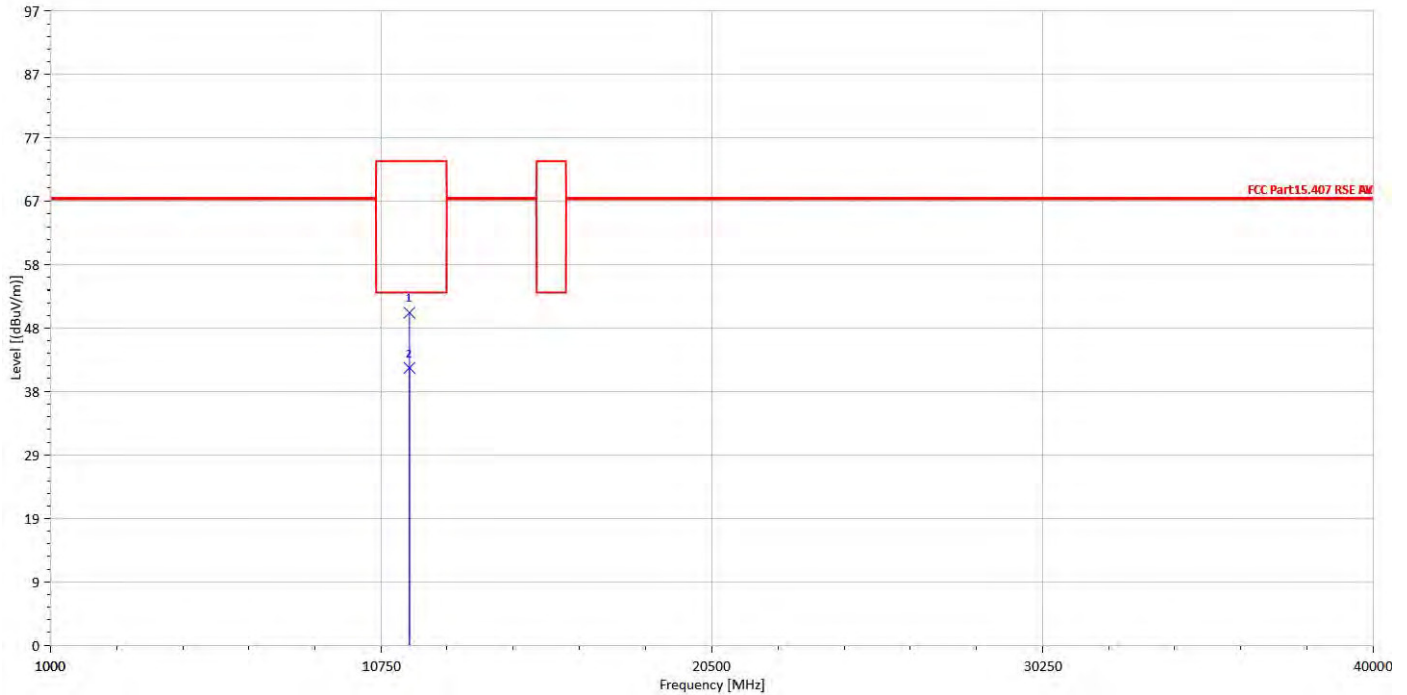
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Operation Mode : 802.11n40 Test Date : 2016/6/15
 Fundamental Frequency : 5795 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
11590.00	H	Peak	31.03	19.85	50.88	74	-23.12
11590.00	H	Average	22.53	19.85	42.38	54	-11.62

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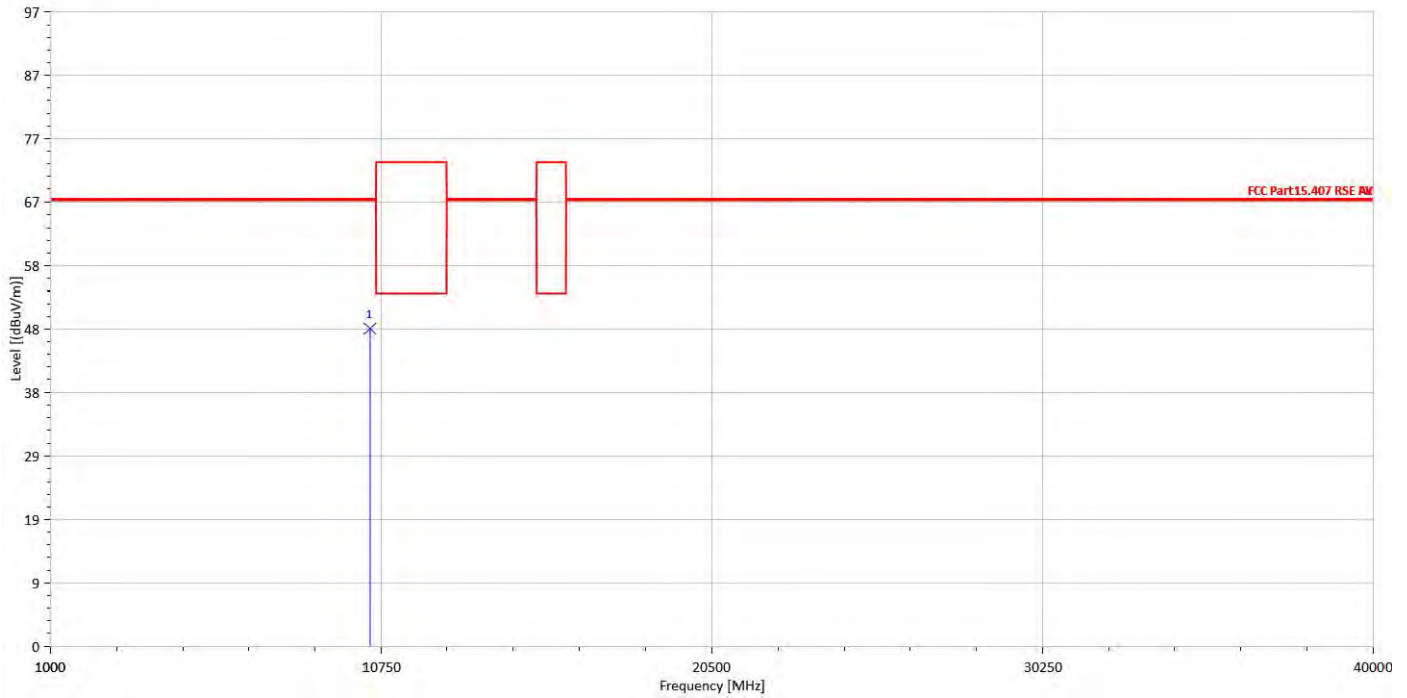
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Radiated Spurious Emission Measurement Result 802.11ac VHT80, 5150~5250 MHz

Operation Mode :	802.11ac80	Test Date :	2016/6/15
Fundamental Frequency :	5210 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10420.00	H	Peak	30.54	18.05	48.59	68.3	-19.71

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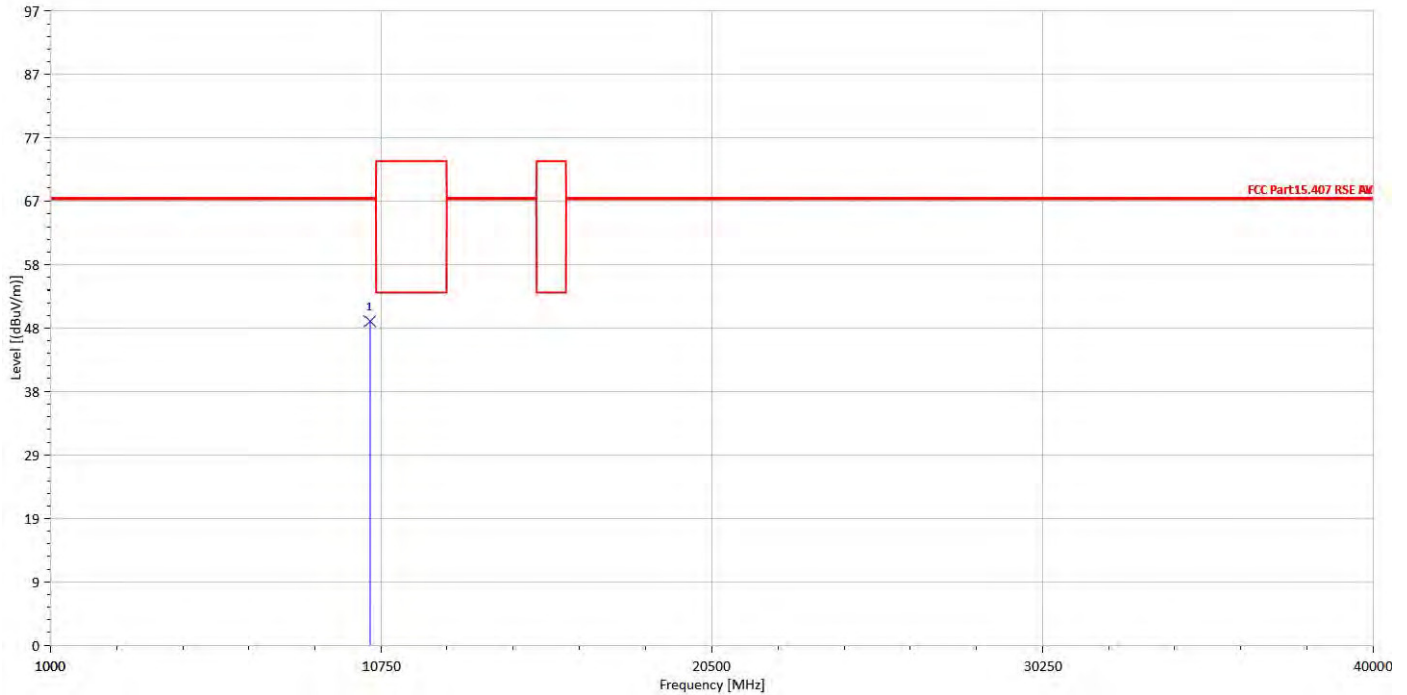
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Operation Mode :	802.11ac80	Test Date :	2016/6/15
Fundamental Frequency :	5210 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10420.00	H	Peak	31.52	18.05	49.56	68.3	-18.74

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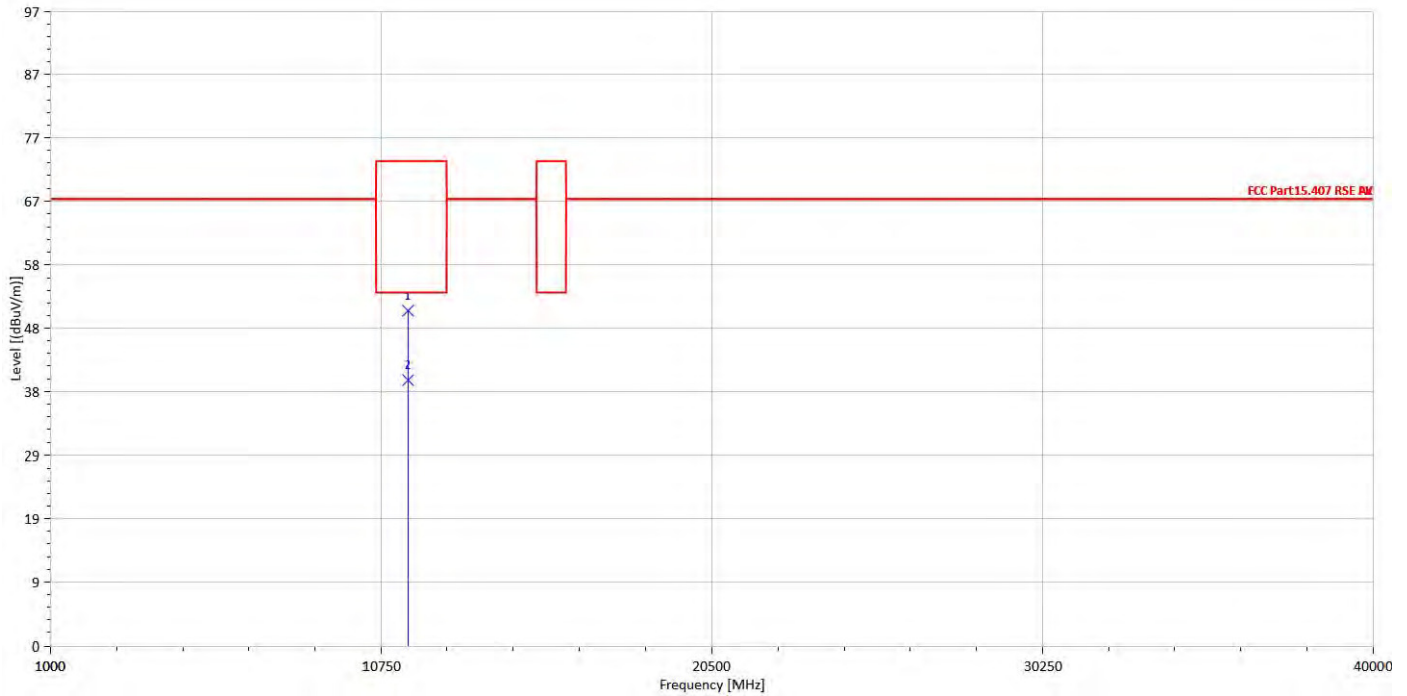
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Radiated Spurious Emission Measurement Result 802.11ac VHT80, 5725~5850 MHz

Operation Mode :	802.11ac80	Test Date :	2016/6/15
Fundamental Frequency :	5775 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11550.00	H	Peak	31.92	19.28	51.20	74	-22.80
11550.00	H	Average	21.35	19.28	40.63	54	-13.37

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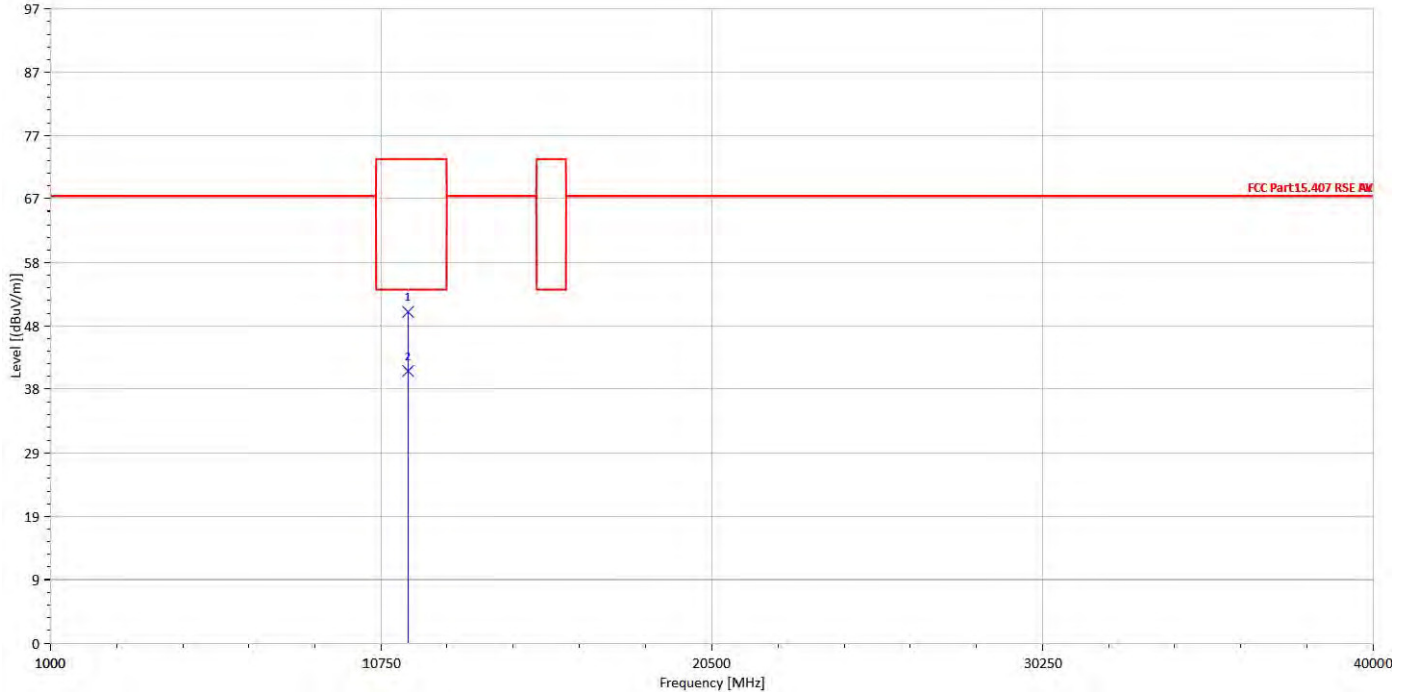
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Operation Mode :	802.11ac80	Test Date :	2016/6/15
Fundamental Frequency :	5775 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
11550.00	H	Peak	31.43	19.28	50.71	74	-23.29
11550.00	H	Average	22.30	19.28	41.58	54	-12.42

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Band edge falling to restricted band

802.11a mode

Operation Mode : 802.11a Test Date : 2016/6/14
 Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Vertical

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5149.36	S	Peak	51.42	8.19	59.61	74	-14.39
5149.36	S	Average	32.24	8.19	40.43	54	-13.57
5150.00	E	Peak	49.33	8.19	57.52	74	-16.48
5150.00	E	Average	32.25	8.19	40.44	54	-13.56

Operation Mode : 802.11a Test Date : 2016/6/14
 Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5148.28	S	Peak	43.57	8.18	51.75	74	-22.25
5148.28	S	Average	31.44	8.18	39.62	54	-14.38
5150.00	E	Peak	41.73	8.19	49.92	74	-24.08
5150.00	E	Average	31.41	8.19	39.60	54	-14.40

Operation Mode : 802.11a Test Date : 2016/6/15
 Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Vertical

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5662.30	S	Peak	54.62	9.21	63.83	77.33186	-13.50
5725.00	E	Peak	65.30	9.30	74.60	122.23	-47.63

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Operation Mode : 802.11a Test Date : 2016/6/15
 Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5663.40	S	Peak	46.49	9.20	55.69	78.14593	-22.45
5725.00	E	Peak	52.99	9.30	62.29	122.23	-59.94

Operation Mode : 802.11a Test Date : 2016/6/15
 Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Vertical

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5850.00	E	Peak	57.31	9.49	66.80	122.23	-55.43
5903.20	S	Peak	53.98	9.76	63.75	84.36186	-20.62

Operation Mode : 802.11a Test Date : 2016/6/15
 Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5850.00	E	Peak	44.54	9.49	54.03	122.23	-68.20
5903.80	S	Peak	43.66	9.77	53.43	83.91814	-30.49

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802.11n20 HT mode

Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Vertical

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5101.48	S	Peak	51.60	7.97	59.57	74	-14.43
5101.48	S	Average	37.31	7.97	45.28	54	-8.72
5150.00	E	Peak	42.89	8.19	51.08	74	-22.92
5150.00	E	Average	31.85	8.19	40.04	54	-13.96

Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5101.84	S	Peak	47.31	7.98	55.29	74	-18.71
5101.84	S	Average	34.54	7.98	42.52	54	-11.48
5150.00	E	Average	31.41	8.19	39.60	54	-14.40
5150.00	E	Peak	41.94	8.19	50.13	74	-23.87

Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Vertical

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5664.00	S	Peak	53.54	9.20	62.73	78.59	-15.86
5725.00	E	Peak	49.53	9.30	58.83	122.23	-63.40

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Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5657.30	S	Peak	49.06	9.25	58.31	73.63186	-15.32
5725.00	E	Peak	48.78	9.30	58.08	122.23	-64.15

Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Vertical

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5850.00	E	Peak	46.72	9.49	56.20	122.23	-66.03
5903.00	S	Peak	52.94	9.76	62.70	84.51	-21.81

Operation Mode : 802.11n20 Test Date : 2016/6/15
 Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5850.00	E	Peak	43.31	9.49	52.80	122.23	-69.43
5903.10	S	Peak	49.81	9.76	59.57	84.43593	-24.87

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802.11n40 HT mode

Operation Mode : 802.11n40 Test Date : 2016/6/15
 Fundamental Frequency : 5190 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Vertical

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5147.20	S	Peak	49.66	8.17	57.84	74	-16.16
5147.20	S	Average	33.21	8.17	41.38	54	-12.62
5150.00	E	Peak	46.20	8.19	54.39	74	-19.61
5150.00	E	Average	33.76	8.19	41.95	54	-12.05

Operation Mode : 802.11n40 Test Date : 2016/6/15
 Fundamental Frequency : 5190 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5100.88	S	Peak	45.66	7.97	53.63	74	-20.37
5100.88	S	Average	32.87	7.97	40.84	54	-13.16
5150.00	E	Peak	42.57	8.19	50.76	74	-23.24
5150.00	E	Average	31.70	8.19	39.89	54	-14.11

Operation Mode : 802.11n40 Test Date : 2016/6/15
 Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Vertical

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5657.31	S	Peak	50.40	9.25	59.65	73.63945	-13.98
5725.00	E	Peak	53.79	9.30	63.09	122.23	-59.14

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Operation Mode : 802.11n40 Test Date : 2016/6/15
 Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5657.20	S	Peak	46.12	9.25	55.37	73.55815	-18.19
5725.00	E	Peak	53.39	9.30	62.69	122.23	-59.54

Operation Mode : 802.11n40 Test Date : 2016/6/15
 Fundamental Frequency : 5795MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Vertical

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5850.00	E	Peak	48.21	9.49	57.70	122.23	-64.53
5883.00	S	Peak	51.05	9.63	60.67	99.31001	-38.64

Operation Mode : 802.11n40 Test Date : 2016/6/15
 Fundamental Frequency : 5795MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5850.00	E	Peak	43.07	9.49	52.56	122.23	-69.67
5880.80	S	Peak	45.47	9.62	55.08	100.93810	-45.85

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802.11ac80 VHT mode

Operation Mode : 802.11ac80 Test Date : 2016/6/15
 Fundamental Frequency : 5210 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Vertical

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5150.00	E	Peak	53.84	8.19	62.03	74	-11.97
5150.00	E	Average	34.65	8.19	42.84	54	-11.16

Operation Mode : 802.11ac80 Test Date : 2016/6/15
 Fundamental Frequency : 5210 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5147.10	S	Peak	47.96	8.17	56.14	74	-17.86
5147.10	S	Average	32.67	8.17	40.84	54	-13.16
5150.00	E	Peak	44.46	8.19	52.65	74	-21.35
5150.00	E	Average	32.60	8.19	40.79	54	-13.21

Operation Mode : 802.11ac80 Test Date : 2016/6/15
 Fundamental Frequency : 5775 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Vertical

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5688.10	S	Peak	50.96	9.50	60.46	96.42407	-35.96
5725.00	E	Peak	57.11	9.30	66.41	122.23	-55.82

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Operation Mode : 802.11ac80 Test Date : 2016/6/15
 Fundamental Frequency : 5775 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5687.60	S	Peak	53.66	9.49	63.15	96.05408	-32.91
5725.00	E	Peak	54.47	9.30	63.77	122.23	-58.46

Operation Mode : 802.11ac80 Test Date : 2016/6/15
 Fundamental Frequency : 5775 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Vertical

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5850.00	E	Peak	49.66	9.49	59.15	122.23	-63.08
5891.28	S	Peak	47.24	9.66	56.90	93.18296	-36.28

Operation Mode : 802.11ac80 Test Date : 2016/6/15
 Fundamental Frequency : 5775 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Pony
 EUT Pol. : H Measurement Antenna Pol. : Horizontal

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5850.00	E	Peak	48.29	9.49	57.78	122.23	-64.45
5890.44	S	Peak	46.50	9.66	56.15	93.80444	-37.65

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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:

Refer to the theory of operation.

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13. FREQUENCY STABILITY

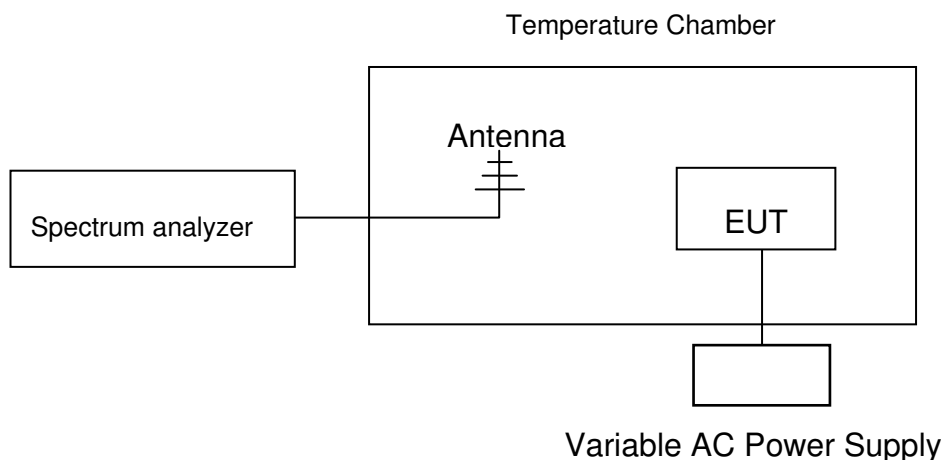
13.1 Standard Applicable

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:

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
DC Block	PASTERNAK	PE8210	RF29	12/12/2015	12/11/2016
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/23/2015	06/22/2016

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13.5 Measurement Result

Operation Mode	802.11 a	Test Date	2016.06.20
Temperature	:25 °C	Test By	Enzo
Humidity	:60 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0 °C	13.8V	36	5180	5,179.90641	0.00001807
		44	5220	5,219.90618	0.00001797
		48	5240	5,239.90643	0.00001786
		149	5745	5,744.89788	0.00001778
		157	5785	5,784.89546	0.00001807
		165	5825	5,824.89480	0.00001806
	10.2V	36	5180	5,179.90783	0.00001779
		44	5220	5,219.90713	0.00001779
		48	5240	5,239.90556	0.00001802
		149	5745	5,744.89764	0.00001782
		157	5785	5,784.89686	0.00001783
		165	5825	5,824.89610	0.00001784

25 °C	12V	36	5180	5,179.90605	0.00001814
		44	5220	5,219.90565	0.00001807
		48	5240	5,239.90521	0.00001809
		149	5745	5,744.89608	0.00001809
		157	5785	5,784.89518	0.00001812
		165	5825	5,824.89458	0.00001810

40 °C	13.8V	36	5180	5,179.90460	0.00001842
		44	5220	5,219.90489	0.00001822
		48	5240	5,239.90333	0.00001845
		149	5745	5,744.89534	0.00001822
		157	5785	5,784.89368	0.00001838
		165	5825	5,824.89406	0.00001819
	10.2V	36	5180	5,179.90417	0.00001850
		44	5220	5,219.90466	0.00001826
		48	5240	5,239.90487	0.00001815
		149	5745	5,744.89452	0.00001836
		157	5785	5,784.89412	0.00001830
		165	5825	5,824.89390	0.00001821

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Operation Mode	802.11 n_HT40	Test Date	2016.06.20
Temperature	:25 °C	Test By	Enzo
Humidity	:60 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0 °C	13.8V	38	5190	5,189.96482	0.00000678
		46	5230	5,230.00864	-0.00000165
		151	5755	5,754.96923	0.00000535
		159	5795	5,795.00876	-0.00000151
	10.2V	38	5190	5,189.96399	0.00000694
		46	5230	5,230.00883	-0.00000169
		151	5755	5,754.96886	0.00000541
		159	5795	5,795.01017	-0.00000175

25 °C	12V	38	5190	5,189.96312	0.00000711
		46	5230	5,230.00712	-0.00000136
		151	5755	5,754.96580	0.00000594
		159	5795	5,795.00845	-0.00000146
40 °C	13.8V	38	5190	5,189.96294	0.00000714
		46	5230	5,230.00592	-0.00000113
		151	5755	5,754.96864	0.00000545
		159	5795	5,795.00679	-0.00000117
	10.2V	38	5190	5,189.96188	0.00000734
		46	5230	5,230.00528	-0.00000101
		151	5755	5,754.96744	0.00000566
		159	5795	5,795.00679	-0.00000117

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Operation Mode	802.11 ac_VHT80	Test Date	2016.06.20
Temperature	:25 °C	Test By	Enzo
Humidity	:60 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0 °C	13.8V	42	5210	5,209.96104	0.00000748
		155	5775	5,774.98779	0.00000211
	10.2V	42	5210	5,209.96113	0.00000746
		155	5775	5,774.98733	0.00000219
25 °C	3.3V	42	5210	5,209.96059	0.00000756
		155	5775	5,774.98725	0.00000221
40 °C	13.8V	42	5210	5,209.95950	0.00000777
		155	5775	5,774.98710	0.00000223
	10.2V	42	5210	5,209.96026	0.00000763
		155	5775	5,774.98609	0.00000241

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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

PCB antenna designs are used.

The antenna is designed with permanent attached and no consideration of replacement. Please see EUT photo and antenna spec. for details.

~ End of Report ~

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