

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E AND INDUSTRY CANADA RSS 247 REQUIREMENT

OF

Product Name: Clickshare CSE-800
Brand Name: Barco
Model No.: R9861580
Model Difference: N/A
FCC ID: 2AAED-R9861580
IC: 21559-R9861580
Report No.: E2/2016/B0014
Issue Date: Jan. 25, 2017
FCC Rule Part: §15.407
IC Rule Part: RSS-247 issue 1 May 2015
FCC Prepared for: Barco NV
Barco NV President Kennedypark35, 8500
Kortrijk, Belgium
IC Prepared for: Barco Visual Solutions Inc
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SGS Taiwan Ltd.
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VERIFICATION OF COMPLIANCE

FCC Applicant: Barco NV
Barco NV President Kennedypark35, 8500 Kortrijk, Belgium

IC Applicant: Barco Visual Solutions Inc
925 Airport Rd Suite 200 Mississauga ON L4V 1W1 Canada

Product Name: Clickshare CSE-800

Brand Name: Barco

Model No.: R9861580

Model Difference: N/A

FCC ID: 2AAED-R9861580

IC: 21559-R9861580

File Number: E2/2016/B0014

Date of Test: Dec. 23, 2016~ Dec.30, 2016

Date of EUT Received: Nov. 09, 2016

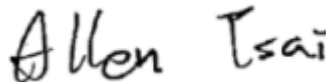
We hereby certify that:

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:**

Jan. 25, 2017

Jerry Lu / Sr. Engineer**Prepared By:****Date:**

Jan. 25, 2017

Allen Tsai / Sr. Engineer**Approved By:****Date:**

Jan. 25, 2017

Jim Chang / Asst. Manager

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Revision History

Report Number	Revision	Description	Issue Date
E2/2016/B0014	Rev.00	Initial creation of document	Jan. 25, 2017

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1 GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	Clickshare CSE-800
Brand Name:	Barco
Model No.:	R9861580
Model Difference:	N/A
Product SW/HW version:	N/A/ Rev 4
Radio SW/HW version:	N/A/ N/A
Test SW Version:	N/A
RF power setting in TEST SW:	N/A
Power Supply:	230 VAC

FCC WLAN 5GHz:

Wi-Fi	Frequency Range (MHz)	Channels	Avg. Rated Power (dBm)	Modulation Technology
11a	5150~5250	4	14.86	OFDM
	5725-5850	5	14.98	
11n HT 20M	5150~5250	4	13.99	OFDM
	5725-5850	5	13.98	

IC WLAN 5GHz:

Wi-Fi	Frequency Range (MHz)	Channels	Rated Power (Avg.) / (EIRP)	Modulation Technology
11a	5150~5250	4	19.87dBm (EIRP)	OFDM
	5725-5850	5	14.98 dBm	
11n HT 20M	5150~5250	4	13.99dBm (EIRP)	OFDM
	5725-5850	5	13.98 dBm	

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Antenna Designation	Dipole Antenna, Antenna Gain: 2 dBi
Modulation type	64QAM, 16QAM, QPSK, BPSK for OFDM
Transition Rate:	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 144.4Mbps

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01

FCC KDB 662911 D01 Multiple Transmitter Output

RSS-247 issue 1 May 2015

RSS-Gen issue4 Nov. 2014

ANSI C63.10:2013

Note: All test items have been performed and record as per the above standards.

1.3 Test Facility

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

FCC Registration Numbers are: 735305

Canada Registration Number: 4620A-5

1.4 Special Accessories

There are no special accessories used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 Conducted Emissions

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

2.3.2 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this 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 4.4dB, and 10dB attenuator.

$$= \text{RF cable loss (dB)} + \text{attenuation factor (dB)} = 14.4(\text{dB})$$

2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission Conducted (Antenna Port) Configuration

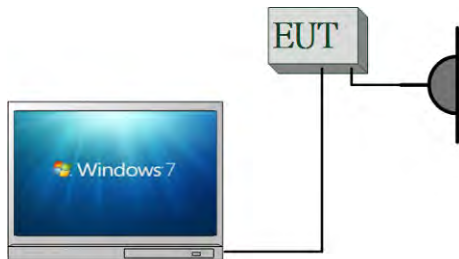


Fig 2-2 Conducted (AC power line) Configuration

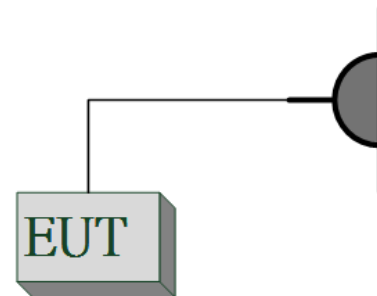


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	L420	LR-6MEX0	N/A	N/A

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3 SUMMARY OF TEST RESULT

FCC Rules	IC Rules	Description Of Test	Result
§15.207	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	RSS-247 §6.2.1~ 4 (1) RSS-Gen §6.6	26 dB & 6dB & 99% Emission Bandwidth	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Maximum Conducted Output Power	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Power Spectral Density	Compliant
§15.407(b)	RSS-247 §6.2.1~ 4 (2)	Undesirable Radiated Emissions	Compliant
§15.407(c)	RSS-247 §6.4	Transmission in case of Absence of Information	Compliant
§15.407(g)	RSS-Gen §6.11	Frequency Stability	Compliant
§15.203 §15.407(a)	RSS- Gen §6.7 RSS- Gen §8.3	Antenna Requirement	Compliant

4 DESCRIPTION OF TEST MODES

4.1 Operated in U-NII Bands

Operated band in 5150 MHz ~5250 MHz:

4 channels are provided for 802.11a, 802.11n_HT20.

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

Operated band in 5725 MHz ~5850 MHz:

5 channels are provided for 802.11a, 802.11n_HT20.

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

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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	MIMO
802.11_n20					MCS8	MIMO
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	MIMO
802.11_n20					MCS8	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	MIMO
802.11n_HT20					MCS8	MIMO
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	MIMO
802.11n_HT20					MCS8	MIMO

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	MIMO
802.11ac_HT20				OFDM	MCS8	MIMO
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	MIMO
802.11ac_HT20				OFDM	MCS8	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	12/08/2016	12/07/2017
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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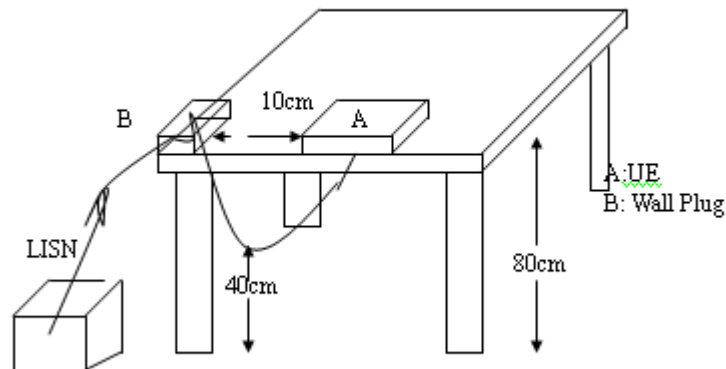
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6.4 Test SET-UP



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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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) = $10 \cdot \log (1/\text{Duty Cycle})$
802.11a	98.23	0.08
802.11n_20	95.47	0.20

$$\text{Duty Cycle Factor: } 10 \cdot \log(1/0.9823) = 0.08$$

$$\text{Duty Cycle Factor: } 10 \cdot \log(1/0.9547) = 0.2$$

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DUTY CYCLE TEST SIGNAL Measurement Result 802.11a

802.11n HT20

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8 26DB & 6DB EMISSION BANDWIDTH MEASUREMENT

8.1 Standard Applicable

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

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

8.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
 - a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto, Detector = Peak, Trace Mode = Max Hold, Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
 - b. Mark the peak frequency and -26dB (upper and lower) frequency.
4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
 - a. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3*RBW, Span = 30M/50MHz, Detector=Peak, Sweep=auto
 - b. Mark the peak frequency and -6dB (upper and lower) frequency.
6. Repeat above procedures until all test default channel measured were complete.

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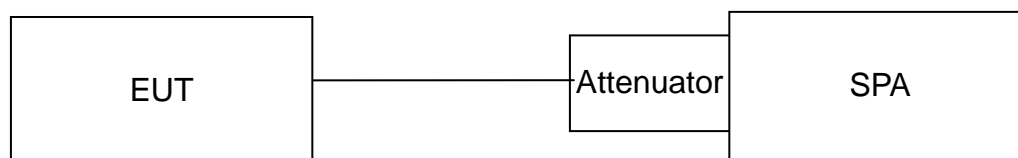
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8.3 Measurement Equipment Used

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
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/12/2016	12/11/2017
DC Block	PASTERNAK	PE8210	RF29	12/12/2016	12/11/2017
Attenuator	WOKEN	218FS-10	RF23	12/12/2016	12/11/2017

8.4 Test Set-up



8.5 Measurement Result

26dB and 6dB Bandwidth

802.11a_Main

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.43	< 5250
5745	5736.60	> 5725

802.11a_Aux1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.37	< 5250
5745	5736.60	> 5725

802.11n_HT20_Main

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.97	< 5250
5745	5736.09	> 5725

802.11n_HT20_Aux1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.97	< 5250
5745	5736.06	> 5725

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802.11a_Main

802.11a_Aux1

Freq. (MHz)	26dB BW (MHz)	10 Log (B)(dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B)(dB)
5180	26.97	14.309	5180	25.93	14.138
5220	27.02	14.317	5220	27.87	14.451
5240	23.58	13.725	5240	24.77	13.939

802.11n_HT20_Main

802.11n_HT20_Aux1

Freq. (MHz)	26dB BW (MHz)	10 Log (B)(dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B)(dB)
5180	22.73	13.566	5180	22.53	13.528
5220	22.92	13.602	5220	22.88	13.595
5240	22.63	13.547	5240	23.42	13.696

802.11a_Main

802.11a_Aux1

Freq. (MHz)	6dB BW (MHz)	10 Log (B)(dB)	Freq. (MHz)	6dB BW (MHz)	10 Log (B)(dB)
5745	16.32	12.128	5745	16.31	12.125
5785	16.33	12.130	5785	16.33	12.129
5825	16.33	12.131	5825	16.40	12.148

802.11n_HT20_Main

802.11n_HT20_Aux1

Freq. (MHz)	6dB BW (MHz)	10 Log (B)(dB)	Freq. (MHz)	6dB BW (MHz)	10 Log (B)(dB)
5745	17.68	12.475	5745	17.65	12.467
5785	17.64	12.464	5785	17.62	12.459
5825	17.58	12.451	5825	17.68	12.475

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99% Bandwidth

802.11a_Main

Freq. (MHz)	99% BW (MHz)	10 Log (B)(dB)
5180	16.517	12.179
5220	16.587	12.198
5240	16.477	12.169

802.11a_Aux1

Freq. (MHz)	99% BW (MHz)	10 Log (B)(dB)
5180	16.617	12.206
5220	16.550	12.188
5240	16.400	12.148

802.11n_HT20_Main

Freq. (MHz)	99% BW (MHz)	10 Log (B)(dB)
5180	17.967	12.545
5220	17.758	12.494
5240	17.625	12.461

802.11n_HT20_Aux1

Freq. (MHz)	99% BW (MHz)	10 Log (B)(dB)
5180	17.777	12.499
5220	17.592	12.453
5240	17.463	12.421

802.11a_Main

Freq. (MHz)	6dB BW (MHz)	10 Log (B)(dB)
5745	16.29	12.119
5785	16.08	12.063
5825	16.06	12.057

802.11a_Aux1

Freq. (MHz)	6dB BW (MHz)	10 Log (B)(dB)
5745	15.96	12.030
5785	16.27	12.114
5825	16.30	12.122

802.11n_HT20_Main

Freq. (MHz)	6dB BW (MHz)	10 Log (B)(dB)
5745	17.58	12.450
5785	17.63	12.463
5825	17.60	12.455

802.11n_HT20_Aux1

Freq. (MHz)	6dB BW (MHz)	10 Log (B)(dB)
5745	17.71	12.482
5785	17.63	12.463
5825	17.36	12.395

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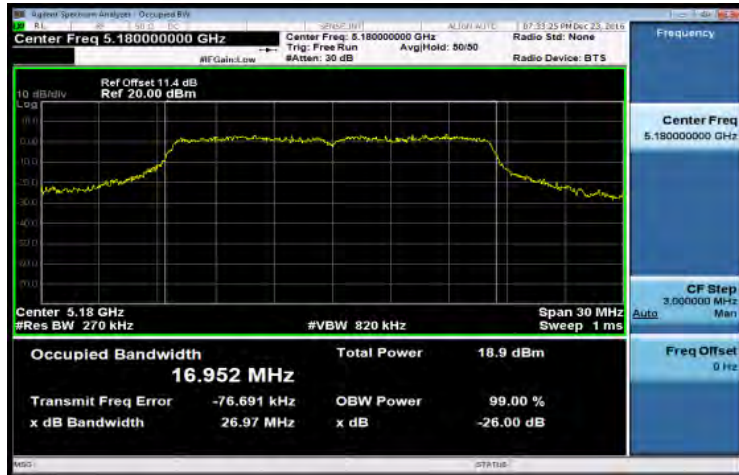
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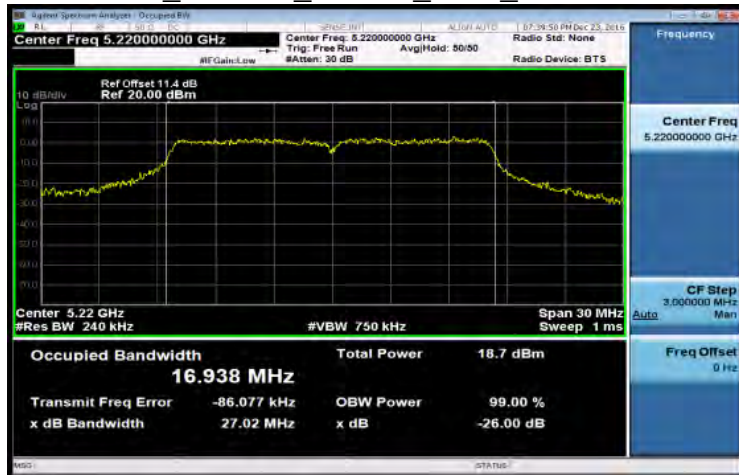
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FCC_802.11a_20MHz_Main_5745MHz



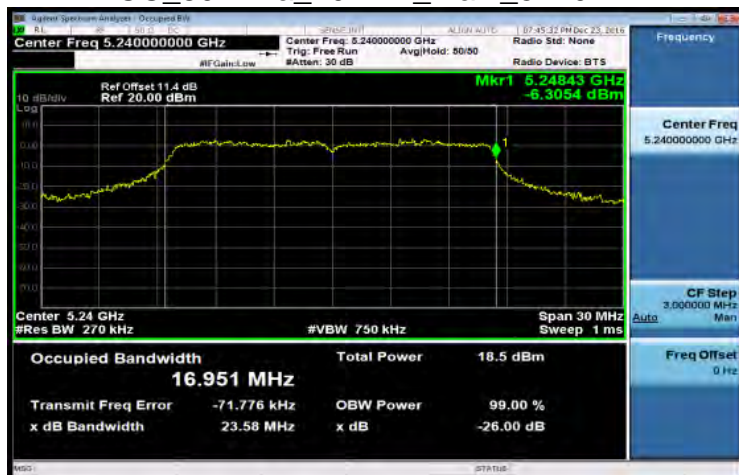
FCC_802.11a_20MHz_Main_5220MHz



FCC_802.11a_20MHz_Main_5785MHz



FCC_802.11a_20MHz_Main_5240MHz



FCC_802.11a_20MHz_Main_5825MHz



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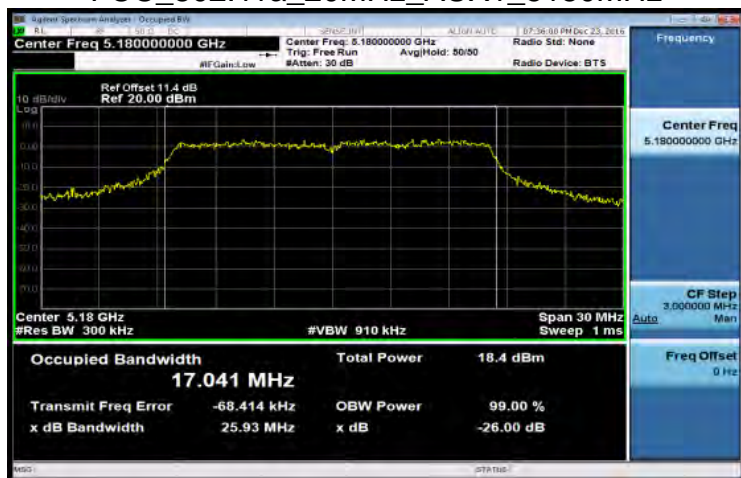
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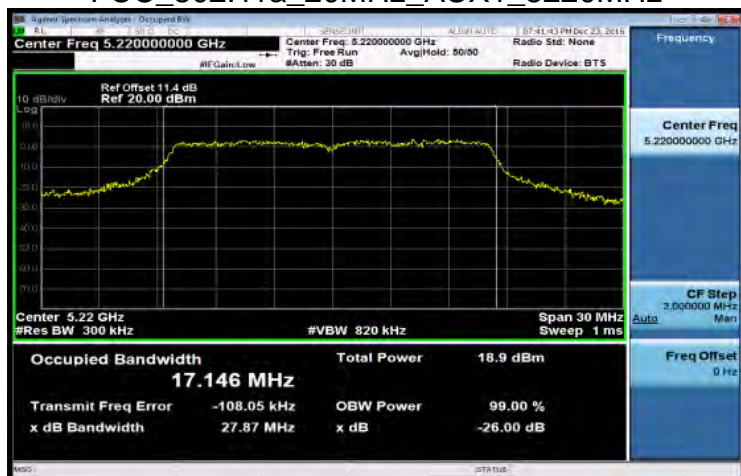
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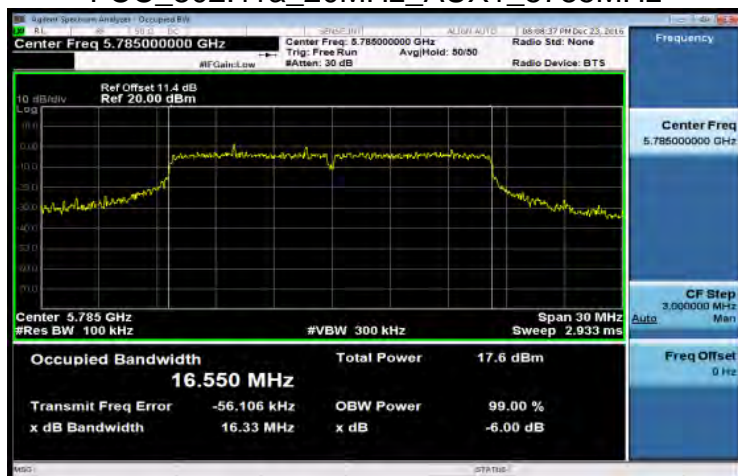
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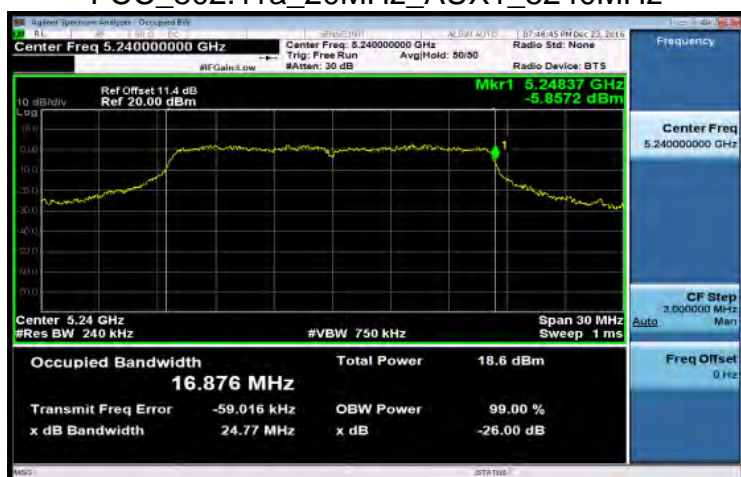
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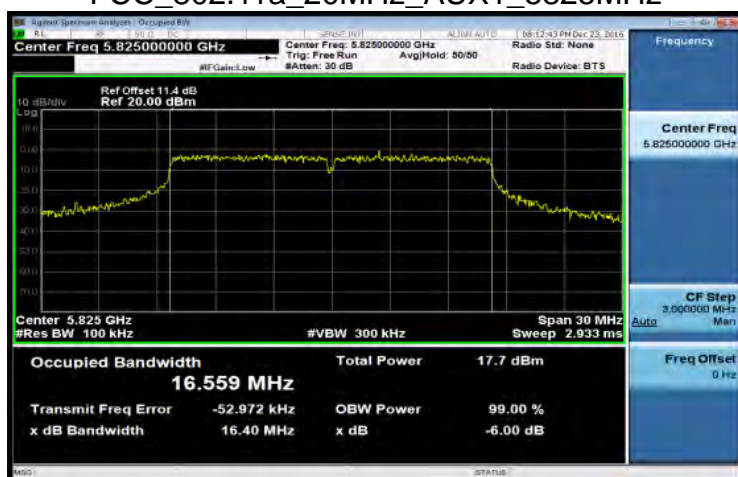
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FCC_802.11a_20MHz_AUX1_5240MHz



FCC_802.11a_20MHz_AUX1_5825MHz



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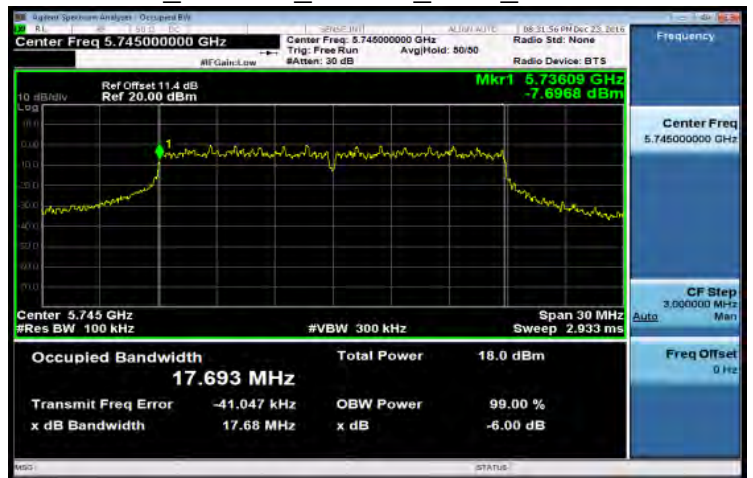
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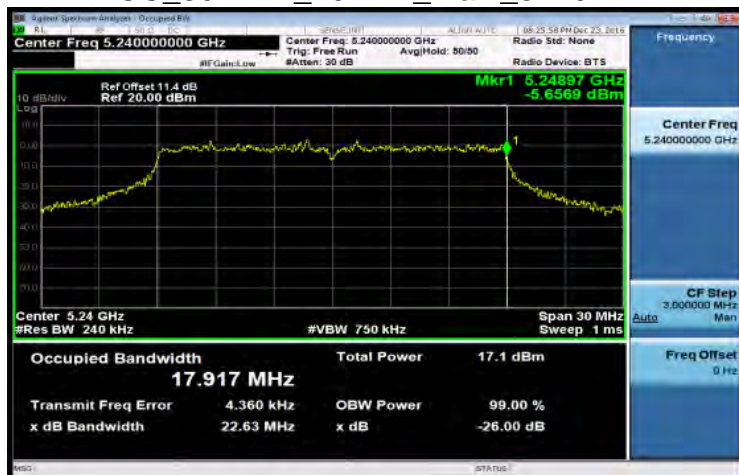
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FCC_802.11n_20MHz_Main_5240MHz



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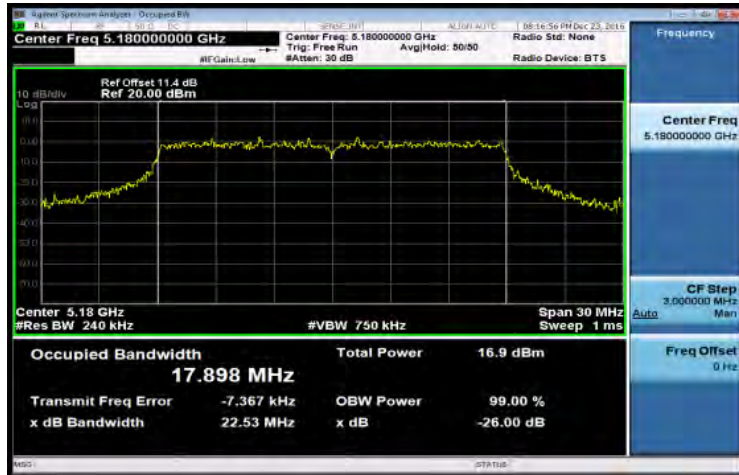


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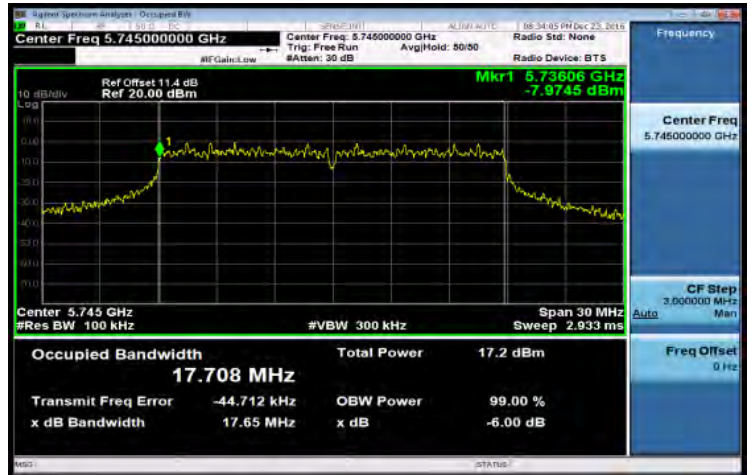
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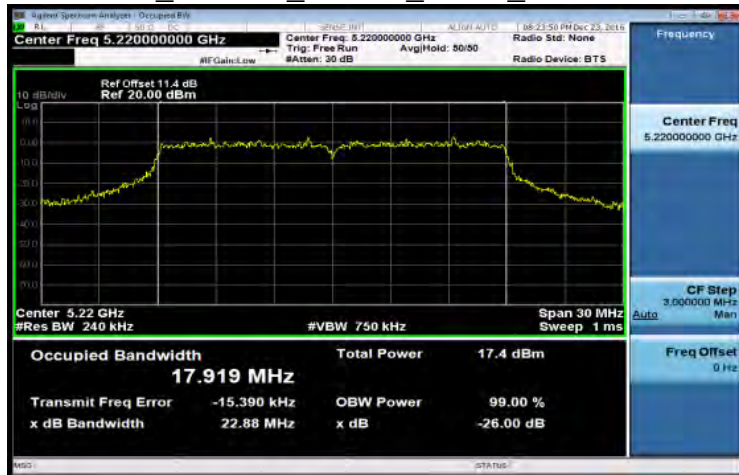
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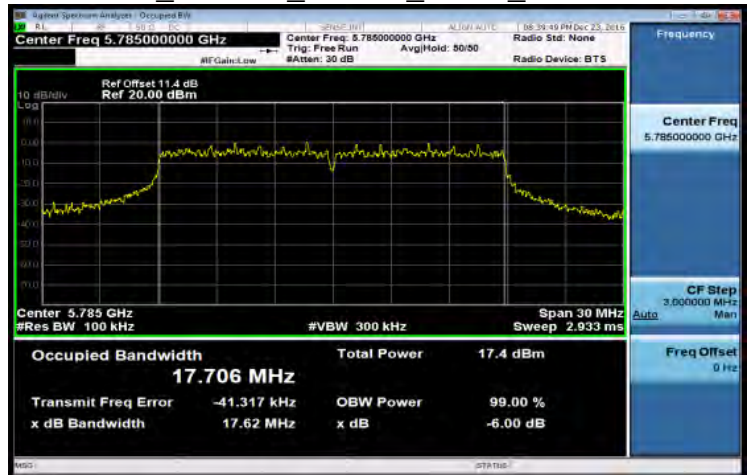
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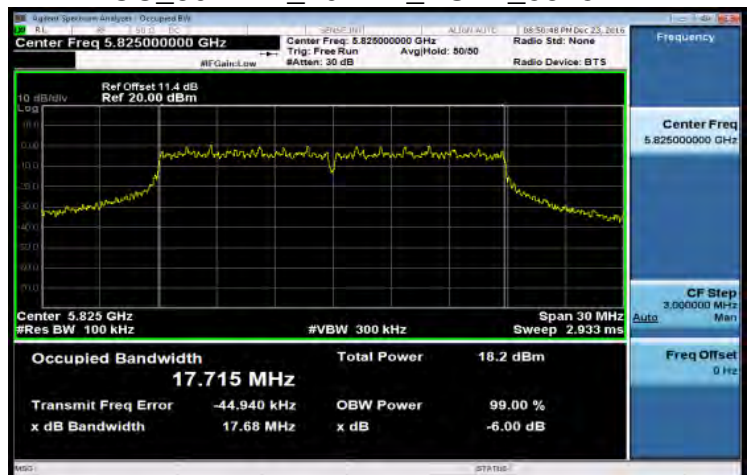
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FCC_802.11n_20MHz_AUX1_5240MHz



FCC_802.11n_20MHz_AUX1_5825MHz



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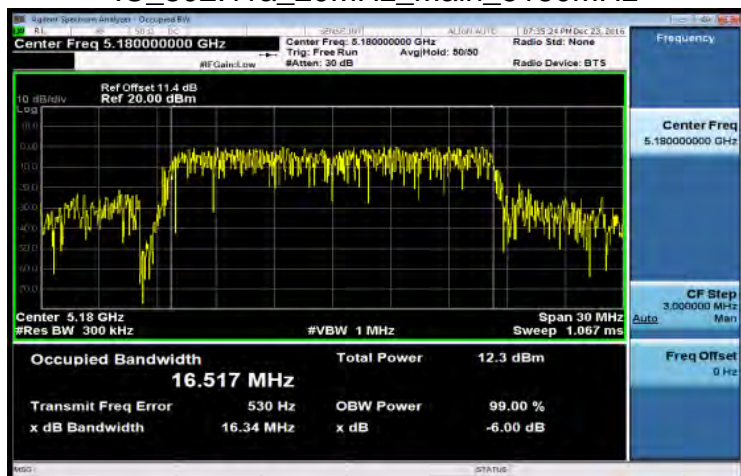
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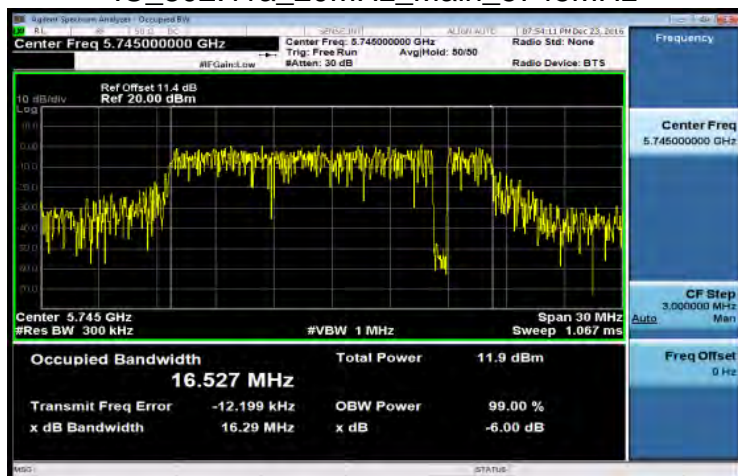
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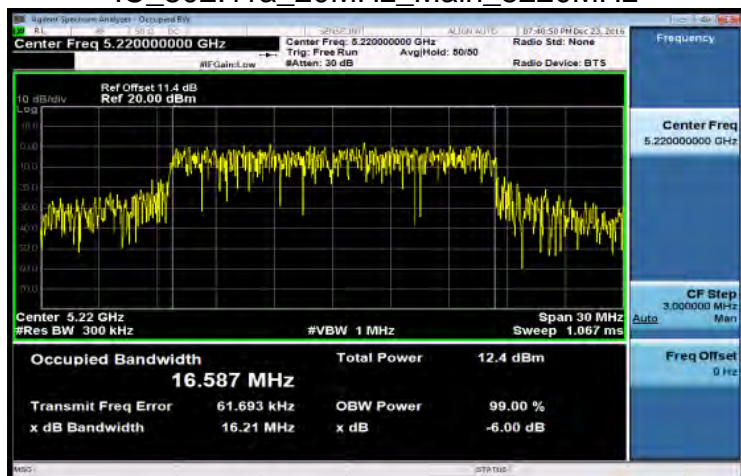
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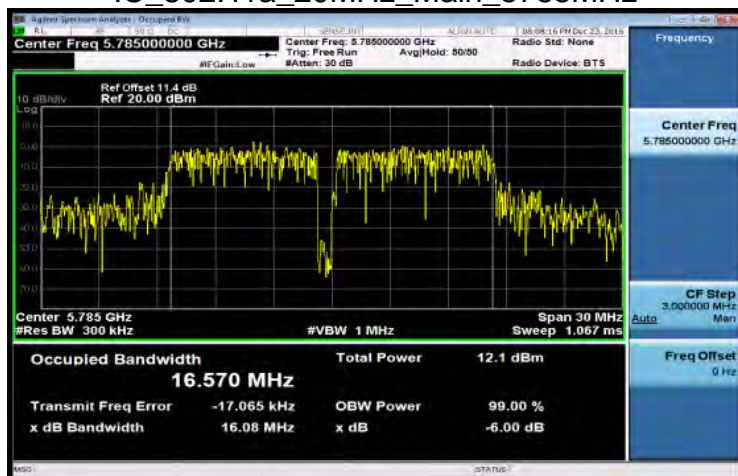
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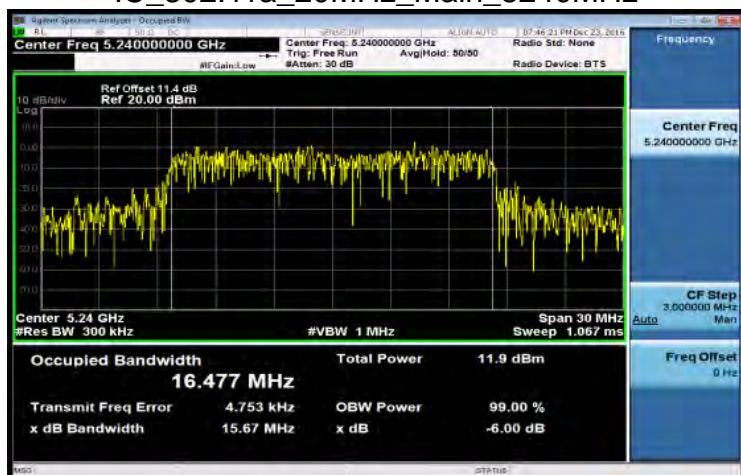
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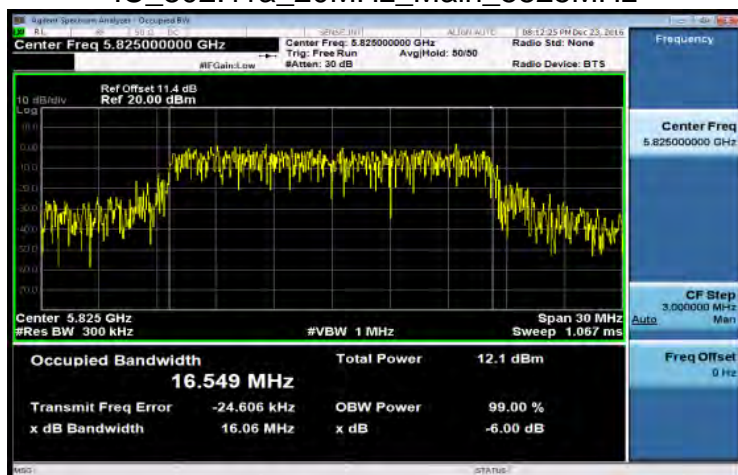
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IC_802.11a_20MHz_Main_5240MHz



IC_802.11a_20MHz_Main_5825MHz

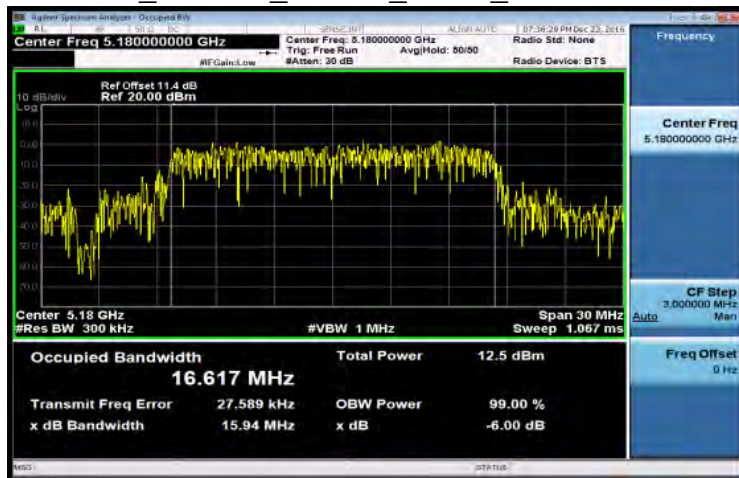


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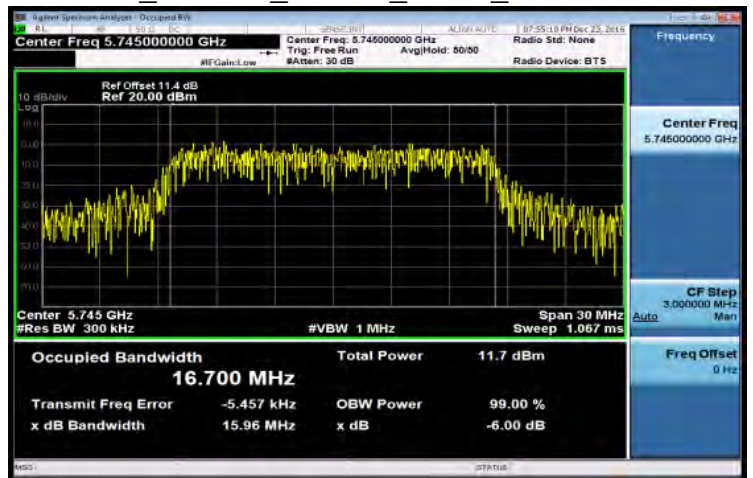
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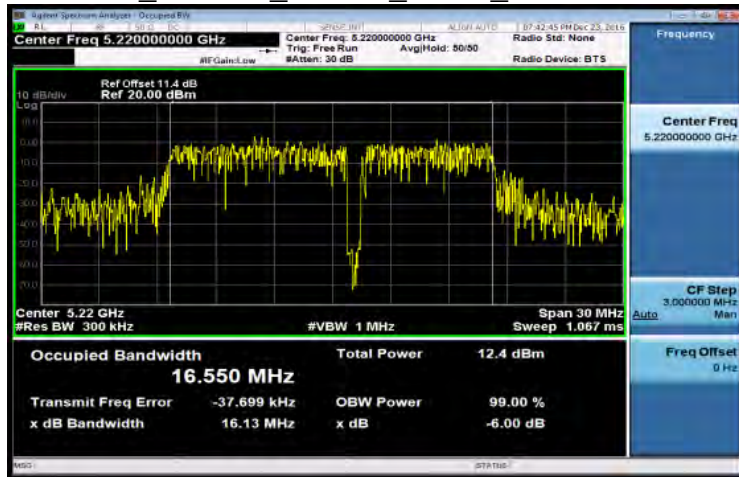
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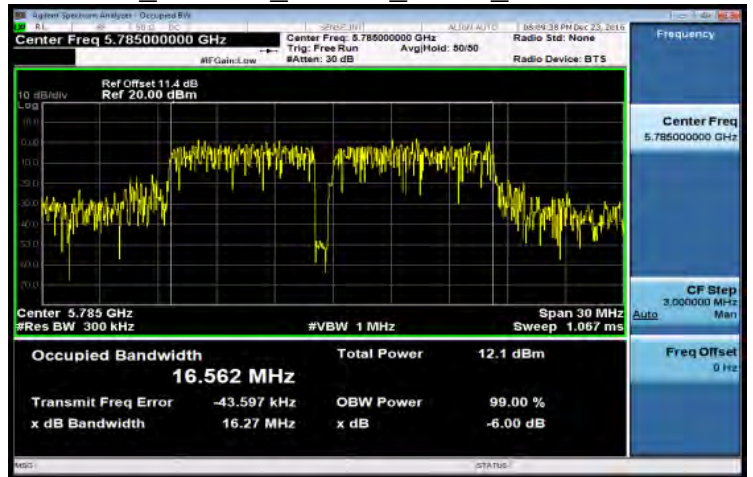
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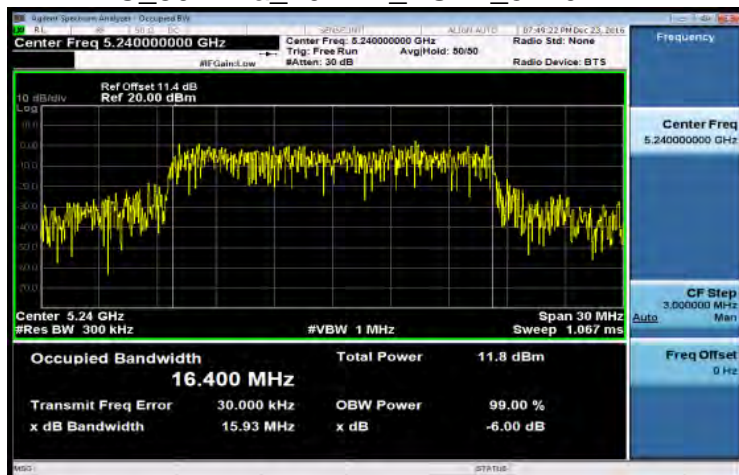
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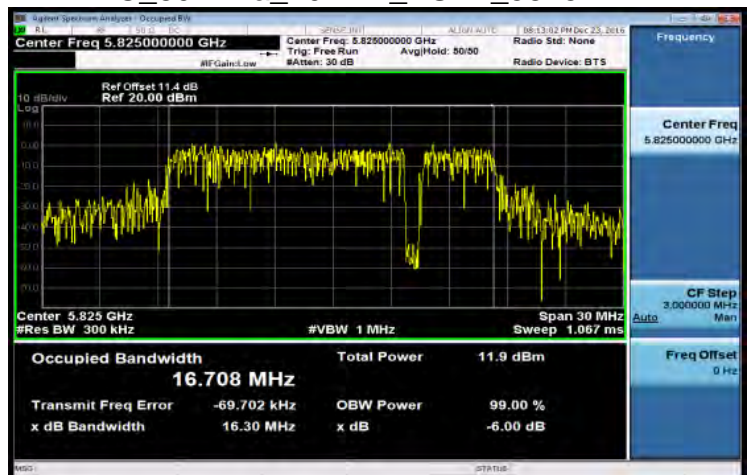
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IC_802.11a_20MHz_AUX1_5240MHz



IC_802.11a_20MHz_AUX1_5825MHz

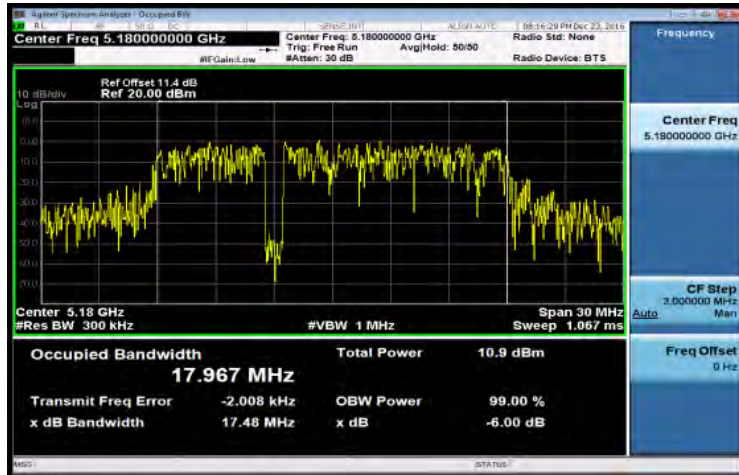


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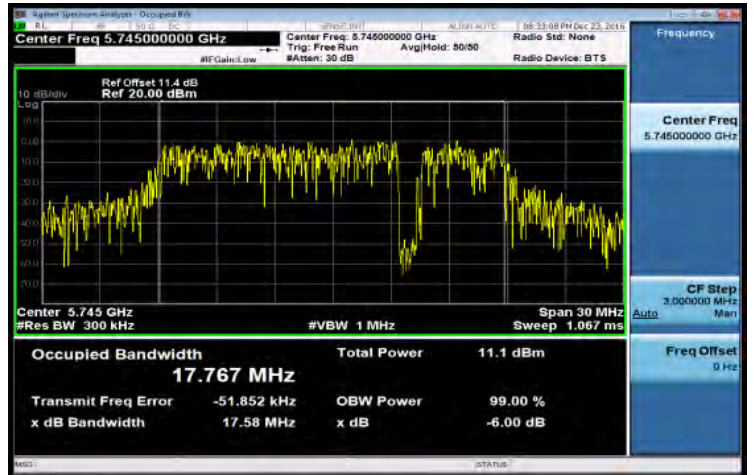
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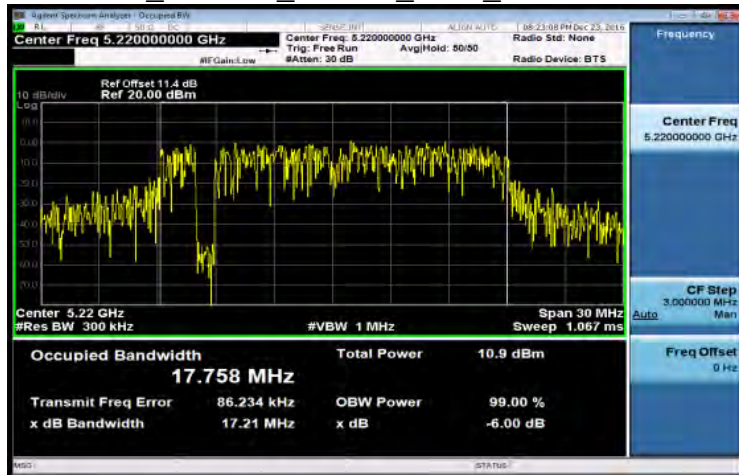
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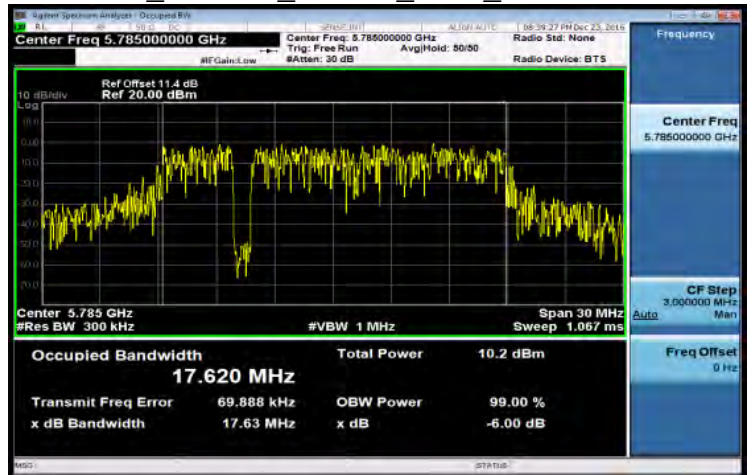
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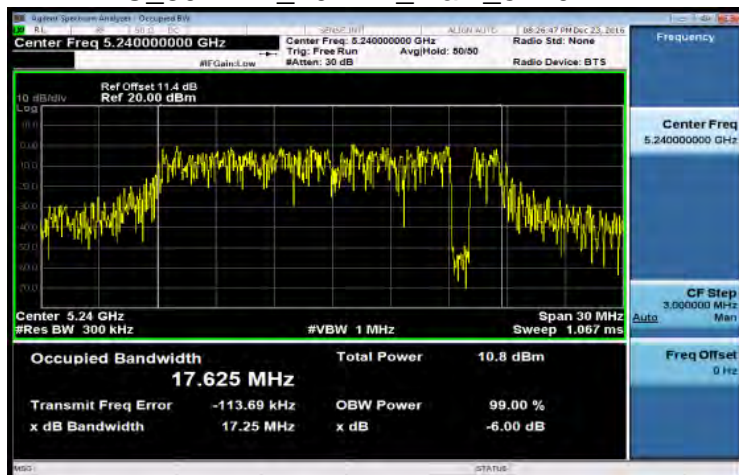
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IC_802.11n_20MHz_Main_5785MHz



IC_802.11n_20MHz_Main_5240MHz



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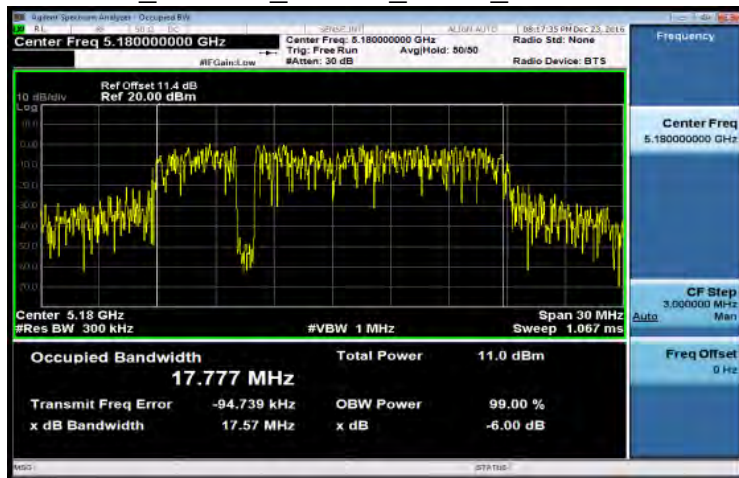


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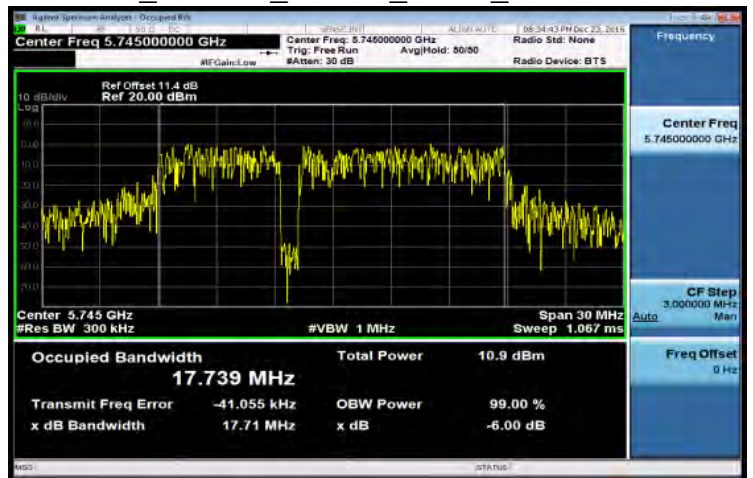
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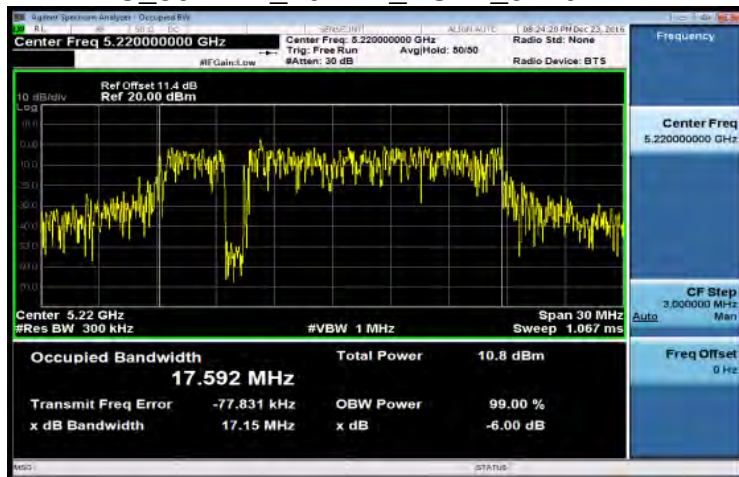
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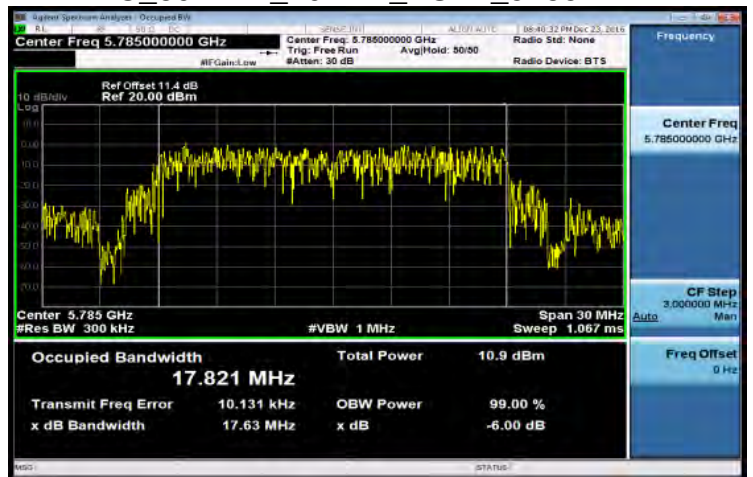
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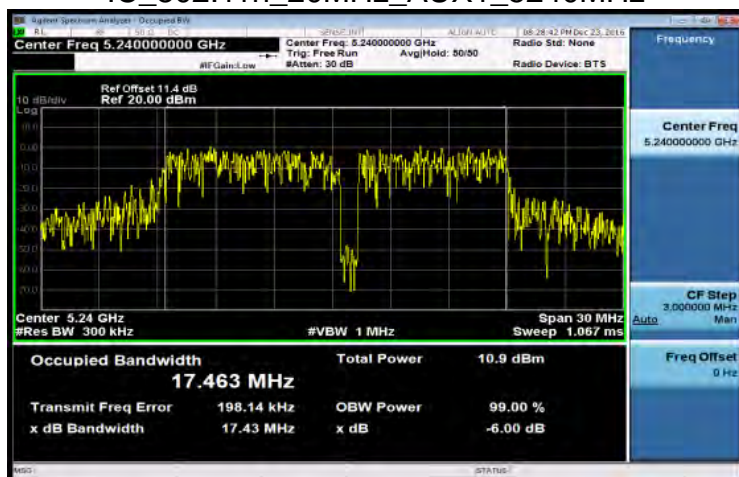
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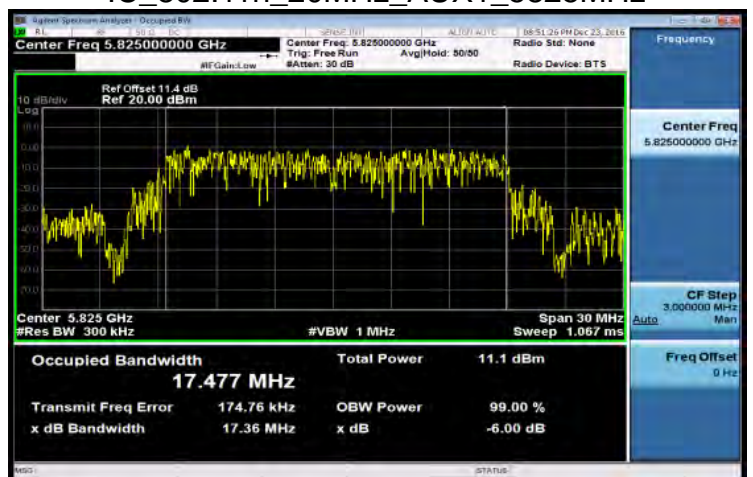
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IC_802.11n_20MHz_AUX1_5240MHz



IC_802.11n_20MHz_AUX1_5825MHz



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9 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

9.1 Standard Applicable

FCC

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1		Access Point (Master device)	1 Watt(30dBm)
		Fixed point-to-point Access Point	1 Watt(30dBm)
	✓	Mobile and portable client 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)

IC

OPERZTION FREQUENCY BAND	LIMIT
5150~5250 MHz	EIRP shall not exceed 200 mW or 10 + 10 log ₁₀ B, dBm
5250~5350 MHz	Conducted output power shall not exceed 250 mW or 11 +10 log ₁₀ B EIRP shall not exceed 1.0 W or 17 + 10 log ₁₀ B, dBm
5470-5600 MHz and 5650-5725 MHz	Conducted output power shall not exceed 250 mW or 11 +10 log ₁₀ B EIRP shall not exceed 1.0 W or 17 + 10 log ₁₀ B, dBm
5725~5850 MHz	Conducted output power shall not exceed 1 W

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.

9.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
4. Power Meter is used as the auxiliary test equipment to conduct the output power measure-

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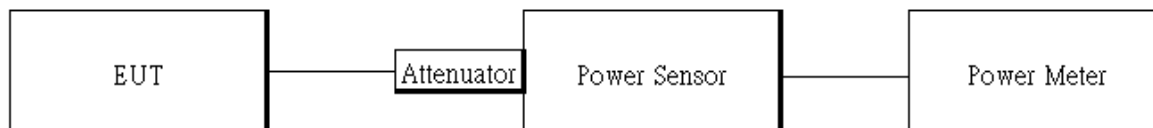
ment.

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	06/23/2016	06/22/2017
Power Sensor	Anritsu	MA2411B	1315048	06/23/2016	06/22/2017
Power Sensor	Anritsu	MA2411B	1315049	06/23/2016	06/22/2017
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/12/2016	12/11/2017
DC Block	PASTERNAK	PE8210	RF29	12/12/2016	12/11/2017
Attenuator	WOKEN	218FS-10	RF23	12/12/2016	12/11/2017

9.4 Test Set-up



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9.5 Measurement Result

Conducted output power (FCC)

802.11a_MIMO

CH	Frequency (MHz)	Data Rate	AVERAGE POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
36	5180	MCS8	12.15	11.53	14.86	30.629	23.98	PASS
44	5220	MCS8	11.85	11.33	14.61	28.894	23.98	PASS
48	5240	MCS8	11.91	11.24	14.60	28.828	23.98	PASS
149	5745	MCS8	11.71	11.67	14.70	29.514	30	PASS
157	5785	MCS8	12.12	11.81	14.98	31.463	30	PASS
165	5825	MCS8	11.95	11.61	14.79	30.155	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				
36	5180	MCS8	10.87	10.65	13.77	23.832	23.98	PASS
44	5220	MCS8	10.85	10.35	13.62	23.001	23.98	PASS
48	5240	MCS8	11.21	10.74	13.99	25.071	23.98	PASS
149	5745	MCS8	11.07	10.87	13.98	25.012	30	PASS
157	5785	MCS8	10.91	10.53	13.73	23.629	30	PASS
165	5825	MCS8	11.01	10.85	13.94	24.780	30	PASS

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Conducted output power (IC)

802.11a_MIMO

CH	Frequency (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
		CH 0	CH 1				
149	5745	11.71	11.67	14.70	29.514	30	PASS
157	5785	12.12	11.81	14.98	31.463	30	PASS
165	5825	11.95	11.61	14.79	30.155	30	PASS

802.11n_HT20_MIMO

CH	Frequency (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
		CH 0	CH 1				
149	5745	11.07	10.87	13.98	25.012	30	PASS
157	5785	10.91	10.53	13.73	23.629	30	PASS
165	5825	11.01	10.85	13.94	24.780	30	PASS

EIRP

802.11a_MIMO

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	14.86	5.010	19.87	97.081	23.01 or $10+10\log(B)=22.18$	PASS
44	5220	14.61	5.010	19.62	91.582	23.01 or $10+10\log(B)=22.19$	PASS
48	5240	14.60	5.010	19.61	91.374	23.01 or $10+10\log(B)=22.15$	PASS

802.11n_HT20_MIMO

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	13.77	5.010	18.78	75.539	23.01 or $10+10\log(B)=22.50$	PASS
44	5220	13.62	5.010	18.63	72.904	23.01 or $10+10\log(B)=22.45$	PASS
48	5240	13.99	5.010	19.00	79.463	23.01 or $10+10\log(B)=22.42$	PASS

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10 PEAK POWER SPECTRAL DENSITY

10.1 Standard Applicable

FCC

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

IC

OPERZTION FREQUENCY BAND	LIMIT
5150~5250 MHz	EIRP spectral density 10 dBm / MHz
5250~5350 MHz	11dBm / MHz
5470-5600 MHz and 5650-5725 MHz	11dBm / MHz
5725~5850 MHz	30dBm / 500 kHz

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.

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10.2 Measurement Procedure

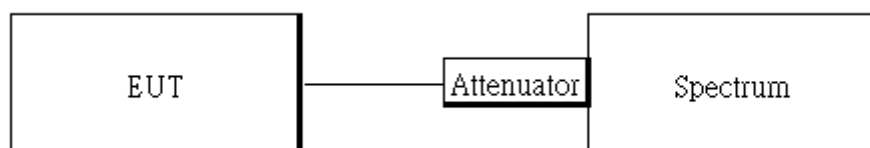
1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
4. **For U-NII1, U-NII-2A, U-NII-2C Band:**
Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
For U-NII-3 Band:
Set RBW=500 kHz, VBW \geq 3RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
5. Use the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add 10 log(1/duty cycle).
7. Repeat above procedures until all default test channel (low, middle, and high) was complete.

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
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/12/2016	12/11/2017
DC Block	PASTERNAK	PE8210	RF29	12/12/2016	12/11/2017
Attenuator	WOKEN	218FS-10	RF23	12/12/2016	12/11/2017

10.4 Test Set-up



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10.5 Measurement Result

POWER DENSITY 802.11a MODE				POWER DENSITY 802.11n HT20 MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5180	2.91	17	-14.09	5180	0.41	17	-16.59
5220	2.88	17	-14.12	5220	0.82	17	-16.18
5240	2.10	17	-14.90	5240	0.27	17	-16.73
5745	7.53	30	-22.47	5745	8.14	30	-21.86
5785	7.85	30	-22.15	5785	7.90	30	-22.10
5825	8.10	30	-21.90	5825	8.08	30	-21.92

EIRP Power Density

EIRP spectral density 802.11a MODE						EIRP spectral density 802.11n HT20 MODE					
Freq. (MHz)	PPSD (dBm)	Ant. Gain (dBi)	EIRP SD (dBm)	Limit (dBm)	Margin (dB)	Freq. (MHz)	PPSD (dBm)	Ant. Gain (dBi)	EIRP SD (dBm)	Limit (dBm)	Margin (dB)
5180	2.91	5.01	7.92	10	-7.09	5180	0.41	5.01	5.42	10	-9.59
5220	2.88	5.01	7.89	10	-7.12	5220	0.82	5.01	5.83	10	-9.18
5240	2.10	5.01	7.11	10	-7.90	5240	0.27	5.01	5.28	10	-9.73

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802.11a_20MHz_5180MHz



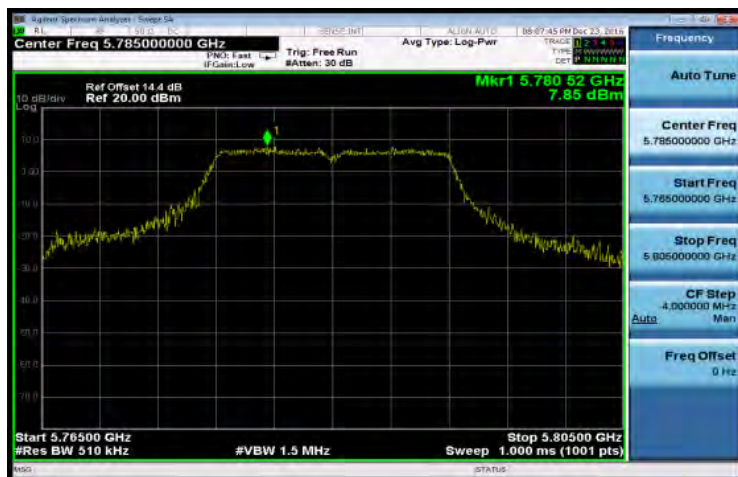
802.11a_20MHz_5745MHz



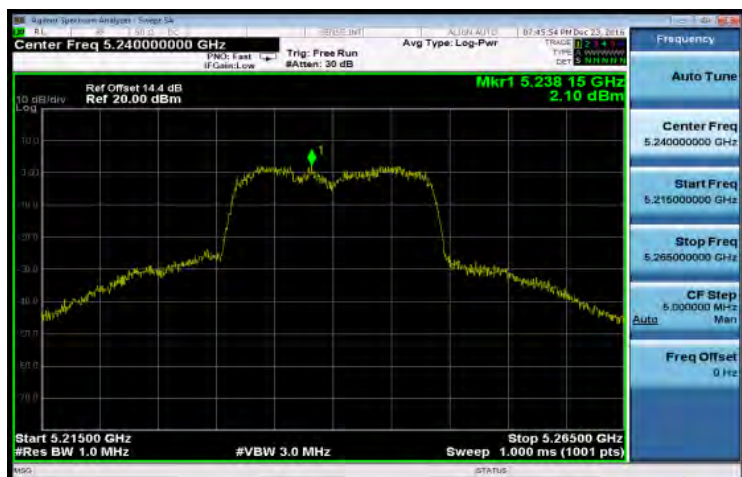
802.11a_20MHz_5220MHz



802.11a_20MHz_5785MHz



802.11a_20MHz_5240MHz



802.11a_20MHz_5825MHz



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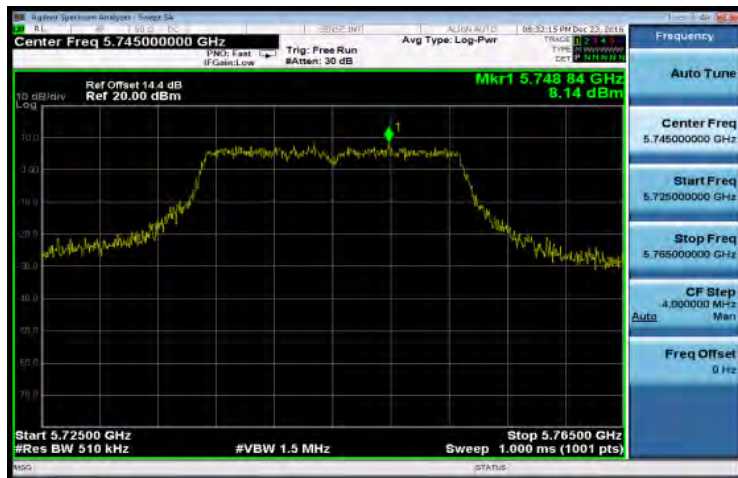
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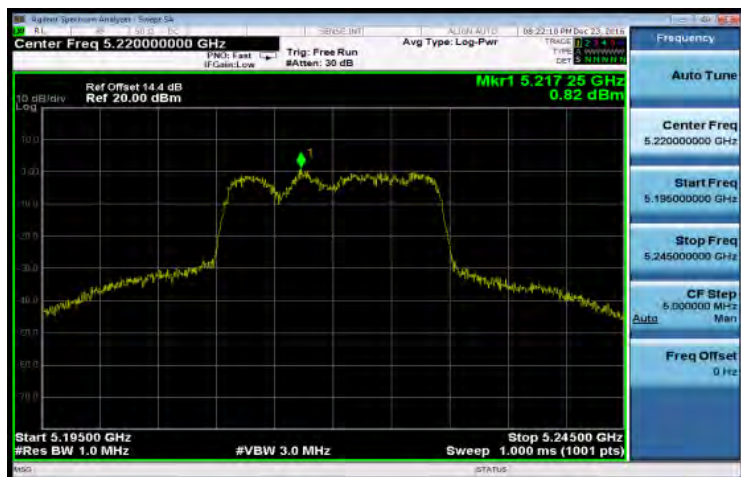
802.11n_20MHz_5180MHz



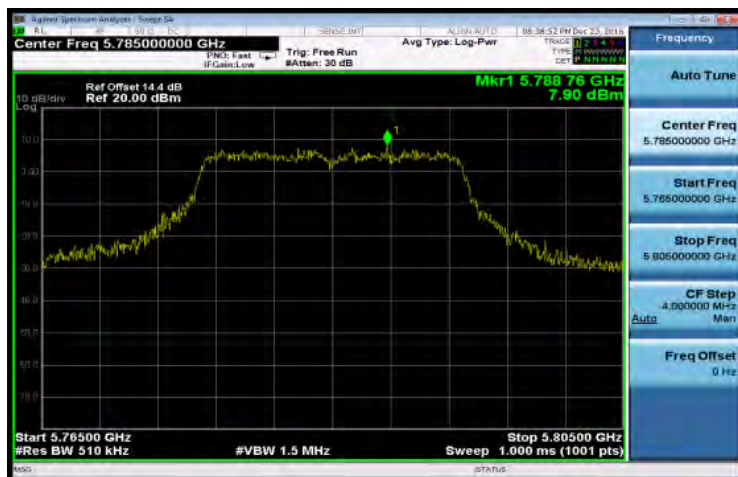
802.11n_20MHz_5745MHz



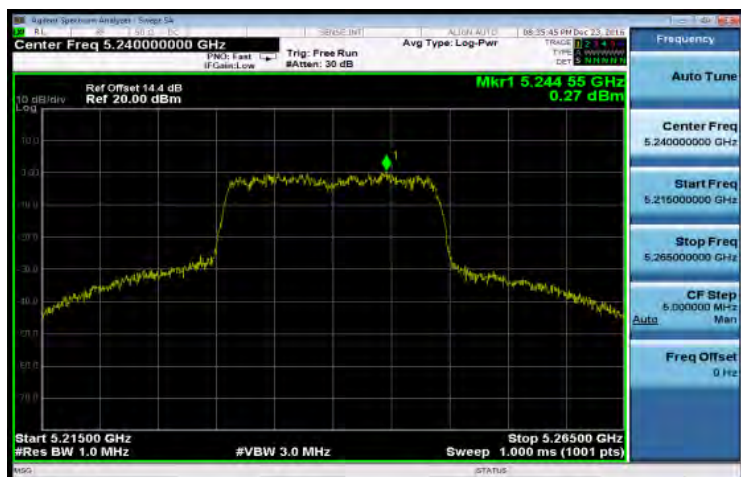
802.11n_20MHz_5220MHz



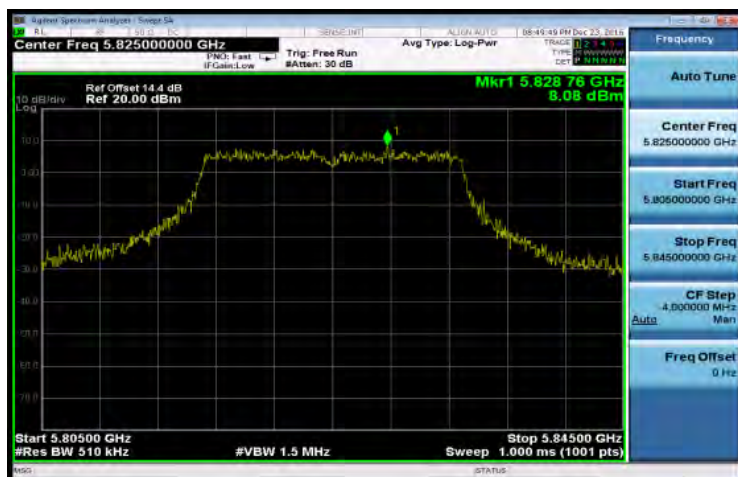
802.11n_20MHz_5785MHz



802.11n_20MHz_5240MHz



802.11n_20MHz_5825MHz



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11 UNDESIRABLE RADIATED EMISSION MEASUREMENT

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
RSS-247 6.2.4 (2)	PK: -27 (dBm/MHz) PK: -17 (dBm/MHz)	PK: 68.3 (dBμV/m) PK: 78.2 (dBμV/m)
*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 (dBμV/m) = 20 log Emission level (dBμV/m)

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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	12/23/2016	12/22/2017
Broadband Antenna	TESEQ	CBL 6112D	35240	11/03/2016	11/02/2017
Horn Antenna	ETS-Lindgren	3117	00143272	12/15/2016	12/16/2017
Horn Antenna	Schwarzbeck	BBHA9170	185	07/24/2016	07/23/2017
Pre Amplifier	EMC Instruments	EMC330	980096	12/12/2016	12/11/2017
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/12/2016	12/11/2017
Pre Amplifier	R&S	SCU-18	10204	12/12/2016	12/11/2017
Pre Amplifier	R&S	SCU-26	100780	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/12/2016	12/11/2017
Attenuator	WOKEN	218FS-10	RF27	12/12/2016	12/11/2017
Site NSA	SGS	966 Chamber C	SAC-C	03/04/2016	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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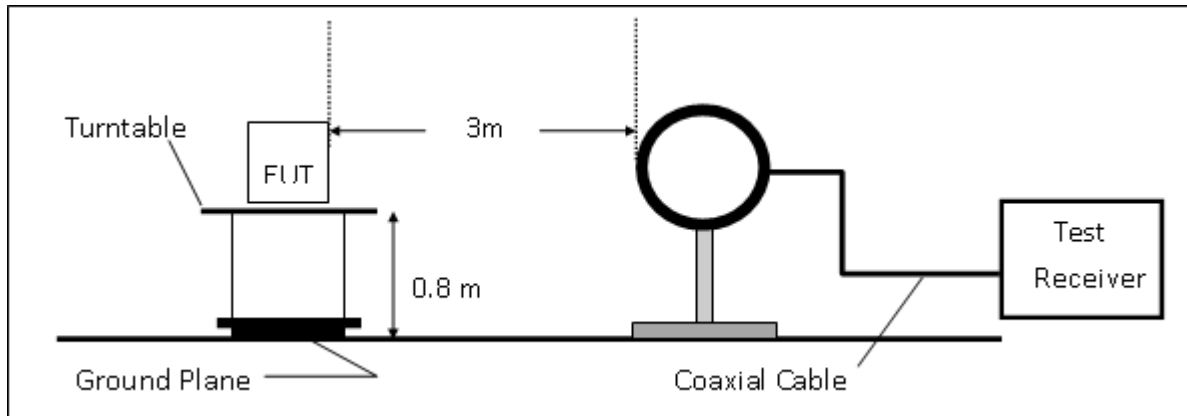
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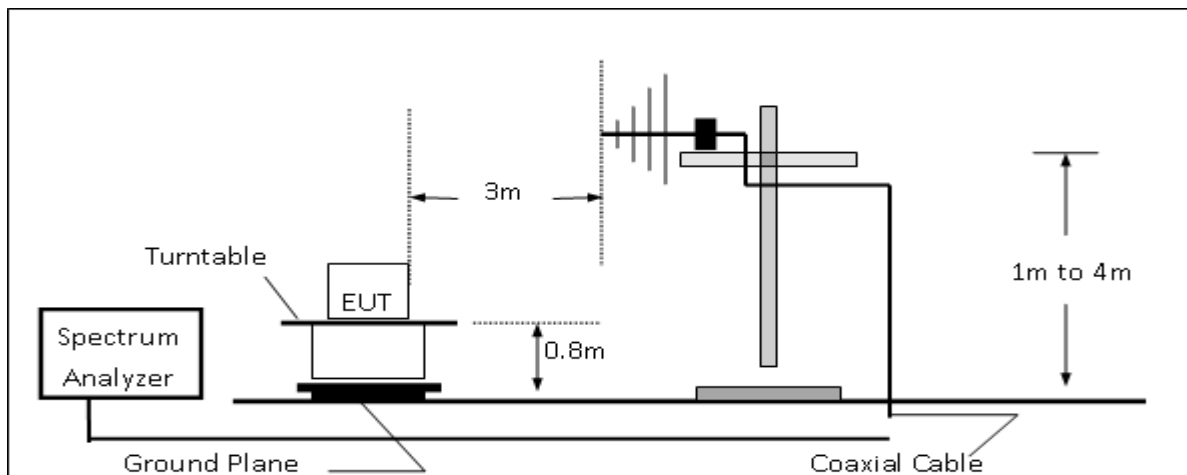
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11.3 Test SET-UP

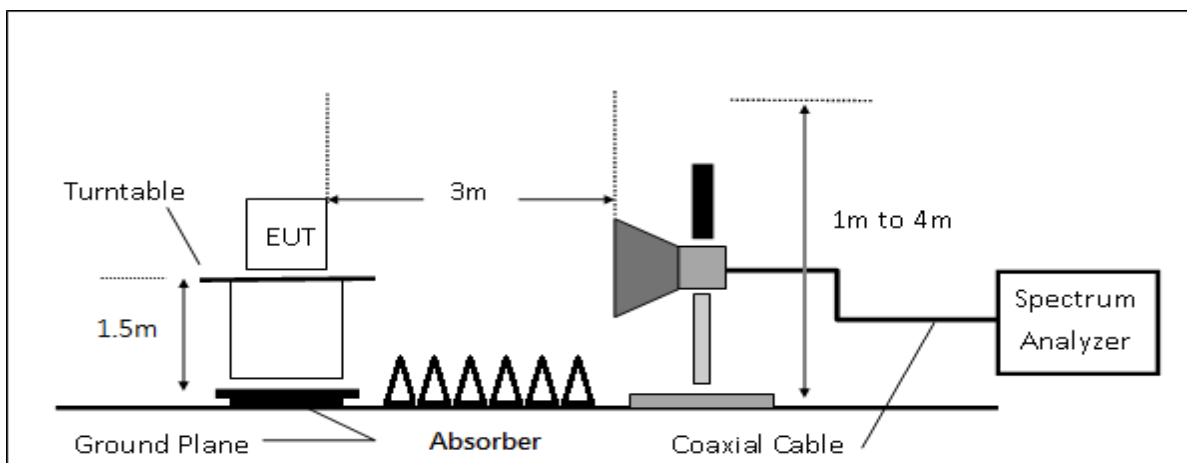
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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

11.5 Field Strength Calculation

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

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

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

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

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

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Note :

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

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

11.6 Test Results of Radiated Spurious Emissions form 9 KHz to 30 MHz

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

11.7 Measurement Result

Refer to attach tabular data sheets.

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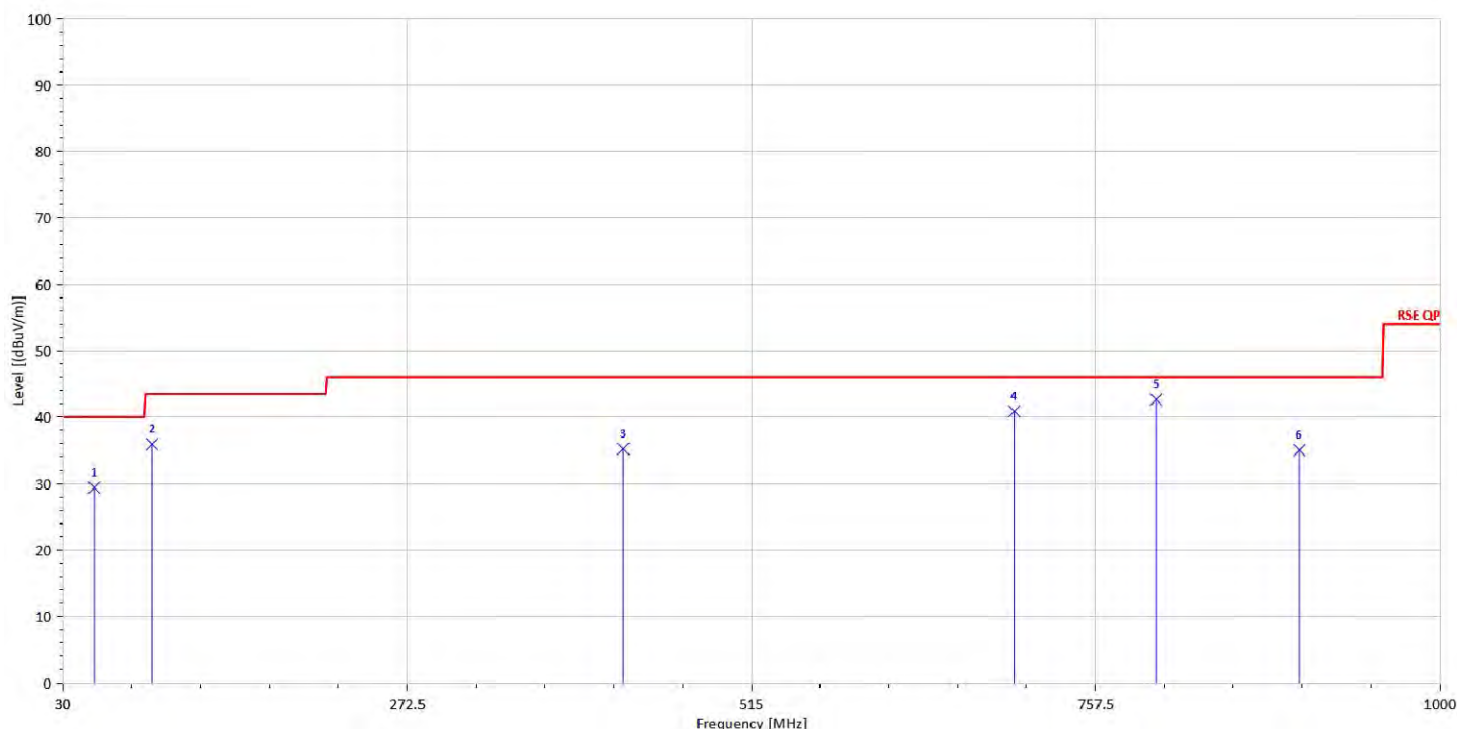
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11.8 Radiated Spurious Emission Measurement Result

Below 1GHz Worst-Case Data:

802.11a 5150~5250 MHz

Operation Mode :	802.11a	Test Date :	2017/1/3
Fundamental Frequency :	5200 MHz	Temp. / Humi. :	23.0deg_C/63RH
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
52.31	S	Peak	49.58	-20.18	29.40	40	-10.60
93.05	S	Peak	54.88	-18.95	35.92	43.5	-7.58
424.79	S	Peak	44.32	-9.10	35.22	46	-10.78
700.27	S	Peak	46.08	-5.20	40.88	46	-5.12
800.18	S	Peak	46.21	-3.56	42.65	46	-3.35
901.06	S	Peak	37.13	-2.09	35.04	46	-10.96

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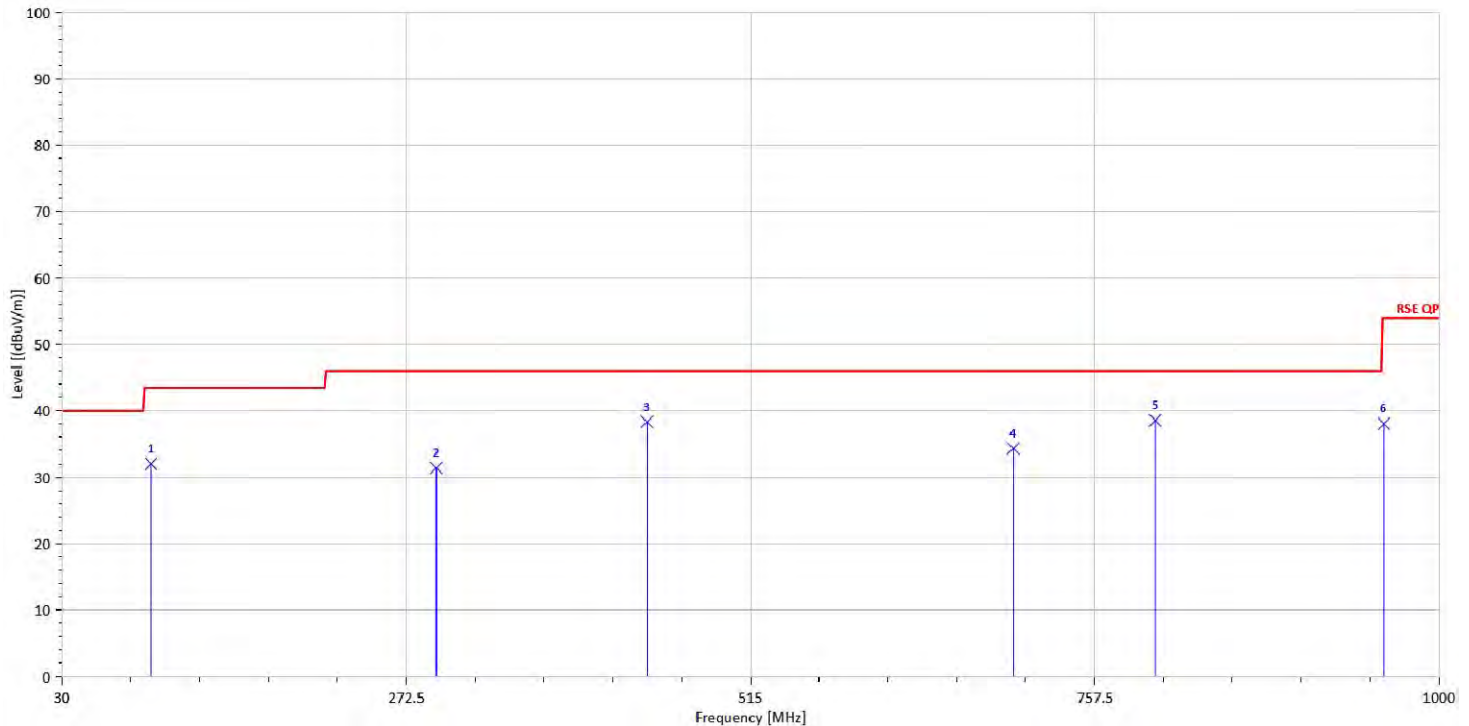
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Operation Mode : 802.11a Test Date : 2017/1/3
 Fundamental Frequency : 5200 MHz Temp. / Humi. : 23.0deg_C/63RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



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
93.05	S	Peak	50.97	-18.95	32.02	43.5	-11.48
293.84	S	Peak	44.63	-13.23	31.40	46	-14.60
442.25	S	Peak	47.83	-9.47	38.35	46	-7.65
700.27	S	Peak	39.53	-5.20	34.33	46	-11.67
800.18	S	Peak	42.13	-3.56	38.57	46	-7.43
961.20	S	Peak	40.33	-2.27	38.06	54	-15.94

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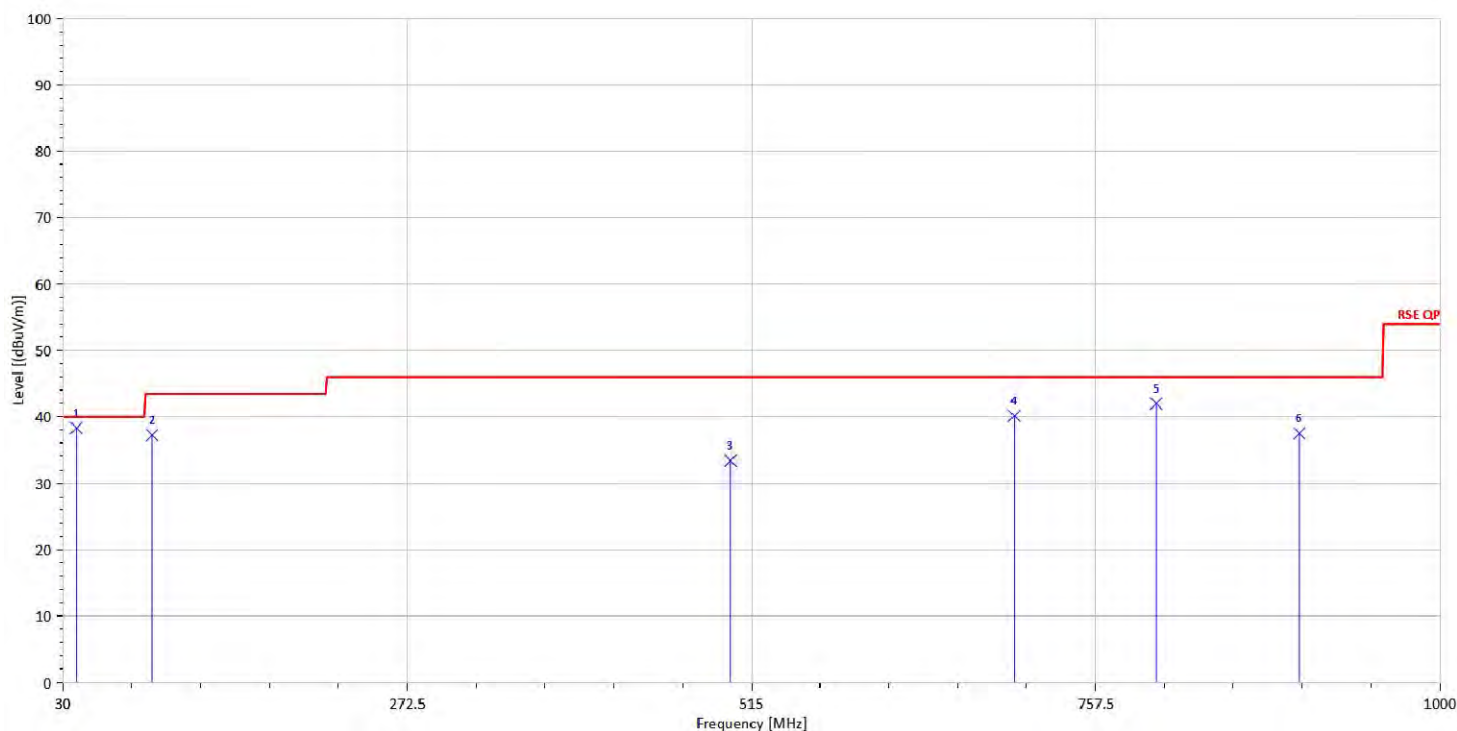
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802.11a, 5725~5850 MHz

Operation Mode : 802.11a Test Date : 2017/1/3
Fundamental Frequency : 5785 MHz Temp. / Humi. : 23.0deg_C/63RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



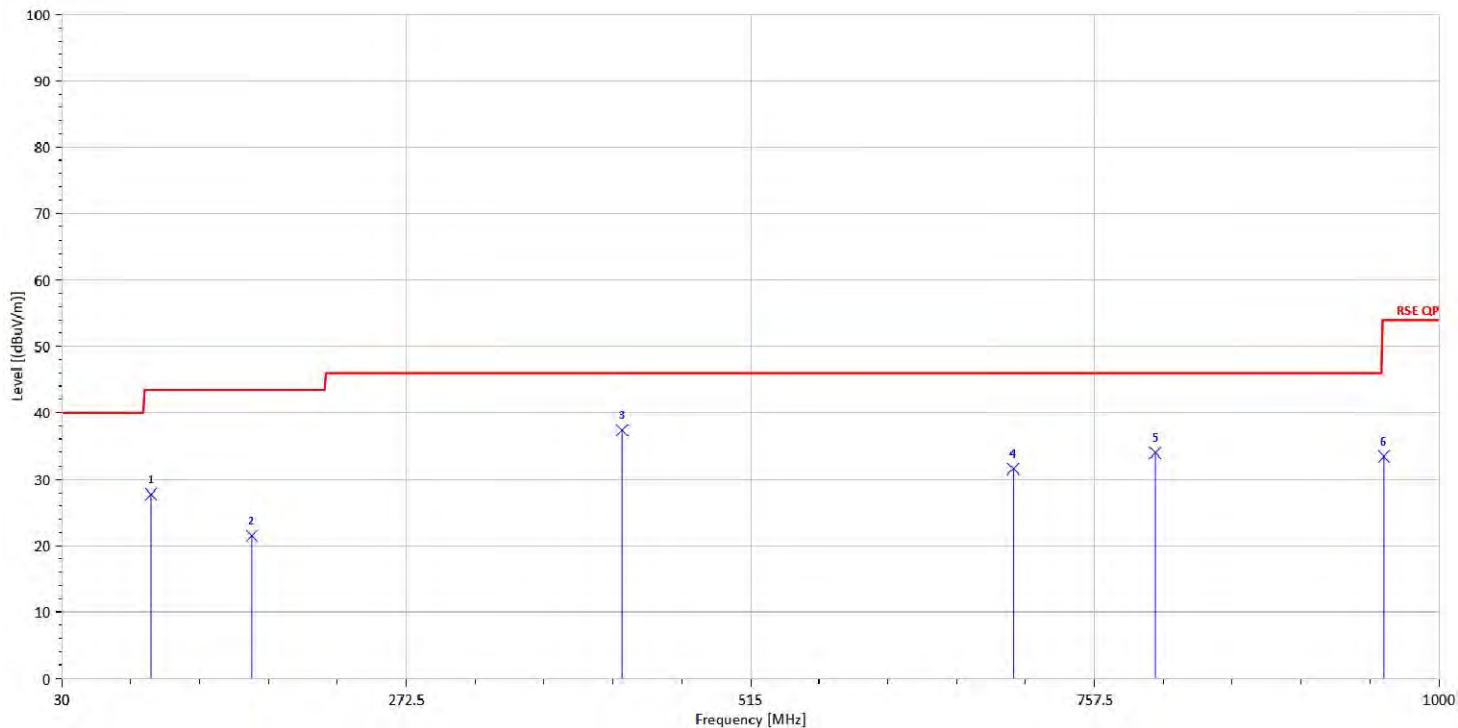
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
39.70	S	Peak	50.95	-12.63	38.32	40	-1.68
93.05	S	Peak	56.20	-18.95	37.24	43.5	-6.26
500.45	S	Peak	40.93	-7.53	33.40	46	-12.60
700.27	S	Peak	45.36	-5.20	40.16	46	-5.84
800.18	S	Peak	45.56	-3.56	42.01	46	-3.99
901.06	S	Peak	39.60	-2.09	37.51	46	-8.49

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Operation Mode : 802.11a Test Date : 2017/1/3
 Fundamental Frequency : 5785 MHz Temp. / Humi. : 23.0deg_C/63RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
93.05	S	Peak	46.68	-18.95	27.73	43.5	-15.77
163.86	S	Peak	39.10	-17.61	21.49	43.5	-22.01
424.79	S	Peak	46.47	-9.10	37.37	46	-8.63
700.27	S	Peak	36.77	-5.20	31.57	46	-14.43
800.18	S	Peak	37.54	-3.56	33.98	46	-12.02
961.20	S	Peak	35.70	-2.27	33.43	54	-20.57

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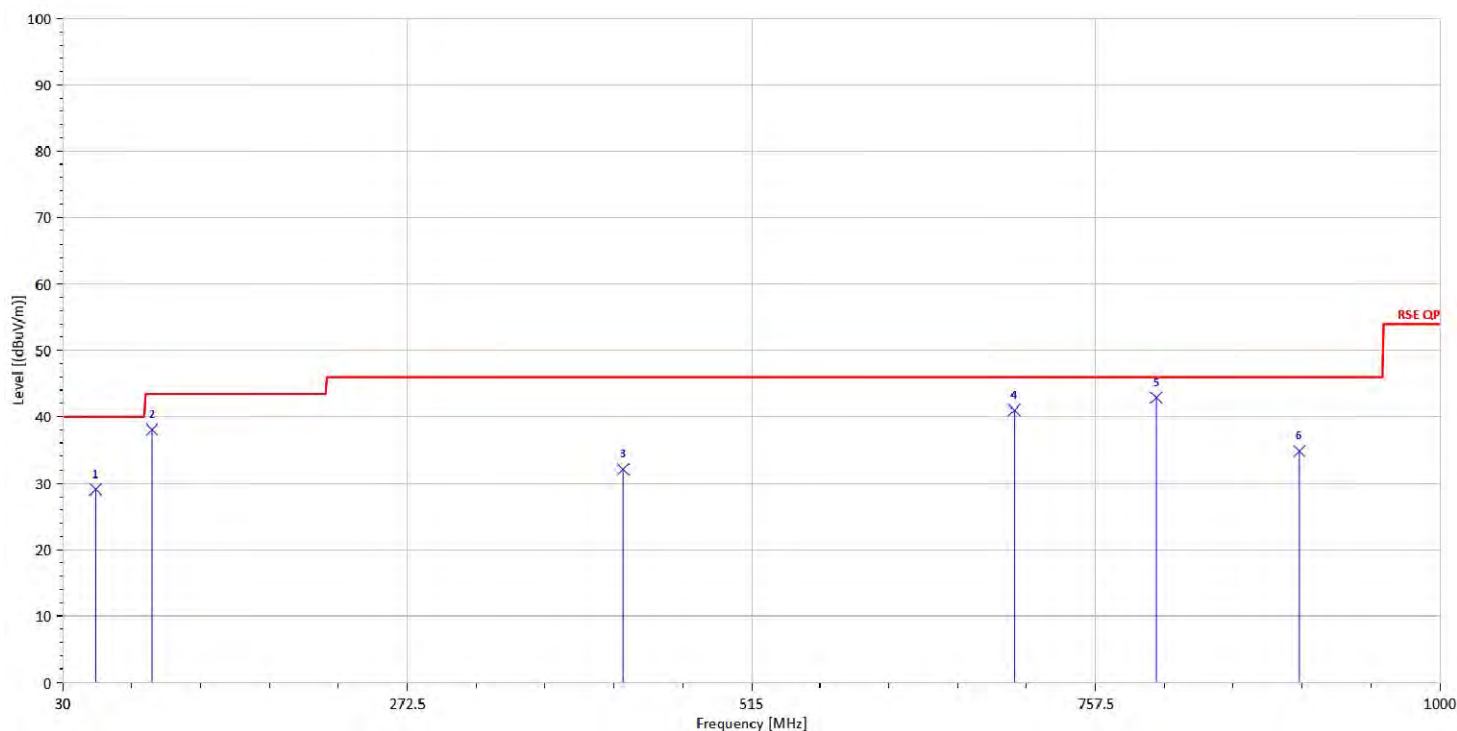
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802.11ac VHT80, 5150~5250 MHz

Operation Mode :	802.11n20	Test Date :	2017/1/3
Fundamental Frequency :	5200 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



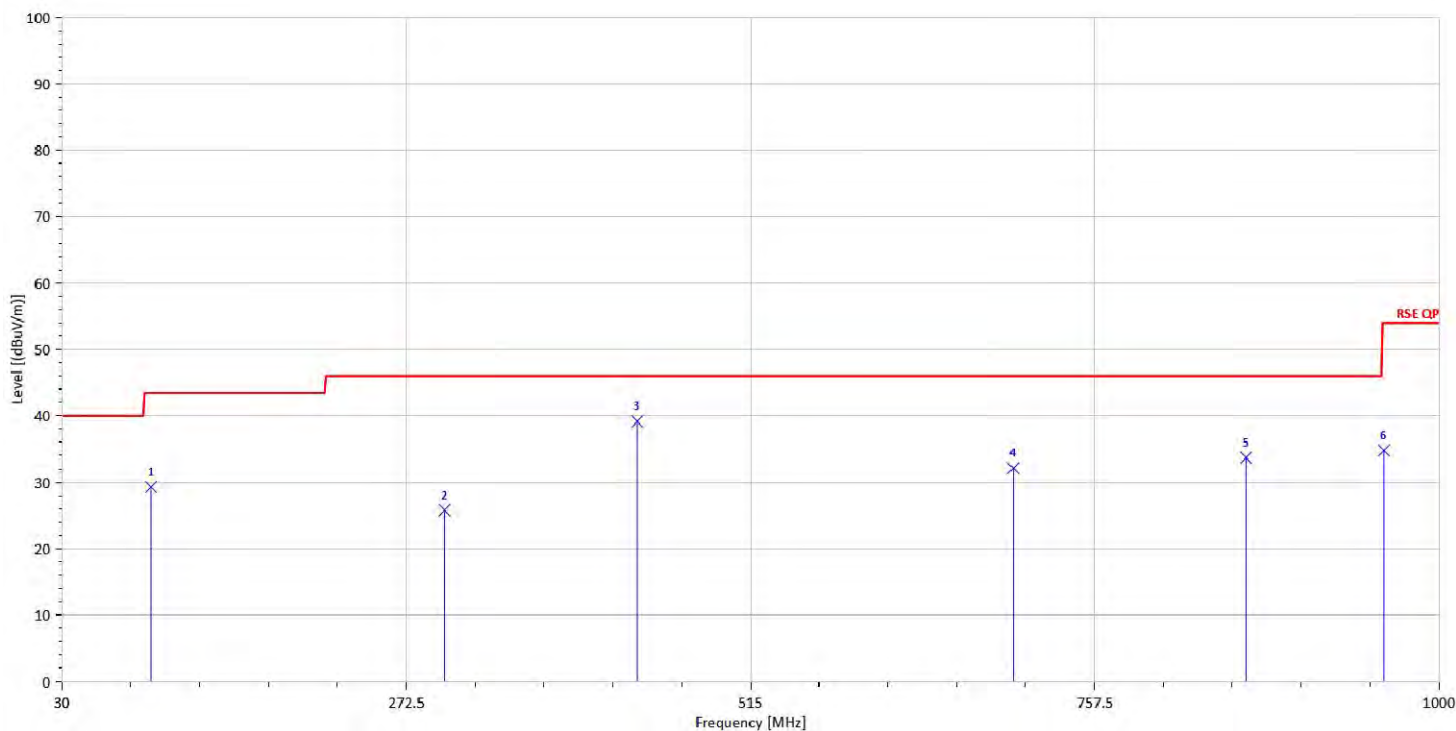
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
53.28	S	Peak	49.61	-20.53	29.08	40	-10.92
93.05	S	Peak	57.05	-18.95	38.10	43.5	-5.40
424.79	S	Peak	41.19	-9.10	32.10	46	-13.90
700.27	S	Peak	46.21	-5.20	41.01	46	-4.99
800.18	S	Peak	46.47	-3.56	42.91	46	-3.09
901.06	S	Peak	36.93	-2.09	34.84	46	-11.16

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Operation Mode : 802.11n20 Test Date : 2017/1/3
 Fundamental Frequency : 5200 MHz Temp. / Humi. : 23.0deg_C/63RH
 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
93.05	S	Peak	48.22	-18.95	29.27	43.5	-14.23
299.66	S	Peak	38.91	-13.11	25.80	46	-20.20
435.46	S	Peak	48.36	-9.20	39.16	46	-6.84
700.27	S	Peak	37.31	-5.20	32.11	46	-13.89
864.20	S	Peak	36.40	-2.70	33.70	46	-12.30
961.20	S	Peak	37.06	-2.27	34.79	54	-19.21

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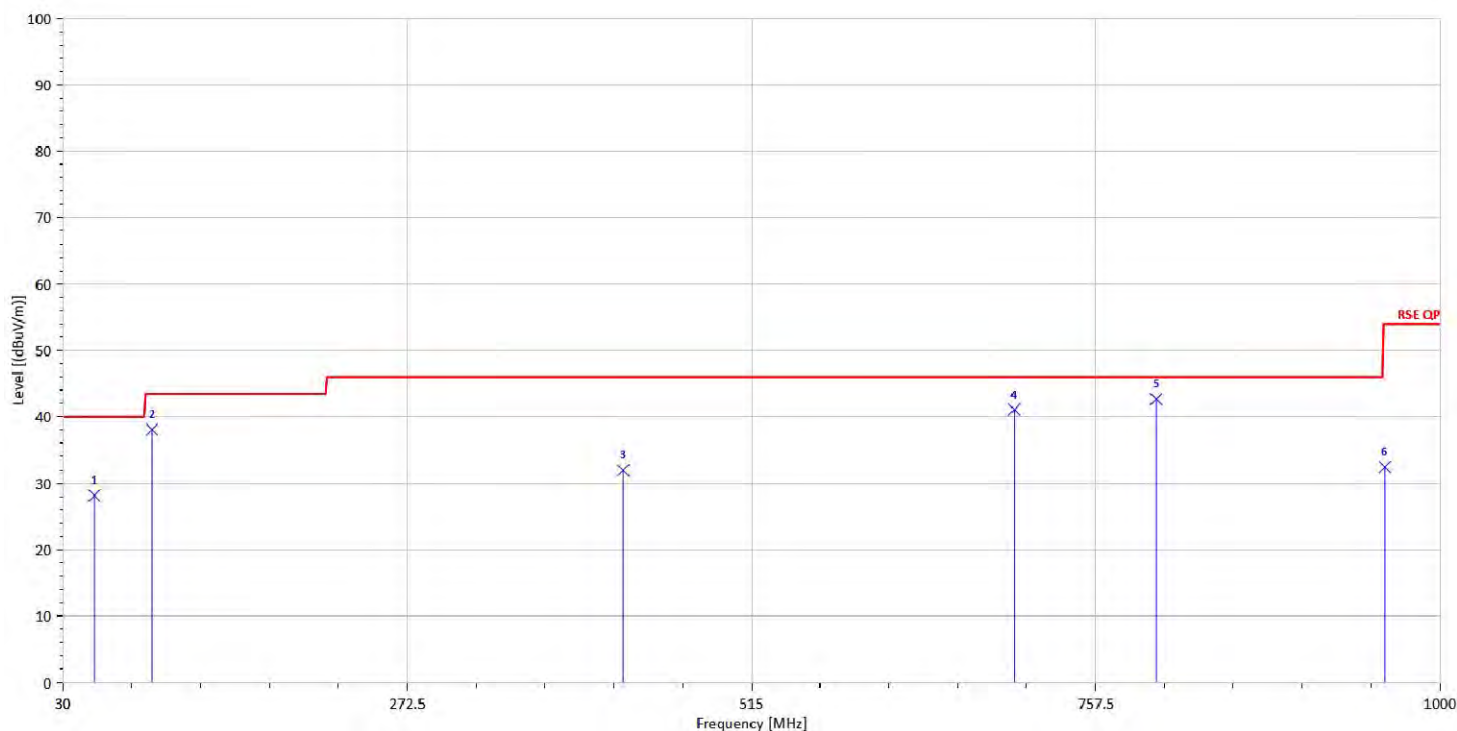
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802.11ac VHT80, 5725~5850 MHz

Operation Mode :	802.11n20	Test Date :	2017/1/3
Fundamental Frequency :	5785 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



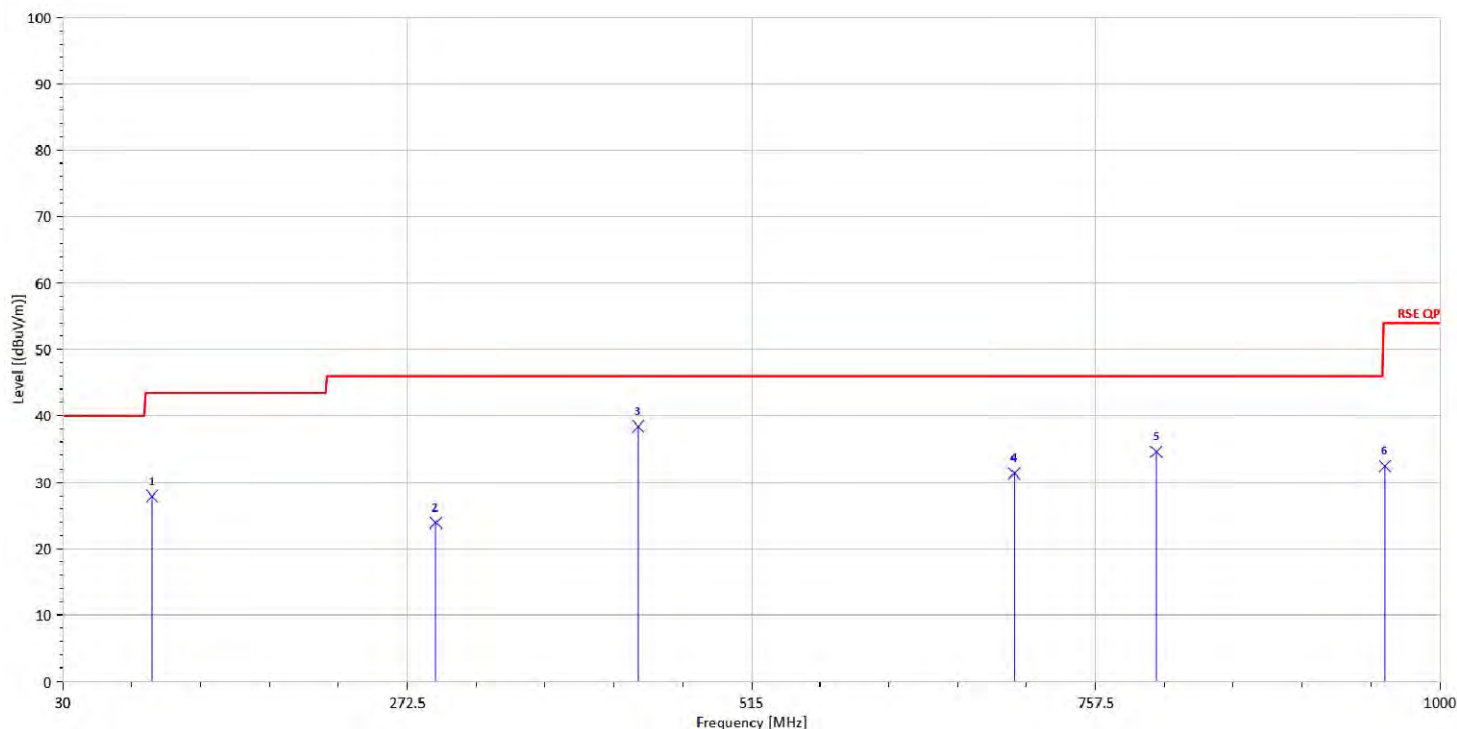
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
52.31	S	Peak	48.33	-20.18	28.16	40	-11.84
93.05	S	Peak	57.05	-18.95	38.10	43.5	-5.40
424.79	S	Peak	41.04	-9.10	31.94	46	-14.06
700.27	S	Peak	46.31	-5.20	41.11	46	-4.89
800.18	S	Peak	46.22	-3.56	42.67	46	-3.33
961.20	S	Peak	34.72	-2.27	32.45	54	-21.55

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Operation Mode : 802.11n20 Test Date : 2017/1/3
Fundamental Frequency : 5785 MHz Temp. / Humi. : 23.0deg_C/63RH
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
93.05	S	Peak	46.87	-18.95	27.91	43.5	-15.59
292.87	S	Peak	37.14	-13.23	23.91	46	-22.09
435.46	S	Peak	47.61	-9.20	38.42	46	-7.58
700.27	S	Peak	36.53	-5.20	31.34	46	-14.66
800.18	S	Peak	38.13	-3.56	34.58	46	-11.42
961.20	S	Peak	34.72	-2.27	32.45	54	-21.55

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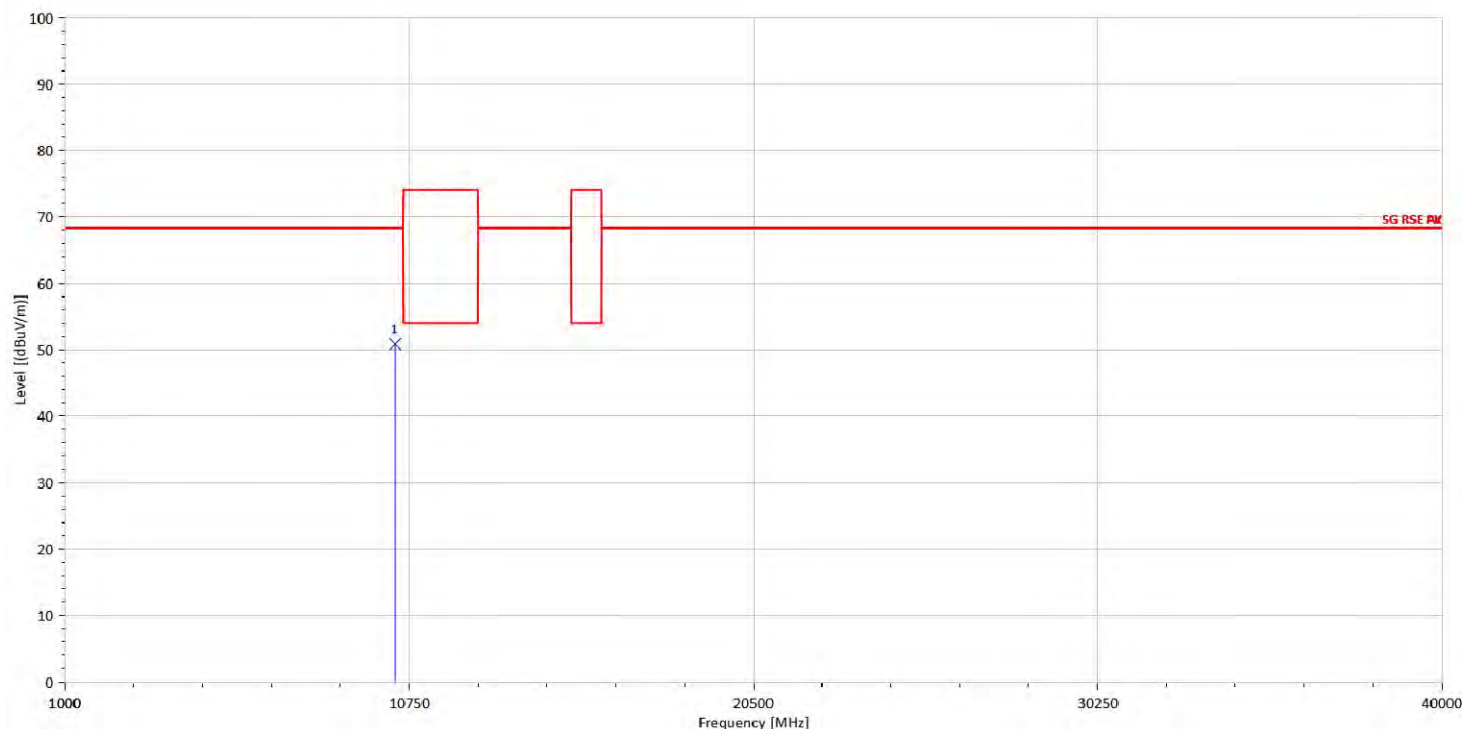
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11.9 Above 1GHz Worst-Case Data:

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

Operation Mode :	802.11a	Test Date :	2017/1/3
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



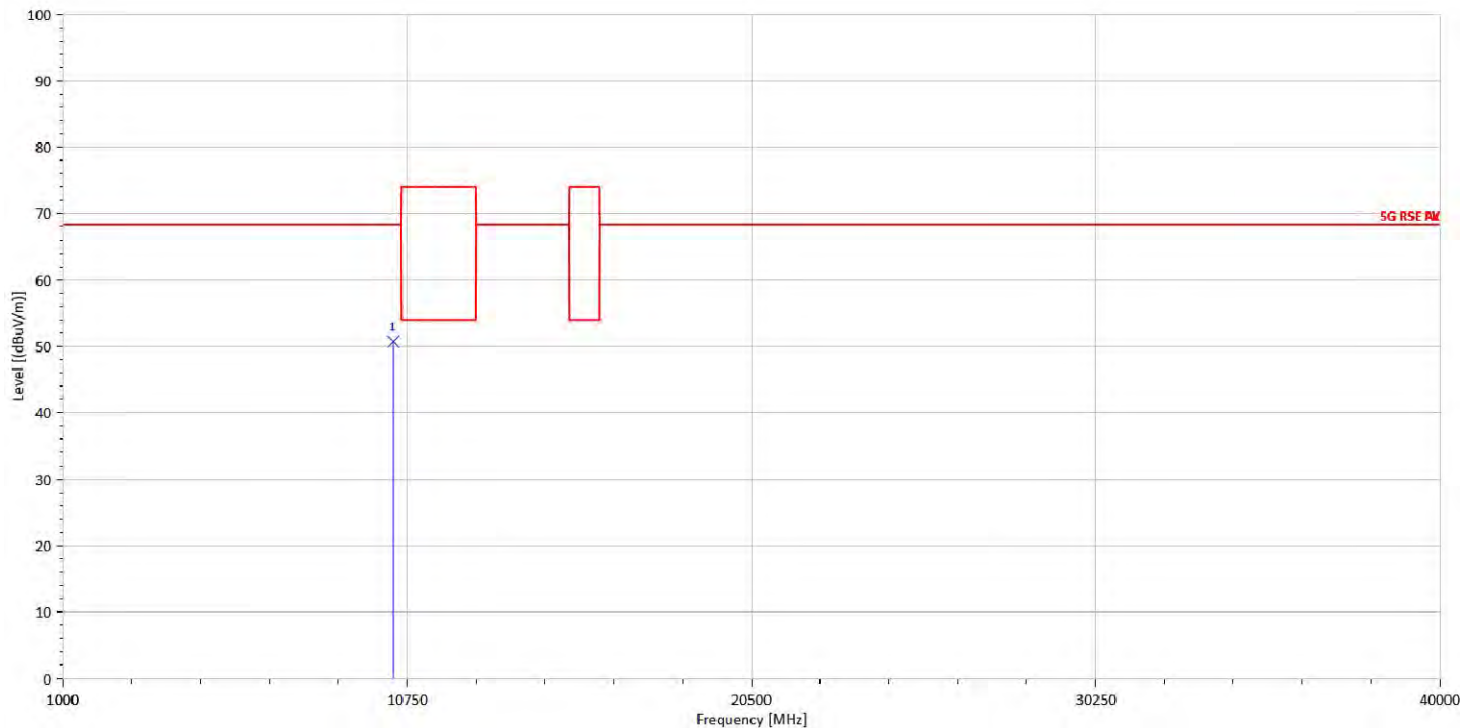
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10360.00	H	Peak	30.68	20.18	50.86	68.3	-17.44

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Operation Mode : 802.11a Test Date : 2017/1/3
Fundamental Frequency : 5180 MHz Temp. / Humi. : 23.0deg_C/63RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



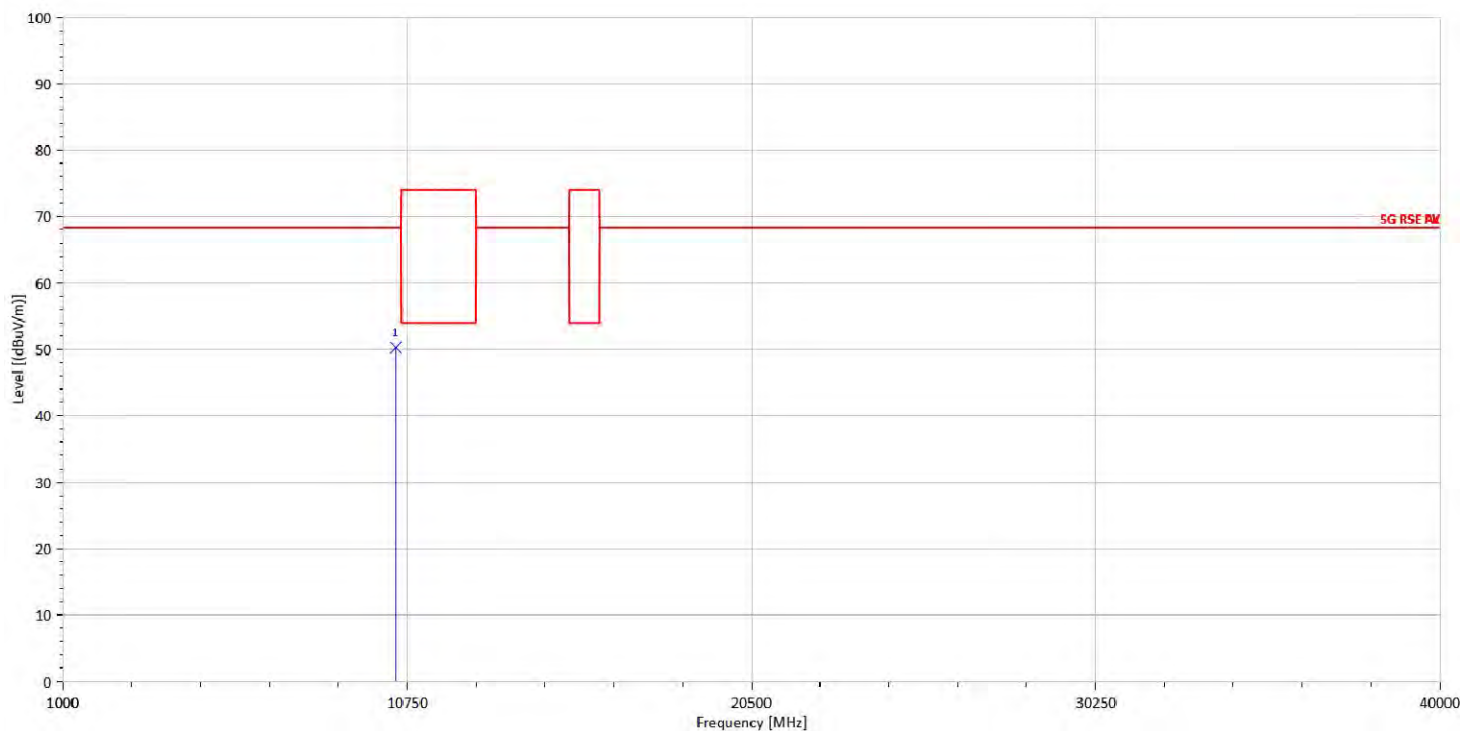
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10360.00	H	Peak	30.57	20.18	50.74	68.3	-17.56

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Operation Mode : 802.11a Test Date : 2017/1/3
 Fundamental Frequency : 5220 MHz Temp. / Humi. : 23.0deg_C/63RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



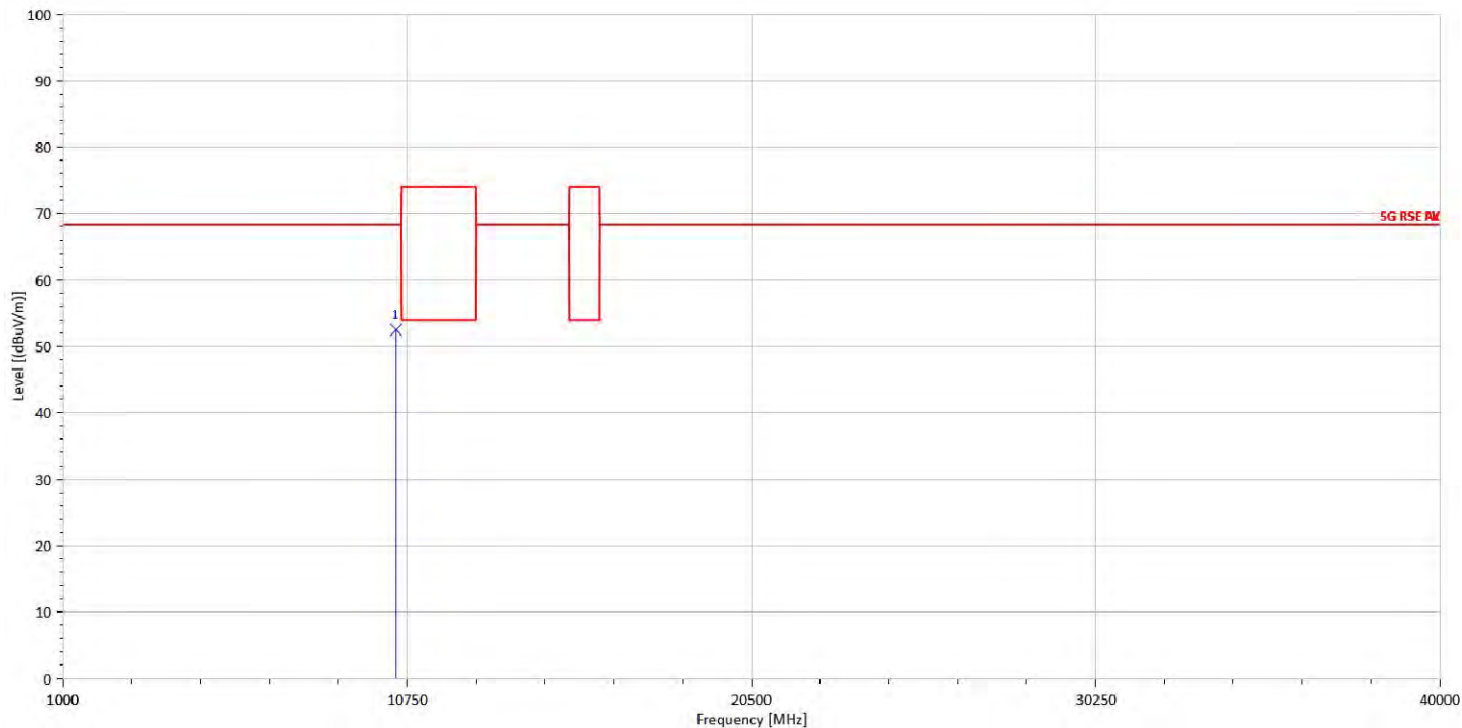
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10440.00	H	Peak	29.99	20.29	50.28	68.3	-18.02

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Operation Mode : 802.11a Test Date : 2017/1/3
Fundamental Frequency : 5220 MHz Temp. / Humi. : 23.0deg_C/63RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



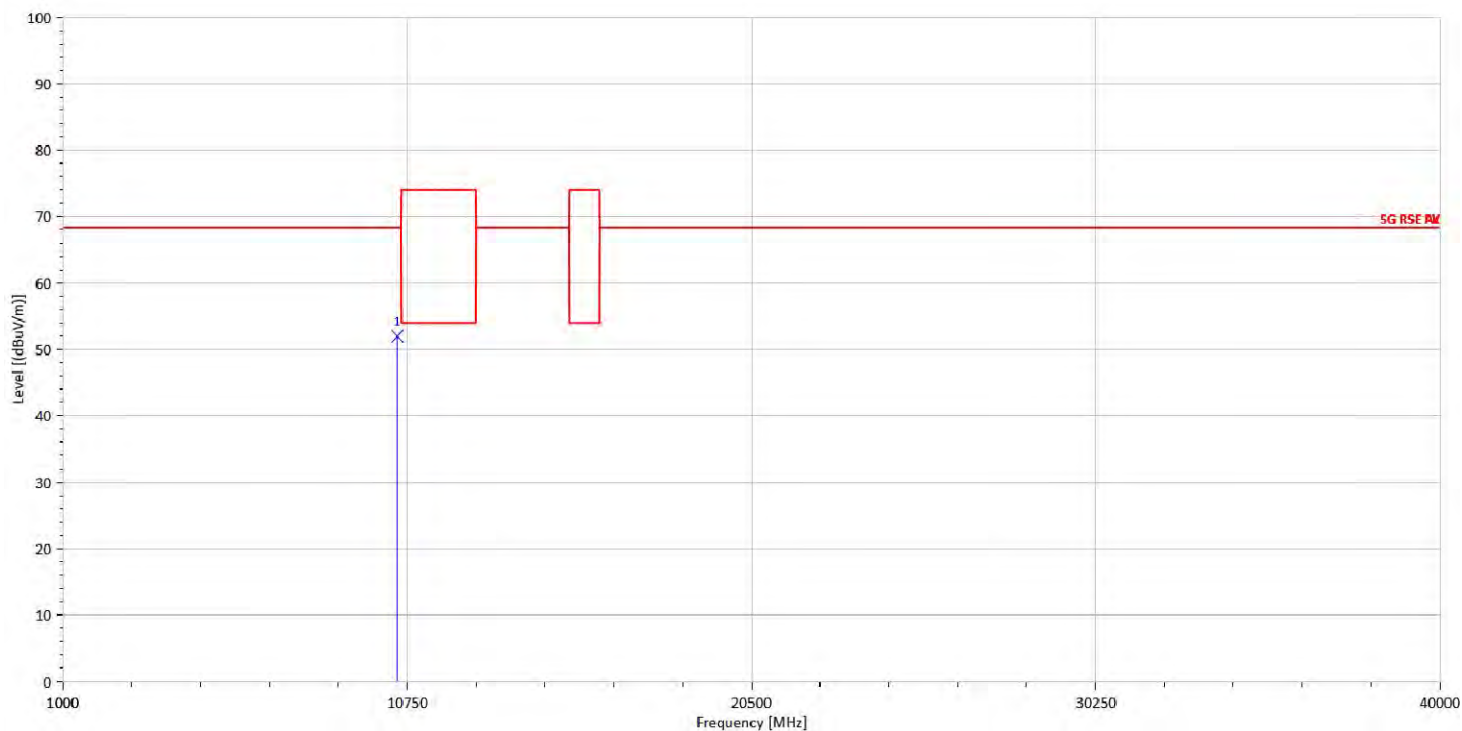
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10440.00	H	Peak	32.20	20.29	52.49	68.3	-15.81

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Operation Mode :	802.11a	Test Date :	2017/1/3
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



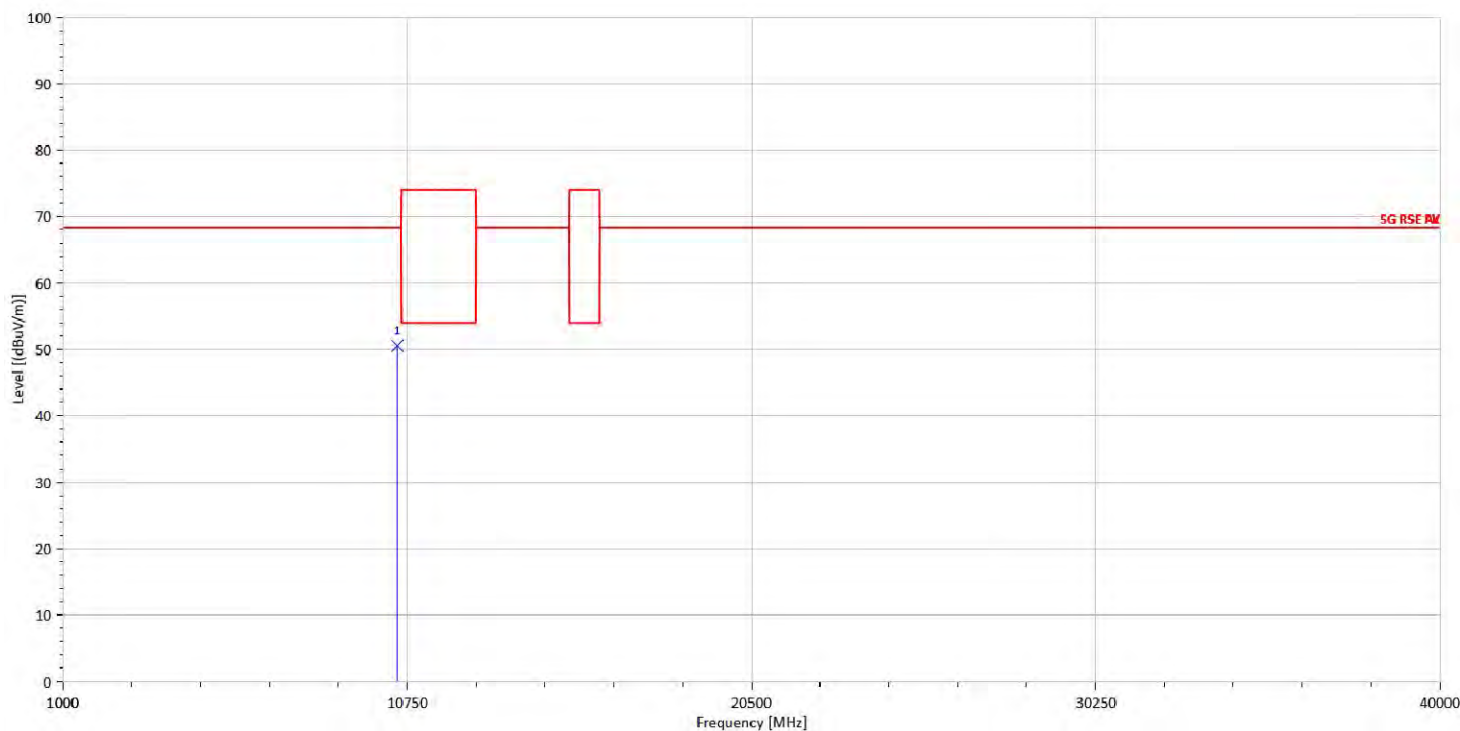
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10480.00	H	Peak	31.30	20.68	51.97	68.3	-16.33

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Operation Mode :	802.11a	Test Date :	2017/1/3
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10480.00	H	Peak	29.88	20.68	50.56	68.3	-17.74

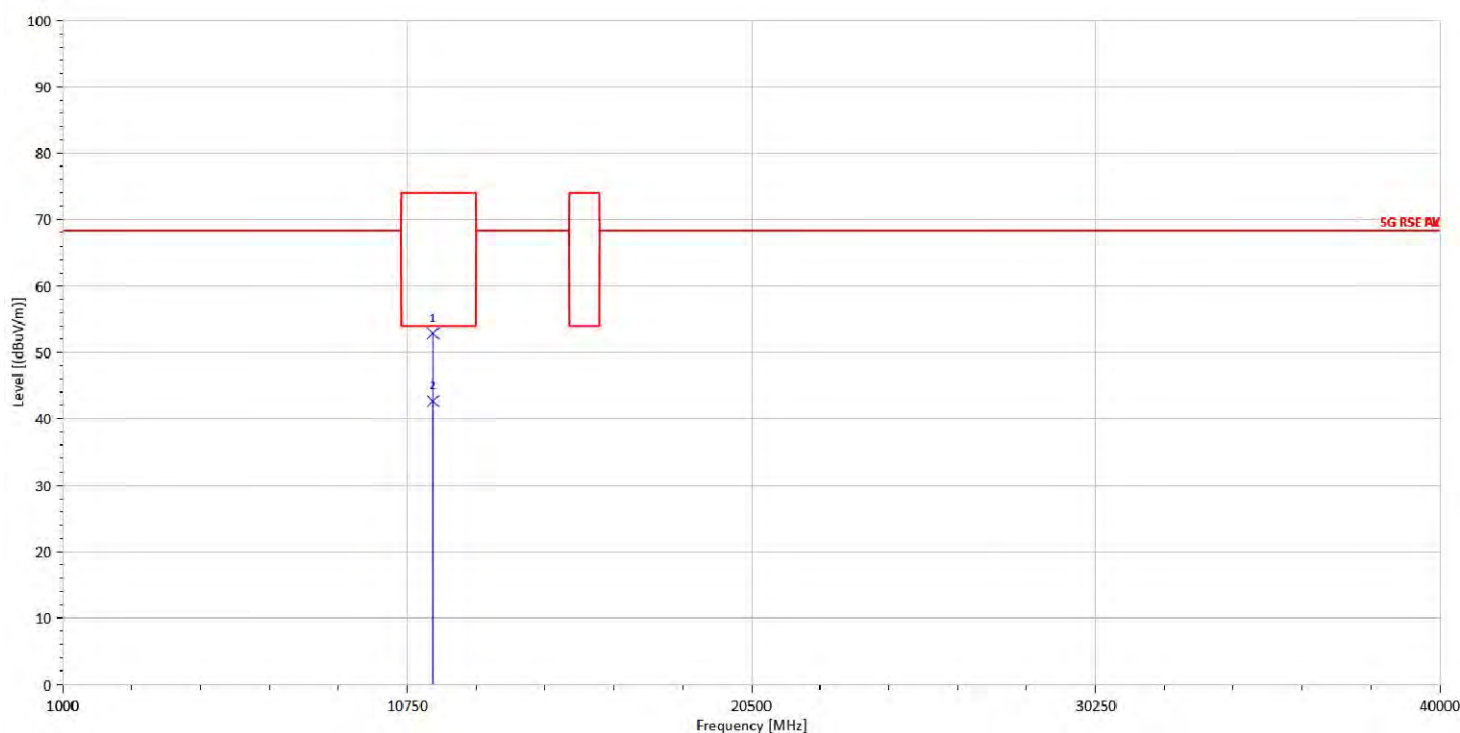
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Radiated Spurious Emission Measurement Result 802.11a, 5725~5850 MHz

Operation Mode :	802.11a	Test Date :	2017/1/3
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	dB
		PK/QP/AV	dBuV		dBuV/m	dBuV/m	
11490.00	H	Peak	32.17	20.70	52.87	74	-21.13
11490.00	H	Average	21.97	20.70	42.67	54	-11.33

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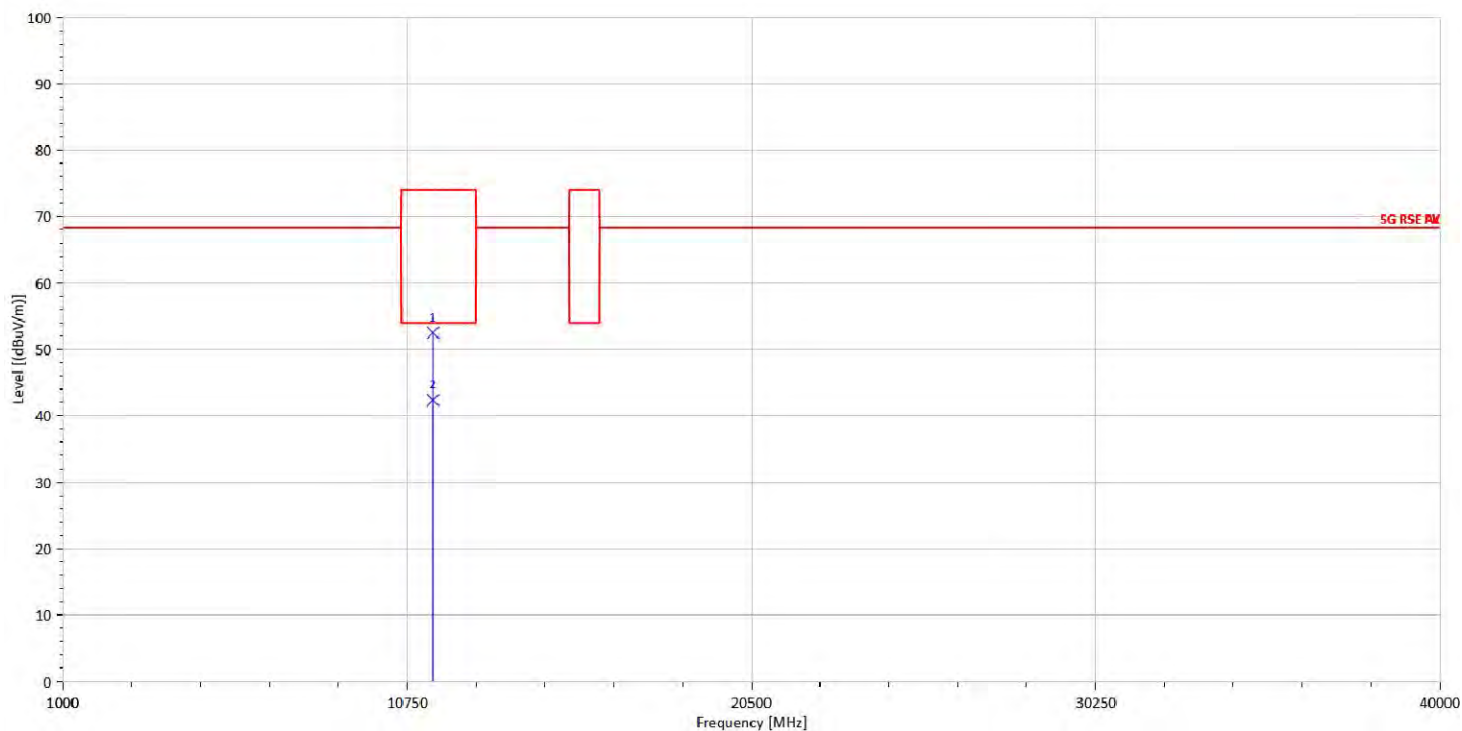
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Operation Mode : 802.11a Test Date : 2017/1/3
Fundamental Frequency : 5745 MHz Temp. / Humi. : 23.0deg_C/63RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



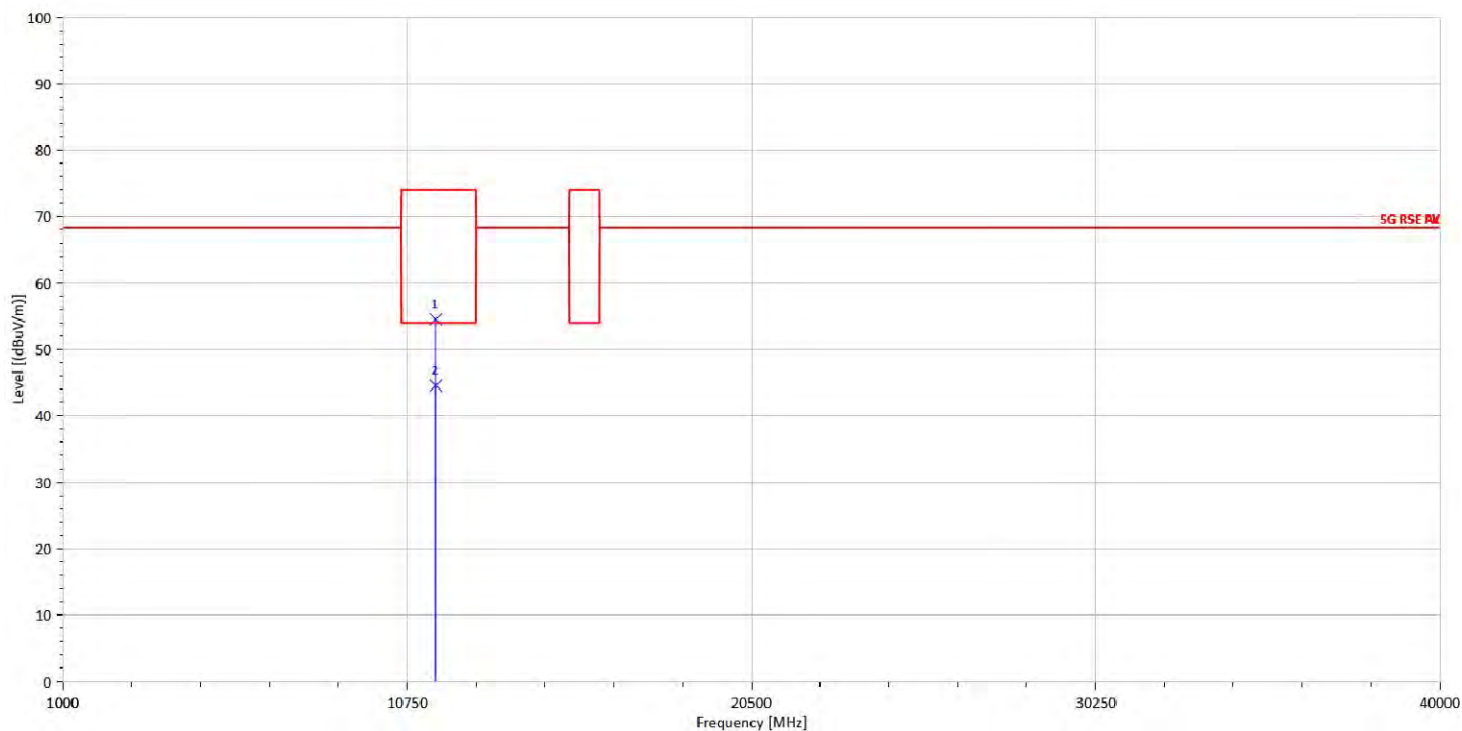
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11490.00	H	Peak	31.81	20.70	52.51	74	-21.49
11490.00	H	Average	21.66	20.70	42.36	54	-11.64

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Operation Mode : 802.11a Test Date : 2017/1/3
 Fundamental Frequency : 5785 MHz Temp. / Humi. : 23.0deg_C/63RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



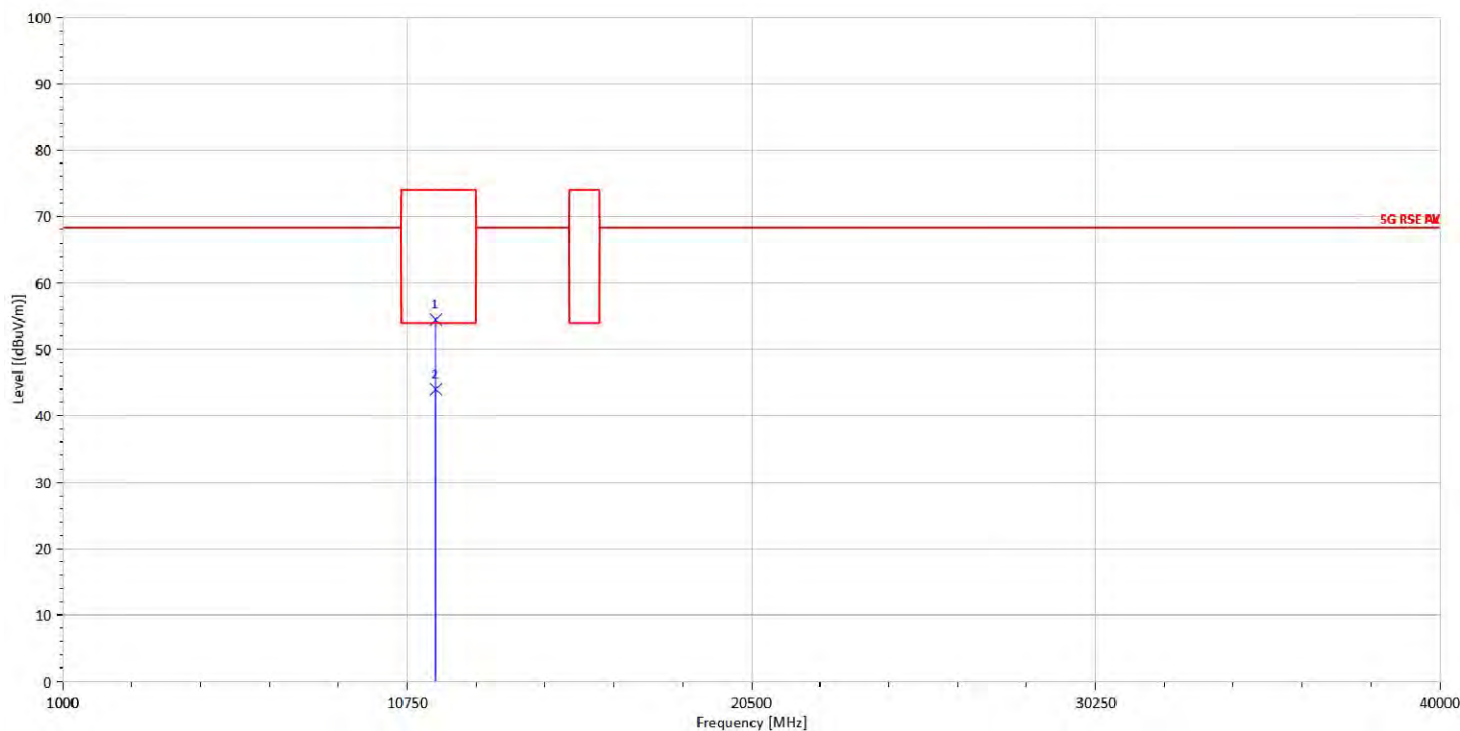
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11570.00	H	Peak	33.10	21.44	54.55	74	-19.45
11570.00	H	Average	23.11	21.44	44.55	54	-9.45

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Operation Mode : 802.11a Test Date : 2017/1/3
Fundamental Frequency : 5785 MHz Temp. / Humi. : 23.0deg_C/63RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



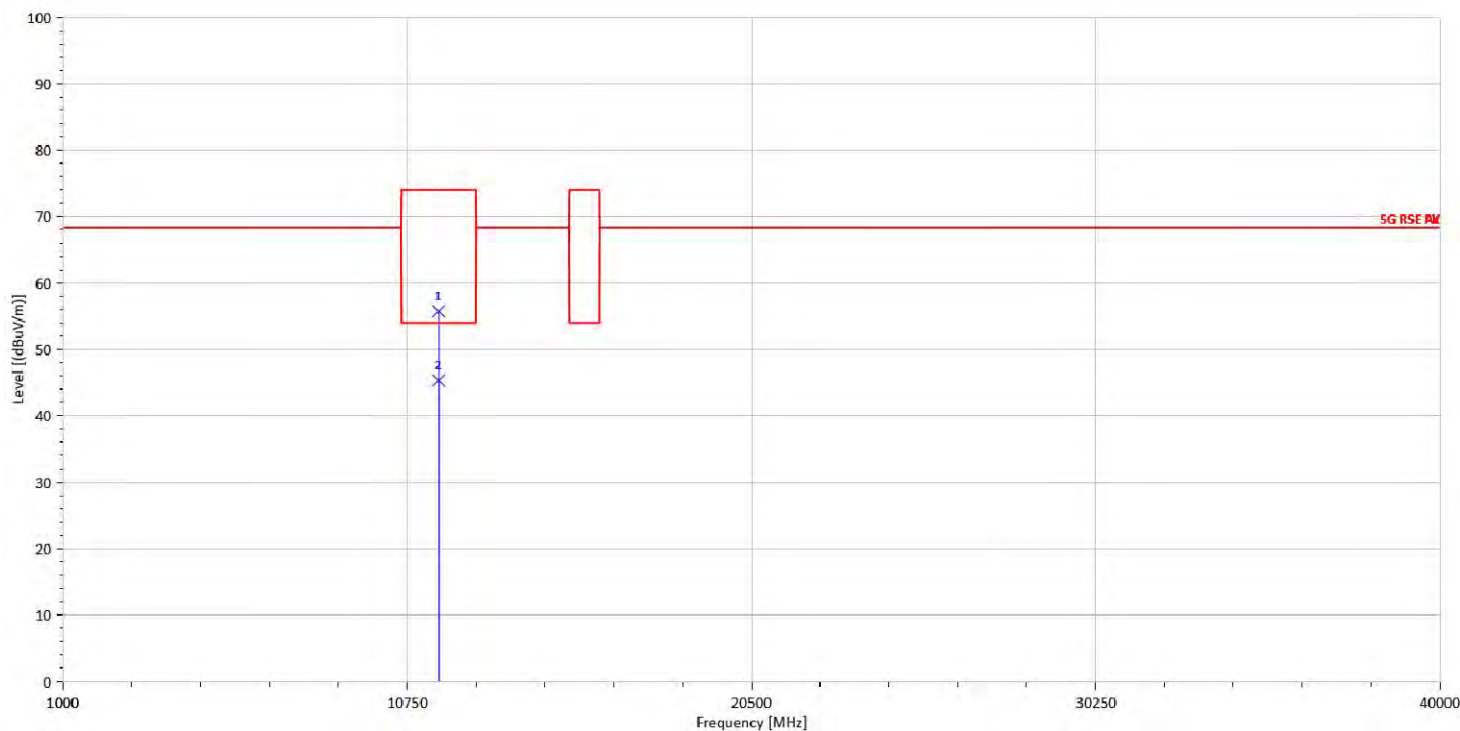
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11570.00	H	Peak	33.03	21.44	54.48	74	-19.52
11570.00	H	Average	22.56	21.44	44.00	54	-10.00

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Operation Mode :	802.11a	Test Date :	2017/1/3
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
11650.00	H	Peak	33.72	22.02	55.74	74	-18.26
11650.00	H	Average	23.30	22.02	45.32	54	-8.68

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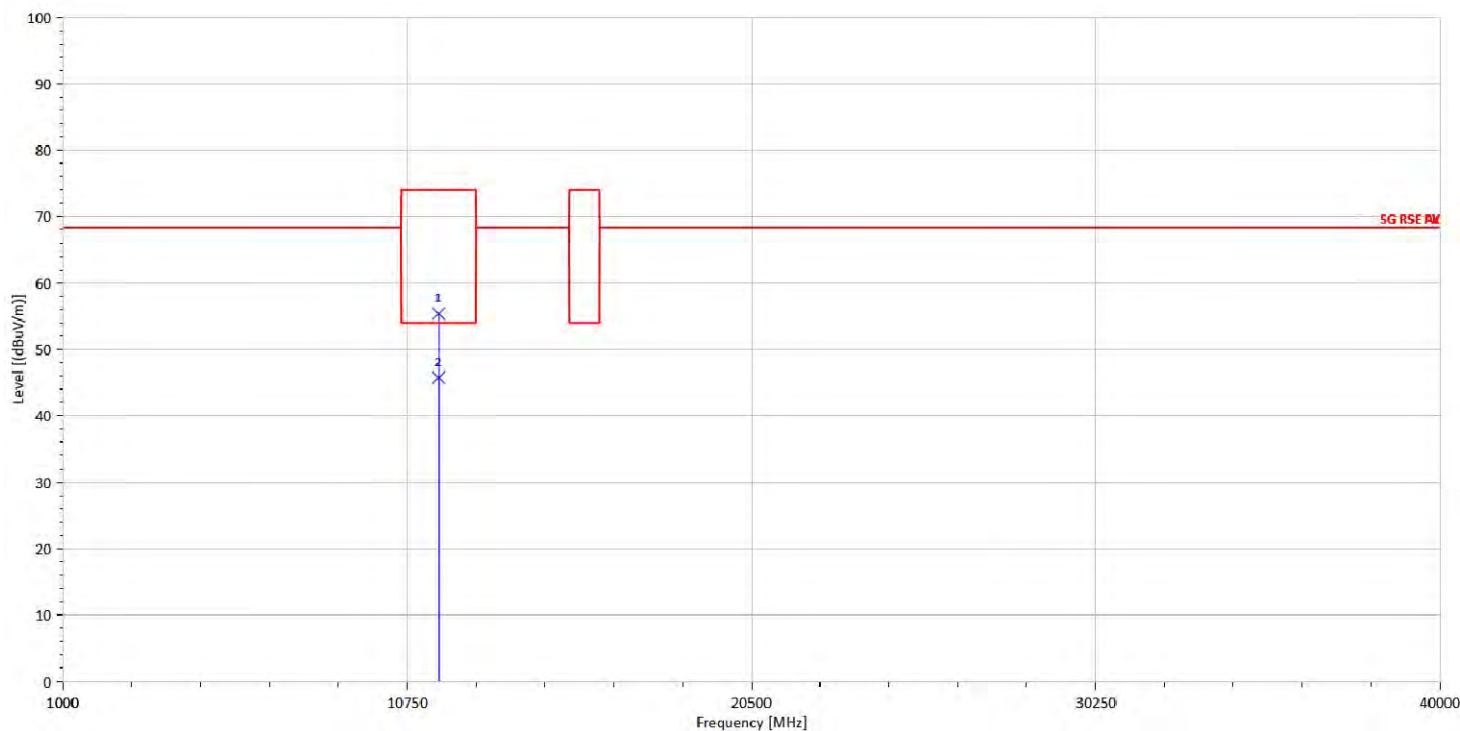
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Operation Mode : 802.11a Test Date : 2017/1/3
Fundamental Frequency : 5825 MHz Temp. / Humi. : 23.0deg_C/63RH
Operation Band : Tx CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



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
11650.00	H	Peak	33.35	22.02	55.37	74	-18.63
11650.00	H	Average	23.73	22.02	45.75	54	-8.25

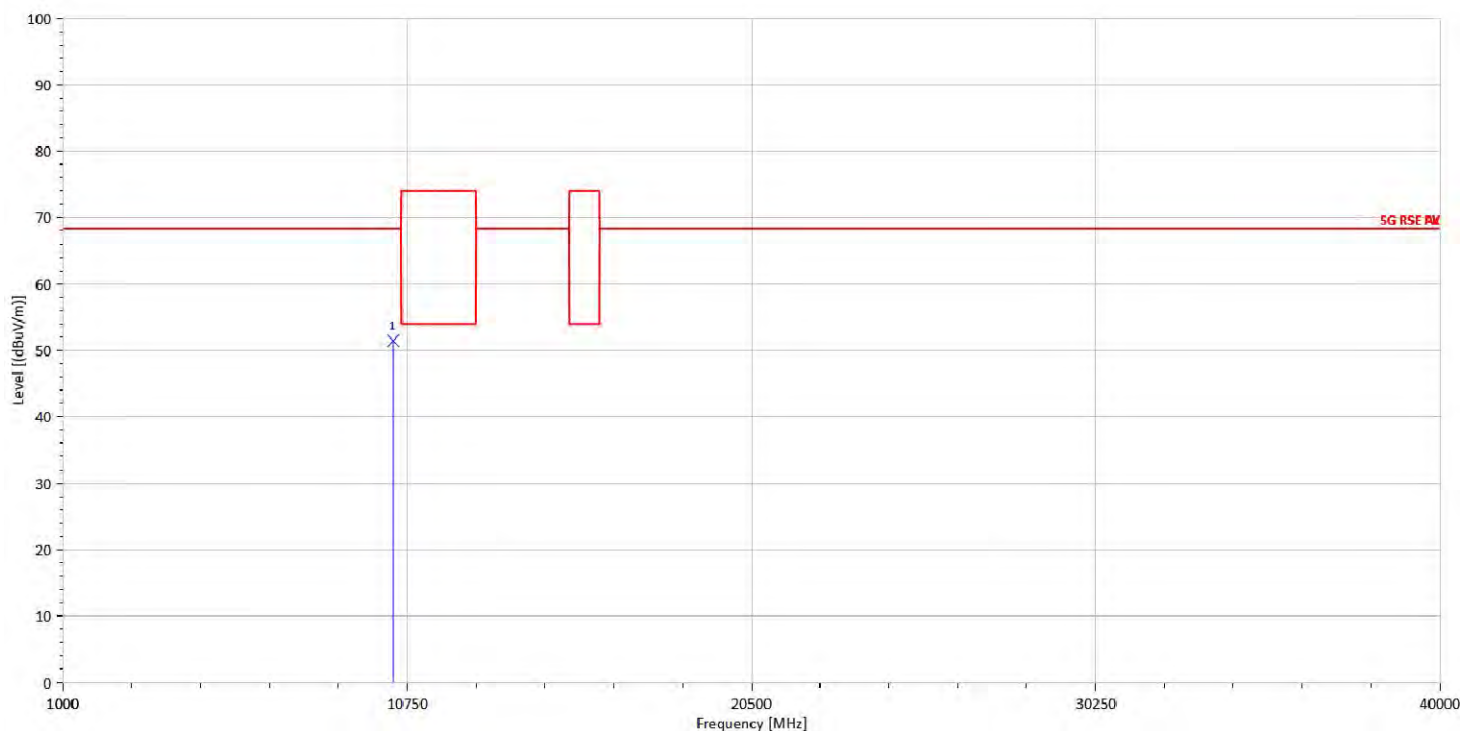
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5150~5250 MHz

Operation Mode :	802.11n20	Test Date :	2017/1/3
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@ 3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
10360.00	H	Peak	31.26	20.18	51.44	68.3	-16.86

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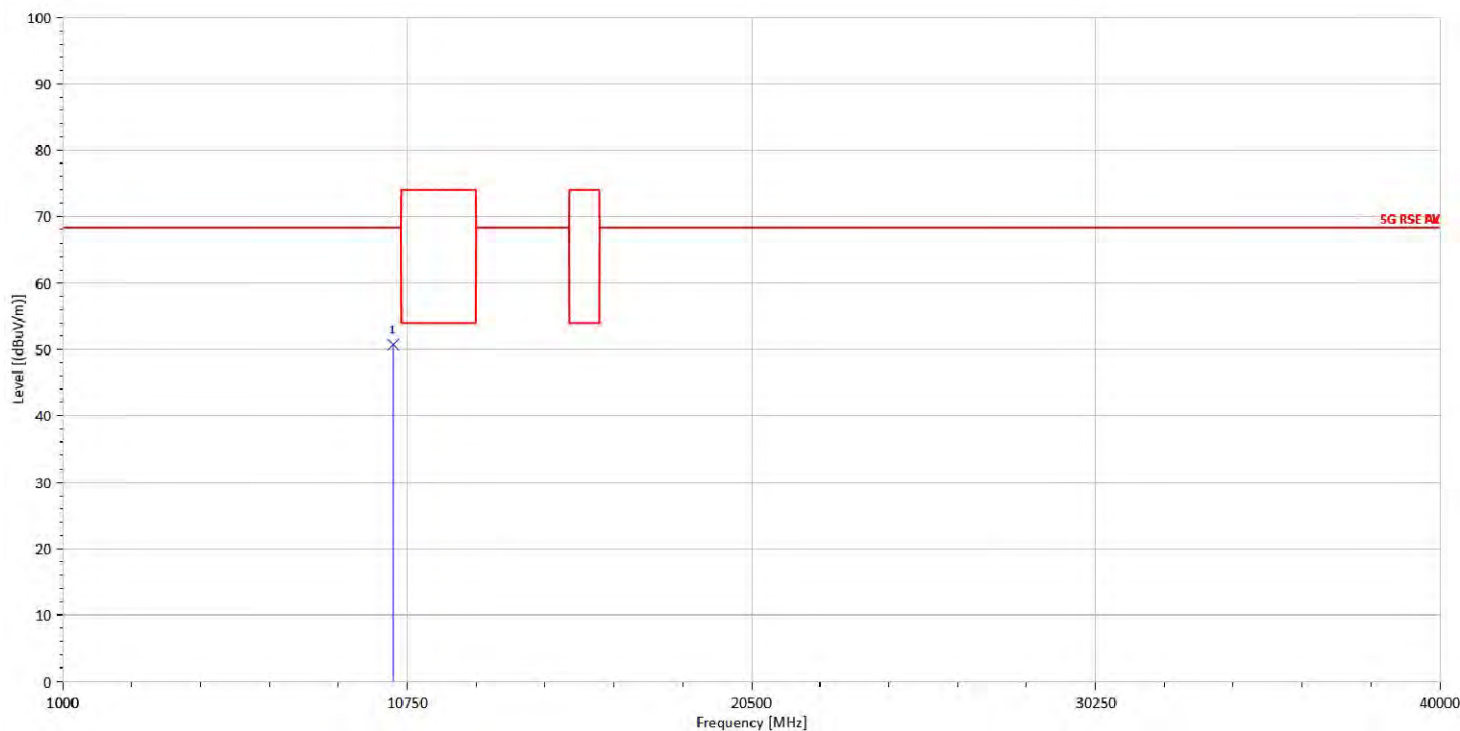
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Operation Mode : 802.11n20 Test Date : 2017/1/3
Fundamental Frequency : 5180 MHz Temp. / Humi. : 23.0deg_C/63RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



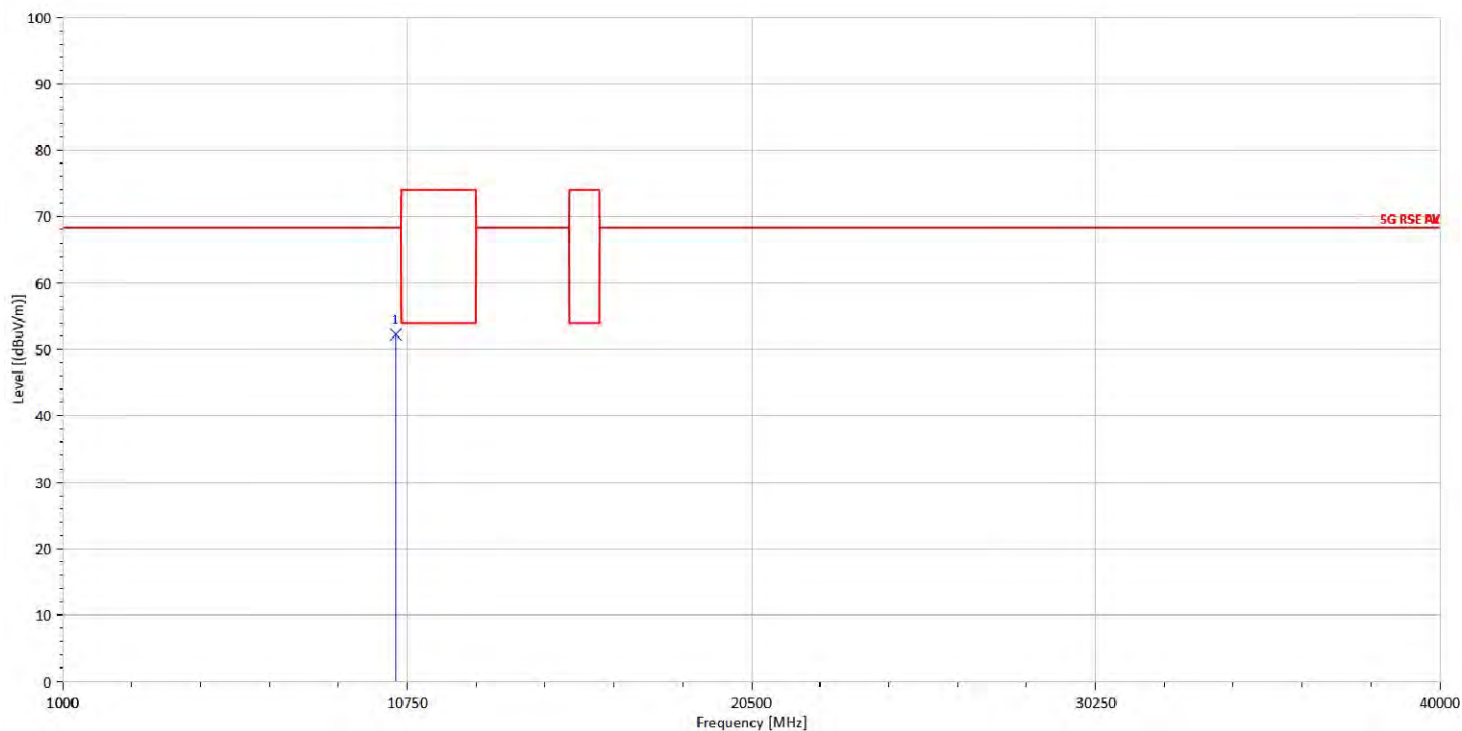
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10360.00	H	Peak	30.56	20.18	50.74	68.3	-17.56

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Operation Mode : 802.11n20 Test Date : 2017/1/3
 Fundamental Frequency : 5220 MHz Temp. / Humi. : 23.0deg_C/63RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



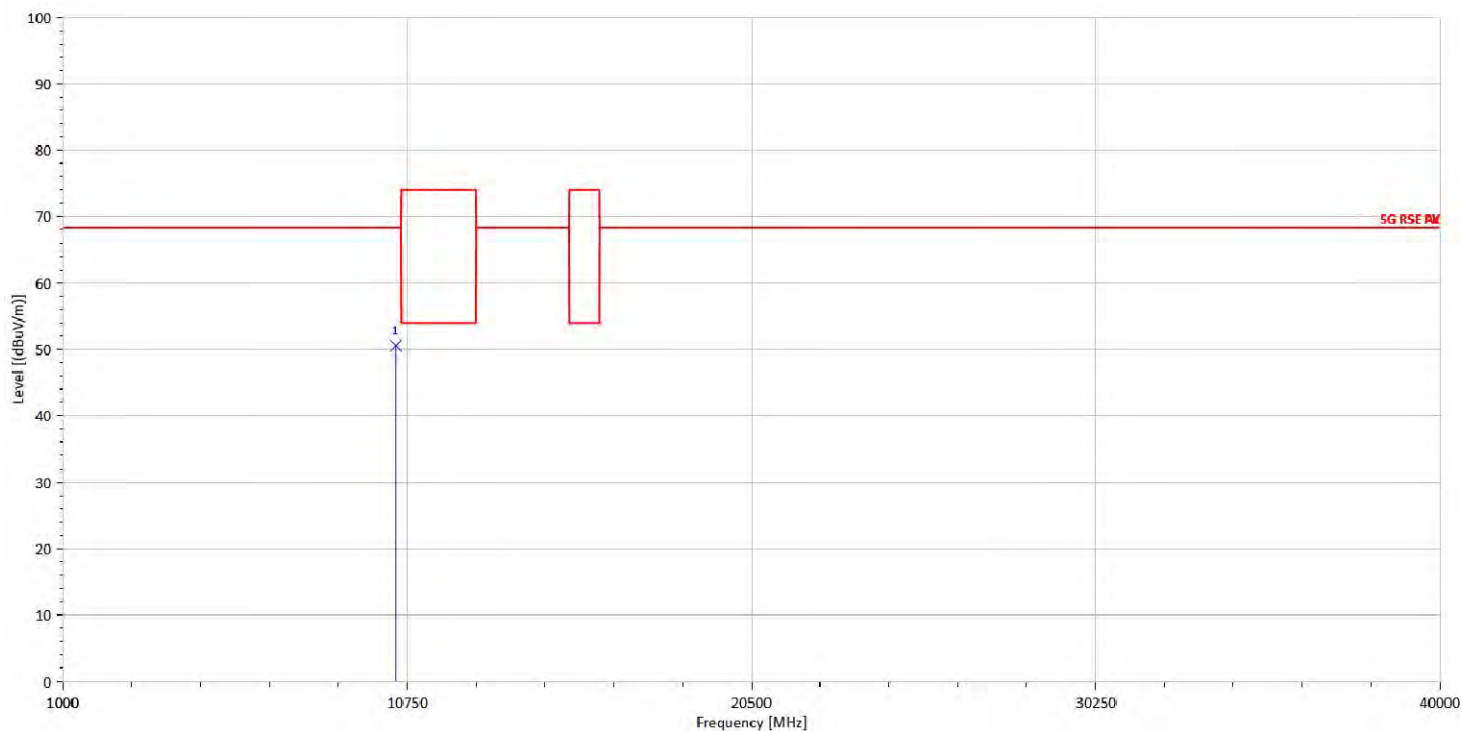
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10440.00	H	Peak	31.97	20.29	52.26	68.3	-16.04

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Operation Mode : 802.11n20 Test Date : 2017/1/3
Fundamental Frequency : 5220 MHz Temp. / Humi. : 23.0deg_C/63RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



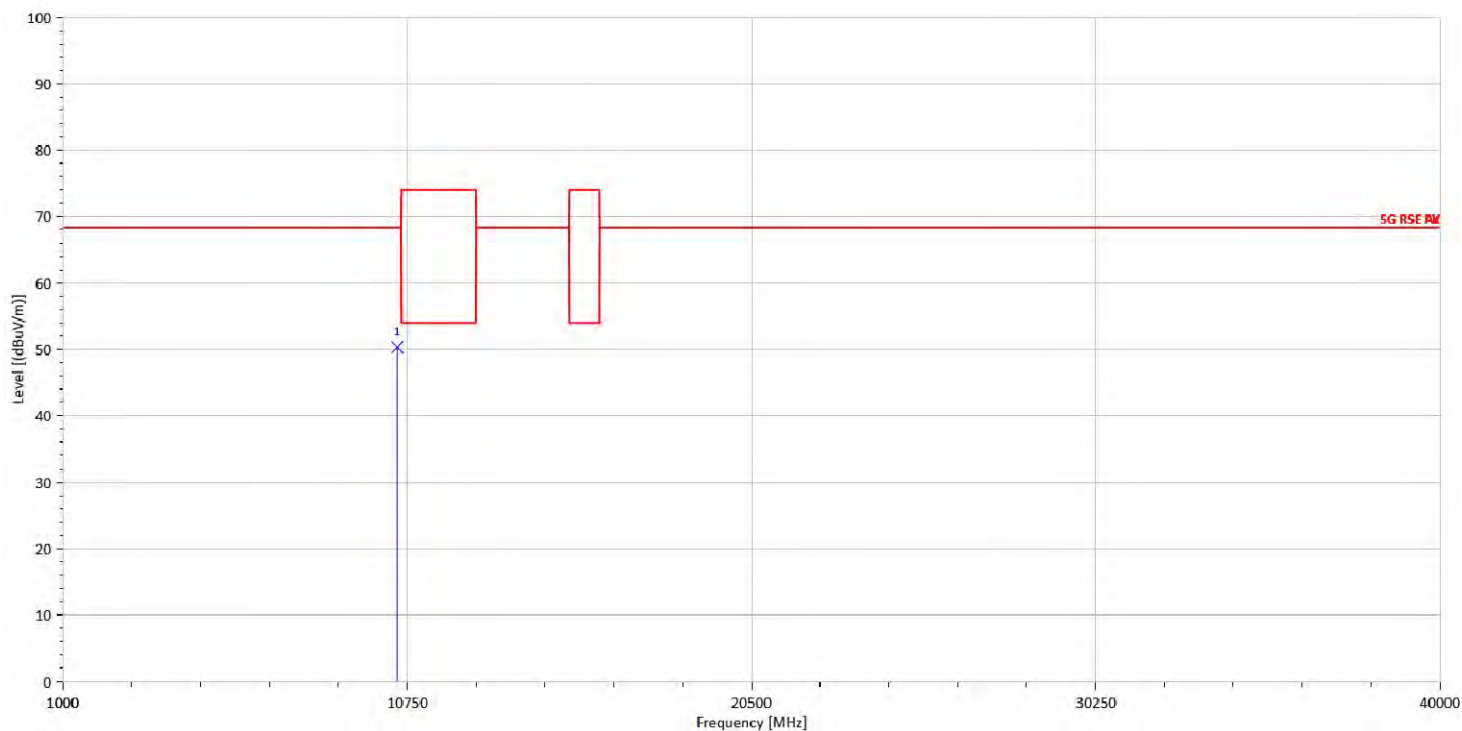
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10440.00	H	Peak	30.27	20.29	50.56	68.3	-17.74

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Operation Mode : 802.11n20 Test Date : 2017/1/3
 Fundamental Frequency : 5240 MHz Temp. / Humi. : 23.0deg_C/63RH
 Operation Band : Tx CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10480.00	H	Peak	29.65	20.68	50.33	68.3	-17.97

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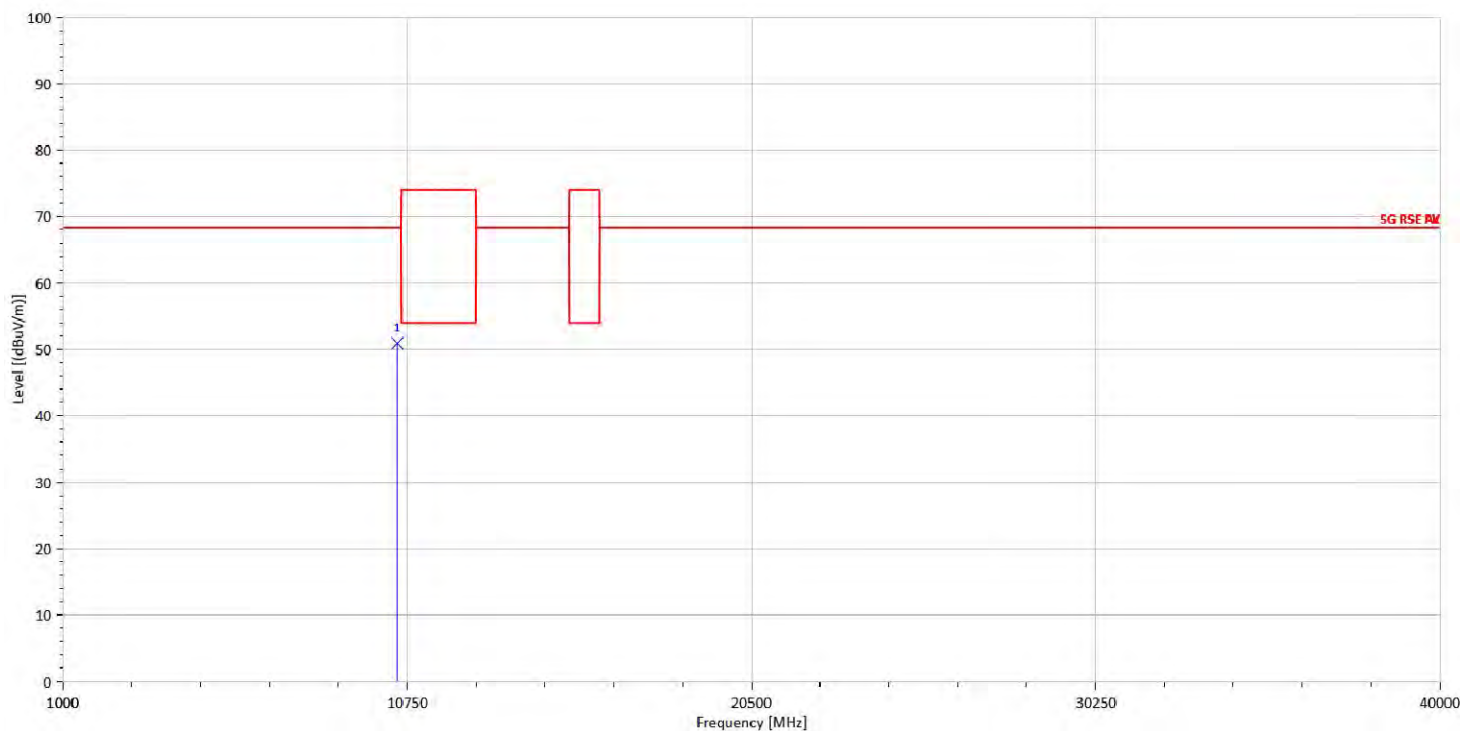
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Operation Mode : 802.11n20 Test Date : 2017/1/3
 Fundamental Frequency : 5240 MHz Temp. / Humi. : 23.0deg_C/63RH
 Operation Band : Tx CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10480.00	H	Peak	30.24	20.68	50.92	68.3	-17.38

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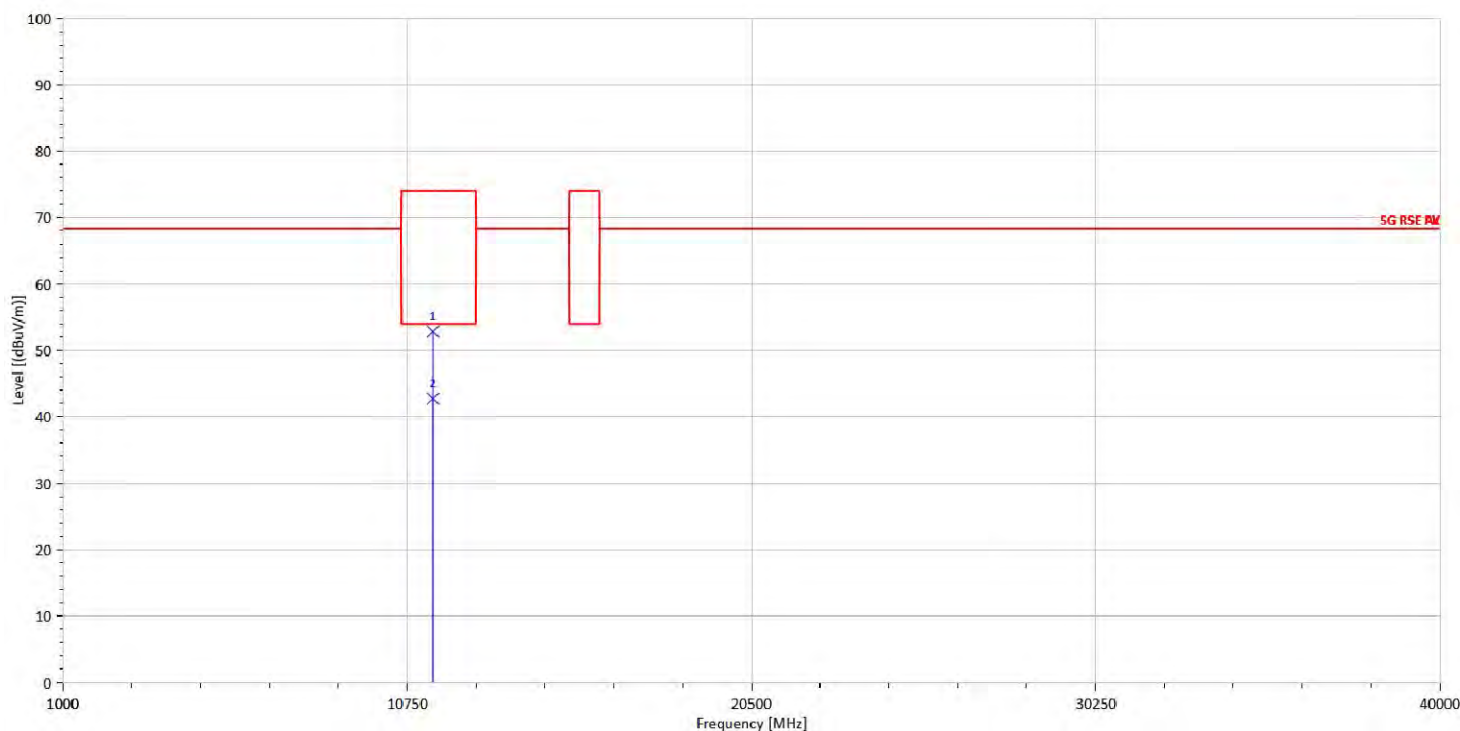
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5725~5850 MHz

Operation Mode :	802.11n20	Test Date :	2017/1/3
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
11490.00	H	Peak	32.12	20.70	52.82	74	-21.18
11490.00	H	Average	22.05	20.70	42.75	54	-11.25

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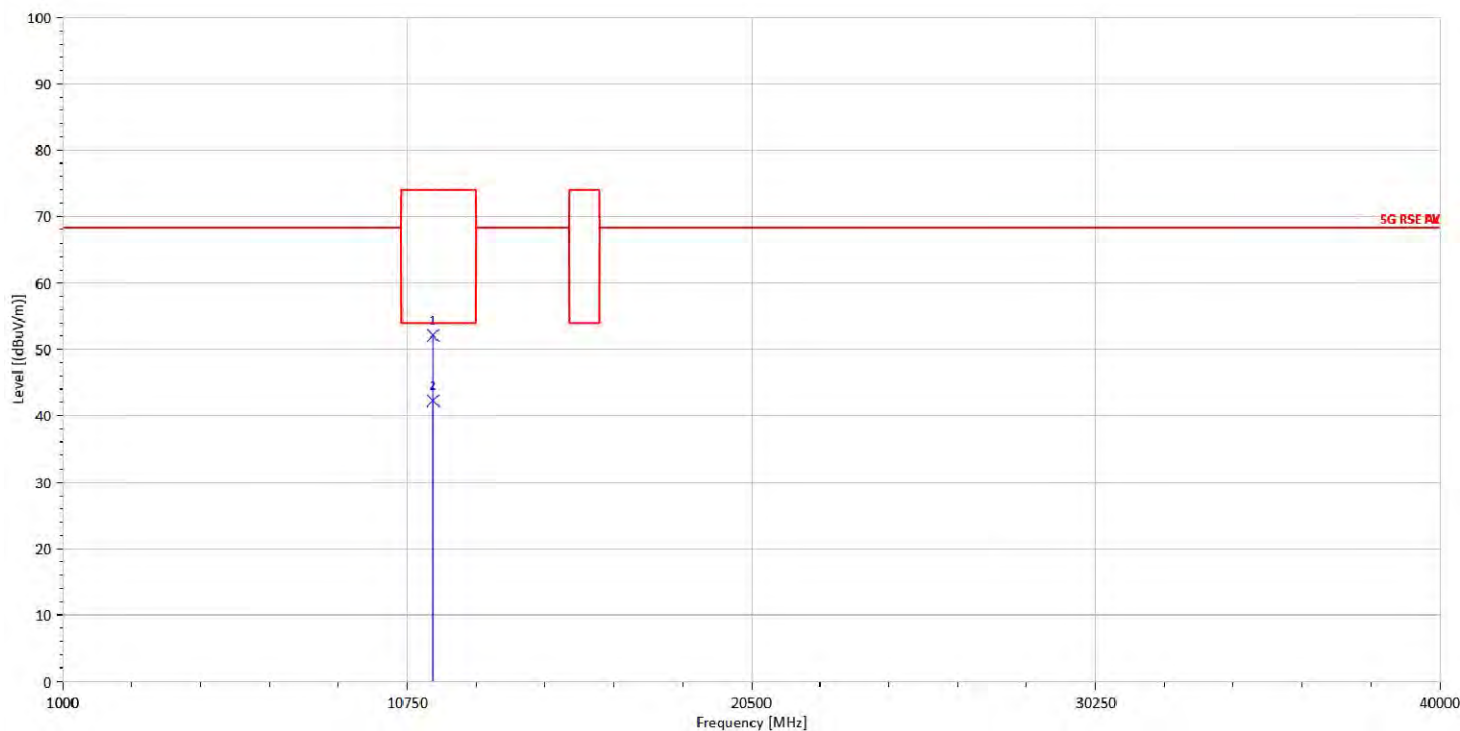
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Operation Mode : 802.11n20 Test Date : 2017/1/3
Fundamental Frequency : 5745 MHz Temp. / Humi. : 23.0deg_C/63RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



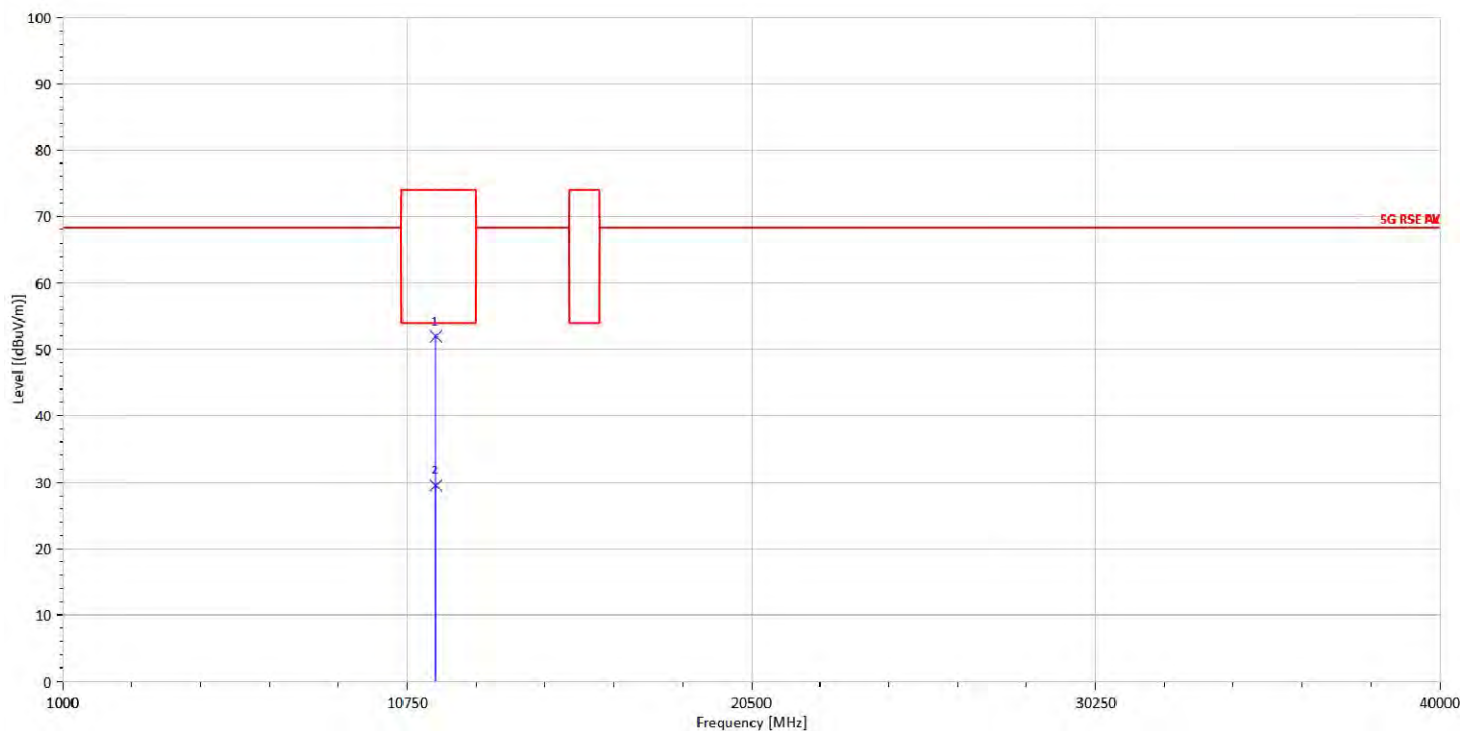
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11490.00	H	Peak	31.43	20.70	52.13	74	-21.87
11490.00	H	Average	21.59	20.70	42.29	54	-11.71

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Operation Mode : 802.11n20 Test Date : 2017/1/3
Fundamental Frequency : 5785 MHz Temp. / Humi. : 23.0deg_C/63RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



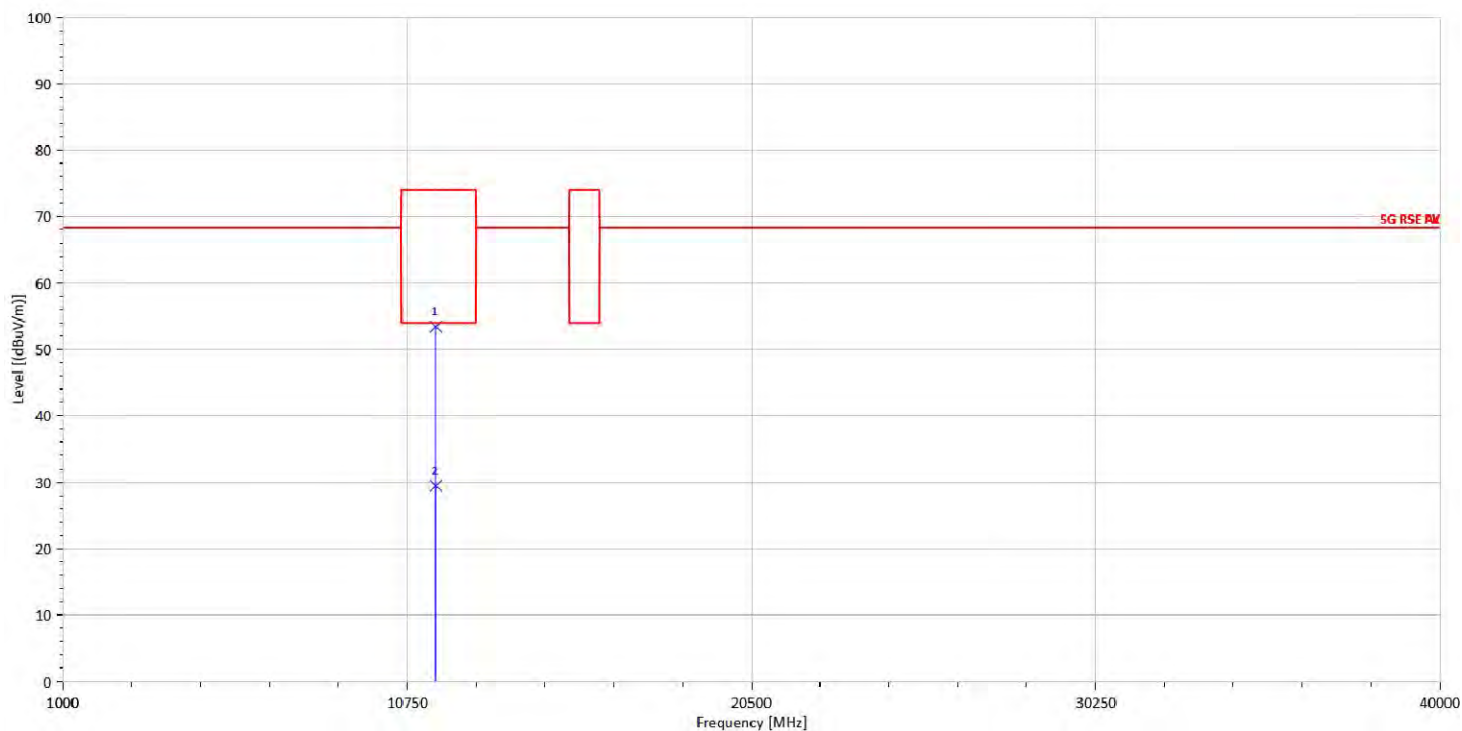
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11570.00	H	Peak	30.54	21.44	51.98	74	-22.02
11570.00	H	Average	8.07	21.44	29.52	54	-24.48

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Operation Mode :	802.11n20	Test Date :	2017/1/3
Fundamental Frequency :	5785 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
11570.00	H	Peak	31.97	21.44	53.42	74	-20.58
11570.00	H	Average	8.02	21.44	29.46	54	-24.54

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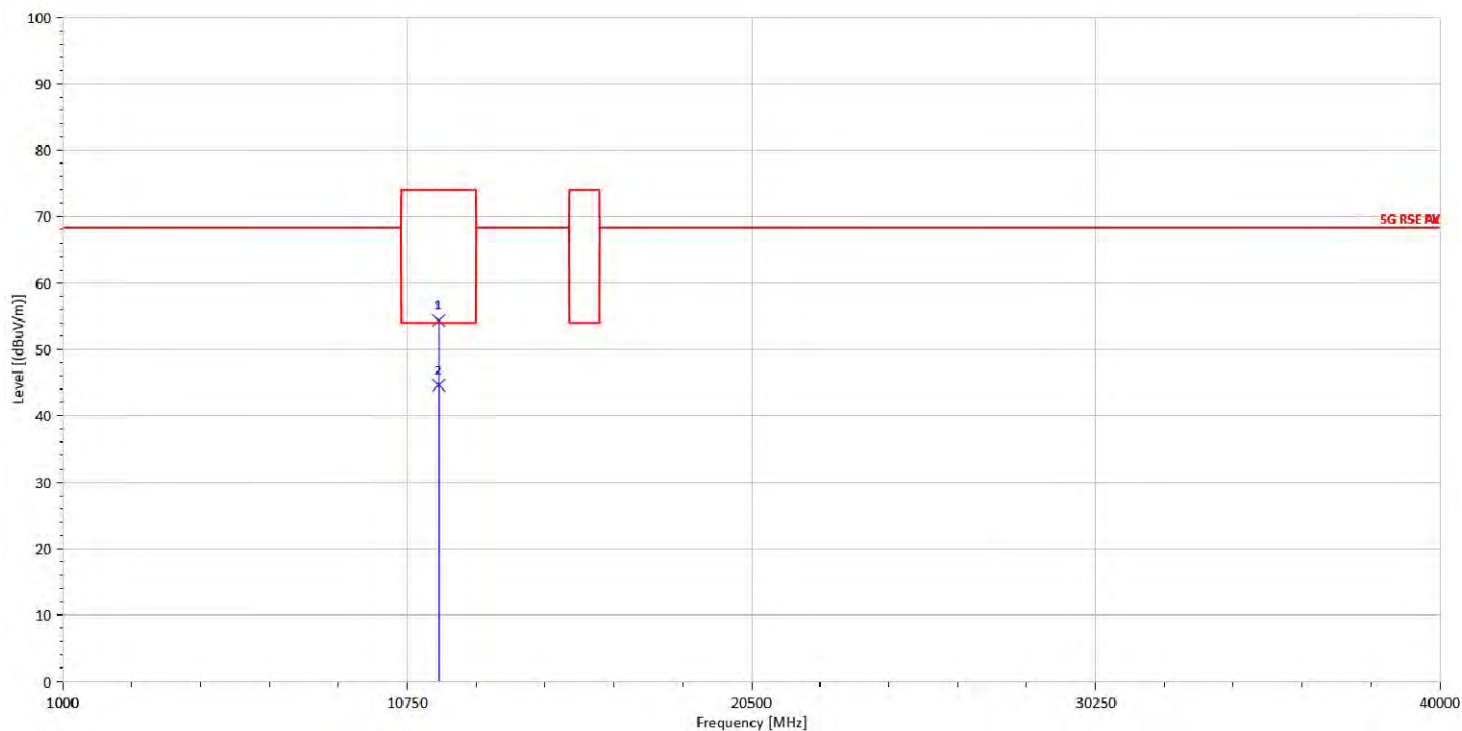
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Operation Mode : 802.11n20 Test Date : 2017/1/3
Fundamental Frequency : 5825 MHz Temp. / Humi. : 23.0deg_C/63RH
Operation Band : Tx CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



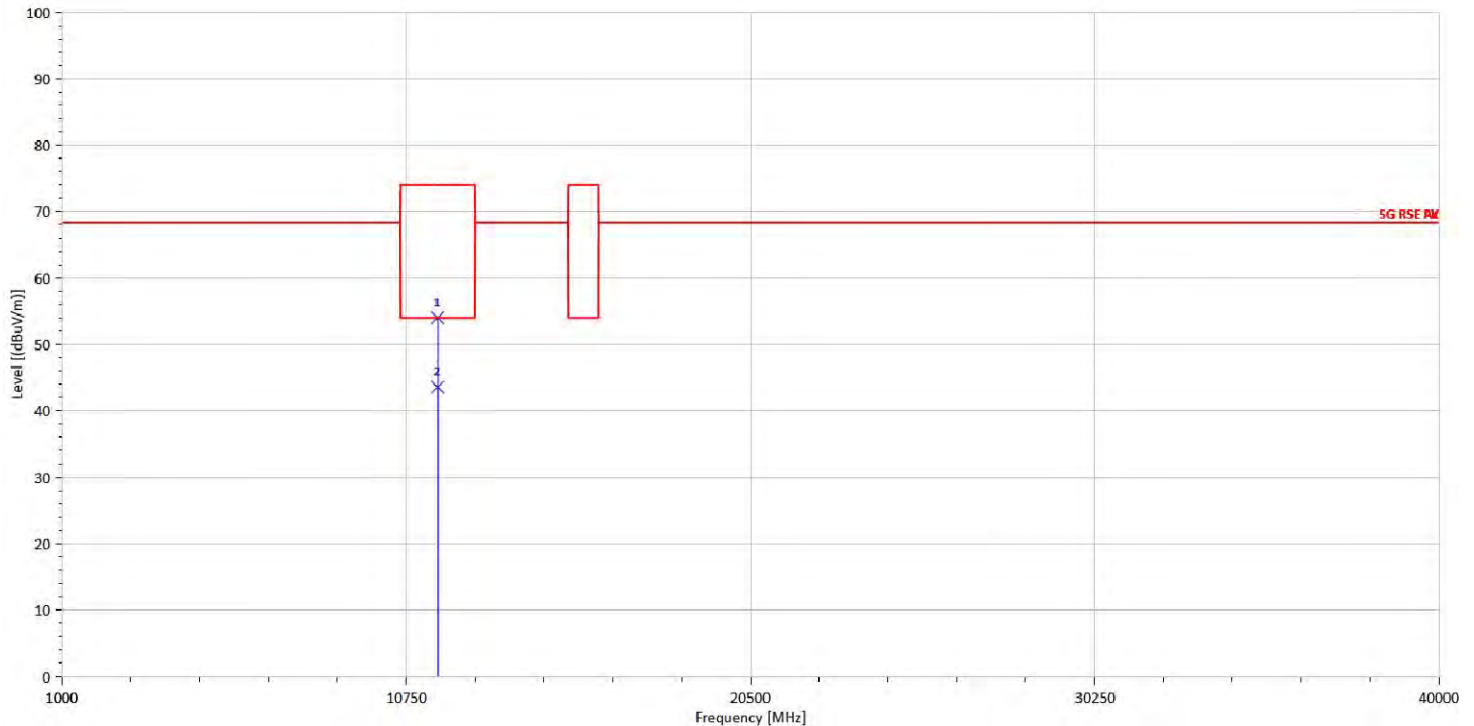
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11650.00	H	Peak	32.32	22.02	54.34	74	-19.66
11650.00	H	Average	22.61	22.02	44.63	54	-9.37

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Operation Mode : 802.11n20 Test Date : 2017/1/3
Fundamental Frequency : 5825 MHz Temp. / Humi. : 23.0deg_C/63RH
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
11650.00	H	Peak	32.00	22.02	54.02	74	-19.98
11650.00	H	Average	21.56	22.02	43.58	54	-10.42

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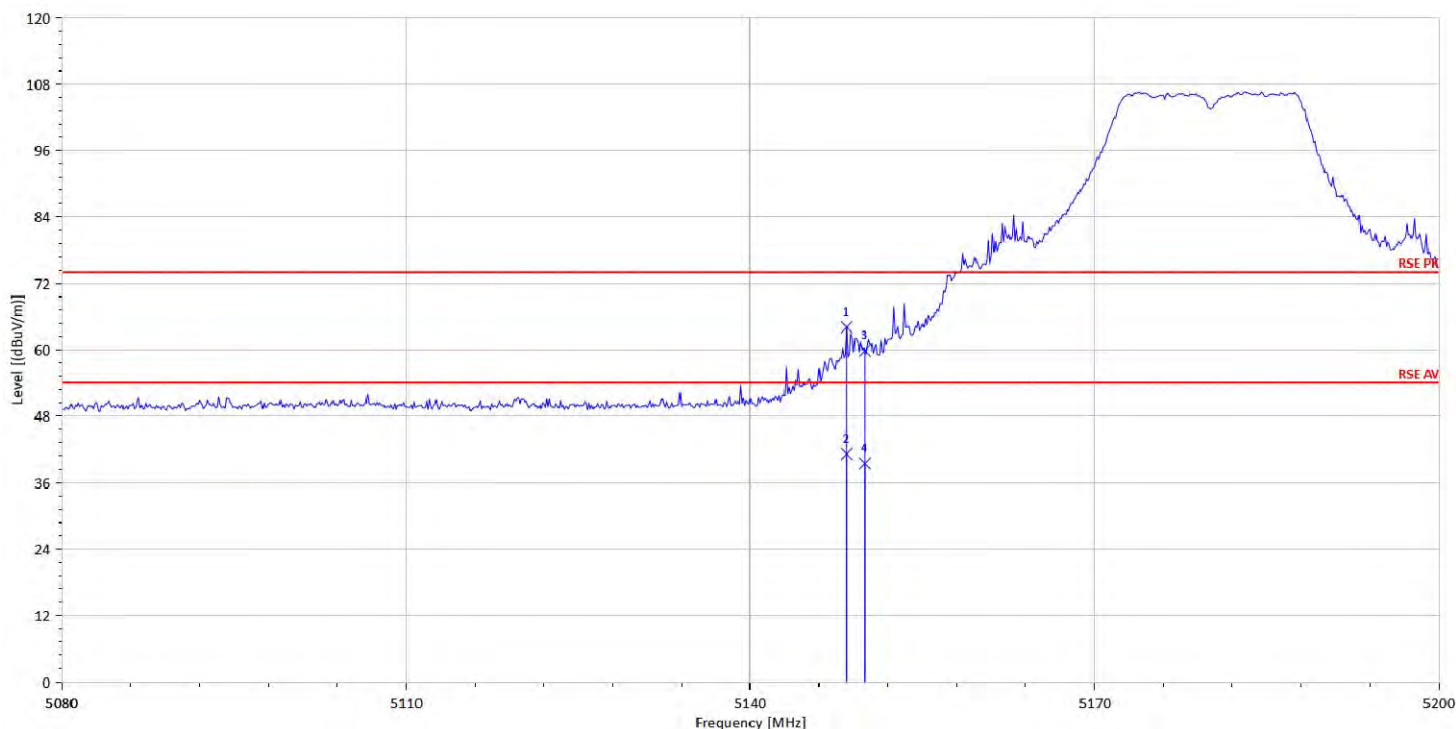
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11.10 Band edge falling to restricted band (FCC)

802.11a mode

Operation Mode :	802.11a	Test Date :	2016/12/30
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5148.40	S	Peak	55.91	8.18	64.09	74	-9.91
5148.40	S	Average	32.98	8.18	41.16	54	-12.84
5150.00	E	Peak	51.66	8.19	59.85	74	-14.15
5150.00	E	Average	31.24	8.19	39.43	54	-14.57

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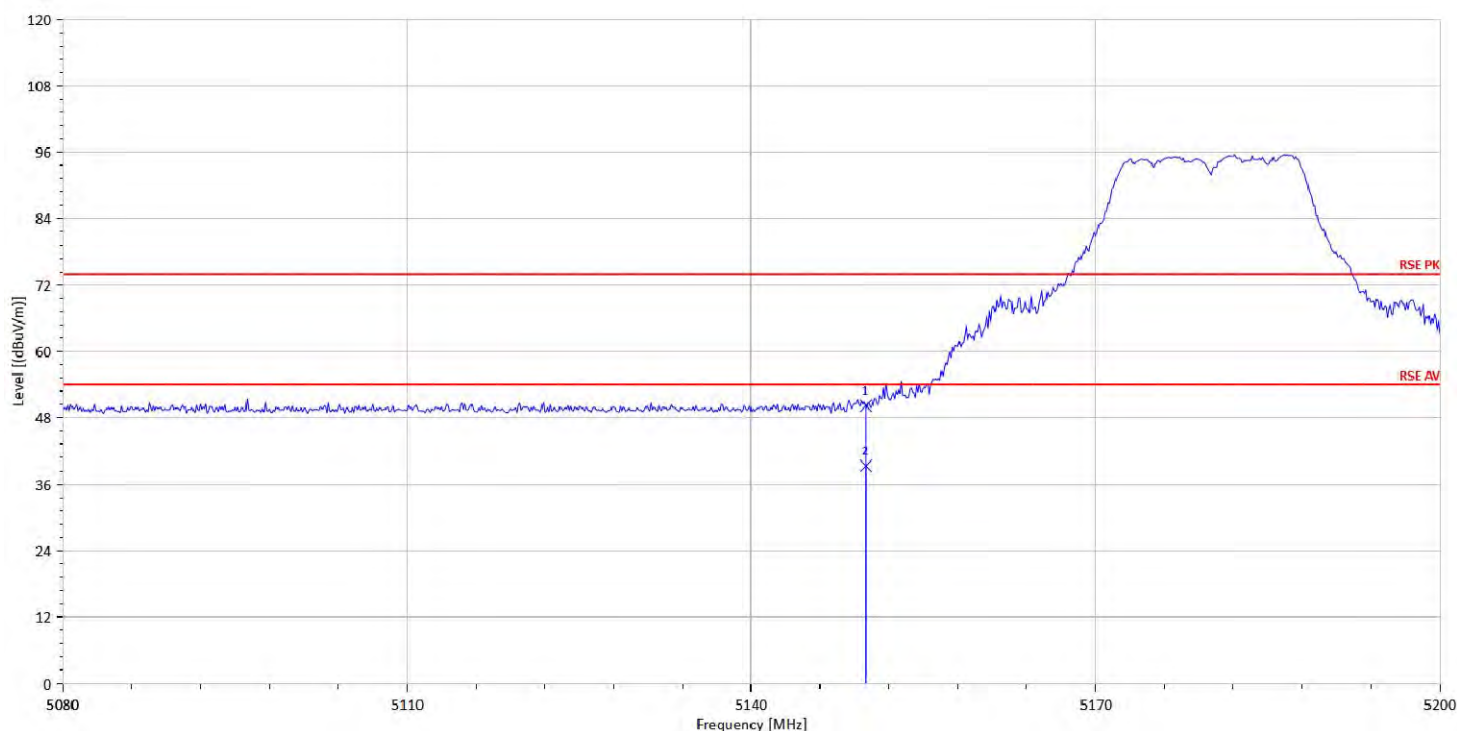
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Operation Mode :	802.11a	Test Date :	2016/12/30
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Peak	42.01	8.19	50.20	74	-23.80
5150.00	E	Average	31.13	8.19	39.32	54	-14.68

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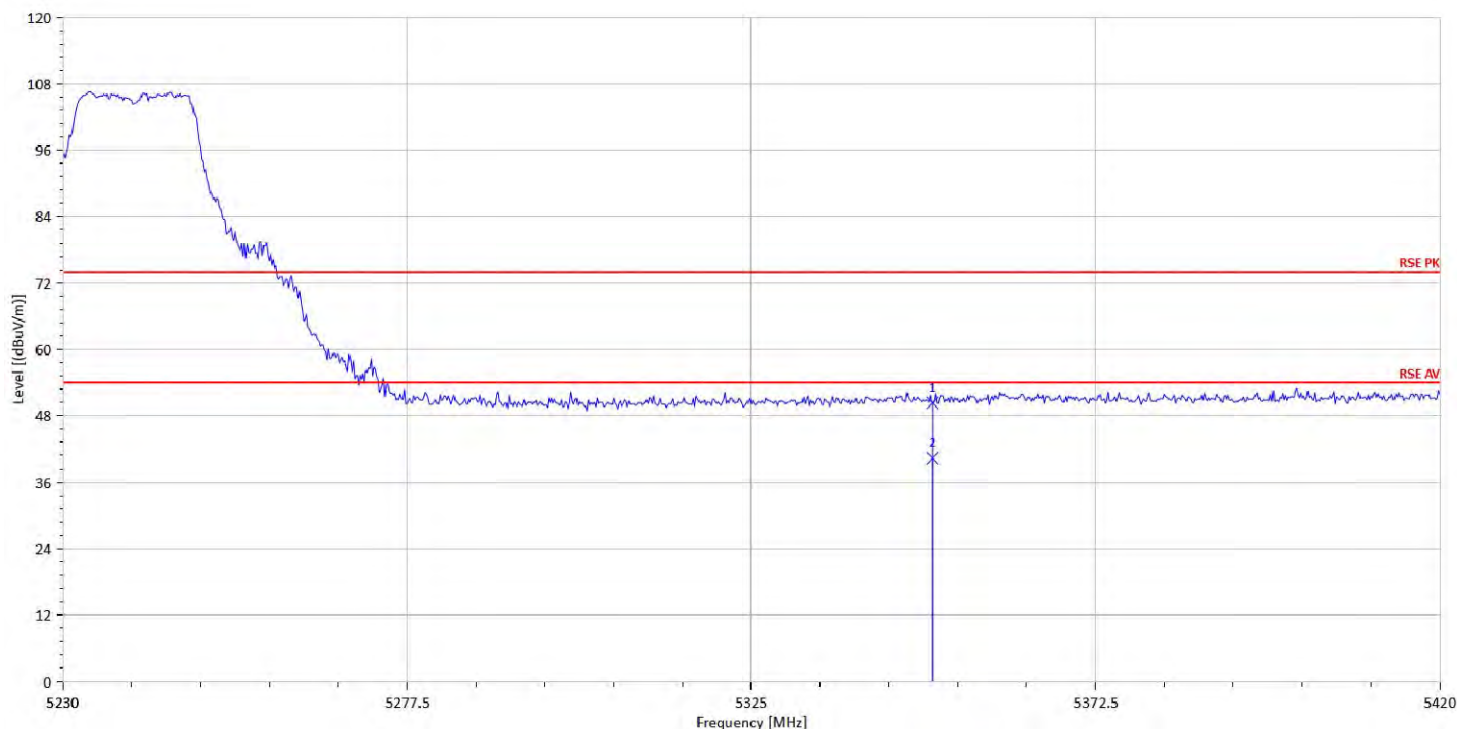
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Operation Mode :	802.11a	Test Date :	2016/12/30
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



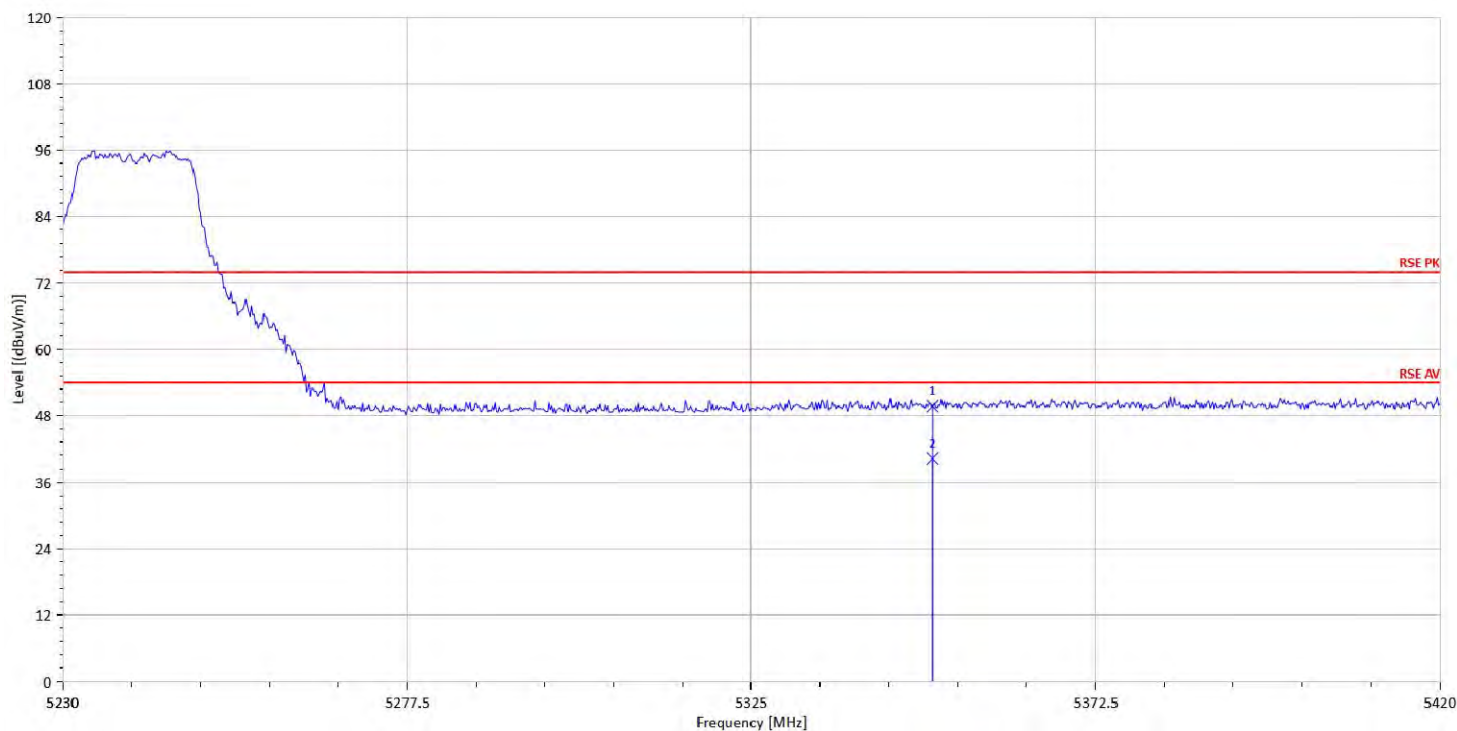
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5350.00	E	Peak	41.39	8.96	50.36	74	-23.64
5350.00	E	Average	31.38	8.96	40.34	54	-13.66

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Operation Mode :	802.11a	Test Date :	2016/12/30
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5350.00	E	Peak	40.79	8.96	49.75	74	-24.25
5350.00	E	Average	31.32	8.96	40.28	54	-13.72

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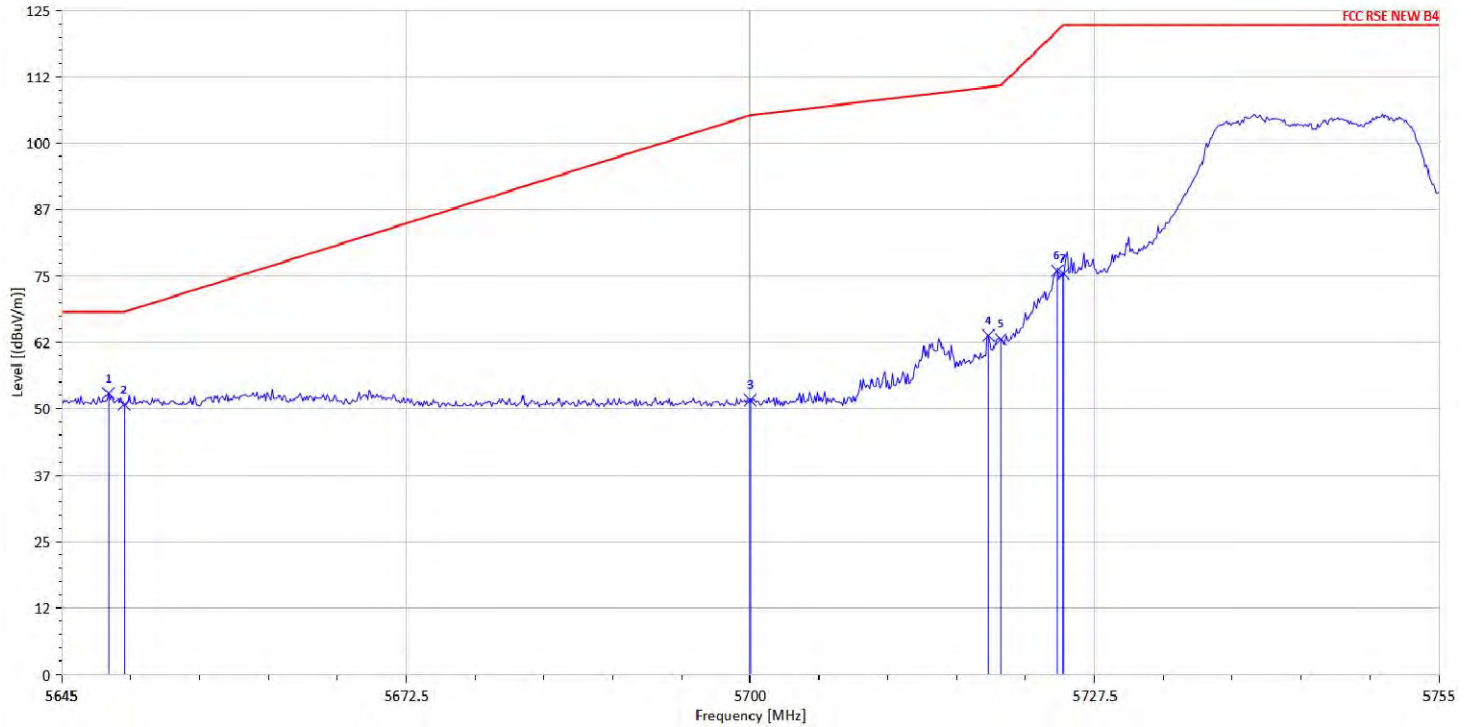
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Operation Mode : 802.11a Test Date : 2017/1/3
 Fundamental Frequency : 5745 MHz Temp. / Humi. : 23.0deg_C/63RH
 Operation Band : BE CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



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
5648.74	S	Peak	43.57	9.35	52.92	68.23	-15.31
5650.00	S	Peak	41.49	9.33	50.82	68.23	-17.41
5700.00	S	Peak	42.20	9.44	51.64	105.23	-53.59
5719.03	S	Peak	54.55	9.28	63.83	110.5583	-46.73
5720.00	S	Peak	53.80	9.28	63.08	110.83	-47.75
5724.53	S	Peak	66.66	9.30	75.96	121.1579	-45.20
5725.00	E	Peak	66.14	9.30	75.44	122.23	-46.79

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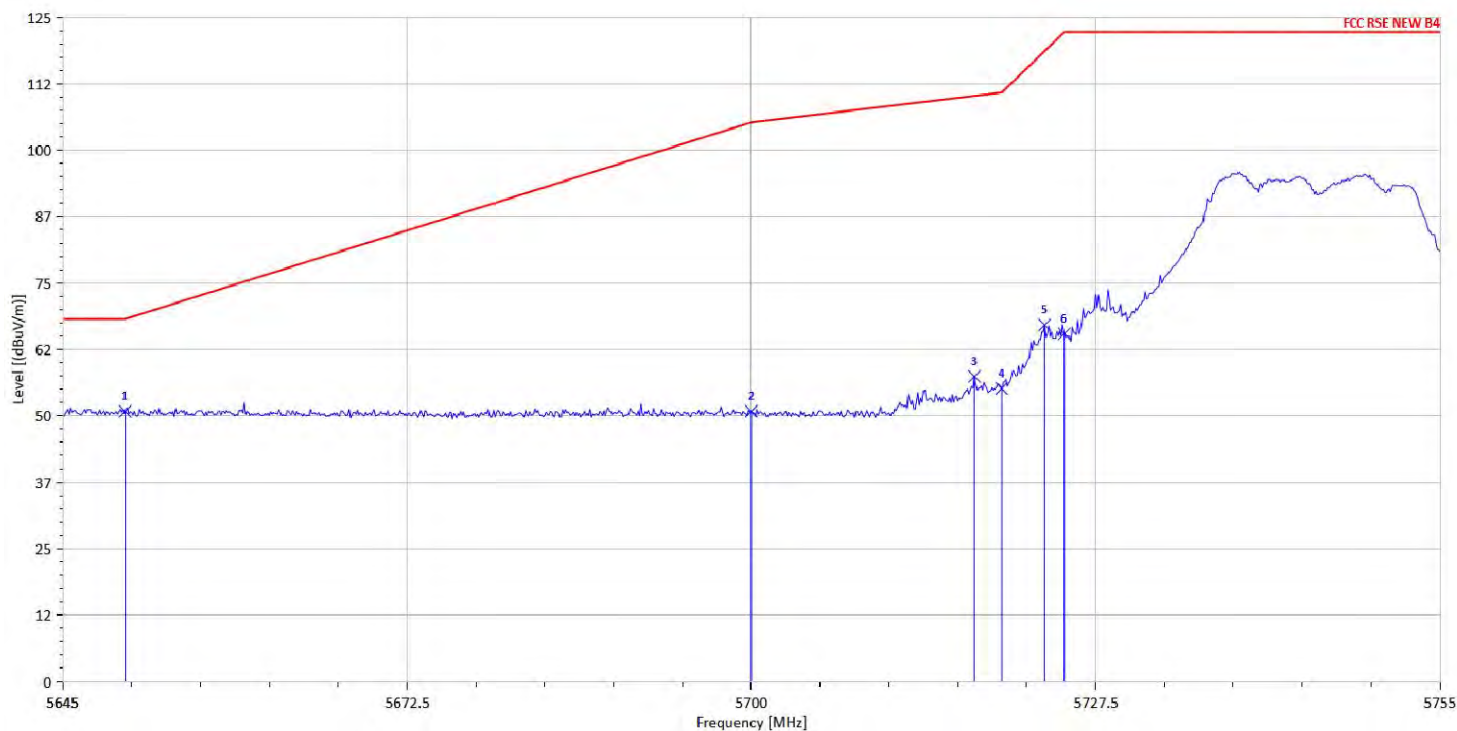
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Operation Mode :	802.11a	Test Date :	2017/1/3
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



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
5650.00	S	Peak	41.51	9.33	50.84	68.23	-17.39
5700.00	S	Peak	41.41	9.44	50.85	105.23	-54.38
5717.82	S	Peak	48.15	9.27	57.42	110.2196	-52.80
5720.00	S	Peak	45.89	9.28	55.17	110.83	-55.66
5723.43	S	Peak	57.82	9.29	67.11	118.6508	-51.54
5725.00	E	Peak	56.15	9.30	65.45	122.23	-56.78

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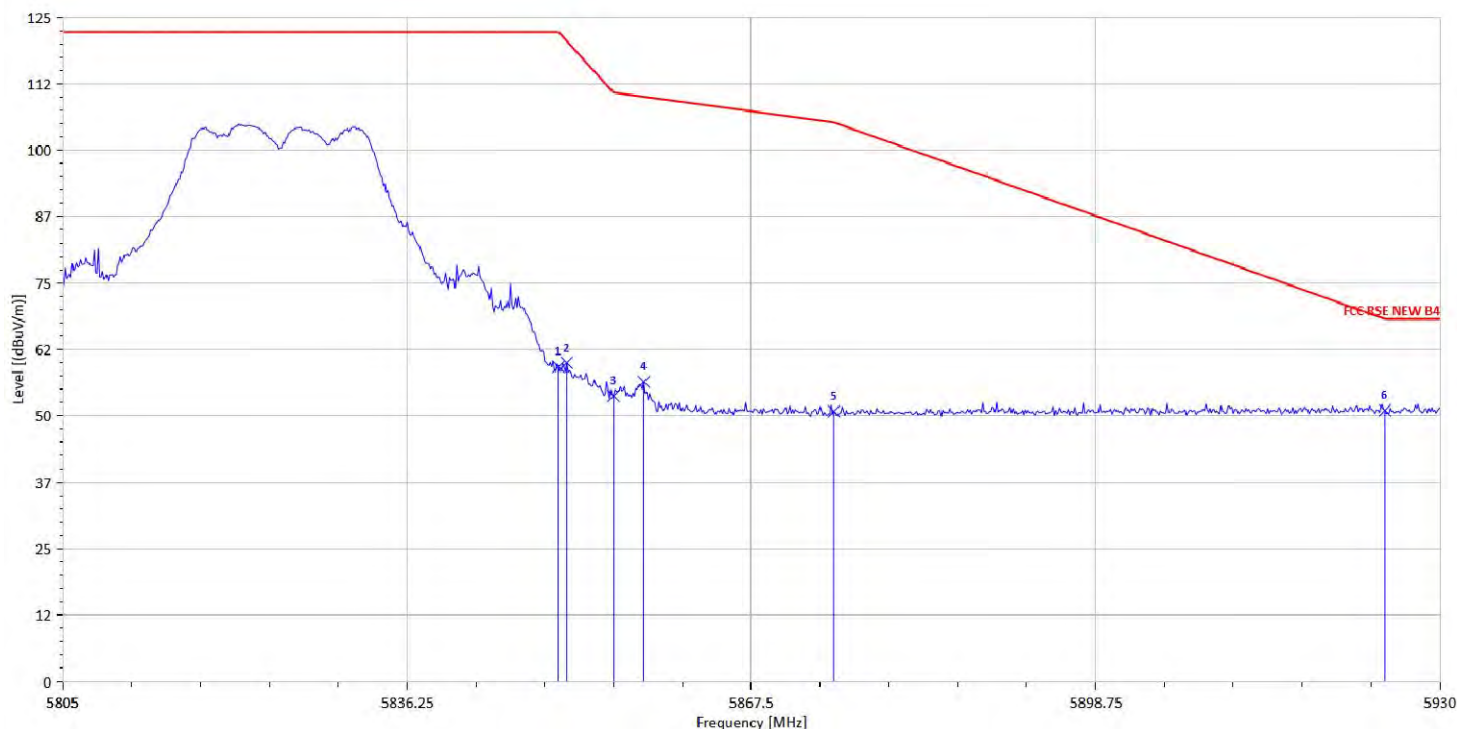
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Operation Mode :	802.11a	Test Date :	2017/1/3
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5850.00	E	Peak	49.77	9.49	59.25	122.23	-62.98
5850.75	S	Peak	50.49	9.50	59.99	120.52	-60.53
5855.00	S	Peak	44.16	9.58	53.74	110.83	-57.09
5857.75	S	Peak	46.75	9.63	56.38	110.06	-53.68
5875.00	S	Peak	41.20	9.63	50.83	105.23	-54.40
5925.00	S	Peak	41.01	10.01	51.02	68.23	-17.21

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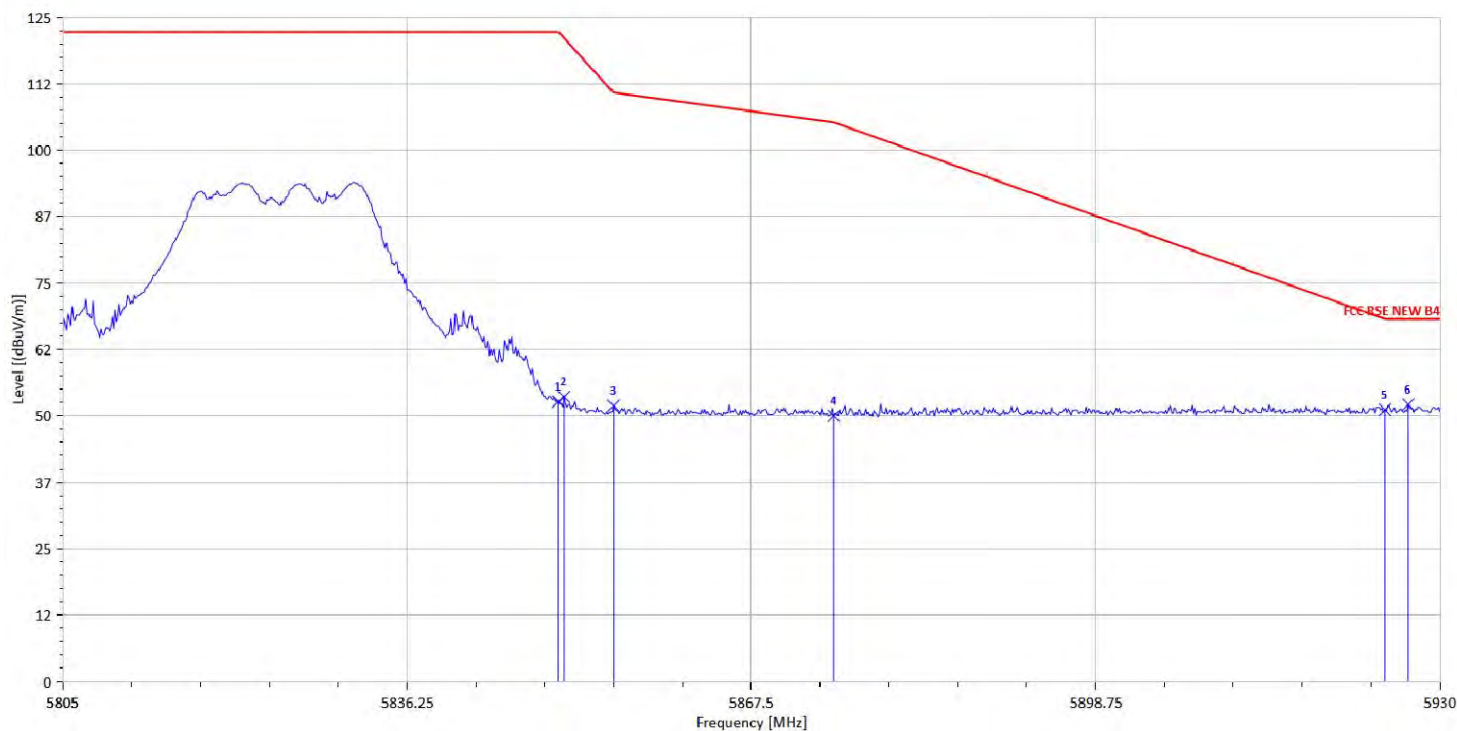
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Operation Mode :	802.11a	Test Date :	2017/1/3
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



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
5850.00	E	Peak	43.19	9.49	52.68	122.23	-69.55
5850.50	S	Peak	44.06	9.50	53.55	121.09	-67.54
5855.00	S	Peak	42.34	9.58	51.92	110.83	-58.91
5875.00	S	Peak	40.36	9.63	50.00	105.23	-55.23
5925.00	S	Peak	41.13	10.01	51.14	68.23	-17.09
5927.13	S	Peak	42.11	10.04	52.15	68.23	-16.08

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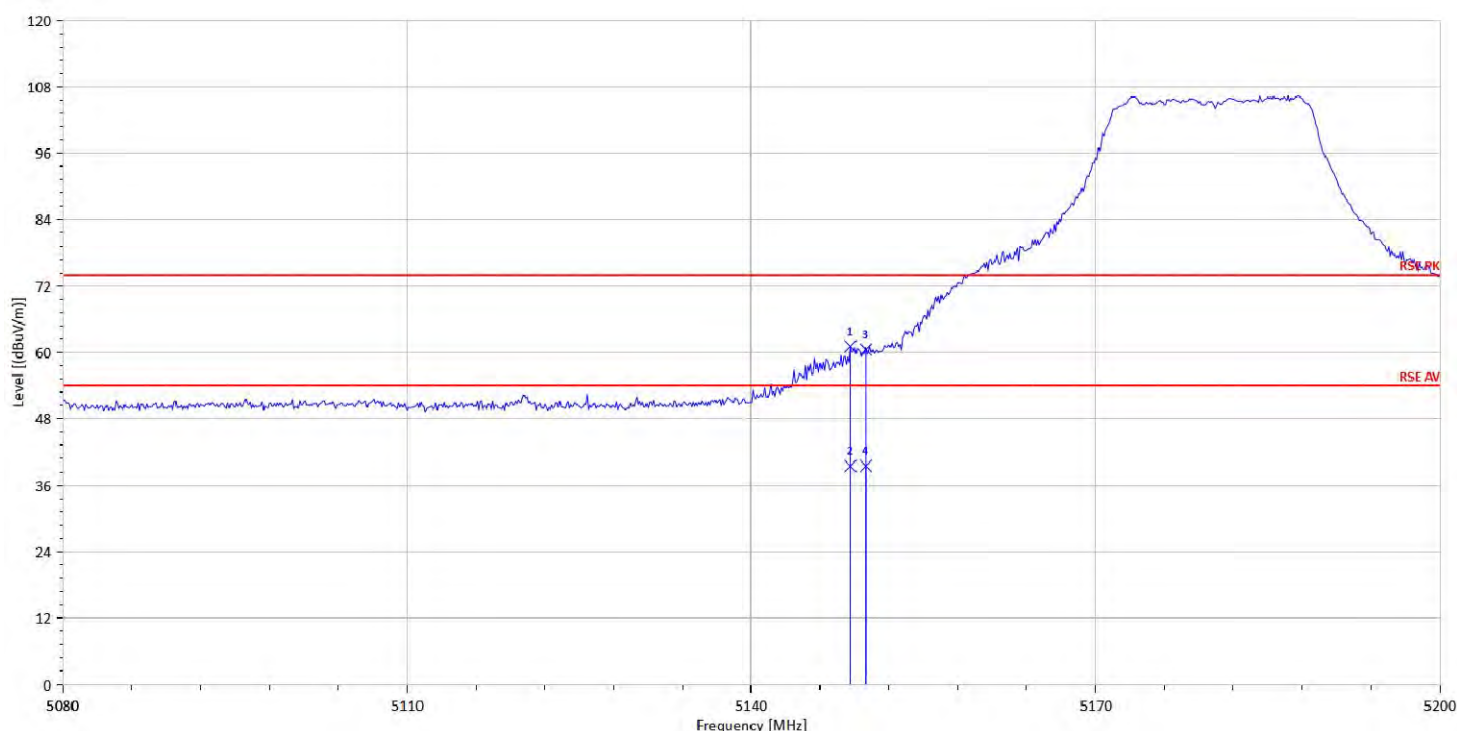
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802.11n20 HT mode

Operation Mode :	802.11n20	Test Date :	2016/12/30
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5148.64	S	Peak	52.92	8.18	61.10	74	-12.90
5148.64	S	Average	31.27	8.18	39.45	54	-14.55
5150.00	E	Peak	52.34	8.19	60.53	74	-13.47
5150.00	E	Average	31.28	8.19	39.47	54	-14.53

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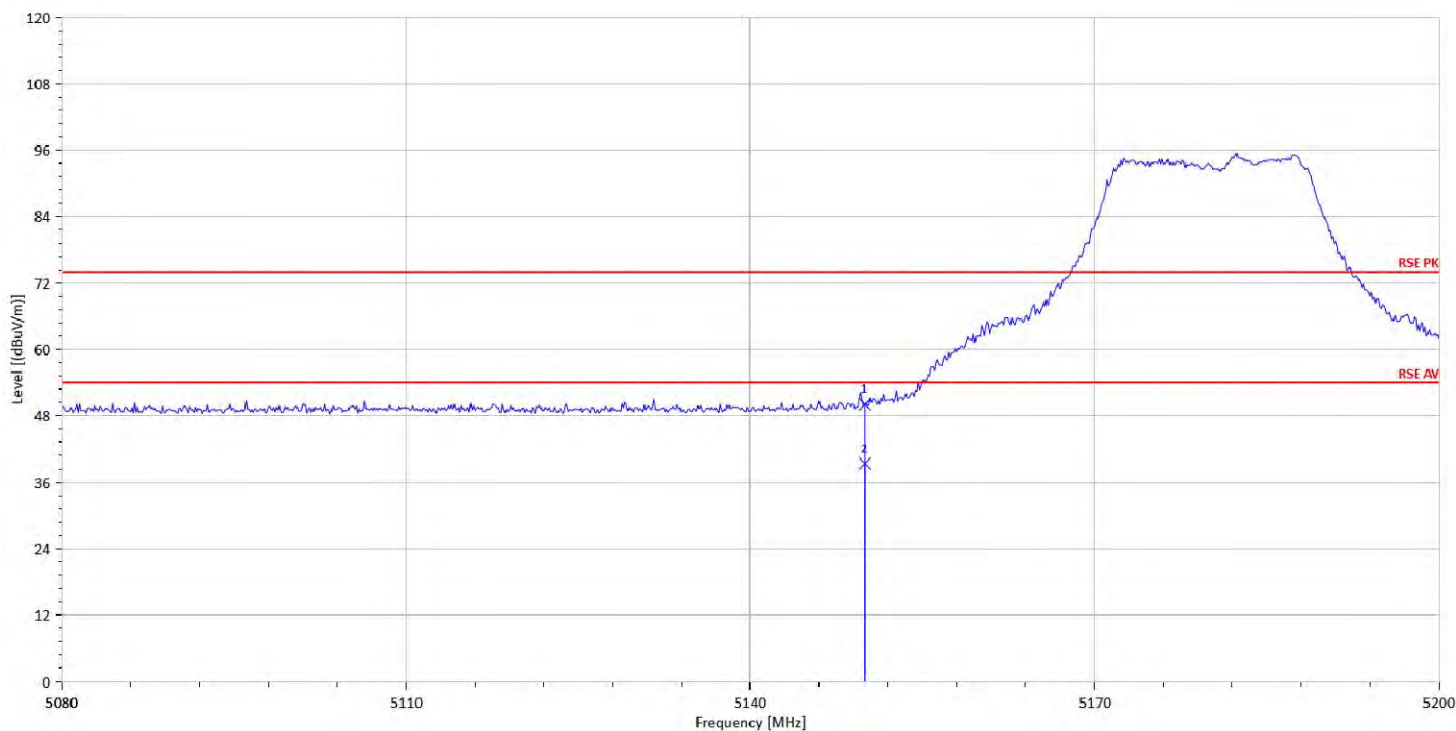
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Operation Mode :	802.11n20	Test Date :	2016/12/30
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



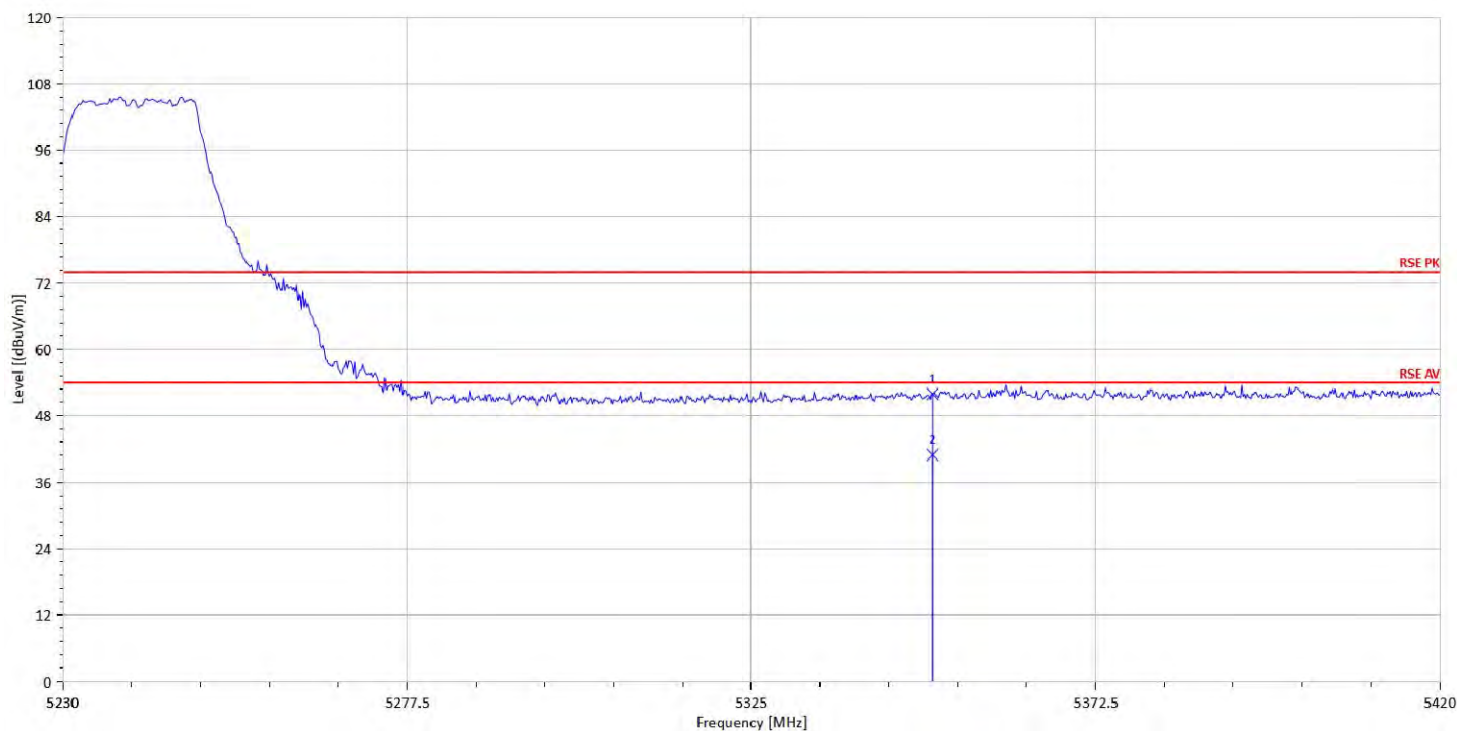
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Peak	41.91	8.19	50.10	74	-23.90
5150.00	E	Average	31.20	8.19	39.39	54	-14.61

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Operation Mode :	802.11n20	Test Date :	2016/12/30
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



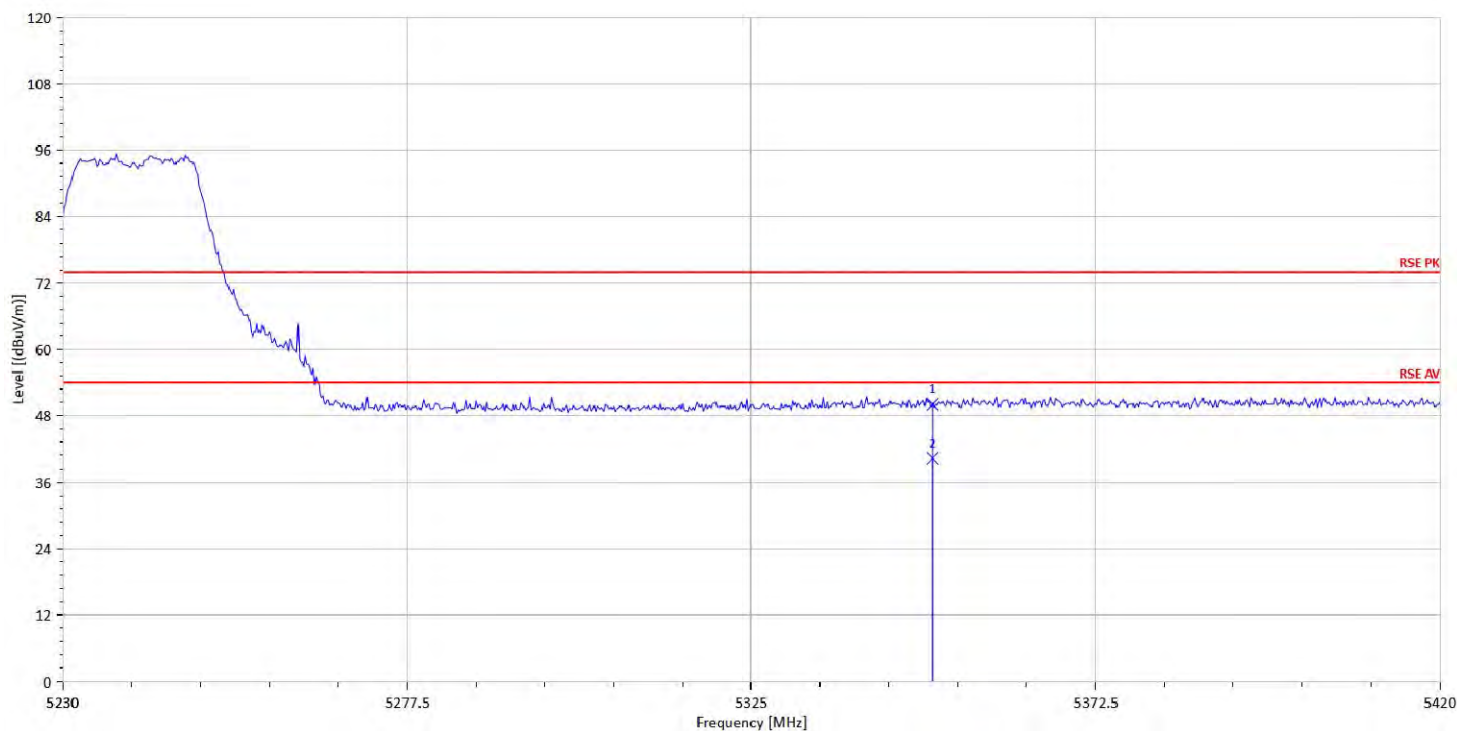
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
5350.00	E	Peak	42.97	8.96	51.94	74	-22.06
5350.00	E	Average	31.97	8.96	40.93	54	-13.07

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Operation Mode :	802.11n20	Test Date :	2016/12/30
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5350.00	E	Peak	41.12	8.96	50.09	74	-23.91
5350.00	E	Average	31.37	8.96	40.33	54	-13.67

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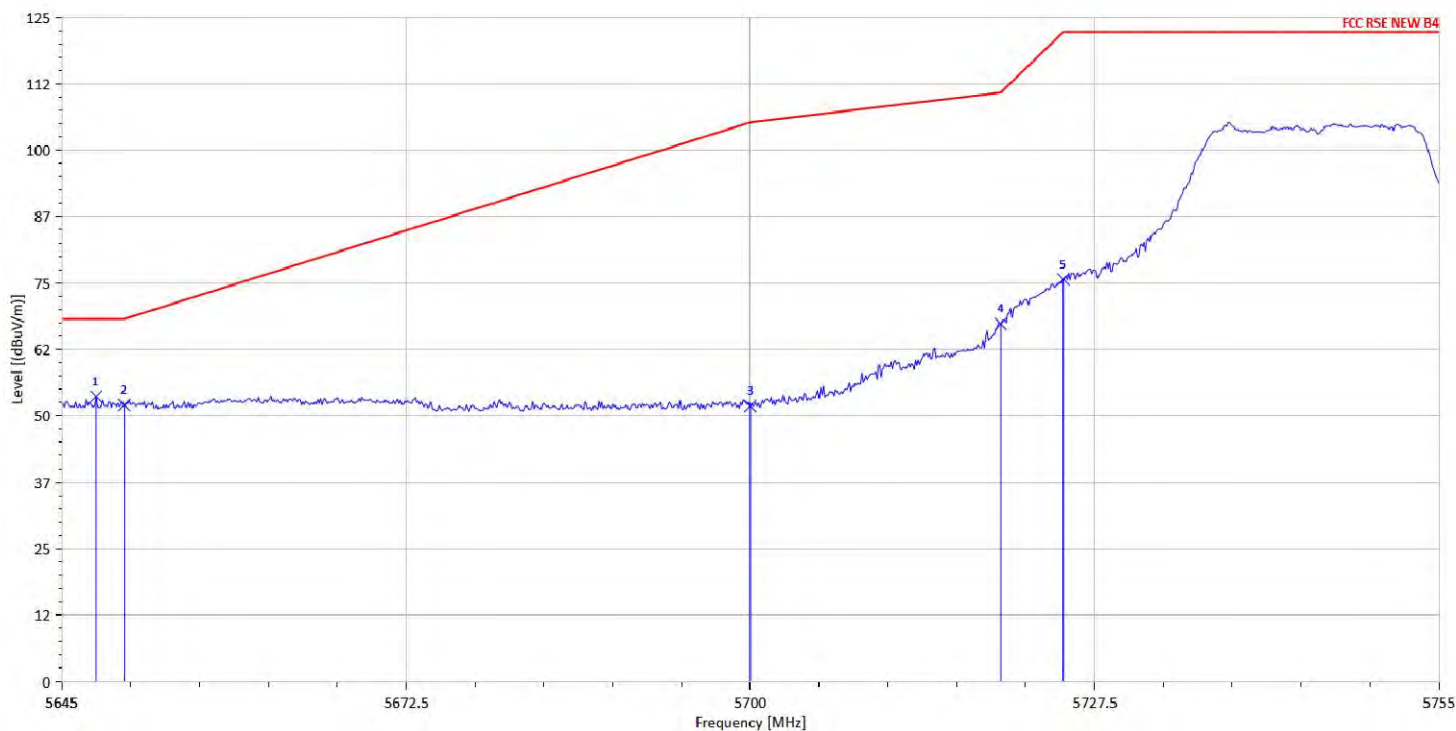
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Operation Mode :	802.11n20	Test Date :	2017/1/3
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



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
5647.75	S	Peak	44.30	9.36	53.66	68.23	-14.57
5650.00	S	Peak	42.71	9.33	52.05	68.23	-16.18
5700.00	S	Peak	42.41	9.44	51.85	105.23	-53.38
5720.00	S	Peak	58.01	9.28	67.30	110.83	-43.53
5725.00	E	Peak	66.40	9.30	75.70	122.23	-46.53

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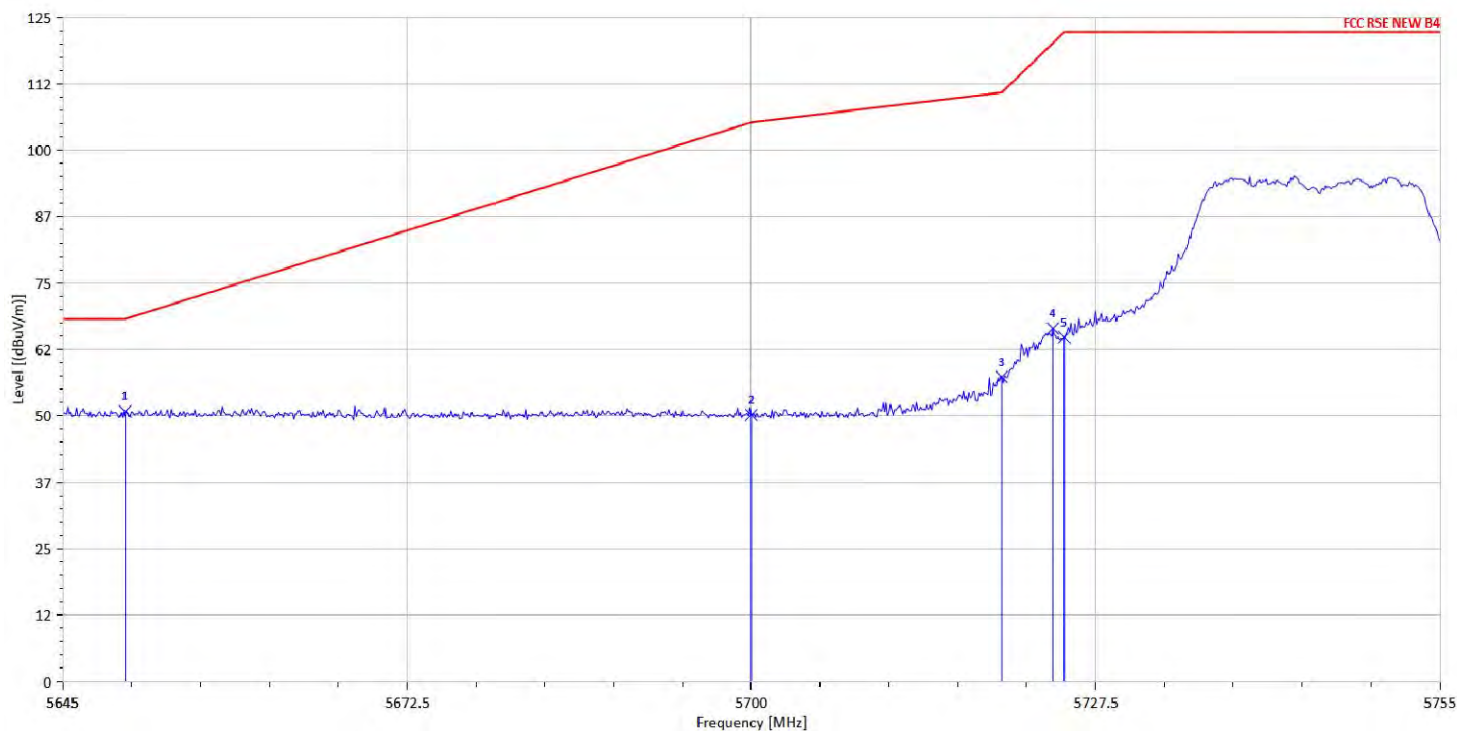
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Operation Mode :	802.11n20	Test Date :	2017/1/3
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



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
5650.00	S	Peak	41.50	9.33	50.83	68.23	-17.40
5700.00	S	Peak	40.73	9.44	50.17	105.23	-55.06
5720.00	S	Peak	48.03	9.28	57.31	110.83	-53.52
5724.09	S	Peak	57.14	9.30	66.44	120.1548	-53.72
5725.00	E	Peak	55.48	9.30	64.78	122.23	-57.45

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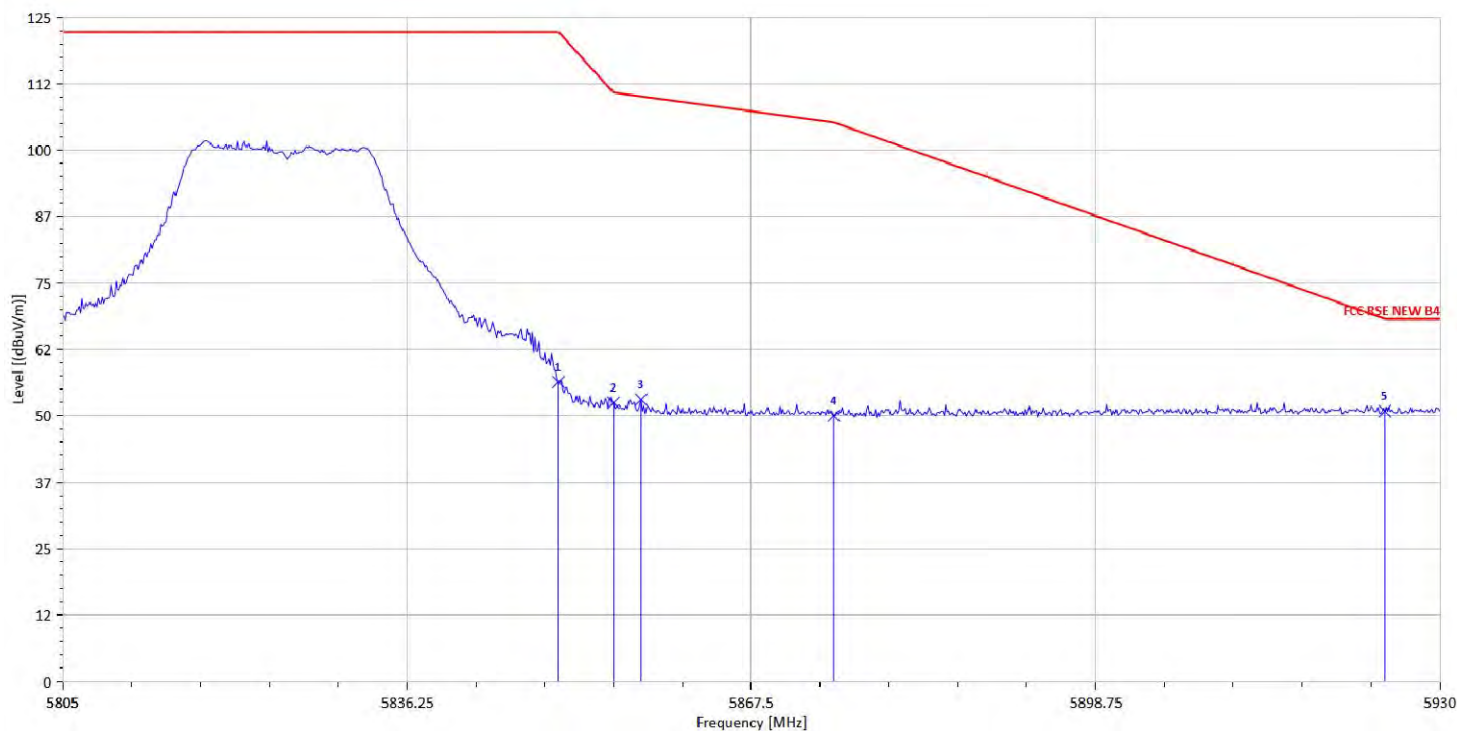
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Operation Mode : 802.11n20 Test Date : 2017/1/3
Fundamental Frequency : 5825 MHz Temp. / Humi. : 23.0deg_C/63RH
Operation Band : BE CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5850.00	E	Peak	46.86	9.49	56.34	122.23	-65.89
5855.00	S	Peak	42.89	9.58	52.47	110.83	-58.36
5857.50	S	Peak	43.43	9.63	53.06	110.13	-57.07
5875.00	S	Peak	40.39	9.63	50.02	105.23	-55.21
5925.00	S	Peak	40.84	10.01	50.86	68.23	-17.37

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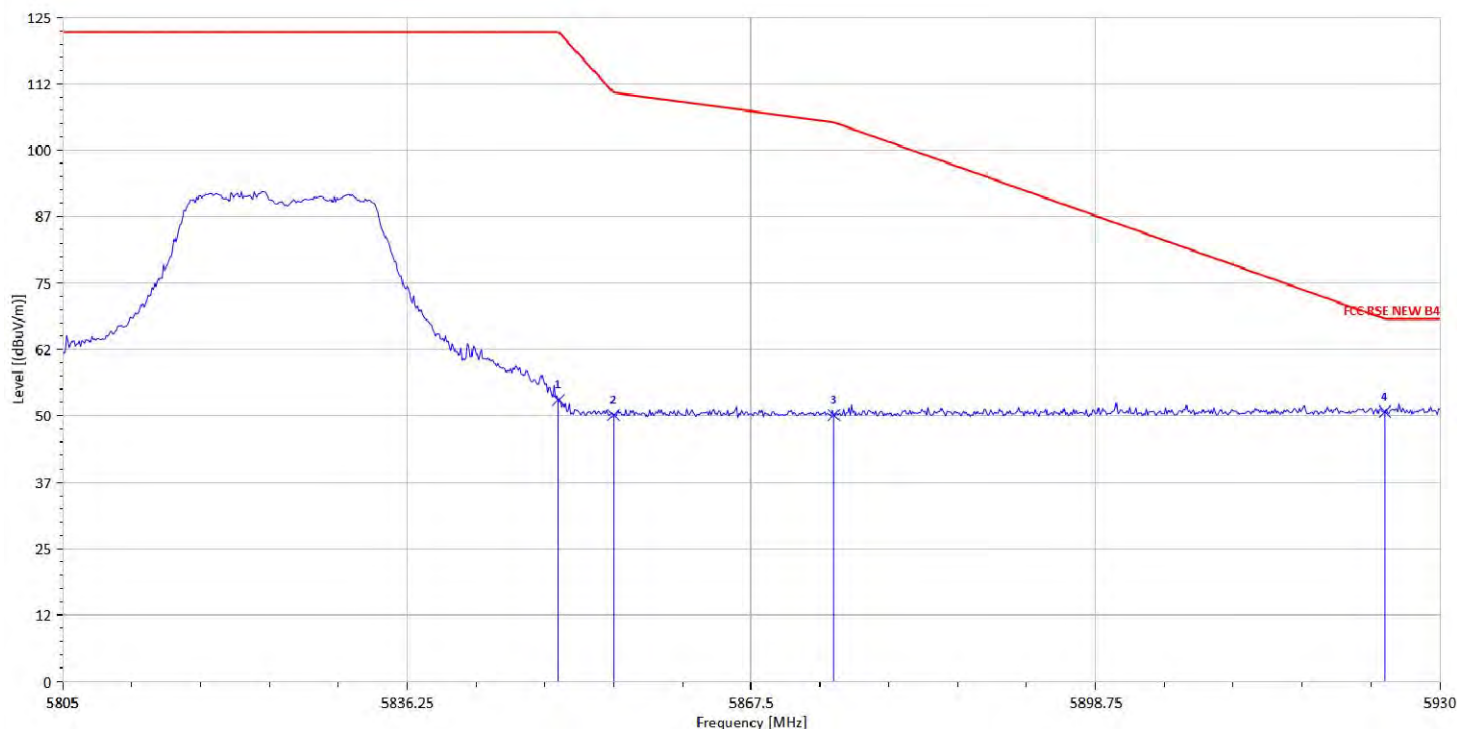
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Operation Mode : 802.11n20 Test Date : 2017/1/3
Fundamental Frequency : 5825 MHz Temp. / Humi. : 23.0deg_C/63RH
Operation Band : BE CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



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
5850.00	E	Peak	43.49	9.49	52.98	122.23	-69.25
5855.00	S	Peak	40.58	9.58	50.16	110.83	-60.67
5875.00	S	Peak	40.53	9.63	50.16	105.23	-55.07
5925.00	S	Peak	40.79	10.01	50.80	68.23	-17.43

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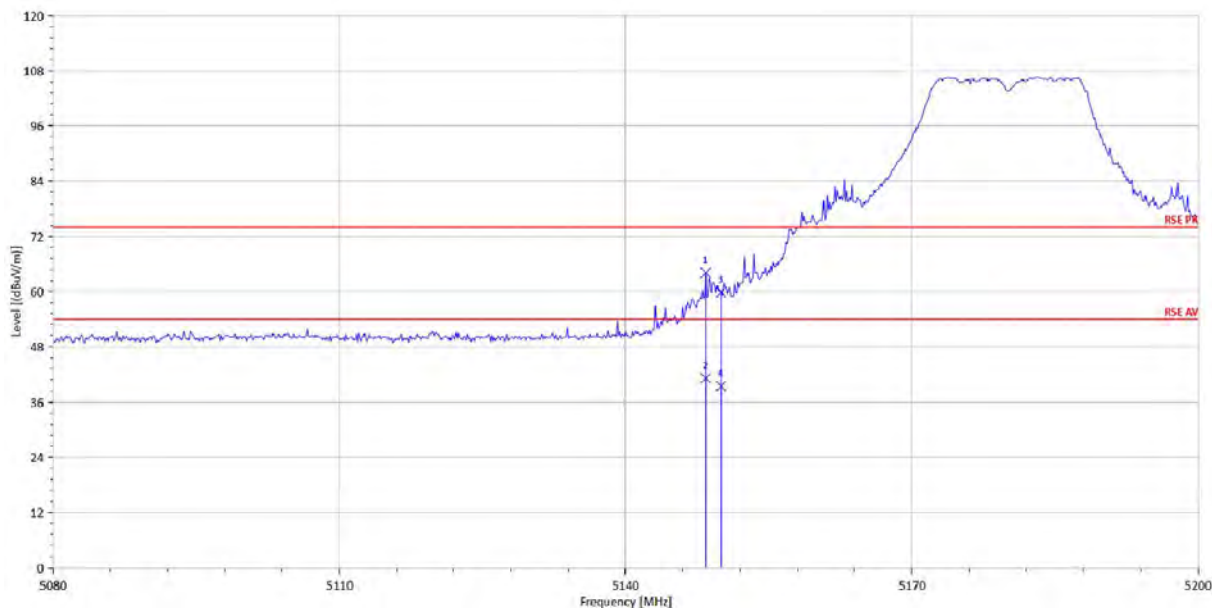
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11.11 Band edge falling to restricted band (IC)

802.11a mode

Operation Mode :	802.11a	Test Date :	2016/12/30
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE 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
5148.40	S	Peak	55.91	8.18	64.09	74	-9.91
5148.40	S	Average	32.98	8.18	41.16	54	-12.84
5150.00	E	Peak	51.66	8.19	59.85	74	-14.15
5150.00	E	Average	31.24	8.19	39.43	54	-14.57

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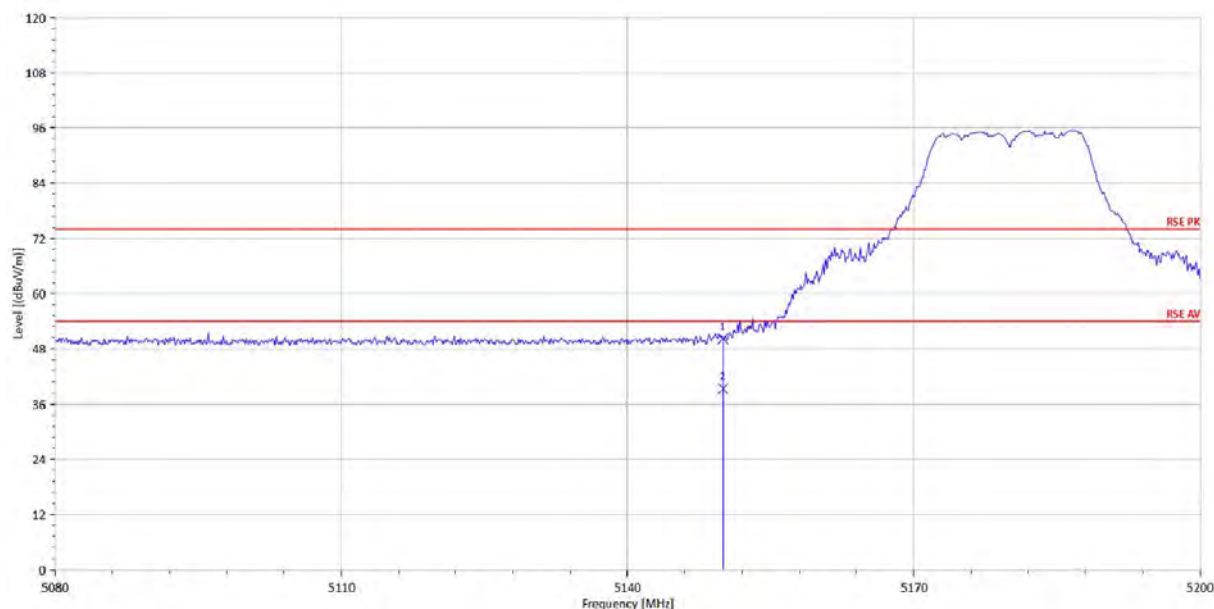
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Operation Mode :	802.11a	Test Date :	2016/12/30
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Peak	42.01	8.19	50.20	74	-23.80
5150.00	E	Average	31.13	8.19	39.32	54	-14.68

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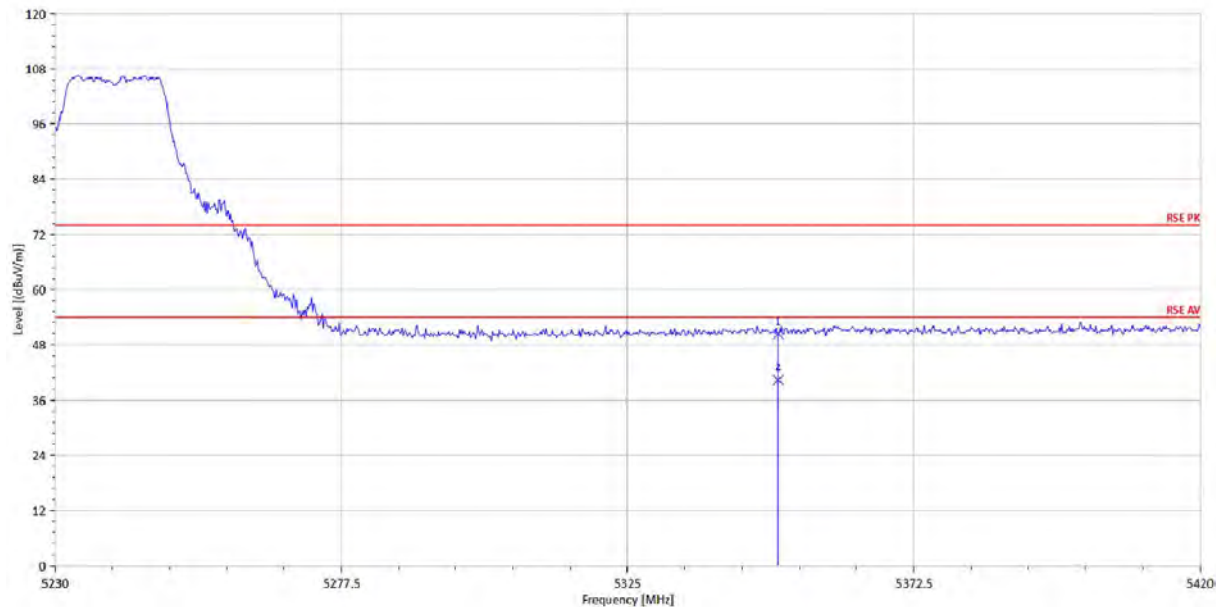
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Operation Mode : 802.11a Test Date : 2016/12/30
Fundamental Frequency : 5240 MHz Temp. / Humi. : 23.0deg_C/63RH
Operation Band : BE CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



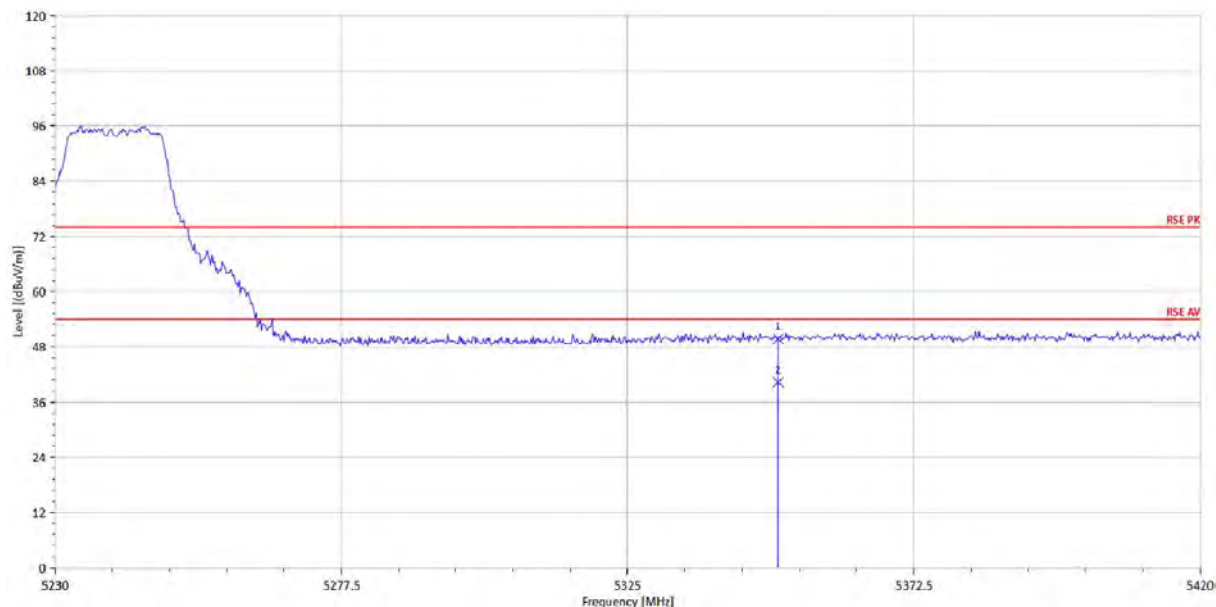
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5350.00	E	Peak	41.39	8.96	50.36	74	-23.64
5350.00	E	Average	31.38	8.96	40.34	54	-13.66

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Operation Mode :	802.11a	Test Date :	2016/12/30
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



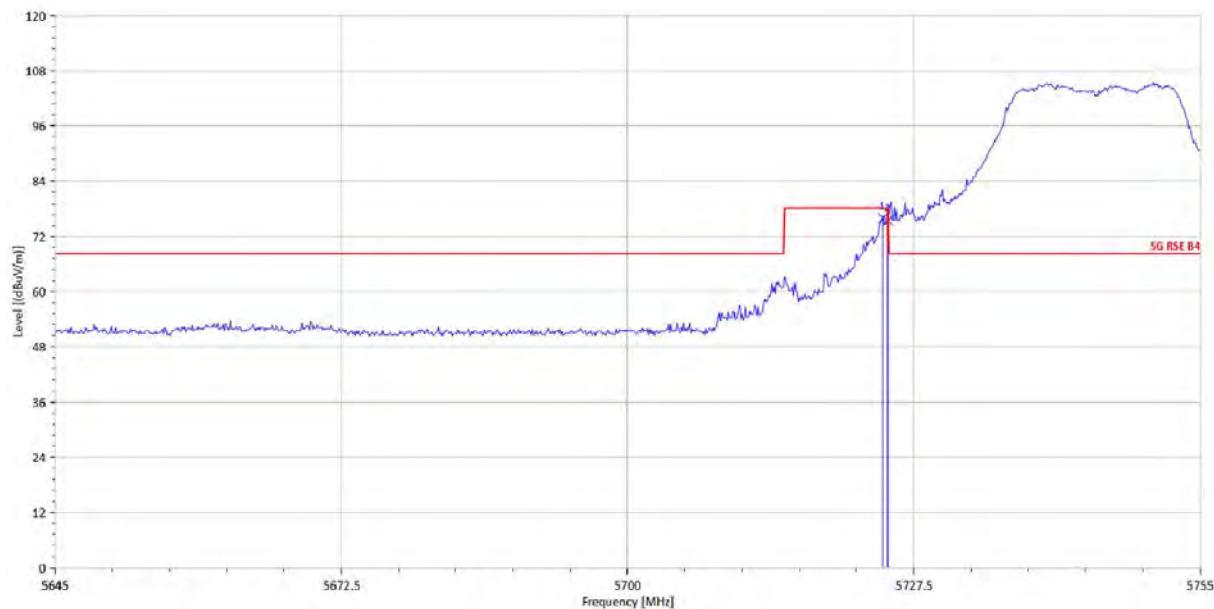
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5350.00	E	Peak	40.79	8.96	49.75	74	-24.25
5350.00	E	Average	31.32	8.96	40.28	54	-13.72

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Operation Mode :	802.11a	Test Date :	2016/12/30
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5724.53	S	Peak	66.66	9.30	75.96	78.2	-2.24
5725.00	E	Peak	66.14	9.30	75.44	78.2	-2.76

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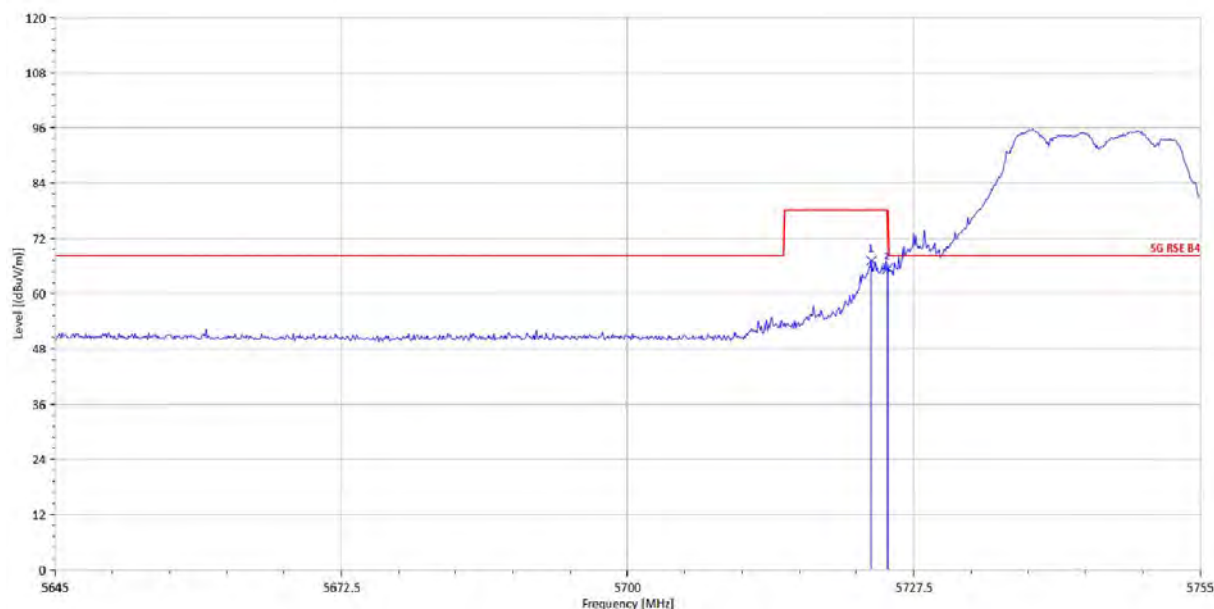
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Operation Mode :	802.11a	Test Date :	2016/12/30
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
5723.43	S	Peak	57.82	9.29	67.11	78.2	-11.09
5725.00	E	Peak	56.15	9.30	65.45	78.2	-12.75

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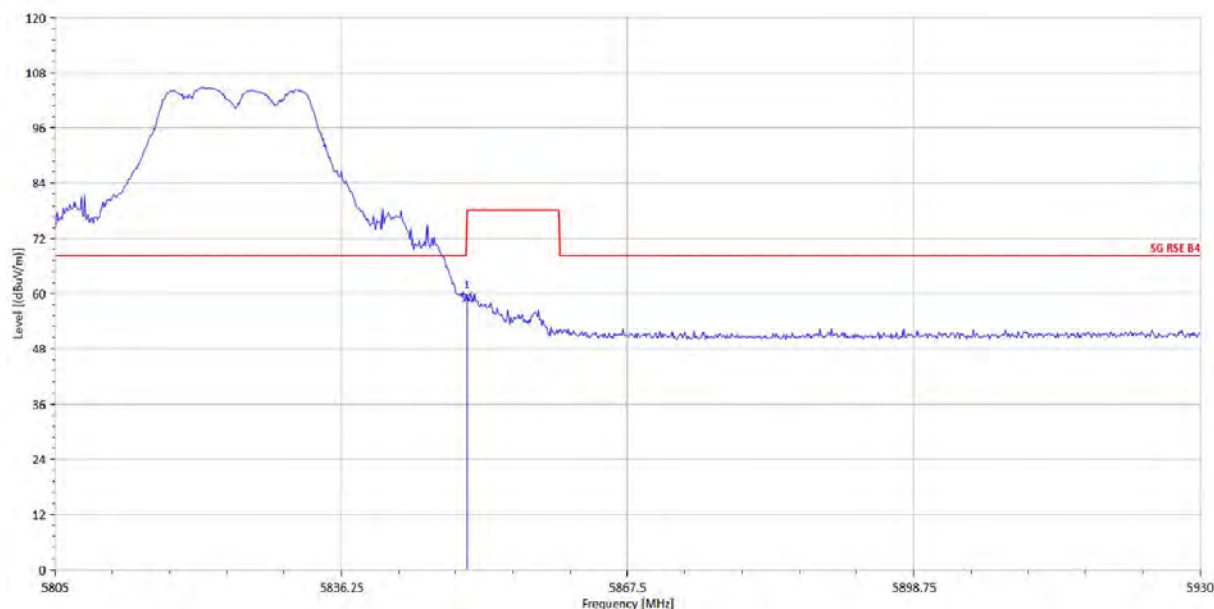
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Operation Mode :	802.11a	Test Date :	2016/12/30
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5850.00	E	Peak	49.77	9.49	59.25	78.2	-18.95

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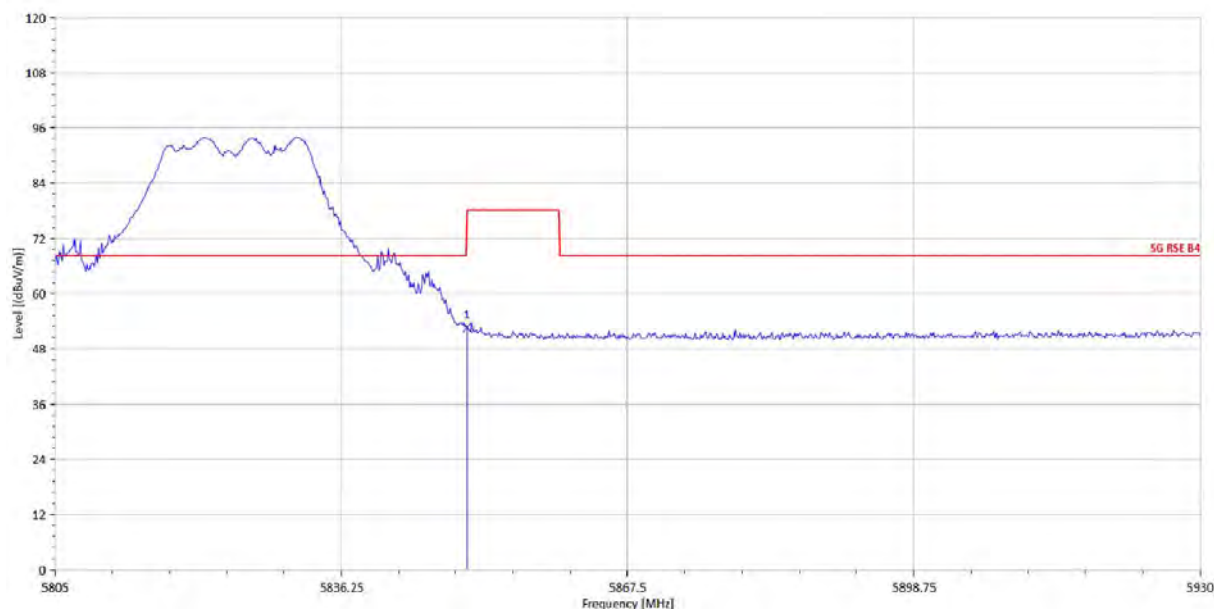
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Operation Mode :	802.11a	Test Date :	2016/12/30
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5850.00	E	Peak	43.19	9.49	52.68	78.2	-25.52

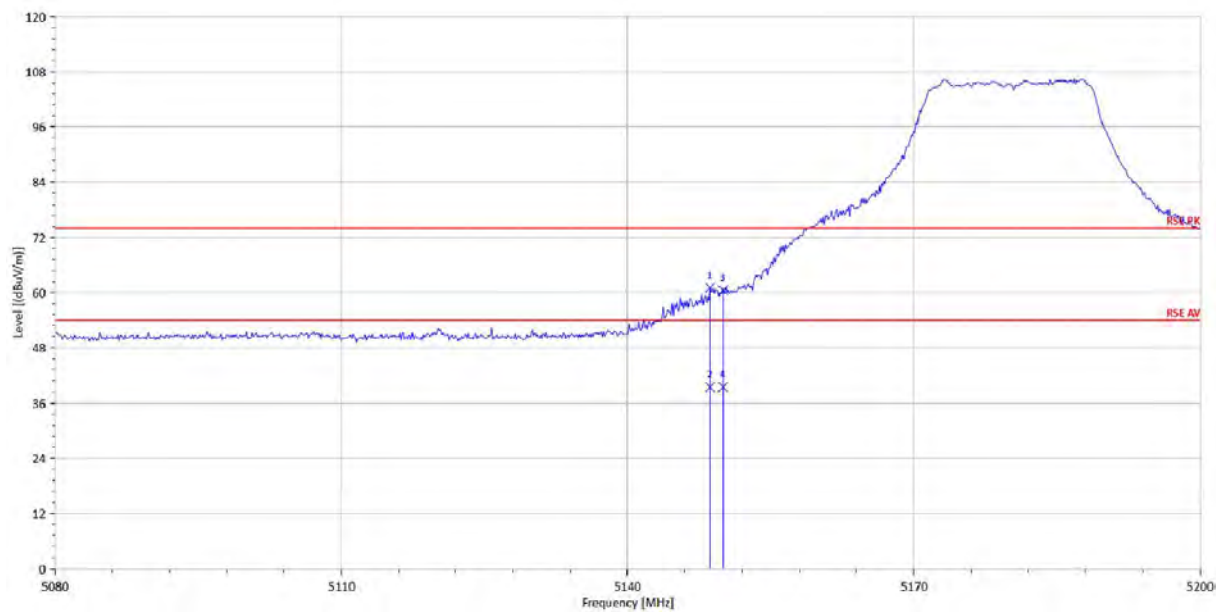
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802.11n20 HT mode

Operation Mode :	802.11n20	Test Date :	2016/12/30
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5148.64	S	Peak	52.92	8.18	61.10	74	-12.90
5148.64	S	Average	31.27	8.18	39.45	54	-14.55
5150.00	E	Peak	52.34	8.19	60.53	74	-13.47
5150.00	E	Average	31.28	8.19	39.47	54	-14.53

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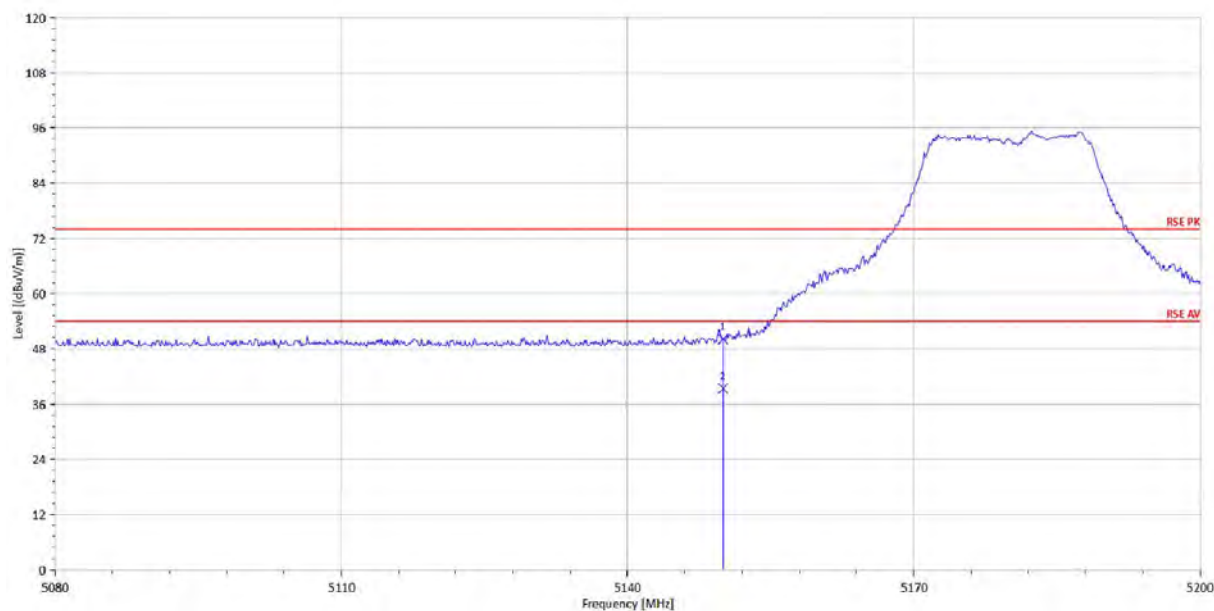
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Operation Mode :	802.11n20	Test Date :	2016/12/30
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



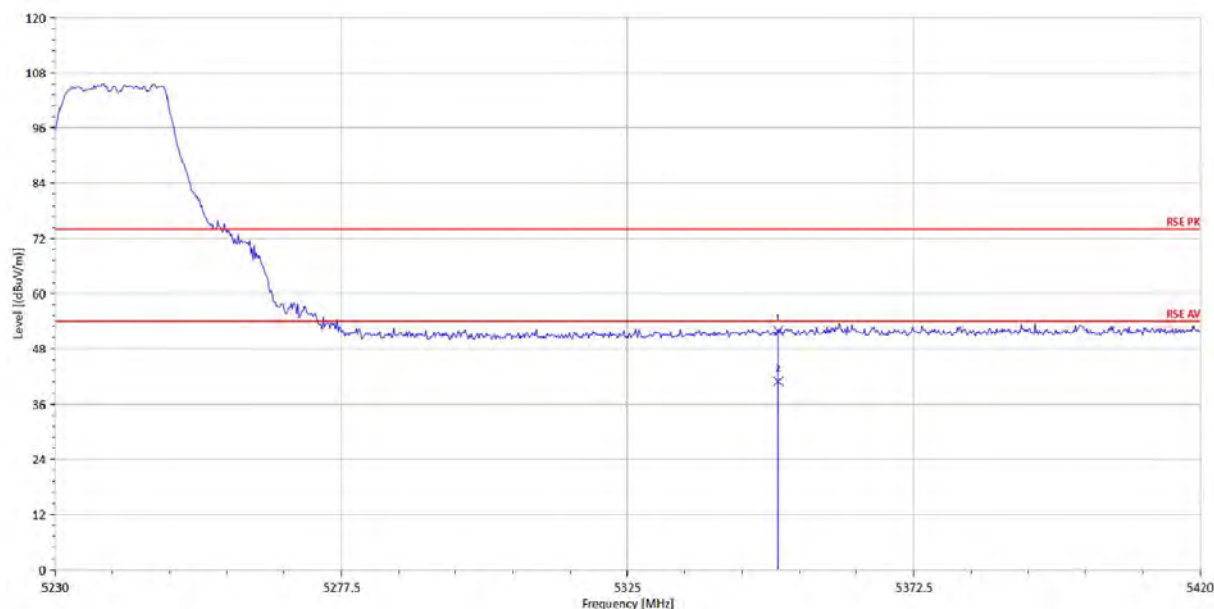
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Peak	41.91	8.19	50.10	74	-23.90
5150.00	E	Average	31.20	8.19	39.39	54	-14.61

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Operation Mode :	802.11n20	Test Date :	2016/12/30
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5350.00	E	Peak	42.97	8.96	51.94	74	-22.06
5350.00	E	Average	31.97	8.96	40.93	54	-13.07

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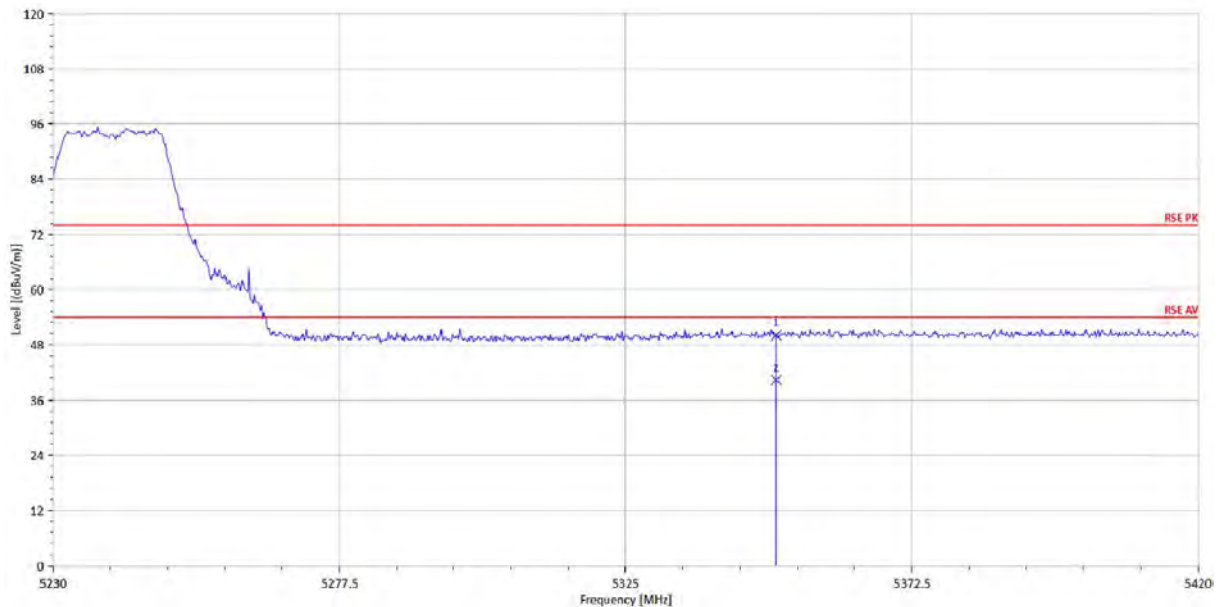
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Operation Mode :	802.11n20	Test Date :	2016/12/30
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



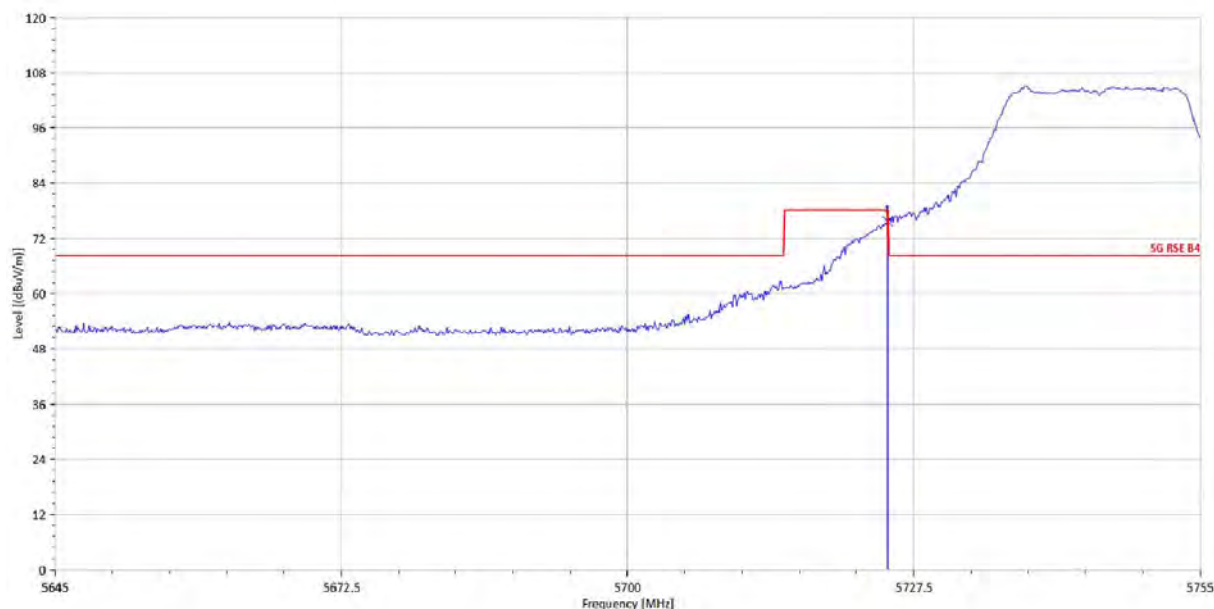
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5350.00	E	Peak	41.12	8.96	50.09	74	-23.91
5350.00	E	Average	31.37	8.96	40.33	54	-13.67

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Operation Mode :	802.11n20	Test Date :	2016/12/30
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5725.00	E	Peak	66.40	9.30	75.70	78.2	-2.50

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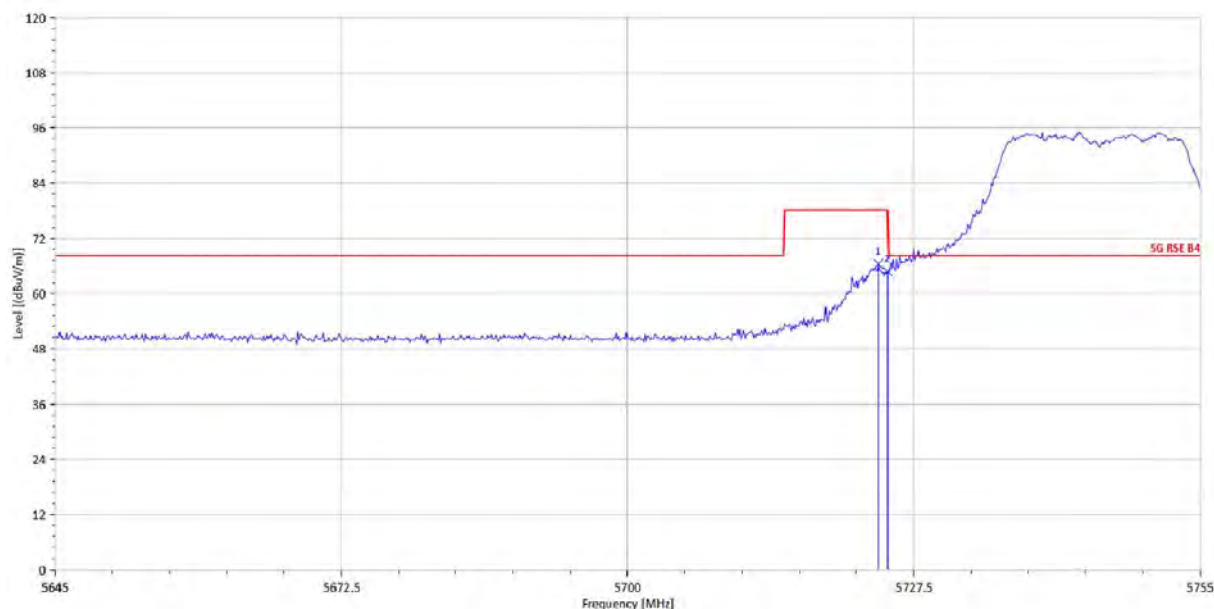
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Operation Mode :	802.11n20	Test Date :	2016/12/30
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



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
5724.09	S	Peak	57.14	9.30	66.44	78.2	-11.76
5725.00	E	Peak	55.48	9.30	64.78	78.2	-13.42

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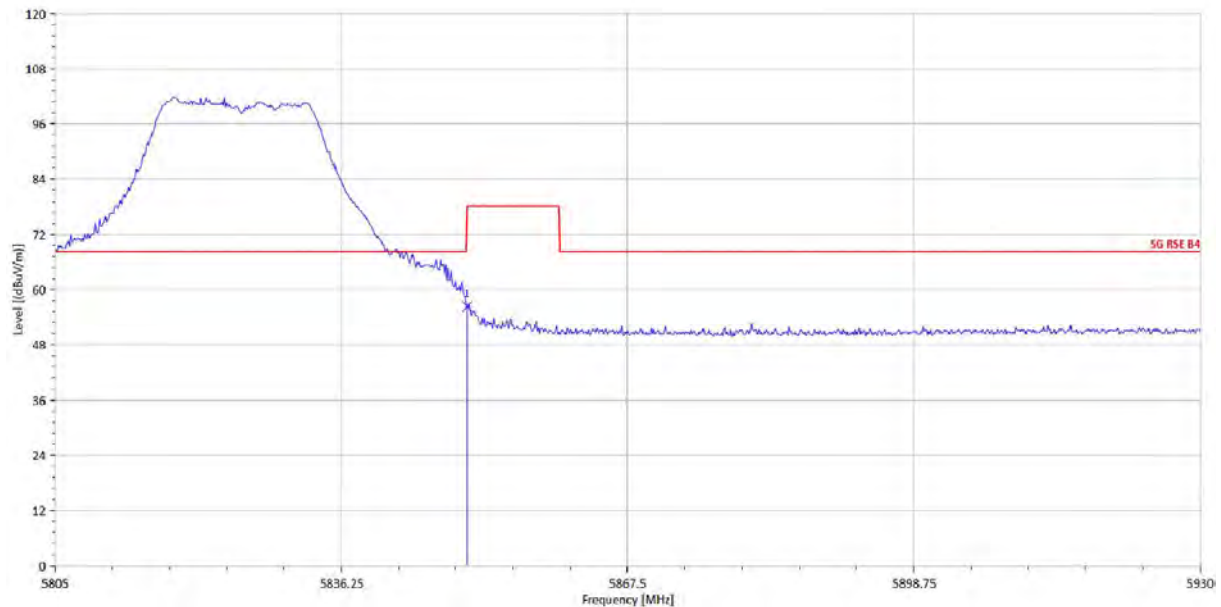
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Operation Mode :	802.11n20	Test Date :	2016/12/30
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



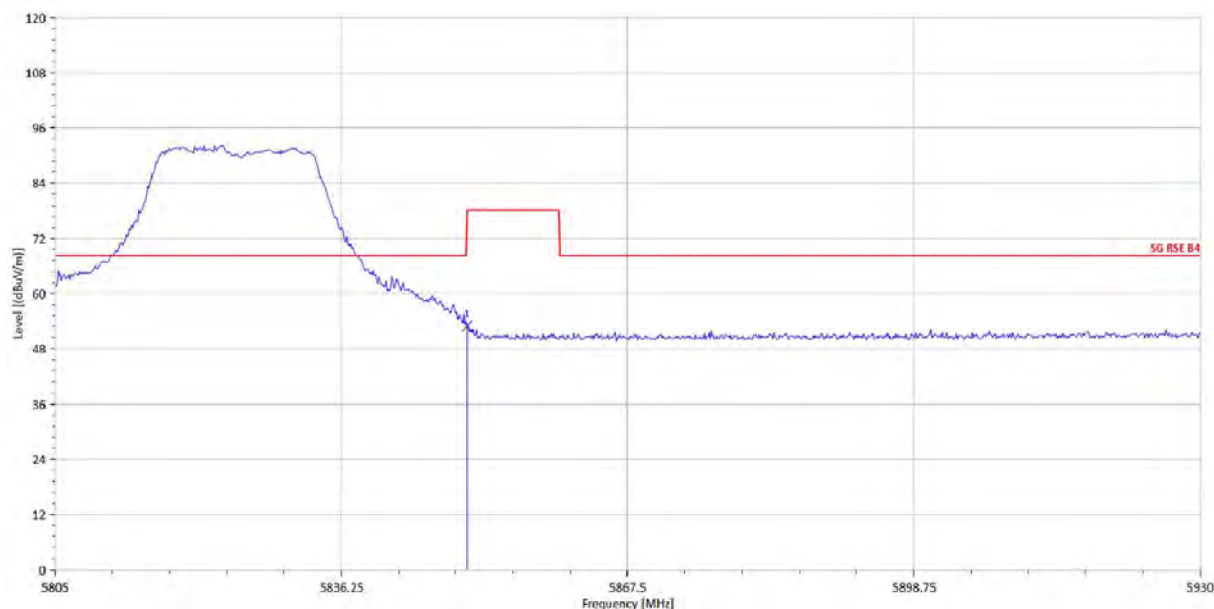
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
5850.00	E	Peak	46.86	9.49	56.34	78.2	-21.86

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Fundamental Frequency :	5825 MHz	Temp. / Humi. :	23.0deg_C/63RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
5850.00	E	Peak	43.49	9.49	52.98	78.2	-25.22

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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

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

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13 FREQUENCY STABILITY

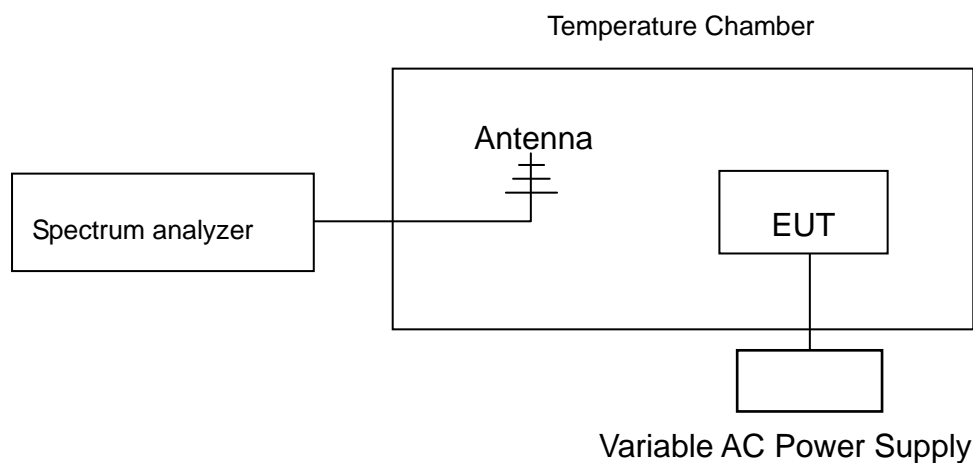
13.1 Standard Applicable

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

13.2 Measurement Procedure

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

13.3 Test SET-UP



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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
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/12/2016	12/11/2017
DC Block	PASTERNAK	PE8210	RF29	12/12/2016	12/11/2017
Attenuator	WOKEN	218FS-10	RF23	12/12/2016	12/11/2017
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/16/2016	06/15/2017

13.5 Measurement Result

Operation Mode	802.11 a	Test Date	2016.12.05.
Temperature	:21	Test By	Wayne
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0	240V	36	5180	5,179.94000	0.00001158
		44	5220	5,219.92000	0.00001533
		48	5240	5,239.90000	0.00001908
		149	5745	5,744.92000	0.00001393
		157	5785	5,784.92000	0.00001383
		165	5825	5,824.92000	0.00001373
	100V	36	5180	5,179.94000	0.00001158
		44	5220	5,219.92000	0.00001533
		48	5240	5,239.92000	0.00001527
		149	5745	5,744.92000	0.00001393
		157	5785	5,784.90000	0.00001729
		165	5825	5,824.92000	0.00001373

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25	230V	36	5180	5,179.94000	0.00001158
		44	5220	5,219.94000	0.00001149
		48	5240	5,239.92000	0.00001527
		149	5745	5,744.94000	0.00001044
		157	5785	5,784.90000	0.00001729
		165	5825	5,824.92000	0.00001373
40	240V	36	5180	5,179.96000	0.00000772
		44	5220	5,219.94000	0.00001149
		48	5240	5,239.94000	0.00001145
		149	5745	5,744.94000	0.00001044
		157	5785	5,784.96000	0.00000691
		165	5825	5,824.92000	0.00001373
	100V	36	5180	5,179.98000	0.00000386
		44	5220	5,219.92000	0.00001533
		48	5240	5,239.94000	0.00001145
		149	5745	5,744.96000	0.00000696
		157	5785	5,784.94000	0.00001037
		165	5825	5,824.96000	0.00000687

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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.

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

~ End of Report ~

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