

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT

OF

Applicant: Acer Incorporated
8F, 88 Sec. 1, Hsin Tai Wu Rd. Hsichih Taipei Hsien 221,
Taiwan

Product Name: Acer Wireless Projection-Kit

Brand Name: acer

Model No.: UWA4

Model Difference: N/A

FCC ID: HLZUWA4

Report Number: ER/2018/20001

FCC Rule Part: §15.407, Cat: NII

Issue Date: Apr. 09, 2018

Date of Test: Feb. 01, 2018 ~ Mar. 28, 2018

Date of EUT Received: Feb. 01, 2018

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.

Tested By:

Marcus Tseng

Marcus Tseng / Engineer

Approved By:

Jim Chang

Jim Chang / Manager



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Revision History

Report Number	Revision	Description	Effectuated Page	Issue Date	Revised By
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1 GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	Acer Wireless Projection-Kit
Brand Name:	acer
Model No.:	UWA4
Model Difference:	N/A
Software version:	00-033000-01[F/W, WL-8211-V1]
Hardware version:	289G133000-B0
Power Supply:	5Vdc from USB Port

WLAN 5GHz:

Wi-Fi 802.11	Frequency Range	Channels	Rated Power (Avg.)	Modulation Technology
a	5150~5250	4	17.16 dBm	OFDM
	5725-5850	5	15.75dBm	
n_HT ac_VHT 20M	5150~5250	4	HT: 17.35 dBm	OFDM
	5725-5850	5	HT: 16.03 dBm	
n_HT ac_VHT 40M	5150~5250	2	HT: 17.25dBm	OFDM
	5725-5850	2	HT: 16.3dBm	
ac_VHT 80M	5150-5350	1	17.13dBm	OFDM
	5725-5850	1	16.12dBm	
Antenna Designation:	PIFA Antenna, Peak Gain:4.7 dBi (5150~5250MHz) 4.7 dBi (5725~5850MHz)			
Modulation type	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only			
Transition Rate:	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 144.4Mbps 802.11 n_40MHz: 13.5 – 300Mbps 802.11 ac_20MHz: 6.5 –144.4Mbps 802.11 ac_40MHz: 13.5 –300Mbps 802.11 ac_80MHz: 29.3 – 650Mbps			

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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

FCC KDB 644545 D03 Guidance for IEEE 802.11ac

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: 509634 / TW0001

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

2.3.2 Radiated Emissions

The EUT is a placed on as turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plan. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

2.4 Measurement Results Explanation Example

For all conducted test items:

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

Note:

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

Offset = RF cable loss (1.7dB)+ attenuation factor(10dB) =11.7(dB)

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2.5 Configuration of T ested System

**Fig. 2-1 Conducted Emission Configura-
tion**



**Fig 2-2 Conducted Emission Configura-
tion**



Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1	Notebook	DELL	E5400	3704625136	Shielded	Unshielded
2	Bluetooth Test Software	N/A	N/A	N/A	N/A	N/A

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3 SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	26 dB & 6dB & 99% Emission Bandwidth	Compliant
§15.407(a)	Maximum Conducted Output Power	Compliant
§15.407(a)	Power Spectral Density	Compliant
§15.407(b)	Undesirable Radiated Emissions	Compliant
§15.407(c)	Transmission in case of Absence of Information	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.203 §15.407(a)	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operated in U-NII Bands

Operated band in 5150 MHz ~5250 MHz:

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

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

802.11ac VHT80 Mode	
channel	Frequency
42	5210

Operated band in 5725 MHz ~5850 MHz:

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

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

802.11ac VHT80 Mode	
channel	Frequency
155	5775

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.

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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	Main
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Main
RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	Main
802.11n_HT20				OFDM	MCS0	Main
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS0	Main
802.11ac_VHT80	5210	42	42	OFDM	MCS8	Main
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Main
802.11n_HT20				OFDM	MCS0	Main
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS0	Main
802.11ac_VHT80	5775	155	155	OFDM	MCS8	Main

Note:

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

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	Main
802.11n_HT20				OFDM	MCS0	Main
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS0	Main
802.11ac_VHT80	5210	42	42	OFDM	MCS8	Main
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Main
802.11n_HT20				OFDM	MCS0	Main
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS0	Main
802.11ac_VHT80	5775	155	155	OFDM	MCS8	Main

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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	ESC17	100760	06/06/2017	06/05/2018
Coaxial Cables	N/A	WK CE Cable	N/A	01/02/2018	01/01/2019
Notebook	Lenovo	T440P	P0000564	N/A	N/A
LISN	SCHWARZBECK	NSLK 8127	8127-649	05/22/2017	05/21/2018

6.3 EUT Setup

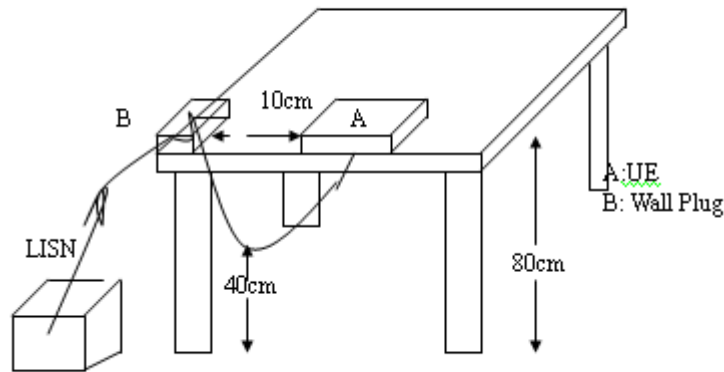
1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz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

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6.4 Test SET-UP



6.5 Measurement Procedure

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

6.6 Measurement Result

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

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

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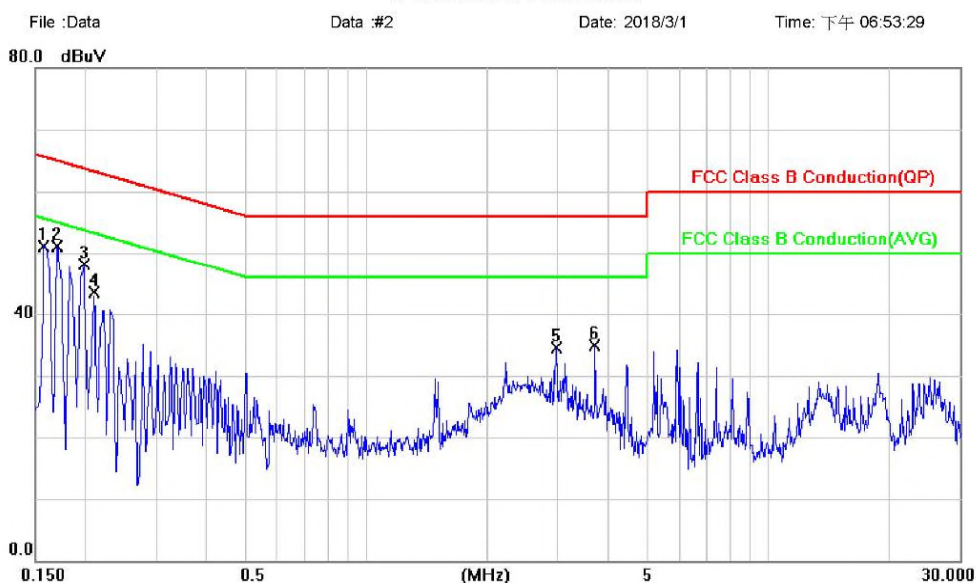
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Operation Mode: operation mode	Test By: Tin
--------------------------------	--------------

Site Conduction Room Phase: **L1** Temperature: 20 °C
 Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 58 %
 Mode: Operation
 Note:

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1580	51.20	0.00	51.20	65.57	-14.37	peak	
2	*	0.1700	51.07	0.00	51.07	64.96	-13.89	peak	
3		0.1980	48.10	0.00	48.10	63.69	-15.59	peak	
4		0.2100	43.43	0.00	43.43	63.21	-19.78	peak	
5		2.9700	34.42	0.03	34.45	56.00	-21.55	peak	
6		3.7140	34.80	0.06	34.86	56.00	-21.14	peak	

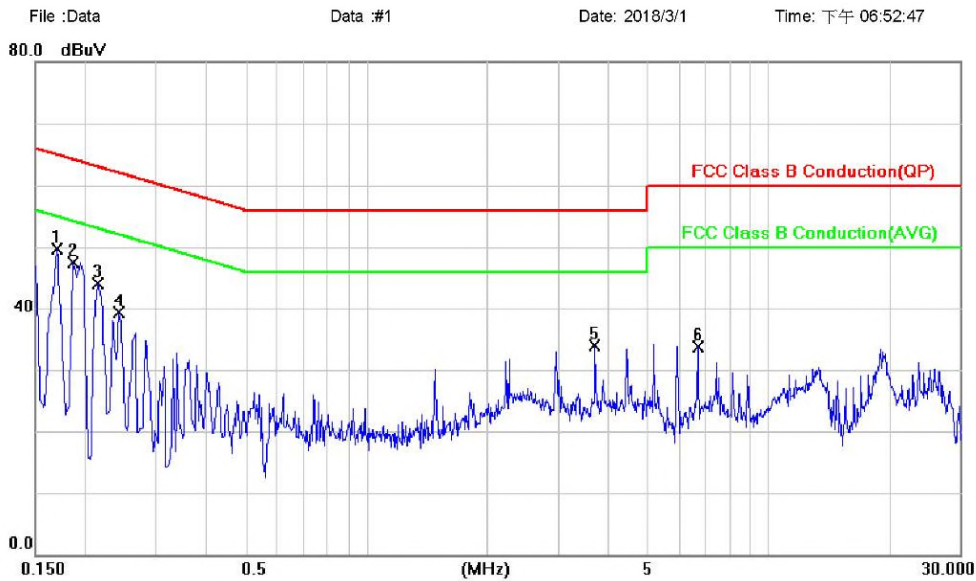
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Site: Conduction Room	Phase: N	Temperature: 20 ℃
Limit: FCC Class B Conduction(QP)	Power: AC 120V/60Hz	Humidity: 58 %
Mode: Operation		
Note:		

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.1700	49.70	0.00	49.70	64.96	-15.26	peak	
2		0.1860	47.54	0.00	47.54	64.21	-16.67	peak	
3		0.2140	44.05	0.00	44.05	63.05	-19.00	peak	
4		0.2420	39.34	0.00	39.34	62.03	-22.69	peak	
5		3.7100	33.84	0.06	33.90	56.00	-22.10	peak	
6		6.6780	33.52	0.10	33.62	60.00	-26.38	peak	

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7 DUTY CYCLE TEST SIGNAL

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

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

Formula:

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

Measurement Procedure:

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

Duty Cycle:

Mode	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11a	96.21	0.17	0.72	1.00
802.11n_20	89.86	0.46	0.77	1.00
802.11n_40	79.86	0.82	1.56	2.00
802.11ac_80	79.79	0.65	3.08	4.00

Duty Cycle Factor: $10 * \log(1/0.9621) = 0.17$

Duty Cycle Factor: $10 * \log(1/0.8986) = 0.46$

Duty Cycle Factor: $10 * \log(1/0.7986) = 0.98$

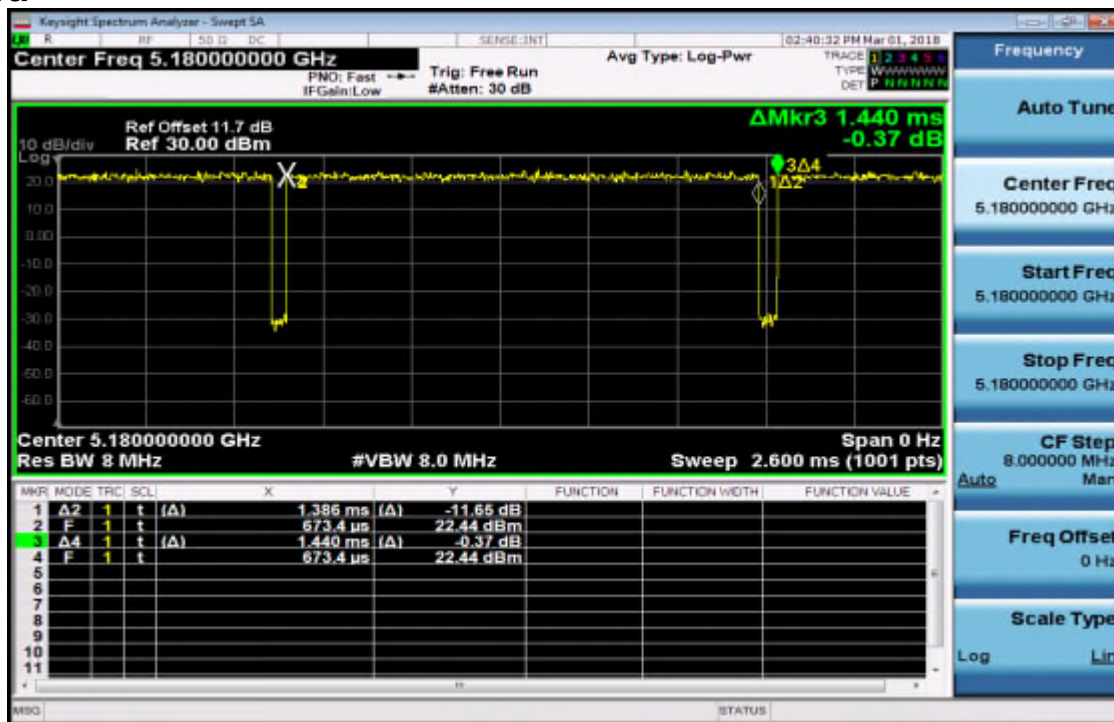
Duty Cycle Factor: $10 * \log(1/0.7979) = 0.98$

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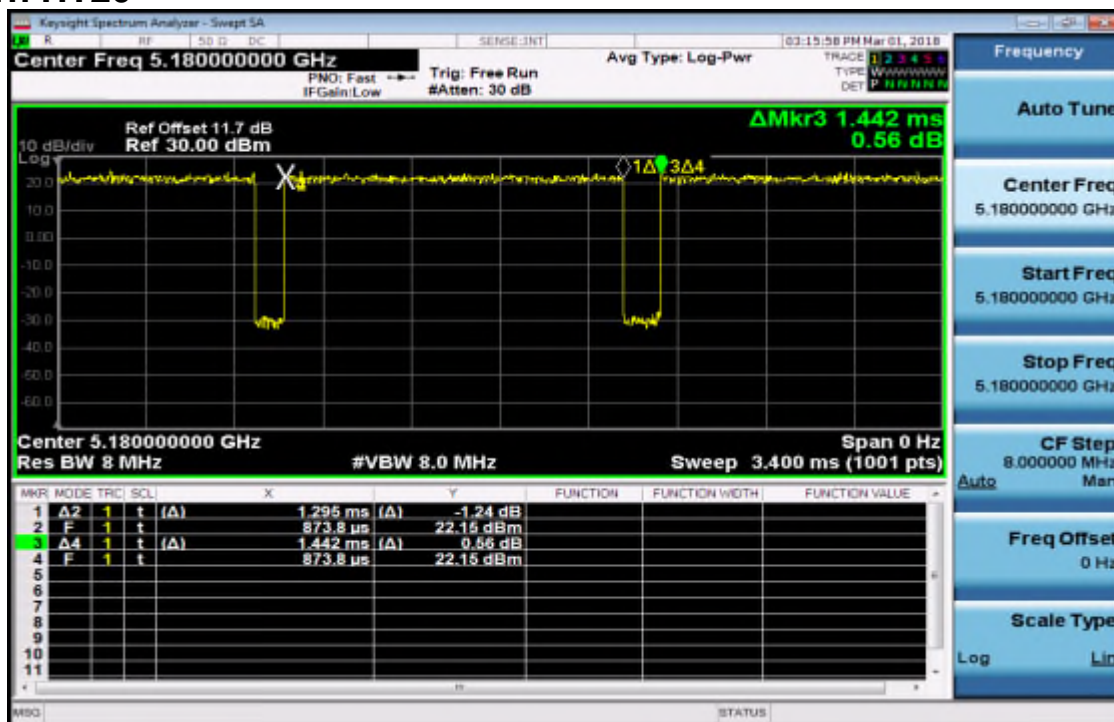
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DUTY CYCLE TEST SIGNAL Measurement Result 802.11a



802.11n HT20

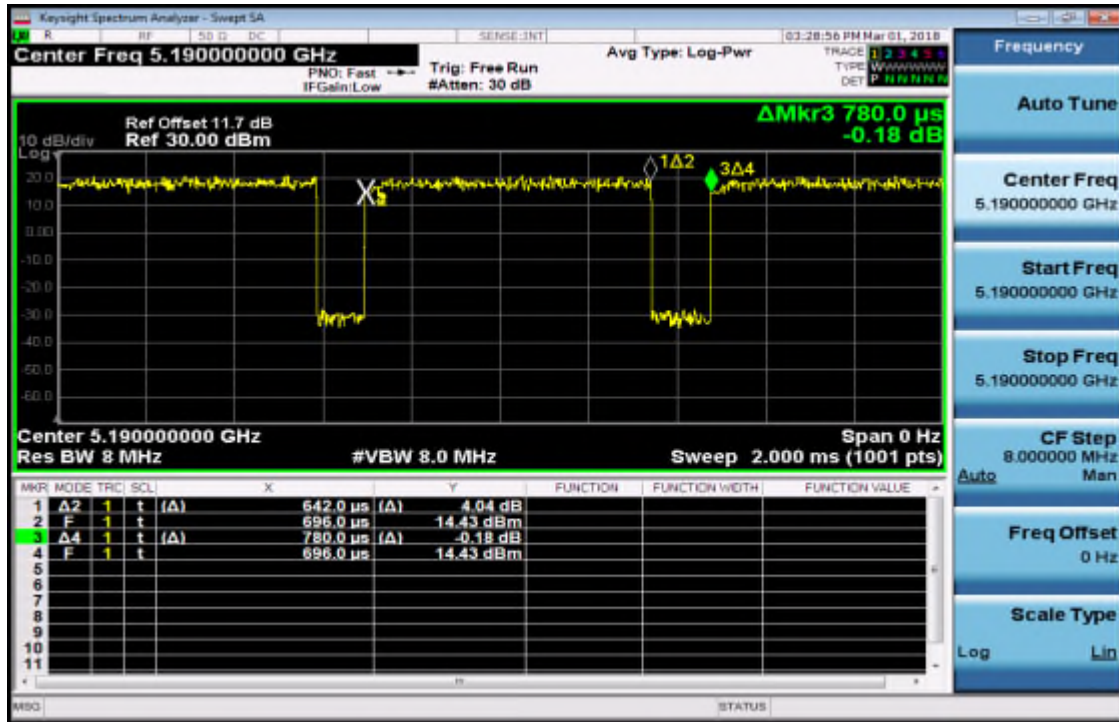


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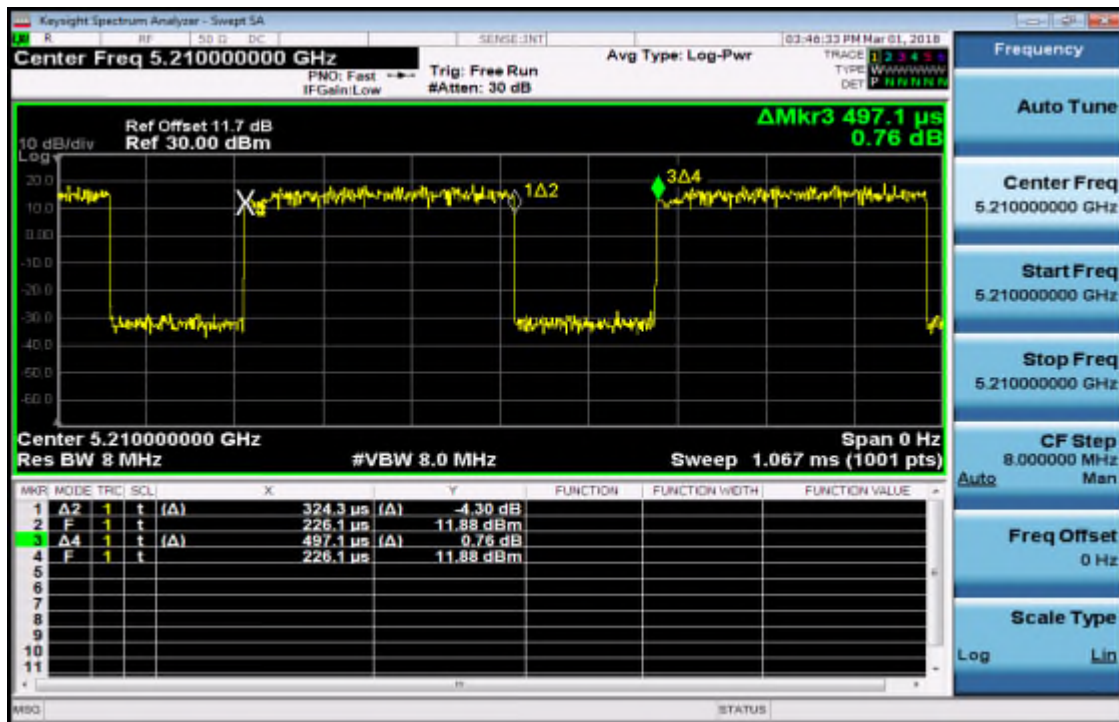
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802.11n HT 40



802.11ac VHT 80



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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.
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.

8.3 Measurement Equipment Used

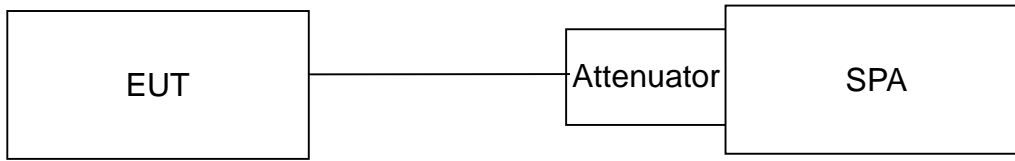
SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EXA Spectrum Analyzer	Agilent	N9010A	MY54200716	10/16/2017	10/15/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2018	01/01/2019
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2018	01/01/2019
Notebook	Lenovo	T440P	P0000564	N/A	N/A

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8.4 Test Set-up



8.5 Measurement Result

26dB and 6dB Bandwidth

802.11a_Main

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.30	12.856
5220	19.47	12.894
5240	19.77	12.960

802.11a_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.39	12.146
5785	16.38	12.143
5825	16.39	12.146

802.11a_Main

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.43	< 5250
5745	5736.66	> 5725

802.11n_HT20_Main

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	20.30	13.074
5220	20.23	13.060
5240	20.97	13.216

802.11n_HT20_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.56	12.445
5785	17.57	12.448
5825	17.57	12.448

802.11n_HT20_Main

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5249.03	< 5250
5745	5736.09	> 5725

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802.11n_HT40_Main

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	39.63	15.980
5230	39.89	16.009

802.11n_HT40_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	36.08	15.573
5795	35.91	15.552

802.11n_HT40_Main

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5230	5248.12	< 5250
5755	5736.82	> 5725

802.11ac_VHT80_Main

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	100.00	20.000

802.11ac_VHT80_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.16	18.760

802.11ac_VHT80_Main

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5210	5247.56	< 5250
5775	5737.44	> 5725

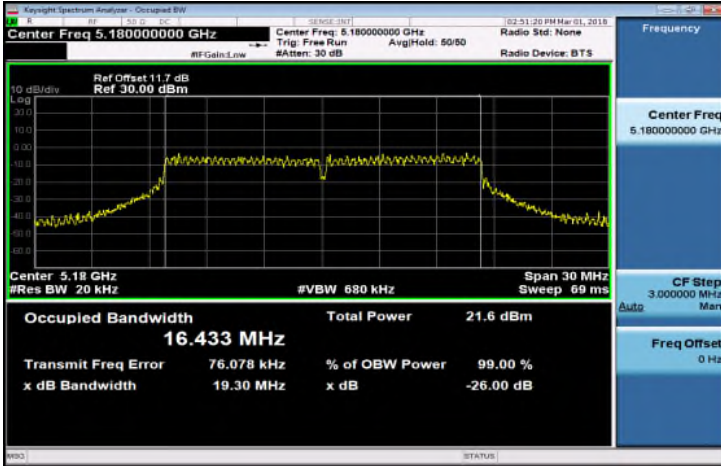
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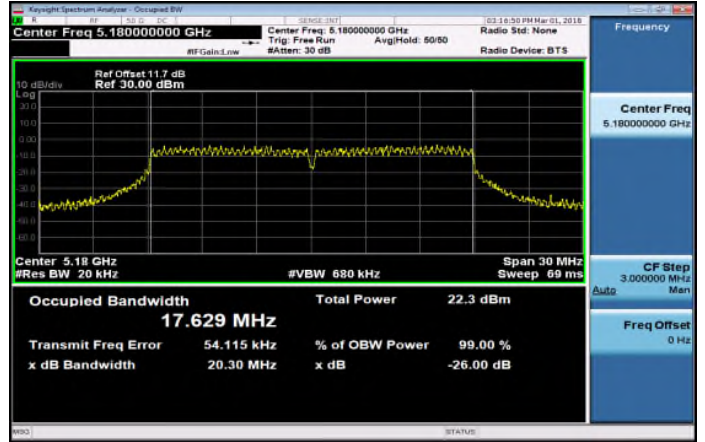
802.11a, 5150~5250 MHz

26dB Band Width Test Data CH-Low (5180MHz)

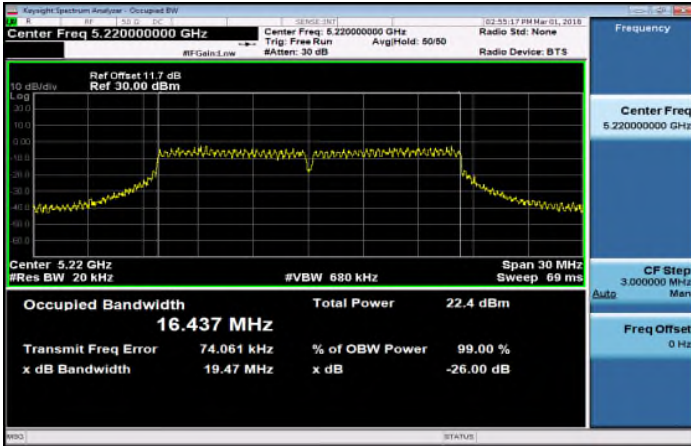


802.11n HT20, 5150~5250 MHz

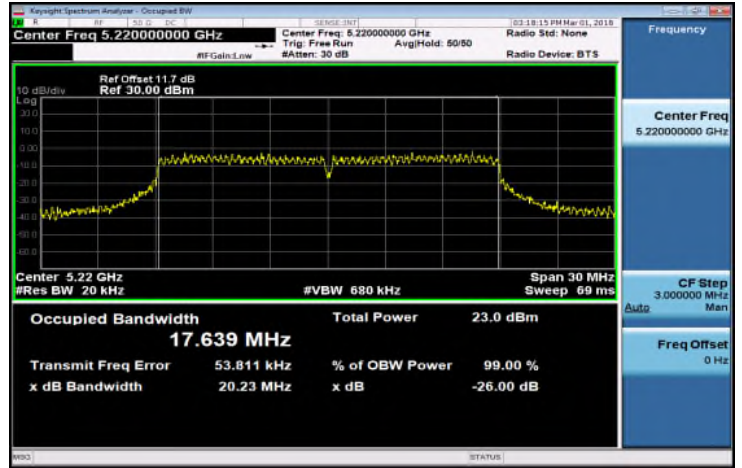
26dB Band Width Test Data CH-Low (5180 MHz)



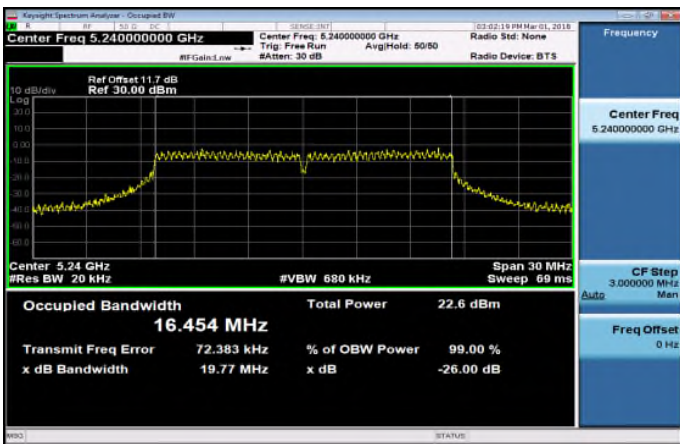
26dB Band Width Test Data CH-Mid (5220MHz)



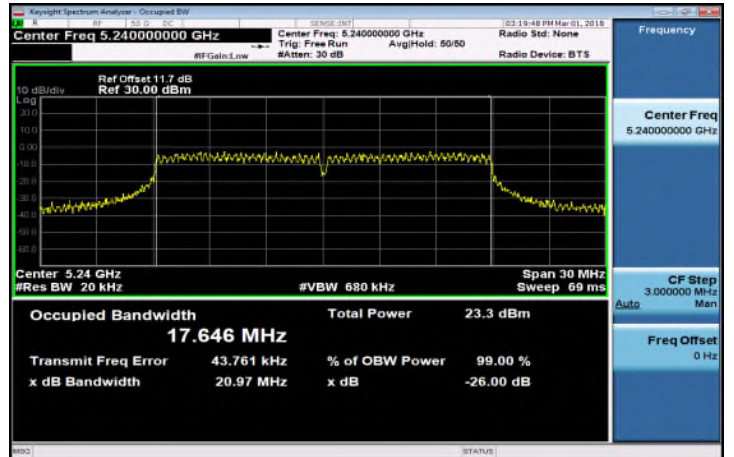
26dB Band Width Test Data CH-Mid (5220 MHz)



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



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

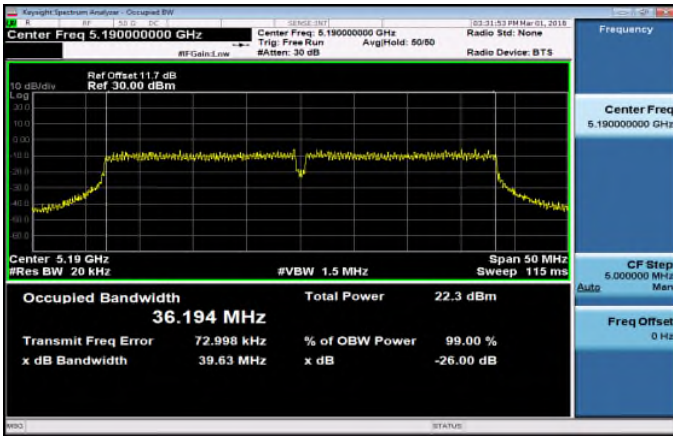


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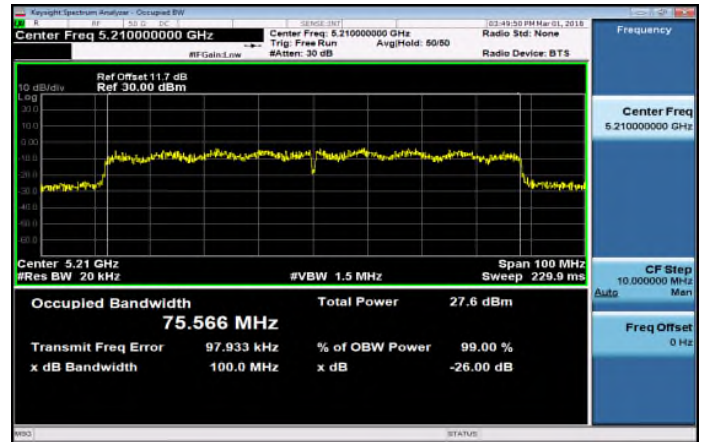
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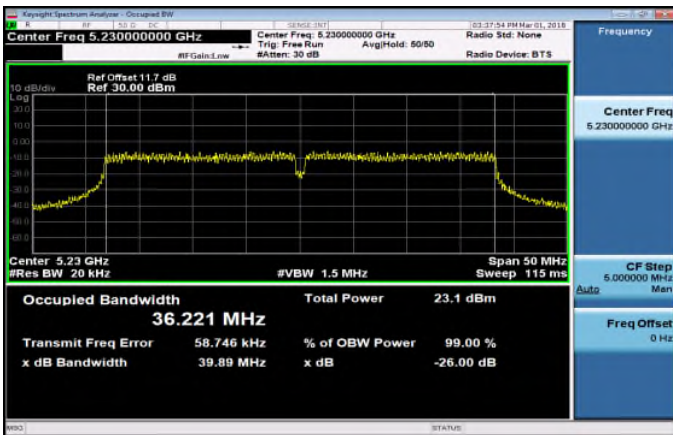
802.11n HT40, 5150~5250 MHz
26dB Band Width Test Data CH-Low (5190 MHz)



802.11ac VHT80, 5150~5250 MHz
26dB Band Width Test Data CH-Mid (5210 MHz)



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

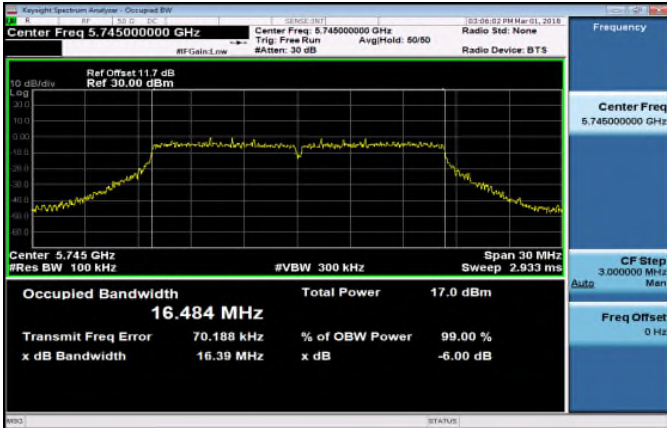


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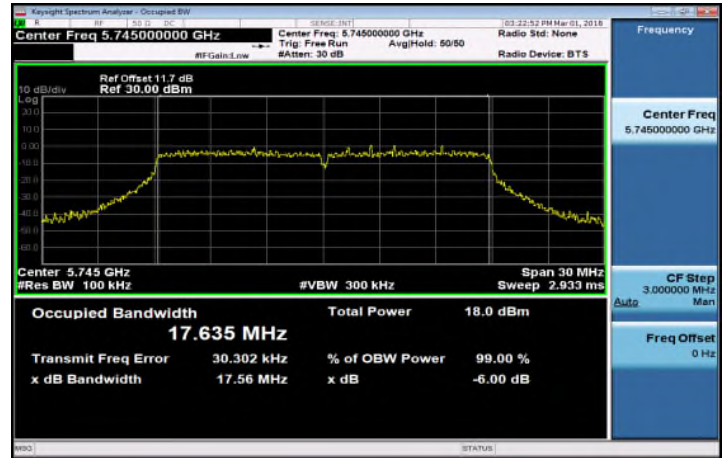
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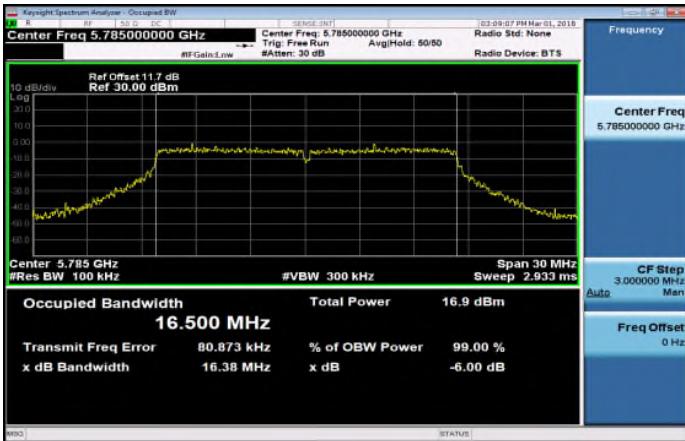
6dB Band Width measure with Peak detector for FCC
802.11a, 5725~5850 MHz
6dB Band Width Test Data CH-Low (5745 MHz)



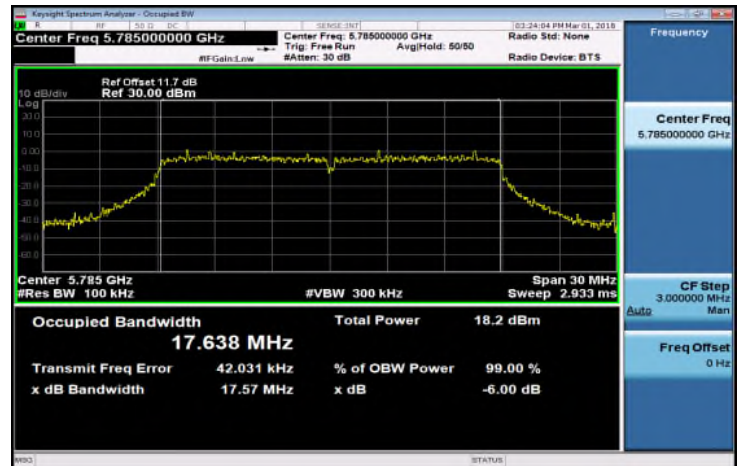
802.11n_HT20, 5725~5850 MHz
6dB Band Width Test Data CH-Low (5745 MHz)



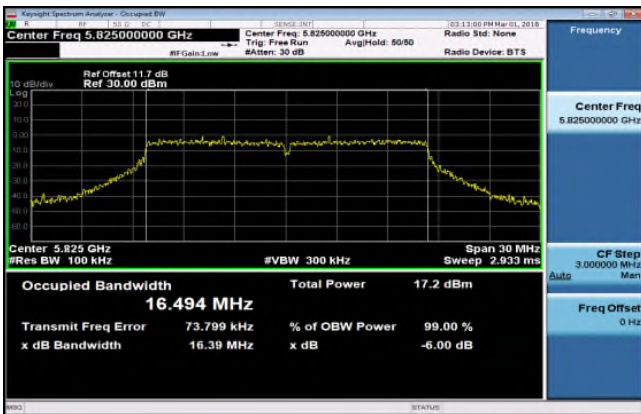
6dB Band Width Test Data CH-Mid (5785 MHz)



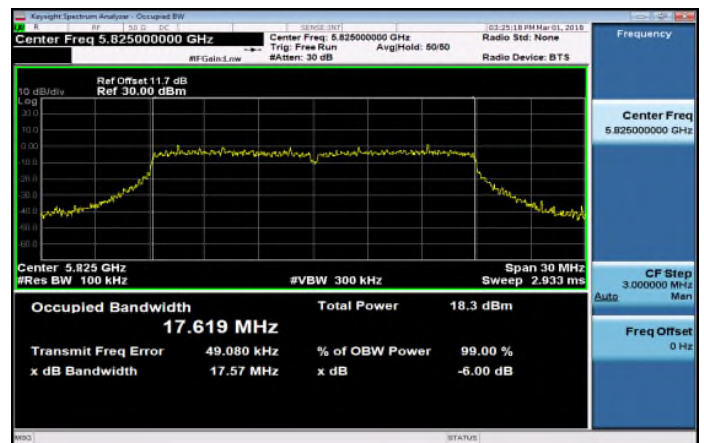
6dB Band Width Test Data CH-Mid (5785 MHz)



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



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



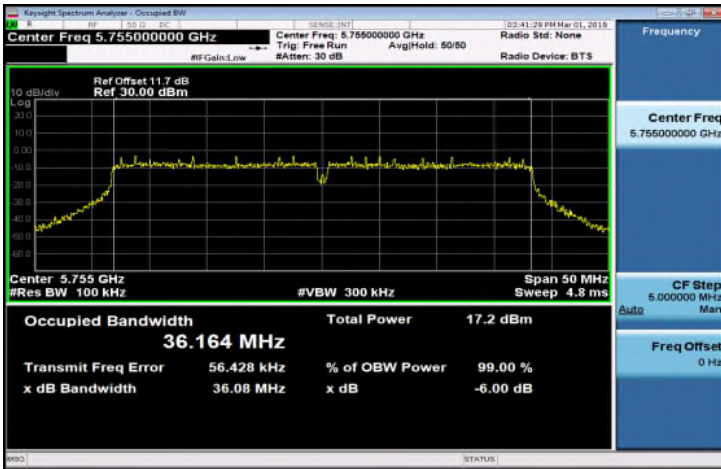
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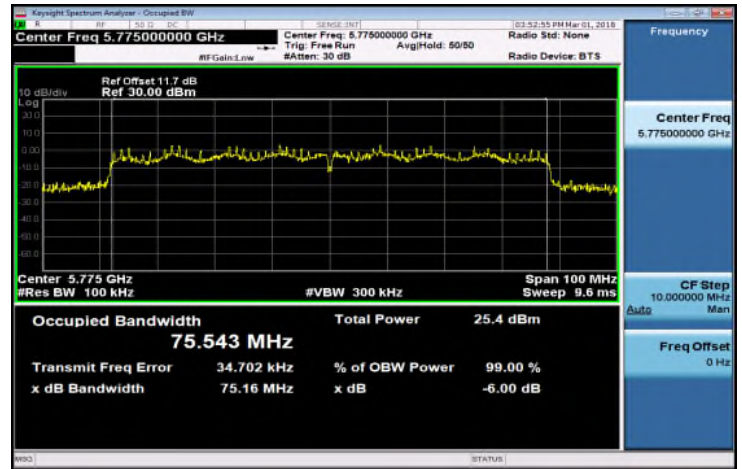
802.11n_HT40, 5725~5850 MHz

6dB Band Width Test Data CH-Low (5755 MHz)

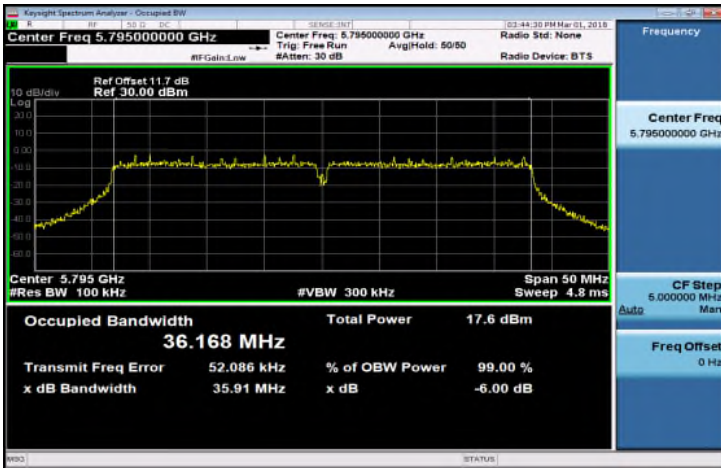


802.11ac_VHT80, 5725~5850 MHz

6dB Band Width Test Data CH-Low (5775 MHz)



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



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9 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

9.1 Standard Applicable

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

If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the direction-al 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.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
4. Power Meter is used as the auxiliary test equipment to conduct the output power measurement.
5. Record the max. reading and add $10 \log(1/\text{duty cycle})$.
6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

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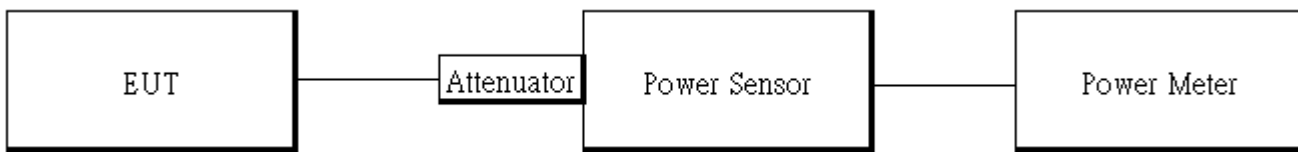
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9.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Power Meter	Anritsu	ML2496A	1242004	10/16/2017	10/15/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2018	01/01/2019
Notebook	Lenovo	T440P	P0000564	N/A	N/A

9.4 Test Set-up



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9.5 Measurement Result

Conducted output power (FCC)

802.11a_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	17.16	51.973	30	PASS
44	5220	6	16.95	49.520	30	PASS
48	5240	6	17.05	50.673	30	PASS
149	5745	6	15.75	37.565	30	PASS
157	5785	6	15.52	35.627	30	PASS
165	5825	6	15.66	36.794	30	PASS

802.11n_HT20_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	17.35	54.379	30	PASS
44	5220	MCS0	17.13	51.693	30	PASS
48	5240	MCS0	17.30	53.757	30	PASS
149	5745	MCS0	16.03	40.127	30	PASS
157	5785	MCS0	15.69	37.105	30	PASS
165	5825	MCS0	15.82	38.233	30	PASS

802.11n_HT40_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	17.25	53.125	30	PASS
46	5230	MCS0	17.21	52.638	30	PASS
151	5755	MCS0	16.30	42.687	30	PASS
159	5795	MCS0	16.19	41.620	30	PASS

802.11ac_VHT80_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
42	5210	MCS0	17.13	51.669	30	PASS
155	5775	MCS0	16.12	40.948	30	PASS

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10 PEAK POWER SPECTRAL DENSITY

10.1 Standard Applicable

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

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

10.2 Measurement Procedure

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

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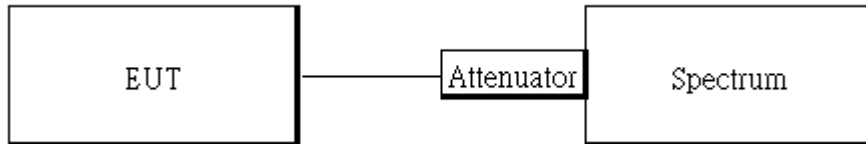
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10.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EXA Spectrum Analyzer	Agilent	N9010A	MY54200716	10/16/2017	10/15/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2018	01/01/2019
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2018	01/01/2019
Notebook	Lenovo	T440P	P0000564	N/A	N/A

10.4 Test Set-up



10.5 Measurement Result

POWER DENSITY 802.11a MODE					
Frequency (MHz)	PPSD W/O Duty Factor (dBm)	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5180	5.50	0.17	5.67	17	-11.33
5220	7.74	0.17	7.91	17	-9.09
5240	7.90	0.17	8.07	17	-8.93
5745	13.57	0.17	13.57	30	-16.43
5785	13.00	0.17	13.00	30	-17.00
5825	12.54	0.17	12.54	30	-17.46

POWER DENSITY 802.11n HT20 MODE					
Frequency (MHz)	PPSD W/O Duty Factor (dBm)	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5180	5.47	0.46	5.93	17	-11.07
5220	9.18	0.46	9.64	17	-7.36
5240	5.56	0.46	6.02	17	-10.98
5745	12.86	0.46	12.86	30	-17.14
5785	12.65	0.46	12.65	30	-17.35
5825	12.83	0.46	12.83	30	-17.17

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POWER DENSITY 802.11n HT40 MODE

Frequency (MHz)	PPSD W/O Duty Factor (dBm)	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5190	-0.09	0.82	0.73	17	-16.27
5230	2.31	0.82	3.13	17	-13.87
5755	9.55	0.82	9.55	30	-20.45
5795	9.75	0.82	9.75	30	-20.25

POWER DENSITY 802.11ac VHT80 MODE

Frequency (MHz)	PPSD W/O Duty Factor (dBm)	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5210	-4.08	0.65	-3.43	17	-20.43
5775	8.74	0.65	8.74	30	-21.26

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802.11a 5150~5250 MHz

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



802.11a 5725~5850 MHz

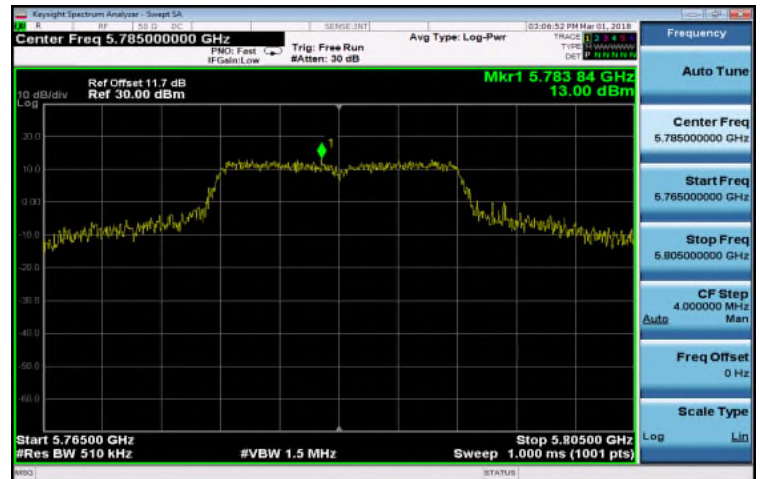
Peak Power Spectral Density Data Plot (CH Low 5745 MHz)



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



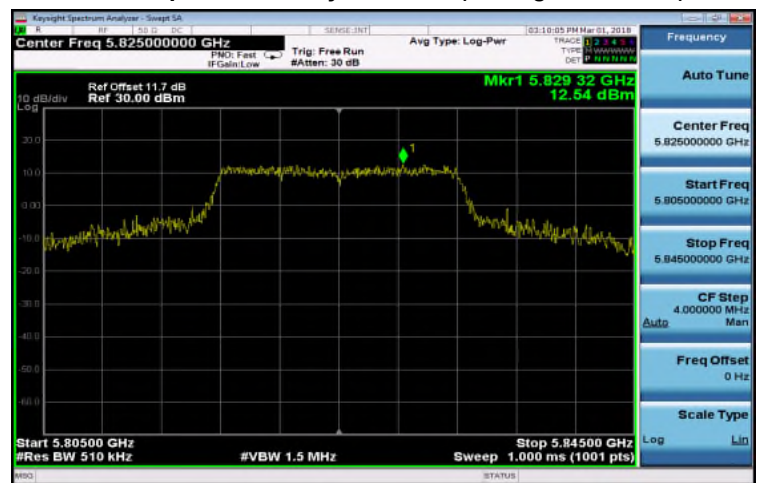
Peak Power Spectral Density Data Plot (CH Mid 5785 MHz)



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



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



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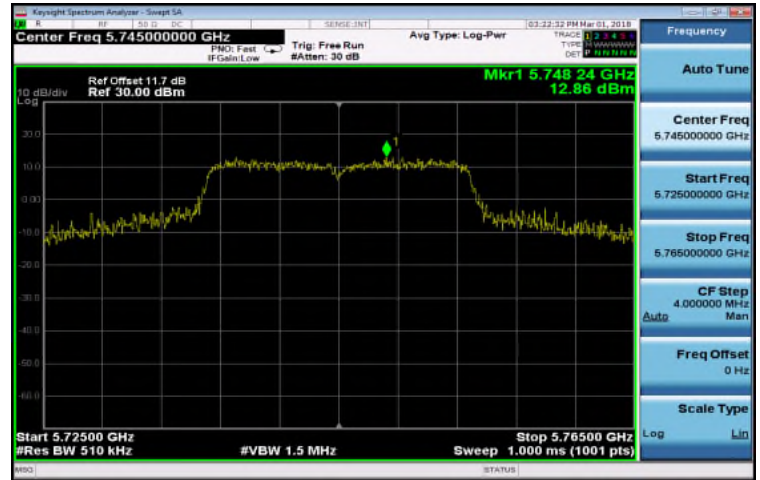
802.11n HT20, 5150~5250 MHz

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



802.11n HT20, 5725~5850 MHz

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



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



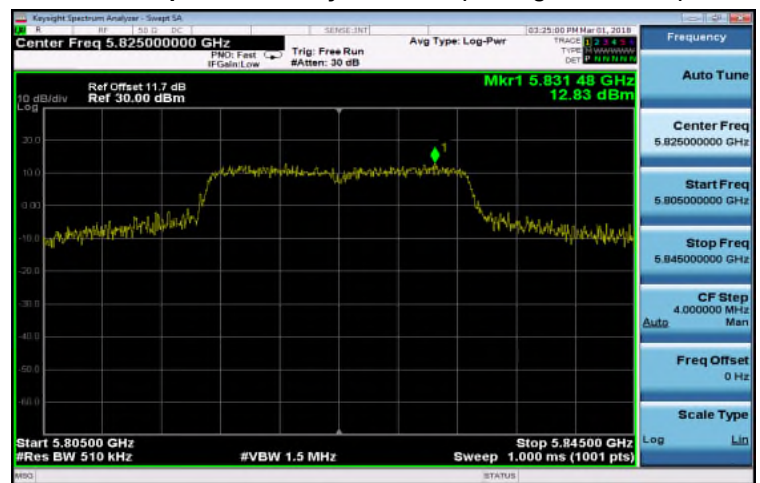
Peak Power Spectral Density Data Plot (CH Mid 5785 MHz)



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



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



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802.11n HT40, 5150~5250 MHz

Peak Power Spectral Density Data Plot (CH Low 5190 MHz)



802.11n HT40, 5725~5850 MHz

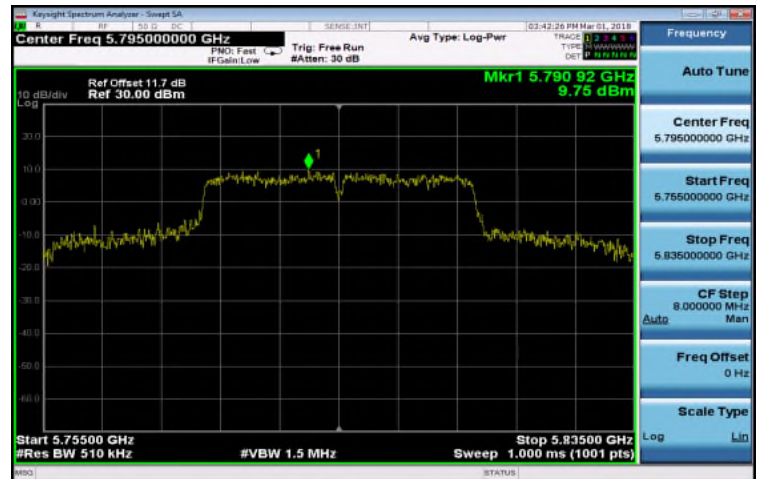
Peak Power Spectral Density Data Plot (CH Low 5755 MHz)



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



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



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802.11ac VHT80, 5150~5250 MHz

Peak Power Spectral Density Data Plot (CH Mid 5210 MHz)



802.11ac VHT80, 5725~5850 MHz

Peak Power Spectral Density Data Plot (CH Mid 5775 MHz)



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11 UNDESIRABLE RADIATED EMISSION MEASUREMENT1

11.1 Standard Applicable

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

1. For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
2. For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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

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

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

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

Note:

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

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11.2 Measurement Equipment Used

SGS SAC-III					
Name of Equip-ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Bi-log Antenna	SCHWAZBECK	VULB9168	378	12/29/2017	12/28/2018
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/04/2017	08/03/2018
Horn Antenna	Schwarzbeck	BBHA9170	184	12/12/2017	12/11/2018
Loop Antenna	ETS.LINDGREN	6502	148045	09/26/2017	09/25/2018
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/10/2017	05/09/2018
EMI Test Receiver	R&S	ESCI7	100760	06/06/2017	06/05/2018
Pre-Amplifier	HP	8449B	3008A00578	01/02/2018	01/01/2019
Pre-Amplifier	HP	8447D	2944A07676	01/02/2018	01/01/2019
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/02/2018	01/01/2019
Attenuator	Mini-Circuit	BW-S10W2+		01/02/2018	01/01/2019
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M1	01/02/2018	01/01/2019
Low Loss Cable	Huber Suhner	966_RX	9	01/02/2018	01/01/2019
Notebook	Lenovo	T440P	P0000564	N/A	N/A

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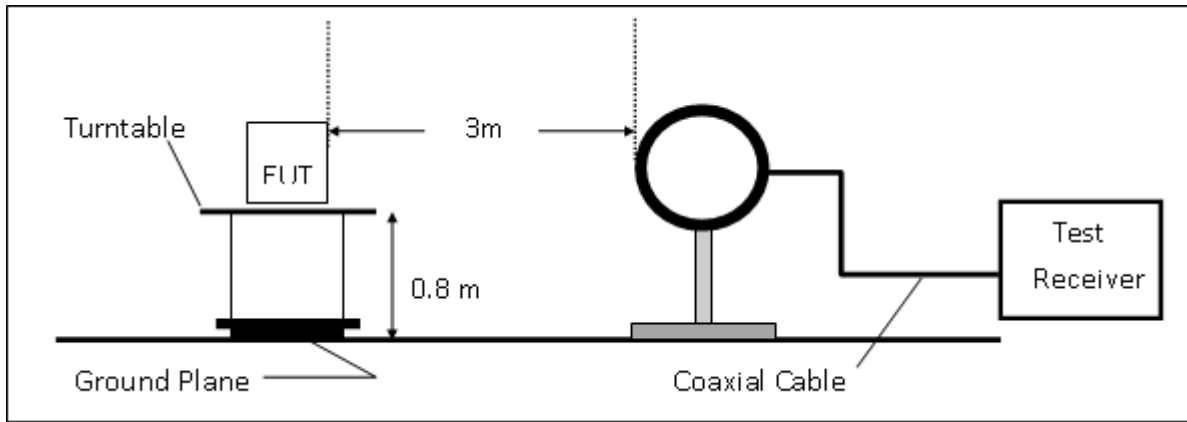
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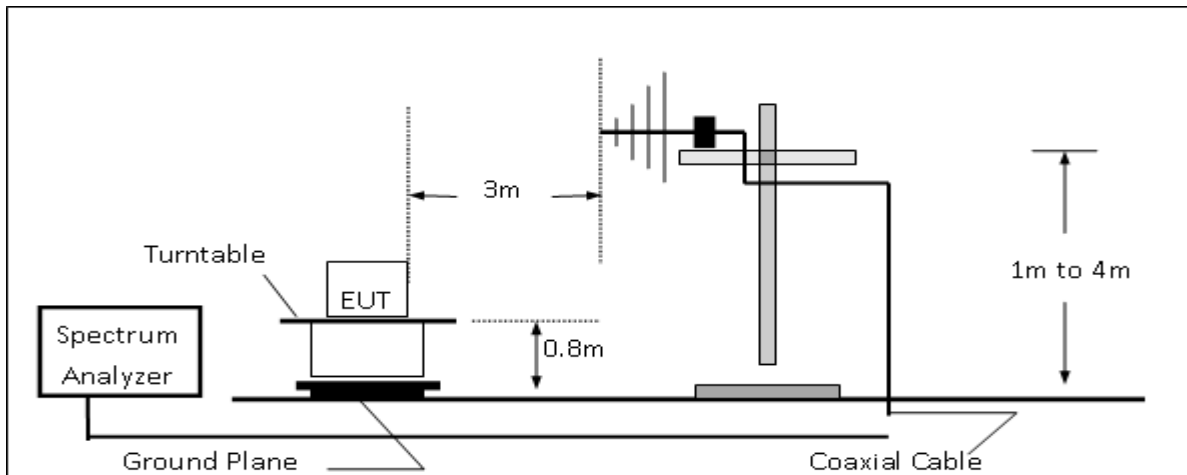
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11.3 Test SET-UP

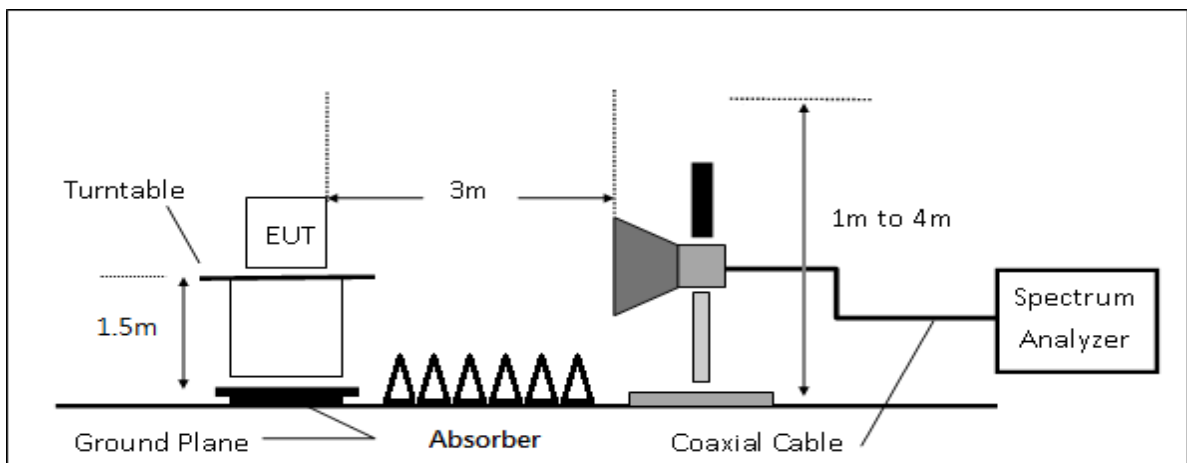
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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11.4 Measurement Procedure

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

11.5 Field Strength Calculation

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

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

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

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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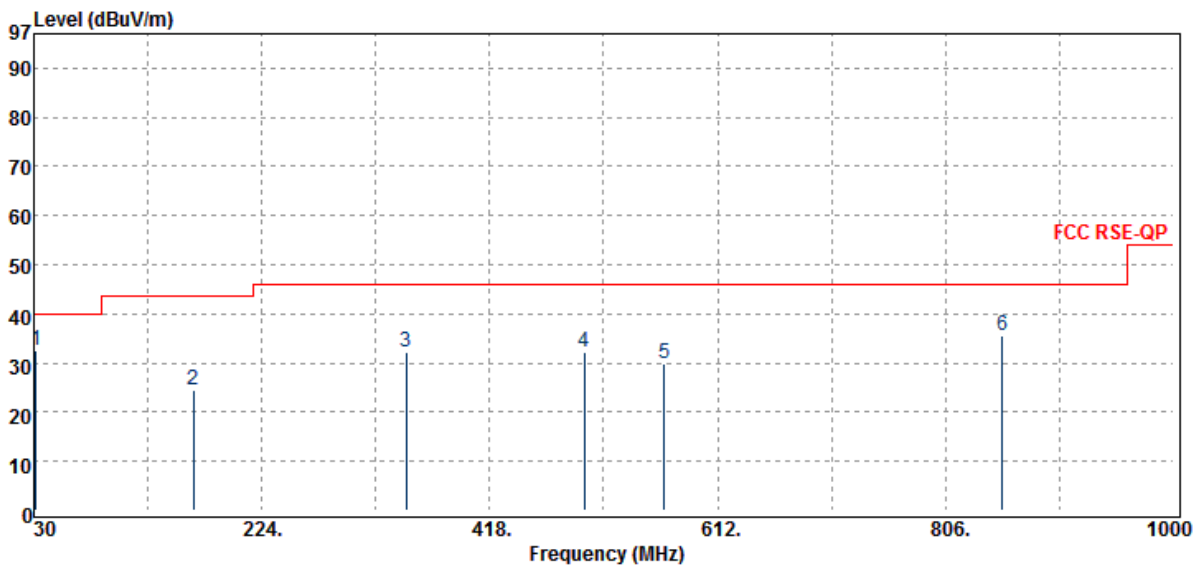
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Radiated Spurious Emission Measurement Result

Below 1GHz Worst-Case Data:

802.11a 5150~5250 MHz

Operation Band	:802.11aB1	Test Date	:2018-03-28
Fundamental Frequency	:5220 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
31.94	S	Peak	41.06	-8.52	32.54	40.00	-7.46
165.80	S	Peak	31.80	-7.27	24.53	43.50	-18.97
347.19	S	Peak	37.13	-4.81	32.32	46.00	-13.68
498.51	S	Peak	34.83	-2.44	32.39	46.00	-13.61
566.41	S	Peak	30.37	-0.51	29.86	46.00	-16.14
854.50	S	Peak	31.91	3.77	35.68	46.00	-10.32

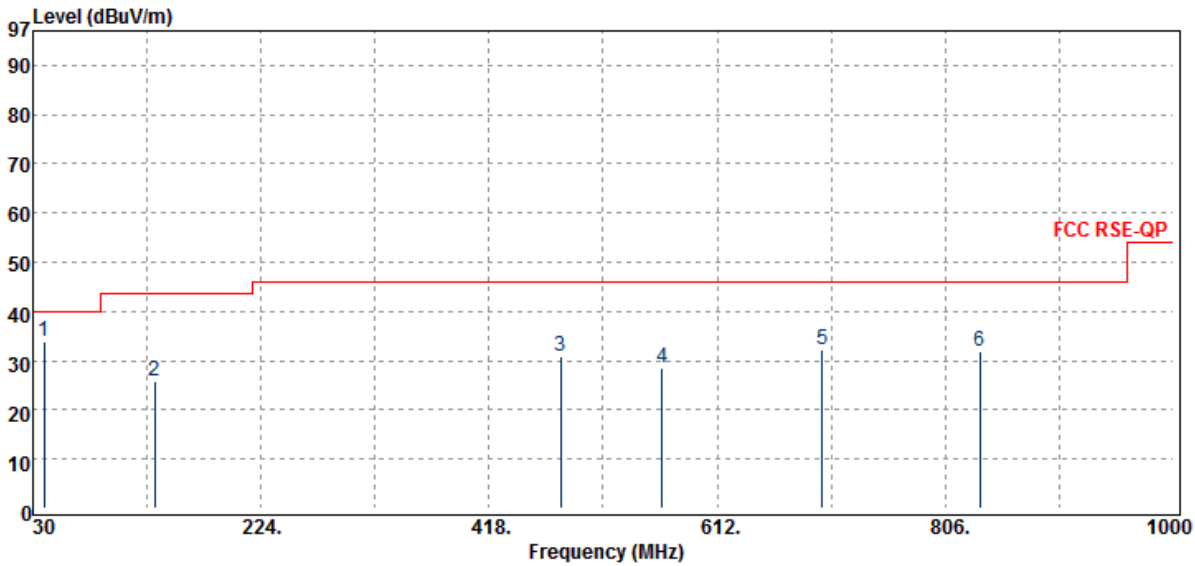
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Operation Band :802.11aB1
Fundamental Frequency :5220 MHz
Operation Mode :Tx CH MID
EUT Pol. :E2 Plane

Test Date :2018-03-28
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
39.70	S	Peak	41.91	-8.08	33.83	40.00	-6.17
133.79	S	Peak	33.96	-8.09	25.87	43.50	-17.63
479.11	S	Peak	32.93	-2.16	30.77	46.00	-15.23
565.44	S	Peak	29.15	-0.50	28.65	46.00	-17.35
701.24	S	Peak	30.73	1.46	32.19	46.00	-13.81
835.10	S	Peak	26.92	4.82	31.74	46.00	-14.26

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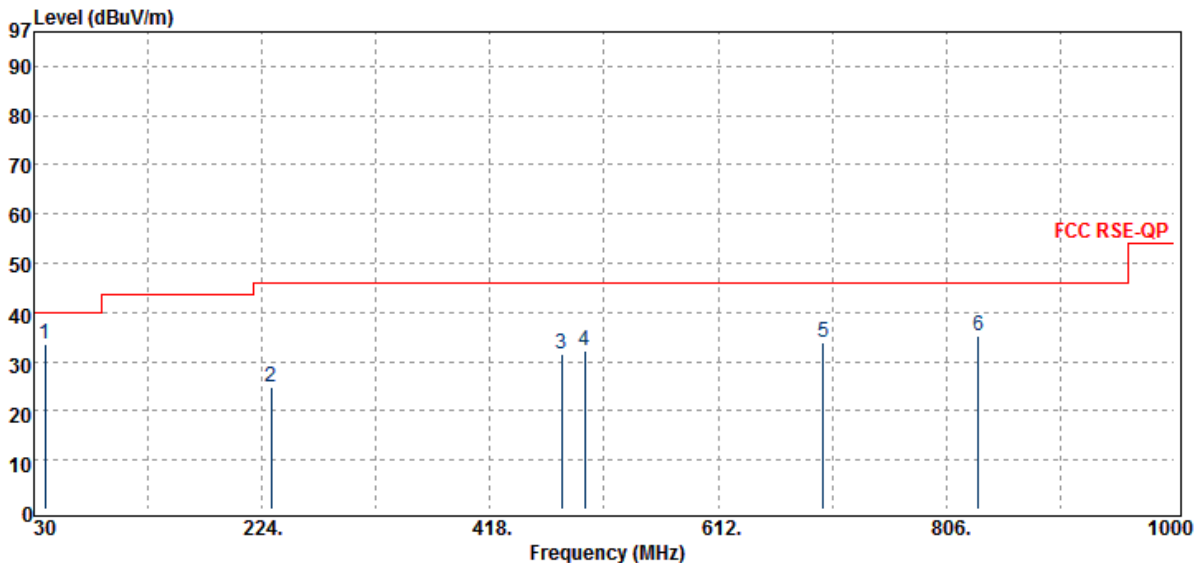
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802.11a, 5725~5850 MHz

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

Test Date :2018-03-28
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Margin dB
39.70	S	Peak	41.67	-8.08	33.59	40.00	-6.41
231.76	S	Peak	33.52	-8.52	25.00	46.00	-21.00
479.11	S	Peak	33.63	-2.16	31.47	46.00	-14.53
498.51	S	Peak	34.63	-2.44	32.19	46.00	-13.81
701.24	S	Peak	32.42	1.46	33.88	46.00	-12.12
833.16	S	Peak	30.78	4.57	35.35	46.00	-10.65

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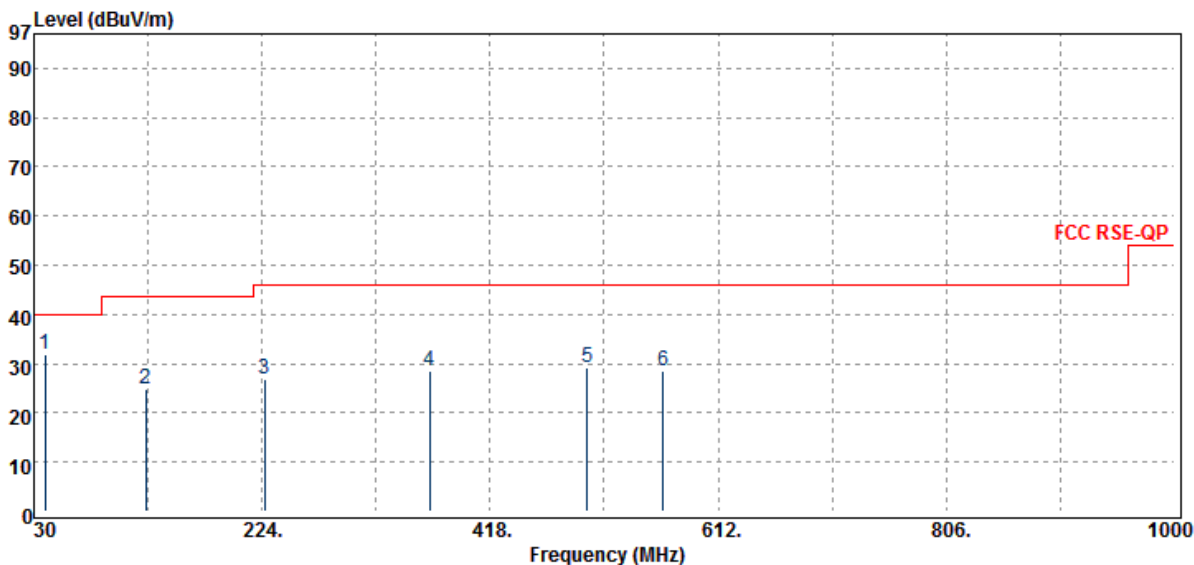
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Operation Band :802.11aB4
 Fundamental Frequency :5785 MHz
 Operation Mode :Tx CH MID
 EUT Pol. :E2 Plane

Test Date :2018-03-28
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
39.70	S	Peak	39.99	-8.08	31.91	40.00	-8.09
125.06	S	Peak	33.92	-8.96	24.96	43.50	-18.54
225.94	S	Peak	35.84	-8.86	26.98	46.00	-19.02
366.59	S	Peak	32.91	-4.32	28.59	46.00	-17.41
500.45	S	Peak	31.37	-2.26	29.11	46.00	-16.89
565.44	S	Peak	29.19	-0.50	28.69	46.00	-17.31

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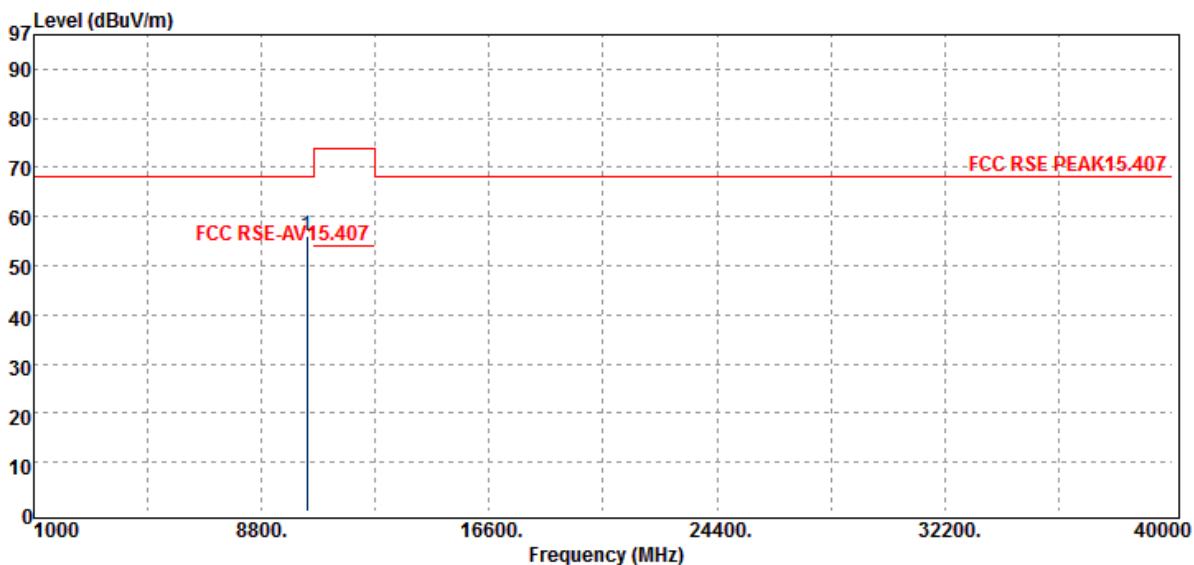
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Above 1GHz Worst-Case Data:

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

Operation Band	:802.11aB1	Test Date	:2018-03-28
Fundamental Frequency	:5180 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Safe Margin dB
10360.00	H	Peak	35.52	20.59	56.11	68.30	-12.19

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

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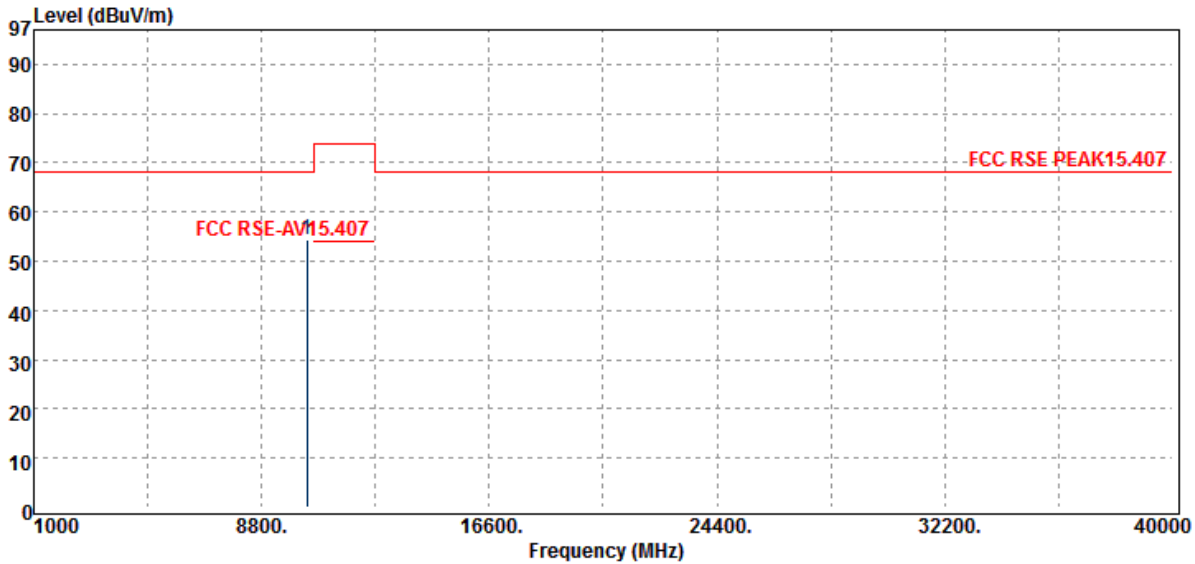
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Operation Band	:802.11aB1	Test Date	:2018-03-28
Fundamental Frequency	:5180 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



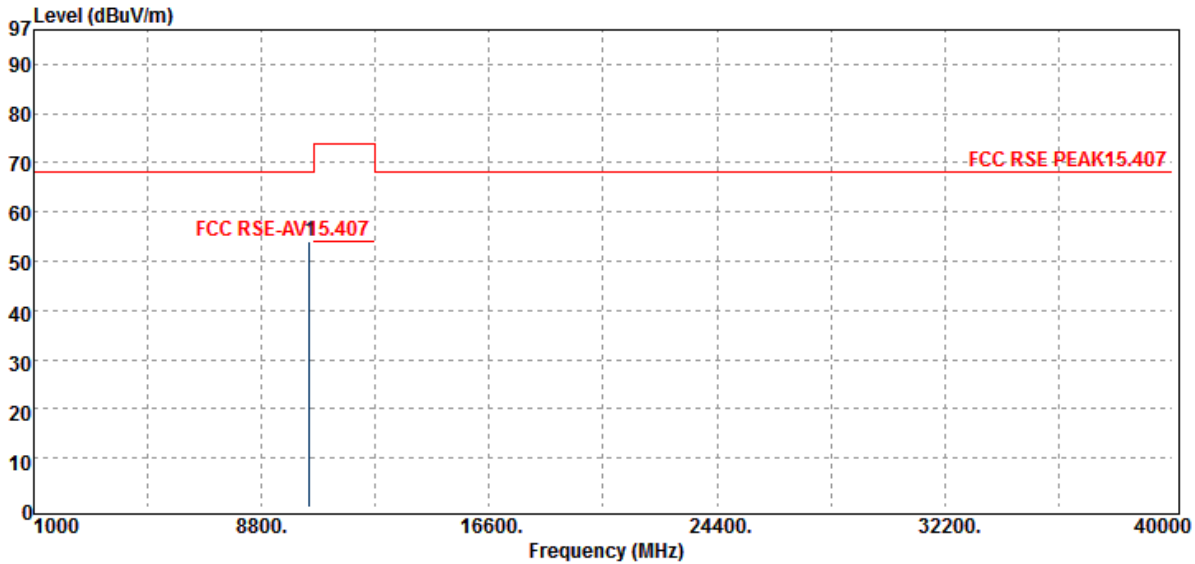
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10360.00	H	Peak	33.82	20.59	54.41	68.30	-13.89

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Operation Band	:802.11aB1	Test Date	:2018-03-28
Fundamental Frequency	:5220 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



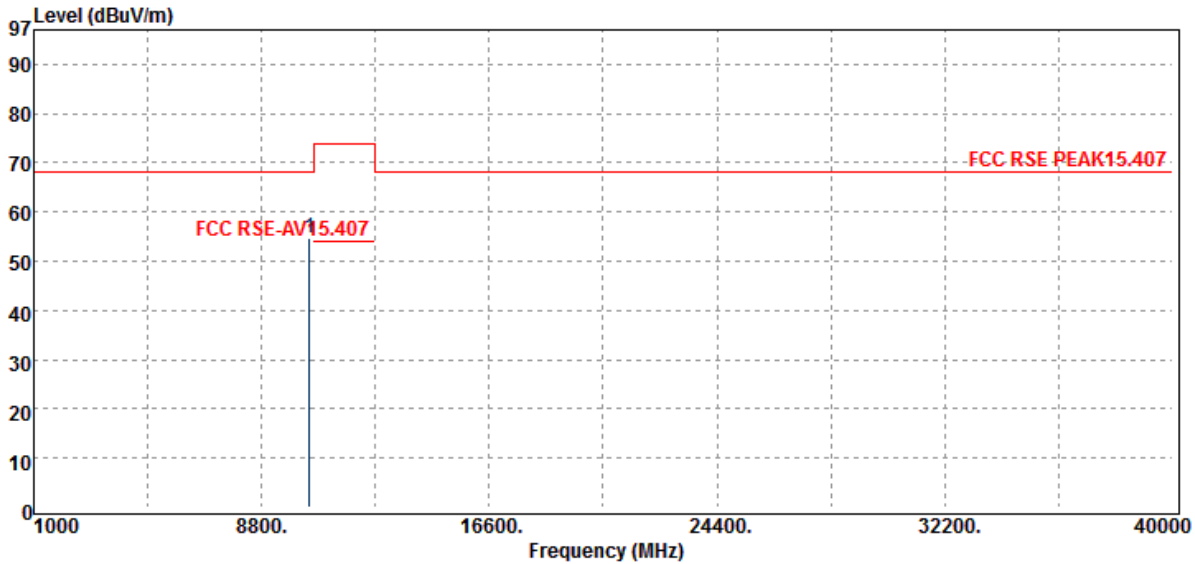
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10440.00	H	Peak	33.20	20.94	54.14	68.30	-14.16

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Operation Band	:802.11aB1	Test Date	:2018-03-28
Fundamental Frequency	:5220 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



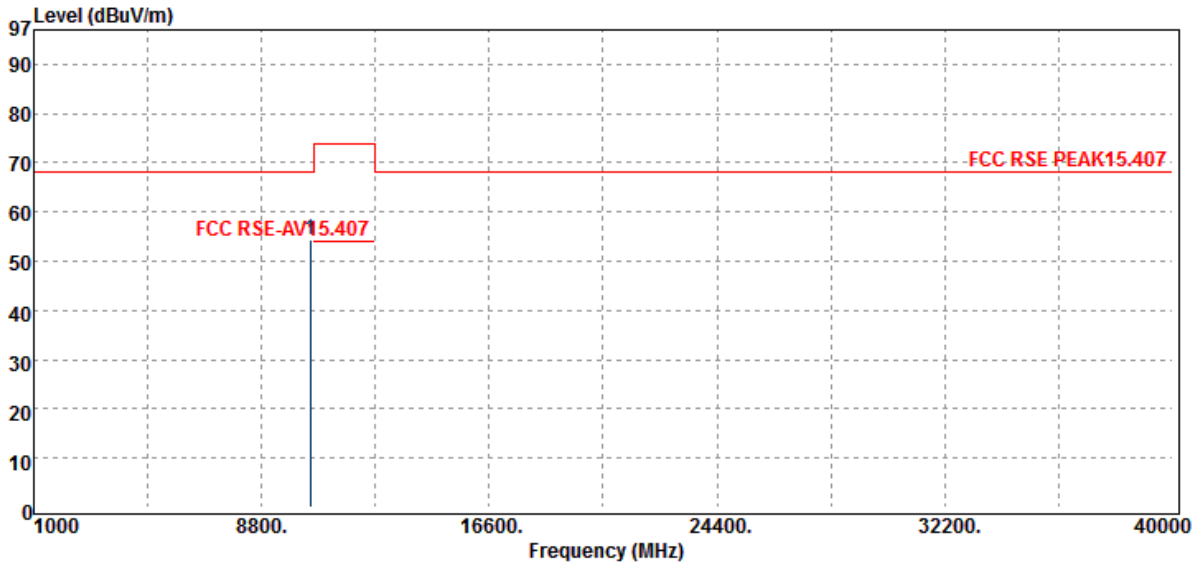
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10440.00	H	Peak	33.71	20.94	54.65	68.30	-13.65

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Operation Band	:802.11aB1	Test Date	:2018-03-28
Fundamental Frequency	:5240 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



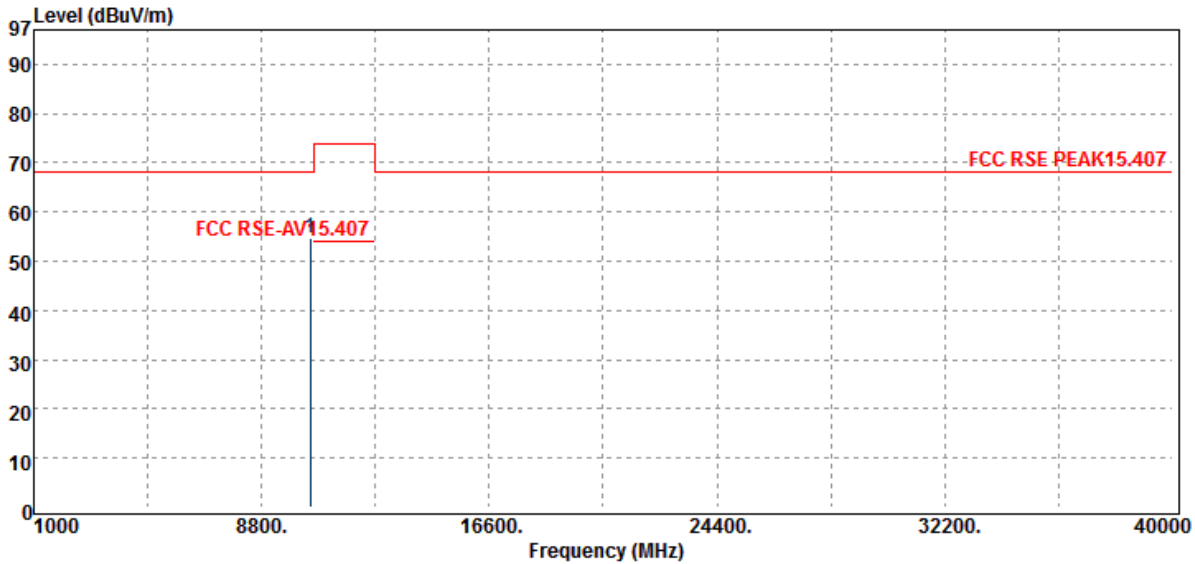
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10480.00	H	Peak	33.45	20.98	54.43	68.30	-13.87

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Operation Band	:802.11aB1	Test Date	:2018-03-28
Fundamental Frequency	:5240 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10480.00	H	Peak	33.68	20.98	54.66	68.30	-13.64

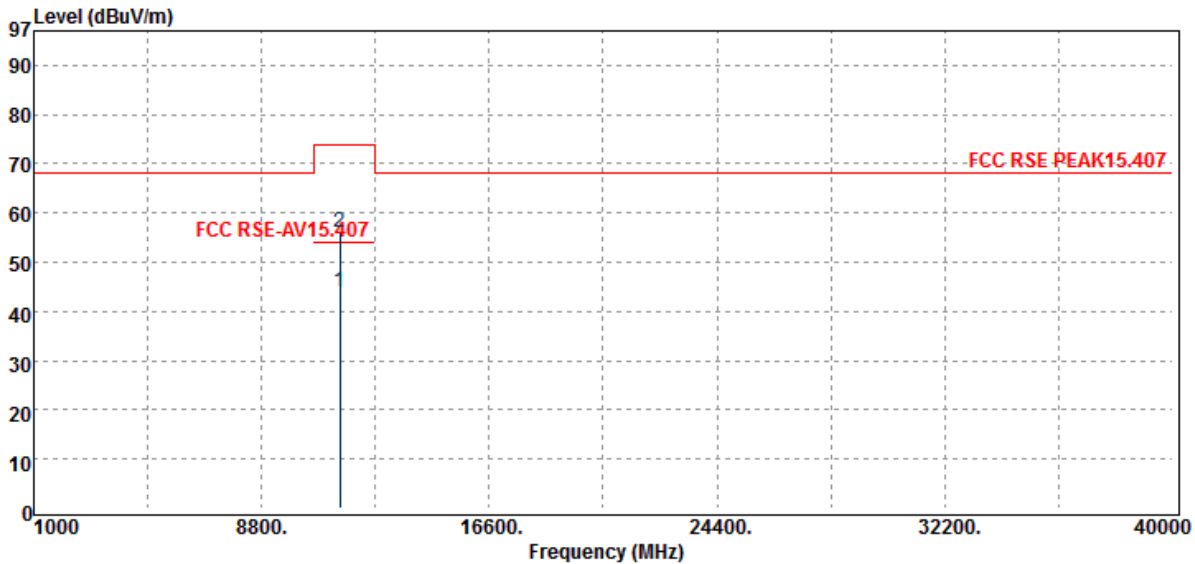
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Radiated Spurious Emission Measurement Result 802.11a, 5725~5850 MHz

Operation Band	:802.11aB4	Test Date	:2018-03-28
Fundamental Frequency	:5745 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



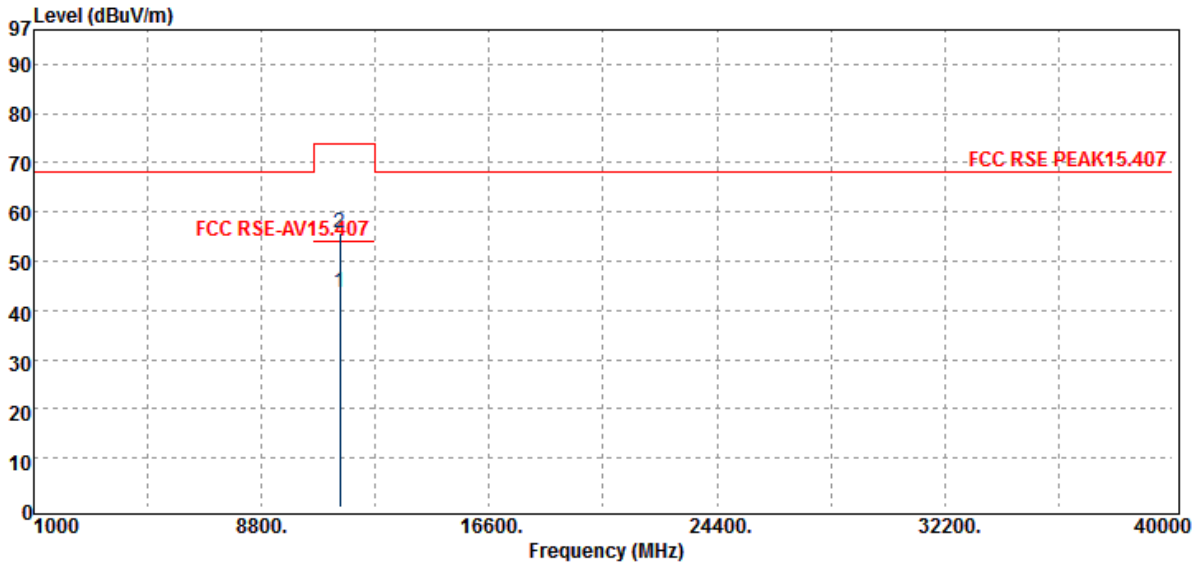
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Safe Margin dB
11490.00	H	Average	21.25	22.61	43.86	54.00	-10.14
11490.00	H	Peak	33.53	22.61	56.14	74.00	-17.86

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Operation Band	:802.11aB4	Test Date	:2018-03-28
Fundamental Frequency	:5745 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



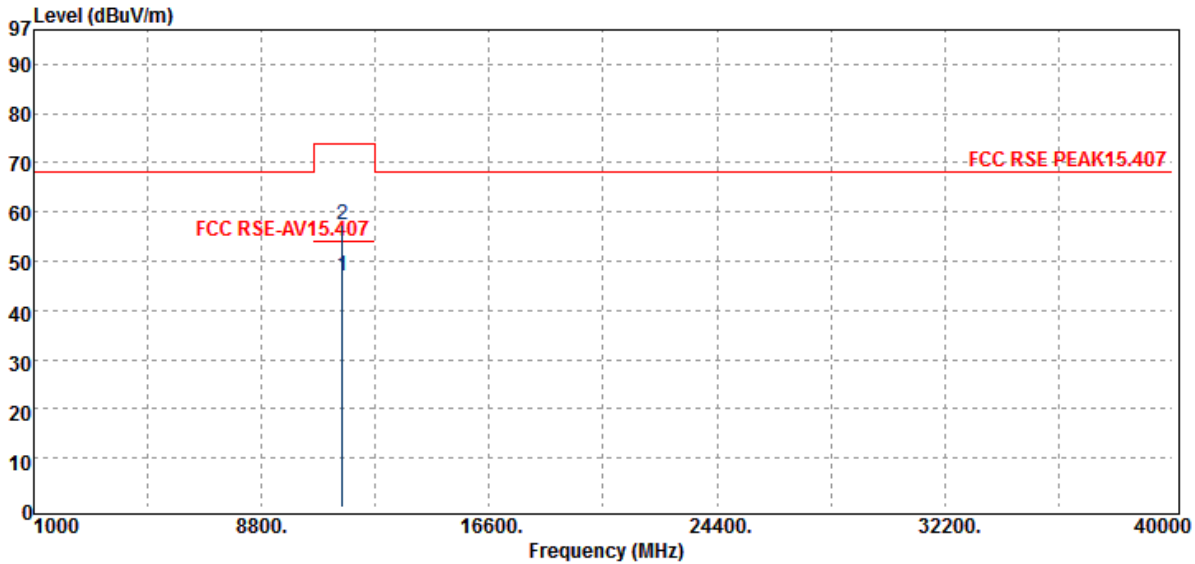
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
11490.00	H	Average	21.07	22.61	43.68	54.00	-10.32
11490.00	H	Peak	33.03	22.61	55.64	74.00	-18.36

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Operation Band	:802.11aB4	Test Date	:2018-03-28
Fundamental Frequency	:5785 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



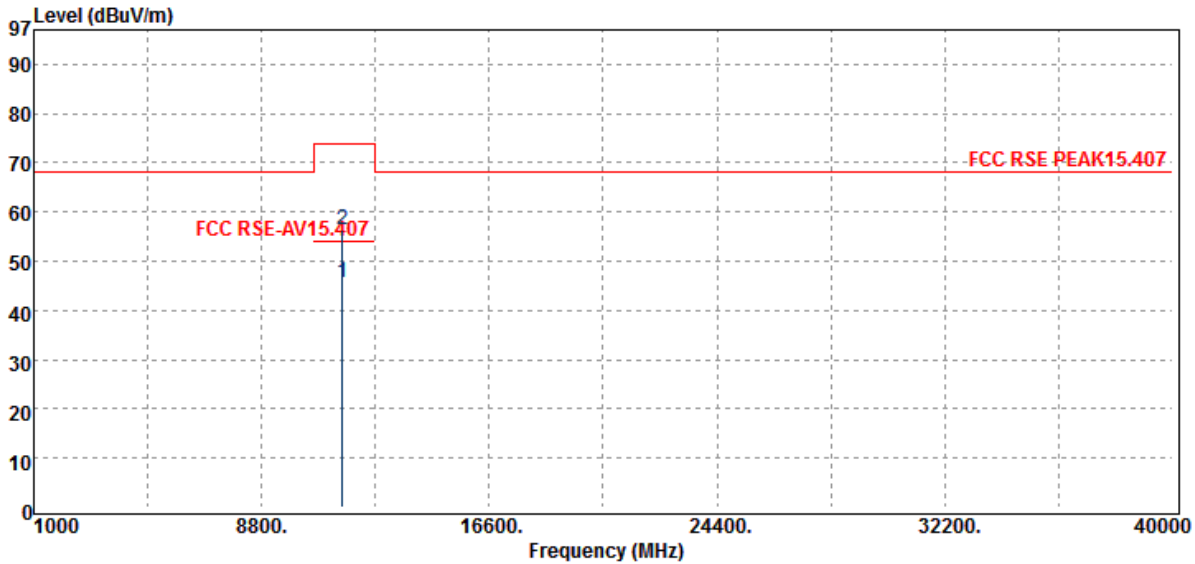
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
11570.00	H	Average	24.32	22.60	46.92	54.00	-7.08
11570.00	H	Peak	34.71	22.60	57.31	74.00	-16.69

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Operation Band	:802.11aB4	Test Date	:2018-03-28
Fundamental Frequency	:5785 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
11570.00	H	Average	23.21	22.60	45.81	54.00	-8.19
11570.00	H	Peak	33.70	22.60	56.30	74.00	-17.70

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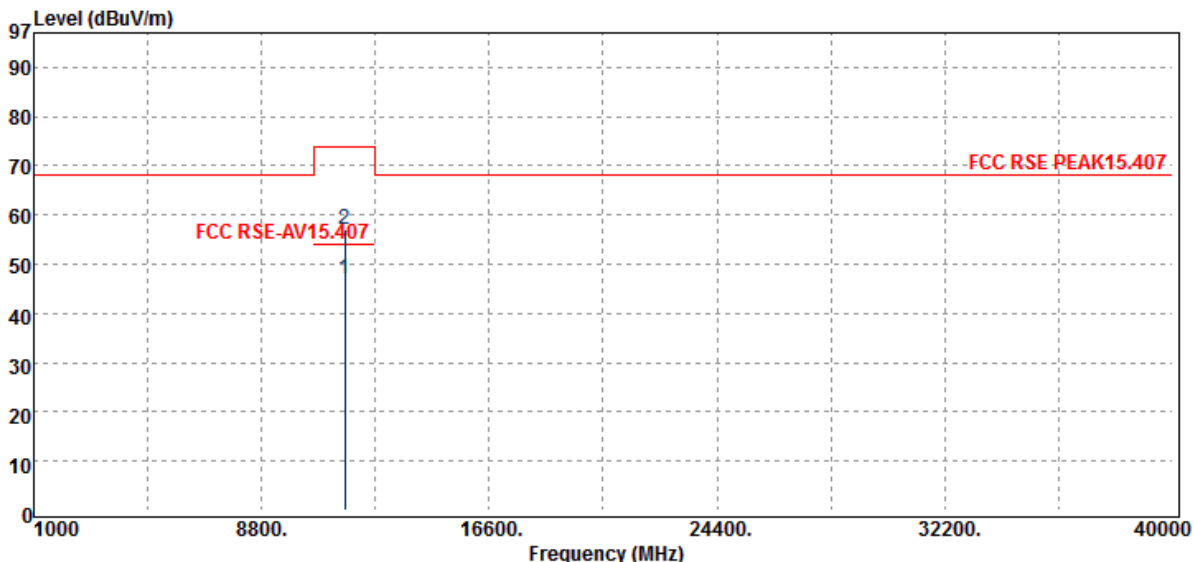
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Operation Band	:802.11aB4	Test Date	:2018-03-28
Fundamental Frequency	:5825 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



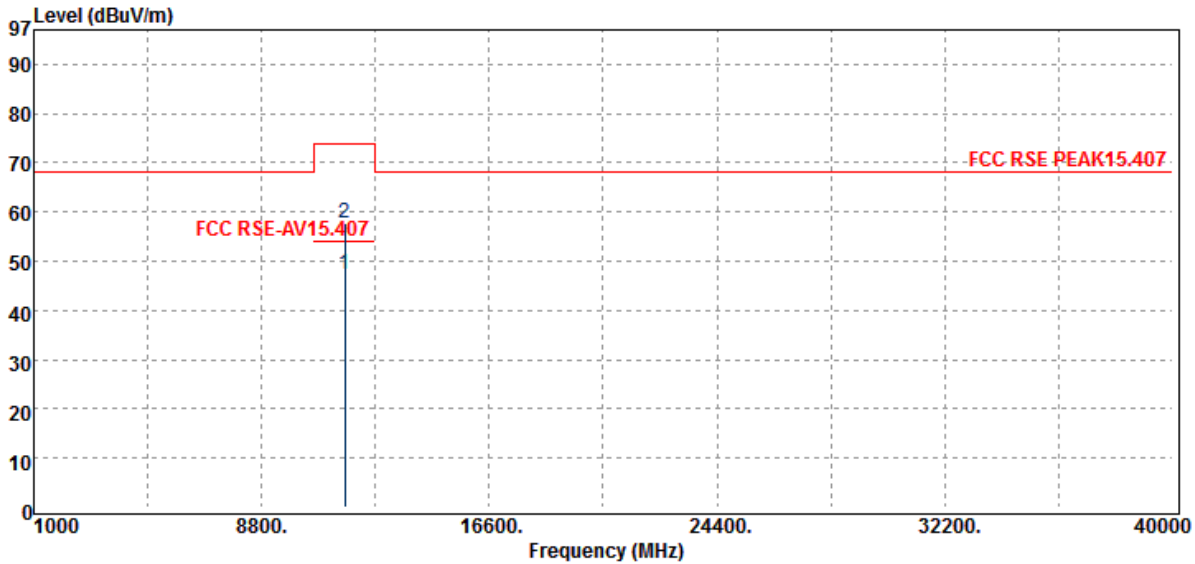
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
11650.00	H	Average	24.67	22.44	47.11	54.00	-6.89
11650.00	H	Peak	34.52	22.44	56.96	74.00	-17.04

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Operation Band	:802.11aB4	Test Date	:2018-03-28
Fundamental Frequency	:5825 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
11650.00	H	Average	24.91	22.44	47.35	54.00	-6.65
11650.00	H	Peak	35.14	22.44	57.58	74.00	-16.42

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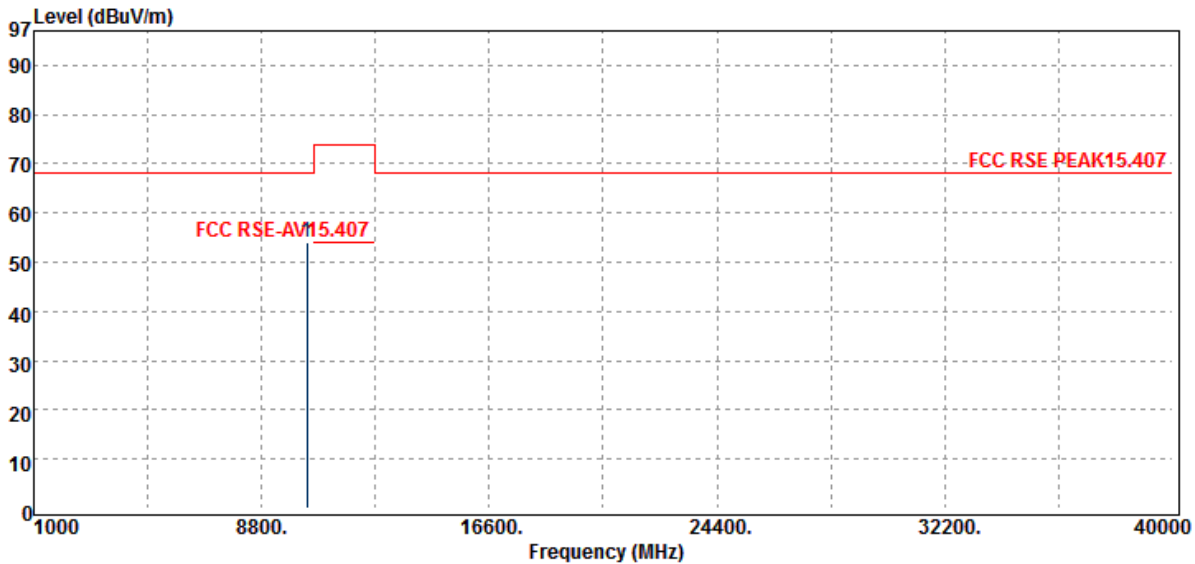
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5150~5250 MHz

Operation Band	:802.11n20B1	Test Date	:2018-03-28
Fundamental Frequency	:5180 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



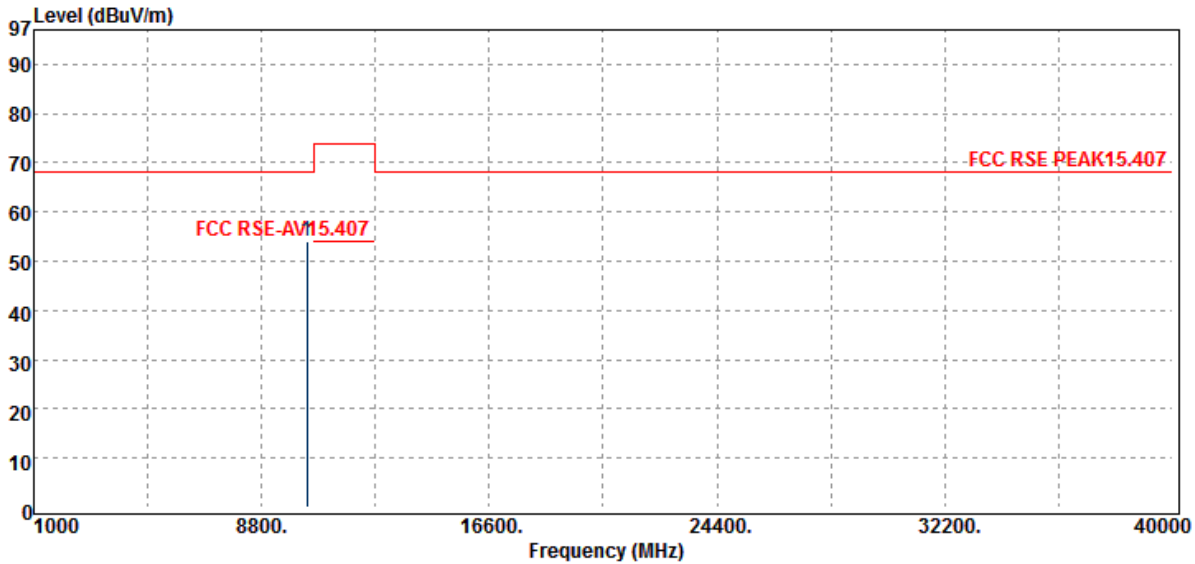
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Safe Margin dB
10360.00	H	Peak	33.41	20.59	54.00	68.30	-14.30

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Operation Band	:802.11n20B1	Test Date	:2018-03-28
Fundamental Frequency	:5180 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



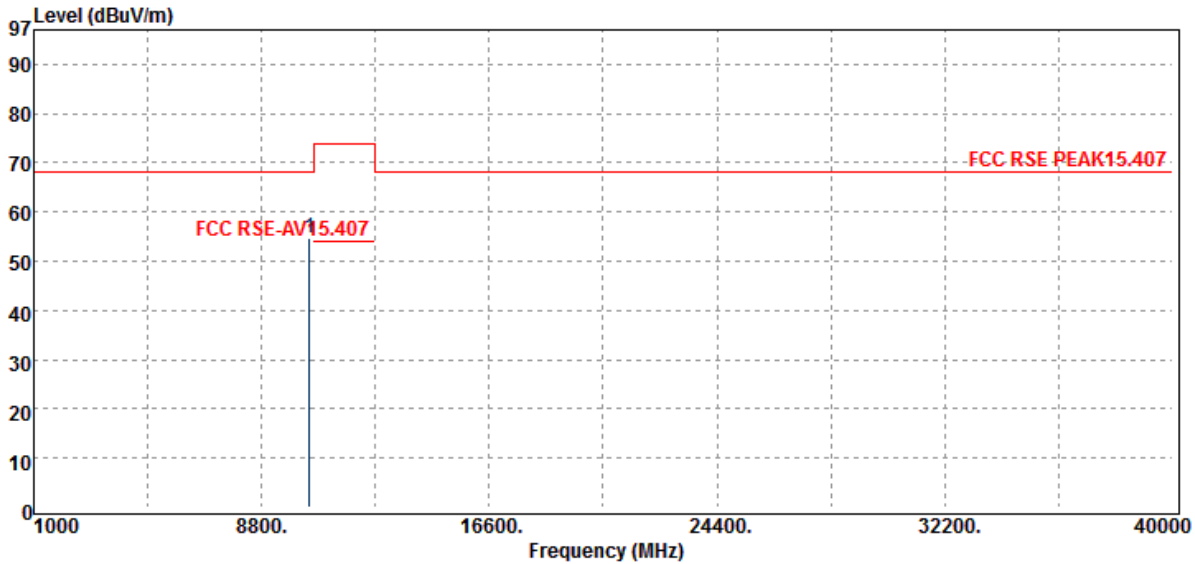
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10360.00	H	Peak	33.36	20.59	53.95	68.30	-14.35

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Operation Band	:802.11n20B1	Test Date	:2018-03-28
Fundamental Frequency	:5220 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



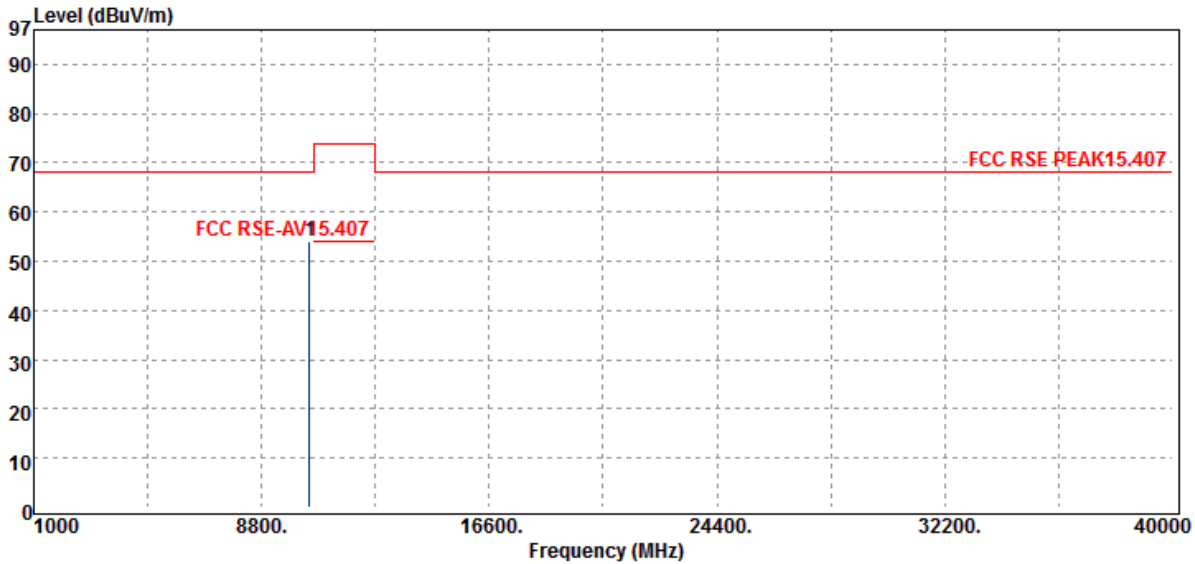
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10440.00	H	Peak	33.73	20.94	54.67	68.30	-13.63

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Operation Band	:802.11n20B1	Test Date	:2018-03-28
Fundamental Frequency	:5220 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10440.00	H	Peak	33.14	20.94	54.08	68.30	-14.22

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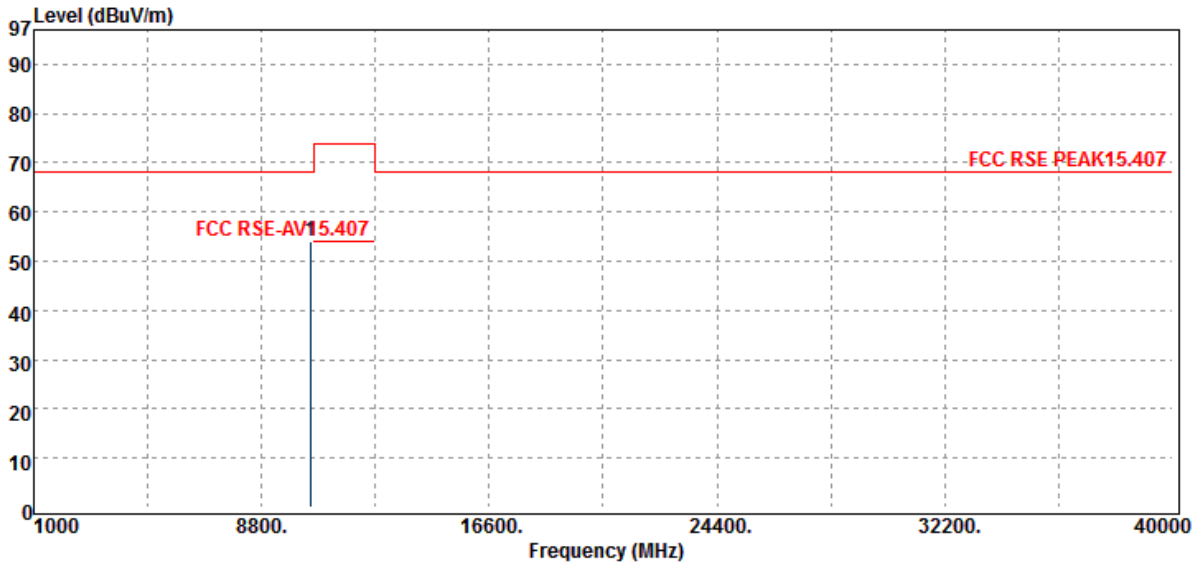
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Operation Band	:802.11n20B1	Test Date	:2018-03-28
Fundamental Frequency	:5240 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10480.00	H	Peak	33.15	20.98	54.13	68.30	-14.17

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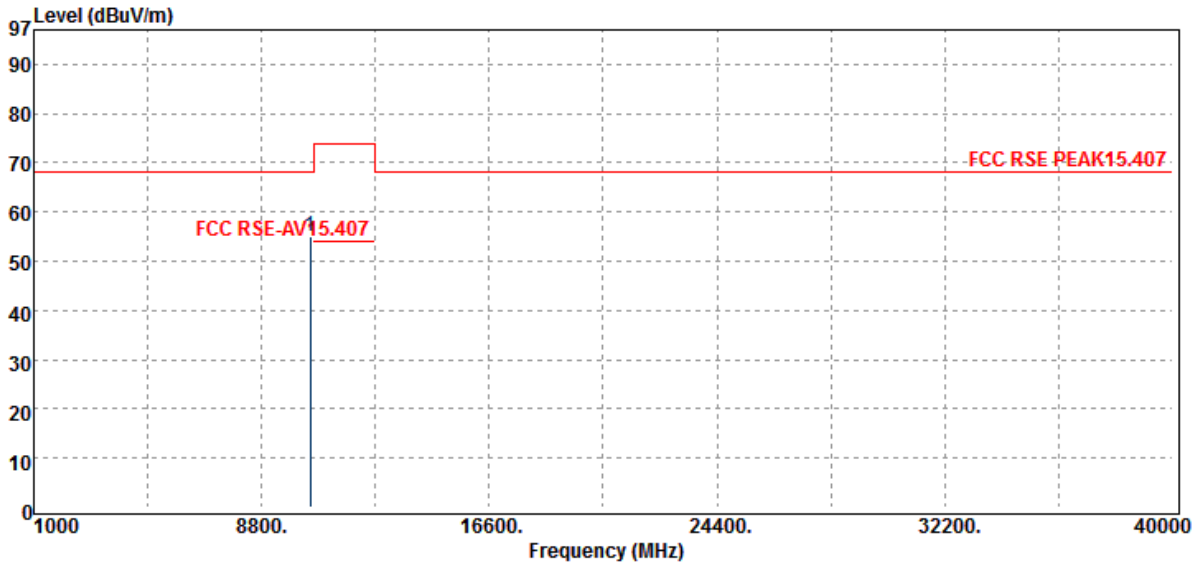
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Operation Band	:802.11n20B1	Test Date	:2018-03-28
Fundamental Frequency	:5240 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10480.00	H	Peak	34.20	20.98	55.18	68.30	-13.12

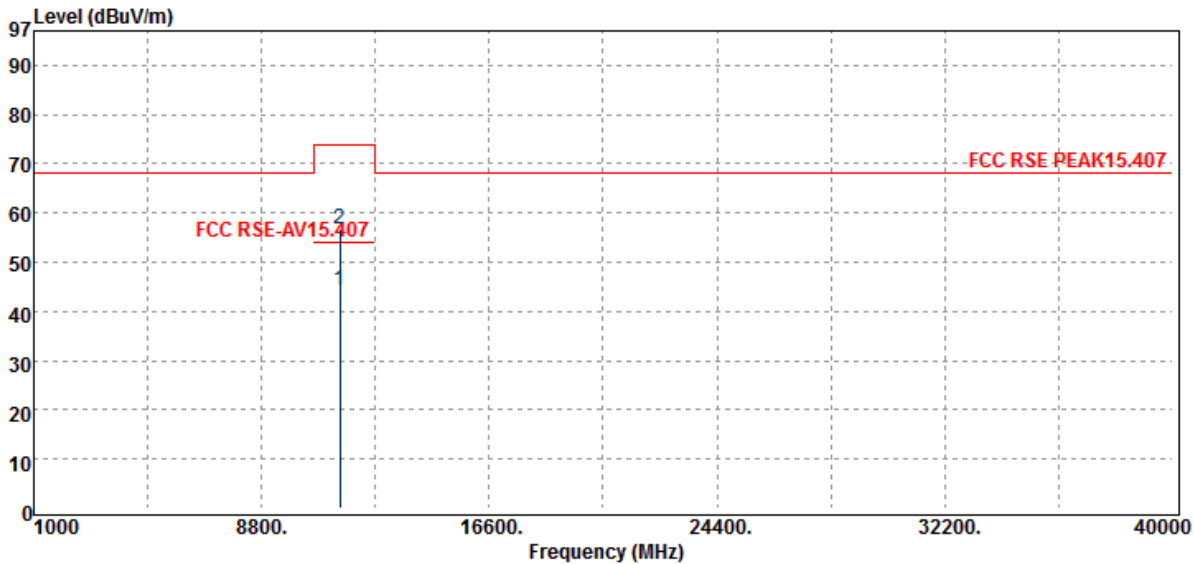
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5725~5850 MHz

Operation Band	:802.11n20B4	Test Date	:2018-03-28
Fundamental Frequency	:5745 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



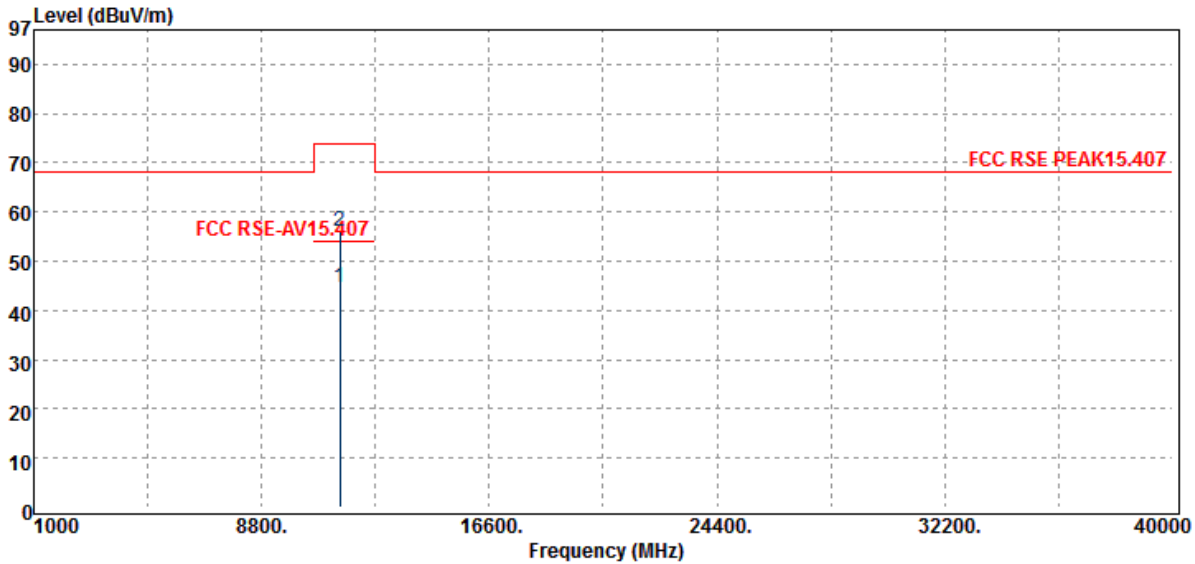
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Safe Margin dB
11490.00	H	Average	21.66	22.61	44.27	54.00	-9.73
11490.00	H	Peak	34.20	22.61	56.81	74.00	-17.19

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Operation Band	:802.11n20B4	Test Date	:2018-03-28
Fundamental Frequency	:5745 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
11490.00	H	Average	21.87	22.61	44.48	54.00	-9.52
11490.00	H	Peak	33.56	22.61	56.17	74.00	-17.83

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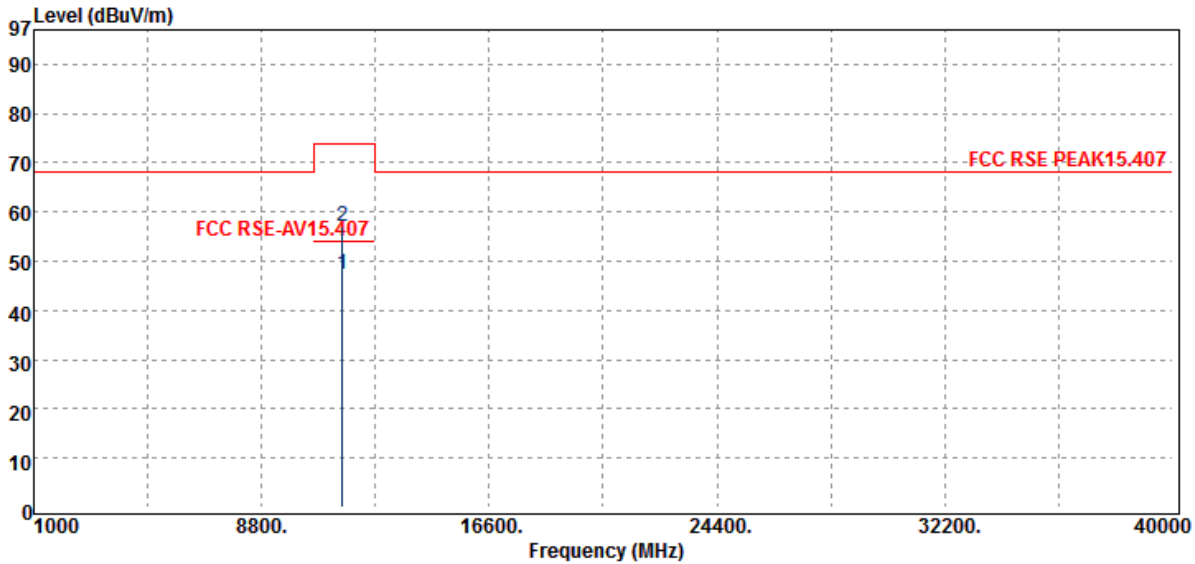
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Operation Band	:802.11n20B4	Test Date	:2018-03-28
Fundamental Frequency	:5785 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



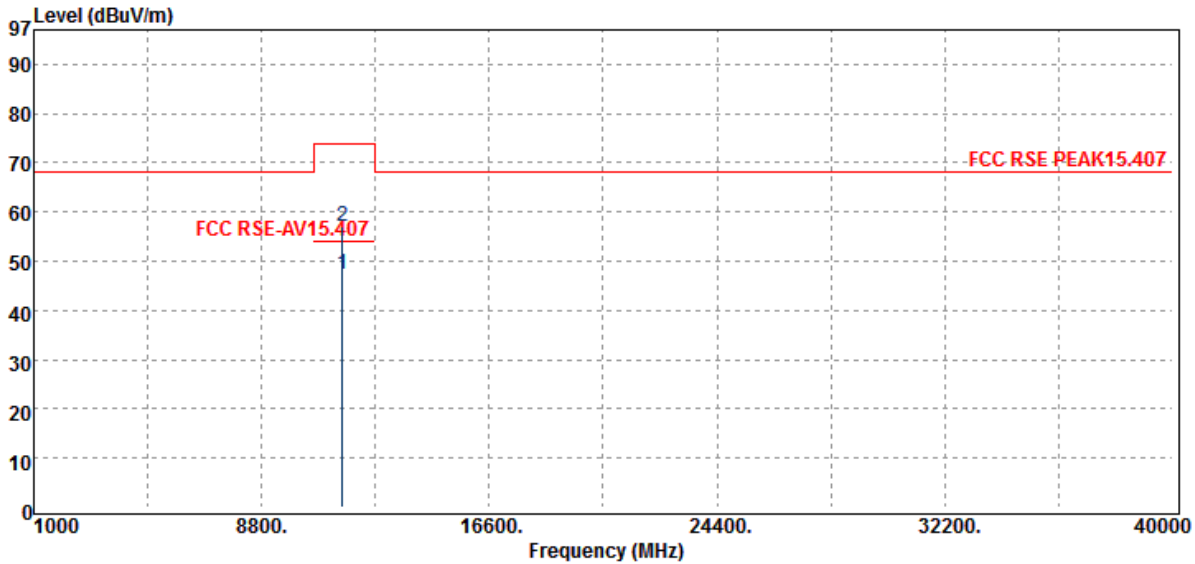
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
11570.00	H	Average	24.75	22.60	47.35	54.00	-6.65
11570.00	H	Peak	34.33	22.60	56.93	74.00	-17.07

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Operation Band	:802.11n20B4	Test Date	:2018-03-28
Fundamental Frequency	:5785 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



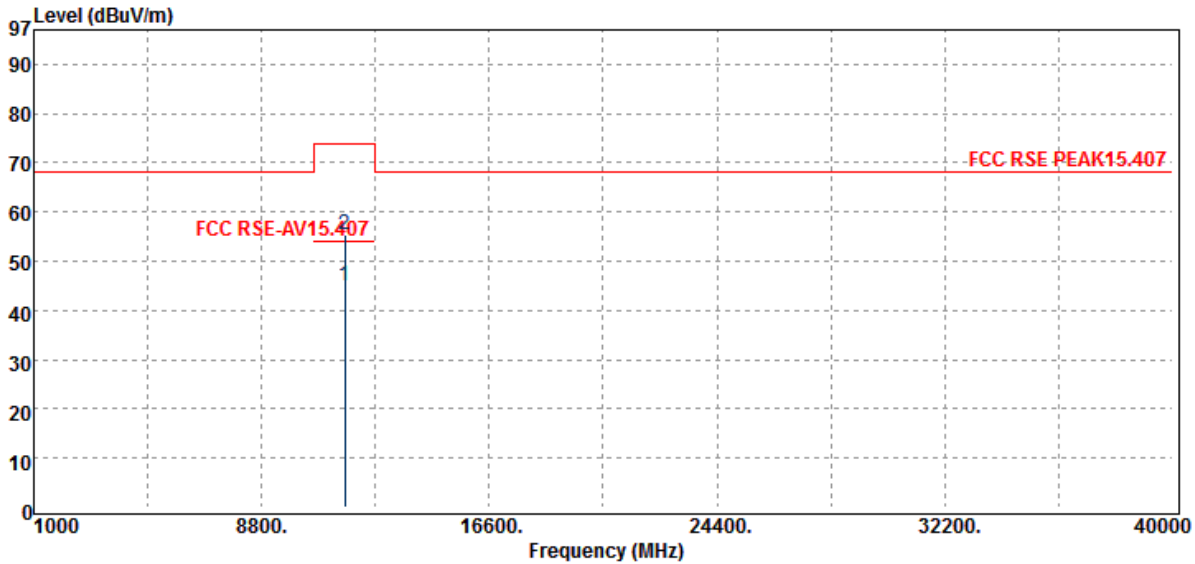
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
11570.00	H	Average	24.57	22.60	47.17	54.00	-6.83
11570.00	H	Peak	34.59	22.60	57.19	74.00	-16.81

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Operation Band	:802.11n20B4	Test Date	:2018-03-28
Fundamental Frequency	:5825 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



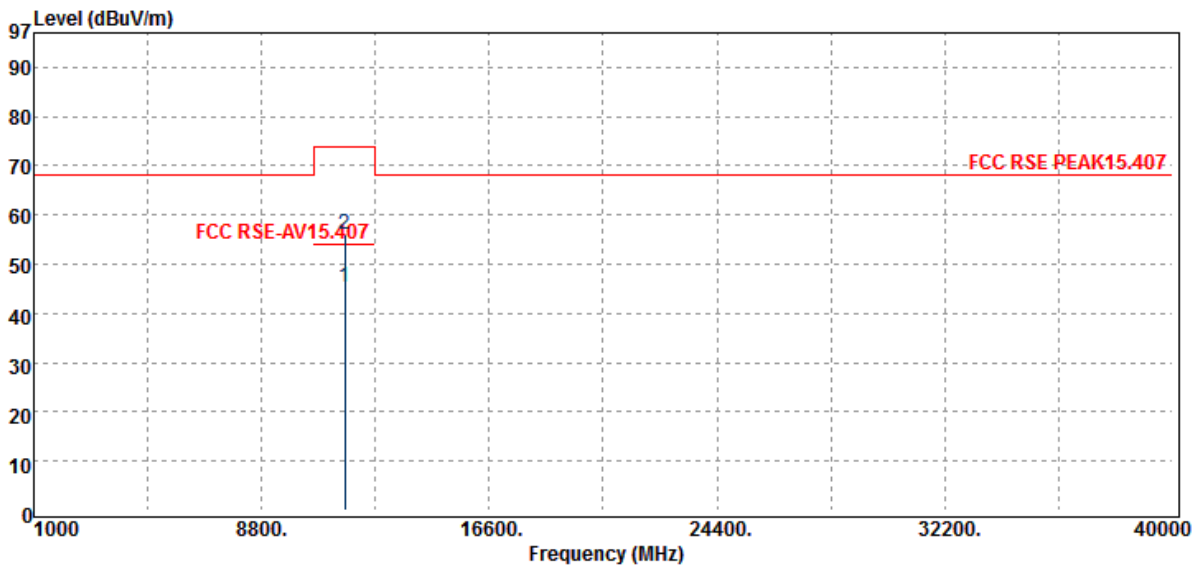
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
11650.00	H	Average	22.63	22.44	45.07	54.00	-8.93
11650.00	H	Peak	33.03	22.44	55.47	74.00	-18.53

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Operation Band	:802.11n20B4	Test Date	:2018-03-28
Fundamental Frequency	:5825 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
11650.00	H	Average	22.95	22.44	45.39	54.00	-8.61
11650.00	H	Peak	33.64	22.44	56.08	74.00	-17.92

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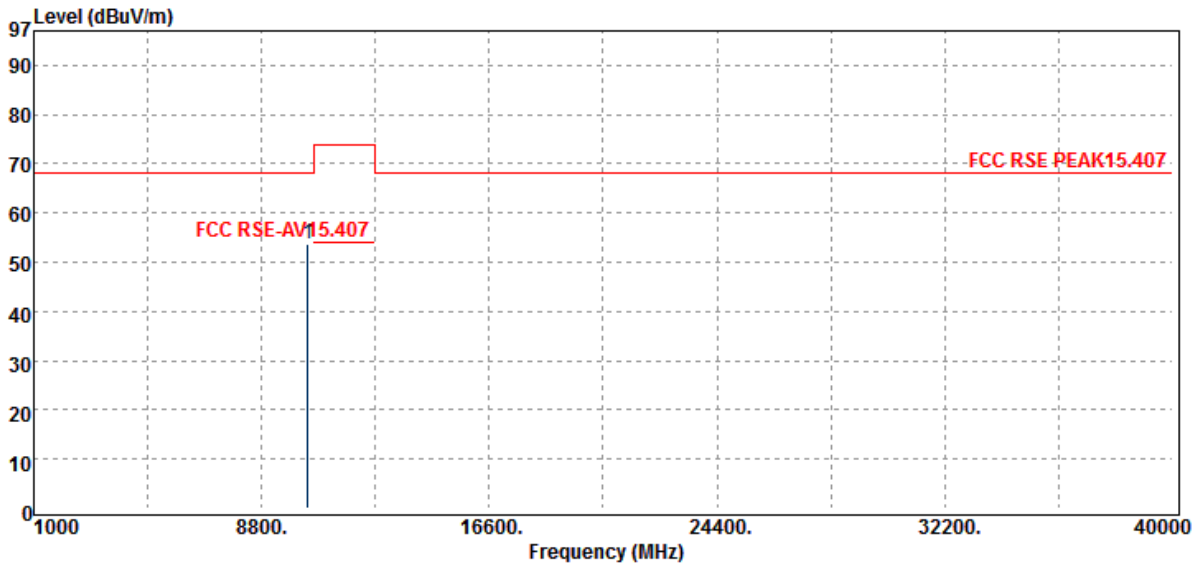
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5150~5250 MHz

Operation Band	:802.11n40B1	Test Date	:2018-03-28
Fundamental Frequency	:5190 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



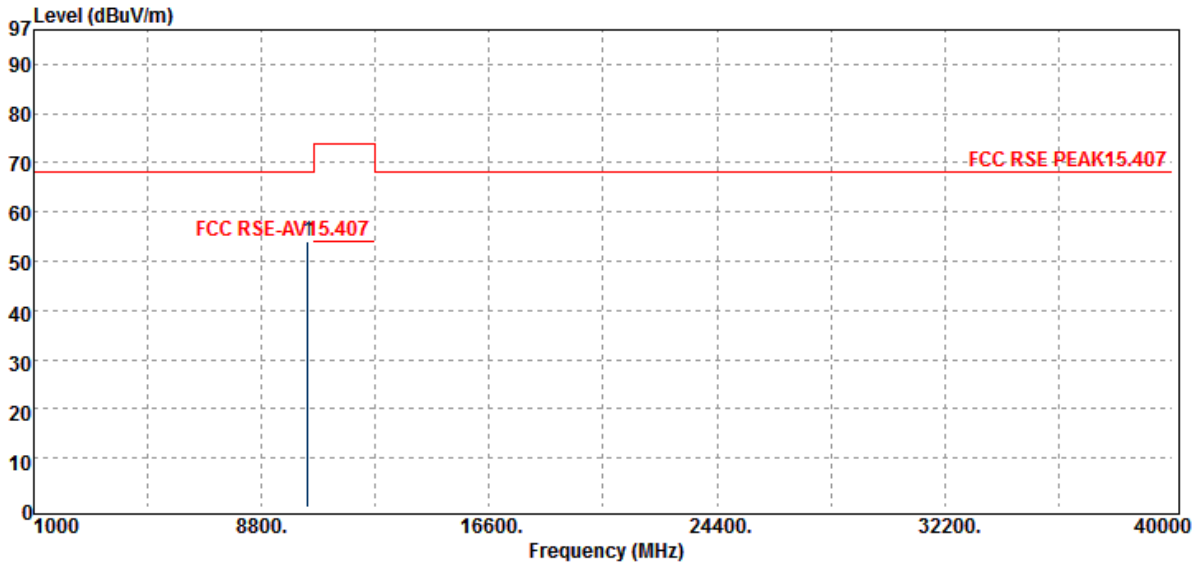
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Safe Margin dB
10380.00	H	Peak	33.07	20.66	53.73	68.30	-14.57

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Operation Band	:802.11n40B1	Test Date	:2018-03-28
Fundamental Frequency	:5190 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



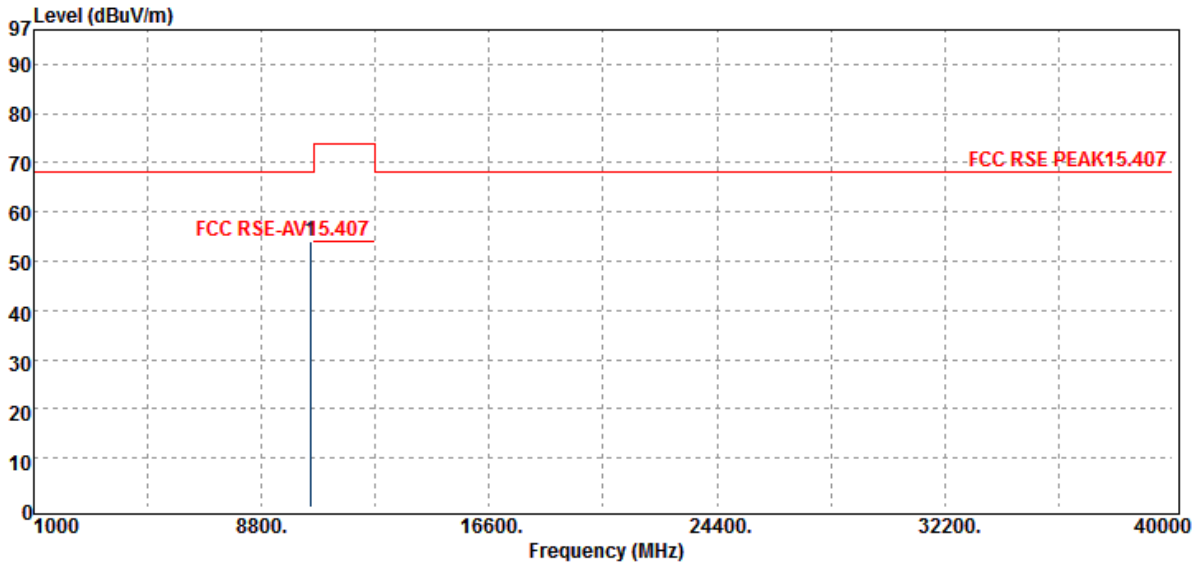
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10380.00	H	Peak	33.31	20.66	53.97	68.30	-14.33

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Operation Band	:802.11n40B1	Test Date	:2018-03-28
Fundamental Frequency	:5230 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10460.00	H	Peak	33.17	20.97	54.14	68.30	-14.16

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台灣檢驗科技股份有限公司

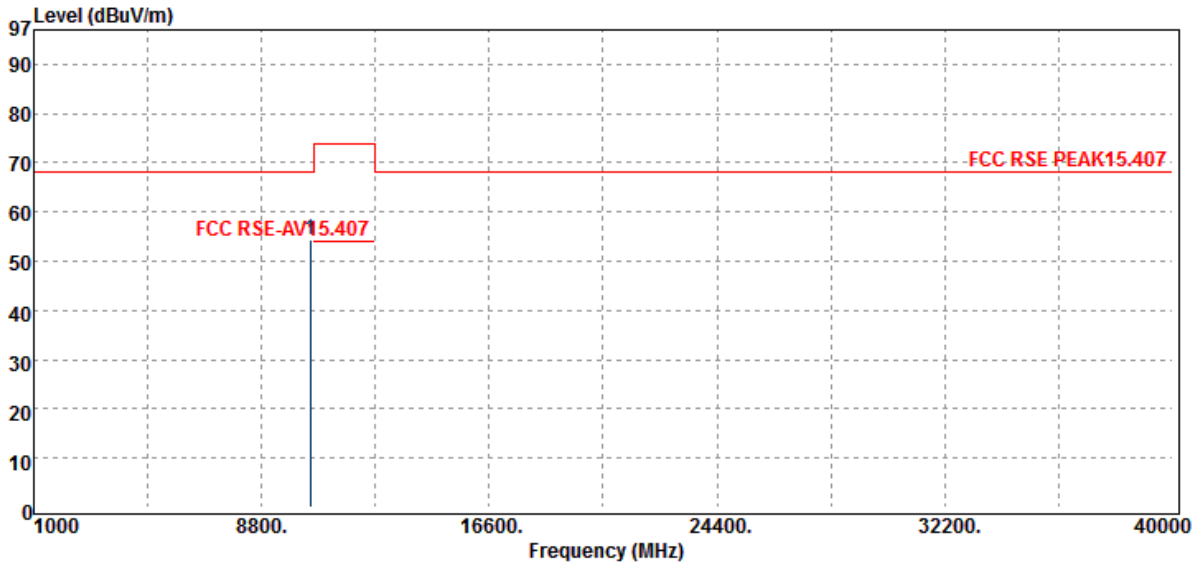
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Operation Band	:802.11n40B1	Test Date	:2018-03-28
Fundamental Frequency	:5230 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10460.00	H	Peak	33.53	20.97	54.50	68.30	-13.80

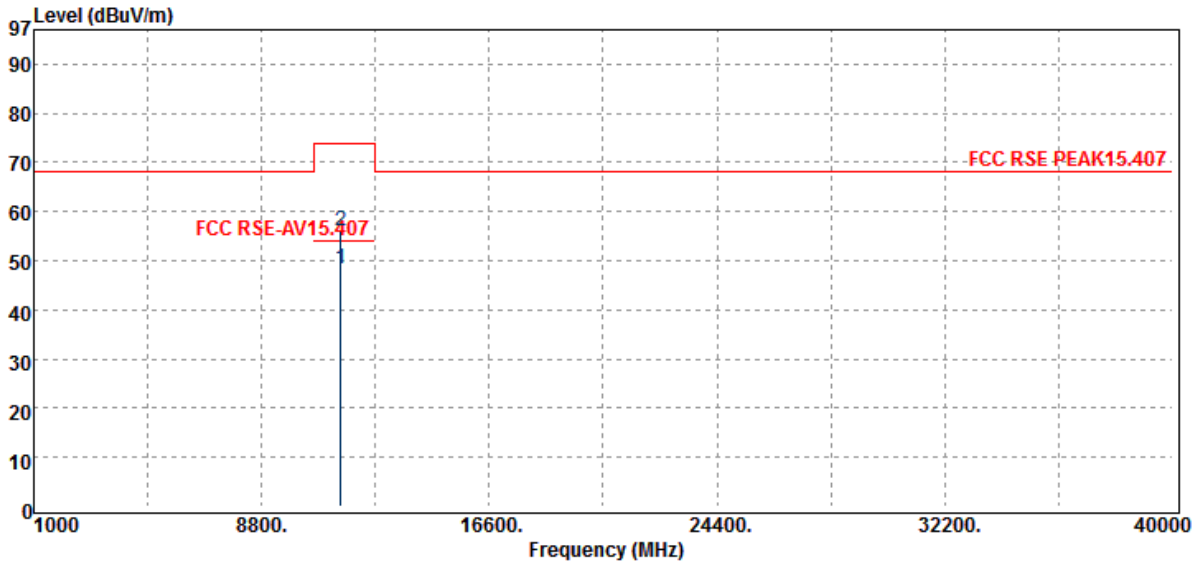
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5725~5850 MHz

Operation Band	:802.11n40B4	Test Date	:2018-03-28
Fundamental Frequency	:5755 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



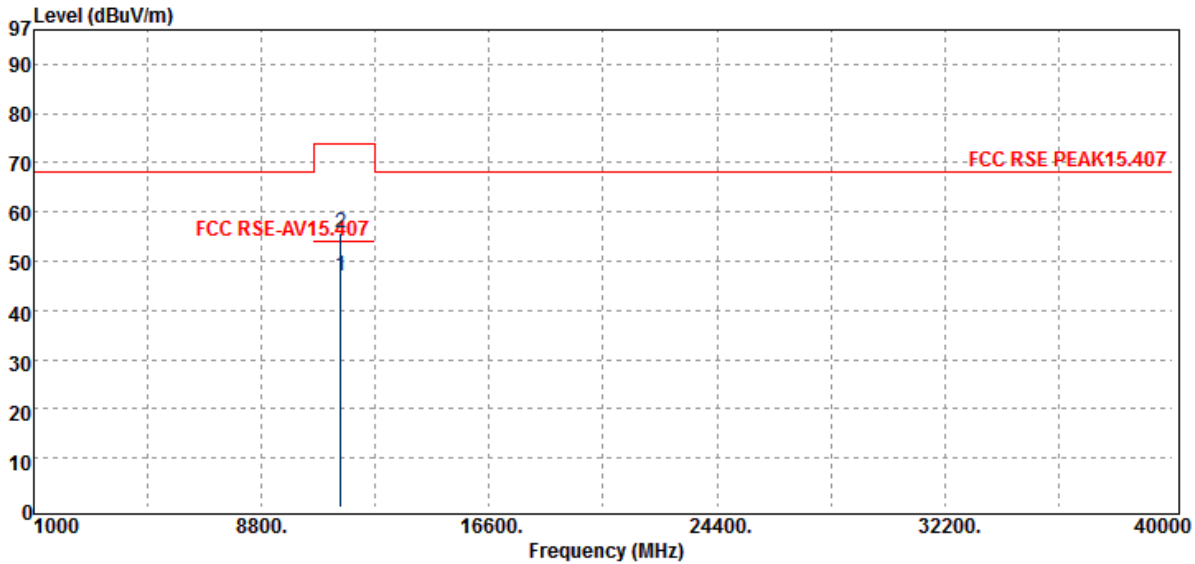
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level d μ V	Factor dB	Actual FS d μ V/m	Limit @3m d μ V/m	Safe Margin dB
11510.00	H	Average	25.65	22.66	48.31	54.00	-5.69
11510.00	H	Peak	33.26	22.66	55.92	74.00	-18.08

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Operation Band	:802.11n40B4	Test Date	:2018-03-28
Fundamental Frequency	:5755 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



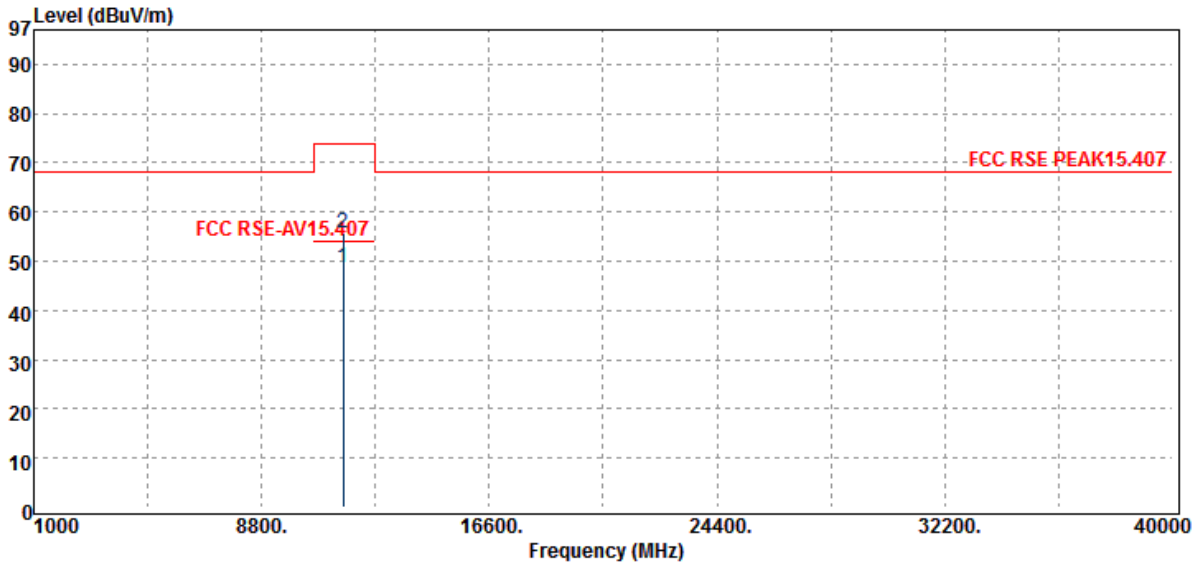
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Safe Margin dB
11510.00	H	Average	24.24	22.66	46.90	54.00	-7.10
11510.00	H	Peak	33.11	22.66	55.77	74.00	-18.23

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Operation Band	:802.11n40B4	Test Date	:2018-03-28
Fundamental Frequency	:5795 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



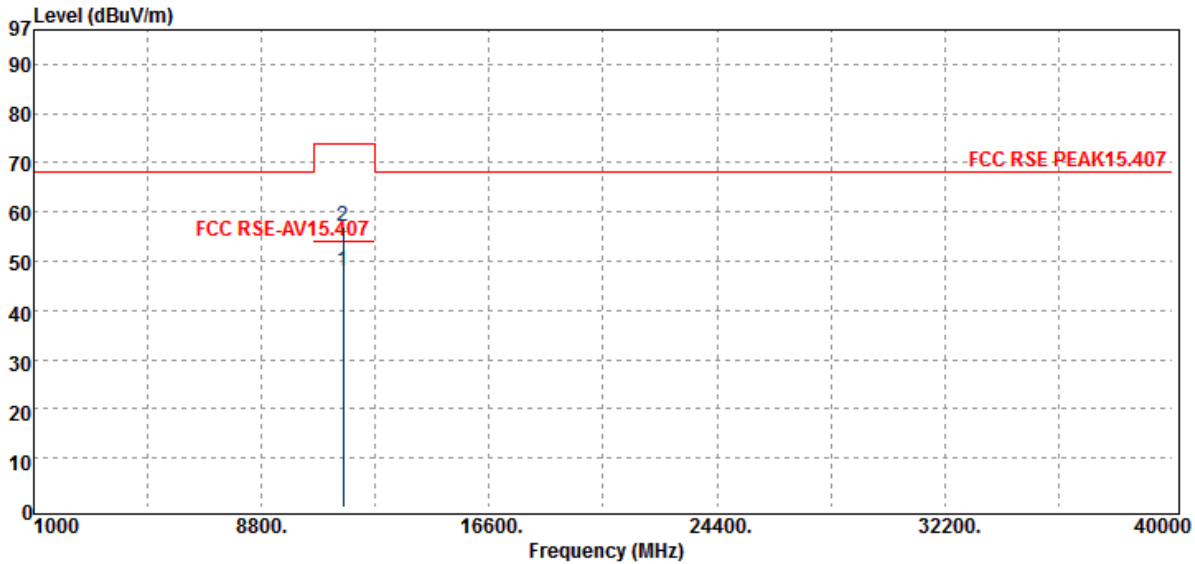
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
11590.00	H	Average	26.27	22.55	48.82	54.00	-5.18
11590.00	H	Peak	33.19	22.55	55.74	74.00	-18.26

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Operation Band	:802.11n40B4	Test Date	:2018-03-28
Fundamental Frequency	:5795 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
11590.00	H	Average	25.38	22.55	47.93	54.00	-6.07
11590.00	H	Peak	34.49	22.55	57.04	74.00	-16.96

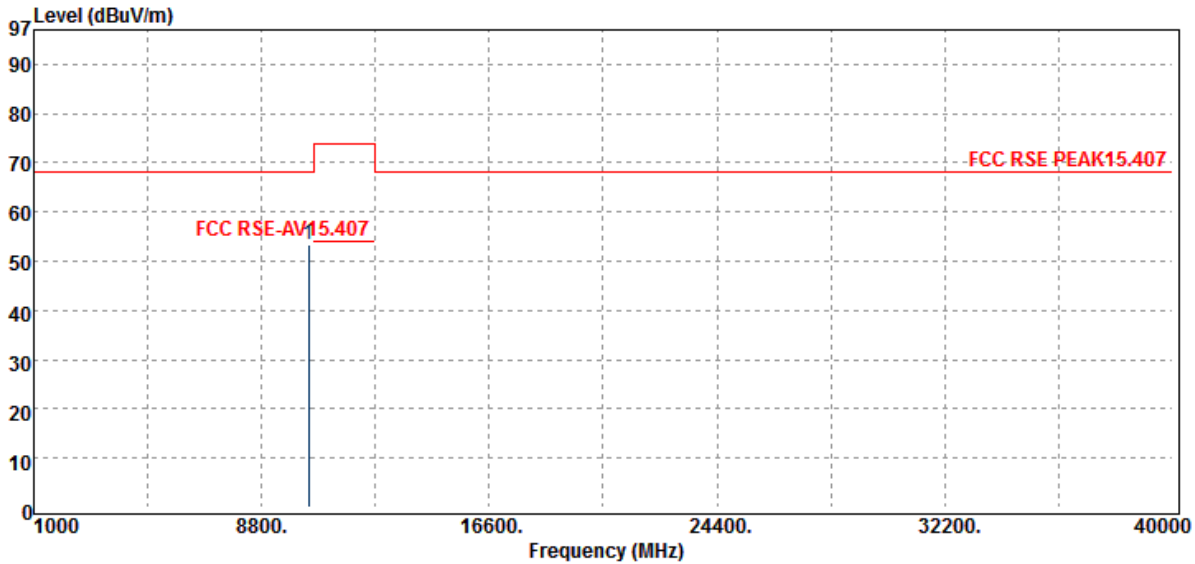
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Radiated Spurious Emission Measurement Result 802.11ac VHT80, 5150~5250 MHz

Operation Band	:802.11ac80B1	Test Date	:2018-03-28
Fundamental Frequency	:5210 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



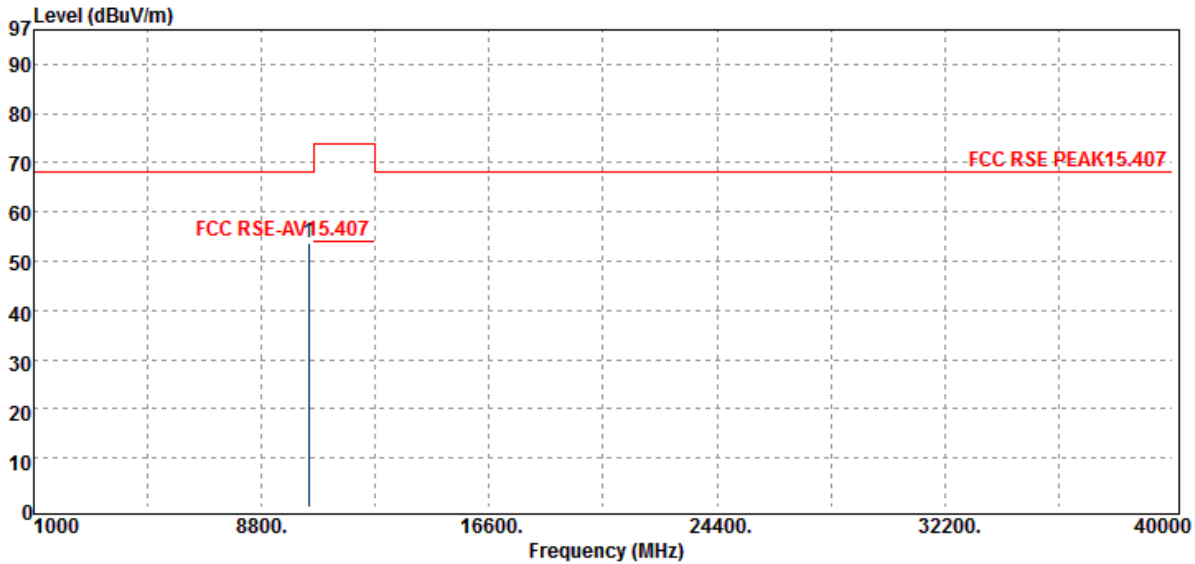
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10420.00	H	Peak	32.64	20.87	53.51	68.30	-14.79

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Operation Band	:802.11ac80B1	Test Date	:2018-03-28
Fundamental Frequency	:5210 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
10420.00	H	Peak	32.99	20.87	53.86	68.30	-14.44

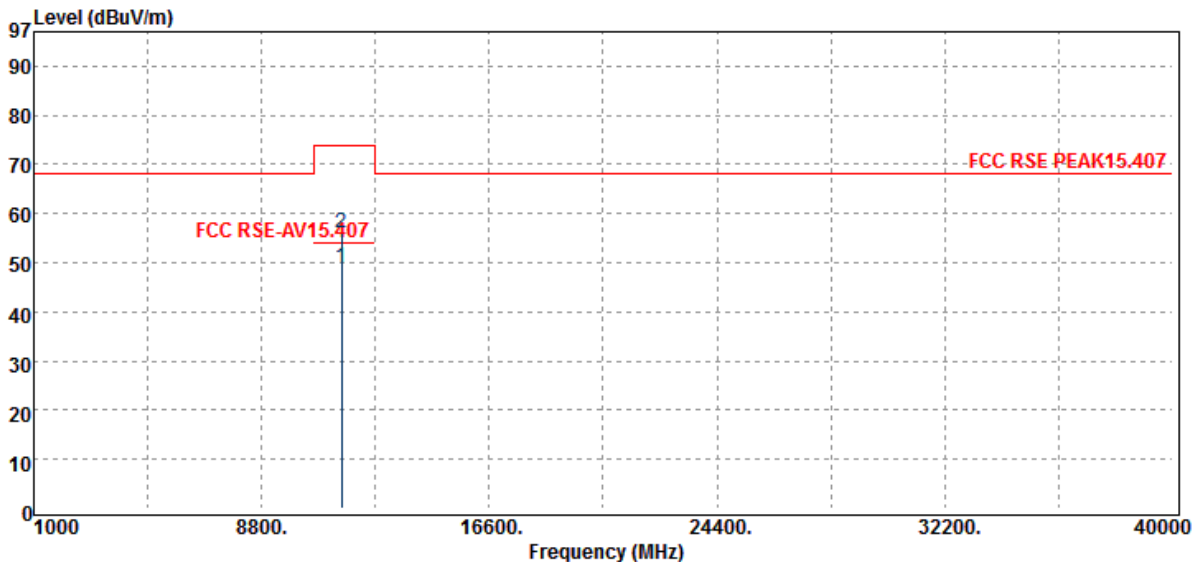
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Radiated Spurious Emission Measurement Result 802.11ac VHT80, 5725~5850 MHz

Operation Band	:802.11ac80B4	Test Date	:2018-03-28
Fundamental Frequency	:5775 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



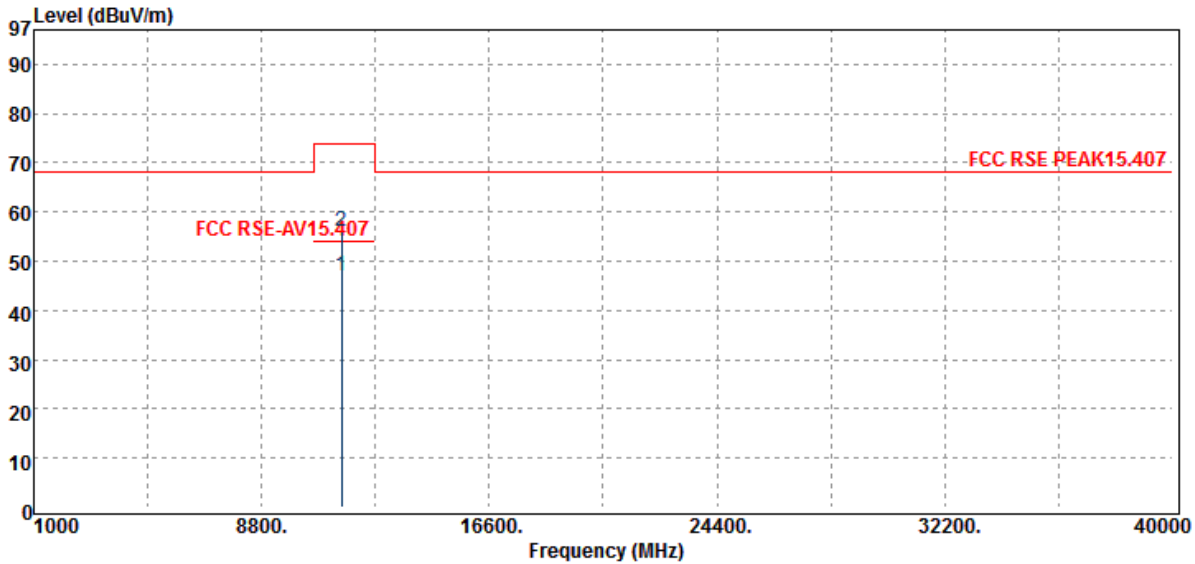
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
11550.00	H	Average	26.49	22.64	49.13	54.00	-4.87
11550.00	H	Peak	33.39	22.64	56.03	74.00	-17.97

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Operation Band	:802.11ac80B4	Test Date	:2018-03-28
Fundamental Frequency	:5775 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Safe Margin dB
11550.00	H	Average	24.20	22.64	46.84	54.00	-7.16
11550.00	H	Peak	33.28	22.64	55.92	74.00	-18.08

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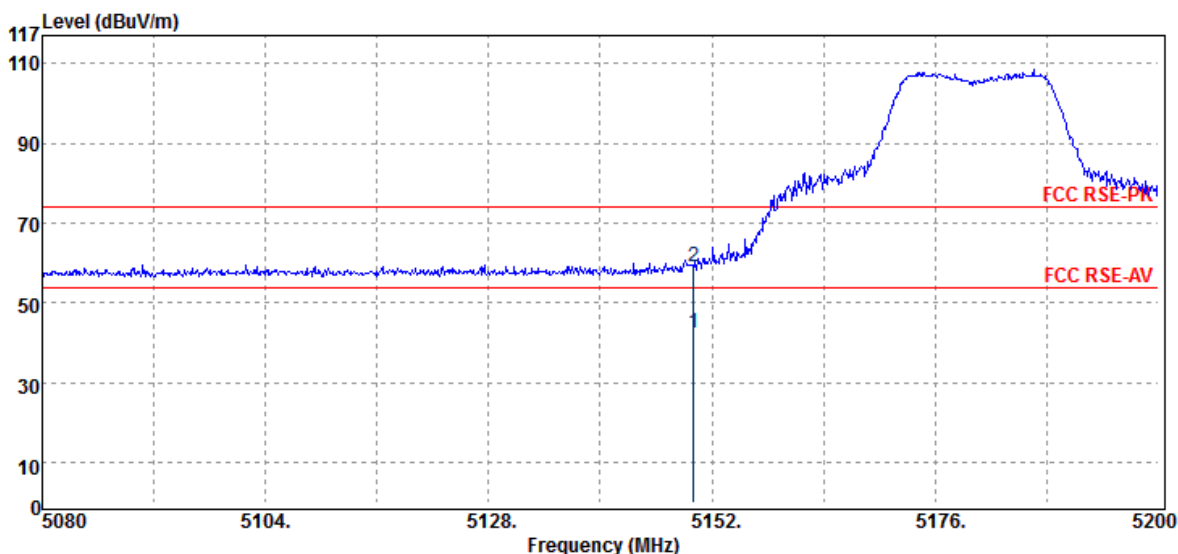
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Band edge falling to restricted band

802.11a mode

Operation Band	:802.11aB1	Test Date	:2018-03-28
Fundamental Frequency	:5180 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5150.00	E	Average	34.51	8.18	42.69	54.00	-11.31
5150.00	E	Peak	51.03	8.18	59.21	74.00	-14.79

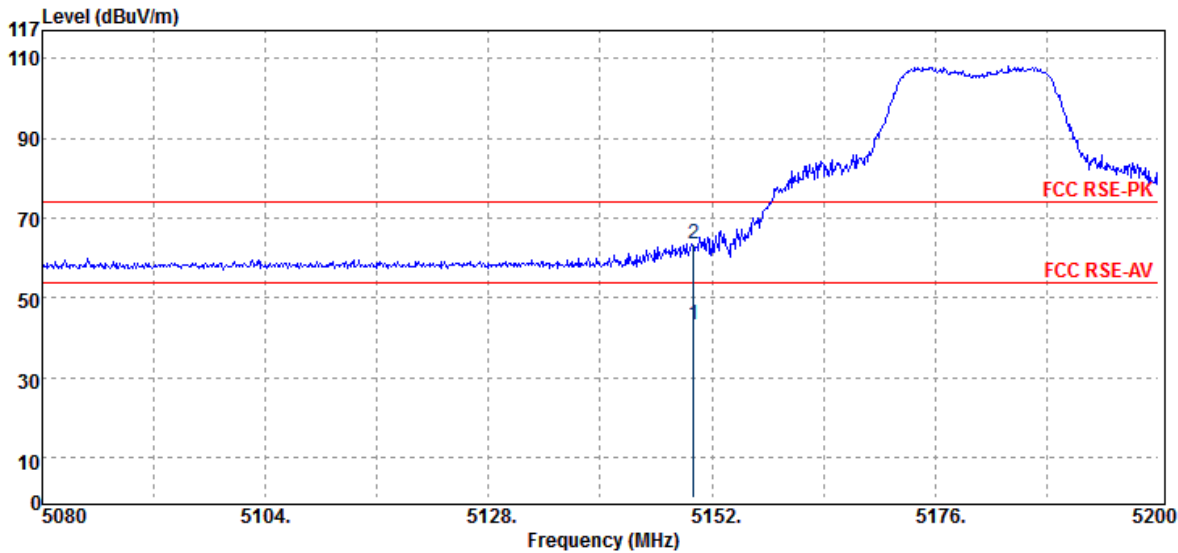
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Operation Band :802.11aB1
 Fundamental Frequency :5180 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-03-28
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5150.00	E	Average	35.17	8.18	43.35	54.00	-10.65
5150.00	E	Peak	55.31	8.18	63.49	74.00	-10.51

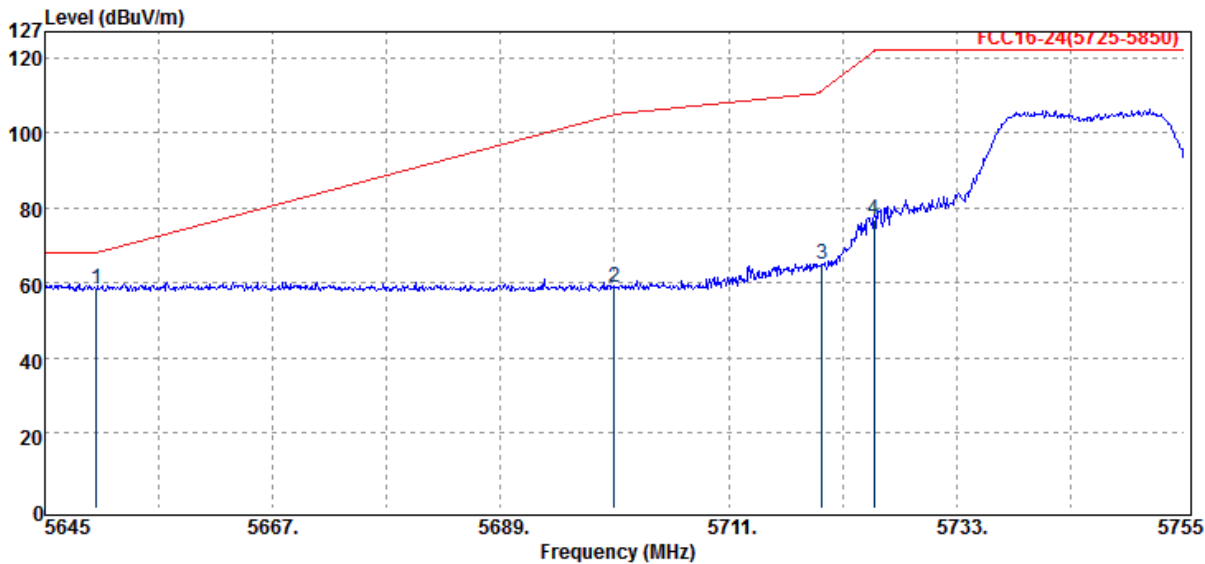
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Operation Band :802.11aB4
 Fundamental Frequency :5745 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-03-28
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



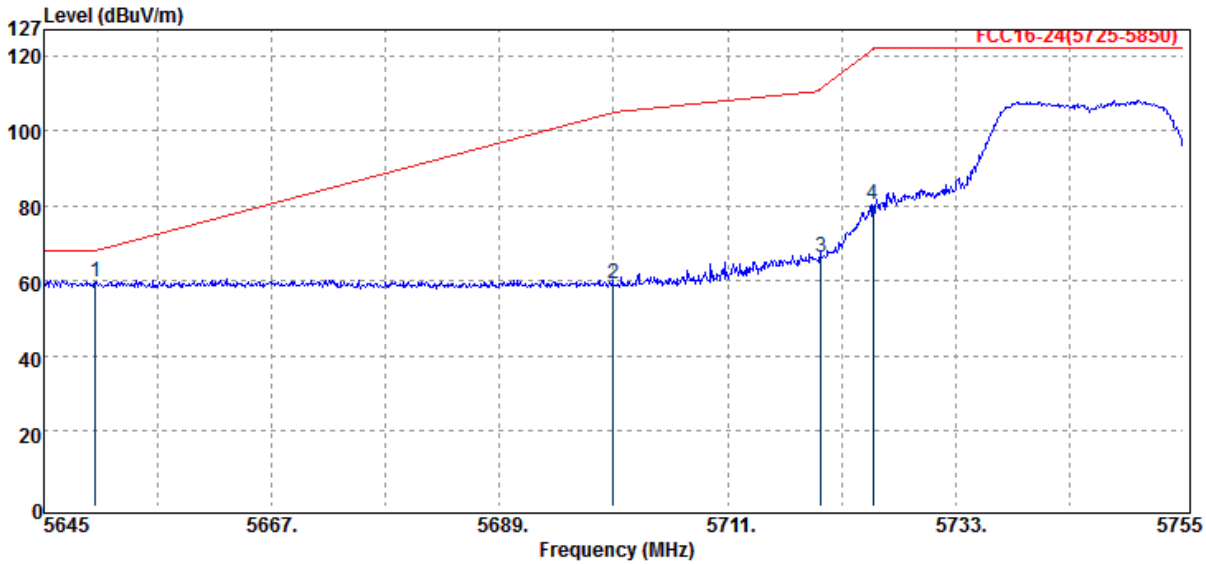
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5650.00	E	Peak	49.53	9.06	58.59	68.23	-9.64
5700.00	E	Peak	49.80	9.23	59.03	105.23	-46.20
5720.00	E	Peak	55.67	9.32	64.99	110.83	-45.84
5725.00	E	Peak	67.77	9.33	77.10	122.23	-45.13

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Operation Band	:802.11aB4	Test Date	:2018-03-28
Fundamental Frequency	:5745 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



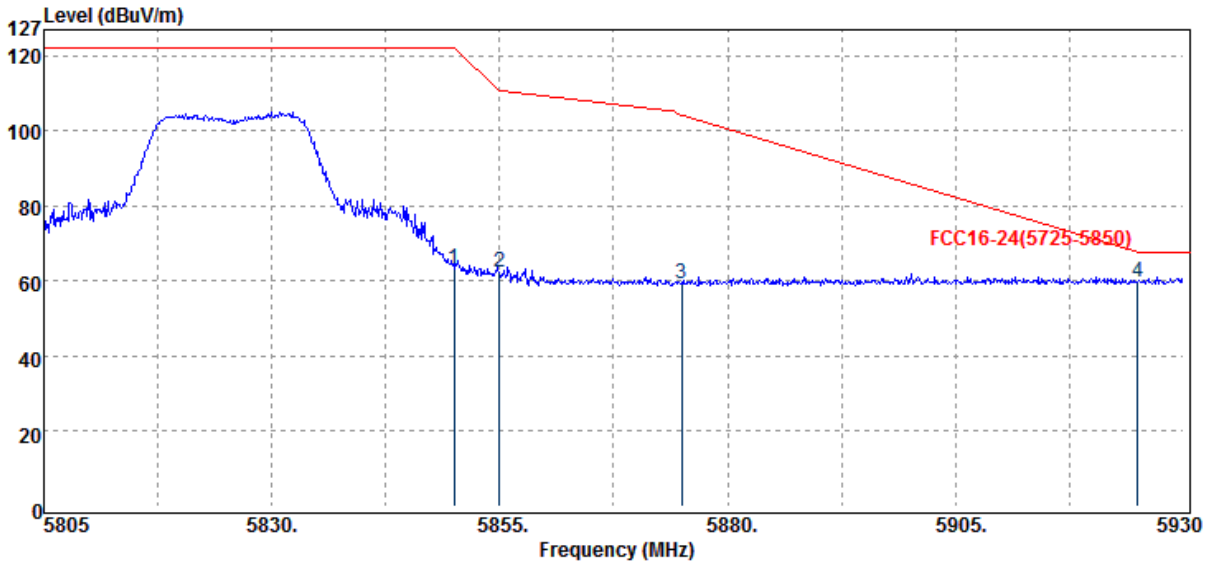
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5650.00	E	Peak	50.79	9.06	59.85	68.23	-8.38
5700.00	E	Peak	50.25	9.23	59.48	105.23	-45.75
5720.00	E	Peak	57.15	9.32	66.47	110.83	-44.36
5725.00	E	Peak	71.07	9.33	80.40	122.23	-41.83

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Operation Band	:802.11aB4	Test Date	:2018-03-28
Fundamental Frequency	:5825 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



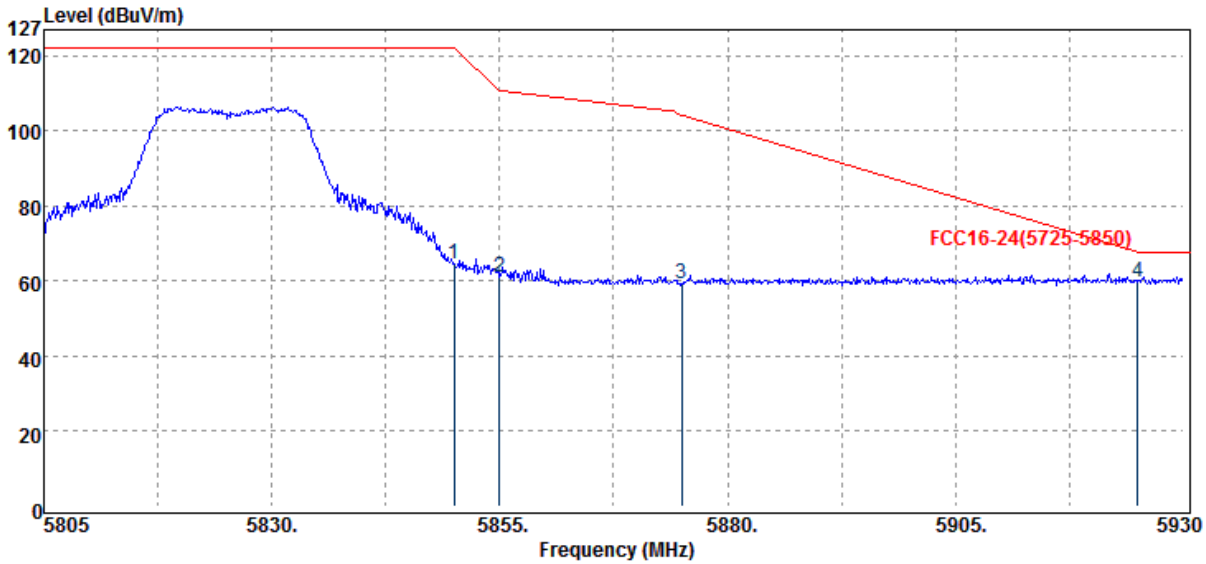
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Margin dB
5850.00	E	Peak	53.48	9.71	63.19	122.23	-59.04
5855.00	E	Peak	52.80	9.72	62.52	110.83	-48.31
5875.00	E	Peak	49.77	9.77	59.54	105.23	-45.69
5925.00	E	Peak	49.73	9.96	59.69	68.23	-8.54

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Operation Band	:802.11aB4	Test Date	:2018-03-28
Fundamental Frequency	:5825 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Margin dB
5850.00	E	Peak	54.75	9.71	64.46	122.23	-57.77
5855.00	E	Peak	51.22	9.72	60.94	110.83	-49.89
5875.00	E	Peak	49.69	9.77	59.46	105.23	-45.77
5925.00	E	Peak	49.99	9.96	59.95	68.23	-8.28

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t (886-2) 2299-3279

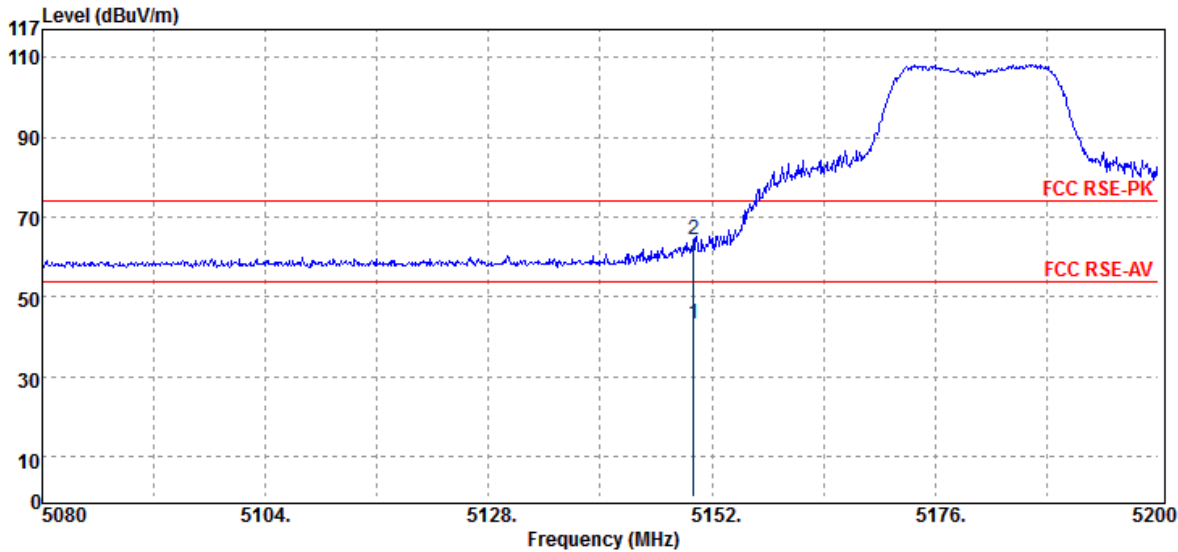
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802.11n20 HT mode

Operation Band	:802.11n20B1	Test Date	:2018-03-28
Fundamental Frequency	:5180 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



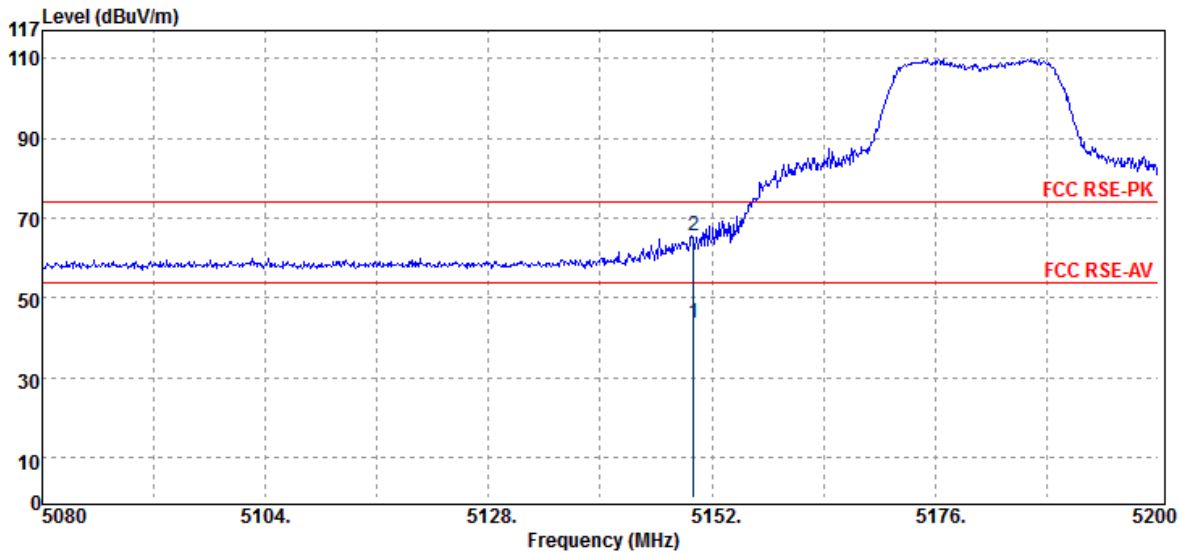
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5150.00	E	Average	35.14	8.18	43.32	54.00	-10.68
5150.00	E	Peak	56.18	8.18	64.36	74.00	-9.64

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Operation Band	:802.11n20B1	Test Date	:2018-03-28
Fundamental Frequency	:5180 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5150.00	E	Average	35.59	8.18	43.77	54.00	-10.23
5150.00	E	Peak	57.56	8.18	65.74	74.00	-8.26

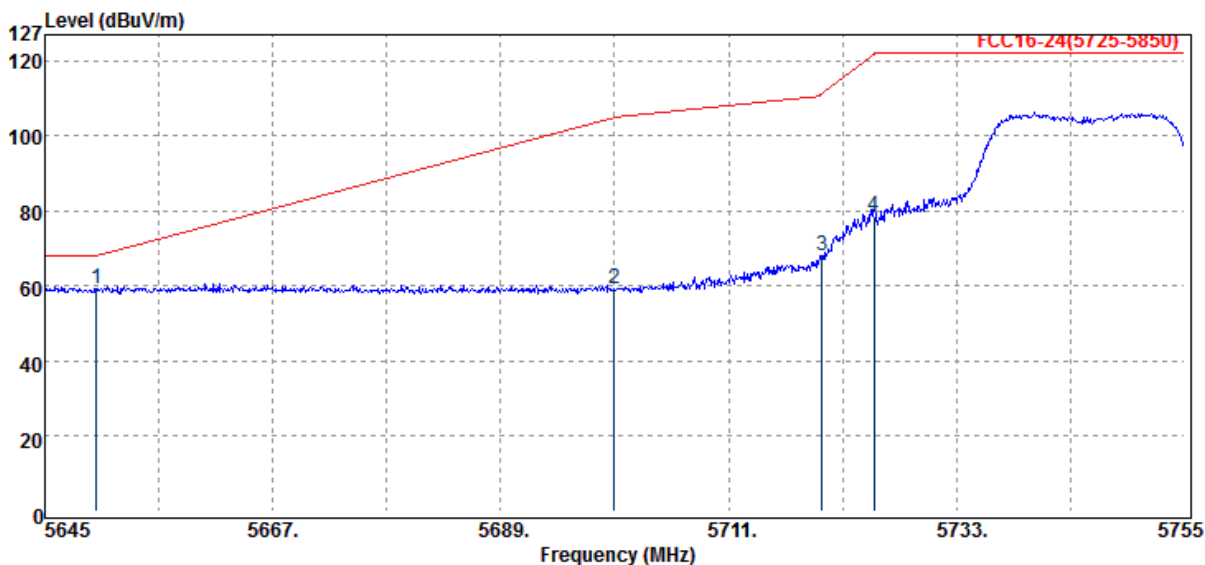
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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

Test Date :2018-03-28
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5650.00	E	Peak	50.09	9.06	59.15	68.23	-9.08
5700.00	E	Peak	49.98	9.23	59.21	105.23	-46.02
5720.00	E	Peak	58.65	9.32	67.97	110.83	-42.86
5725.00	E	Peak	69.32	9.33	78.65	122.23	-43.58

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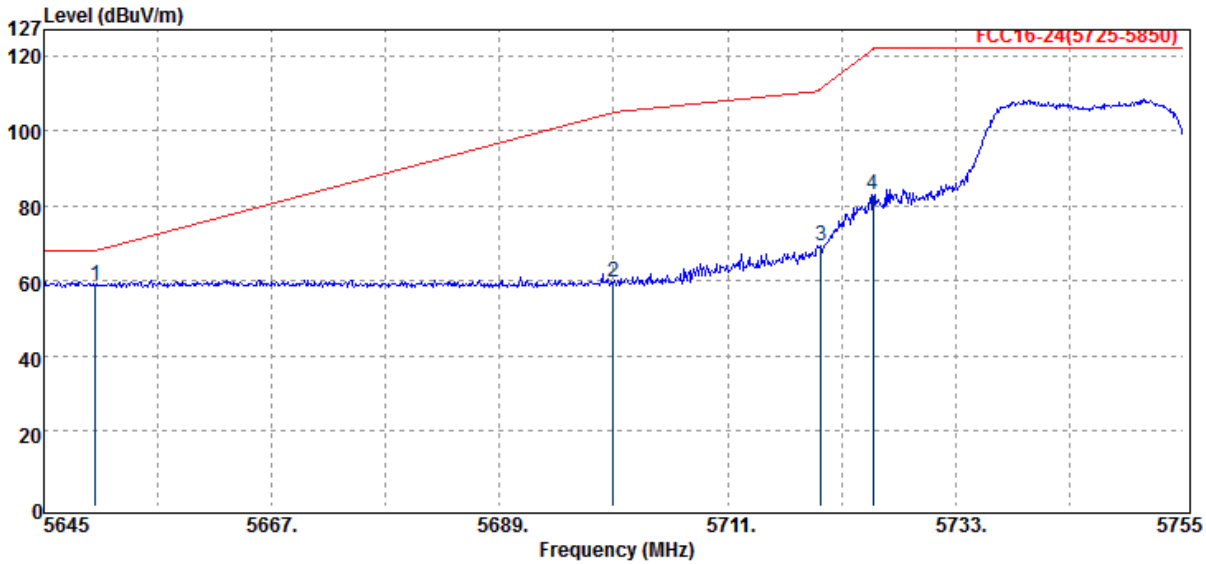
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Operation Band	:802.11n20B4	Test Date	:2018-03-28
Fundamental Frequency	:5745 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5650.00	E	Peak	49.88	9.06	58.94	68.23	-9.29
5700.00	E	Peak	50.36	9.23	59.59	105.23	-45.64
5720.00	E	Peak	60.00	9.32	69.32	110.83	-41.51
5725.00	E	Peak	73.52	9.33	82.85	122.23	-39.38

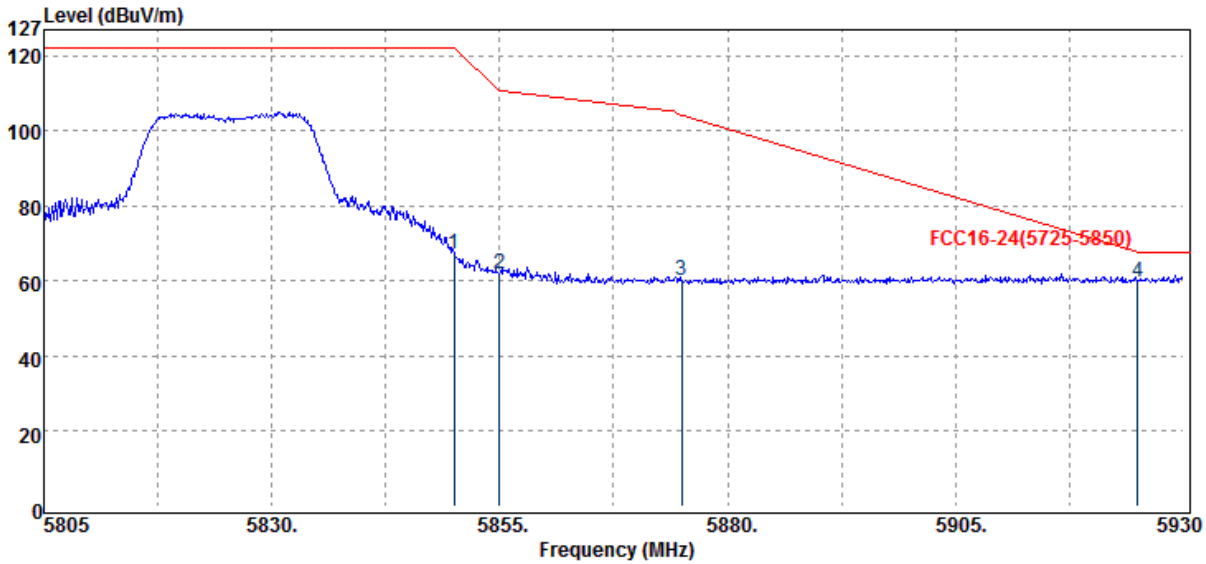
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Operation Band :802.11n20B4
 Fundamental Frequency :5825 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-03-28
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



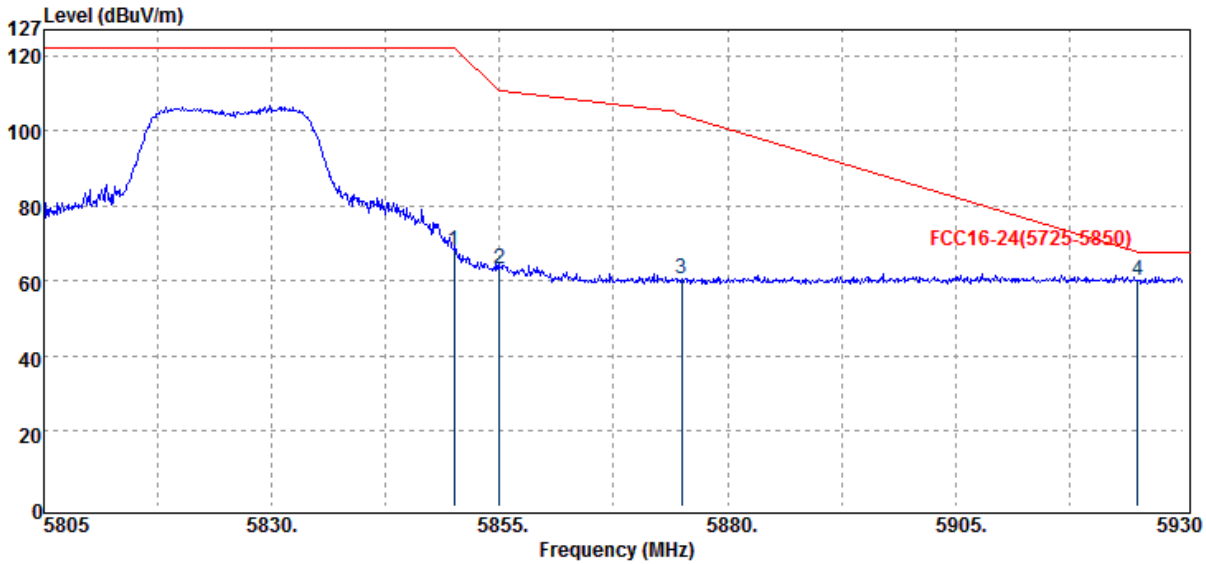
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5850.00	E	Peak	57.51	9.71	67.22	122.23	-55.01
5855.00	E	Peak	52.40	9.72	62.12	110.83	-48.71
5875.00	E	Peak	50.55	9.77	60.32	105.23	-44.91
5925.00	E	Peak	50.02	9.96	59.98	68.23	-8.25

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Operation Band	:802.11n20B4	Test Date	:2018-03-28
Fundamental Frequency	:5825 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5850.00	E	Peak	58.20	9.71	67.91	122.23	-54.32
5855.00	E	Peak	53.74	9.72	63.46	110.83	-47.37
5875.00	E	Peak	50.99	9.77	60.76	105.23	-44.47
5925.00	E	Peak	50.44	9.96	60.40	68.23	-7.83

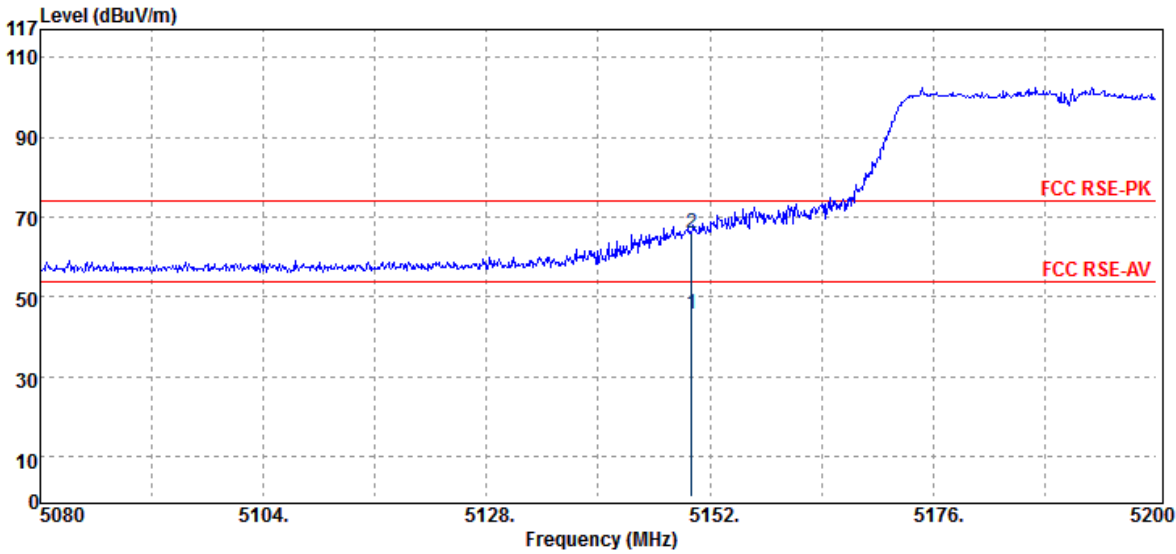
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802.11n40 HT mode

Operation Band	:802.11n40B1	Test Date	:2018-03-28
Fundamental Frequency	:5190 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



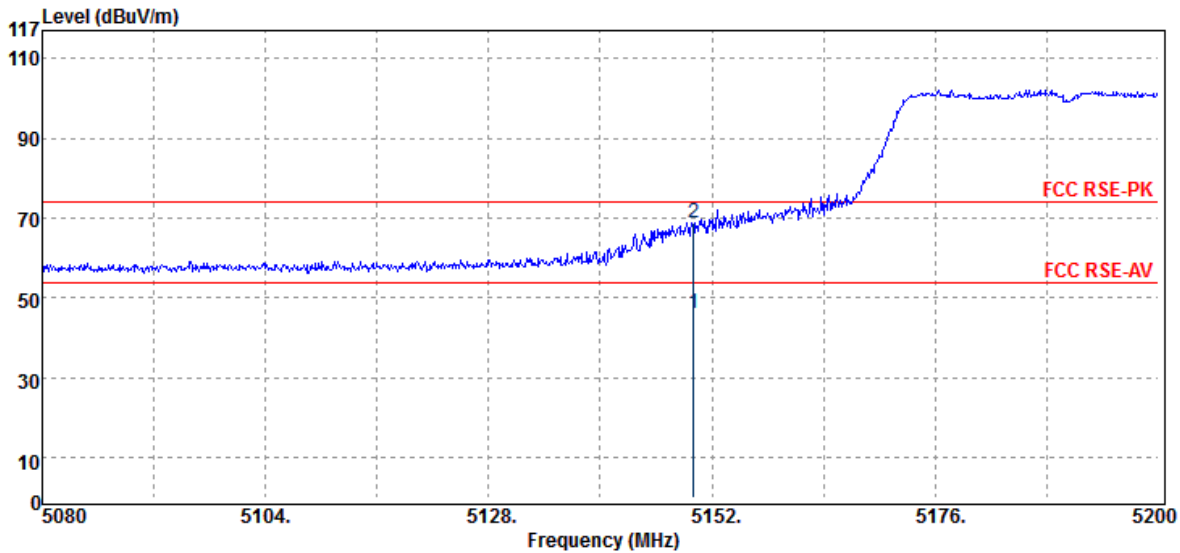
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5150.00	E	Average	37.44	8.18	45.62	54.00	-8.38
5150.00	E	Peak	57.94	8.18	66.12	74.00	-7.88

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Operation Band	:802.11n40B1	Test Date	:2018-03-28
Fundamental Frequency	:5190 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5150.00	E	Average	38.09	8.18	46.27	54.00	-7.73
5150.00	E	Peak	60.77	8.18	68.95	74.00	-5.05

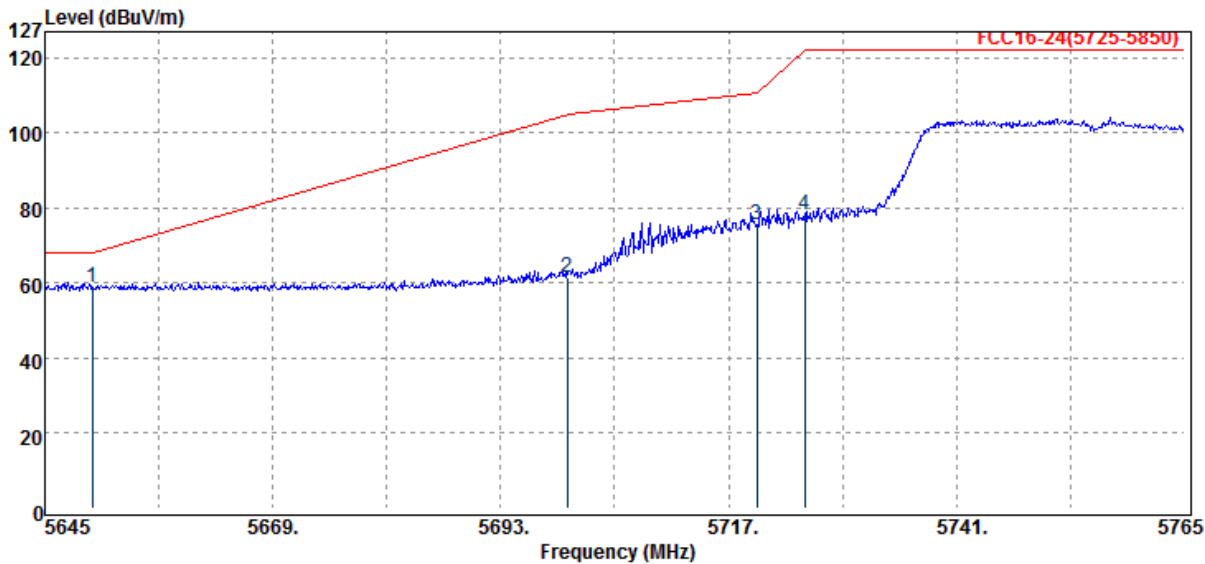
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Operation Band :802.11n40B4
 Fundamental Frequency :5755 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-03-28
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



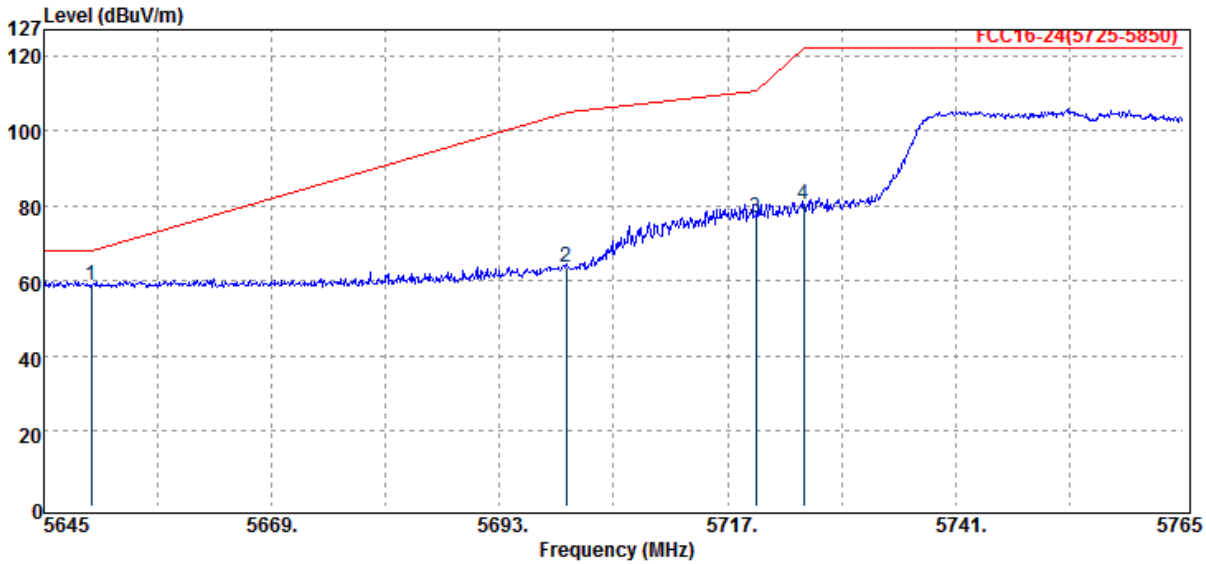
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5650.00	E	Peak	49.67	9.06	58.73	68.23	-9.50
5700.00	E	Peak	52.51	9.23	61.74	105.23	-43.49
5720.00	E	Peak	66.06	9.32	75.38	110.83	-35.45
5725.00	E	Peak	68.88	9.33	78.21	122.23	-44.02

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Operation Band	:802.11n40B4	Test Date	:2018-03-28
Fundamental Frequency	:5755 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5650.00	E	Peak	50.00	9.06	59.06	68.23	-9.17
5700.00	E	Peak	54.65	9.23	63.88	105.23	-41.35
5720.00	E	Peak	67.64	9.32	76.96	110.83	-33.87
5725.00	E	Peak	70.98	9.33	80.31	122.23	-41.92

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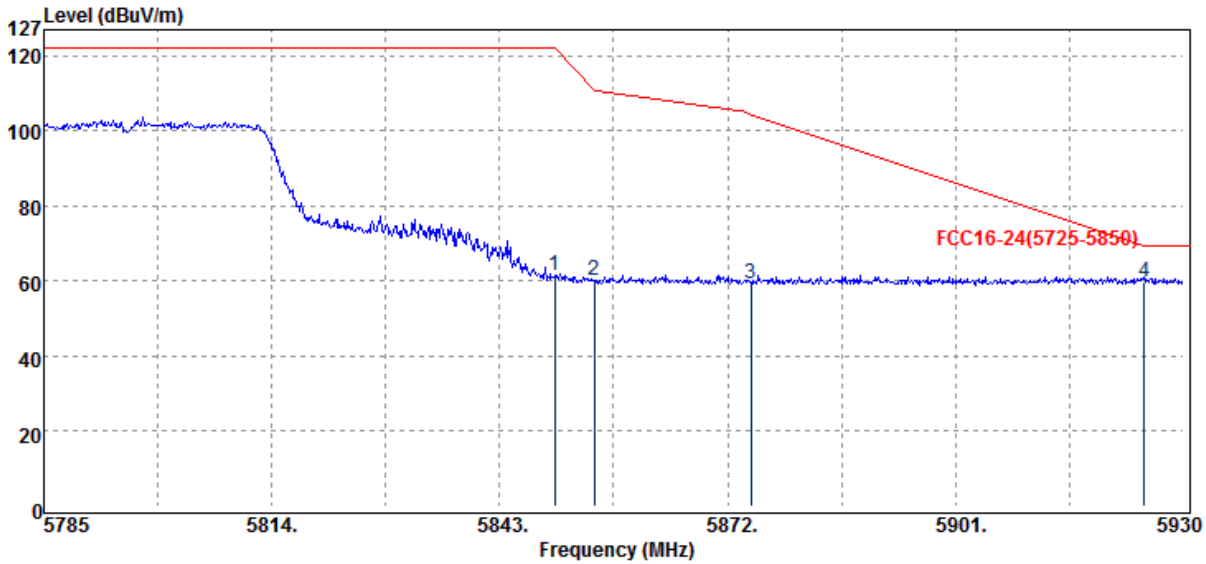
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Operation Band	:802.11n40B4	Test Date	:2018-03-28
Fundamental Frequency	:5795 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



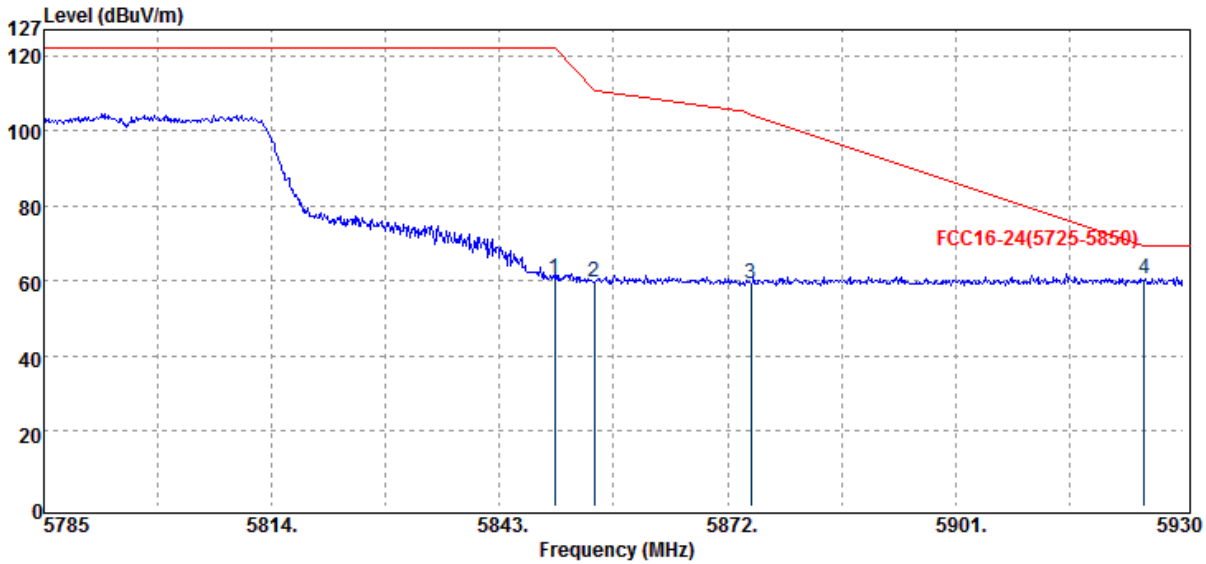
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5850.00	E	Peak	51.67	9.71	61.38	122.23	-60.85
5855.00	E	Peak	50.46	9.72	60.18	110.83	-50.65
5875.00	E	Peak	49.55	9.77	59.32	105.23	-45.91
5925.00	E	Peak	49.91	9.96	59.87	68.23	-8.36

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Operation Band	:802.11n40B4	Test Date	:2018-03-28
Fundamental Frequency	:5795 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5850.00	E	Peak	50.88	9.71	60.59	122.23	-61.64
5855.00	E	Peak	50.02	9.72	59.74	110.83	-51.09
5875.00	E	Peak	49.65	9.77	59.42	105.23	-45.81
5925.00	E	Peak	50.47	9.96	60.43	68.23	-7.80

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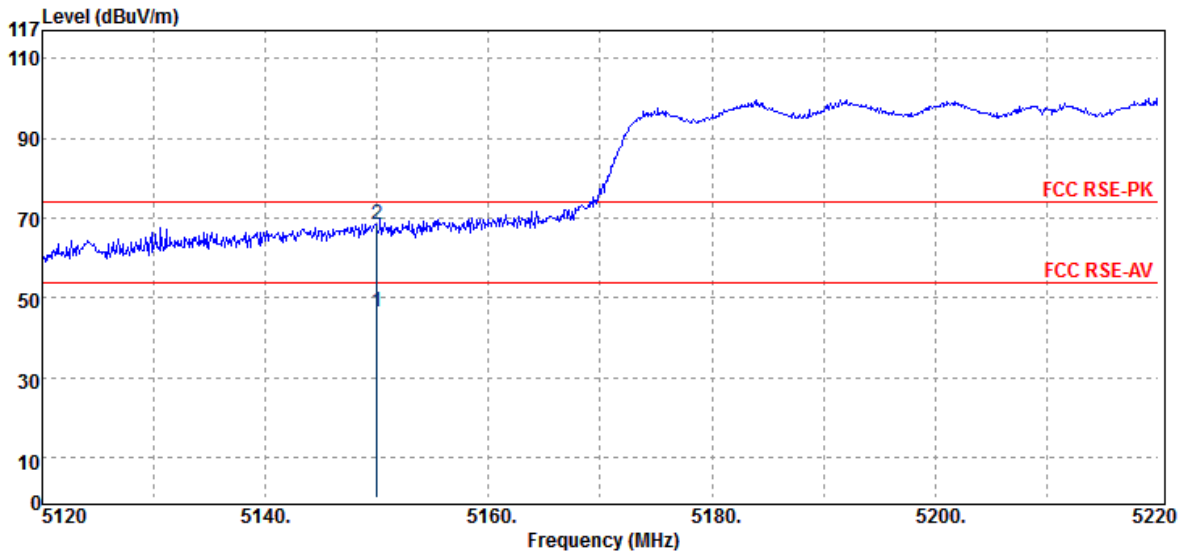
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802.11ac80 mode

Operation Band	:802.11ac80B1	Test Date	:2018-03-28
Fundamental Frequency	:5210 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5150.00	E	Average	38.54	8.18	46.72	54.00	-7.28
5150.00	E	Peak	60.31	8.18	68.49	74.00	-5.51

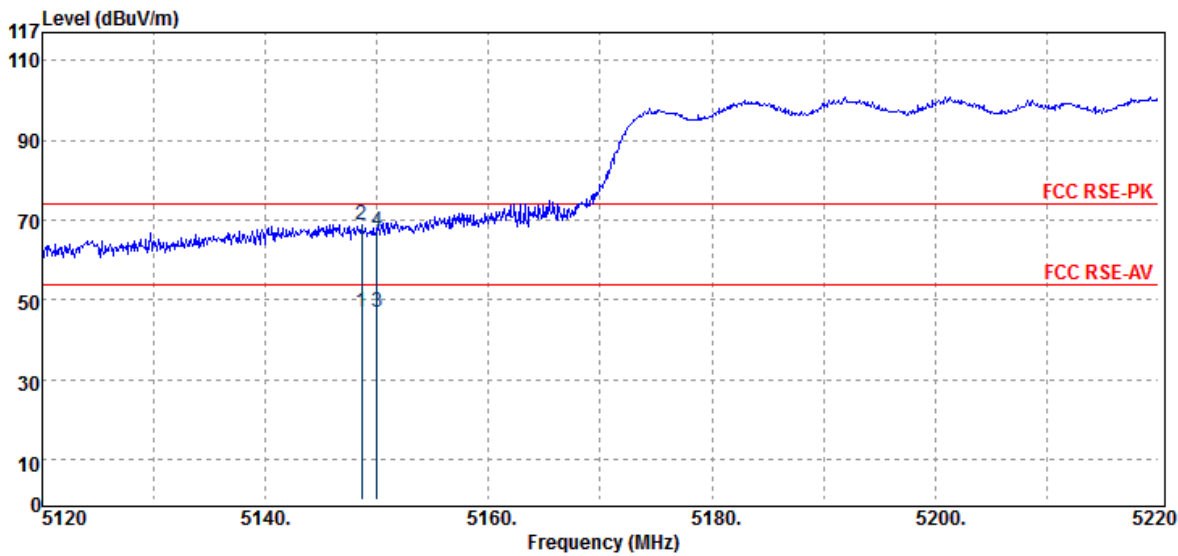
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Operation Band :802.11ac80B1
Fundamental Frequency :5210 MHz
Operation Mode :Bandedge CH LOW
EUT Pol. :E2 Plane

Test Date :2018-03-28
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :HORIZONTAL



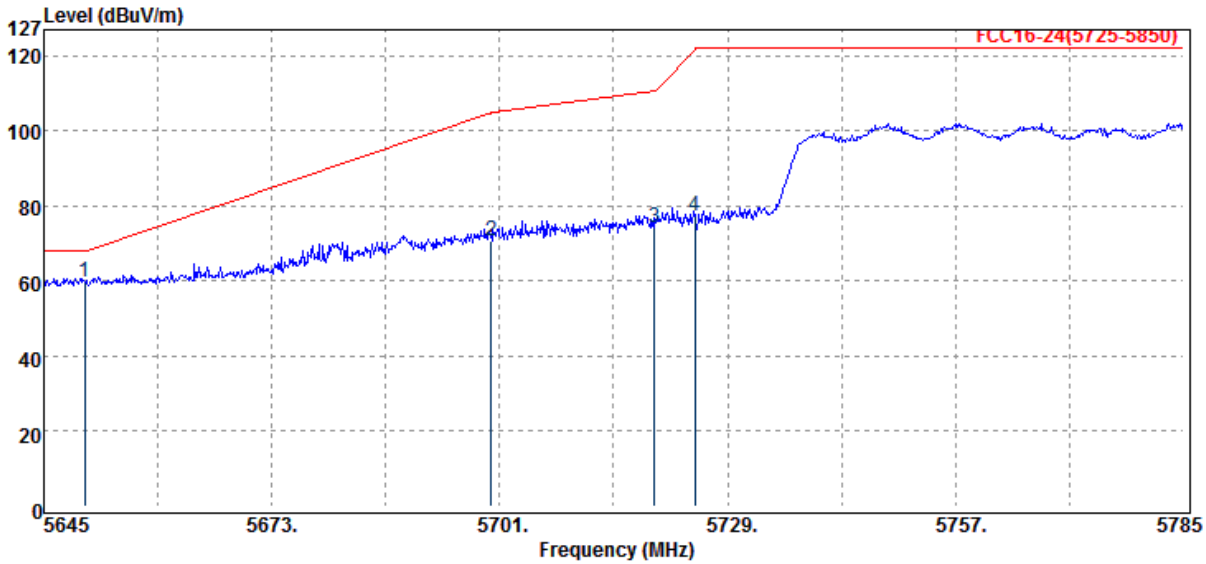
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5148.60	E	Average	38.90	8.17	47.07	54.00	-6.93
5148.60	E	Peak	60.77	8.17	68.94	74.00	-5.06
5150.00	E	Average	38.88	8.18	47.06	54.00	-6.94
5150.00	E	Peak	59.15	8.18	67.33	74.00	-6.67

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Operation Band	:802.11ac80B4	Test Date	:2018-03-28
Fundamental Frequency	:5775 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



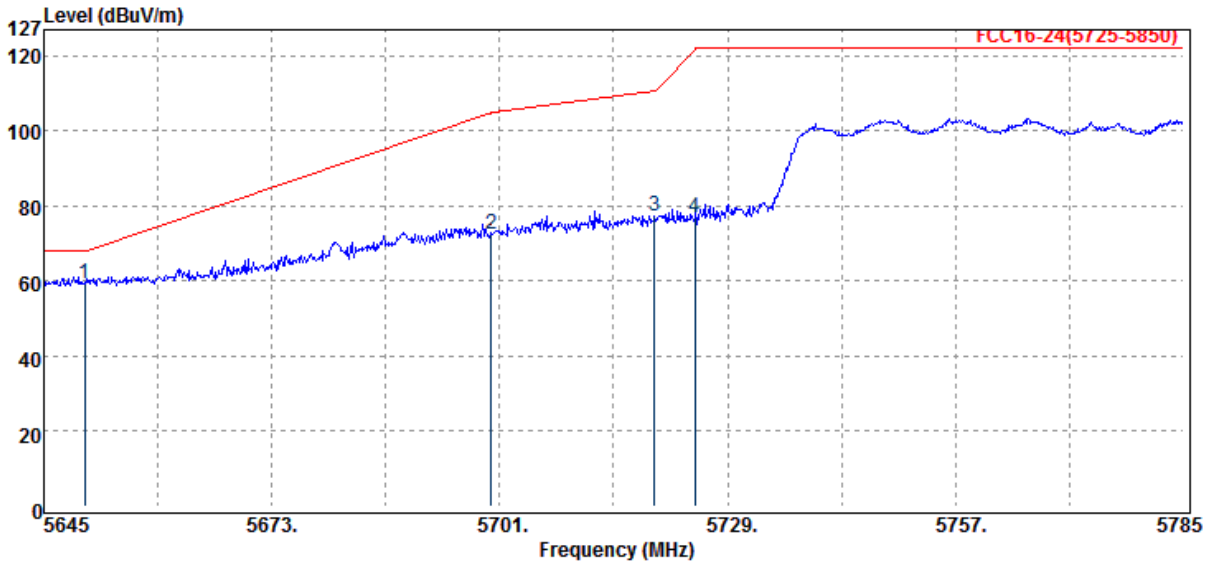
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5650.00	E	Peak	50.59	9.06	59.65	68.23	-8.58
5700.00	E	Peak	61.71	9.23	70.94	105.23	-34.29
5720.00	E	Peak	64.78	9.32	74.10	110.83	-36.73
5725.00	E	Peak	67.86	9.33	77.19	122.23	-45.04

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Operation Band	:802.11ac80B4	Test Date	:2018-03-28
Fundamental Frequency	:5775 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



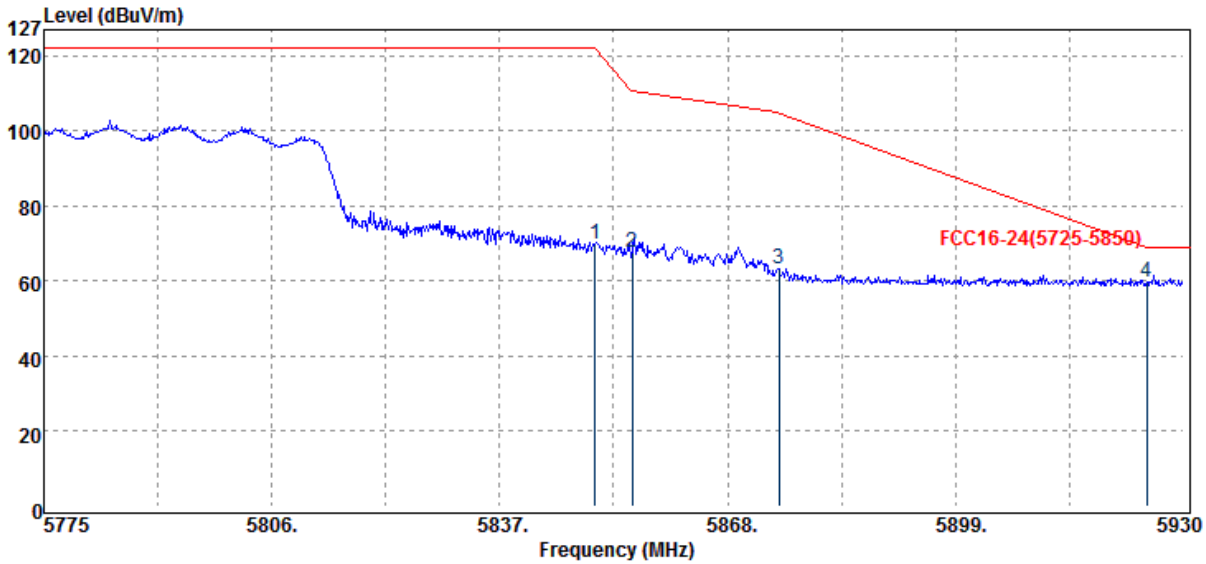
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5650.00	E	Peak	50.34	9.06	59.40	68.23	-8.83
5700.00	E	Peak	63.17	9.23	72.40	105.23	-32.83
5720.00	E	Peak	68.20	9.32	77.52	110.83	-33.31
5725.00	E	Peak	67.70	9.33	77.03	122.23	-45.20

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Operation Band	:802.11ac80B4	Test Date	:2018-03-28
Fundamental Frequency	:5775 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



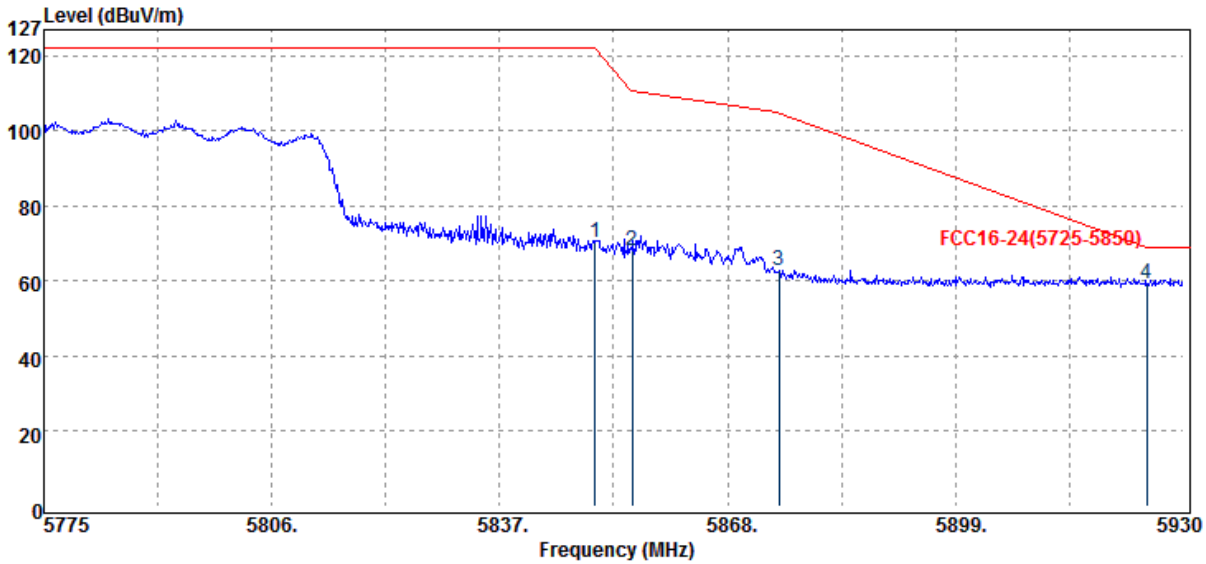
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5850.00	E	Peak	60.22	9.71	69.93	122.23	-52.30
5855.00	E	Peak	57.89	9.72	67.61	110.83	-43.22
5875.00	E	Peak	53.70	9.77	63.47	105.23	-41.76
5925.00	E	Peak	50.02	9.96	59.98	68.23	-8.25

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Operation Band	:802.11ac80B4	Test Date	:2018-03-28
Fundamental Frequency	:5775 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Kane
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5850.00	E	Peak	60.54	9.71	70.25	122.23	-51.98
5855.00	E	Peak	58.35	9.72	68.07	110.83	-42.76
5875.00	E	Peak	53.04	9.77	62.81	105.23	-42.42
5925.00	E	Peak	49.41	9.96	59.37	68.23	-8.86

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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

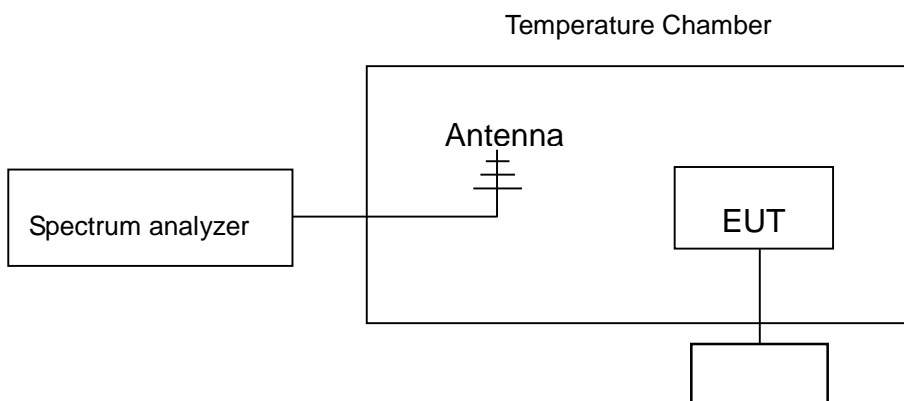
13.1 Standard Applicable

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



13.4 Measurement Equipment Used: Variable DC Power Supply

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EXA Spectrum Analyzer	Agilent	N9010A	MY54200716	10/16/2017	10/15/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2018	01/01/2019
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2018	01/01/2019
Notebook	Lenovo	T440P	P0000564	N/A	N/A

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13.5 Measurement Result

Operation Mode		802.11 a		Test Date	2018.03.01
Temperature		:23 °C		Test By	Mike
Humidity		:68 %			
Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0 °C	5.5V	36	5180	5,180.07495	-0.00001447
		44	5220	5,220.07495	-0.00001436
		48	5240	5,240.07495	-0.00001430
		149	5745	5,745.09009	-0.00001568
		157	5785	5,785.10498	-0.00001815
		165	5825	5,825.09009	-0.00001547
	4.5V	36	5180	5,180.09009	-0.00001739
		44	5220	5,220.05981	-0.00001146
		48	5240	5,240.05981	-0.00001141
		149	5745	5,745.05981	-0.00001041
		157	5785	5,785.08984	-0.00001553
		165	5825	5,825.07495	-0.00001287
25 °C	5V	36	5180	5,180.08984	-0.00001734
		44	5220	5,220.07495	-0.00001436
		48	5240	5,240.09009	-0.00001719
		149	5745	5,745.08984	-0.00001564
		157	5785	5,785.06006	-0.00001038
		165	5825	5,825.10498	-0.00001802
55 °C	5.5V	36	5180	5,180.08984	-0.00001734
		44	5220	5,220.08984	-0.00001721
		48	5240	5,240.09009	-0.00001719
		149	5745	5,745.10498	-0.00001827
		157	5785	5,785.09009	-0.00001557
		165	5825	5,825.11987	-0.00002058
	4.5V	36	5180	5,180.10498	-0.00002027
		44	5220	5,220.07495	-0.00001436
		48	5240	5,240.09009	-0.00001719
		149	5745	5,745.10498	-0.00001827
		157	5785	5,785.10498	-0.00001815
		165	5825	5,825.10498	-0.00001802

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Operation Mode	802.11 n_HT40	Test Date	2018.03.01
Temperature	:23 °C	Test By	Mike
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0 °C	5.5V	38	5190	5,190.07495	-0.00001444
		46	5230	5,230.02490	-0.00000476
		151	5755	5,755.02490	-0.00000433
		159	5795	5,795.07495	-0.00001293
	4.5V	38	5190	5,190.09985	-0.00001924
		46	5230	5,229.97510	0.00000476
		151	5755	5,755.04981	-0.00000865
		159	5795	5,795.07495	-0.00001293
25 °C	5V	38	5190	5,190.07495	-0.00001444
		46	5230	5,230.02490	-0.00000476
		151	5755	5,755.04981	-0.00000865
		159	5795	5,795.07495	-0.00001293
55 °C	5.5V	38	5190	5,190.07495	-0.00001444
		46	5230	5,230.05005	-0.00000957
		151	5755	5,755.07495	-0.00001302
		159	5795	5,795.07495	-0.00001293
	4.5V	38	5190	5,190.04981	-0.00000960
		46	5230	5,230.09985	-0.00001909
		151	5755	5,755.07495	-0.00001302
		159	5795	5,795.05005	-0.00000864

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Operation Mode	802.11 ac_VHT80	Test Date	2018.03.01
Temperature	:23 °C	Test By	Mike
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0 °C	5.5V	42	5210	5,210.19995	-0.00003838
		155	5775	5,775.19995	-0.00003462
	4.5V	42	5210	5,210.05005	-0.00000961
		155	5775	5,774.85010	0.00002596
25 °C	5V	42	5210	5,209.75000	0.00004798
		155	5775	5,775.05005	-0.00000867
55 °C	5.5V	42	5210	5,210.05005	-0.00000961
		155	5775	5,774.84985	0.00002600
	4.5V	42	5210	5,209.84985	0.00002882
		155	5775	5,775.05005	-0.00000867

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14 ANTENNA REQUIREMENT

14.1 Standard Applicable

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

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

14.2 Antenna Connected Construction

An embedded-in antenna design is used.

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

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