

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT**INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART E REQUIREMENT**

OF

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

Product Name: Clickshare CSE-200+

Brand Name: Barco

Model No.: CSE-200+

Model Difference: N/A

FCC ID: 2AAED-R9861521

Report Number: ER/2018/70109

FCC Rule Part: §15.407, Cat: NII

Issue Date: Sep. 03, 2018

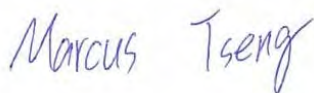
Date of Test: Jul. 12, 2018 ~ Aug. 22, 2018

Date of EUT Received: Jul. 12, 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 / Engineer****Approved By:****Jim Chang / Manager**

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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
ER/2018/70109	Rev.00	Initial creation of document	All	Sep. 03, 2018	Yuri Tsai

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1 GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	Clickshare CSE-200+	
Brand Name:	Barco	
Model No.:	CSE-200+	
Model Difference:	N/A	
Product SW/HW version:	N/A / EVT2	
WLAN Module:	Model No.: WCBN807A	
Power Supply:	120Vac input / 12Vdc output from AC/DC adapter	
	Adapter:	Model No.: BA070-120417GXX Supplier: BILLION

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WLAN 5GHz:

Wi-Fi 802.11	Frequency Range	Channels	Rated Power (Avg.) (dBm)	Modulation Technology
a	5180~5240	4	17.75	OFDM
	5745-5825	5	18.40	
n_HT ac_VHT 20M	5180~5240	4	HT: 17.97 (Worst case)	OFDM
	5745-5825	5	HT: 18.35 (Worst case)	
n_HT ac_VHT 40M	5190~5230	2	HT: 17.76 (Worst case)	OFDM
	5755~5795	2	HT: 16.65 (Worst case)	
ac_VHT 80M	5210	1	11.28	OFDM
	5775	1	11.21	
Modulation type		64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only		
Antenna Type:		PCB Antenna, Peak Gain: Antenna 1: 0.97dBi (5150~5250MHz) 1.75dBi (5725~5850MHz) Antenna 2: -0.02dBi (5150~5250MHz) 1.2dBi (5725~5850MHz)		
Transition Rate:s		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 – 300.0Mbps 802.11 ac_20MHz: 6.5 –173.3Mbps 802.11 ac_40MHz: 13.5 –400.0Mbps 802.11 ac_80MHz: 29.3 – 866.7Mbps		

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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 V02r01

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

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.2, Keji 1st Rd.,
Guishan District, Taoyuan City, Taiwan 333 (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 placed on a turn table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Radiated Emissions

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

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2.5 Configuration of Tested System

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



Fig. 2-2 Radiated Emission & Conduction (AC Power Line) Radiated Emission

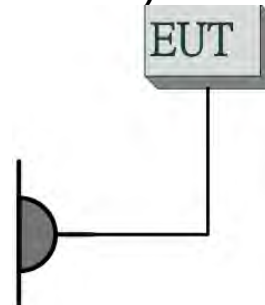


Table 2-1 Equipment Used in Tested System

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

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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 5745 MHz ~5850 MHz:

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

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

802.11ac VHT80 Mode	
channel	Frequency
155	5775

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4.2 The Worst Test Modes and Channel Details

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

RADIATED EMISSION TEST:

MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
RADIATED EMISSION TEST (BELOW 1 GHz)						
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	2TX
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Aux
802.11ac_VHT80	5775	155	155	OFDM	MCS0	MIMO
RADIATED EMISSION TEST (ABOVE 1 GHz)						
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	2TX
802.11n_HT20				OFDM	MCS8	MIMO
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	2TX
802.11n_HT20				OFDM	MCS8	MIMO
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS8	MIMO
802.11ac_VHT80	5775	155	155	OFDM	MCS0	MIMO

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

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ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	2TX
802.11n_HT20 802.11ac_VHT20				OFDM	MCS8 / MCS0	MIMO
802.11n_HT40 802.11ac_VHT40	5190~5230	38 to 46	38,46	OFDM	MCS8 / MCS0	MIMO
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	2TX
802.11n_HT20 802.11ac_VHT20				OFDM	MCS8 / MCS0	MIMO
802.11n_HT40 802.11ac_VHT40	5755~5795	151 to 159	151,159	OFDM	MCS8 / MCS0	MIMO
802.11ac_VHT80	5775	155	155	OFDM	MCS0	MIMO

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26dB & 6dB Emission Bandwidth	+/- 123.36 Hz
The Maximum Output Power Measurement	+/- 0.96 dB
Peak Power Spectral Density Measurement	+/- 1.67 dB
Frequency Stability	+/- 123.36 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC=+/- 0.2%

Radiated Spurious Emission:

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

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

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

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6 CONDUCTED EMISSION TEST

6.1. Standard Applicable

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

Frequency range MHz	Limits dB(μV)	
	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	100335	02/02/2018	02/01/2019
LISN	SCHWARZ- BECK	NSLK 8127	8127-649	05/18/2018	05/17/2019

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 table top.
3. The LISN was connected with 120Vac/60Hz power source.

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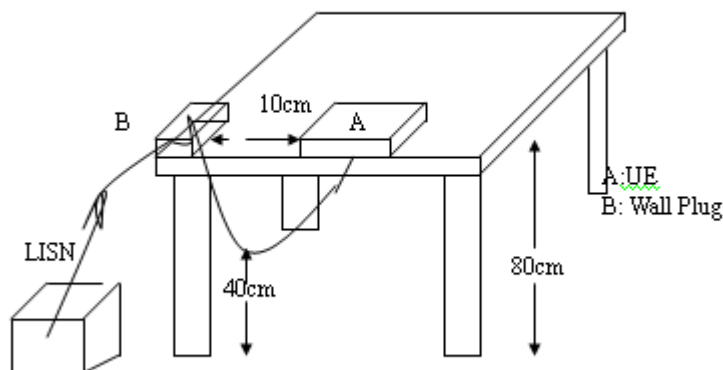
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6.4. Test SET-UP



6.5. Measurement Procedure

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

6.6. Measurement Result

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

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

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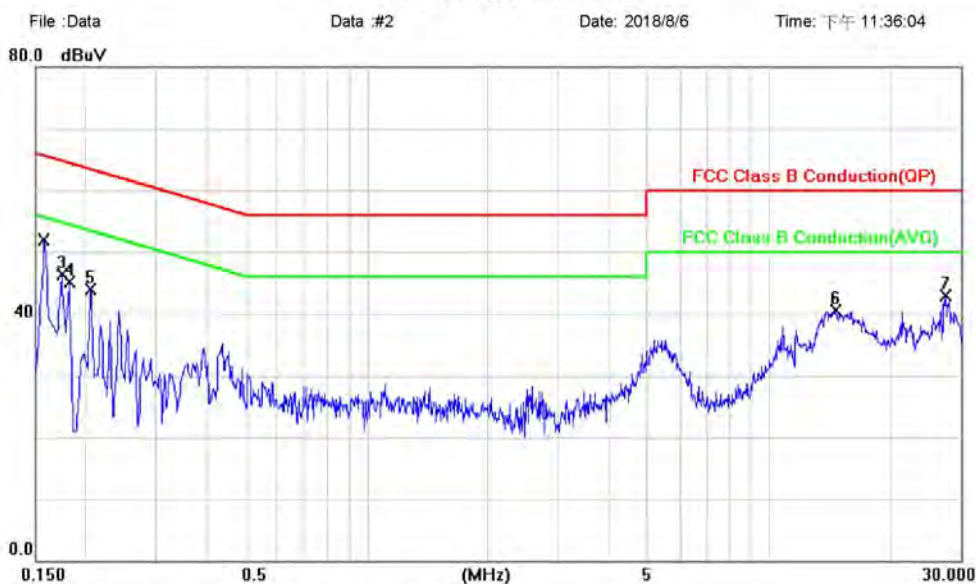
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Site: Conduction Room	Phase: L1	Temperature: 25 °C
Limit: FCC Class B Conduction(QP)	Power: AC 120V/60Hz	Humidity: 85 %
Mode: Operation		
Note: Adapter: BA070-120417GXX		

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.1580	49.80	0.04	49.84	65.57	-15.73	QP	
2		0.1580	34.00	0.04	34.04	55.57	-21.53	AVG	
3		0.1740	46.21	0.04	46.25	64.77	-18.52	peak	
4		0.1820	45.09	0.04	45.13	64.39	-19.26	peak	
5		0.2060	43.80	0.04	43.84	63.37	-19.53	peak	
6		14.6060	40.17	0.36	40.53	60.00	-19.47	peak	
7		27.5220	42.33	0.52	42.85	60.00	-17.15	peak	

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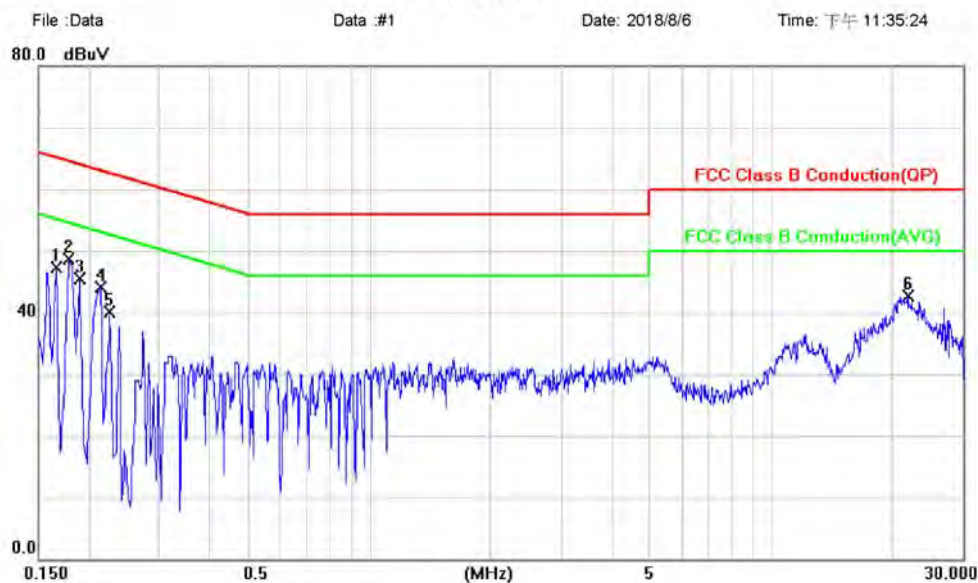
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Site: Conduction Room
Limit: FCC Class B Conduction(QP)
Mode: Operation
Note: Adapter: BA070-120417GXX

Phase: **N**
Power: AC 120V/60Hz

Temperature: 25 °C
Humidity: 85 %

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1660	47.21	0.04	47.25	65.16	-17.91	peak	
2	*	0.1780	48.72	0.04	48.76	64.58	-15.82	peak	
3		0.1900	45.50	0.04	45.54	64.04	-18.50	peak	
4		0.2140	44.15	0.04	44.19	63.05	-18.86	peak	
5		0.2260	40.01	0.04	40.05	62.60	-22.55	peak	
6		21.8820	42.19	0.44	42.63	60.00	-17.37	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	95.26	0.21	0.48	1.00
802.11n_20	91.30	0.40	1.02	2.00
802.11n_40	91.01	0.41	1.05	2.00
802.11ac_80	82.34	0.84	2.16	3.00

Duty Cycle Factor: $10 * \log(1/0.9526) = 0.21$

Duty Cycle Factor: $10 * \log(1/0.913) = 0.4$

Duty Cycle Factor: $10 * \log(1/0.9101) = 0.41$

Duty Cycle Factor: $10 * \log(1/0.8234) = 0.84$

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DUTY CYCLE TEST SIGNAL Measurement Result 802.11a



802.11n HT20



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802.11n HT 40



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

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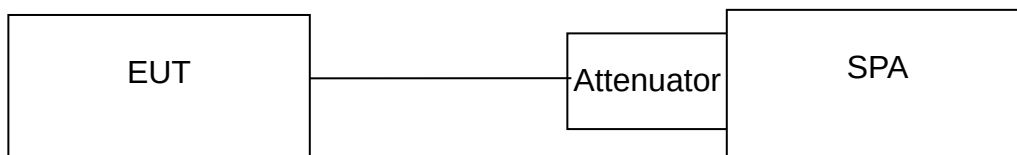
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8.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equip-ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EXA Spectrum An-alyzer	Agilent	N9010A	MY50420195	2018/05/03	2019/05/02
DC Block	Mini-Circuits	BLK-18-S+	1	2018/01/02	2019/01/01
Coaxial Cables	N/A	WK CE Cable	N/A	2018/01/02	2019/01/01

8.4 Test Set-up



8.5 Measurement Result

26dB Bandwidth

802.11a_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	20.10	13.032
5220	28.14	14.492
5240	29.95	14.763

802.11a_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.98	13.006
5220	28.89	14.608
5240	29.95	14.764

802.11n_HT20_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.04	12.797
5220	20.06	13.023
5240	28.25	14.510

802.11n_HT20_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.29	12.853
5220	20.43	13.103
5240	29.74	14.733

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802.11n_HT40_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	38.09	15.808
5230	49.31	16.929

802.11n_HT40_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	38.08	15.807
5230	49.81	16.973

802.11ac_VHT80_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	81.45	19.109

802.11ac_VHT80_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	80.15	19.039

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

802.11a_Ch0

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	15.33	11.855
5785	14.50	11.614
5825	15.13	11.798

802.11a_Ch1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.07	12.061
5785	14.53	11.622
5825	15.13	11.797

802.11n_HT20_Ch0

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	15.06	11.779
5785	15.71	11.961
5825	15.15	11.803

802.11n_HT20_Ch1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	15.68	11.952
5785	15.70	11.958
5825	15.07	11.781

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802.11n_HT40_Ch0

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.11	15.455
5795	35.06	15.448

802.11n_HT40_Ch1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.08	15.451
5795	32.57	15.129

802.11ac_VHT80_Ch0

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.04	18.753

802.11ac_VHT80_Ch1

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

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99% BW Verification of DFS Function

802.11a_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.61	< 5250
5745	5736.75	> 5725

802.11a_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.37	< 5250
5745	5736.78	> 5725

802.11n_HT20_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.76	< 5250
5745	5736.21	> 5725

802.11n_HT20_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.73	< 5250
5745	5736.21	> 5725

802.11n_HT40_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5230	5247.85	< 5250
5755	5736.90	> 5725

802.11n_HT40_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5230	5247.90	< 5250
5755	5736.95	> 5725

802.11ac_VHT80_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5210	5247.30	< 5250
5775	5737.20	> 5725

802.11n_HT80_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5210	5247.30	< 5250
5775	5737.20	> 5725

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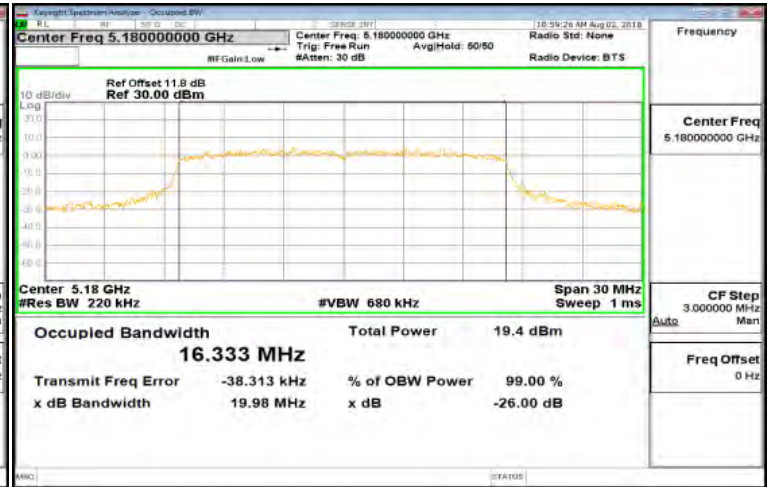
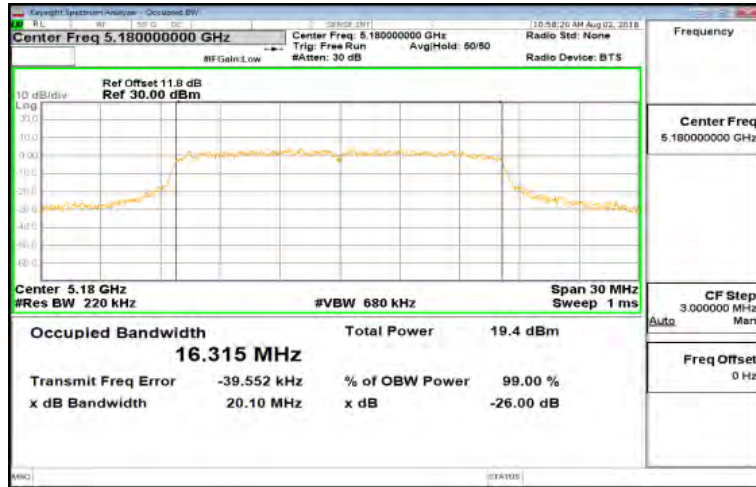
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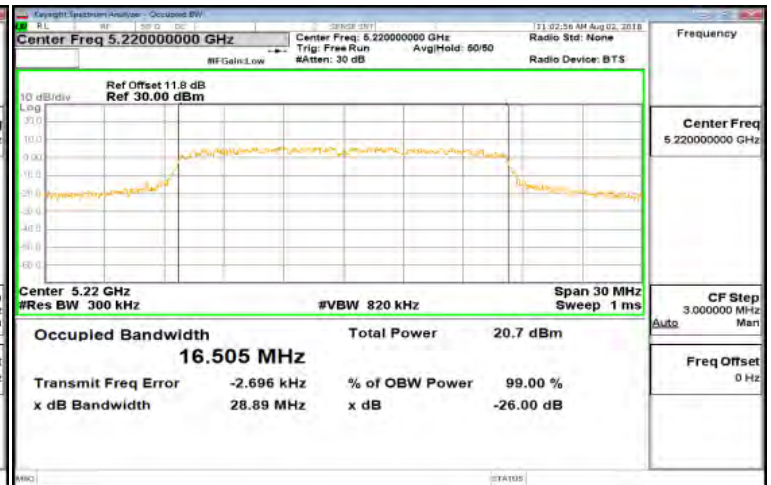
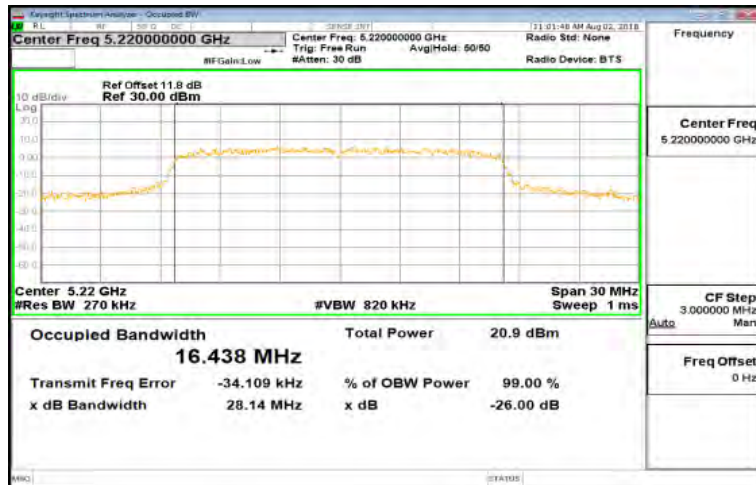
802.11a (Main) 5180MHz

802.11a (Aux1) 5180MHz



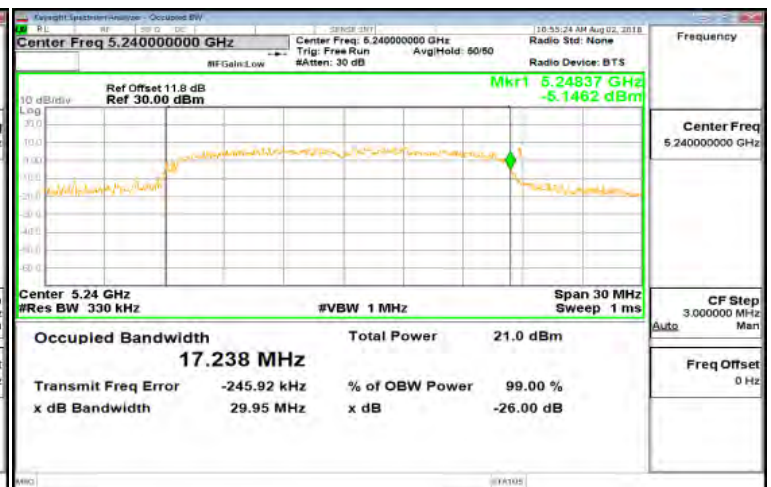
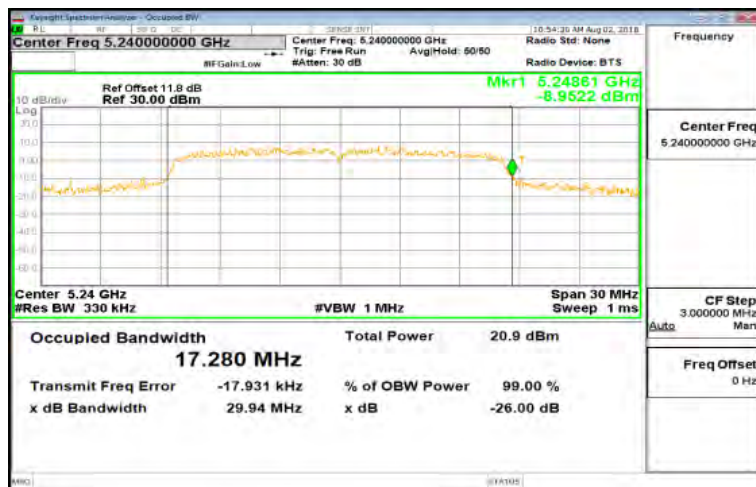
5220MHz

5220MHz



5240MHz

5240MHz



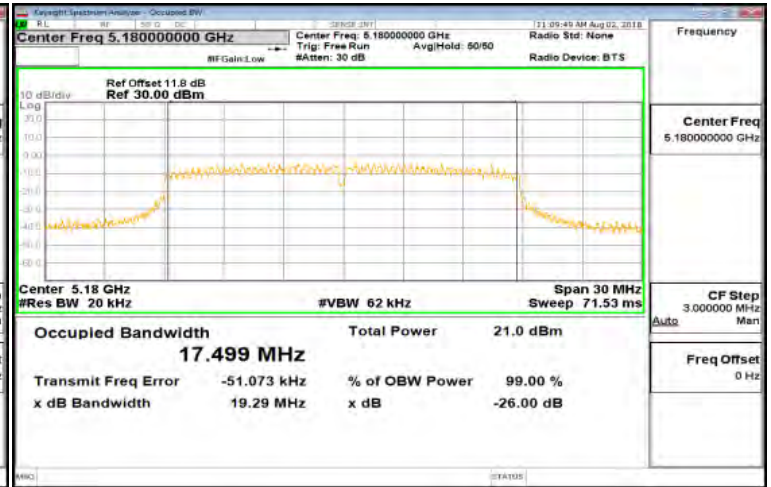
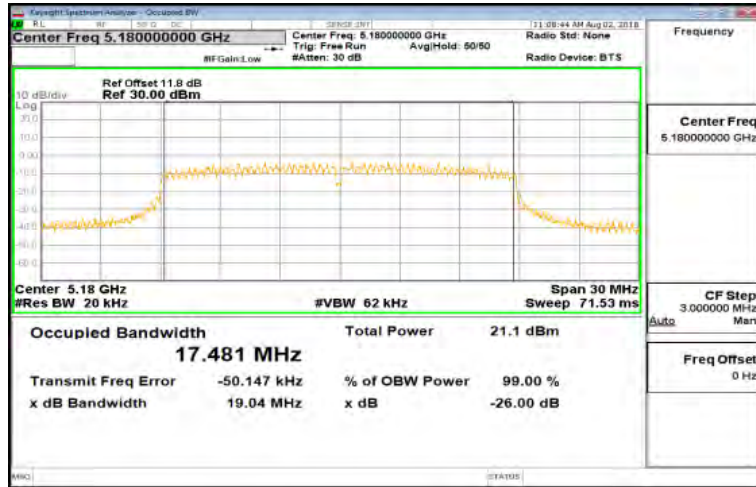
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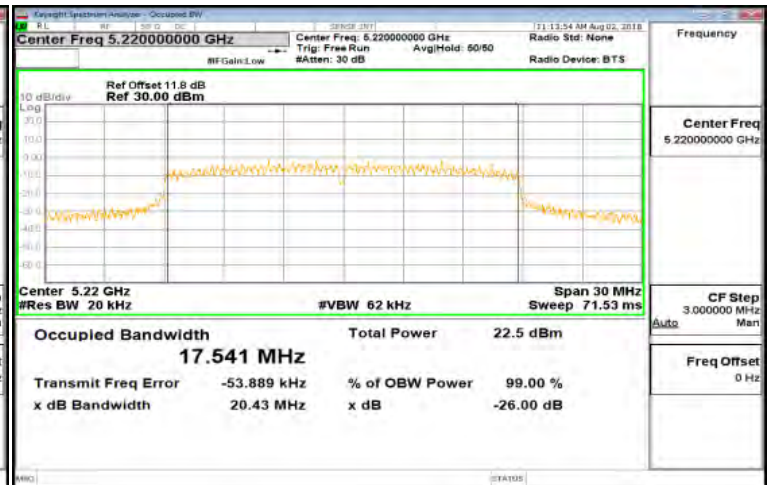
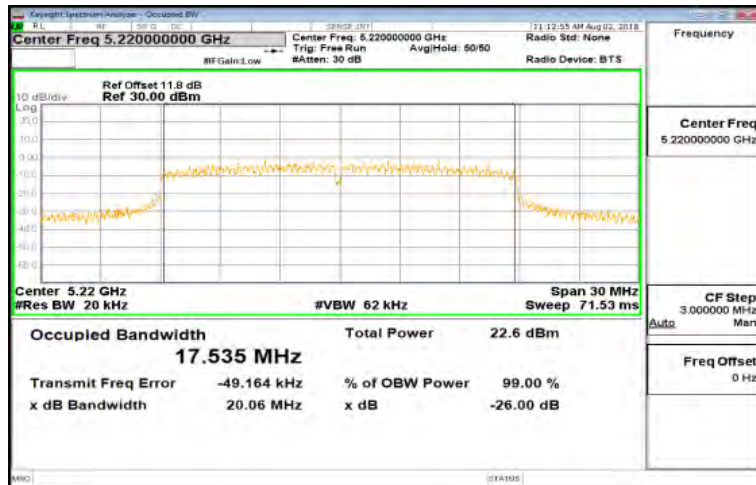
802.11n HT20 (Main) 5180 MHz

802.11n HT20 (Aux1) 5180 MHz



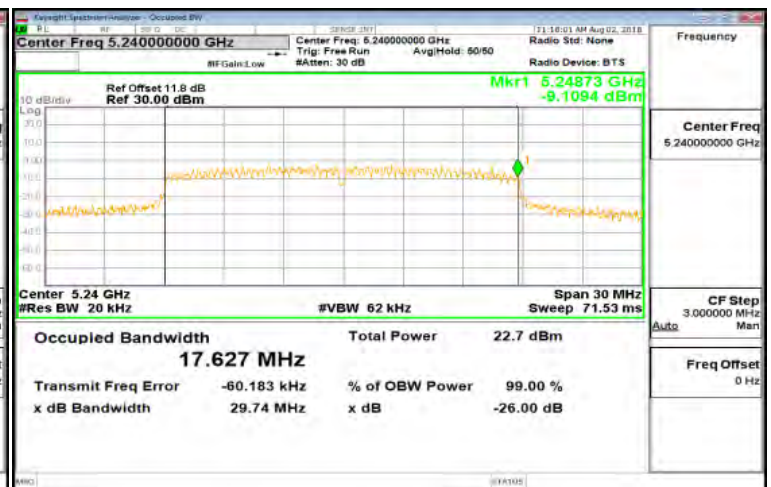
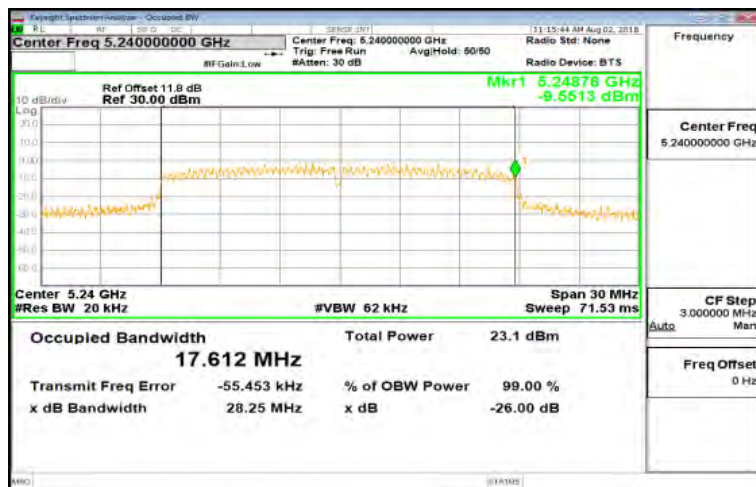
5220 MHz

5220 MHz



5240 MHz

5240 MHz



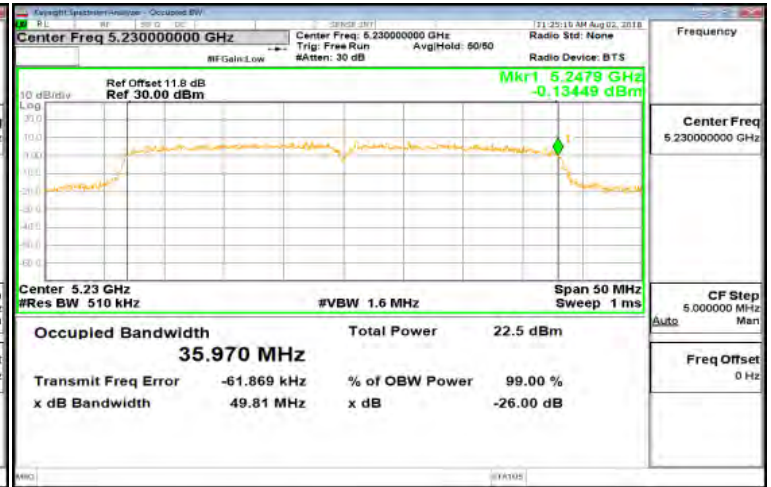
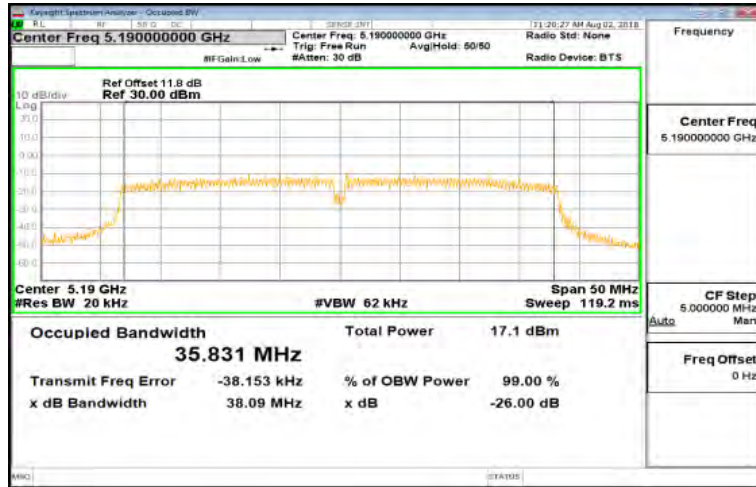
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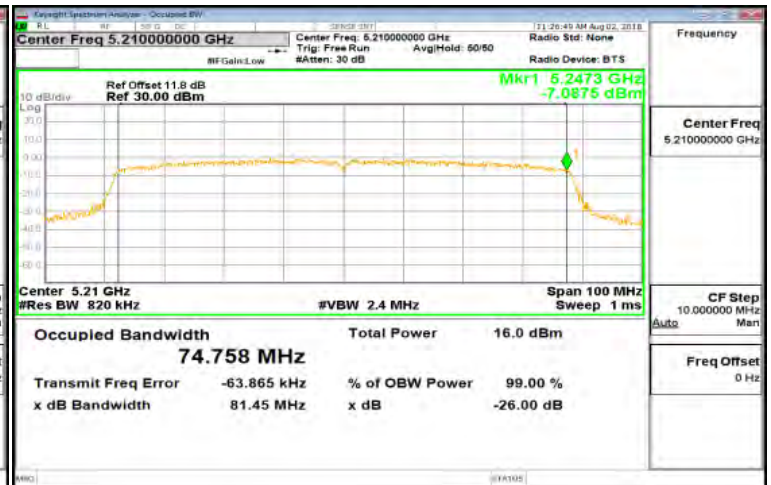
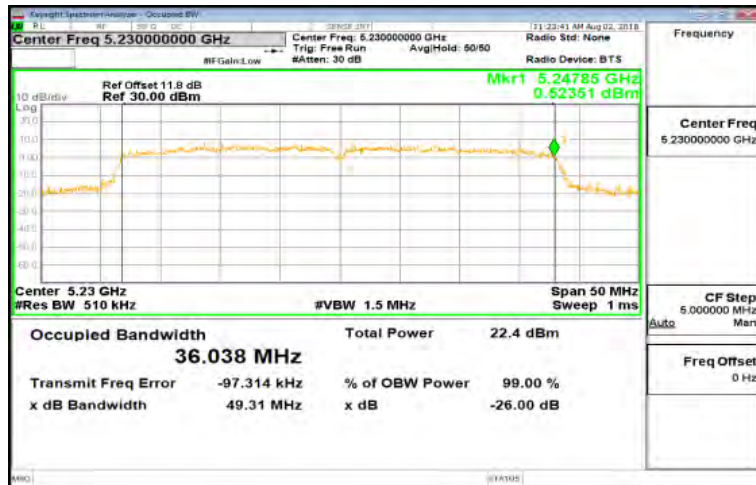
802.11n HT40 (Main) 5190 MHz

5230 MHz



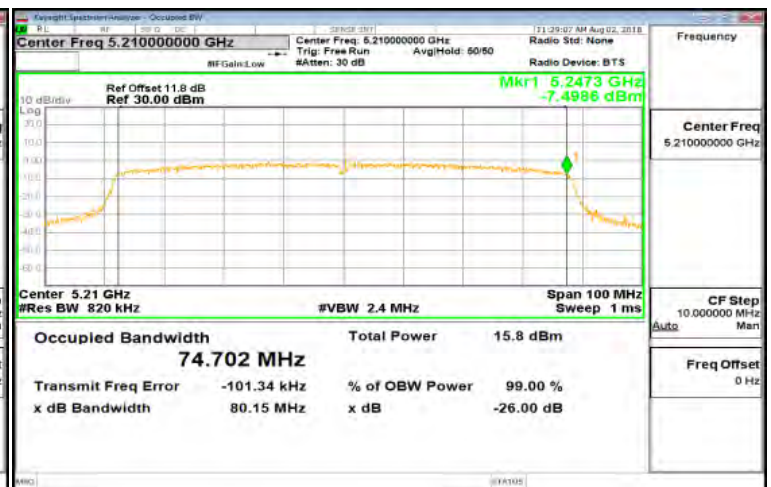
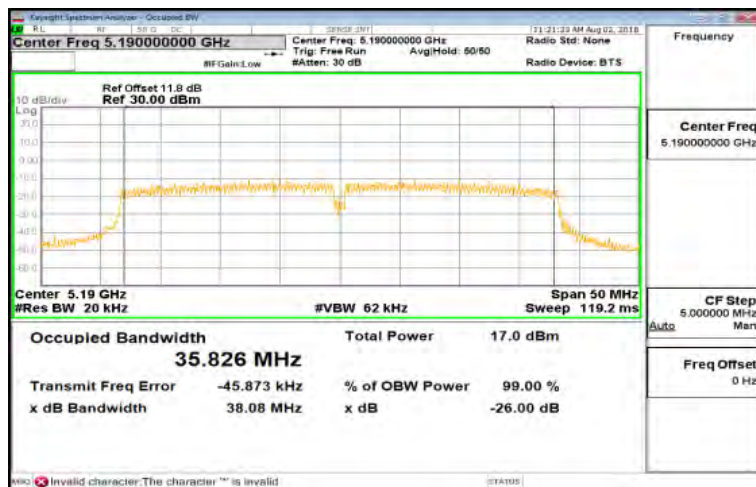
5230 MHz

802.11ac VHT80 (Main) 5210 MHz



802.11n HT40 (Aux1) 5190 MHz

802.11ac VHT80 (Aux1) 5210 MHz

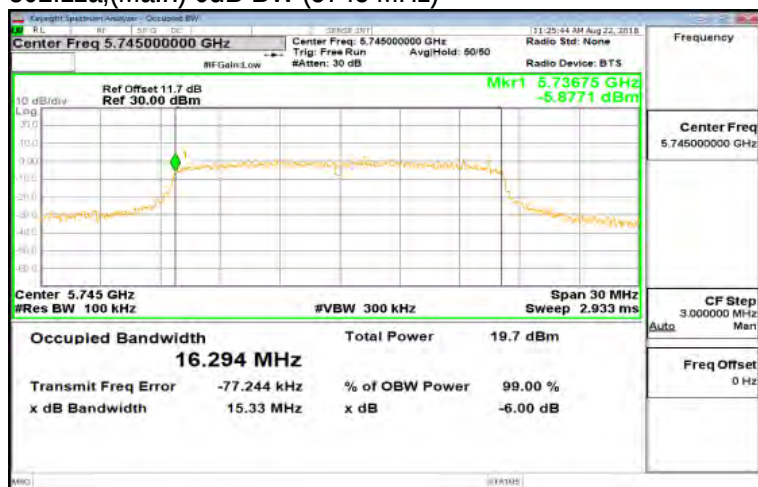


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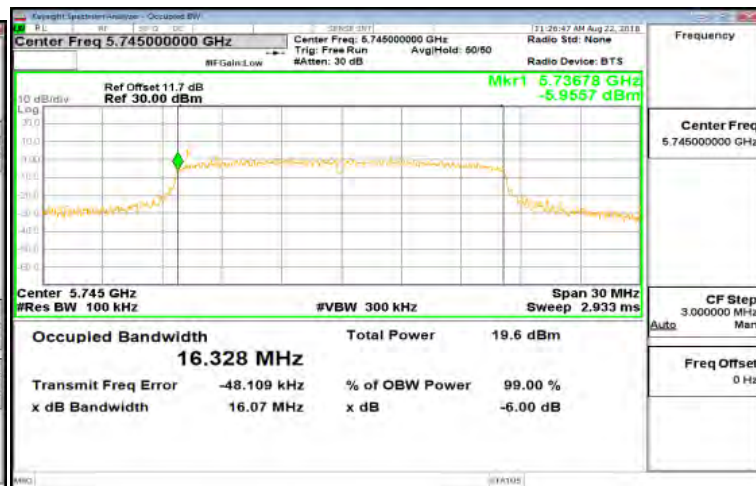
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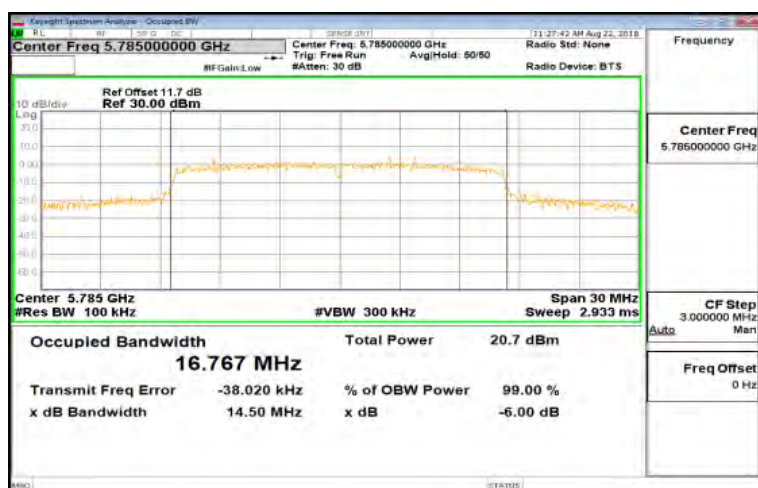
6dB Band Width measure with Peak detector for FCC 802.11a,(Main) 6dB BW (5745 MHz)



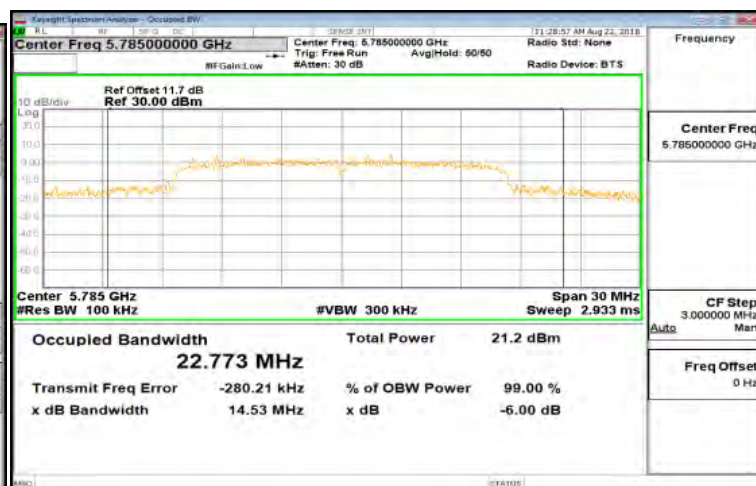
802.11a,(Aux1) 6dB BW (5745 MHz)



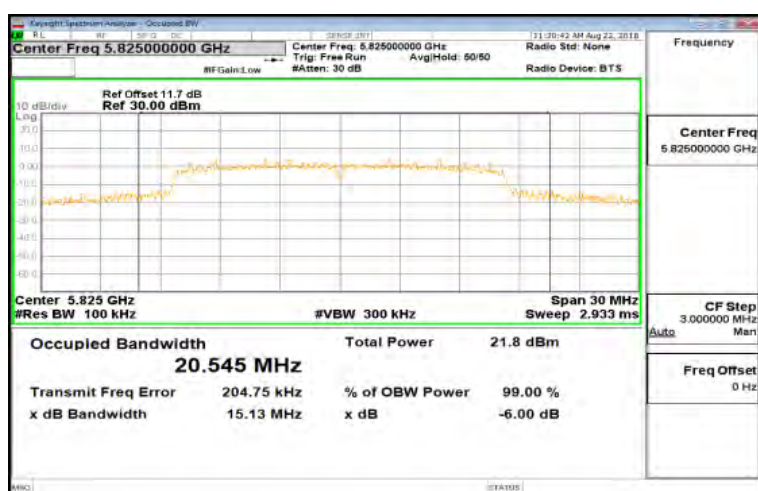
6dB BW (5785 MHz)



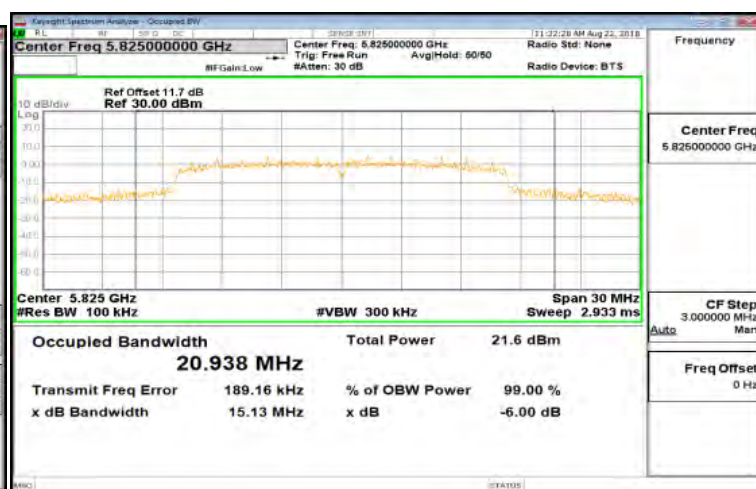
6dB BW (5785 MHz)



6dB BW (5825 MHz)



6dB BW (5825 MHz)



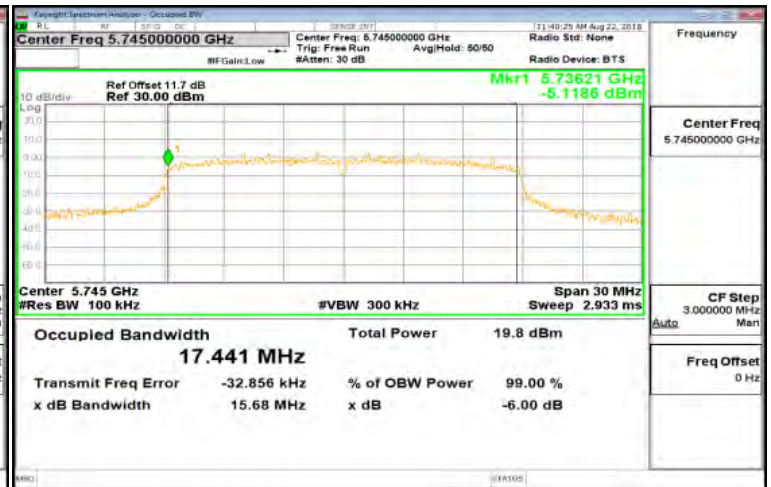
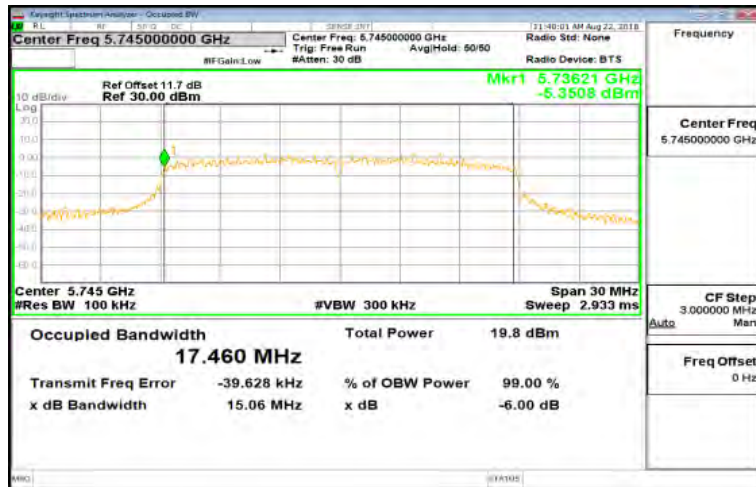
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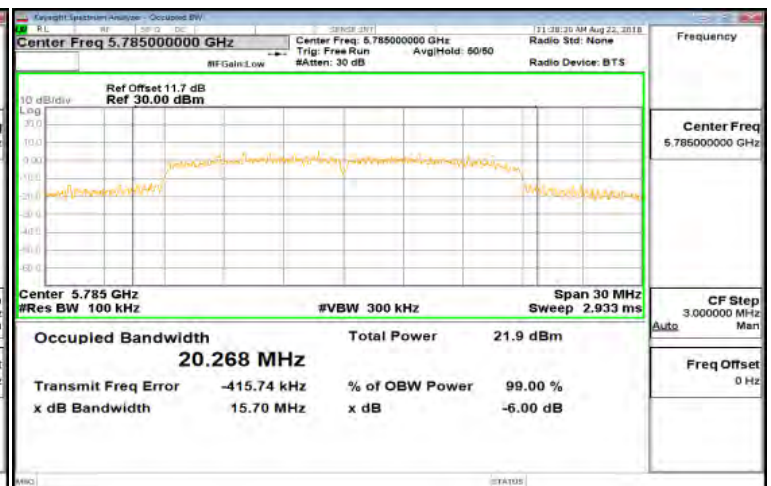
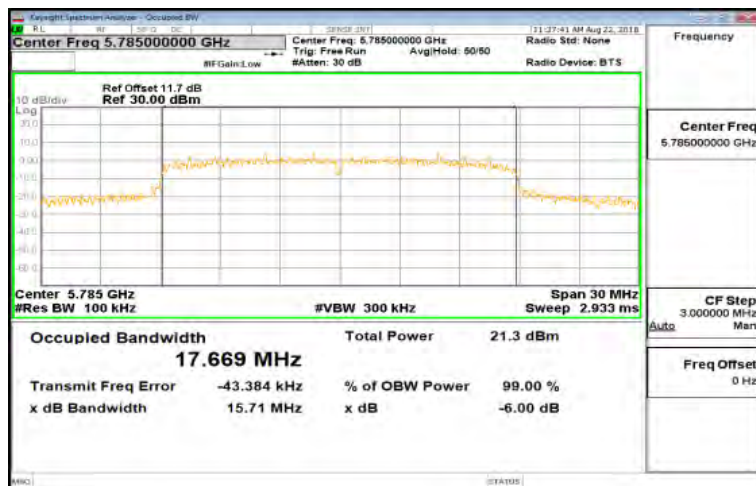
802.11n_HT20,(Main) 6dB BW (5745 MHz)

802.11n_HT20,(Aux1) 6dB BW (5745 MHz)



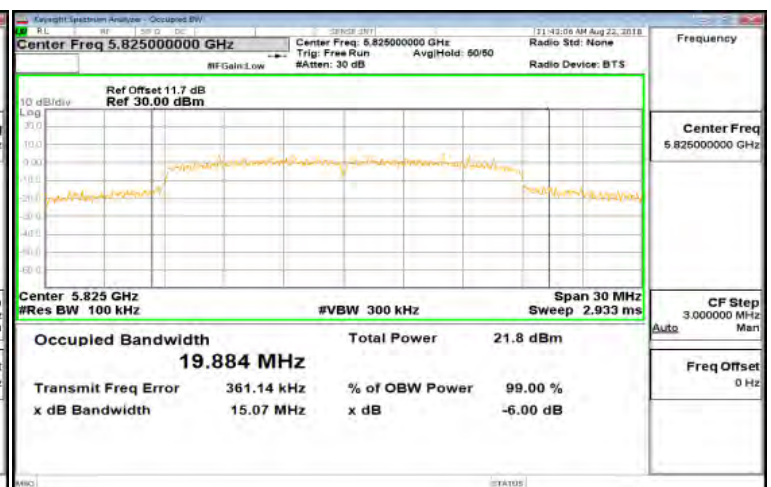
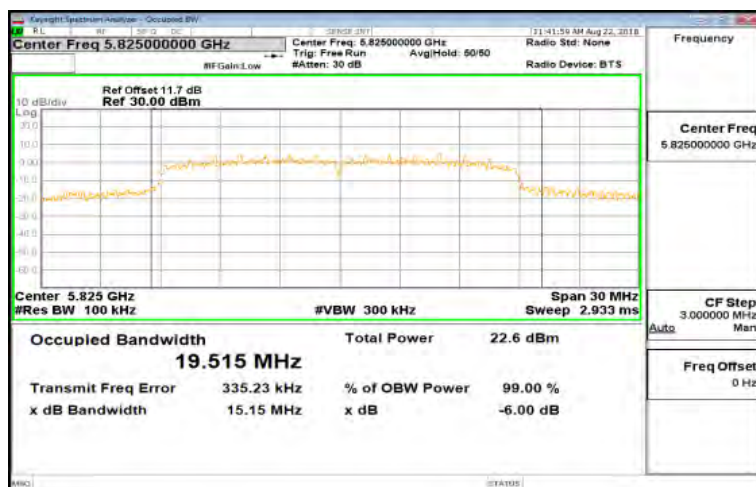
6dB BW (5785 MHz)

6dB BW (5785 MHz)



6dB BW (5825 MHz)

6dB BW (5825 MHz)



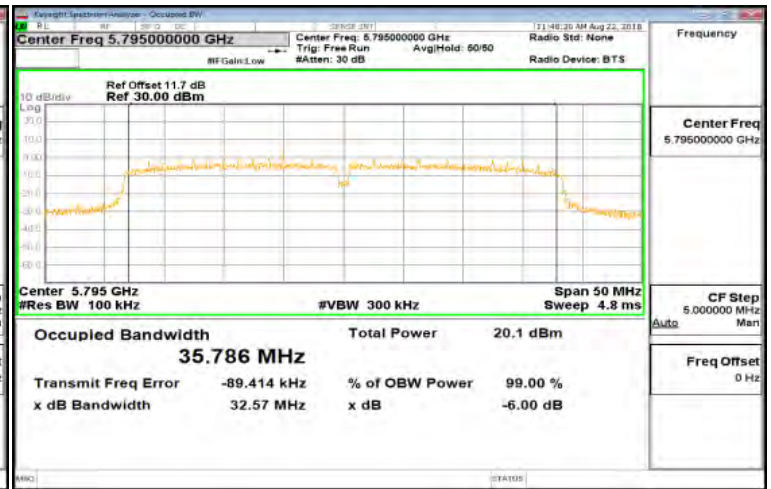
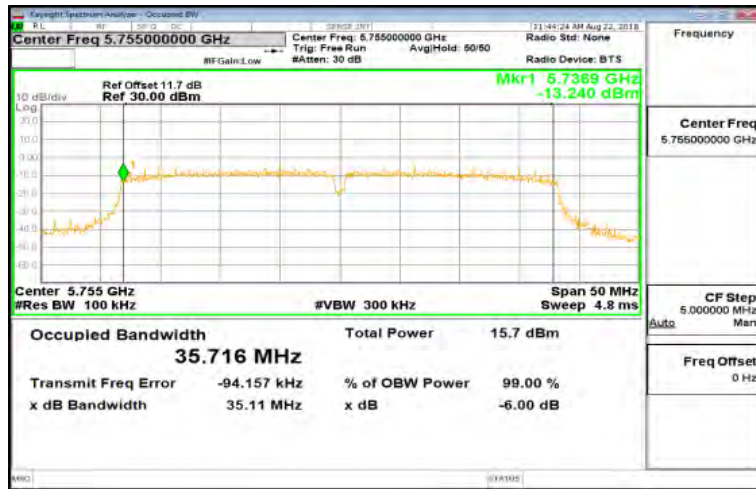
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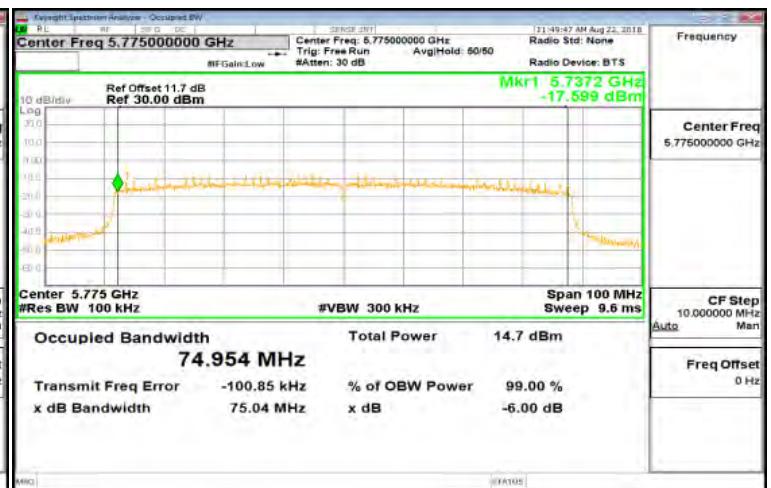
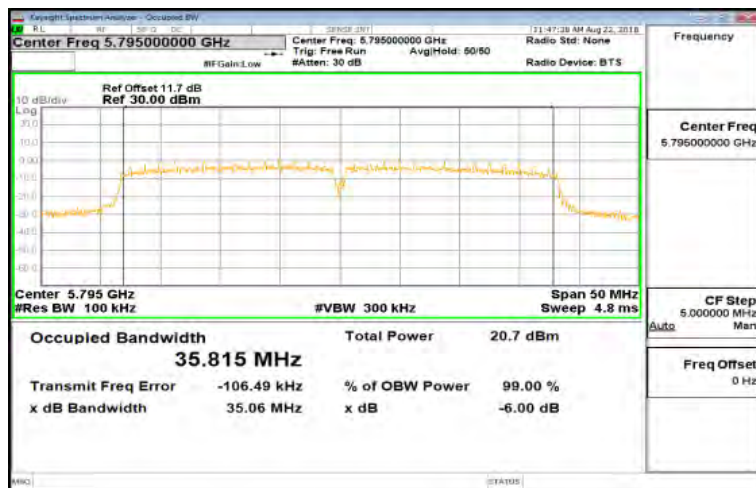
802.11n_HT40,(Main) 6dB BW (5755 MHz)

6dB BW (5795 MHz)



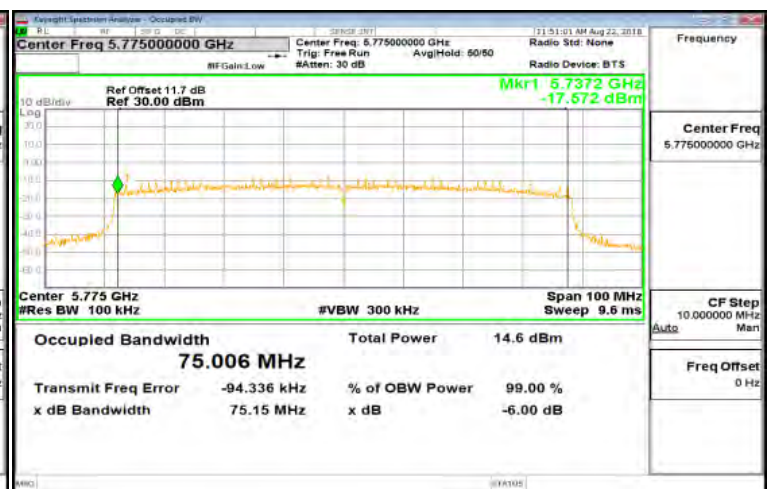
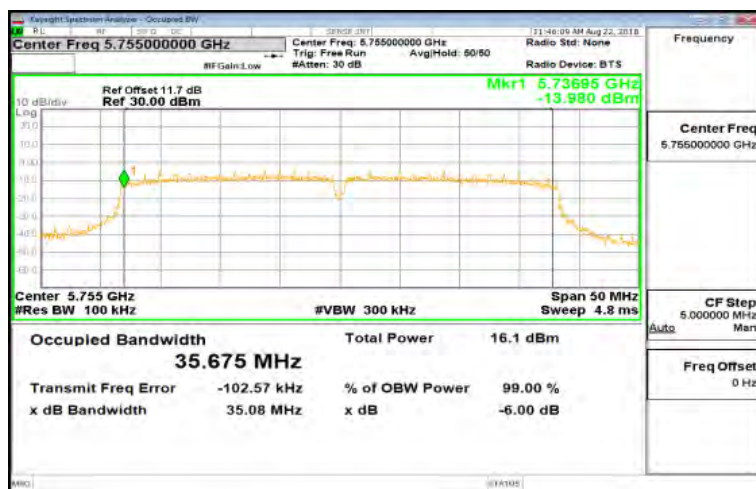
6dB BW (5795 MHz)

802.11ac VHT80,(Main) 6dB BW (5775 MHz)



802.11n_HT40,(Aux1) 6dB BW (5755 MHz)

802.11ac VHT80,(Aux1) 6dB BW (5775 MHz)



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9 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

9.1 Standard Applicable

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

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

Note:

As per FCC KDB 662911 D01

Unequal antenna gains, with equal transmit powers. For antenna gains given by G1, G2, ..., GN dBi.

(i) If transmit signals are correlated, then Directional gain

$$= 10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] \text{ dBi}$$

[Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

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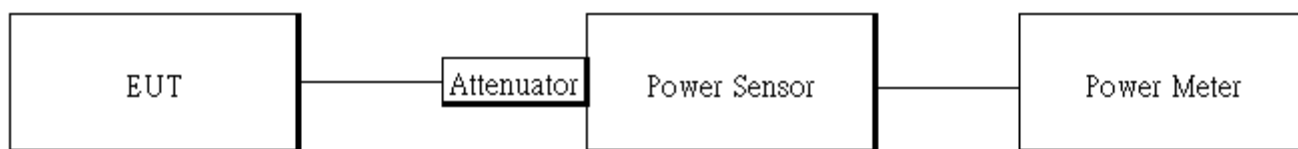
9.2 Measurement Procedure

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

9.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equip-ment	Manufacturer	Model	Serial Num-ber	Calibration Date	Calibration Due
Power Meter	Anritsu	ML2496A	1804001	2018/02/01	2019/01/31
Power Sensor	Anritsu	MA2411B	1726104	2018/02/01	2019/01/31
Power Sensor	Anritsu	MA2411B	1726107	2018/02/01	2019/01/31
Coaxial Cables	N/A	WK CE Cable	N/A	2018/01/02	2019/01/01

9.4 Test Set-up



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9.5 Measurement Result

Conducted output power (FCC)

802.11a_2Tx

CH	Frequency (MHz)	Data Rate	g. POWER (dB)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
36	5180	6	13.7	13.3	16.70	44.979	30	PASS
44	5220	6	14.4	14.4	17.58	55.022	30	PASS
48	5240	6	14.6	14.5	17.75	57.221	30	PASS
149	5745	6	14.4	13	16.93	47.460	30	PASS
157	5785	6	16.2	14	18.40	66.503	30	PASS
165	5825	6	15.7	14.1	18.19	63.439	30	PASS

802.11n_HT20_MIMO

CH	Frequency (MHz)	Data Rate	g. POWER (dB)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
36	5180	MCS8	14	12.6	16.51	43.050	30	PASS
44	5220	MCS8	14.8	14.7	17.93	59.653	30	PASS
48	5240	MCS8	15	14.6	17.97	60.251	30	PASS
149	5745	MCS8	13.9	13	16.63	44.260	30	PASS
157	5785	MCS8	16	14.2	18.35	65.809	30	PASS
165	5825	MCS8	15.6	14.3	18.18	63.285	30	PASS

802.11n_HT40_MIMO

CH	Frequency (MHz)	Data Rate	g. POWER (dB)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
38	5190	MCS8	9.23	8.59	12.30	15.603	30	PASS
46	5230	MCS8	14.6	14.2	17.76	54.818	30	PASS
151	5755	MCS8	10.1	8.72	12.85	17.704	30	PASS
159	5795	MCS8	14.1	12.2	16.65	42.457	30	PASS

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802.11ac_VHT20_MIMO

CH	Frequency (MHz)	Data Rate	g. POWER (dB)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
36	5180	MCS0	13.5	13	16.41	42.084	30	PASS
44	5220	MCS0	15.2	14.9	18.20	63.575	30	PASS
48	5240	MCS0	15.1	14.8	18.14	62.628	30	PASS
149	5745	MCS0	13.8	12.9	16.54	43.332	30	PASS
157	5785	MCS0	16	14.2	18.33	65.507	30	PASS
165	5825	MCS0	15.5	14.3	18.15	62.728	30	PASS

802.11ac_VHT40_MIMO

CH	Frequency (MHz)	Data Rate	g. POWER (dB)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
38	5190	MCS0	8.88	8.45	12.05	14.725	30	PASS
46	5230	MCS0	14.5	14.2	17.74	54.547	30	PASS
151	5755	MCS0	10.1	8.68	12.80	17.495	30	PASS
159	5795	MCS0	14	12.2	16.59	41.833	30	PASS

802.11ac_VHT80_MIMO

CH	Frequency (MHz)	Data Rate	g. POWER (dB)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
42	5210	MCS0	7.76	7.23	11.28	11.255	30	PASS
155	5775	MCS0	7.92	6.88	11.21	11.070	30	PASS

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10 PEAK POWER SPECTRAL DENSITY

10.1 Standard Applicable

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

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

Note:

As per FCC KDB 662911 D01

Unequal antenna gains, with equal transmit powers. For antenna gains given by G1, G2, ..., GN dBi.

(i) If transmit signals are correlated, then Directional gain

$$= 10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] \text{ dBi}$$

[Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

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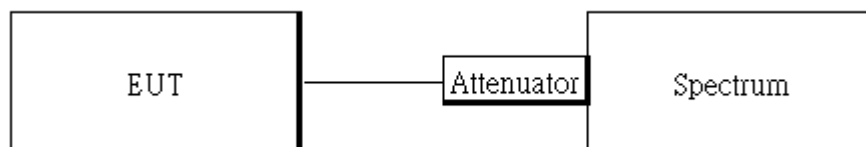
10.2 Measurement Procedure

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

10.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	2018/05/03	2019/05/02
DC Block	Mini-Circuits	BLK-18-S+	1	2018/01/02	2019/01/01
Coaxial Cables	N/A	WK CE Cable	N/A	2018/01/02	2019/01/01

10.4 Test Set-up



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10.5 Measurement Result

POWER DENSITY 802.11a MODE						
Frequency (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5180	5.27	11.80	0.21	5.48	17	-11.52
5220	4.37	11.80	0.21	4.58	17	-12.42
5240	4.79	11.80	0.21	5.00	17	-12.00
5745	12.42	11.70	-	12.42	30	-17.58
5785	13.55	11.70	-	13.55	30	-16.45
5825	13.54	11.70	-	13.54	30	-16.46

POWER DENSITY 802.11n HT20 MODE						
Frequency (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5180	5.02	11.80	0.40	5.42	17	-11.58
5220	4.58	11.80	0.40	4.98	17	-12.02
5240	3.37	11.80	0.40	3.77	17	-13.23
5745	12.12	11.70	-	12.12	30	-17.88
5785	14.10	11.70	-	14.10	30	-15.90
5825	13.10	11.70	-	13.10	30	-16.90

POWER DENSITY 802.11n HT40 MODE						
Frequency (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5190	-2.17	11.80	0.41	-1.76	17	-18.76
5230	0.73	11.80	0.41	1.14	17	-15.86
5755	4.41	11.70	-	4.41	30	-25.59
5795	8.74	11.70	-	8.74	30	-21.26

POWER DENSITY 802.11ac VHT80 MODE						
Frequency (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5210	-9.71	11.80	0.84	-8.87	17	-25.87
5775	-0.36	11.70	-	-0.36	30	-30.36

Note:

MIMO offset= 14.8

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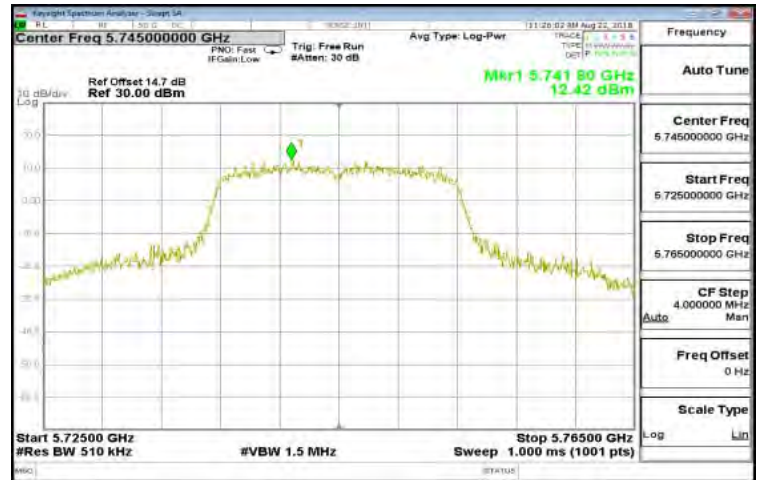
802.11a 5150~5250 MHz

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)



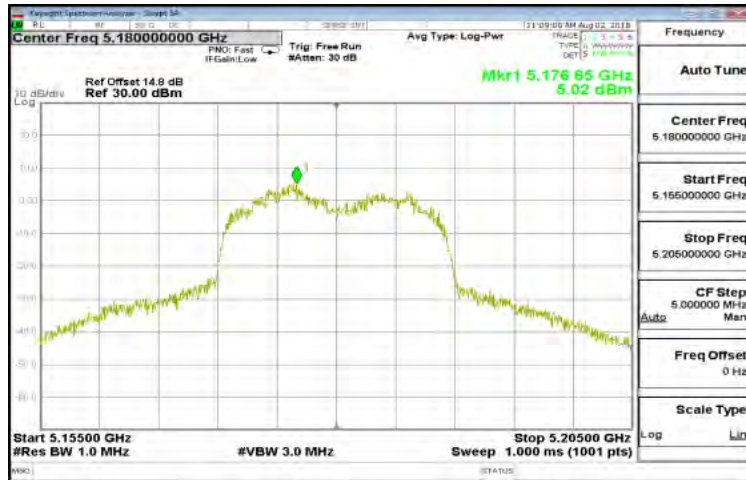
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802.11n HT20, 5150~5250 MHz

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)

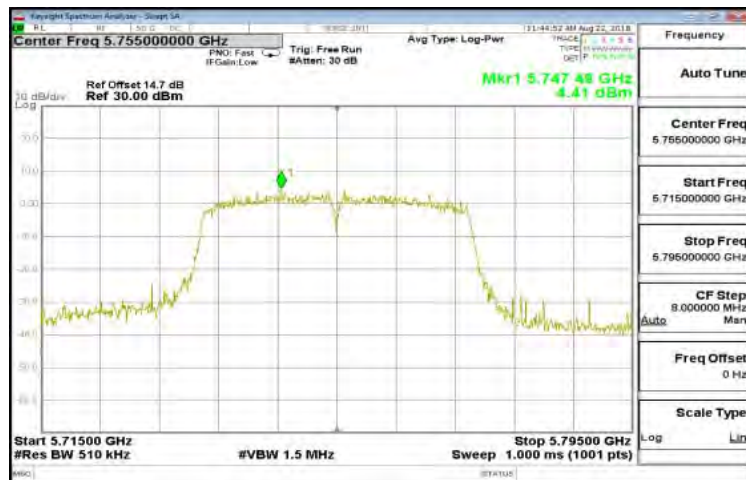


Peak Power Spectral Density Data Plot (CH High 5230 MHz)

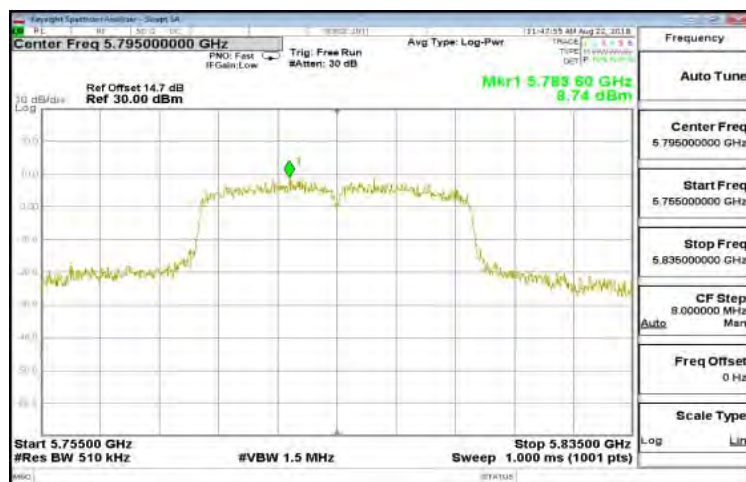


802.11n HT40, 5725~5850 MHz

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



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



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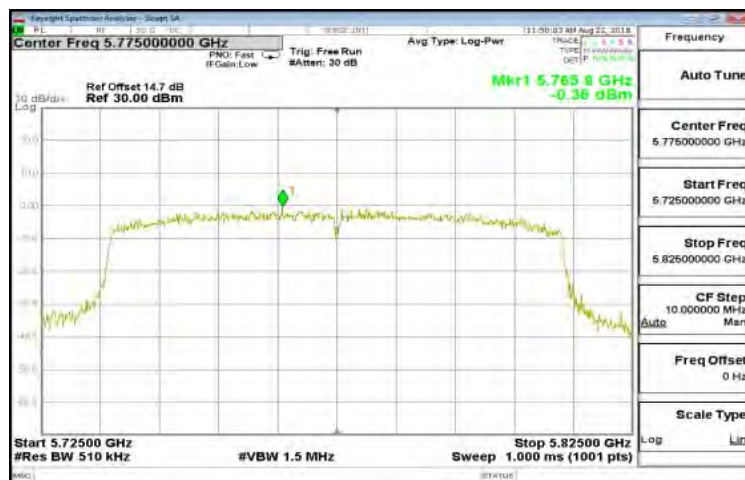
802.11ac VHT80, 5150~5250 MHz

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 MEASUREMENT

11.1 Standard Applicable

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

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

APPLICABLE TO	LIMIT	
FCC KDB 789033 D02 General UNII Test Procedures New Rules	FIELD STRENGTH AT 3m	
	PK: 74 (dBμV/m)	AV 54 (dBμV/m)
APPLICABLE TO	EIRP LIMIT	FIELD STRENGTH AT 3m
15.407(b)(1)	PK: -27 (dBm/MHz)	PK: 68.3 (dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)(i)	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK:105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK:122.2 (dBμV/m) *4
*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 Num-ber	Calibration Date	Calibration Due
Bi-log Antenna	SCHWAZBECK	VULB9168	378	2017/12/29	2018/12/28
Horn Antenna	Schwarzbeck	BBHA9120D	1441	2017/08/04	2018/08/03
Horn Antenna	Schwarzbeck	BBHA9120D	1441	2018/08/04	2019/08/03
Horn Antenna	Schwarzbeck	BBHA9170	184	2017/12/12	2018/12/11
Loop Antenna	ETS.LINDGREN	6502	148045	2017/09/26	2018/09/25
3m Site NSA	SGS	966 chamber	N/A	2018/01/02	2019/01/01
Spectrum Ana-lyzer	Agilent	E4446A	MY51100003	2018/05/15	2019/05/14
EMI Test Receiv-er	R&S	ESCI7	100335	2018/02/02	2019/02/01
Pre-Amplifier	HP	8449B	3008A00578	2018/01/02	2019/01/01
Pre-Amplifier	HP	8447D	2944A07676	2018/01/02	2019/01/01
Pre-Amplifier	EMC Instruments	EMC184045B	980135	2017/10/27	2018/10/26
Attenuator	Mini-Circuit	BW-S10W2+	2	2018/01/02	2019/01/01
Filter 5150-5350 MHz	Micro-Tronics	BRM50703	1	2018/01/02	2019/01/01
Low Loss Cable	Huber Suhner	966_RX	9	2018/01/02	2019/01/01

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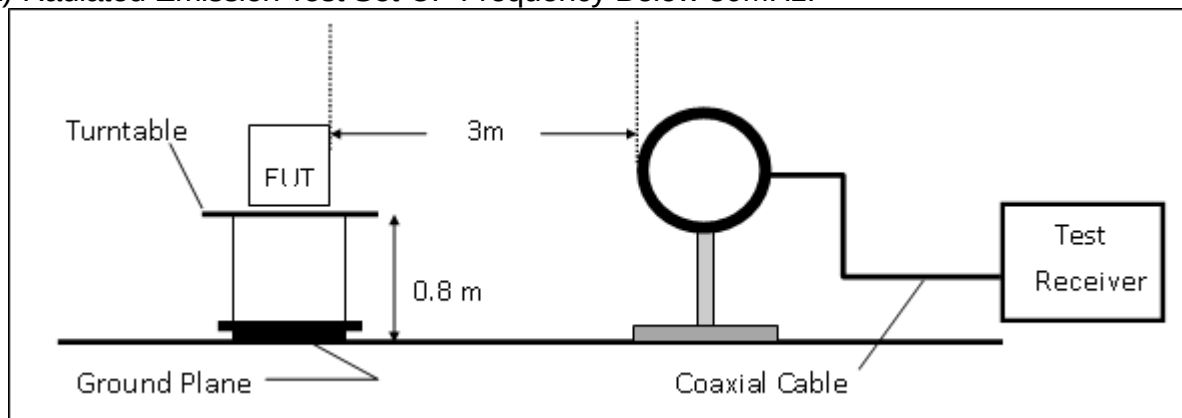
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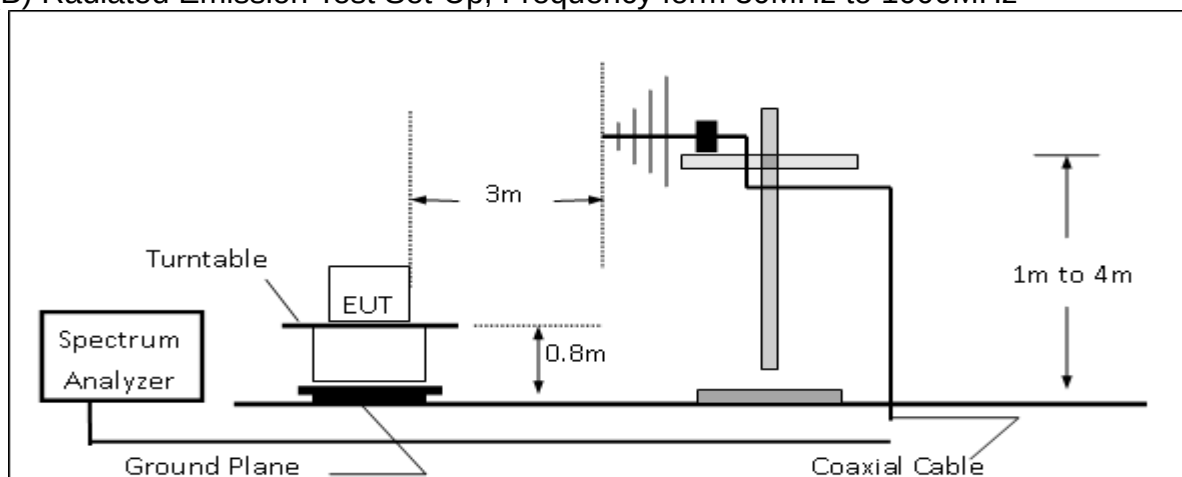
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11.3 Test SET-UP

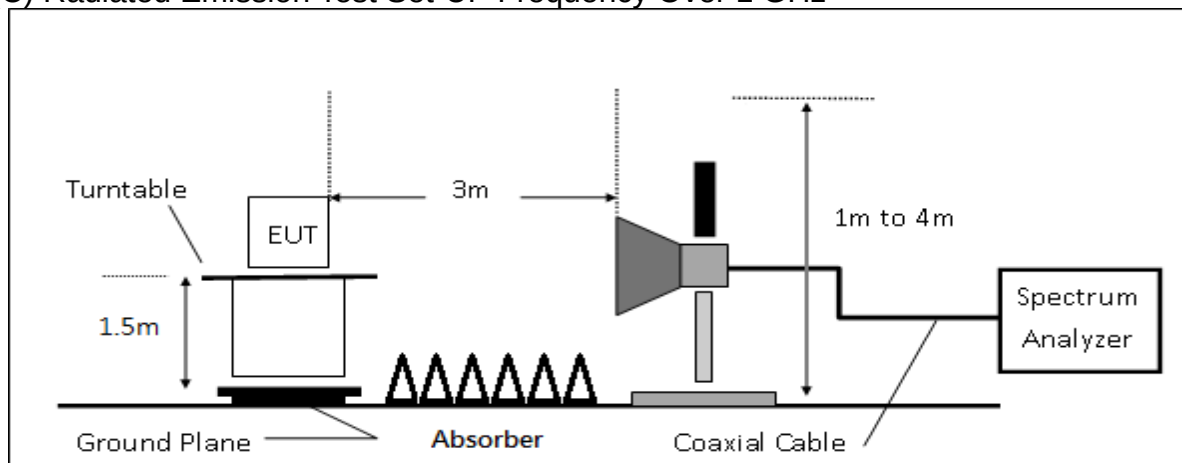
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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)

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.

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11.7 Measurement Result

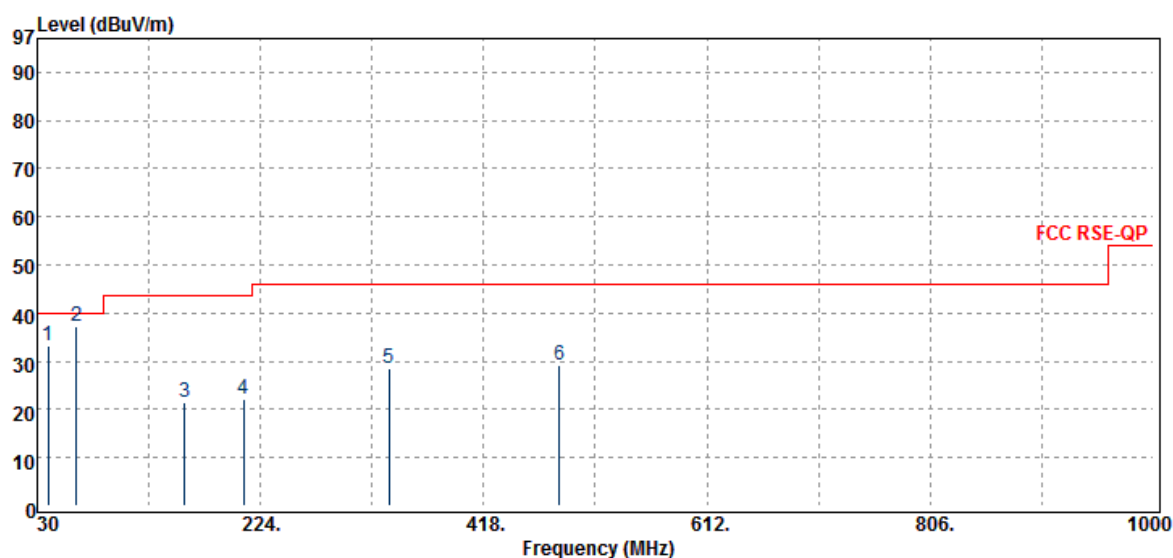
Radiated Spurious Emission Measurement Result

Below 1GHz Worst-Case Data:

802.11a

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

Test Date :2018-08-06
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
39.70	Peak	41.53	-8.28	33.25	40.00	-6.75
63.95	Peak	46.12	-8.75	37.37	40.00	-2.63
158.04	Peak	28.77	-7.17	21.60	43.50	-21.90
209.45	Peak	31.53	-9.24	22.29	43.50	-21.21
335.55	Peak	33.48	-4.89	28.59	46.00	-17.41
483.96	Peak	31.93	-2.70	29.23	46.00	-16.77

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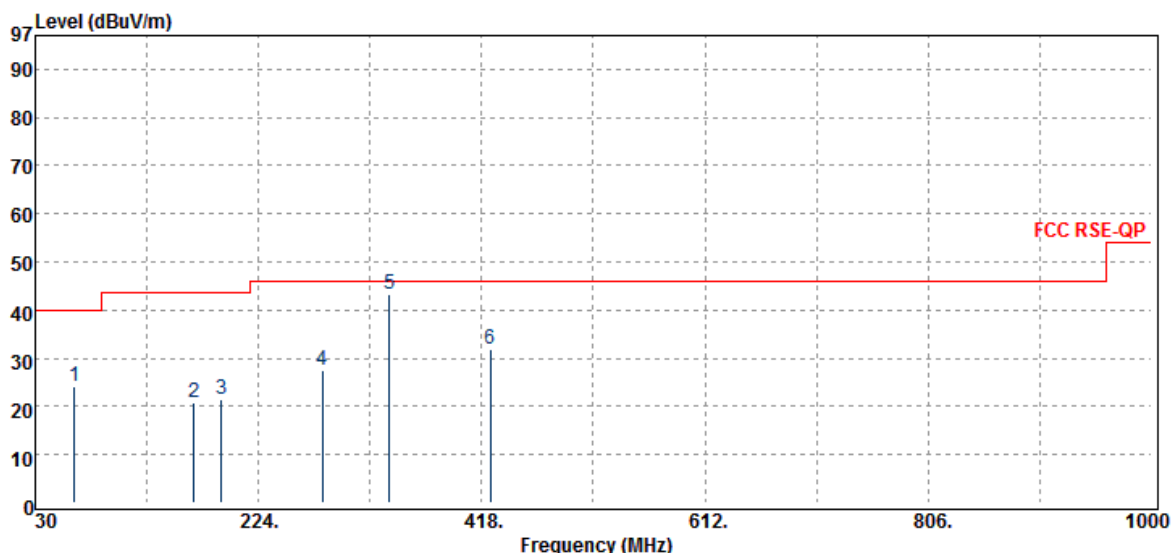
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Operation Band :802.11aB1
Fundamental Frequency :5220 MHz
Operation Mode :Tx CH MID
EUT Pol. :E2 Plane

Test Date :2018-08-06
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
63.95	Peak	32.76	-8.75	24.01	40.00	-15.99
167.74	Peak	28.19	-7.31	20.88	43.50	-22.62
191.99	Peak	30.59	-9.03	21.56	43.50	-21.94
279.29	Peak	33.57	-6.17	27.40	46.00	-18.60
337.49	Peak	48.03	-4.85	43.18	46.00	-2.82
425.76	Peak	35.03	-3.07	31.96	46.00	-14.04

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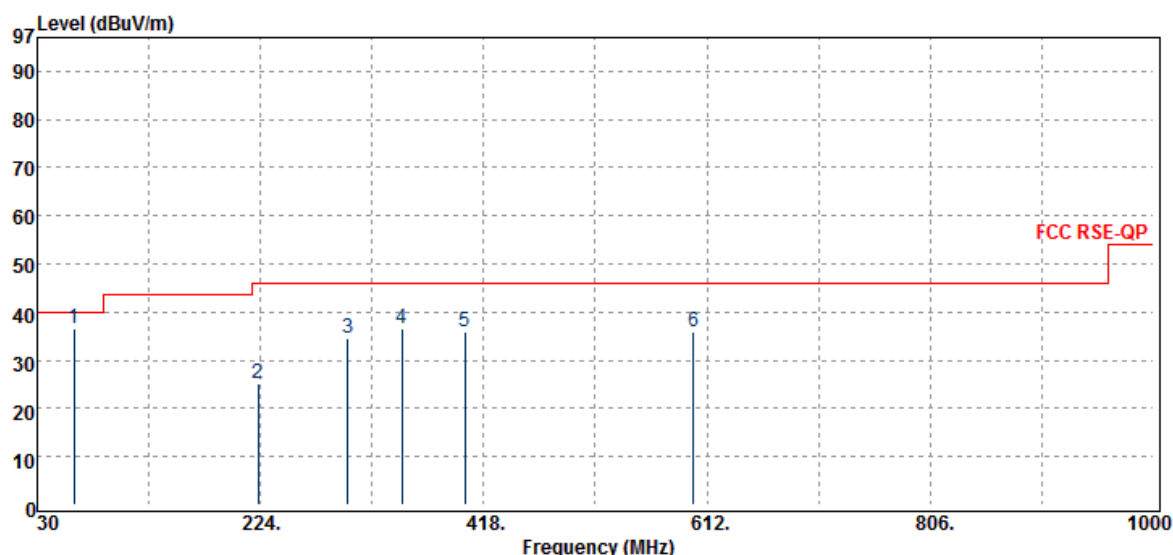
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Operation Band :802.11aB4
Fundamental Frequency :5785 MHz
Operation Mode :Tx CH MID
EUT Pol. :E2 Plane

Test Date :2018-08-21
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
62.01	Peak	44.85	-8.28	36.57	40.00	-3.43
222.06	Peak	34.21	-8.97	25.24	46.00	-20.76
299.66	Peak	40.09	-5.52	34.57	46.00	-11.43
347.19	Peak	41.10	-4.61	36.49	46.00	-9.51
401.51	Peak	39.04	-3.27	35.77	46.00	-10.23
600.36	Peak	35.92	0.12	36.04	46.00	-9.96

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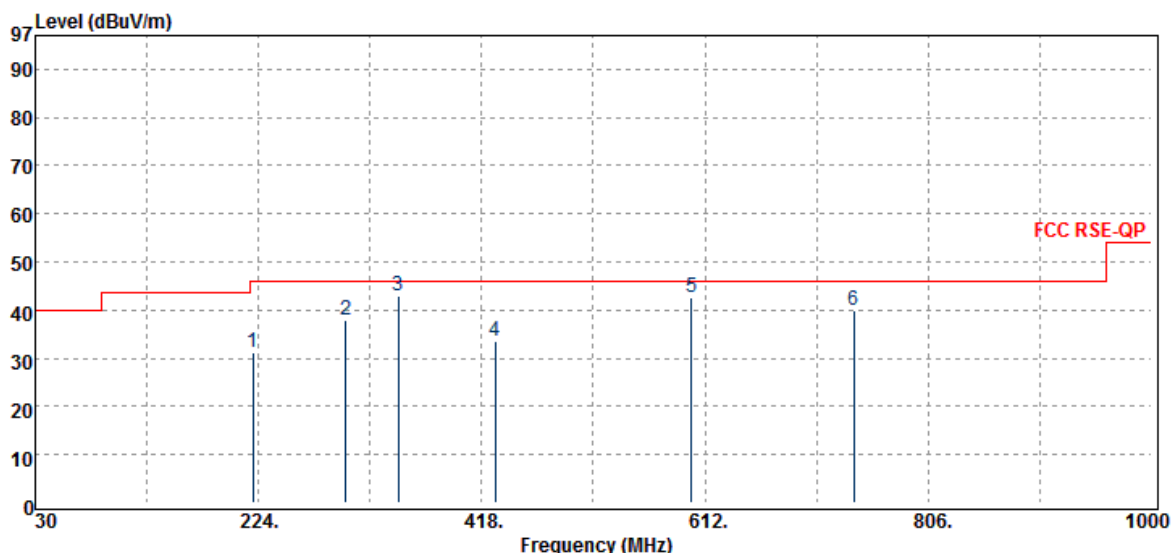
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www.tw.sgs.com

Member of SGS Group

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

Test Date :2018-08-21
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
219.15	Peak	40.30	-9.08	31.22	46.00	-14.78
299.66	Peak	43.49	-5.52	37.97	46.00	-8.03
345.25	Peak	47.50	-4.57	42.93	46.00	-3.07
429.64	Peak	36.36	-2.70	33.66	46.00	-12.34
600.36	Peak	42.66	0.12	42.78	46.00	-3.22
741.01	Peak	36.43	3.35	39.78	46.00	-6.22

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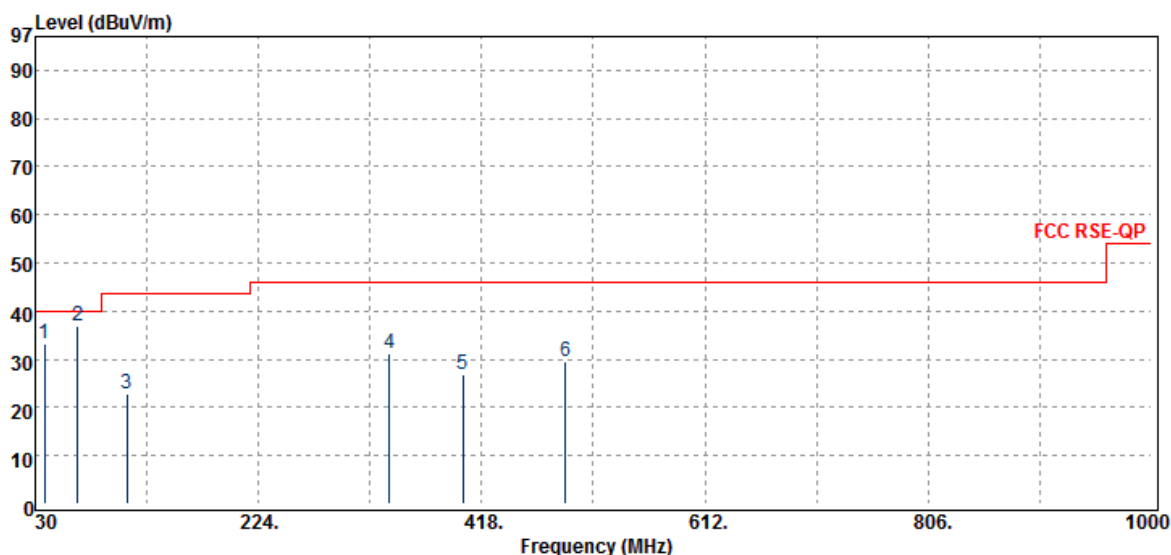
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802.11ac VHT80,

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

Test Date :2018-08-06
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
37.76	Peak	41.81	-8.46	33.35	40.00	-6.65
66.86	Peak	46.51	-9.42	37.09	40.00	-2.91
109.54	Peak	33.86	-11.05	22.81	43.50	-20.69
337.49	Peak	36.16	-4.85	31.31	46.00	-14.69
401.51	Peak	30.20	-3.27	26.93	46.00	-19.07
490.75	Peak	31.86	-2.32	29.54	46.00	-16.46

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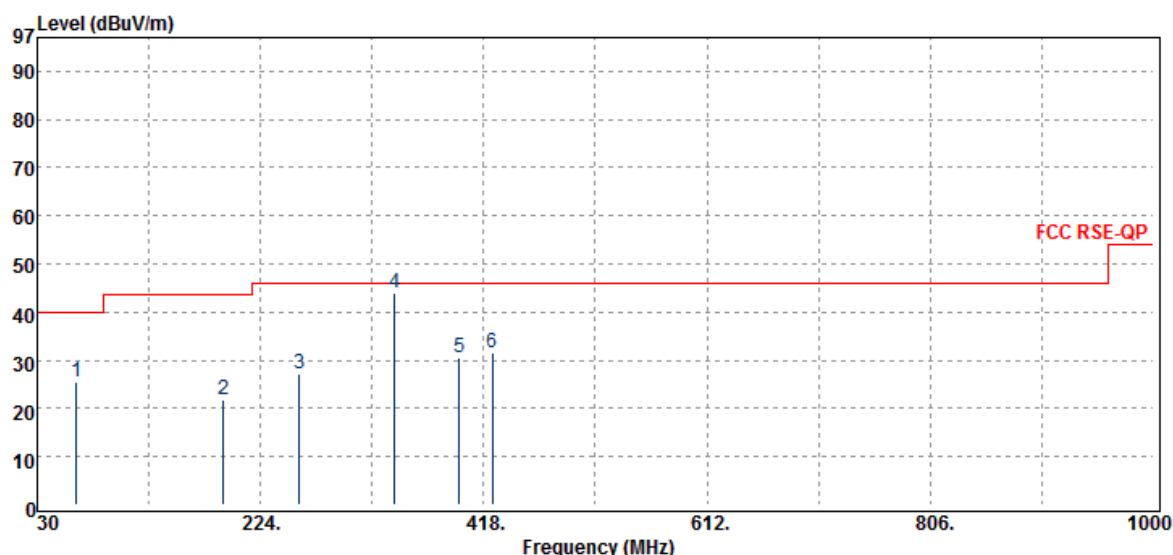
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www.tw.sgs.com

Member of SGS Group

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

Test Date :2018-08-06
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
63.95	Peak	34.22	-8.75	25.47	40.00	-14.53
191.99	Peak	30.96	-9.03	21.93	43.50	-21.57
257.95	Peak	34.11	-7.08	27.03	46.00	-18.97
340.40	Peak	48.65	-4.77	43.88	46.00	-2.12
396.66	Peak	33.92	-3.36	30.56	46.00	-15.44
425.76	Peak	34.72	-3.07	31.65	46.00	-14.35

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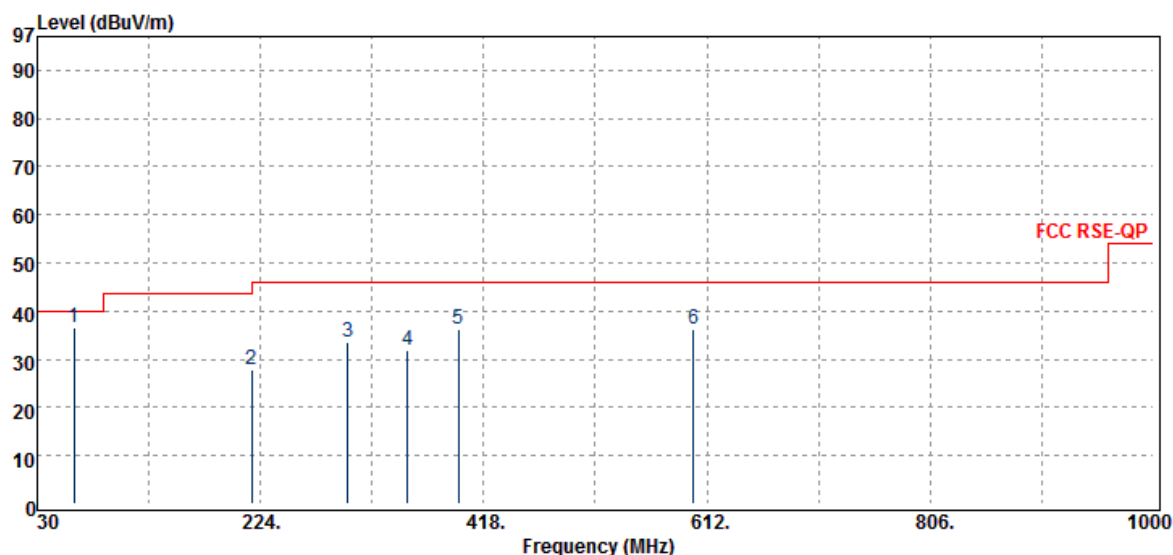
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Operation Band :802.11ac80B4
 Fundamental Frequency :5775 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Margin dB
62.01	Peak	44.82	-8.28	36.54	40.00	-3.46
216.24	Peak	36.94	-9.14	27.80	46.00	-18.20
299.66	Peak	39.22	-5.52	33.70	46.00	-12.30
352.04	Peak	36.52	-4.48	32.04	46.00	-13.96
395.69	Peak	39.69	-3.34	36.35	46.00	-9.65
600.36	Peak	36.26	0.12	36.38	46.00	-9.62

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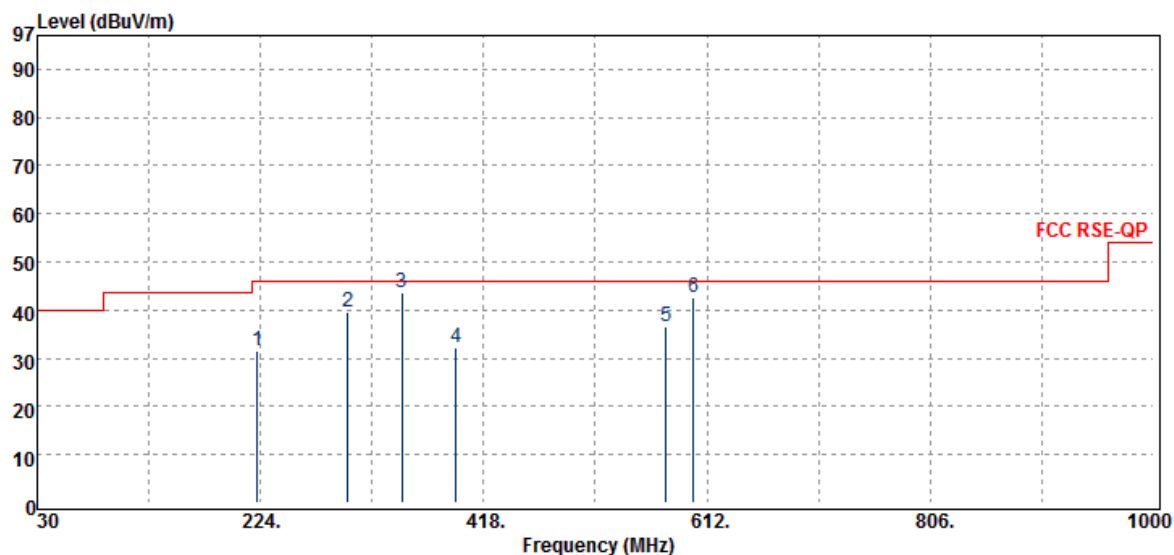
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Member of SGS Group

Operation Band :802.11ac80B4
Fundamental Frequency :5775 MHz
Operation Mode :Tx CH LOW
EUT Pol. :E2 Plane

Test Date :2018-08-21
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
221.09	Peak	40.44	-9.01	31.43	46.00	-14.57
299.66	Peak	45.08	-5.52	39.56	46.00	-6.44
347.19	Peak	48.25	-4.61	43.64	46.00	-2.36
393.75	Peak	35.50	-3.42	32.08	46.00	-13.92
576.11	Peak	36.63	-0.11	36.52	46.00	-9.48
600.36	Peak	42.66	0.12	42.78	46.00	-3.22

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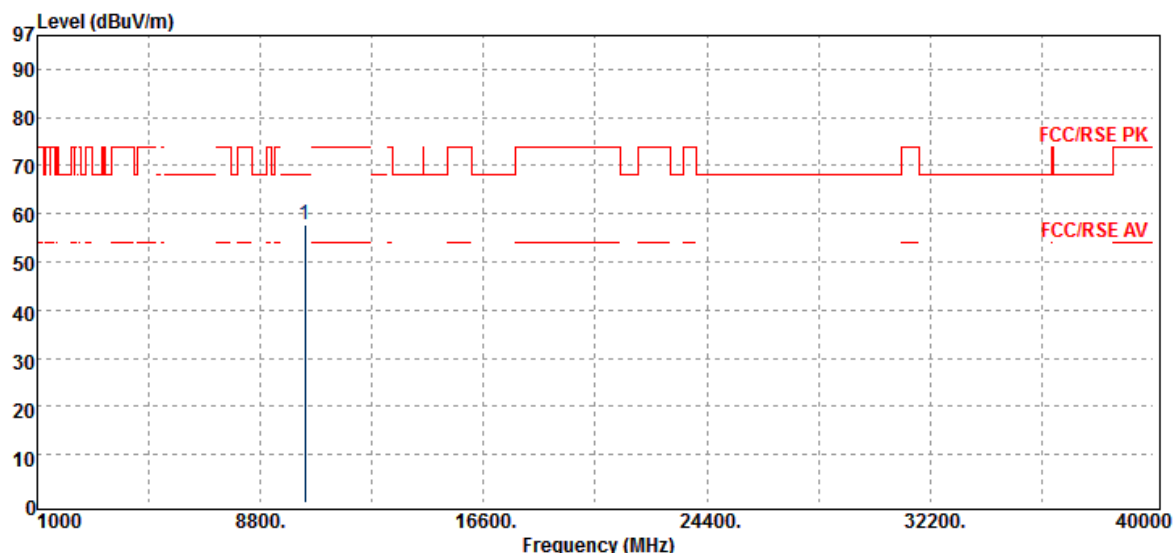
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Above 1GHz Worst-Case Data:

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

Operation Band	:802.11aB1	Test Date	:2018-08-03
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.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level	dB	FS	@3m	dB
	PK/QP/AV	dBμV		dBμV/m	dBμV/m	
10360.00	Peak	38.14	19.71	57.85	68.20	-10.35

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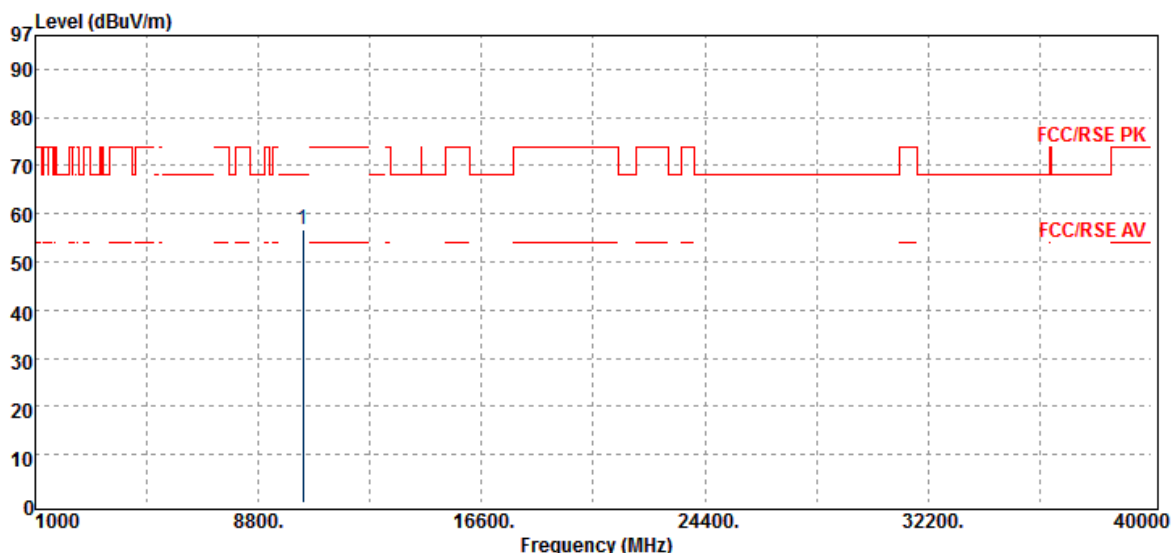
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Member of SGS Group

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

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10360.00	Peak	37.12	19.71	56.83	68.20	-11.37

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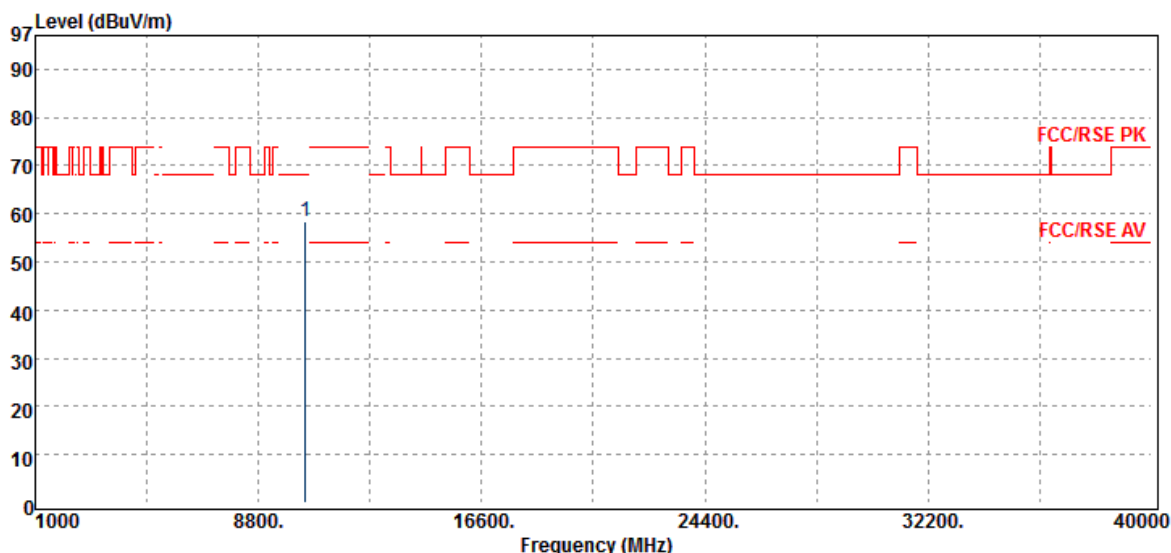
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Operation Band :802.11aB1
 Fundamental Frequency :5220 MHz
 Operation Mode :Tx CH MID
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10440.00	Peak	38.40	20.05	58.45	68.20	-9.75

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

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10440.00	Peak	35.52	20.05	55.57	68.20	-12.63

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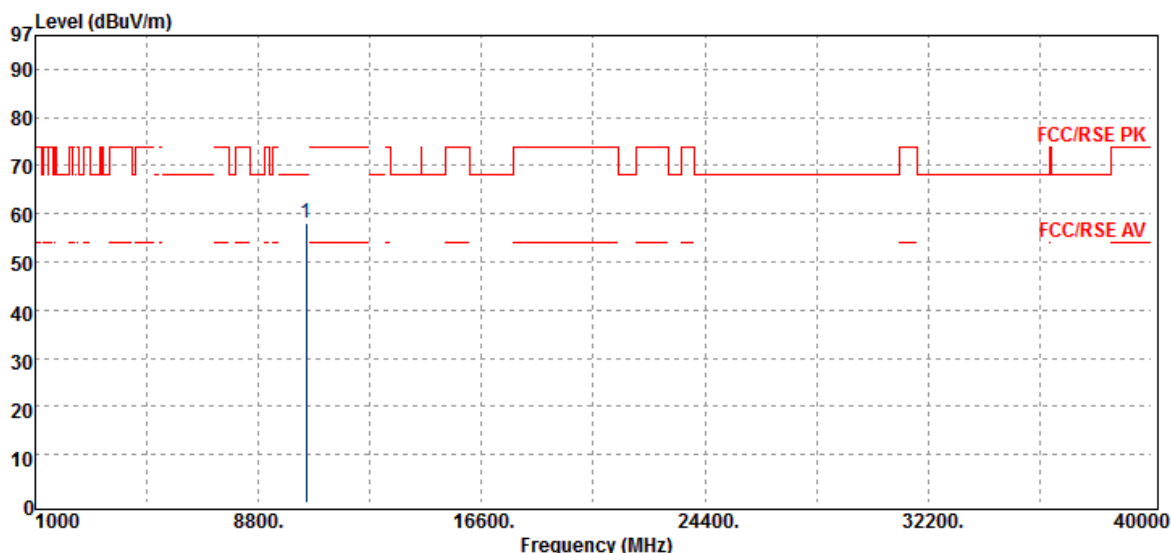
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Operation Band :802.11aB1
 Fundamental Frequency :5240 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10480.00	Peak	38.15	20.07	58.22	68.20	-9.98

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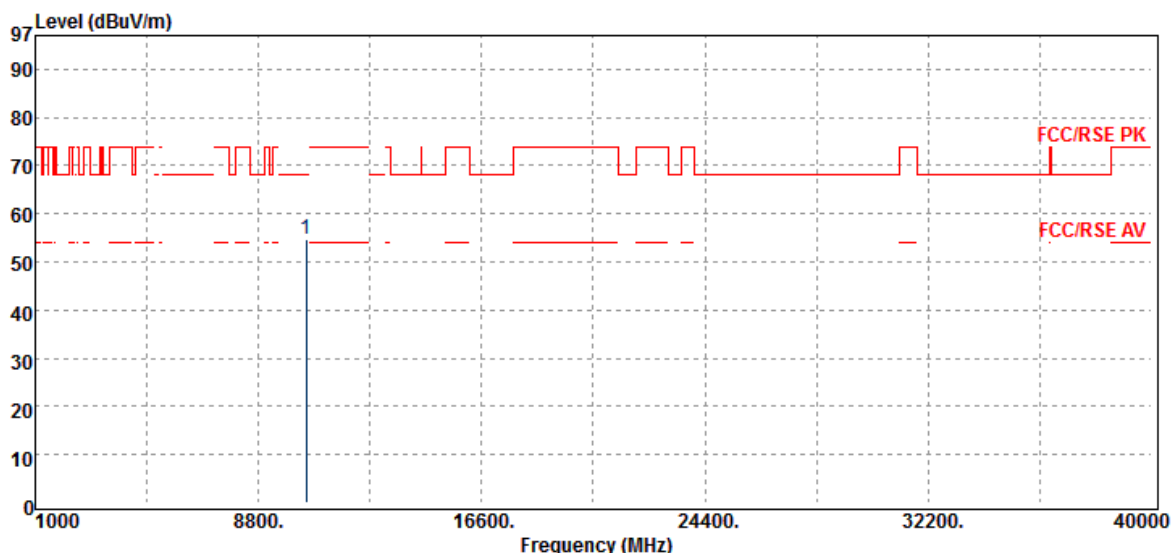
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Operation Band :802.11aB1
 Fundamental Frequency :5240 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10480.00	Peak	34.68	20.07	54.75	68.20	-13.45

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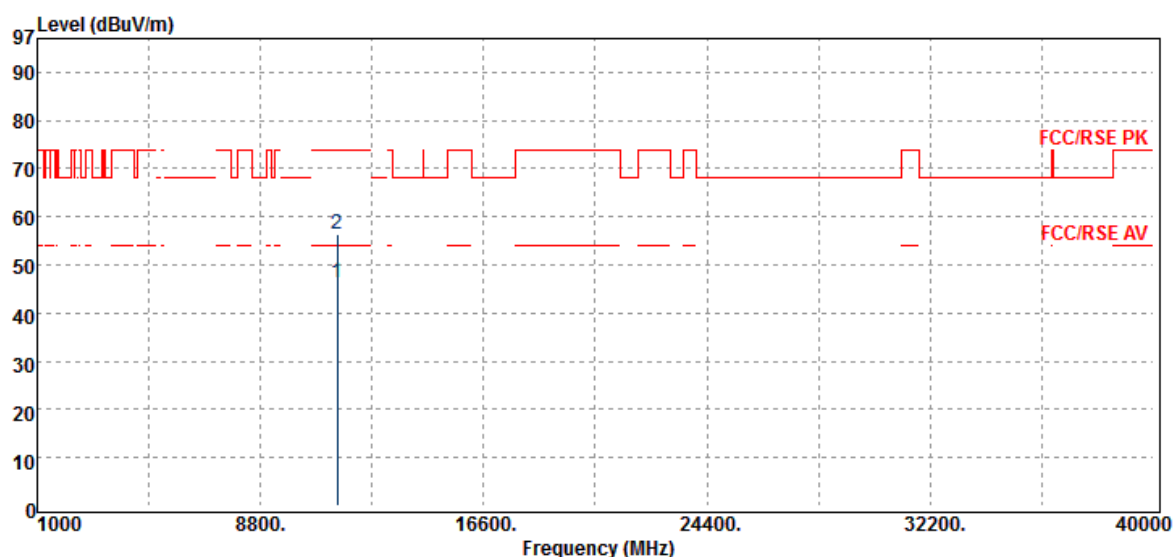
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Radiated Spurious Emission Measurement Result 802.11a, 5725~5850 MHz

Operation Band	:802.11aB4	Test Date	:2018-08-21
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.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
11490.00	Average	24.72	21.61	46.33	54.00	-7.67
11490.00	Peak	34.89	21.61	56.50	74.00	-17.50

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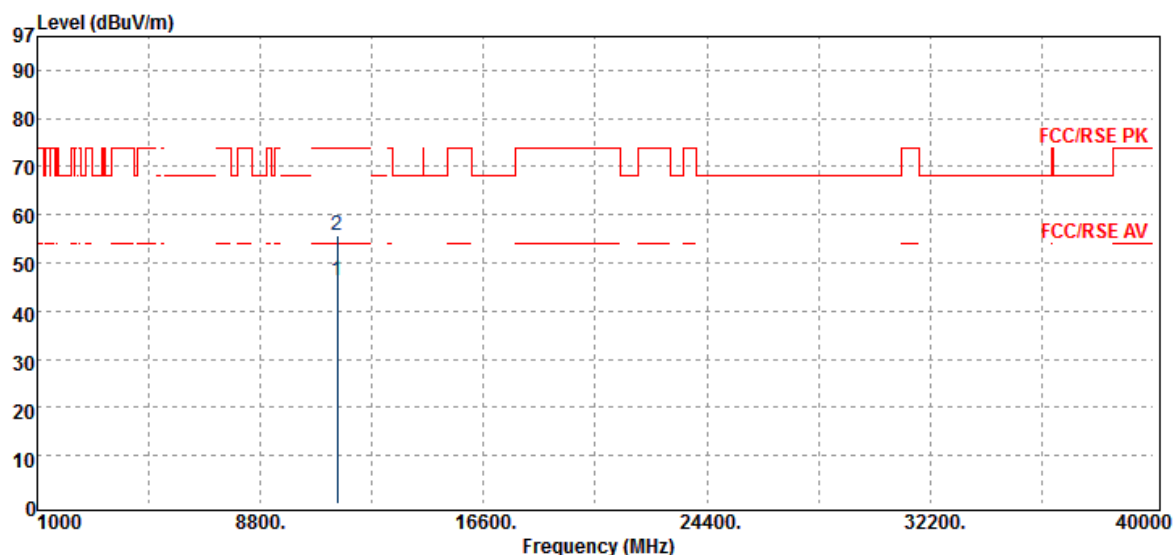
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Operation Band :802.11aB4
 Fundamental Frequency :5745 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11490.00	Average	24.69	21.61	46.30	54.00	-7.70
11490.00	Peak	34.01	21.61	55.62	74.00	-18.38

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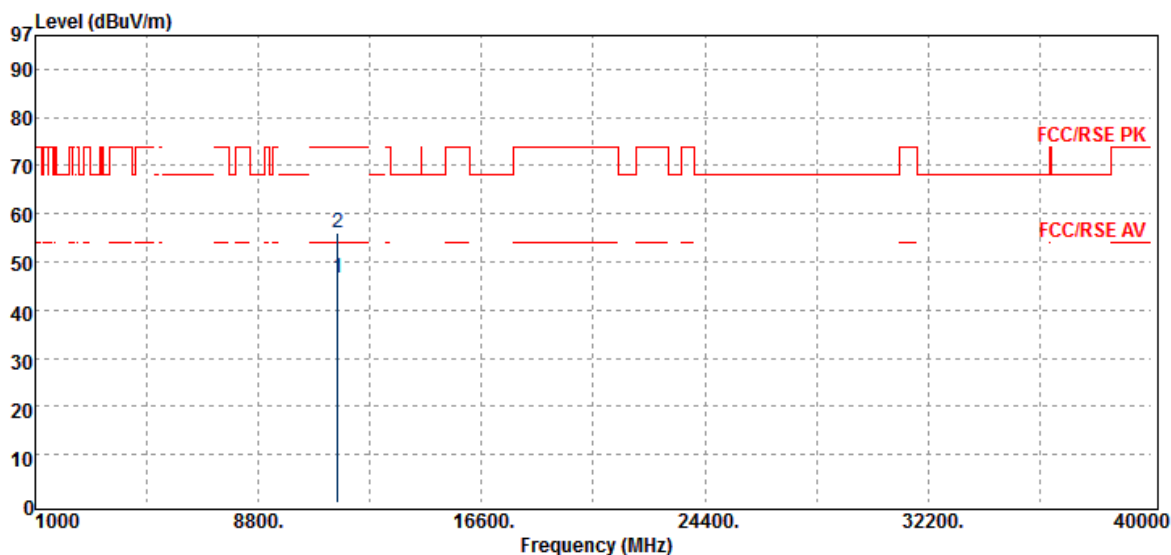
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Operation Band :802.11aB4
 Fundamental Frequency :5785 MHz
 Operation Mode :Tx CH MID
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11570.00	Average	24.98	21.66	46.64	54.00	-7.36
11570.00	Peak	34.25	21.66	55.91	74.00	-18.09

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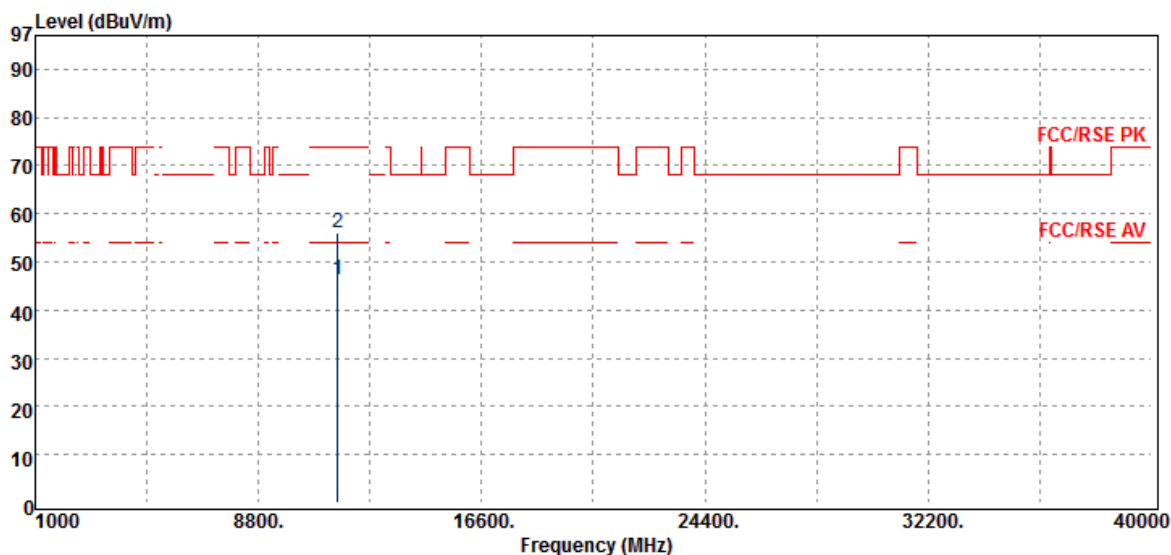
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Operation Band :802.11aB4
 Fundamental Frequency :5785 MHz
 Operation Mode :Tx CH MID
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11570.00	Average	24.58	21.66	46.24	54.00	-7.76
11570.00	Peak	34.44	21.66	56.10	74.00	-17.90

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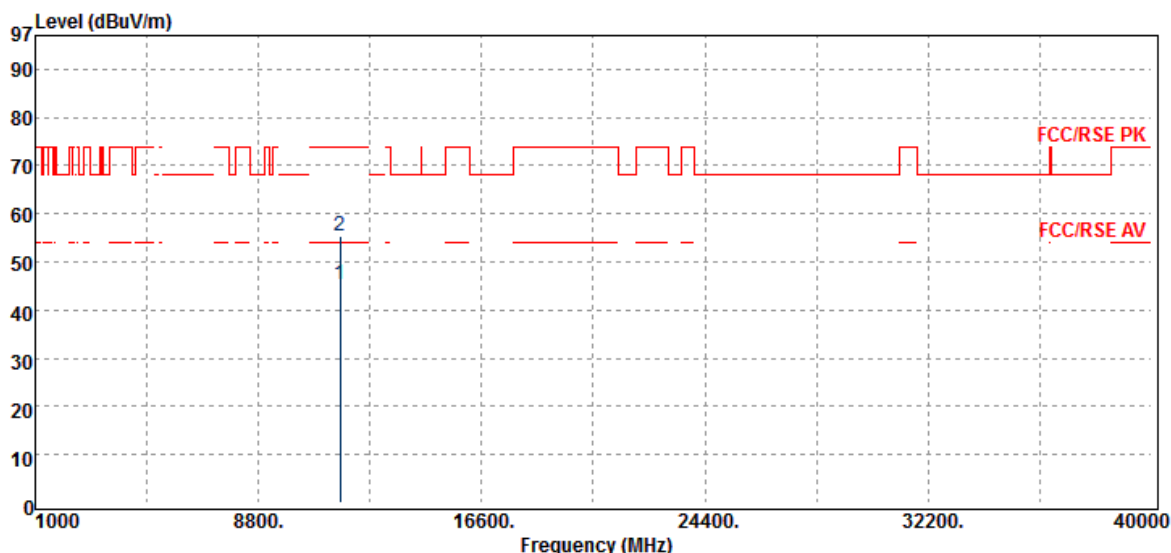
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Operation Band :802.11aB4
 Fundamental Frequency :5825 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11650.00	Average	23.77	21.60	45.37	54.00	-8.63
11650.00	Peak	33.92	21.60	55.52	74.00	-18.48

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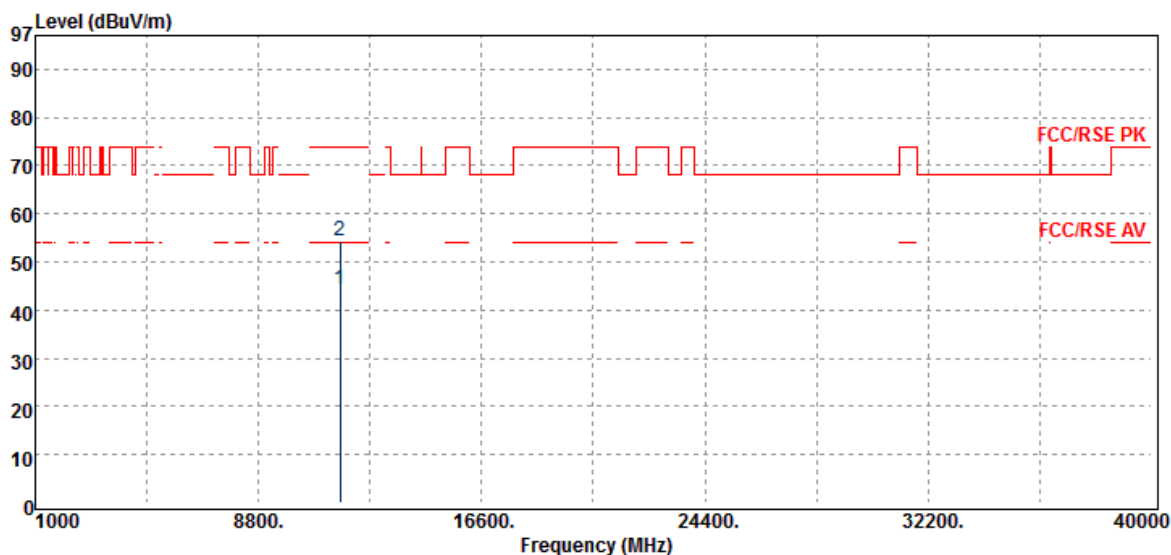
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Operation Band :802.11aB4
 Fundamental Frequency :5825 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11650.00	Average	22.76	21.60	44.36	54.00	-9.64
11650.00	Peak	32.61	21.60	54.21	74.00	-19.79

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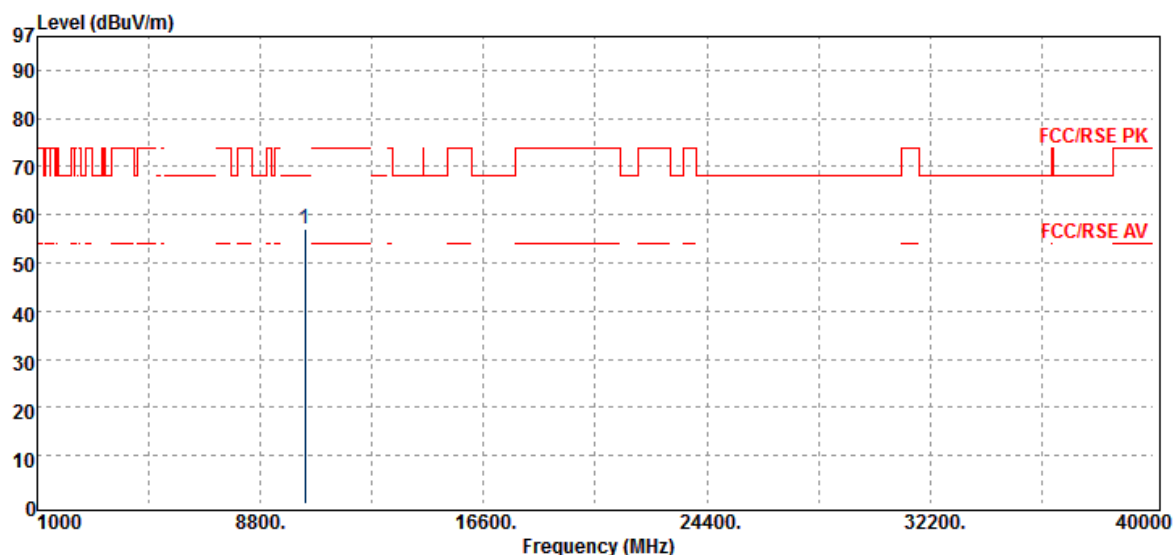
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5150~5250 MHz

Operation Band :802.11n20B1
Fundamental Frequency :5180 MHz
Operation Mode :Tx CH LOW
EUT Pol. :E2 Plane

Test Date :2018-08-03
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10360.00	Peak	37.39	19.71	57.10	68.20	-11.10

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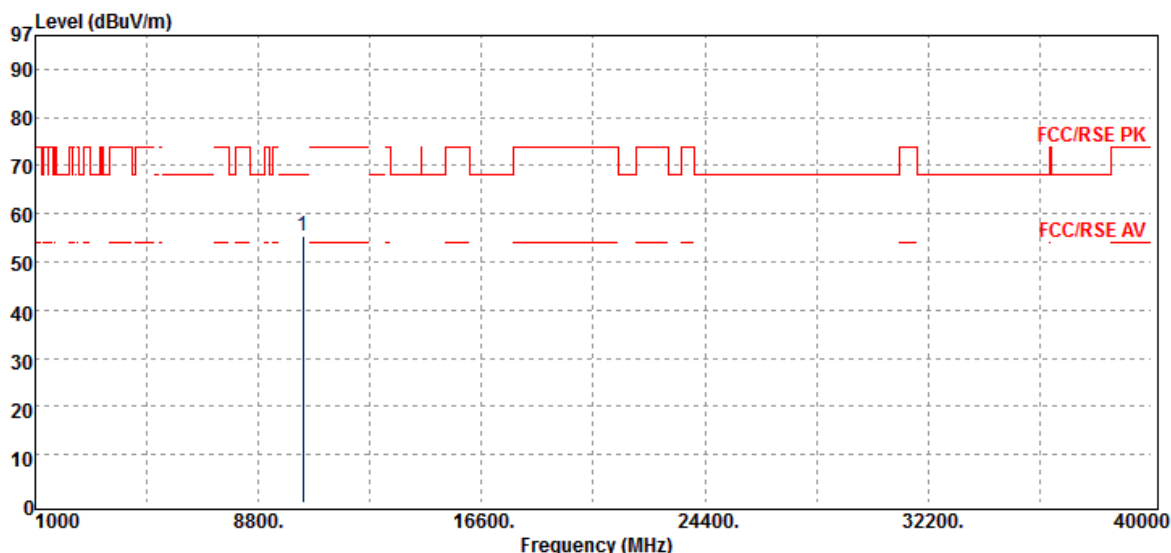
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Operation Band :802.11n20B1
 Fundamental Frequency :5180 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10360.00	Peak	35.54	19.71	55.25	68.20	-12.95

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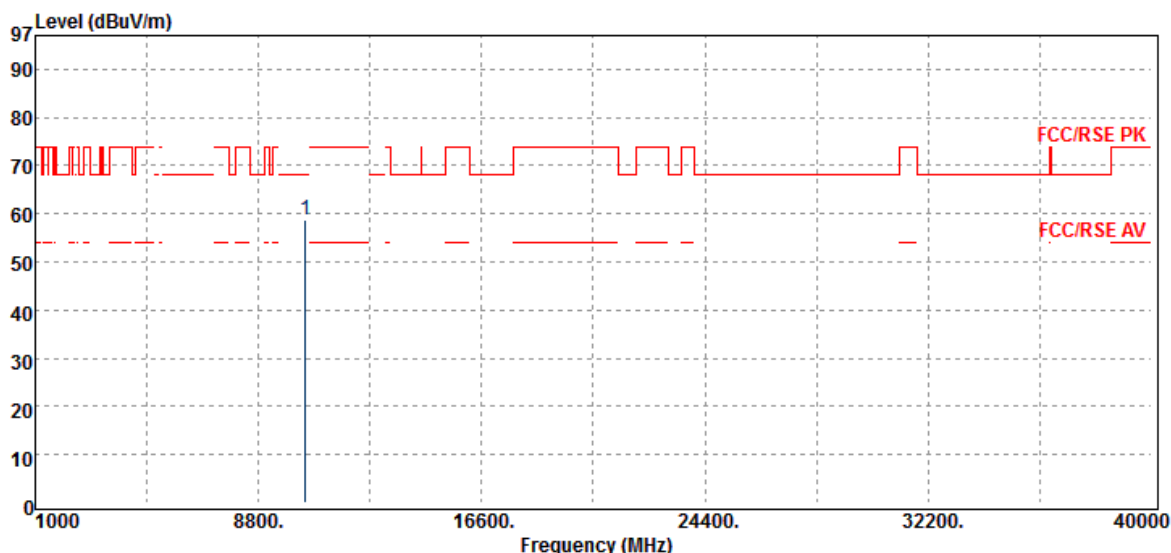
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Operation Band :802.11n20B1
 Fundamental Frequency :5220 MHz
 Operation Mode :Tx CH MID
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10440.00	Peak	38.83	20.05	58.88	68.20	-9.32

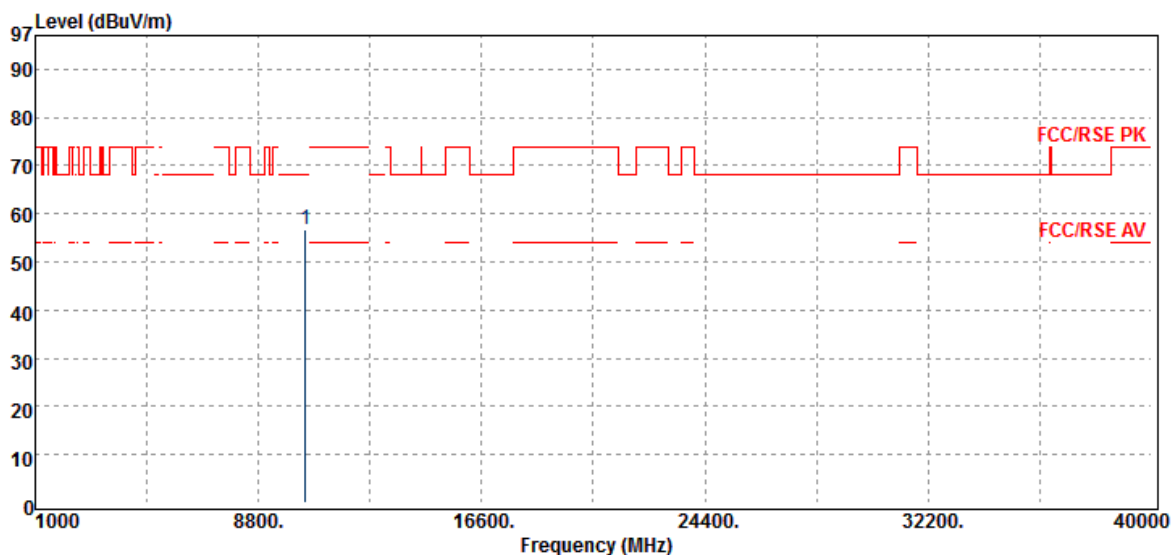
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Operation Band :802.11n20B1
 Fundamental Frequency :5220 MHz
 Operation Mode :Tx CH MID
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10440.00	Peak	36.68	20.05	56.73	68.20	-11.47

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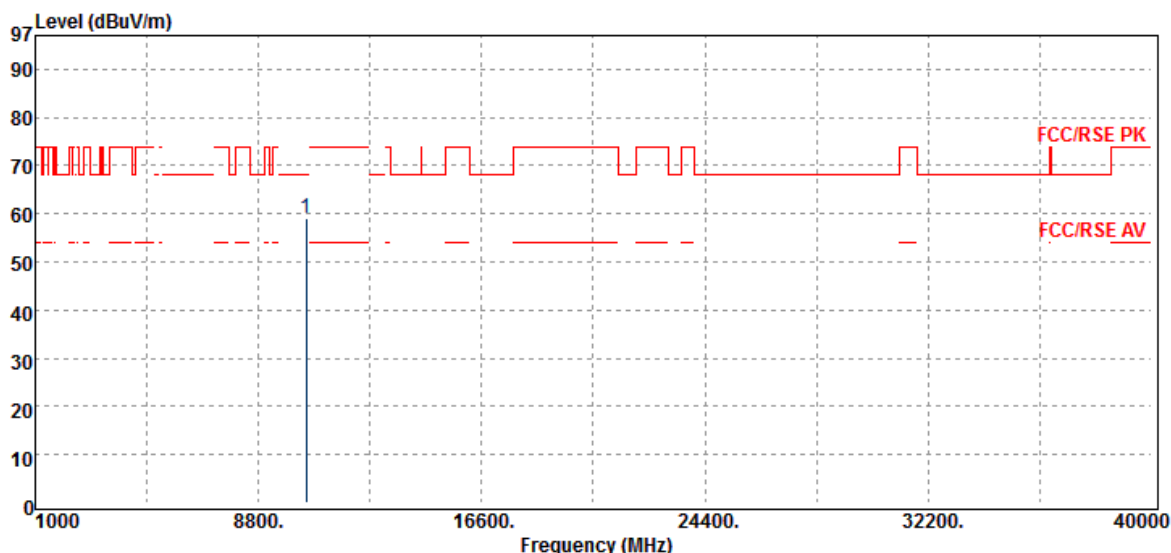
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Operation Band :802.11n20B1
 Fundamental Frequency :5240 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10480.00	Peak	39.01	20.07	59.08	68.20	-9.12

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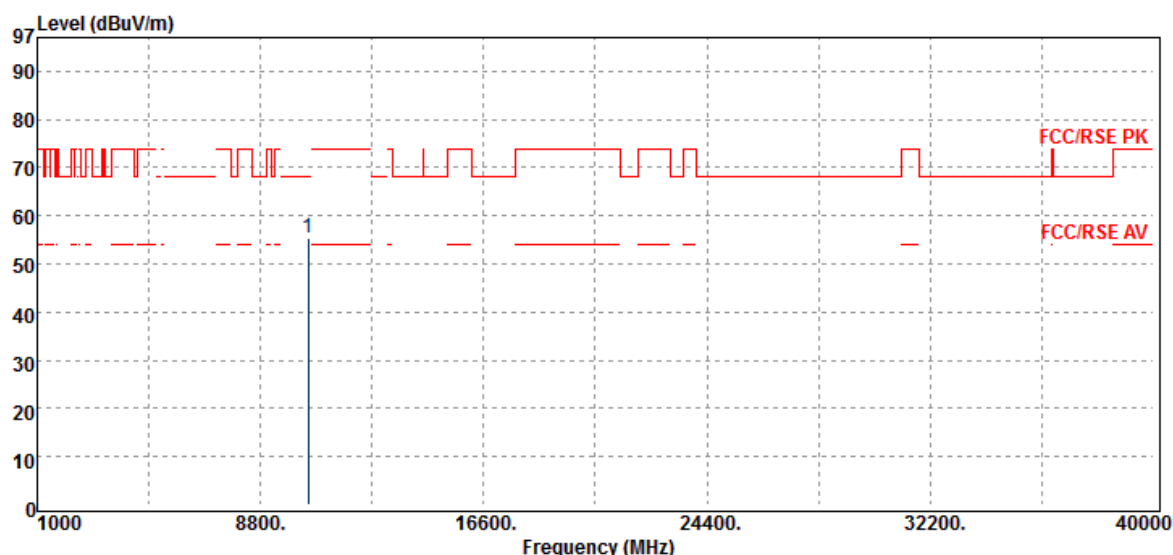
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Member of SGS Group

Operation Band :802.11n20B1
 Fundamental Frequency :5240 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10480.00	Peak	35.33	20.07	55.40	68.20	-12.80

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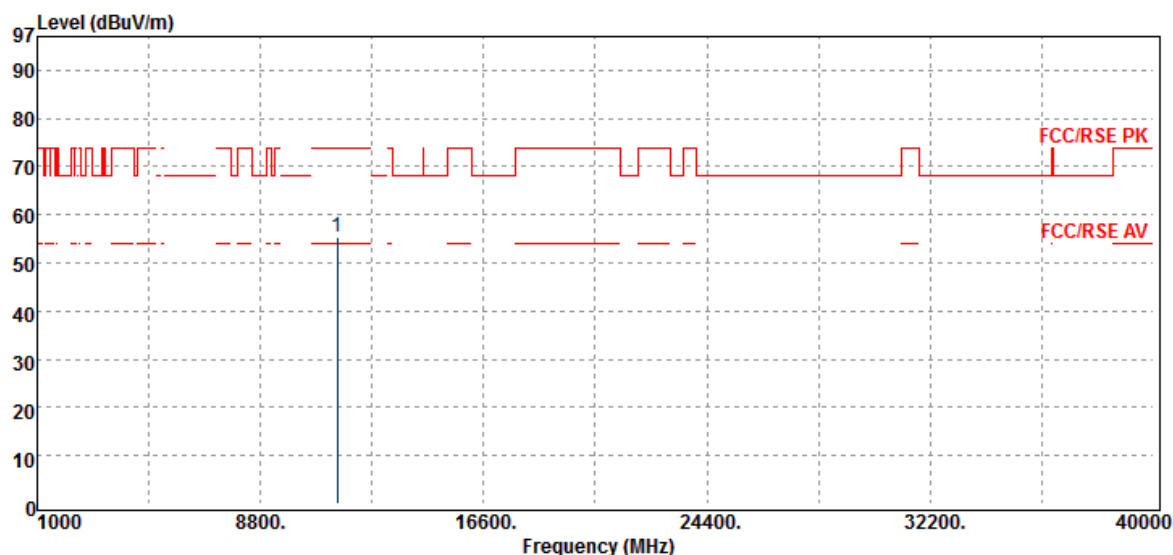
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5725~5850 MHz

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

Test Date :2018-08-21
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
11490.00	Peak	33.84	21.61	55.45	74.00	-18.55

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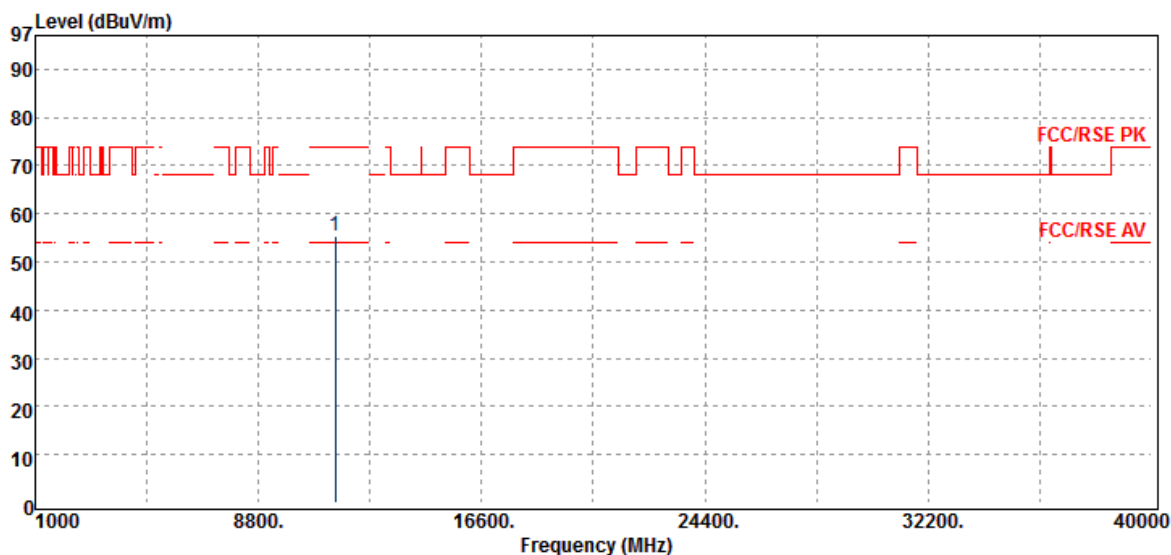
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www.tw.sgs.com

Member of SGS Group

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

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11490.00	Peak	33.78	21.61	55.39	74.00	-18.61

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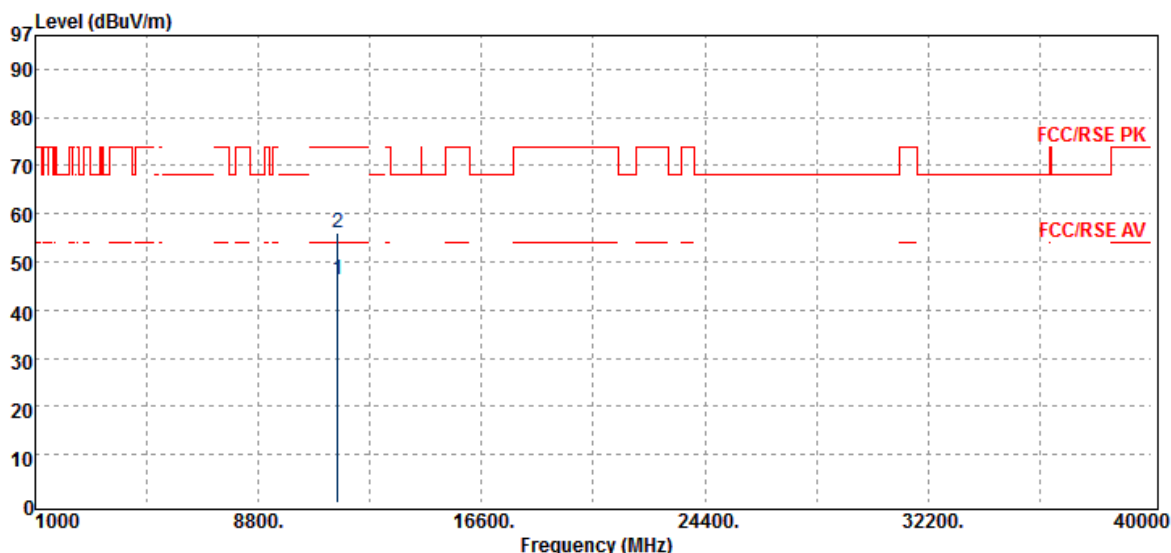
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www.tw.sgs.com

Member of SGS Group

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

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11570.00	Average	24.68	21.66	46.34	54.00	-7.66
11570.00	Peak	34.47	21.66	56.13	74.00	-17.87

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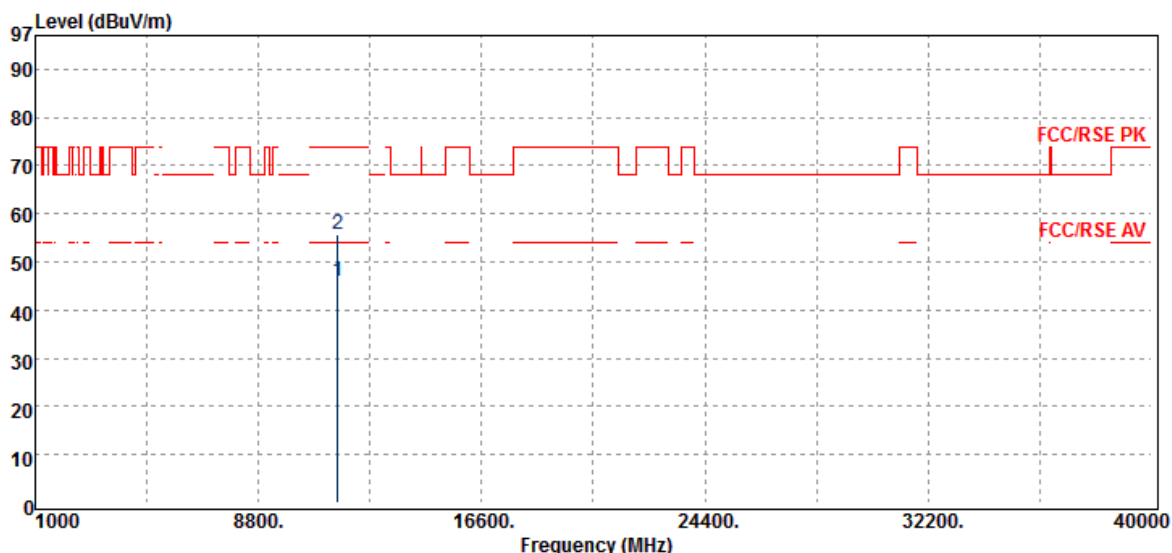
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www.tw.sgs.com

Member of SGS Group

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

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11570.00	Average	24.20	21.66	45.86	54.00	-8.14
11570.00	Peak	34.03	21.66	55.69	74.00	-18.31

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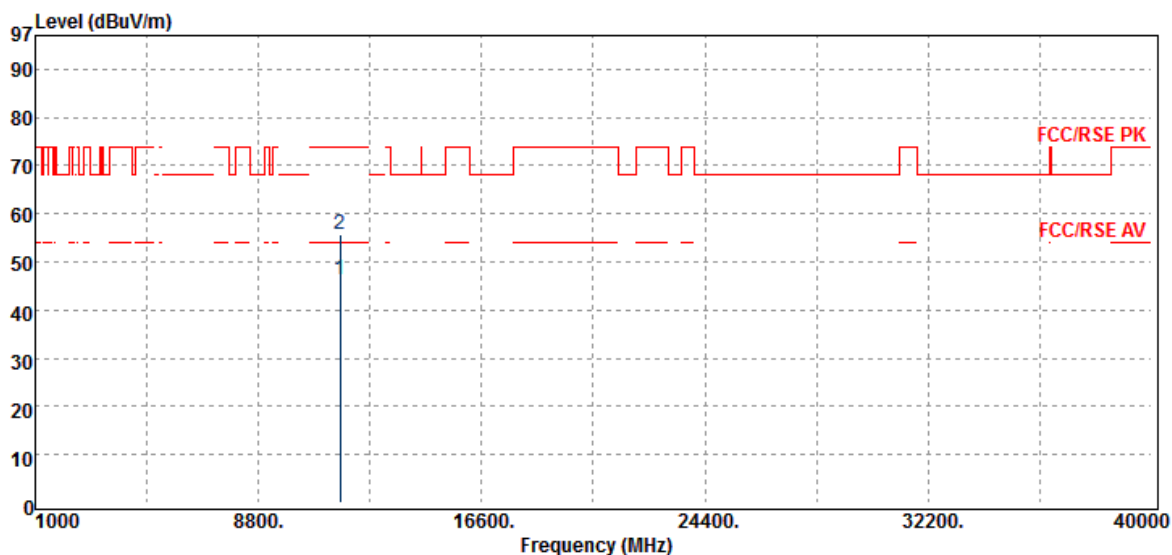
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Member of SGS Group

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

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11650.00	Average	24.57	21.60	46.17	54.00	-7.83
11650.00	Peak	34.22	21.60	55.82	74.00	-18.18

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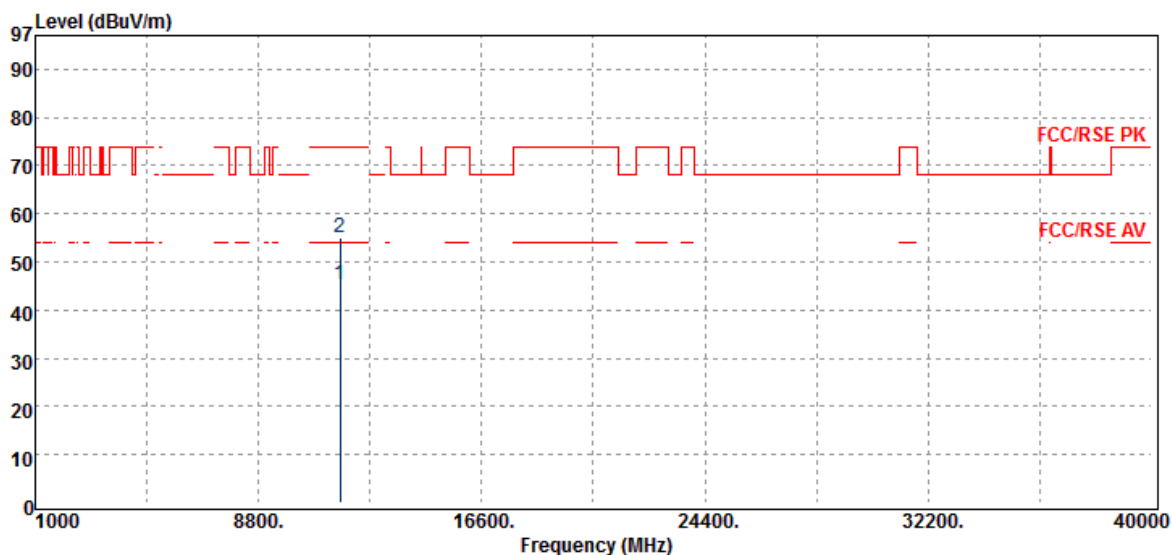
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Operation Band :802.11n20B4
 Fundamental Frequency :5825 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11650.00	Average	23.56	21.60	45.16	54.00	-8.84
11650.00	Peak	33.45	21.60	55.05	74.00	-18.95

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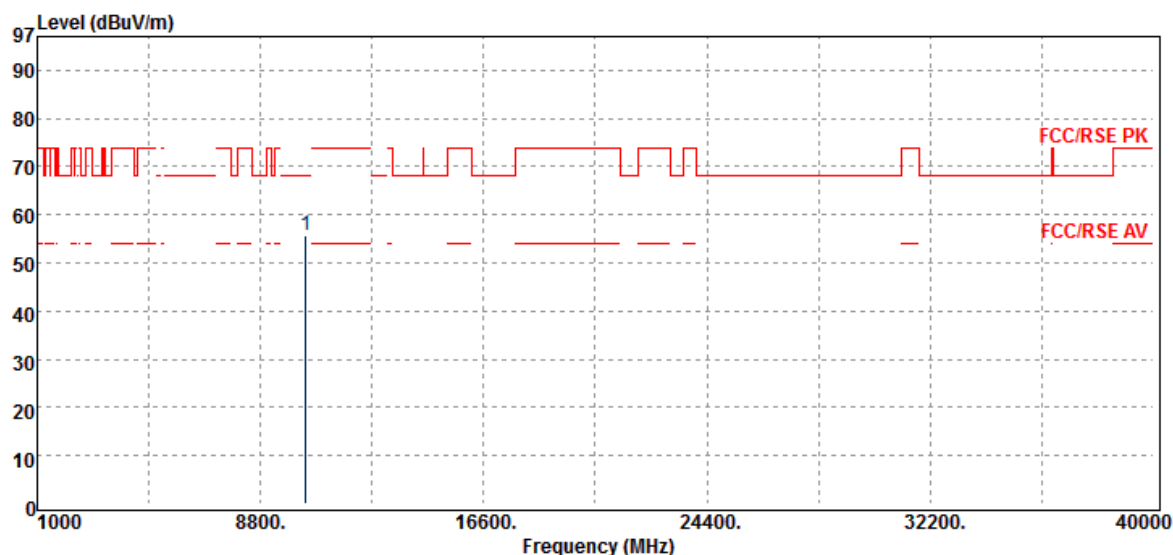
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5150~5250 MHz

Operation Band	:802.11n40B1	Test Date	:2018-08-03
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.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10380.00	Peak	36.02	19.78	55.80	68.20	-12.40

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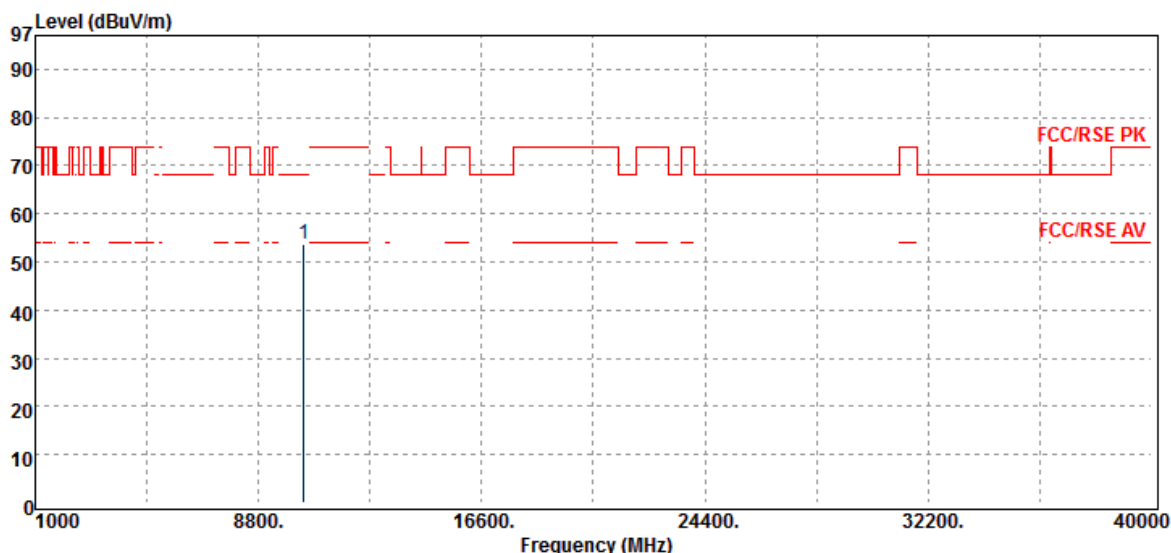
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Member of SGS Group

Operation Band :802.11n40B1
 Fundamental Frequency :5190 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10380.00	Peak	33.78	19.78	53.56	68.20	-14.64

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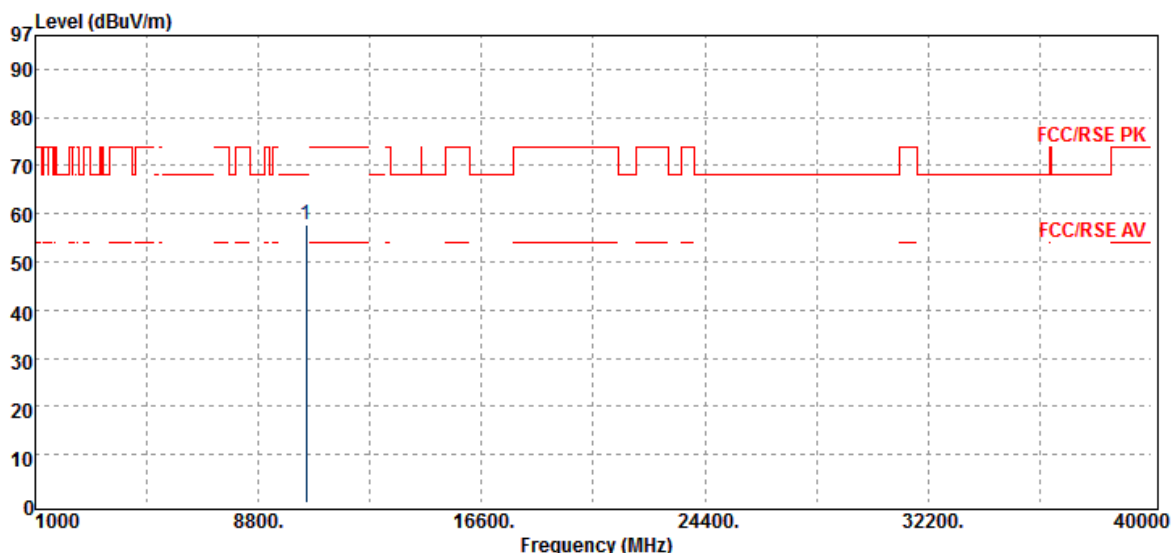
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Operation Band :802.11n40B1
 Fundamental Frequency :5230 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10460.00	Peak	37.78	20.07	57.85	68.20	-10.35

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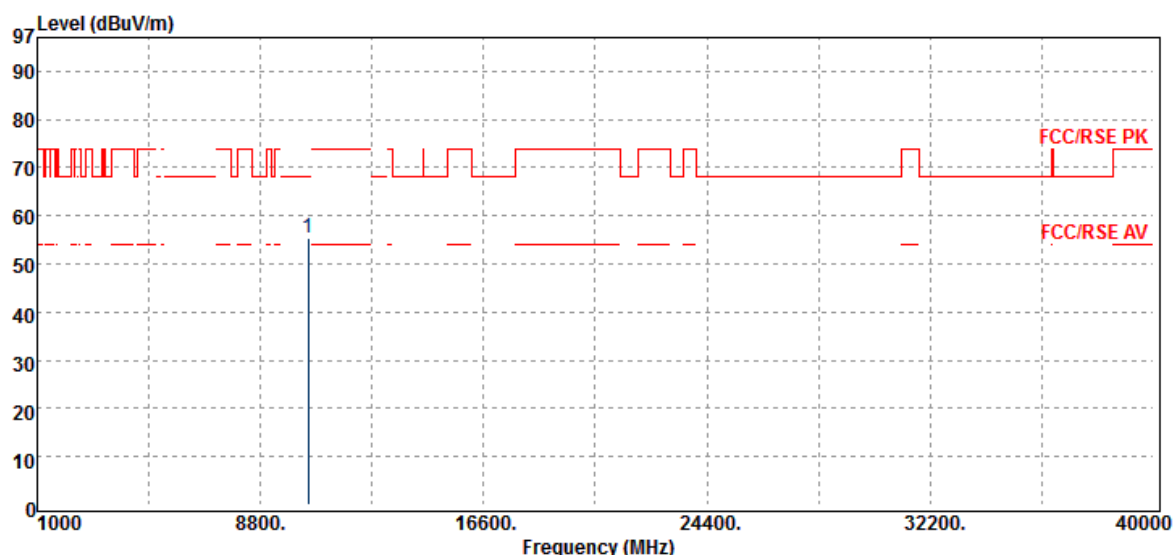
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Operation Band :802.11n40B1
 Fundamental Frequency :5230 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10460.00	Peak	35.41	20.07	55.48	68.20	-12.72

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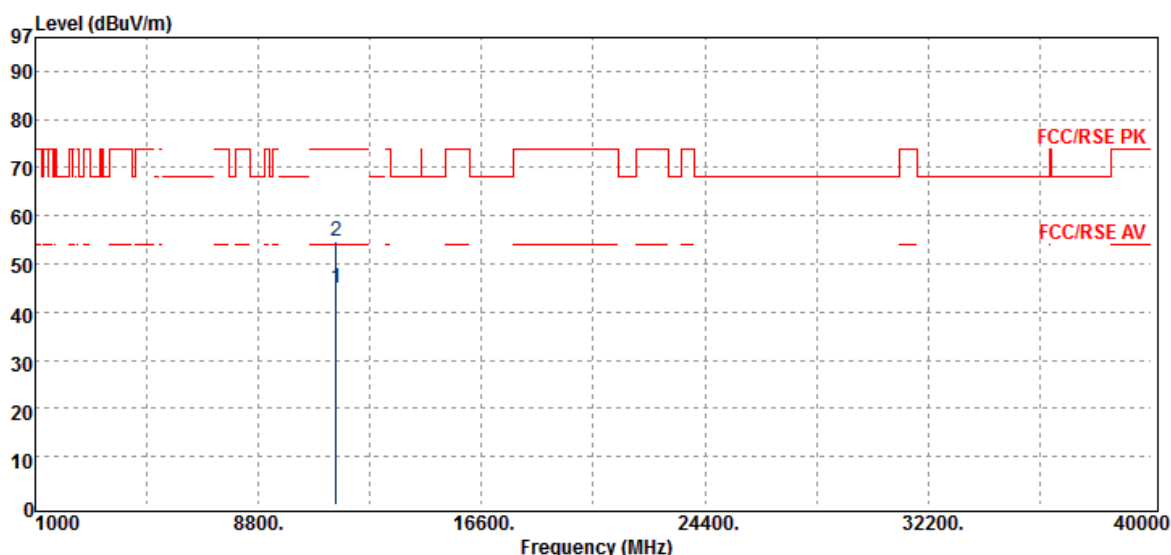
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5725~5850 MHz

Operation Band	:802.11n40B4	Test Date	:2018-08-21
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	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11510.00	Average	23.37	21.66	45.03	54.00	-8.97
11510.00	Peak	33.03	21.66	54.69	74.00	-19.31

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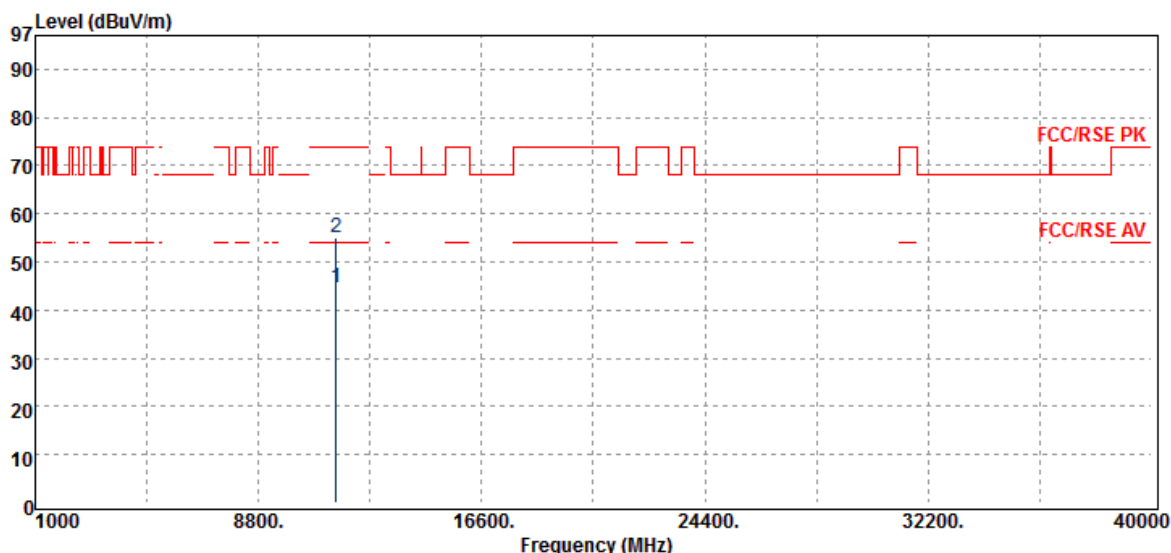
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Operation Band :802.11n40B4
 Fundamental Frequency :5755 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11510.00	Average	23.02	21.66	44.68	54.00	-9.32
11510.00	Peak	33.33	21.66	54.99	74.00	-19.01

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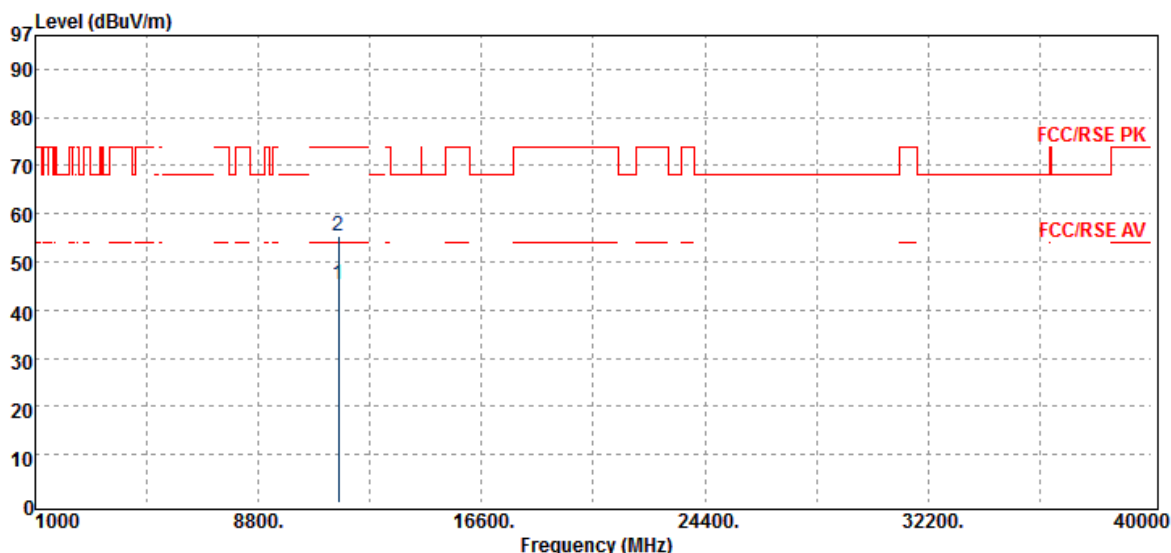
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Operation Band :802.11n40B4
 Fundamental Frequency :5795 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11590.00	Average	23.62	21.66	45.28	54.00	-8.72
11590.00	Peak	33.73	21.66	55.39	74.00	-18.61

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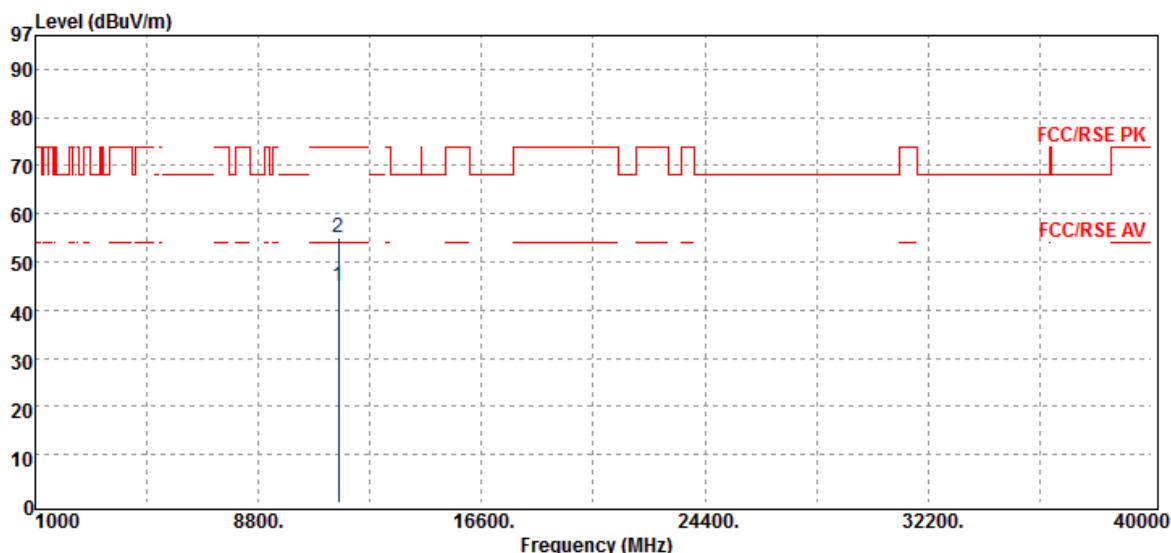
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Operation Band :802.11n40B4
 Fundamental Frequency :5795 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11590.00	Average	23.27	21.66	44.93	54.00	-9.07
11590.00	Peak	33.50	21.66	55.16	74.00	-18.84

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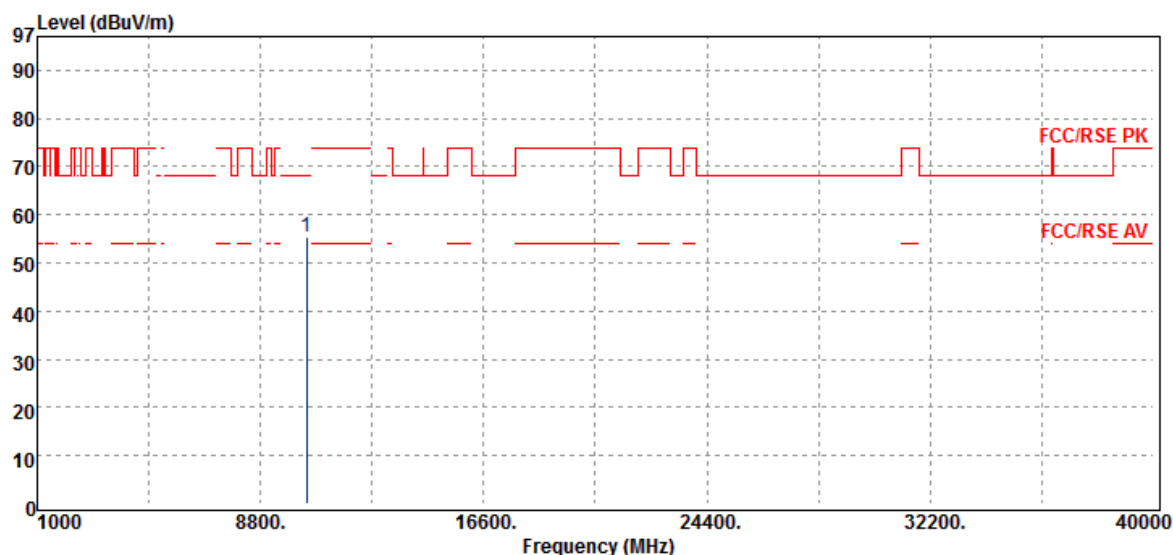
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Radiated Spurious Emission Measurement Result 802.11ac VHT80, 5150~5250 MHz

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

Test Date :2018-08-03
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10420.00	Peak	35.29	19.99	55.28	68.20	-12.92

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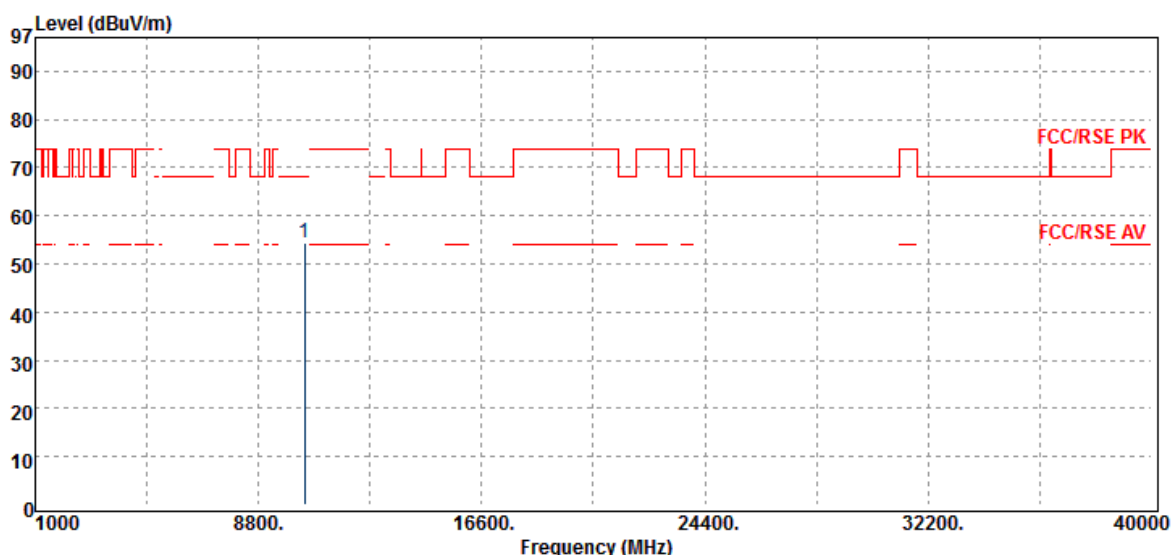
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Operation Band :802.11ac80B1
 Fundamental Frequency :5210 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10420.00	Peak	34.43	19.99	54.42	68.20	-13.78

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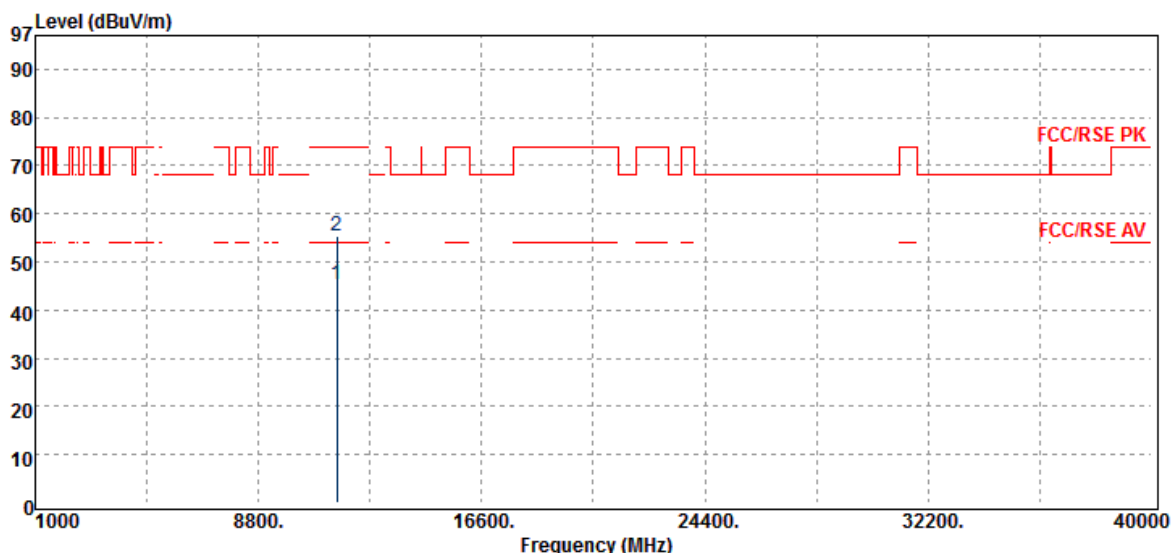
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Radiated Spurious Emission Measurement Result 802.11ac VHT80, 5725~5850 MHz

Operation Band :802.11ac80B4
Fundamental Frequency :5775 MHz
Operation Mode :Tx CH LOW
EUT Pol. :E2 Plane

Test Date :2018-08-21
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11550.00	Average	23.67	21.66	45.33	54.00	-8.67
11550.00	Peak	33.56	21.66	55.22	74.00	-18.78

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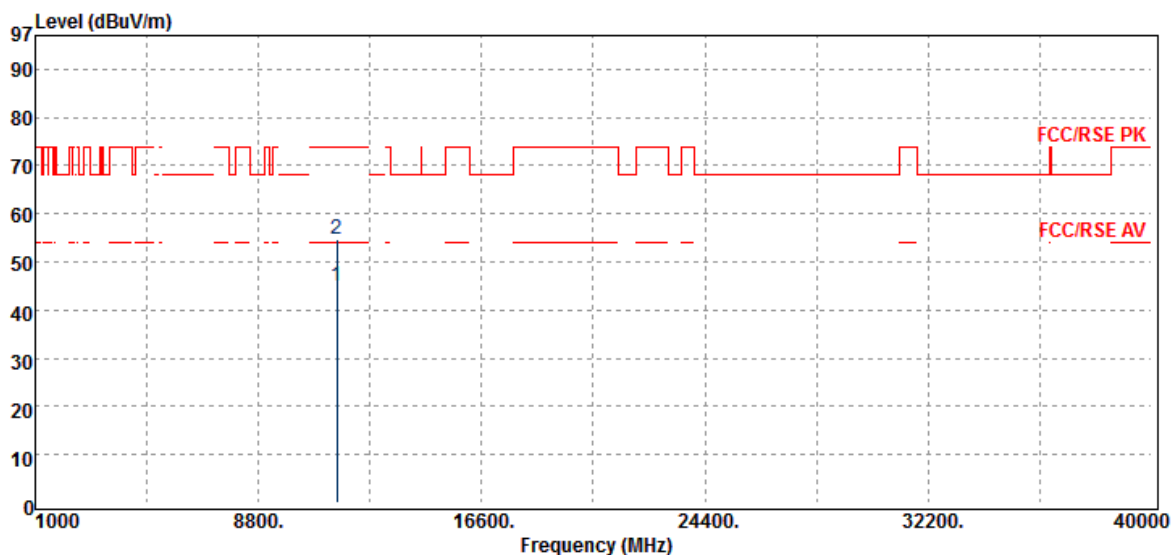
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Operation Band :802.11ac80B4
 Fundamental Frequency :5775 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11550.00	Average	23.27	21.66	44.93	54.00	-9.07
11550.00	Peak	33.00	21.66	54.66	74.00	-19.34

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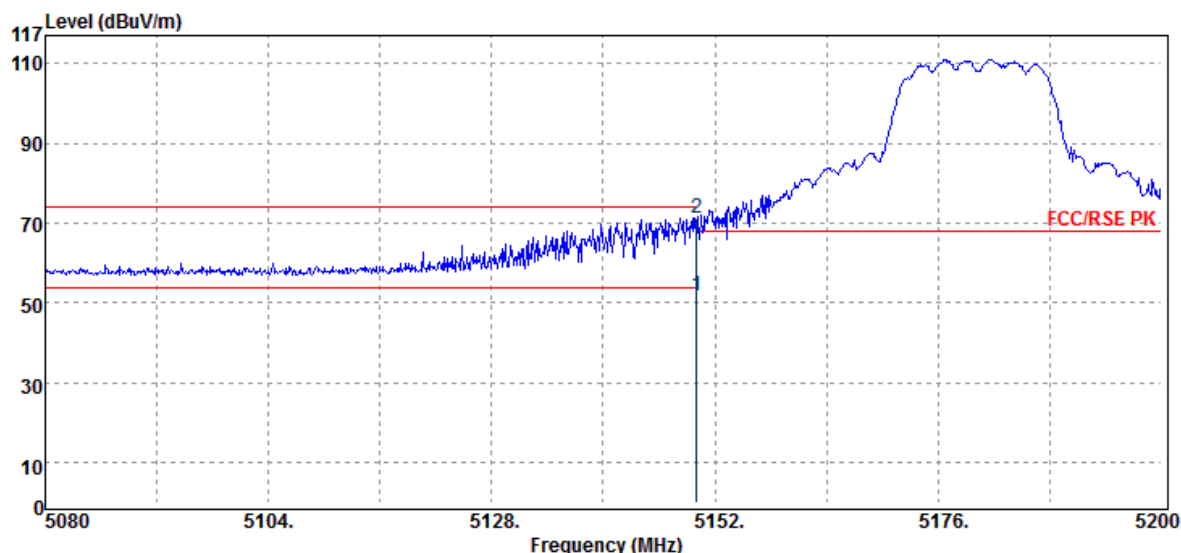
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Band edge falling to restricted band

802.11a mode

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

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5150.00	Average	43.46	8.32	51.78	54.00	-2.22
5150.00	Peak	62.86	8.32	71.18	74.00	-2.82

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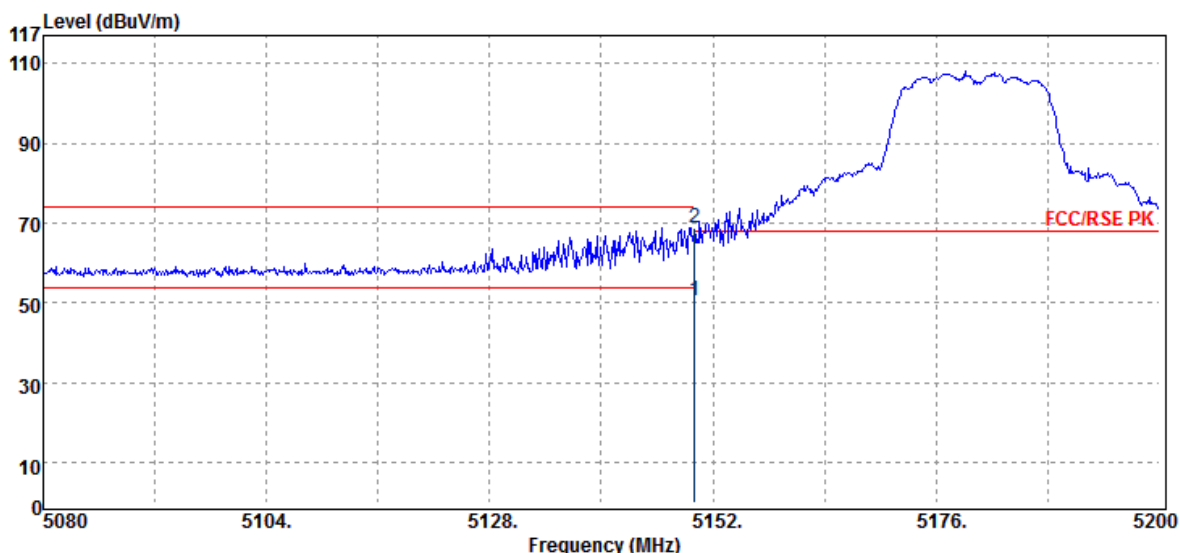
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Operation Band :802.11aB1
 Fundamental Frequency :5180 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5150.00	Average	42.14	8.32	50.46	54.00	-3.54
5150.00	Peak	60.70	8.32	69.02	74.00	-4.98

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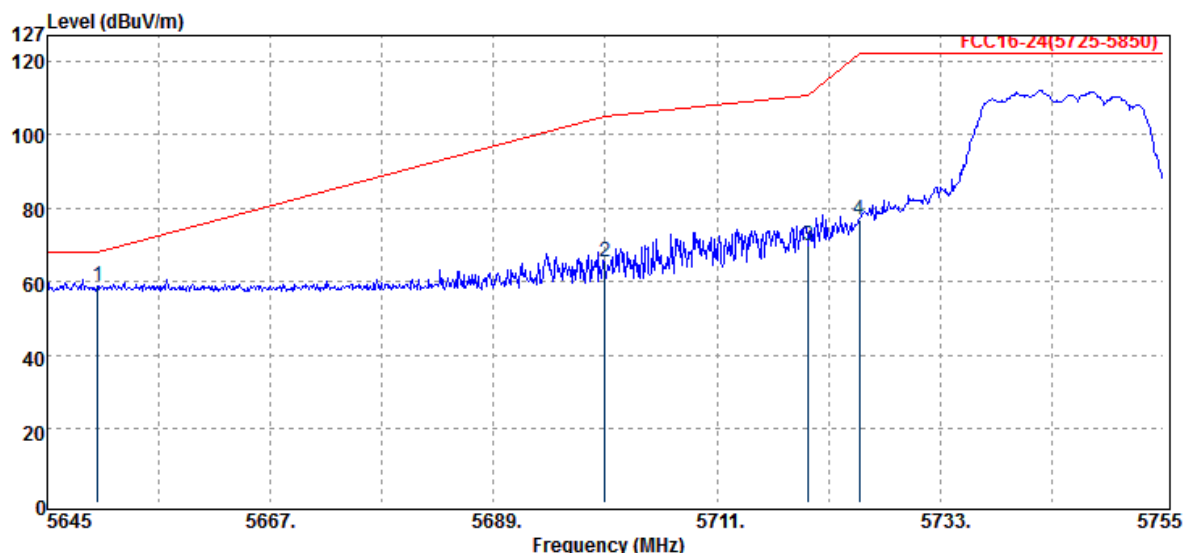
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Operation Band :802.11aB4
 Fundamental Frequency :5745 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	Peak	49.88	9.20	59.08	68.23	-9.15
5700.00	Peak	55.99	9.35	65.34	105.23	-39.89
5720.00	Peak	60.35	9.43	69.78	110.83	-41.05
5725.00	Peak	67.38	9.44	76.82	122.23	-45.41

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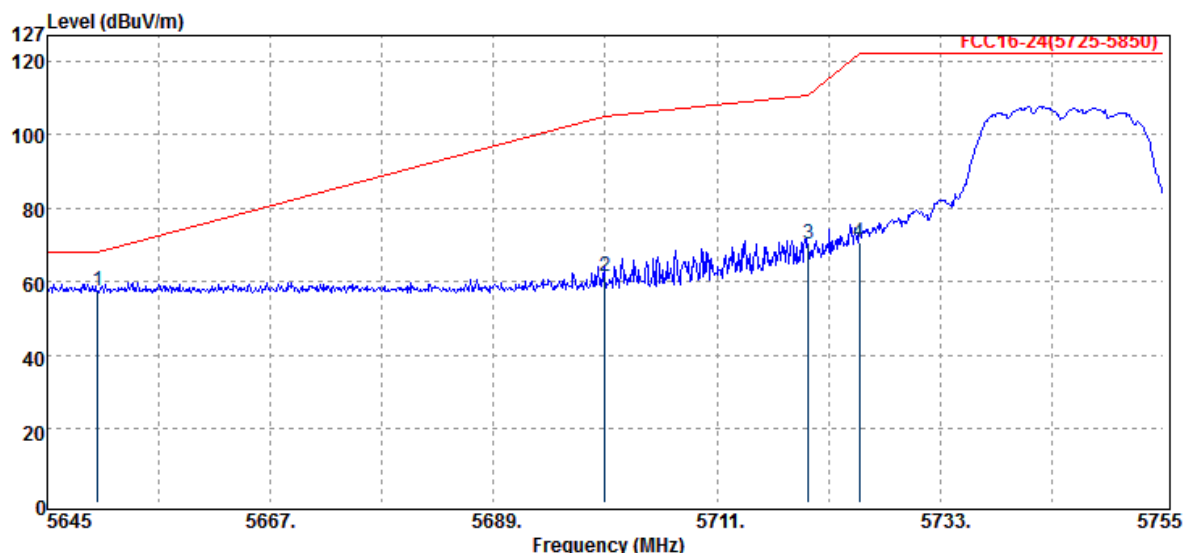
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www.tw.sgs.com

Member of SGS Group

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

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	Peak	48.57	9.20	57.77	68.23	-10.46
5700.00	Peak	52.19	9.35	61.54	105.23	-43.69
5720.00	Peak	60.98	9.43	70.41	110.83	-40.42
5725.00	Peak	61.48	9.44	70.92	122.23	-51.31

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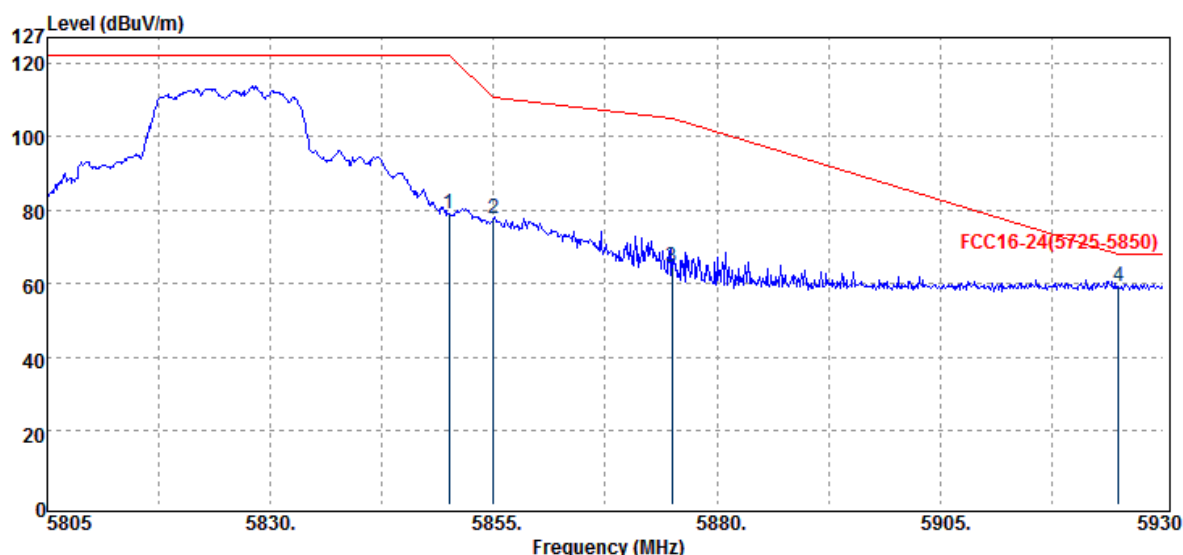
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Member of SGS Group

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

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5850.00	Peak	69.28	9.77	79.05	122.23	-43.18
5855.00	Peak	67.87	9.78	77.65	110.83	-33.18
5875.00	Peak	54.83	9.82	64.65	105.23	-40.58
5925.00	Peak	49.49	9.98	59.47	68.23	-8.76

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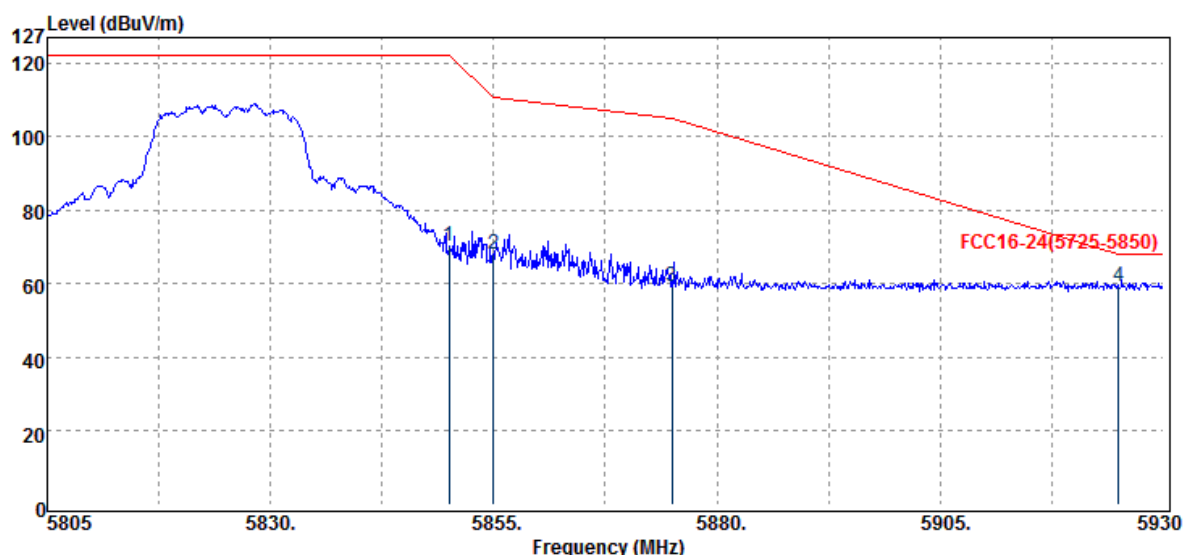
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Member of SGS Group

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

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	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	Peak	60.64	9.77	70.41	122.23	-51.82
5855.00	Peak	58.43	9.78	68.21	110.83	-42.62
5875.00	Peak	49.39	9.82	59.21	105.23	-46.02
5925.00	Peak	49.49	9.98	59.47	68.23	-8.76

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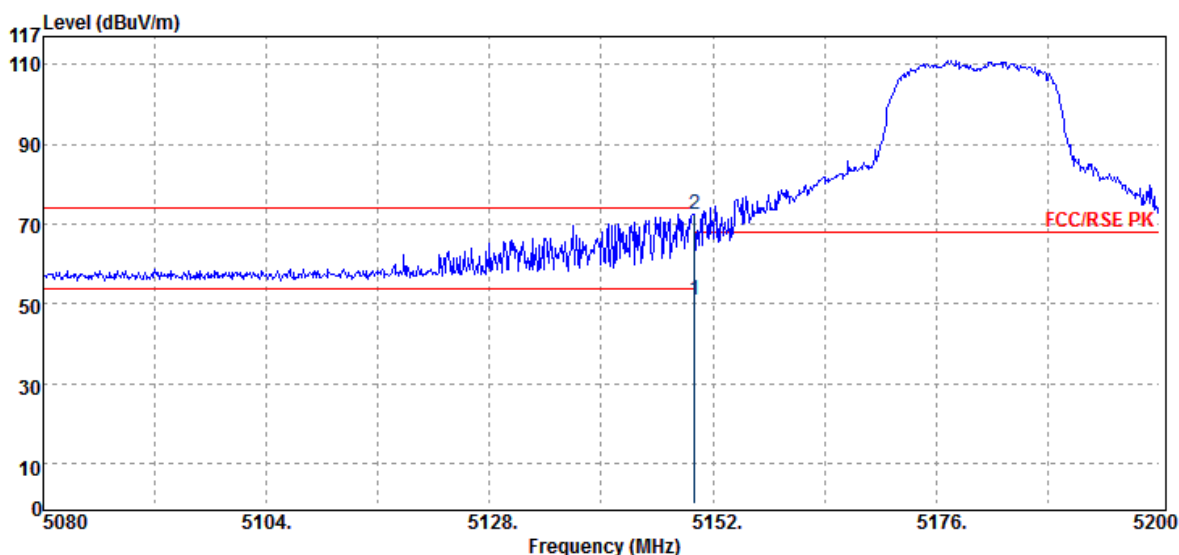
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802.11n20 HT mode

Operation Band :802.11n20B1
Fundamental Frequency :5180 MHz
Operation Mode :Bandedge CH LOW
EUT Pol. :E2 Plane

Test Date :2018-08-03
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5150.00	Average	42.76	8.32	51.08	54.00	-2.92
5150.00	Peak	64.33	8.32	72.65	74.00	-1.35

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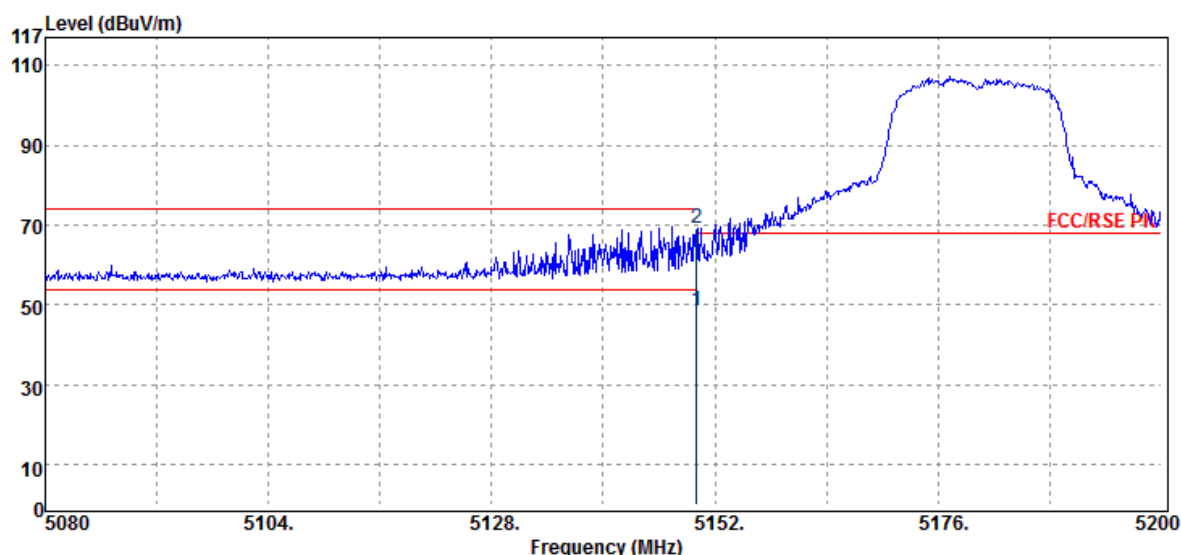
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Operation Band :802.11n20B1
Fundamental Frequency :5180 MHz
Operation Mode :Bandedge CH LOW
EUT Pol. :E2 Plane

Test Date :2018-08-03
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5150.00	Average	40.43	8.32	48.75	54.00	-5.25
5150.00	Peak	60.98	8.32	69.30	74.00	-4.70

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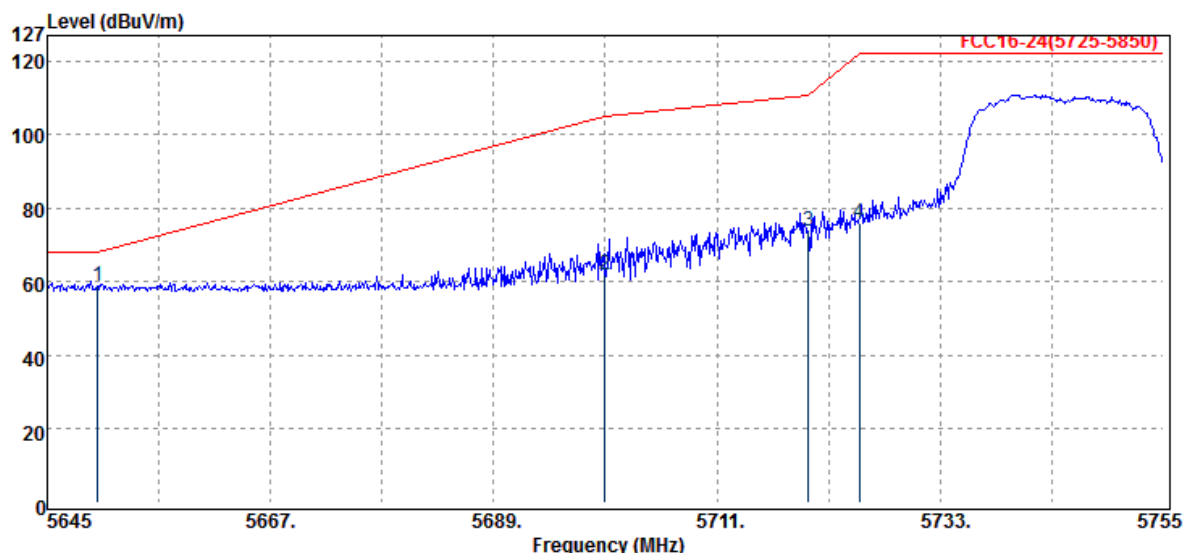
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Member of SGS Group

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

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	Peak	49.49	9.20	58.69	68.23	-9.54
5700.00	Peak	52.75	9.35	62.10	105.23	-43.13
5720.00	Peak	64.41	9.43	73.84	110.83	-36.99
5725.00	Peak	66.68	9.44	76.12	122.23	-46.11

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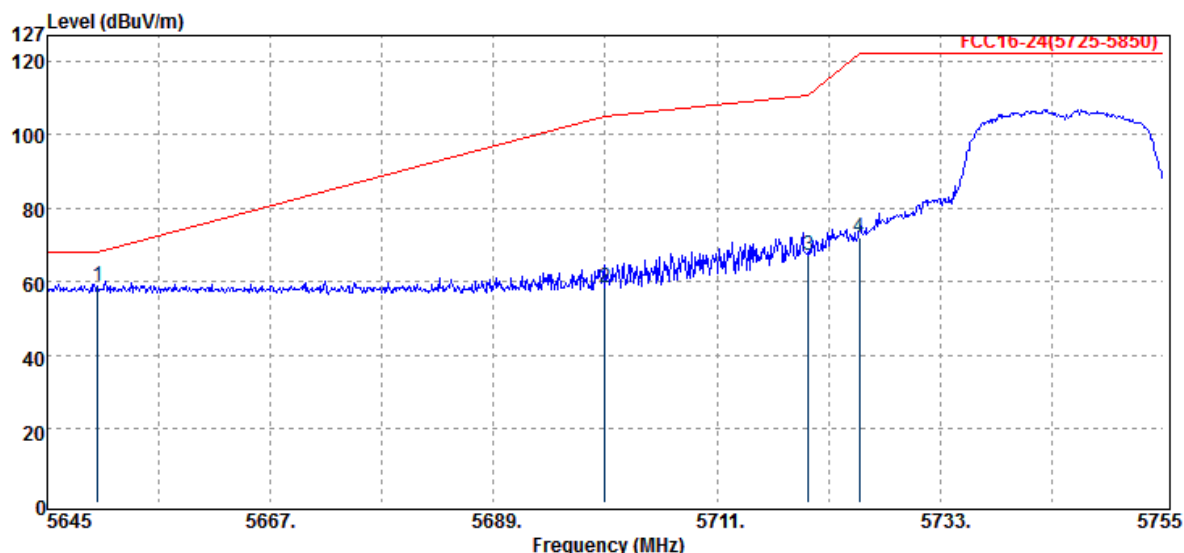
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Operation Band :802.11n20B4
 Fundamental Frequency :5745 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	Peak	49.69	9.20	58.89	68.23	-9.34
5700.00	Peak	49.04	9.35	58.39	105.23	-46.84
5720.00	Peak	57.92	9.43	67.35	110.83	-43.48
5725.00	Peak	62.83	9.44	72.27	122.23	-49.96

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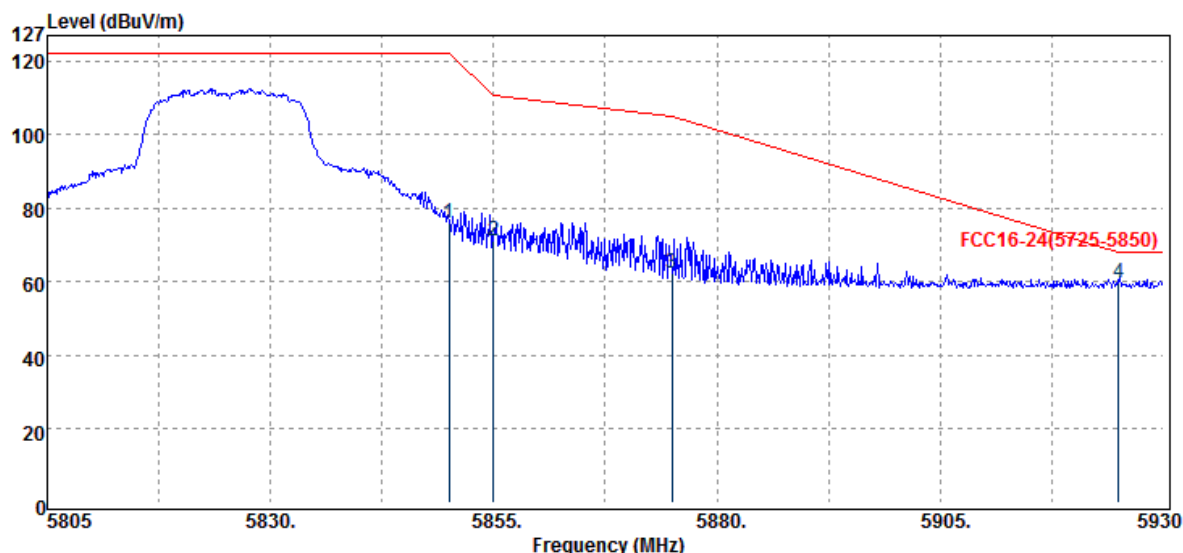
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Operation Band :802.11n20B4
 Fundamental Frequency :5825 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5850.00	Peak	66.41	9.77	76.18	122.23	-46.05
5855.00	Peak	61.50	9.78	71.28	110.83	-39.55
5875.00	Peak	52.72	9.82	62.54	105.23	-42.69
5925.00	Peak	49.94	9.98	59.92	68.23	-8.31

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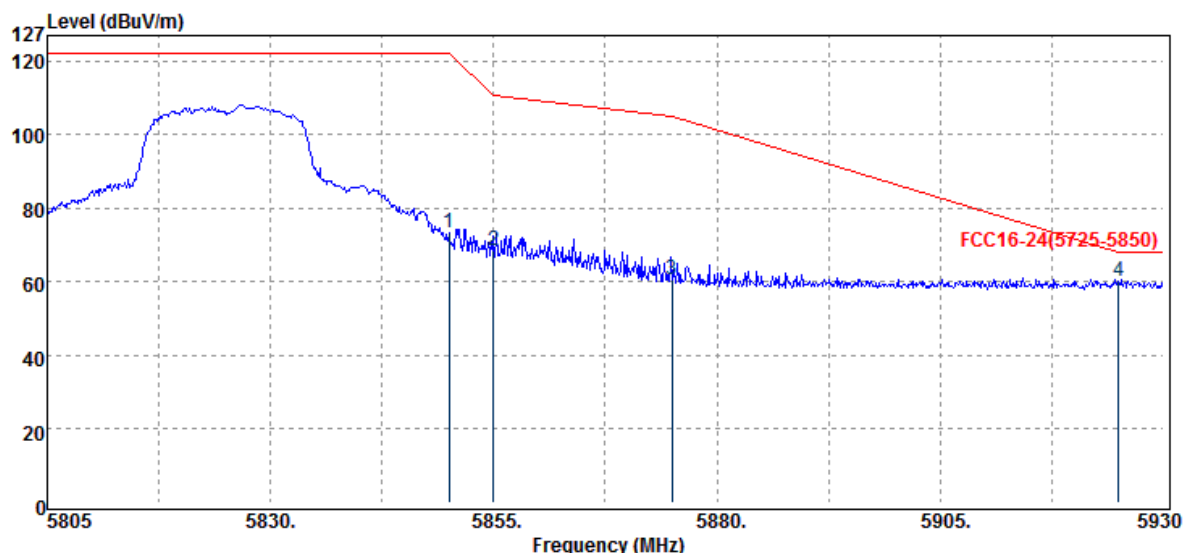
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Operation Band :802.11n20B4
 Fundamental Frequency :5825 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5850.00	Peak	63.67	9.77	73.44	122.23	-48.79
5855.00	Peak	58.81	9.78	68.59	110.83	-42.24
5875.00	Peak	50.70	9.82	60.52	105.23	-44.71
5925.00	Peak	50.11	9.98	60.09	68.23	-8.14

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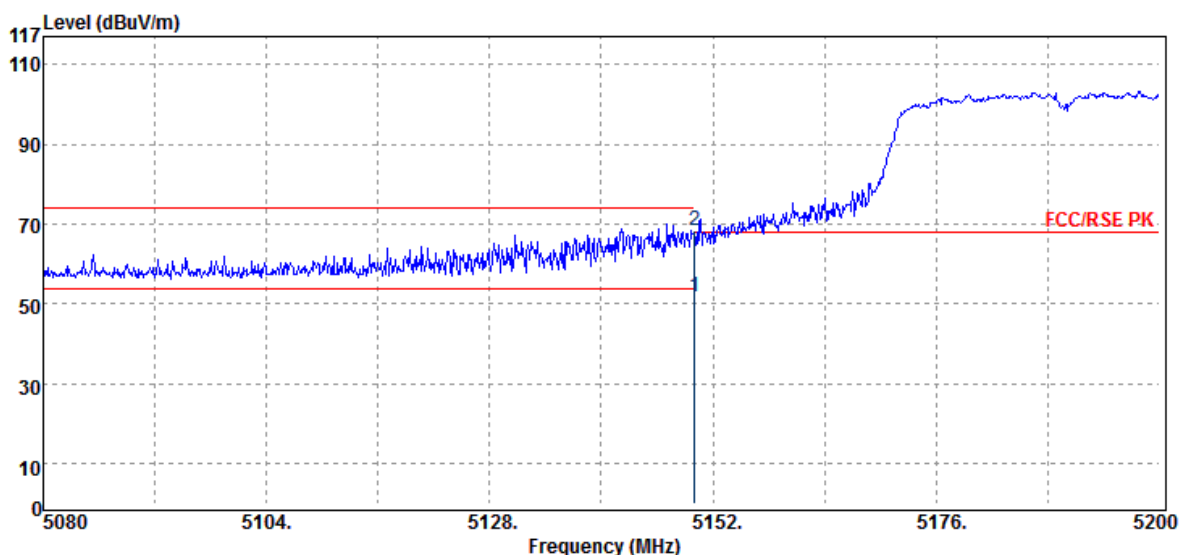
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802.11n40 HT mode

Operation Band :802.11n40B1
 Fundamental Frequency :5190 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5150.00	Average	43.69	8.32	52.01	54.00	-1.99
5150.00	Peak	59.90	8.32	68.22	74.00	-5.78

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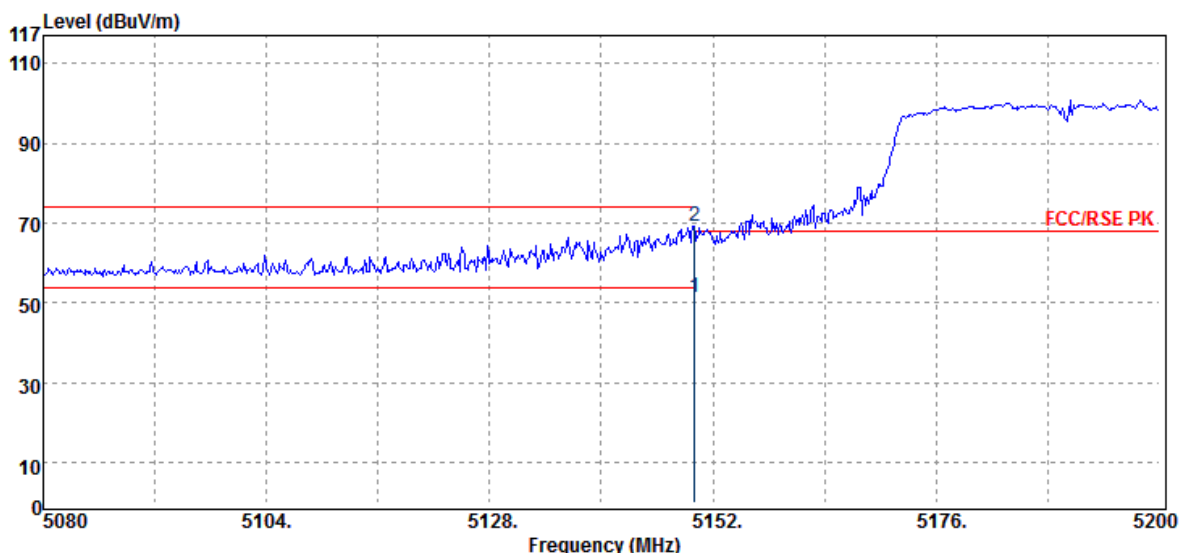
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Operation Band :802.11n40B1
 Fundamental Frequency :5190 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5150.00	Average	43.15	8.32	51.47	54.00	-2.53
5150.00	Peak	61.02	8.32	69.34	74.00	-4.66

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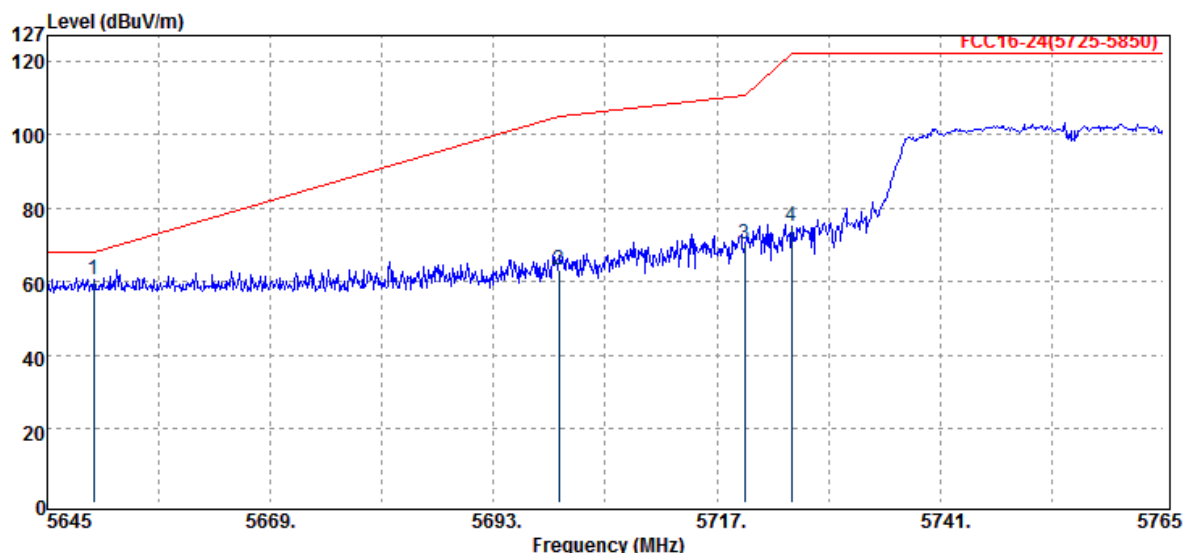
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www.tw.sgs.com

Member of SGS Group

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

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	Peak	51.31	9.20	60.51	68.23	-7.72
5700.00	Peak	53.93	9.35	63.28	105.23	-41.95
5720.00	Peak	60.70	9.43	70.13	110.83	-40.70
5725.00	Peak	65.54	9.44	74.98	122.23	-47.25

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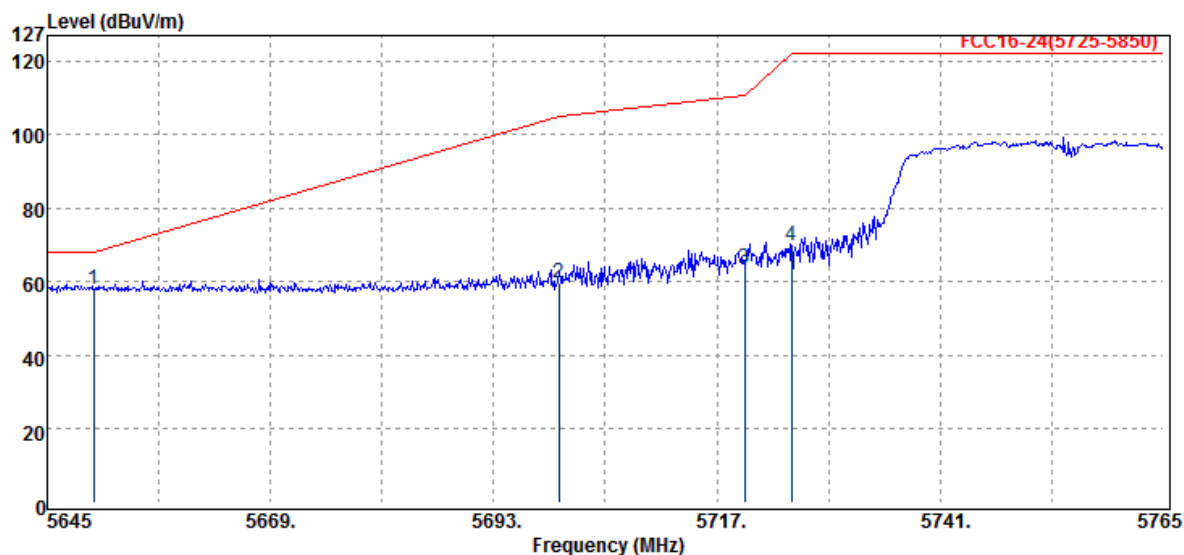
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Operation Band :802.11n40B4
 Fundamental Frequency :5755 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	Peak	48.90	9.20	58.10	68.23	-10.13
5700.00	Peak	50.30	9.35	59.65	105.23	-45.58
5720.00	Peak	54.47	9.43	63.90	110.83	-46.93
5725.00	Peak	60.55	9.44	69.99	122.23	-52.24

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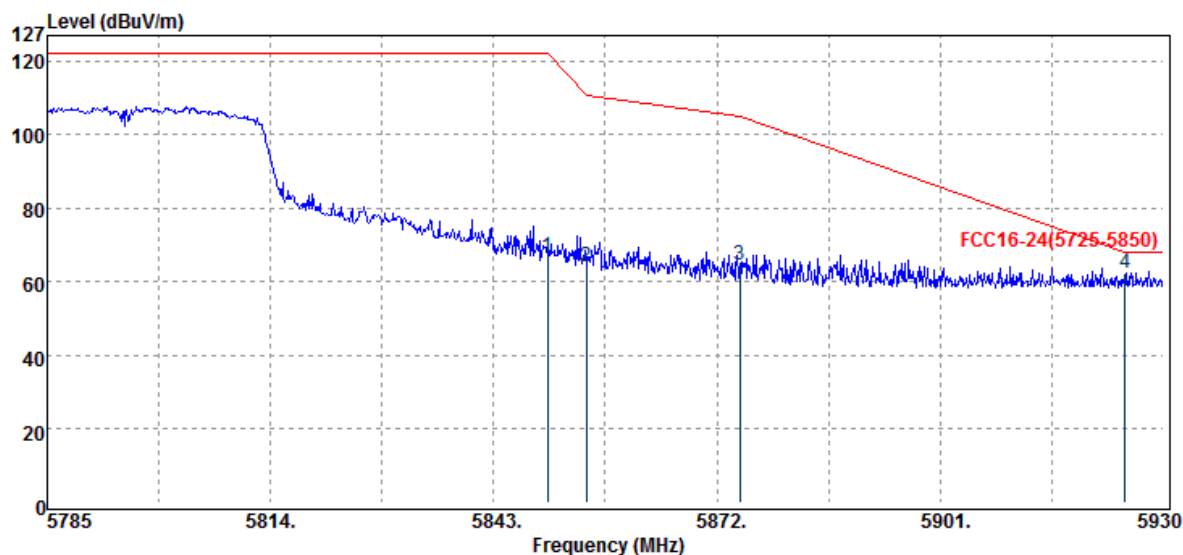
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Member of SGS Group

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

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5850.00	Peak	56.97	9.77	66.74	122.23	-55.49
5855.00	Peak	54.44	9.78	64.22	110.83	-46.61
5875.00	Peak	54.92	9.82	64.74	105.23	-40.49
5925.00	Peak	52.34	9.98	62.32	68.23	-5.91

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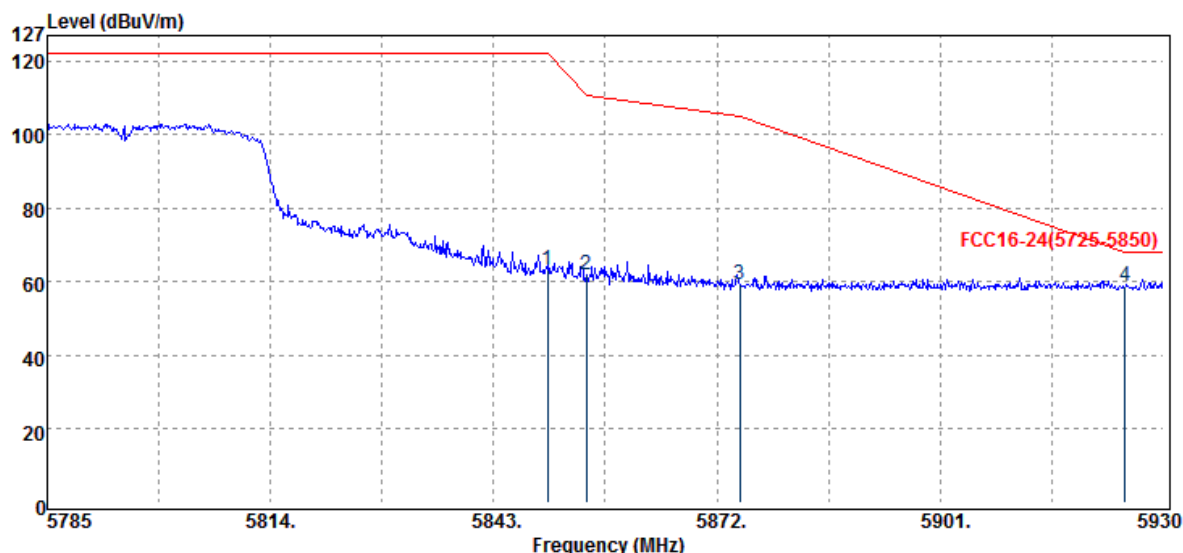
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Operation Band :802.11n40B4
 Fundamental Frequency :5795 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5850.00	Peak	53.37	9.77	63.14	122.23	-59.09
5855.00	Peak	52.17	9.78	61.95	110.83	-48.88
5875.00	Peak	49.68	9.82	59.50	105.23	-45.73
5925.00	Peak	48.98	9.98	58.96	68.23	-9.27

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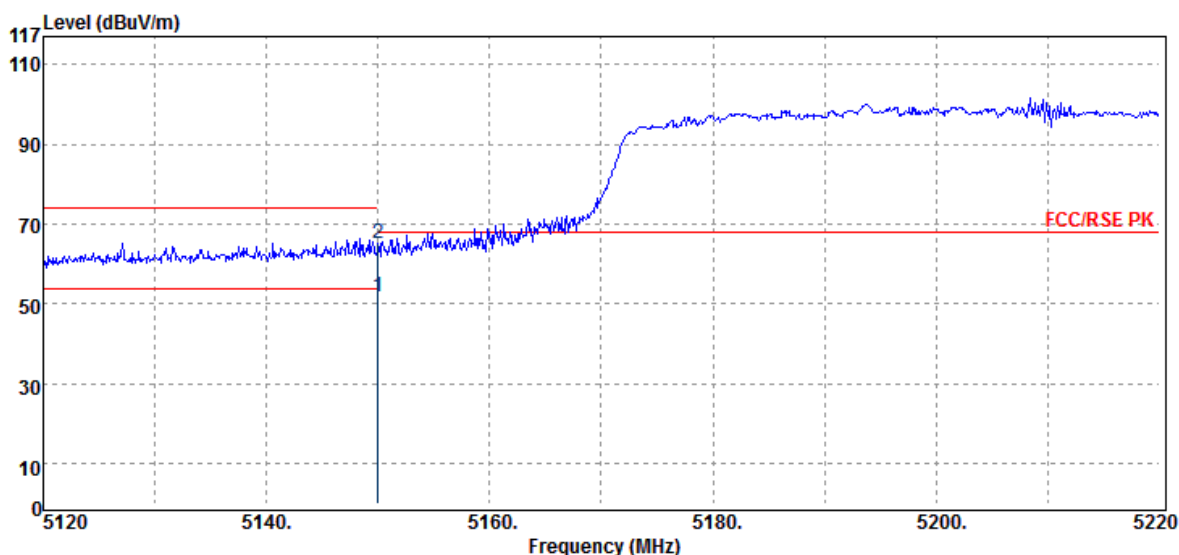
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802.11ac80 VHT mode

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

Test Date :2018-08-03
Temp./Humi. :23 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5150.00	Average	43.50	8.32	51.82	54.00	-2.18
5150.00	Peak	56.86	8.32	65.18	74.00	-8.82

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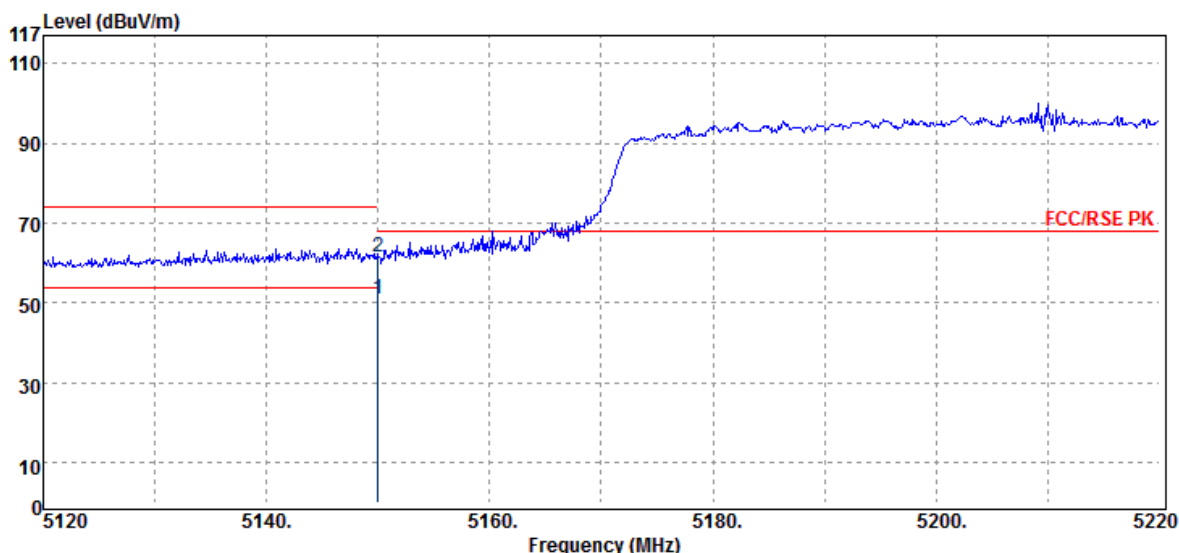
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Operation Band :802.11ac80B1
 Fundamental Frequency :5210 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-03
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5150.00	Average	42.76	8.32	51.08	54.00	-2.92
5150.00	Peak	53.17	8.32	61.49	74.00	-12.51

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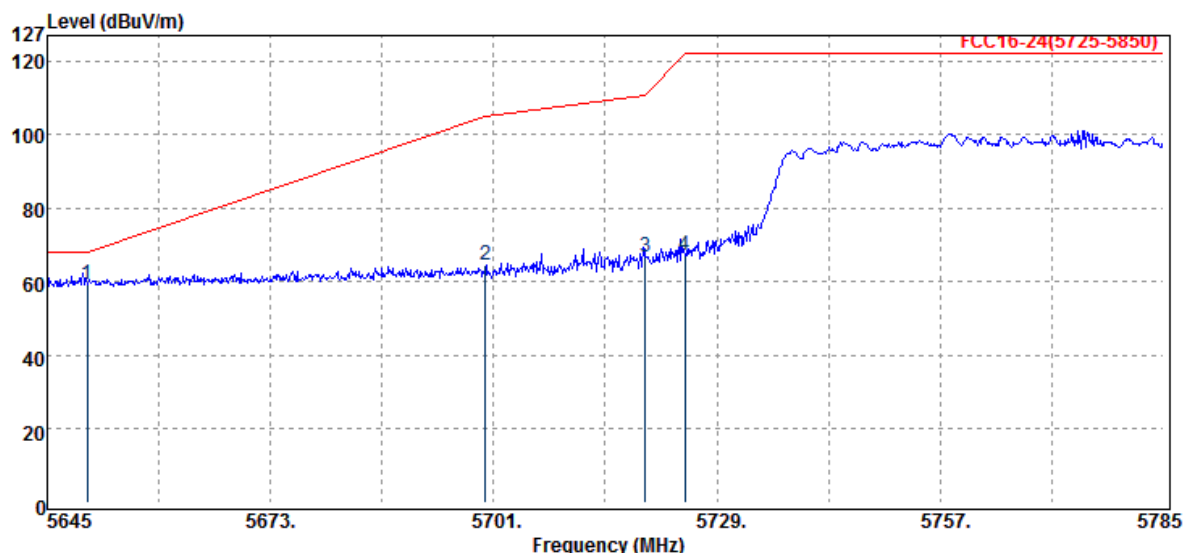
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Operation Band :802.11ac80B4
 Fundamental Frequency :5775 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	Peak	50.33	9.20	59.53	68.23	-8.70
5700.00	Peak	55.26	9.35	64.61	105.23	-40.62
5720.00	Peak	57.19	9.43	66.62	110.83	-44.21
5725.00	Peak	57.72	9.44	67.16	122.23	-55.07

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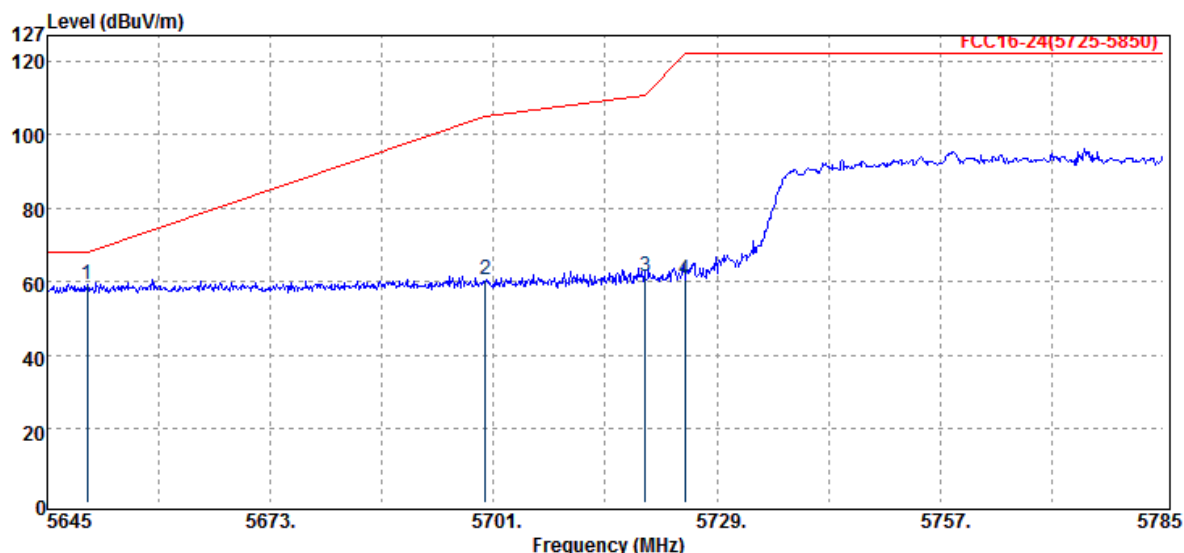
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Operation Band :802.11ac80B4
 Fundamental Frequency :5775 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	Peak	50.08	9.20	59.28	68.23	-8.95
5700.00	Peak	51.46	9.35	60.81	105.23	-44.42
5720.00	Peak	52.17	9.43	61.60	110.83	-49.23
5725.00	Peak	51.31	9.44	60.75	122.23	-61.48

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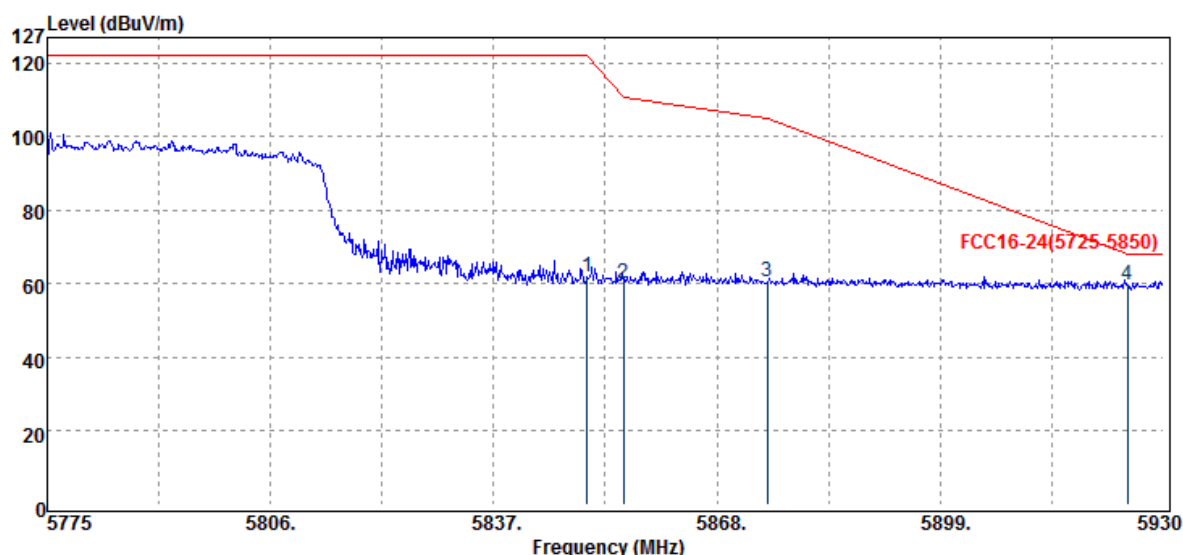
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Operation Band :802.11ac80B4
 Fundamental Frequency :5775 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5850.00	Peak	52.18	9.77	61.95	122.23	-60.28
5855.00	Peak	50.53	9.78	60.31	110.83	-50.52
5875.00	Peak	50.89	9.82	60.71	105.23	-44.52
5925.00	Peak	49.64	9.98	59.62	68.23	-8.61

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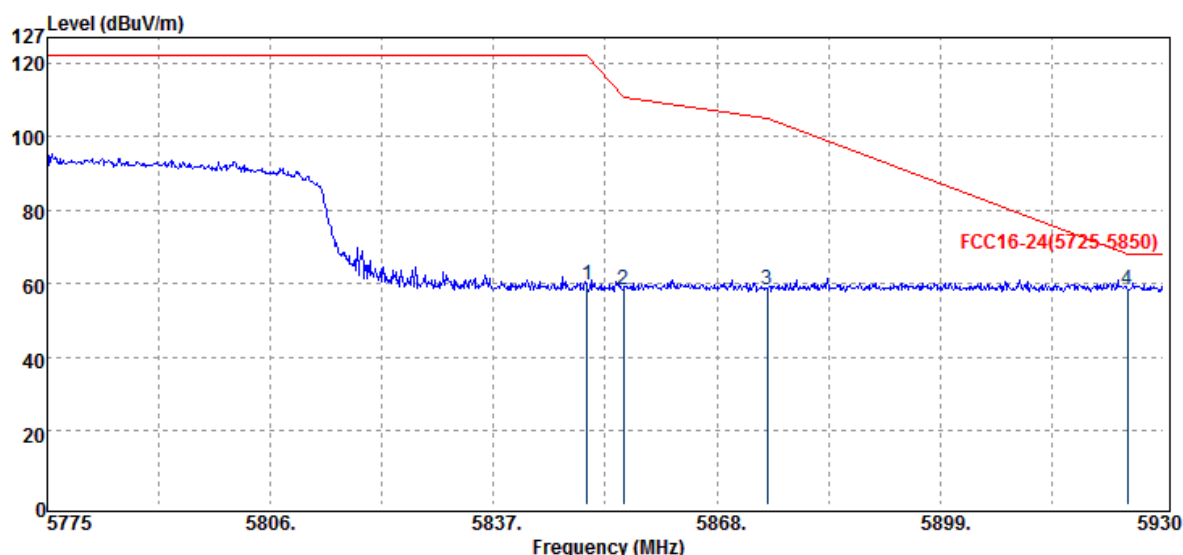
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Operation Band :802.11ac80B4
 Fundamental Frequency :5775 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :E2 Plane

Test Date :2018-08-21
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5850.00	Peak	49.98	9.77	59.75	122.23	-62.48
5855.00	Peak	48.75	9.78	58.53	110.83	-52.30
5875.00	Peak	48.81	9.82	58.63	105.23	-46.60
5925.00	Peak	48.49	9.98	58.47	68.23	-9.76

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12 TRANSMISSION IN THE ABSENCE OF DATA

12.1 Standard Applicable

According to §15.407(c)

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

12.2 Result

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

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13 FREQUENCY STABILITY

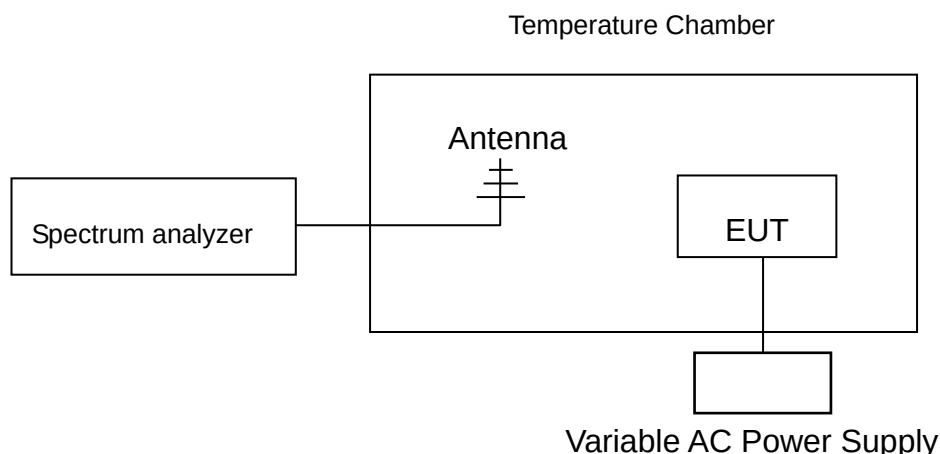
13.1 Standard Applicable

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

13.2 Measurement Procedure

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

13.3 Test SET-UP



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13.4 Measurement Equipment Used:

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	2018/05/03	2019/05/02
DC Block	Mini-Circuits	BLK-18-S+	1	2018/01/02	2019/01/01
Coaxial Cables	N/A	WK CE Cable	N/A	2018/01/02	2019/01/01

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13.5 Measurement Result

Startup

Operation Mode	802.11 a	Test Date	2018.08.02
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	133.2V	36	5180	5,179.99499	0.00000097
		44	5220	5,219.99060	0.00000180
		48	5240	5,239.99412	0.00000112
		149	5745	5,744.98878	0.00000195
		157	5785	5,784.98873	0.00000195
		165	5825	5,824.99608	0.00000067
	120V	36	5180	5,179.99229	0.00000149
		44	5220	5,219.99969	0.00000006
		48	5240	5,239.99159	0.00000161
		149	5745	5,744.99011	0.00000172
		157	5785	5,784.98783	0.00000210
		165	5825	5,824.99120	0.00000151
25 °C	106.8V	36	5180	5,180.00793	-0.00000153
		44	5220	5,220.00854	-0.00000164
		48	5240	5,240.00387	-0.00000074
		149	5745	5,744.98478	0.00000265
		157	5785	5,784.98571	0.00000247
		165	5825	5,824.98157	0.00000316
55 °C	133.2V	36	5180	5,180.00674	-0.00000130
		44	5220	5,219.99851	0.00000029
		48	5240	5,239.99874	0.00000024
		149	5745	5,744.97627	0.00000413
		157	5785	5,784.99307	0.00000120
		165	5825	5,824.99587	0.00000071
	120V	36	5180	5,179.99995	0.00000001
		44	5220	5,220.00038	-0.00000007
		48	5240	5,240.00274	-0.00000052
		149	5745	5,744.98795	0.00000210
		157	5785	5,784.99644	0.00000062
		165	5825	5,824.99370	0.00000108

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Operation Mode	802.11 n_HT40	Test Date	2018.08.02
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	133.2V	38	5190	5,189.99443	0.00000107
		46	5230	5,230.00313	-0.00000060
		151	5755	5,754.97636	0.00000411
		159	5795	5,794.98528	0.00000254
	120V	38	5190	5,190.00599	-0.00000115
		46	5230	5,229.99626	0.00000072
		151	5755	5,754.98511	0.00000259
		159	5795	5,794.98241	0.00000304
25 °C	106.8V	38	5190	5,190.00417	-0.00000080
		46	5230	5,230.00157	-0.00000030
		151	5755	5,754.98828	0.00000204
		159	5795	5,794.97903	0.00000362
55 °C	133.2V	38	5190	5,189.99325	0.00000130
		46	5230	5,230.00906	-0.00000173
		151	5755	5,754.98207	0.00000312
		159	5795	5,794.98948	0.00000182
	120V	38	5190	5,189.99350	0.00000125
		46	5230	5,230.00609	-0.00000117
		151	5755	5,754.97299	0.00000469
		159	5795	5,794.97821	0.00000376

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Operation Mode	802.11 ac_VHT80	Test Date	2018.08.02
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	133.2V	42	5210	5,210.00963	-0.00000185
		155	5775	5,774.99145	0.00000148
	120V	42	5210	5,209.99615	0.00000074
		155	5775	5,774.99941	0.00000010
25 °C	106.8V	42	5210	5,209.99578	0.00000081
		155	5775	5,775.00234	-0.00000041
55 °C	133.2V	42	5210	5,210.00978	-0.00000188
		155	5775	5,775.00329	-0.00000057
	120V	42	5210	5,209.99670	0.00000063
		155	5775	5,774.99869	0.00000023

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2 Minutes:

Operation Mode	802.11 a	Test Date	2018.08.02
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	133.2V	36	5180	5,180.00274	-0.00000053
		44	5220	5,219.99745	0.00000049
		48	5240	5,239.99682	0.00000061
		149	5745	5,744.99383	0.00000107
		157	5785	5,784.98366	0.00000282
		165	5825	5,824.97980	0.00000347
	120V	36	5180	5,179.99176	0.00000159
		44	5220	5,220.00016	-0.00000003
		48	5240	5,240.00691	-0.00000132
		149	5745	5,744.99171	0.00000144
		157	5785	5,784.99219	0.00000135
		165	5825	5,824.99447	0.00000095
25 °C	106.8V	36	5180	5,179.99397	0.00000116
		44	5220	5,220.00445	-0.00000085
		48	5240	5,239.99199	0.00000153
		149	5745	5,744.98166	0.00000319
		157	5785	5,784.97816	0.00000377
		165	5825	5,824.98709	0.00000222
55 °C	133.2V	36	5180	5,180.00787	-0.00000152
		44	5220	5,220.00675	-0.00000129
		48	5240	5,240.00485	-0.00000093
		149	5745	5,744.98553	0.00000252
		157	5785	5,784.98871	0.00000195
		165	5825	5,824.98864	0.00000195
	120V	36	5180	5,180.00003	-0.00000001
		44	5220	5,220.00007	-0.00000001
		48	5240	5,240.00181	-0.00000035
		149	5745	5,744.99072	0.00000162
		157	5785	5,784.98215	0.00000309
		165	5825	5,824.98725	0.00000219

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Operation Mode	802.11 n_HT40	Test Date	2018.08.02
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	133.2V	38	5190	5,190.00643	-0.00000124
		46	5230	5,229.99966	0.00000007
		151	5755	5,754.98930	0.00000186
		159	5795	5,794.97493	0.00000433
	120V	38	5190	5,190.00562	-0.00000108
		46	5230	5,229.99507	0.00000094
		151	5755	5,754.97803	0.00000382
		159	5795	5,794.97865	0.00000368
25 °C	106.8V	38	5190	5,190.00265	-0.00000051
		46	5230	5,230.00651	-0.00000124
		151	5755	5,754.97756	0.00000390
		159	5795	5,794.98544	0.00000251
55 °C	133.2V	38	5190	5,190.00466	-0.00000090
		46	5230	5,229.99661	0.00000065
		151	5755	5,754.97516	0.00000432
		159	5795	5,794.98024	0.00000341
	120V	38	5190	5,190.00972	-0.00000187
		46	5230	5,229.99318	0.00000130
		151	5755	5,754.97424	0.00000448
		159	5795	5,794.99200	0.00000138

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Operation Mode	802.11 ac_VHT80	Test Date	2018.08.02
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	133.2V	42	5210	5,209.99012	0.00000190
		155	5775	5,774.99120	0.00000152
	120V	42	5210	5,210.00982	-0.00000188
		155	5775	5,775.00500	-0.00000087
25 °C	106.8V	42	5210	5,209.99947	0.00000010
		155	5775	5,774.99284	0.00000124
55 °C	133.2V	42	5210	5,209.99136	0.00000166
		155	5775	5,774.99066	0.00000162
	120V	42	5210	5,209.99271	0.00000140
		155	5775	5,774.99724	0.00000048

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5 Minutes:

Operation Mode	802.11 a	Test Date	2018.08.02
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	133.2V	36	5180	5,180.00349	-0.00000067
		44	5220	5,219.99293	0.00000135
		48	5240	5,240.00754	-0.00000144
		149	5745	5,744.97560	0.00000425
		157	5785	5,784.98493	0.00000261
		165	5825	5,824.98177	0.00000313
	120V	36	5180	5,179.99641	0.00000069
		44	5220	5,220.00330	-0.00000063
		48	5240	5,239.99728	0.00000052
		149	5745	5,744.97834	0.00000377
		157	5785	5,784.98884	0.00000193
		165	5825	5,824.98310	0.00000290
25 °C	106.8V	36	5180	5,179.99331	0.00000129
		44	5220	5,219.99022	0.00000187
		48	5240	5,239.99794	0.00000039
		149	5745	5,744.97774	0.00000388
		157	5785	5,784.98374	0.00000281
		165	5825	5,824.98981	0.00000175
55 °C	133.2V	36	5180	5,179.99532	0.00000090
		44	5220	5,220.00500	-0.00000096
		48	5240	5,240.00060	-0.00000011
		149	5745	5,744.98442	0.00000271
		157	5785	5,784.97679	0.00000401
		165	5825	5,824.98812	0.00000204
	120V	36	5180	5,179.99545	0.00000088
		44	5220	5,220.00106	-0.00000020
		48	5240	5,240.00763	-0.00000146
		149	5745	5,744.99397	0.00000105
		157	5785	5,784.99404	0.00000103
		165	5825	5,824.98552	0.00000249

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Operation Mode	802.11 n_HT40	Test Date	2018.08.02
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	133.2V	38	5190	5,189.99569	0.00000083
		46	5230	5,229.99780	0.00000042
		151	5755	5,754.98284	0.00000298
		159	5795	5,794.98690	0.00000226
	120V	38	5190	5,190.00625	-0.00000120
		46	5230	5,230.00040	-0.00000008
		151	5755	5,754.98988	0.00000176
		159	5795	5,794.99185	0.00000141
25 °C	106.8V	38	5190	5,190.00347	-0.00000067
		46	5230	5,230.00159	-0.00000030
		151	5755	5,754.98174	0.00000317
		159	5795	5,794.97284	0.00000469
55 °C	133.2V	38	5190	5,190.00038	-0.00000007
		46	5230	5,229.99367	0.00000121
		151	5755	5,754.97921	0.00000361
		159	5795	5,794.97745	0.00000389
	120V	38	5190	5,189.99647	0.00000068
		46	5230	5,229.99511	0.00000094
		151	5755	5,754.97339	0.00000462
		159	5795	5,794.98946	0.00000182

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Operation Mode	802.11 ac_VHT80	Test Date	2018.08.02
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	133.2V	42	5210	5,209.99565	0.00000084
		155	5775	5,774.99246	0.00000130
	120V	42	5210	5,209.99782	0.00000042
		155	5775	5,775.00886	-0.00000153
25 °C	106.8V	42	5210	5,210.00957	-0.00000184
		155	5775	5,775.00322	-0.00000056
55 °C	133.2V	42	5210	5,210.00336	-0.00000065
		155	5775	5,775.00572	-0.00000099
	120V	42	5210	5,210.00014	-0.00000003
		155	5775	5,774.99299	0.00000121

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10 Minutes:

Operation Mode	802.11 a	Test Date	2018.08.02
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	133.2V	36	5180	5,180.00383	-0.00000074
		44	5220	5,220.00297	-0.00000057
		48	5240	5,239.99265	0.00000140
		149	5745	5,744.98815	0.00000206
		157	5785	5,784.98983	0.00000176
		165	5825	5,824.99022	0.00000168
	120V	36	5180	5,180.00865	-0.00000167
		44	5220	5,219.99824	0.00000034
		48	5240	5,240.00042	-0.00000008
		149	5745	5,744.99213	0.00000137
		157	5785	5,784.98335	0.00000288
		165	5825	5,824.98944	0.00000181
25 °C	106.8V	36	5180	5,179.99335	0.00000128
		44	5220	5,219.99752	0.00000048
		48	5240	5,240.00613	-0.00000117
		149	5745	5,744.97580	0.00000421
		157	5785	5,784.97705	0.00000397
		165	5825	5,824.97801	0.00000377
55 °C	133.2V	36	5180	5,179.99374	0.00000121
		44	5220	5,219.99190	0.00000155
		48	5240	5,239.99881	0.00000023
		149	5745	5,744.99007	0.00000173
		157	5785	5,784.99274	0.00000125
		165	5825	5,824.99129	0.00000150
	120V	36	5180	5,180.00187	-0.00000036
		44	5220	5,219.99445	0.00000106
		48	5240	5,239.99862	0.00000026
		149	5745	5,744.98703	0.00000226
		157	5785	5,784.98259	0.00000301
		165	5825	5,824.98843	0.00000199

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Operation Mode	802.11 n_HT40	Test Date	2018.08.02
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	133.2V	38	5190	5,190.00046	-0.00000009
		46	5230	5,230.00803	-0.00000154
		151	5755	5,754.97730	0.00000394
		159	5795	5,794.98794	0.00000208
	120V	38	5190	5,189.99367	0.00000122
		46	5230	5,230.00904	-0.00000173
		151	5755	5,754.98590	0.00000245
		159	5795	5,794.97607	0.00000413
25 °C	106.8V	38	5190	5,190.00581	-0.00000112
		46	5230	5,229.99465	0.00000102
		151	5755	5,754.97368	0.00000457
		159	5795	5,794.98687	0.00000227
55 °C	133.2V	38	5190	5,190.00378	-0.00000073
		46	5230	5,230.00532	-0.00000102
		151	5755	5,754.97207	0.00000485
		159	5795	5,794.98147	0.00000320
	120V	38	5190	5,190.00721	-0.00000139
		46	5230	5,230.00743	-0.00000142
		151	5755	5,754.98151	0.00000321
		159	5795	5,794.98089	0.00000330

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Operation Mode	802.11 ac_VHT80	Test Date	2018.08.02
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	133.2V	42	5210	5,209.99663	0.00000065
		155	5775	5,775.00221	-0.00000038
	120V	42	5210	5,210.00315	-0.00000060
		155	5775	5,774.99559	0.00000076
25 °C	106.8V	42	5210	5,210.00262	-0.00000050
		155	5775	5,774.99747	0.00000044
55 °C	133.2V	42	5210	5,209.99422	0.00000111
		155	5775	5,775.00407	-0.00000070
	120V	42	5210	5,209.99490	0.00000098
		155	5775	5,774.99481	0.00000090

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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

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~

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