

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

OF

Applicant: Comtrend Corporation
3F-1, 10 Lane 609, Chung Hsin Road, Section 5, San Chung Dist. New Taipei City, 24159, Taiwan

Product Name: AC 1200 WiFi Extender, AC1200 Wireless Mesh Point, AC1200 Wireless Extender

Brand Name: COMTREND

Model No.: WAP-5922, WAP-5922MP, WAP-5922R

Model Difference: For market segmentation

FCC ID: L9VWAP5922

Report Number: ER/2018/60127

FCC Rule Part: §15.407, Cat: NII

Issue Date: Sep. 25, 2018

Date of Test: Jun. 26, 2018 ~ Sep. 14, 2018

Date of EUT Received: Jun. 26, 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:

CHUN-CHIEH, CHEN

**CHUN-CHIEH, CHEN /
Engineer****Approved By:**

Blue Yang

Blue Yang / SupervisorTesting Laboratory
0513

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f (886-2) 2298-0488

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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
ER/2018/60127	Rev.00	Initial creation of document	All	Sep. 25, 2018	Yuri Tsai

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1 GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	AC 1200 WiFi Extender, AC1200 Wireless Mesh Point, AC1200 Wireless Extender
Brand Name:	COMTREND
Model No.:	WAP-5922, WAP-5922MP, WAP-5922R
Model Difference:	For market segmentation
Product SW/HW version:	N/A / N/A
Power Supply:	120Vac

WLAN 5GHz:

Wi-Fi 802.11	Frequency Range	Channels	Rated Power (Avg.) (dBm)	Modulation Technology
a	5180~5240	4	17.94	OFDM
	5745-5825	5	22.73	
n_HT ac_VHT 20M	5180~5240	4	HT: 17.18 (Worst case)	OFDM
	5745-5825	5	HT: 23.21 (Worst case)	
n_HT ac_VHT 40M	5190~5230	2	HT: 15.51 (Worst case)	OFDM
	5755~5795	2	HT: 22.56 (Worst case)	
ac_VHT 80M	5210	1	14.92	OFDM
	5775	1	18.17	
Modulation type		64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only		
Antenna Type:		PIFA Antenna, Peak Gain: Antenna 1: 3.29dBi (5150~5250MHz) 3.86dBi (5725~5850MHz) Antenna 2: 4.94dBi (5150~5250MHz) 3.24dBi (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.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803 (TAF code 0513)

FCC Registration Numbers are: 509634 / TW0001

1.4 Special Accessories

There are no special accessories used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is 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.

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2.5 Configuration of Tested System

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

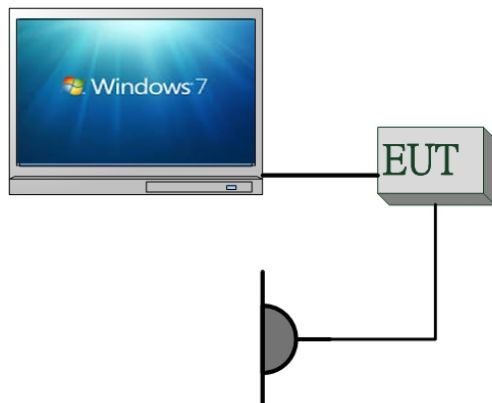


Fig. 2-2 Radiated Emission & Conduction (AC Power Line) Radiated Emission

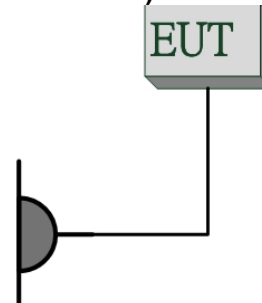


Table 2-1 Equipment Used in Tested System

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
2.	Notebook	Lenovo	L430	R9-WGNK5	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 H position was reported

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ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	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	2018/02/02	2019/02/01
LISN	SCHWARZ- BECK	NSLK 8127	8127-649	2018/05/18	2019/05/17

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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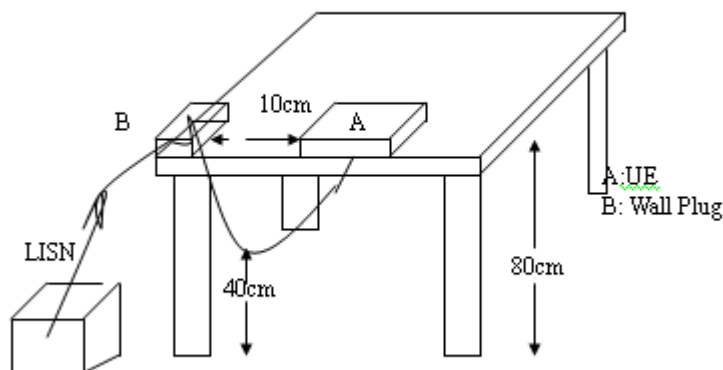
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6.4. Test SET-UP



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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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: WAP-5922MP

Conducted Emission

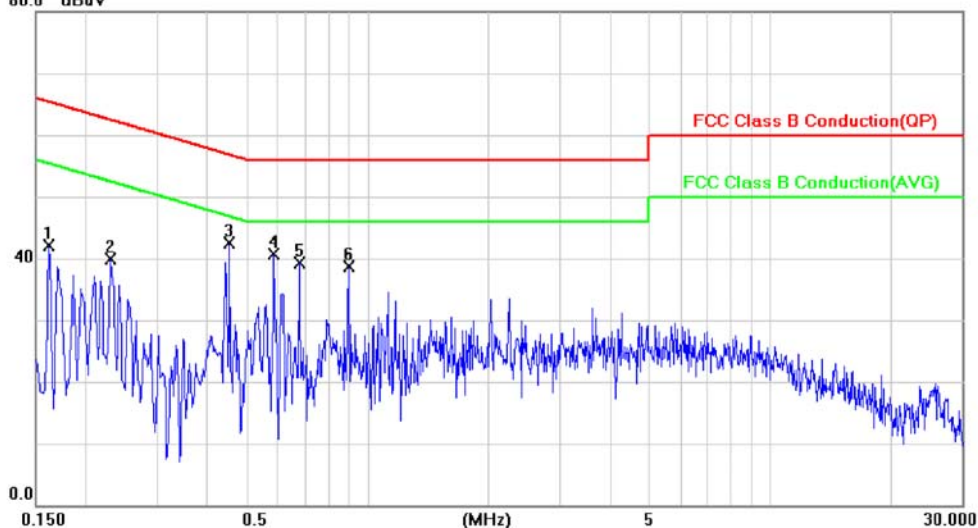
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Date: 2018/8/24

Time: 下午 11:04:08

80.0 dBuV



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1620	42.10	0.04	42.14	65.36	-23.22	peak	
2		0.2300	39.83	0.04	39.87	62.45	-22.58	peak	
3	*	0.4540	42.41	0.04	42.45	56.80	-14.35	peak	
4		0.5860	40.57	0.04	40.61	56.00	-15.39	peak	
5		0.6780	39.29	0.04	39.33	56.00	-16.67	peak	
6		0.9020	38.65	0.05	38.70	56.00	-17.30	peak	

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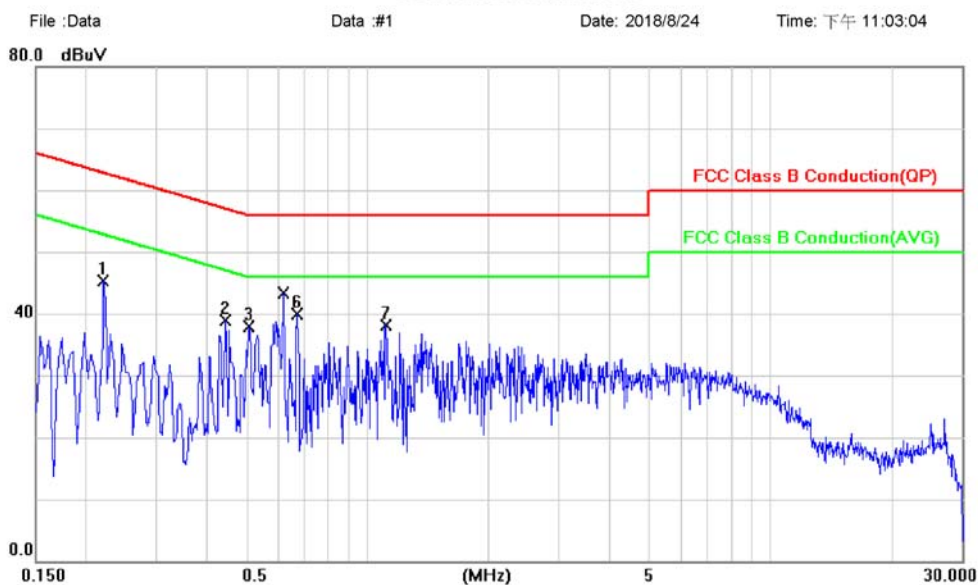
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Site: Conduction Room
Limit: FCC Class B Conduction(QP)
Mode: Operation
Note: Adapter: WAP-5922MP

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		0.2220	45.26	0.04	45.30	62.74	-17.44	peak	
2		0.4460	38.77	0.04	38.81	56.95	-18.14	peak	
3		0.5100	37.83	0.04	37.87	56.00	-18.13	peak	
4		0.6180	41.70	0.04	41.74	56.00	-14.26	QP	
5	*	0.6180	34.60	0.04	34.64	46.00	-11.36	AVG	
6		0.6700	39.91	0.04	39.95	56.00	-16.05	peak	
7		1.1140	38.15	0.05	38.20	56.00	-17.80	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	92.56	0.34	0.69	1.00
802.11n_20	90.34	0.44	0.74	1.00
802.11ac_20	89.83	0.47	0.73	1.00
802.11n_40	94.86	0.23	2.82	3.00
802.11ac_40	82.23	0.85	1.48	2.00
802.11ac_80	95.02	0.22	2.98	3.00

Duty Cycle Factor: $10 * \log(1/0.9256) = 0.34$

Duty Cycle Factor: $10 * \log(1/0.9034) = 0.44$

Duty Cycle Factor: $10 * \log(1/0.8983) = 0.47$

Duty Cycle Factor: $10 * \log(1/0.9486) = 0.23$

Duty Cycle Factor: $10 * \log(1/0.8223) = 0.85$

Duty Cycle Factor: $10 * \log(1/0.9502) = 0.22$

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DUTY CYCLE TEST SIGNAL Measurement Result

802.11a



802.11n HT20



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802.11ac VHT20



802.11n HT 40



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802.11ac VHT 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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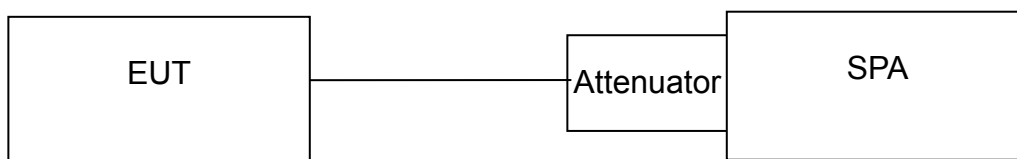
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8.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equip-ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EXA Spectrum An-alyzer	Agilent	N9010A	MY57120290	2018/02/14	2019/02/13
Temperature Chamber	TERCHY	MHG-120LF	911009	2018/05/18	2019/05/17
Attenuator	Mini-Circuit	BW-S10W2+	4	2018/01/02	2019/01/01
Attenuator	Mini-Circuit	BW-S10W2+	2	2018/01/02	2019/01/01
Coaxial Cables	N/A	WK CE Cable	N/A	2018/01/02	2019/01/01
Notebook	Lenovo	L430	R9-WGNK5	N/A	N/A

8.4 Test Set-up



8.5 Measurement Result

26dB Bandwidth

802.11a_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	18.39	12.646
5220	19.46	12.890
5240	19.24	12.841

802.11a_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	18.31	12.627
5220	19.44	12.886
5240	18.86	12.754

802.11n_HT20_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.18	12.828
5220	19.31	12.858
5240	19.27	12.849

802.11n_HT20_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.39	12.875
5220	19.26	12.847
5240	19.27	12.849

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802.11n_HT40_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	39.27	15.941
5230	38.60	15.866

802.11n_HT40_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	38.78	15.886
5230	38.62	15.868

802.11ac_VHT80_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	77.64	18.901

802.11ac_VHT80_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	77.65	18.901

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	16.07	12.061
5785	15.48	11.898
5825	16.34	12.133

802.11a_Ch1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.33	12.130
5785	16.34	12.131
5825	15.72	11.965

802.11n_HT20_Ch0

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	15.72	11.965
5785	17.56	12.445
5825	17.08	12.325

802.11n_HT20_Ch1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.55	12.187
5785	16.41	12.150
5825	16.56	12.191

802.11n_HT40_Ch0

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	34.09	15.326
5795	35.21	15.467

802.11n_HT40_Ch1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	34.47	15.374
5795	35.12	15.456

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802.11ac_VHT80_Ch0

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	73.93	18.688

802.11ac_VHT80_Ch1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.10	18.756

99% BW Verification of DFS Function

802.11a_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.25	< 5250
5745	5733.09	> 5725

802.11a_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.16	< 5250
5745	5733.42	> 5725

802.11n_HT20_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.76	< 5250
5745	5733.36	> 5725

802.11n_HT20_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.76	< 5250
5745	5733.18	> 5725

802.11n_HT40_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5230	5247.95	< 5250
5755	5735.15	> 5725

802.11n_HT40_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5230	5247.95	< 5250
5755	5735.00	> 5725

802.11ac_VHT80_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5210	5247.40	< 5250
5775	5737.20	> 5725

802.11n_HT80_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5210	5247.40	< 5250
5775	5737.10	> 5725

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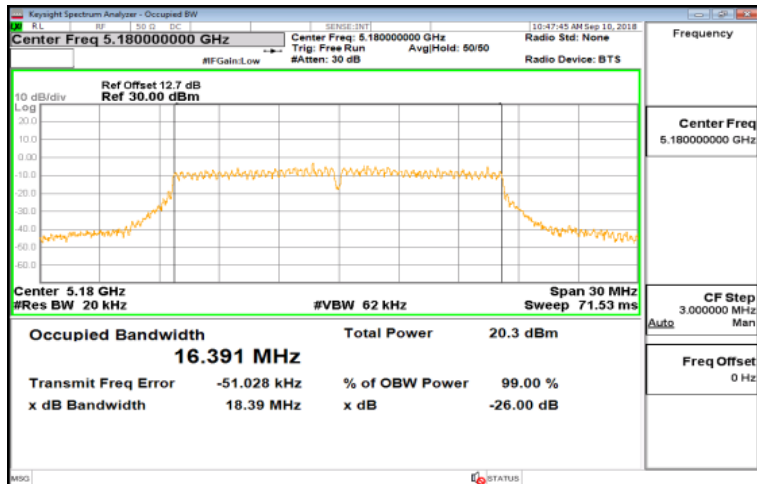
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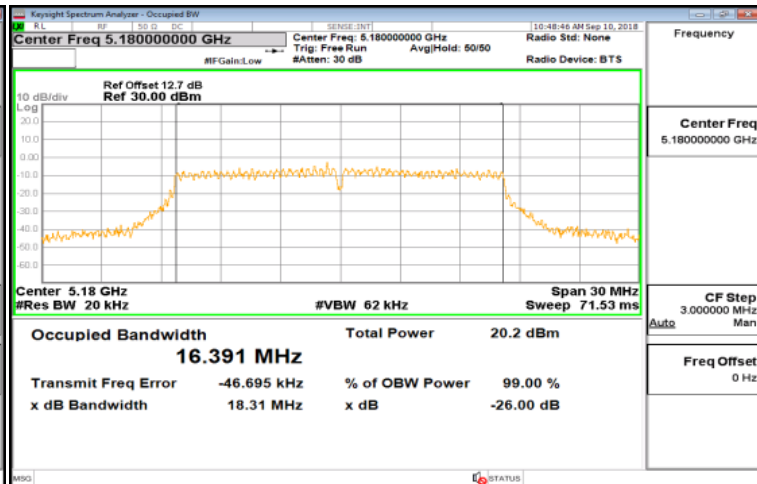
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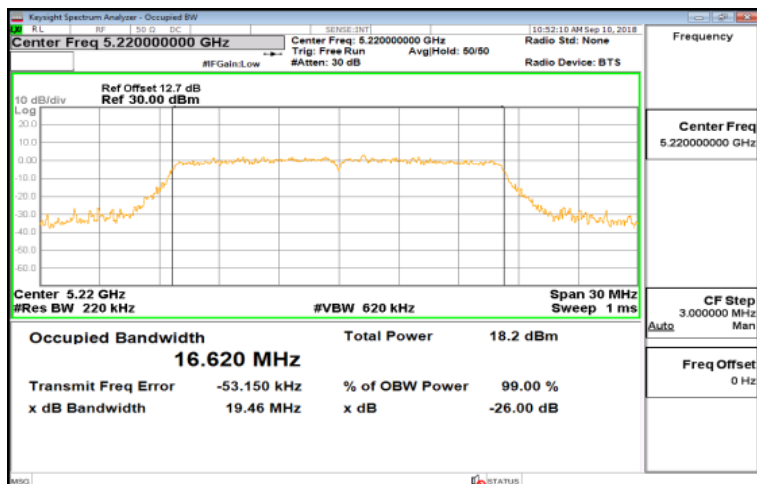
802.11a (Main) 5180MHz



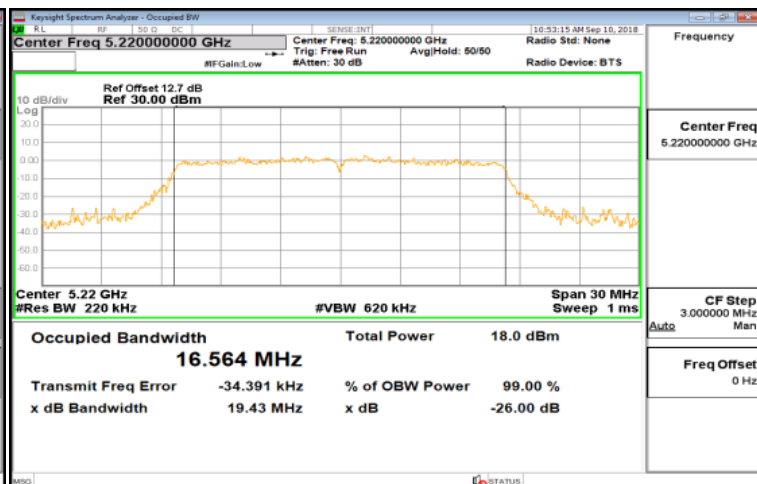
802.11a (Aux1) 5180MHz



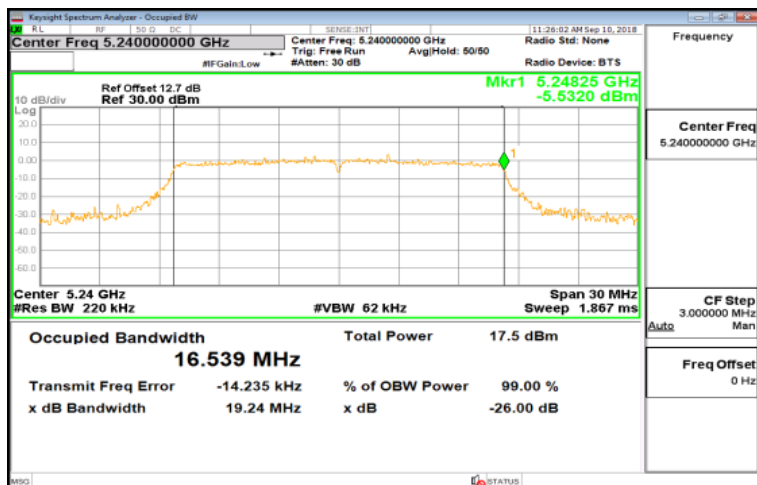
5220MHz



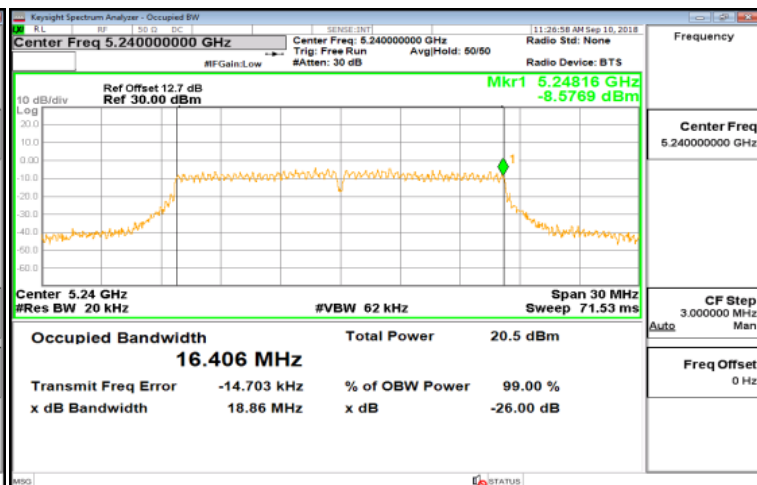
5220MHz



5240MHz



5240MHz



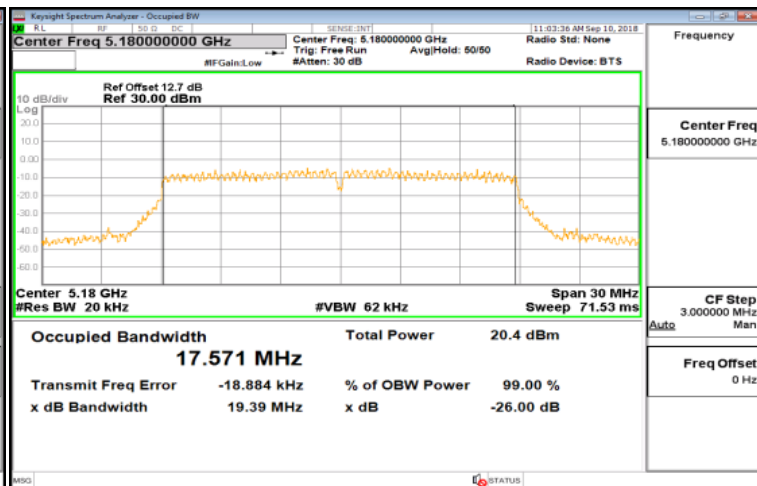
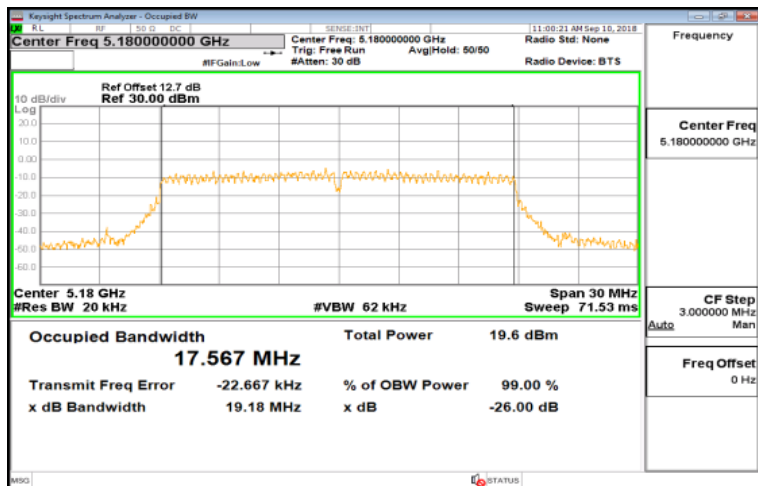
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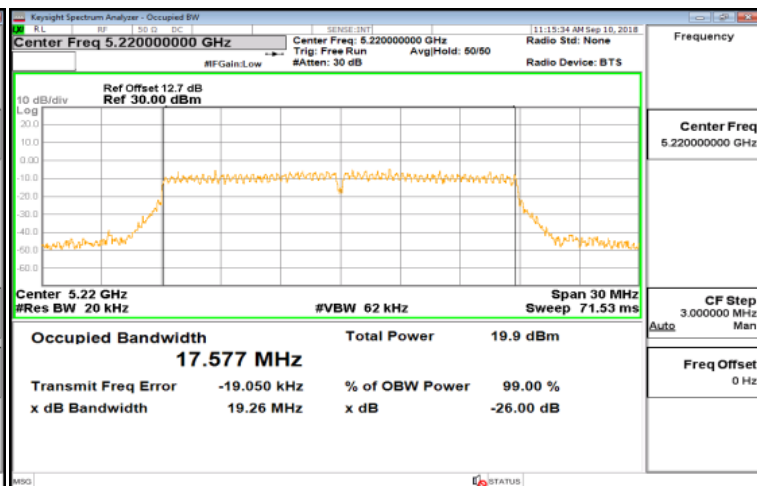
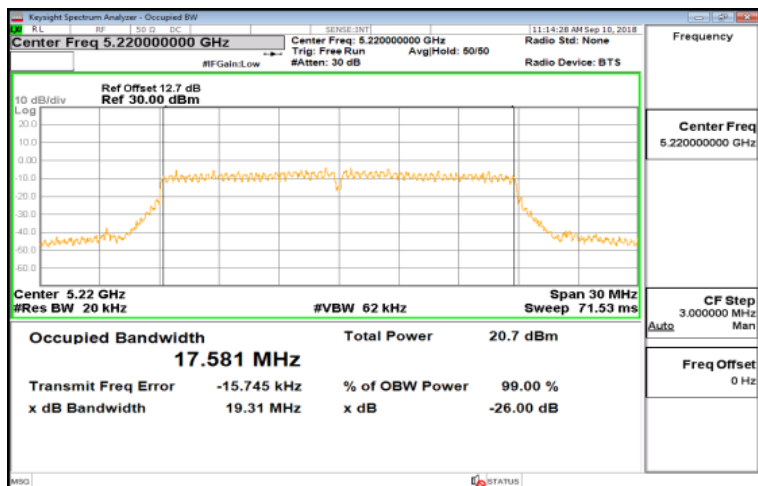
802.11n HT20 (Main) 5180 MHz

802.11n HT20 (Aux1) 5180 MHz



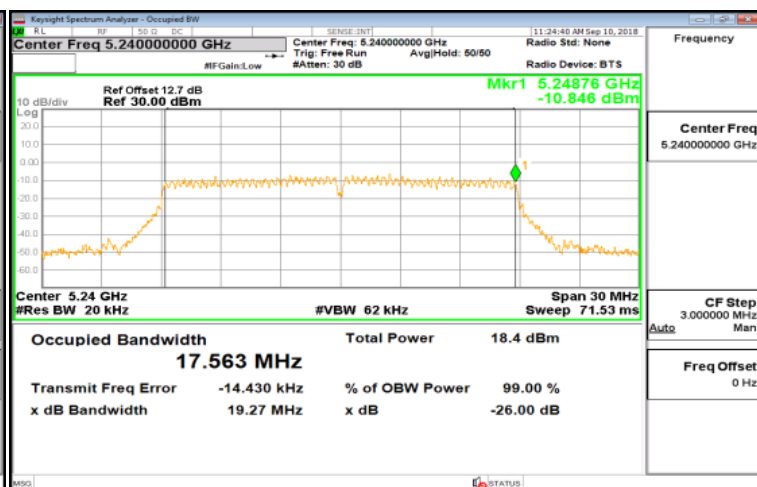
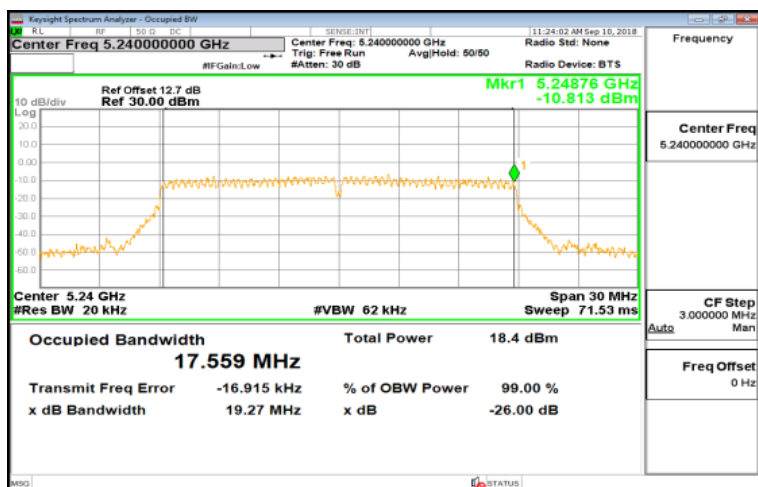
5220 MHz

5220 MHz



5240 MHz

5240 MHz



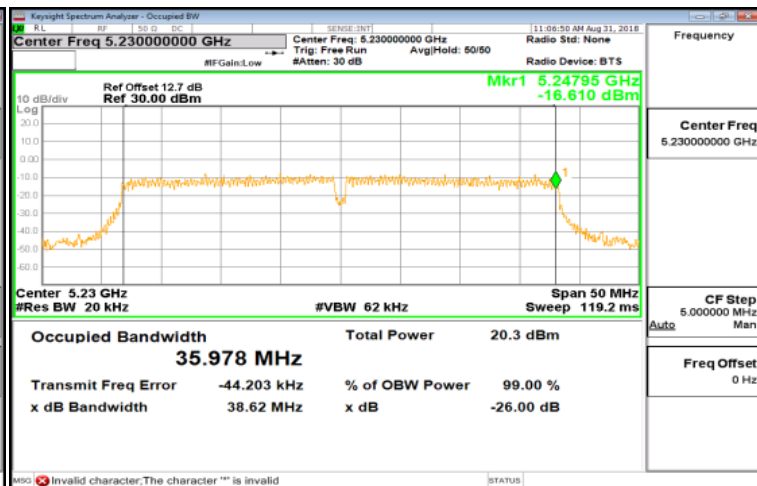
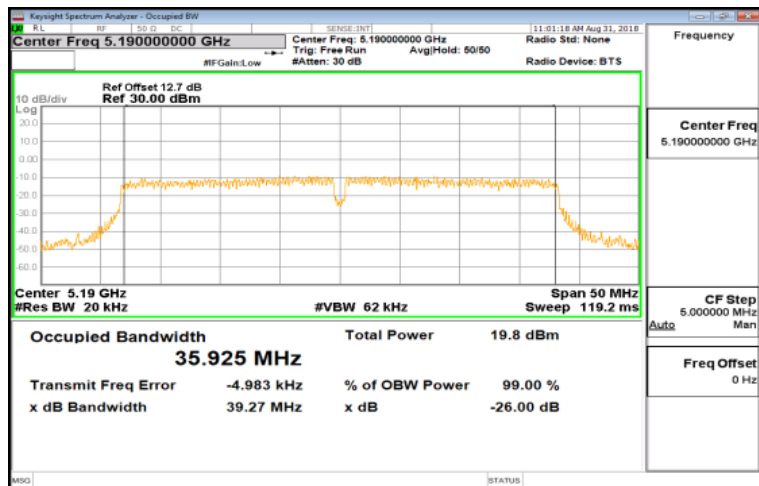
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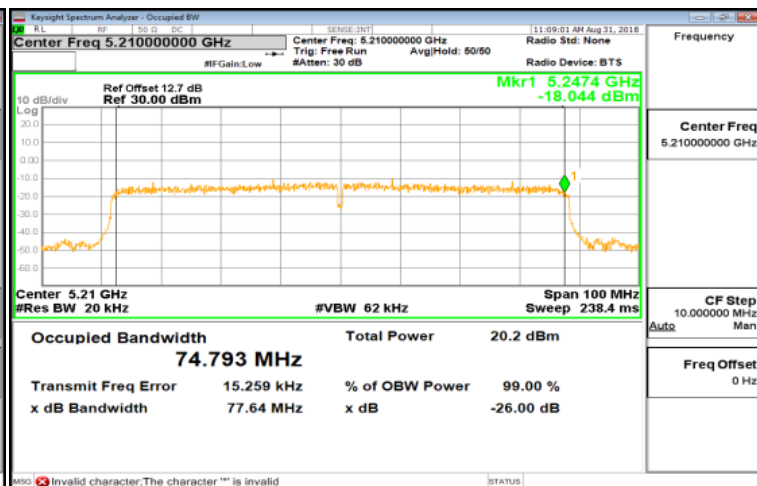
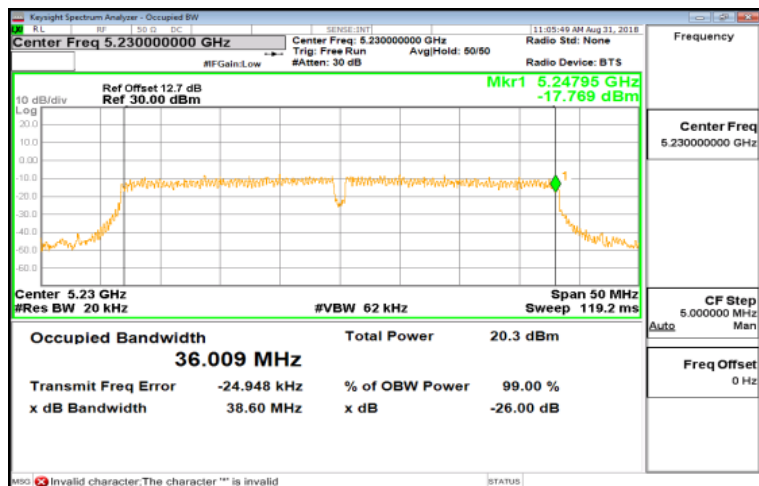
802.11n HT40 (Main) 5190 MHz

5230 MHz



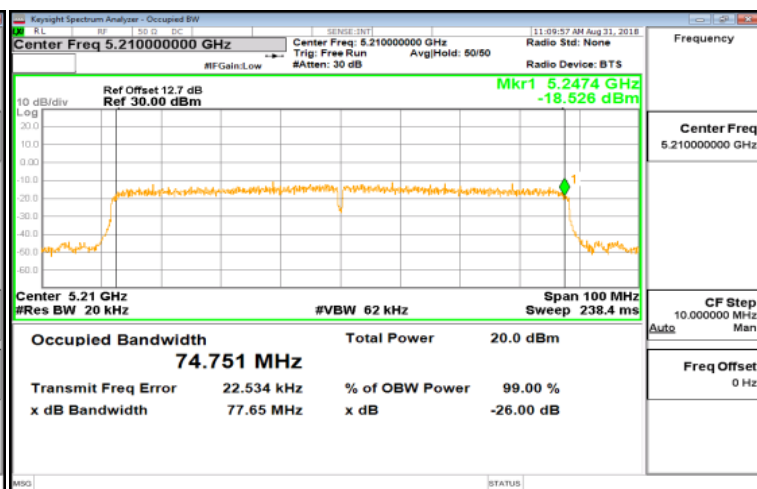
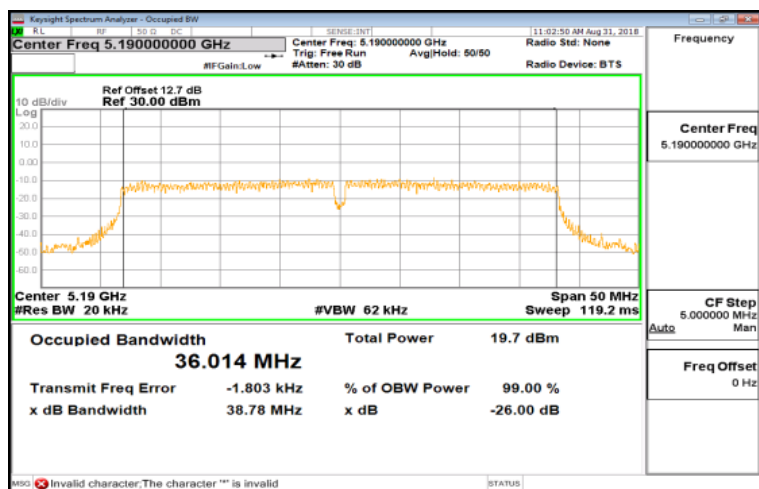
5230 MHz

802.11ac VHT80 (Main) 5210 MHz



802.11n HT40 (Aux1) 5190 MHz

802.11ac VHT80 (Aux1) 5210 MHz

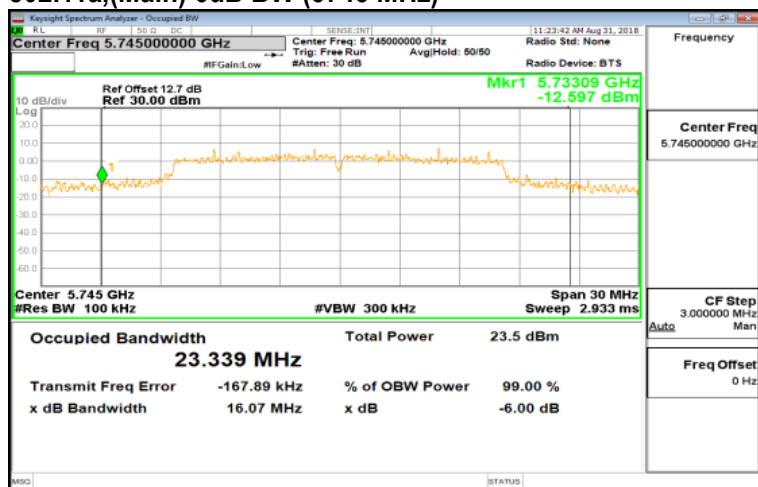


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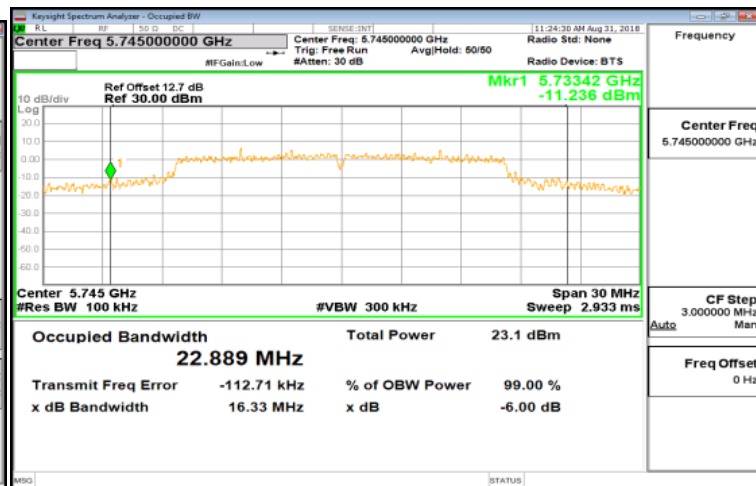
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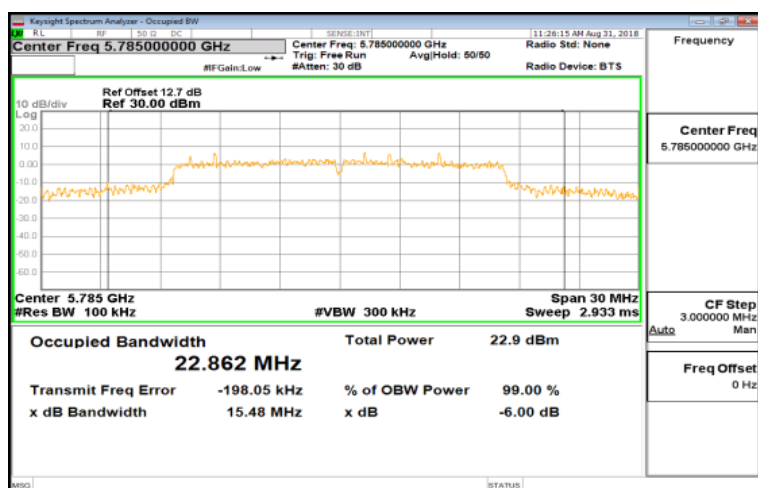
6dB Band Width measure with Peak detector for FCC 802.11a,(Main) 6dB BW (5745 MHz)



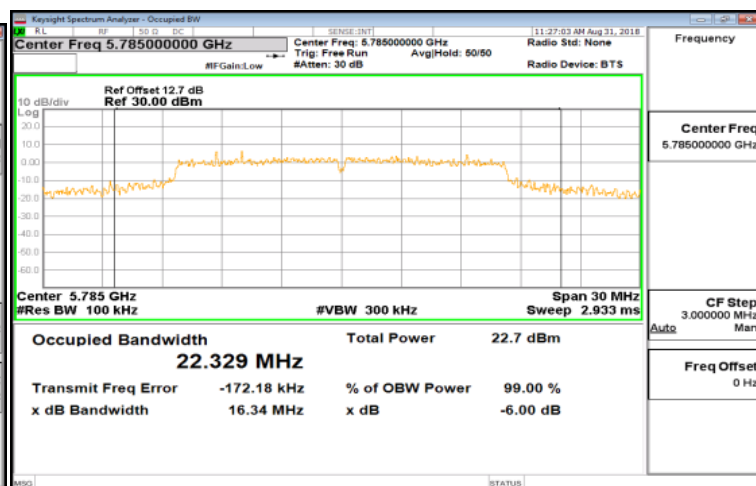
802.11a,(Aux1) 6dB BW (5745 MHz)



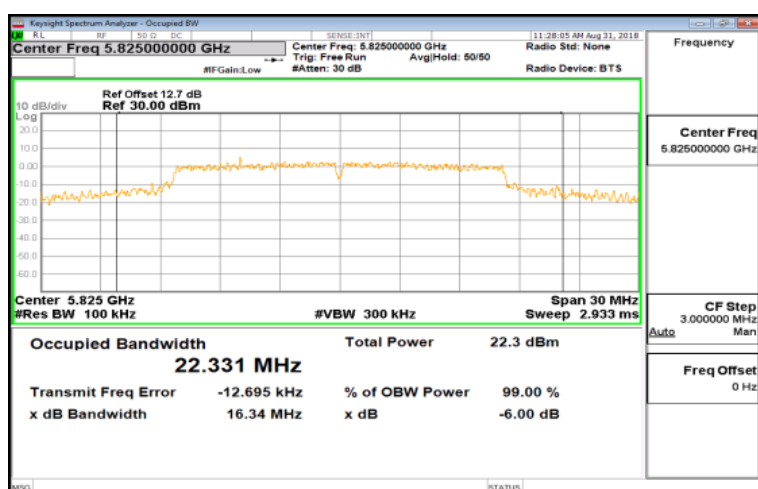
6dB BW (5785 MHz)



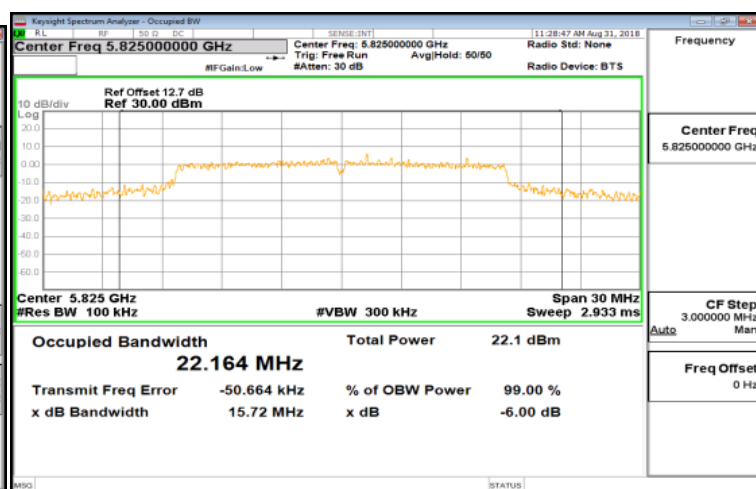
6dB BW (5785 MHz)



6dB BW (5825 MHz)



6dB BW (5825 MHz)

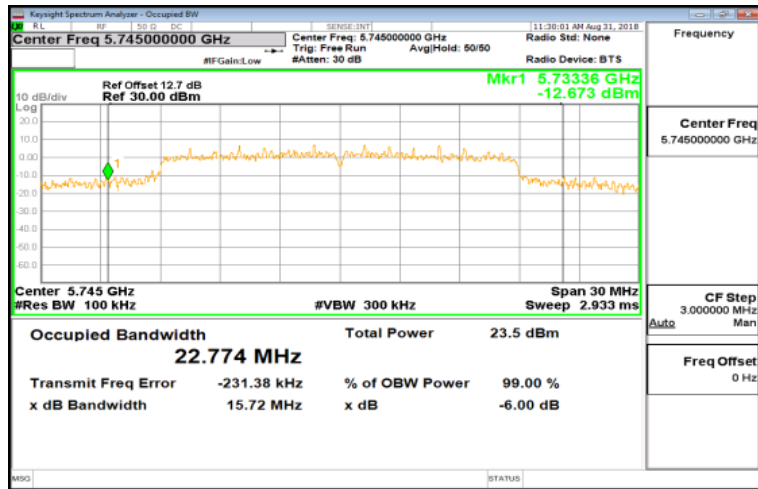


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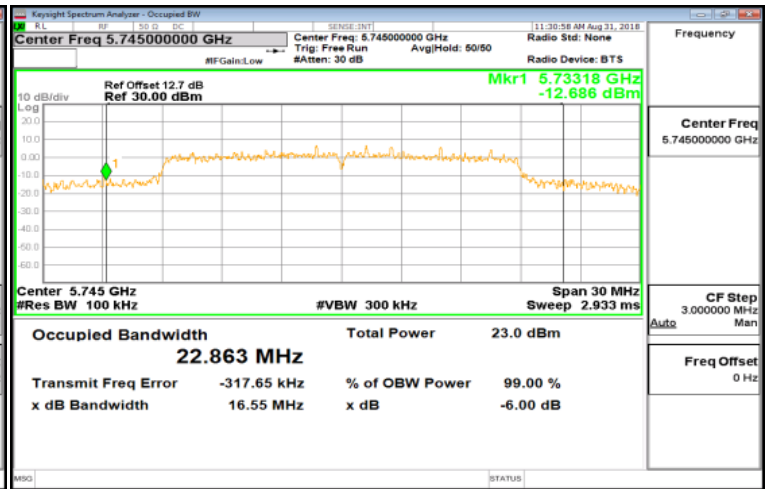
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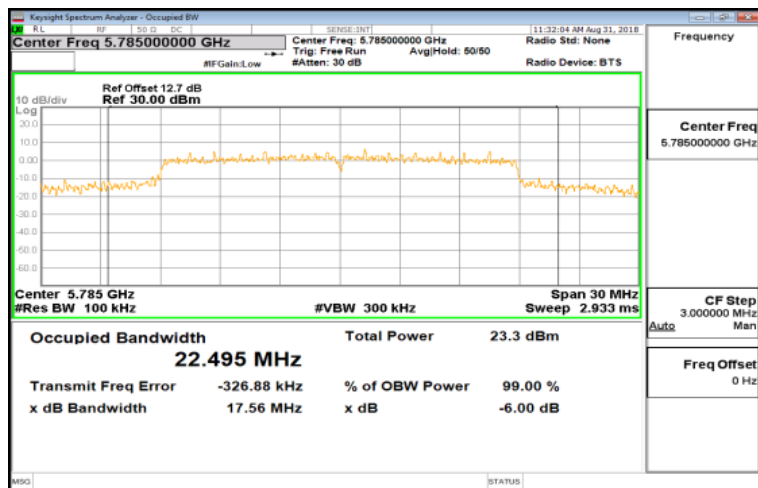
802.11n_HT20,(Main) 6dB BW (5745 MHz)



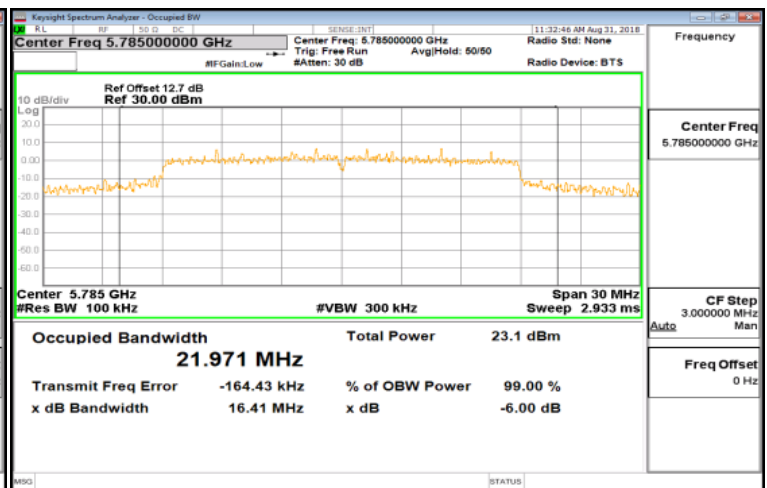
802.11n_HT20,(Aux1) 6dB BW (5745 MHz)



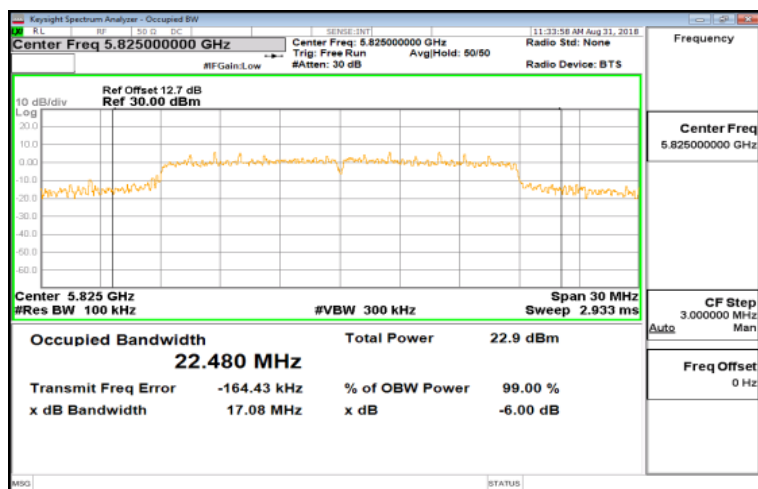
6dB BW (5785 MHz)



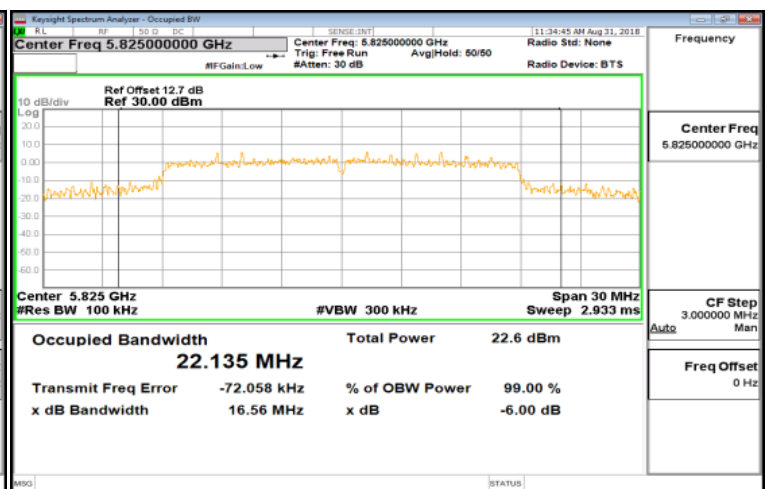
6dB BW (5785 MHz)



6dB BW (5825 MHz)



6dB BW (5825 MHz)



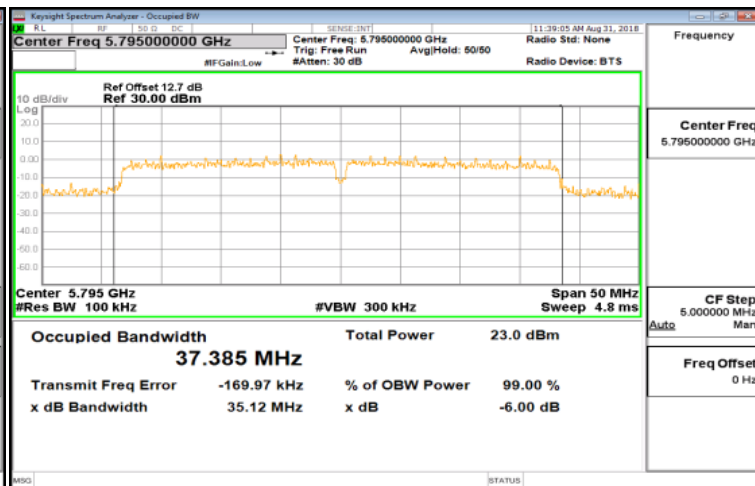
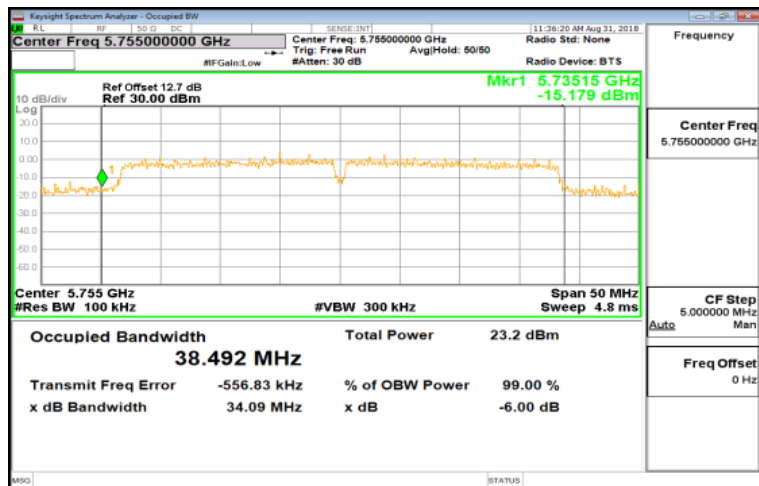
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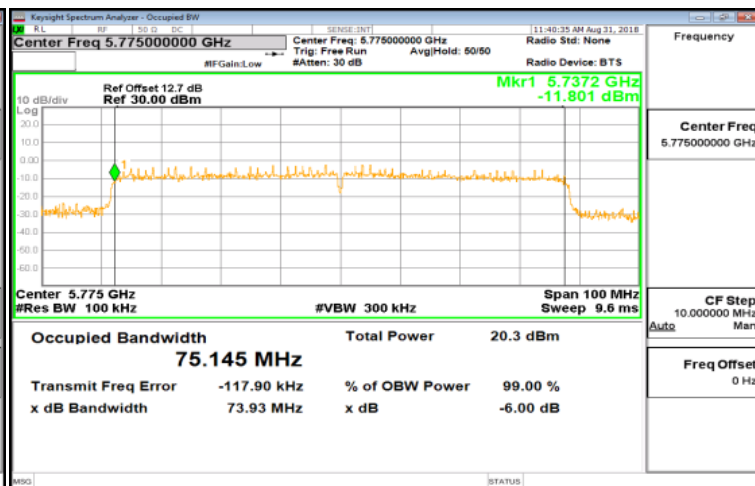
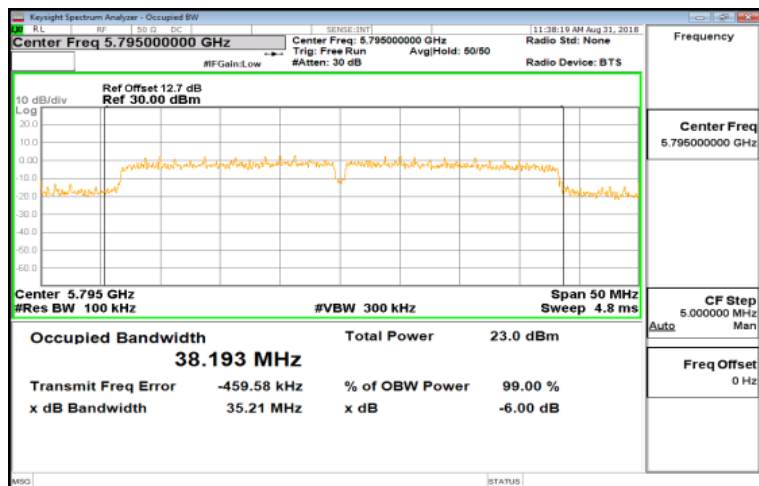
802.11n_HT40,(Main) 6dB BW (5755 MHz)

6dB BW (5795 MHz)



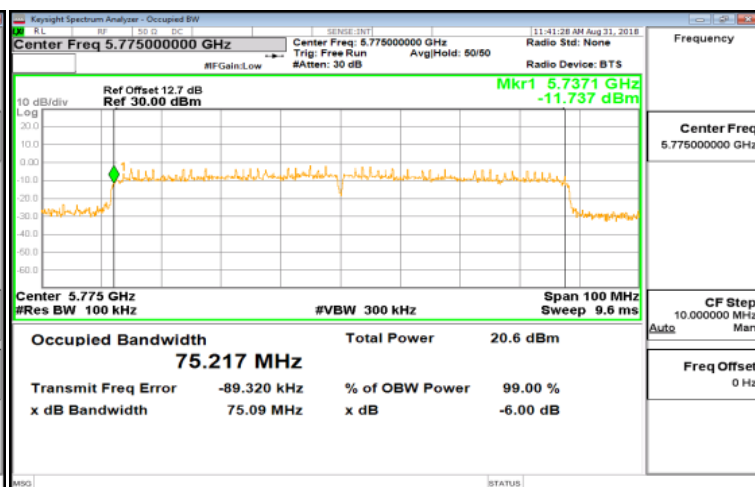
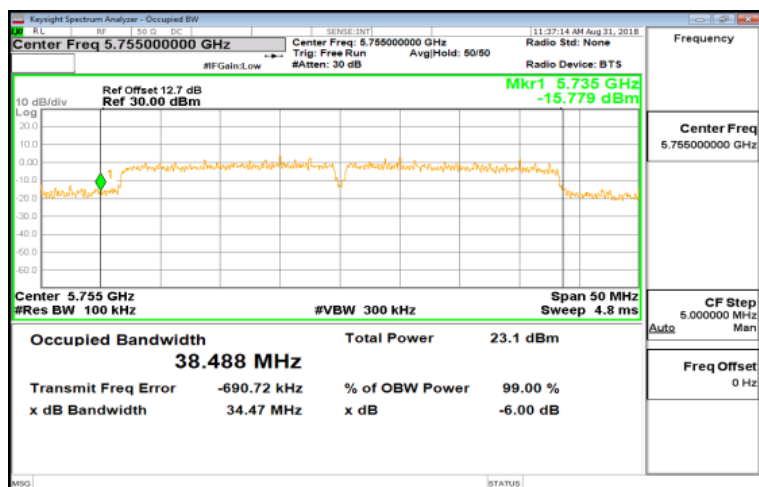
6dB BW (5795 MHz)

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 (Master device)	1 Watt(30dBm)
		Fixed point-to-point Access Ponit	1 Watt(30dBm)
		Mobile and portable client device	250mW(23.98dBm)
U-NII-2A			250mW(23.98dBm) or 11dBm+10 log B
U-NII-2C			250mW(23.98dBm) or 11dBm+10 log B
U-NII-3	√		1 Watt(30dBm)
If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum transmit power 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.]

The antenna gain is grater than 6 dBi in MIMO mode, therefore the limit needs to be reduced as below:

	Effective Legacy Gain (dBi)	Conducted Power Limit (dBm)
UNII-1	7.16	28.84
U-NII-3	6.57	29.43

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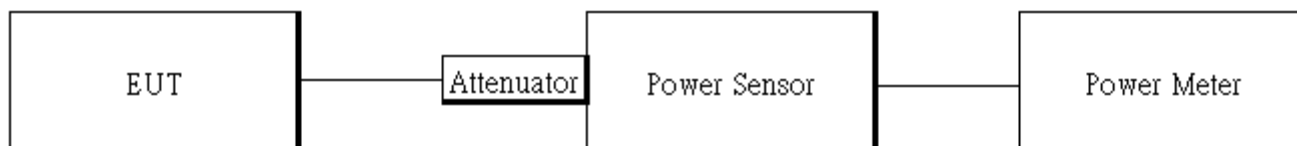
9.2 Measurement Procedure

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
Attenuator	Mini-Circuit	BW-S10W2+	4	2018/01/02	2019/01/01
Attenuator	Mini-Circuit	BW-S10W2+	2	2018/01/02	2019/01/01
Coaxial Cables	N/A	WK CE Cable	N/A	2018/01/02	2019/01/01
Notebook	Lenovo	L430	R9-WGNK5	N/A	N/A

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	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
36	5180	6	14.74	14.23	17.84	56.270	28.83557889	PASS
44	5220	6	14.43	13.67	17.41	51.014	28.83557889	PASS
48	5240	6	14.83	14.34	17.94	57.573	28.83557889	PASS
149	5745	6	18.19	18.87	21.89	143.008	29.43416926	PASS
157	5785	6	18.67	19.14	22.26	155.656	29.43416926	PASS
165	5825	6	19.19	19.57	22.73	173.558	29.43416926	PASS

802.11n_HT20_MIMO

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
36	5180	MCS8	14.15	13.27	17.18	47.234	28.83557889	PASS
44	5220	MCS8	13.86	13.44	17.11	46.402	28.83557889	PASS
48	5240	MCS8	12.75	12.51	16.08	36.660	28.83557889	PASS
149	5745	MCS8	18.35	19.08	22.18	149.301	29.43416926	PASS
157	5785	MCS8	19.09	19.73	22.87	175.068	29.43416926	PASS
165	5825	MCS8	19.37	20.11	23.21	189.062	29.43416926	PASS

802.11n_HT40_MIMO

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
38	5190	MCS8	12.21	11.98	15.34	32.410	28.83557889	PASS
46	5230	MCS8	12.35	12.18	15.51	33.699	28.83557889	PASS
151	5755	MCS8	18.36	19.27	22.08	153.077	29.43416926	PASS
159	5795	MCS8	18.68	19.87	22.56	170.841	29.43416926	PASS

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802.11ac_VHT20_MIMO

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
36	5180	MCS0	14.07	13.21	17.14	46.468	28.83557889	PASS
44	5220	MCS0	13.78	13.34	17.04	45.456	28.83557889	PASS
48	5240	MCS0	12.66	12.49	16.05	36.192	28.83557889	PASS
149	5745	MCS0	18.06	18.66	21.85	137.425	29.43416926	PASS
157	5785	MCS0	19.02	19.46	22.72	168.107	29.43416926	PASS
165	5825	MCS0	19.29	19.95	23.11	183.773	29.43416926	PASS

802.11ac_VHT40_MIMO

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
38	5190	MCS0	12.14	11.87	15.30	31.750	28.83557889	PASS
46	5230	MCS0	12.24	12.14	15.48	33.118	28.83557889	PASS
151	5755	MCS0	18.24	19.22	22.05	150.241	29.43416926	PASS
159	5795	MCS0	18.80	19.48	22.44	164.573	29.43416926	PASS

802.11ac_VHT80_MIMO

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
42	5210	MCS0	11.89	11.48	14.92	29.513	28.83557889	PASS
155	5775	MCS0	14.25	15.53	18.17	62.335	29.43416926	PASS

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10 POWER SPECTRAL DENSITY

10.1 Standard Applicable

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1	√	Access Point (Master device)	17dBm/ MHz
		Fixed point-to-point Access Ponit	
		Mobile and portable client 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, the Maximum 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.]

The antenna gain is grater than 6 dBi in MIMO mode, therefore the limit needs to be reduced as below:

	Effective Legacy Gain (dBi)	Conducted Power Limit (dBm)
UNII-1	7.16	15.84
U-NII-3	6.57	29.43

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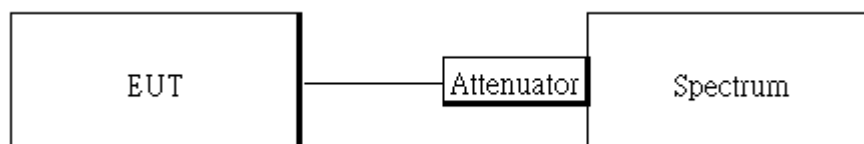
10.2 Measurement Procedure

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	MY57120290	2018/02/14	2019/02/13
Temperature Chamber	TERCHY	MHG-120LF	911009	2018/05/18	2019/05/17
Attenuator	Mini-Circuit	BW-S10W2+	4	2018/01/02	2019/01/01
Attenuator	Mini-Circuit	BW-S10W2+	2	2018/01/02	2019/01/01
Coaxial Cables	N/A	WK CE Cable	N/A	2018/01/02	2019/01/01
Notebook	Lenovo	L430	R9-WGNK5	N/A	N/A

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	5.11	12.70	0.34	5.45	15.836	-10.39
5220	3.90	12.70	0.34	4.24	15.836	-11.60
5240	4.70	12.70	0.34	5.04	15.836	-10.80
5745	14.19	12.70	-	14.19	29.434	-15.24
5785	13.98	12.70	-	13.98	29.434	-15.45
5825	13.18	12.70	-	13.18	29.434	-16.25

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	2.93	12.70	0.44	3.37	15.836	-12.46
5220	3.32	12.70	0.44	3.76	15.836	-12.07
5240	2.78	12.70	0.44	3.22	15.836	-12.61
5745	14.05	12.70	-	14.05	29.434	-15.38
5785	14.37	12.70	-	14.37	29.434	-15.06
5825	14.07	12.70	-	14.07	29.434	-15.36

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	-3.2	12.70	0.23	-2.97	15.836	-18.81
5230	-4.04	12.70	0.23	-3.81	15.836	-19.65
5755	12.26	12.70	-	12.26	29.434	-17.17
5795	12.52	12.70	-	12.52	29.434	-16.91

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	-6.50	12.70	0.22	-6.28	15.836	-22.11
5775	4.84	12.70	-	4.84	29.434	-24.59

Note: MIMO offset=12.7

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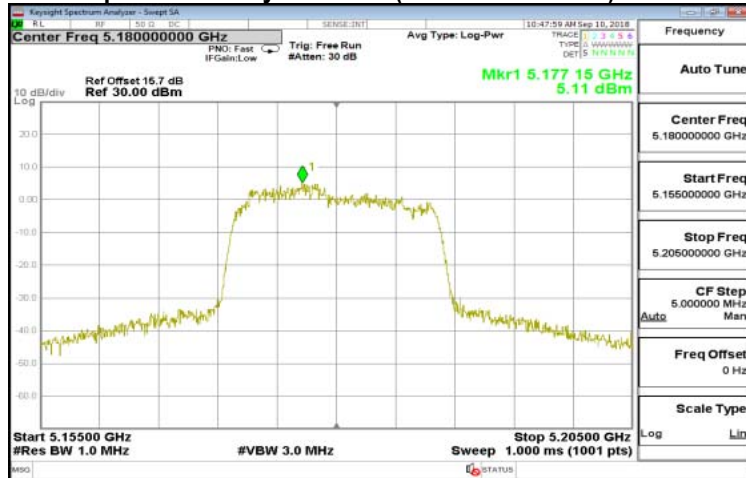
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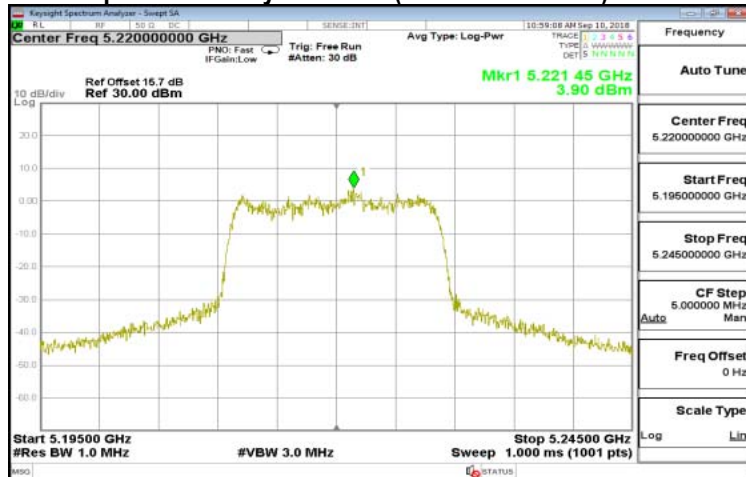
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802.11a 5150~5250 MHz

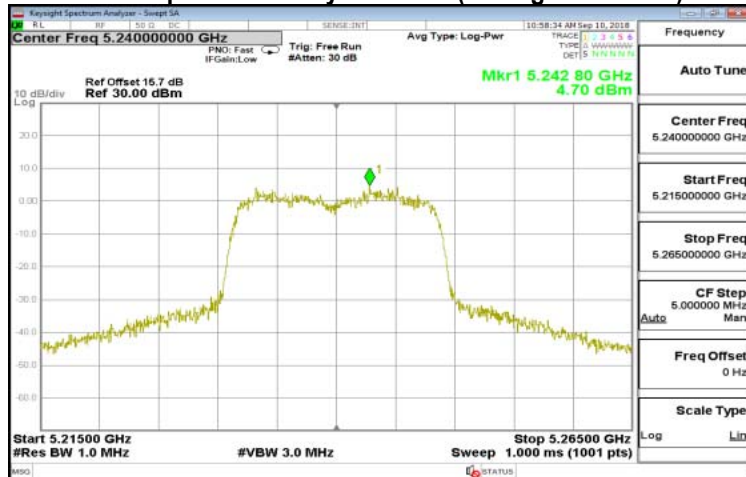
Power Spectral Density Data Plot (CH Low 5180 MHz)



Power Spectral Density Data Plot (CH Mid 5220 MHz)



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

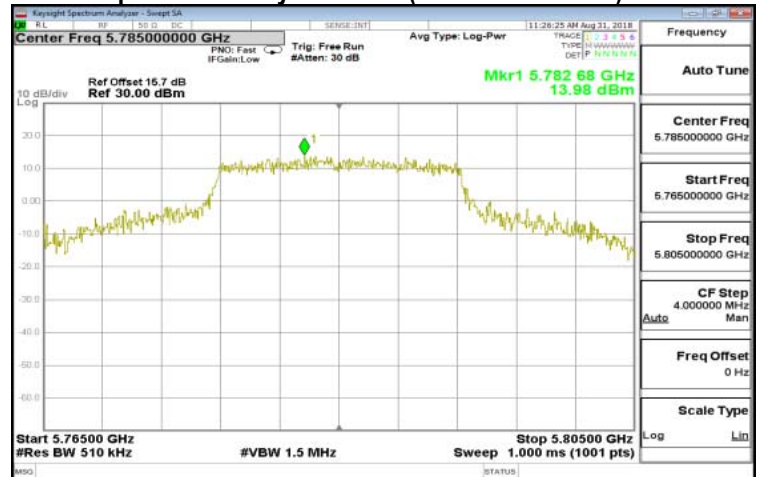


802.11a 5725~5850 MHz

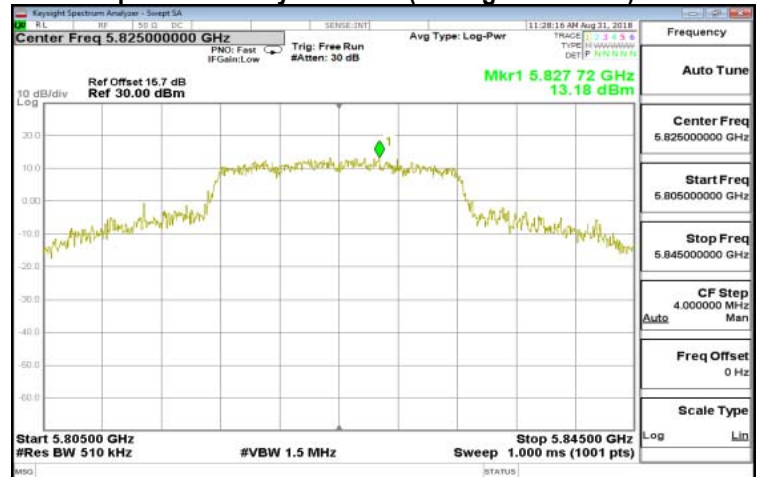
Power Spectral Density Data Plot (CH Low 5745 MHz)



Power Spectral Density Data Plot (CH Mid 5785 MHz)



Power Spectral Density Data Plot (CH High 5825 MHz)

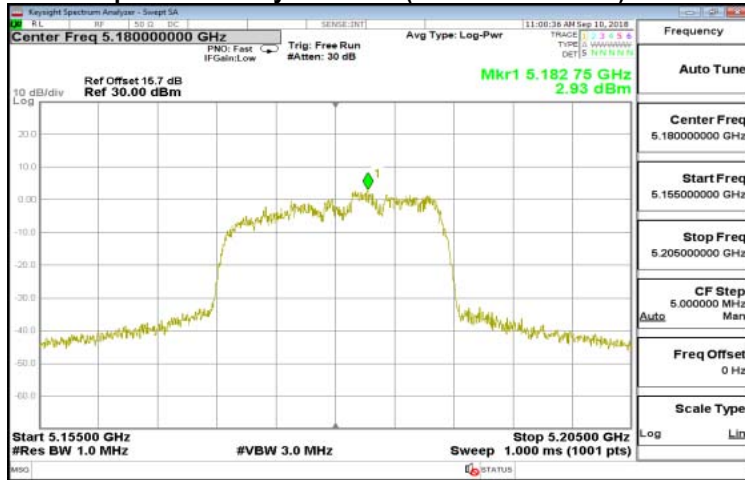


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802.11n HT20, 5150~5250 MHz
Power Spectral Density Data Plot (CH Low 5180 MHz)



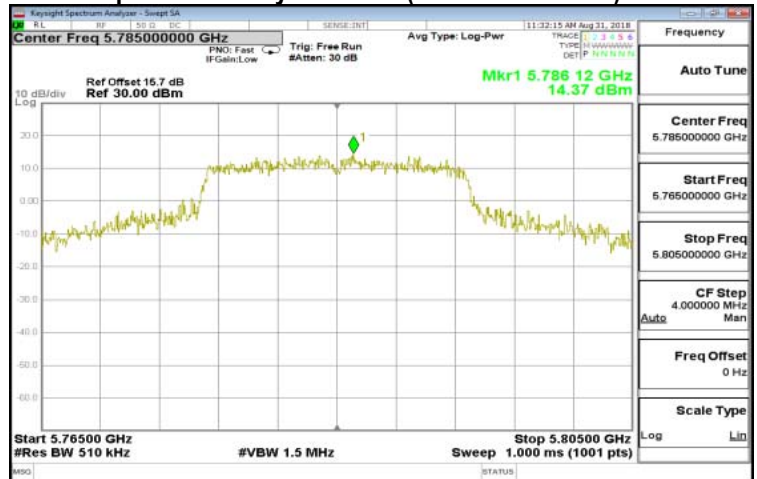
802.11n HT20, 5725~5850 MHz
Power Spectral Density Data Plot (CH Low 5745 MHz)



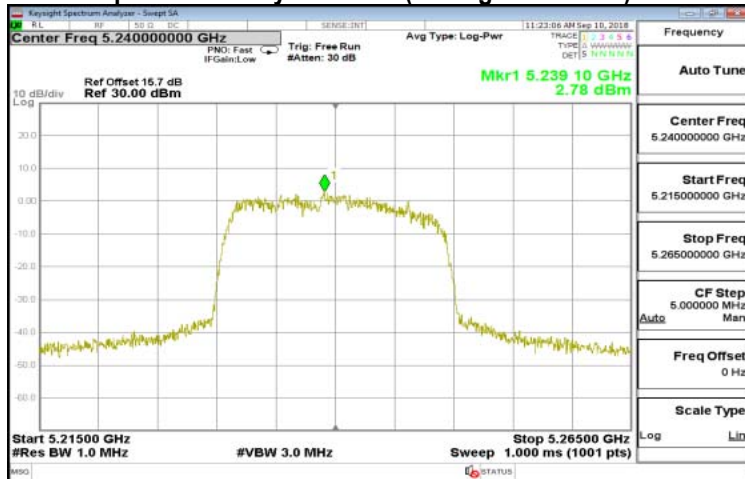
Power Spectral Density Data Plot (CH Mid 5220 MHz)



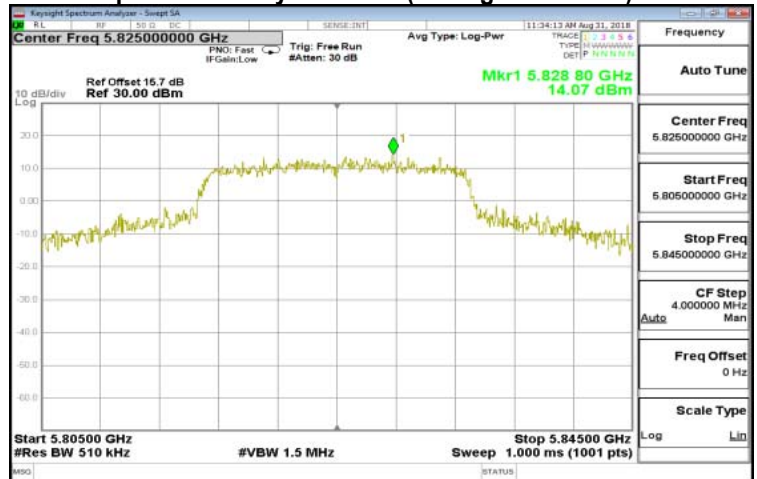
Power Spectral Density Data Plot (CH Mid 5785 MHz)



Power Spectral Density Data Plot (CH High 5240 MHz)



Power Spectral Density Data Plot (CH High 5825 MHz)



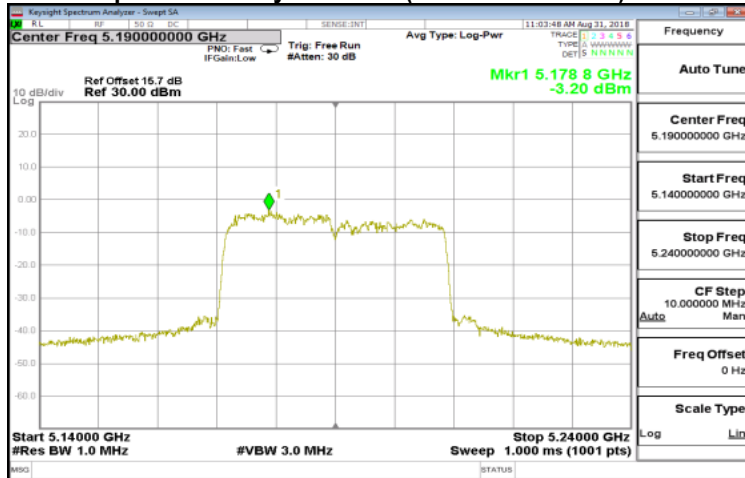
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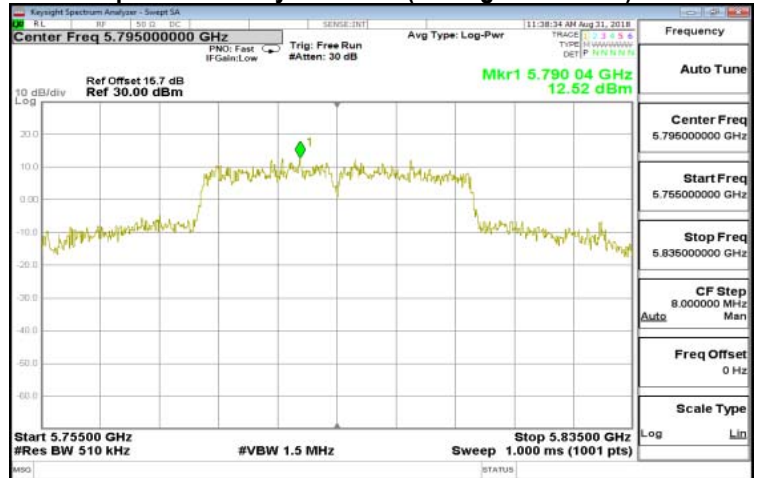
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802.11n HT40, 5150~5250 MHz

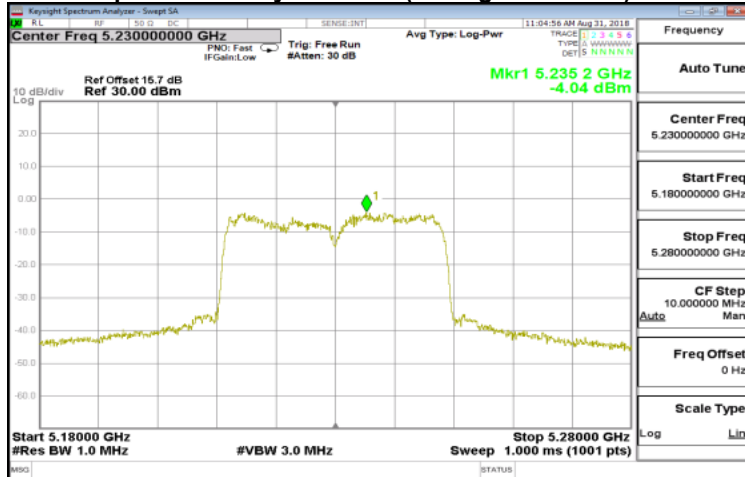
Power Spectral Density Data Plot (CH Low 5190 MHz)



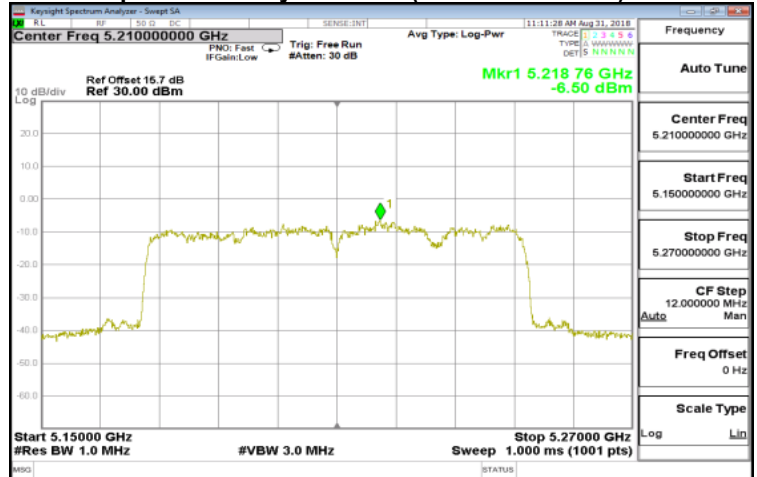
Power Spectral Density Data Plot (CH High 5795 MHz)



Power Spectral Density Data Plot (CH High 5230 MHz)

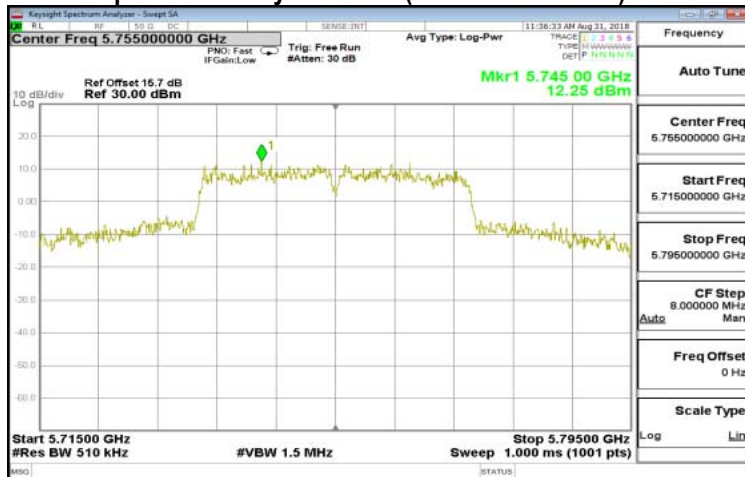


Power Spectral Density Data Plot (CH Mid 5210 MHz)



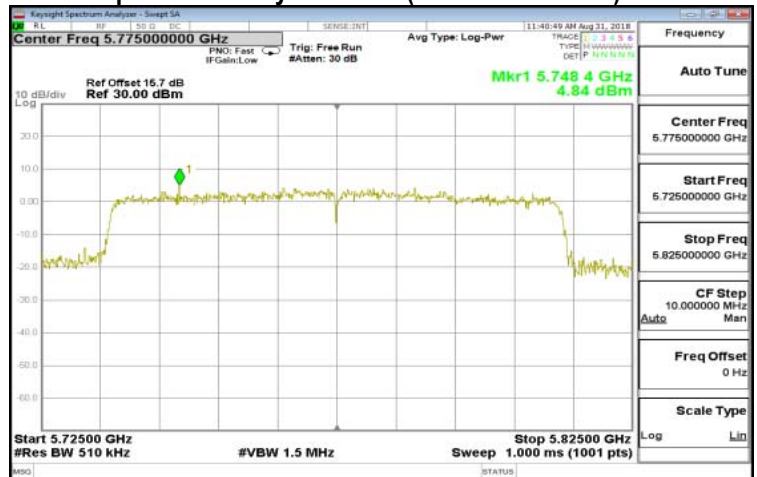
802.11n HT40, 5725~5850 MHz

Power Spectral Density Data Plot (CH Low 5755 MHz)



802.11ac VHT80, 5725~5850 MHz

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	2018/08/16	2019/08/15
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+	4	2018/01/02	2019/01/01
Filter 5150-5350 MHz	Micro-Tronics	BRM50703	1	2018/01/02	2019/01/01
Filter 5725-5875 MHz	Micro-Tronics	BRM50705	1	2018/01/02	2019/01/01
Low Loss Cable	Huber Suhner	966_RX	9	2018/01/02	2019/01/01
Notebook	Lenovo	L430	R9-WGNK5	N/A	N/A

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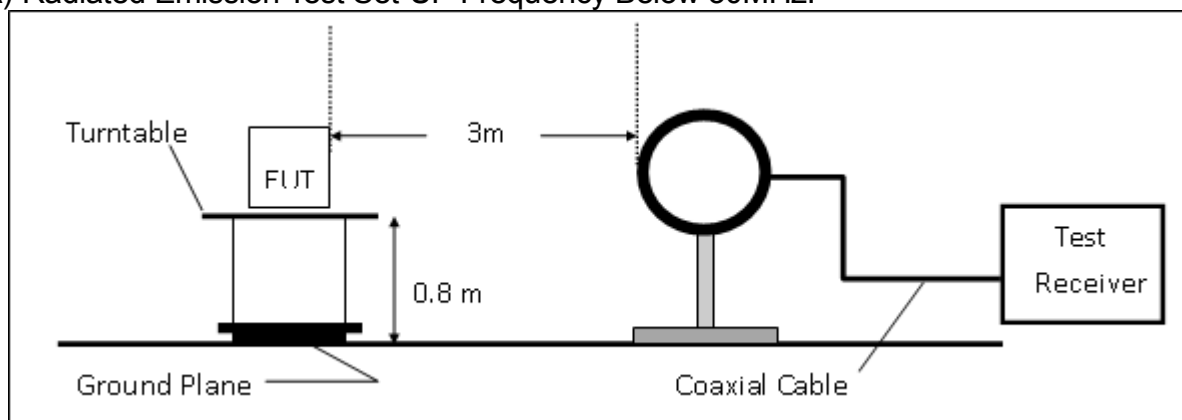
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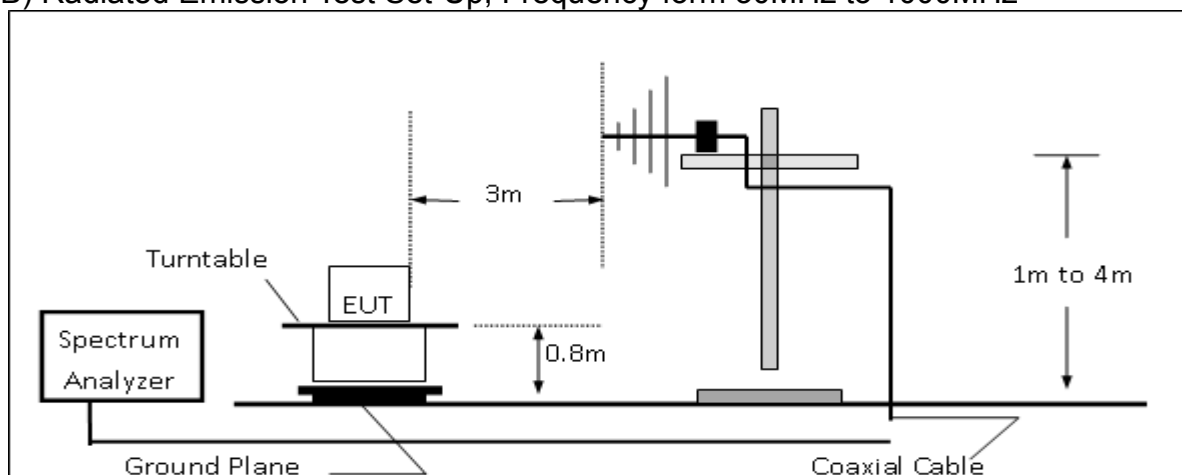
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11.3 Test SET-UP

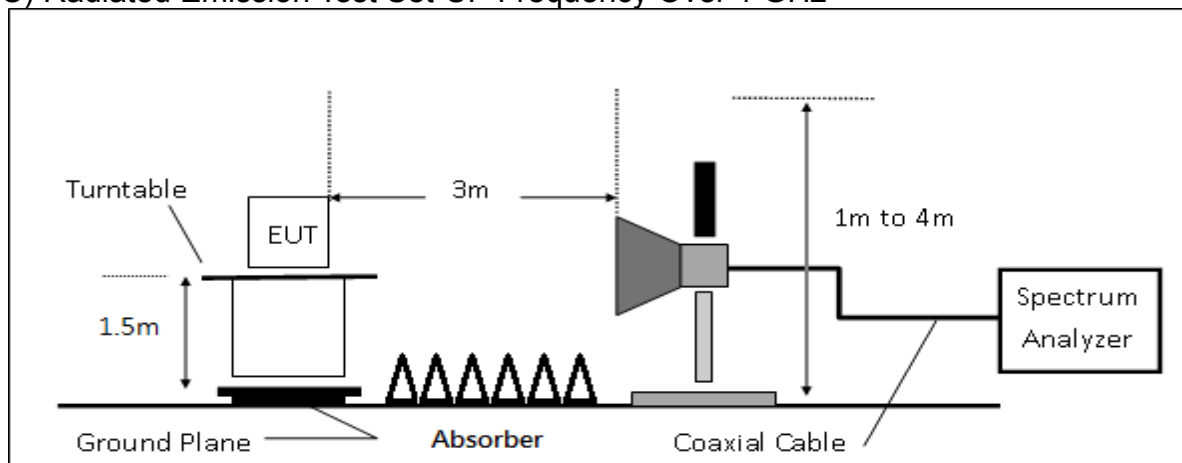
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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11.4 Measurement Procedure

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

11.5 Field Strength Calculation

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

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

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

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

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

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

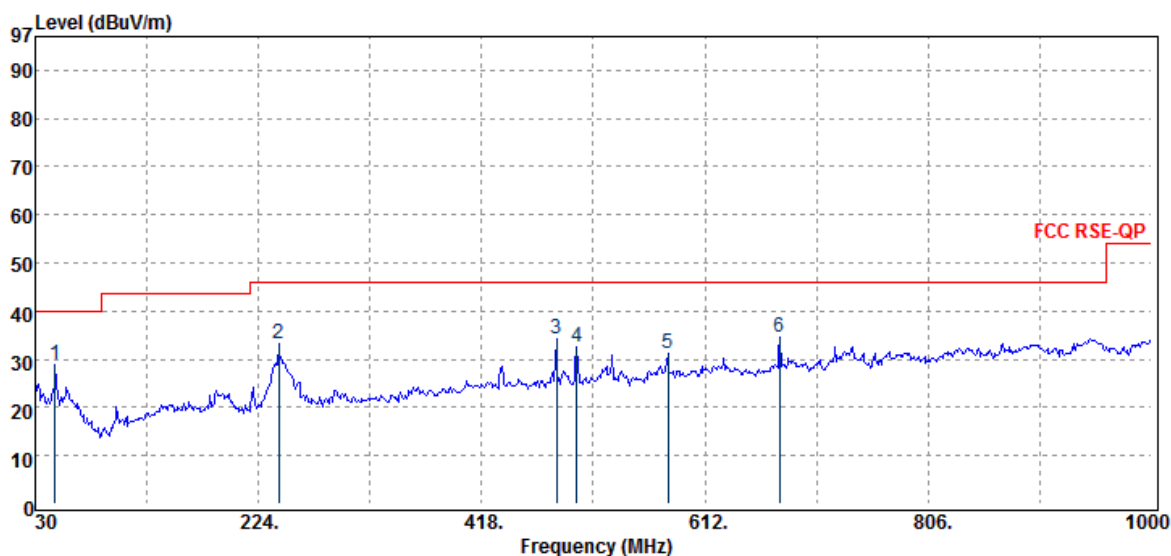
Radiated Spurious Emission Measurement Result

Below 1GHz Worst-Case Data:

802.11a

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

Test Date :2018-08-10
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
47.46	Peak	36.44	-7.64	28.80	40.00	-11.20
241.46	Peak	40.89	-7.72	33.17	46.00	-12.83
482.99	Peak	36.67	-2.54	34.13	46.00	-11.87
500.45	Peak	34.87	-2.36	32.51	46.00	-13.49
579.99	Peak	31.12	0.01	31.13	46.00	-14.87
676.99	Peak	33.22	1.40	34.62	46.00	-11.38

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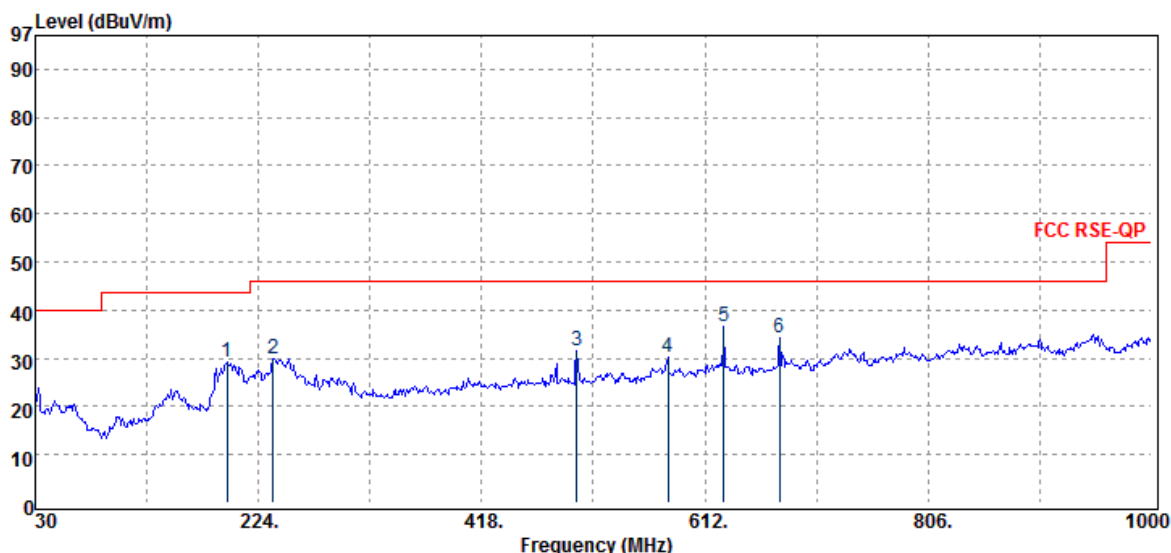
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Operation Band :802.11aB1
Fundamental Frequency :5220 MHz
Operation Mode :Tx CH MID
EUT Pol. :H Plane

Test Date :2018-08-10
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
196.84	Peak	38.49	-9.19	29.30	43.50	-14.20
236.61	Peak	37.85	-8.01	29.84	46.00	-16.16
500.45	Peak	33.84	-2.36	31.48	46.00	-14.52
579.99	Peak	30.24	0.01	30.25	46.00	-15.75
628.49	Peak	35.89	0.84	36.73	46.00	-9.27
676.99	Peak	32.91	1.40	34.31	46.00	-11.69

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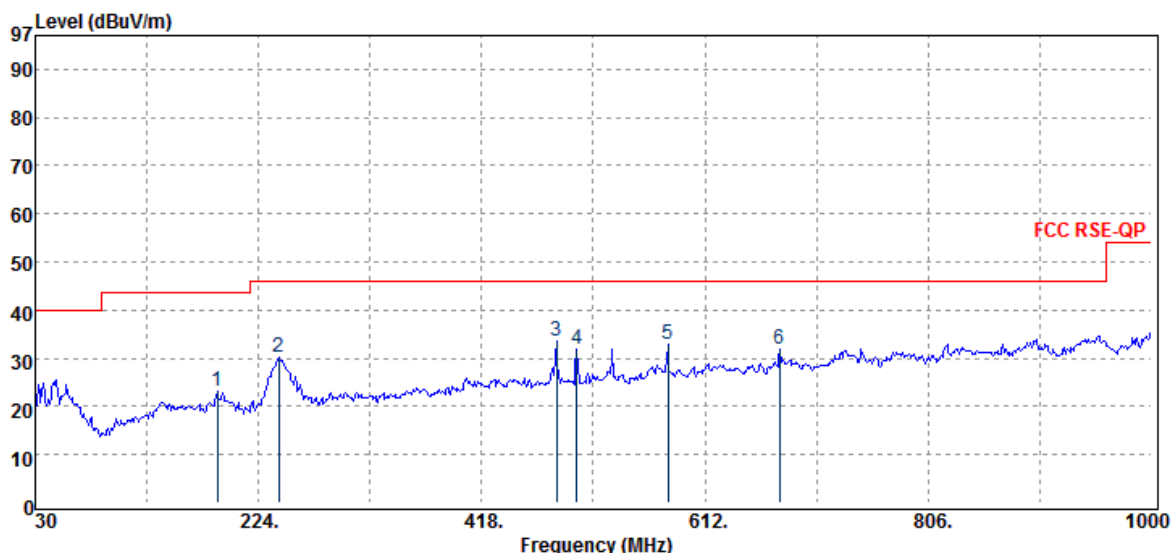
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Operation Band :802.11aB4
 Fundamental Frequency :5785 MHz
 Operation Mode :Tx CH MID
 EUT Pol. :H Plane

Test Date :2018-08-10
 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
188.11	Peak	31.85	-8.84	23.01	43.50	-20.49
241.46	Peak	37.84	-7.72	30.12	46.00	-15.88
482.99	Peak	36.13	-2.54	33.59	46.00	-12.41
500.45	Peak	34.21	-2.36	31.85	46.00	-14.15
579.99	Peak	32.79	0.01	32.80	46.00	-13.20
676.99	Peak	30.65	1.40	32.05	46.00	-13.95

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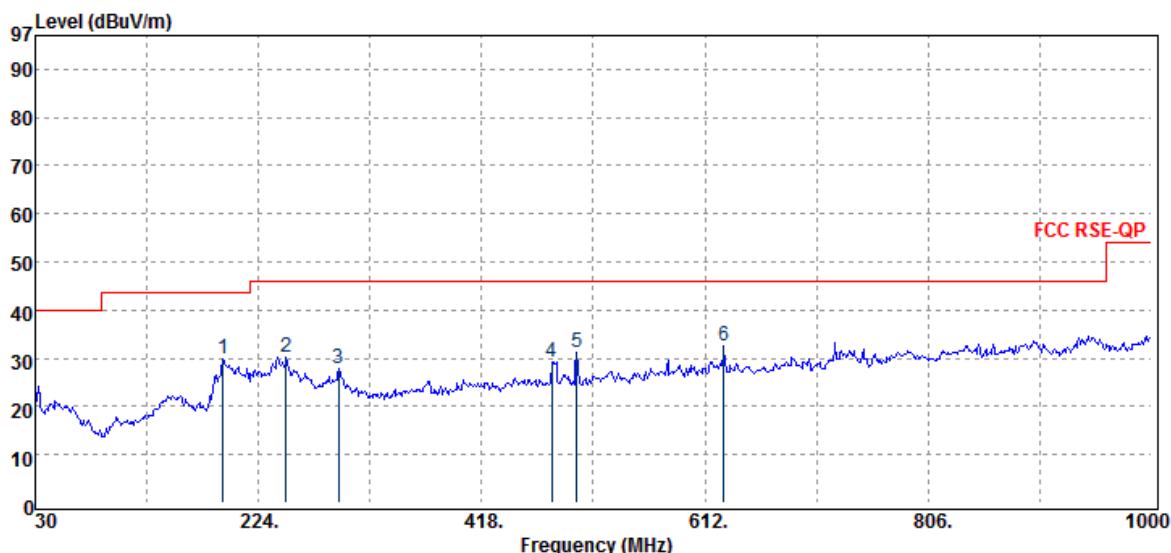
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Operation Band :802.11aB4
 Fundamental Frequency :5785 MHz
 Operation Mode :Tx CH MID
 EUT Pol. :H Plane

Test Date :2018-08-10
 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
192.96	Peak	38.77	-9.06	29.71	43.50	-13.79
248.25	Peak	37.76	-7.43	30.33	46.00	-15.67
293.84	Peak	33.63	-5.69	27.94	46.00	-18.06
479.11	Peak	31.40	-2.10	29.30	46.00	-16.70
500.45	Peak	33.72	-2.36	31.36	46.00	-14.64
628.49	Peak	31.77	0.84	32.61	46.00	-13.39

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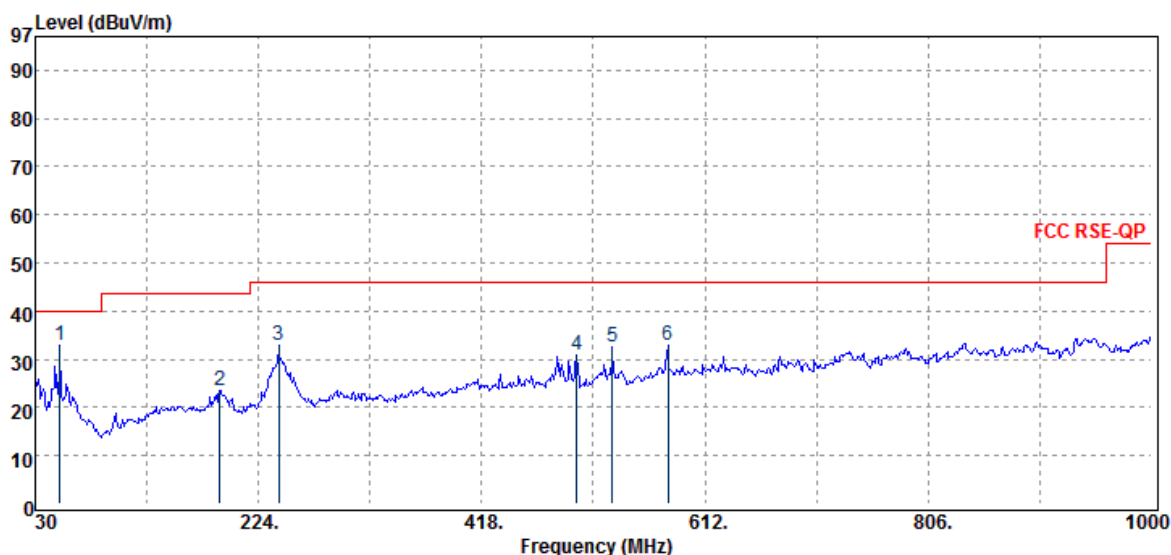
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802.11ac VHT80,

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

Test Date :2018-08-10
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
51.34	Peak	40.30	-7.51	32.79	40.00	-7.21
190.05	Peak	32.48	-8.96	23.52	43.50	-19.98
241.46	Peak	40.45	-7.72	32.73	46.00	-13.27
500.45	Peak	33.40	-2.36	31.04	46.00	-14.96
531.49	Peak	33.96	-1.41	32.55	46.00	-13.45
579.99	Peak	32.78	0.01	32.79	46.00	-13.21

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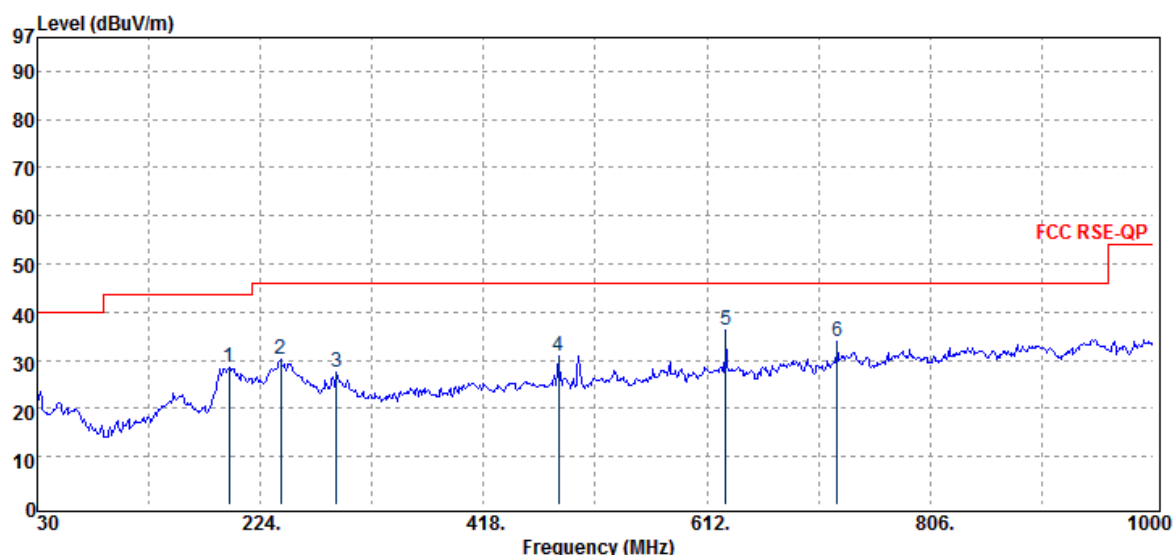
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Operation Band :802.11ac80B1
 Fundamental Frequency :5210 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :H Plane

Test Date :2018-08-10
 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
196.84	Peak	37.77	-9.19	28.58	43.50	-14.92
241.46	Peak	37.78	-7.72	30.06	46.00	-15.94
289.96	Peak	33.31	-5.82	27.49	46.00	-18.51
482.99	Peak	33.55	-2.54	31.01	46.00	-14.99
628.49	Peak	35.55	0.84	36.39	46.00	-9.61
725.49	Peak	31.26	2.63	33.89	46.00	-12.11

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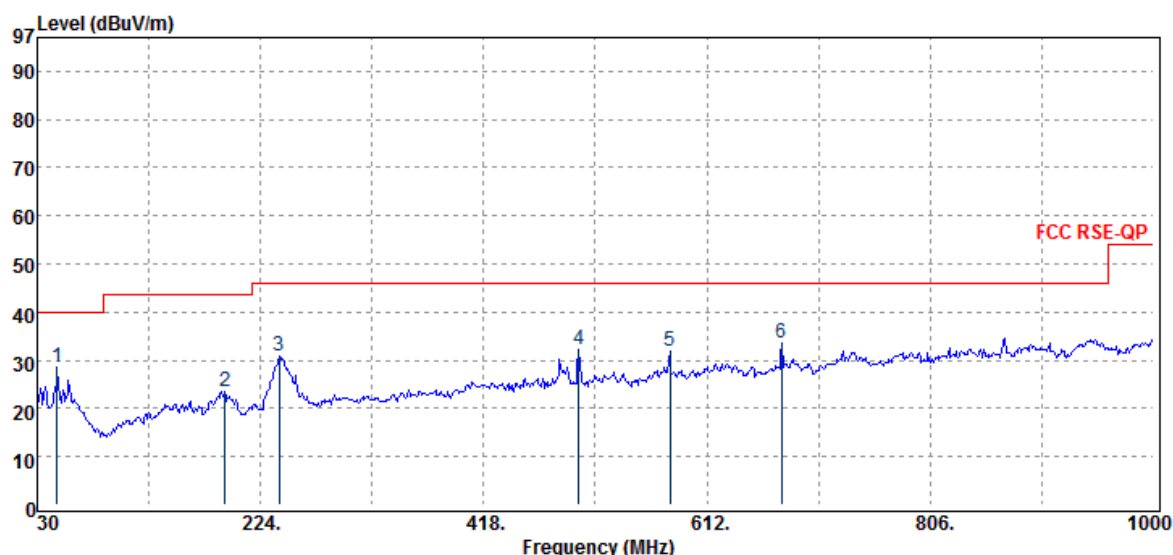
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Operation Band :802.11ac80B4
 Fundamental Frequency :5775 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :H Plane

Test Date :2018-08-10
 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
47.46	Peak	36.01	-7.64	28.37	40.00	-11.63
192.96	Peak	32.63	-9.06	23.57	43.50	-19.93
240.49	Peak	38.53	-7.79	30.74	46.00	-15.26
500.45	Peak	34.64	-2.36	32.28	46.00	-13.72
579.99	Peak	32.01	0.01	32.02	46.00	-13.98
676.99	Peak	32.28	1.40	33.68	46.00	-12.32

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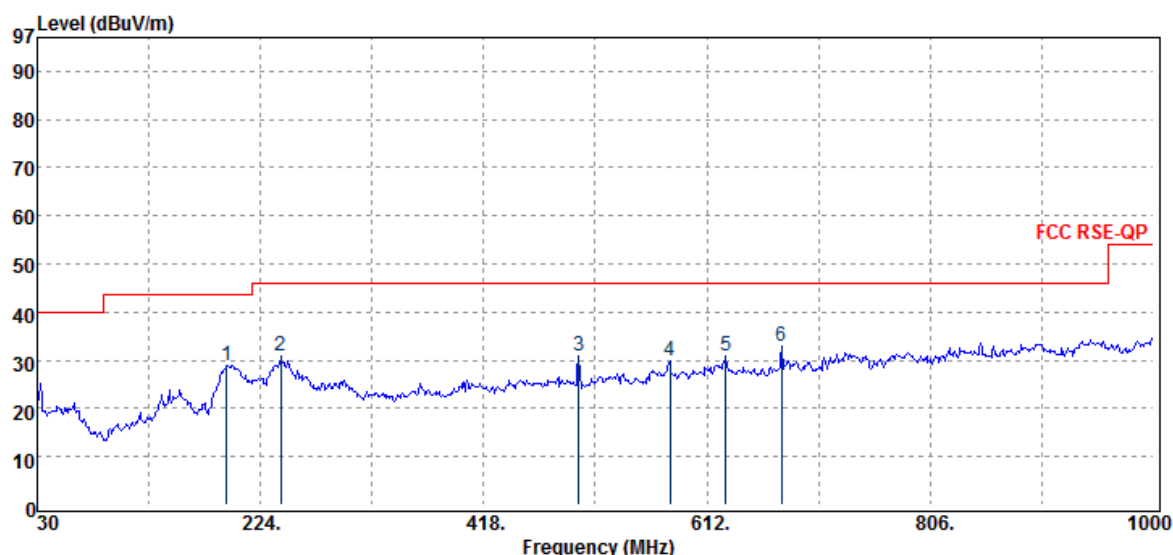
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Operation Band :802.11ac80B4
 Fundamental Frequency :5775 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :H Plane

Test Date :2018-08-10
 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
194.90	Peak	38.06	-9.13	28.93	43.50	-14.57
241.46	Peak	38.66	-7.72	30.94	46.00	-15.06
500.45	Peak	33.33	-2.36	30.97	46.00	-15.03
579.99	Peak	29.94	0.01	29.95	46.00	-16.05
628.49	Peak	30.05	0.84	30.89	46.00	-15.11
676.99	Peak	31.55	1.40	32.95	46.00	-13.05

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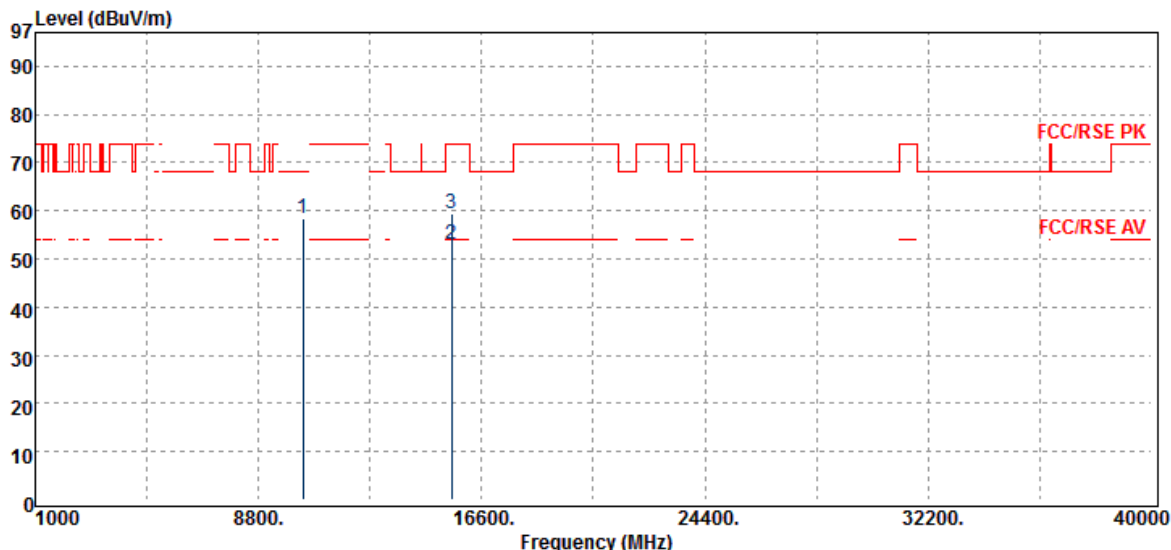
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Above 1GHz Worst-Case Data:

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

Operation Band	:802.11aB1	Test Date	:2018-08-23
Fundamental Frequency	:5180 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:H 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
10360.00	Peak	38.74	19.71	58.45	68.20	-9.75
15540.00	Average	29.60	23.37	52.97	54.00	-1.03
15540.00	Peak	36.02	23.37	59.39	74.00	-14.61

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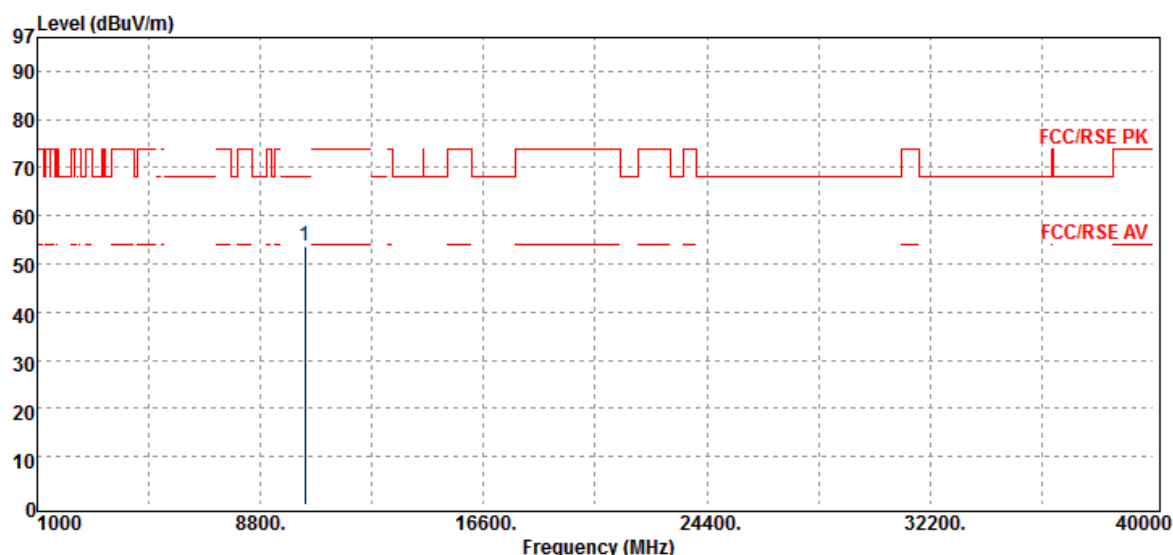
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Operation Band :802.11aB1
 Fundamental Frequency :5180 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :H Plane

Test Date :2018-08-23
 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	34.16	19.71	53.87	68.20	-14.33

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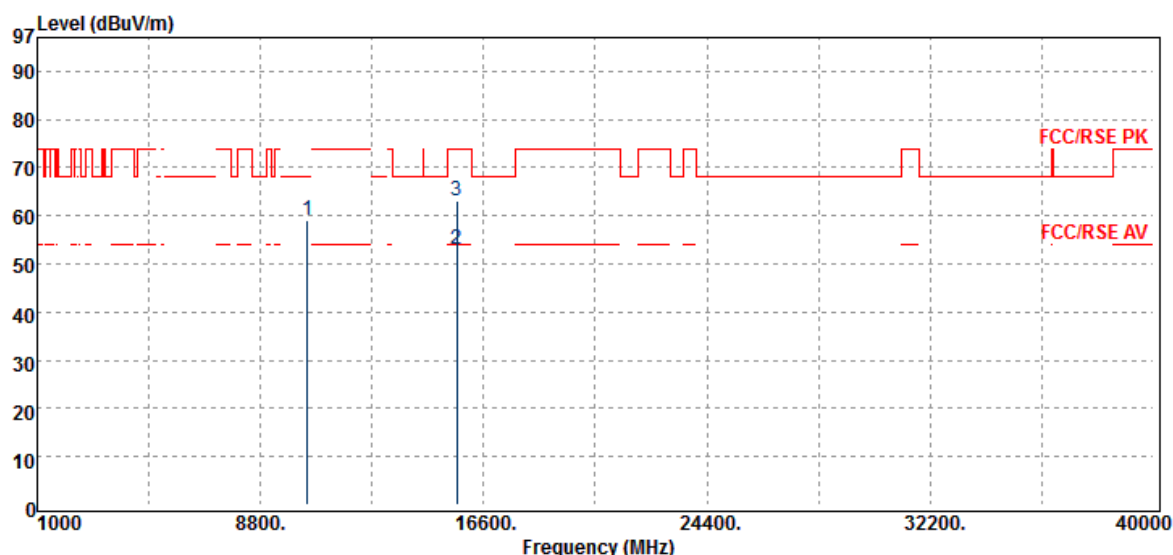
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Operation Band :802.11aB1
 Fundamental Frequency :5220 MHz
 Operation Mode :Tx CH MID
 EUT Pol. :H Plane

Test Date :2018-08-23
 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	38.90	20.05	58.95	68.20	-9.25
15660.00	Average	29.70	23.22	52.92	54.00	-1.08
15660.00	Peak	39.83	23.22	63.05	74.00	-10.95

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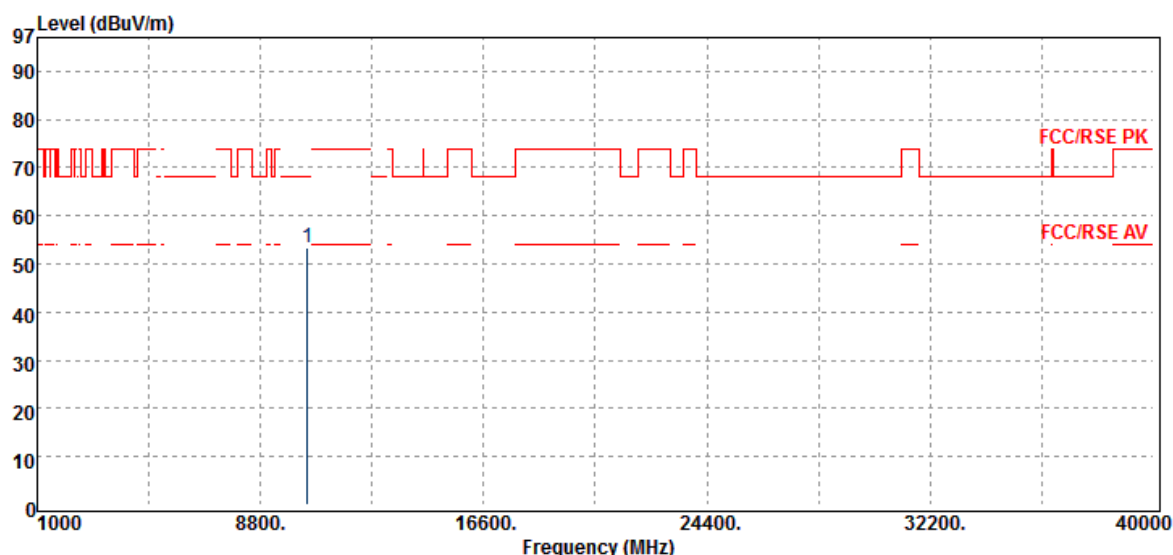
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Operation Band :802.11aB1
 Fundamental Frequency :5220 MHz
 Operation Mode :Tx CH MID
 EUT Pol. :H Plane

Test Date :2018-08-23
 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	33.24	20.05	53.29	68.20	-14.91

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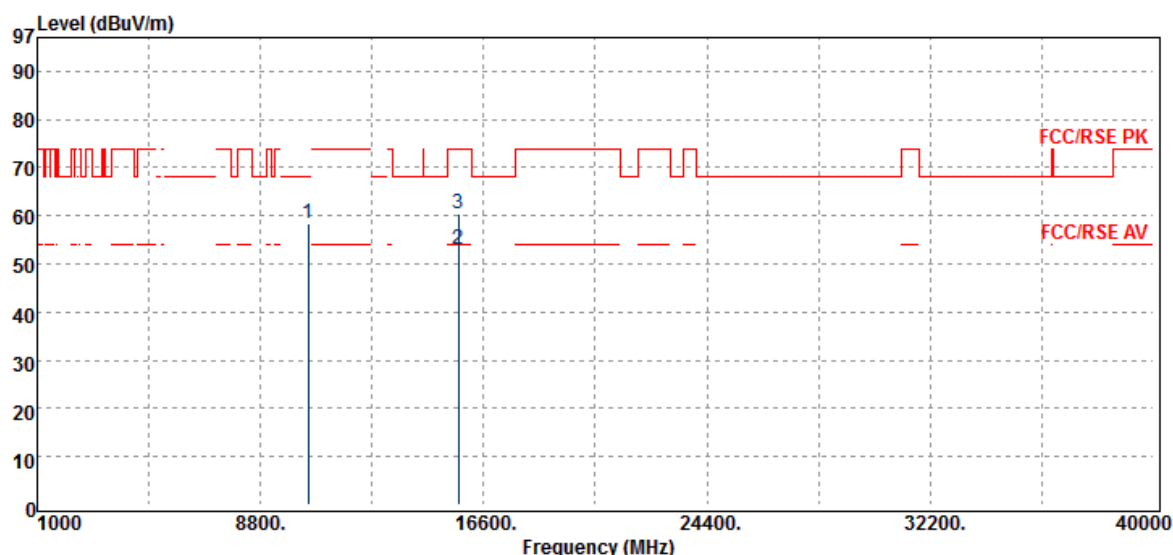
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Member of SGS Group

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

Test Date :2018-08-23
 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	38.36	20.07	58.43	68.20	-9.77
15720.00	Average	29.78	23.10	52.88	54.00	-1.12
15720.00	Peak	37.23	23.10	60.33	74.00	-13.67

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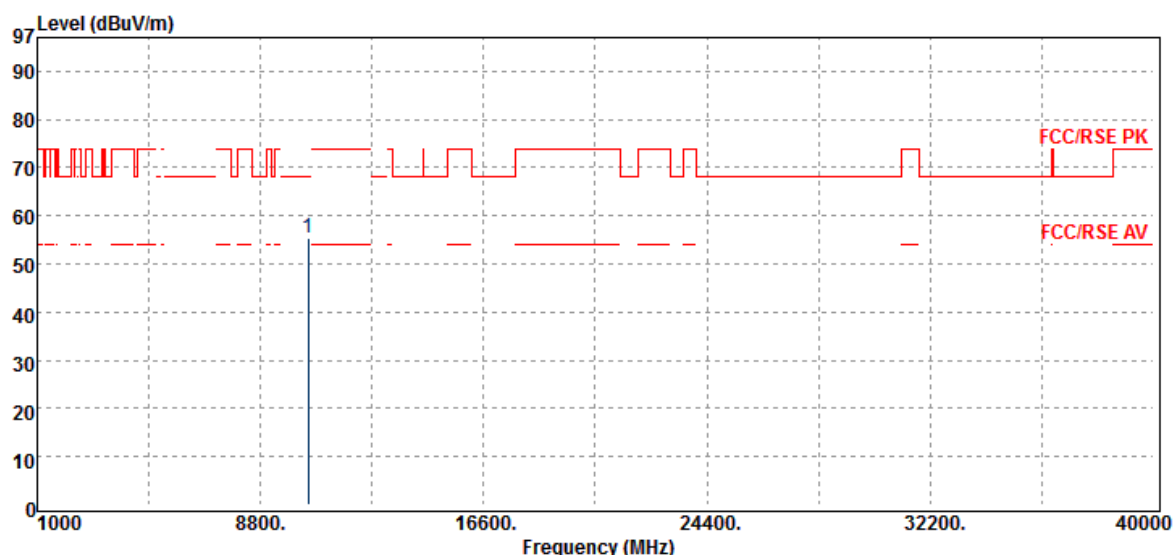
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Member of SGS Group

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

Test Date :2018-08-23
 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	35.41	20.07	55.48	68.20	-12.72

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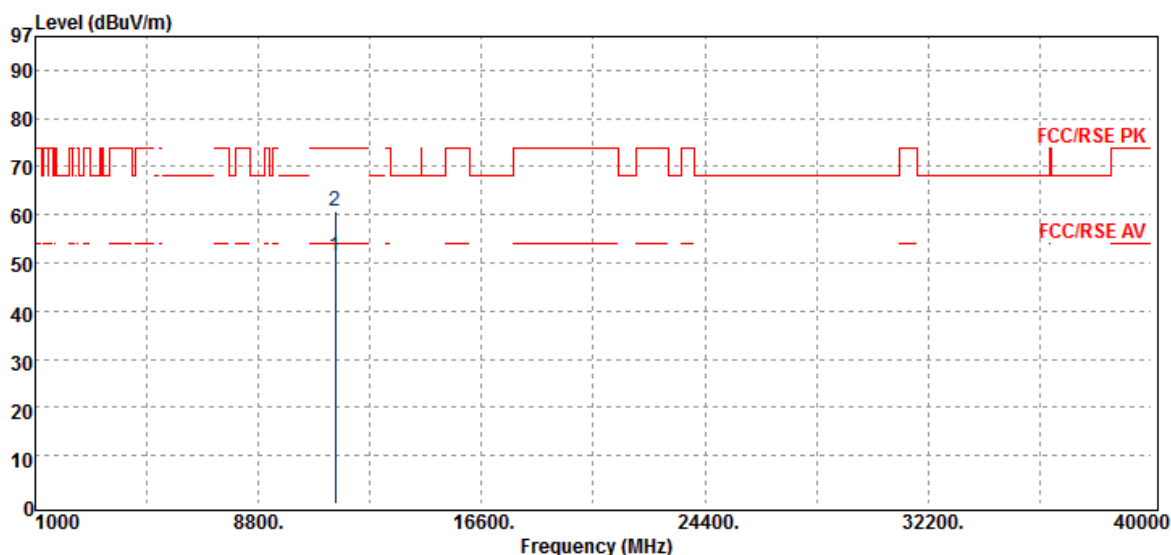
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www.tw.sgs.com

Member of SGS Group

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

Test Date :2018-08-24
 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
11490.00	Average	29.68	21.61	51.29	54.00	-2.71
11490.00	Peak	39.18	21.61	60.79	74.00	-13.21

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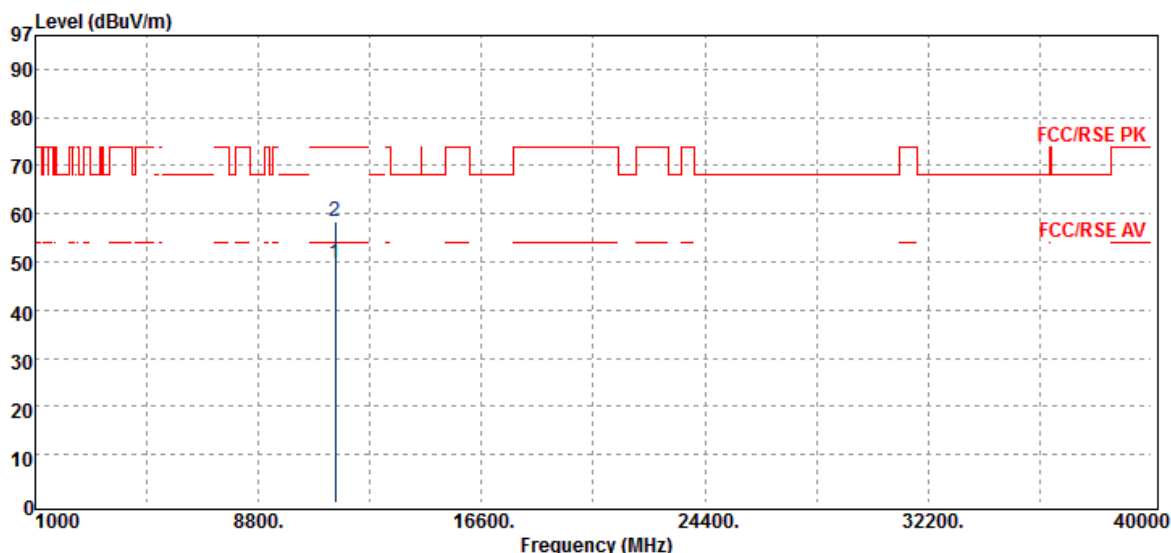
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Member of SGS Group

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

Test Date :2018-08-24
 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
11490.00	Average	27.99	21.61	49.60	54.00	-4.40
11490.00	Peak	36.88	21.61	58.49	74.00	-15.51

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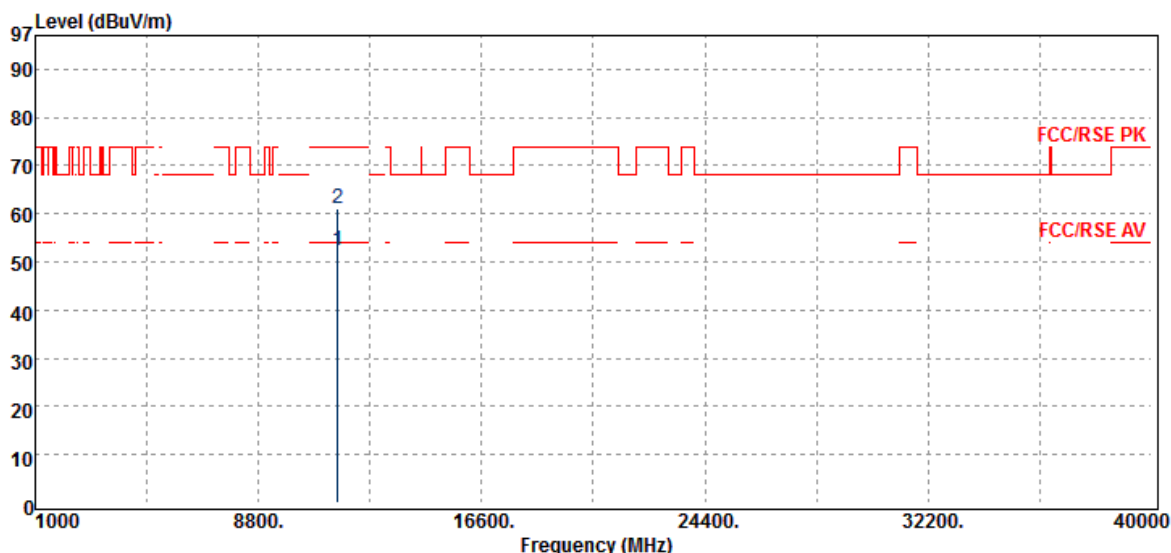
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Operation Band :802.11aB4
 Fundamental Frequency :5785 MHz
 Operation Mode :Tx CH MID
 EUT Pol. :H Plane

Test Date :2018-08-24
 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	30.57	21.66	52.23	54.00	-1.77
11570.00	Peak	39.53	21.66	61.19	74.00	-12.81

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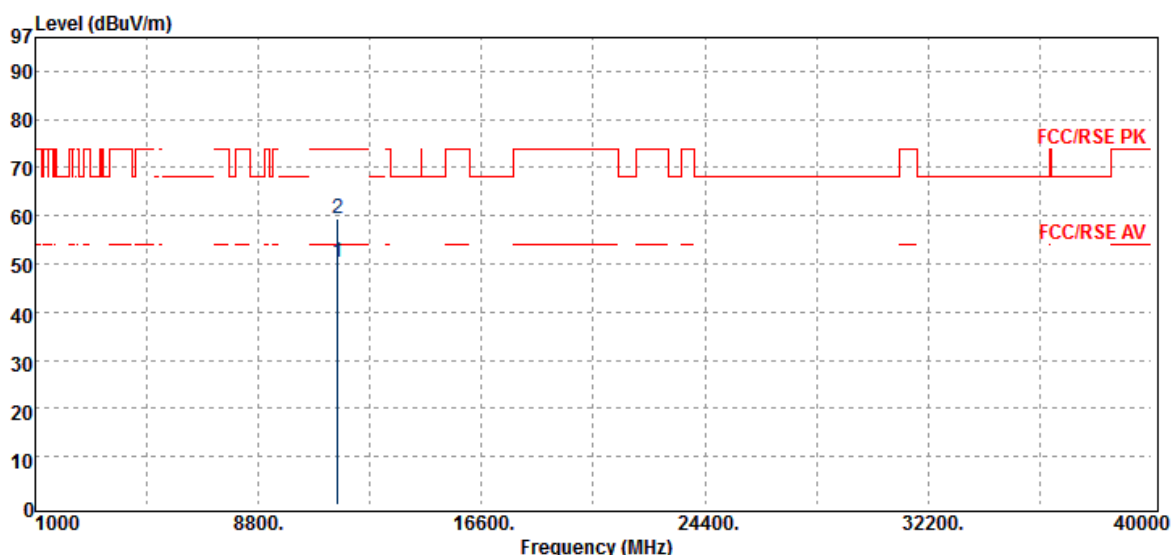
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Operation Band :802.11aB4
 Fundamental Frequency :5785 MHz
 Operation Mode :Tx CH MID
 EUT Pol. :H Plane

Test Date :2018-08-24
 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	28.61	21.66	50.27	54.00	-3.73
11570.00	Peak	37.63	21.66	59.29	74.00	-14.71

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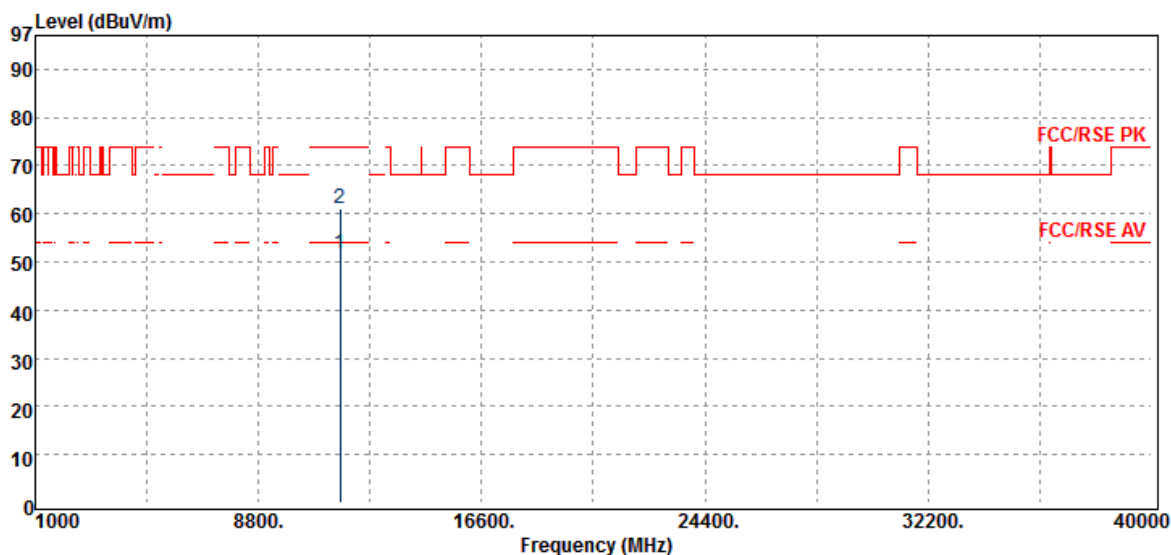
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Operation Band :802.11aB4
 Fundamental Frequency :5825 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :H Plane

Test Date :2018-08-24
 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	30.04	21.60	51.64	54.00	-2.36
11650.00	Peak	39.44	21.60	61.04	74.00	-12.96

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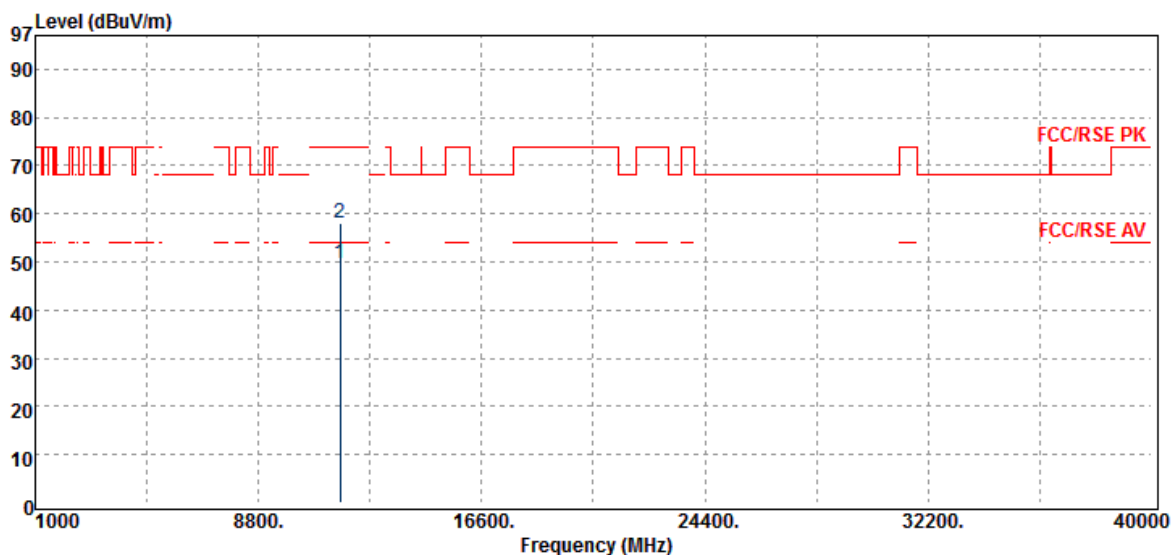
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Operation Band :802.11aB4
Fundamental Frequency :5825 MHz
Operation Mode :Tx CH HIGH
EUT Pol. :H Plane

Test Date :2018-08-24
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
11650.00	Average	28.17	21.60	49.77	54.00	-4.23
11650.00	Peak	36.51	21.60	58.11	74.00	-15.89

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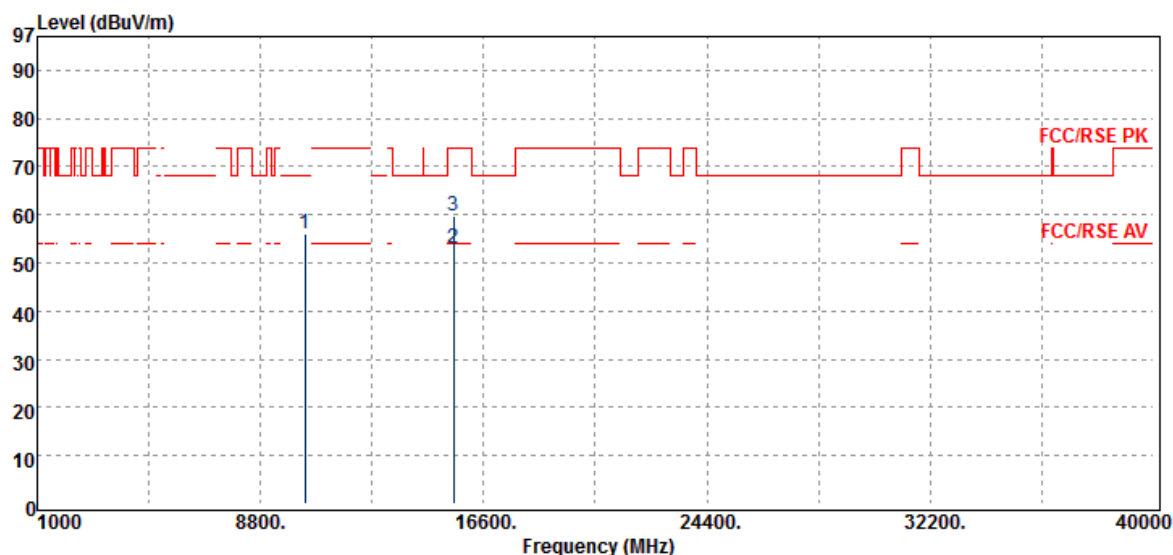
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5150~5250 MHz

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

Test Date :2018-08-24
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
10360.00	Peak	36.50	19.71	56.21	68.20	-11.99
15540.00	Average	29.50	23.37	52.87	54.00	-1.13
15540.00	Peak	36.50	23.37	59.87	74.00	-14.13

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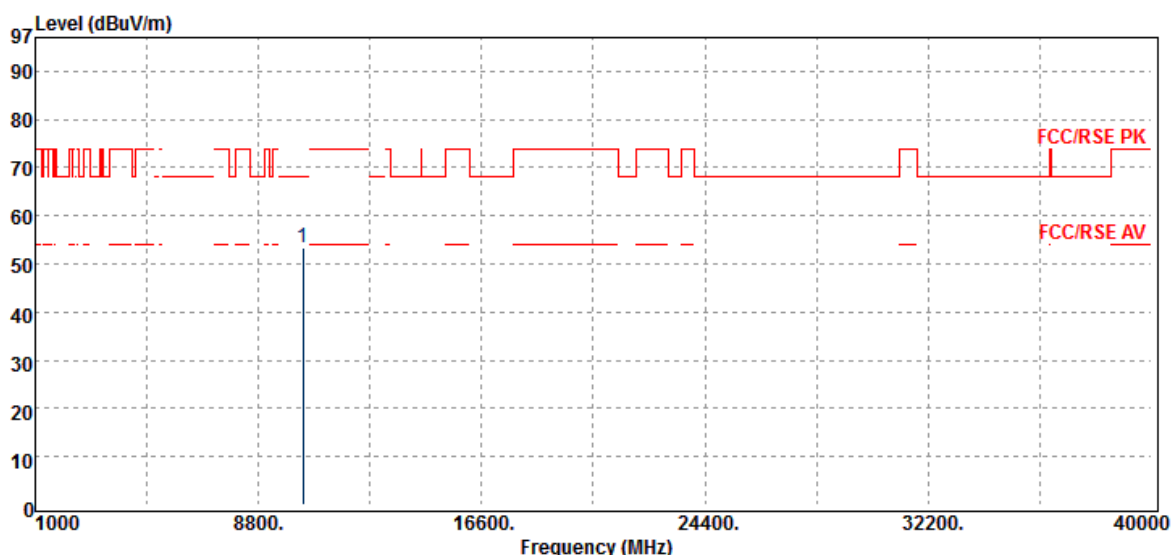
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Operation Band :802.11n20B1
 Fundamental Frequency :5180 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :H Plane

Test Date :2018-08-24
 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	33.80	19.71	53.51	68.20	-14.69

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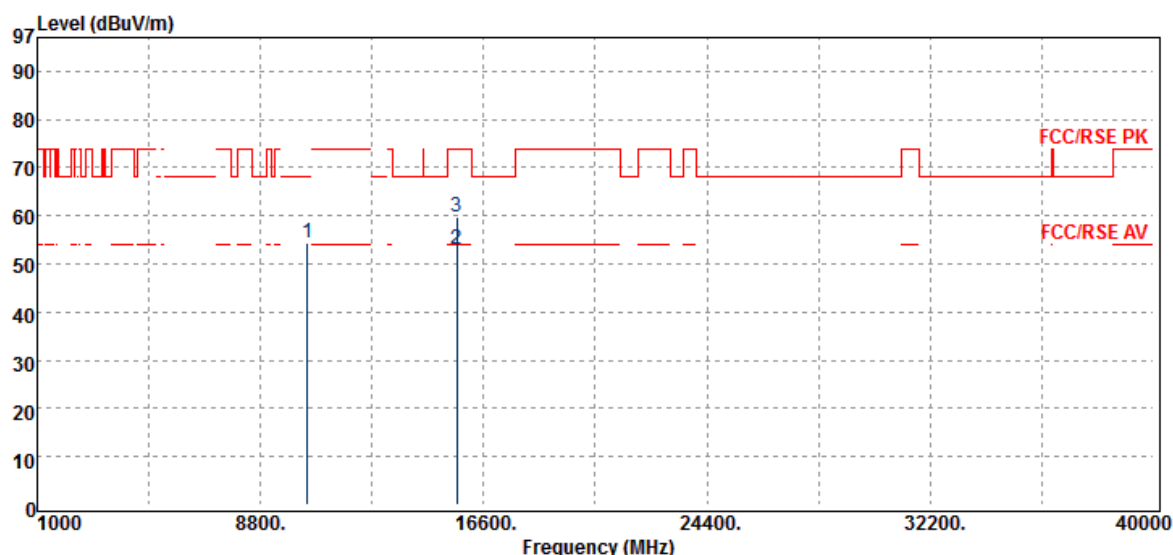
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Member of SGS Group

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

Test Date :2018-08-24
 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	34.28	20.05	54.33	68.20	-13.87
15660.00	Average	29.67	23.22	52.89	54.00	-1.11
15660.00	Peak	36.48	23.22	59.70	74.00	-14.30

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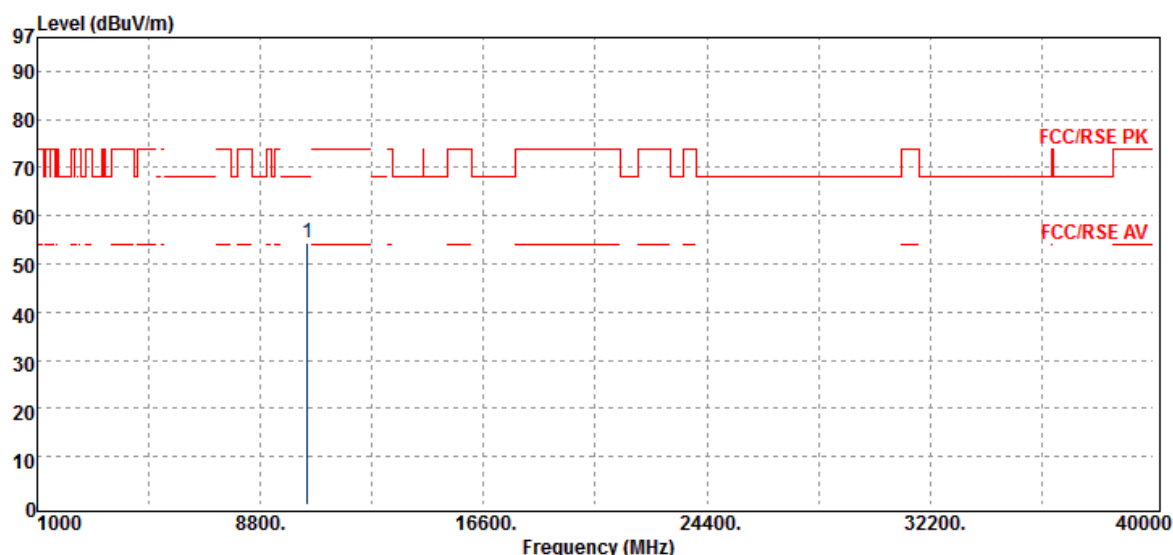
f (886-2) 2298-0488

www.tw.sgs.com

Member of SGS Group

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

Test Date :2018-08-24
 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
10440.00	Peak	34.37	20.05	54.42	68.20	-13.78

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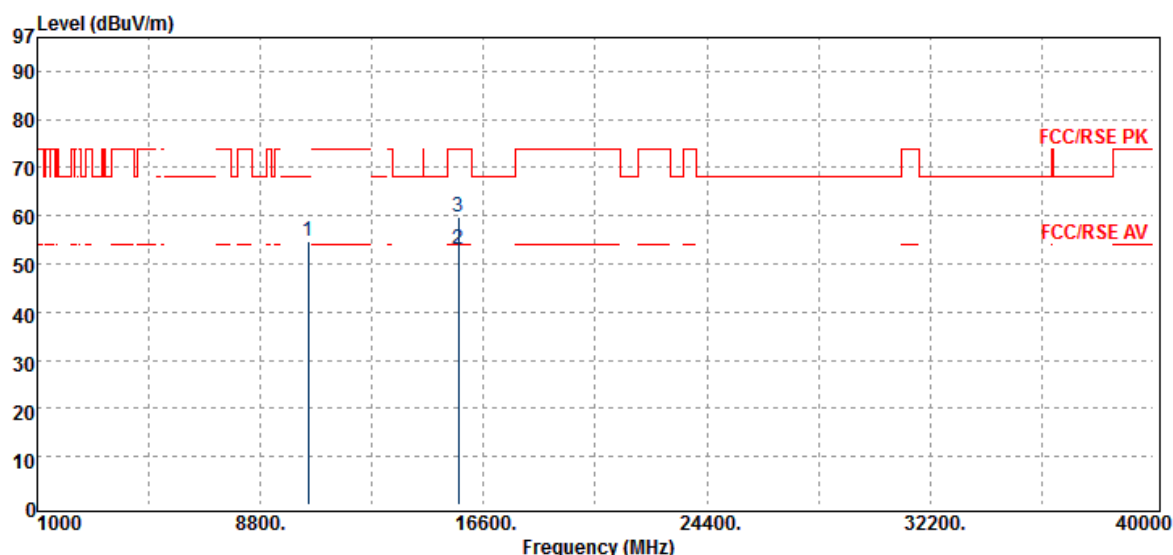
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Member of SGS Group

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

Test Date :2018-08-24
 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	34.55	20.07	54.62	68.20	-13.58
15720.00	Average	29.78	23.10	52.88	54.00	-1.12
15720.00	Peak	36.72	23.10	59.82	74.00	-14.18

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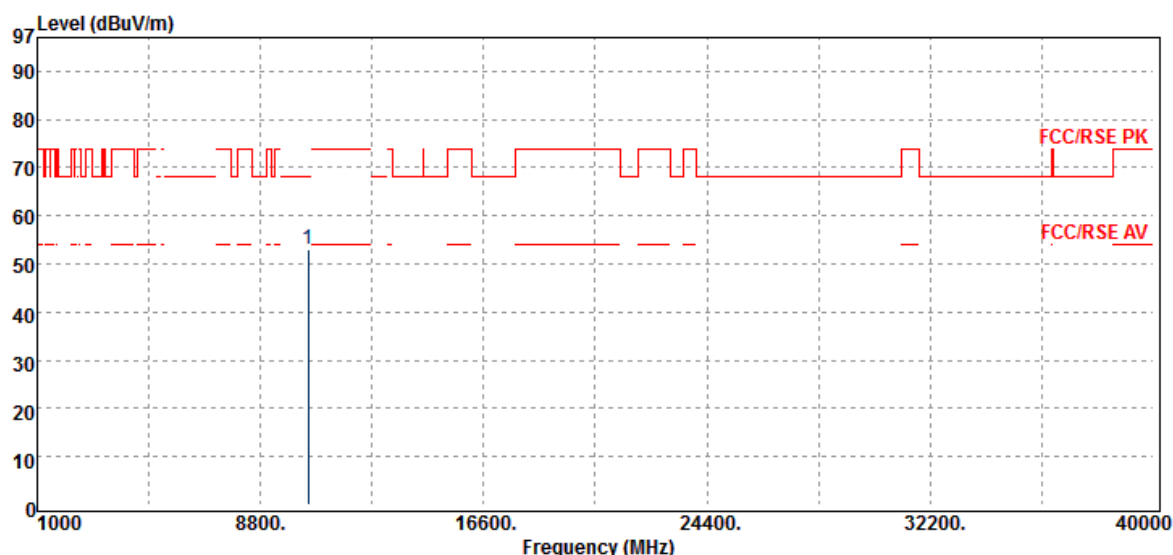
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Operation Band :802.11n20B1
 Fundamental Frequency :5240 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :H Plane

Test Date :2018-08-24
 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	33.06	20.07	53.13	68.20	-15.07

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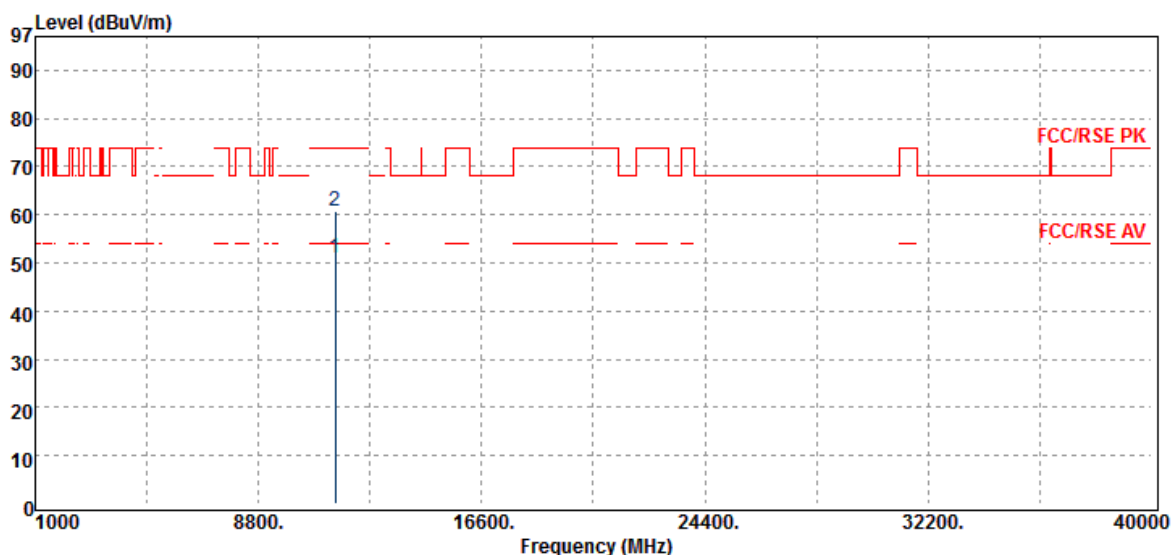
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5725~5850 MHz

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

Test Date :2018-08-24
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
11490.00	Average	29.43	21.61	51.04	54.00	-2.96
11490.00	Peak	39.01	21.61	60.62	74.00	-13.38

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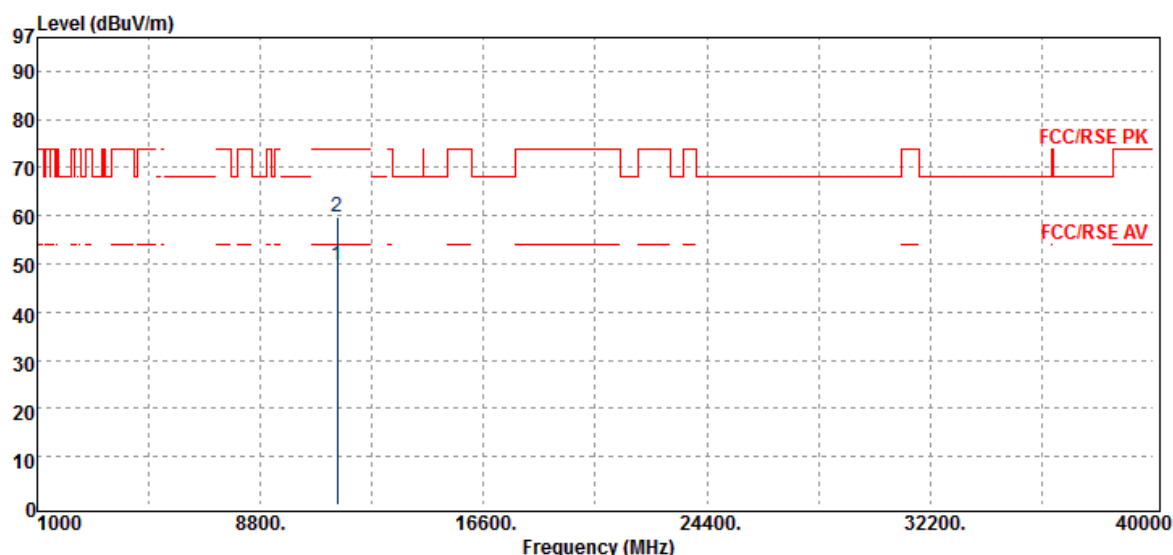
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Operation Band :802.11n20B4
 Fundamental Frequency :5745 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :H Plane

Test Date :2018-08-24
 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	28.16	21.61	49.77	54.00	-4.23
11490.00	Peak	38.29	21.61	59.90	74.00	-14.10

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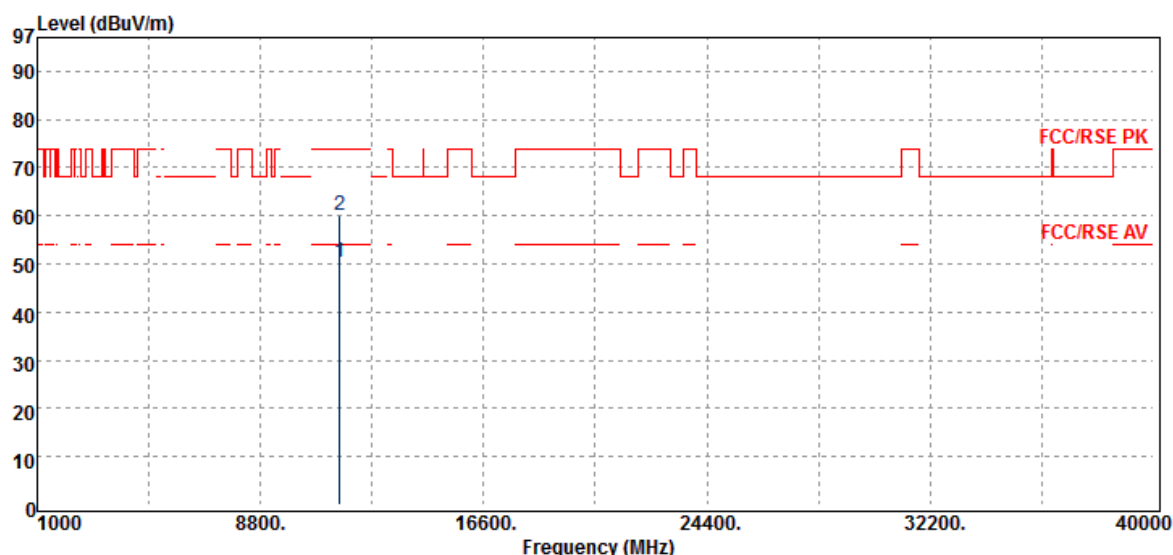
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Member of SGS Group

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

Test Date :2018-08-24
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	28.84	21.66	50.50	54.00	-3.50
11570.00	Peak	38.58	21.66	60.24	74.00	-13.76

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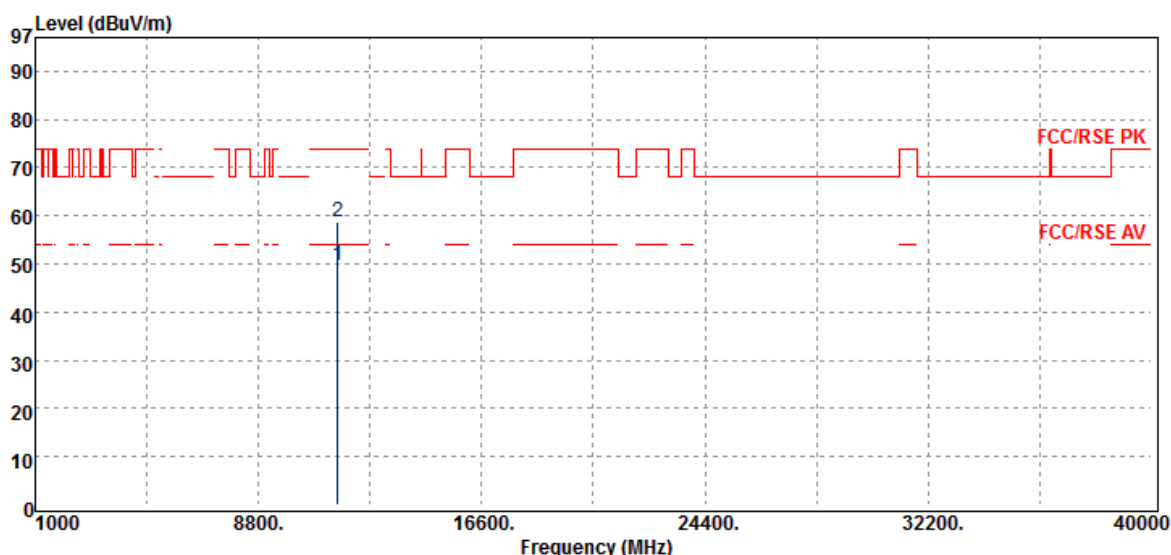
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Operation Band :802.11n20B4
 Fundamental Frequency :5785 MHz
 Operation Mode :Tx CH MID
 EUT Pol. :H Plane

Test Date :2018-08-24
 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	28.02	21.66	49.68	54.00	-4.32
11570.00	Peak	37.04	21.66	58.70	74.00	-15.30

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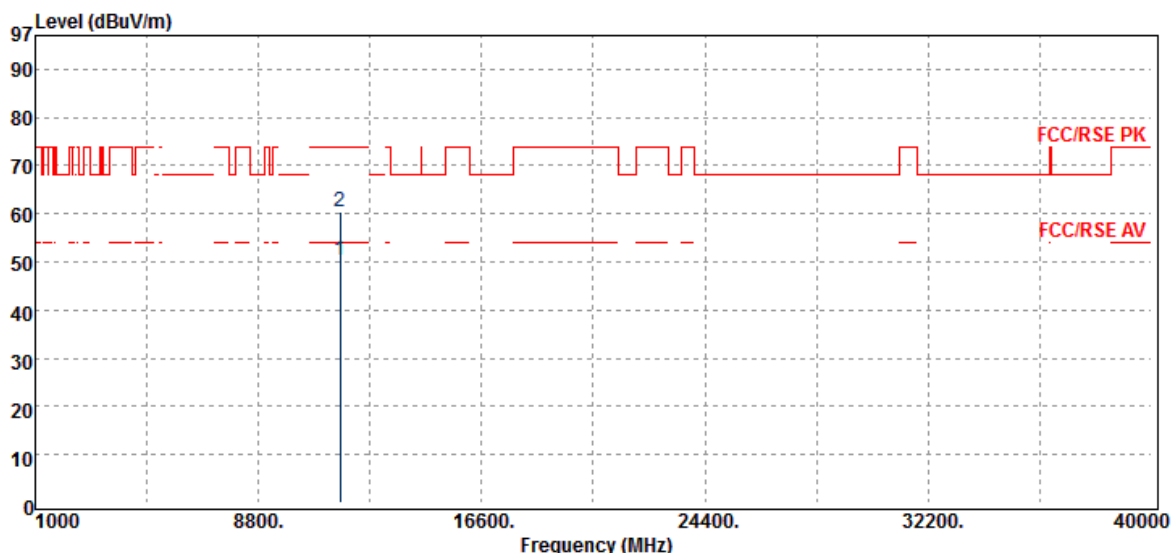
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Member of SGS Group

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

Test Date :2018-08-24
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	28.87	21.60	50.47	54.00	-3.53
11650.00	Peak	38.66	21.60	60.26	74.00	-13.74

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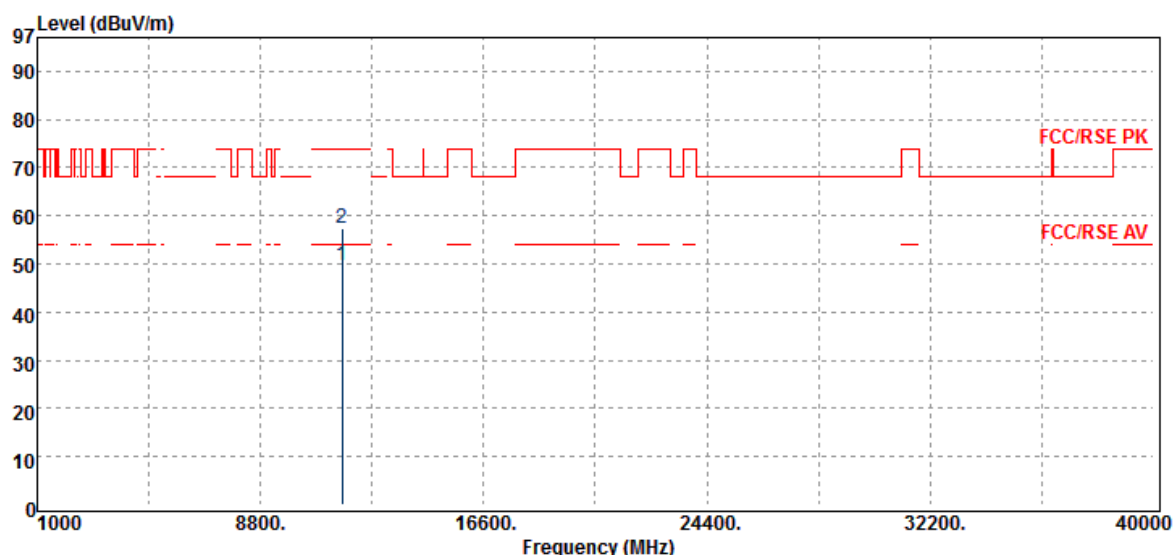
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Operation Band :802.11n20B4
 Fundamental Frequency :5825 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :H Plane

Test Date :2018-08-24
 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	28.22	21.60	49.82	54.00	-4.18
11650.00	Peak	35.91	21.60	57.51	74.00	-16.49

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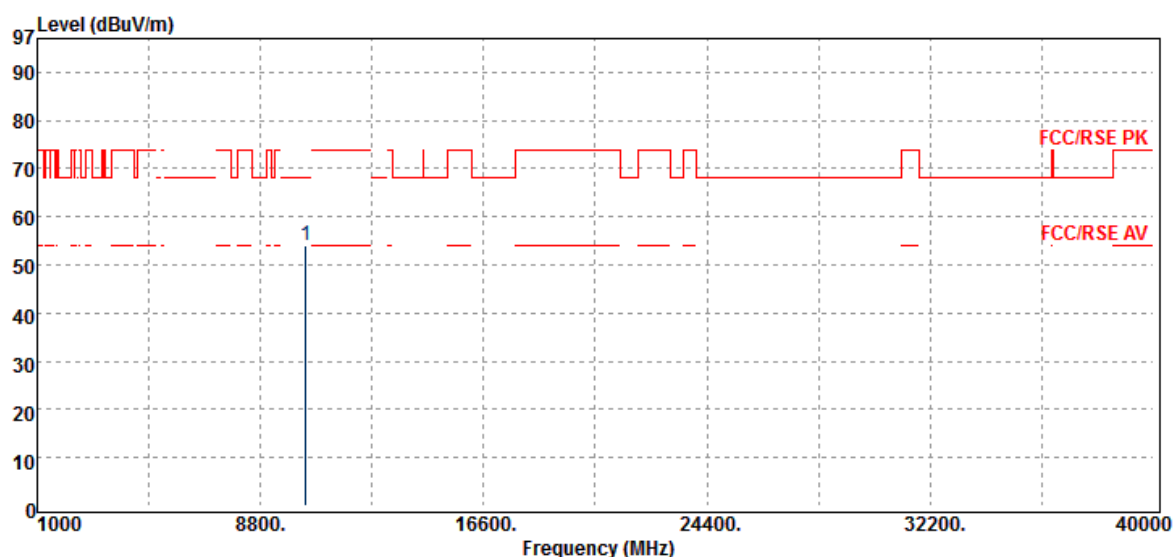
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5150~5250 MHz

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

Test Date :2018-08-24
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
10380.00	Peak	34.10	19.78	53.88	68.20	-14.32

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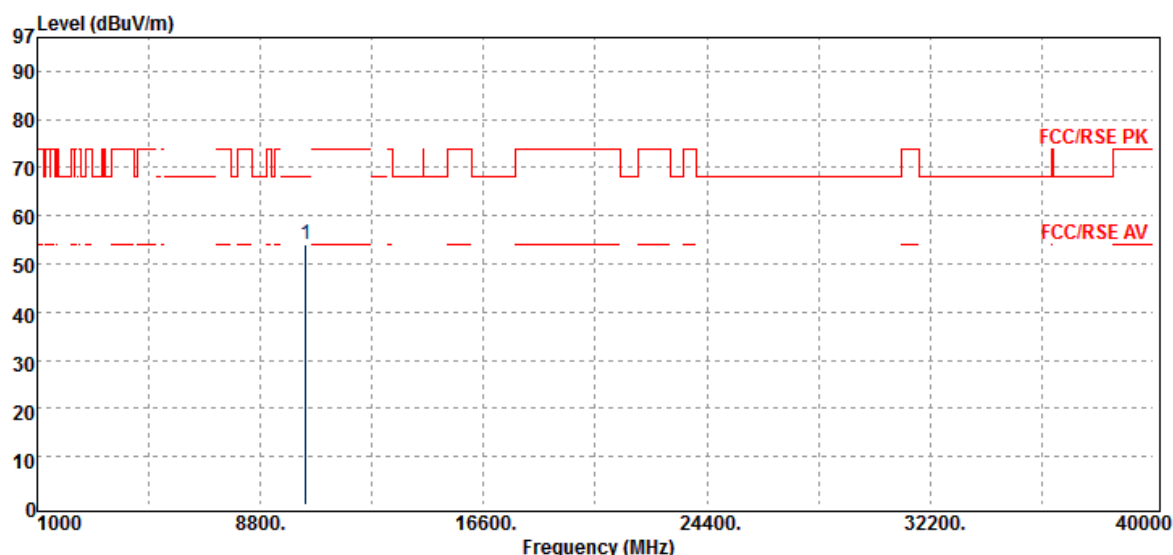
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Operation Band :802.11n40B1
 Fundamental Frequency :5190 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :H Plane

Test Date :2018-08-24
 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
10380.00	Peak	34.16	19.78	53.94	68.20	-14.26

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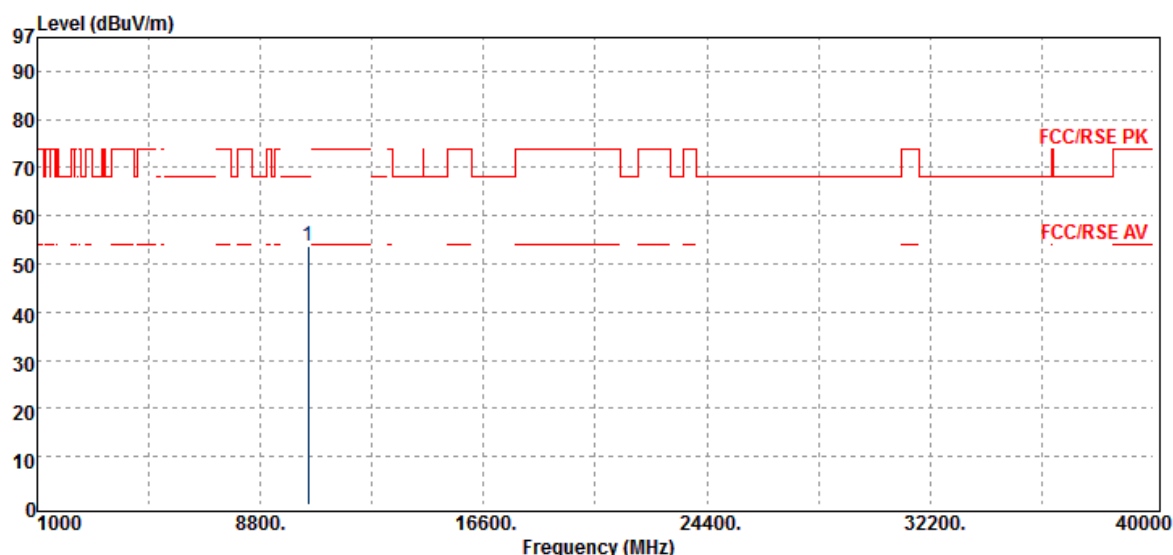
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Operation Band :802.11n40B1
 Fundamental Frequency :5230 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :H Plane

Test Date :2018-08-24
 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	33.49	20.07	53.56	68.20	-14.64

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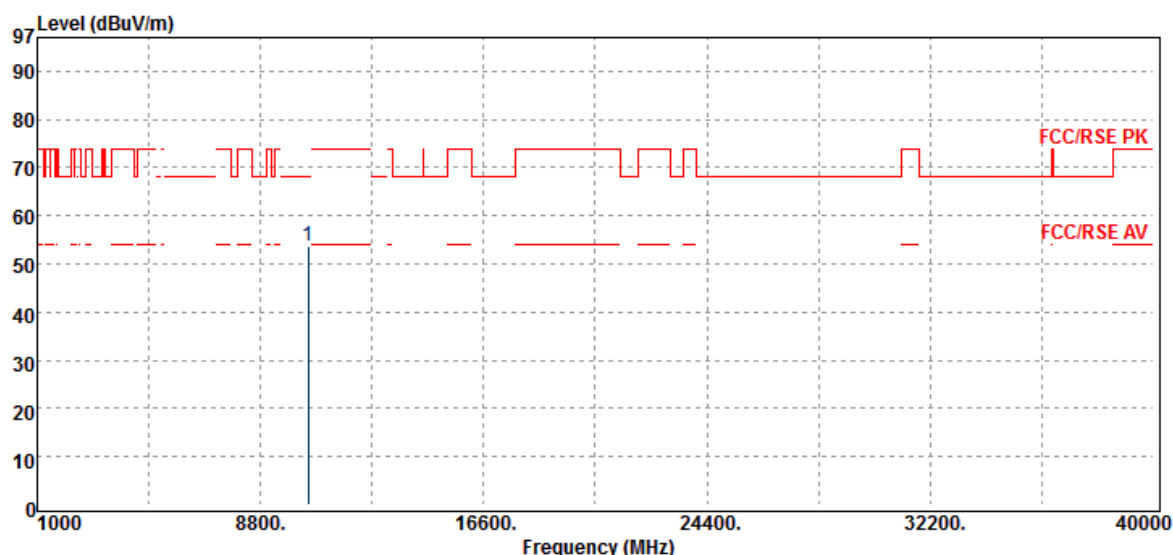
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Operation Band :802.11n40B1
 Fundamental Frequency :5230 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :H Plane

Test Date :2018-08-24
 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	33.50	20.07	53.57	68.20	-14.63

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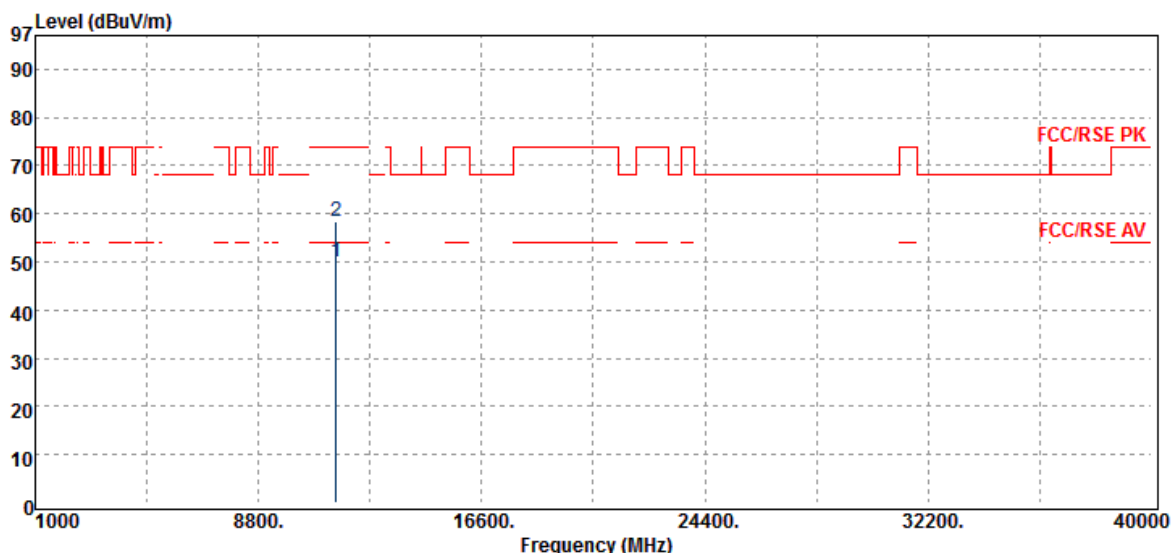
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5725~5850 MHz

Operation Band	:802.11n40B4	Test Date	:2018-08-24
Fundamental Frequency	:5755 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:H 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	28.19	21.66	49.85	54.00	-4.15
11510.00	Peak	36.67	21.66	58.33	74.00	-15.67

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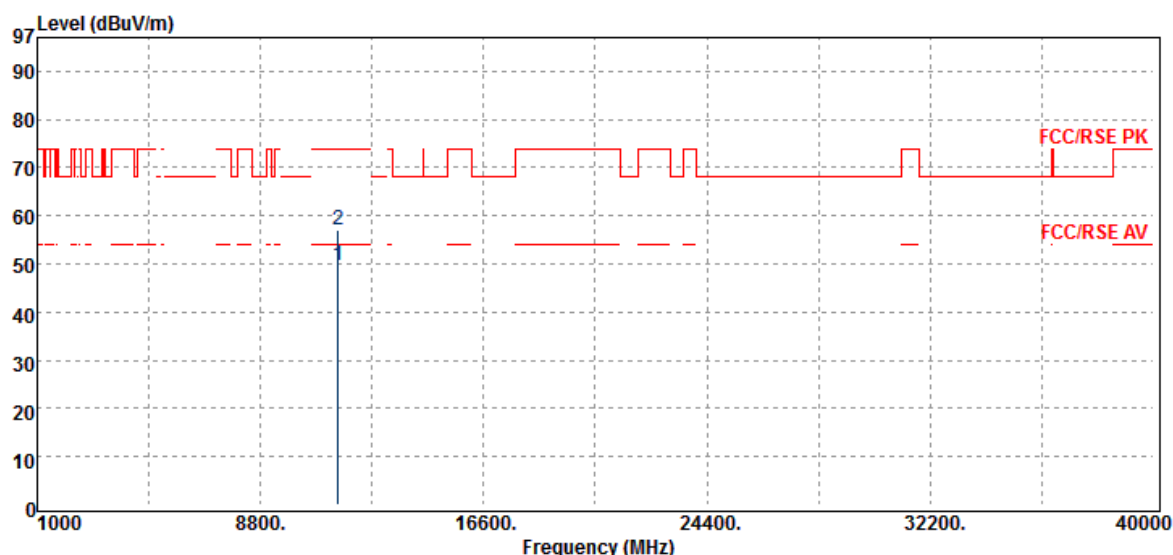
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Operation Band :802.11n40B4
Fundamental Frequency :5755 MHz
Operation Mode :Tx CH LOW
EUT Pol. :H Plane

Test Date :2018-08-24
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	27.85	21.66	49.51	54.00	-4.49
11510.00	Peak	35.47	21.66	57.13	74.00	-16.87

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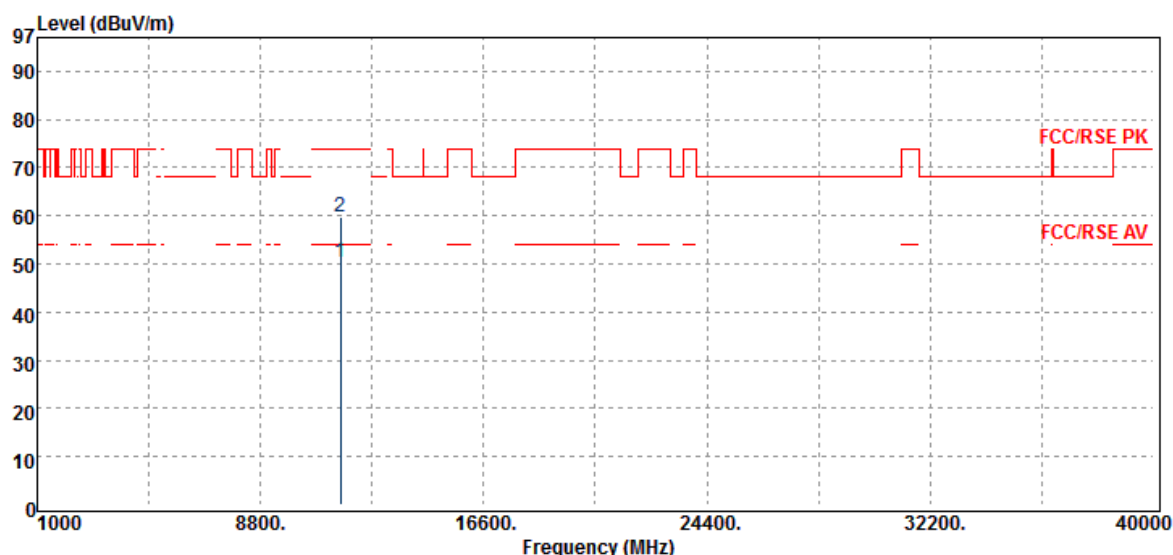
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Operation Band :802.11n40B4
 Fundamental Frequency :5795 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :H Plane

Test Date :2018-08-24
 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	28.66	21.66	50.32	54.00	-3.68
11590.00	Peak	37.93	21.66	59.59	74.00	-14.41

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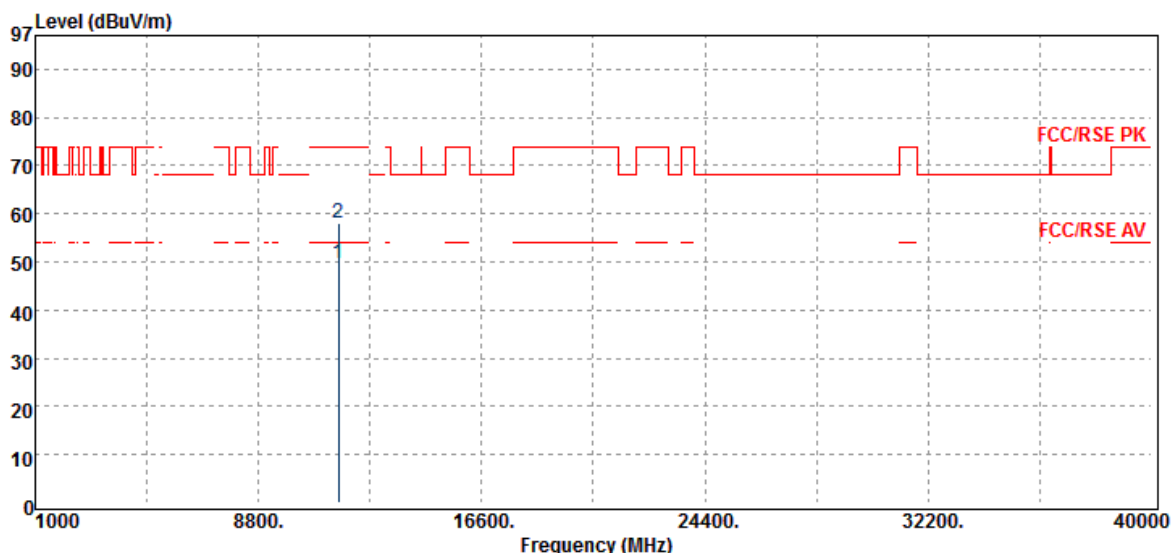
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Operation Band :802.11n40B4
 Fundamental Frequency :5795 MHz
 Operation Mode :Tx CH HIGH
 EUT Pol. :H Plane

Test Date :2018-08-24
 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
11590.00	Average	28.16	21.66	49.82	54.00	-4.18
11590.00	Peak	36.32	21.66	57.98	74.00	-16.02

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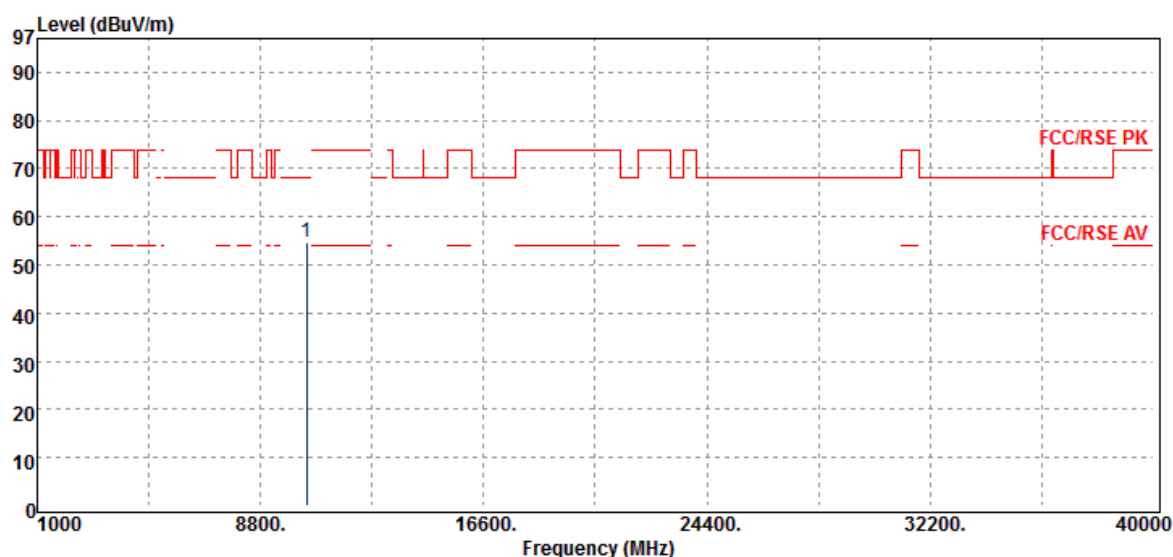
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Radiated Spurious Emission Measurement Result 802.11ac VHT80, 5150~5250 MHz

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

Test Date :2018-08-27
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	34.67	19.99	54.66	68.20	-13.54

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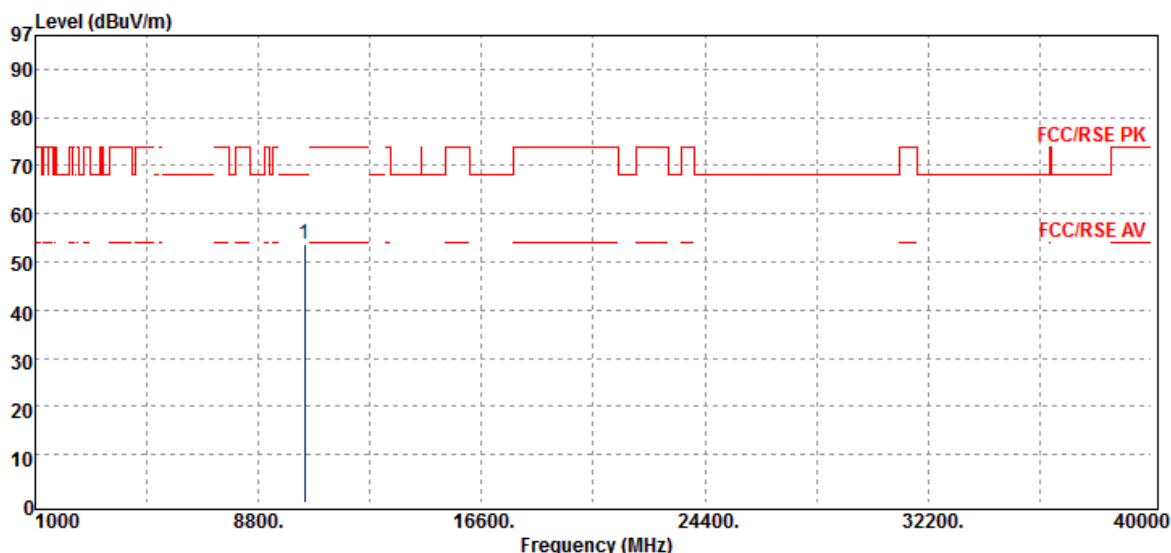
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Operation Band :802.11ac80B1
 Fundamental Frequency :5210 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :H Plane

Test Date :2018-08-27
 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	33.74	19.99	53.73	68.20	-14.47

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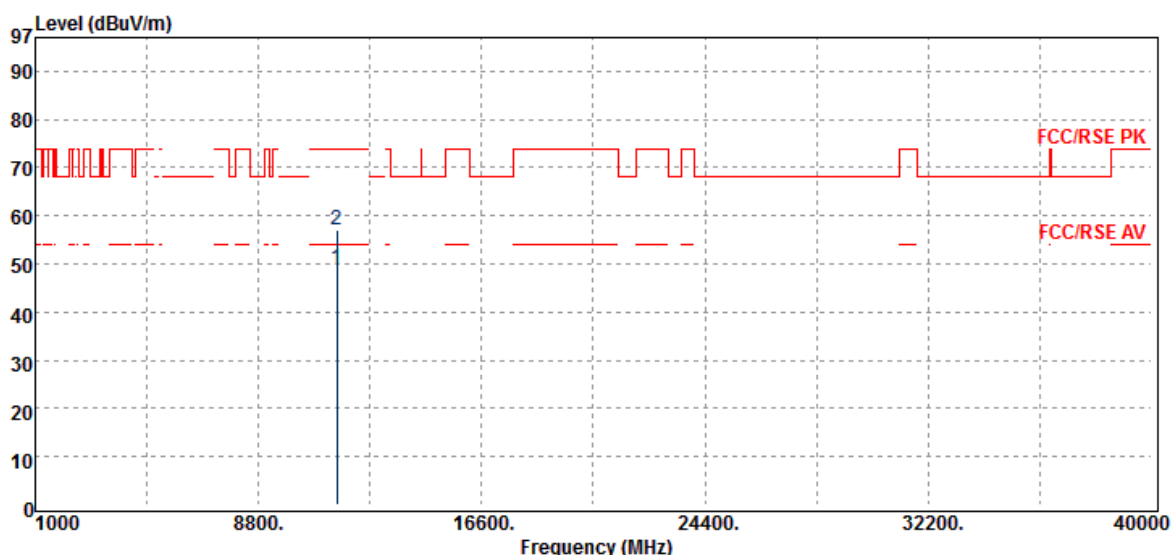
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Radiated Spurious Emission Measurement Result 802.11ac VHT80, 5725~5850 MHz

Operation Band	:802.11ac80B4	Test Date	:2018-08-27
Fundamental Frequency	:5775 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Kane
EUT Pol.	:H 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
11550.00	Average	27.28	21.66	48.94	54.00	-5.06
11550.00	Peak	35.26	21.66	56.92	74.00	-17.08

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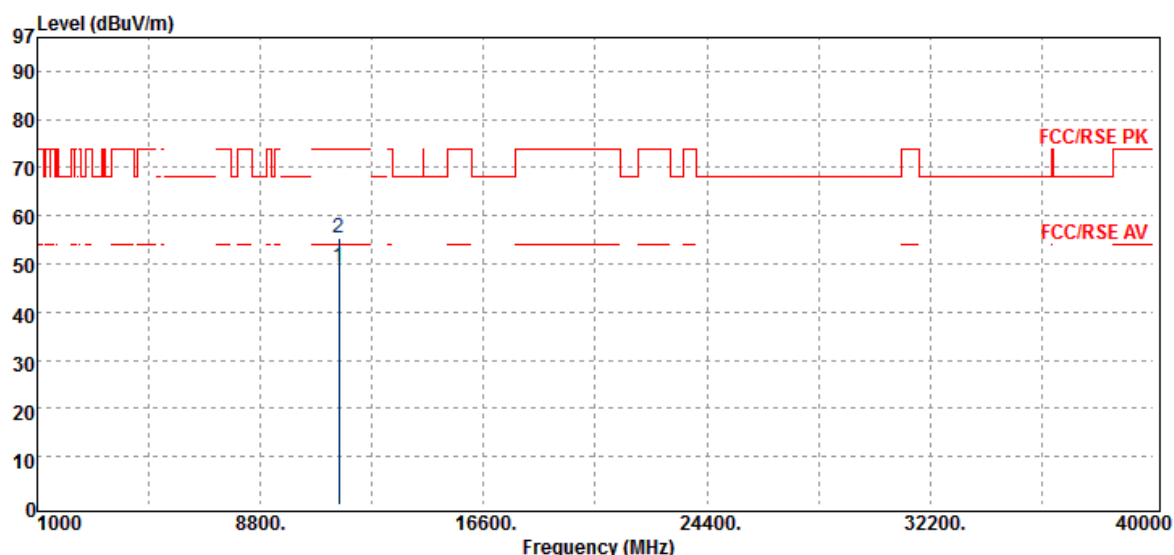
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Operation Band :802.11ac80B4
 Fundamental Frequency :5775 MHz
 Operation Mode :Tx CH LOW
 EUT Pol. :H Plane

Test Date :2018-08-27
 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	27.81	21.66	49.47	54.00	-4.53
11550.00	Peak	33.56	21.66	55.22	74.00	-18.78

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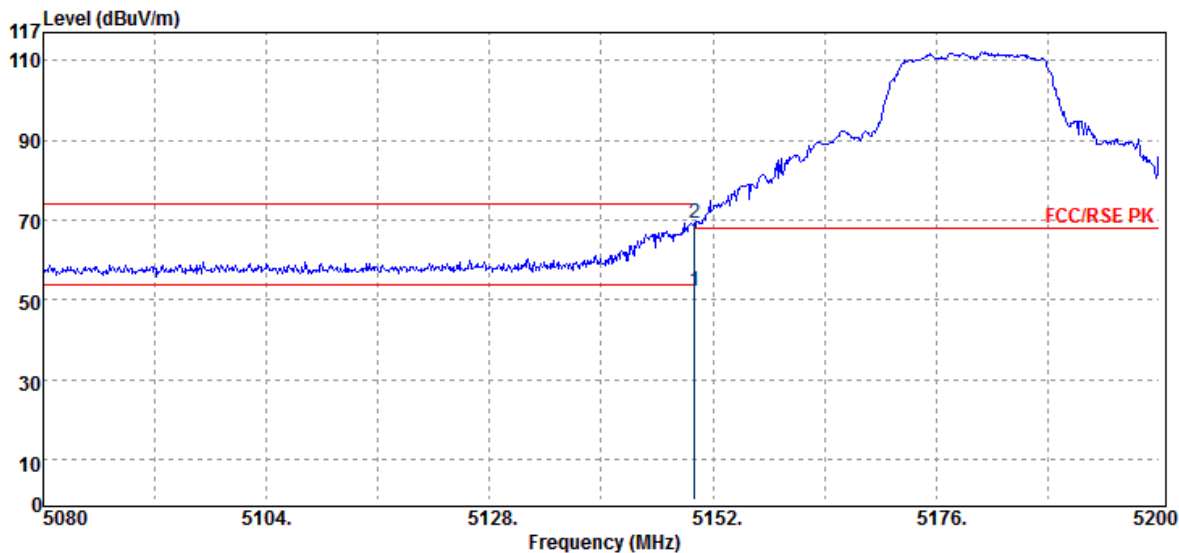
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Band edge falling to restricted band

802.11a mode

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

Test Date :2018-07-20
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	43.77	8.32	52.09	54.00	-1.91
5150.00	Peak	60.95	8.32	69.27	74.00	-4.73

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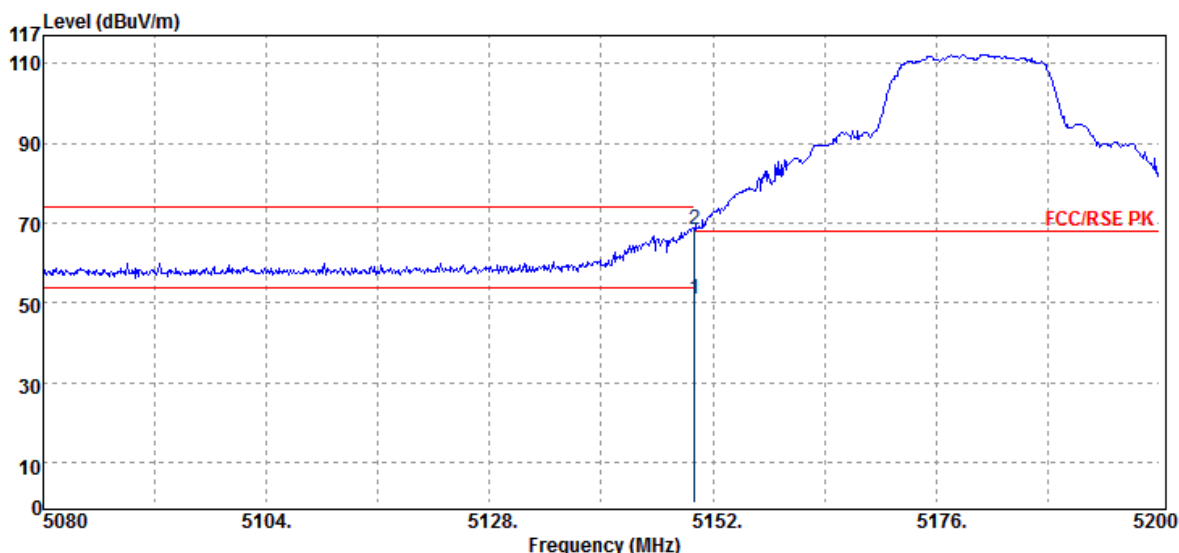
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www.tw.sgs.com

Member of SGS Group

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

Test Date :2018-07-20
 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
5150.00	Average	42.87	8.32	51.19	54.00	-2.81
5150.00	Peak	60.20	8.32	68.52	74.00	-5.48

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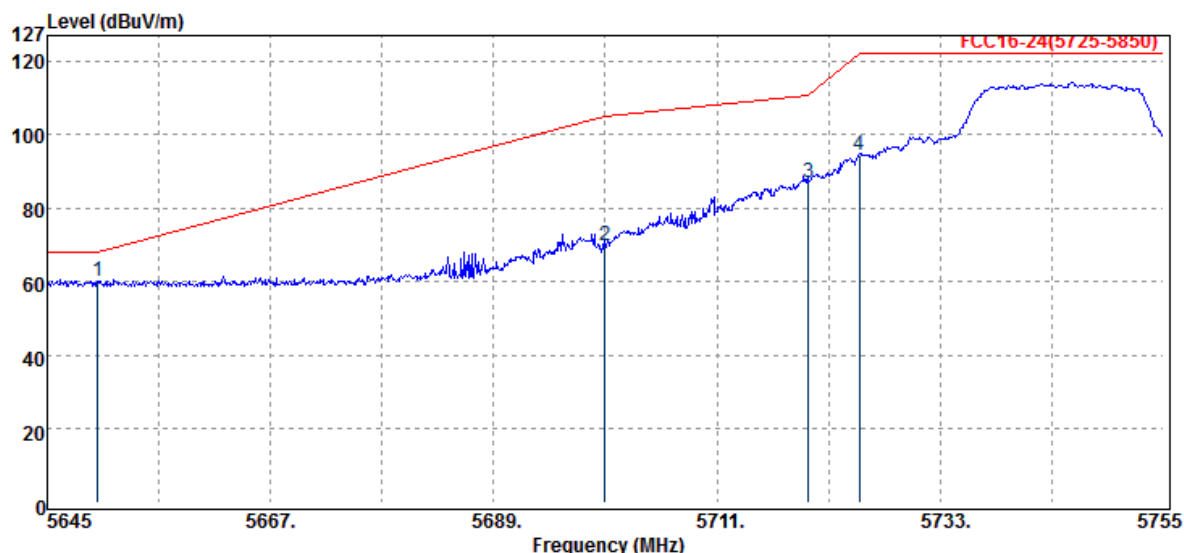
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www.tw.sgs.com

Member of SGS Group

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

Test Date :2018-07-20
 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	50.82	9.20	60.02	68.23	-8.21
5700.00	Peak	60.36	9.35	69.71	105.23	-35.52
5720.00	Peak	77.50	9.43	86.93	110.83	-23.90
5725.00	Peak	85.00	9.44	94.44	122.23	-27.79

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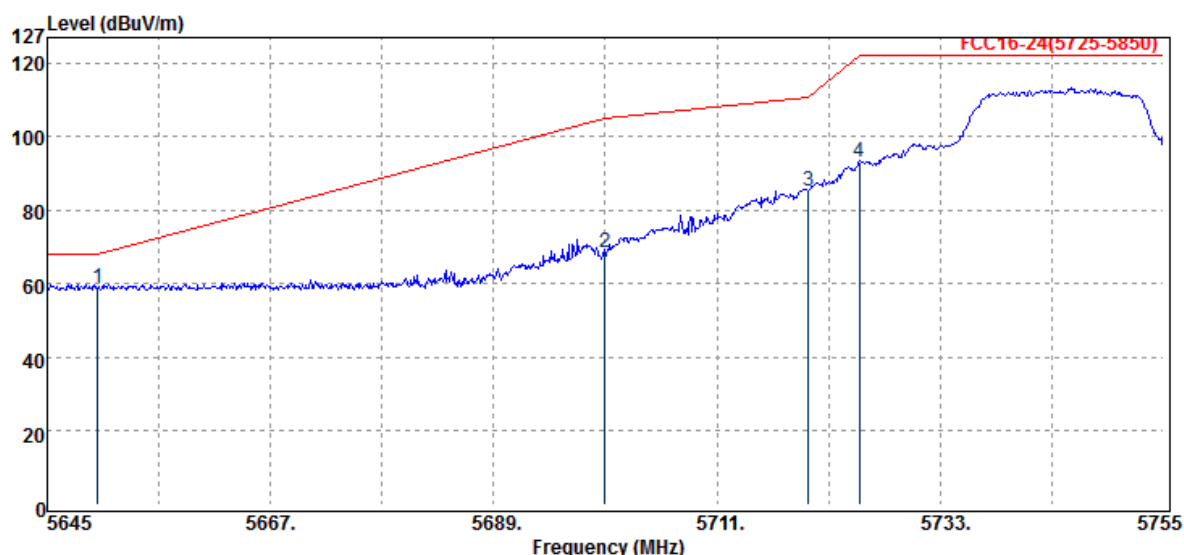
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Operation Band :802.11aB4
 Fundamental Frequency :5745 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :H Plane

Test Date :2018-07-20
 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	49.77	9.20	58.97	68.23	-9.26
5700.00	Peak	59.13	9.35	68.48	105.23	-36.75
5720.00	Peak	75.83	9.43	85.26	110.83	-25.57
5725.00	Peak	83.60	9.44	93.04	122.23	-29.19

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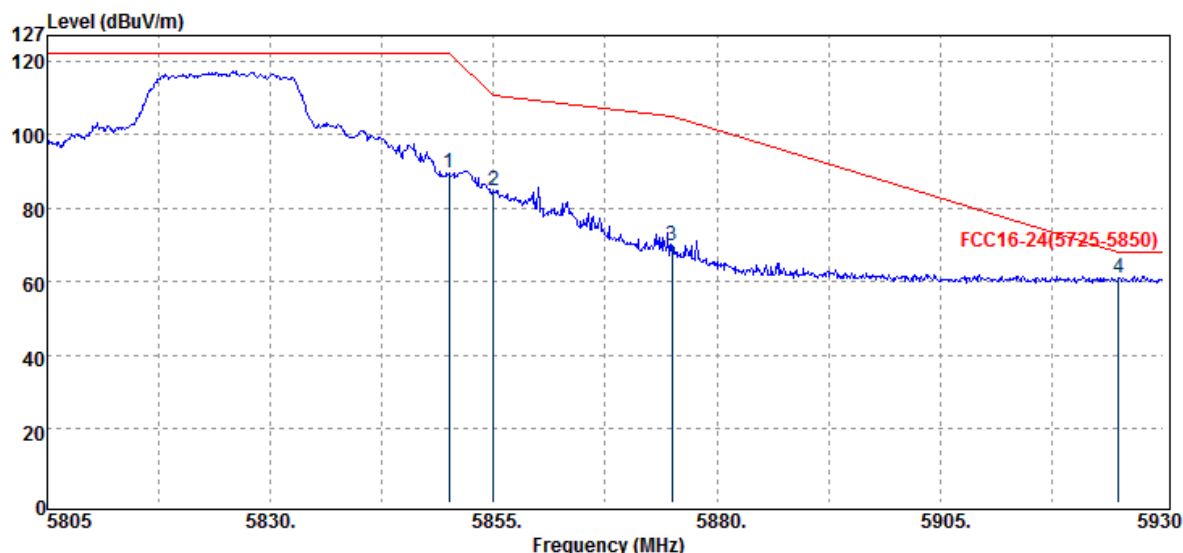
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Member of SGS Group

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

Test Date :2018-07-20
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



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	79.71	9.77	89.48	122.23	-32.75
5855.00	Peak	74.88	9.78	84.66	110.83	-26.17
5875.00	Peak	59.91	9.82	69.73	105.23	-35.50
5925.00	Peak	51.06	9.98	61.04	68.23	-7.19

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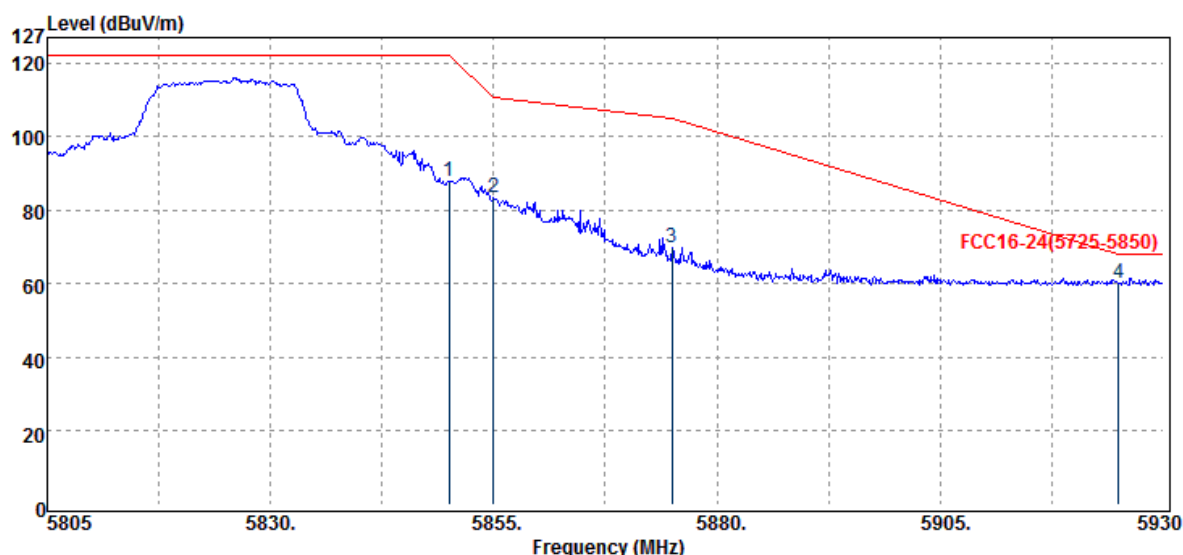
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Operation Band :802.11aB4
 Fundamental Frequency :5825 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :H Plane

Test Date :2018-07-20
 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	78.18	9.77	87.95	122.23	-34.28
5855.00	Peak	73.83	9.78	83.61	110.83	-27.22
5875.00	Peak	60.23	9.82	70.05	105.23	-35.18
5925.00	Peak	50.39	9.98	60.37	68.23	-7.86

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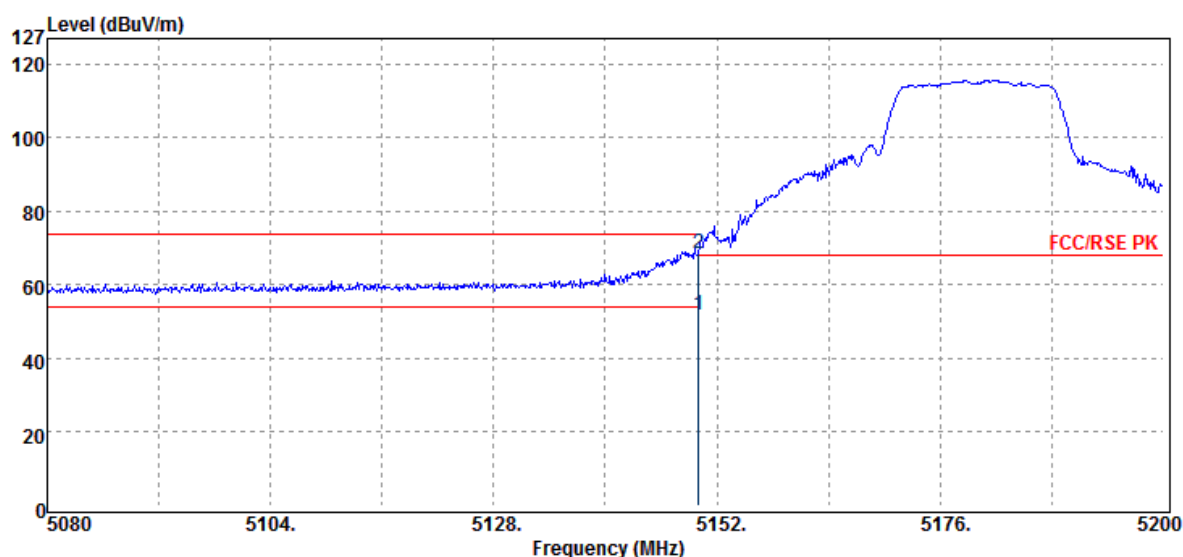
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802.11n20 HT mode

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

Test Date :2018-07-20
 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	43.71	8.32	52.03	54.00	-1.97
5150.00	Peak	60.23	8.32	68.55	74.00	-5.45

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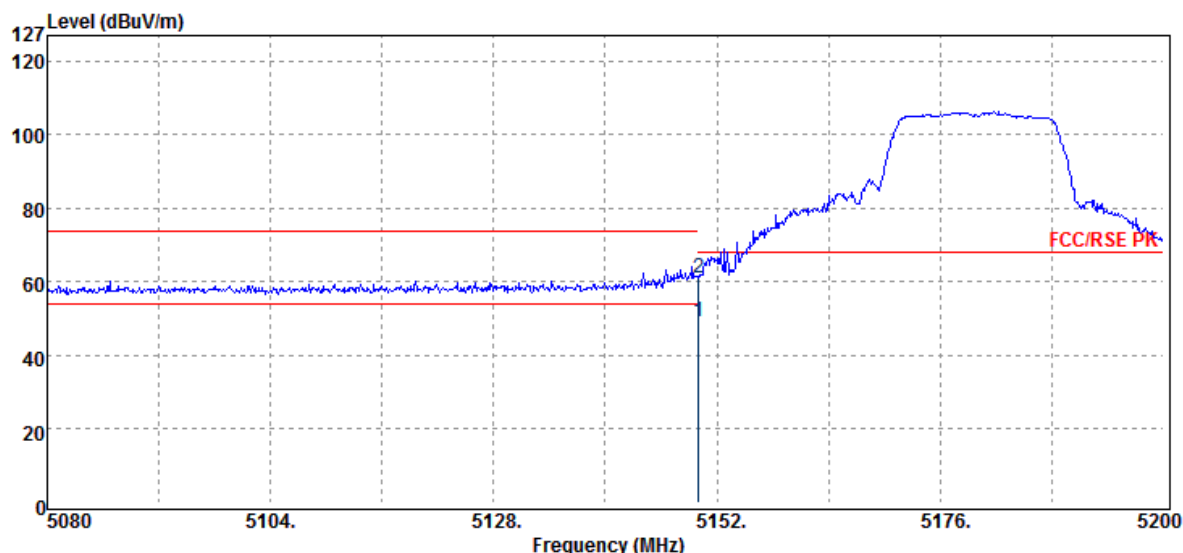
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Operation Band :802.11n20B1
 Fundamental Frequency :5180 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :H Plane

Test Date :2018-07-20
 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	40.69	8.32	49.01	54.00	-4.99
5150.00	Peak	52.62	8.32	60.94	74.00	-13.06

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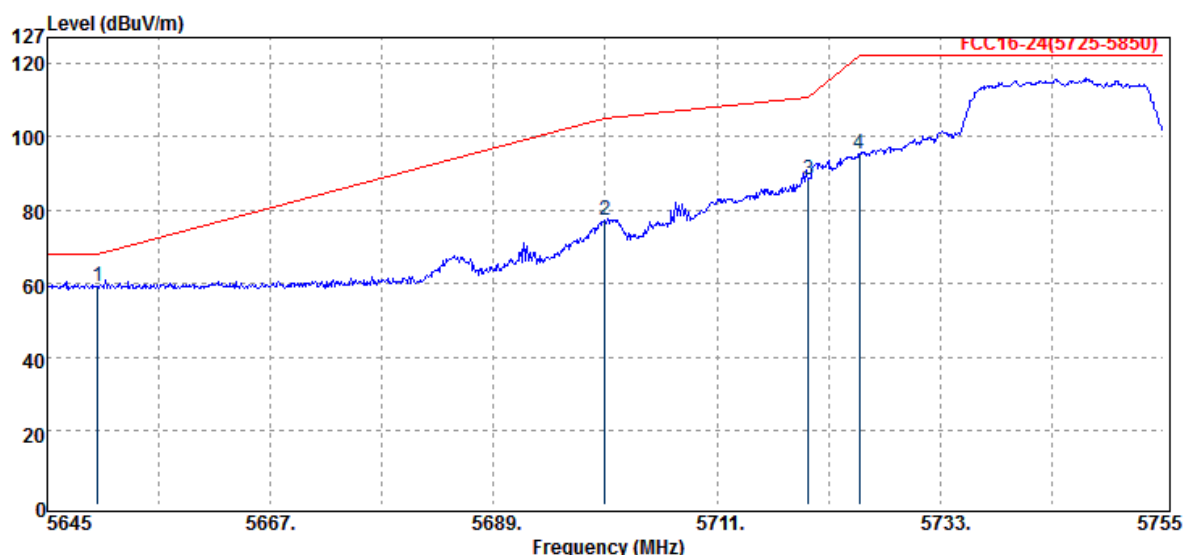
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Operation Band :802.11n20B4
 Fundamental Frequency :5745 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :H Plane

Test Date :2018-07-20
 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	67.91	9.35	77.26	105.23	-27.97
5720.00	Peak	78.89	9.43	88.32	110.83	-22.51
5725.00	Peak	85.79	9.44	95.23	122.23	-27.00

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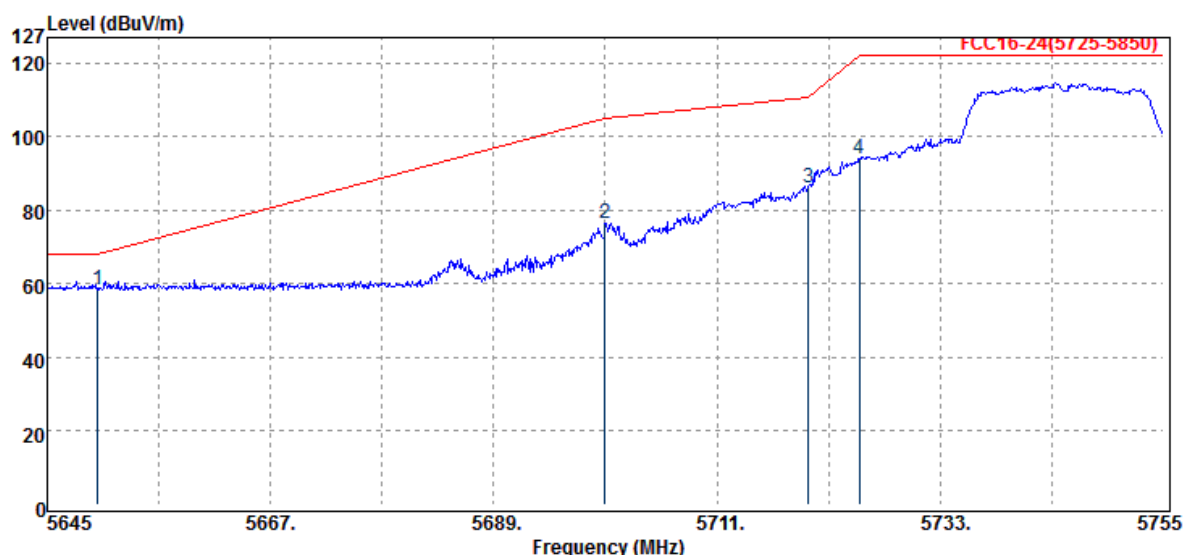
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Operation Band :802.11n20B4
 Fundamental Frequency :5745 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :H Plane

Test Date :2018-07-20
 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	49.11	9.20	58.31	68.23	-9.92
5700.00	Peak	67.02	9.35	76.37	105.23	-28.86
5720.00	Peak	76.52	9.43	85.95	110.83	-24.88
5725.00	Peak	84.59	9.44	94.03	122.23	-28.20

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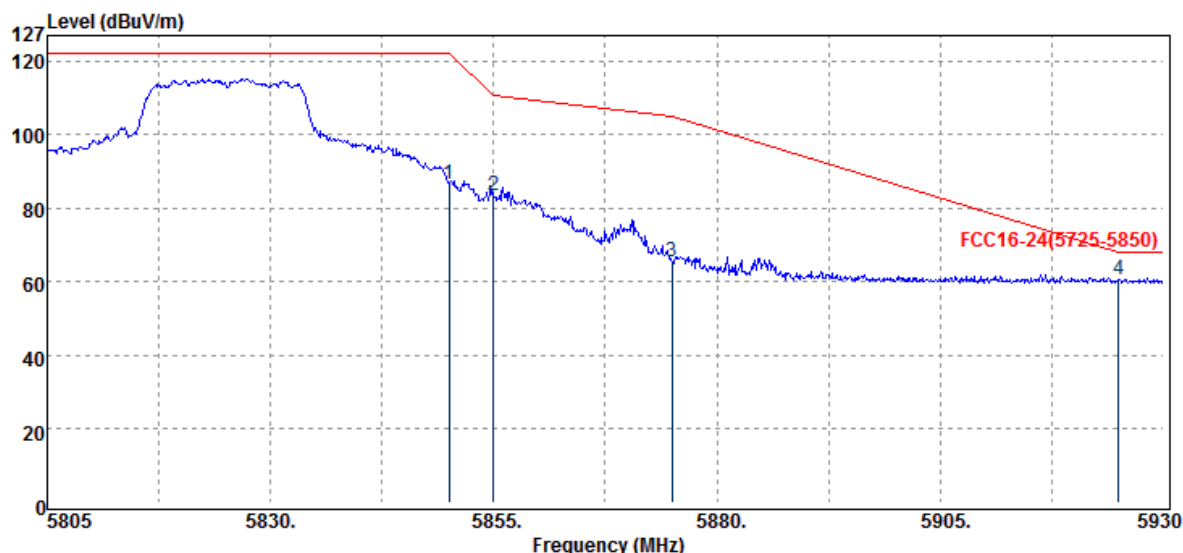
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Operation Band :802.11n20B4
 Fundamental Frequency :5825 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :H Plane

Test Date :2018-07-20
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



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	76.81	9.77	86.58	122.23	-35.65
5855.00	Peak	73.65	9.78	83.43	110.83	-27.40
5875.00	Peak	55.61	9.82	65.43	105.23	-39.80
5925.00	Peak	50.84	9.98	60.82	68.23	-7.41

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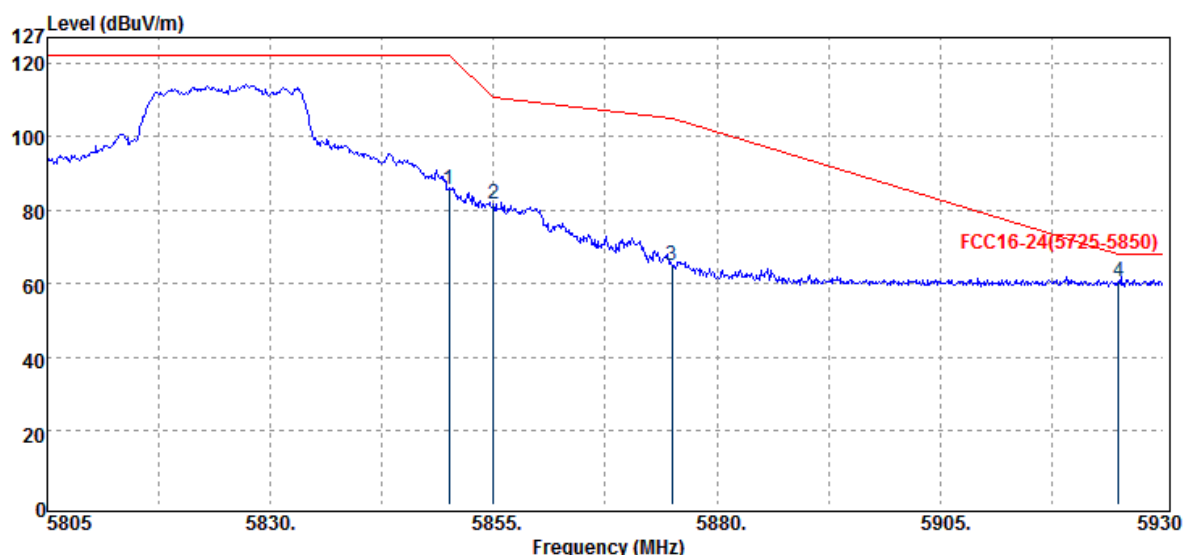
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Operation Band :802.11n20B4
 Fundamental Frequency :5825 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :H Plane

Test Date :2018-07-20
 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	76.06	9.77	85.83	122.23	-36.40
5855.00	Peak	71.77	9.78	81.55	110.83	-29.28
5875.00	Peak	55.01	9.82	64.83	105.23	-40.40
5925.00	Peak	50.65	9.98	60.63	68.23	-7.60

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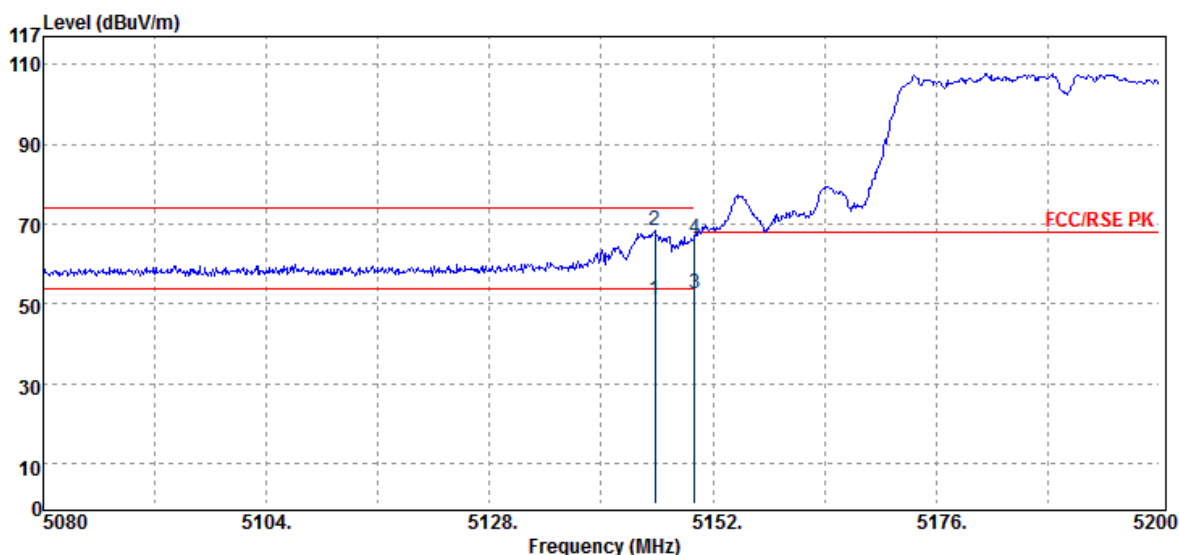
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802.11n40 HT mode

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

Test Date :2018-07-20
 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
5145.76	Average	42.55	8.30	50.85	54.00	-3.15
5145.76	Peak	59.92	8.30	68.22	74.00	-5.78
5150.00	Average	44.23	8.32	52.55	54.00	-1.45
5150.00	Peak	58.21	8.32	66.53	74.00	-7.47

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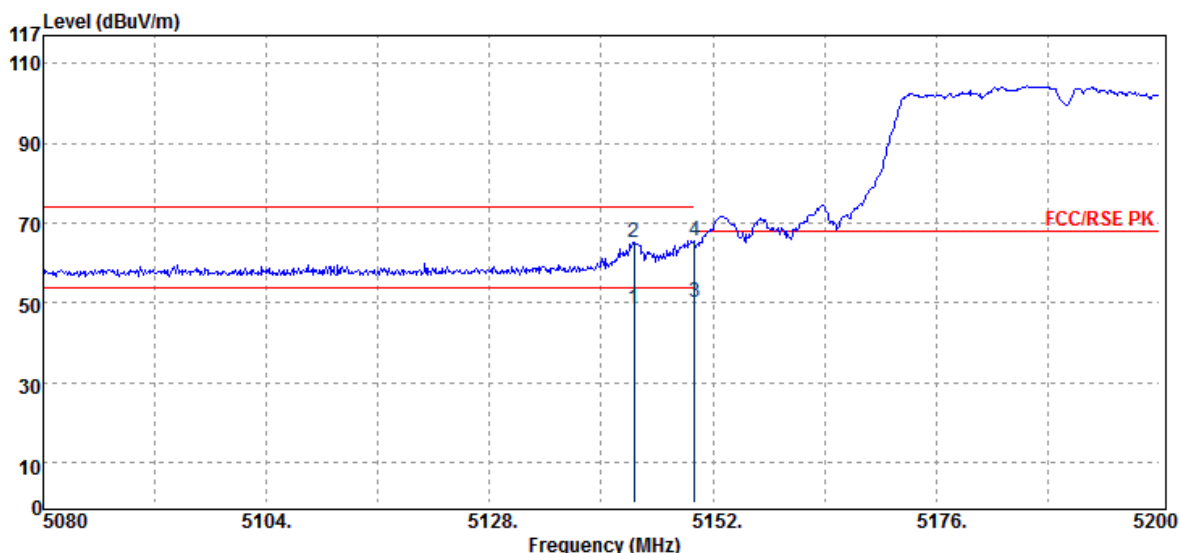
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Operation Band :802.11n40B1
 Fundamental Frequency :5190 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :H Plane

Test Date :2018-07-20
 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
5143.48	Average	40.21	8.30	48.51	54.00	-5.49
5143.48	Peak	56.97	8.30	65.27	74.00	-8.73
5150.00	Average	41.72	8.32	50.04	54.00	-3.96
5150.00	Peak	57.35	8.32	65.67	74.00	-8.33

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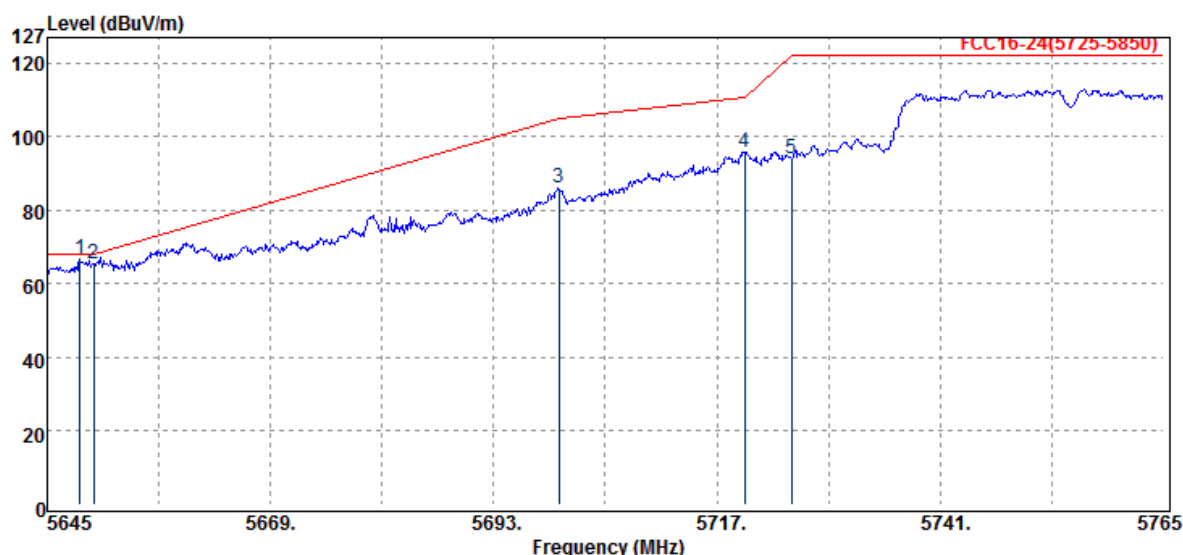
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Member of SGS Group

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

Test Date :2018-07-20
 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
5648.48	Peak	57.62	9.19	66.81	68.23	-1.42
5650.00	Peak	56.38	9.20	65.58	68.23	-2.65
5700.00	Peak	76.65	9.35	86.00	105.23	-19.23
5720.00	Peak	86.44	9.43	95.87	110.83	-14.96
5725.00	Peak	84.72	9.44	94.16	122.23	-28.07

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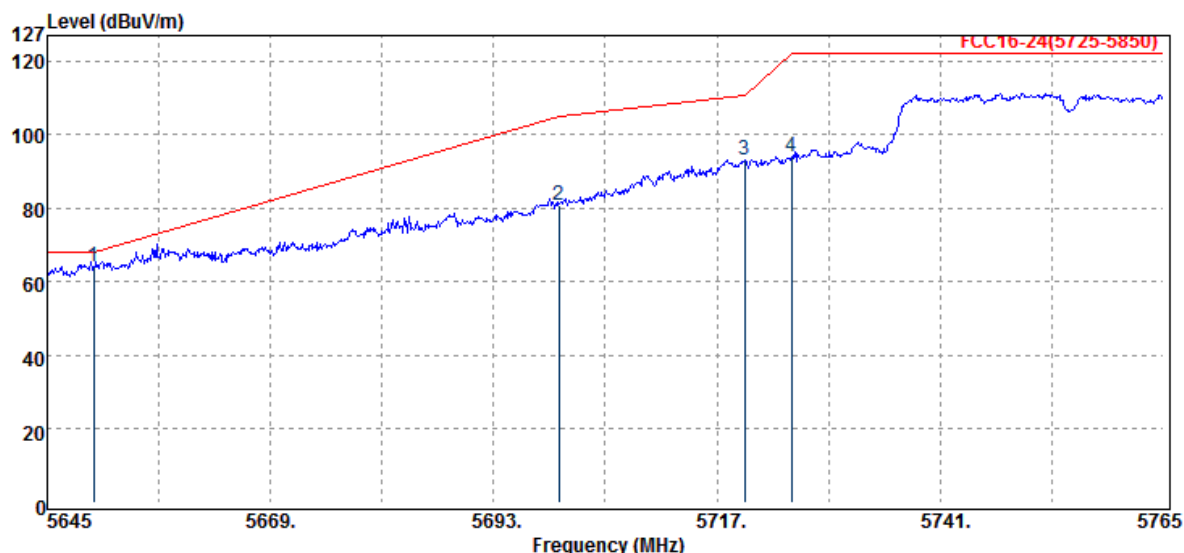
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Operation Band :802.11n40B4
 Fundamental Frequency :5755 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :H Plane

Test Date :2018-07-20
 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	54.97	9.20	64.17	68.23	-4.06
5700.00	Peak	71.45	9.35	80.80	105.23	-24.43
5720.00	Peak	83.86	9.43	93.29	110.83	-17.54
5725.00	Peak	84.70	9.44	94.14	122.23	-28.09

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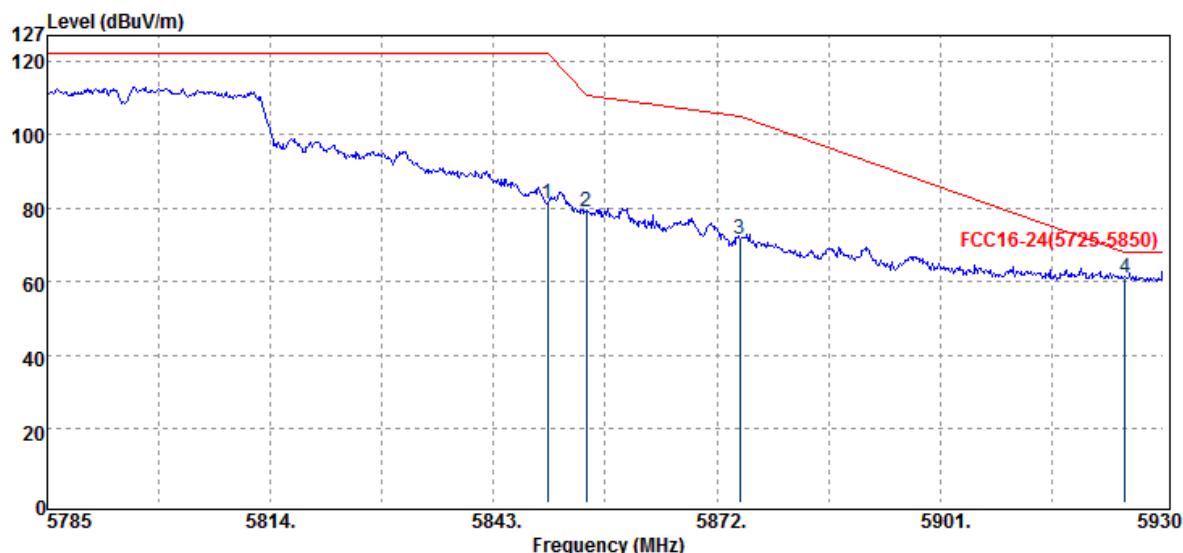
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Operation Band :802.11n40B4
 Fundamental Frequency :5795 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :H Plane

Test Date :2018-07-20
 Temp./Humi. :23 deg_C / 62 RH
 Engineer :Kane
 Measurement Antenna Pol. :VERTICAL



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	71.39	9.77	81.16	122.23	-41.07
5855.00	Peak	69.16	9.78	78.94	110.83	-31.89
5875.00	Peak	61.75	9.82	71.57	105.23	-33.66
5925.00	Peak	51.30	9.98	61.28	68.23	-6.95

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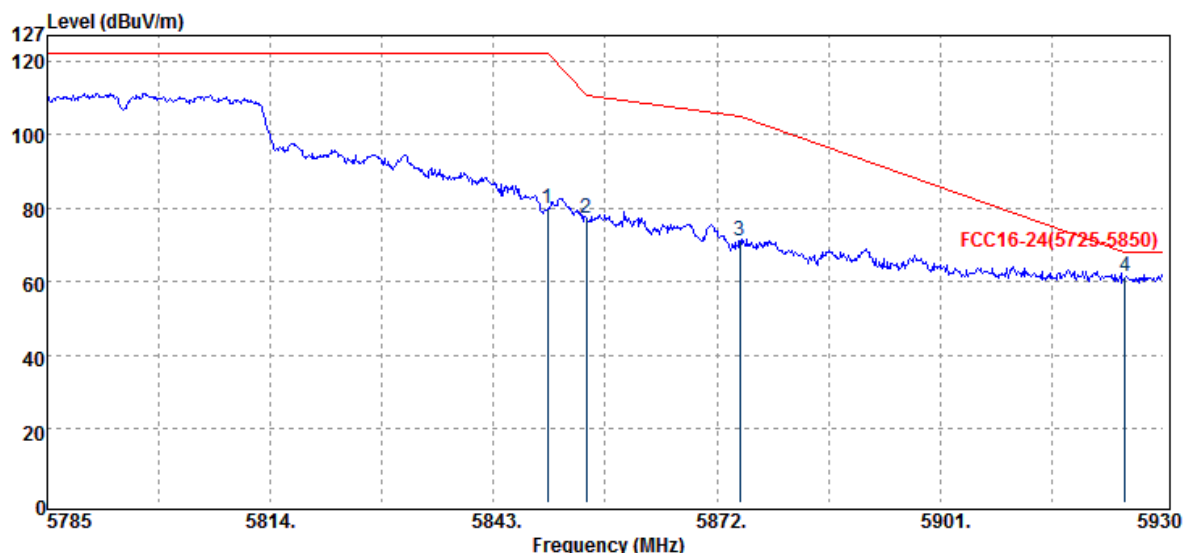
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Operation Band :802.11n40B4
 Fundamental Frequency :5795 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :H Plane

Test Date :2018-07-20
 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	70.22	9.77	79.99	122.23	-42.24
5855.00	Peak	67.54	9.78	77.32	110.83	-33.51
5875.00	Peak	61.53	9.82	71.35	105.23	-33.88
5925.00	Peak	51.43	9.98	61.41	68.23	-6.82

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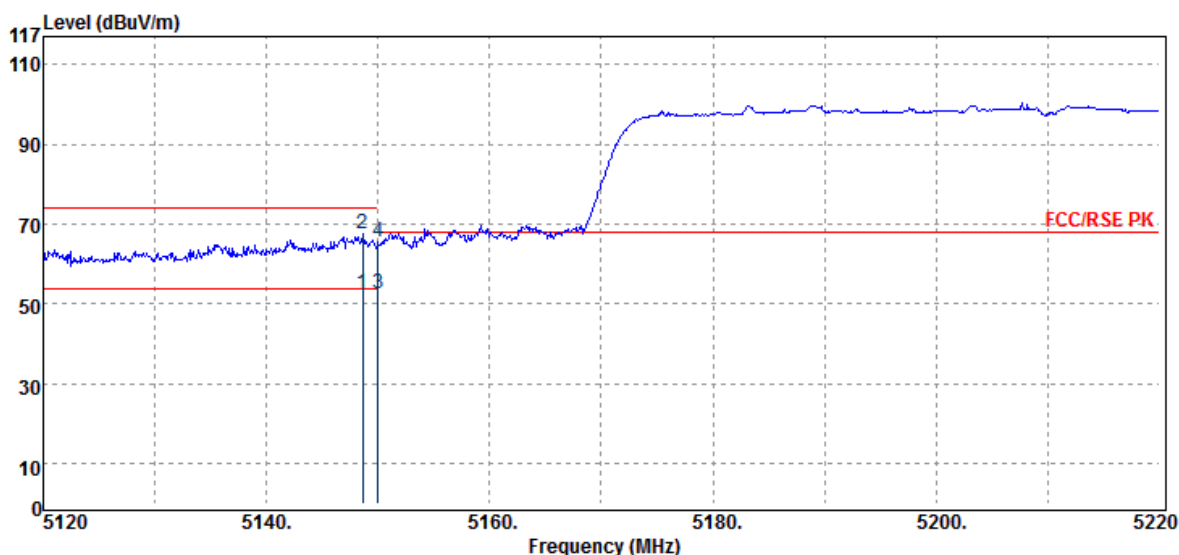
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802.11ac80 VHT mode

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

Test Date :2018-07-20
 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
5148.60	Average	44.29	8.30	52.59	54.00	-1.41
5148.60	Peak	59.26	8.30	67.56	74.00	-6.44
5150.00	Average	44.33	8.32	52.65	54.00	-1.35
5150.00	Peak	57.19	8.32	65.51	74.00	-8.49

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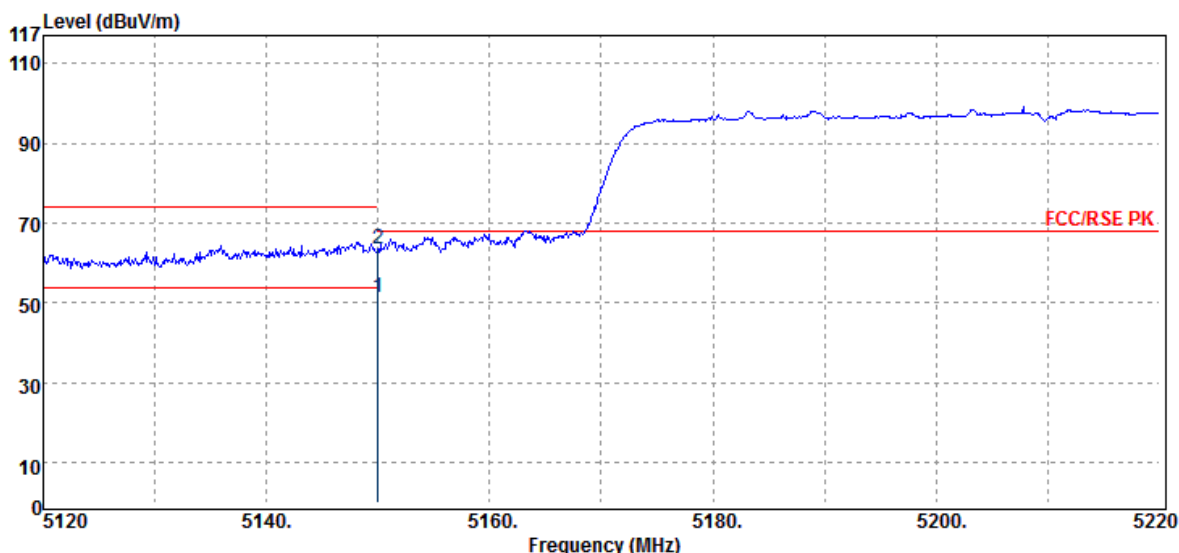
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Operation Band :802.11ac80B1
 Fundamental Frequency :5210 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :H Plane

Test Date :2018-07-20
 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
5150.00	Average	42.96	8.32	51.28	54.00	-2.72
5150.00	Peak	55.15	8.32	63.47	74.00	-10.53

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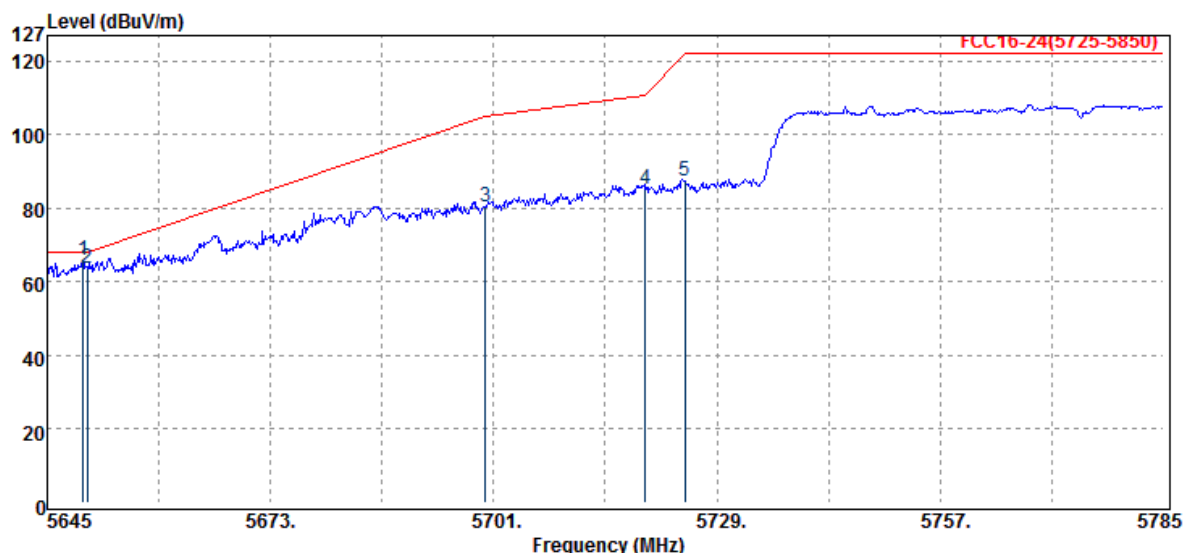
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Operation Band :802.11ac80B4
 Fundamental Frequency :5775 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :H Plane

Test Date :2018-07-20
 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
5649.48	Peak	56.89	9.20	66.09	68.23	-2.14
5650.00	Peak	54.57	9.20	63.77	68.23	-4.46
5700.00	Peak	70.90	9.35	80.25	105.23	-24.98
5720.00	Peak	75.78	9.43	85.21	110.83	-25.62
5725.00	Peak	77.95	9.44	87.39	122.23	-34.84

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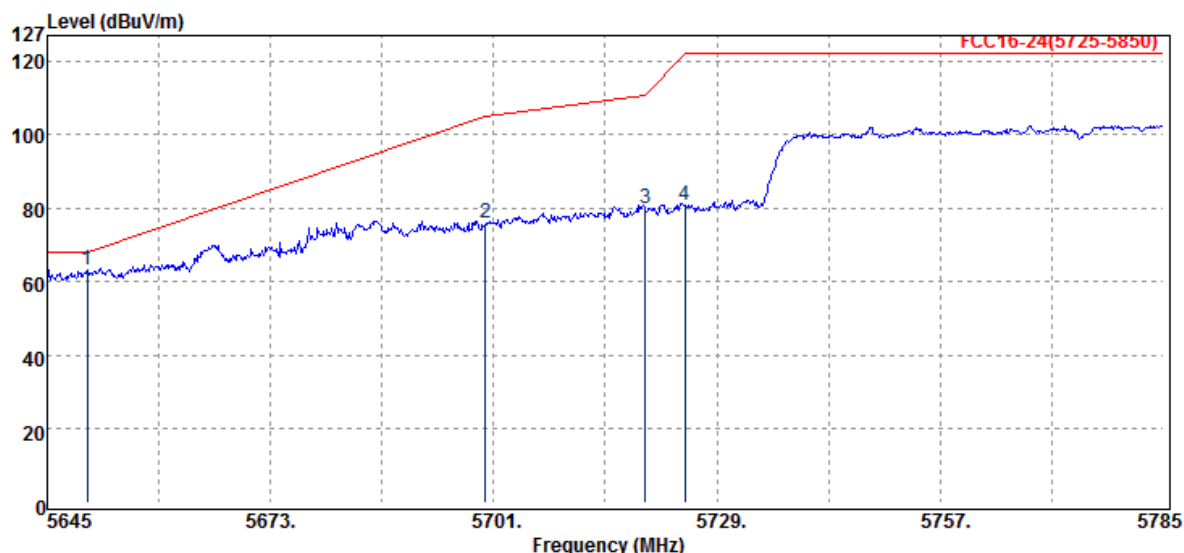
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Operation Band :802.11ac80B4
 Fundamental Frequency :5775 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :H Plane

Test Date :2018-07-20
 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
5650.00	Peak	54.13	9.20	63.33	68.23	-4.90
5700.00	Peak	66.53	9.35	75.88	105.23	-29.35
5720.00	Peak	70.51	9.43	79.94	110.83	-30.89
5725.00	Peak	71.25	9.44	80.69	122.23	-41.54

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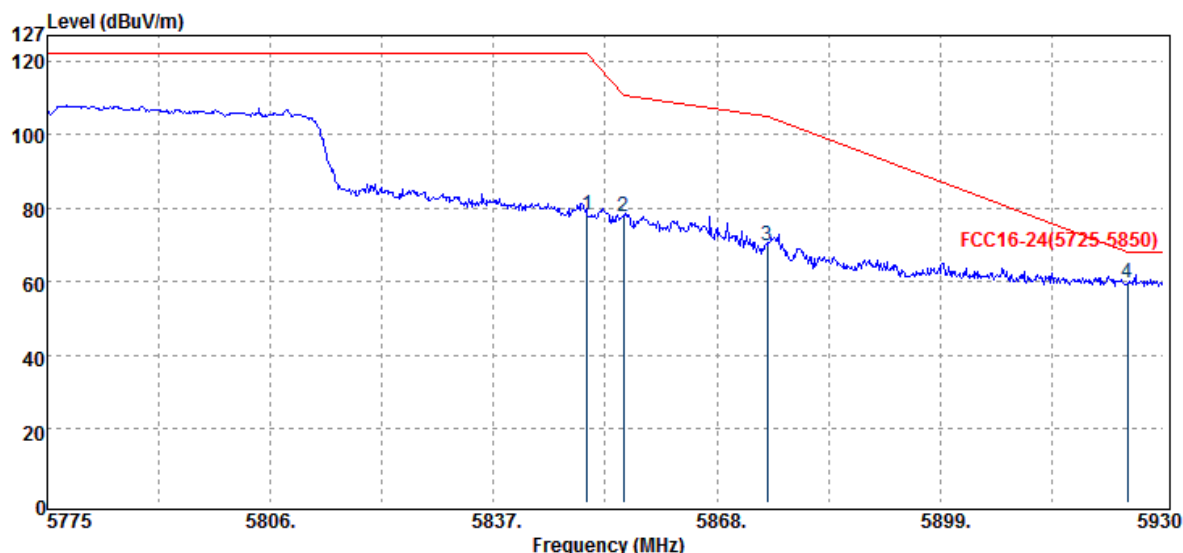
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Operation Band :802.11ac80B4
 Fundamental Frequency :5775 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :H Plane

Test Date :2018-07-20
 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	68.24	9.77	78.01	122.23	-44.22
5855.00	Peak	68.17	9.78	77.95	110.83	-32.88
5875.00	Peak	60.03	9.82	69.85	105.23	-35.38
5925.00	Peak	50.00	9.98	59.98	68.23	-8.25

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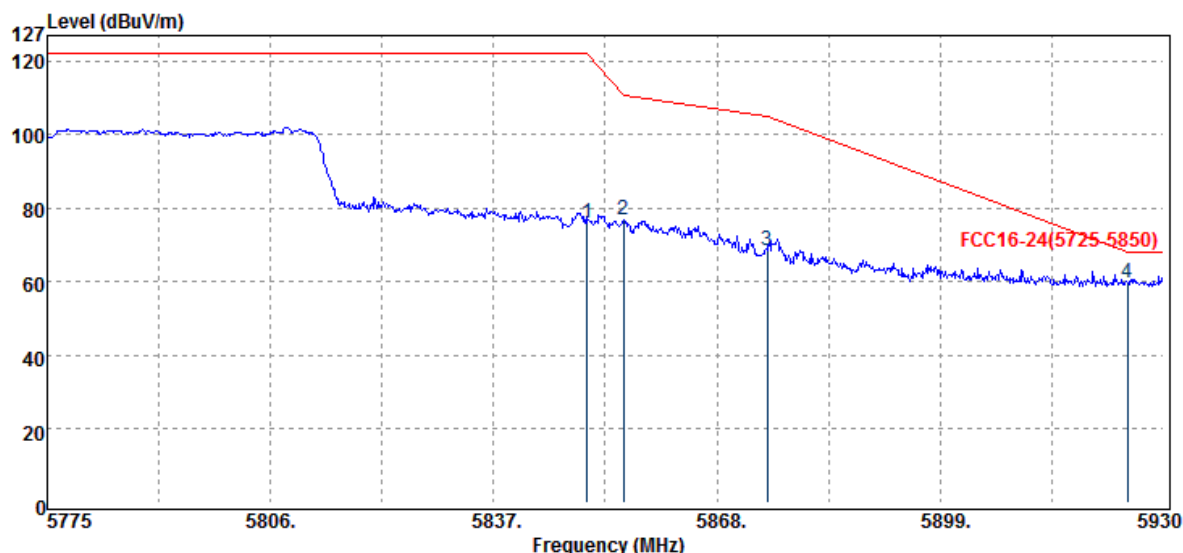
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Operation Band :802.11ac80B4
 Fundamental Frequency :5775 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :H Plane

Test Date :2018-07-20
 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	66.16	9.77	75.93	122.23	-46.30
5855.00	Peak	66.99	9.78	76.77	110.83	-34.06
5875.00	Peak	58.82	9.82	68.64	105.23	-36.59
5925.00	Peak	49.67	9.98	59.65	68.23	-8.58

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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

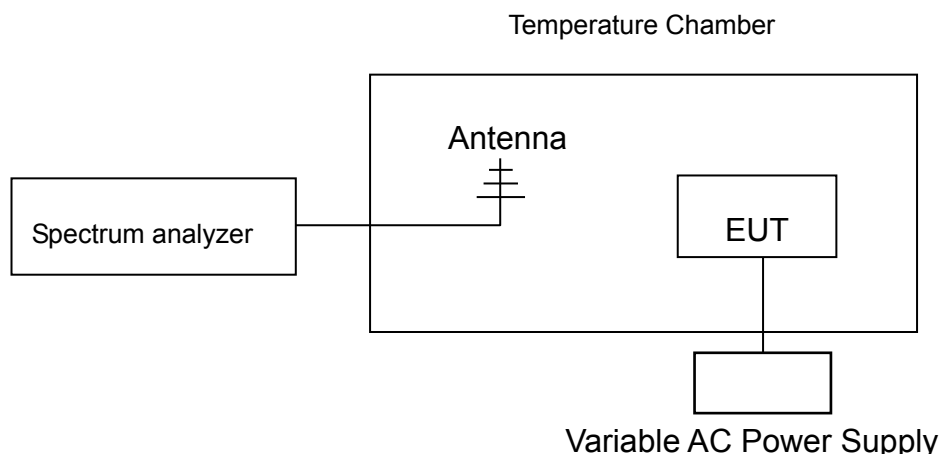
13.1 Standard Applicable

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	MY57120290	2018/02/14	2019/02/13
Temperature Chamber	TERCHY	MHG-120LF	911009	2018/05/18	2019/05/17
Attenuator	Mini-Circuit	BW-S10W2+	4	2018/01/02	2019/01/01
Attenuator	Mini-Circuit	BW-S10W2+	2	2018/01/02	2019/01/01
Coaxial Cables	N/A	WK CE Cable	N/A	2018/01/02	2019/01/01
Notebook	Lenovo	L430	R9-WGNK5	N/A	N/A

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13.5 Measurement Result

Startup

Operation Mode	802.11 a	Test Date	2018.09.4
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	138V	36	5180	5,179.98767	0.00000238
		44	5220	5,220.00155	-0.00000030
		48	5240	5,239.96873	0.00000597
		149	5745	5,744.97724	0.00000396
		157	5785	5,784.98372	0.00000281
		165	5825	5,824.99700	0.00000051
	102V	36	5180	5,179.99677	0.00000062
		44	5220	5,219.98773	0.00000235
		48	5240	5,239.98265	0.00000331
		149	5745	5,744.98655	0.00000234
		157	5785	5,784.97805	0.00000379
		165	5825	5,824.98496	0.00000258
25 °C	120V	36	5180	5,179.99965	0.00000007
		44	5220	5,219.99206	0.00000152
		48	5240	5,239.97368	0.00000502
		149	5745	5,744.98766	0.00000215
		157	5785	5,784.99332	0.00000115
		165	5825	5,824.99213	0.00000135
55 °C	138V	36	5180	5,179.98442	0.00000301
		44	5220	5,220.00380	-0.00000073
		48	5240	5,239.97543	0.00000469
		149	5745	5,744.98560	0.00000251
		157	5785	5,784.98274	0.00000298
		165	5825	5,824.98194	0.00000310
	102V	36	5180	5,179.98591	0.00000272
		44	5220	5,220.00185	-0.00000035
		48	5240	5,239.98147	0.00000354
		149	5745	5,744.98170	0.00000319
		157	5785	5,784.98677	0.00000229
		165	5825	5,824.98099	0.00000326

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Operation Mode	802.11 n_HT40	Test Date	2018.09.4
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	138V	38	5190	5,189.98481	0.00000293
		46	5230	5,230.00717	-0.00000137
		151	5755	5,754.97963	0.00000354
		159	5795	5,794.98390	0.00000278
	102V	38	5190	5,189.99903	0.00000019
		46	5230	5,229.99788	0.00000040
		151	5755	5,754.97361	0.00000459
		159	5795	5,794.99017	0.00000170
25 °C	120V	38	5190	5,190.00033	-0.00000006
		46	5230	5,230.00093	-0.00000018
		151	5755	5,754.98298	0.00000296
		159	5795	5,794.97384	0.00000451
55 °C	138V	38	5190	5,189.99540	0.00000089
		46	5230	5,230.01320	-0.00000252
		151	5755	5,754.97324	0.00000465
		159	5795	5,794.98183	0.00000313
	102V	38	5190	5,189.98286	0.00000330
		46	5230	5,230.01159	-0.00000222
		151	5755	5,754.98884	0.00000194
		159	5795	5,794.97562	0.00000421

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Operation Mode	802.11 ac_VHT80	Test Date	2018.09.4
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	138V	42	5210	5,209.99977	0.00000005
		155	5775	5,774.99924	0.00000013
	102V	42	5210	5,210.00877	-0.00000168
		155	5775	5,774.99182	0.00000142
25 °C	120V	42	5210	5,210.00294	-0.00000056
		155	5775	5,774.99361	0.00000111
55 °C	138V	42	5210	5,210.00019	-0.00000004
		155	5775	5,775.00739	-0.00000128
	102V	42	5210	5,209.99878	0.00000023
		155	5775	5,774.99198	0.00000139

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2 Minutes:

Operation Mode	802.11 a	Test Date	2018.09.4
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	138V	36	5180	5,179.98998	0.00000193
		44	5220	5,219.99849	0.00000029
		48	5240	5,239.96865	0.00000598
		149	5745	5,744.98108	0.00000329
		157	5785	5,784.99381	0.00000107
		165	5825	5,824.98069	0.00000332
	102V	36	5180	5,179.99467	0.00000103
		44	5220	5,219.98677	0.00000254
		48	5240	5,239.97136	0.00000547
		149	5745	5,744.99210	0.00000138
		157	5785	5,784.99307	0.00000120
		165	5825	5,824.98960	0.00000179
25 °C	120V	36	5180	5,179.99190	0.00000156
		44	5220	5,219.99909	0.00000017
		48	5240	5,239.97258	0.00000523
		149	5745	5,744.98714	0.00000224
		157	5785	5,784.99147	0.00000148
		165	5825	5,824.98320	0.00000288
55 °C	138V	36	5180	5,179.99325	0.00000130
		44	5220	5,220.00021	-0.00000004
		48	5240	5,239.96895	0.00000593
		149	5745	5,744.97690	0.00000402
		157	5785	5,784.97674	0.00000402
		165	5825	5,824.98157	0.00000316
	102V	36	5180	5,179.98626	0.00000265
		44	5220	5,219.99236	0.00000146
		48	5240	5,239.97131	0.00000548
		149	5745	5,744.99140	0.00000150
		157	5785	5,784.99395	0.00000105
		165	5825	5,824.98811	0.00000204

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Operation Mode	802.11 n_HT40	Test Date	2018.09.4
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	138V	38	5190	5,189.98267	0.00000334
		46	5230	5,230.01178	-0.00000225
		151	5755	5,754.98836	0.00000202
		159	5795	5,794.97349	0.00000457
	102V	38	5190	5,190.00127	-0.00000024
		46	5230	5,230.01457	-0.00000279
		151	5755	5,754.97420	0.00000448
		159	5795	5,794.98669	0.00000230
25 °C	120V	38	5190	5,189.99790	0.00000041
		46	5230	5,230.00927	-0.00000177
		151	5755	5,754.98000	0.00000348
		159	5795	5,794.98030	0.00000340
55 °C	138V	38	5190	5,189.99999	0.00000000
		46	5230	5,230.00680	-0.00000130
		151	5755	5,754.98710	0.00000224
		159	5795	5,794.98669	0.00000230
	102V	38	5190	5,189.98516	0.00000286
		46	5230	5,230.01192	-0.00000228
		151	5755	5,754.97457	0.00000442
		159	5795	5,794.98893	0.00000191

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f (886-2) 2298-0488

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Operation Mode	802.11 ac_VHT80	Test Date	2018.09.4
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	138V	42	5210	5,210.00448	-0.00000086
		155	5775	5,775.00002	0.00000000
	102V	42	5210	5,210.00942	-0.00000181
		155	5775	5,775.00843	-0.00000146
25 °C	120V	42	5210	5,209.99396	0.00000116
		155	5775	5,775.00555	-0.00000096
55 °C	138V	42	5210	5,210.00519	-0.00000100
		155	5775	5,774.99656	0.00000060
	102V	42	5210	5,210.00736	-0.00000141
		155	5775	5,775.00102	-0.00000018

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5 Minutes:

Operation Mode	802.11 a	Test Date	2018.09.4
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	138V	36	5180	5,179.99245	0.00000146
		44	5220	5,219.99918	0.00000016
		48	5240	5,239.98072	0.00000368
		149	5745	5,744.98865	0.00000198
		157	5785	5,784.99142	0.00000148
		165	5825	5,824.98743	0.00000216
	102V	36	5180	5,179.99498	0.00000097
		44	5220	5,220.00386	-0.00000074
		48	5240	5,239.96664	0.00000637
		149	5745	5,744.97926	0.00000361
		157	5785	5,784.98054	0.00000336
		165	5825	5,824.99292	0.00000122
25 °C	120V	36	5180	5,179.99588	0.00000080
		44	5220	5,219.98860	0.00000218
		48	5240	5,239.98148	0.00000353
		149	5745	5,744.98493	0.00000262
		157	5785	5,784.98483	0.00000262
		165	5825	5,824.98246	0.00000301
55 °C	138V	36	5180	5,179.98311	0.00000326
		44	5220	5,219.98753	0.00000239
		48	5240	5,239.97940	0.00000393
		149	5745	5,744.98103	0.00000330
		157	5785	5,784.97717	0.00000395
		165	5825	5,824.98092	0.00000328
	102V	36	5180	5,179.98268	0.00000334
		44	5220	5,219.98746	0.00000240
		48	5240	5,239.97743	0.00000431
		149	5745	5,744.97679	0.00000404
		157	5785	5,784.97906	0.00000362
		165	5825	5,824.97991	0.00000345

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Operation Mode	802.11 n_HT40	Test Date	2018.09.4
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	138V	38	5190	5,190.00029	-0.00000006
		46	5230	5,230.01009	-0.00000193
		151	5755	5,754.98652	0.00000234
		159	5795	5,794.98772	0.00000212
	102V	38	5190	5,189.98672	0.00000256
		46	5230	5,229.99686	0.00000060
		151	5755	5,754.98723	0.00000222
		159	5795	5,794.99004	0.00000172
25 °C	120V	38	5190	5,189.98864	0.00000219
		46	5230	5,230.00906	-0.00000173
		151	5755	5,754.97571	0.00000422
		159	5795	5,794.98331	0.00000288
55 °C	138V	38	5190	5,189.99354	0.00000125
		46	5230	5,230.00560	-0.00000107
		151	5755	5,754.98044	0.00000340
		159	5795	5,794.98157	0.00000318
	102V	38	5190	5,189.99616	0.00000074
		46	5230	5,230.00685	-0.00000131
		151	5755	5,754.98361	0.00000285
		159	5795	5,794.98704	0.00000224

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Operation Mode	802.11 ac_VHT80	Test Date	2018.09.4
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	138V	42	5210	5,210.00987	-0.00000189
		155	5775	5,775.00759	-0.00000131
	102V	42	5210	5,210.00146	-0.00000028
		155	5775	5,775.00364	-0.00000063
25 °C	120V	42	5210	5,209.99612	0.00000075
		155	5775	5,774.99495	0.00000088
55 °C	138V	42	5210	5,209.99964	0.00000007
		155	5775	5,774.99212	0.00000136
	102V	42	5210	5,210.00059	-0.00000011
		155	5775	5,775.00066	-0.00000011

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Operation Mode	802.11 a	Test Date	2018.09.4
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	138V	36	5180	5,179.98177	0.00000352
		44	5220	5,219.99453	0.00000105
		48	5240	5,239.98346	0.00000316
		149	5745	5,744.98885	0.00000194
		157	5785	5,784.98568	0.00000247
		165	5825	5,824.98270	0.00000297
	102V	36	5180	5,179.98721	0.00000247
		44	5220	5,219.98695	0.00000250
		48	5240	5,239.98537	0.00000279
		149	5745	5,744.98765	0.00000215
		157	5785	5,784.98828	0.00000203
		165	5825	5,824.99081	0.00000158
25 °C	120V	36	5180	5,179.98694	0.00000252
		44	5220	5,220.00047	-0.00000009
		48	5240	5,239.98047	0.00000373
		149	5745	5,744.98351	0.00000287
		157	5785	5,784.99658	0.00000059
		165	5825	5,824.99605	0.00000068
55 °C	138V	36	5180	5,179.99705	0.00000057
		44	5220	5,219.98618	0.00000265
		48	5240	5,239.97261	0.00000523
		149	5745	5,744.99338	0.00000115
		157	5785	5,784.98620	0.00000239
		165	5825	5,824.98733	0.00000217
	102V	36	5180	5,179.98475	0.00000294
		44	5220	5,220.00555	-0.00000106
		48	5240	5,239.98235	0.00000337
		149	5745	5,744.97710	0.00000399
		157	5785	5,784.99188	0.00000140
		165	5825	5,824.99376	0.00000107

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Operation Mode	802.11 n_HT40	Test Date	2018.09.4
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	138V	38	5190	5,189.98564	0.00000277
		46	5230	5,230.00360	-0.00000069
		151	5755	5,754.97211	0.00000485
		159	5795	5,794.97471	0.00000436
	102V	38	5190	5,189.98963	0.00000200
		46	5230	5,230.00618	-0.00000118
		151	5755	5,754.97498	0.00000435
		159	5795	5,794.97911	0.00000360
25 °C	120V	38	5190	5,189.99327	0.00000130
		46	5230	5,229.99835	0.00000032
		151	5755	5,754.97160	0.00000493
		159	5795	5,794.99230	0.00000133
55 °C	138V	38	5190	5,189.98830	0.00000225
		46	5230	5,230.00828	-0.00000158
		151	5755	5,754.97541	0.00000427
		159	5795	5,794.98868	0.00000195
	102V	38	5190	5,189.98997	0.00000193
		46	5230	5,230.01264	-0.00000242
		151	5755	5,754.98268	0.00000301
		159	5795	5,794.98790	0.00000209

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Operation Mode	802.11 ac_VHT80	Test Date	2018.09.4
Temperature	:23 °C	Test By	Gary
Humidity	:68 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 °C	138V	42	5210	5,209.99747	0.00000049
		155	5775	5,774.99278	0.00000125
	102V	42	5210	5,209.99330	0.00000129
		155	5775	5,774.99348	0.00000113
25 °C	120V	42	5210	5,210.00049	-0.00000009
		155	5775	5,775.00632	-0.00000109
55 °C	138V	42	5210	5,210.00355	-0.00000068
		155	5775	5,774.99174	0.00000143
	102V	42	5210	5,209.99160	0.00000161
		155	5775	5,774.99245	0.00000131

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台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.tw.sgs.com

Member of SGS Group

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 ~

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

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SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號

t (886-2) 2299-3279

f (886-2) 2298-0488

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