ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT

OF

Product Name:	**USB module**
Brand Name:	**REALTEK**
Model No.:	**RTL8812BU**
Model Difference:	**N/A**
FCC ID:	**TX2-RTL8812BU**
Report No.:	**ER/2017/70016**
Issue Date:	**Jul. 21, 2017**
FCC Rule Part:	**§15.407**
Prepared for:	**REALTEK SEMICONDUCTOR CORP. NO. 2, INNOVATION ROAD II, SCIENCE PARK, HSINCHU 300, TAIWAN**
Prepared by:	**SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803**

Testing Laboratory
0513

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VERIFICATION OF COMPLIANCE

Applicant for:	REALTEK SEMICONDUCTOR CORP. NO. 2, INNOVATION ROAD II, SCIENCE PARK, HSINCHU 300, TAIWAN
Product Name:	USB module
Brand Name:	REALTEK
Model No.:	RTL8812BU
Model Difference:	N/A
FCC ID:	TX2-RTL8812BU
File Number:	ER/2017/70016
Date of Test:	Jul. 03, 2017 ~ Jul. 17, 2017
Date of EUT Received:	Jul. 03, 2017

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

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

Test By:	Tin Lin	***Date:***	Jul. 21, 2017
	Tin Lin / Engineer		
Prepared By:	Violetta Tang	***Date:***	Jul. 21, 2017
	Violetta Tang / Clerk		
Approved By:	Jim Chang	***Date:***	Jul. 21, 2017
	Jim Chang / Asst. Manager		

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Revision History

Report Number	Revision	Description	Issue Date
ER/2017/70016	Rev.00	Initial creation of document	Jul. 21, 2017

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Contents

1. GENERAL INFORMATION 5
2. SYSTEM TEST CONFIGURATION 9
3. SUMMARY OF TEST RESULT 11
4. DESCRIPTION OF TEST MODES 12
5. MEASUREMENT UNCERTAINTY 15
6. CONDUCTED EMISSION TEST 16
7. DUTY CYCLE TEST SIGNAL 20
8. 26dB & 6dB EMISSION BANDWIDTH MEASUREMENT 23
9. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT 49
10. PEAK POWER SPECTRAL DENSITY 52
11. UNDESIRABLE RADIATED EMISSION MEASUREMENT 67
12. TRANSMISSION IN THE ABSENCE OF DATA 148
13. FREQUENCY STABILITY 149
14. MAXIMUM PERMISSIBLE EXPOSURE (MPE) 163

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1. GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	USB module
Brand Name:	REALTEK
FCC Model No.:	RTL8812BU
Model Difference:	N/A
Software Version:	V0.6
Hardware Version:	0V8
Power Supply:	5V from USB Port

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WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Avg.)	Modulation Technology
11a	5150~5250	4	22.39dBm	OFDM
	5725-5850	5	26.26dBm	
11n / ac_20M	HT20 / VHT20 5150~5250	4	HT: 22.34dBm (Worst Case)	OFDM
	HT20 / VHT20 5725-5850	5	HT: 26.20dBm (Worst Case)	
11n / ac_40M	HT40 / VHT40 5150~5250	2	HT: 22.20dBm (Worst Case)	OFDM
	HT40 / VHT40 5725-5850	2	HT: 25.98dBm (Worst Case)	
11ac_80M	VHT80 5150~5250	1	18.54dBm	OFDM
	VHT80 5725-5850	1	23.62dBm	
Antenna Designation:	Printed Antenna, Part No.: RTK-ANT-0002, Supplier: REALTEK Main Antenna Gain: 4.5dBi (5150~5250MHz) Main Antenna Gain: 4.5dBi (5725~5850MHz) Part No.: RTK-ANT-0002, Supplier: REALTEK Aux Antenna Gain: 2.8dBi (5150~5250MHz) Aux Antenna Gain: 2.8dBi (5725~5850MHz)			
Modulation type	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only			
Transition Rate:	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 144.4Mbps 802.11 n_40MHz: 13.5 – 300Mbps 802.11 ac_20MHz: 6.5 –144.4Mbps 802.11 ac_40MHz: 13.5 –300Mbps 802.11 ac_80MHz: 29.3 – 650Mbps			

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Host Information:

MB/NB/add-in card model name	OS	USB Host
Acer-Aspire VN7 719G-55MB(NB)	WIN8.1	Intel USB3.0
ASUS-(P7H55-M/USB3)	WIN7	NEC USB3.0
ASUS-(M5A87) (PC)	WIN7	Asmedia USB3.0
ASUS(NB)-(U36J)	WIN7	Fresco USB3.0
ASUS-(P8Z77-V LX)	WIN7	Intel USB3.0
DELL Vostro 270S (PC)	WIN7	Intel USB3.0
GIGABYTE-(GA-880GMA-UD2H)	WIN7	NEC USB3.0
GIGABYTE-(GA-F2A85X-UP4)	WIN7	AMD USB3.0
GIGABYTE-(GA-H61M-USB3(B3))	WIN7	ETRON USB3.0
HP 14-R017TU(NB)	WIN8	Intel USB3.0
Lenovo T430(NB)	WIN7	Intel USB3.0
MSI-(H67MA-E35(B3))	WIN7	NEC USB3.0
TOSHIBA(NB)-(R830)	WIN7	Renesas USB3.0
TOSHIBA(NB)-(R930)	WIN7	Intel USB3.0
UTB222	WIN7	Renesas USB3.0
UTB242	WIN7	TI USB3.0
UTB245	WIN7	Fresco USB3.0
VLI-805 add-in card	WIN7	VLI USB3.0

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules

FCC KDB 662911 D01 Multiple Transmitter Output

FCC KDB 644545 D03 Guidance for IEEE 802.11ac v01

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

1.4 Special Accessories

There are no special accessories used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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2. SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 Conducted Emissions

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

2.3.2 Radiated Emissions

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

2.4 Measurement Results Explanation Example

For all conducted test items:

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

Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor. Following shows an offset computation example with cable loss 2.3dB, and 10dB attenuator (SISO) and cable loss 5.3dB, and 10dB attenuator (MIMO).

SISO mode offset = RF cable loss (dB)+ attenuation factor(dB)=12.3(dB)
MIMO mode offset = RF cable loss (dB)+ attenuation factor(dB)+ 10 log(N_{ANT}) dB =15.3(dB)

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2.5 Configuration of Tested System

Fig. 2-1 Radiated & AC Power Line & Conducted (Antenna Port) Emission

Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	L420	LR-7HXZA	Shielded	Un-shielded

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3. SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	26 dB & 6dB 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:

4 channels are provided for 802.11a, 802.11n_HT20, 802.11ac_VHT20

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

2 channels are provided for 802.11n_HT40, 802.11ac_VHT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac_VHT80

CHANNEL	FREQUENCY
42	5210 MHz

Operated band in 5725 MHz ~5850 MHz:

5 channels are provided for 802.11a, 802.11n_HT20, 802.11ac_VHT20

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

2 channels are provided for 802.11n_HT40, 802.11ac_VHT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755 MHz	159	5795 MHz

1 channel is provided for 802.11ac_VHT80

CHANNEL	FREQUENCY
155	5775 MHz

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4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting mode is pro grammed.
3. Investigation has been done on all the possible configurations for searching the worst case.
4. The given UE is pre-scanned among 802.11n and ac modes, and 802.11n yields the highest reading that generates the highest emission. Therefore, 802.11n as the mode of test configuration is chosen to carry out the relevantly mandatory test items.

RADIATED EMISSION TEST:

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

Pre-scanned was done on Main antenna and Aux antenna. The Mian antenna results higher emission at 5GHz. Therefore, the completed set of radiated measurement was done on Main antenna to be presented on this test report.

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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	MIMO
802.11ac_HT20				OFDM	MCS8	MIMO
802.11ac_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO
802.11ac_VHT80	5210	42	42	OFDM	MCS8	MIMO
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	MIMO
802.11ac_HT20				OFDM	MCS8	MIMO
802.11ac_HT40	5755~5795	151 to 159	151,159	OFDM	MCS8	MIMO
802.11ac_VHT80	5775	155	155	OFDM	MCS8	MIMO

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5. MEASUREMENT UNCERTAINTY

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

Radiated Spurious Emission:

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

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

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

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6. CONDUCTED EMISSION TEST

6.1. Standard Applicable

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

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note
1.The lower limit shall apply at the transition frequencies
2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

6.2. Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCI7	100760	05/11/2017	05/10/2018
LISN	SCHWARZBECK	NSLK 8127	8127-649	05/22/2017	05/21/2018
LISN	MESS TEC	FCC-LISN-50/250-25-2-01	4034	03/19/2017	03/18/2018
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2016	11/25/2017

6.3. EUT Setup

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

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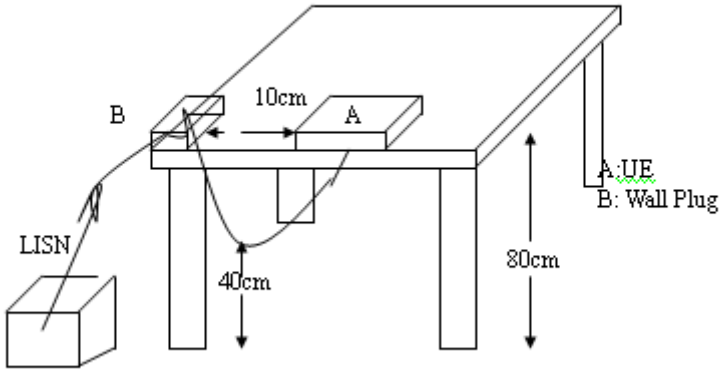
6.4. Test SET-UP



6.5. Measurement Procedure

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

6.6. Measurement Result

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

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

.

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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode			Test By:	Tin
Temperature:	20 ℃	Humidity:	58 %	Phase:	L1 / N

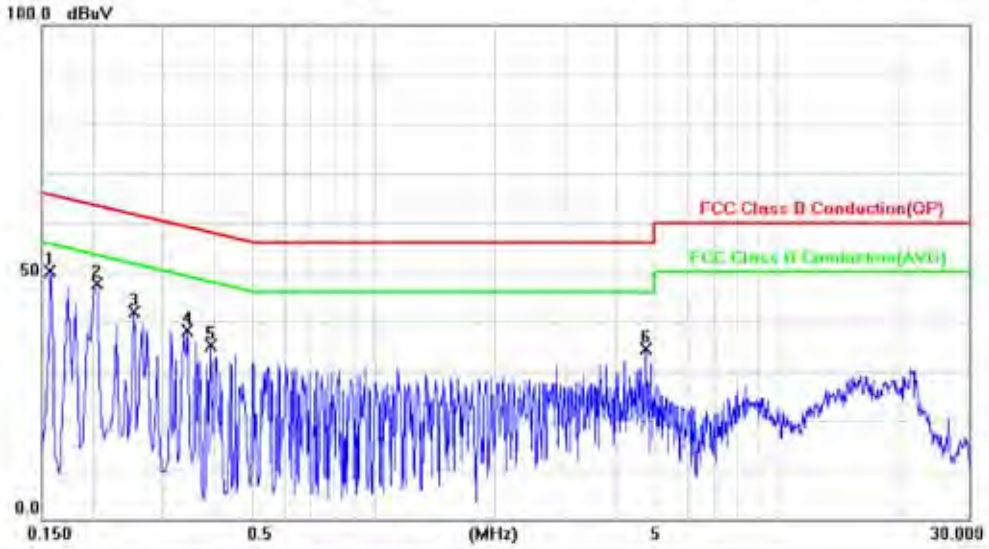
Site: Conduction Room
Limit: FCC Class B Conduction(QP)
Mode: Operation mode
Note:

Phase: L1
Power: AC 110V/60Hz

Temperature: 20 ℃
Humidity: 58 %

Conducted Emission

File: [illegible] Data: #18 Date: 2017/7/10 Time: 上午 11:02:31



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1580	49.98	0.12	50.10	65.57	-15.47	peak	
2		0.2060	47.56	0.12	47.68	63.37	-15.69	peak	
3		0.2540	41.76	0.12	41.88	61.63	-19.75	peak	
4		0.3460	37.95	0.11	38.06	59.06	-21.00	peak	
5		0.3940	34.98	0.11	35.09	57.98	-22.89	peak	
6		4.7380	34.19	0.28	34.47	56.00	-21.53	peak	

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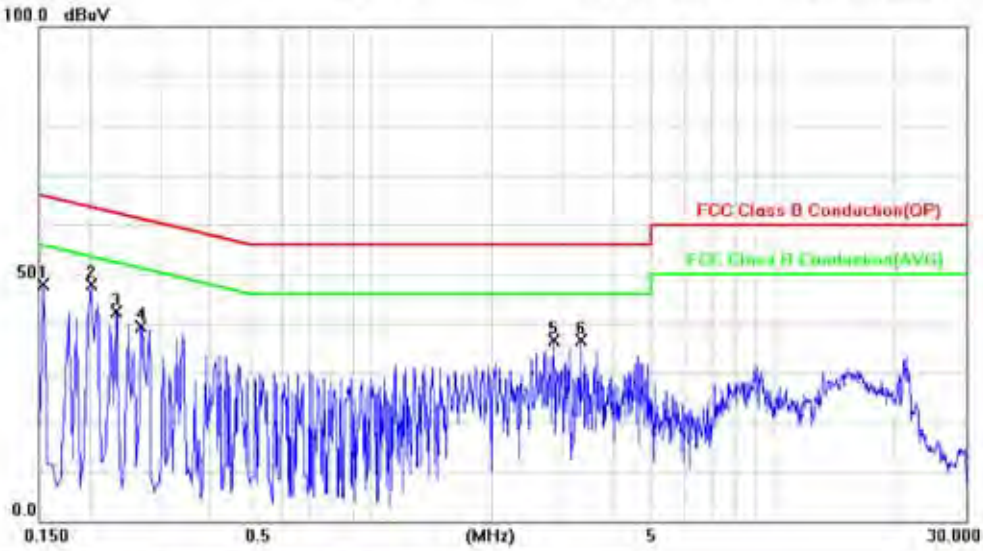
Site: Conduction Room
Limit: FCC Class B Conduction(QP)
Mode: Operation mode
Note:

Phase: N
Power: AC 110V/60Hz

Temperature: 20 ℃
Humidity: 58 %

Conducted Emission

File :[illegible] Data :#20 Date: 2017/7/10 Time: 上午 11:03:24



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1540	47.87	0.07	47.94	65.78	-17.84	peak	
2	*	0.2020	47.70	0.07	47.77	63.53	-15.76	peak	
3		0.2340	42.29	0.07	42.36	62.31	-19.95	peak	
4		0.2700	39.33	0.07	39.40	61.12	-21.72	peak	
5		2.8500	36.57	0.15	36.72	56.00	-19.28	peak	
6		3.3140	36.41	0.17	36.58	56.00	-19.42	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:

Duty Cycle = Ton / (Ton+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)
802.11a	92.42	0.34
802.11n_20	92.42	0.34
802.11n_40	87.55	0.58
802.11ac_80	80.25	0.96

Duty Cycle Factor: 10 * log(1/0.9242) = 0.34
Duty Cycle Factor: 10 * log(1/0.9242) = 0.34
Duty Cycle Factor: 10 * log(1/0.8755) = 0.58
Duty Cycle Factor: 10 * log(1/0.8025) = 0.96

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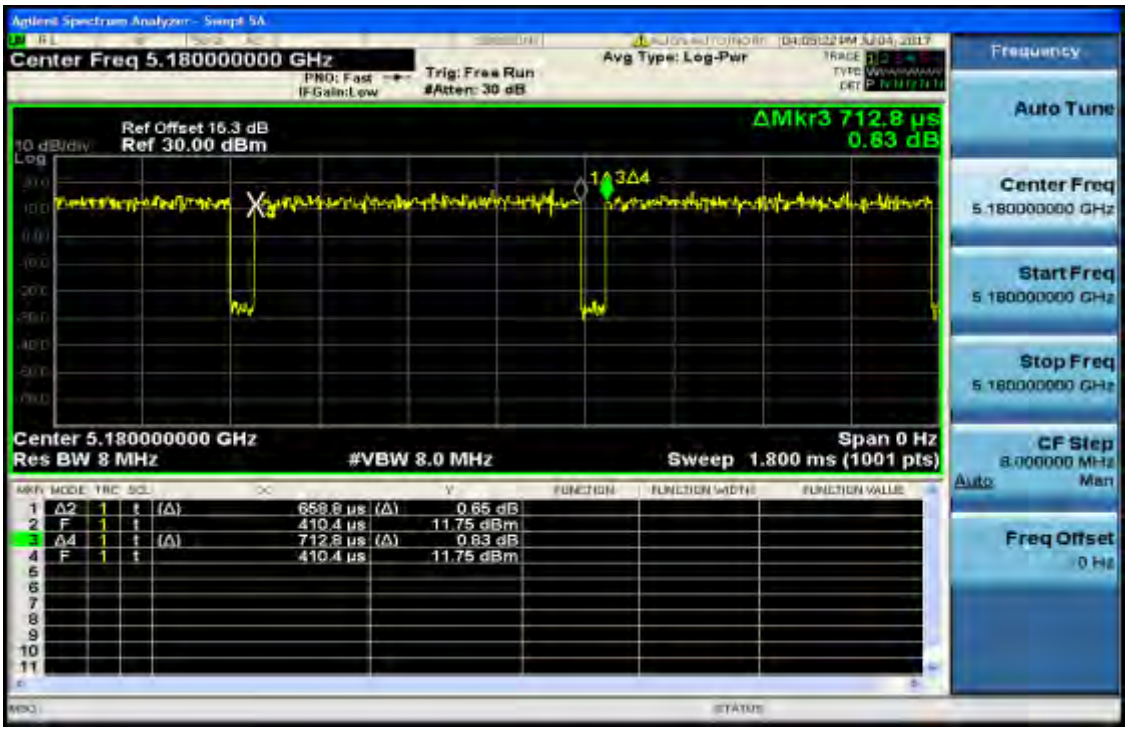
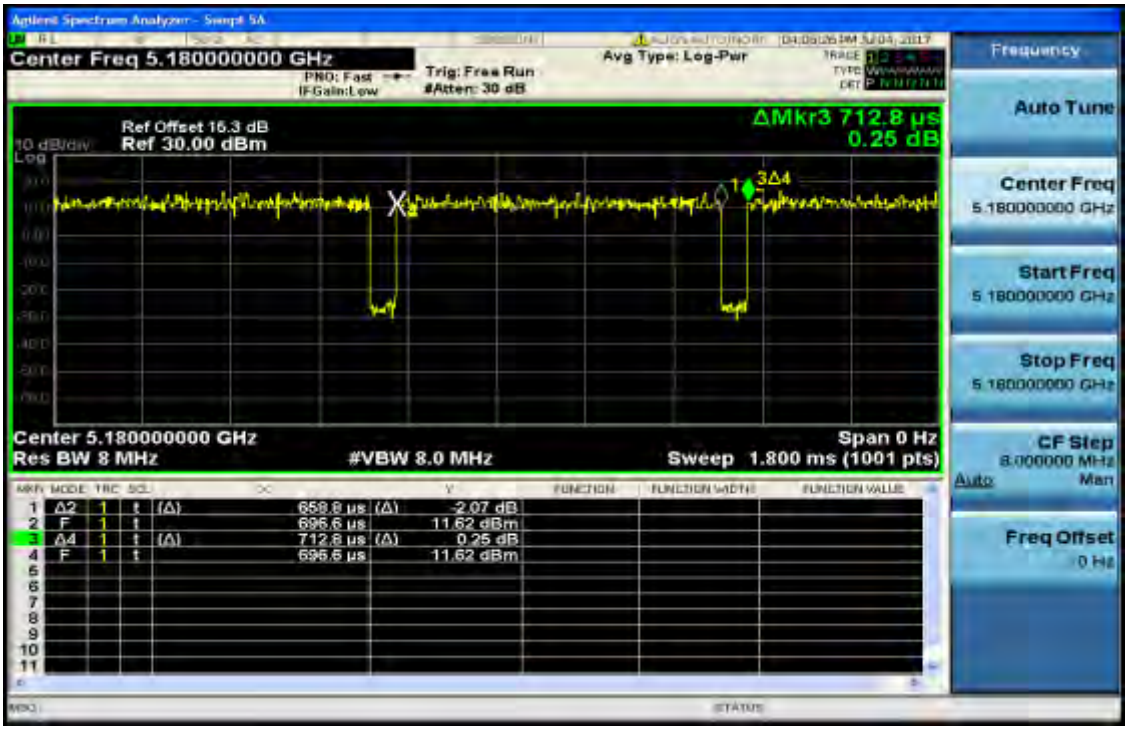
DUTY CYCLE TEST SIGNAL Measurement Result

802.11a



802.11n HT20



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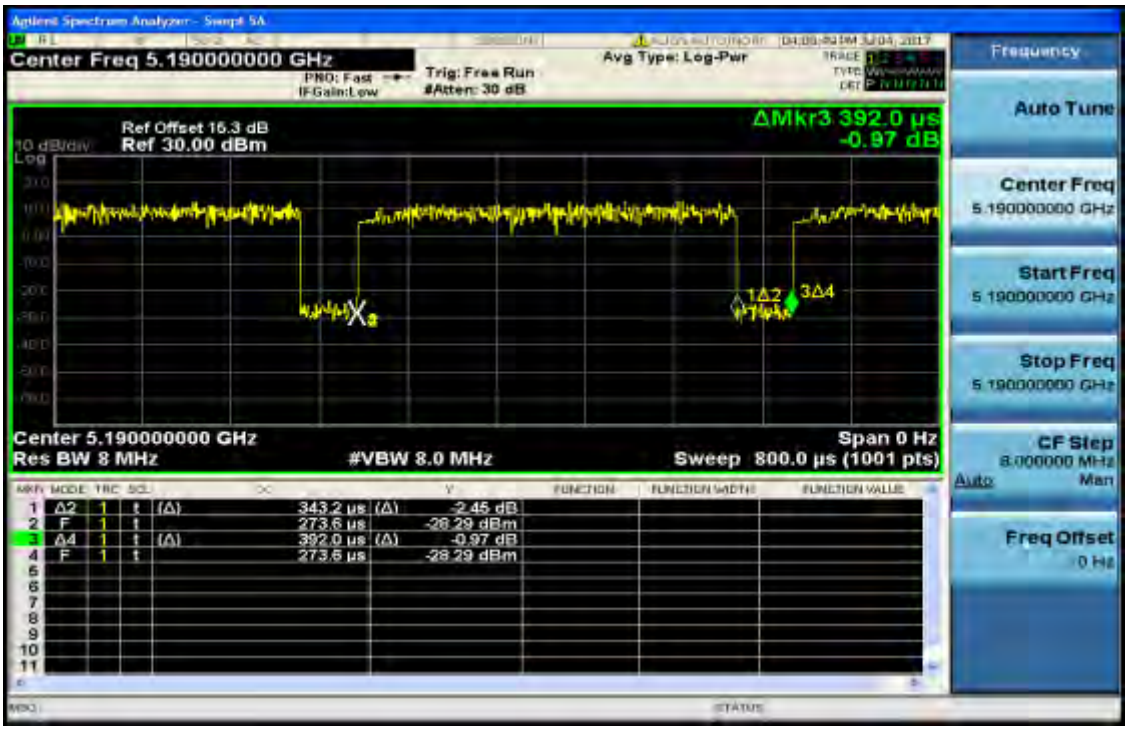
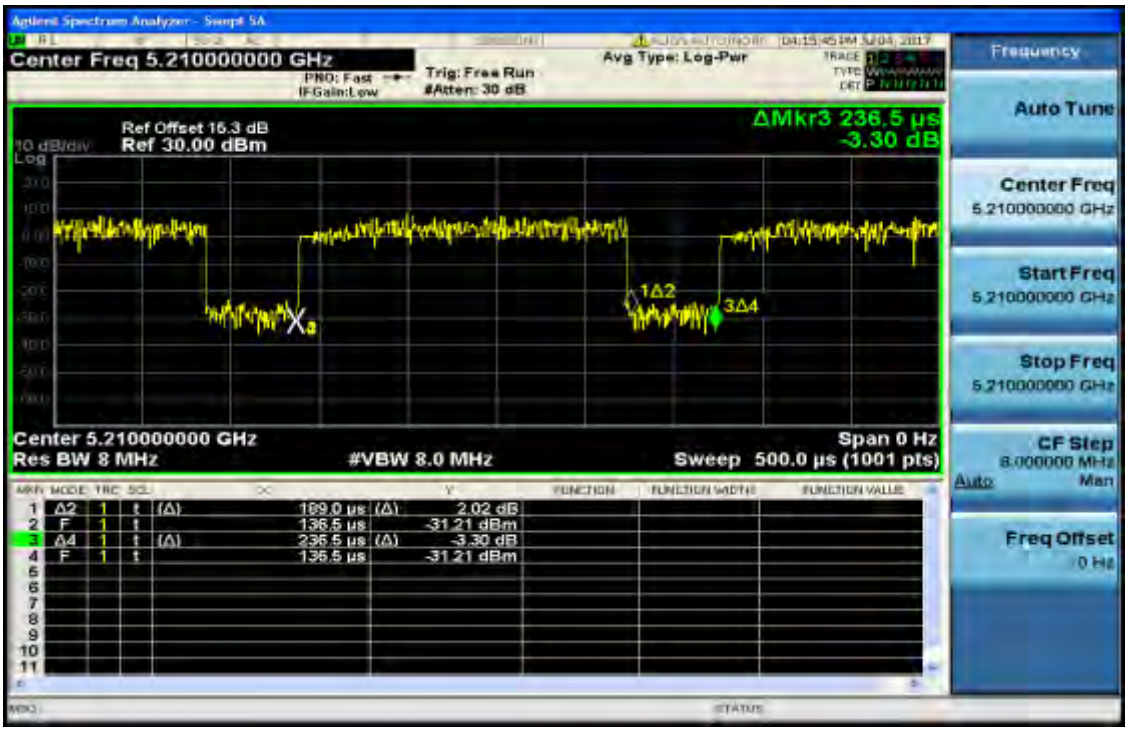
802.11n HT 40



802.11 ac VHT 80



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8. 26dB & 6dB EMISSION BANDWIDTH MEASUREMENT

8.1 Standard Applicable

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

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

8.2 Measurement Procedure

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

Note: For the overlapped channels between U-NII-2C and U-NII-3 bands, and according to FCC KDB 644545 D03, the boundary frequency between the bands is used as one edge for defining the portion of the 26dB BW that falls within a particular U-NII band. This rule is only applicable for the 26dB BW and for those channels marked as overlapped.

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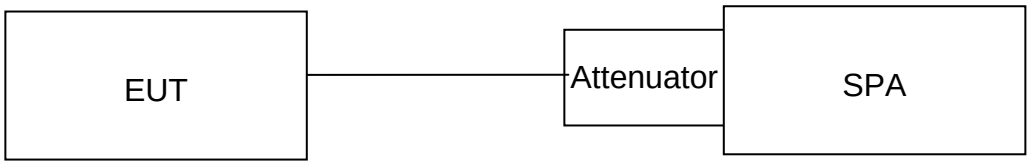
8.3 Measurement Equipment Used

SGS Conducted Room					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018
Splitter	Agilent	11636B	N/A	01/05/2017	01/04/2018
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017
Temperature Chamber	TERCHY	MHG-120LF	911009	05/19/2017	05/18/2018

8.4 Test Set-up



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8.5 Measurement Result
26dB Bandwidth

802.11a_Main

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.68	13.557
5220	24.13	13.826
5240	22.83	13.584

802.11a_Aux1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	29.05	14.631
5220	23.11	13.639
5240	23.99	13.800

802.11n_HT20_Main

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	29.97	14.766
5220	25.61	14.083
5240	23.04	13.626

802.11n_HT20_Aux1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	29.94	14.762
5220	29.28	14.665
5240	24.87	13.956

802.11n _HT40_Main

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	43.15	16.349
5230	49.12	16.913

802.11n _HT40_Aux1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	42.29	16.262
5230	46.08	16.635

802.11ac _VHT80_Main

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	81.27	19.099

802.11ac _VHT80_Aux1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	81.62	19.118

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

802.11a_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.31	12.124
5785	16.40	12.149
5825	16.50	12.176

802.11a_Aux1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.37	12.140
5785	16.36	12.139
5825	16.41	12.150

802.11n_HT20_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.62	12.460
5785	17.67	12.471
5825	17.61	12.459

802.11n_HT20_Aux1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.30	12.381
5785	17.62	12.460
5825	17.65	12.467

802.11n_HT40_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	36.43	15.614
5795	36.46	15.618

802.11n_HT40_Aux1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	36.45	15.616
5795	36.58	15.633

802.11ac _VHT80_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.01	18.751

802.11ac _VHT80_Aux1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	74.18	18.703

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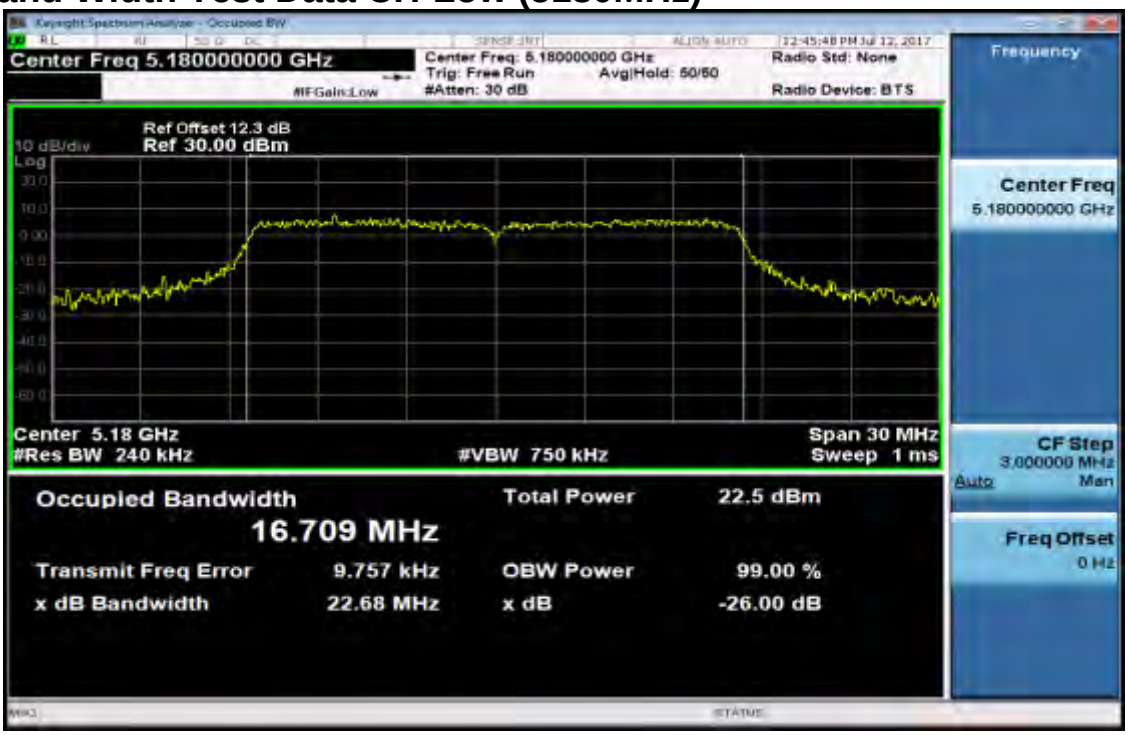
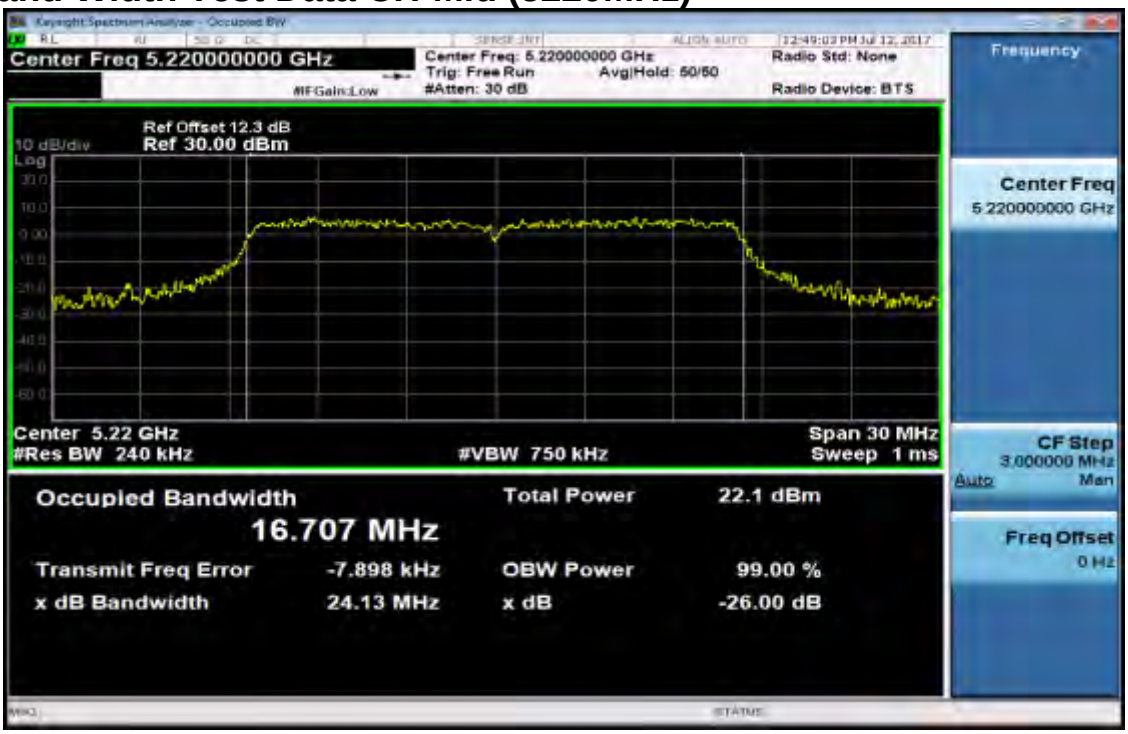
802.11a, 5150~5250 MHz (Main)
26dB Band Width Test Data CH-Low (5180MHz)



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



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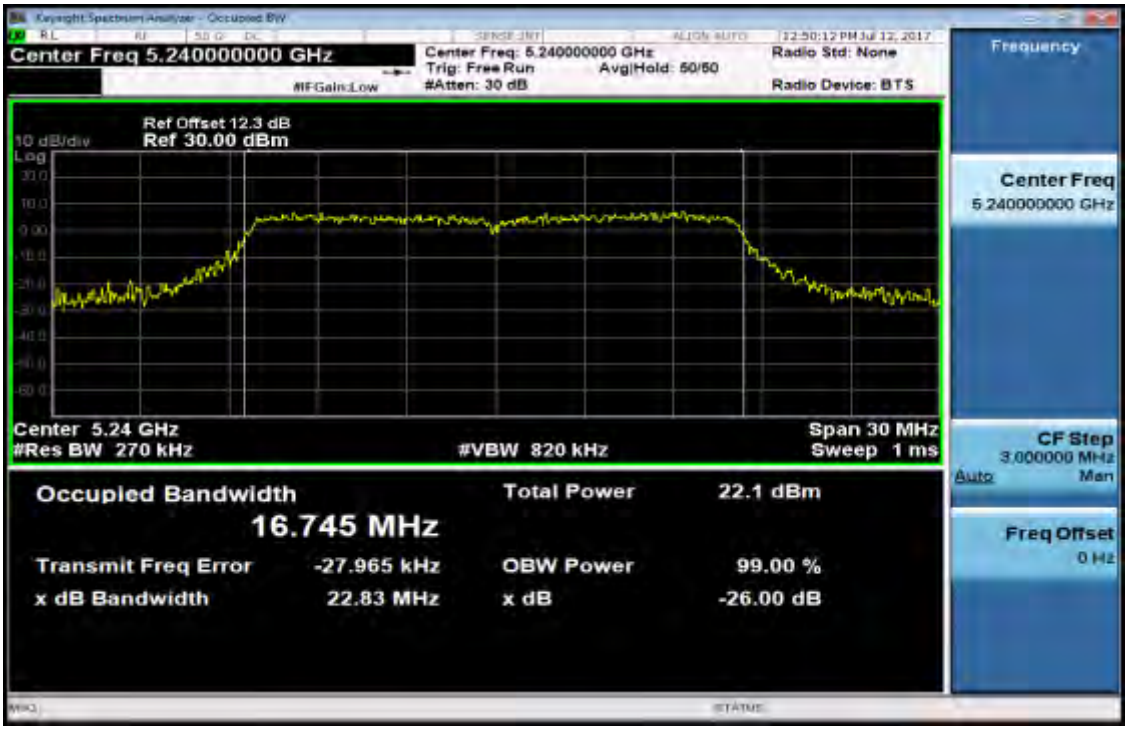
26dB Band Width Test Data CH-High (5240MHz)



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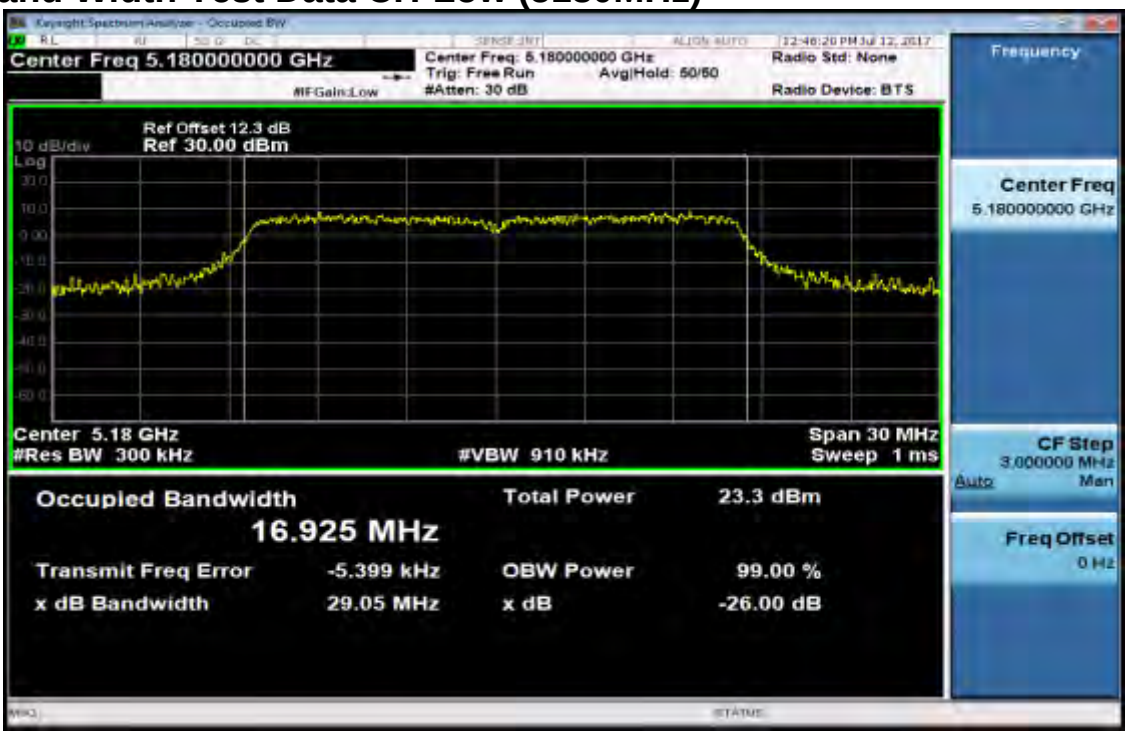
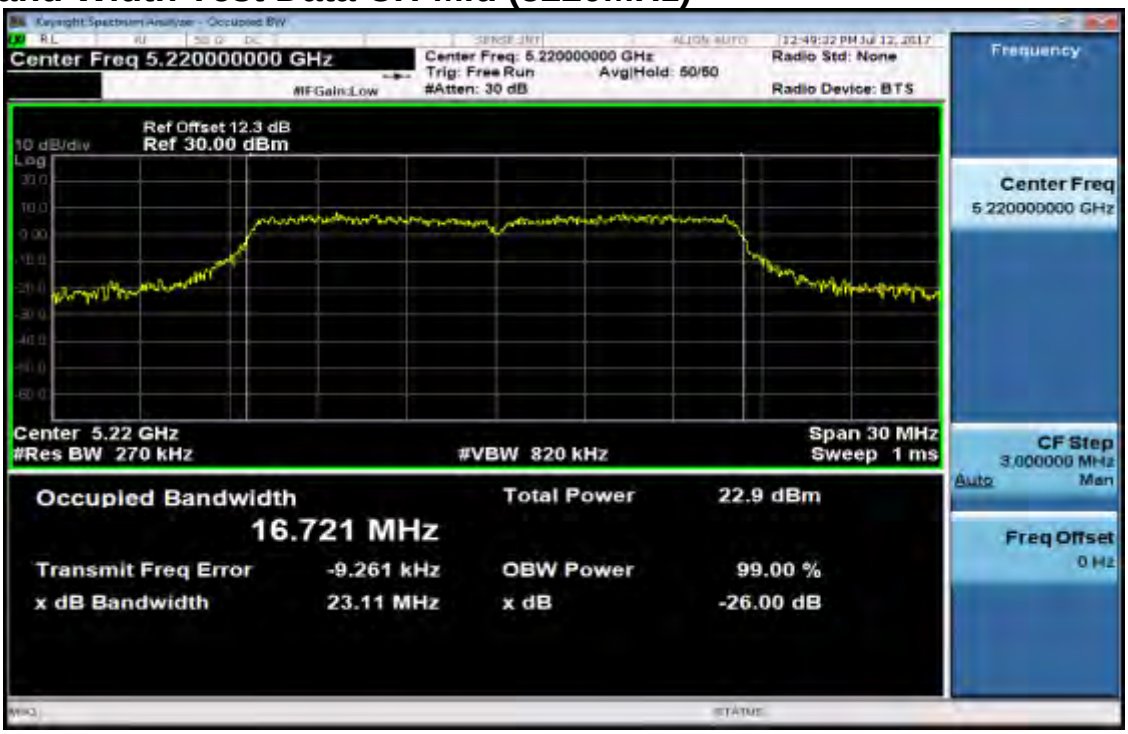
802.11a, 5150~5250 MHz (Aux)
26dB Band Width Test Data CH-Low (5180MHz)



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



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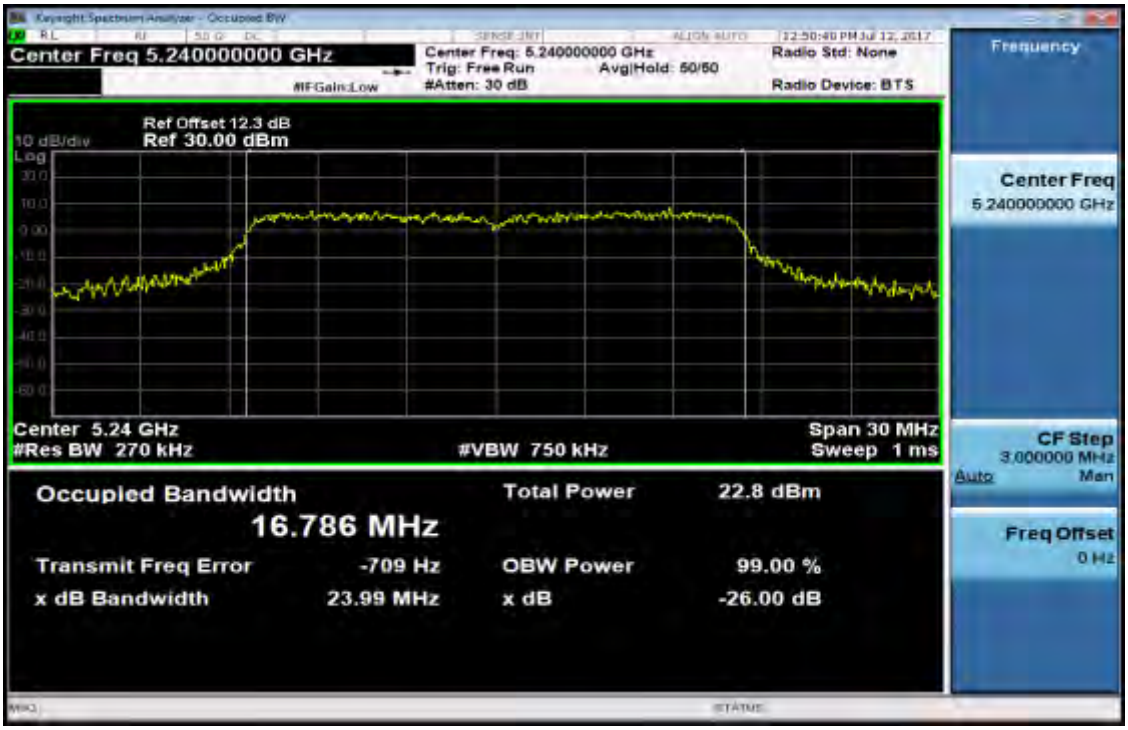
26dB Band Width Test Data CH-High (5240MHz)



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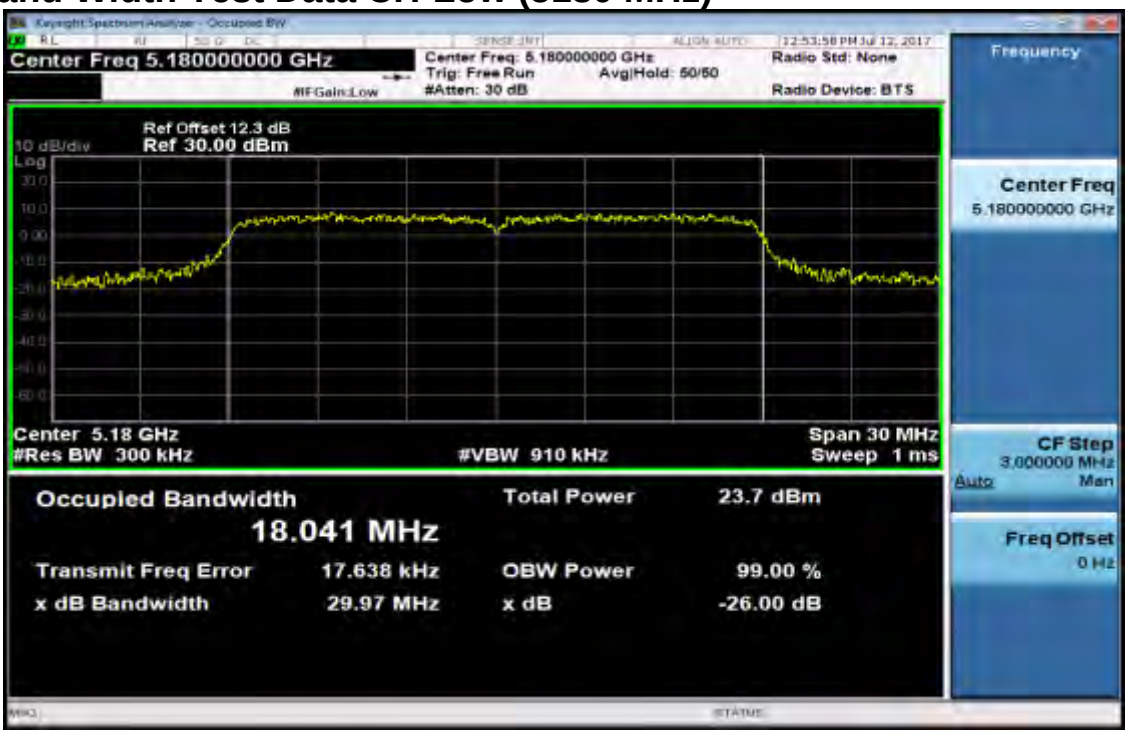
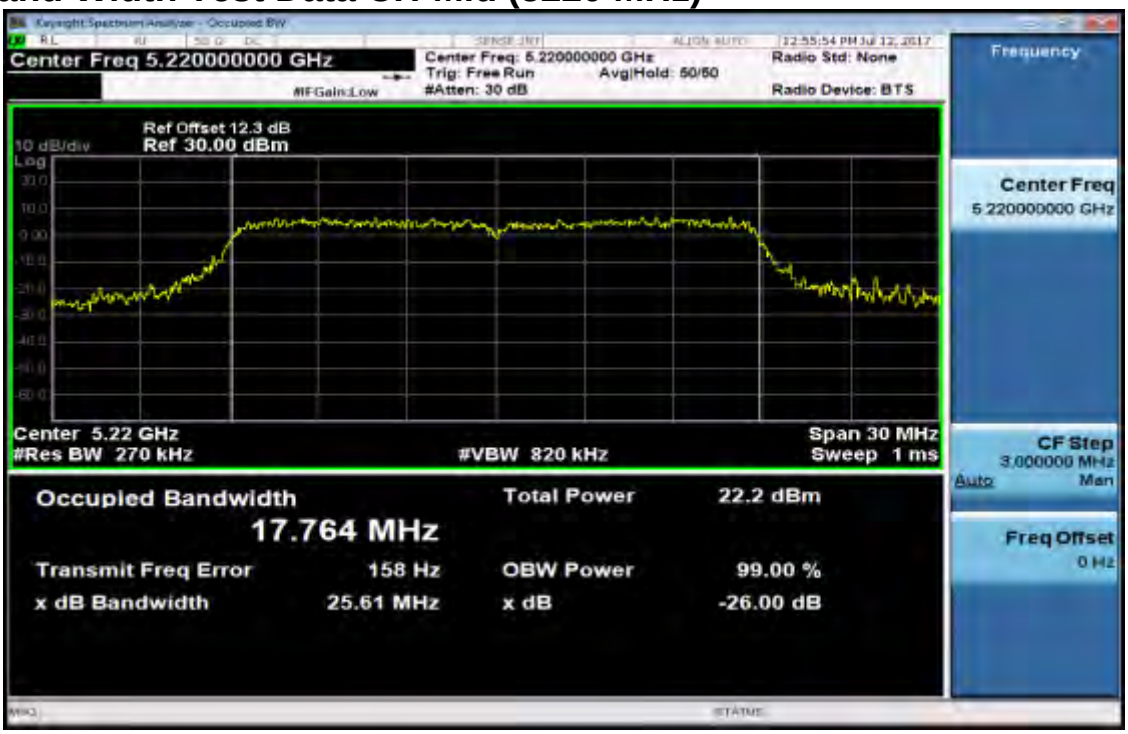
802.11n HT20, 5150~5250 MHz (Main)
26dB Band Width Test Data CH-Low (5180 MHz)



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



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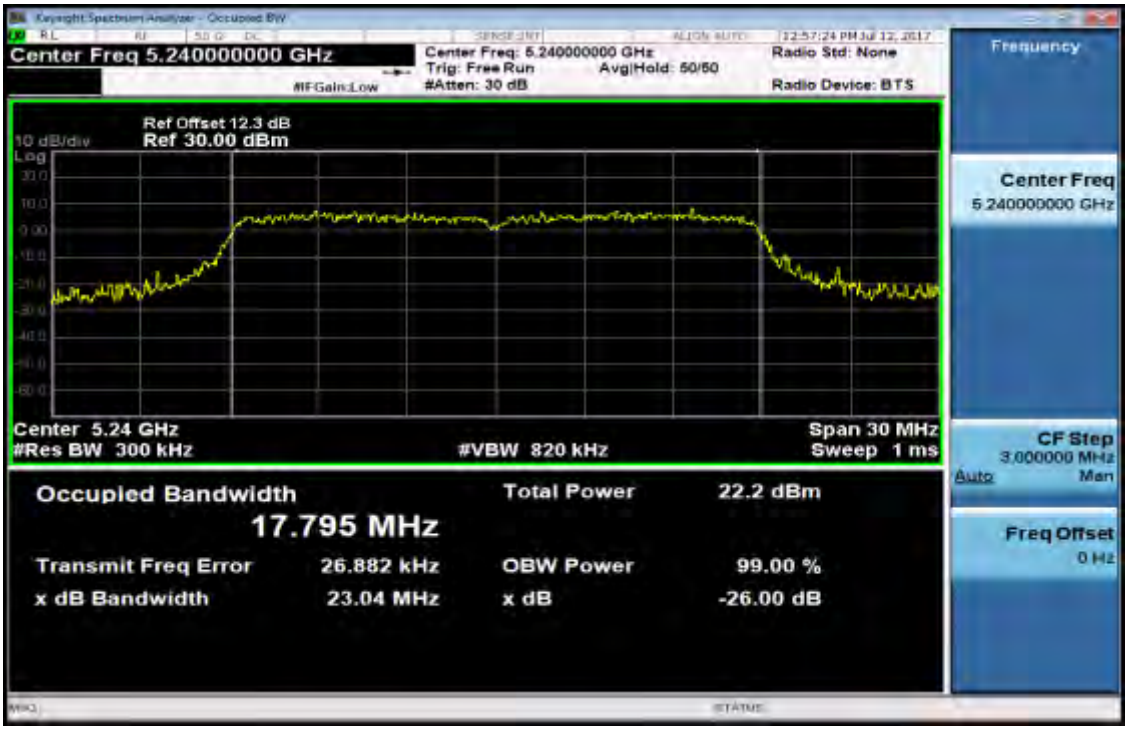
26dB Band Width Test Data CH-High (5240 MHz)



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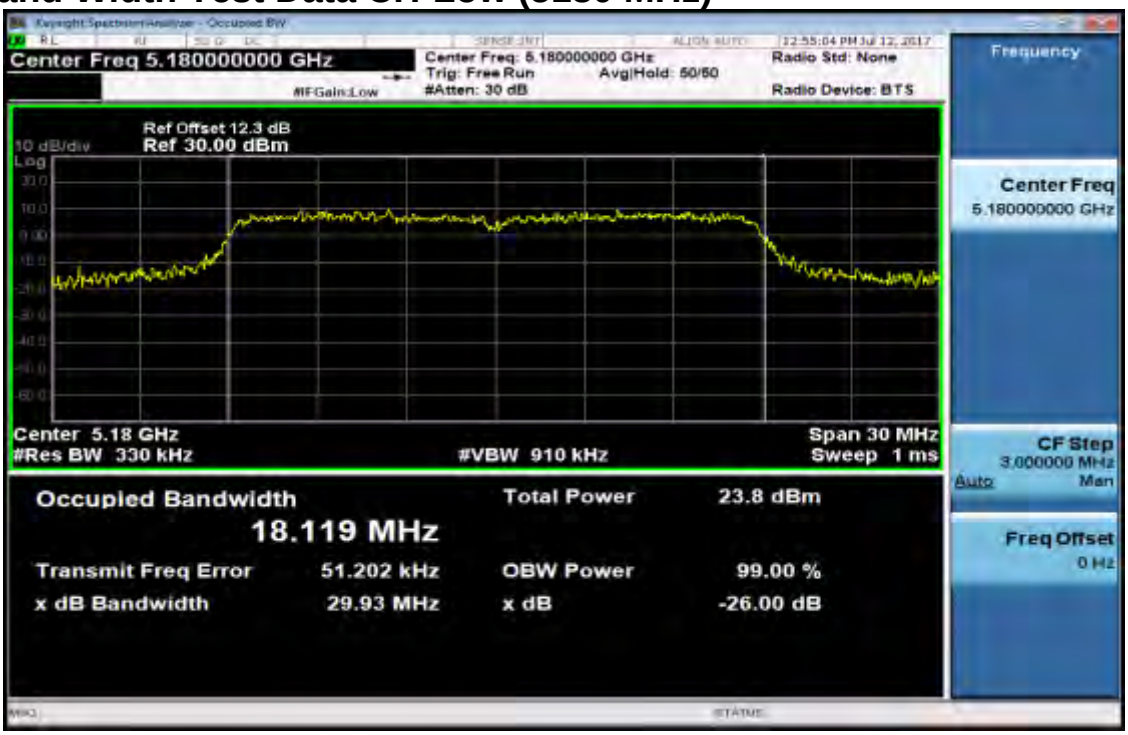
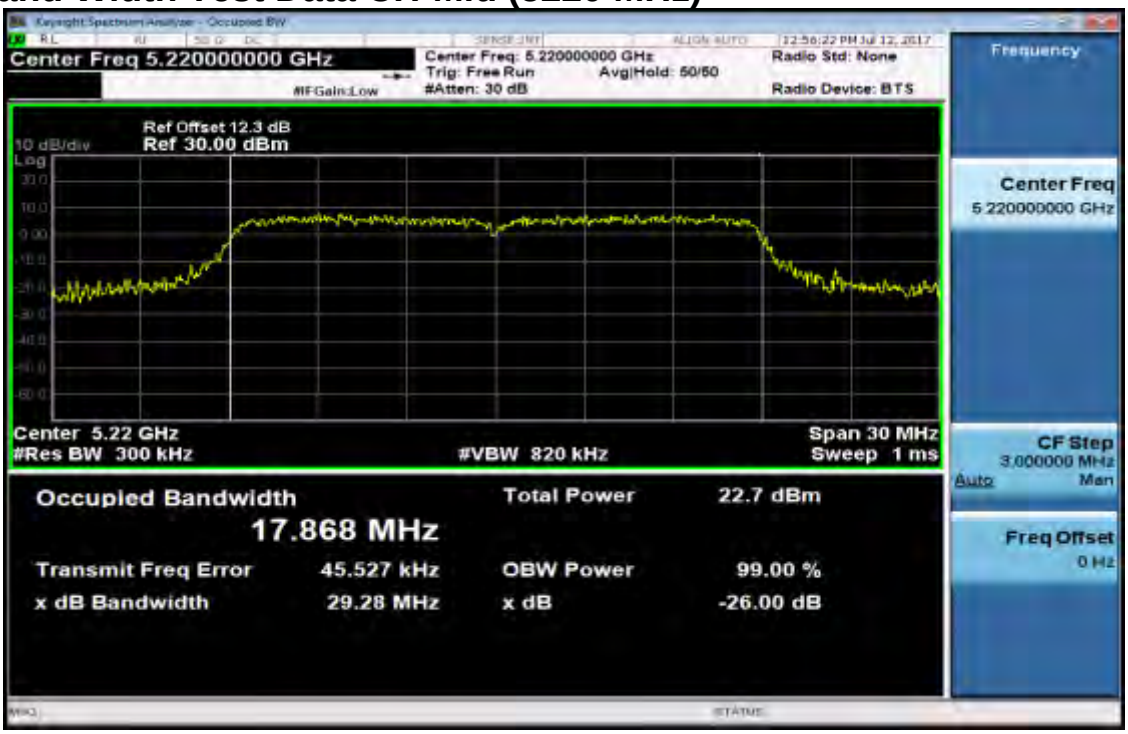
802.11n HT20, 5150~5250 MHz (Aux)
26dB Band Width Test Data CH-Low (5180 MHz)



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



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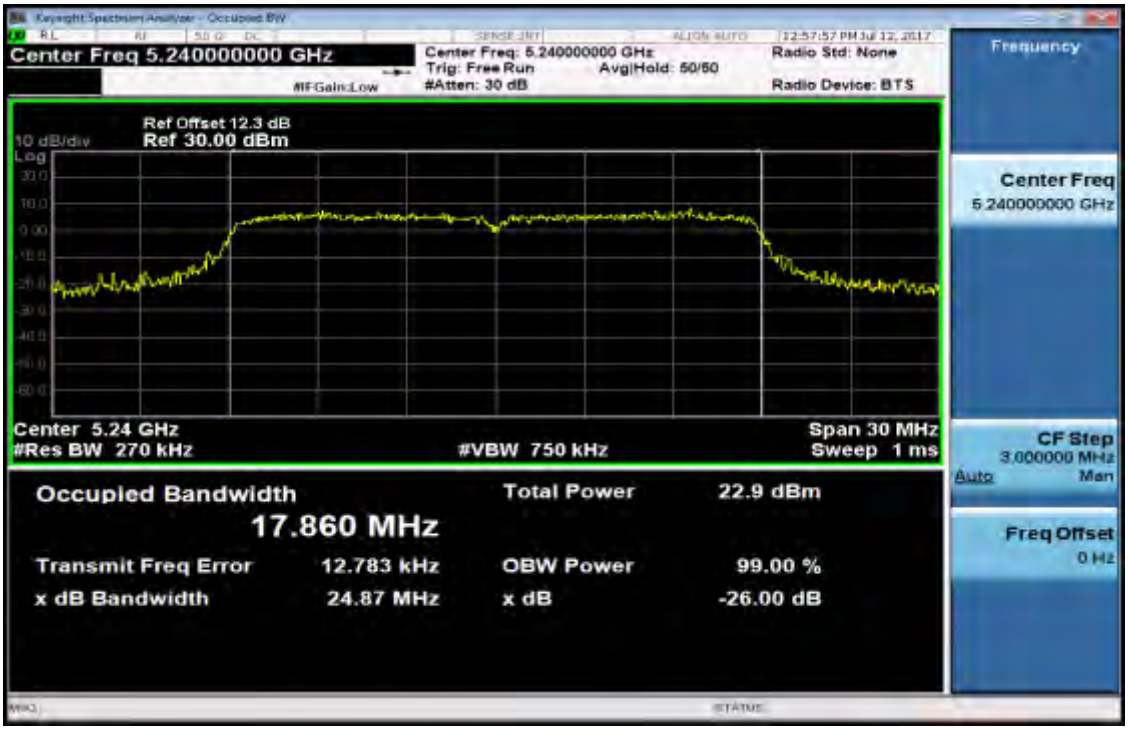
26dB Band Width Test Data CH-High (5240 MHz)



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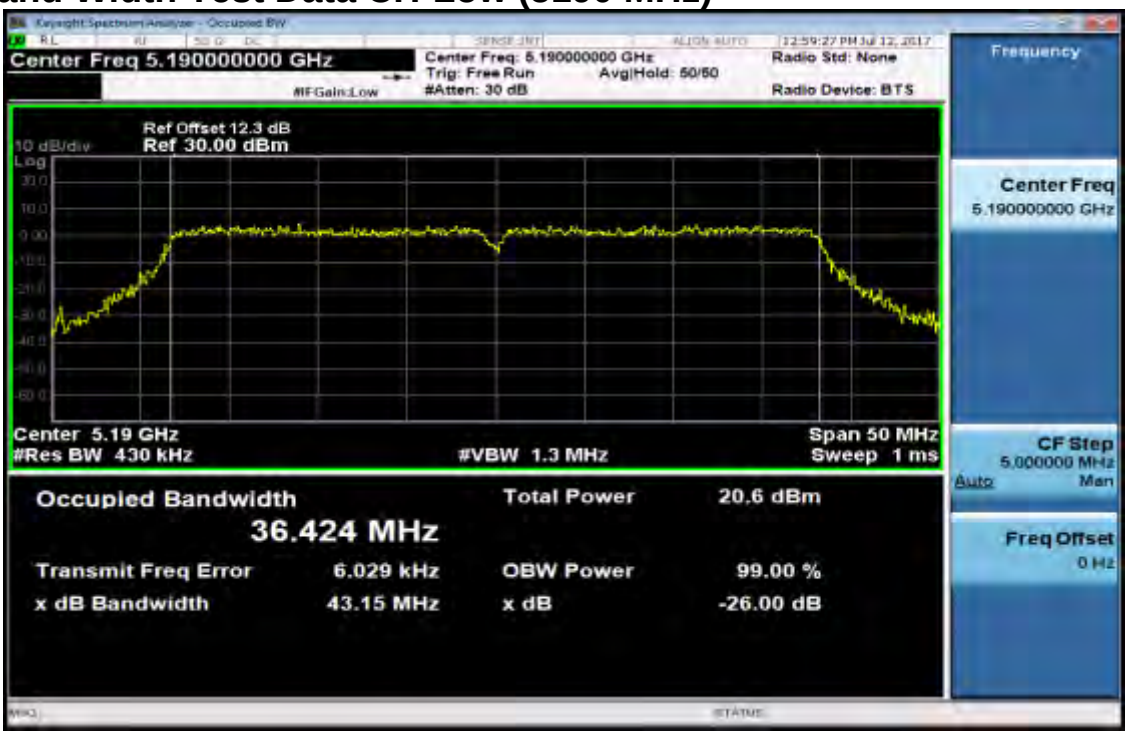
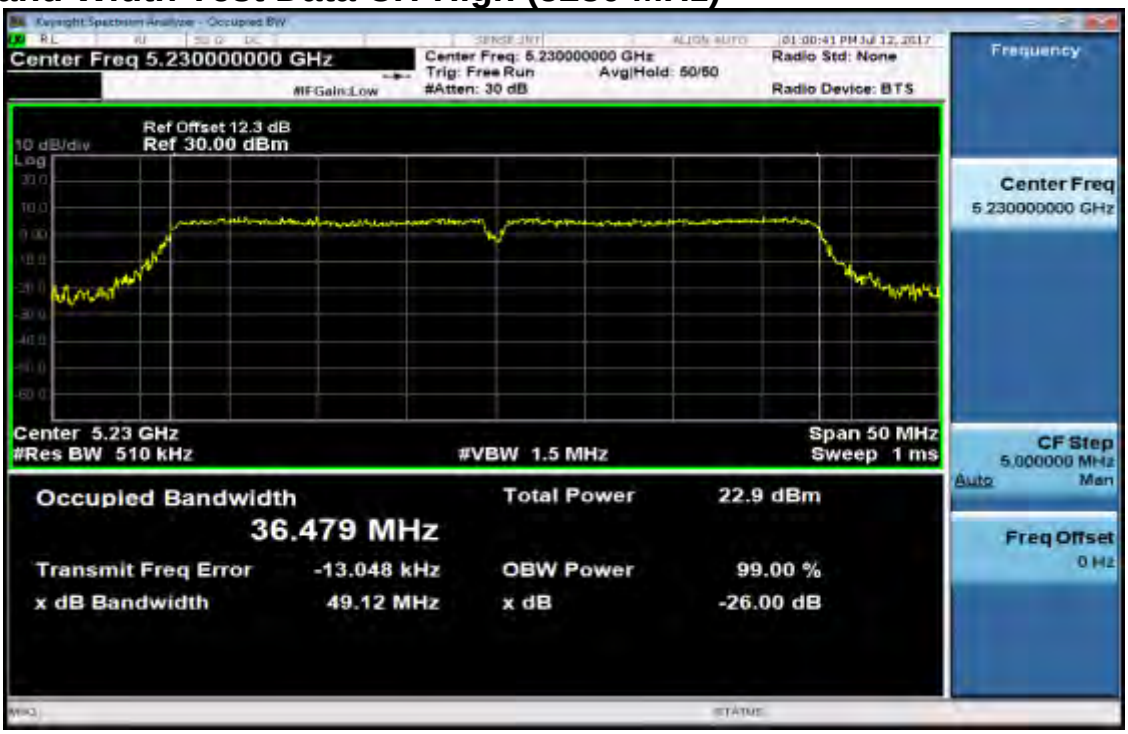
802.11n HT40, 5150~5250 MHz (Main)
26dB Band Width Test Data CH-Low (5190 MHz)



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



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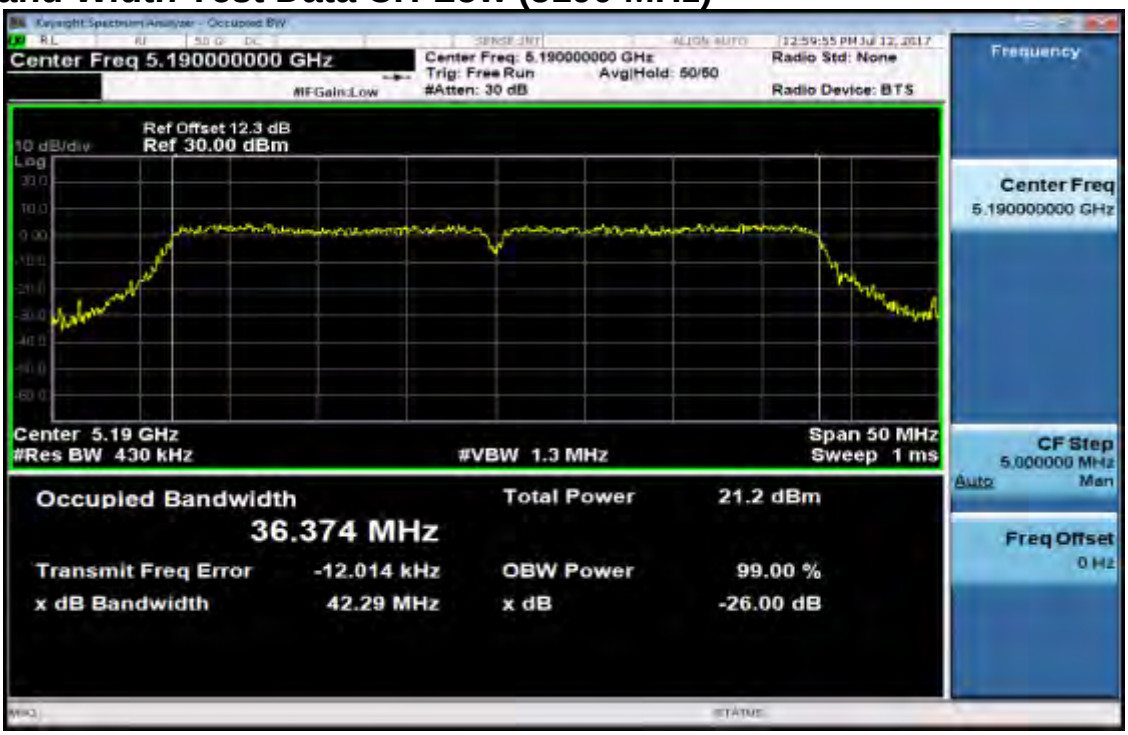
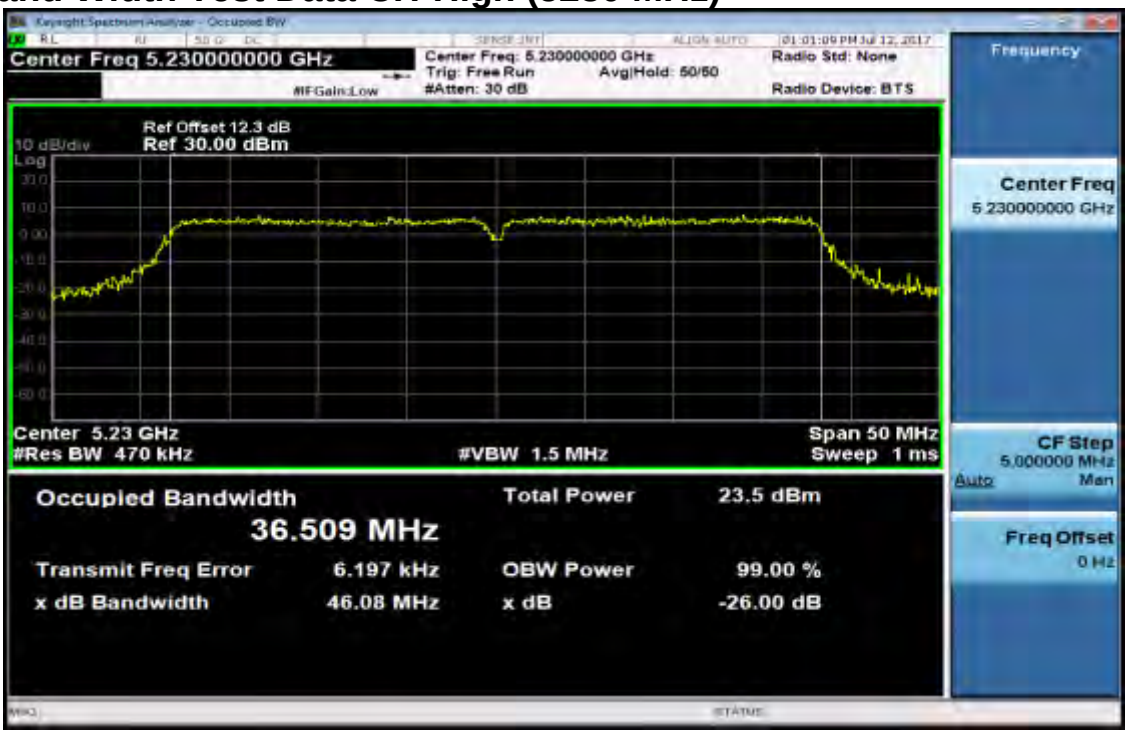
802.11n HT40, 5150~5250 MHz (Aux)
26dB Band Width Test Data CH-Low (5190 MHz)



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



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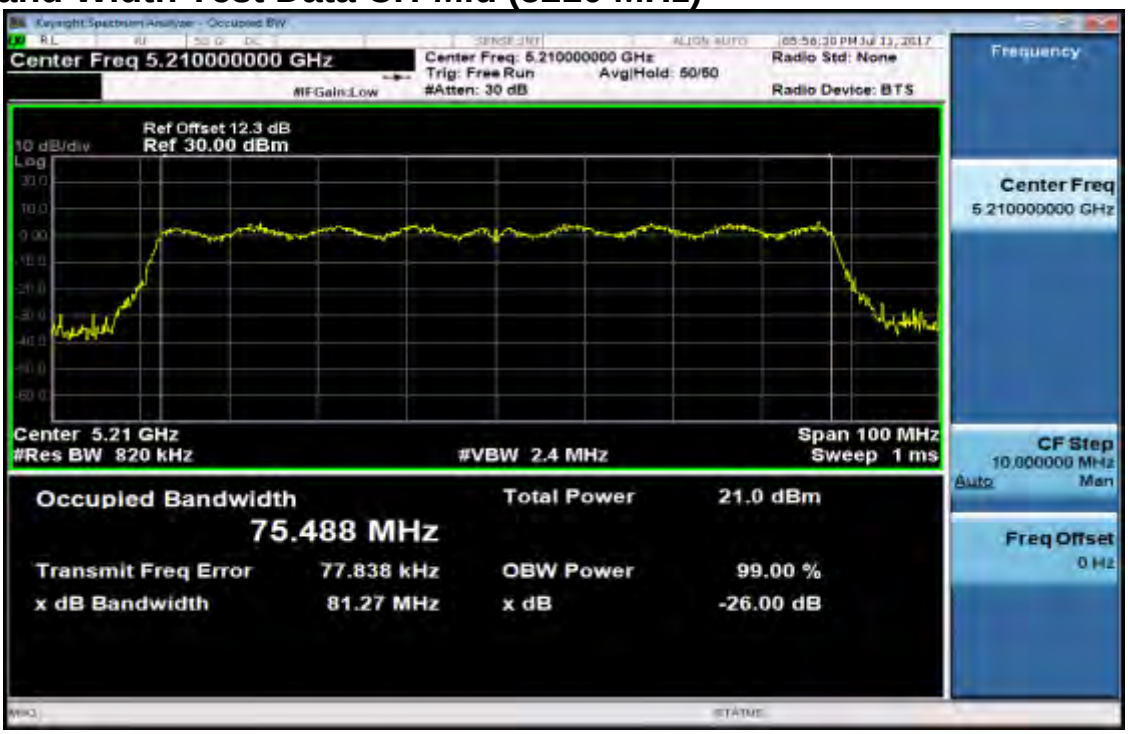
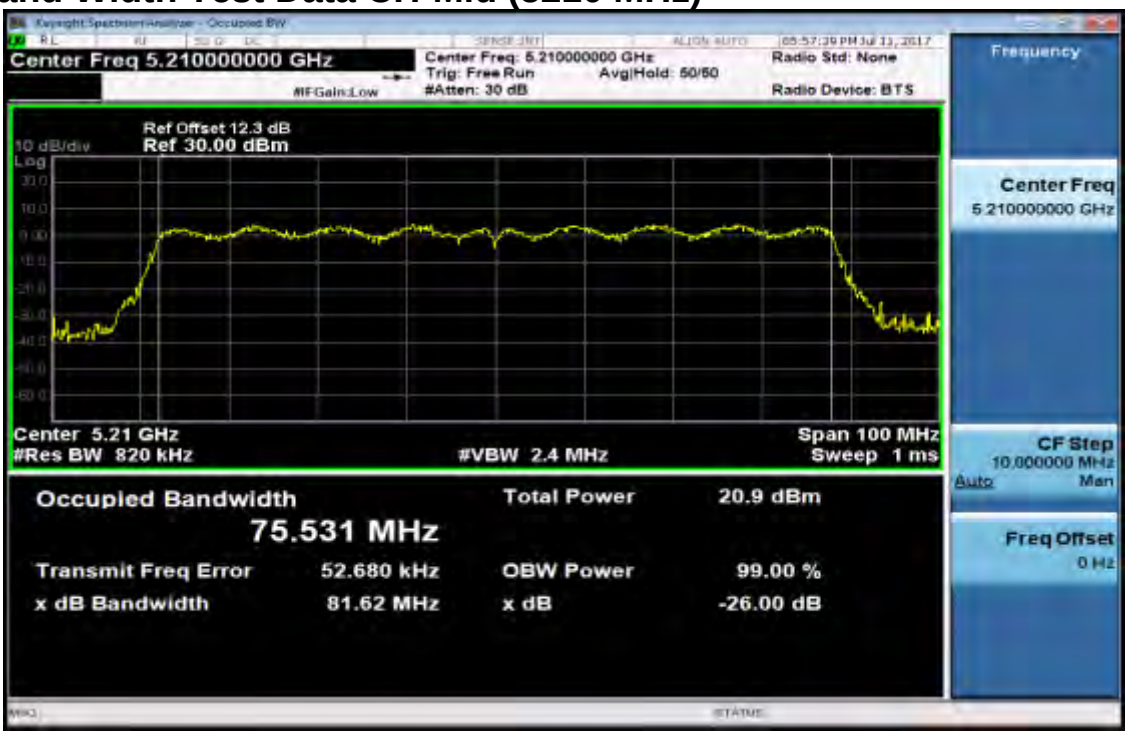
802.11ac VHT80, 5150~5250 MHz (Main)
26dB Band Width Test Data CH-Mid (5210 MHz)



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



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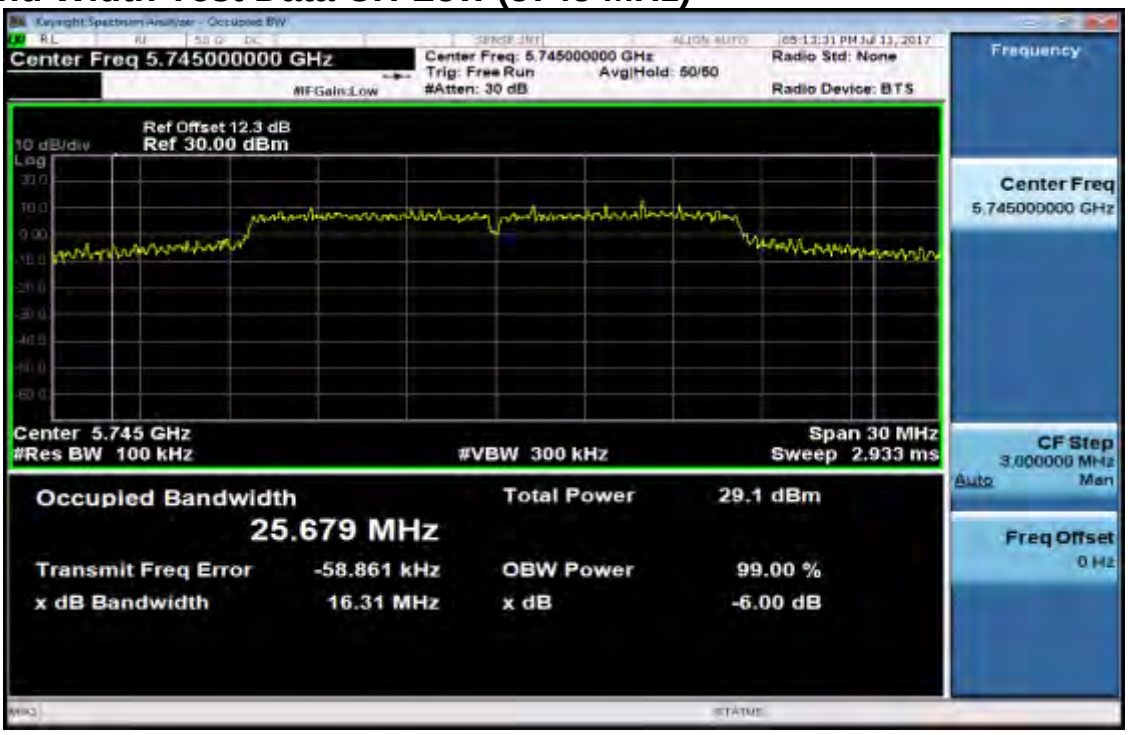
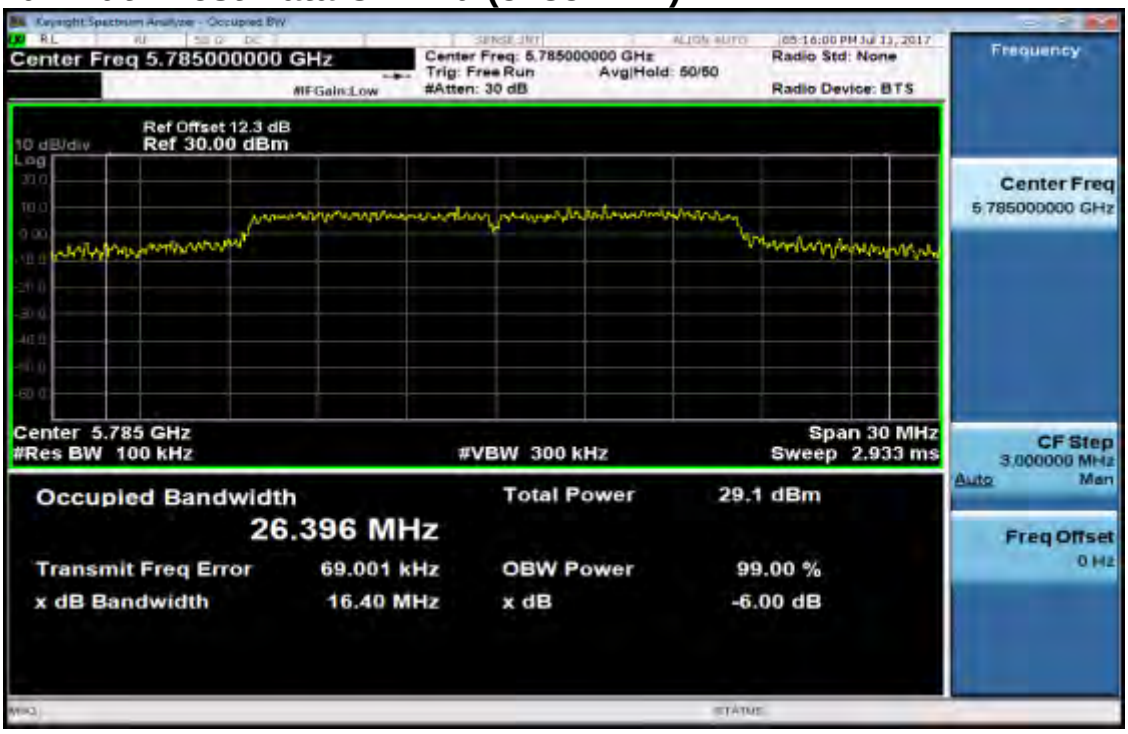
6dB Band Width measure with Peak detector for FCC 802.11a, 5725~5850 MHz (Main)

6dB Band Width Test Data CH-Low (5745 MHz)



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



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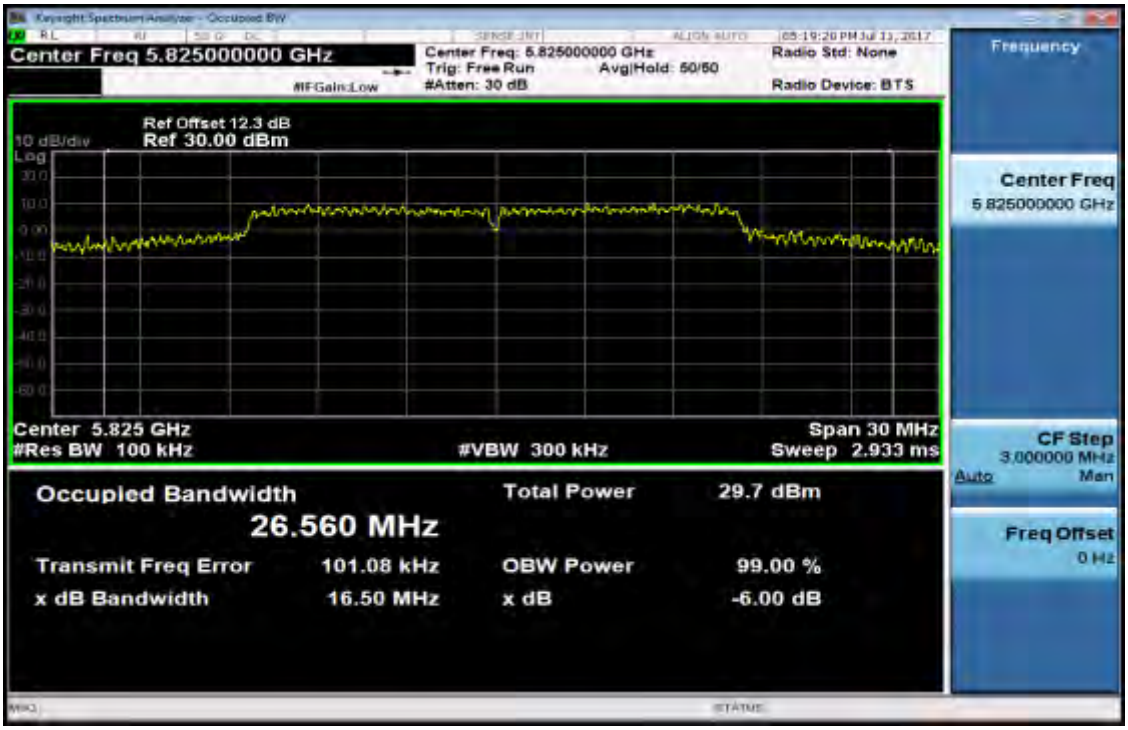
6dB Band Width Test Data CH-High (5825 MHz)



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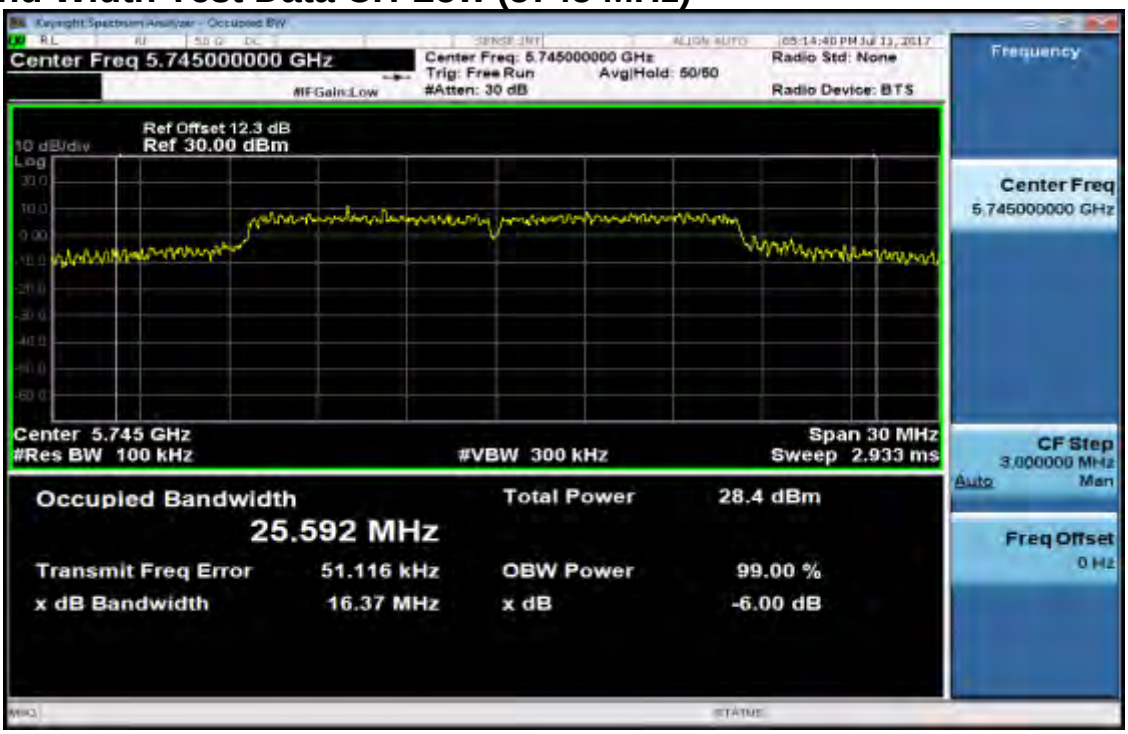
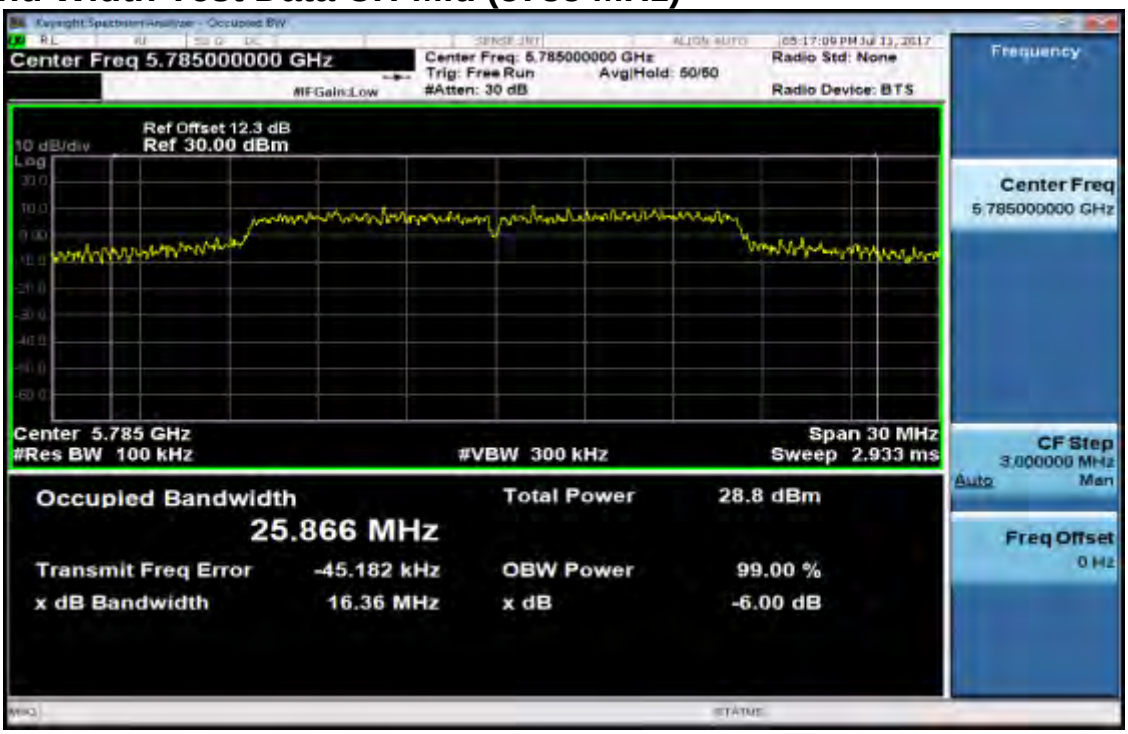
802.11a, 5725~5850 MHz (Aux)
6dB Band Width Test Data CH-Low (5745 MHz)



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



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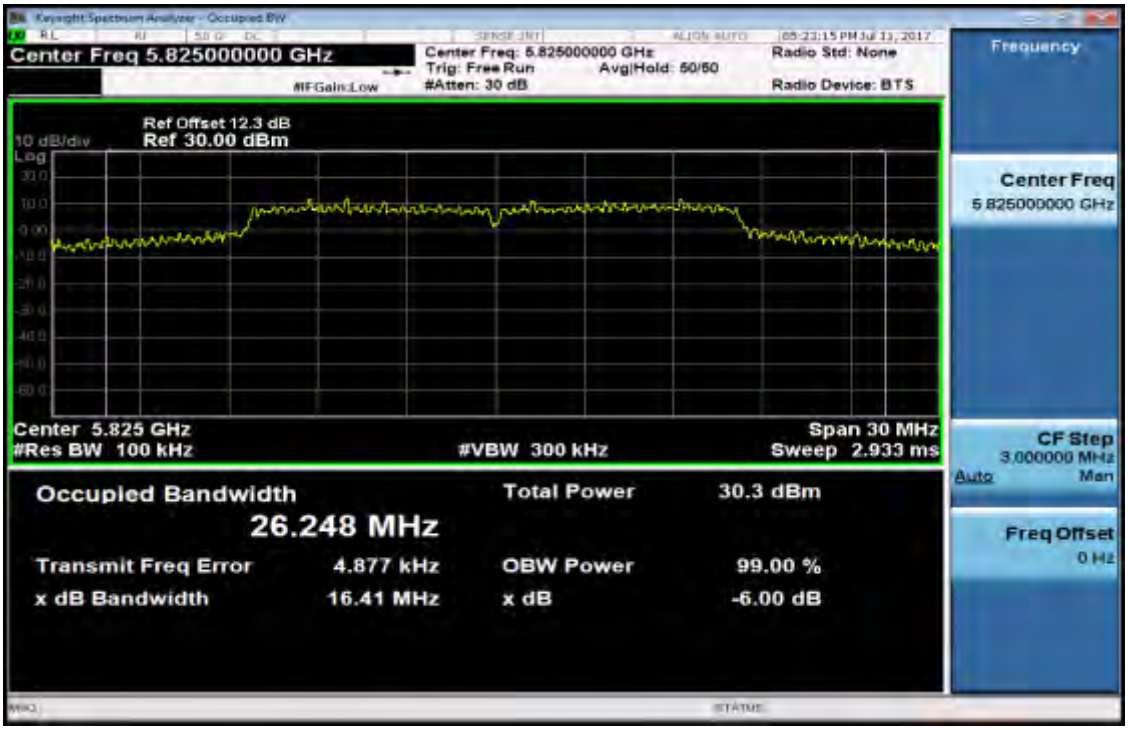
6dB Band Width Test Data CH-High (5825 MHz)



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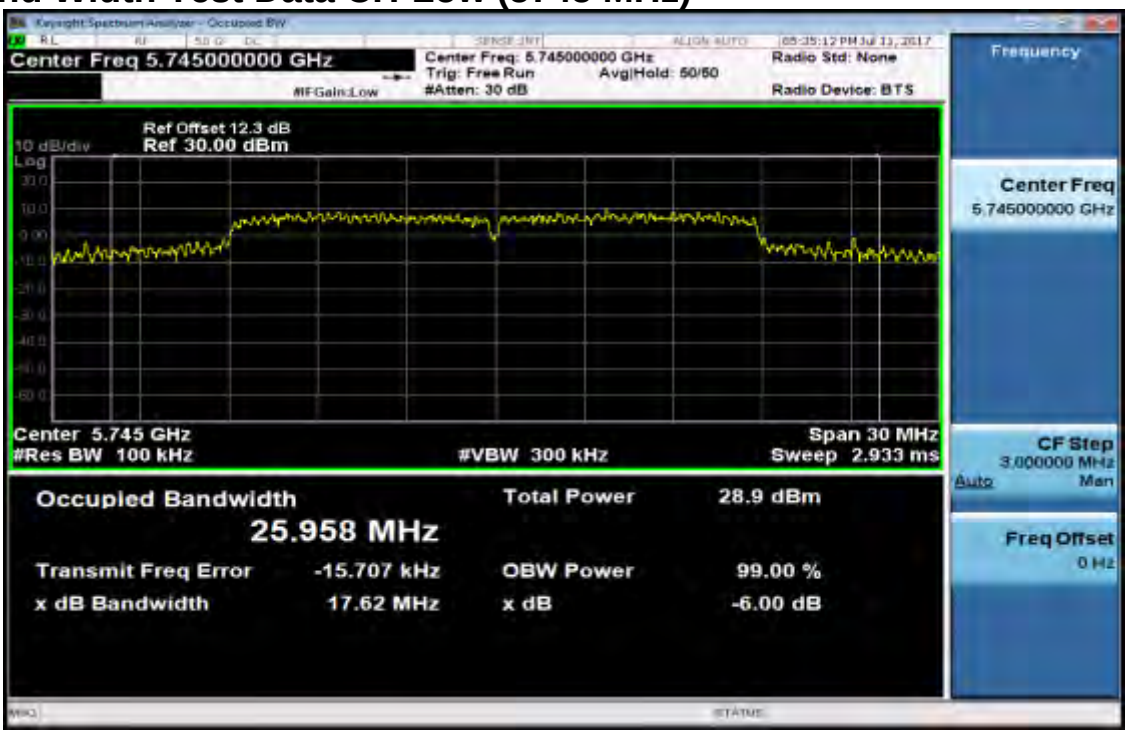
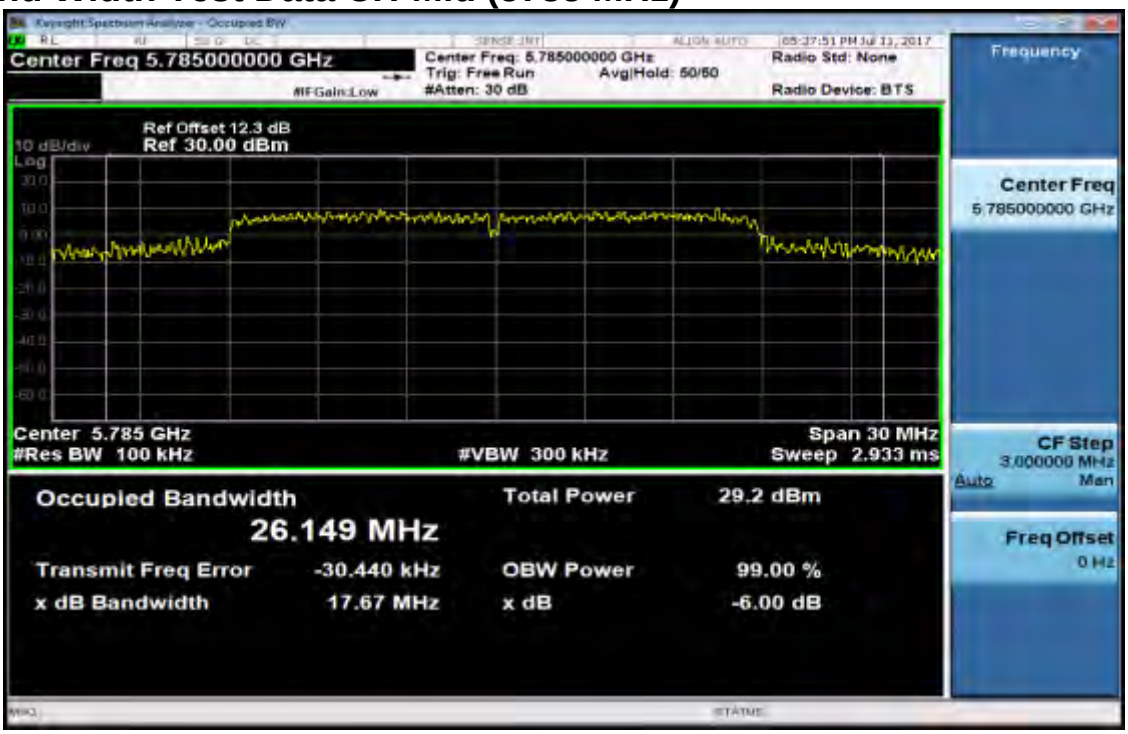
802.11n_HT20, 5725~5850 MHz (Main)
6dB Band Width Test Data CH-Low (5745 MHz)



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



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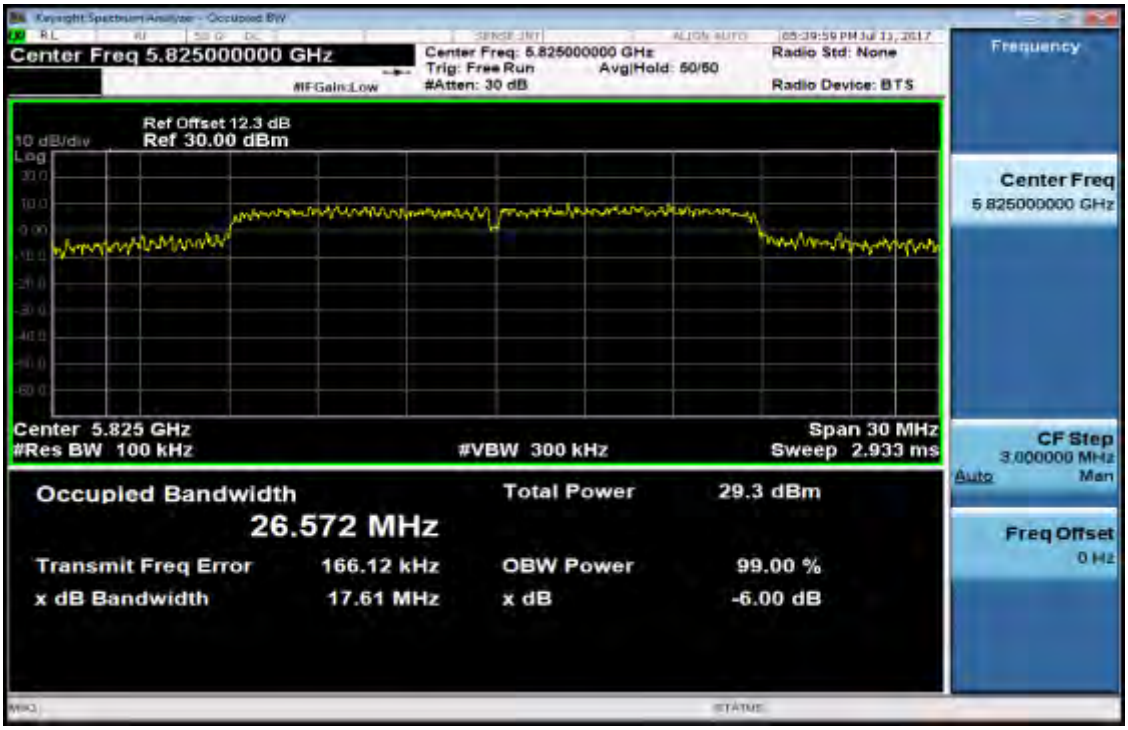
6dB Band Width Test Data CH-High (5825 MHz)



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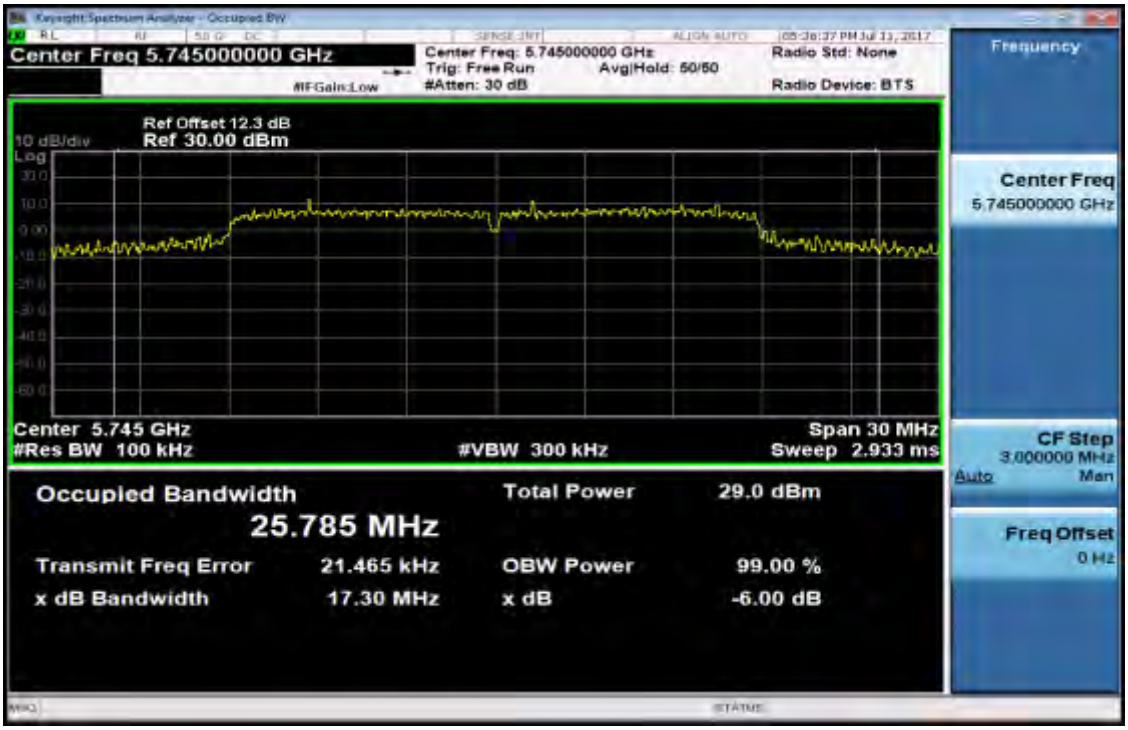
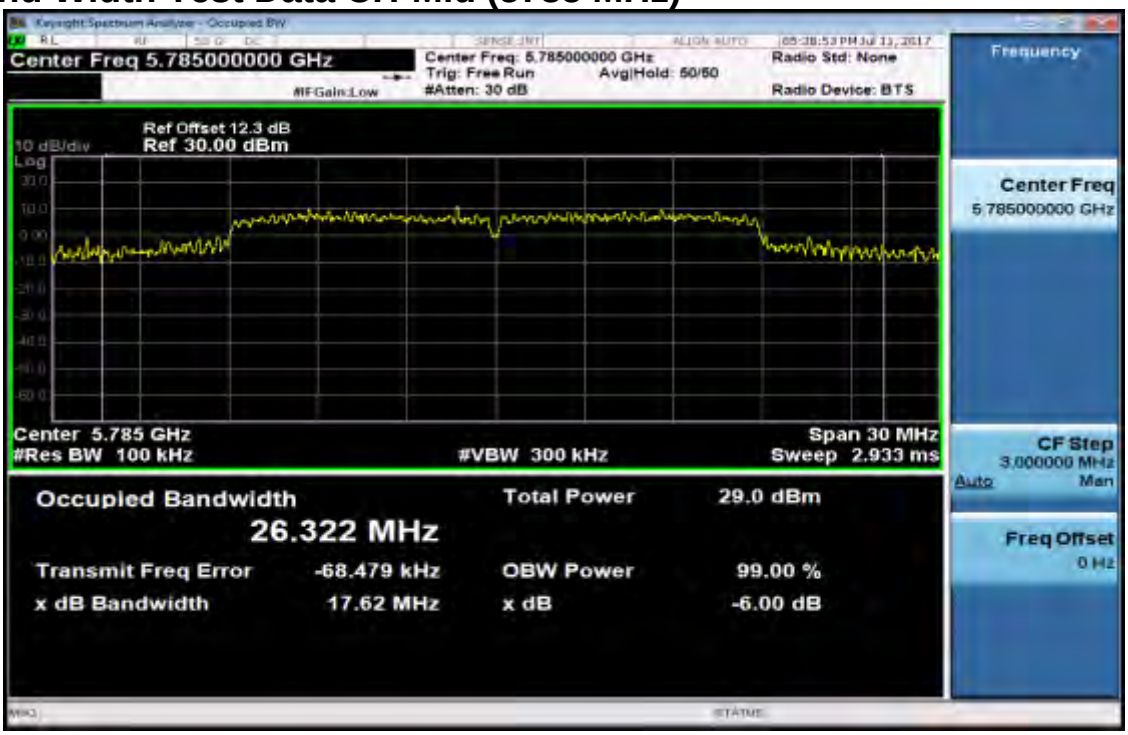
802.11n_HT20, 5725~5850 MHz (Aux)
6dB Band Width Test Data CH-Low (5745 MHz)



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



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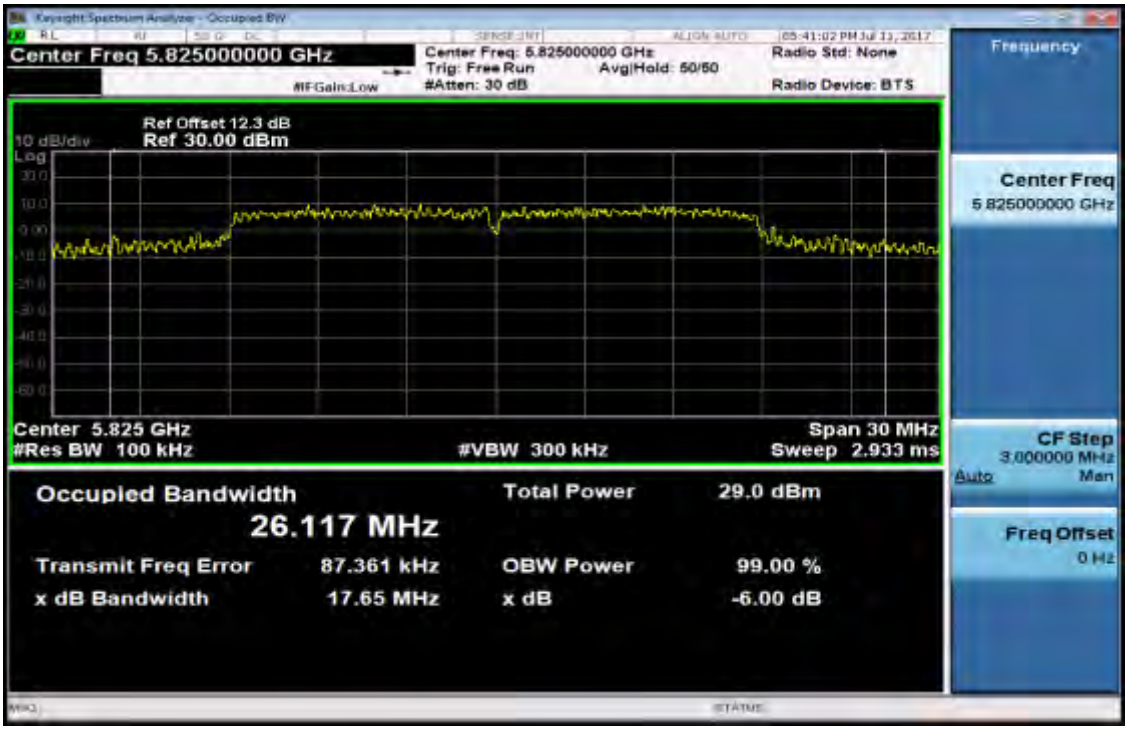
6dB Band Width Test Data CH-High (5825 MHz)



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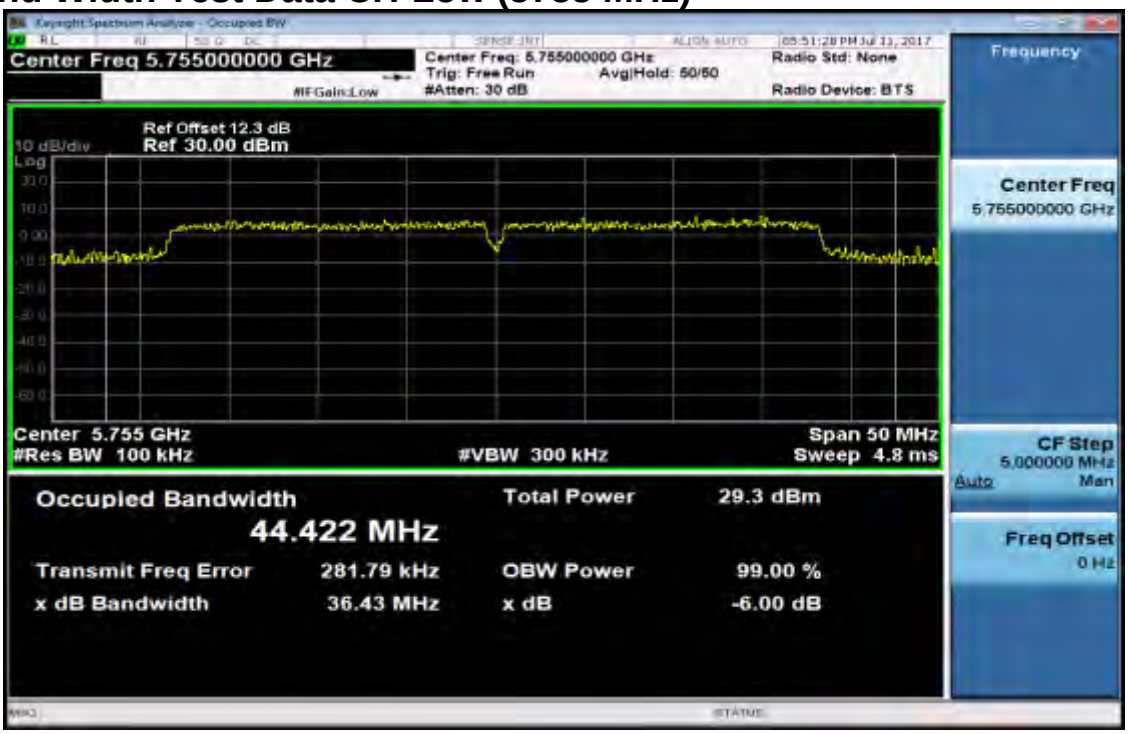
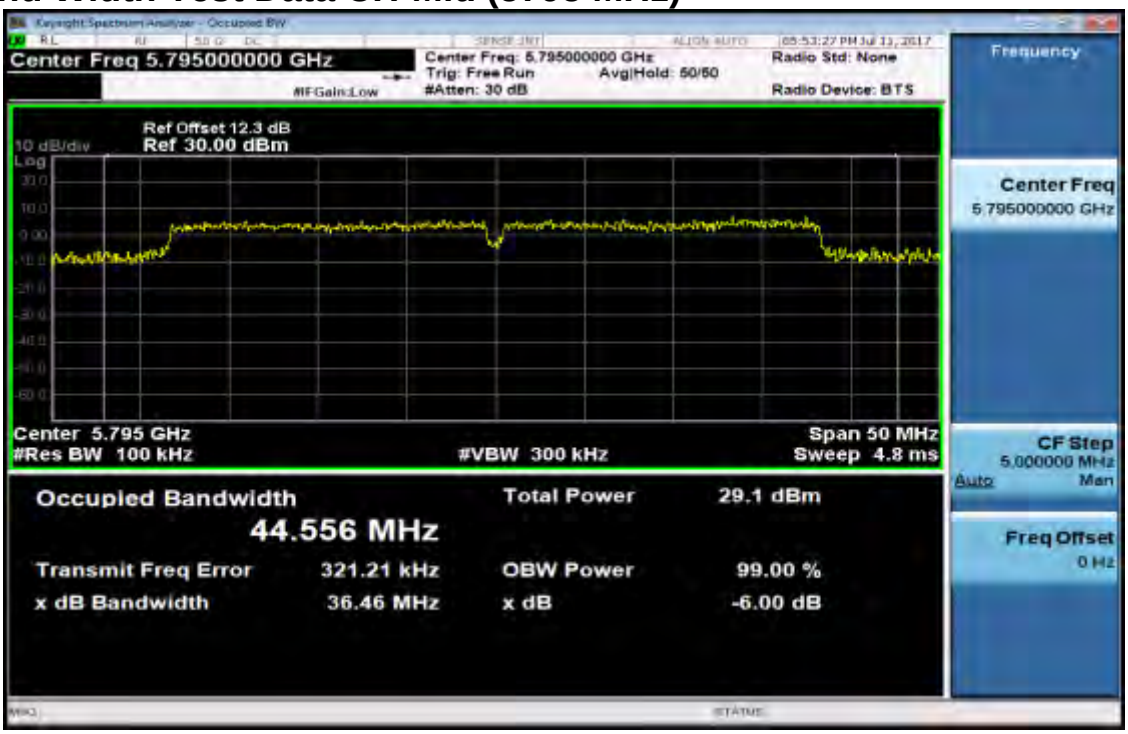
802.11n_HT40, 5725~5850 MHz (Main)
6dB Band Width Test Data CH-Low (5755 MHz)



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



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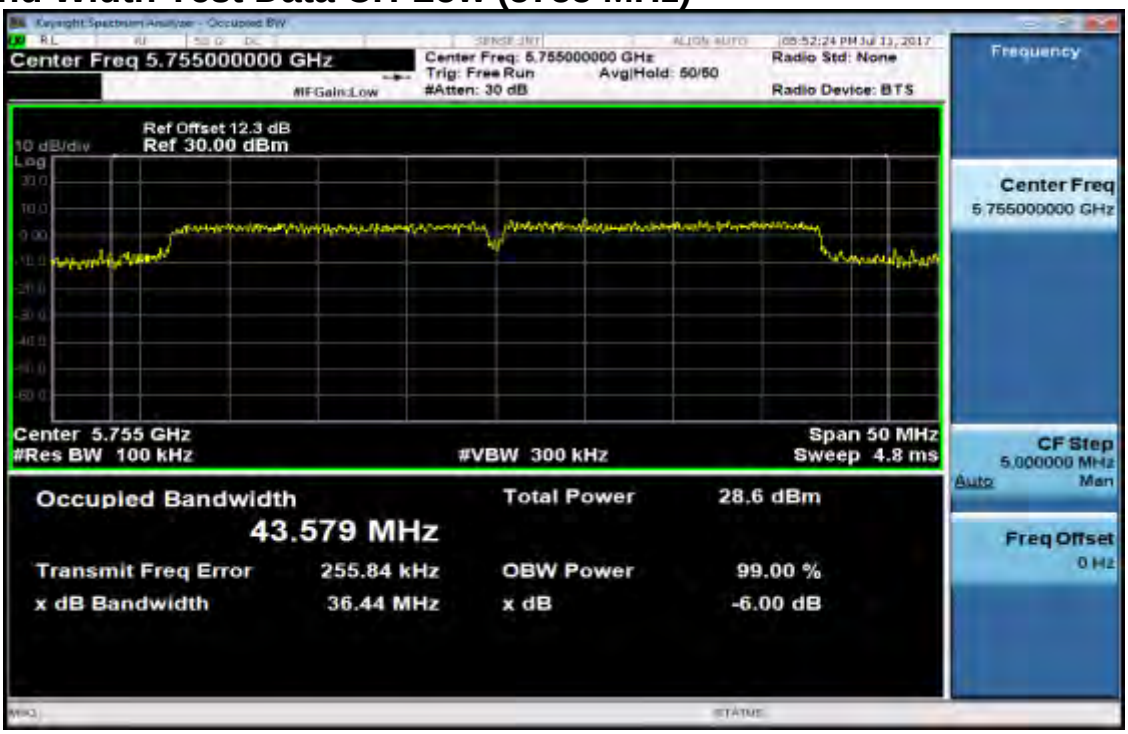
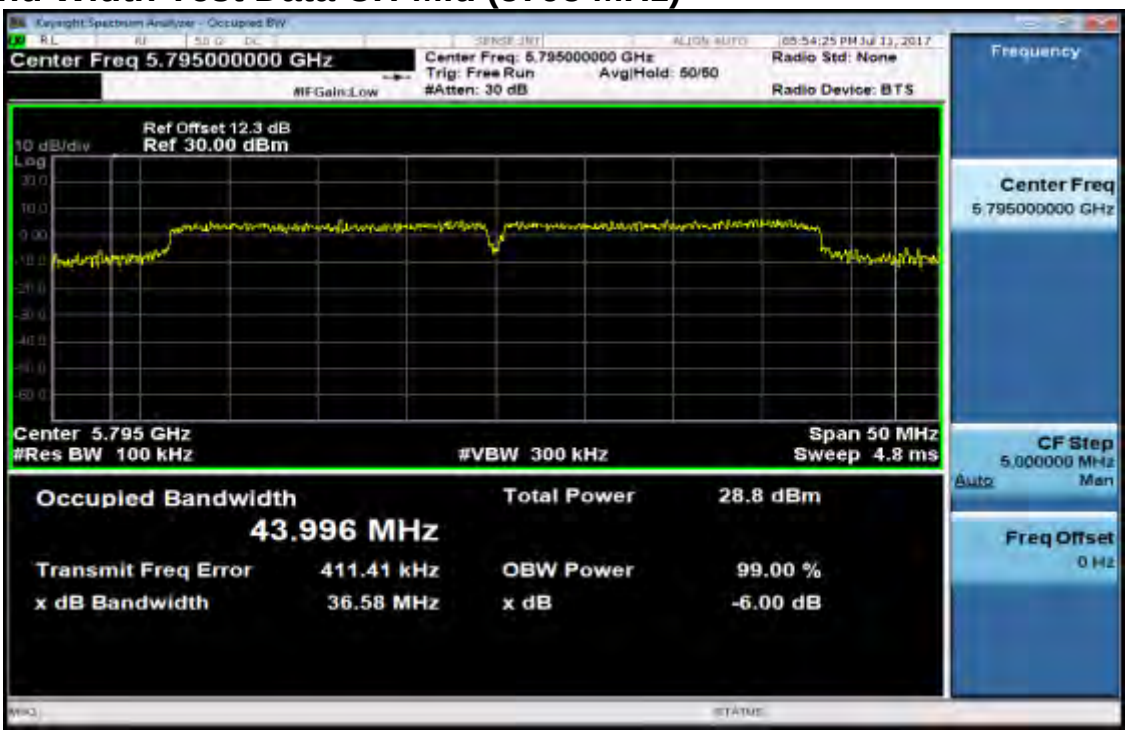
802.11n_HT40, 5725~5850 MHz (Aux)
6dB Band Width Test Data CH-Low (5755 MHz)



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



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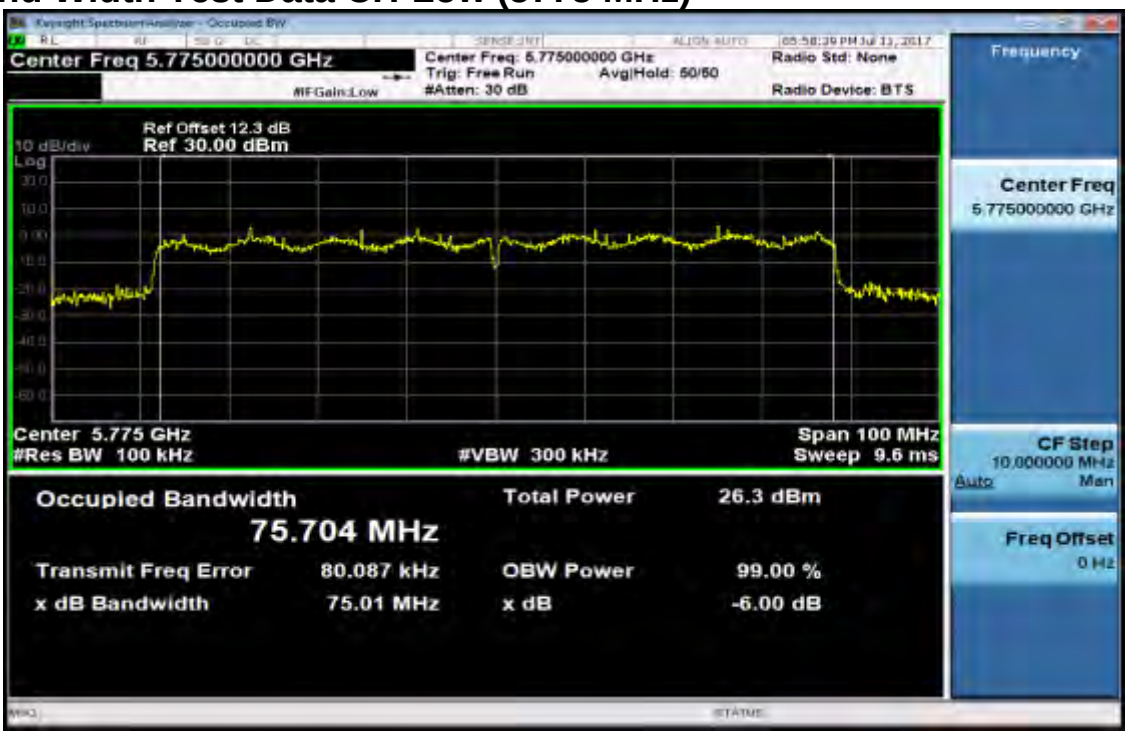
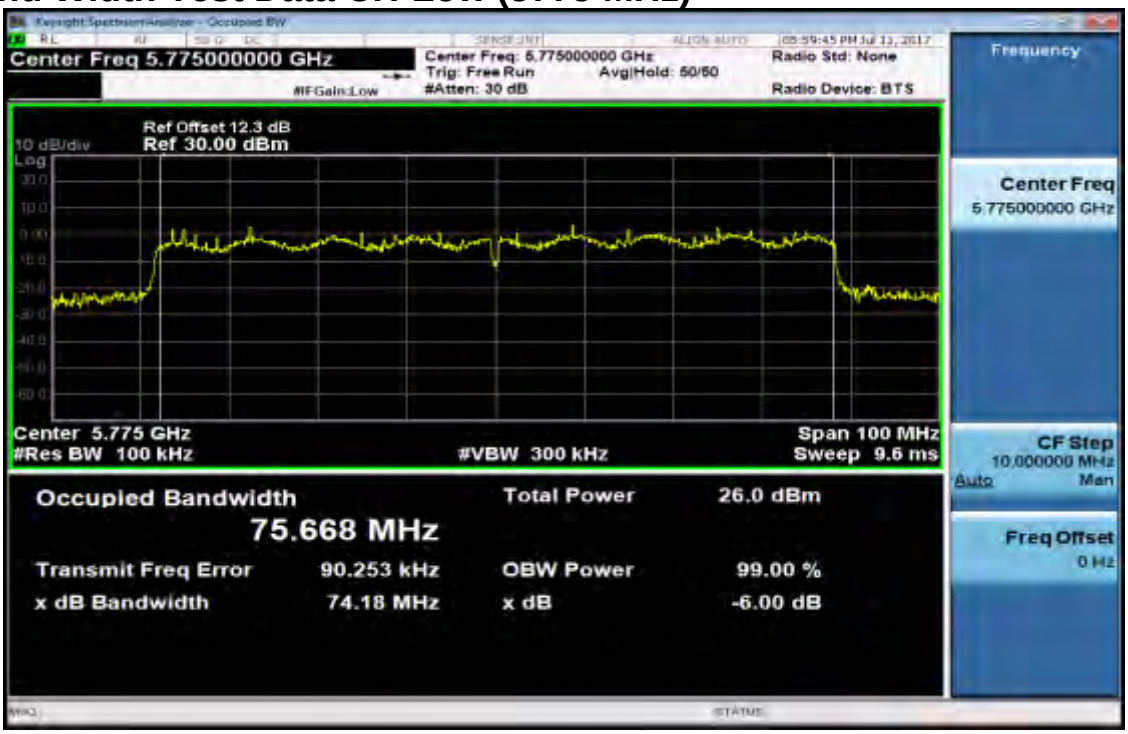
802.11ac VHT80, 5725~5850 MHz (Main)
6dB Band Width Test Data CH-Low (5775 MHz)



802.11ac VHT80, 5725~5850 MHz (Aux)
6dB Band Width Test Data CH-Low (5775 MHz)



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9. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

9.1 Standard Applicable

FCC

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

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

The antenna gain is granter than 6 dBi in MIMO mode the limit reduce as below:
Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

FCC

	Effective Legacy Gain (dBi)	Limit
UNII-1	4.5+3.01=7.51dBi	23.98dBm – (7.51– 6dBi) = 22.47dBm
U-NII-3	4.5+3.01=7.51dBi	30dBm – (7.51– 6dBi) = 28.49dBm

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

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9.2 Measurement Procedure

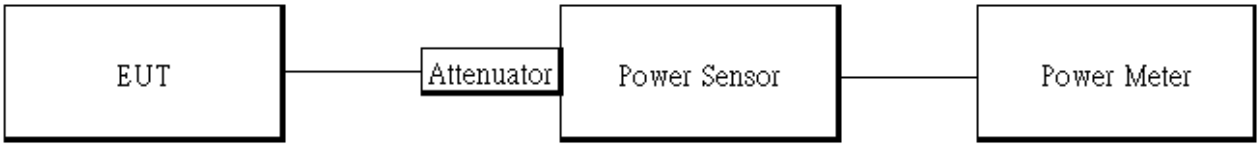
1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antennport to the power meter
4. Power Meter is used as the auxiliary test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

Note: For the overlapped channels between U-NII-2C and U-NII-3, and according to FCC KDB 644545 D03 the power is computed based on the portion of the emission bandwidth contained within that band. This rule is only applicable for those channels marked as overlapped.

9.3 Measurement Equipment Used

SGS Conducted Room					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018
Splitter	Agilent	11636B	N/A	01/05/2017	01/04/2018
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017
Temperature Chamber	TERCHY	MHG-120LF	911009	05/19/2017	05/18/2018

9.4 Test Set-up



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9.5 Measurement Result

802.11a_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	19.23	18.65	22.36	157.035	22.47	PASS
44	5220	MCS8	19.16	18.78	**22.39**	**157.923**	22.47	PASS
48	5240	MCS8	19.14	18.79	22.38	157.718	22.47	PASS
149	5745	MCS8	22.78	22.22	25.92	356.395	28.49	PASS
157	5785	MCS8	23.27	22.38	**26.26**	**385.306**	28.49	PASS
165	5825	MCS8	22.07	21.88	25.39	315.235	28.49	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	19.27	18.56	**22.34**	**156.307**	22.47	PASS
44	5220	MCS8	19.15	18.53	22.26	153.510	22.47	PASS
48	5240	MCS8	19.06	18.36	22.14	149.087	22.47	PASS
149	5745	MCS8	22.58	21.96	25.69	338.170	28.49	PASS
157	5785	MCS8	22.95	22.23	26.02	364.351	28.49	PASS
165	5825	MCS8	23.07	22.49	**26.20**	**380.187**	28.49	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	15.97	15.03	19.11	71.379	22.47	PASS
46	5230	MCS8	18.96	18.23	**22.20**	**145.232**	22.47	PASS
151	5755	MCS8	22.46	21.72	25.69	324.791	28.49	PASS
159	5795	MCS8	22.78	21.96	**25.98**	**346.707**	28.49	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	15.36	13.56	18.54	57.054	22.47	PASS
155	5775	MCS0	20.3	18.85	23.62	183.888	28.49	PASS

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10. PEAK POWER SPECTRAL DENSITY

10.1 Standard Applicable

FCC

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

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

The antenna gain is granter than 6 dBi in MIMO mode the limit reduce as below:
Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

FCC

	Effective Legacy Gain (dBi)	Limit
UNII-1	4.5+3.01=7.51dBi	11dBm – (7.51– 6dBi) = 9.49dBm
U-NII-3	4.5+3.01=7.51dBi	30dBm – (7.51– 6dBi) = 28.49dBm

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

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10.2 Measurement Procedure

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

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

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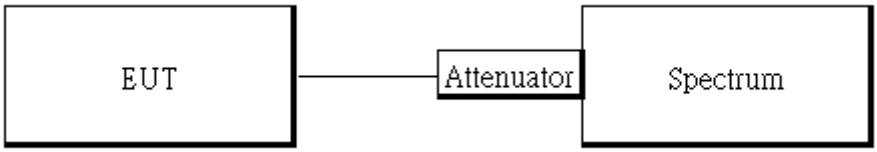
10.3 Measurement Equipment Used

SGS Conducted Room					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018
Splitter	Agilent	11636B	N/A	01/05/2017	01/04/2018
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017
Temperature Chamber	TERCHY	MHG-120LF	911009	05/19/2017	05/18/2018

10.4 Test Set-up



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10.5 Measurement Result

POWER DENSITY 802.11a MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5180	8.17	9.49	-1.32
5220	7.66	9.49	-1.83
5240	7.90	9.49	-1.59
5745	19.70	28.49	-8.79
5785	19.83	28.49	-8.66
5825	19.68	28.49	-8.81

POWER DENSITY 802.11n HT20 MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5180	8.54	9.49	-0.95
5220	8.80	9.49	-0.69
5240	8.00	9.49	-1.49
5745	19.22	28.49	-9.27
5785	19.58	28.49	-8.91
5825	19.73	28.49	-8.76

POWER DENSITY 802.11n HT40 MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5190	2.12	9.49	-7.37
5230	5.28	9.49	-4.21
5755	15.86	28.49	-12.63
5795	16.56	28.49	-11.93

POWER DENSITY 802.11ac VHT80 MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5210	-1.83	9.49	-11.32
5775	11.13	28.49	-17.36

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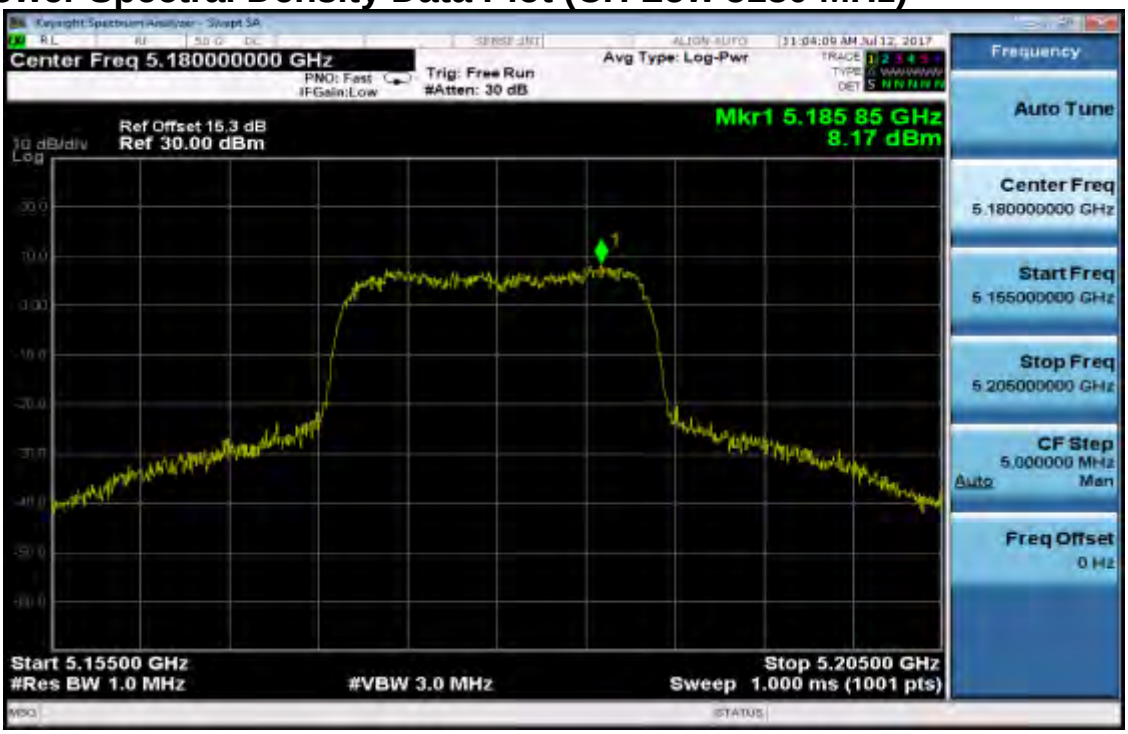
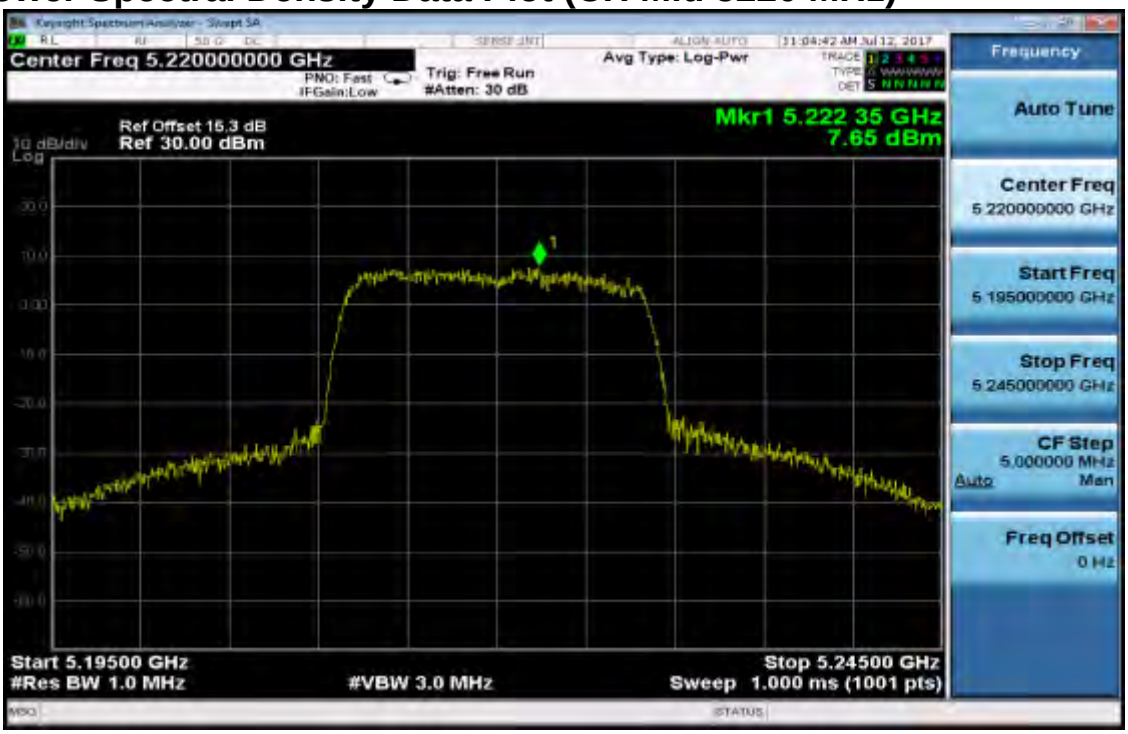
802.11a 5150~5250 MHz
Peak Power Spectral Density Data Plot (CH Low 5180 MHz)



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



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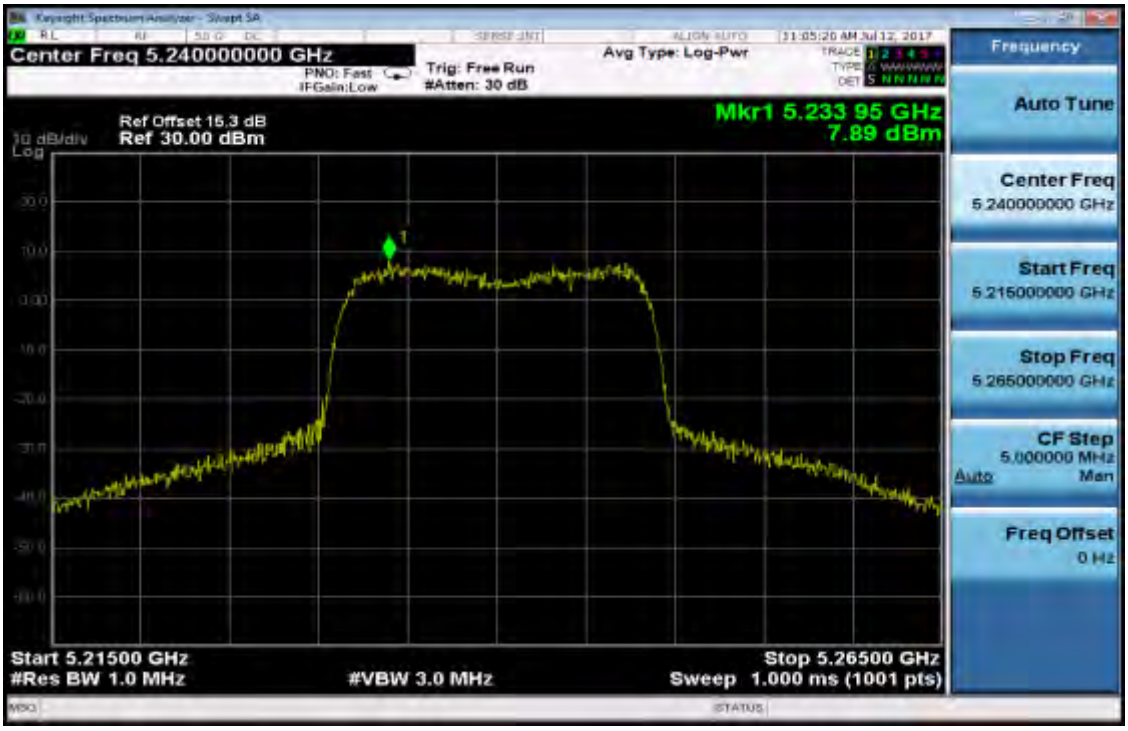
Peak Power Spectral Density Data Plot (CH High 5240 MHz)



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802.11a 5725~5850 MHz
Peak Power Spectral Density Data Plot (CH Low 5745 MHz)

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

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

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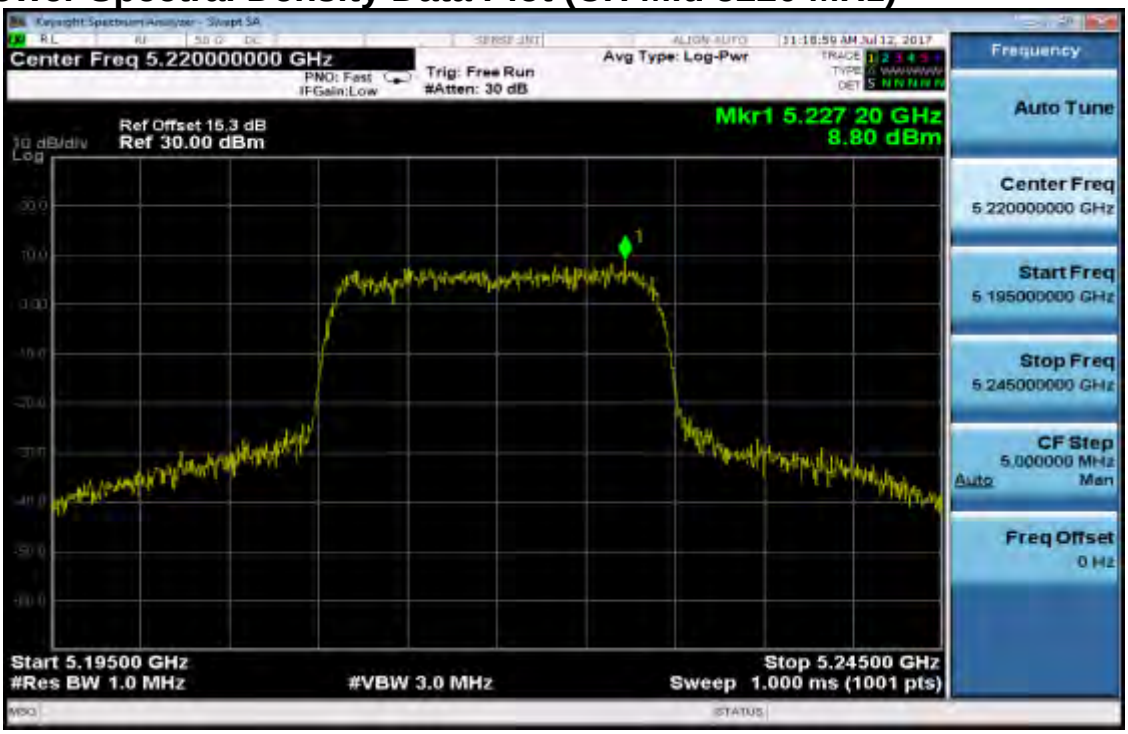
802.11n HT20, 5150~5250 MHz
Peak Power Spectral Density Data Plot (CH Low 5180 MHz)

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



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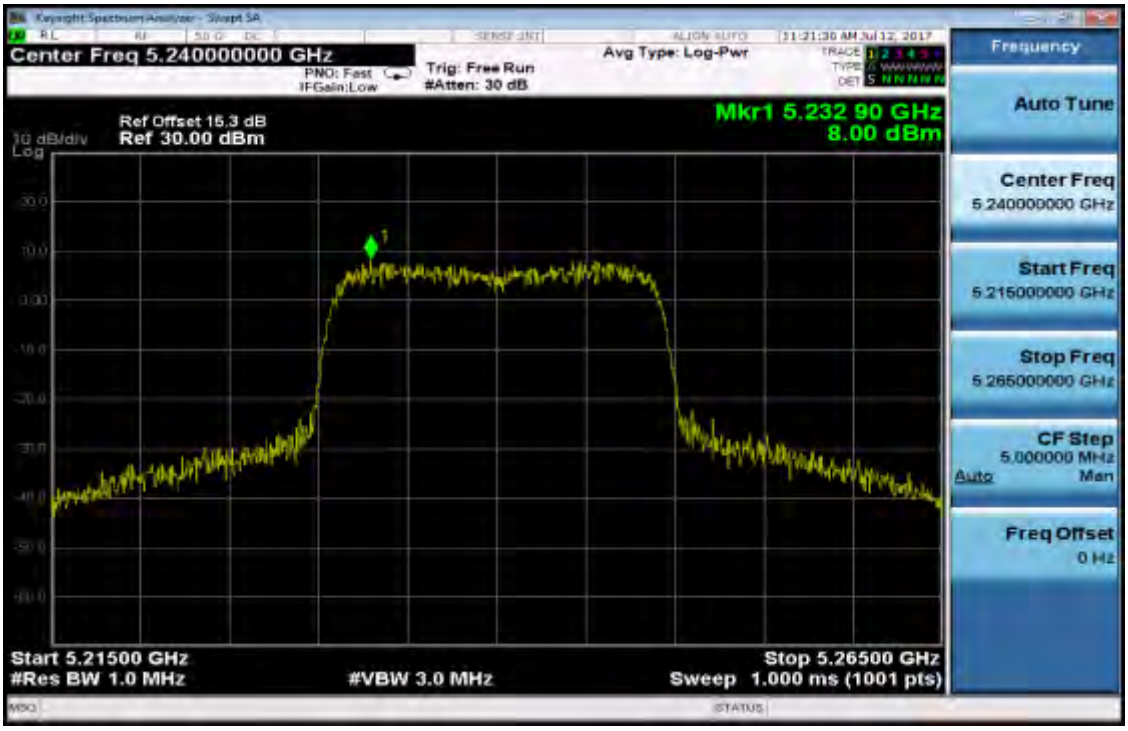
Peak Power Spectral Density Data Plot (CH High 5240 MHz)



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

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

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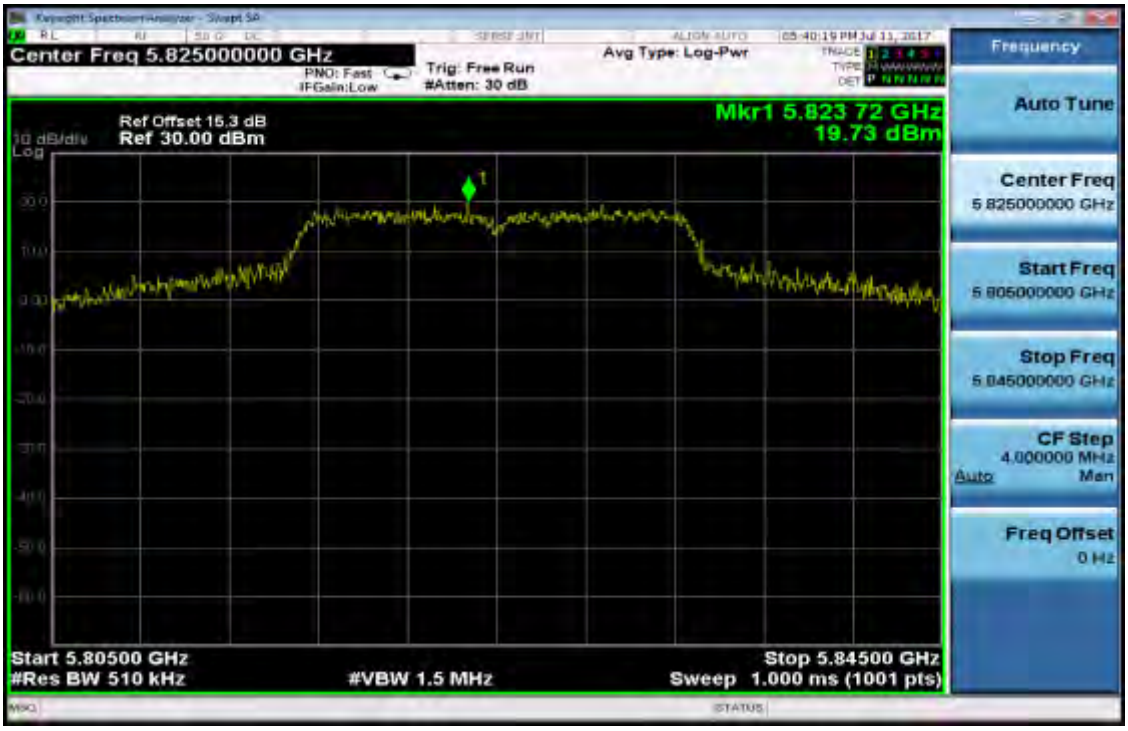
Peak Power Spectral Density Data Plot (CH High 5825 MHz)



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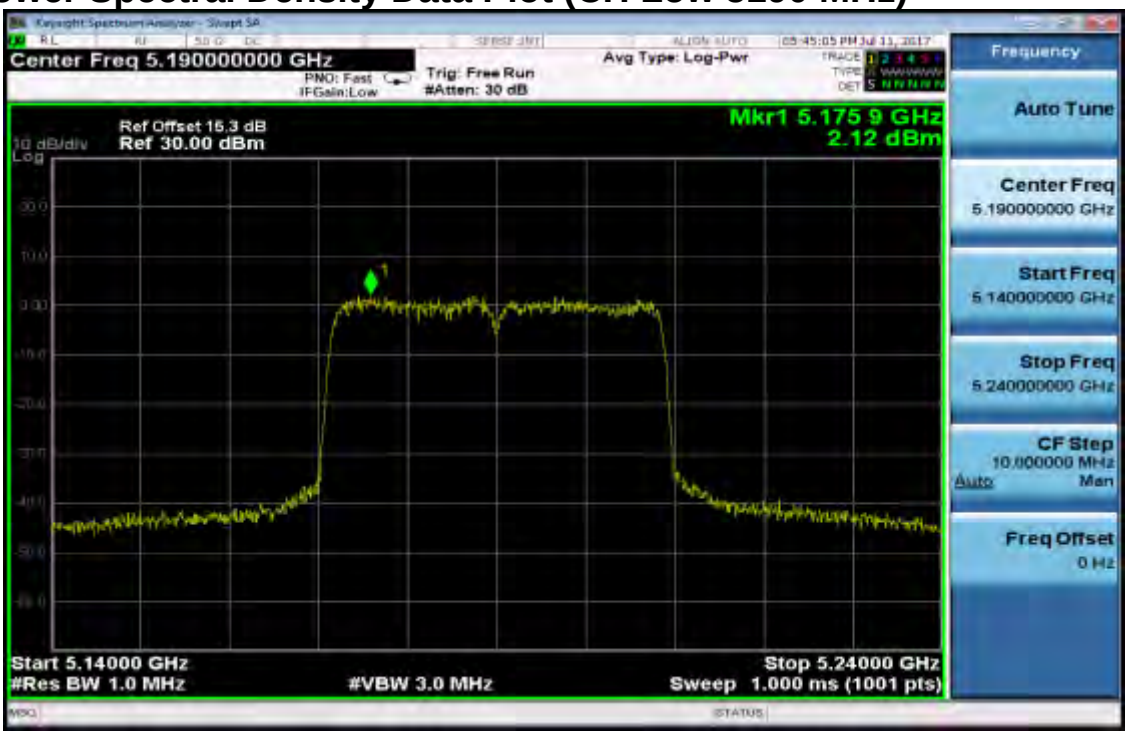
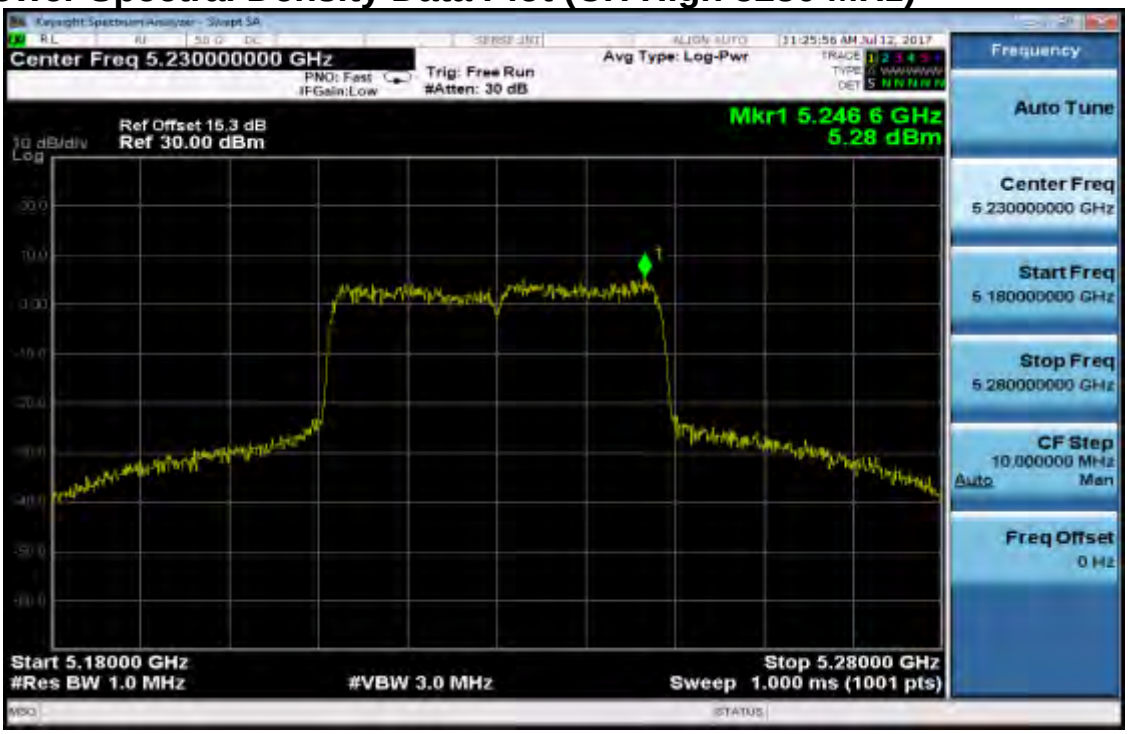
802.11n HT40, 5150~5250 MHz
Peak Power Spectral Density Data Plot (CH Low 5190 MHz)



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



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

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

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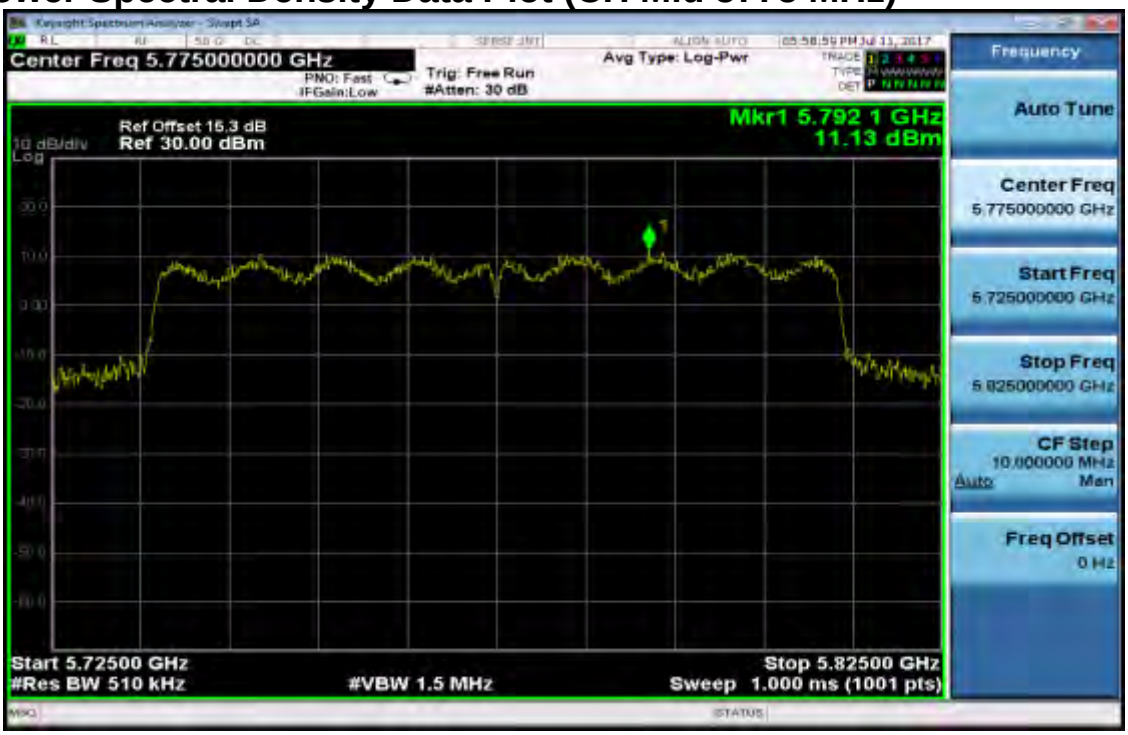
802.11ac VHT80, 5150~5250 MHz
Peak Power Spectral Density Data Plot (CH Mid 5210 MHz)

802.11ac VHT80, 5725~5850 MHz
Peak Power Spectral Density Data Plot (CH Mid 5775 MHz)



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11. UNDESIRABLE RADIATED EMISSION 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 v01r04	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)	PK: -27 (dBm/MHz) PK: -17 (dBm/MHz)	PK: 68.3 (dBμV/m) PK: 78.2 (dBμV/m)
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*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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t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

11.2 Measurement Equipment Used

SGS SAC-III					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/11/2017	05/10/2018
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/25/2017	04/24/2018
Loop Antenna	ETS-Lindgren	6502	148045	09/20/2016	09/19/2017
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/19/2016	12/18/2017
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/01/2016	07/31/2017
Pre-Amplifier	Agilent	8447D	2944A07676	01/05/2017	01/04/2018
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/05/2017	01/04/2018
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	ChamPro	AM-BS-4500-B	060776-ABS	N.C.R	N.C.R
Controller	ChamPro	EM1000	60776	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_RX	9	01/05/2017	01/04/2018
3m Site NSA	SGS	966 chamber	N/A	07/01/2017	06/30/2018
Low Loss Cable	Huber Suhner	966 TX	1	01/05/2017	01/04/2018
Horn Antenna	Schwarzbeck	BBHA9170	184	12/12/2016	12/11/2017
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/05/2017	01/04/2018

NOTE: N.C.R refers to Not Calibrated Required.

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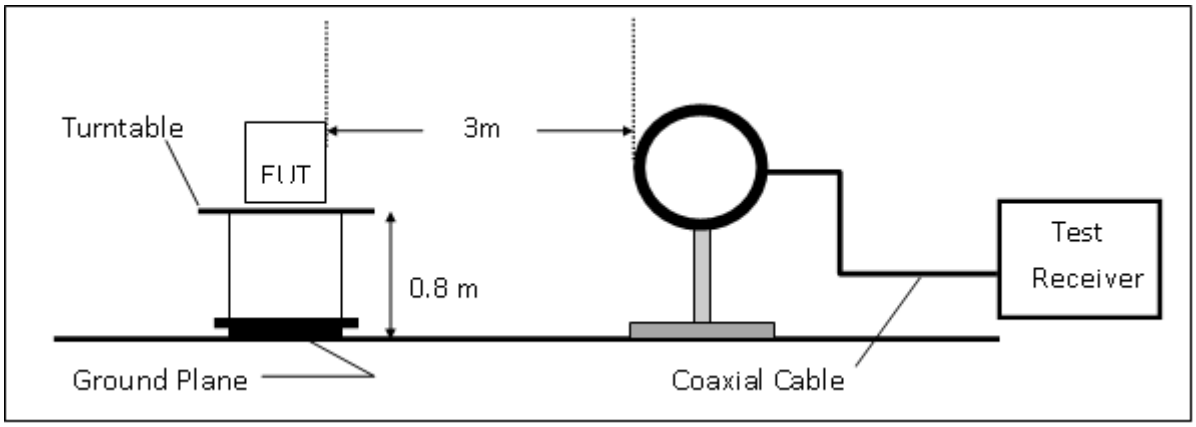
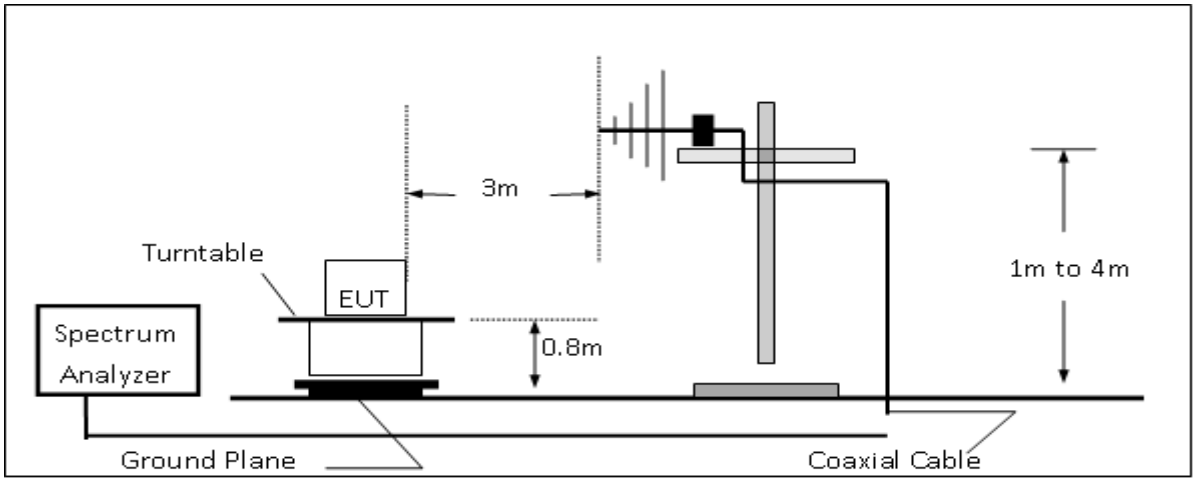
11.3 Test SET-UP

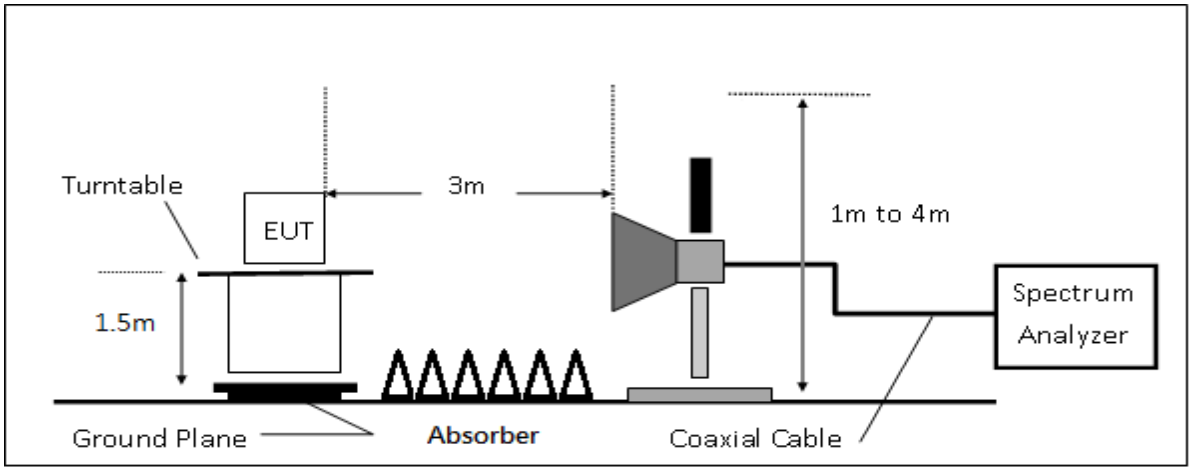
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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11.4 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01.
3. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plane.
4. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
5. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
6. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
8. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
9. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
11. Repeat above procedures until all frequency measured were complete.

11.5 Field Strength Calculation

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

FS = RA + AF + CL - AG

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

Actual FS(dBµV/m) = SPA. Reading level(dBµV) + Factor(dB)
Factor(dB) = Antenna Factor(dBµV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note :

"**F**" : denotes Fundamental Frequency. ; "**H**" : denotes Harmonic Frequency.
"**E**" : denotes Band Edge Frequency. ; "**S**" : denotes Spurious Frequency.

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

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

11.7 Measurement Result

Refer to attach tabular data sheets.

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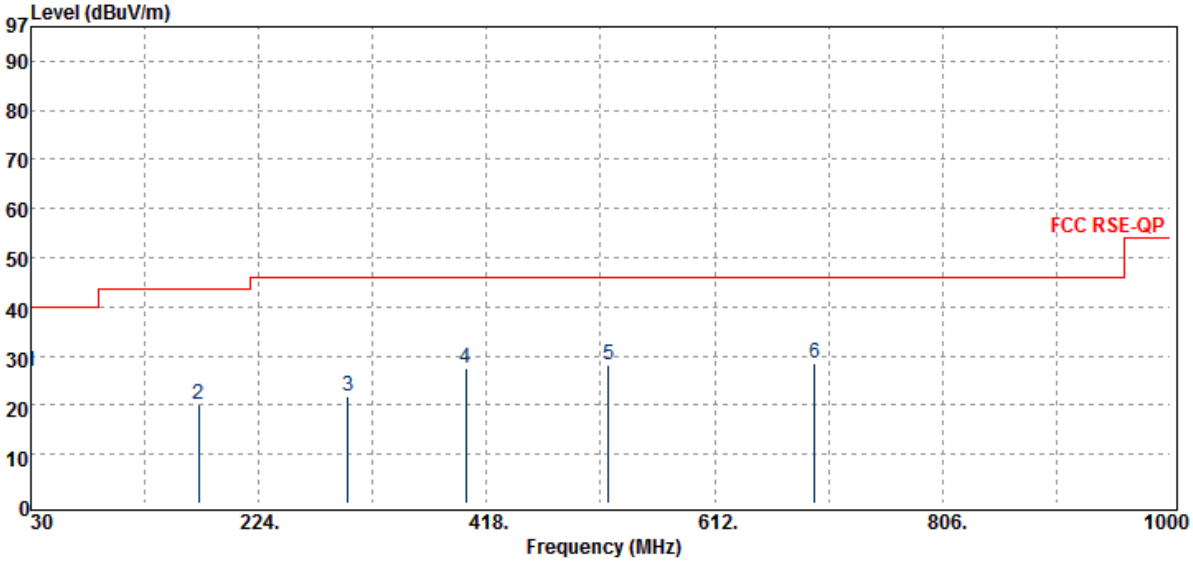
Radiated Spurious Emission Measurement Result

Below 1GHz Worst-Case Data:

802.11a 5150~5250 MHz

Operation Band	:802.11aB1	Test Date	:2017-07-07
Fundamental Frequency	:5220 MHz	Temp./Humi.	:21 deg_C / 61 RH
Operation Mode	:Tx CH MID	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
30.00	S	Peak	36.07	-9.19	26.88	40.00	-13.12
172.59	S	Peak	27.98	-7.86	20.12	43.50	-23.38
299.66	S	Peak	27.80	-5.93	21.87	46.00	-24.13
400.54	S	Peak	31.49	-3.94	27.55	46.00	-18.45
521.79	S	Peak	29.96	-1.61	28.35	46.00	-17.65
697.36	S	Peak	27.25	1.36	28.61	46.00	-17.39

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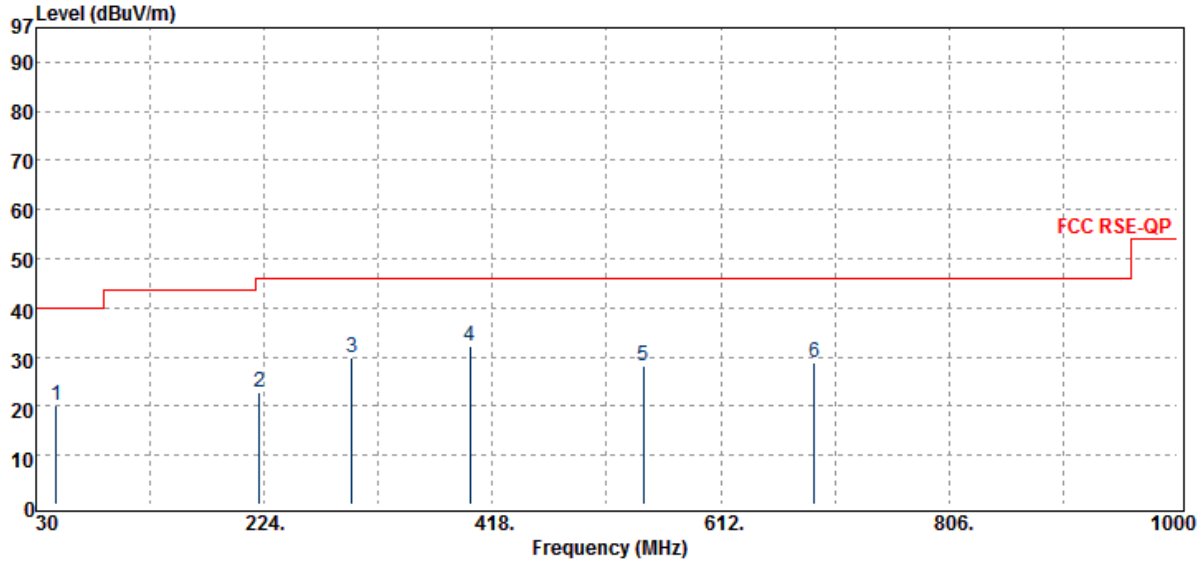
Operation Band	:802.11aB1	Test Date	:2017-07-07
Fundamental Frequency	:5220 MHz	Temp./Humi.	:21 deg_C / 61 RH
Operation Mode	:Tx CH MID	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
47.46	S	Peak	27.91	-7.85	20.06	40.00	-19.94
220.12	S	Peak	32.21	-9.25	22.96	46.00	-23.04
298.69	S	Peak	35.92	-5.95	29.97	46.00	-16.03
398.60	S	Peak	36.20	-3.97	32.23	46.00	-13.77
546.04	S	Peak	29.83	-1.55	28.28	46.00	-17.72
691.54	S	Peak	27.33	1.47	28.80	46.00	-17.20

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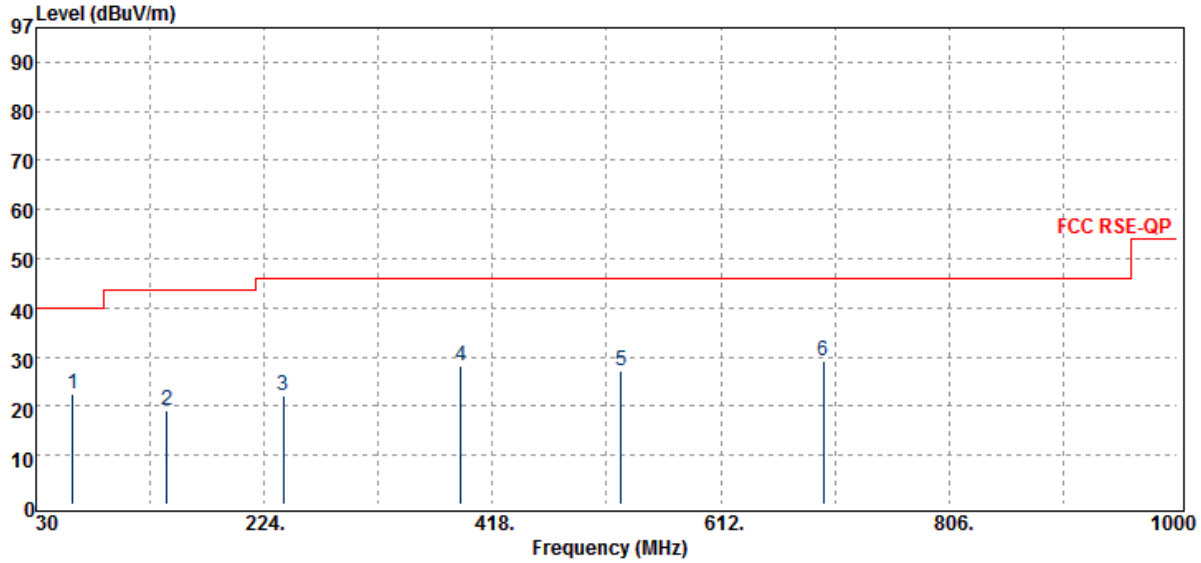
802.11a, 5725~5850 MHz

Operation Band	:802.11aB4	Test Date	:2017-07-07
Fundamental Frequency	:5785 MHz	Temp./Humi.	:21 deg_C / 61 RH
Operation Mode	:Tx CH MID	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
61.04	S	Peak	30.88	-8.25	22.63	40.00	-17.37
141.55	S	Peak	27.39	-8.26	19.13	43.50	-24.37
240.49	S	Peak	30.25	-8.04	22.21	46.00	-23.79
390.84	S	Peak	32.32	-4.18	28.14	46.00	-17.86
527.61	S	Peak	28.44	-1.32	27.12	46.00	-18.88
699.30	S	Peak	27.75	1.44	29.19	46.00	-16.81

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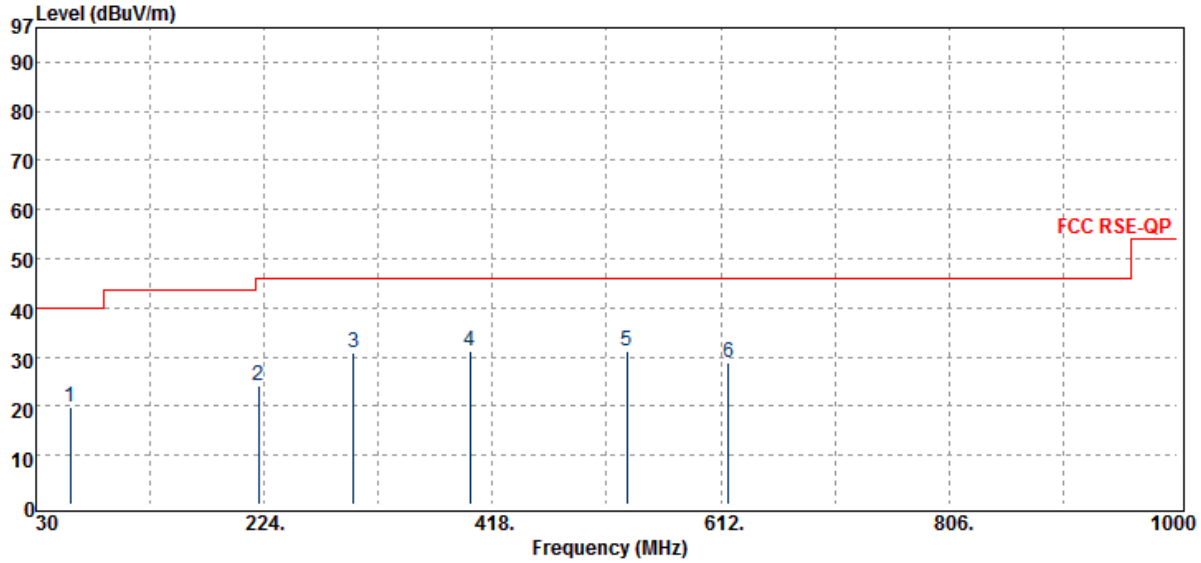
Operation Band	:802.11aB4	Test Date	:2017-07-07
Fundamental Frequency	:5785 MHz	Temp./Humi.	:21 deg_C / 61 RH
Operation Mode	:Tx CH MID	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
59.10	S	Peak	27.68	-8.03	19.65	40.00	-20.35
219.15	S	Peak	33.53	-9.28	24.25	46.00	-21.75
299.66	S	Peak	36.78	-5.93	30.85	46.00	-15.15
398.60	S	Peak	35.20	-3.97	31.23	46.00	-14.77
532.46	S	Peak	32.78	-1.68	31.10	46.00	-14.90
618.79	S	Peak	28.93	0.00	28.93	46.00	-17.07

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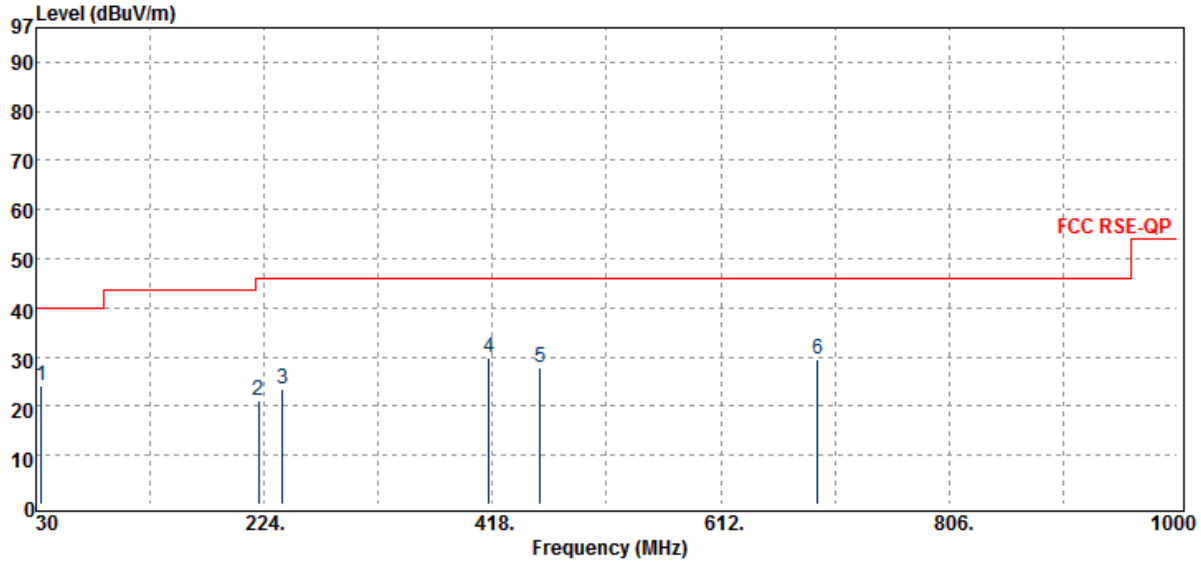
802.11ac VHT80, 5150~5250 MHz

Operation Band	:802.11ac80B1	Test Date	:2017-07-07
Fundamental Frequency	:5210 MHz	Temp./Humi.	:21 deg_C / 61 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
34.85	S	Peak	33.27	-8.99	24.28	40.00	-15.72
219.15	S	Peak	30.29	-9.28	21.01	46.00	-24.99
239.52	S	Peak	31.71	-8.12	23.59	46.00	-22.41
415.09	S	Peak	33.11	-3.21	29.90	46.00	-16.10
458.74	S	Peak	30.45	-2.68	27.77	46.00	-18.23
694.45	S	Peak	28.31	1.36	29.67	46.00	-16.33

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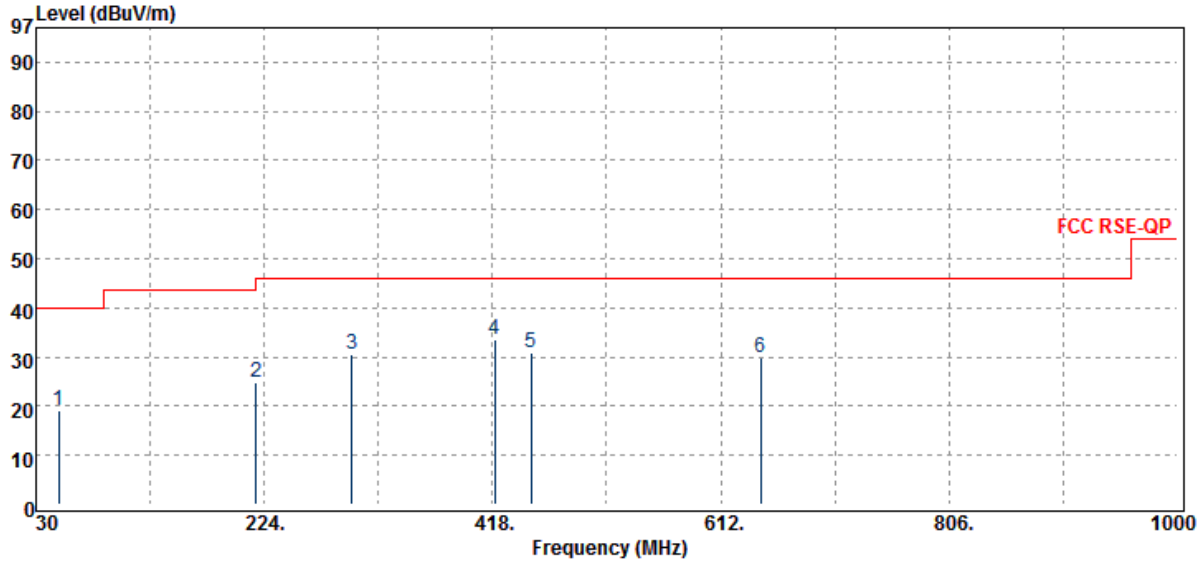
Operation Band	:802.11ac80B1	Test Date	:2017-07-07
Fundamental Frequency	:5210 MHz	Temp./Humi.	:21 deg_C / 61 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
49.40	S	Peak	26.85	-7.74	19.11	40.00	-20.89
217.21	S	Peak	34.29	-9.39	24.90	46.00	-21.10
298.69	S	Peak	36.33	-5.95	30.38	46.00	-15.62
419.94	S	Peak	37.01	-3.39	33.62	46.00	-12.38
450.98	S	Peak	33.62	-2.88	30.74	46.00	-15.26
645.95	S	Peak	29.26	0.53	29.79	46.00	-16.21

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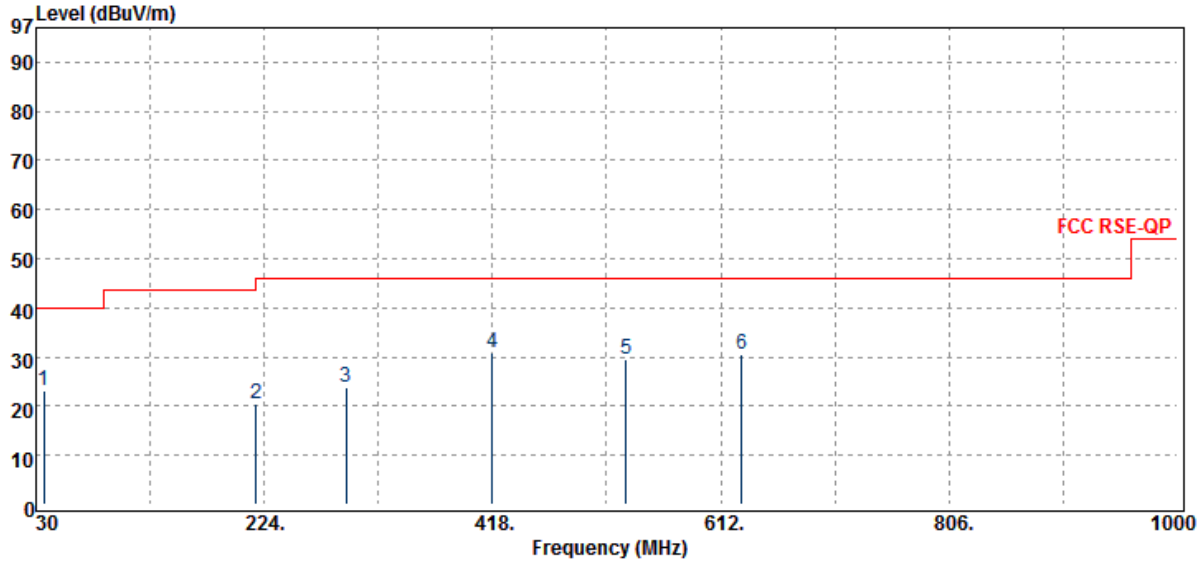
802.11ac VHT80, 5725~5850 MHz

Operation Band	:802.11ac80B4	Test Date	:2017-07-07
Fundamental Frequency	:5775 MHz	Temp./Humi.	:21 deg_C / 61 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
36.79	S	Peak	32.02	-8.84	23.18	40.00	-16.82
217.21	S	Peak	29.73	-9.39	20.34	46.00	-25.66
293.84	S	Peak	29.84	-6.04	23.80	46.00	-22.20
418.00	S	Peak	34.35	-3.37	30.98	46.00	-15.02
531.49	S	Peak	30.98	-1.57	29.41	46.00	-16.59
629.46	S	Peak	30.28	0.16	30.44	46.00	-15.56

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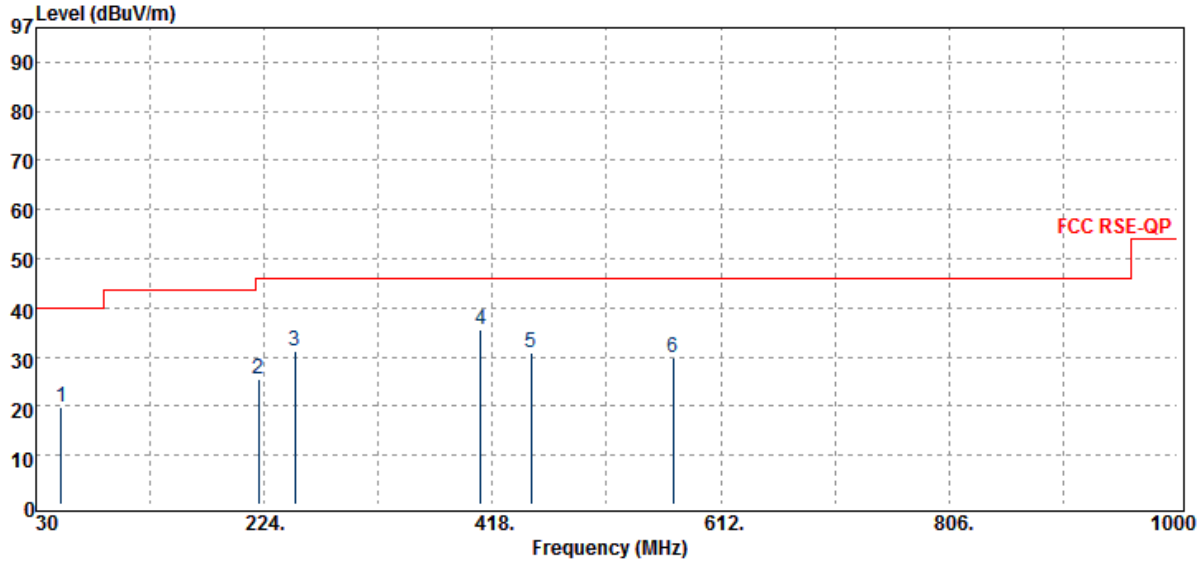
Operation Band	:802.11ac80B4	Test Date	:2017-07-07
Fundamental Frequency	:5775 MHz	Temp./Humi.	:21 deg_C / 61 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
51.34	S	Peak	27.44	-7.75	19.69	40.00	-20.31
219.15	S	Peak	34.81	-9.28	25.53	46.00	-20.47
250.19	S	Peak	39.16	-7.93	31.23	46.00	-14.77
408.30	S	Peak	38.96	-3.53	35.43	46.00	-10.57
450.98	S	Peak	33.90	-2.88	31.02	46.00	-14.98
571.26	S	Peak	30.53	-0.76	29.77	46.00	-16.23

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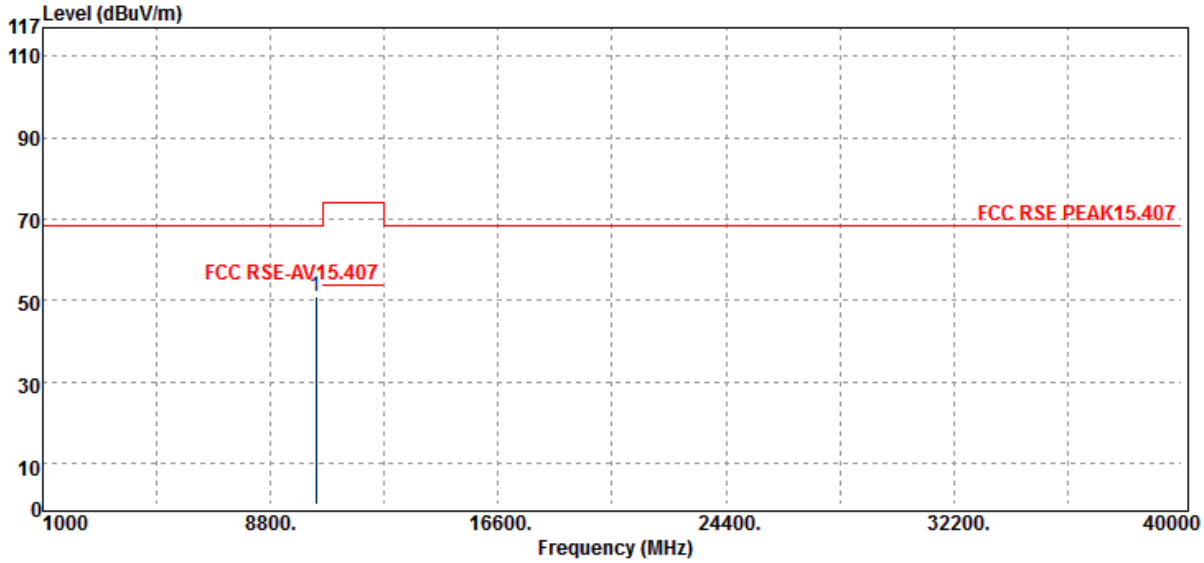
Above 1GHz Worst-Case Data:

802.11a, 5150~5250 MHz

Operation Band	:802.11aB1	Test Date	:2017-07-12
Fundamental Frequency	:5180 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10360.00	H	Peak	32.67	18.29	50.96	68.30	-17.34

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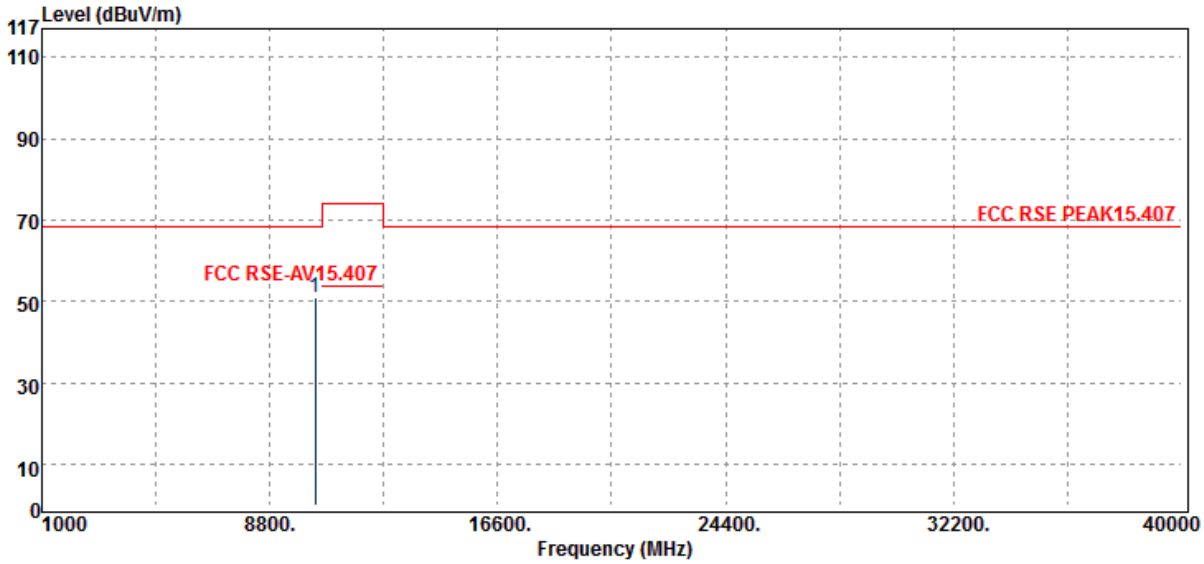
Operation Band	:802.11aB1	Test Date	:2017-07-12
Fundamental Frequency	:5180 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10360.00	H	Peak	32.58	18.29	50.87	68.30	-17.43

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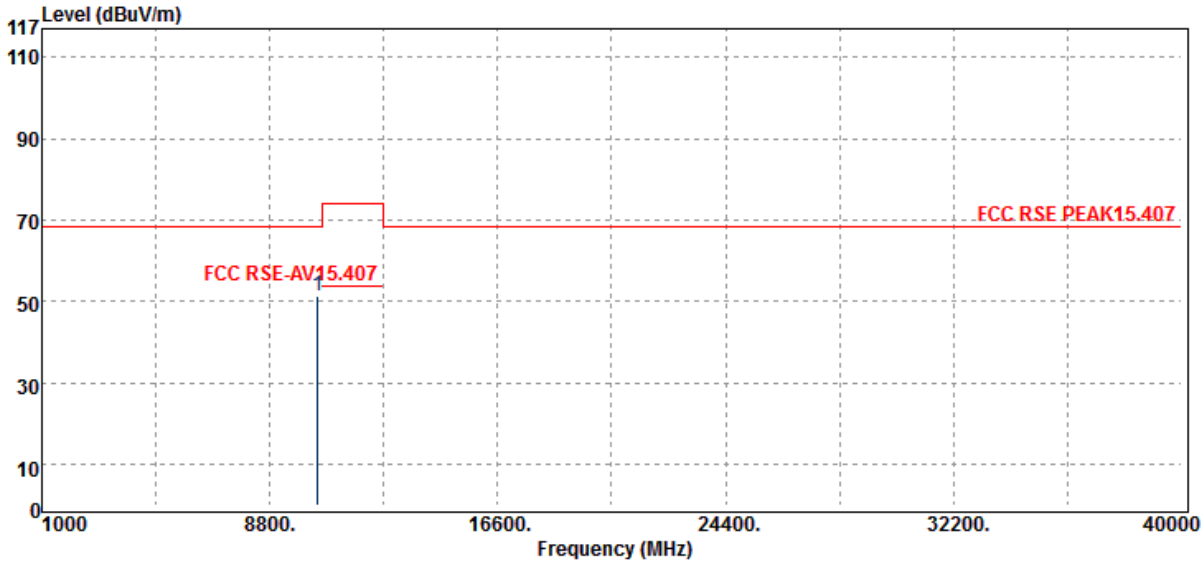
Operation Band	:802.11aB1	Test Date	:2017-07-12
Fundamental Frequency	:5220 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10440.00	H	Peak	32.83	18.69	51.52	68.30	-16.78

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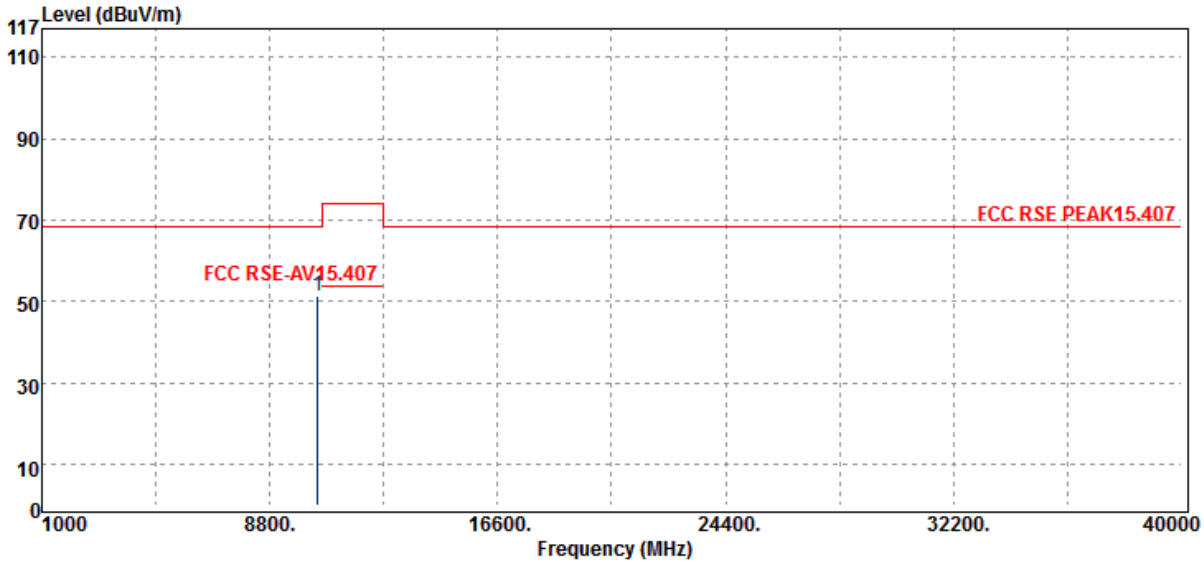
Operation Band	:802.11aB1	Test Date	:2017-07-12
Fundamental Frequency	:5220 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10440.00	H	Peak	32.85	18.69	51.54	68.30	-16.76

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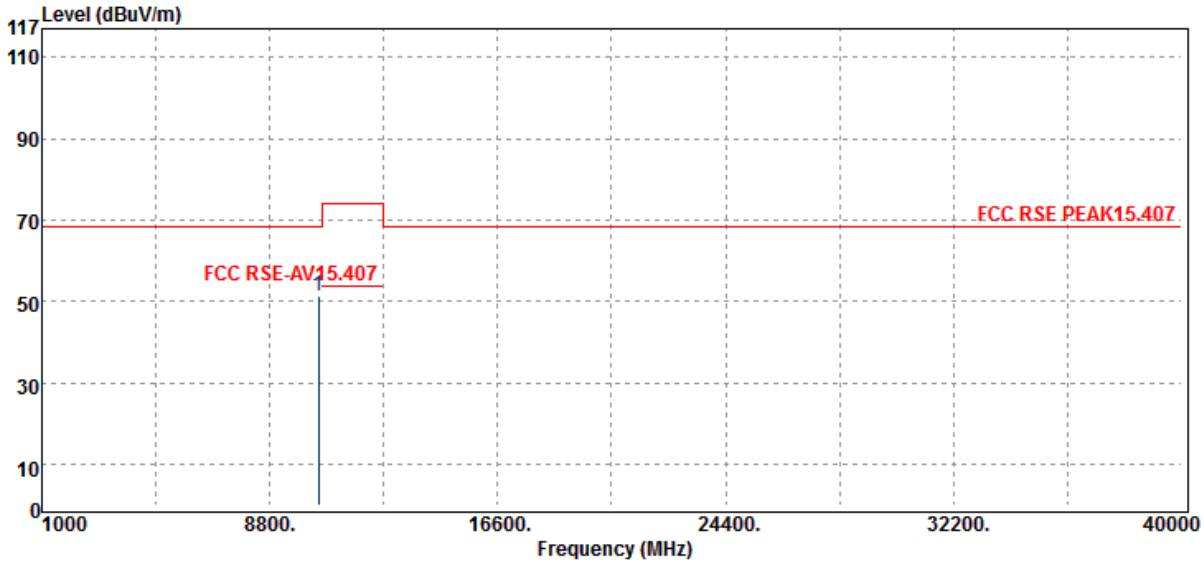
Operation Band	:802.11aB1	Test Date	:2017-07-12
Fundamental Frequency	:5240 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10480.00	H	Peak	33.15	18.30	51.45	68.30	-16.85

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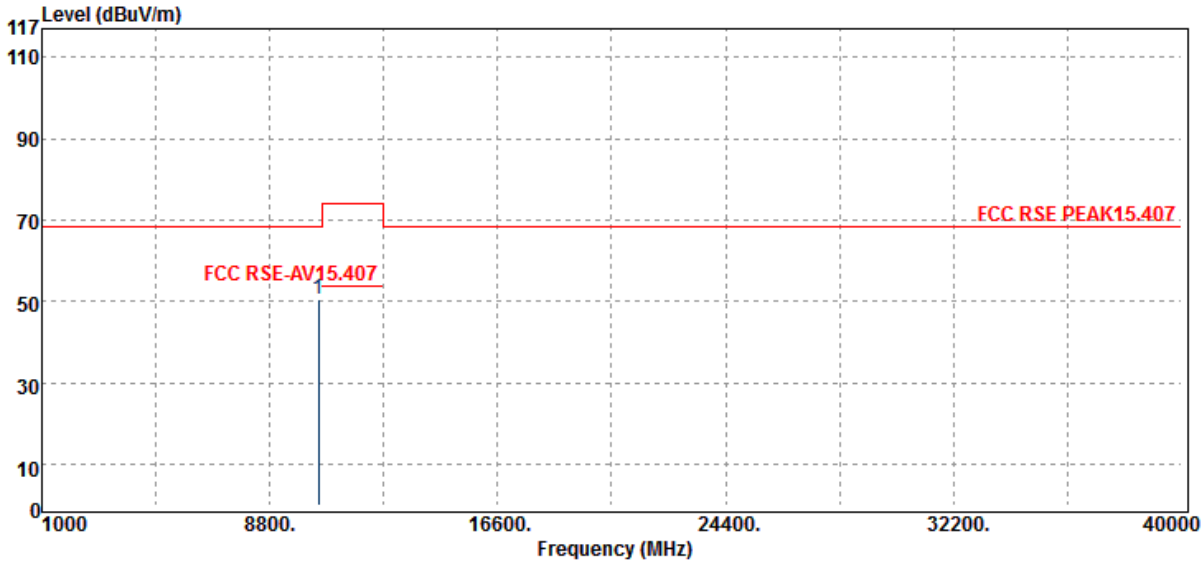
Operation Band	:802.11aB1	Test Date	:2017-07-12
Fundamental Frequency	:5240 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10480.00	H	Peak	32.50	18.30	50.80	68.30	-17.50

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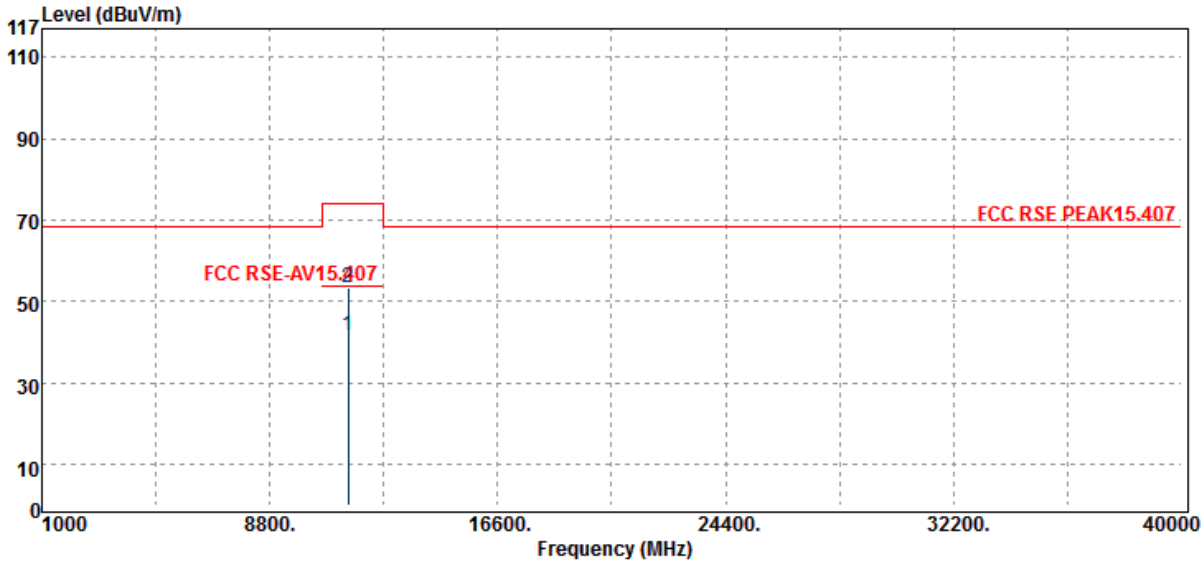
802.11a, 5725~5850 MHz

Operation Band	:802.11aB4	Test Date	:2017-07-06
Fundamental Frequency	:5745 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11490.00	H	Average	21.11	20.42	41.53	54.00	-12.47
11490.00	H	Peak	33.02	20.42	53.44	74.00	-20.56

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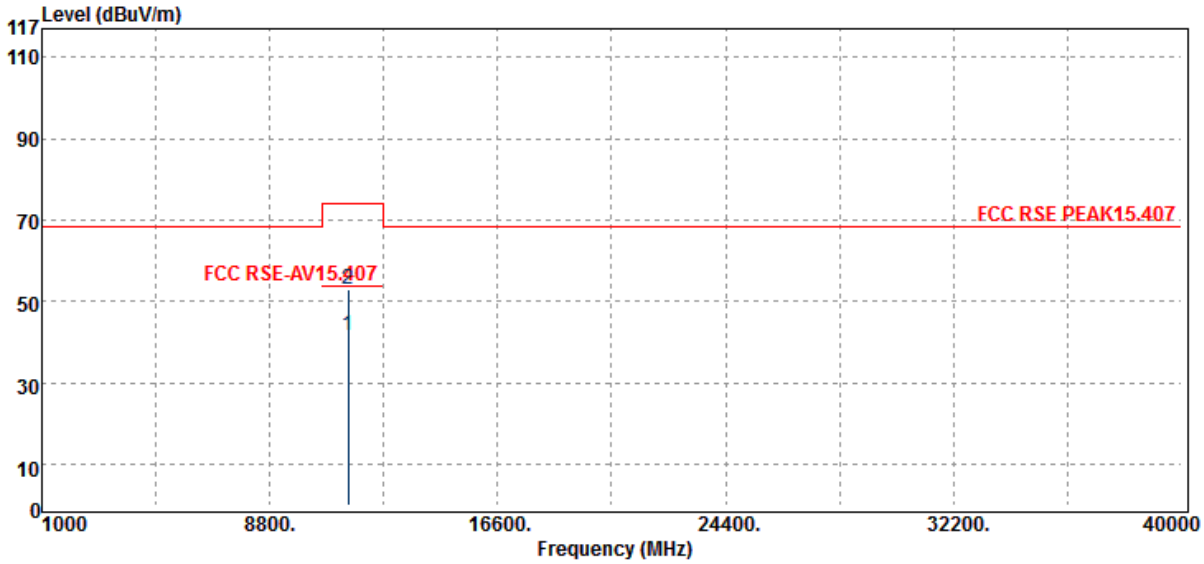
Operation Band	:802.11aB4	Test Date	:2017-07-06
Fundamental Frequency	:5745 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11490.00	H	Average	21.21	20.42	41.63	54.00	-12.37
11490.00	H	Peak	32.42	20.42	52.84	74.00	-21.16

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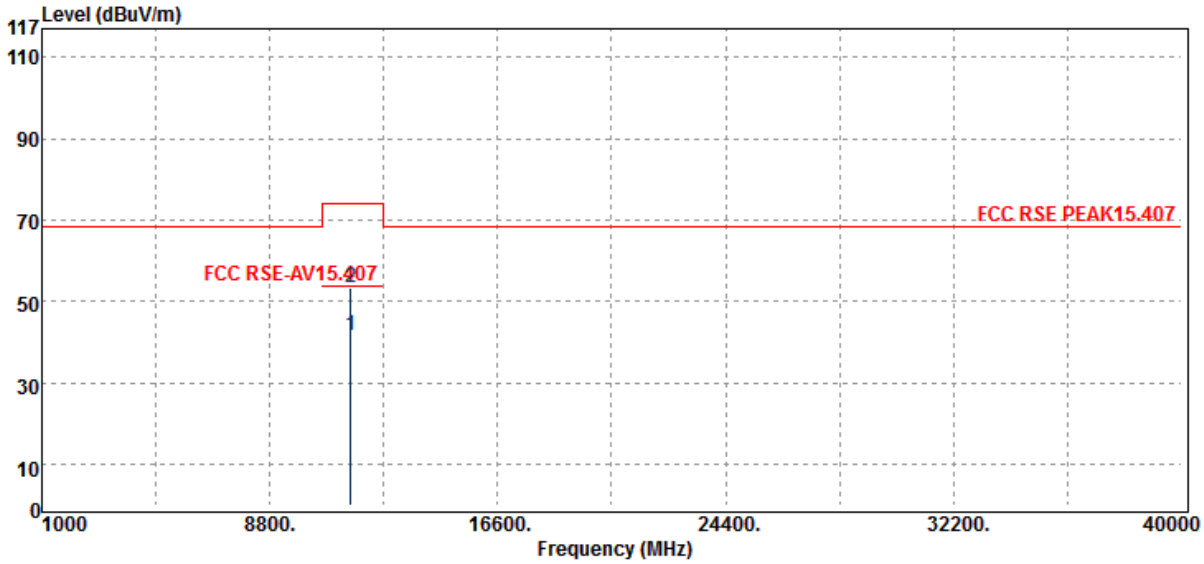
Operation Band	:802.11aB4	Test Date	:2017-07-06
Fundamental Frequency	:5785 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11570.00	H	Average	21.10	20.58	41.68	54.00	-12.32
11570.00	H	Peak	32.66	20.58	53.24	74.00	-20.76

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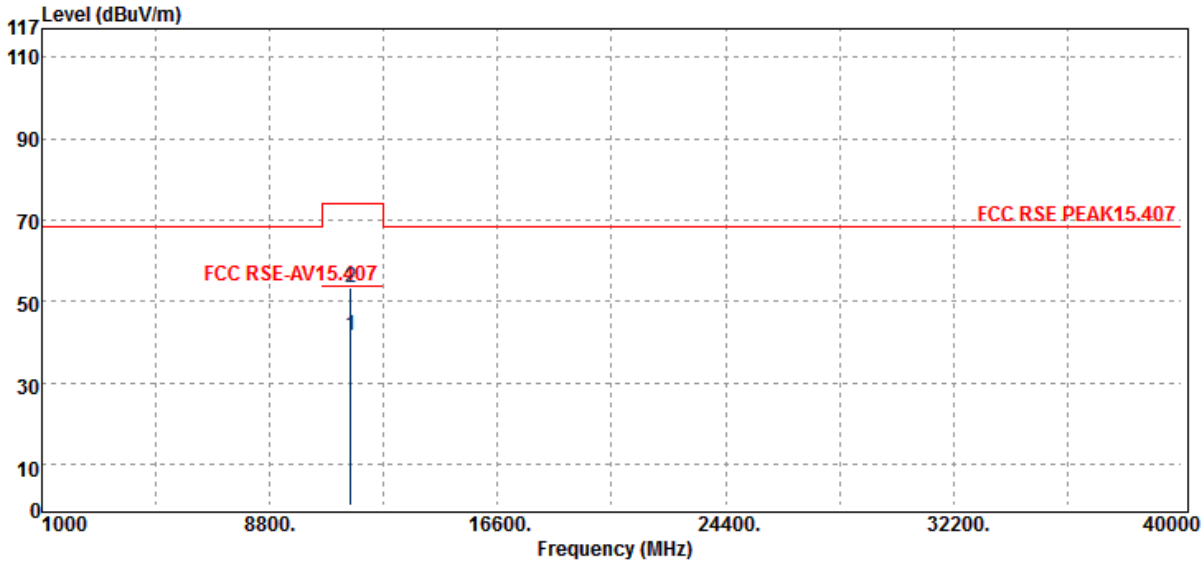
Operation Band	:802.11aB4	Test Date	:2017-07-06
Fundamental Frequency	:5785 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11570.00	H	Average	21.19	20.58	41.77	54.00	-12.23
11570.00	H	Peak	32.80	20.58	53.38	74.00	-20.62

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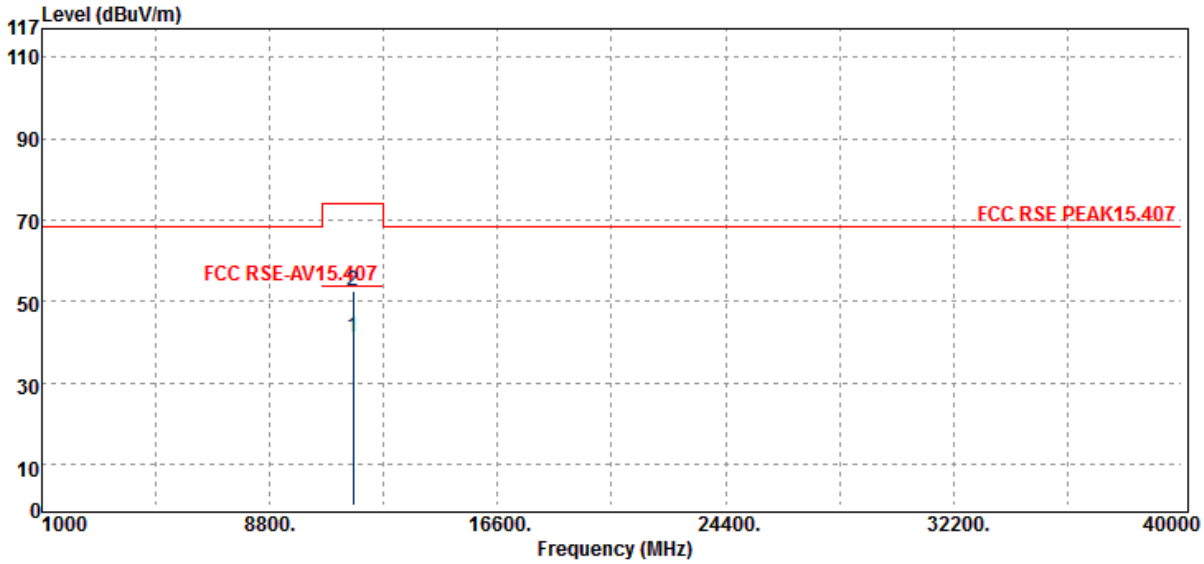
Operation Band	:802.11aB4	Test Date	:2017-07-06
Fundamental Frequency	:5825 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11650.00	H	Average	21.05	20.43	41.48	54.00	-12.52
11650.00	H	Peak	32.19	20.43	52.62	74.00	-21.38

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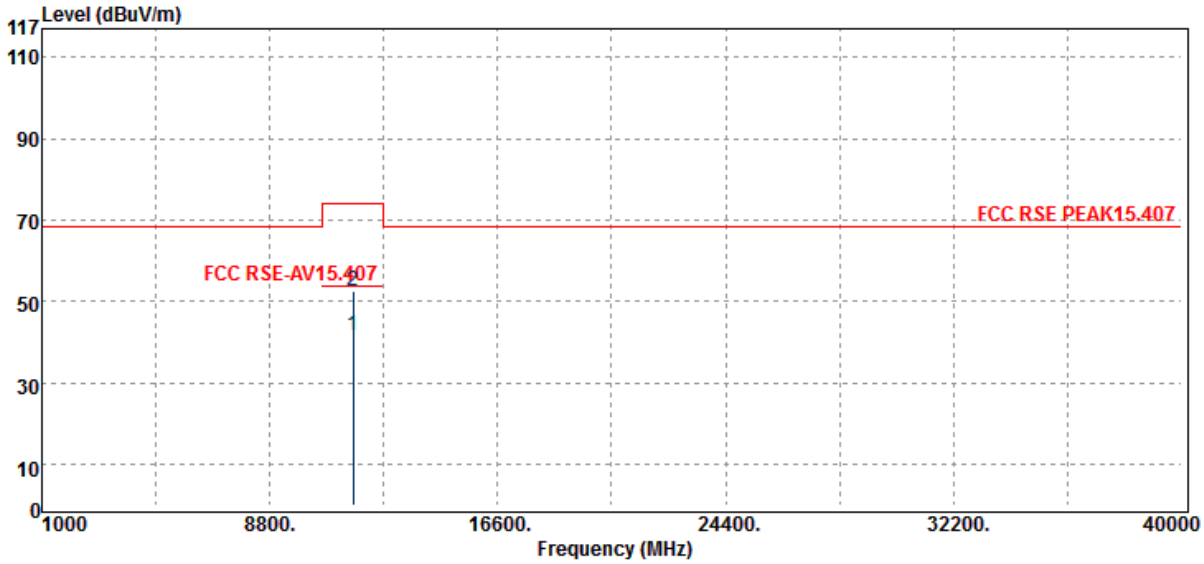
Operation Band	:802.11aB4	Test Date	:2017-07-06
Fundamental Frequency	:5825 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11650.00	H	Average	21.13	20.43	41.56	54.00	-12.44
11650.00	H	Peak	32.30	20.43	52.73	74.00	-21.27

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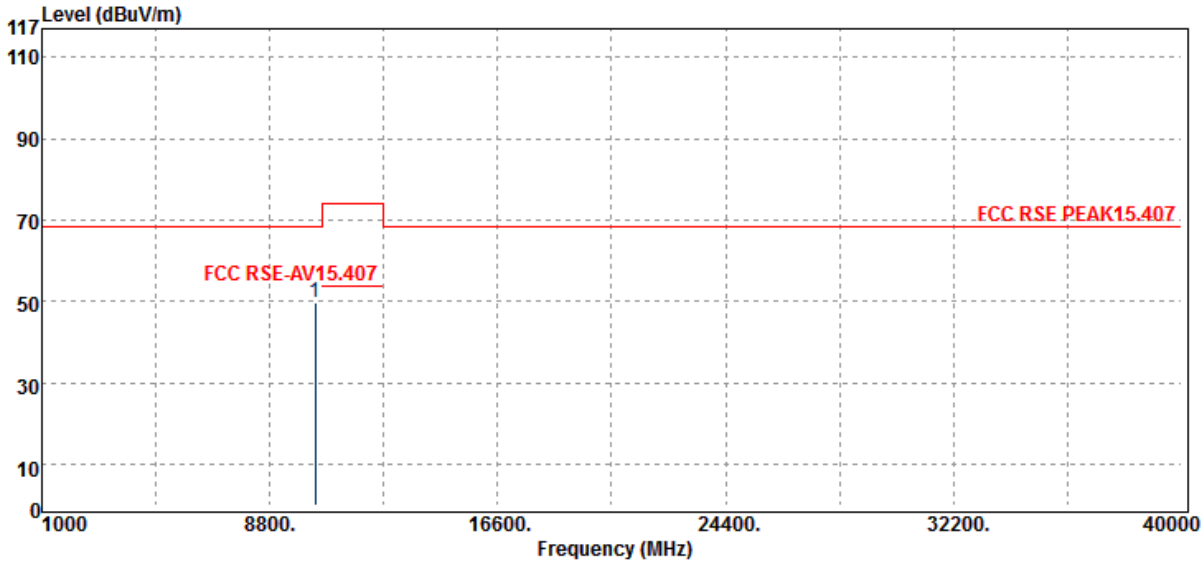
802.11n HT20, 5150~5250 MHz

Operation Band	:802.11n20B1	Test Date	:2017-07-06
Fundamental Frequency	:5180 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10360.00	H	Peak	31.62	18.29	49.91	68.30	-18.39

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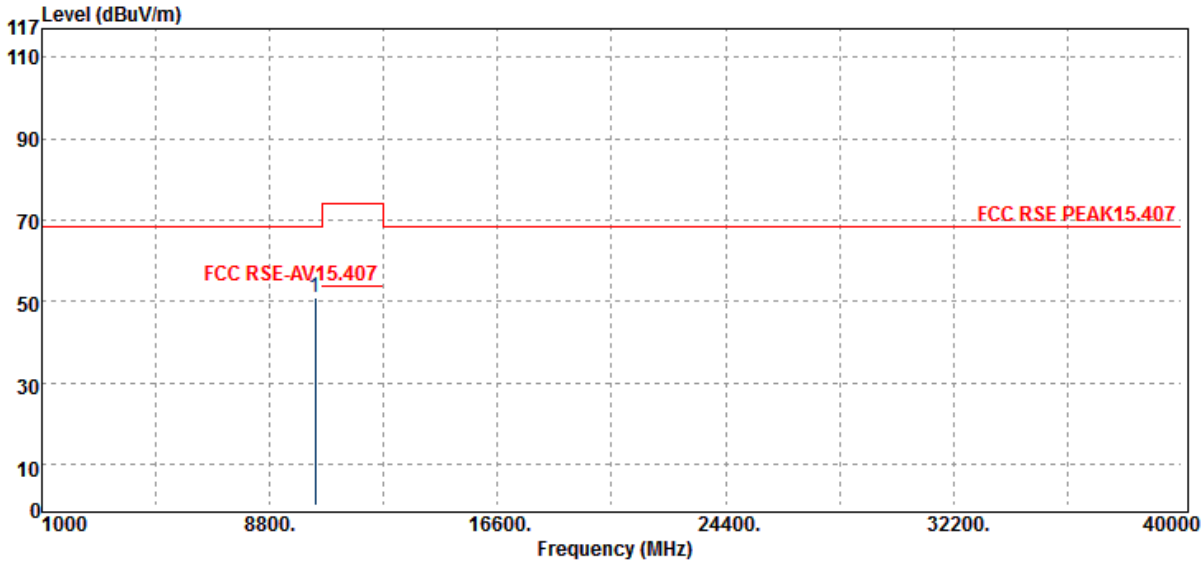
Operation Band	:802.11n20B1	Test Date	:2017-07-06
Fundamental Frequency	:5180 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10360.00	H	Peak	32.62	18.29	50.91	68.30	-17.39

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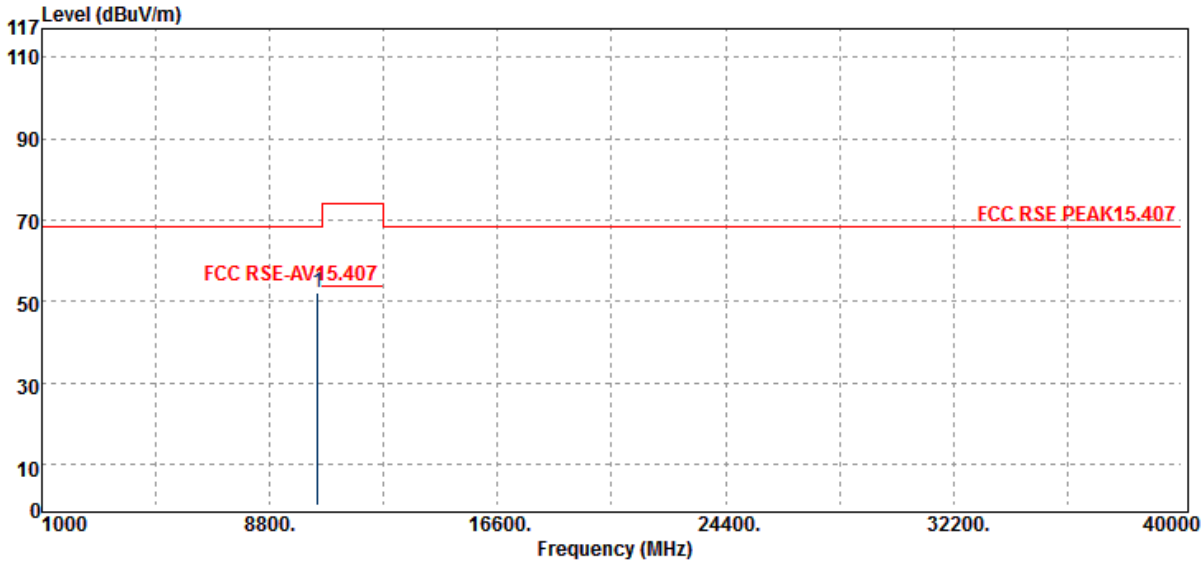
Operation Band	:802.11n20B1	Test Date	:2017-07-12
Fundamental Frequency	:5220 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10440.00	H	Peak	33.45	18.69	52.14	68.30	-16.16

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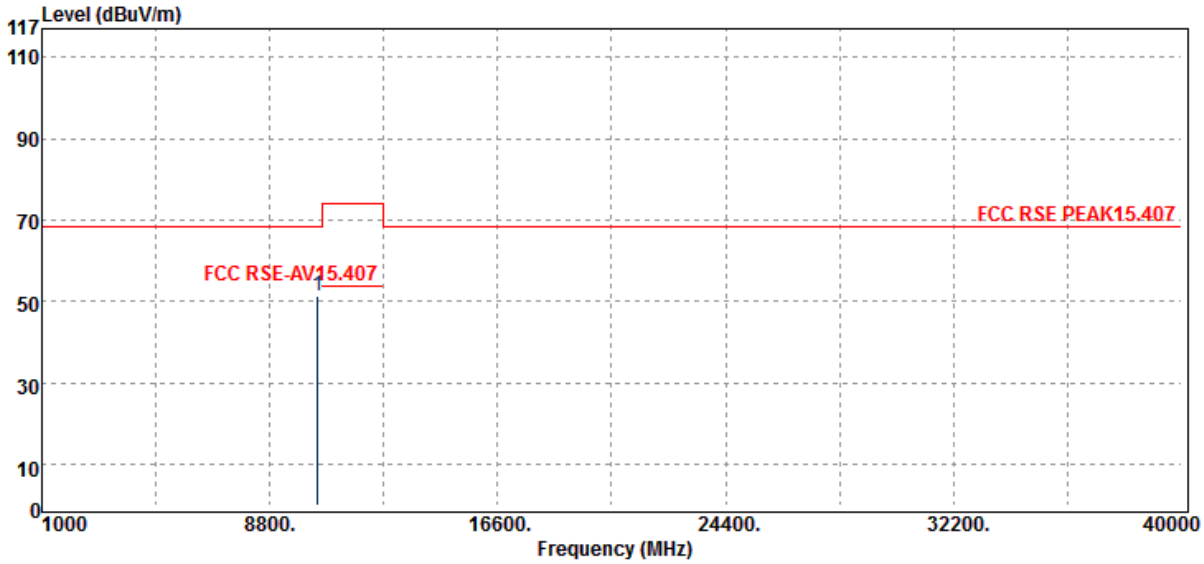
Operation Band	:802.11n20B1	Test Date	:2017-07-12
Fundamental Frequency	:5220 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10440.00	H	Peak	32.63	18.69	51.32	68.30	-16.98

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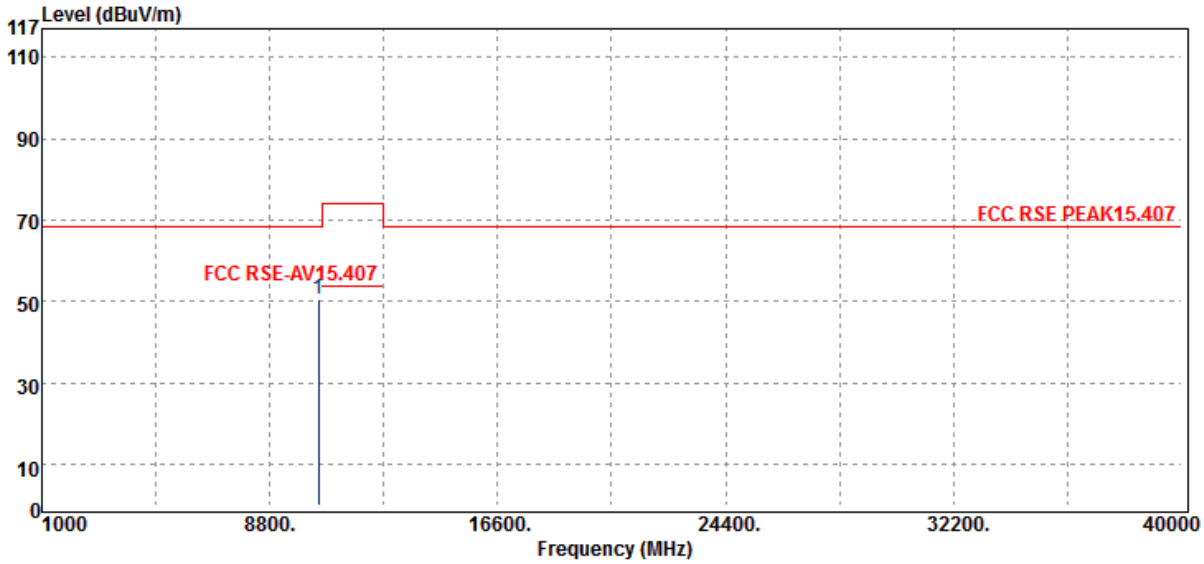
Operation Band	:802.11n20B1	Test Date	:2017-07-12
Fundamental Frequency	:5240 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10480.00	H	Peak	32.17	18.30	50.47	68.30	-17.83

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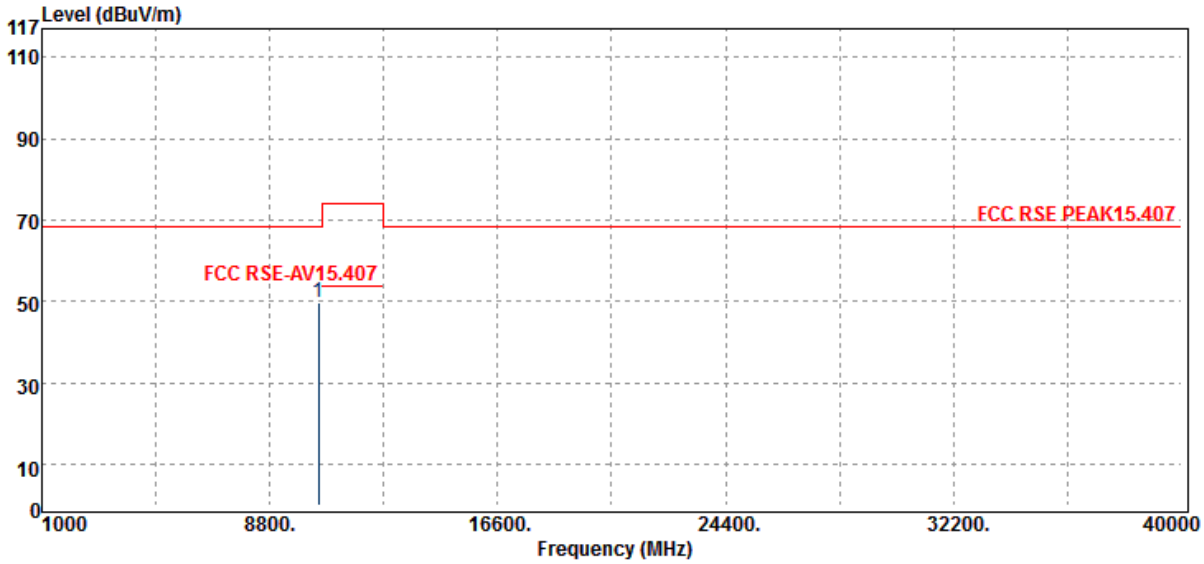
Operation Band	:802.11n20B1	Test Date	:2017-07-12
Fundamental Frequency	:5240 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10480.00	H	Peak	31.49	18.30	49.79	68.30	-18.51

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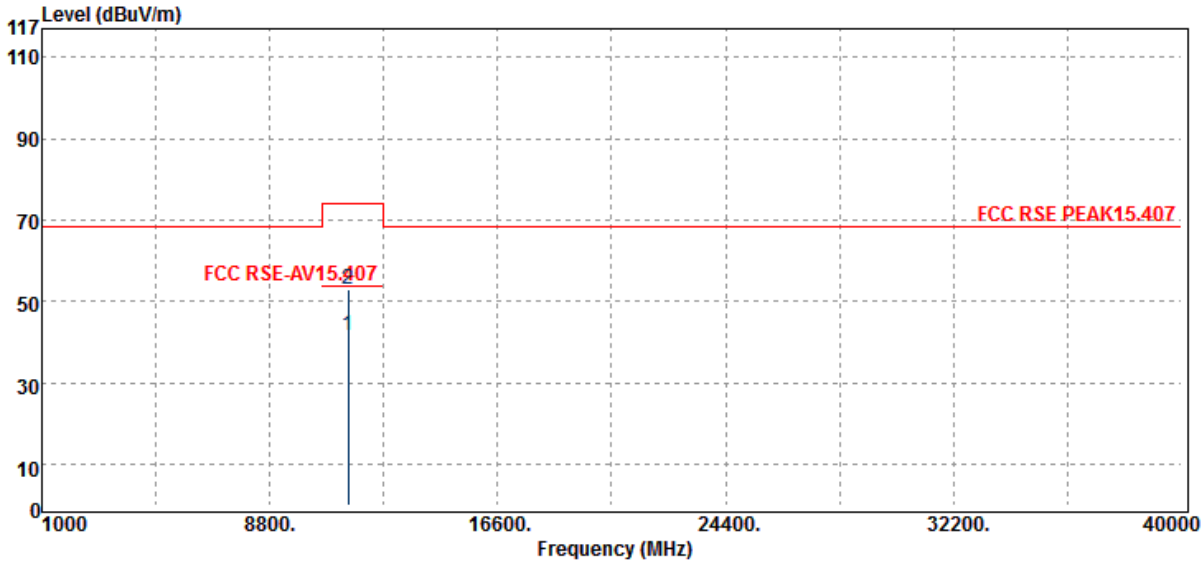
802.11n HT20, 5470~5725 MHz

Operation Band	:802.11n20B4	Test Date	:2017-07-06
Fundamental Frequency	:5745 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Safe Margin dB
11490.00	H	Average	21.09	20.42	41.51	54.00	-12.49
11490.00	H	Peak	32.81	20.42	53.23	74.00	-20.77

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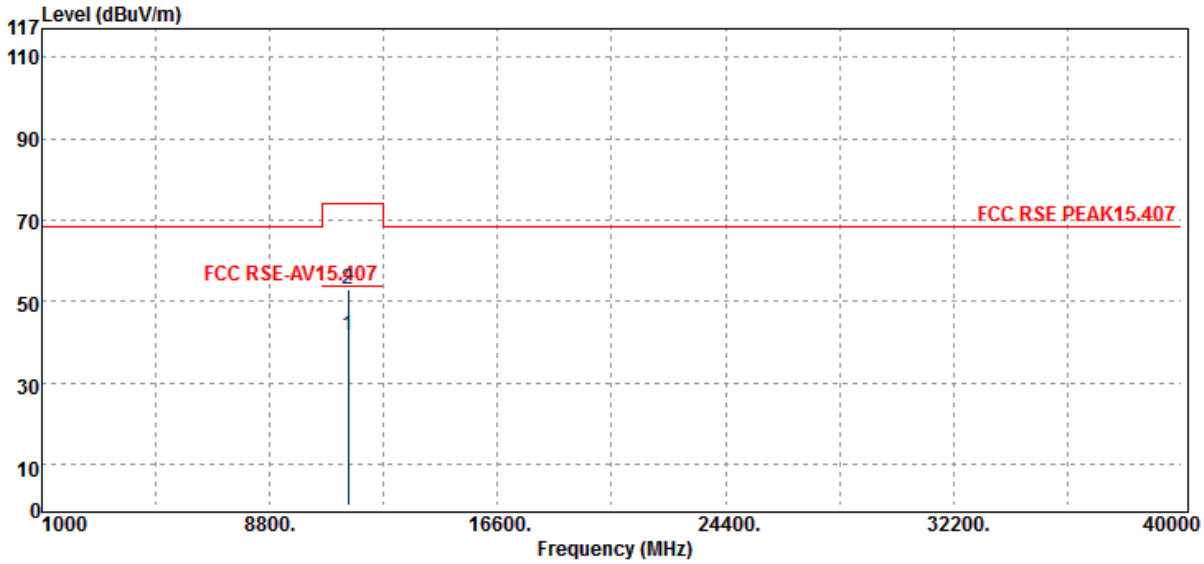
Operation Band	:802.11n20B4	Test Date	:2017-07-06
Fundamental Frequency	:5745 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11490.00	H	Average	21.14	20.42	41.56	54.00	-12.44
11490.00	H	Peak	32.43	20.42	52.85	74.00	-21.15

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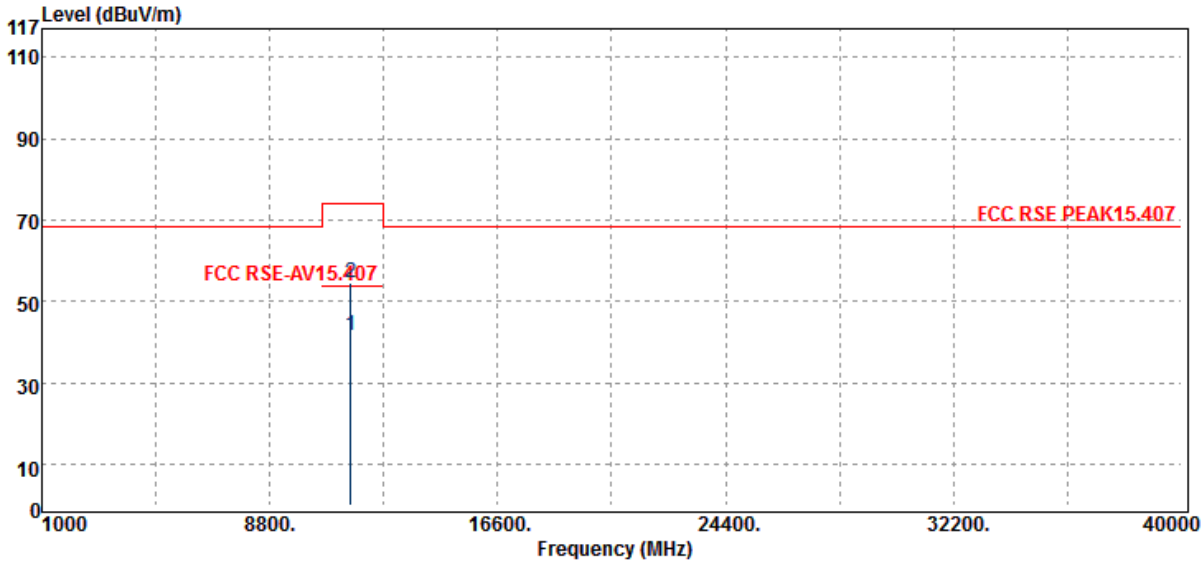
Operation Band	:802.11n20B4	Test Date	:2017-07-06
Fundamental Frequency	:5785 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11570.00	H	Average	20.98	20.58	41.56	54.00	-12.44
11570.00	H	Peak	33.88	20.58	54.46	74.00	-19.54

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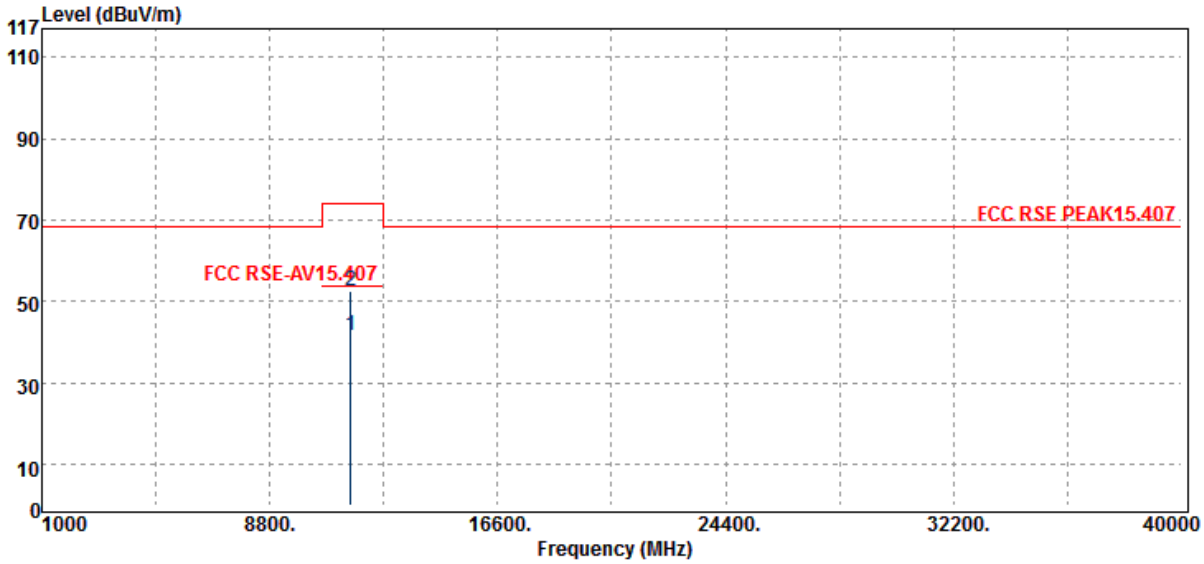
Operation Band	:802.11n20B4	Test Date	:2017-07-06
Fundamental Frequency	:5785 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11570.00	H	Average	21.12	20.58	41.70	54.00	-12.30
11570.00	H	Peak	32.08	20.58	52.66	74.00	-21.34

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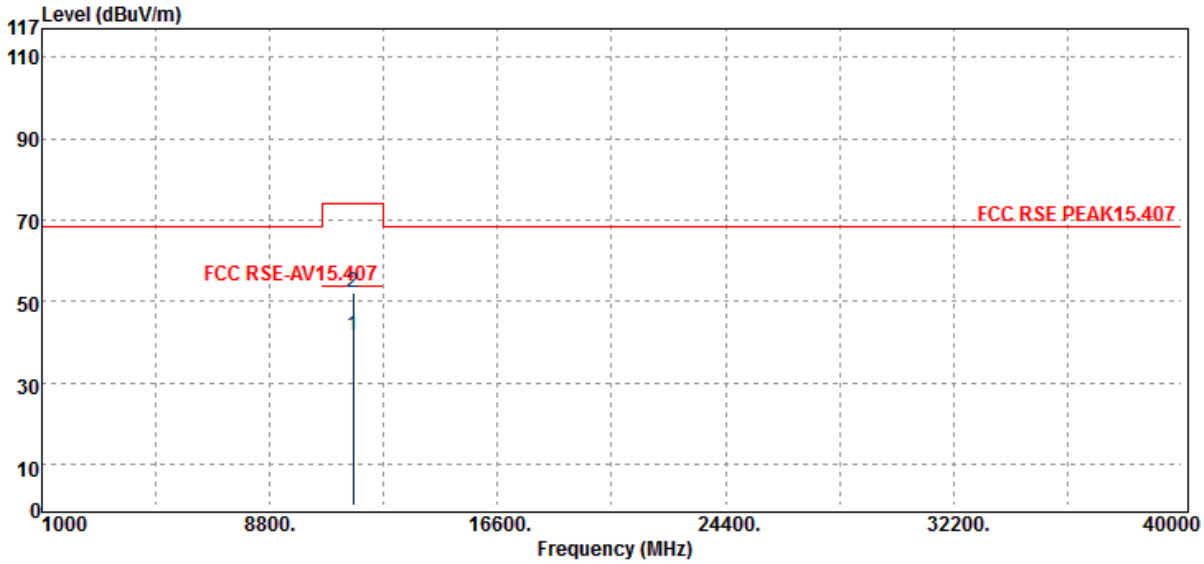
Operation Band	:802.11n20B4	Test Date	:2017-07-06
Fundamental Frequency	:5825 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11650.00	H	Average	21.24	20.43	41.67	54.00	-12.33
11650.00	H	Peak	31.67	20.43	52.10	74.00	-21.90

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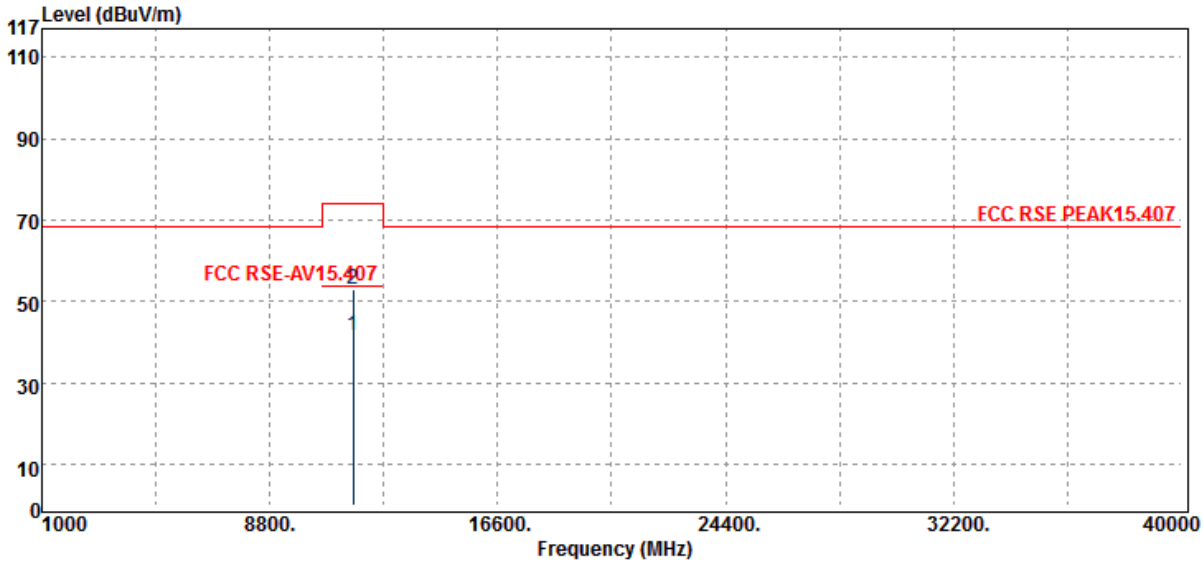
Operation Band	:802.11n20B4	Test Date	:2017-07-06
Fundamental Frequency	:5825 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11650.00	H	Average	21.30	20.43	41.73	54.00	-12.27
11650.00	H	Peak	32.76	20.43	53.19	74.00	-20.81

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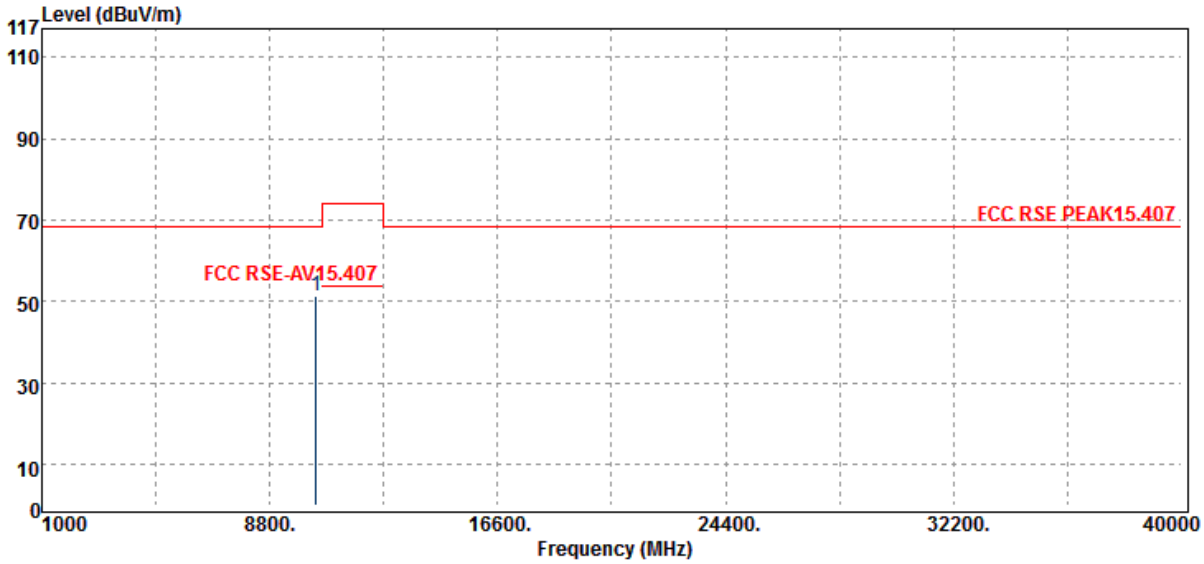
802.11n HT40, 5150~5250 MHz

Operation Band	:802.11n40B1	Test Date	:2017-07-06
Fundamental Frequency	:5190 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10380.00	H	Peak	33.27	18.12	51.39	68.30	-16.91

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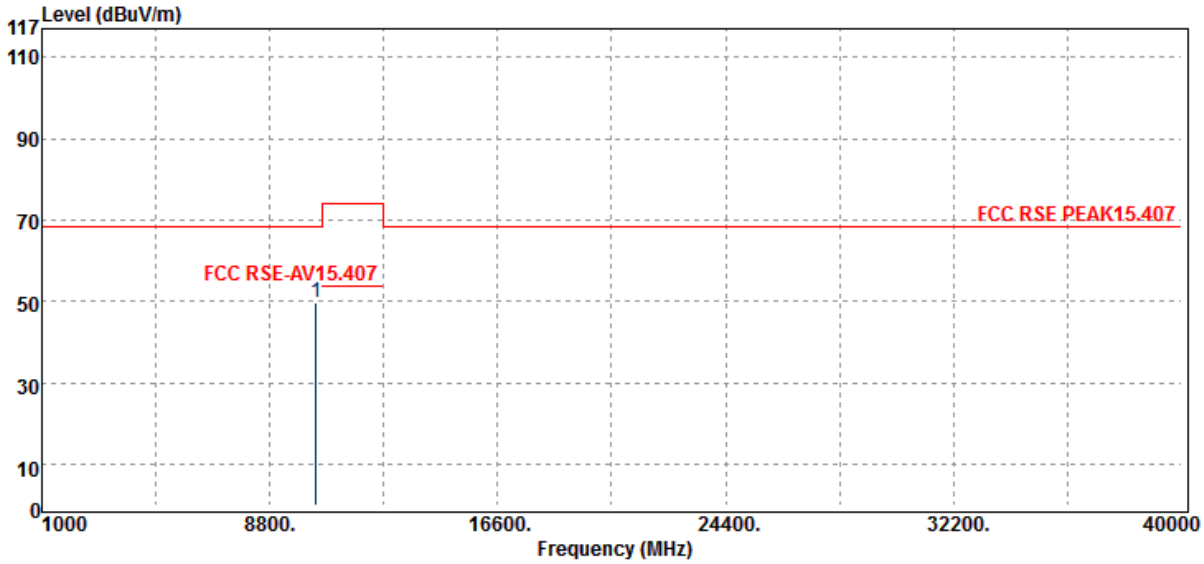
Operation Band	:802.11n40B1	Test Date	:2017-07-06
Fundamental Frequency	:5190 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10380.00	H	Peak	31.64	18.12	49.76	68.30	-18.54

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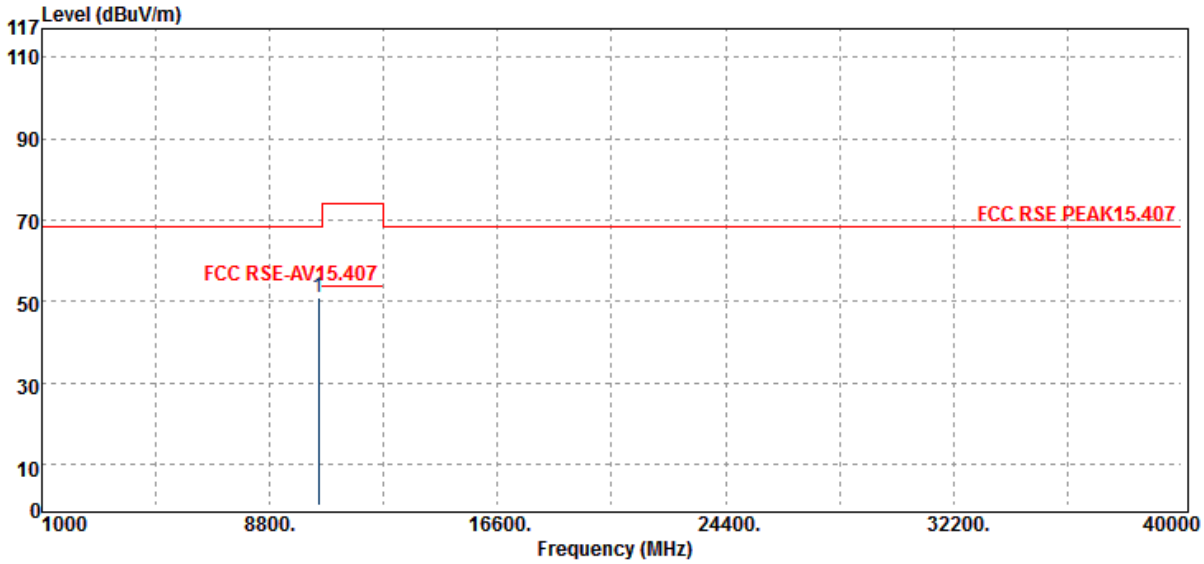
Operation Band	:802.11n40B1	Test Date	:2017-07-12
Fundamental Frequency	:5230 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10460.00	H	Peak	32.33	18.55	50.88	68.30	-17.42

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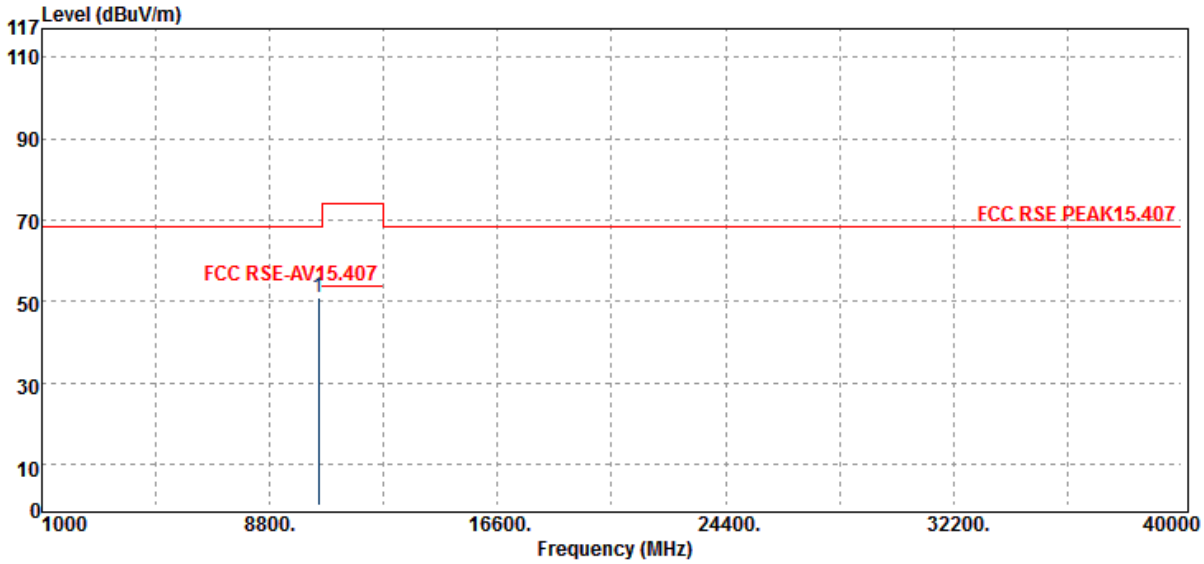
Operation Band	:802.11n40B1	Test Date	:2017-07-12
Fundamental Frequency	:5230 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10460.00	H	Peak	32.60	18.55	51.15	68.30	-17.15

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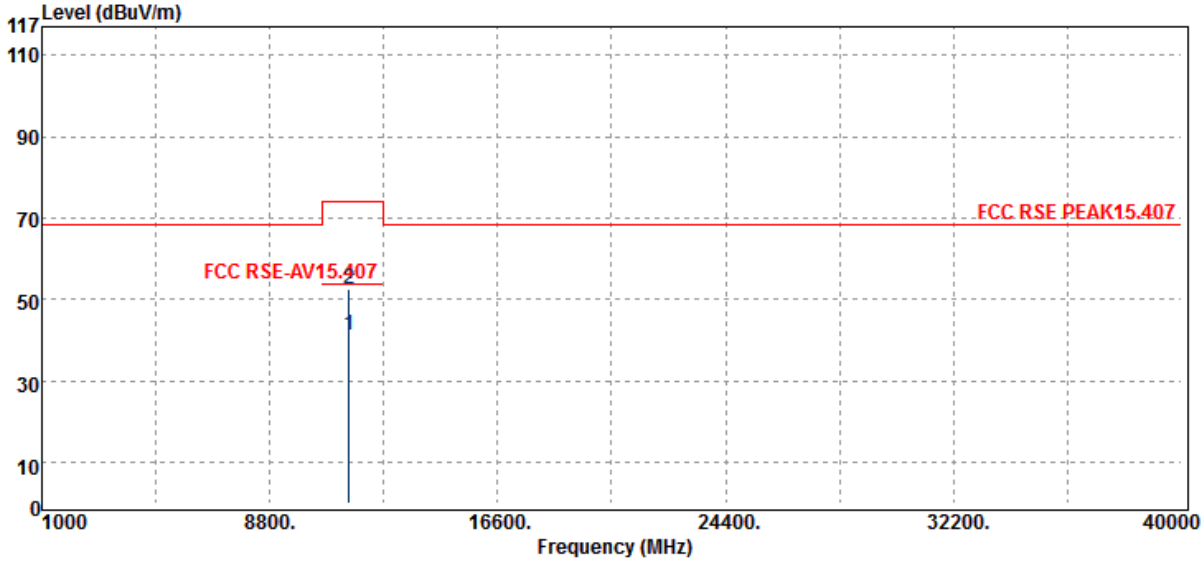
802.11n HT40, 5725~5850 MHz

Operation Band	:802.11n40B4	Test Date	:2017-07-06
Fundamental Frequency	:5755 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11510.00	H	Average	20.95	20.38	41.33	54.00	-12.67
11510.00	H	Peak	32.22	20.38	52.60	74.00	-21.40

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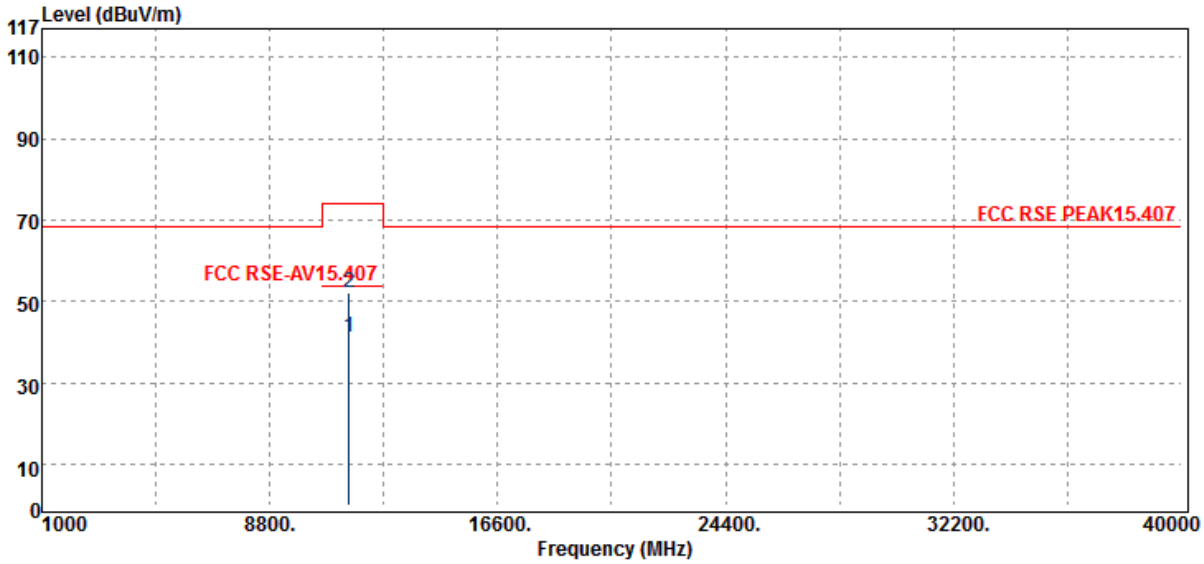
Operation Band	:802.11n40B4	Test Date	:2017-07-06
Fundamental Frequency	:5755 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11510.00	H	Average	21.06	20.38	41.44	54.00	-12.56
11510.00	H	Peak	31.99	20.38	52.37	74.00	-21.63

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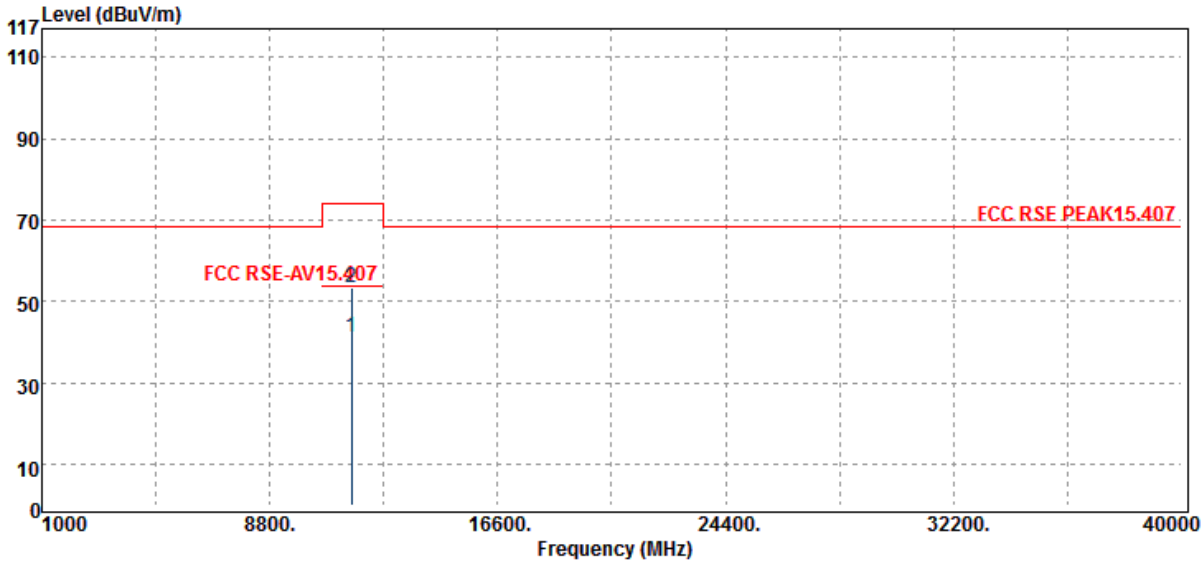
Operation Band	:802.11n40B4	Test Date	:2017-07-06
Fundamental Frequency	:5795 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Safe Margin dB
11590.00	H	Average	21.04	20.43	41.47	54.00	-12.53
11590.00	H	Peak	33.03	20.43	53.46	74.00	-20.54

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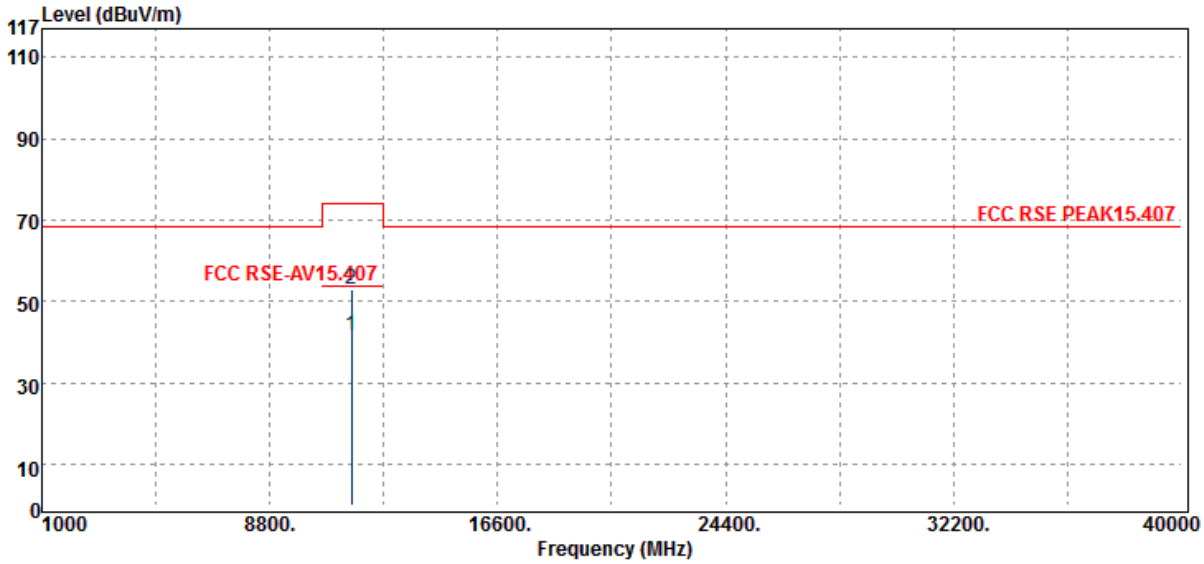
Operation Band	:802.11n40B4	Test Date	:2017-07-06
Fundamental Frequency	:5795 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11590.00	H	Average	21.14	20.43	41.57	54.00	-12.43
11590.00	H	Peak	32.54	20.43	52.97	74.00	-21.03

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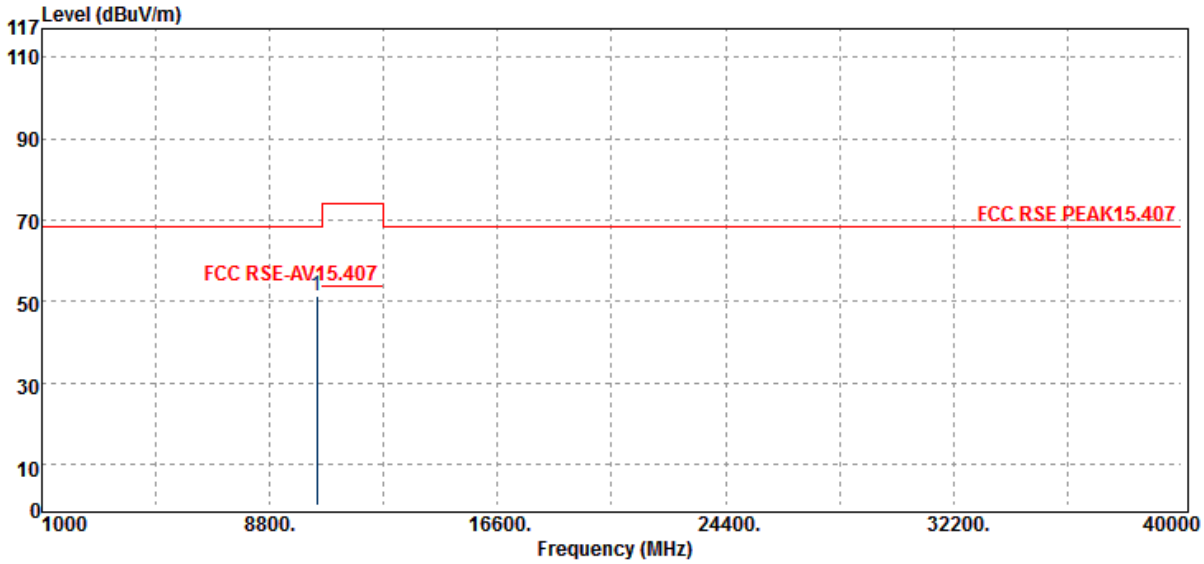
802.11ac VHT80, 5150~5250 MHz

Operation Band	:802.11ac80B1	Test Date	:2017-07-06
Fundamental Frequency	:5210 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10420.00	H	Peak	32.77	18.71	51.48	68.30	-16.82

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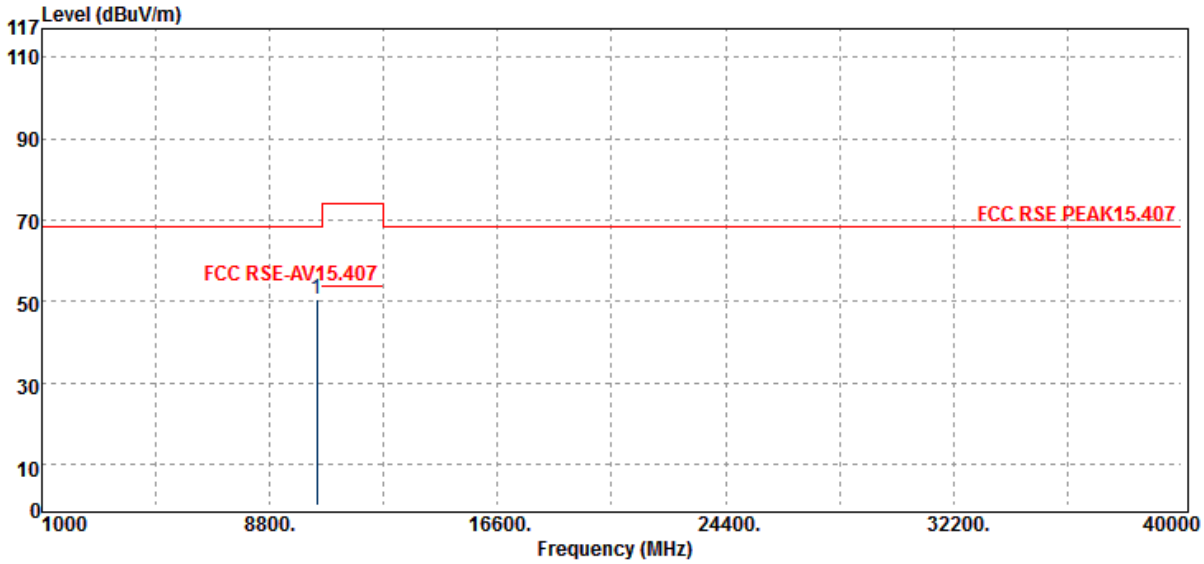
Operation Band	:802.11ac80B1	Test Date	:2017-07-06
Fundamental Frequency	:5210 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10420.00	H	Peak	31.90	18.71	50.61	68.30	-17.69

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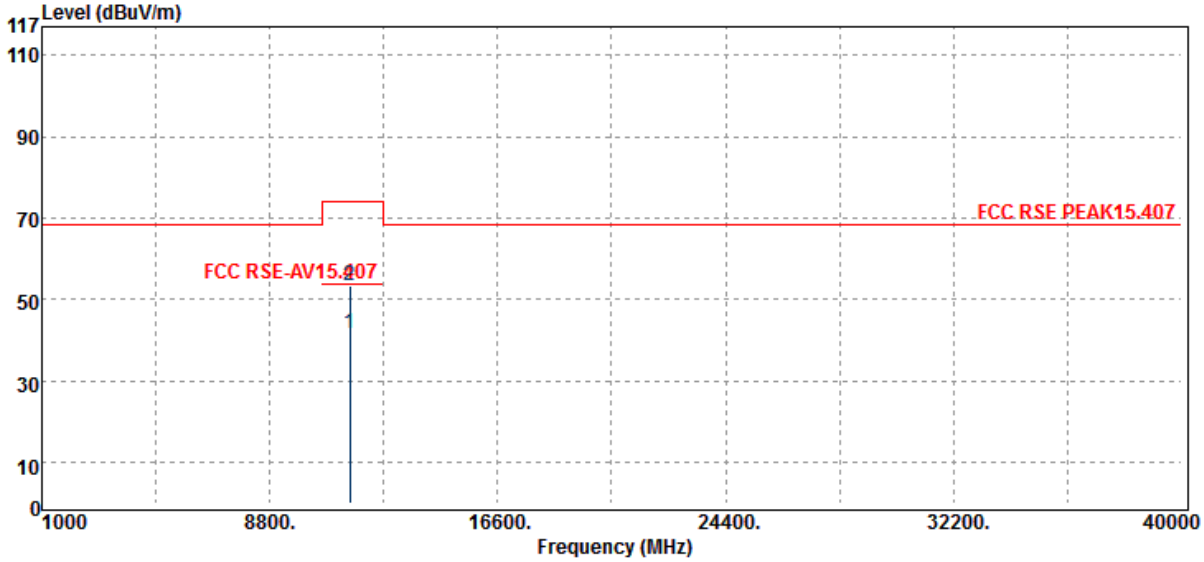
802.11ac VHT80, 5725~5850 MHz

Operation Band	:802.11ac80B4	Test Date	:2017-07-06
Fundamental Frequency	:5775 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Safe Margin dB
11550.00	H	Average	21.18	20.51	41.69	54.00	-12.31
11550.00	H	Peak	32.93	20.51	53.44	74.00	-20.56

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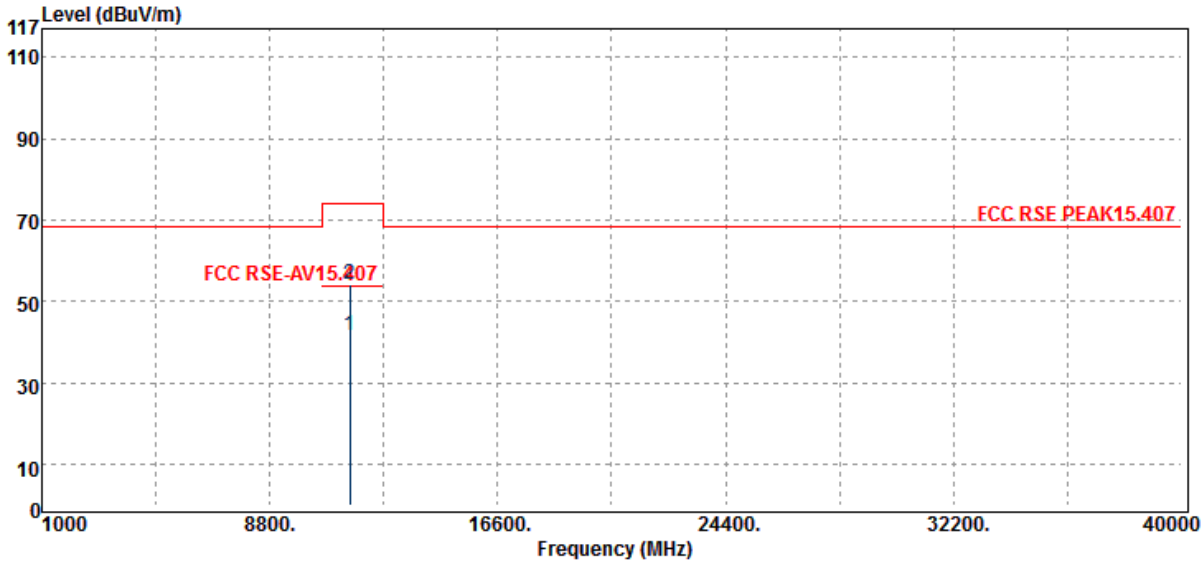
Operation Band	:802.11ac80B4	Test Date	:2017-07-06
Fundamental Frequency	:5775 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11550.00	H	Average	21.22	20.51	41.73	54.00	-12.27
11550.00	H	Peak	33.82	20.51	54.33	74.00	-19.67

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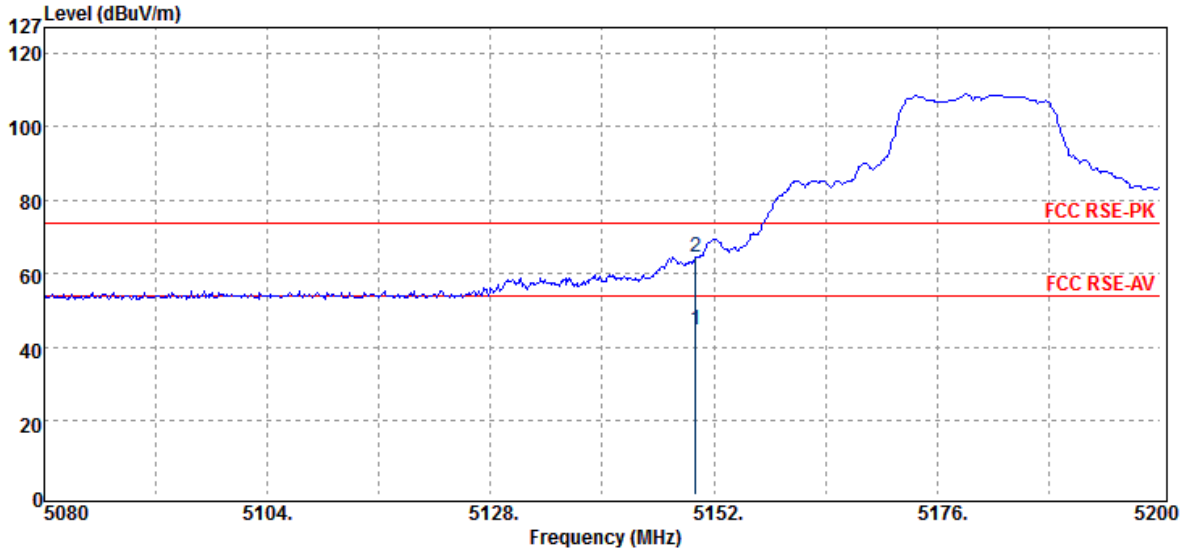
Band edge falling to restricted band

802.11a mode

Operation Band	:802.11aB1	Test Date	:2017-07-12
Fundamental Frequency	:5180 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5150.00	E	Average	38.85	5.88	44.73	54.00	-9.27
5150.00	E	Peak	58.62	5.88	64.50	74.00	-9.50

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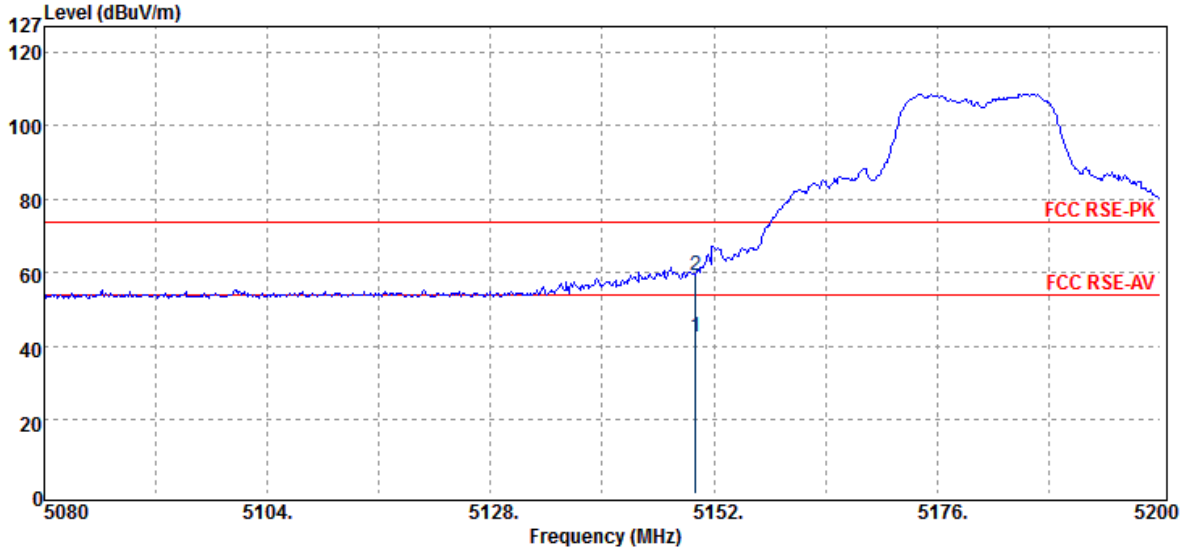
Operation Band	:802.11aB1	Test Date	:2017-07-12
Fundamental Frequency	:5180 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5150.00	E	Average	36.59	5.88	42.47	54.00	-11.53
5150.00	E	Peak	53.53	5.88	59.41	74.00	-14.59

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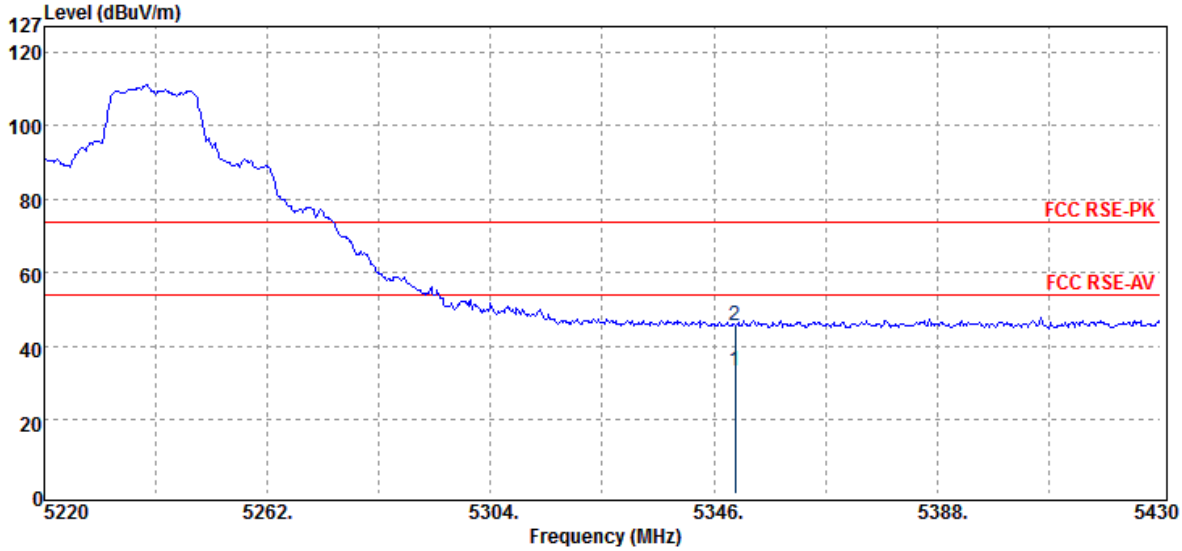
Operation Band	:802.11aB1	Test Date	:2017-07-12
Fundamental Frequency	:5240 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5350.00	E	Average	27.35	6.16	33.51	54.00	-20.49
5350.00	E	Peak	39.88	6.16	46.04	74.00	-27.96

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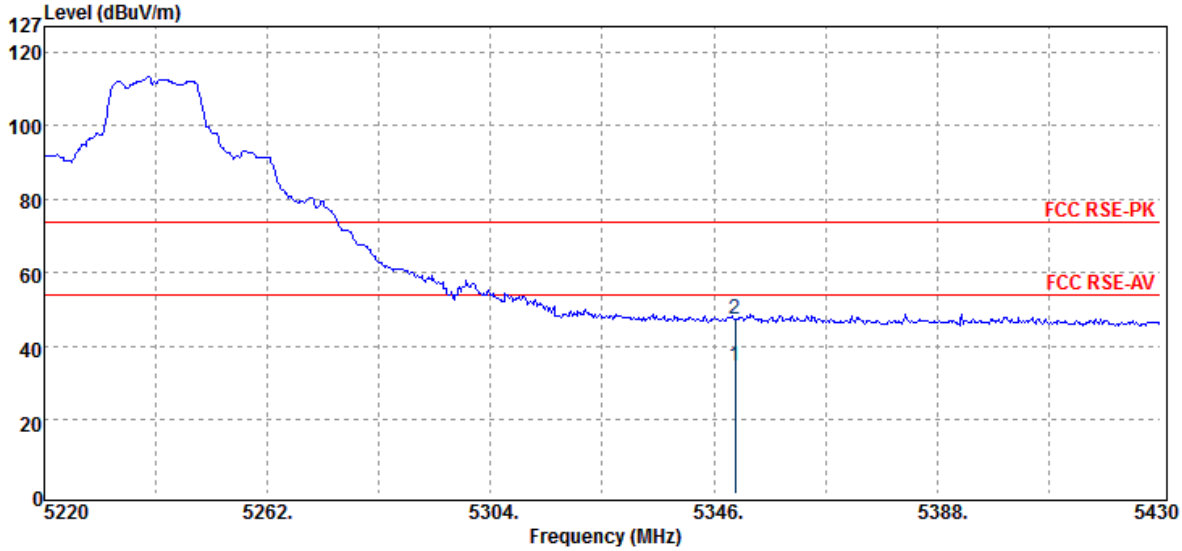
Operation Band	:802.11aB1	Test Date	:2017-07-12
Fundamental Frequency	:5240 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5350.00	E	Average	28.78	6.16	34.94	54.00	-19.06
5350.00	E	Peak	41.68	6.16	47.84	74.00	-26.16

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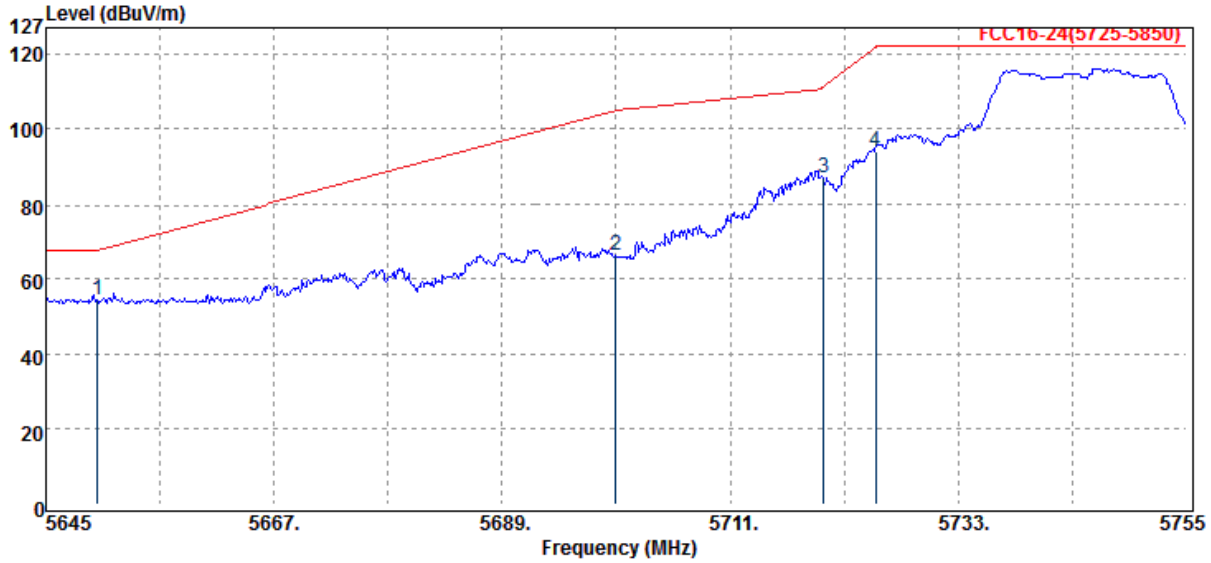
Operation Band	:802.11aB4	Test Date	:2017-07-07
Fundamental Frequency	:5745 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5650.00	E	Peak	47.84	6.48	54.32	68.23	-13.91
5700.00	E	Peak	59.48	6.67	66.15	105.23	-39.08
5720.00	E	Peak	80.27	6.60	86.87	110.83	-23.96
5725.00	E	Peak	87.67	6.59	94.26	122.23	-27.97

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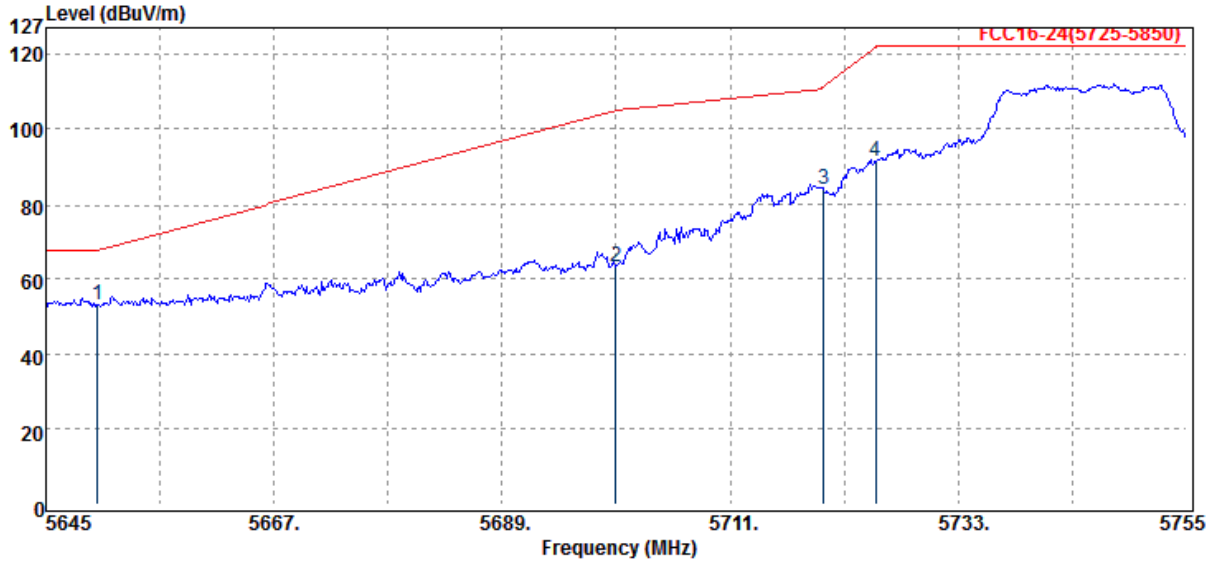
Operation Band	:802.11aB4	Test Date	:2017-07-07
Fundamental Frequency	:5745 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5650.00	E	Peak	46.80	6.48	53.28	68.23	-14.95
5700.00	E	Peak	56.58	6.67	63.25	105.23	-41.98
5720.00	E	Peak	77.47	6.60	84.07	110.83	-26.76
5725.00	E	Peak	84.95	6.59	91.54	122.23	-30.69

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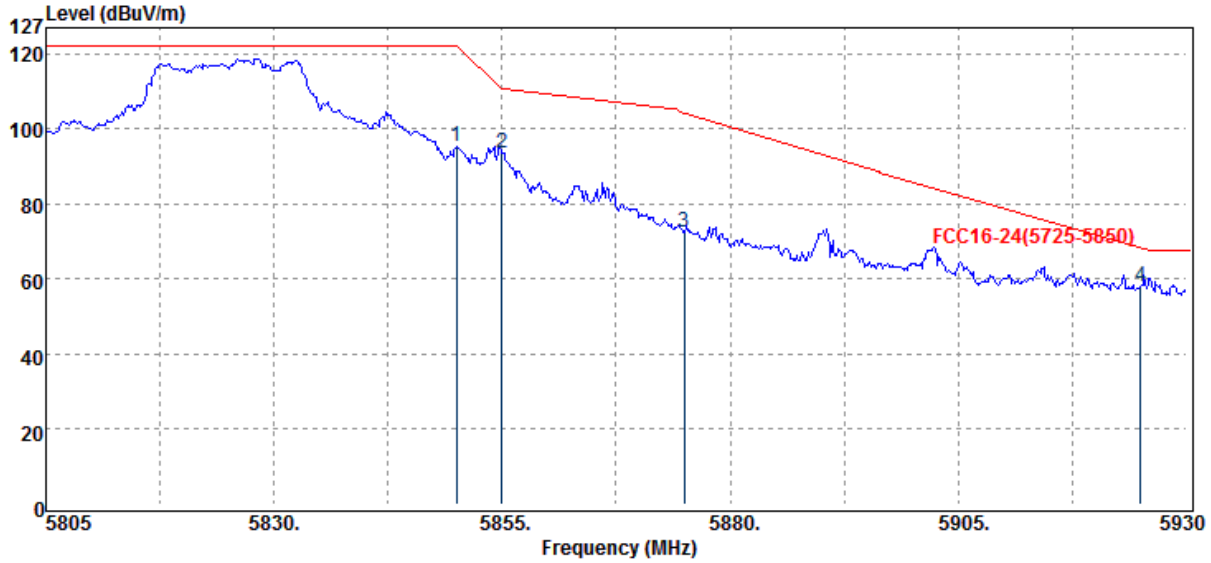
Operation Band	:802.11aB4	Test Date	:2017-07-07
Fundamental Frequency	:5825 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5850.00	E	Peak	88.26	7.28	95.54	122.23	-26.69
5855.00	E	Peak	86.50	7.32	93.82	110.83	-17.01
5875.00	E	Peak	65.06	7.37	72.43	105.23	-32.80
5925.00	E	Peak	50.79	7.39	58.18	68.23	-10.05

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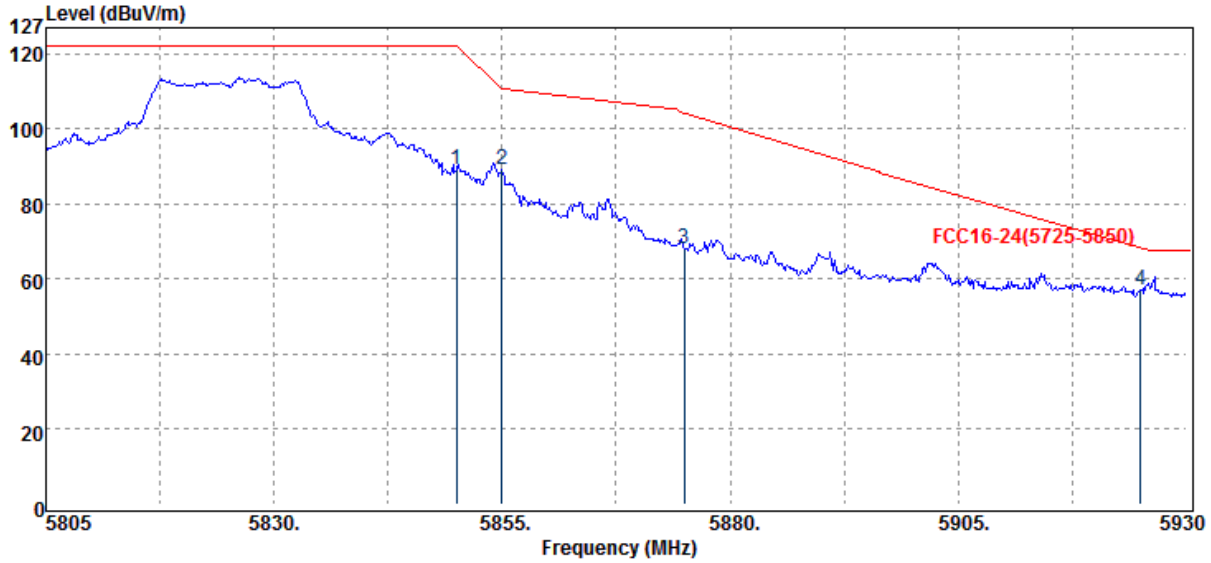
Operation Band	:802.11aB4	Test Date	:2017-07-07
Fundamental Frequency	:5825 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5850.00	E	Peak	81.90	7.28	89.18	122.23	-33.05
5855.00	E	Peak	81.93	7.32	89.25	110.83	-21.58
5875.00	E	Peak	60.78	7.37	68.15	105.23	-37.08
5925.00	E	Peak	49.83	7.39	57.22	68.23	-11.01

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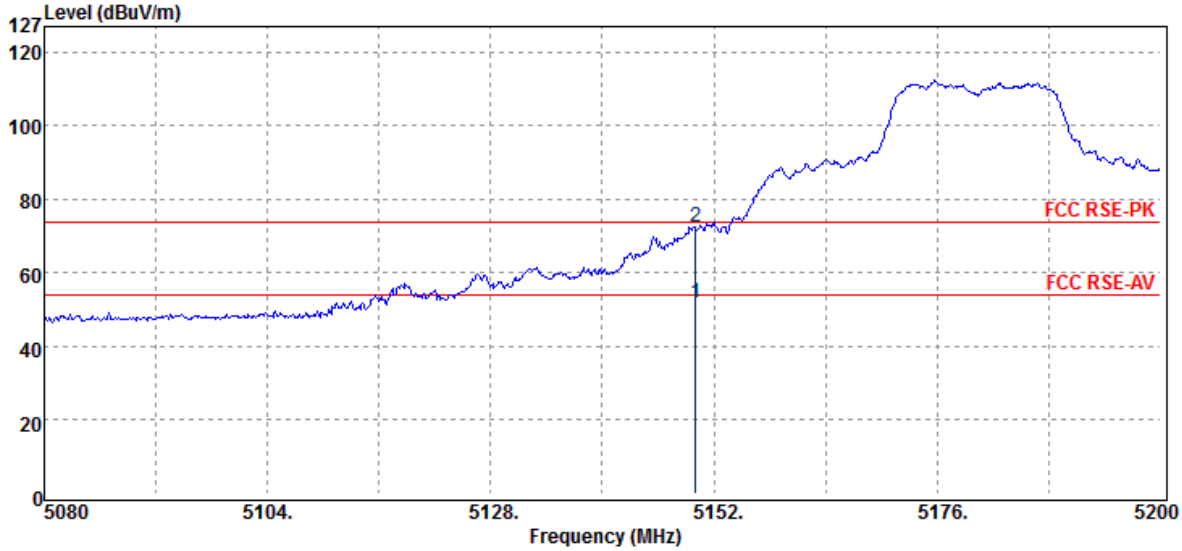
802.11n20 HT mode

Operation Band	:802.11n20B1	Test Date	:2017-07-07
Fundamental Frequency	:5180 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5150.00	E	Average	46.13	5.88	52.01	54.00	-1.99
5150.00	E	Peak	66.47	5.88	72.35	74.00	-1.65

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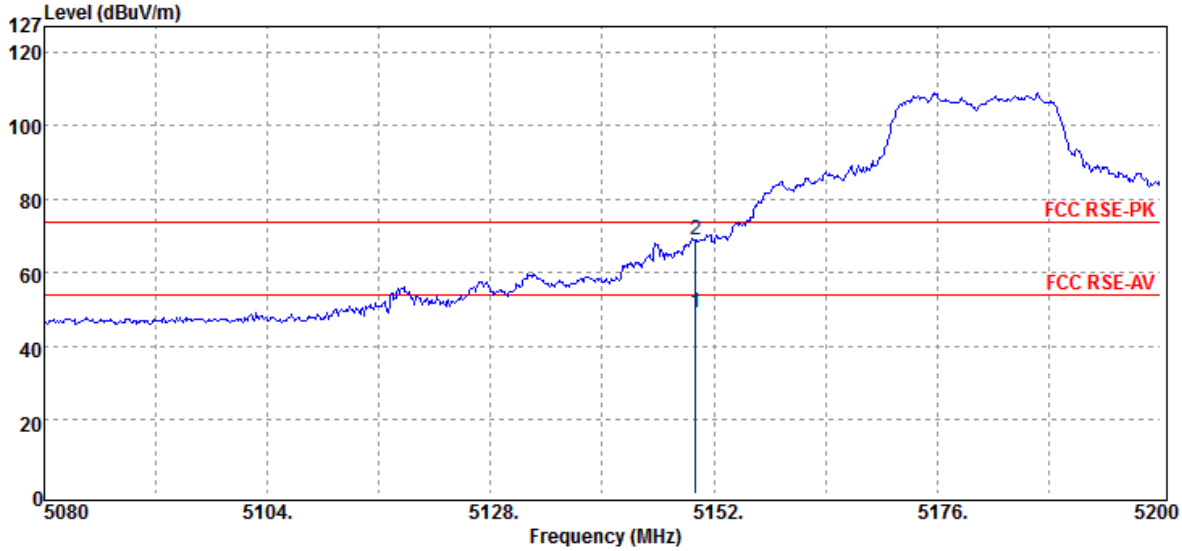
Operation Band	:802.11n20B1	Test Date	:2017-07-07
Fundamental Frequency	:5180 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5150.00	E	Average	43.26	5.88	49.14	54.00	-4.86
5150.00	E	Peak	63.29	5.88	69.17	74.00	-4.83

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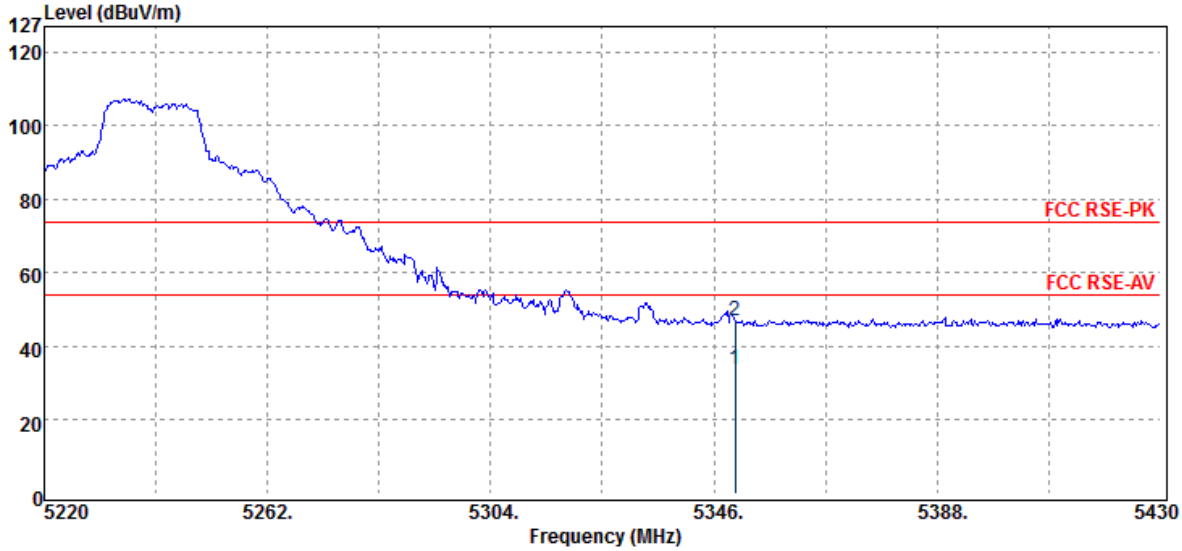
Operation Band	:802.11n20B1	Test Date	:2017-07-12
Fundamental Frequency	:5240 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5350.00	E	Average	27.71	6.16	33.87	54.00	-20.13
5350.00	E	Peak	40.92	6.16	47.08	74.00	-26.92

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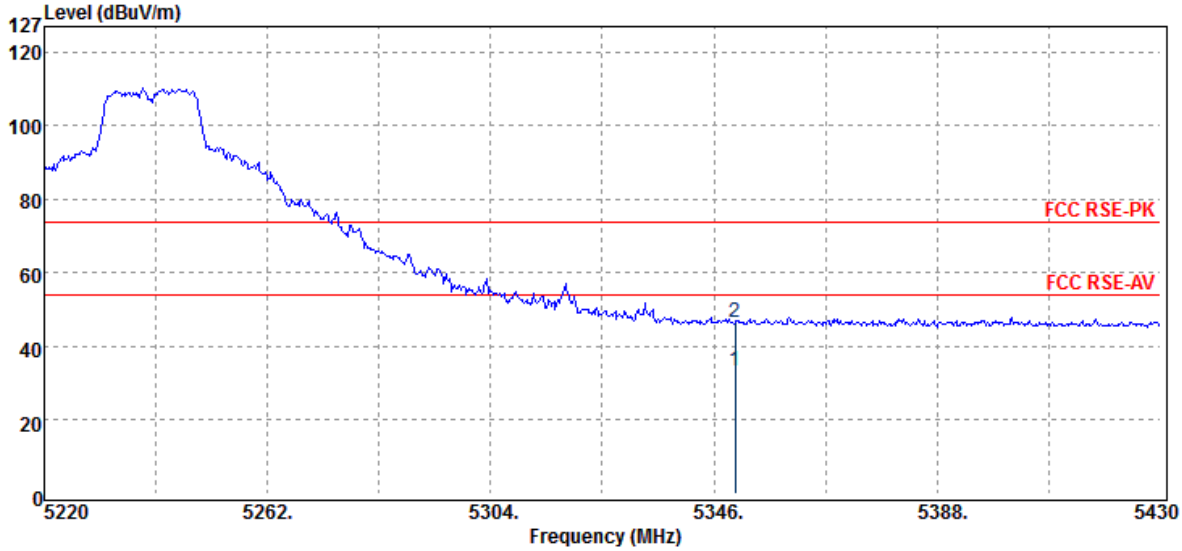
Operation Band	:802.11n20B1	Test Date	:2017-07-12
Fundamental Frequency	:5240 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5350.00	E	Average	27.38	6.16	33.54	54.00	-20.46
5350.00	E	Peak	40.41	6.16	46.57	74.00	-27.43

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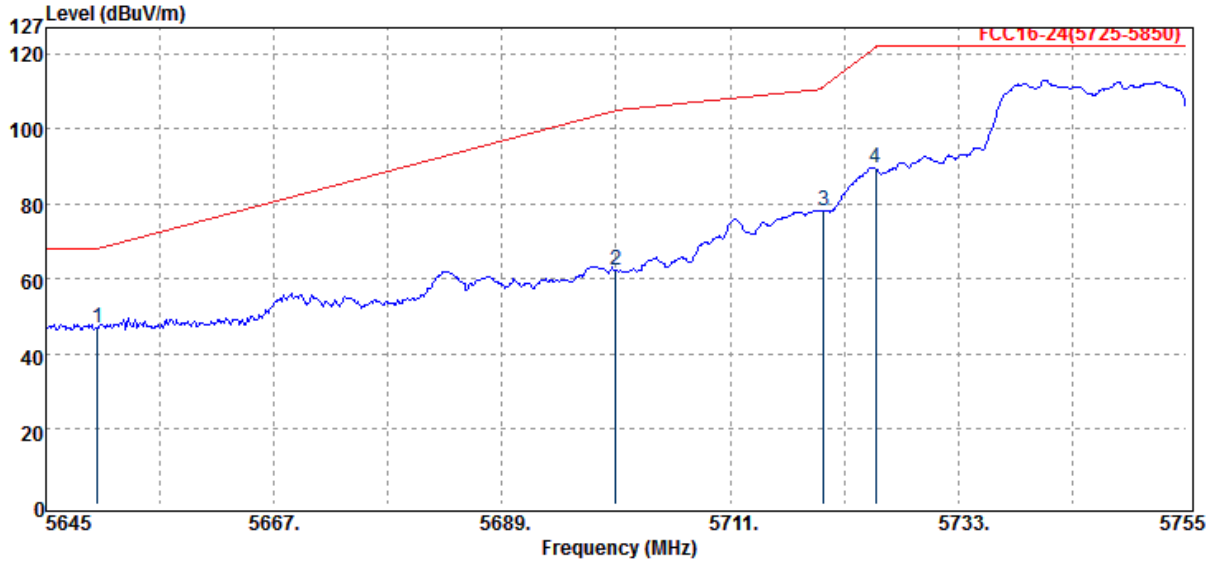
Operation Band	:802.11n20B4	Test Date	:2017-07-07
Fundamental Frequency	:5745 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5650.00	E	Peak	40.39	6.48	46.87	68.23	-21.36
5700.00	E	Peak	55.83	6.67	62.50	105.23	-42.73
5720.00	E	Peak	71.54	6.60	78.14	110.83	-32.69
5725.00	E	Peak	83.00	6.59	89.59	122.23	-32.64

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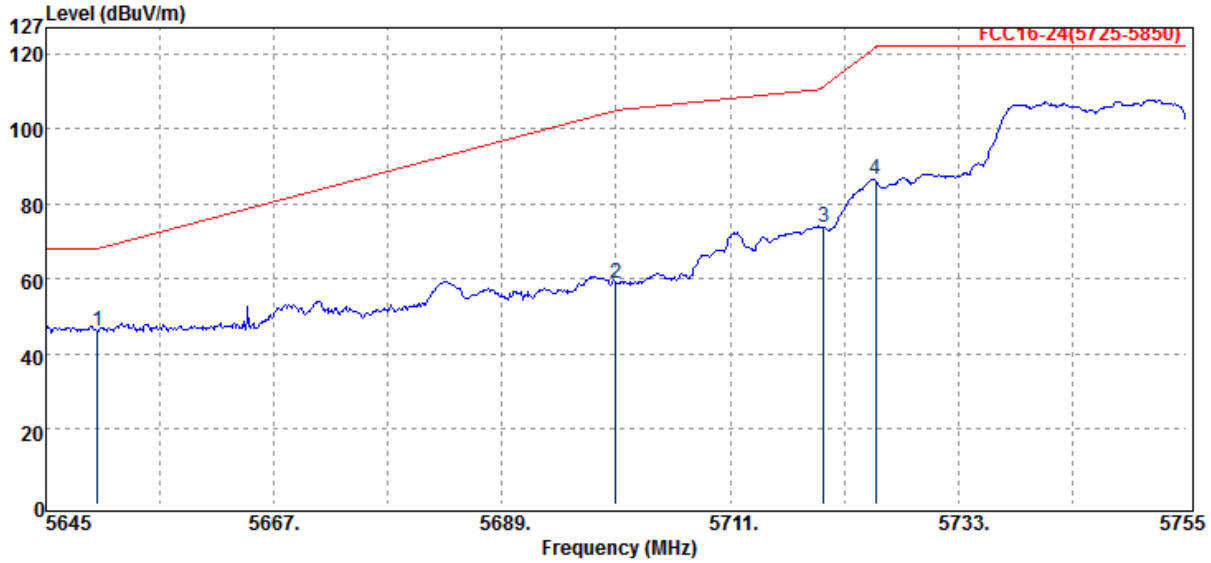
Operation Band	:802.11n20B4	Test Date	:2017-07-07
Fundamental Frequency	:5745 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5650.00	E	Peak	39.83	6.48	46.31	68.23	-21.92
5700.00	E	Peak	52.34	6.67	59.01	105.23	-46.22
5720.00	E	Peak	67.40	6.60	74.00	110.83	-36.83
5725.00	E	Peak	79.94	6.59	86.53	122.23	-35.70

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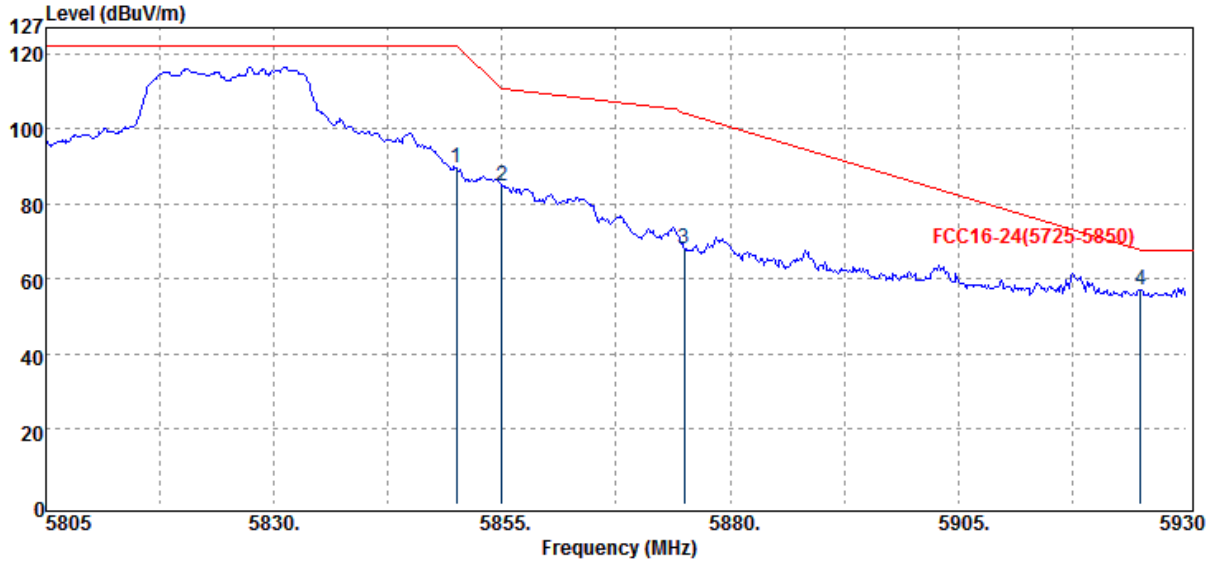
Operation Band	:802.11n20B4	Test Date	:2017-07-07
Fundamental Frequency	:5825 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5850.00	E	Peak	82.26	7.28	89.54	122.23	-32.69
5855.00	E	Peak	77.62	7.32	84.94	110.83	-25.89
5875.00	E	Peak	60.95	7.37	68.32	105.23	-36.91
5925.00	E	Peak	49.92	7.39	57.31	68.23	-10.92

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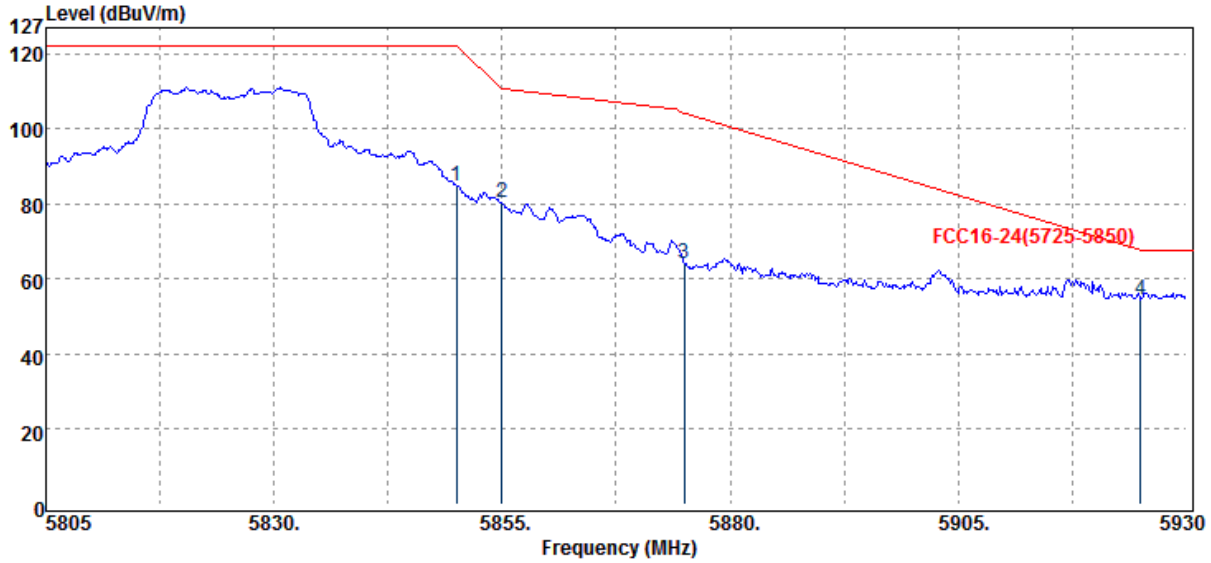
Operation Band	:802.11n20B4	Test Date	:2017-07-07
Fundamental Frequency	:5825 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5850.00	E	Peak	77.70	7.28	84.98	122.23	-37.25
5855.00	E	Peak	73.14	7.32	80.46	110.83	-30.37
5875.00	E	Peak	57.01	7.37	64.38	105.23	-40.85
5925.00	E	Peak	47.16	7.39	54.55	68.23	-13.68

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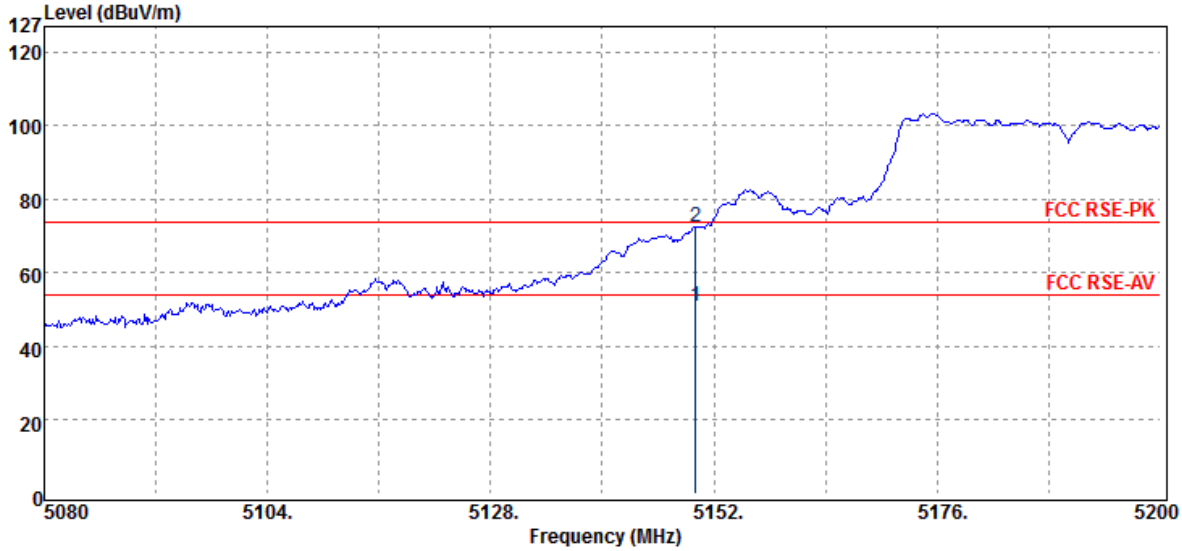
802.11n40 HT mode

Operation Band	:802.11n40B1	Test Date	:2017-07-07
Fundamental Frequency	:5190 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5150.00	E	Average	45.31	5.88	51.19	54.00	-2.81
5150.00	E	Peak	66.60	5.88	72.48	74.00	-1.52

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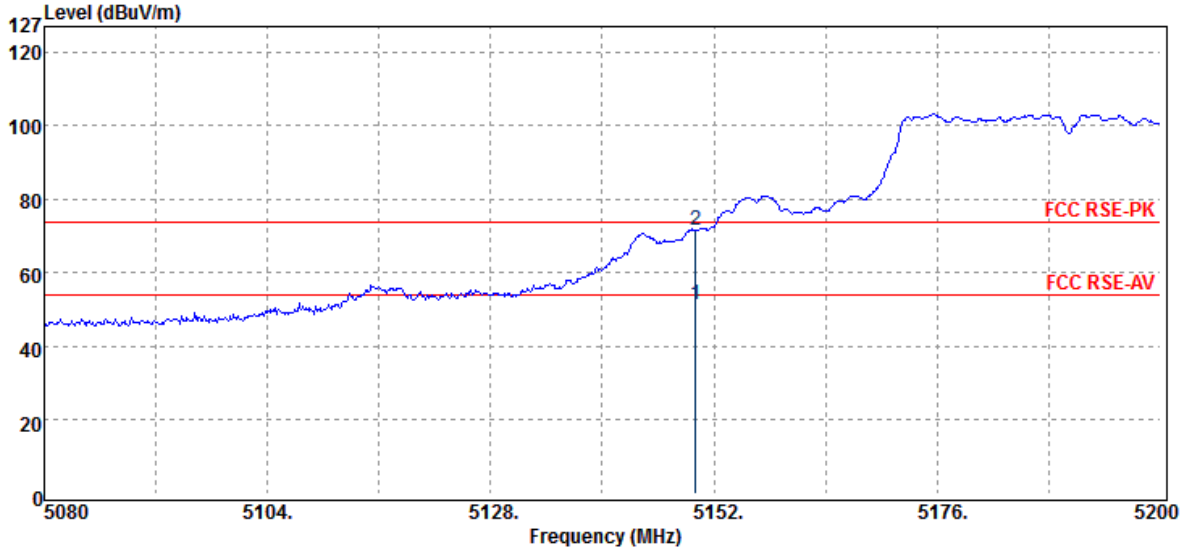
Operation Band	:802.11n40B1	Test Date	:2017-07-07
Fundamental Frequency	:5190 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5150.00	E	Average	45.65	5.88	51.53	54.00	-2.47
5150.00	E	Peak	65.64	5.88	71.52	74.00	-2.48

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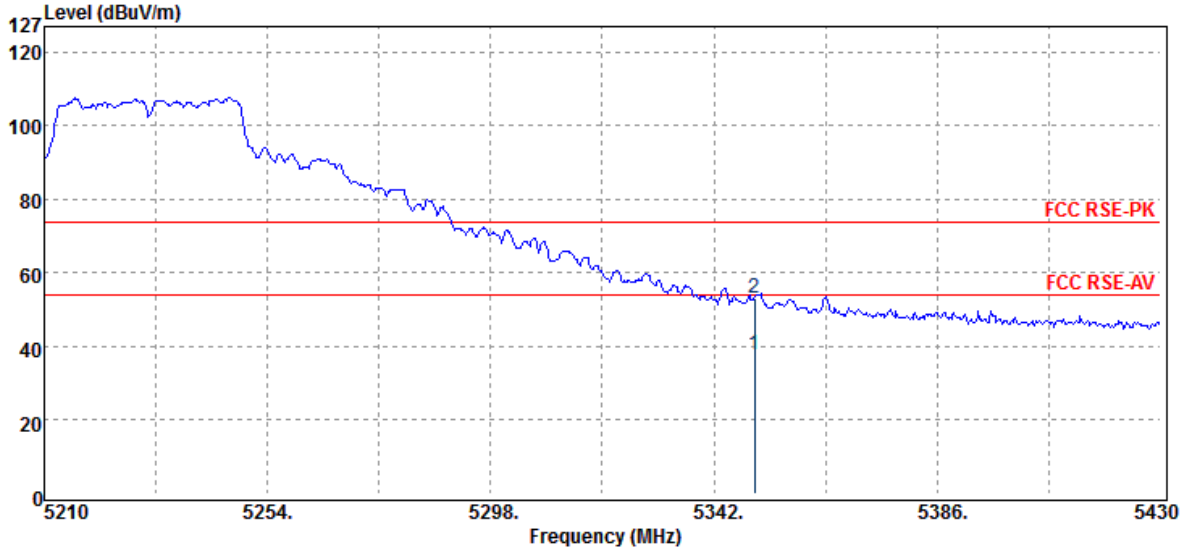
Member of SGS Group

Operation Band	:802.11n40B1	Test Date	:2017-07-12
Fundamental Frequency	:5230 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5350.00	E	Average	31.63	6.16	37.79	54.00	-16.21
5350.00	E	Peak	47.00	6.16	53.16	74.00	-20.84

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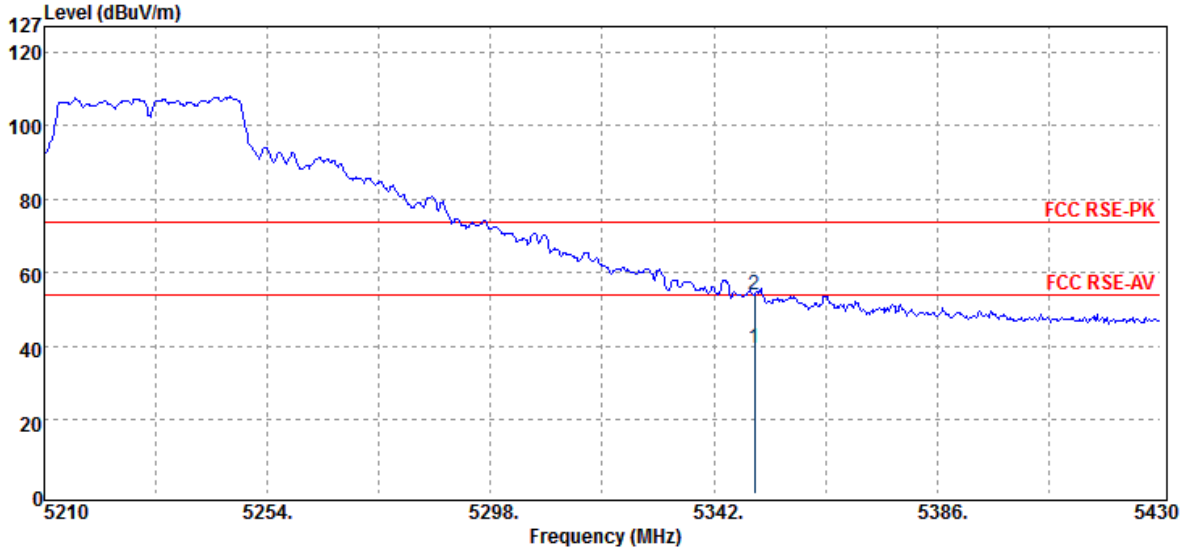
Operation Band	:802.11n40B1	Test Date	:2017-07-12
Fundamental Frequency	:5230 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5350.00	E	Average	33.32	6.16	39.48	54.00	-14.52
5350.00	E	Peak	47.66	6.16	53.82	74.00	-20.18

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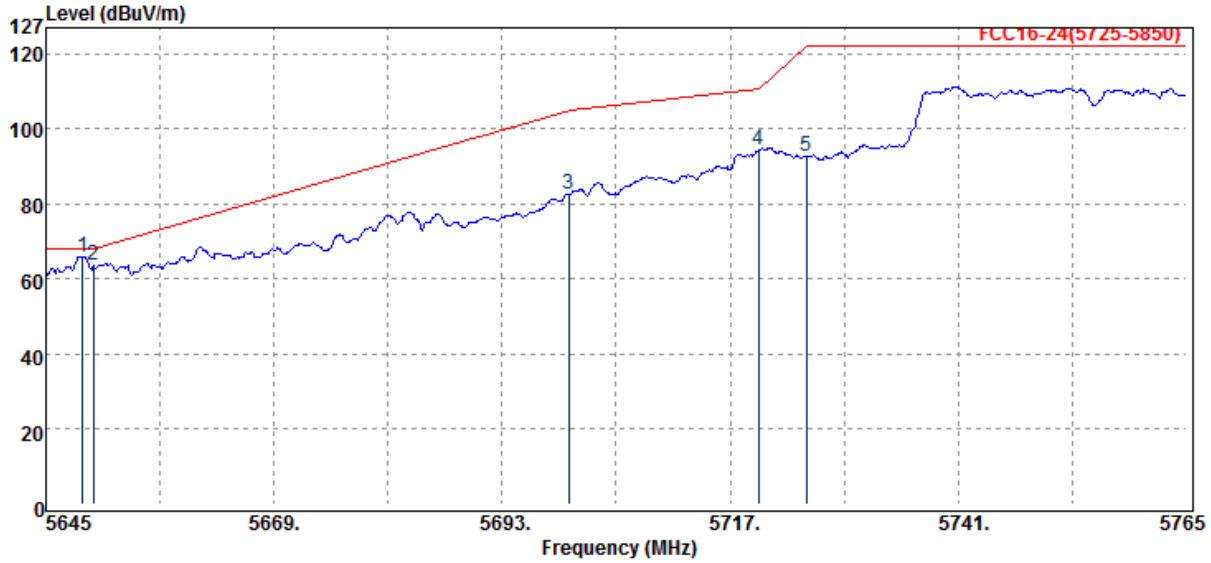
Operation Band	:802.11n40B4	Test Date	:2017-07-07
Fundamental Frequency	:5755 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5648.84	E	Peak	59.65	6.48	66.13	68.23	-2.10
5650.00	E	Peak	57.08	6.48	63.56	68.23	-4.67
5700.00	E	Peak	76.00	6.67	82.67	105.23	-22.56
5720.00	E	Peak	87.89	6.60	94.49	110.83	-16.34
5725.00	E	Peak	86.13	6.59	92.72	122.23	-29.51

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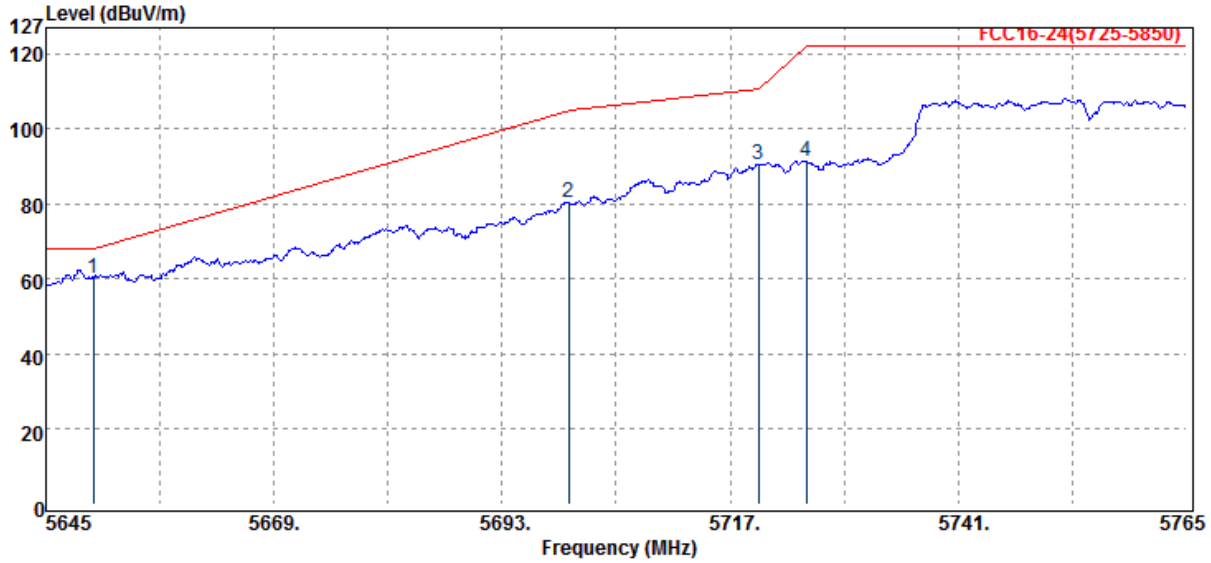
Operation Band	:802.11n40B4	Test Date	:2017-07-07
Fundamental Frequency	:5755 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5650.00	E	Peak	53.85	6.48	60.33	68.23	-7.90
5700.00	E	Peak	73.68	6.67	80.35	105.23	-24.88
5720.00	E	Peak	84.12	6.60	90.72	110.83	-20.11
5725.00	E	Peak	84.97	6.59	91.56	122.23	-30.67

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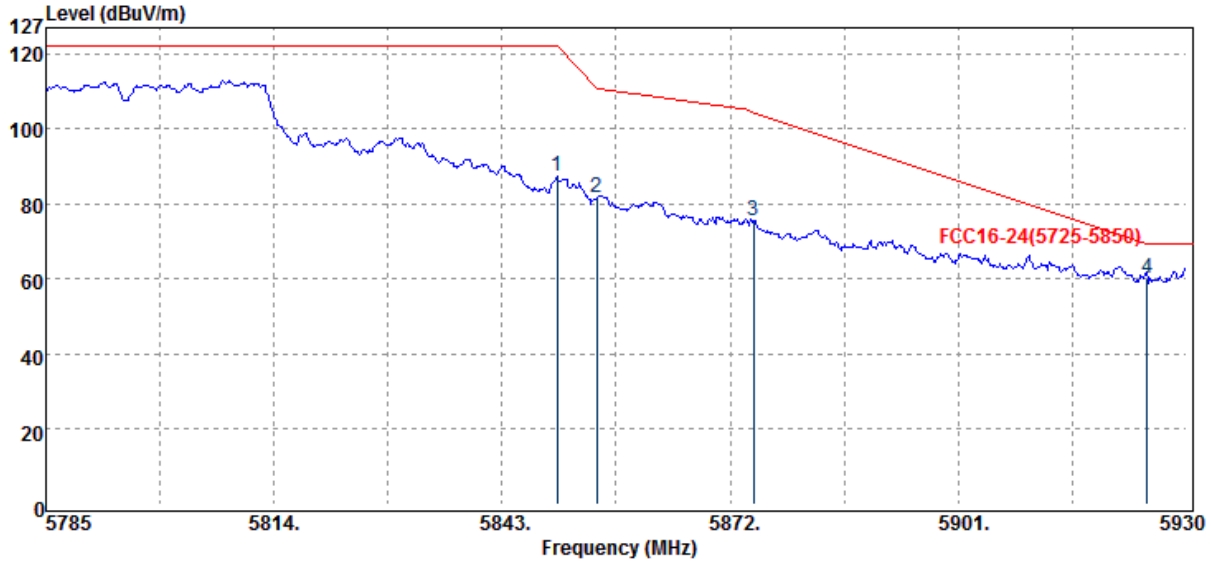
Operation Band	:802.11n40B4	Test Date	:2017-07-07
Fundamental Frequency	:5795 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5850.00	E	Peak	80.19	7.28	87.47	122.23	-34.76
5855.00	E	Peak	74.21	7.32	81.53	110.83	-29.30
5875.00	E	Peak	68.00	7.37	75.37	105.23	-29.86
5925.00	E	Peak	53.00	7.39	60.39	68.23	-7.84

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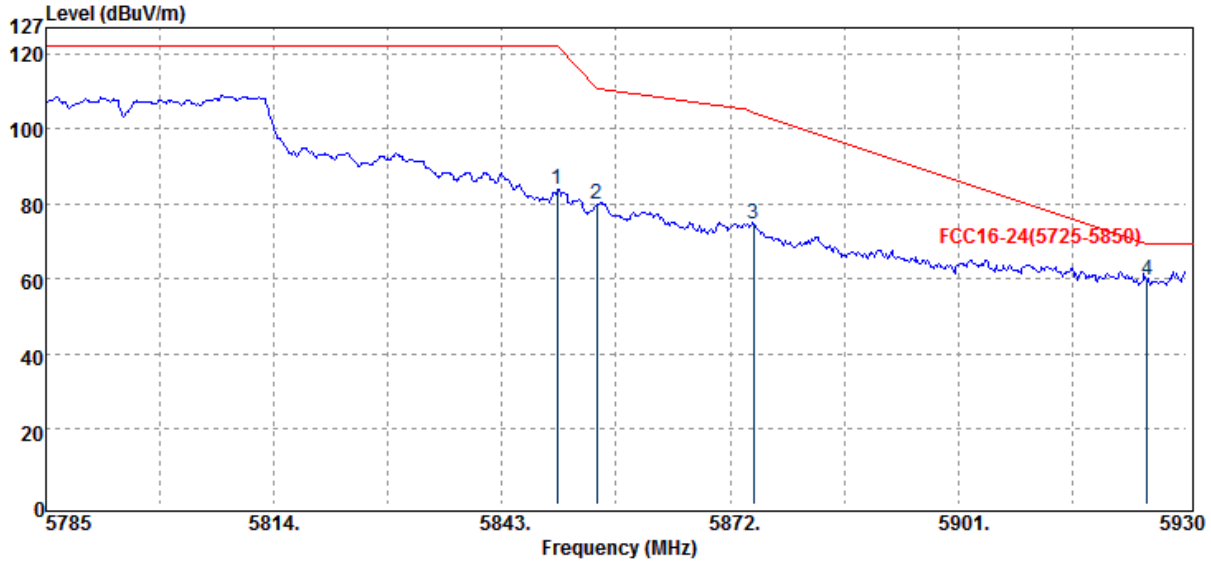
Operation Band	:802.11n40B4	Test Date	:2017-07-07
Fundamental Frequency	:5795 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5850.00	E	Peak	76.70	7.28	83.98	122.23	-38.25
5855.00	E	Peak	72.53	7.32	79.85	110.83	-30.98
5875.00	E	Peak	67.33	7.37	74.70	105.23	-30.53
5925.00	E	Peak	52.36	7.39	59.75	68.23	-8.48

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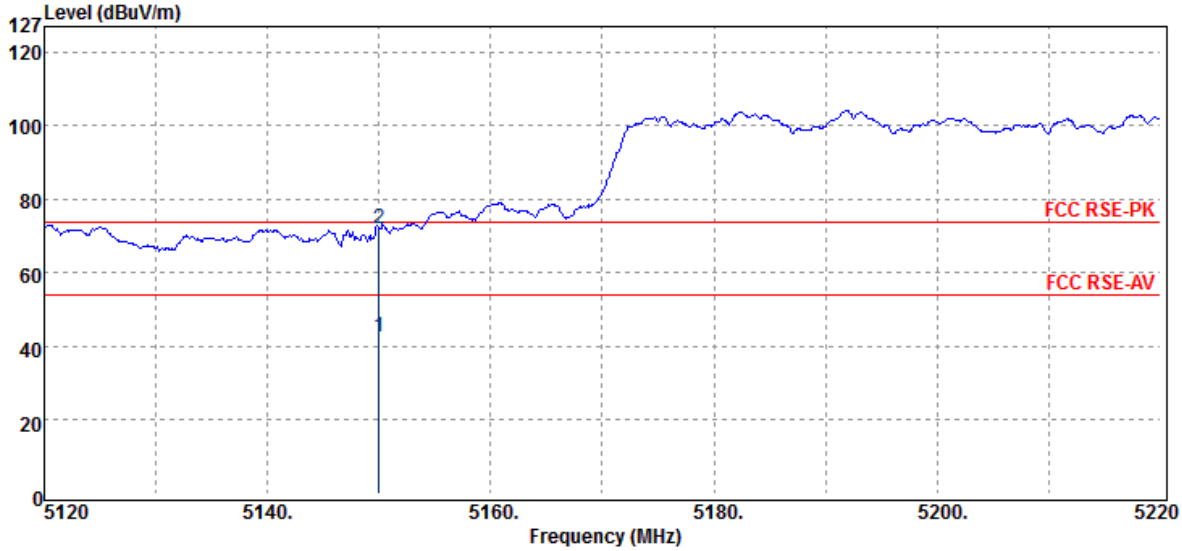
802.11ac80 VHT mode

Operation Band	:802.11ac80B1	Test Date	:2017-07-07
Fundamental Frequency	:5210 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5150.00	E	Average	36.78	5.88	42.66	54.00	-11.34
5150.00	E	Peak	66.27	5.88	72.15	74.00	-1.85

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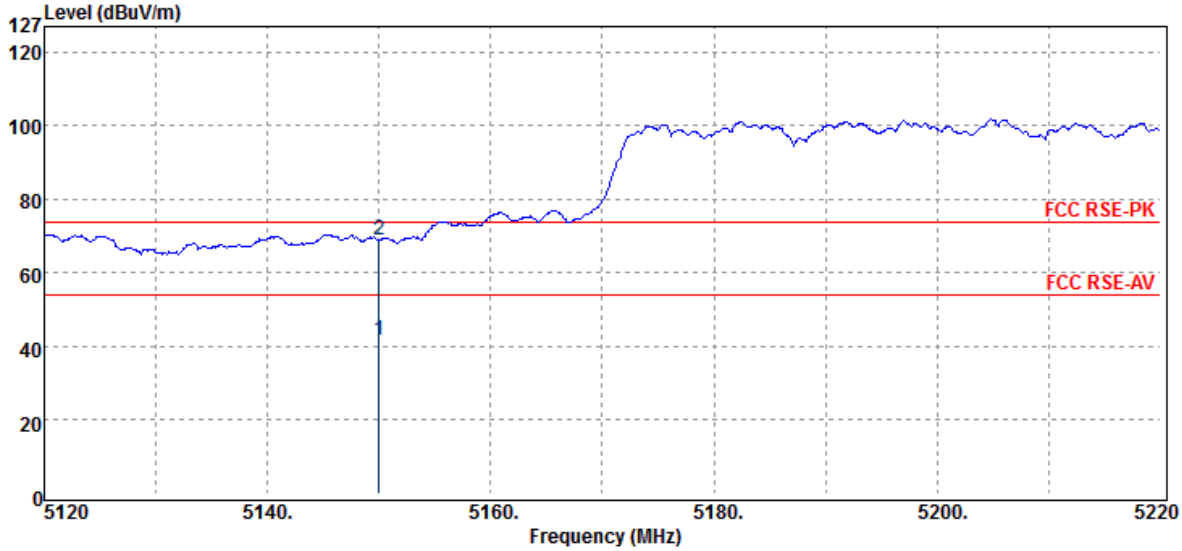
Operation Band	:802.11ac80B1	Test Date	:2017-07-07
Fundamental Frequency	:5210 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5150.00	E	Average	35.79	5.88	41.67	54.00	-12.33
5150.00	E	Peak	63.11	5.88	68.99	74.00	-5.01

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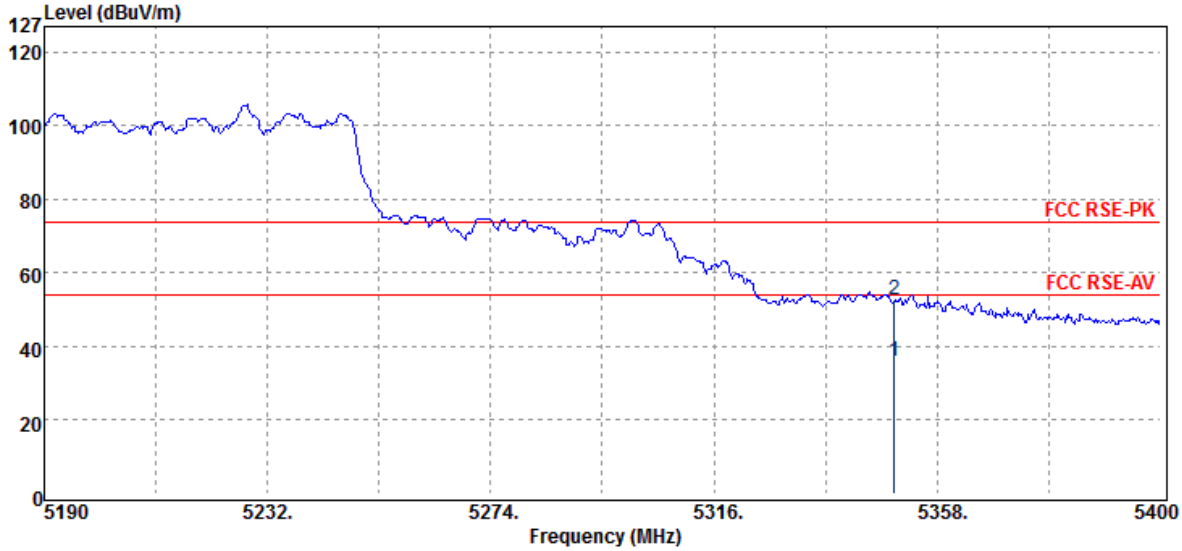
Operation Band	:802.11ac80B1	Test Date	:2017-07-07
Fundamental Frequency	:5210 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5350.00	E	Average	29.87	6.16	36.03	54.00	-17.97
5350.00	E	Peak	46.62	6.16	52.78	74.00	-21.22

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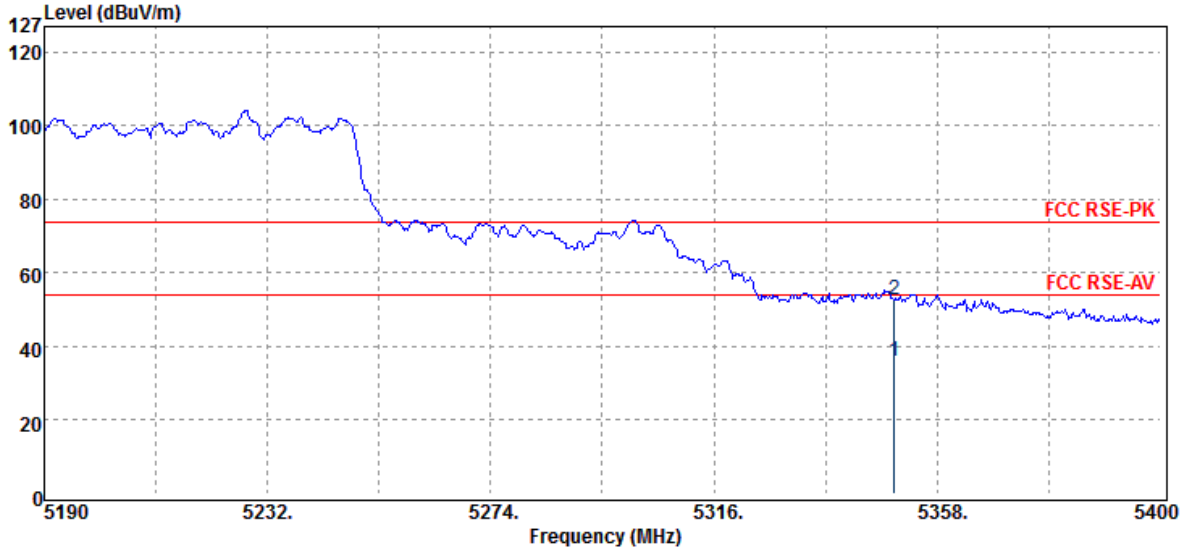
Operation Band	:802.11ac80B1	Test Date	:2017-07-07
Fundamental Frequency	:5210 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5350.00	E	Average	29.93	6.16	36.09	54.00	-17.91
5350.00	E	Peak	46.54	6.16	52.70	74.00	-21.30

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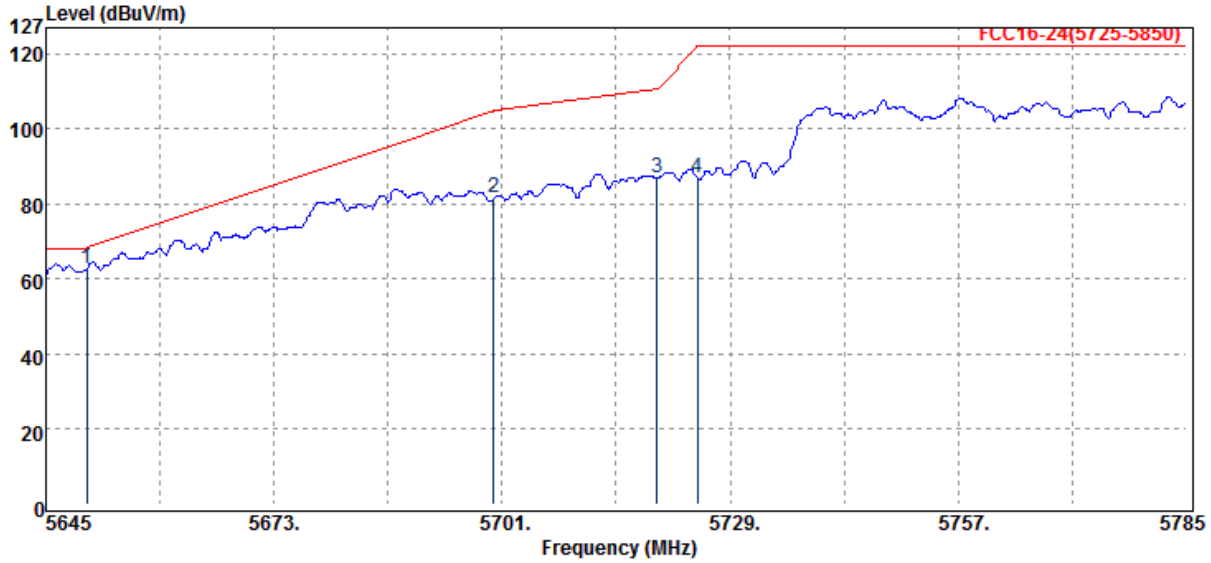
Operation Band	:802.11ac80B4	Test Date	:2017-07-07
Fundamental Frequency	:5775 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5650.00	E	Peak	56.39	6.48	62.87	68.23	-5.36
5700.00	E	Peak	74.96	6.67	81.63	105.23	-23.60
5720.00	E	Peak	80.45	6.60	87.05	110.83	-23.78
5725.00	E	Peak	80.64	6.59	87.23	122.23	-35.00

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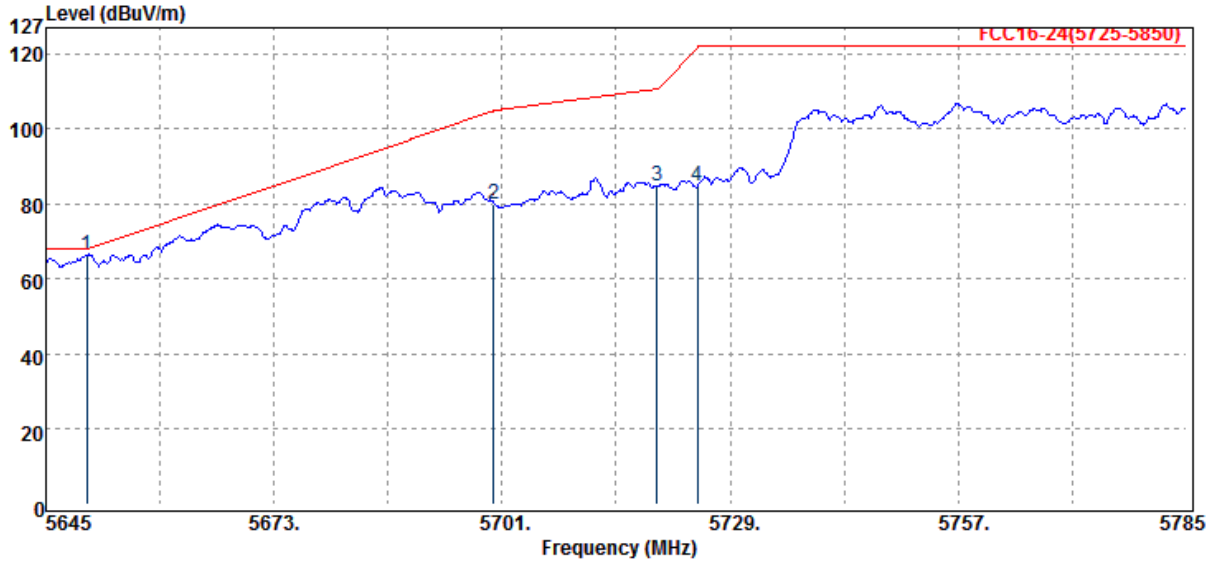
Operation Band	:802.11ac80B4	Test Date	:2017-07-07
Fundamental Frequency	:5775 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5650.00	E	Peak	59.81	6.48	66.29	68.23	-1.94
5700.00	E	Peak	73.46	6.67	80.13	105.23	-25.10
5720.00	E	Peak	78.16	6.60	84.76	110.83	-26.07
5725.00	E	Peak	78.19	6.59	84.78	122.23	-37.45

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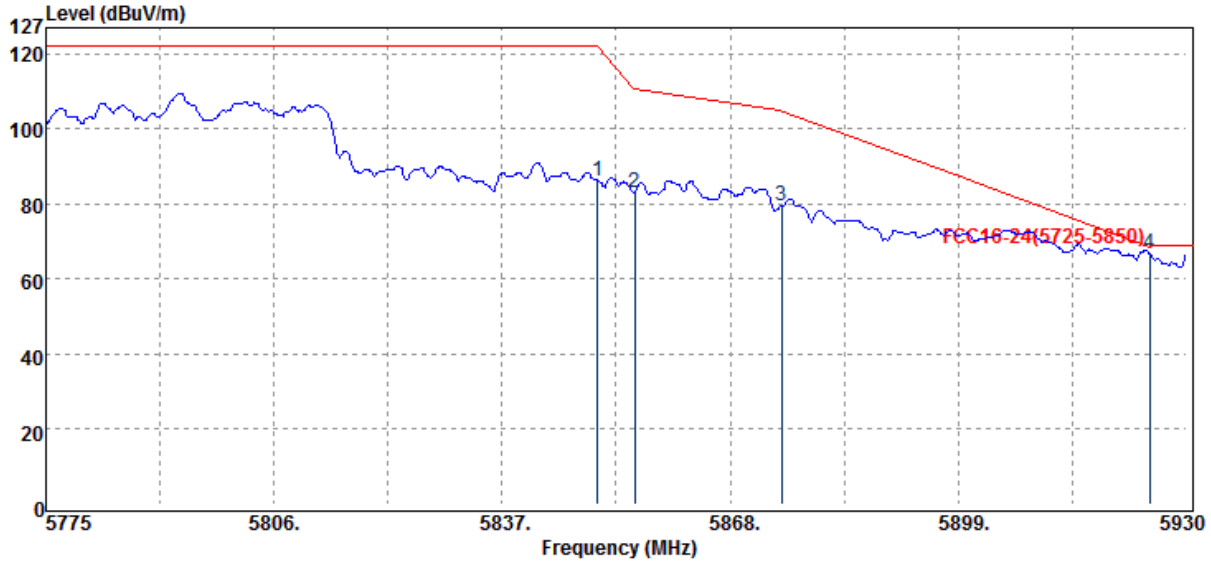
Operation Band	:802.11ac80B4	Test Date	:2017-07-07
Fundamental Frequency	:5775 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5850.00	E	Peak	79.05	7.28	86.33	122.23	-35.90
5855.00	E	Peak	75.74	7.32	83.06	110.83	-27.77
5875.00	E	Peak	72.25	7.37	79.62	105.23	-25.61
5925.00	E	Peak	59.20	7.39	66.59	68.23	-1.64

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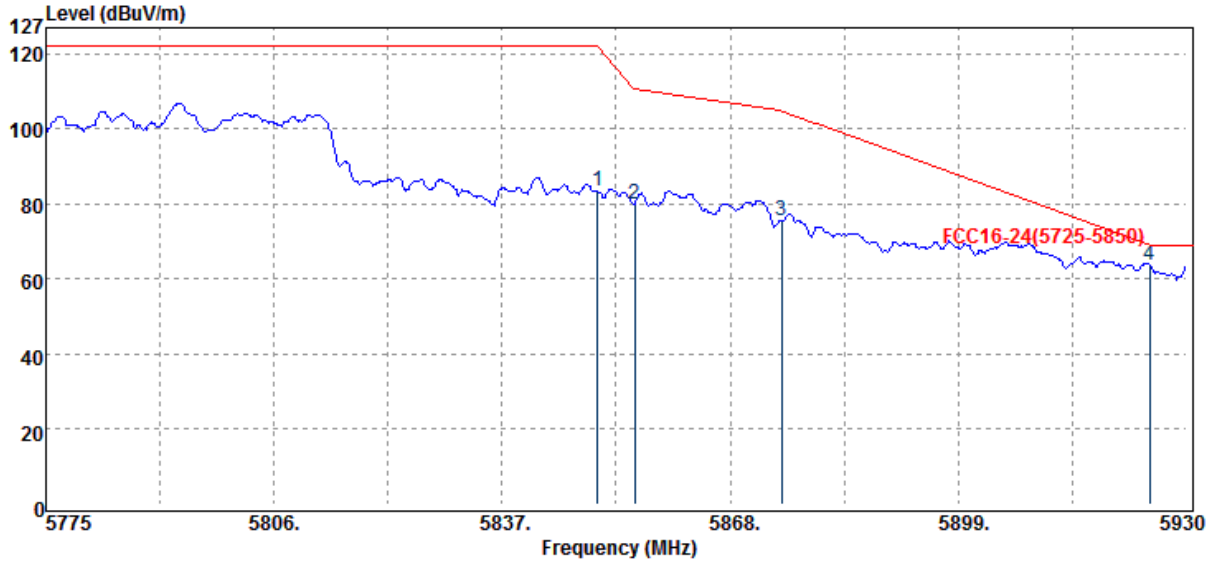
Operation Band	:802.11ac80B4	Test Date	:2017-07-07
Fundamental Frequency	:5775 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH HIGH	Engineer	:Mike
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5850.00	E	Peak	76.14	7.28	83.42	122.23	-38.81
5855.00	E	Peak	72.74	7.32	80.06	110.83	-30.77
5875.00	E	Peak	68.22	7.37	75.59	105.23	-29.64
5925.00	E	Peak	56.24	7.39	63.63	68.23	-4.60

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12. TRANSMISSION IN THE ABSENCE OF DATA

12.1 Standard Applicable

According to §15.407(c)

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

12.2 Result

No non-compliance noted:

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

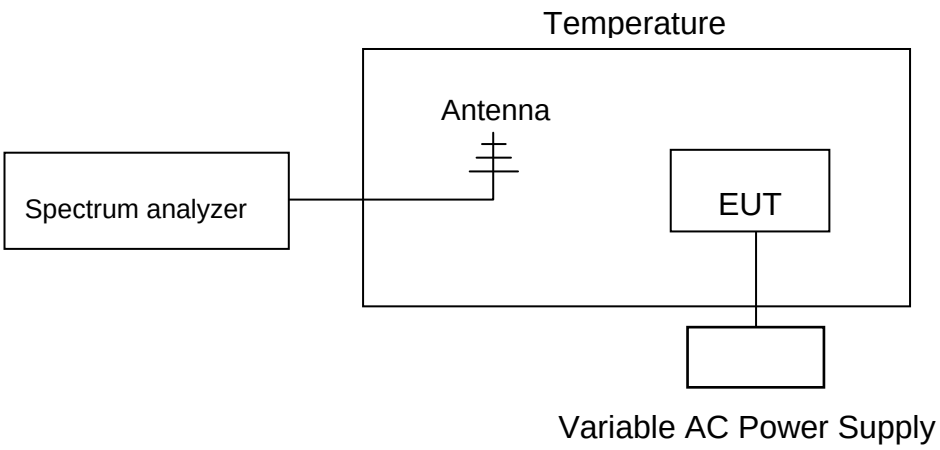
13.1 Standard Applicable

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					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018
Splitter	Agilent	11636B	N/A	01/05/2017	01/04/2018
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017
Temperature Chamber	TERCHY	MHG-120LF	911009	05/19/2017	05/18/2018

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13.5 Measurement Result

Startup:

Operation Mode	802.11 a	Test Date	2017.07.12
Temperature	:17 ℃	Test By	Cooper
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 ℃	5.5V	36	5180	5,179.96698	0.00000637
		44	5220	5,219.96541	0.00000663
		48	5240	5,239.96560	0.00000656
		149	5745	5,744.96932	0.00000534
		157	5785	5,784.97396	0.00000450
		165	5825	5,824.97934	0.00000355
	4.5V	36	5180	5,179.96679	0.00000641
		44	5220	5,219.96478	0.00000675
		48	5240	5,239.96502	0.00000668
		149	5745	5,744.96559	0.00000599
		157	5785	5,784.97369	0.00000455
		165	5825	5,824.97776	0.00000382
25 ℃	5V	36	5180	5,179.96771	0.00000623
		44	5220	5,219.96590	0.00000653
		48	5240	5,239.96533	0.00000662
		149	5745	5,744.96978	0.00000526
		157	5785	5,784.97535	0.00000426
		165	5825	5,824.98375	0.00000279
55 ℃	5.5V	36	5180	5,179.96644	0.00000648
		44	5220	5,219.96561	0.00000659
		48	5240	5,239.96618	0.00000645
		149	5745	5,744.97169	0.00000493
		157	5785	5,784.97602	0.00000415
		165	5825	5,824.98043	0.00000336
	4.5V	36	5180	5,179.96653	0.00000646
		44	5220	5,219.96709	0.00000630
		48	5240	5,239.96621	0.00000645
		149	5745	5,744.97084	0.00000508
		157	5785	5,784.97559	0.00000422
		165	5825	5,824.98183	0.00000312

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Operation Mode	802.11 n_HT40	Test Date	2017.07.12
Temperature	:17 ℃	Test By	Cooper
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 ℃	5.5V	38	5190	5,189.96779	0.00000621
		46	5230	5,229.96891	0.00000594
		151	5755	5,754.97539	0.00000428
		159	5795	5,794.98156	0.00000318
	4.5V	38	5190	5,189.96608	0.00000654
		46	5230	5,229.96740	0.00000623
		151	5755	5,754.97150	0.00000495
		159	5795	5,794.97841	0.00000373
25 ℃	5V	38	5190	5,189.96796	0.00000617
		46	5230	5,229.96937	0.00000586
		151	5755	5,754.97605	0.00000416
		159	5795	5,794.98368	0.00000282
55 ℃	5.5V	38	5190	5,189.96836	0.00000610
		46	5230	5,229.96971	0.00000579
		151	5755	5,754.97845	0.00000374
		159	5795	5,794.98131	0.00000323
	4.5V	38	5190	5,189.96812	0.00000614
		46	5230	5,229.96962	0.00000581
		151	5755	5,754.97733	0.00000394
		159	5795	5,794.98442	0.00000269

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Operation Mode	802.11 ac_VHT80	Test Date	2017.07.12
Temperature	:17 ℃	Test By	Cooper
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 ℃	5.5V	42	5210	5,209.96480	0.00000676
		155	5775	5,774.97025	0.00000515
	4.5V	42	5210	5,209.96487	0.00000674
		155	5775	5,774.96782	0.00000557
25 ℃	5V	42	5210	5,209.96509	0.00000670
		155	5775	5,774.97227	0.00000480
55 ℃	5.5V	42	5210	5,209.96557	0.00000661
		155	5775	5,774.97473	0.00000438
	4.5V	42	5210	5,209.96537	0.00000665
		155	5775	5,774.97364	0.00000456

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2 minutes:

Operation Mode	802.11 a	Test Date	2017.07.12
Temperature	:17 ℃	Test By	Cooper
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 ℃	5.5V	36	5180	5,179.96857	0.00000607
		44	5220	5,219.96690	0.00000634
		48	5240	5,239.96534	0.00000661
		149	5745	5,744.96303	0.00000643
		157	5785	5,784.98371	0.00000282
		165	5825	5,824.98803	0.00000206
	4.5V	36	5180	5,179.96289	0.00000717
		44	5220	5,219.95598	0.00000843
		48	5240	5,239.97231	0.00000528
		149	5745	5,744.96407	0.00000626
		157	5785	5,784.96966	0.00000524
		165	5825	5,824.97283	0.00000466
25 ℃	5V	36	5180	5,179.97233	0.00000534
		44	5220	5,219.96085	0.00000750
		48	5240	5,239.97225	0.00000530
		149	5745	5,744.97396	0.00000453
		157	5785	5,784.96695	0.00000571
		165	5825	5,824.98988	0.00000174
55 ℃	5.5V	36	5180	5,179.96337	0.00000707
		44	5220	5,219.95972	0.00000772
		48	5240	5,239.96053	0.00000753
		149	5745	5,744.97288	0.00000472
		157	5785	5,784.98067	0.00000334
		165	5825	5,824.98679	0.00000227
	4.5V	36	5180	5,179.95815	0.00000808
		44	5220	5,219.96675	0.00000637
		48	5240	5,239.96220	0.00000721
		149	5745	5,744.96730	0.00000569
		157	5785	5,784.98351	0.00000285
		165	5825	5,824.99101	0.00000154

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Operation Mode	802.11 n_HT40	Test Date	2017.07.12
Temperature	:17 ℃	Test By	Cooper
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 ℃	5.5V	38	5190	5,189.97765	0.00000431
		46	5230	5,229.97439	0.00000490
		151	5755	5,754.98493	0.00000262
		159	5795	5,794.97205	0.00000482
	4.5V	38	5190	5,189.96527	0.00000669
		46	5230	5,229.95769	0.00000809
		151	5755	5,754.97964	0.00000354
		159	5795	5,794.97266	0.00000472
25 ℃	5V	38	5190	5,189.95938	0.00000783
		46	5230	5,229.97070	0.00000560
		151	5755	5,754.98223	0.00000309
		159	5795	5,794.98338	0.00000287
55 ℃	5.5V	38	5190	5,189.96753	0.00000626
		46	5230	5,229.96650	0.00000640
		151	5755	5,754.97533	0.00000429
		159	5795	5,794.97566	0.00000420
	4.5V	38	5190	5,189.97810	0.00000422
		46	5230	5,229.96919	0.00000589
		151	5755	5,754.98164	0.00000319
		159	5795	5,794.99068	0.00000161

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Operation Mode	802.11 ac_VHT80	Test Date	2017.07.12
Temperature	:17 ℃	Test By	Cooper
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 ℃	5.5V	42	5210	5,209.96223	0.00000725
		155	5775	5,774.96064	0.00000682
	4.5V	42	5210	5,209.96582	0.00000656
		155	5775	5,774.96693	0.00000573
25 ℃	5V	42	5210	5,209.97001	0.00000576
		155	5775	5,774.97068	0.00000508
55 ℃	5.5V	42	5210	5,209.96750	0.00000624
		155	5775	5,774.96685	0.00000574
	4.5V	42	5210	5,209.95883	0.00000790
		155	5775	5,774.97920	0.00000360

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5 minutes:

Operation Mode	802.11 a	Test Date	2017.07.12
Temperature	:17 ℃	Test By	Cooper
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 ℃	5.5V	36	5180	5,179.95835	0.00000804
		44	5220	5,219.95894	0.00000787
		48	5240	5,239.95894	0.00000784
		149	5745	5,744.97741	0.00000393
		157	5785	5,784.98145	0.00000321
		165	5825	5,824.98588	0.00000242
	4.5V	36	5180	5,179.96968	0.00000585
		44	5220	5,219.96151	0.00000737
		48	5240	5,239.96287	0.00000709
		149	5745	5,744.96578	0.00000596
		157	5785	5,784.97165	0.00000490
		165	5825	5,824.98044	0.00000336
25 ℃	5V	36	5180	5,179.97585	0.00000466
		44	5220	5,219.95669	0.00000830
		48	5240	5,239.96178	0.00000729
		149	5745	5,744.96483	0.00000612
		157	5785	5,784.96938	0.00000529
		165	5825	5,824.98391	0.00000276
55 ℃	5.5V	36	5180	5,179.95837	0.00000804
		44	5220	5,219.97386	0.00000501
		48	5240	5,239.96711	0.00000628
		149	5745	5,744.97431	0.00000447
		157	5785	5,784.97727	0.00000393
		165	5825	5,824.97348	0.00000455
	4.5V	36	5180	5,179.95669	0.00000836
		44	5220	5,219.95878	0.00000790
		48	5240	5,239.96606	0.00000648
		149	5745	5,744.97444	0.00000445
		157	5785	5,784.97239	0.00000477
		165	5825	5,824.98932	0.00000183

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Operation Mode	802.11 n_HT40	Test Date	2017.07.12
Temperature	:17 ℃	Test By	Cooper
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 ℃	5.5V	38	5190	5,189.97125	0.00000554
		46	5230	5,229.95941	0.00000776
		151	5755	5,754.97072	0.00000509
		159	5795	5,794.98254	0.00000301
	4.5V	38	5190	5,189.97386	0.00000504
		46	5230	5,229.95915	0.00000781
		151	5755	5,754.96836	0.00000550
		159	5795	5,794.97122	0.00000497
25 ℃	5V	38	5190	5,189.97623	0.00000458
		46	5230	5,229.96276	0.00000712
		151	5755	5,754.98502	0.00000260
		159	5795	5,794.99294	0.00000122
55 ℃	5.5V	38	5190	5,189.96151	0.00000742
		46	5230	5,229.96310	0.00000706
		151	5755	5,754.98322	0.00000292
		159	5795	5,794.98178	0.00000314
	4.5V	38	5190	5,189.97179	0.00000544
		46	5230	5,229.97676	0.00000444
		151	5755	5,754.97279	0.00000473
		159	5795	5,794.97717	0.00000394

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Operation Mode	802.11 ac_VHT80	Test Date	2017.07.12
Temperature	:17 ℃	Test By	Cooper
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 ℃	5.5V	42	5210	5,209.97395	0.00000500
		155	5775	5,774.97798	0.00000381
	4.5V	42	5210	5,209.95500	0.00000864
		155	5775	5,774.97678	0.00000402
25 ℃	5V	42	5210	5,209.95680	0.00000829
		155	5775	5,774.97943	0.00000356
55 ℃	5.5V	42	5210	5,209.96398	0.00000691
		155	5775	5,774.97102	0.00000502
	4.5V	42	5210	5,209.96502	0.00000671
		155	5775	5,774.97505	0.00000432

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10 minutes:

Operation Mode	802.11 a	Test Date	2017.07.12
Temperature	:17 ℃	Test By	Cooper
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 ℃	5.5V	36	5180	5,179.96381	0.00000699
		44	5220	5,219.95727	0.00000819
		48	5240	5,239.97211	0.00000532
		149	5745	5,744.96946	0.00000532
		157	5785	5,784.97614	0.00000413
		165	5825	5,824.97830	0.00000373
	4.5V	36	5180	5,179.97337	0.00000514
		44	5220	5,219.96853	0.00000603
		48	5240	5,239.97426	0.00000491
		149	5745	5,744.97324	0.00000466
		157	5785	5,784.98167	0.00000317
		165	5825	5,824.96864	0.00000538
25 ℃	5V	36	5180	5,179.96375	0.00000700
		44	5220	5,219.96951	0.00000584
		48	5240	5,239.97277	0.00000520
		149	5745	5,744.97536	0.00000429
		157	5785	5,784.97054	0.00000509
		165	5825	5,824.97834	0.00000372
55 ℃	5.5V	36	5180	5,179.96439	0.00000688
		44	5220	5,219.96934	0.00000587
		48	5240	5,239.96635	0.00000642
		149	5745	5,744.97792	0.00000384
		157	5785	5,784.98077	0.00000332
		165	5825	5,824.98760	0.00000213
	4.5V	36	5180	5,179.96030	0.00000766
		44	5220	5,219.97218	0.00000533
		48	5240	5,239.97409	0.00000494
		149	5745	5,744.97208	0.00000486
		157	5785	5,784.97760	0.00000387
		165	5825	5,824.99125	0.00000150

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Operation Mode	802.11 n_HT40	Test Date	2017.07.12
Temperature	:17 ℃	Test By	Cooper
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 ℃	5.5V	38	5190	5,189.95910	0.00000788
		46	5230	5,229.96864	0.00000600
		151	5755	5,754.97017	0.00000518
		159	5795	5,794.98991	0.00000174
	4.5V	38	5190	5,189.95967	0.00000777
		46	5230	5,229.96649	0.00000641
		151	5755	5,754.97725	0.00000395
		159	5795	5,794.96842	0.00000545
25 ℃	5V	38	5190	5,189.97328	0.00000515
		46	5230	5,229.97464	0.00000485
		151	5755	5,754.97067	0.00000510
		159	5795	5,794.98367	0.00000282
55 ℃	5.5V	38	5190	5,189.96667	0.00000642
		46	5230	5,229.97403	0.00000497
		151	5755	5,754.98016	0.00000345
		159	5795	5,794.97706	0.00000396
	4.5V	38	5190	5,189.97411	0.00000499
		46	5230	5,229.97569	0.00000465
		151	5755	5,754.96962	0.00000528
		159	5795	5,794.98878	0.00000194

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Operation Mode	802.11 ac_VHT80	Test Date	2017.07.12
Temperature	:17 ℃	Test By	Cooper
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10 ℃	5.5V	42	5210	5,209.97462	0.00000487
		155	5775	5,774.97243	0.00000477
	4.5V	42	5210	5,209.96248	0.00000720
		155	5775	5,774.97466	0.00000439
25 ℃	5V	42	5210	5,209.96576	0.00000657
		155	5775	5,774.96703	0.00000571
55 ℃	5.5V	42	5210	5,209.97050	0.00000566
		155	5775	5,774.97849	0.00000373
	4.5V	42	5210	5,209.96787	0.00000617
		155	5775	5,774.97459	0.00000440

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14. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

14.1 Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-15000	/	/	1.0	30

F = frequency in MHz

* = Plane-wave equipment power density

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14.2 Maximum Permissible Exposure (MPE) Evaluation (Worst Case)

802.11a_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	19.23	18.65	22.36	157.035	22.47	PASS
44	5220	MCS8	19.16	18.78	**22.39**	**157.923**	22.47	PASS
48	5240	MCS8	19.14	18.79	22.38	157.718	22.47	PASS
149	5745	MCS8	22.78	22.22	25.92	356.395	28.49	PASS
157	5785	MCS8	23.27	22.38	**26.26**	**385.306**	28.49	PASS
165	5825	MCS8	22.07	21.88	25.39	315.235	28.49	PASS

MPE Prediction (802.11a)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S=PG/4\pi R^2$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

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5150~5250MHz

Max. output power including tune-up tolerancel:	22.39	(dBm)
Max. output power including tune-up tolerancel:	173.3804	(mW)
Duty cycle:	92.42	(%)
Maximum Pav :	160.23817	(mW)
Peak Antenna gain (Maximum):	4.5	(dBi)
Peak Antenna gain (linear):	2.8183829	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5220	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.090	(mW/cm2)

Measurement Result
The predicted power density level at 20 cm is 0.09 mW/cm2.
This is below the uncontrolled exposure limit of 1 mW/cm2 at 5220MHz.

5745~5825MHz

Max. output power including tune-up tolerancel:	26.26	(dBm)
Max. output power including tune-up tolerancel:	422.66861	(mW)
Duty cycle:	92.42	(%)
Maximum Pav :	390.63033	(mW)
Peak Antenna gain (Maximum):	2.8	(dBi)
Peak Antenna gain (linear):	1.9054607	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5785	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.148	(mW/cm2)

Measurement Result
The predicted power density level at 20 cm is 0.148 mW/cm2.
This is below the uncontrolled exposure limit of 1 mW/cm2 at 5785MHz.

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