

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT

OF

Product Name: Diagnostic Ultrasound System
Brand Name: Qisda
Model No.: 9896054***** (* may be 0-9 or a-z or blank)/
Innosight
Model Difference: Marketed with different accessories.
FCC ID: VRSAPOLLO
Report No.: E2/2016/C0010
Issue Date: Dec. 23, 2016
FCC Rule Part: §15.407
Prepared for: QISDA CORPORATION
NO.157, SHAN-YING ROAD, SHAN-TING LI,
GUEISHAN DIST., TAOYUAN CITY, Taiwan,
R.O.C
SGS Taiwan Ltd.
Prepared by: Electronics & Communication Laboratory
No.2, Keji 1st Rd., Guishan District,
Taoyuan City, Taiwan 333



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VERIFICATION OF COMPLIANCE

Applicant: QISDA CORPORATION
NO.157, SHAN-YING ROAD, SHAN-TING LI, GUEISHAN DIST.,
TAOYUAN CITY, Taiwan, R.O.C

Product Name: Diagnostic Ultrasound System

Brand Name: Qisda

Model No.: 9896054***** (* may be 0-9 or a-z or blank)/ Innosight

Model Difference: Marketed with different accessories.

FCC ID: VRSAPOLLO

File Number: E2/2016/C0010

Date of Test: Dec. 07, 2016 ~ Dec. 12, 2016

Date of EUT Received: Apr. 08, 2016

We hereby certify that:

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

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

Test By:

Jerry Lu

Date:

Dec. 23, 2016

Jerry Lu / Sr. Engineer

Prepared By:

Allen Tsai

Date:

Dec. 23, 2016

Allen Tsai / Engineer

Approved By:

Jim Chang

Date:

Dec. 23, 2016

Jim Chang / Asst. Manager

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Revision History

Report Number	Revision	Description	Issue Date
E2/2016/C0010	Rev.00	Initial creation of document	Dec. 23, 2016

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1 GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	Diagnostic Ultrasound System	
Brand Name:	Qisda	
Model No.:	9896054***** (* may be 0-9 or a-z or blank)/ Innosight	
Model Difference:	Marketed with different accessories.	
Software version:	N/A	
Hardware version:	N/A	
Transducer:	1. Model No.: TL117-160114004, Supplier: N/A 2. Model No.: TP108-160114004, Supplier: N/A 3. Model No.: TE080-160114004, Supplier: N/A 4. Model No.: TC155-160114004, Supplier: N/A	
Power Supply:	10.8Vdc from rechargeable battery or 19Vdc from AC/DC adapter	
	Battery:	Model No.: N/A; Supplier: T-GEE Electronic Co., Ltd.
	Adapter:	Model No.: EXM 80 5120-01 Supplier: power box

WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Avg.)	Modulation Technology
11a	5150~5250	4	12.23 dBm	OFDM
	5725-5850	5	11.73 dBm	
11n	HT20 5150~5250	4	HT: 12.22 dBm	OFDM
	HT20 5725-5850	5	HT: 11.77 dBm	
11n	HT40 5150~5250	2	HT: 10.02 dBm	OFDM
	HT40 5725-5850	2	HT: 8.61 dBm	
Antenna Designation:		PIFA Antenna, Peak Gain:1.37 dBi (5150~5250MHz) 2.79 dBi (5725~5850MHz)		
Modulation type		64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only		
Transition Rate:		802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 144.4Mbps 802.11 n_40MHz: 13.5 – 300Mbps		

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules

FCC KDB 644545 D03 Guidance for IEEE 802.11ac

ANSI C63.10:2013

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

1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd.,
Guishan District, Taoyuan City, Taiwan 333 (TAF code 0513)

FCC Registration Numbers are: 735305

1.4 Special Accessories

There are no special accessories used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 Conducted Emissions

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

2.3.2 Radiated Emissions

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

2.4 Measurement Results Explanation Example

For all conducted test items:

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

Note:

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

Offset = RF cable loss (0.8dB) + attenuation factor (10dB) = 10.8(dB)

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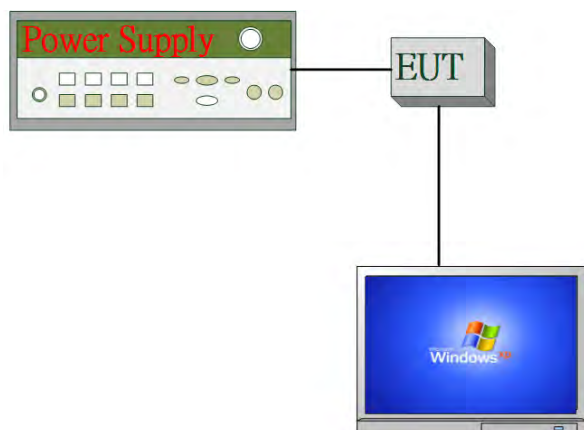
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2.5 Configuration of T ested System

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



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

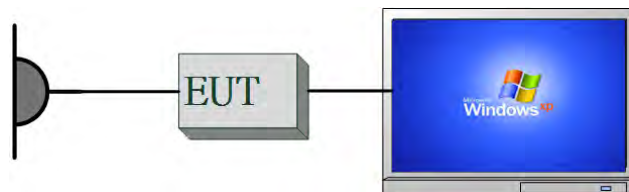


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1	Notebook	Qisda	DHR700	9HK7101T02616 00025DHR700	Shielded	Unshielded
2	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
3.	DC Power Supply	Agilent	E3640A	MY53140006	N/A	Unshielded

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3 SUMMARY OF TEST RESULT

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

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4 DESCRIPTION OF TEST MODES

4.1 Operated in U-NII Bands

Operated band in 5150 MHz ~5250 MHz:

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

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

Operated band in 5725 MHz ~5850 MHz:

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

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

4.2 The Worst Test Modes and Channel Details

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

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RADIATED EMISSION TEST:

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

Note:

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

ANTENNA PORT CONDUCTED MEASUREMENT:

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

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5 MEASUREMENT UNCERTAINTY

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

Radiated Spurious Emission:

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

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

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

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6 CONDUCTED EMISSION TEST

6.1 Standard Applicable

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

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

Note

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

6.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI 7	100950	12/12/2016	12/11/2017
Coaxial Cables	N/A	N30N30-1042-1 50cm	N/A	02/07/2016	02/06/2017
LISN	Schwarzbeck	NSLK 8127	8127-648	03/11/2016	03/10/2017
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.

6.3 EUT Setup

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

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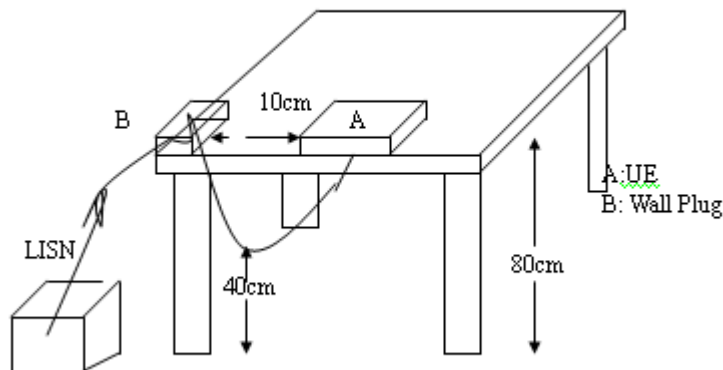
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6.4 Test SET-UP



6.5 Measurement Procedure

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

6.6 Measurement Result

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

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

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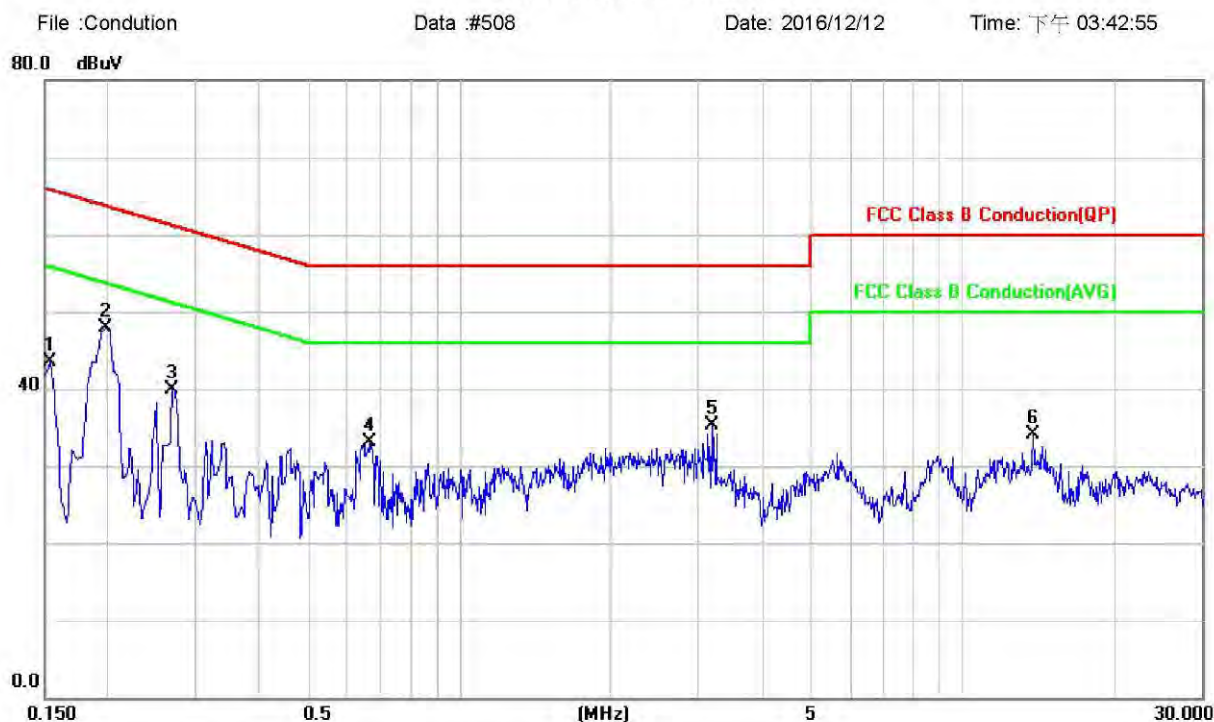
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Operation Mode:	operation mode	Test By:	Jerry
Site :	Conduction Room	Phase:	L1
Limit:	FCC Class B Conduction(QP)	Power:	AC 120V/60Hz
Mode:	佳世達	Temperature:	23 °C
Note:		Humidity:	65 %

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1540	23.83	19.72	43.55	65.78	-22.23	peak	
2	*	0.1980	28.19	19.71	47.90	63.69	-15.79	peak	
3		0.2700	20.07	19.76	39.83	61.12	-21.29	peak	
4		0.6660	13.29	19.90	33.19	56.00	-22.81	peak	
5		3.1780	15.30	19.95	35.25	56.00	-20.75	peak	
6		13.8740	13.78	20.24	34.02	60.00	-25.98	peak	

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Site : Conduction Room

Phase: **N**

Temperature: 23 °C

Limit: FCC Class B Conduction(QP)

Power: AC 120V/60Hz

Humidity: 65 %

Mode: 佳世達

Note:

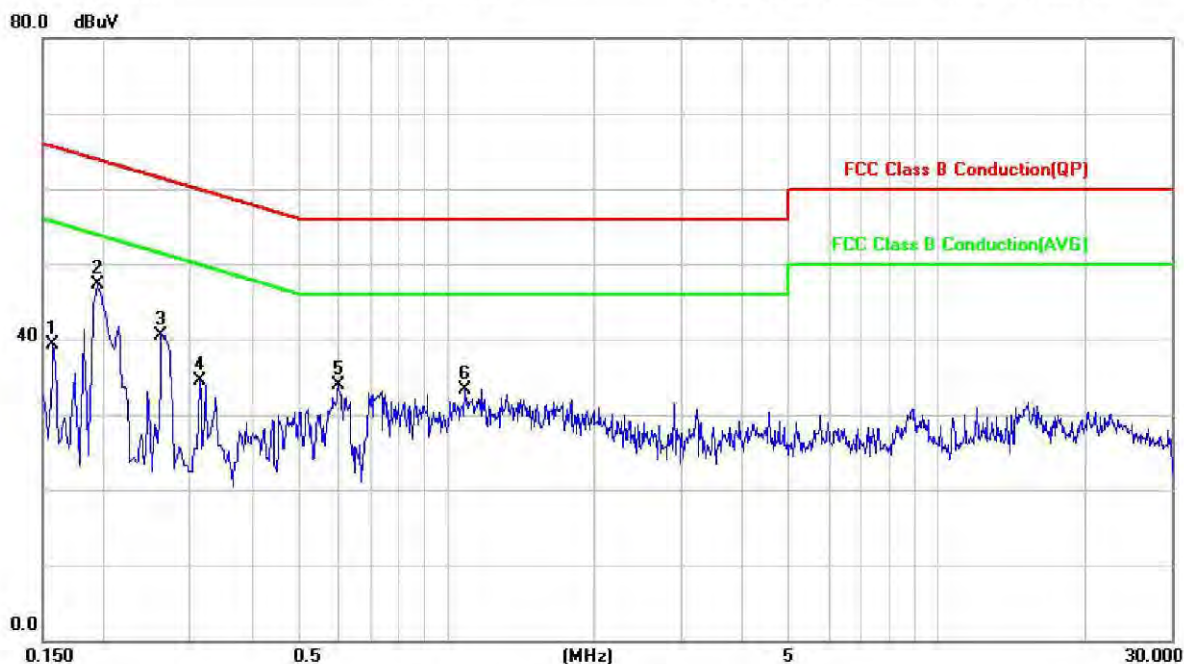
Conducted Emission

File :Conduction

Data :#509

Date: 2016/12/12

Time: 下午 03:44:01



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1580	19.50	19.73	39.23	65.57	-26.34	peak	
2	*	0.1940	27.54	19.72	47.26	63.86	-16.60	peak	
3		0.2620	20.84	19.76	40.60	61.37	-20.77	peak	
4		0.3140	14.81	19.79	34.60	59.86	-25.26	peak	
5		0.6020	14.02	19.91	33.93	56.00	-22.07	peak	
6		1.0900	13.35	19.92	33.27	56.00	-22.73	peak	

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7 DUTY CYCLE TEST SIGNAL

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

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

Formula:

$$\text{Duty Cycle} = T_{\text{on}} / (T_{\text{on}} + T_{\text{off}})$$

Measurement Procedure:

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

Duty Cycle:

Frequency	Modulation	Carrier Power	Sum Power	Ratio	Area	Line	Margin
MHz	Mod	dBm	dBm	dB	dBm	dBm	dB
1000	H	10	30	20	53	63	-13

Operation Mode :	802.11n20	Test Date :	2016/12/9
Fundamental Frequency:	5240 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal

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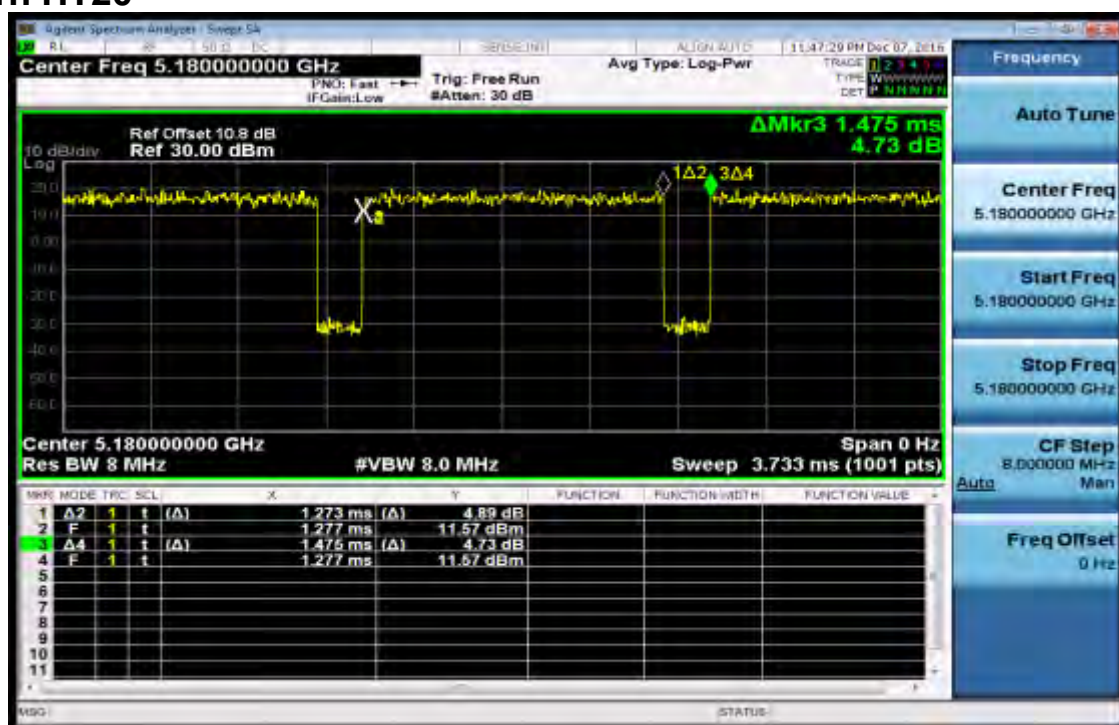
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DUTY CYCLE TEST SIGNAL Measurement Result 802.11a



802.11n HT20



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802.11n HT 40



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8 26DB & 6DB EMISSION BANDWIDTH MEASUREMENT

8.1 Standard Applicable

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

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

8.2 Measurement Procedure

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

8.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
DC Block	PASTERNAK	PE8210	RF29	12/13/2015	12/12/2016
Attenuator	WOKEN	218FS-10	RF23	12/13/2015	12/12/2016
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017

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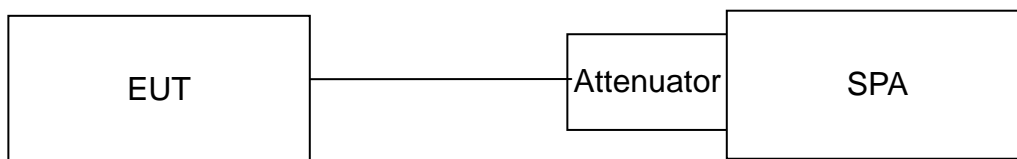
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8.4 Test Set-up



8.5 Measurement Result

26dB and 6dB Bandwidth

802.11a_Main

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	21.79	13.383
5220	22.56	13.533
5240	23.51	13.713

802.11a_Main

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.39	12.146
5785	16.38	12.143
5825	16.37	12.140

802.11a_Main

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.52	< 5250
5745	5736.60	> 5725

802.11n_HT20_Main

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.58	13.537
5220	22.28	13.479
5240	25.47	14.060

802.11n_HT20_Main

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.62	12.460
5785	16.95	12.292
5825	17.29	12.378

802.11n_HT20_Main

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5249.03	< 5250
5745	5736.12	> 5725

802.11n_HT40_Main

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	43.22	16.357
5230	44.23	16.457

802.11n_HT40_Main

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.19	15.464
5795	35.29	15.477

802.11n_HT40_Main

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.10	< 5250
5755	5736.90	> 5725

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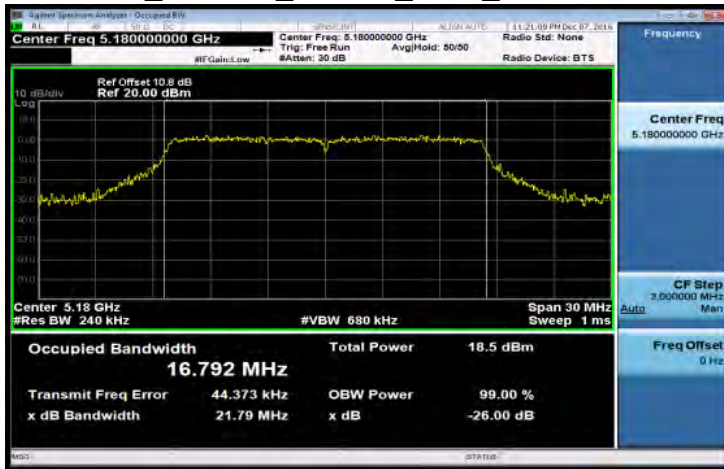
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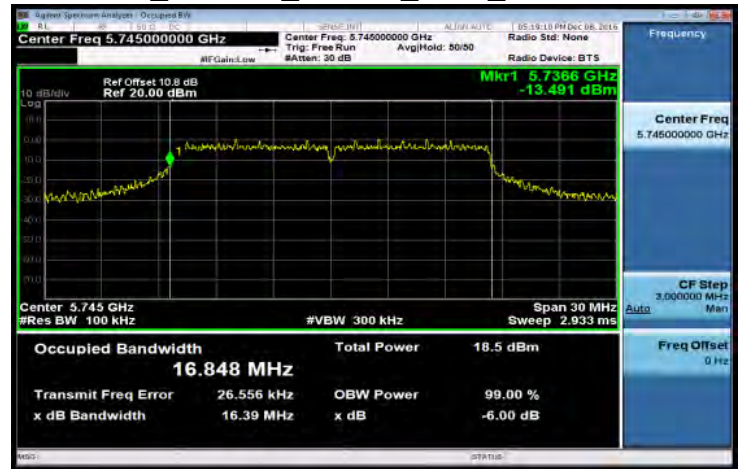
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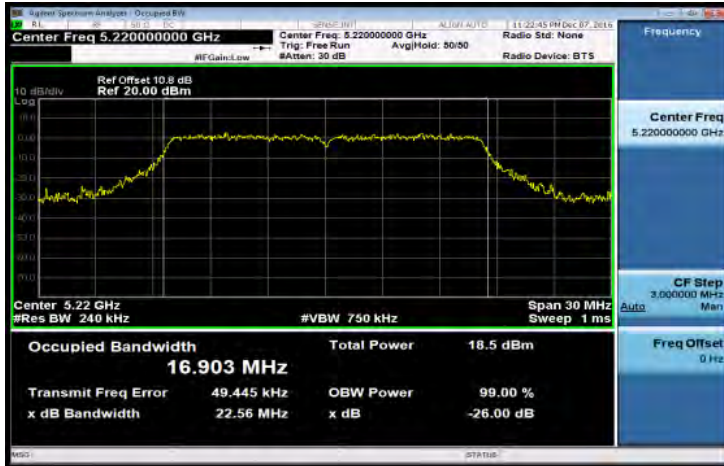
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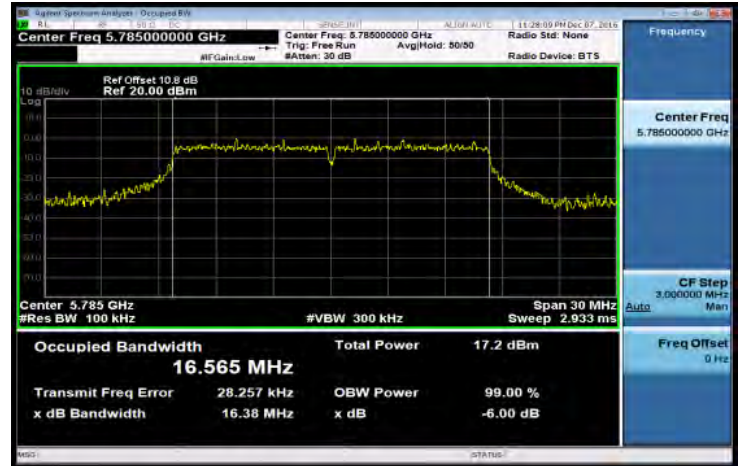
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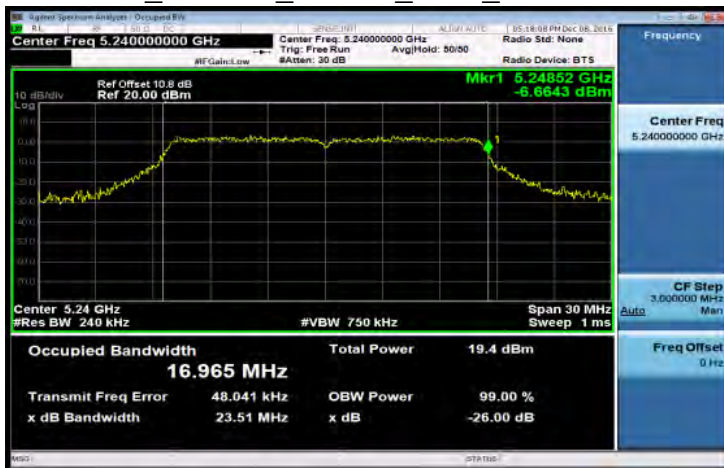
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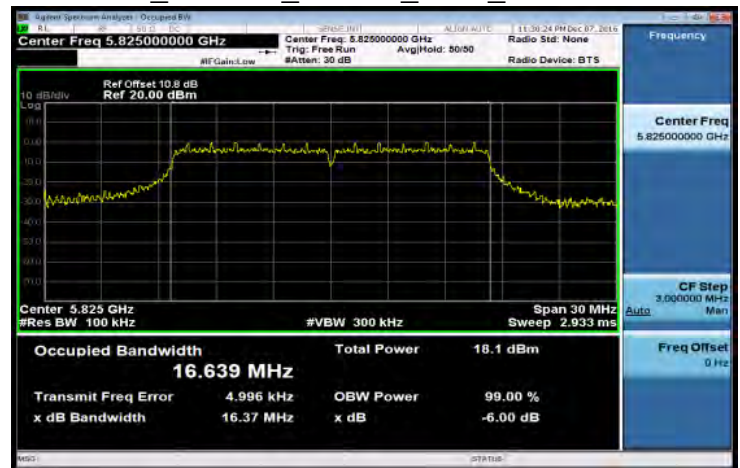
FCC_802.11a_20MHz_Main_5785MHz



FCC_802.11a_20MHz_Main_5240MHz



FCC_802.11a_20MHz_Main_5825MHz



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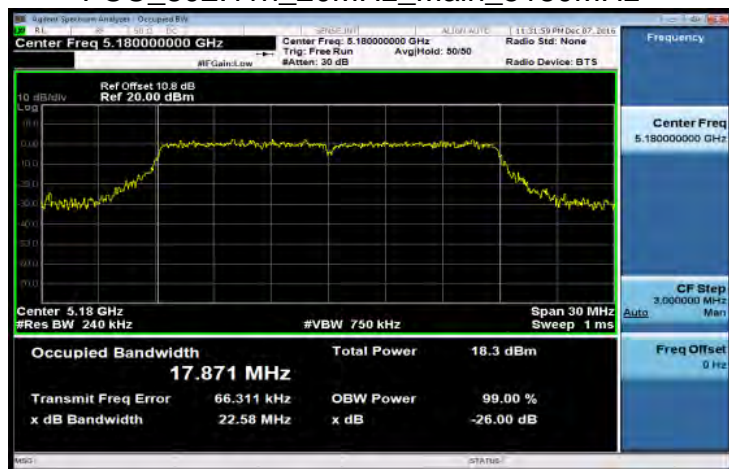
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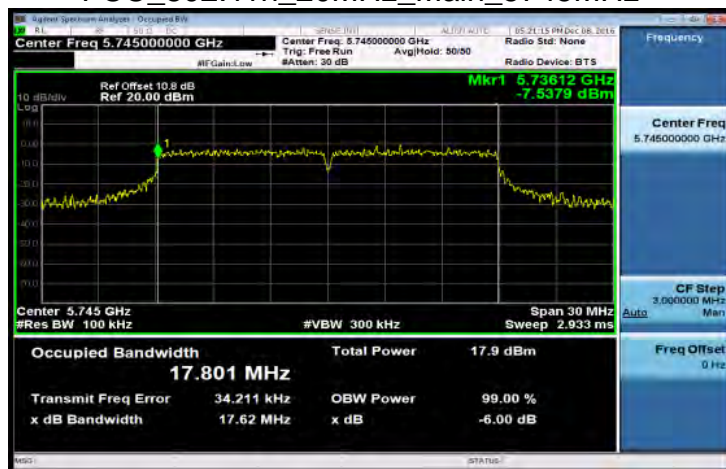
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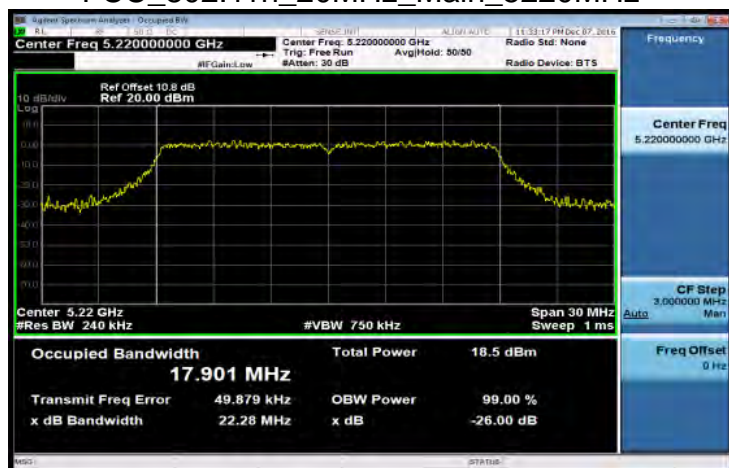
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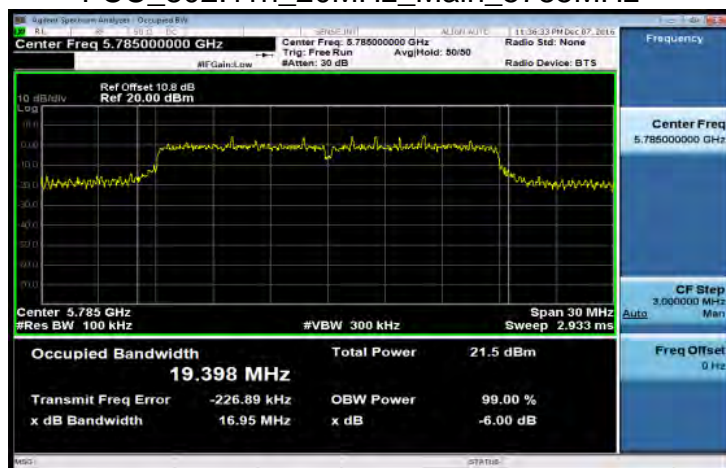
FCC_802.11n_20MHz_Main_5745MHz



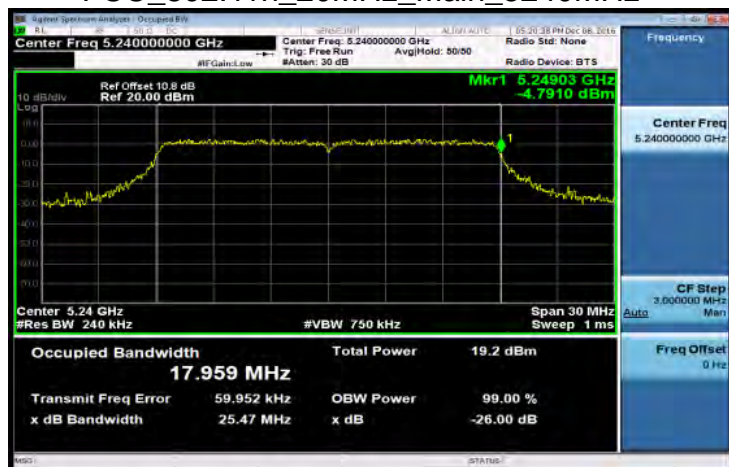
FCC_802.11n_20MHz_Main_5220MHz



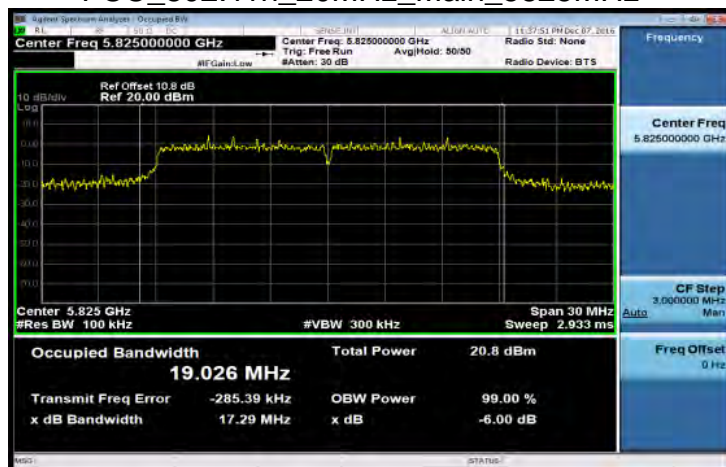
FCC_802.11n_20MHz_Main_5785MHz



FCC_802.11n_20MHz_Main_5240MHz



FCC_802.11n_20MHz_Main_5825MHz



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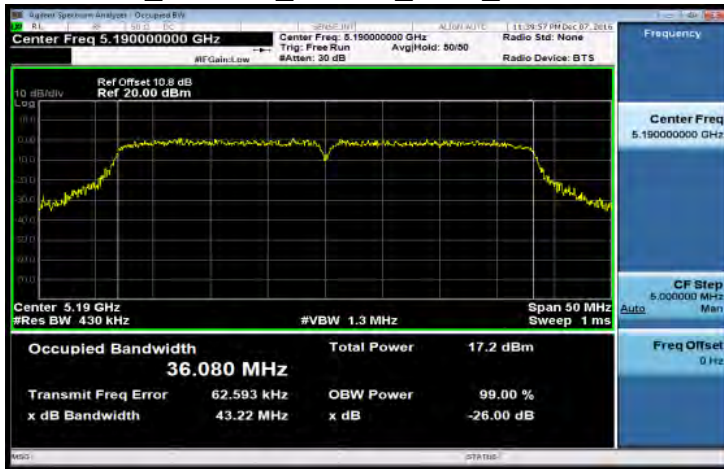
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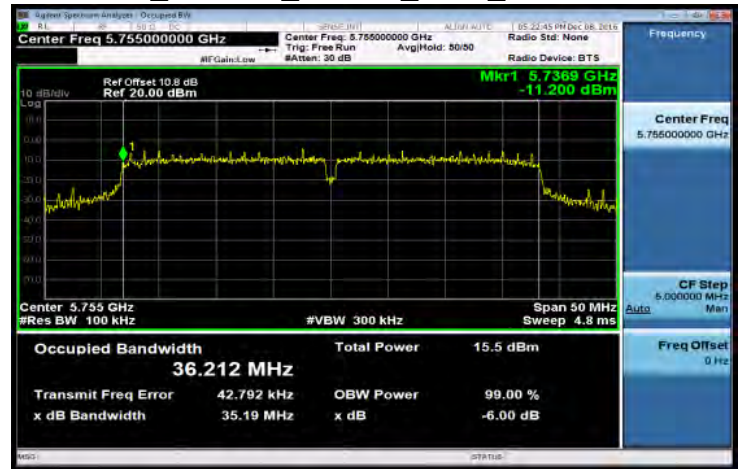
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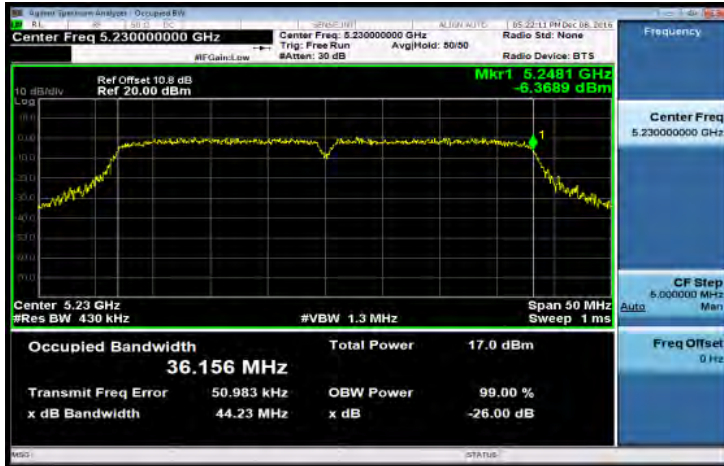
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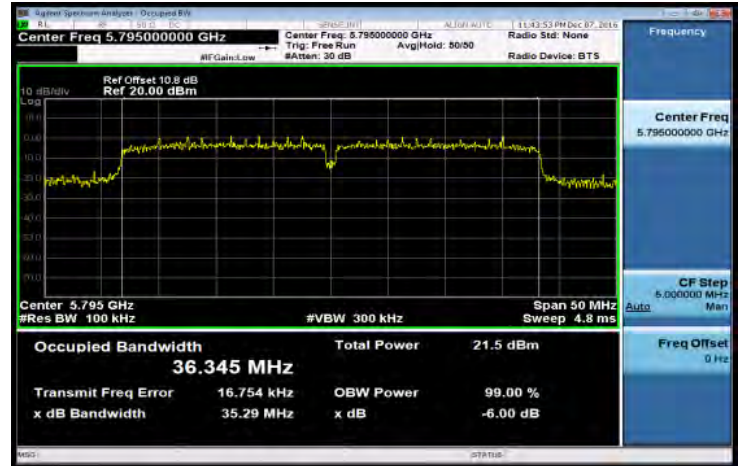
FCC_802.11n_40MHz_Main_5755MHz



FCC_802.11n_40MHz_Main_5230MHz



FCC_802.11n_40MHz_Main_5795MHz



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9 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

9.1 Standard Applicable

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

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

9.2 Measurement Procedure

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

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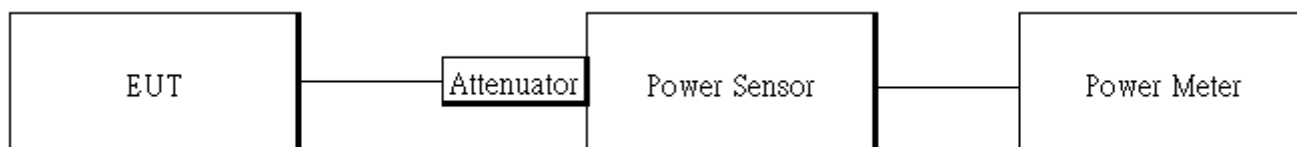
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9.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equip-ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Power Meter	Anritsu	ML2496A	1326001	06/23/2016	06/22/2017
Power Sensor	Anritsu	MA2411B	1315048	06/23/2016	06/22/2017
Power Sensor	Anritsu	MA2411B	1315049	06/23/2016	06/22/2017
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/13/2015	12/12/2016
DC Block	PASTERNAK	PE8210	RF29	12/13/2015	12/12/2016
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/13/2015	12/12/2016
Attenuator	WOKEN	218FS-10	RF23	12/13/2015	12/12/2016
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017

9.4 Test Set-up



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9.5 Measurement Result

Conducted output power (FCC)

802.11a_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	12.04	15.996	23.98	PASS
44	5220	MCS0	11.95	15.668	23.98	PASS
48	5240	MCS0	12.23	16.711	23.98	PASS
149	5745	MCS0	11.73	14.894	30	PASS
157	5785	MCS0	11.13	12.972	30	PASS
165	5825	MCS0	11.34	13.614	30	PASS

Frequency Modulation Data Rate Sum Power Avg Power Link Margin
 MHz dBm dBm dBm dBm dBm dBm dBm dBm
 5180 5220 5240 5745 5785 5825 5180 5220 5240 5745 5785 5825
 12.04 11.95 12.23 11.73 11.13 11.34 15.996 15.668 16.711 14.894 12.972 13.614
 23.98 23.98 23.98 30 30 30 23.98 23.98 23.98 30 30 30
 PASS PASS PASS PASS PASS PASS PASS PASS PASS PASS PASS PASS

Order No.: 821120 Test Date: 2016/12/29
 Function: Frequency 58MHz Test Item: 251002RH
 Order Ref: TCGlow Test Engineer: Aton
 EUT: H Measurement Area: H2016

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10 PEAK POWER SPECTRAL DENSITY

10.1 Standard Applicable

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

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

10.2 Measurement Procedure

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

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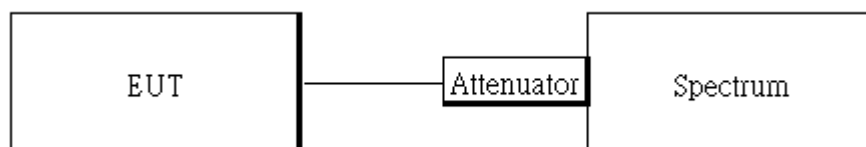
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10.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
DC Block	PASTERNAK	PE8210	RF29	12/13/2015	12/12/2016
Attenuator	WOKEN	218FS-10	RF23	12/13/2015	12/12/2016
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017

10.4 Test Set-up



10.5 Measurement Result

POWER DENSITY 802.11a MODE				POWER DENSITY 802.11n HT20 MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5180	-2.89	17	-19.89	5180	-4.18	17	-21.18
5220	-2.22	17	-19.22	5220	-4.37	17	-21.37
5240	-3.79	17	-20.79	5240	-2.28	17	-19.28
5745	5.28	30	-24.72	5745	5.53	30	-24.47
5785	4.65	30	-25.35	5785	8.26	30	-21.74
5825	4.98	30	-25.02	5825	8.13	30	-21.87

POWER DENSITY 802.11n HT40 MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5190	-12.07	17	-29.07
5230	-13.02	17	-30.02
5755	-0.04	30	-30.04
5795	5.24	30	-24.76

Note:

SISO offset= 10.8 dB

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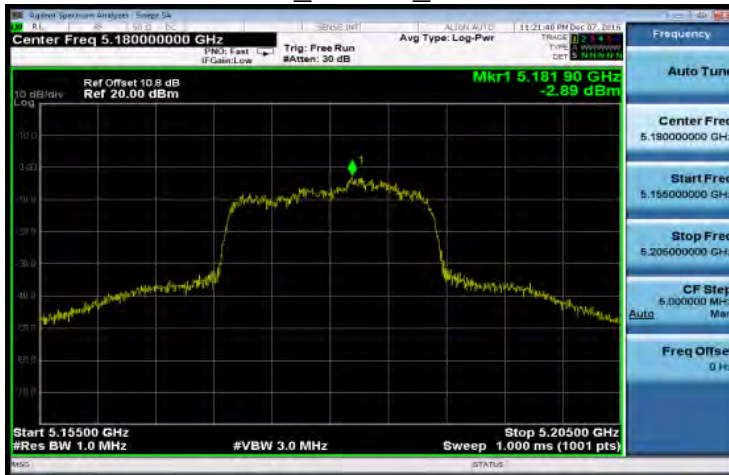
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802.11a_20MHz_5745MHz



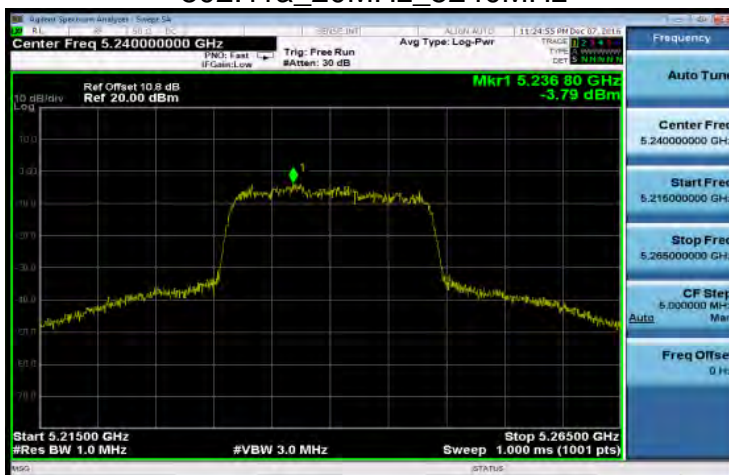
802.11a_20MHz_5220MHz



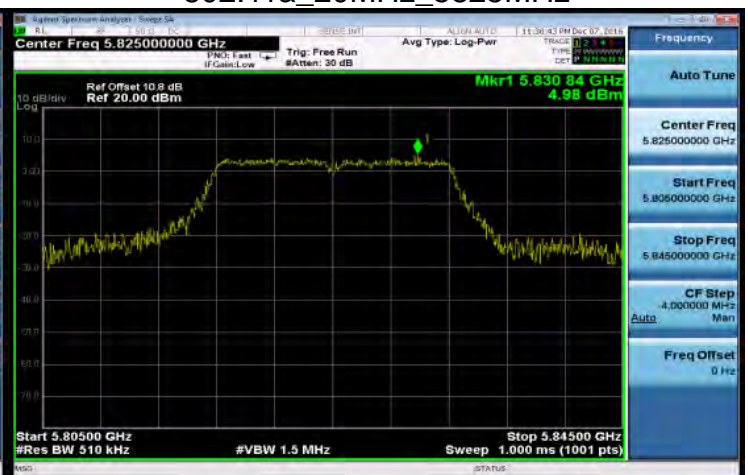
802.11a_20MHz_5785MHz



802.11a_20MHz_5240MHz



802.11a_20MHz_5825MHz



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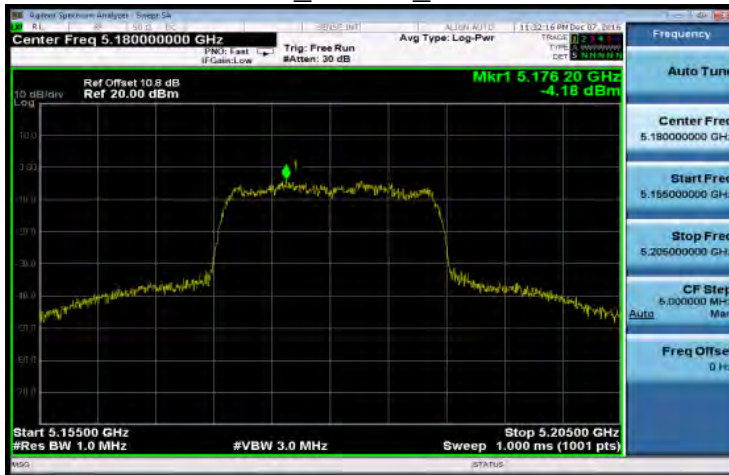
t (886-2) 2299-3279

f (886-2) 2298-0488

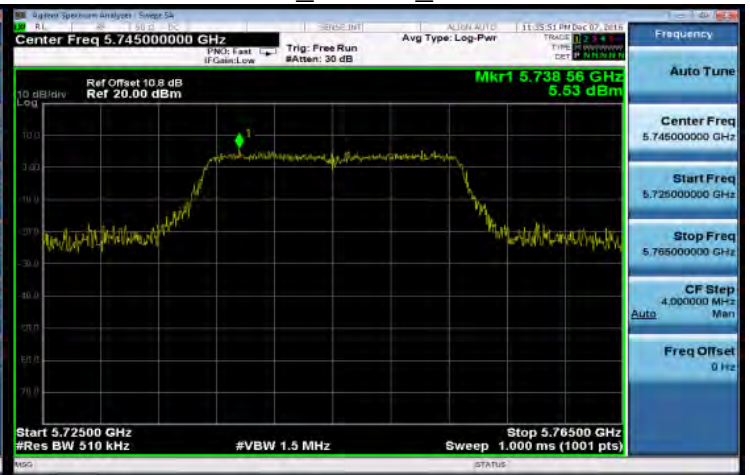
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802.11n_20MHz_5180MHz



802.11n_20MHz_5745MHz



802.11n_20MHz_5220MHz



802.11n_20MHz_5785MHz



802.11n_20MHz_5240MHz



802.11n_20MHz_5825MHz



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802.11n_40MHz_5190MHz



802.11n_40MHz_5755MHz



802.11n_40MHz_5230MHz



802.11n_40MHz_5795MHz



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11 UNDESIRABLE RADIATED EMISSION MEASUREMENT1

11.1 Standard Applicable

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

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

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

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

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

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

Note:

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

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11.2 Measurement Equipment Used

SGS SAC-III					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI Test Receiver	R&S	ESU 40	100363	04/12/2016	04/11/2017
Loop Antenna	ETS-Lindgren	6502	00143303	12/23/2015	12/22/2016
Broadband Antenna	TESEQ	CBL 6112D	35240	11/03/2016	11/02/2017
Horn Antenna	ETS-Lindgren	3117	00143272	12/16/2015	12/15/2016
Horn Antenna	Schwarzbeck	BBHA9170	185	07/24/2016	07/23/2017
Pre Amplifier	EMC Instruments	EMC330	980096	12/13/2015	12/12/2016
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/13/2015	12/12/2016
Pre Amplifier	R&S	SCU-18	10204	12/13/2015	12/12/2016
Pre Amplifier	R&S	SCU-26	100780	12/13/2015	12/12/2016
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/13/2015	12/12/2016
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/13/2015	12/12/2016
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/13/2015	12/12/2016
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/13/2015	12/12/2016
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/13/2015	12/12/2016
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/13/2015	12/12/2016
Attenuator	WOKEN	218FS-10	RF27	12/13/2015	12/12/2016
Site NSA	SGS	966 Chamber C	SAC-C	03/04/2016	03/03/2017
Site VSWR	SGS	966 Chamber C	SAC-C	03/04/2016	03/03/2017
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2016	05/03/2017
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.

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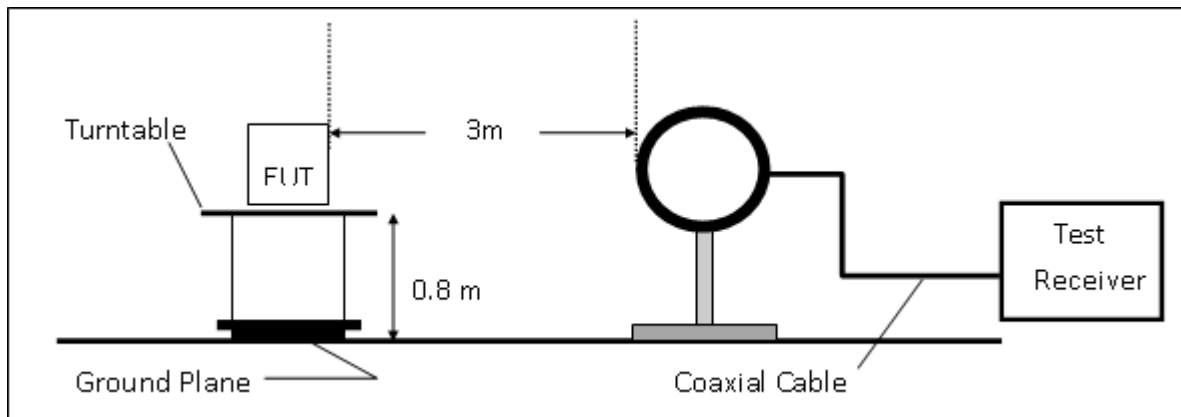
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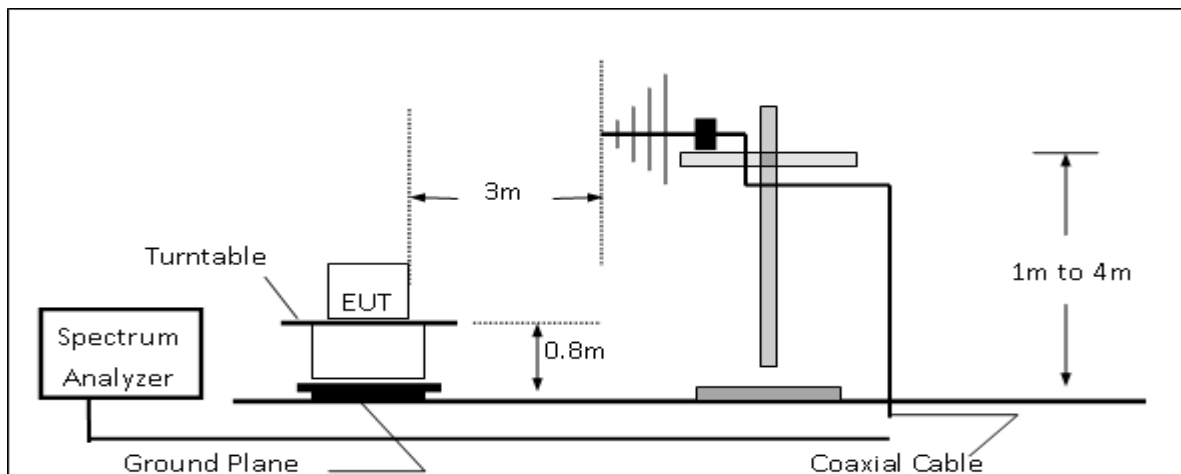
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11.3 Test SET-UP

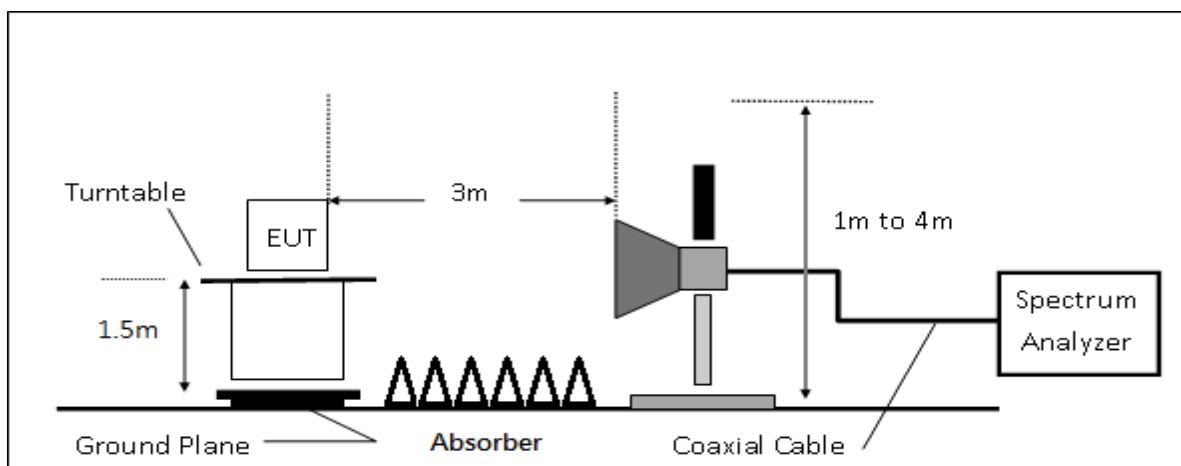
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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11.4 Measurement Procedure

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

11.5 Field Strength Calculation

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

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

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

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

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

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Note :

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

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

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

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

11.7 Measurement Result

Refer to attach tabular data sheets.

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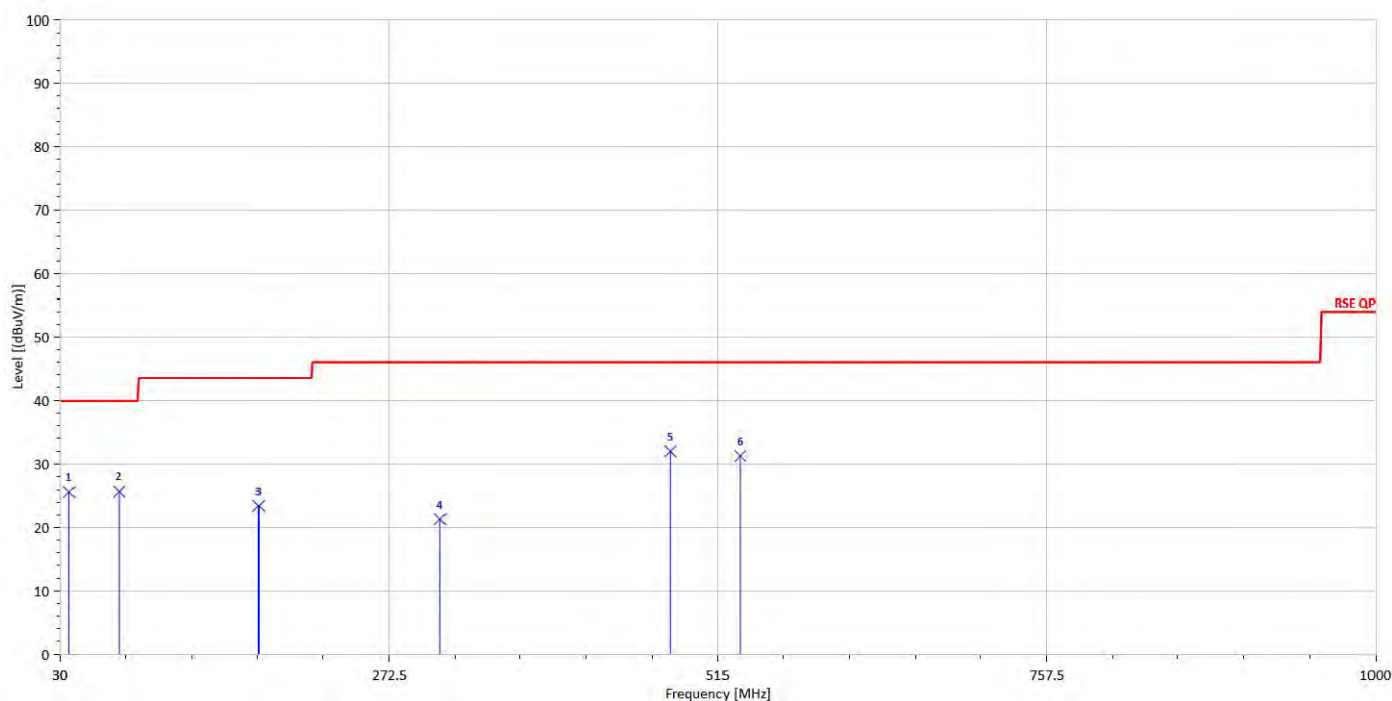
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Radiated Spurious Emission Measurement Result

Below 1GHz Worst-Case Data:

802.11a 5150~5250 MHz

Freq. MHz	Note F/H/E/S	Detector Mode P/K/Q/P/A/V	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @ 3m dBµV/m	Margin dB
5147.08	S	Peak	58.24	8.17	66.41	74	-7.59
5147.08	S	Average	36.73	8.17	44.90	54	-9.10
5150.00	E	Peak	57.62	8.19	65.81	74	-8.19
5150.00	E	Average	37.29	8.19	45.48	54	-8.52



Order No.: 821140 Test Date: 2016/11/5
 Funded Frequency: 5150 MHz Temp/Hum: 25degC/62RH
 Order Band: E2C Low Test Engineer: Aston
 EUT: H Measurement Point: Vertical

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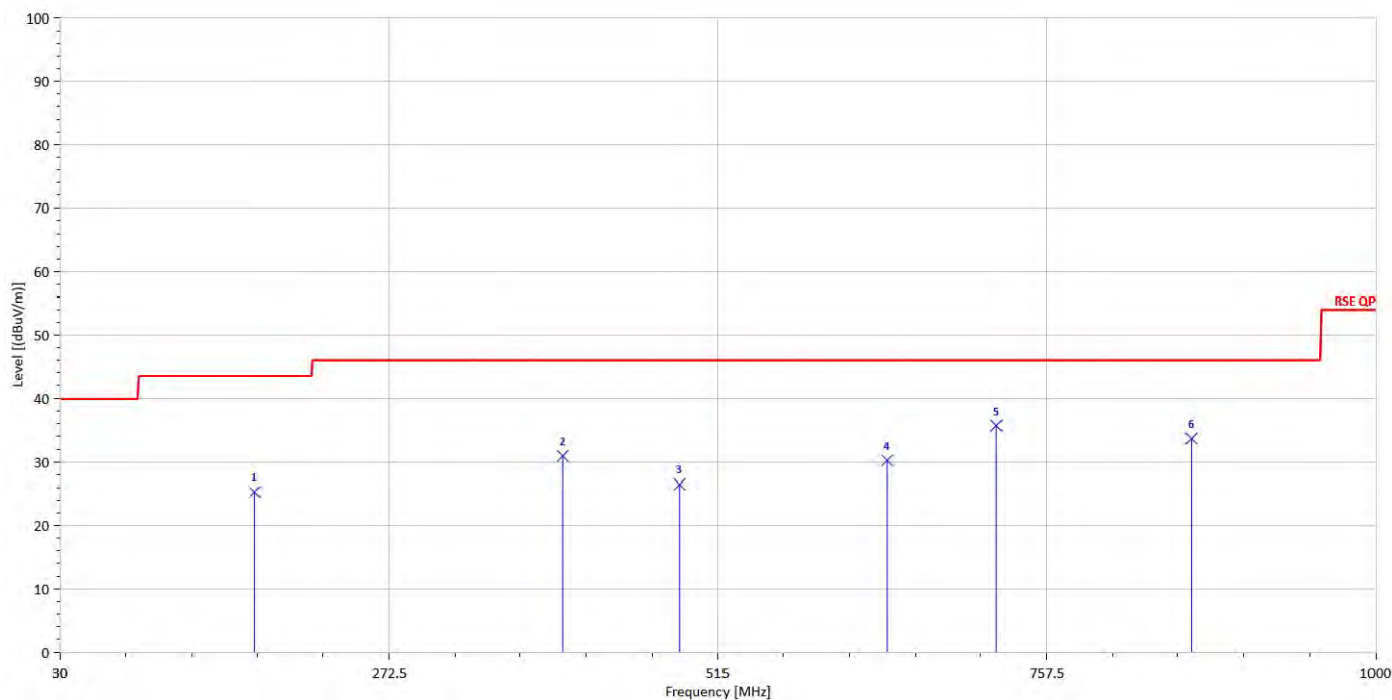
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Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	P/K/Q/P/A/V	dBμV	dB	dBμV/m	dBμV/m	dB
5850.00	E	Peak	59.49	9.49	68.97	122.23	-53.26
5851.13	S	Peak	61.25	9.51	70.76	119.665	-48.91
5855.00	S	Peak	53.57	9.58	63.15	110.83	-47.68
5856.38	S	Peak	54.22	9.61	63.83	110.445	-46.62
5875.00	S	Peak	47.30	9.63	56.93	105.23	-48.30
5925.00	S	Peak	47.66	10.01	57.67	68.23	-10.56



Order No.: 821120 **Test Date:** 2016/12/27
Frequency: 5855MHz **Temp/Hum:** 25degC/62RH
Order Ref: EEC-High **Test Engineer:** Aston
ETP: H **Measurement Ref:** H0201

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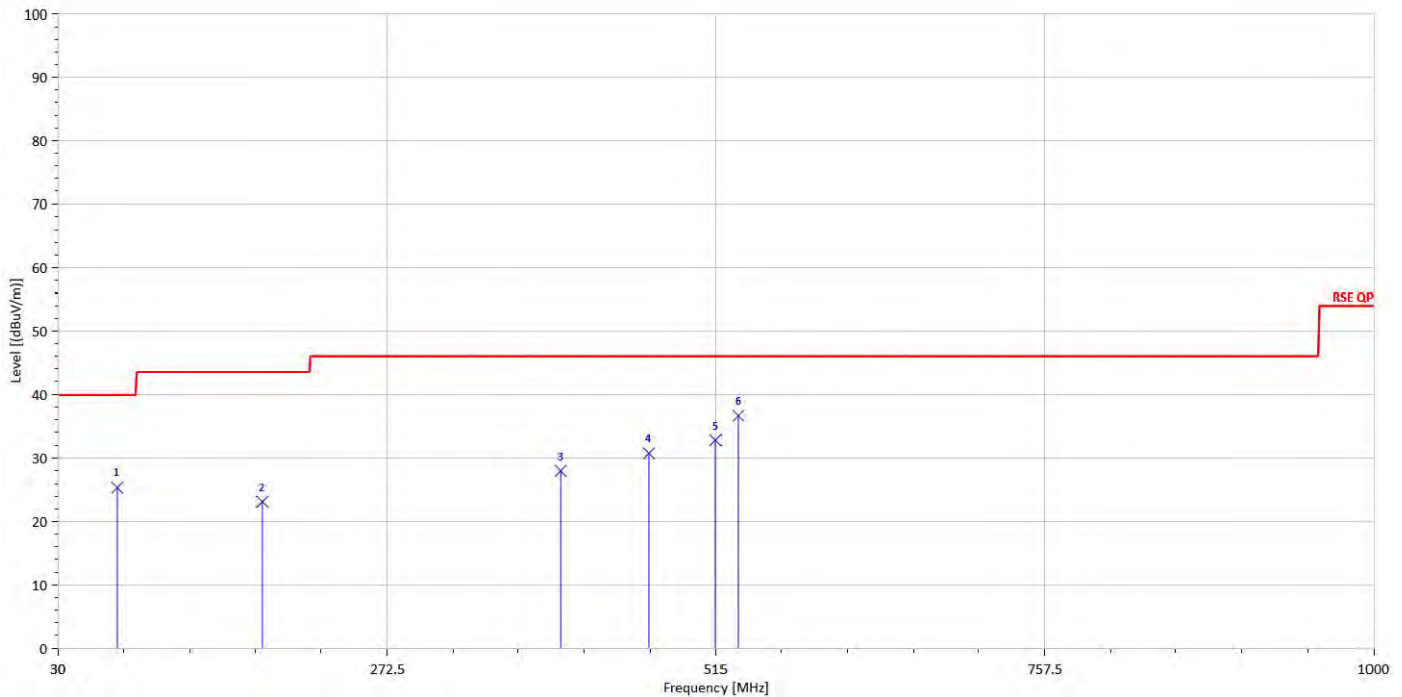
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802.11a, 5725~5850 MHz

Freq. M H z	Note F / H / E / S	D e t e c t o r M o d e P K / Q P / A V	S p e c t r u m R e a d i n g L e v e l d B μ V	F a c t o r d B	A c t u a l F S d B μ V / m	L i m i t @ 3 m d B μ V / m	M a r g i n d B
5 8 5 0 . 0 0	E	Peak	59.22	9.49	68.71	122.23	-53.52
5 8 5 5 . 0 0	S	Peak	53.97	9.58	63.55	110.83	-47.28
5 8 5 7 . 1 3	S	Peak	54.98	9.62	64.60	110.235	-45.63
5 8 7 5 . 0 0	S	Peak	46.69	9.63	56.32	105.23	-48.91
5 9 2 5 . 0 0	S	Peak	47.39	10.01	57.41	68.23	-10.82



Order No.: 821120 Test Date: 2016/12/7
 Funded Frequency: 5825 MHz Test Item: 251dBm/20MHz
 Order Band: E2C High Test Engineer: Aston
 EUT: H Measurement Method: Vivald

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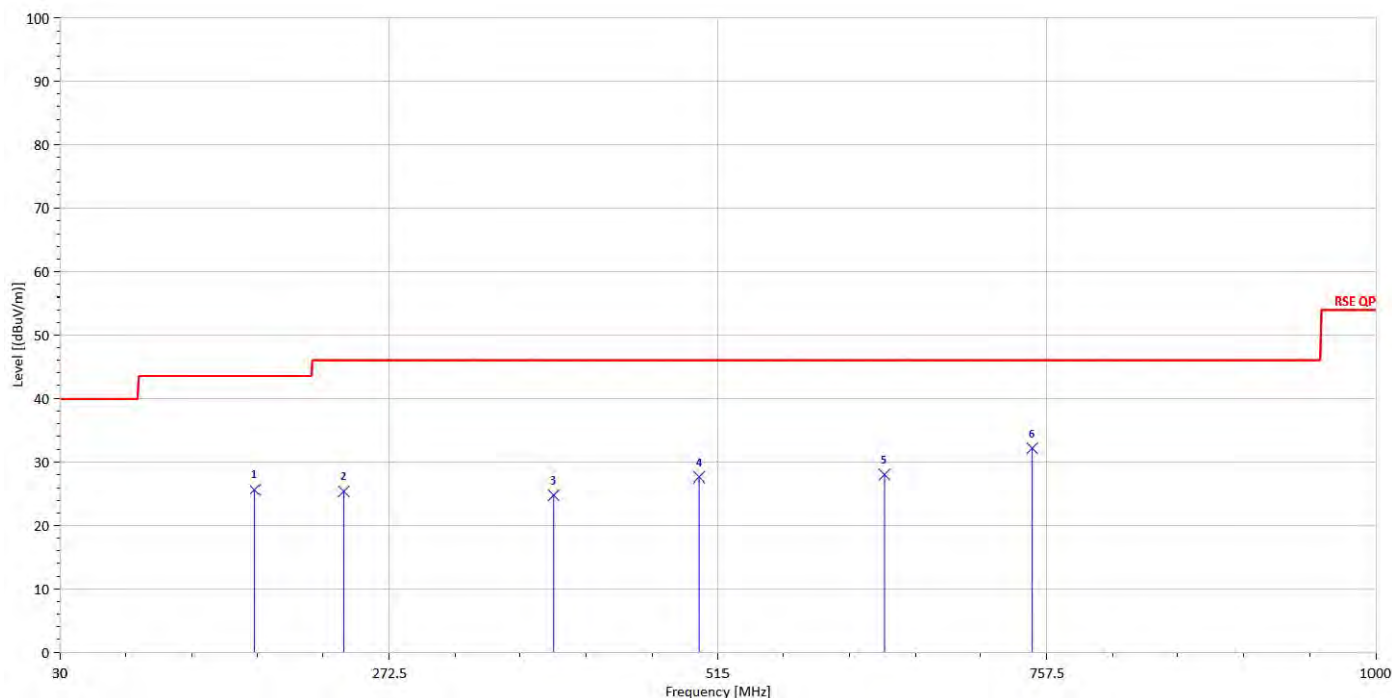
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Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@ 3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
5350.00	E	Peak	47.74	8.96	56.70	74	-17.30
5350.00	E	Average	36.09	8.96	45.05	54	-8.95



Order No.: 821120 **Test Date:** 2016/11/5
Final test Frequency: 520MHz **Temp/Hum:** 25degC/62RH
Order Part: ECHigh **Test Engineer:** Aston
ETP#: H **Measurement Area:** Horizontal

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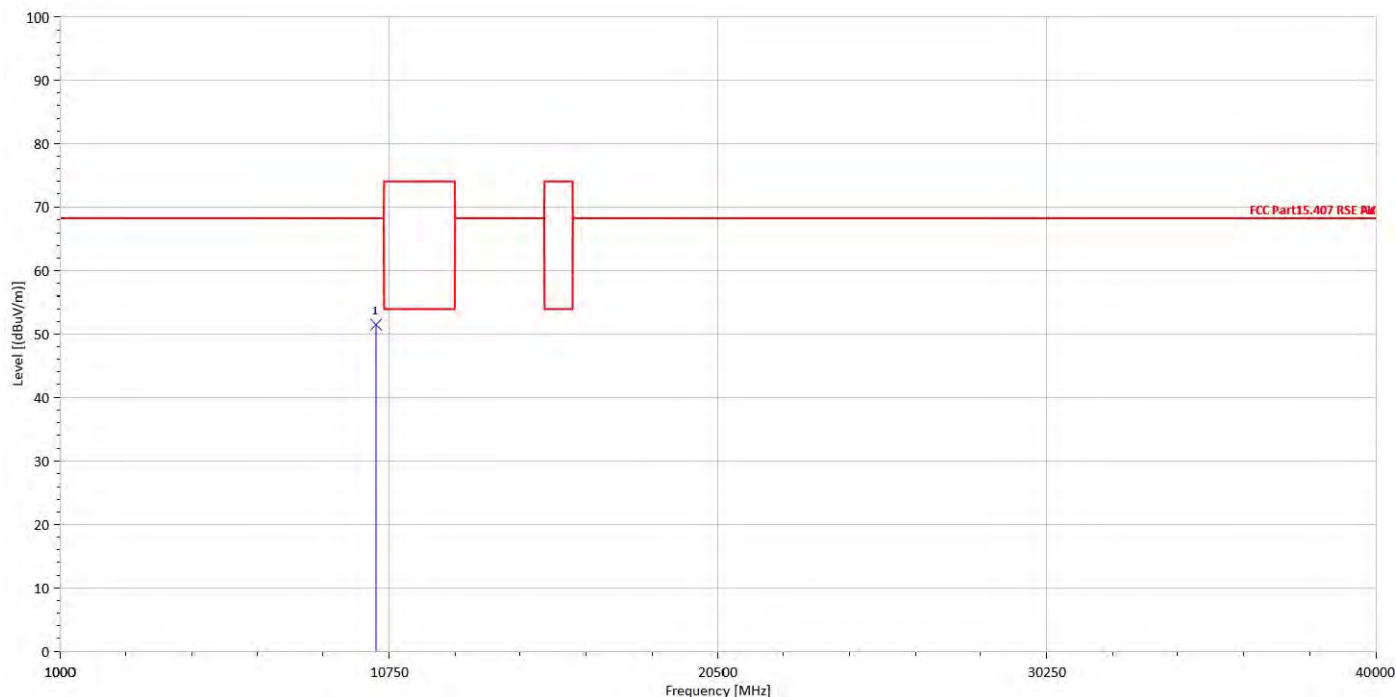
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Above 1GHz Worst-Case Data:

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

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @ 3m dB μ V/m	Margin dB
5350.00	E	Peak	47.77	8.96	56.74	74	-17.26
5350.00	E	Average	35.15	8.96	44.11	54	-9.89



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @ 3m dB μ V/m	Margin dB
5650.00	S	Peak	46.95	9.33	56.28	68.23	-11.95
5700.00	S	Peak	46.39	9.44	55.83	105.23	-49.40
5717.60	S	Peak	60.64	9.27	69.91	110.158	-40.25
5720.00	S	Peak	61.38	9.28	70.67	110.83	-40.16
5722.11	S	Peak	70.24	9.29	79.53	115.6405	-36.11
5725.00	E	Peak	67.59	9.30	76.89	122.23	-45.34

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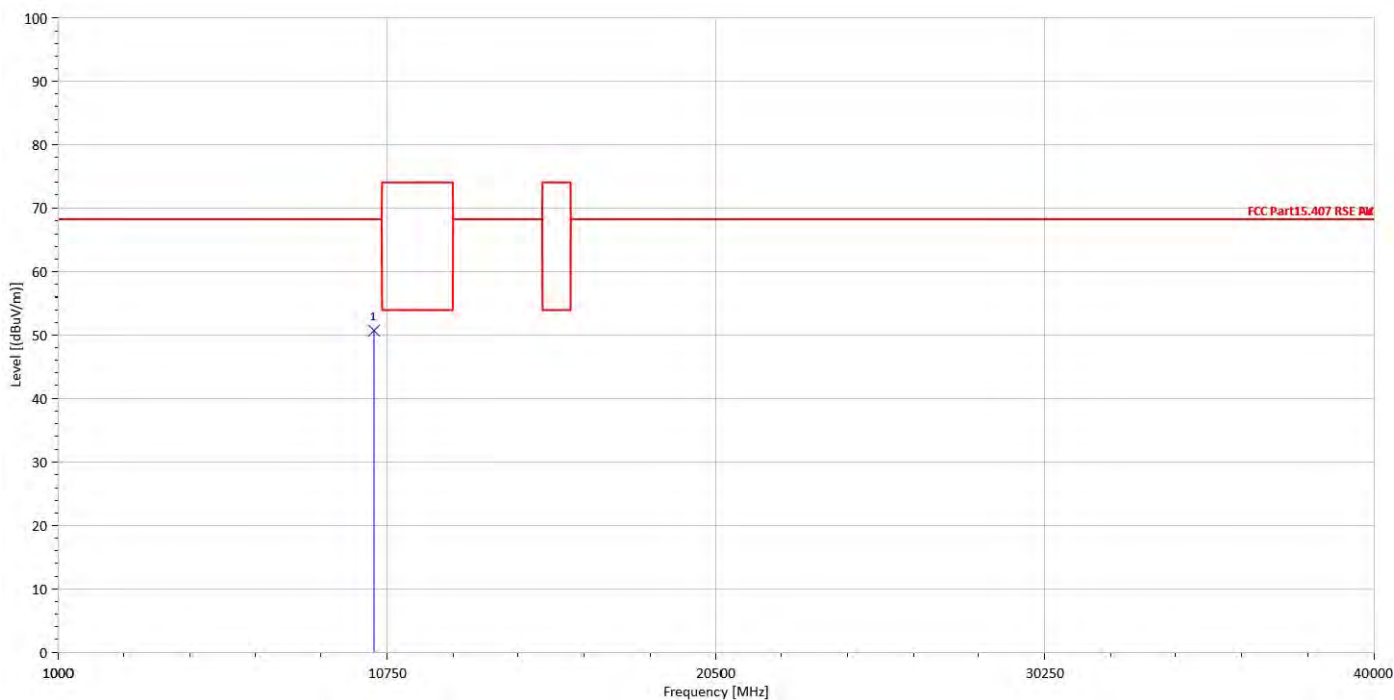
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Operation Mode : 802.11n20 Test Date : 2016/12/7
 Fundamental Frequency : 5745 MHz Temp. / Humi. : 25.1 deg_C/62 RH
 Operation Band : BE CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	P/K/Q/P/A/V	dBμV	dB	dBμV/m	dBμV/m	dB
5650.00	S	Peak	46.84	9.33	56.17	68.23	-12.06
5700.00	S	Peak	46.80	9.44	56.23	105.23	-49.00
5716.50	S	Peak	63.27	9.27	72.54	109.85	-37.31
5720.00	S	Peak	61.54	9.28	70.82	110.83	-40.01
5724.53	S	Peak	70.78	9.30	80.08	121.1579	-41.08
5725.00	E	Peak	70.25	9.30	79.55	122.23	-42.68

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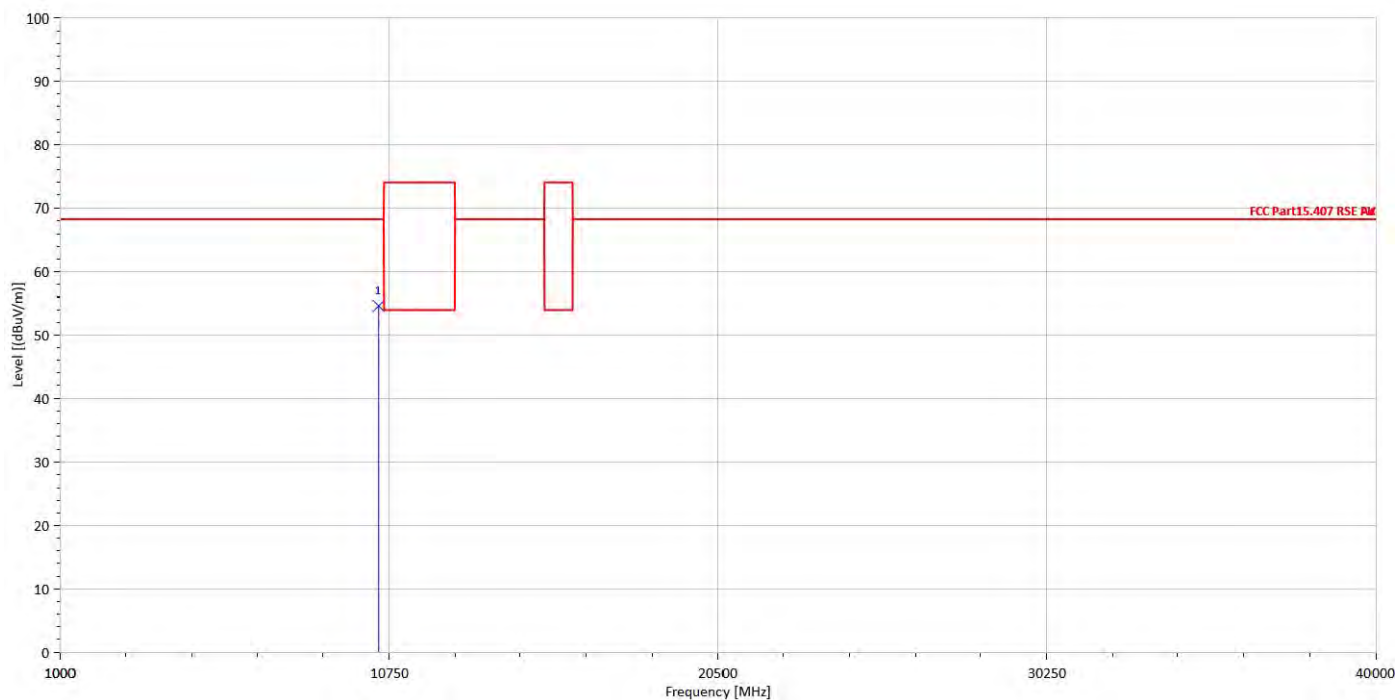
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Operation Mode :	802.11n20	Test Date :	2016/12/7
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Peak	48.66	8.19	56.85	74	-17.15
5150.00	E	Average	35.79	8.19	43.98	54	-10.02

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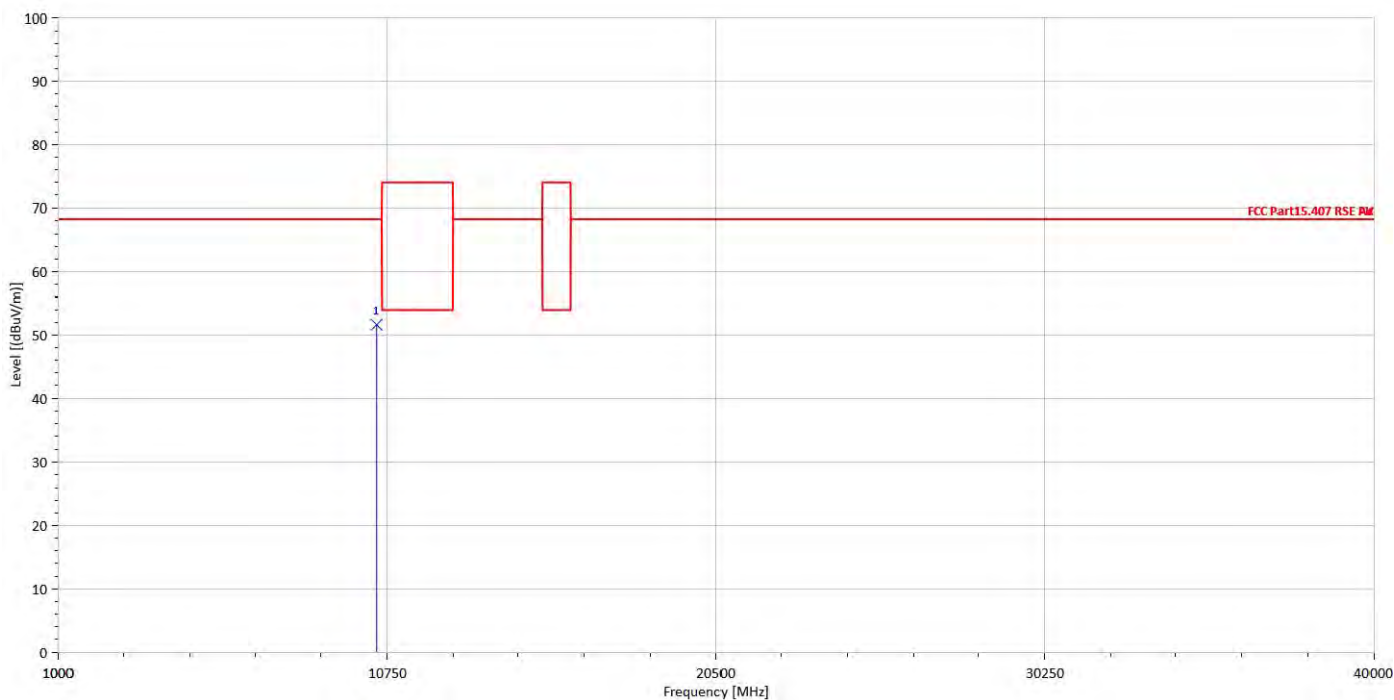
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Operation Mode :	802.11n20	Test Date :	2016/11/5
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Peak	49.58	8.19	57.77	74	-16.23
5150.00	E	Average	35.69	8.19	43.88	54	-10.12

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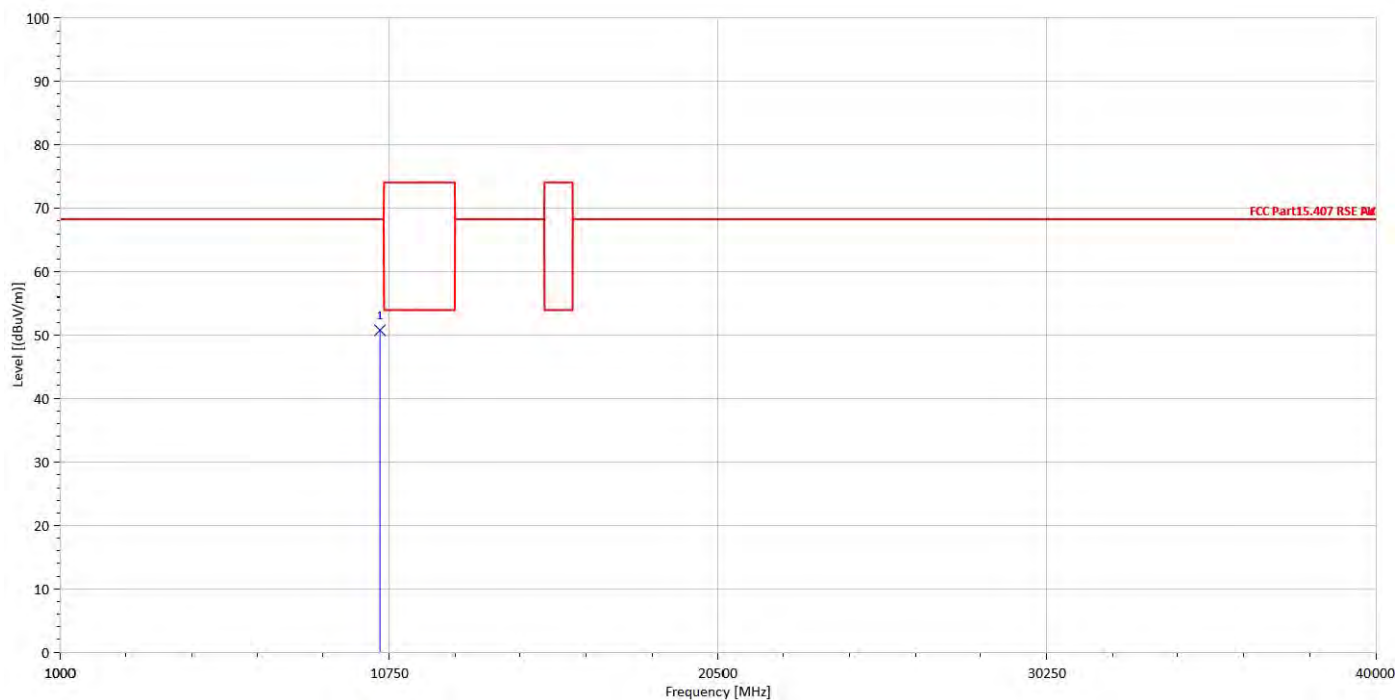
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Operation Mode :	802.11n20	Test Date :	2016/11/5
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Operation Mode :	802.11a	Test Date :	2016/12/7
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal

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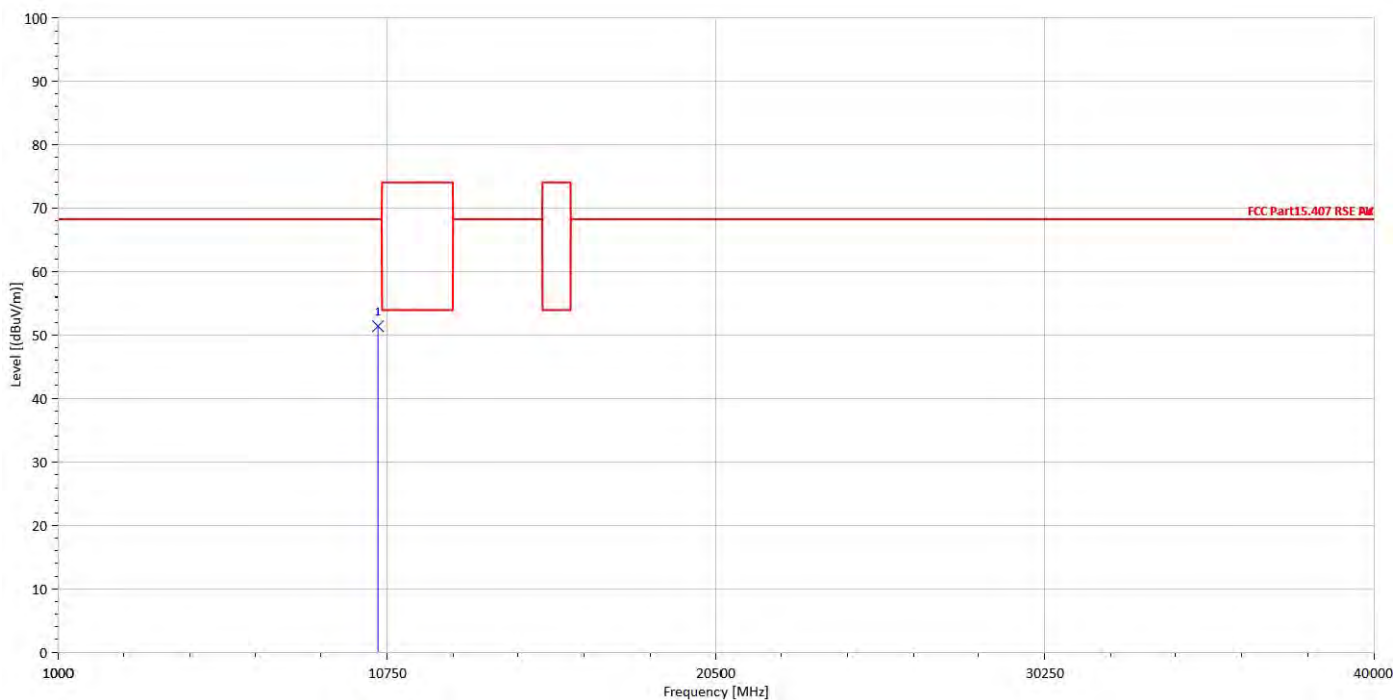
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Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	P/K/Q/P/A/V	dBμV	dB	dBμV/m	dBμV/m	dB
5850.00	E	Peak	54.18	9.49	63.67	122.23	-58.56
5850.50	S	Peak	57.27	9.50	66.76	121.09	-54.33
5855.00	S	Peak	51.60	9.58	61.18	110.83	-49.65
5855.88	S	Peak	54.03	9.60	63.63	110.585	-46.96
5875.00	S	Peak	47.01	9.63	56.64	105.23	-48.59
5913.25	S	Peak	49.11	9.88	58.99	76.925	-17.94
5925.00	S	Peak	47.58	10.01	57.59	68.23	-10.64



Operation Mode :	802.11a	Test Date :	2016/12/7
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical

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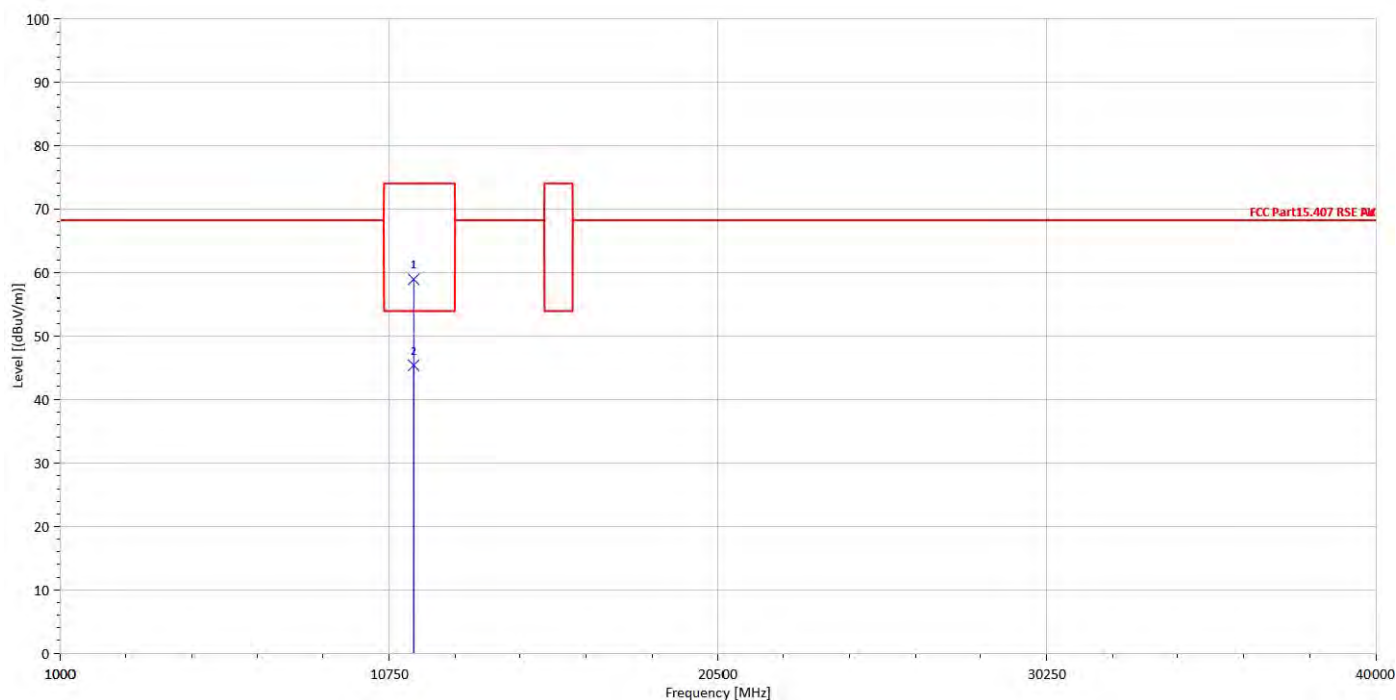
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Radiated Spurious Emission Measurement Result 802.11a, 5725~5850 MHz

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	F S	@ 3 m	dB
		P/K/Q/P/A/V	dBμV		dBμV/m	dBμV/m	
5650.00	S	Peak	46.82	9.33	56.15	68.23	-12.08
5692.96	S	Peak	48.42	9.60	58.01	100.204	-42.01
5700.00	S	Peak	46.63	9.44	56.07	105.23	-49.16
5719.91	S	Peak	59.73	9.28	69.01	110.8048	-41.80
5720.00	S	Peak	58.46	9.28	67.74	110.83	-43.09
5724.75	S	Peak	69.47	9.30	78.77	121.66	-42.89
5725.00	E	Peak	66.90	9.30	76.20	122.23	-46.03



Operation Mode : 802.11a
Fundamental Frequency : 5745 MHz
Operation Band : BE CH Low
EUT Pol. : H

Test Date : 2016/12/7
Temp. / Humi. : 25.1 deg_C/62 RH
Test Engineer : Ashton
Measurement Antenna Pol. : Horizontal

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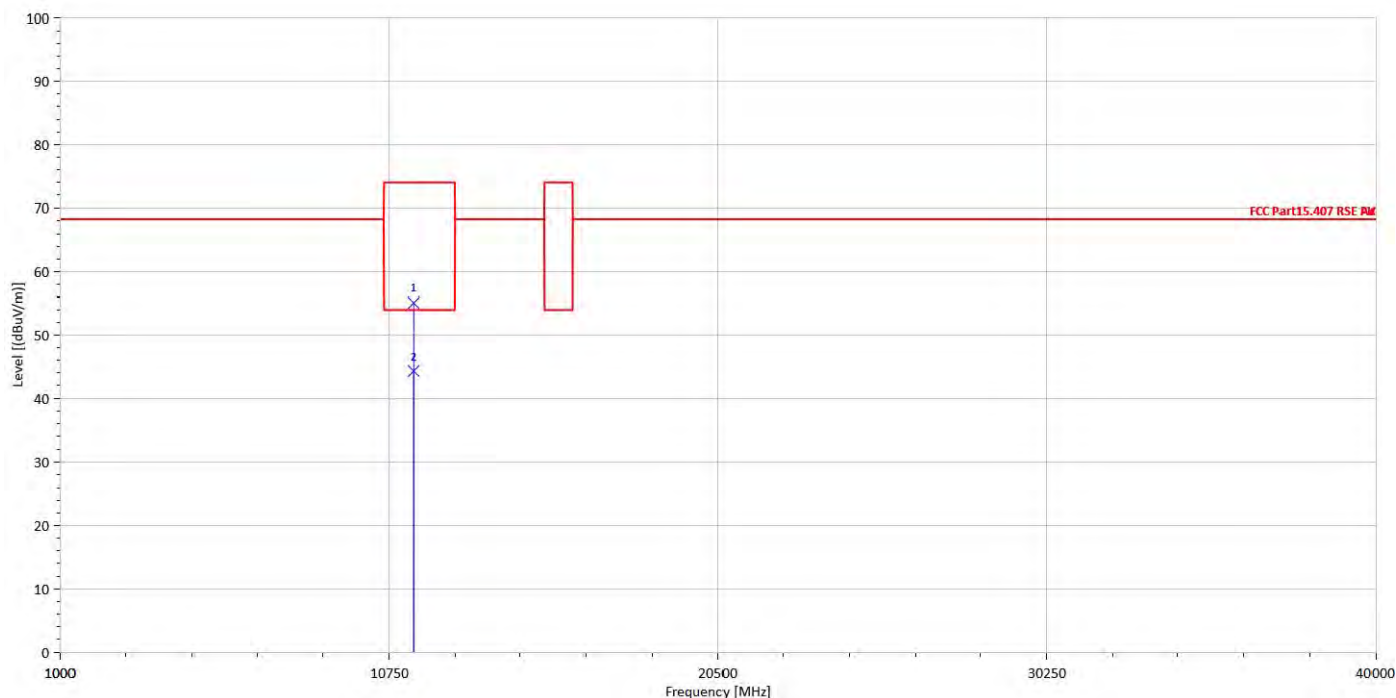
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Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5650.00	S	Peak	47.18	9.33	56.52	68.23	-11.71
5700.00	S	Peak	46.93	9.44	56.37	105.23	-48.86
5718.48	S	Peak	61.82	9.27	71.10	110.4044	-39.31
5720.00	S	Peak	58.55	9.28	67.83	110.83	-43.00
5723.65	S	Peak	69.86	9.30	79.16	119.1518	-39.99
5725.00	E	Peak	68.81	9.30	78.11	122.23	-44.12



Operation Mode : 802.11a
 Fundamental Frequency : 5745 MHz
 Operation Band : BE CH Low
 EUT Pol. : H

Test Date : 2016/12/7
 Temp. / Humi. : 25.1 deg_C/62 RH
 Test Engineer : Ashton
 Measurement Antenna Pol. : Vertical

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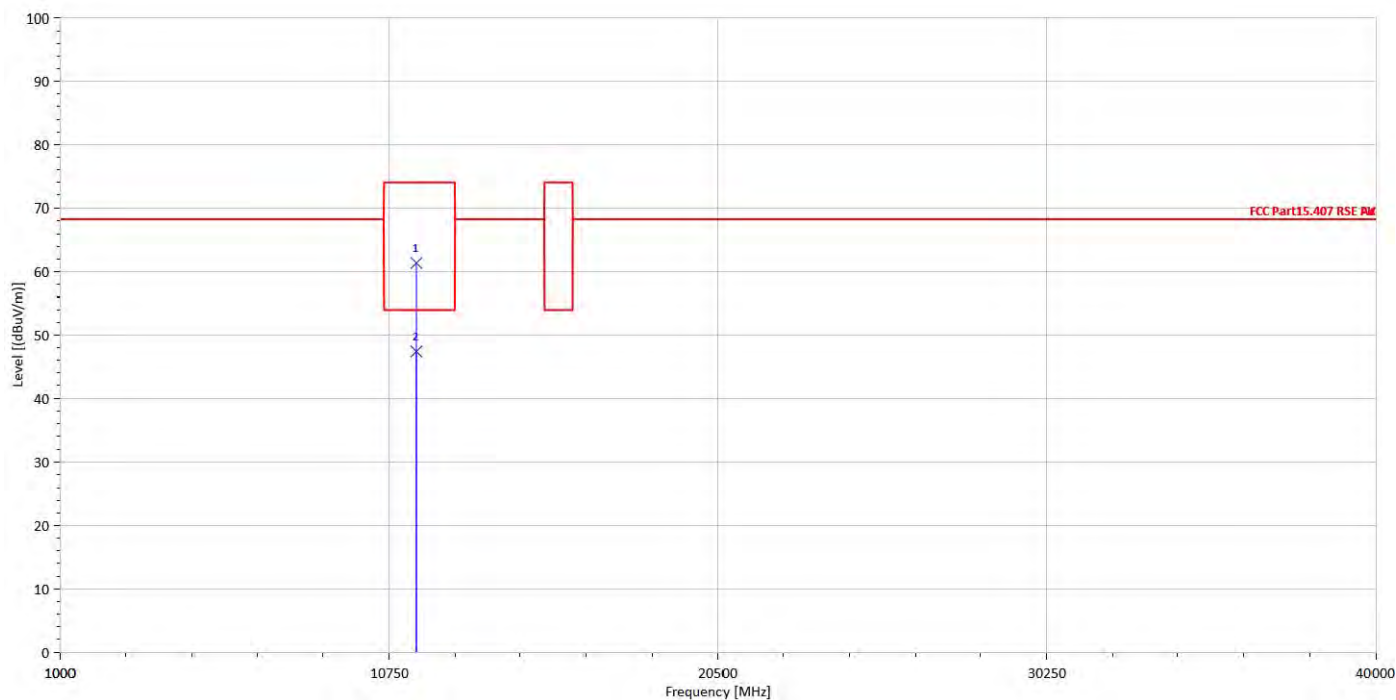
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Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
5150.00	E	Peak	50.12	8.19	58.31	74	-15.69
5150.00	E	Average	35.48	8.19	43.67	54	-10.33



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @ 3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
5149.60	S	Peak	52.33	8.19	60.52	74	-13.48
5149.60	S	Average	35.56	8.19	43.75	54	-10.25
5150.00	E	Peak	49.11	8.19	57.30	74	-16.70
5150.00	E	Average	35.58	8.19	43.77	54	-10.23

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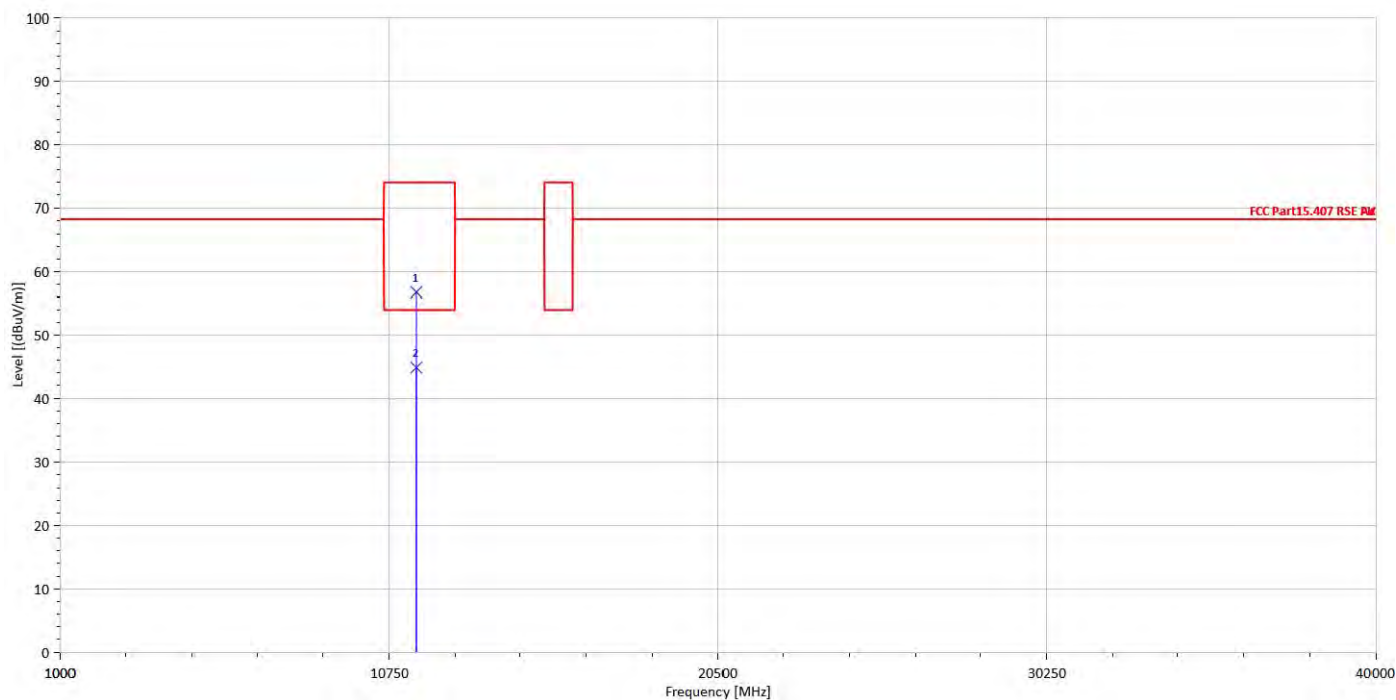
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Operation Mode :	802.11a	Test Date :	2016/11/5
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@ 3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
11570.00	H	Peak	35.27	21.44	56.72	74	-17.28
11570.00	H	Average	23.40	21.44	44.84	54	-9.16

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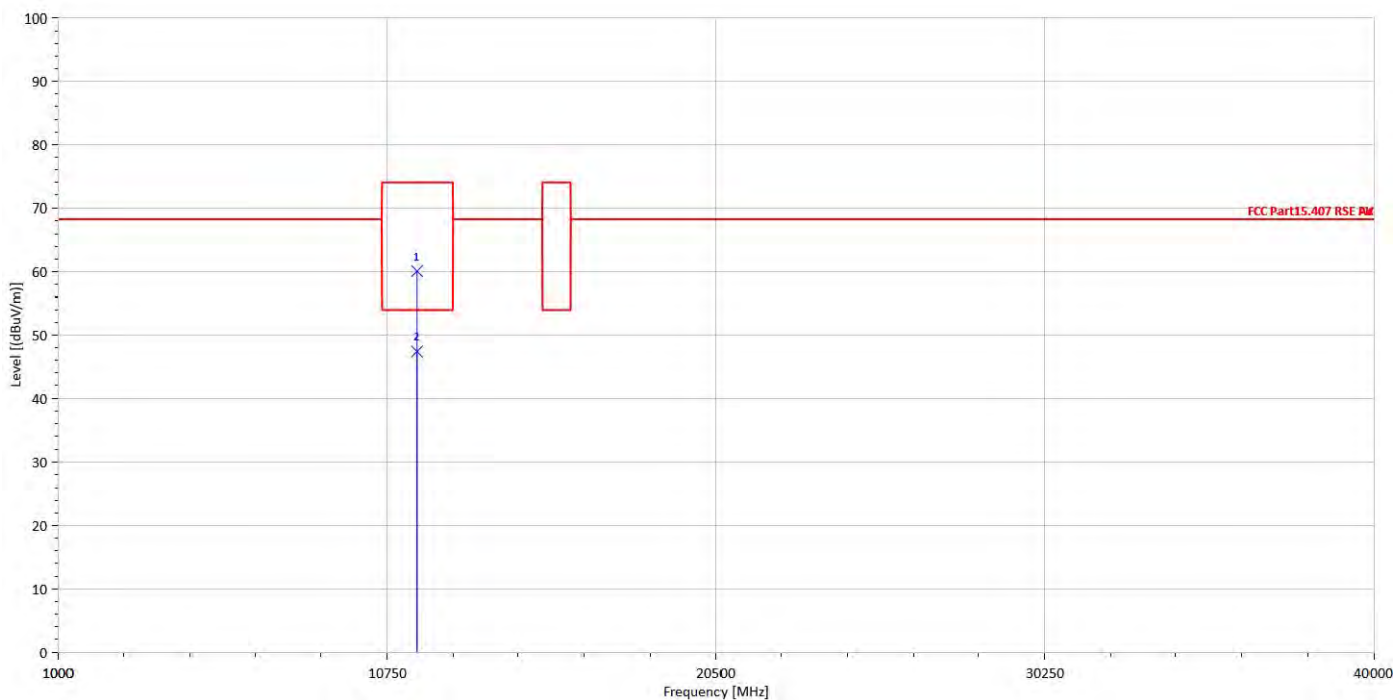
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Operation Mode :	802.11a	Test Date :	2016/12/9
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@ 3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
11650.00	H	Peak	38.03	22.02	60.05	74	-13.95
11650.00	H	Average	25.38	22.02	47.40	54	-6.60

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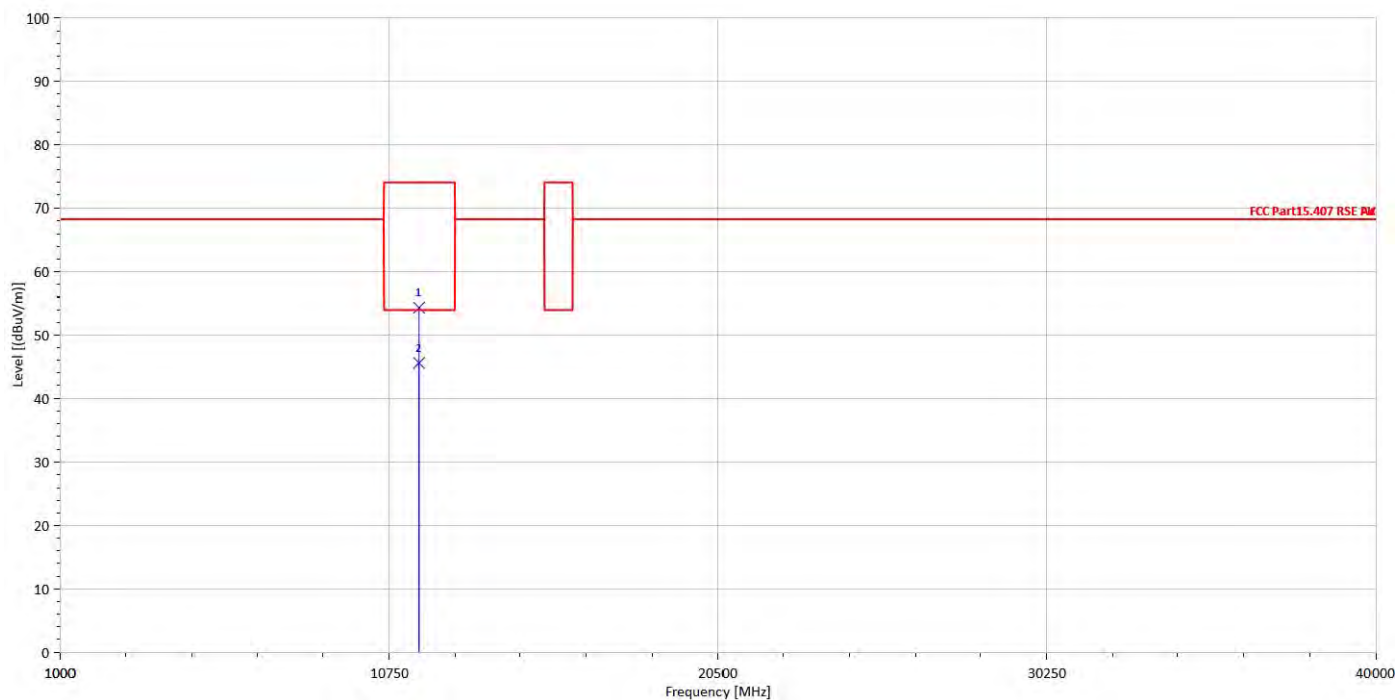
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Operation Mode :	802.11a	Test Date :	2016/12/9
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@ 3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
11650.00	H	Peak	32.35	22.02	54.37	74	-19.63
11650.00	H	Average	23.56	22.02	45.58	54	-8.42

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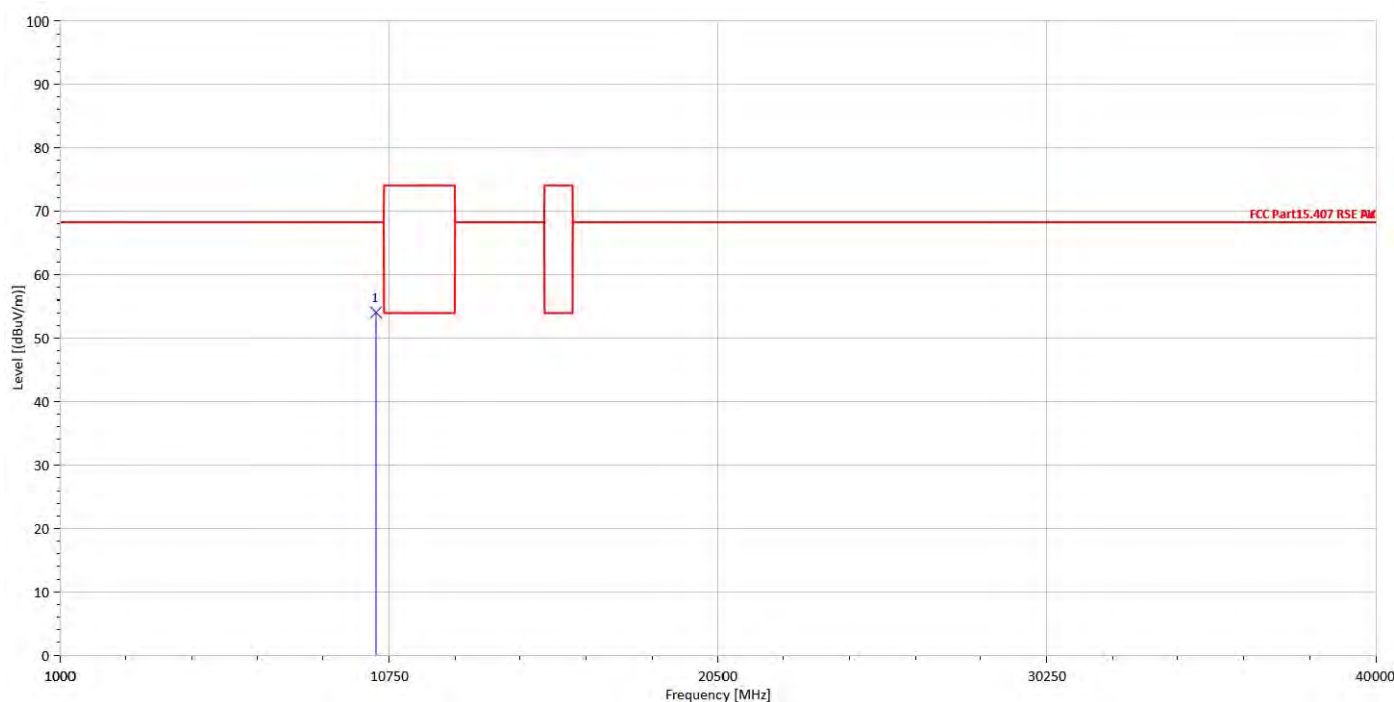
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5150~5250 MHz

Operation Mode :	802.11n20	Test Date :	2016/12/9
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
10360.00	H	Peak	33.93	20.18	54.10	68.3	-14.20

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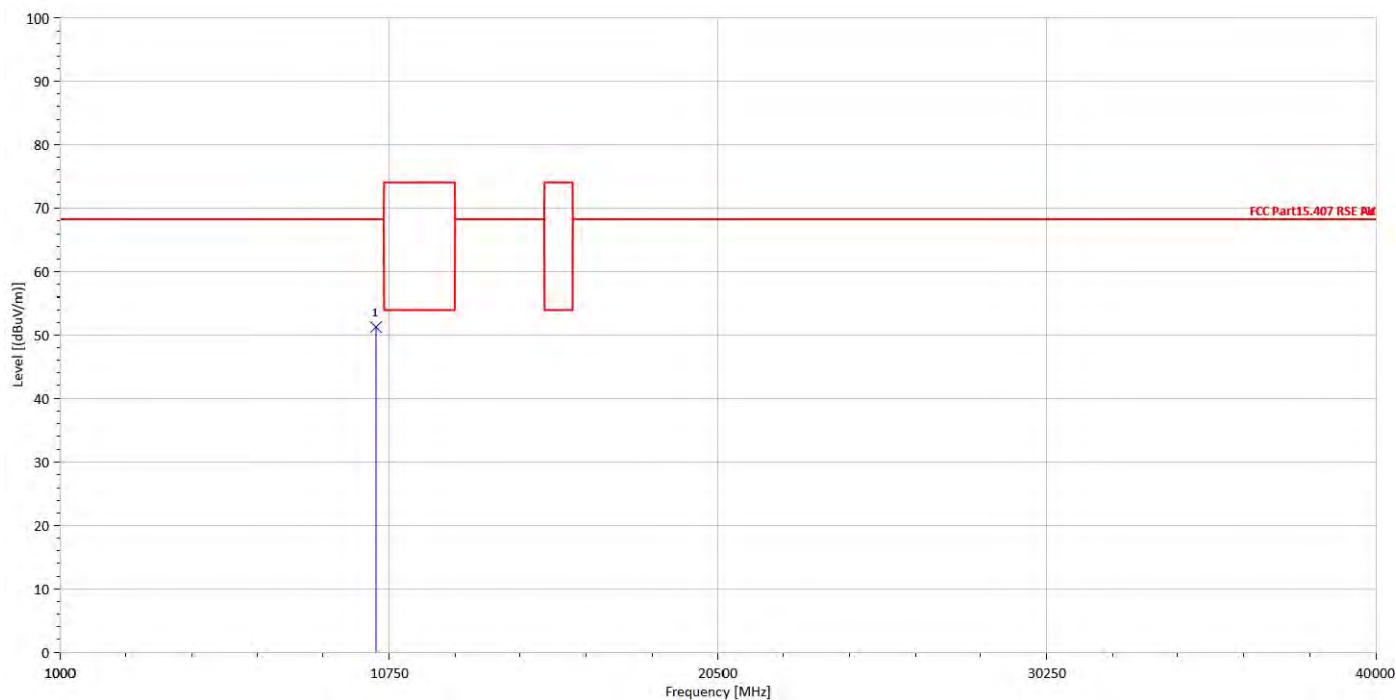
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Operation Mode :	802.11n20	Test Date :	2016/12/9
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10360.00	H	Peak	31.12	20.18	51.30	68.3	-17.00

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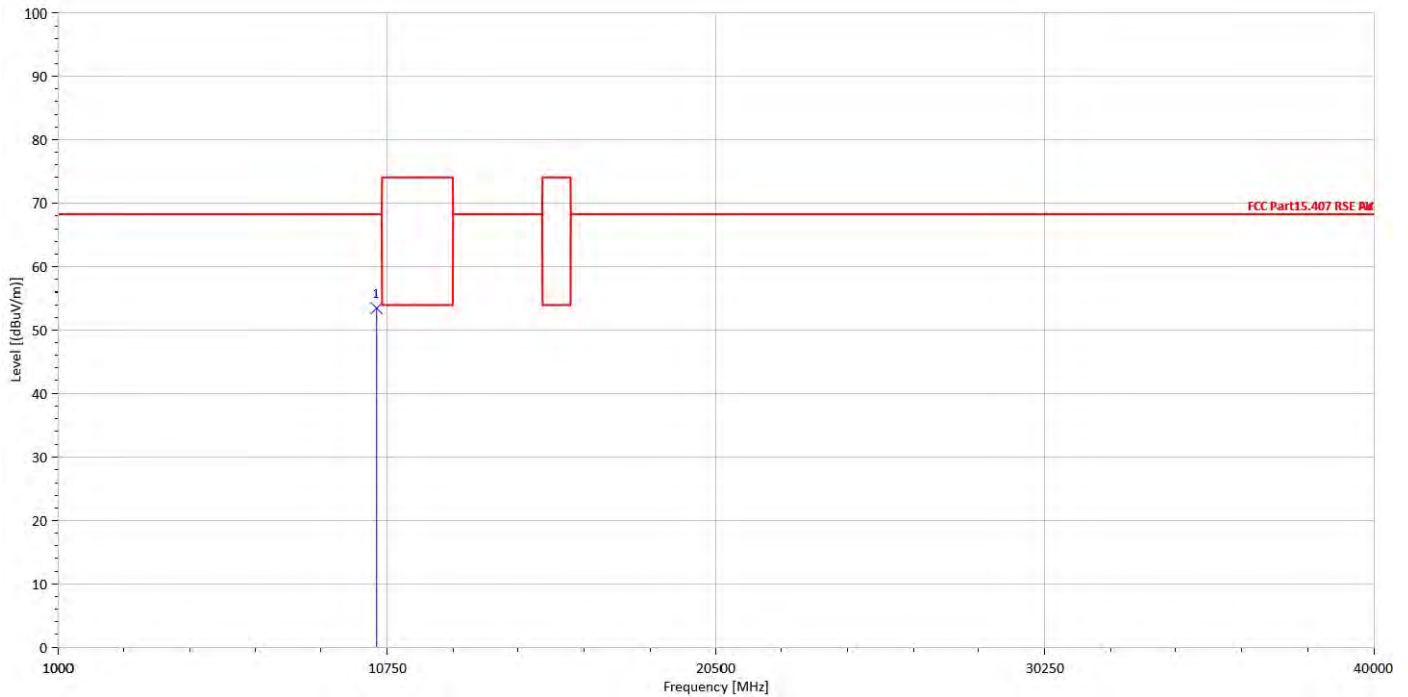
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802.11a - Main

C H	F r e q u e n c y (M H z)	D a t a R a t e	T O T A L P O W E R (d B m)	T O T A L P O W E R (m W)	R E Q U I R E D L I M I T (d B m)	R E S U L T
3 6	5 1 8 0	M C S 0	1 2 . 0 4	1 5 . 9 9 6	2 3 . 9 8	P A S S
4 4	5 2 2 0	M C S 0	1 1 . 9 5	1 5 . 6 6 8	2 3 . 9 8	P A S S
4 8	5 2 4 0	M C S 0	1 2 . 2 3	1 6 . 7 1 1	2 3 . 9 8	P A S S
1 4 9	5 7 4 5	M C S 0	1 1 . 7 3	1 4 . 8 9 4	3 0	P A S S
1 5 7	5 7 8 5	M C S 0	1 1 . 1 3	1 2 . 9 7 2	3 0	P A S S
1 6 5	5 8 2 5	M C S 0	1 1 . 3 4	1 3 . 6 1 4	3 0	P A S S



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
10440.00	H	Peak	33.20	20.29	53.49	68.3	-14.81

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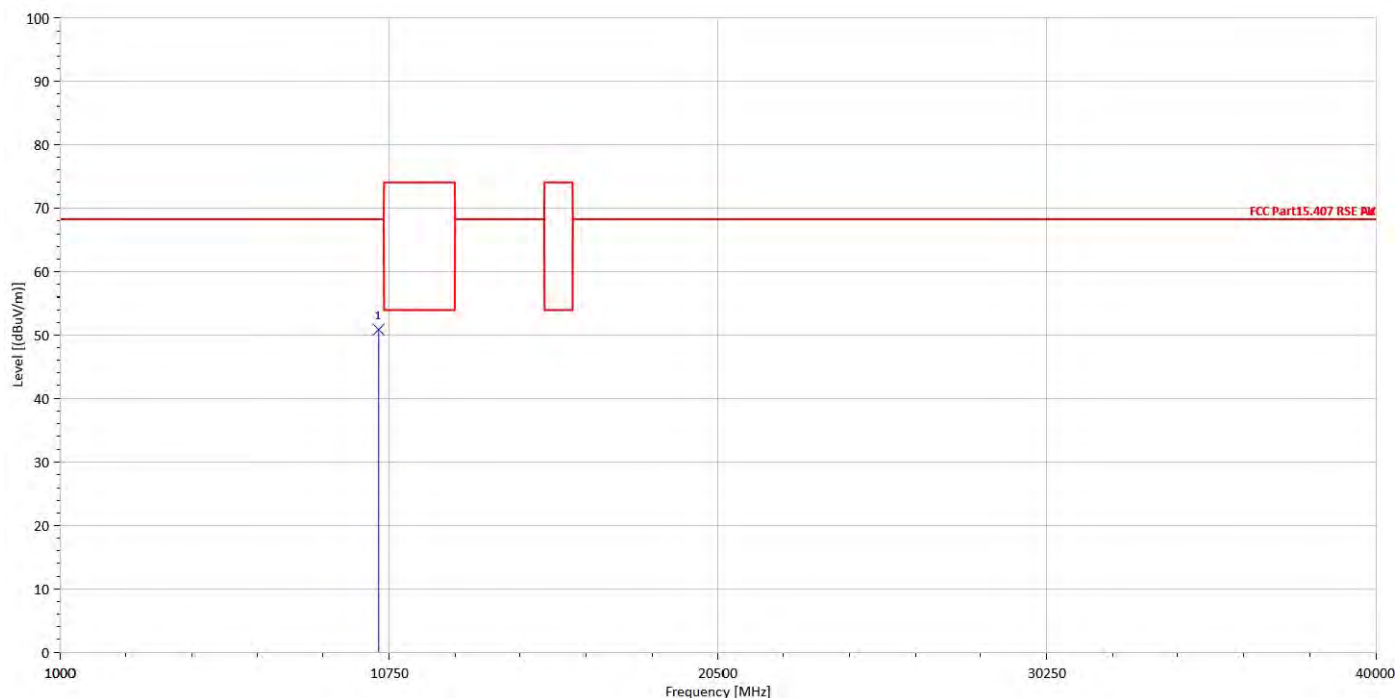
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Operation Mode :	802.11n20	Test Date :	2016/12/9
Fundamental Frequency :	5220 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10440.00	H	Peak	30.60	20.29	50.89	68.3	-17.41

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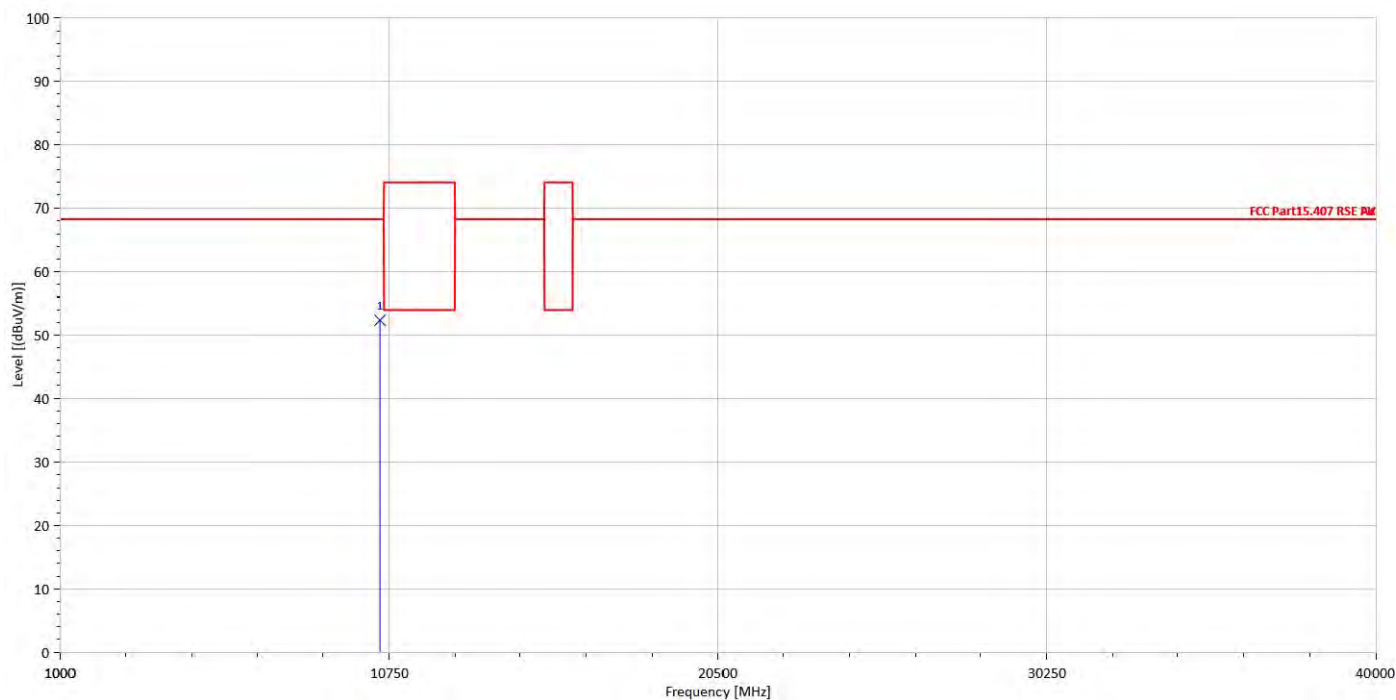
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Operation Mode : 802.11n20 Test Date : 2016/12/9
 Fundamental Frequency : 5240 MHz Temp. / Humi. : 25.1 deg_C/62 RH
 Operation Band : Tx CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
10480.00	H	Peak	31.70	20.68	52.38	68.3	-15.92

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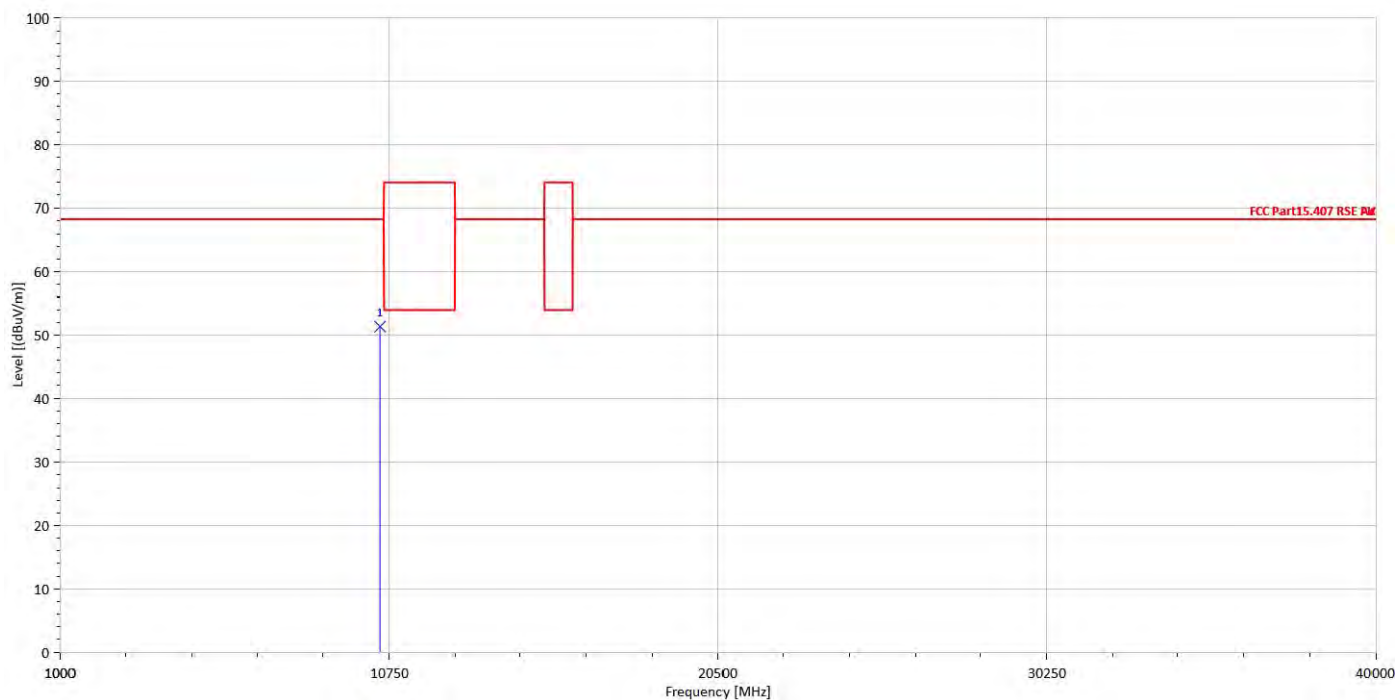
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Operation Mode :	802.11n20	Test Date :	2016/12/9
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10480.00	H	Peak	30.69	20.68	51.37	68.3	-16.93

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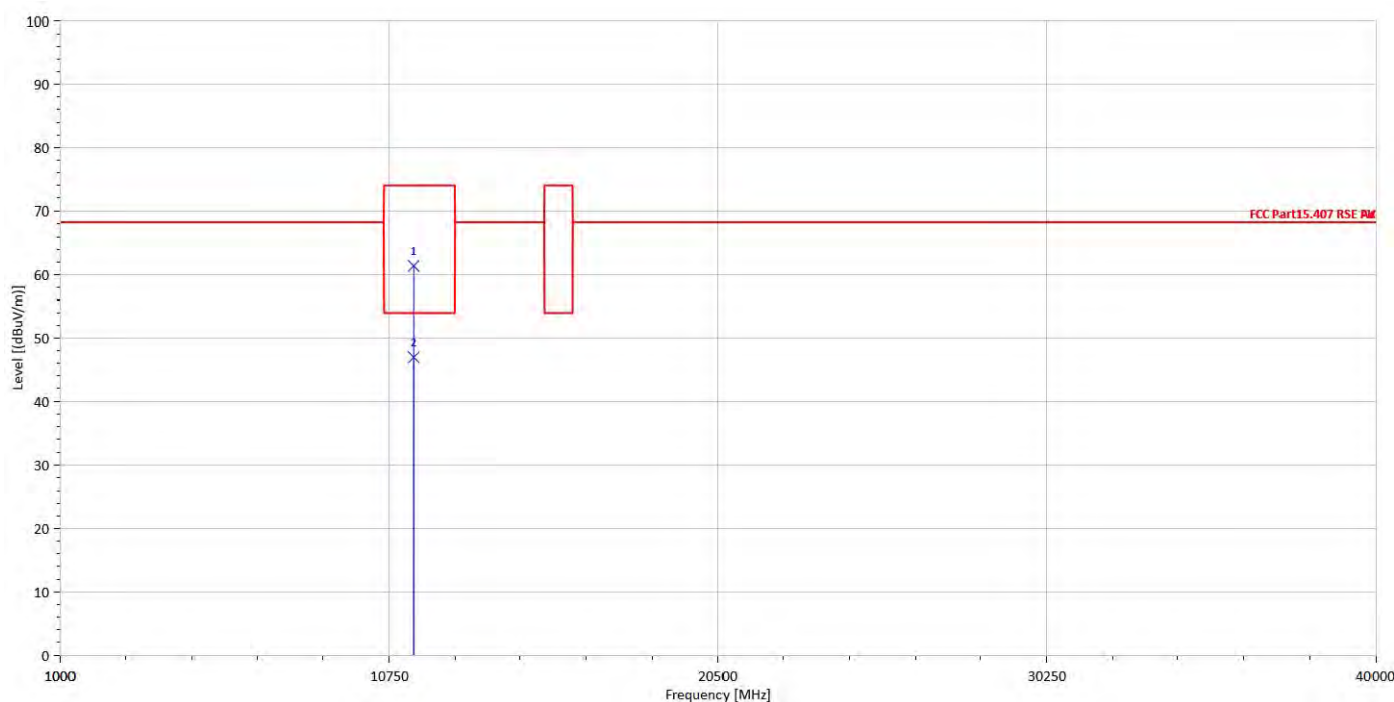
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5725~5850 MHz

Operation Mode :	802.11n20	Test Date :	2016/12/9
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11490.00	H	Peak	40.65	20.70	61.35	74	-12.65
11490.00	H	Average	26.26	20.70	46.96	54	-7.04

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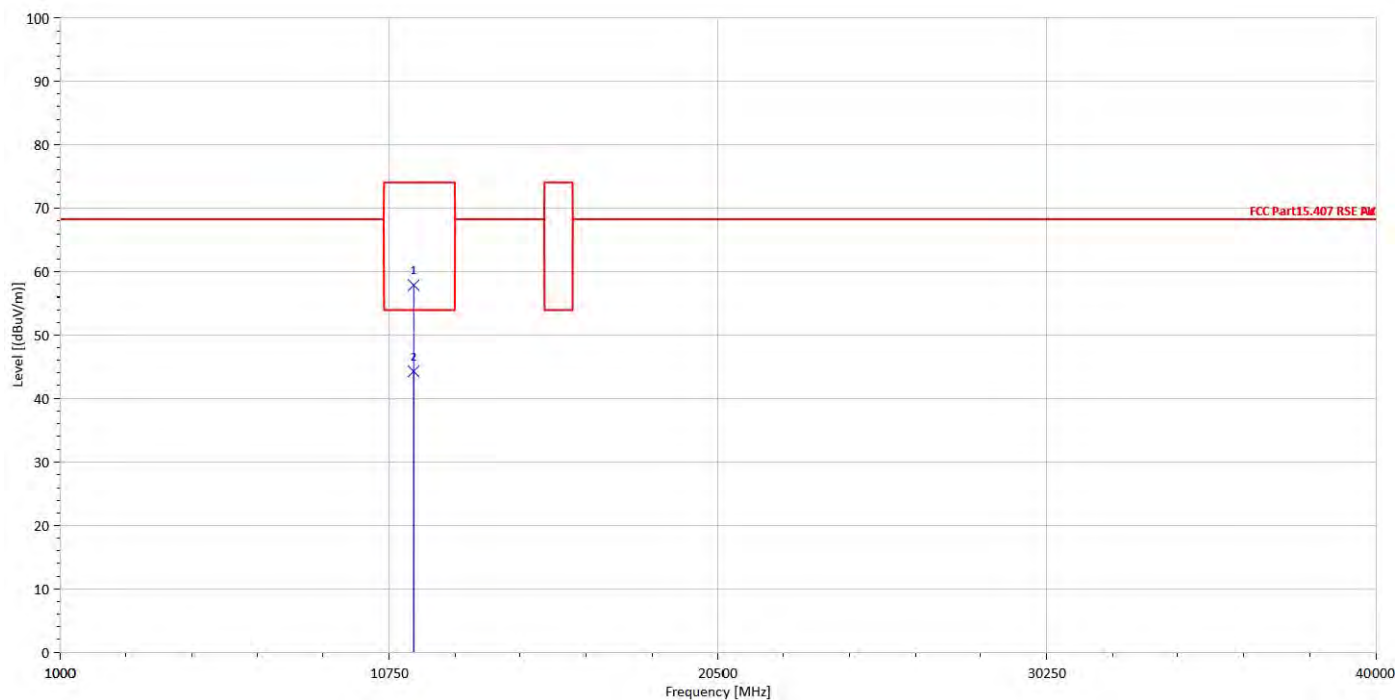
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Operation Mode :	802.11n20	Test Date :	2016/12/9
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@ 3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
11490.00	H	Peak	37.11	20.70	57.81	74	-16.19
11490.00	H	Average	23.54	20.70	44.24	54	-9.76

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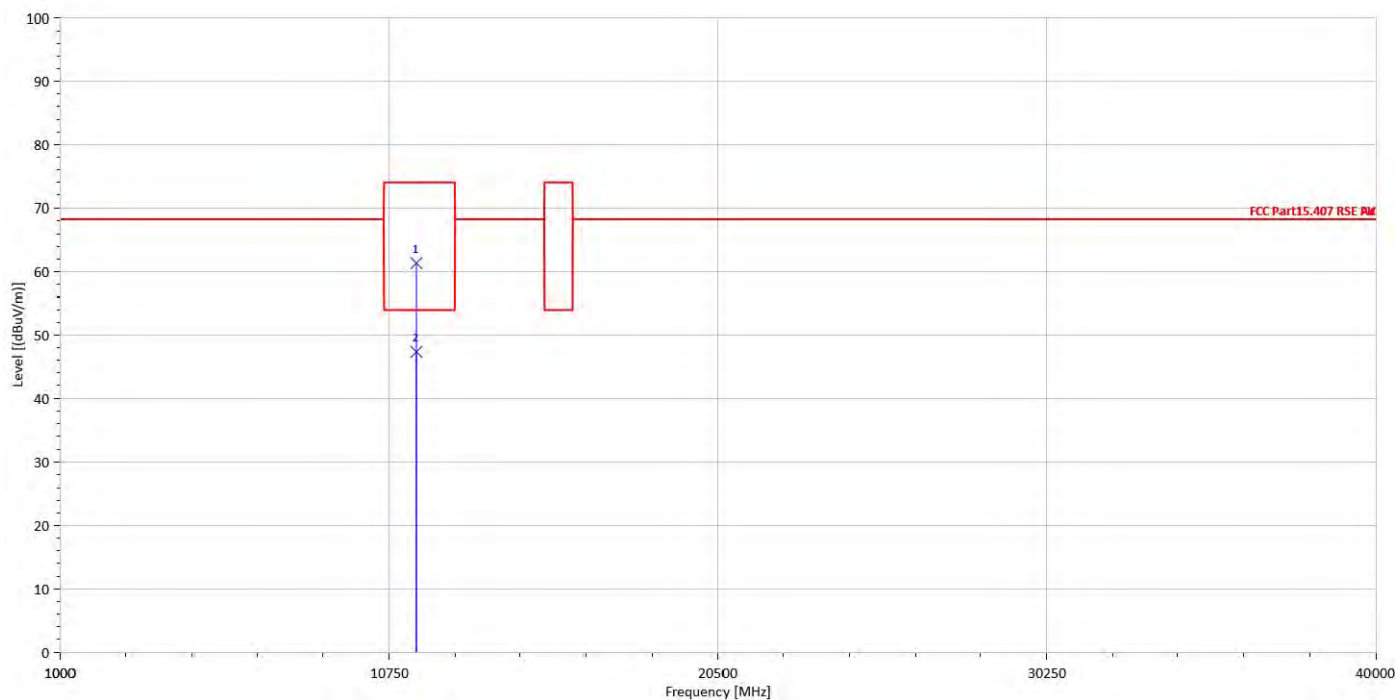
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Operation Mode :	802.11n20	Test Date :	2016/12/9
Fundamental Frequency :	5785 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@ 3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
11570.00	H	Peak	39.87	21.44	61.32	74	-12.68
11570.00	H	Average	25.91	21.44	47.35	54	-6.65

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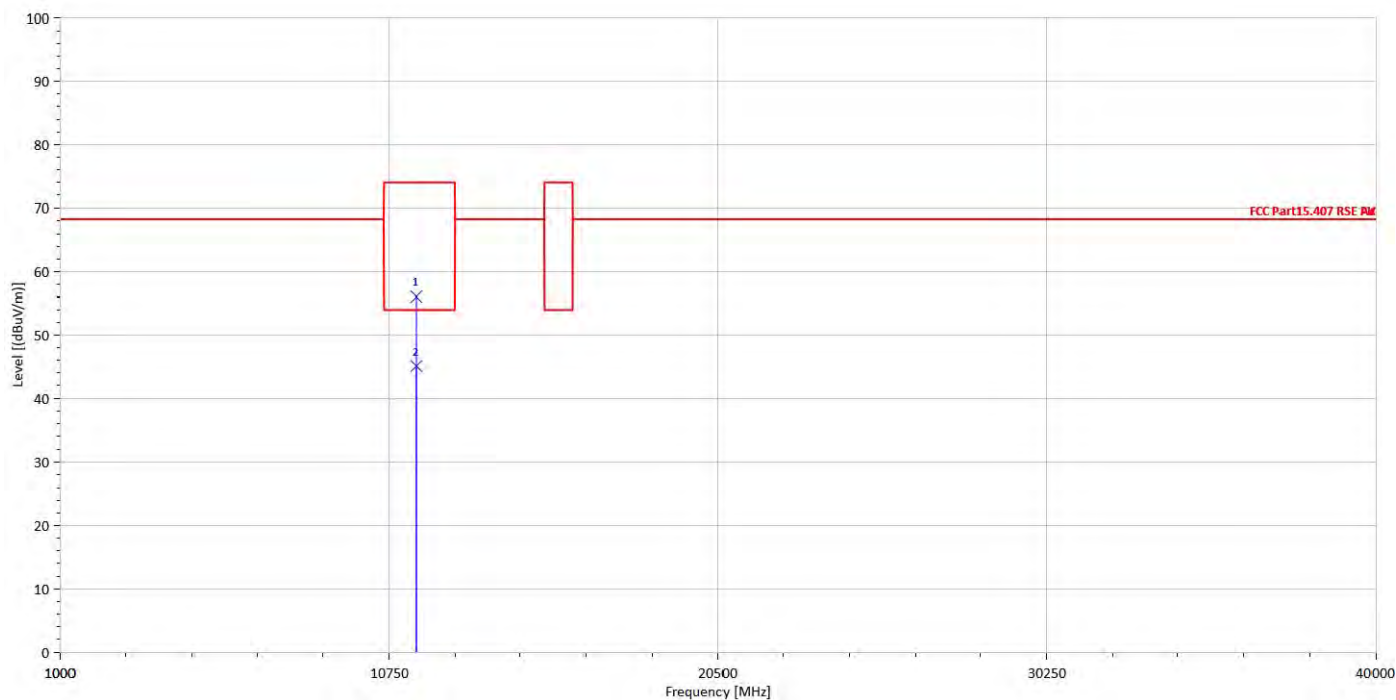
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Operation Mode :	802.11n20	Test Date :	2016/12/9
Fundamental Frequency :	5785 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@ 3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
11570.00	H	Peak	34.60	21.44	56.04	74	-17.96
11570.00	H	Average	23.64	21.44	45.08	54	-8.92

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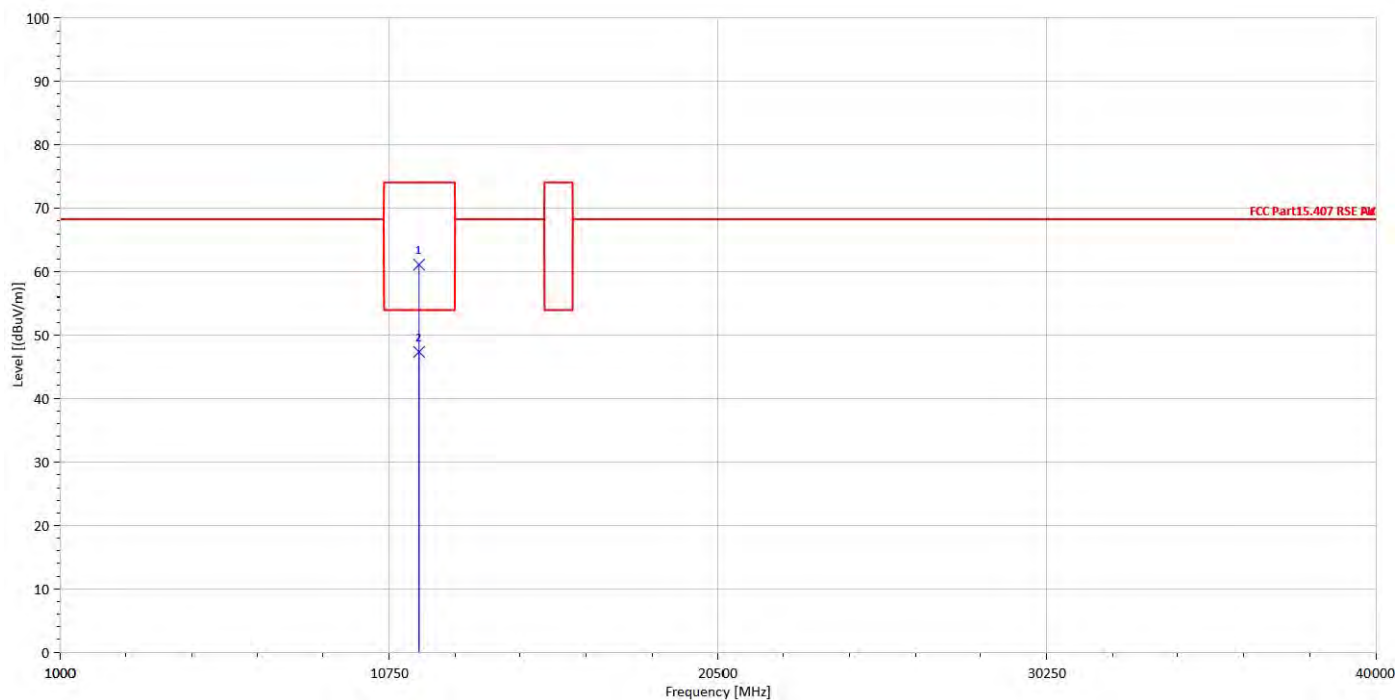
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Operation Mode :	802.11n20	Test Date :	2016/12/9
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@ 3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
11650.00	H	Peak	39.04	22.02	61.07	74	-12.93
11650.00	H	Average	25.31	22.02	47.33	54	-6.67

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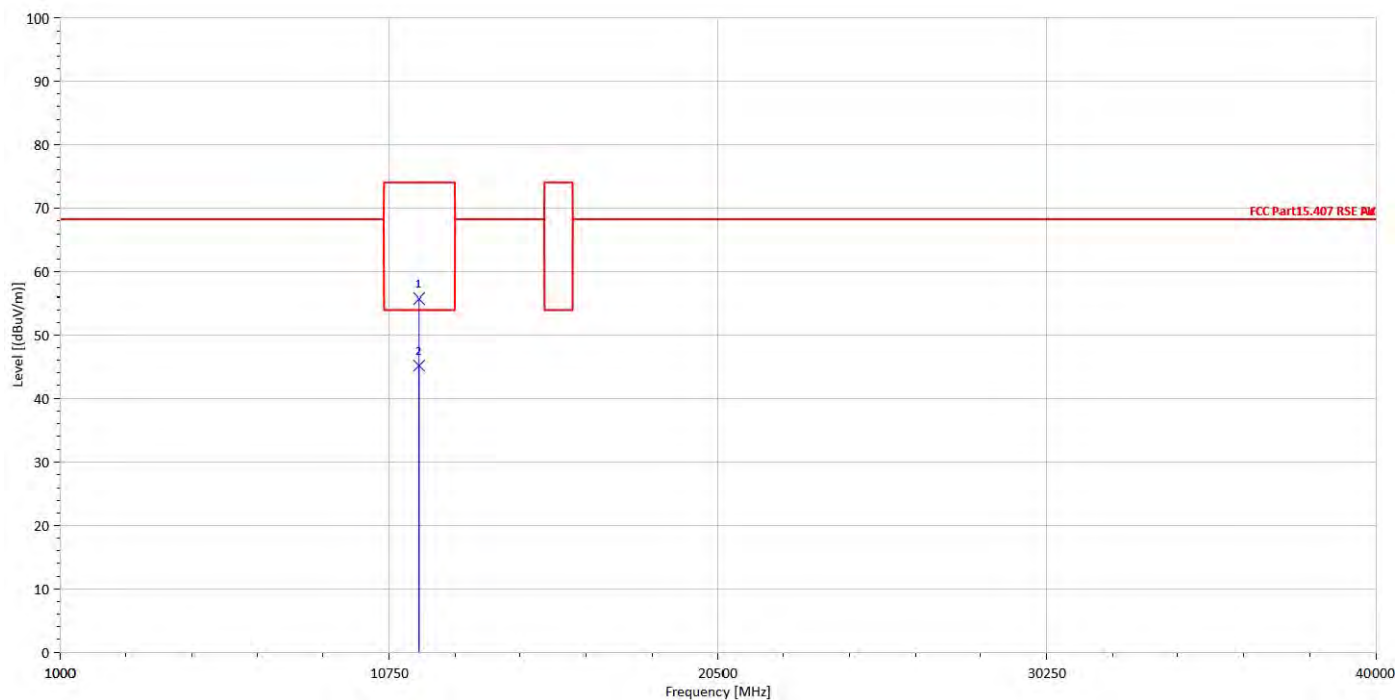
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Operation Mode :	802.11n20	Test Date :	2016/12/9
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@ 3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
11650.00	H	Peak	33.73	22.02	55.75	74	-18.25
11650.00	H	Average	23.12	22.02	45.14	54	-8.86

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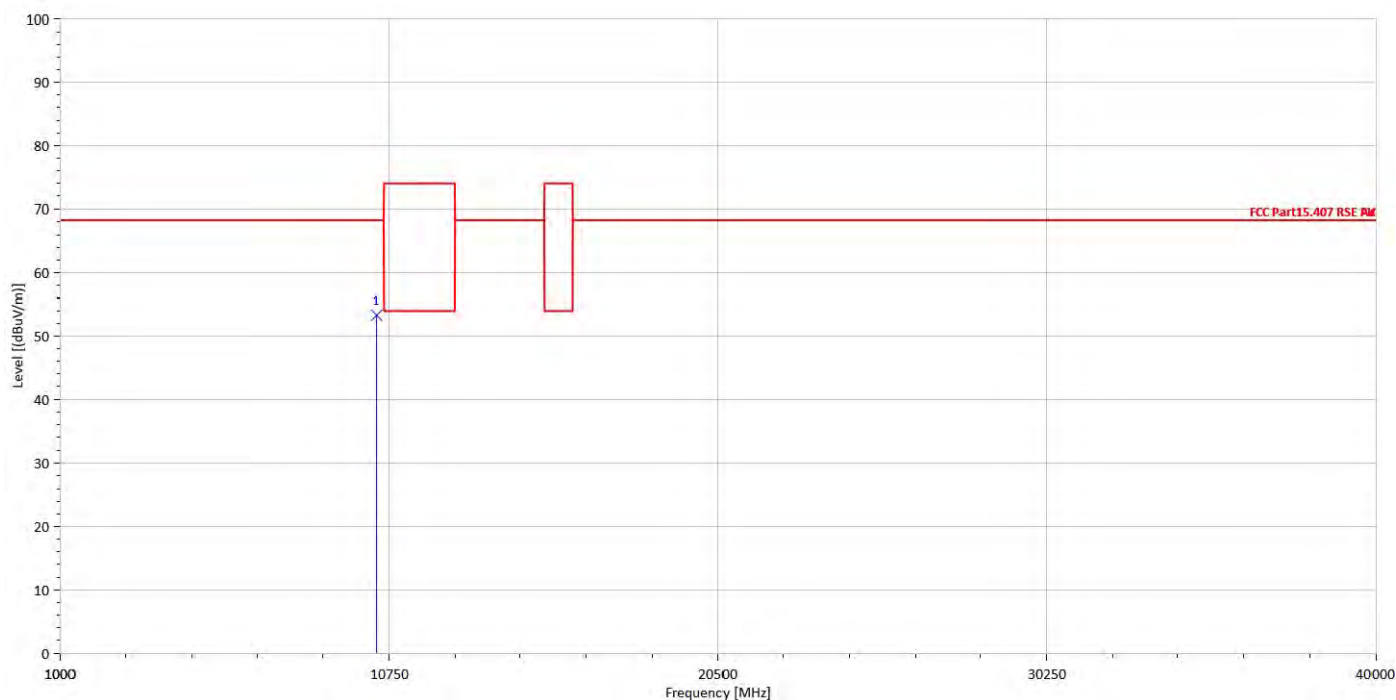
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5150~5250 MHz

Operation Mode :	802.11n40	Test Date :	2016/12/9
Fundamental Frequency :	5190 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
10380.00	H	Peak	32.38	20.95	53.34	68.3	-14.96

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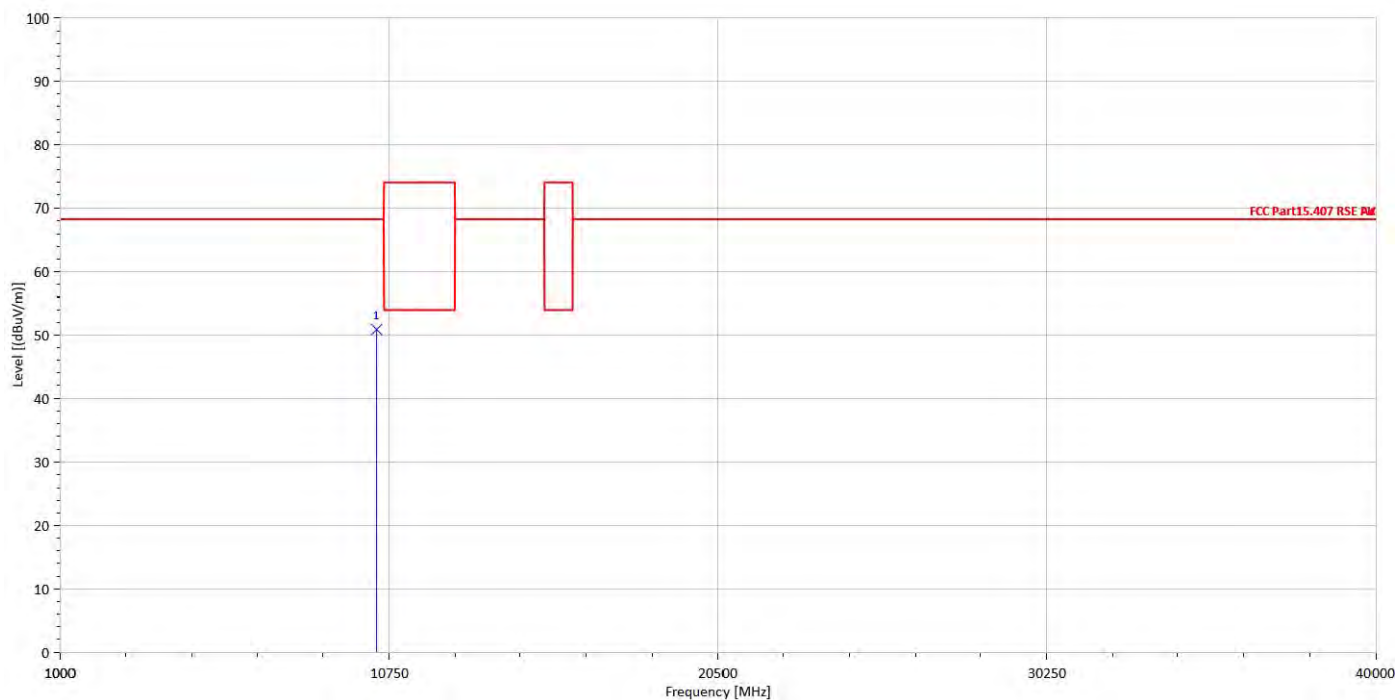
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Operation Mode :	802.11n40	Test Date :	2016/12/9
Fundamental Frequency :	5190 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10380.00	H	Peak	29.94	20.95	50.89	68.3	-17.41

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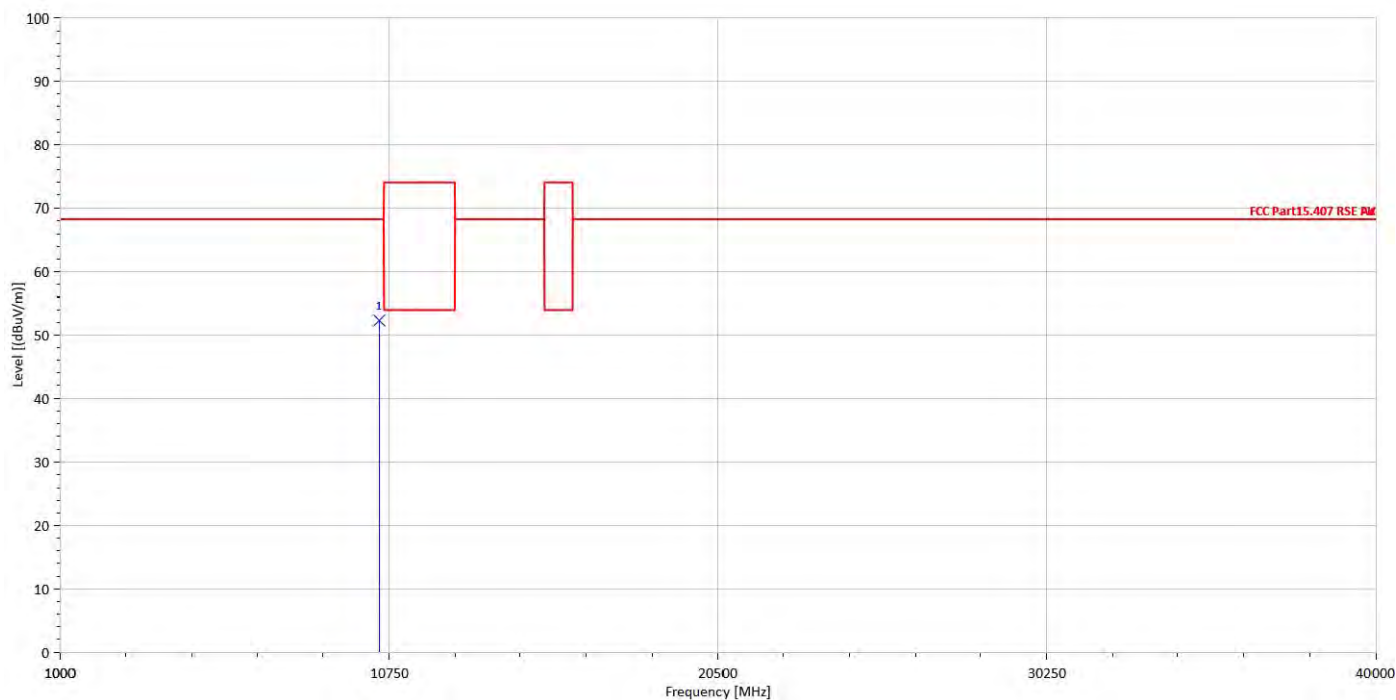
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Operation Mode :	802.11n40	Test Date :	2016/12/9
Fundamental Frequency :	5230 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10460.00	H	Peak	31.39	20.95	52.35	68.3	-15.95

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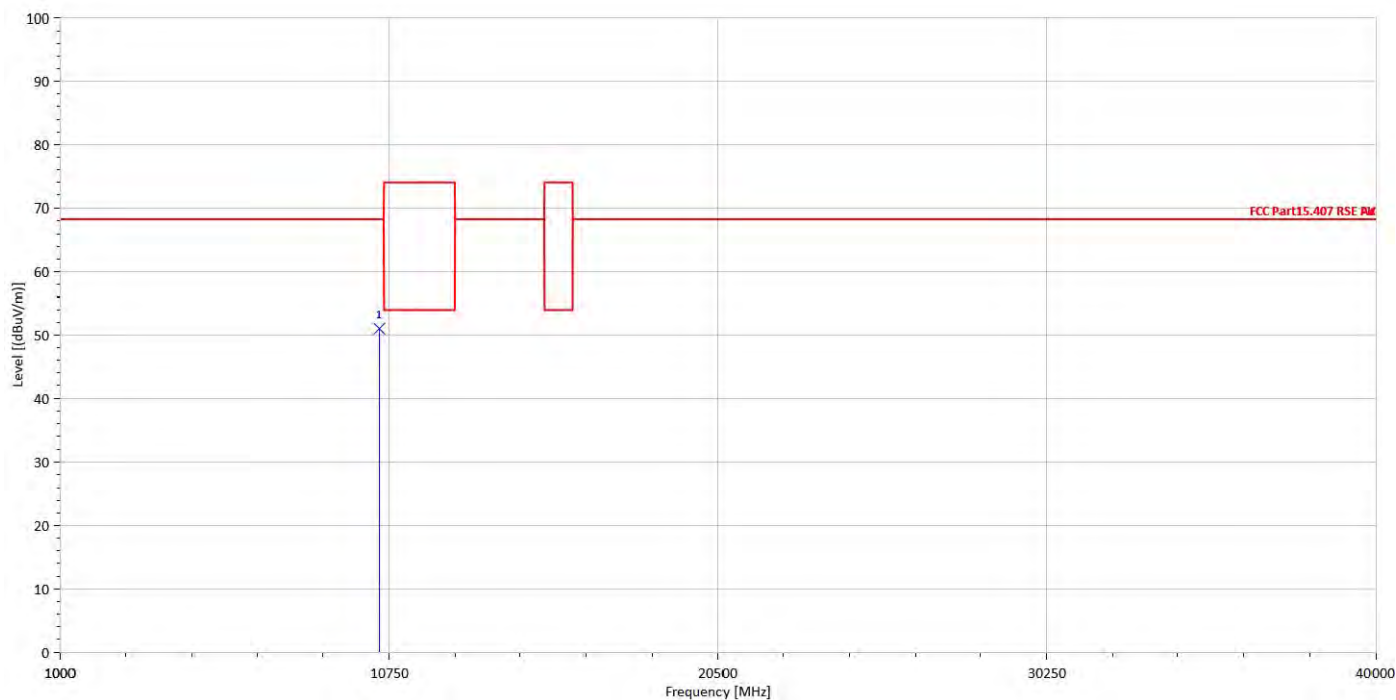
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Operation Mode :	802.11n40	Test Date :	2016/12/9
Fundamental Frequency :	5230 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
10460.00	H	Peak	30.08	20.95	51.04	68.3	-17.26

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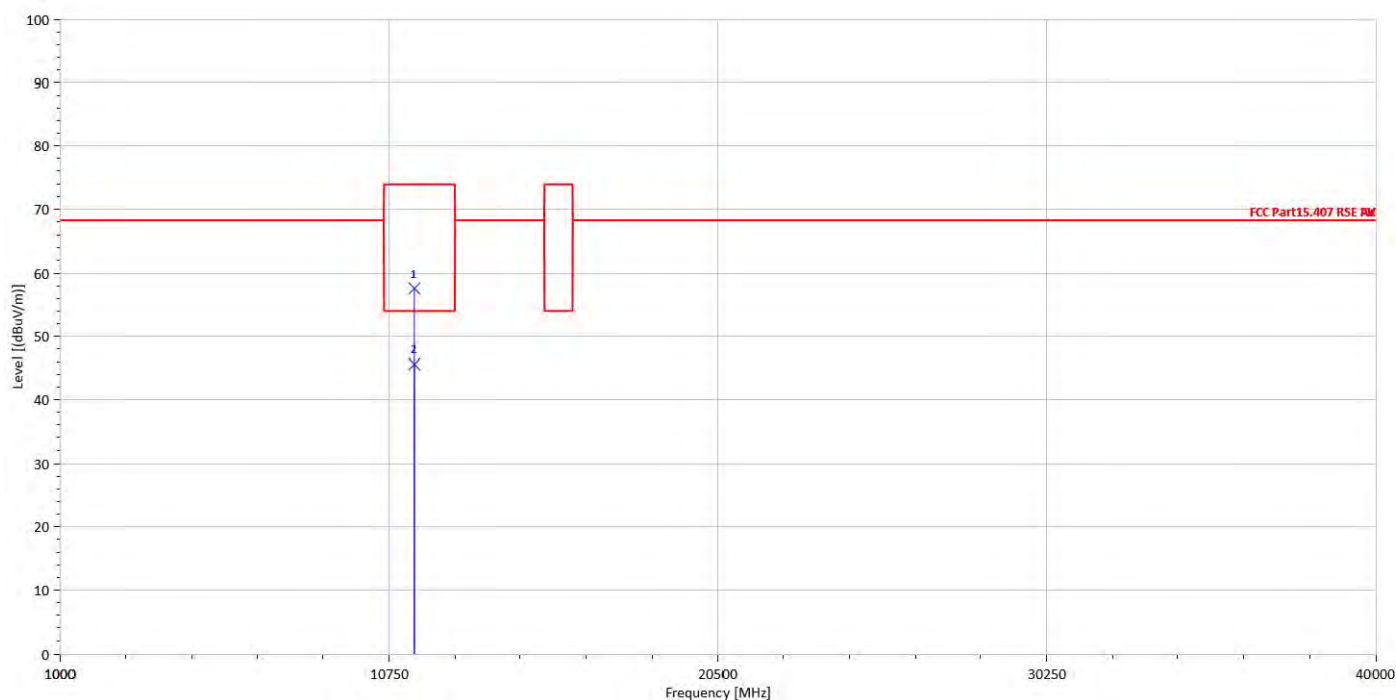
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5725~5850 MHz

Operation Mode :	802.11n40	Test Date :	2016/12/9
Fundamental Frequency :	5755 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @ 3m dBμV/m	Margin dB
11510.00	H	Peak	35.45	22.17	57.62	74	-16.38
11510.00	H	Average	23.48	22.17	45.65	54	-8.35

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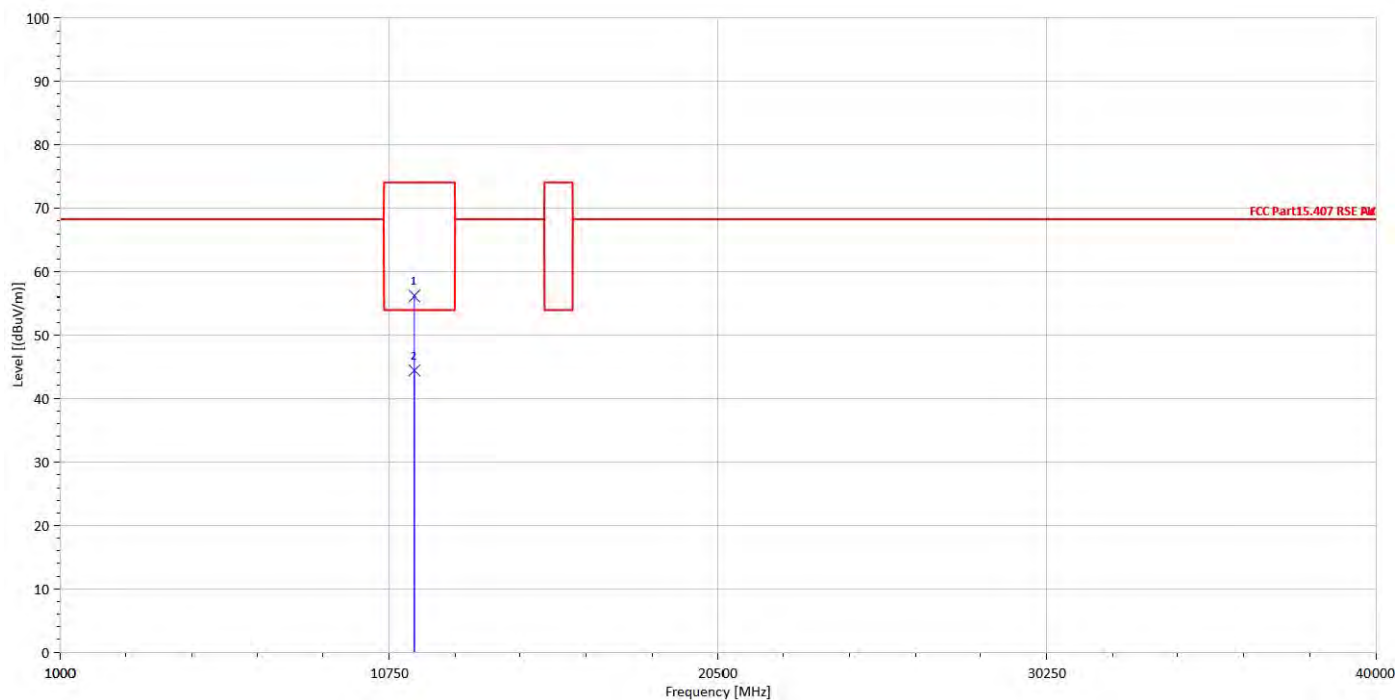
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Operation Mode :	802.11n40	Test Date :	2016/12/9
Fundamental Frequency :	5755 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@ 3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
11510.00	H	Peak	34.00	22.17	56.17	74	-17.83
11510.00	H	Average	22.22	22.17	44.39	54	-9.61

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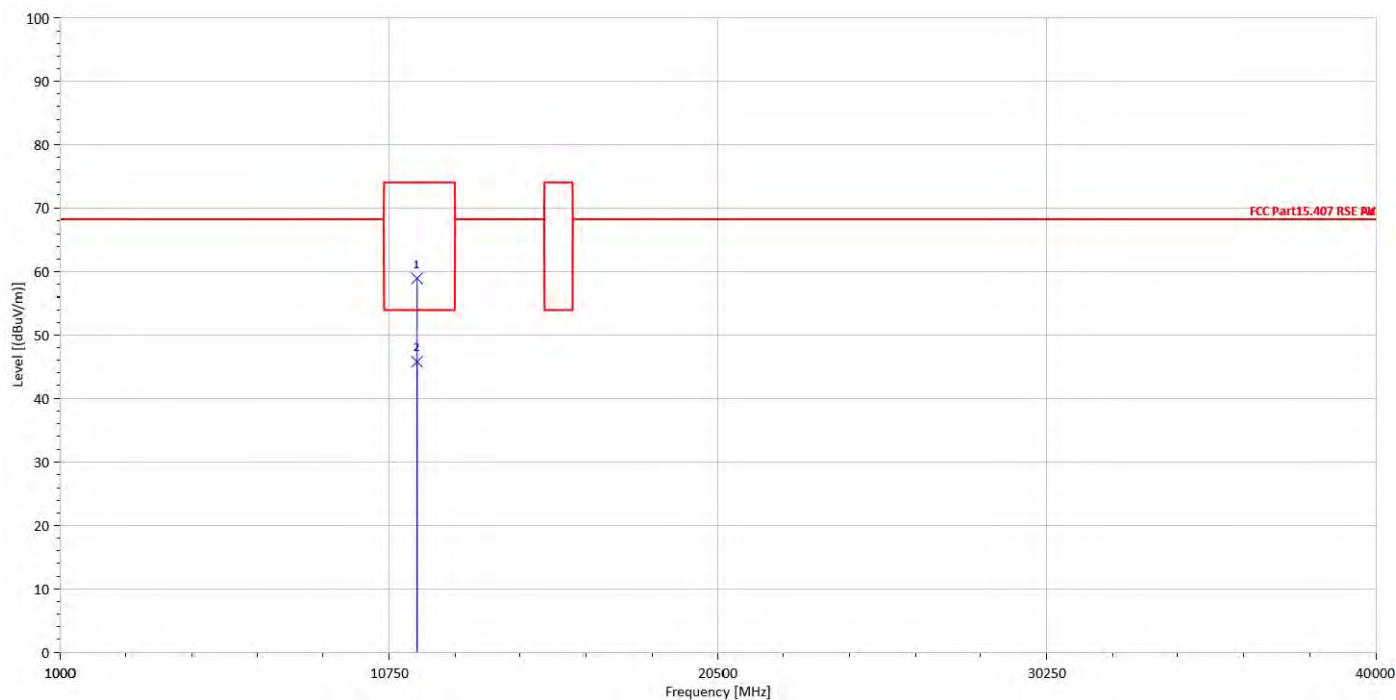
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Operation Mode :	802.11n40	Test Date :	2016/12/9
Fundamental Frequency :	5795 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@ 3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
11590.00	H	Peak	37.03	21.84	58.88	74	-15.12
11590.00	H	Average	23.92	21.84	45.76	54	-8.24

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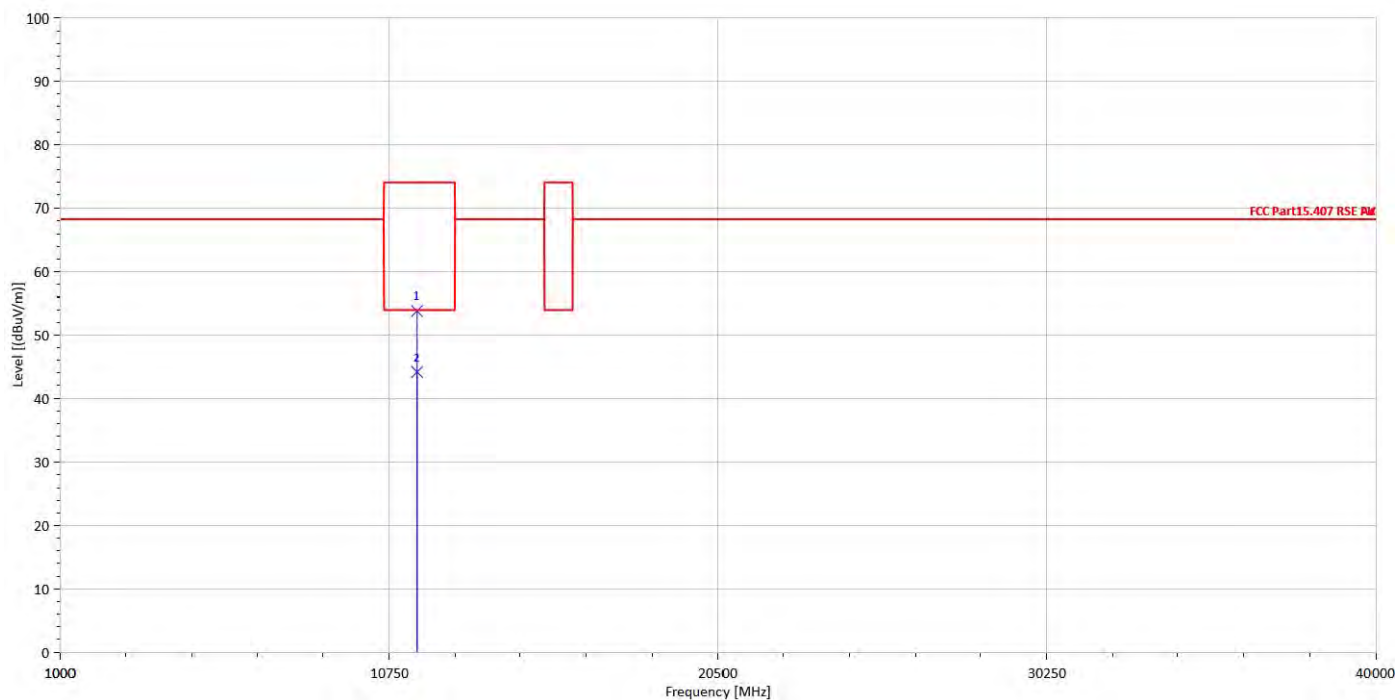
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Operation Mode :	802.11n40	Test Date :	2016/12/9
Fundamental Frequency :	5795 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@ 3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
11590.00	H	Peak	32.01	21.84	53.85	74	-20.15
11590.00	H	Average	22.29	21.84	44.13	54	-9.87

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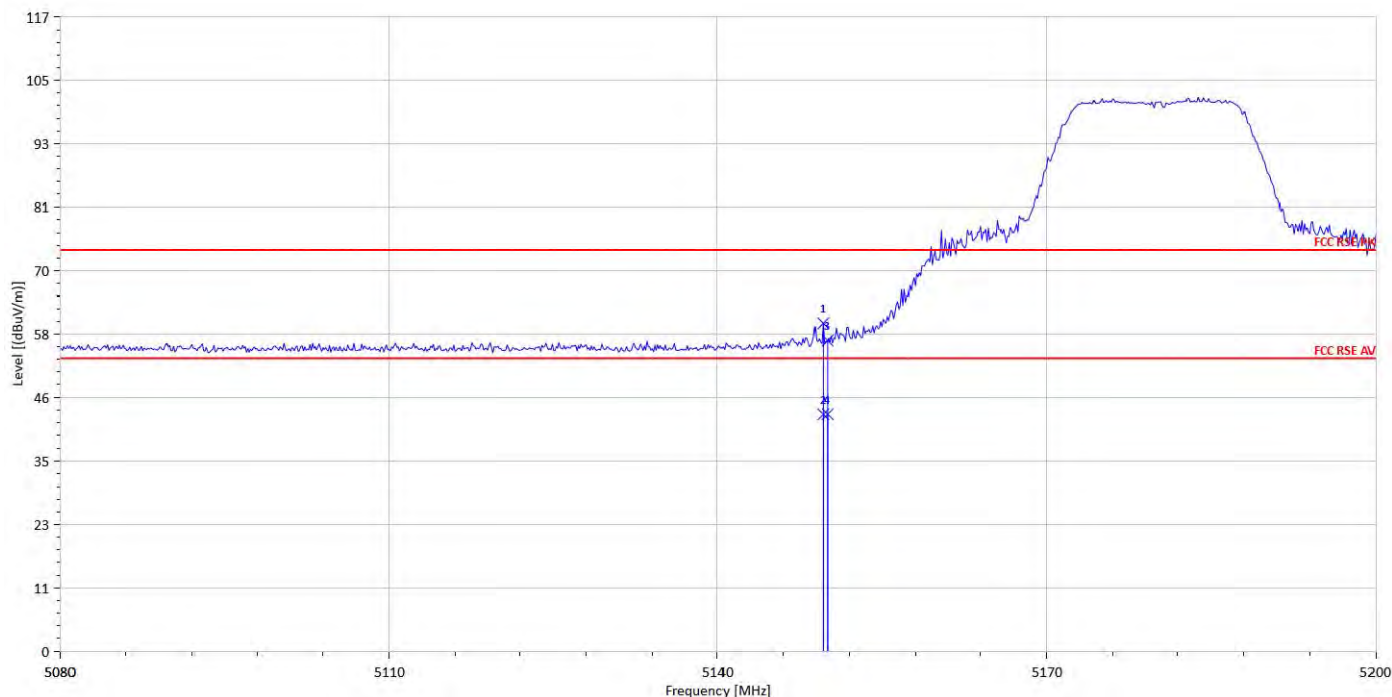
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Band edge falling to restricted band

802.11a mode

Operation Mode :	802.11a	Test Date :	2016/11/5
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5149.60	S	Peak	52.33	8.19	60.52	74	-13.48
5149.60	S	Average	35.56	8.19	43.75	54	-10.25
5150.00	E	Peak	49.11	8.19	57.30	74	-16.70
5150.00	E	Average	35.58	8.19	43.77	54	-10.23

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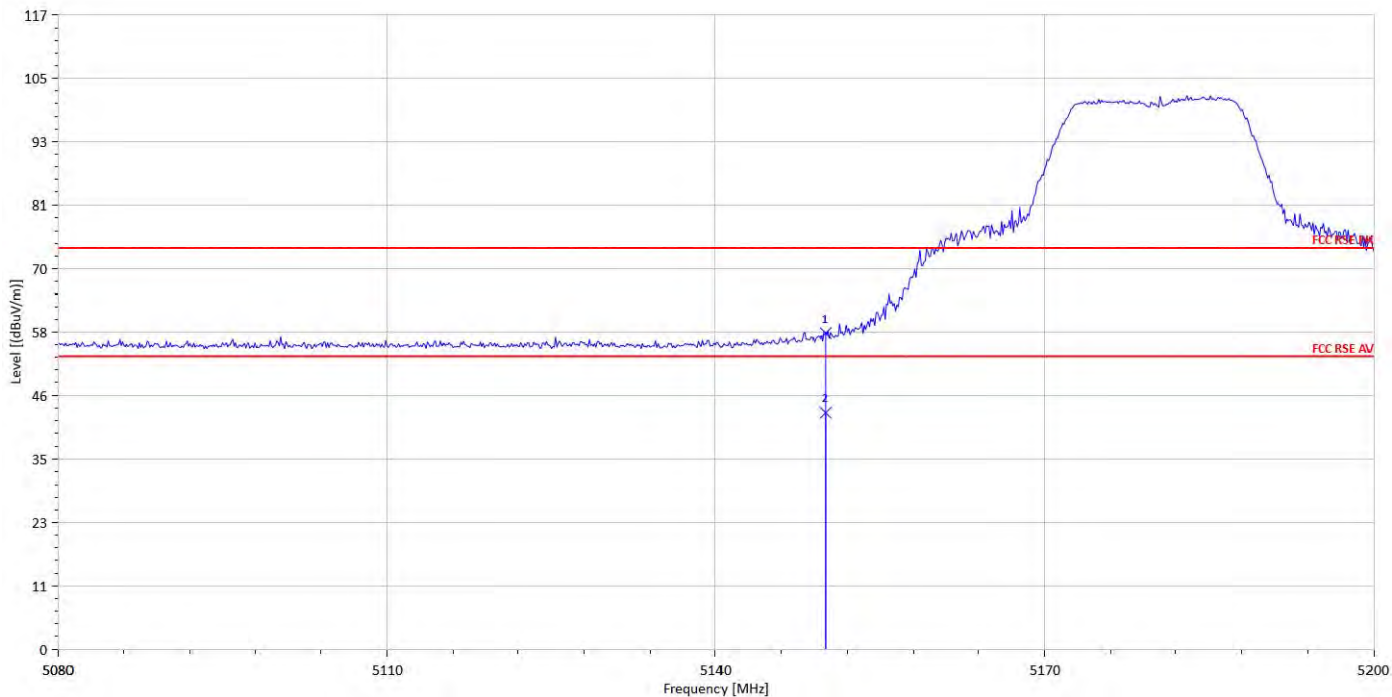
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Operation Mode :	802.11a	Test Date :	2016/12/7
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Peak	50.12	8.19	58.31	74	-15.69
5150.00	E	Average	35.48	8.19	43.67	54	-10.33

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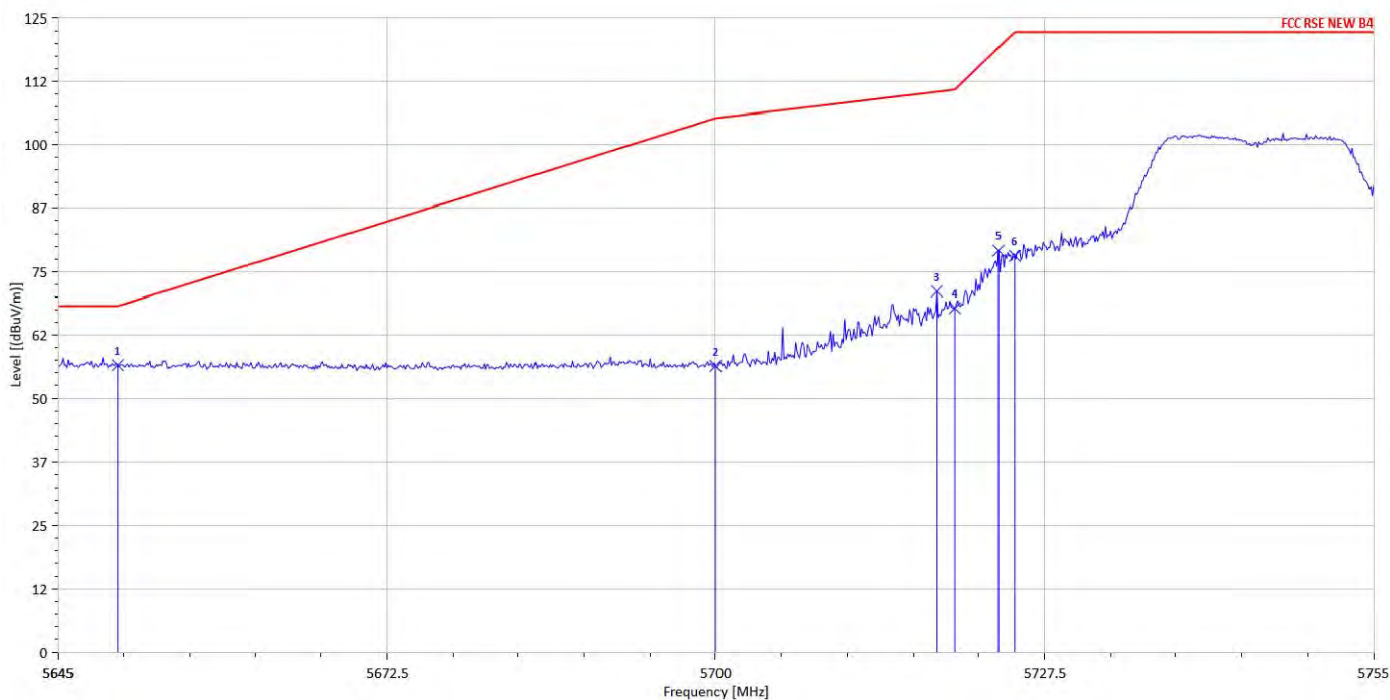
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Operation Mode :	802.11a	Test Date :	2016/12/7
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	S	Peak	47.18	9.33	56.52	68.23	-11.71
5700.00	S	Peak	46.93	9.44	56.37	105.23	-48.86
5718.48	S	Peak	61.82	9.27	71.10	110.4044	-39.31
5720.00	S	Peak	58.55	9.28	67.83	110.83	-43.00
5723.65	S	Peak	69.86	9.30	79.16	119.1518	-39.99
5725.00	E	Peak	68.81	9.30	78.11	122.23	-44.12

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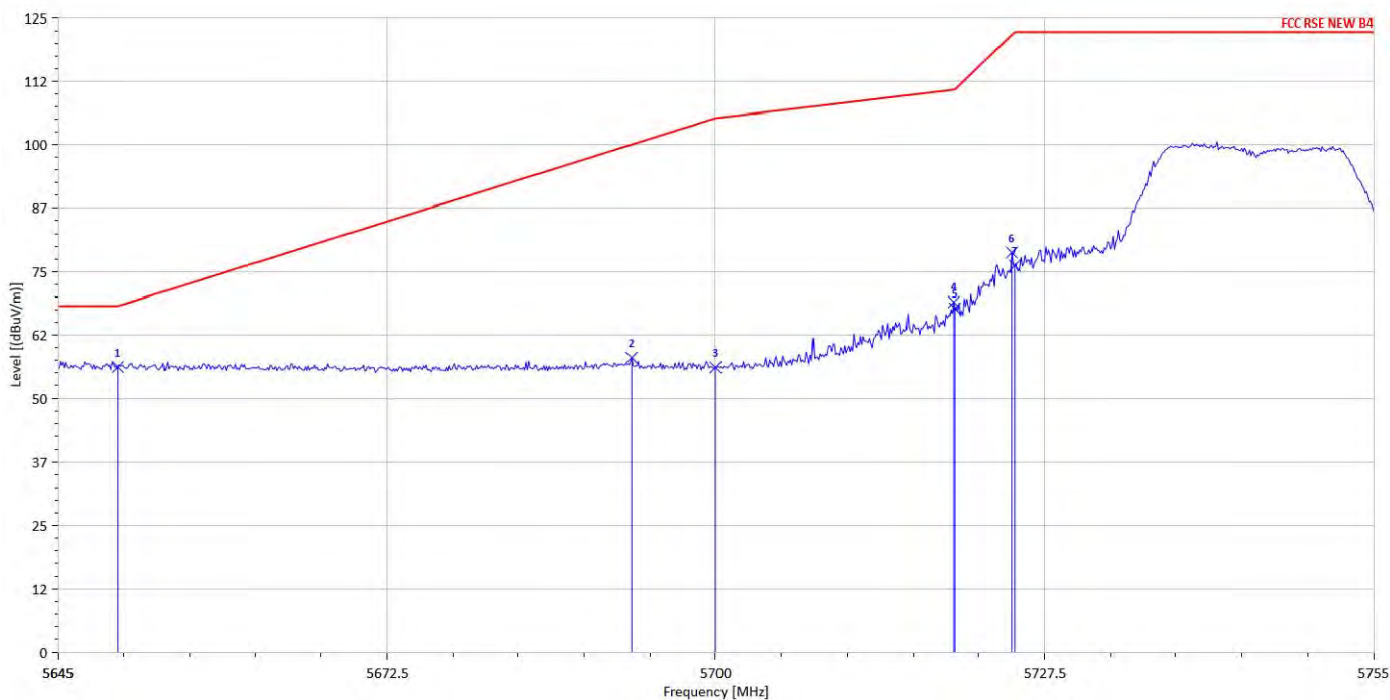
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Operation Mode :	802.11a	Test Date :	2016/12/7
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
5650.00	S	Peak	46.82	9.33	56.15	68.23	-12.08
5692.96	S	Peak	48.42	9.60	58.01	100.0204	-42.01
5700.00	S	Peak	46.63	9.44	56.07	105.23	-49.16
5719.91	S	Peak	59.73	9.28	69.01	110.8048	-41.80
5720.00	S	Peak	58.46	9.28	67.74	110.83	-43.09
5724.75	S	Peak	69.47	9.30	78.77	121.66	-42.89
5725.00	E	Peak	66.90	9.30	76.20	122.23	-46.03

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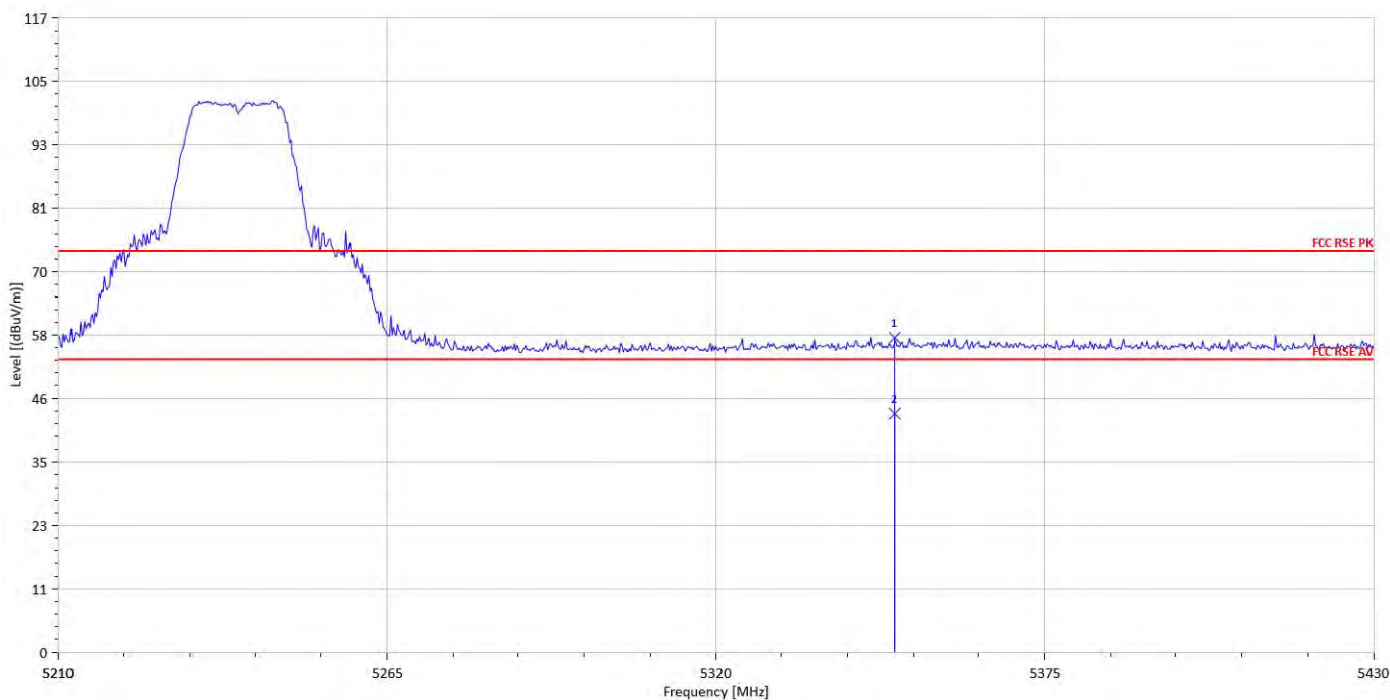
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Operation Mode :	802.11a	Test Date :	2016/12/7
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5850.00	E	Peak	54.18	9.49	63.67	122.23	-58.56
5850.50	S	Peak	57.27	9.50	66.76	121.09	-54.33
5855.00	S	Peak	51.60	9.58	61.18	110.83	-49.65
5855.88	S	Peak	54.03	9.60	63.63	110.585	-46.96
5875.00	S	Peak	47.01	9.63	56.64	105.23	-48.59
5913.25	S	Peak	49.11	9.88	58.99	76.925	-17.94
5925.00	S	Peak	47.58	10.01	57.59	68.23	-10.64

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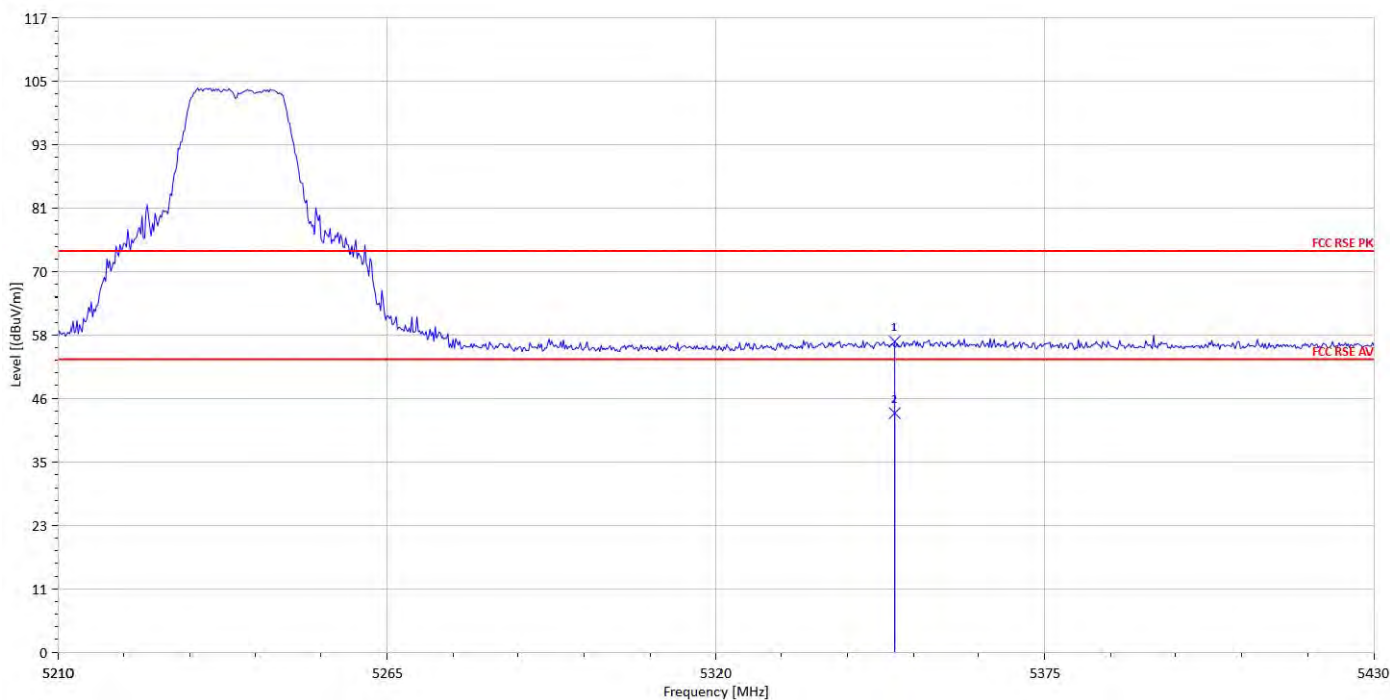
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Operation Mode :	802.11a	Test Date :	2016/12/7
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5850.00	E	Peak	54.54	9.49	64.03	122.23	-58.20
5855.00	S	Peak	50.55	9.58	60.13	110.83	-50.70
5855.75	S	Peak	51.93	9.59	61.52	110.62	-49.10
5875.00	S	Peak	46.73	9.63	56.36	105.23	-48.87
5907.13	S	Peak	48.90	9.81	58.71	81.4575	-22.75
5925.00	S	Peak	47.22	10.01	57.23	68.23	-11.00

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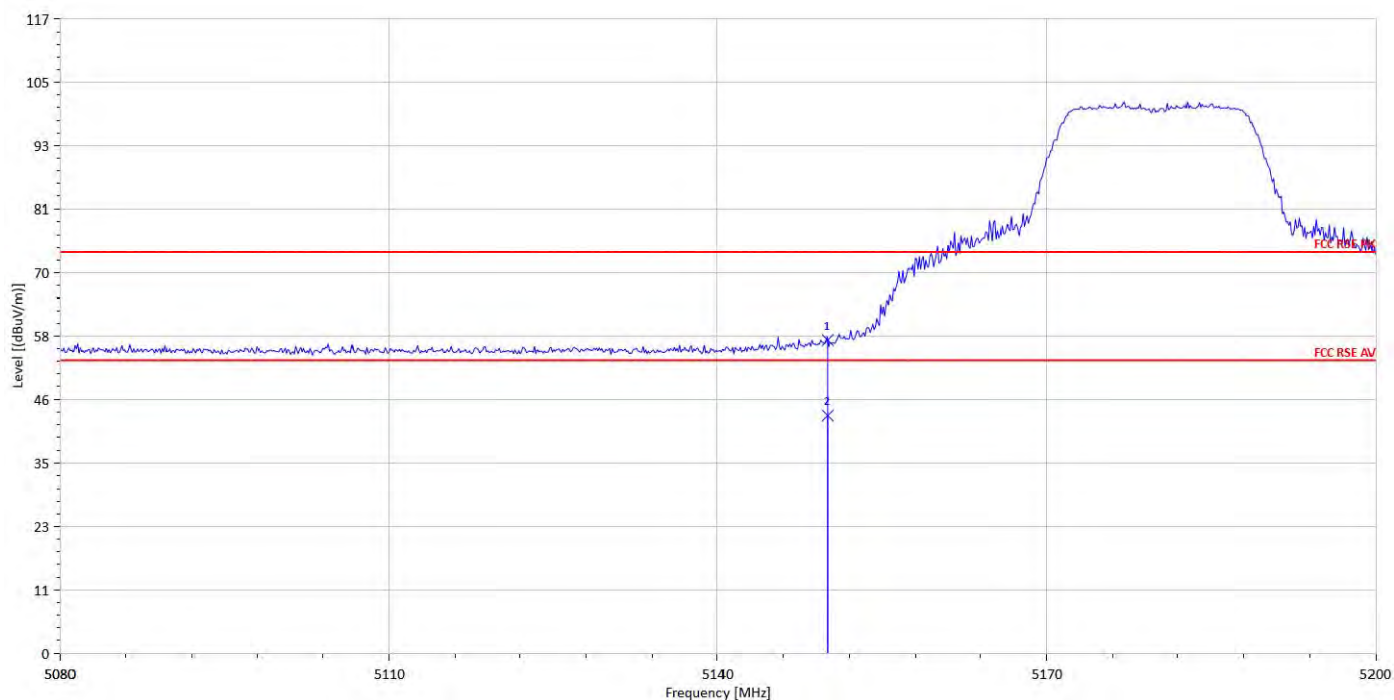
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802.11n20 HT mode

Operation Mode :	802.11n20	Test Date :	2016/11/5
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Peak	49.58	8.19	57.77	74	-16.23
5150.00	E	Average	35.69	8.19	43.88	54	-10.12

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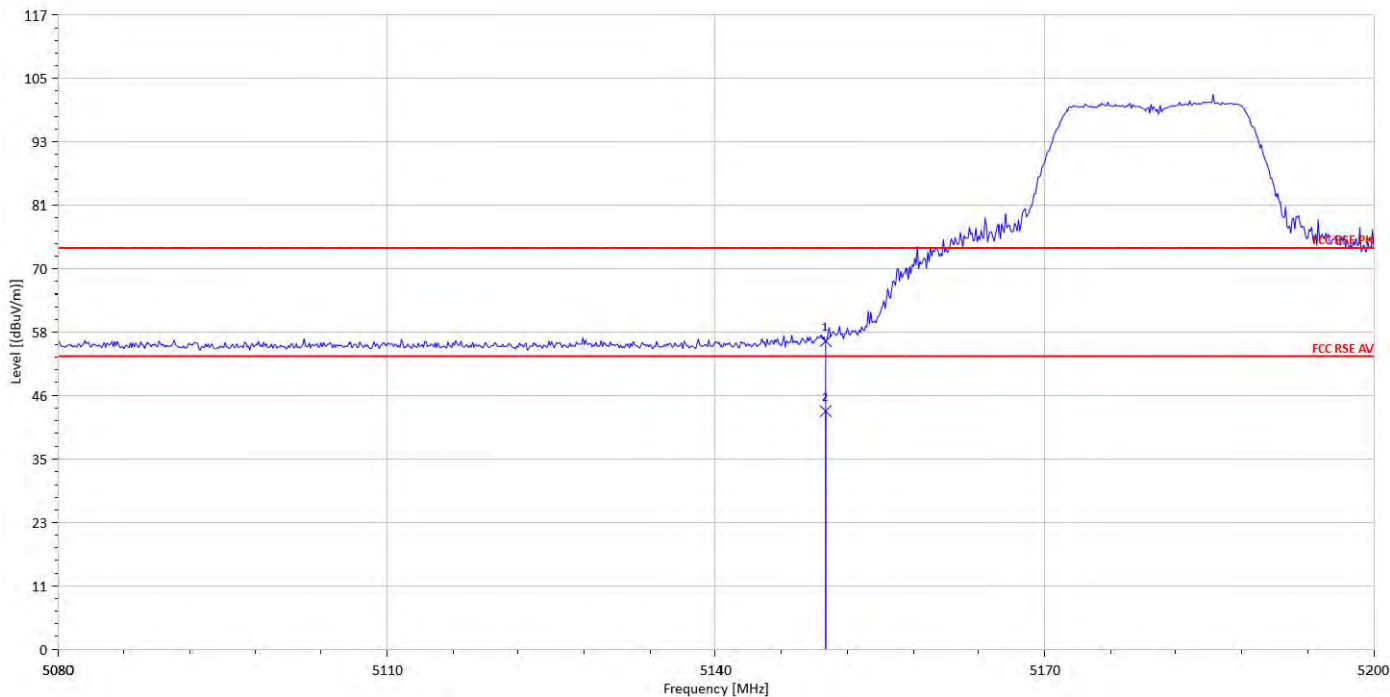
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Operation Mode :	802.11n20	Test Date :	2016/11/5
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Peak	48.66	8.19	56.85	74	-17.15
5150.00	E	Average	35.79	8.19	43.98	54	-10.02

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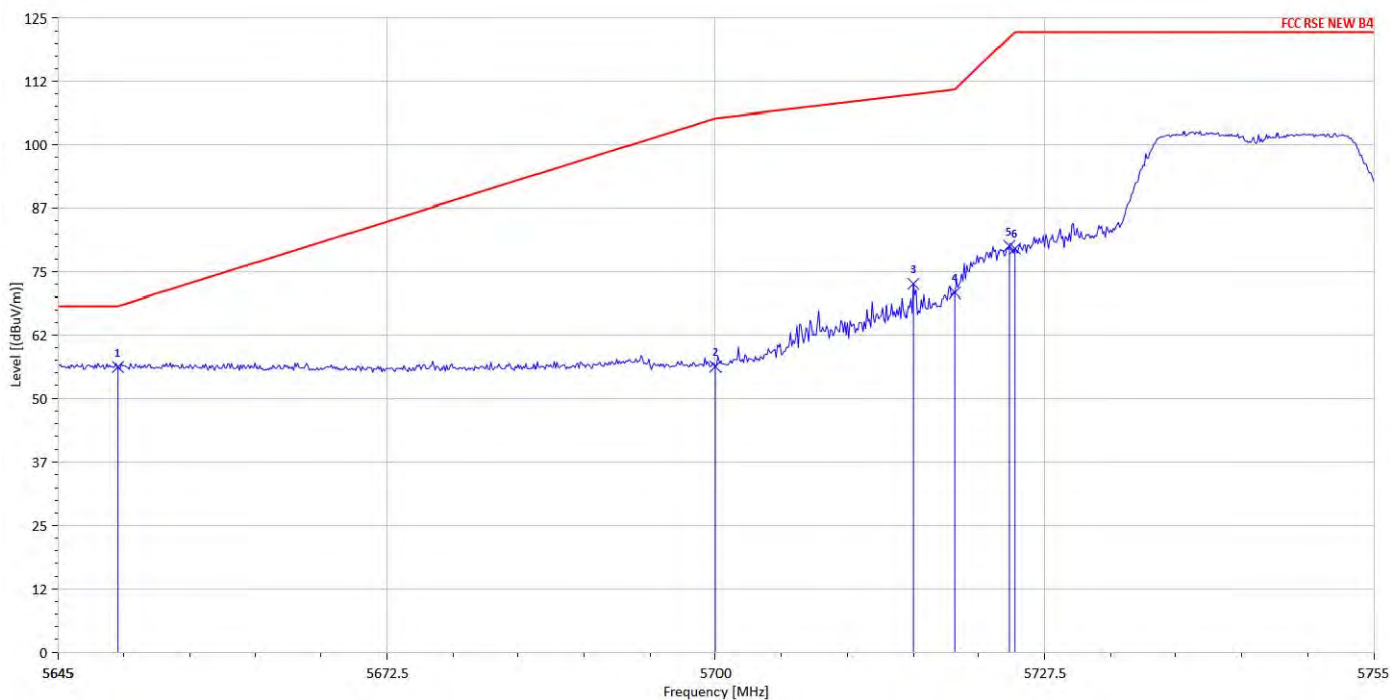
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Operation Mode :	802.11n20	Test Date :	2016/12/7
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5650.00	S	Peak	46.84	9.33	56.17	68.23	-12.06
5700.00	S	Peak	46.80	9.44	56.23	105.23	-49.00
5716.50	S	Peak	63.27	9.27	72.54	109.85	-37.31
5720.00	S	Peak	61.54	9.28	70.82	110.83	-40.01
5724.53	S	Peak	70.78	9.30	80.08	121.1579	-41.08
5725.00	E	Peak	70.25	9.30	79.55	122.23	-42.68

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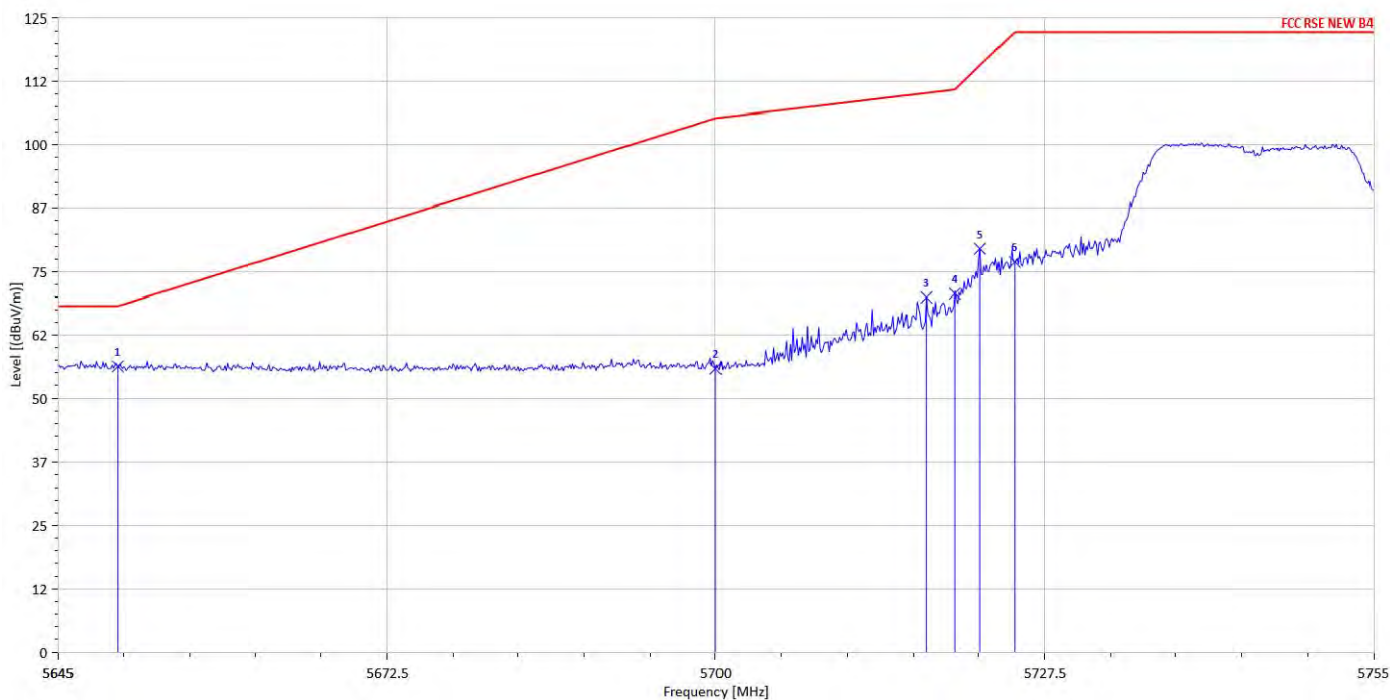
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Operation Mode :	802.11n20	Test Date :	2016/12/7
Fundamental Frequency :	5745 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
5650.00	S	Peak	46.95	9.33	56.28	68.23	-11.95
5700.00	S	Peak	46.39	9.44	55.83	105.23	-49.40
5717.60	S	Peak	60.64	9.27	69.91	110.158	-40.25
5720.00	S	Peak	61.38	9.28	70.67	110.83	-40.16
5722.11	S	Peak	70.24	9.29	79.53	115.6405	-36.11
5725.00	E	Peak	67.59	9.30	76.89	122.23	-45.34

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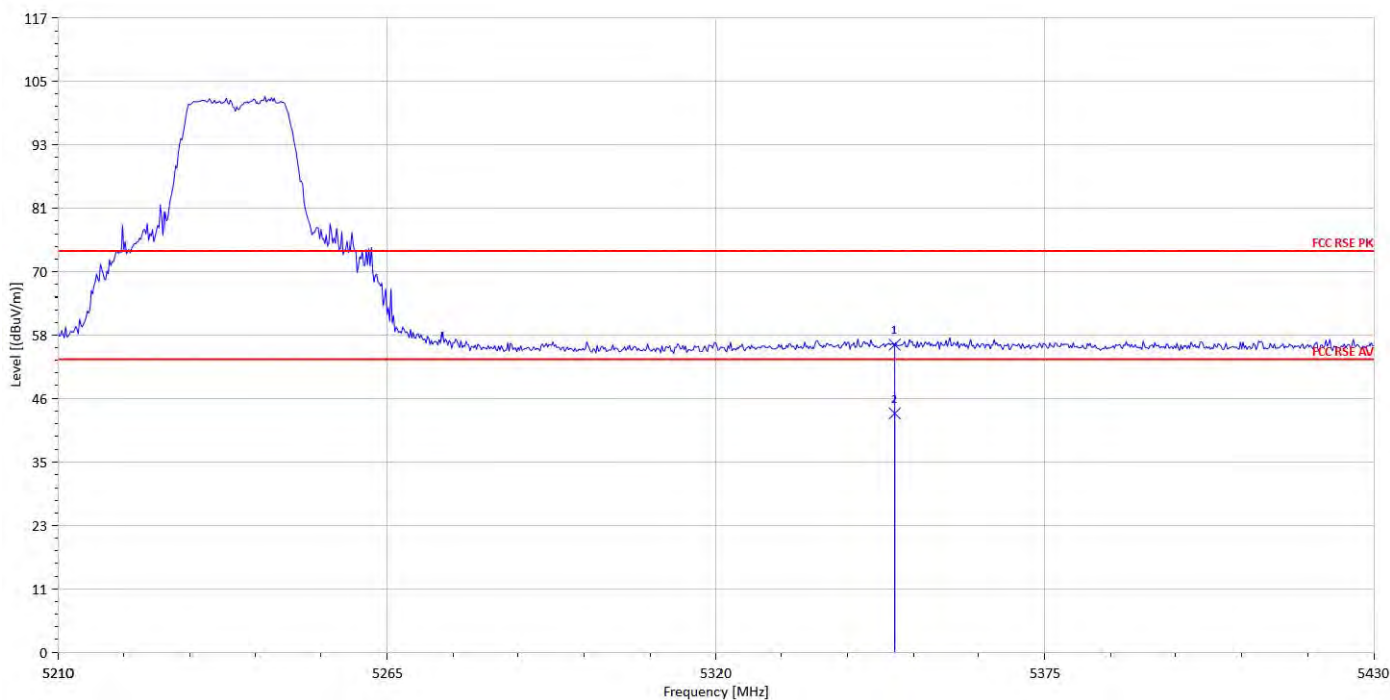
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Operation Mode :	802.11n20	Test Date :	2016/11/5
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5350.00	E	Peak	47.77	8.96	56.74	74	-17.26
5350.00	E	Average	35.15	8.96	44.11	54	-9.89

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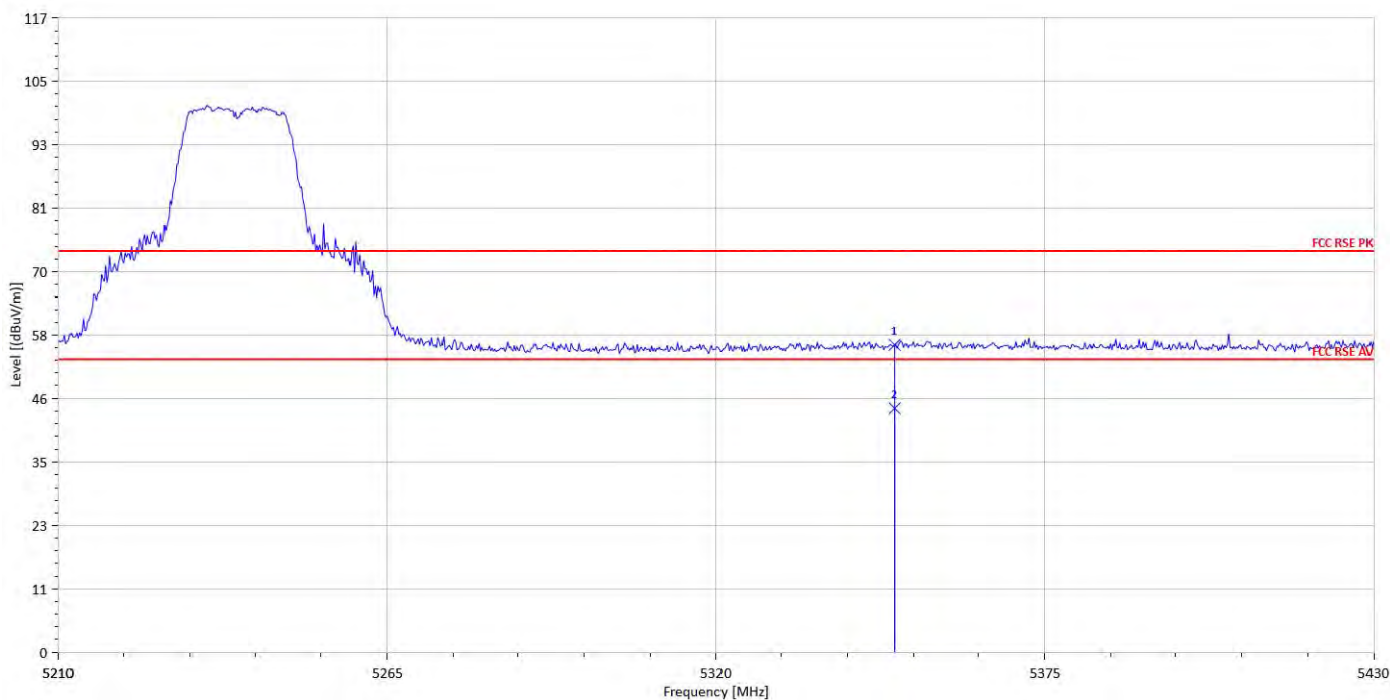
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Operation Mode :	802.11n20	Test Date :	2016/11/5
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
5350.00	E	Peak	47.74	8.96	56.70	74	-17.30
5350.00	E	Average	36.09	8.96	45.05	54	-8.95

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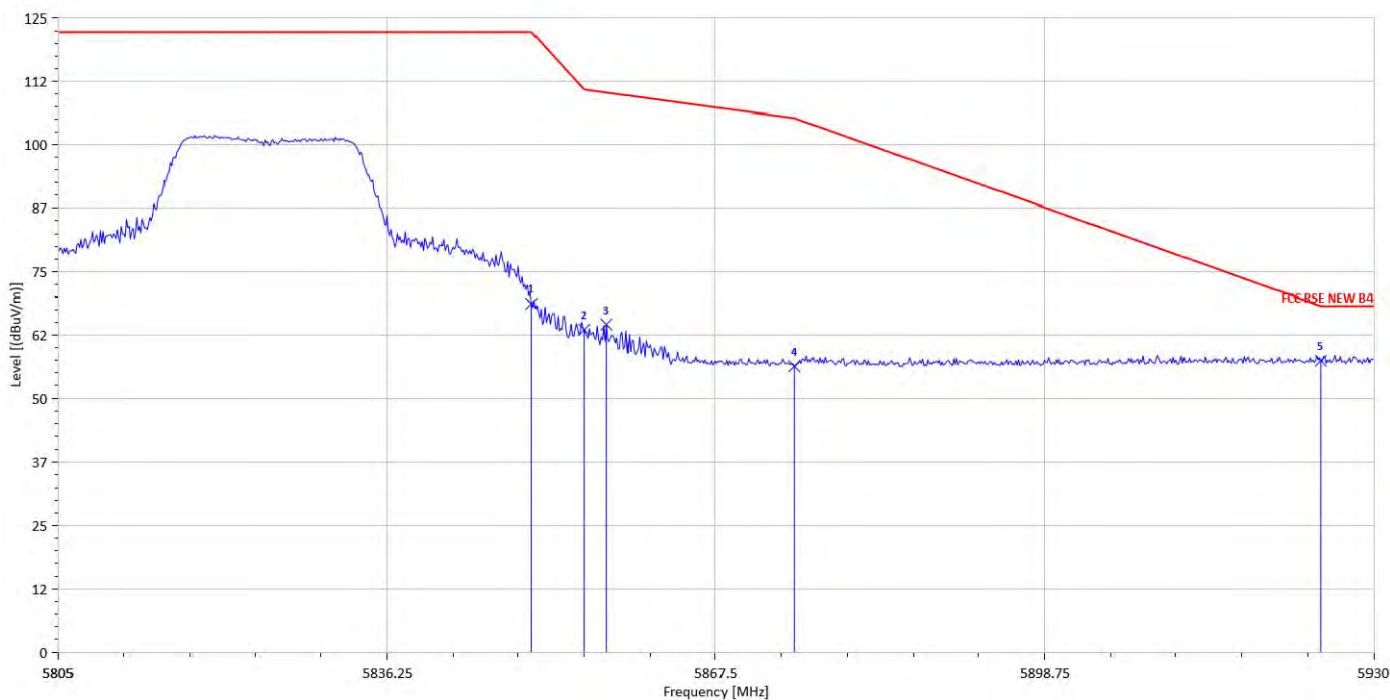
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Operation Mode :	802.11n20	Test Date :	2016/12/7
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5850.00	E	Peak	59.22	9.49	68.71	122.23	-53.52
5855.00	S	Peak	53.97	9.58	63.55	110.83	-47.28
5857.13	S	Peak	54.98	9.62	64.60	110.235	-45.63
5875.00	S	Peak	46.69	9.63	56.32	105.23	-48.91
5925.00	S	Peak	47.39	10.01	57.41	68.23	-10.82

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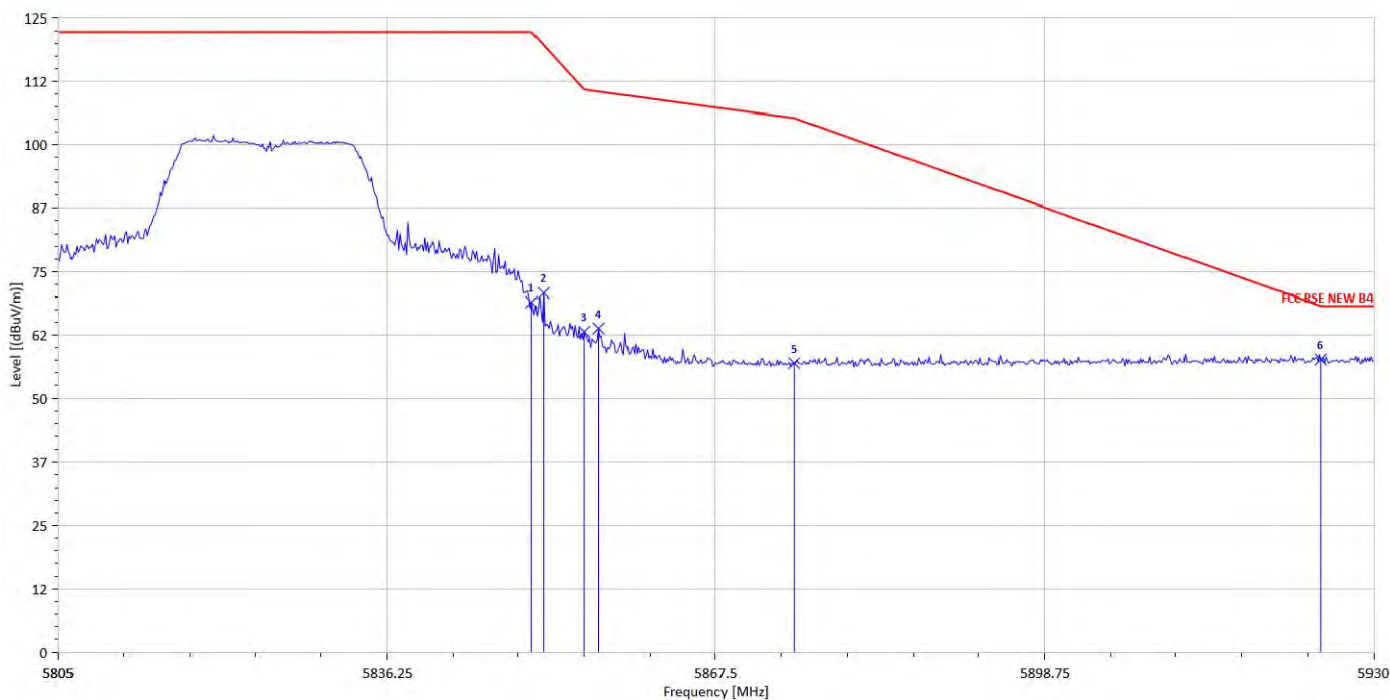
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Operation Mode :	802.11n20	Test Date :	2016/12/7
Fundamental Frequency :	5825 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
5850.00	E	Peak	59.49	9.49	68.97	122.23	-53.26
5851.13	S	Peak	61.25	9.51	70.76	119.665	-48.91
5855.00	S	Peak	53.57	9.58	63.15	110.83	-47.68
5856.38	S	Peak	54.22	9.61	63.83	110.445	-46.62
5875.00	S	Peak	47.30	9.63	56.93	105.23	-48.30
5925.00	S	Peak	47.66	10.01	57.67	68.23	-10.56

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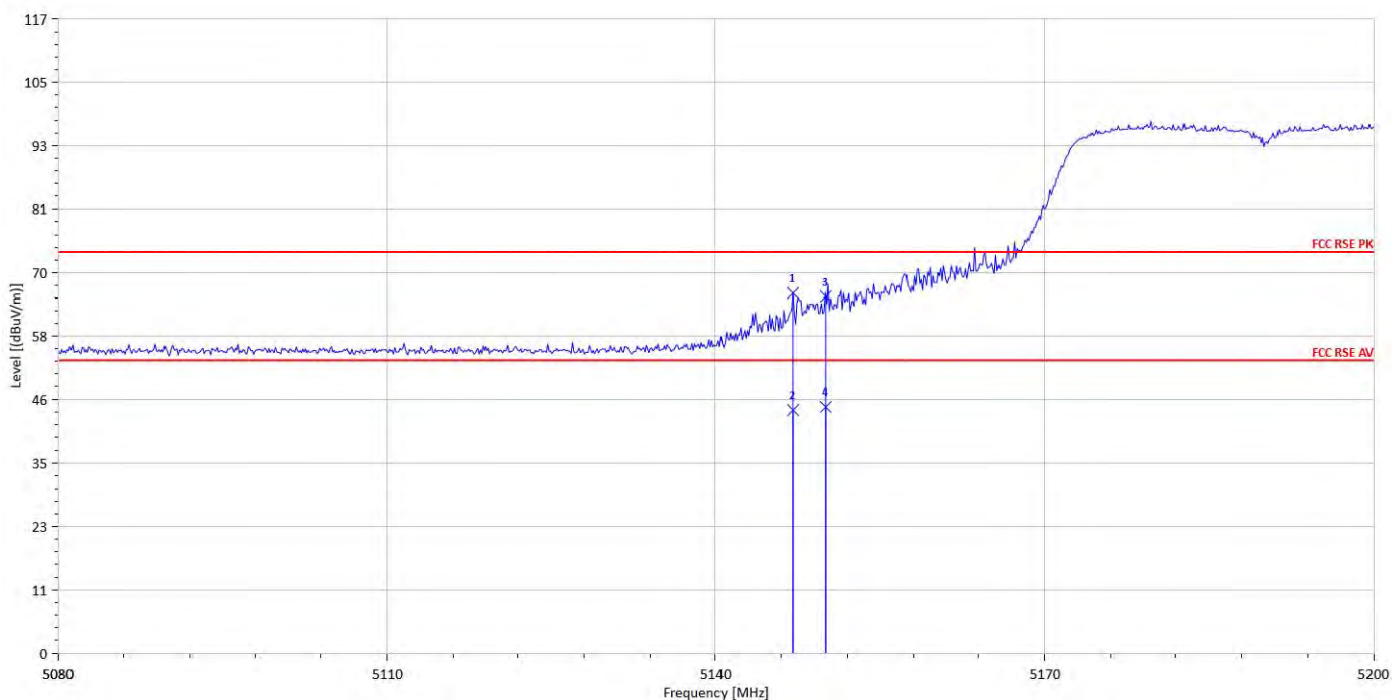
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802.11n40 HT mode

Operation Mode :	802.11n40	Test Date :	2016/11/5
Fundamental Frequency :	5190 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5147.08	S	Peak	58.24	8.17	66.41	74	-7.59
5147.08	S	Average	36.73	8.17	44.90	54	-9.10
5150.00	E	Peak	57.62	8.19	65.81	74	-8.19
5150.00	E	Average	37.29	8.19	45.48	54	-8.52

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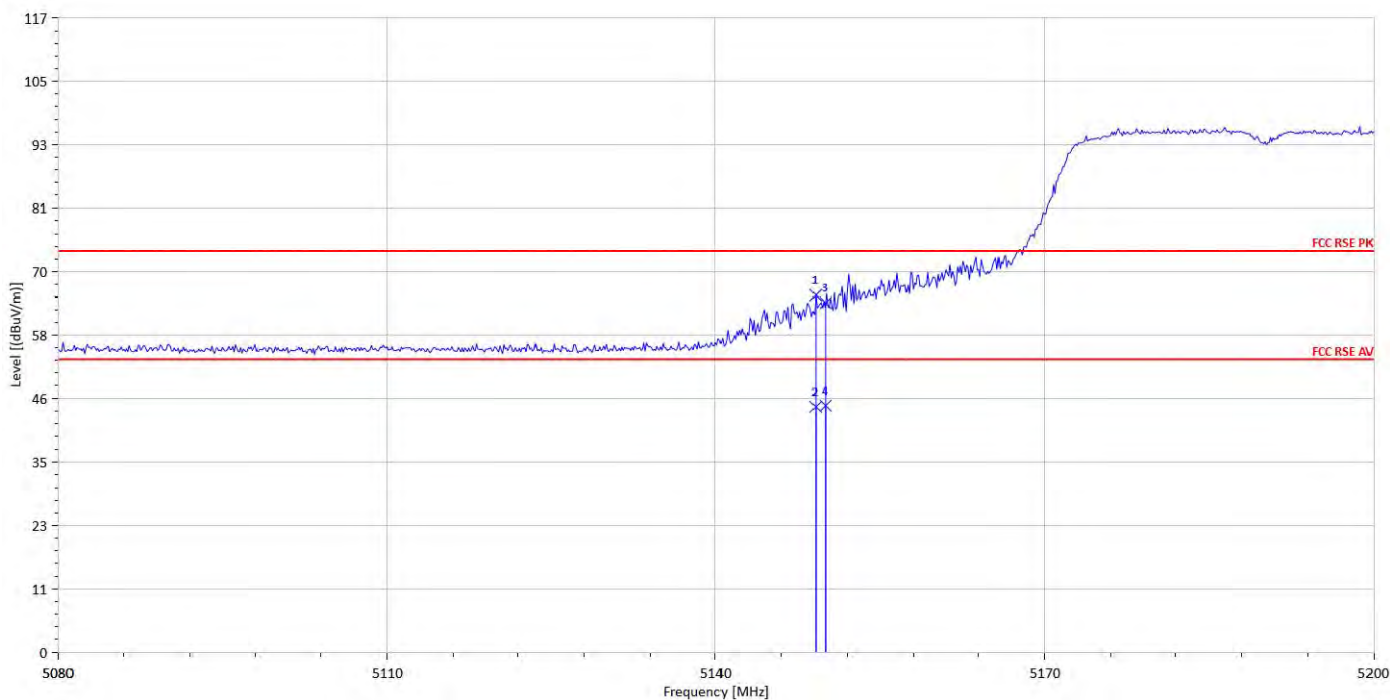
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Operation Mode :	802.11n40	Test Date :	2016/11/5
Fundamental Frequency :	5190 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5149.12	S	Peak	57.67	8.19	65.86	74	-8.14
5149.12	S	Average	37.14	8.19	45.33	54	-8.67
5150.00	E	Peak	56.26	8.19	64.45	74	-9.55
5150.00	E	Average	37.36	8.19	45.55	54	-8.45

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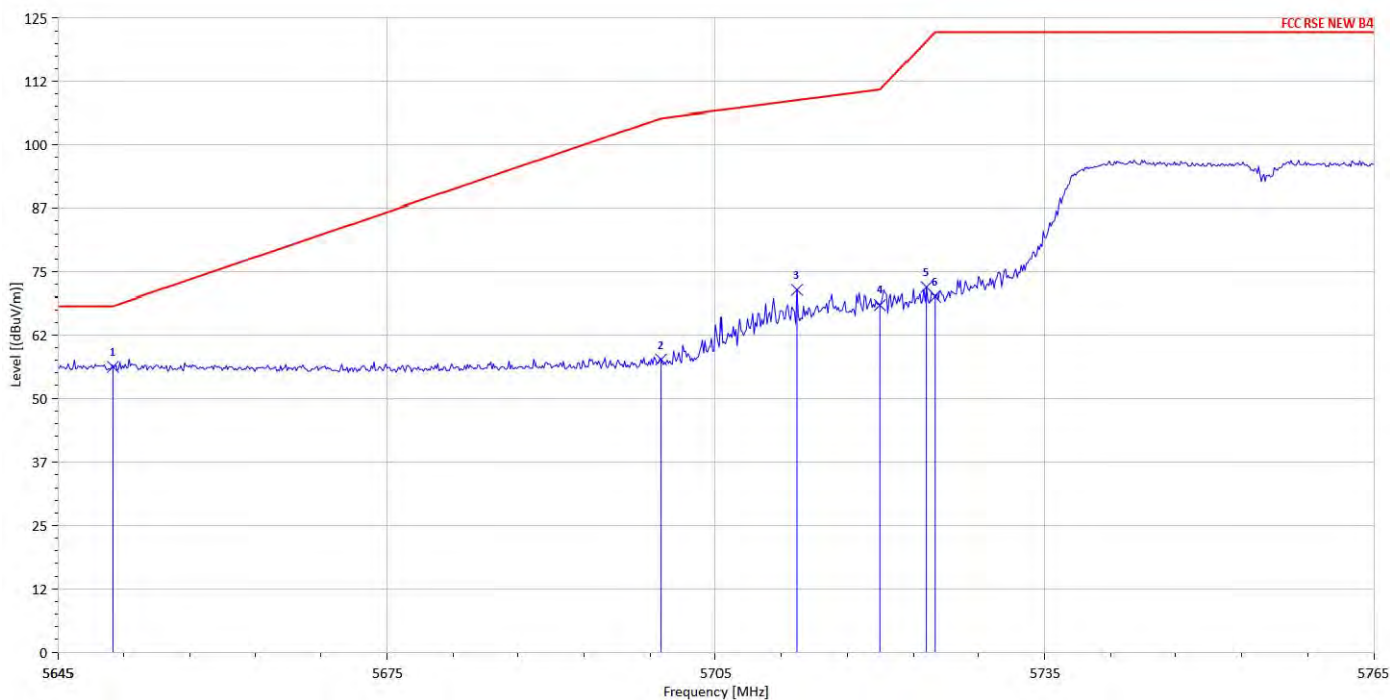
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Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	S	Peak	46.87	9.33	56.20	68.23	-12.03
5700.00	S	Peak	48.22	9.44	57.66	105.23	-47.57
5712.44	S	Peak	62.09	9.25	71.34	108.7132	-37.37
5720.00	S	Peak	59.20	9.28	68.48	110.83	-42.35
5724.20	S	Peak	62.60	9.30	71.90	120.4064	-48.51
5725.00	E	Peak	60.83	9.30	70.13	122.23	-52.10

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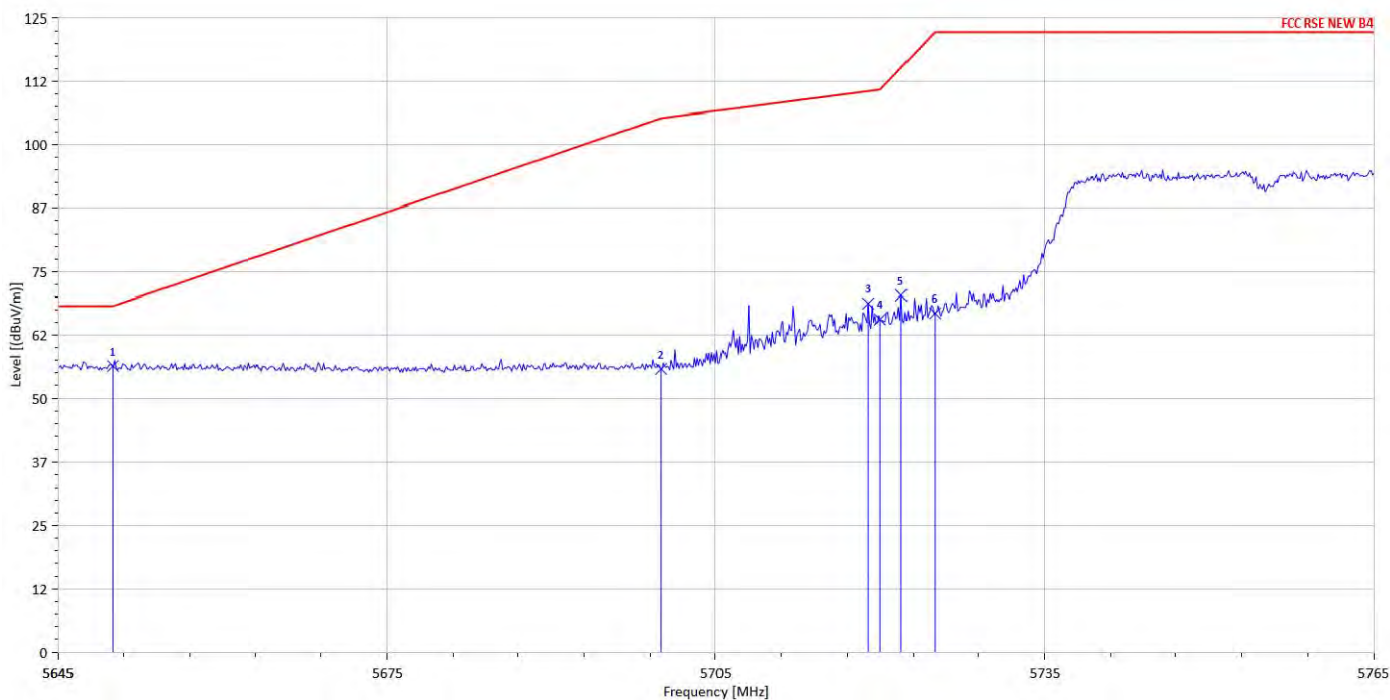
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Operation Mode :	802.11n40	Test Date :	2016/12/7
Fundamental Frequency :	5755 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	S	Peak	47.03	9.33	56.36	68.23	-11.87
5700.00	S	Peak	46.33	9.44	55.77	105.23	-49.46
5718.92	S	Peak	59.46	9.28	68.73	110.5276	-41.79
5720.00	S	Peak	56.31	9.28	65.59	110.83	-45.24
5721.92	S	Peak	61.05	9.29	70.34	115.2074	-44.87
5725.00	E	Peak	57.50	9.30	66.80	122.23	-55.43

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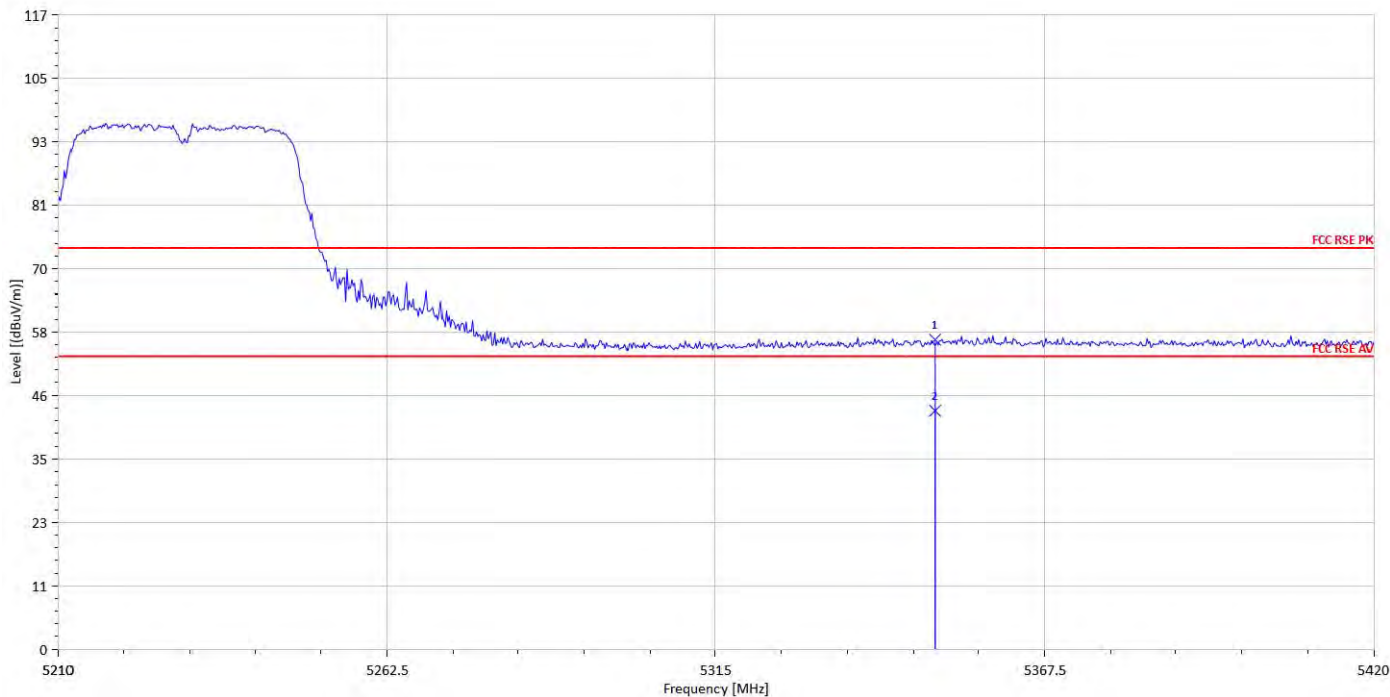
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Operation Mode :	802.11n40	Test Date :	2016/12/7
Fundamental Frequency :	5230 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5350.00	E	Peak	48.14	8.96	57.10	74	-16.90
5350.00	E	Average	35.08	8.96	44.04	54	-9.96

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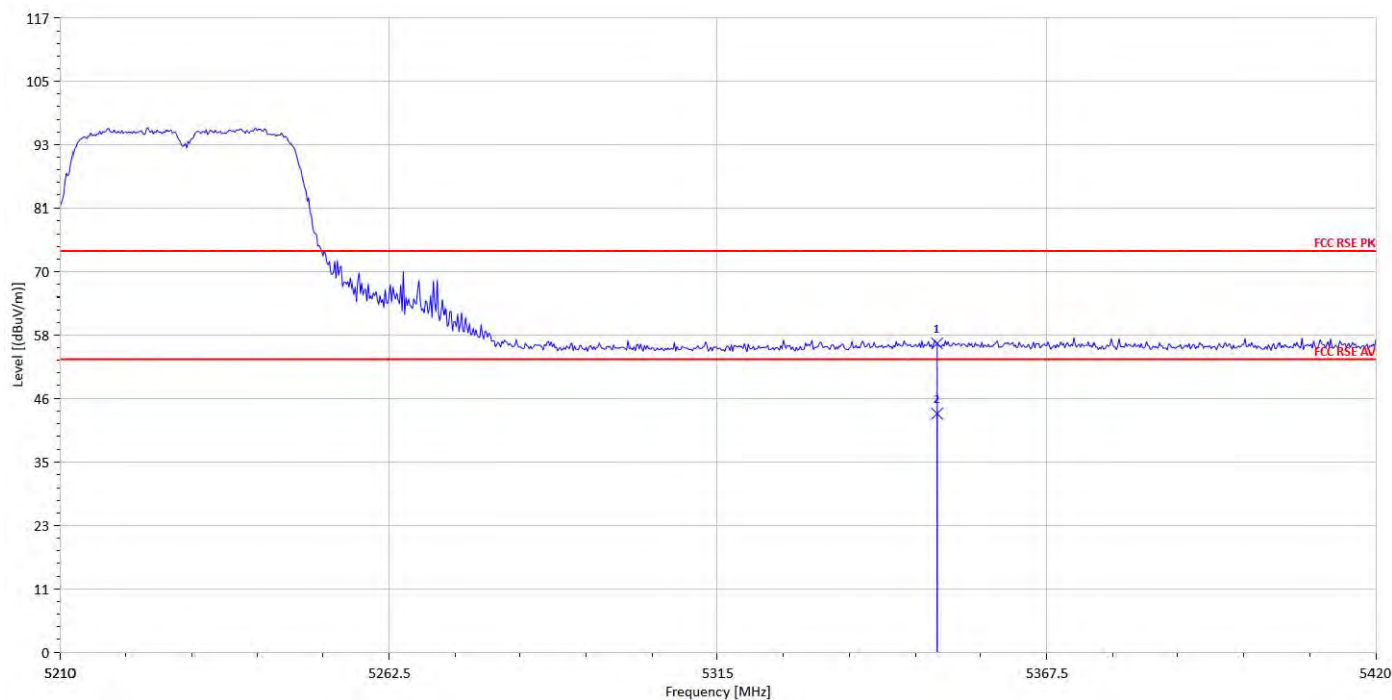
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Operation Mode :	802.11n40	Test Date :	2016/11/5
Fundamental Frequency :	5230 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	dB
		PK/QP/AV	dBuV		dBuV/m	dBuV/m	
5350.00	E	Peak	48.00	8.96	56.96	74	-17.04
5350.00	E	Average	35.10	8.96	44.06	54	-9.94

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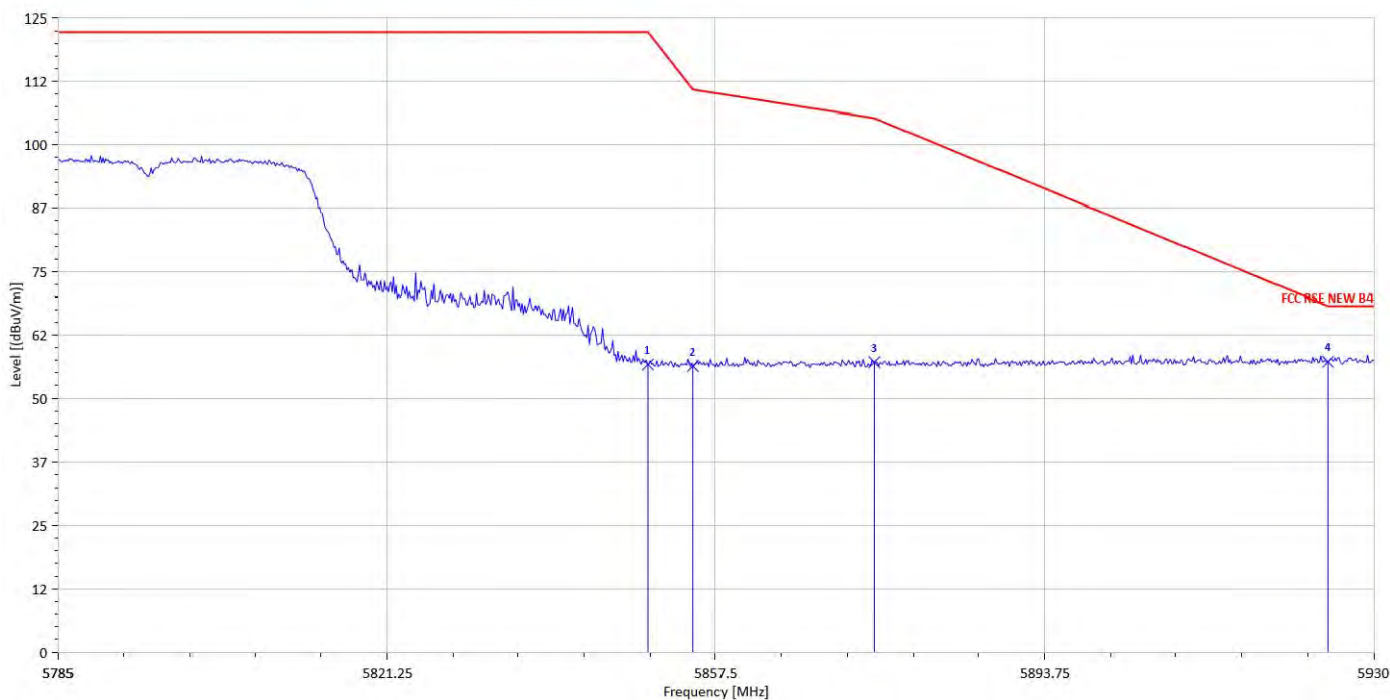
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Operation Mode :	802.11n40	Test Date :	2016/11/5
Fundamental Frequency :	5795 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5850.00	E	Peak	47.18	9.49	56.67	122.23	-65.56
5855.00	S	Peak	46.78	9.58	56.36	110.83	-54.47
5875.00	S	Peak	47.49	9.63	57.13	105.23	-48.10
5925.00	S	Peak	47.18	10.01	57.19	68.23	-11.04

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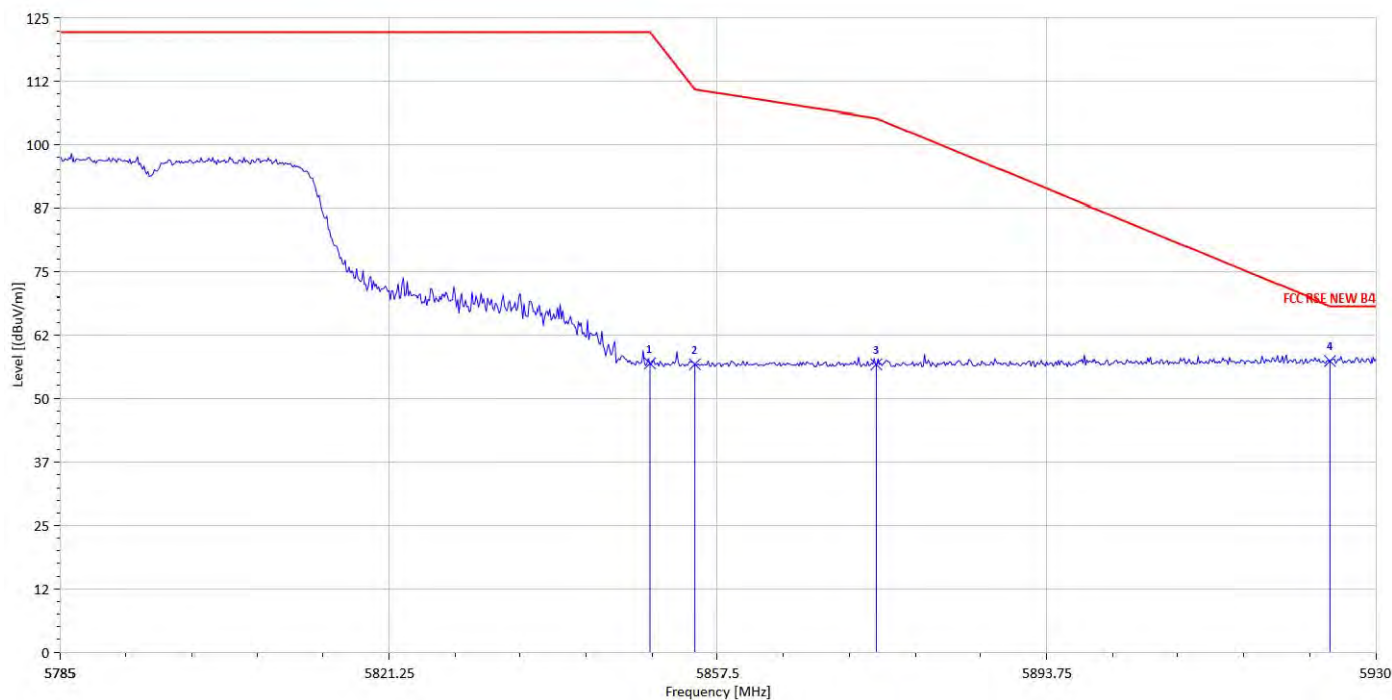
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Operation Mode :	802.11n40	Test Date :	2016/11/5
Fundamental Frequency :	5795 MHz	Temp. / Humi. :	25.1 deg_C/62 RH
Operation Band :	BE CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5850.00	E	Peak	47.40	9.49	56.89	122.23	-65.34
5855.00	S	Peak	47.14	9.58	56.72	110.83	-54.11
5875.00	S	Peak	47.05	9.63	56.68	105.23	-48.55
5925.00	S	Peak	47.34	10.01	57.35	68.23	-10.88

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12 TRANSMISSION IN THE ABSENCE OF DATA

12.1 Standard Applicable

According to §15.407(c)

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

12.2 Result

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

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13 FREQUENCY STABILITY

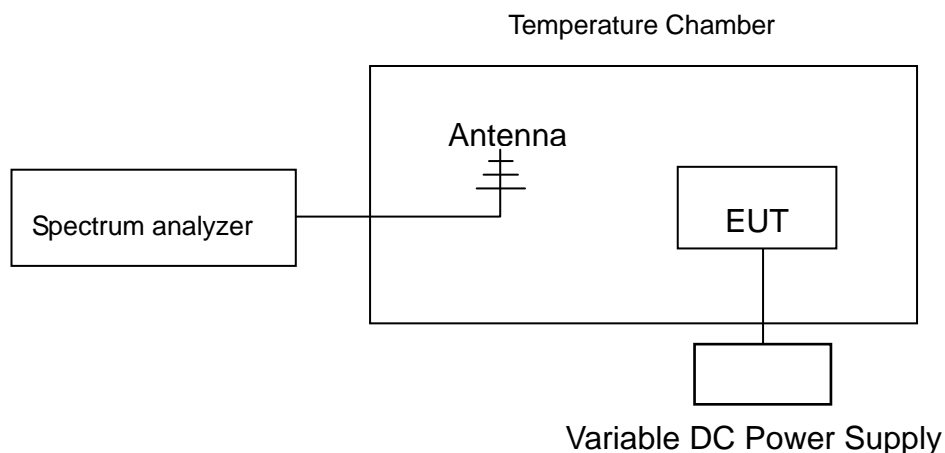
13.1 Standard Applicable

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

13.2 Measurement Procedure

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

13.3 Test SET-UP



13.4 Measurement Equipment Used:

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/16/2016	06/15/2017

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13.5 Measurement Result

Operation Mode	802.11 a	Test Date	2015.12.21
Temperature	:17	Test By	Cooper
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0	12.6V	36	5180	5,179.99970	0.00000006
		44	5220	5,219.99980	0.00000004
		48	5240	5,240.00090	-0.00000017
		149	5745	5,745.00080	-0.00000014
		157	5785	5,784.99920	0.00000014
		165	5825	5,824.99970	0.00000005
	9.6V	36	5180	5,180.00050	-0.00000010
		44	5220	5,220.00020	-0.00000004
		48	5240	5,220.00040	0.00381672
		149	5745	5,744.99980	0.00000003
		157	5785	5,785.00050	-0.00000009
		165	5825	5,824.99980	0.00000003

25	10.8V	36	5180	5,180.00080	-0.00000015
		44	5220	5,220.00070	-0.00000013
		48	5240	5,239.99940	0.00000011
		149	5745	5,744.99920	0.00000014
		157	5785	5,784.99940	0.00000010
		165	5825	5,825.00080	-0.00000014

50	12.6V	36	5180	5,180.00040	-0.00000008
		44	5220	5,220.00080	-0.00000015
		48	5240	5,240.00020	-0.00000004
		149	5745	5,745.00020	-0.00000003
		157	5785	5,785.00010	-0.00000002
		165	5825	5,824.99950	0.00000009
	9.6V	36	5180	5,179.99950	0.00000010
		44	5220	5,219.99970	0.00000006
		48	5240	5,240.00040	-0.00000008
		149	5745	5,745.00020	-0.00000003
		157	5785	5,785.00030	-0.00000005
		165	5825	5,824.99970	0.00000005

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Operation Mode	802.11 n_HT40	Test Date	2015.12.21
Temperature	:17	Test By	Cooper
Humidity	:65 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0	12.6V	38	5190	5,190.00050	-0.00000010
		46	5230	5,230.00080	-0.00000015
		151	5755	5,755.00080	-0.00000014
		159	5795	5,794.99920	0.00000014
	9.6V	38	5190	5,189.99920	0.00000015
		46	5230	5,230.00000	0.00000000
		151	5755	5,754.99960	0.00000007
		159	5795	5,794.99900	0.00000017

25	10.8V	38	5190	5,189.99960	0.00000008
		46	5230	5,230.00100	-0.00000019
		151	5755	5,754.99950	0.00000009
		159	5795	5,795.00060	-0.00000010
50	12.6V	38	5190	5,190.00070	-0.00000013
		46	5230	5,229.99920	0.00000015
		151	5755	5,754.99910	0.00000016
		159	5795	5,794.99960	0.00000007
	9.6V	38	5190	5,190.00080	-0.00000015
		46	5230	5,230.00060	-0.00000011
		151	5755	5,754.99910	0.00000016
		159	5795	5,794.99940	0.00000010

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14 ANTENNA REQUIREMENT

14.1 Standard Applicable

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

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

14.2 Antenna Connected Construction

An embedded-in antenna design is used.

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

~ End of Report ~

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