

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT AND INDUSTRY CANADA RSS 247 CLASS II & IV PC REPORT

OF

Product Name: Single Stream 802.11a/b/g/n/ac + BT4.1 M.2 Type Card
Brand Name: Qualcomm Atheros
Model No.: QCNFA435
Model Difference: N/A
FCC ID: PPD-QCNFA435
IC: 4104A-QCNFA435
Report No.: E2/2016/A0004
Issue Date: Oct. 26, 2016
FCC Rule Part: §15.247, Cat: DTS
IC Rule Part: RSS-247 issue 1 :2015
Prepared for: Qualcomm Atheros, Inc.
1700 Technology Drive, San Jose, CA 95110
Prepared by: SGS Taiwan Ltd.
Electronics & Communication Laboratory
No.2, Keji 1st Rd., Guishan Township, Taoyuan
County, Taiwan 333



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VERIFICATION OF COMPLIANCE

Applicant: Qualcomm Atheros, Inc.
1700 Technology Drive, San Jose, CA 95110

Product Name: Single Stream 802.11a/b/g/n/ac + BT4.1 M.2 Type Card

Brand Name: Qualcomm Atheros

Model No.: QCNFA435

Model Difference: N/A

FCC ID: PPD-QCNFA435

IC: 4104A-QCNFA435

File Number: E2/2016/A0004

Date of test: Oct. 03, 2016 ~ Oct. 26, 2016

Date of EUT Received: Oct. 03, 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:

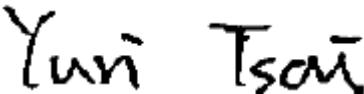


Date:

Oct. 26, 2016

Aken Huang / Engineer

Prepared By:



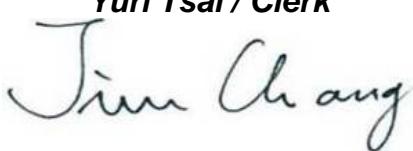
Date:

Oct. 26, 2016

Yuri Tsai / Clerk

Approved

By:



Date:

Oct. 26, 2016

Jim Chang / Asst. Manager

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Revision History

Report Number	Revision	Description	Issue Date
E2/2016/A0004	Rev.00	Initial creation of document	Oct. 26, 2016

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1 GENERAL INFORMATION

1.1 Product description

General Information of Host:

Product Name of Host:	Notebook Computer
Brand Name:	acer
FCC Marketing Name of Host:	SP513-51; SP113-31
IC Marketing Name of Host:	SP113-31
Model No. of Host:	N16W1
Model Difference:	N/A
Hardware Version:	version 1-1
Software Version:	Win 10
Model No. of BT/WLAN Module:	QCNFA435
Module FCC ID:	PPD-QCNFA435
Module IC:	4104A-QCNFA435
Scope:	The test report covers the radiated emissions requirements of the standards referenced in the report to allow system level approval of the module in this specific host.
Class II & Class IV Permissive change:	Single Stream 802.11a/b/g/n/ac + BT4.1 M.2 Type Card (QCNFA435) INSTALLED IN Notebook Computer
Power Supply:	15.2Vdc from Rechargeable Li-ion Battery or 19V by AC/DC Power Adapter
	Battery: Model No.: AC14B8K; Supplier: LGC
	Adapter: Model No.: PA-1450-26, Supplier: LITE-ON

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WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Peak)	Modulation Technology	Type of Emission
11b/g	2412-2462	11	b: 21.55dBm b: 19.69 (EIRP) g: 23.94dBm g: 18.69dBm (EIRP)	DSSS OFDM	b: 14M2G1D g: 16M8D1D
11n (2.4GHz)	HT20 / VHT20 2412-2462	11	VHT20: 23.55dBm VHT20: 18.73 (EIRP)	OFDM	17M8D1D
11n (2.4GHz)	HT40 / VHT40 2422-2452	11	VHT40: 23.54dBm VHT40: 17.68 (EIRP)	OFDM	36M4D1D
Antenna Designation:		PIFA Antenna, Gain: 0.73dBi			
Modulation type		CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM			
Transition Rate:		802.11 b: 1/2/5.5/11 Mbps; 802.11 g: 6/9/12/18/24/36/48/54 Mbps 802.11 HT20 / VHT20MHz: 6.5 – 65Mbps 802.11 HT40 / VHT40MHz: 13.5 – 135Mbps			

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1.2 Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is Notebook Computer supporting, Bluetooth and Wi-Fi 802.11 a/b/g/n/ac features, and below is details of information.

Product Feature	
Product Name of Host:	Notebook Computer
Brand Name:	acer
FCC Marketing Name of Host:	SP513-51; SP113-31
IC Marketing Name of Host:	SP113-31
Model No. of Host:	N16W1
Model Difference:	N/A
Module FCC ID:	PPD-QCNFA435
Module IC :	4104A-QCNFA435
Bluetooth Version	V4.1 dual mode
Wi-Fi Specification	802.11a/b/g/n/ac

Note: The above EUT information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 DTS Meas. Guidance v03r05

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

Canada RSS-247 issue 1: 2015

RSS-Gen Issue 4:2014

ANSI C63.10:2013

Note:

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

1.4 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

Canada Registration Number: 4620A-5

1.5 Special Accessories

There is no special accessory used while test was conducted.

1.6 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 plan. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Radiated Emissions

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

2.4 Measurement Results Explanation Example

For all conducted test items:

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

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2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission Configuration

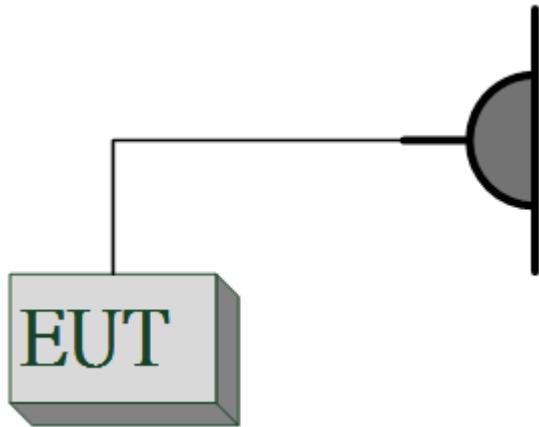


Fig. 2-2 Conducted (Antenna Port) Configuration

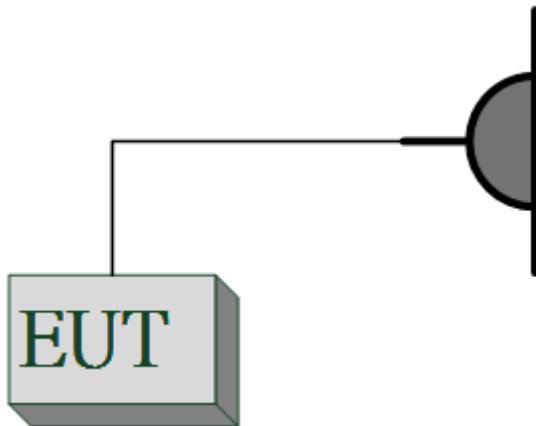


Table 2-1 Equipment Used in Tested System

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

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3 SUMMARY OF TEST RESULTS

FCC / IC Rules	Description Of Test	Result
§15.247(b) (3) RSS-247 §5.4 (2)	Peak Output Power	Compliant
§15.247(d) RSS-247 §5.5	Spurious Emission	Compliant
§15.203 RSS- Gen §6.7 RSS- Gen §8.3	Antenna Requirement	Compliant

4 DESCRIPTION OF TEST MODES

4.1 Operated in 2400 ~ 2483.5MHz Band

11 channels are provided for 802.11b, 802.11g and 802.11n HT20, VHT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412 MHz	7	2442 MHz
2	2417 MHz	8	2447 MHz
3	2422 MHz	9	2452 MHz
4	2427 MHz	10	2457 MHz
5	2432 MHz	11	2462 MHz
6	2437 MHz		

7 channels are provided for 802.11n HT40, VHT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422 MHz	7	2442 MHz
4	2427 MHz	8	2447 MHz
5	2432 MHz	9	2452 MHz
6	2437 MHz		

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RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11g	1 to 11	1, 6, 11	OFDM	6	Main
RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	MODE	MODE	MODE	MODE	MODE
802.11b	1 to 11	1, 6, 11	DSSS	1	Main
802.11g	1 to 11	1, 6, 11	OFDM	6	Main
802.11n (VHT20)	1 to 11	1, 6, 11	OFDM	MCS0	Main
802.11n (VHT40)	3 to 9	3, 6, 9	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/b/g/n WLAN Transmitter for channel Low, Mid and High, the worst case H position was tested as resulted in pre-scanned measurement.

Pre-scanned was done on Antenna Main and Antenna Aux, and Antenna Main results higher emission at 2.4GHz. Therefore, the completed set of measurement was done on Antenna Main (2.4GHz) to be presented on this test report.

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 11	1, 6, 11	DSSS	1	MAIN
802.11g	1 to 11	1, 6, 11	OFDM	6	MAIN
802.11n (VHT20)	1 to 11	1, 6, 11	OFDM	MCS0	MAIN
802.11n (VHT40)	3 to 9	3, 6, 9	OFDM	MCS0	MAIN

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 1.55dB (for Spectrum) +/- 1.42 dB (for Power Meter)
6dB Bandwidth	+/- 123.36 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 1.55 dB
Peak Power Density	+/- 1.55 dB
99% Power Bandwidth	+/- 123.36 Hz
Temperature	+/- 0.8 °C
Humidity	+/- 4.7 %
DC / AC Power Source	DC= +/- 1%, 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 - 126GHz: +/- 4.04dB
	126GHz - 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 - 126GHz: +/- 4.08dB
	126GHz - 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 DUTY CYCLE OF TEST SIGNAL

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

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

Formula:

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

Measurement Procedure:

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

Duty Cycle:

	Duty Cycle (%)	Duty Factor (dB)
802.11b	98.31	0.07
802.11g	92.71	0.33
802.11ac_20	94.72	0.24
802.11ac_40	89.97	0.46

$$b = 98.31\%, g = 92.71\%, ac_ht_20 = 94.72\%, ac_ht40 = 89.97\%$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9831) = 0.07$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9271) = 0.33$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9472) = 0.24$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.8997) = 0.46$$

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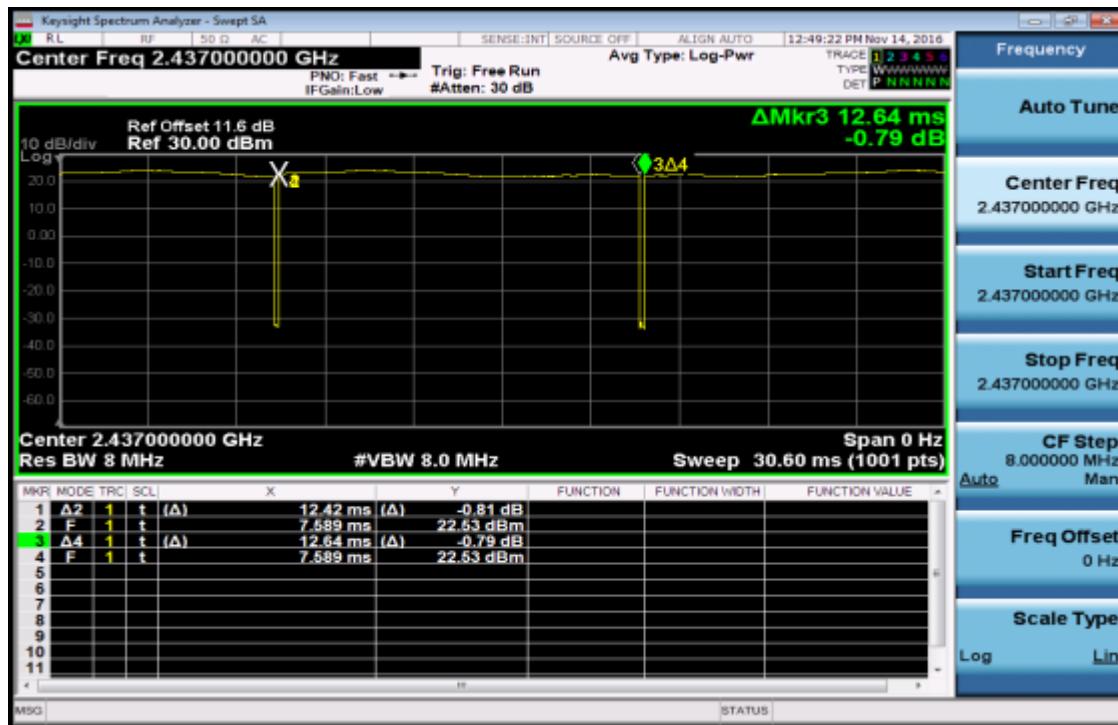
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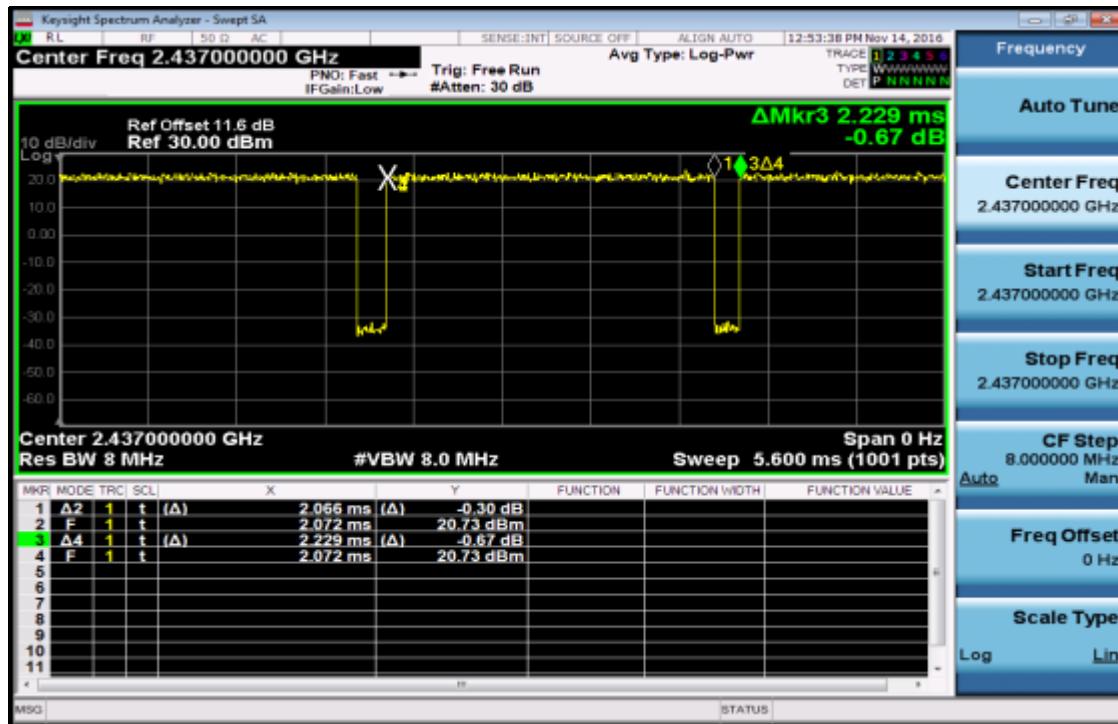
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6.1 Duty Cycle Test Signal Measurement Result

802.11 b



802.11 g

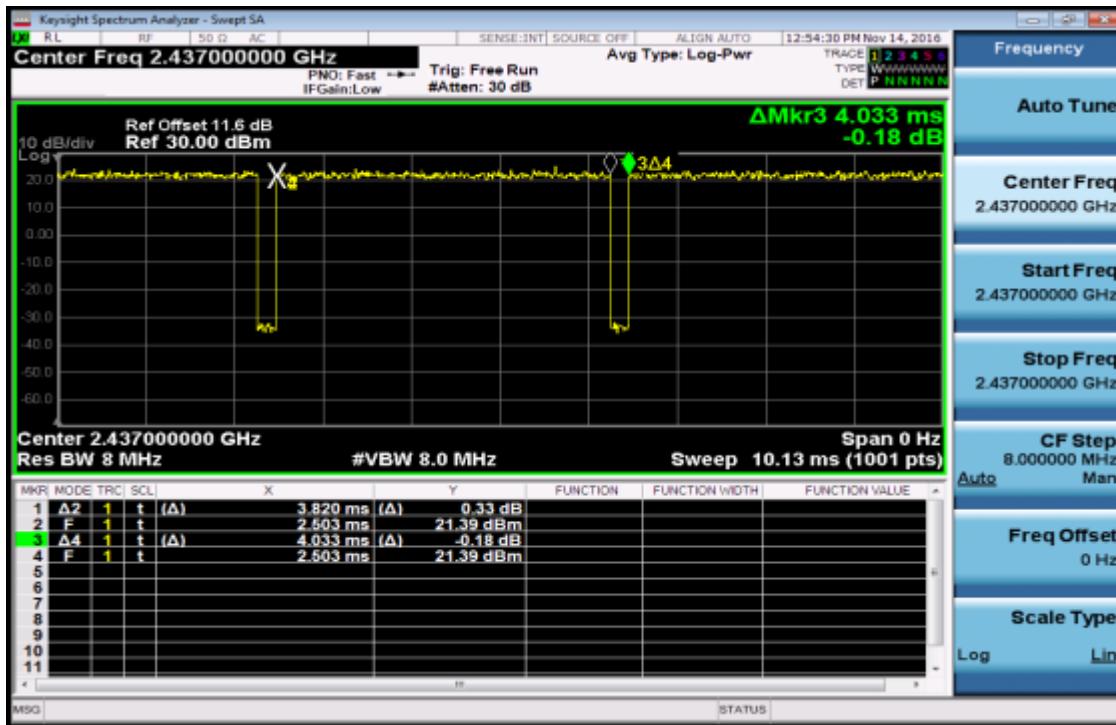


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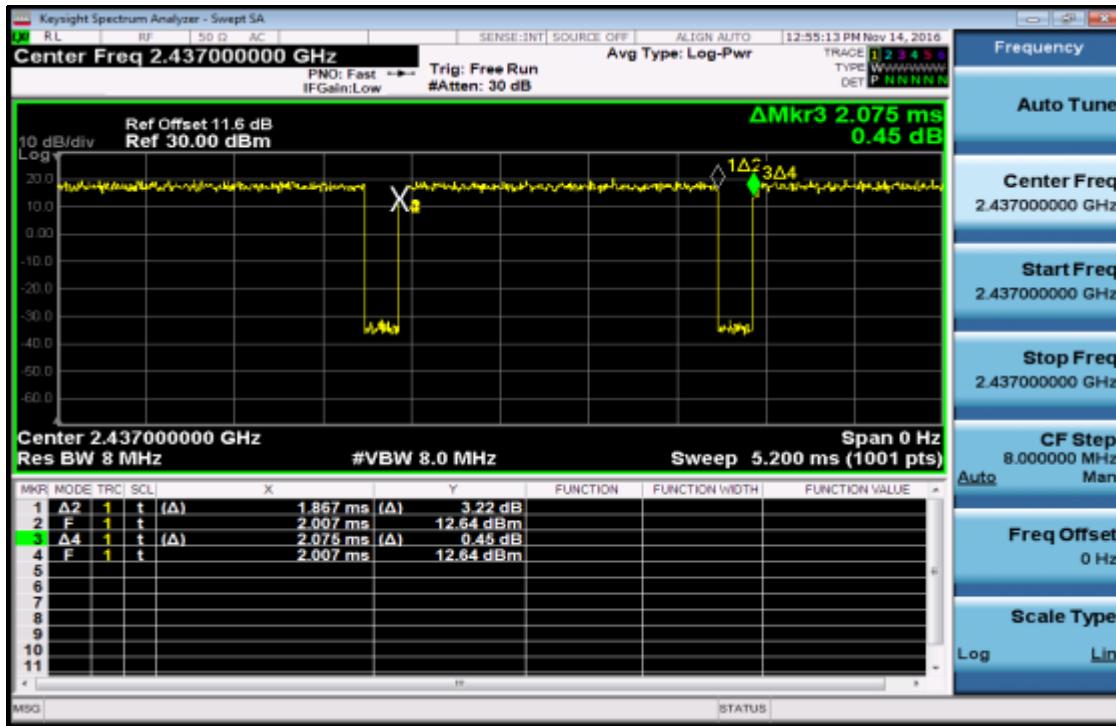
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802.11 n_20 MHz



802.11 n_40 MHz



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7 PEAK OUTPUT POWER MEASUREMENT

7.1 Standard Applicable:

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt.

If the transmitting antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

7.2 Measurement Equipment Used:

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
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	12/12/2015	12/11/2016
DC Block	PASTERNACK	PE8210	RF29	12/12/2015	12/11/2016
Splitter	RF-LAMBAD	RFLT2W1G126G	RF35	12/12/2015	12/11/2016
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017

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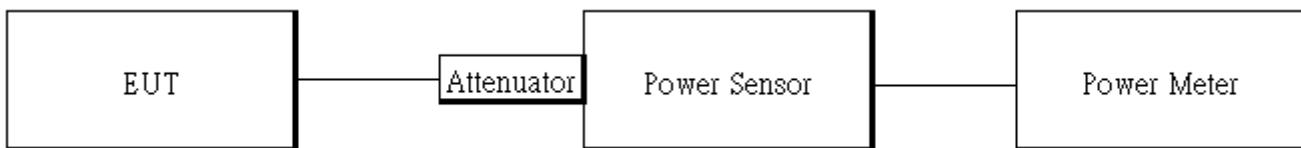
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7.3 Test Set-up:

Power Meter:



7.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.

Power Meter:

It is used as the auxiliary test equipment to conduct the output power measurement.

4. Record the max. Reading as observed from Spectrum or Power Meter.
5. For MIMO operation, measurement is done per chain basis, and then sum the simultaneous transmitting output in linear.

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7.5 Measurement Result (Worst Case Data Rate):

802.11b

CH	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit
1	2412	1	21.55	142.89	1 Watt = 30
6	2437	1	21.42	138.68	1 Watt = 30
11	2462	1	21.19	131.52	1 Watt = 30

CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit
1	2412	1	18.96	78.70	1 Watt = 30
6	2437	1	18.88	77.27	1 Watt = 30
11	2462	1	18.75	74.99	1 Watt = 30

802.11g

CH	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit
1	2412	1	22.64	183.65	1 Watt = 30
6	2437	1	23.94	247.74	1 Watt = 30
11	2462	1	22.13	163.31	1 Watt = 30

CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit
1	2412	1	15.71	37.24	1 Watt = 30
6	2437	1	17.96	62.52	1 Watt = 30
11	2462	1	16.22	41.88	1 Watt = 30

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802.11ac_HT20

CH	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit
1	2412	1	22.69	185.78	1 Watt = 30
6	2437	1	23.55	226.46	1 Watt = 30
11	2462	1	21.42	138.68	1 Watt = 30

CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit
1	2412	1	15.95	39.36	1 Watt = 30
6	2437	1	18.00	63.10	1 Watt = 30
11	2462	1	15.46	35.16	1 Watt = 30

802.11ac_HT40

CH	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit
1	2412	1	20.29	106.91	1 Watt = 30
6	2437	1	23.54	225.94	1 Watt = 30
11	2462	1	19.37	86.50	1 Watt = 30

CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit
1	2412	1	15.35	34.28	1 Watt = 30
6	2437	1	16.95	49.55	1 Watt = 30
11	2462	1	13.48	22.28	1 Watt = 30

* Note: The duty cycle factor is compensated back to obtain the maximum value of the measurement in average.

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EIRP Measurement: 802.11b

CH	Frequency (MHz)	Avg. Output Power		GAIN (dBi)	EIRP	REQUIRED LIMIT (dBm)	RESULT
		TOTAL POWER (dBm)	TOTAL POWER (mW)				
1	2412	18.96	78.705	0.73	19.69	36	PASS
6	2437	18.88	77.268	0.73	19.61	36	PASS
11	2462	18.75	74.989	0.73	19.48	36	PASS

802.11g

CH	Frequency (MHz)	Avg. Output Power		GAIN (dBi)	EIRP	REQUIRED LIMIT (dBm)	RESULT
		TOTAL POWER (dBm)	TOTAL POWER (mW)				
1	2412	15.71	37.239	0.73	16.44	36	PASS
6	2437	17.96	62.517	0.73	18.69	36	PASS
11	2462	16.22	41.879	0.73	16.95	36	PASS

802.11ac_HT20

CH	Frequency (MHz)	Avg. Output Power		GAIN (dBi)	EIRP	REQUIRED LIMIT (dBm)	RESULT
		TOTAL POWER (dBm)	TOTAL POWER (mW)				
1	2412	15.95	39.355	0.73	16.68	36	PASS
6	2437	18.00	63.096	0.73	18.73	36	PASS
11	2462	15.46	35.156	0.73	16.19	36	PASS

802.11ac_HT40

CH	Frequency (MHz)	Avg. Output Power		GAIN (dBi)	EIRP	REQUIRED LIMIT (dBm)	RESULT
		TOTAL POWER (dBm)	TOTAL POWER (mW)				
3	2422	15.35	34.277	0.73	16.08	36	PASS
6	2437	16.95	49.545	0.73	17.68	36	PASS
9	2452	13.48	22.284	0.73	14.21	36	PASS

* Note: EIRP = Average Power + Gain, where the nominal gain of the antenna 1.08dBi for 2.4GHz

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8 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

8.1 Standard Applicable:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands must also comply with the §15.209 limit as below.

And according to §15.33(a) (1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

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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8.2 Measurement Equipment Used:

SGS 966 Chamber No.C					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI Test Re-ceiver	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	10/28/2015	10/27/2016
Horn Antenna	ETS-Lindgren	3117	00143272	12/16/2015	12/15/2016
Horn Antenna	Schwarzbeck	BBHA9170	185	07/18/2016	07/17/2017
Pre Amplifier	EMC Instruments	EMC330	980096	12/12/2015	12/11/2016
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/12/2015	12/11/2016
Pre Amplifier	R&S	SCU-18	10204	12/12/2015	12/11/2016
Pre Amplifier	R&S	SCU-26	100780	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-126G	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 126G-40G	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-126G	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 126G-40G	12/12/2015	12/11/2016
Attenuator	WOKEN	218FS-10	RF27	12/12/2015	12/11/2016
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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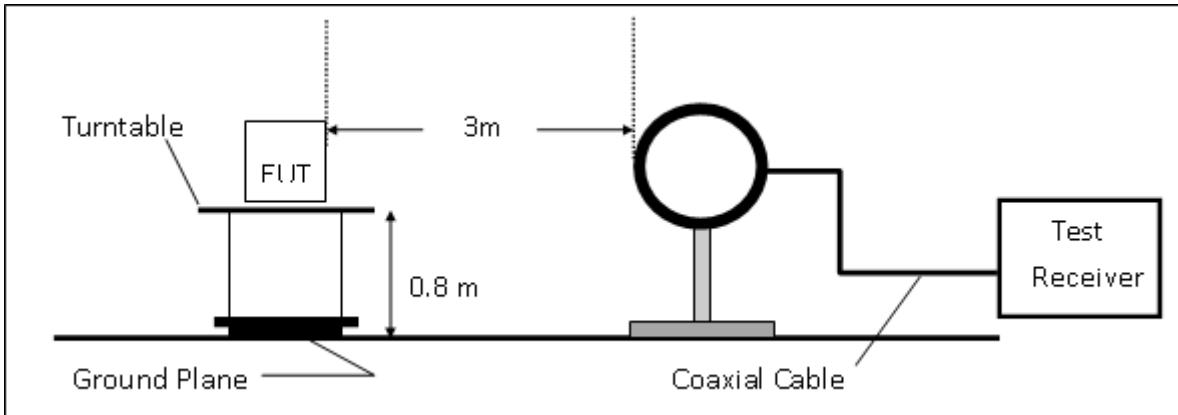
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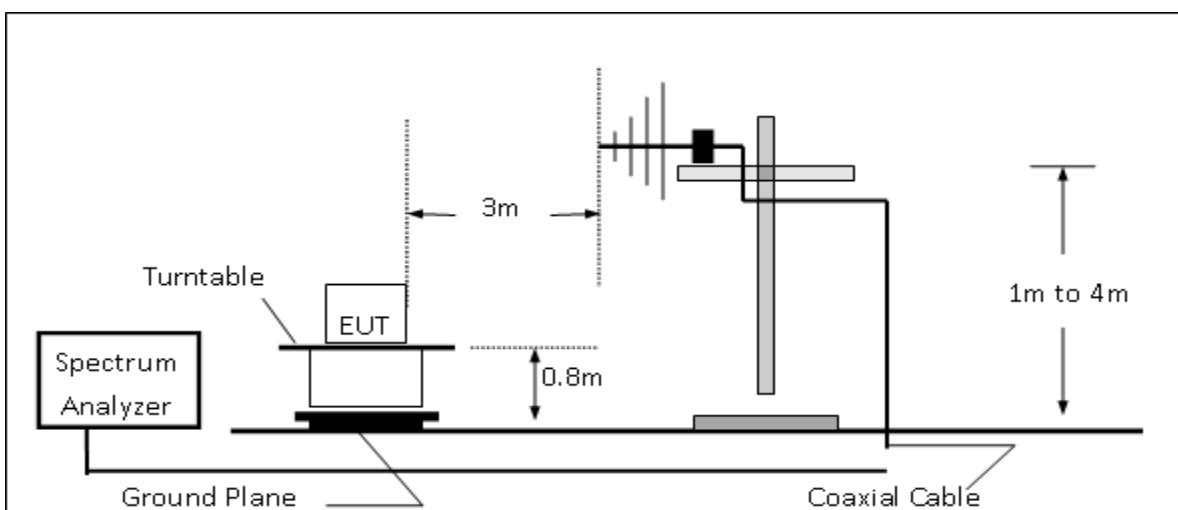
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8.3 Test SET-UP:

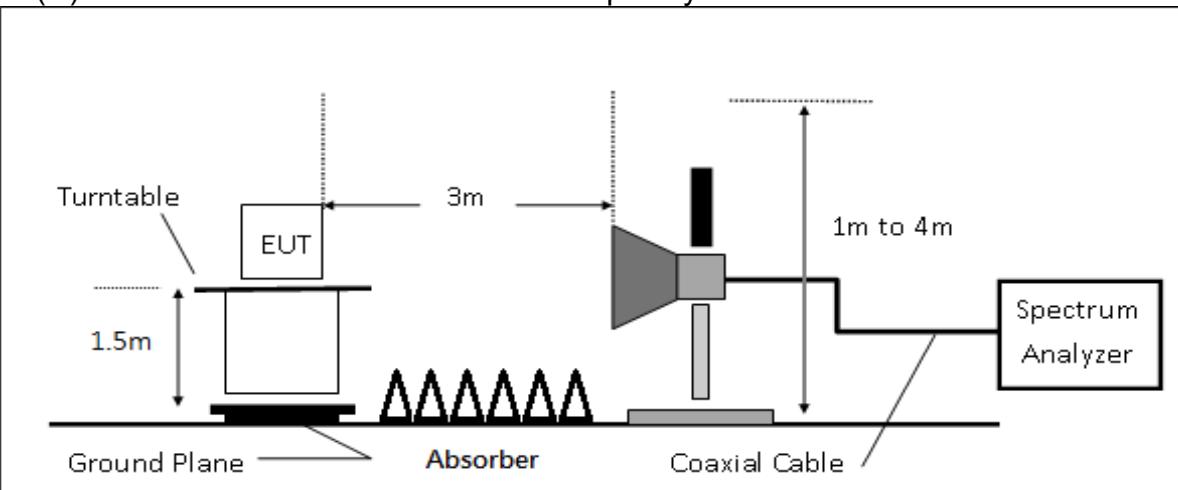
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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8.4 Measurement Procedure:

1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
2. The EUT was placed on a turn table with 0.8m for frequency < 1GHz and 1.5m for frequency > 1GHz above ground plane.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
5. When 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.
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 \geq 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
9. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
10. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
11. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
12. Repeat above procedures until all default test channel measured were complete.

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8.5 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(dB μ V/m) = SPA. Reading level(dB μ V) + Factor(dB)

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

Note :

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

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

8.6 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.

8.7 Measurement Result:

Note: Refer to next page tabular data sheets.

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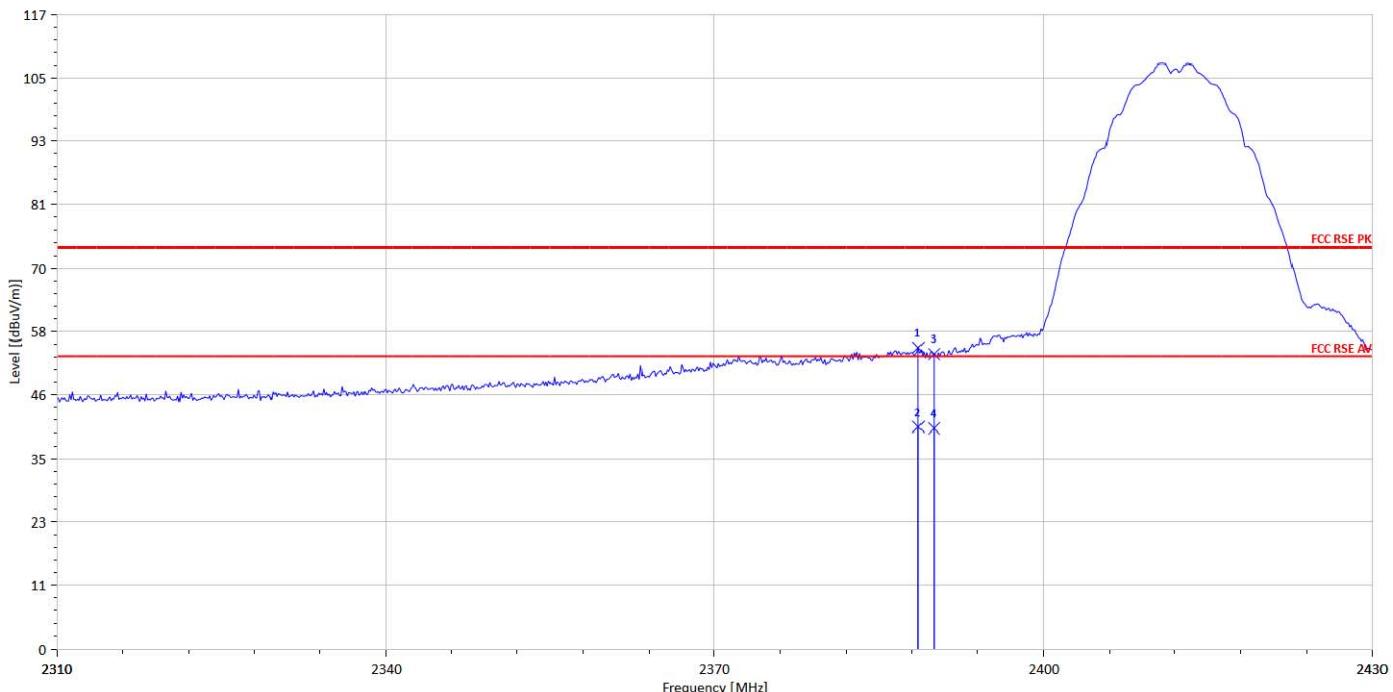
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Radiated Band Edge Measurement Result: 802.11 b mode

Operation Mode : 802.11b Test Date : 2016/10/12
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : BE CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



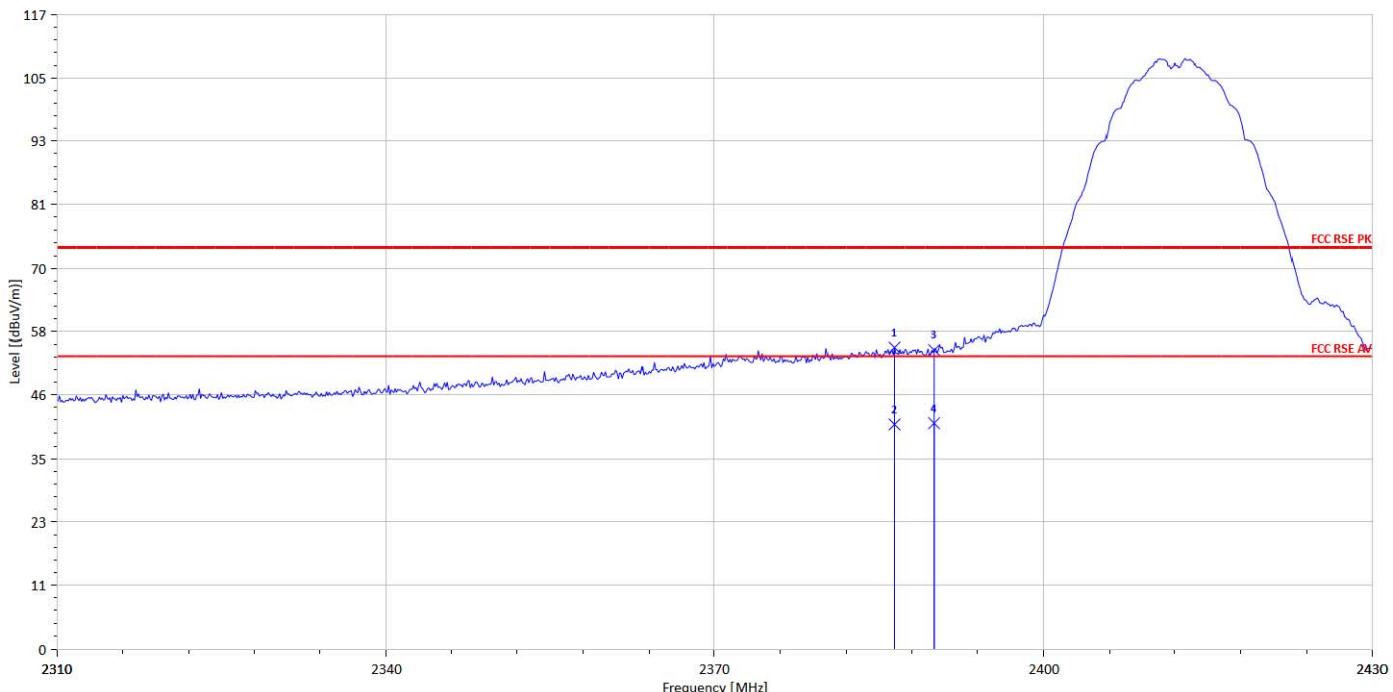
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
			Reading	Level dB μ V				
2388.60	S	Peak	54.68	0.90	55.58	74	-18.42	
2388.60	S	Average	40.02	0.90	40.92	54	-13.08	
2390.00	E	Peak	53.48	0.92	54.40	74	-19.60	
2390.00	E	Average	39.73	0.92	40.65	54	-13.35	

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Operation Mode : 802.11b Test Date : 2016/10/12
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : BE CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



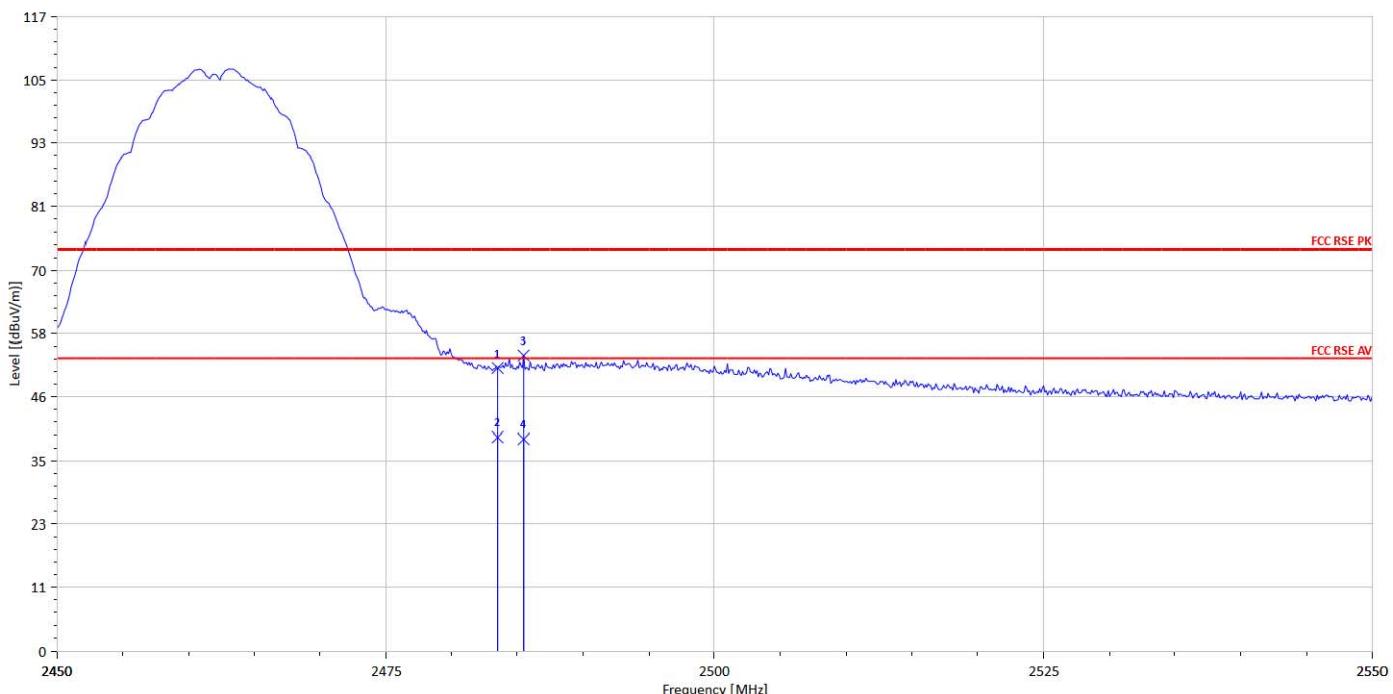
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2386.44	S	Peak	54.75	0.87	55.63	74	-18.37
2386.44	S	Average	40.44	0.87	41.31	54	-12.69
2390.00	E	Peak	54.24	0.92	55.17	74	-18.83
2390.00	E	Average	40.63	0.92	41.55	54	-12.45

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Operation Mode : 802.11b Test Date : 2016/10/12
 Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



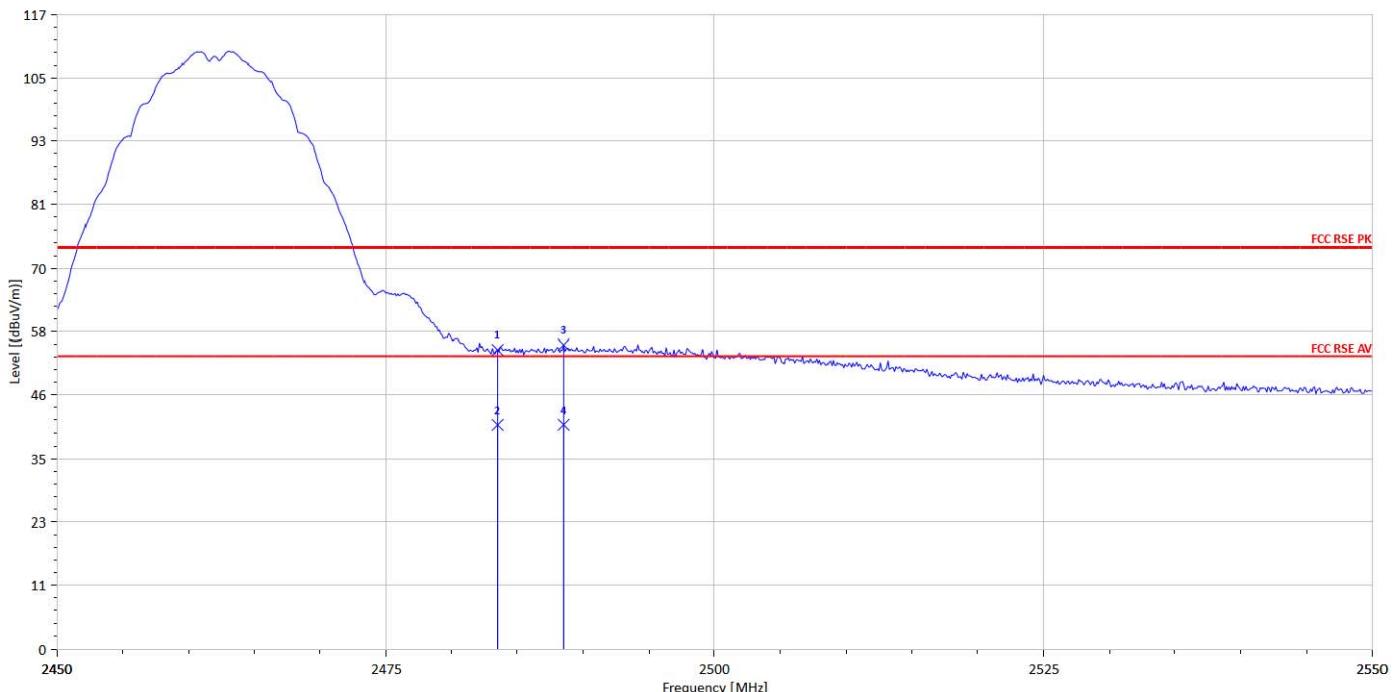
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2483.50	E	Peak	51.04	1.16	52.20	74	-21.80
2483.50	E	Average	38.25	1.16	39.41	54	-14.59
2485.50	S	Peak	53.37	1.15	54.52	74	-19.48
2485.50	S	Average	37.92	1.15	39.07	54	-14.93

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Operation Mode : 802.11b Test Date : 2016/10/12
Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : BE CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



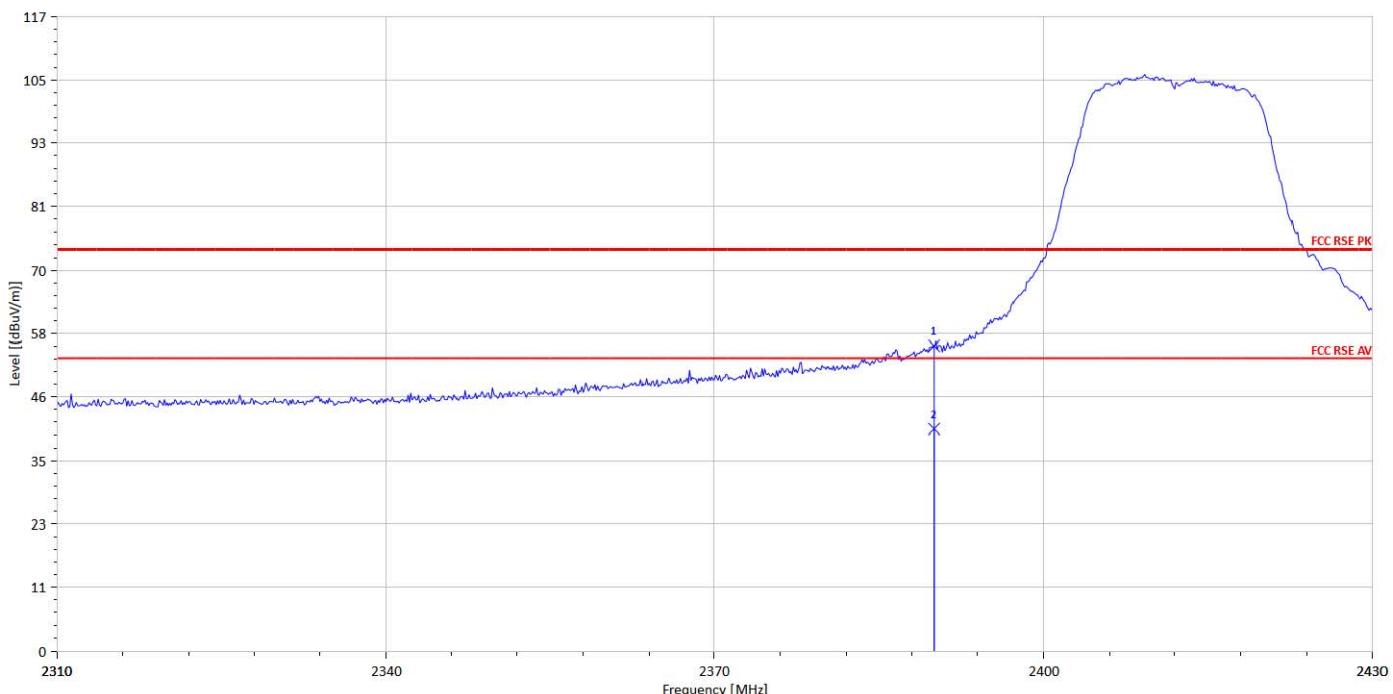
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2483.50	E	Peak	54.00	1.16	55.16	74	-18.84
2483.50	E	Average	40.06	1.16	41.22	54	-12.78
2488.50	S	Peak	54.93	1.15	56.07	74	-17.93
2488.50	S	Average	40.10	1.15	41.25	54	-12.75

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Operation Mode : 802.11g Test Date : 2016/10/12
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : BE CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



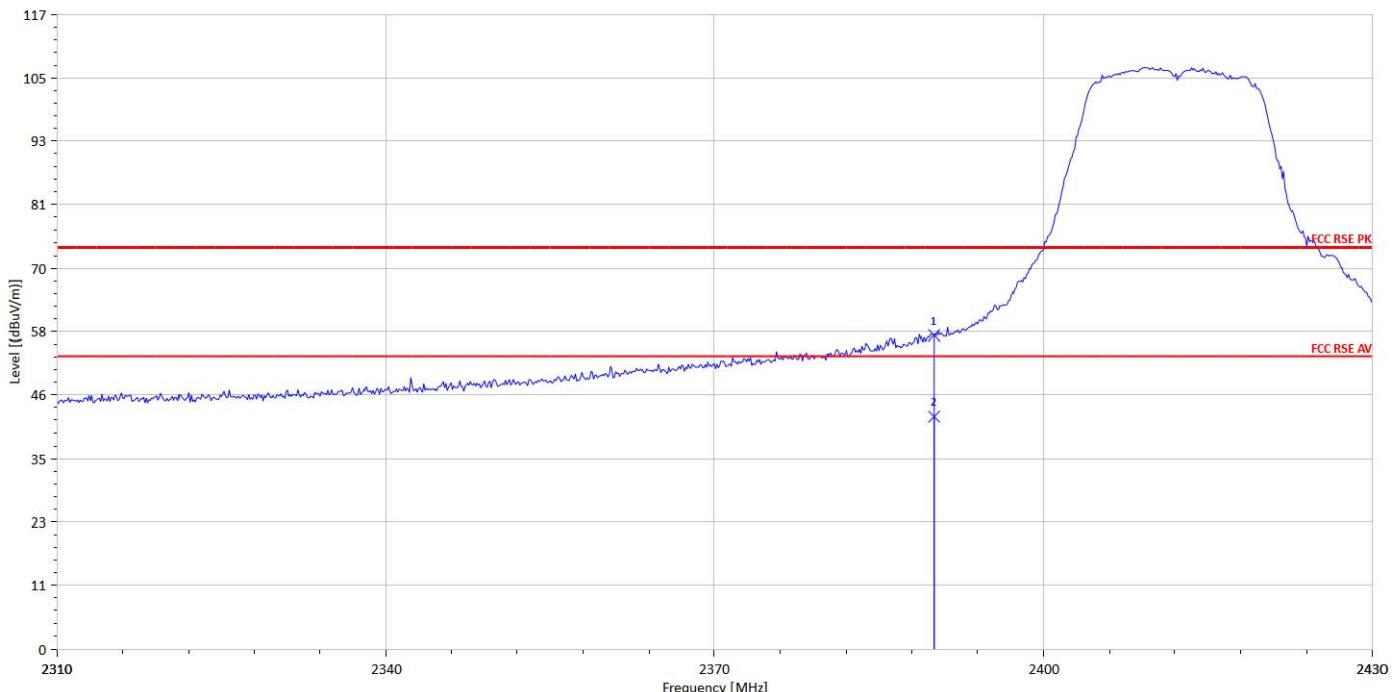
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2390.00	E	Peak	55.33	0.92	56.25	74	-17.75
2390.00	E	Average	39.98	0.92	40.90	54	-13.10

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Operation Mode : 802.11g Test Date : 2016/10/12
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : BE CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



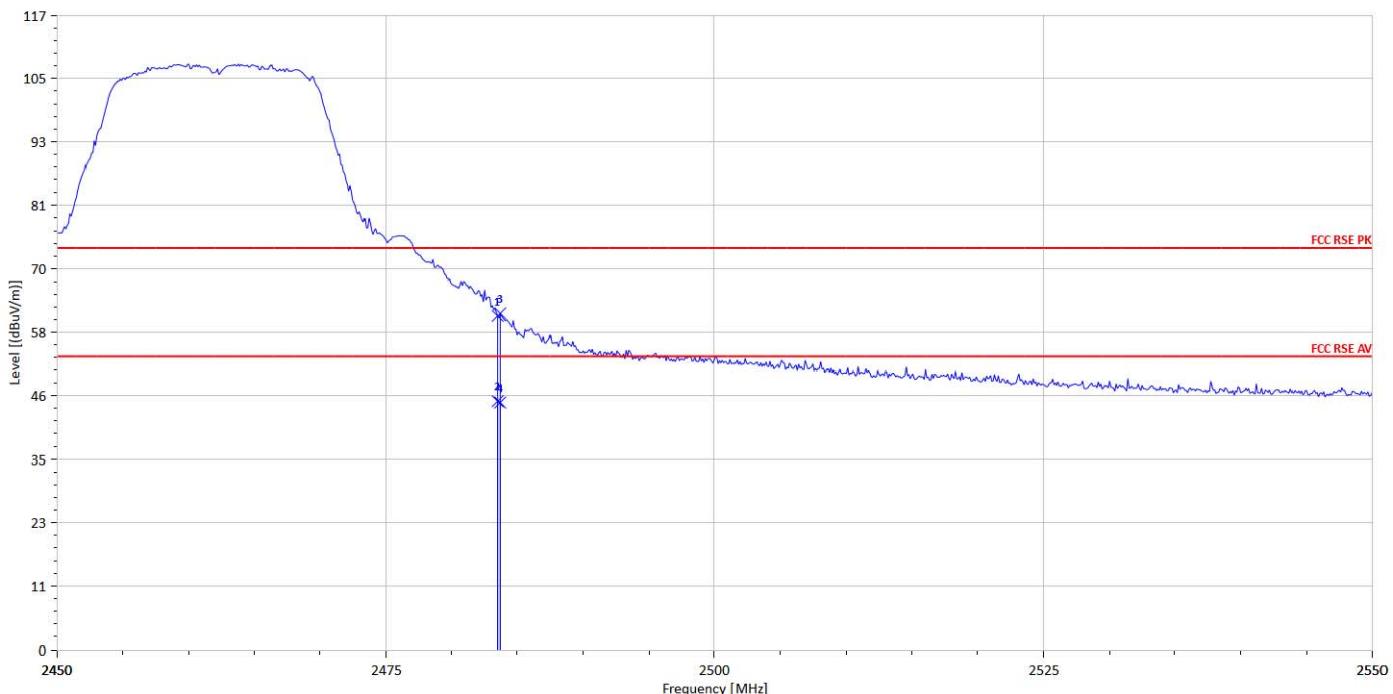
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2390.00	E	Peak	56.85	0.92	57.77	74	-16.23
2390.00	E	Average	41.84	0.92	42.76	54	-11.24

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Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : BE CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



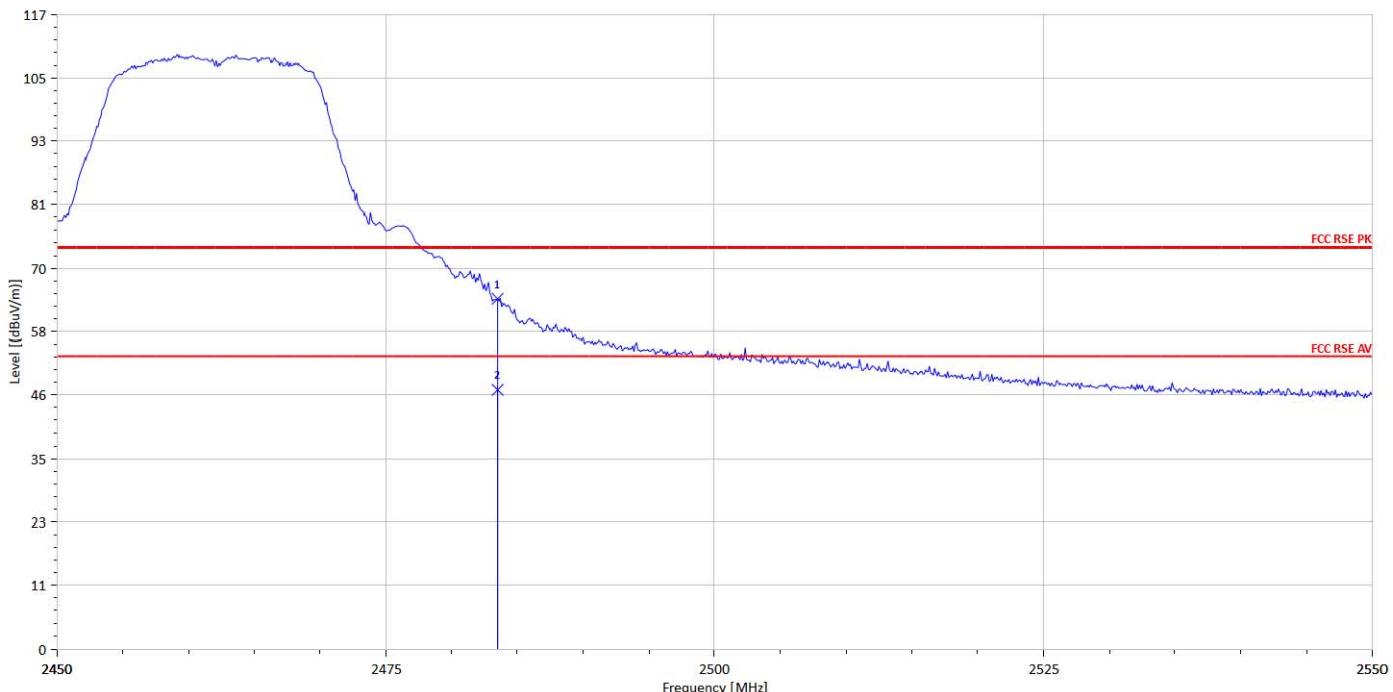
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2483.50	E	Peak	60.38	1.16	61.54	74	-12.46
2483.50	E	Average	44.66	1.16	45.82	54	-8.18
2483.70	S	Peak	60.86	1.16	62.02	74	-11.98
2483.70	S	Average	44.41	1.16	45.57	54	-8.43

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Operation Mode : 802.11g Test Date : 2016/10/12
Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
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	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	63.37	1.16	64.53	74	-9.47
2483.50	E	Average	46.59	1.16	47.75	54	-6.25

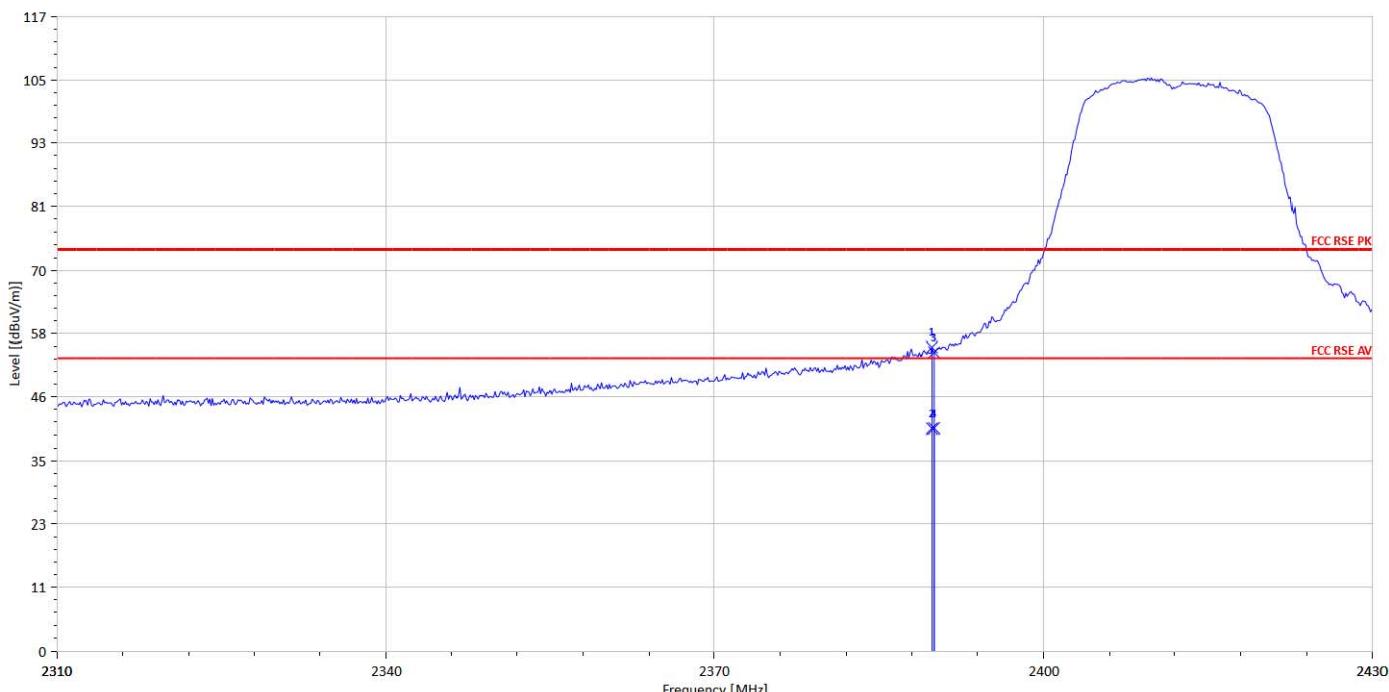
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Radiated Band Edge Measurement Result (802.11n_VHT20)

Operation Mode : 802.11ac20 Test Date : 2016/10/12
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
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		Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
			Reading	Level dB μ V				
2389.80	S	Peak	55.10	55.10	0.92	56.02	74	-17.98
2389.80	S	Average	40.04	40.04	0.92	40.96	54	-13.04
2390.00	E	Peak	54.16	54.16	0.92	55.09	74	-18.91
2390.00	E	Average	40.09	40.09	0.92	41.01	54	-12.99

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台灣檢驗科技股份有限公司

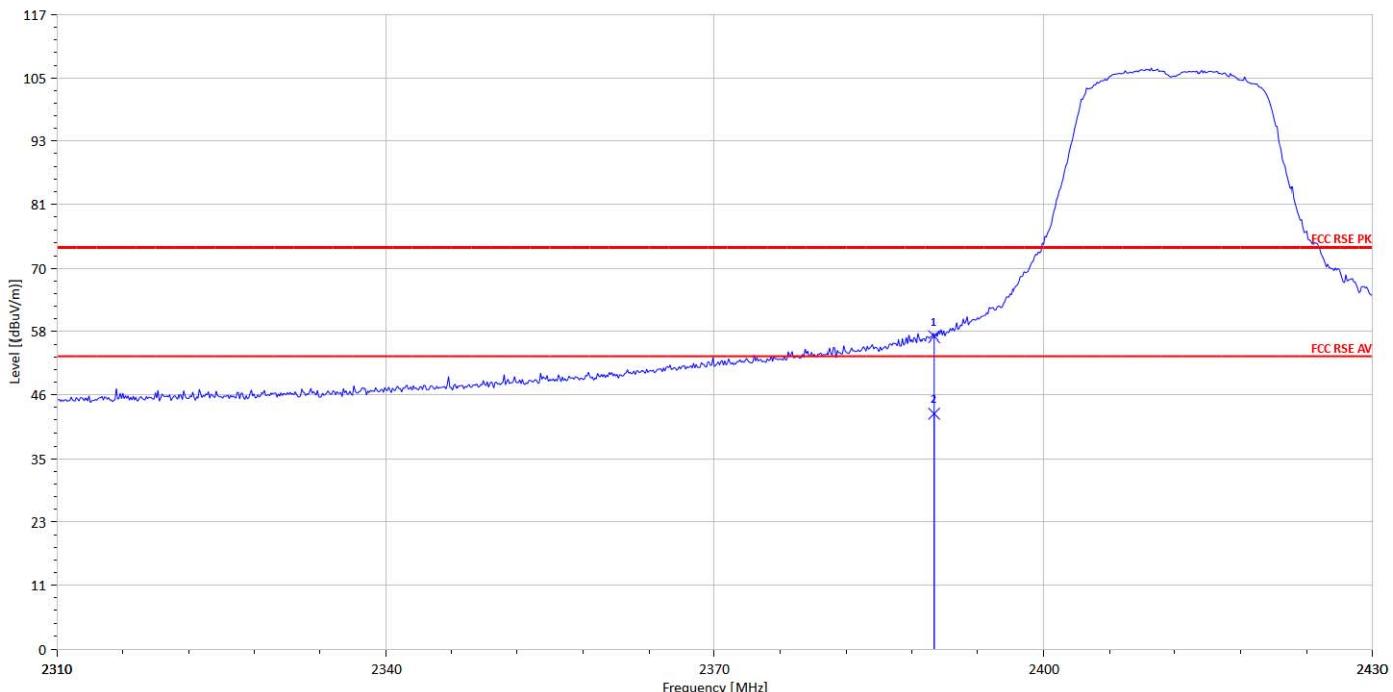
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Operation Mode : 802.11ac20 Test Date : 2016/10/12
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : BE CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



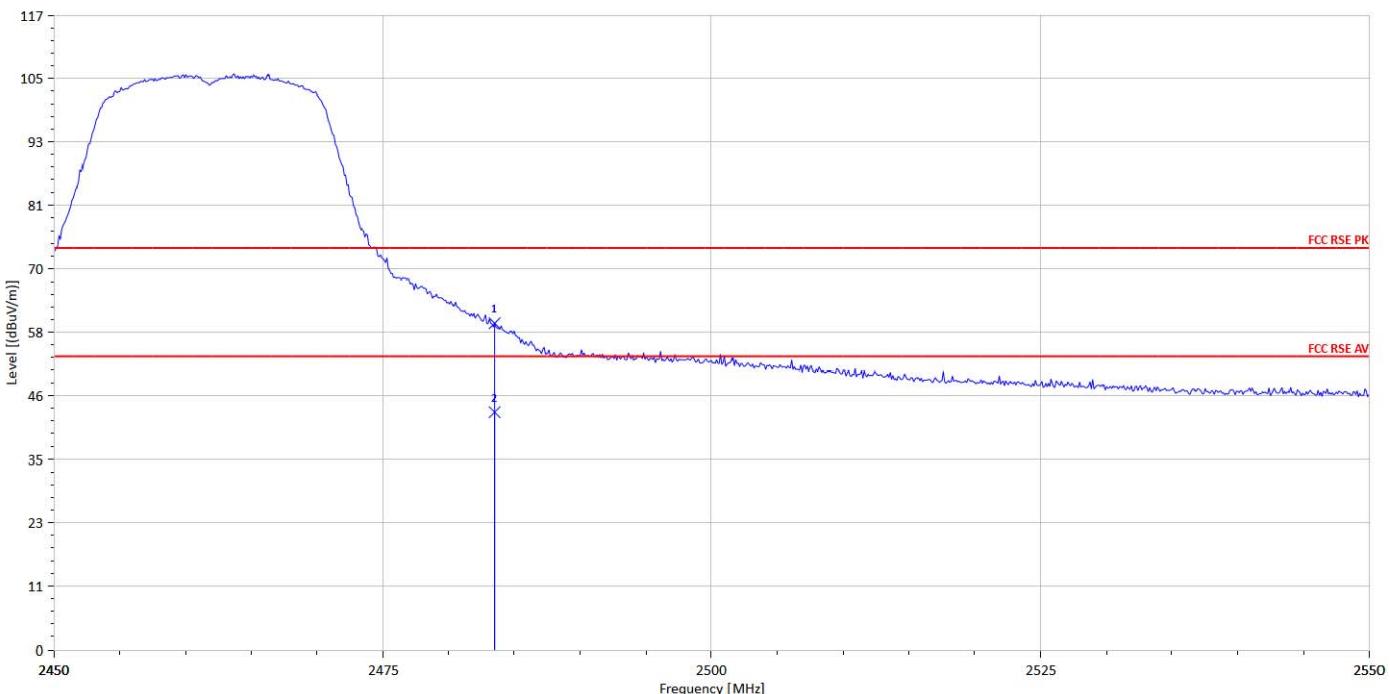
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2390.00	E	Peak	56.63	0.92	57.56	74	-16.44
2390.00	E	Average	42.38	0.92	43.30	54	-10.70

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Operation Mode : 802.11ac20 Test Date : 2016/10/12
Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : BE CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



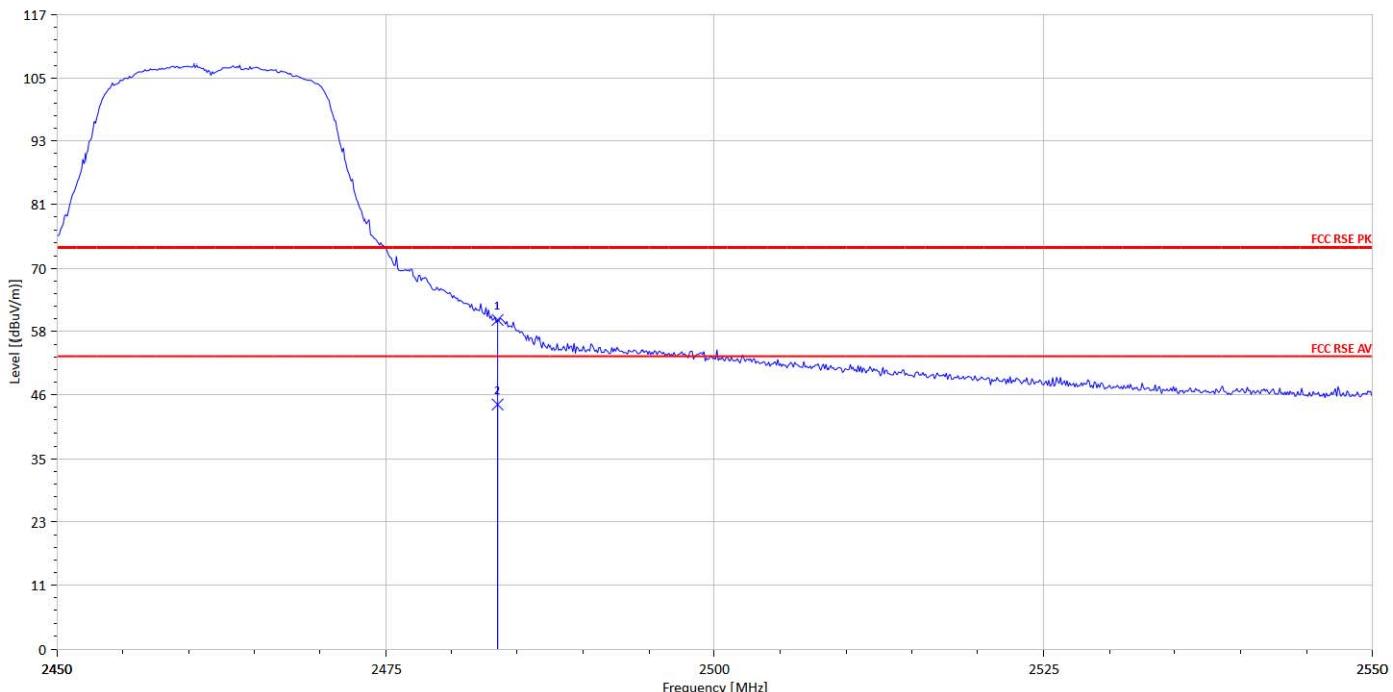
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2483.50	E	Peak	59.00	1.16	60.16	74	-13.84
2483.50	E	Average	42.61	1.16	43.77	54	-10.23

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Operation Mode : 802.11ac20 Test Date : 2016/10/12
Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2483.50	E	Peak	59.43	1.16	60.59	74	-13.41
2483.50	E	Average	43.86	1.16	45.02	54	-8.98

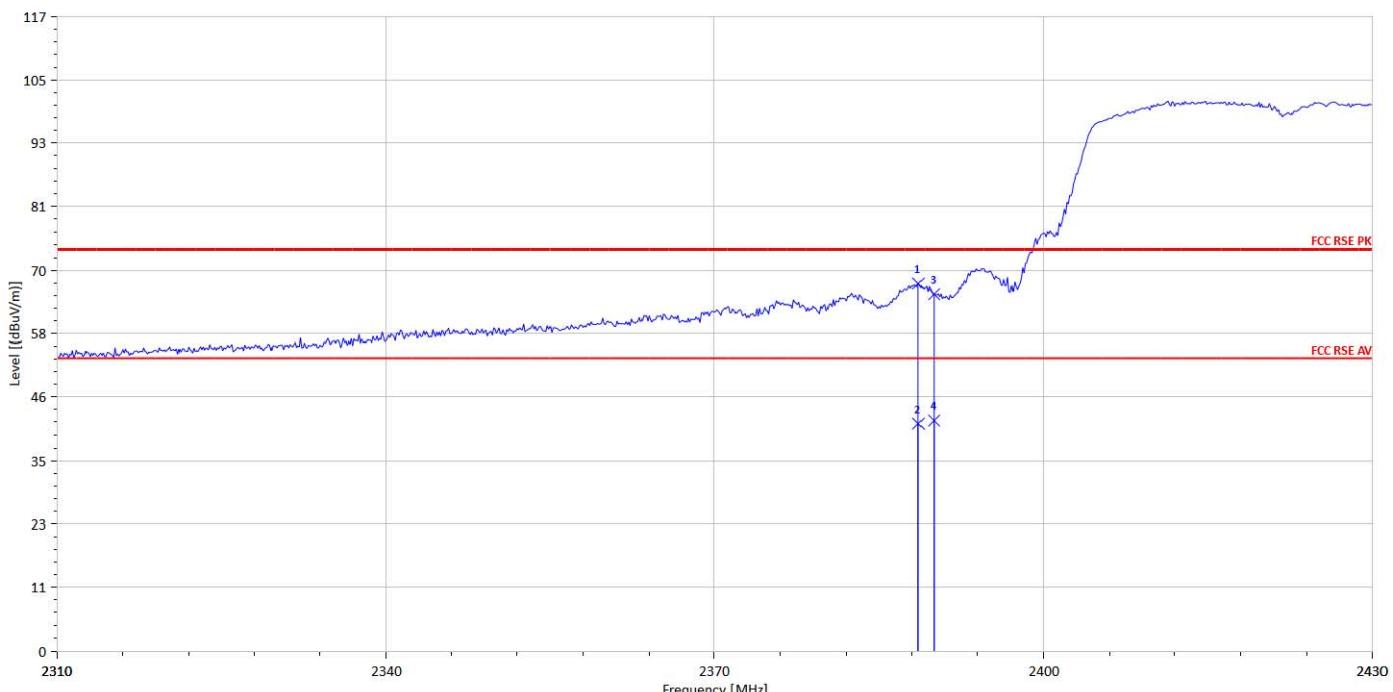
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Radiated Band Edge Measurement Result (802.11n_VHT40)

Operation Mode :	802.11ac40	Test Date :	2016/10/12
Fundamental Frequency :	2422 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



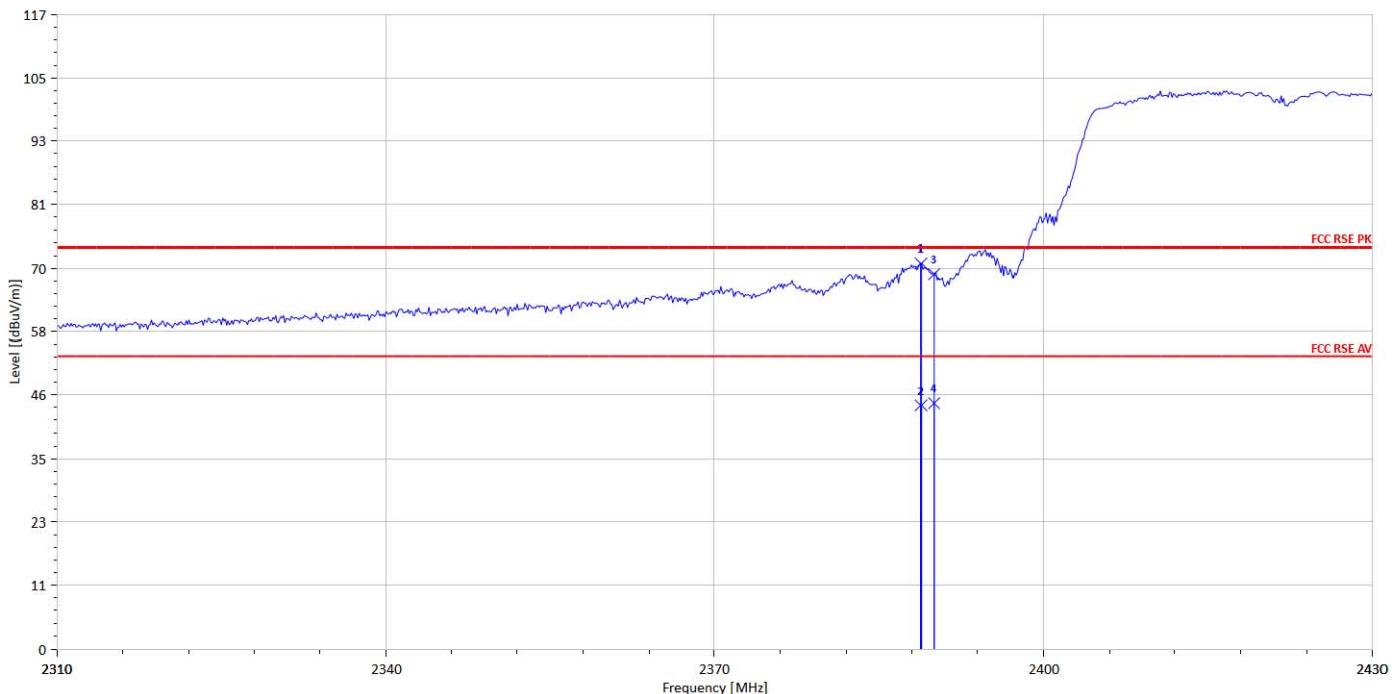
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2388.60	S	Peak	66.87	0.90	67.77	74	-6.23
2388.60	S	Average	40.93	0.90	41.83	54	-12.17
2390.00	E	Peak	64.83	0.92	65.76	74	-8.24
2390.00	E	Average	41.48	0.92	42.40	54	-11.60

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Operation Mode : 802.11ac40 Test Date : 2016/10/12
 Fundamental Frequency : 2422 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



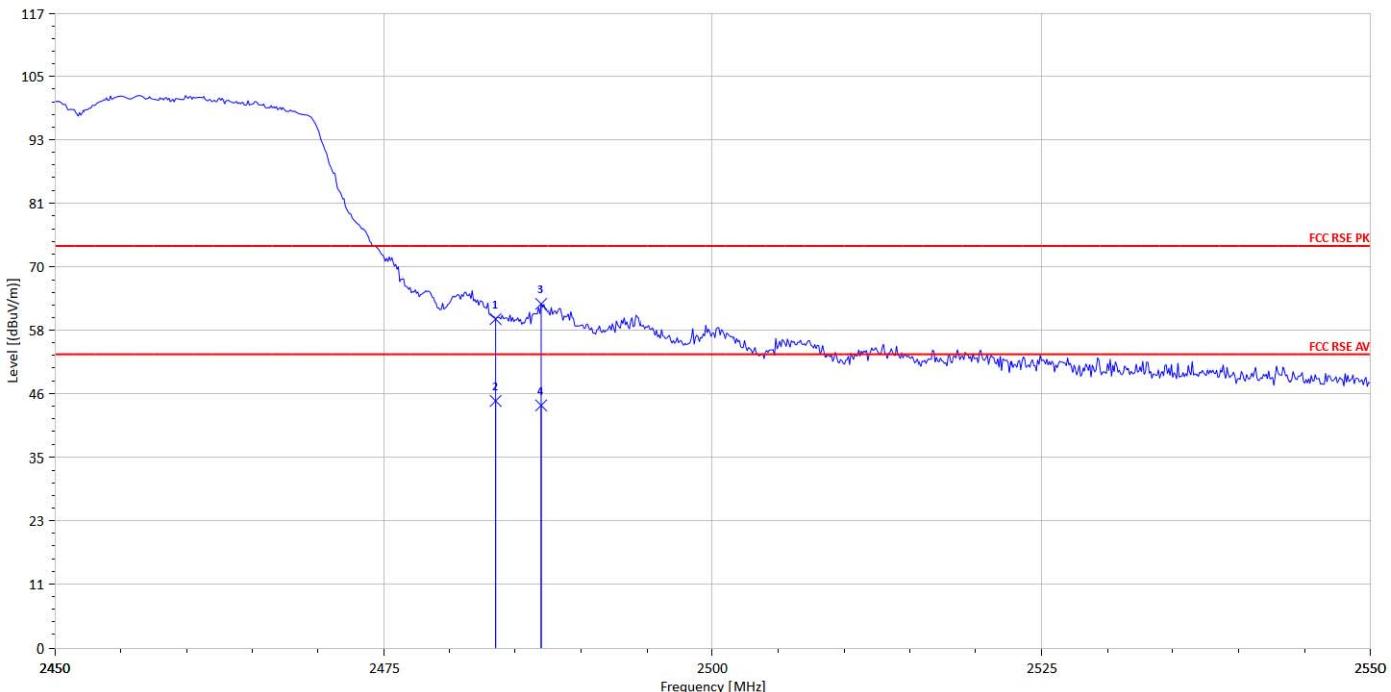
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2388.84	S	Peak	70.24	0.91	71.15	74	-2.85
2388.84	S	Average	43.96	0.91	44.87	54	-9.13
2390.00	E	Peak	68.19	0.92	69.11	74	-4.89
2390.00	E	Average	44.35	0.92	45.27	54	-8.73

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Operation Mode : 802.11ac40 Test Date : 2016/10/12
Fundamental Frequency : 2452 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : BE CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



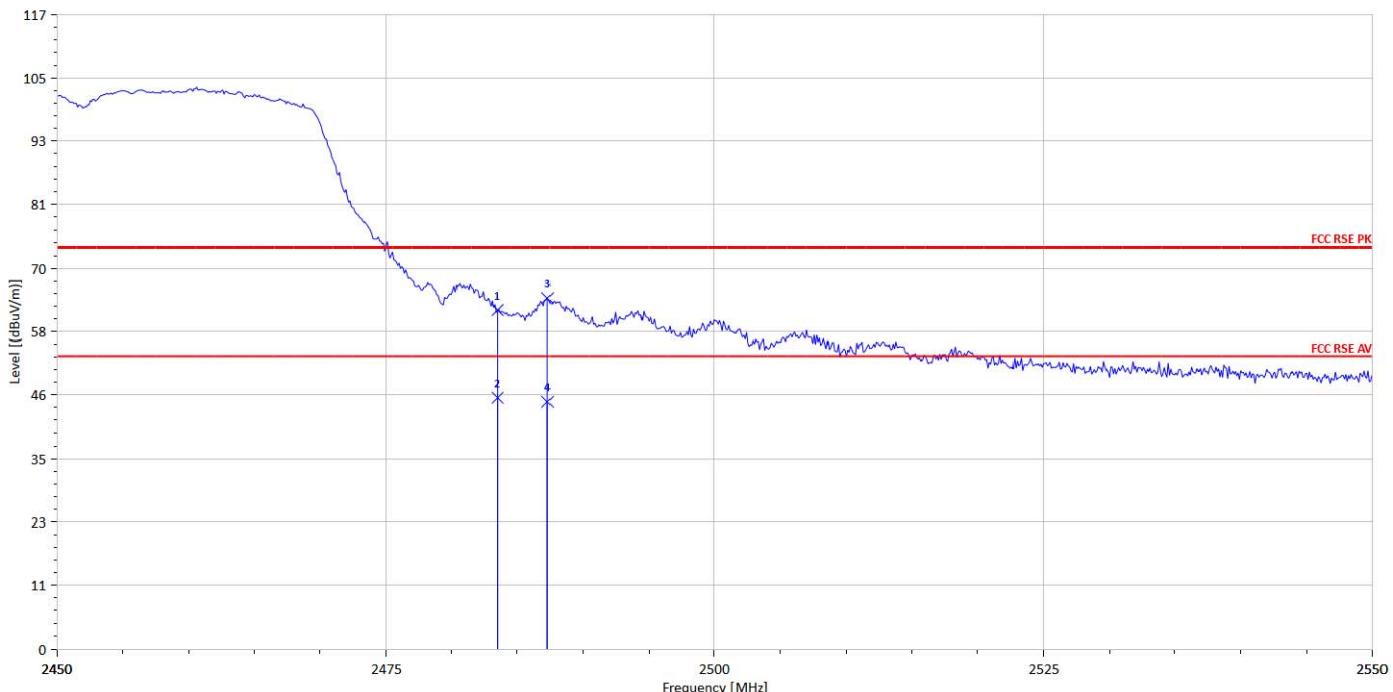
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2483.50	E	Peak	59.40	1.16	60.56	74	-13.44
2483.50	E	Average	44.33	1.16	45.49	54	-8.51
2487.00	S	Peak	62.24	1.15	63.39	74	-10.61
2487.00	S	Average	43.52	1.15	44.67	54	-9.33

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Operation Mode : 802.11ac40 Test Date : 2016/10/12
Fundamental Frequency : 2452 MHz Temp. / Humi. : 22.7deg_C/57RH
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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2483.50	E	Peak	61.28	1.16	62.44	74	-11.56
2483.50	E	Average	45.13	1.16	46.29	54	-7.71
2487.30	S	Peak	63.49	1.15	64.64	74	-9.36
2487.30	S	Average	44.39	1.15	45.54	54	-8.46

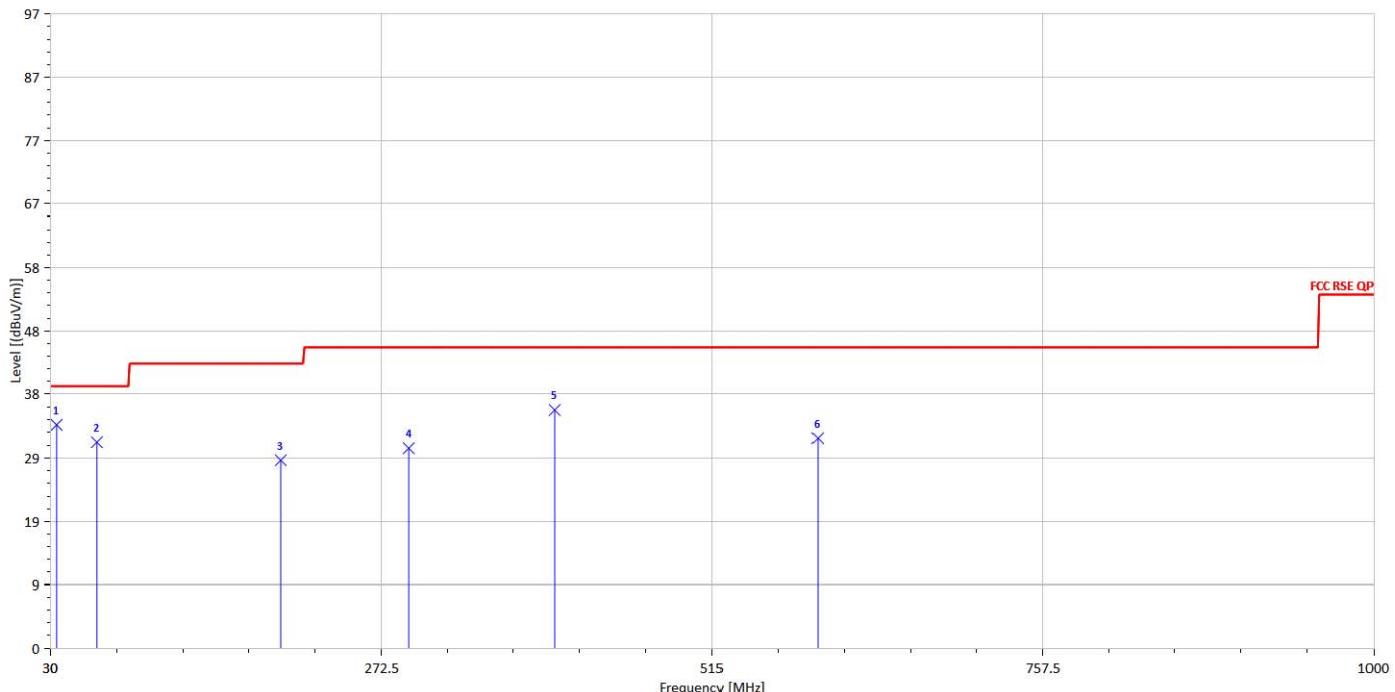
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Below 1GHz Data:**Radiated Spurious Emission Measurement Result (802.11 g) (Worst Case)**

Operation Mode : 802.11g Test Date : 2016/10/13
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



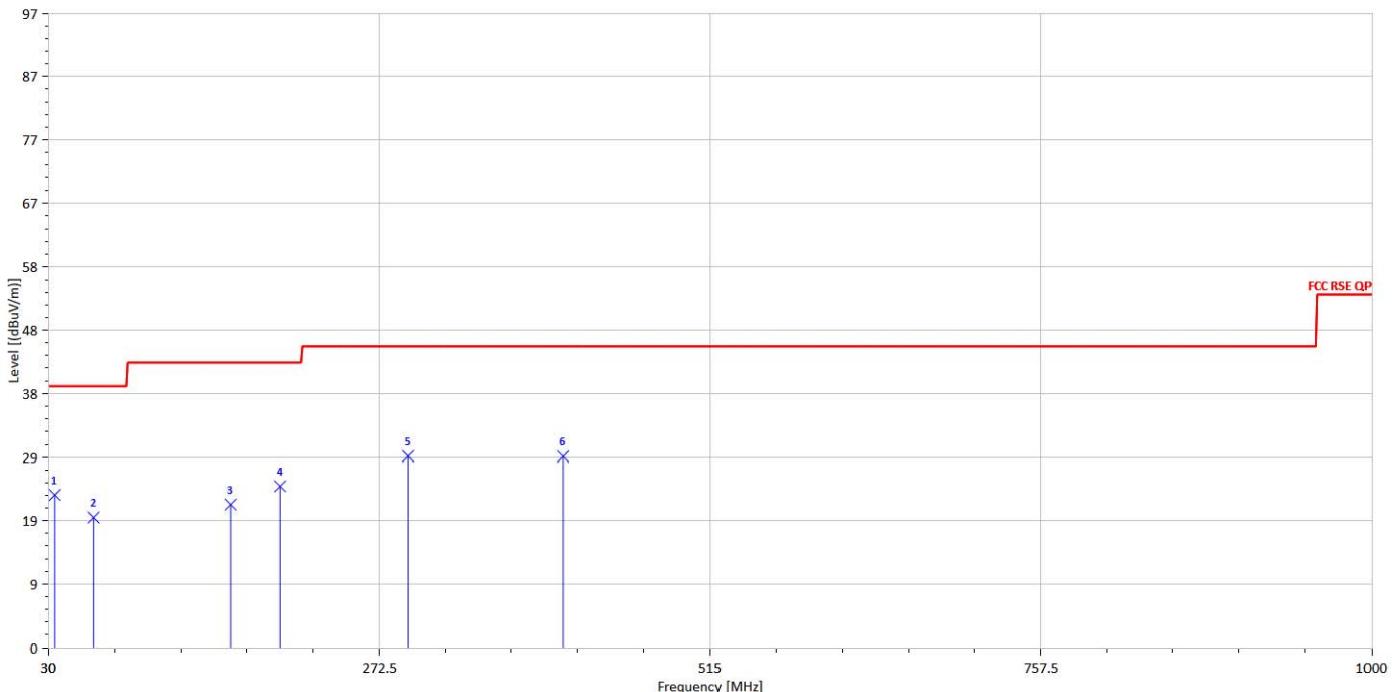
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
34.85	S	Peak	43.95	-9.78	34.17	40	-5.83
63.95	S	Peak	53.97	-22.48	31.49	40	-8.51
198.78	S	Peak	46.30	-17.58	28.72	43.5	-14.78
292.87	S	Peak	43.80	-13.23	30.57	46	-15.43
399.57	S	Peak	46.20	-9.73	36.46	46	-9.54
592.60	S	Peak	38.20	-6.08	32.12	46	-13.88

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Operation Mode : 802.11g Test Date : 2016/10/13
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



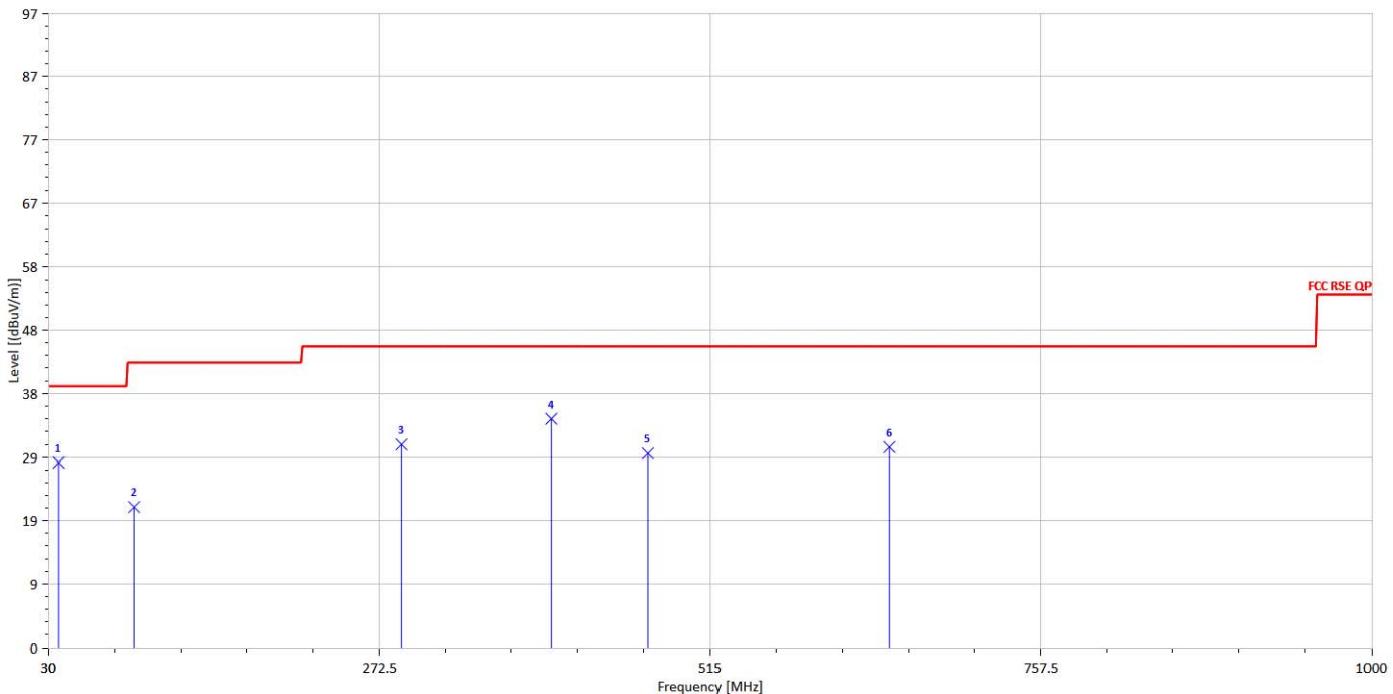
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
34.85	S	Peak	33.10	-9.78	23.32	40	-16.68
62.98	S	Peak	42.41	-22.56	19.86	40	-20.14
163.86	S	Peak	39.46	-17.61	21.85	43.5	-21.65
199.75	S	Peak	42.17	-17.51	24.65	43.5	-18.85
293.84	S	Peak	42.47	-13.23	29.25	46	-16.75
407.33	S	Peak	38.37	-9.16	29.20	46	-16.80

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Operation Mode : 802.11g Test Date : 2016/10/13
 Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid 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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
37.76	S	Peak	39.76	-11.49	28.27	40	-11.73
93.05	S	Peak	40.43	-18.95	21.47	43.5	-22.03
288.99	S	Peak	44.35	-13.31	31.03	46	-14.97
398.60	S	Peak	44.72	-9.75	34.97	46	-11.03
469.41	S	Peak	37.42	-7.76	29.66	46	-16.34
646.92	S	Peak	35.55	-4.92	30.63	46	-15.37

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台灣檢驗科技股份有限公司

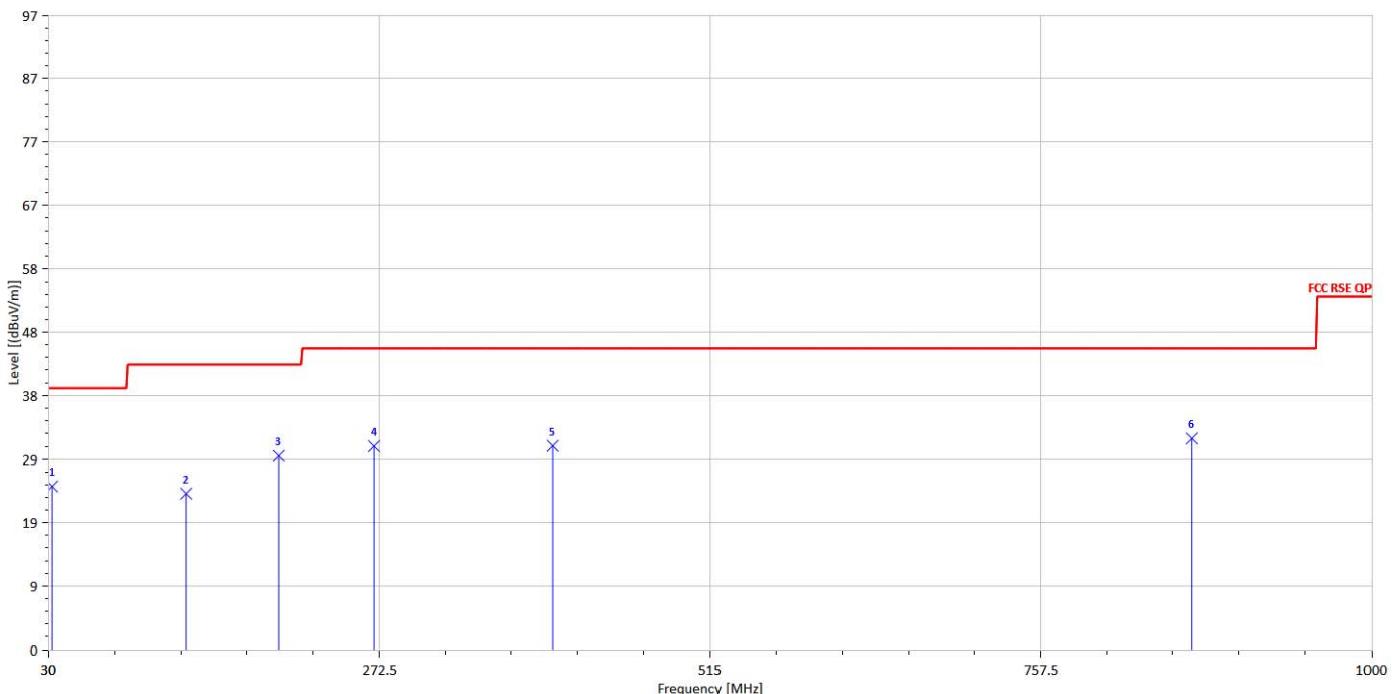
t (886-2) 2299-3279

f (886-2) 2298-0488

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Operation Mode : 802.11g Test Date : 2016/10/13
Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



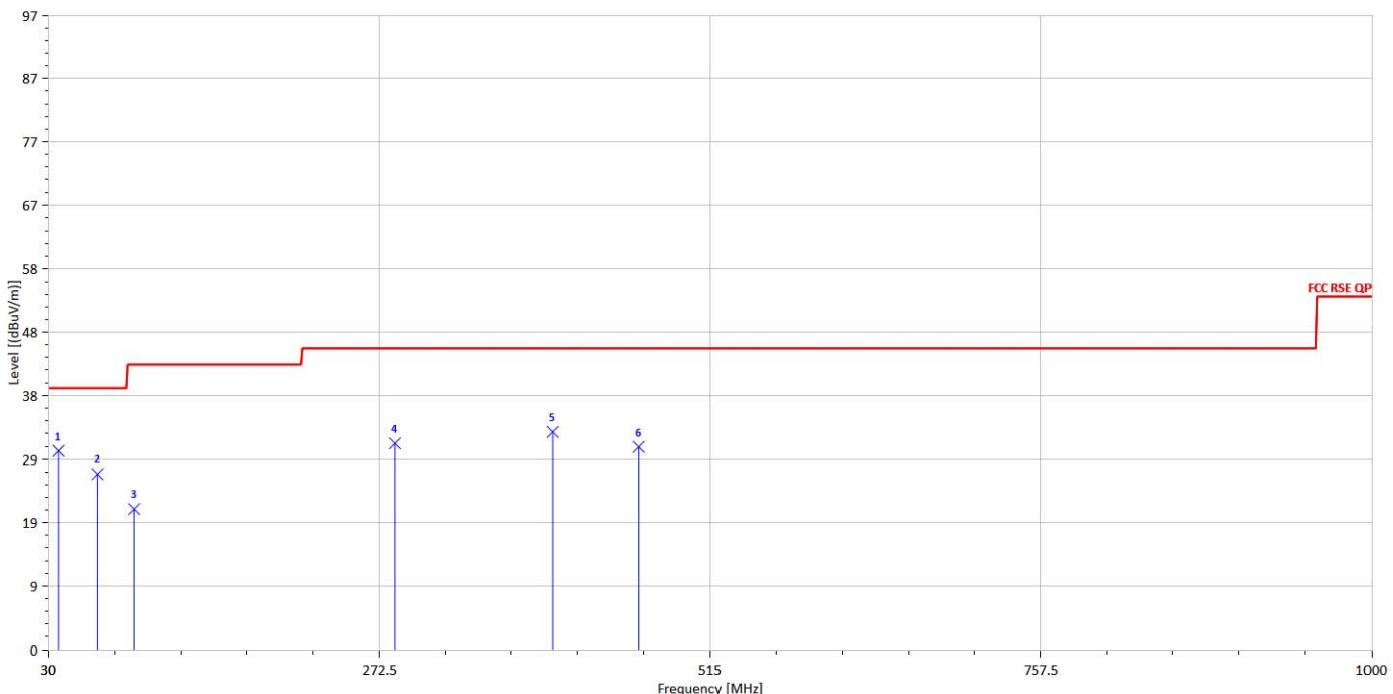
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
32.91	S	Peak	33.70	-8.75	24.95	40	-15.05
130.88	S	Peak	39.54	-15.71	23.83	43.5	-19.67
198.78	S	Peak	47.17	-17.58	29.59	43.5	-13.91
268.62	S	Peak	44.95	-13.88	31.07	46	-14.93
399.57	S	Peak	40.85	-9.73	31.11	46	-14.89
868.08	S	Peak	35.32	-3.07	32.25	46	-13.75

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Operation Mode : 802.11g Test Date : 2016/10/13
Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7 deg_C/57 RH
Operation Band : Tx CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



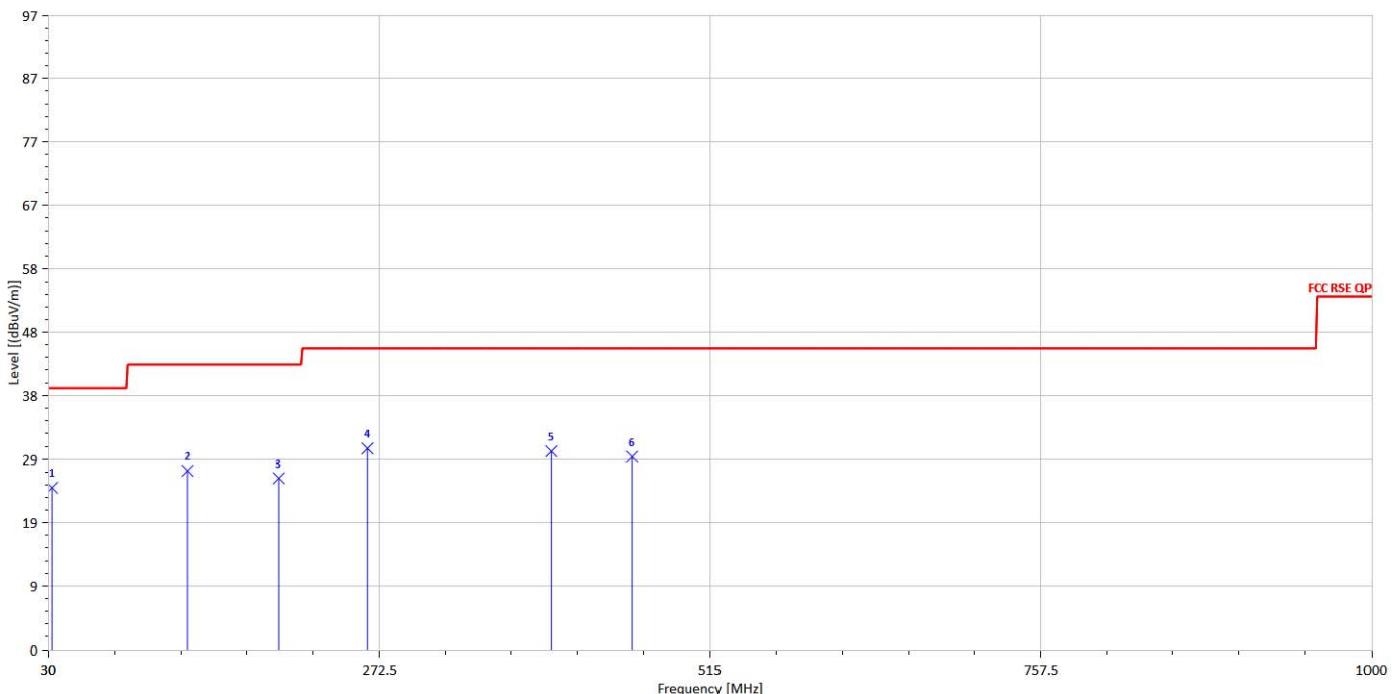
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
37.76	S	Peak	41.84	-11.49	30.35	40	-9.65
65.89	S	Peak	49.13	-22.29	26.84	40	-13.16
93.05	S	Peak	40.43	-18.95	21.47	43.5	-22.03
284.14	S	Peak	44.97	-13.47	31.50	46	-14.50
399.57	S	Peak	42.98	-9.73	33.25	46	-12.75
462.62	S	Peak	39.10	-8.14	30.96	46	-15.04

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Operation Mode : 802.11g Test Date : 2016/10/13
 Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7 deg_C/57 RH
 Operation Band : Tx 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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
32.91	S	Peak	33.49	-8.75	24.75	40	-15.25
131.85	S	Peak	43.06	-15.71	27.36	43.5	-16.14
198.78	S	Peak	43.79	-17.58	26.20	43.5	-17.30
263.77	S	Peak	44.52	-13.80	30.72	46	-15.28
398.60	S	Peak	40.03	-9.75	30.28	46	-15.72
457.77	S	Peak	37.55	-8.11	29.44	46	-16.56

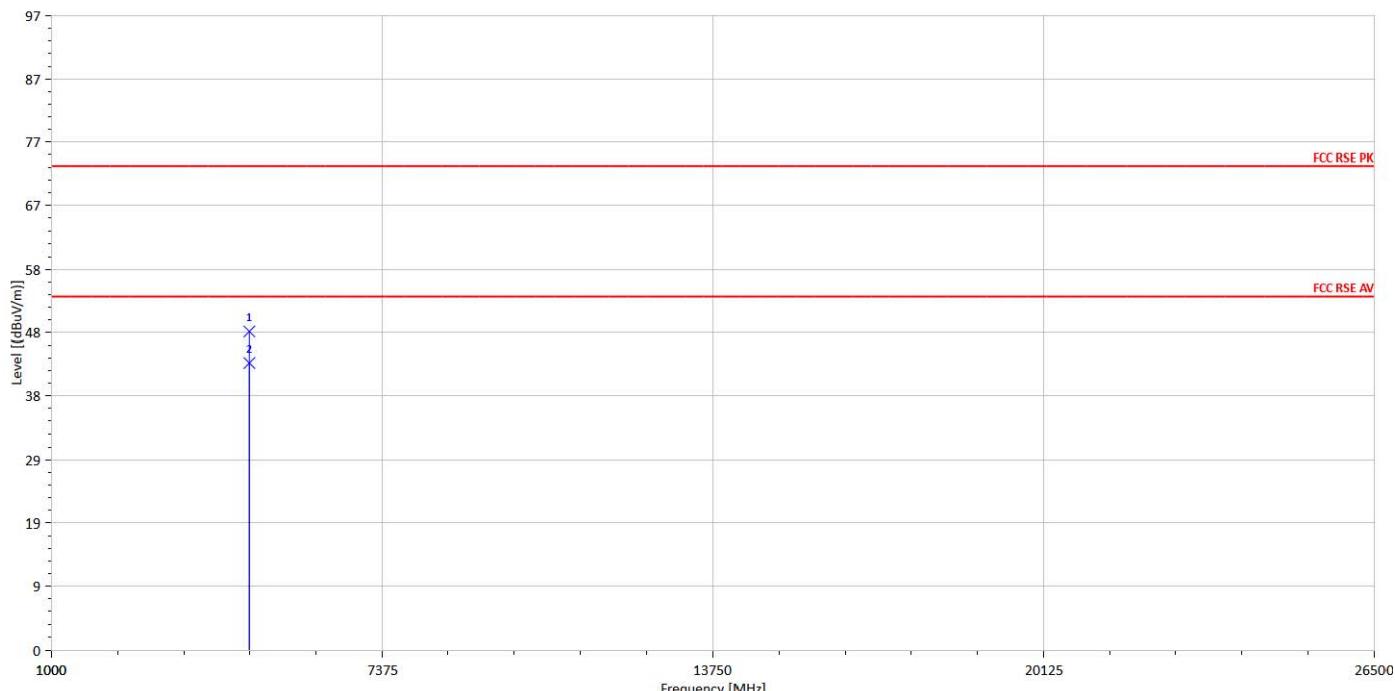
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Above 1GHz Data:**Radiated Spurious Emission Measurement Result (802.11 b)**

Operation Mode :	802.11b	Test Date :	2016/10/12
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



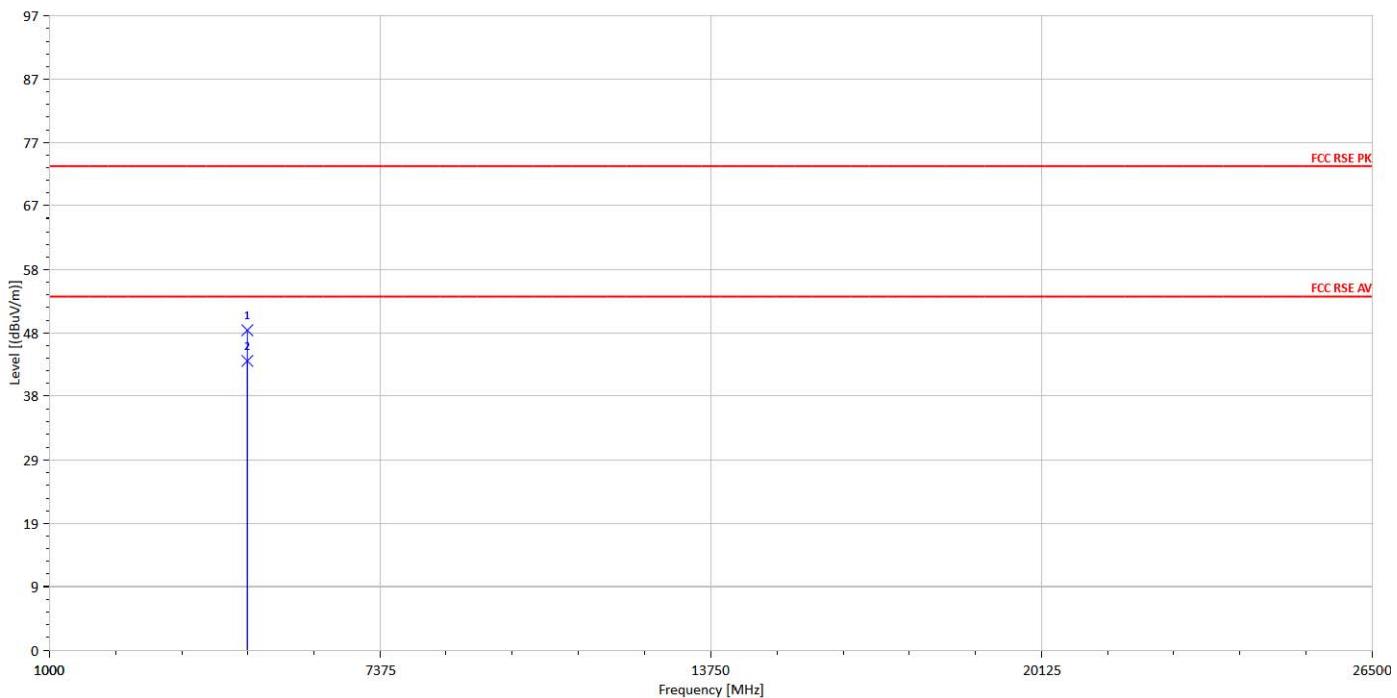
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4824.00	H	Peak	41.04	7.58	48.62	74	-25.38
4824.00	H	Average	36.31	7.58	43.89	54	-10.11

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Operation Mode : 802.11b Test Date : 2016/10/12
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



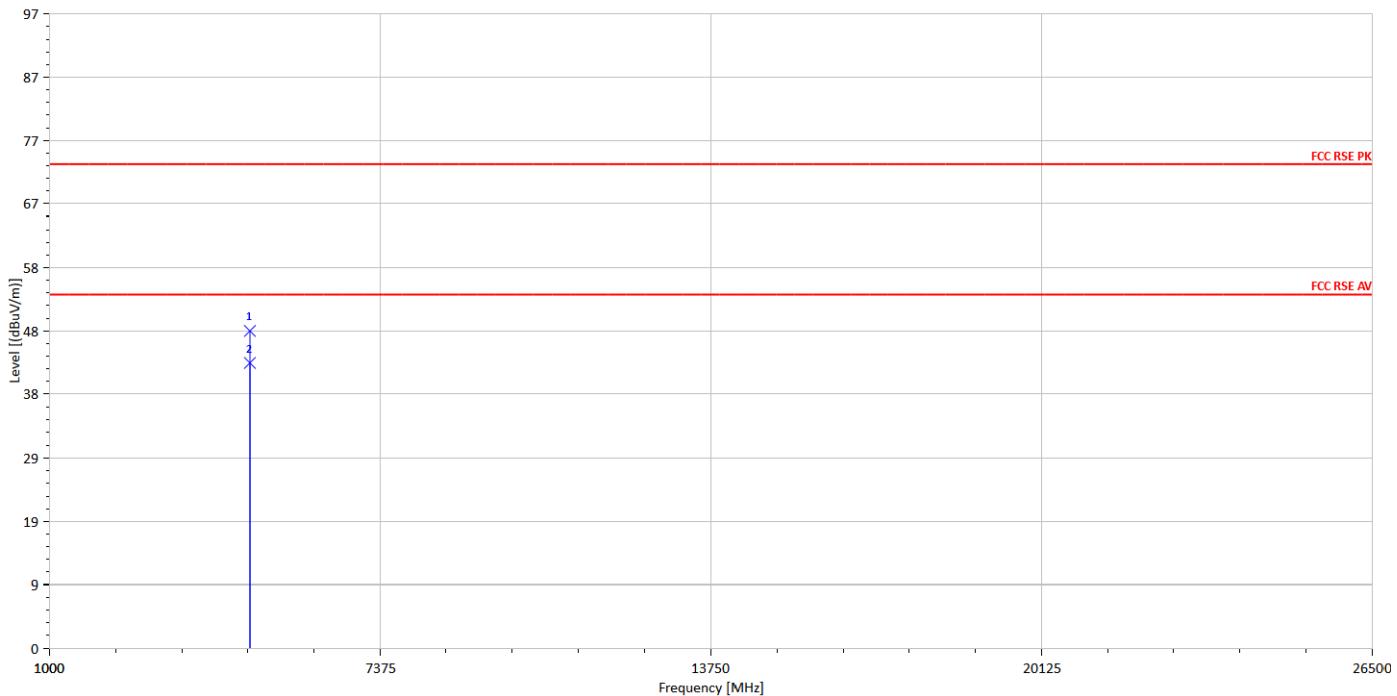
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
4824.00	H	Peak	41.37	7.58	48.95	74	-25.05
4824.00	H	Average	36.64	7.58	44.22	54	-9.78

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Operation Mode : 802.11b Test Date : 2016/10/12
 Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



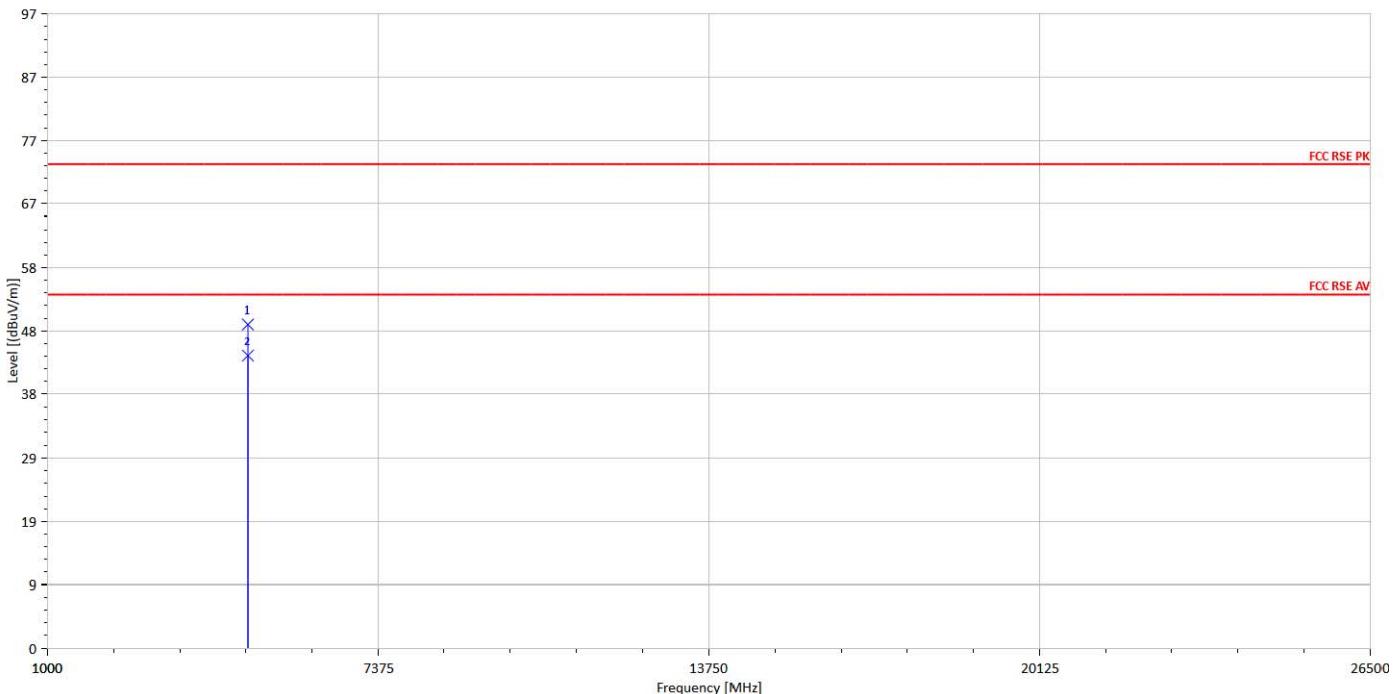
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
4874.00	H	Peak	40.63	7.91	48.54	74	-25.46
4874.00	H	Average	35.68	7.91	43.59	54	-10.41

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Operation Mode : 802.11b Test Date : 2016/10/12
Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



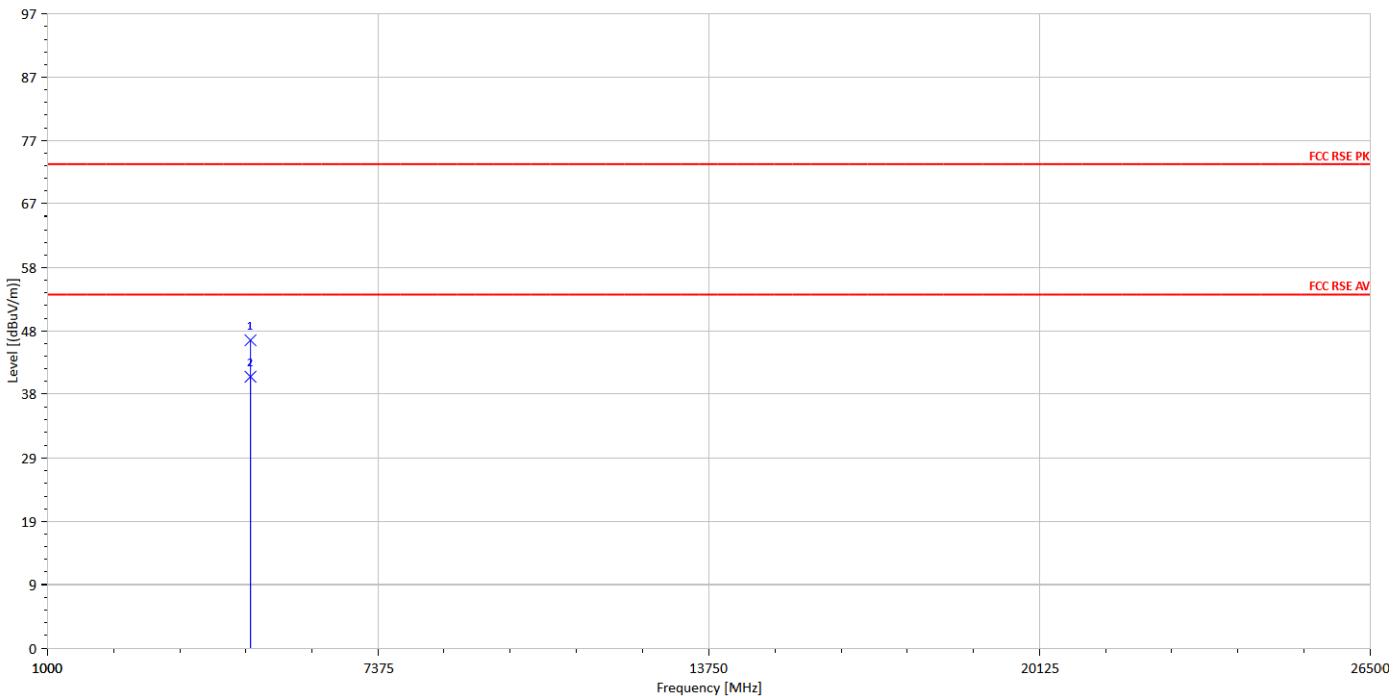
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
4874.00	H	Peak	41.62	7.91	49.53	74	-24.47
4874.00	H	Average	36.82	7.91	44.73	54	-9.27

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Operation Mode : 802.11b Test Date : 2016/10/12
Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



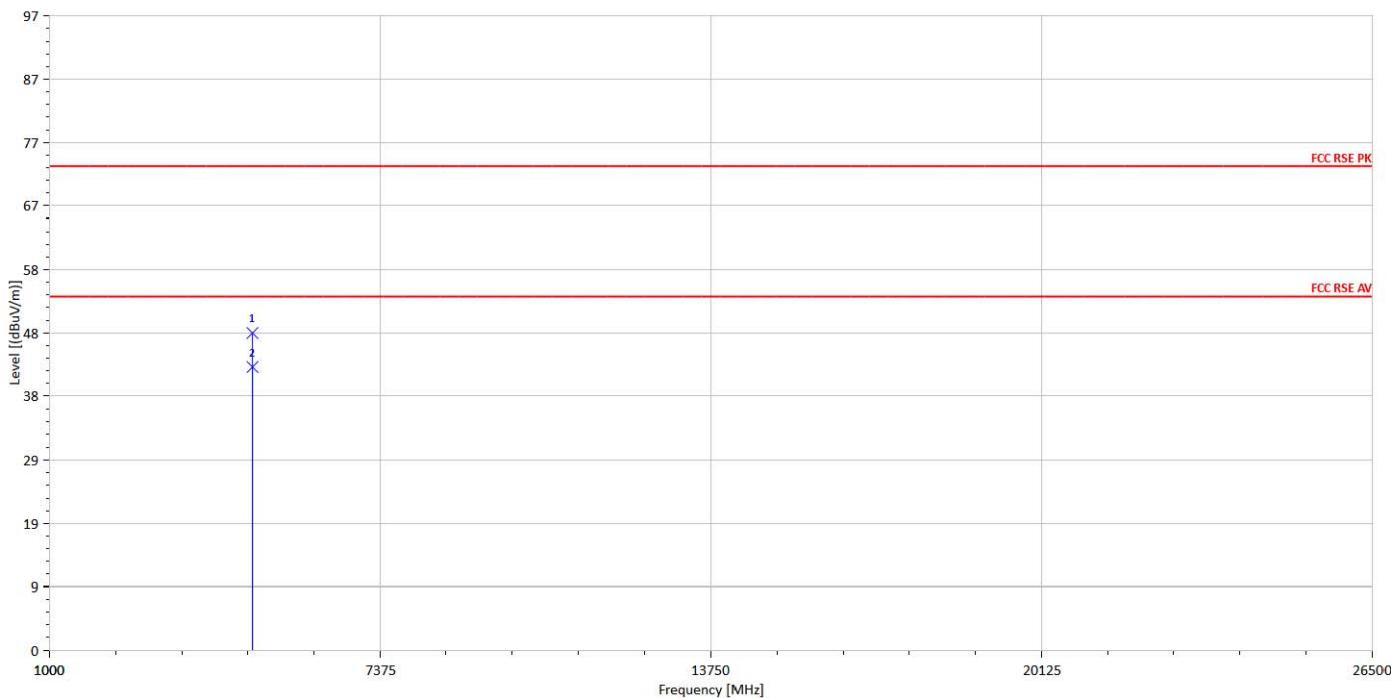
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
4924.00	H	Peak	39.18	7.92	47.10	74	-26.90
4924.00	H	Average	33.54	7.92	41.46	54	-12.54

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Operation Mode : 802.11b Test Date : 2016/10/12
 Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7 deg_C/57RH
 Operation Band : Tx 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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
4924.00	H	Peak	40.60	7.92	48.52	74	-25.48
4924.00	H	Average	35.35	7.92	43.27	54	-10.73

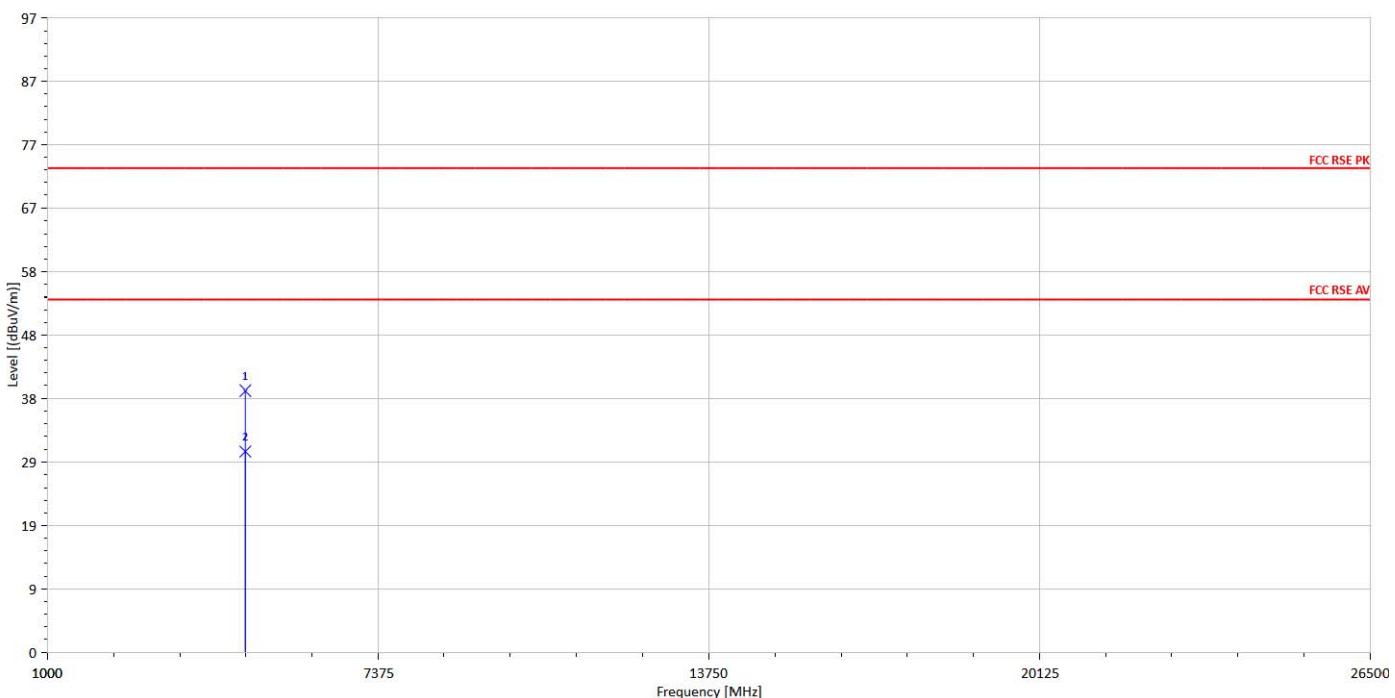
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Radiated Spurious Emission Measurement Result (802.11 g)

Operation Mode : 802.11g Test Date : 2016/10/12
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



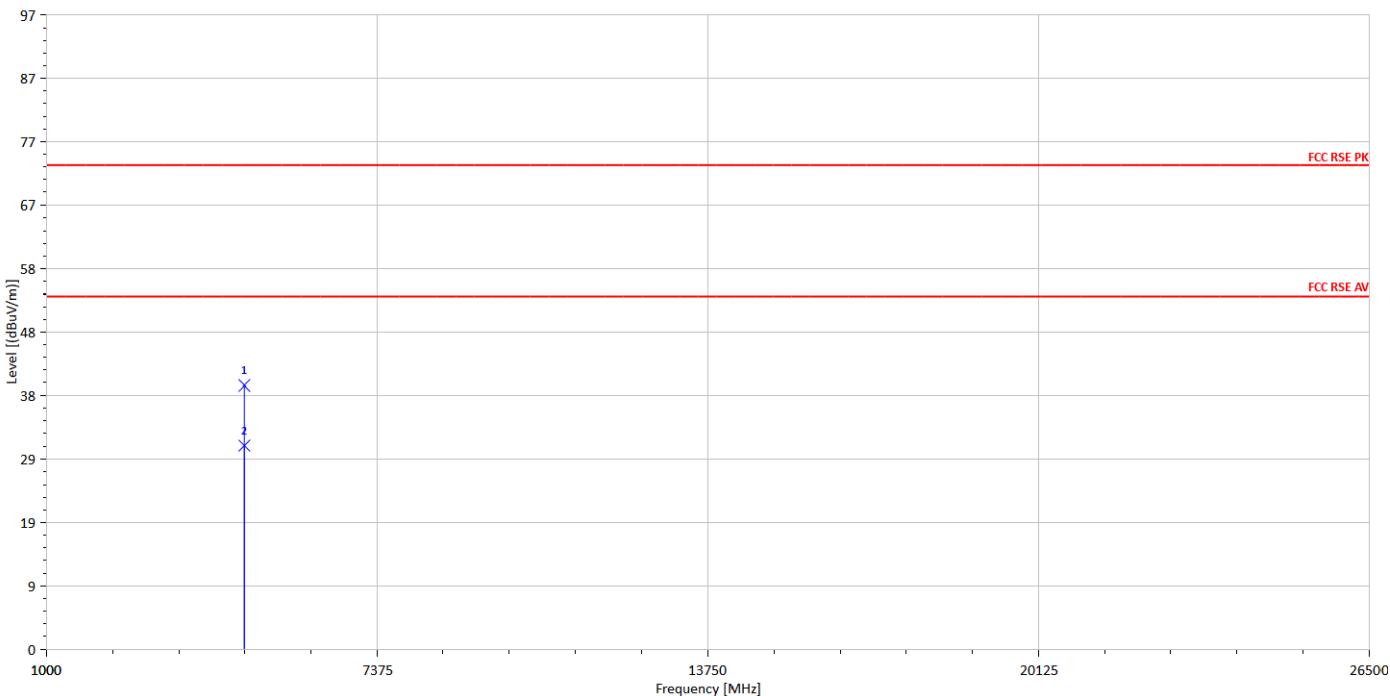
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
4824.00	H	Peak	32.43	7.58	40.00	74	-34.00
4824.00	H	Average	23.10	7.58	30.68	54	-23.32

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Operation Mode : 802.11g Test Date : 2016/10/12
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



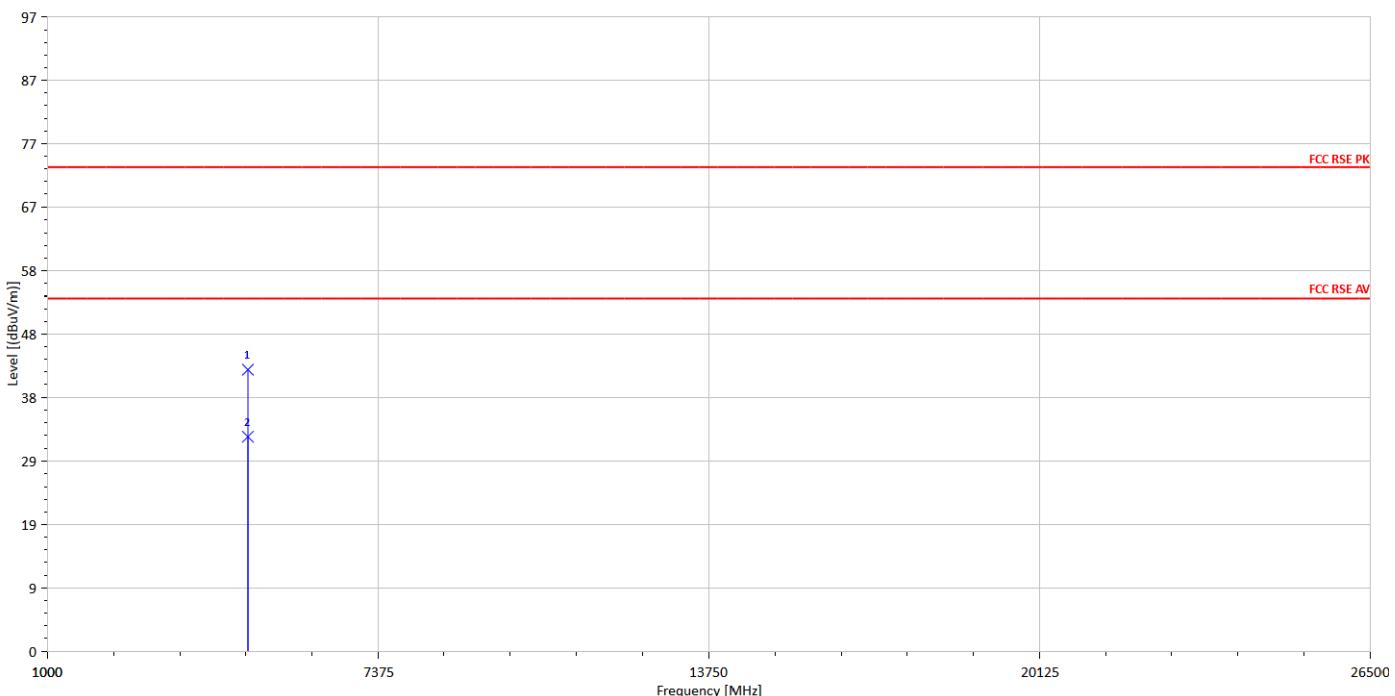
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
4824.00	H	Peak	32.77	7.58	40.34	74	-33.66
4824.00	H	Average	23.55	7.58	31.13	54	-22.87

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Operation Mode : 802.11g Test Date : 2016/10/12
Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



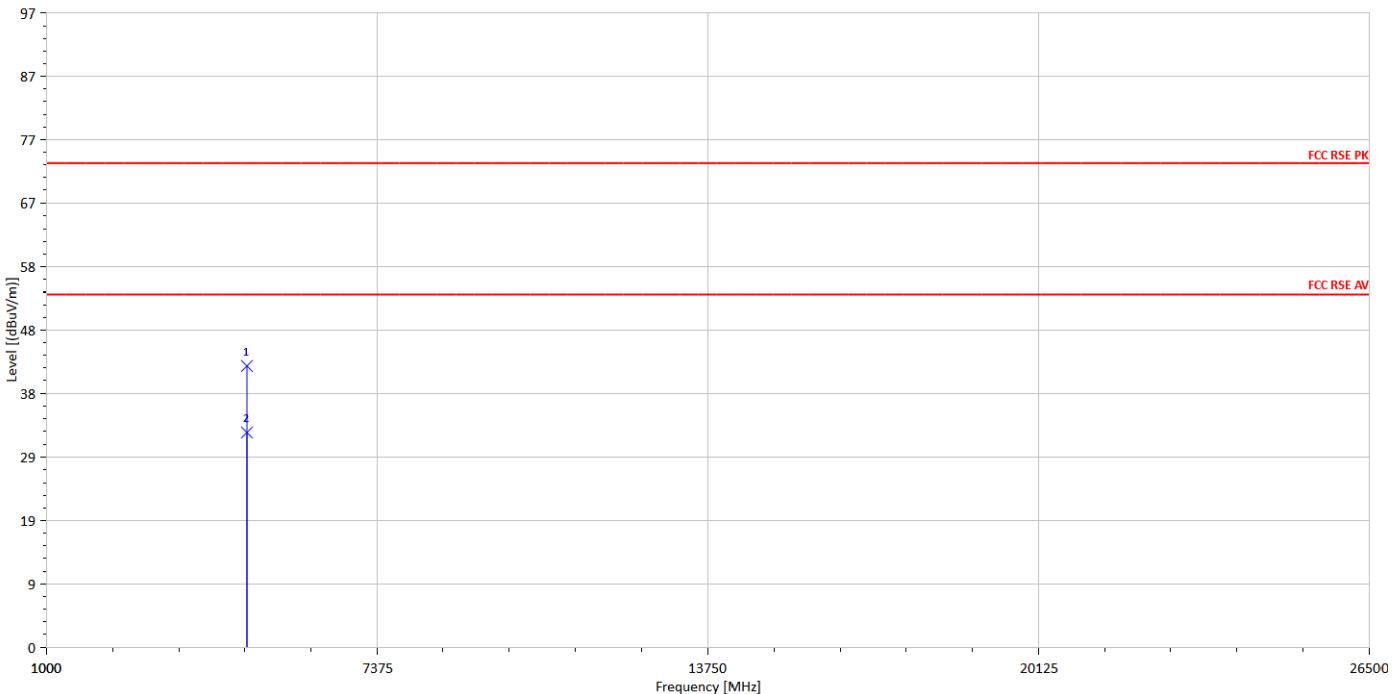
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
4874.00	H	Peak	35.10	7.91	43.01	74	-30.99
4874.00	H	Average	24.89	7.91	32.80	54	-21.20

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Operation Mode : 802.11g Test Date : 2016/10/12
Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



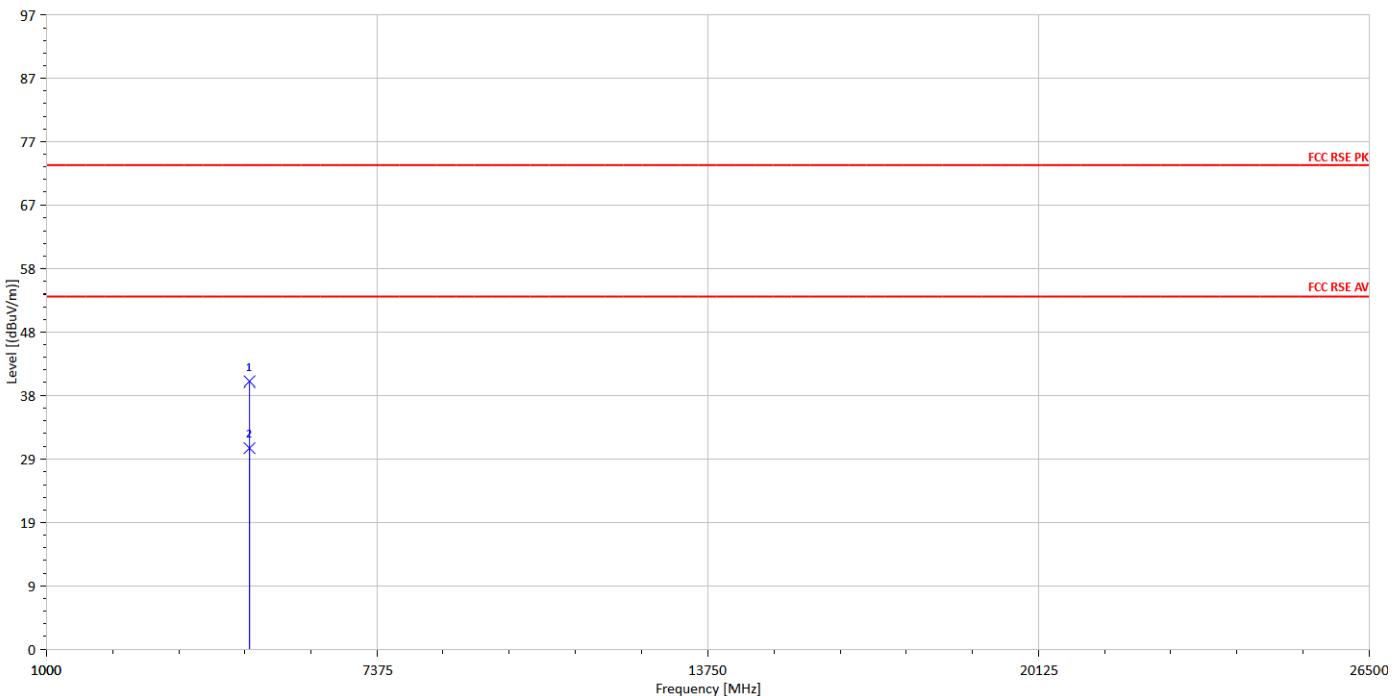
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
4874.00	H	Peak	35.06	7.91	42.97	74	-31.03
4874.00	H	Average	24.93	7.91	32.84	54	-21.16

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Operation Mode : 802.11g Test Date : 2016/10/12
Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7 deg_C/57 RH
Operation Band : Tx CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



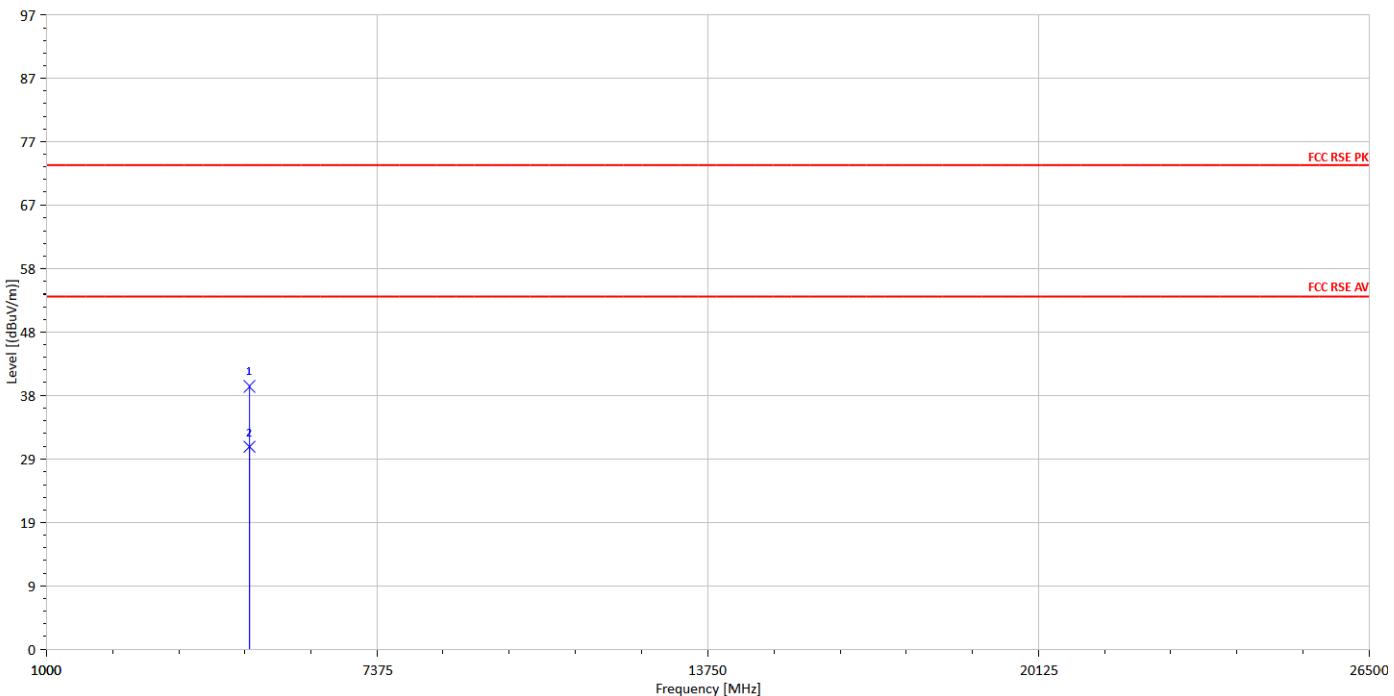
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4924.00	H	Peak	32.99	7.92	40.92	74	-33.08
4924.00	H	Average	22.81	7.92	30.73	54	-23.27

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Operation Mode : 802.11g Test Date : 2016/10/12
Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7 deg_C/57 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	dB μ V	dB	dB μ V/m	dB μ V/m	dB
4924.00	H	Peak	32.28	7.92	40.20	74	-33.80
4924.00	H	Average	23.03	7.92	30.95	54	-23.05

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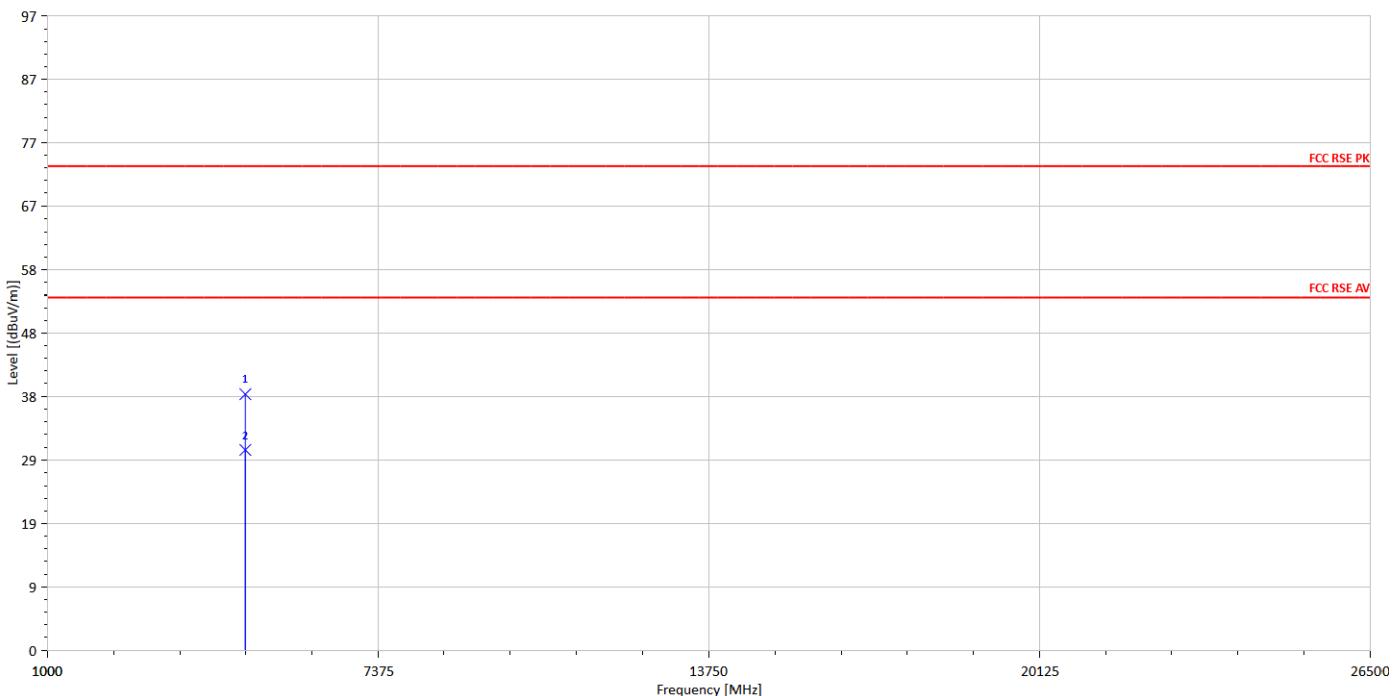
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Radiated Spurious Emission Measurement Result (802.11n_VHT20)

Operation Mode : 802.11ac20 Test Date : 2016/10/12
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



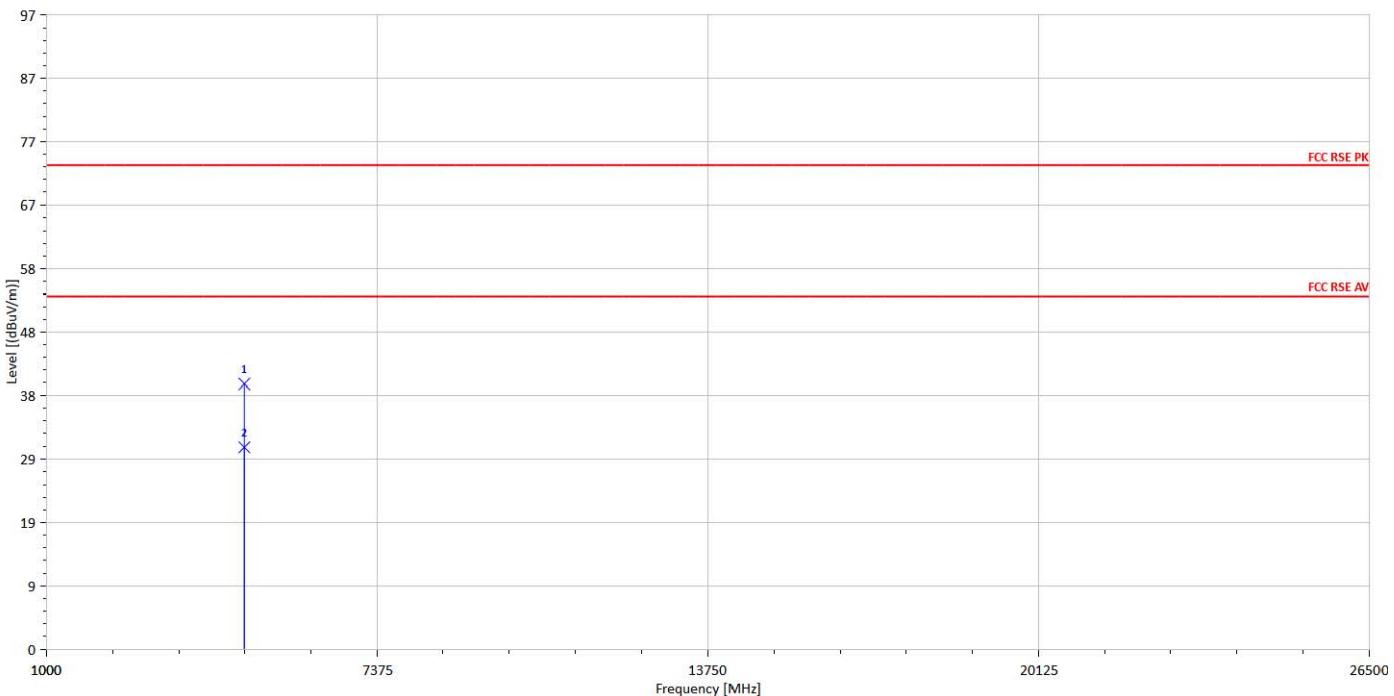
Freq.	Note	Detector Mode	Spectrum Reading	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	Level dB μ V	dB	dB μ V/m	dB μ V/m	dB
4824.00	H	Peak	31.65	7.58	39.22	74	-34.78
4824.00	H	Average	23.04	7.58	30.62	54	-23.38

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Operation Mode : 802.11ac20 Test Date : 2016/10/12
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
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	dB μ V	dB	dB μ V/m	dB μ V/m	dB
4824.00	H	Peak	32.99	7.58	40.57	74	-33.43
4824.00	H	Average	23.29	7.58	30.87	54	-23.13

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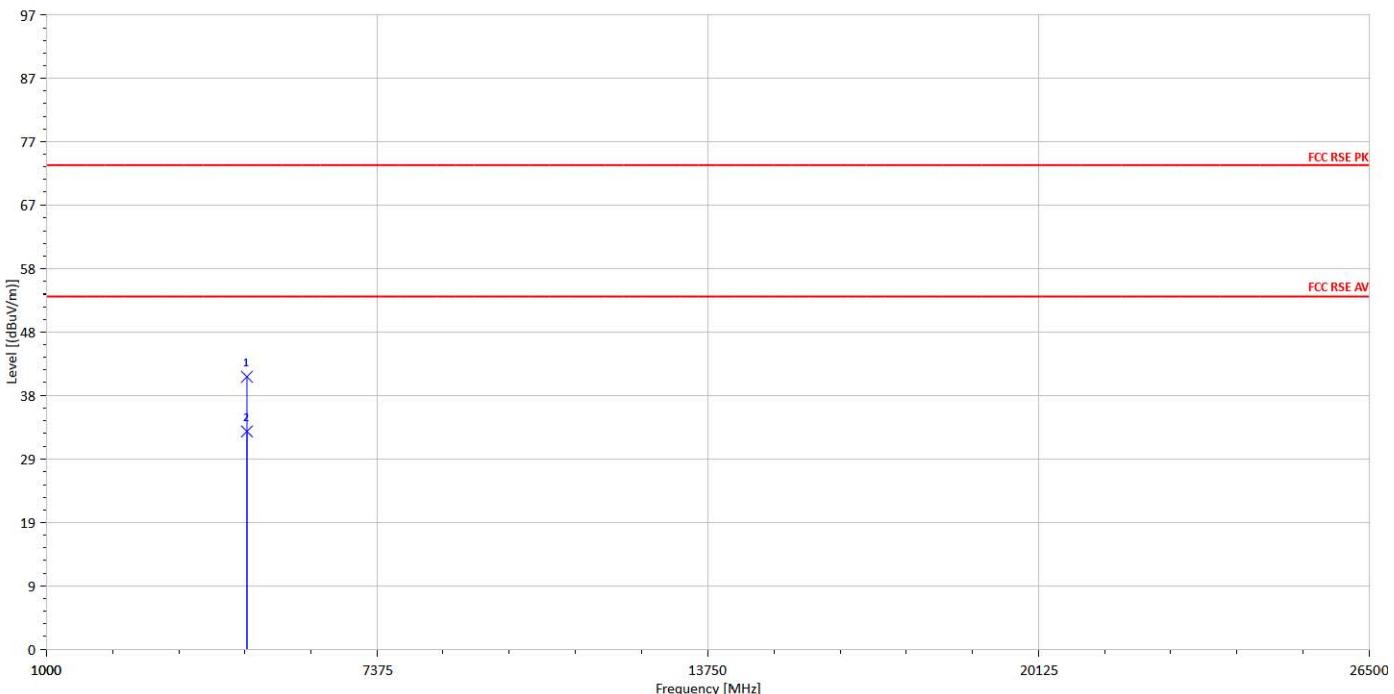
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Operation Mode : 802.11ac20 Test Date : 2016/10/12
Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



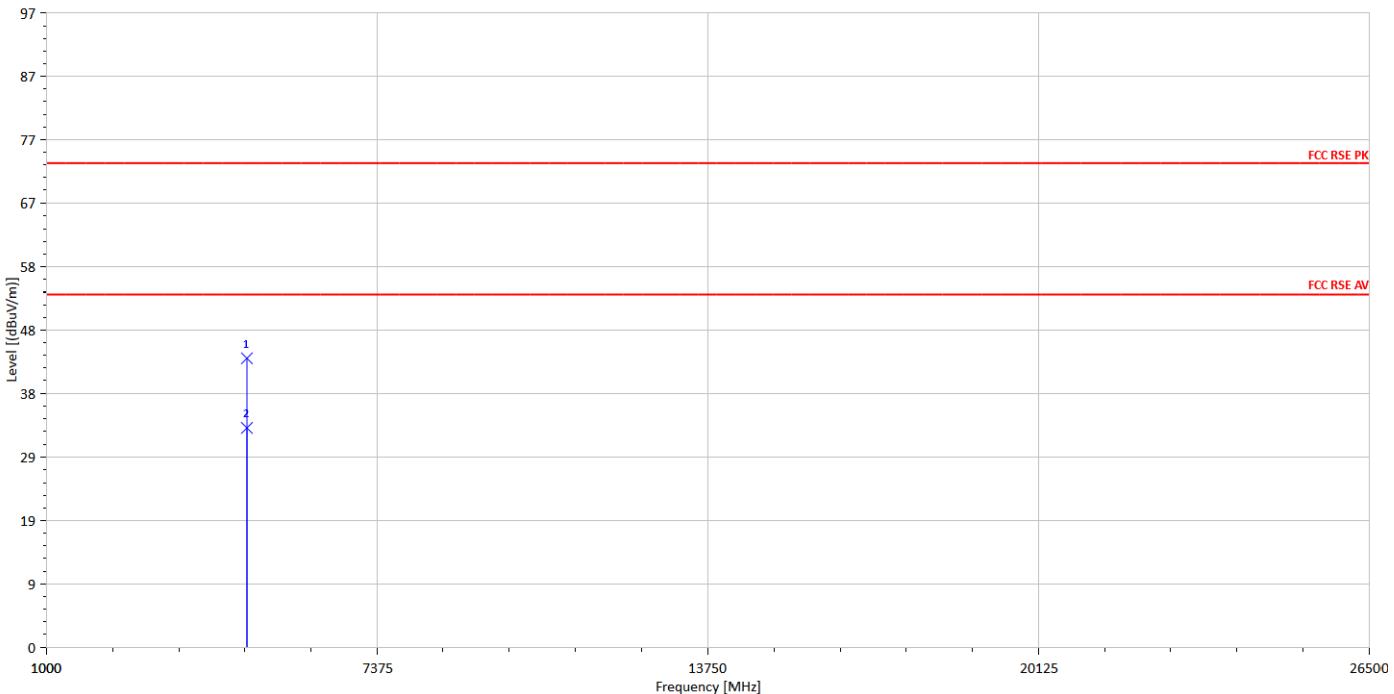
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
4874.00	H	Peak	33.70	7.91	41.61	74	-32.39
4874.00	H	Average	25.41	7.91	33.32	54	-20.68

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Operation Mode : 802.11ac20 Test Date : 2016/10/12
Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



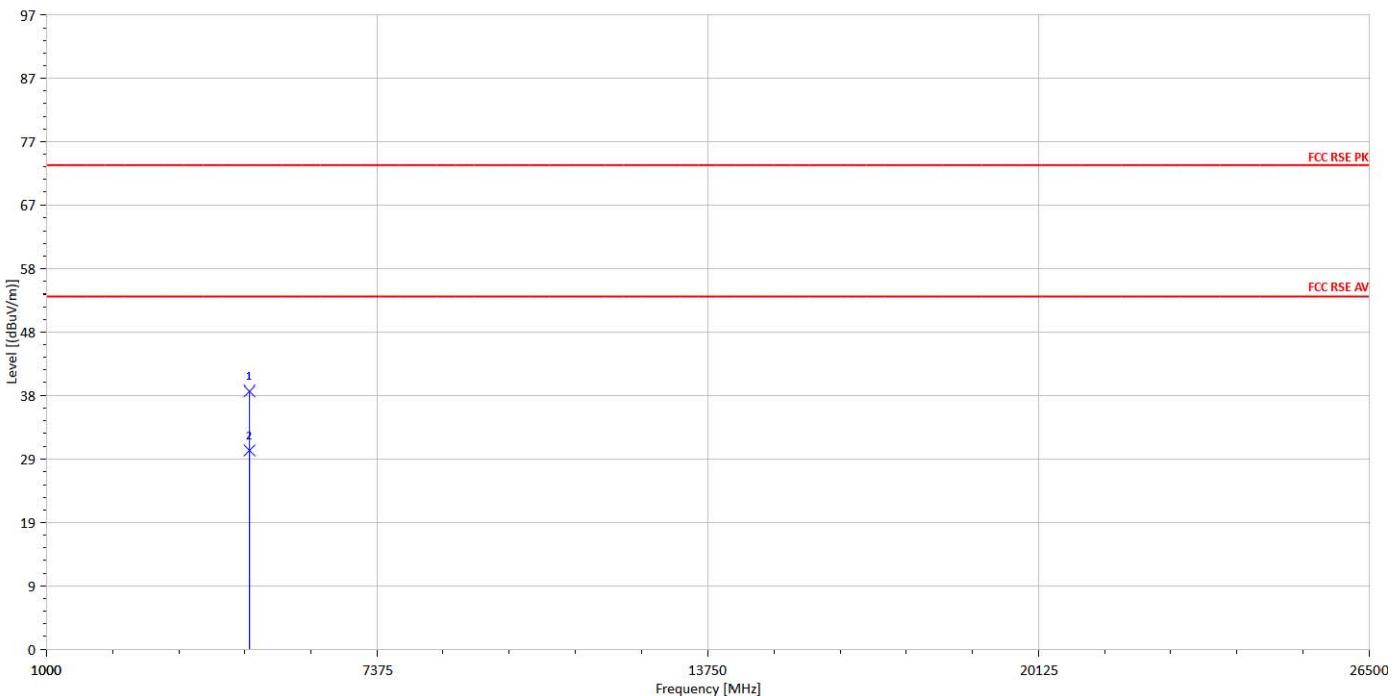
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
4874.00	H	Peak	36.24	7.91	44.16	74	-29.84
4874.00	H	Average	25.65	7.91	33.56	54	-20.44

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Operation Mode : 802.11ac20 Test Date : 2016/10/12
Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



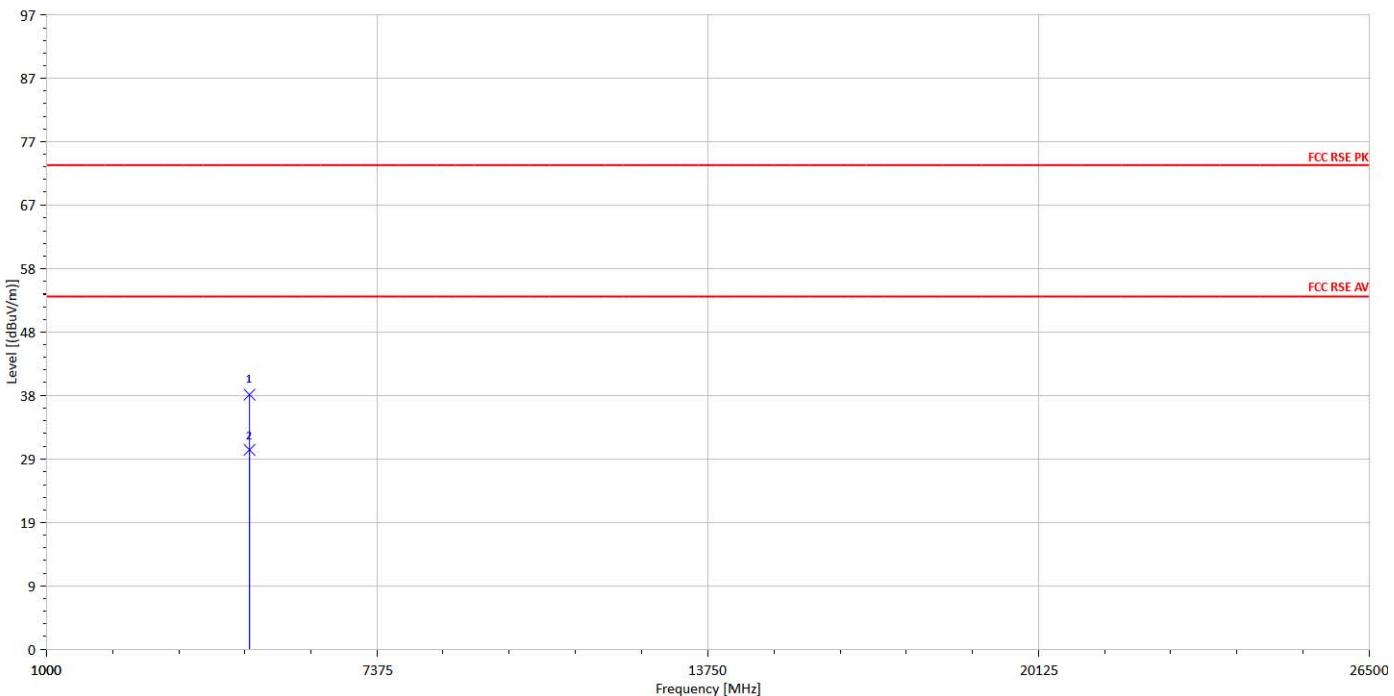
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
			Reading	Level				
4924.00	H	Peak	31.59		7.92	39.51	74	-34.49
4924.00	H	Average		22.46	7.92	30.38	54	-23.62

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Operation Mode : 802.11ac20 Test Date : 2016/10/12
Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
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	dB μ V	dB	dB μ V/m	dB μ V/m	dB
4924.00	H	Peak	31.07	7.92	39.00	74	-35.00
4924.00	H	Average	22.55	7.92	30.47	54	-23.53

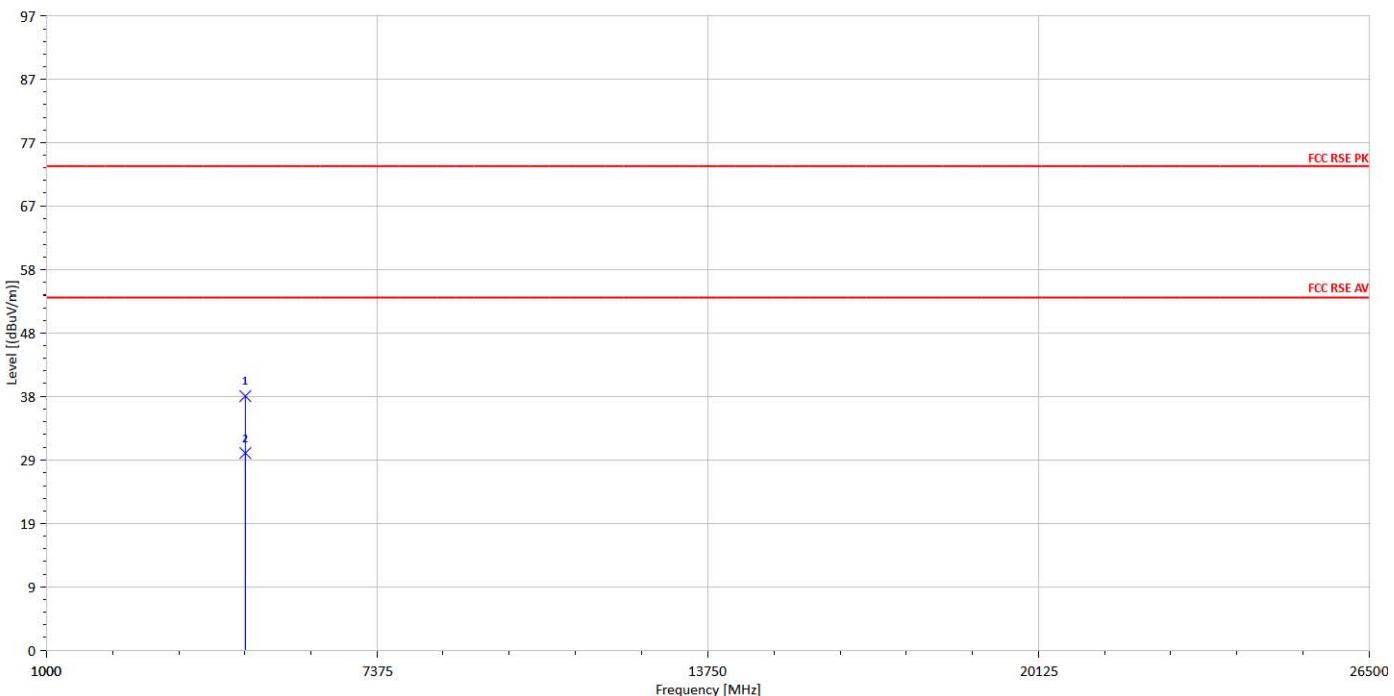
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Radiated Spurious Emission Measurement Result (802.11n_VHT40)

Operation Mode : 802.11ac40 Test Date : 2016/10/12
Fundamental Frequency : 2422 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



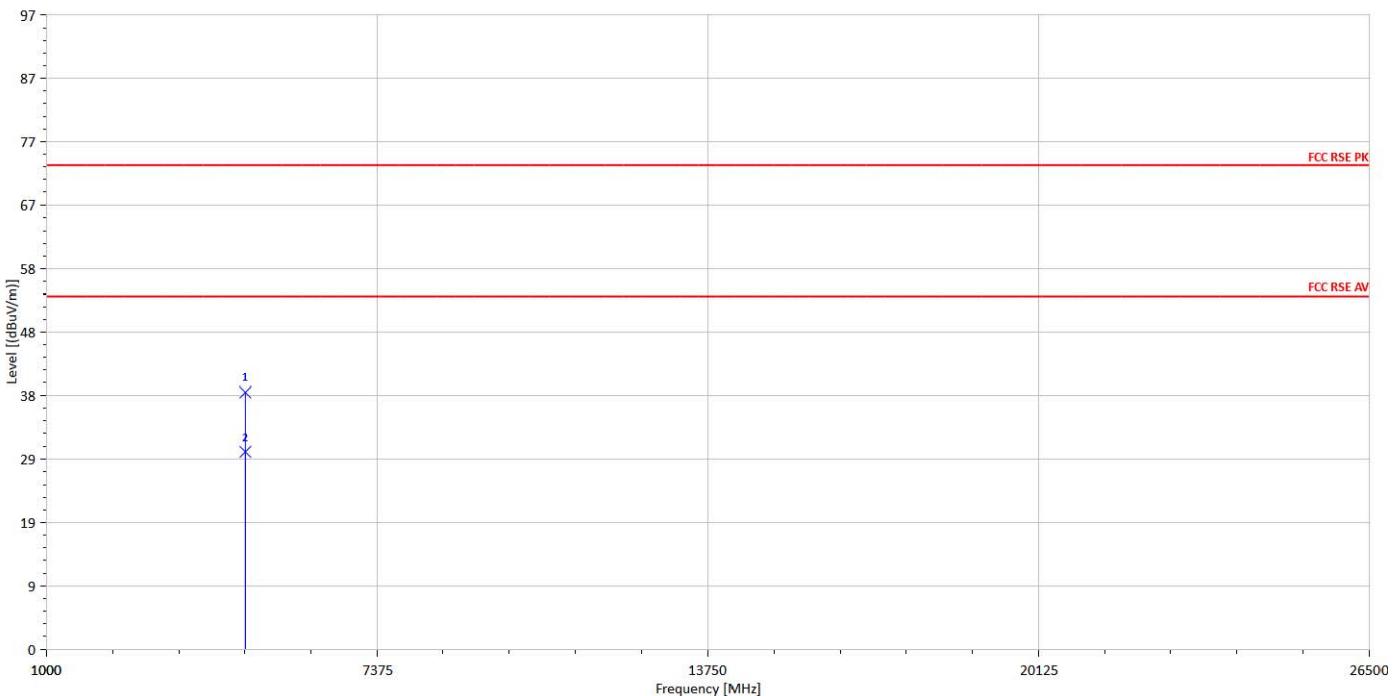
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading	Factor	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
			Level dB μ V				
4844.00	H	Peak	31.35	7.58	38.93	74	-35.07
4844.00	H	Average	22.56	7.58	30.14	54	-23.86

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Operation Mode : 802.11ac40 Test Date : 2016/10/12
Fundamental Frequency : 2422 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx 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		Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
			Reading	Level dB μ V				
4844.00	H	Peak	31.75	7.58	39.32	74	-34.68	
4844.00	H	Average	22.59	7.58	30.17	54	-23.83	

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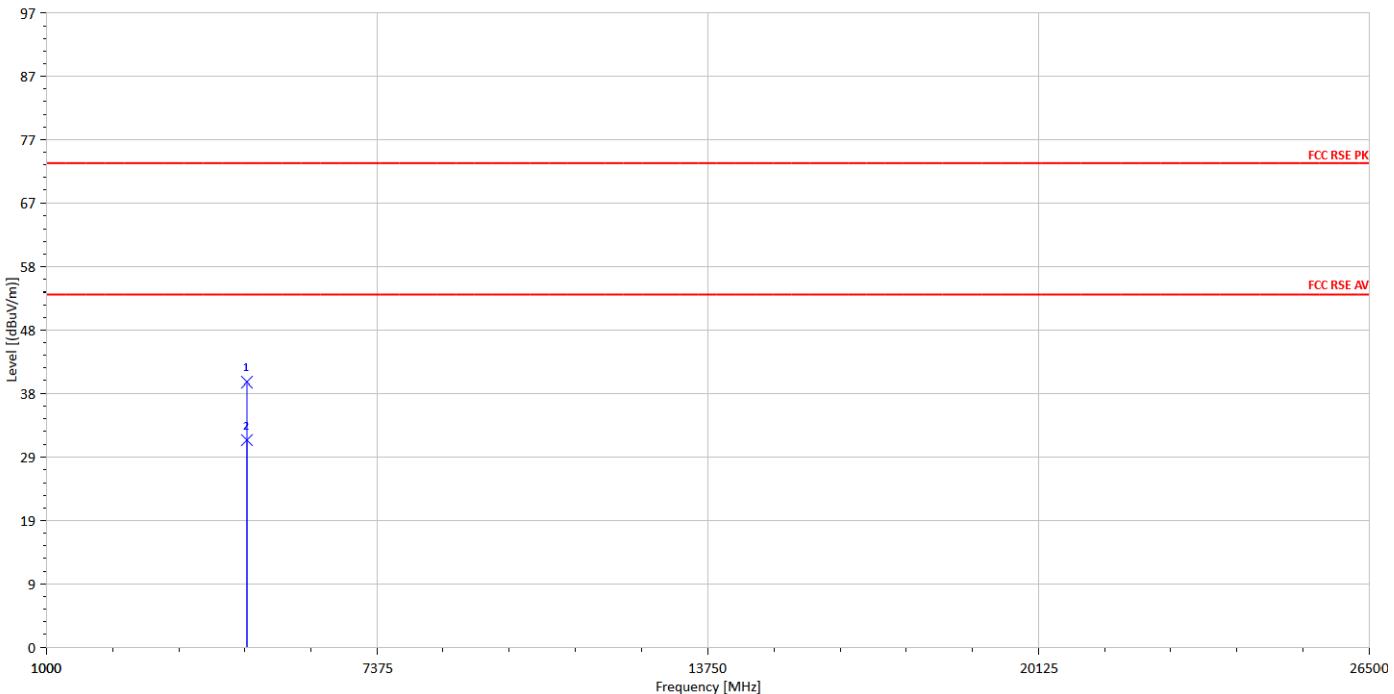
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Operation Mode : 802.11ac40 Test Date : 2016/10/12
Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



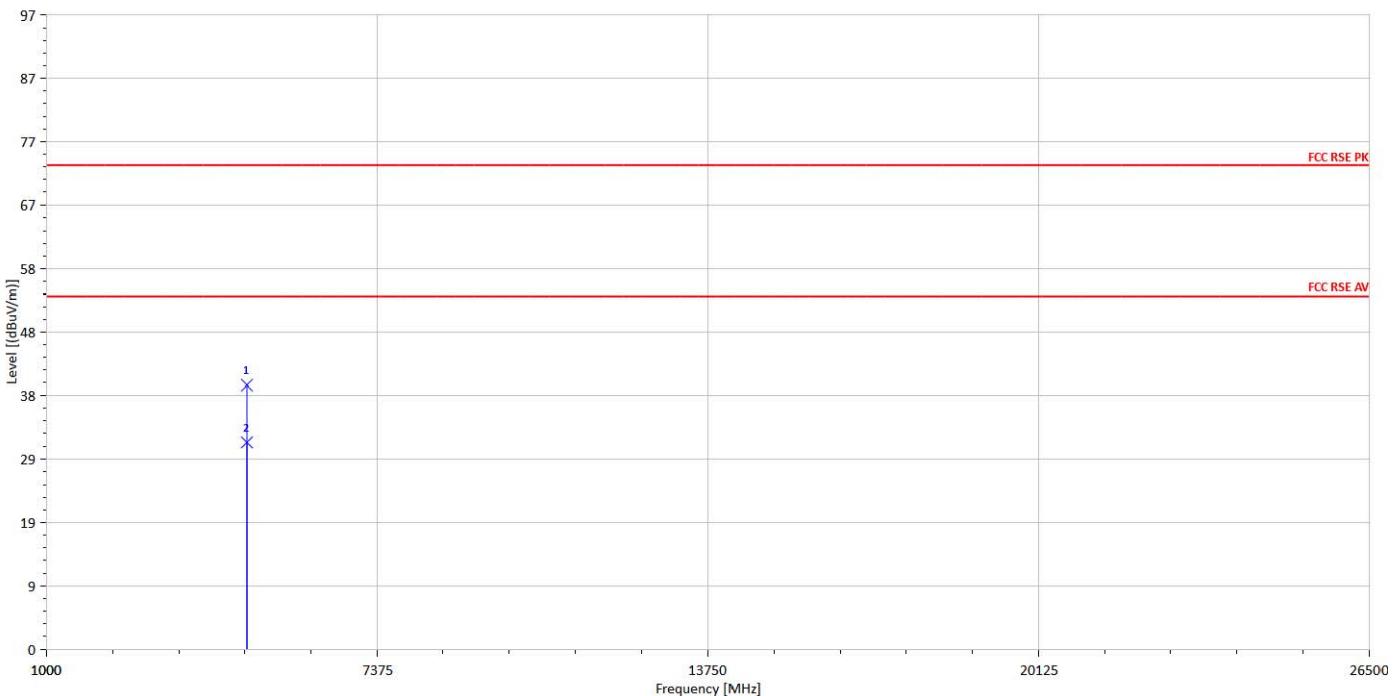
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
4874.00	H	Peak	32.63	7.91	40.54	74	-33.46
4874.00	H	Average	23.76	7.91	31.67	54	-22.33

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Operation Mode : 802.11ac40 Test Date : 2016/10/12
Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



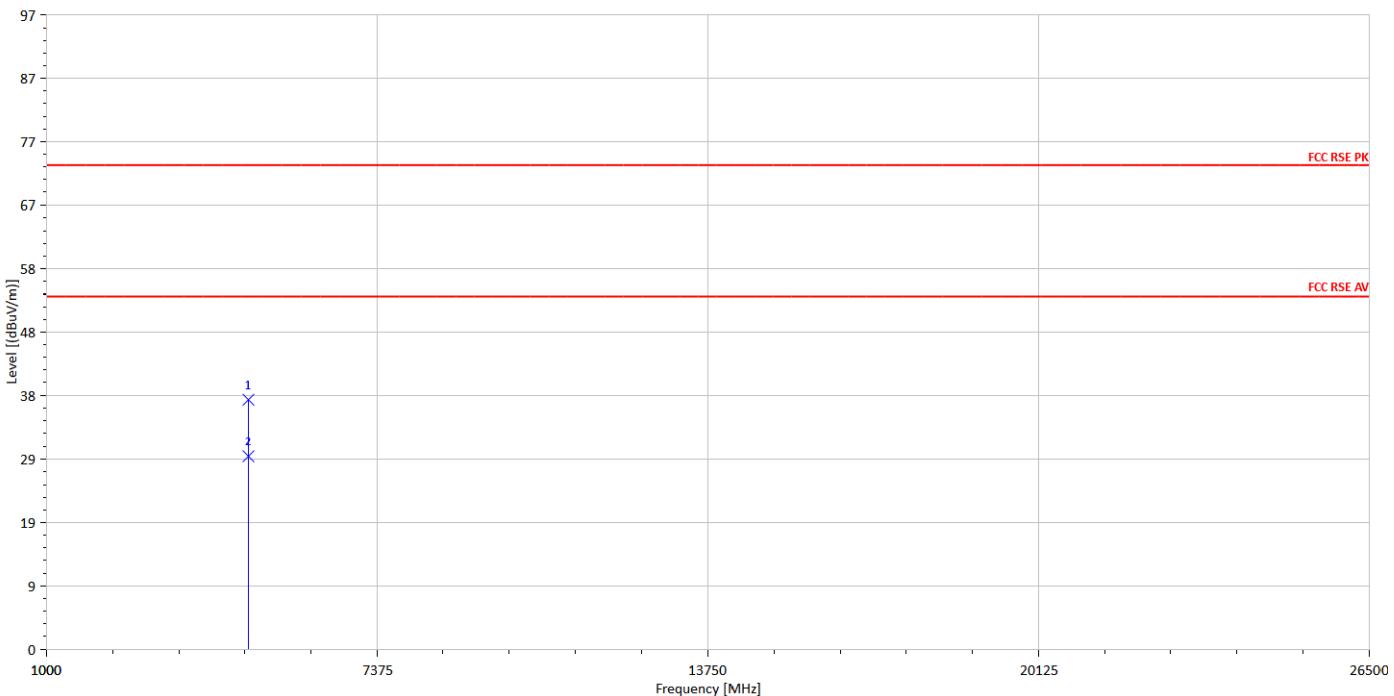
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
4874.00	H	Peak	32.47	7.91	40.38	74	-33.62
4874.00	H	Average	23.72	7.91	31.63	54	-22.37

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Operation Mode : 802.11ac40 Test Date : 2016/10/12
Fundamental Frequency : 2452 MHz Temp. / Humi. : 22.7deg_C/57RH
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		Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
			Reading	Level dB μ V				
4904.00	H	Peak	30.77	30.77	7.44	38.21	74	-35.79
4904.00	H	Average	22.05	22.05	7.44	29.49	54	-24.51

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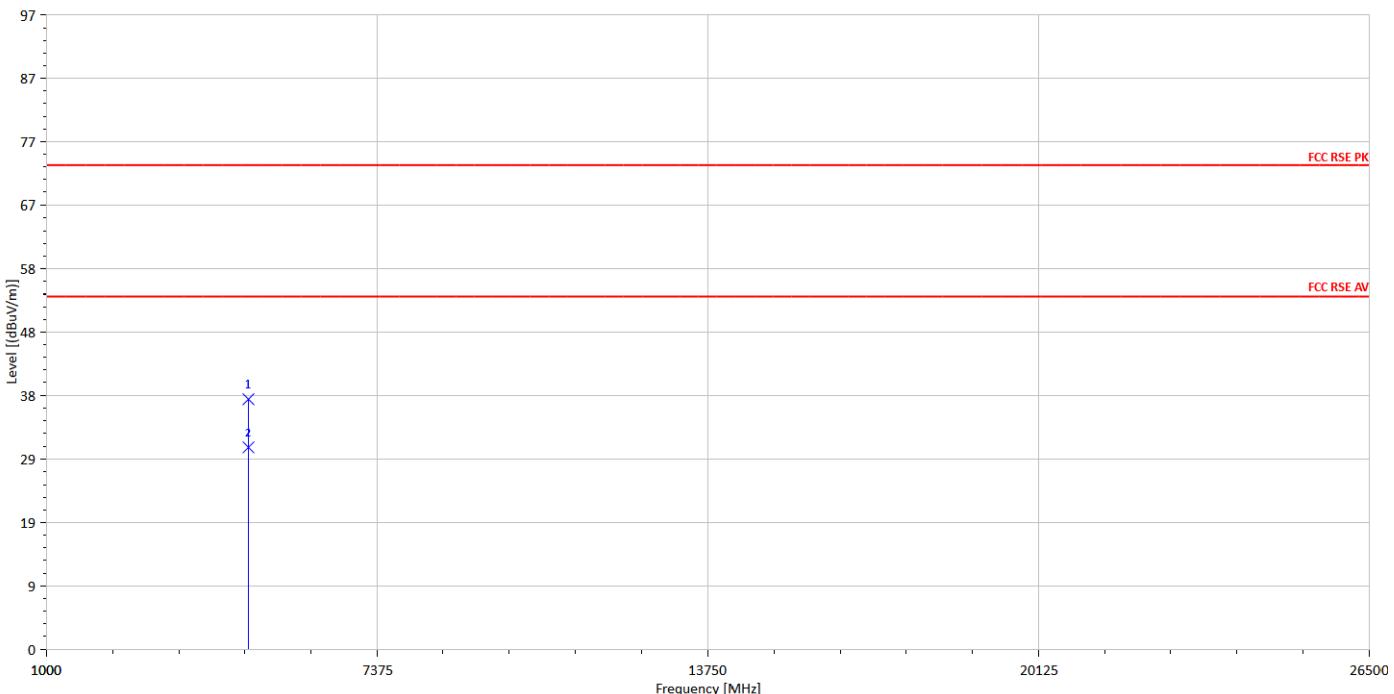
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Operation Mode : 802.11ac40 Test Date : 2016/10/12
Fundamental Frequency : 2452 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
4904.00	H	Peak	30.85	7.44	38.30	74	-35.70
4904.00	H	Average	23.42	7.44	30.86	54	-23.14

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9 ANTENNA REQUIREMENT

9.1 Standard Applicable:

For intentional device, 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.

If the transmitting antenna is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi.

According to RSS-GEN 8.3

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.⁹ When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

9.2 Antenna Connected Construction:

An embedded-in antenna design is used.

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

The antenna gain is less than 6dBi. Therefore, it is not necessary to reduce maximum output power limit.

~ End of Report ~

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