

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Applicant: Robotelf Technologies Co., Ltd
3390 East Harmony Road Fort Collins, Colorado 80528 United States

Product Name: Robelf Smart Robot

Brand Name: Robotelf Technologies Co., Ltd

Model No.: RBE001

Model Difference: N/A

FCC ID: 2APLA-RBE001

Report Number: E2/2018/40038

FCC Rule Part: §15.247, Cat: DTS

Issue Date: Jun. 08, 2018

Date of Test: Apr. 23, 2018(Conducted); May. 29, 2018(Radiated)

Date of EUT Received: Apr. 12, 2018

We hereby certify that:

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

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

Tested By:

Aken Huang

Aken Huang / Engineer

Approved By:

Jim Chang

Jim Chang / Manager



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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
E2/2018/40038	Rev.00	Initial creation of document	All	Jun. 08, 2018	Elle Chang

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1 GENERAL INFORMATION

1.1 Product description

General:

Product Name:	Robelf Smart Robot	
Brand Name:	Robotelf Technologies Co., Ltd	
Marketing Name:	Robotelf Technologies Co., Ltd	
Model No.:	RBE001	
Model Difference:	N/A	
Software version:	N/A	
Hardware version:	N/A	
Power Supply:	20V from AC/DC Adapter	
	Adapter:	Model No.: ADPC2045, Supplier: TPV ELECTRONICS(FUJIAN) CO., LTD

WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power	Modulation Technology
11b/g	2412-2462	11	b: 20.59dBm g: 21.14dBm	DSSS, OFDM
11n	HT20 2412-2462	11	HT20:21.19dBm	OFDM
11n	HT40 2422-2452	9	HT40:22.42dBm	OFDM
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 n_20MHz: 6.5 – 72.2Mbps 802.11 n_40MHz: 13.5 - 150.0Mbps		

Antenna Designation

Antenna Type	Part Number	Supplier	Peak Gain (dBi)
PCB	WA-P-LB-02-522	INPAQ TECHNOLOGY. CO. LTD	4.53

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 DTS Meas. Guidance v04

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 Number and Designation are: 735305 / TW0002

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.

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2.4 Configuration of Tested System

Fig. 2-1 Conducted Emission Configuration



Fig. 2-2 Radiated Emission Configuration



Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1	Notebook	DELL	E5400	3704625136	Shielded	Unshielded
2	Bluetooth Test Software	N/A	N/A	N/A	N/A	N/A

3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	Peak Output Power	Compliant
§15.247(a)(2)	6dB & 99% Emission Bandwidth	Compliant
§15.247(d)	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d)	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.203 §15.247(b)	Antenna Requirement	Compliant

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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

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

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		

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 and receiving mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case.

RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
802.11g	1 to 11	1,6,11	OFDM	6

RADIATED EMISSION TEST (ABOVE 1 GHz)				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	1
802.11g	1 to 11	1, 6, 11	OFDM	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 0
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	MCS 0

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Note:

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

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	1
802.11g	1 to 11	1, 6, 11	OFDM	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 0
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	MCS 0

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 0.84 dB
6dB Bandwidth	+/- 51.33 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.84 dB
Peak Power Density	+/- 1.3 dB
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: +/- 2.87 dB
	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: +/- 2.87 dB
	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 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

6.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	06/21/2017	06/20/2018
Attenuator	Marvelous	MVE2213-10	RF31	12/26/2017	12/25/2018
DC Block	PASTERNAK	PE8210	RF81	12/26/2017	12/25/2018
Coaxial Cables	Woken	00100A1F1A185C	RF229	12/26/2017	12/25/2018

6.3 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

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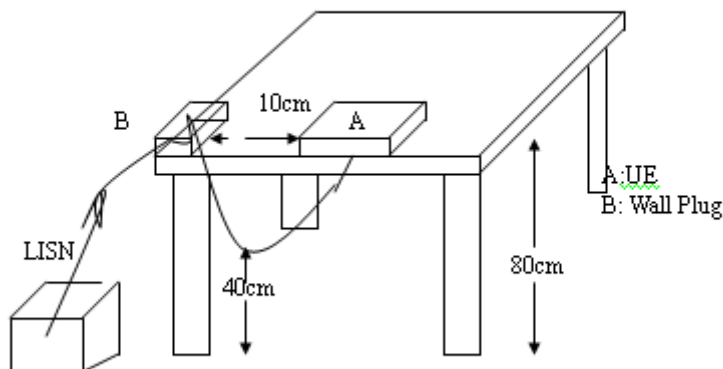
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6.4 Test SET-UP (Block Diagram of Configuration)



6.5 Measurement Procedure

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

6.6 Measurement Result

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

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

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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode: operation mode

Test By: Jerry

Site : Conduction Room

Phase: L1

Temperature: 21 °C

Limit: FCC Class B Conduction(QP)

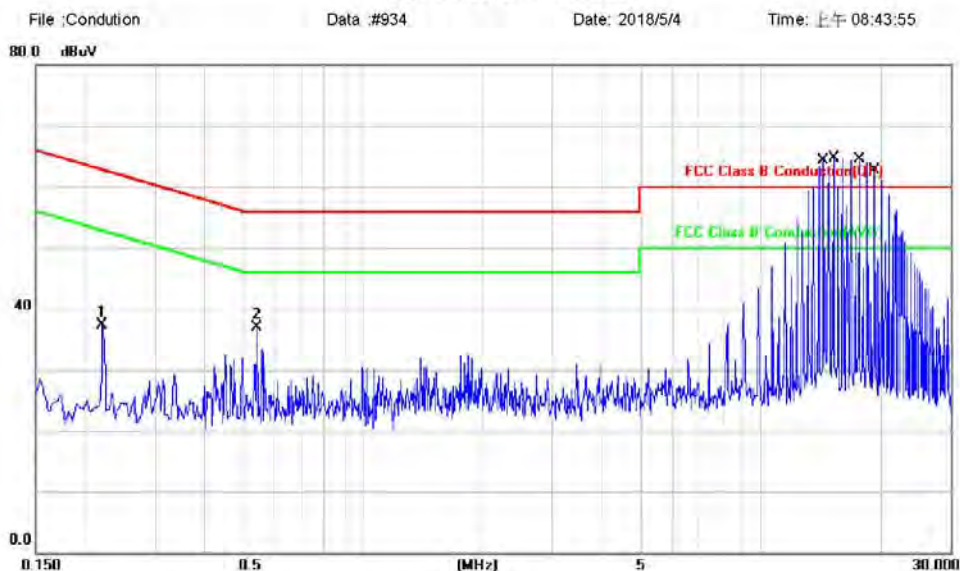
Power: AC 120V/60Hz

Humidity: 59 %

Mode:

Note:

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.2220	17.55	19.68	37.23	62.74	-25.51	peak	
2		0.5420	16.83	20.10	36.93	56.00	-19.07	peak	
3		14.4220	9.20	20.08	29.28	60.00	-30.72	QP	
4		14.4220	3.90	20.08	23.98	50.00	-26.02	AVG	
5		15.2460	23.80	20.09	43.89	60.00	-16.11	QP	
6 *		15.2460	16.70	20.09	36.79	50.00	-13.21	AVG	
7		17.7140	13.00	20.10	33.10	60.00	-26.90	QP	
8		17.7140	6.60	20.10	26.70	50.00	-23.30	AVG	
9		19.3620	8.60	20.12	28.72	60.00	-31.28	QP	
10		19.3620	3.30	20.12	23.42	50.00	-26.58	AVG	

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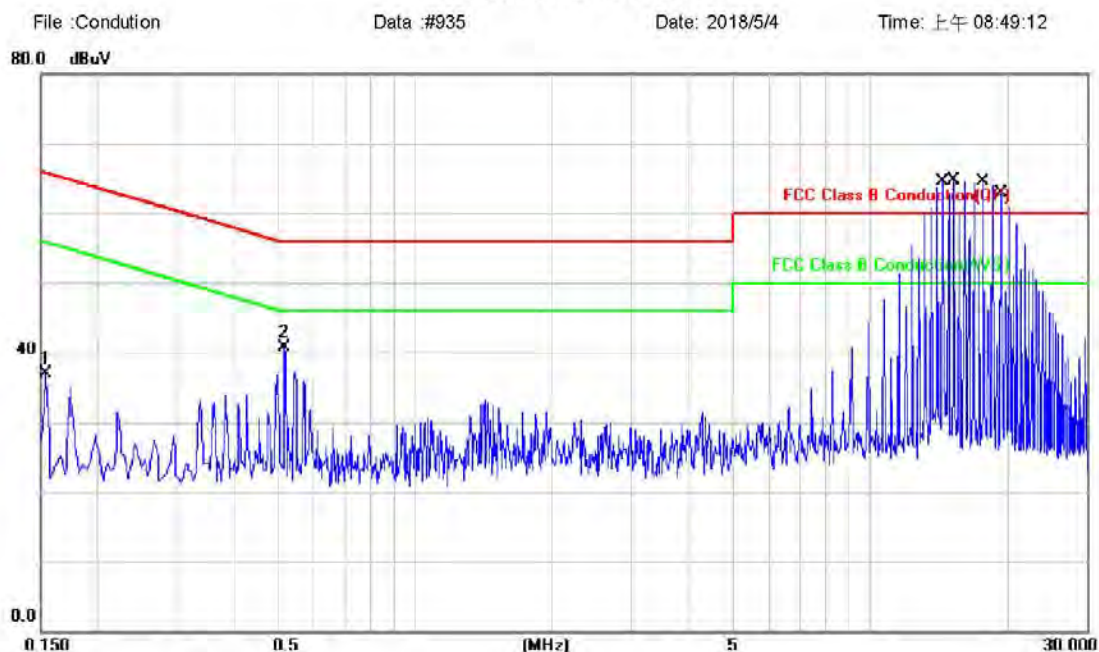
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Site : Conduction Room
Limit: FCC Class B Conduction(QP)
Mode:
Note:

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

Temperature: 21 °C
Humidity: 59 %

Conducted Emission



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1540	17.26	19.64	36.90	65.78	-28.88	peak	
2		0.5180	20.60	20.11	40.71	56.00	-15.29	peak	
3		14.5020	12.60	20.09	32.69	60.00	-27.31	QP	
4		14.5020	7.20	20.09	27.29	50.00	-22.71	AVG	
5		15.3300	26.70	20.10	46.80	60.00	-13.20	QP	
6 *		15.3300	19.10	20.10	39.20	50.00	-10.80	AVG	
7		17.8180	15.50	20.13	35.63	60.00	-24.37	QP	
8		17.8180	9.70	20.13	29.83	50.00	-20.17	AVG	
9		19.4740	11.30	20.15	31.45	60.00	-28.55	QP	
10		19.4740	5.90	20.15	26.05	50.00	-23.95	AVG	

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7 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)	1/T (kHz)	VBW setting (kHz)
802.11b	99.64	0.02	0.12	1.00
802.11g	96.84	0.14	0.72	1.00
802.11n_20	96.19	0.17	0.77	1.00
802.11n_40	95.01	0.22	1.54	2.00

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9964) = 0.02$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9684) = 0.14$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9619) = 0.17$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9501) = 0.22$$

$$b = 99.64\%, g = 96.84\%, n_{ht_20} = 96.19\%$$

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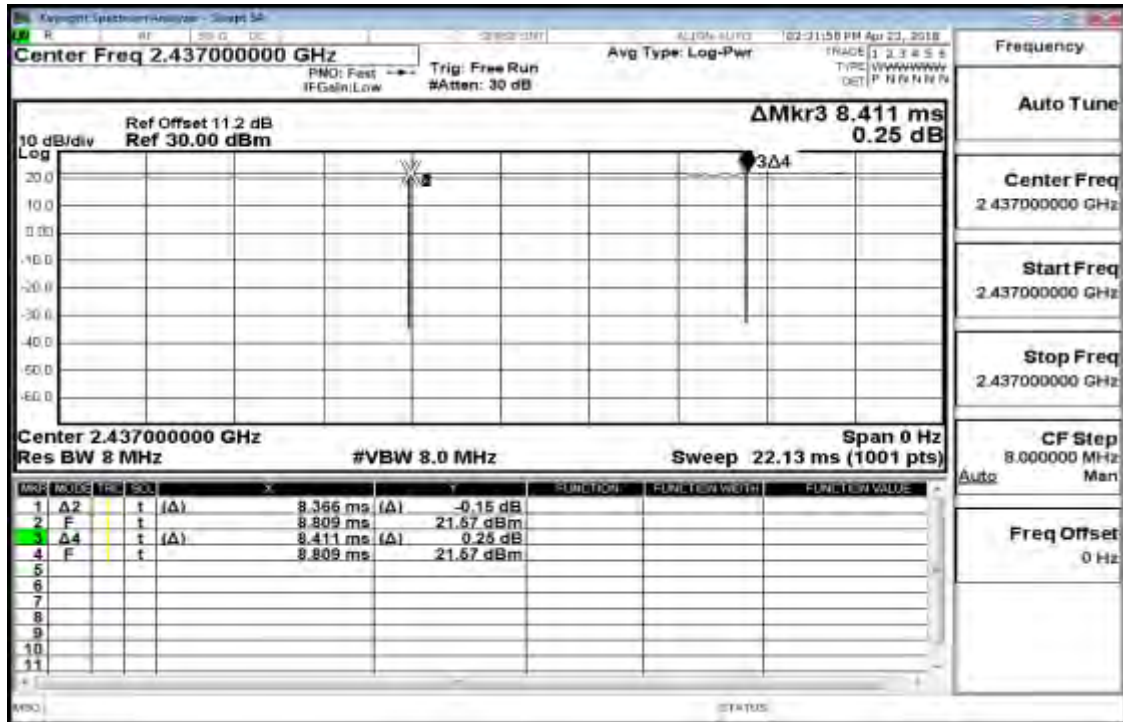
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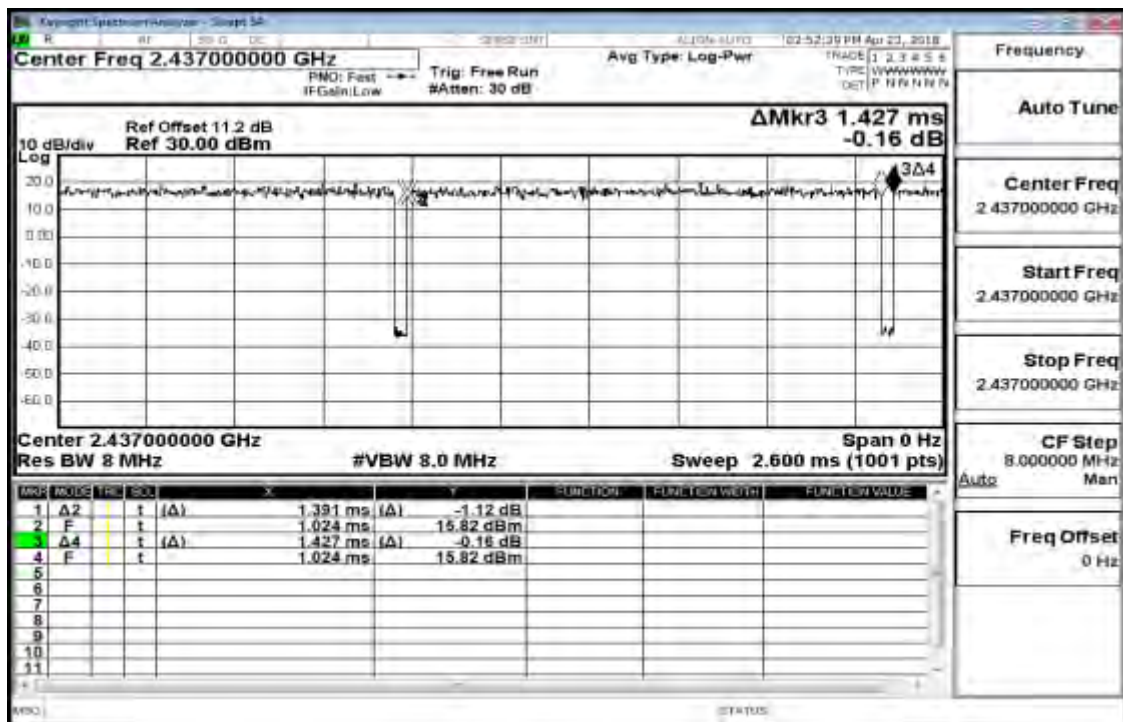
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7.1 DUTY CYCLE TEST SIGNAL Measurement Result

802.11 b



802.11 g



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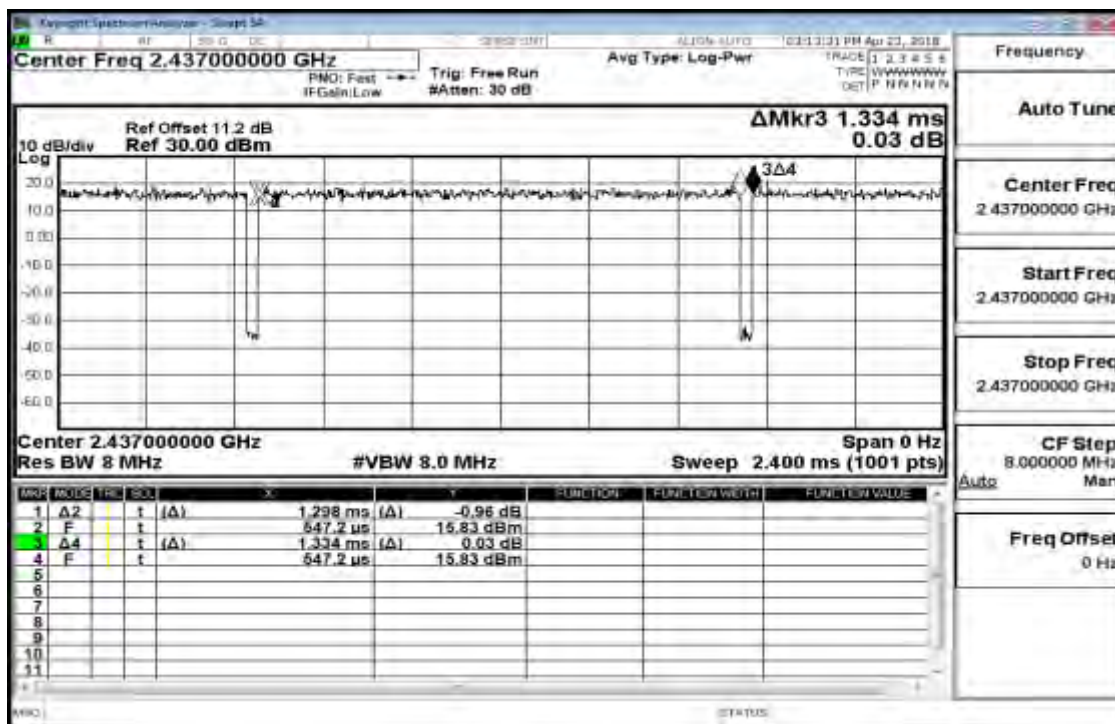
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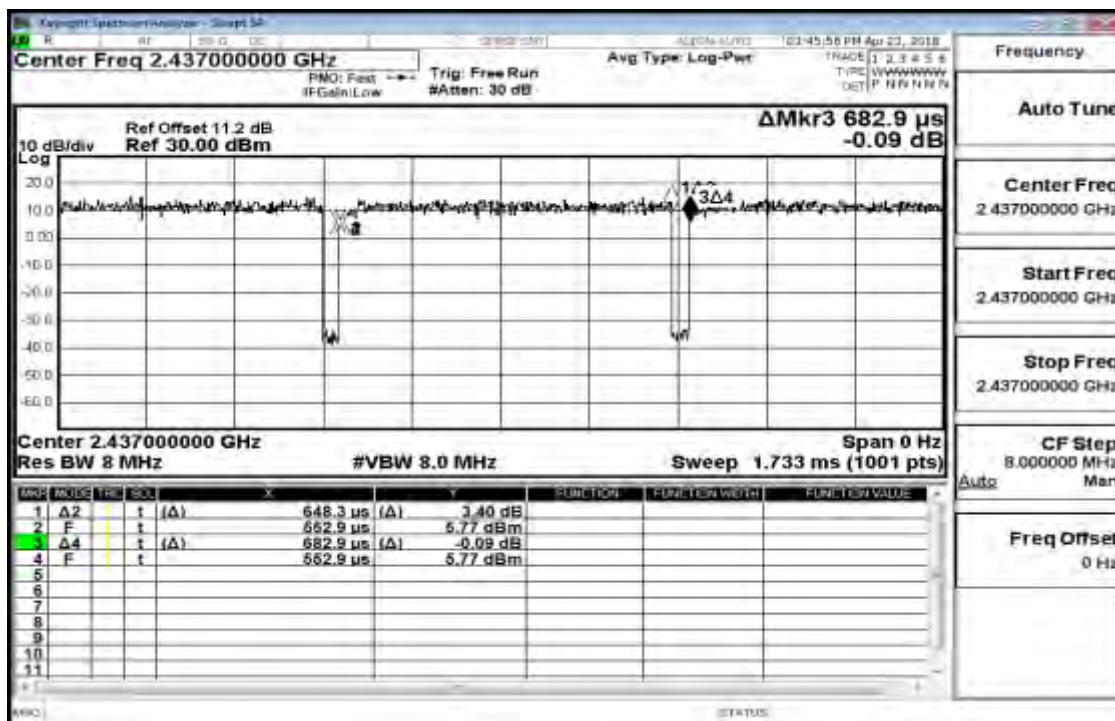
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802.11 n_20 MHz



802.11 n_40 MHz



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8 PEAK OUTPUT POWER MEASUREMENT

8.1 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.

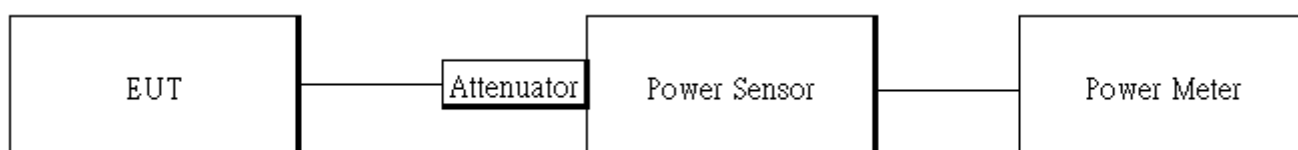
In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

8.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2496A	1326001	07/26/2017	07/25/2018
Power Sensor	Anritsu	MA2411B	1315048	07/26/2017	07/25/2018
Power Sensor	Anritsu	MA2411B	1315049	07/26/2017	07/25/2018
Attenuator	Marvelous	MVE2213-10	RF31	12/26/2017	12/25/2018
Coaxial Cables	Woken	00100A1F1A 185C	RF229	12/26/2017	12/25/2018

8.3 Test Set-up

Power Meter:



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8.4 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.

8.5 Measurement Result

802.11b Main					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
1	2412	1	16.49	1 Watt = 30.00 dBm	PASS
6	2437	1	20.03	1 Watt = 30.00 dBm	PASS
11	2462	1	20.59	1 Watt = 30.00 dBm	PASS
802.11b Main					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
1	2412	1	13.73	1 Watt = 30.00 dBm	PASS
6	2437	1	18.75	1 Watt = 30.00 dBm	PASS
11	2462	1	19.06	1 Watt = 30.00 dBm	PASS

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802.11g Main					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
1	2412	6	18.93	1 Watt = 30.00 dBm	PASS
6	2437	6	20.29	1 Watt = 30.00 dBm	PASS
11	2462	6	21.14	1 Watt = 30.00 dBm	PASS
802.11g Main					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
1	2412	6	9.58	1 Watt = 30.00 dBm	PASS
6	2437	6	14.37	1 Watt = 30.00 dBm	PASS
11	2462	6	16.35	1 Watt = 30.00 dBm	PASS

802.11n_HT20M Main					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
1	2412	MCS0	19.15	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	20.53	1 Watt = 30.00 dBm	PASS
11	2462	MCS0	21.19	1 Watt = 30.00 dBm	PASS
802.11n_HT20M Main					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
1	2412	MCS0	9.64	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	14.40	1 Watt = 30.00 dBm	PASS
11	2462	MCS0	16.05	1 Watt = 30.00 dBm	PASS

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802.11n_HT40M Main					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
3	2422	MCS0	21.88	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	22.42	1 Watt = 30.00 dBm	PASS
9	2452	MCS0	21.34	1 Watt = 30.00 dBm	PASS
802.11n_HT40M Main					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
3	2422	MCS0	15.44	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	15.21	1 Watt = 30.00 dBm	PASS
9	2452	MCS0	15.13	1 Watt = 30.00 dBm	PASS

Note:

Main Antenna Gain:	4.53 dBi
Aux1 Antenna Gain:	0.00 dBi
Aux2 Antenna Gain:	0.00 dBi
Limit:	30 dBm

The antenna gain is grater than 6dBi in MIMO mode the limit reduce as below:

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

#NUM!

#NUM!

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

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9 6DB BANDWIDTH MEASUREMENT

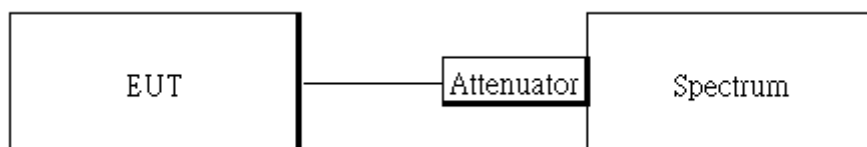
9.1 Standard Applicable

The minimum 6 dB bandwidth shall be at least 500 kHz.

9.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	06/21/2017	06/20/2018
Attenuator	Marvelous	MVE2213-10	RF31	12/26/2017	12/25/2018
DC Block	PASTERNAK	PE8210	RF81	12/26/2017	12/25/2018
Coaxial Cables	Woken	00100A1F1A185C	RF229	12/26/2017	12/25/2018

9.3 Test Set-up



9.4 Measurement Procedure

- Place the EUT on the table and set it in transmitting mode.
- The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
- Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- For 6dB Bandwidth:
Set the spectrum analyzer as RBW = 100 kHz, VBW = 3*RBW, Span = 30M/50MHz, Detector=peak, Sweep=auto.
- Mark the peak frequency and -6dB (upper and lower) frequency.
- For 99% Bandwidth:
Set the spectrum analyzer as RBW=1%, VBW = 3*RBW, Span = 30M/50MHz, Detector=Sample, Sweep=auto.
- Turn on the 99% bandwidth function, max reading.
- Repeat above procedures until all frequency of interest measured was complete.

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9.5 Measurement Result

6dB Bandwidth

802.11b Main

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	10100	> 500	PASS
2437	10120	> 500	PASS
2462	9080	> 500	PASS

802.11g Main

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	16190	> 500	PASS
2437	15790	> 500	PASS
2462	13200	> 500	PASS

802.11 n HT20 Main

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	16450	> 500	PASS
2437	16420	> 500	PASS
2462	11330	> 500	PASS

802.11 n HT40 Main

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	20070	> 500	PASS
2437	35760	> 500	PASS
2452	16340	> 500	PASS

**Refer to next page for plots*

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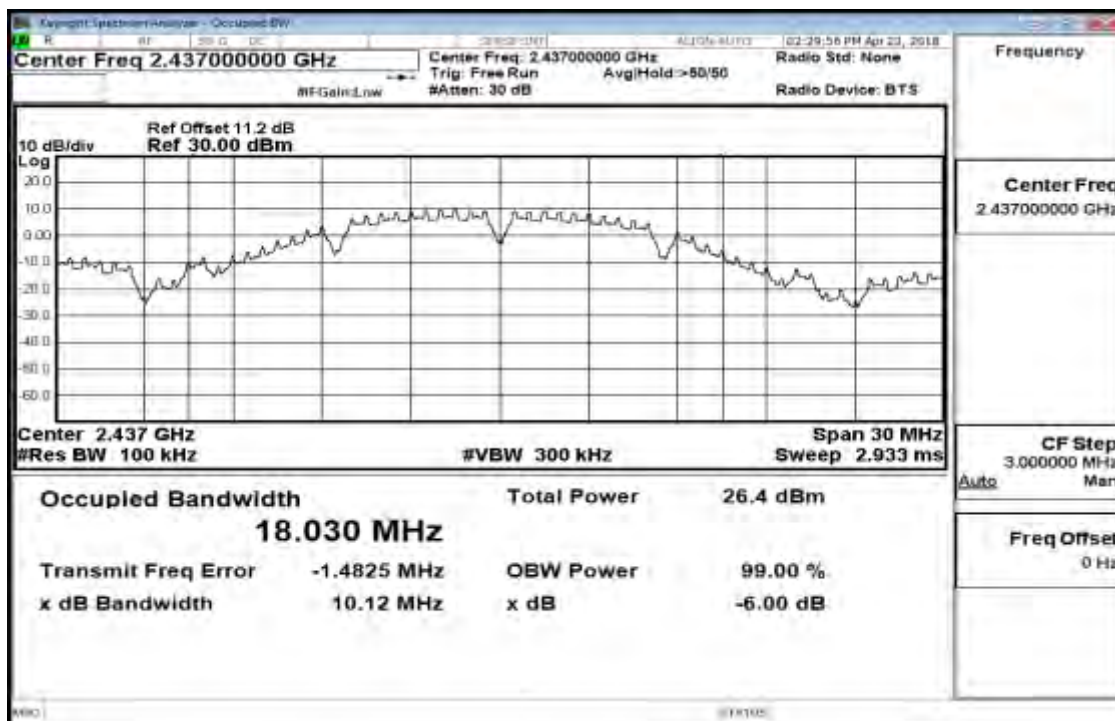
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802.11b

6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid



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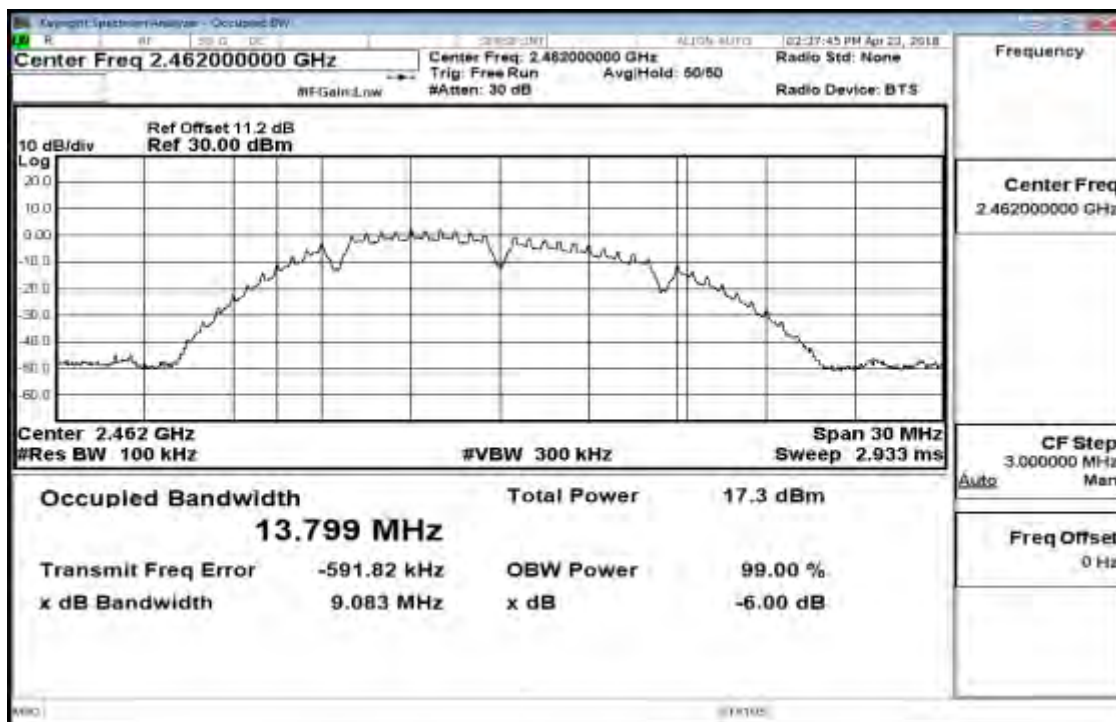
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6dB Band Width Test Data CH-High



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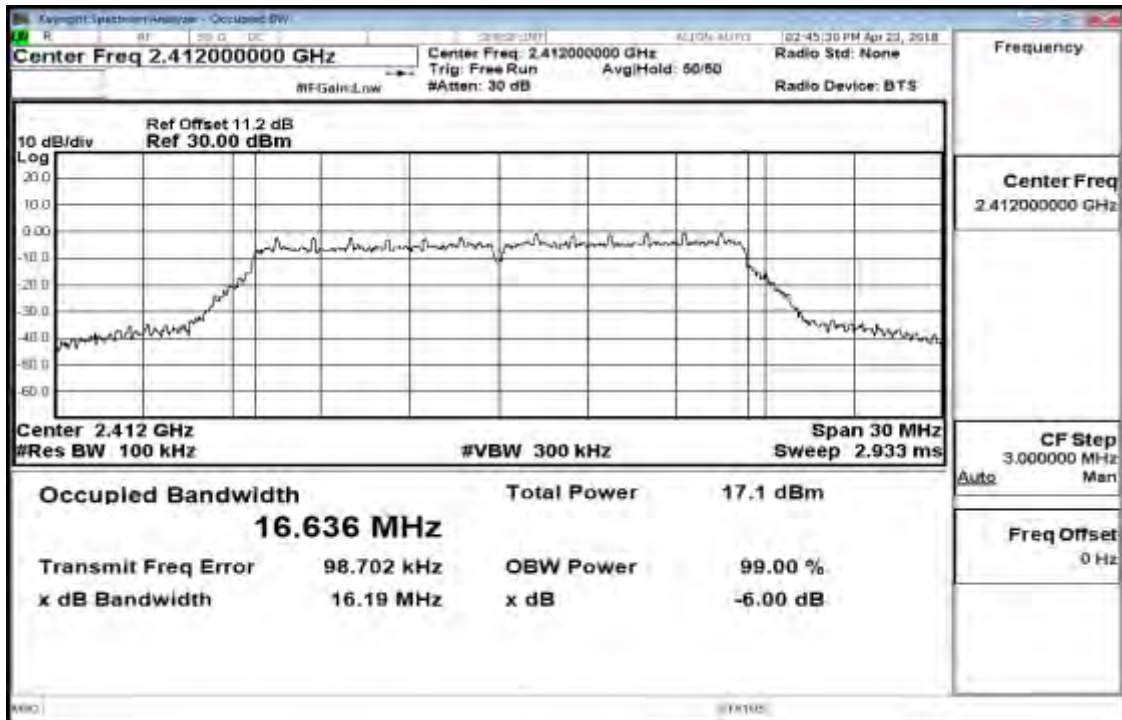
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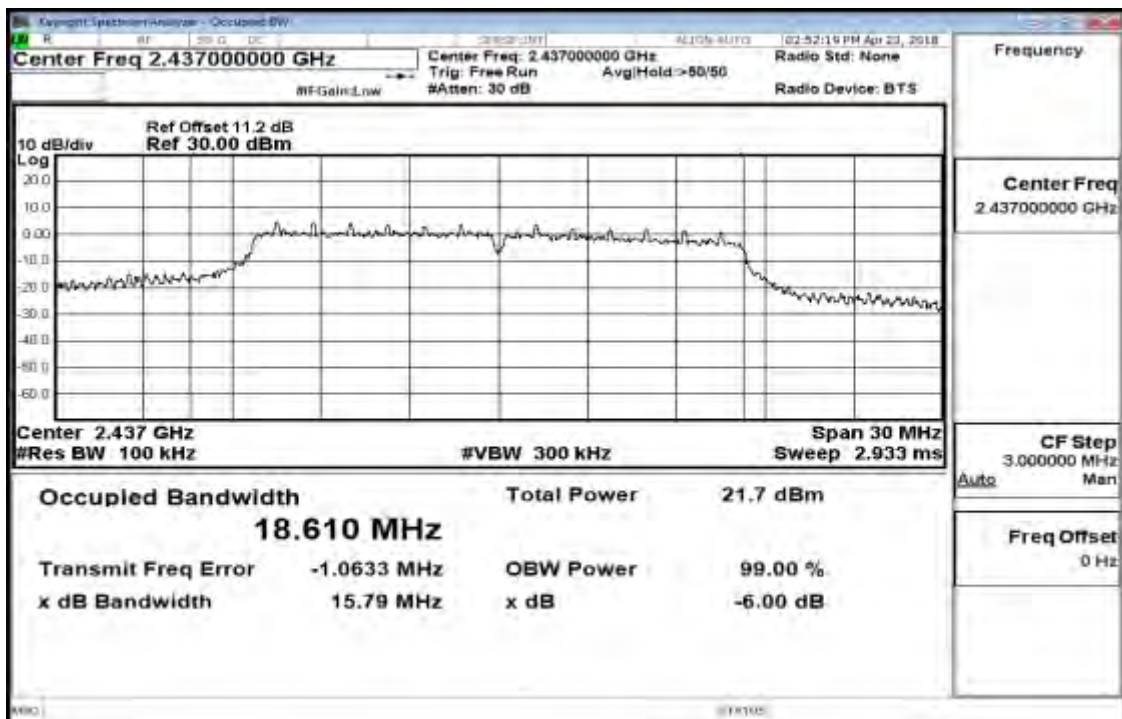
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802.11g

6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid



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6dB Band Width Test Data CH-High



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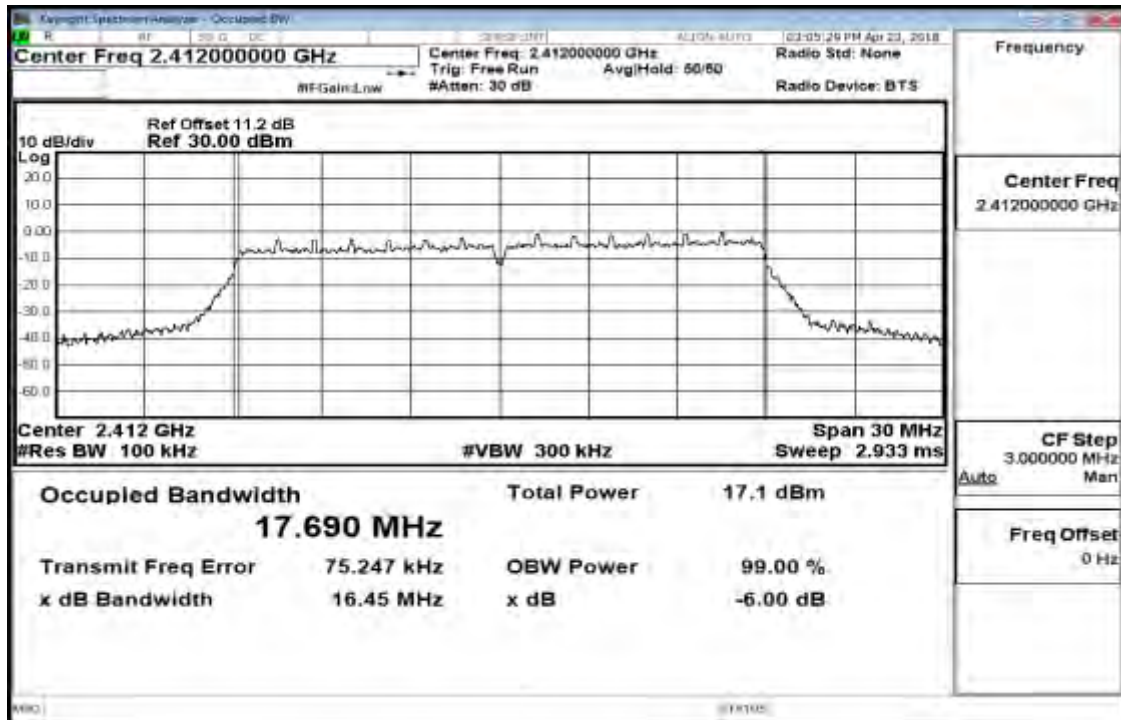
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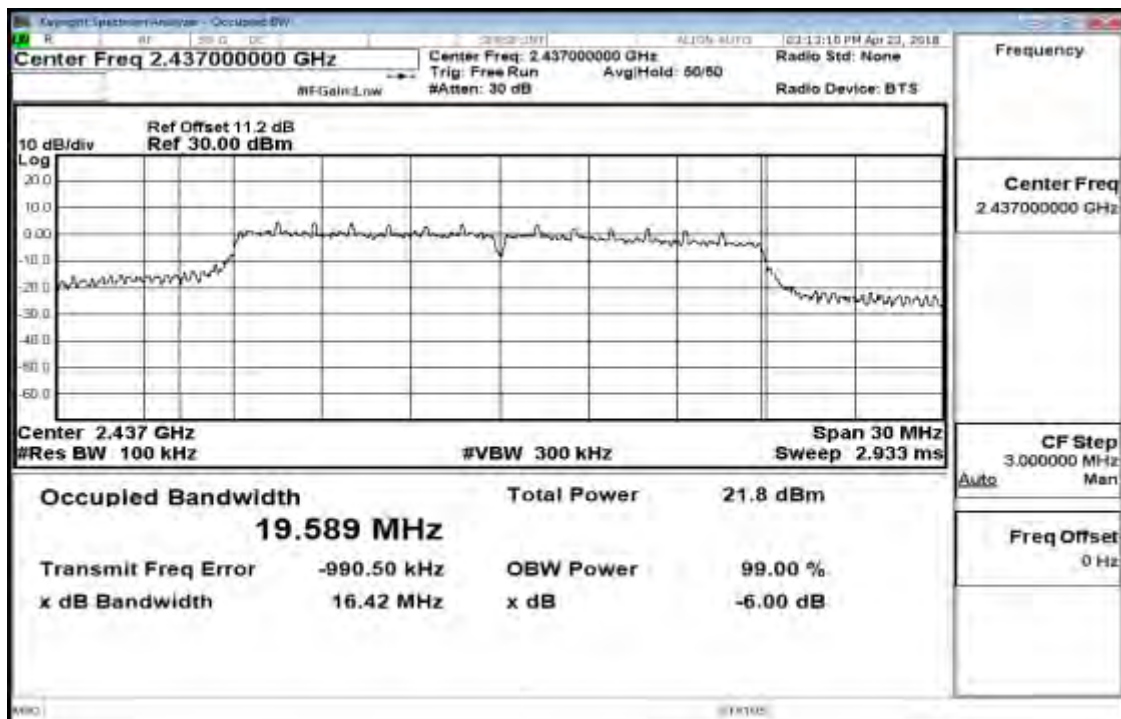
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802.11n_HT20M

6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid



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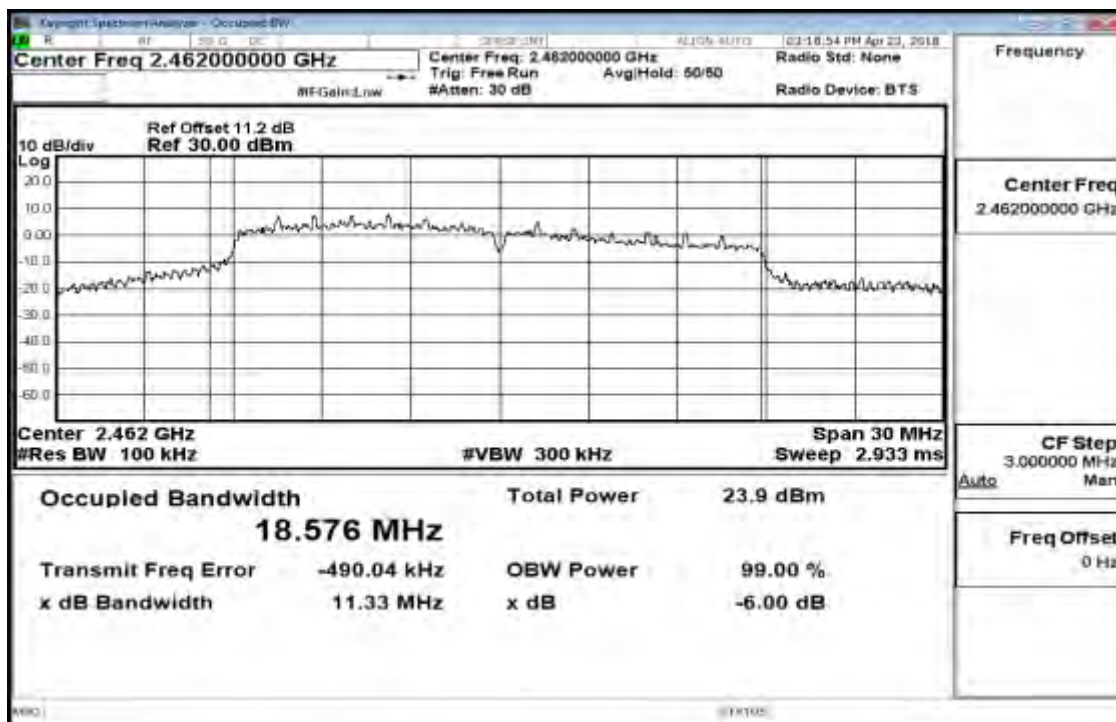
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6dB Band Width Test Data CH-High



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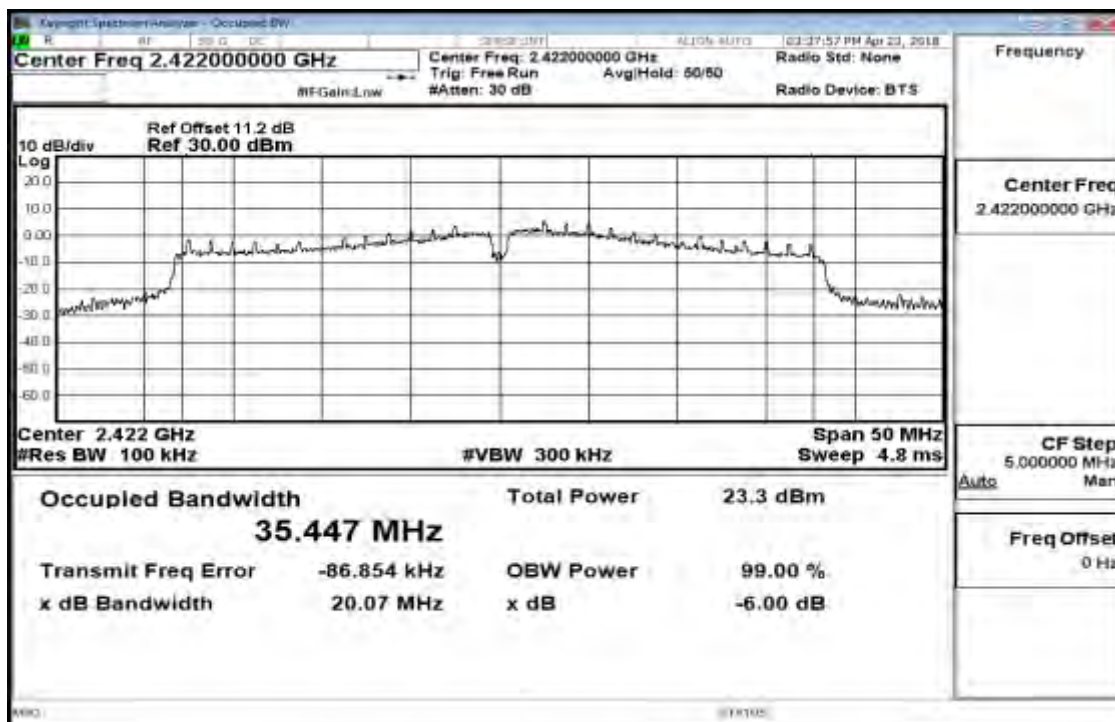
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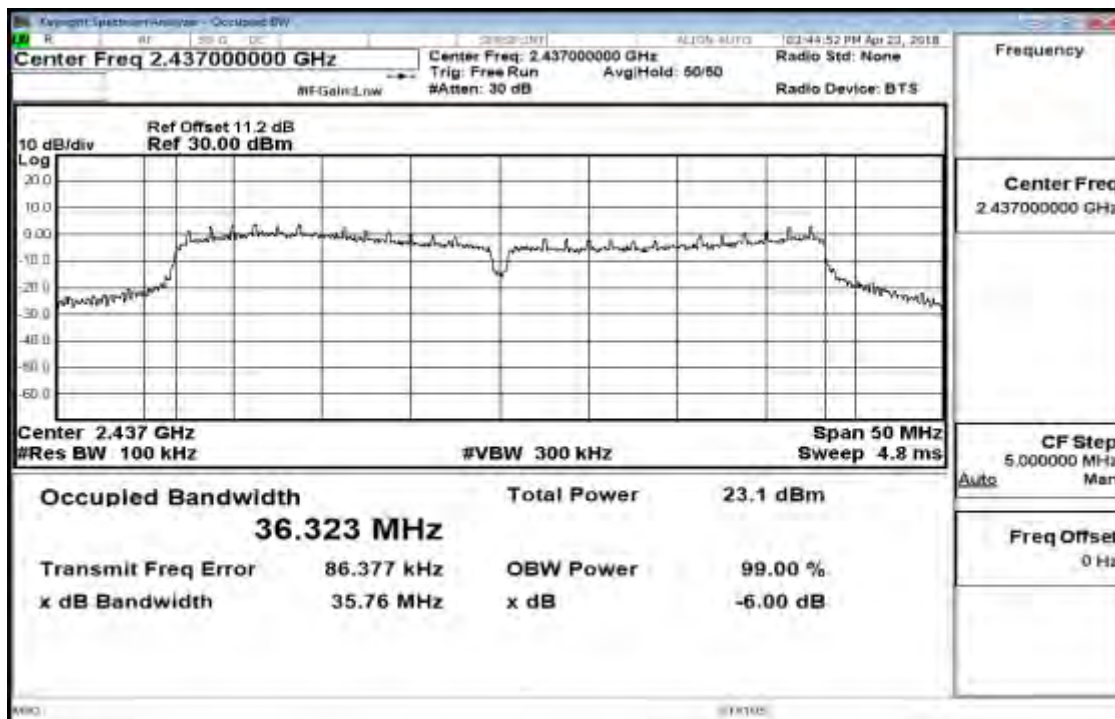
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802.11n_HT40M

6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid



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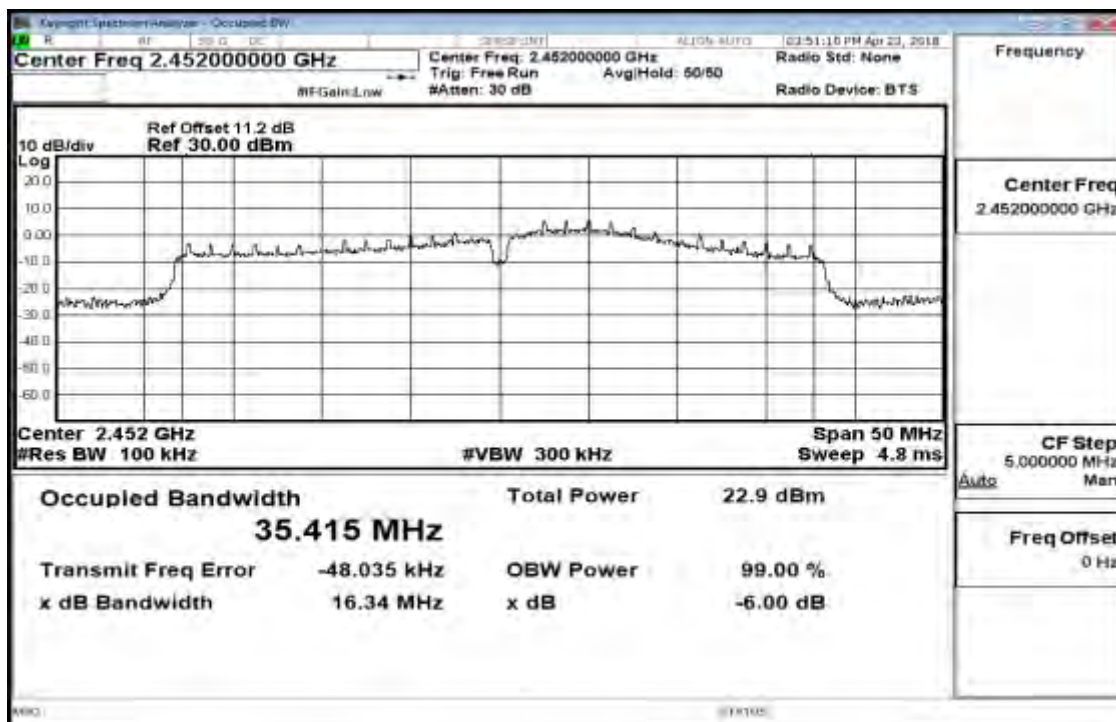
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10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

10.1 Standard Applicable

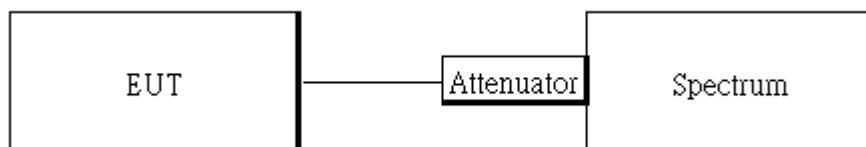
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

10.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	06/21/2017	06/20/2018
Attenuator	Marvelous	MVE2213-10	RF31	12/26/2017	12/25/2018
DC Block	PASTERNAK	PE8210	RF81	12/26/2017	12/25/2018
Coaxial Cables	Woken	00100A1F1A185C	RF229	12/26/2017	12/25/2018

10.3 Test SET-UP



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10.4 Measurement Procedure

Reference Level of Emission Limit:

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 100kHz & VBW = 300 kHz.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

Conducted Band Edge:

1. To connect Antenna Port of EUT to Spectrum.
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 spectrum analyzer.
4. Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Detector = Peak, Sweep = auto
6. Mark the highest reading of the emission as the reference level measurement.
7. Set DL as the limit = reading on marker 1 – 20dBm
8. Marker on frequency, 2.3999GHz and 2.4836GHz, and examine shall 100 kHz immediately outside the authorized (2400~2483.5) be attenuated by 20dB at least relative to the maximum emission of power.
9. Repeat above procedures until all default test channel (low, middle, and high) was complete.

Conducted Spurious Emission:

1. To connect Antenna Port of EUT to Spectrum
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Set RBW = 100 kHz & VBW= 300 kHz, Detector =Peak, Sweep = Auto.
4. Allow trace to fully stabilize.
5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
6. Repeat above procedures until all default test channel measured were complete.

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10.5 Measurement Result

Reference Level of Limit 802.11b mode			Reference Level of Limit 802.11g mode		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)	Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	4.91	-15.09	2412	0.09	-19.91
2462	1.91	-18.09	2462	7.59	-12.41

Reference Level of Limit 802.11n20 mode			Reference Level of Limit 802.11n40 MODE		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)	Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	-0.10	-20.10	2422	5.39	-14.61
2462	7.53	-12.47	2452	5.37	-14.63

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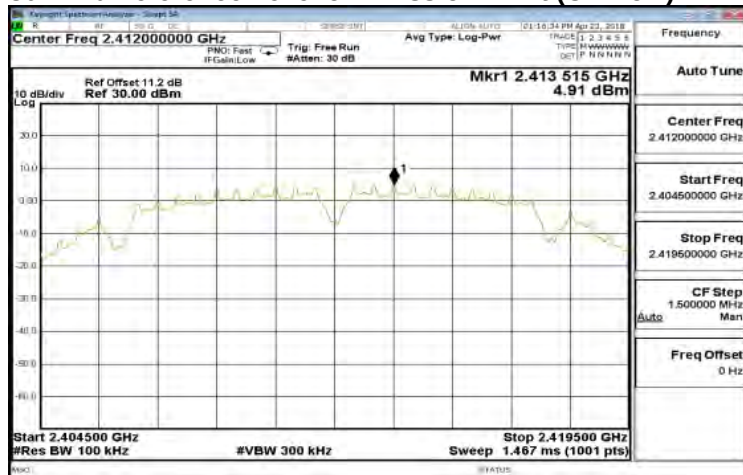
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802.11b Reference Level of Emission Limit (CH-Low)



802.11g Reference Level of Emission Limit (CH-High)



802.11b Reference Level of Emission Limit (CH-High)



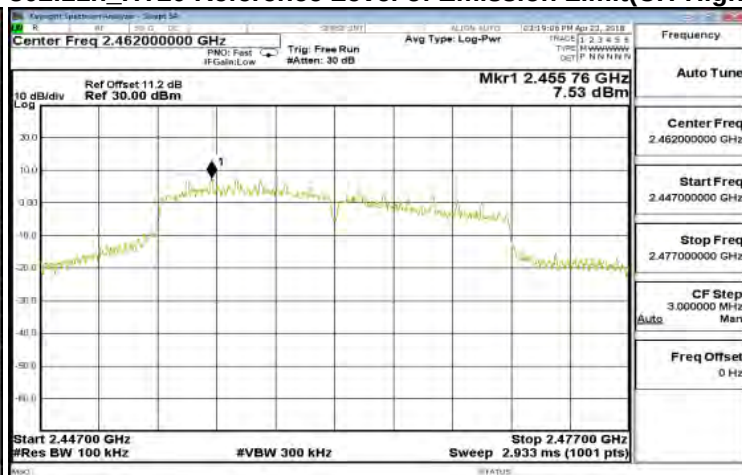
802.11n HT20 Reference Level of Emission Limit (CH-Low)



802.11g Reference Level of Emission Limit (CH-Low)



802.11n HT20 Reference Level of Emission Limit (CH-High)



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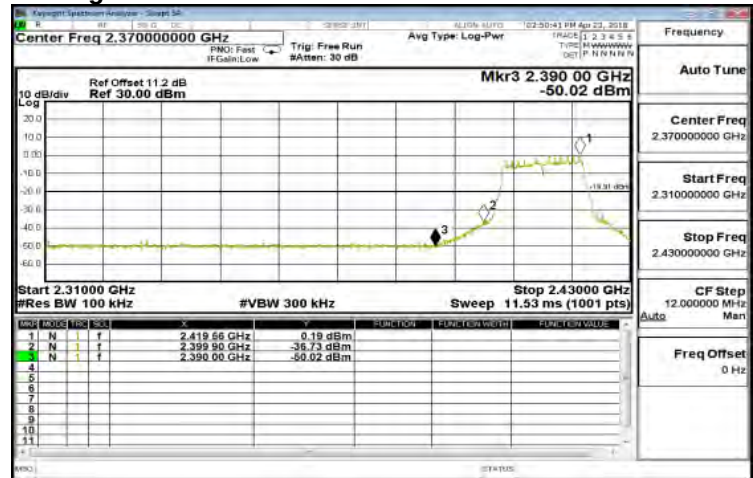
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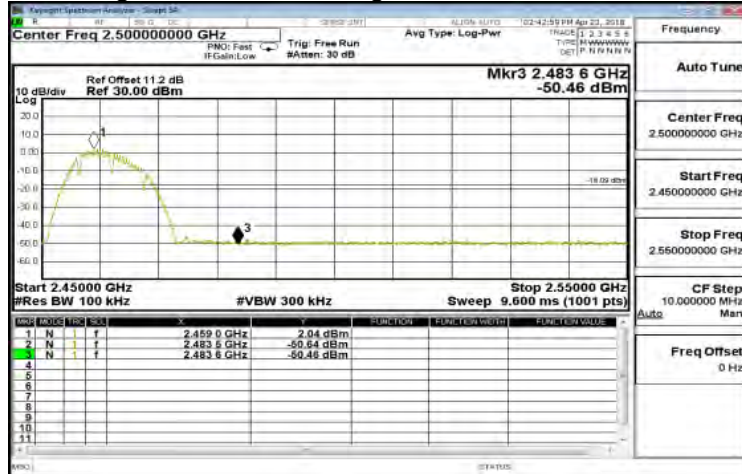
802.11b Band Edges Test Data CH-Low



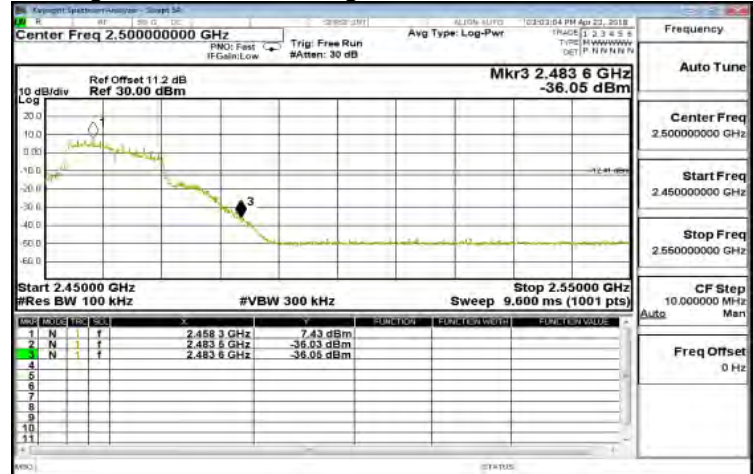
802.11g Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Band Edges Test Data CH-High



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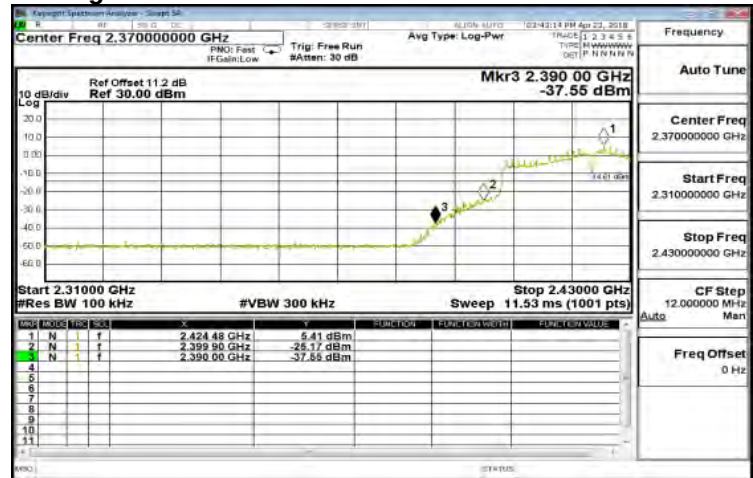
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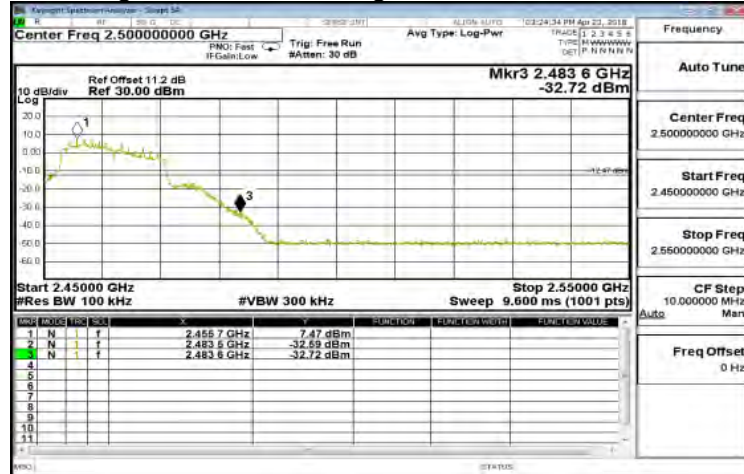
802.11n_HT20 Band Edges Test Data CH-Low



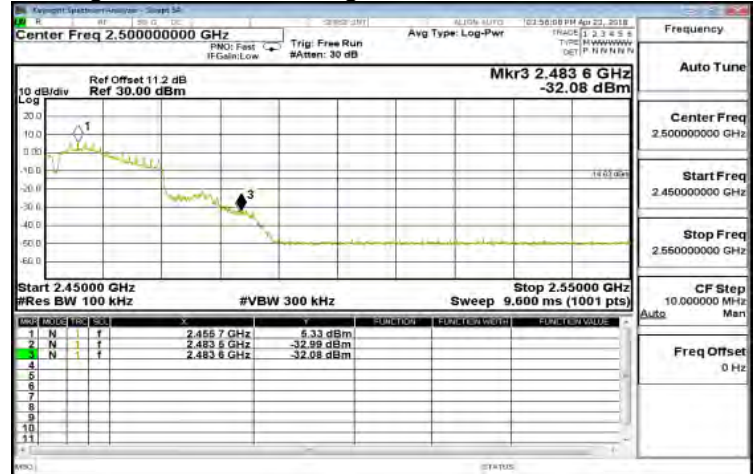
802.11n_HT40 Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Band Edges Test Data CH-High



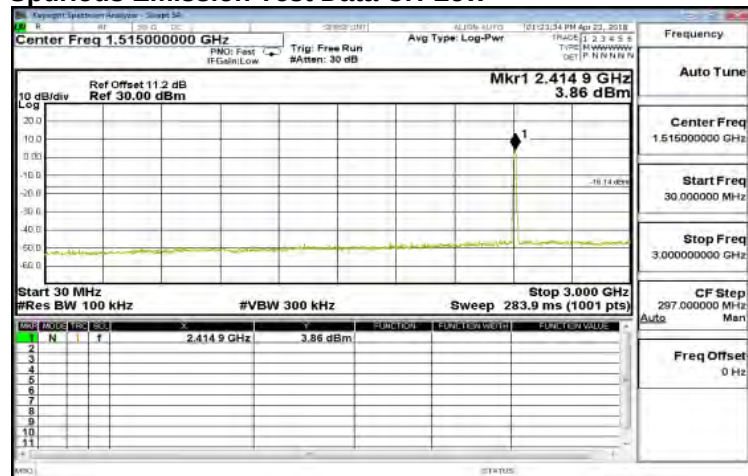
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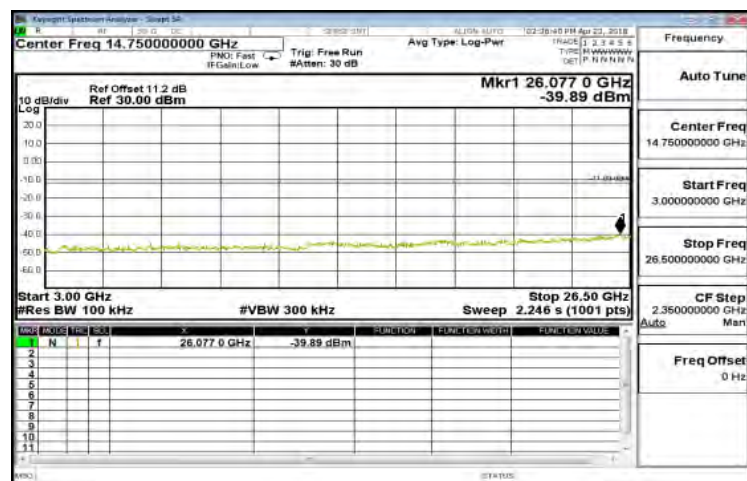
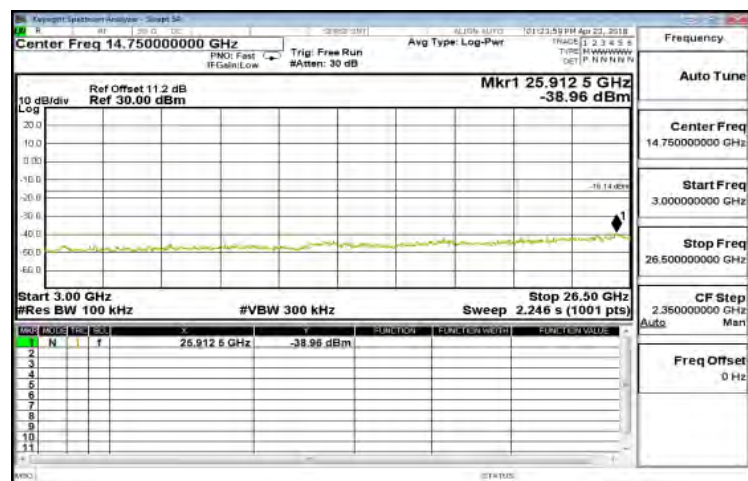
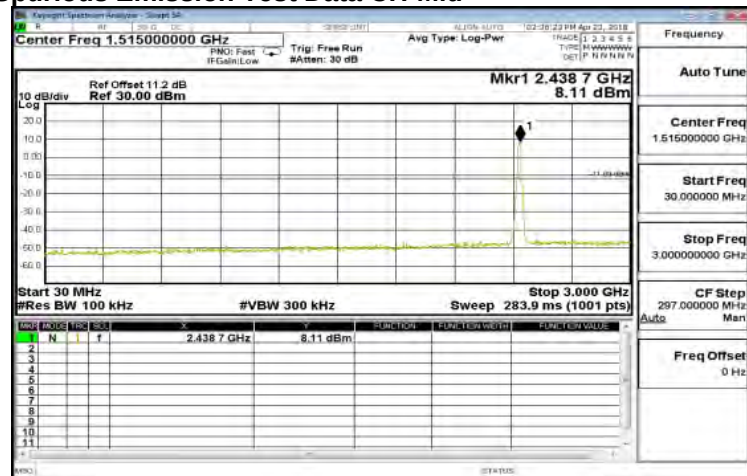
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802.11b

Spurious Emission Test Data CH-Low



Spurious Emission Test Data CH-Mid



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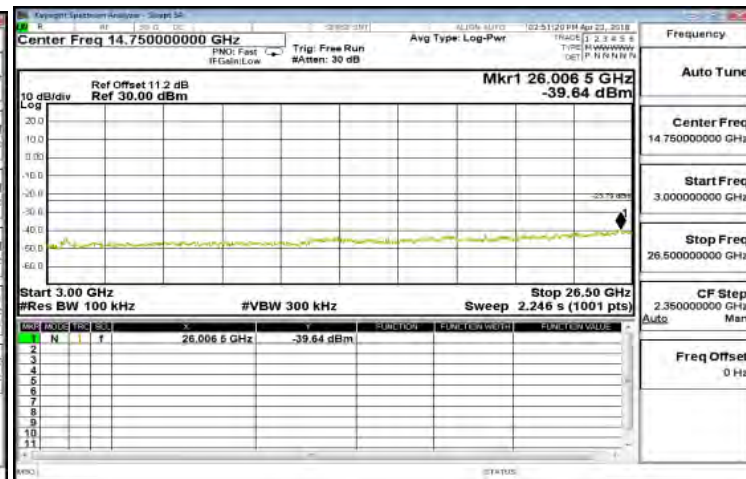
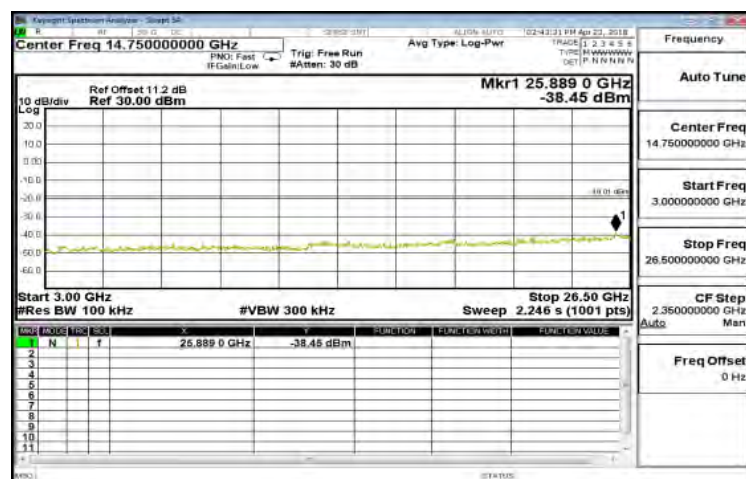
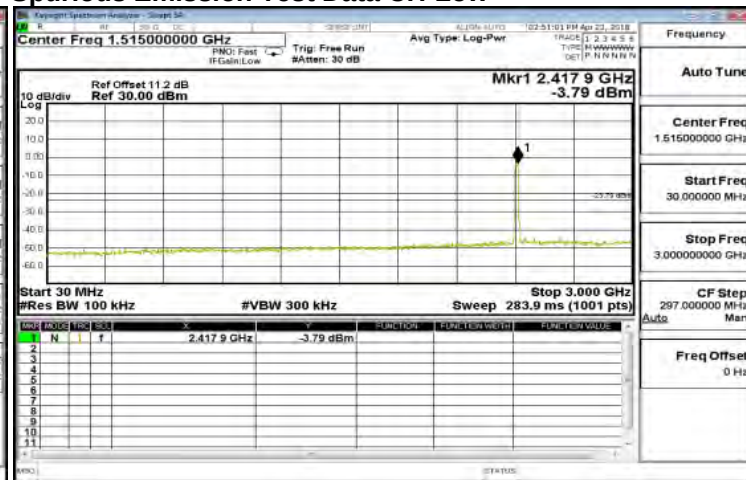
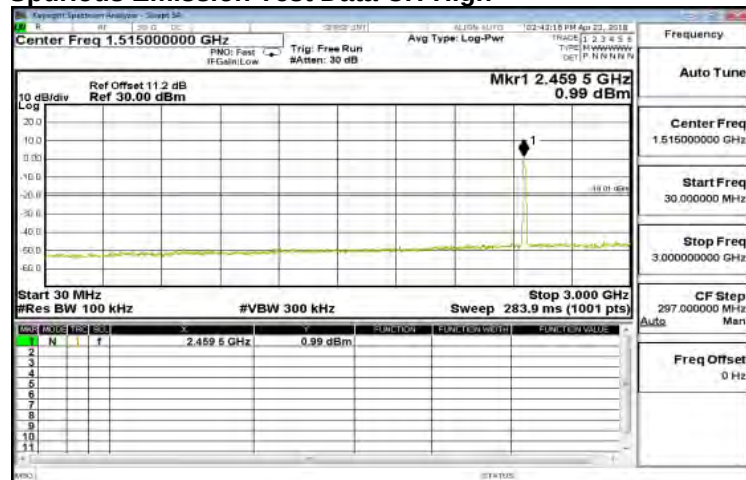
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802.11g

Spurious Emission Test Data CH-High

Spurious Emission Test Data CH-Low

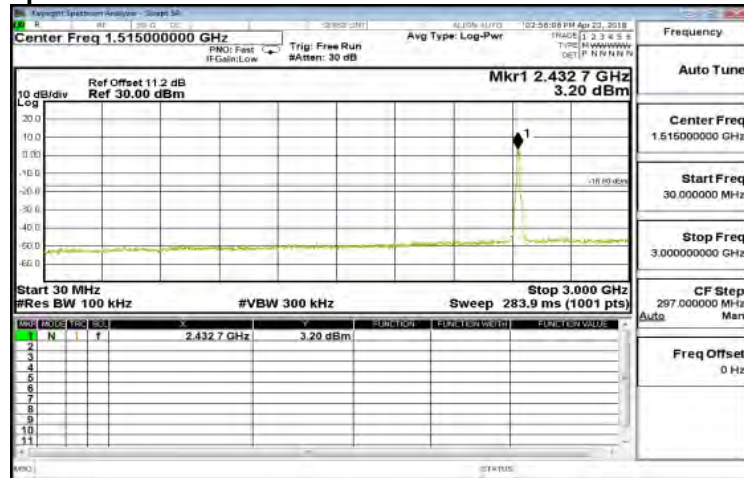


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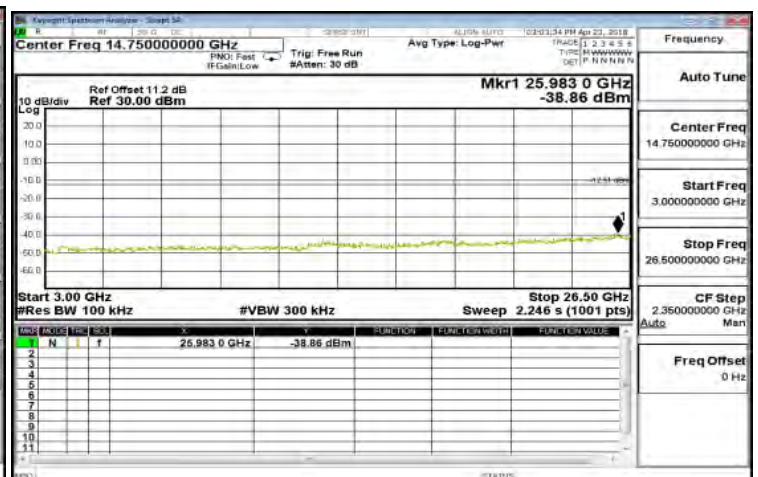
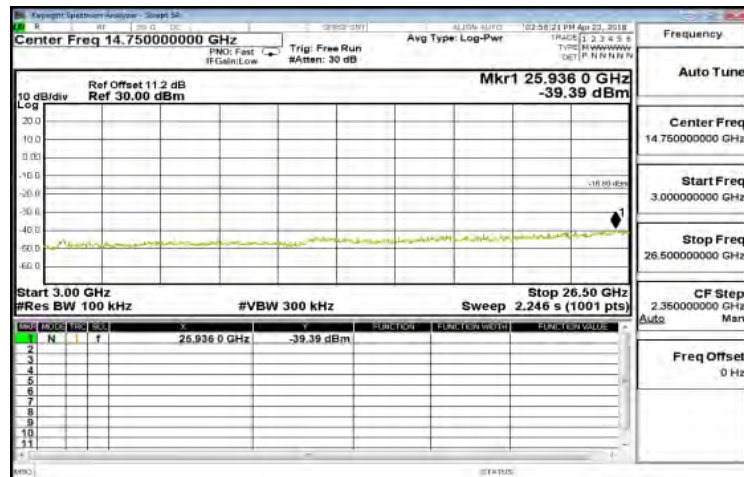
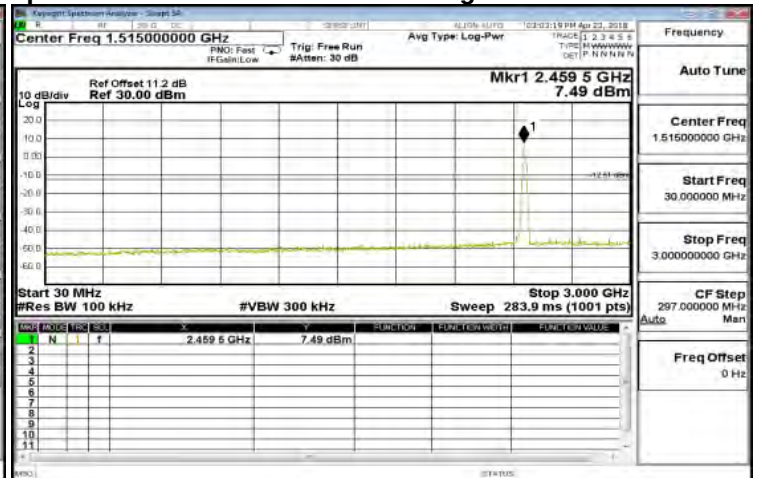
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Spurious Emission Test Data CH-Mid



Spurious Emission Test Data CH-High



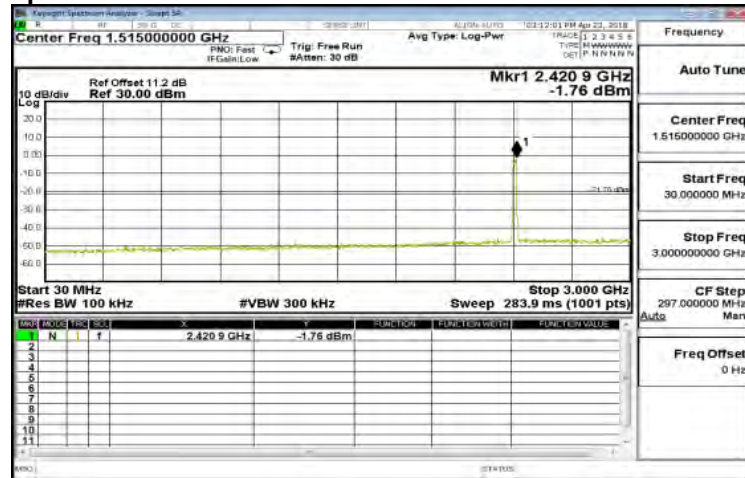
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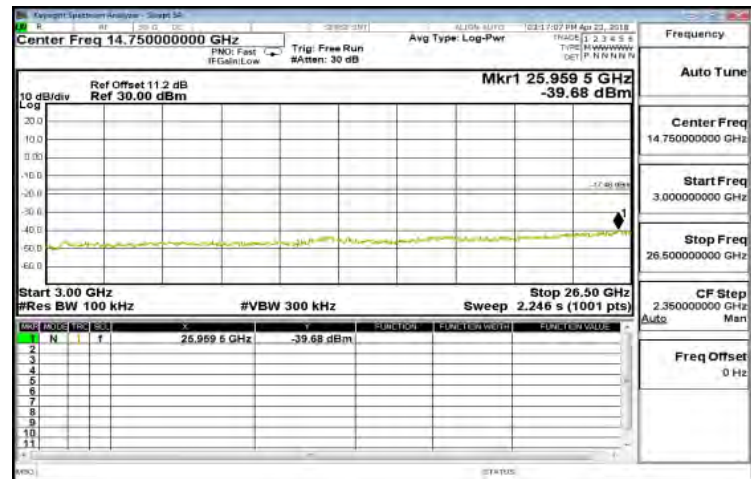
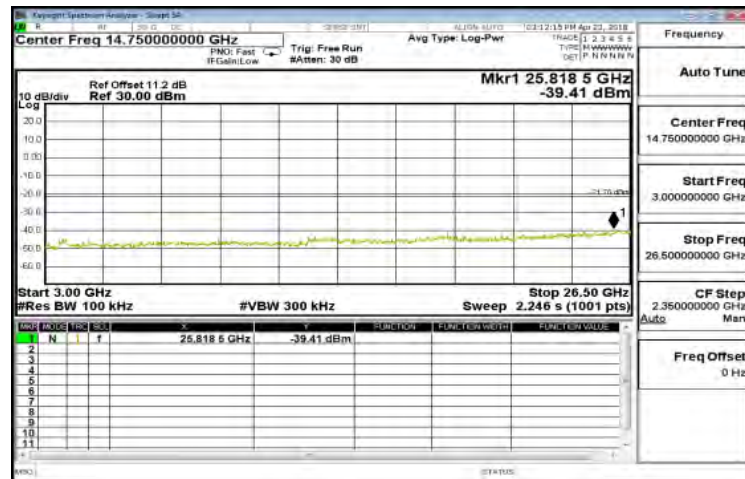
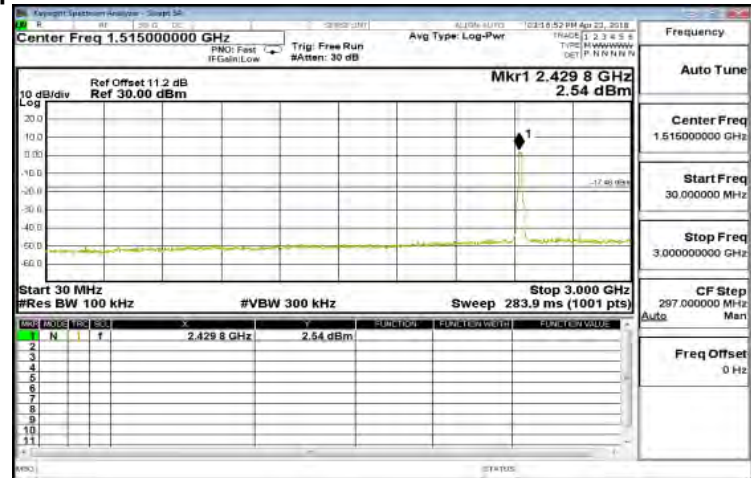
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802.11n_HT20

Spurious Emission Test Data CH-Low



Spurious Emission Test Data CH-Mid



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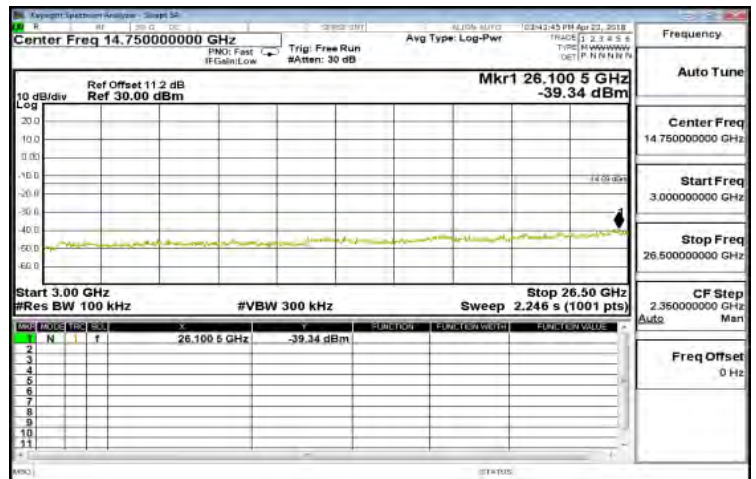
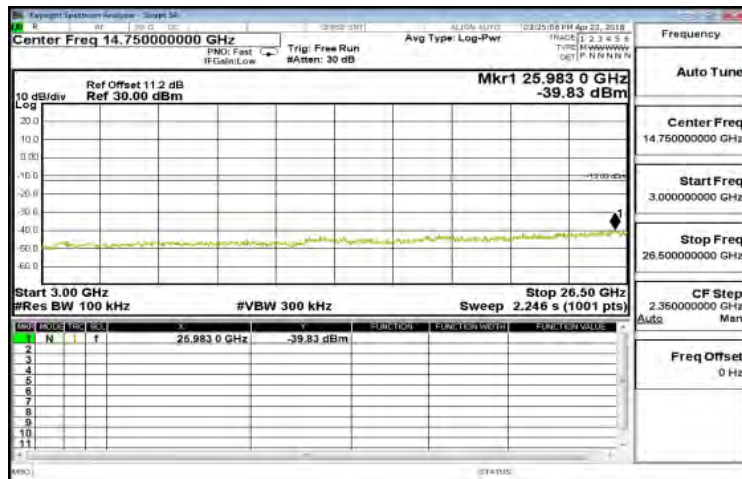
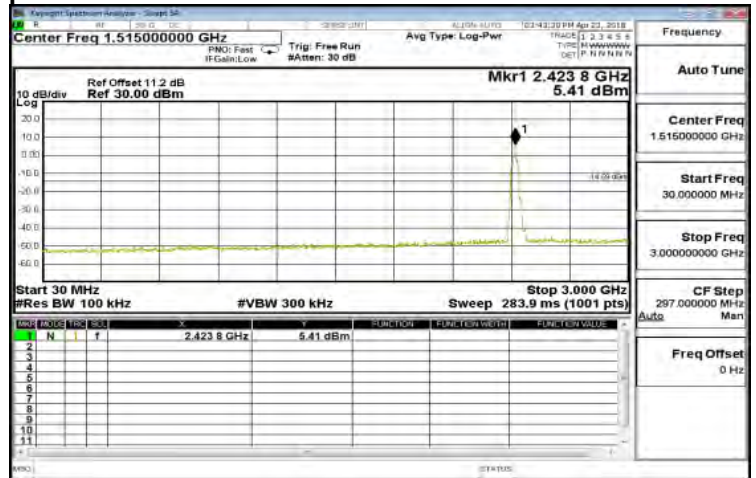
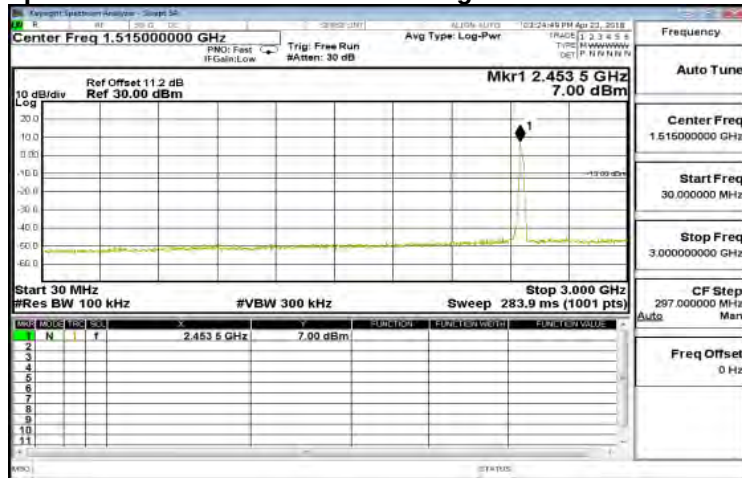
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802.11n_HT40

Spurious Emission Test Data CH-High

Spurious Emission Test Data CH-Low

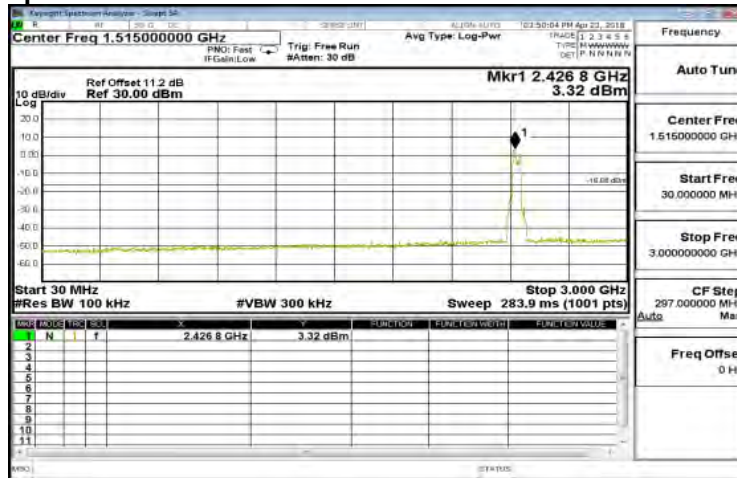


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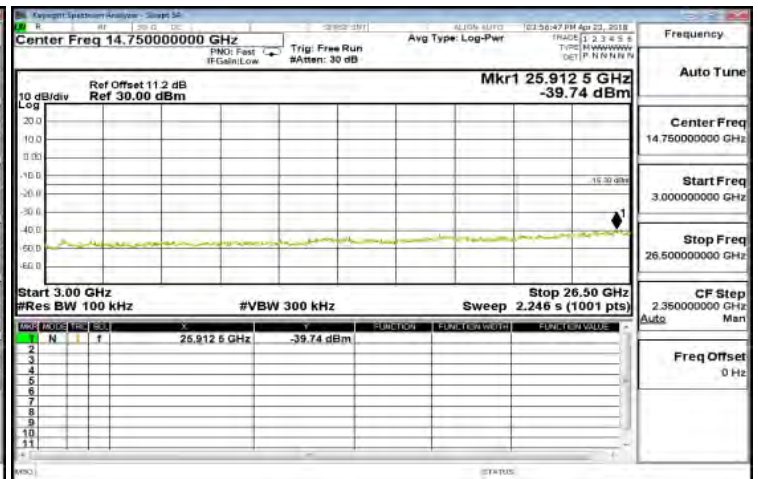
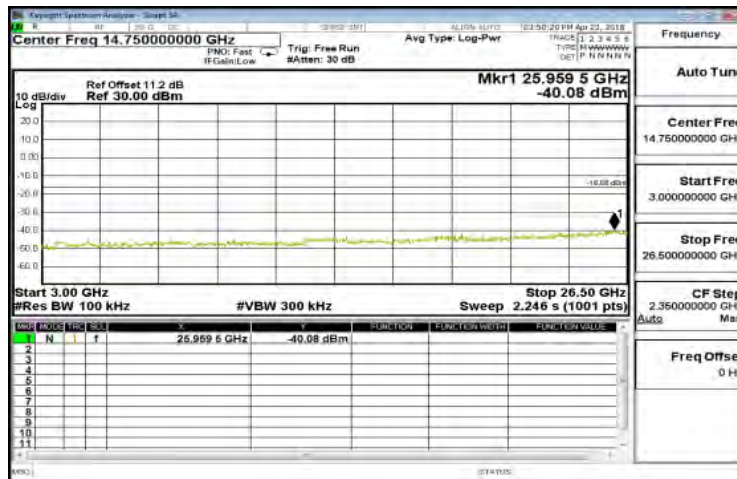
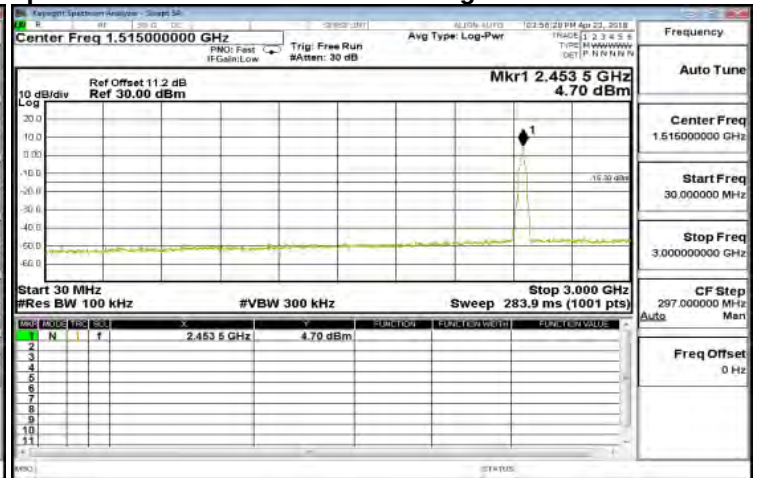
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Spurious Emission Test Data CH-Mid



Spurious Emission Test Data CH-High



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11 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

11.1 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 (dBμV/m) = 20 log Emission level (dBμV/m)

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11.2 Measurement Equipment Used:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	SCHWAZBECK	VULB 9168	9168-617	10/27/2017	10/26/2018
Horn Antenna	Schwarzbeck	BBHA9120D	1341	05/31/2017	05/30/2018
Loop Antenna	ETS.LINDGREN	6502	148045	09/26/2017	09/25/2018
3m Site NSA	SGS	966 chamber D	N/A	07/06/2018	07/05/2019
EMI Test Receiver	R&S	ESU 40	100363	04/11/2018	04/10/2019
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/27/2017	10/26/2018
Pre-Amplifier	EMC Instruments	EMC9135	980234	12/26/2017	12/25/2018
Pre-Amplifier	EMC Instruments	EMC12630SE	980271	12/26/2017	12/25/2018
Attenuator	Marvelous	WATT-218FS-10	RF246	12/26/2017	12/25/2018
Highpass Filter	Micro Tronics	BRM50701-01	G008	12/26/2017	12/25/2018
Coaxial Cable	Huber+Suhner	RG 214/U	W21.01	12/26/2017	12/25/2018
Coaxial Cable	Huber Suhner	EMC106-SM-SM -7200	150703	12/26/2017	12/25/2018

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

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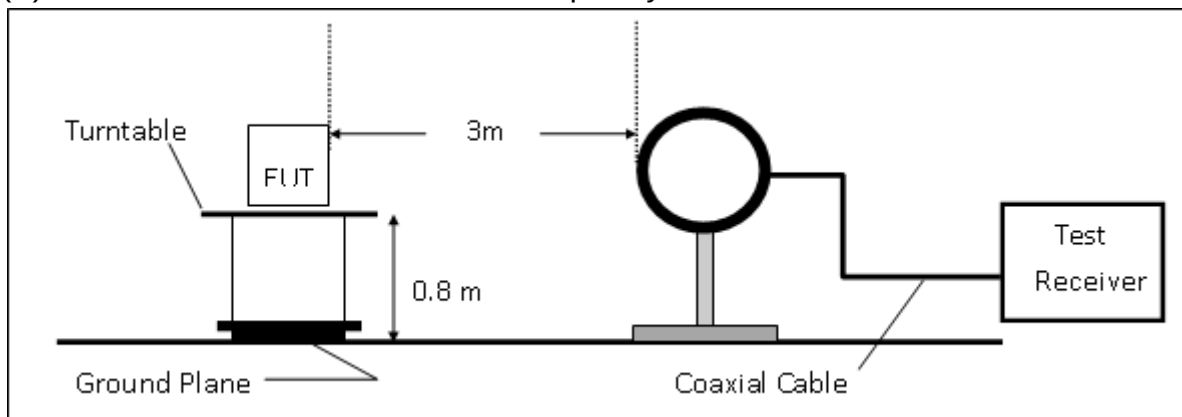
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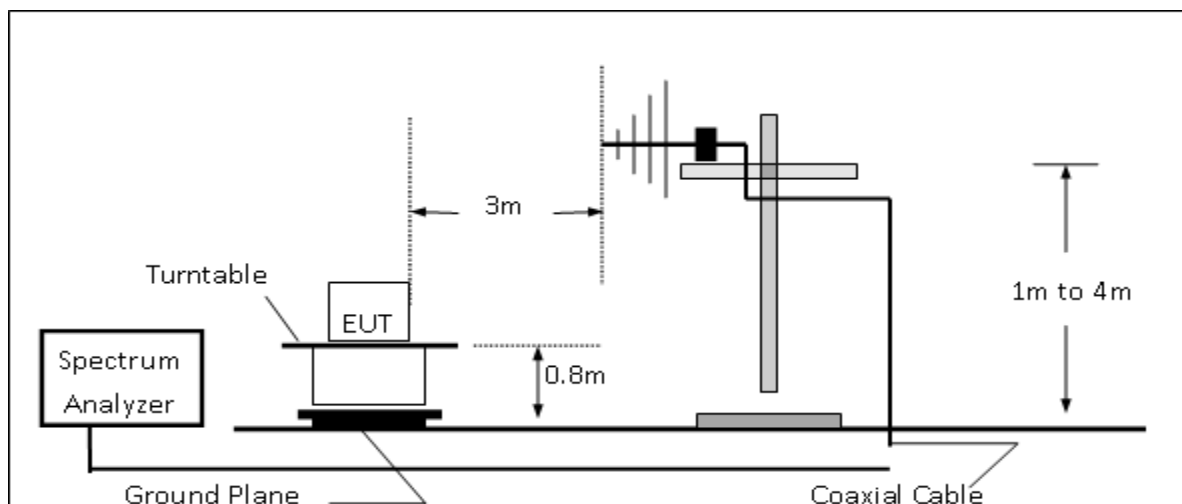
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11.3 Test SET-UP

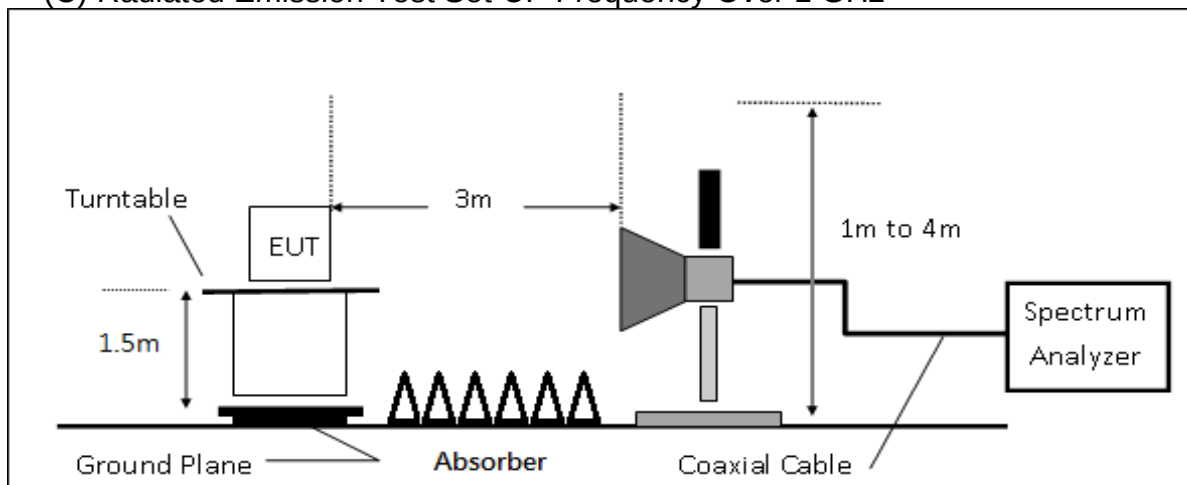
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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 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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11.5 Field Strength Calculation

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

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

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

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

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

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

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

11.7 Measurement Result

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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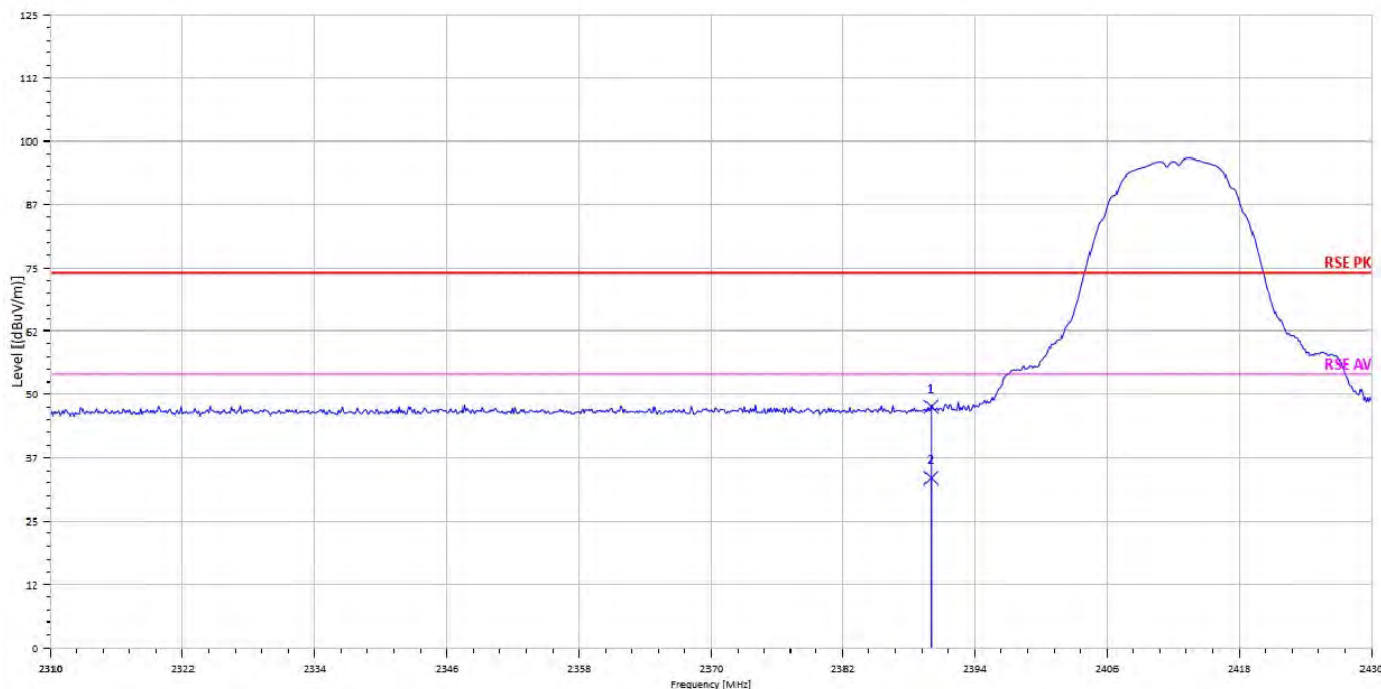
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Radiated Band Edge Measurement Result (802.11b)

Operation Mode :	802.11b	Test Date :	2018/5/2
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	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
2390.00	E	Peak	54.46	-6.84	47.62	74	-26.38
2390.00	E	Average	40.35	-6.84	33.51	54	-20.49

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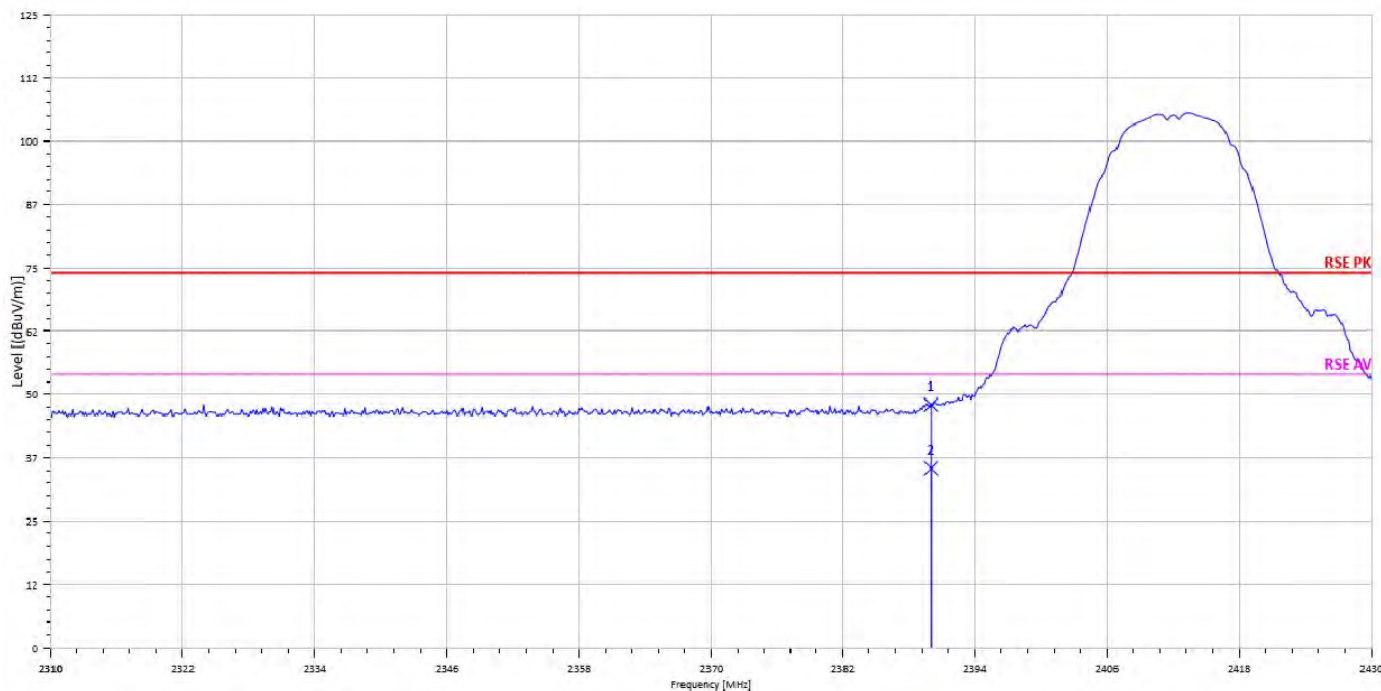
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Operation Mode :	802.11b	Test Date :	2018/5/2
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



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
2390.00	E	Peak	54.80	-6.84	47.95	74	-26.05
2390.00	E	Average	42.26	-6.84	35.41	54	-18.59

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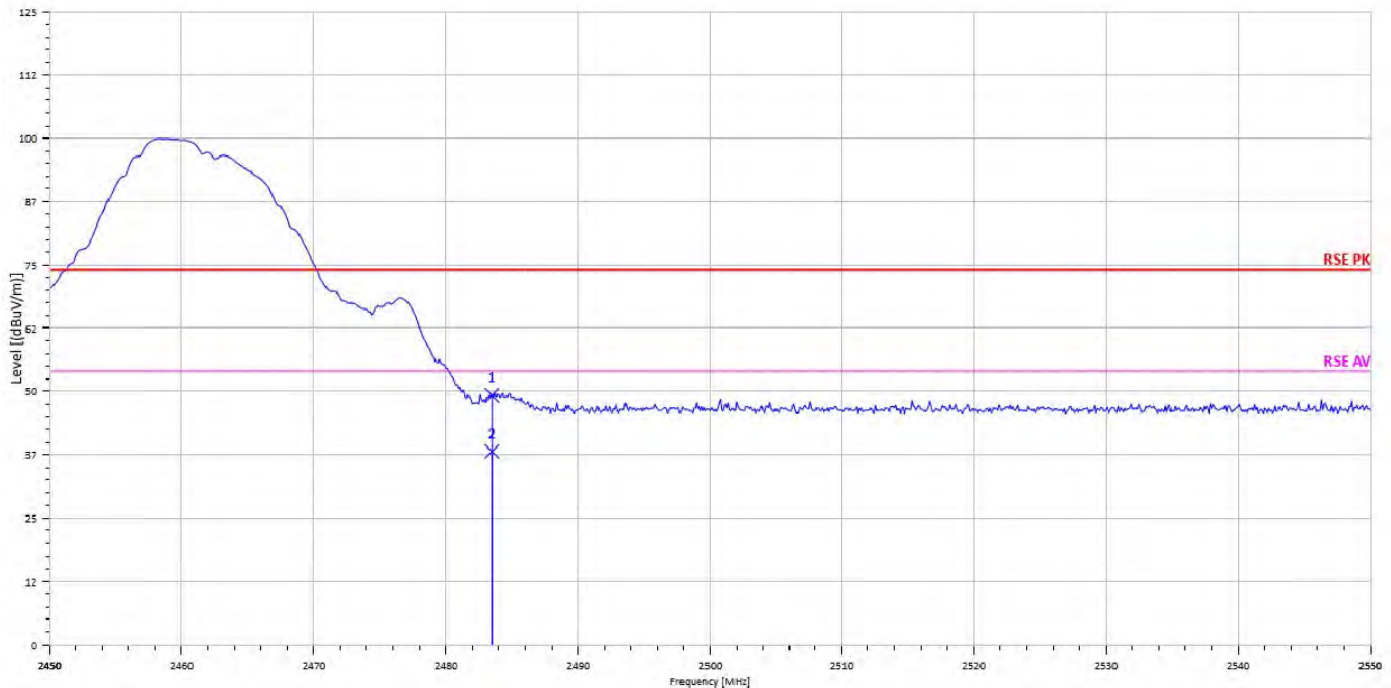
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Operation Mode :	802.11b	Test Date :	2018/5/2
Fundamental Frequency :	2462 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH High	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Vertical



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
2483.50	E	Peak	55.63	-6.38	49.24	74	-24.76
2483.50	E	Average	44.53	-6.38	38.14	54	-15.86

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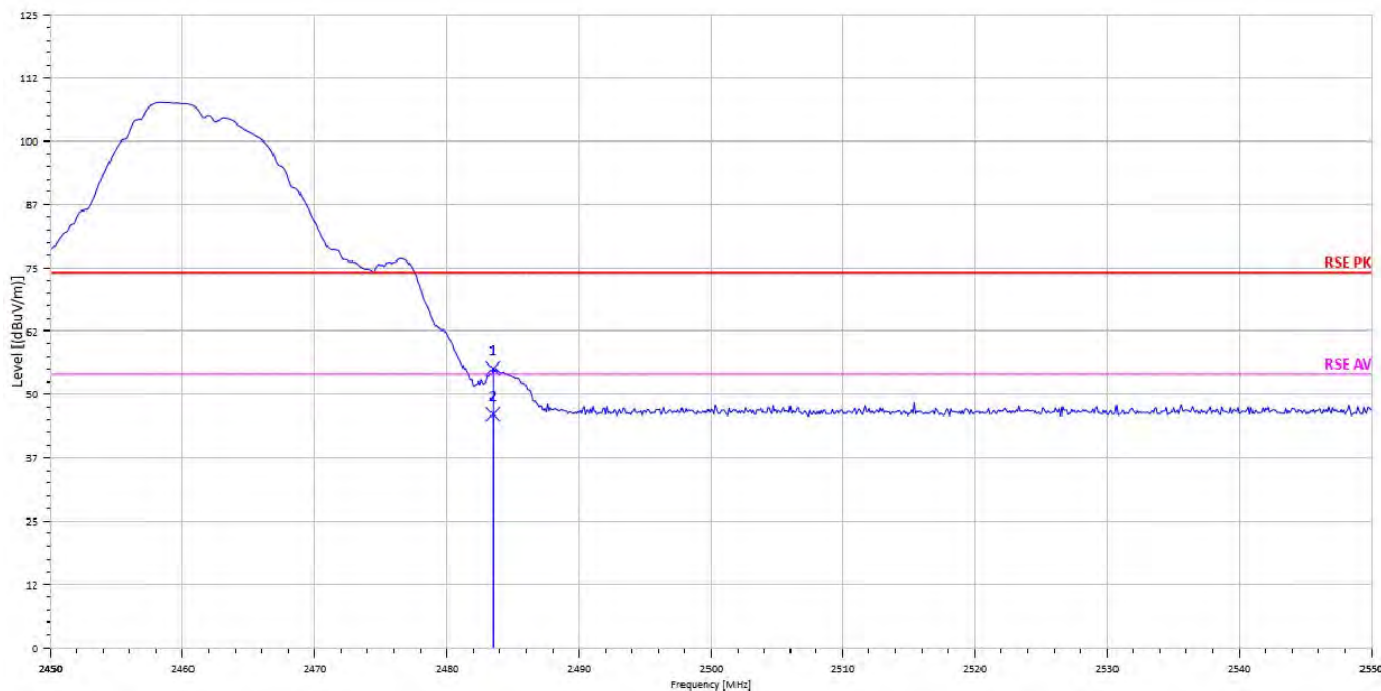
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Operation Mode :	802.11b	Test Date :	2018/5/2
Fundamental Frequency :	2462 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH High	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



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	61.51	-6.38	55.13	74	-18.87
2483.50	E	Average	52.51	-6.38	46.12	54	-7.88

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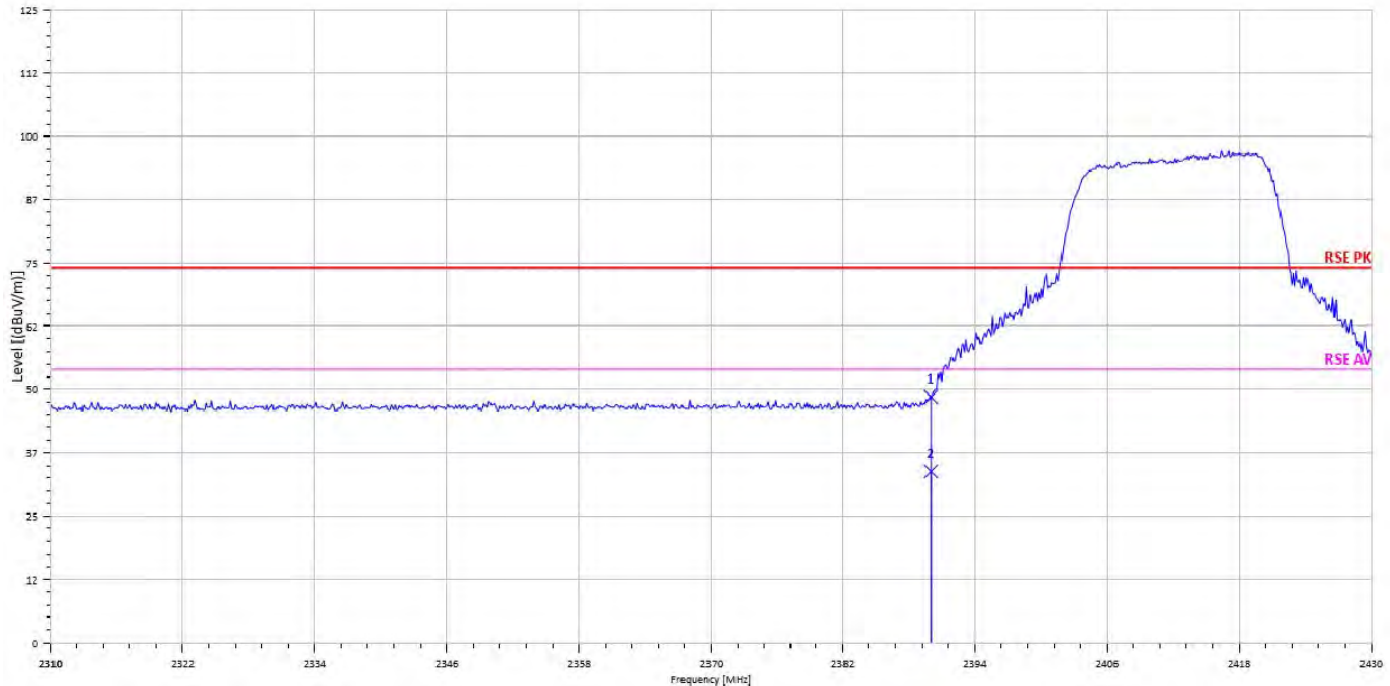
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Radiated Band Edge Measurement Result (802.11g)

Operation Mode :	802.11g	Test Date :	2018/5/2
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	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
2390.00	E	Peak	55.34	-6.84	48.50	74	-25.50
2390.00	E	Average	40.68	-6.84	33.83	54	-20.17

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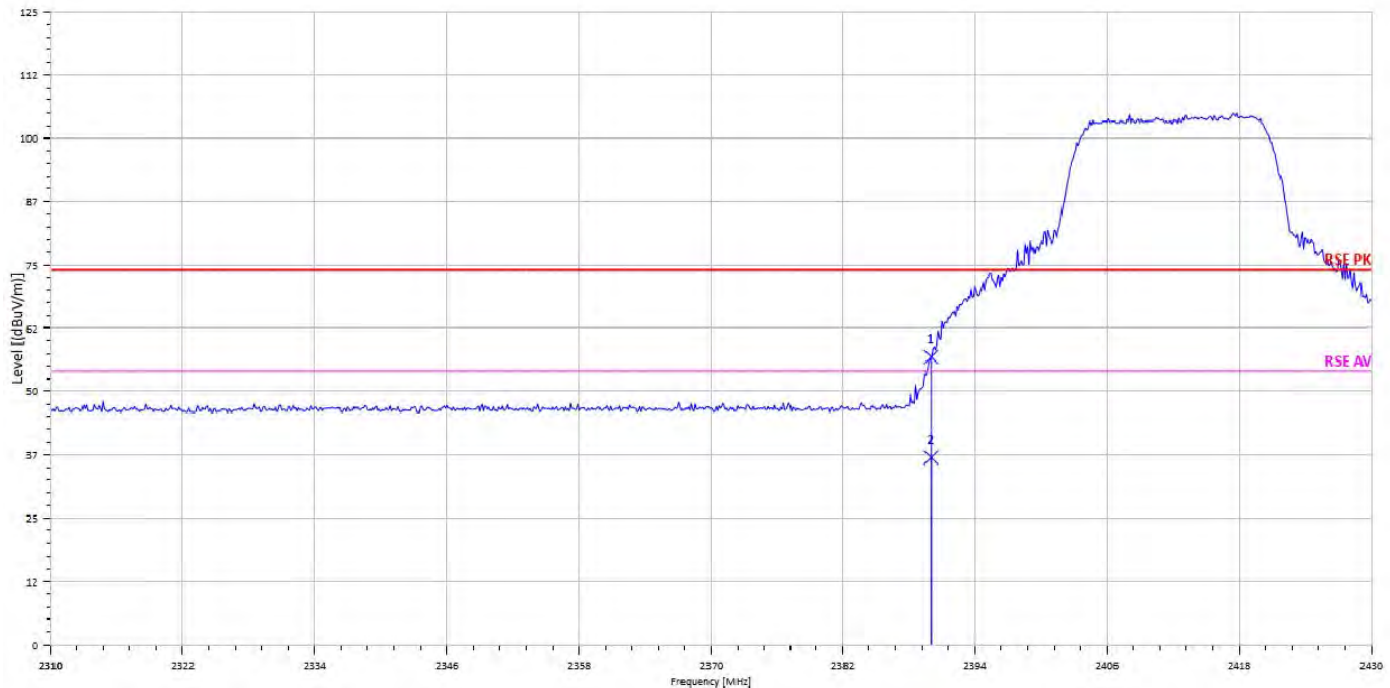
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Operation Mode :	802.11g	Test Date :	2018/5/2
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



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
2390.00	E	Peak	63.69	-6.84	56.85	74	-17.15
2390.00	E	Average	43.84	-6.84	36.99	54	-17.01

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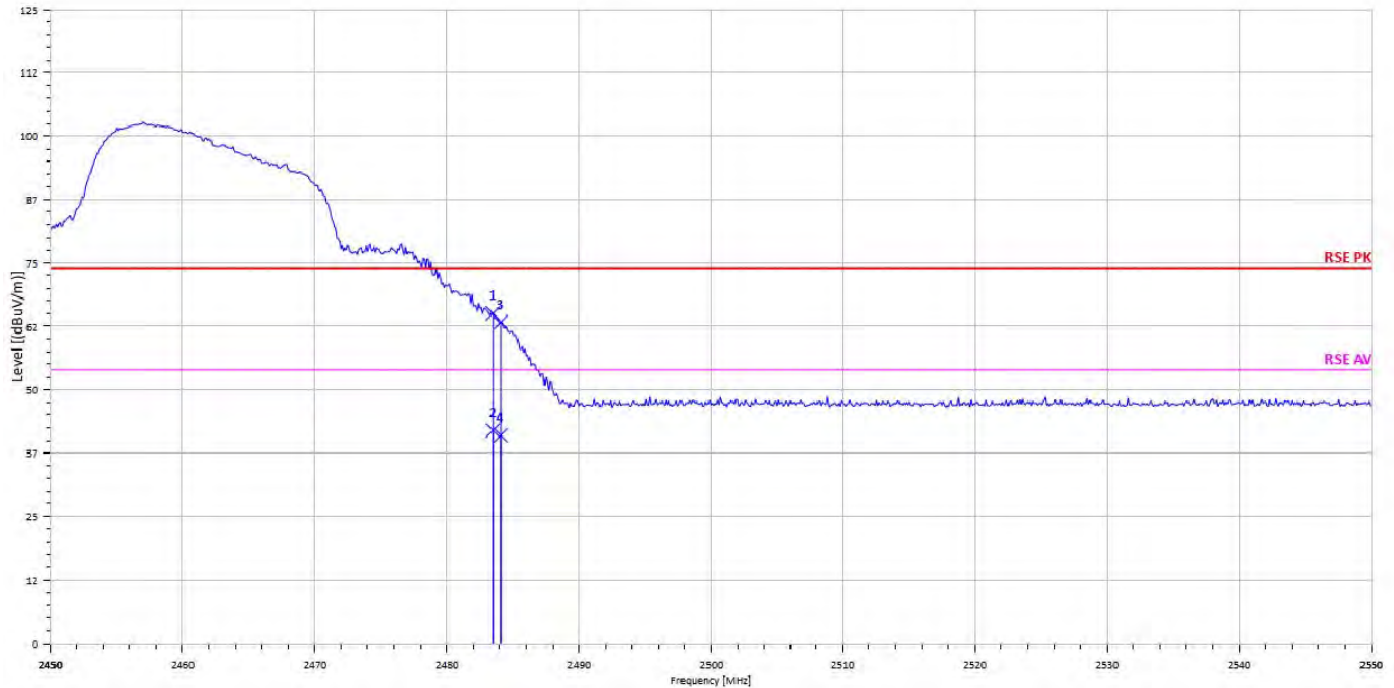
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Operation Mode :	802.11g	Test Date :	2018/5/2
Fundamental Frequency :	2462 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH High	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Vertical



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
2483.50	E	Peak	71.45	-6.38	65.06	74	-8.94
2483.50	E	Average	48.39	-6.38	42.00	54	-12.00
2484.10	S	Peak	69.70	-6.38	63.32	74	-10.68
2484.10	S	Average	47.42	-6.38	41.04	54	-12.96

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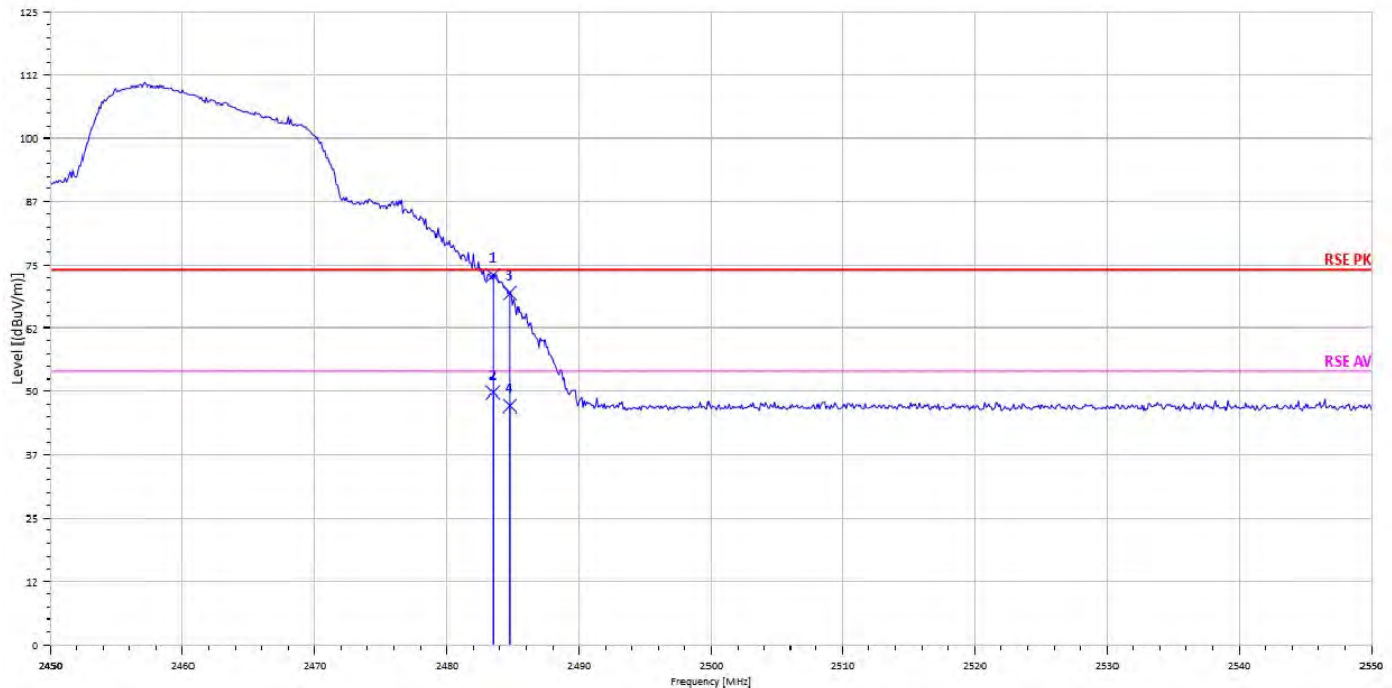
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Operation Mode :	802.11g	Test Date :	2018/5/2
Fundamental Frequency :	2462 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH High	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



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	79.32	-6.38	72.94	74	-1.06
2483.50	E	Average	56.21	-6.38	49.82	54	-4.18
2484.80	S	Peak	75.84	-6.38	69.46	74	-4.54
2484.80	S	Average	53.57	-6.38	47.19	54	-6.81

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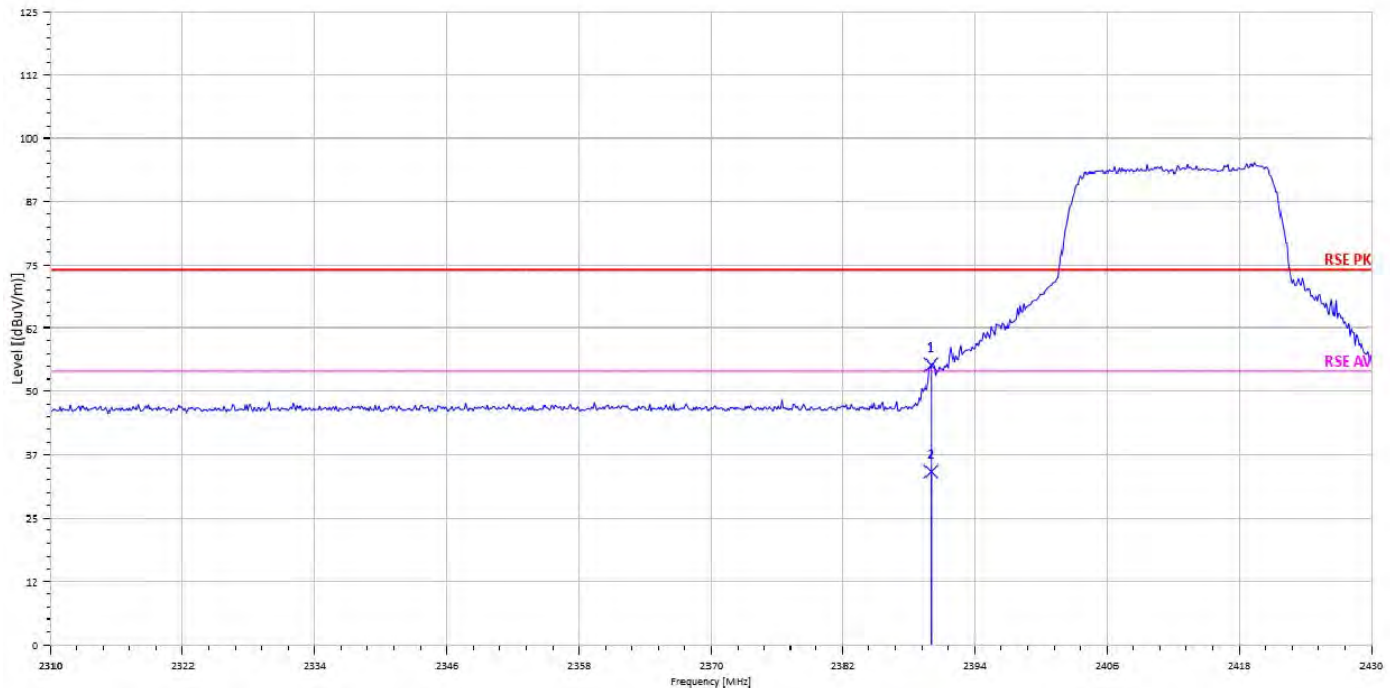
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Radiated Band Edge Measurement Result (802.11_HT20)

Operation Mode :	802.11n20	Test Date :	2018/5/2
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	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
2390.00	E	Peak	62.11	-6.84	55.27	74	-18.73
2390.00	E	Average	41.04	-6.84	34.19	54	-19.81

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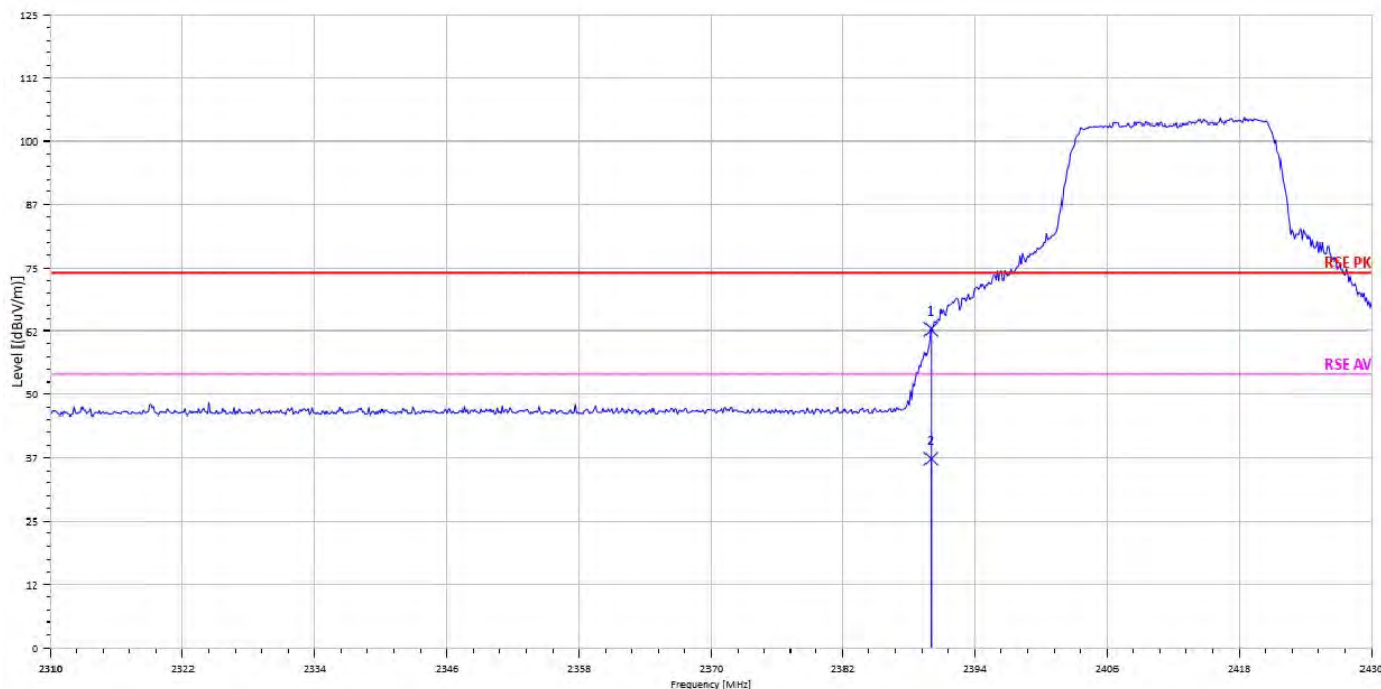
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Operation Mode :	802.11n20	Test Date :	2018/5/2
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



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
2390.00	E	Peak	69.75	-6.84	62.90	74	-11.10
2390.00	E	Average	44.15	-6.84	37.31	54	-16.69

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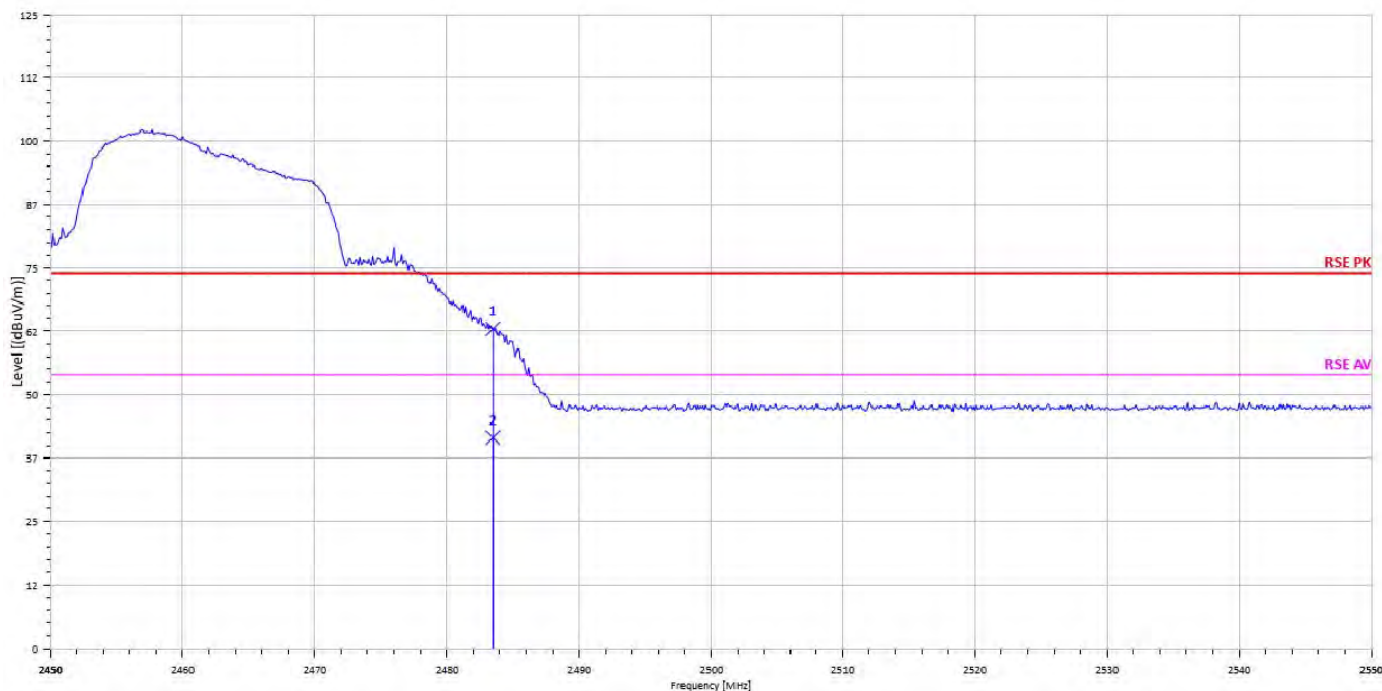
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Operation Mode :	802.11n20	Test Date :	2018/5/2
Fundamental Frequency :	2462 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH High	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Vertical



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
2483.50	E	Peak	69.37	-6.38	62.98	74	-11.02
2483.50	E	Average	47.93	-6.38	41.54	54	-12.46

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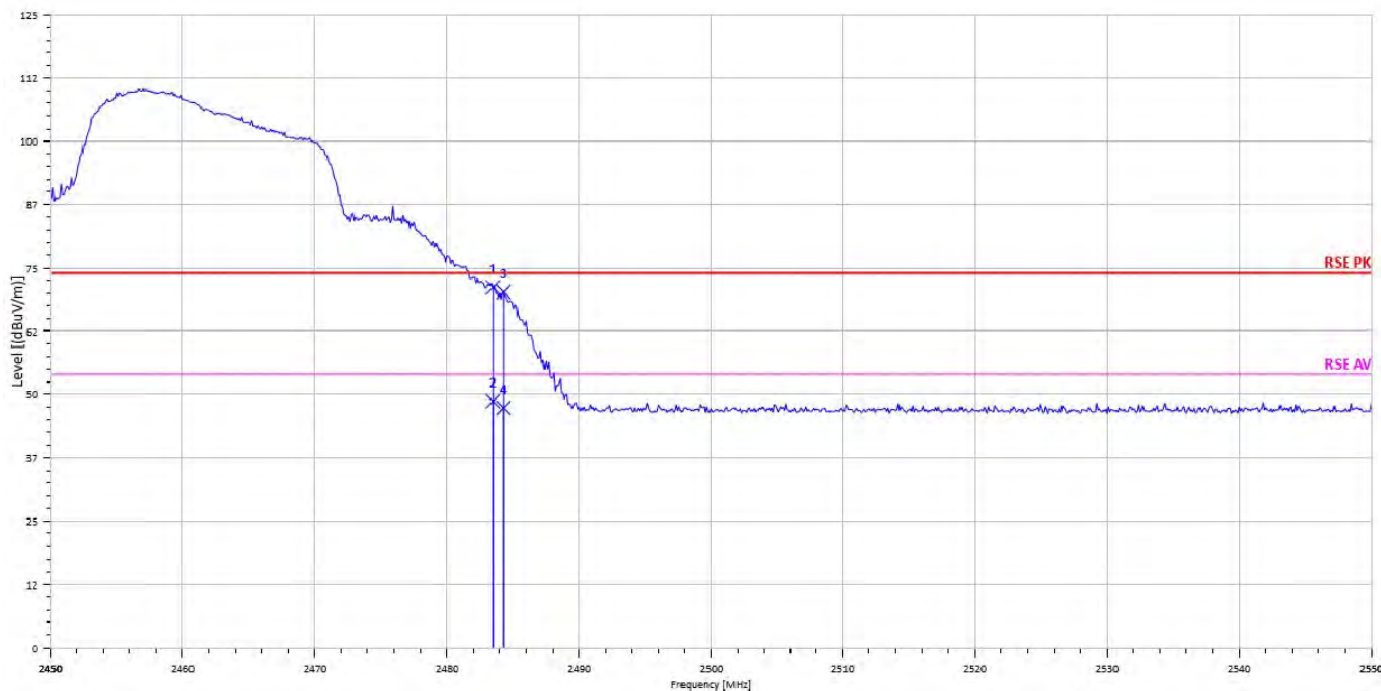
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Operation Mode : 802.11n20 Test Date : 2018/5/2
 Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Jerry
 EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



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	77.54	-6.38	71.16	74	-2.84
2483.50	E	Average	55.04	-6.38	48.65	54	-5.35
2484.30	S	Peak	76.63	-6.38	70.25	74	-3.75
2484.30	S	Average	53.70	-6.38	47.32	54	-6.68

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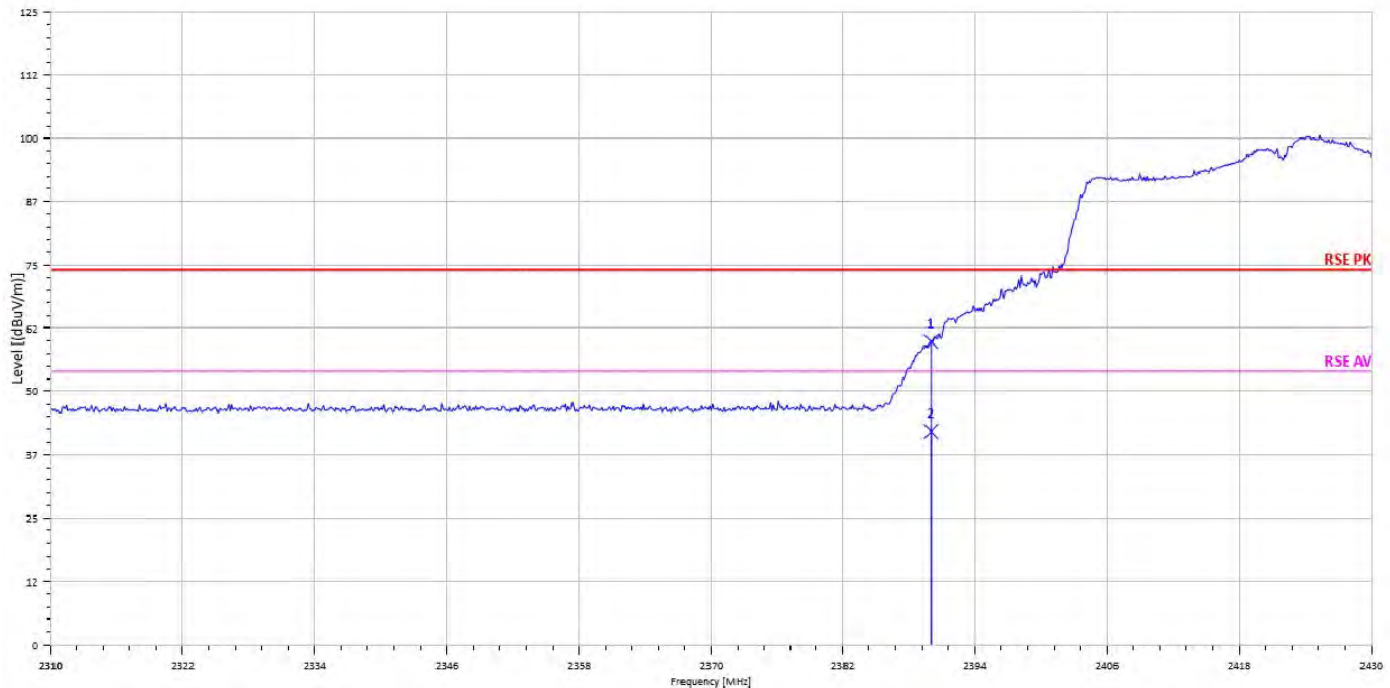
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Radiated Band Edge Measurement Result (802.11_HT40)

Operation Mode :	802.11n40	Test Date :	2018/5/2
Fundamental Frequency :	2422 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	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
2390.00	E	Peak	66.70	-6.84	59.86	74	-14.14
2390.00	E	Average	48.93	-6.84	42.08	54	-11.92

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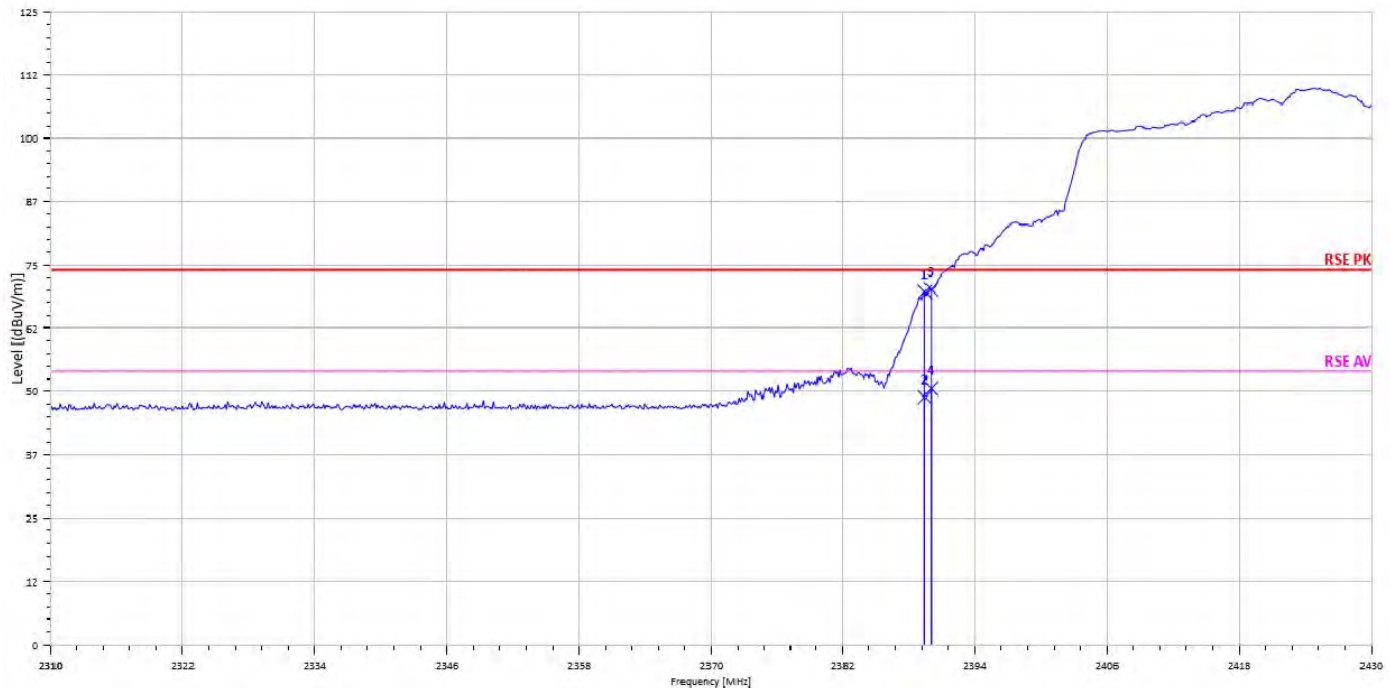
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Operation Mode :	802.11n40	Test Date :	2018/5/2
Fundamental Frequency :	2422 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



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
2389.44	S	Peak	76.55	-6.85	69.70	74	-4.30
2389.44	S	Average	55.67	-6.85	48.83	54	-5.17
2390.00	E	Peak	77.01	-6.84	70.17	74	-3.83
2390.00	E	Average	57.43	-6.84	50.59	54	-3.41

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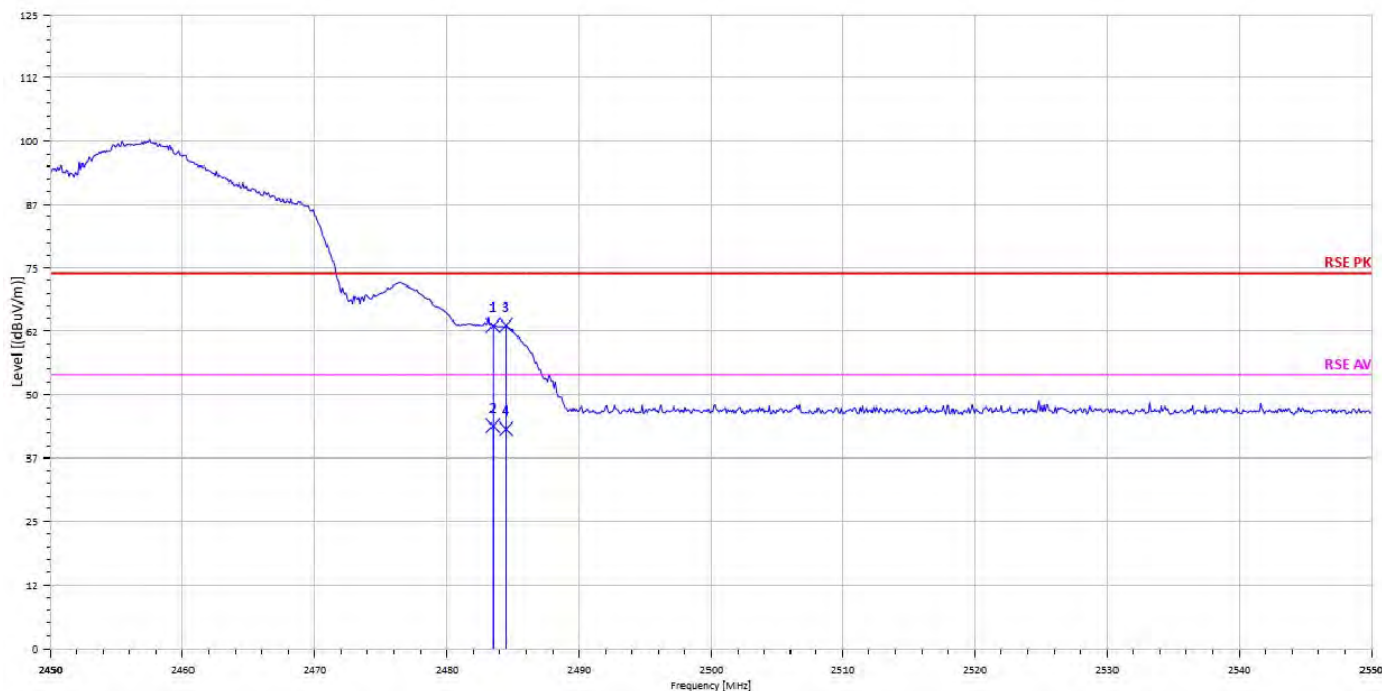
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Operation Mode : 802.11n40 Test Date : 2018/5/2
 Fundamental Frequency : 2452 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Jerry
 EUT Pol. : E2 Measurement Antenna Pol. : Vertical



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
2483.50	E	Peak	69.98	-6.38	63.59	74	-10.41
2483.50	E	Average	50.27	-6.38	43.89	54	-10.11
2484.50	S	Peak	70.08	-6.38	63.70	74	-10.30
2484.50	S	Average	49.63	-6.38	43.25	54	-10.75

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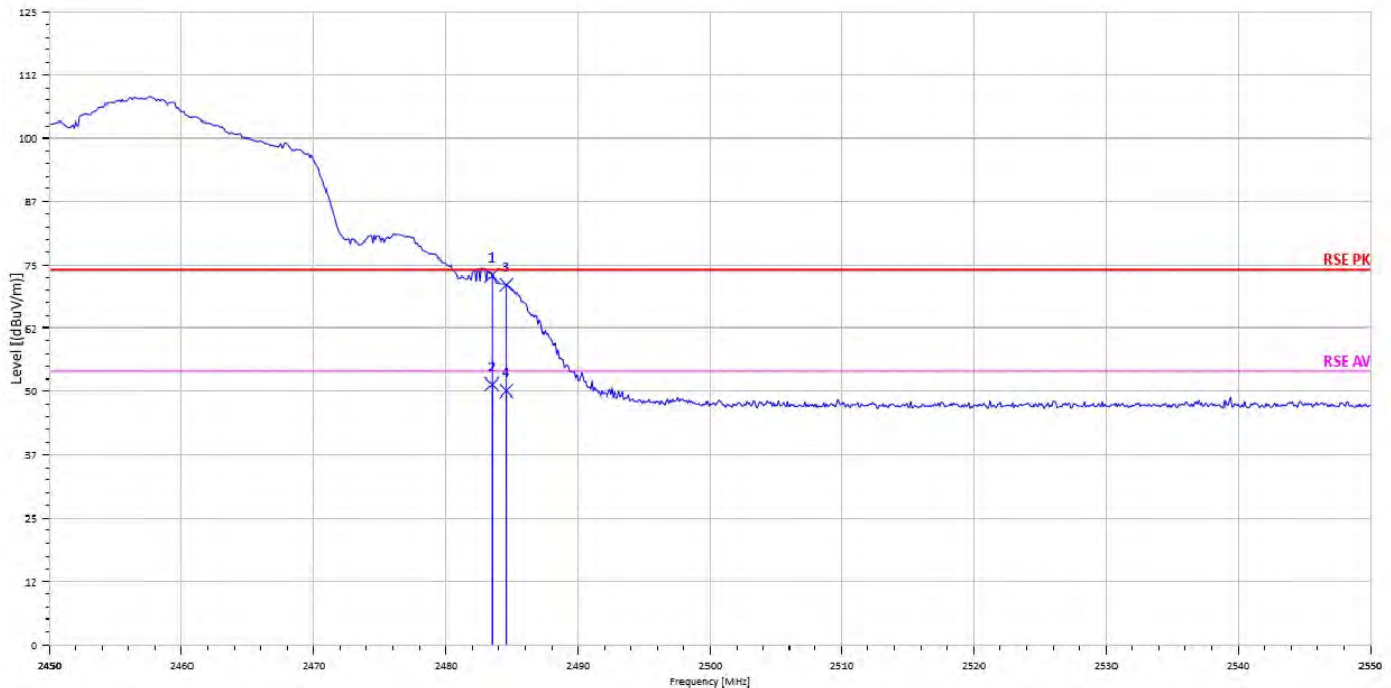
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Operation Mode : 802.11n40 Test Date : 2018/5/2
Fundamental Frequency : 2452 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : BE CH High Test Engineer : Jerry
EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



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	79.35	-6.38	72.97	74	-1.03
2483.50	E	Average	57.80	-6.38	51.41	54	-2.59
2484.60	S	Peak	77.44	-6.38	71.06	74	-2.94
2484.60	S	Average	56.50	-6.38	50.12	54	-3.88

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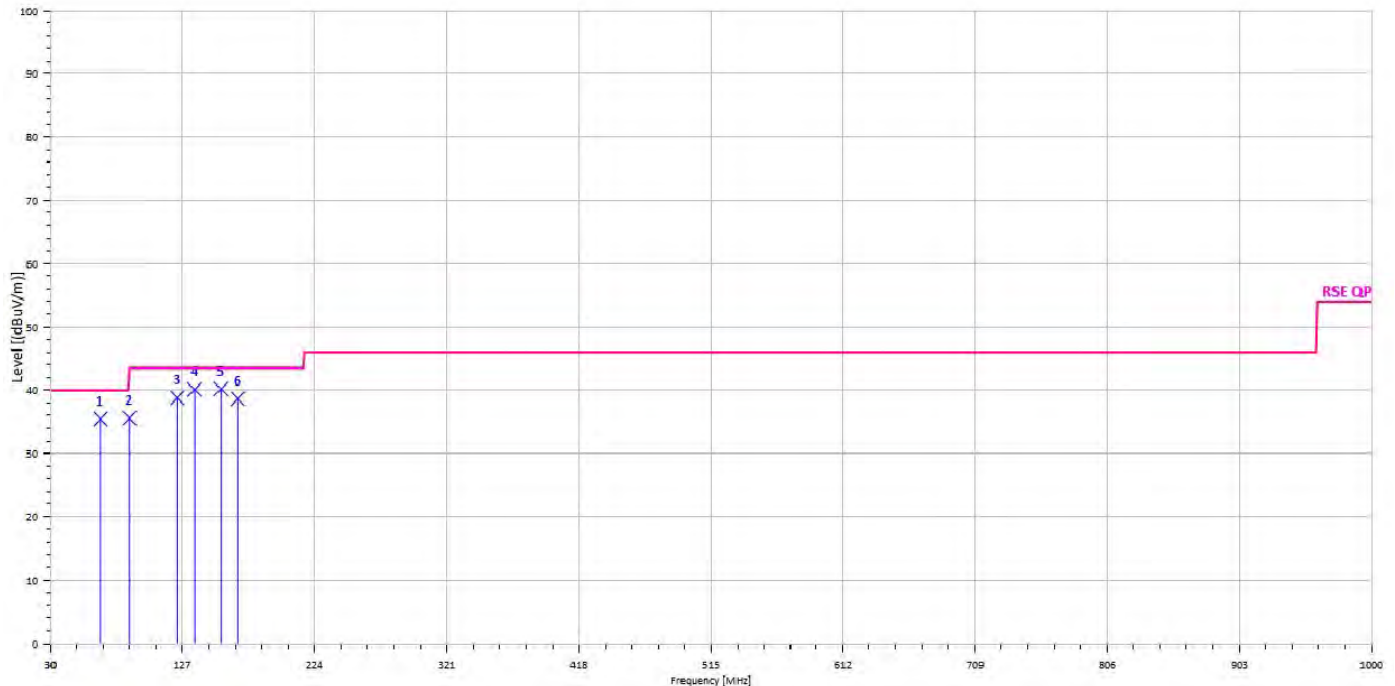
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Below 1GHz Worst-Case Data:

Radiated Spurious Emission Measurement Result (802.11 g)

Operation Mode :	802.11g	Test Date :	2018/5/29
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	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
66.86	S	Peak	54.35	-18.90	35.45	40	-4.55
88.20	S	Peak	58.07	-22.49	35.58	43.5	-7.92
123.12	S	Peak	57.18	-18.37	38.80	43.5	-4.70
135.73	S	Peak	57.05	-16.95	40.10	43.5	-3.40
155.13	S	QP	55.87	-15.68	40.19	43.5	-3.31
167.74	S	Peak	54.90	-16.24	38.65	43.5	-4.85

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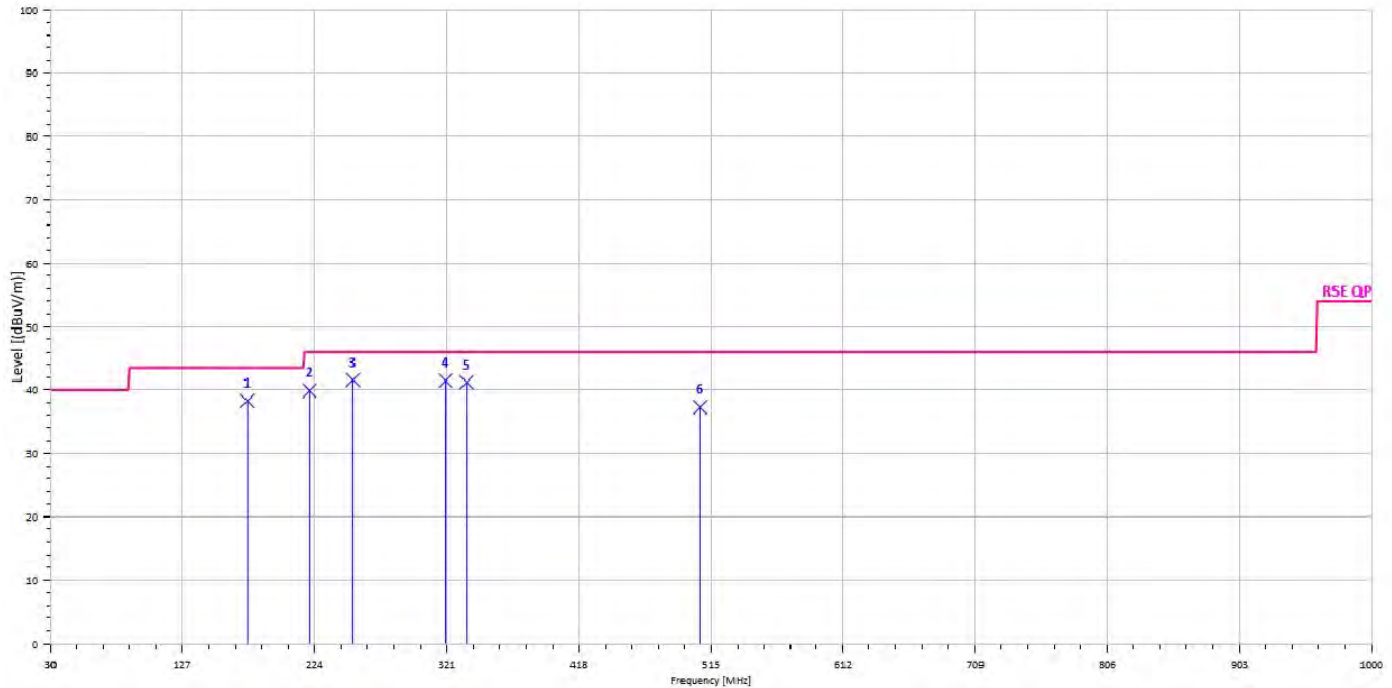
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Operation Mode : 802.11g Test Date : 2018/5/29
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Jerry
EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



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
174.53	S	Peak	55.45	-17.17	38.28	43.5	-5.22
220.12	S	Peak	58.53	-18.65	39.87	46	-6.13
252.13	S	Peak	58.63	-17.06	41.57	46	-4.43
320.03	S	Peak	56.16	-14.71	41.45	46	-4.55
335.55	S	Peak	55.58	-14.39	41.18	46	-4.82
507.24	S	Peak	48.36	-11.08	37.28	46	-8.72

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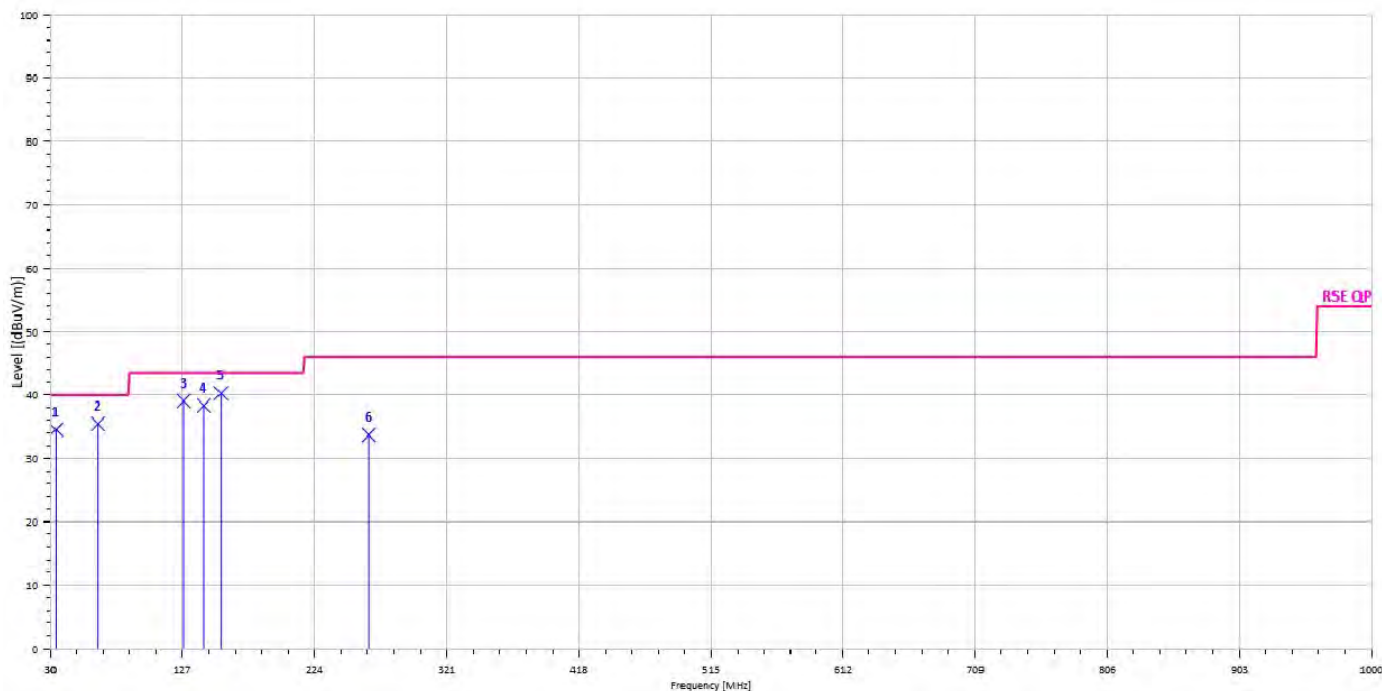
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Operation Mode : 802.11g Test Date : 2018/5/29
 Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Jerry
 EUT Pol. : E2 Measurement Antenna Pol. : Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
33.88	S	Peak	52.56	-18.03	34.53	40	-5.47
64.92	S	Peak	54.08	-18.64	35.44	40	-4.56
127.97	S	Peak	56.89	-17.84	39.06	43.5	-4.44
142.52	S	Peak	54.62	-16.30	38.33	43.5	-5.17
155.13	S	QP	55.94	-15.68	40.26	43.5	-3.24
263.77	S	Peak	50.54	-16.86	33.69	46	-12.31

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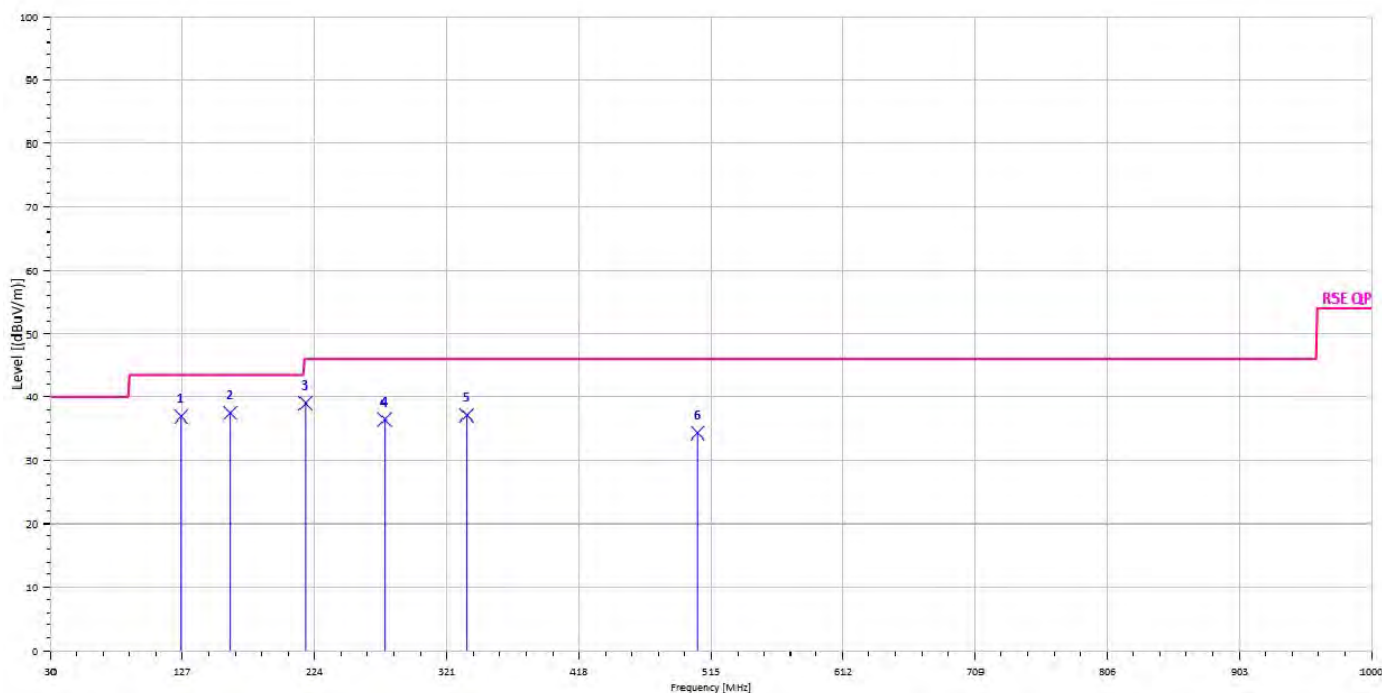
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Operation Mode : 802.11g Test Date : 2018/5/29
 Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Jerry
 EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



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
126.03	S	Peak	54.97	-18.05	36.92	43.5	-6.58
161.92	S	Peak	53.19	-15.71	37.48	43.5	-6.02
217.21	S	Peak	57.64	-18.63	39.01	46	-6.99
275.41	S	Peak	52.47	-16.01	36.46	46	-9.54
335.55	S	Peak	51.50	-14.39	37.11	46	-8.89
505.30	S	Peak	45.48	-11.17	34.31	46	-11.69

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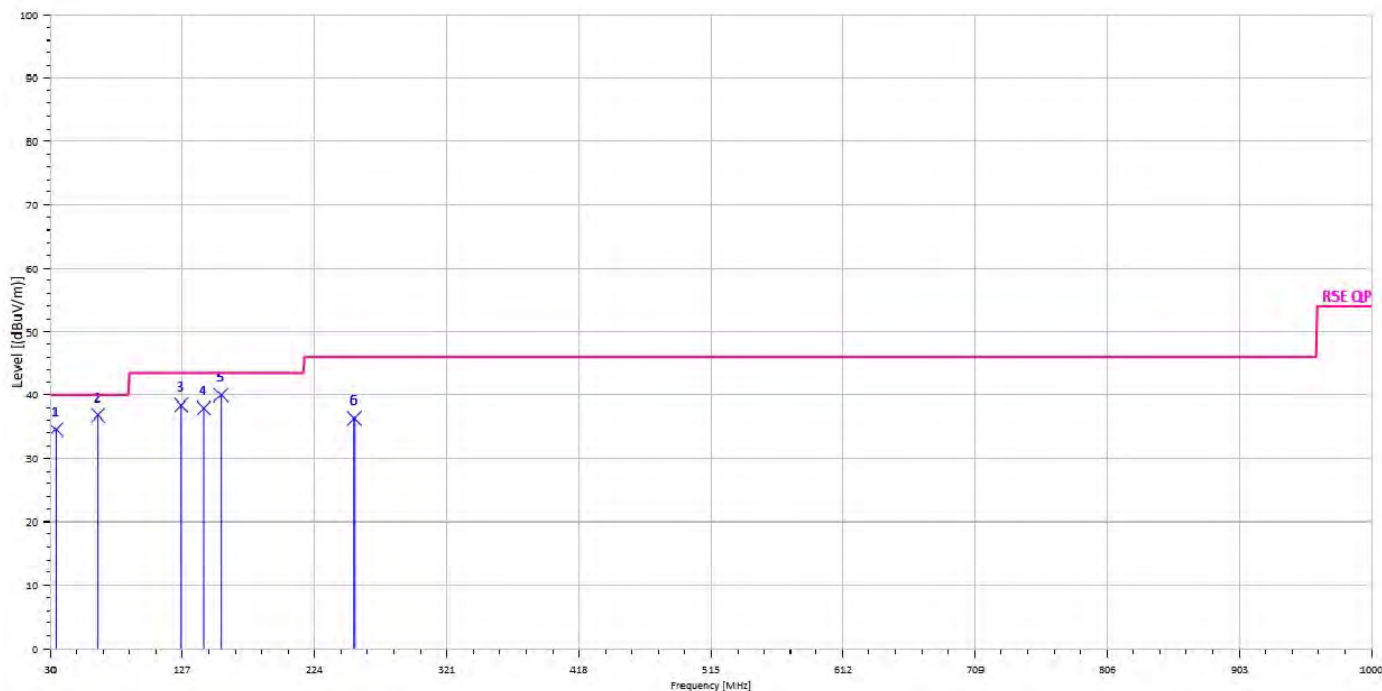
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Operation Mode : 802.11g Test Date : 2018/5/29
 Fundamental Frequency : 2480 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Jerry
 EUT Pol. : E2 Measurement Antenna Pol. : Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
33.88	S	Peak	52.58	-18.03	34.55	40	-5.45
64.92	S	Peak	55.45	-18.64	36.80	40	-3.20
126.03	S	Peak	56.44	-18.05	38.39	43.5	-5.11
142.52	S	Peak	54.21	-16.30	37.91	43.5	-5.59
155.13	S	QP	55.69	-15.68	40.02	43.5	-3.48
253.10	S	Peak	53.38	-17.07	36.31	46	-9.69

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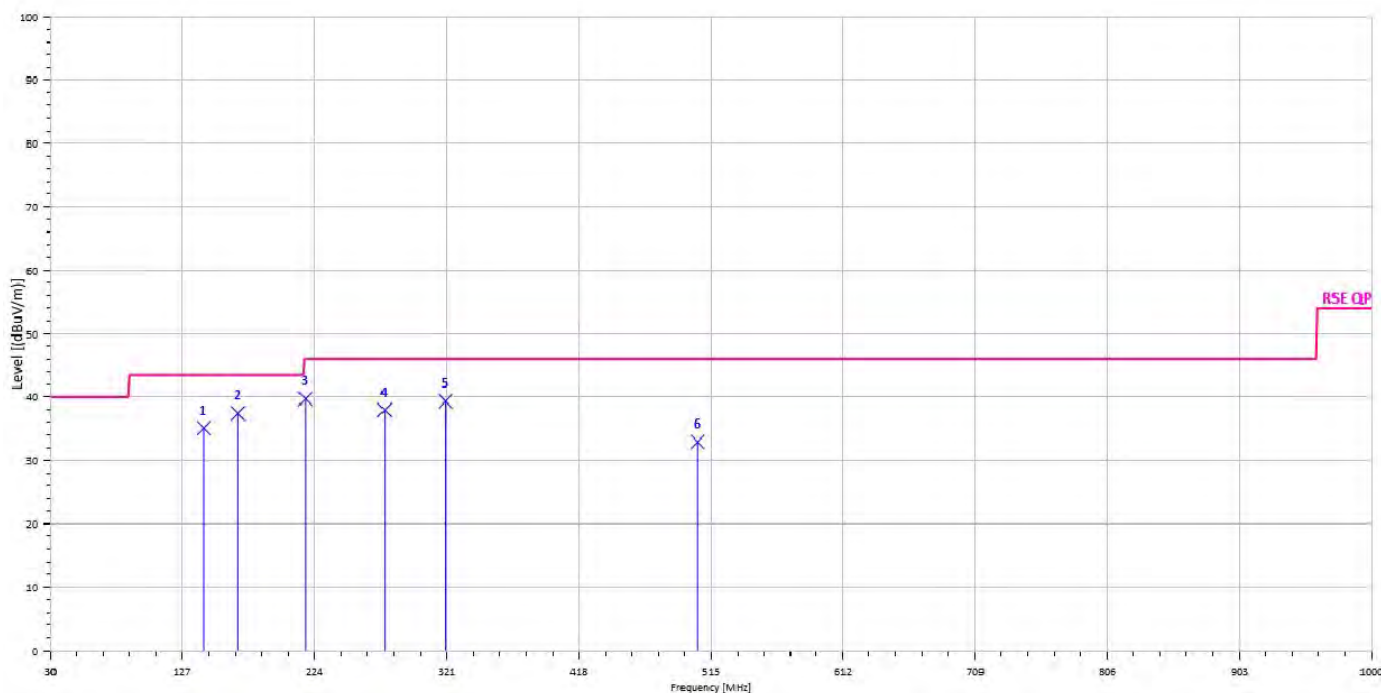
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Operation Mode : 802.11g Test Date : 2018/5/29
 Fundamental Frequency : 2480 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Jerry
 EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



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
142.52	S	Peak	51.39	-16.30	35.09	43.5	-8.41
167.74	S	Peak	53.65	-16.24	37.41	43.5	-6.09
217.21	S	Peak	58.32	-18.63	39.69	46	-6.31
275.41	S	Peak	53.95	-16.01	37.94	46	-8.06
320.03	S	Peak	54.04	-14.71	39.33	46	-6.67
505.30	S	Peak	44.05	-11.17	32.89	46	-13.11

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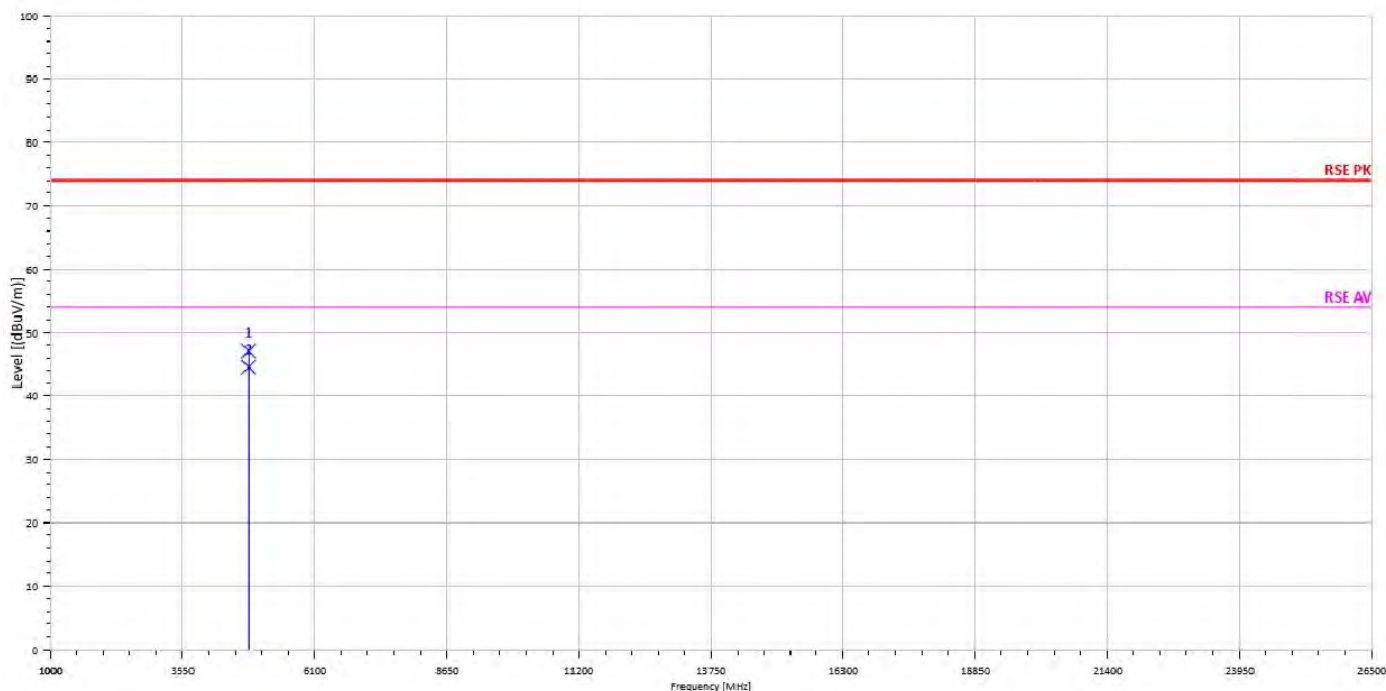
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Above 1GHz Data:

Radiated Spurious Emission Measurement Result (802.11 b)

Operation Mode :	802.11b	Test Date :	2018/5/3
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	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
4824.00	H	Peak	48.12	-1.04	47.08	74	-26.92
4824.00	H	Average	45.60	-1.04	44.56	54	-9.44

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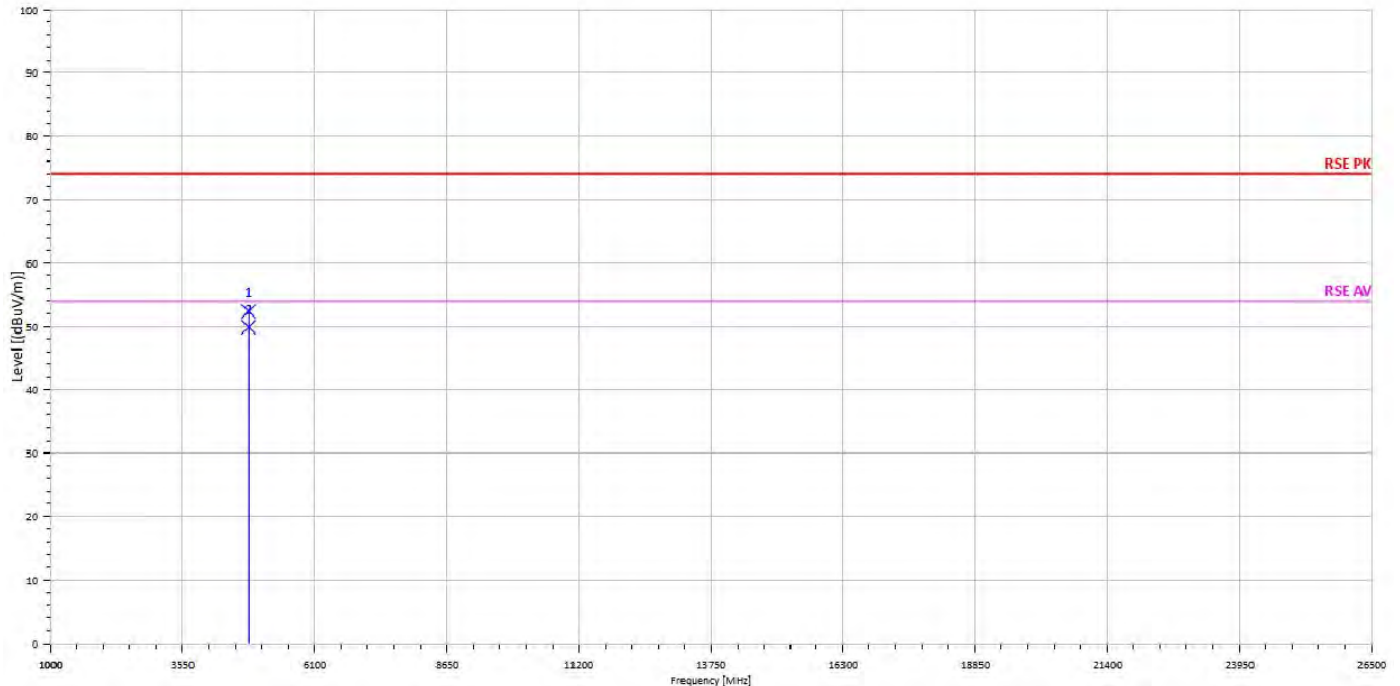
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Operation Mode : 802.11b Test Date : 2018/5/3
Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Jerry
EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



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
4824.00	H	Peak	53.41	-1.04	52.37	74	-21.63
4824.00	H	Average	50.91	-1.04	49.87	54	-4.13

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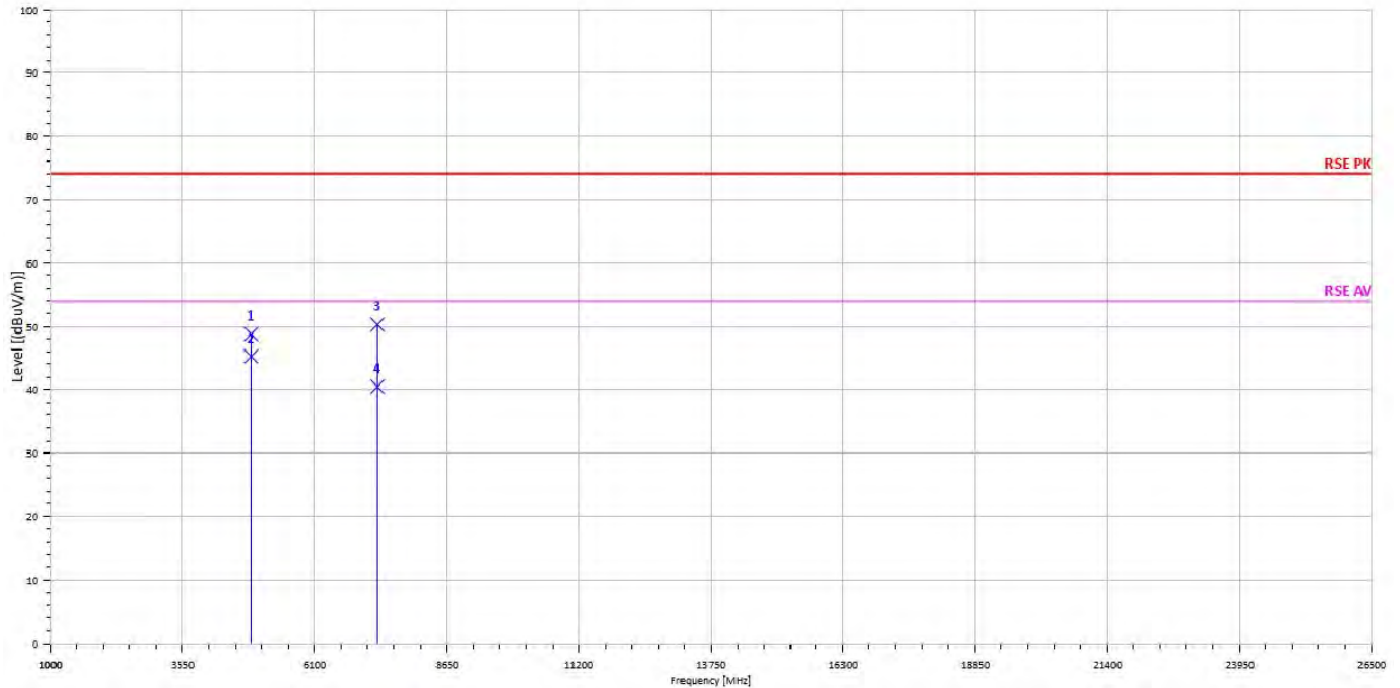
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Operation Mode :	802.11b	Test Date :	2018/5/3
Fundamental Frequency :	2437 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Vertical



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
4874.00	H	Peak	49.52	-0.75	48.77	74	-25.23
4874.00	H	Average	46.00	-0.75	45.25	54	-8.75
7311.00	H	Peak	44.20	6.10	50.30	74	-23.70
7311.00	H	Average	34.38	6.10	40.48	54	-13.52

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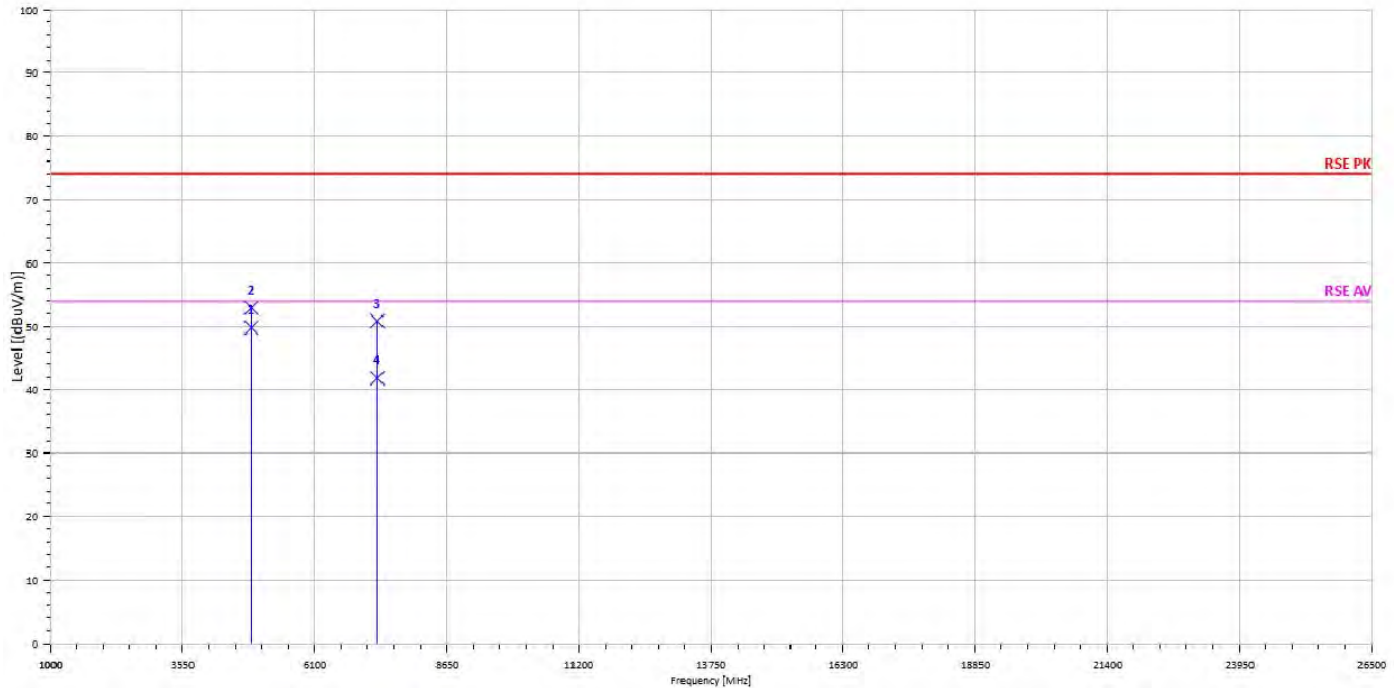
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Operation Mode :	802.11b	Test Date :	2018/5/3
Fundamental Frequency :	2437 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



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
4874.00	H	Peak	55.88	-0.75	49.79	74	-24.21
4874.00	H	Average	53.68	-0.75	52.93	54	-1.07
7311.00	H	Peak	44.72	6.10	50.82	74	-23.18
7311.00	H	Average	35.73	6.10	41.83	54	-12.17

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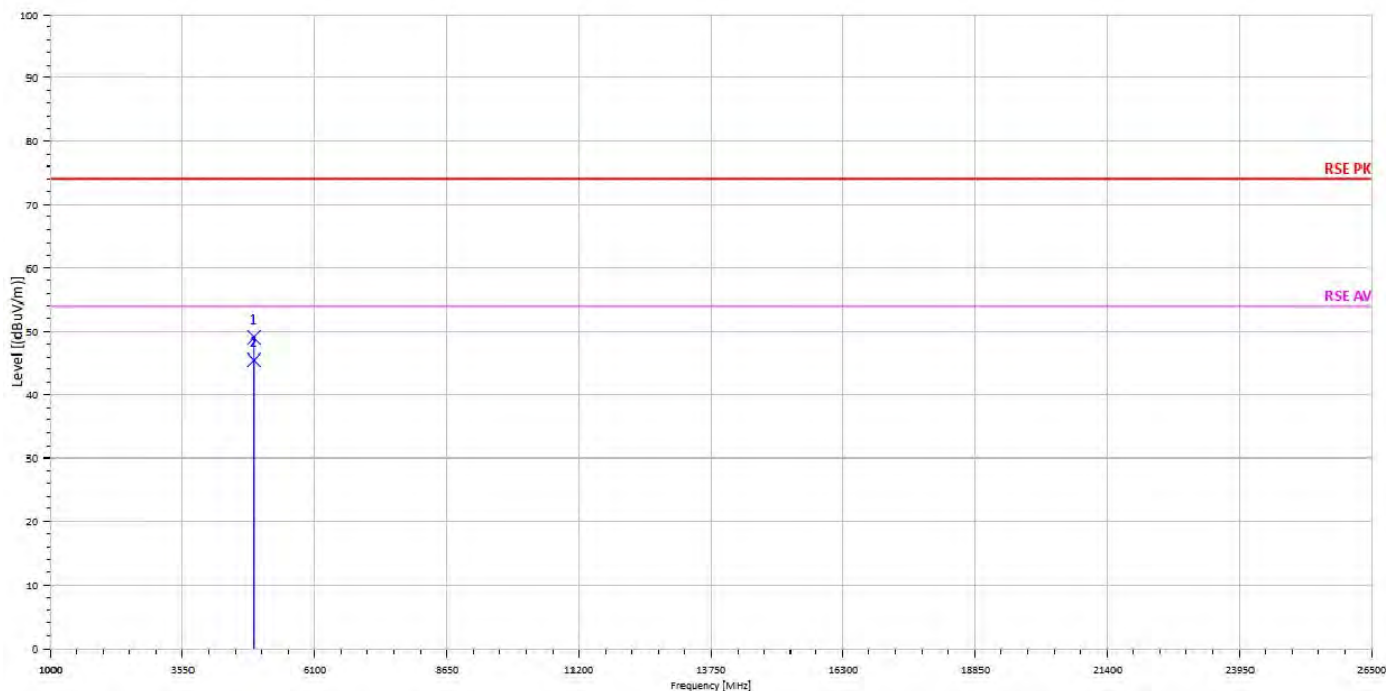
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Operation Mode : 802.11b Test Date : 2018/5/3
 Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Jerry
 EUT Pol. : E2 Measurement Antenna Pol. : Vertical



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
4924.00	H	Peak	49.66	-0.62	49.04	74	-24.96
4924.00	H	Average	46.07	-0.62	45.45	54	-8.55

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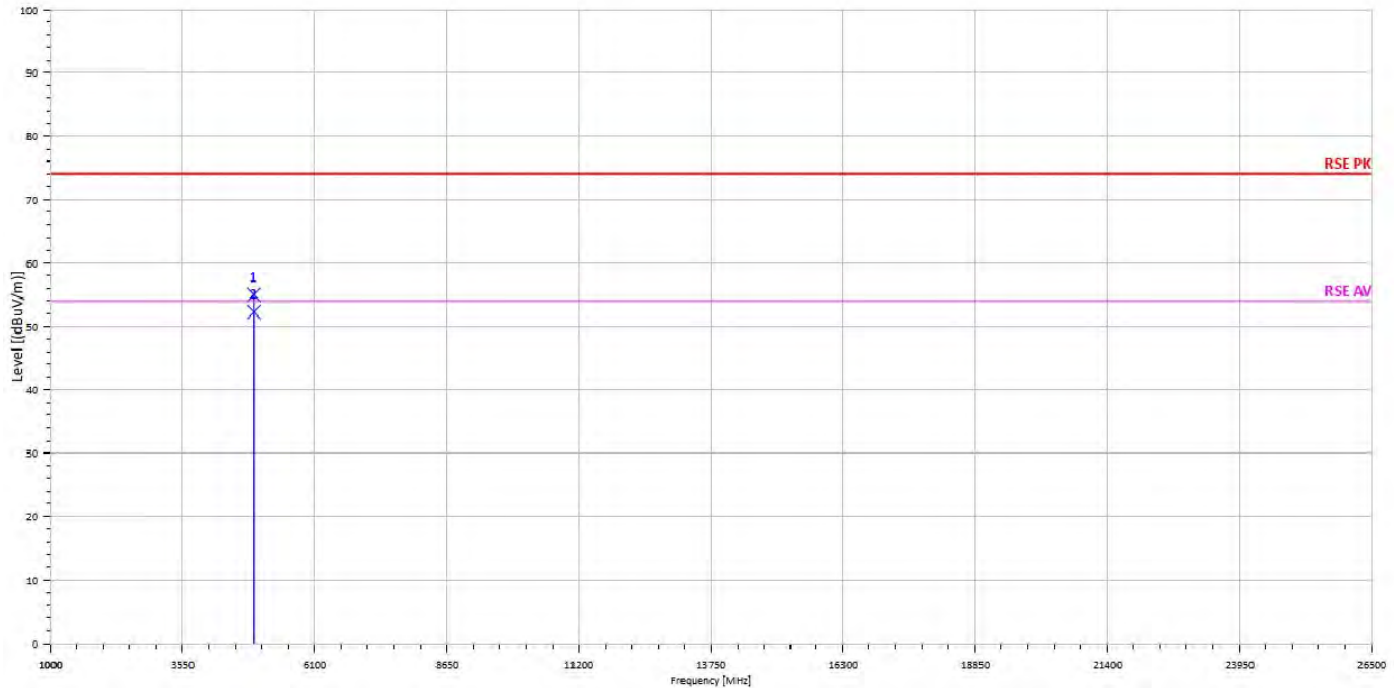
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Operation Mode : 802.11b Test Date : 2018/5/3
Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH High Test Engineer : Jerry
EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



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
4924.00	H	Peak	55.62	-0.62	55.00	74	-19.00
4924.00	H	Average	52.88	-0.62	52.25	54	-1.75

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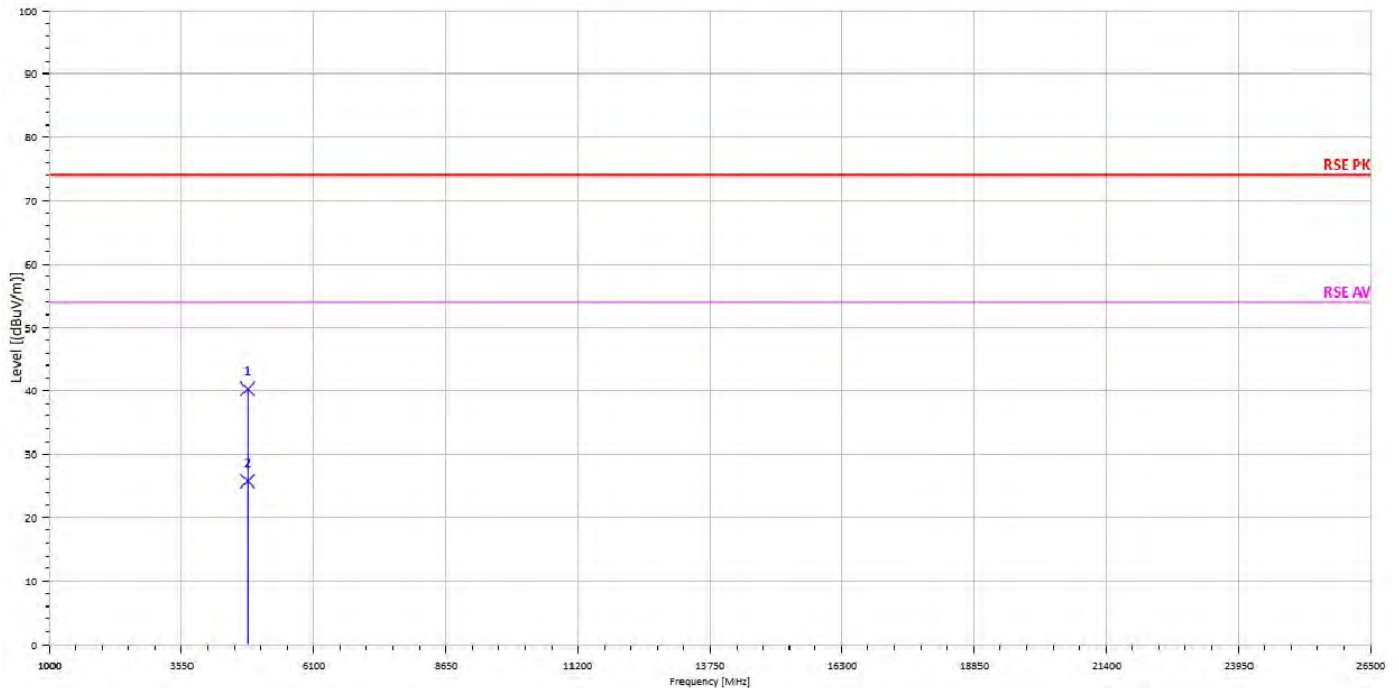
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Radiated Spurious Emission Measurement Result (802.11 g)

Operation Mode :	802.11g	Test Date :	2018/5/3
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	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
4824.00	H	Peak	41.34	-1.04	40.30	74	-33.70
4824.00	H	Average	26.79	-1.04	25.75	54	-28.25

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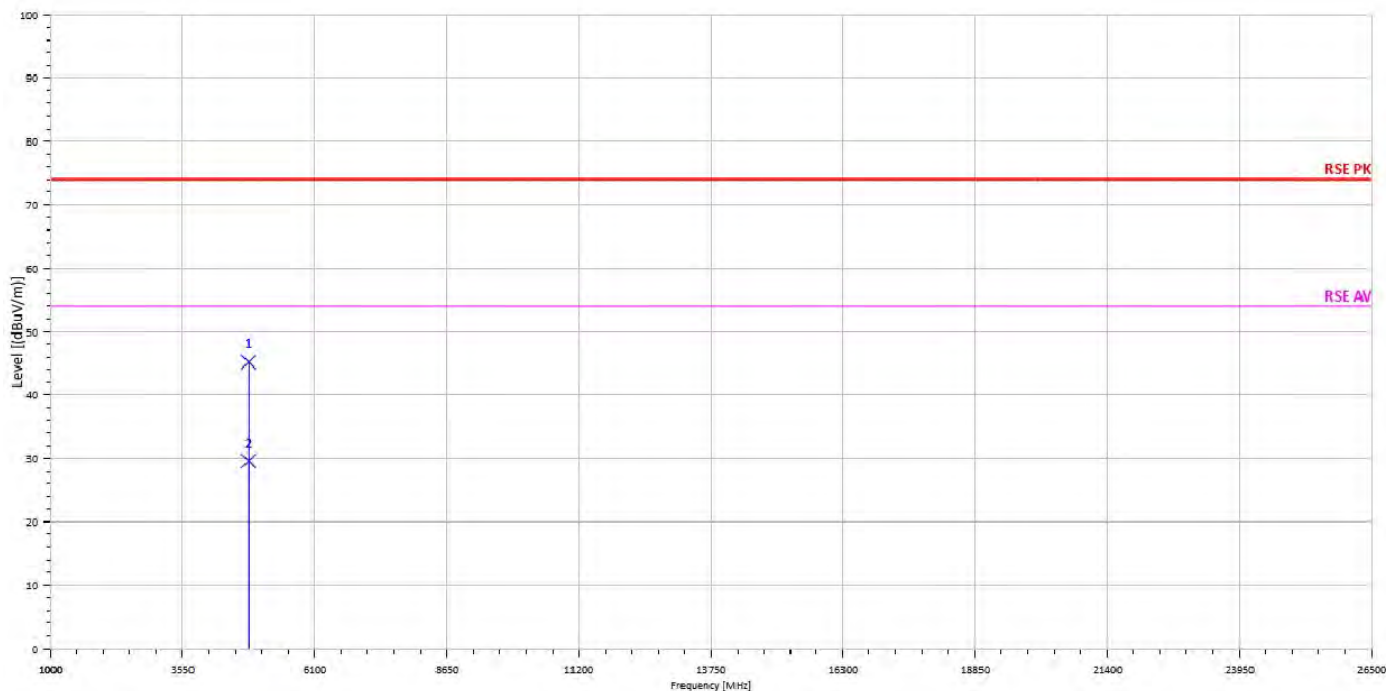
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Operation Mode : 802.11g Test Date : 2018/5/3
 Fundamental Frequency : 2412 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Low Test Engineer : Jerry
 EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



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
4824.00	S	Peak	46.24	-1.04	45.20	74	-28.80
4824.00	S	Peak	30.62	-1.04	29.58	74	-44.42

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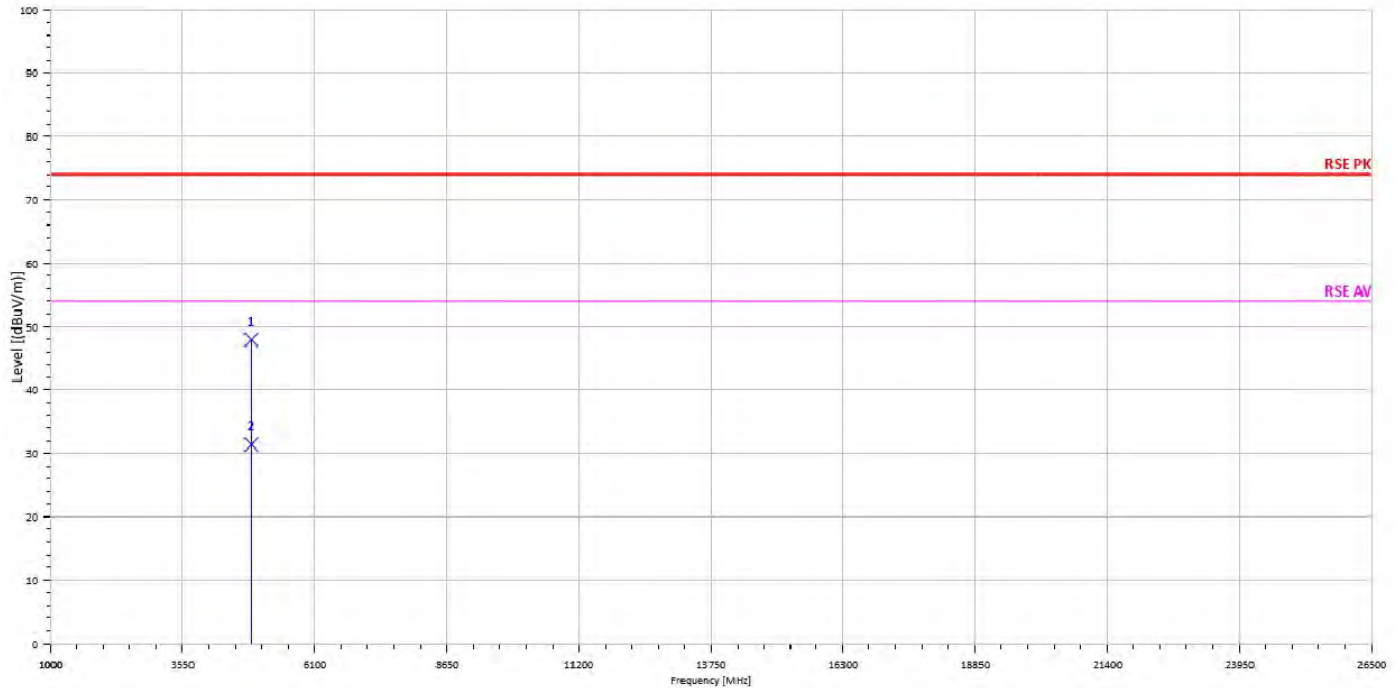
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Operation Mode :	802.11g	Test Date :	2018/5/3
Fundamental Frequency :	2437 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4874.00	H	Peak	48.67	-0.75	47.92	74	-26.08
4874.00	H	Average	32.14	-0.75	31.39	54	-22.61

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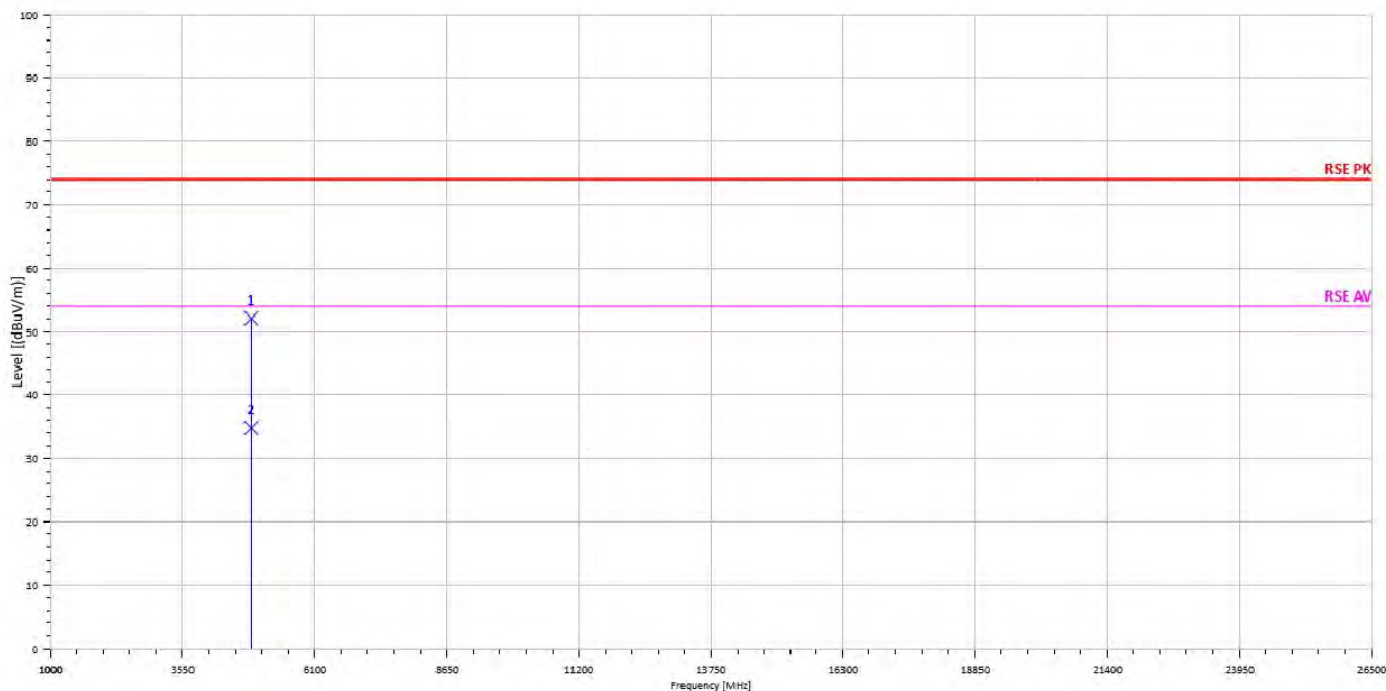
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Operation Mode :	802.11g	Test Date :	2018/5/3
Fundamental Frequency :	2437 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



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
4874.00	H	Peak	52.84	-0.75	52.09	74	-21.91
4874.00	H	Average	35.53	-0.75	34.79	54	-19.21

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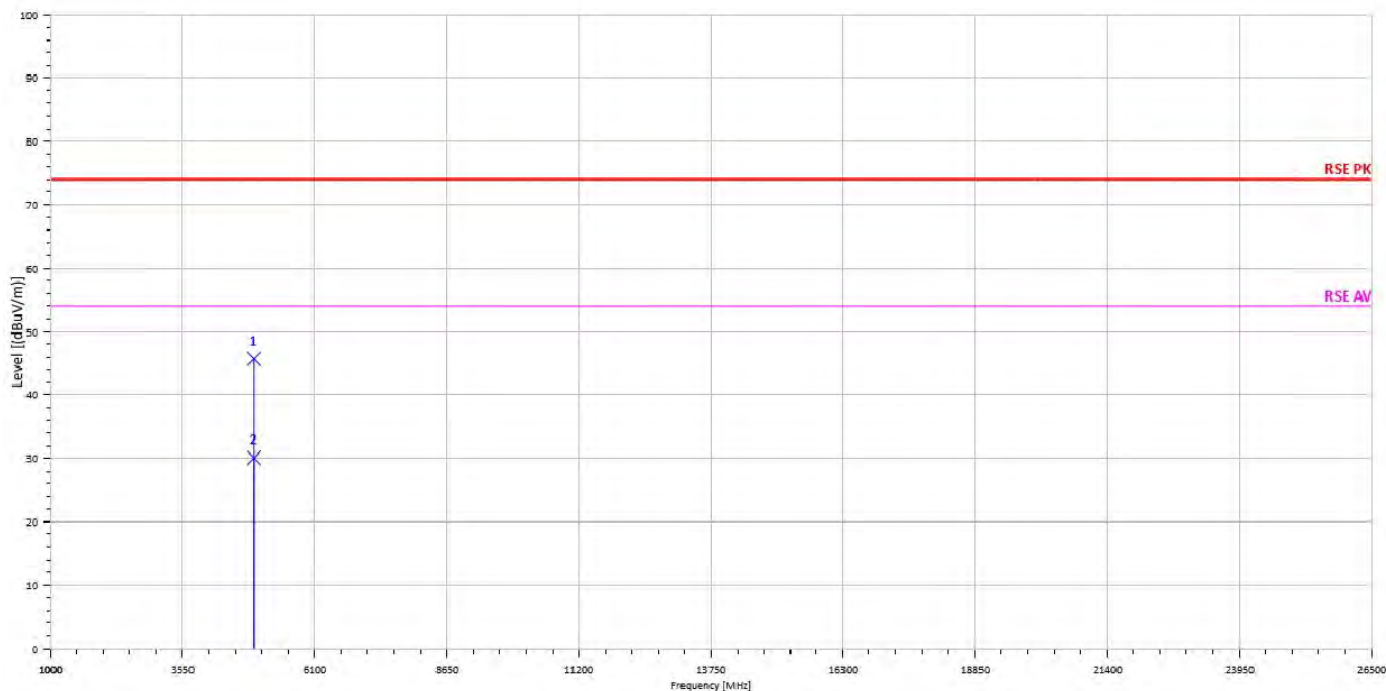
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Operation Mode : 802.11g Test Date : 2018/5/3
Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH High Test Engineer : Jerry
EUT Pol. : E2 Measurement Antenna Pol. : Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4924.00	H	Peak	46.32	-0.62	45.70	74	-28.30
4924.00	H	Average	30.68	-0.62	30.06	54	-23.94

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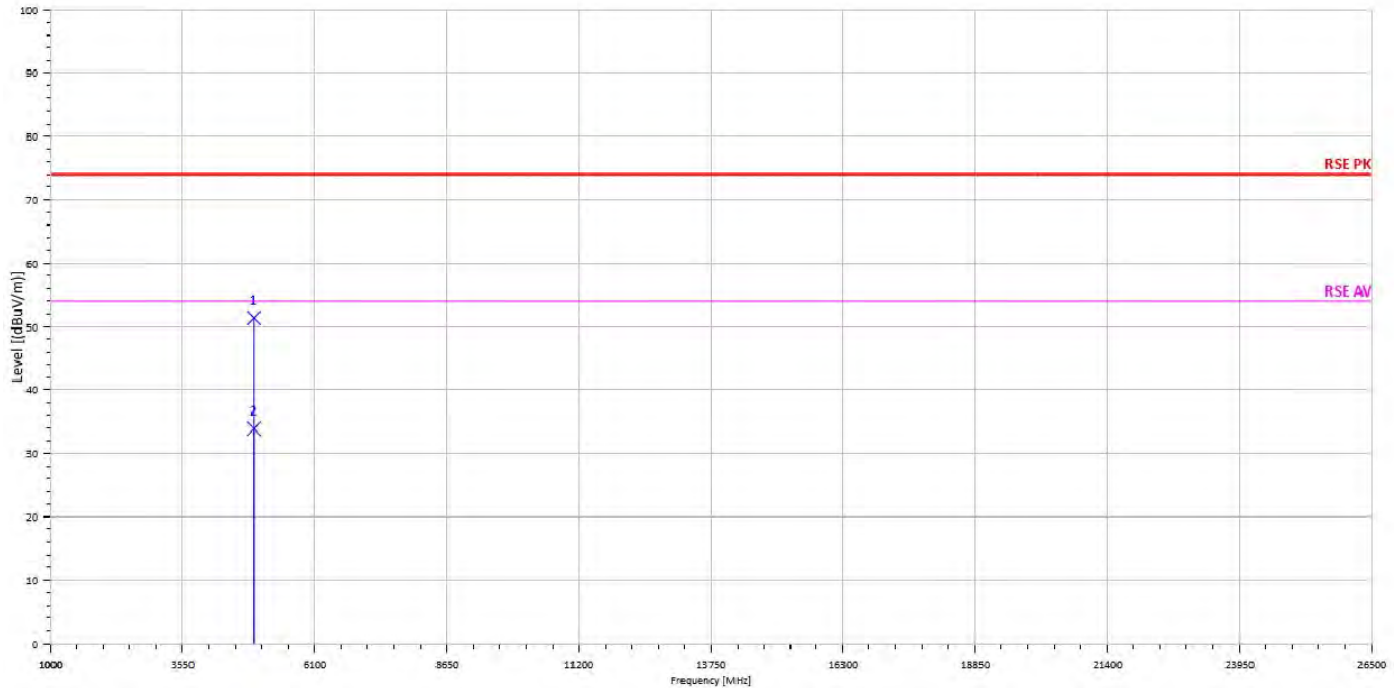
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Operation Mode : 802.11g Test Date : 2018/5/3
Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH High Test Engineer : Jerry
EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



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
4924.00	H	Peak	51.97	-0.62	51.35	74	-22.65
4924.00	H	Average	34.51	-0.62	33.89	54	-20.11

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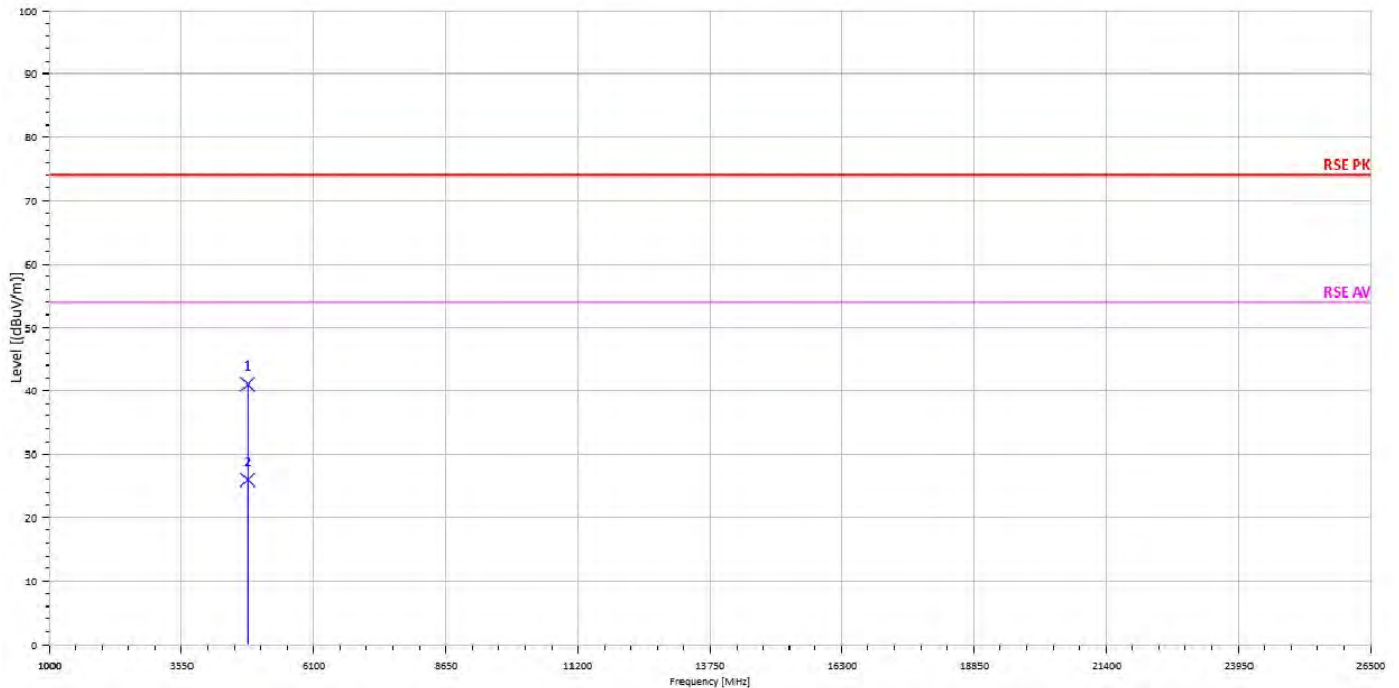
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Radiated Spurious Emission Measurement Result (802.11_HT20)

Operation Mode :	802.11n20	Test Date :	2018/5/3
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	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	dBuV	dB	dBuV/m	dBuV/m	dB
4824.00	H	Peak	42.05	-1.04	41.01	74	-32.99
4824.00	H	Average	26.99	-1.04	25.95	54	-28.05

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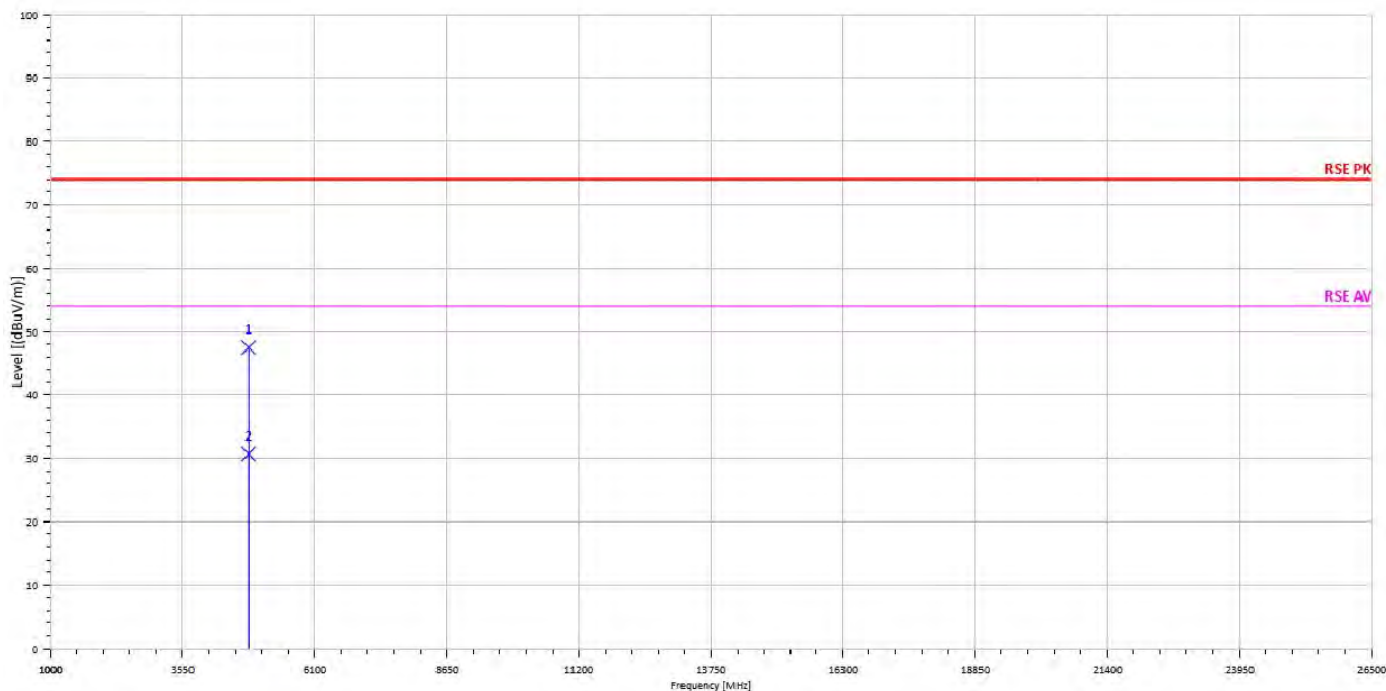
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Operation Mode :	802.11n20	Test Date :	2018/5/3
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



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
4824.00	S	Peak	48.52	-1.04	47.48	74	-26.52
4824.00	S	Peak	31.72	-1.04	30.68	74	-43.32

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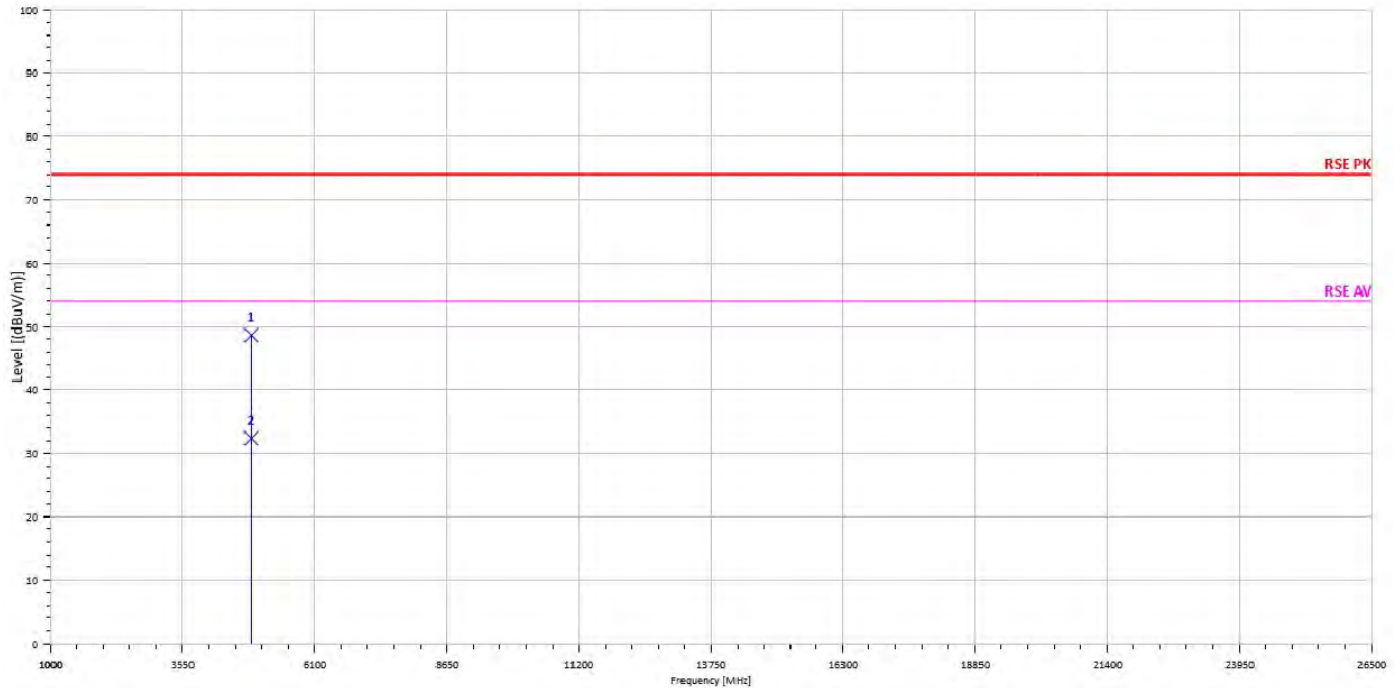
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f (886-2) 2298-0488

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Operation Mode : 802.11n20 Test Date : 2018/5/3
Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Jerry
EUT Pol. : E2 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	dBuV	dB	dBuV/m	dBuV/m	dB
4874.00	H	Peak	49.38	-0.75	48.63	74	-25.37
4874.00	H	Average	33.11	-0.75	32.36	54	-21.64

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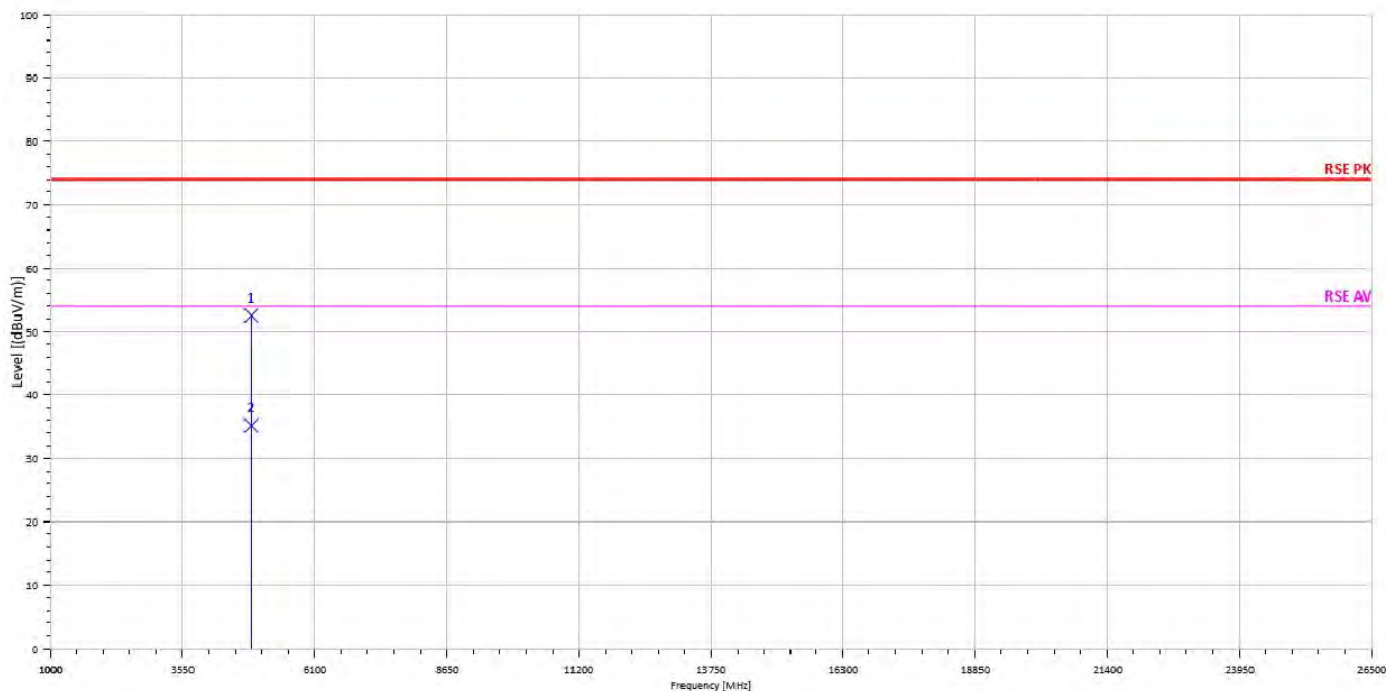
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f (886-2) 2298-0488

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Operation Mode : 802.11n20 Test Date : 2018/5/3
Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Jerry
EUT Pol. : E2 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
4874.00	H	Peak	53.28	-0.75	52.53	74	-21.47
4874.00	H	Average	35.90	-0.75	35.15	54	-18.85

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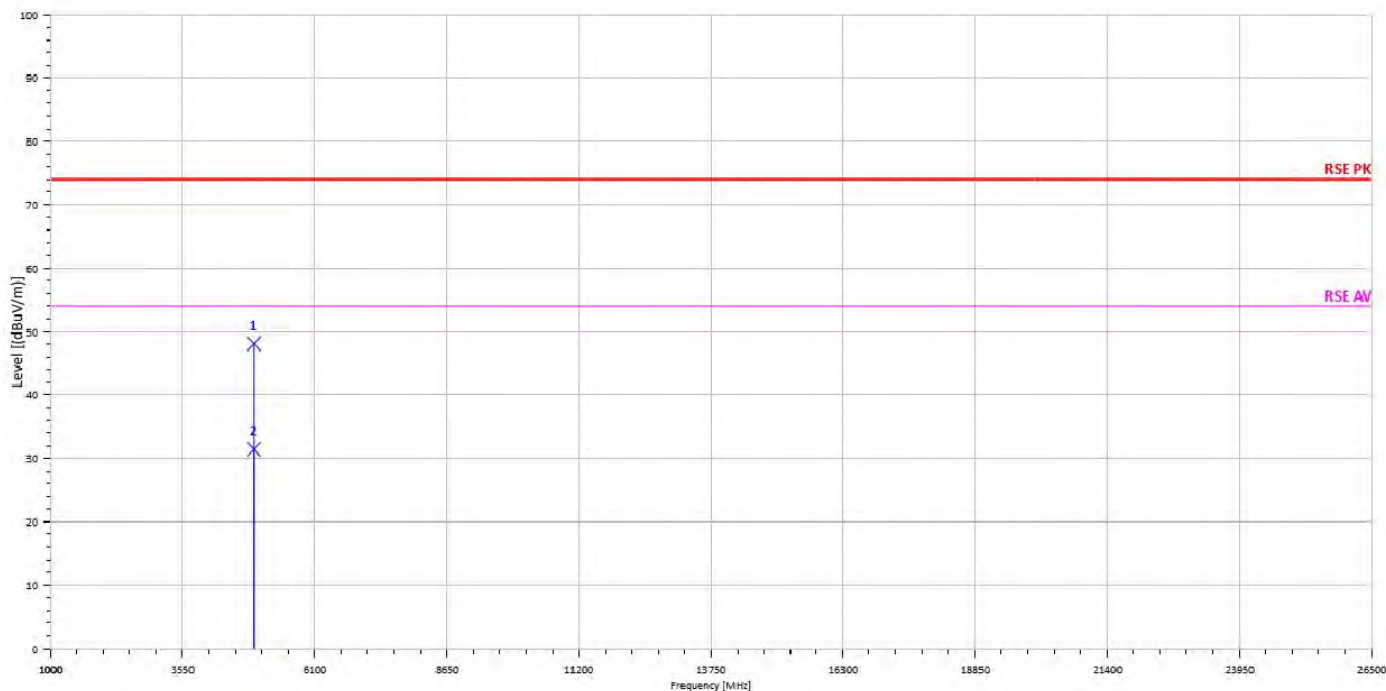
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Operation Mode : 802.11n20 Test Date : 2018/5/3
 Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Jerry
 EUT Pol. : E2 Measurement Antenna Pol. : Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4924.00	H	Peak	48.70	-0.62	48.08	74	-25.92
4924.00	H	Average	32.05	-0.62	31.43	54	-22.57

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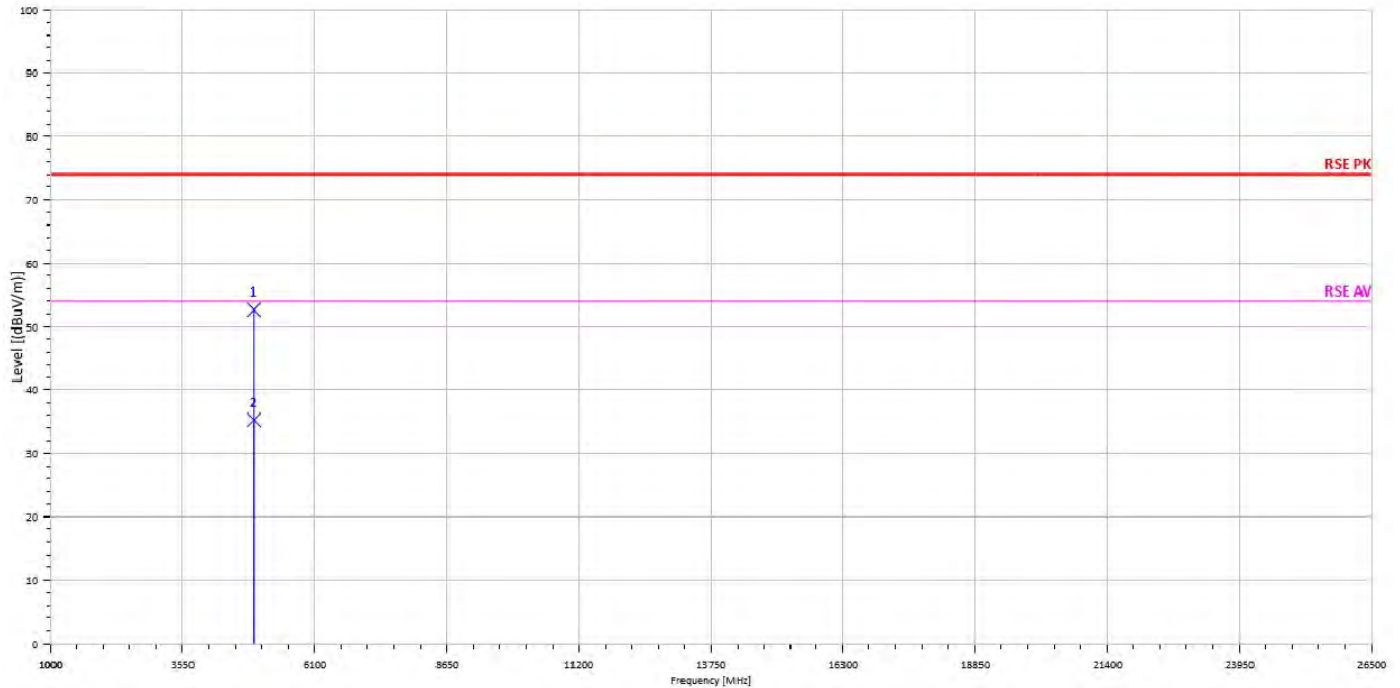
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Operation Mode : 802.11n20 Test Date : 2018/5/3
Fundamental Frequency : 2462 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH High Test Engineer : Jerry
EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



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
4924.00	H	Peak	53.27	-0.62	52.65	74	-21.35
4924.00	H	Average	35.88	-0.62	35.26	54	-18.74

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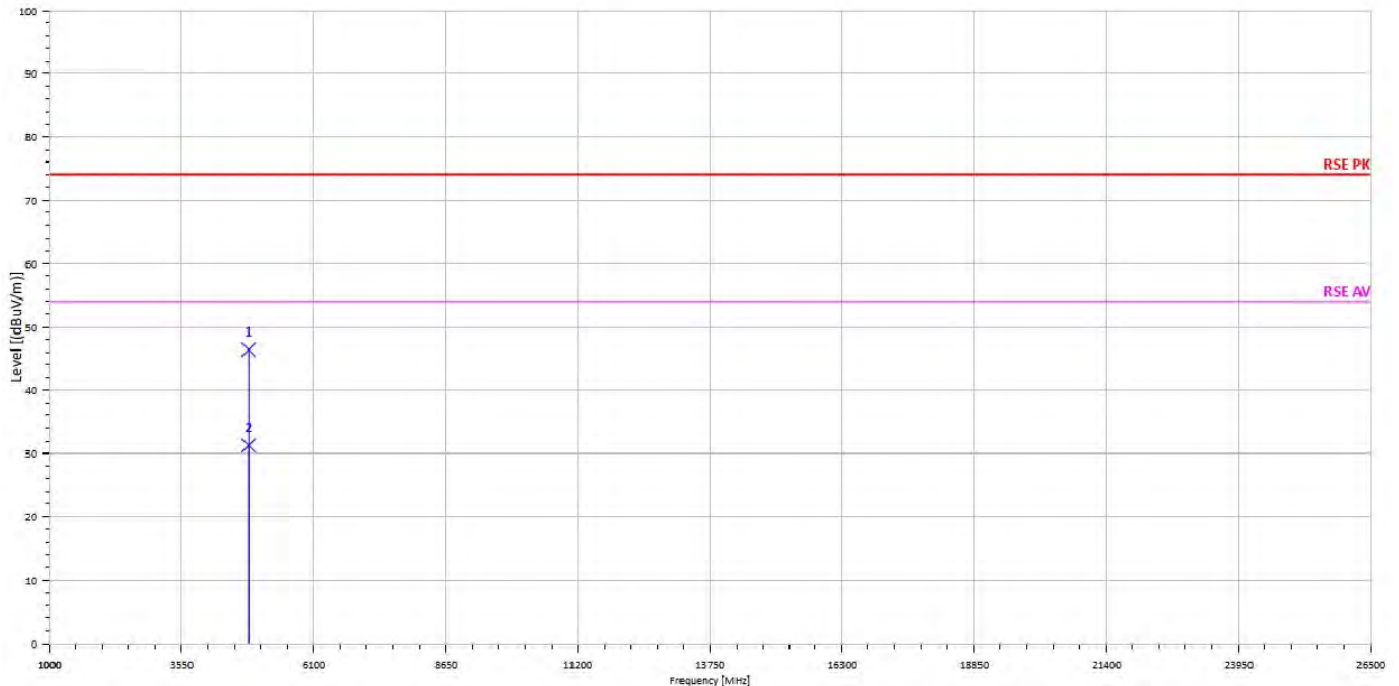
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Radiated Spurious Emission Measurement Result (802.11_HT40)

Operation Mode :	802.11n40	Test Date :	2018/5/3
Fundamental Frequency :	2422 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	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
4844.00	H	Peak	47.32	-0.92	46.40	74	-27.60
4844.00	H	Average	32.21	-0.92	31.29	54	-22.71

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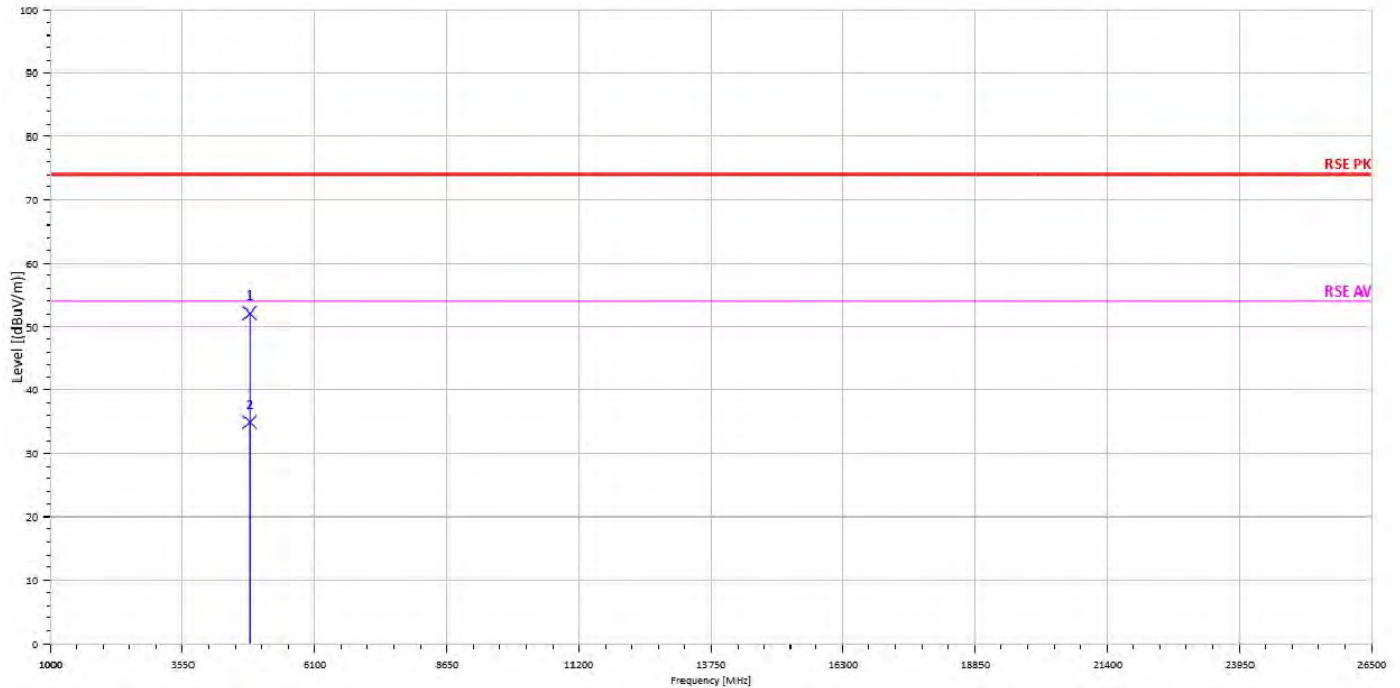
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f (886-2) 2298-0488

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Operation Mode : 802.11n40 Test Date : 2018/5/3
Fundamental Frequency : 2422 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Jerry
EUT Pol. : E2 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
4844.00	H	Peak	53.03	-0.92	52.11	74	-21.89
4844.00	H	Average	35.86	-0.92	34.94	54	-19.06

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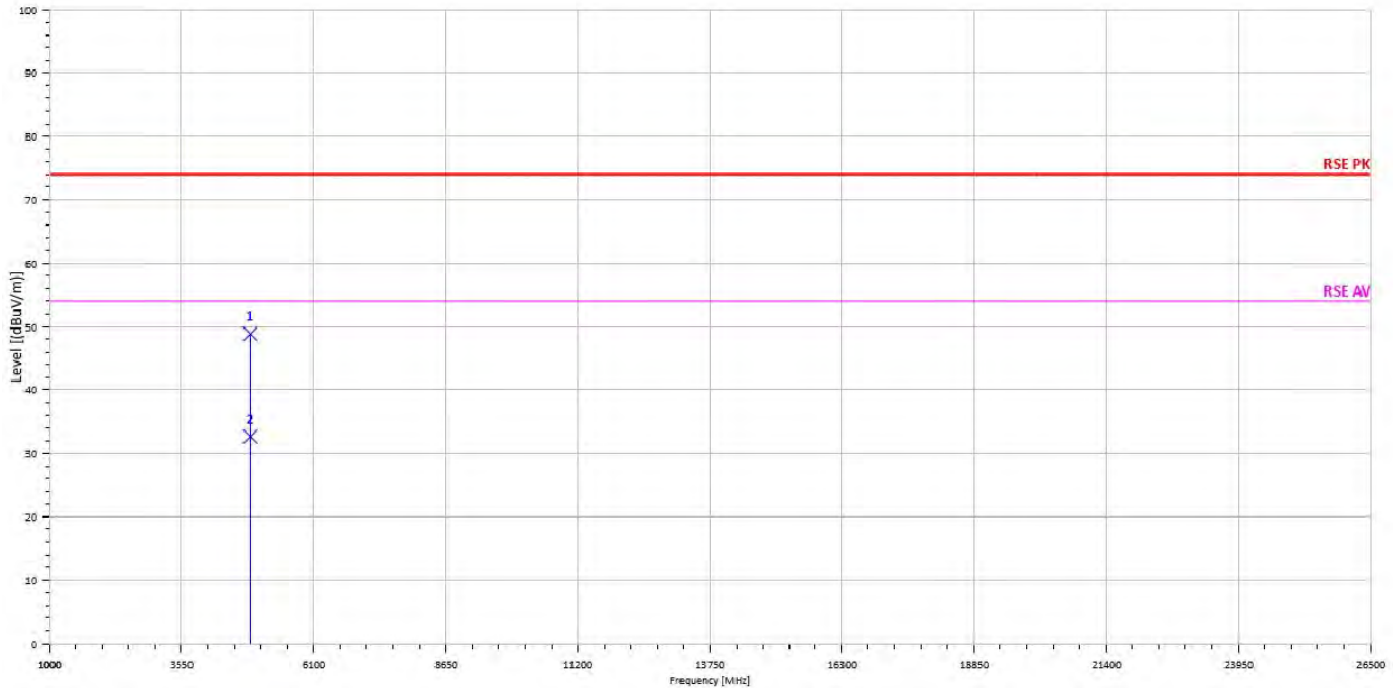
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Operation Mode : 802.11n40 Test Date : 2018/5/3
Fundamental Frequency : 2437 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Jerry
EUT Pol. : E2 Measurement Antenna Pol. : Vertical



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4874.00	H	Peak	49.57	-0.75	48.82	74	-25.18
4874.00	H	Average	33.37	-0.75	32.62	54	-21.38

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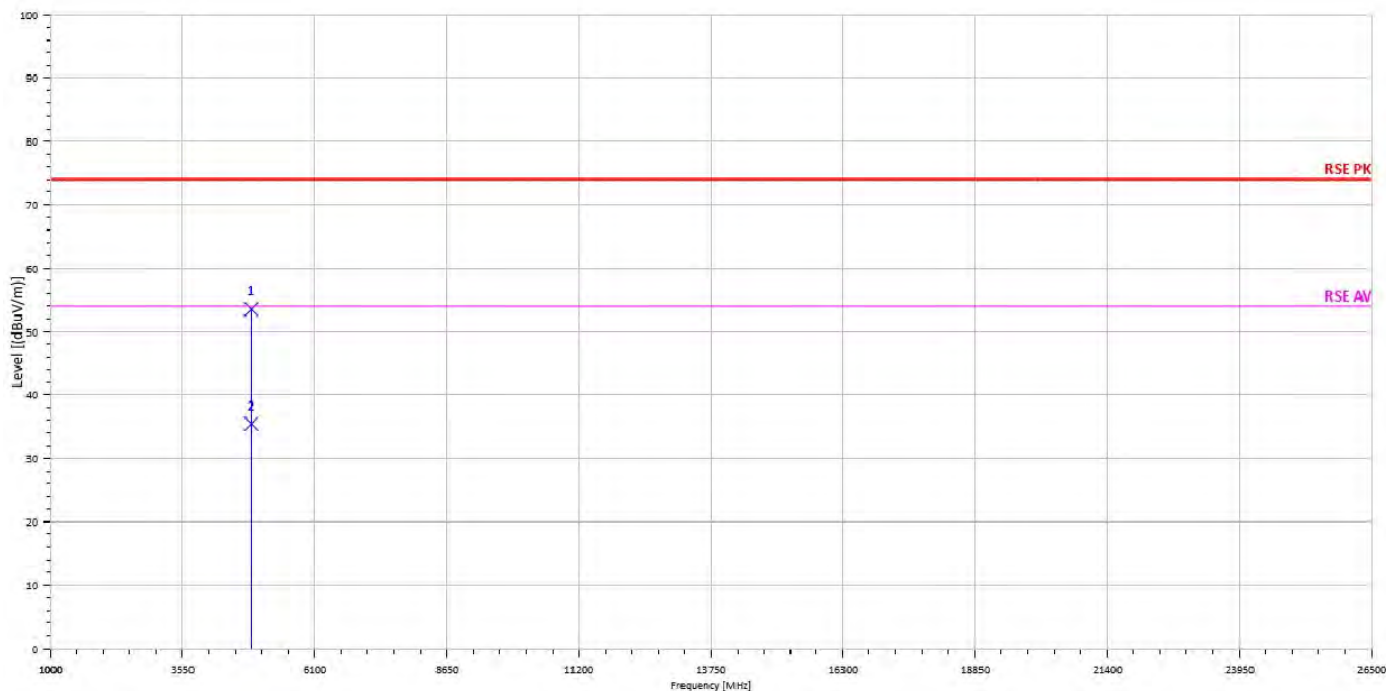
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Operation Mode :	802.11n40	Test Date :	2018/5/3
Fundamental Frequency :	2437 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



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
4874.00	H	Peak	54.28	-0.75	53.53	74	-20.47
4874.00	H	Average	36.18	-0.75	35.43	54	-18.57

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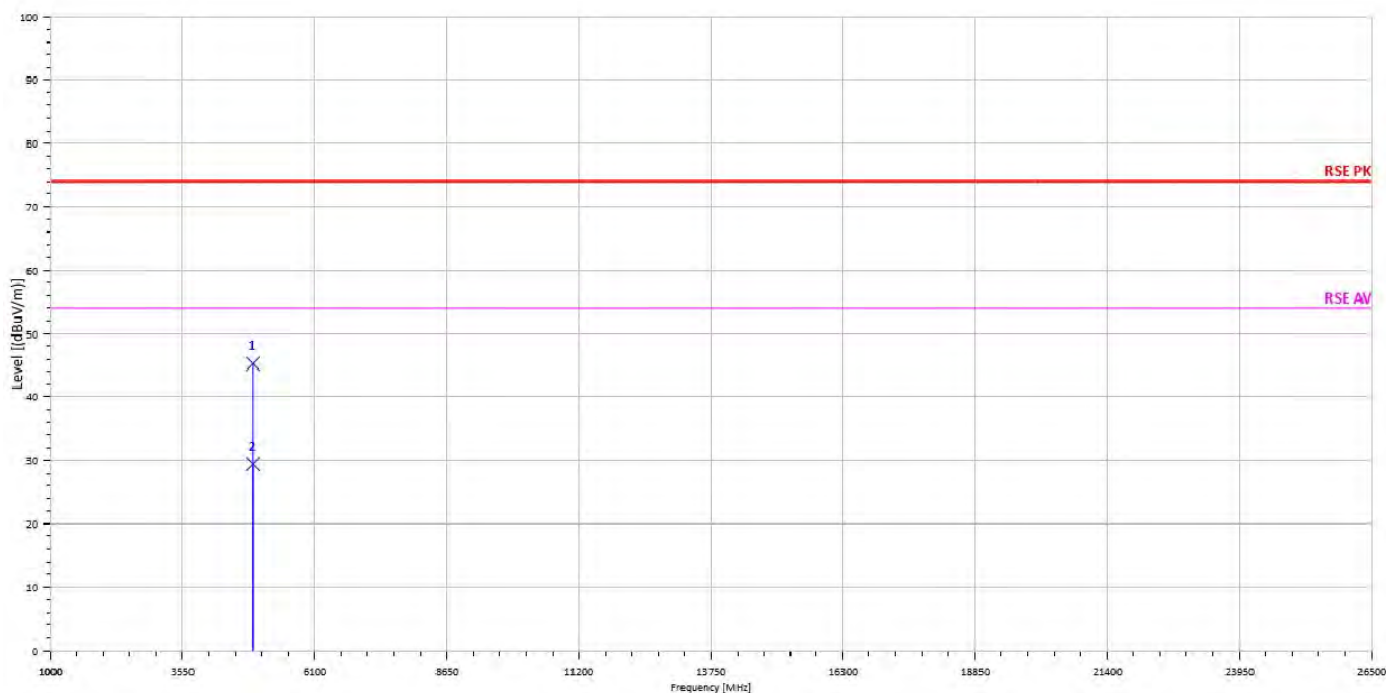
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Operation Mode : 802.11n40 Test Date : 2018/5/3
 Fundamental Frequency : 2452 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Jerry
 EUT Pol. : E2 Measurement Antenna Pol. : Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4904.00	H	Peak	45.88	-0.60	45.28	74	-28.72
4904.00	H	Average	30.01	-0.60	29.41	54	-24.59

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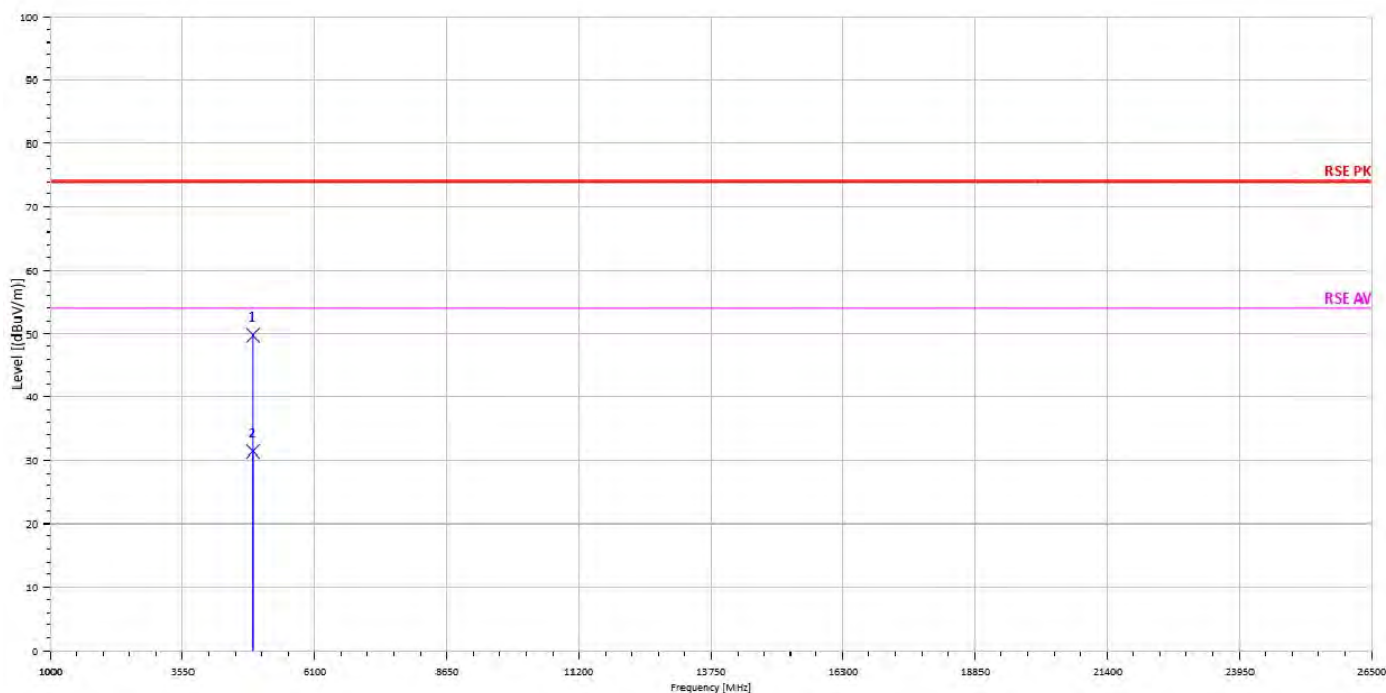
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Operation Mode : 802.11n40 Test Date : 2018/5/3
 Fundamental Frequency : 2452 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH High Test Engineer : Jerry
 EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



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
4904.00	H	Peak	50.33	-0.60	49.73	74	-24.27
4904.00	H	Average	32.02	-0.60	31.42	54	-22.58

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12 PEAK POWER SPECTRAL DENSITY

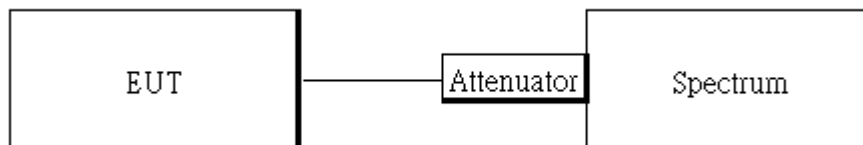
12.1 Standard Applicable

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

12.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	06/21/2017	06/20/2018
Attenuator	Marvelous	MVE2213-10	RF31	12/26/2017	12/25/2018
DC Block	PASTERNAK	PE8210	RF81	12/26/2017	12/25/2018
Coaxial Cables	Woken	00100A1F1A185C	RF229	12/26/2017	12/25/2018

12.3 Test Set-up



12.4 Measurement Procedure

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 3 kHz & VBW = 10 kHz.
5. For defining Restricted Band Edge Limit:
Set the RBW = 100kHz & VBW = 300 kHz
6. Detector = peak.
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum amplitude level.

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12.5 Measurement Result

POWER DENSITY 802.11b						
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result
2412	-10.48	11.20	0.02	-10.46	8.00	PASS
2437	-5.09	11.20	0.02	-5.07	8.00	PASS
2462	-11.68	11.20	0.02	-11.66	8.00	PASS

POWER DENSITY 802.11g						
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result
2412	-15.00	11.20	0.14	-14.86	8.00	PASS
2437	-11.54	11.20	0.14	-11.40	8.00	PASS
2462	-8.23	11.20	0.14	-8.09	8.00	PASS

POWER DENSITY 802.11n HT20						
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result
2412	-15.19	11.20	0.17	-15.02	8.00	PASS
2437	-10.52	11.20	0.17	-10.35	8.00	PASS
2462	-4.87	11.20	0.17	-4.70	8.00	PASS

POWER DENSITY 802.11n HT40						
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result
2422	-10.55	11.20	0.22	-10.33	8.00	PASS
2437	-12.24	11.20	0.22	-12.02	8.00	PASS
2452	-10.47	11.20	0.22	-10.25	8.00	PASS

**Refer to next page for plots*

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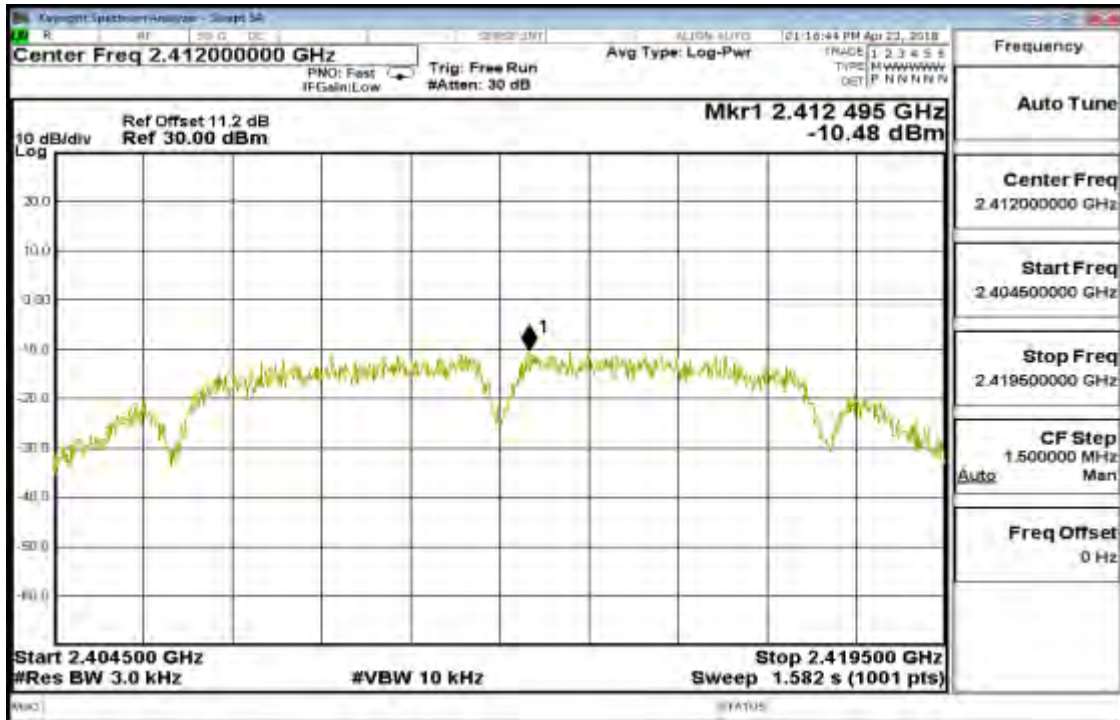
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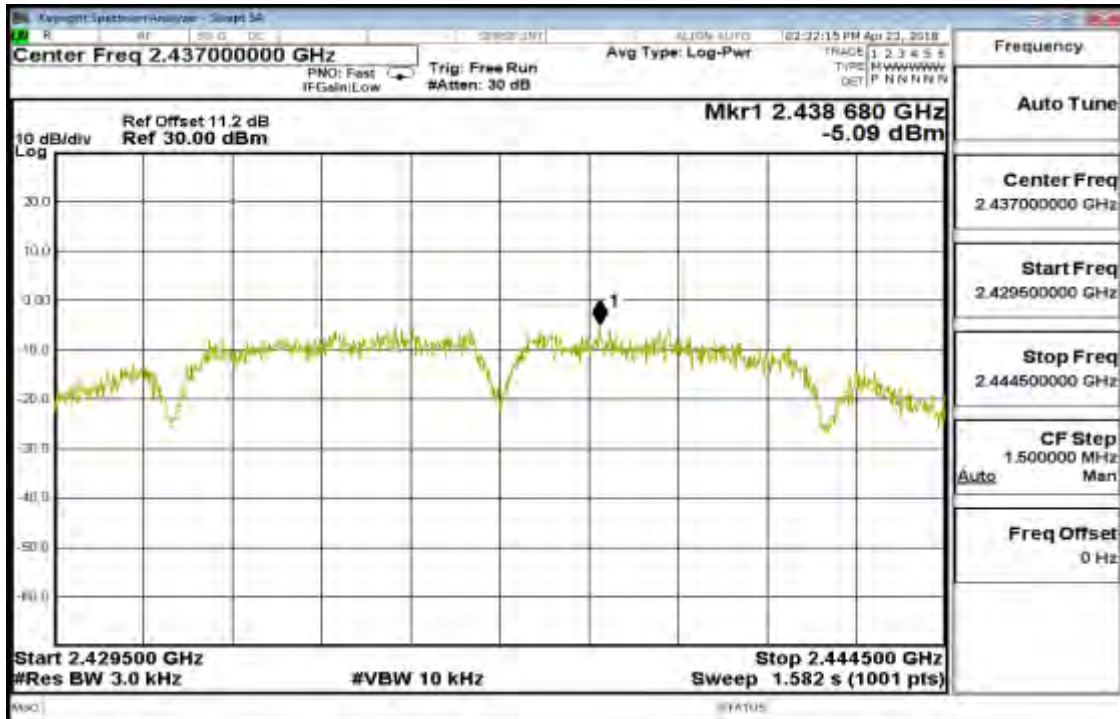
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802.11b

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



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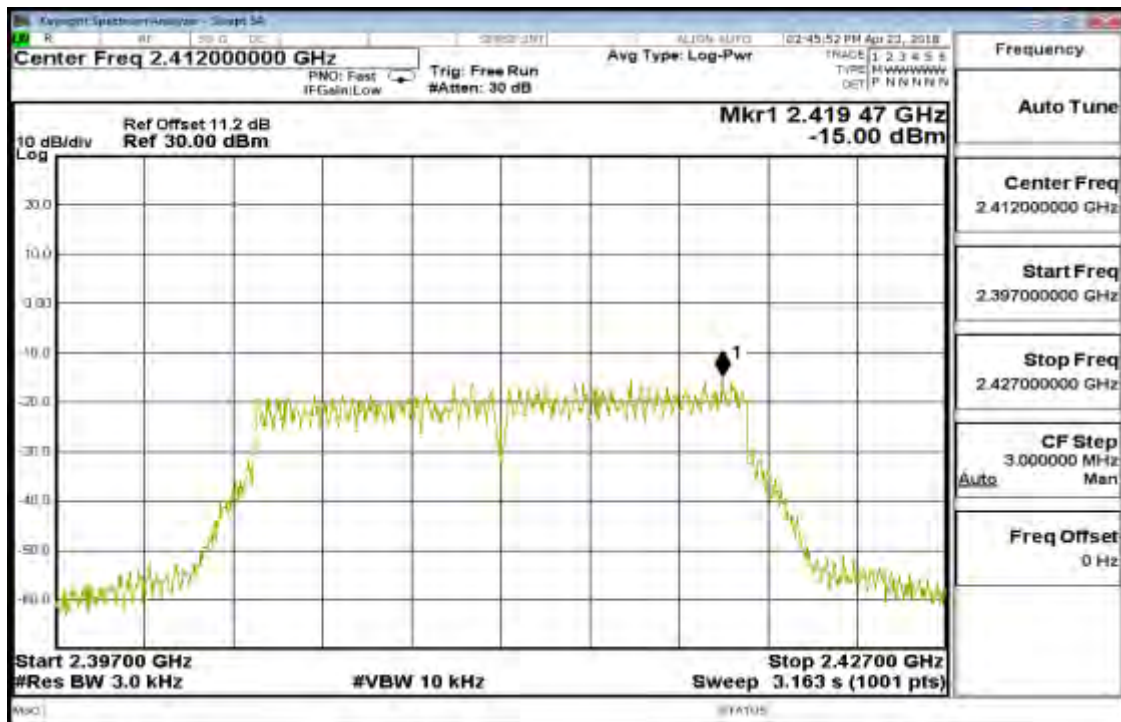
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Power Spectral Density Test Plot (CH-High)



802.11g

Power Spectral Density Test Plot (CH-Low)



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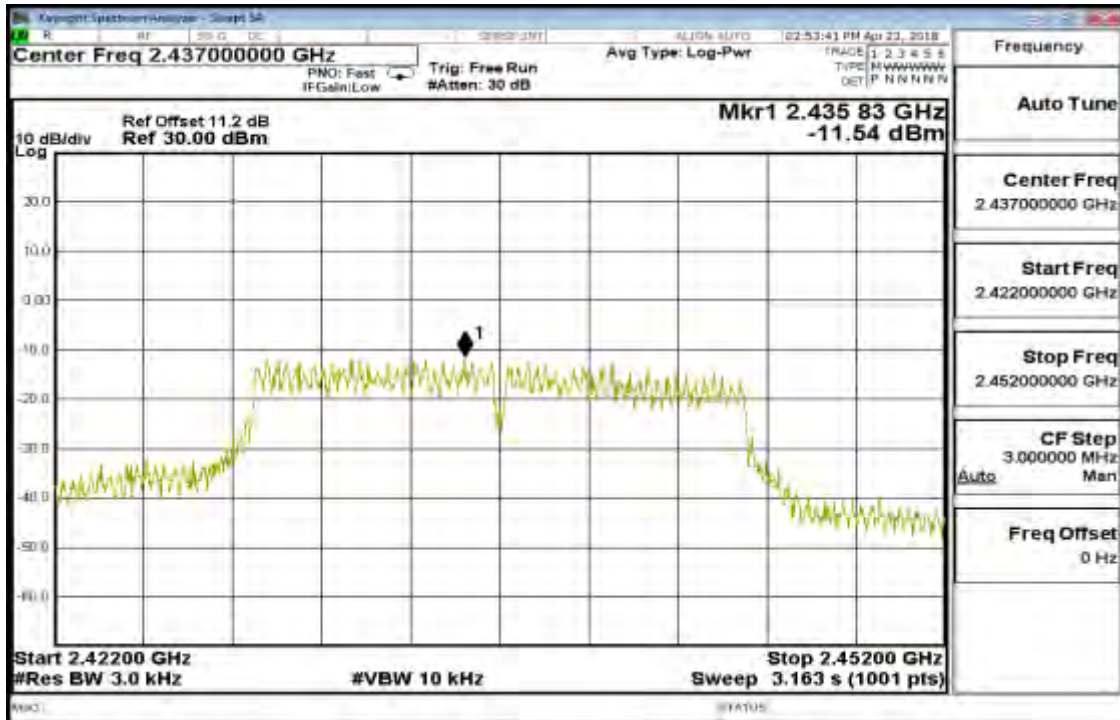
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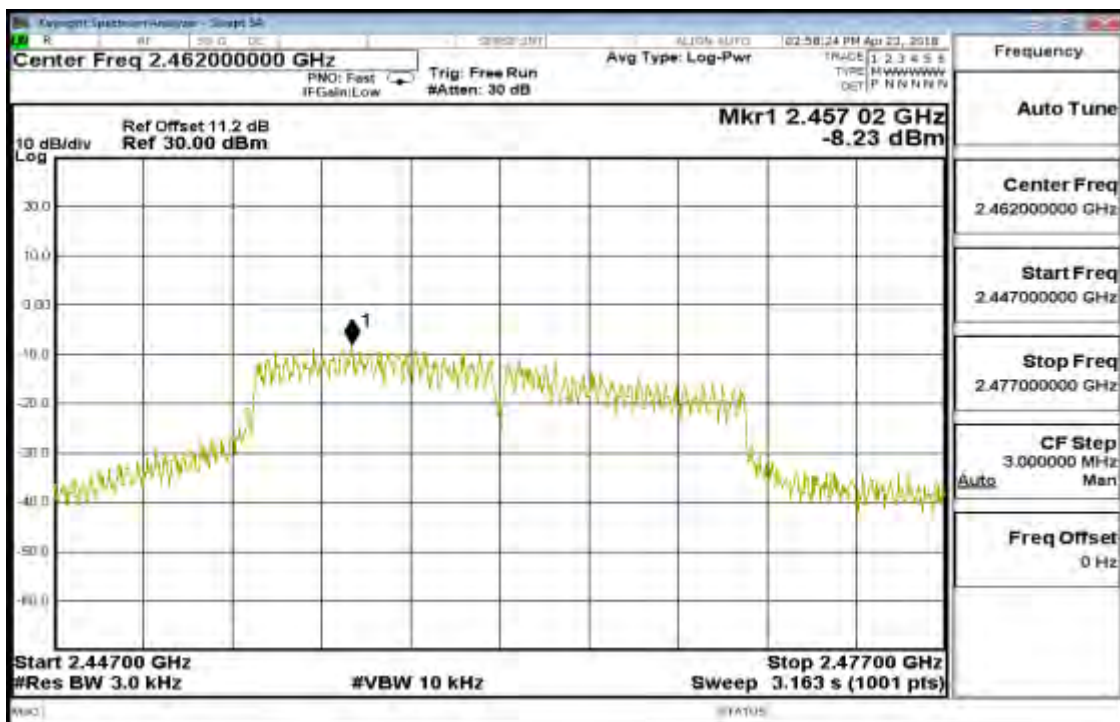
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Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



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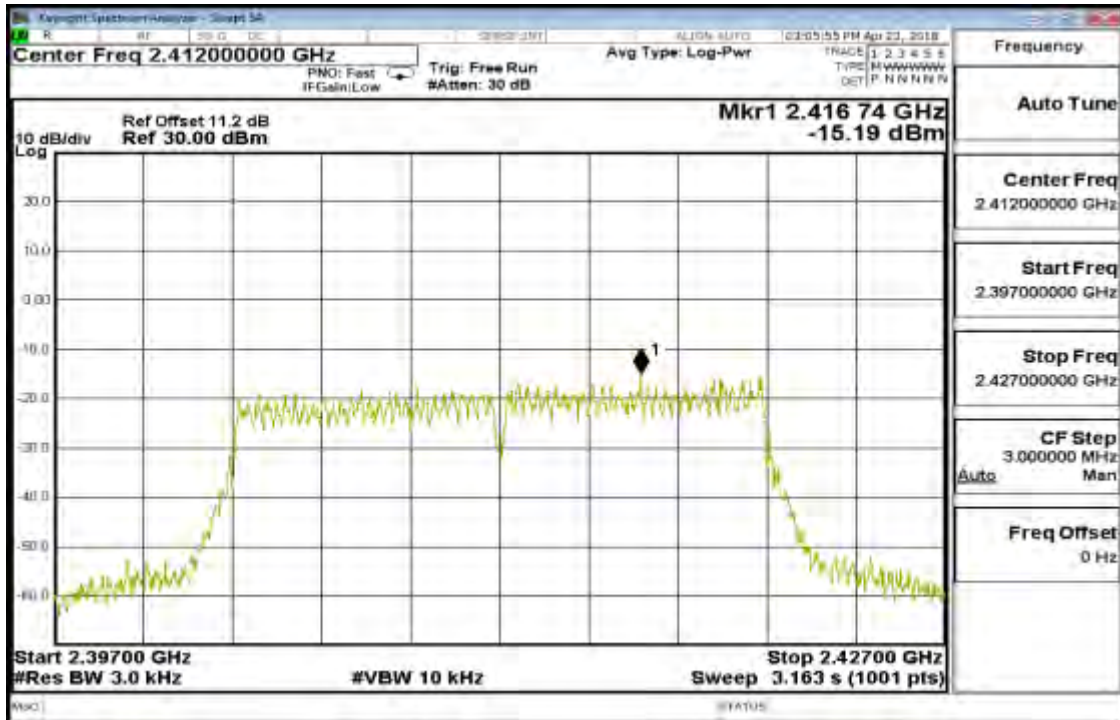
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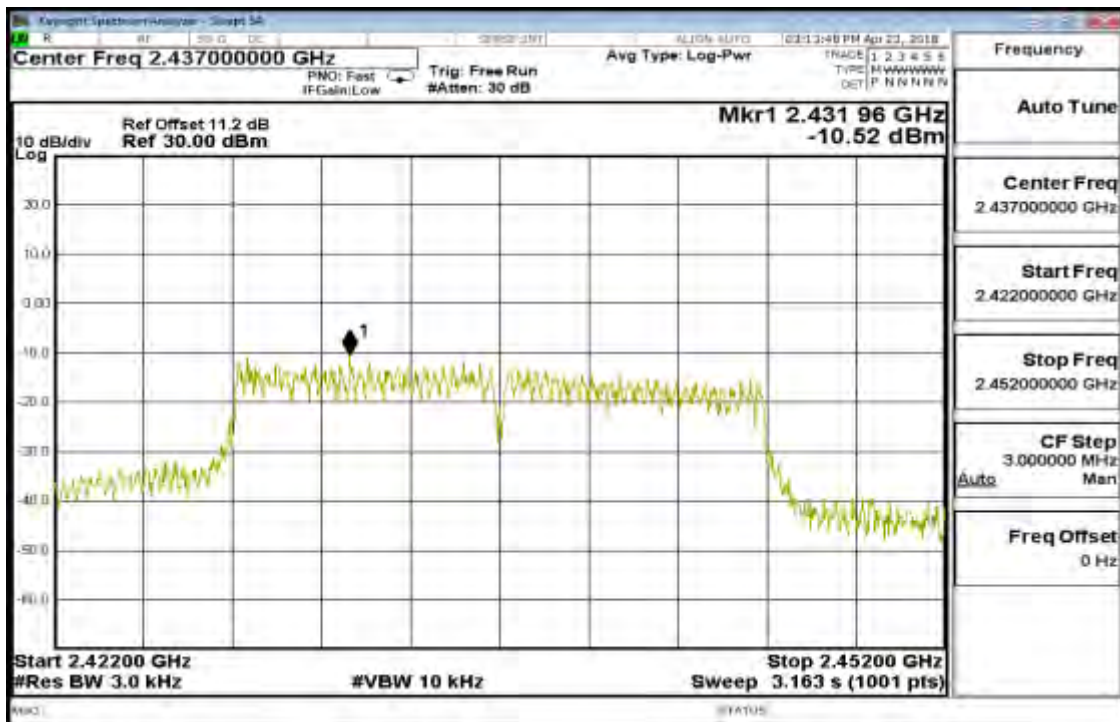
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802.11n_HT20

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



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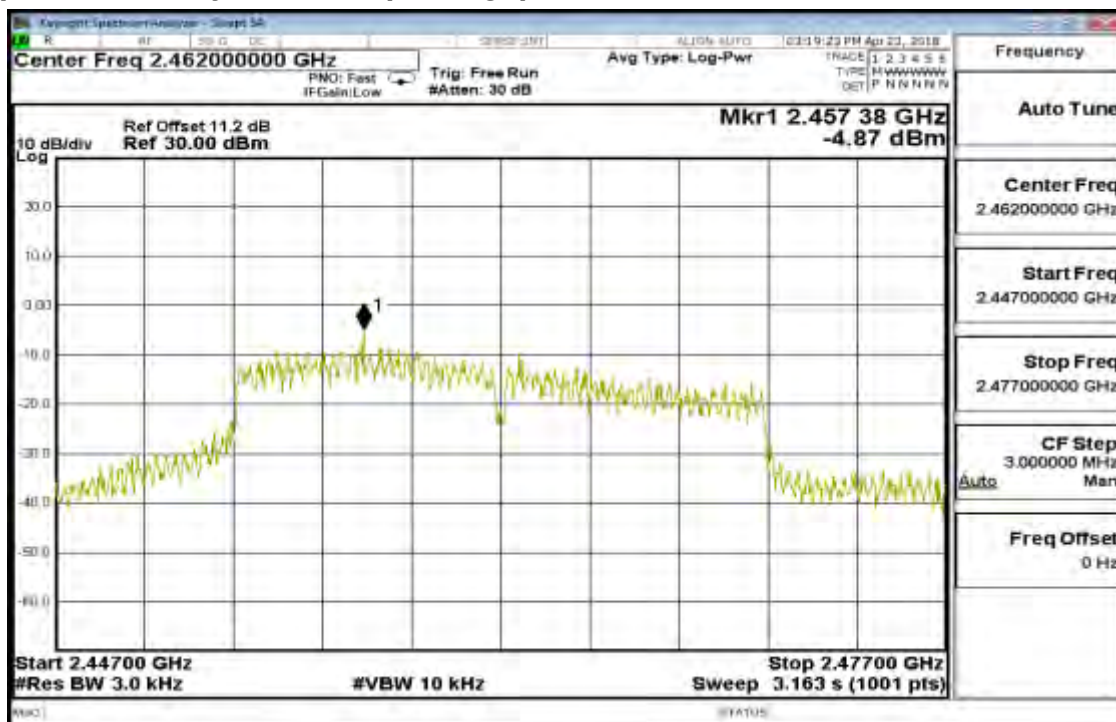
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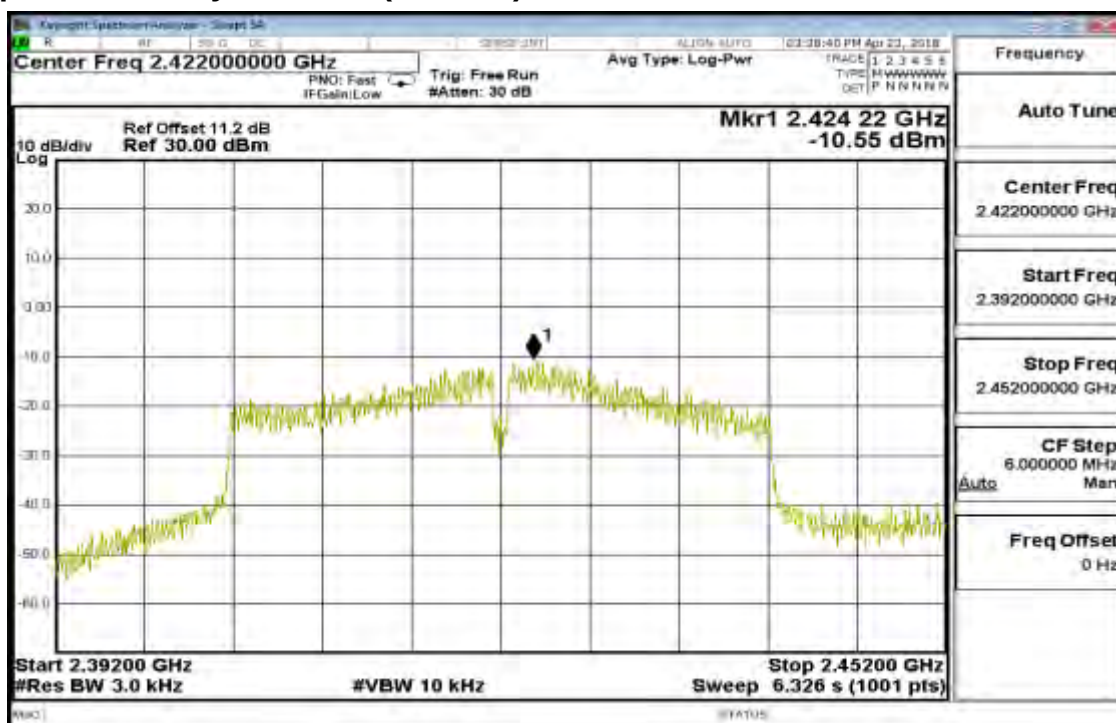
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Power Spectral Density Test Plot (CH-High)



802.11n_HT40

Power Spectral Density Test Plot (CH-Low)



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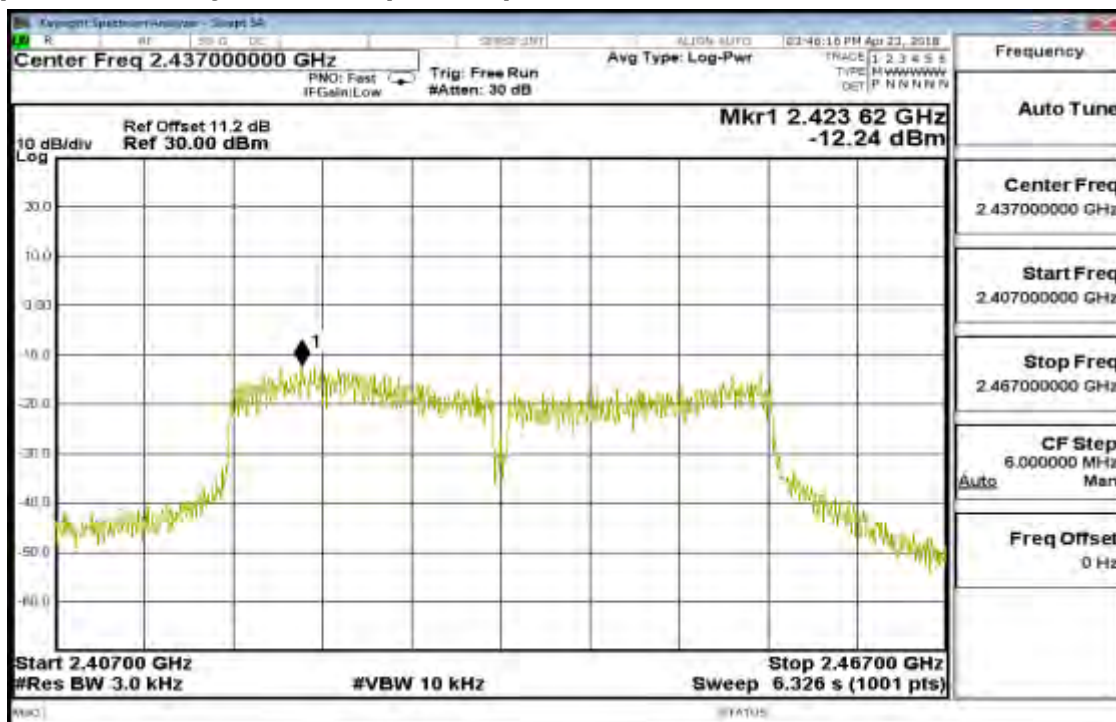
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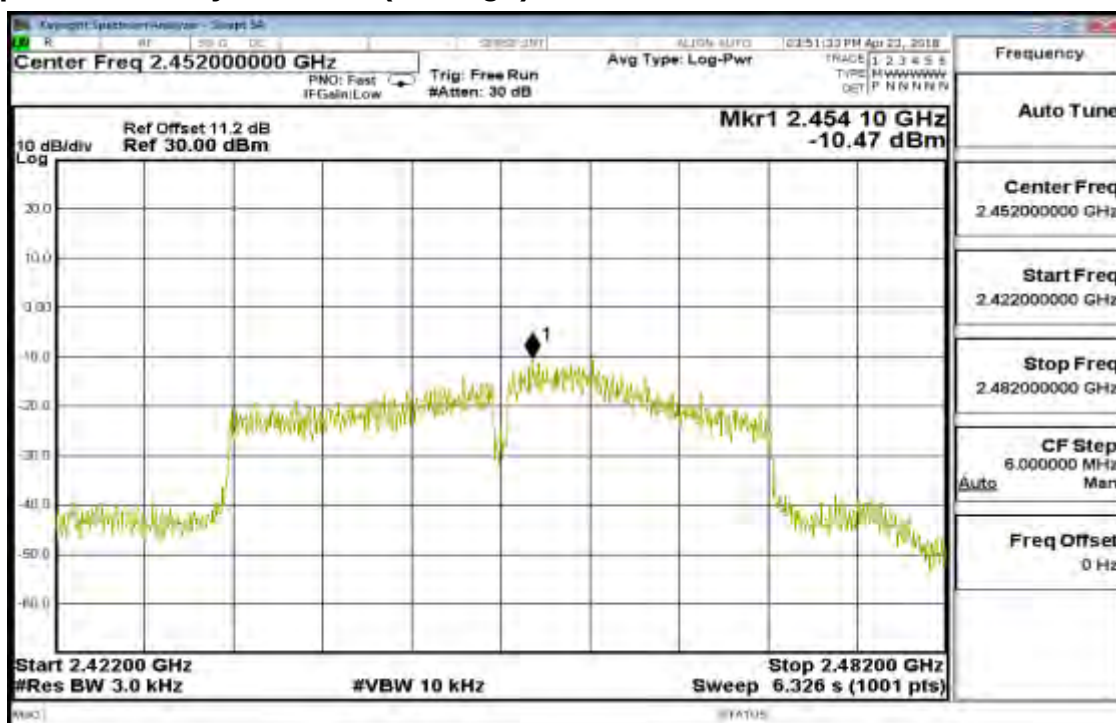
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Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



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13 ANTENNA REQUIREMENT

13.1 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.

13.2 Antenna Connected Construction

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

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