

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT AND INDUSTRY CANADA RSS 247

OF

**Applicant:** Quanta Computer Inc.  
No. 188, Wenhua 2nd Road, Guishan District, Taoyuan City 33377,  
Taiwan

**Product Name:** Clover Mini

**Brand Name:** clover

**Model No.:** C302U

**Model Difference:** N/A

**FCC ID:** HFS-C302U

**IC:** 1787B-C302U

**Report Number:** E2/2018/80006

**FCC Rule Part:** §15.247, Cat: DTS

**IC Rule Part:** RSS-247 issue 2 Feb 2017

**Issue Date:** Sep. 10, 2018

**Date of Test:** Aug. 01, 2018~ Aug. 29, 2018

**Date of EUT Received:** Aug. 01, 2018

**We hereby certify that:**

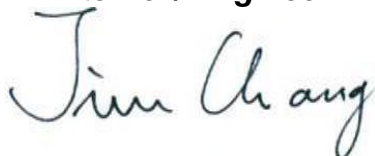
The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested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



**Vito Pei / Engineer**

**Approved By:**



**Jim Chang / Manager**



Testing Laboratory

0513

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## Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
E2/2018/80006	Rev.00	Initial creation of document	All	Sep. 10, 2018	Stefanie Yu

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## Table of Contents

1	GENERAL INFORMATION .....	4
2	SYSTEM TEST CONFIGURATION.....	7
3	SUMMARY OF TEST RESULTS.....	9
4	DESCRIPTION OF TEST MODES.....	9
5	MEASUREMENT UNCERTAINTY .....	12
6	CONDUCTED EMISSION TEST.....	13
7	DUTY CYCLE OF TEST SIGNAL .....	17
8	PEAK OUTPUT POWER MEASUREMENT .....	20
9	6dB & 99% BANDWIDTH MEASUREMENT.....	28
10	CONDUCTED BAND EDGE AND SPURIOUS EMISSION MEASUREMENT .....	39
11	RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT.....	52
12	MAXIMUM POWER SPECTRAL DENSITY.....	109
13	ANTENNA REQUIREMENT.....	113
14	MAXIMUM PERMISSIBLE EXPOSURE (MPE).....	114

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# 1 GENERAL INFORMATION

## 1.1 Product description

General:

Product Name:	Clover Mini	
Brand Name:	clover	
Model No.:	C302U	
Model Difference:	N/A	
Product SW/HW version:	N/A / 1.0	
Radio SW/HW version:	N/A / N/A	
Test SW Version:	N/A	
RF power setting in TEST SW:	N/A	
Power Supply:	12V from AC/DC Adapter	
	Adapter:	1. Model No.: FSP040-RHBN3, Supplier: FSP 2. Model No.: FSP040-RHBN2, Supplier: FSP

WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	HT/VHT mode	Rated Power in dBm (Peak)	Rated Power in dBm (EIRP)	Type of Emission	Modulation Technology
802.11b	2412-2462	11	--	18.24	17.54	12M9G1D	OFDM
802.11g			--	21.43	18.59	16M8D1D	
802.11n HT20 / ac VHT20			HT	22.10	21.54	18M1D1D	
802.11n HT40 / ac VHT40	2422-2452	7	HT	24.00	21.53	36M4D1D	

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Antenna Designation:	PIFA Antenna, 1. P/N: LA81FP017-1H , Supplier: Luxshare-ICT Antenna Gain: 2.1 (Main) P/N: LA81FP018-1H, Supplier: Luxshare-ICT Antenna Gain: 0.9dBi (Aux) 2. P/N: GD9320-15-001-R , Supplier: SAA, Antenna Gain: 1.15dBi (Main) P/N:GD9321-15-001-R, Supplier: SAA, Antenna Gain: -0.2dBi (Aux)
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 – 144.4Mbps 802.11 n_40MHz: 13.5 – 300.0Mbps

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## 1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 v05 DTS Meas. Guidance

FCC KDB 662911 D01 Multiple Transmitter Output

Canada RSS-247 issue 2 Feb. 2017

Canada RSS-Gen issue 5 Apr. 2018

ANSI C63.10:2013

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

## 1.3 Test Facility

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

(TAF code 0513)

FCC Registration Numbers are: 735305 / TW0002

Canada Registration Number: 4620A-5 .

## 1.4 Special Accessories

AC Adapter is used while the test is conducted and there is no other accessory attached. This is the worst case condition.

## 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 is configured to operate in a continuous transmission mode. EUT placement and various angles were checked to find worst mode where the emission characteristics are maximized.

### 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 30MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 Radiated Emissions

The EUT is 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 Measurement Results Explanation Example

### For all conducted test items:

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

### Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor. Following shows an offset computation example with cable loss and attenuator.

### Offset:

= RF cable loss (dB)+ attenuation factor(dB) dB =10.6 (dB)

## 2.5 Configuration of Tested System

Fig. 2-1 Radiated & Conducted Emission Configuration

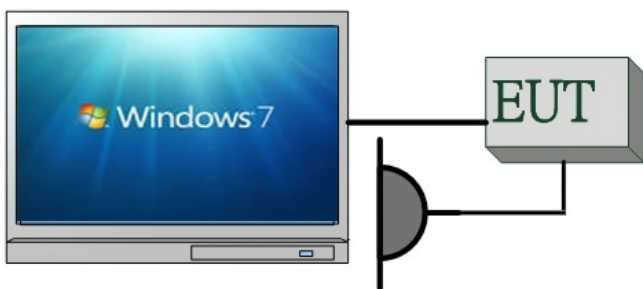


Fig.2-2 Conducted Emission (Antenna Port) Configuration

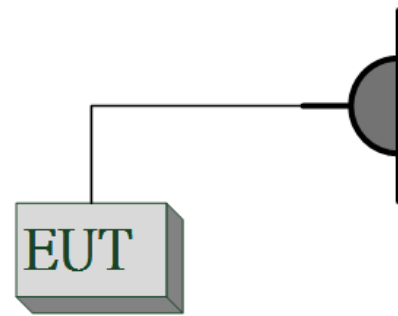


Table 2-1 Equipment Used in Tested System

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
2	Notebook	Lenovo	L420	S0012467	Shielded	Unshielded

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### 3 SUMMARY OF TEST RESULTS

FCC Rules	IC Rules	Description Of Test	Result
§15.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	RSS-247 §5.4(4)	Peak Output Power	Compliant
§15.247(a)(2)	RSS-247 §5.2 (1) RSS-Gen §6.7	6dB & 99% Emission Bandwidth	Compliant
§15.247(d)	RSS-247 §5.5	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d)	RSS-247 §5.5	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e)	RSS-247 §5.2(2)	Power Spectral Density	Compliant
§15.203	RSS- Gen §6.8	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

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

7 channels are provided for 802.11n\_HT40

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

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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.
4. For MIMO modes, the 2TX emission testing was considered as a worst case scenario and was performed at power levels, per transmit chain, greater than or equal to the maximum power in any 1TX mode.
5. Power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.
6. For 802.11n HT and VHT modes, the HT emission testing was considered as a worst case scenario and was performed at power levels, per transmit chain, greater than or equal to the maximum power in any HT mode.

**AC POWER LINE CONDUCTION EMISSION**

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	PACKET TYPE
802.11n 20MHz	Operation in normal mode			

**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	AUX
802.11n HT40	3 to 9	3, 6, 9	OFDM	MCS 8	MIMO

RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 11	1, 6, 11	DSSS	1	AUX
802.11g	1 to 11	1, 6, 11	OFDM	6	AUX
802.11n HT20	1 to 11	1, 6, 11	OFDM	MCS 8	MIMO
802.11n HT40	3 to 9	3, 6, 9	OFDM	MCS 8	MIMO

**Note:**

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

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**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	AUX
802.11g	1 to 11	1, 6, 11	OFDM	6	AUX
802.11n HT20	1 to 11	1, 6, 11	OFDM	MCS 8	MIMO
802.11n HT40	3 to 9	3, 6, 9	OFDM	MCS 8	MIMO

**Directional gain (MIMO)**

The Tx transmission to construct MIMO operation is cyclic delay diversity, and the following deduction to obtain the array gain of MIMO operation is based on the approach given by KDB 662911 D01.

d) *Unequal antenna gains, with equal transmit powers.* For antenna gains given by  $G_1, G_2, \dots, G_N$  dBi

(i) If transmit signals are *correlated*, then

Directional gain =  $10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N_{ANT}]$  dBi [Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

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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 Edge	+/- 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 : <b>Vertical</b> )	9kHz-30MHz: +/-2.87dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

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

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

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## 6 CONDUCTED EMISSION TEST

### 6.1 Standard Applicable

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

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

Note

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

### 6.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
LISN	TESEQ	NNB 51	36076	2018/02/14	2019/2/13
EMI Test Receiver	R&S	ESCI	101300	2017/11/02	2018/11/1

### 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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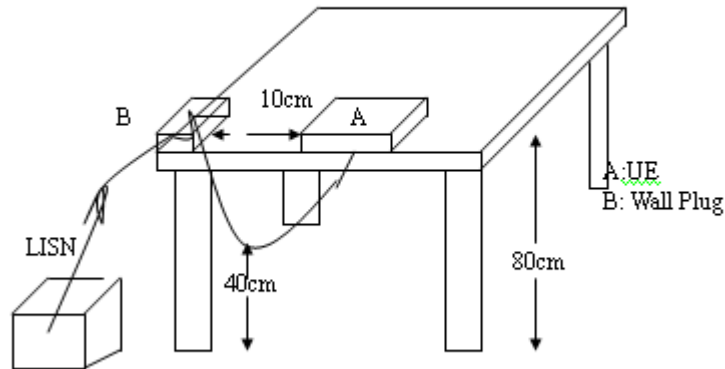
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### 6.4 Test SET-UP (Block Diagram of Configuration)



### 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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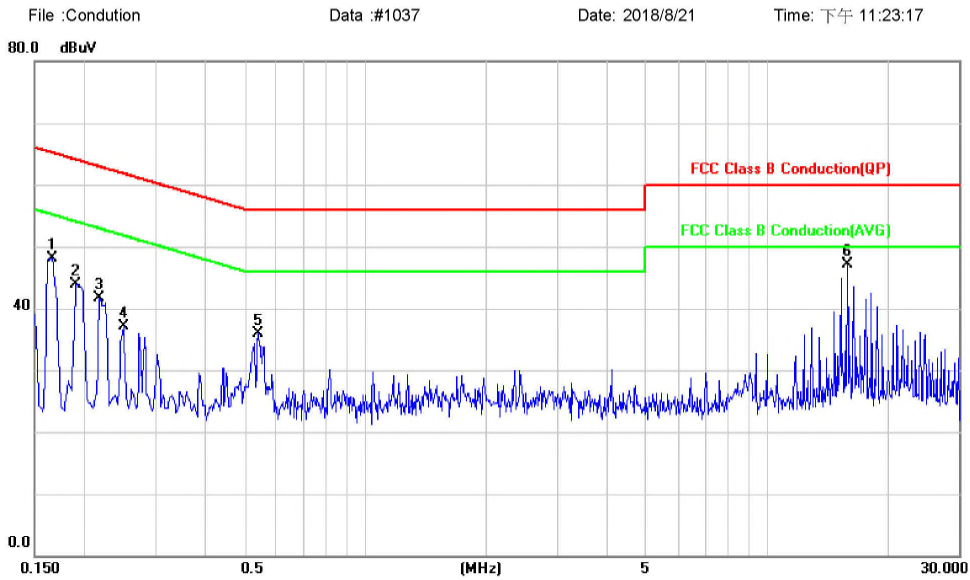
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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode: operation mode	Test By: Jerry
--------------------------------	----------------

Site : Conduction Room	Phase: <b>L1</b>	Temperature: 23 °C
Limit: FCC Class B Conduction(QP)	Power: AC 120V/60Hz	Humidity: 69 %
Mode:		
Note:		

### Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1660	28.49	19.68	48.17	65.16	-16.99	peak	
2		0.1900	24.25	19.72	43.97	64.04	-20.07	peak	
3		0.2180	21.86	19.77	41.63	62.89	-21.26	peak	
4		0.2500	17.30	19.82	37.12	61.76	-24.64	peak	
5		0.5420	15.69	20.20	35.89	56.00	-20.11	peak	
6 *		15.8580	27.09	19.99	47.08	60.00	-12.92	peak	

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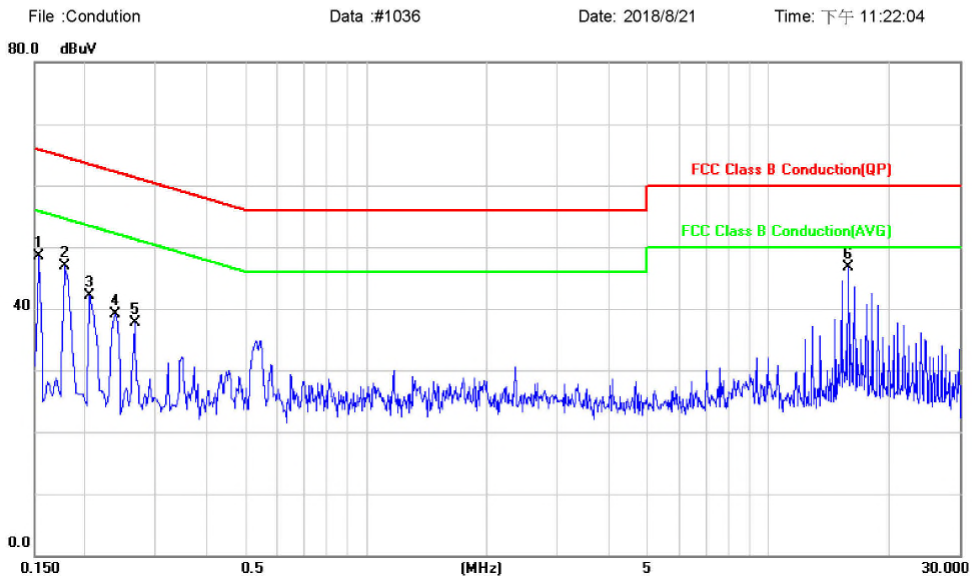
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Site : Conduction Room Phase: **N** Temperature: 23 °C  
 Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 69 %  
 Mode:  
 Note:

**Conducted Emission**



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1540	28.93	19.65	48.58	65.78	-17.20	peak	
2		0.1780	27.23	19.69	46.92	64.58	-17.66	peak	
3		0.2060	22.38	19.73	42.11	63.37	-21.26	peak	
4		0.2380	19.23	19.78	39.01	62.17	-23.16	peak	
5		0.2660	17.95	19.83	37.78	61.24	-23.46	peak	
6 *		15.8540	26.77	20.01	46.78	60.00	-13.22	peak	

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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	99.20	0.03	1.01	2.00
802.11g	95.42	0.20	1.05	2.00
802.11n_20	90.86	0.42	1.10	2.00
802.11n_40	85.24	0.69	1.17	2.00

$$b = 99.2\%, g = 95.42\%, n_{ht\_20} = 90.86\%$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.992) = 0.03$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9542) = 0.2$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9086) = 0.42$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.8524) = 0.69$$

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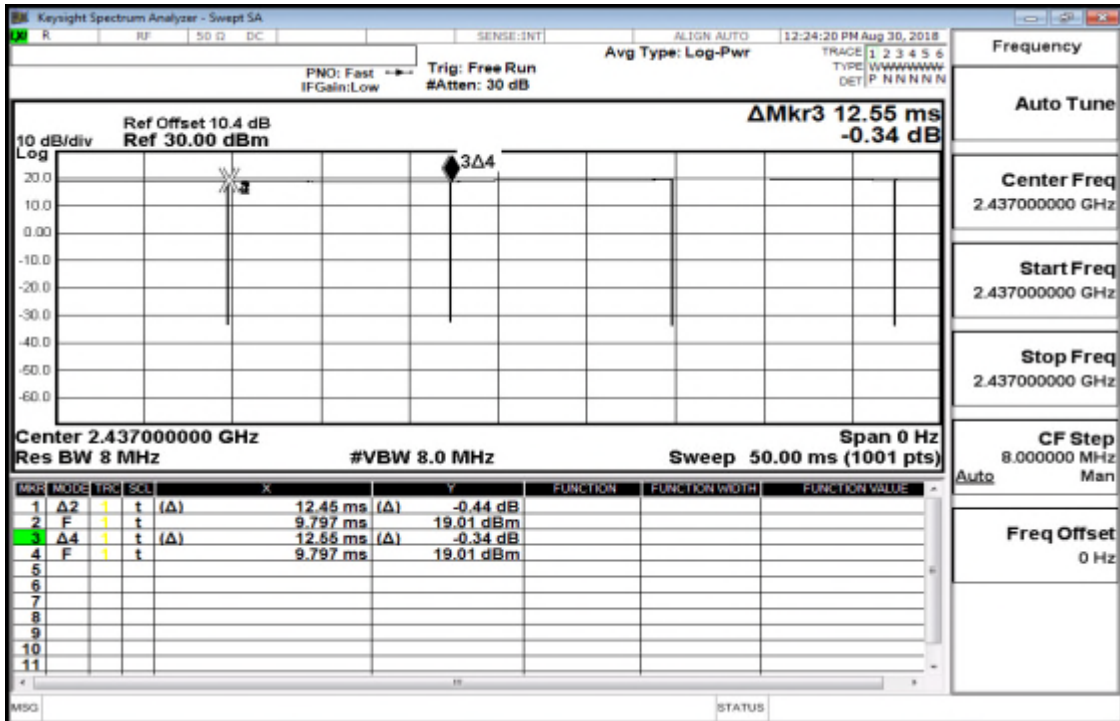
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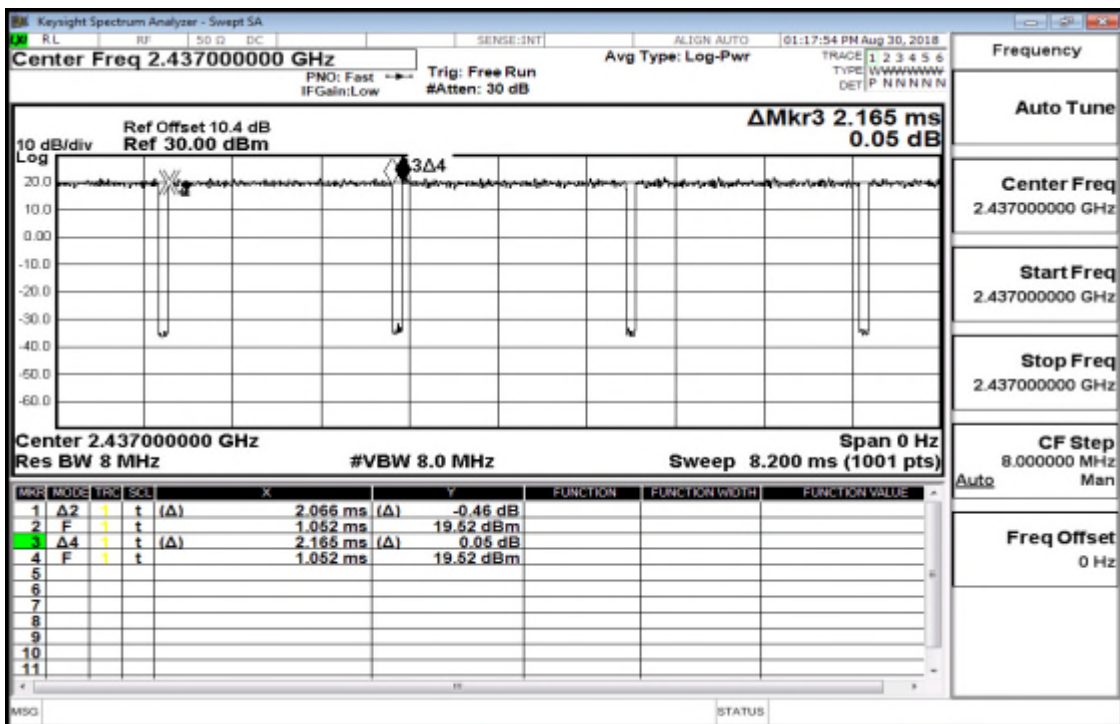
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### 7.1 DUTY CYCLE TEST SIGNAL Measurement Result

802.11 b



802.11 g

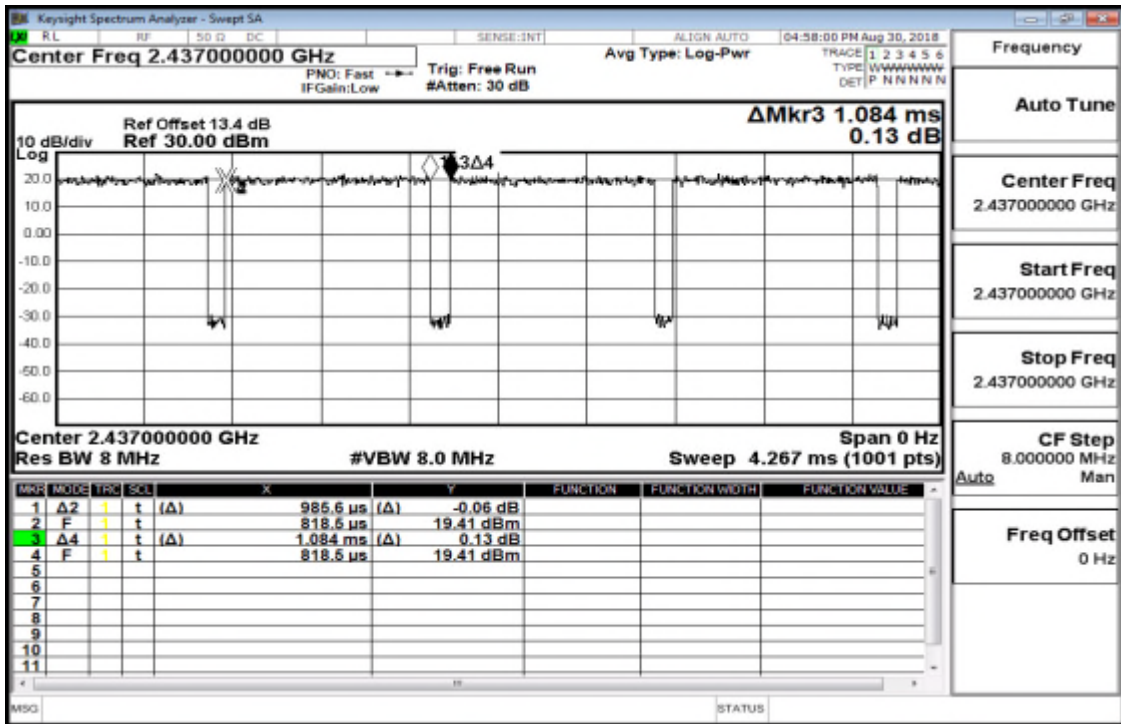


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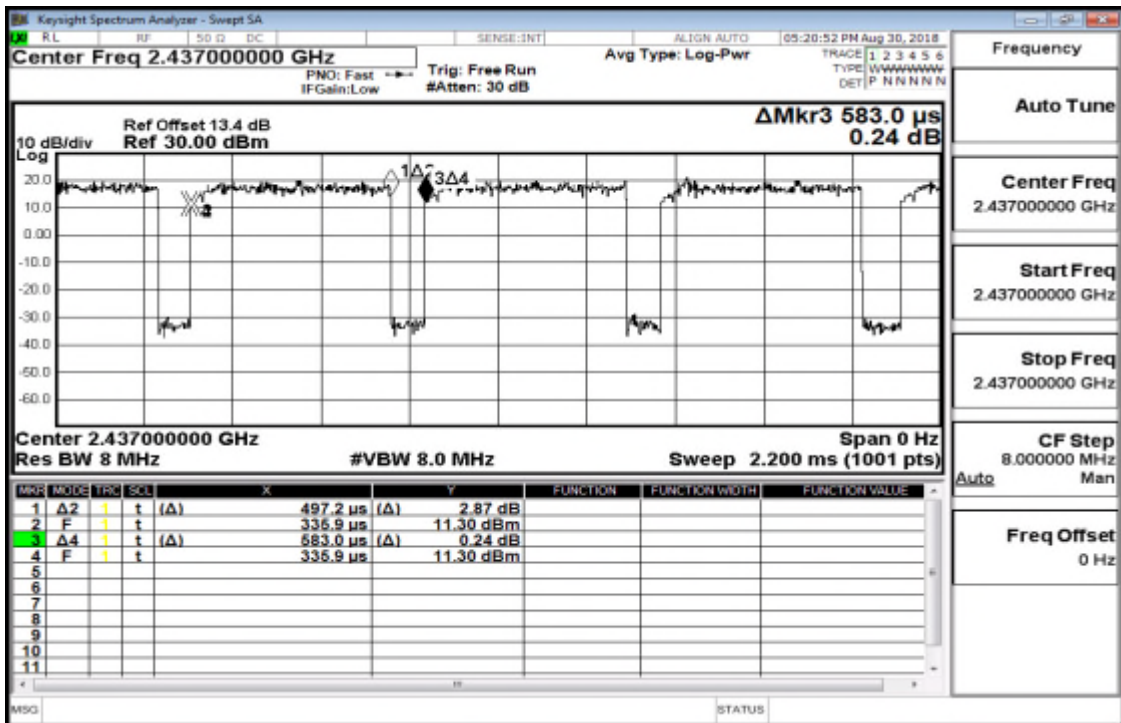
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802.11 n\_20 MHz



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.

Per RSS-247 §5.4(4)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the e.i.r.p. shall not exceed 4 W.

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.

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;

Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

Frequency (MHz)	Effective Legacy Gain (dBi)	Conducted Power Limit (dBm)
2412~2462	4.55	30

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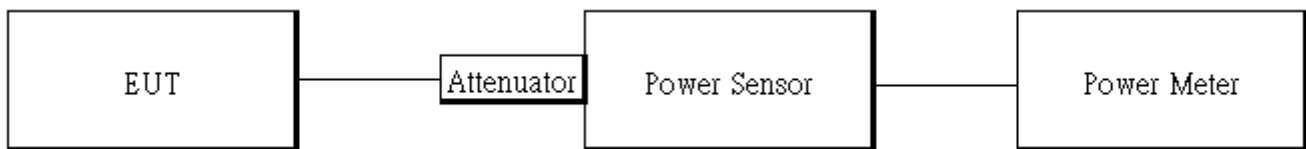
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## 8.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2496A	1326001	2018/08/09	2019/8/2
Power Sensor	Anritsu	MA2411B	1315048	2018/08/09	2019/8/2
Power Sensor	Anritsu	MA2411B	1315049	2018/08/09	2019/8/2
Notebook	Lenovo	L430	P0000195	N/A	N/A
Spectrum Analyzer	Agilent	N9010A	MY53400256	2017/10/30	2018/10/29
DC Block	PASTERNACK	PE8210	RF81	2017/12/26	2018/12/25
Notebook	Lenovo	L430	P0000195	N/A	N/A

## 8.3 Test Set-up

Power Meter:



## 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.

Note: The reported CH0 and CH1 power values in the 2Tx and MIMO tables were measured when performing additional measurements and all reported values are within compliance.

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## 8.5 Measurement Result

802.11b Main					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
1	2412	1	18.05	1 Watt = 30.00 dBm	PASS
6	2437	1	18.19	1 Watt = 30.00 dBm	PASS
11	2462	1	18.10	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	15.40	1 Watt = 30.00 dBm	PASS
6	2437	1	<b>15.44</b>	1 Watt = 30.00 dBm	PASS
11	2462	1	15.35	1 Watt = 30.00 dBm	PASS
802.11b Aux1					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
1	2412	1	18.11	1 Watt = 30.00 dBm	PASS
6	2437	1	17.95	1 Watt = 30.00 dBm	PASS
11	2462	1	<b>18.24</b>	1 Watt = 30.00 dBm	PASS
802.11b Aux1					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
1	2412	1	15.16	1 Watt = 30.00 dBm	PASS
6	2437	1	15.08	1 Watt = 30.00 dBm	PASS
11	2462	1	15.37	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	21.38	1 Watt = 30.00 dBm	PASS
6	2437	6	<b>21.43</b>	1 Watt = 30.00 dBm	PASS
11	2462	6	21.33	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	16.47	1 Watt = 30.00 dBm	PASS
6	2437	6	<b>16.49</b>	1 Watt = 30.00 dBm	PASS
11	2462	6	16.44	1 Watt = 30.00 dBm	PASS
802.11g Aux1					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
1	2412	6	21.16	1 Watt = 30.00 dBm	PASS
6	2437	6	21.22	1 Watt = 30.00 dBm	PASS
11	2462	6	21.13	1 Watt = 30.00 dBm	PASS
802.11g Aux1					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
1	2412	6	16.42	1 Watt = 30.00 dBm	PASS
6	2437	6	16.46	1 Watt = 30.00 dBm	PASS
11	2462	6	16.41	1 Watt = 30.00 dBm	PASS

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802.11n_HT20M Main					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
1	2412	MCS0	18.56	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	18.80	1 Watt = 30.00 dBm	PASS
11	2462	MCS0	18.76	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	13.84	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	<b>13.99</b>	1 Watt = 30.00 dBm	PASS
11	2462	MCS0	13.88	1 Watt = 30.00 dBm	PASS
802.11n_HT20M Aux1					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
1	2412	MCS0	19.67	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	<b>19.76</b>	1 Watt = 30.00 dBm	PASS
11	2462	MCS0	19.68	1 Watt = 30.00 dBm	PASS
802.11n_HT20M Aux1					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
1	2412	MCS0	13.76	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	13.95	1 Watt = 30.00 dBm	PASS
11	2462	MCS0	13.83	1 Watt = 30.00 dBm	PASS

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802.11n_HT20M MIMO								
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Total Peak Output Power (mW)	Limit	RESULT
			CH 0	CH 1				
1	2412	MCS8	18.90	18.61	21.77	150.24	1 Watt = 30.00 dBm	PASS
6	2437	MCS8	19.37	18.78	22.10	162.01	1 Watt = 30.00 dBm	PASS
11	2462	MCS8	19.23	18.38	21.84	152.62	1 Watt = 30.00 dBm	PASS

802.11n_HT20M MIMO								
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Max. Avg. Output include tune up tolerance Power (mW)	Limit	RESULT
			CH 0	CH 1				
1	2412	MCS8	14.03	13.40	16.95	49.60	1 Watt = 30.00 dBm	PASS
6	2437	MCS8	14.08	13.42	<b>16.99</b>	50.02	1 Watt = 30.00 dBm	PASS
11	2462	MCS8	14.02	13.34	16.92	49.22	1 Watt = 30.00 dBm	PASS

802.11n_HT40M Main					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
3	2422	MCS0	19.91	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	20.01	1 Watt = 30.00 dBm	PASS
9	2452	MCS0	20.37	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	<b>13.98</b>	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	13.96	1 Watt = 30.00 dBm	PASS
9	2452	MCS0	13.91	1 Watt = 30.00 dBm	PASS

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802.11n_HT40M Aux1					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
3	2422	MCS0	21.55	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	21.34	1 Watt = 30.00 dBm	PASS
9	2452	MCS0	21.38	1 Watt = 30.00 dBm	PASS
802.11n_HT40M Aux1					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
3	2422	MCS0	13.94	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	13.93	1 Watt = 30.00 dBm	PASS
9	2452	MCS0	13.79	1 Watt = 30.00 dBm	PASS

802.11n_HT40M MIMO								
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Total Peak Output Power (mW)	Limit	RESULT
			CH 0	CH 1				
3	2422	MCS8	21.04	20.32	23.71	234.70	1 Watt = 30.00 dBm	PASS
6	2437	MCS8	21.31	20.65	24.00	251.35	1 Watt = 30.00 dBm	PASS
9	2452	MCS8	21.23	20.59	23.93	247.29	1 Watt = 30.00 dBm	PASS
802.11n_HT40M MIMO								
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Max. Avg. Output include tune up tolerance Power (mW)	Limit	RESULT
			CH 0	CH 1				
3	2422	MCS8	14.49	12.28	16.98	49.86	1 Watt = 30.00 dBm	PASS
6	2437	MCS8	14.45	12.36	16.98	49.92	1 Watt = 30.00 dBm	PASS
9	2452	MCS8	14.40	12.16	16.88	48.71	1 Watt = 30.00 dBm	PASS

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

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**EIRP**

802.11b Main							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit	RESULT
1	2412	1	15.40	2.10	17.50	4W= 36 dBm	PASS
6	2437	1	15.44	2.10	17.54	4W= 36 dBm	PASS
11	2462	1	15.35	2.10	17.45	4W= 36 dBm	PASS
802.11g Main							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit	RESULT
1	2412	6	16.47	2.10	18.57	4W= 36 dBm	PASS
6	2437	6	16.49	2.10	18.59	4W= 36 dBm	PASS
11	2462	6	16.44	2.10	18.54	4W= 36 dBm	PASS

**802.11n\_HT20M MIMO**

CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Avg. Output Power (dBm)	Total Peak Output Power (mW)	Antenna Gain (dBi)	EIRP (dBm)	Limit	RESULT
			CH 0	CH 1						
1	2412	MCS8	14.03	13.40	16.95	49.60	4.55	21.51	4W= 36 dBm	PASS
6	2437	MCS8	14.08	13.42	16.99	50.02	4.55	21.54	4W= 36 dBm	PASS
11	2462	MCS8	14.02	13.34	16.92	49.22	4.55	21.47	4W= 36 dBm	PASS

**802.11n\_HT40M MIMO**

CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Avg. Output Power (dBm)	Total Peak Output Power (mW)	Antenna Gain (dBi)	EIRP (dBm)	Limit	RESULT
			CH 0	CH 1						
3	2422	MCS8	14.49	12.28	16.98	49.86	4.55	21.53	4W= 36 dBm	PASS
6	2437	MCS8	14.45	12.36	16.98	49.92	4.55	21.53	4W= 36 dBm	PASS
9	2452	MCS8	14.40	12.16	16.88	48.71	4.55	21.43	4W= 36 dBm	PASS

\* **Note:** EIRP = Average Power + Gain

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## 9 6DB & 99% BANDWIDTH MEASUREMENT

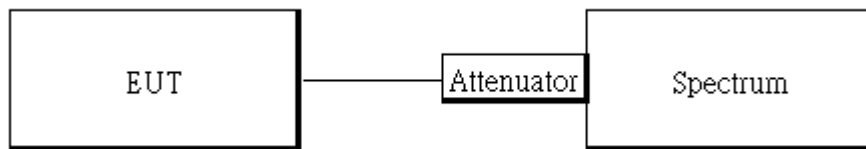
### 9.1 Standard Applicable

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	MY53400256	2017/10/30	2018/10/29
DC Block	PASTERNAK	PE8210	RF81	2017/12/26	2018/12/25
Notebook	Lenovo	L430	P0000195	N/A	N/A

### 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=Peak, 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	Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	<b>8.074</b>	> 500	PASS	2412	<b>8.073</b>	> 500	PASS
2437	7.115	> 500	PASS	2437	7.113	> 500	PASS
2462	8.068	> 500	PASS	2462	8.067	> 500	PASS

#### 802.11b Aux1

#### 802.11g Main

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result	Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	<b>15.46</b>	> 500	PASS	2412	<b>16.485</b>	> 500	PASS
2437	15.37	> 500	PASS	2437	16.424	> 500	PASS
2462	15.18	> 500	PASS	2462	16.448	> 500	PASS

#### 802.11g Aux1

#### 802.11\_n\_HT20 Main

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result	Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	<b>15.75</b>	> 500	PASS	2412	<b>16.35</b>	> 500	PASS
2437	15.73	> 500	PASS	2437	15.73	> 500	PASS
2462	15.50	> 500	PASS	2462	15.49	> 500	PASS

#### 802.11\_n\_HT20 Aux1

#### 802.11\_n\_HT40 Main

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result	Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	35.16	> 500	PASS	2422	35.16	> 500	PASS
2437	35.16	> 500	PASS	2437	35.17	> 500	PASS
2452	<b>35.76</b>	> 500	PASS	2452	<b>35.75</b>	> 500	PASS

#### 802.11\_n\_HT40 Aux1

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## 99% Bandwidth

802.11b Main		802.11b Aux1	
Freq. (MHz)	99% BW (MHz)	Freq. (MHz)	99% BW (MHz)
2412	12.876	2412	12.866
2437	12.815	2437	12.808
2462	<b>12.893</b>	2462	<b>12.886</b>

802.11g Main		802.11g Aux1	
Freq. (MHz)	99% BW (MHz)	Freq. (MHz)	99% BW (MHz)
2412	<b>16.826</b>	2412	<b>16.810</b>
2437	16.697	2437	16.706
2462	16.775	2462	16.741

802.11n_HT20M Main		802.11n_HT20M Aux1	
Freq. (MHz)	99% BW (MHz)	Freq. (MHz)	99% BW (MHz)
2412	<b>18.015</b>	2412	<b>18.051</b>
2437	17.859	2437	17.880
2462	17.907	2462	17.096

802.11n_HT40M Main		802.11n_HT40M Aux1	
Freq. (MHz)	99% BW (MHz)	Freq. (MHz)	99% BW (MHz)
2422	36.193	2422	36.188
2437	36.113	2437	36.184
2452	<b>36.350</b>	2452	<b>36.346</b>

*\*Refer to next page for plots*

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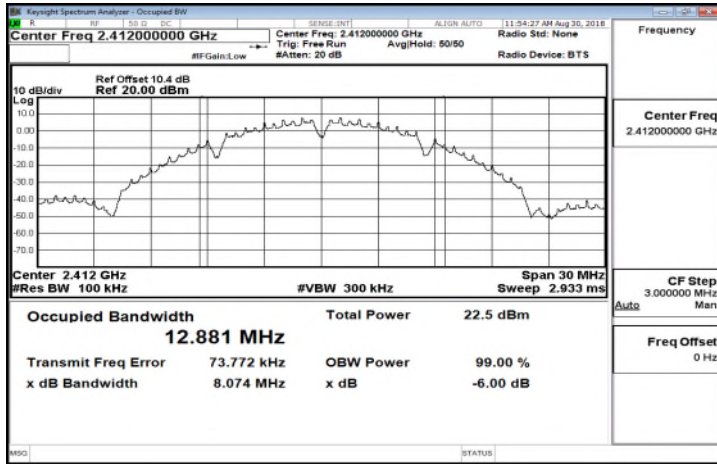
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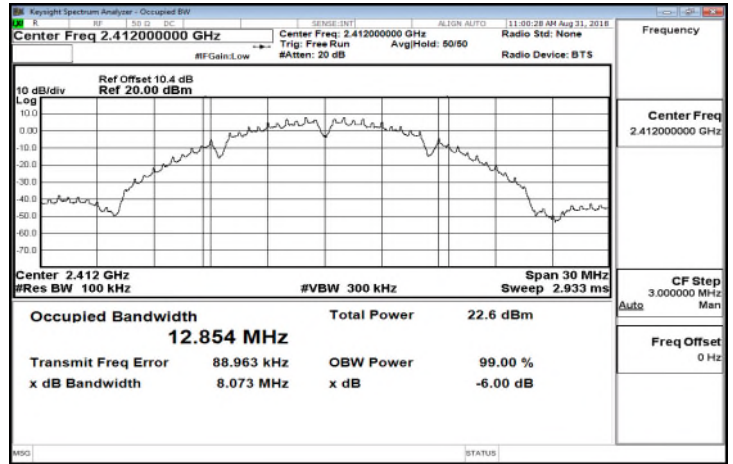
802.11b (CH0)

6dB Band Width Test Data CH-Low

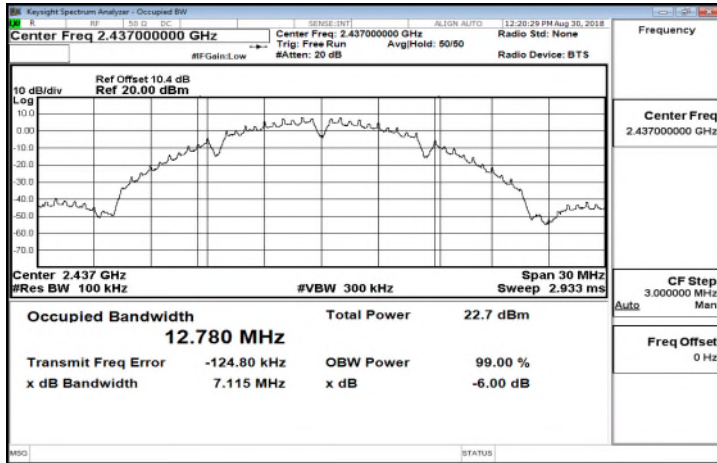


802.11b (CH1)

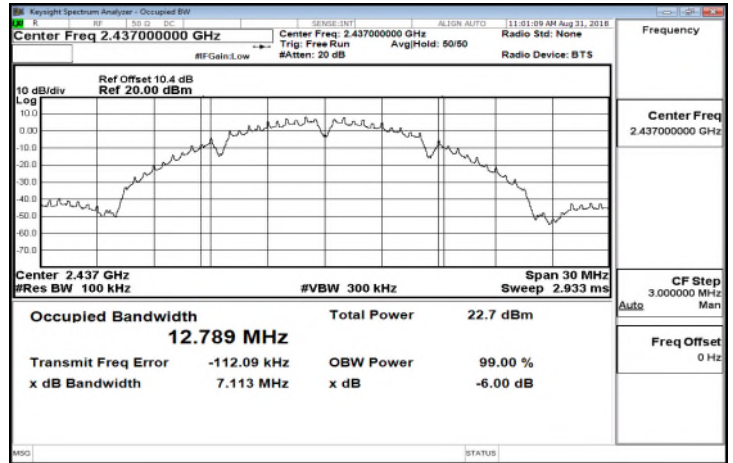
6dB Band Width Test Data CH-Low



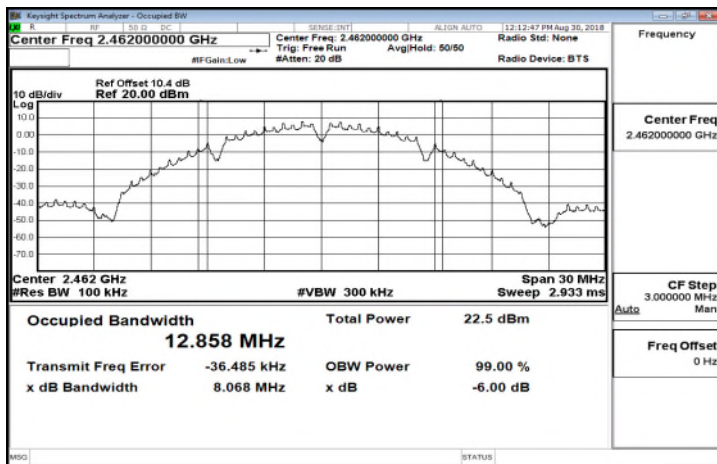
6dB Band Width Test Data CH-Mid



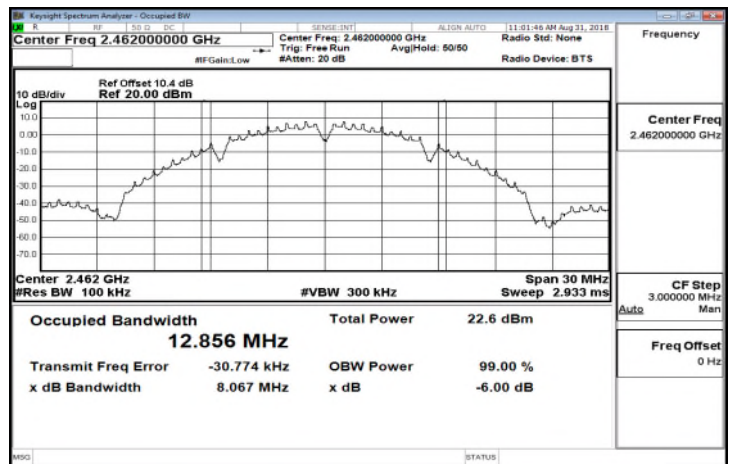
6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



6dB Band Width Test Data CH-High

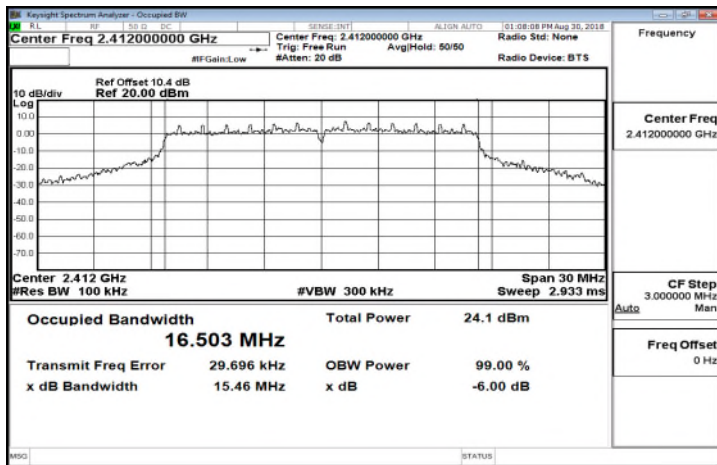


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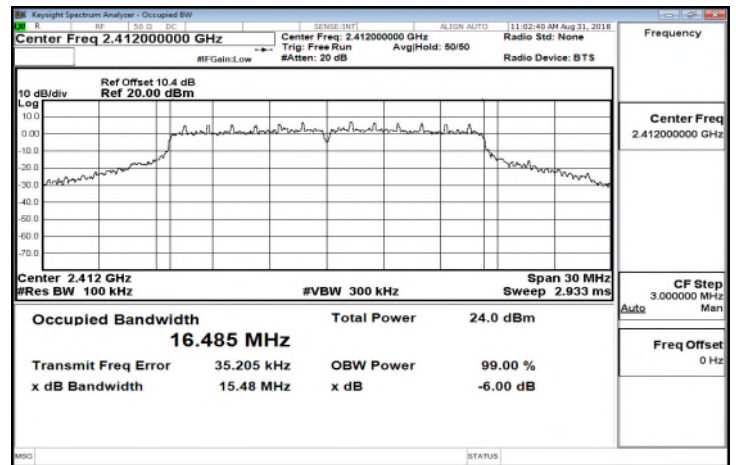
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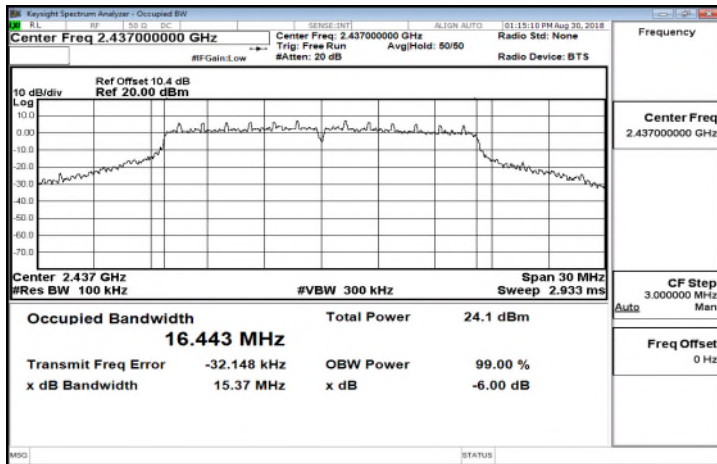
802.11g (CH0)  
6dB Band Width Test Data CH-Low



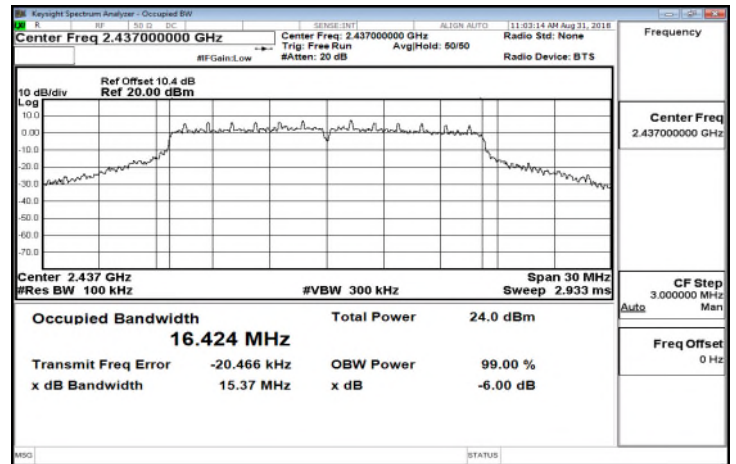
802.11g (CH1)  
6dB Band Width Test Data CH-Low



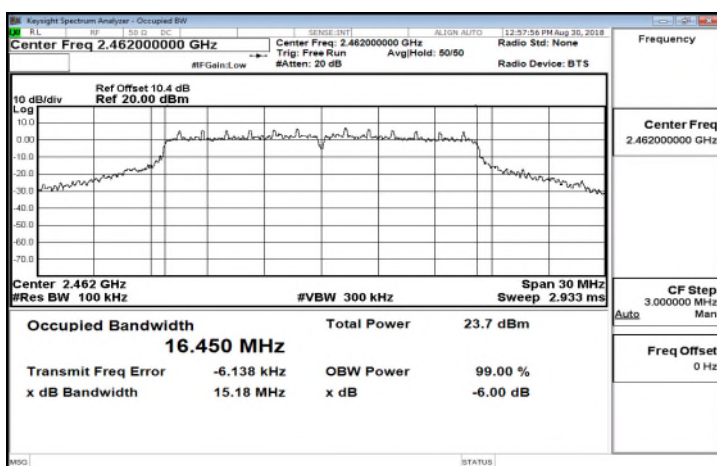
6dB Band Width Test Data CH-Mid



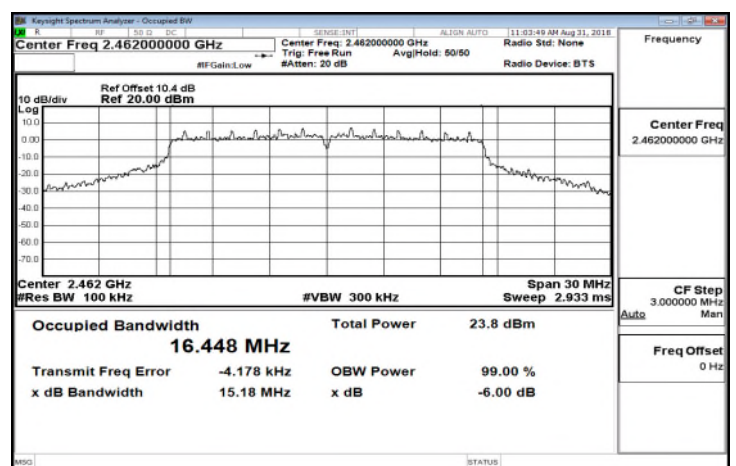
6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



6dB Band Width Test Data CH-High



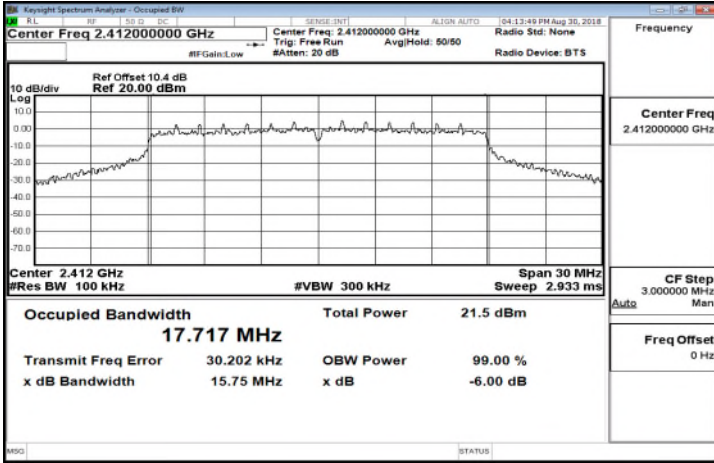
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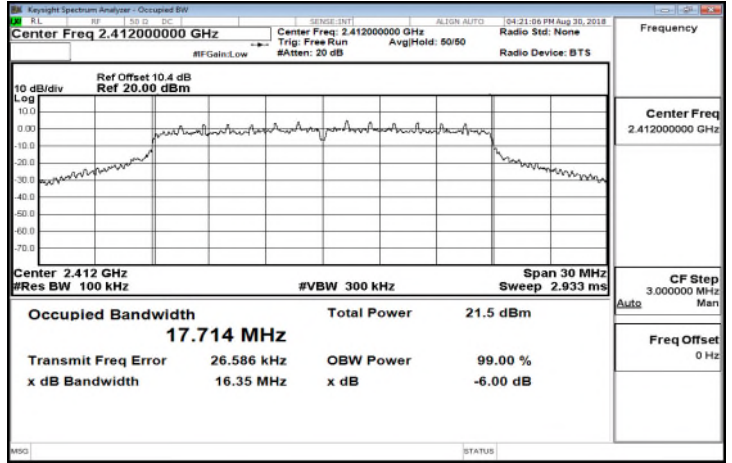
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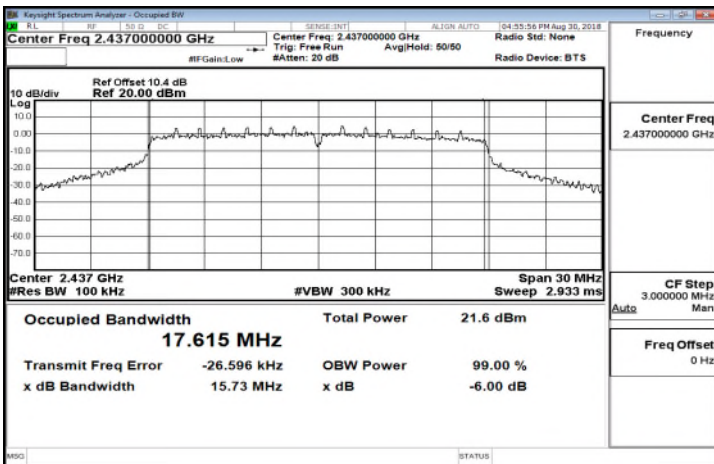
802.11n\_20M (CH0)  
6dB Band Width Test Data CH-Low



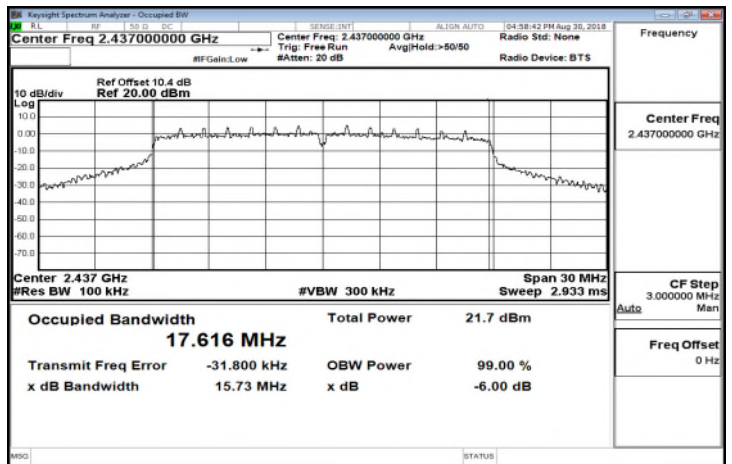
802.11n\_20M (CH1)  
6dB Band Width Test Data CH-Low



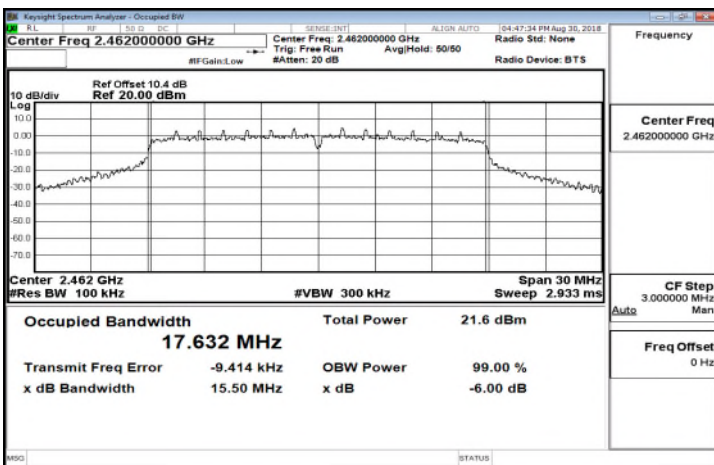
6dB Band Width Test Data CH-Mid



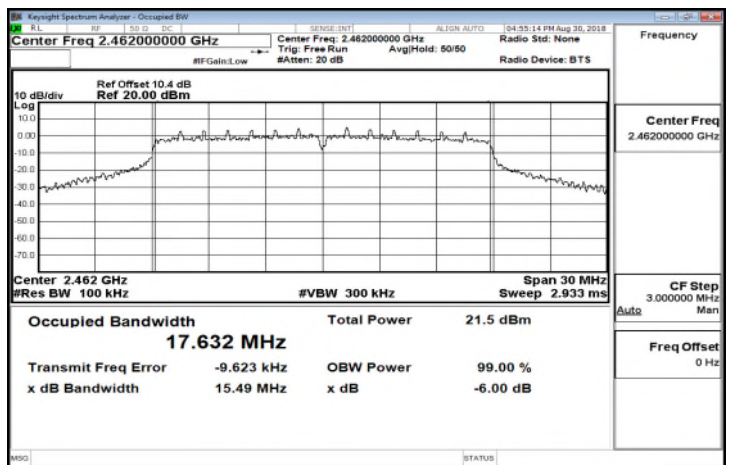
6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



6dB Band Width Test Data CH-High

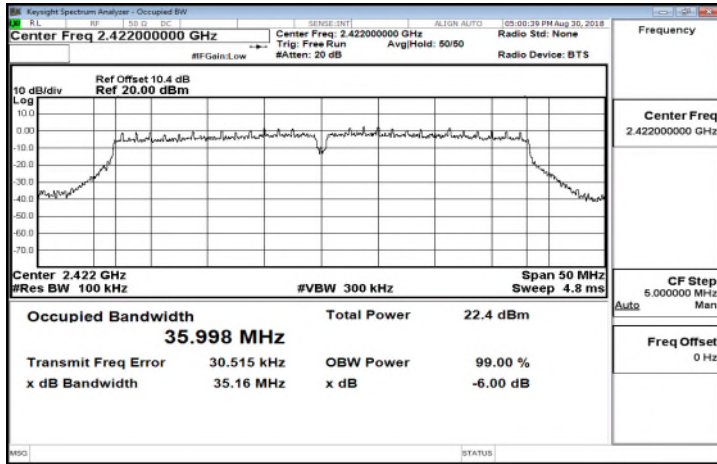


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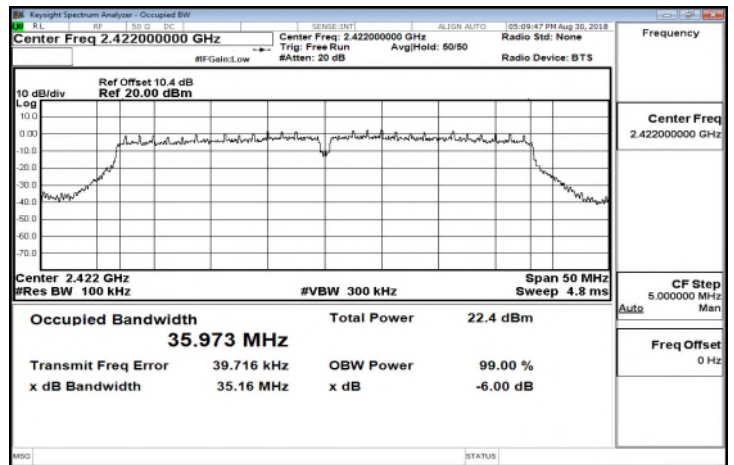
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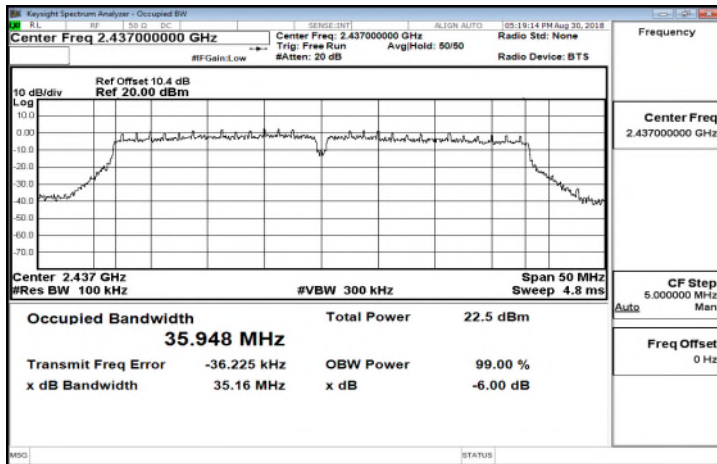
802.11n\_40M (CH0)  
6dB Band Width Test Data CH-Low



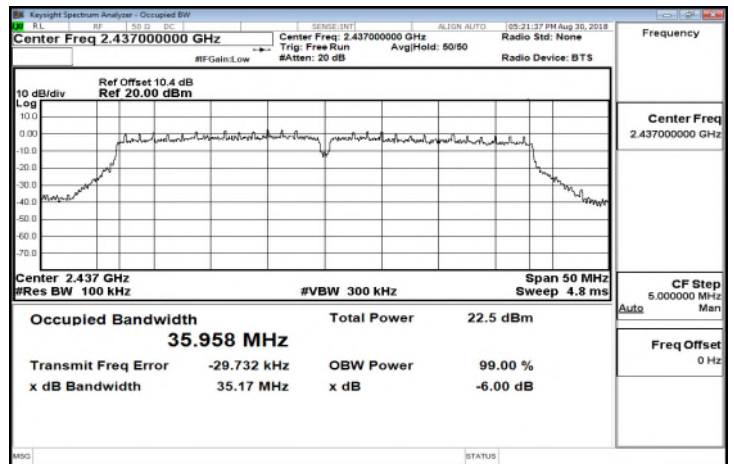
802.11n\_40M (CH1)  
6dB Band Width Test Data CH-Low



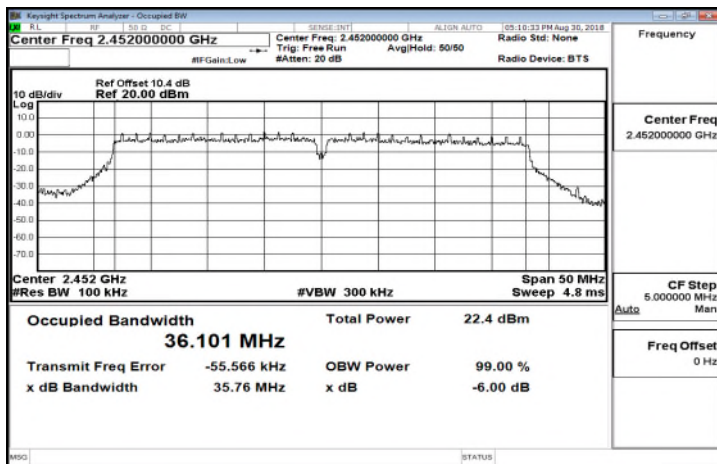
6dB Band Width Test Data CH-Mid



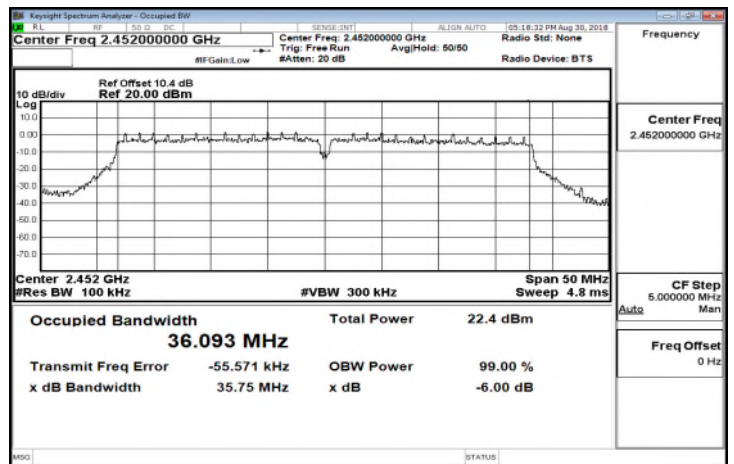
6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



6dB Band Width Test Data CH-High



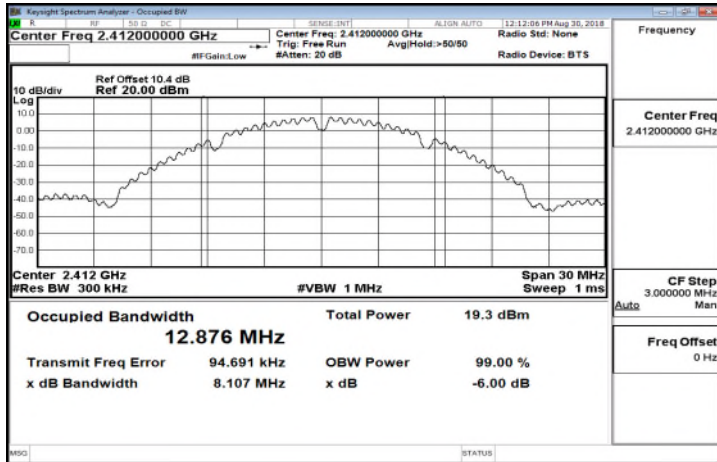
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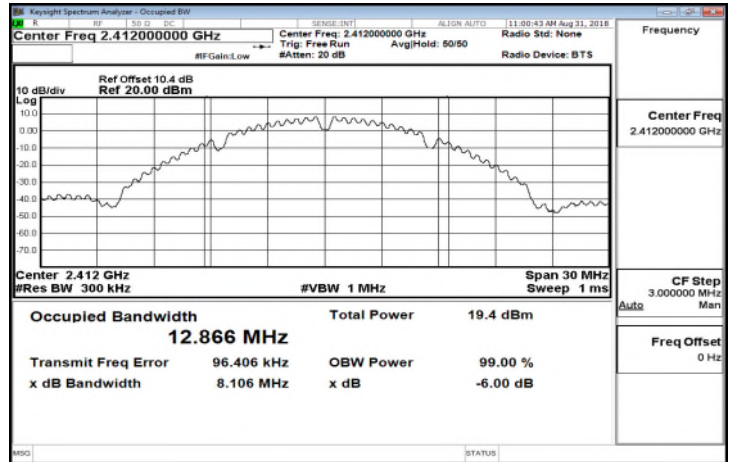
802.11b (CH0)

99% Band Width Test Data CH-Low

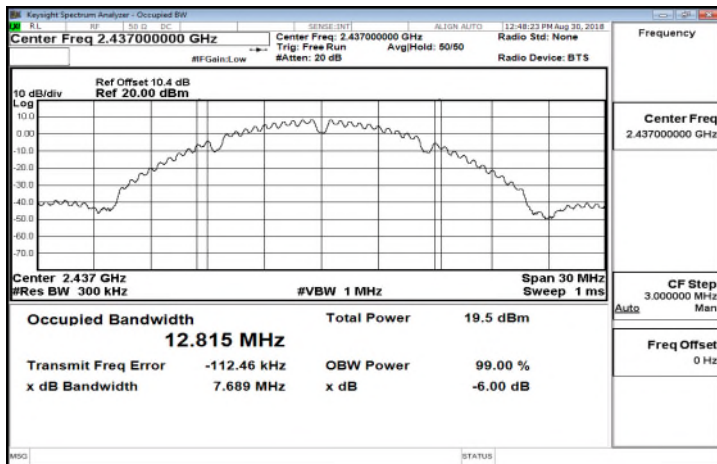


802.11b (CH1)

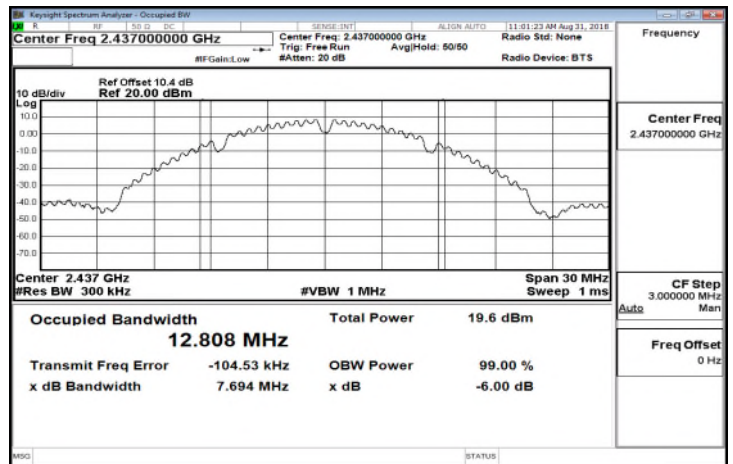
99% Band Width Test Data CH-Low



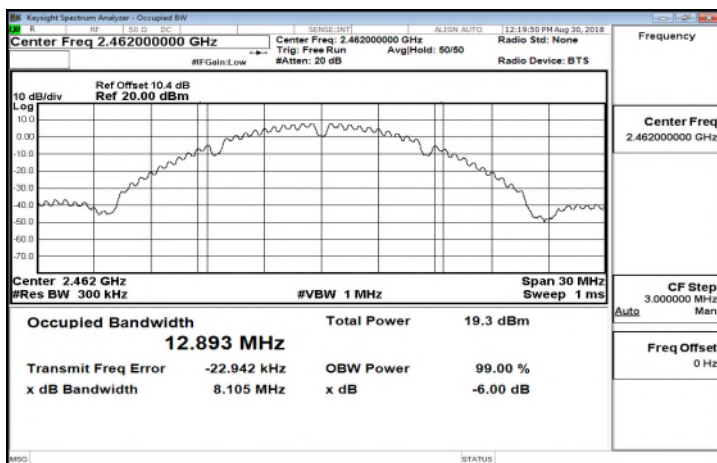
99% Band Width Test Data CH-Mid



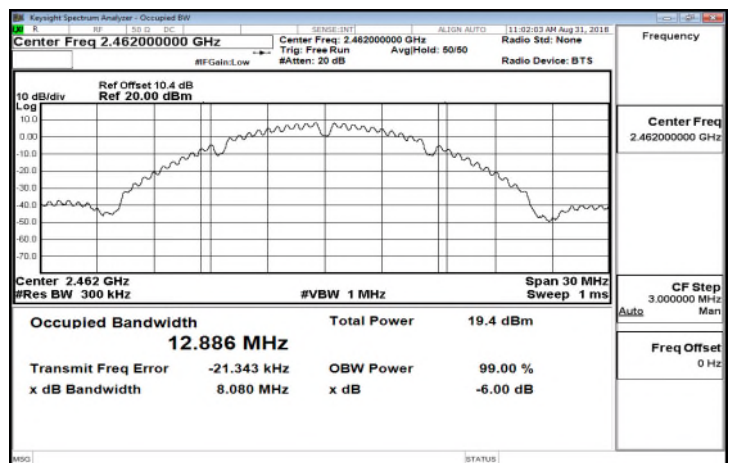
99% Band Width Test Data CH-Mid



99% Band Width Test Data CH-High



99% Band Width Test Data CH-High



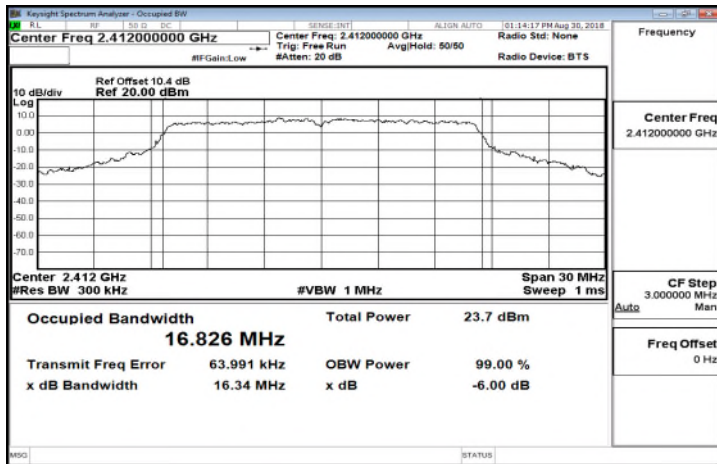
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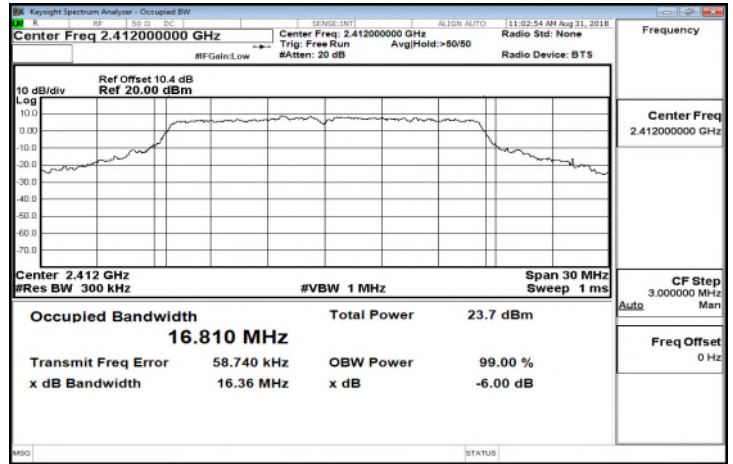
802.11g (CH0)

99% Band Width Test Data CH-Low

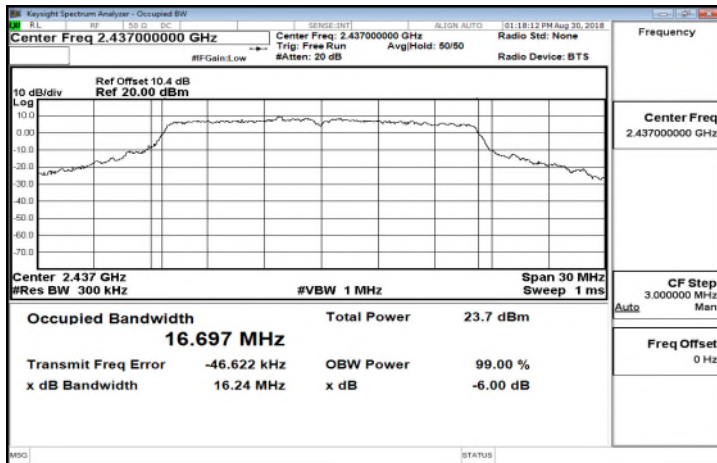


802.11g (CH1)

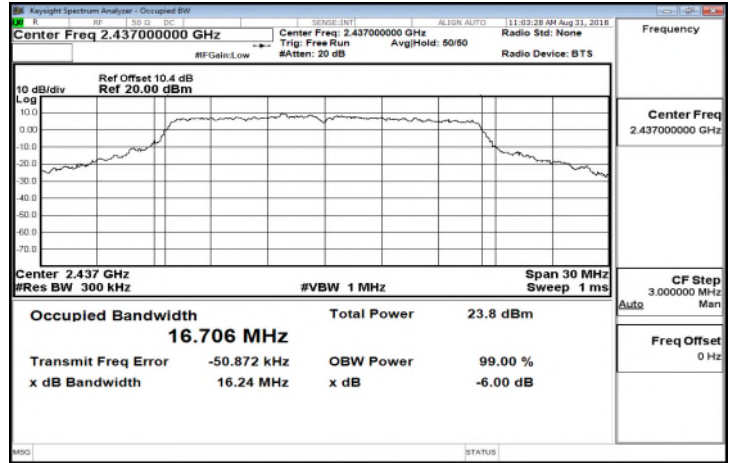
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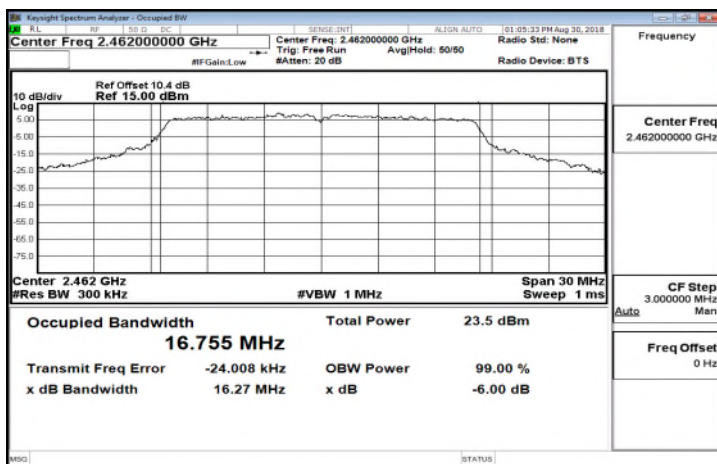
99% Band Width Test Data CH-Mid



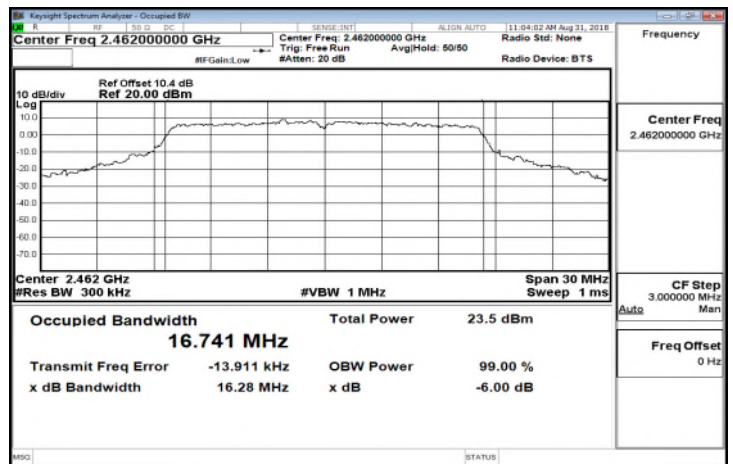
99% Band Width Test Data CH-Mid



99% Band Width Test Data CH-High



99% Band Width Test Data CH-High

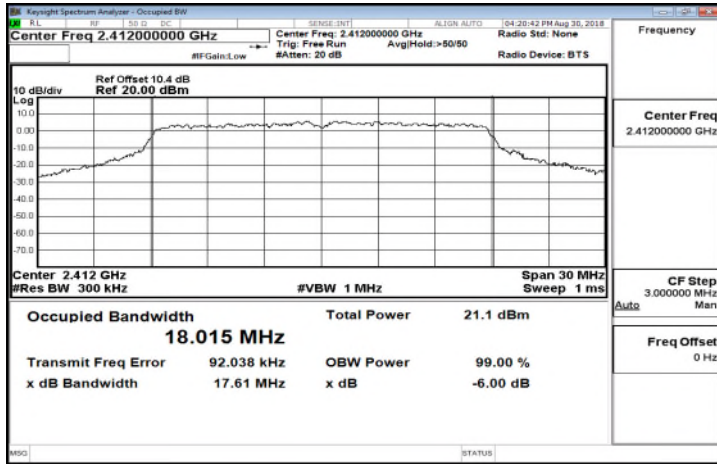


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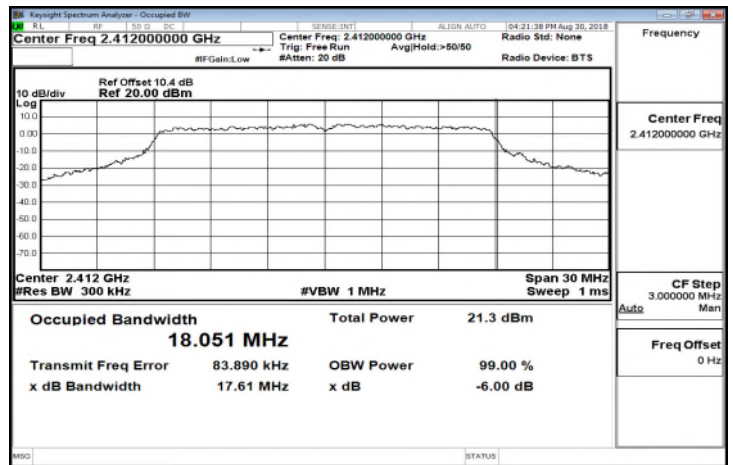
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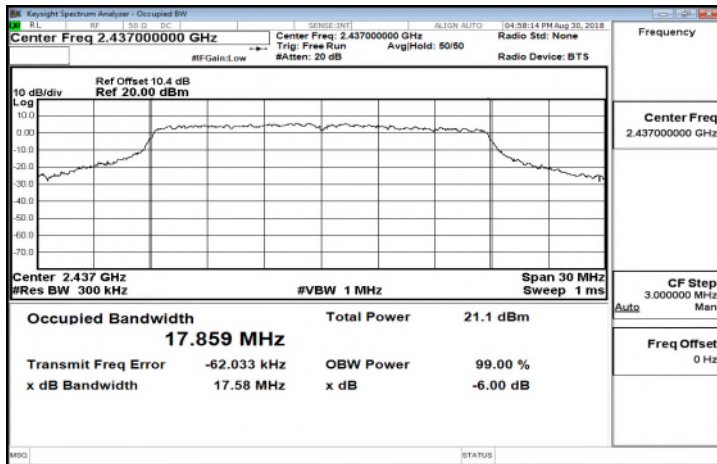
802.11n\_20M (CH0)  
99% Band Width Test Data CH-Low



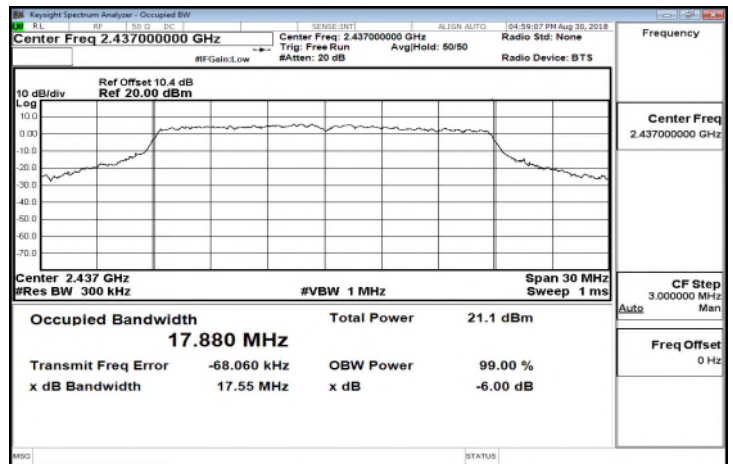
802.11n\_20M (CH1)  
99% Band Width Test Data CH-Low



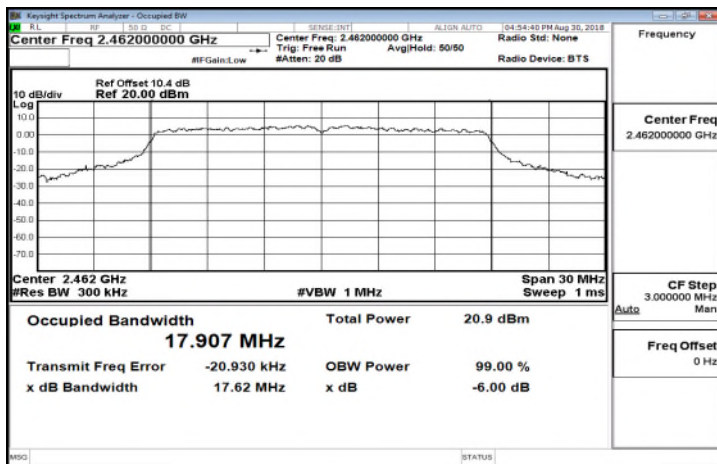
99% Band Width Test Data CH-Mid



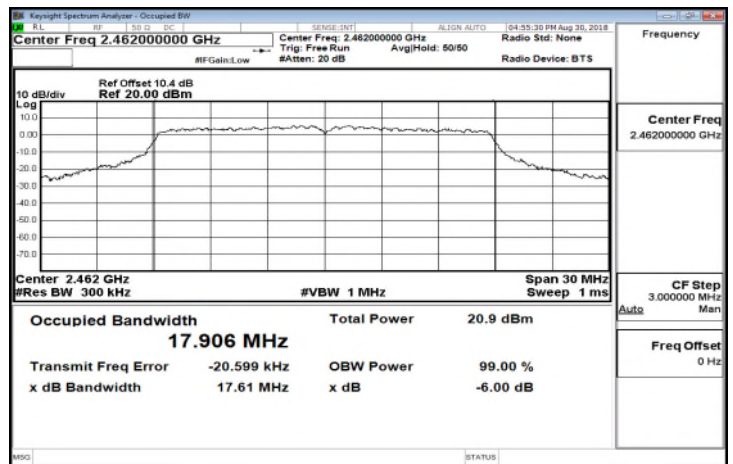
99% Band Width Test Data CH-Mid



99% Band Width Test Data CH-High



99% Band Width Test Data CH-High



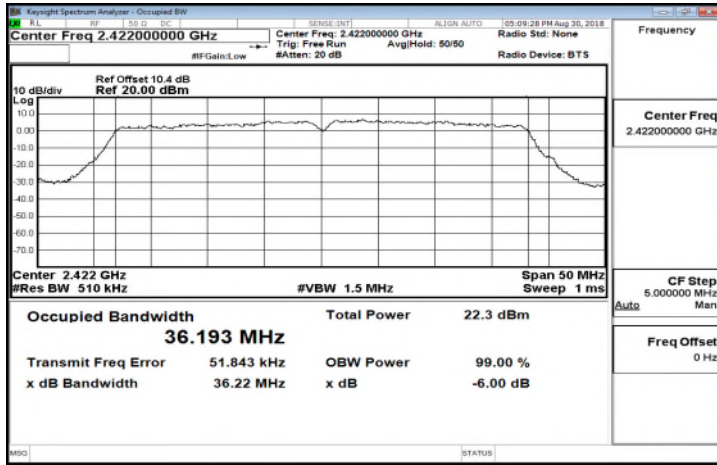
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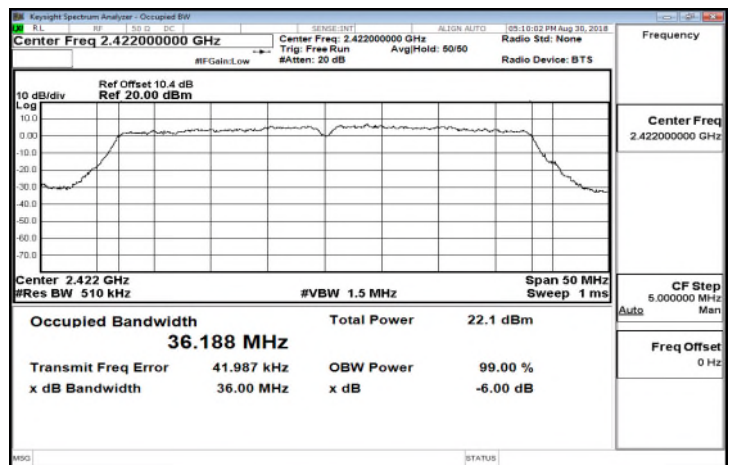
802.11n\_40M (CH0)

99% Band Width Test Data CH-Low

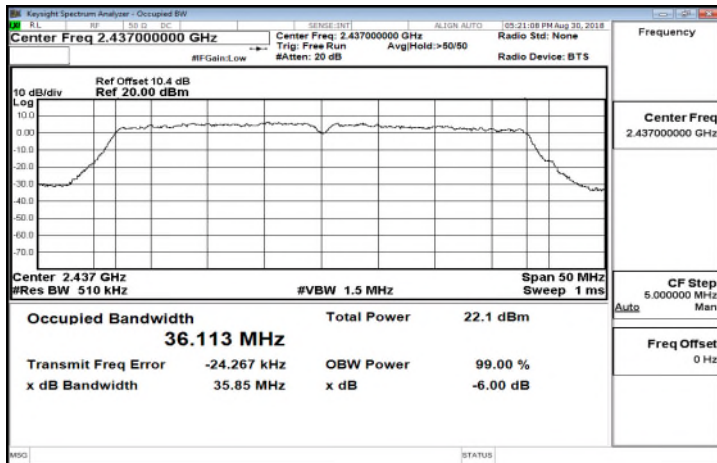


802.11n\_40M (CH1)

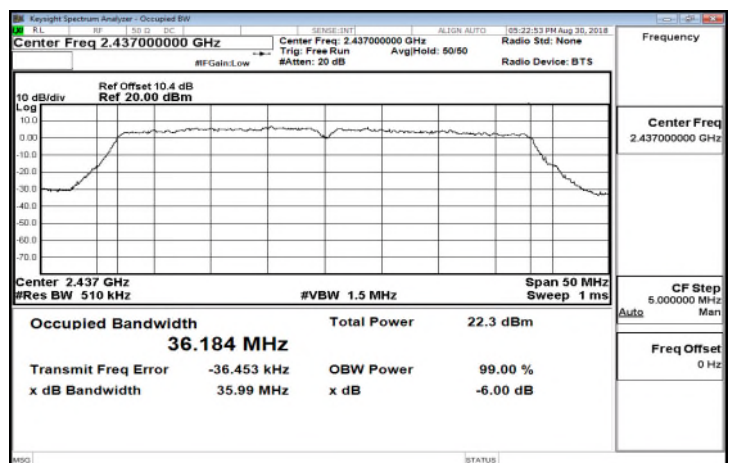
99% Band Width Test Data CH-Low



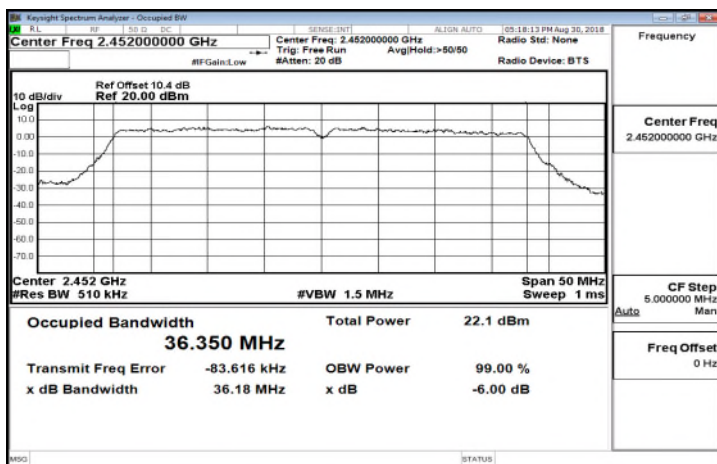
99% Band Width Test Data CH-Mid



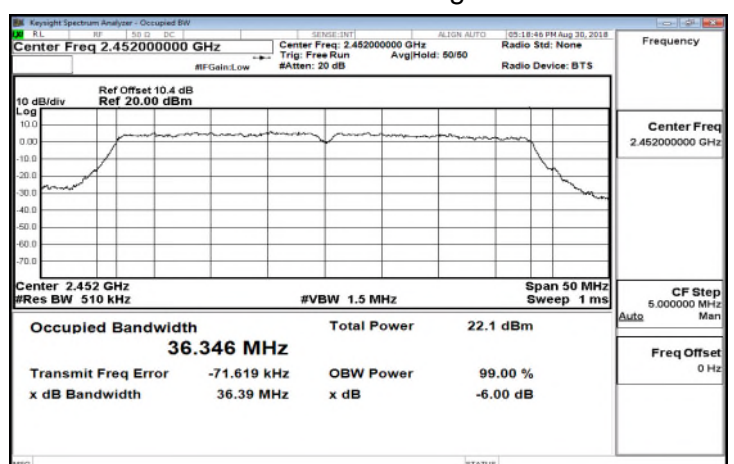
99% Band Width Test Data CH-Mid



99% Band Width Test Data CH-High



99% Band Width Test Data CH-High



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## 10 CONDUCTED BAND EDGE 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.

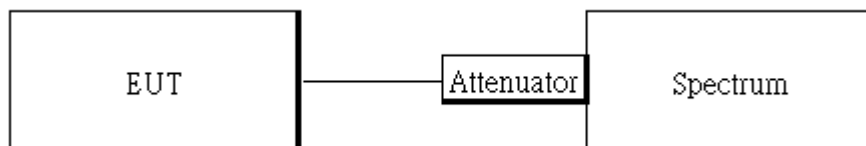
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) & RSS-Gen §8.10, must also comply with the radiated emission limits specified in §15.209(a) & RSS-Gen §8.8.

If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen 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	MY53400256	2017/10/30	2018/10/29
DC Block	PASTERNAK	PE8210	RF81	2017/12/26	2018/12/25
Notebook	Lenovo	L430	P0000195	N/A	N/A

### 10.3 Test SET-UP



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## 10.4 Measurement Procedure

### Conducted Band Edge 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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7. 802.11n MIMO mode: offset is set following “measure and add 10 Log (N)” on spectrum to measure the PSD for MIMO mode. Offset = cable loss + 10 log (N), where N is number of transmitting antenna. N=2 for this given application for the test of PSD at MIMO mode, the highest emission of worst case is employing.

## 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	7.680	-12.32	2412	7.18	-12.82
2437	7.985	-12.02	2437	6.88	-13.12
2462	7.650	-12.35	2462	7.11	-12.89

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	7.90	-12.10	2422	5.5	-14.50
2437	7.80	-12.20	2437	5.31	-14.69
2462	7.74	-12.26	2452	4.75	-15.25

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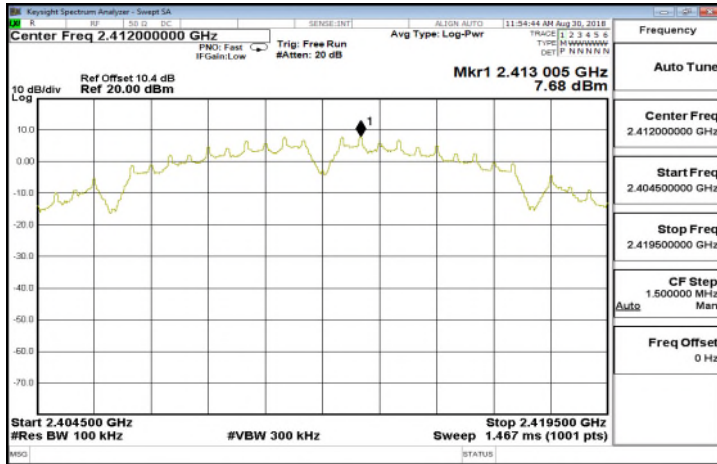
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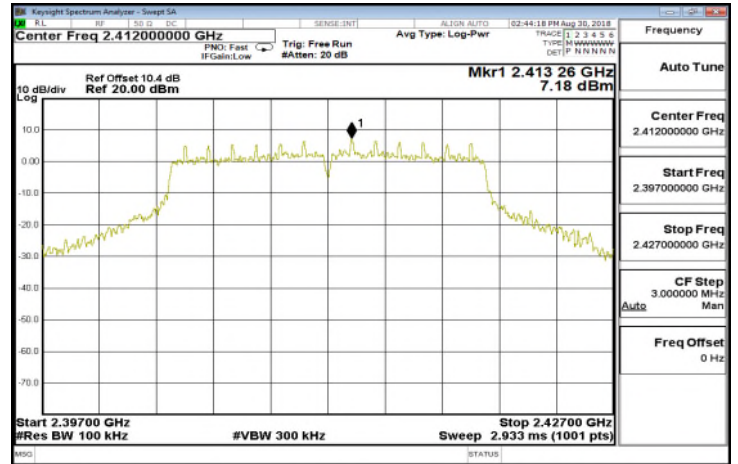
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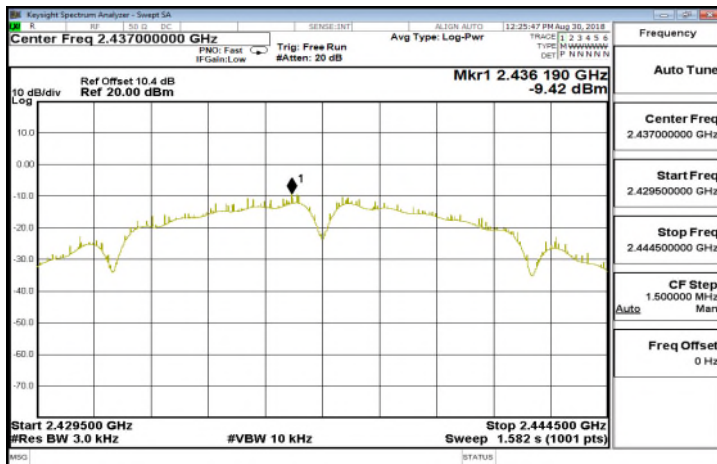
802.11b Band Edge Limit Test Data CH-Low



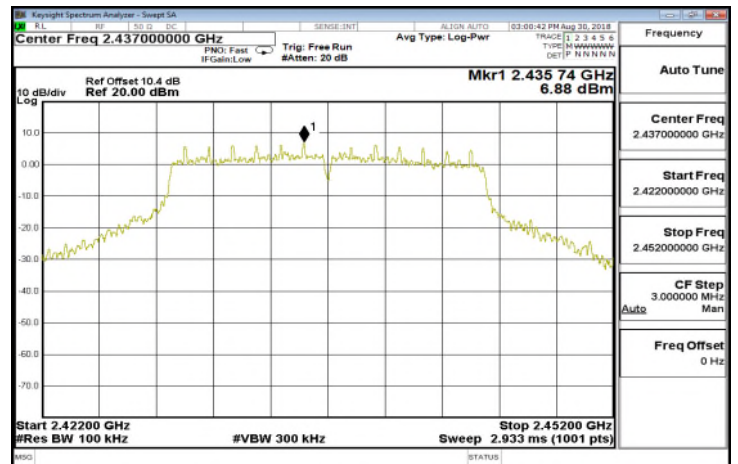
802.11g Band Edge Limit Test Data CH-Low



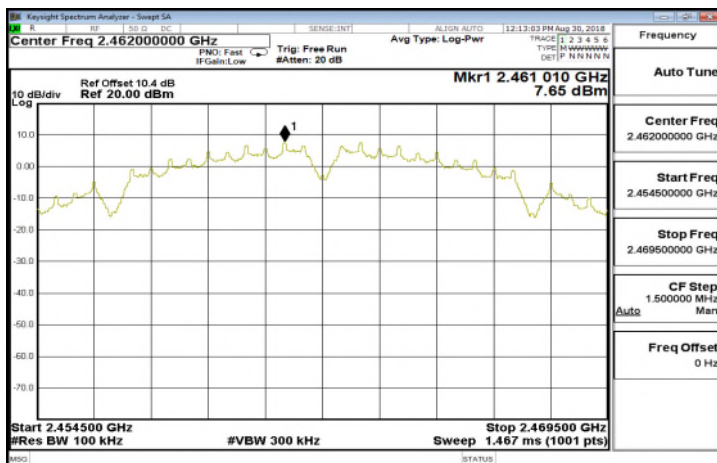
802.11b Band Edge Limit Test Data CH-Mid



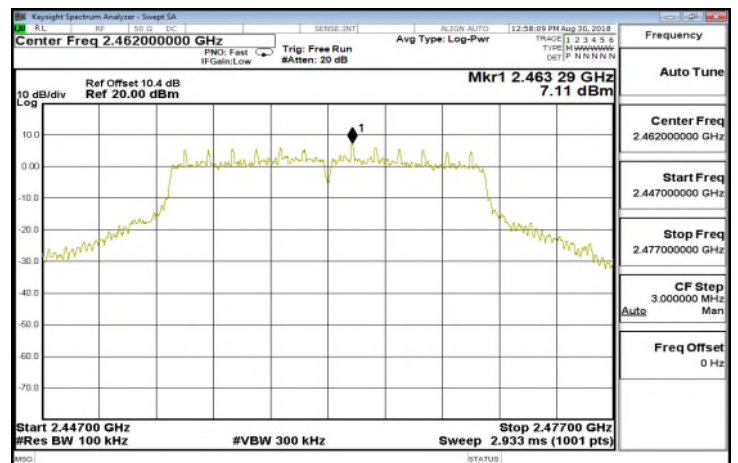
802.11g Band Edge Limit Test Data CH-Mid



802.11b Band Edge Limit Test Data CH-High



802.11g Band Edge Limit Test Data CH-High

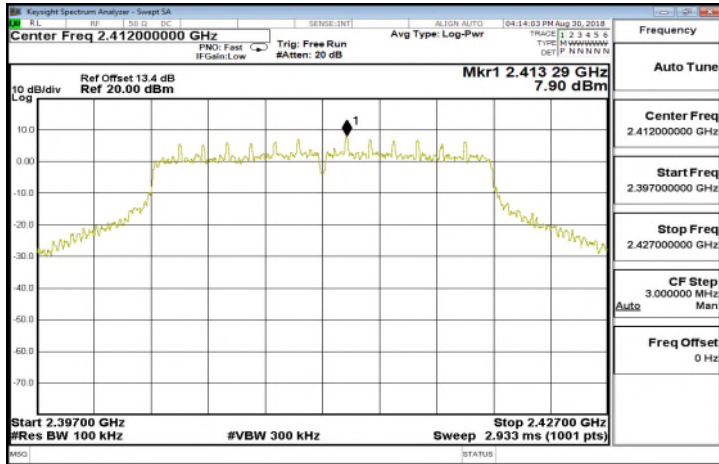


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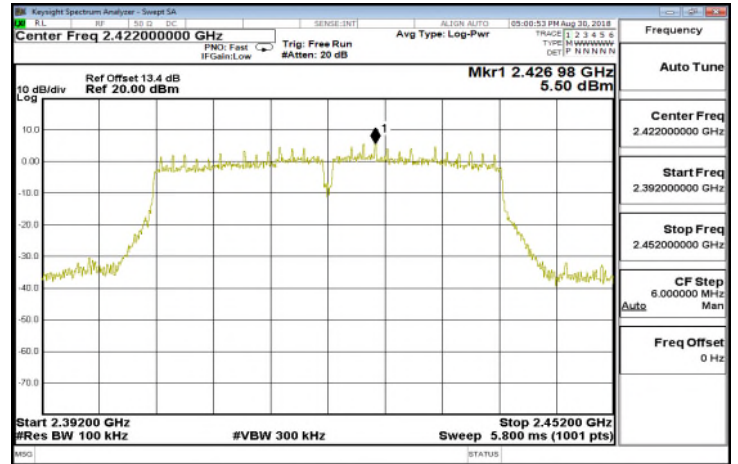
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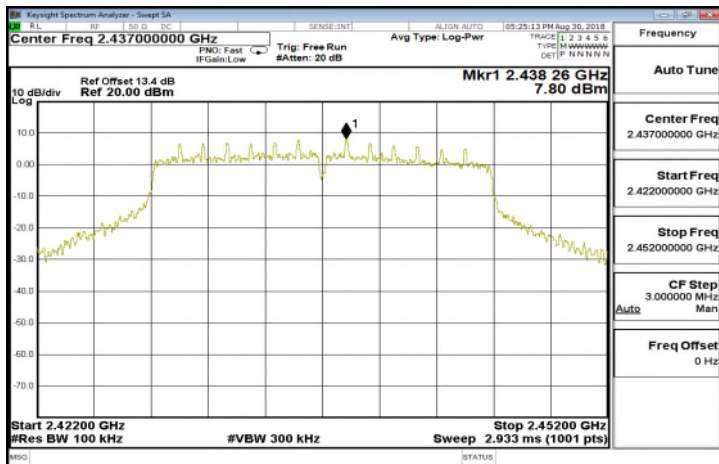
802.11n\_HT20 Band Edge Limit Test Data CH-Low



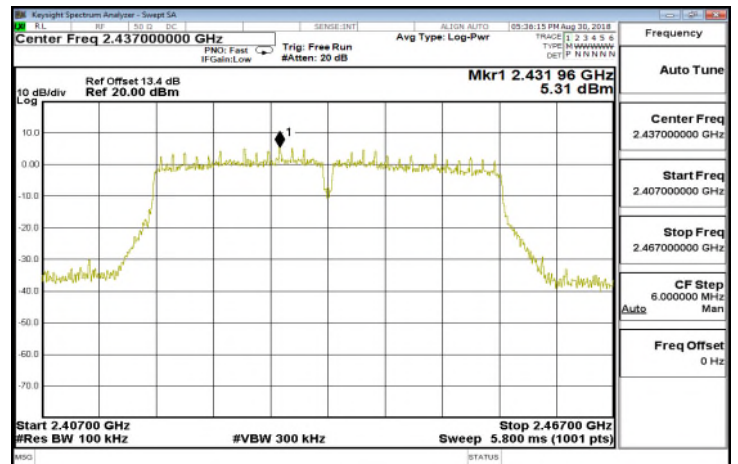
802.11n\_HT40 Band Edge Limit Test Data CH-Low



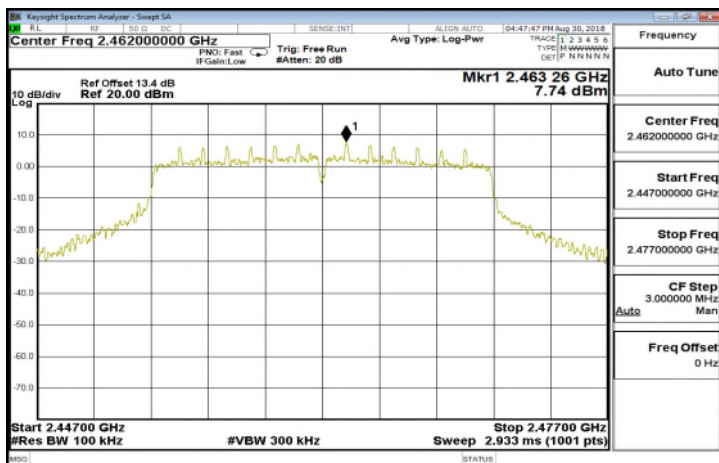
802.11n\_HT20 Band Edge Limit Test Data CH-Mid



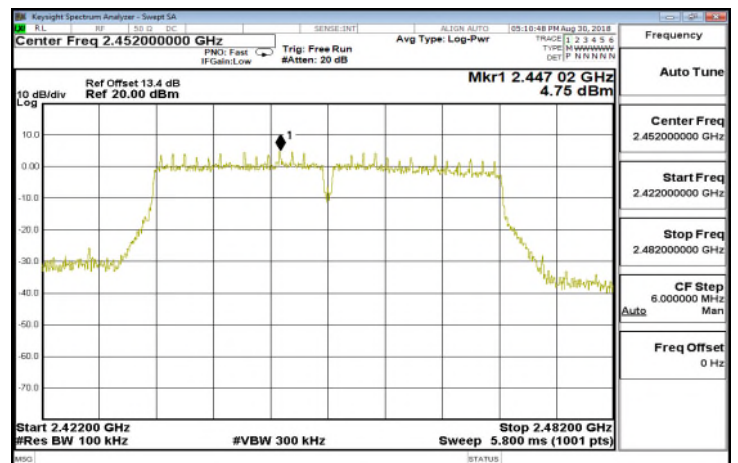
802.11n\_HT40 Band Edge Limit Test Data CH-Mid



802.11n\_HT20 Band Edge Limit Test Data CH-High



802.11n\_HT40 Band Edge Limit Test Data CH-High

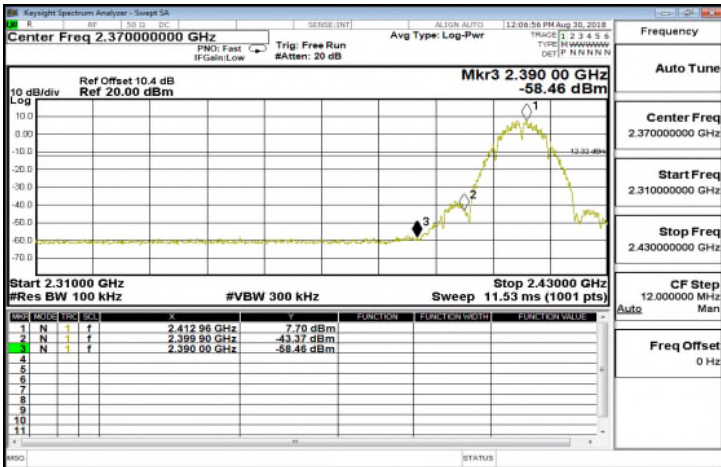


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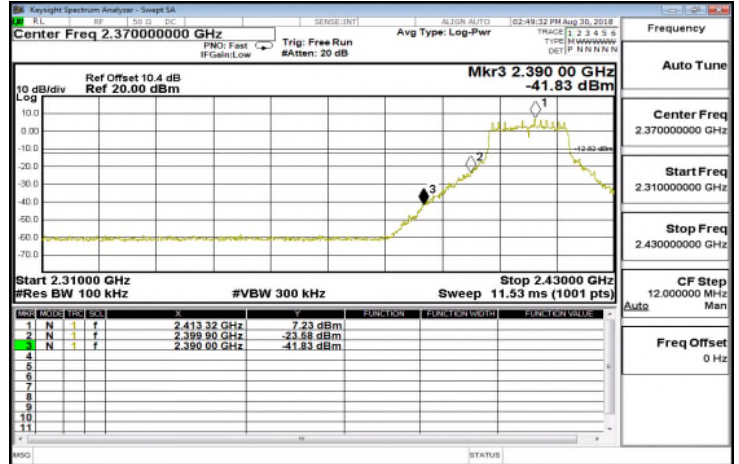
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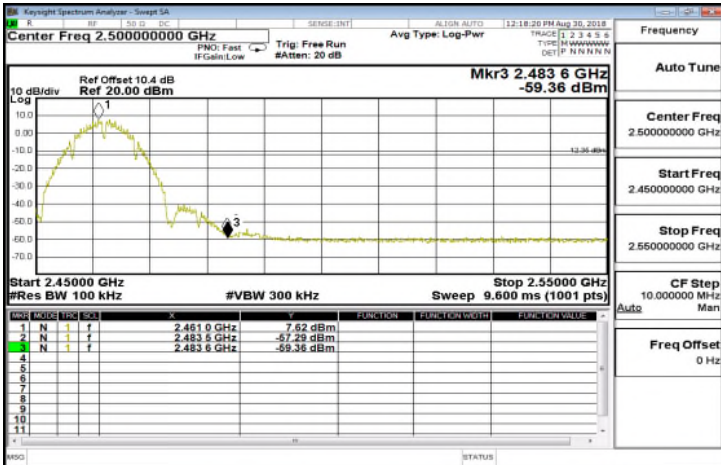
802.11b  
Band Edge Test Data CH-Low



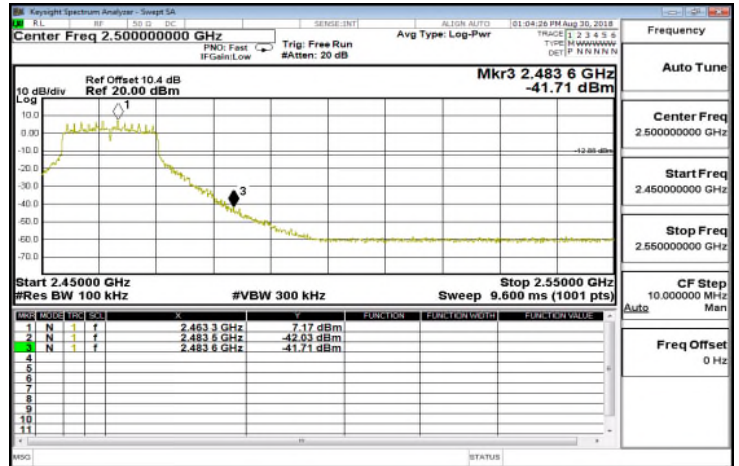
802.11g  
Band Edge Test Data CH-Low



Band Edge Test Data CH-High



Band Edge Test Data CH-High

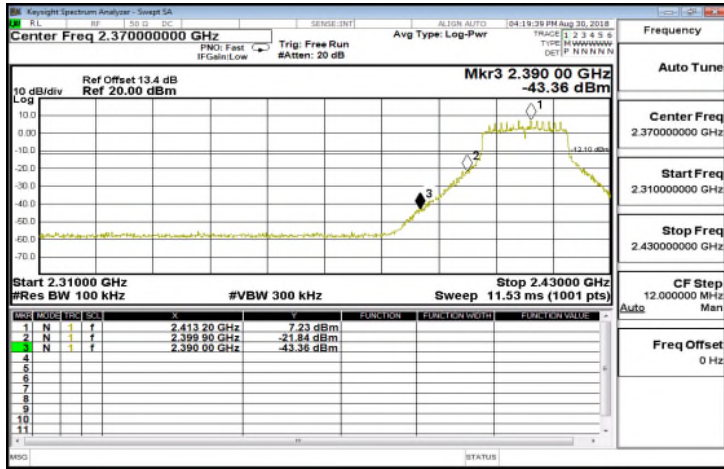


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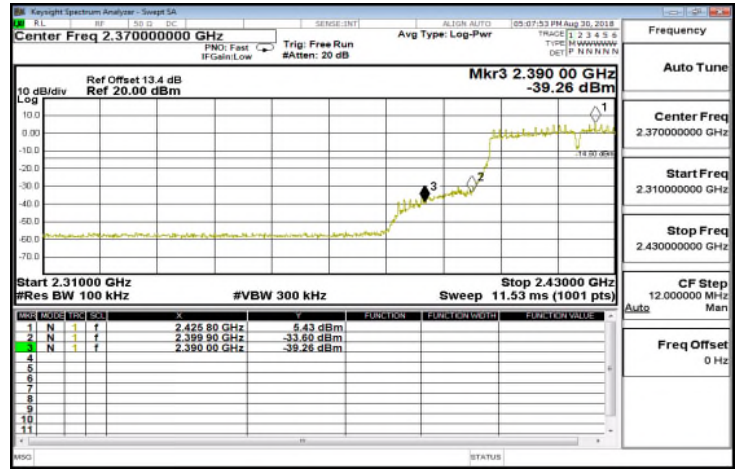
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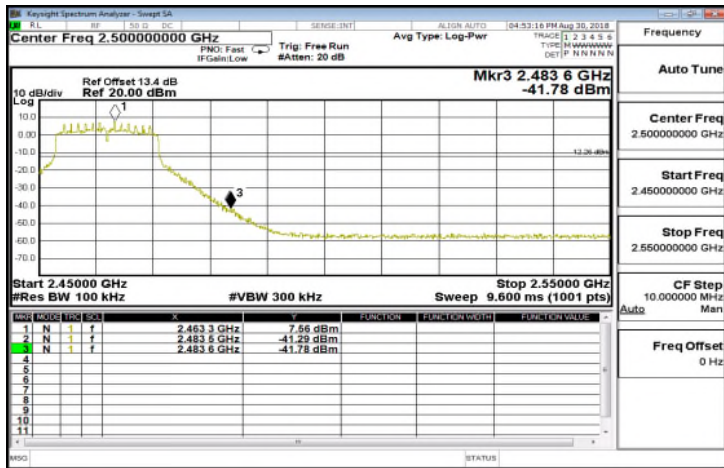
802.11n\_HT20  
Band Edge Test Data CH-Low



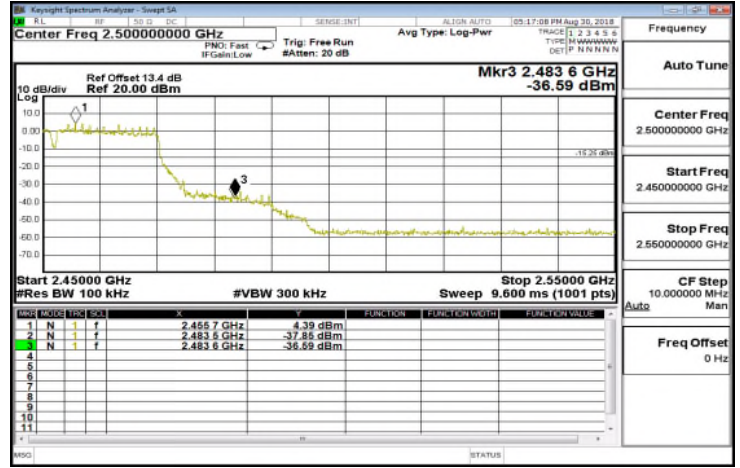
802.11n\_HT40  
Band Edge Test Data CH-Low



Band Edge Test Data CH-High



Band Edge Test Data CH-High

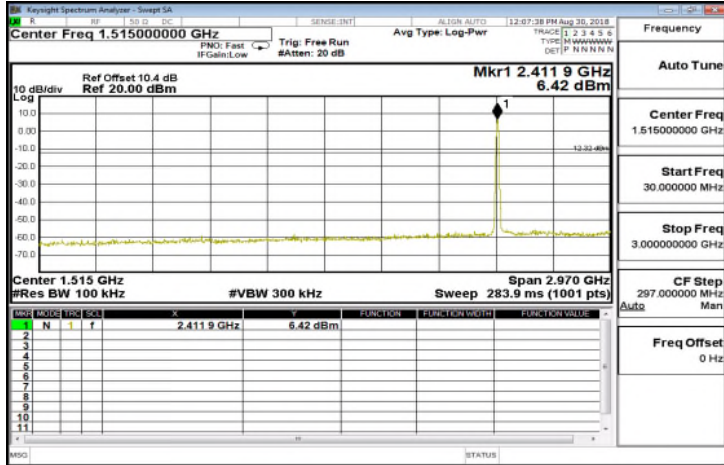


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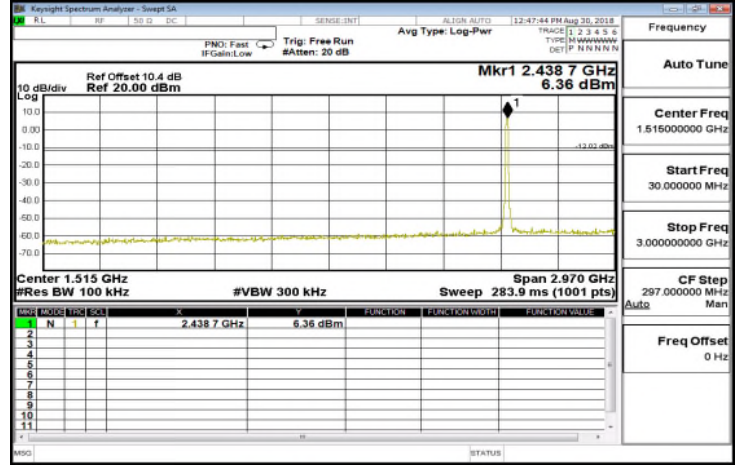
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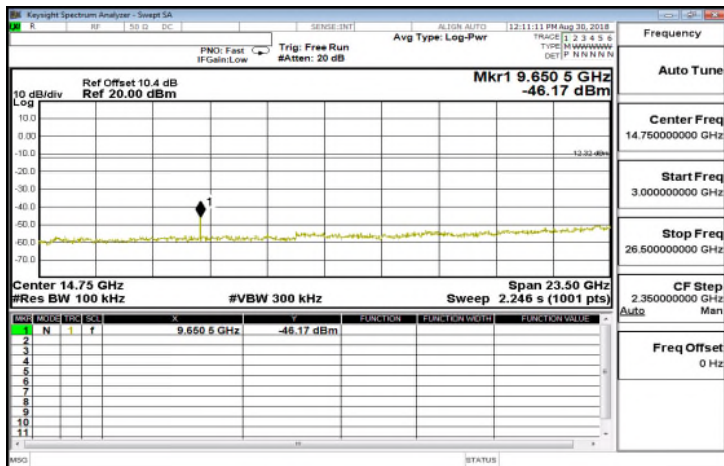
802.11b  
30M-3GHz Spurious Emission Test Data  
CH-Low



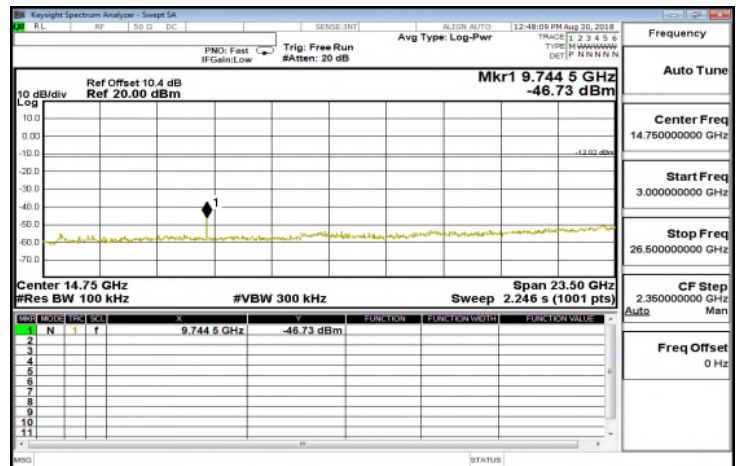
30M-3GHz Spurious Emission Test Data CH-Mid



3G-26.5GHz Spurious Emission Test Data  
CH-Low



3G-26.5GHz Spurious Emission Test Data  
CH-Mid

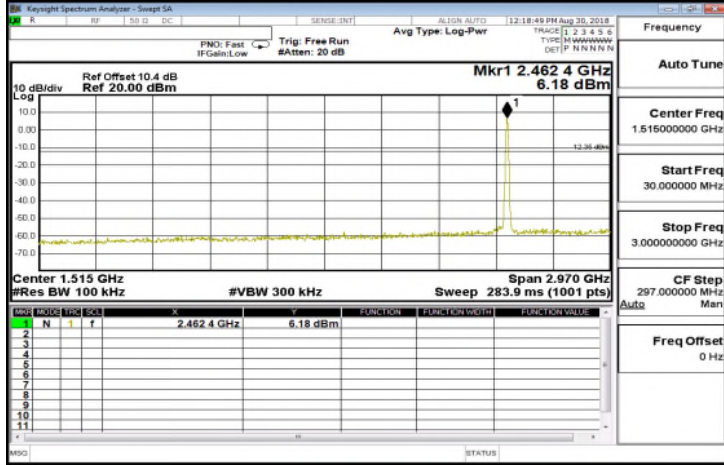


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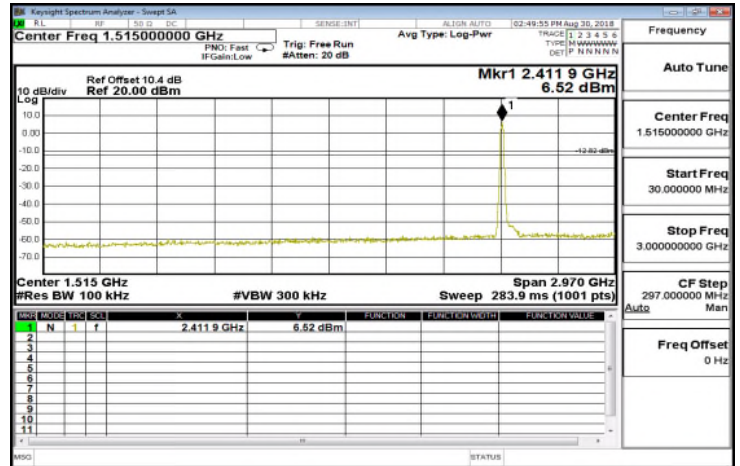
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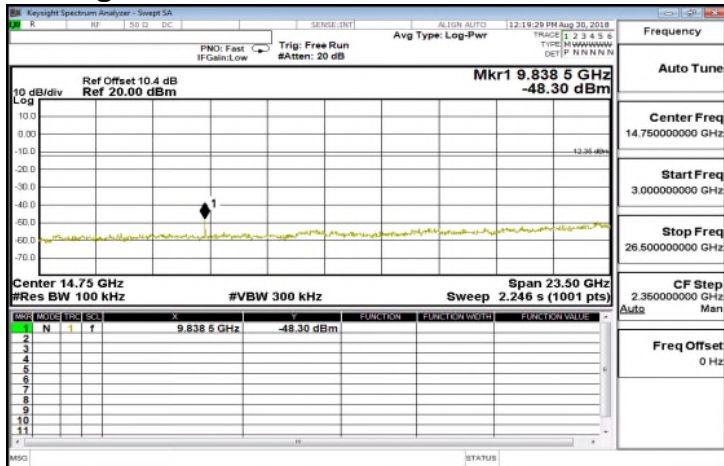
### 30M-3GHz Spurious Emission Test Data CH-High



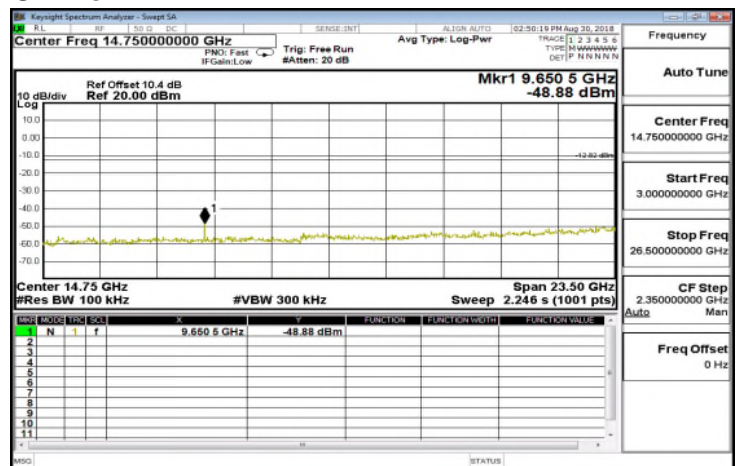
### 802.11g 30M-3GHz Spurious Emission Test Data CH-Low



### 3G-26.5GHz Spurious Emission Test Data CH-High



### 3G-26.5GHz Spurious Emission Test Data CH-Low

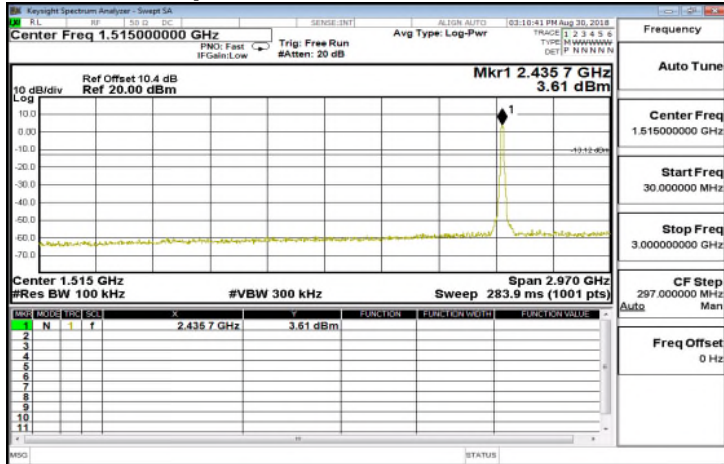


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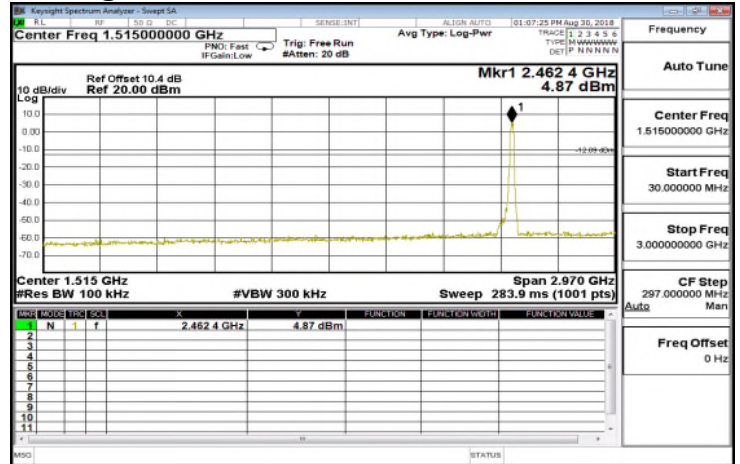
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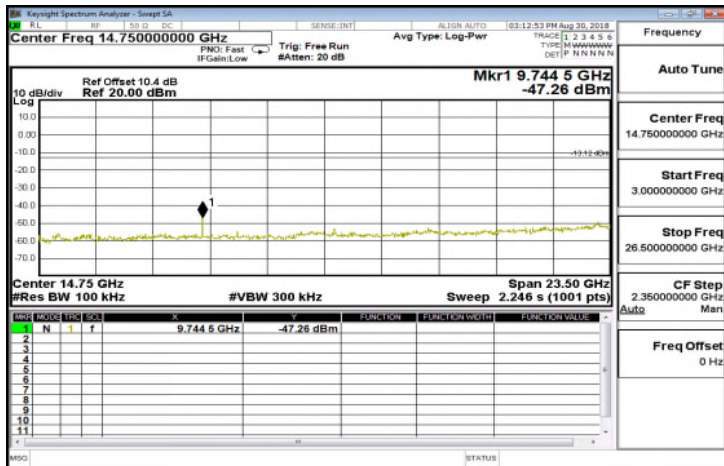
### 30M-3GHz Spurious Emission Test Data CH-Mid



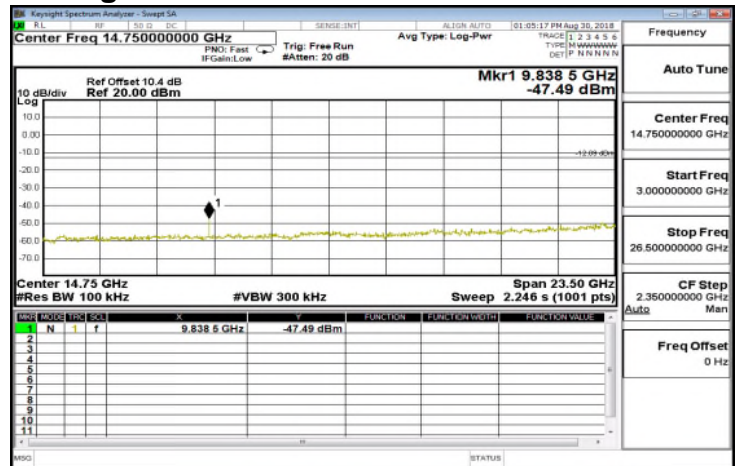
### 30M-3GHz Spurious Emission Test Data CH-High



### 3G-26.5GHz Spurious Emission Test Data CH-Mid



### 3G-26.5GHz Spurious Emission Test Data CH-High



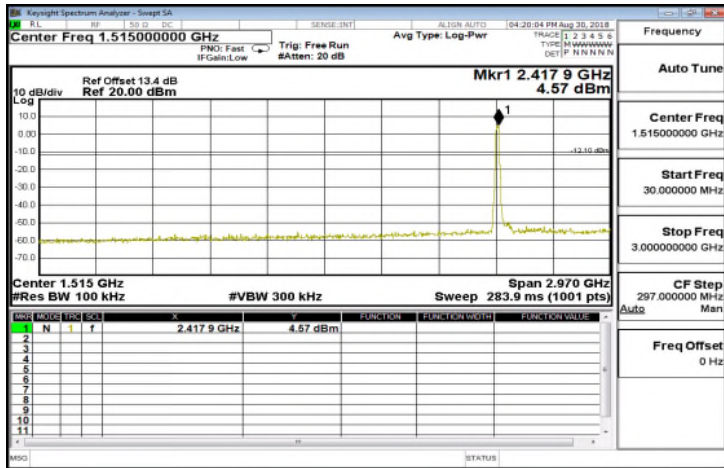
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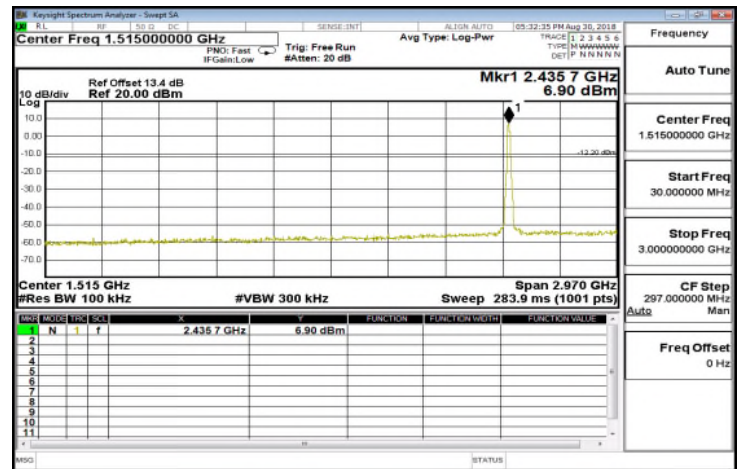
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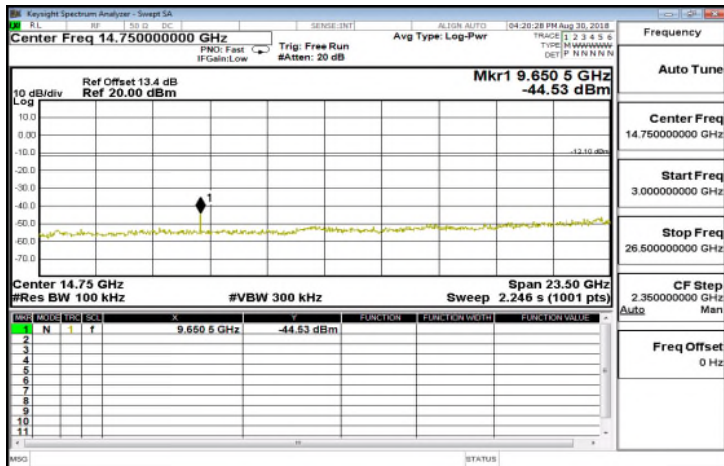
### 802.11n\_HT20 30M-3GHz Spurious Emission Test Data CH-Low



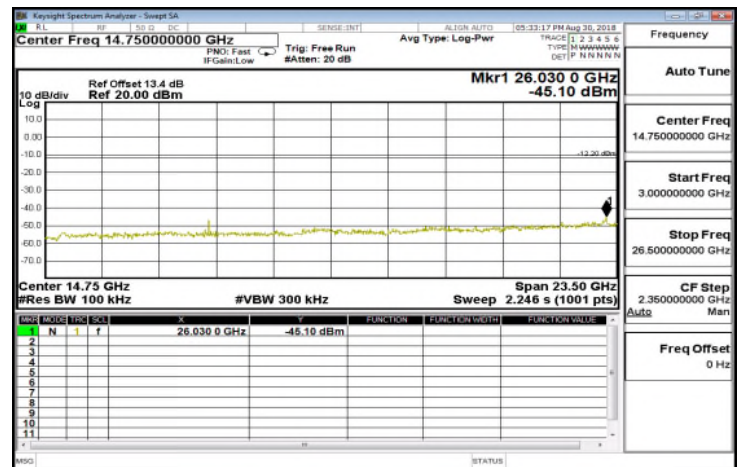
### 30M-3GHz Spurious Emission Test Data CH-Mid



### 3G-26.5GHz Spurious Emission Test Data CH-Low



### 3G-26.5GHz Spurious Emission Test Data CH-Mid

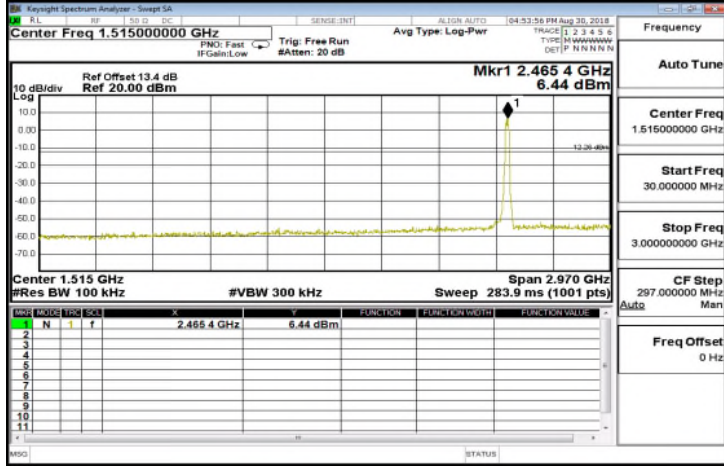


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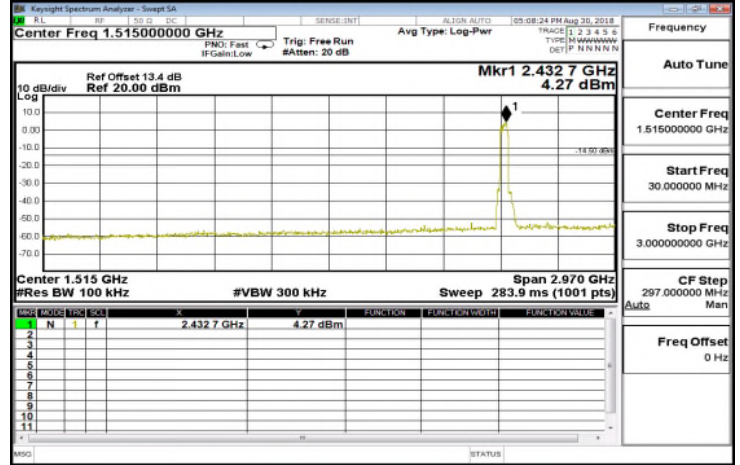
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### 30M-3GHz Spurious Emission Test Data CH-High

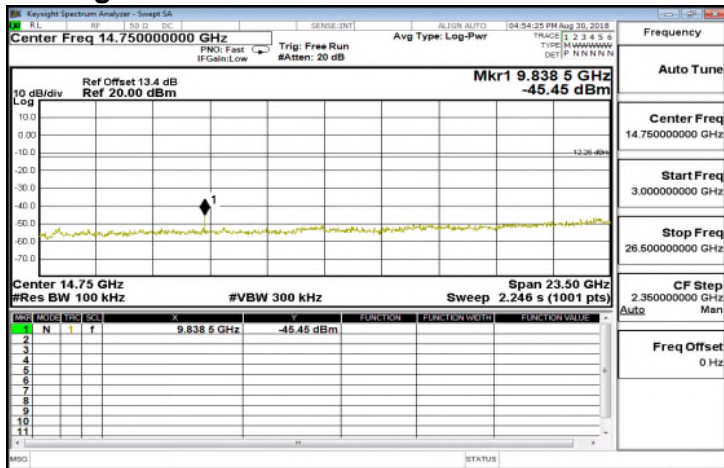


### 802.11n\_HT40

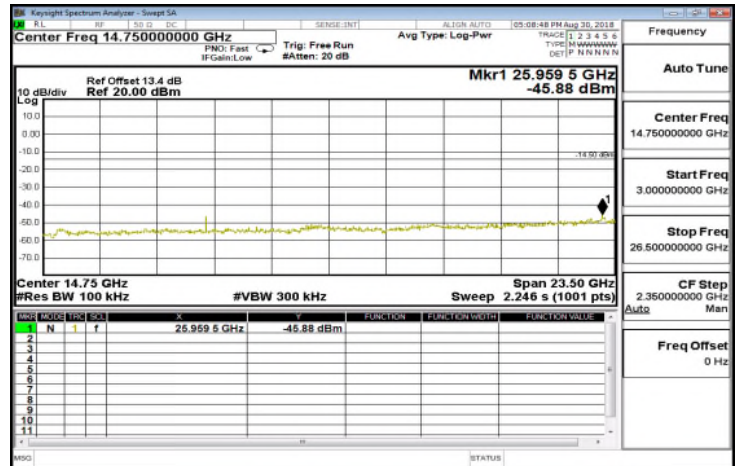
### 30M-3GHz Spurious Emission Test Data CH-Low



### 3G-26.5GHz Spurious Emission Test Data CH-High



### 3G-26.5GHz Spurious Emission Test Data CH-Low

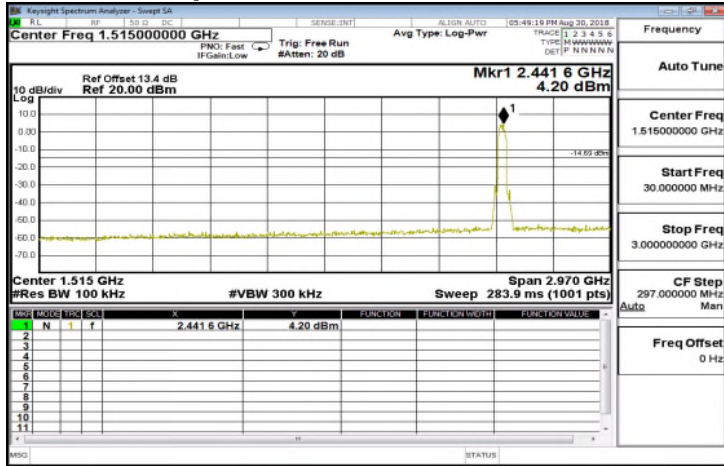


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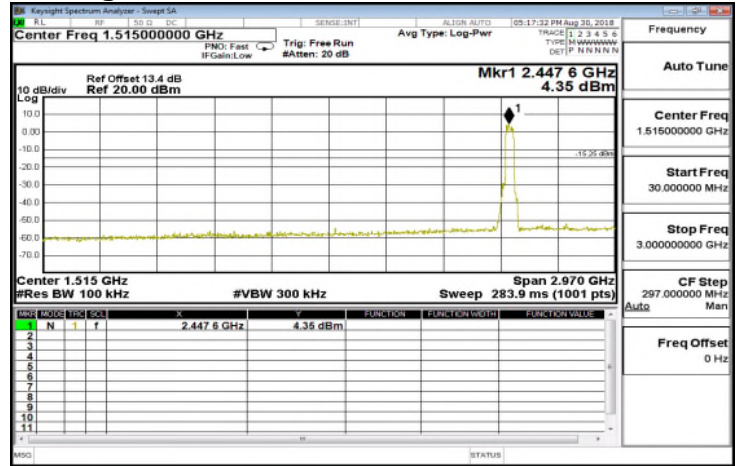
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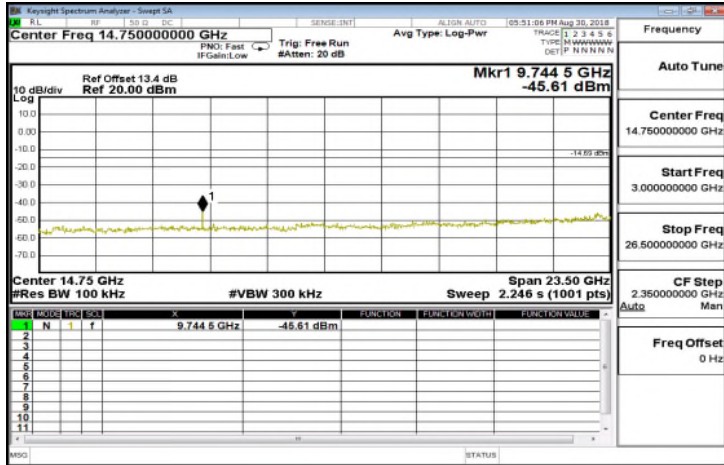
### 30M-3GHz Spurious Emission Test Data CH-Mid



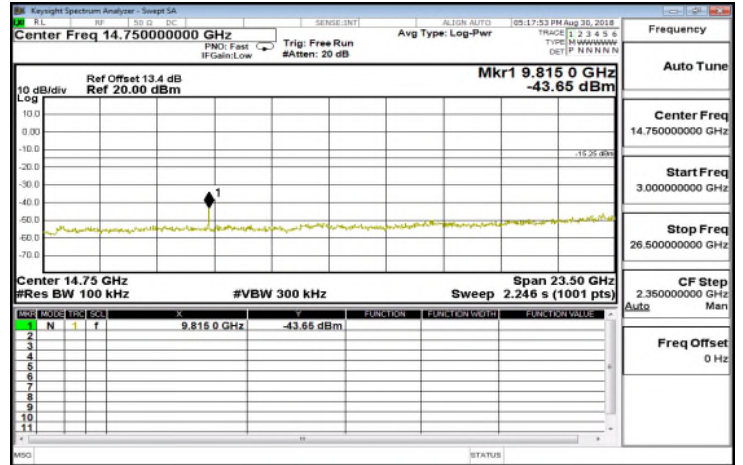
### 30M-3GHz Spurious Emission Test Data CH-High



### 3G-26.5GHz Spurious Emission Test Data CH-Mid



### 3G-26.5GHz 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 & RSS-Gen §8.8, 8.9 limit as below.

And according to §15.33(a) (1) & RSS-Gen §6.13(a), 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 (µV/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	2017/10/27	2018/10/26
Horn Antenna	Schwarzbeck	BBHA9120D	1341	2018/06/07	2019/6/6
Horn Antenna	SCHWAZBECK	BBHA9170	184	2017/12/12	2018/12/11
Loop Antenna	ETS.LINDGREN	6502	148045	2017/09/26	2018/9/25
3m Site NSA	SGS	966 chamber D	N/A	2018/07/06	2019/7/5
EMI Test Receiver	R&S	ESU 40	100363	2018/04/11	2019/4/10
Pre-Amplifier	EMC Instruments	EMC184045B	980135	2017/10/27	2018/10/26
Pre-Amplifier	EMC Instruments	EMC9135	980234	2017/12/26	2018/12/25
Pre-Amplifier	EMC Instruments	EMC12630SE	980271	2017/12/26	2018/12/25
Attenuator	Marvelous	WATT-218FS-10	RF246	2017/12/26	2018/12/25
Highpass Filter	Micro Tronics	BRM50701-01	G008	2017/12/26	2018/12/25
Coaxial Cable	Huber Suhner	EMC106-SM-SM-7200	150703	2017/12/26	2018/12/25
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	2017/12/26	2018/12/25
Notebook	Lenovo	L420	S0012467	N/A	N/A
Broadband Antenna	SCHWAZBECK	VULB 9168	9168-617	2017/10/27	2018/10/26
Horn Antenna	Schwarzbeck	BBHA9120D	1341	2018/06/07	2019/6/6
Horn Antenna	SCHWAZBECK	BBHA9170	184	2017/12/12	2018/12/11
Loop Antenna	ETS.LINDGREN	6502	148045	2017/09/26	2018/9/25
3m Site NSA	SGS	966 chamber D	N/A	2018/07/06	2019/7/5
EMI Test Receiver	R&S	ESU 40	100363	2018/04/11	2019/4/10
Pre-Amplifier	EMC Instruments	EMC184045B	980135	2017/10/27	2018/10/26
Pre-Amplifier	EMC Instruments	EMC9135	980234	2017/12/26	2018/12/25
Pre-Amplifier	EMC Instruments	EMC12630SE	980271	2017/12/26	2018/12/25

Note: The measurement was taken place with the long duration of the time, and additional equipment list as shown above indicate those equipment of which has been subject to undertake the calibration in intermediate period of time of the measurement.

N.C.R refers to Not Calibrated Required.

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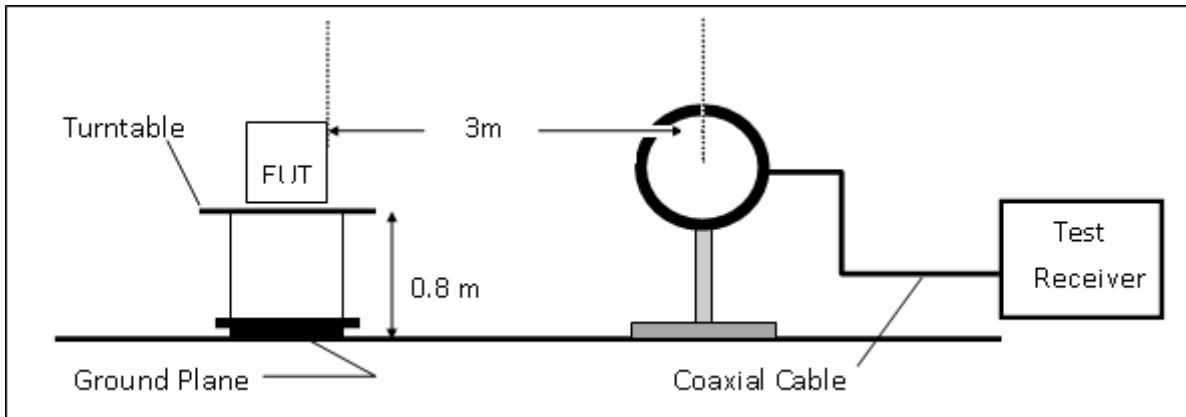
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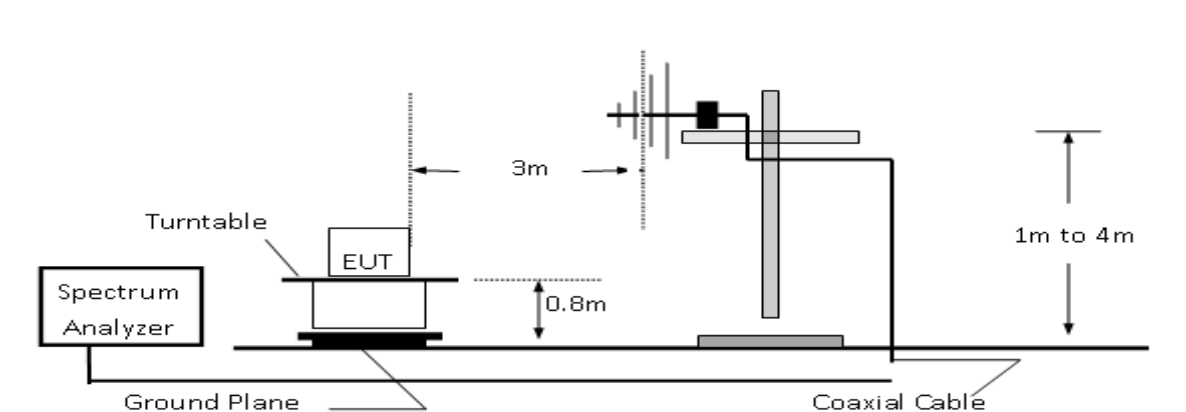
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### 11.3 Test SET-UP

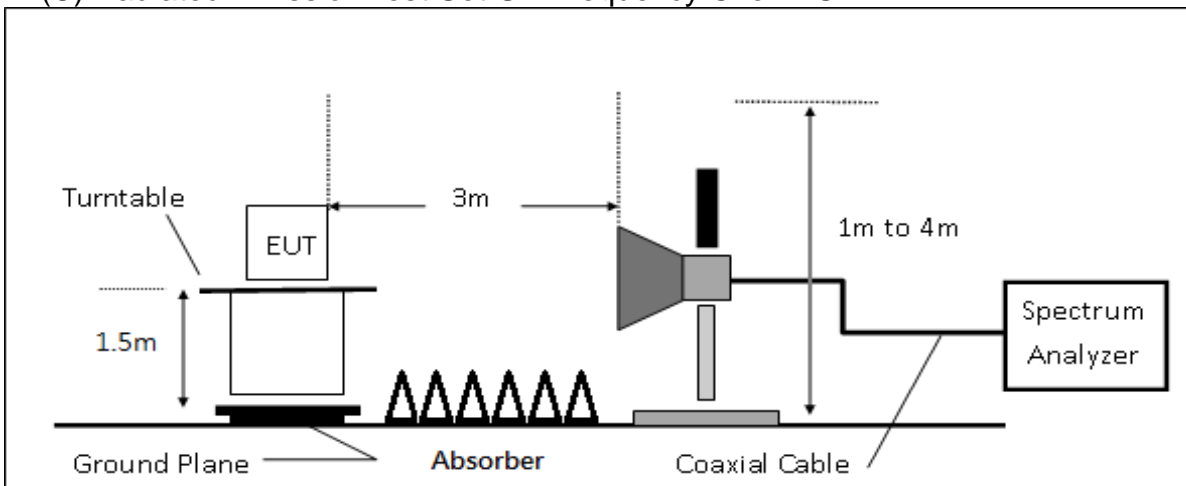
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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 ≥ 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(dB/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

**Note :**

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

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

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

Radiated emission below 30MHz is measured in a 9m\*9m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site. And there is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

After Pre-scanned 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: WLAN/BT coexistence cases were investigated and there are no new emissions to report.

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

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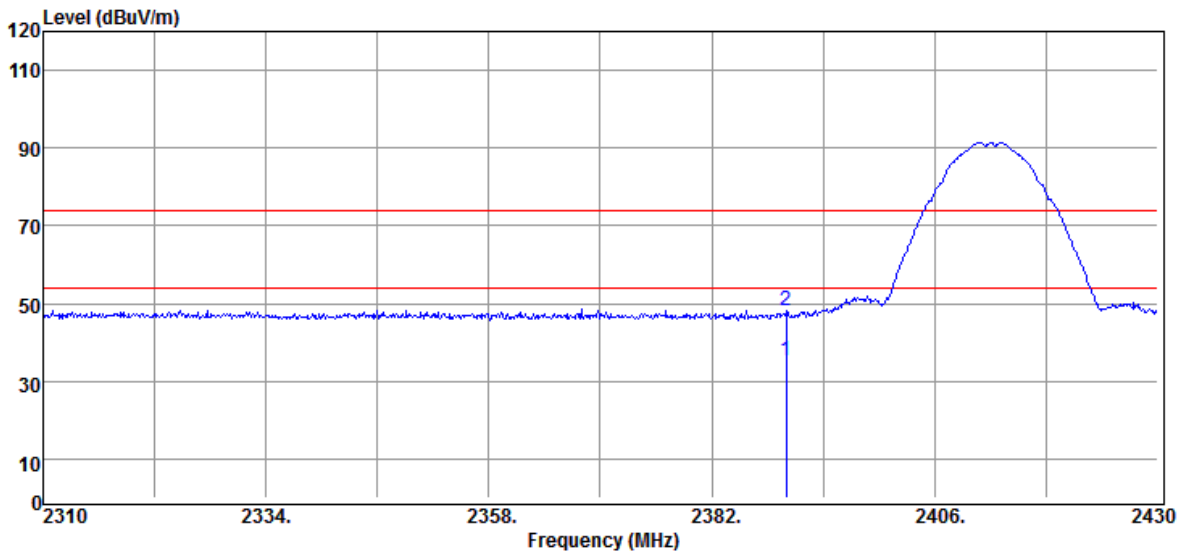
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### Radiated Band Edge Measurement Result (802.11b)

Operation Mode	:802.11b	Test Date	:2018-08-22
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2402 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2390.00	Average	41.01	-5.57	35.44	54.00	-18.56
2390.00	Peak	53.85	-5.57	48.28	74.00	-25.72

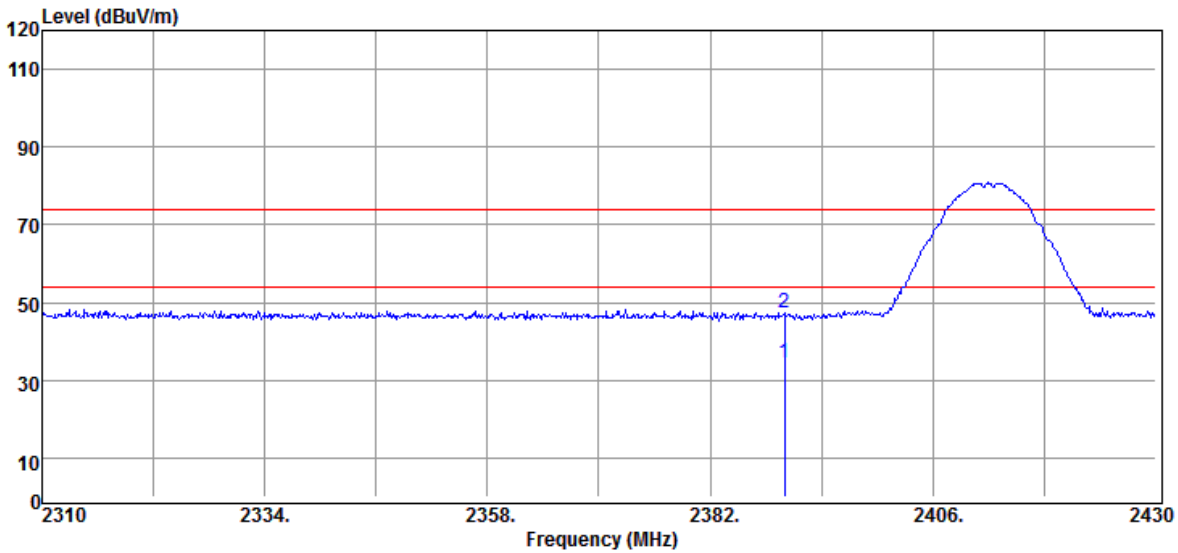
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Operation Mode	:802.11b	Test Date	:2018-08-22
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2402 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2390.00	Average	40.03	-5.57	34.46	54.00	-19.54
2390.00	Peak	52.72	-5.57	47.15	74.00	-26.85

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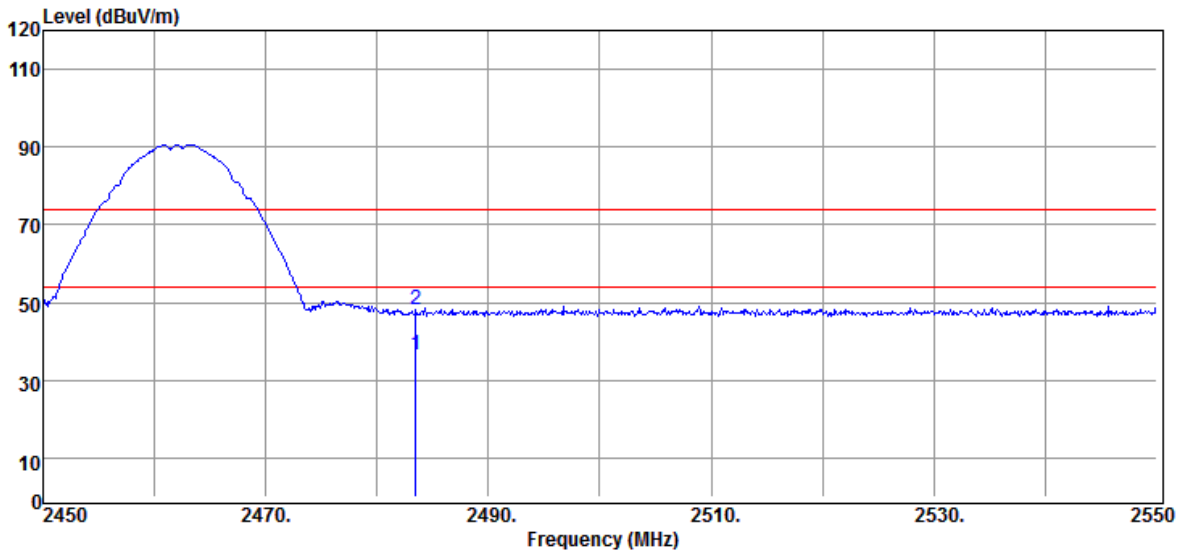
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Operation Mode	:802.11b	Test Date	:2018-08-22
Test Mode	:BE CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	41.25	-4.90	36.35	54.00	-17.65
2483.50	Peak	53.11	-4.90	48.21	74.00	-25.79

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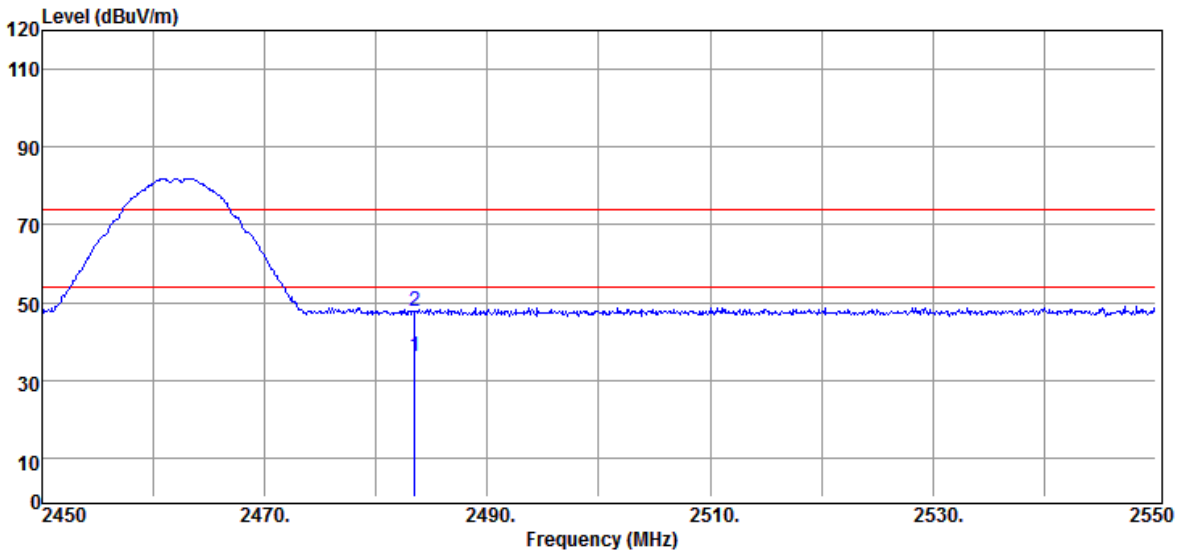
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Operation Mode	:802.11b	Test Date	:2018-08-22
Test Mode	:BE CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2483.50	Average	41.22	-4.90	36.32	54.00	-17.68
2483.50	Peak	52.66	-4.90	47.76	74.00	-26.24

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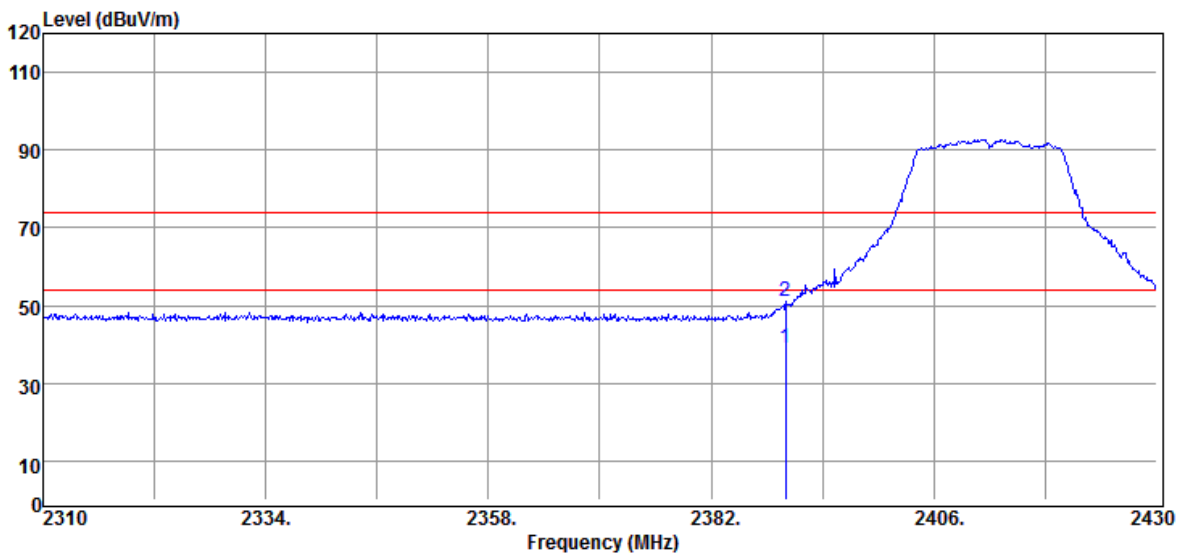
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### Radiated Band Edge Measurement Result (802.11g)

Operation Mode	:802.11g	Test Date	:2018-08-22
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2402 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2390.00	Average	44.51	-5.57	38.94	54.00	-15.06
2390.00	Peak	56.63	-5.57	51.06	74.00	-22.94

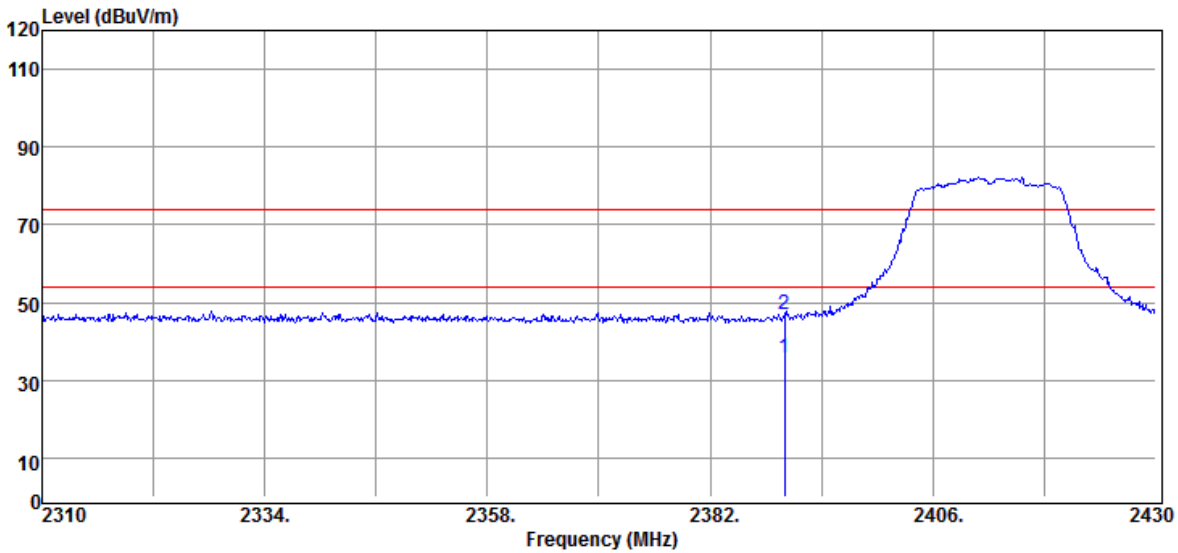
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Operation Mode	:802.11g	Test Date	:2018-08-22
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2402 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2390.00	Average	41.11	-5.57	35.54	54.00	-18.46
2390.00	Peak	52.37	-5.57	46.80	74.00	-27.20

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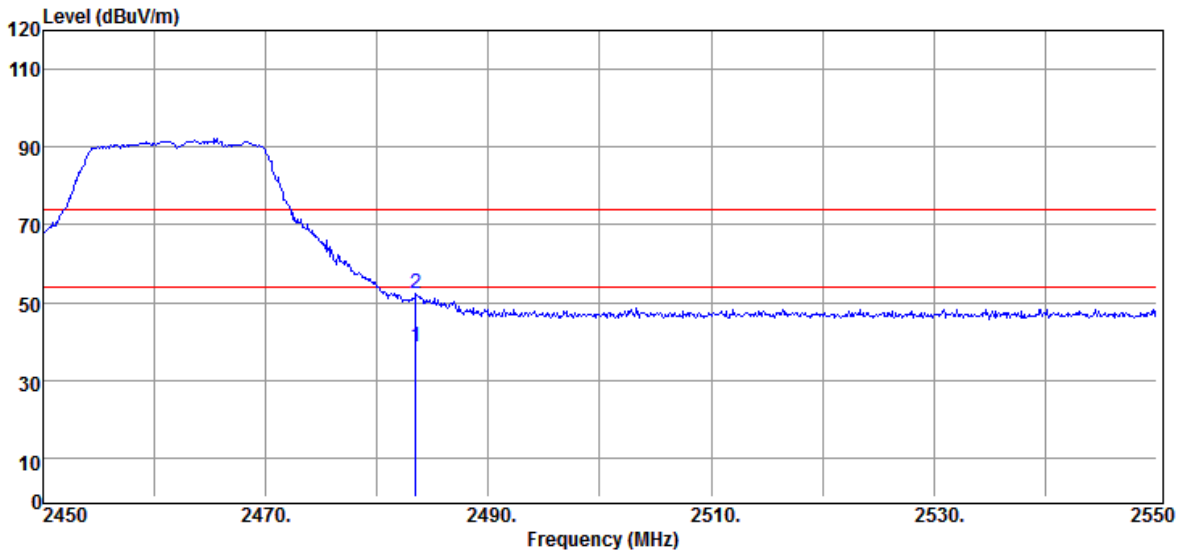
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Operation Mode	:802.11g	Test Date	:2018-08-22
Test Mode	:BE CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	43.65	-4.90	38.75	54.00	-15.25
2483.50	Peak	57.28	-4.90	52.38	74.00	-21.62

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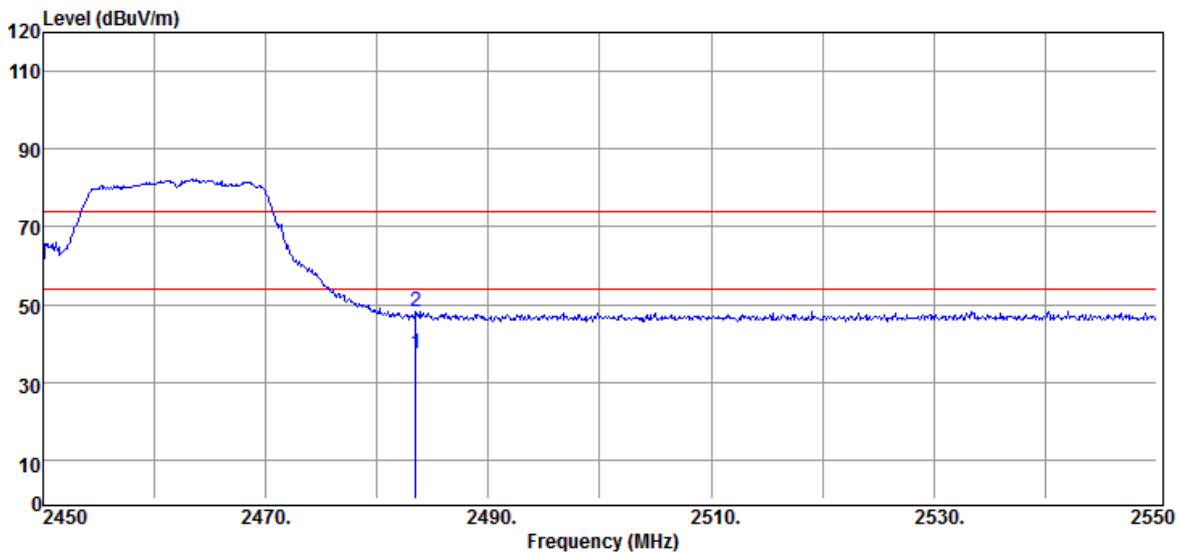
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Operation Mode	:802.11g	Test Date	:2018-08-22
Test Mode	:BE CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	42.33	-4.90	37.43	54.00	-16.57
2483.50	Peak	53.04	-4.90	48.14	74.00	-25.86

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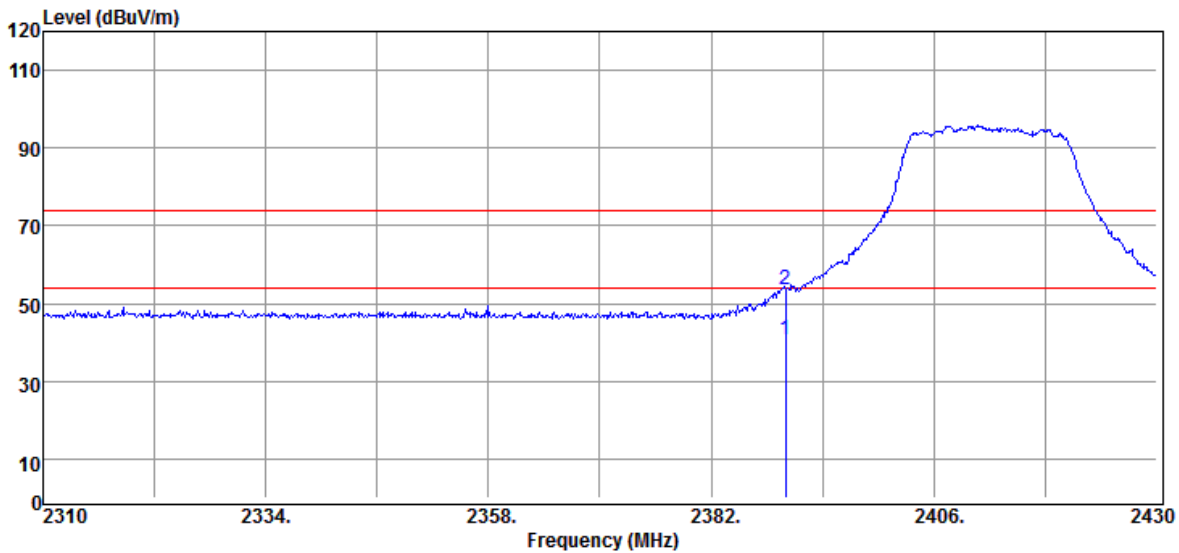
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### Radiated Band Edge Measurement Result (802.11\_HT20)

Operation Mode	:802.11n20	Test Date	:2018-08-22
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2402 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2390.00	Average	46.32	-5.57	40.75	54.00	-13.25
2390.00	Peak	59.30	-5.57	53.73	74.00	-20.27

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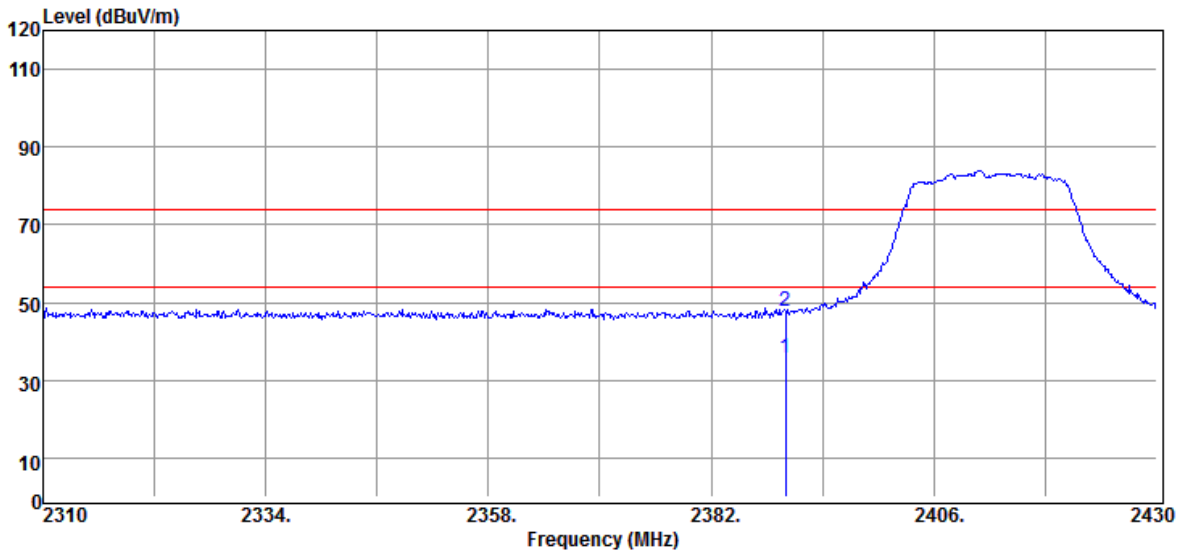
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Operation Mode	:802.11n20	Test Date	:2018-08-22
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2402 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2390.00	Average	41.28	-5.57	35.71	54.00	-18.29
2390.00	Peak	53.48	-5.57	47.91	74.00	-26.09

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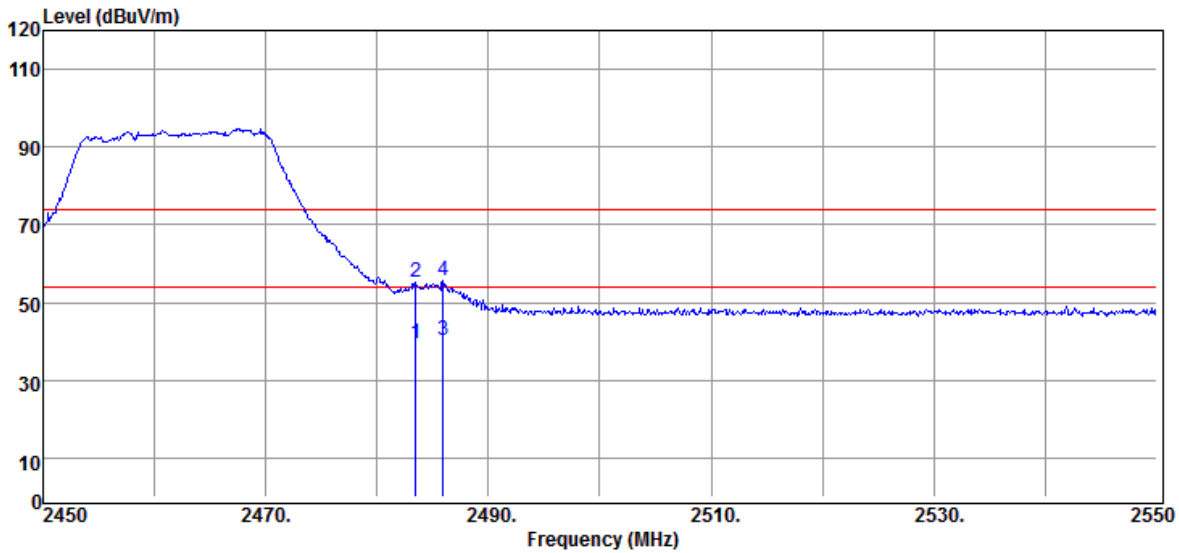
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Operation Mode	:802.11n20	Test Date	:2018-08-22
Test Mode	:BE CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2483.50	Average	44.28	-4.90	39.38	54.00	-14.62
2483.50	Peak	59.96	-4.90	55.06	74.00	-18.94
2485.90	Average	45.23	-4.88	40.35	54.00	-13.65
2485.90	Peak	60.46	-4.88	55.58	74.00	-18.42

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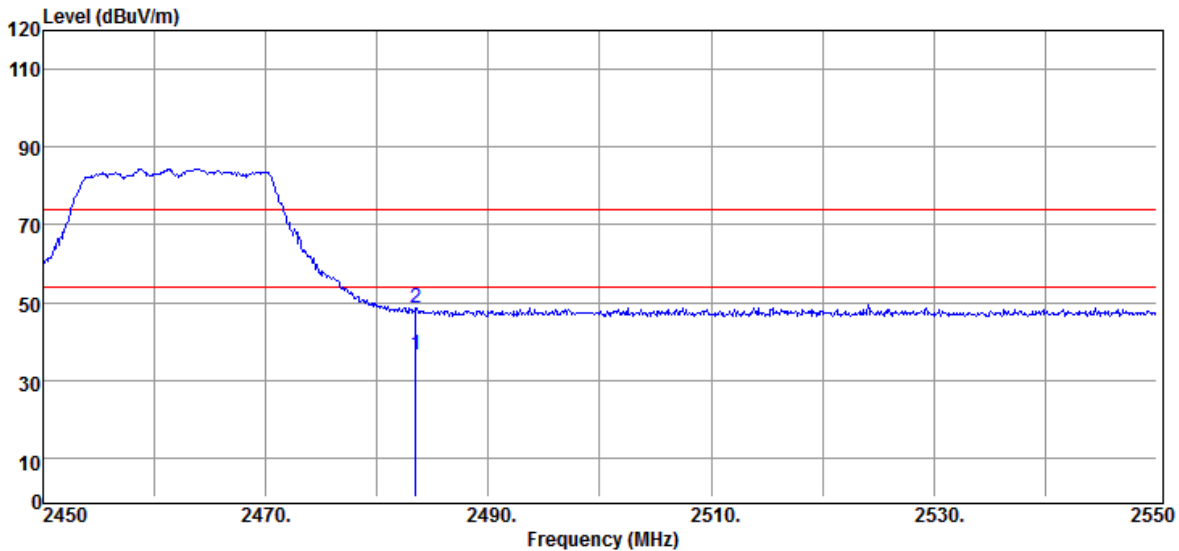
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Operation Mode	:802.11n20	Test Date	:2018-08-22
Test Mode	:BE CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	41.51	-4.90	36.61	54.00	-17.39
2483.50	Peak	53.49	-4.90	48.59	74.00	-25.41

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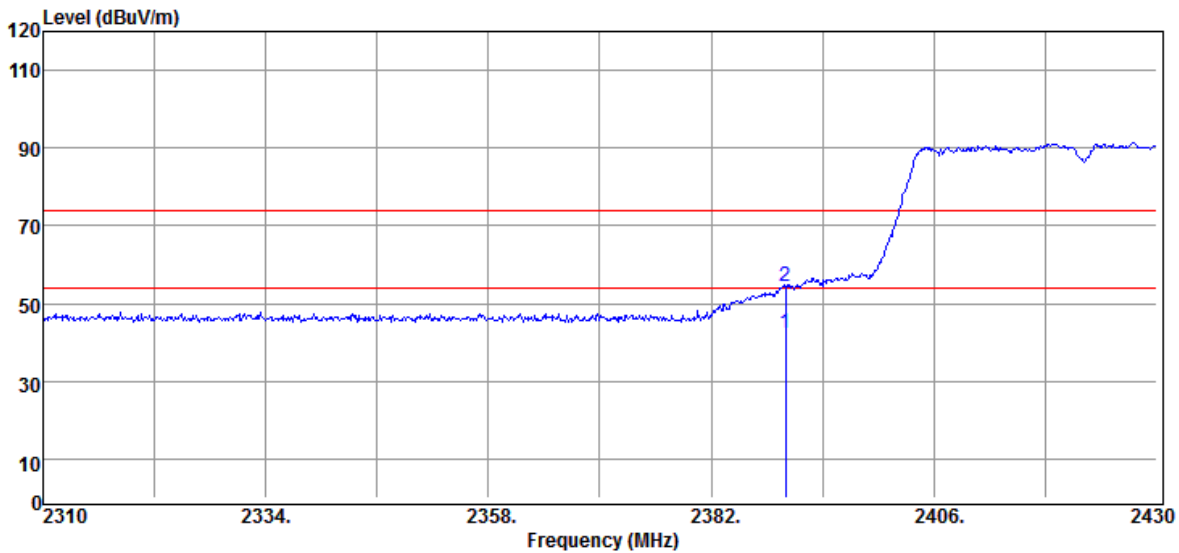
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### Radiated Band Edge Measurement Result (802.11\_HT40)

Operation Mode	:802.11n40	Test Date	:2018-08-22
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2422 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2390.00	Average	48.10	-5.57	42.53	54.00	-11.47
2390.00	Peak	60.06	-5.57	54.49	74.00	-19.51

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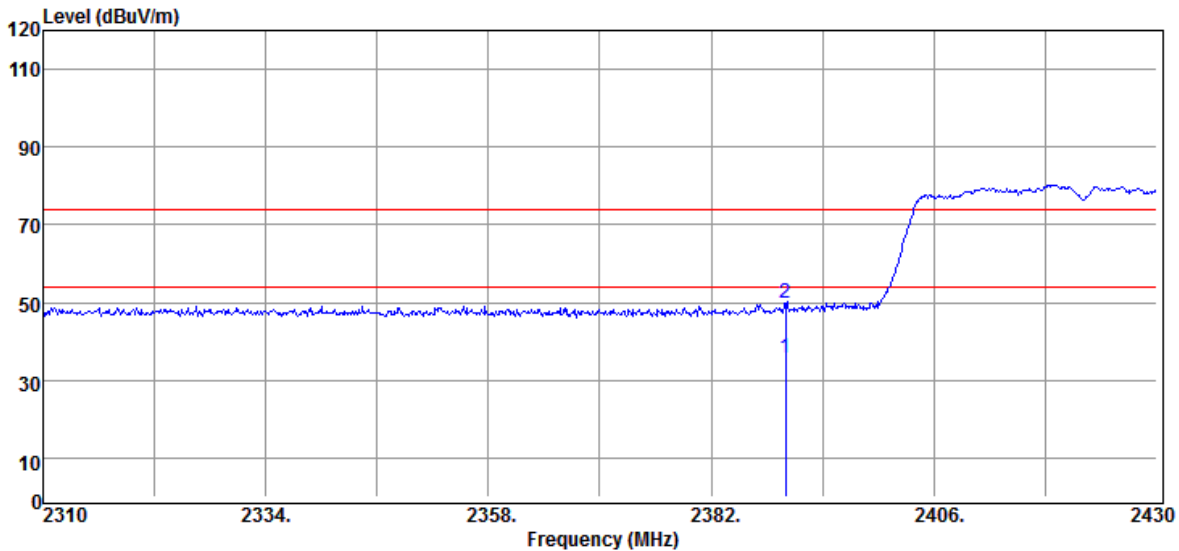
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Operation Mode	:802.11n40	Test Date	:2018-08-22
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2422 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2390.00	Average	41.22	-5.57	35.65	54.00	-18.35
2390.00	Peak	55.57	-5.57	50.00	74.00	-24.00

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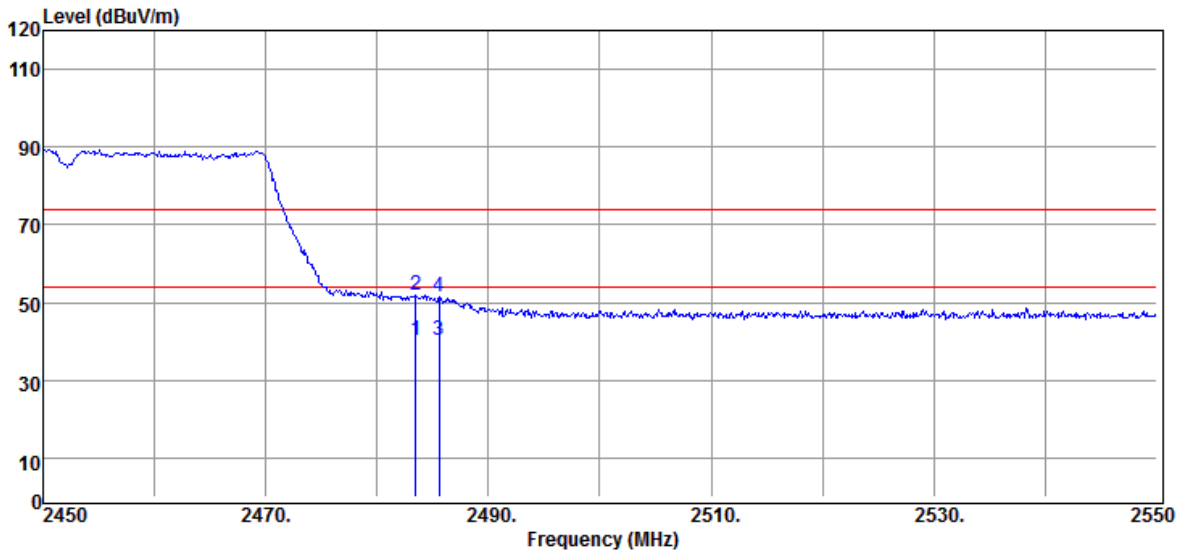
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Operation Mode	:802.11n40	Test Date	:2018-08-22
Test Mode	:BE CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2452 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2483.50	Average	44.99	-4.90	40.09	54.00	-13.91
2483.50	Peak	56.64	-4.90	51.74	74.00	-22.26
2485.60	Average	45.03	-4.88	40.15	54.00	-13.85
2485.60	Peak	56.26	-4.88	51.38	74.00	-22.62

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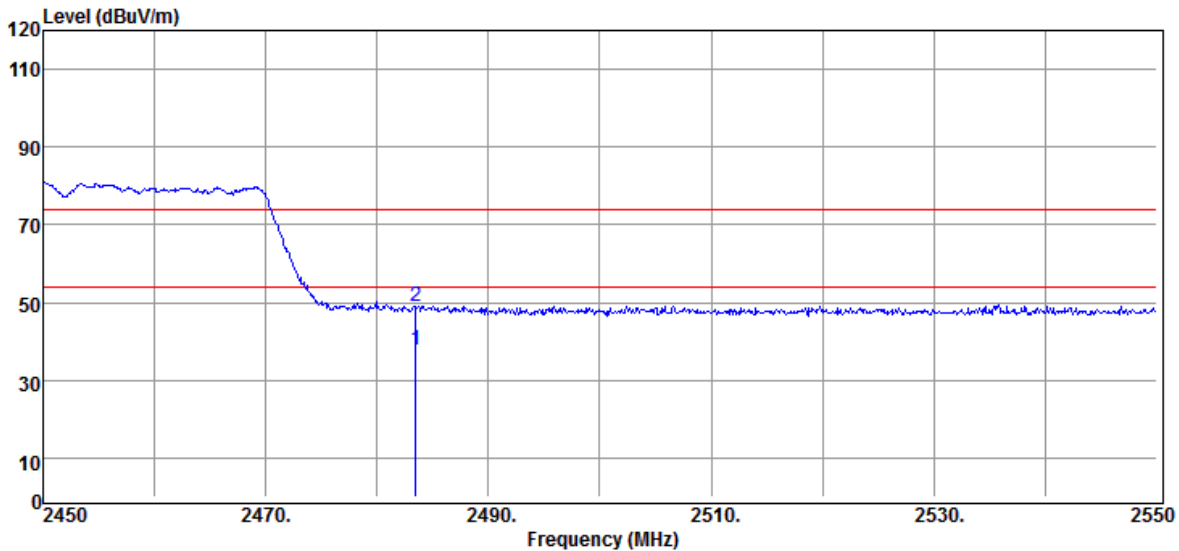
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Operation Mode	:802.11n40	Test Date	:2018-08-22
Test Mode	:BE CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2452 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2483.50	Average	42.51	-4.90	37.61	54.00	-16.39
2483.50	Peak	53.89	-4.90	48.99	74.00	-25.01

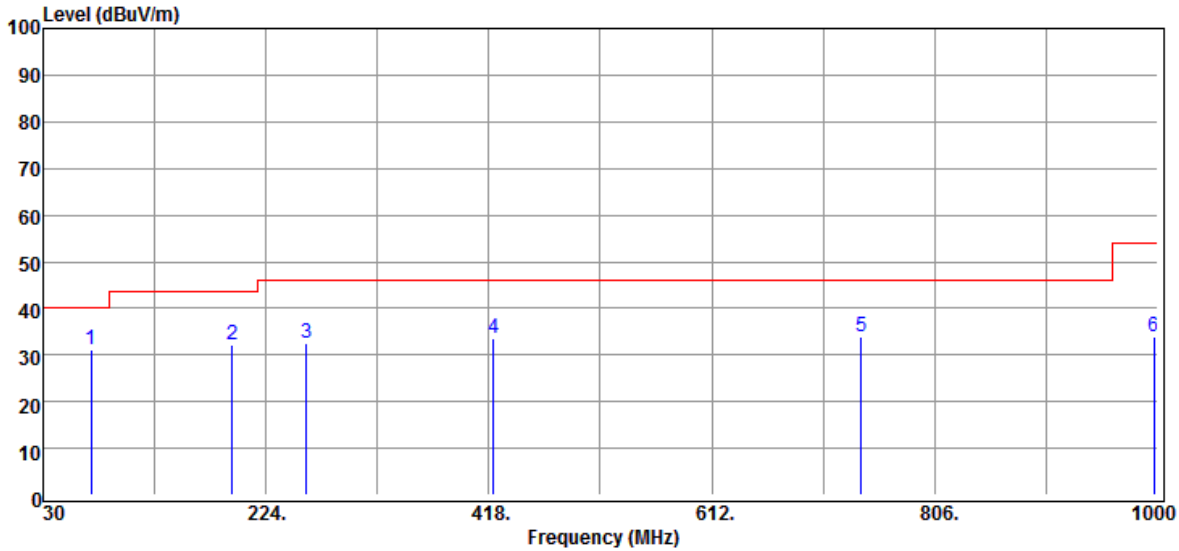
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**Below 1GHz Worst-Case Data:**

**Radiated Spurious Emission Measurement Result (802.11 g)**

Operation Mode	:802.11g	Test Date	:2018-08-21
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
71.71	Peak	50.91	-19.83	31.08	40.00	-8.92
194.90	Peak	50.56	-18.48	32.08	43.50	-11.42
258.92	Peak	49.33	-16.69	32.64	46.00	-13.36
421.88	Peak	45.90	-12.19	33.71	46.00	-12.29
741.98	Peak	40.74	-6.91	33.83	46.00	-12.17
997.09	Peak	37.63	-3.80	33.83	54.00	-20.17

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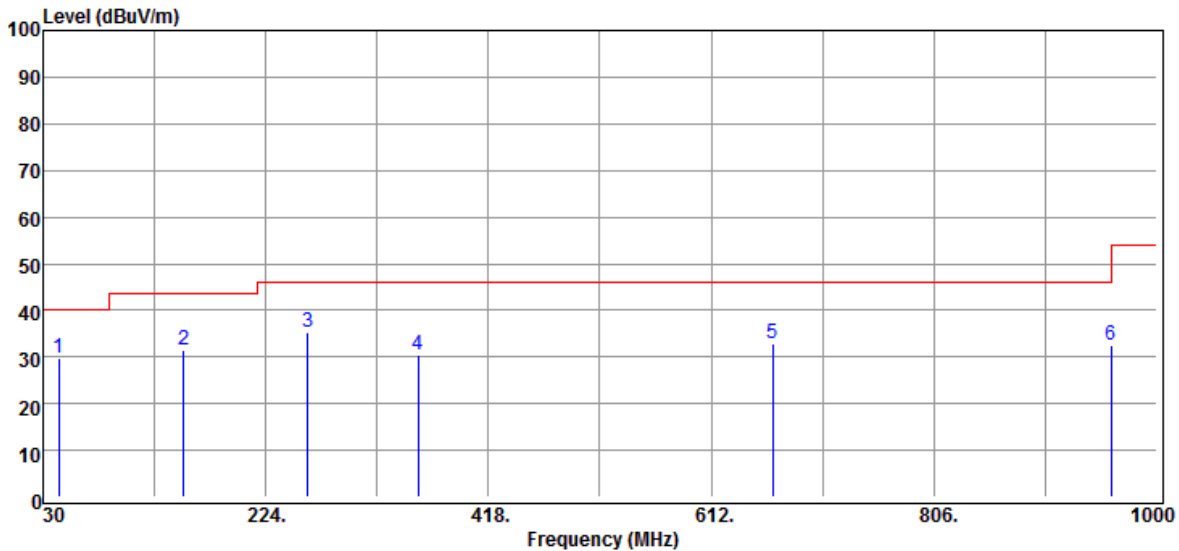
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Operation Mode	:802.11g	Test Date	:2018-08-21
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
43.58	Peak	52.68	-22.95	29.73	40.00	-10.27
152.22	Peak	47.54	-16.16	31.38	43.50	-12.12
260.86	Peak	52.00	-16.64	35.36	46.00	-10.64
356.89	Peak	44.17	-13.81	30.36	46.00	-15.64
665.35	Peak	41.80	-8.76	33.04	46.00	-12.96
960.23	Peak	36.72	-4.07	32.65	54.00	-21.35

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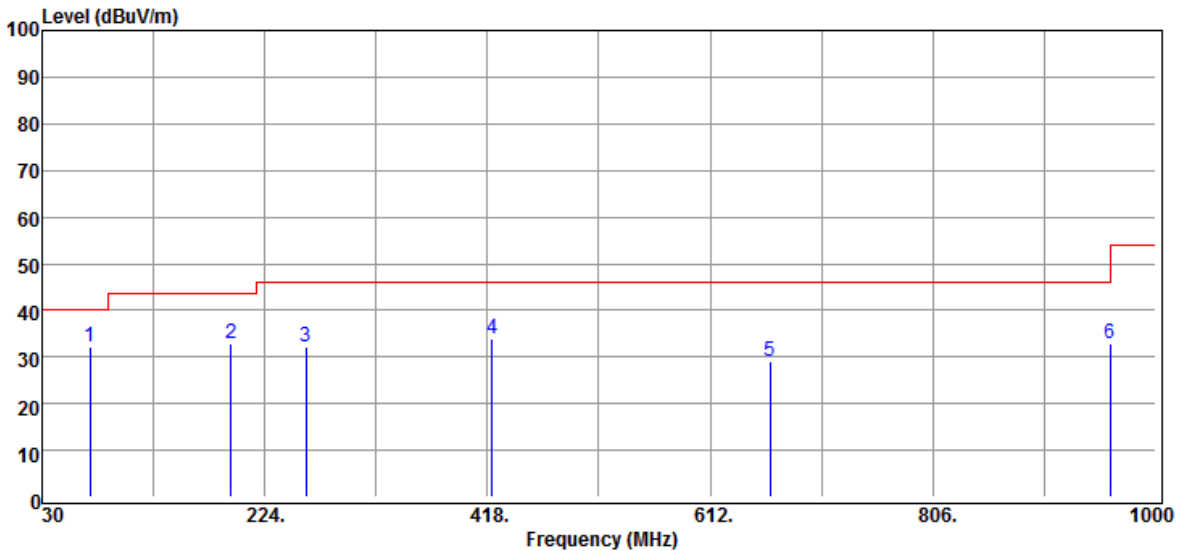
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Operation Mode	:802.11g	Test Date	:2018-08-21
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
71.71	Peak	52.15	-19.83	32.32	40.00	-7.68
194.90	Peak	51.50	-18.48	33.02	43.50	-10.48
259.89	Peak	48.75	-16.68	32.07	46.00	-13.93
421.88	Peak	45.98	-12.19	33.79	46.00	-12.21
664.38	Peak	37.78	-8.78	29.00	46.00	-17.00
960.23	Peak	37.09	-4.07	33.02	54.00	-20.98

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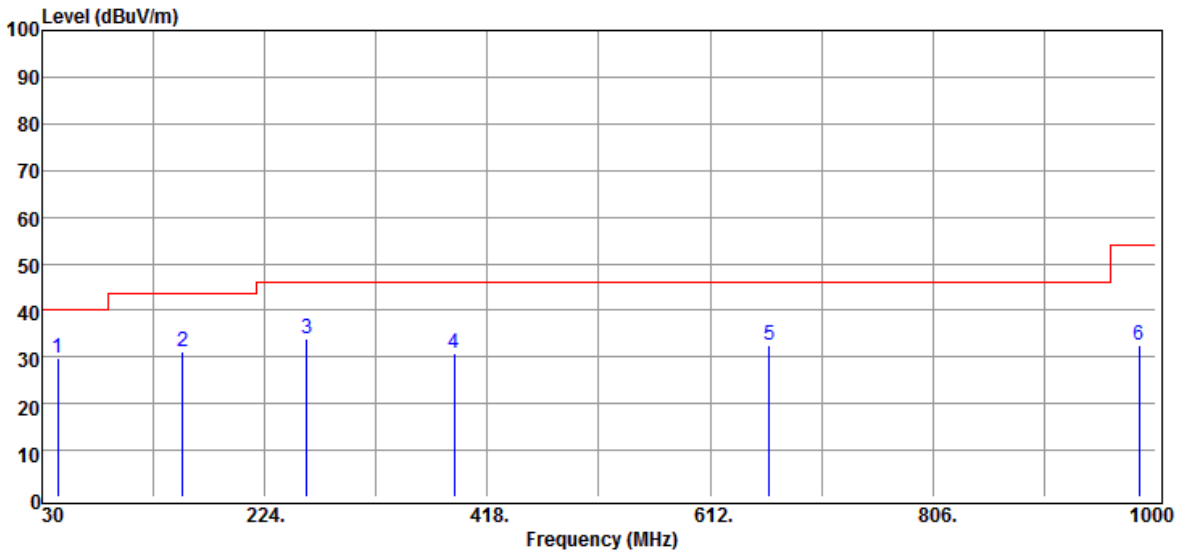
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Operation Mode	:802.11g	Test Date	:2018-08-21
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
43.58	Peak	52.87	-22.95	29.92	40.00	-10.08
152.22	Peak	47.46	-16.16	31.30	43.50	-12.20
260.86	Peak	50.69	-16.64	34.05	46.00	-11.95
388.90	Peak	43.82	-13.07	30.75	46.00	-15.25
663.41	Peak	41.47	-8.80	32.67	46.00	-13.33
985.45	Peak	36.08	-3.70	32.38	54.00	-21.62

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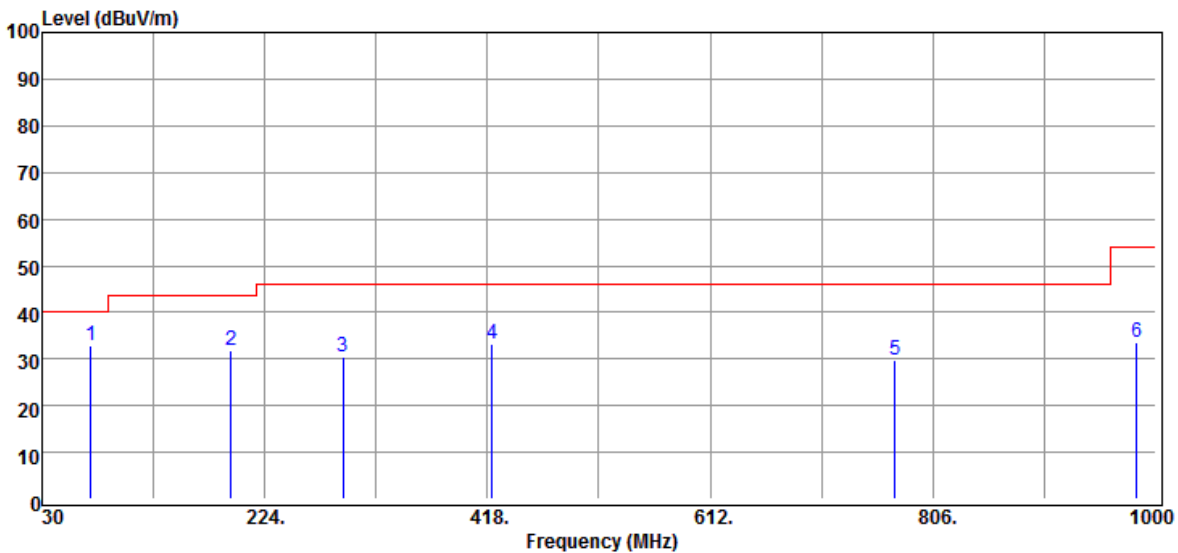
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Operation Mode	:802.11g	Test Date	:2018-08-21
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
72.68	Peak	53.02	-20.03	32.99	40.00	-7.01
194.90	Peak	50.30	-18.48	31.82	43.50	-11.68
291.90	Peak	46.01	-15.50	30.51	46.00	-15.49
421.88	Peak	45.29	-12.19	33.10	46.00	-12.90
773.02	Peak	36.89	-6.97	29.92	46.00	-16.08
983.51	Peak	37.15	-3.62	33.53	54.00	-20.47

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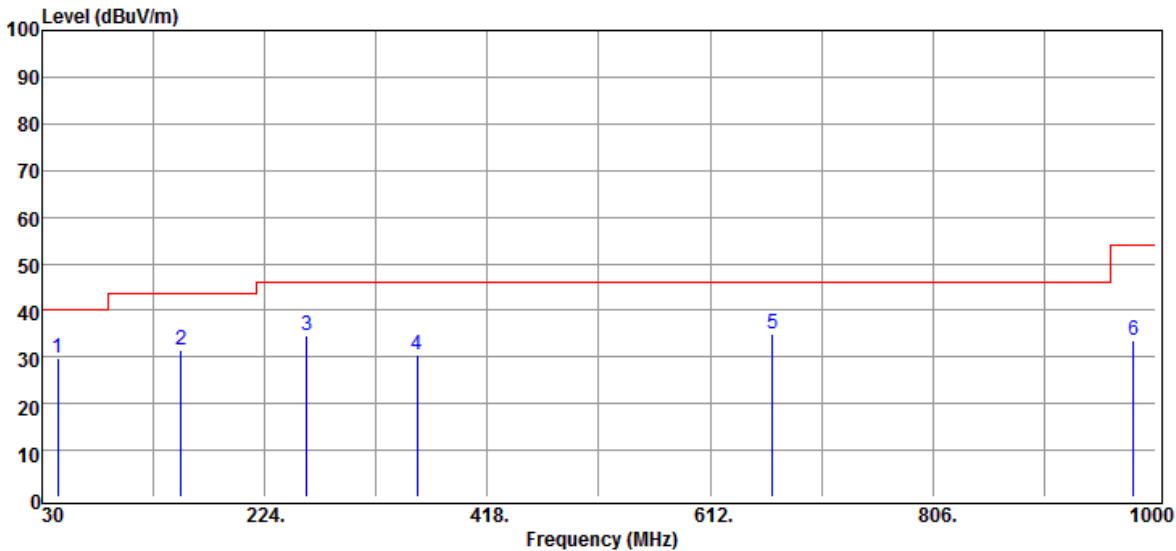
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Operation Mode	:802.11g	Test Date	:2018-08-21
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
43.58	Peak	52.61	-22.95	29.66	40.00	-10.34
151.25	Peak	47.78	-16.17	31.61	43.50	-11.89
260.86	Peak	51.12	-16.64	34.48	46.00	-11.52
356.89	Peak	44.40	-13.81	30.59	46.00	-15.41
666.32	Peak	43.73	-8.72	35.01	46.00	-10.99
980.60	Peak	37.05	-3.50	33.55	54.00	-20.45

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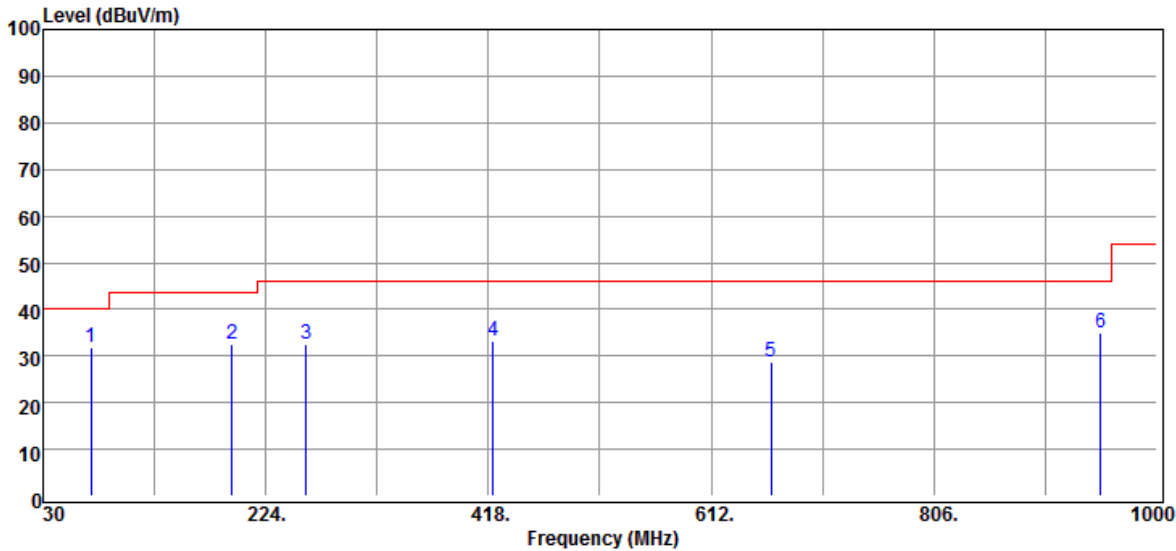
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### Radiated Spurious Emission Measurement Result (802.11n 40)

Operation Mode	:802.11n40	Test Date	:2018-08-21
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2422 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
71.71	Peak	51.70	-19.83	31.87	40.00	-8.13
194.90	Peak	51.04	-18.48	32.56	43.50	-10.94
258.92	Peak	49.08	-16.69	32.39	46.00	-13.61
421.88	Peak	45.58	-12.19	33.39	46.00	-12.61
664.38	Peak	37.63	-8.78	28.85	46.00	-17.15
951.50	Peak	39.46	-4.59	34.87	46.00	-11.13

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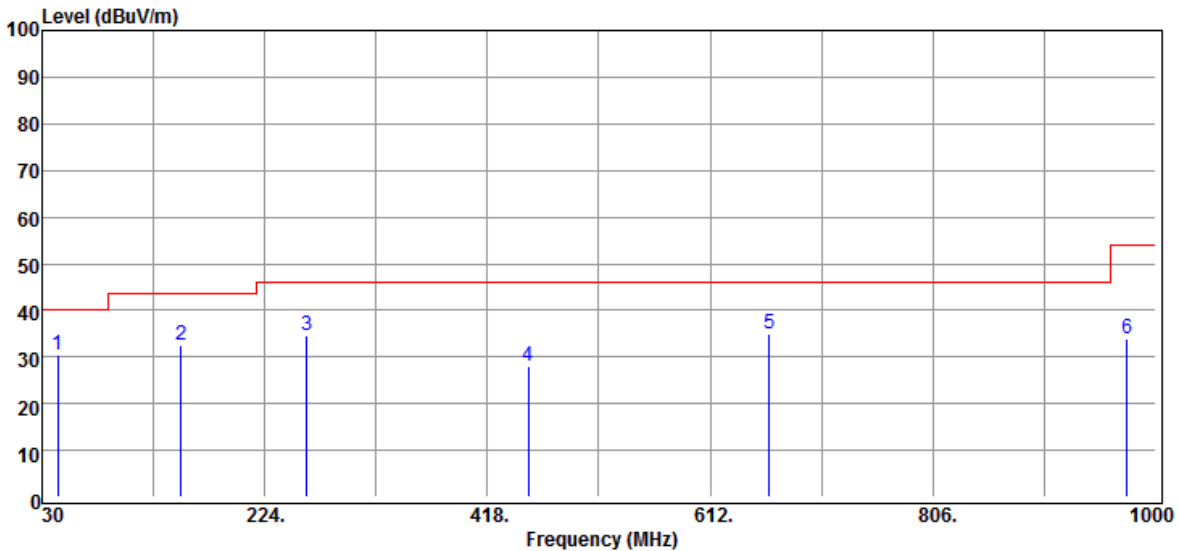
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Operation Mode :802.11n40  
 Test Mode :Tx CH Low  
 EUT Pol :E1 Plan  
 Test Channel :2422 MHz

Test Date :2018-08-21  
 Temp./Humi. :25/60  
 Antenna Pol. :HORIZONTAL  
 Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
43.58	Peak	53.28	-22.95	30.33	40.00	-9.67
151.25	Peak	48.52	-16.17	32.35	43.50	-11.15
260.86	Peak	51.27	-16.64	34.63	46.00	-11.37
453.89	Peak	39.86	-11.74	28.12	46.00	-17.88
663.41	Peak	43.63	-8.80	34.83	46.00	-11.17
974.78	Peak	37.42	-3.38	34.04	54.00	-19.96

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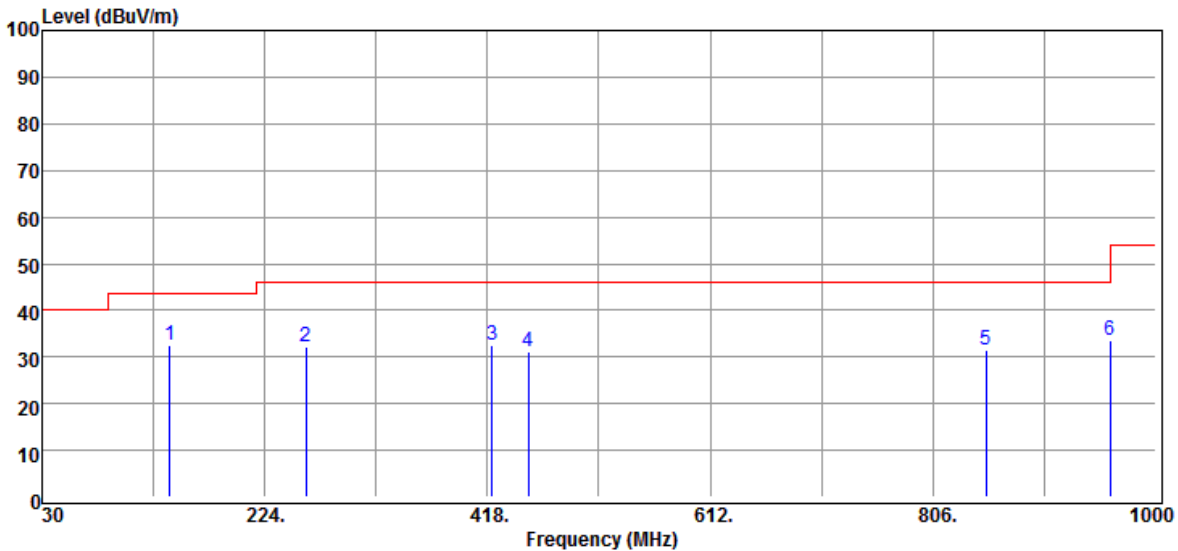
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Operation Mode	:802.11n40	Test Date	:2018-08-21
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
141.55	Peak	48.82	-16.44	32.38	43.50	-11.12
259.89	Peak	48.87	-16.68	32.19	46.00	-13.81
421.88	Peak	44.69	-12.19	32.50	46.00	-13.50
453.89	Peak	42.78	-11.74	31.04	46.00	-14.96
852.56	Peak	37.17	-5.67	31.50	46.00	-14.50
960.23	Peak	37.50	-4.07	33.43	54.00	-20.57

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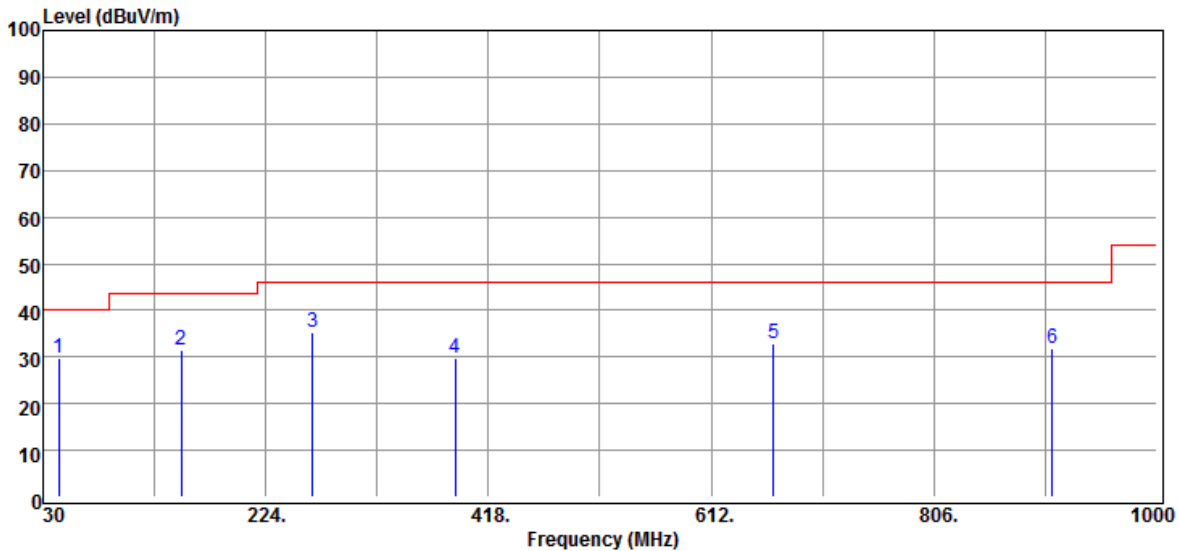
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Operation Mode	:802.11n40	Test Date	:2018-08-21
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
43.58	Peak	52.54	-22.95	29.59	40.00	-10.41
150.28	Peak	47.74	-16.15	31.59	43.50	-11.91
264.74	Peak	51.63	-16.47	35.16	46.00	-10.84
388.90	Peak	42.88	-13.07	29.81	46.00	-16.19
666.32	Peak	41.50	-8.72	32.78	46.00	-13.22
908.82	Peak	36.68	-4.77	31.91	46.00	-14.09

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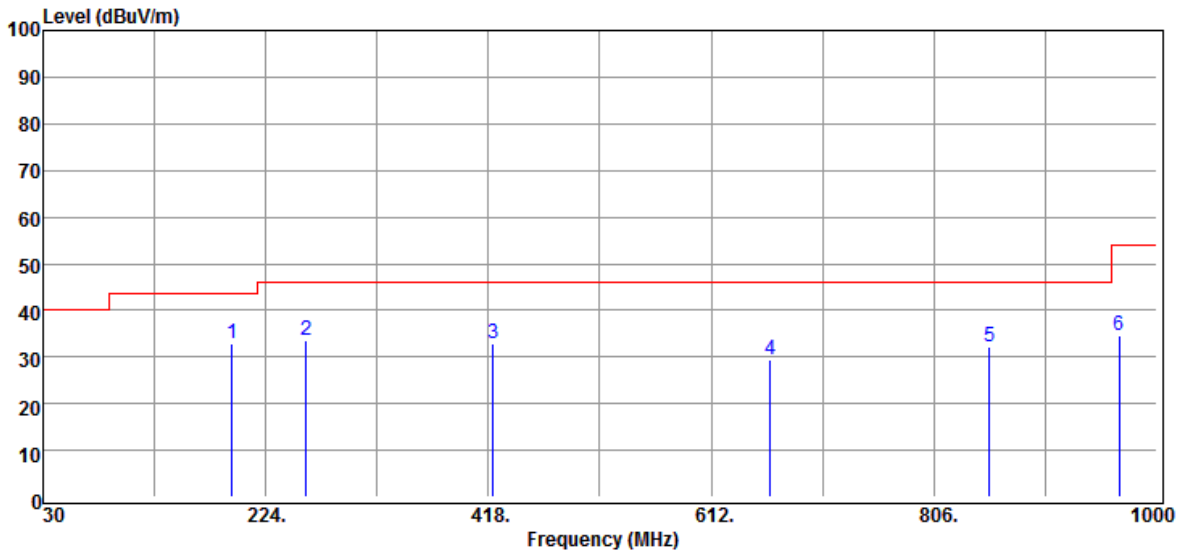
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Operation Mode	:802.11n40	Test Date	:2018-08-21
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2452 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
194.90	Peak	51.20	-18.48	32.72	43.50	-10.78
258.92	Peak	50.25	-16.69	33.56	46.00	-12.44
421.88	Peak	44.97	-12.19	32.78	46.00	-13.22
663.41	Peak	38.22	-8.80	29.42	46.00	-16.58
854.50	Peak	37.83	-5.60	32.23	46.00	-13.77
967.02	Peak	38.03	-3.53	34.50	54.00	-19.50

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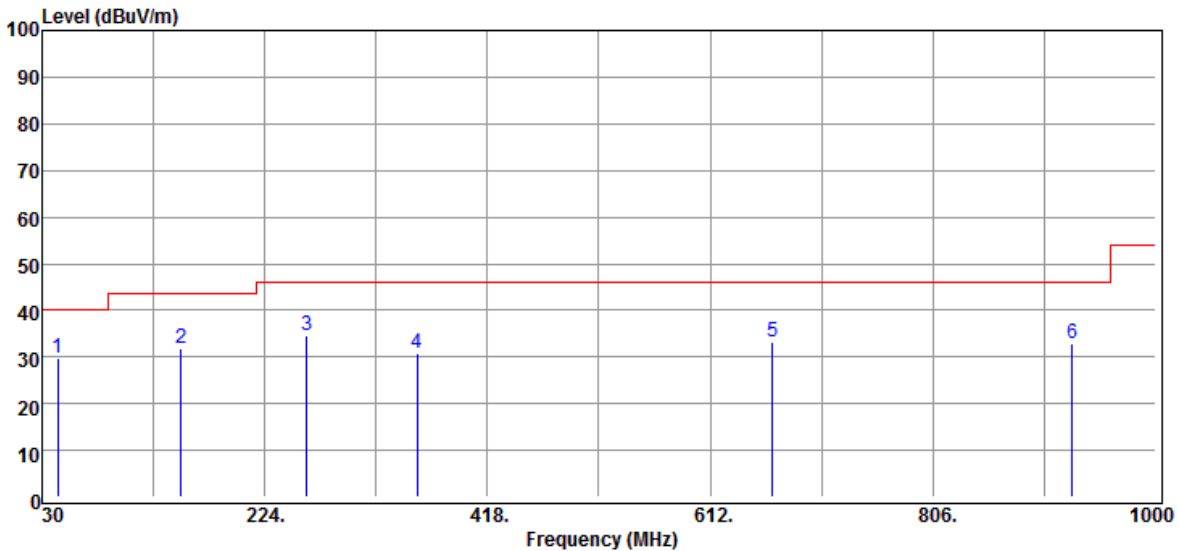
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Operation Mode :802.11n40  
 Test Mode :Tx CH High  
 EUT Pol :E1 Plan  
 Test Channel :2452 MHz

Test Date :2018-08-21  
 Temp./Humi. :25/60  
 Antenna Pol. :HORIZONTAL  
 Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
43.58	Peak	52.76	-22.95	29.81	40.00	-10.19
151.25	Peak	47.93	-16.17	31.76	43.50	-11.74
260.86	Peak	51.29	-16.64	34.65	46.00	-11.35
356.89	Peak	44.61	-13.81	30.80	46.00	-15.20
666.32	Peak	41.93	-8.72	33.21	46.00	-12.79
927.25	Peak	37.34	-4.41	32.93	46.00	-13.07

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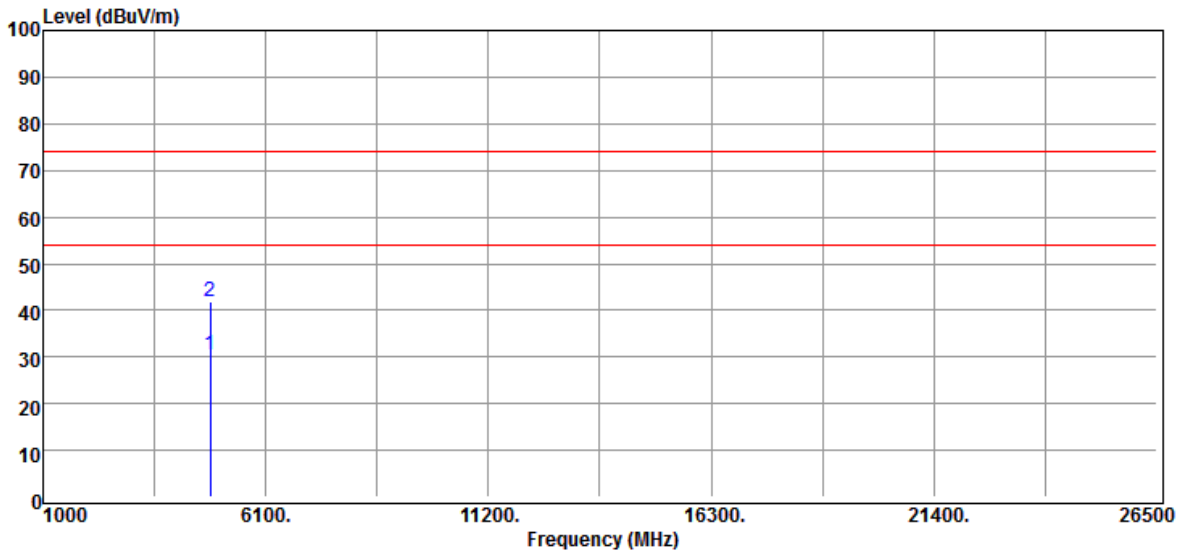
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**Above 1GHz Data:**

**Radiated Spurious Emission Measurement Result (802.11 b)**

Operation Mode	:802.11b	Test Date	:2018-08-22
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4824.00	Average	30.21	0.38	30.59	54.00	-23.41
4824.00	Peak	41.52	0.38	41.90	74.00	-32.10

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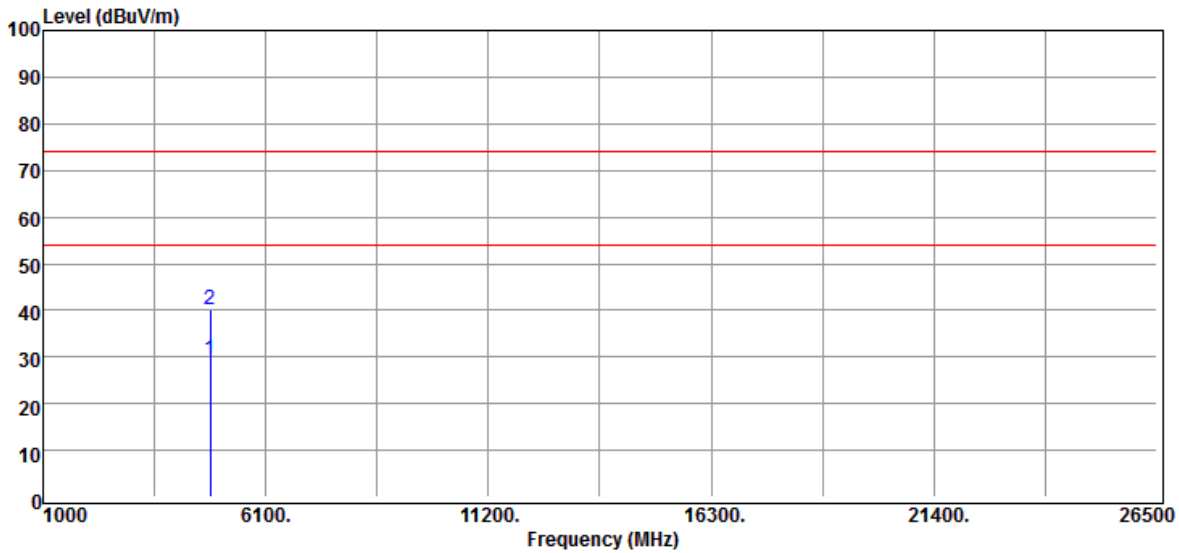
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Operation Mode	:802.11b	Test Date	:2018-08-22
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4824.00	Average	29.02	0.38	29.40	54.00	-24.60
4824.00	Peak	39.87	0.38	40.25	74.00	-33.75

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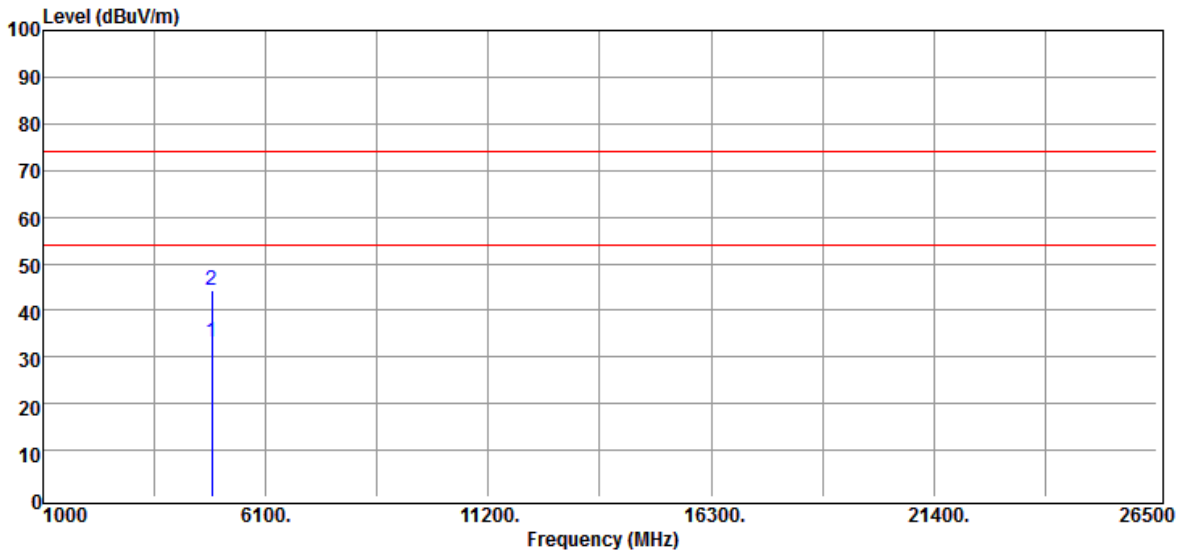
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Operation Mode	:802.11b	Test Date	:2018-08-22
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4874.00	Average	32.70	0.66	33.36	54.00	-20.64
4874.00	Peak	43.58	0.66	44.24	74.00	-29.76

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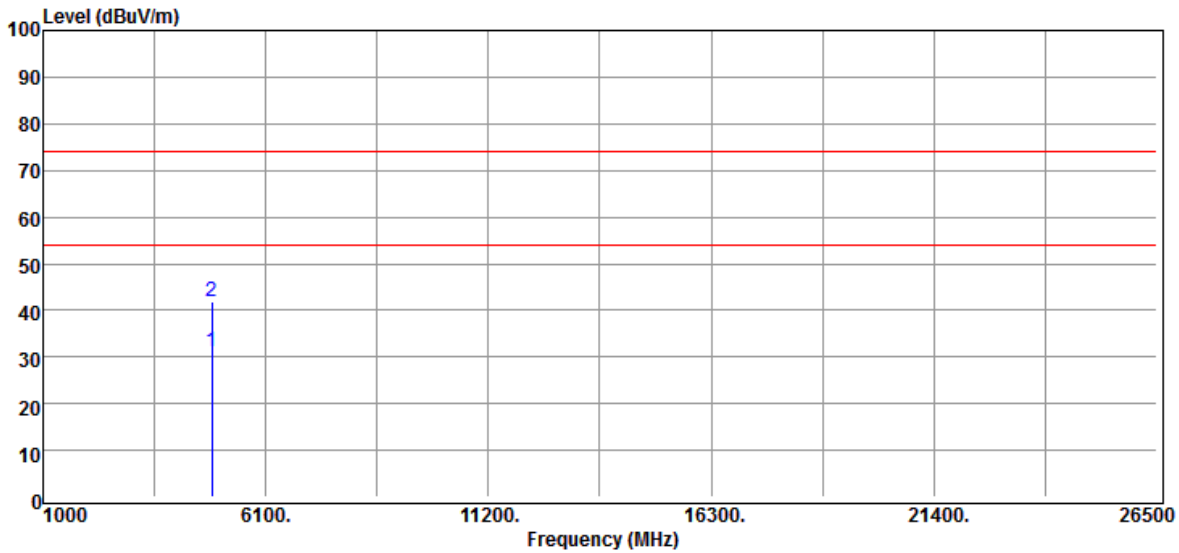
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Operation Mode	:802.11b	Test Date	:2018-08-22
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4874.00	Average	30.56	0.66	31.22	54.00	-22.78
4874.00	Peak	41.28	0.66	41.94	74.00	-32.06

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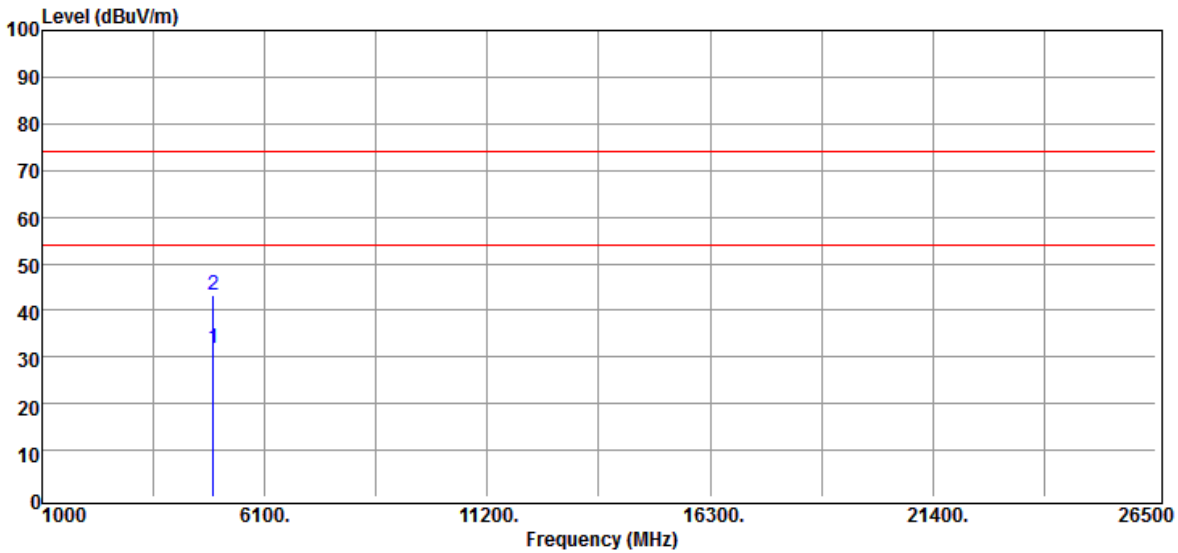
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Operation Mode	:802.11b	Test Date	:2018-08-22
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4924.00	Average	30.95	0.97	31.92	54.00	-22.08
4924.00	Peak	42.39	0.97	43.36	74.00	-30.64

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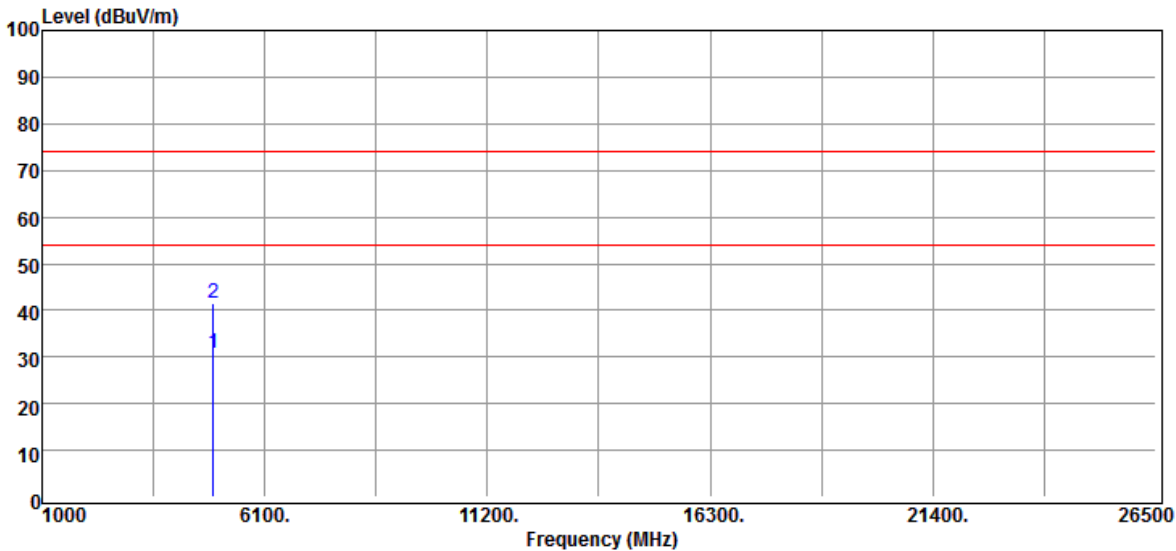
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Operation Mode	:802.11b	Test Date	:2018-08-22
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4924.00	Average	29.87	0.97	30.84	54.00	-23.16
4924.00	Peak	40.68	0.97	41.65	74.00	-32.35

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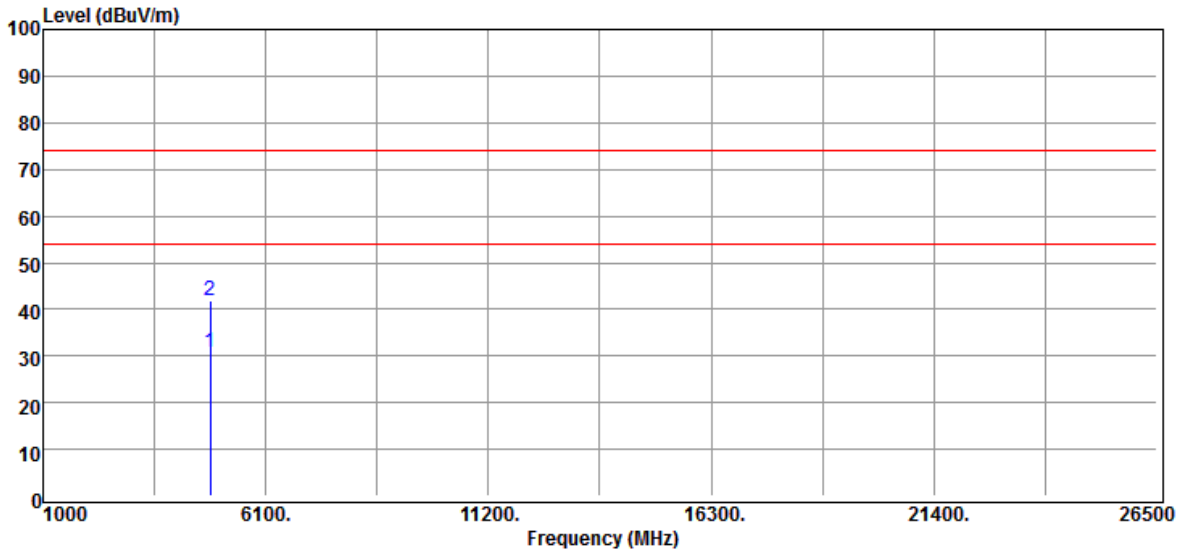
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### Radiated Spurious Emission Measurement Result (802.11 g)

Operation Mode	:802.11g	Test Date	:2018-08-22
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4824.00	Average	30.31	0.38	30.69	54.00	-23.31
4824.00	Peak	41.39	0.38	41.77	74.00	-32.23

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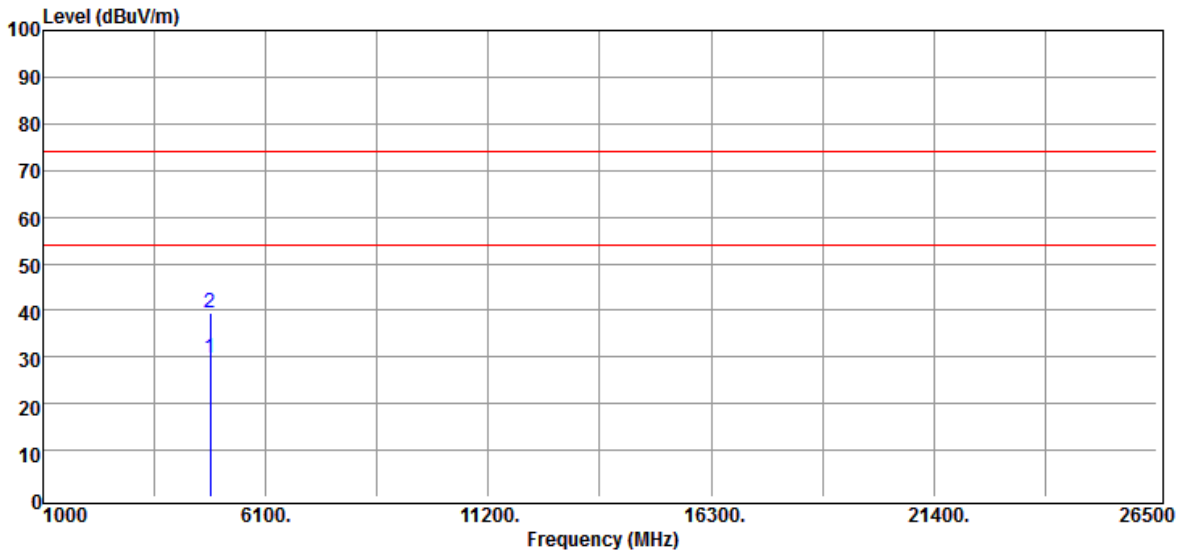
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Operation Mode	:802.11g	Test Date	:2018-08-22
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4824.00	Average	29.55	0.38	29.93	54.00	-24.07
4824.00	Peak	39.23	0.38	39.61	74.00	-34.39

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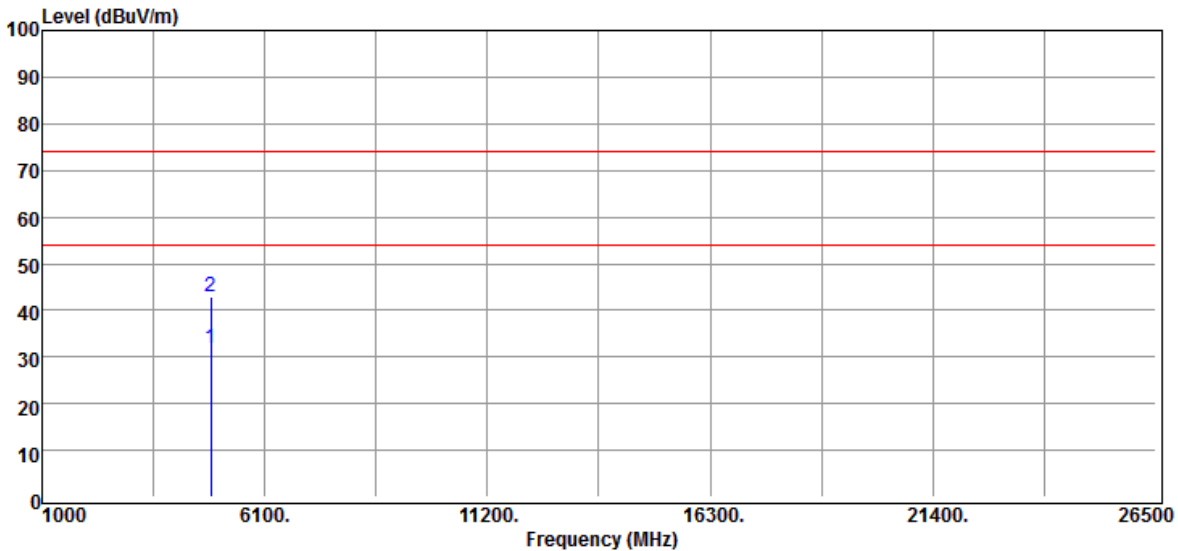
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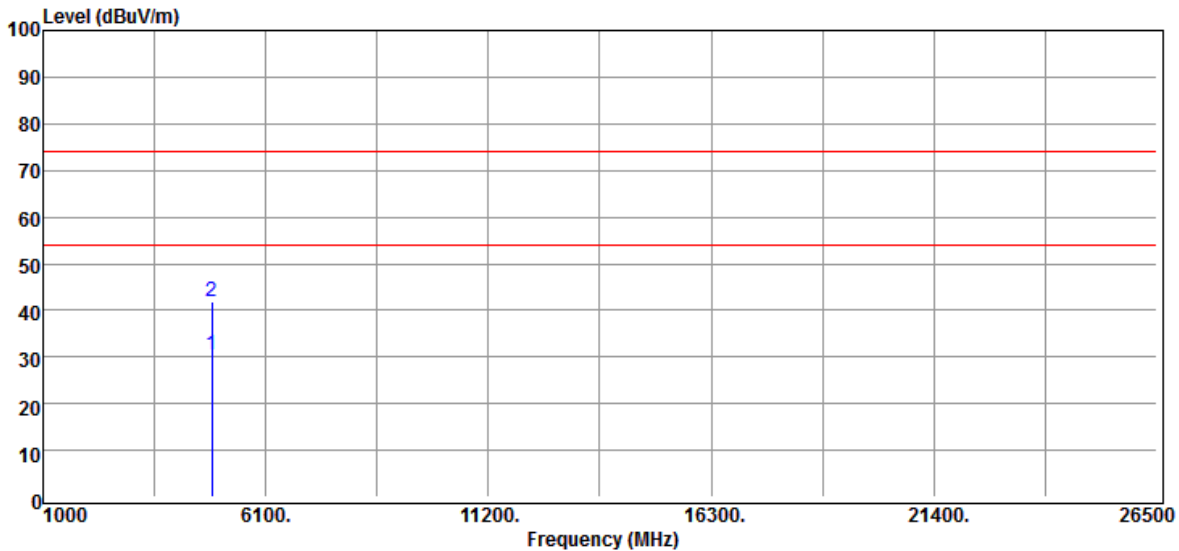
Operation Mode	:802.11g	Test Date	:2018-08-22
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4874.00	Average	31.22	0.66	31.88	54.00	-22.12
4874.00	Peak	42.37	0.66	43.03	74.00	-30.97

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Operation Mode	:802.11g	Test Date	:2018-08-22
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4874.00	Average	29.87	0.66	30.53	54.00	-23.47
4874.00	Peak	41.37	0.66	42.03	74.00	-31.97

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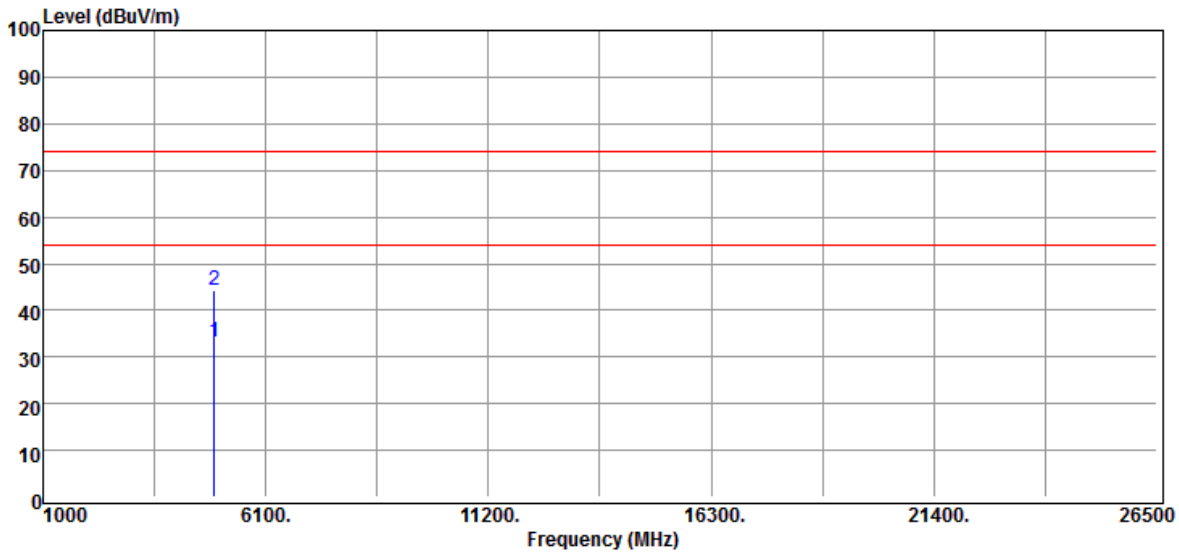
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Operation Mode	:802.11g	Test Date	:2018-08-22
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4924.00	Average	32.09	0.97	33.06	54.00	-20.94
4924.00	Peak	43.29	0.97	44.26	74.00	-29.74

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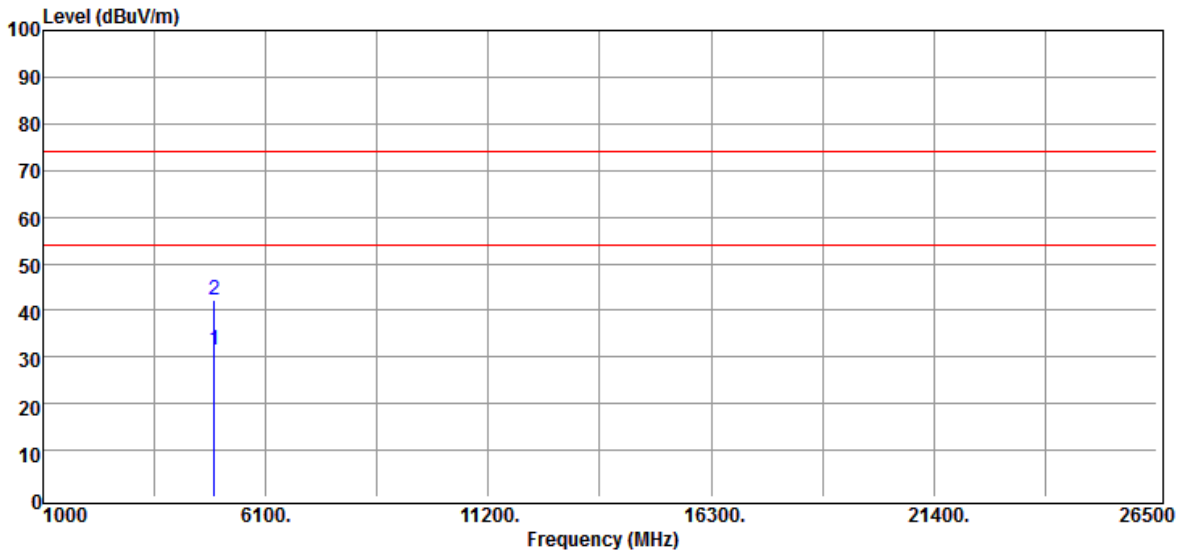
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Operation Mode	:802.11g	Test Date	:2018-08-22
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4924.00	Average	30.54	0.97	31.51	54.00	-22.49
4924.00	Peak	41.34	0.97	42.31	74.00	-31.69

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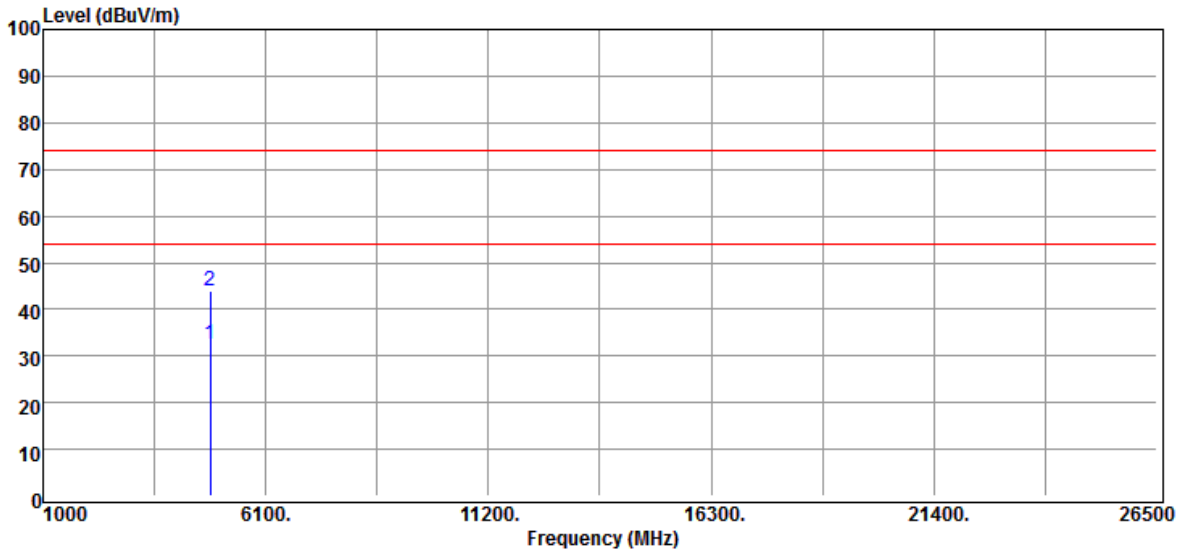
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### Radiated Spurious Emission Measurement Result (802.11n\_HT20)

Operation Mode	:802.11n20	Test Date	:2018-08-22
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4824.00	Average	32.11	0.38	32.49	54.00	-21.51
4824.00	Peak	43.52	0.38	43.90	74.00	-30.10

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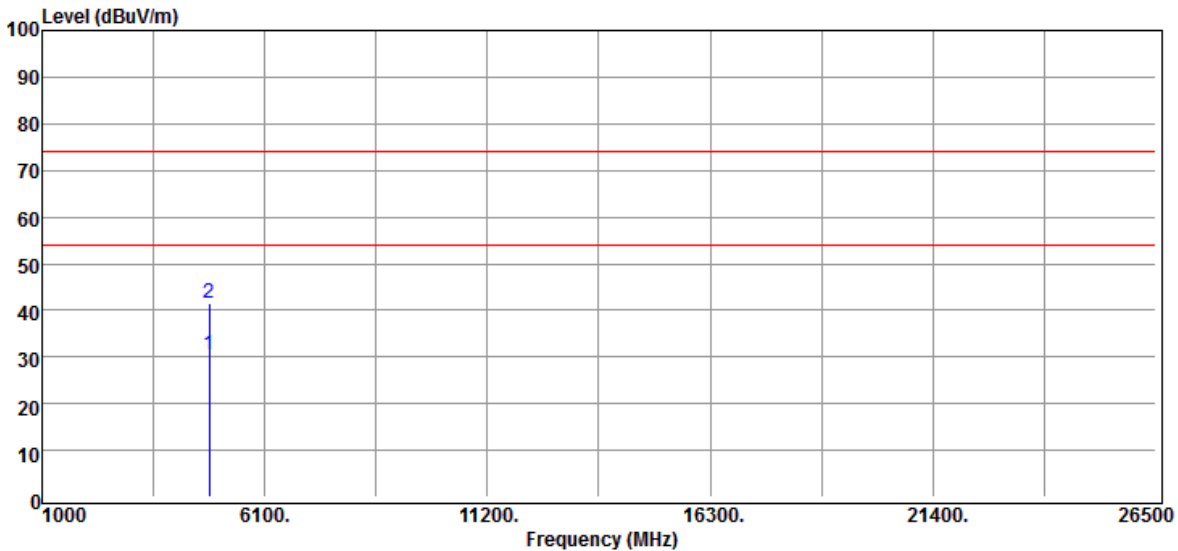
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Operation Mode	:802.11n20	Test Date	:2018-08-22
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4824.00	Average	30.13	0.38	30.51	54.00	-23.49
4824.00	Peak	41.25	0.38	41.63	74.00	-32.37

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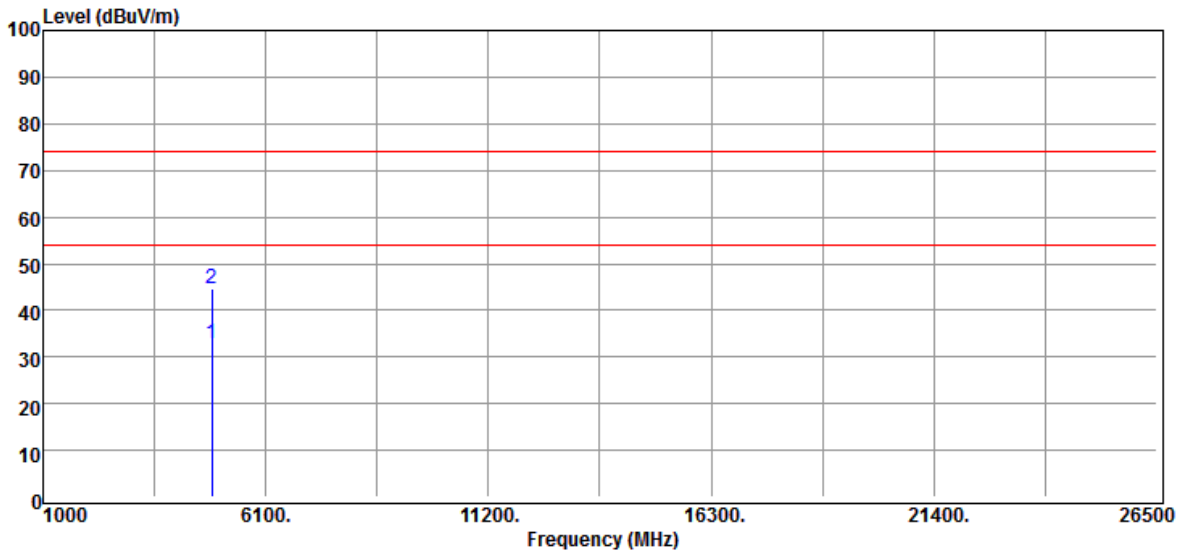
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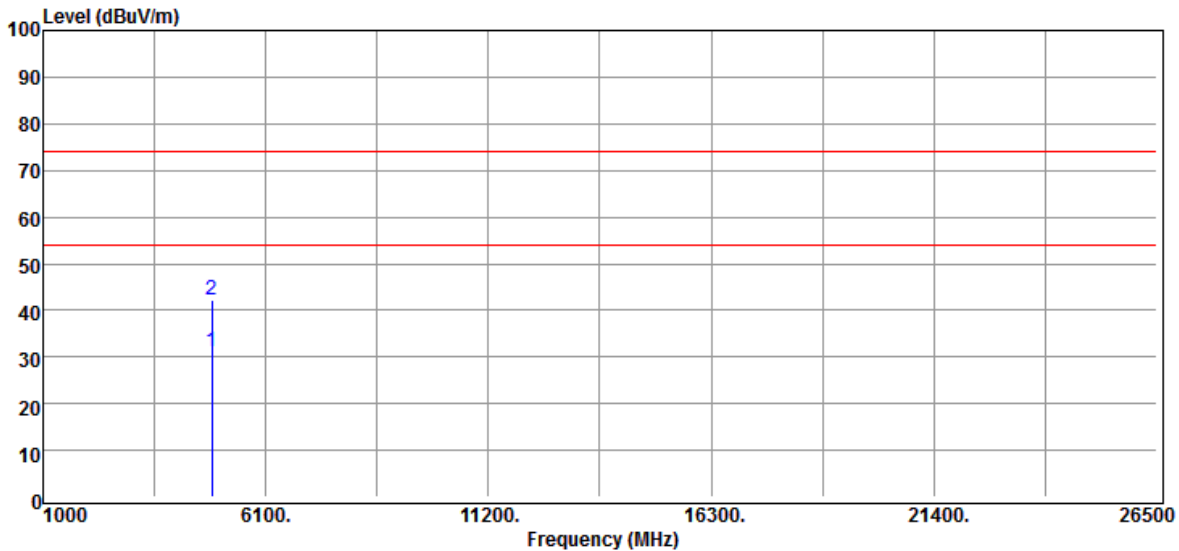
Operation Mode	:802.11n20	Test Date	:2018-08-22
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4874.00	Average	32.36	0.66	33.02	54.00	-20.98
4874.00	Peak	43.88	0.66	44.54	74.00	-29.46

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Operation Mode	:802.11n20	Test Date	:2018-08-22
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4874.00	Average	30.33	0.66	30.99	54.00	-23.01
4874.00	Peak	41.69	0.66	42.35	74.00	-31.65

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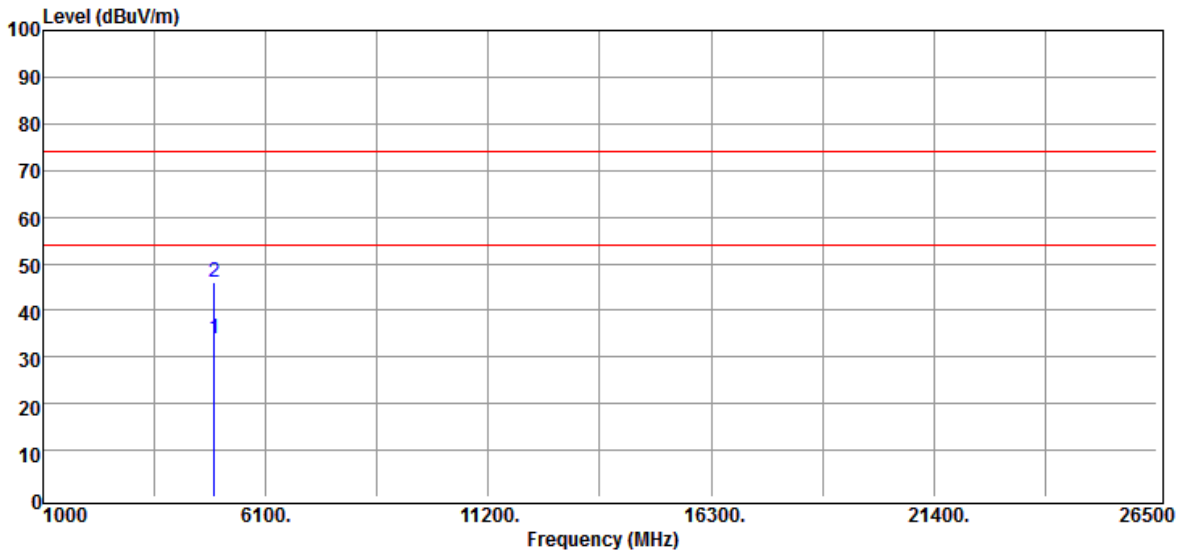
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Operation Mode	:802.11n20	Test Date	:2018-08-22
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4924.00	Average	32.90	0.97	33.87	54.00	-20.13
4924.00	Peak	45.04	0.97	46.01	74.00	-27.99

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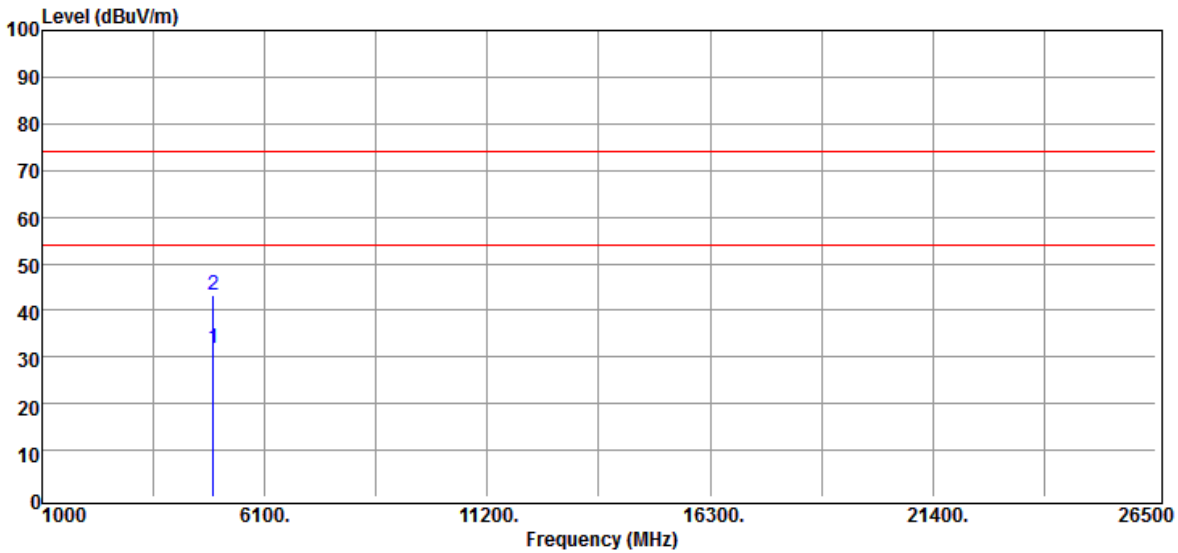
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Operation Mode	:802.11n20	Test Date	:2018-08-22
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4927.00	Average	30.67	1.00	31.67	54.00	-22.33
4927.00	Peak	42.39	1.00	43.39	74.00	-30.61

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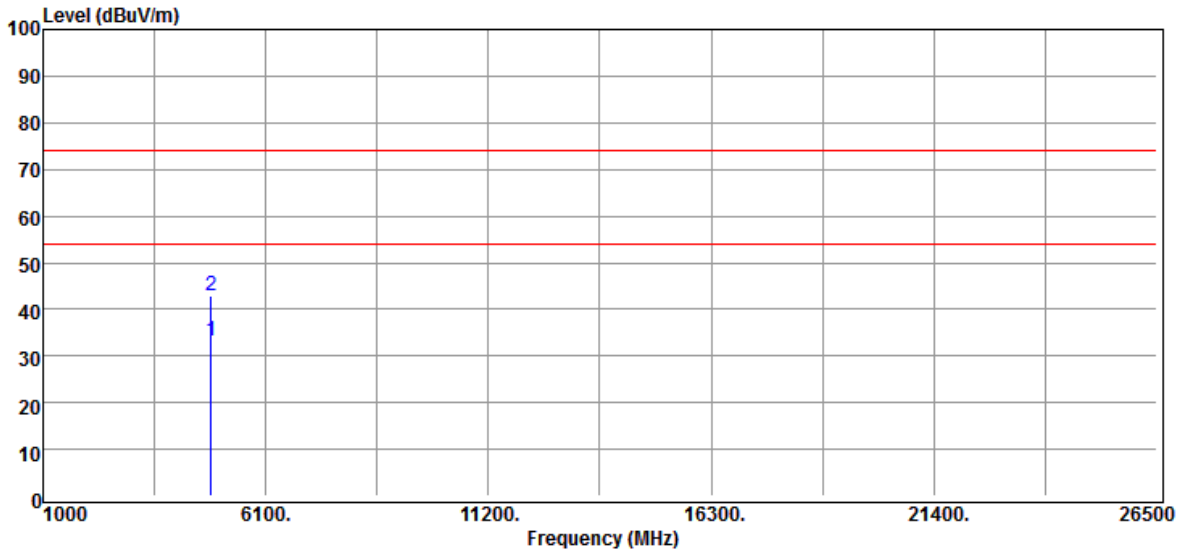
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### Radiated Spurious Emission Measurement Result (802.11n\_HT40)

Operation Mode	:802.11n40	Test Date	:2018-08-22
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2422 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4844.00	Average	32.68	0.49	33.17	54.00	-20.83
4844.00	Peak	42.35	0.49	42.84	74.00	-31.16

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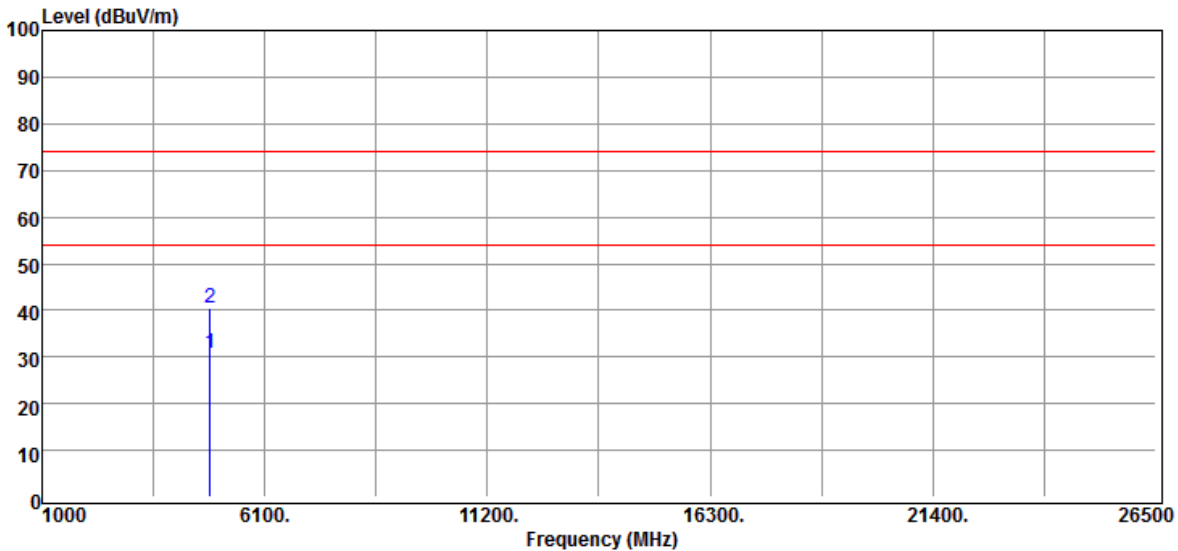
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Operation Mode	:802.11n40	Test Date	:2018-08-22
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2422 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4844.00	Average	30.36	0.49	30.85	54.00	-23.15
4844.00	Peak	40.13	0.49	40.62	74.00	-33.38

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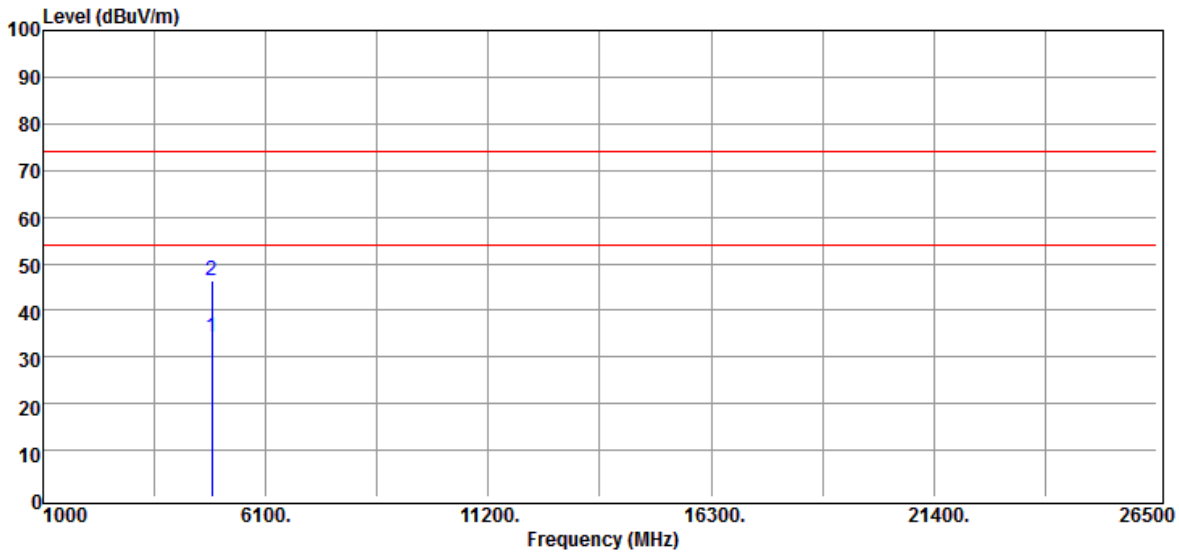
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Operation Mode	:802.11n40	Test Date	:2018-08-22
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4874.00	Average	33.72	0.66	34.38	54.00	-19.62
4874.00	Peak	45.63	0.66	46.29	74.00	-27.71

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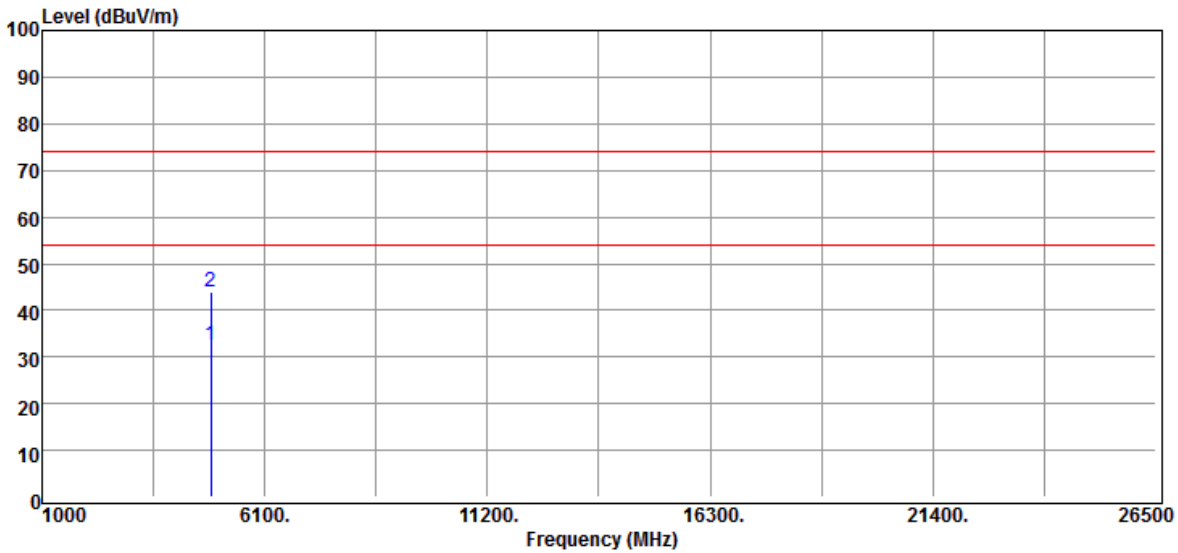
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Operation Mode	:802.11n40	Test Date	:2018-08-22
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4874.00	Average	31.90	0.66	32.56	54.00	-21.44
4874.00	Peak	43.28	0.66	43.94	74.00	-30.06

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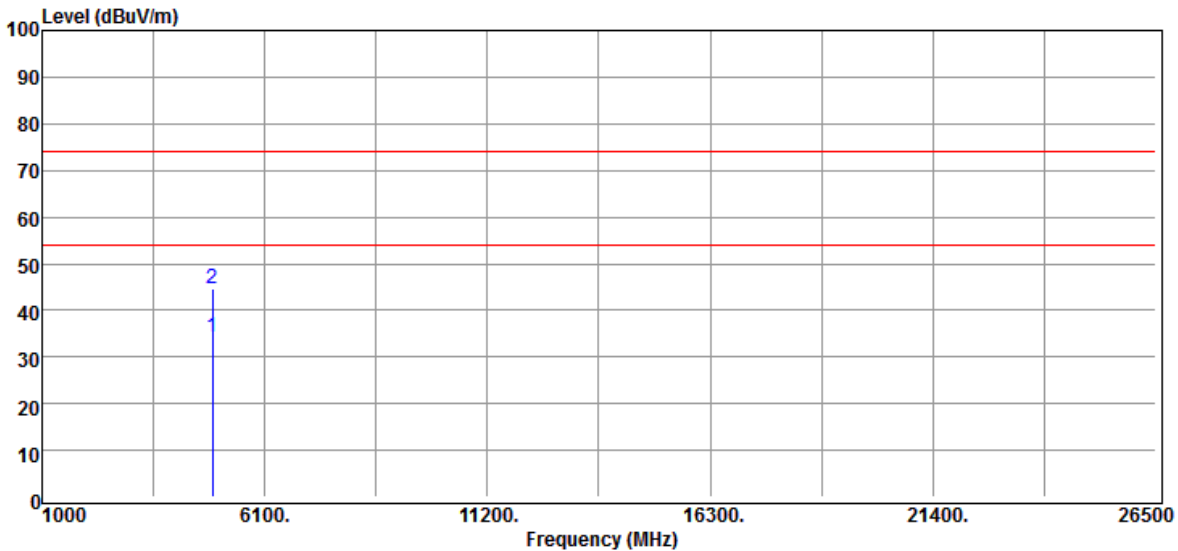
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Operation Mode	:802.11n40	Test Date	:2018-08-22
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2452 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4904.00	Average	33.26	0.84	34.10	54.00	-19.90
4904.00	Peak	43.89	0.84	44.73	74.00	-29.27

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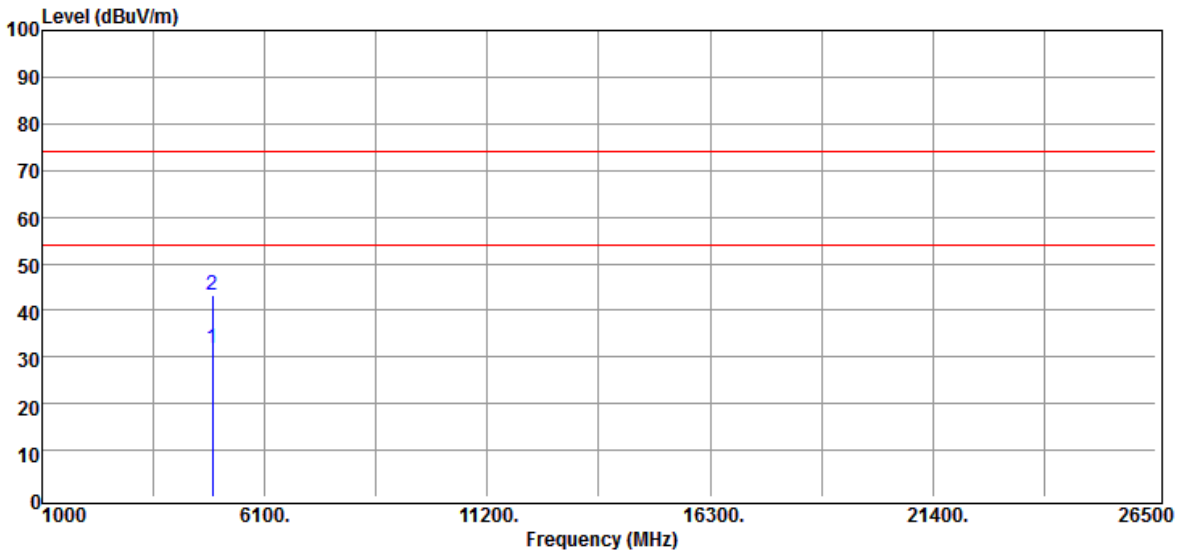
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Operation Mode	:802.11n40	Test Date	:2018-08-22
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2452 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4904.00	Average	31.12	0.84	31.96	54.00	-22.04
4904.00	Peak	42.33	0.84	43.17	74.00	-30.83

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## 12 MAXIMUM POWER SPECTRAL DENSITY

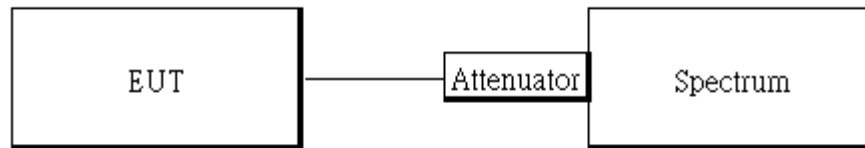
### 12.1 Standard Applicable

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	MY5340025 6	2017/10/30	2018/10/29
DC Block	PASTERNAK	PE8210	RF81	2017/12/26	2018/12/25
Notebook	Lenovo	L430	P0000195	N/A	N/A

### 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. & the 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.
11. 802.11n MIMO mode: offset is set following “measure and add 10 Log (N)” on spectrum to measure the PSD for MIMO mode. Offset = cable loss + 10 log (N), where N is number of transmitting antenna. N=2 for this given application for the test of PSD at MIMO mode, the highest emission of worst case is employing.

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POWER DENSITY 802.11b			
Freq. (MHz)	PPSD (dBm)	Limit (dBm)	Result
2412	-10.987	8.00	PASS
2437	-9.420	8.00	PASS
2462	-8.860	8.00	PASS

POWER DENSITY 802.11g			
Freq. (MHz)	PPSD (dBm)	Limit (dBm)	Result
2412	-11.24	8.00	PASS
2437	-10.27	8.00	PASS
2462	-11.75	8.00	PASS

POWER DENSITY 802.11n HT20			
Freq. (MHz)	PPSD (dBm)	Limit (dBm)	Result
2412	-9.81	8.00	PASS
2437	-9.81	8.00	PASS
2462	-9.61	8.00	PASS

POWER DENSITY 802.11n HT40			
Freq. (MHz)	PPSD (dBm)	Limit (dBm)	Result
2422	-11.05	8.00	PASS
2437	-9.82	8.00	PASS
2452	-11.2	8.00	PASS

offset 10.40 dB for SISO mode

offset 13.40 dB for MIMO mode

\*Refer to next page for plots

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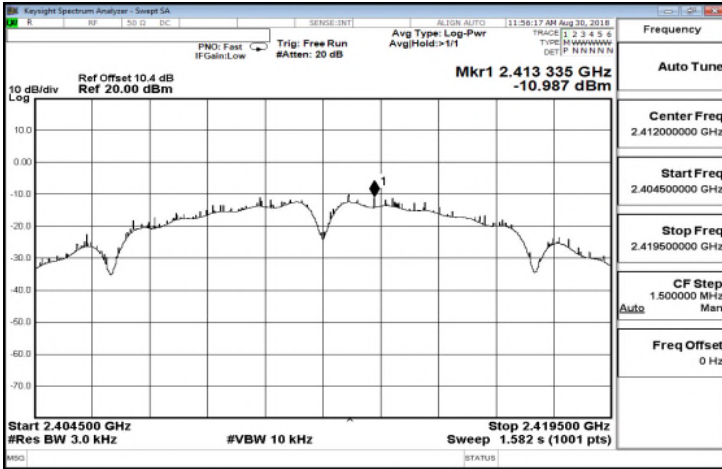
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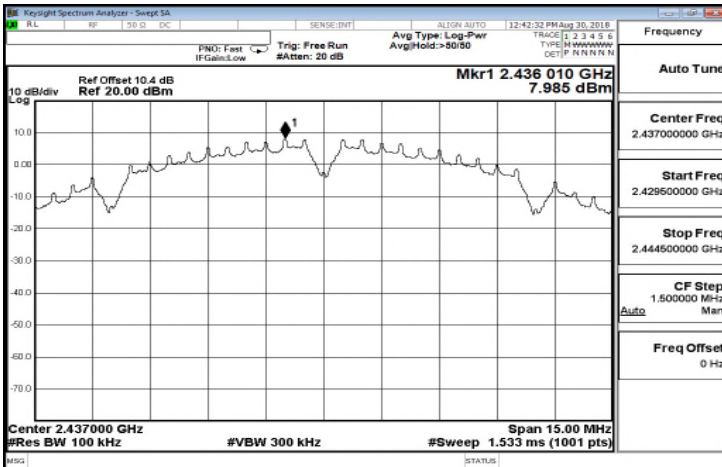
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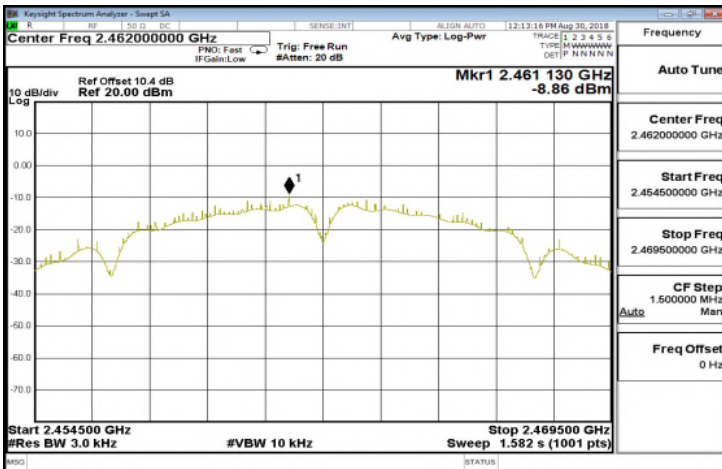
**802.11b**  
**Power Spectral Density Test Plot (CH-Low)**



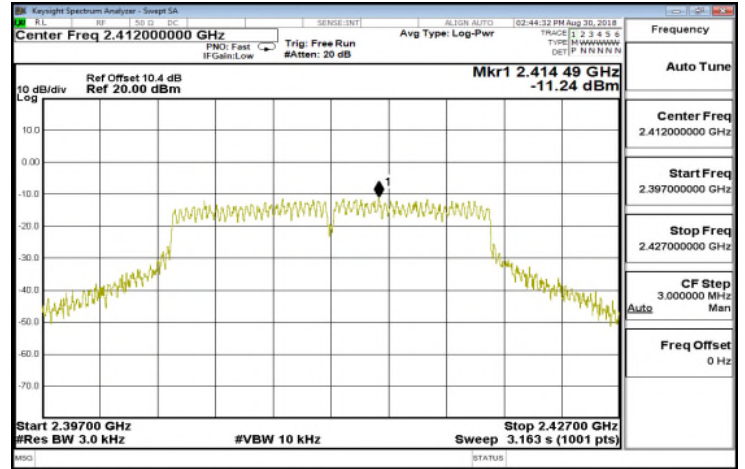
**Power Spectral Density Test Plot (CH-Mid)**



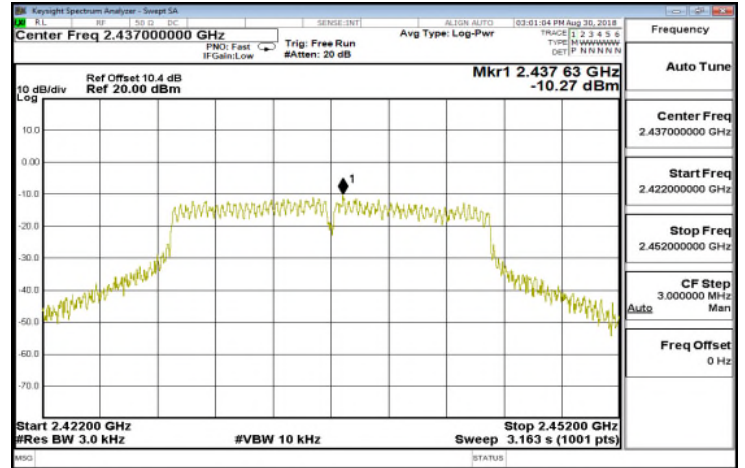
**Power Spectral Density Test Plot (CH-High)**



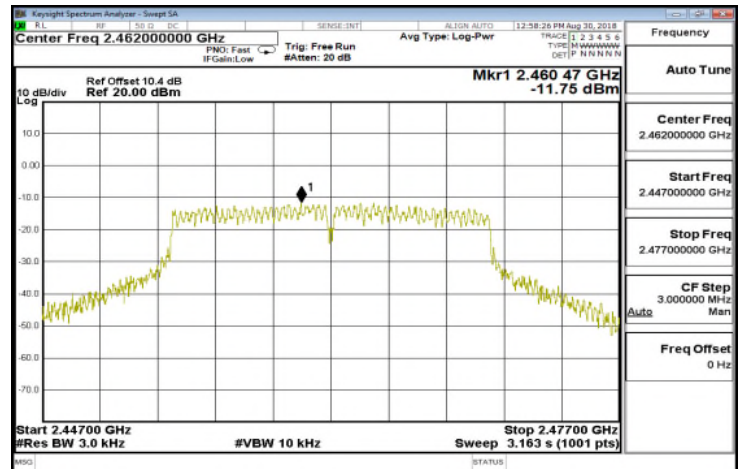
**802.11g**  
**Power Spectral Density Test Plot (CH-Low)**



**Power Spectral Density Test Plot (CH-Mid)**



**Power Spectral Density Test Plot (CH-High)**



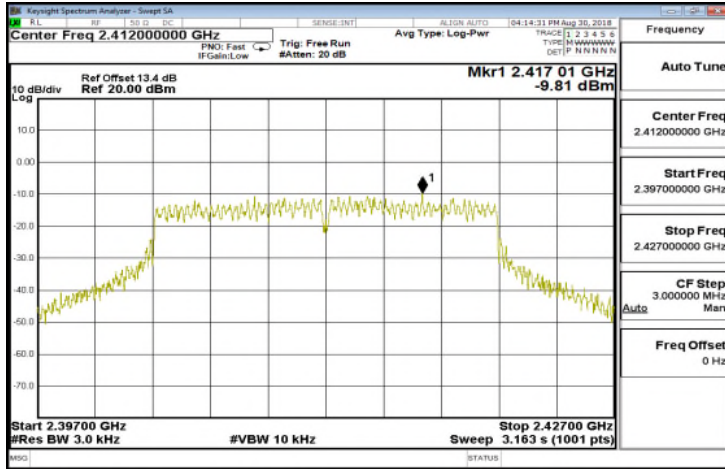
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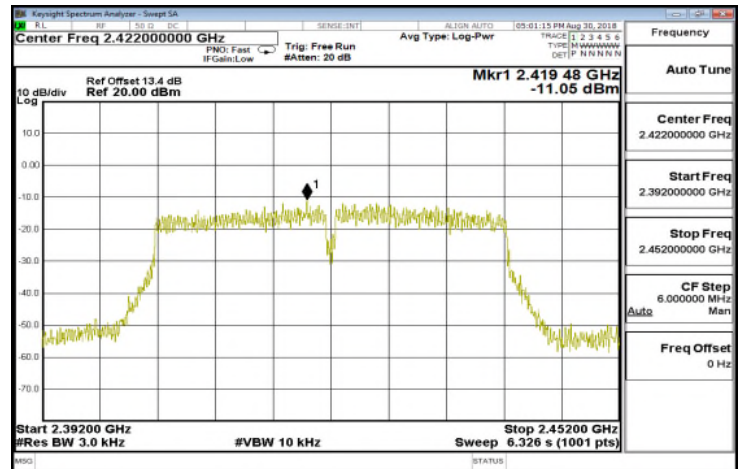
### 802.11n\_HT20

#### Power Spectral Density Test Plot (CH-Low)

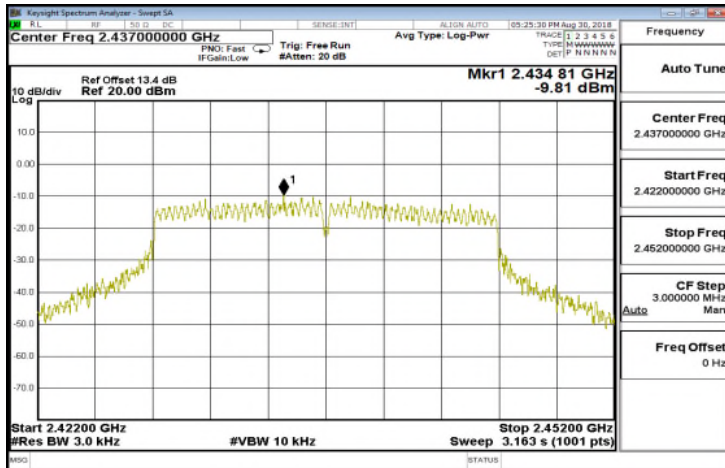


### 802.11n\_HT40

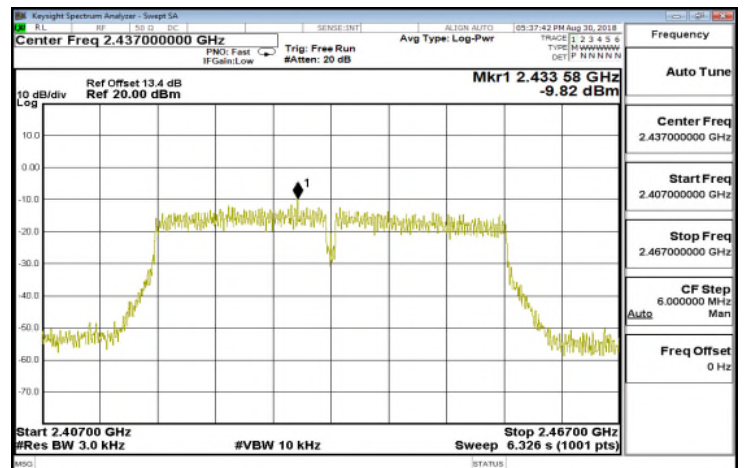
#### Power Spectral Density Test Plot (CH-Low)



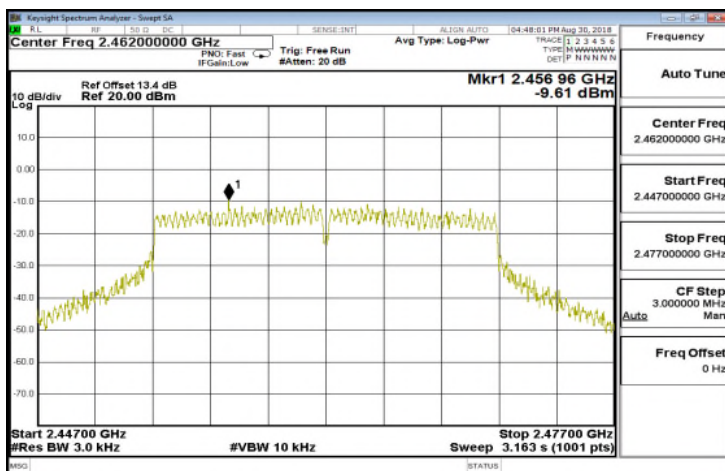
#### Power Spectral Density Test Plot (CH-Mid)



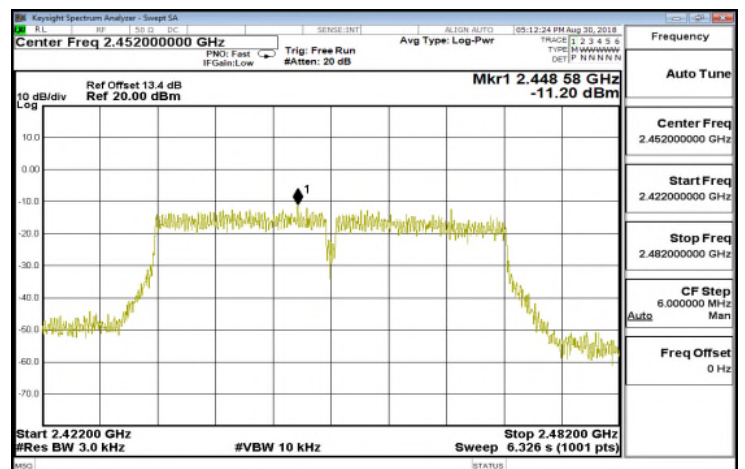
#### Power Spectral Density Test Plot (CH-Mid)



#### Power Spectral Density Test Plot (CH-High)



#### 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.

### 13.2 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.

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## 14 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### 14.1 FCC Standard Applicable

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

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

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

f = frequency in MHz

\* = Plane-wave equipment power density

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## 14.2 ISED Standard Applicable

This submittal(s) (test report) is intended to comply with RSS-102 issue 5 Radio frequency Radiation Exposure requirement.

This is a Mobile device, the MPE is required.

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field Strength (A/m rms)	Power Density (W/m <sup>2</sup> )	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	0.73/ <i>f</i>	-	6**
1.1-10	87/ <i>f</i> <sup>0.5</sup>	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ <i>f</i> <sup>0.25</sup>	0.1540/ <i>f</i> <sup>0.25</sup>	8.944/ <i>f</i> <sup>0.5</sup>	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 <i>f</i> <sup>0.3417</sup>	0.008335 <i>f</i> <sup>0.3417</sup>	0.02619 <i>f</i> <sup>0.6834</sup>	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> <sup>1.2</sup>
150000-300000	0.158 <i>f</i> <sup>0.5</sup>	4.21 x 10 <sup>-4</sup> <i>f</i> <sup>0.5</sup>	6.67 x 10 <sup>-5</sup> <i>f</i>	616000/ <i>f</i> <sup>1.2</sup>

F = frequency in MHz

\* = Based on nerve stimulation (NS).

\*\* = Based on specific absorption rate (SAR)

Maximum Permissible Exposure (MPE) Evaluation

Prediction of MPE limit at a given distance

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

Where: S = Power density

P = Power input to antenna

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

R = Distance to the center of radiation of the antenna

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

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### 14.3 Power Density Calculation (Worst Case)

FCC								ISED		
Operation Mode	Evaluation Frequency (MHz)	Operation Distance (cm)	Output Power EIRP (dBm)	Output Power EIRP (mW)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Pass / Fail	Power Density (W/cm <sup>2</sup> )	Limit (W/cm <sup>2</sup> )	Pass / Fail
WLAN 2.4G	2437.00	20	19.09	81.10	0.010	1.000	Pass	0.100	5.404	Pass

~ End of Report ~

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