

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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

OF

**Product Name:** Arlo Bridge

**Brand Name:** Netgear

**Model No.:** ABB1000

**Model Difference:** N/A

**FCC ID:** PY317300394

**IC:** 4054A-17300394

**Report No.:** ER/2017/70119

**Issue Date:** Sep. 08, 2017

**FCC Rule Part:** §15.247, Cat: DTS

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

**Prepared for FCC Applicant:** Netgear Incorporated  
350 East Plumeria Drive, San Jose, CA 95134, USA

**Prepared for IC Applicant:** NETGEAR Inc.  
Suite 168-10760 Shellbridge Way, Richmond British Columbia V6X 3H1 Canada  
SGS Taiwan Ltd.

**Prepared by:** Electronics & Communication Laboratory  
No.134, Wu Kung Road, New Taipei Industrial Park,  
Wuku District, New Taipei City, Taiwan 24803



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## VERIFICATION OF COMPLIANCE

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**IC Applicant:** NETGEAR Inc.  
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**Model No.:** ABB1000

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**File Number:** ER/2017/70119

**Date of Test:** Jul. 19, 2017 ~ Sep. 08, 2017

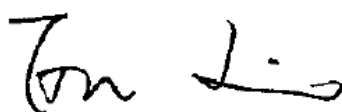
**Date of EUT Received:** Jul. 19, 2017

### We hereby certify that:

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

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

**Test By:**

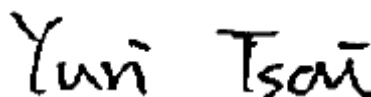


**Date:**

Sep. 08, 2017

*Tin Lin / Engineer*

**Prepared By:**

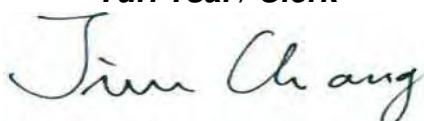


**Date:**

Sep. 08, 2017

*Yuri Tsai / Clerk*

**Approved By:**



**Date:**

Sep. 08, 2017

*Jim Chang / Asst. Manager*

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## Revision History

Report Number	Revision	Description	Issue Date
ER/2017/70119	Rev.00	Initial creation of document	Sep. 08, 2017

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## 1 GENERAL INFORMATION

### 1.1 Product description

General:

Product Name:	Arlo Bridge
Brand Name:	Netgear
Model No.:	ABB1000
Model Difference:	N/A
Product SW/HW version:	VMDB1000-20170824 / 2976552902
Radio SW/HW version:	qca-wifi-10.4 / 2976552902
Test SW Version:	N/A
RF power setting in TEST SW:	N/A
Test SW Version:	N/A
RF power setting in TEST SW:	N/A
Power Supply:	100~240Vac

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WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power / (EIRP)	Type of Emission	Modulation Technology
11b/g	2412-2462	11	b: 28.61dBm b: 31.50dBm (EIRP) g: 29.50dBm g: 29.92dBm (EIRP)	b: 15M1G1D g:16M4D1D	DSSS, OFDM
11n	HT/VHT20 2412-2462	11	HT20:29.39dBm (MIMO Chain 0+1) HT20:29.59dBm (MIMO Chain 0+1) (EIRP)	HT20:17M5D1D	OFDM
11n	HT/VHT40 2422-2452	7	HT40: 29.64dBm (MIMO Chain 0+1) HT40: 31.17dBm (MIMO Chain 0+1) (EIRP)	HT40:36M2D1D	OFDM
Antenna Designation		Dipole Antenna 1. Part No.: 902E00006N0(555), Supplier: Master Wave Technology Co., Ltd. 2.4GHz Gain: 1.62 dBi  2. Part No.: 902E00007N0(555), Supplier: Master Wave Technology Co., Ltd. 2.4GHz Gain: 2.58 dBi			
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 – 216.7Mbps 802.11 n_40MHz: 13.5 – 450.0Mbps			

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## 1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 v04 DTS Meas. Guidance

FCC KDB 662911 D01 v02r01 Multiple Transmitter Output

Canada RSS-247 issue 2 Feb. 2017

Canada RSS-Gen issue 4 Nov. 2014

ANSI C63.10:2013

Note:

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

## 1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road,  
New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803

(TAF code 0513)

FCC Registration Numbers are: 509634

Canada Registration Number: 4620A-5 .

## 1.4 Special Accessories

There are no special accessories used while test was conducted.

## 1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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## 2 SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

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

### 2.2 EUT Exercise

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

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

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

#### 2.3.2 Radiated Emissions

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

### 2.4 Measurement Results Explanation Example

#### For all conducted test items:

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

#### Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor. Following shows an offset computation example with cable loss 5.9dB and 10dB attenuator.

#### Offset:

$$= \text{RF cable loss (dB)} + \text{attenuation factor (dB)} \text{ dB} = 15.36 \text{ dB}$$

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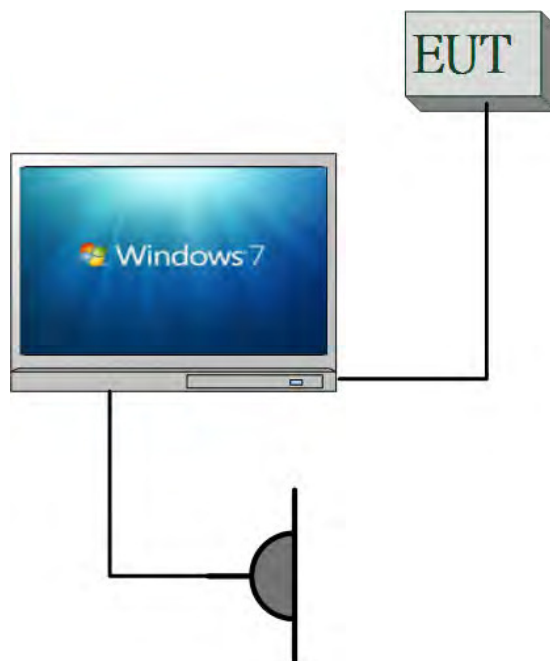
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## 2.5 Configuration of Tested System

**Fig. 2-1 Radiated Emission configuration & Conducted (Antenna Port) Configuration Emission**



**Table 2-1 Equipment Used in Tested System**

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

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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(d)	Peak Output Power	Compliant
§15.247(a)(2) RSS-247 §5.2 (a) RSS-Gen §6.6	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(b)	Power Spectral Density	Compliant
§15.203 §15.247(b) RSS- Gen §6.7 RSS- Gen §8.3	Antenna Requirement	Compliant

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## 4 DESCRIPTION OF TEST MODES

### 4.1 Operated in 2400 ~ 2483.5MHz Band

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

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

7 channels are provided for 802.11n HT40

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

### 4.2 The Worst Test Modes and Channel Details

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

#### RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11g	1 to 11	1,6,11	OFDM	54	MIMO

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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	11	MIMO
802.11g	1 to 11	1, 6, 11	OFDM	54	MIMO
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 mode) and lie down position (E1, E2 mode) for 802.11b/g/n WLAN Transmitter for channel Low, Mid and High, the worst case E1 position was reported.

### 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	11	MIMO
802.11g	1 to 11	1, 6, 11	OFDM	54	MIMO
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

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## 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 v02r01.

Array gain = 4.77dBi (peak spectral density, conducted spurious emission)

Gain that is combined with different magnitude of two antennas:

(ii) If antenna gains are not equal, the user may use either of the following methods to calculate directional gain, provided that each transmit antenna is driven by only one spatial stream:

- Directional gain may be calculated by using the formulas applicable to equal gain antennas with  $G_{ANT}$  set equal to the gain of the antenna having the highest gain; or,

$$DirectionalGain = 10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;

$N_{SS}$  = the number of independent spatial streams of data;

$N_{ANT}$  = the total number of antennas

$g_{j,k} = 10^{G_k/20}$  if the  $k$ th antenna is being fed by spatial stream  $j$ , or zero if it is not;  
 $G_k$  is the gain in dBi of the  $k$ th antenna.

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 0.84 dB
6dB Bandwidth	+/- 51.33 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.84 dB
Peak Power Density	+/- 1.3 dB
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : <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(μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
<b>Note</b> 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

### 6.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/11/2017	05/10/2018
LISN	SCHWARZ BECK	NSLK 8127	8127-649	05/22/2017	05/21/2018
LISN	MESS TEC	FCC-LISN-50/250-2 5-2-01	4034	03/19/2017	03/18/2018
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2016	11/25/2017

### 6.3 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 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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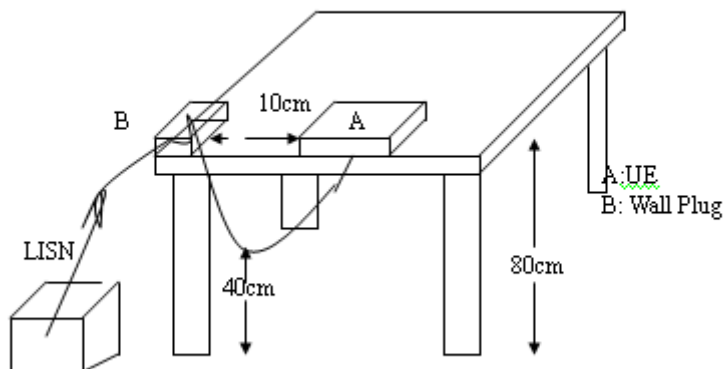
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## 6.4 Test SET-UP (Block Diagram of Configuration)



## 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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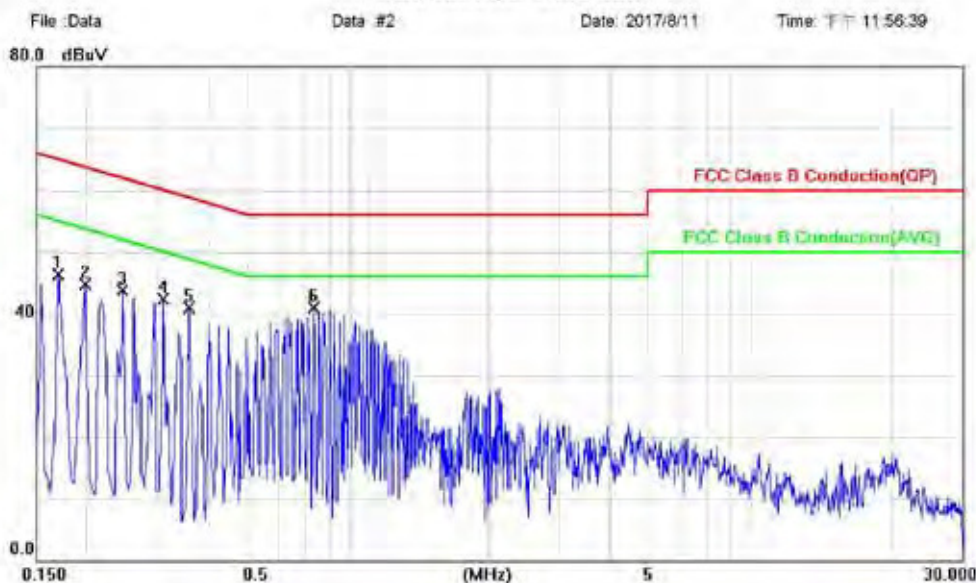
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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode	Test By:	Tin
Temperature:	20 °C	Humidity:	58 %

Site: Conduction Room Phase: **L1** Temperature: 20 °C  
Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 58 %  
Mode: Operation  
Note:

### Conducted Emission



No.	Mk	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1700	46.21	0.07	46.28	64.96	-18.68	peak	
2		0.1980	44.66	0.07	44.73	63.69	-18.96	peak	
3		0.2460	43.56	0.07	43.63	61.89	-18.26	peak	
4		0.3100	42.26	0.08	42.34	59.97	-17.63	peak	
5		0.3580	40.85	0.08	40.93	58.77	-17.84	peak	
6 *		0.7340	40.74	0.09	40.83	56.00	-15.17	peak	

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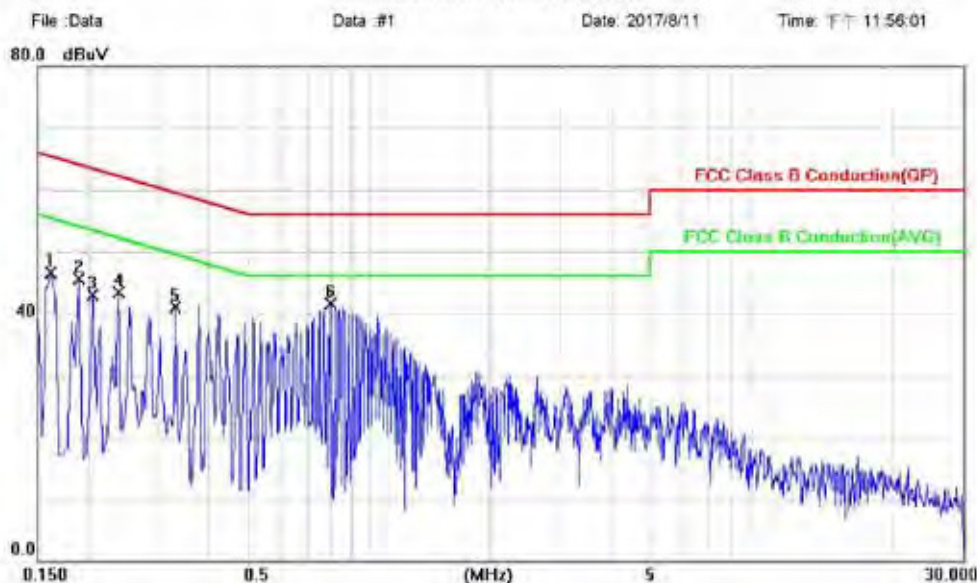
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Site: Conduction Room  
Limit: FCC Class B Conduction(QP)  
Mode: Operation  
Note:

Phase: N  
Power: AC 120V/60Hz

Temperature: 20 °C  
Humidity: 58 %

## Conducted Emission



No.	Mk	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1620	46.42	0.07	46.49	65.36	-18.87	peak	
2		0.1900	45.39	0.07	45.46	64.04	-18.58	peak	
3		0.2060	42.88	0.07	42.95	63.37	-20.42	peak	
4		0.2380	43.21	0.07	43.28	62.17	-18.89	peak	
5		0.3300	40.82	0.08	40.90	59.45	-18.55	peak	
6	*	0.8020	41.40	0.09	41.49	56.00	-14.51	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:

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

### Measurement Procedure:

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

### Duty Cycle:

	Duty Cycle (%)	Duty Factor (dB)
802.11b	99.45	0.02
802.11g	97.57	0.11
802.11n_20	95.14	0.22
802.11n_40	92.76	0.33

$$b = 99.45\%, g = 97.57\%, n_{ht\_20} = 95.14\%$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9945) = 0.02$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9757) = 0.11$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9514) = 0.22$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9276) = 0.33$$

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t (886-2) 2299-3279

f (886-2) 2298-0488

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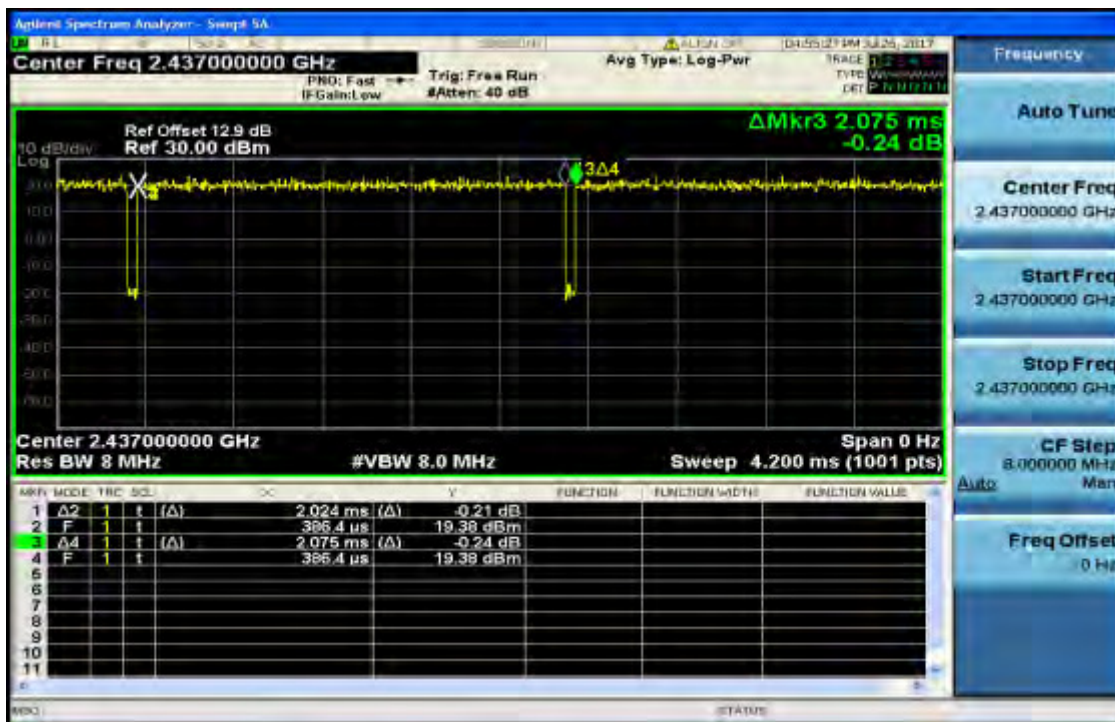
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## 7.1 DUTY CYCLE TEST SIGNAL Measurement Result

802.11 b



802.11 g



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## 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.

Main Antenna Gain:	1.62 dBi
Aux1 Antenna Gain:	2.58 dBi
Aux2 Antenna Gain:	0.00 dBi
Aux3 Antenna Gain:	0.00 dBi
Number Antenna:	2 pcs
Limit:	30 dBm
<i>The antenna gain is grater than 6dBi in MIMO mode the limit reduce as below:</i>	
<i>Directional gain = gain of antenna element + 10 log (# of TX antenna elements)</i>	

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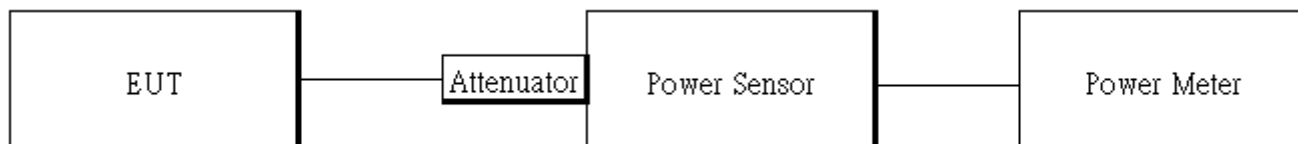
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## 8.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017
Spectrum Analyzer	Agilent	N9010A	MY50420195	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018
Splitter	Agilent	11636B	N/A	01/05/2017	01/04/2018
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017
Temperature Chamber	TERCHY	MHG-120LF	911009	05/19/2017	05/18/2018

## 8.3 Test Set-up

Power Meter:



## 8.4 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 v04 DTS Meas. Guidance .
- 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.

- Record the max. Reading as observed from Spectrum or Power Meter.

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## 8.5 Measurement Result

802.11b_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	1	25.21	25.13	28.18	657.73	1 Watt = 30.00 dBm	PASS
6	2437	1	25.54	25.65	28.61	725.38	1 Watt = 30.00 dBm	PASS
11	2462	1	25.35	24.78	28.08	643.38	1 Watt = 30.00 dBm	PASS

802.11b_MIMO								
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit	RESULT
			CH 0	CH 1				
1	2412	1	22.98	22.78	25.92	388.28	1 Watt = 30.00 dBm	PASS
6	2437	1	22.98	22.82	25.93	390.04	1 Watt = 30.00 dBm	PASS
11	2462	1	22.90	22.73	25.85	382.48	1 Watt = 30.00 dBm	PASS

802.11g_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	6	24.98	24.71	27.86	610.58	1 Watt = 30.00 dBm	PASS
6	2437	6	26.50	26.47	29.50	890.29	1 Watt = 30.00 dBm	PASS
11	2462	6	24.68	24.45	27.58	572.38	1 Watt = 30.00 dBm	PASS

802.11g_MIMO								
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit	RESULT
			CH 0	CH 1				
1	2412	6	18.84	18.63	21.85	149.51	1 Watt = 30.00 dBm	PASS
6	2437	6	21.46	21.17	24.43	270.88	1 Watt = 30.00 dBm	PASS
11	2462	6	18.43	18.08	21.38	133.93	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	24.87	24.56	27.73	592.66	1 Watt = 30.00 dBm	PASS
6	2437	MCS8	26.44	26.32	<b>29.39</b>	869.10	1 Watt = 30.00 dBm	PASS
11	2462	MCS8	24.22	24.18	27.21	526.06	1 Watt = 30.00 dBm	PASS

**802.11n\_HT20M MIMO**

CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit	RESULT
			CH 0	CH 1				
1	2412	MCS8	17.79	17.44	20.85	115.58	1 Watt = 30.00 dBm	PASS
6	2437	MCS8	21.17	20.80	<b>24.22</b>	251.14	1 Watt = 30.00 dBm	PASS
11	2462	MCS8	17.76	17.43	20.82	115.04	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	19.84	18.78	22.35	171.89	1 Watt = 30.00 dBm	PASS
6	2437	MCS8	26.41	26.83	<b>29.64</b>	919.47	1 Watt = 30.00 dBm	PASS
9	2452	MCS8	19.83	19.23	22.55	179.91	1 Watt = 30.00 dBm	PASS

**802.11n\_HT40M MIMO**

CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit	RESULT
			CH 0	CH 1				
3	2422	MCS8	13.78	13.22	16.85	44.87	1 Watt = 30.00 dBm	PASS
6	2437	MCS8	22.70	22.43	<b>25.90</b>	361.19	1 Watt = 30.00 dBm	PASS
9	2452	MCS8	14.40	13.85	17.47	51.81	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\_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	1	22.98	22.78	25.92	388.28	5.59	31.51	4W= 36 dBm	PASS
6	2437	1	22.98	22.82	<b>25.93</b>	<b>390.04</b>	5.59	<b>31.52</b>	4W= 36 dBm	PASS
11	2462	1	22.90	22.73	25.85	382.48	5.59	31.44	4W= 36 dBm	PASS

## 802.11g\_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	6	18.84	18.63	21.85	149.51	<b>5.59</b>	27.44	4W= 36 dBm	PASS
6	2437	6	21.46	21.17	<b>24.43</b>	<b>270.88</b>	<b>5.59</b>	<b>30.02</b>	4W= 36 dBm	PASS
11	2462	6	18.43	18.08	21.38	133.93	<b>5.59</b>	26.97	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	17.79	17.44	20.85	115.58	<b>5.59</b>	26.44	4W= 36 dBm	PASS
6	2437	MCS8	21.17	20.80	<b>24.22</b>	<b>251.14</b>	<b>5.59</b>	<b>29.81</b>	4W= 36 dBm	PASS
11	2462	MCS8	17.76	17.43	20.82	115.04	<b>5.59</b>	26.41	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	13.78	13.22	16.85	44.87	<b>5.59</b>	22.44	4W= 36 dBm	PASS
6	2437	MCS8	22.70	22.43	<b>25.90</b>	<b>361.19</b>	<b>5.59</b>	<b>31.49</b>	4W= 36 dBm	PASS
9	2452	MCS8	14.40	13.85	17.47	51.81	<b>5.59</b>	23.06	4W= 36 dBm	PASS

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

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## 9 6DB & 99% BANDWIDTH MEASUREMENT

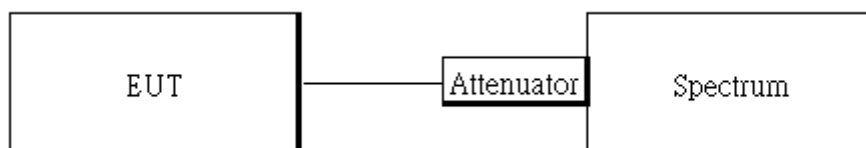
### 9.1 Standard Applicable

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.
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018

### 9.3 Test Set-up



### 9.4 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 v04 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. For 6dB Bandwidth:  
Set the spectrum analyzer as RBW = 100 kHz, VBW = 3\*RBW, Span = 30M/50MHz, Detector=peak, Sweep=auto.
5. Mark the peak frequency and -6dB (upper and lower) frequency.
6. For 99% Bandwidth:  
Set the spectrum analyzer as RBW=1%, VBW = 3\*RBW, Span = 30M/50MHz, Detector=Sample, Sweep=auto.
7. Turn on the 99% bandwidth function, max reading.
8. Repeat above procedures until all frequency of interest measured was complete.

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t (886-2) 2299-3279

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## 9.5 Measurement Result

### 6dB Bandwidth

#### 802.11b Main

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	<b>10097</b>	> 500	PASS
2437	10088	> 500	PASS
2462	10096	> 500	PASS

#### 802.11b Aux1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	10091	> 500	PASS
2437	10077	> 500	PASS
2462	<b>10094</b>	> 500	PASS

#### 802.11g Main

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	15120	> 500	PASS
2437	<b>15140</b>	> 500	PASS
2462	15130	> 500	PASS

#### 802.11g Aux1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	15120	> 500	PASS
2437	<b>15130</b>	> 500	PASS
2462	15120	> 500	PASS

#### 802.11\_n\_HT20 Main

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	15120	> 500	PASS
2437	<b>15130</b>	> 500	PASS
2462	<b>15130</b>	> 500	PASS

#### 802.11\_n\_HT20 Aux1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	<b>15130</b>	> 500	PASS
2437	<b>15130</b>	> 500	PASS
2462	<b>15130</b>	> 500	PASS

#### 802.11\_n\_HT40 Main

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	<b>33860</b>	> 500	PASS
2437	32600	> 500	PASS
2452	33840	> 500	PASS

#### 802.11\_n\_HT40 Aux1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	<b>33880</b>	> 500	PASS
2437	32620	> 500	PASS
2452	<b>33880</b>	> 500	PASS

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## 99% Bandwidth

802.11b Main		802.11b Aux1	
Freq. (MHz)	99% BW (MHz)	Freq. (MHz)	99% BW (MHz)
2412	14.504	2412	14.084
2437	<b>15.096</b>	2437	14.013
2462	14.385	2462	14.728

802.11g Main		802.11g Aux1	
Freq. (MHz)	99% BW (MHz)	Freq. (MHz)	99% BW (MHz)
2412	16.271	2412	16.257
2437	<b>16.435</b>	2437	16.325
2462	16.158	2462	16.272

802.11n_HT20M Main		802.11n_HT20M Aux1	
Freq. (MHz)	99% BW (MHz)	Freq. (MHz)	99% BW (MHz)
2412	17.411	2412	17.410
2437	17.445	2437	17.327
2462	17.458	2462	<b>17.493</b>

802.11n_HT40M Main		802.11n_HT40M Aux1	
Freq. (MHz)	99% BW (MHz)	Freq. (MHz)	99% BW (MHz)
2422	33.872	2422	35.647
2437	<b>36.226</b>	2437	36.035
2452	35.894	2452	35.745

*\*Refer to next page for plots*

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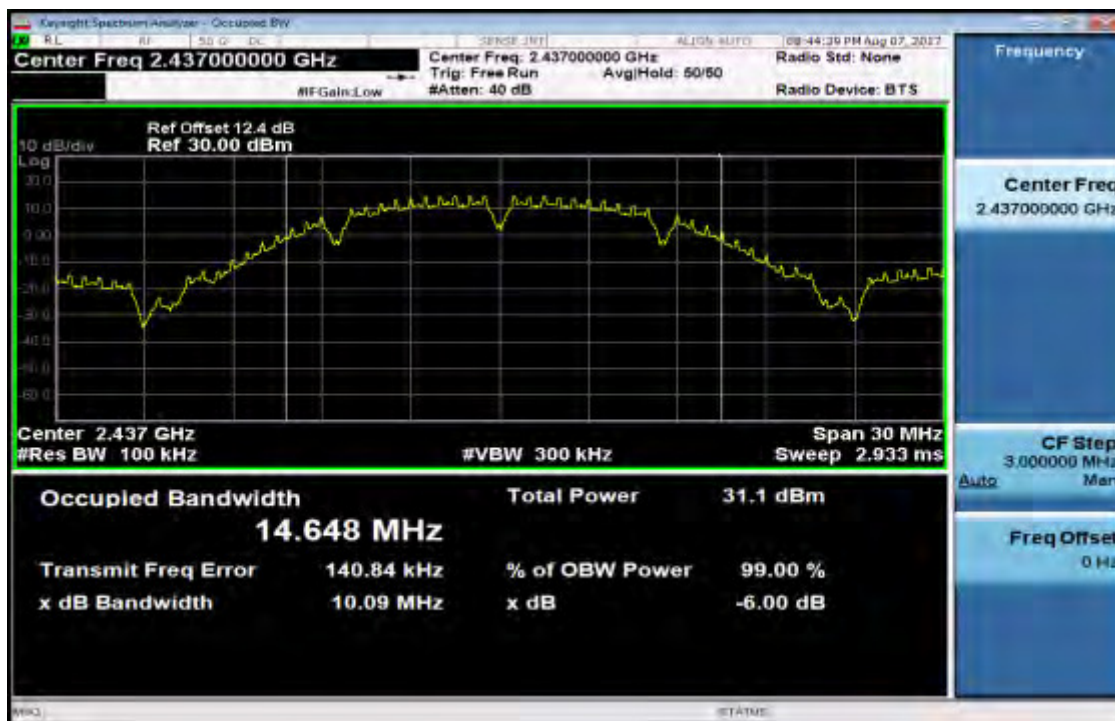
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## 802.11b (Main)

### 6dB Band Width Test Data CH-Low



### 6dB Band Width Test Data CH-Mid



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## 6dB Band Width Test Data CH-High



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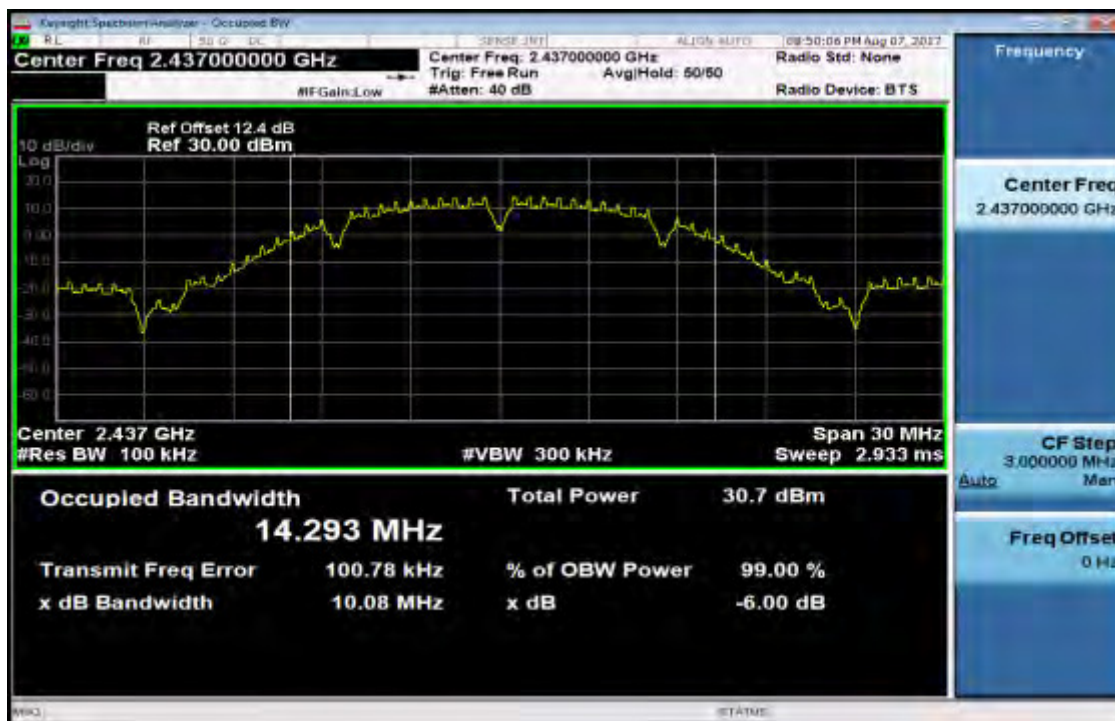
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## 802.11b (AUX1)

### 6dB Band Width Test Data CH-Low



### 6dB Band Width Test Data CH-Mid



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## 6dB Band Width Test Data CH-High



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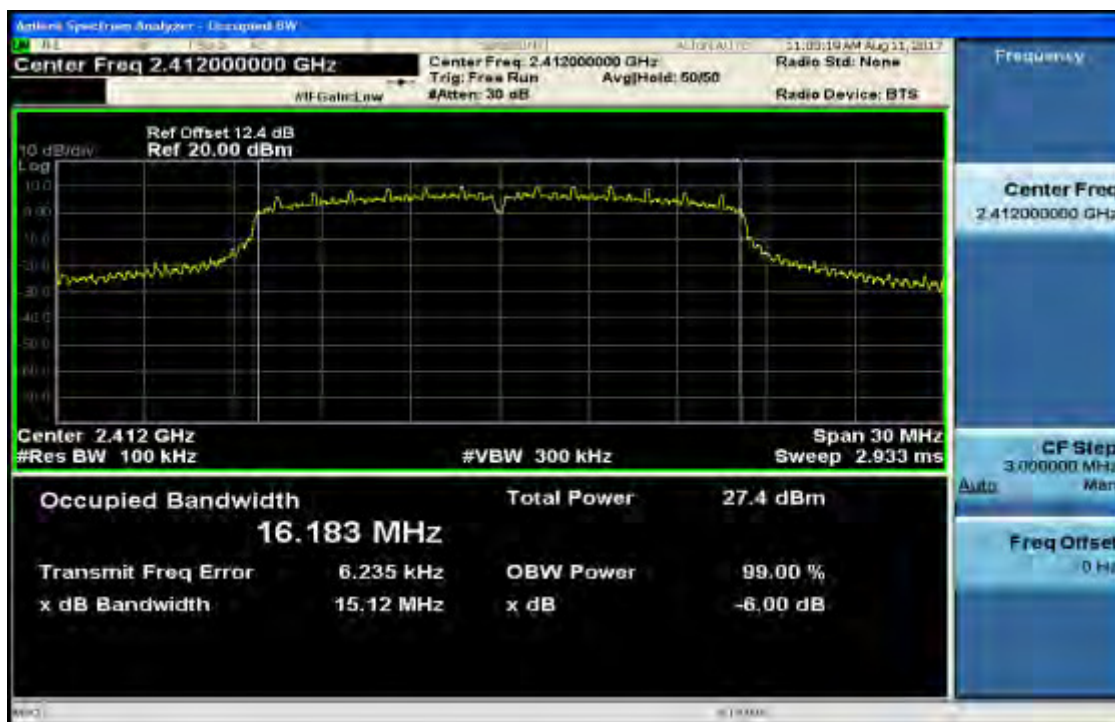
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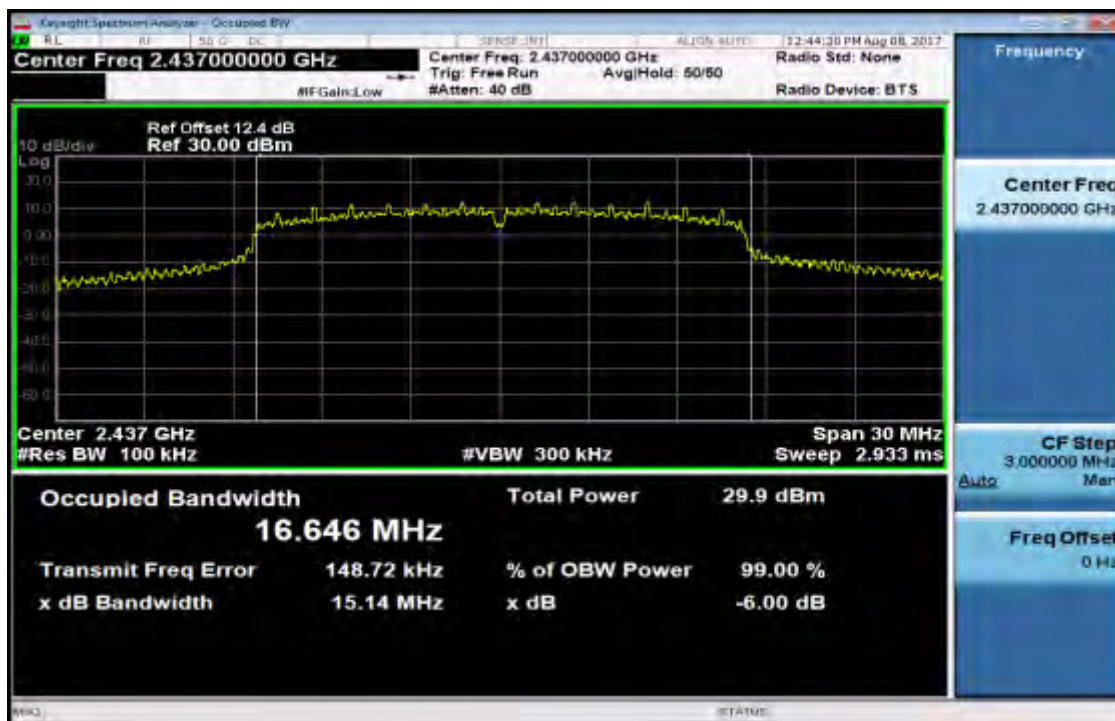
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## 802.11g (Main)

### 6dB Band Width Test Data CH-Low



### 6dB Band Width Test Data CH-Mid



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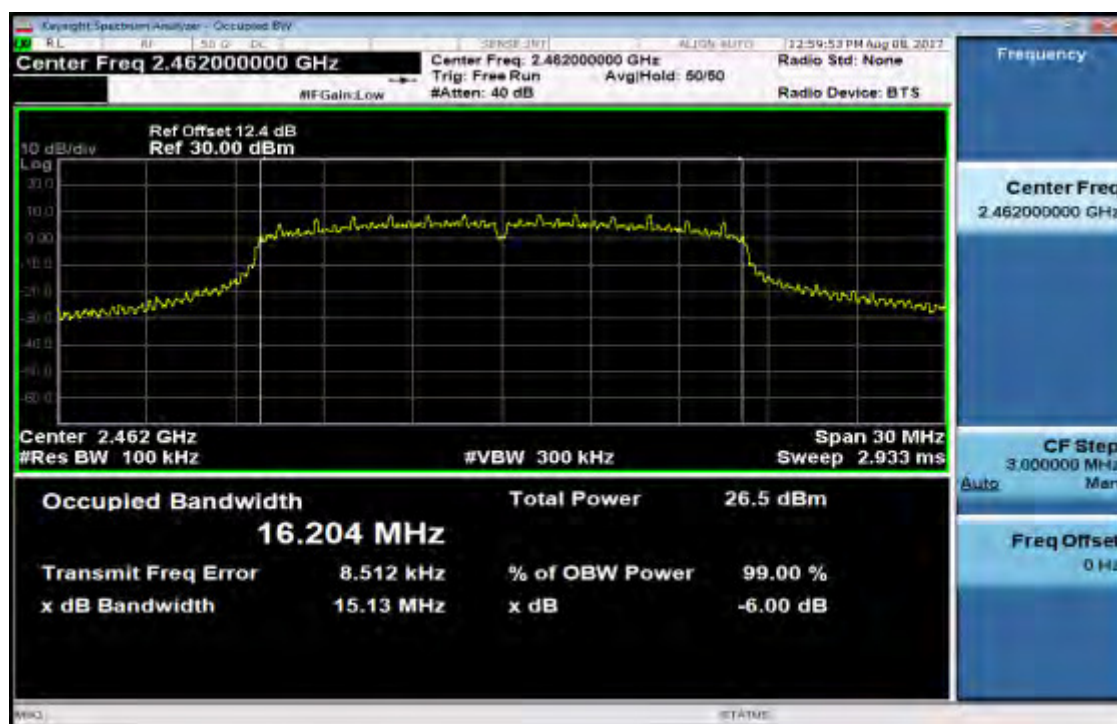
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## 6dB Band Width Test Data CH-High



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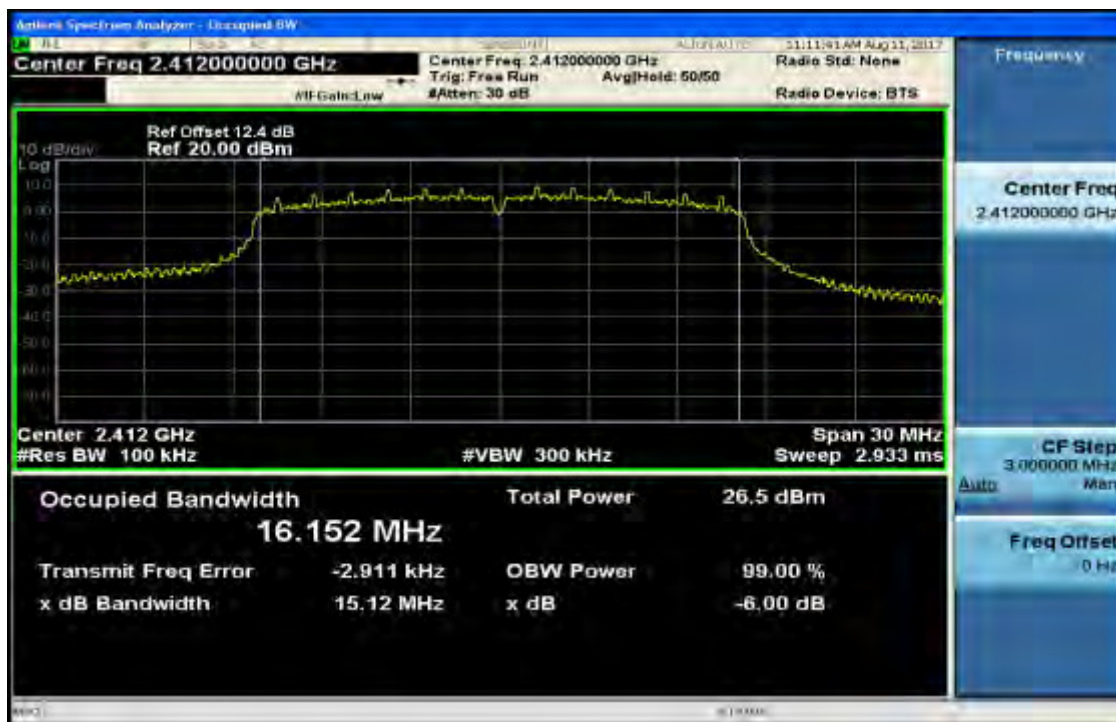
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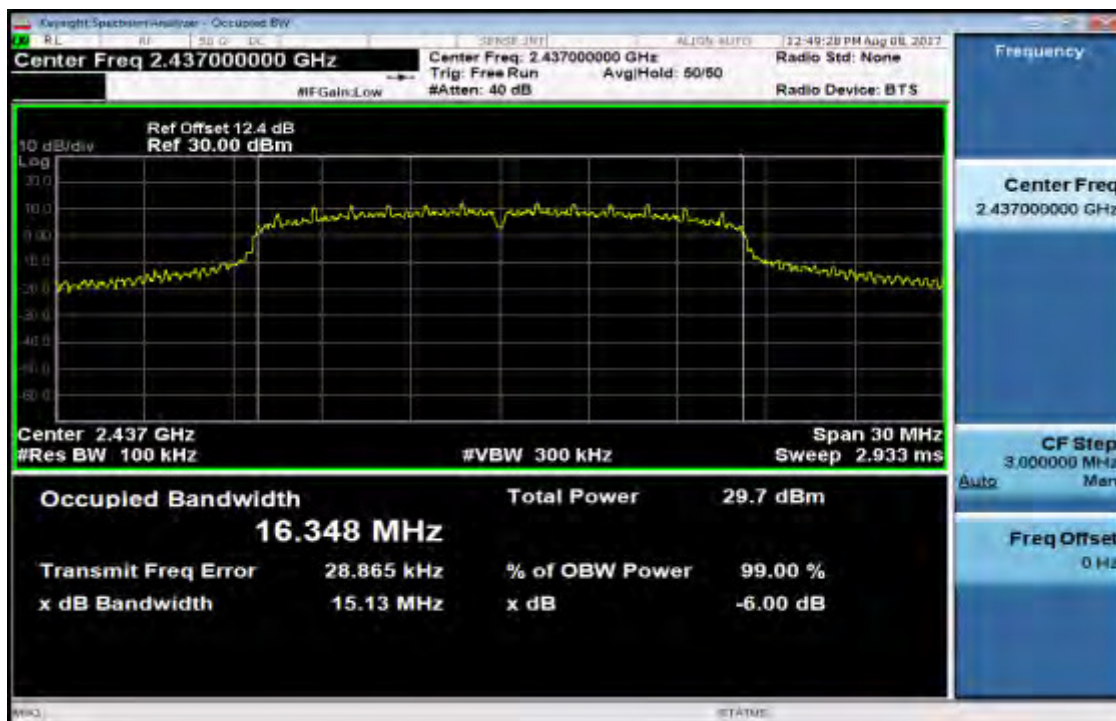


## 802.11g (AUX1)

### 6dB Band Width Test Data CH-Low



### 6dB Band Width Test Data CH-Mid



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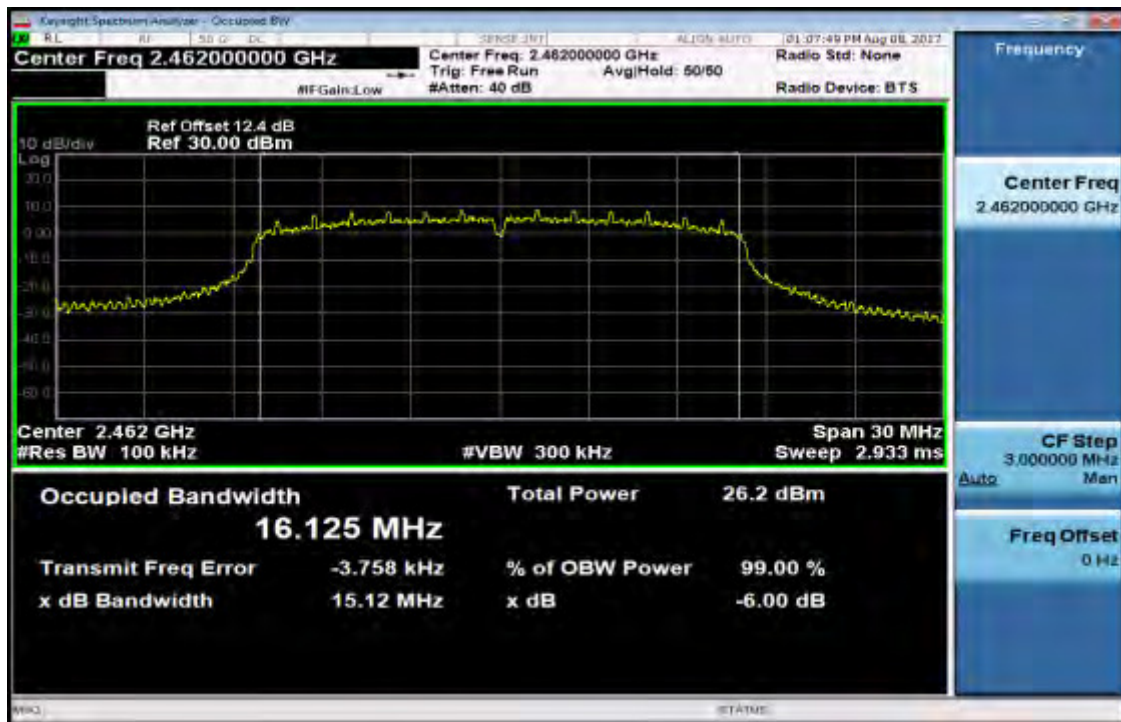
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## 6dB Band Width Test Data CH-High



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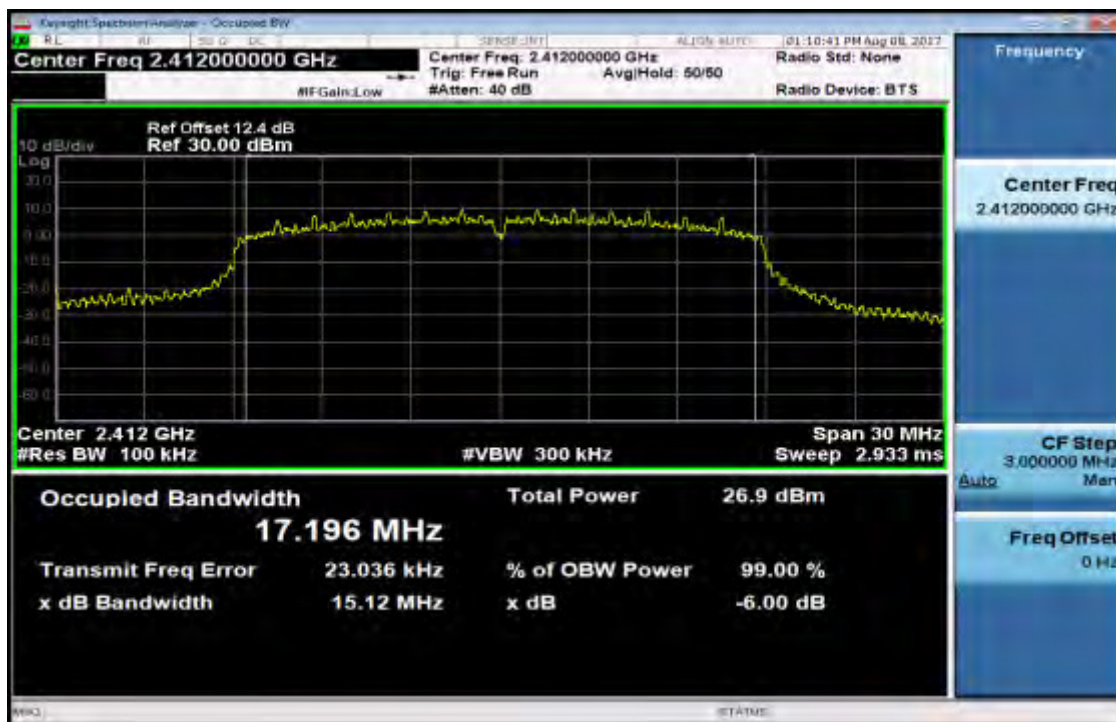
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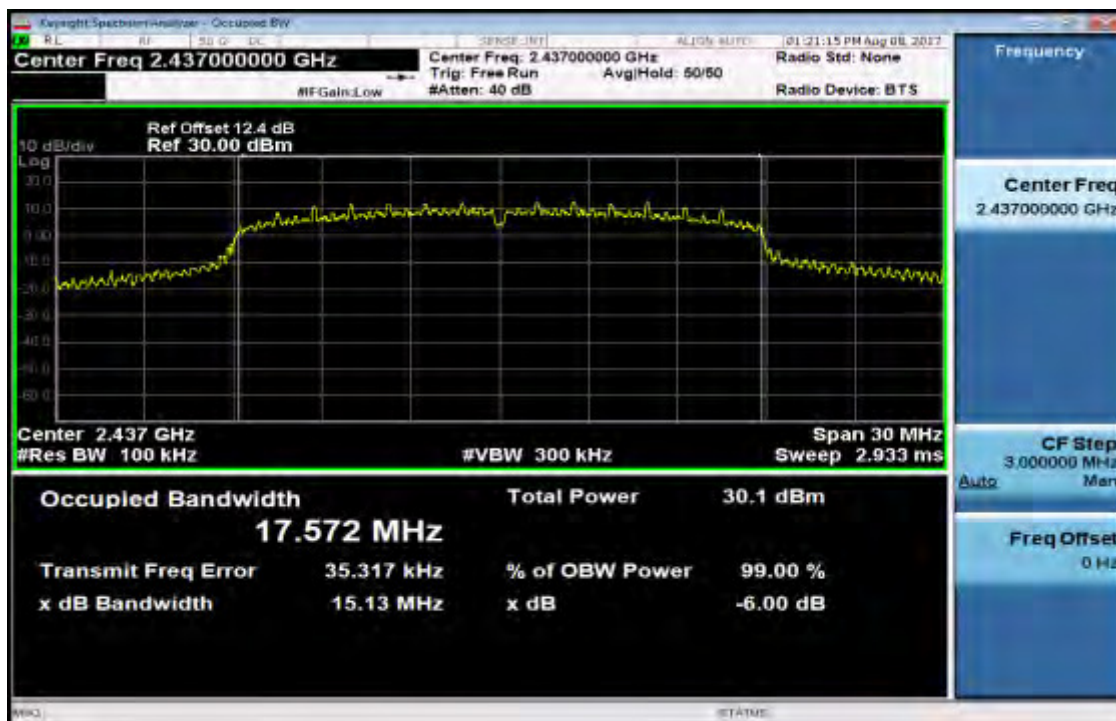
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## 802.11n\_20M (Main) 6dB Band Width Test Data CH-Low



## 6dB Band Width Test Data CH-Mid



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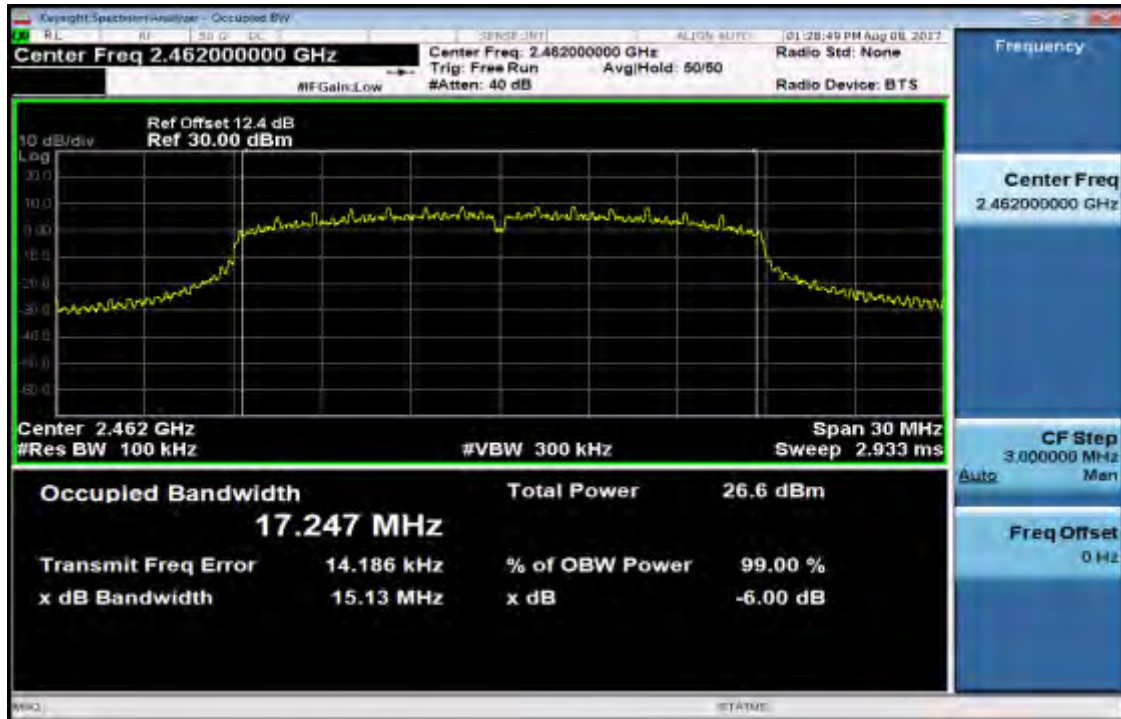
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## 6dB Band Width Test Data CH-High



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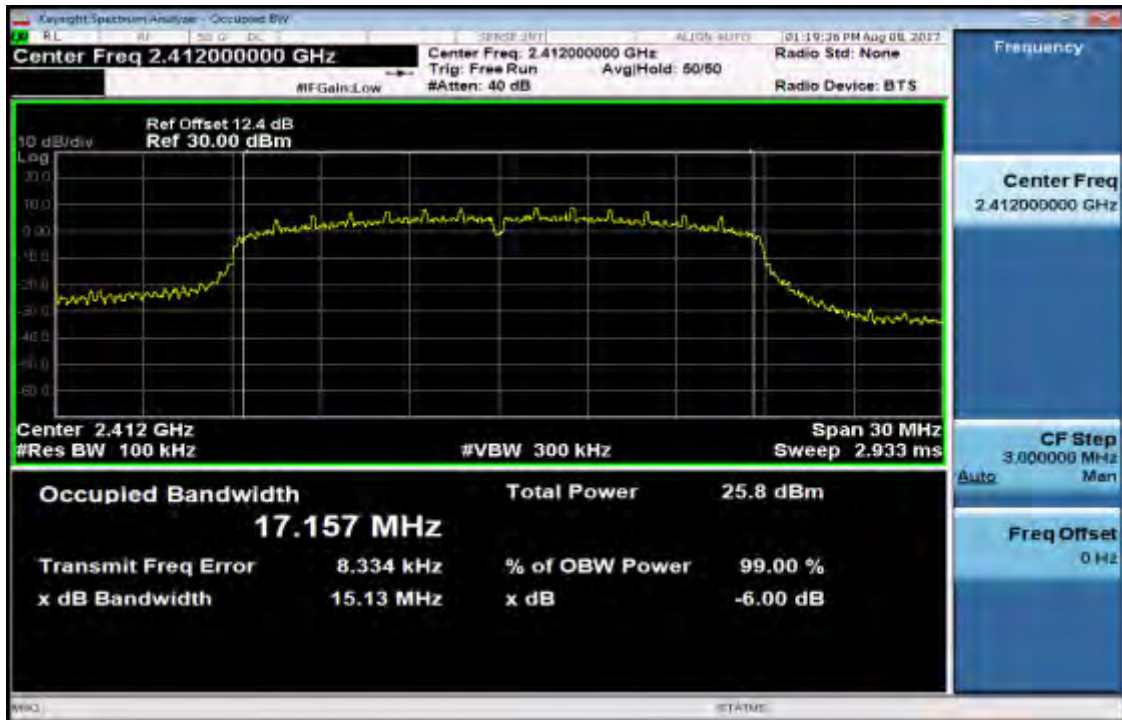
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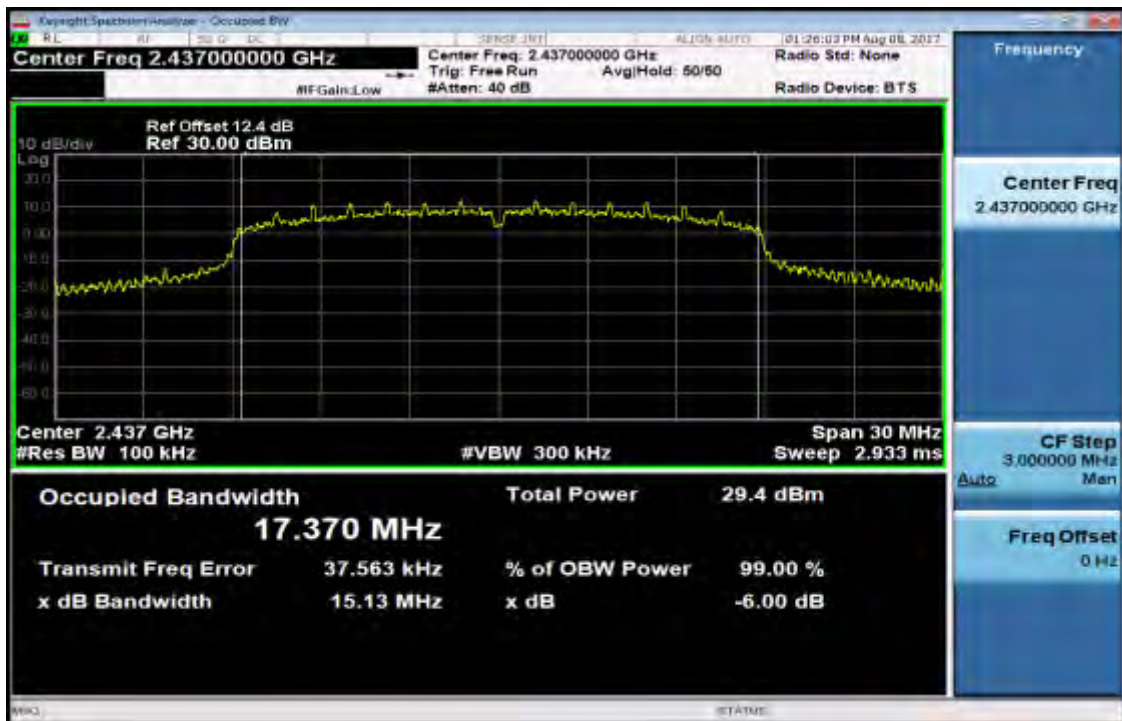


## 802.11n\_20M (AUX1)

### 6dB Band Width Test Data CH-Low



### 6dB Band Width Test Data CH-Mid



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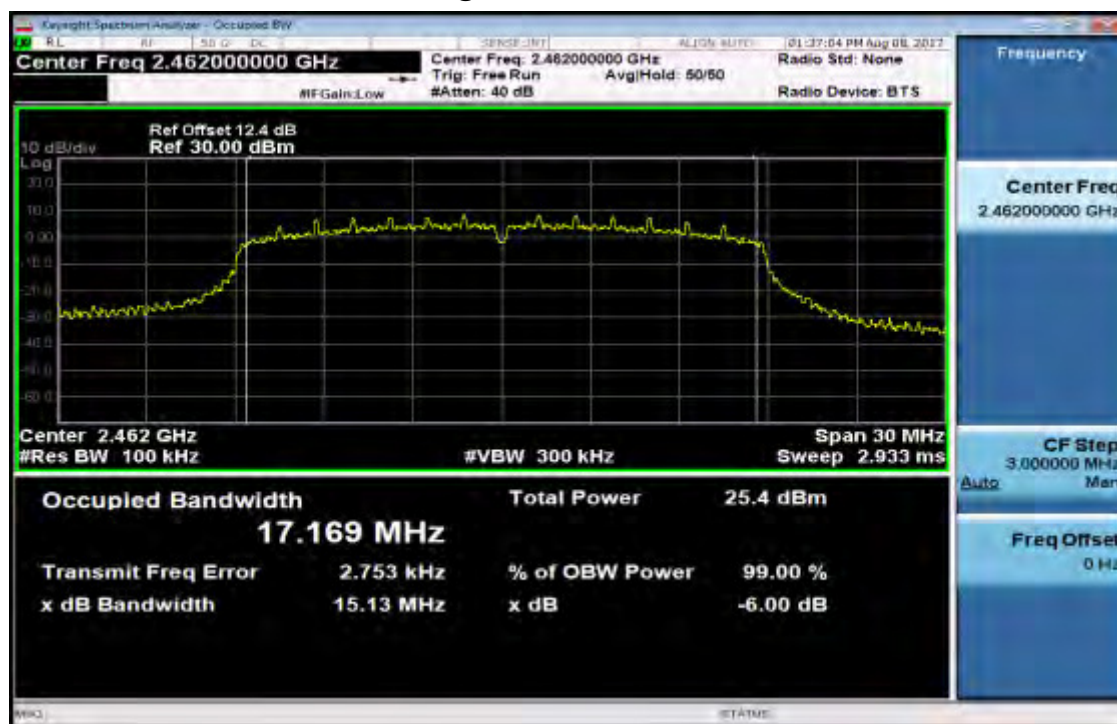
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## 6dB Band Width Test Data CH-High



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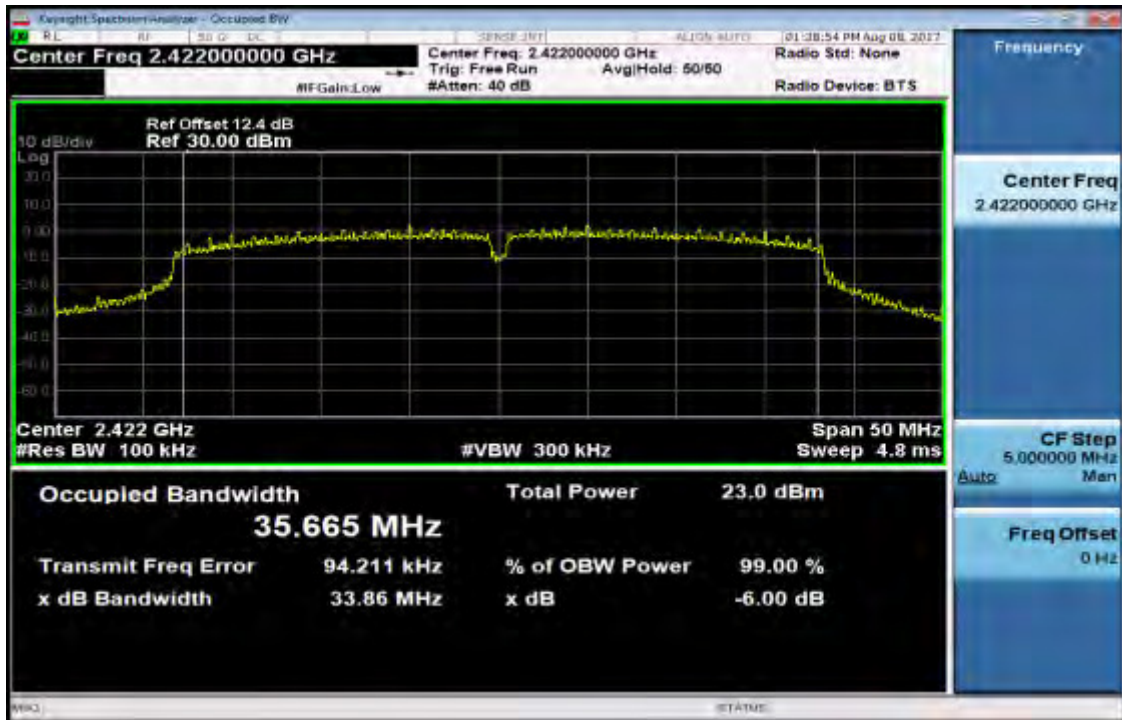
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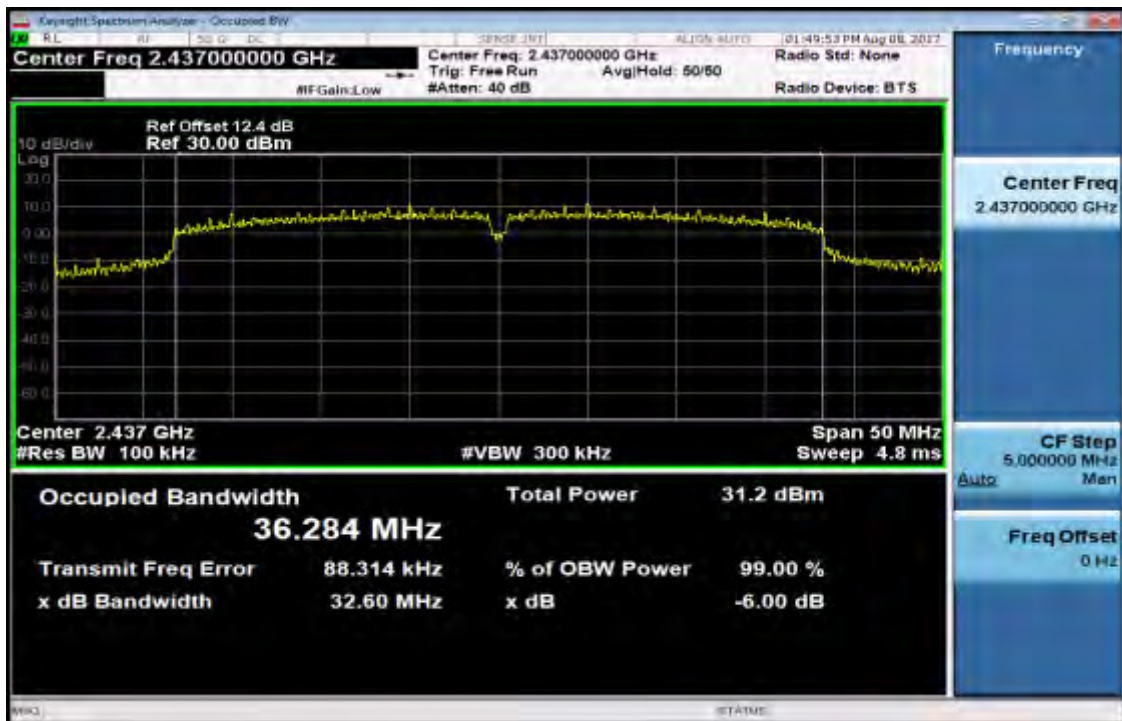
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## 802.11n\_40M (Main) 6dB Band Width Test Data CH-Low



## 6dB Band Width Test Data CH-Mid



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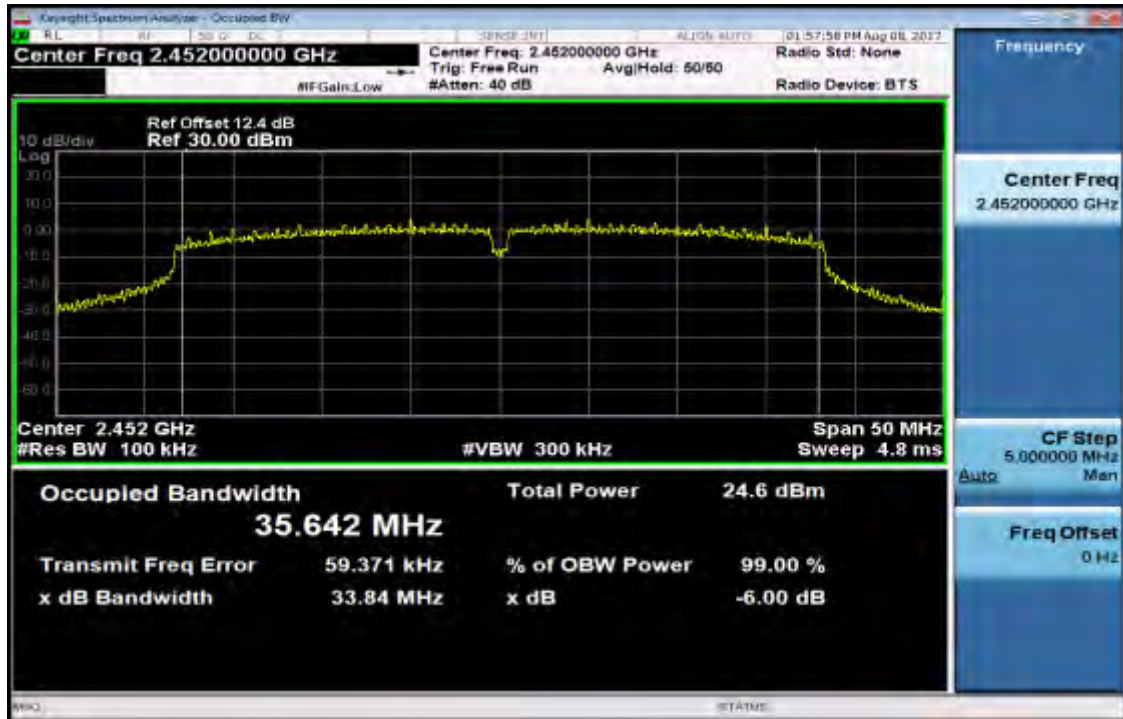
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## 6dB Band Width Test Data CH-High



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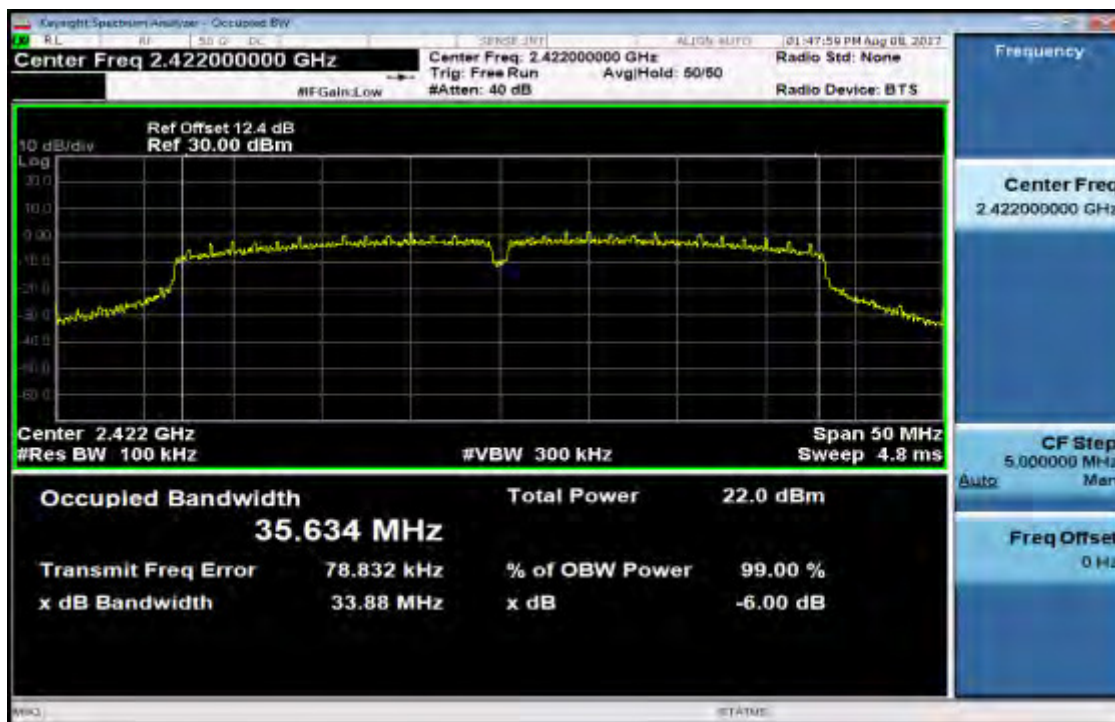
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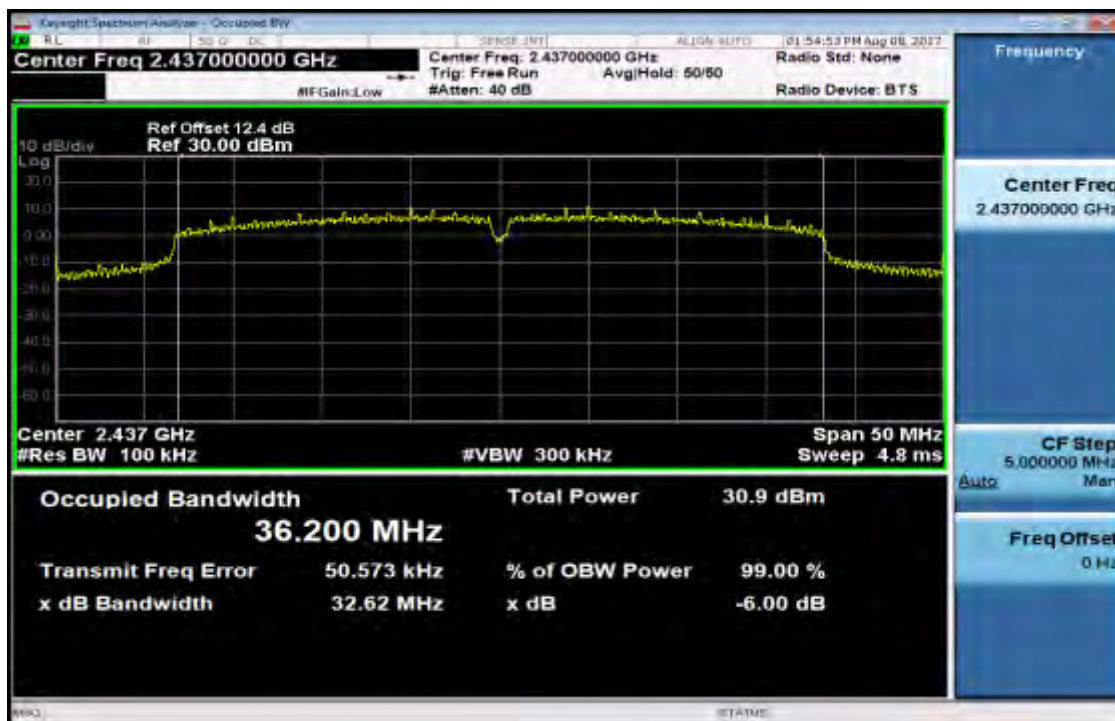
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## 802.11n\_40M (AUX1)

### 6dB Band Width Test Data CH-Low



### 6dB Band Width Test Data CH-Mid



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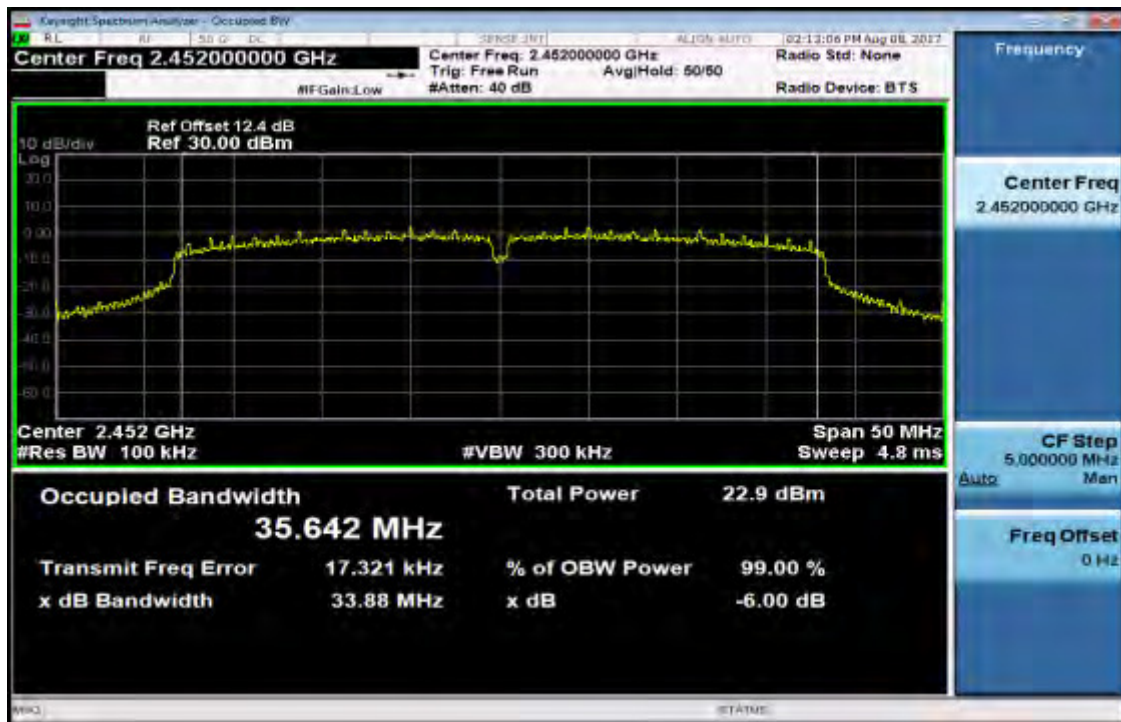
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## 6dB Band Width Test Data CH-High



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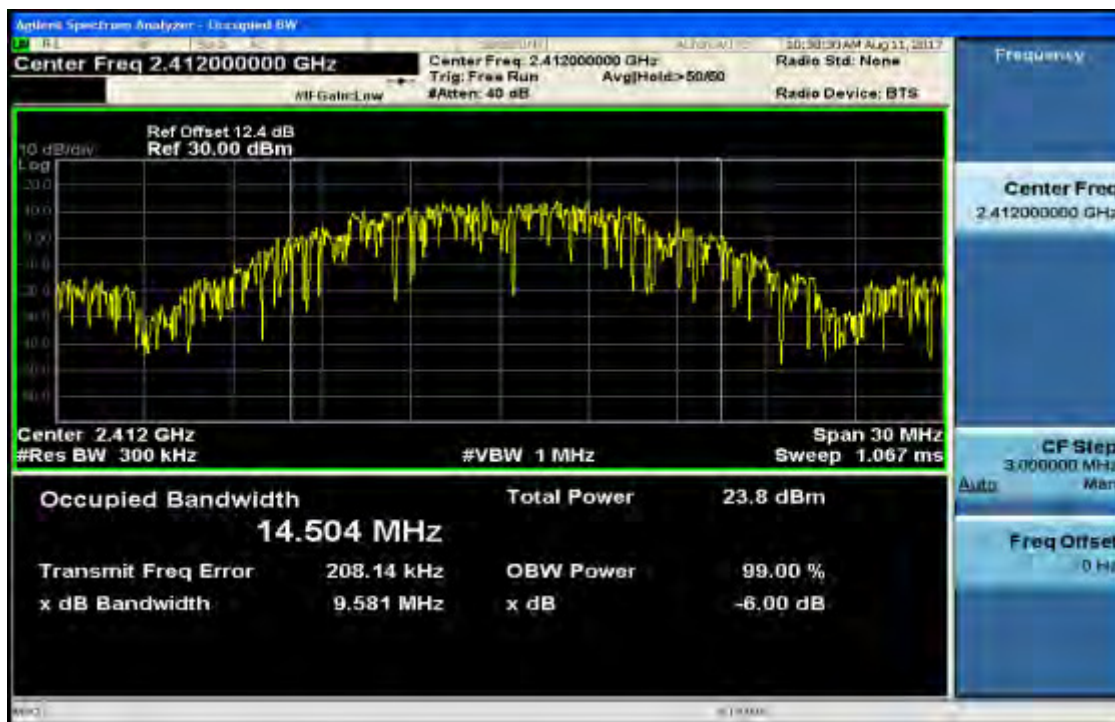
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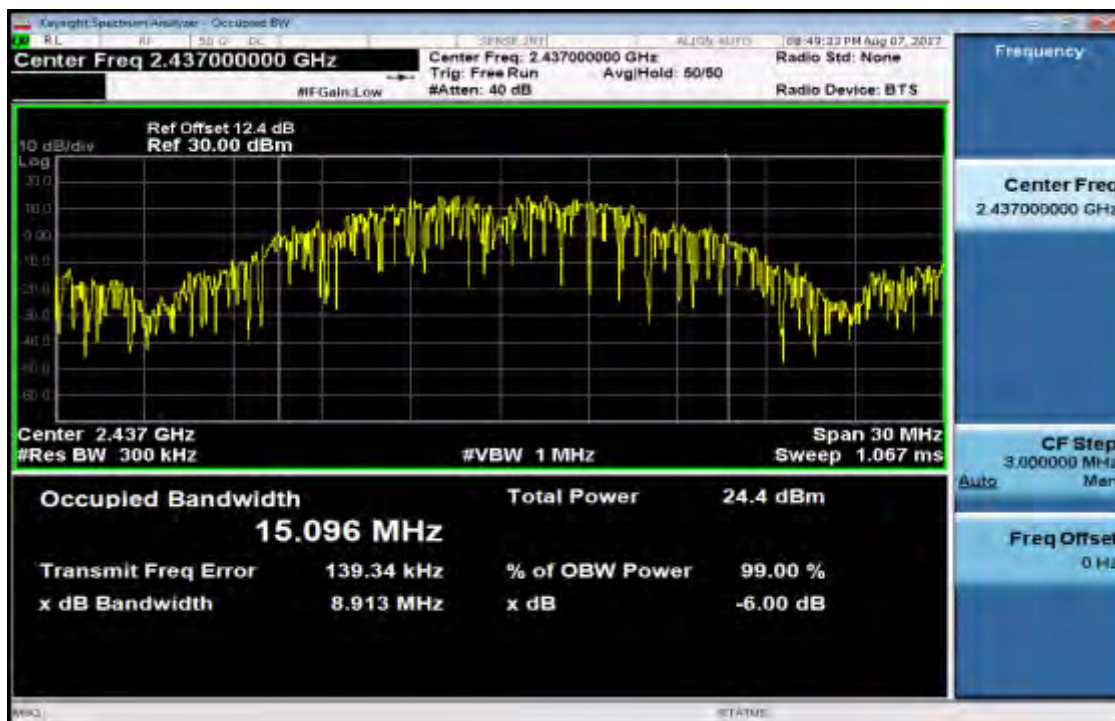


## 802.11b (Main)

### 99% Band Width Test Data CH-Low



### 99% Band Width Test Data CH-Mid



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## 99% Band Width Test Data CH-High



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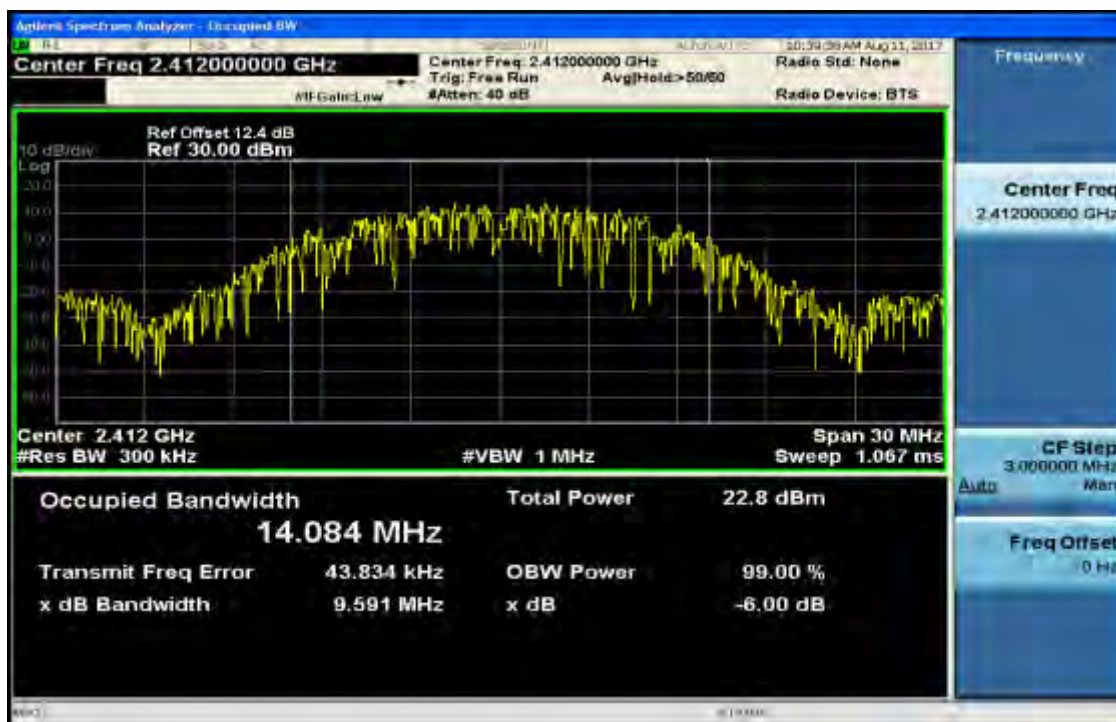
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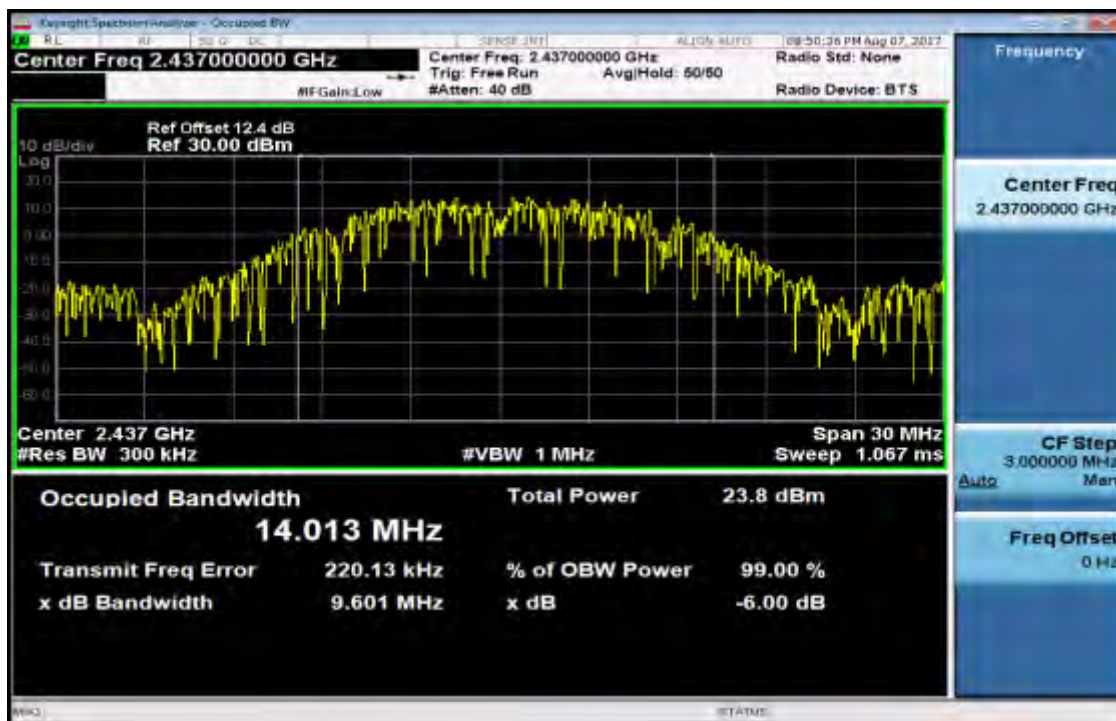
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## 802.11b (AUX1)

### 99% Band Width Test Data CH-Low



### 99% Band Width Test Data CH-Mid



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## 99% Band Width Test Data CH-High



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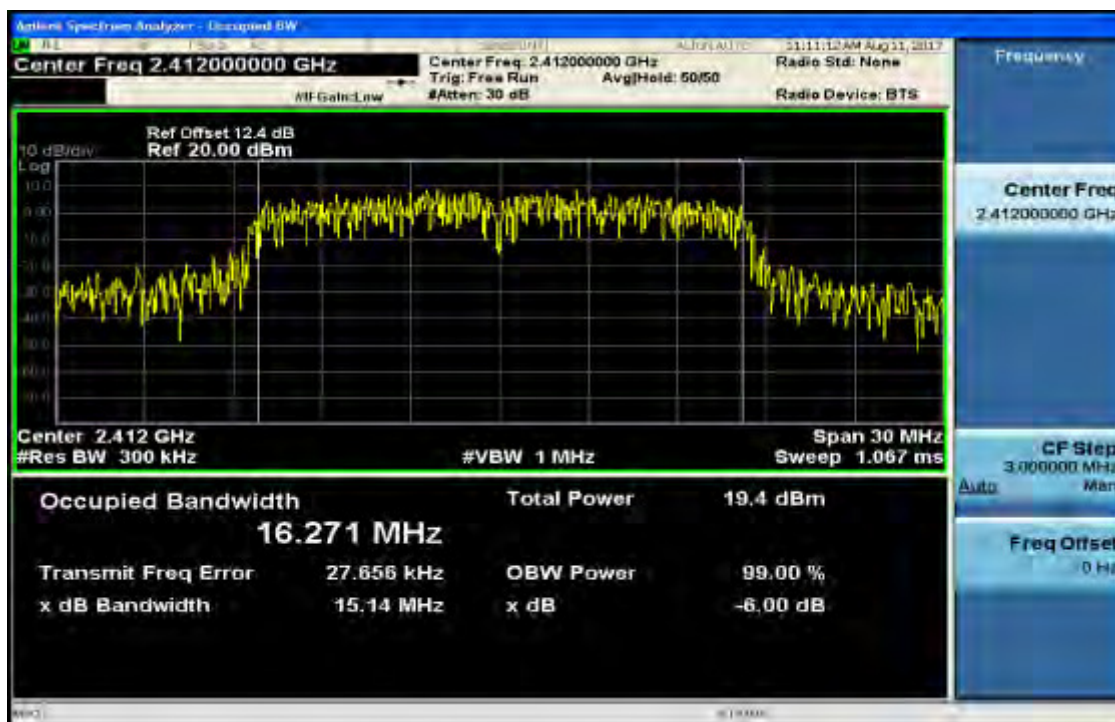
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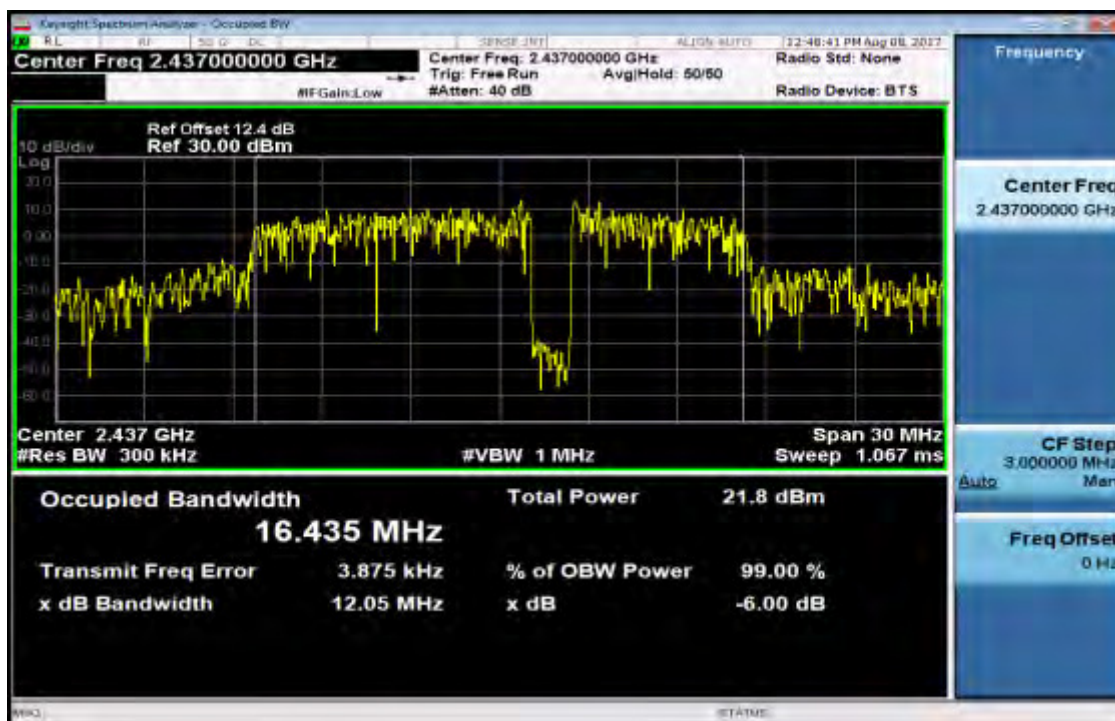
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## 802.11g (Main)

### 99% Band Width Test Data CH-Low



### 99% Band Width Test Data CH-Mid



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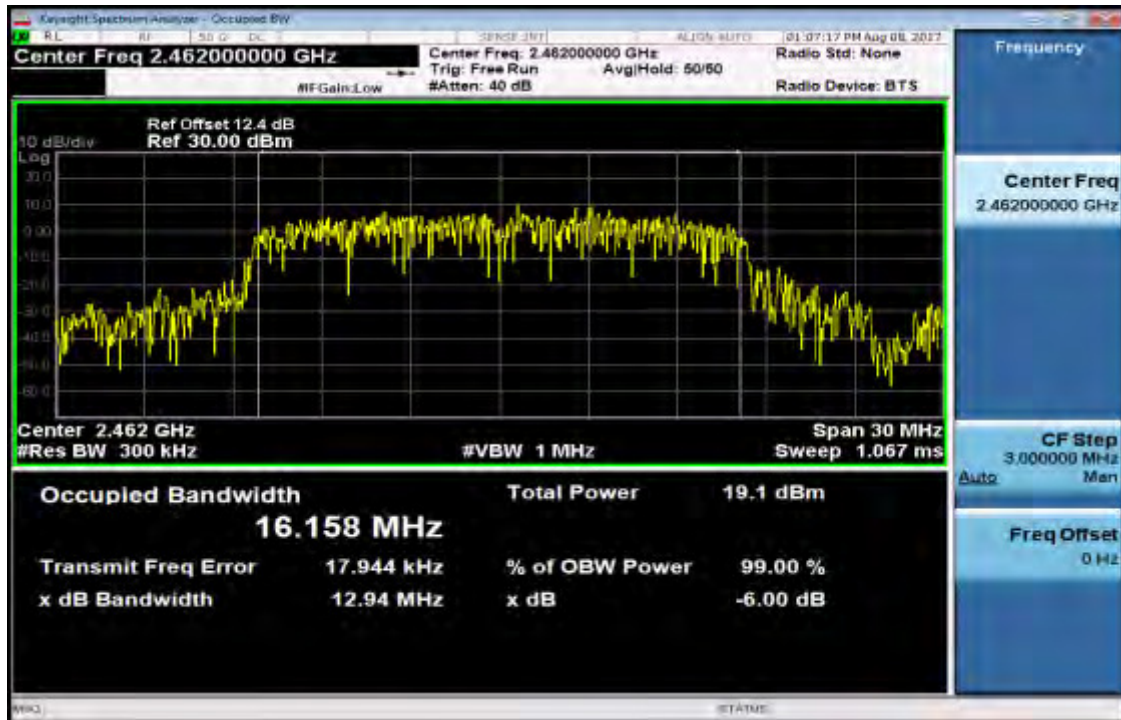
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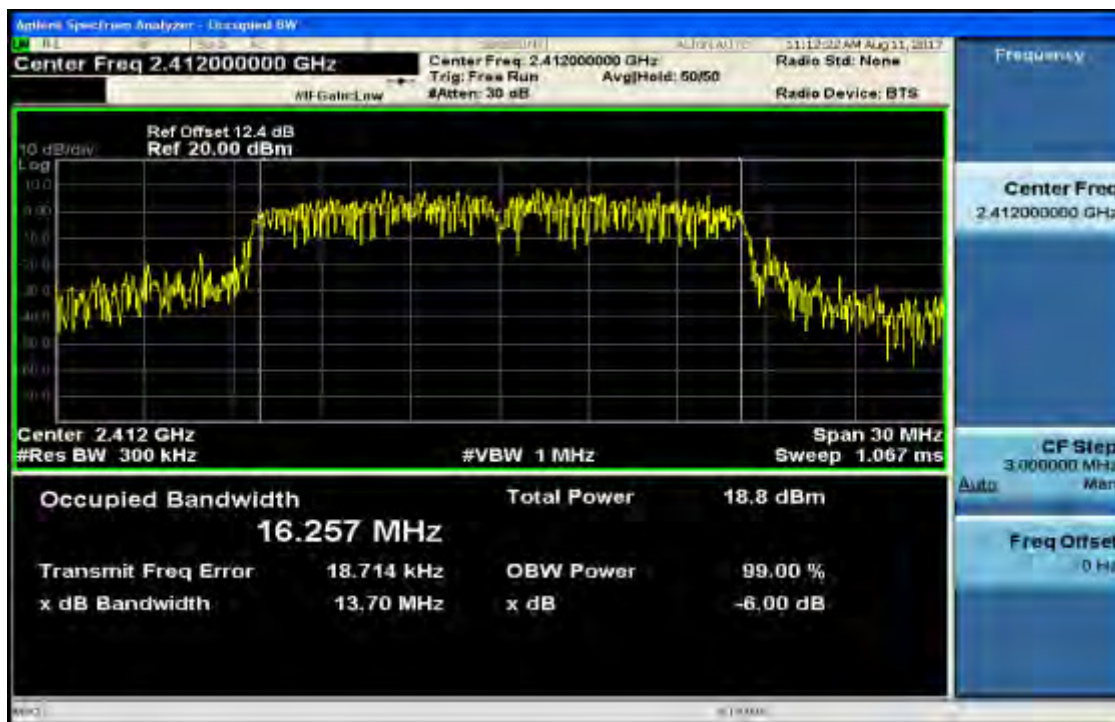
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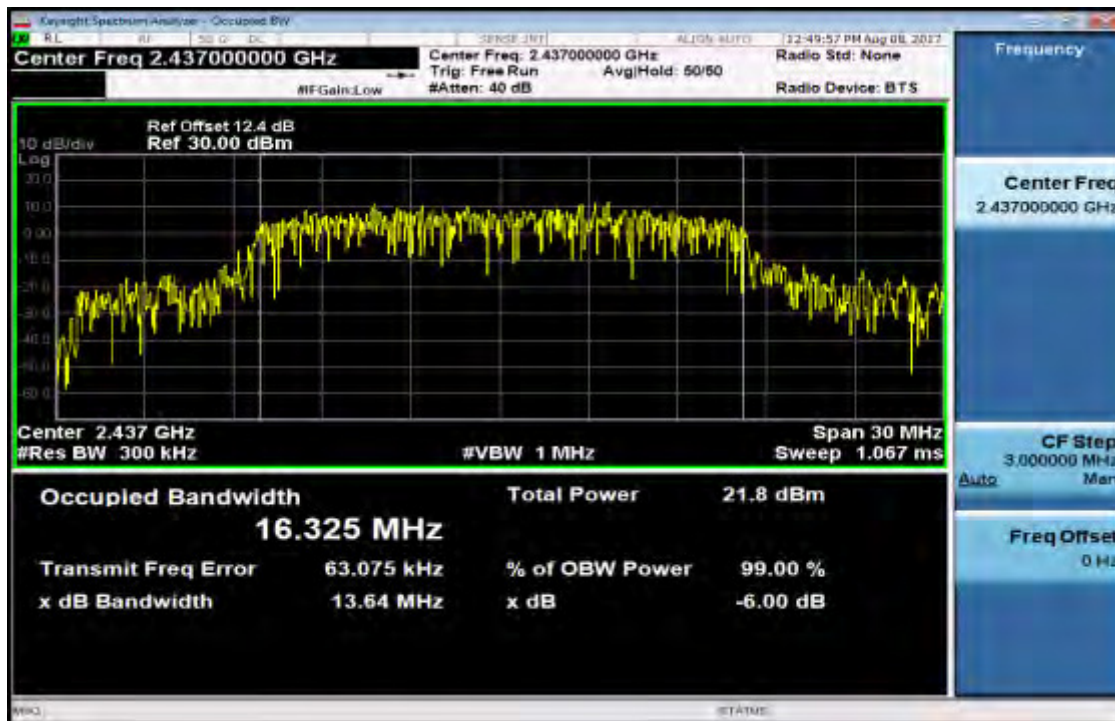


## 802.11g (AUX1)

### 99% Band Width Test Data CH-Low



### 99% Band Width Test Data CH-Mid



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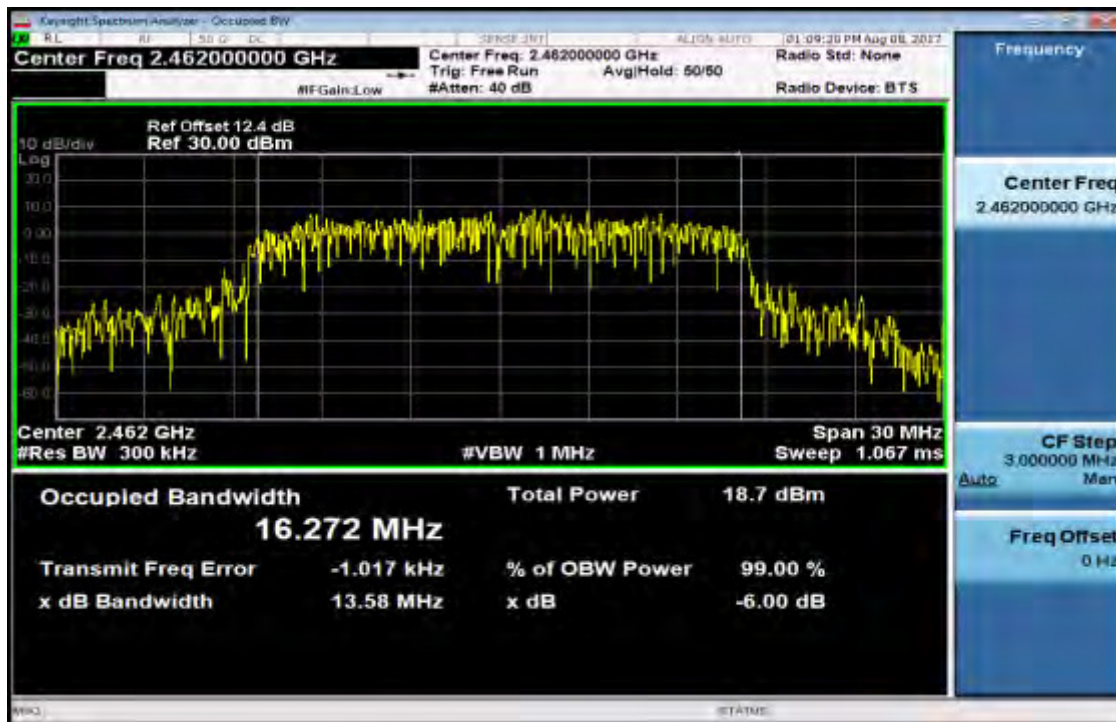
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## 99% Band Width Test Data CH-High



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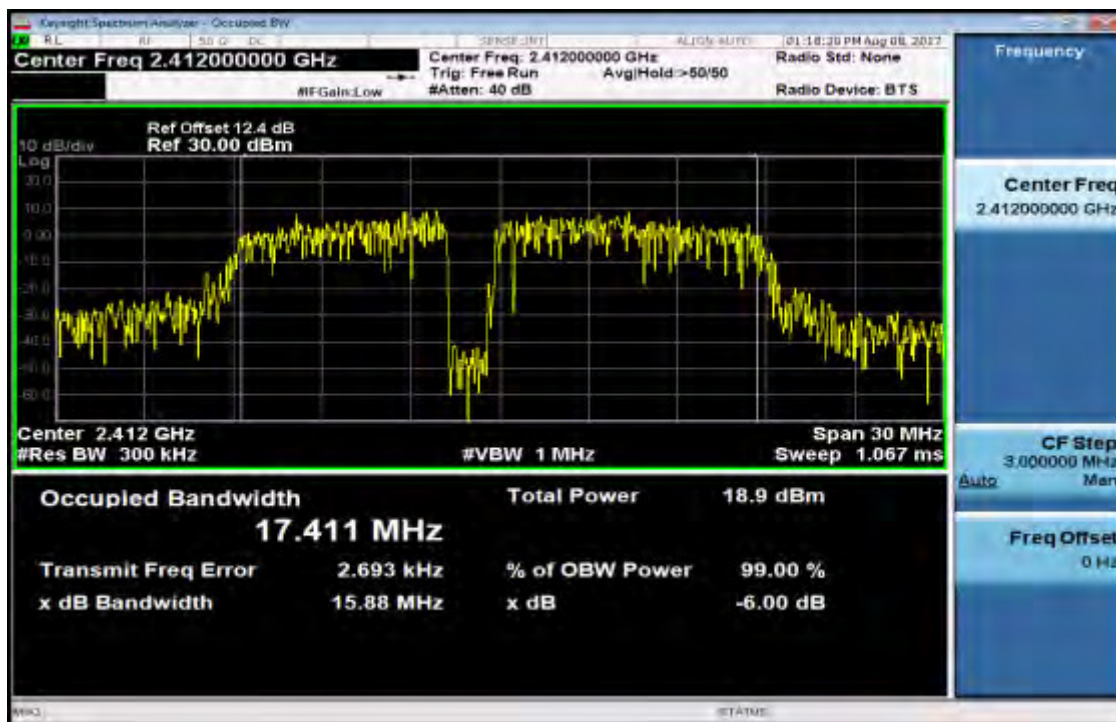
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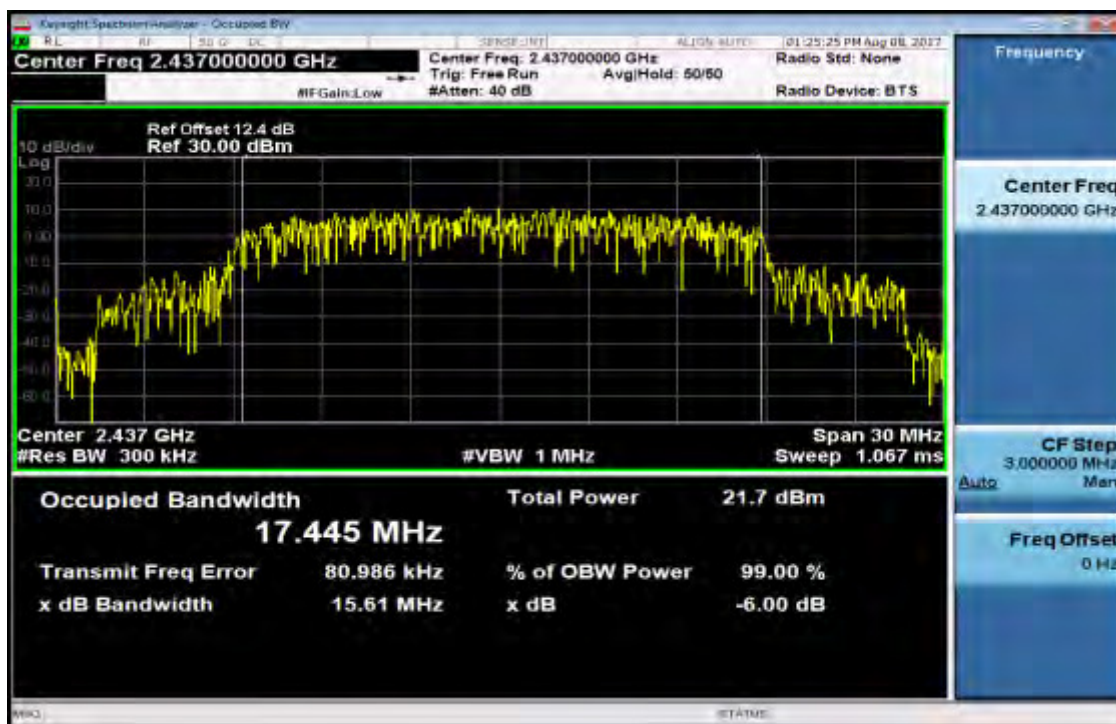


## 802.11n\_20M (Main)

### 99% Band Width Test Data CH-Low



### 99% Band Width Test Data CH-Mid



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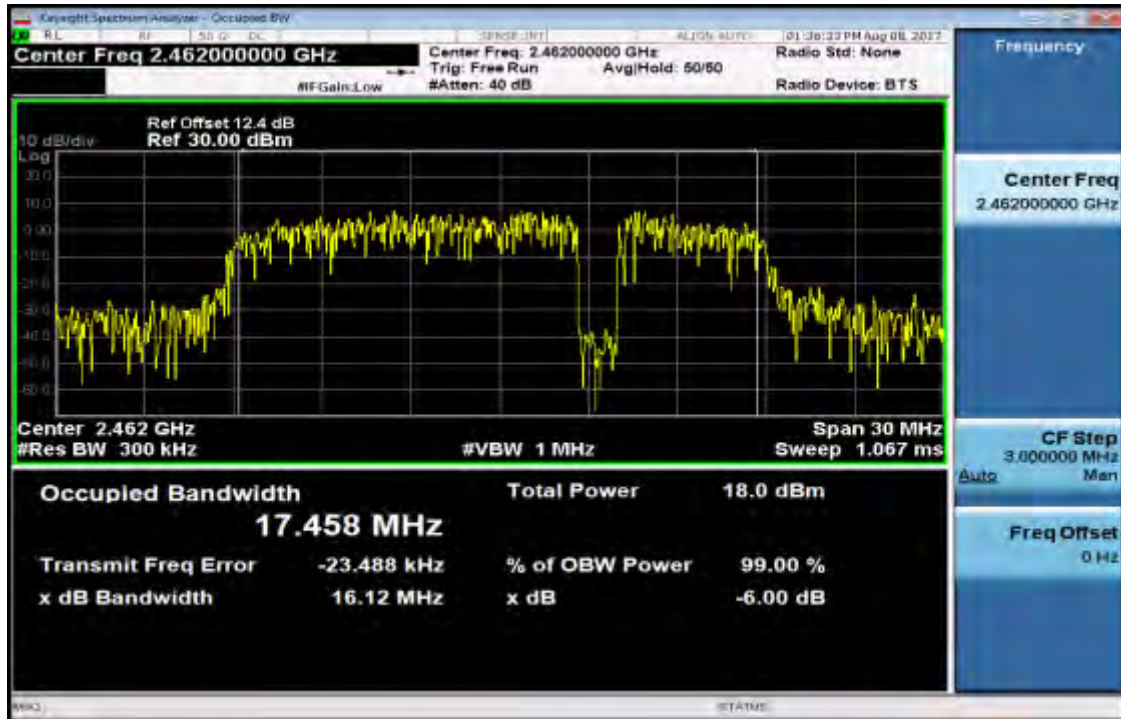
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## 99% Band Width Test Data CH-High



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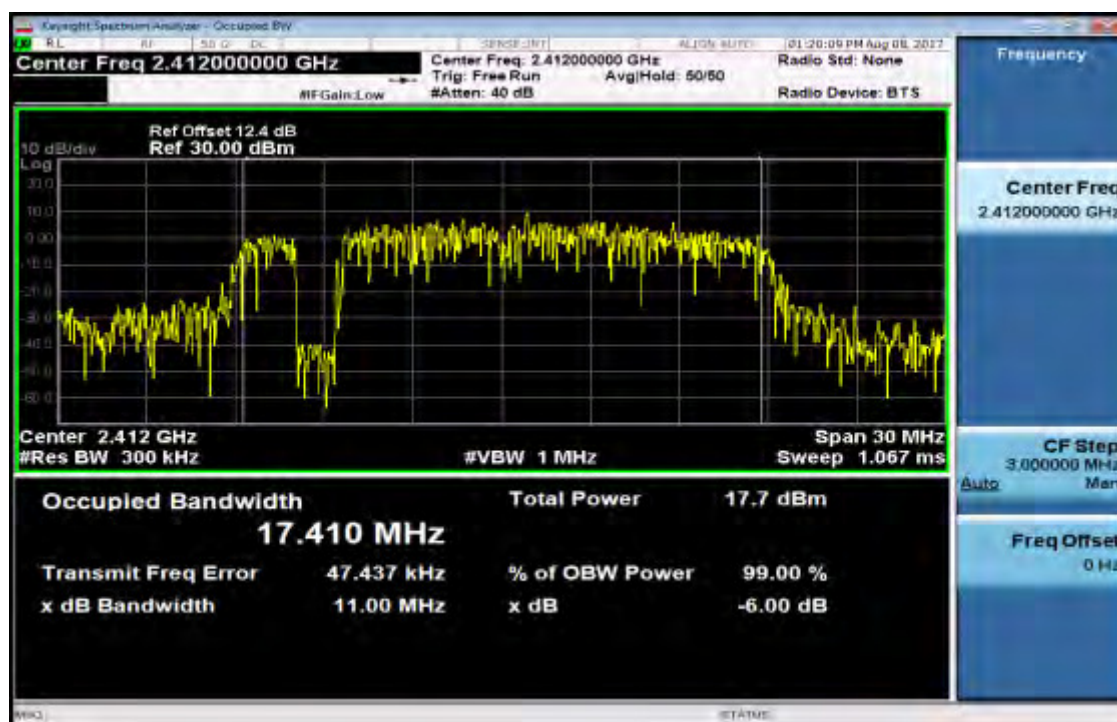
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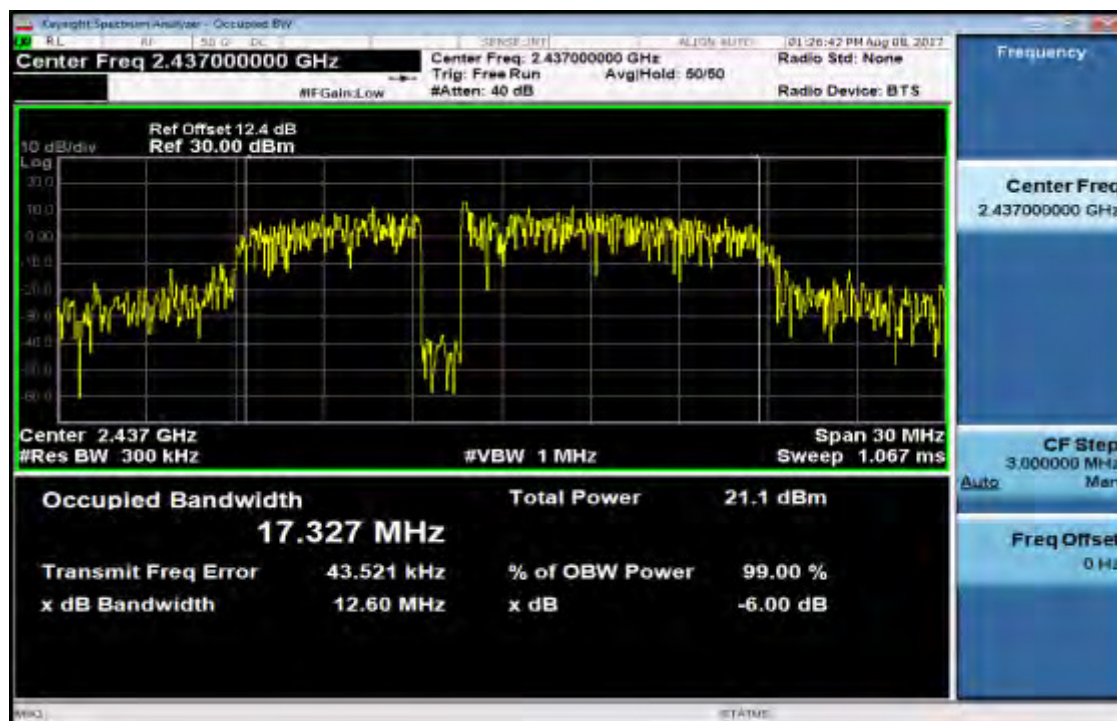
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## 802.11n\_20M (AUX1)

## 99% Band Width Test Data CH-Low



## 99% Band Width Test Data CH-Mid



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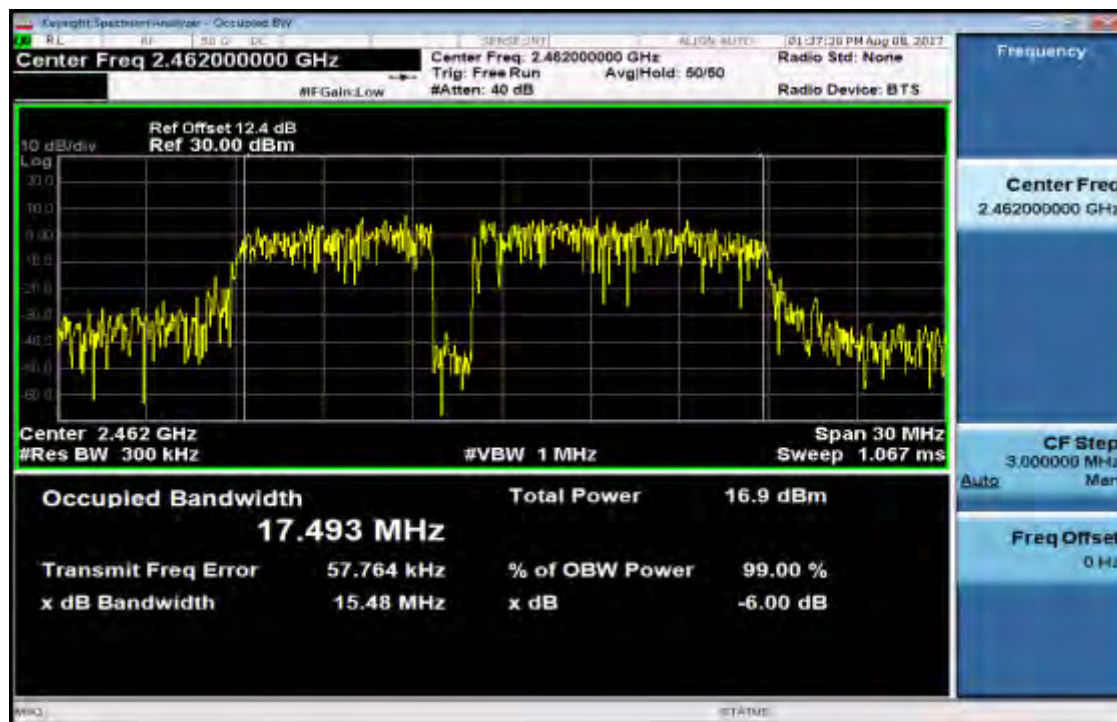
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## 99% Band Width Test Data CH-High



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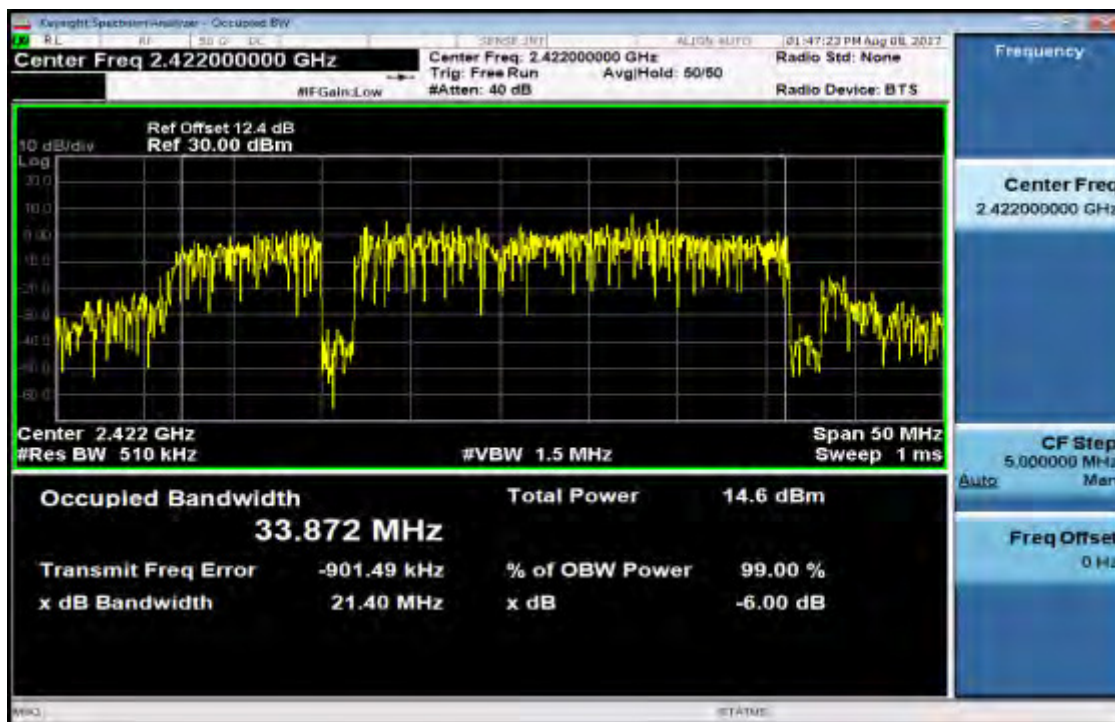
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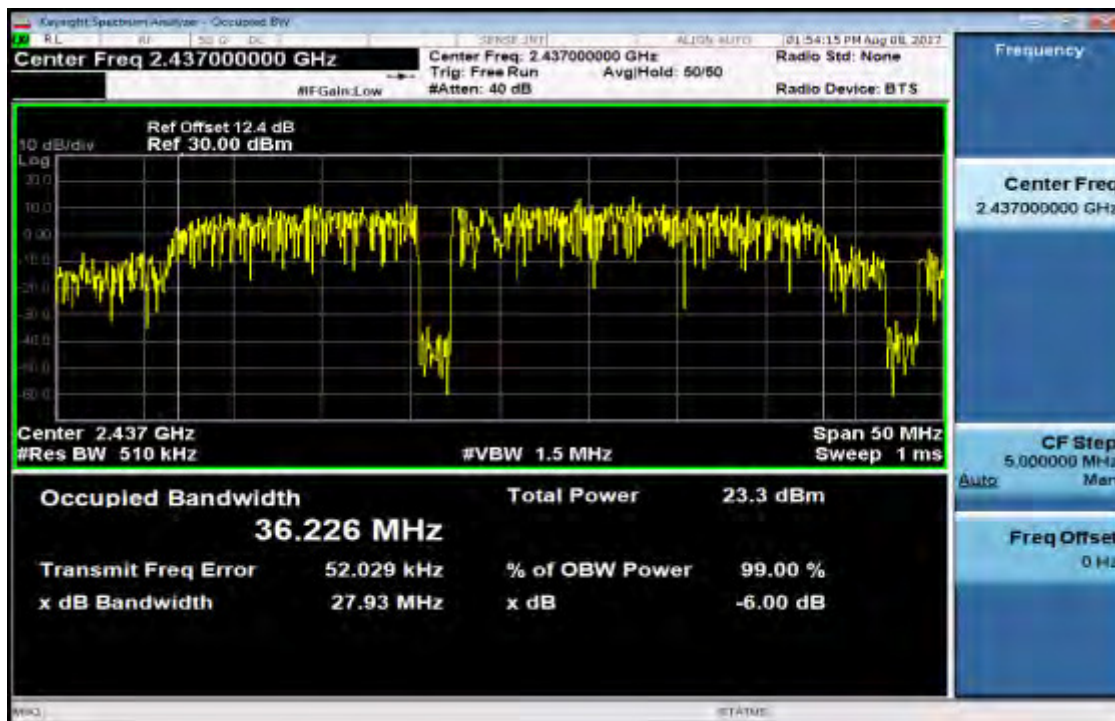
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## 802.11n\_40M (Main)

### 99% Band Width Test Data CH-Low



### 99% Band Width Test Data CH-Mid



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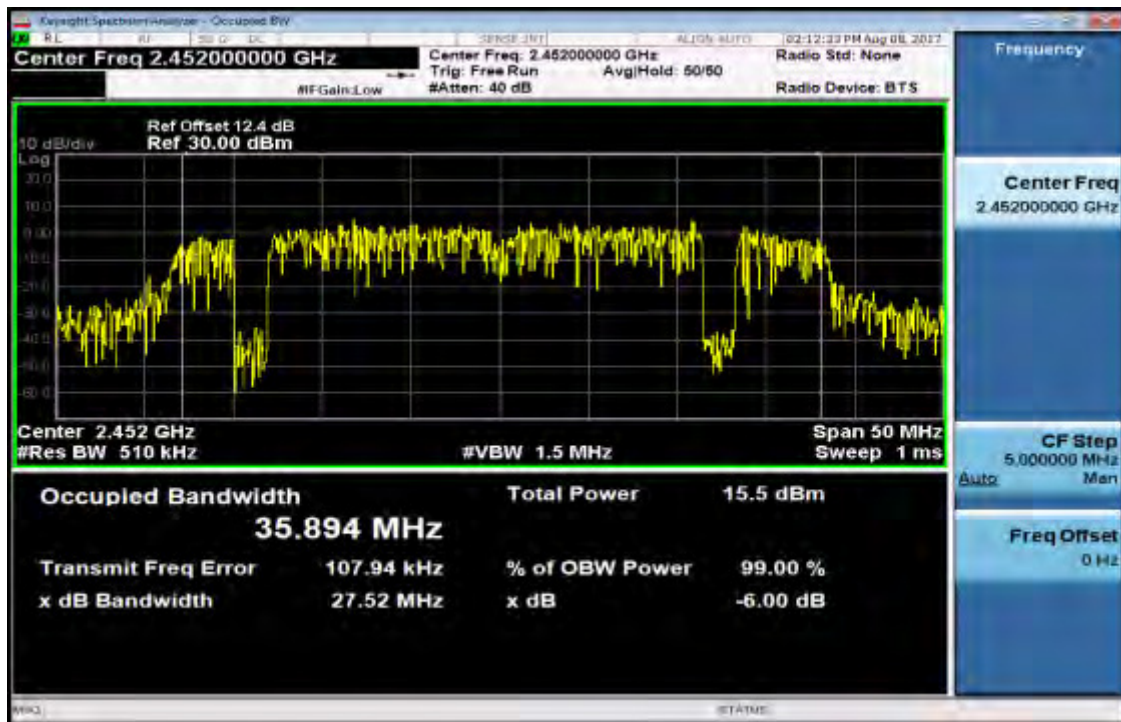
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## 99% Band Width Test Data CH-High



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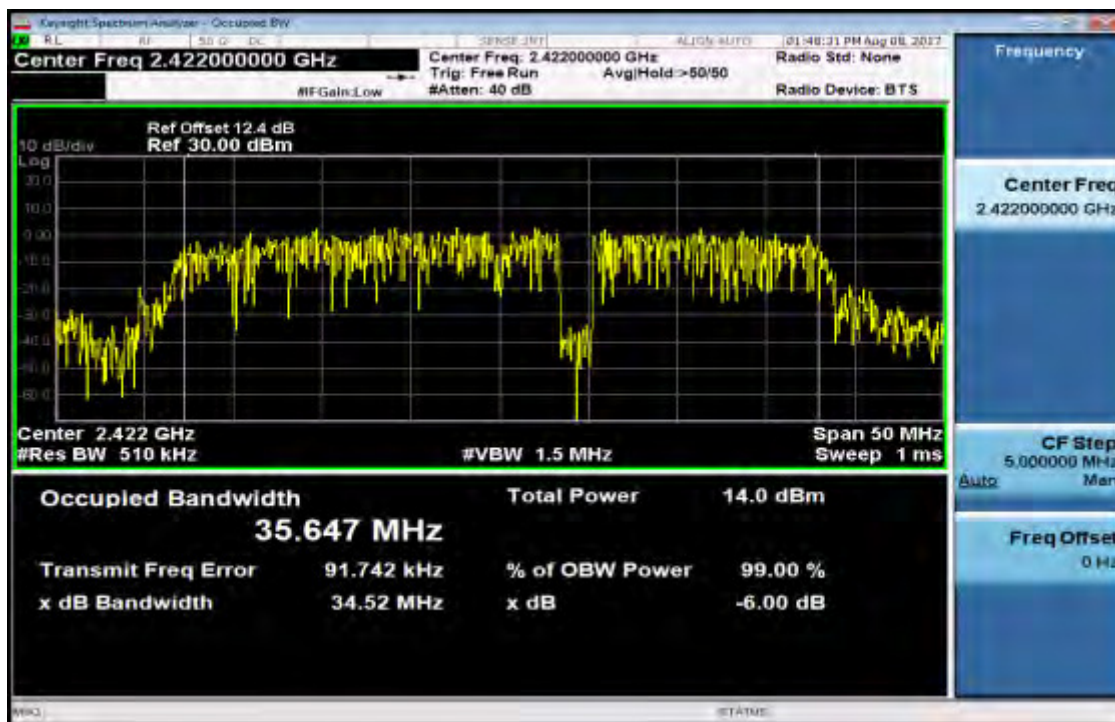
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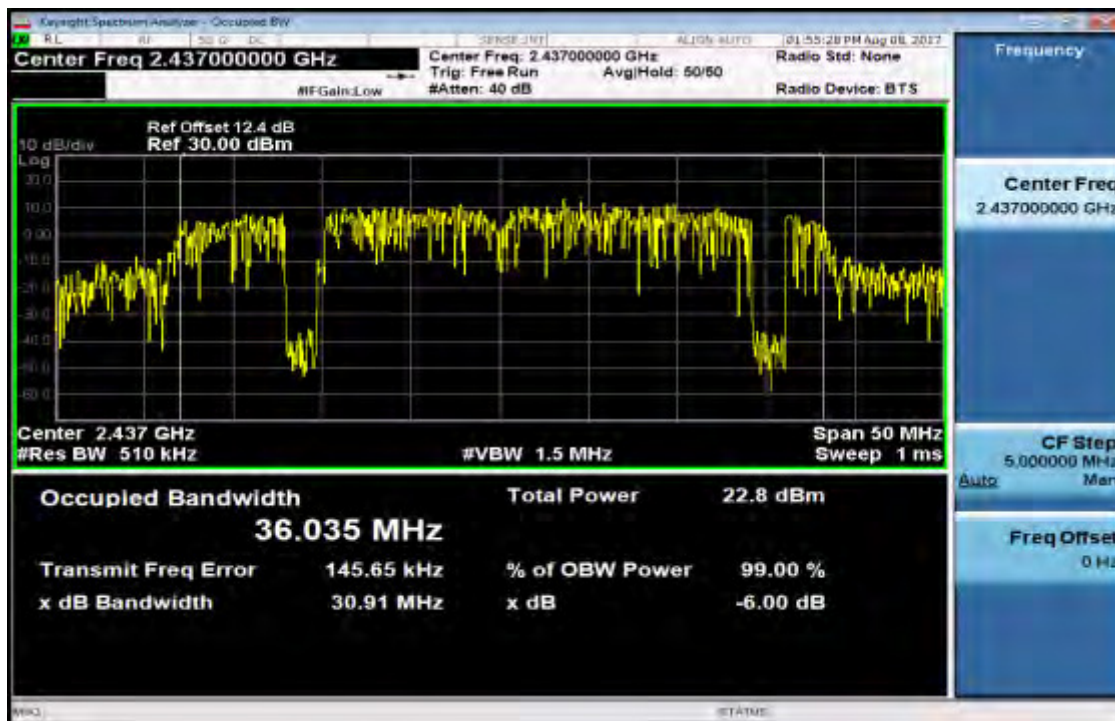
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## 802.11n\_40M (AUX1)

### 99% Band Width Test Data CH-Low



### 99% Band Width Test Data CH-Mid



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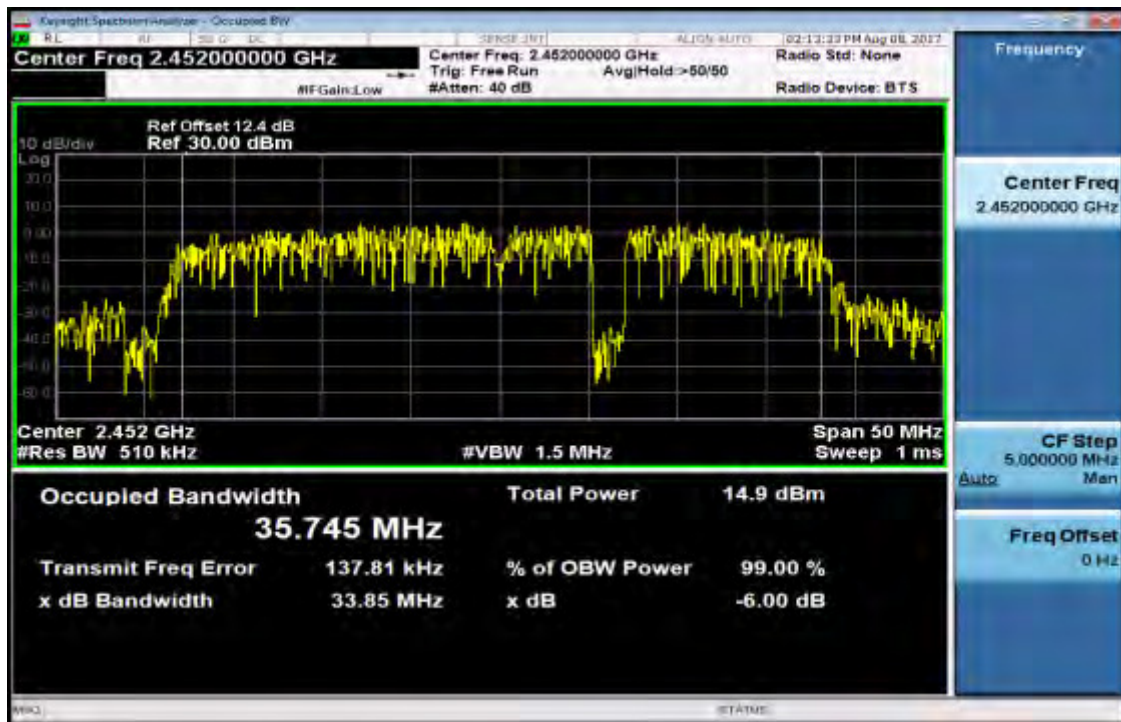
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## 99% Band Width Test Data CH-High



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## 10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

### 10.1 Standard Applicable

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

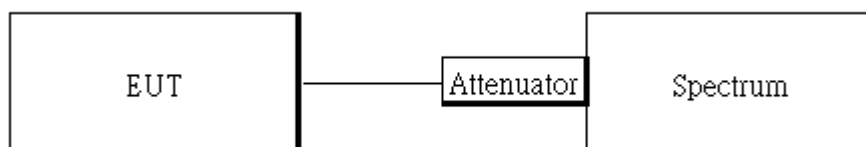
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) & RSS-Gen §8.10, must also comply with the radiated emission limits specified in §15.209(a) & RSS-Gen §8.8.

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.
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018

### 10.3 Test SET-UP



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## 10.4 Measurement Procedure

### Conducted Band Edge:

1. To connect Antenna Port of EUT to Spectrum.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 v04 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 v04 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.

## 10.5 Measurement Result

### Note:

1. **Refer to next page spectrum analyzer data chart and tabular data sheets.**
2. **For Restricted Band Edge Limit, please refer to section 12.5 of this report for measurement result.**

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## 802.11b

### Band Edges Test Data CH-Low



### Band Edges Test Data CH-High



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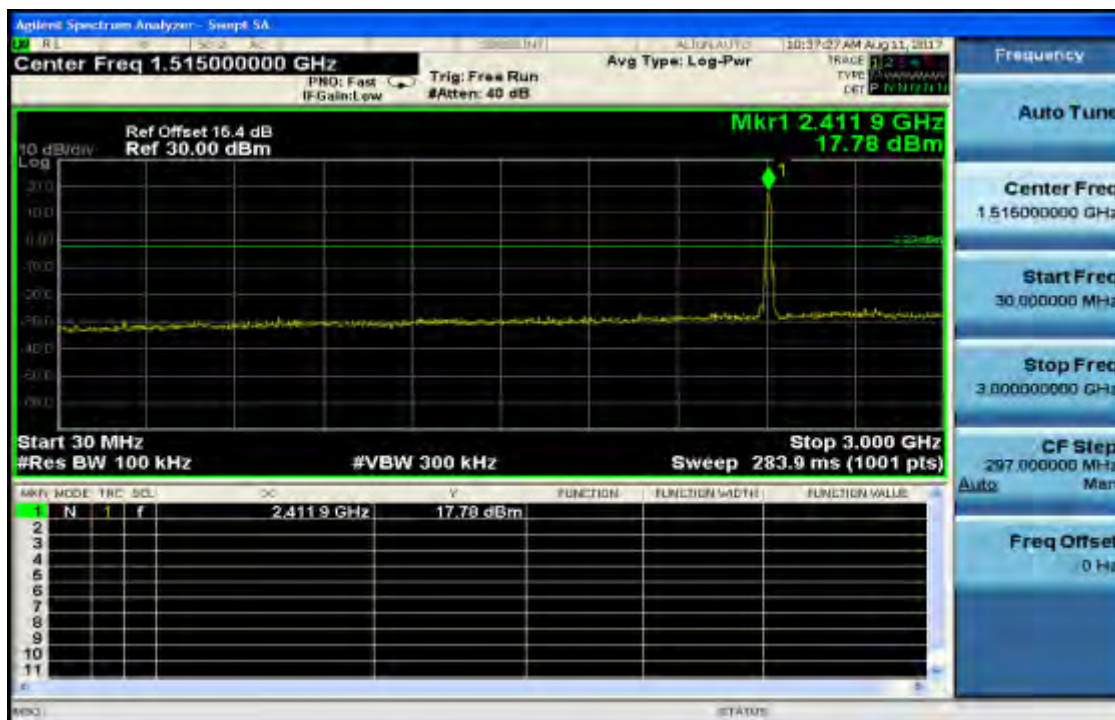
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Spurious Emission Test Data CH-Low



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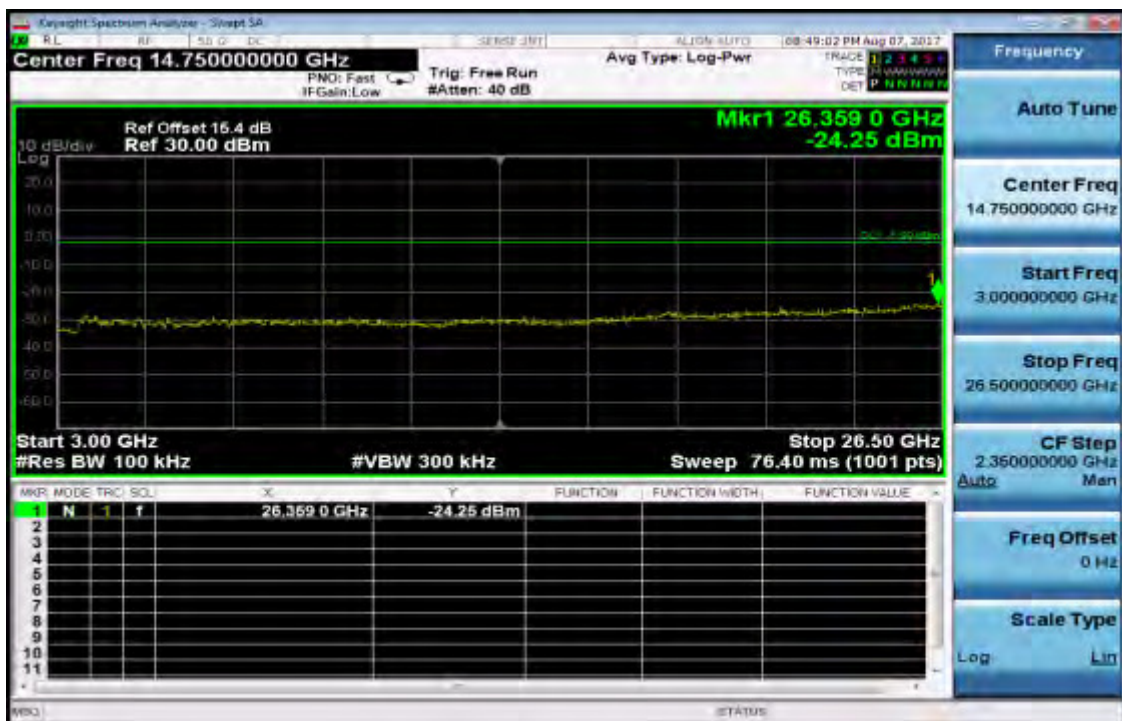
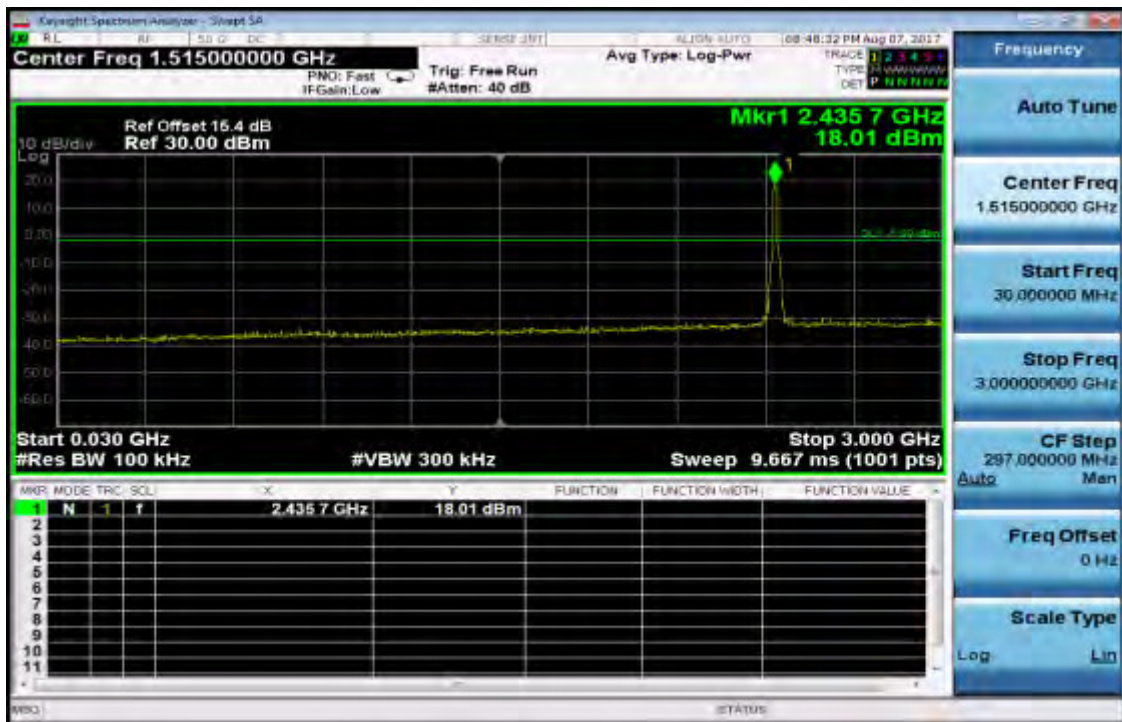
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## Spurious Emission Test Data CH-Mid



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## Spurious Emission Test Data CH-High



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802.11g

## Band Edges Test Data CH-Low



## Band Edges Test Data CH-High



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Spurious Emission Test Data CH-Low



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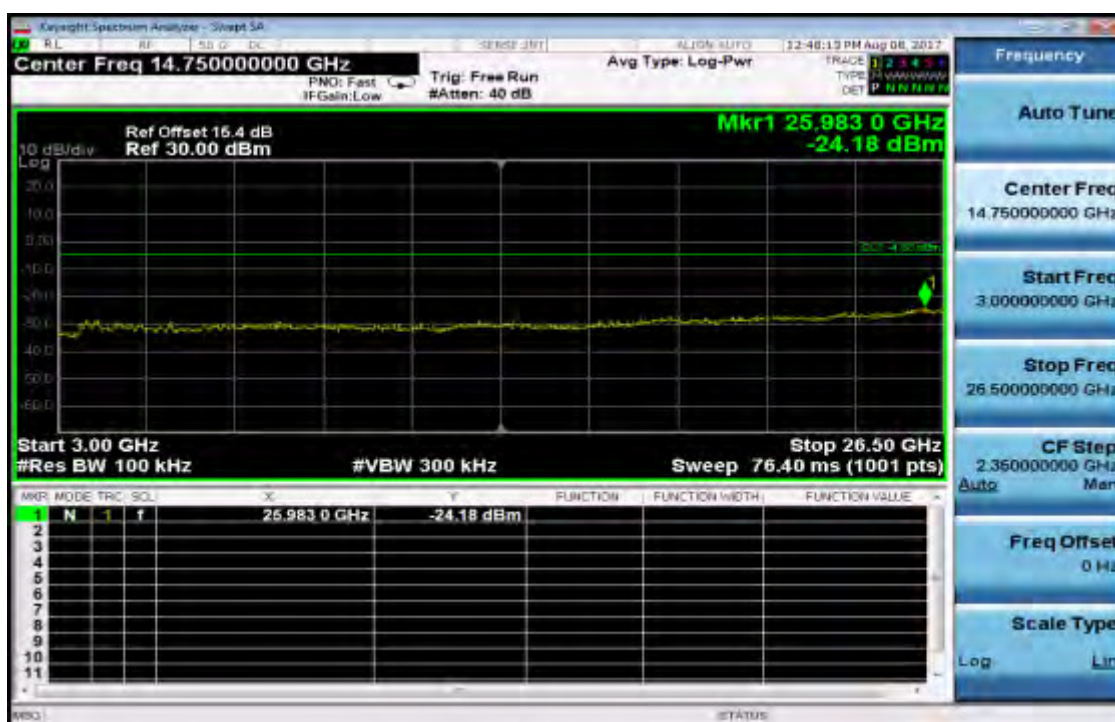
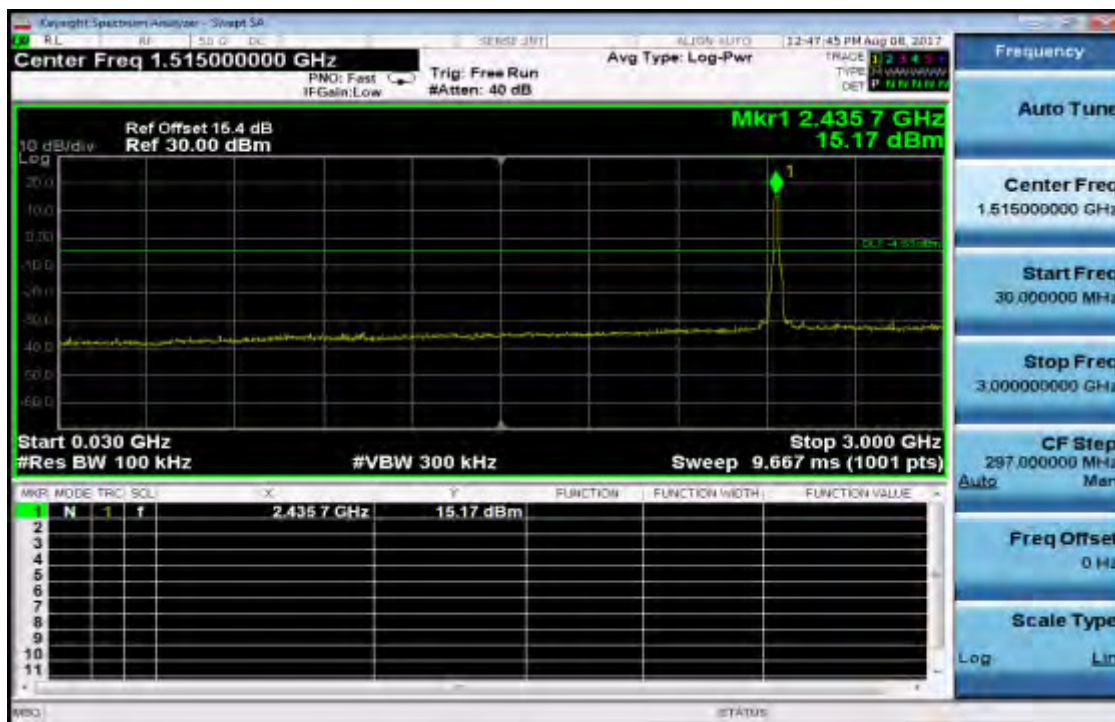
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## Spurious Emission Test Data CH-Mid



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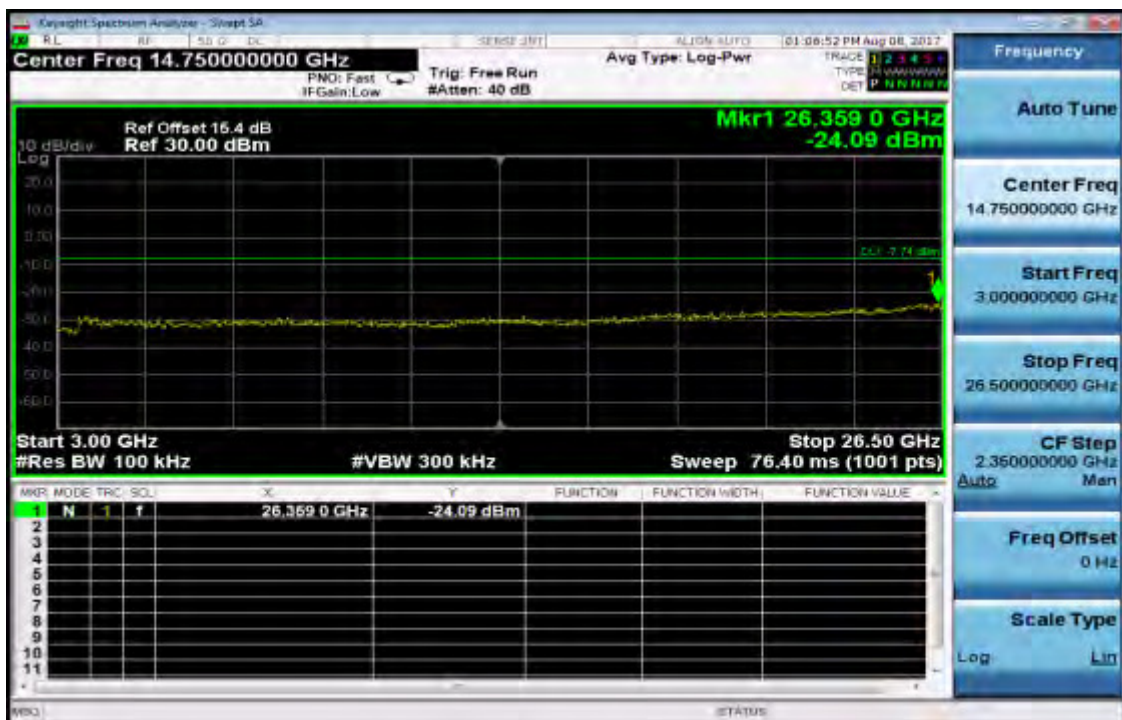
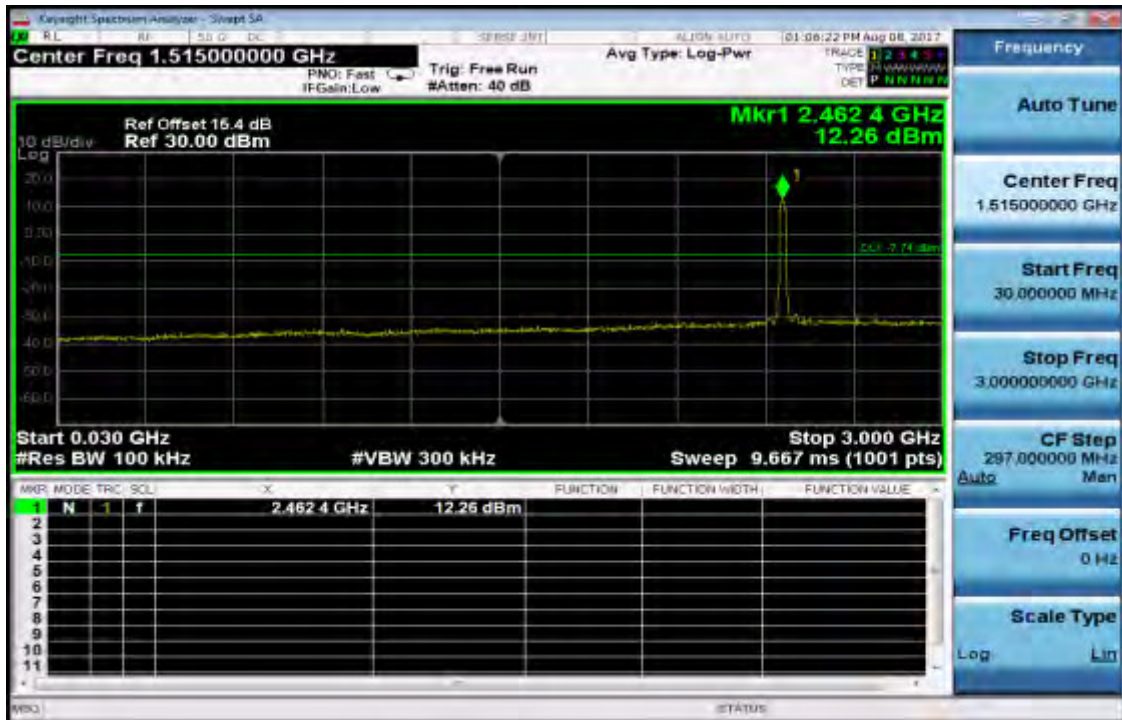
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## Spurious Emission Test Data CH-High



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## 802.11n\_HT20

### Band Edges Test Data CH-Low



### Band Edges Test Data CH-High



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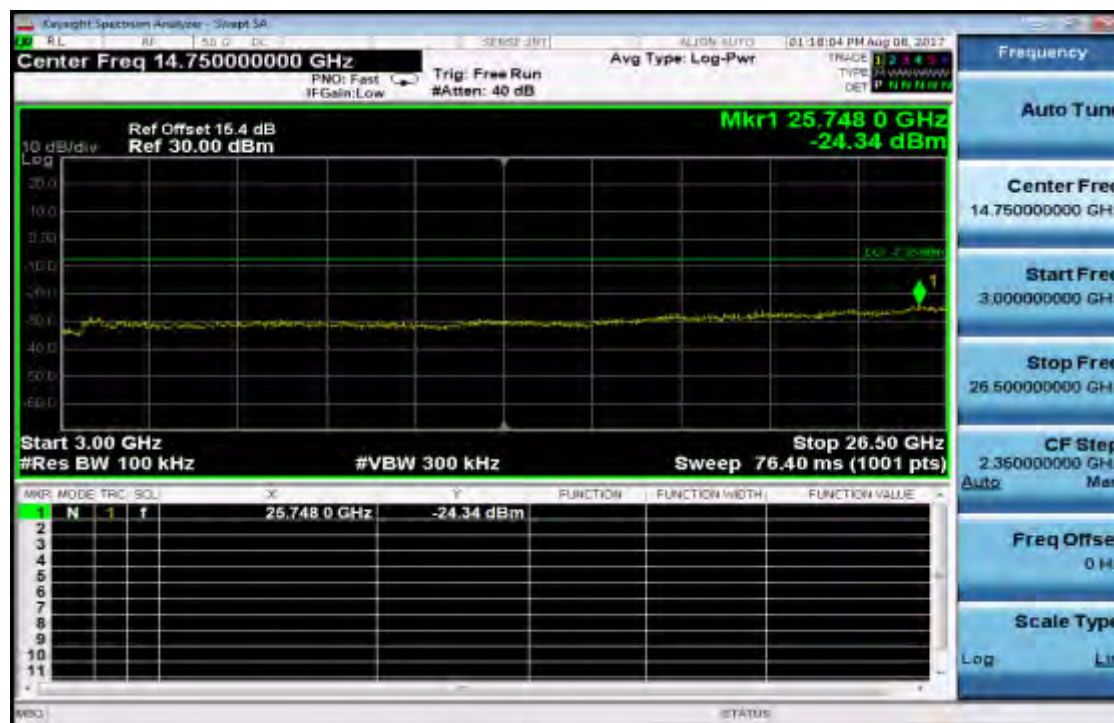
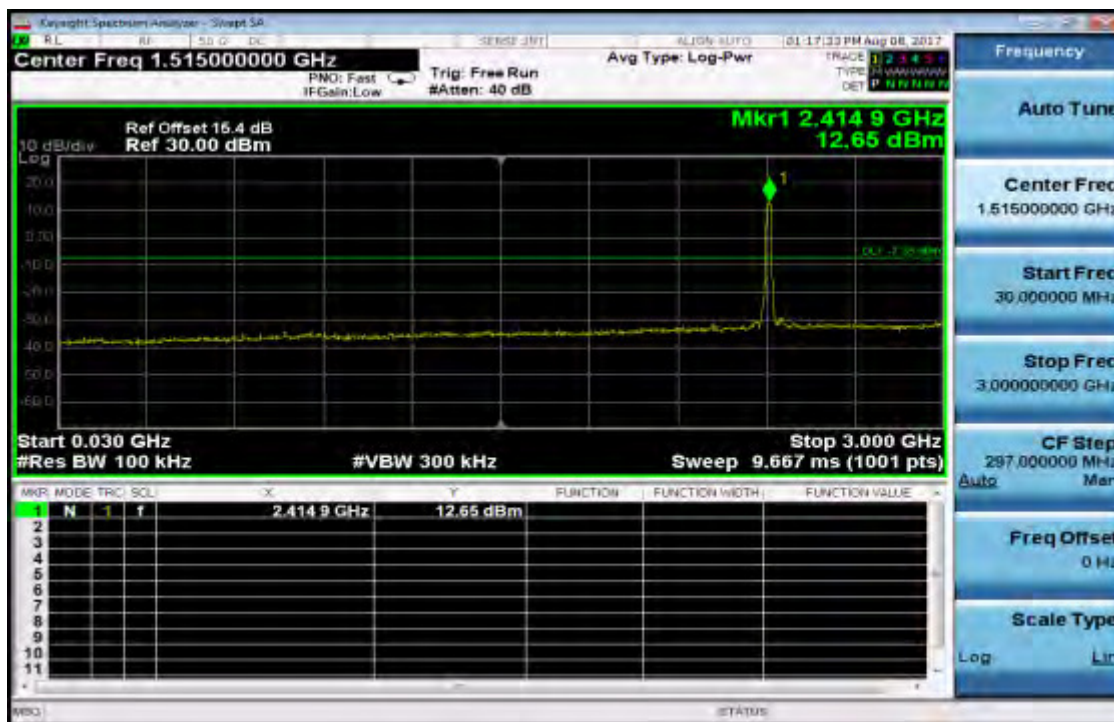
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## 802.11n\_HT20

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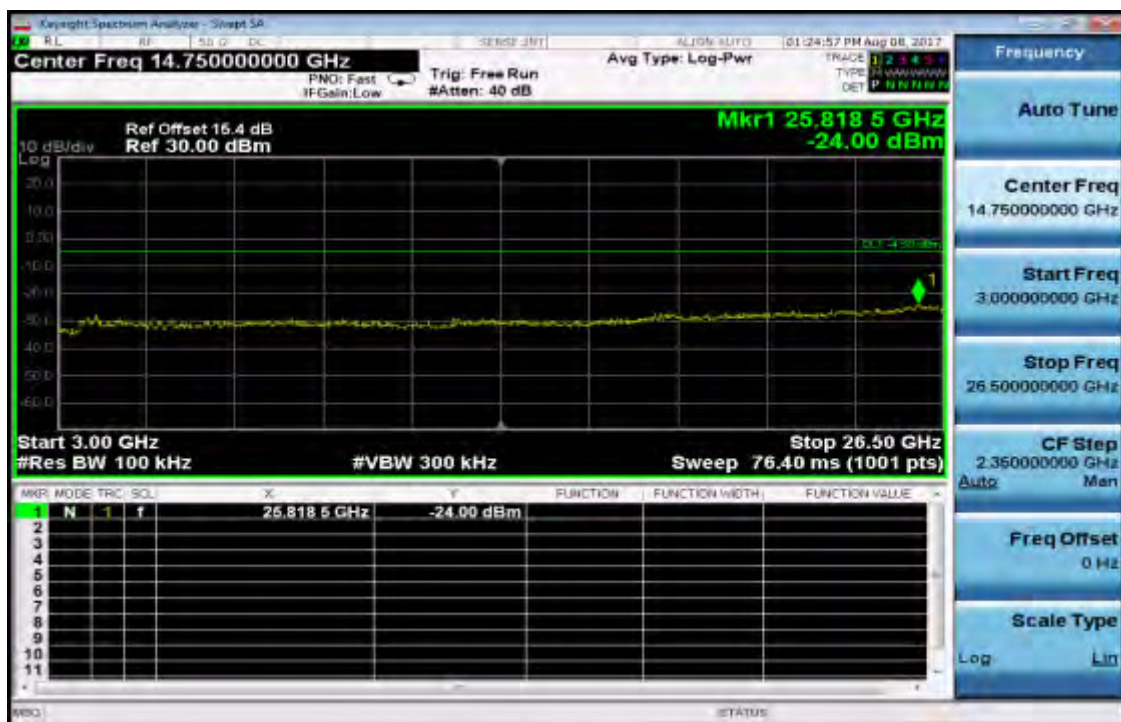
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## Spurious Emission Test Data CH-Mid



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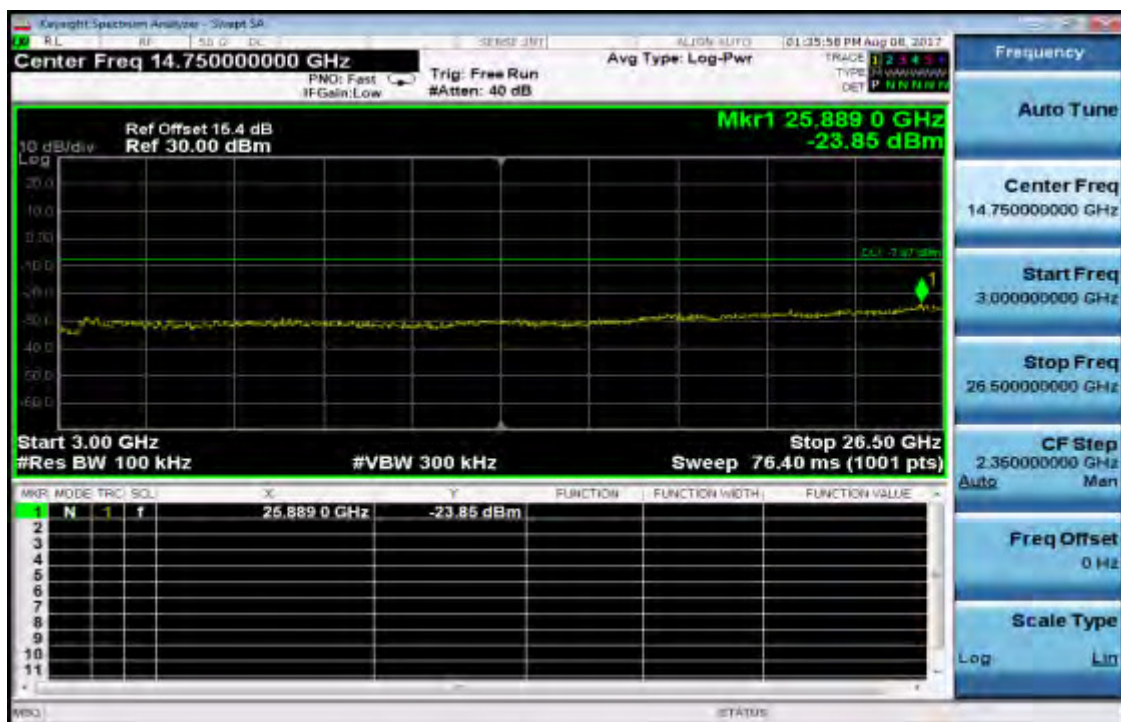
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## Spurious Emission Test Data CH-High



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## 802.11n\_HT40

### Band Edges Test Data CH-Low



### Band Edges Test Data CH-High



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t (886-2) 2299-3279

f (886-2) 2298-0488

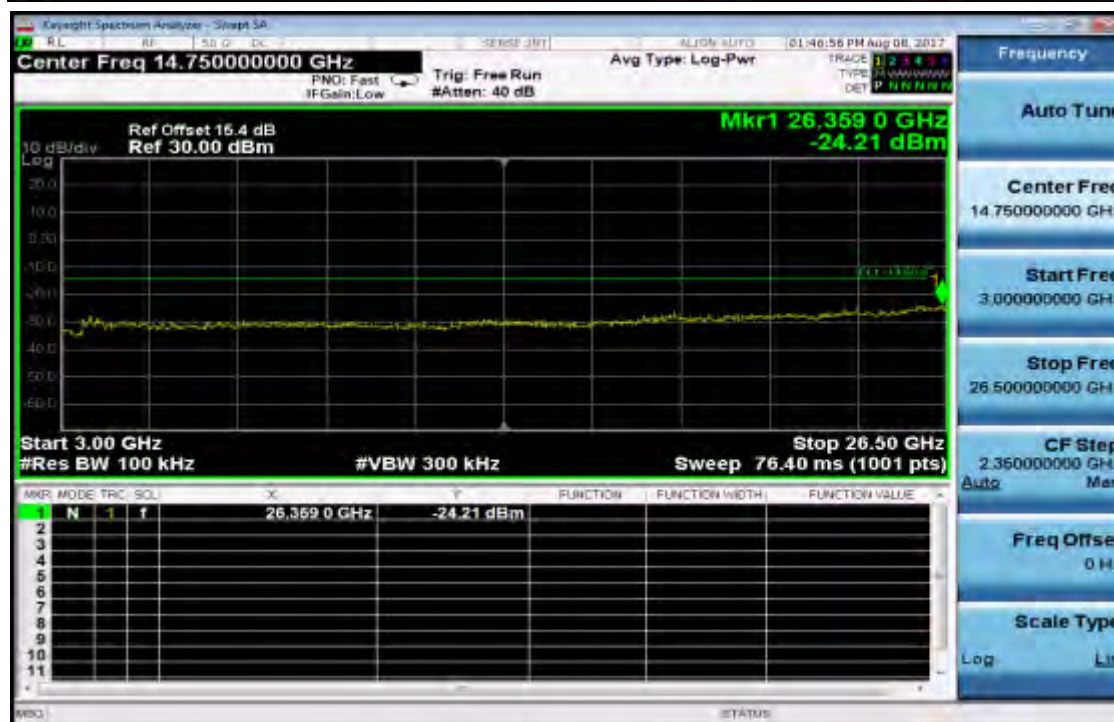
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# 802.11n\_HT40

## Spurious Emission Test Data CH-Low



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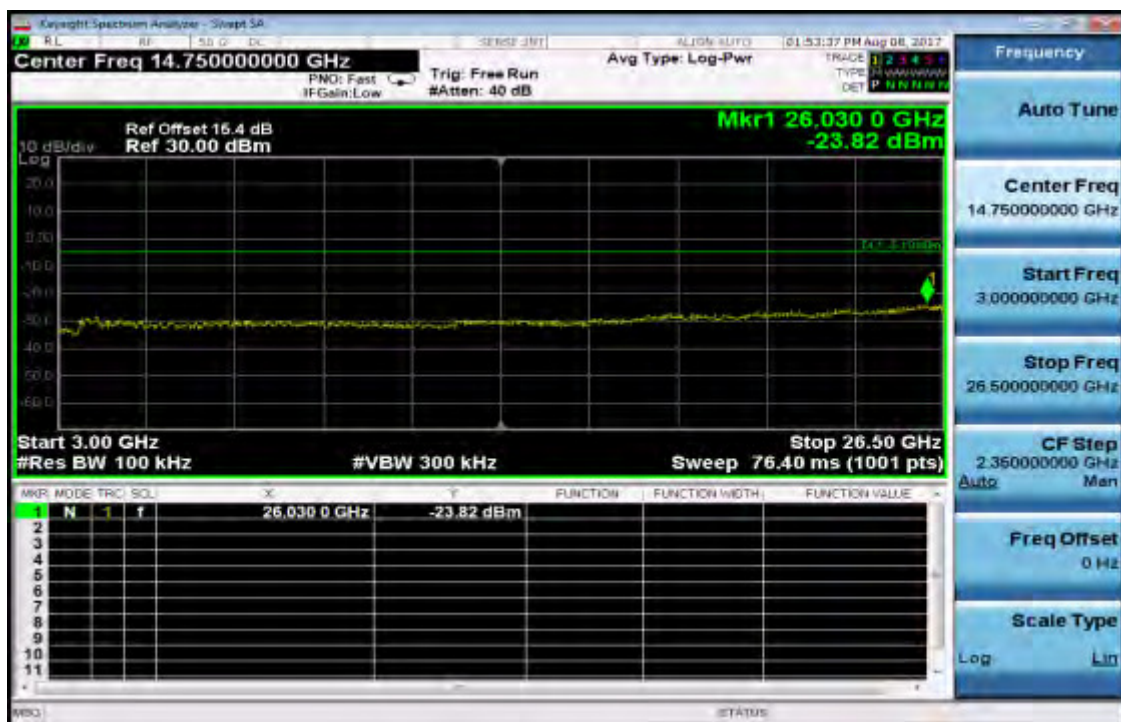
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## Spurious Emission Test Data CH-Mid



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## 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 (dBμV/m)

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## 11.2 Measurement Equipment Used:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/11/2017	05/10/2018
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/25/2017	04/24/2018
Loop Antenna	ETS.LINDGREN	6502	148045	09/20/2016	09/19/2017
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/19/2016	12/18/2017
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/04/2017	08/03/2018
Pre-Amplifier	Agilent	8447D	2944A07676	01/03/2017	01/02/2018
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/03/2017	01/02/2018
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	ChamPro	AM-BS-4500-B	060776-ABS	N.C.R	N.C.R
Controller	ChamPro	EM1000	60776	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_RX	9	01/05/2017	01/04/2018
3m Site NSA	SGS	966 chamber	N/A	07/01/2017	06/30/2018
Low Loss Cable	Huber Suhner	966 TX	1	01/05/2017	01/04/2018

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

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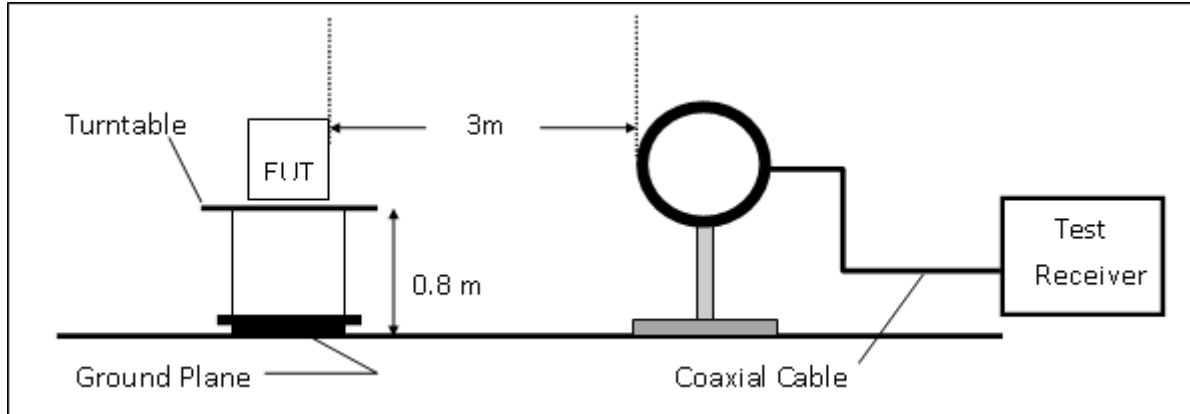
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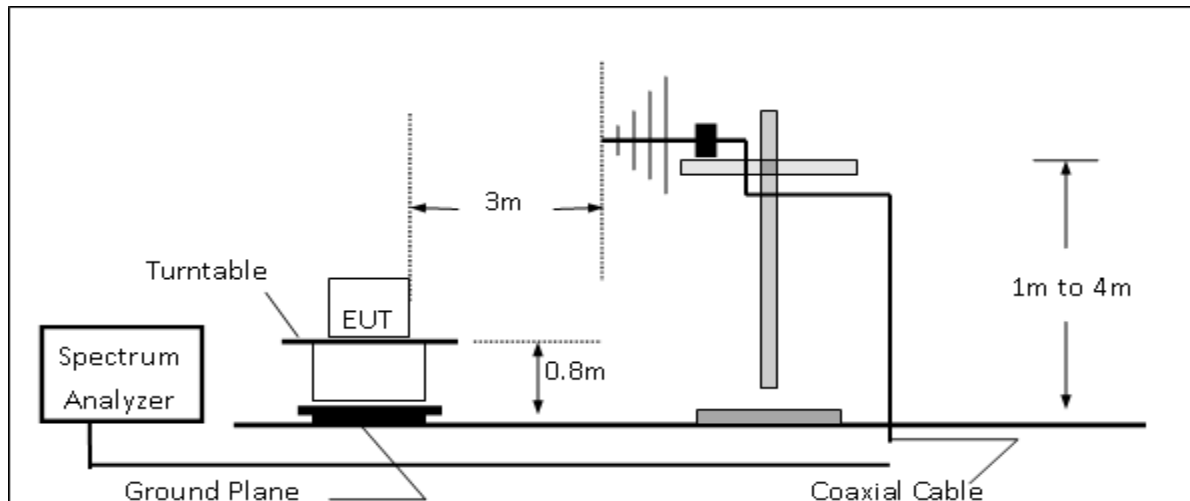
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### 11.3 Test SET-UP

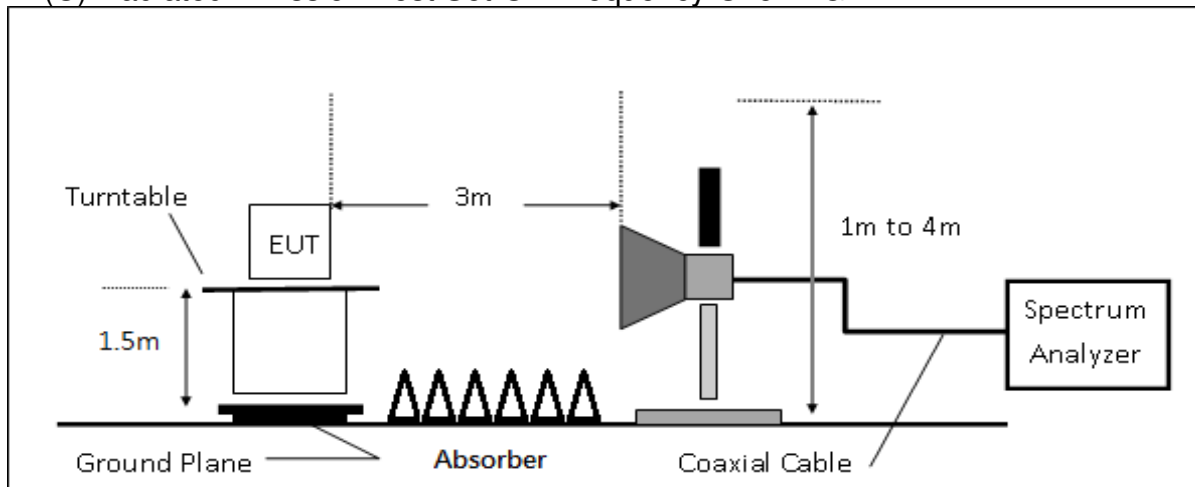
#### (A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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## 11.4 Measurement Procedure

1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 v04 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(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

#### Note :

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

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

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

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

### 11.7 Measurement Result

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

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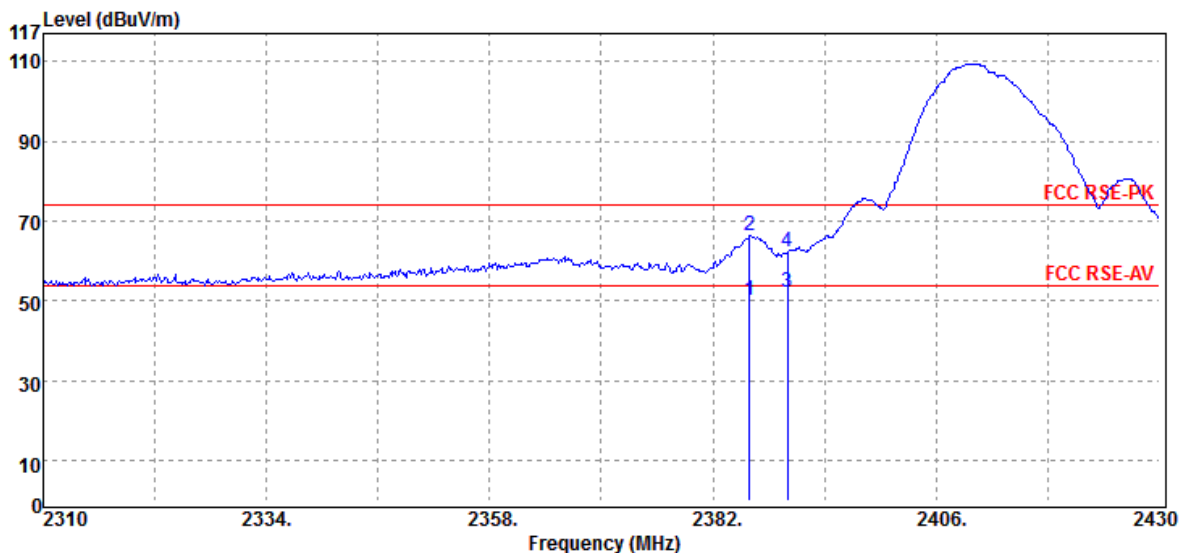
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## Radiated Band Edge Measurement Result (802.11b)

Operation Band	:802.11b	Test Date	:2017-08-09
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2385.96	S	Average	52.01	-1.72	50.29	54.00	-3.71
2385.96	S	Peak	68.00	-1.72	66.28	74.00	-7.72
2390.00	E	Average	54.16	-1.74	52.42	54.00	-1.58
2390.00	E	Peak	63.96	-1.74	62.22	74.00	-11.78

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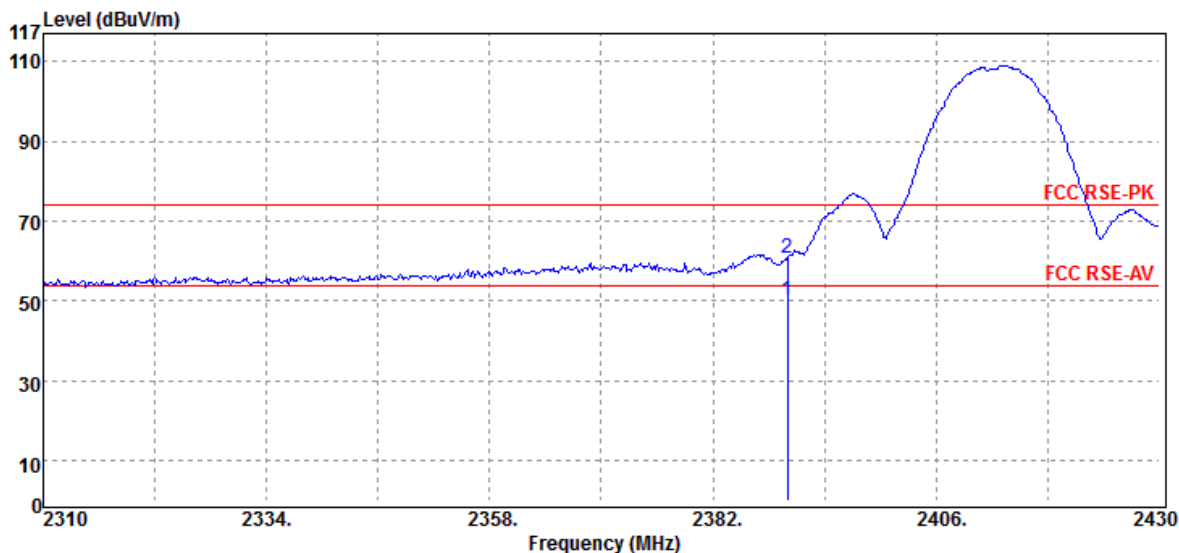
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Operation Band :802.11b  
Fundamental Frequency :2412 MHz  
Operation Mode :Bandedge CH LOW  
EUT Pol. :E1 Plane

Test Date :2017-08-09  
Temp./Humi. :21 deg\_C / 62 RH  
Engineer :Tin  
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	52.03	-1.74	50.29	54.00	-3.71
2390.00	E	Peak	62.49	-1.74	60.75	74.00	-13.25

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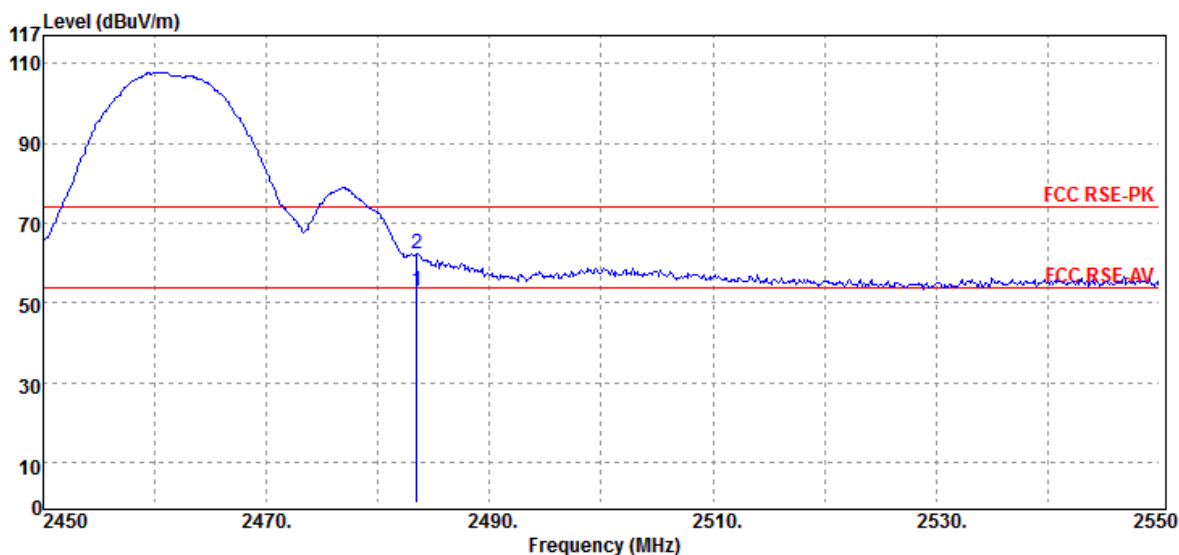
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Operation Band :802.11b  
Fundamental Frequency :2462 MHz  
Operation Mode :Bandedge CH HIGH  
EUT Pol. :E1 Plane

Test Date :2017-08-09  
Temp./Humi. :21 deg\_C / 62 RH  
Engineer :Tin  
Measurement Antenna Pol. :VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	54.67	-1.62	53.05	54.00	-0.95
2483.50	E	Peak	64.04	-1.62	62.42	74.00	-11.58

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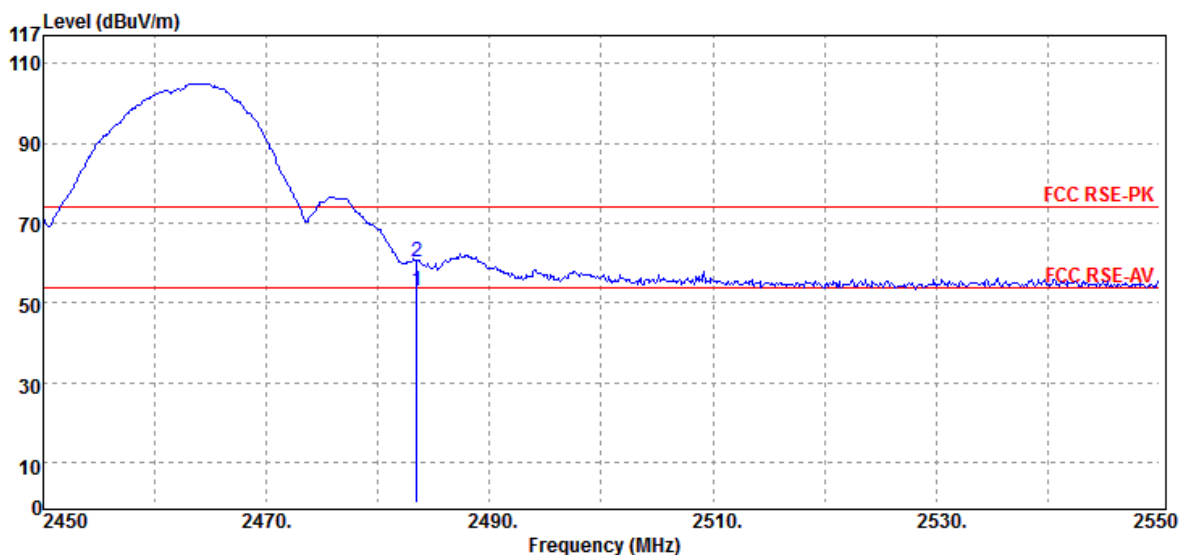
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Operation Band :802.11b  
Fundamental Frequency :2462 MHz  
Operation Mode :Bandedge CH HIGH  
EUT Pol. :E1 Plane

Test Date :2017-08-09  
Temp./Humi. :21 deg\_C / 62 RH  
Engineer :Tin  
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	54.73	-1.62	53.11	54.00	-0.89
2483.50	E	Peak	62.10	-1.62	60.48	74.00	-13.52

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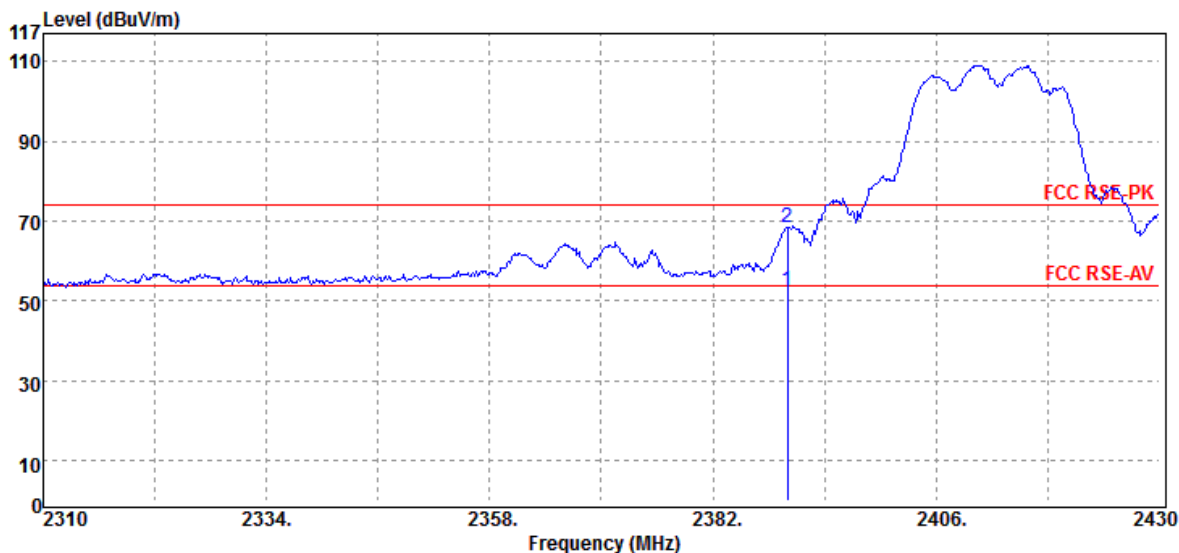
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## Radiated Band Edge Measurement Result (802.11g)

Operation Band	:802.11g	Test Date	:2017-08-09
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	54.51	-1.74	52.77	54.00	-1.23
2390.00	E	Peak	70.10	-1.74	68.36	74.00	-5.64

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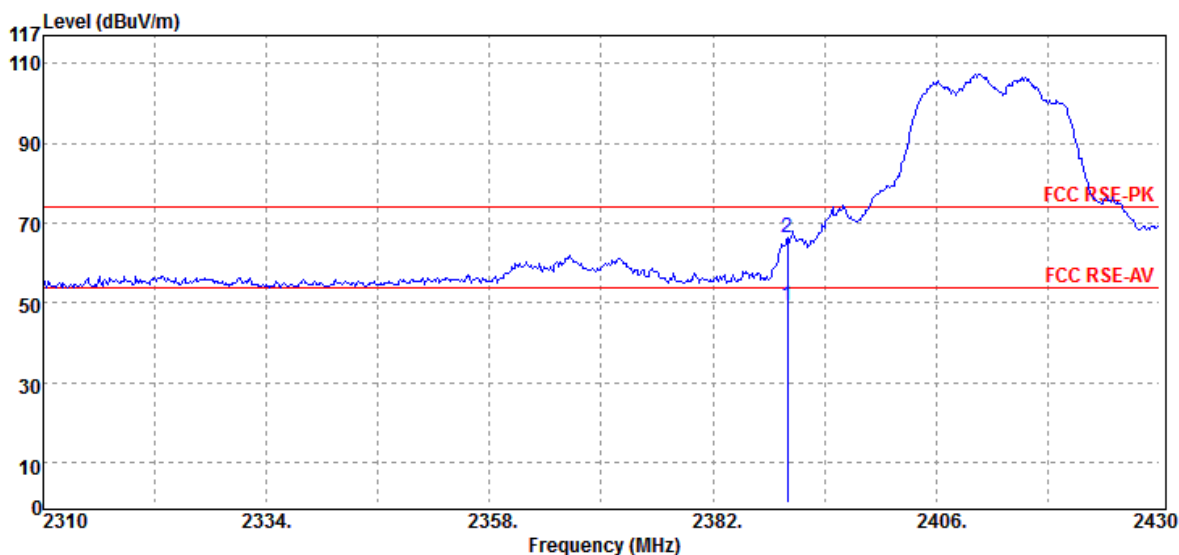
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Operation Band :802.11g  
Fundamental Frequency :2412 MHz  
Operation Mode :Bandedge CH LOW  
EUT Pol. :E1 Plane

Test Date :2017-08-09  
Temp./Humi. :21 deg\_C / 62 RH  
Engineer :Tin  
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	51.32	-1.74	49.58	54.00	-4.42
2390.00	E	Peak	68.11	-1.74	66.37	74.00	-7.63

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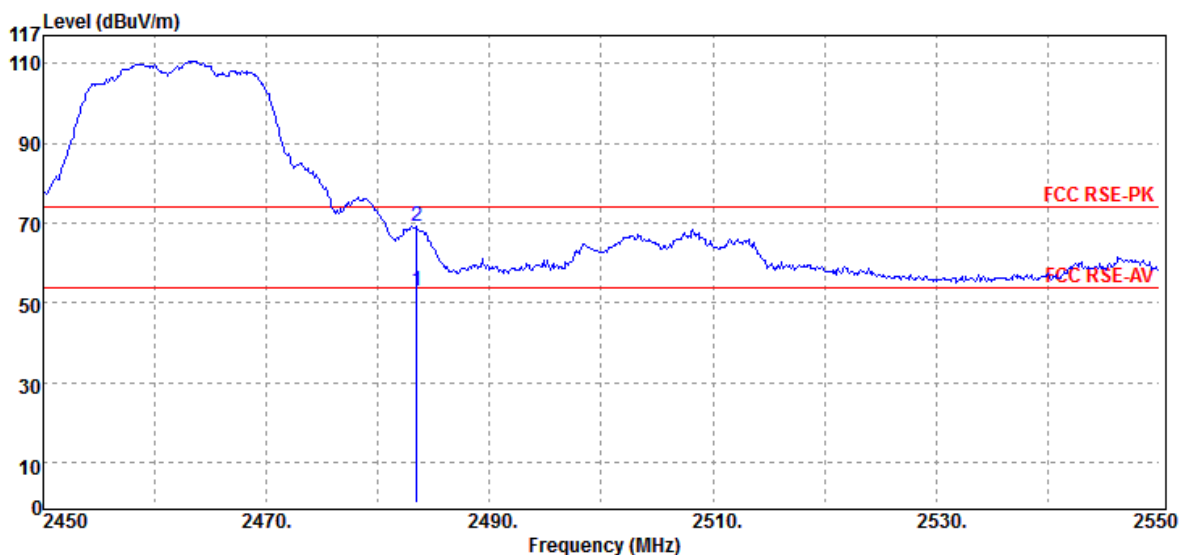
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Operation Band :802.11g  
Fundamental Frequency :2462 MHz  
Operation Mode :Bandedge CH HIGH  
EUT Pol. :E1 Plane

Test Date :2017-08-03  
Temp./Humi. :21 deg\_C / 62 RH  
Engineer :Tin  
Measurement Antenna Pol. :VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode			Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	54.50	-1.62	52.88	54.00	-1.12
2483.50	E	Peak	70.95	-1.62	69.33	74.00	-4.67

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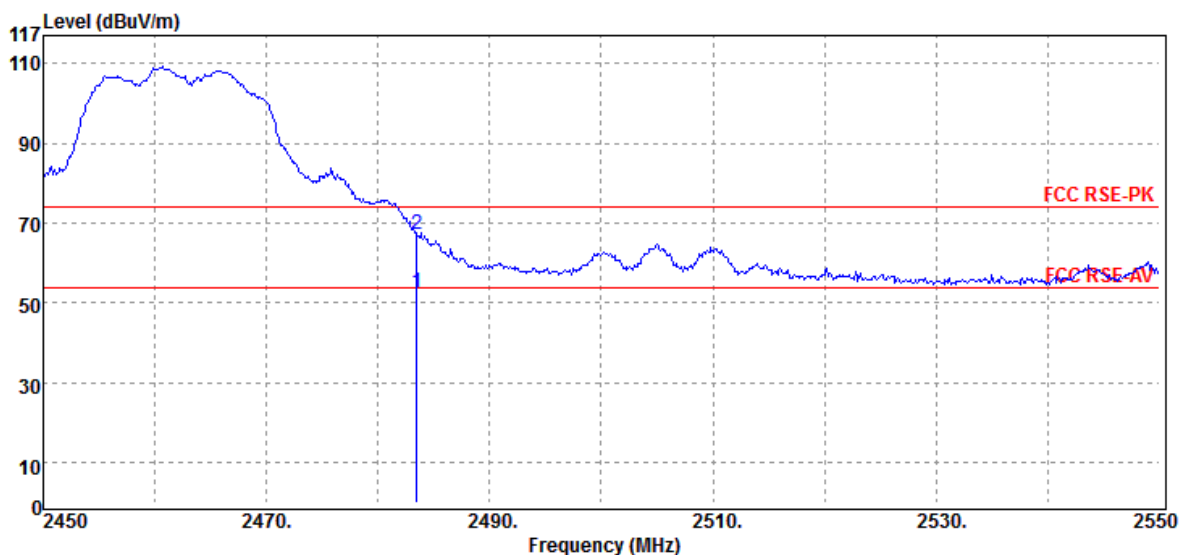
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Operation Band :802.11g  
Fundamental Frequency :2462 MHz  
Operation Mode :Bandedge CH HIGH  
EUT Pol. :E1 Plane

Test Date :2017-08-03  
Temp./Humi. :21 deg\_C / 62 RH  
Engineer :Tin  
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode			Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	54.09	-1.62	52.47	54.00	-1.53
2483.50	E	Peak	68.93	-1.62	67.31	74.00	-6.69

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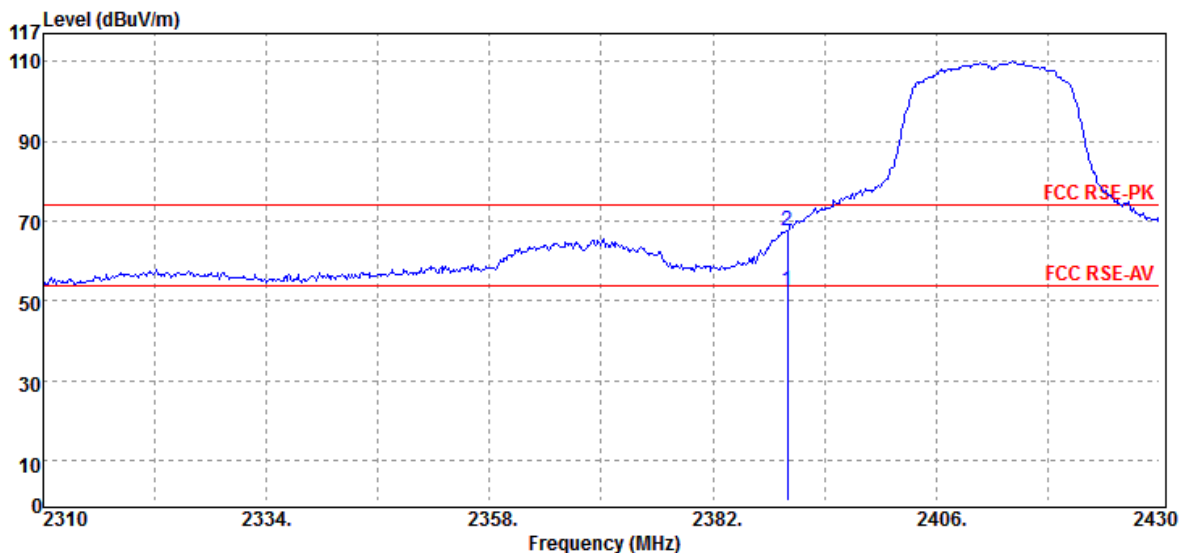
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## Radiated Band Edge Measurement Result (802.11\_HT20)

Operation Band	:802.11n20	Test Date	:2017-08-03
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	54.41	-1.74	52.67	54.00	-1.33
2390.00	E	Peak	69.44	-1.74	67.70	74.00	-6.30

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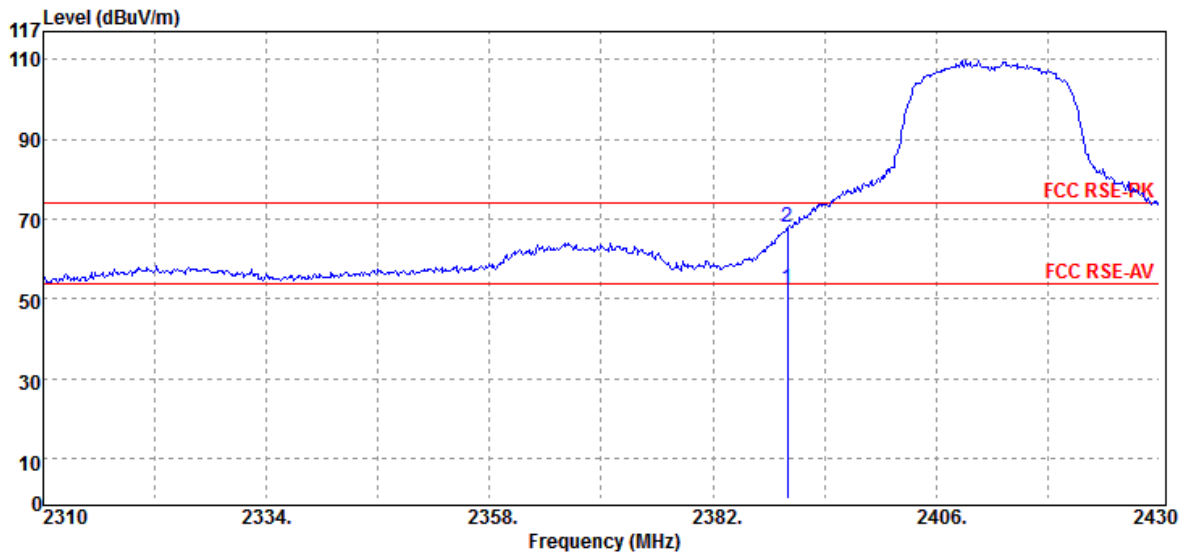
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Operation Band :802.11n20  
Fundamental Frequency :2412 MHz  
Operation Mode :Bandedge CH LOW  
EUT Pol. :E1 Plane

Test Date :2017-08-03  
Temp./Humi. :21 deg\_C / 62 RH  
Engineer :Tin  
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	54.25	-1.74	52.51	54.00	-1.49
2390.00	E	Peak	69.76	-1.74	68.02	74.00	-5.98

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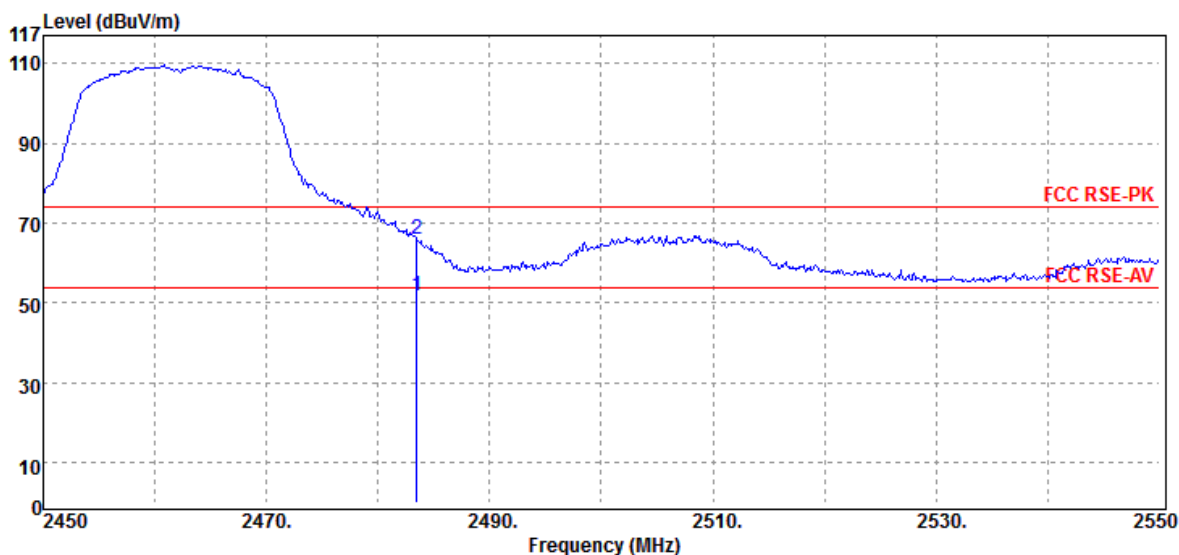
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Operation Band :802.11n20  
Fundamental Frequency :2462 MHz  
Operation Mode :Bandedge CH HIGH  
EUT Pol. :E1 Plane

Test Date :2017-08-03  
Temp./Humi. :21 deg\_C / 62 RH  
Engineer :Tin  
Measurement Antenna Pol. :VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	53.43	-1.62	51.81	54.00	-2.19
2483.50	E	Peak	67.67	-1.62	66.05	74.00	-7.95

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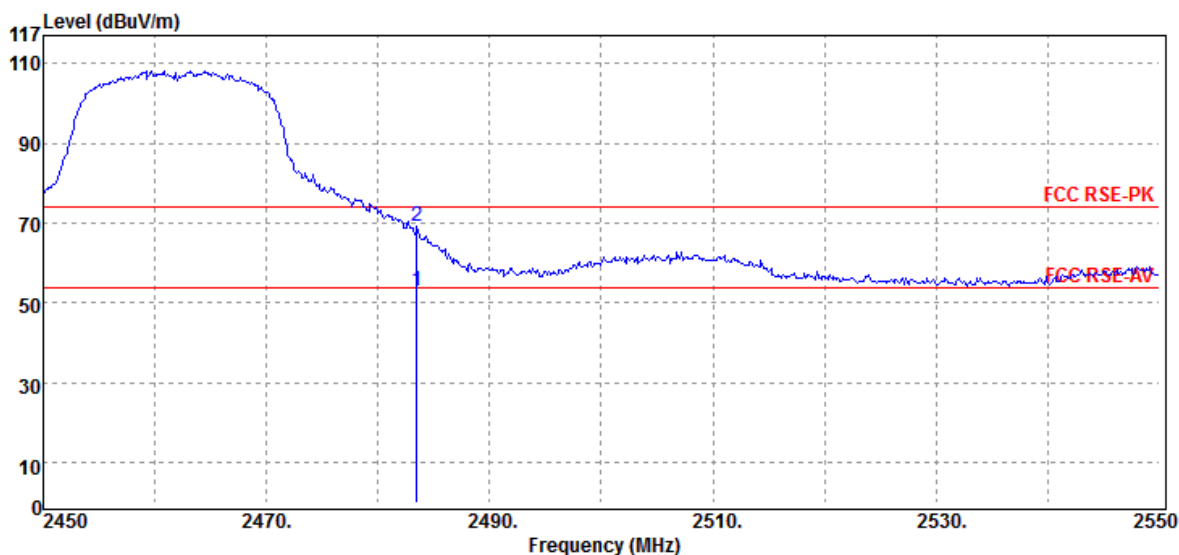
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Operation Band :802.11n20  
Fundamental Frequency :2462 MHz  
Operation Mode :Bandedge CH HIGH  
EUT Pol. :E1 Plane

Test Date :2017-08-03  
Temp./Humi. :21 deg\_C / 62 RH  
Engineer :Tin  
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode			Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	54.55	-1.62	52.93	54.00	-1.07
2483.50	E	Peak	70.71	-1.62	69.09	74.00	-4.91

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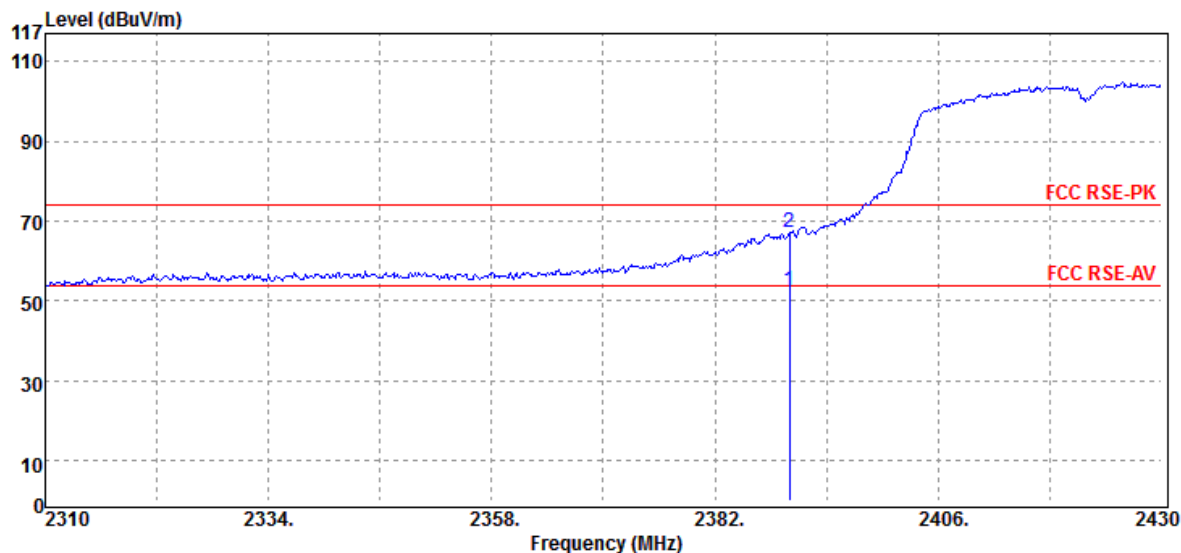
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## Radiated Band Edge Measurement Result (802.11\_HT40)

Operation Band	:802.11n40	Test Date	:2017-08-03
Fundamental Frequency	:2422 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	54.38	-1.74	52.64	54.00	-1.36
2390.00	E	Peak	68.94	-1.74	67.20	74.00	-6.80

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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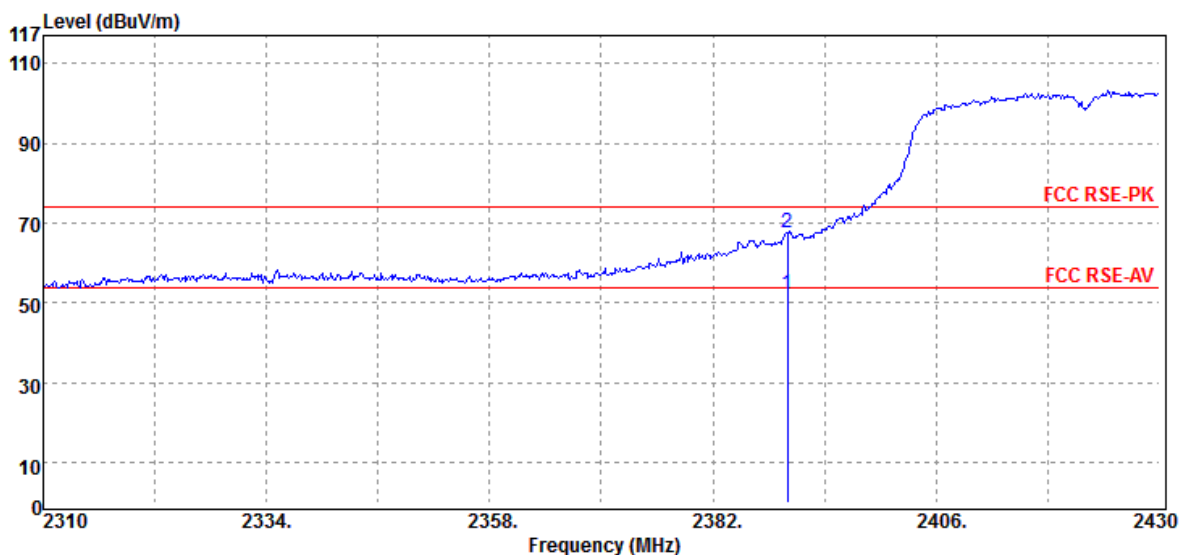
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Operation Band :802.11n40  
Fundamental Frequency :2422 MHz  
Operation Mode :Bandedge CH LOW  
EUT Pol. :E1 Plane

Test Date :2017-08-03  
Temp./Humi. :21 deg\_C / 62 RH  
Engineer :Tin  
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	53.87	-1.74	52.13	54.00	-1.87
2390.00	E	Peak	69.47	-1.74	67.73	74.00	-6.27

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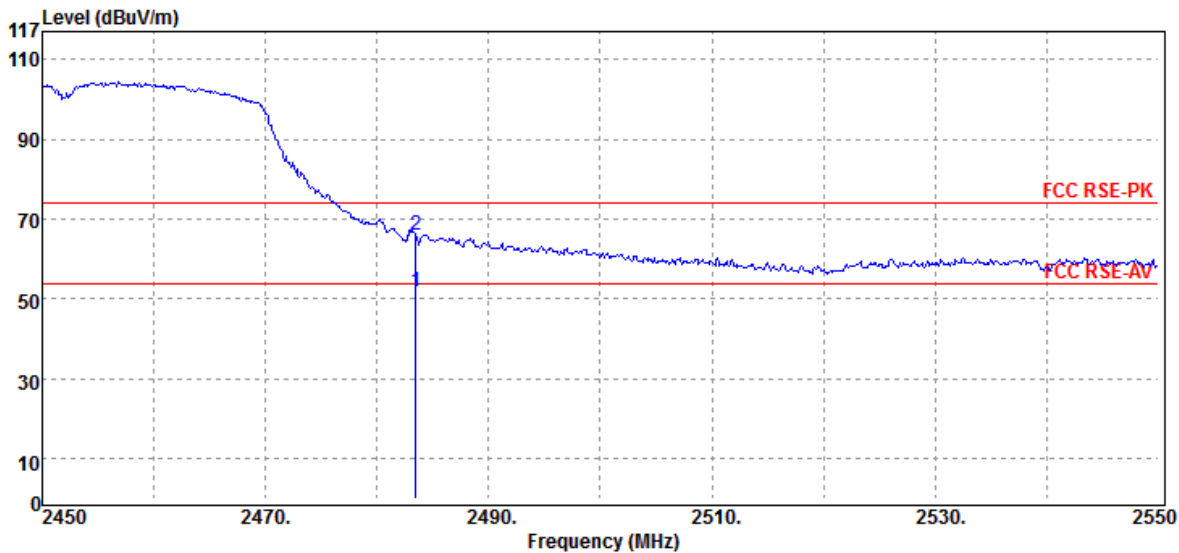
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Operation Band :802.11n40  
Fundamental Frequency :2422 MHz  
Operation Mode :Bandedge CH HIGH  
EUT Pol. :E1 Plane

Test Date :2017-08-03  
Temp./Humi. :21 deg\_C / 62 RH  
Engineer :Tin  
Measurement Antenna Pol. :VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	53.51	-1.62	51.89	54.00	-2.11
2483.50	E	Peak	67.77	-1.62	66.15	74.00	-7.85

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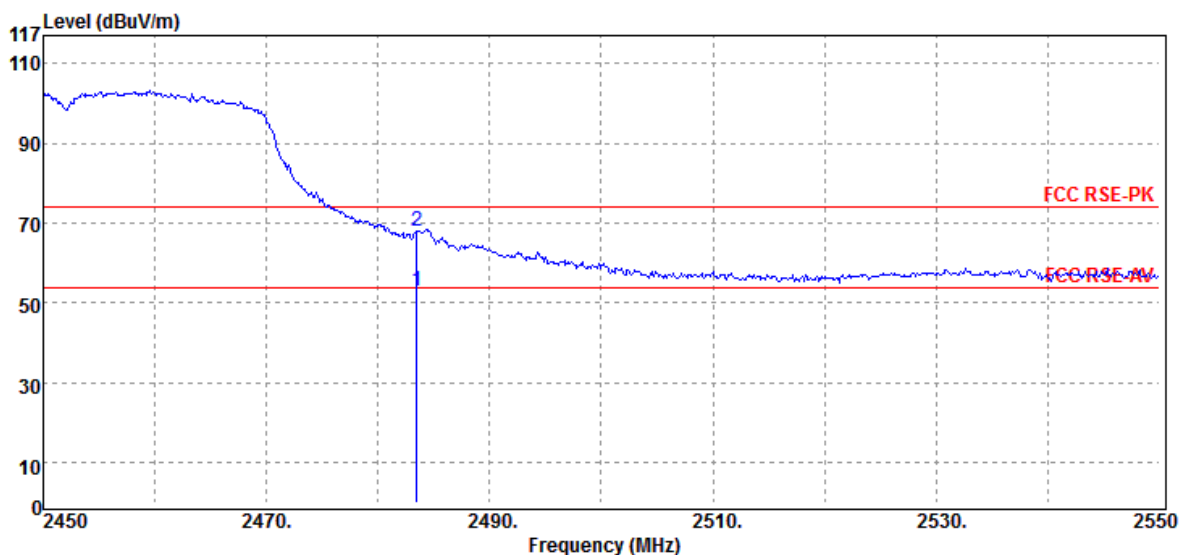
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Operation Band :802.11n40  
Fundamental Frequency :2422 MHz  
Operation Mode :Bandedge CH HIGH  
EUT Pol. :E1 Plane

Test Date :2017-08-03  
Temp./Humi. :21 deg\_C / 62 RH  
Engineer :Tin  
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	54.45	-1.62	52.83	54.00	-1.17
2483.50	E	Peak	69.61	-1.62	67.99	74.00	-6.01

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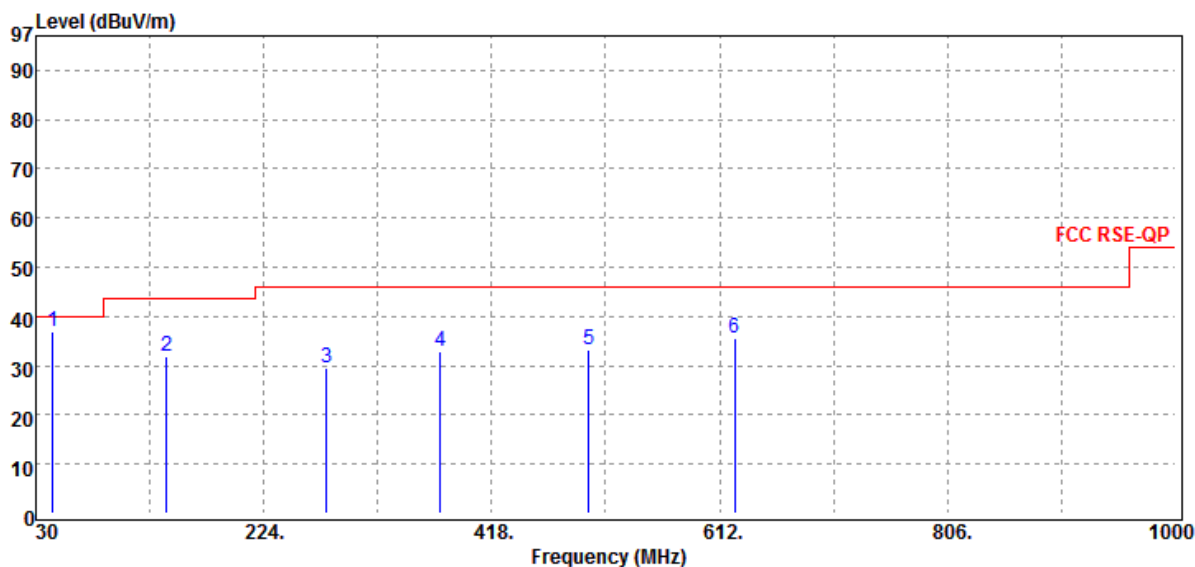
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## Below 1GHz Worst-Case Data:

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

Operation Band	:802.11g	Test Date	:2017-08-03
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
44.55	S	Peak	45.12	-8.09	37.03	40.00	-2.97
141.55	S	Peak	40.12	-8.26	31.86	43.50	-11.64
277.35	S	Peak	36.14	-6.55	29.59	46.00	-16.41
374.35	S	Peak	37.48	-4.54	32.94	46.00	-13.06
500.45	S	Peak	36.05	-2.68	33.37	46.00	-12.63
624.61	S	Peak	35.55	0.15	35.70	46.00	-10.30

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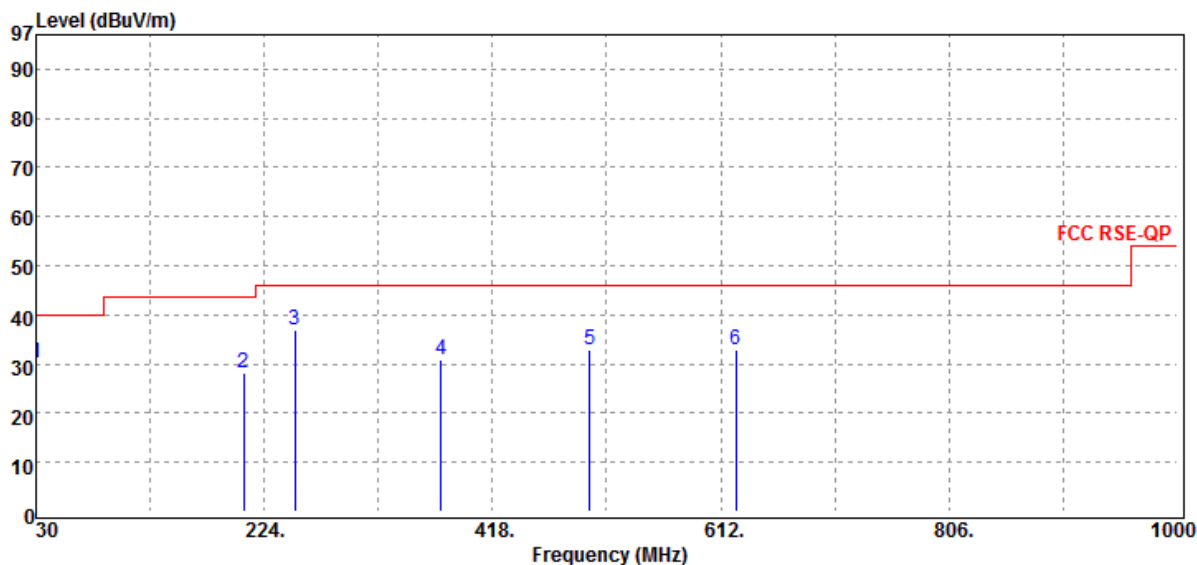
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Operation Band :802.11g  
Fundamental Frequency :2412 MHz  
Operation Mode :Tx CH LOW  
EUT Pol. :E1 Plane

Test Date :2017-08-03  
Temp./Humi. :21 deg\_C / 62 RH  
Engineer :Tin  
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
30.00	S	Peak	39.26	-9.19	30.07	40.00	-9.93
206.54	S	Peak	37.98	-9.71	28.27	43.50	-15.23
250.19	S	Peak	44.69	-7.93	36.76	46.00	-9.24
374.35	S	Peak	35.39	-4.54	30.85	46.00	-15.15
500.45	S	Peak	35.55	-2.68	32.87	46.00	-13.13
624.61	S	Peak	32.62	0.15	32.77	46.00	-13.23

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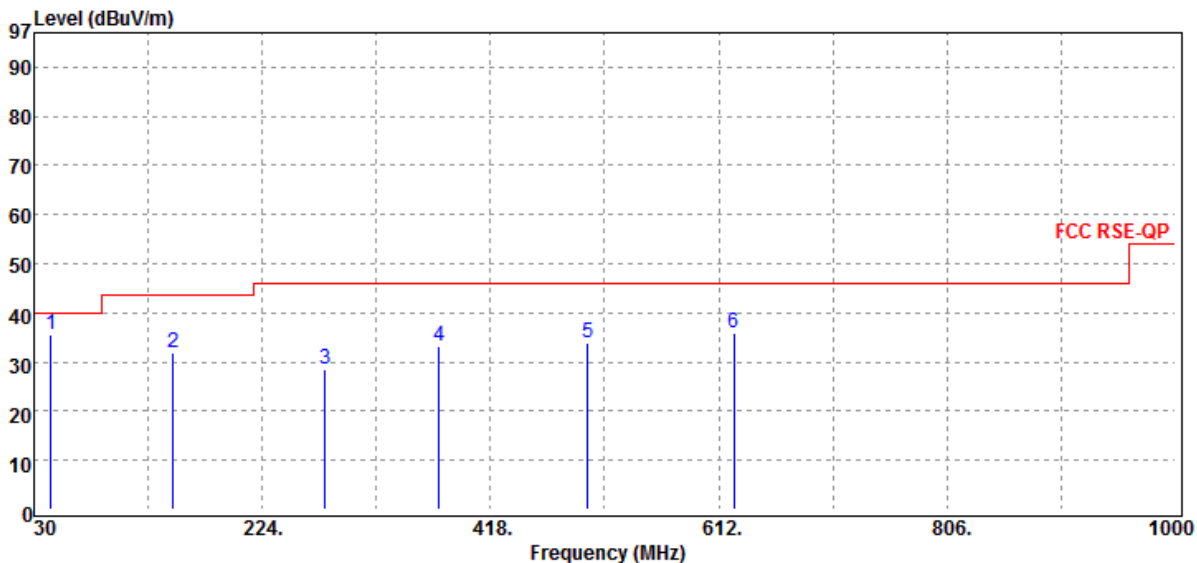
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Operation Band	:802.11g	Test Date	:2017-08-03
Fundamental Frequency	:2437 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
44.55	S	Peak	43.59	-8.09	35.50	40.00	-4.50
148.34	S	Peak	39.89	-7.89	32.00	43.50	-11.50
277.35	S	Peak	35.04	-6.55	28.49	46.00	-17.51
374.35	S	Peak	37.73	-4.54	33.19	46.00	-12.81
500.45	S	Peak	36.56	-2.68	33.88	46.00	-12.12
624.61	S	Peak	35.77	0.15	35.92	46.00	-10.08

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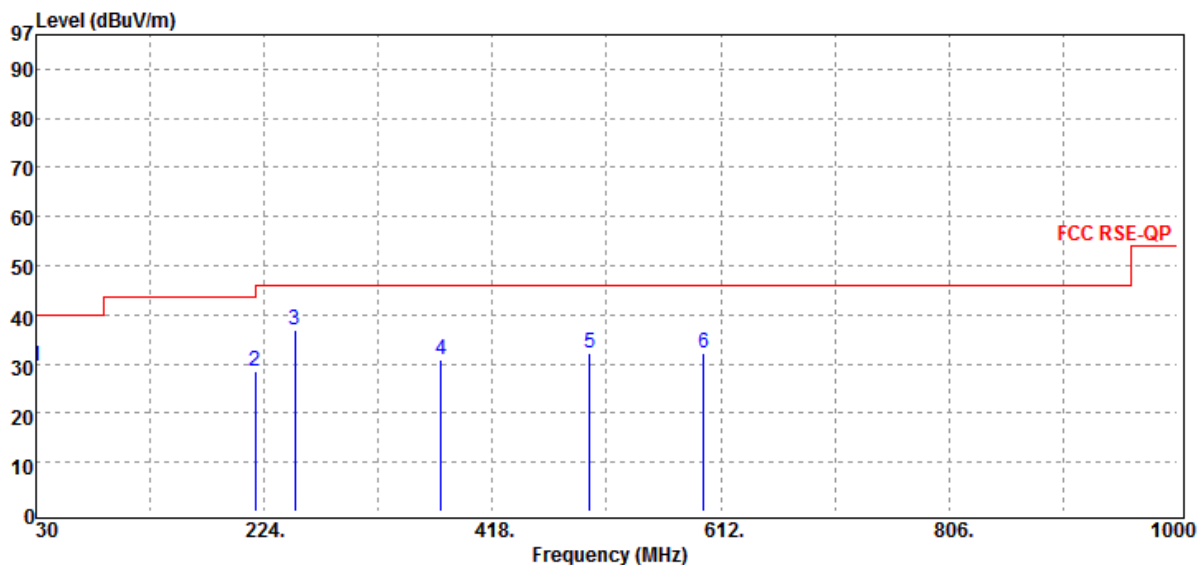
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Operation Band :802.11g  
Fundamental Frequency :2437 MHz  
Operation Mode :Tx CH MID  
EUT Pol. :E1 Plane

Test Date :2017-08-03  
Temp./Humi. :21 deg\_C / 62 RH  
Engineer :Tin  
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
30.00	S	Peak	38.63	-9.19	29.44	40.00	-10.56
216.24	S	Peak	37.79	-9.43	28.36	46.00	-17.64
250.19	S	Peak	44.88	-7.93	36.95	46.00	-9.05
374.35	S	Peak	35.33	-4.54	30.79	46.00	-15.21
500.45	S	Peak	34.75	-2.68	32.07	46.00	-13.93
597.45	S	Peak	32.31	-0.19	32.12	46.00	-13.88

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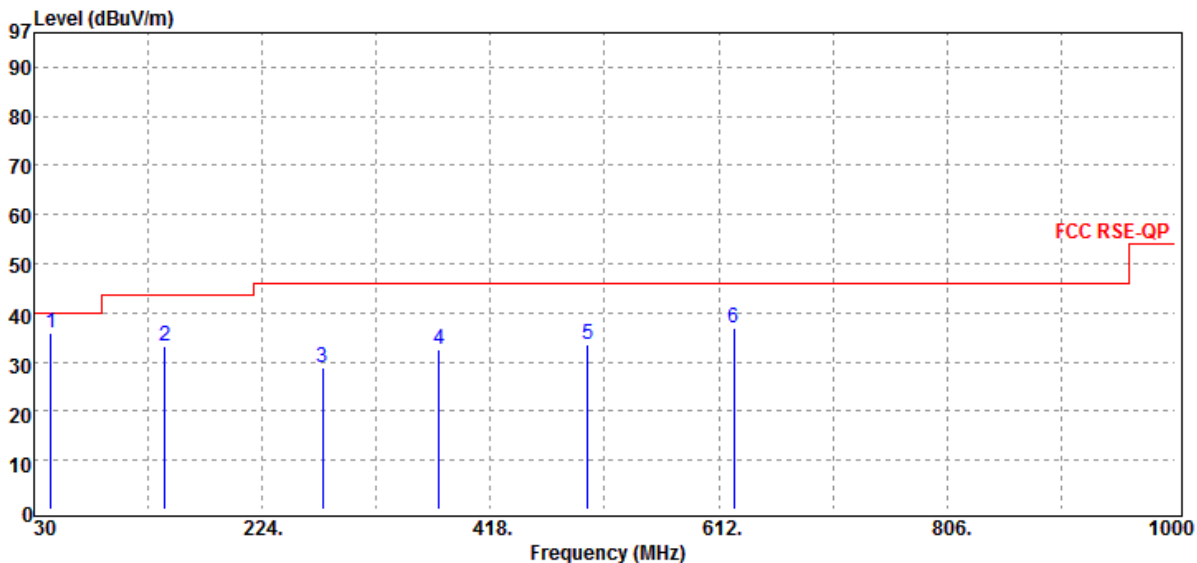
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Operation Band	:802.11g	Test Date	:2017-08-03
Fundamental Frequency	:2462 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
44.55	S	Peak	44.01	-8.09	35.92	40.00	-4.08
141.55	S	Peak	41.40	-8.26	33.14	43.50	-10.36
275.41	S	Peak	35.37	-6.63	28.74	46.00	-17.26
374.35	S	Peak	37.02	-4.54	32.48	46.00	-13.52
500.45	S	Peak	36.18	-2.68	33.50	46.00	-12.50
624.61	S	Peak	36.78	0.15	36.93	46.00	-9.07

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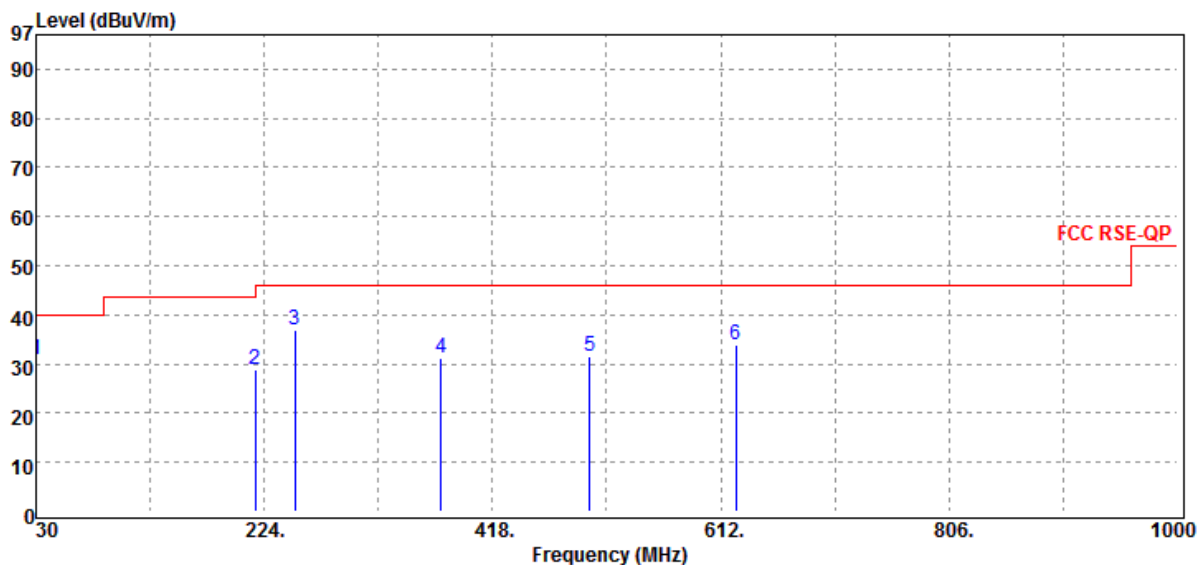
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Operation Band	:802.11g	Test Date	:2017-08-03
Fundamental Frequency	:2462 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
30.00	S	Peak	39.98	-9.19	30.79	40.00	-9.21
216.24	S	Peak	38.21	-9.43	28.78	46.00	-17.22
250.19	S	Peak	45.00	-7.93	37.07	46.00	-8.93
374.35	S	Peak	35.72	-4.54	31.18	46.00	-14.82
500.45	S	Peak	34.15	-2.68	31.47	46.00	-14.53
624.61	S	Peak	33.66	0.15	33.81	46.00	-12.19

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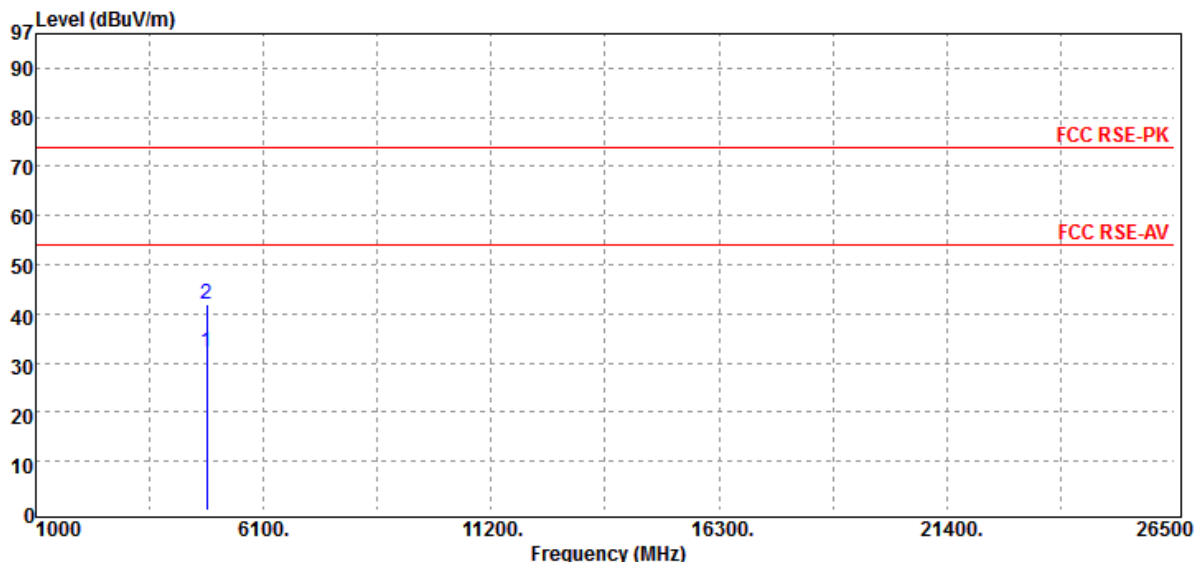
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## Above 1GHz Data:

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

Operation Band	:802.11b	Test Date	:2017-08-14
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	Margin
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	dB
4824.00	H	Average	27.33	4.93	32.26	54.00	-21.74
4824.00	H	Peak	36.02	4.93	40.95	74.00	-33.05

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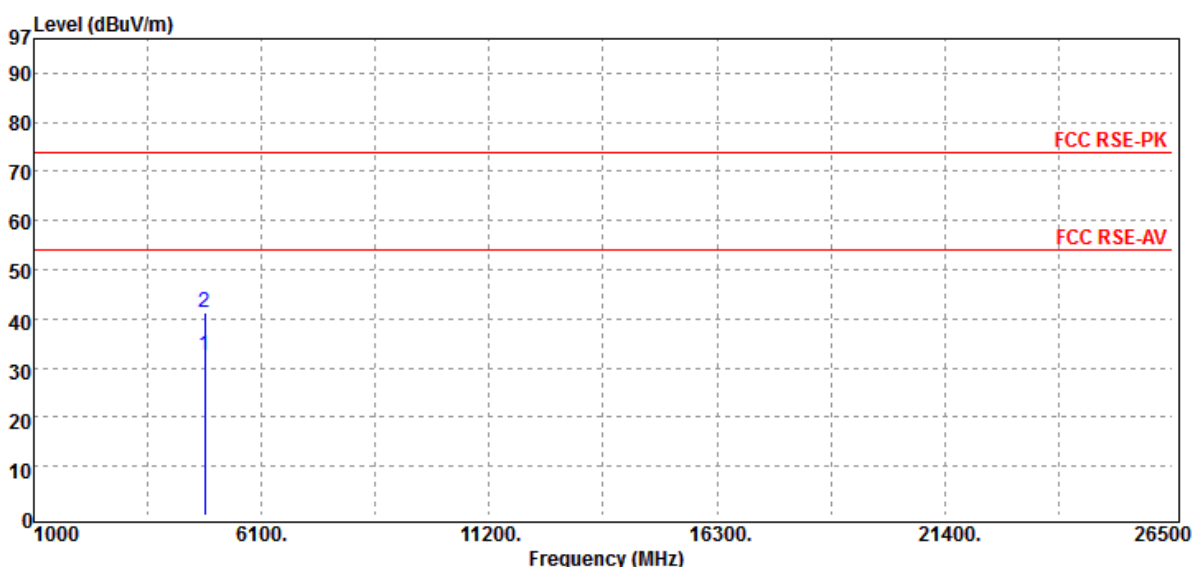
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Operation Band	:802.11b	Test Date	:2017-08-14
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4824.00	H	Average	26.62	4.93	31.55	54.00	-22.45
4824.00	H	Peak	35.79	4.93	40.72	74.00	-33.28

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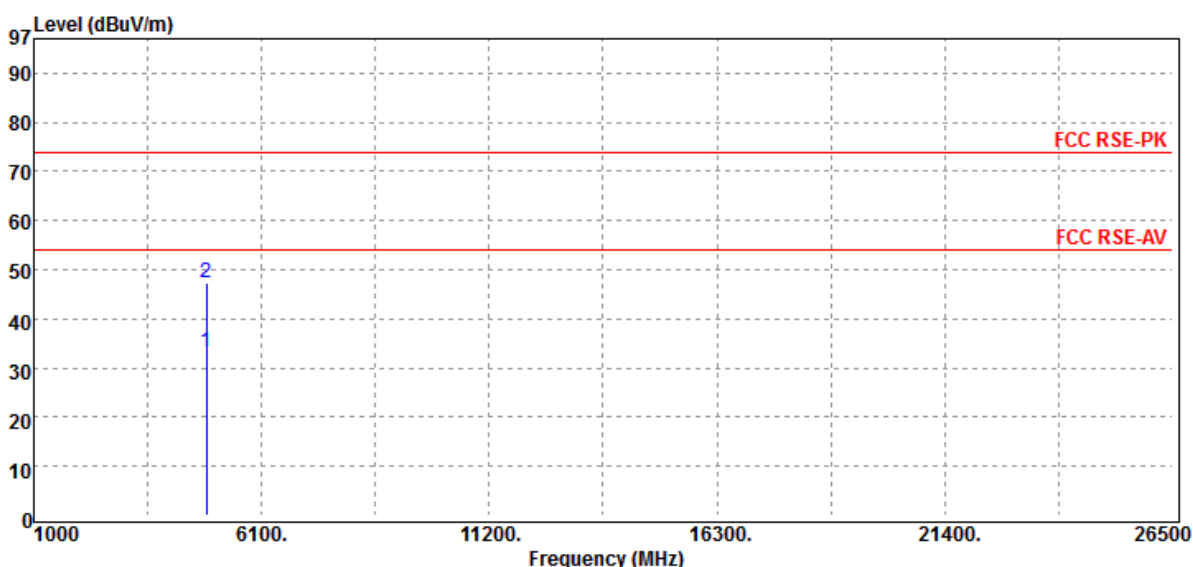
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Operation Band	:802.11b	Test Date	:2017-08-14
Fundamental Frequency	:2437 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4874.00	H	Average	26.97	5.13	32.10	54.00	-21.90
4874.00	H	Peak	41.90	5.13	47.03	74.00	-26.97

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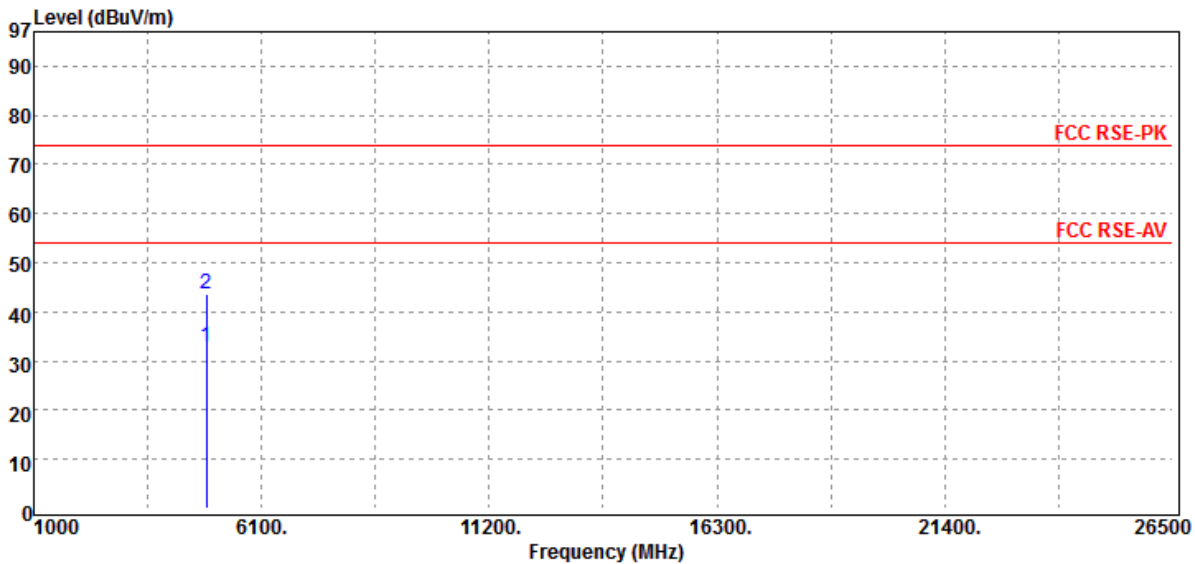
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Operation Band	:802.11b	Test Date	:2017-08-14
Fundamental Frequency	:2437 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4874.00	H	Average	27.11	5.13	32.24	54.00	-21.76
4874.00	H	Peak	38.10	5.13	43.23	74.00	-30.77

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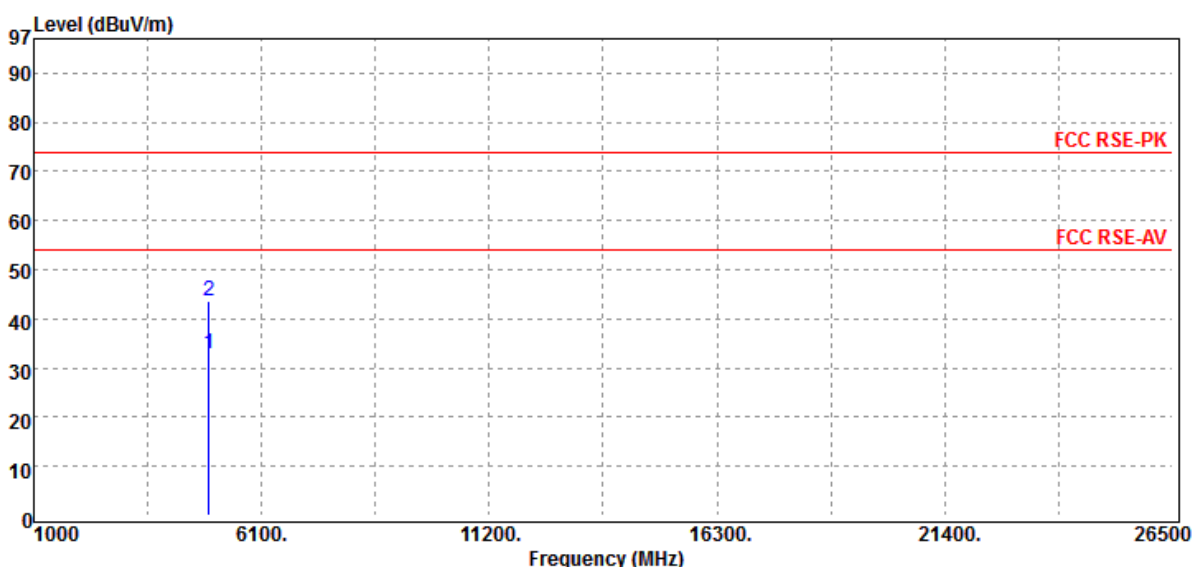
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Operation Band	:802.11b	Test Date	:2017-08-14
Fundamental Frequency	:2462 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4924.00	H	Average	27.20	5.25	32.45	54.00	-21.56
4924.00	H	Peak	37.75	5.25	43.00	74.00	-31.00

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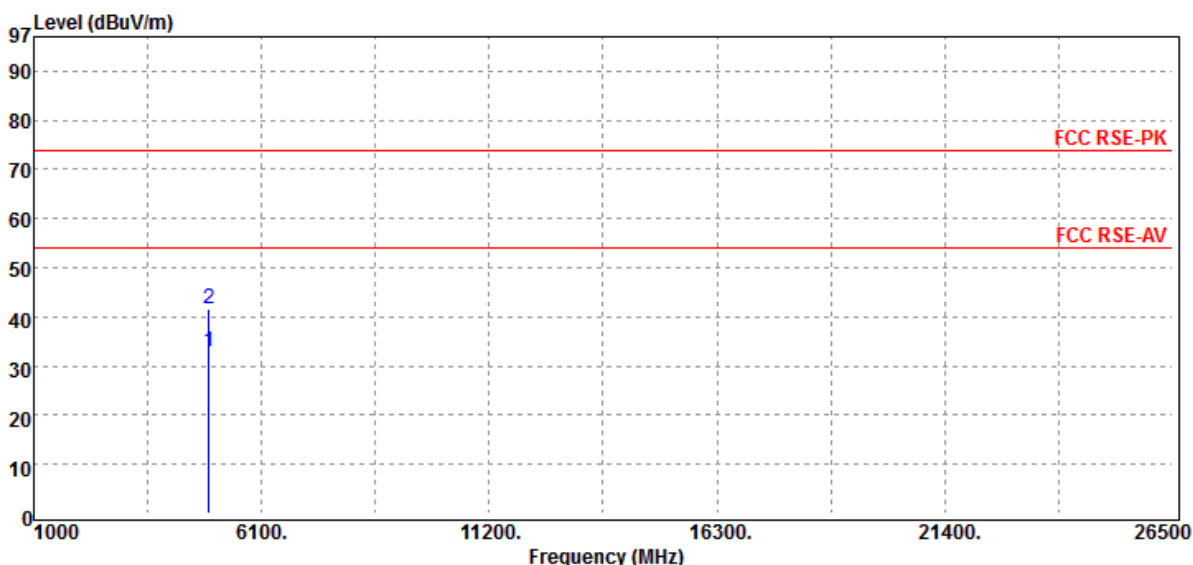
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Operation Band	:802.11b	Test Date	:2017-08-14
Fundamental Frequency	:2462 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4924.00	H	Average	27.62	5.25	32.87	54.00	-21.13
4924.00	H	Peak	35.82	5.25	41.07	74.00	-32.93

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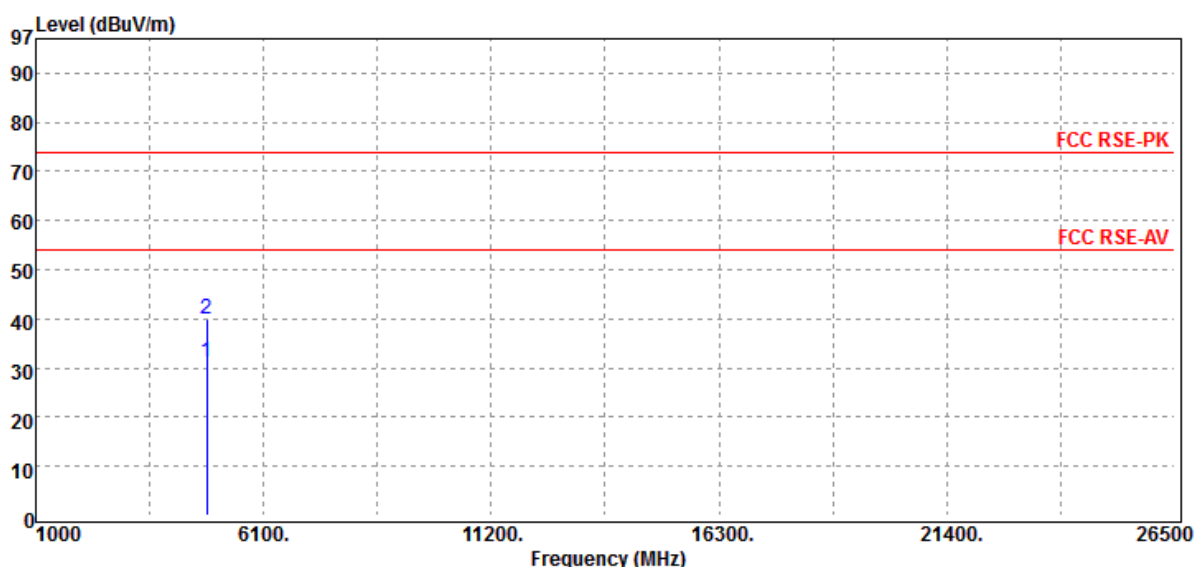
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# Radiated Spurious Emission Measurement Result (802.11 g)

Operation Band	:802.11g	Test Date	:2017-08-03
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4824.00	H	Average	25.47	4.93	30.40	54.00	-23.60
4824.00	H	Peak	34.52	4.93	39.45	74.00	-34.55

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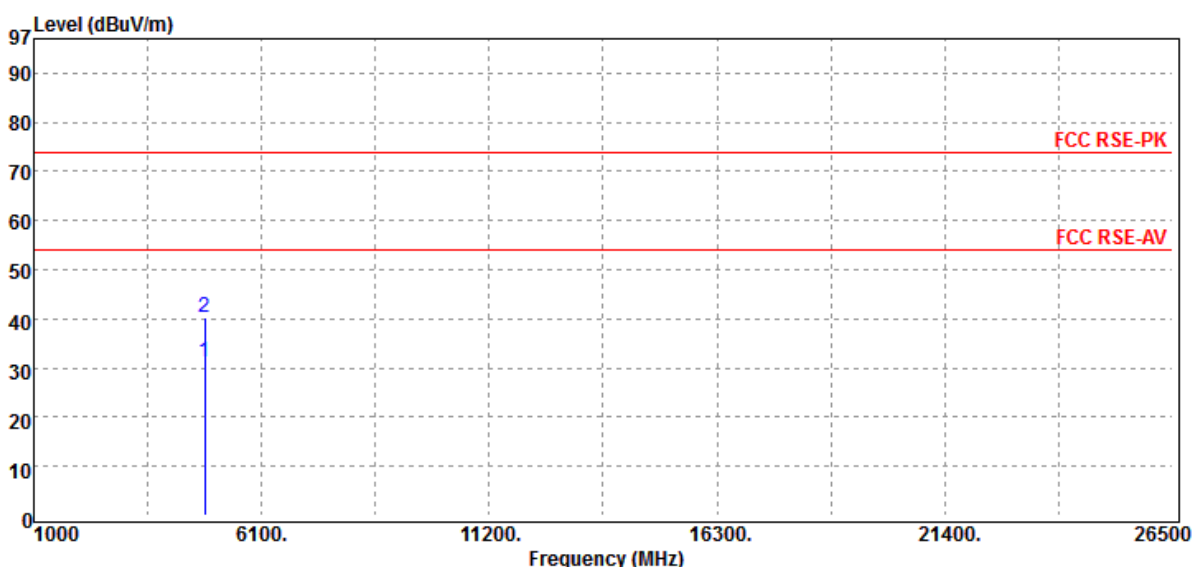
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Operation Band	:802.11g	Test Date	:2017-08-03
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4824.00	H	Average	25.39	4.93	30.32	54.00	-23.68
4824.00	H	Peak	35.11	4.93	40.04	74.00	-33.96

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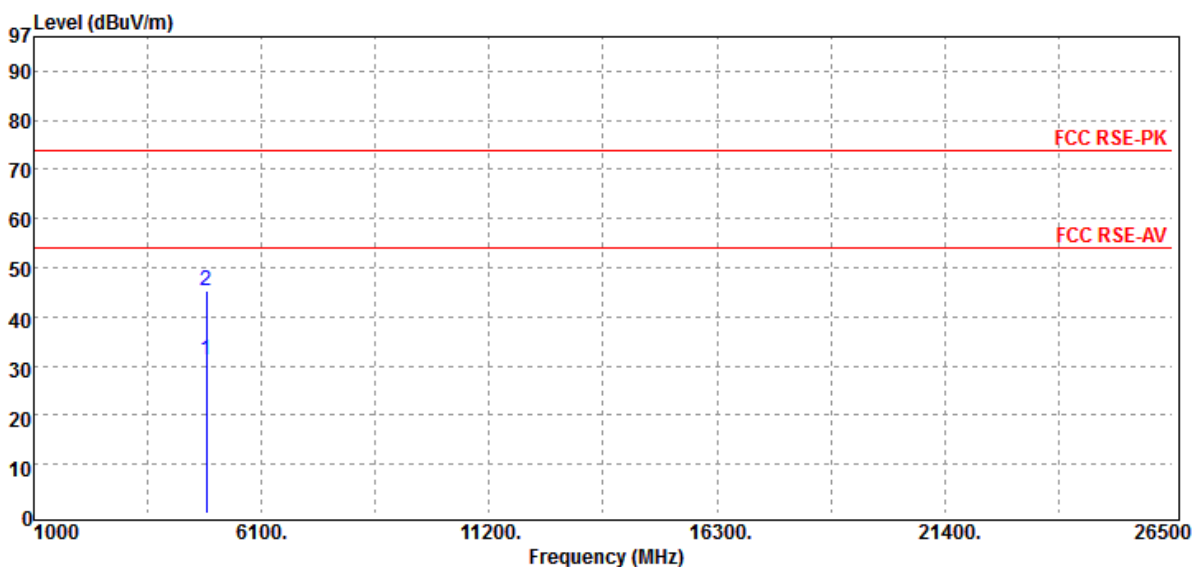
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Operation Band	:802.11g	Test Date	:2017-08-03
Fundamental Frequency	:2437 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4874.00	H	Average	25.31	5.13	30.44	54.00	-23.56
4874.00	H	Peak	39.09	5.13	44.22	74.00	-29.78

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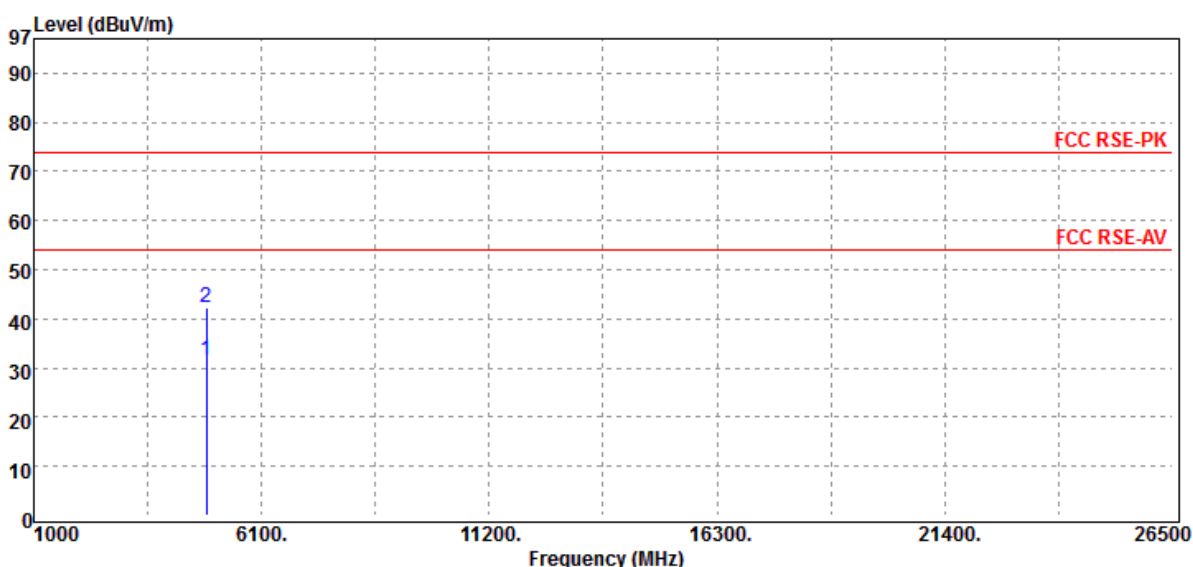
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Operation Band	:802.11g	Test Date	:2017-08-03
Fundamental Frequency	:2437 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4874.00	H	Average	25.91	5.13	31.04	54.00	-22.96
4874.00	H	Peak	36.99	5.13	42.12	74.00	-31.88

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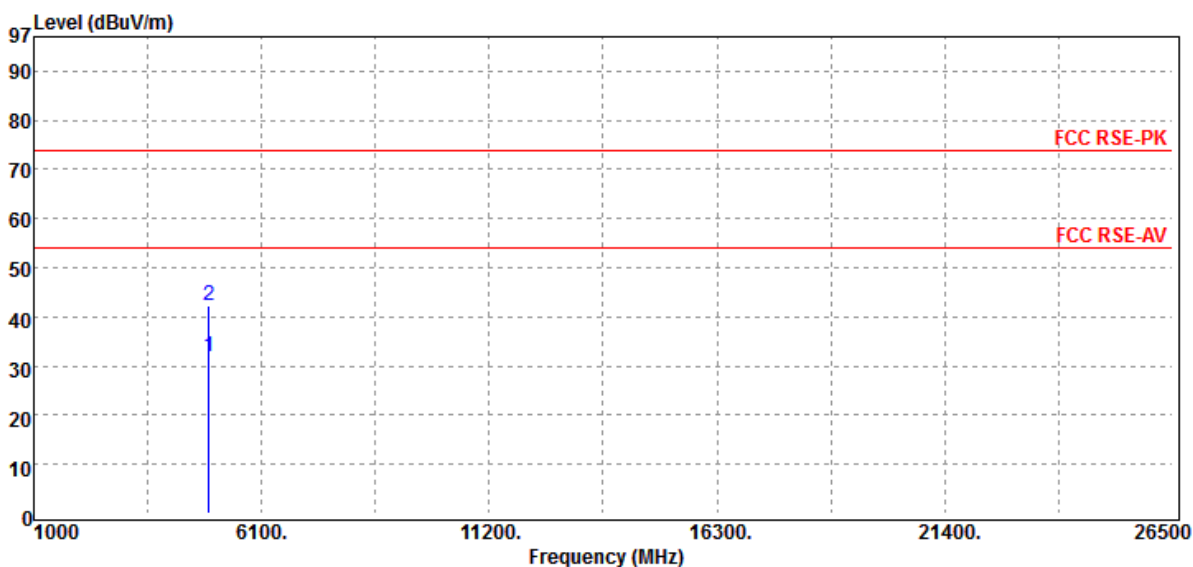
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Operation Band	:802.11g	Test Date	:2017-08-03
Fundamental Frequency	:2462 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4924.00	H	Average	26.24	5.25	31.49	54.00	-22.51
4924.00	H	Peak	36.08	5.25	41.33	74.00	-32.67

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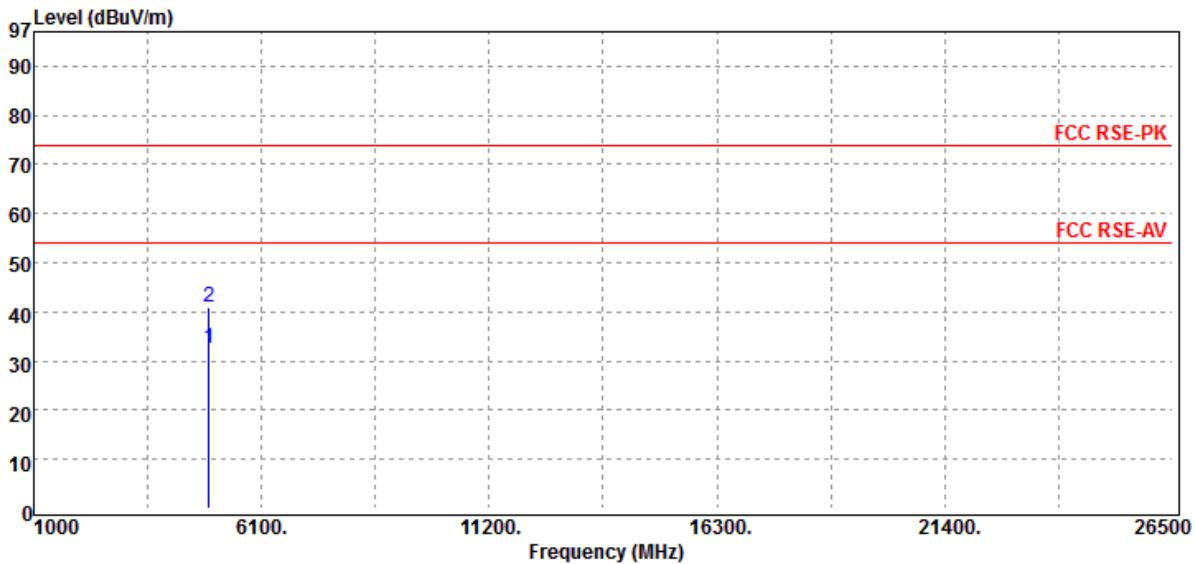
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Operation Band	:802.11g	Test Date	:2017-08-03
Fundamental Frequency	:2462 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4924.00	H	Average	26.98	5.25	32.23	54.00	-21.77
4924.00	H	Peak	34.97	5.25	40.22	74.00	-33.78

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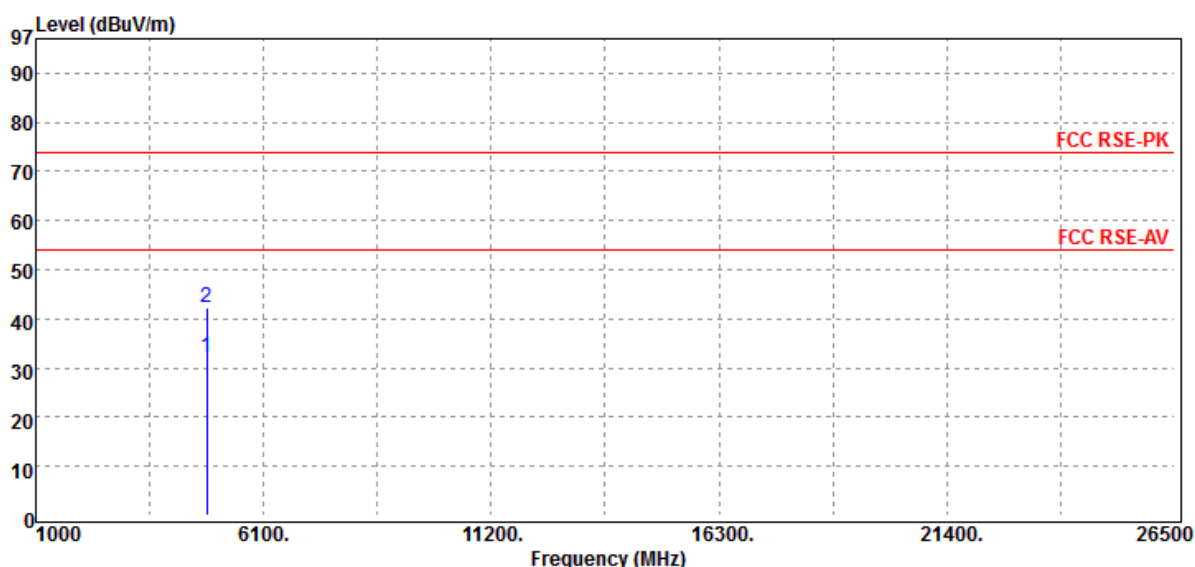
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## Radiated Spurious Emission Measurement Result (802.11\_HT20)

Operation Band	:802.11n20	Test Date	:2017-08-03
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4824.00	H	Average	27.20	4.93	32.13	54.00	-21.87
4824.00	H	Peak	37.12	4.93	42.05	74.00	-31.95

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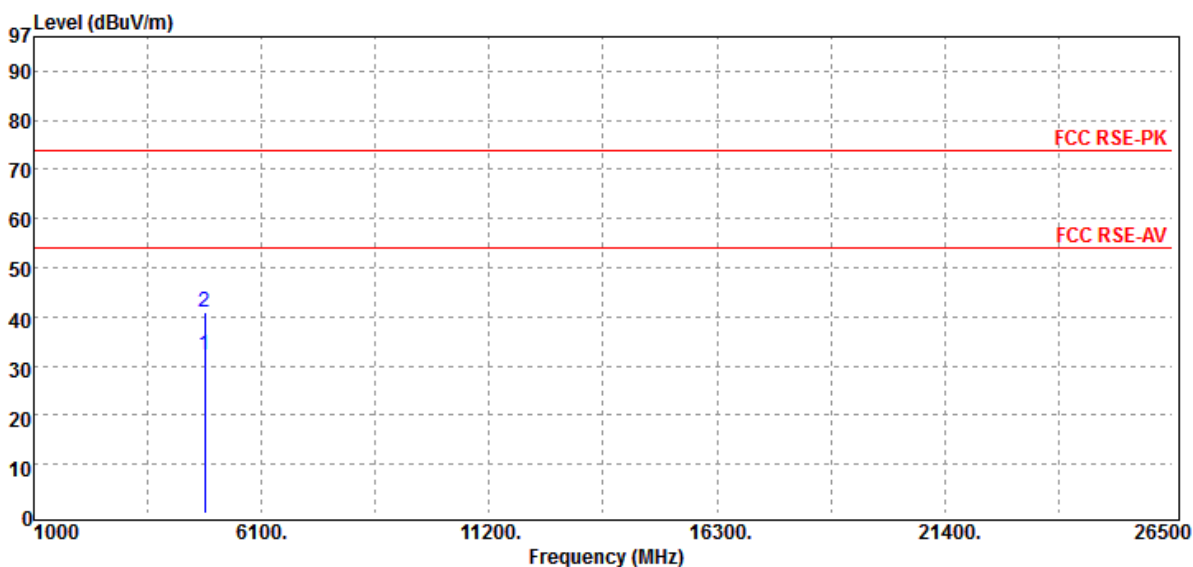
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Operation Band	:802.11n20	Test Date	:2017-08-03
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4824.00	H	Average	27.39	4.93	32.32	54.00	-21.68
4824.00	H	Peak	35.58	4.93	40.51	74.00	-33.49

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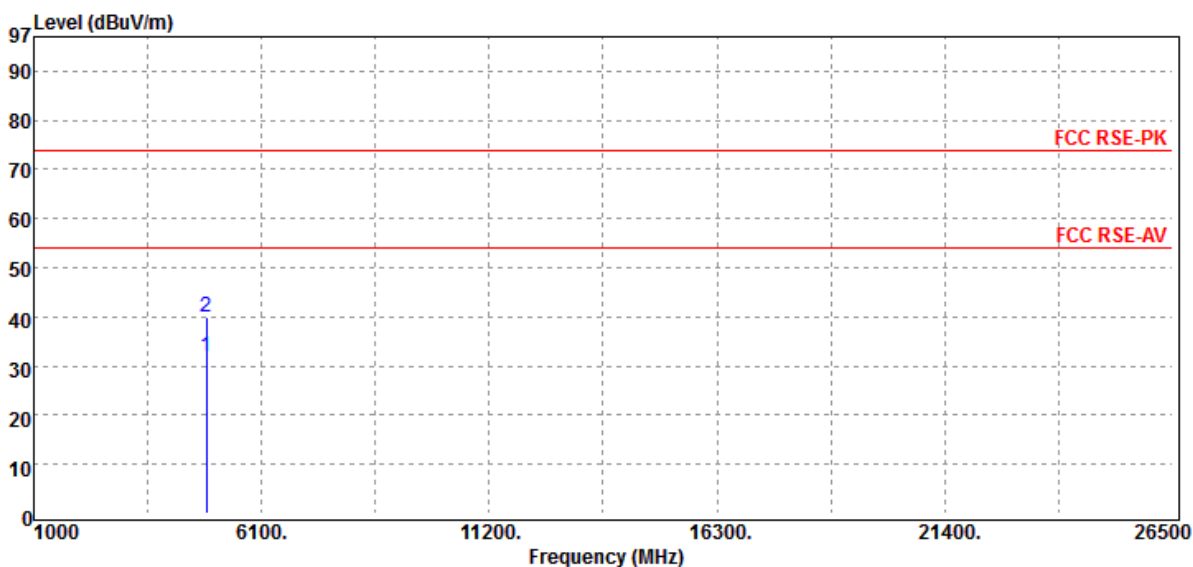
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Operation Band	:802.11n20	Test Date	:2017-08-03
Fundamental Frequency	:2437 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4874.00	H	Average	26.77	5.13	31.90	54.00	-22.10
4874.00	H	Peak	34.56	5.13	39.69	74.00	-34.31

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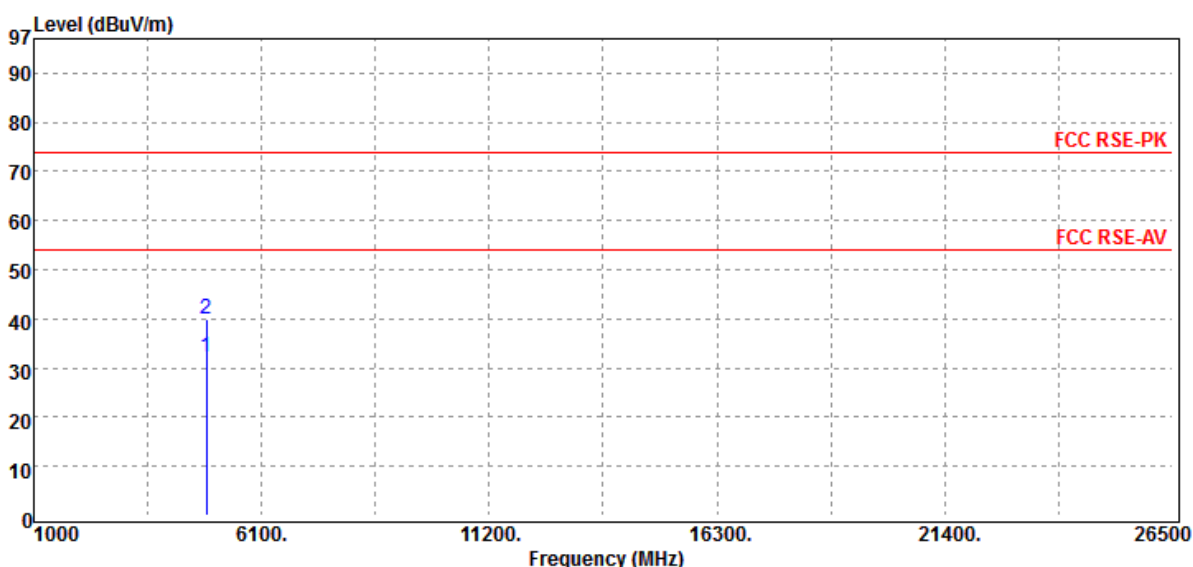
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Operation Band	:802.11n20	Test Date	:2017-08-03
Fundamental Frequency	:2437 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4874.00	H	Average	27.16	5.13	32.29	54.00	-21.71
4874.00	H	Peak	34.92	5.13	40.05	74.00	-33.95

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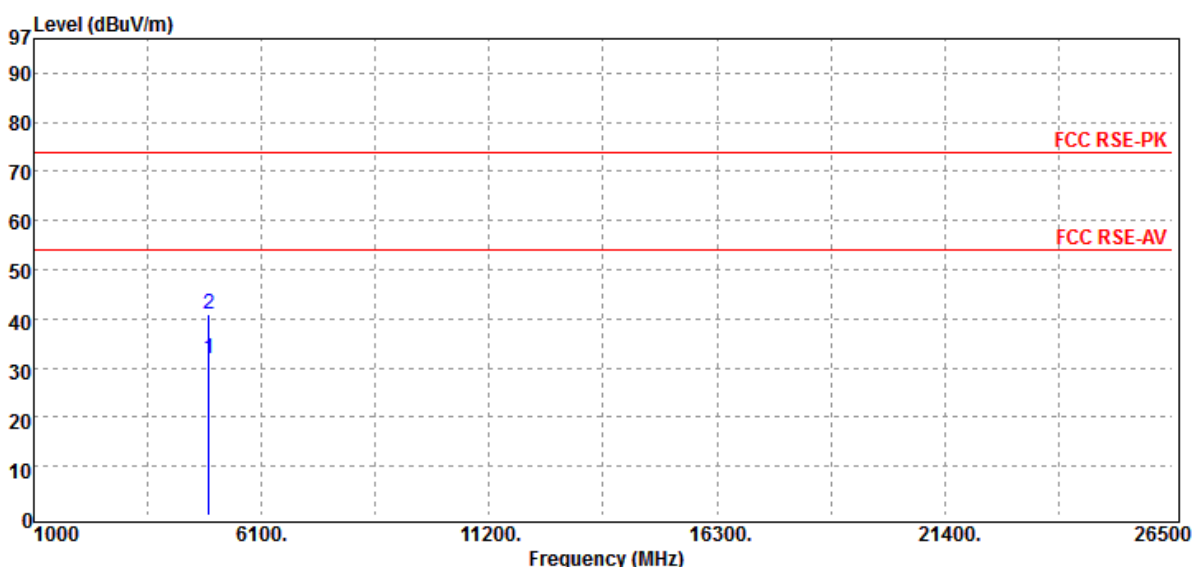
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Operation Band	:802.11n20	Test Date	:2017-08-03
Fundamental Frequency	:2462 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4924.00	H	Average	26.03	5.25	31.28	54.00	-22.72
4924.00	H	Peak	35.70	5.25	40.95	74.00	-33.05

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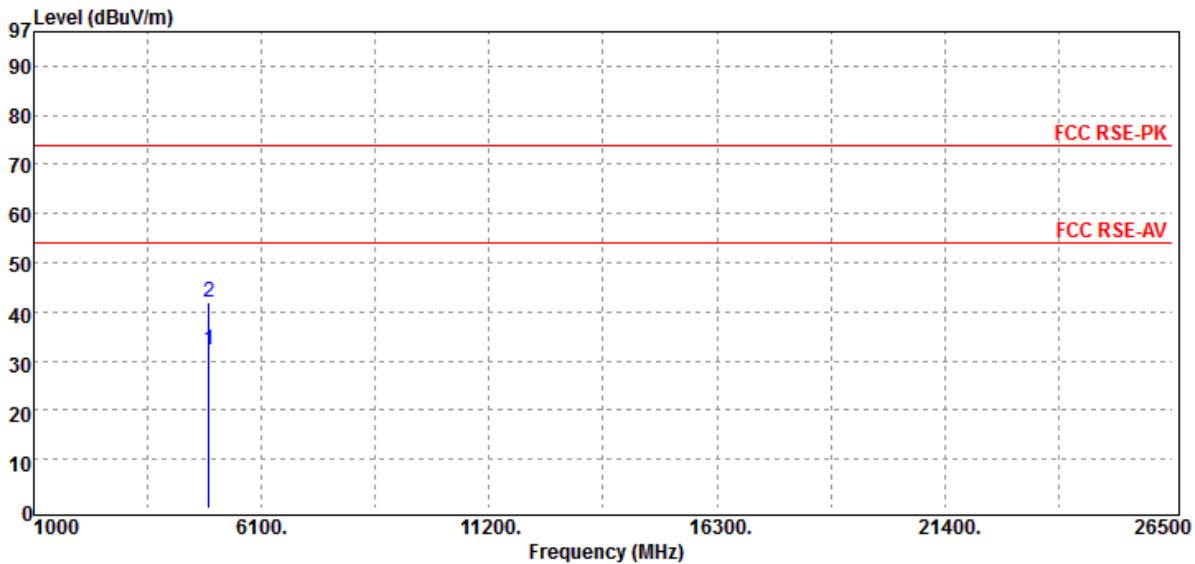
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Operation Band	:802.11n20	Test Date	:2017-08-03
Fundamental Frequency	:2462 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH HIGH	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4924.00	H	Average	26.88	5.25	32.13	54.00	-21.87
4924.00	H	Peak	36.60	5.25	41.85	74.00	-32.15

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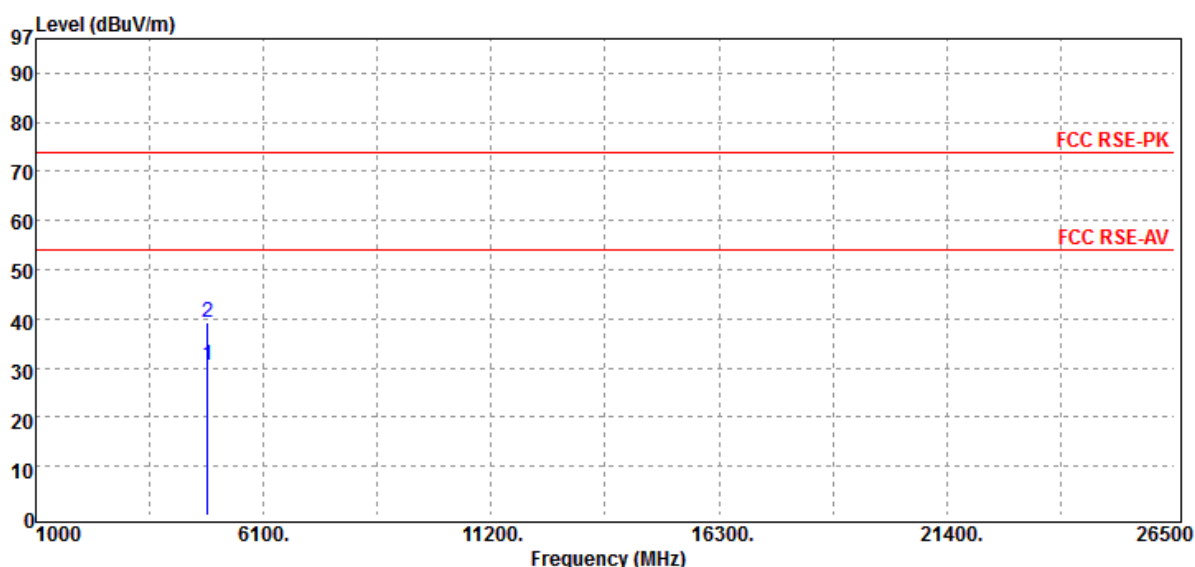
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# Radiated Spurious Emission Measurement Result (802.11\_HT40)

Operation Band	:802.11n40	Test Date	:2017-08-03
Fundamental Frequency	:2422 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4844.00	H	Average	25.41	4.97	30.38	54.00	-23.62
4844.00	H	Peak	34.19	4.97	39.16	74.00	-34.84

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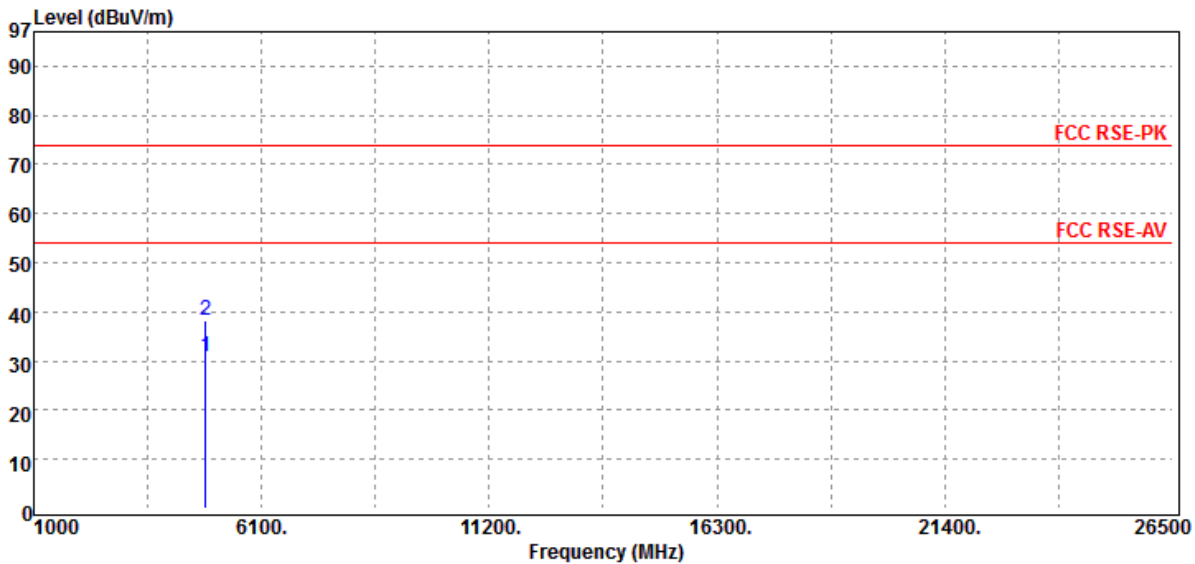
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Operation Band	:802.11n40	Test Date	:2017-08-03
Fundamental Frequency	:2422 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4844.00	H	Average	25.87	4.97	30.84	54.00	-23.16
4844.00	H	Peak	33.18	4.97	38.15	74.00	-35.85

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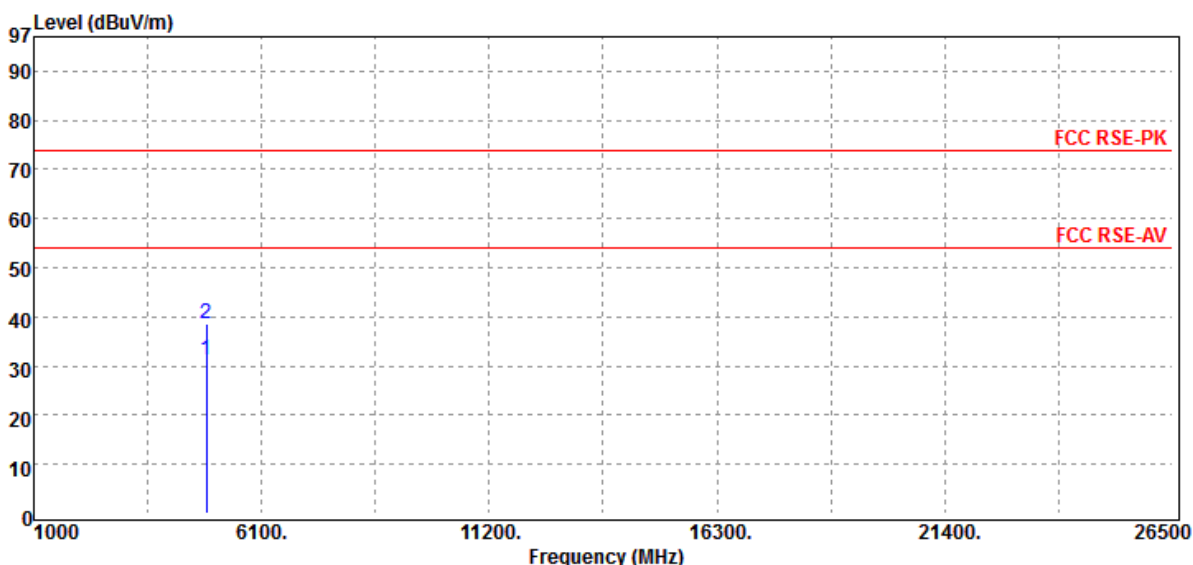
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Operation Band	:802.11n40	Test Date	:2017-08-03
Fundamental Frequency	:2437 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4874.00	H	Average	26.00	5.13	31.13	54.00	-22.87
4874.00	H	Peak	33.25	5.13	38.38	74.00	-35.62

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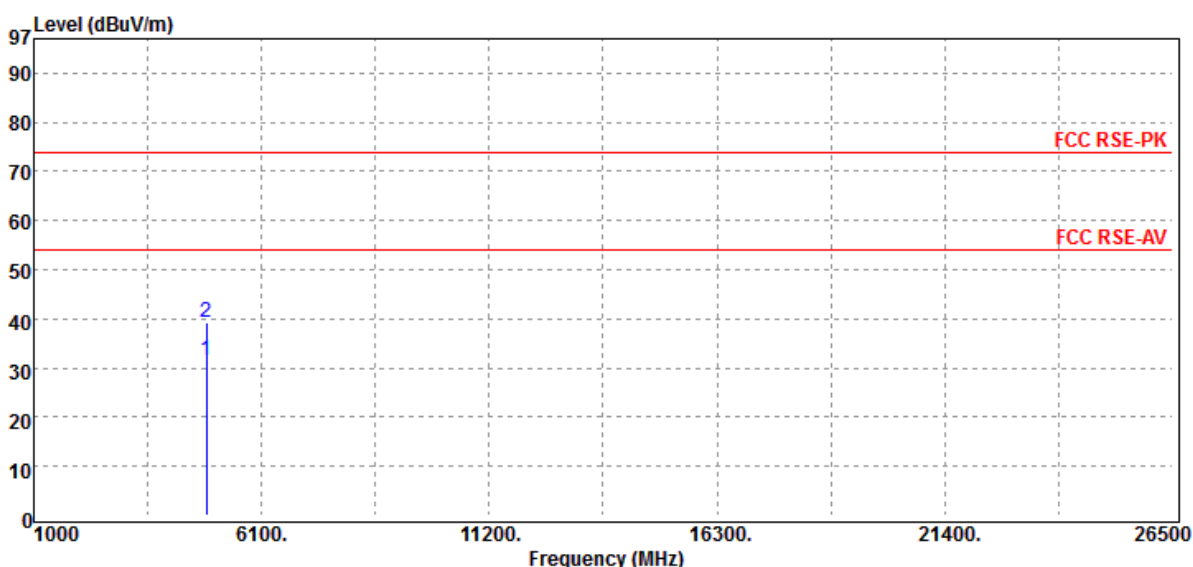
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Operation Band	:802.11n40	Test Date	:2017-08-03
Fundamental Frequency	:2437 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4874.00	H	Average	26.22	5.13	31.35	54.00	-22.65
4874.00	H	Peak	34.17	5.13	39.30	74.00	-34.70

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## 12 PEAK POWER SPECTRAL DENSITY

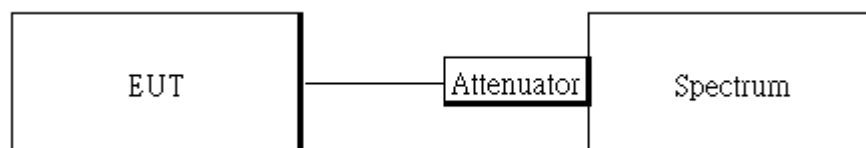
### 12.1 Standard Applicable

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

### 12.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018

### 12.3 Test Set-up



### 12.4 Measurement Procedure

- Set analyzer center frequency to DTS channel center frequency.
- The testing follows the Measurement Procedure of FCC KDB 558074 D01 v04 DTS Meas. Guidance .
- Set the span to 1.5 times the DTS channel bandwidth.
- Set the RBW = 3 kHz. & the VBW = 10 kHz
- For defining Restricted Band Edge Limit:  
Set the RBW = 100kHz & VBW = 300 kHz.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.
- 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.

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**Note:**

Antenna Gain: 1.62 dBi

Aux1 Antenna Gain: 2.58 dBi

Aux2 Antenna Gain: 0.00 dBi

Aux3 Antenna Gain: 0.00 dBi

Number Antenna: 2 pcs

Limit: 8 dBm

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

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

Effective Legacy Gain (dBi) = 2.58+3.01=5.59dBi

Limit: 8dBm – (5.59– 6dBi)=8

**12.5 Measurement Result**

POWER DENSITY 802.11b					
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result
2412	3.74	0.02	3.76	8.00	PASS
2437	3.87	0.02	3.89	8.00	PASS
2462	2.46	0.02	2.48	8.00	PASS

POWER DENSITY 802.11g					
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result
2412	-1.57	0.11	-1.46	8.00	PASS
2437	1.64	0.11	1.75	8.00	PASS
2462	-1.39	0.11	-1.28	8.00	PASS

POWER DENSITY 802.11n HT20					
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result
2412	-0.96	0.22	-0.74	8.00	PASS
2437	1.59	0.22	1.81	8.00	PASS
2462	-1.57	0.22	-1.35	8.00	PASS

POWER DENSITY 802.11n HT40					
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result
2422	-8.94	0.33	-8.61	8.00	PASS
2437	-0.2	0.33	0.13	8.00	PASS
2452	-6.61	0.33	-6.28	8.00	PASS

\*Refer to next page for plots

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802.11b

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



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



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



802.11g

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



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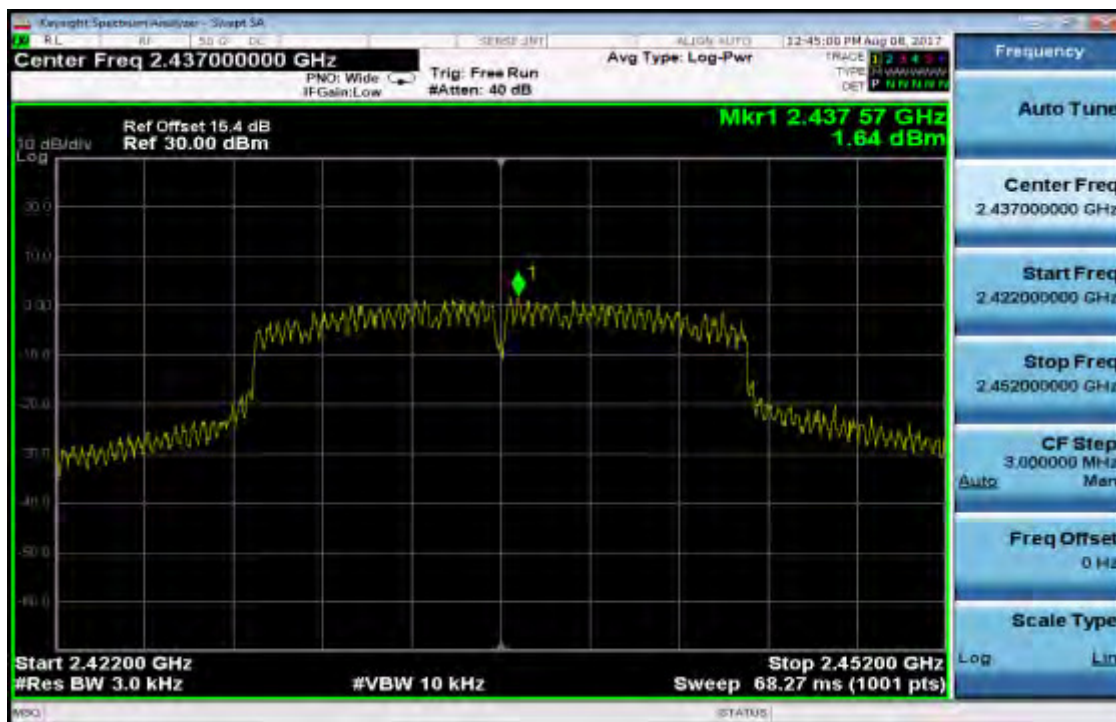
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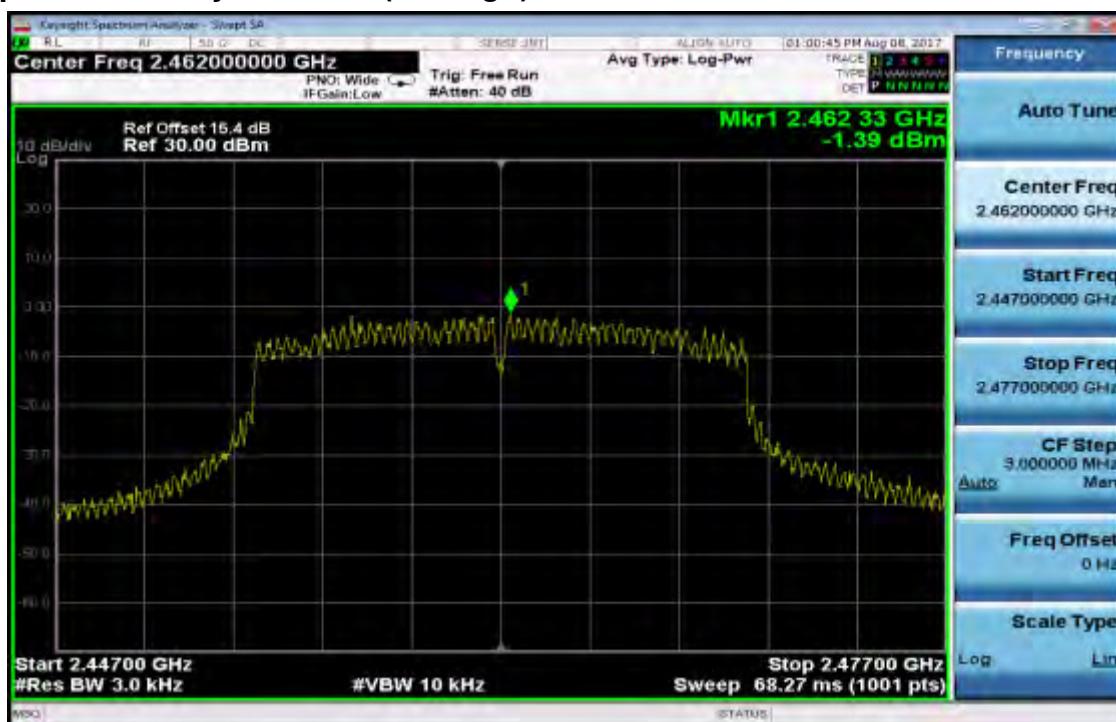
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## Power Spectral Density Test Plot (CH-Mid)



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



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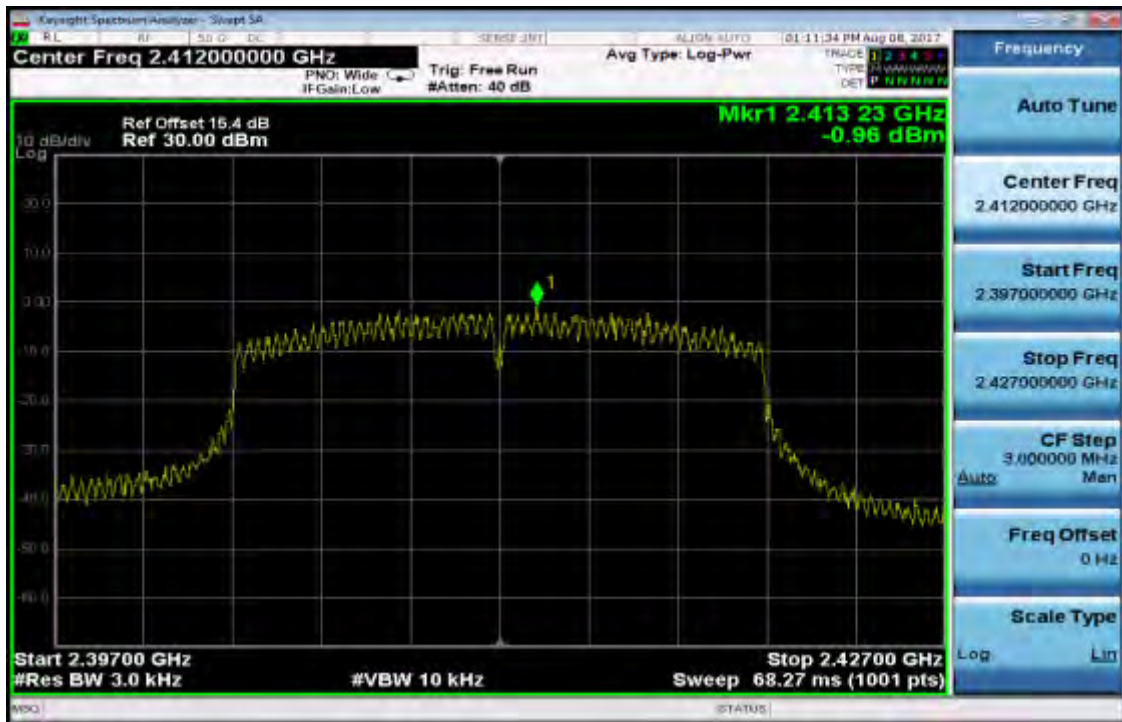
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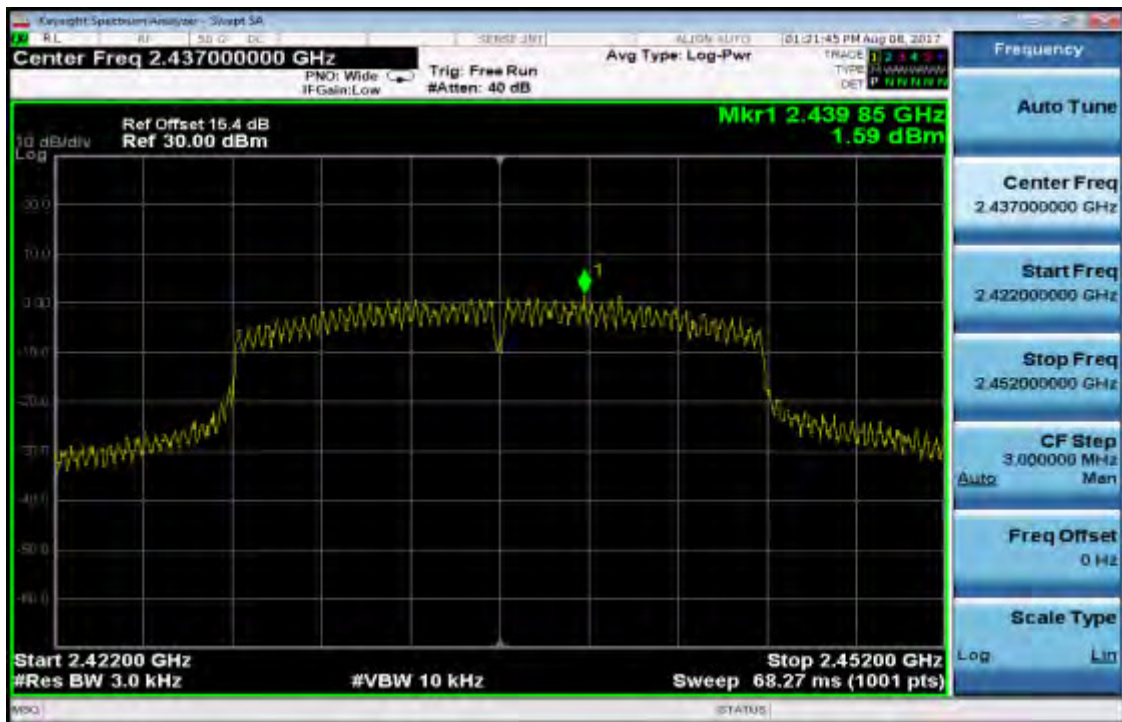


## 802.11n\_HT20 (MIMO)

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



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



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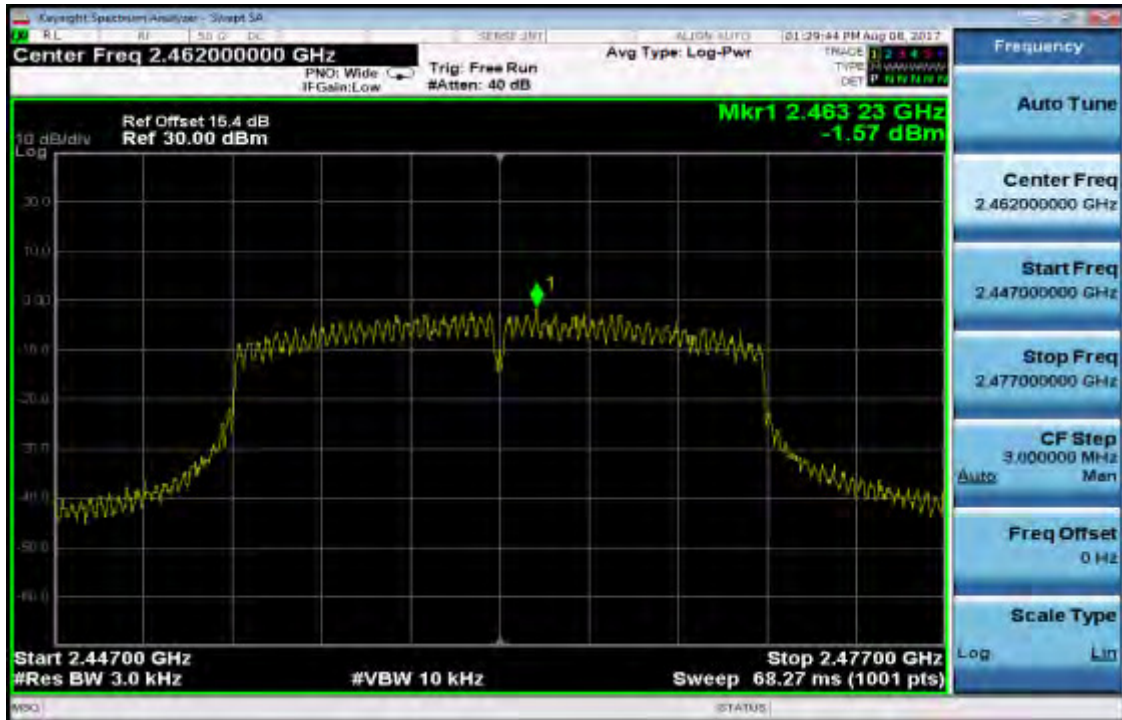
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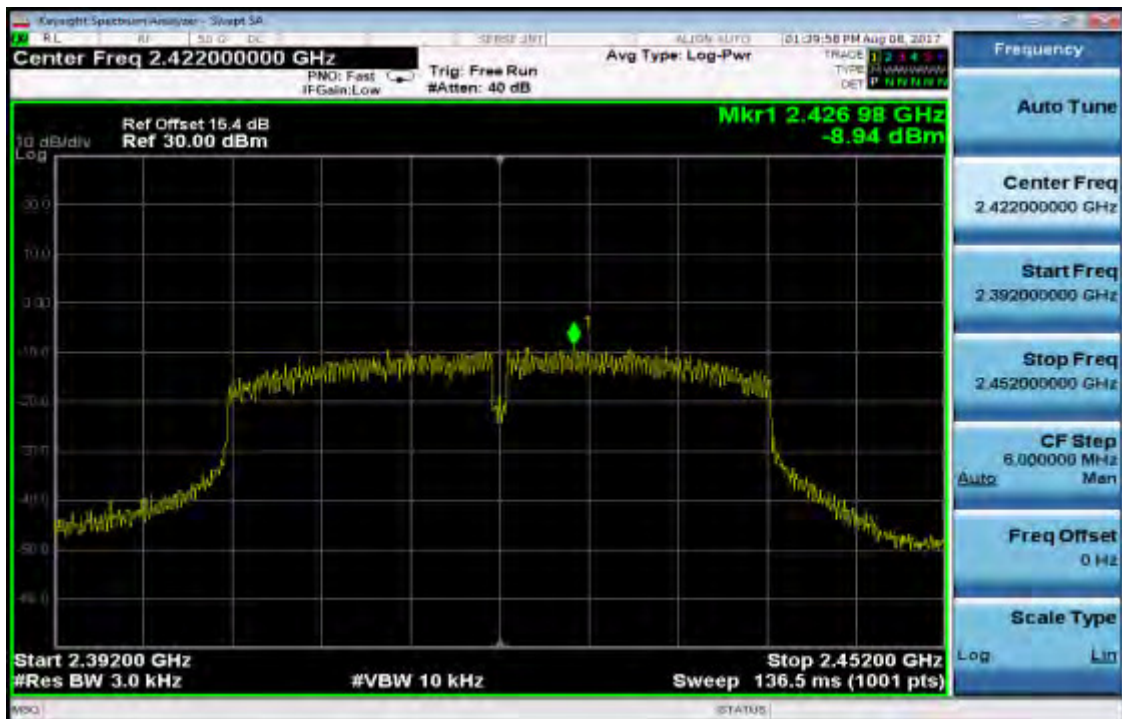
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## Power Spectral Density Test Plot (CH-High)



## 802.11n\_HT40 (MIMO)

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



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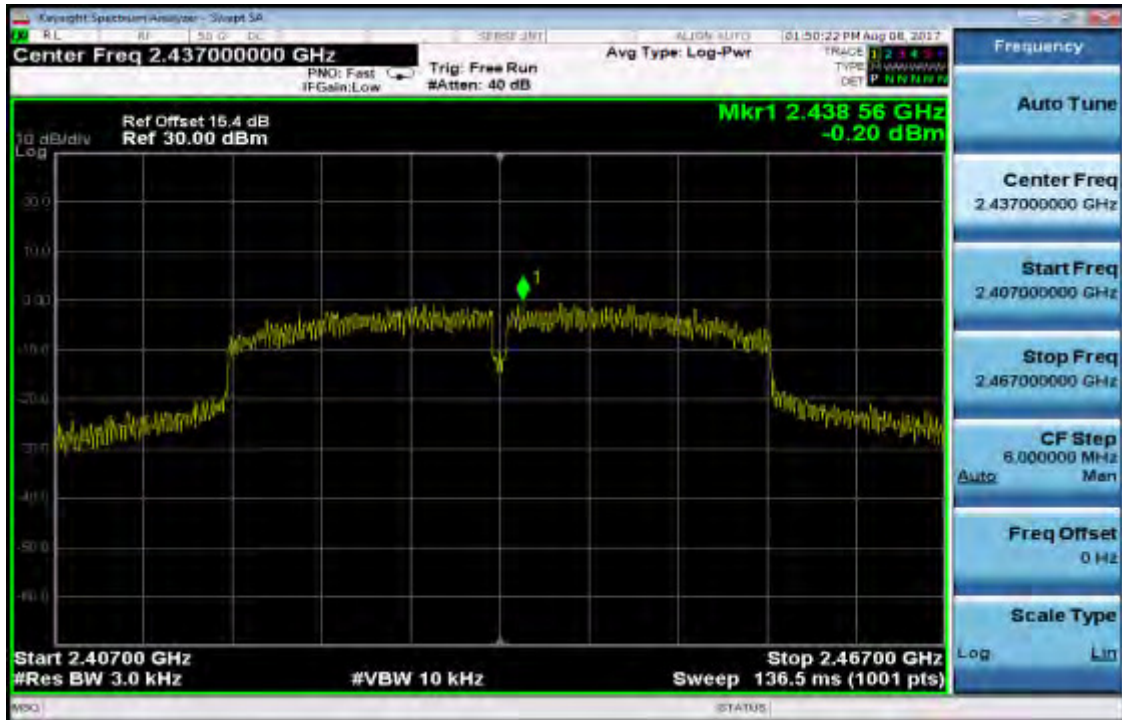
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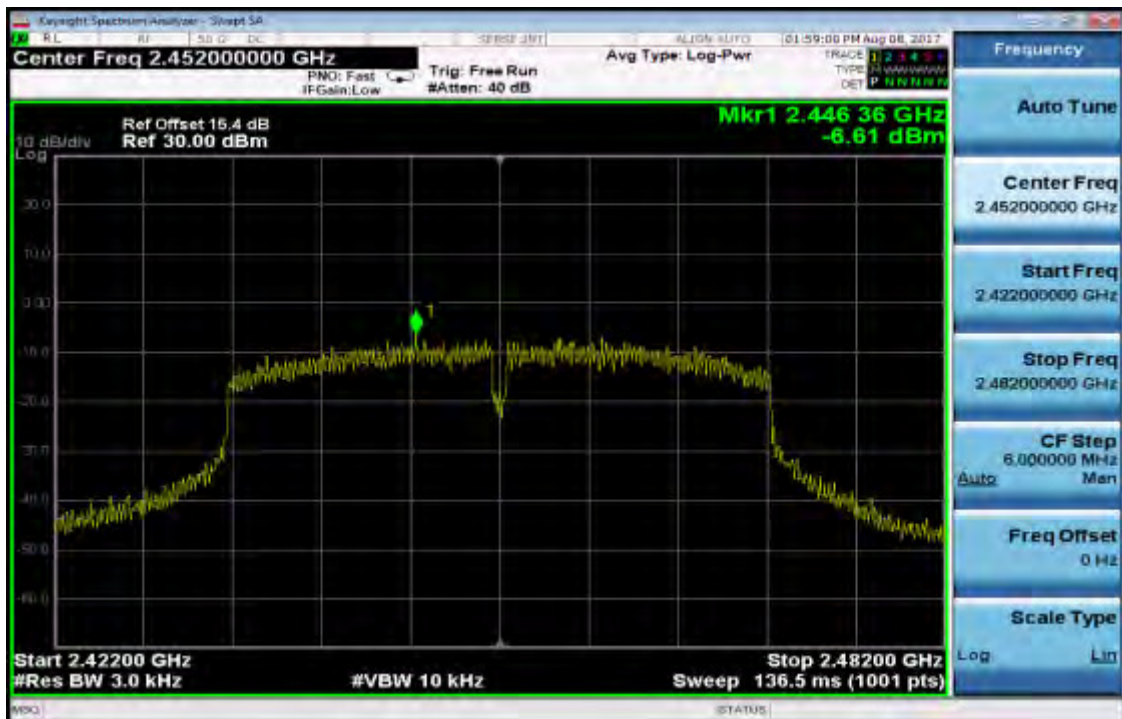
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## Power Spectral Density Test Plot (CH-Mid)



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



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802.11b

### Power Spectral Density for Bandedge Limit (CH-Low)



### Power Spectral Density for Bandedge Limit (CH-High)



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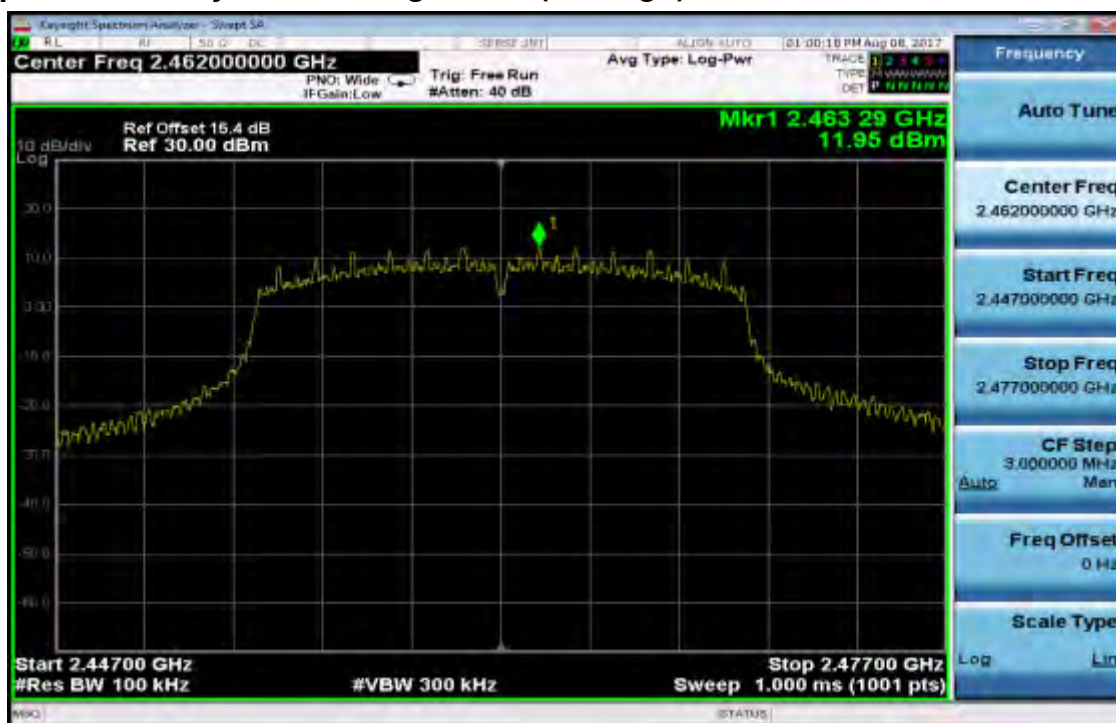


802.11g

## Power Spectral Density for Bandedge Limit (CH-Low)



## Power Spectral Density for Bandedge Limit (CH-High)



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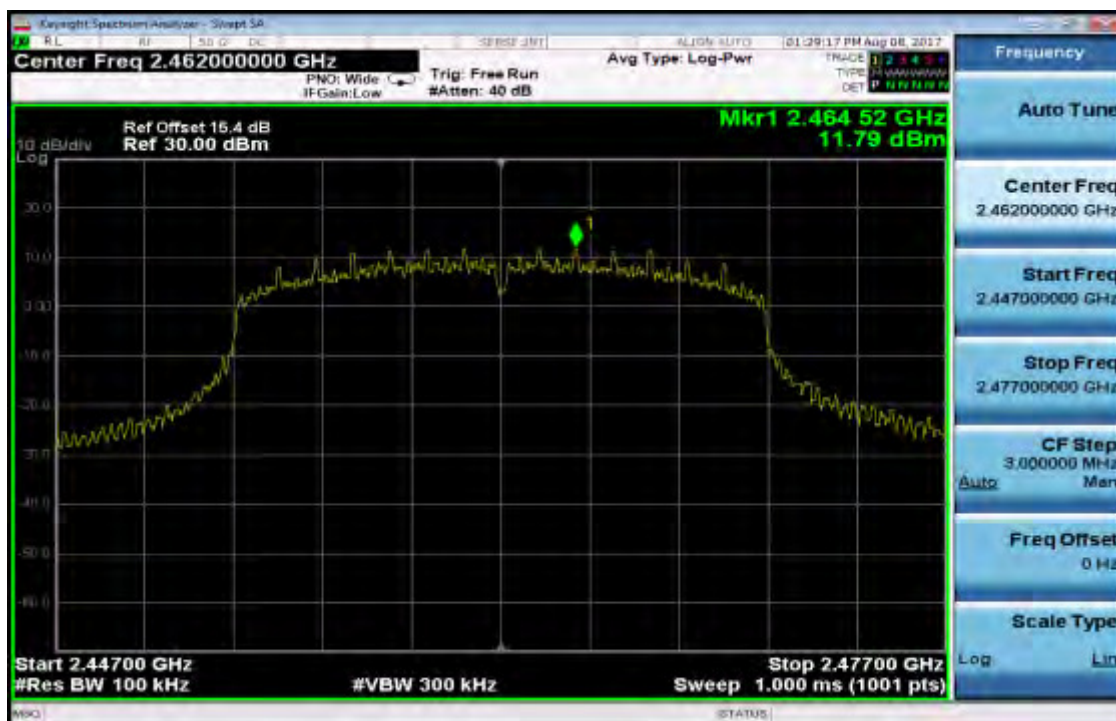


## 802.11n\_HT20

### Power Spectral Density for Bandedge Limit (CH-Low)



### Power Spectral Density for Bandedge Limit (CH-High)



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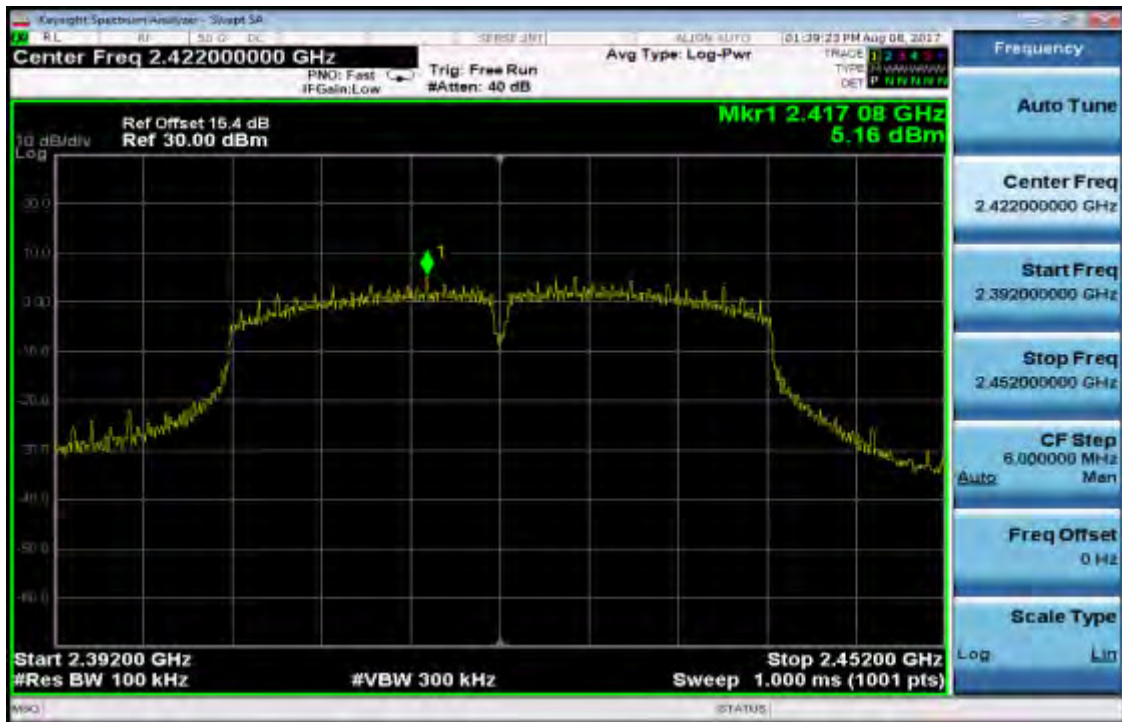
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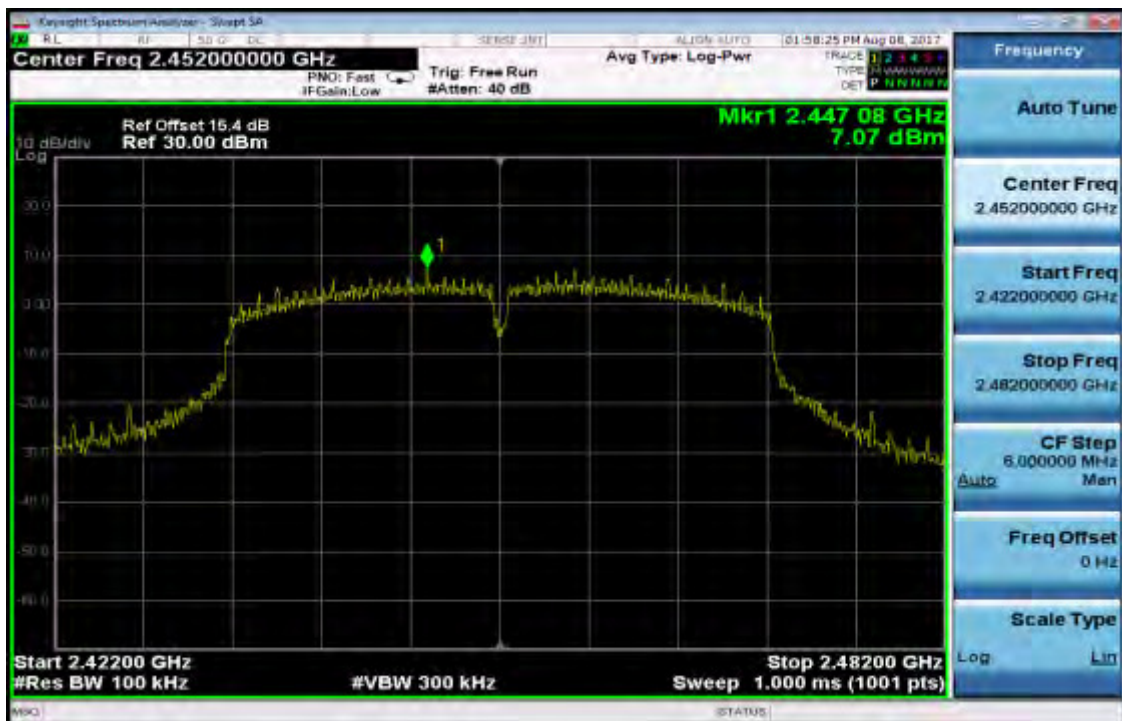
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## 802.11n\_HT40

### Power Spectral Density for Bandedge Limit (CH-Low)



### Power Spectral Density for Bandedge Limit (CH-High)



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## 13 ANTENNA REQUIREMENT

### 13.1 Standard Applicable

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

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

According to RSS-GEN 8.3

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

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

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

### 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.

*~ End of Report ~*

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