

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

**Applicant:** CVICLOUD CORPORATION  
9F., No.11, Lane 3, Sec.1, Chung-Cheng East Road, Tamsui,  
New Taipei City 25147, Taiwan

**Product Name:** M32-ESP32 Wi-Fi module

**Brand Name:** CviCloud

**Model No.:** FWS703

**Model Difference:** N/A

**FCC ID:** 2AN36-FWS703

**Report Number:** E2/2018/A0004

**FCC Rule Part:** §15.247, Cat: DTS

**Issue Date:** Nov. 15, 2018

**Date of Test:** Oct. 03, 2018 ~ Oct. 22, 2018

**Date of EUT** Oct. 03, 2018

**Received:**

### We hereby certify that:

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

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

**Tested By:**

*Vito Pei*  
Vito Pei / Sr. Engineer

**Approved By:**

*Jay Lin*  
Jay Lin / Asst. Supervisor



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## Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
E2/2018/A0004	Rev.00	Initial creation of document	All	Nov. 15, 2018	Susan Lin

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# 1 GENERAL INFORMATION

## 1.1 Product description

General:

Product Name:	M32-ESP32 Wi-Fi module
Brand Name:	CviCloud
Marketing Name:	N/A
Model No.:	FWS703
Model Difference:	N/A
Product HW / SW version:	1.0 / 1.0
Radio HW / SW version:	1.0 / 1.0
Firmware Version (Chip):	1.3.3
Power Supply:	5Vdc from USB Port

### WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power	Modulation Technology
11b/g	2412-2462	11	b: 21.03dBm g: 21.54dBm	DSSS, OFDM
11n	HT20 2412-2462	11	HT20: 21.53dBm	OFDM
11n	HT40 2422-2452	9	HT40: 21.22dBm	OFDM
Antenna Type		FPCB Antenna, Gain: 1.96dBi		
Modulation type:		CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM		
Transition Rate:		802.11 b: 1/2/5.5/11 Mbps 802.11 g: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 72.2Mbps 802.11 n_40MHz: 13.5 - 150.0Mbps		

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## 1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 DTS Meas. Guidance v05

ANSI C63.10:2013

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

## 1.3 Test Facility

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

FCC Registration Number and Designation are: 735305 / TW0002

## 1.4 Special Accessories

There are no special accessories used while test was conducted.

## 1.5 Equipment Modifications

There was no modification incorporated into the EUT.

## 1.6 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m\*9m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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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 table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50uH/50 ohm 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 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

#### 2.3.3 Radiated Emissions

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

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## 2.4 Configuration of Tested System

**Fig. 2-1 Conducted (Antenna Port) & Conduction**



**Fig. 2-2 Radiated Emission**



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

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

## 3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	Peak Output Power	Compliant
§15.247(a)(2)	6dB & 99% Emission Bandwidth	Compliant
§15.205 §15.209 §15.247(d)	Conducted Band Edge and Spurious Emission	Compliant
§15.205 §15.209 §15.247(d)	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.203 §15.247(b)	Antenna Requirement	Compliant

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## 4 DESCRIPTION OF TEST MODES

### 4.1 Operated in 2400 ~ 2483.5MHz Band

11 channels are provided for 802.11b, 802.11g and 802.11n\_HT20

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

7 channels are provided for 802.11n\_HT40

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

### 4.2 The Worst Test Modes and Channel Details

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

#### RADIATED EMISSION TEST:

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

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

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**Note:**

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

**ANTENNA PORT CONDUCTED MEASUREMENT:**

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

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## 5 MEASUREMENT UNCERTAINTY

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

Radiated Spurious Emission:

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

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

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

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## 6 CONDUCTED EMISSION TEST

### 6.1 Standard Applicable

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

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

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
LISN	TESEQ	NNB 51	36076	2018/02/14	2019/02/13
EMI Test Receiver	R&S	ESCI	101300	2017/11/02	2018/11/01
Notebook	Lenovo	L420	S0012467	N/A	N/A

### 6.3 EUT Setup

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

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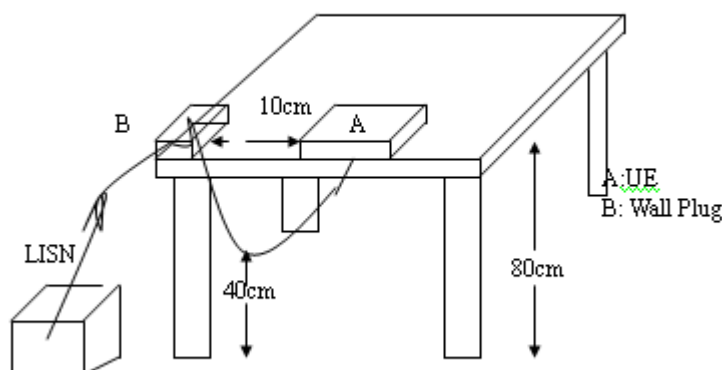
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## 6.4 Test SET-UP (Block Diagram of Configuration)



## 6.5 Measurement Procedure

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

## 6.6 Measurement Result

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

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

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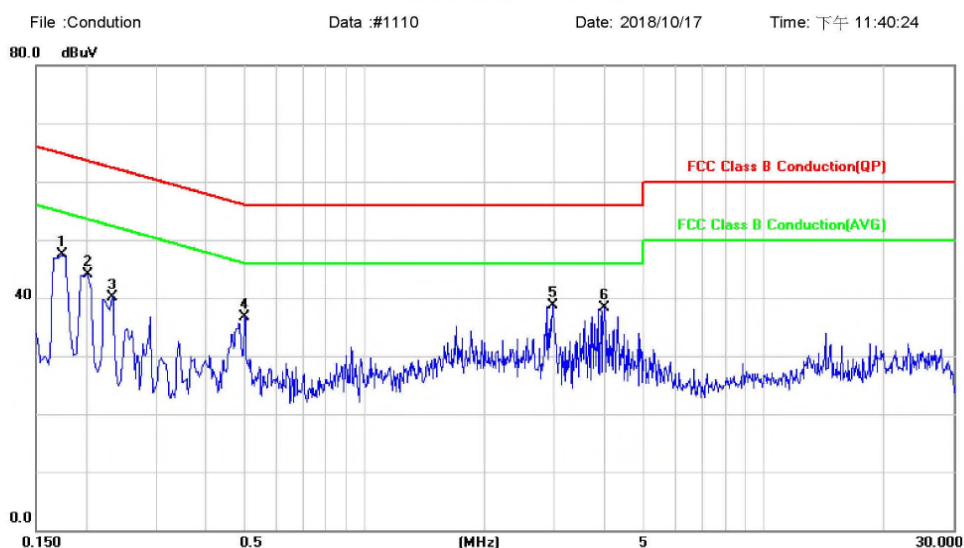
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## AC POWER LINE CONDUCTED EMISSION TEST DATA

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

Site : Conduction Room	Phase: <b>L1</b>	Temperature: 23 °C
Limit: FCC Class B Conduction(QP)	Power: AC 120V/60Hz	Humidity: 64 %
Mode:		
Note:		

### Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1740	27.73	19.70	47.43	64.77	-17.34	peak	
2		0.2020	24.45	19.74	44.19	63.53	-19.34	peak	
3		0.2340	20.37	19.80	40.17	62.31	-22.14	peak	
4		0.5020	16.45	20.23	36.68	56.00	-19.32	peak	
5 *		2.9660	18.35	20.38	38.73	56.00	-17.27	peak	
6		4.0060	18.13	20.18	38.31	56.00	-17.69	peak	

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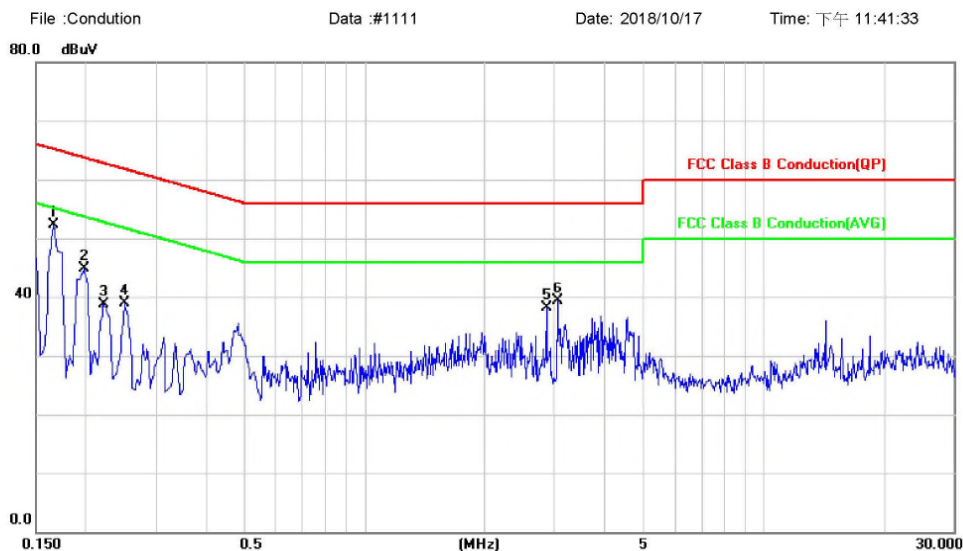
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Site : Conduction Room Phase: **N** Temperature: 23 °C  
Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 64 %  
Mode:  
Note:

### Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.1660	32.67	19.66	52.33	65.16	-12.83	peak	
2		0.1980	25.17	19.72	44.89	63.69	-18.80	peak	
3		0.2220	18.87	19.76	38.63	62.74	-24.11	peak	
4		0.2500	19.01	19.80	38.81	61.76	-22.95	peak	
5		2.8660	17.69	20.38	38.07	56.00	-17.93	peak	
6		3.0500	19.06	20.34	39.40	56.00	-16.60	peak	

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## 7 DUTY CYCLE OF TEST SIGNAL

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

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

### Formula:

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

### Measurement Procedure:

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

### Duty Cycle:

	Duty Cycle (%)	Duty Factor (dB)	1/T (kHz)	VBW setting (kHz)
802.11b	100.00	0.00	0.00	0.01
802.11g	100.00	0.00	0.00	0.01
802.11n_20	100.00	0.00	0.00	0.01
802.11n_40	100.00	0.00	0.00	0.01

$$\text{Duty Cycle Factor: } 10 * \log(1/1) = 0$$

$$\text{Duty Cycle Factor: } 10 * \log(1/1) = 0$$

$$\text{Duty Cycle Factor: } 10 * \log(1/1) = 0$$

$$\text{Duty Cycle Factor: } 10 * \log(1/1) = 0$$

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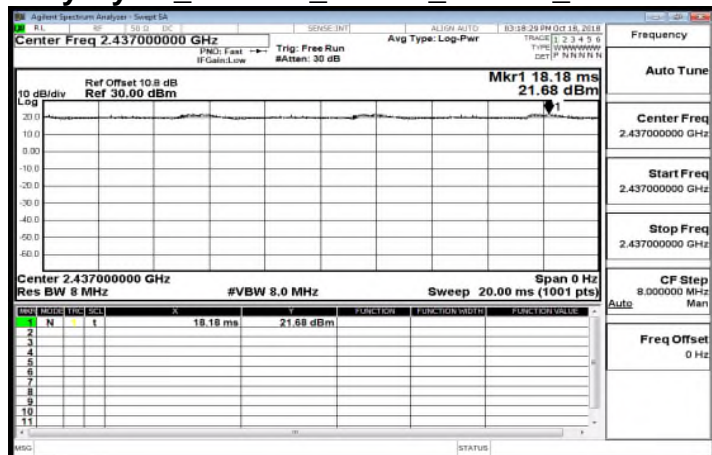
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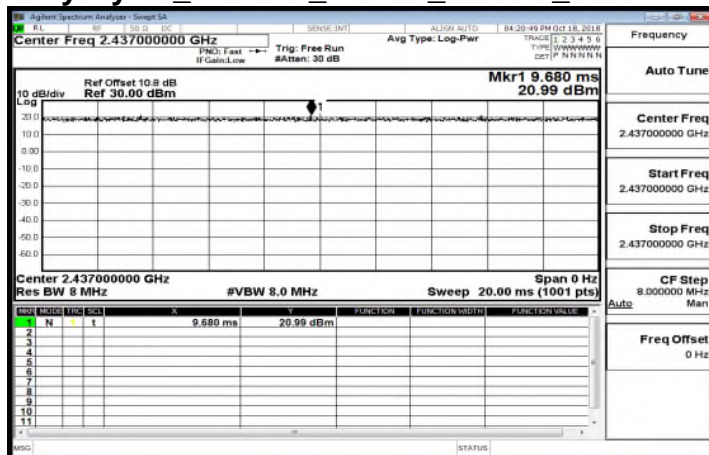


## 7.1 DUTY CYCLE TEST SIGNAL Measurement Result

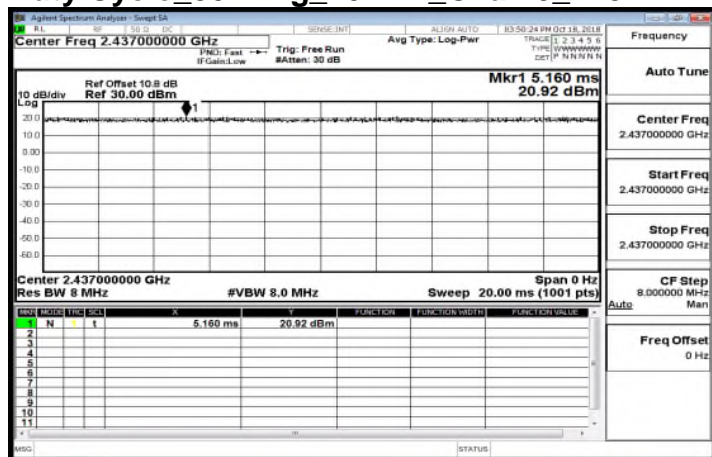
### Duty Cycle\_802.11b\_20MHz\_Chain0\_2437MHz



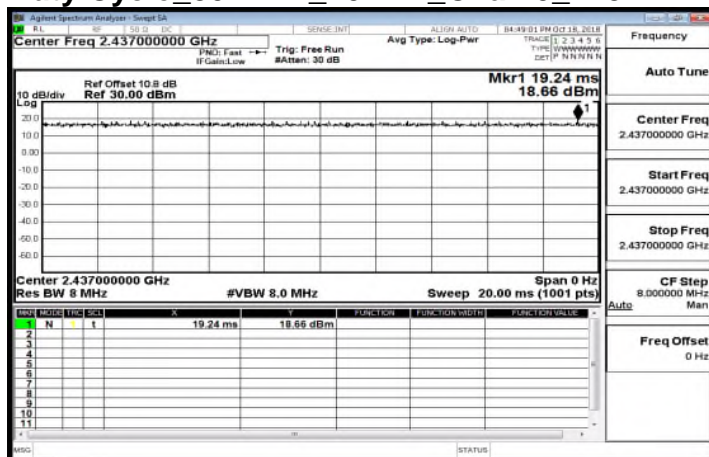
### Duty Cycle\_802.11n\_20MHz\_Chain0\_2437MHz



### Duty Cycle\_802.11g\_20MHz\_Chain0\_2437MHz



### Duty Cycle\_802.11n\_40MHz\_Chain0\_2437MHz



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## 8 PEAK OUTPUT POWER MEASUREMENT

### 8.1 Standard Applicable

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

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

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

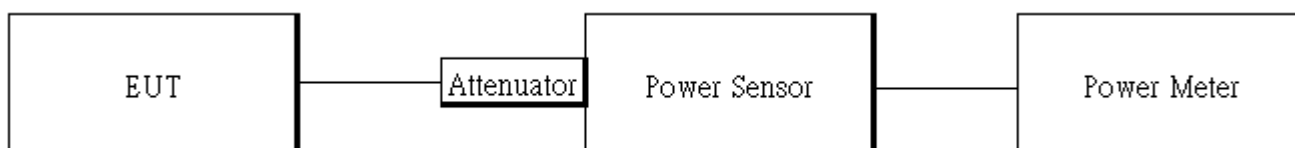
The antenna gain is not greater than 6 dBi. Therefore, reduction of power is not required.

### 8.2 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2496A	1326001	2018/08/09	2019/08/02
Power Sensor	Anritsu	MA2411B	1315048	2018/08/09	2019/08/02
Power Sensor	Anritsu	MA2411B	1315049	2018/08/09	2019/08/02
Notebook	Lenovo	L420	S0011721	N/A	N/A

### 8.3 Test Set-up

Power Meter:



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## 8.4 Measurement Procedure

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

### Power Meter:

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

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

## 8.5 Measurement Result

802.11b Ch0					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
1	2412	1	21.03	1 Watt = 30.00 dBm	PASS
6	2437	1	20.22	1 Watt = 30.00 dBm	PASS
11	2462	1	19.67	1 Watt = 30.00 dBm	PASS
802.11b Ch0					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
1	2412	1	18.52	1 Watt = 30.00 dBm	PASS
6	2437	1	17.60	1 Watt = 30.00 dBm	PASS
11	2462	1	17.00	1 Watt = 30.00 dBm	PASS

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802.11g Ch0					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
1	2412	6	21.54	1 Watt = 30.00 dBm	PASS
6	2437	6	21.06	1 Watt = 30.00 dBm	PASS
11	2462	6	19.20	1 Watt = 30.00 dBm	PASS
802.11g Ch0					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
1	2412	6	15.24	1 Watt = 30.00 dBm	PASS
6	2437	6	15.13	1 Watt = 30.00 dBm	PASS
11	2462	6	13.34	1 Watt = 30.00 dBm	PASS

802.11n_HT20M Ch0					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
1	2412	MCS0	21.53	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	21.28	1 Watt = 30.00 dBm	PASS
11	2462	MCS0	19.49	1 Watt = 30.00 dBm	PASS
802.11n_HT20M Ch0					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
1	2412	MCS0	14.92	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	14.84	1 Watt = 30.00 dBm	PASS
11	2462	MCS0	13.07	1 Watt = 30.00 dBm	PASS

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802.11n_HT40M Ch0					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
3	2422	MCS0	19.90	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	<b>21.22</b>	1 Watt = 30.00 dBm	PASS
9	2452	MCS0	18.41	1 Watt = 30.00 dBm	PASS
802.11n_HT40M Ch0					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
3	2422	MCS0	<b>14.39</b>	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	14.25	1 Watt = 30.00 dBm	PASS
9	2452	MCS0	12.48	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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## 9 6DB BANDWIDTH MEASUREMENT

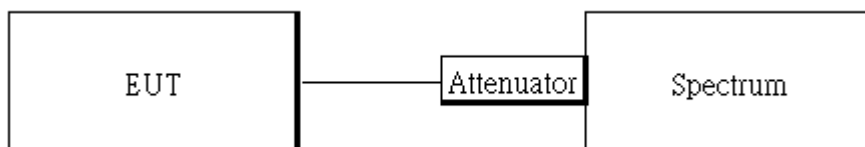
### 9.1 Standard Applicable

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

### 9.2 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/06/19
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25
DC Block	PASTERNAK	PE8210	RF29	2017/12/26	2018/12/25
Notebook	Lenovo	L420	S0011721	N/A	N/A

### 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 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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## 9.5 Measurement Result

### 6dB Bandwidth

#### 802.11b Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	<b>8728.90</b>	> 500	PASS
2437	8726.00	> 500	PASS
2462	8726.30	> 500	PASS

#### 802.11g Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	16320.00	> 500	PASS
2437	<b>16327.00</b>	> 500	PASS
2462	16323.00	> 500	PASS

#### 802.11\_n\_HT20 Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	16597.00	> 500	PASS
2437	16597.00	> 500	PASS
2462	<b>16602.00</b>	> 500	PASS

#### 802.11\_n\_HT40 Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	36092.00	> 500	PASS
2437	36086.00	> 500	PASS
2452	<b>36301.00</b>	> 500	PASS

\* Note: Offset 10.8dB for 2.4G 802.11b/g/n\_20

*\*Refer to next page for plots*

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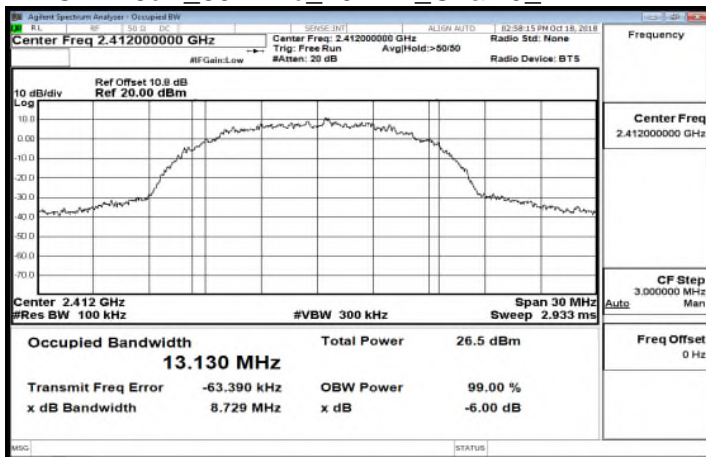
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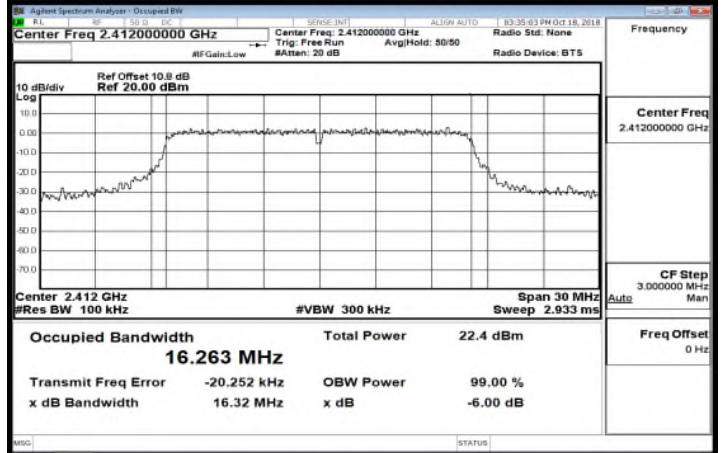
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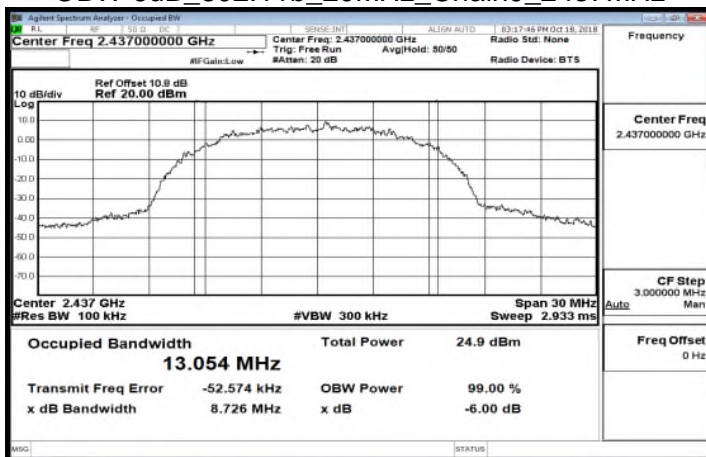
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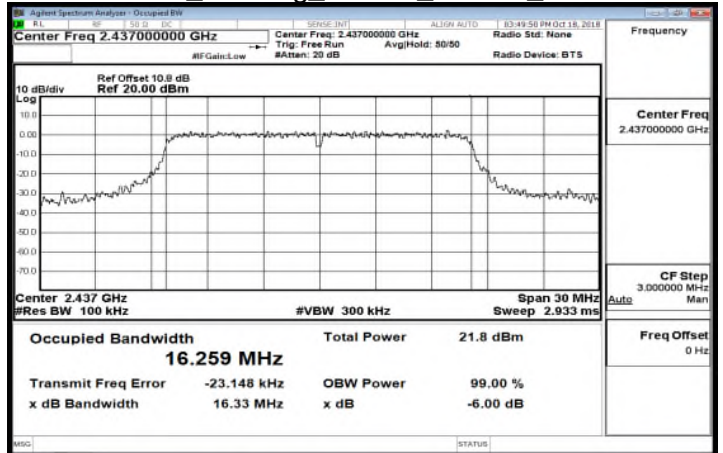
OBW 6dB\_802.11g\_20MHz\_Chain0\_2412MHz



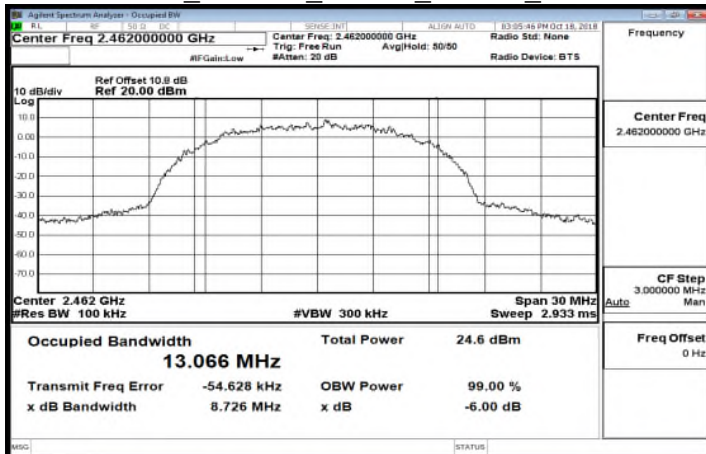
OBW 6dB\_802.11b\_20MHz\_Chain0\_2437MHz



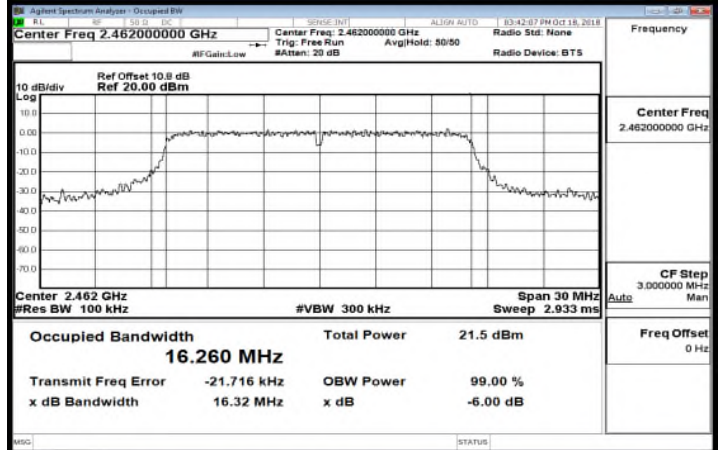
OBW 6dB\_802.11g\_20MHz\_Chain0\_2437MHz



OBW 6dB\_802.11b\_20MHz\_Chain0\_2462MHz



OBW 6dB\_802.11g\_20MHz\_Chain0\_2462MHz



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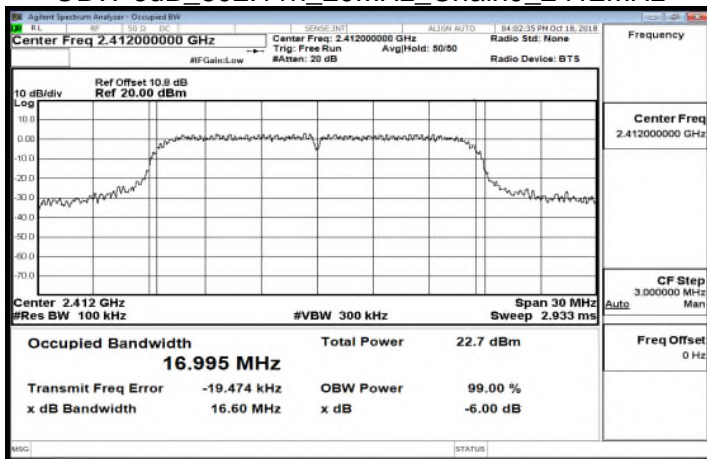
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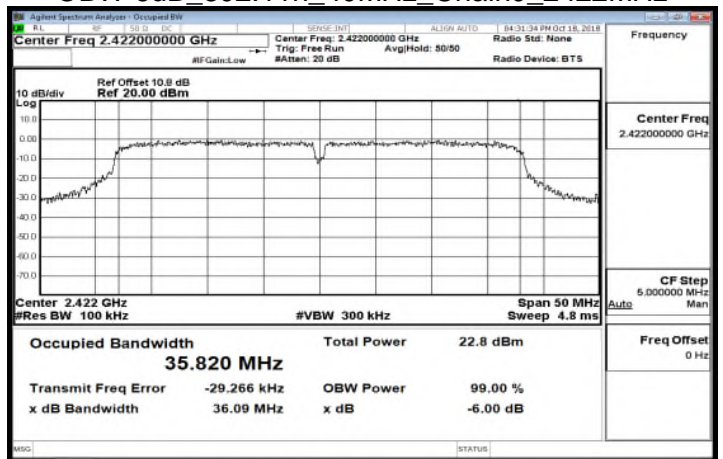
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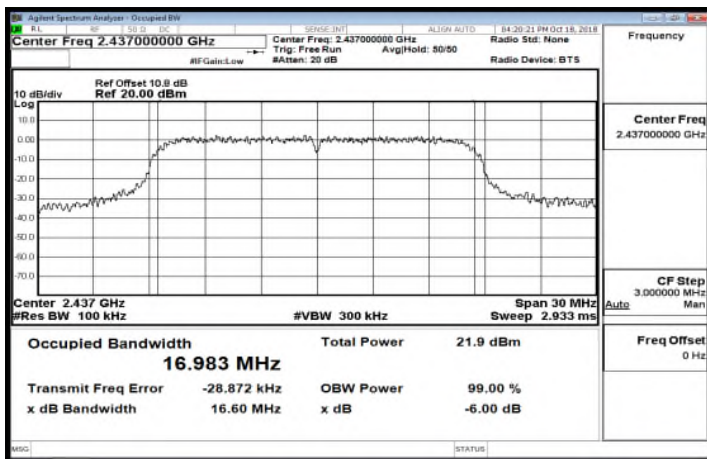
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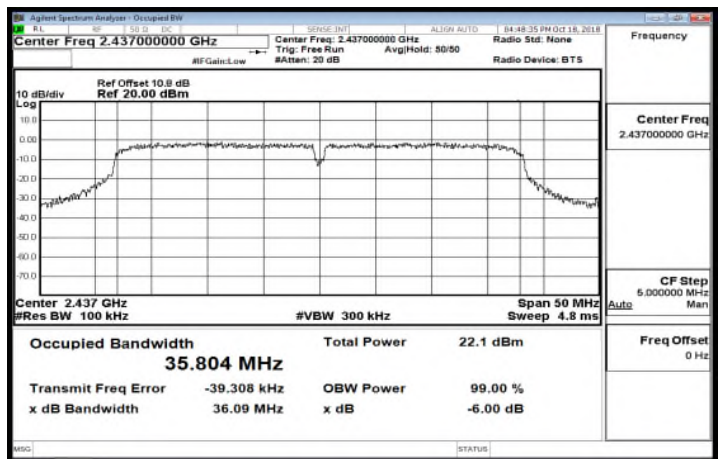
OBW 6dB\_802.11n\_40MHz\_Chain0\_2422MHz



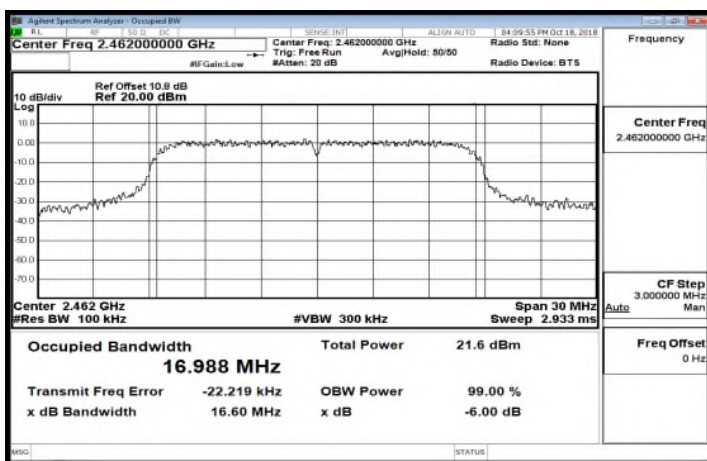
OBW 6dB\_802.11n\_20MHz\_Chain0\_2437MHz



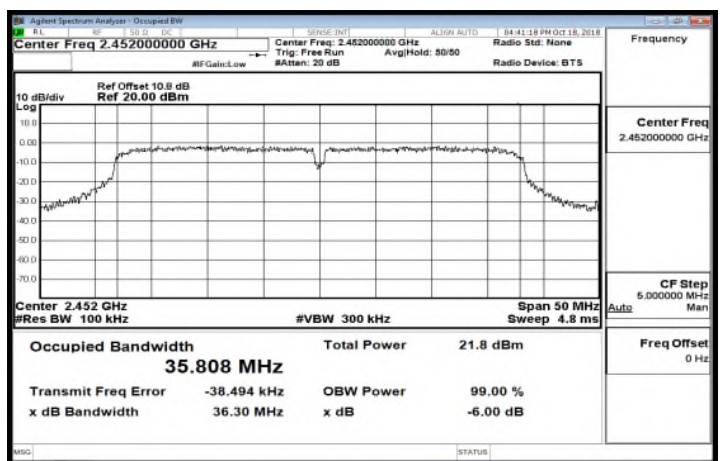
OBW 6dB\_802.11n\_40MHz\_Chain0\_2437MHz



OBW 6dB\_802.11n\_20MHz\_Chain0\_2462MHz



OBW 6dB\_802.11n\_40MHz\_Chain0\_2452MHz



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## 10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

### 10.1 Standard Applicable

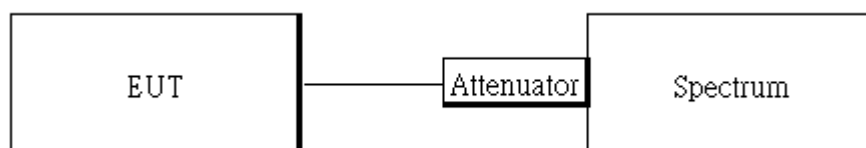
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

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

### 10.2 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/06/19
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25
DC Block	PASTERNAK	PE8210	RF29	2017/12/26	2018/12/25
Notebook	Lenovo	L420	S0011721	N/A	N/A

### 10.3 Test SET-UP



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## 10.4 Measurement Procedure

### Reference Level of Emission Limit:

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

### Conducted Band Edge:

1. To connect Antenna Port of EUT to Spectrum.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Detector = Peak, Sweep = auto
6. Mark the highest reading of the emission as the reference level measurement.
7. Set DL as the limit = reading on marker 1 – 20dBm
8. Marker on frequency, 2.3999GHz and 2.4836GHz, and examine shall 100 kHz immediately outside the authorized (2400~2483.5) be attenuated by 20dB at least relative to the maximum emission of power.
9. Repeat above procedures until all default test channel (low, middle, and high) was complete.

### Conducted Spurious Emission:

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

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## 10.5 Measurement Result

Reference Level of Limit 802.11b mode			Reference Level of Limit 802.11g mode		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)	Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	10.56	-9.44	2412	3.05	-16.95
2437	9.39	-10.61	2437	2.35	-17.65
2462	8.84	-11.16	2462	2.11	-17.89

Reference Level of Limit 802.11n20 mode			Reference Level of Limit 802.11n40 MODE		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)	Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	2.92	-17.08	2422	-0.44	-20.44
2437	2.22	-17.79	2437	-0.90	-20.90
2462	2.00	-18.00	2452	-1.56	-21.56

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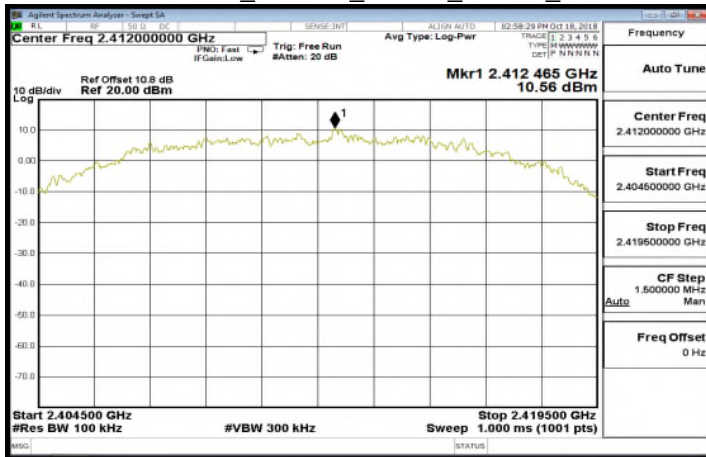
t (886-2) 2299-3279

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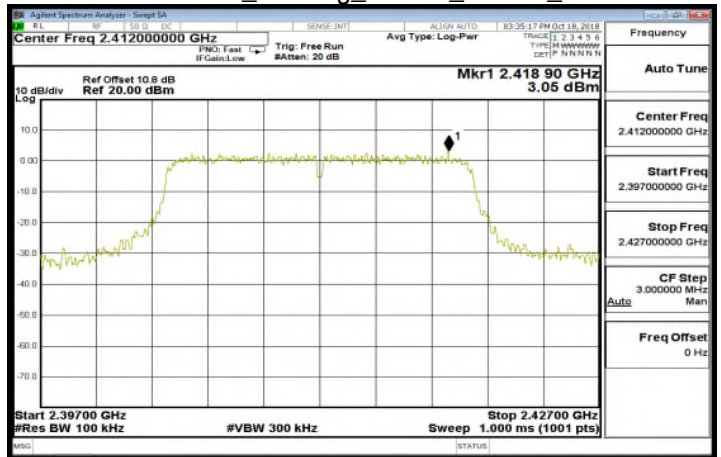
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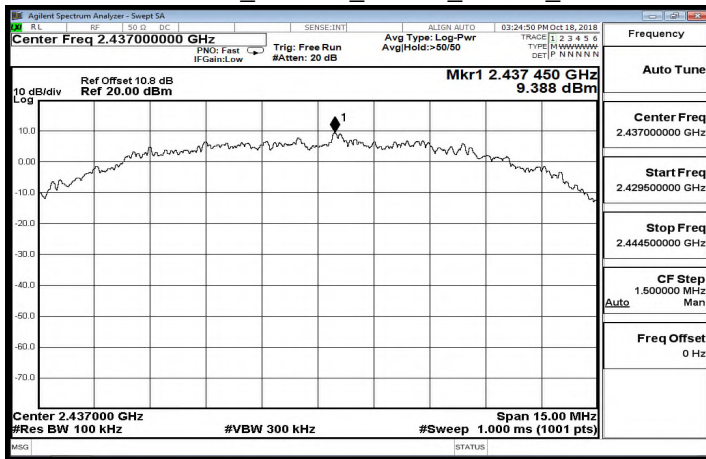
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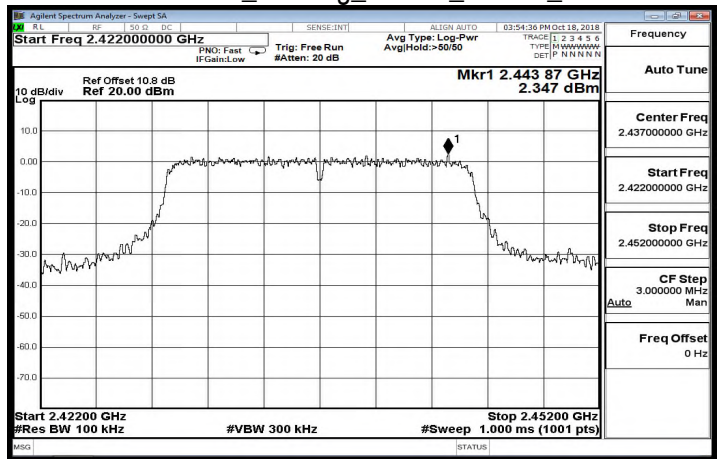
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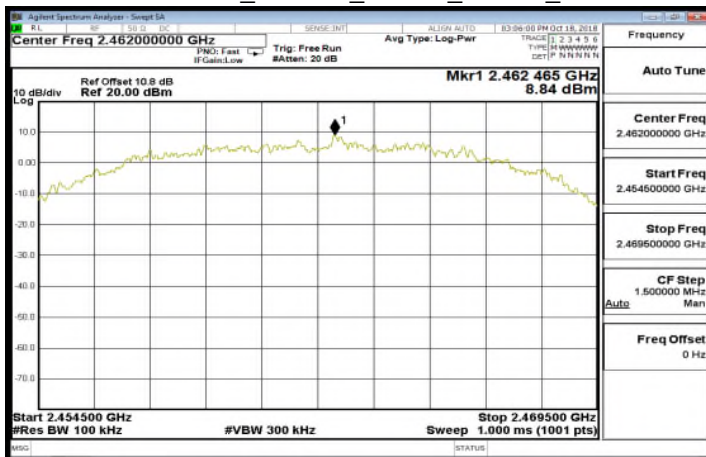
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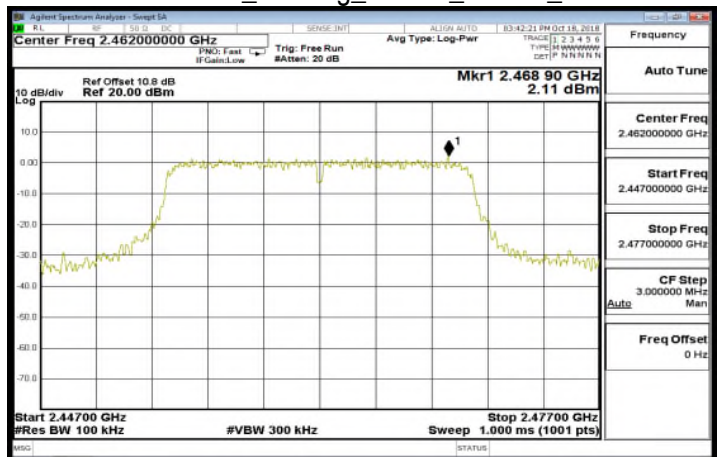
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Reference Level\_802.11b\_20MHz\_Chain0\_2462MHz



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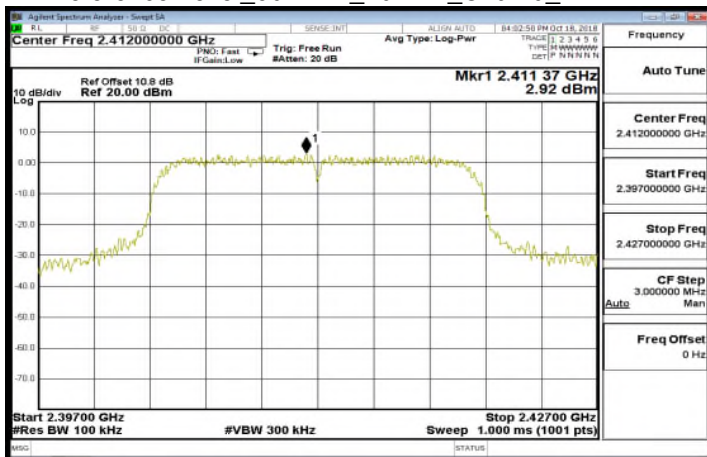
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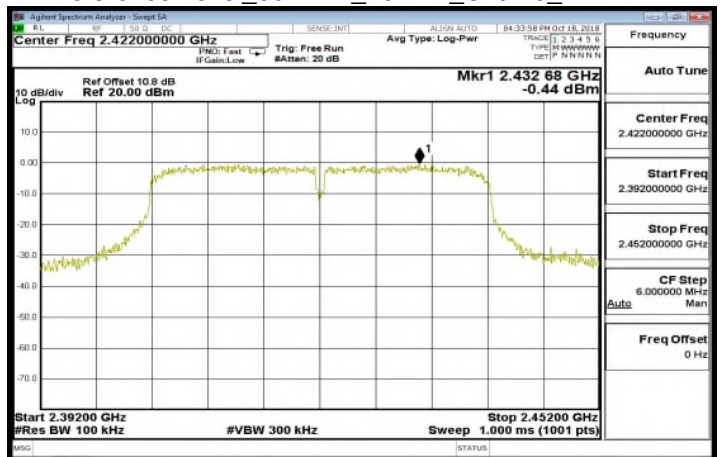
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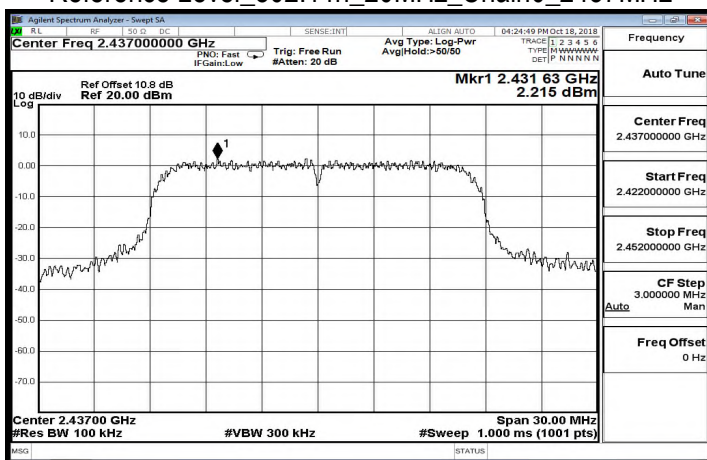
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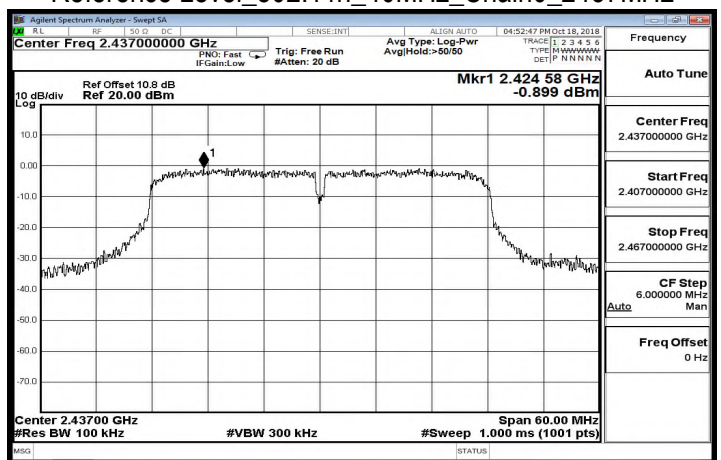
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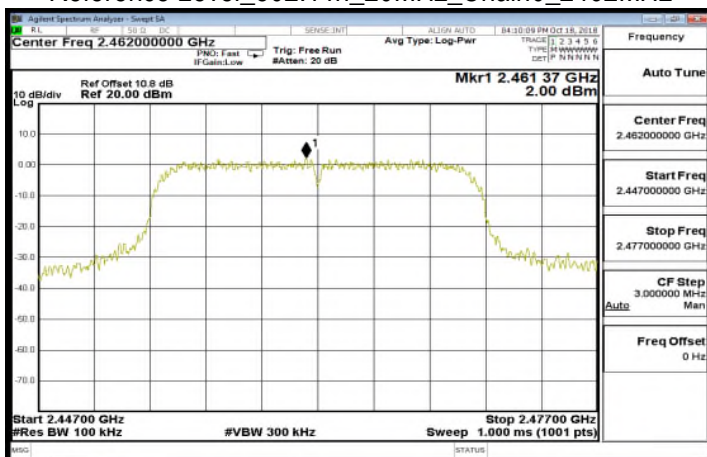
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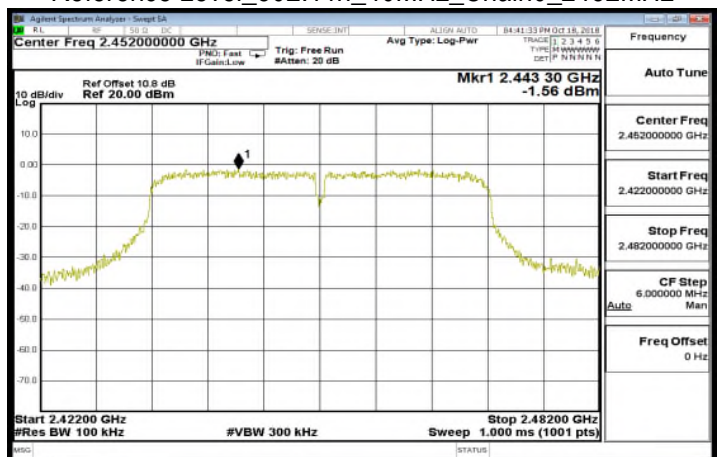
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Reference Level\_802.11n\_20MHz\_Chain0\_2462MHz



Reference Level\_802.11n\_40MHz\_Chain0\_2452MHz



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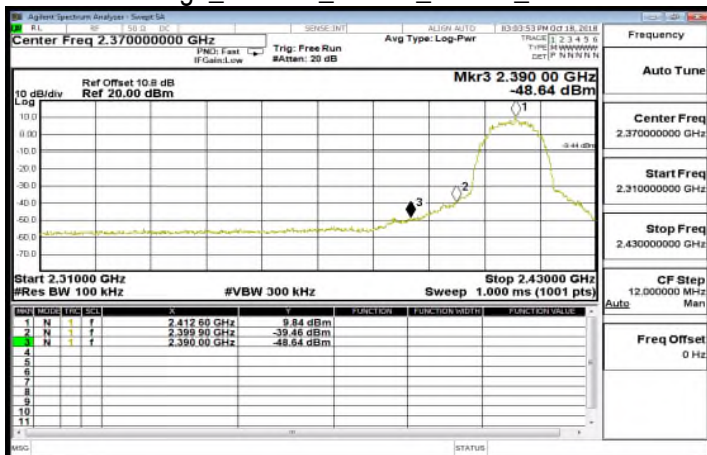
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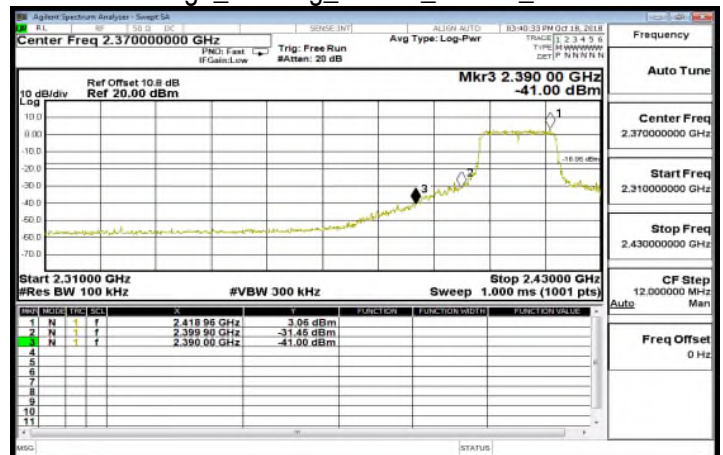
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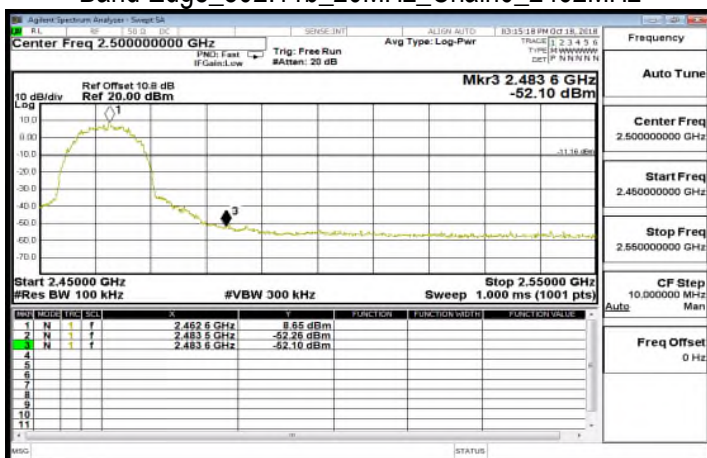
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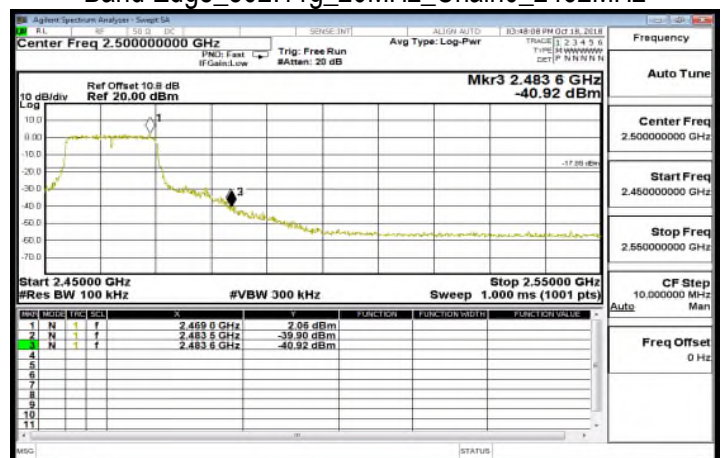
Band Edge\_802.11g\_20MHz\_Chain0\_2412MHz



Band Edge\_802.11b\_20MHz\_Chain0\_2462MHz



Band Edge\_802.11g\_20MHz\_Chain0\_2462MHz



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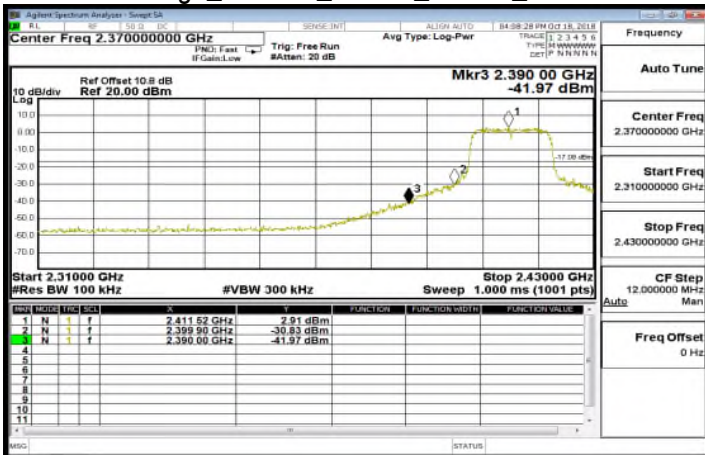
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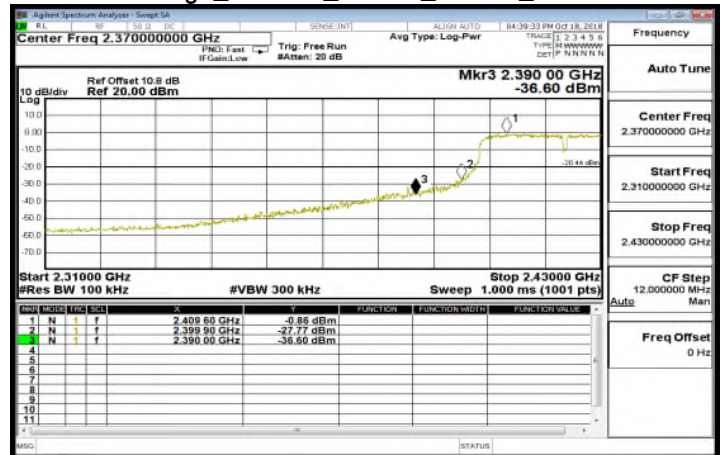
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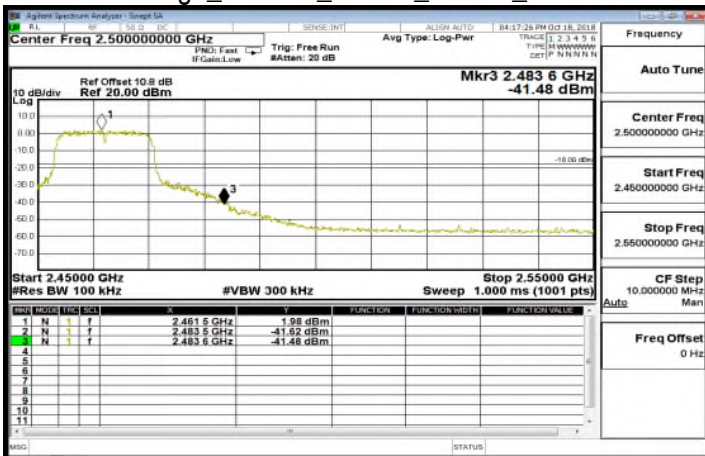
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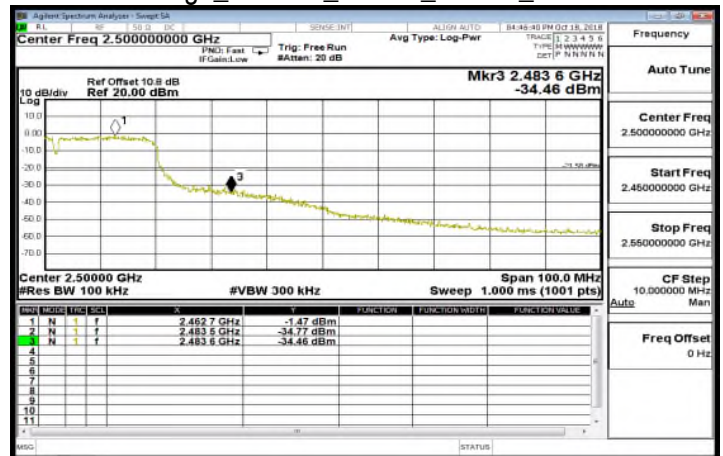
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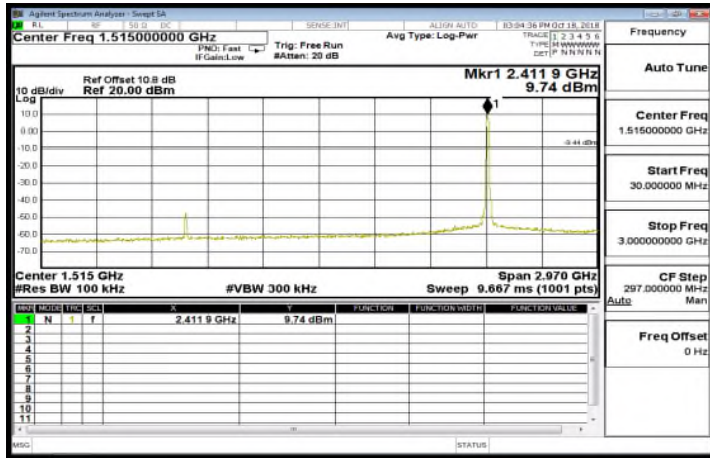
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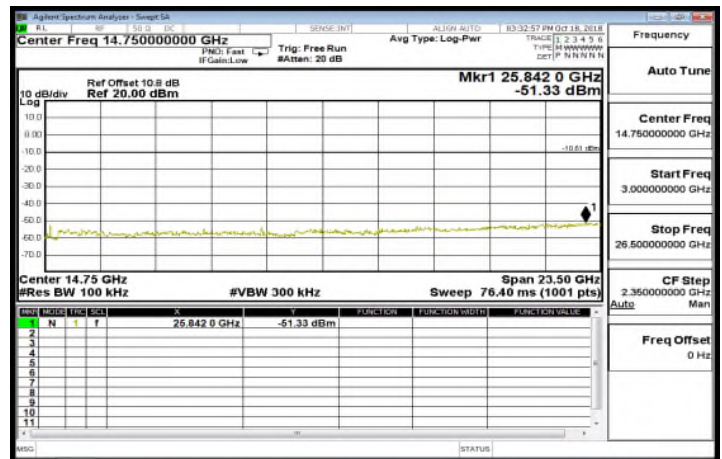
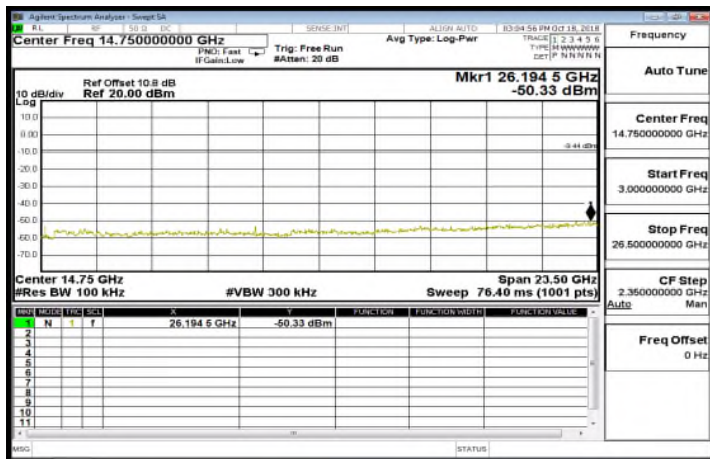
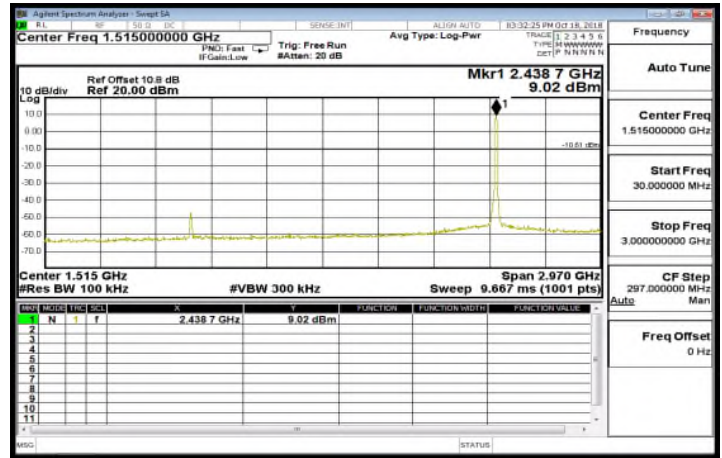
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## 802.11b Spurious Emission Test Data CH-Low



## Spurious Emission Test Data CH-Mid



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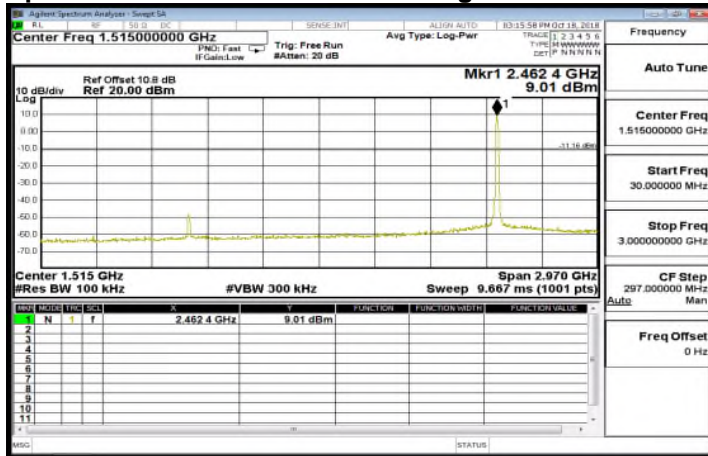
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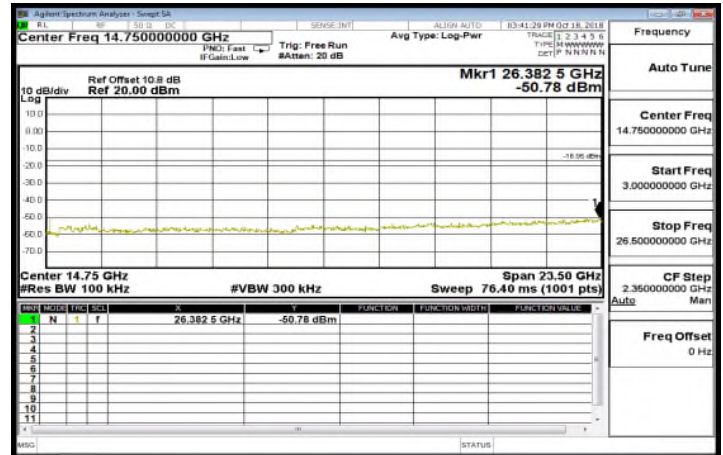
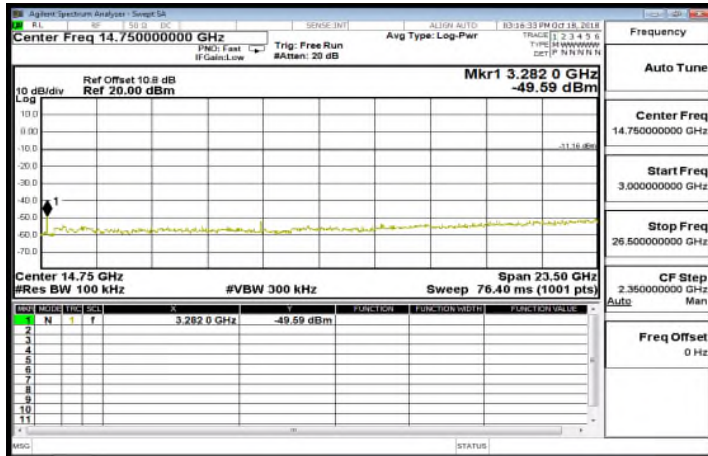
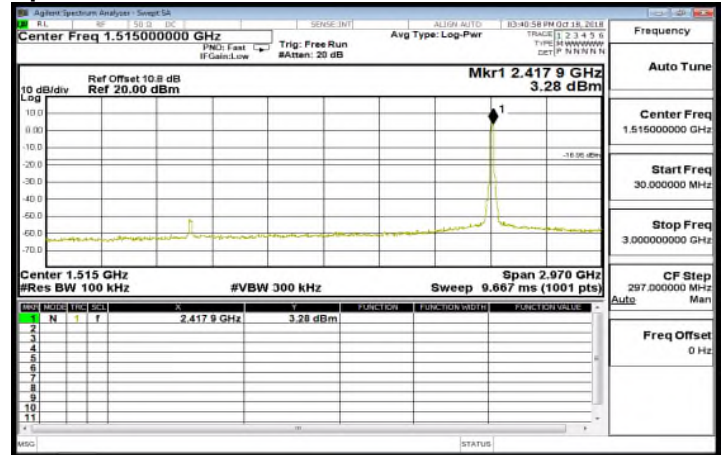
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## Spurious Emission Test Data CH-High



## 802.11g Spurious Emission Test Data CH-Low

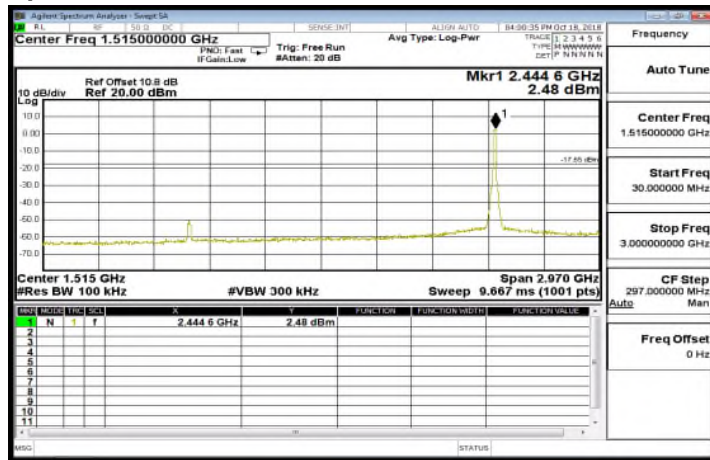


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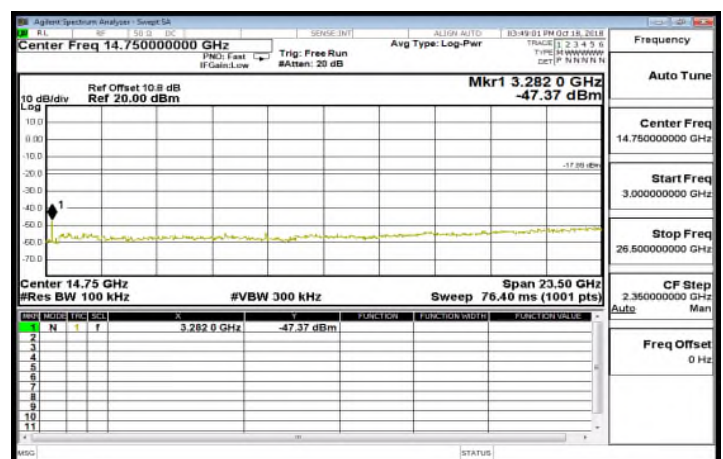
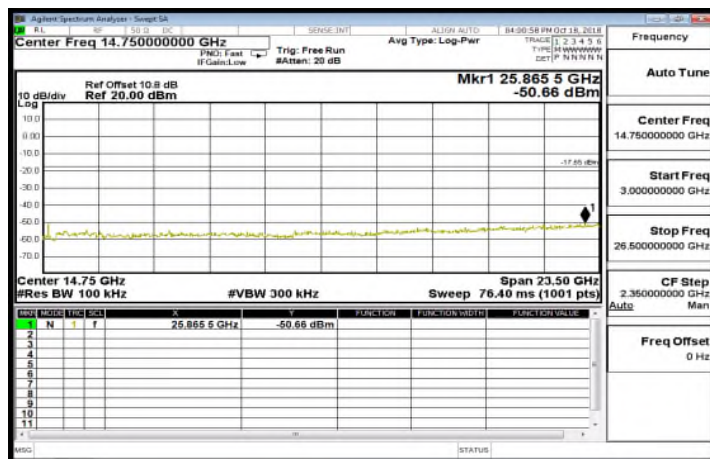
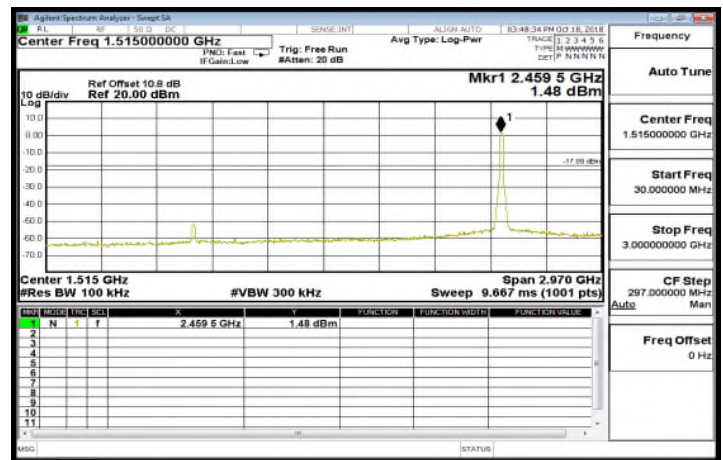
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## Spurious Emission Test Data CH-Mid



## Spurious Emission Test Data CH-High



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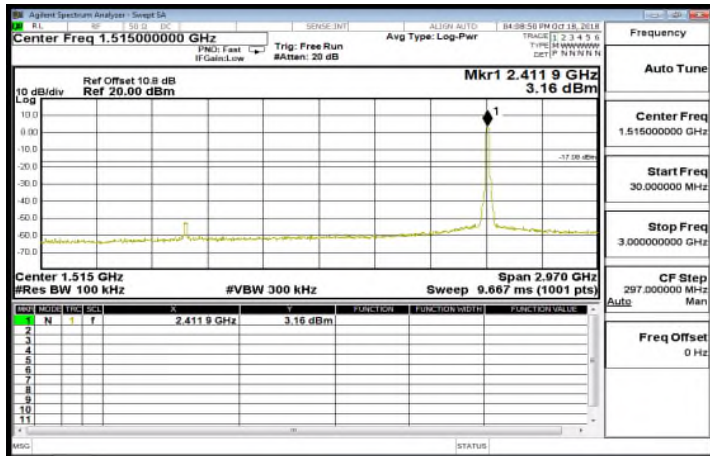
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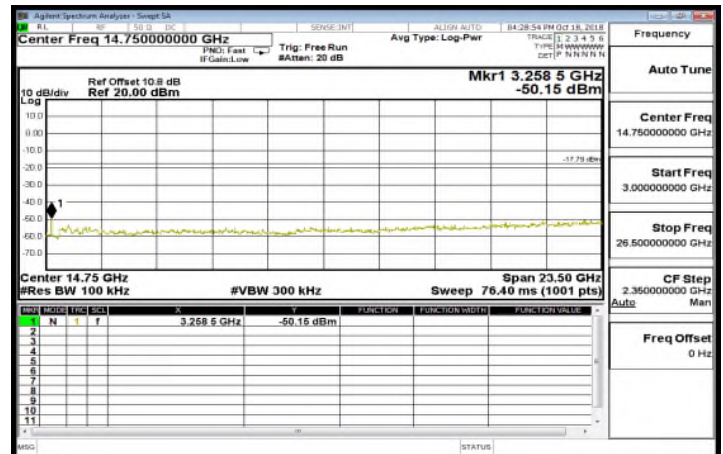
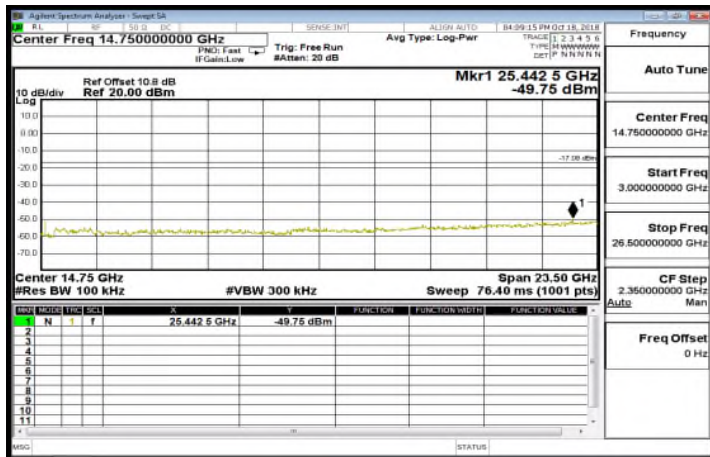
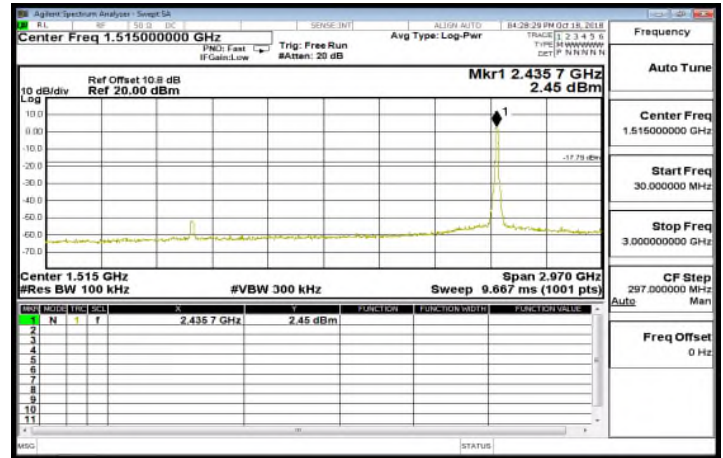
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## 802.11n\_HT20 Spurious Emission Test Data CH-Low



## Spurious Emission Test Data CH-Mid



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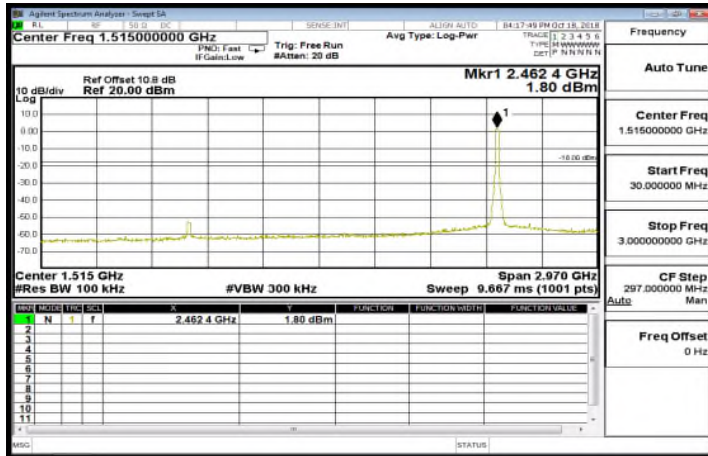
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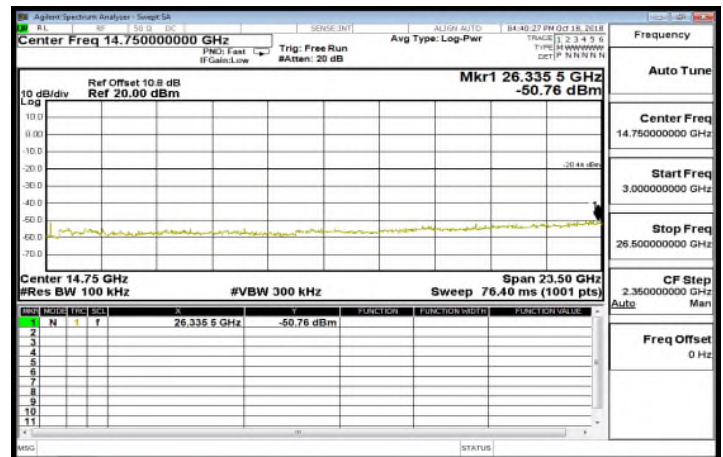
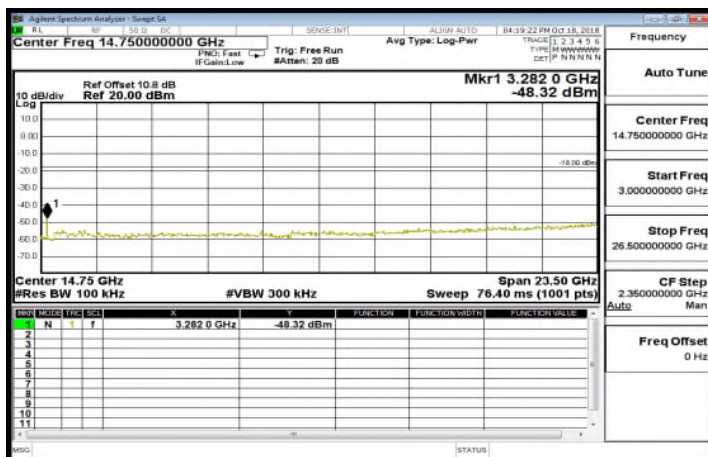
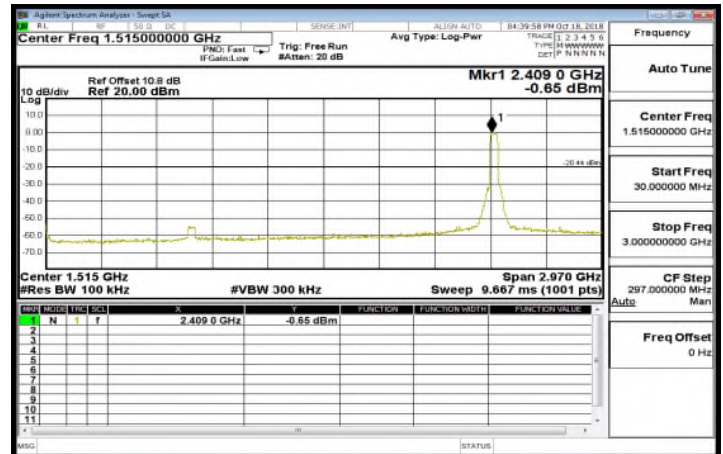


## Spurious Emission Test Data CH-High



## 802.11n\_HT40

## Spurious Emission Test Data CH-Low



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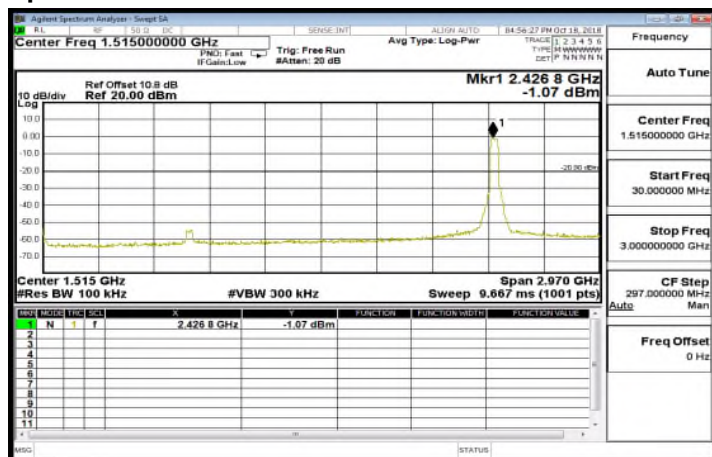
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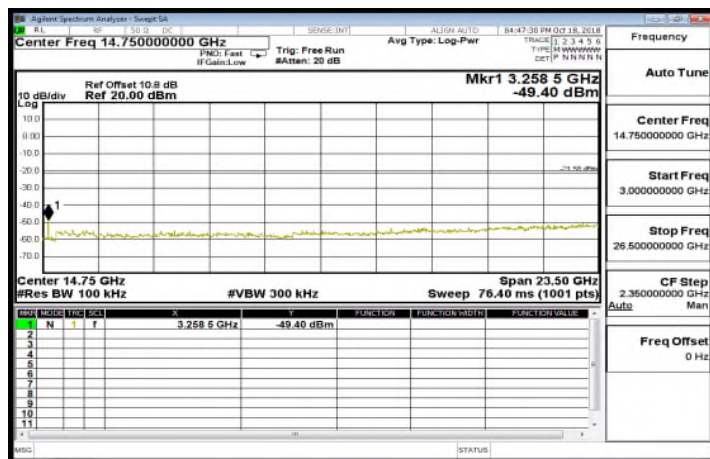
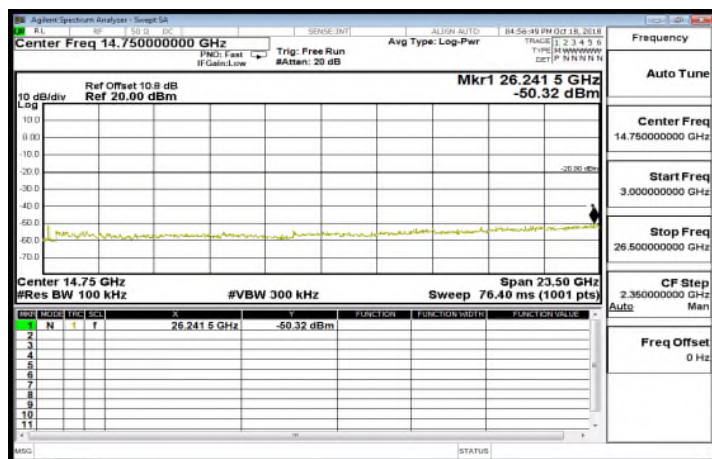
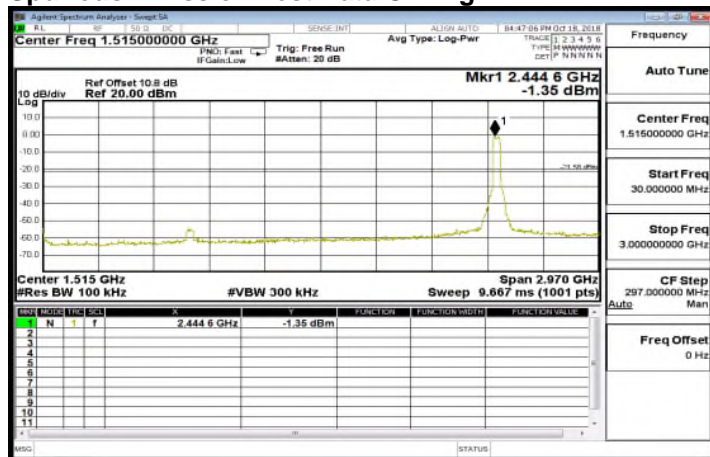
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## Spurious Emission Test Data CH-Mid



## Spurious Emission Test Data CH-High



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## 11 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

### 11.1 Standard Applicable

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

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

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

**Note:**

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

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## 11.2 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	SCHWAZBECK	VULB 9168	9168-617	2017/10/27	2018/10/26
Horn Antenna	Schwarzbeck	BBHA9120D	1341	2018/06/07	2019/06/06
Horn Antenna	SCHWAZBECK	BBHA9170	184	2017/12/12	2018/12/11
Loop Antenna	ETS.LINDGREN	6502	00143304	2018/04/19	2018/04/18
3m Site NSA	SGS	966 chamber D	N/A	2018/07/06	2019/07/05
EMI Test Receiver	R&S	ESU 40	100363	2018/04/11	2019/04/10
Pre-Amplifier	EMC Instruments	EMC184045B	980135	2017/12/26	2018/10/26
Pre-Amplifier	EMC Instruments	EMC9135	980234	2017/12/26	2018/12/25
Pre-Amplifier	EMC Instruments	EMC12630SE	980271	2017/12/26	2018/12/25
Attenuator	Marvelous	WATT-218FS-10	RF246	2017/12/26	2018/12/25
Highpass Filter	Micro Tronics	BRM50701-01	G008	2017/12/26	2018/12/25
Coaxial Cable	Huber Suhner	EMC106-SM-SM-7200	150703	2017/12/26	2018/12/25
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	2017/12/26	2018/12/25
Notebook	Lenovo	L420	S0012467	N/A	N/A

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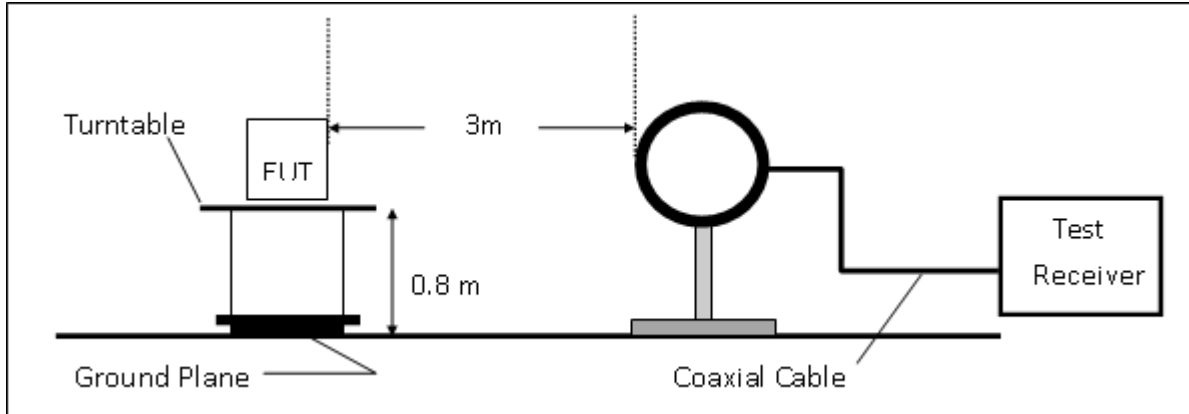
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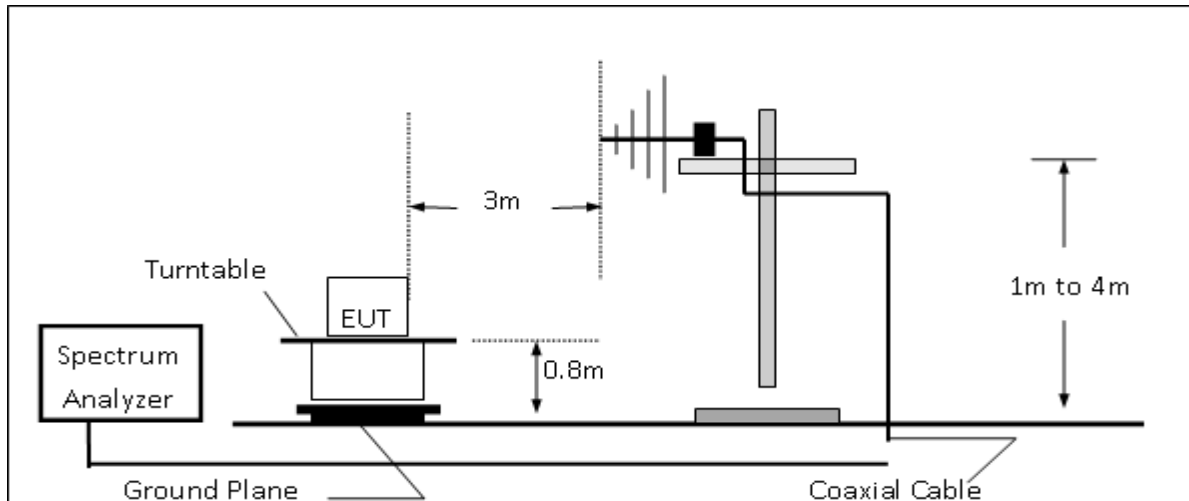
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### 11.3 Test SET-UP

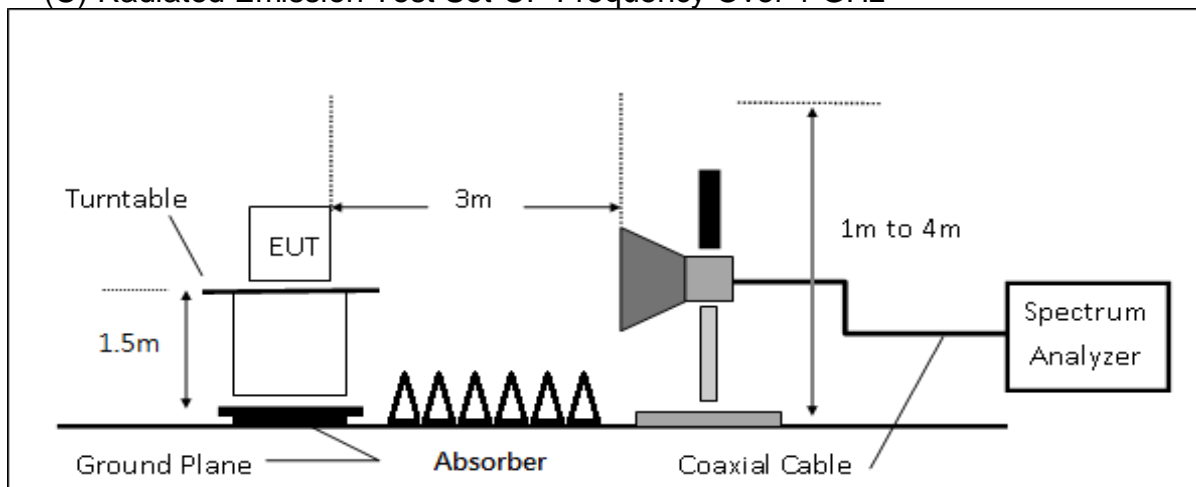
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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## 11.4 Measurement Procedure

1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
2. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plane.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
5. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
6. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
8. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
9. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
10. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
11. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
12. Repeat above procedures until all default test channel measured were complete.

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### 11.5 Field Strength Calculation

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

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

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

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

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

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

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

### 11.7 Measurement Result

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

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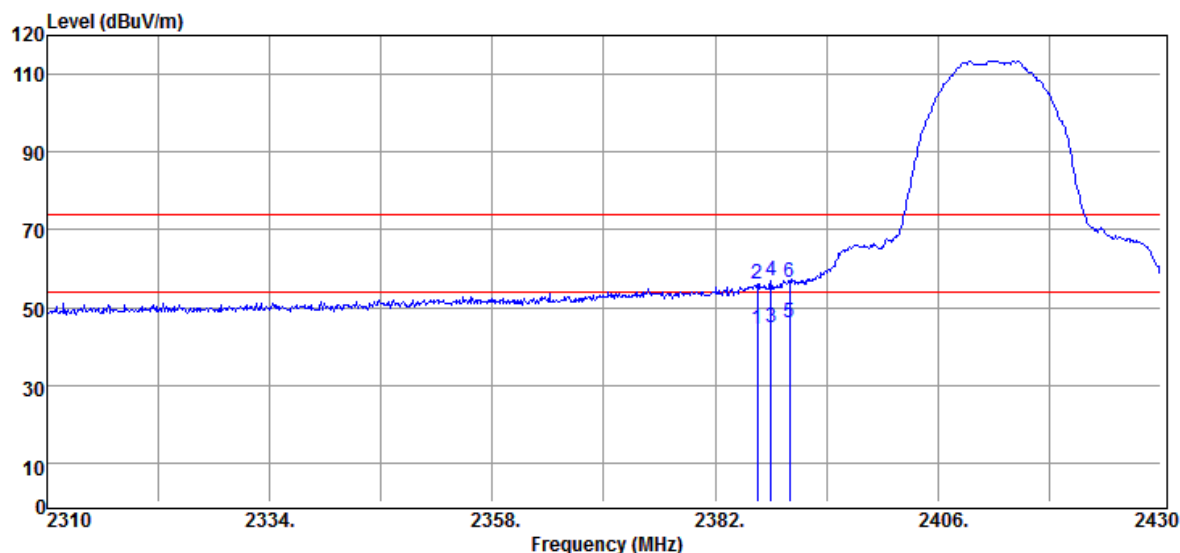
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## Radiated Band Edge Measurement Result

Operation Mode	:802.11b	Test Date	:2018-10-18
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E2 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2386.56	Average	49.83	-5.57	44.26	54.00	-9.74
2386.56	Peak	61.78	-5.57	56.21	74.00	-17.79
2388.00	Average	50.32	-5.58	44.74	54.00	-9.26
2388.00	Peak	62.66	-5.58	57.08	74.00	-16.92
2390.00	Average	51.56	-5.57	45.99	54.00	-8.01
2390.00	Peak	62.03	-5.57	56.46	74.00	-17.54

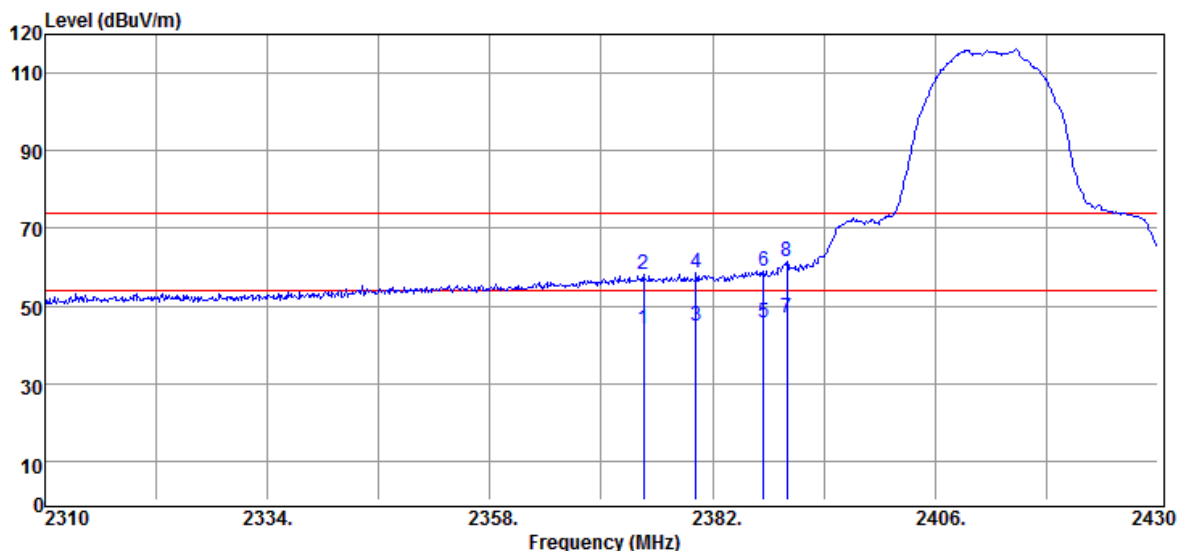
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Operation Mode	:802.11b	Test Date	:2018-10-18
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E2 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2374.56	Average	49.52	-5.57	43.95	54.00	-10.05
2374.56	Peak	63.53	-5.57	57.96	74.00	-16.04
2380.20	Average	50.55	-5.57	44.98	54.00	-9.02
2380.20	Peak	64.18	-5.57	58.61	74.00	-15.39
2387.52	Average	51.28	-5.58	45.70	54.00	-8.30
2387.52	Peak	64.55	-5.58	58.97	74.00	-15.03
2390.00	Average	52.52	-5.57	46.95	54.00	-7.05
2390.00	Peak	67.00	-5.57	61.43	74.00	-12.57

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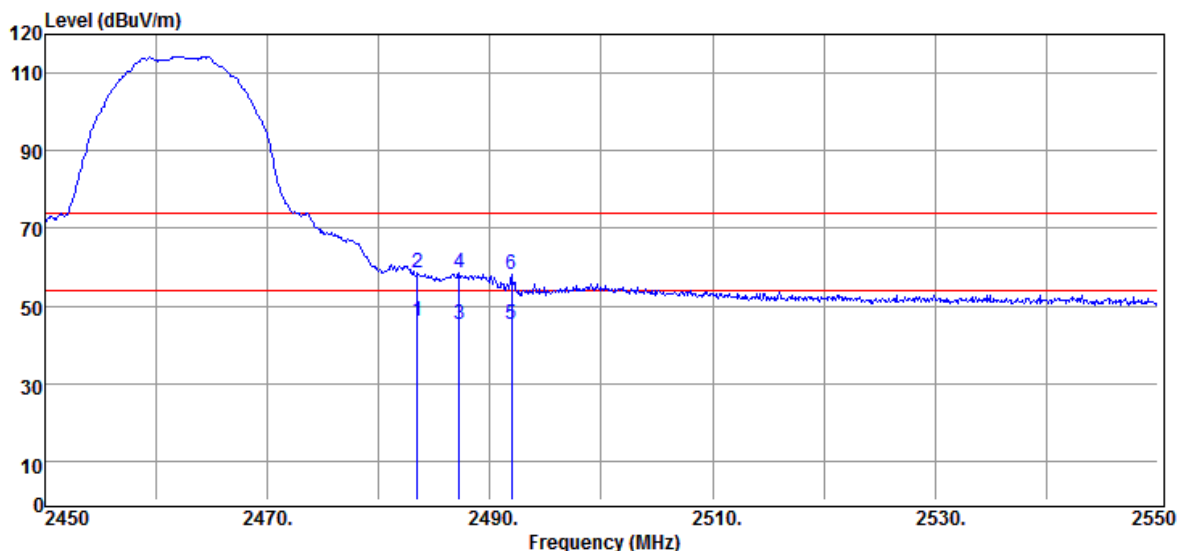
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Operation Mode	:802.11b	Test Date	:2018-10-18
Test Mode	:BE CH High	Temp./Humi.	:25/60
EUT Pol	:E2 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	51.05	-4.90	46.15	54.00	-7.85
2483.50	Peak	63.26	-4.90	58.36	74.00	-15.64
2487.20	Average	50.05	-4.87	45.18	54.00	-8.82
2487.20	Peak	63.47	-4.87	58.60	74.00	-15.40
2491.90	Average	49.99	-4.83	45.16	54.00	-8.84
2491.90	Peak	62.87	-4.83	58.04	74.00	-15.96

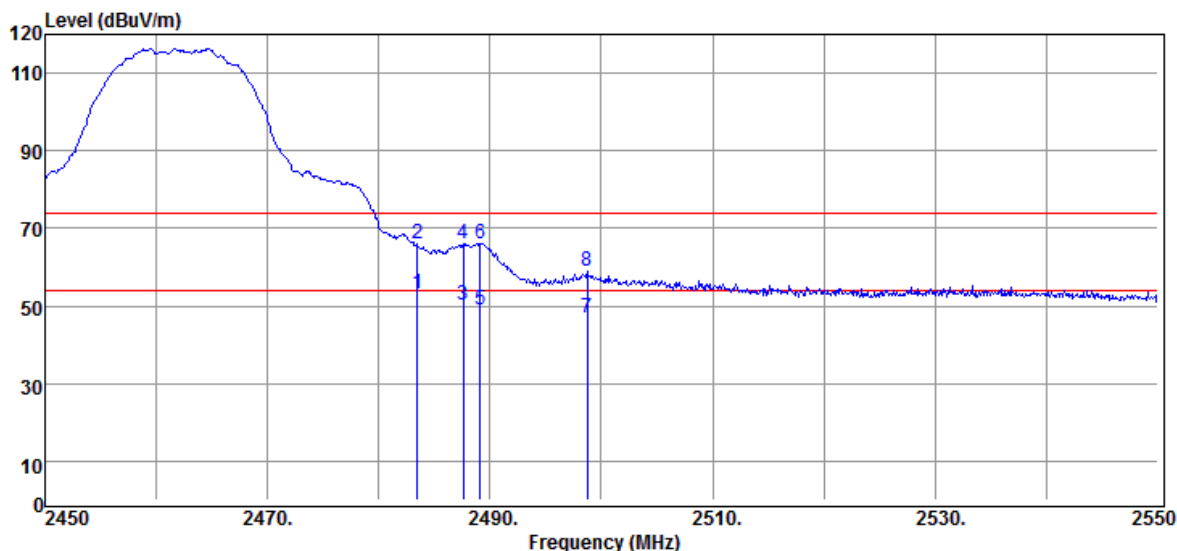
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Operation Mode	:802.11b	Test Date	:2018-10-18
Test Mode	:BE CH High	Temp./Humi.	:25/60
EUT Pol	:E2 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	57.87	-4.90	52.97	54.00	-1.03
2483.50	Peak	70.72	-4.90	65.82	74.00	-8.18
2487.60	Average	55.18	-4.87	50.31	54.00	-3.69
2487.60	Peak	70.92	-4.87	66.05	74.00	-7.95
2489.10	Average	53.86	-4.85	49.01	54.00	-4.99
2489.10	Peak	71.06	-4.85	66.21	74.00	-7.79
2498.70	Average	51.56	-4.78	46.78	54.00	-7.22
2498.70	Peak	63.62	-4.78	58.84	74.00	-15.16

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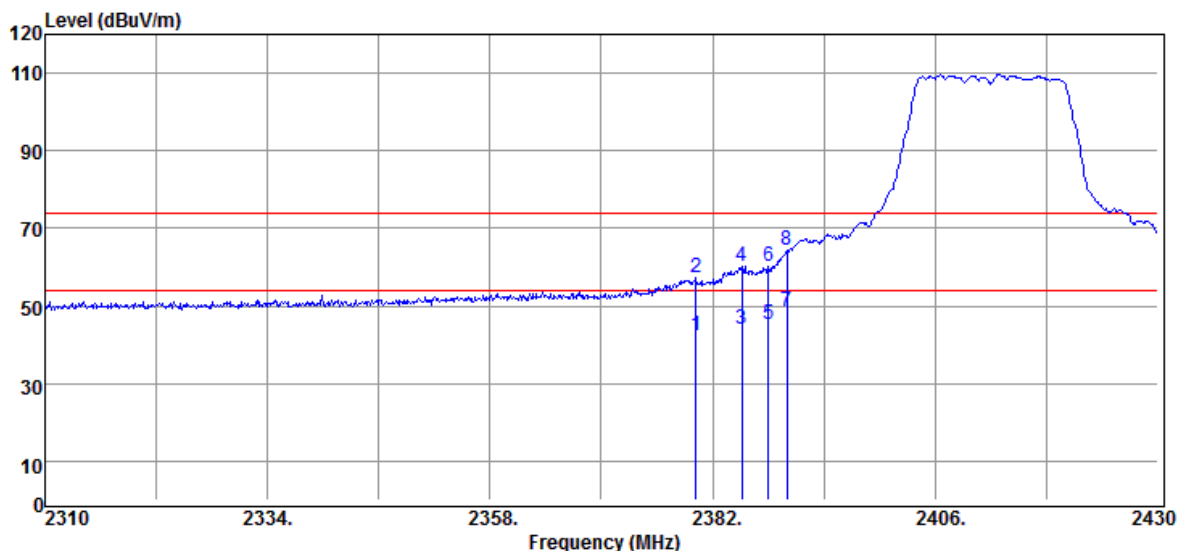
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Operation Mode	:802.11g	Test Date	:2018-10-18
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E2 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2380.20	Average	47.73	-5.57	42.16	54.00	-11.84
2380.20	Peak	62.86	-5.57	57.29	74.00	-16.71
2385.12	Average	49.76	-5.57	44.19	54.00	-9.81
2385.12	Peak	65.75	-5.57	60.18	74.00	-13.82
2388.00	Average	50.99	-5.58	45.41	54.00	-8.59
2388.00	Peak	65.71	-5.58	60.13	74.00	-13.87
2390.00	Average	53.95	-5.57	48.38	54.00	-5.62
2390.00	Peak	69.94	-5.57	64.37	74.00	-9.63

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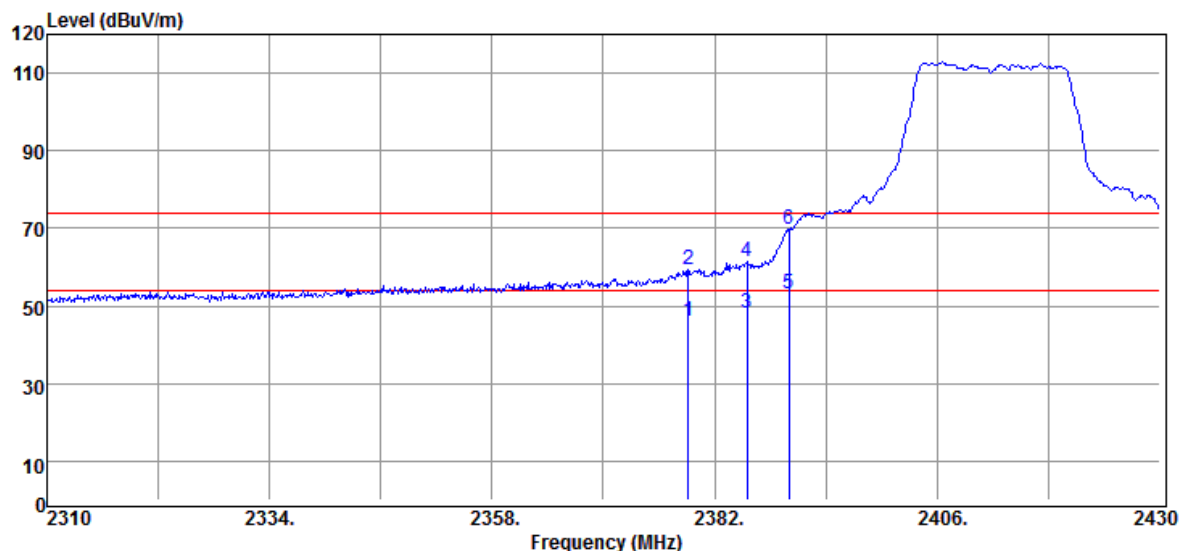
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Operation Mode	:802.11g	Test Date	:2018-10-18
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E2 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2379.12	Average	51.81	-5.56	46.25	54.00	-7.75
2379.12	Peak	65.02	-5.56	59.46	74.00	-14.54
2385.48	Average	53.61	-5.57	48.04	54.00	-5.96
2385.48	Peak	66.92	-5.57	61.35	74.00	-12.65
2390.00	Average	58.61	-5.57	53.04	54.00	-0.96
2390.00	Peak	75.24	-5.57	69.67	74.00	-4.33

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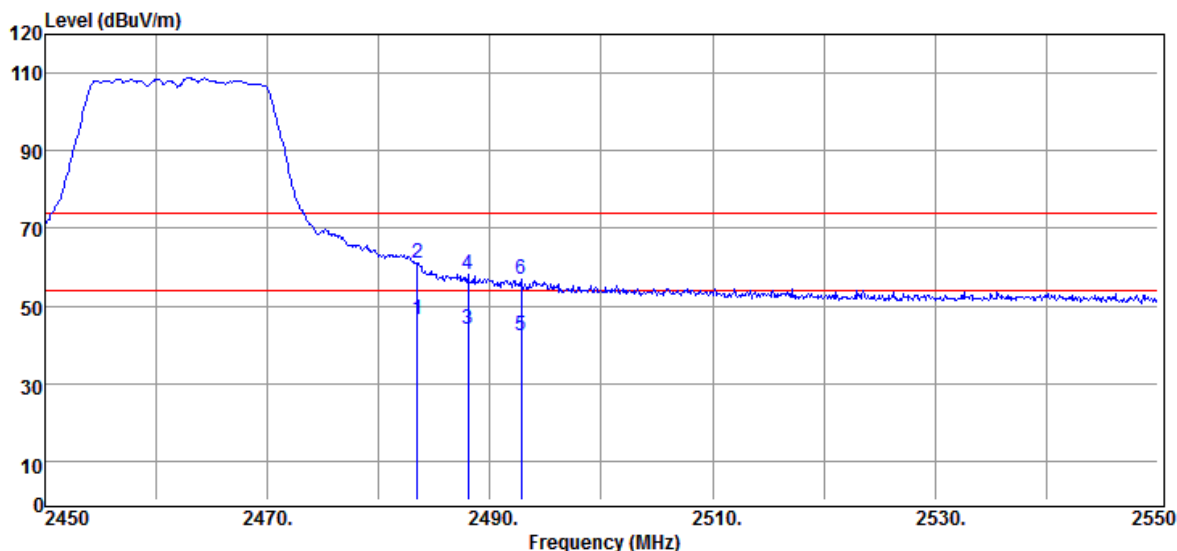
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Operation Mode	:802.11g	Test Date	:2018-10-18
Test Mode	:BE CH High	Temp./Humi.	:25/60
EUT Pol	:E2 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	51.20	-4.90	46.30	54.00	-7.70
2483.50	Peak	65.94	-4.90	61.04	74.00	-12.96
2488.00	Average	48.77	-4.86	43.91	54.00	-10.09
2488.00	Peak	62.96	-4.86	58.10	74.00	-15.90
2492.80	Average	47.35	-4.82	42.53	54.00	-11.47
2492.80	Peak	61.63	-4.82	56.81	74.00	-17.19

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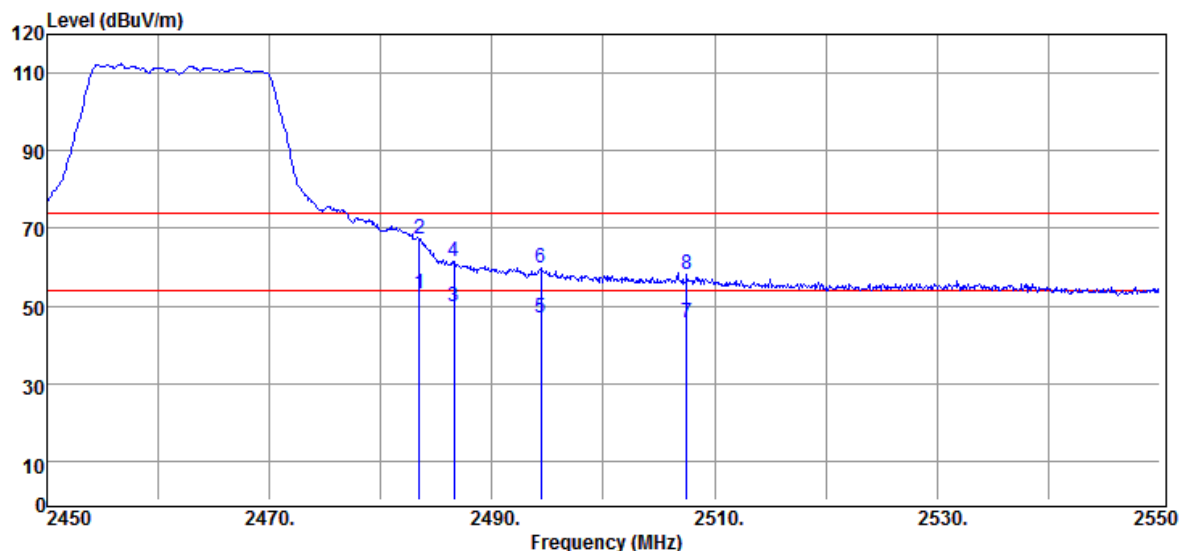
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Operation Mode :802.11g  
Test Mode :BE CH High  
EUT Pol :E2 Plan  
Test Channel :2462 MHz

Test Date :2018-10-18  
Temp./Humi. :25/60  
Antenna Pol. :HORIZONTAL  
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	58.23	-4.90	53.33	54.00	-0.67
2483.50	Peak	72.14	-4.90	67.24	74.00	-6.76
2486.60	Average	54.53	-4.87	49.66	54.00	-4.34
2486.60	Peak	66.50	-4.87	61.63	74.00	-12.37
2494.40	Average	51.70	-4.82	46.88	54.00	-7.12
2494.40	Peak	64.67	-4.82	59.85	74.00	-14.15
2507.50	Average	50.60	-4.77	45.83	54.00	-8.17
2507.50	Peak	63.09	-4.77	58.32	74.00	-15.68

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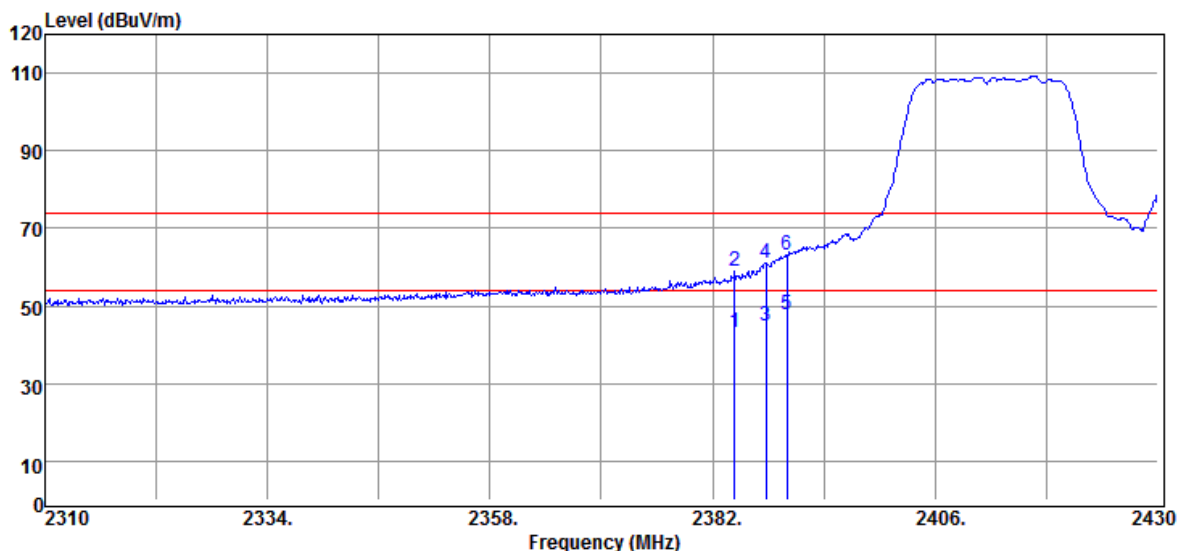
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Operation Mode	:802.11n20	Test Date	:2018-10-18
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E2 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2384.40	Average	48.57	-5.57	43.00	54.00	-11.00
2384.40	Peak	64.36	-5.57	58.79	74.00	-15.21
2387.76	Average	50.52	-5.58	44.94	54.00	-9.06
2387.76	Peak	66.53	-5.58	60.95	74.00	-13.05
2390.00	Average	53.12	-5.57	47.55	54.00	-6.45
2390.00	Peak	68.71	-5.57	63.14	74.00	-10.86

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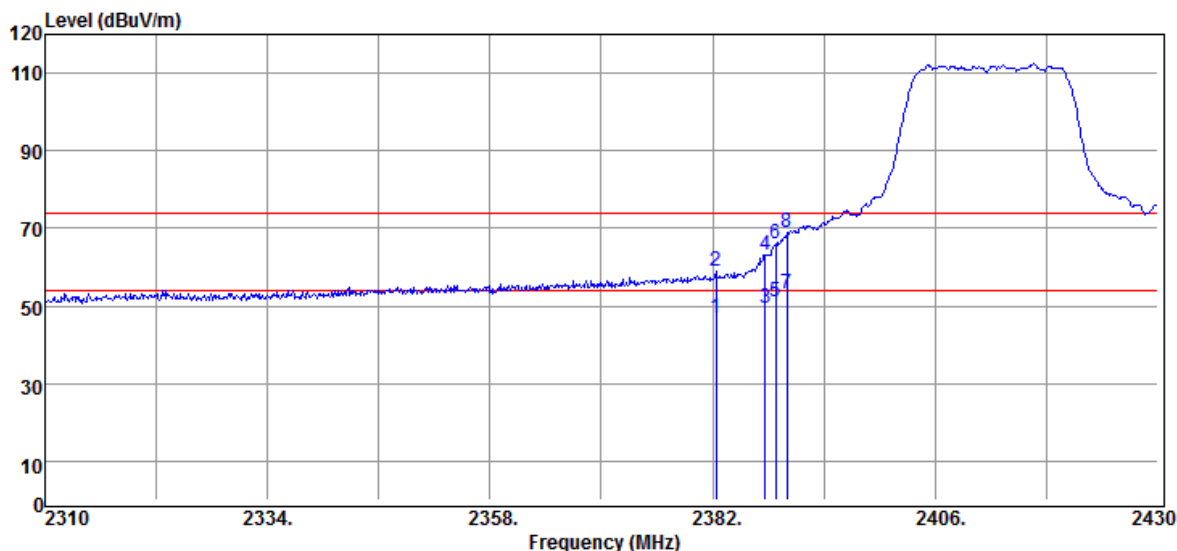
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Operation Mode	:802.11n20	Test Date	:2018-10-18
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E2 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2382.36	Average	52.63	-5.57	47.06	54.00	-6.94
2382.36	Peak	64.53	-5.57	58.96	74.00	-15.04
2387.64	Average	54.80	-5.58	49.22	54.00	-4.78
2387.64	Peak	68.80	-5.58	63.22	74.00	-10.78
2388.84	Average	56.78	-5.57	51.21	54.00	-2.79
2388.84	Peak	71.56	-5.57	65.99	74.00	-8.01
2390.00	Average	58.58	-5.57	53.01	54.00	-0.99
2390.00	Peak	74.39	-5.57	68.82	74.00	-5.18

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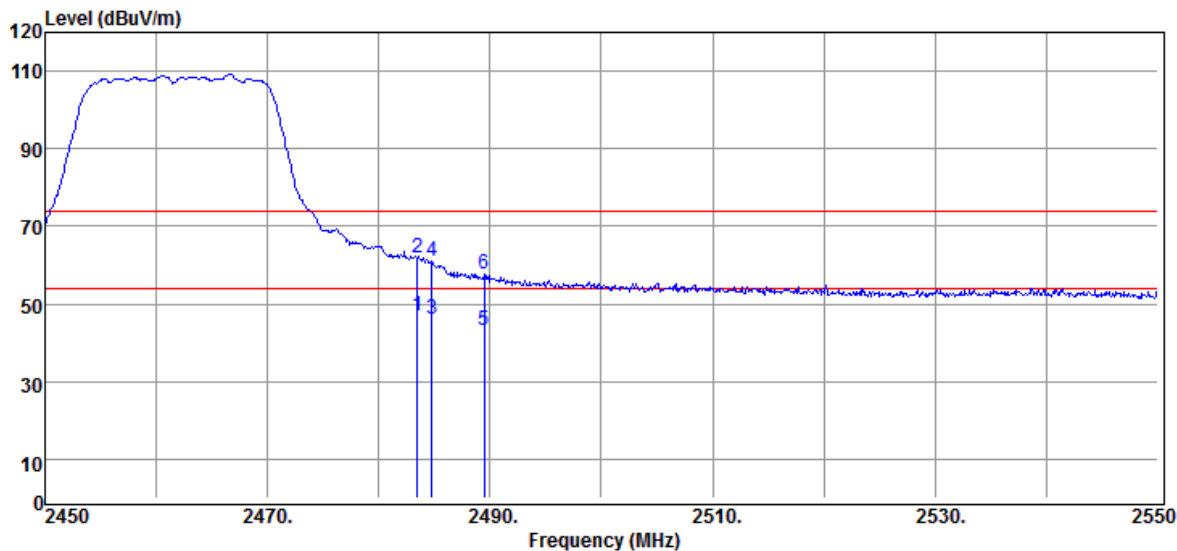
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Operation Mode	:802.11n20	Test Date	:2018-10-18
Test Mode	:BE CH High	Temp./Humi.	:25/60
EUT Pol	:E2 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	51.64	-4.90	46.74	54.00	-7.26
2483.50	Peak	66.79	-4.90	61.89	74.00	-12.11
2484.80	Average	50.84	-4.90	45.94	54.00	-8.06
2484.80	Peak	65.93	-4.90	61.03	74.00	-12.97
2489.50	Average	47.93	-4.85	43.08	54.00	-10.92
2489.50	Peak	62.38	-4.85	57.53	74.00	-16.47

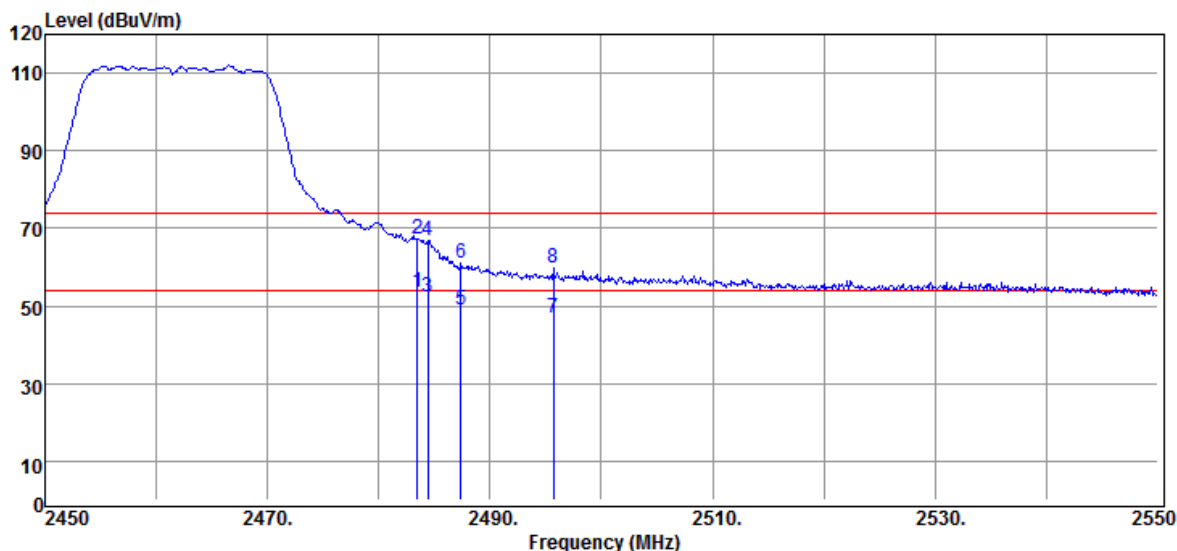
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Operation Mode	:802.11n20	Test Date	:2018-10-18
Test Mode	:BE CH High	Temp./Humi.	:25/60
EUT Pol	:E2 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	58.34	-4.90	53.44	54.00	-0.56
2483.50	Peak	72.14	-4.90	67.24	74.00	-6.76
2484.40	Average	57.30	-4.90	52.40	54.00	-1.60
2484.40	Peak	71.79	-4.90	66.89	74.00	-7.11
2487.40	Average	53.81	-4.87	48.94	54.00	-5.06
2487.40	Peak	65.91	-4.87	61.04	74.00	-12.96
2495.70	Average	51.52	-4.80	46.72	54.00	-7.28
2495.70	Peak	64.58	-4.80	59.78	74.00	-14.22

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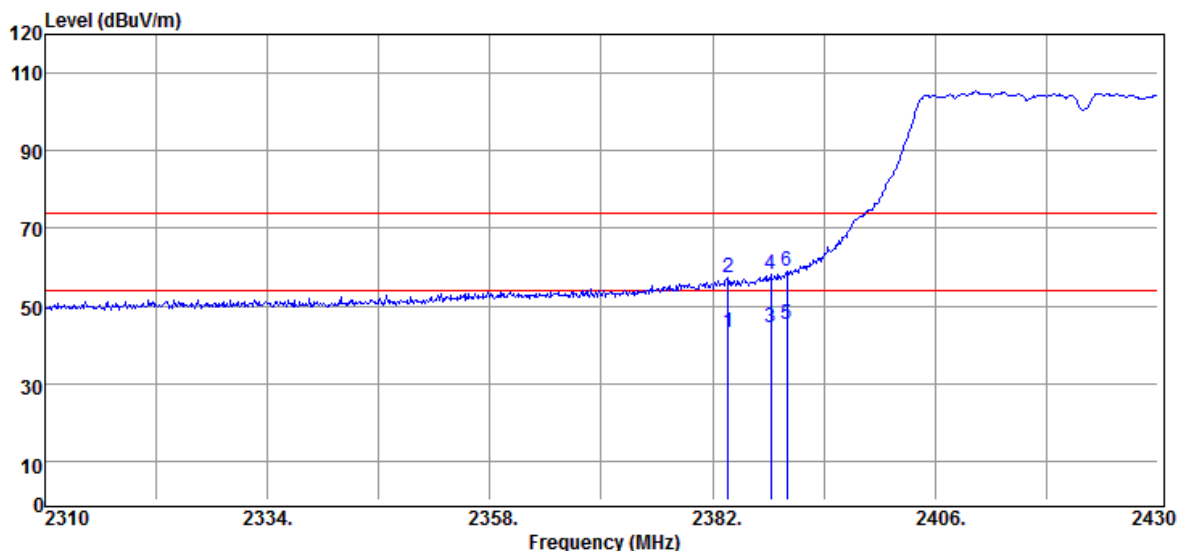
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Operation Mode	:802.11n40	Test Date	:2018-10-18
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E2 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2422 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2383.68	Average	48.70	-5.57	43.13	54.00	-10.87
2383.68	Peak	62.84	-5.57	57.27	74.00	-16.73
2388.24	Average	49.84	-5.58	44.26	54.00	-9.74
2388.24	Peak	63.82	-5.58	58.24	74.00	-15.76
2390.00	Average	50.68	-5.57	45.11	54.00	-8.89
2390.00	Peak	64.49	-5.57	58.92	74.00	-15.08

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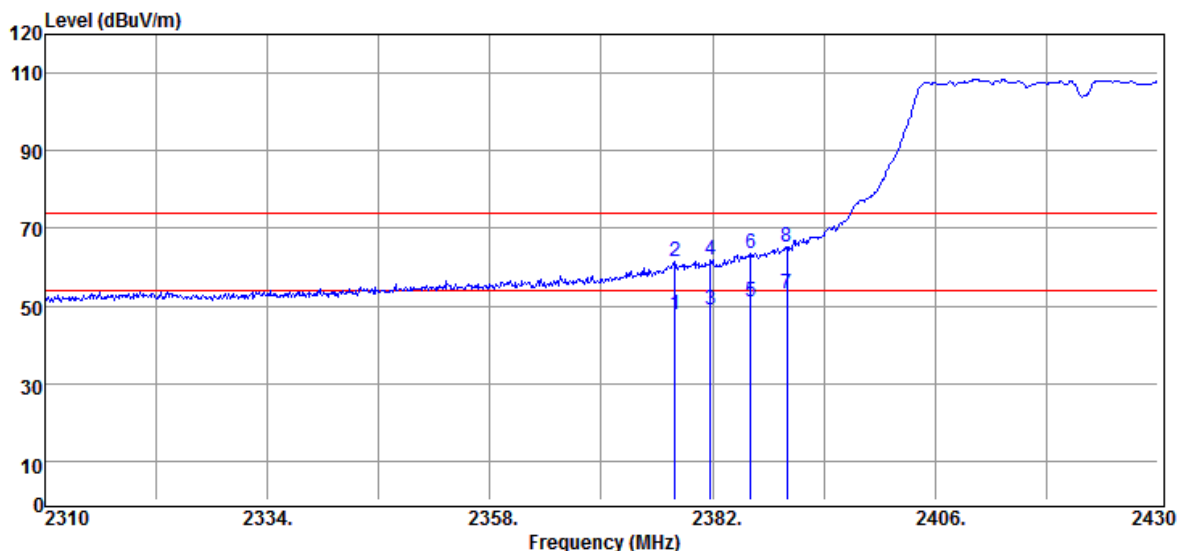
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Operation Mode	:802.11n40	Test Date	:2018-10-18
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E2 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2422 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2377.92	Average	53.53	-5.58	47.95	54.00	-6.05
2377.92	Peak	66.85	-5.58	61.27	74.00	-12.73
2381.76	Average	54.75	-5.56	49.19	54.00	-4.81
2381.76	Peak	67.44	-5.56	61.88	74.00	-12.12
2386.08	Average	56.65	-5.57	51.08	54.00	-2.92
2386.08	Peak	68.96	-5.57	63.39	74.00	-10.61
2390.00	Average	58.80	-5.57	53.23	54.00	-0.77
2390.00	Peak	70.90	-5.57	65.33	74.00	-8.67

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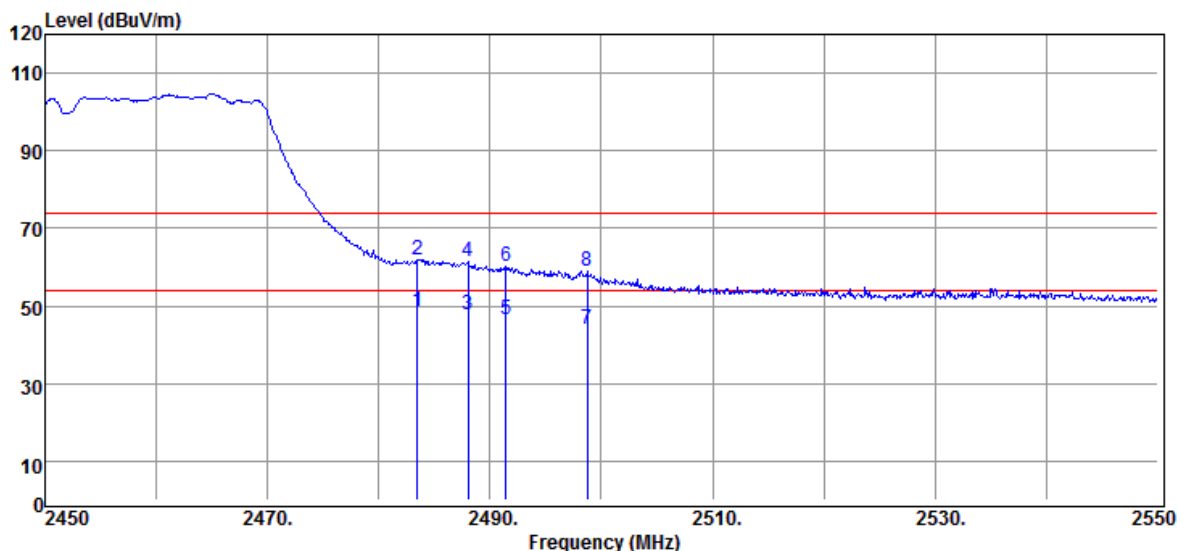
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Operation Mode	:802.11n40	Test Date	:2018-10-18
Test Mode	:BE CH High	Temp./Humi.	:25/60
EUT Pol	:E2 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2452 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	53.63	-4.90	48.73	54.00	-5.27
2483.50	Peak	66.77	-4.90	61.87	74.00	-12.13
2488.00	Average	52.50	-4.86	47.64	54.00	-6.36
2488.00	Peak	66.12	-4.86	61.26	74.00	-12.74
2491.40	Average	51.27	-4.84	46.43	54.00	-7.57
2491.40	Peak	65.02	-4.84	60.18	74.00	-13.82
2498.70	Average	48.74	-4.78	43.96	54.00	-10.04
2498.70	Peak	63.79	-4.78	59.01	74.00	-14.99

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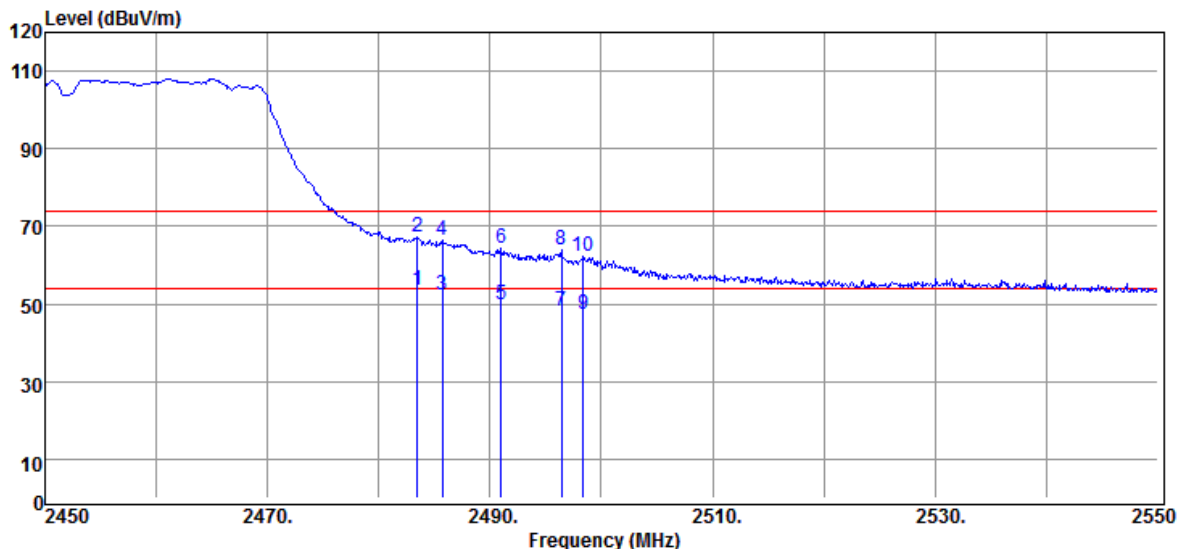
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Operation Mode :802.11n40  
Test Mode :BE CH High  
EUT Pol :E2 Plan  
Test Channel :2452 MHz

Test Date :2018-10-18  
Temp./Humi. :25/60  
Antenna Pol. :HORIZONTAL  
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	58.38	-4.90	53.48	54.00	-0.52
2483.50	Peak	72.23	-4.90	67.33	74.00	-6.67
2485.70	Average	57.33	-4.88	52.45	54.00	-1.55
2485.70	Peak	71.44	-4.88	66.56	74.00	-7.44
2491.00	Average	54.85	-4.84	50.01	54.00	-3.99
2491.00	Peak	69.23	-4.84	64.39	74.00	-9.61
2496.40	Average	52.78	-4.80	47.98	54.00	-6.02
2496.40	Peak	68.79	-4.80	63.99	74.00	-10.01
2498.40	Average	52.23	-4.78	47.45	54.00	-6.55
2498.40	Peak	67.23	-4.78	62.45	74.00	-11.55

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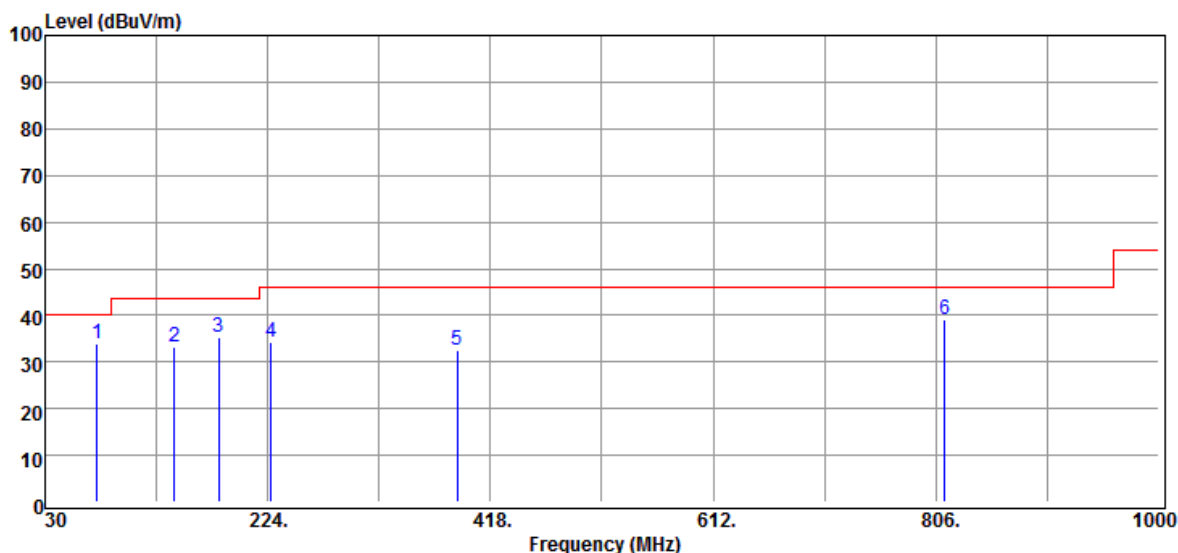
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## Below 1GHz Worst-Case Data:

### Radiated Spurious Emission Measurement Result

Operation Mode	:802.11g	Test Date	:2018-10-17
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
75.59	Peak	54.46	-20.63	33.83	40.00	-6.17
142.52	Peak	49.67	-16.41	33.26	43.50	-10.24
181.32	Peak	52.71	-17.50	35.21	43.50	-8.29
226.91	Peak	52.50	-18.20	34.30	46.00	-11.70
388.90	Peak	45.66	-13.07	32.59	46.00	-13.41
813.76	Peak	45.23	-5.99	39.24	46.00	-6.76

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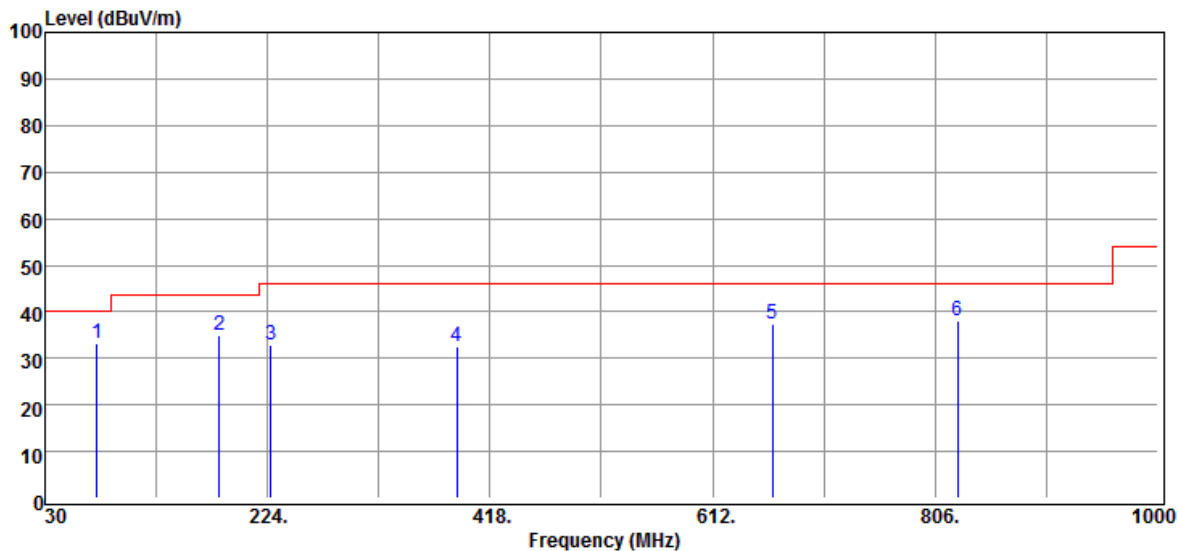
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Operation Mode :802.11g  
Test Mode :Tx CH Low  
EUT Pol :H Plan  
Test Channel :2412 MHz

Test Date :2018-10-17  
Temp./Humi. :25/60  
Antenna Pol. :HORIZONTAL  
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
75.59	Peak	57.56	-24.37	33.19	40.00	-6.81
182.29	Peak	54.10	-19.11	34.99	43.50	-8.51
226.91	Peak	56.33	-23.60	32.73	46.00	-13.27
388.90	Peak	45.53	-13.07	32.46	46.00	-13.54
664.38	Peak	46.10	-8.78	37.32	46.00	-8.68
825.40	Peak	44.44	-6.24	38.20	46.00	-7.80

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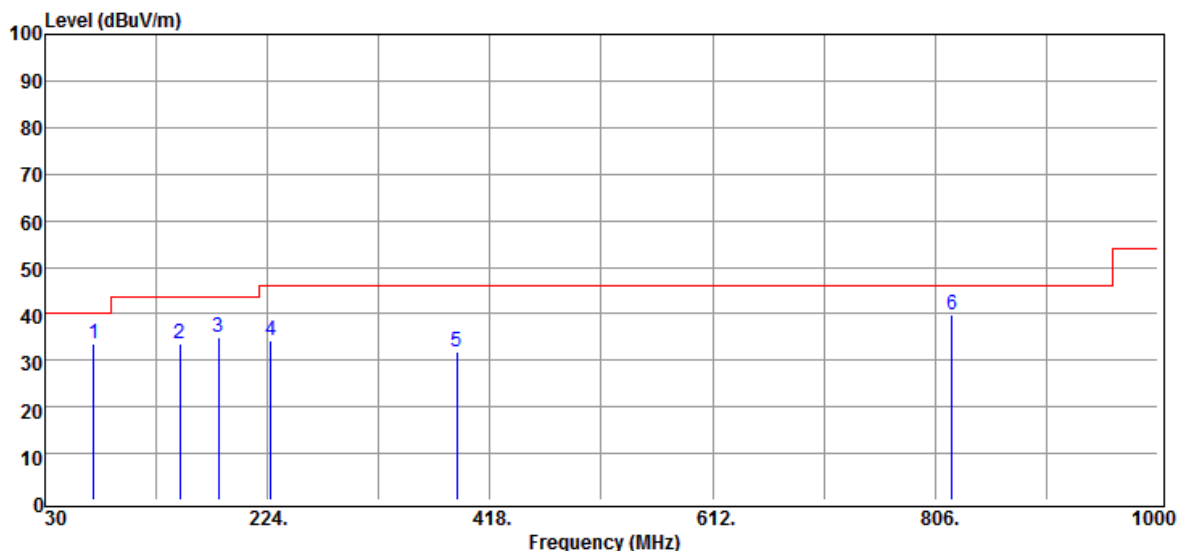
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Operation Mode	:802.11g	Test Date	:2018-10-17
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
72.68	Peak	53.58	-20.03	33.55	40.00	-6.45
147.37	Peak	49.87	-16.24	33.63	43.50	-9.87
181.32	Peak	52.29	-17.50	34.79	43.50	-8.71
226.91	Peak	52.54	-18.20	34.34	46.00	-11.66
388.90	Peak	44.95	-13.07	31.88	46.00	-14.12
820.55	Peak	45.82	-6.06	39.76	46.00	-6.24

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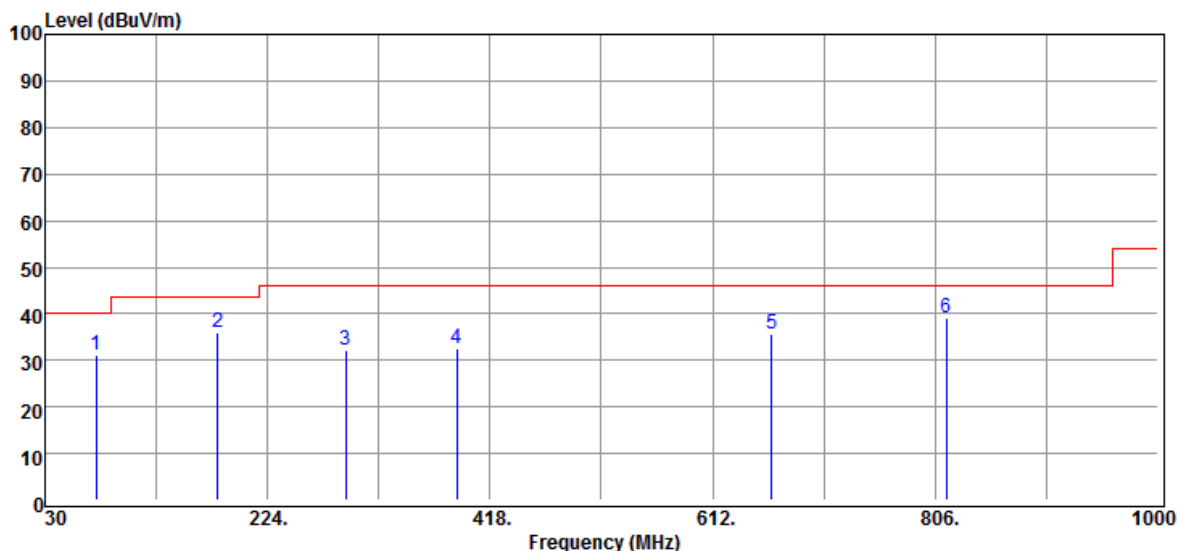
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Operation Mode	:802.11g	Test Date	:2018-10-17
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
74.62	Peak	54.77	-23.52	31.25	40.00	-8.75
180.35	Peak	53.80	-17.65	36.15	43.50	-7.35
291.90	Peak	48.61	-16.49	32.12	46.00	-13.88
388.90	Peak	45.60	-13.07	32.53	46.00	-13.47
663.41	Peak	44.55	-8.80	35.75	46.00	-10.25
815.70	Peak	45.25	-6.00	39.25	46.00	-6.75

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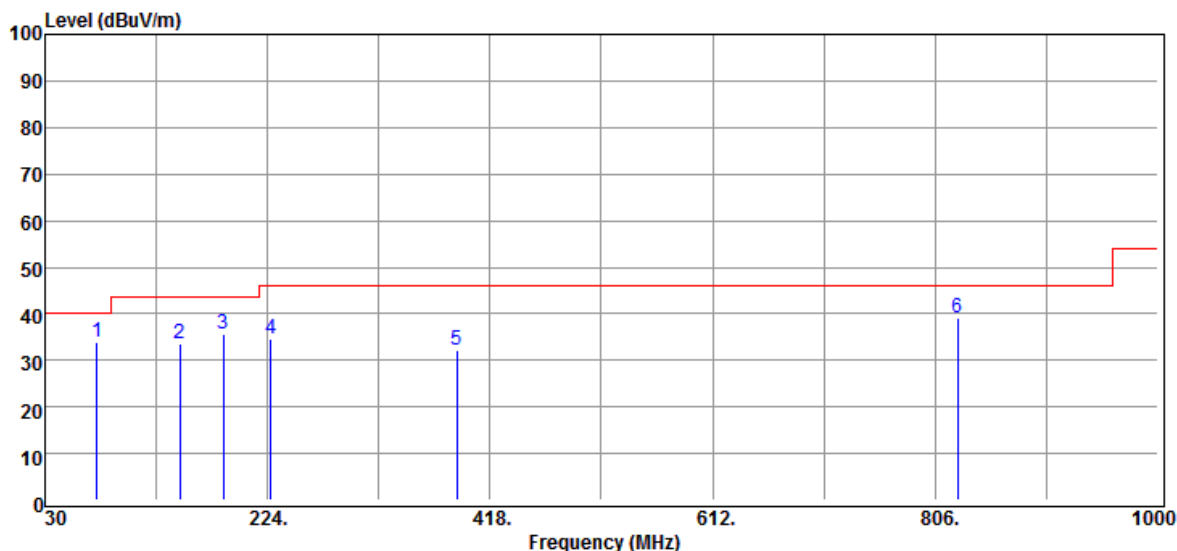
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Operation Mode	:802.11g	Test Date	:2018-10-17
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
75.59	Peak	54.53	-20.63	33.90	40.00	-6.10
147.37	Peak	49.66	-16.24	33.42	43.50	-10.08
185.20	Peak	53.63	-17.87	35.76	43.50	-7.74
226.91	Peak	52.82	-18.20	34.62	46.00	-11.38
388.90	Peak	45.29	-13.07	32.22	46.00	-13.78
825.40	Peak	45.36	-6.24	39.12	46.00	-6.88

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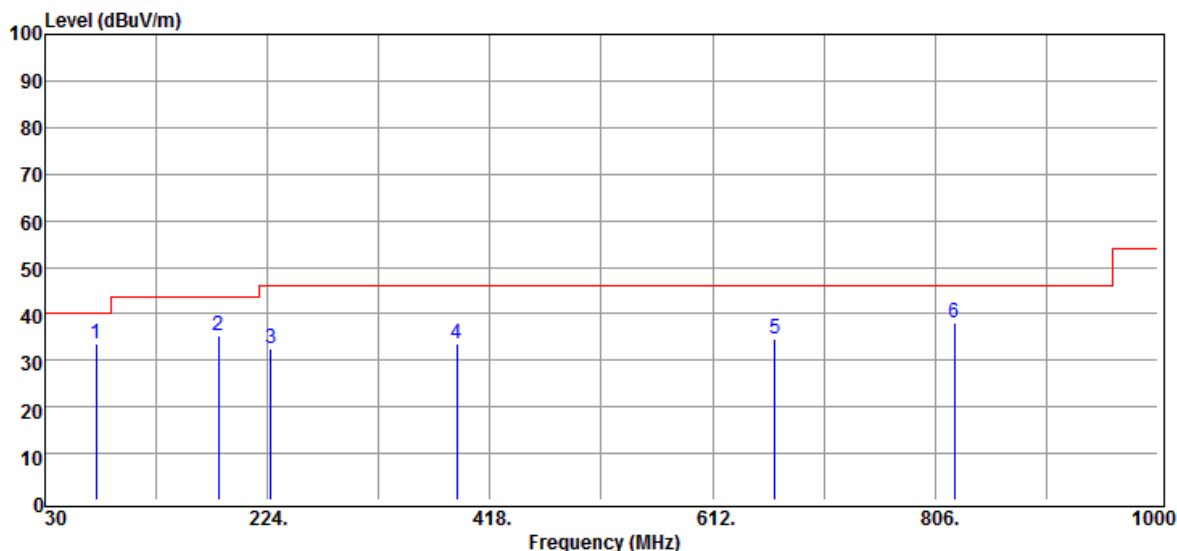
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Operation Mode	:802.11g	Test Date	:2018-10-17
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
74.62	Peak	56.98	-23.52	33.46	40.00	-6.54
181.32	Peak	53.69	-18.37	35.32	43.50	-8.18
226.91	Peak	56.28	-23.60	32.68	46.00	-13.32
388.90	Peak	46.54	-13.07	33.47	46.00	-12.53
666.32	Peak	43.47	-8.72	34.75	46.00	-11.25
822.49	Peak	44.18	-6.13	38.05	46.00	-7.95

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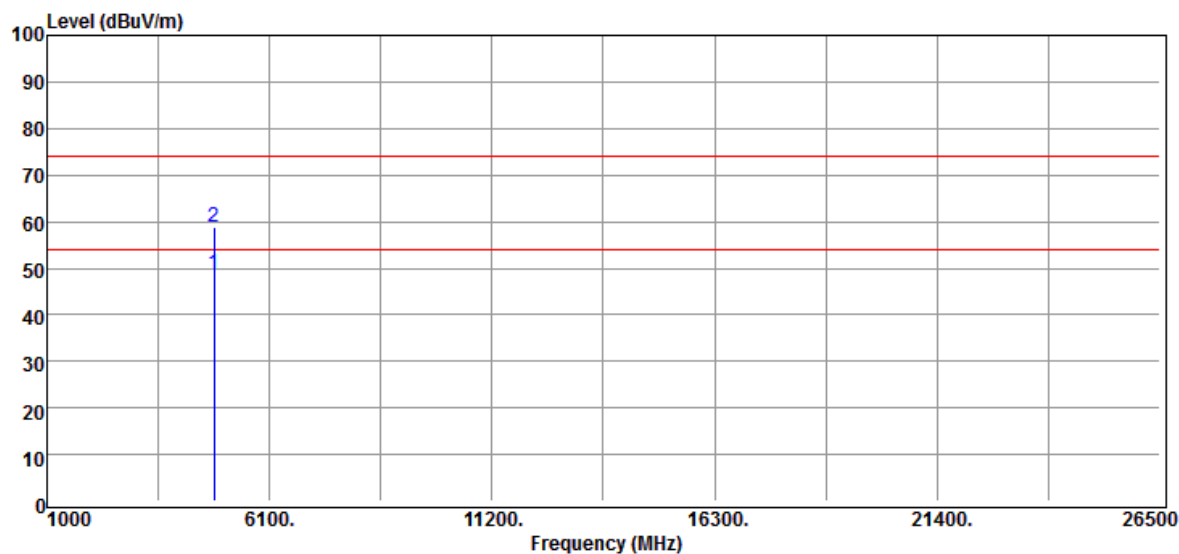
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## Above 1GHz Data: Radiated Spurious Emission Measurement Result

Operation Mode	:802.11b	Test Date	:2018-10-17
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4824.00	Average	48.41	0.38	48.79	54.00	-5.21
4824.00	Peak	58.40	0.38	58.78	74.00	-15.22

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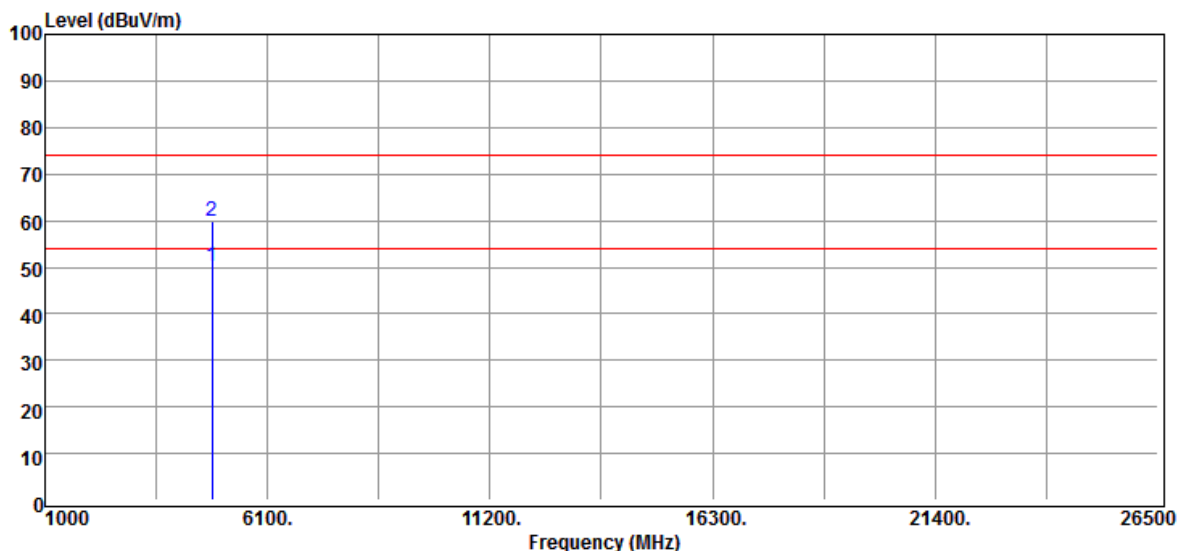
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Operation Mode	:802.11b	Test Date	:2018-10-17
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4824.00	Average	49.87	0.38	50.25	54.00	-3.75
4824.00	Peak	59.33	0.38	59.71	74.00	-14.29

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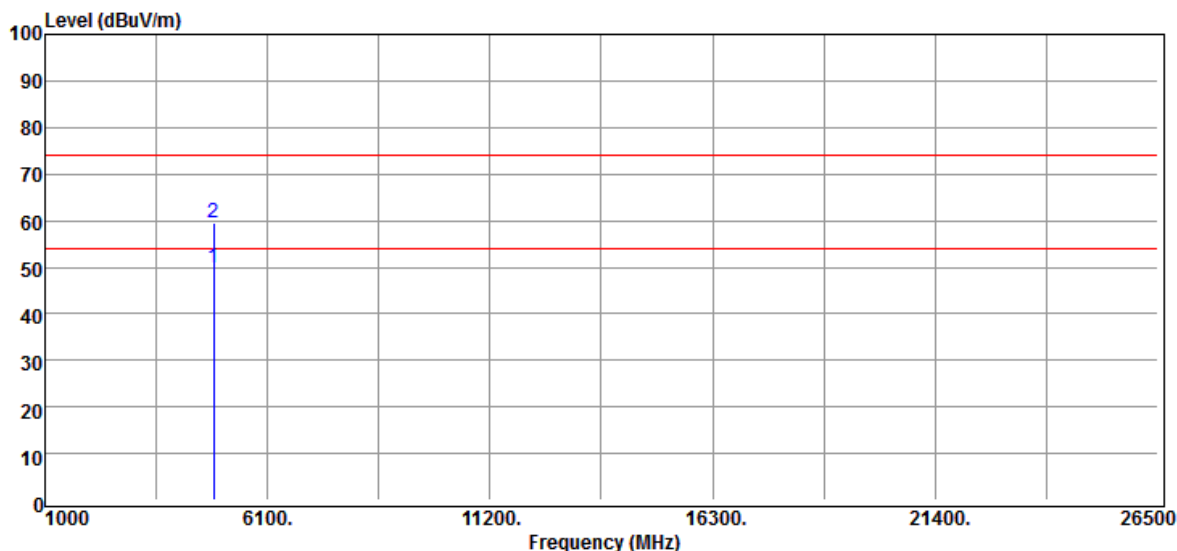
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Operation Mode	:802.11b	Test Date	:2018-10-17
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4874.00	Average	49.28	0.66	49.94	54.00	-4.06
4874.00	Peak	58.79	0.66	59.45	74.00	-14.55

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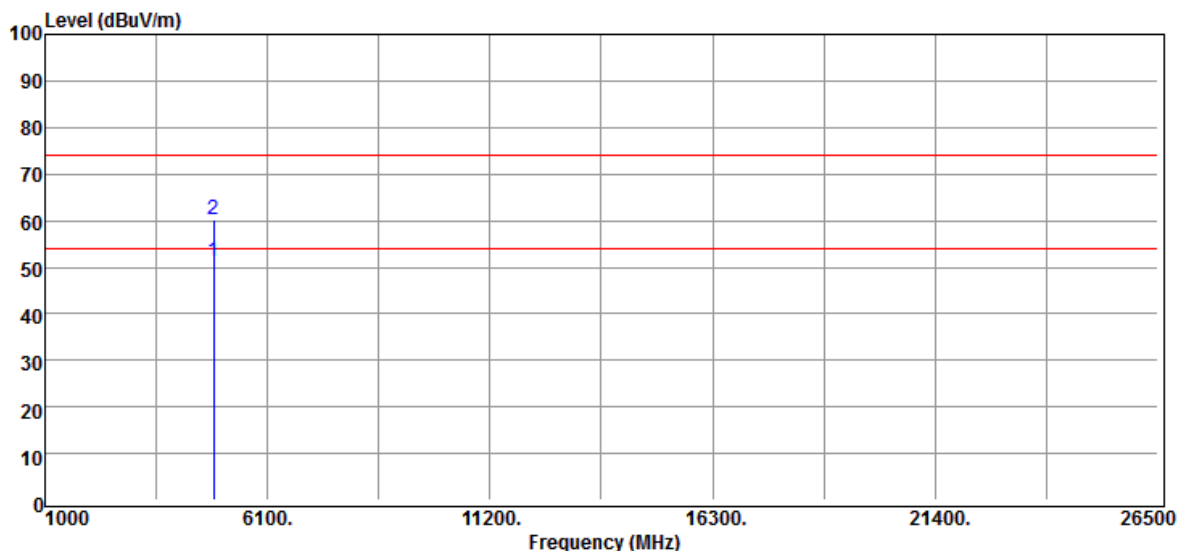
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Operation Mode :802.11b  
Test Mode :Tx CH Mid  
EUT Pol :H Plan  
Test Channel :2437 MHz

Test Date :2018-10-17  
Temp./Humi. :25/60  
Antenna Pol. :HORIZONTAL  
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4874.00	Average	50.40	0.66	51.06	54.00	-2.94
4874.00	Peak	59.56	0.66	60.22	74.00	-13.78

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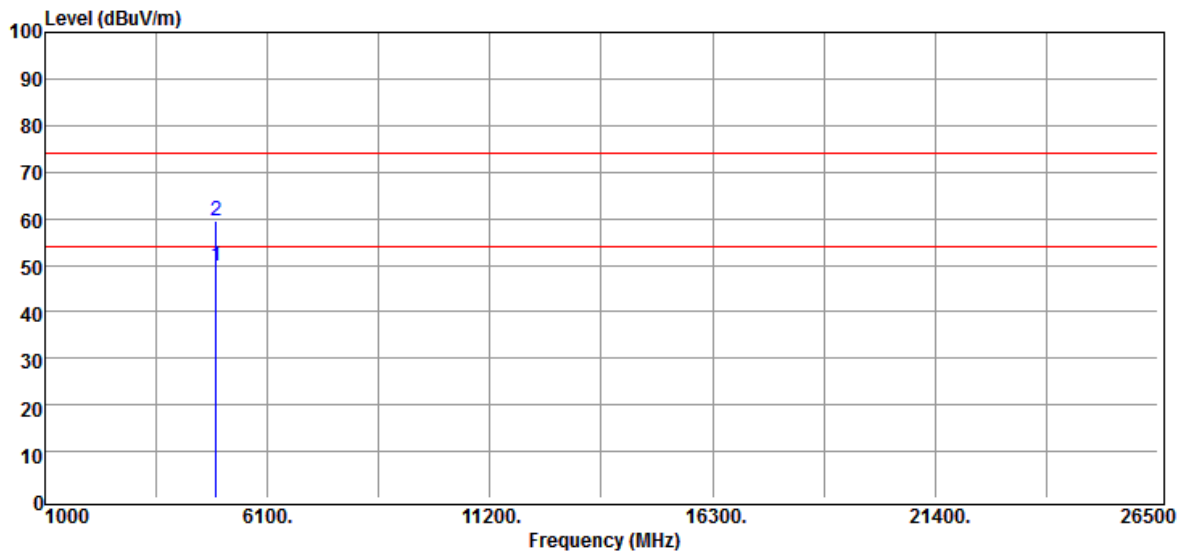
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Operation Mode	:802.11b	Test Date	:2018-10-17
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4924.00	Average	49.02	0.97	49.99	54.00	-4.01
4924.00	Peak	58.67	0.97	59.64	74.00	-14.36

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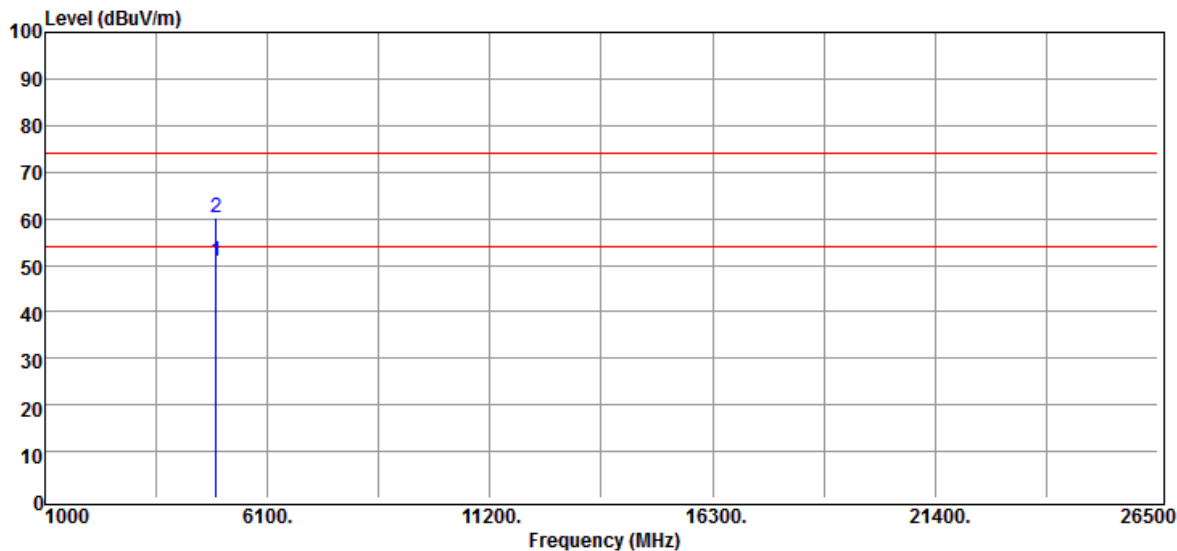
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Operation Mode	:802.11b	Test Date	:2018-10-17
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4924.00	Average	49.98	0.97	50.95	54.00	-3.05
4924.00	Peak	59.19	0.97	60.16	74.00	-13.84

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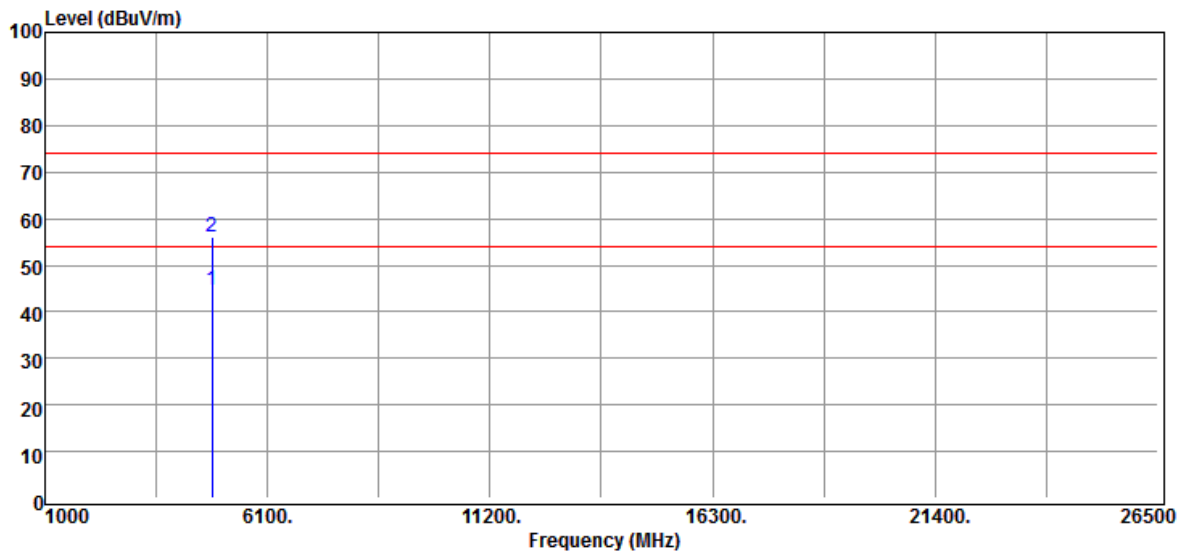
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Operation Mode	:802.11g	Test Date	:2018-10-17
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4824.00	Average	44.11	0.38	44.49	54.00	-9.51
4824.00	Peak	55.79	0.38	56.17	74.00	-17.83

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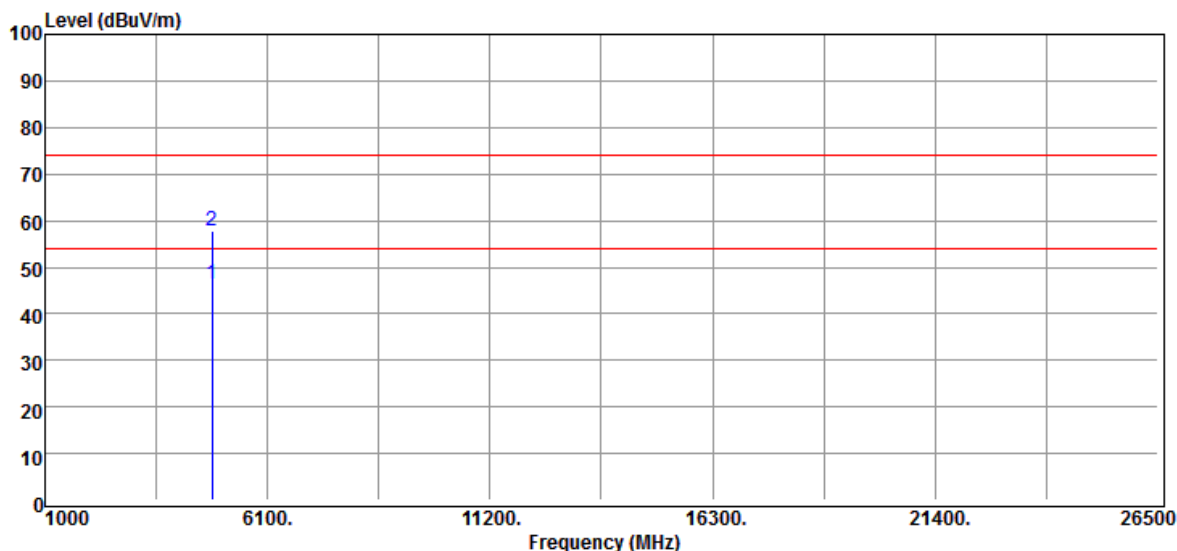
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Operation Mode	:802.11g	Test Date	:2018-10-17
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4824.00	Average	45.92	0.38	46.30	54.00	-7.70
4824.00	Peak	57.26	0.38	57.64	74.00	-16.36

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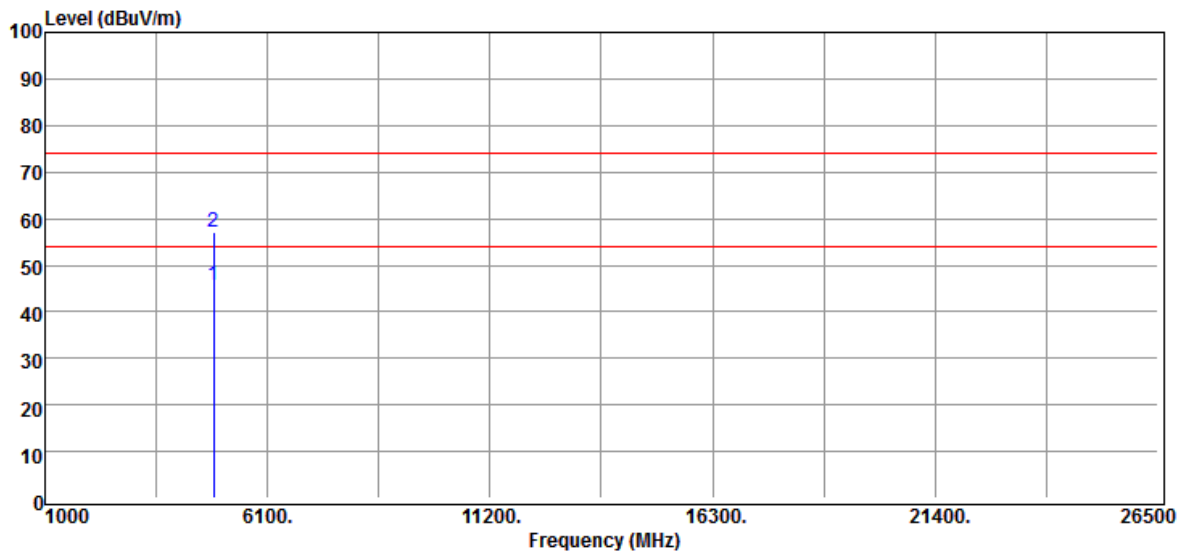
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Operation Mode	:802.11g	Test Date	:2018-10-17
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4874.00	Average	45.00	0.66	45.66	54.00	-8.34
4874.00	Peak	56.58	0.66	57.24	74.00	-16.76

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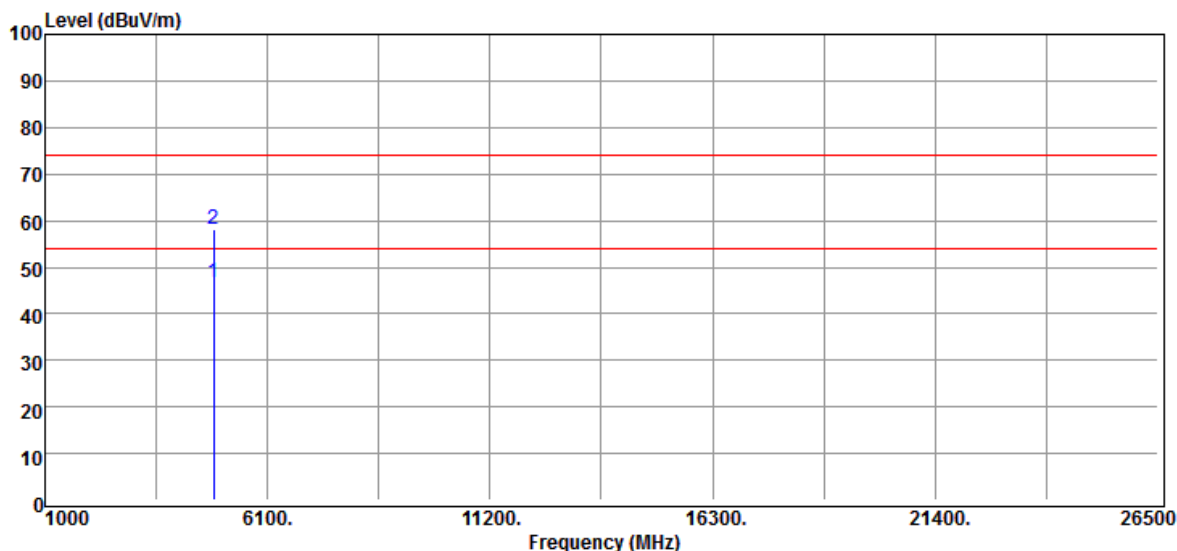
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Operation Mode	:802.11g	Test Date	:2018-10-17
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4874.00	Average	46.22	0.66	46.88	54.00	-7.12
4874.00	Peak	57.57	0.66	58.23	74.00	-15.77

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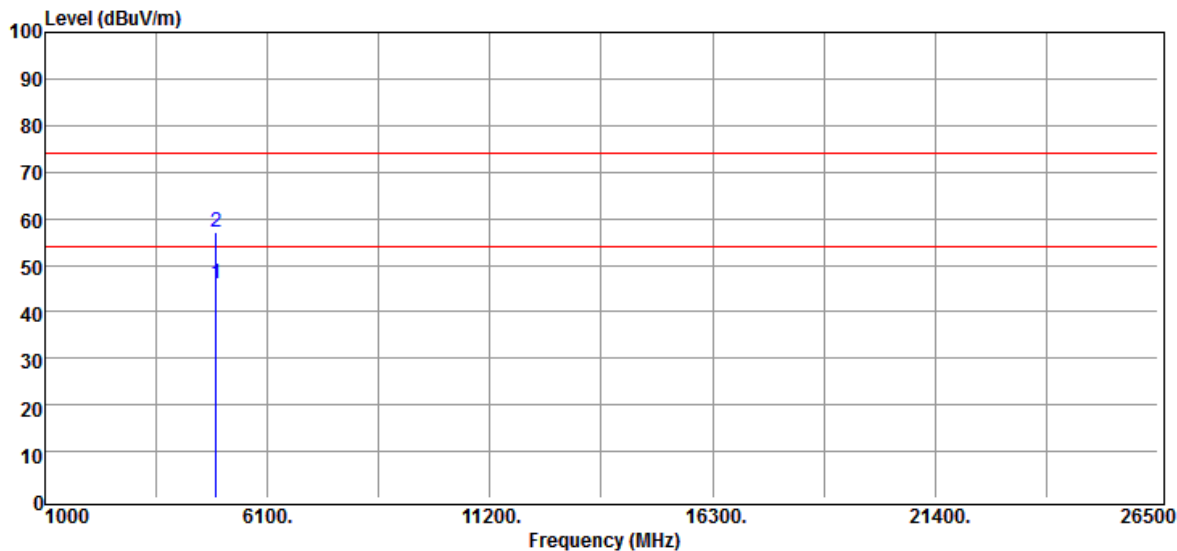
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Operation Mode	:802.11g	Test Date	:2018-10-17
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4924.00	Average	45.01	0.97	45.98	54.00	-8.02
4924.00	Peak	56.03	0.97	57.00	74.00	-17.00

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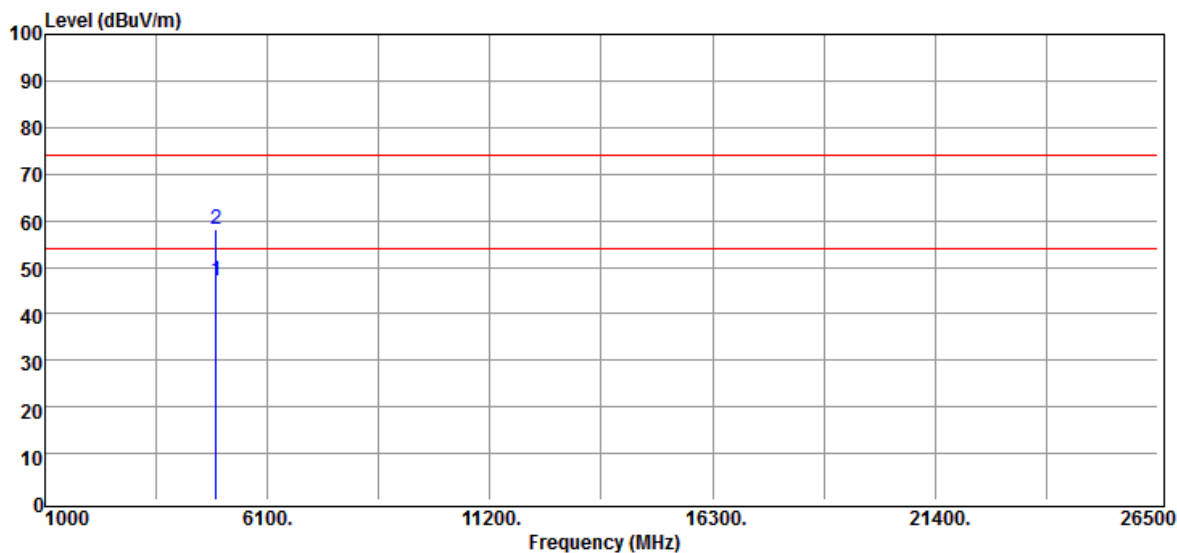
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Operation Mode	:802.11g	Test Date	:2018-10-17
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4924.00	Average	46.20	0.97	47.17	54.00	-6.83
4924.00	Peak	57.12	0.97	58.09	74.00	-15.91

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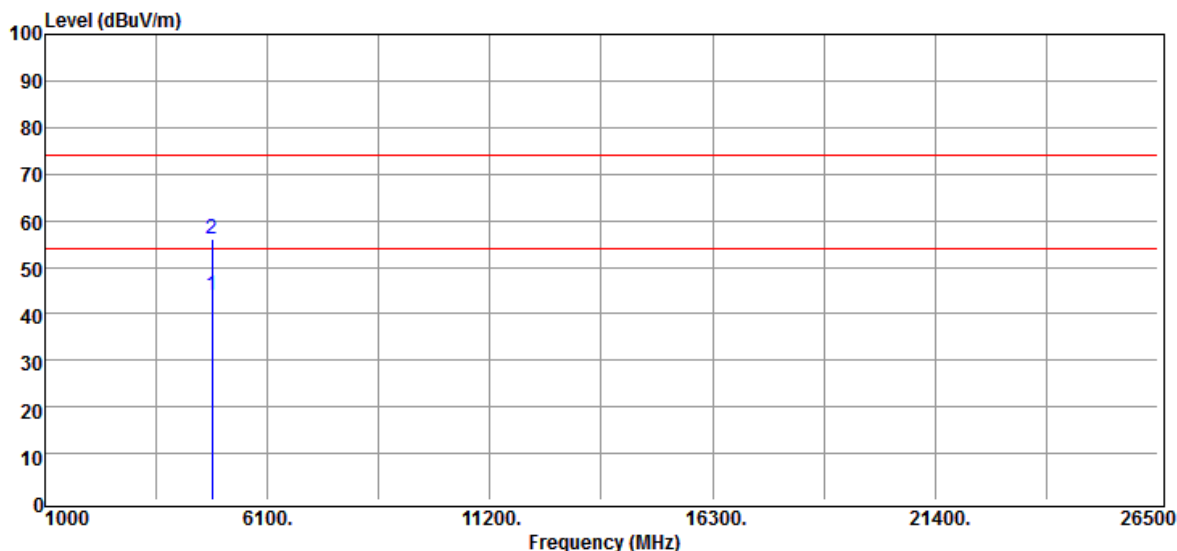
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Operation Mode	:802.11n20	Test Date	:2018-10-17
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2412 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4824.00	Average	43.57	0.38	43.95	54.00	-10.05
4824.00	Peak	55.65	0.38	56.03	74.00	-17.97

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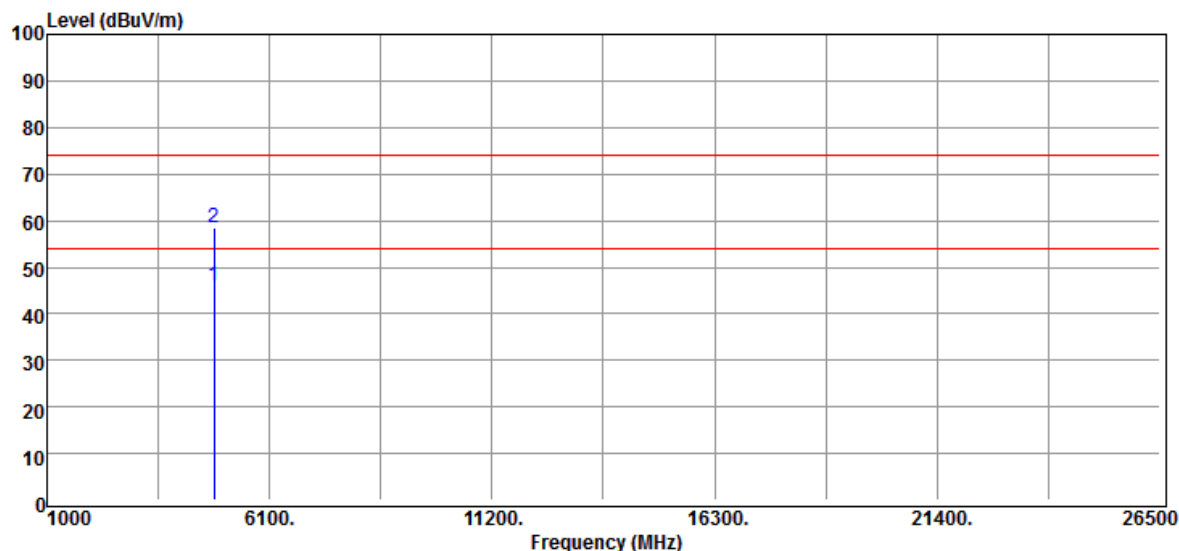
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Operation Mode :802.11n20  
Test Mode :Tx CH Low  
EUT Pol :H Plan  
Test Channel :2412 MHz

Test Date :2018-10-17  
Temp./Humi. :25/60  
Antenna Pol. :HORIZONTAL  
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4824.00	Average	45.54	0.38	45.92	54.00	-8.08
4824.00	Peak	57.93	0.38	58.31	74.00	-15.69

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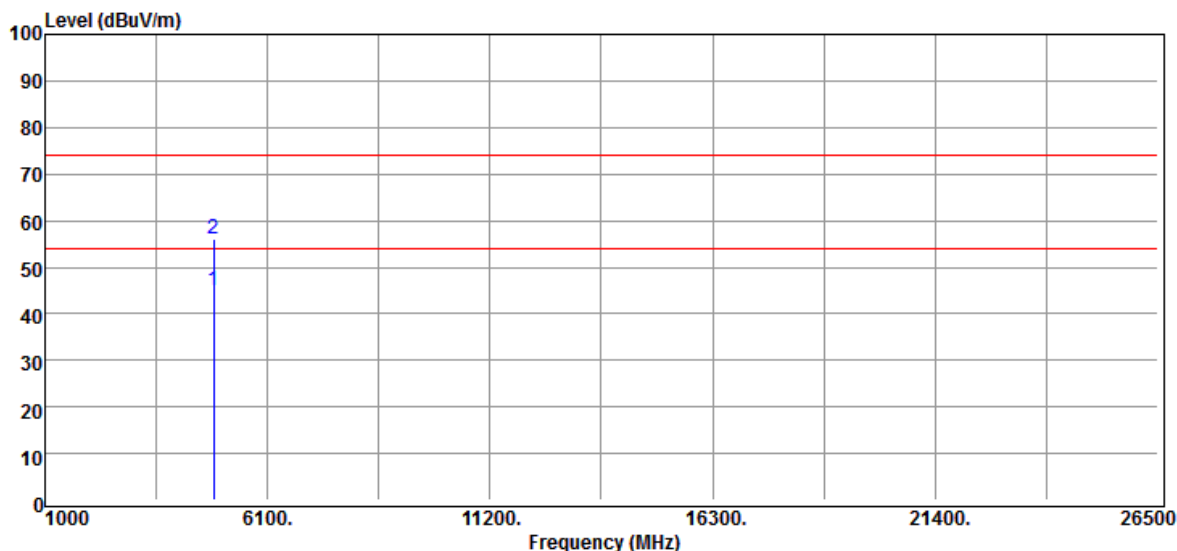
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Operation Mode	:802.11n20	Test Date	:2018-10-17
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4874.00	Average	44.17	0.66	44.83	54.00	-9.17
4874.00	Peak	55.38	0.66	56.04	74.00	-17.96

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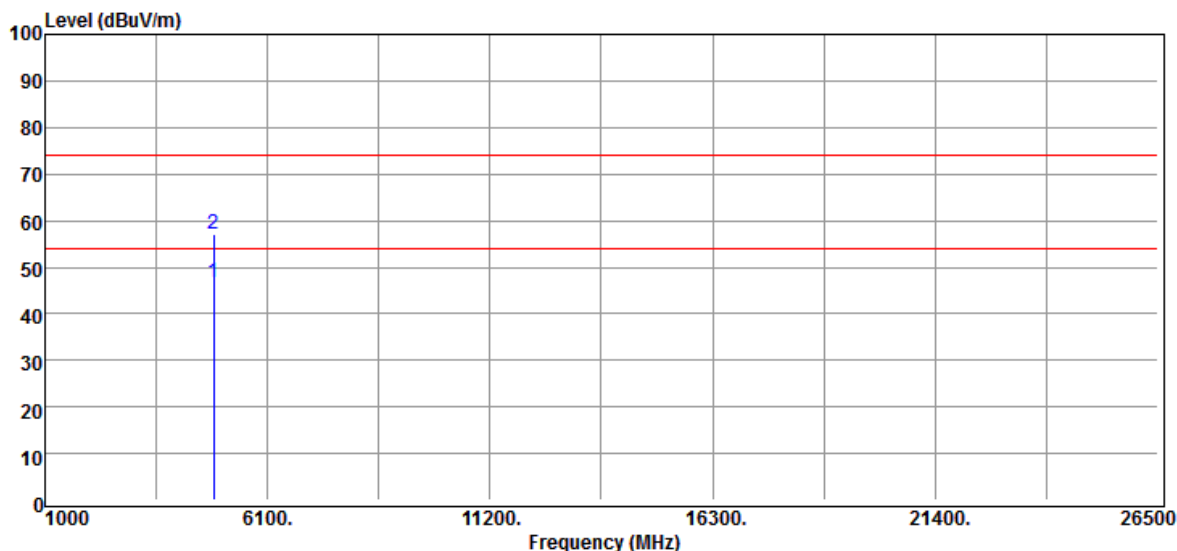
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Operation Mode :802.11n20  
Test Mode :Tx CH Mid  
EUT Pol :H Plan  
Test Channel :2437 MHz

Test Date :2018-10-17  
Temp./Humi. :25/60  
Antenna Pol. :HORIZONTAL  
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4874.00	Average	45.98	0.66	46.64	54.00	-7.36
4874.00	Peak	56.52	0.66	57.18	74.00	-16.82

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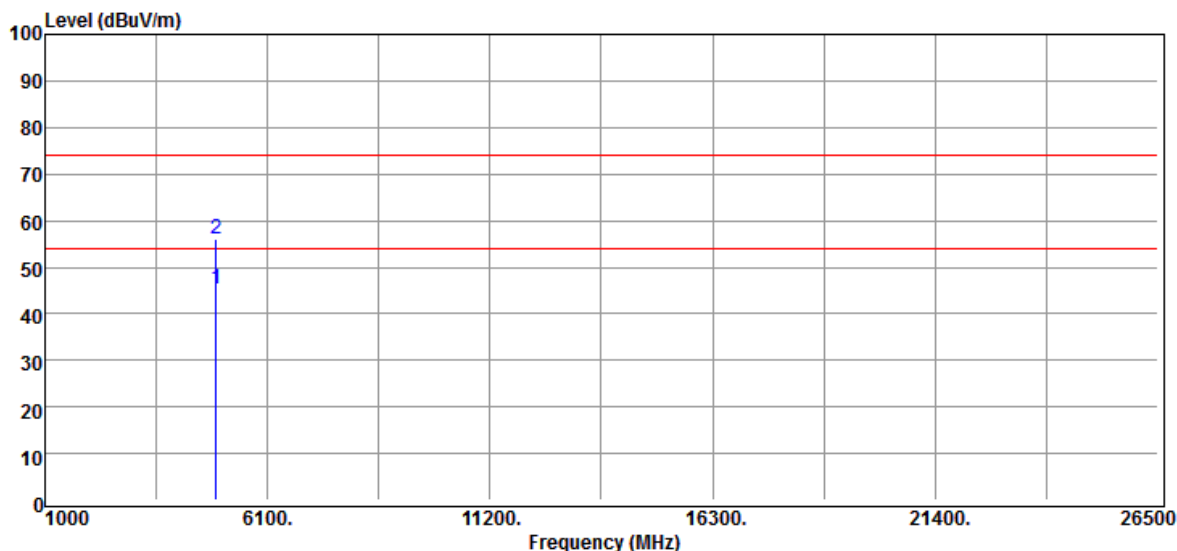
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Operation Mode	:802.11n20	Test Date	:2018-10-17
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4924.00	Average	44.40	0.97	45.37	54.00	-8.63
4924.00	Peak	55.24	0.97	56.21	74.00	-17.79

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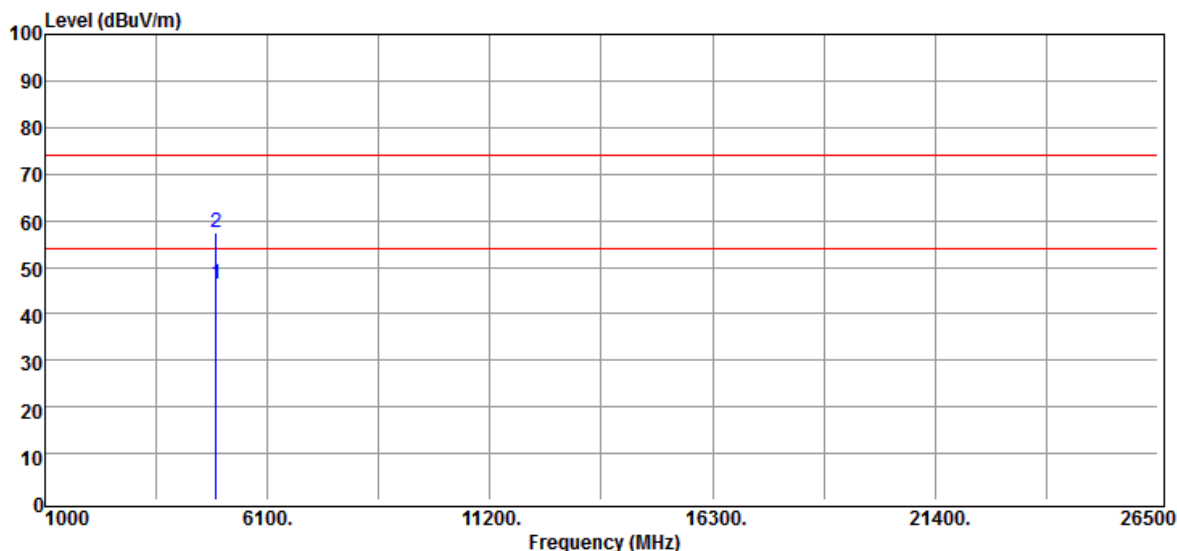
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Operation Mode	:802.11n20	Test Date	:2018-10-17
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2462 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4924.00	Average	45.54	0.97	46.51	54.00	-7.49
4924.00	Peak	56.36	0.97	57.33	74.00	-16.67

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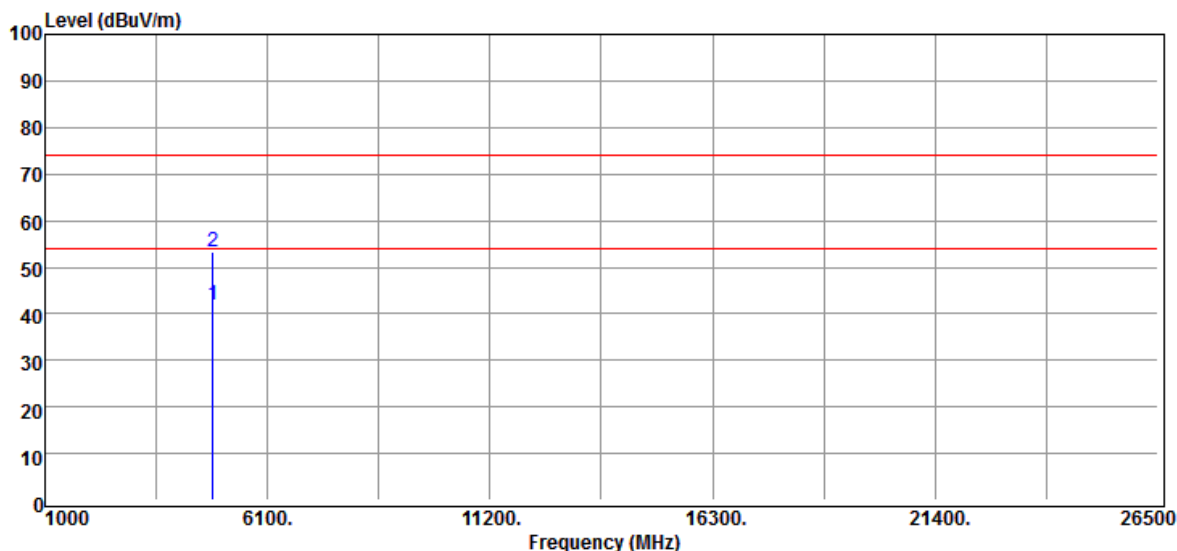
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Operation Mode	:802.11n40	Test Date	:2018-10-17
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2422 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4844.00	Average	41.23	0.49	41.72	54.00	-12.28
4844.00	Peak	52.85	0.49	53.34	74.00	-20.66

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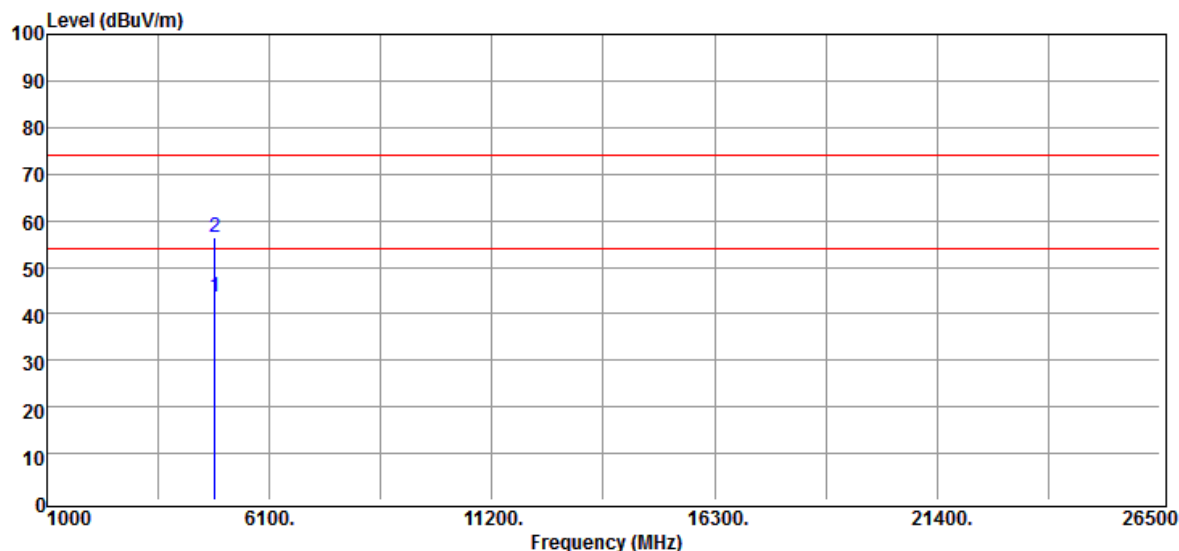
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Operation Mode :802.11n40  
Test Mode :Tx CH Low  
EUT Pol :H Plan  
Test Channel :2422 MHz

Test Date :2018-10-17  
Temp./Humi. :25/60  
Antenna Pol. :HORIZONTAL  
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4844.00	Average	43.16	0.49	43.65	54.00	-10.35
4844.00	Peak	56.00	0.49	56.49	74.00	-17.51

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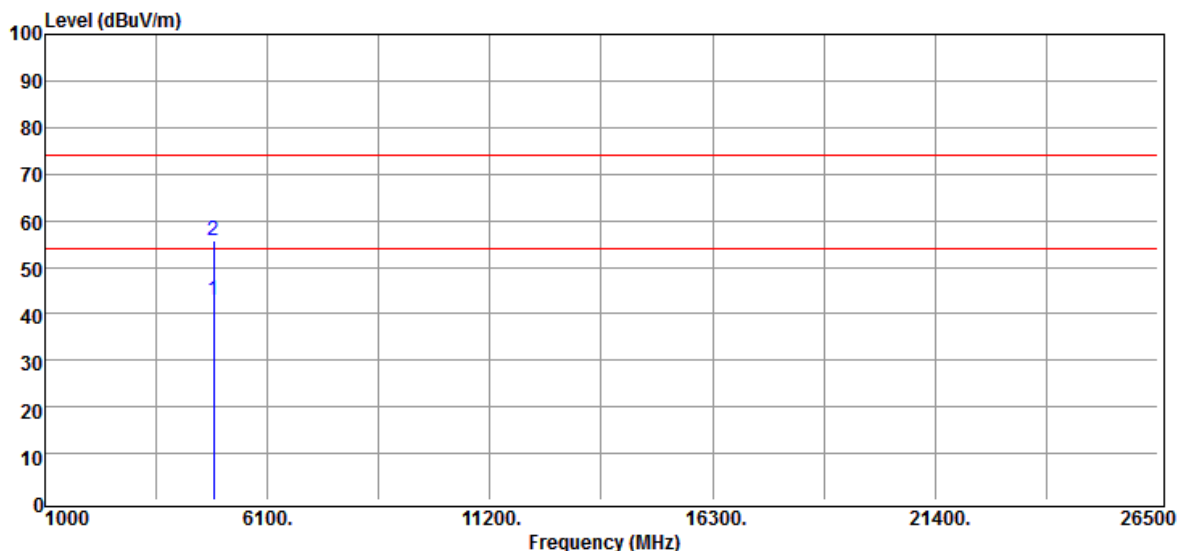
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Operation Mode	:802.11n40	Test Date	:2018-10-17
Test Mode	:Tx CH Mid	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2437 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4874.00	Average	42.28	0.66	42.94	54.00	-11.06
4874.00	Peak	55.05	0.66	55.71	74.00	-18.29

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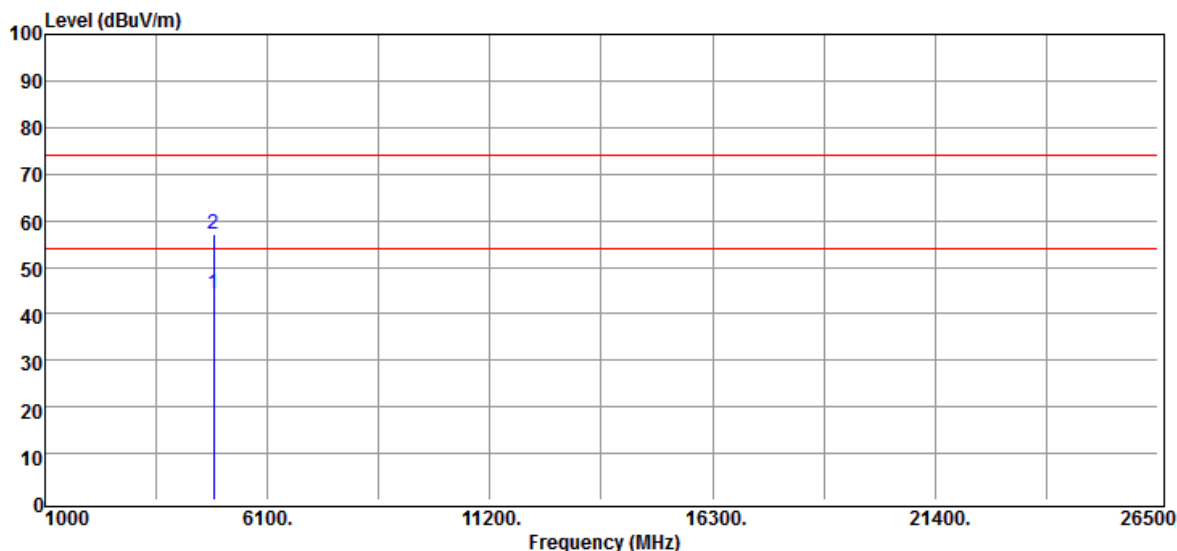
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Operation Mode :802.11n40  
Test Mode :Tx CH Mid  
EUT Pol :H Plan  
Test Channel :2437 MHz

Test Date :2018-10-17  
Temp./Humi. :25/60  
Antenna Pol. :HORIZONTAL  
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4874.00	Average	43.62	0.66	44.28	54.00	-9.72
4874.00	Peak	56.34	0.66	57.00	74.00	-17.00

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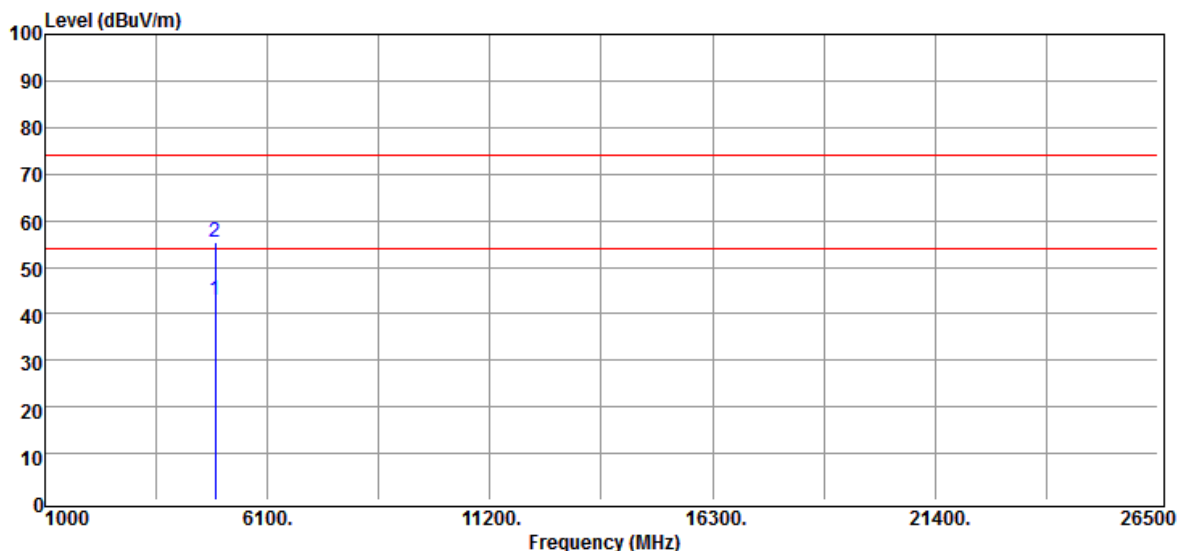
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Operation Mode	:802.11n40	Test Date	:2018-10-17
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2452 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4904.00	Average	42.02	0.84	42.86	54.00	-11.14
4904.00	Peak	54.59	0.84	55.43	74.00	-18.57

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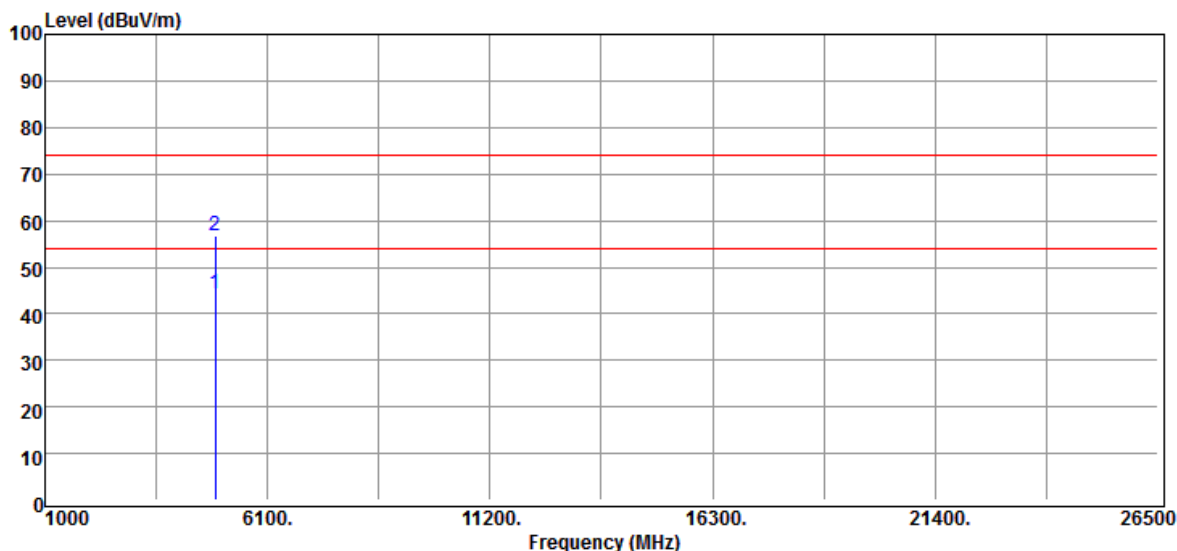
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Operation Mode	:802.11n40	Test Date	:2018-10-17
Test Mode	:Tx CH High	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2452 MHz	Engineer	:Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4904.00	Average	43.39	0.84	44.23	54.00	-9.77
4904.00	Peak	56.00	0.84	56.84	74.00	-17.16

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## 12 POWER SPECTRAL DENSITY

### 12.1 Standard Applicable

Per Part 15.247 (e)

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.

This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

The antenna gain is not greater than 6 dBi. Therefore, reduction of power is not required.

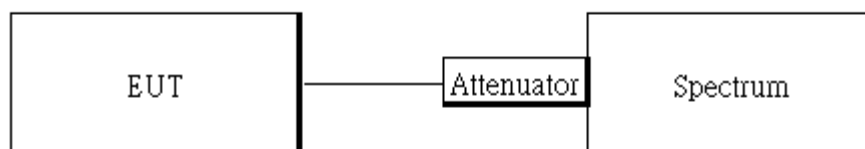
Per RSS-247 section 5.4 d

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 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

### 12.2 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/06/19
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25
DC Block	PASTERNAK	PE8210	RF29	2017/12/26	2018/12/25
Notebook	Lenovo	L420	S0011721	N/A	N/A

### 12.3 Test Set-up



### 12.4 Measurement Procedure

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .

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3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 3 kHz & VBW = 10 kHz.
5. For defining Restricted Band Edge Limit:  
Set the RBW = 100kHz & VBW = 300 kHz
6. Detector = peak.
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum amplitude level.

## 12.5 Measurement Result

POWER DENSITY 802.11b				POWER DENSITY 802.11g			
Freq. (MHz)	PPSD (dBm/3kHz)	Limit (dBm/3kHz)	Result	Freq. (MHz)	PPSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-5.66	8.00	PASS	2412	-12.21	8.00	PASS
2437	-6.94	8.00	PASS	2437	-12.78	8.00	PASS
2462	-7.26	8.00	PASS	2462	-13.13	8.00	PASS

POWER DENSITY 802.11n HT20				POWER DENSITY 802.11n HT40			
Freq. (MHz)	PPSD (dBm/3kHz)	Limit (dBm/3kHz)	Result	Freq. (MHz)	PPSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-11.45	8.00	PASS	2422	-13.24	8.00	PASS
2437	-12.02	8.00	PASS	2437	-13.48	8.00	PASS
2462	-12.37	8.00	PASS	2452	-14.26	8.00	PASS

offset 10.80 dB for SISO mode  
offset dB for MIMO mode

\*Refer to next page for plots

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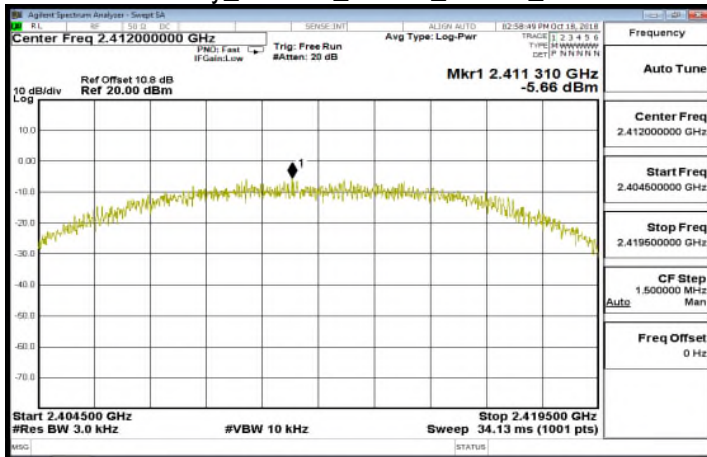
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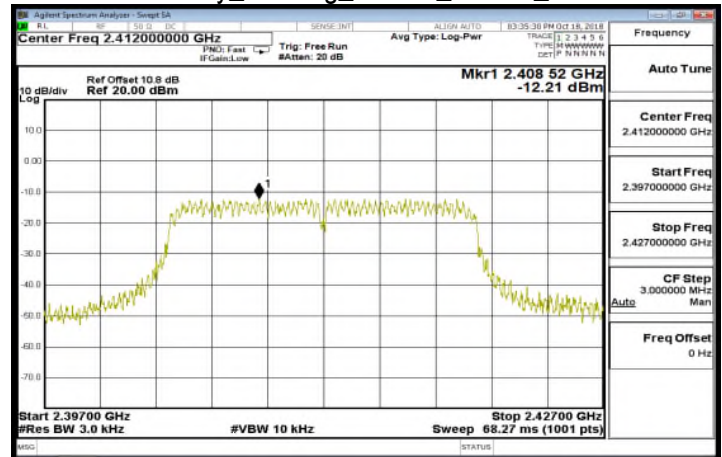
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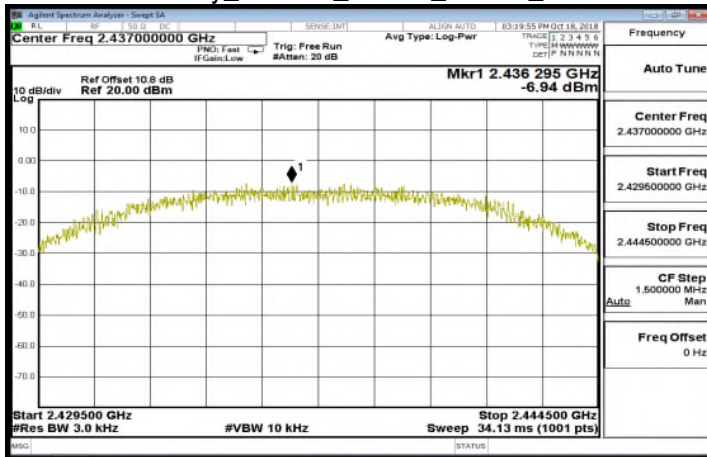
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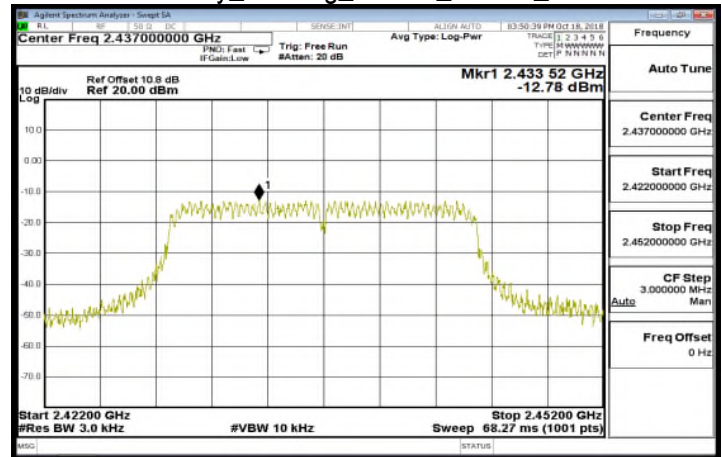
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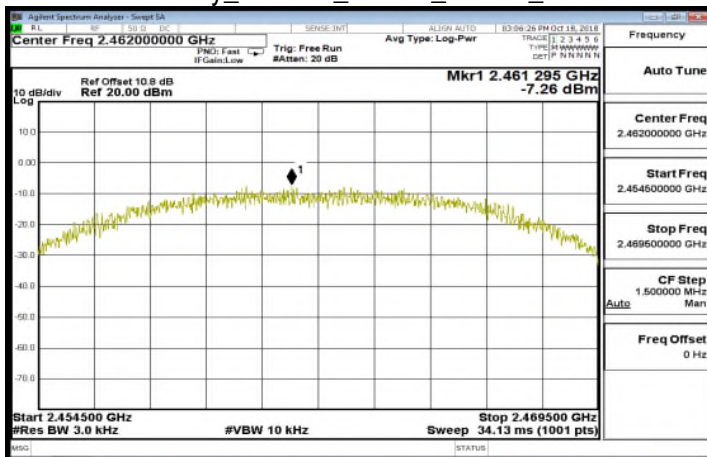
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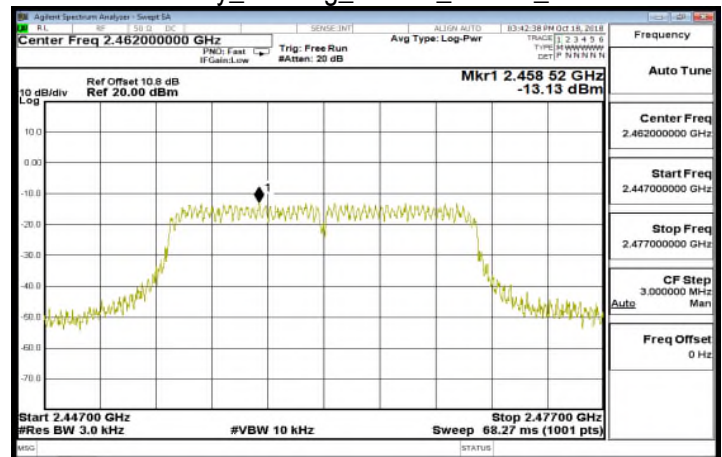
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Power Density\_802.11b\_20MHz\_Chain0\_2462MHz



Power Density\_802.11g\_20MHz\_Chain0\_2462MHz



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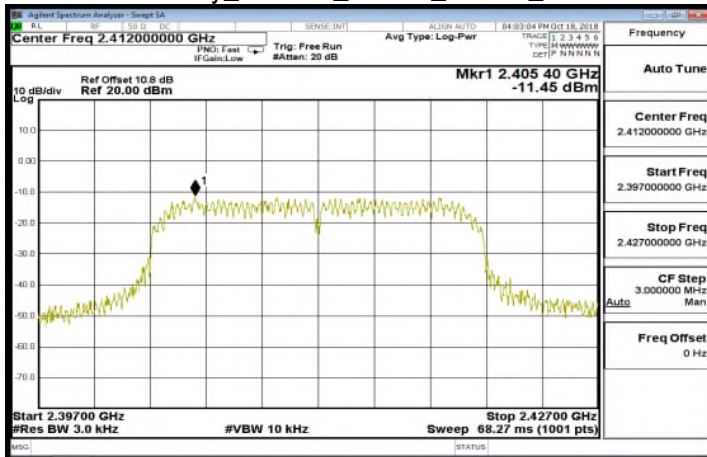
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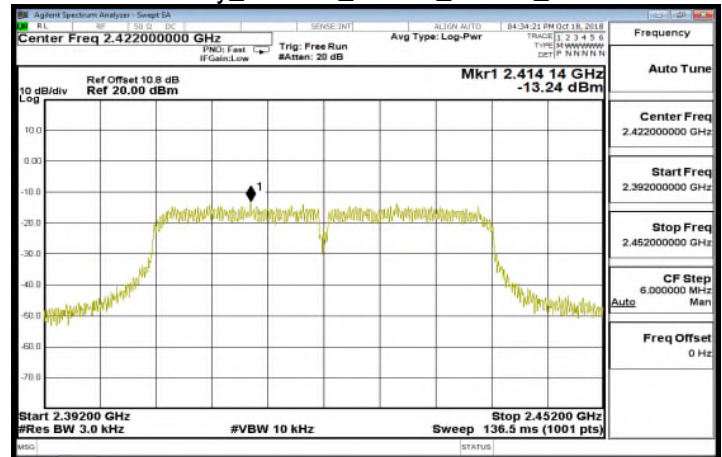
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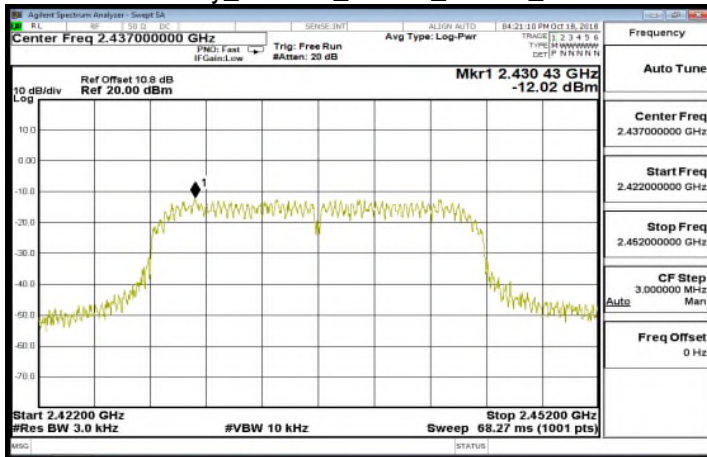
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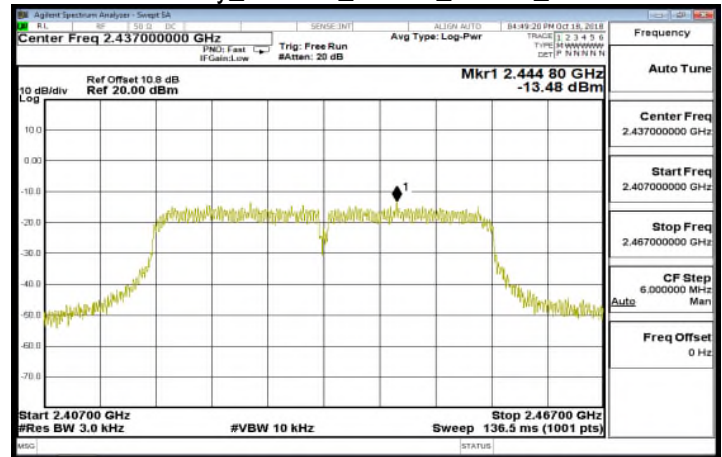
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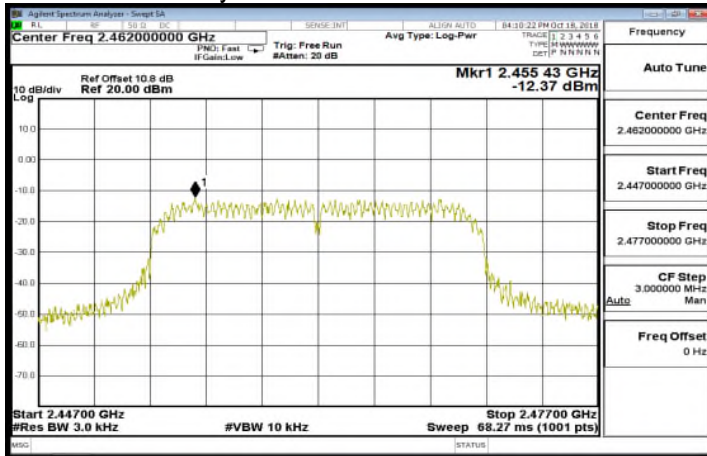
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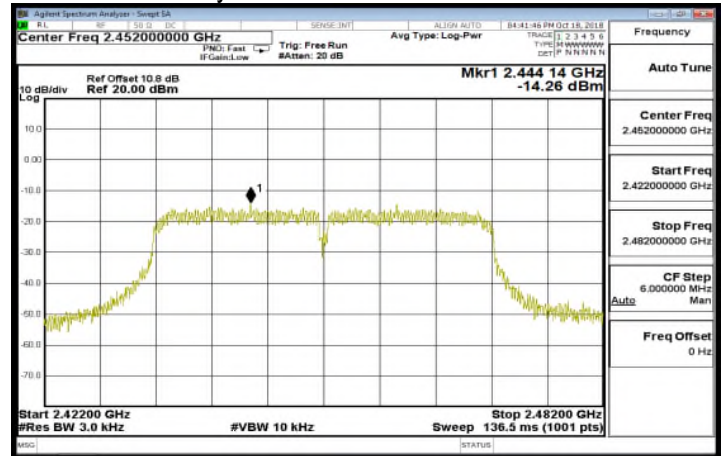
Power Density\_802.11n\_40MHz\_Chain0\_2437MHz



Power Density\_802.11n\_20MHz\_Chain0\_2462MHz



Power Density\_802.11n\_40MHz\_Chain0\_2462MHz



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## 13 ANTENNA REQUIREMENT

### 13.1 Standard Applicable

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

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

### 13.2 Antenna Connected Construction

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo for details.

*~ End of Report ~*

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