

## ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

**Applicant:** ThirdEye Gen Inc  
300 Alexander Park Dr, Princeton, NJ 08540 United States

**Product Name:** ThirdEye X2

**Brand Name:** ThirdEye

**Model No.:** X2 MR Glasses

**Model Difference:** N/A

**Report Number:** E2/2019/C0005

**FCC ID:** 2ANDNX2

**FCC Rule Part:** §15.247, Cat: DTS

**Issue Date:** Jan. 09, 2020

**Date of Test:** Dec. 06, 2019 ~ Dec. 24, 2019

**Date of EUT Received:** Dec. 06, 2019

**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.

Approved By:

*Jazz Huang*

Jazz Huang / Asst. Supervisor



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Revision History			
Revision	Description	Issue Date	Remark
Rev.00	Original.	Jan. 09, 2020	Revised By: Karen Huang

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# 1 GENERAL INFORMATION

## 1.1 Product Description

Product Name:	ThirdEye X2	
Brand Name:	ThirdEye	
Model No.:	X2 MR Glasses	
Model Difference:	N/A	
Hardware Version:	N/A	
Software Version:	N/A	
Power Supply:	5V / 9V / 12V from AC/DC Switching Adapter or 5V from USB Port	
	Adapter:	Model No.: DSA-24QFA FUS A, Supplier: DEE VAN ENTERPRISE CO., LTD.

Wi-Fi 802.11	Frequency Range	Channels	Rated Power (dBm)	Modulation Technology
b	2412-2462	11	17.21	DSSS
g			20.24	OFDM
n_HT20			20.38 (MIMO)	
n_HT40	2422-2452	7	18.42 (MIMO)	
Modulation type:	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM			
Transistion Rate:	802.11 b: 1/2/5.5/11 Mbps 802.11 g: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 144.4Mbps 802.11 n_40MHz: 13.5 – 300.0Mbps			
Antenna Designation:	Monopole Antenna, Gain: 2.6dBi (WiFi 1) / 0.1dBi (WiFi 2)			

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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 v05r02

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10:2013

## 1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory (TAF code 0513)

No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333

FCC Designation number: 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 a 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. 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 a 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.

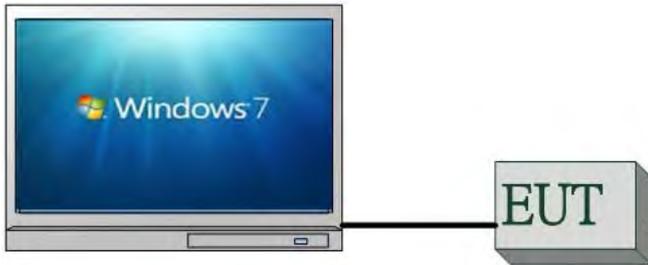
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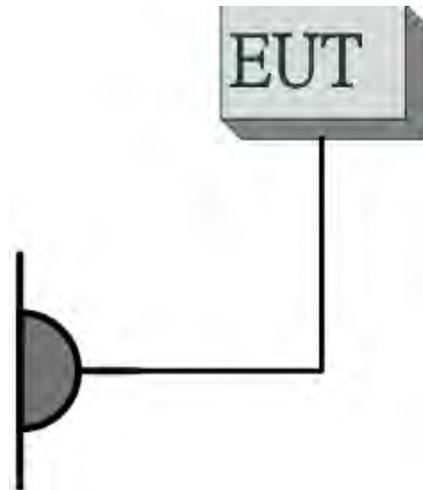
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## 2.4 Configuration of Tested System

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



**Fig 2-2 Conduction (AC Power Line) Emission**



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

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	T460p	P0001013	N/A	N/A
3.	Notebook	Lenovo	L420	S0011721	N/A	N/A

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### 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 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/g/n 20M.

7 channels are provided for 802.11n 40M

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

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

### 4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. aTest 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.

The given UE is pre-scanned among below modes.

Modulation	Transmission Chain				Multiple Transmission Spatial
	Ch0	Ch1	Ch2	Ch3	
<input checked="" type="checkbox"/> 802.11 b	<input checked="" type="checkbox"/> Ch0	<input checked="" type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input type="checkbox"/> 2TX
<input checked="" type="checkbox"/> 802.11 g	<input checked="" type="checkbox"/> Ch0	<input checked="" type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input type="checkbox"/> 2TX
<input checked="" type="checkbox"/> 802.11 n	<input checked="" type="checkbox"/> Ch0	<input checked="" type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input checked="" type="checkbox"/> MIMO

4. Therefore, below summary is the modes of test configuration that yield the highest reading and generate the highest emission chosen to carry out the relevantly mandatory test items.

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#### 4.3 Radiated Emission Test:

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
<b>RADIATED EMISSION TEST (BELOW 1 GHz)</b>					
802.11g	1 to 11	6	OFDM	6	Ch1
<b>RADIATED EMISSION TEST (ABOVE 1 GHz)</b>					
802.11b	1 to 11	1, 6, 11	DSSS	1	Ch1
802.11g	1 to 11	1, 6, 11	OFDM	6	Ch1
802.11n 20M	1 to 11	1, 6, 11	OFDM	MCS 8	MIMO
802.11n 40M	3 to 9	3, 6, 9	OFDM	MCS 8	MIMO

**Note:**

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

#### 4.4 Antenna Port Conducted Measurement:

<b>CONDUCTED TEST</b>					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 11	1, 6, 11	DSSS	1	Ch1
802.11g	1 to 11	1, 6, 11	OFDM	6	Ch1
802.11n 20M	1 to 11	1, 6, 11	OFDM	MCS 8	MIMO
802.11n 40M	3 to 9	3, 6, 9	OFDM	MCS 8	MIMO

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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	
<b>Polarization: Vertical</b>	9kHz~30MHz: +2.3dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB
<b>Polarization: Horizontal</b>	9kHz~30MHz: +2.3dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

**Note:**

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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## 6 CONDUCTED EMISSION TEST

### 6.1 Standard Applicable

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

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

Note

- The lower limit shall apply at the transition frequencies
- 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	02/13/2019	02/12/2020
EMI Test Receiver	R&S	ESCI	101342	04/26/2019	04/25/2020

### 6.3 EUT Setup

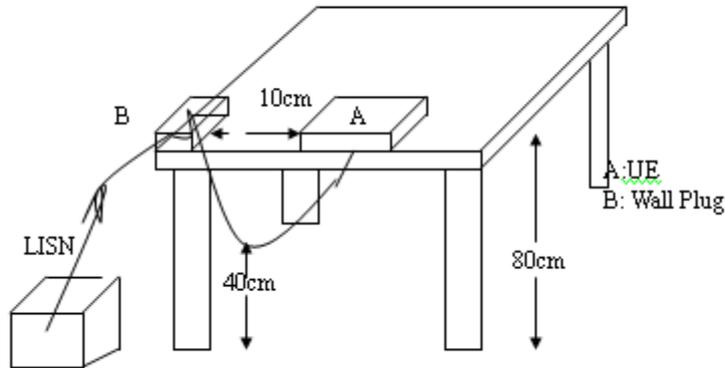
- The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
- The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- The LISN was connected with 120Vac/60Hz power source.

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



## 6.5 Measurement Procedure

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

## 6.6 Measurement Result

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

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

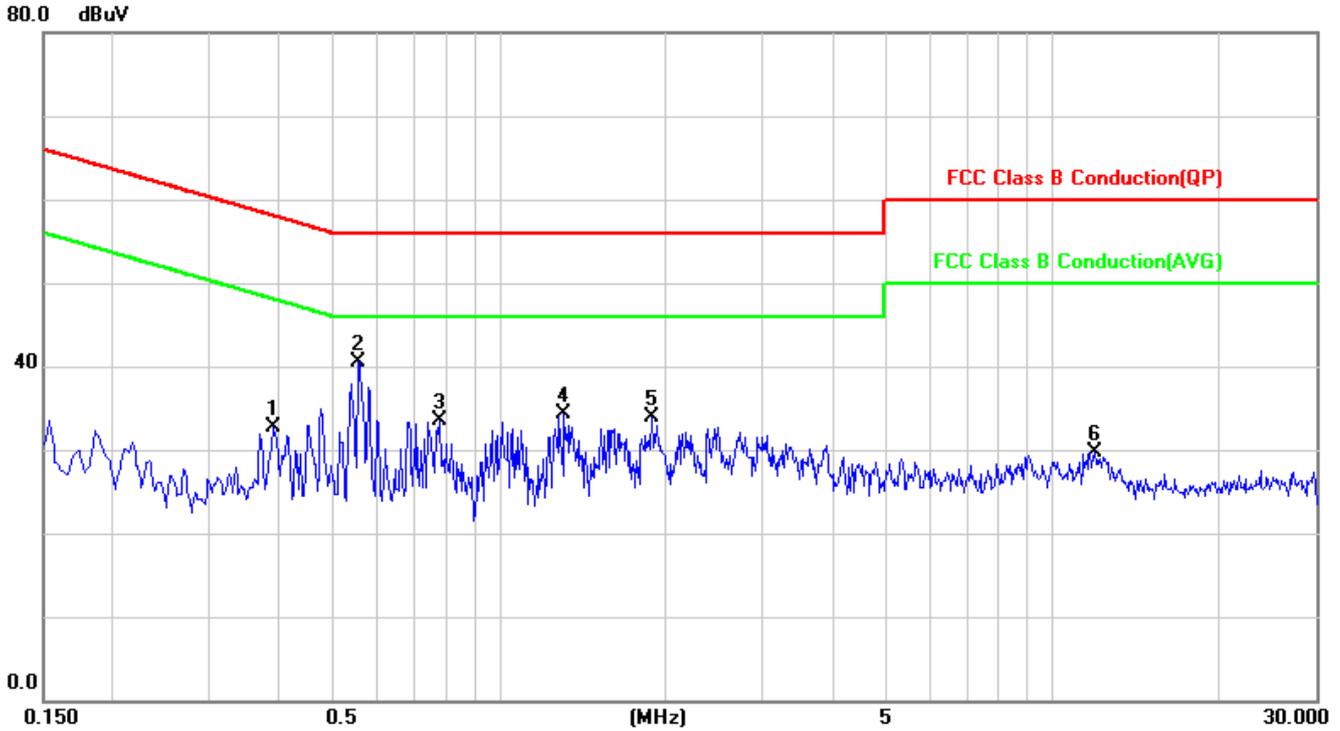
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## AC POWER LINE CONDUCTED EMISSION TEST DATA

<b>Description:</b>	Operation	<b>Date:</b>	2019/12/24
<b>Line:</b>	L1	<b>Temp.(°C)/Hum.(%):</b>	23.2(°C)/65%
<b>Test Voltage:</b>	AC 120V/60Hz	<b>Test By:</b>	Kailin
<b>Note:</b>	E2/2019/C0005		



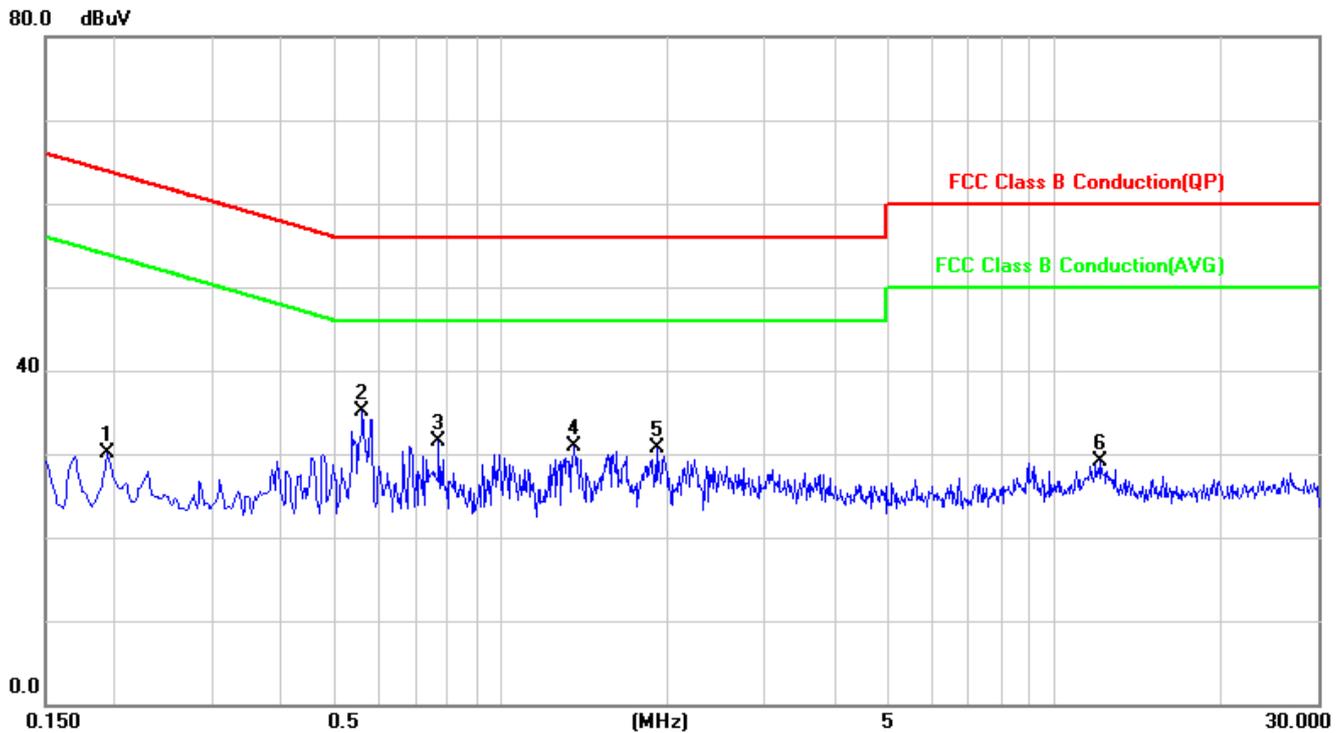
No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
		( MHz )	( dBuV )	( dB )	( dBuV )	( dBuV )	( dB )		
1		0.3900	13.05	19.69	32.74	58.06	-25.32	peak	
2	*	0.5580	20.79	19.76	40.55	56.00	-15.45	peak	
3		0.7820	13.69	19.77	33.46	56.00	-22.54	peak	
4		1.3140	14.45	19.83	34.28	56.00	-21.72	peak	
5		1.8900	13.97	19.96	33.93	56.00	-22.07	peak	
6		11.9420	9.81	19.97	29.78	60.00	-30.22	peak	

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<b>Description:</b>	<b>Operation</b>	<b>Date:</b>	<b>2019/12/24</b>
<b>Line:</b>	<b>N</b>	<b>Temp.(°C)/Hum.(%):</b>	<b>23.2(°C)/65%</b>
<b>Test Voltage:</b>	<b>AC 120V/60Hz</b>	<b>Test By:</b>	<b>Kailin</b>
<b>Note:</b>	<b>E2/2019/C0005</b>		



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
		( MHz )	( dBuV )	( dB )	( dBuV )	( dBuV )	( dB )		
1		0.1940	10.30	19.77	30.07	63.86	-33.79	peak	
2	*	0.5620	15.07	19.97	35.04	56.00	-20.96	peak	
3		0.7740	11.54	19.98	31.52	56.00	-24.48	peak	
4		1.3540	10.75	20.06	30.81	56.00	-25.19	peak	
5		1.9180	10.44	20.18	30.62	56.00	-25.38	peak	
6		12.1380	8.91	20.21	29.12	60.00	-30.88	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.

### 7.1 Measurement Procedure:

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

### 7.2 Duty Cycle:

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) = 10*log ( 1/Duty Cycle )	1/T (kHz)	VBW setting (kHz)
802.11b	99.27	0.03	0.08	0.01
802.11g	98.29	0.07	0.48	0.01
802.11n_20	96.47	0.16	1.02	2.00
802.11n_40	90.68	0.42	2.02	3.00

$b = 99.27\%$ ,  $g = 98.29\%$ ,  $n\_ht\_20 = 96.47\%$ ,  $n\_ht\_40 = 90.68\%$

Duty Cycle Factor:  $10 * \log(1/0.9927) = 0.03$

Duty Cycle Factor:  $10 * \log(1/0.9829) = 0.07$

Duty Cycle Factor:  $10 * \log(1/0.9647) = 0.16$

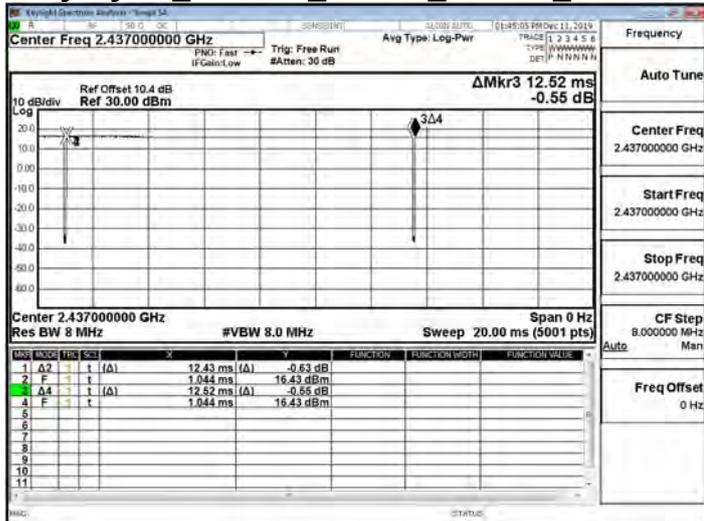
Duty Cycle Factor:  $10 * \log(1/0.9068) = 0.42$

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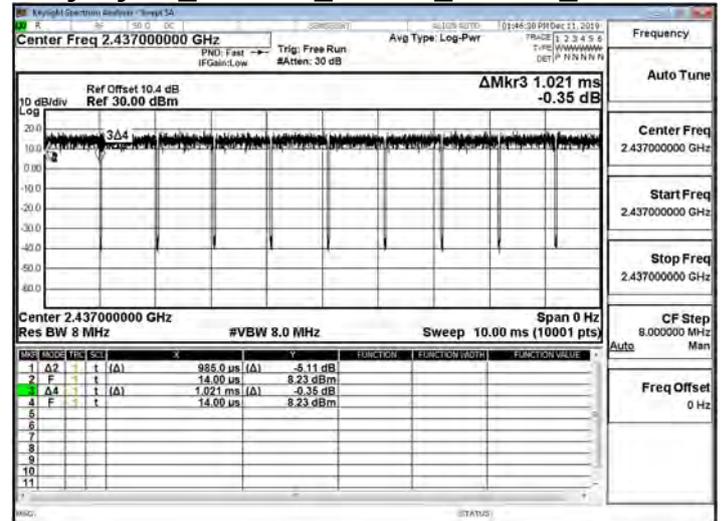
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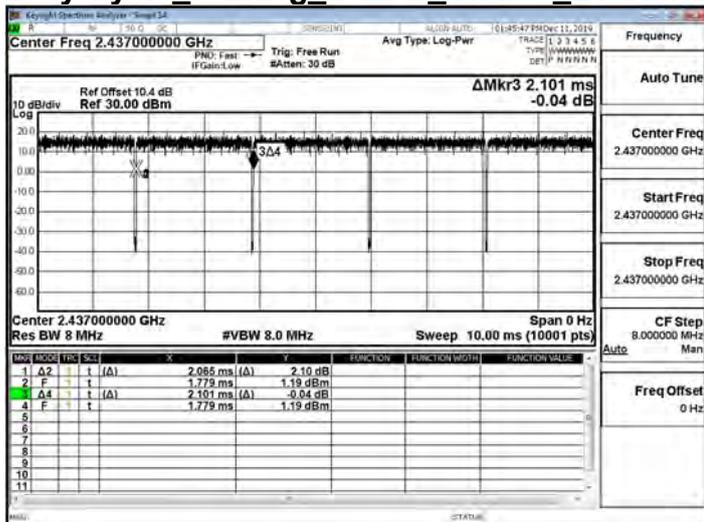
### 7.3 Duty Cycle test plots Duty Cycle\_802.11b\_20MHz\_Chain0\_2437MHz



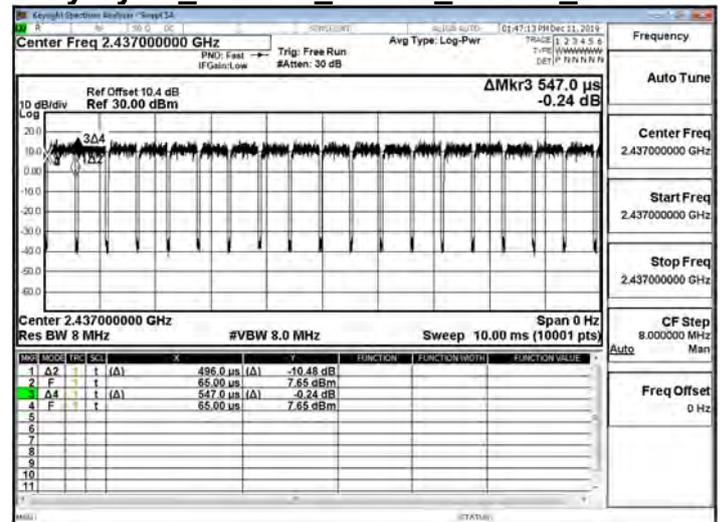
### Duty Cycle\_802.11n\_20MHz\_Chain0\_2437MHz



### 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.

**Note:**

As per FCC KDB 662911 D01

Unequal antenna gains, with equal transmit powers. For antenna gains given by G1, G2, ..., GN dBi.

(i) If transmit signals are correlated, then Directional gain  
 $= 10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$  dBi

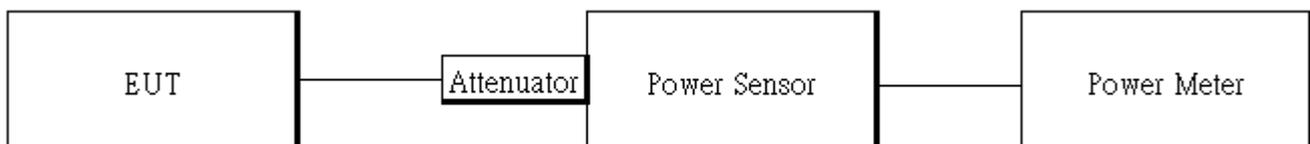
[Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

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	08/05/2019	08/04/2020
Power Sensor	Anritsu	MA2411B	1315048	08/05/2019	08/04/2020
Power Sensor	Anritsu	MA2411B	1315049	08/05/2019	08/04/2020
Attenuator	Marvelous	MVE2213-10	RF80	11/20/2019	11/19/2020

### 8.3 Test Set-up



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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 (dBm)	RESULT
1	2412	1	17.04	30.00	PASS
6	2437	1	17.21	30.00	PASS
11	2462	1	17.17	30.00	PASS
802.11b Ch0					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
1	2412	1	14.75	30.00	PASS
6	2437	1	14.97	30.00	PASS
11	2462	1	14.89	30.00	PASS

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802.11b Ch1					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	1	17.10	30.00	PASS
6	2437	1	16.88	30.00	PASS
11	2462	1	16.95	30.00	PASS
802.11b Ch1					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
1	2412	1	14.72	30.00	PASS
6	2437	1	14.75	30.00	PASS
11	2462	1	14.82	30.00	PASS
802.11g Ch0					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	6	19.64	30.00	PASS
6	2437	6	19.44	30.00	PASS
11	2462	6	19.82	30.00	PASS
802.11g Ch0					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
1	2412	6	13.98	30.00	PASS
6	2437	6	13.96	30.00	PASS
11	2462	6	13.89	30.00	PASS

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802.11g Ch1					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	6	20.24	30.00	PASS
6	2437	6	19.86	30.00	PASS
11	2462	6	19.73	30.00	PASS
802.11g Ch1					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
1	2412	6	13.94	30.00	PASS
6	2437	6	13.93	30.00	PASS
11	2462	6	13.81	30.00	PASS
802.11n_HT20M Ch0					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	19.66	30.00	PASS
6	2437	MCS0	19.64	30.00	PASS
11	2462	MCS0	19.97	30.00	PASS
802.11n_HT20M Ch0					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	13.97	30.00	PASS
6	2437	MCS0	13.96	30.00	PASS
11	2462	MCS0	13.92	30.00	PASS

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802.11n_HT20M Ch1					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	20.38	30.00	PASS
6	2437	MCS0	19.97	30.00	PASS
11	2462	MCS0	19.77	30.00	PASS
802.11n_HT20M Ch1					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	13.90	30.00	PASS
6	2437	MCS0	13.88	30.00	PASS
11	2462	MCS0	13.86	30.00	PASS

802.11n_HT20M MIMO							
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1			
1	2412	MCS8	16.74	17.87	20.35	30.00	PASS
6	2437	MCS8	16.20	17.37	19.83	30.00	PASS
11	2462	MCS8	16.18	17.80	20.08	30.00	PASS
802.11n_HT20M MIMO							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1			
1	2412	MCS8	10.22	11.36	13.99	30.00	PASS
6	2437	MCS8	9.91	11.55	13.97	30.00	PASS
11	2462	MCS8	9.92	11.54	13.97	30.00	PASS

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802.11n_HT40M Ch0					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	17.70	30.00	PASS
6	2437	MCS0	17.55	30.00	PASS
9	2452	MCS0	18.03	30.00	PASS

802.11n_HT40M Ch0					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	10.96	30.00	PASS
6	2437	MCS0	10.91	30.00	PASS
9	2452	MCS0	10.94	30.00	PASS

802.11n_HT40M Ch1					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	17.90	30.00	PASS
6	2437	MCS0	17.63	30.00	PASS
9	2452	MCS0	18.05	30.00	PASS

802.11n_HT40M Ch1					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	10.76	30.00	PASS
6	2437	MCS0	10.70	30.00	PASS
9	2452	MCS0	10.67	30.00	PASS

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802.11n_HT40M MIMO							
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1			
3	2422	MCS8	14.60	16.09	18.42	30.00	PASS
6	2437	MCS8	14.43	15.75	18.15	30.00	PASS
9	2452	MCS8	14.54	16.05	18.37	30.00	PASS
802.11n_HT40M MIMO							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1			
3	2422	MCS8	6.71	8.24	10.98	30.00	PASS
6	2437	MCS8	6.69	8.28	10.99	30.00	PASS
9	2452	MCS8	6.51	8.37	10.97	30.00	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

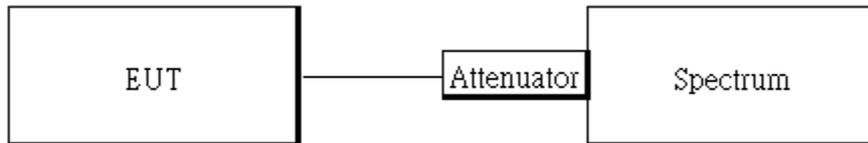
### 9.1 Standard Applicable

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	KEYSIGHT	N9010A	MY57120200	03/06/2019	03/05/2020
DC Block	PASTERNAK	PE8210	RF256	11/20/2019	11/19/2020
Attenuator	Marvelous	MVE2213-10	RF80	11/20/2019	11/19/2020

### 9.3 Test Set-up



### 9.4 Measurement Procedure

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

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## 9.5 6dB Bandwidth

802.11b Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	8105.00	> 500	PASS
2437	8109.00	> 500	PASS
2462	<b>8127.00</b>	> 500	PASS

802.11b Ch1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	8105.00	> 500	PASS
2437	8109.00	> 500	PASS
2462	<b>8127.00</b>	> 500	PASS

802.11g Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	15150.00	> 500	PASS
2437	15530.00	> 500	PASS
2462	<b>16330.00</b>	> 500	PASS

802.11g Ch1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	15150.00	> 500	PASS
2437	15530.00	> 500	PASS
2462	<b>16320.00</b>	> 500	PASS

802.11\_n\_HT20 Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	15150.00	> 500	PASS
2437	16900.00	> 500	PASS
2462	<b>17600.00</b>	> 500	PASS

802.11\_n\_HT20 Ch1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	15720.00	> 500	PASS
2437	16340.00	> 500	PASS
2462	<b>17590.00</b>	> 500	PASS

802.11\_n\_HT40 Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	<b>36310.00</b>	> 500	PASS
2437	35170.00	> 500	PASS
2452	35170.00	> 500	PASS

802.11\_n\_HT40 Ch1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	<b>35760.00</b>	> 500	PASS
2437	35170.00	> 500	PASS
2452	35170.00	> 500	PASS

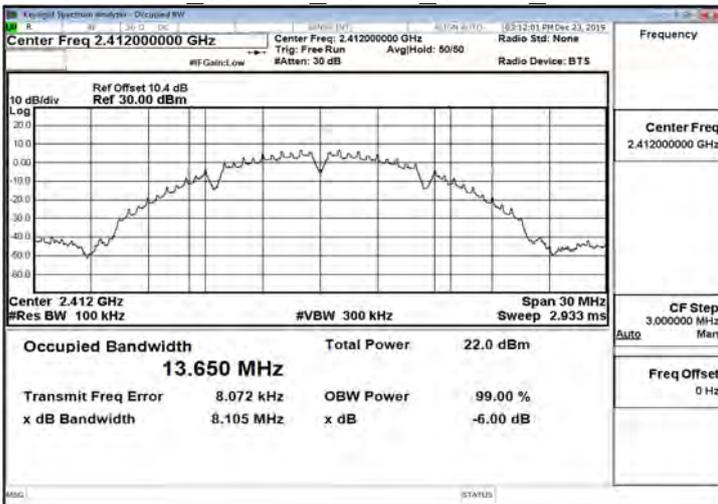
*\*Refer to next page for plots*

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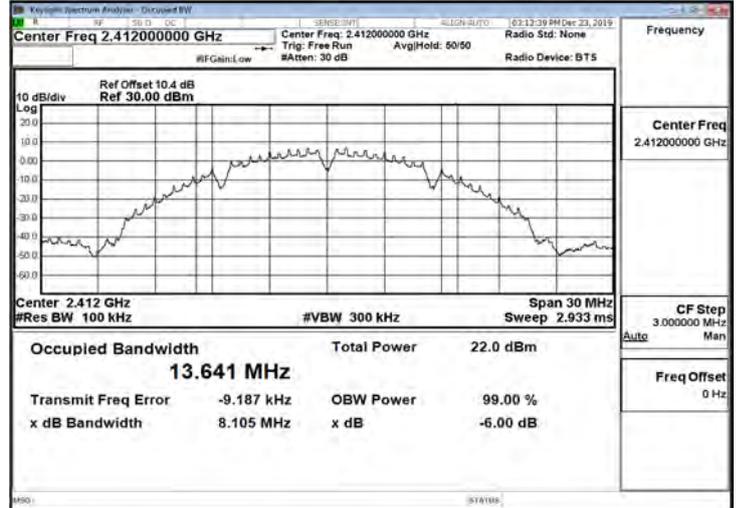
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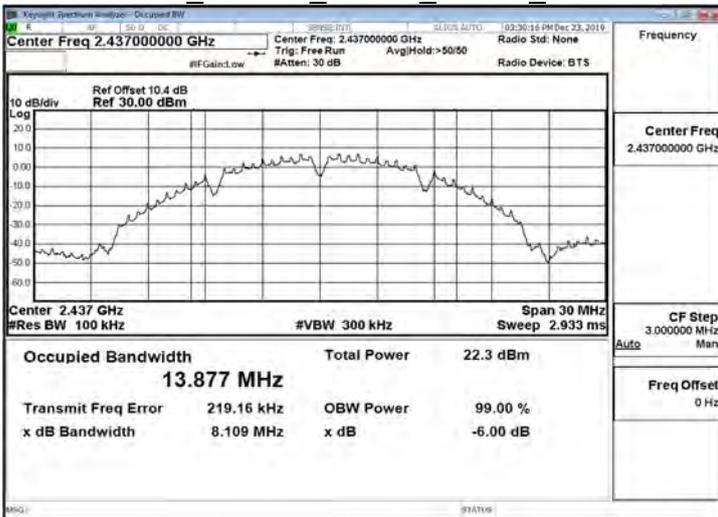
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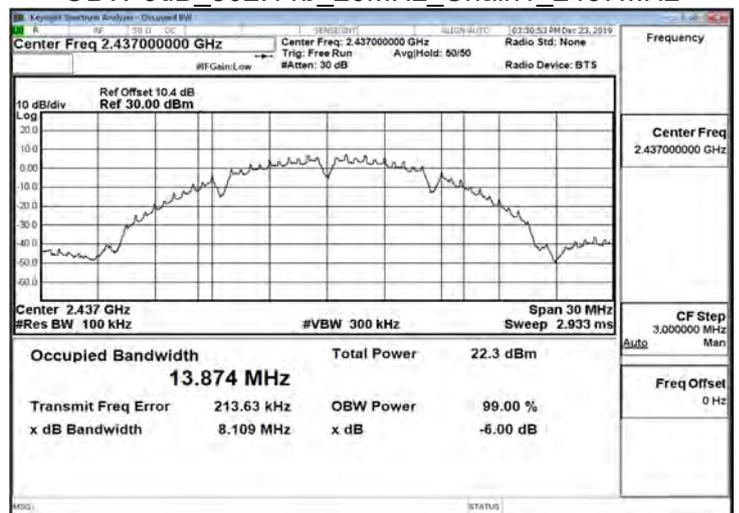
OBW 6dB 802.11b 20MHz Chain1 2412MHz



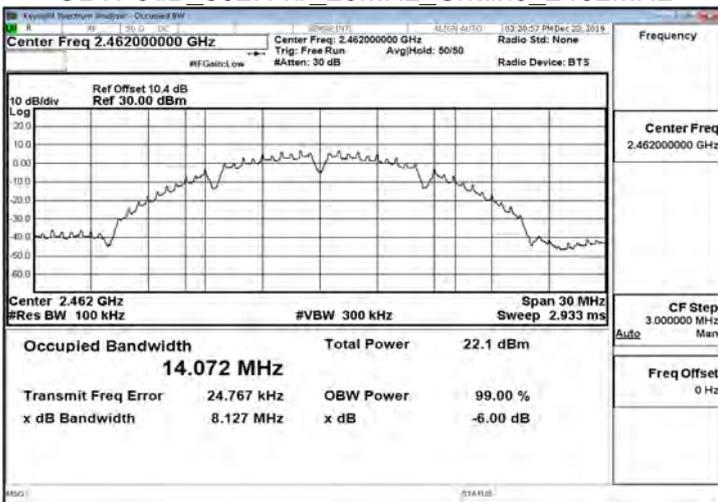
OBW 6dB 802.11b 20MHz Chain0 2437MHz



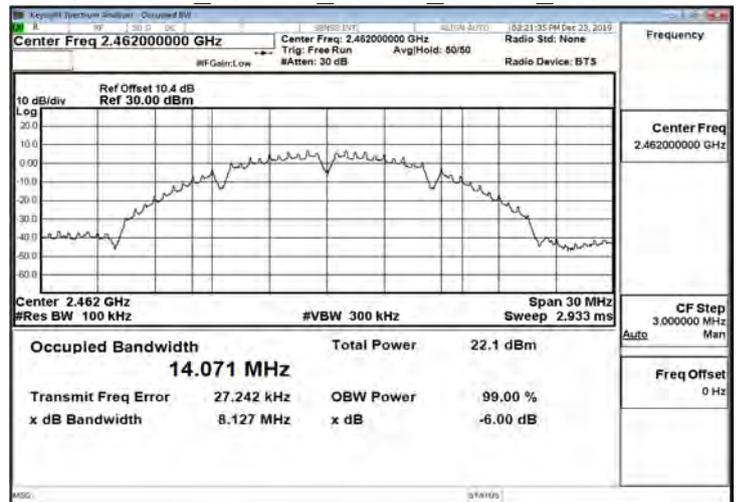
OBW 6dB 802.11b 20MHz Chain1 2437MHz



OBW 6dB 802.11b 20MHz Chain0 2462MHz



OBW 6dB 802.11b 20MHz Chain1 2462MHz

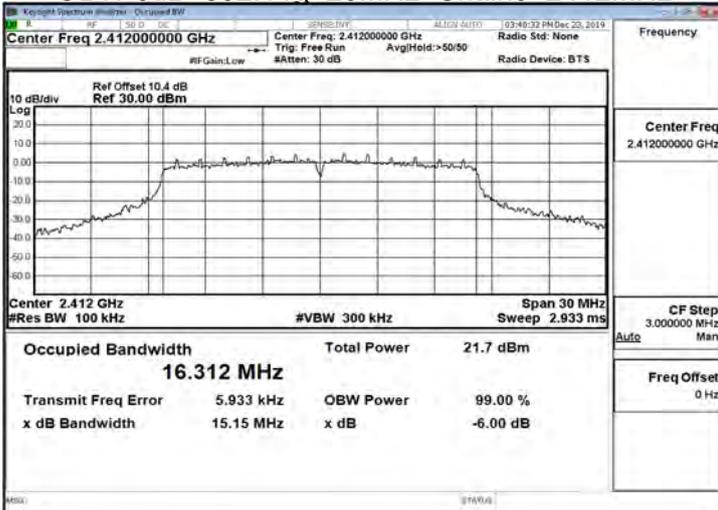


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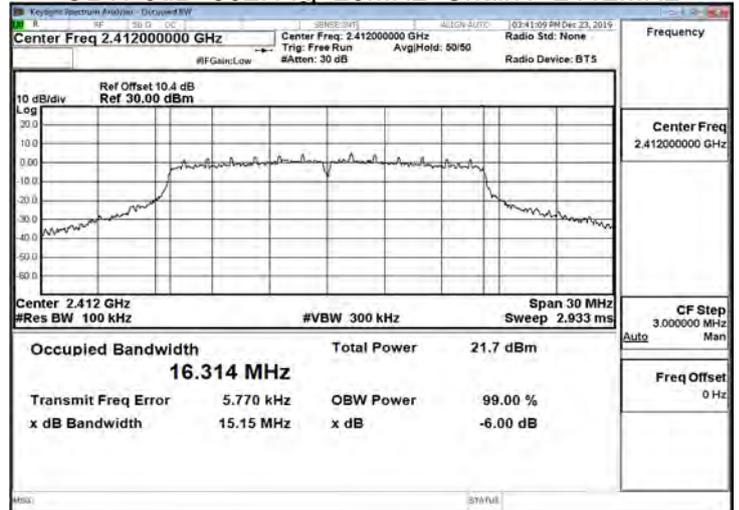
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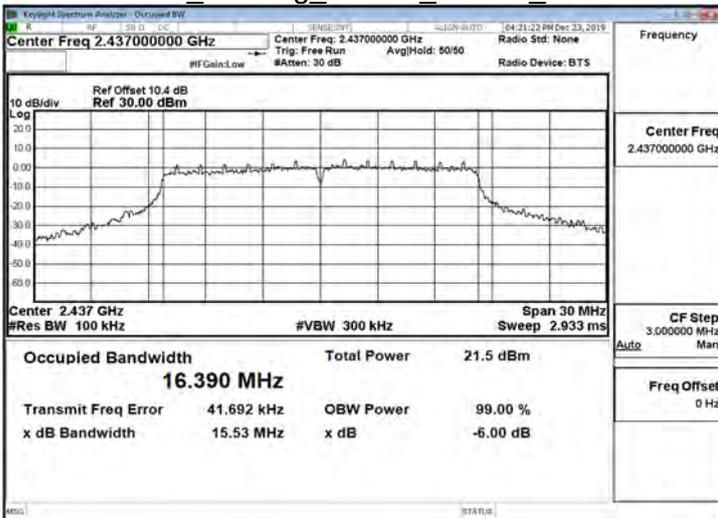
OBW 6dB 802.11g 20MHz Chain0 2412MHz



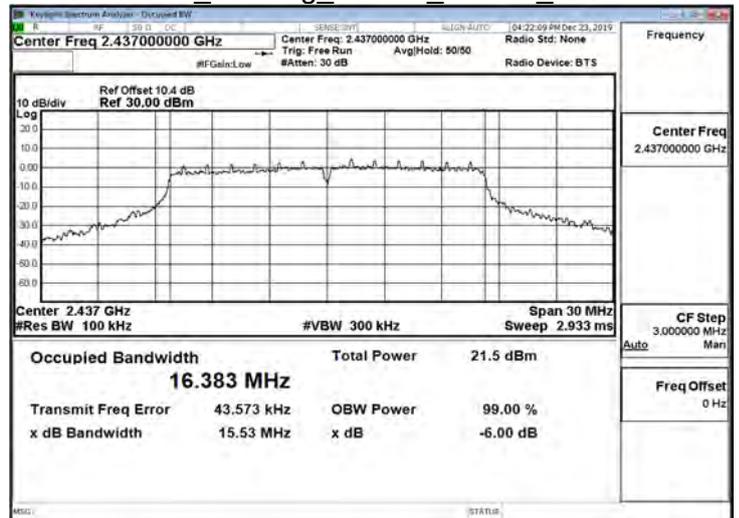
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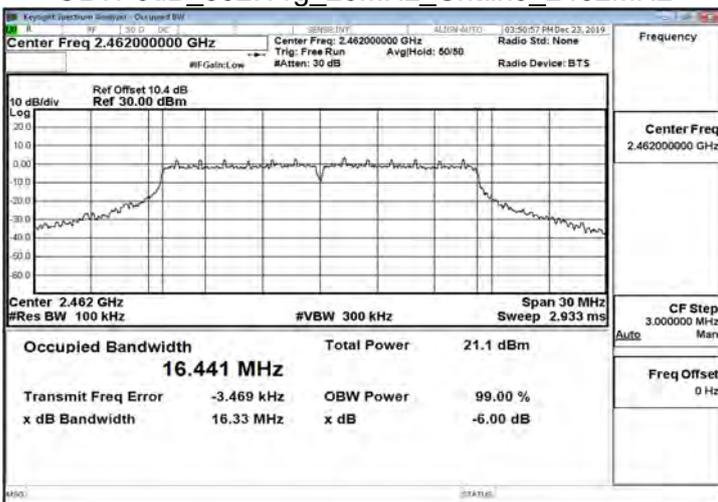
OBW 6dB 802.11g 20MHz Chain0 2437MHz



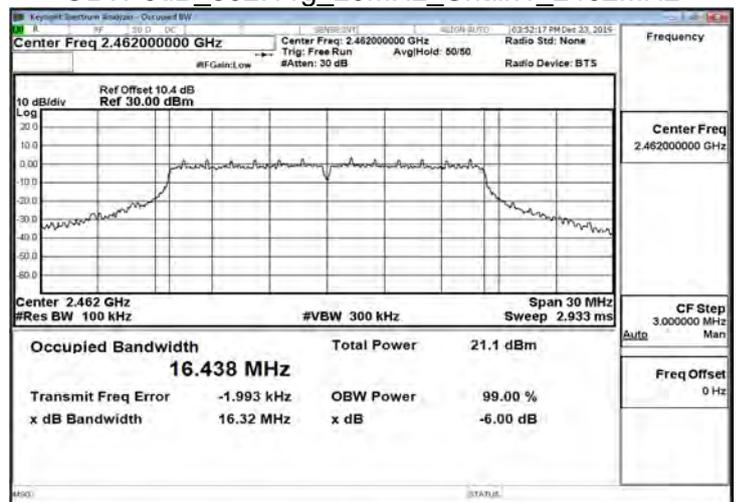
OBW 6dB 802.11g 20MHz Chain1 2437MHz



OBW 6dB 802.11g 20MHz Chain0 2462MHz



OBW 6dB 802.11g 20MHz Chain1 2462MHz

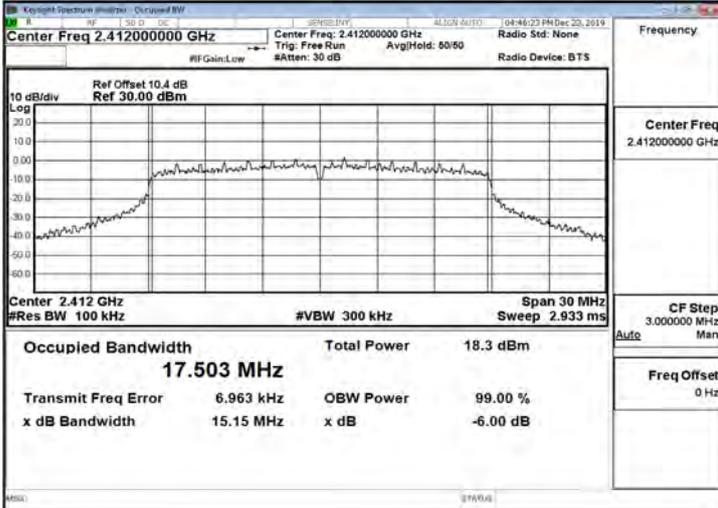


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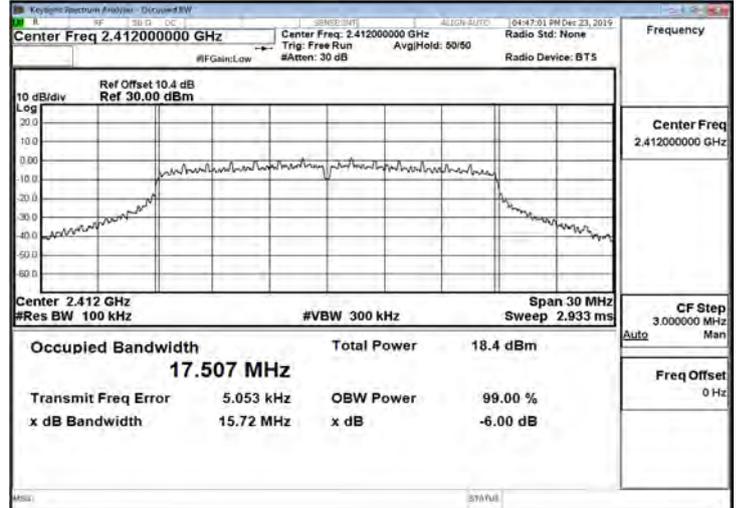
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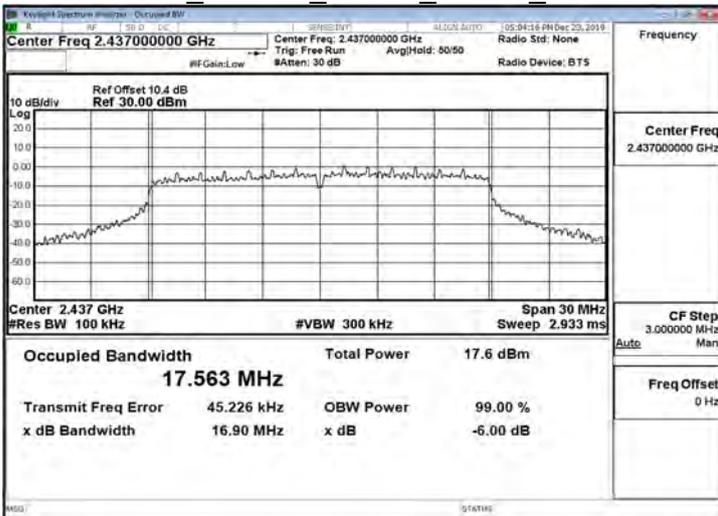
OBW 6dB 802.11n 20MHz Chain0 2412MHz



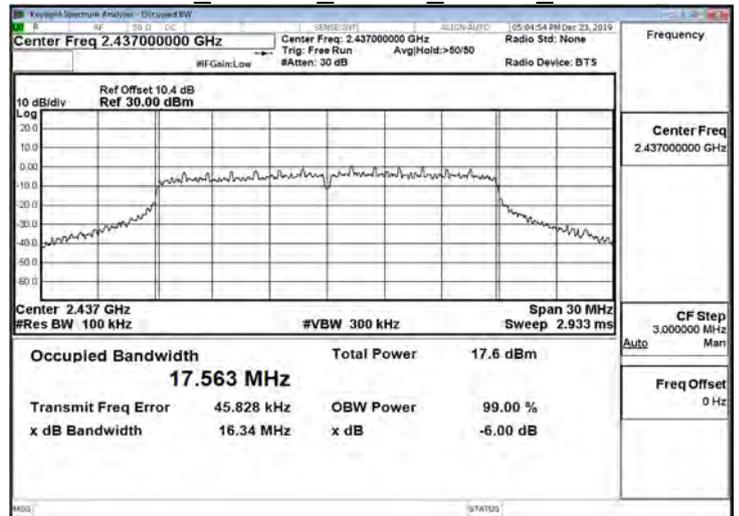
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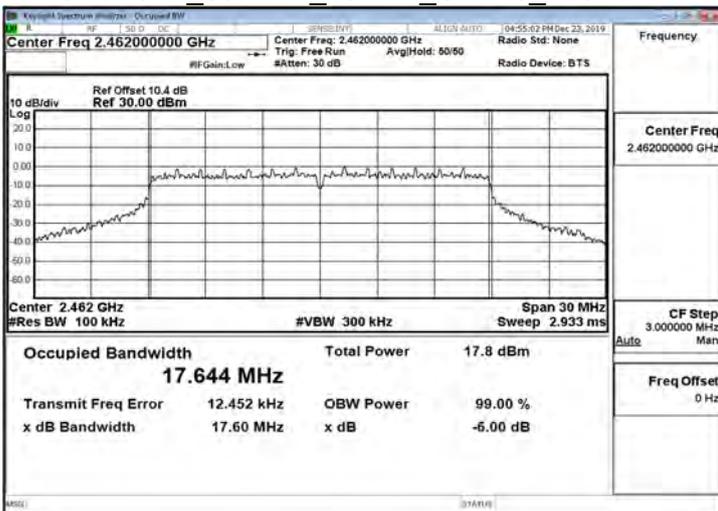
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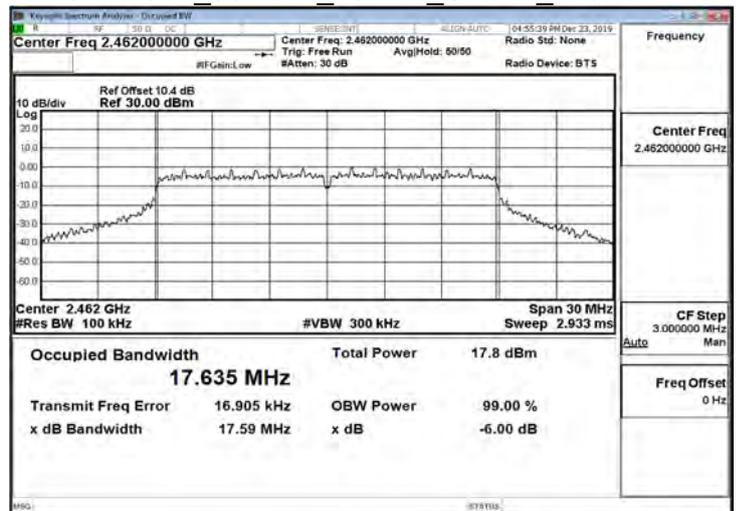
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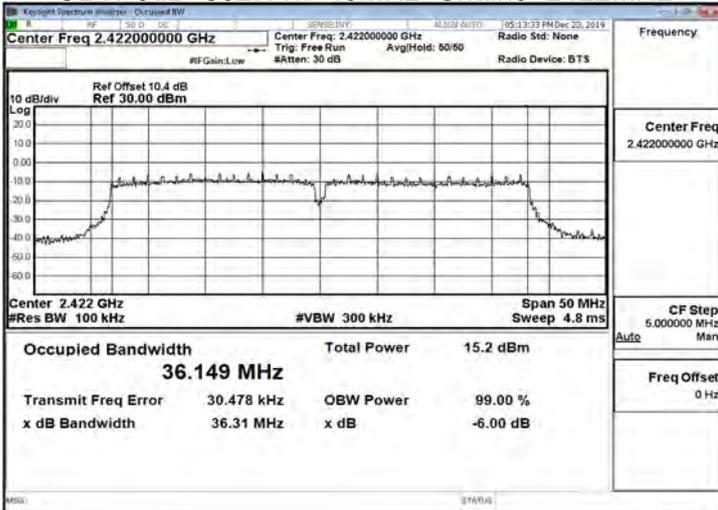


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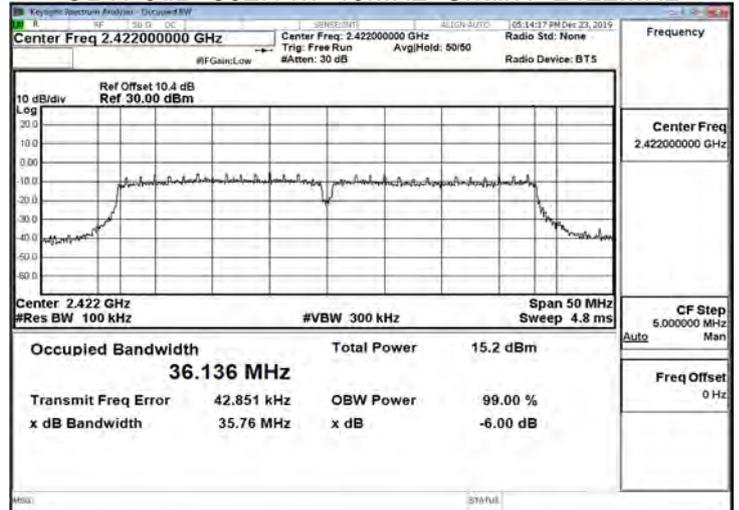
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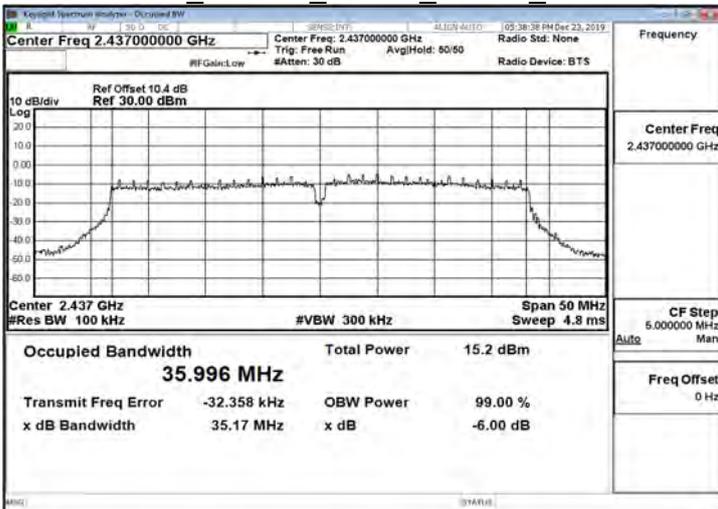
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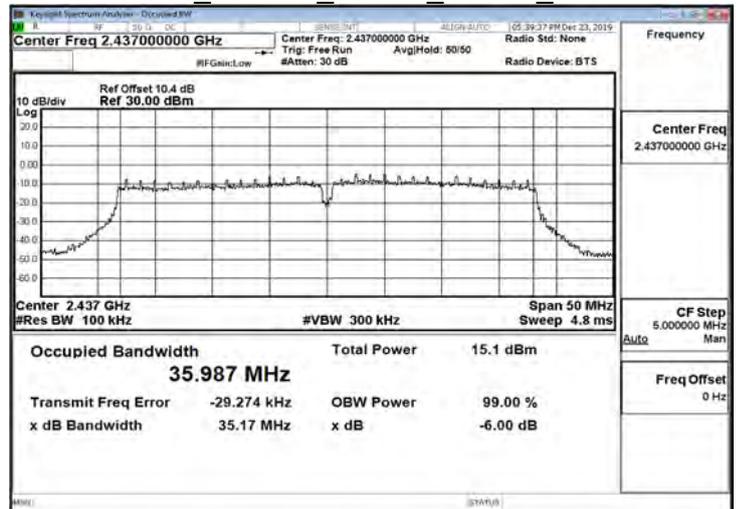
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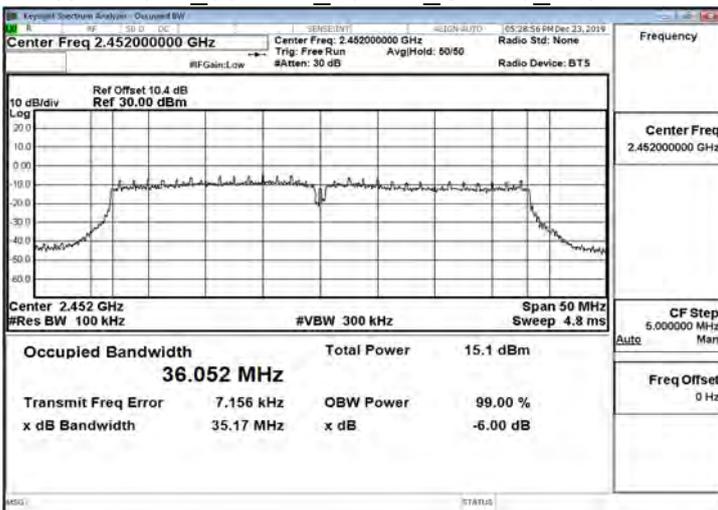
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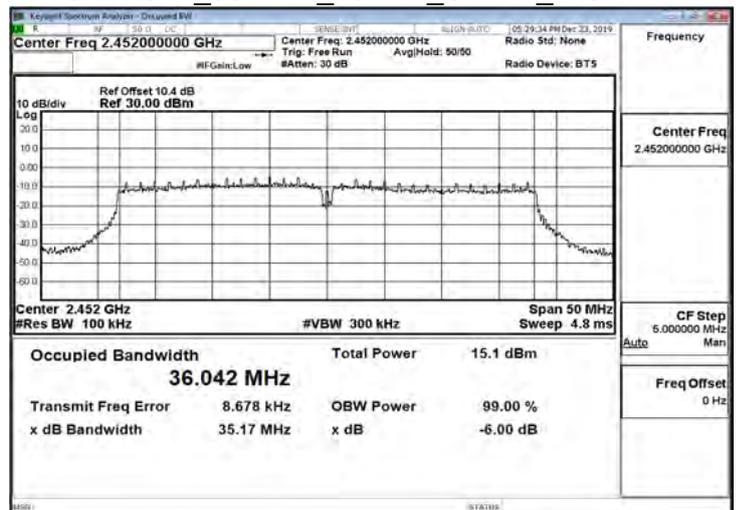
OBW 6dB 802.11n 40MHz Chain1 2437MHz



OBW 6dB 802.11n 40MHz Chain0 2452MHz



OBW 6dB 802.11n 40MHz Chain1 2452MHz



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## 10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

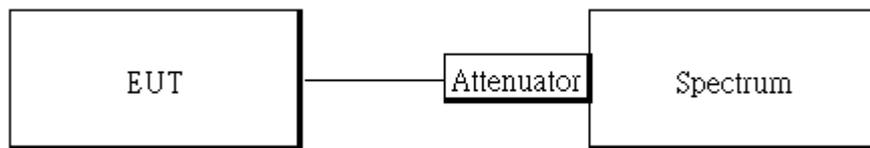
### 10.1 Standard Applicable

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).

### 10.2 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120200	03/06/2019	03/05/2020
DC Block	PASTERNAK	PE8210	RF256	11/20/2019	11/19/2020
Attenuator	Marvelous	MVE2213-10	RF80	11/20/2019	11/19/2020

### 10.3 Test SET-UP



### 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.

Use the peak marker function to determine the maximum amplitude level.

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**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.

**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	6.88	-13.12	2412	4.84	-15.16
2437	7.13	-12.87	2437	4.53	-15.47
2462	6.67	-13.33	2462	3.56	-16.44

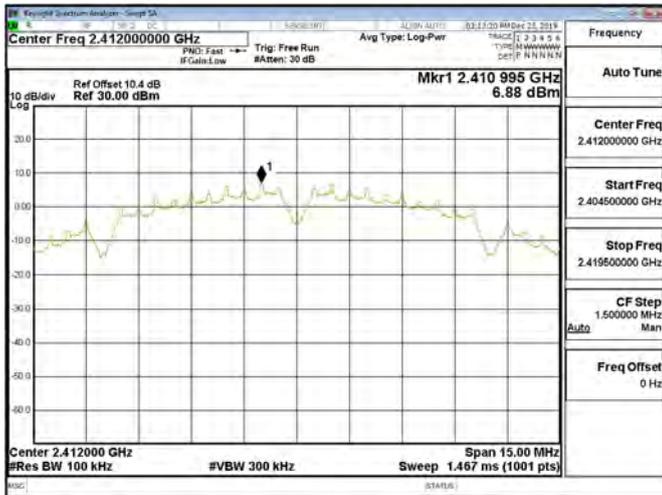
Reference Level of Limit 802.11n20 mode			Reference Level of Limit 802.11n40 MODE		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)	Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	4.35	-15.65	2422	-2.42	-22.42
2437	3.32	-16.68	2437	-1.96	-21.96
2462	2.94	-17.06	2452	-1.73	-21.73

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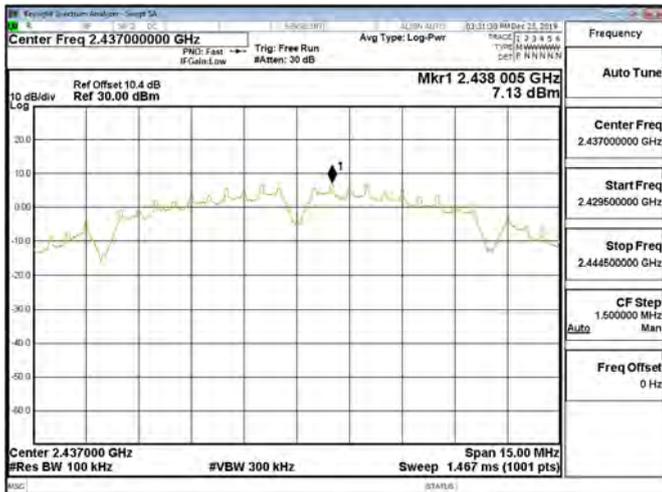
Reference Level\_802.11b\_20MHz\_2412MHz



Reference Level\_802.11g\_20MHz\_2412MHz



Reference Level\_802.11b\_20MHz\_2437MHz



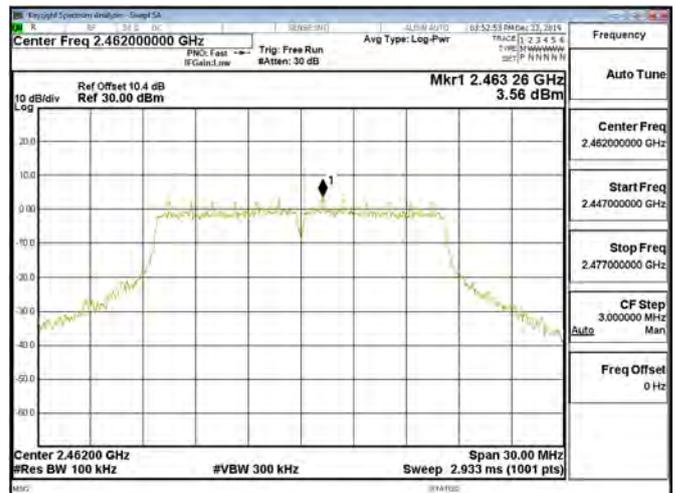
Reference Level\_802.11g\_20MHz\_2437MHz



Reference Level\_802.11b\_20MHz\_2462MHz



Reference Level\_802.11g\_20MHz\_2462MHz

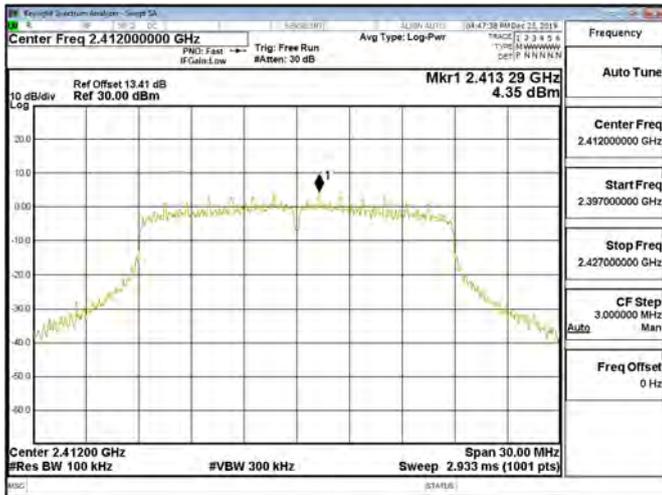


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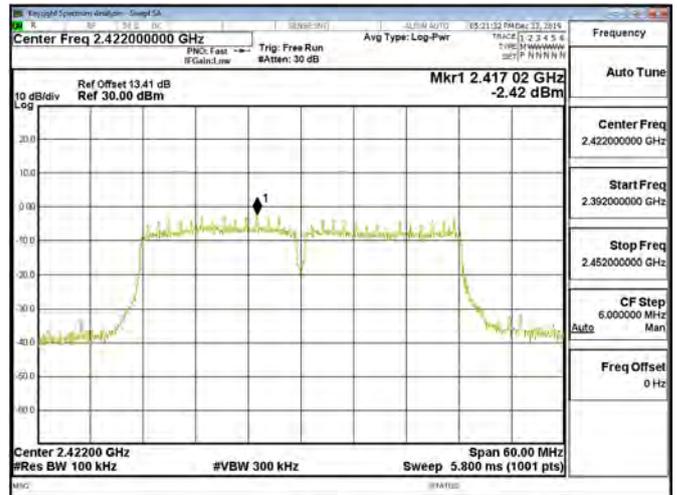
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Reference Level\_802.11n\_20MHz\_2412MHz



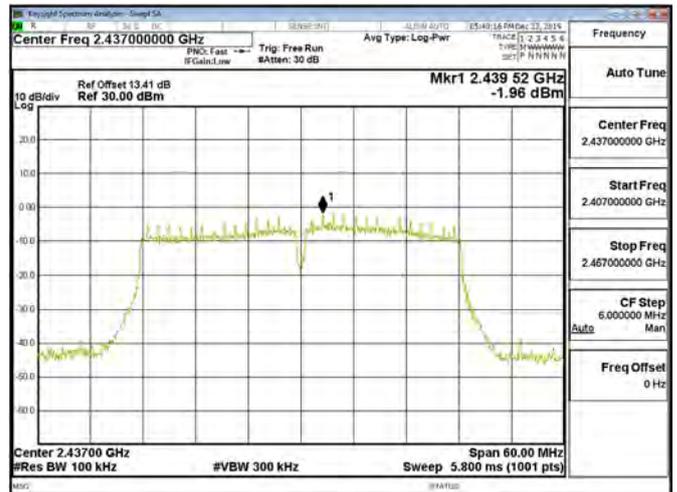
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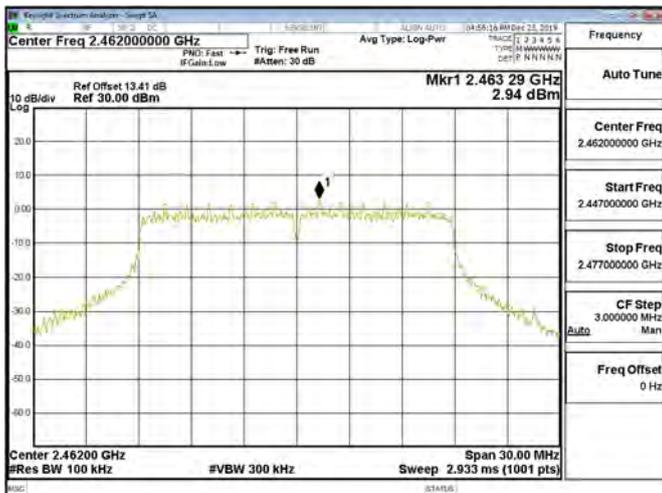
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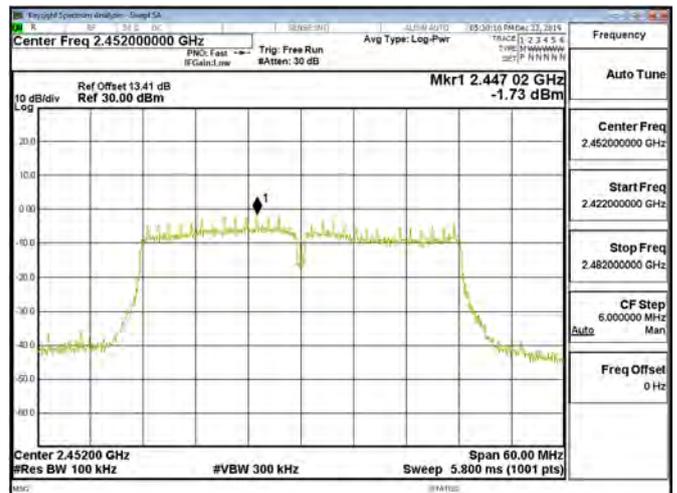
Reference Level\_802.11n\_40MHz\_2437MHz



Reference Level\_802.11n\_20MHz\_2462MHz



Reference Level\_802.11n\_40MHz\_2452MHz

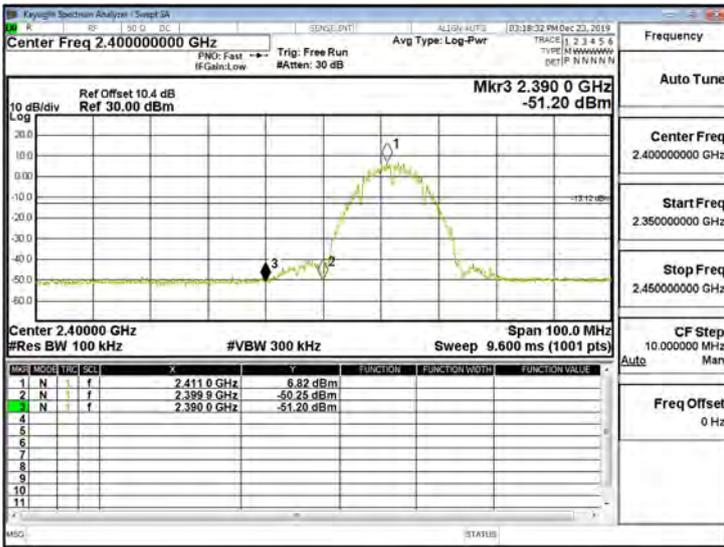


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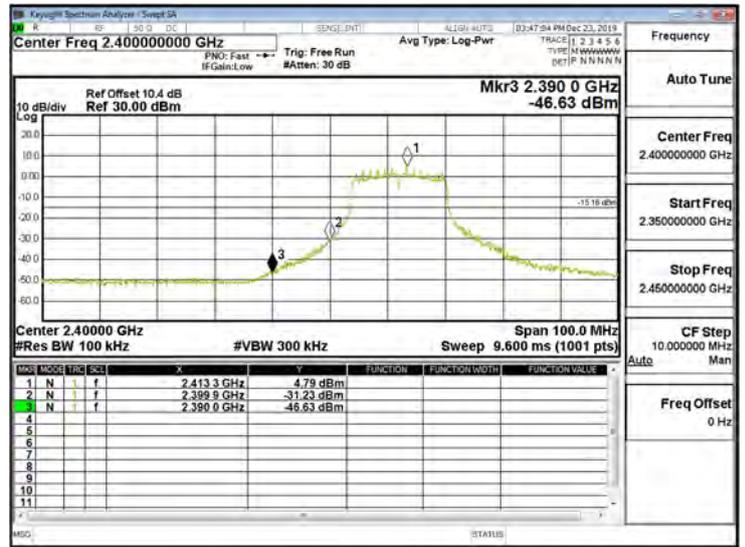
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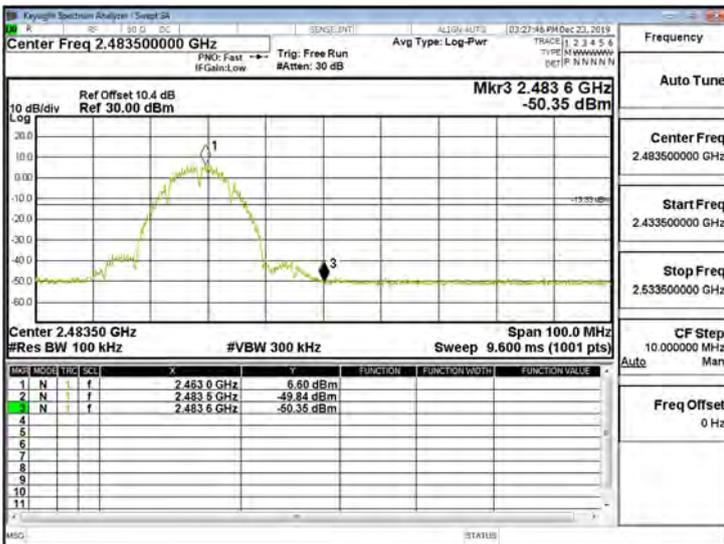
Band Edge\_802.11b\_20MHz\_2412MHz



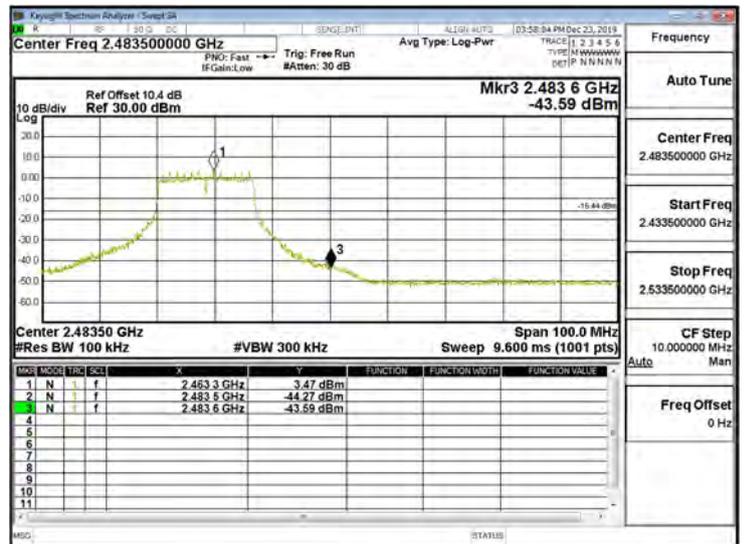
Band Edge\_802.11g\_20MHz\_2412MHz



Band Edge\_802.11b\_20MHz\_2462MHz



Band Edge\_802.11g\_20MHz\_2462MHz

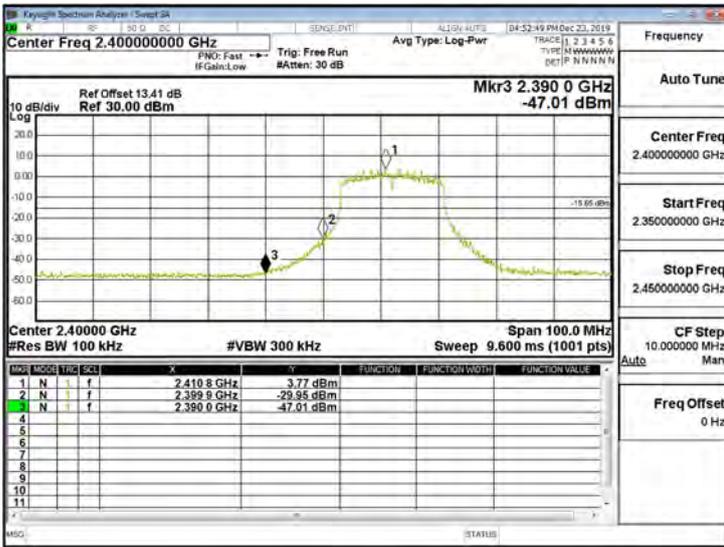


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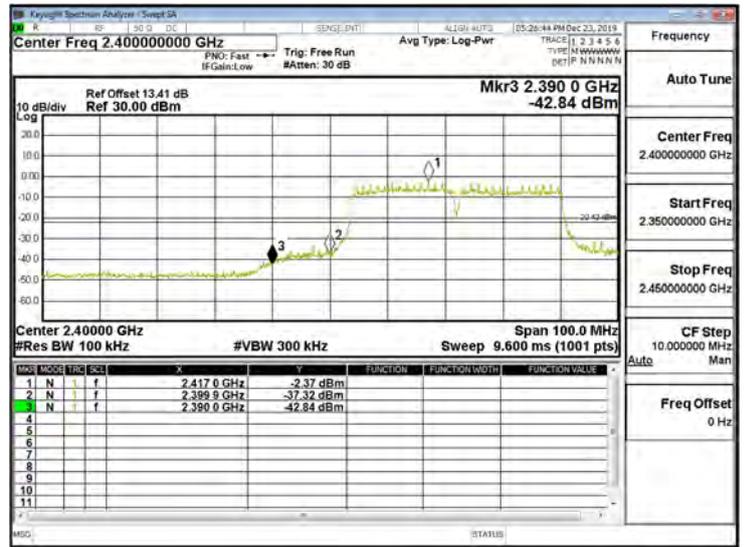
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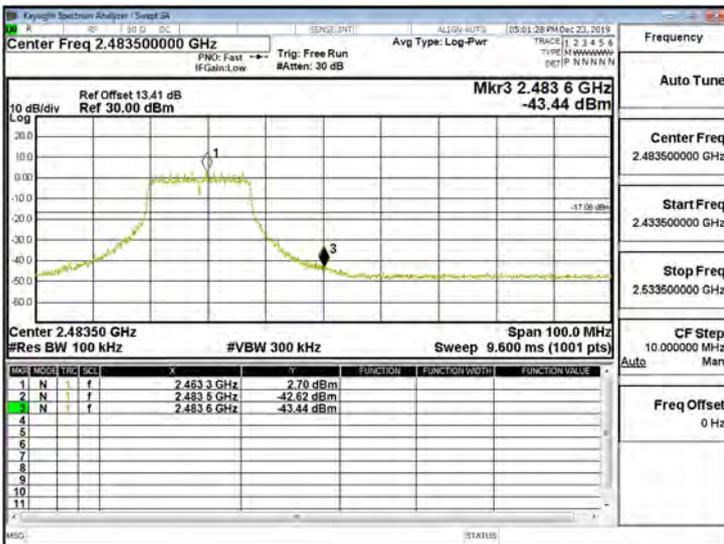
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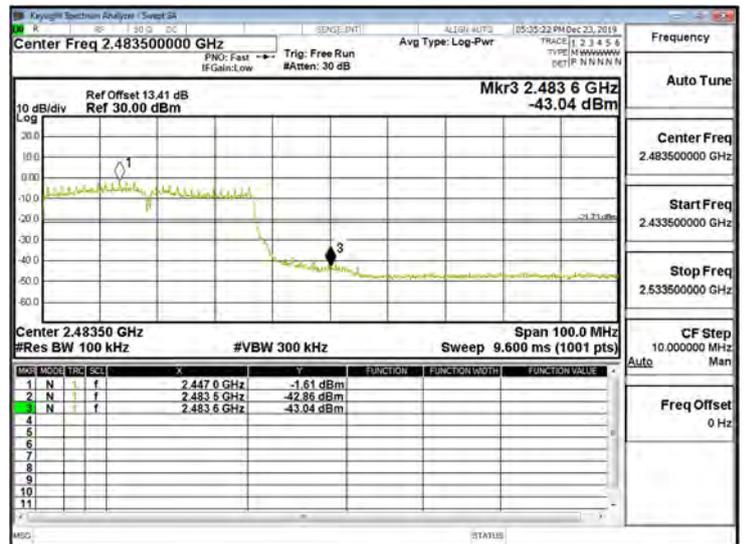
Band Edge\_802.11n\_40MHz\_2422MHz



Band Edge\_802.11n\_20MHz\_2462MHz



Band Edge\_802.11n\_40MHz\_2452MHz

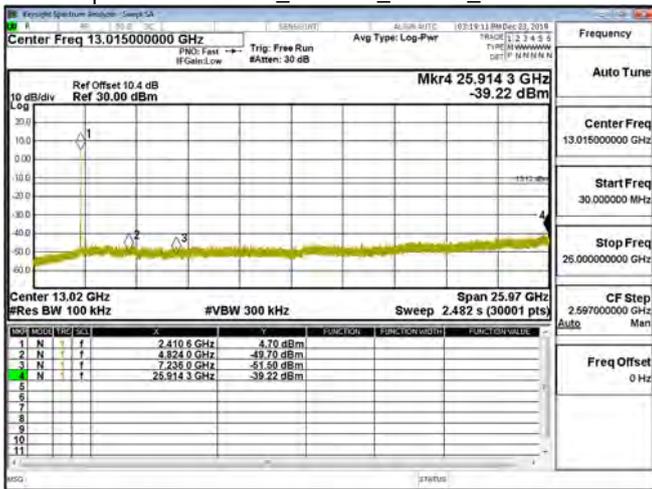


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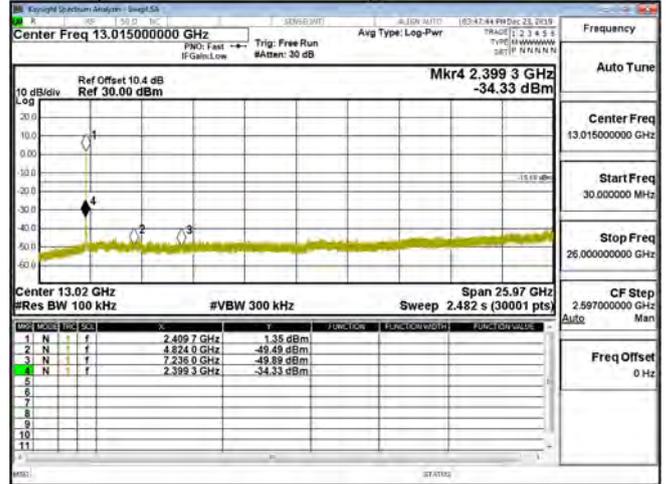
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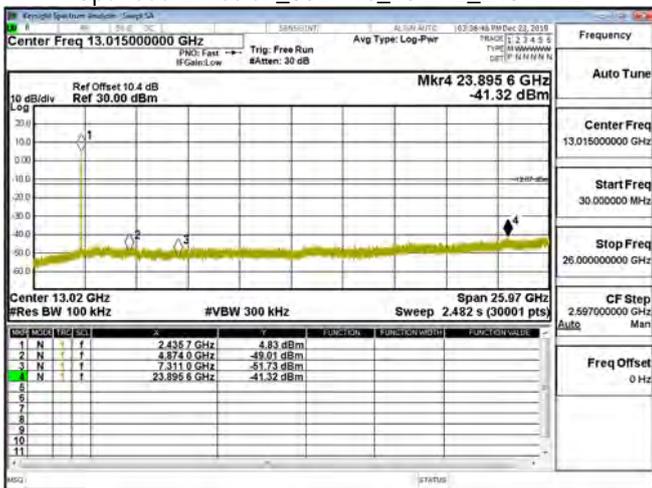
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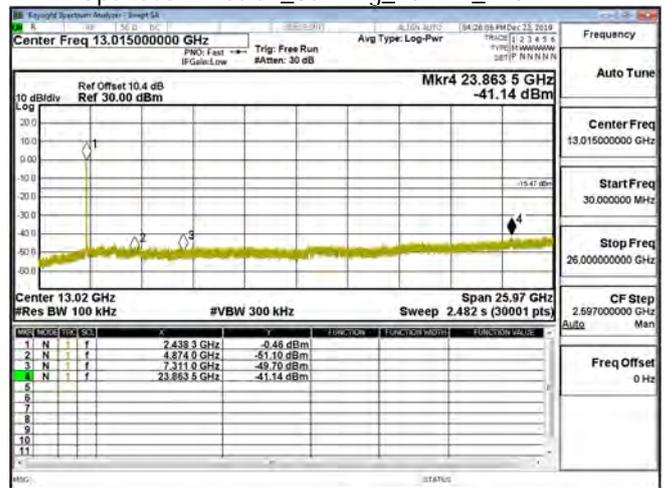
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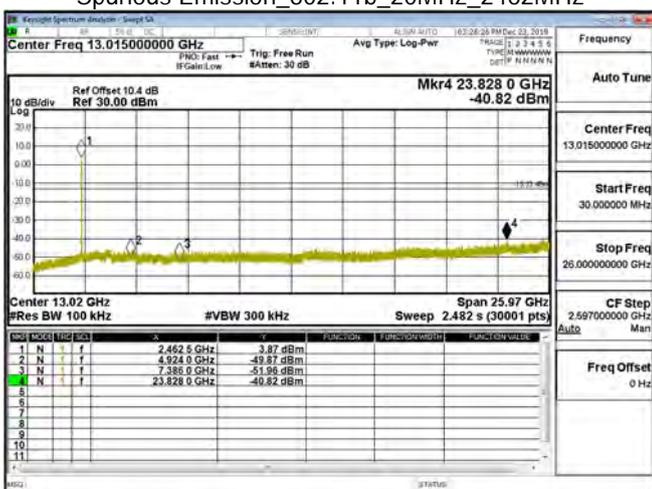
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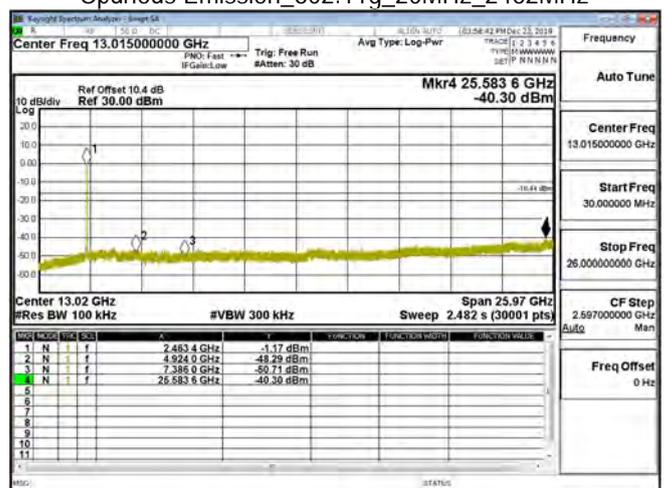
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Spurious Emission\_802.11b\_20MHz\_2462MHz



Spurious Emission\_802.11g\_20MHz\_2462MHz

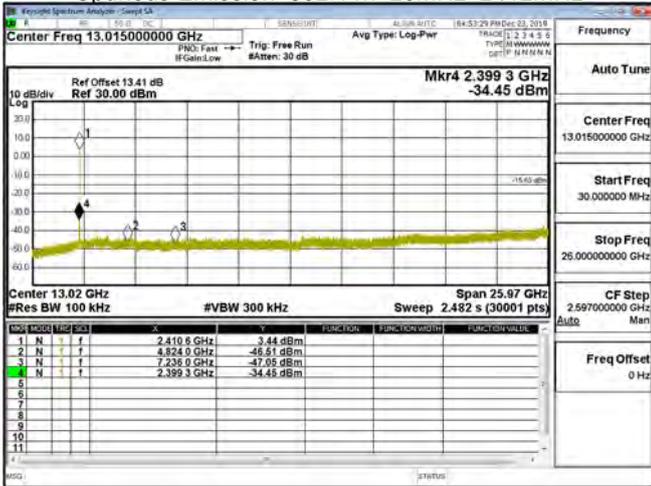


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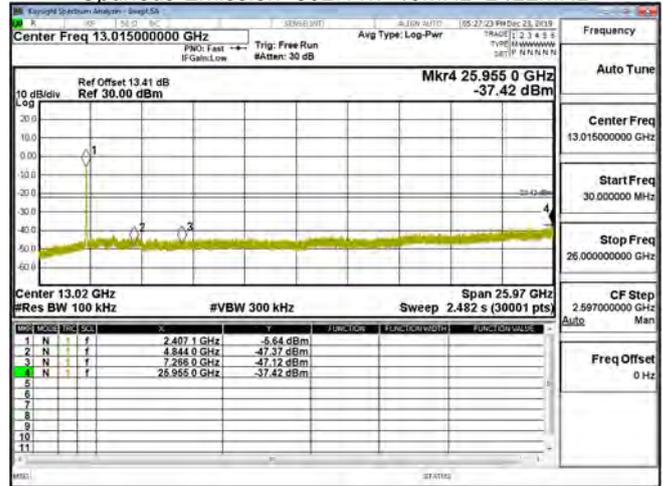
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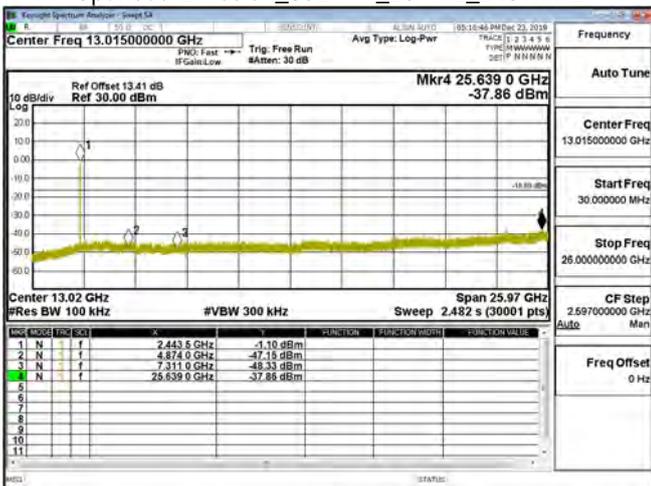
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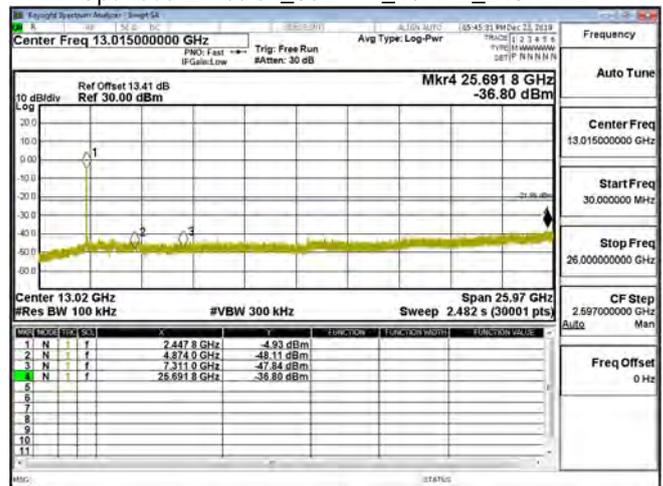
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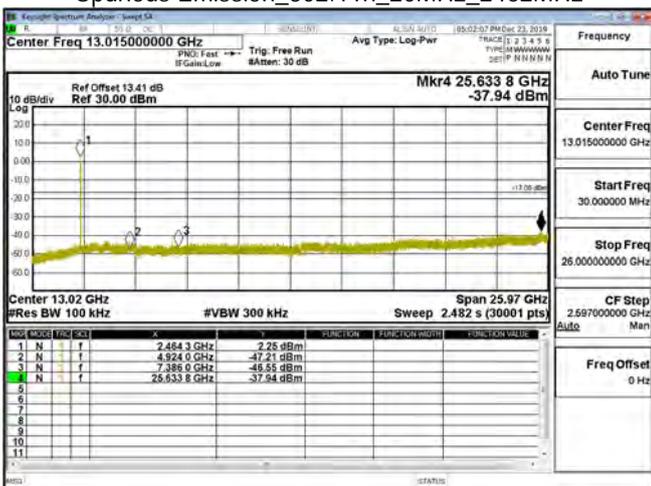
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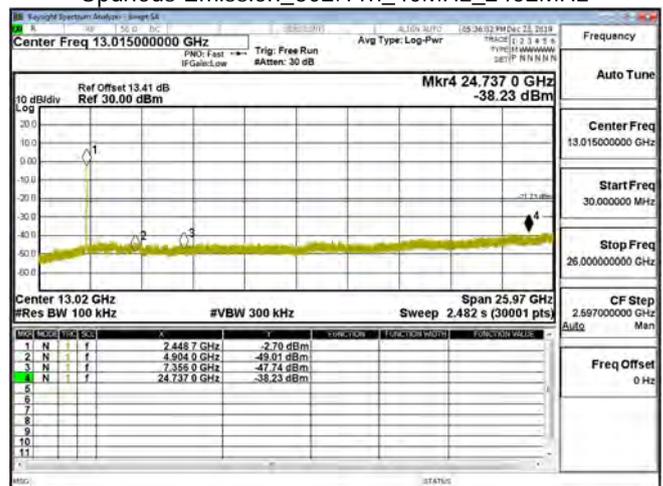
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Spurious Emission\_802.11n\_20MHz\_2462MHz



Spurious Emission\_802.11n\_40MHz\_2452MHz



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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	11/04/2019	11/03/2020
Horn Antenna	Schwarzbeck	BBHA9170	185	08/07/2019	08/06/2020
Horn Antenna	Schwarzbeck	BBHA9120D	1341	06/12/2019	06/11/2020
Loop Antenna	ETS.LIND-GREN	6502	143303	04/25/2019	04/24/2020
3m Site NSA	SGS	966 chamber D	N/A	07/12/2019	07/11/2020
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	06/10/2019	06/09/2020
Pre-Amplifier	EMC Instruments	EMC184045B	980135	11/20/2019	11/19/2020
Pre-Amplifier	EMC Instruments	EMC9135	980234	11/20/2019	11/19/2020
Pre-Amplifier	EMC Instruments	EMC12630SE	980271	11/20/2019	11/19/2020
Attenuator	Woken	WATT-218FS-10	RF25	11/20/2019	11/19/2020
High Pass Filter	R&S	F13 HPF 3GHz	RF64	11/20/2019	11/19/2020
Low Pass Filter	EWT	EWT-56-0019	RF46	11/20/2019	11/19/2020
Notch Filter	EWT	EWT-54-0038	RF55	11/20/2019	11/19/2020
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	11/20/2019	11/19/2020
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	11/20/2019	11/19/2020
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17413/4	11/20/2019	11/19/2020

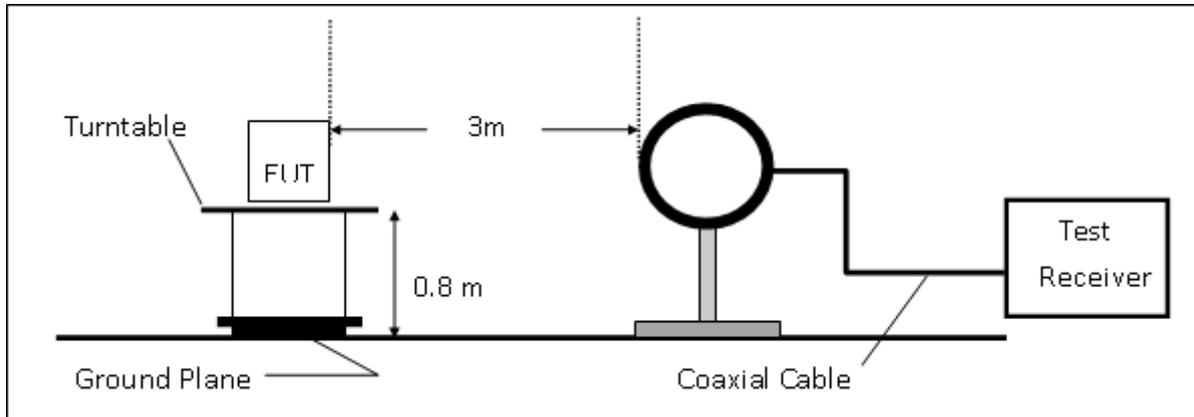
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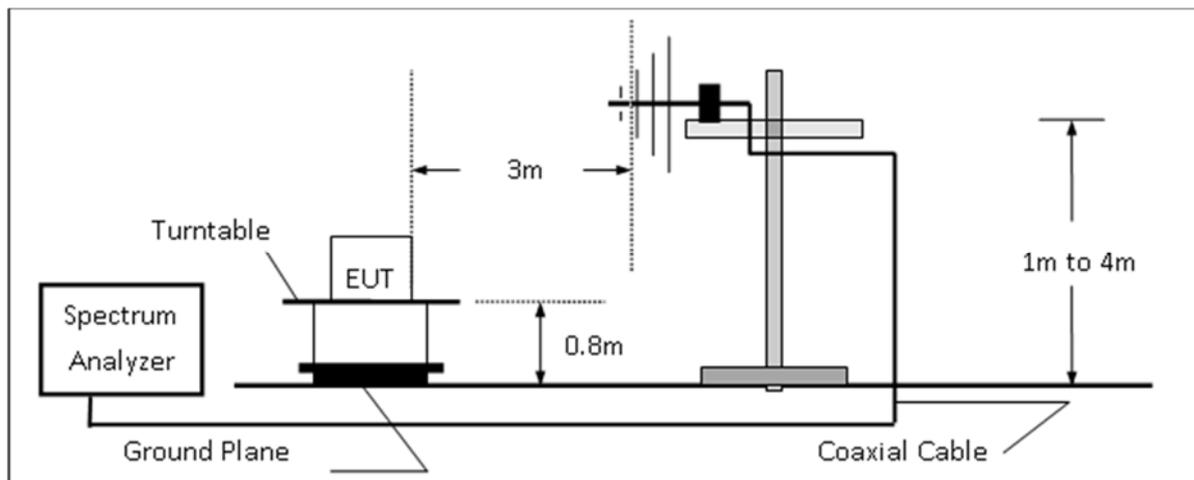
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### 11.3 Test SET-UP

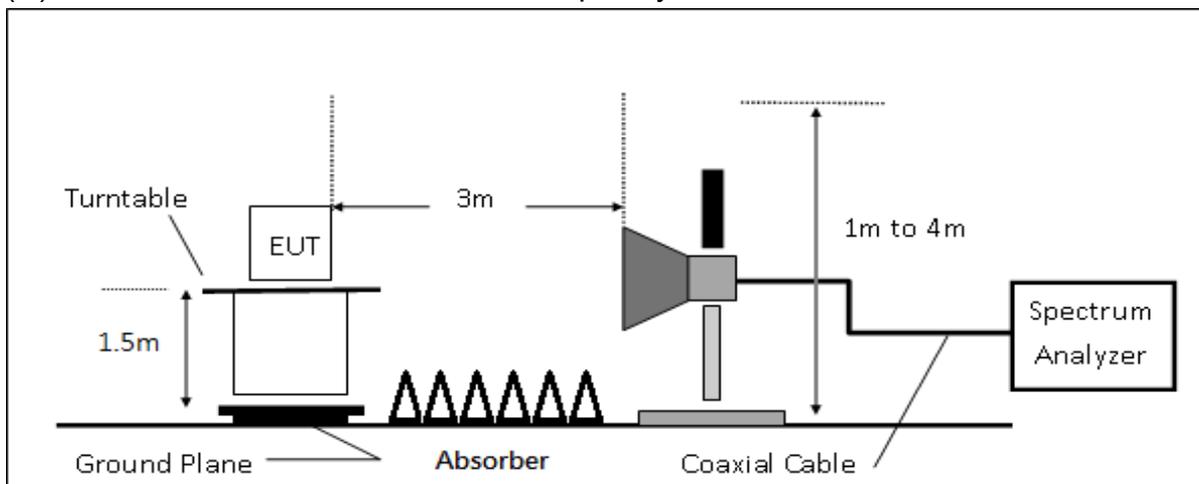
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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

The limit of the emission level is expressed in dBuV/m, which converts  $20 \cdot \log(uV/m)$

*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:

1. Refer to next page spectrum analyzer data chart and tabular data sheets.
2. Measurements are completed at peak and average level, the mark of average is the highest emission in restricted bands

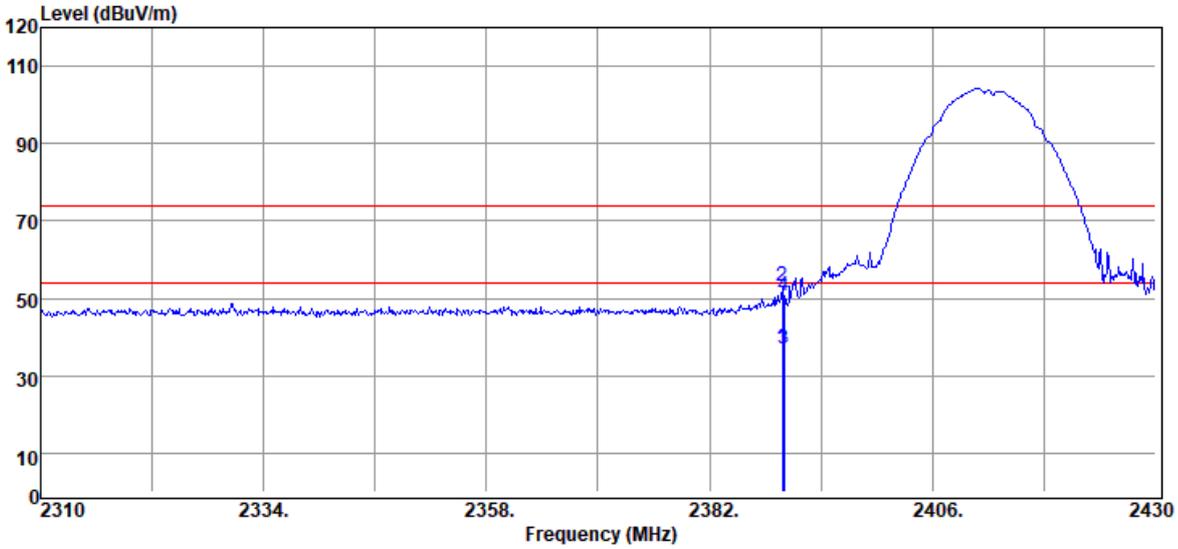
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### 11.7.1 Radiated Band Edge Measurement Result

Report Number	:E2/2019/C0005	Test Date	:2019-12-19
Operation Mode	:802.11b	Temp./Humi.	:22.8/60
Test Channel	:2412 MHz	Antenna Pol.	:VERTICAL
Test Mode	:BE CH LOW	Engineer	:Kailin
EUT Pol	:E2 Plan		



Freq. MHz	Detector Mode	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2389.80	Average	42.56	-5.52	37.04	54.00	-16.96
2389.80	Peak	58.76	-5.52	53.24	74.00	-20.76
2390.00	Average	42.66	-5.52	37.14	54.00	-16.86
2390.00	Peak	56.26	-5.52	50.74	74.00	-23.26

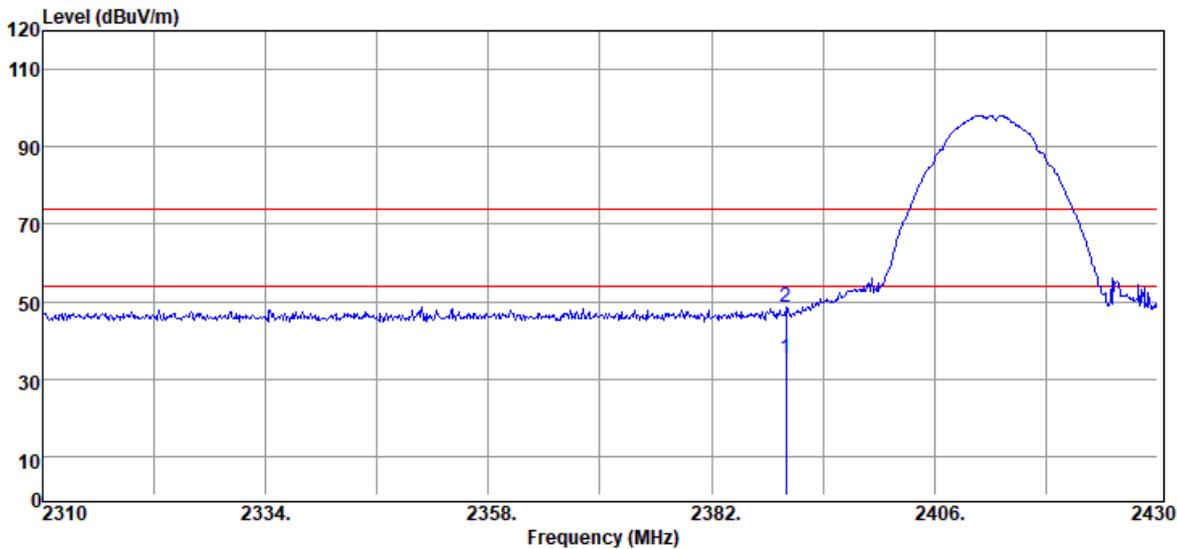
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Report Number :E2/2019/C0005  
 Operation Mode :802.11b  
 Test Channel :2412 MHz  
 Test Mode :BE CH LOW  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.8/60  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2390.00	Average	40.75	-5.52	35.23	54.00	-18.77
2390.00	Peak	54.03	-5.52	48.51	74.00	-25.49

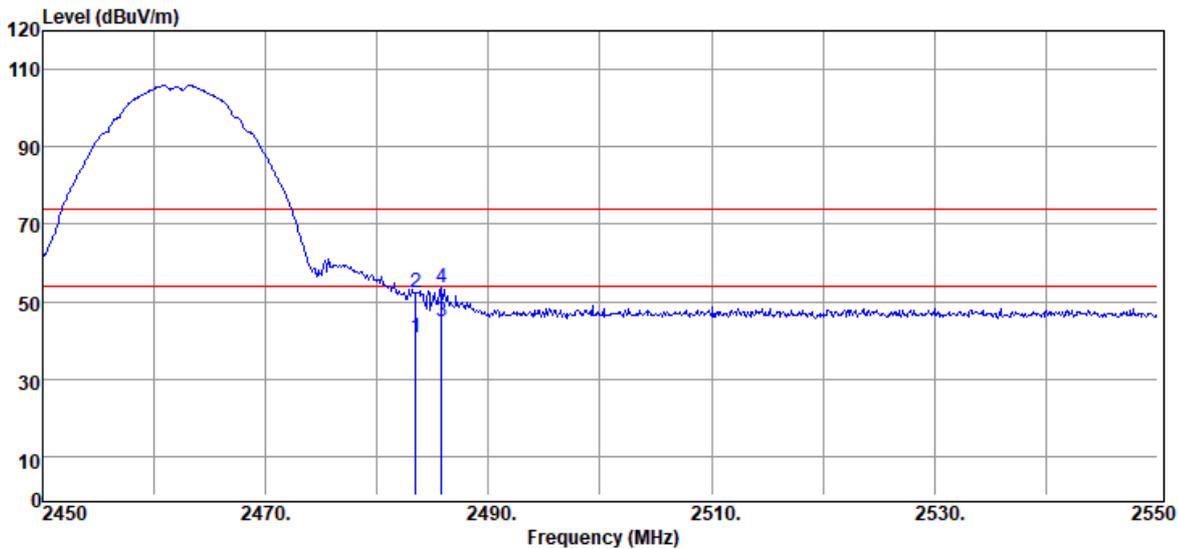
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Report Number :E2/2019/C0005  
 Operation Mode :802.11b  
 Test Channel :2462 MHz  
 Test Mode :BE CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.8/60  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode	Spectrum Reading Level d $\mu$ V	Factor dB	Actual FS d $\mu$ V/m	Limit @3m d $\mu$ V/m	Margin dB
2483.50	Average	45.92	-5.42	40.50	54.00	-13.50
2483.50	Peak	57.69	-5.42	52.27	74.00	-21.73
2485.80	Average	50.08	-5.42	44.66	54.00	-9.34
2485.80	Peak	58.87	-5.42	53.45	74.00	-20.55

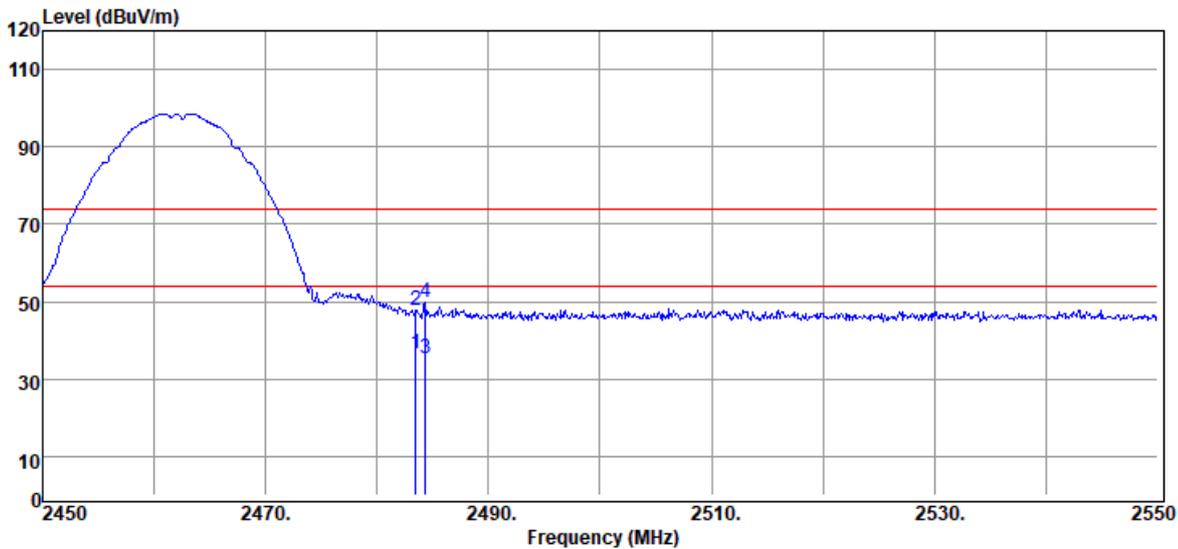
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 Operation Mode :802.11b  
 Test Channel :2462 MHz  
 Test Mode :BE CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.8/60  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2483.50	Average	42.16	-5.42	36.74	54.00	-17.26
2483.50	Peak	53.29	-5.42	47.87	74.00	-26.13
2484.30	Average	40.58	-5.42	35.16	54.00	-18.84
2484.30	Peak	55.10	-5.42	49.68	74.00	-24.32

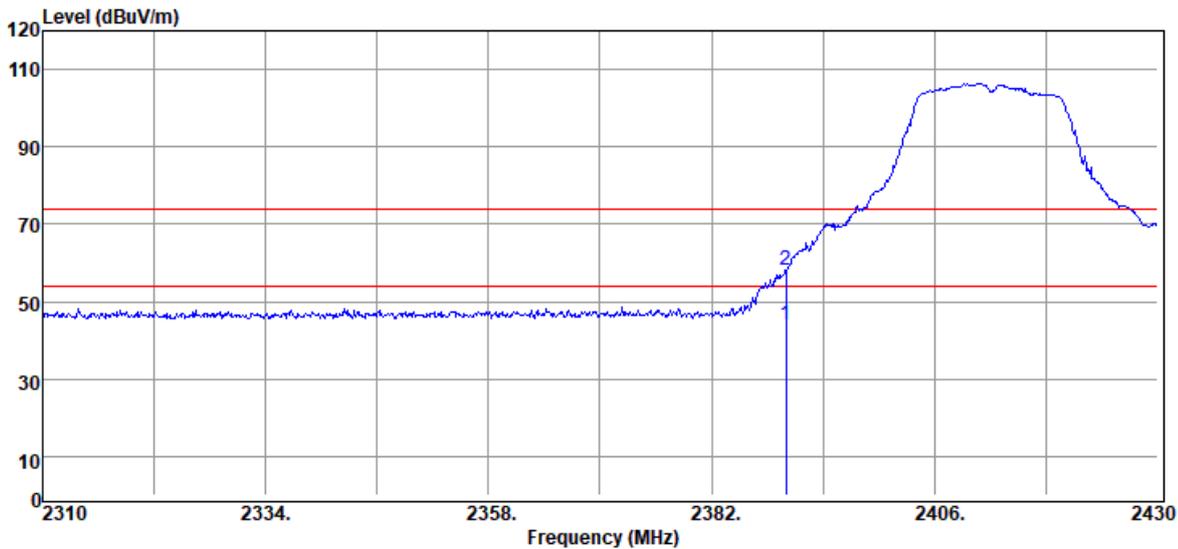
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Report Number :E2/2019/C0005  
 Operation Mode :802.11g  
 Test Channel :2412 MHz  
 Test Mode :BE CH LOW  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.8/60  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode	Spectrum Reading Level d $\mu$ V	Factor dB	Actual FS d $\mu$ V/m	Limit @3m d $\mu$ V/m	Margin dB
2390.00	Average	49.49	-5.52	43.97	54.00	-10.03
2390.00	Peak	63.85	-5.52	58.33	74.00	-15.67

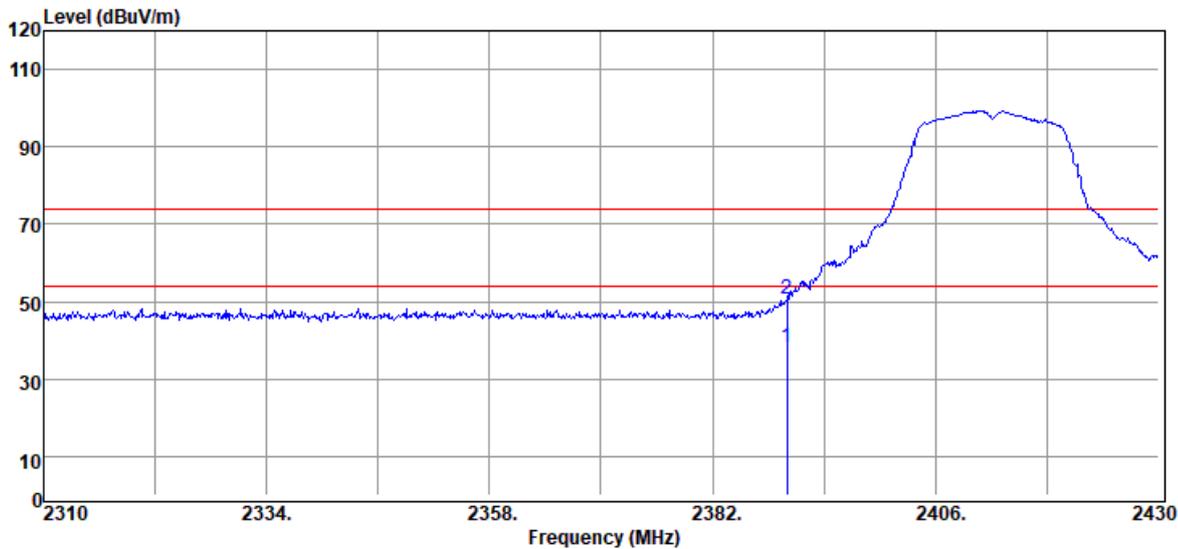
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 Test Channel :2412 MHz  
 Test Mode :BE CH LOW  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.8/60  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2390.00	Average	43.76	-5.52	38.24	54.00	-15.76
2390.00	Peak	56.29	-5.52	50.77	74.00	-23.23

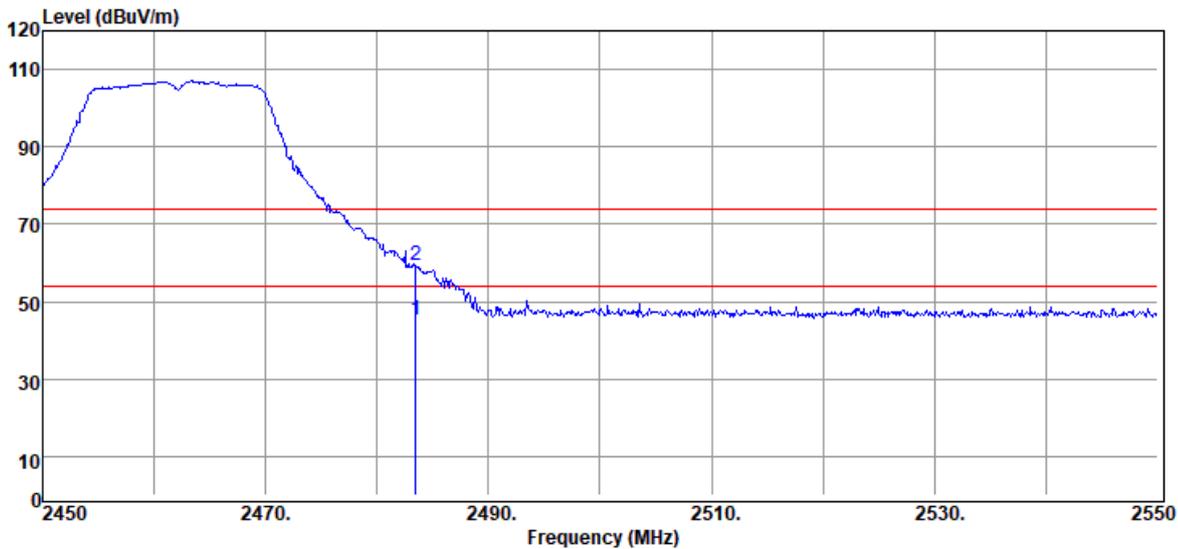
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 Test Channel :2462 MHz  
 Test Mode :BE CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.8/60  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level d $\mu$ V	Factor dB	Actual FS d $\mu$ V/m	Limit @3m d $\mu$ V/m	Margin dB
2483.50	Average	50.79	-5.42	45.37	54.00	-8.63
2483.50	Peak	65.00	-5.42	59.58	74.00	-14.42

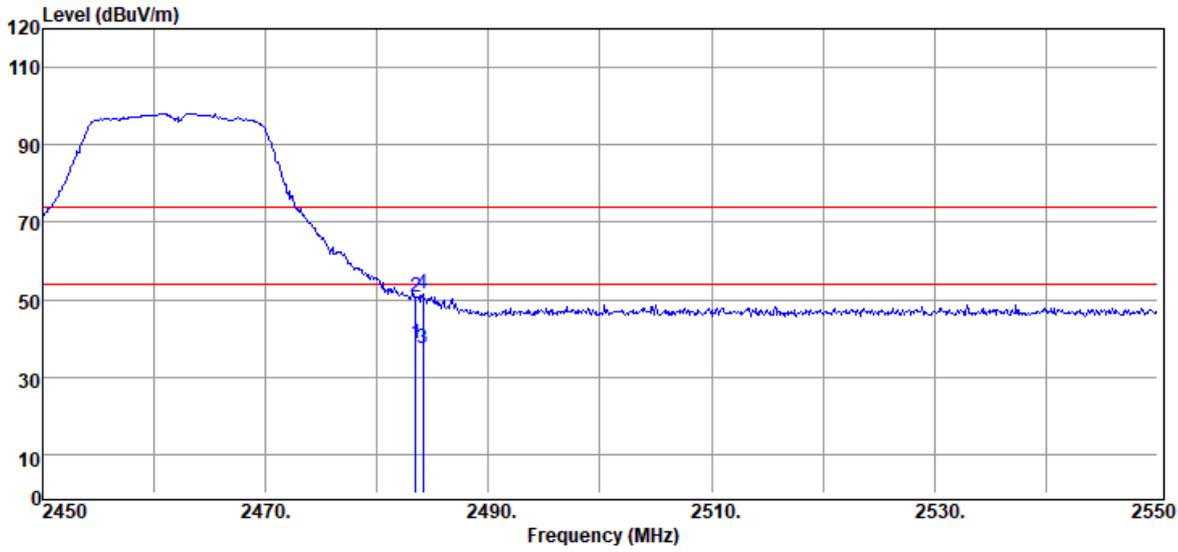
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 Test Channel :2462 MHz  
 Test Mode :BE CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.8/60  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode	Spectrum Reading Level d $\mu$ V	Factor dB	Actual FS d $\mu$ V/m	Limit @3m d $\mu$ V/m	Margin dB
2483.50	Average	44.01	-5.42	38.59	54.00	-15.41
2483.50	Peak	56.01	-5.42	50.59	74.00	-23.41
2484.10	Average	42.98	-5.42	37.56	54.00	-16.44
2484.10	Peak	56.92	-5.42	51.50	74.00	-22.50

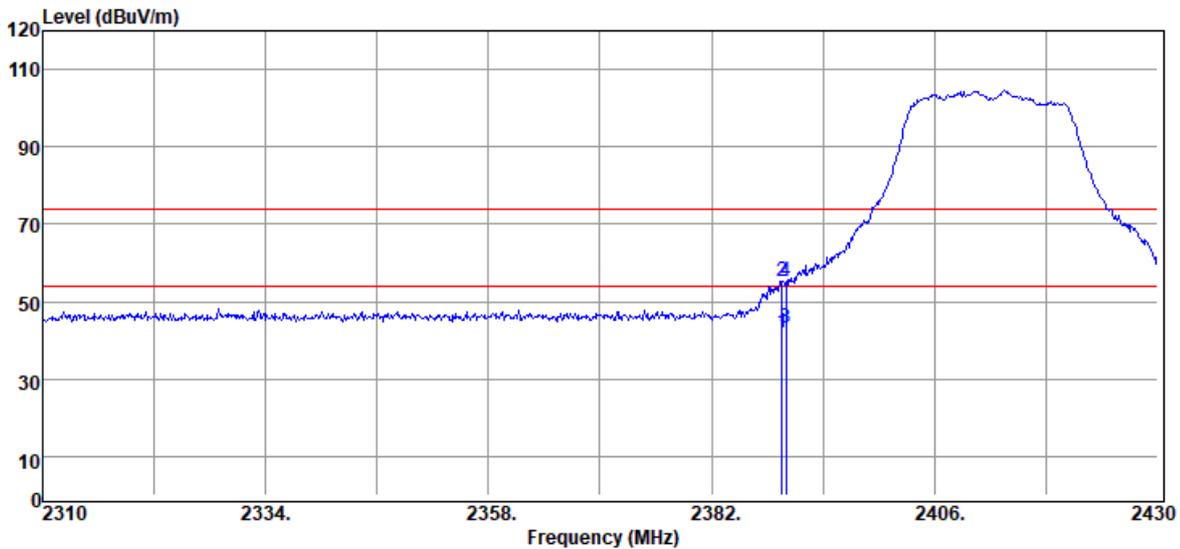
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n20  
 Test Channel :2412 MHz  
 Test Mode :BE CH LOW  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.8/60  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode	Spectrum Reading Level d $\mu$ V	Factor dB	Actual FS d $\mu$ V/m	Limit @3m d $\mu$ V/m	Margin dB
2389.56	Average	47.49	-5.52	41.97	54.00	-12.03
2389.56	Peak	60.88	-5.52	55.36	74.00	-18.64
2390.00	Average	48.72	-5.52	43.20	54.00	-10.80
2390.00	Peak	60.90	-5.52	55.38	74.00	-18.62

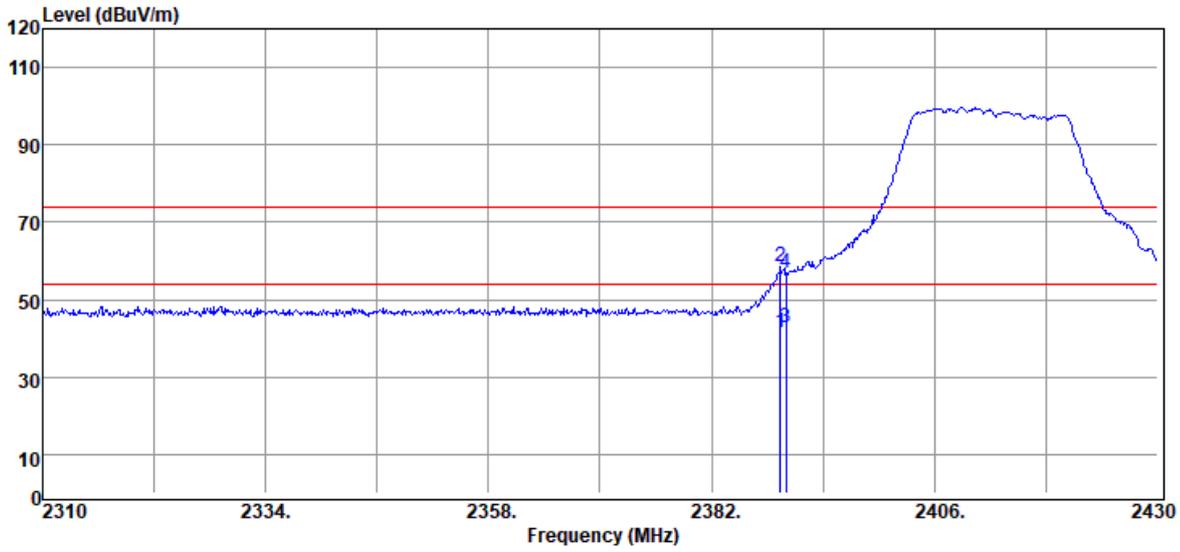
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n20  
 Test Channel :2412 MHz  
 Test Mode :BE CH LOW  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.8/60  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode	Spectrum Reading Level d $\mu$ V	Factor dB	Actual FS d $\mu$ V/m	Limit @3m d $\mu$ V/m	Margin dB
2389.44	Average	47.25	-5.52	41.73	54.00	-12.27
2389.44	Peak	64.18	-5.52	58.66	74.00	-15.34
2390.00	Average	48.46	-5.52	42.94	54.00	-11.06
2390.00	Peak	62.27	-5.52	56.75	74.00	-17.25

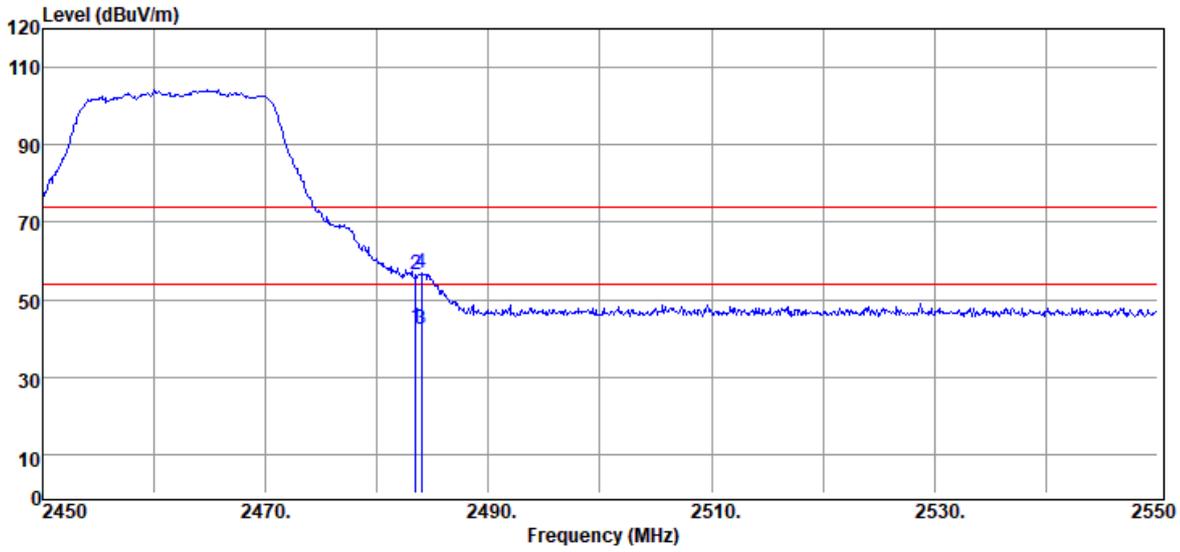
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n20  
 Test Channel :2462 MHz  
 Test Mode :BE CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.8/60  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2483.50	Average	48.28	-5.42	42.86	54.00	-11.14
2483.50	Peak	61.70	-5.42	56.28	74.00	-17.72
2484.00	Average	47.95	-5.42	42.53	54.00	-11.47
2484.00	Peak	62.15	-5.42	56.73	74.00	-17.27

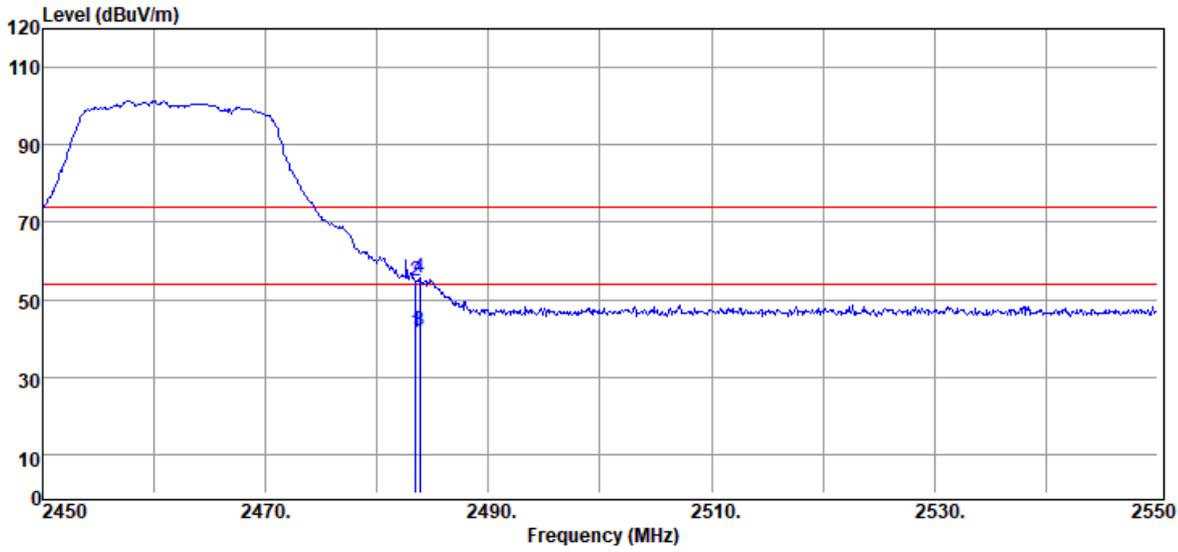
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n20  
 Test Channel :2462 MHz  
 Test Mode :BE CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.8/60  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2483.50	Average	47.11	-5.42	41.69	54.00	-12.31
2483.50	Peak	60.24	-5.42	54.82	74.00	-19.18
2483.80	Average	47.33	-5.42	41.91	54.00	-12.09
2483.80	Peak	61.00	-5.42	55.58	74.00	-18.42

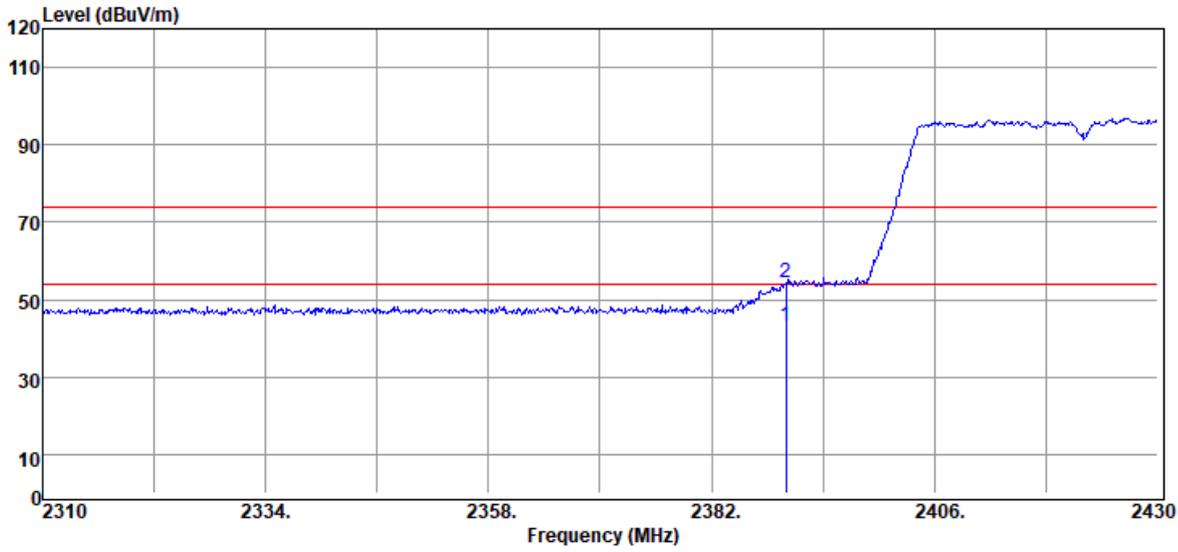
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n40  
 Test Channel :2422 MHz  
 Test Mode :BE CH LOW  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode	Spectrum Reading Level d $\mu$ V	Factor dB	Actual FS d $\mu$ V/m	Limit @3m d $\mu$ V/m	Margin dB
2390.00	Average	48.56	-5.52	43.04	54.00	-10.96
2390.00	Peak	60.10	-5.52	54.58	74.00	-19.42

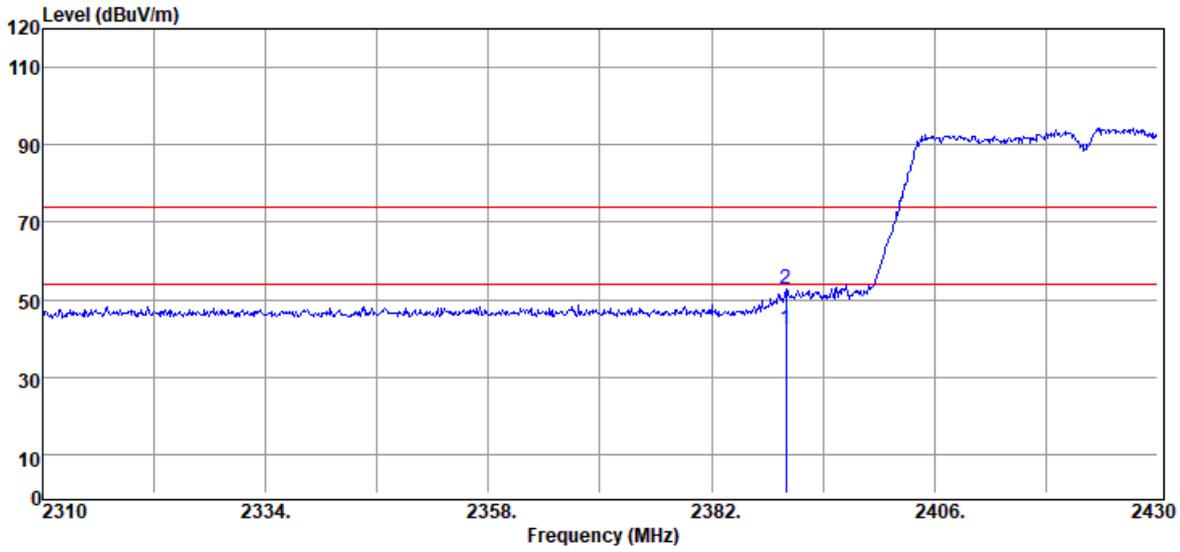
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n40  
 Test Channel :2422 MHz  
 Test Mode :BE CH LOW  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode	Spectrum Reading Level d $\mu$ V	Factor dB	Actual FS d $\mu$ V/m	Limit @3m d $\mu$ V/m	Margin dB
2390.00	Average	47.92	-5.52	42.40	54.00	-11.60
2390.00	Peak	58.14	-5.52	52.62	74.00	-21.38

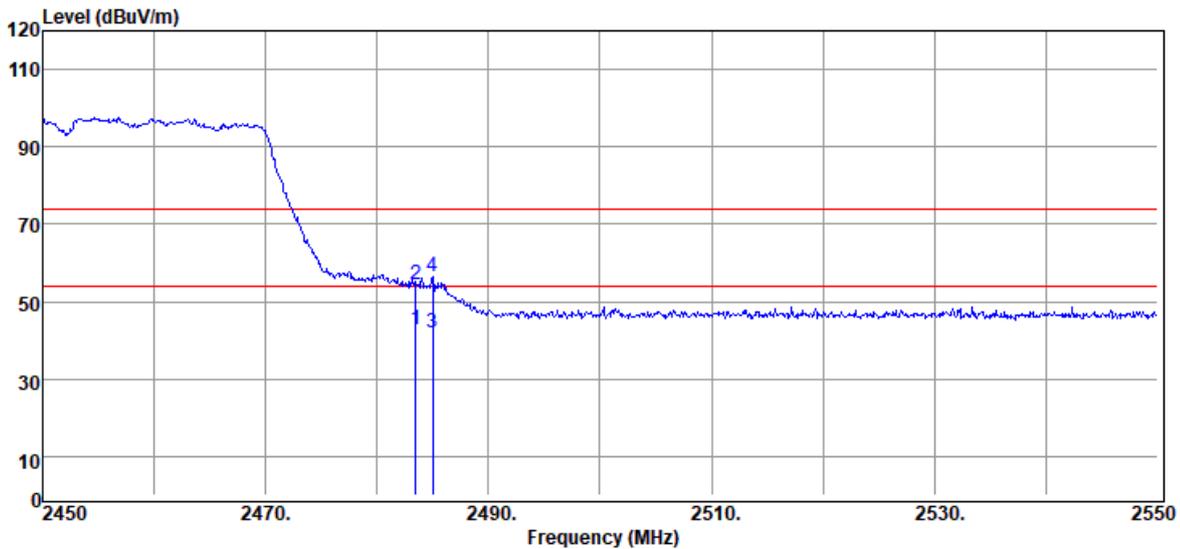
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n40  
 Test Channel :2452 MHz  
 Test Mode :BE CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2483.50	Average	48.27	-5.42	42.85	54.00	-11.15
2483.50	Peak	59.99	-5.42	54.57	74.00	-19.43
2485.00	Average	47.22	-5.42	41.80	54.00	-12.20
2485.00	Peak	62.04	-5.42	56.62	74.00	-17.38

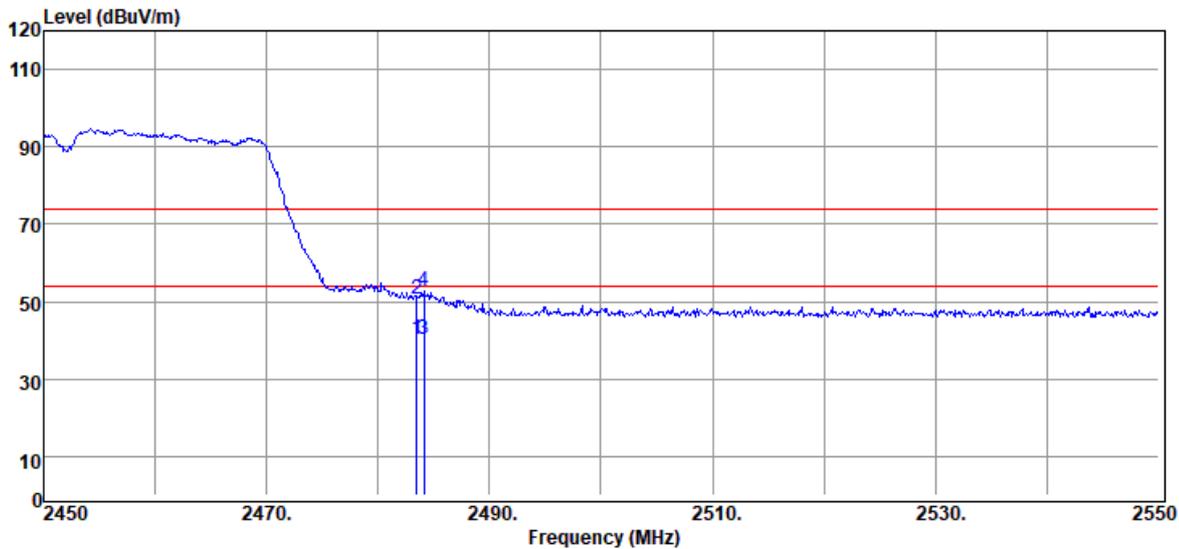
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n40  
 Test Channel :2452 MHz  
 Test Mode :BE CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
2483.50	Average	45.71	-5.42	40.29	54.00	-13.71
2483.50	Peak	55.91	-5.42	50.49	74.00	-23.51
2484.10	Average	45.66	-5.42	40.24	54.00	-13.76
2484.10	Peak	58.07	-5.42	52.65	74.00	-21.35

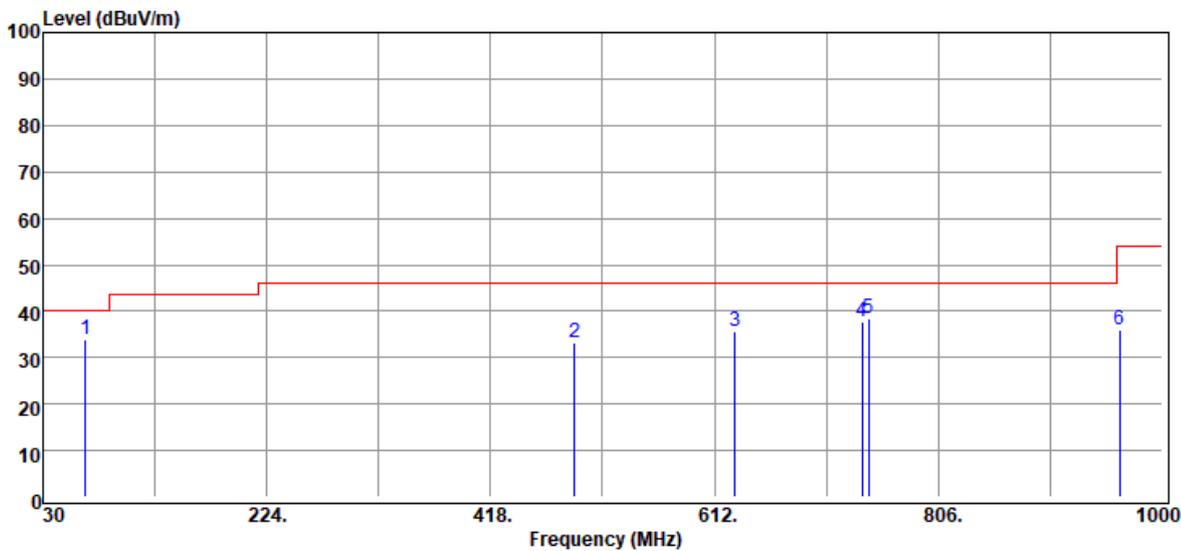
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### 11.7.2 Below 1GHz Worst-Case Emission:

Report Number	:E2/2019/C0005	Test Date	:2019-12-19
Operation Mode	:802.11b	Temp./Humi.	:22.6/60
Test Channel	:2437 MHz	Antenna Pol.	:VERTICAL
Test Mode	:TX CH MID	Engineer	:Kailin
EUT Pol	:E2 Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
66.86	Peak	52.46	-18.59	33.87	40.00	-6.13
490.75	Peak	44.28	-11.10	33.18	46.00	-12.82
629.46	Peak	43.70	-8.13	35.57	46.00	-10.43
740.04	Peak	44.92	-7.05	37.87	46.00	-8.13
745.86	Peak	45.39	-6.86	38.53	46.00	-7.47
963.14	Peak	40.08	-4.25	35.83	54.00	-18.17

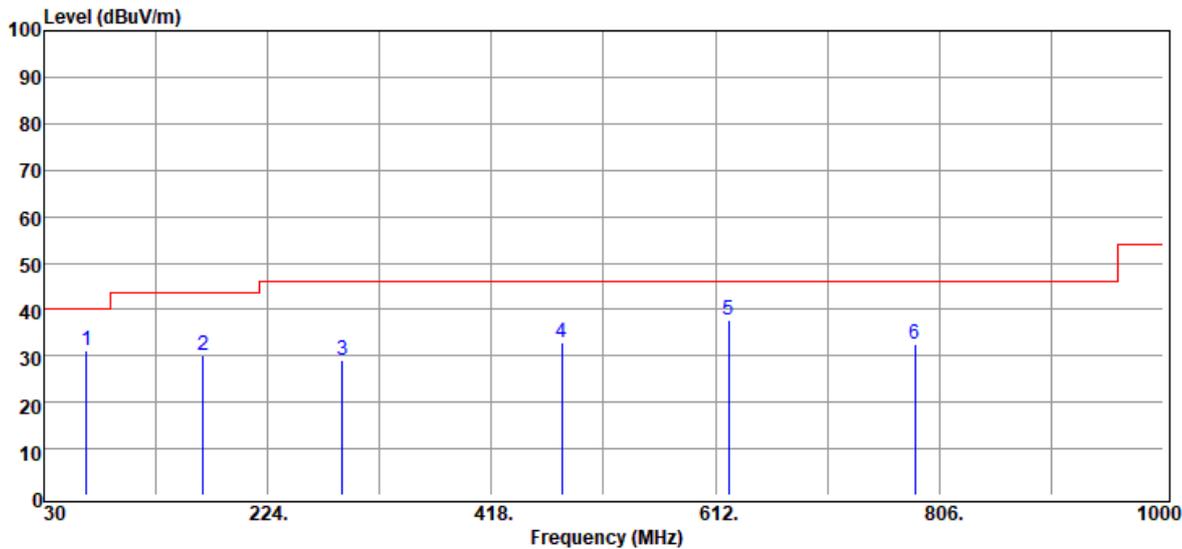
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Report Number :E2/2019/C0005  
 Operation Mode :802.11b  
 Test Channel :2437 MHz  
 Test Mode :TX CH MID  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.6/60  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
66.86	Peak	49.61	-18.59	31.02	40.00	-8.98
167.74	Peak	46.17	-16.04	30.13	43.50	-13.37
288.99	Peak	44.77	-15.58	29.19	46.00	-16.81
479.11	Peak	44.26	-11.24	33.02	46.00	-12.98
623.64	Peak	46.11	-8.30	37.81	46.00	-8.19
784.66	Peak	38.61	-6.17	32.44	46.00	-13.56

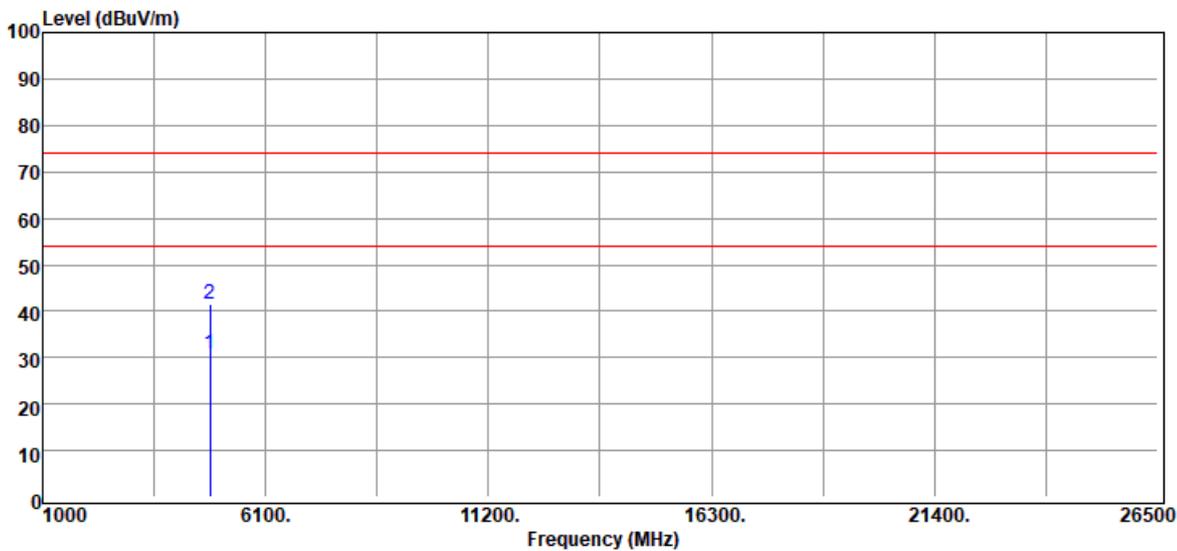
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### 11.7.3 Above 1GHz Emission:

Report Number	:E2/2019/C0005	Test Date	:2019-12-19
Operation Mode	:802.11b	Temp./Humi.	:22.3/58
Test Channel	:2412 MHz	Antenna Pol.	:VERTICAL
Test Mode	:TX CH LOW	Engineer	:Kailin
EUT Pol	:E2 Plan		



Freq. MHz	Detector Mode	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4824.00	Average	31.07	-0.34	30.73	54.00	-23.27
4824.00	Peak	41.96	-0.34	41.62	74.00	-32.38

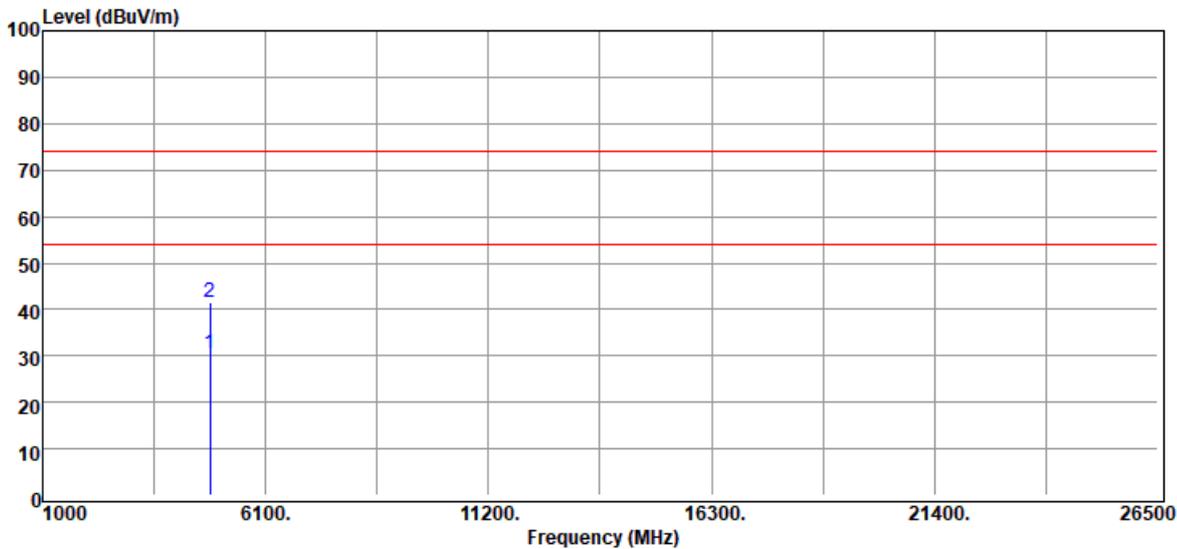
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Report Number :E2/2019/C0005  
 Operation Mode :802.11b  
 Test Channel :2412 MHz  
 Test Mode :TX CH LOW  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4824.00	Average	30.72	-0.34	30.38	54.00	-23.62
4824.00	Peak	41.83	-0.34	41.49	74.00	-32.51

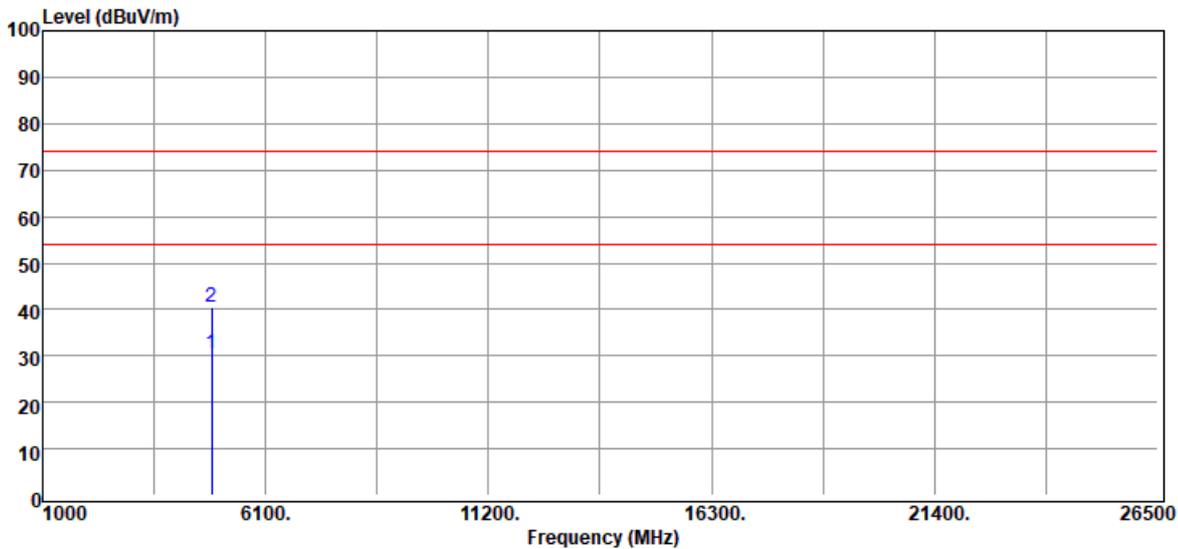
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Report Number :E2/2019/C0005  
 Operation Mode :802.11b  
 Test Channel :2437 MHz  
 Test Mode :TX CH MID  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4874.00	Average	30.96	-0.42	30.54	54.00	-23.46
4874.00	Peak	40.94	-0.42	40.52	74.00	-33.48

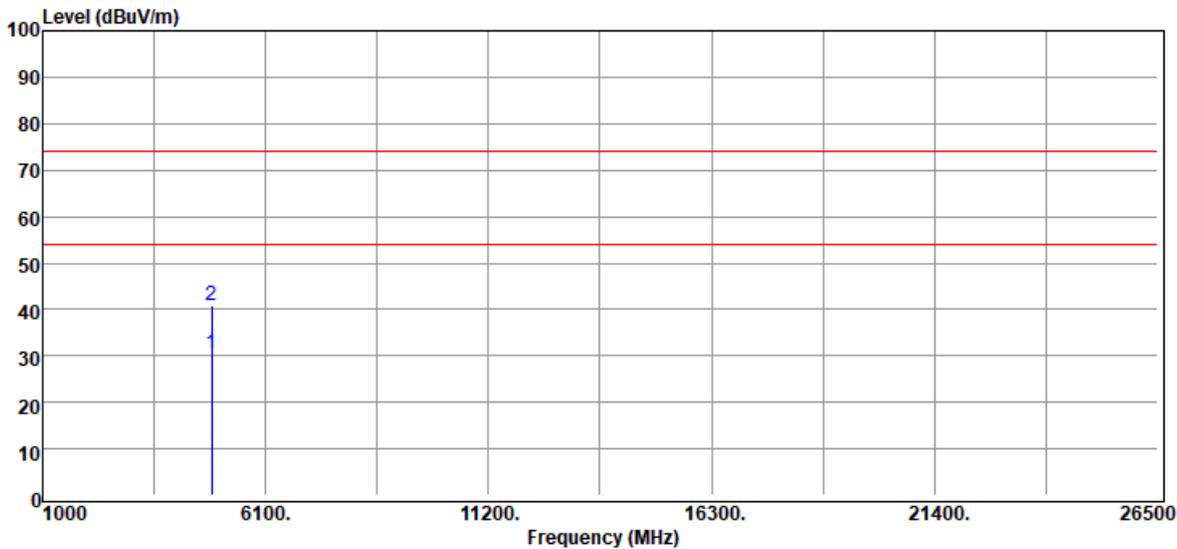
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Report Number :E2/2019/C0005  
 Operation Mode :802.11b  
 Test Channel :2437 MHz  
 Test Mode :TX CH MID  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4874.00	Average	30.91	-0.42	30.49	54.00	-23.51
4874.00	Peak	41.08	-0.42	40.66	74.00	-33.34

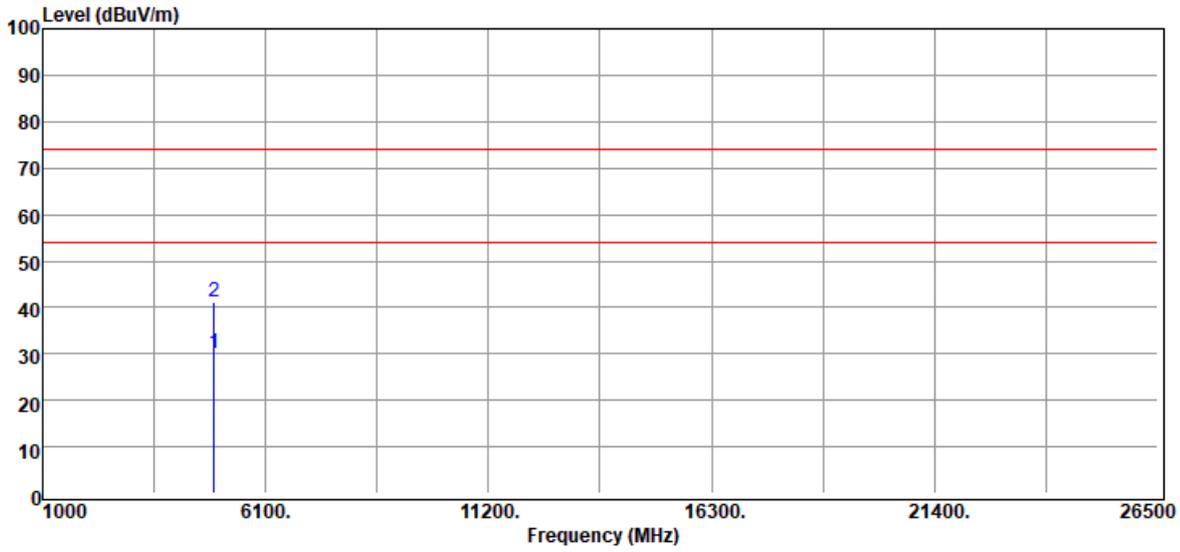
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Report Number :E2/2019/C0005  
 Operation Mode :802.11b  
 Test Channel :2462 MHz  
 Test Mode :TX CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4924.00	Average	30.85	-0.61	30.24	54.00	-23.76
4924.00	Peak	41.90	-0.61	41.29	74.00	-32.71

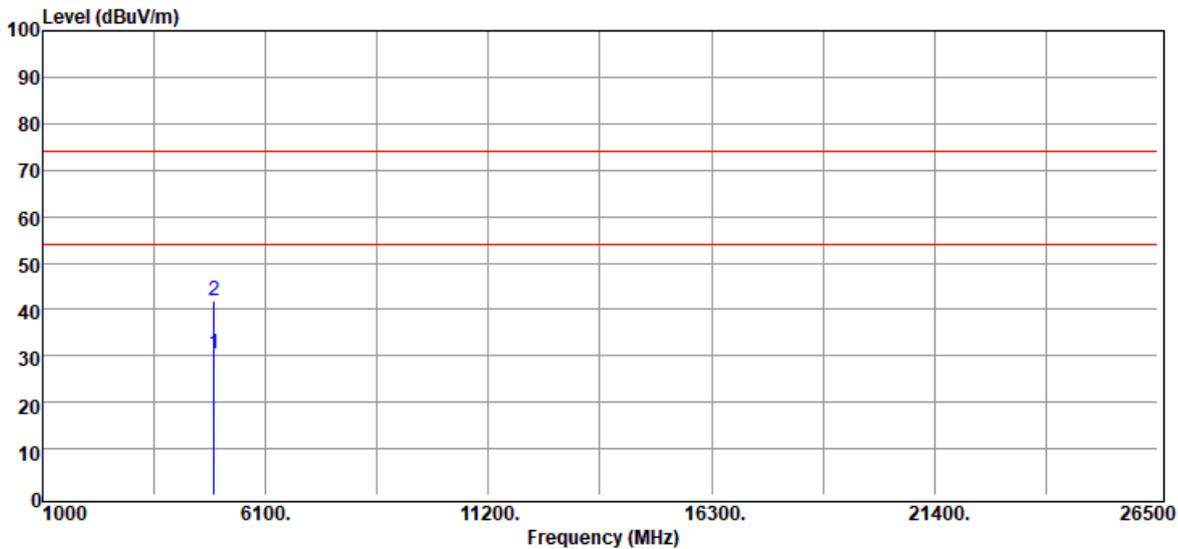
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Report Number :E2/2019/C0005  
 Operation Mode :802.11b  
 Test Channel :2462 MHz  
 Test Mode :TX CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4924.00	Average	30.99	-0.61	30.38	54.00	-23.62
4924.00	Peak	42.57	-0.61	41.96	74.00	-32.04

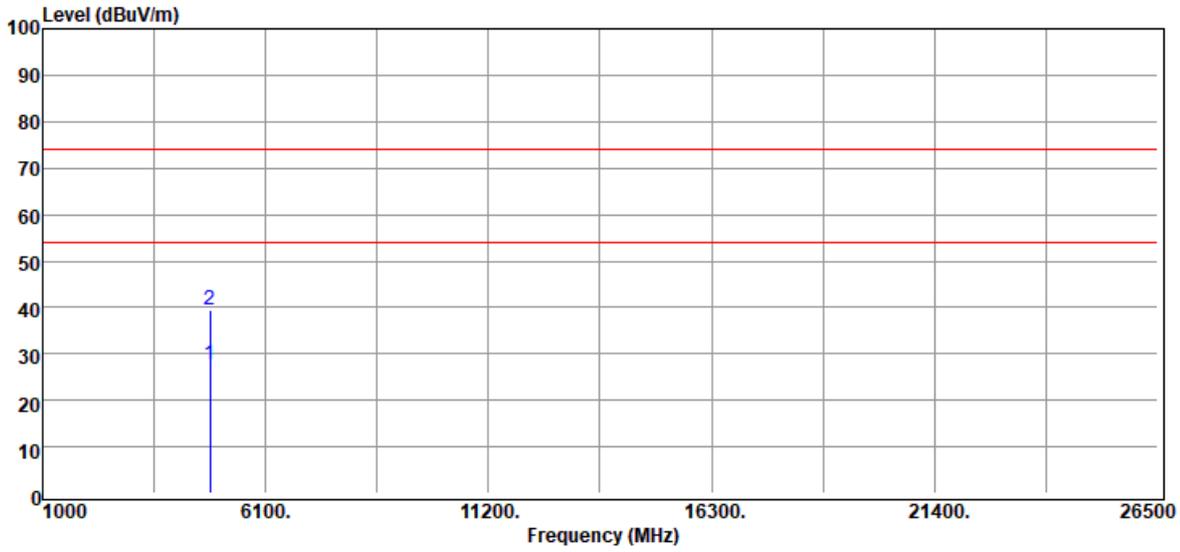
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Report Number :E2/2019/C0005  
 Operation Mode :802.11g  
 Test Channel :2412 MHz  
 Test Mode :TX CH LOW  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



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	28.04	-0.34	27.70	54.00	-26.30
4824.00	Peak	39.68	-0.34	39.34	74.00	-34.66

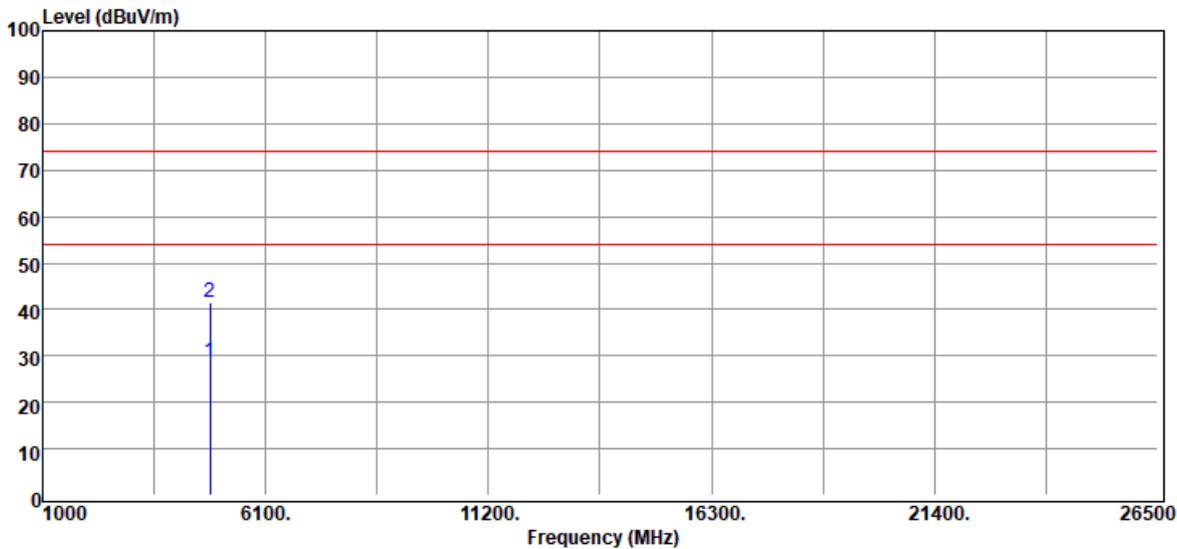
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Report Number :E2/2019/C0005  
 Operation Mode :802.11g  
 Test Channel :2412 MHz  
 Test Mode :TX CH LOW  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4824.00	Average	28.93	-0.34	28.59	54.00	-25.41
4824.00	Peak	41.85	-0.34	41.51	74.00	-32.49

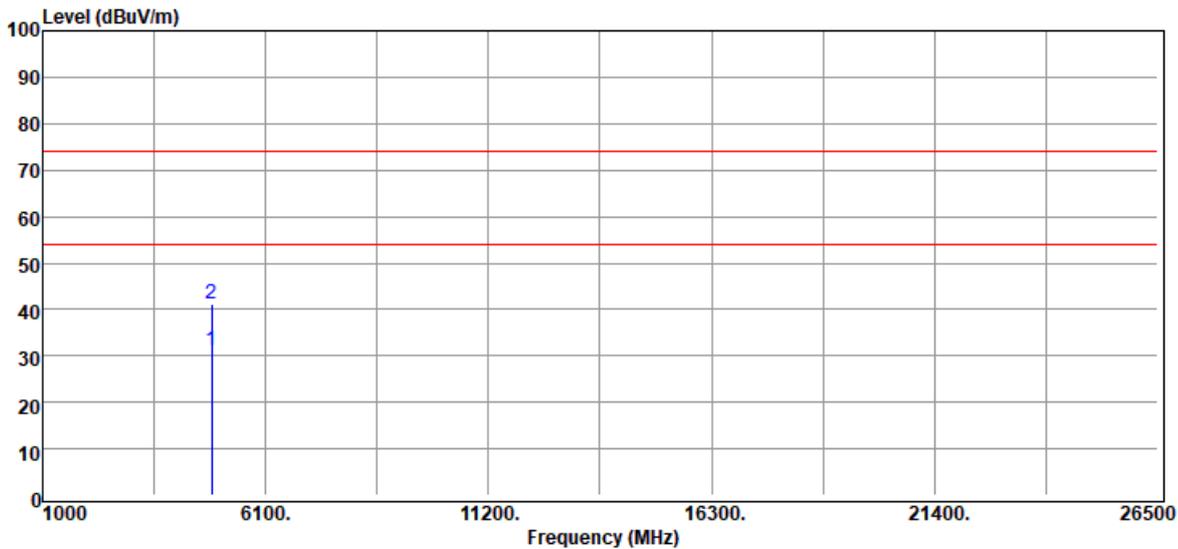
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Report Number :E2/2019/C0005  
 Operation Mode :802.11g  
 Test Channel :2437 MHz  
 Test Mode :TX CH MID  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4874.00	Average	31.64	-0.42	31.22	54.00	-22.78
4874.00	Peak	41.73	-0.42	41.31	74.00	-32.69

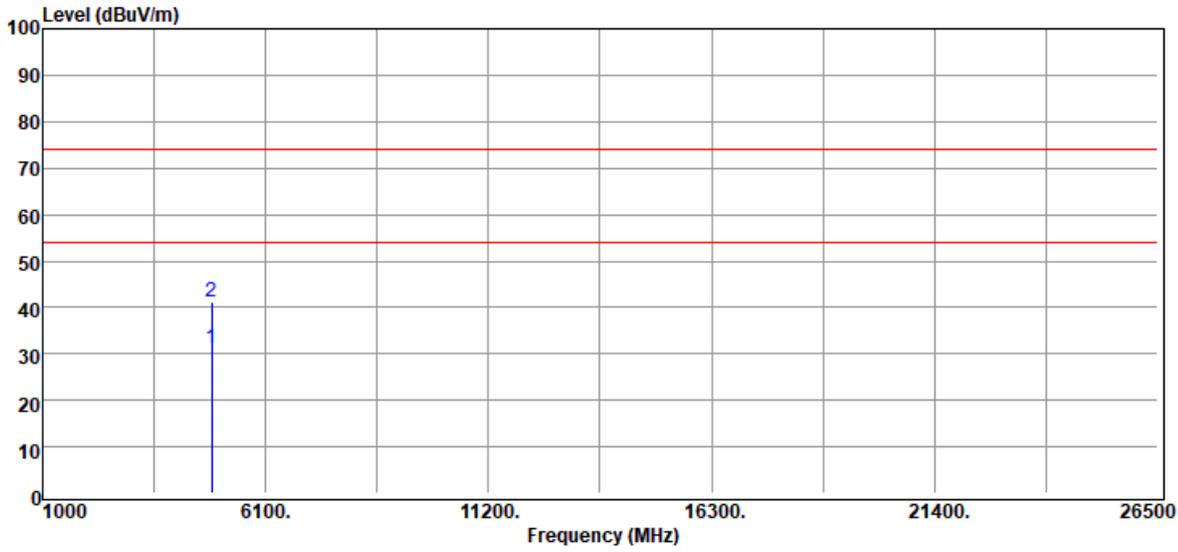
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Report Number :E2/2019/C0005  
 Operation Mode :802.11g  
 Test Channel :2437 MHz  
 Test Mode :TX CH MID  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4874.00	Average	31.72	-0.42	31.30	54.00	-22.70
4874.00	Peak	41.64	-0.42	41.22	74.00	-32.78

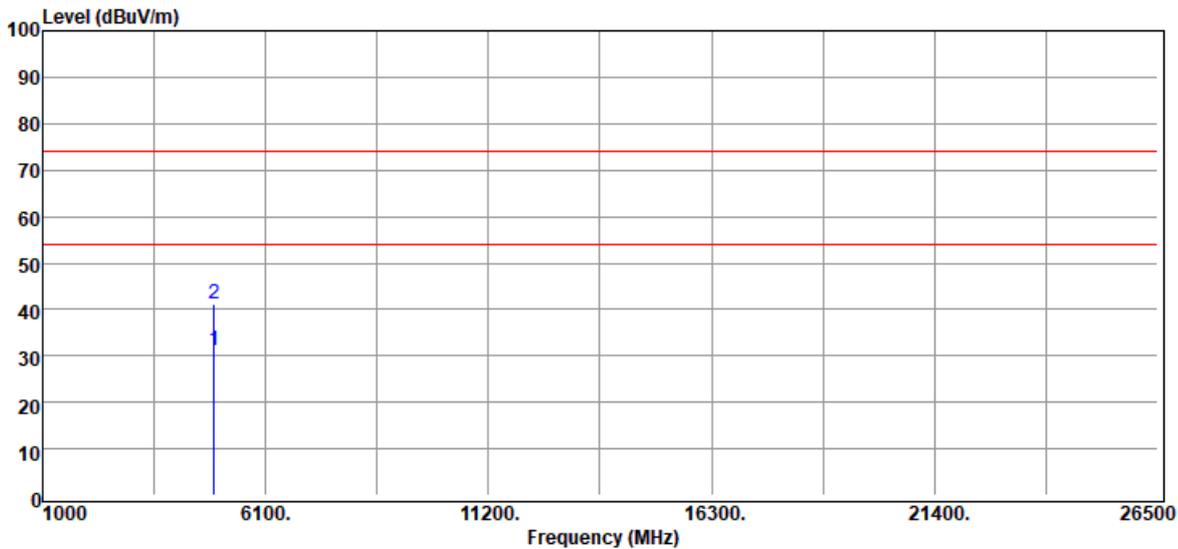
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Report Number :E2/2019/C0005  
 Operation Mode :802.11g  
 Test Channel :2462 MHz  
 Test Mode :TX CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4924.00	Average	31.63	-0.61	31.02	54.00	-22.98
4924.00	Peak	41.82	-0.61	41.21	74.00	-32.79

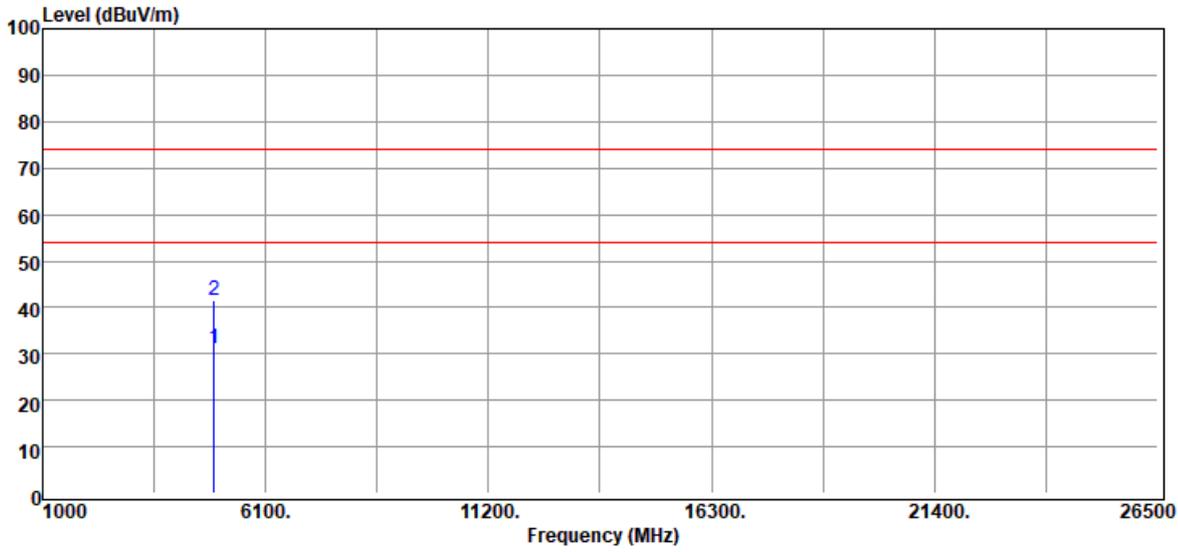
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 Operation Mode :802.11g  
 Test Channel :2462 MHz  
 Test Mode :TX CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.3/58  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4924.00	Average	31.82	-0.61	31.21	54.00	-22.79
4924.00	Peak	42.07	-0.61	41.46	74.00	-32.54

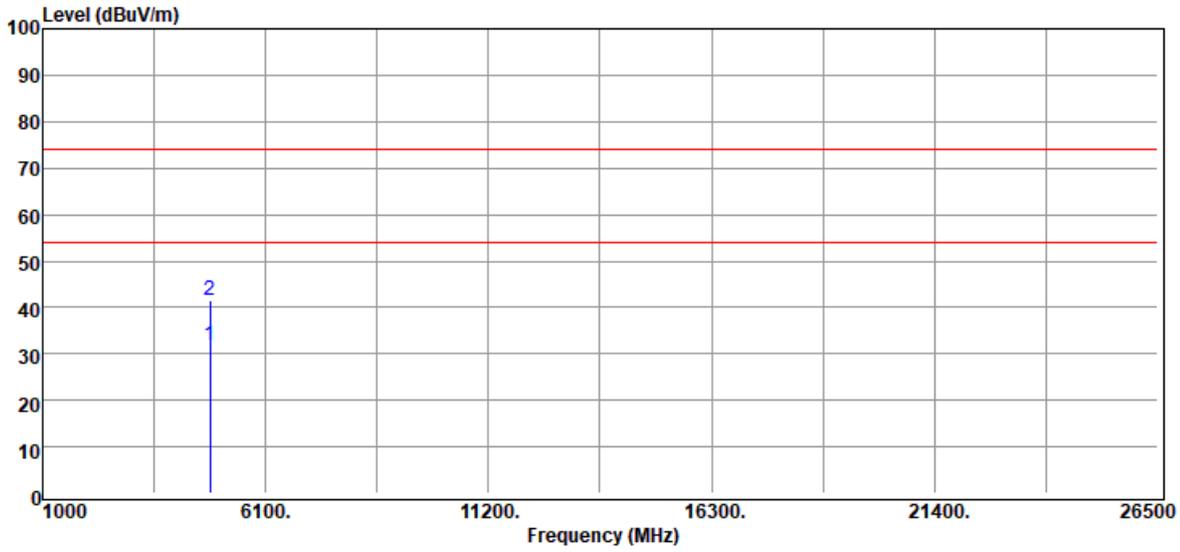
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n20  
 Test Channel :2412 MHz  
 Test Mode :TX CH LOW  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.5/59  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



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	32.12	-0.34	31.78	54.00	-22.22
4824.00	Peak	41.72	-0.34	41.38	74.00	-32.62

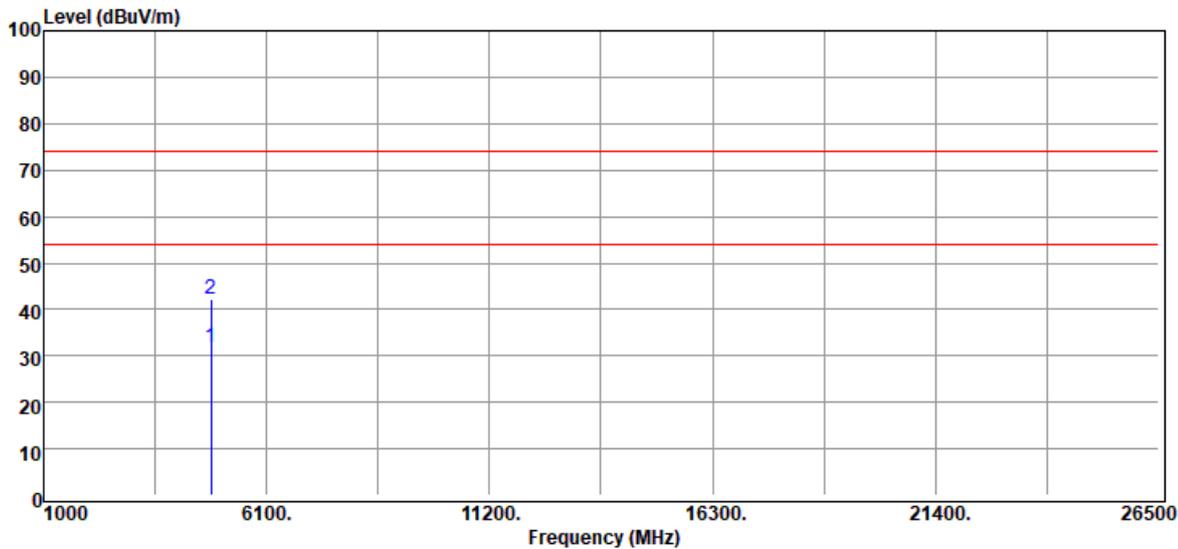
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n20  
 Test Channel :2412 MHz  
 Test Mode :TX CH LOW  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.5/59  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4824.00	Average	32.05	-0.34	31.71	54.00	-22.29
4824.00	Peak	42.52	-0.34	42.18	74.00	-31.82

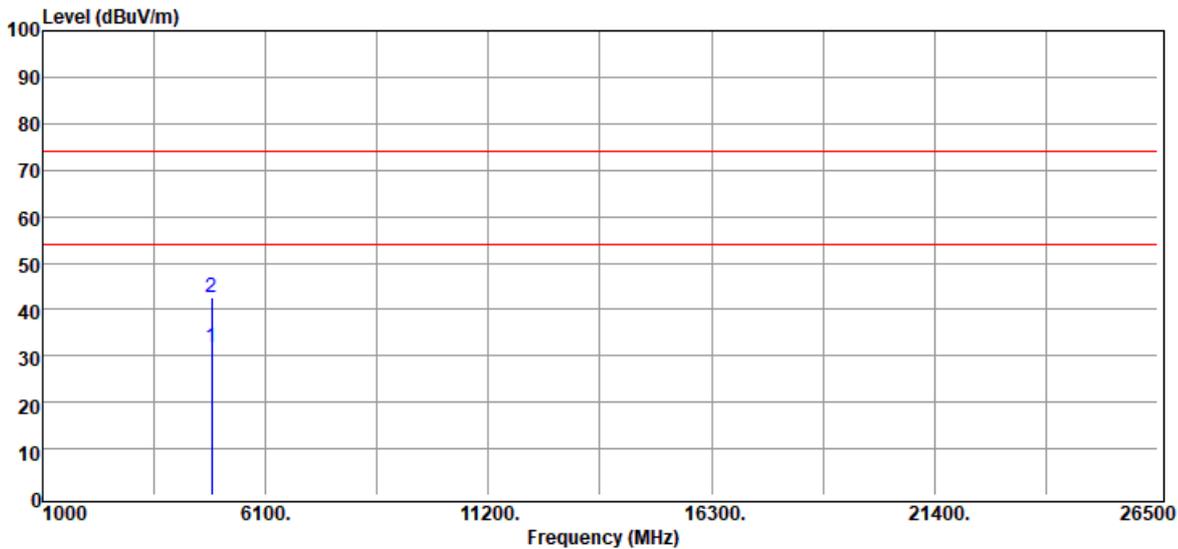
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n20  
 Test Channel :2437 MHz  
 Test Mode :TX CH MID  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.5/59  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4874.00	Average	32.35	-0.42	31.93	54.00	-22.07
4874.00	Peak	42.94	-0.42	42.52	74.00	-31.48

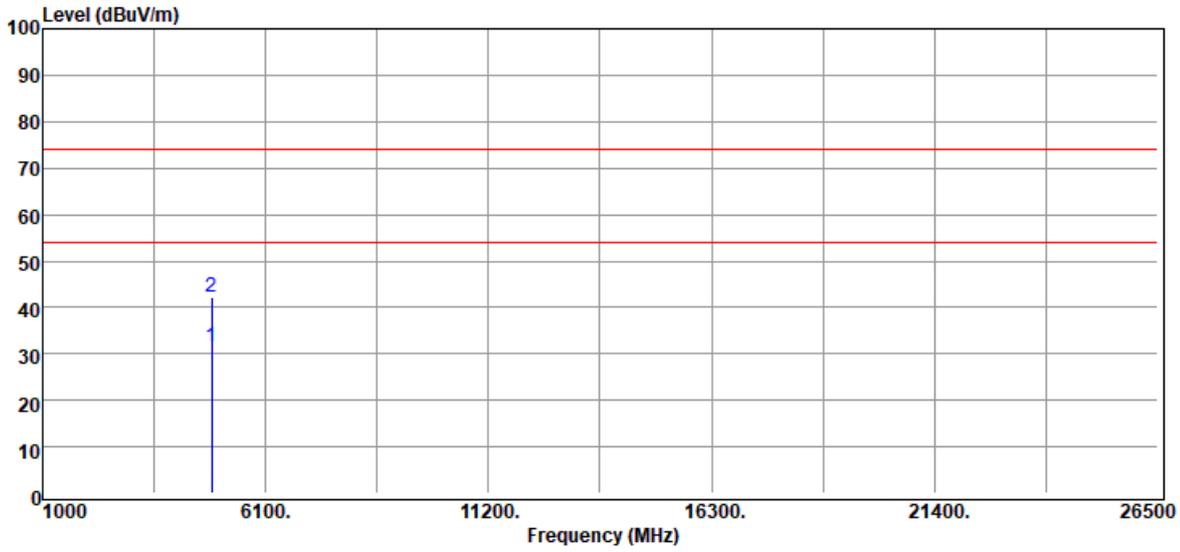
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 Operation Mode :802.11n20  
 Test Channel :2437 MHz  
 Test Mode :TX CH MID  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.5/59  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4874.00	Average	31.91	-0.42	31.49	54.00	-22.51
4874.00	Peak	42.60	-0.42	42.18	74.00	-31.82

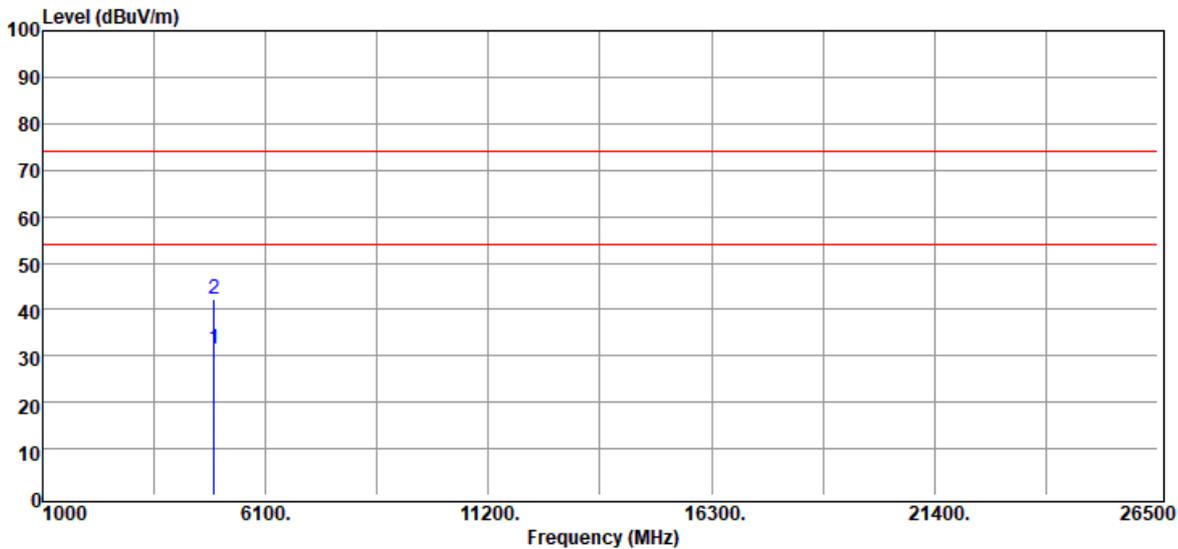
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n20  
 Test Channel :2462 MHz  
 Test Mode :TX CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.5/59  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4924.00	Average	31.96	-0.61	31.35	54.00	-22.65
4924.00	Peak	42.72	-0.61	42.11	74.00	-31.89

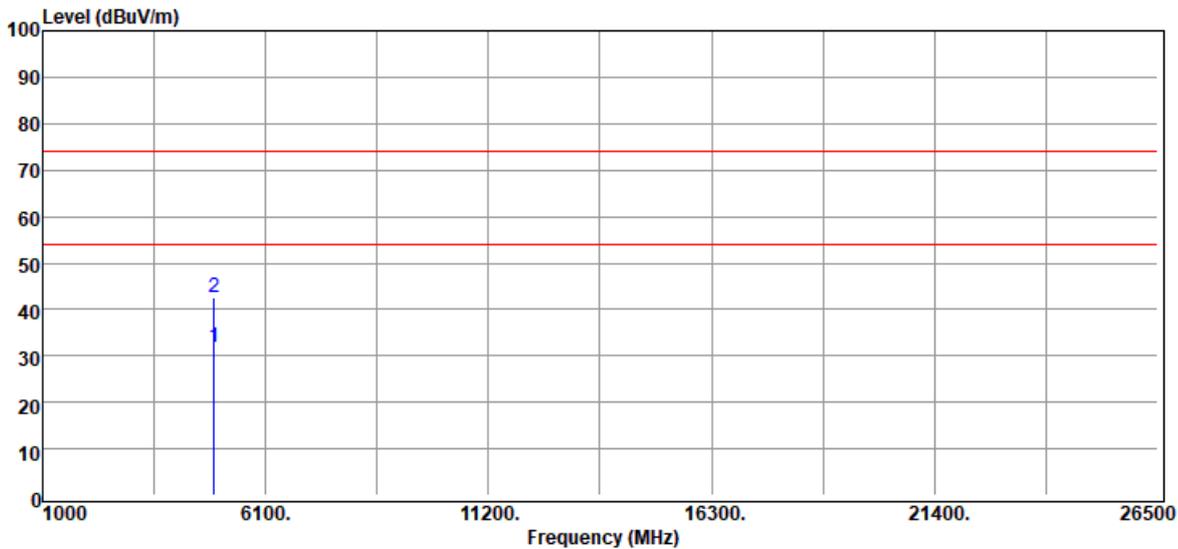
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 Operation Mode :802.11n20  
 Test Channel :2462 MHz  
 Test Mode :TX CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.5/59  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4924.00	Average	32.45	-0.61	31.84	54.00	-22.16
4924.00	Peak	43.02	-0.61	42.41	74.00	-31.59

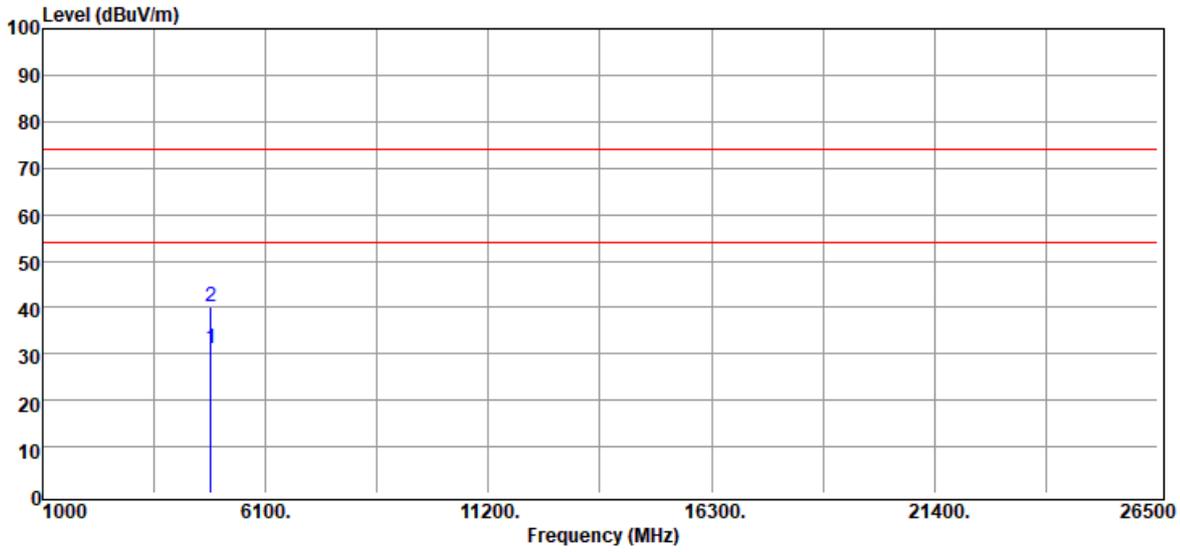
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n40  
 Test Channel :2422 MHz  
 Test Mode :TX CH LOW  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.5/59  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level d $\mu$ V	Factor dB	Actual FS d $\mu$ V/m	Limit @3m d $\mu$ V/m	Margin dB
4844.00	Average	31.52	-0.33	31.19	54.00	-22.81
4844.00	Peak	40.59	-0.33	40.26	74.00	-33.74

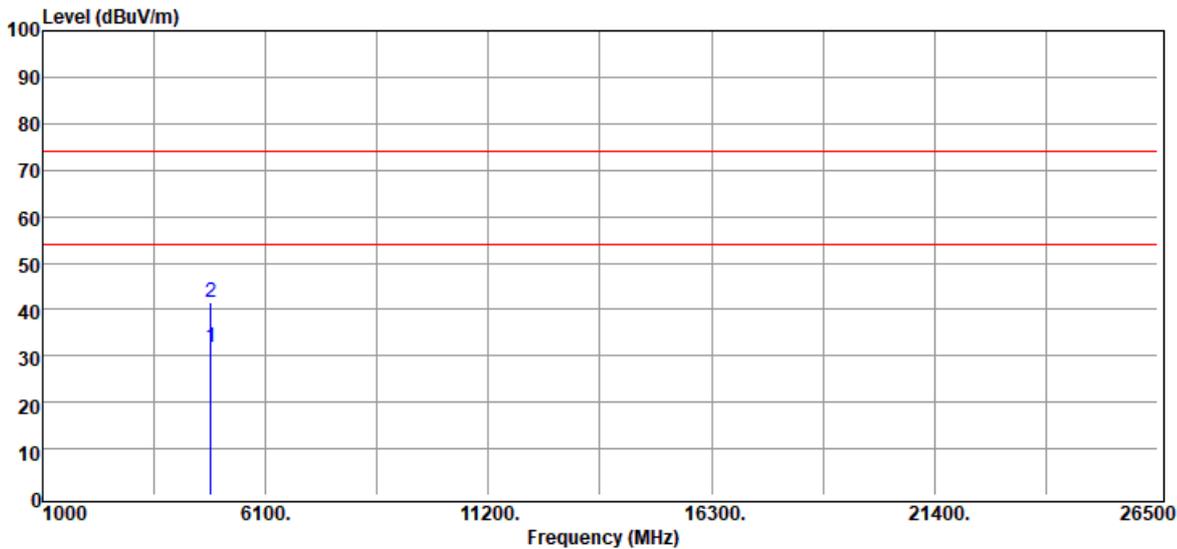
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n40  
 Test Channel :2422 MHz  
 Test Mode :TX CH LOW  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.5/59  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4844.00	Average	32.01	-0.33	31.68	54.00	-22.32
4844.00	Peak	41.85	-0.33	41.52	74.00	-32.48

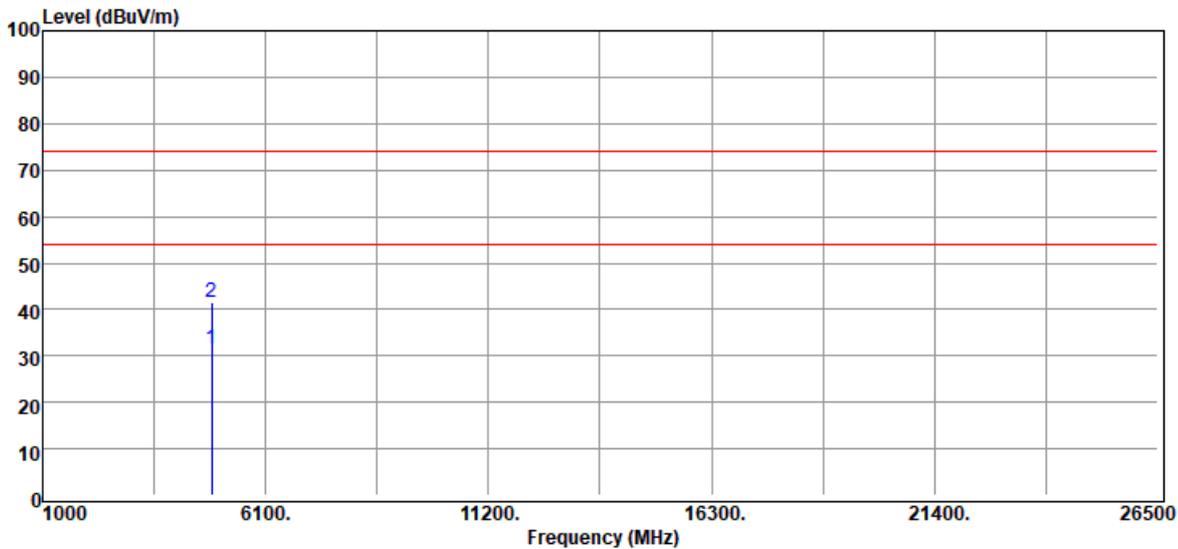
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n40  
 Test Channel :2437 MHz  
 Test Mode :TX CH MID  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.5/59  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4874.00	Average	31.94	-0.42	31.52	54.00	-22.48
4874.00	Peak	41.96	-0.42	41.54	74.00	-32.46

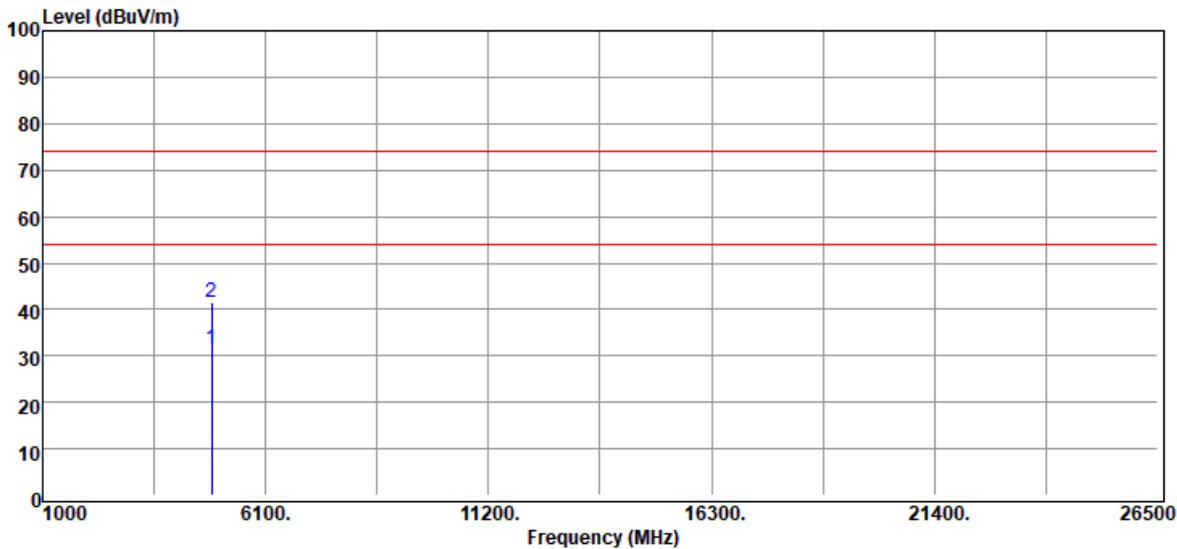
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n40  
 Test Channel :2437 MHz  
 Test Mode :TX CH MID  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.5/59  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4874.00	Average	31.83	-0.42	31.41	54.00	-22.59
4874.00	Peak	41.83	-0.42	41.41	74.00	-32.59

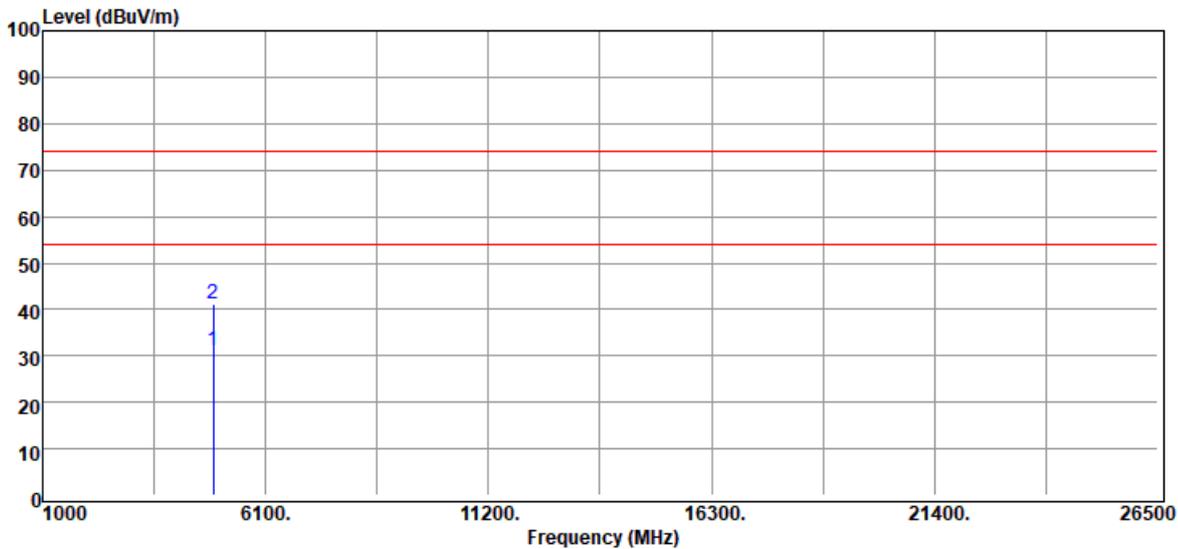
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Report Number :E2/2019/C0005  
 Operation Mode :802.11n40  
 Test Channel :2452 MHz  
 Test Mode :TX CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.5/59  
 Antenna Pol. :VERTICAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4904.00	Average	31.54	-0.51	31.03	54.00	-22.97
4904.00	Peak	41.71	-0.51	41.20	74.00	-32.80

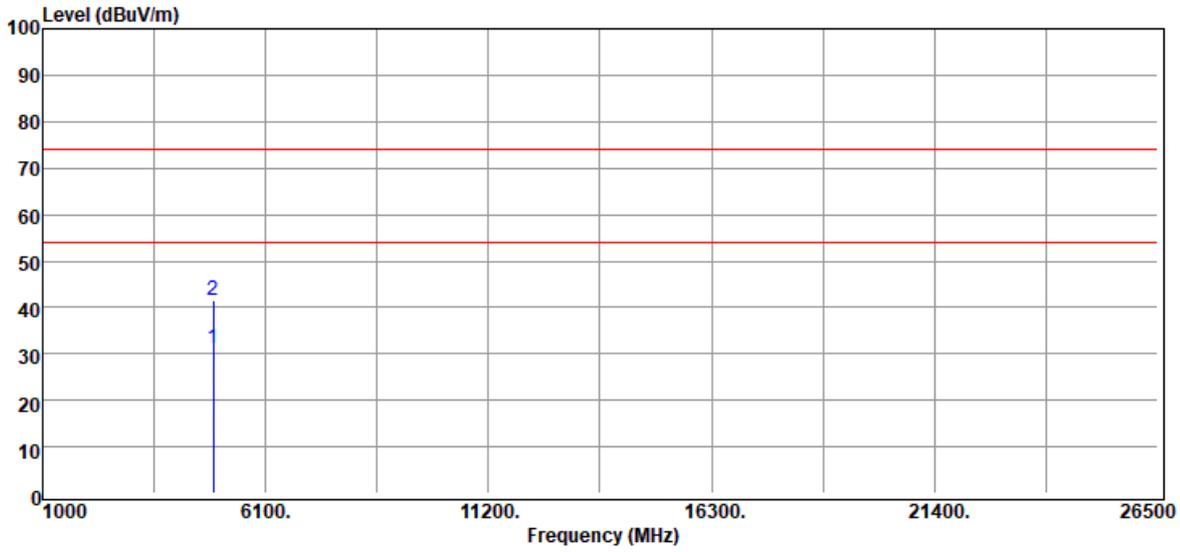
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 Operation Mode :802.11n40  
 Test Channel :2452 MHz  
 Test Mode :TX CH HIGH  
 EUT Pol :E2 Plan

Test Date :2019-12-19  
 Temp./Humi. :22.5/59  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kailin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4904.00	Average	31.62	-0.51	31.11	54.00	-22.89
4904.00	Peak	42.14	-0.51	41.63	74.00	-32.37

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## 12 POWER SPECTRAL DENSITY

### 12.1 Standard Applicable

Per Part 15.247 (e)

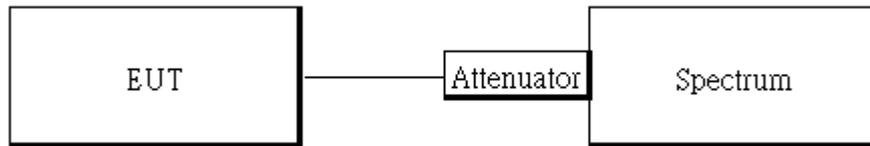
The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

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.

### 12.2 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120200	03/06/2019	03/05/2020
DC Block	PASTERNAK	PE8210	RF256	11/20/2019	11/19/2020
Attenuator	Marvelous	MVE2213-10	RF80	11/20/2019	11/19/2020

### 12.3 Test Set-up



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## 12.4 Measurement Procedure

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 3 kHz & VBW = 10 kHz.
5. For defining Restricted Band Edge Limit:  
Set the RBW = 100kHz & VBW = 300 kHz
6. Detector = peak.
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum amplitude level.
11. 802.11n MIMO mode: offset is set following “measure and add 10 Log (N)” on spectrum to measure the PSD for MIMO mode. Offset = cable loss + 10 log (N), where N is number of transmitting antenna. N=2 for this given application.

### Note:

*For the test of PSD at MIMO mode, the highest emission of worst case employing Measure and add 10 log (N) technical is reported on this report after the comparison between Main Antenna at single transmitting mode and Aux that yields the higher value. The MIMO transmitting mode produces higher value of outcome*

## 12.5 As per FCC KDB 662911 D01

Unequal antenna gains, with equal transmit powers. For antenna gains given by G<sub>1</sub>, G<sub>2</sub>, ..., G<sub>N</sub> dBi.

(i) If transmit signals are correlated, then Directional gain  
= 10 log<sub>10</sub>[(10<sup>G<sub>1</sub>/20</sup> + 10<sup>G<sub>2</sub>/20</sup> + ... + 10<sup>G<sub>N</sub>/20</sup>)<sup>2</sup> / N<sub>ANT</sub>] dBi

[Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

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

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## 12.6 Power spectral density

POWER DENSITY 802.11b			
Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	5.87	8.00	PASS
2437	1.96	8.00	PASS
2462	-9.39	8.00	PASS

POWER DENSITY 802.11g			
Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-12.66	8.00	PASS
2437	-12.85	8.00	PASS
2462	-12.67	8.00	PASS

POWER DENSITY 802.11n HT20			
Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-11.41	8.00	PASS
2437	-12.61	8.00	PASS
2462	-13.82	8.00	PASS

POWER DENSITY 802.11n HT40			
Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2422	-18.35	8.00	PASS
2437	-19.24	8.00	PASS
2452	-11.82	8.00	PASS

\*Refer to next page for plots

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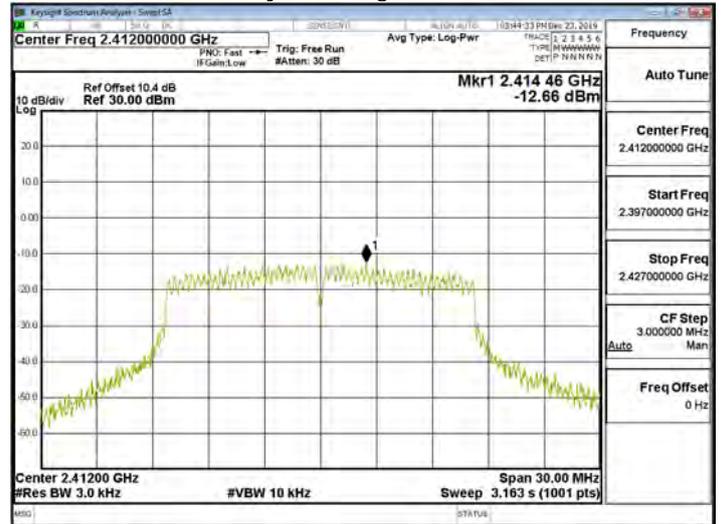
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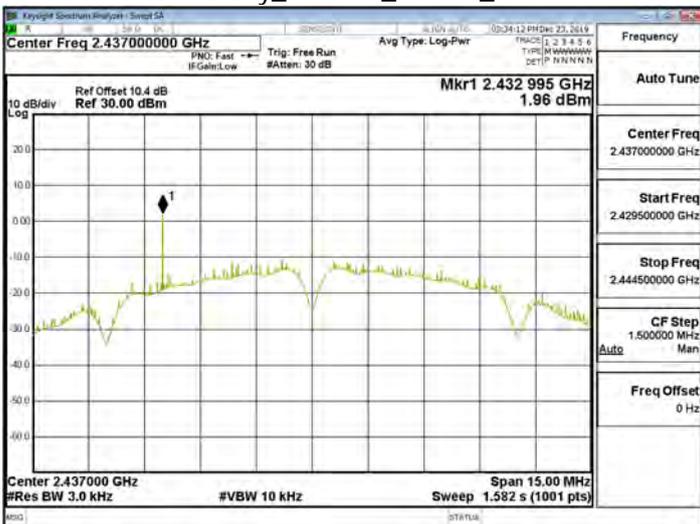
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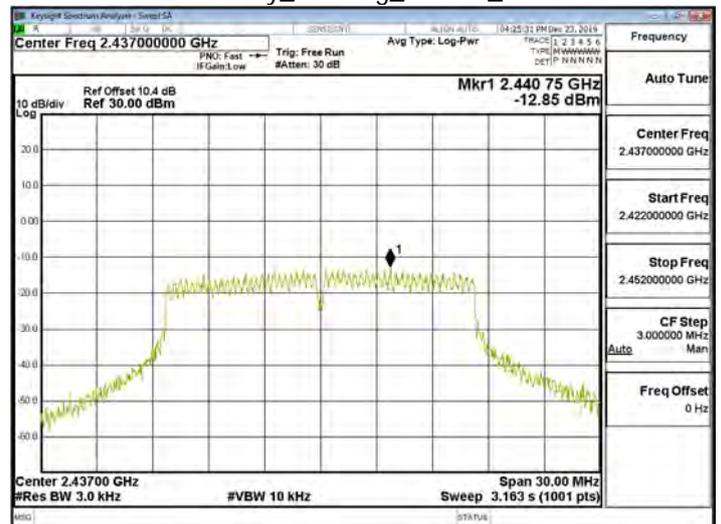
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Power Density\_802.11b\_20MHz\_2437MHz



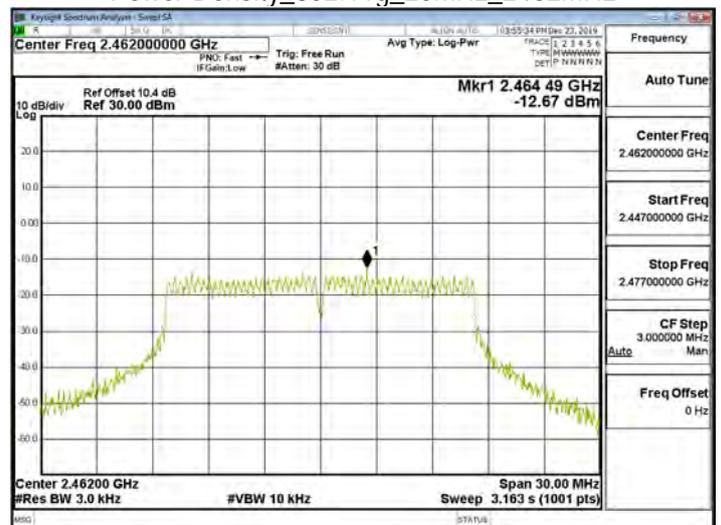
Power Density\_802.11g\_20MHz\_2437MHz



Power Density\_802.11b\_20MHz\_2462MHz



Power Density\_802.11g\_20MHz\_2462MHz

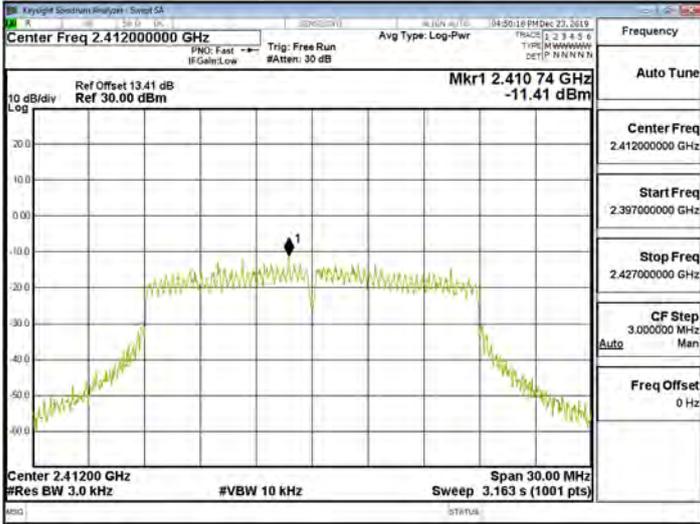


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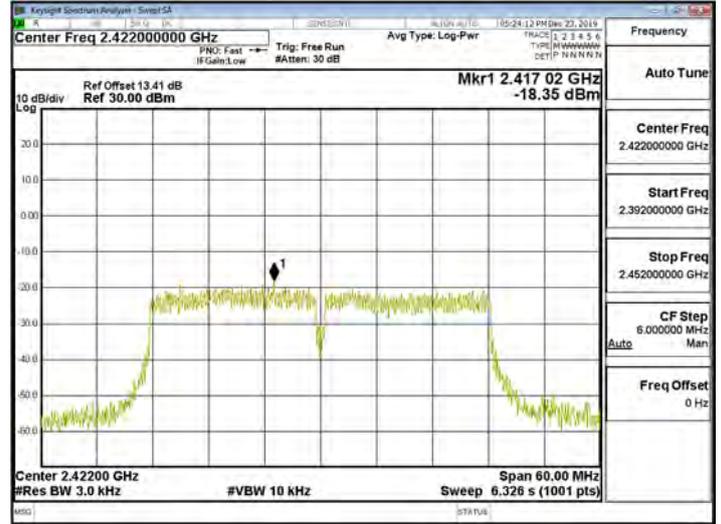
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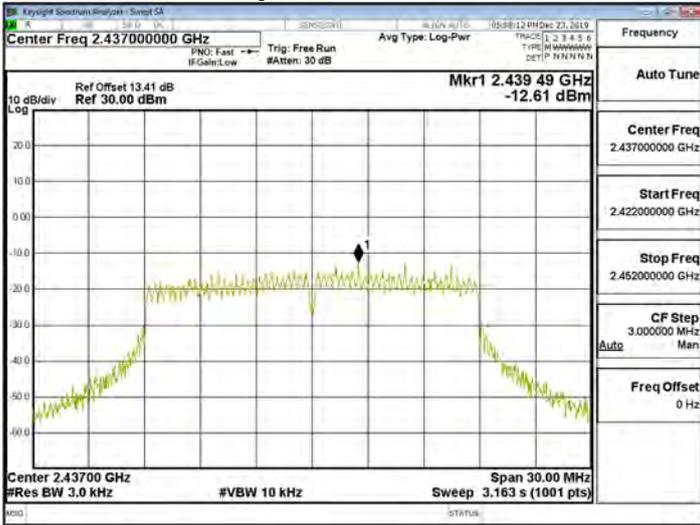
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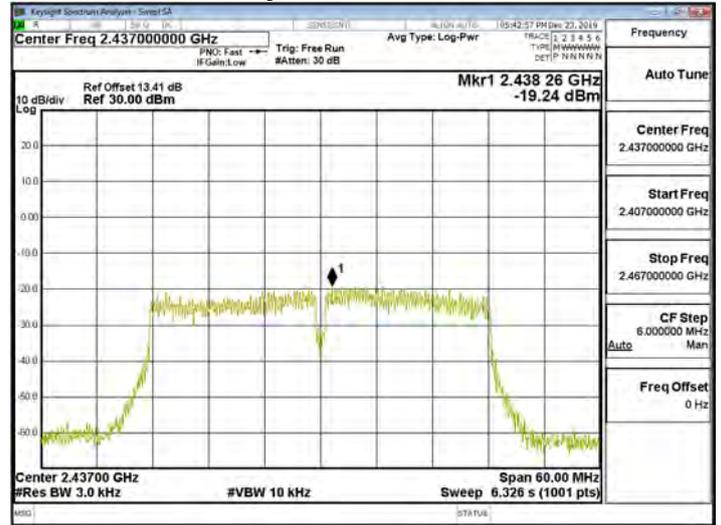
Power Density\_802.11n\_40MHz\_2422MHz



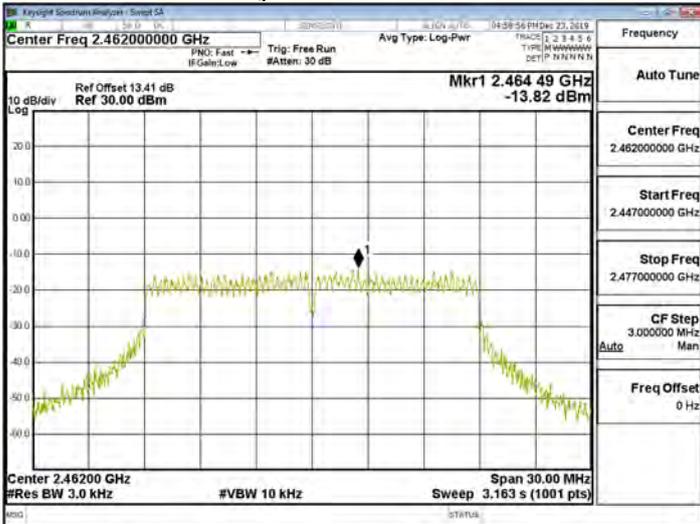
Power Density\_802.11n\_20MHz\_2437MHz



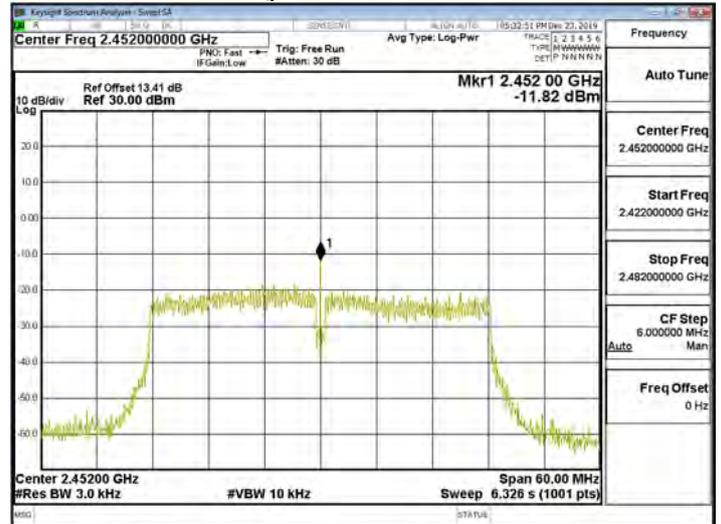
Power Density\_802.11n\_40MHz\_2437MHz



Power Density\_802.11n\_20MHz\_2462MHz



Power Density\_802.11n\_40MHz\_2452MHz



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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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