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# FCC Test Report

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Report No.: AGC11447201002FE05

**FCC ID** : QOS-TCMICROTX  
**APPLICATION PURPOSE** : Original Equipment  
**PRODUCT DESIGNATION** : MICRO TX  
**BRAND NAME** : TBS TRACER  
**MODEL NAME** : MICRO TX  
**APPLICANT** : TBS Avionics Limited  
**DATE OF ISSUE** : Apr. 14, 2021  
**STANDARD(S)** : FCC Part 15.247  
**TEST PROCEDURE(S)**  
**REPORT VERSION** : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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**REPORT REVISE RECORD**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Apr. 14, 2021	Valid	Initial Release

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## 1. VERIFICATION OF CONFORMITY

<b>Applicant</b>	TBS Avionics Limited
<b>Address</b>	9/F, Tungtex Building 203 Wai Yip Street, Kwun Tong, Hong Kong, China
<b>manufacturer</b>	TBS Avionics Limited
<b>Address</b>	9/F, Tungtex Building 203 Wai Yip Street, Kwun Tong, Hong Kong, China
<b>Factory</b>	TBS Avionics Limited
<b>Address</b>	9/F, Tungtex Building 203 Wai Yip Street, Kwun Tong, Hong Kong, China
<b>Product Designation</b>	MICRO TX
<b>Brand Name</b>	TBS TRACER
<b>Test Model</b>	MICRO TX
<b>Date of test</b>	Mar. 12, 2021 to Apr. 14, 2021
<b>Deviation</b>	No any deviation from the test method
<b>Condition of Test Sample</b>	Normal
<b>Test Result</b>	Pass
<b>Report Template</b>	AGCRT-US-BGN/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. 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 radiated emission limits of FCC Rules Part 15.247.

Prepared By *Sky Dong*  
 Sky Dong  
 (Project Engineer) Apr. 14, 2021

Reviewed By *Max Zhang*  
 Max Zhang  
 (Reviewer) Apr. 14, 2021

Approved By *Forrest Lei*  
 Forrest Lei  
 (Authorized Officer) Apr. 14, 2021

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## 2. GENERAL INFORMATION

### 2.1. PRODUCT DESCRIPTION

The EUT is designed as “MICRO TX”. It is designed by way of utilizing the DSSS and OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

<b>Operation Frequency</b>	2.412 GHz~2.462GHz
<b>Output Power (Average)</b>	IEEE 802.11b:0.21dBm; IEEE 802.11g:-0.80dBm; IEEE 802.11n(20):-0.60dBm
<b>Output Power (Peak)</b>	IEEE 802.11b:3.07dBm; IEEE 802.11g:7.14dBm; IEEE 802.11n(20):7.09dBm
<b>Modulation</b>	DSSS(DBPSK/DQPSK/CCK); OFDM(BPSK/QPSK/16-QAM/64-QAM)
<b>Number of channels</b>	11
<b>Hardware Version</b>	V1.01
<b>Software Version</b>	v4.39
<b>Antenna Designation</b>	PCB antenna(Comply with requirements of the FCC part 15.203)
<b>Antenna Gain</b>	3.0dBi
<b>Power Supply</b>	DC 3.5V to 13V

### 2.2. TABLE OF CARRIER FREQUENCIES

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	1	2412 MHZ
	2	2417 MHZ
	3	2422 MHZ
	4	2427 MHZ
	5	2432 MHZ
	6	2437 MHZ
	7	2442 MHZ
	8	2447 MHZ
	9	2452 MHZ
	10	2457 MHZ
	11	2462 MHZ

Note: For 20MHZ bandwidth system use Channel 1 to Channel 11.

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### 2.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss	Modulation	R	NBPS	NCBPS		NDBPS		Data rate(Mbps)	
									800nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0
6	1	64-QAM	3/4	6	312	648	234	489	58.5	121.5
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPS	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

### 2.4. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: QOS-TCMICROTX** filing to comply with the FCC Part 15 requirements.

### 2.5. TEST METHODOLOGY

KDB 558074 D01 15.247 Meas Guidance v05: Guidance for compliance measurements on Digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules  
ANSI C63.10:2013: American National Standard for Testing Unlicensed Wireless Devices

### 2.6. SPECIAL ACCESSORIES

Refer to section 5.2.

### 2.7. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

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## 2.8. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

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### 3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	$U_c = \pm 3.1$ dB
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 4.0$ dB
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.8$ dB
Uncertainty of total RF power, conducted	$U_c = \pm 0.8$ dB
Uncertainty of RF power density, conducted	$U_c = \pm 2.6$ dB
Uncertainty of spurious emissions, conducted	$U_c = \pm 2$ %
Uncertainty of Occupied Channel Bandwidth	$U_c = \pm 2$ %

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#### 4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel transmitting (TX)
2	Middle channel transmitting (TX)
3	High channel transmitting (TX)
Note: Transmit by 802.11b with Data rate (1/2/5.5/11) Transmit by 802.11g with Data rate (6/9/12/18/24/36/48/54) Transmit by 802.11n (20MHz) with Data rate (6.5/13/19.5/26/39/52/58.5/65)	

**Note:**

1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency Individually, and the EUT is operating at its maximum duty cycle>or equal 98%
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.  
The test software is the SecureCRT\_x86\_7.0.4.537 which can set the EUT into the individual test modes

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## 5. SYSTEM TEST CONFIGURATION

### 5.1. CONFIGURATION OF EUT SYSTEM

Configure:



### 5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	MICRO TX	MICRO TX	QOS-TCMICROTX	EUT
2	PC	Nbl-WAQ9R	N/A	AE
3	Control board	C3	DC 5V	AE

### 5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247	Output Power	Compliant
§15.247	6 dB Bandwidth	Compliant
§15.247	Conducted Spurious Emission	Compliant
§15.247	Maximum Conducted Output Power Spectral Density	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Band Edges	Compliant
§15.207	Line Conduction Emission	Compliant

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## 6. TEST FACILITY

<b>Test Site</b>	Attestation of Global Compliance (Shenzhen) Co., Ltd
<b>Location</b>	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
<b>Designation Number</b>	CN1259
<b>FCC Test Firm Registration Number</b>	975832
<b>A2LA Cert. No.</b>	5054.02
<b>Description</b>	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

### TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	May 15, 2020	May 14, 2021
LISN	R&S	ESH2-Z5	100086	Jul. 03,2020	Jul. 02, 2021
Test software	R&S	ES-K1(Ver.V1.71)	N/A	N/A	N/A

### TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 07, 2020	Dec. 06, 2021
2.4GHz Fliter	Micro-tronics	087	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	Weinachel Corp	58-30-33	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.21, 2019	Sep. 20, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	00034609	May. 17, 2019	May. 16, 2021
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May. 17, 2019	May. 16, 2021
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep. 20, 2019	Sep. 19, 2021
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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## 7. OUTPUT POWER

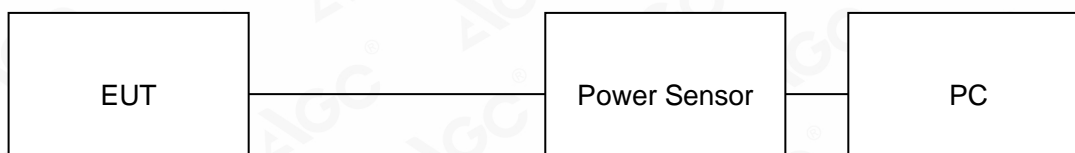
### 7.1. MEASUREMENT PROCEDURE

For average power test:

1. Connect EUT RF output port to power sensor through an RF attenuator.
2. Connect the power sensor to the PC.
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Record the maximum power from the software.

**Note :** The EUT was tested according to ANSI C63.10 (2013) for compliance to FCC 47CFR 15.247 requirements.

### 7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



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### 7.3. LIMITS AND MEASUREMENT RESULT

Test Data of Conducted Output Power					
Test Mode	Test Channel (MHz)	Average Power (dBm)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
802.11b	2412	-0.18	2.70	≤30	Pass
	2437	0.21	3.07	≤30	Pass
	2462	0.14	3.04	≤30	Pass
802.11g	2412	-0.80	7.14	≤30	Pass
	2437	-1.08	6.81	≤30	Pass
	2462	-0.88	7.04	≤30	Pass
802.11n20	2412	-1.15	6.40	≤30	Pass
	2437	-0.59	6.99	≤30	Pass
	2462	-0.60	7.09	≤30	Pass

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## 8. BANDWIDTH

### 8.1. MEASUREMENT PROCEDURE

6dB bandwidth:

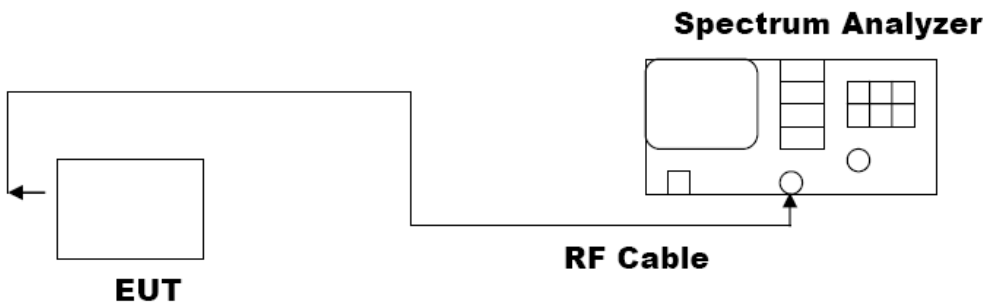
1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 kHz, VBW $\geq$ 3 $\times$ RBW.
4. Set SPA Trace 1 Max hold, then View.

Occupied bandwidth:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel  
The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

**Note:** The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

### 8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



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### 8.3. LIMITS AND MEASUREMENT RESULTS

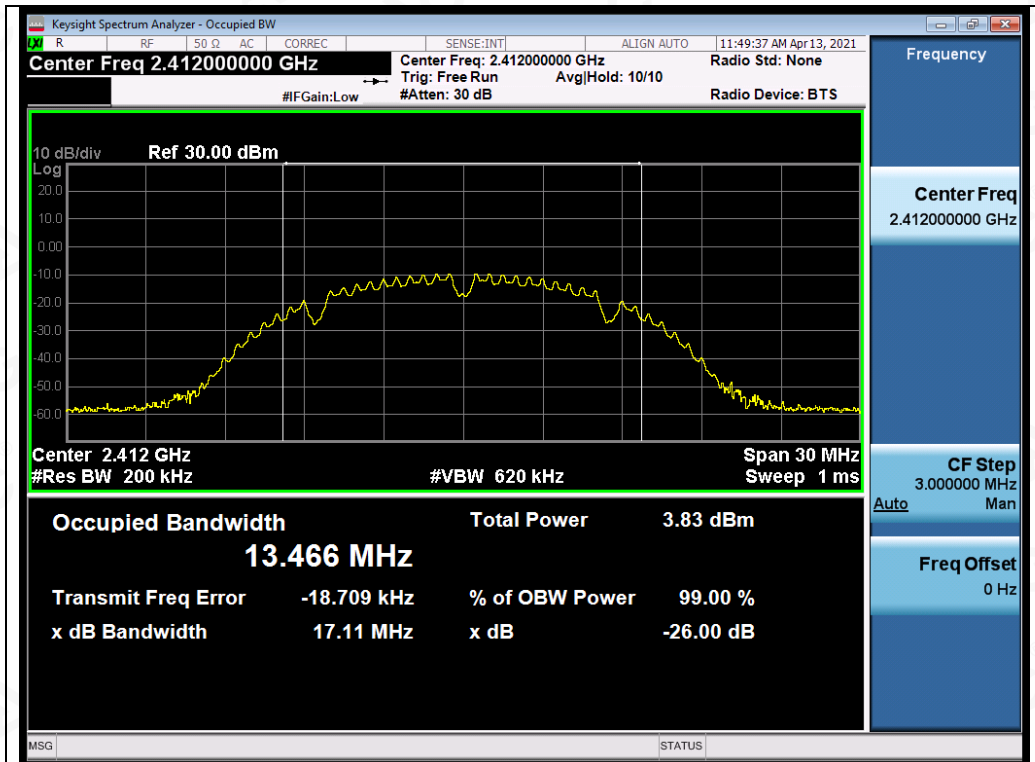
Test Data of Occupied Bandwidth and DTS Bandwidth					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-6dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11b	2412	13.466	9.079	≥0.5	Pass
	2437	13.444	9.073	≥0.5	Pass
	2462	13.481	9.076	≥0.5	Pass
802.11g	2412	16.415	16.322	≥0.5	Pass
	2437	16.419	16.318	≥0.5	Pass
	2462	16.414	16.317	≥0.5	Pass
802.11n20	2412	17.486	16.810	≥0.5	Pass
	2437	17.482	16.804	≥0.5	Pass
	2462	17.482	16.799	≥0.5	Pass

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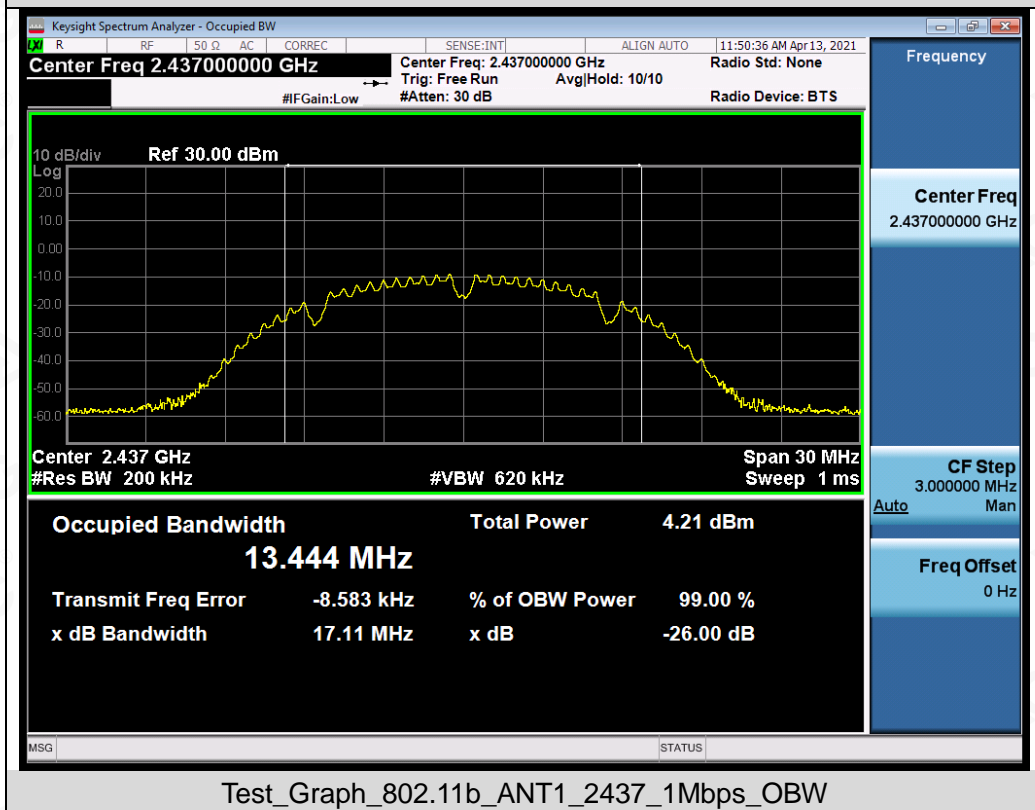




### Test Graphs of Occupied Bandwidth



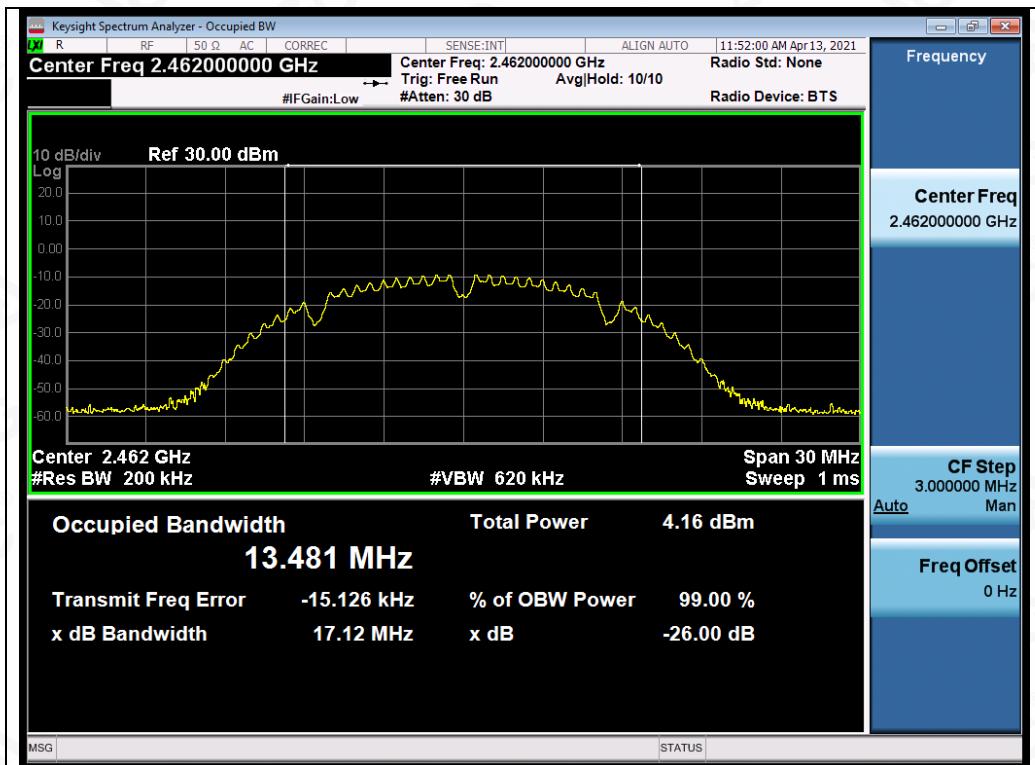
Test\_Graph\_802.11b\_ANT1\_2412\_1Mbps\_OBW



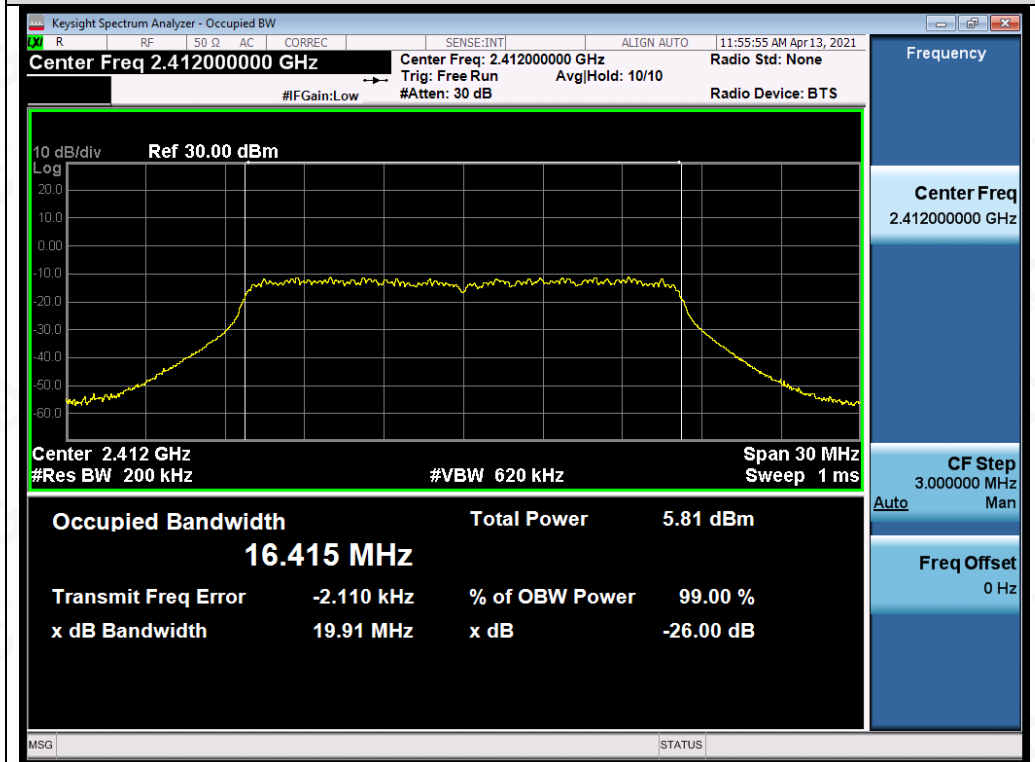
Test\_Graph\_802.11b\_ANT1\_2437\_1Mbps\_OBW

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Test\_Graph\_802.11b\_ANT1\_2462\_1Mbps\_OBW

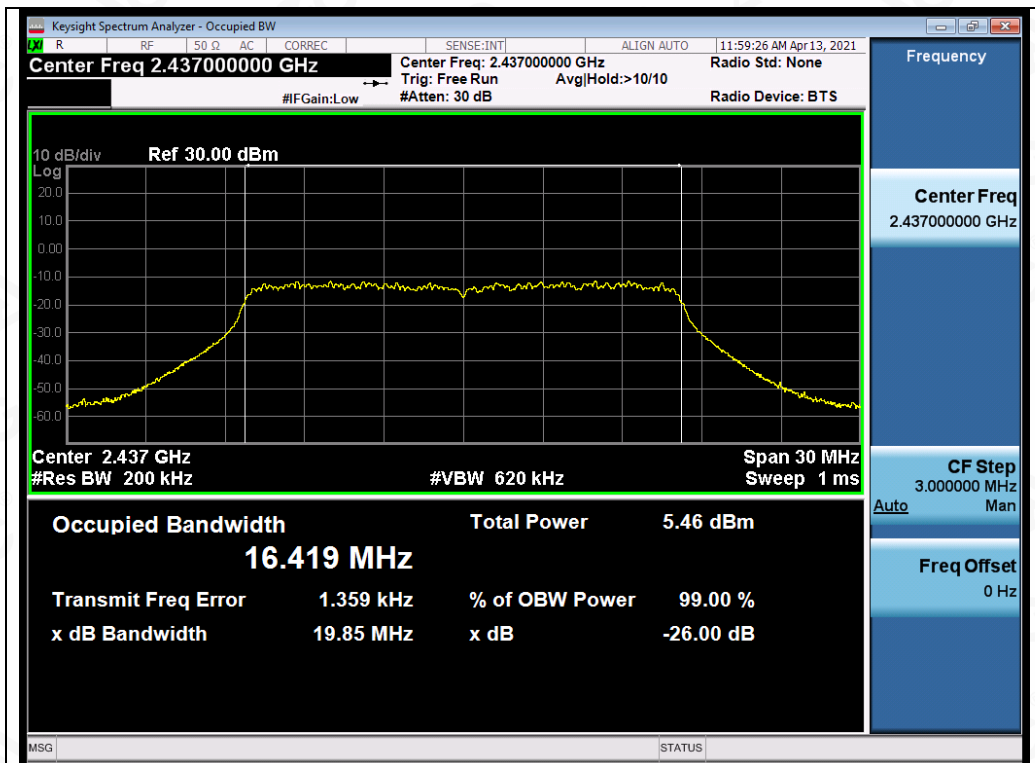


Test\_Graph\_802.11g\_ANT1\_2412\_6Mbps\_OBW

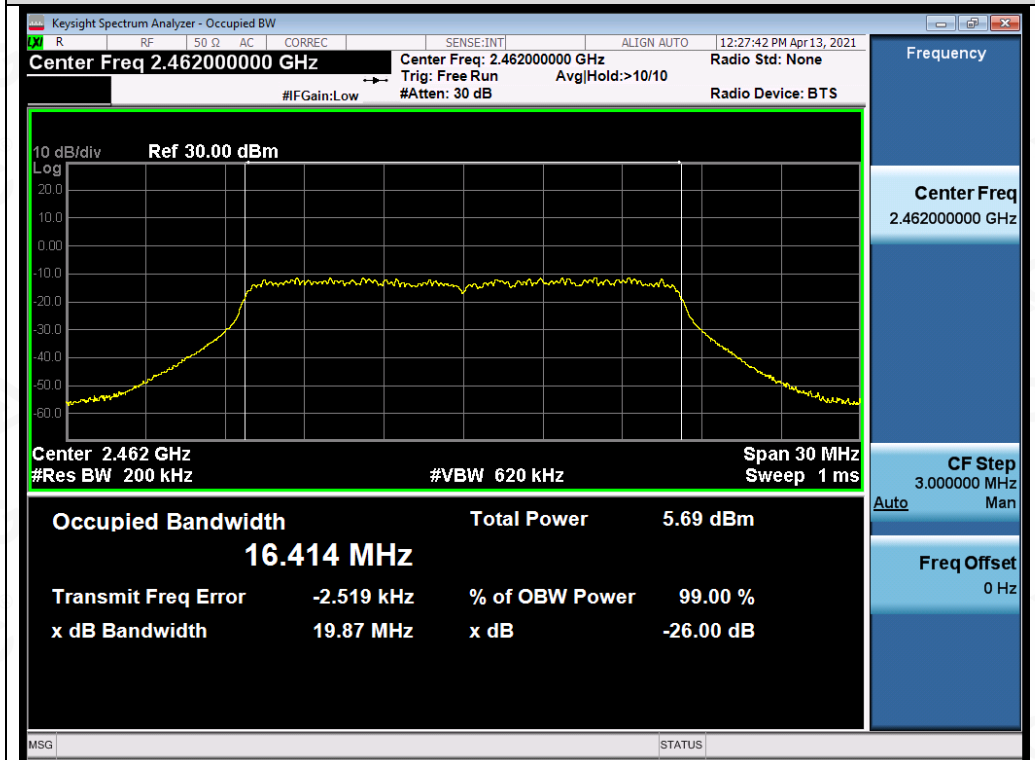
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Test\_Graph\_802.11g\_ANT1\_2437\_6Mbps\_OBW

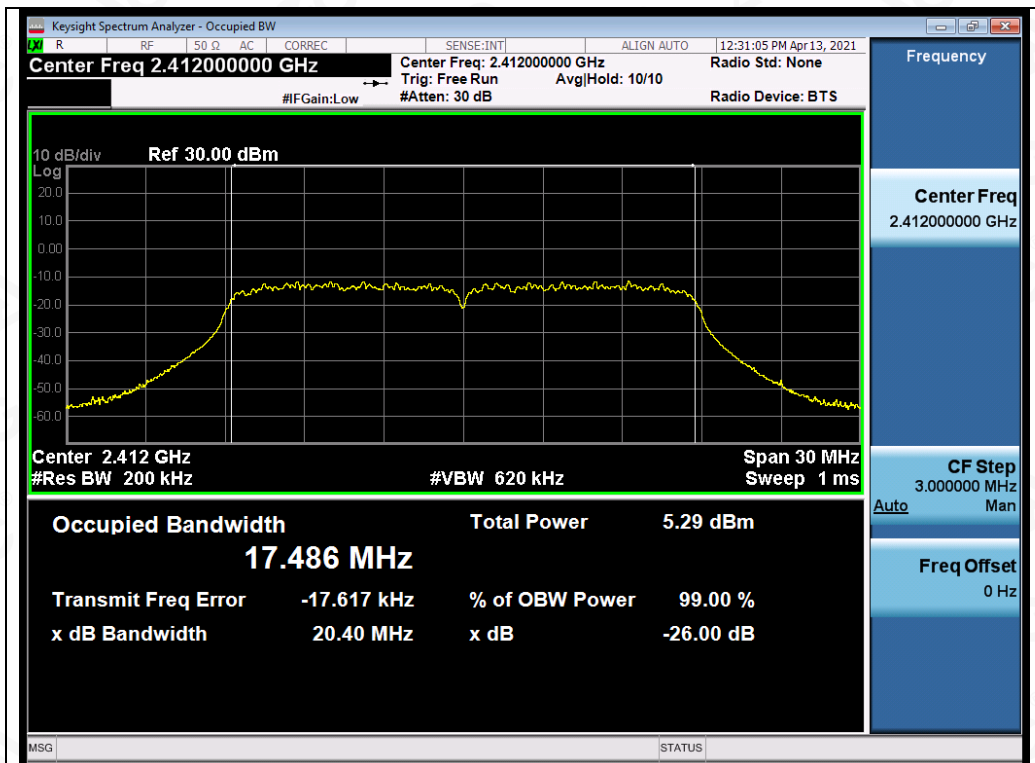


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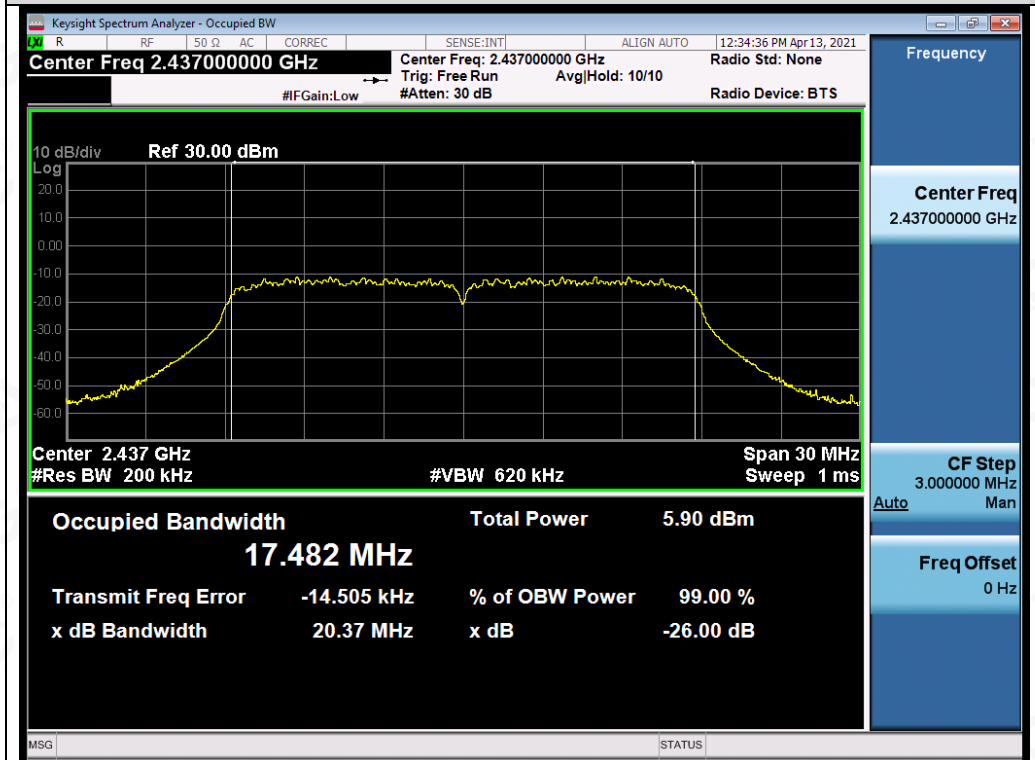
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Test\_Graph\_802.11n20\_ANT1\_2412\_MCS0\_OBW



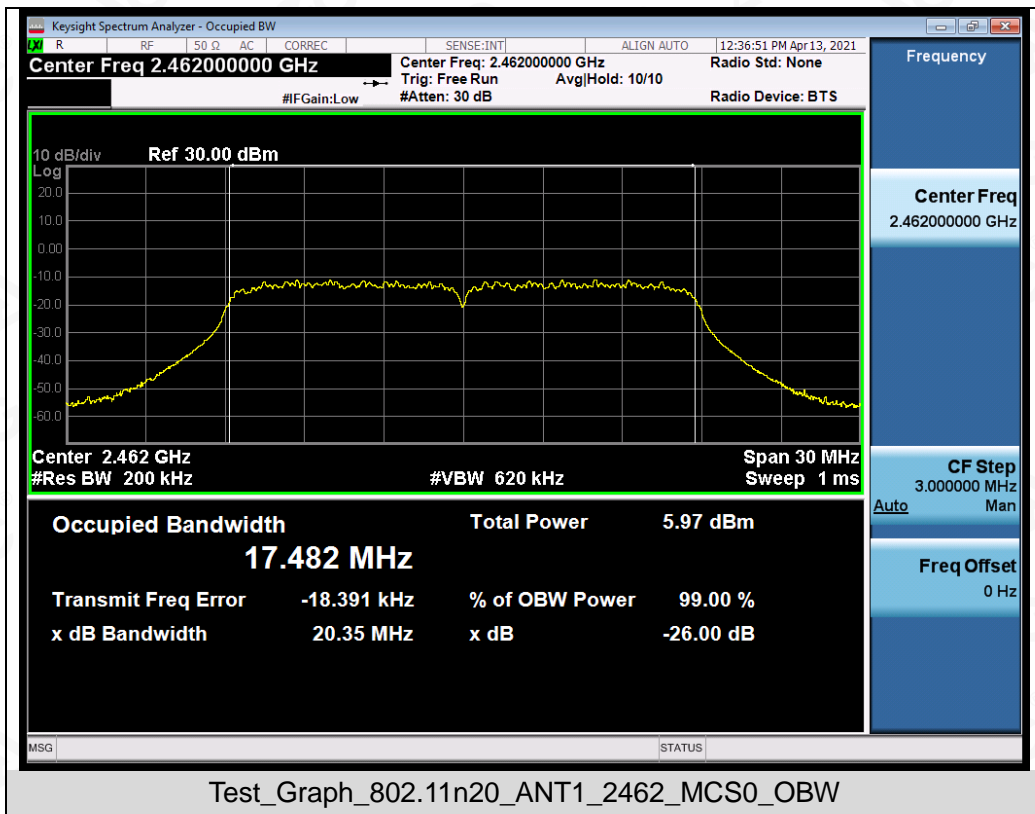
Test\_Graph\_802.11n20\_ANT1\_2437\_MCS0\_OBW

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Test\_Graph\_802.11n20\_ANT1\_2462\_MCS0\_OBW

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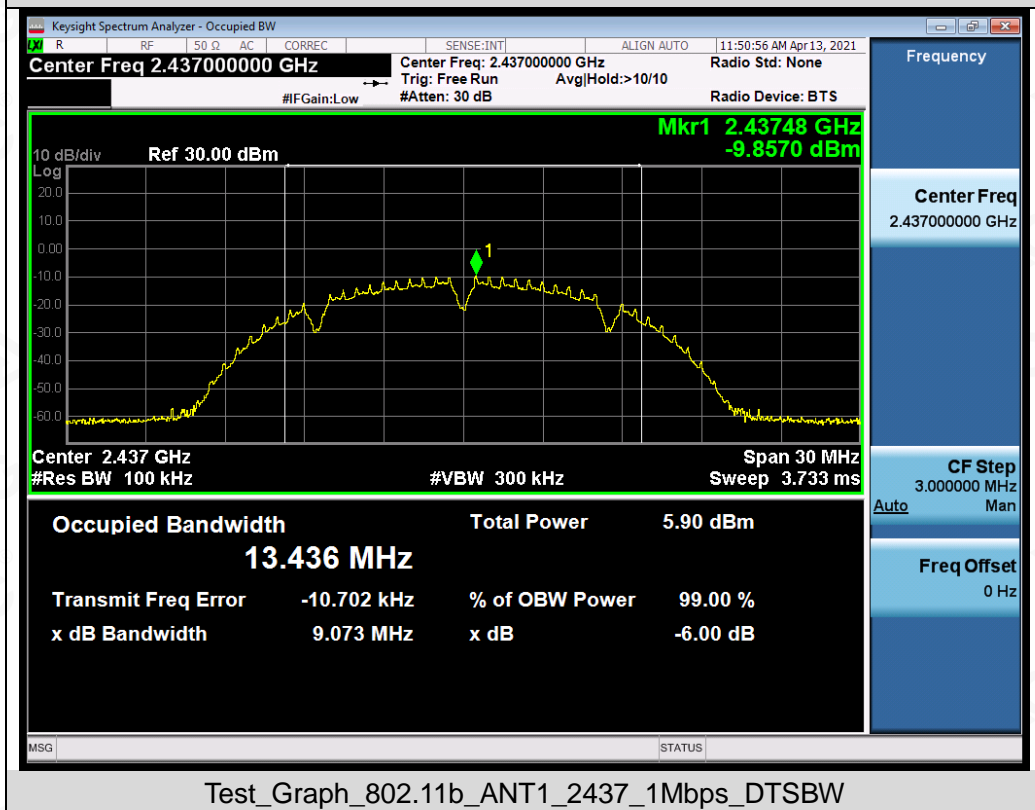
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### Test Graphs of DTS Bandwidth



Test\_Graph\_802.11b\_ANT1\_2412\_1Mbps\_DTSBW



Test\_Graph\_802.11b\_ANT1\_2437\_1Mbps\_DTSBW

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Test\_Graph\_802.11b\_ANT1\_2462\_1Mbps\_DTSBW

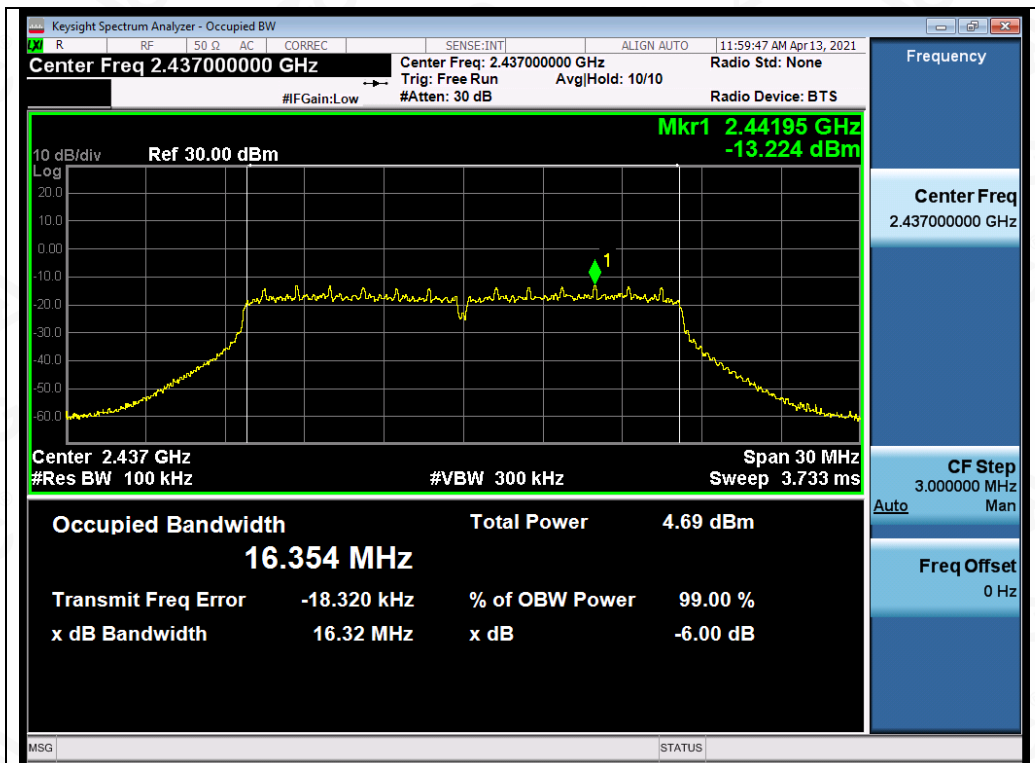


Test\_Graph\_802.11g\_ANT1\_2412\_6Mbps\_DTSBW

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Test\_Graph\_802.11g\_ANT1\_2437\_6Mbps\_DTSBW



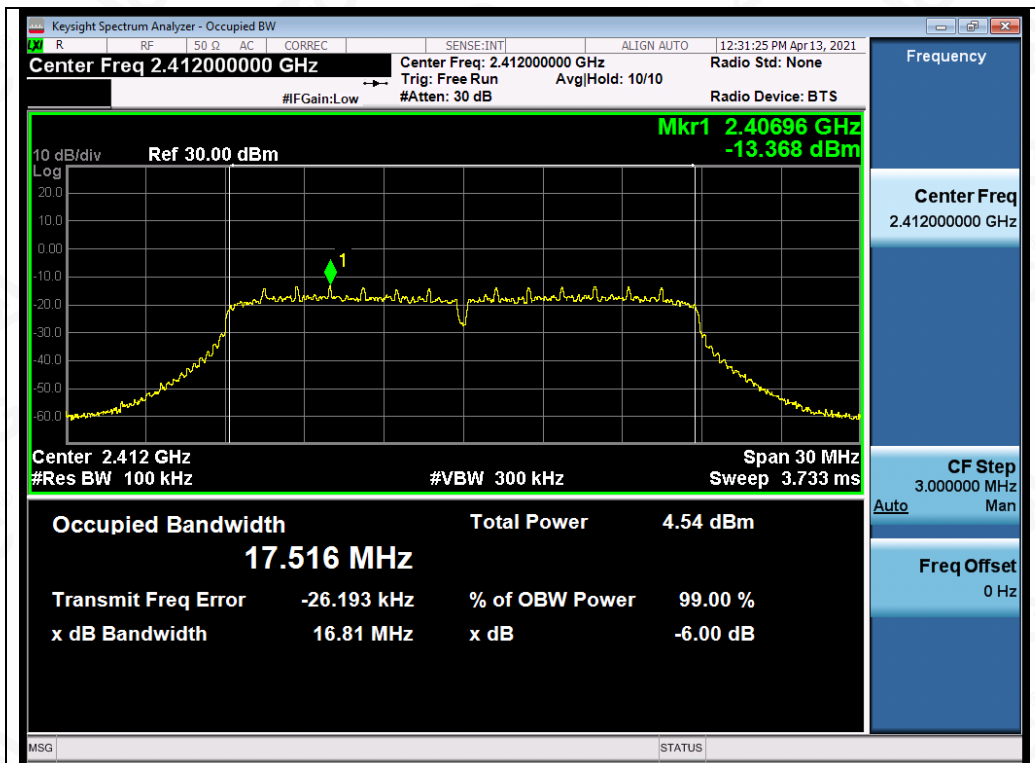
Test\_Graph\_802.11g\_ANT1\_2462\_6Mbps\_DTSBW

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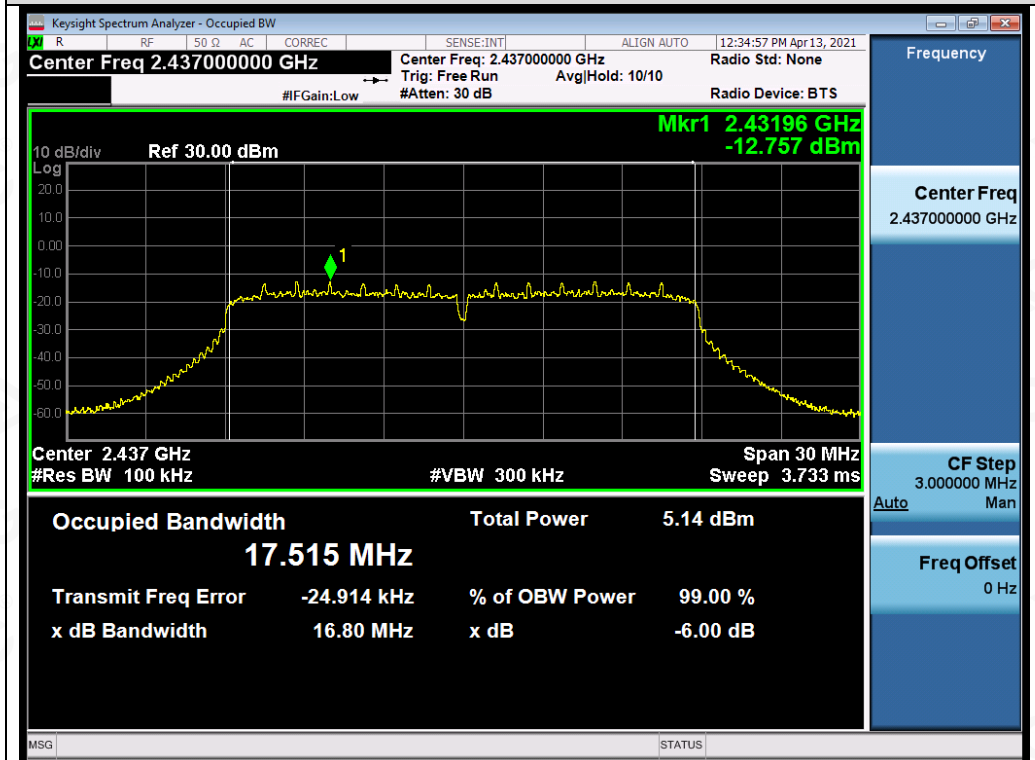
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Test\_Graph\_802.11n20\_ANT1\_2412\_MCS0\_DTSBW

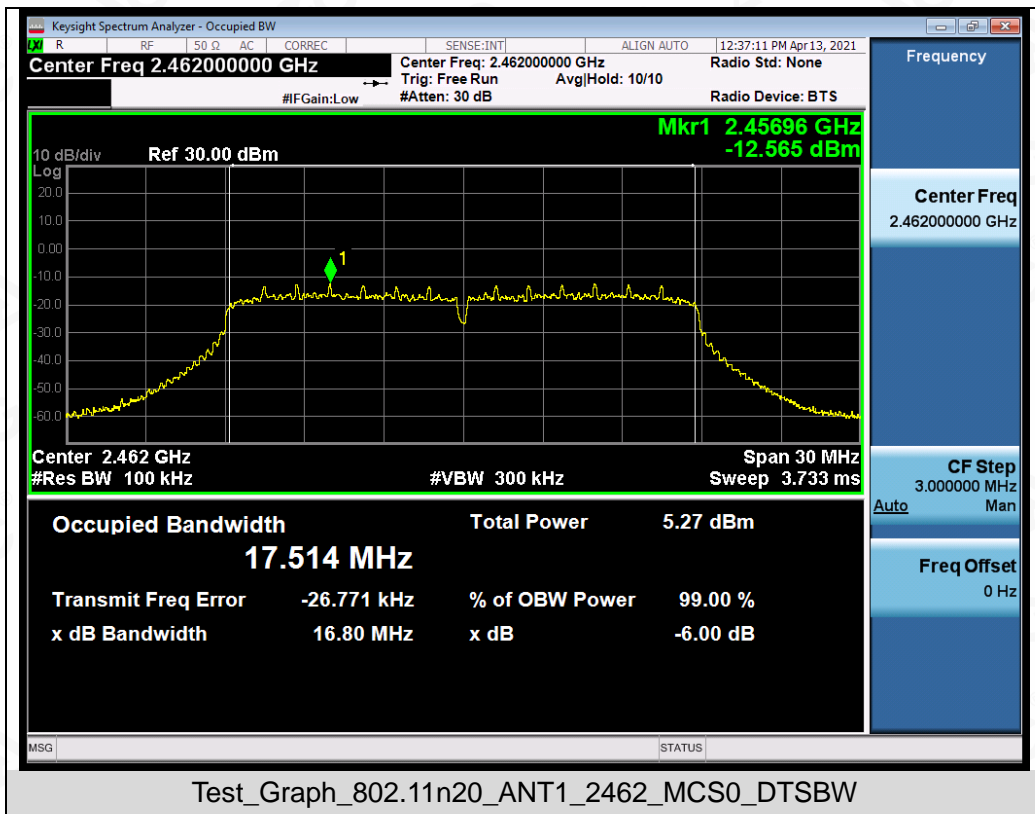


Test\_Graph\_802.11n20\_ANT1\_2437\_MCS0\_DTSBW

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## 9. CONDUCTED SPURIOUS EMISSION

### 9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Trace 1 Max hold, then View.

**Note:** The EUT was tested according to ANSI C63.10 (2013) for compliance to FCC 47CFR 15.247 requirements. Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW > RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW > RBW) are conform to the requirement.

### 9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2.

### 9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

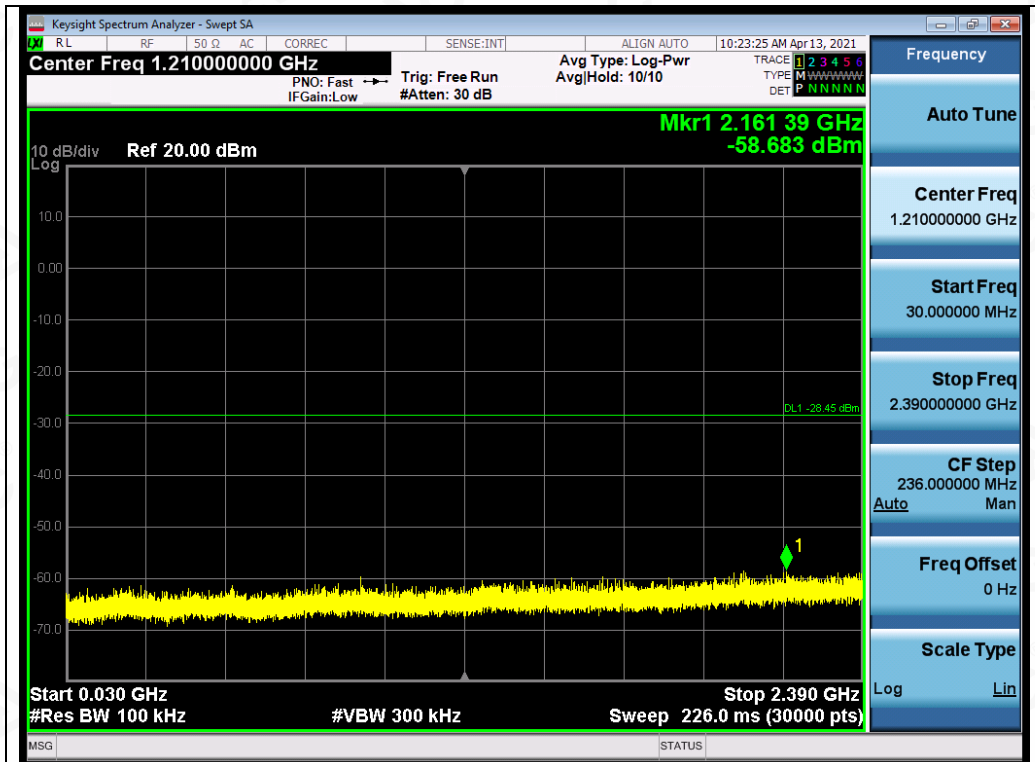
### 9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT		
Applicable Limits	Measurement Result	
	Test Data	Criteria
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation 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)	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS
	At least -20dBc than the limit Specified on the TOP Channel	PASS

Note: The limits reference level is according to the test plot of -6dB bandwidth.



### Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands



Test\_Graph\_802.11b\_ANT1\_2412\_1Mbps\_Lower Band Emissions



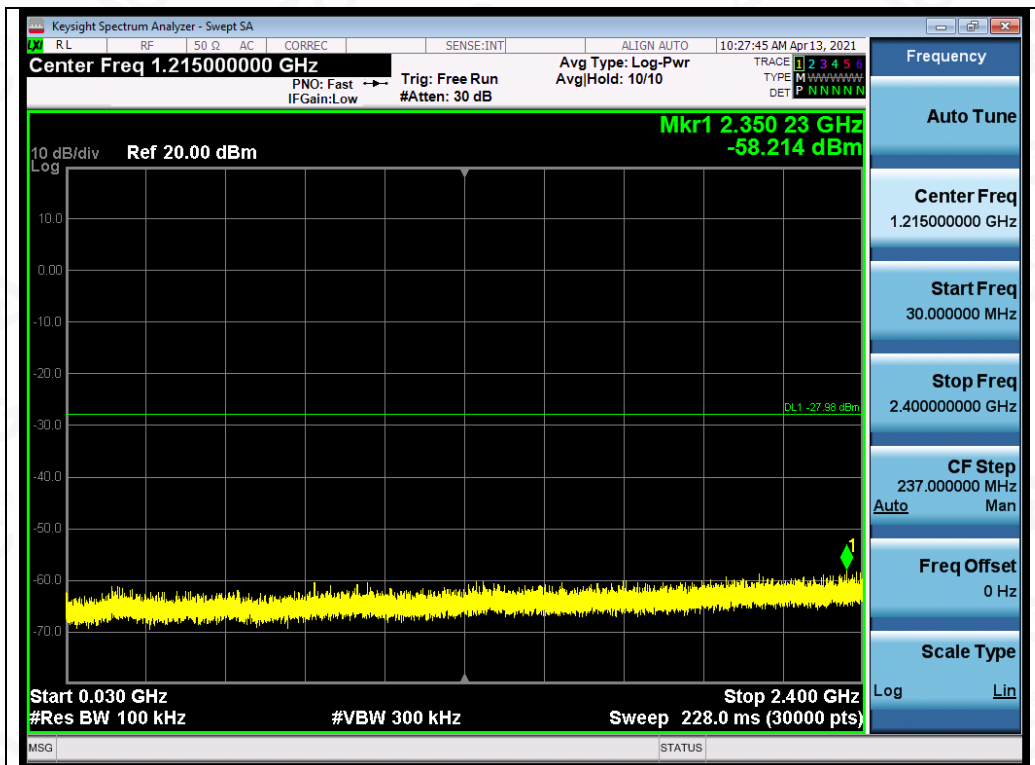
Test\_Graph\_802.11b\_ANT1\_2412\_1Mbps\_Higher Band Emissions

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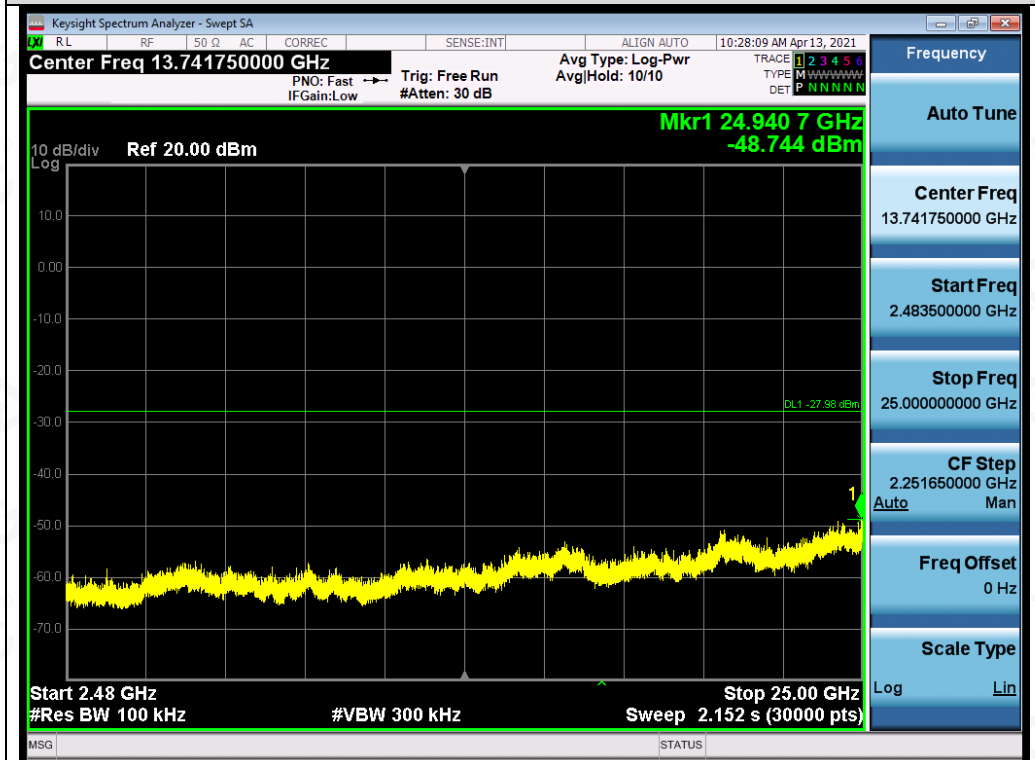
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Test\_Graph\_802.11b\_ANT1\_2437\_1Mbps\_Lower Band Emissions

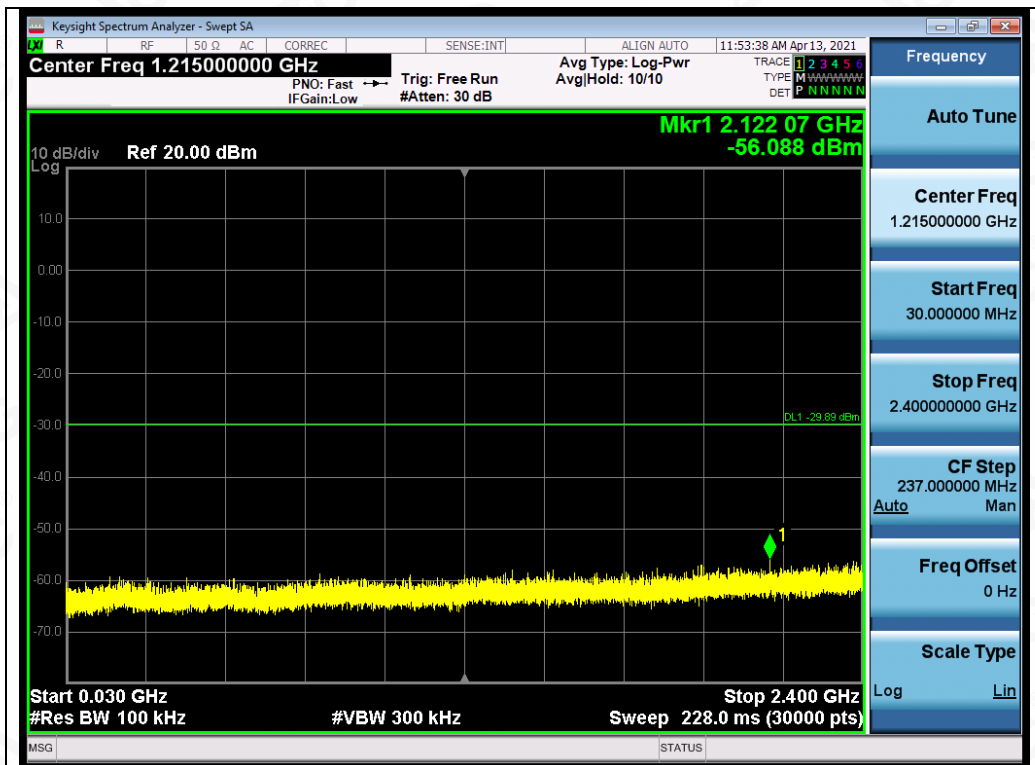


Test\_Graph\_802.11b\_ANT1\_2437\_1Mbps\_Higher Band Emissions

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Test\_Graph\_802.11b\_ANT1\_2462\_1Mbps\_Lower Band Emissions

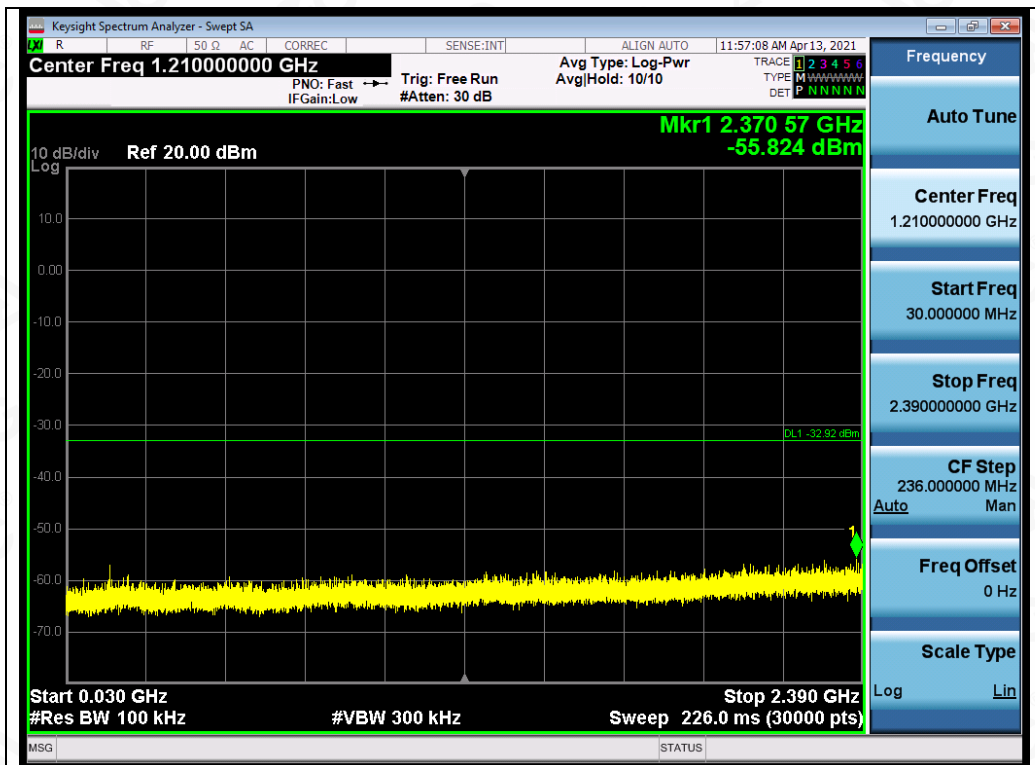


Test\_Graph\_802.11b\_ANT1\_2462\_1Mbps\_Higher Band Emissions

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Test\_Graph\_802.11g\_ANT1\_2412\_6Mbps\_Lower Band Emissions

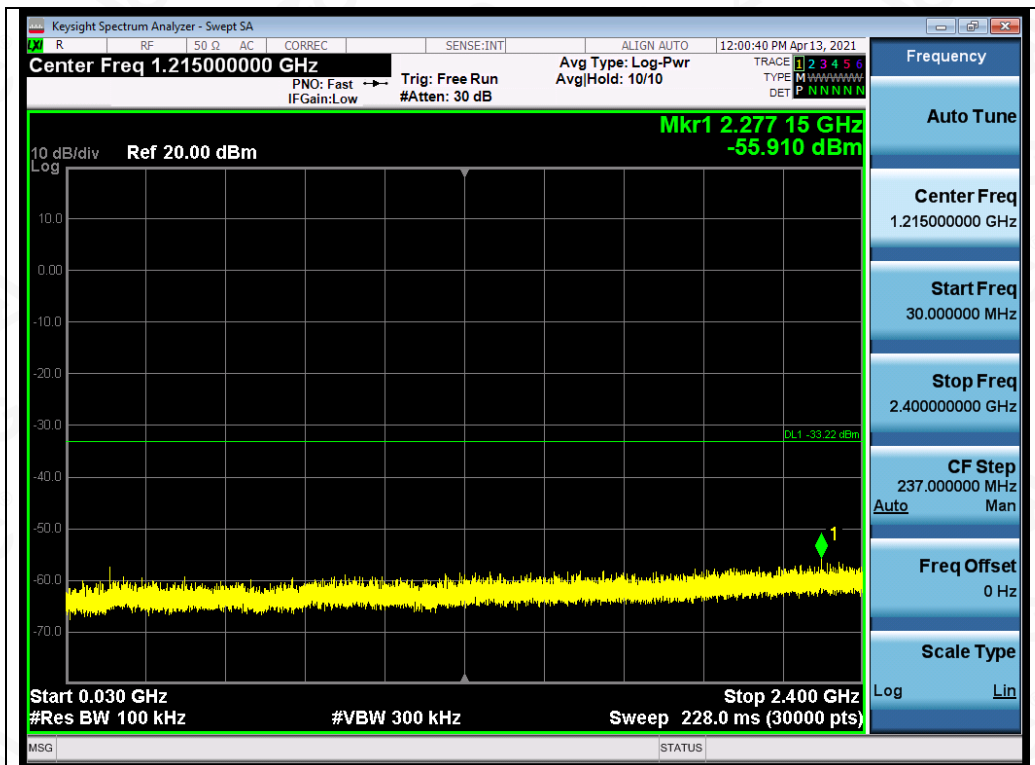


Test\_Graph\_802.11g\_ANT1\_2412\_6Mbps\_Higher Band Emissions

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Test\_Graph\_802.11g\_ANT1\_2437\_6Mbps\_Lower Band Emissions



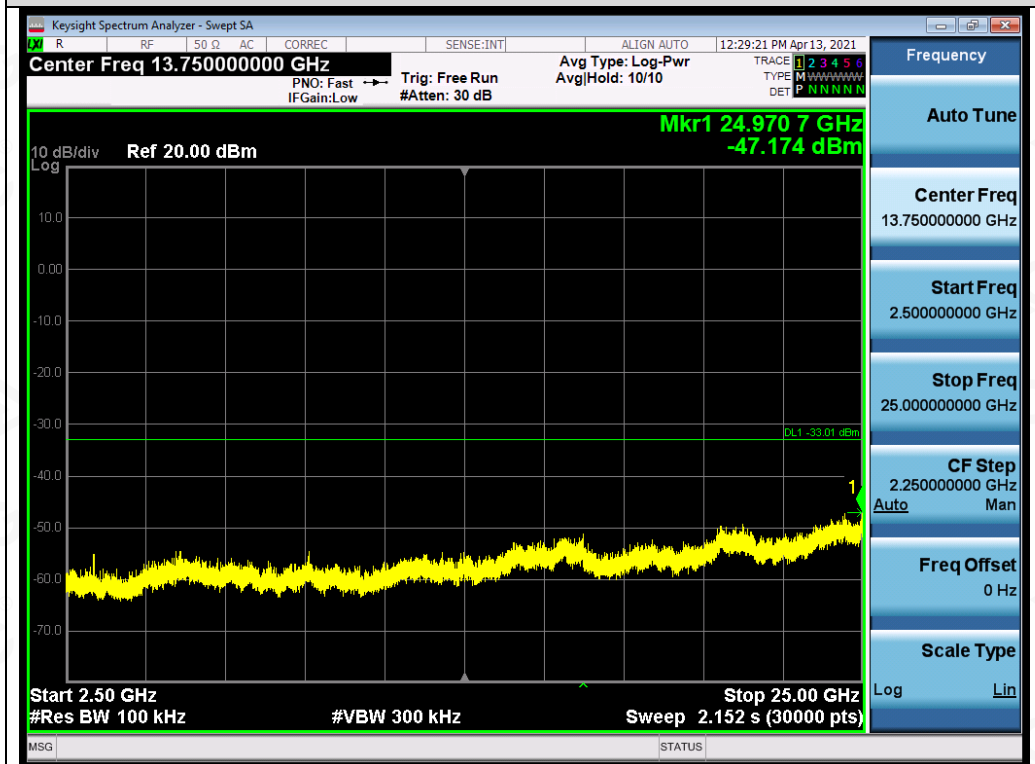
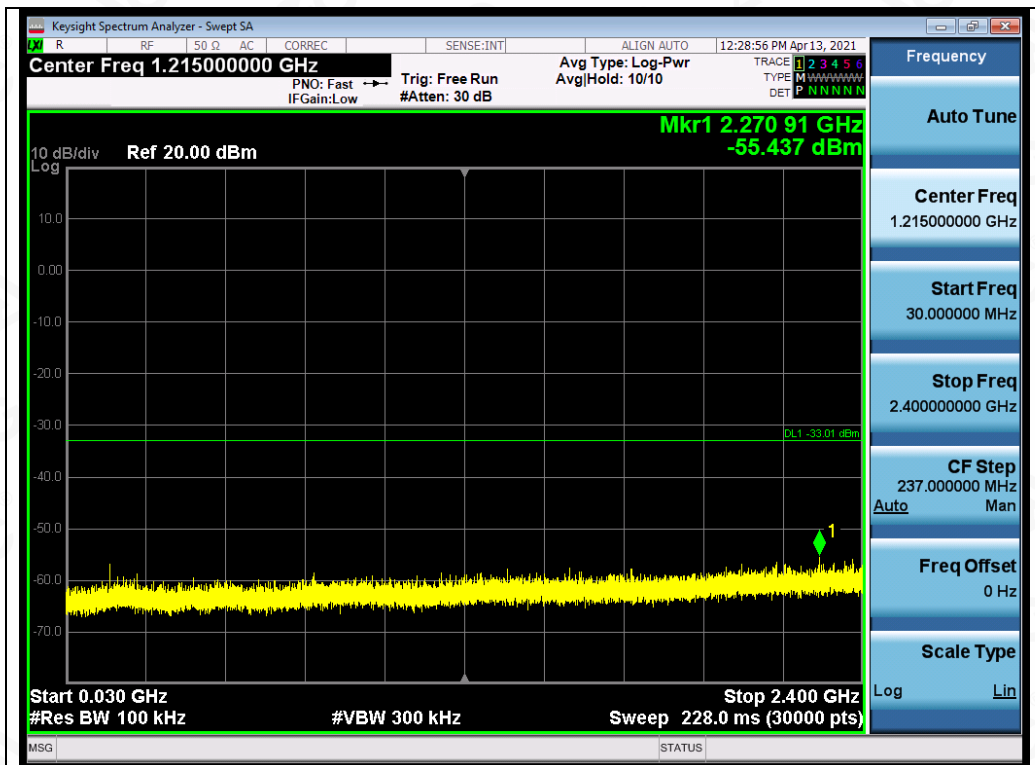
Test\_Graph\_802.11g\_ANT1\_2437\_6Mbps\_Higher Band Emissions

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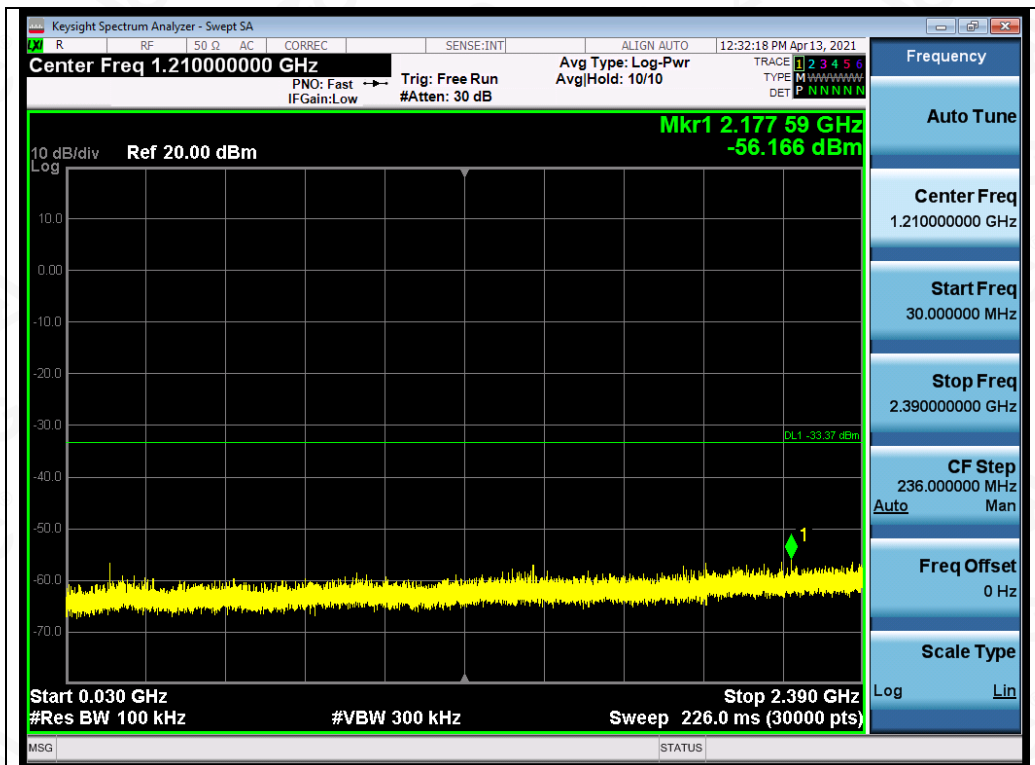




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Test\_Graph\_802.11n20\_ANT1\_2412\_MCS0\_Lower Band Emissions

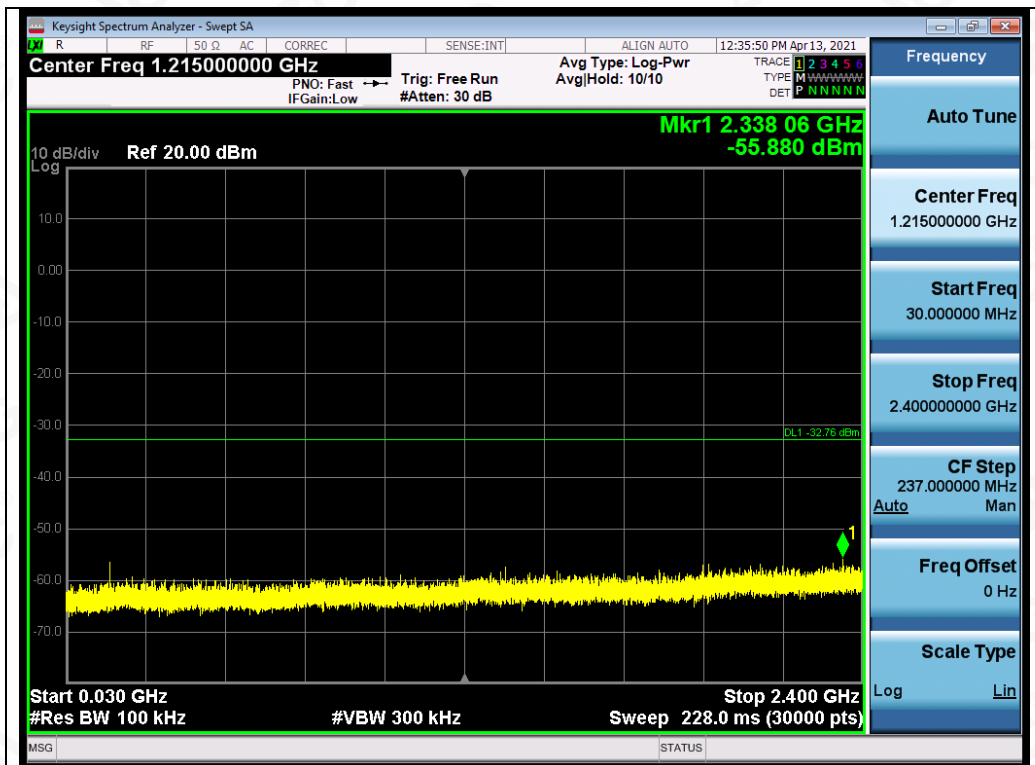


Test\_Graph\_802.11n20\_ANT1\_2412\_MCS0\_Higher Band Emissions

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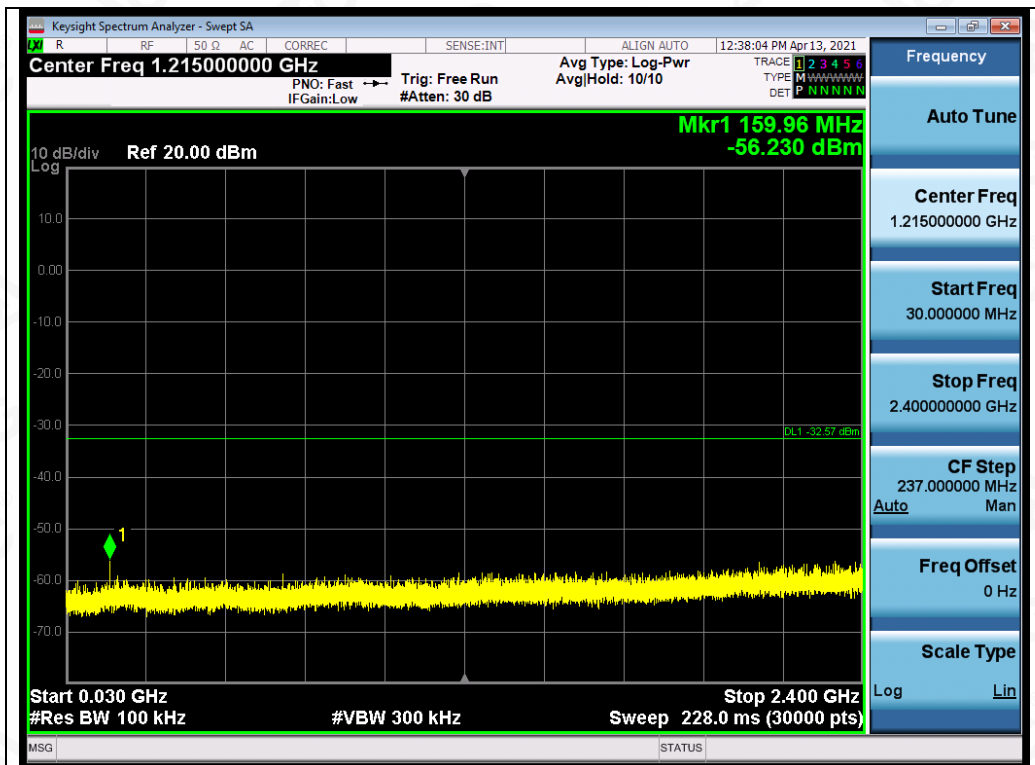




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Test\_Graph\_802.11n20\_ANT1\_2462\_MCS0\_Lower Band Emissions



Test\_Graph\_802.11n20\_ANT1\_2462\_MCS0\_Higher Band Emissions

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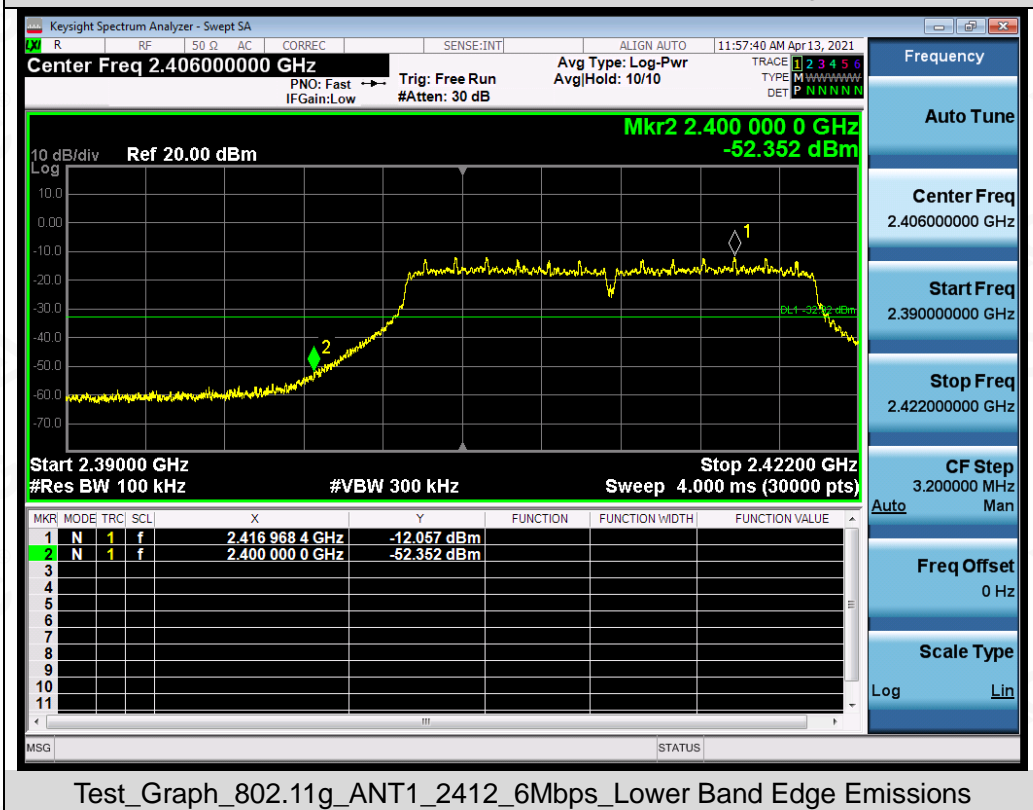




**Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands**



Test\_Graph\_802.11b\_ANT1\_2412\_1Mbps\_Lower Band Edge Emissions

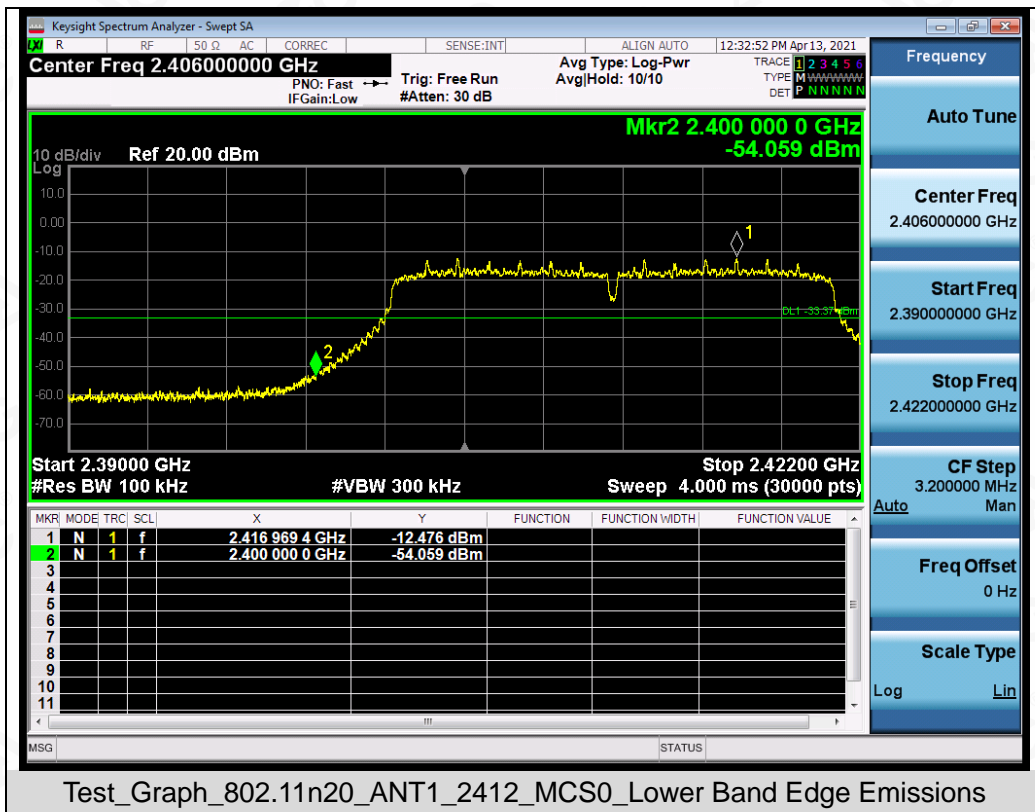


Test\_Graph\_802.11g\_ANT1\_2412\_6Mbps\_Lower Band Edge Emissions

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Note: Emissions from 2483.5-2500MHz which fall in the restricted bands had been considered with the radiated emission limits specified.

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## 10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

### 10.1 MEASUREMENT PROCEDURE

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set SPA Trace 1 Max hold, then View.

Note: The method of PKPSD in the ANSI C63.10 (2013) item 11.10 was used in this testing.

### 10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer to Section 8.2.

### 10.3 MEASUREMENT EQUIPMENT USED

Refer to Section 6.

### 10.4 LIMITS AND MEASUREMENT RESULT

Test Data of Conducted Output Power Spectral Density					
Test Mode	Test Channel (MHz)	Power density (dBm/20kHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail
802.11b	2412	-8.007	-16.246	∞	Pass
	2437	-7.452	-15.691	∞	Pass
	2462	-14.369	-22.608	∞	Pass
802.11g	2412	-18.644	-26.883	∞	Pass
	2437	-19.106	-27.345	∞	Pass
	2462	-18.697	-26.936	∞	Pass
802.11n20	2412	-19.016	-27.255	∞	Pass
	2437	-17.734	-25.973	∞	Pass
	2462	-17.598	-25.837	∞	Pass

Note: Power density(dBm/3kHz) = Power density(dBm/20kHz) – 10\*log(20/3).

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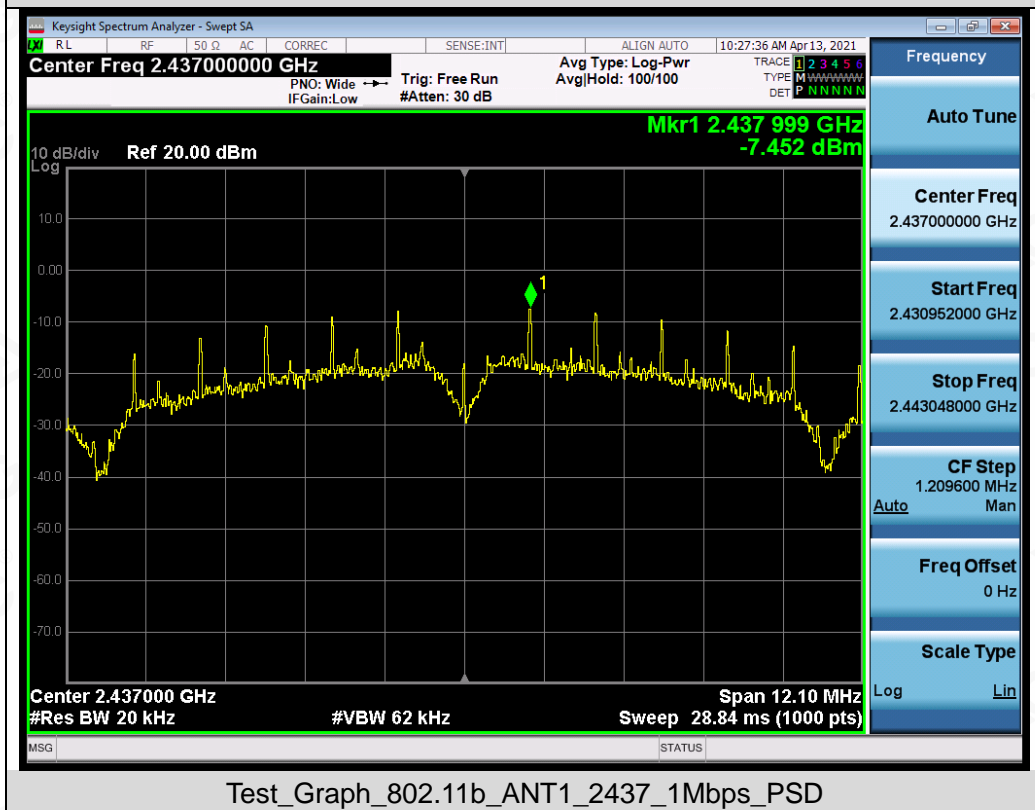
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### Test Graphs of Conducted Output Power Spectral Density



Test\_Graph\_802.11b\_ANT1\_2412\_1Mbps\_PSD



Test\_Graph\_802.11b\_ANT1\_2437\_1Mbps\_PSD

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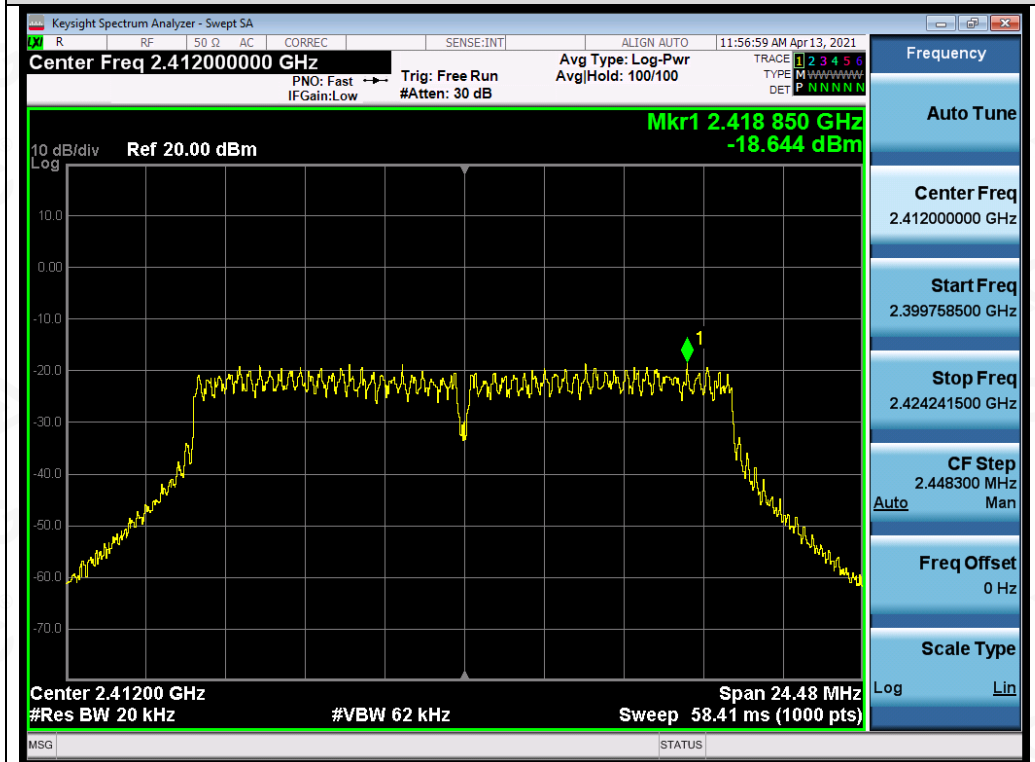
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Test\_Graph\_802.11b\_ANT1\_2462\_1Mbps\_PSD

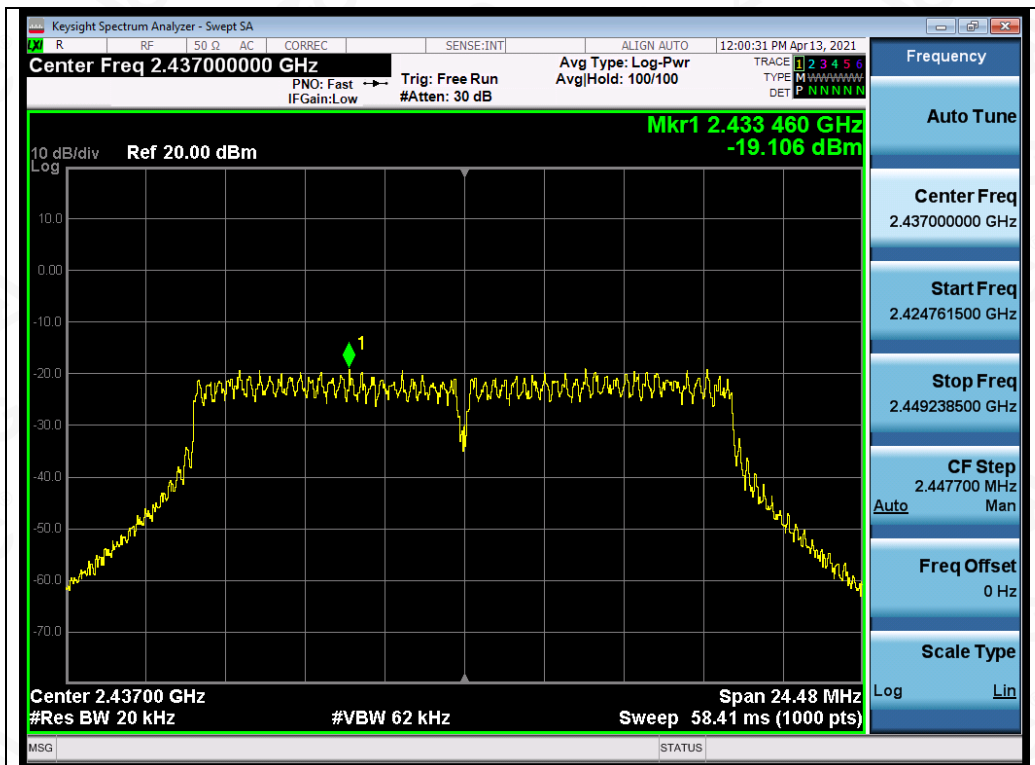


Test\_Graph\_802.11g\_ANT1\_2412\_6Mbps\_PSD

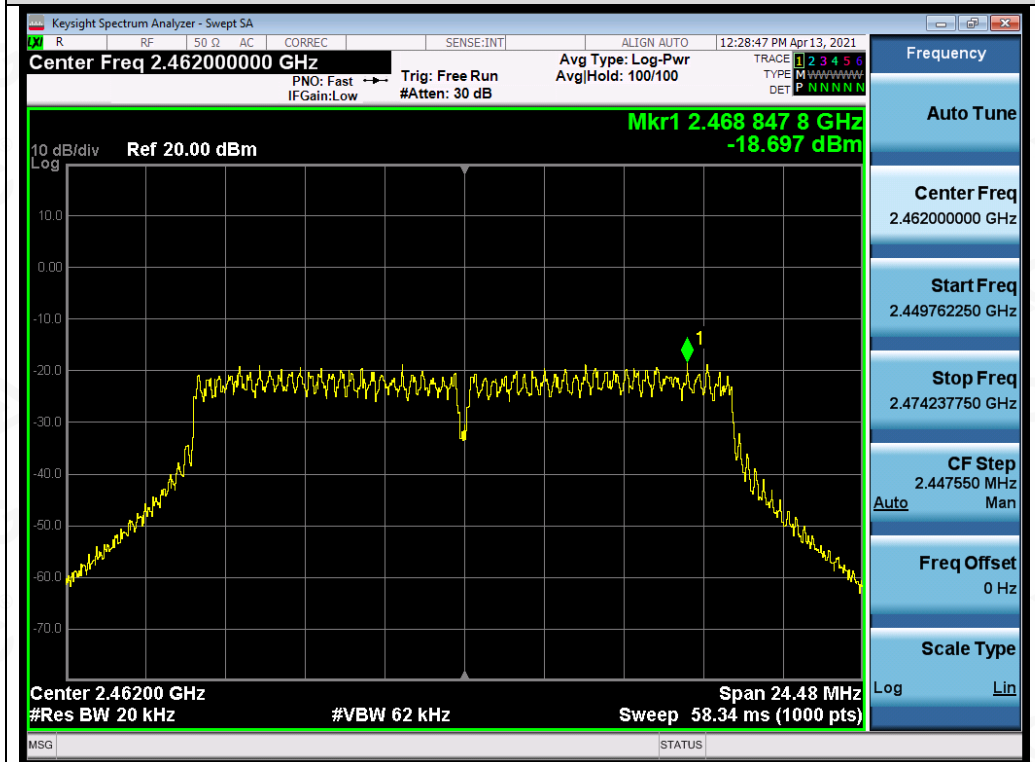
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Test\_Graph\_802.11g\_ANT1\_2437\_6Mbps\_PSD

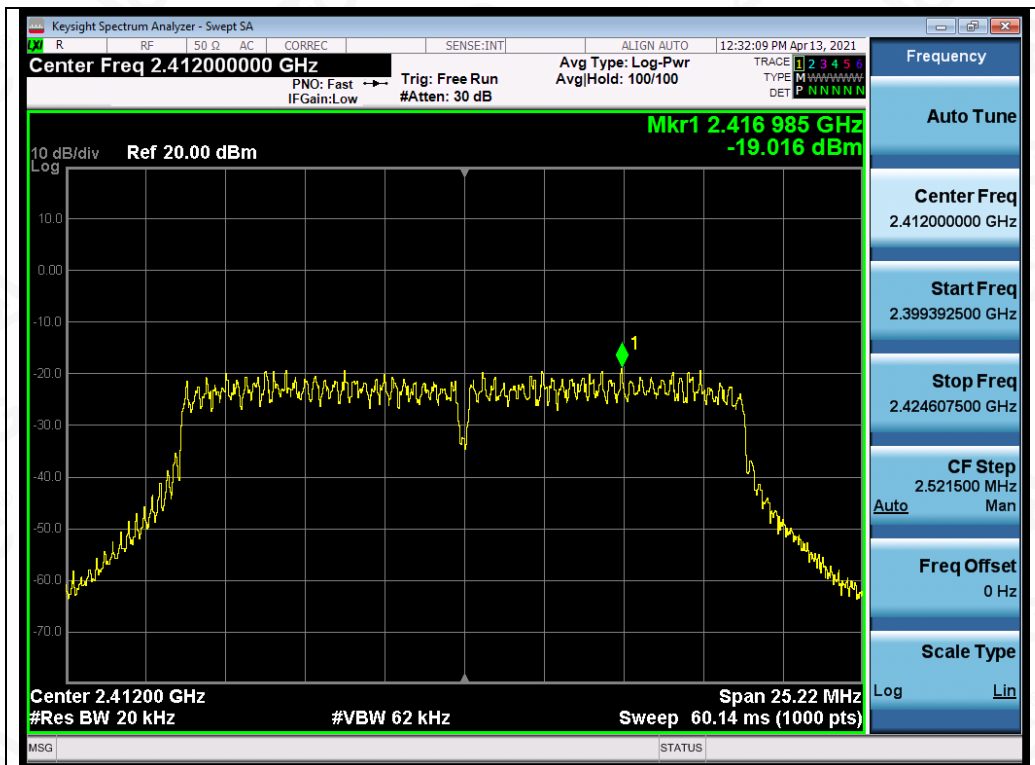


Test\_Graph\_802.11g\_ANT1\_2462\_6Mbps\_PSD

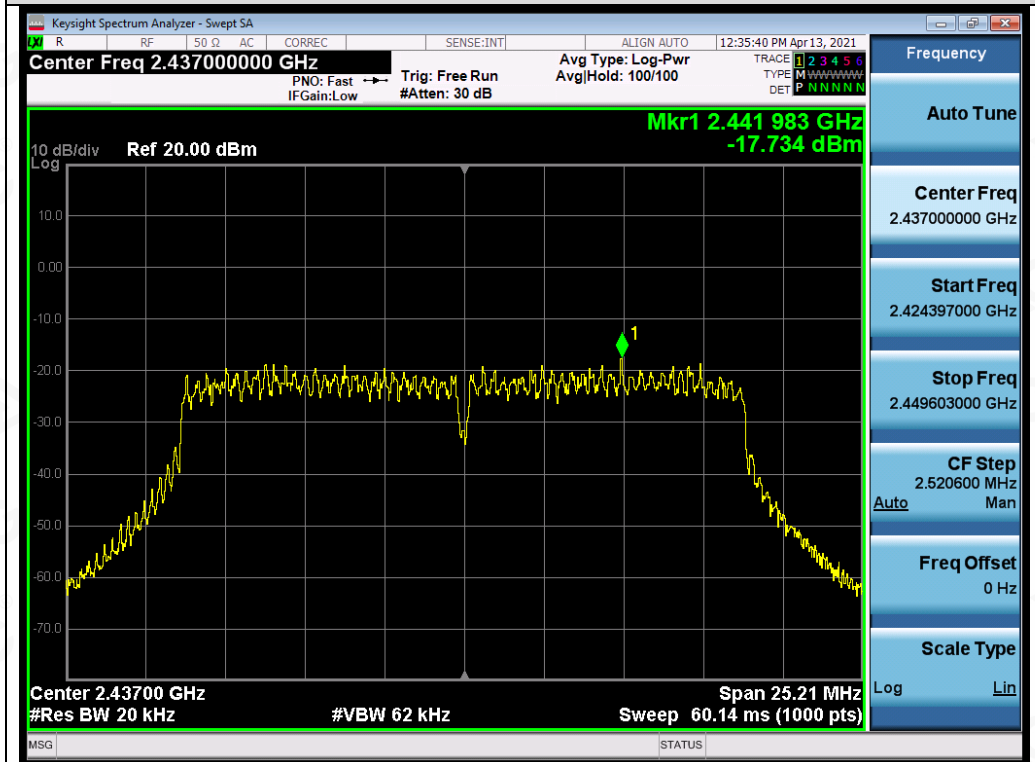
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Test\_Graph\_802.11n20\_ANT1\_2412\_MCS0\_PSD

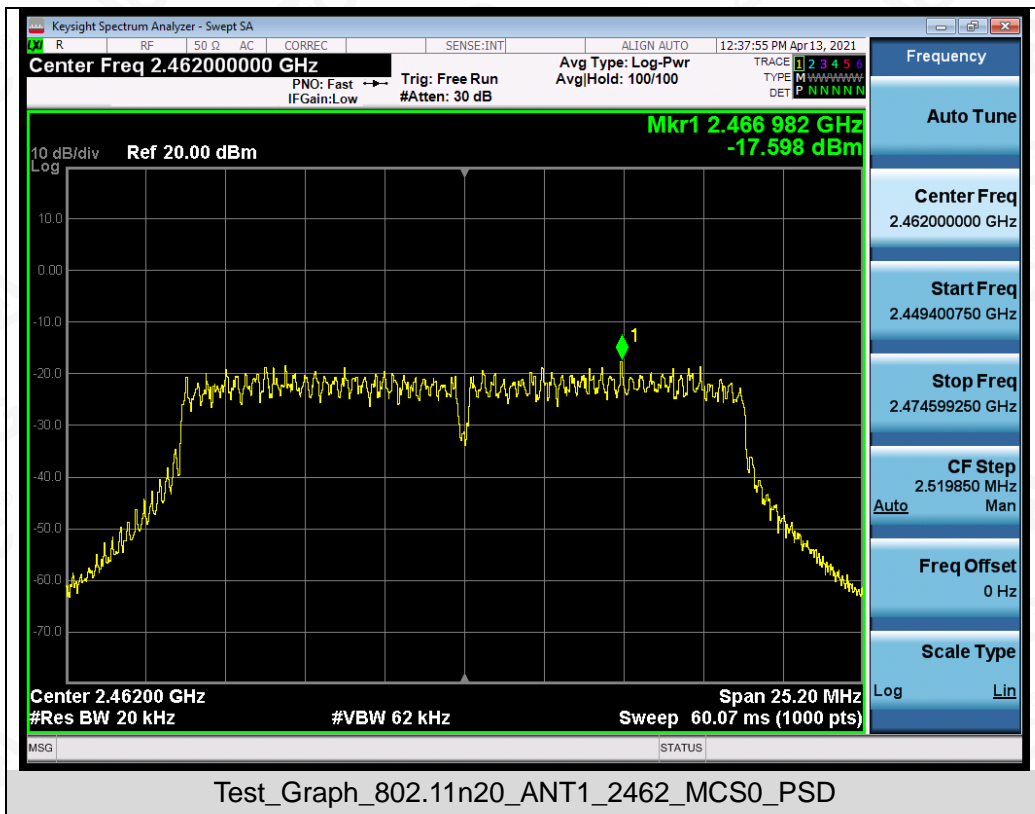


Test\_Graph\_802.11n20\_ANT1\_2437\_MCS0\_PSD

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## 11. RADIATED EMISSION

### 11.1. MEASUREMENT PROCEDURE

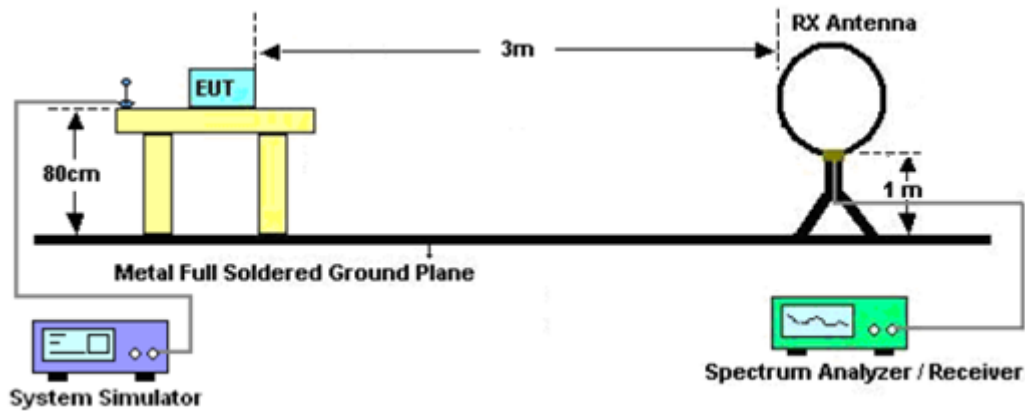
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

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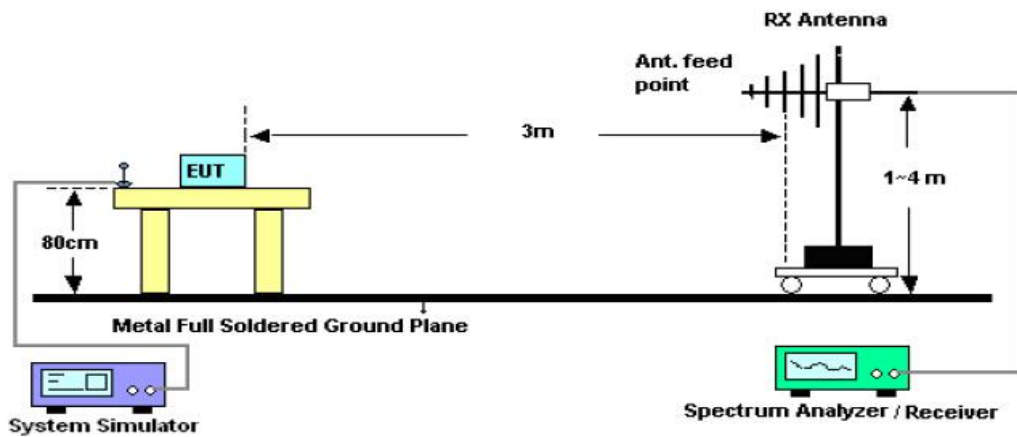


### 11.2. TEST SETUP

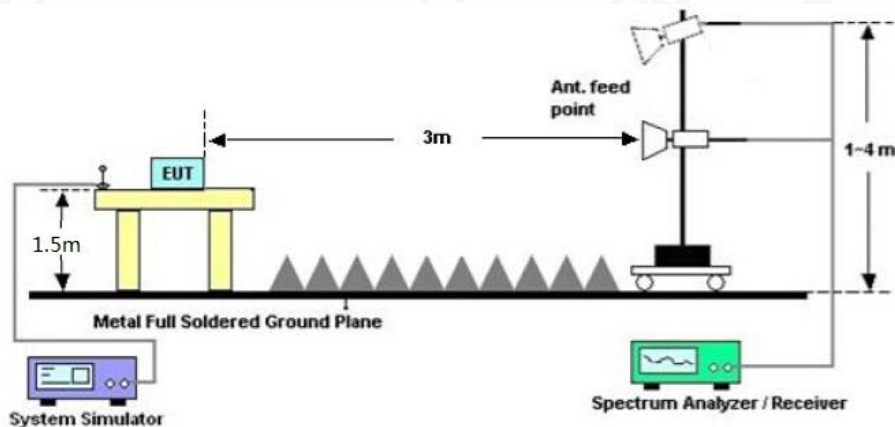
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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### 11.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

### 11.4. TEST RESULT

#### Radiated emission below 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

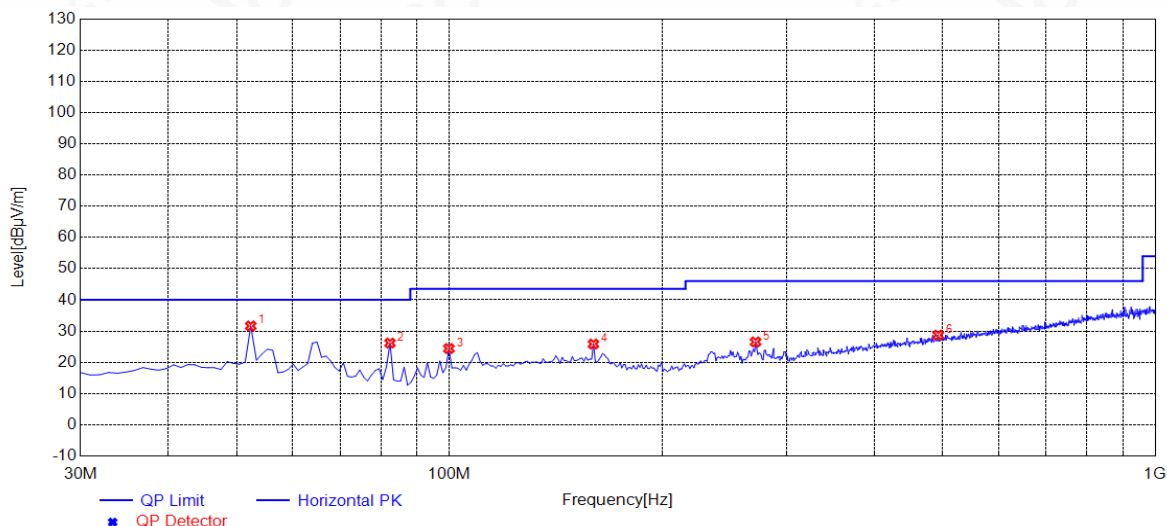
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**Radiated emission from 30MHz to 1000MHz**

<b>EUT</b>	MICRO TX	<b>Model Name</b>	TBS TRACER
<b>Temperature</b>	25°C	<b>Relative Humidity</b>	58%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	Normal Voltage
<b>Test Mode</b>	802.11b with data rate 1 2412MHz	<b>Antenna</b>	Horizontal



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	52.3100	31.65	11.49	40.00	8.35	200	30	Horizontal
2	82.3800	26.18	7.17	40.00	13.82	200	242	Horizontal
3	99.8400	24.42	11.30	43.50	19.08	200	284	Horizontal
4	159.9800	25.85	14.94	43.50	17.65	200	305	Horizontal
5	271.5300	26.54	15.55	46.00	19.46	200	183	Horizontal
6	492.6900	28.73	22.00	46.00	17.27	100	359	Horizontal

**RESULT: PASS**

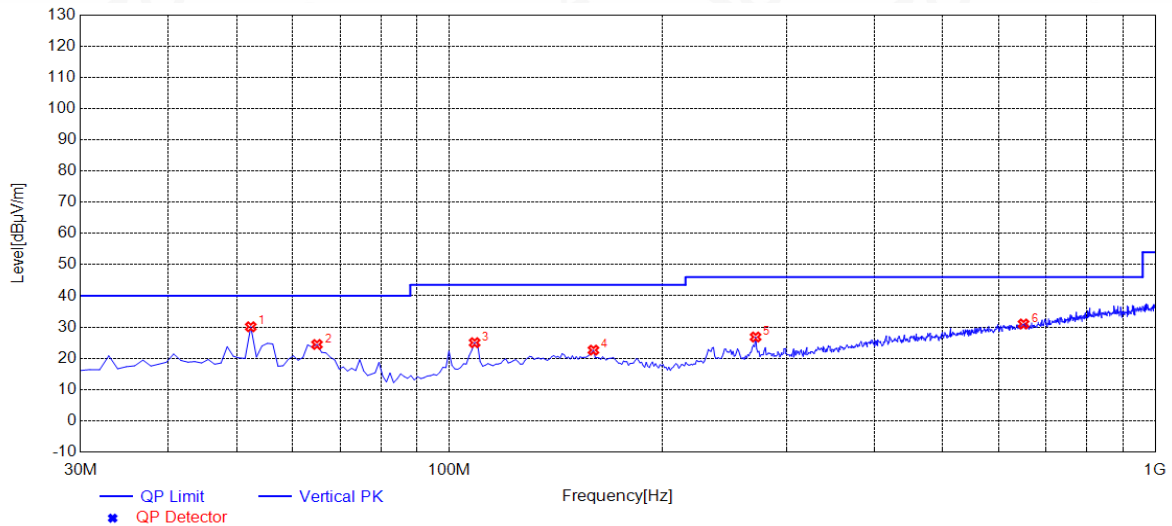
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<b>EUT</b>	MICRO TX	<b>Model Name</b>	TBS TRACER
<b>Temperature</b>	25°C	<b>Relative Humidity</b>	58%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	Normal Voltage
<b>Test Mode</b>	802.11b with date rate 1 2412MHz	<b>Antenna</b>	Vertical



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	52.3100	30.11	11.49	40.00	9.89	100	301	Vertical
2	64.9200	24.44	10.09	40.00	15.56	100	141	Vertical
3	108.5700	25.01	12.27	43.50	18.49	100	333	Vertical
4	159.9800	22.63	14.94	43.50	20.87	100	269	Vertical
5	271.5300	26.83	15.55	46.00	19.17	100	251	Vertical
6	650.8000	31.00	25.18	46.00	15.00	100	54	Vertical

**RESULT: PASS**

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Limit-Level.

2. The “Factor” value can be calculated automatically by software of measurement system.

3. All test modes had been pre-tested. The 802.11b at low channel is the worst case and recorded in the report.

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**Radiated emission above 1GHz**

<b>EUT</b>	MICRO TX	<b>Model Name</b>	TBS TRACER
<b>Temperature</b>	25°C	<b>Relative Humidity</b>	58%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	Normal Voltage
<b>Test Mode</b>	802.11b with data rate 1 2412MHz	<b>Antenna</b>	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4824.000	54.29	0.08	54.37	74	-19.63	peak
4824.000	45.31	0.08	45.39	54	-8.61	AVG
7236.000	49.37	2.21	51.58	74	-22.42	peak
7236.000	40.15	2.21	42.36	54	-11.64	AVG

Remark:  
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT</b>	MICRO TX	<b>Model Name</b>	TBS TRACER
<b>Temperature</b>	25°C	<b>Relative Humidity</b>	58%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	Normal Voltage
<b>Test Mode</b>	802.11b with data rate 1 2412MHz	<b>Antenna</b>	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4824.000	56.91	0.08	56.99	74	-17.01	peak
4824.000	46.28	0.08	46.36	54	-7.64	AVG
7236.000	51.24	2.21	53.45	74	-20.55	peak
7236.000	42.83	2.21	45.04	54	-8.96	AVG

Remark:  
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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<b>EUT</b>	MICRO TX	<b>Model Name</b>	TBS TRACER
<b>Temperature</b>	25°C	<b>Relative Humidity</b>	58%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	Normal Voltage
<b>Test Mode</b>	802.11b with data rate 1 2437MHz	<b>Antenna</b>	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4874.000	56.18	0.14	56.32	74	-17.68	peak
4874.000	45.27	0.14	45.41	54	-8.59	AVG
7311.000	51.07	2.36	53.43	74	-20.57	peak
7311.000	41.32	2.36	43.68	54	-10.32	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT</b>	MICRO TX	<b>Model Name</b>	TBS TRACER
<b>Temperature</b>	25°C	<b>Relative Humidity</b>	58%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	Normal Voltage
<b>Test Mode</b>	802.11b with data rate 1 2437MHz	<b>Antenna</b>	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4874.000	55.19	0.14	55.33	74	-18.67	peak
4874.000	46.27	0.14	46.41	54	-7.59	AVG
7311.000	50.16	2.36	52.52	74	-21.48	peak
7311.000	41.37	2.36	43.73	54	-10.27	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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<b>EUT</b>	MICRO TX	<b>Model Name</b>	TBS TRACER
<b>Temperature</b>	25°C	<b>Relative Humidity</b>	58%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	Normal Voltage
<b>Test Mode</b>	802.11b with data rate 1 2462MHz	<b>Antenna</b>	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4924.000	56.19	0.22	56.41	74	-17.59	peak
4924.000	45.37	0.22	45.59	54	-8.41	AVG
7386.000	50.27	2.64	52.91	74	-21.09	peak
7386.000	40.16	2.64	42.8	54	-11.2	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT</b>	MICRO TX	<b>Model Name</b>	TBS TRACER
<b>Temperature</b>	25°C	<b>Relative Humidity</b>	58%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	Normal Voltage
<b>Test Mode</b>	802.11b with data rate 1 2462MHz	<b>Antenna</b>	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4924.000	56.13	0.22	56.35	74	-17.65	peak
4924.000	45.27	0.22	45.49	54	-8.51	AVG
7386.000	52.17	2.64	54.81	74	-19.19	peak
7386.000	42.35	2.64	44.99	54	-9.01	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

## RESULT: PASS

### Note:

The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

All test modes had been pre-tested. The 802.11b mode is the worst case and recorded in the report.

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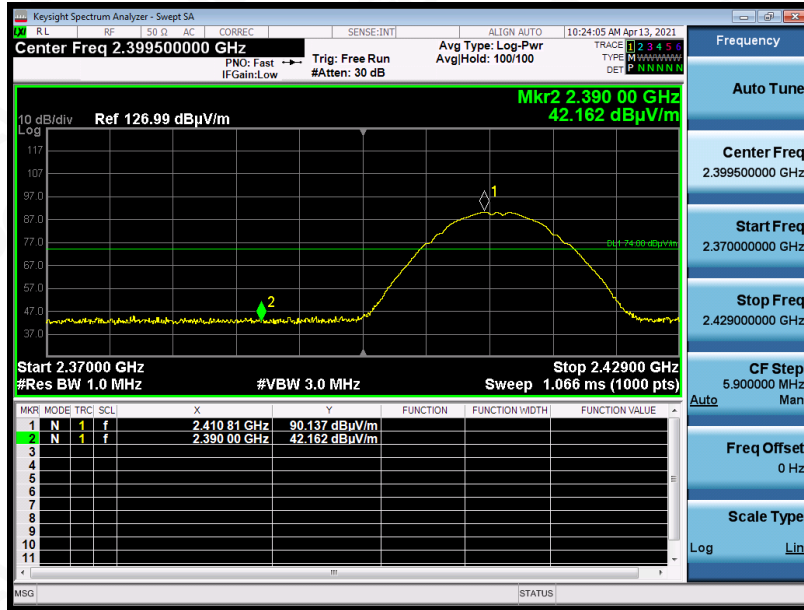




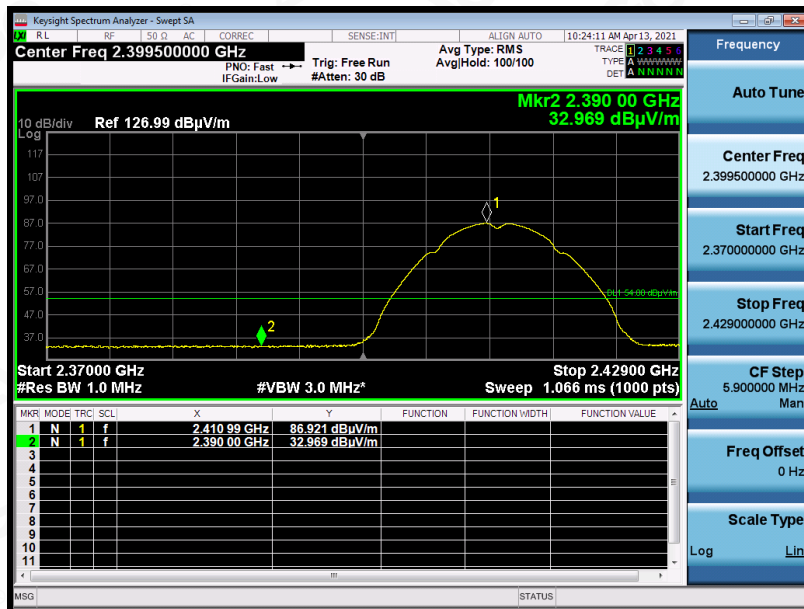
**Test result for band edge emission at restricted bands**

EUT	MICRO TX	Model Name	TBS TRACER
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHz	Antenna	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement



**RESULT: PASS**

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