
FCC Test Report

Report No.: AGC03923230801FR01

FCC ID : 2BCGH-IPM004

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : WIFI Camera

BRAND NAME : E-Song

MODEL NAME : IPM004

APPLICANT : E-Song Digital Limited

DATE OF ISSUE : Aug. 24, 2023

STANDARD(S)
TEST PROCEDURE(S) : FCC Part 15.247

REPORT VERSION : V1.0

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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug. 24, 2023	Valid	Initial Release

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TABLE OF CONTENTS

1. VERIFICATION OF CONFORMITY	5
2. GENERAL INFORMATION	6
2.1. PRODUCT DESCRIPTION	6
2.2. TABLE OF CARRIER FREQUENCYS	7
2.3. IEEE 802.11N MODULATION SCHEME	8
2.4. RELATED SUBMITTAL(S) / GRANT (S)	8
2.5. TEST METHODOLOGY	8
2.6. SPECIAL ACCESSORIES	8
2.7. EQUIPMENT MODIFICATIONS	8
2.8. ANTENNA REQUIREMENT	9
3. MEASUREMENT UNCERTAINTY	10
4. DESCRIPTION OF TEST MODES	11
5. SYSTEM TEST CONFIGURATION	12
5.1. CONFIGURATION OF EUT SYSTEM	12
5.2. EQUIPMENT USED IN EUT SYSTEM	12
5.3. SUMMARY OF TEST RESULTS	12
6. TEST FACILITY	13
7. DUTY CYCLE MEASUREMENT	14
8. OUTPUT POWER	16
8.1. MEASUREMENT PROCEDURE	16
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	16
8.3. LIMITS AND MEASUREMENT RESULT	17
9. BANDWIDTH	18
9.1. MEASUREMENT PROCEDURE	18
9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	18
9.3. LIMITS AND MEASUREMENT RESULTS	19
10. CONDUCTED SPURIOUS EMISSION	30
10.1. MEASUREMENT PROCEDURE	30
10.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	30
10.3. MEASUREMENT EQUIPMENT USED	30

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10.4. LIMITS AND MEASUREMENT RESULT	30
11. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY.....	42
11.1 MEASUREMENT PROCEDURE.....	42
11.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	42
11.3 MEASUREMENT EQUIPMENT USED	42
11.4 LIMITS AND MEASUREMENT RESULT	42
12. RADIATED EMISSION	48
12.1. MEASUREMENT PROCEDURE	48
12.2. TEST SETUP	49
12.3. LIMITS AND MEASUREMENT RESULT	50
12.4. TEST RESULT.....	50
13. LINE CONDUCTED EMISSION TEST.....	68
13.1. LIMITS OF LINE CONDUCTED EMISSION TEST	68
13.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST.....	68
13.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST	69
12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST.....	69
13.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST	70
APPENDIX I: PHOTOGRAPHS OF TEST SETUP.....	72
APPENDIX II: PHOTOGRAPHS OF EUT	72

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1. VERIFICATION OF CONFORMITY

Applicant	E-Song Digital Limited
Address	6F, Block B, Jintai Industrial Park, Hangcheng Road, Gushu, Xixiang, Bao'an District, Shenzhen City, PRC
manufacturer	E-Song Digital Limited
Address	6F, Block B, Jintai Industrial Park, Hangcheng Road, Gushu, Xixiang, Bao'an District, Shenzhen City, PRC
Factory	E-Song Digital Limited
Address	6F, Block B, Jintai Industrial Park, Hangcheng Road, Gushu, Xixiang, Bao'an District, Shenzhen City, PRC
Product Designation	WIFI Camera
Brand Name	E-Song
Test Model	IPM004
Date of receipt of test item	Aug. 07, 2023
Date of test	Aug. 07, 2023 to Aug. 24, 2023
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	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



Cici Li
(Project Engineer)

Aug. 24, 2023

Reviewed By



Calvin Liu
(Reviewer)

Aug. 24, 2023

Approved By



Max Zhang
(Authorized Officer)

Aug. 24, 2023

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as "WIFI Camera". 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

Equipment Type	WLAN 2.4G
Frequency Band	2400MHz ~ 2483.5MHz
Operation Frequency	2412MHz ~ 2462MHz
Output Power (Average)	IEEE 802.11b: 12.65dBm; IEEE 802.11g: 10.77dBm; IEEE 802.11n(HT20): 11.15dBm;
Output Power (Peak)	IEEE 802.11b: 15.67dBm; IEEE 802.11g: 18.67dBm; IEEE 802.11n(HT20): 19.06dBm;
Modulation	802.11b:DQPSK, DBPSK, CCK 802.11g/n: 64-QAM, 16-QAM, QPSK, BPSK
Data Rate	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps
Number of channels	11
Hardware Version	V4
Software Version	11.4
Antenna Designation	FPC antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	3.31dBi
Power Supply	DC 3.7V by battery or DC 5V by adapter

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2.2. TABLE OF CARRIER FREQUENCYS**11 channels are provided for 802.11b/g/n(HT20):**

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz		

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2.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Data rate(Mbps)	
					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
NBPSC	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: 2BCGH-IPM004** 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 II: PHOTOGRAPHS OF EUT.

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3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended 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	$U_c = \pm 2.9 \text{ dB}$
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 3.9 \text{ dB}$
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.9 \text{ dB}$
Uncertainty of total RF power, conducted	$U_c = \pm 0.8 \text{ dB}$
Uncertainty of RF power density, conducted	$U_c = \pm 2.6 \text{ dB}$
Uncertainty of spurious emissions, conducted	$U_c = \pm 2.7 \%$
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 Date rate (1/2/5.5/11)

Transmit by 802.11g with Date rate (6/9/12/18/24/36/48/54)

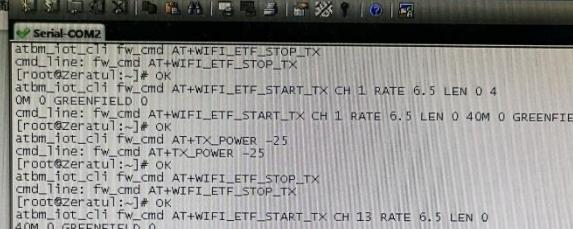
Transmit by 802.11n (20MHz) with Date rate (6.5/13/19.5/26/39/52/58.5/65)

The test channel for 20MHz bandwidth system is channel 1, 6 and 11.

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 configuration applicable have been tested and the worst mode test data recording in the test report, if no other mode data.

Software Setting



```
Serial-COM2 - SecureCRT
文件(F) 窗口(W) 查看(V) 选项(O) 传输(T) 脚本(S) 工具(L) 帮助(H)
拆分合并 X
Serial-COM2
atbm_iot_c1f fw_cmd AT+WIFIETF_STOP_TX
cmd_line: fw_cmd AT+WIFIETF_STOP_TX
[root@zeratul:~]# OK
atbm_iot_c1f fw_cmd AT+WIFIETF_START_TX CH 1 RATE 6.5 LEN 0 4
OM 0 GREENFIELD 0
cmd_line: fw_cmd AT+WIFIETF_START_TX CH 1 RATE 6.5 LEN 0 40M 0 GREENFIELD 0
[root@zeratul:~]# OK
atbm_iot_c1f fw_cmd AT+TX_POWER -25
cmd_line: fw_cmd AT+TX_POWER -25
[root@zeratul:~]# OK
atbm_iot_c1f fw_cmd AT+WIFIETF_STOP_TX
cmd_line: fw_cmd AT+WIFIETF_STOP_TX
[root@zeratul:~]# OK
atbm_iot_c1f fw_cmd AT+WIFIETF_START_TX CH 13 RATE 6.5 LEN 0
40M GREENFIELD 0
cmd_line: fw_cmd AT+WIFIETF_START_TX CH 13 RATE 6.5 LEN 0 40M 0 GREENFIELD 0
[root@zeratul:~]# OK
atbm_iot_c1f fw_cmd AT+TX_POWER -25
cmd_line: fw_cmd AT+TX_POWER -25
[root@zeratul:~]# OK
atbm_iot_c1f fw_cmd AT+WIFIETF_STOP_TX
cmd_line: fw_cmd AT+WIFIETF_STOP_TX
[root@zeratul:~]# OK

Default - 1 2 3 4 5 6 7 reset show reboot
```

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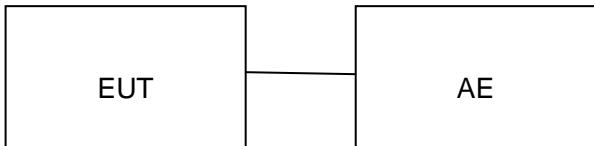
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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	WIFI Camera	IPM004	2BCGH-IPM004	EUT

5.3. SUMMARY OF TEST RESULTS

Item	FCC Rules	Description Of Test	Result
1	§15.203&15.247(b)(4)	Antenna Equipment	Pass
2	§15.247 (b)(1)	RF Output Power	Pass
3	§15.247 (a)(1)	6 dB Bandwidth	Pass
4	§15.247 (e)	Power Spectral Density	Pass
4	§15.247 (d)	Conducted Spurious Emission	Pass
5	§15.209	Radiated Emission& Band Edge	Pass
6	§15.207	AC Power Line Conducted Emission	Pass

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	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	Jun. 03, 2023	Jun. 02, 2024
LISN	R&S	ESH2-Z5	100086	Jun. 03, 2023	Jun. 02, 2024
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	Feb. 18, 2023	Feb. 17, 2024
EXA Signal Analyzer	Agilent	N9010A	MY53470504	Jun. 01, 2023	May 31, 2024
2.4GHz Fliter	EM Electronics	2400-2500MHz	N/A	Jun. 01, 2023	May 31, 2024
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Oct. 31, 2021	Oct. 30, 2023
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	00034609	Mar. 12, 2022	Mar. 11, 2024
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Apr. 23, 2023	Apr. 22, 2024
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 01, 2022	Sep. 02, 2024
ANTENNA	SCHWARZBECK	VULB9168	VULB9168-494	Jan. 05, 2023	Jan. 04, 2025
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

TEST EQUIPMENT OF RF Conducted

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Power Sensor	Agilent	U2021XA	MY54110007	Mar. 03, 2023	Mar. 02, 2024

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7. DUTY CYCLE MEASUREMENT

2.4GHz WLAN (DTS) operation is possible in 20MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = Peak. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Operating mode	Data rates (Mbps)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11b	1	100	-	-	-
IEEE 802.11g	6	100	-	-	-
IEEE 802.11n-HT20	MCS0	100	-	-	-

Remark:

1. Duty Cycle factor = $10 * \log (1 / \text{Duty cycle})$ 2. Average factor = $20 \log_{10} \text{Duty Cycle}$

The duty cycle of each frequency band mode reflects the determination requirements of the low channel measurement value

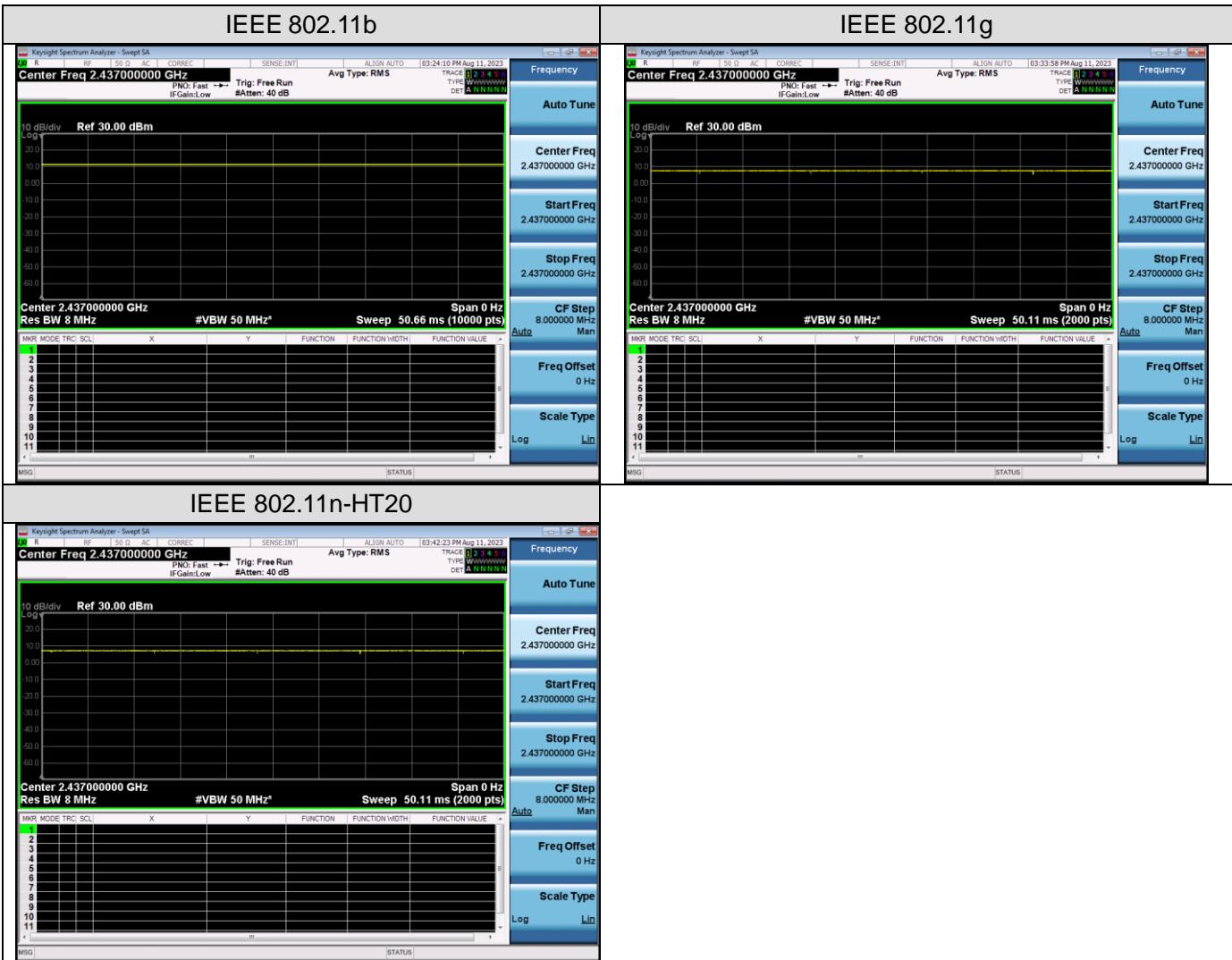
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The test plots as follows:



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8. OUTPUT POWER

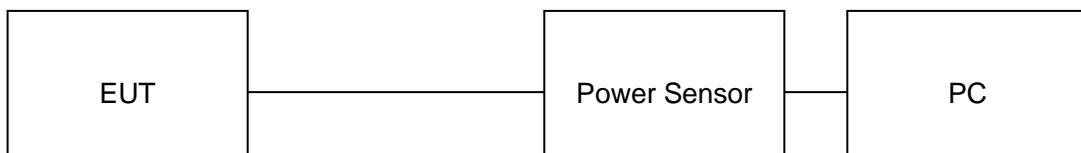
8.1. MEASUREMENT PROCEDURE

For average power test:

1. Connect EUT RF output port to power sensor.
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.

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



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8.3. 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	12.50	15.45	≤30	Pass
	2437	12.31	15.29	≤30	Pass
	2462	12.65	15.67	≤30	Pass
802.11g	2412	10.24	18.19	≤30	Pass
	2437	10.30	18.23	≤30	Pass
	2462	10.77	18.67	≤30	Pass
802.11n20	2412	10.18	18.08	≤30	Pass
	2437	10.19	18.04	≤30	Pass
	2462	11.15	19.06	≤30	Pass

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9. BANDWIDTH

9.1. MEASUREMENT PROCEDURE

6dB bandwidth:

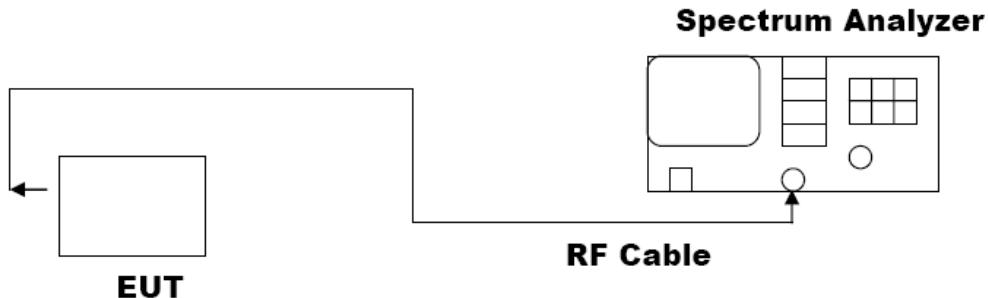
1. Connect EUT RF output port to the Spectrum Analyzer
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 kHz, VBW \geq 3 \times RBW.
4. Set SPA Trace 1 Max hold, then View.

Occupied bandwidth:

1. Connect EUT RF output port to the Spectrum Analyzer
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.

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



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9.3. 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	13.239	9.829	≥0.5	Pass
	2437	13.255	9.816	≥0.5	Pass
	2462	13.254	9.809	≥0.5	Pass
802.11g	2412	16.404	16.368	≥0.5	Pass
	2437	16.385	16.364	≥0.5	Pass
	2462	16.407	16.290	≥0.5	Pass
802.11n20	2412	17.505	17.059	≥0.5	Pass
	2437	17.532	16.765	≥0.5	Pass
	2462	17.493	17.319	≥0.5	Pass

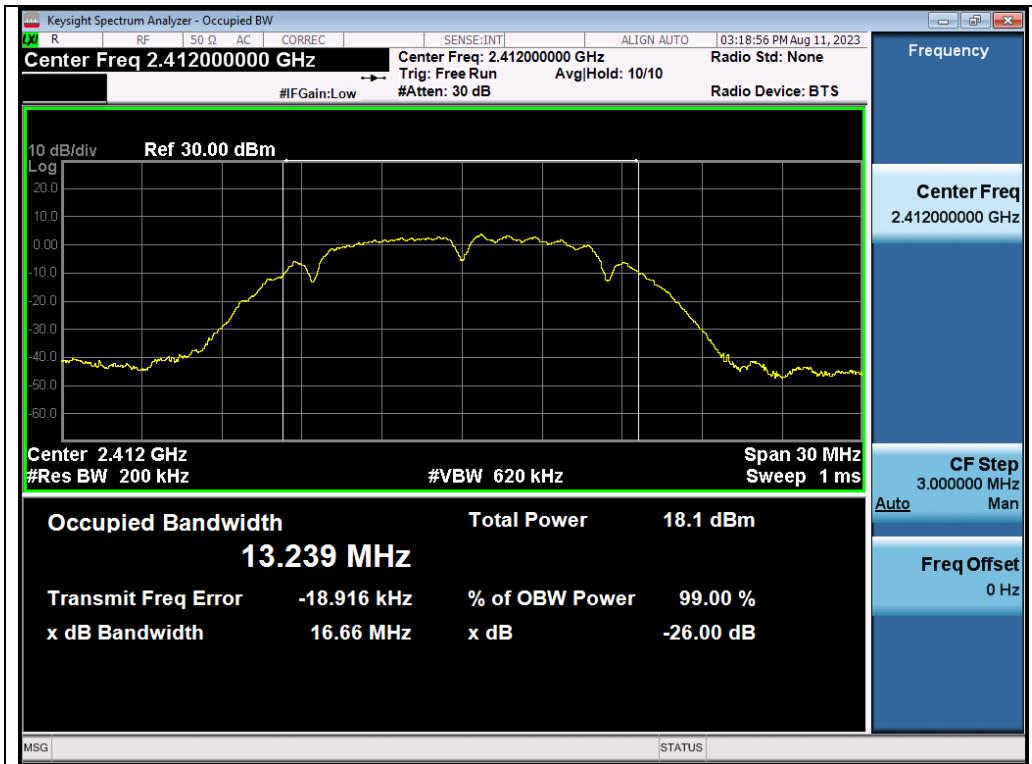
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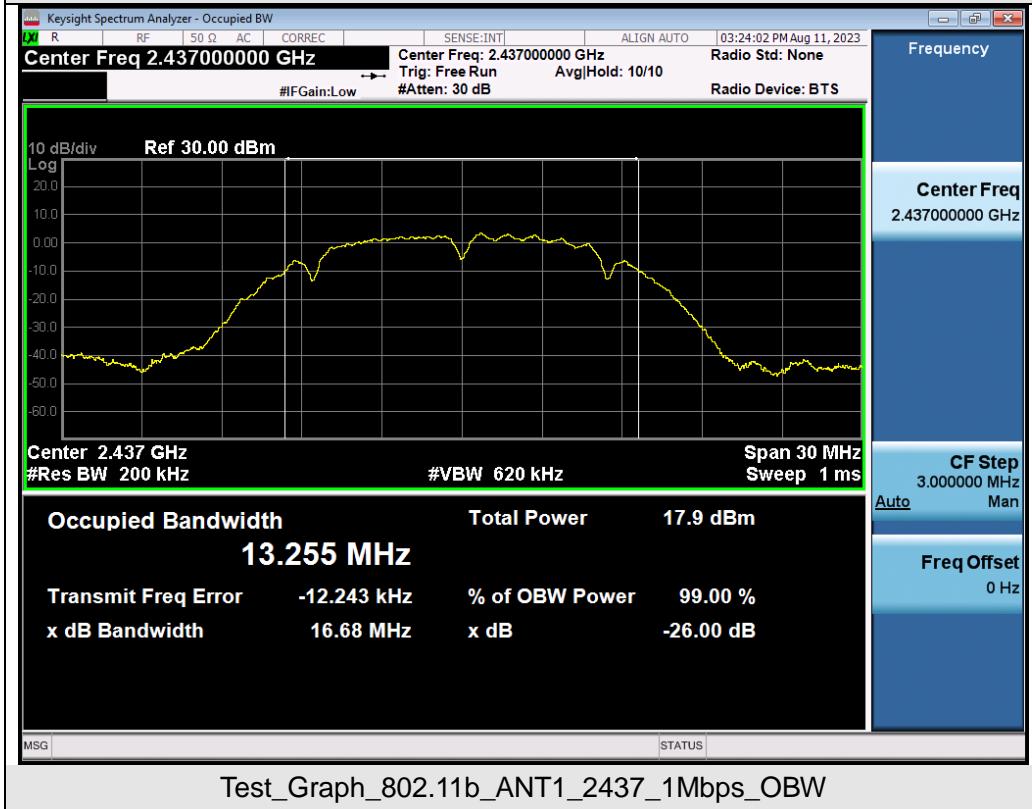
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Test Graphs of Occupied Bandwidth



Test_Graph_802.11b_ANT1_2412_1Mbps_OBW



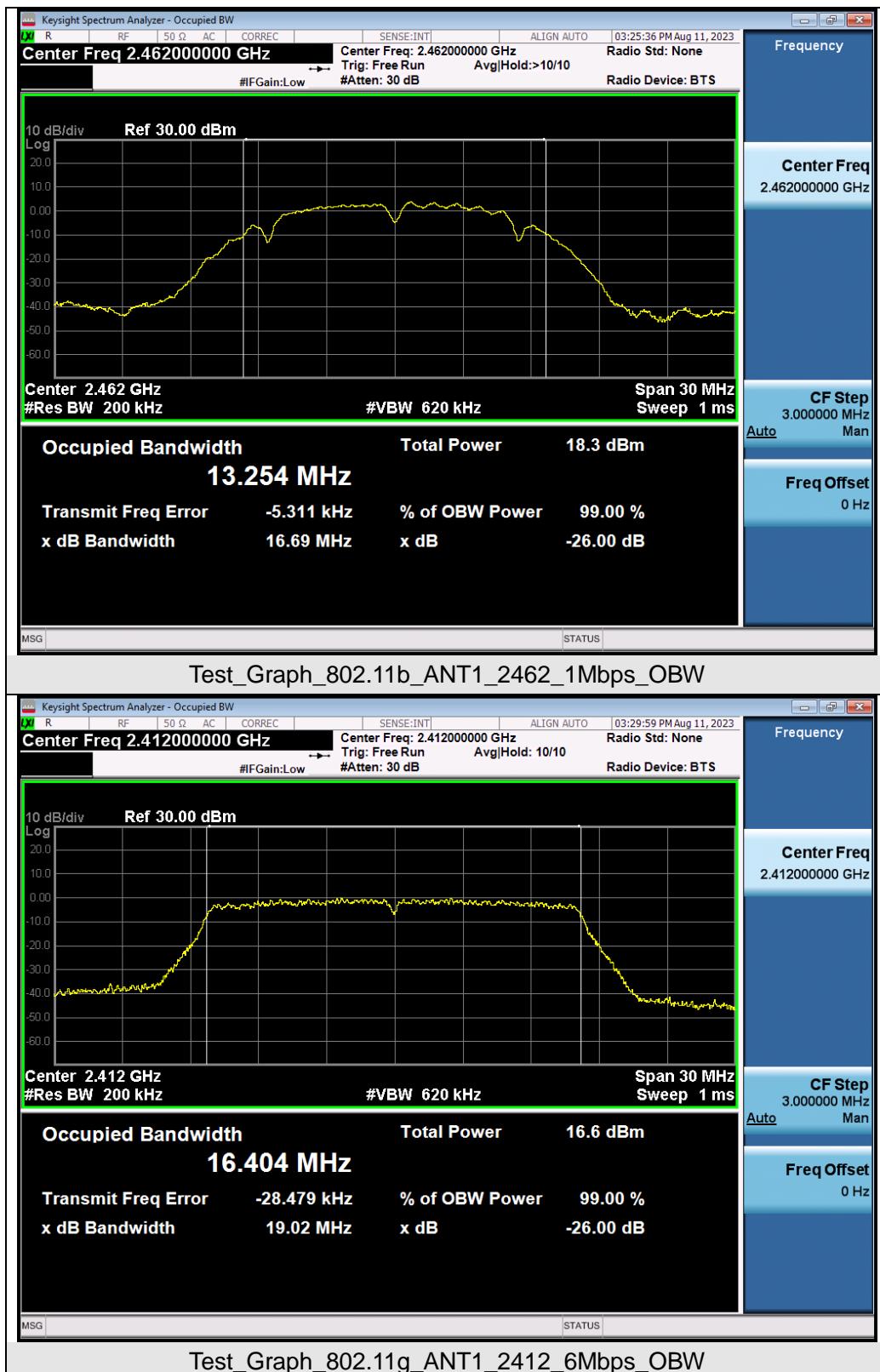
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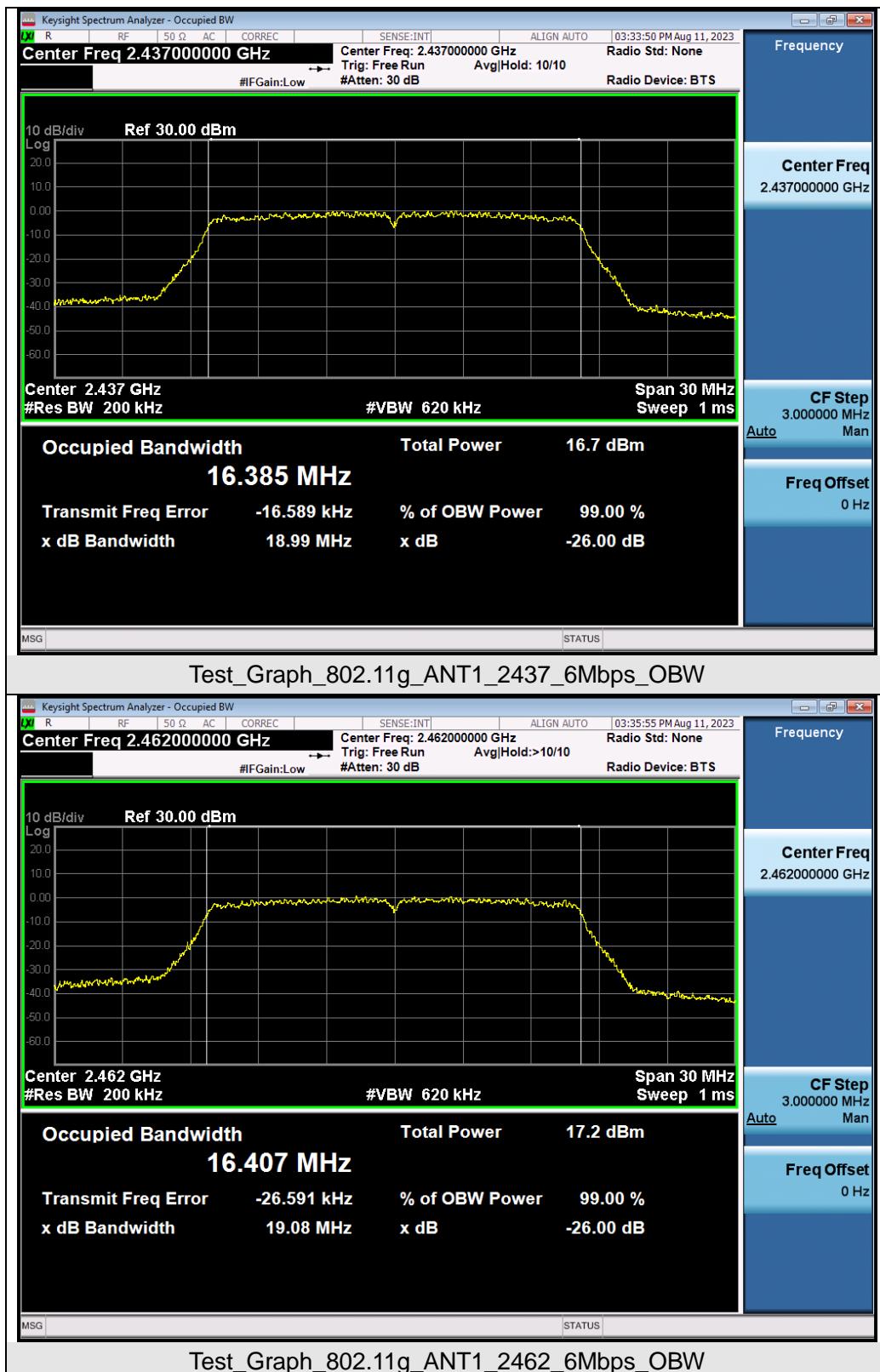


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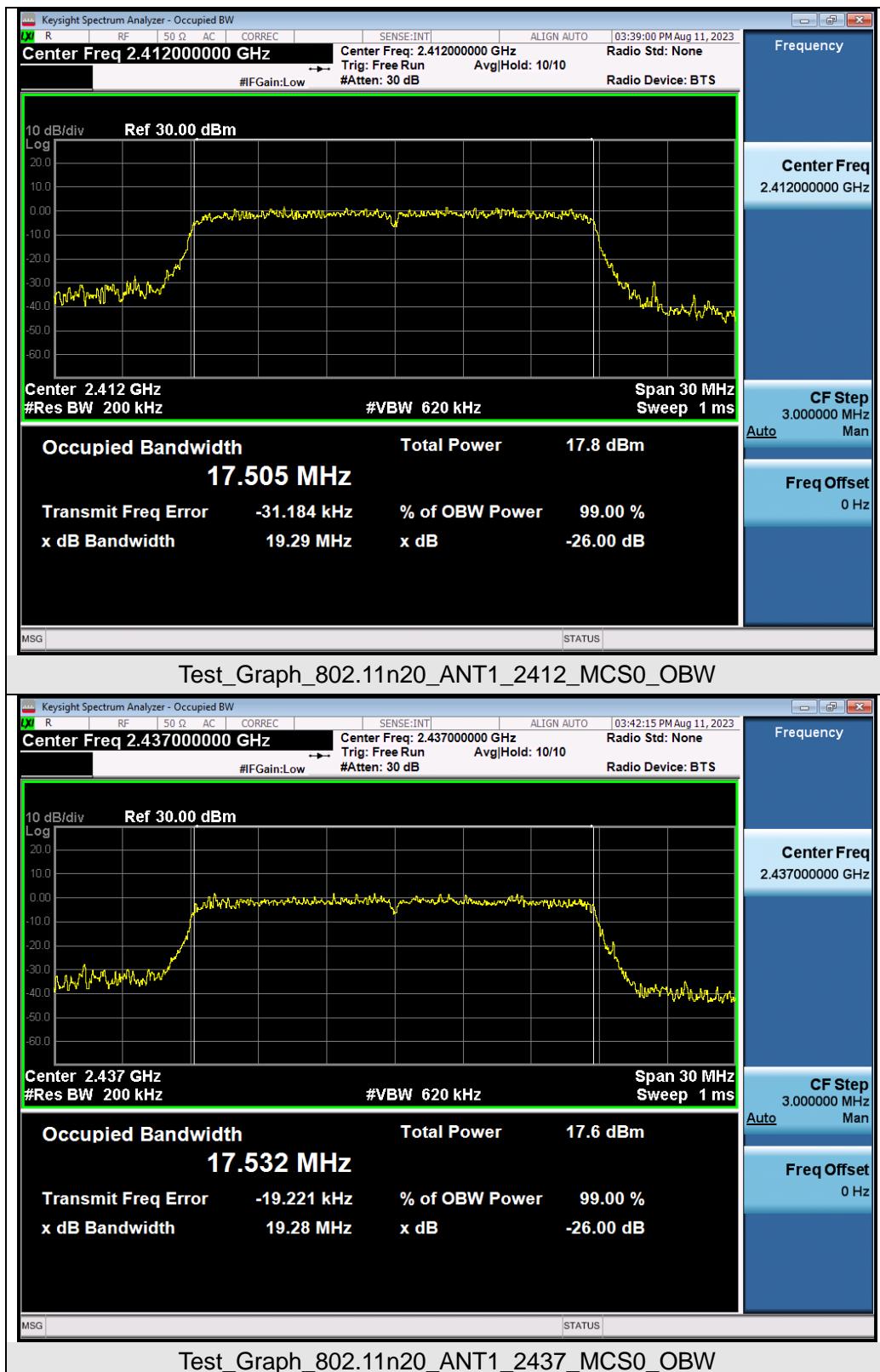


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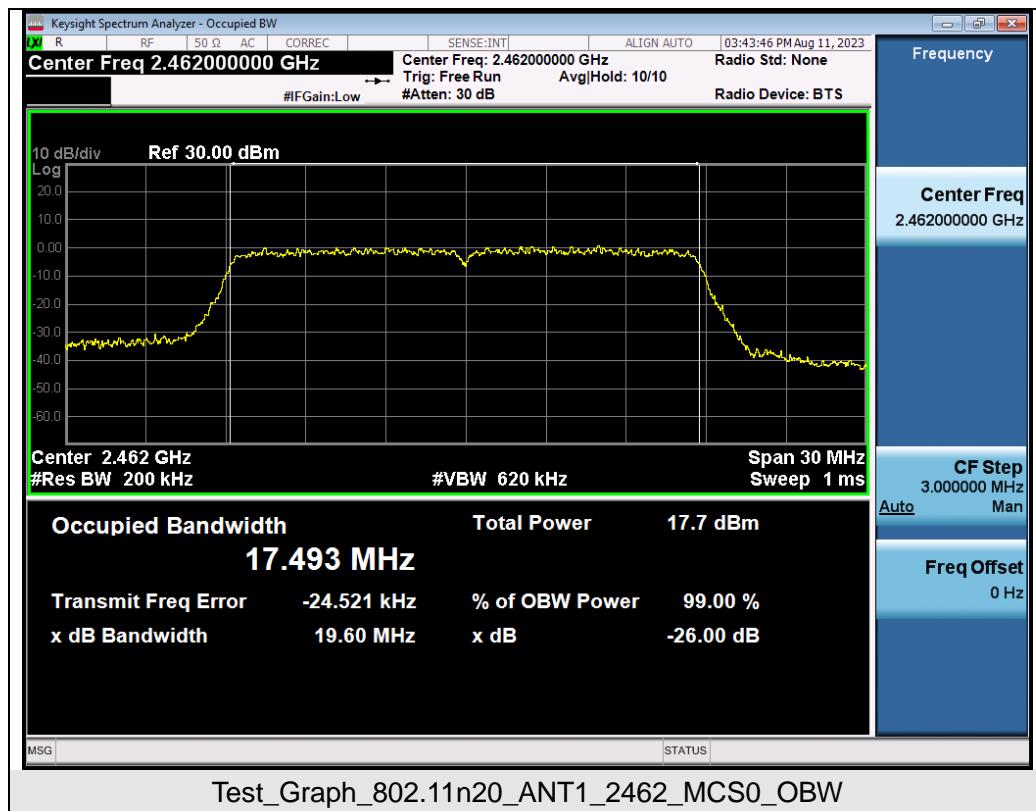


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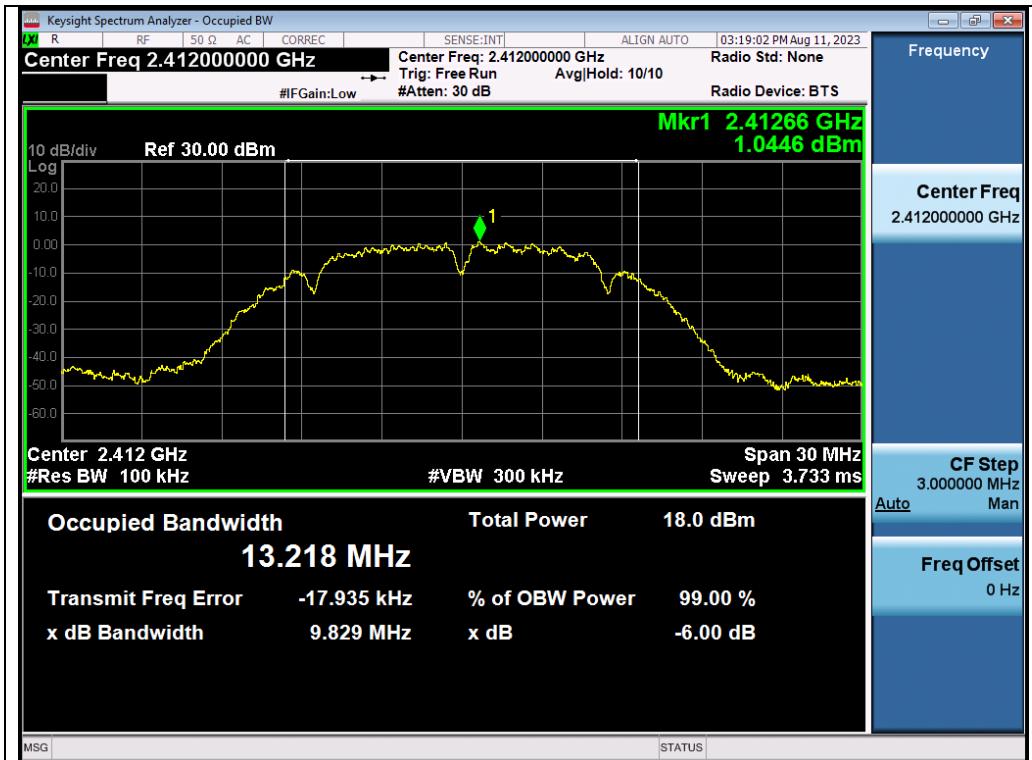
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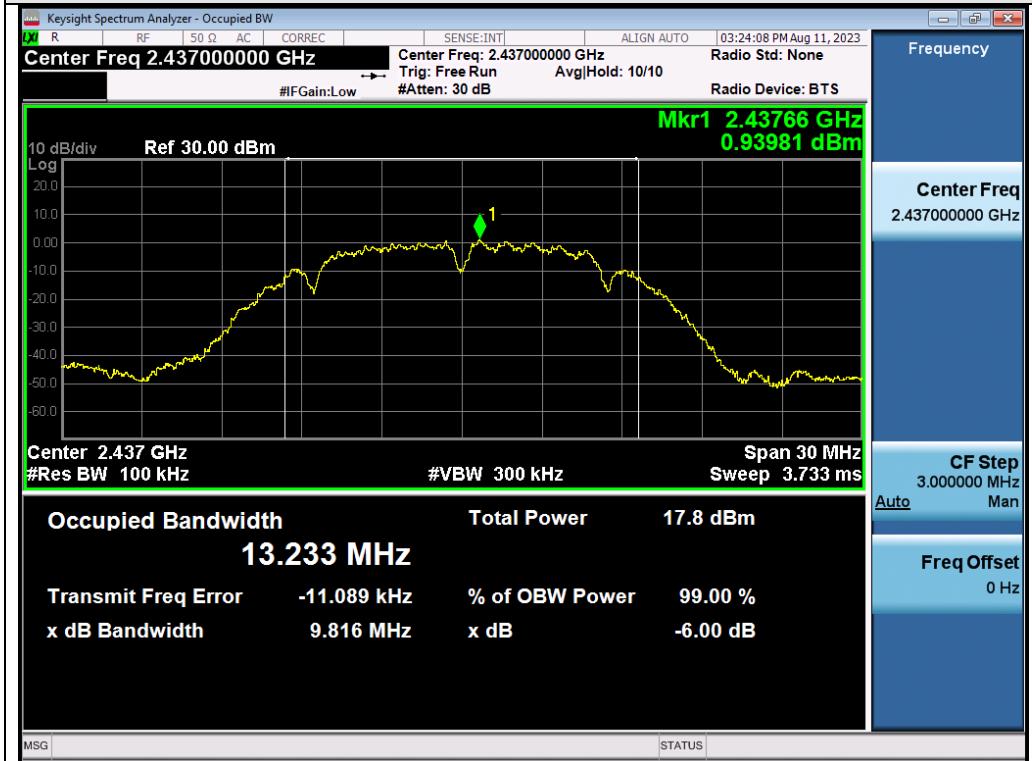
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Test Graphs of DTS Bandwidth



Test_Graph_802.11b_ANT1_2412_1Mbps_DTSBW



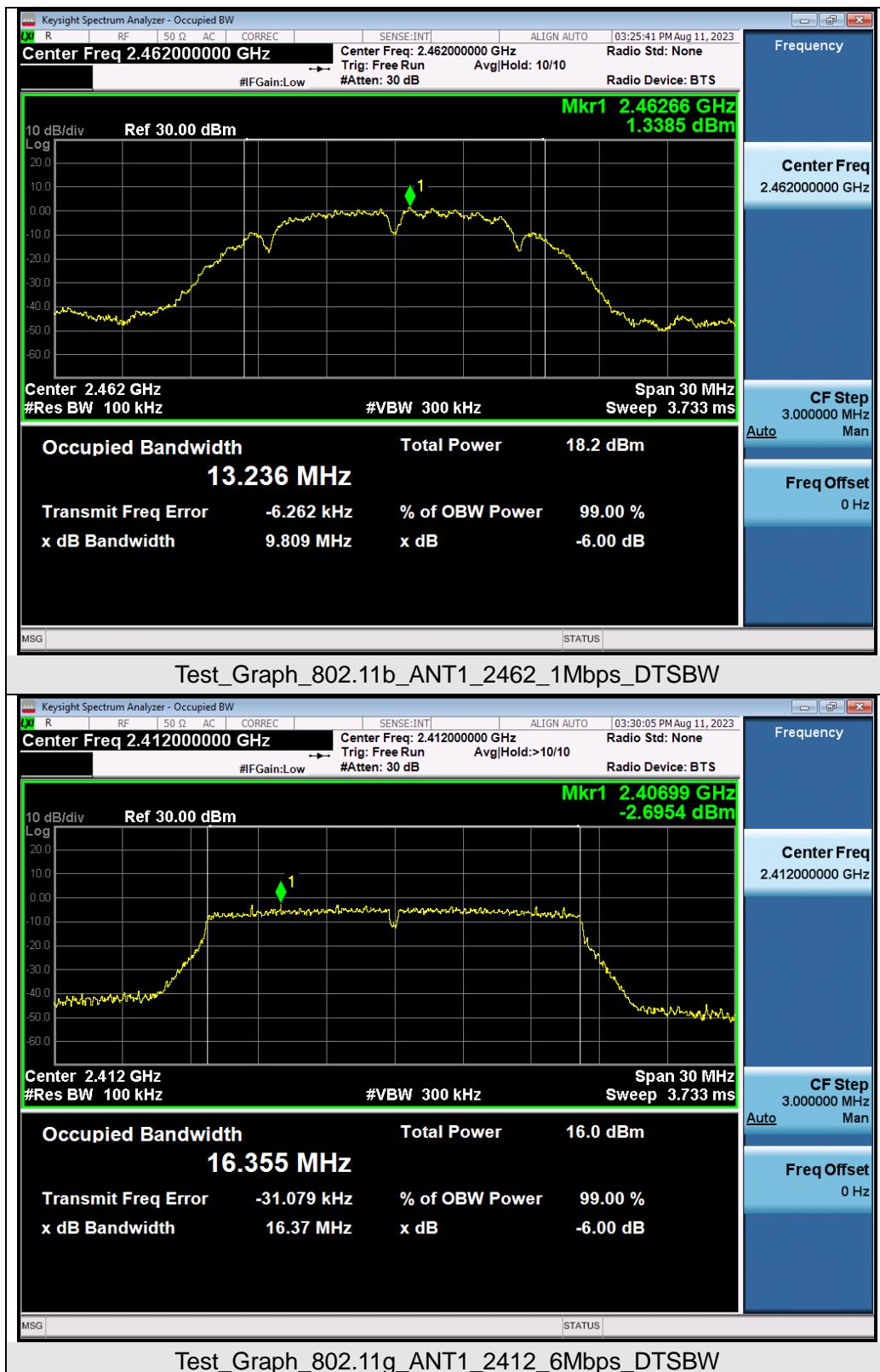
Test_Graph_802.11b_ANT1_2437_1Mbps_DTSBW

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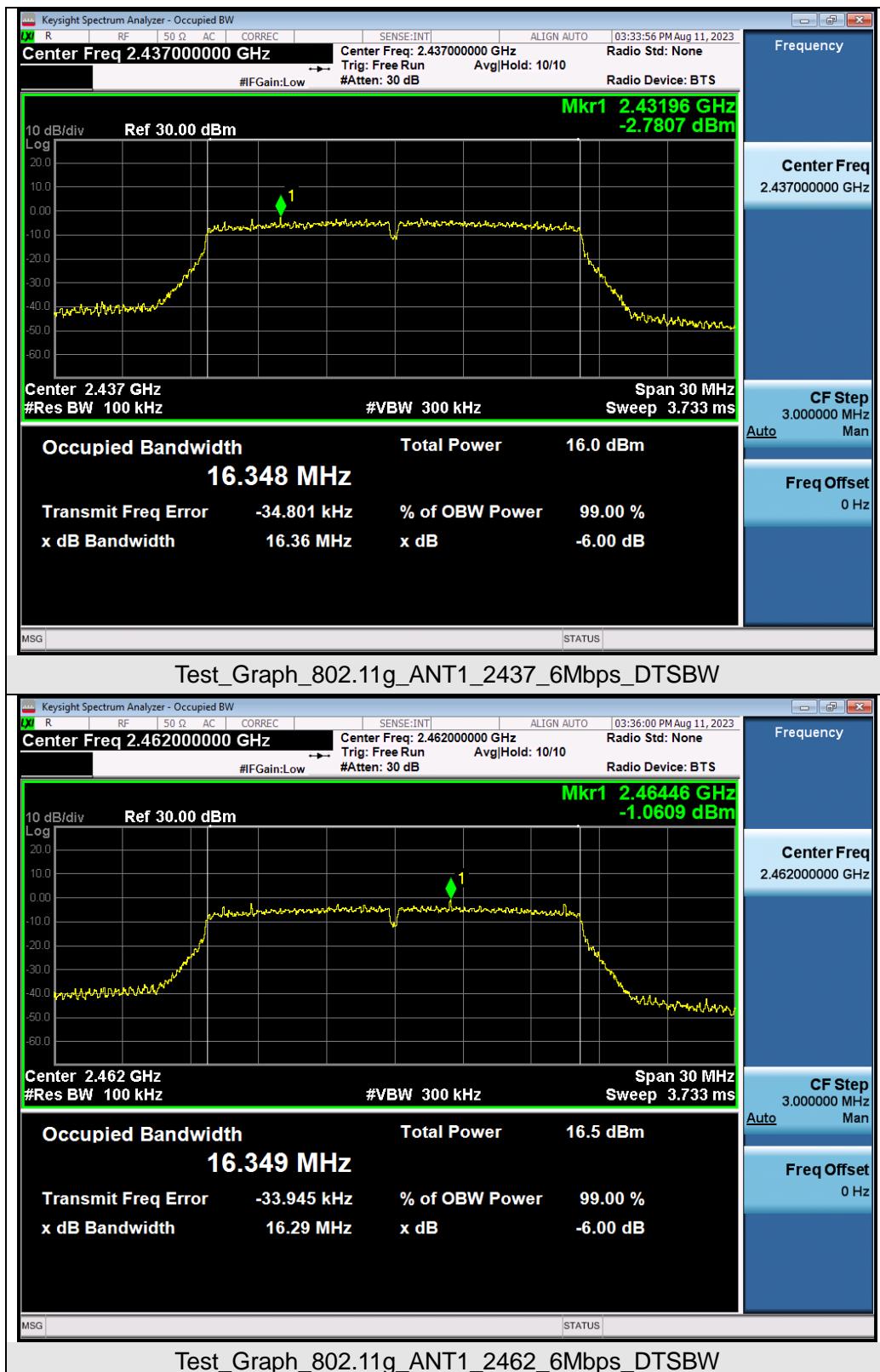


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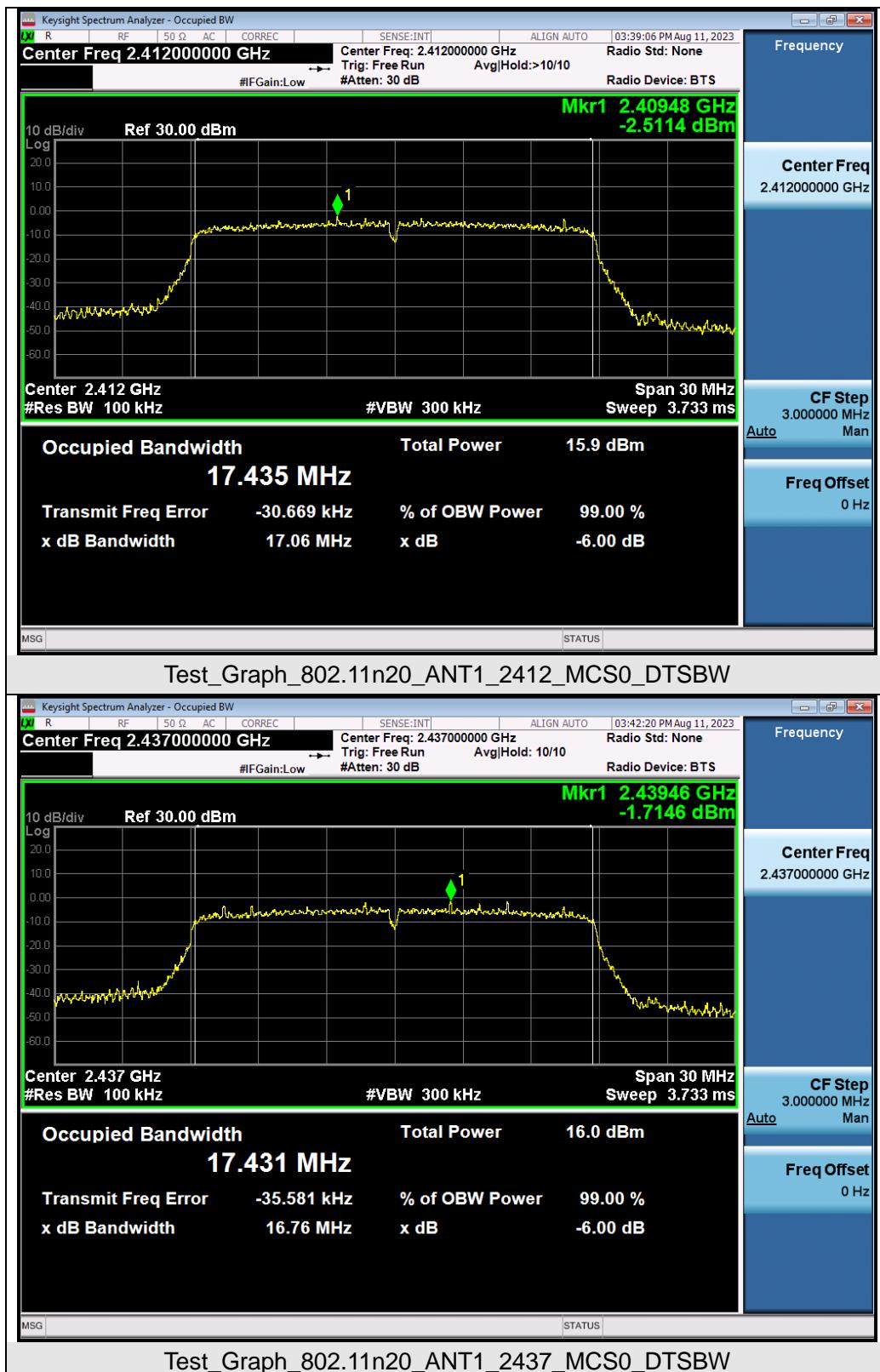


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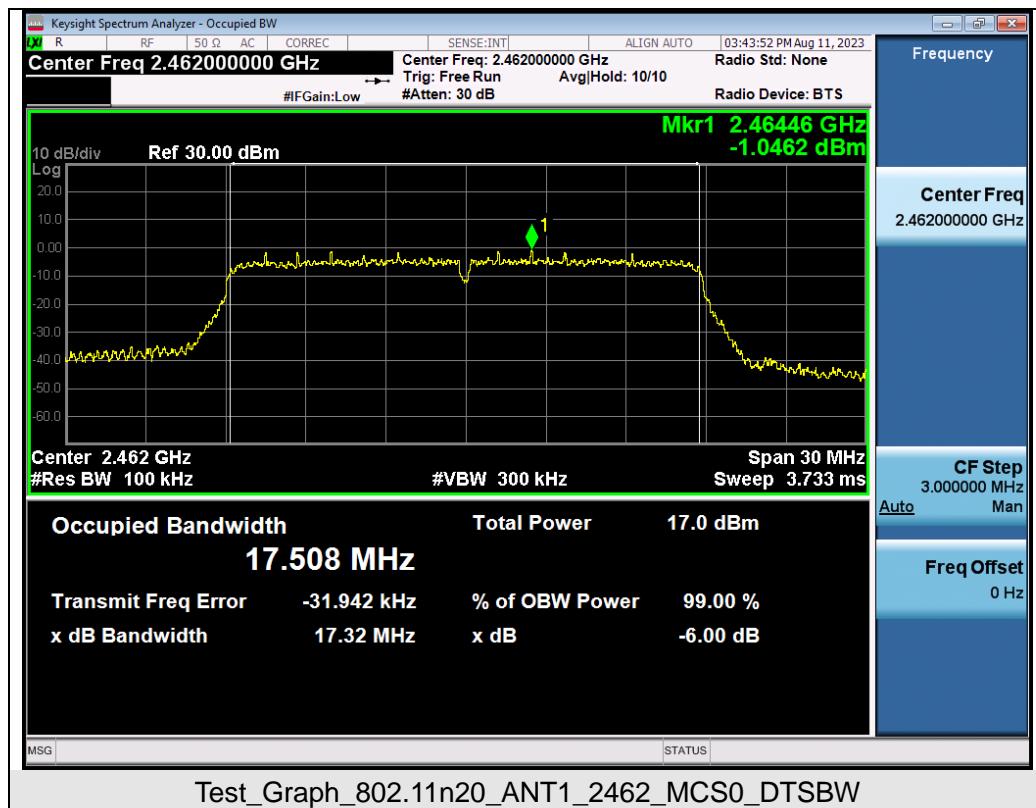


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10. CONDUCTED SPURIOUS EMISSION

10.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer
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.

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

The same as described in section 8.2.

10.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

10.4. 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.	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS
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 TOP Channel	PASS

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

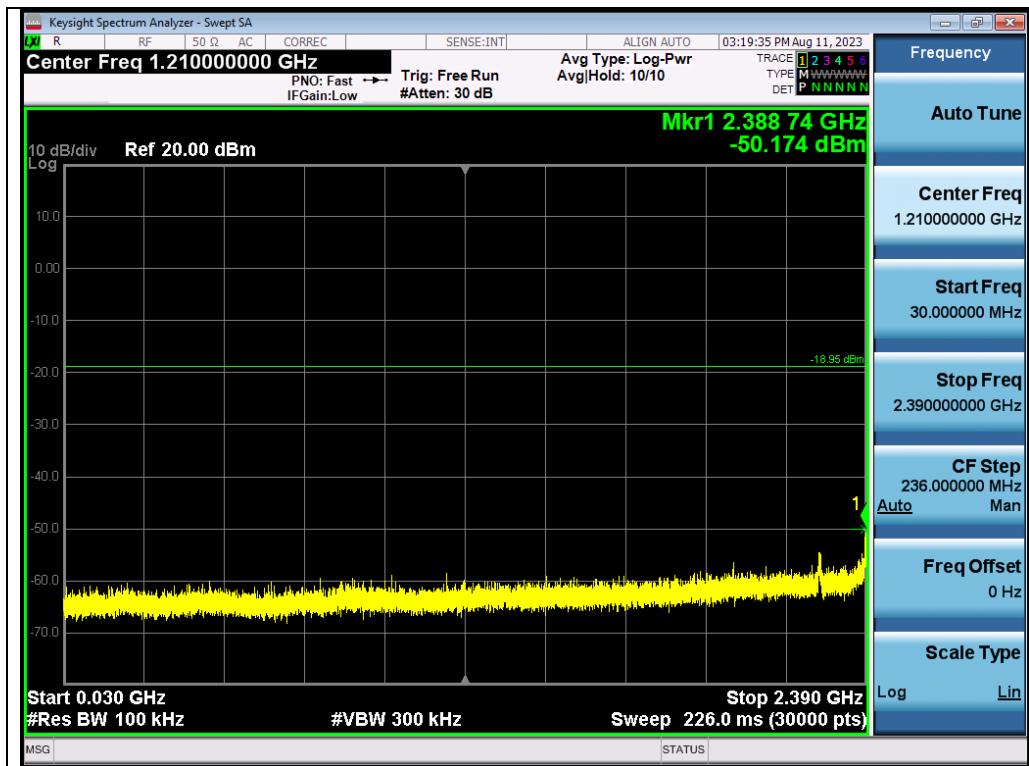
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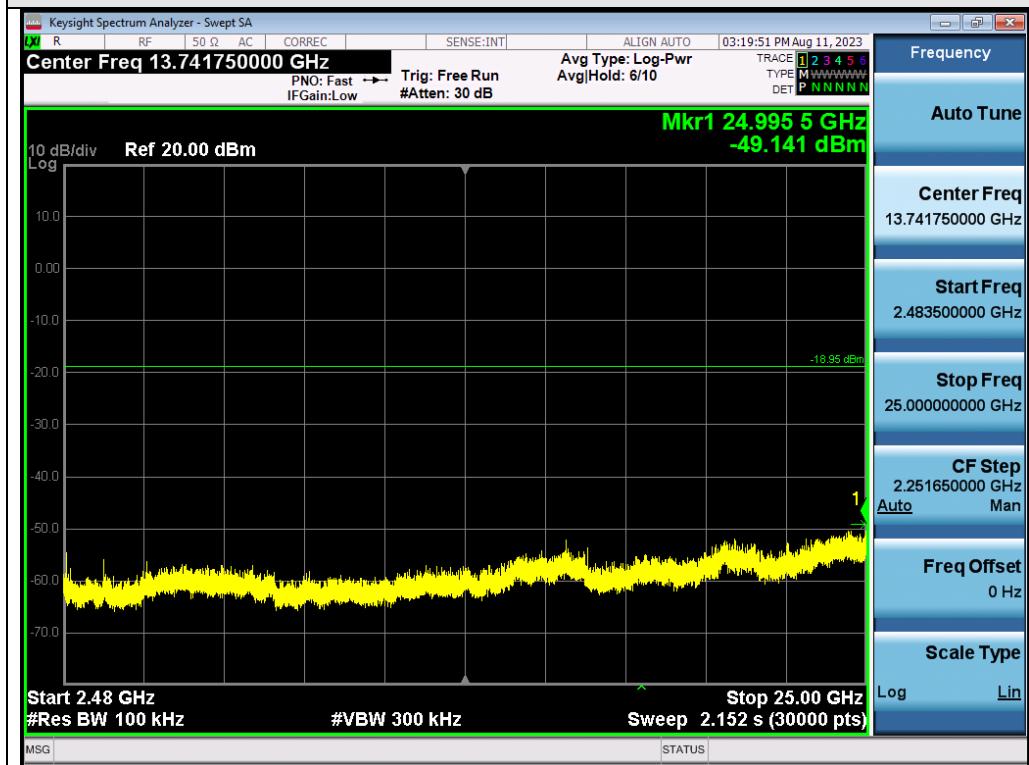
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Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands



Test_Graph_802.11b_ANT1_2412_1Mbps_Lower Band Emissions



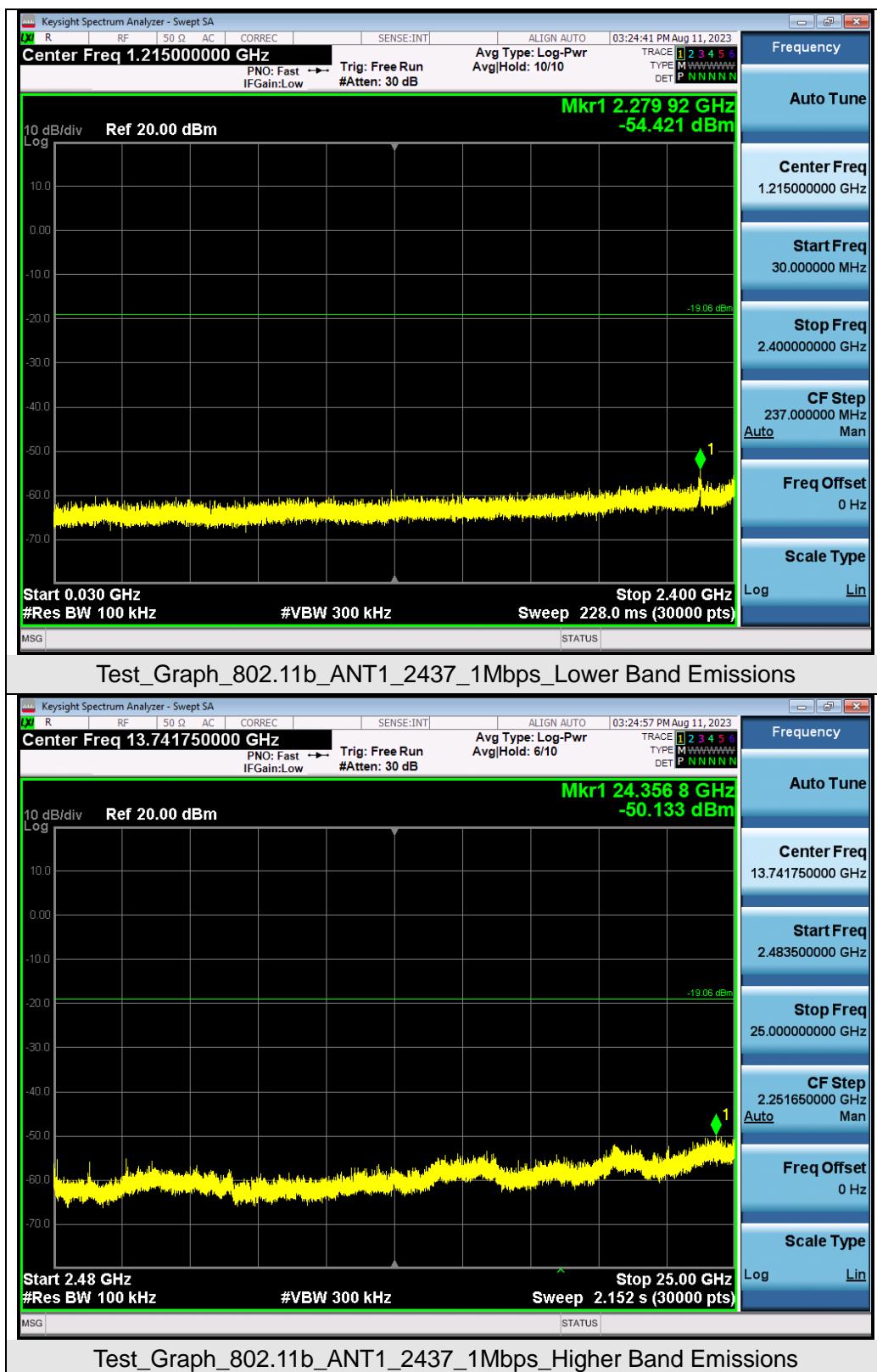
Test_Graph_802.11b_ANT1_2412_1Mbps_Higher Band Emissions

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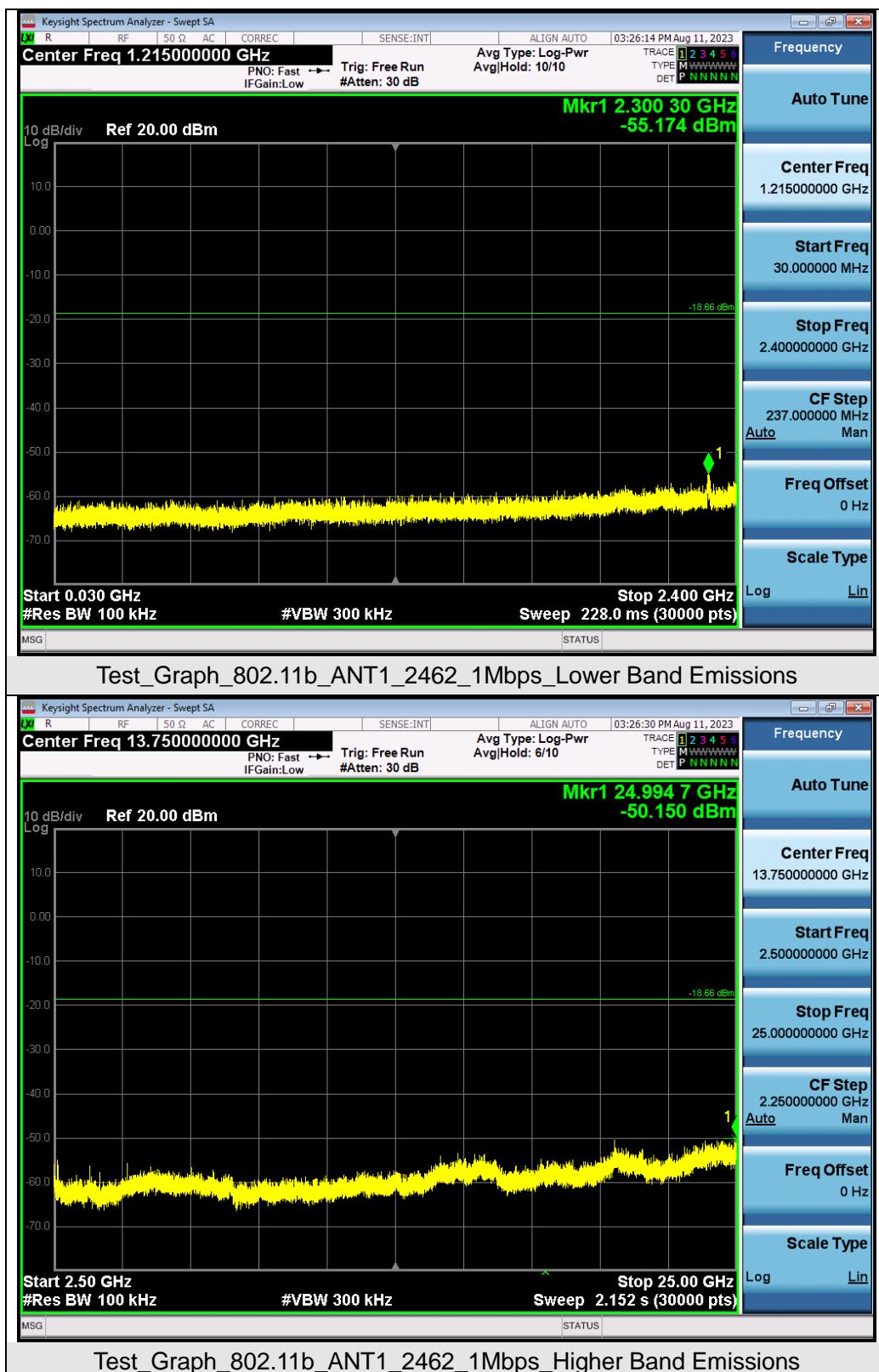


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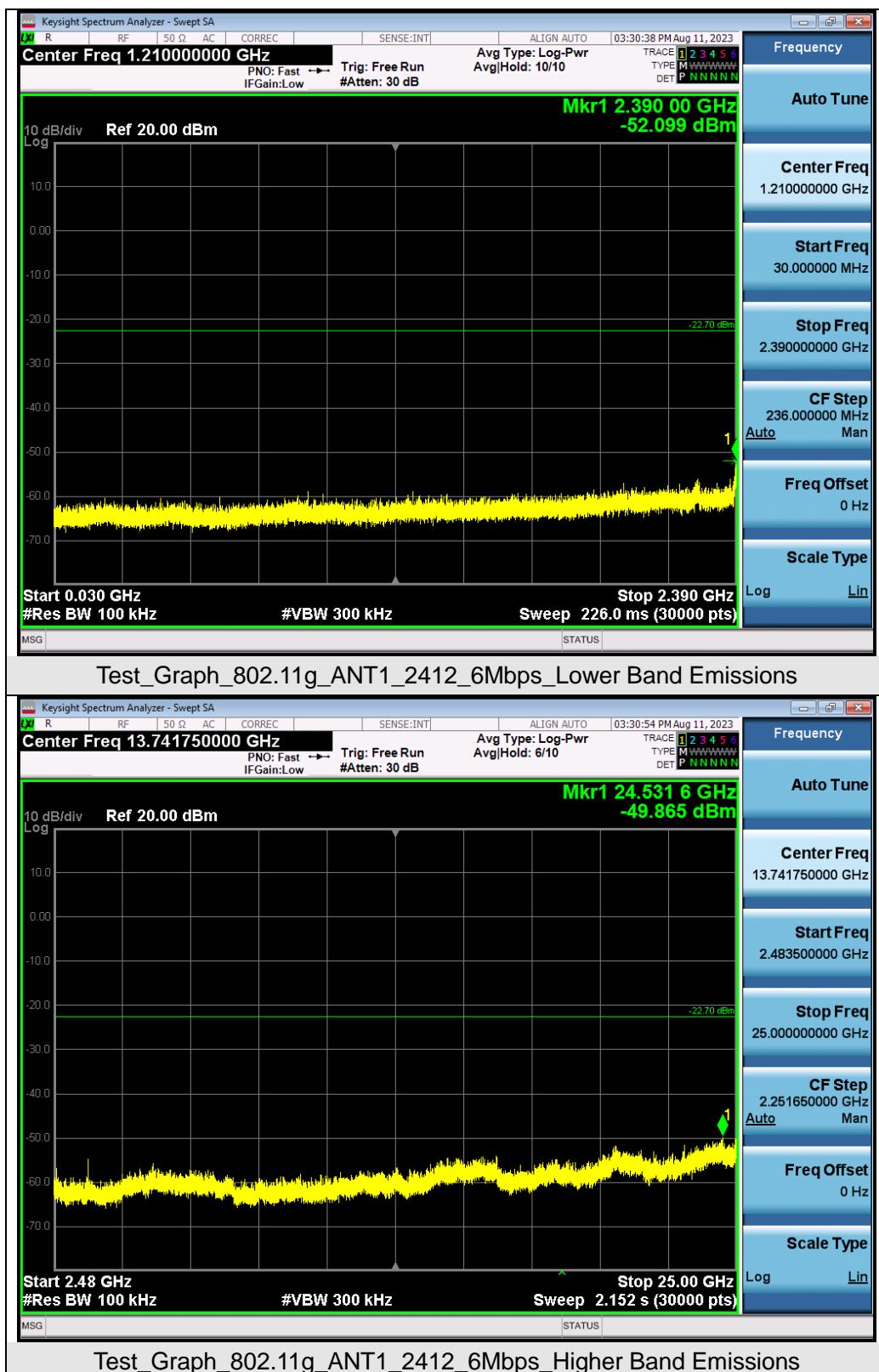


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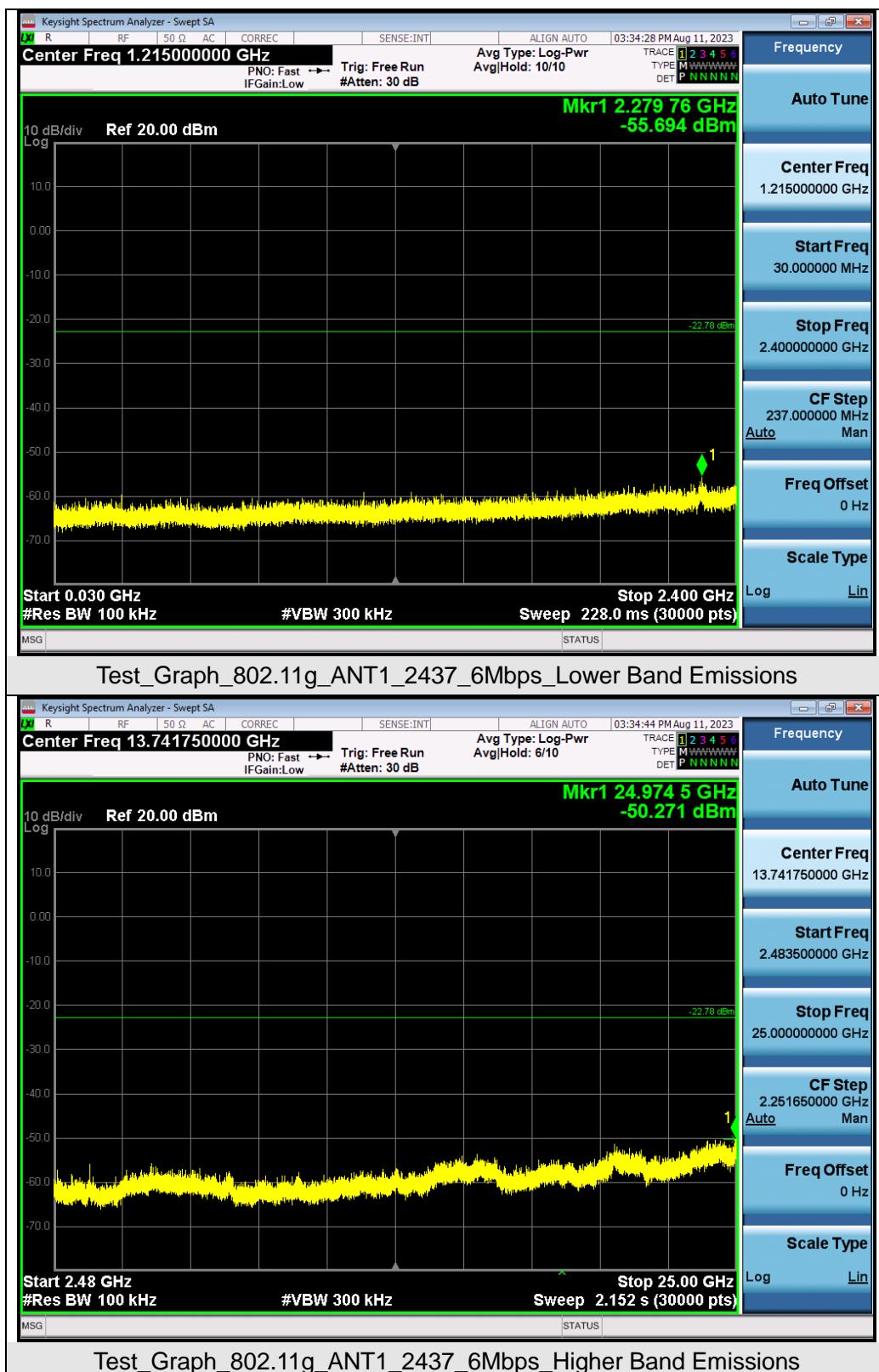


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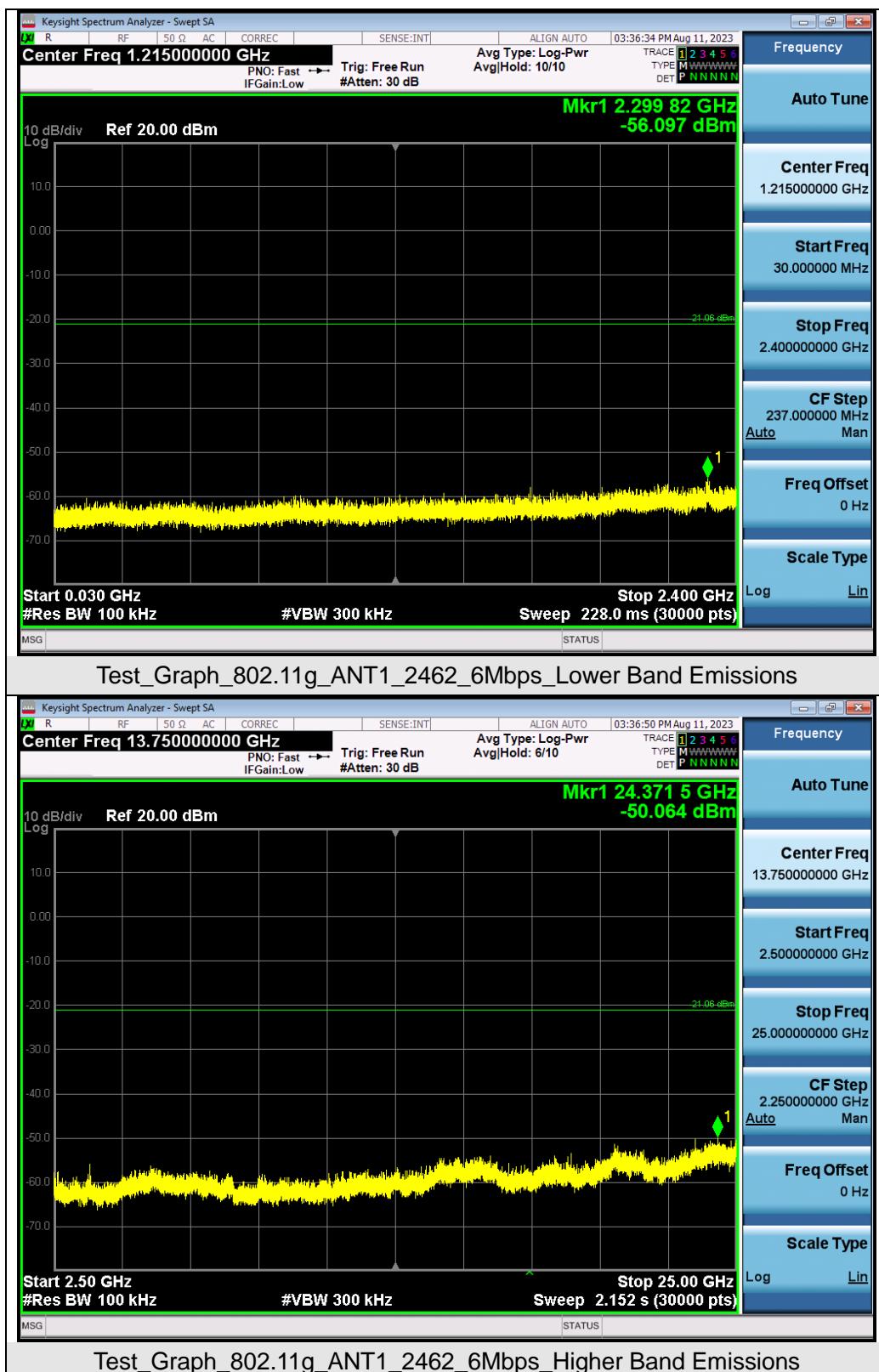


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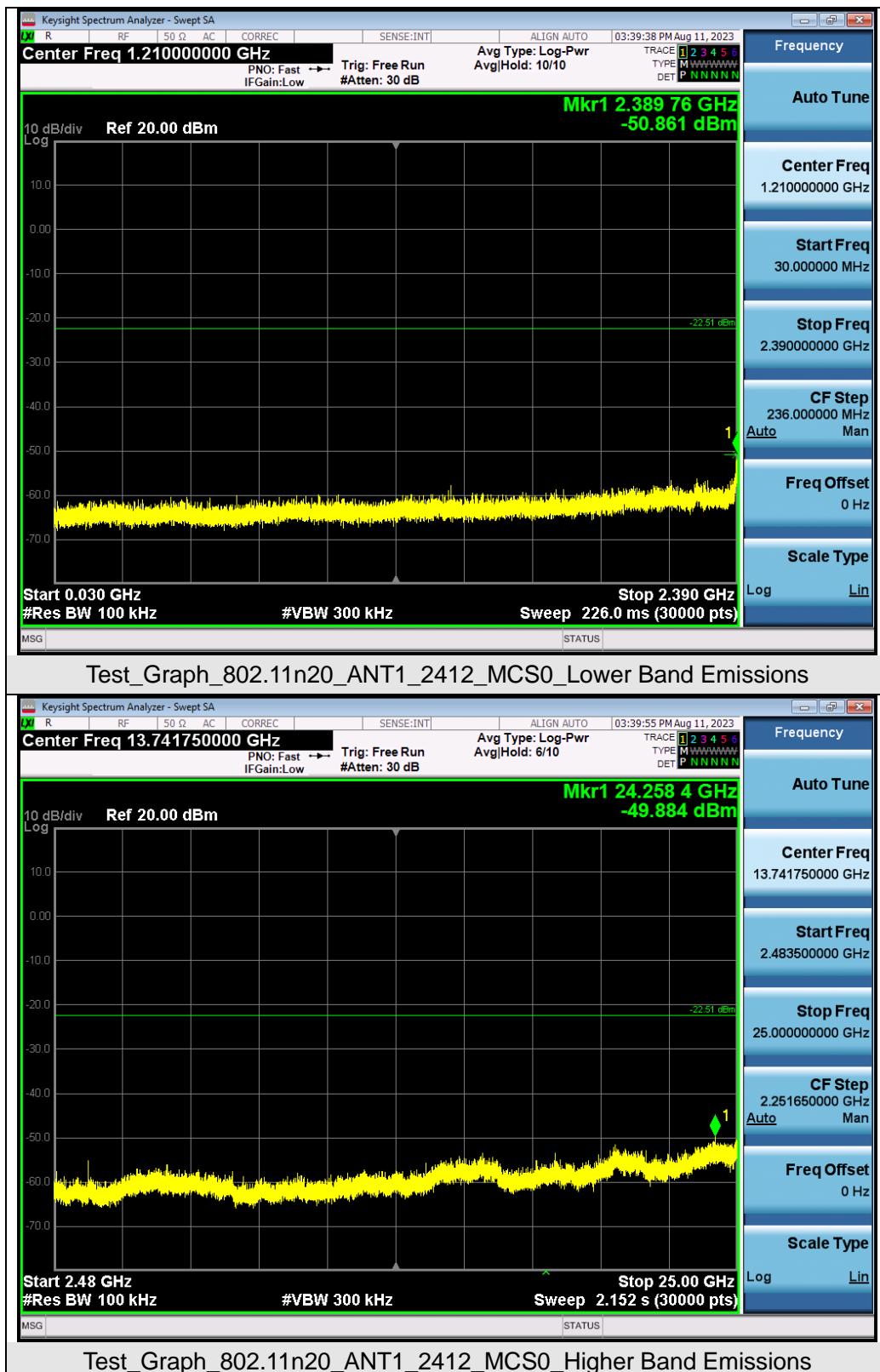


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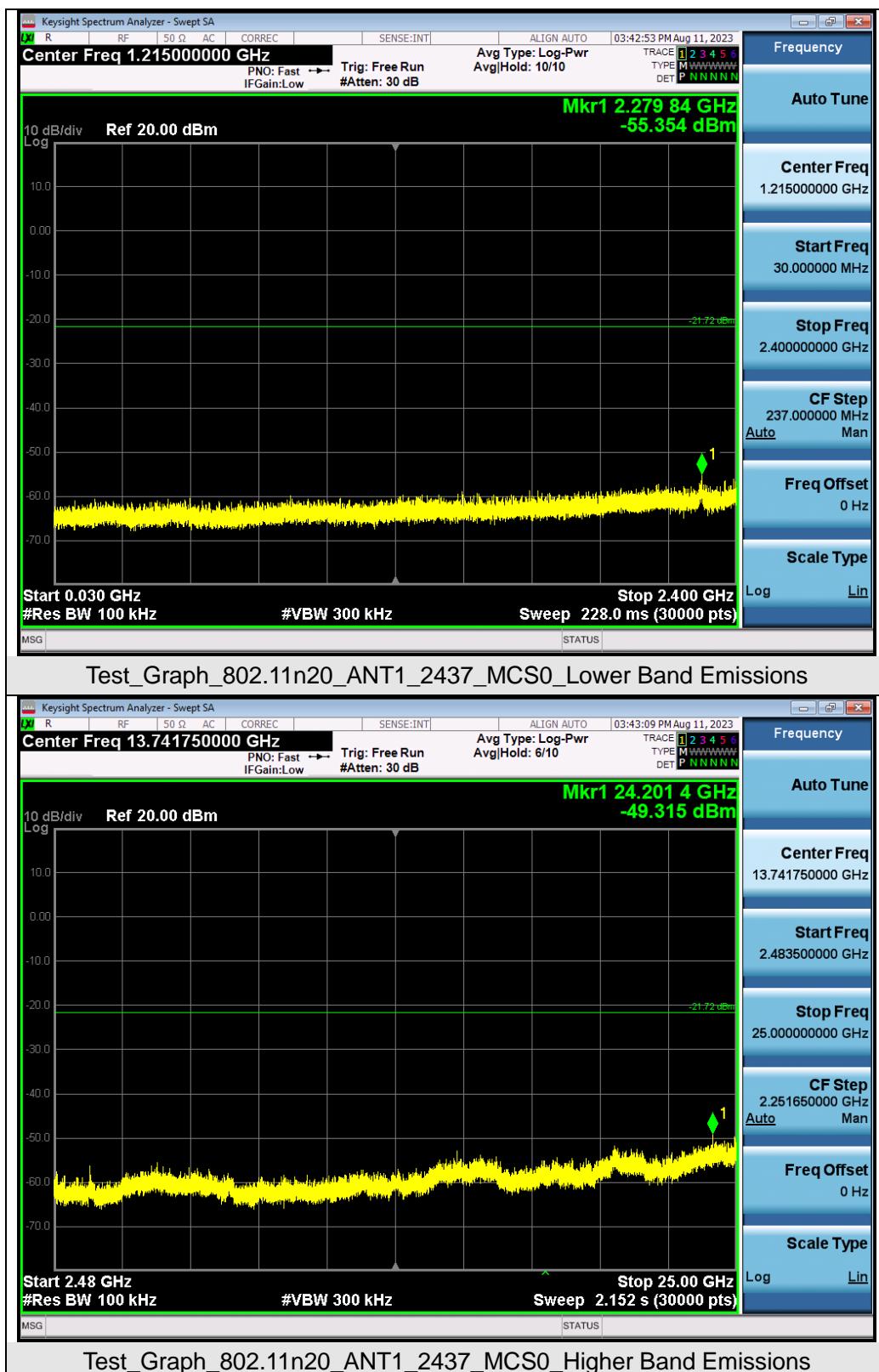


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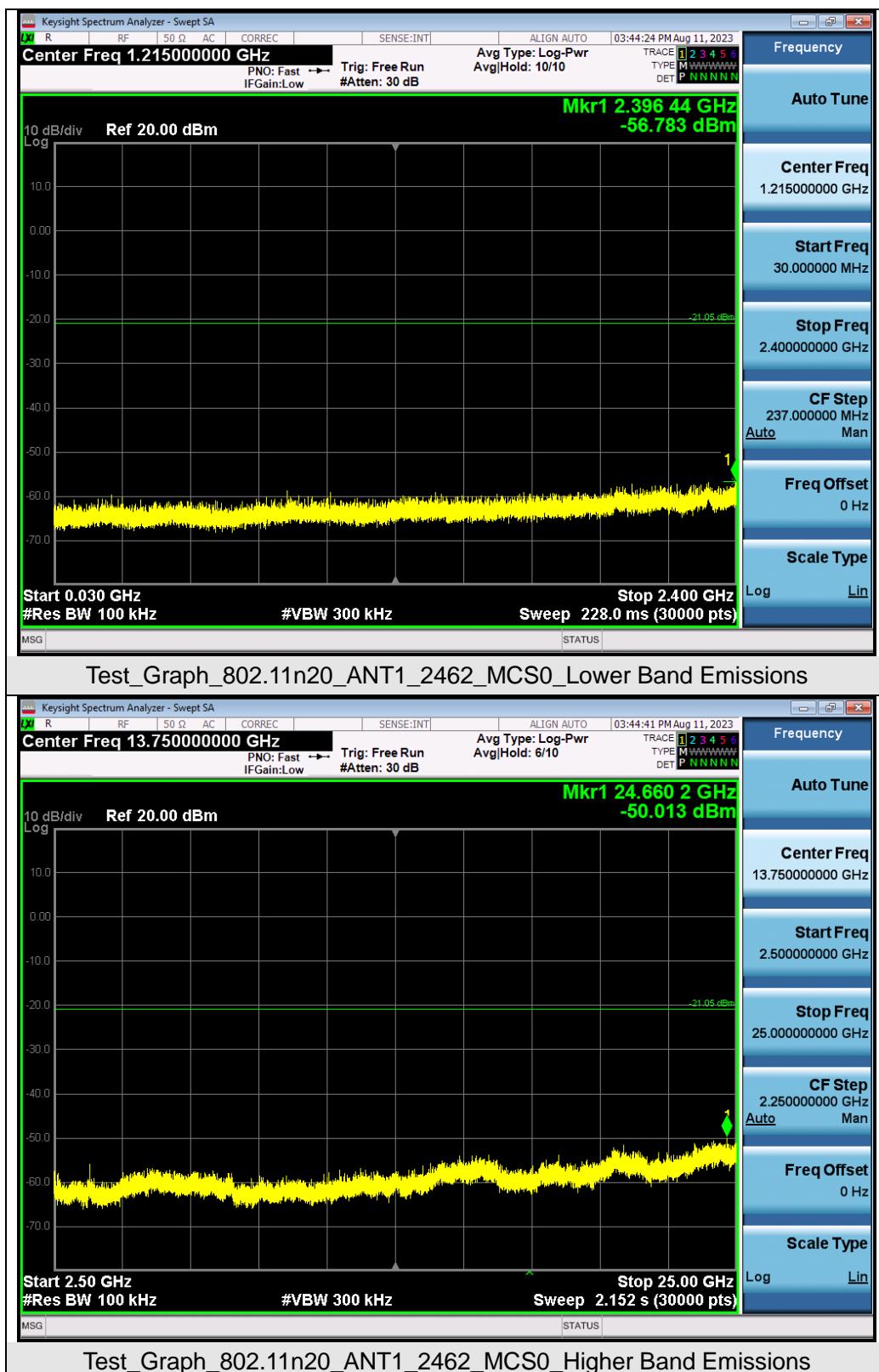


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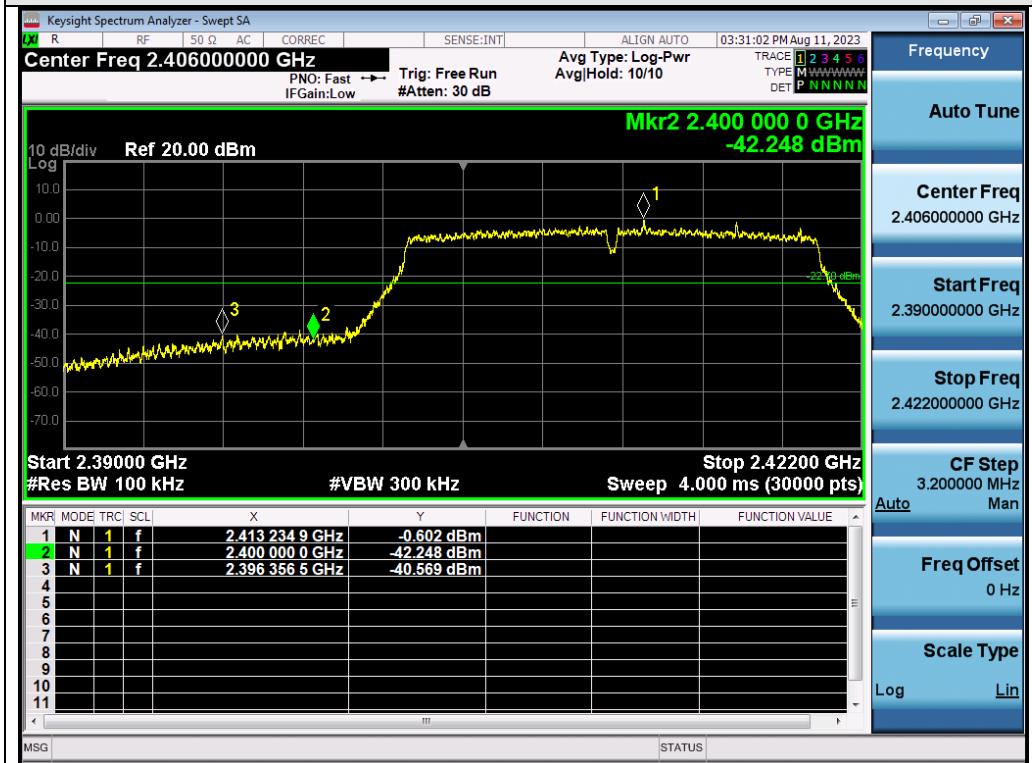
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Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands



Test_Graph_802.11b_ANT1_2412_1Mbps_Lower Band Edge Emissions



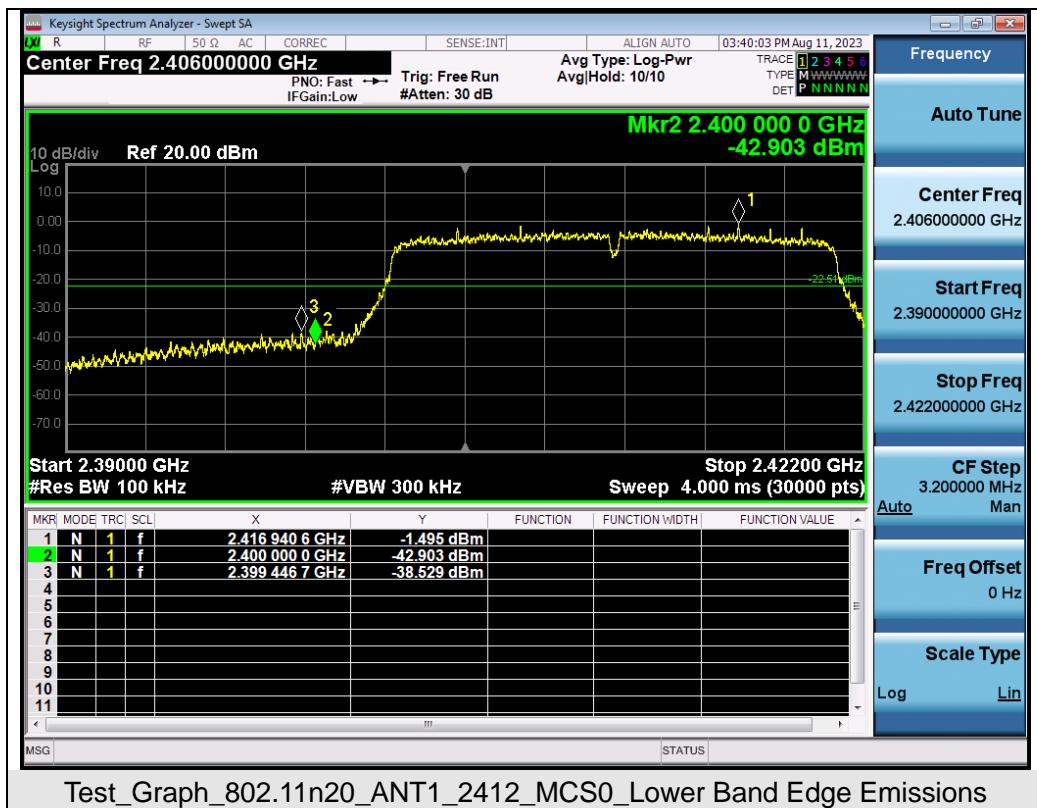
Test_Graph_802.11g_ANT1_2412_6Mbps_Lower Band Edge Emissions

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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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11. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

11.1 MEASUREMENT PROCEDURE

- (1). Connect EUT RF output port to the Spectrum Analyzer
- (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.

11.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer to Section 8.2.

11.3 MEASUREMENT EQUIPMENT USED

Refer to Section 6.

11.4 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	-4.142	-12.381	≤8	Pass
	2437	-4.293	-12.532	≤8	Pass
	2462	-3.929	-12.168	≤8	Pass
802.11g	2412	-5.425	-13.664	≤8	Pass
	2437	-6.647	-14.886	≤8	Pass
	2462	-5.900	-14.139	≤8	Pass
802.11n20	2412	-5.925	-14.164	≤8	Pass
	2437	-6.778	-15.017	≤8	Pass
	2462	-5.959	-14.198	≤8	Pass

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

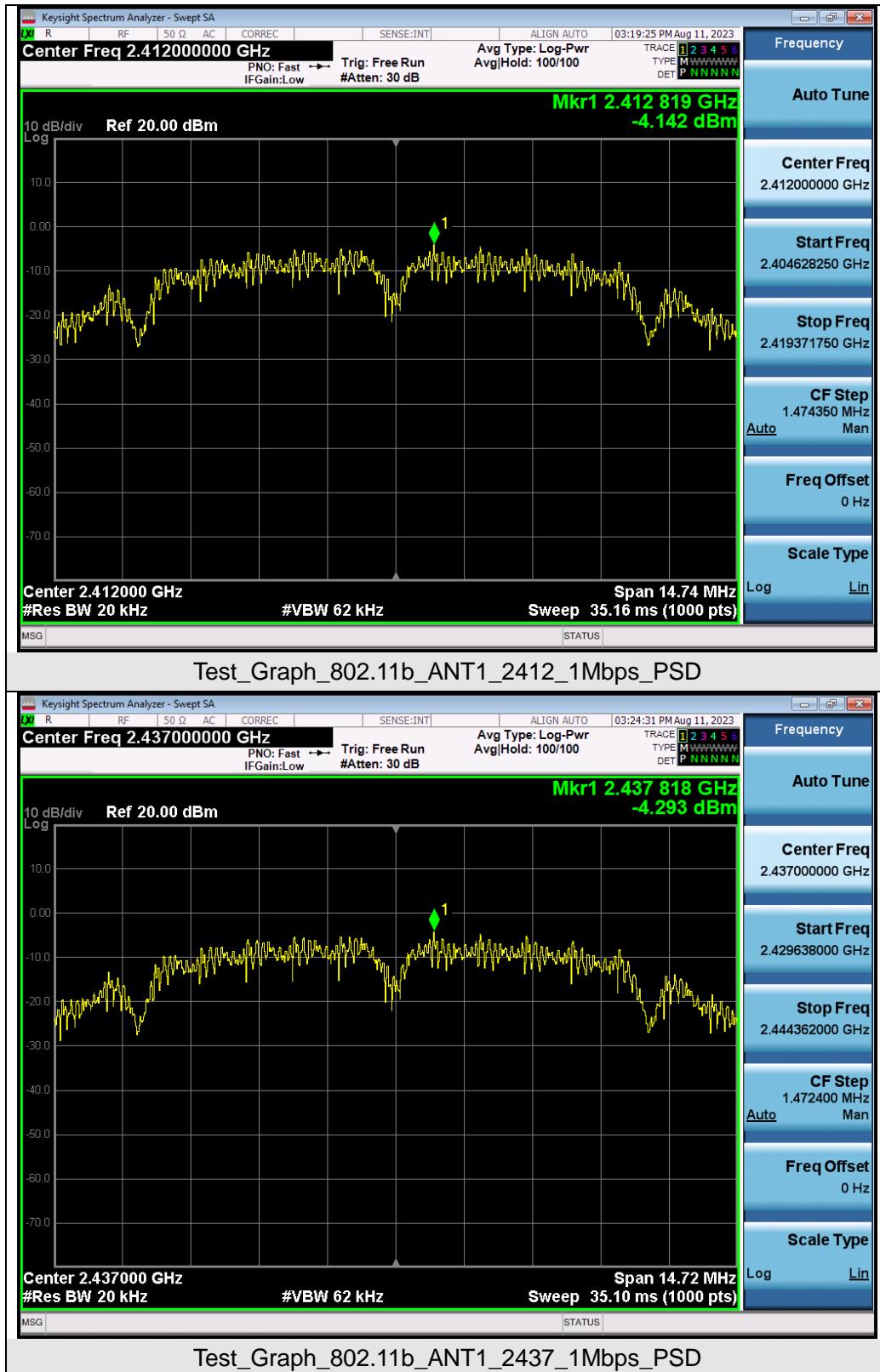
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Test Graphs of Conducted Output Power Spectral Density

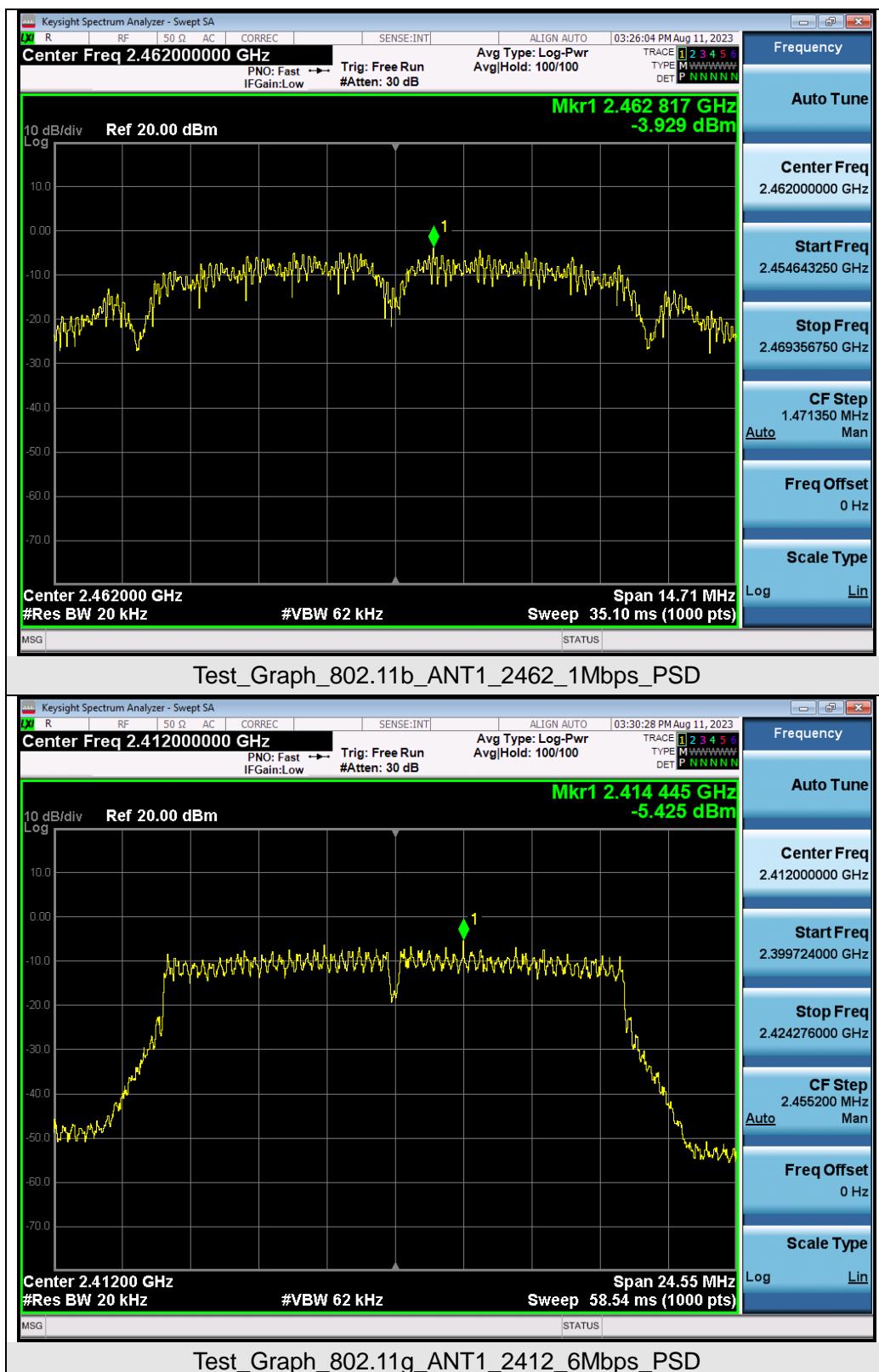


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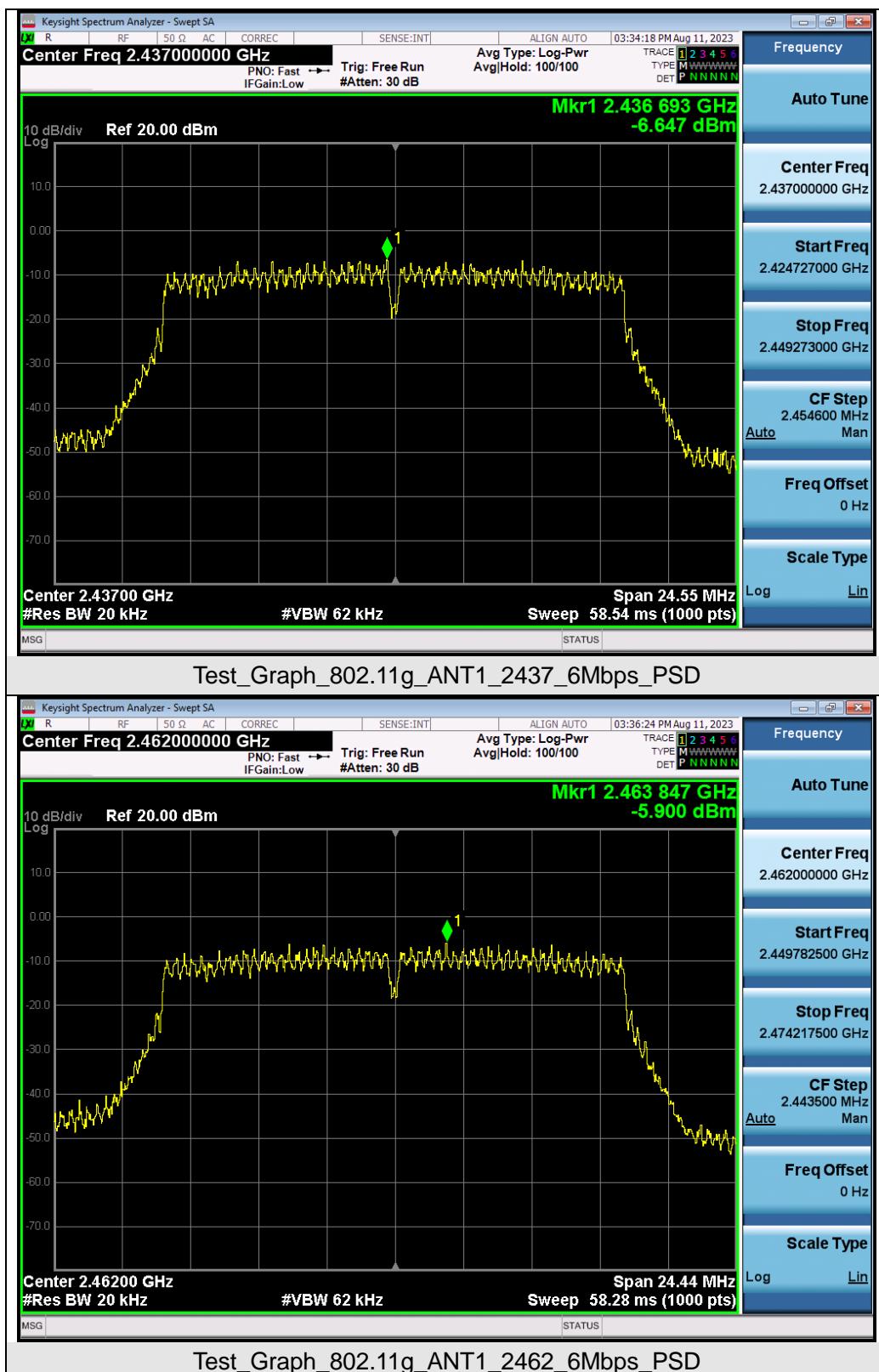


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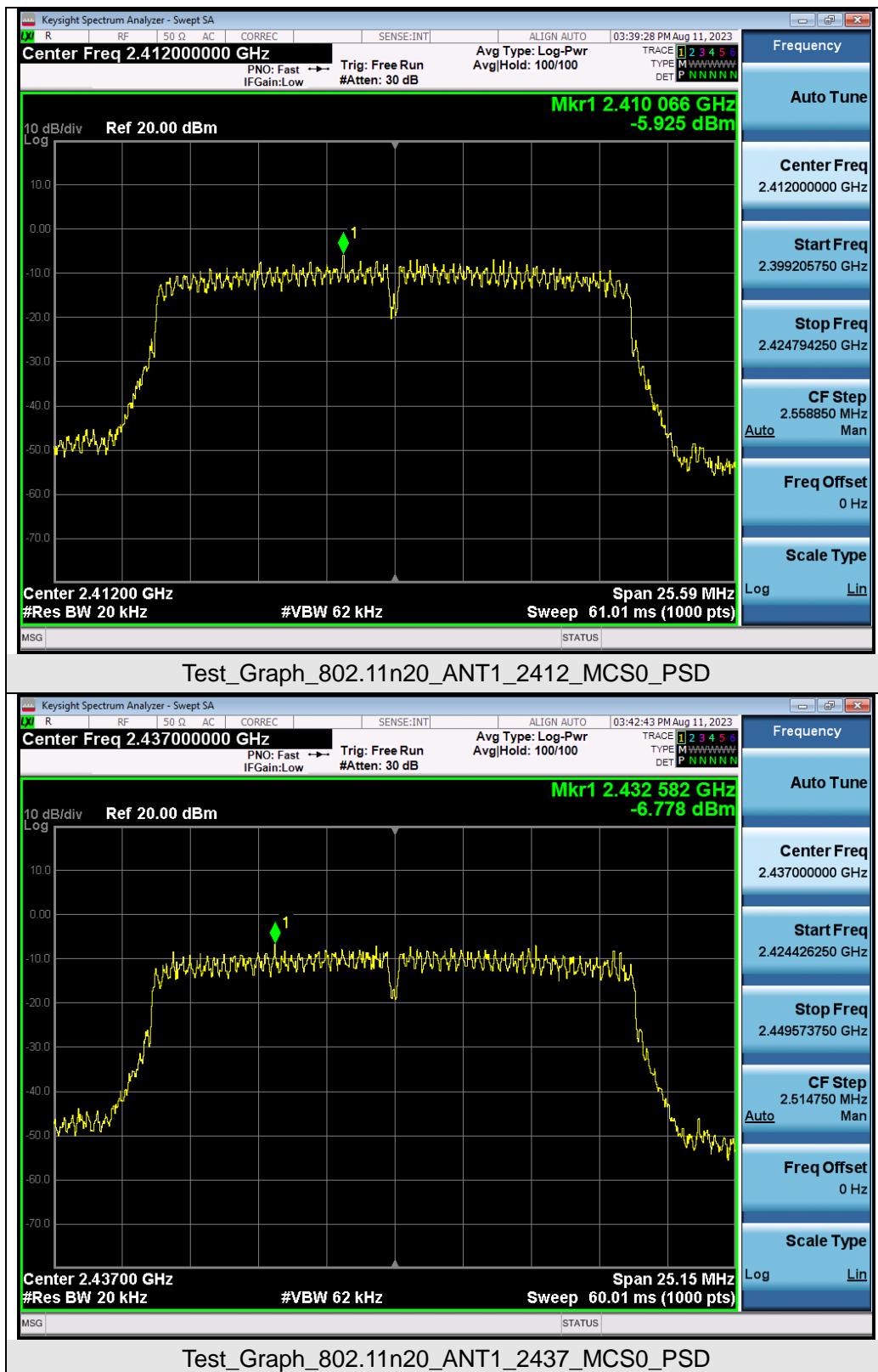


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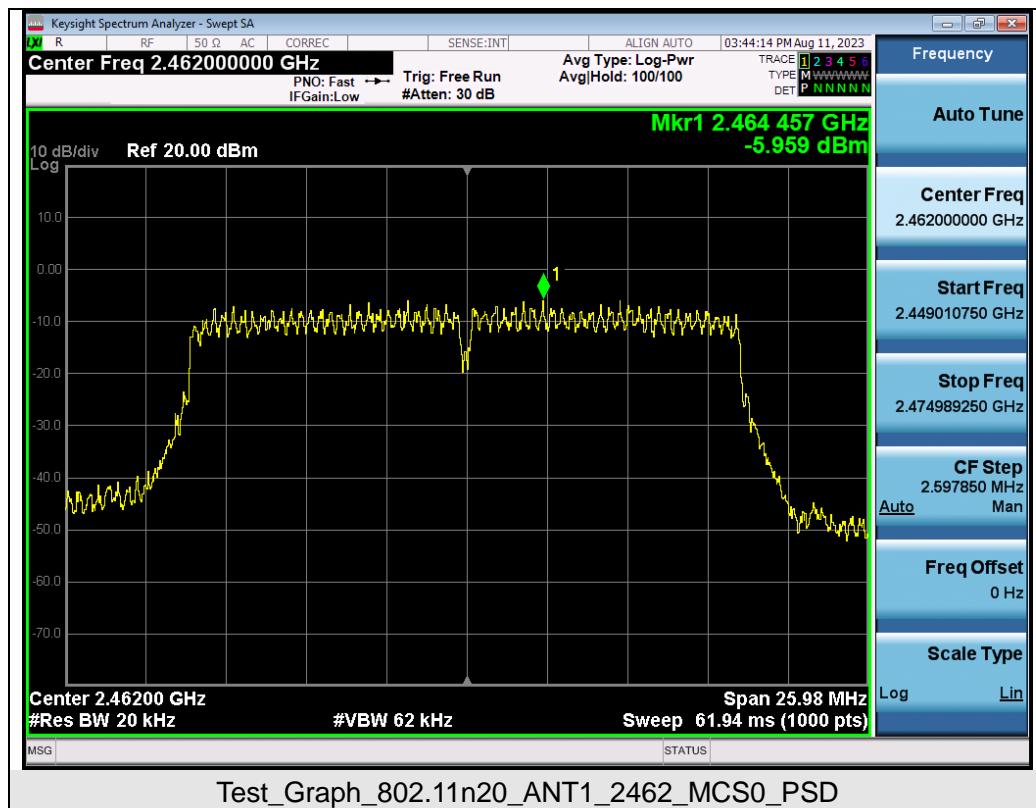


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12. RADIATED EMISSION

12.1. 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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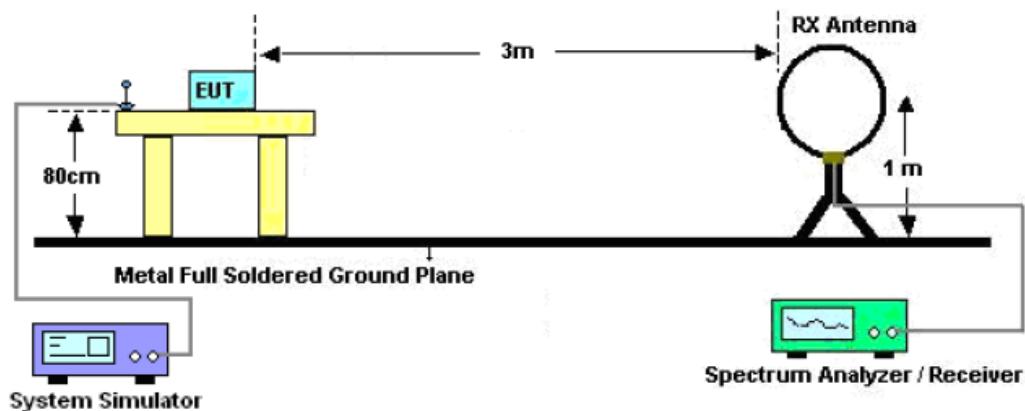
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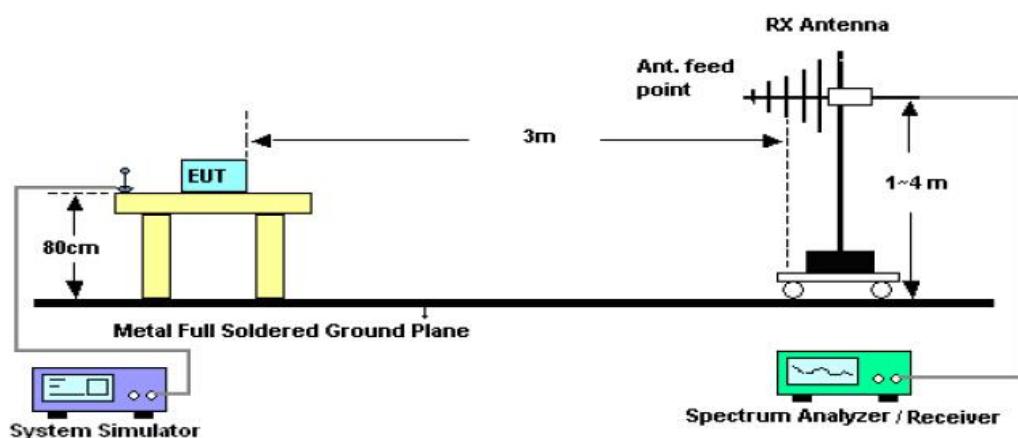
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12.2. TEST SETUP

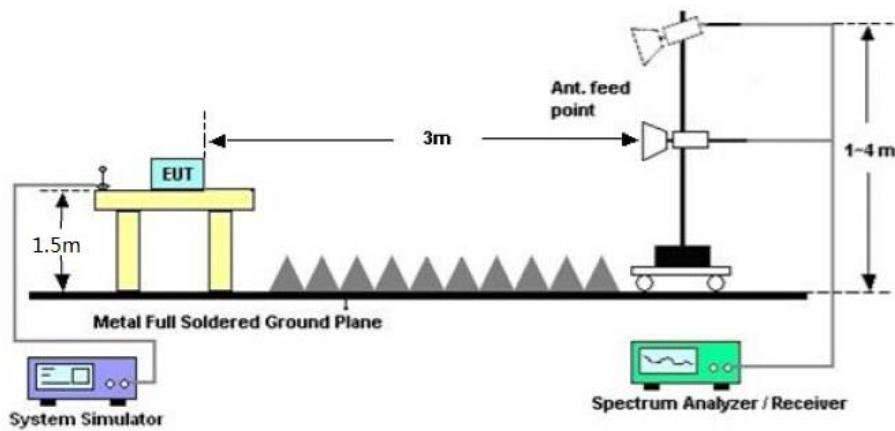
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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12.3. 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.

12.4. 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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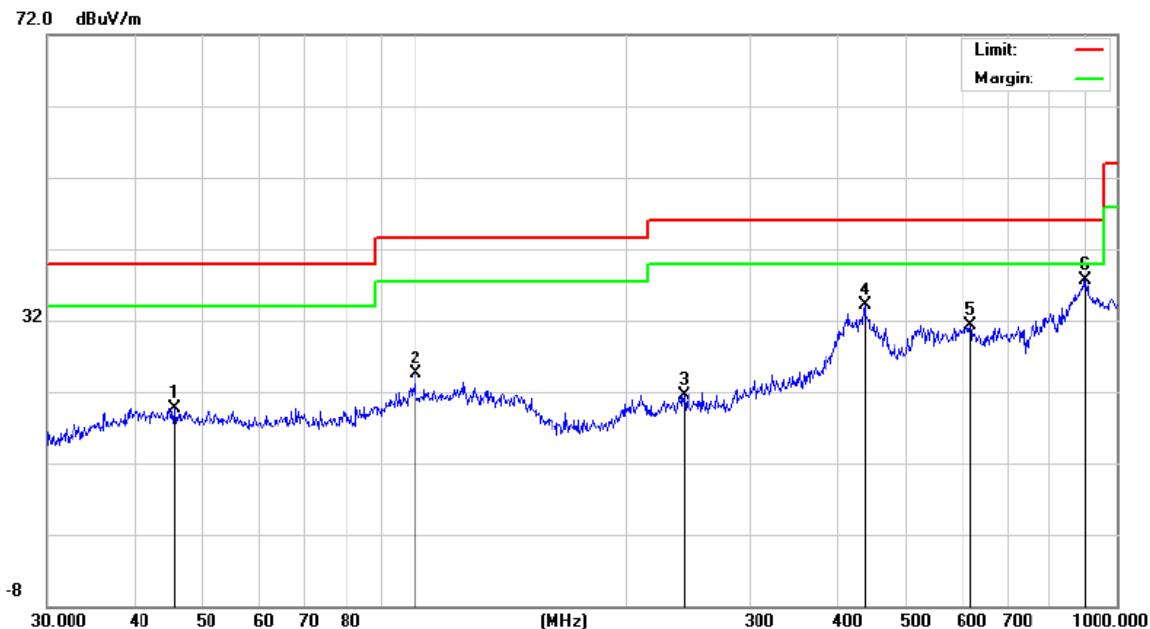
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Radiated emission from 30MHz to 1000MHz

EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	Antenna	Horizontal



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over
			Level	Factor	ment		
		MHz	dBuV	dB	dBuV/m	dB/m	dB
1		45.5348	6.19	13.51	19.70	40.00	-20.30
2		100.2286	8.35	16.20	24.55	43.50	-18.95
3		241.6763	6.23	15.35	21.58	46.00	-24.42
4		437.1199	9.70	24.48	34.18	46.00	-11.82
5		618.5369	6.09	25.19	31.28	46.00	-14.72
6	*	900.1474	6.02	31.78	37.80	46.00	-8.20

RESULT: PASS

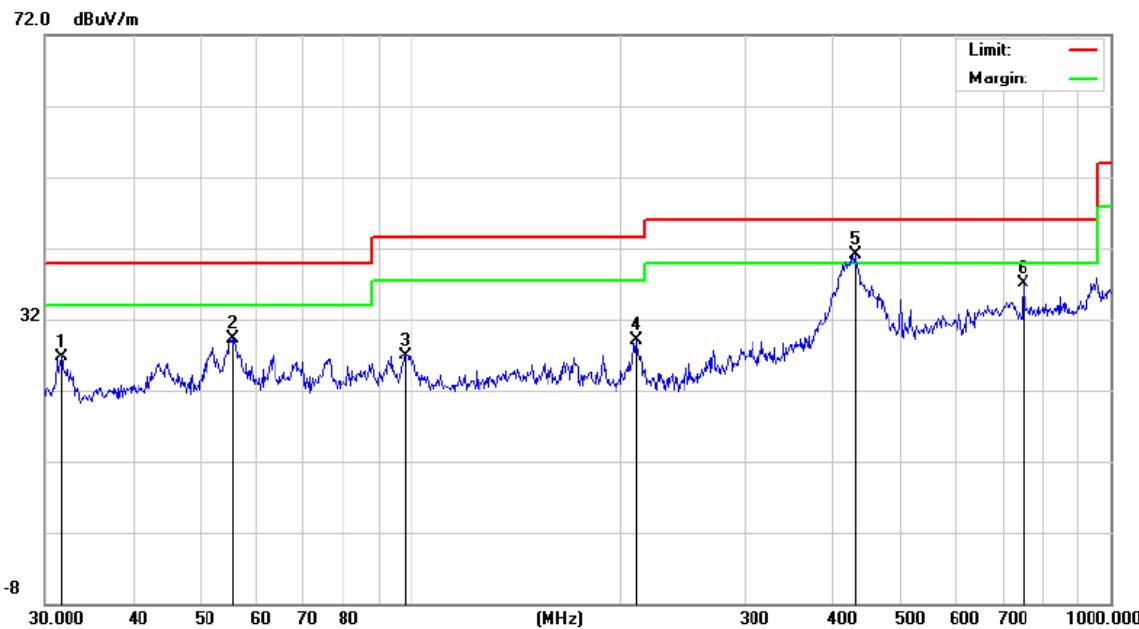
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EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	Antenna	Vertical



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		31.6202	12.63	14.13	26.76	40.00	-13.24	peak
2		55.6094	12.32	17.06	29.38	40.00	-10.62	peak
3		98.1419	12.45	14.45	26.90	43.50	-16.60	peak
4		210.0482	11.90	17.15	29.05	43.50	-14.45	peak
5	*	431.0316	16.44	24.66	41.10	46.00	-4.90	peak
6		750.1083	9.50	27.56	37.06	46.00	-8.94	peak

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Over=Measure-Limit.

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

EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4824.000	56.23	0.08	56.31	74	-17.69	peak
4824.000	47.67	0.08	47.75	54	-6.25	AVG
7236.000	50.32	2.21	52.53	74	-21.47	peak
7236.000	41.66	2.21	43.87	54	-10.13	AVG

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

EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4824.000	56.82	0.08	56.9	74	-17.1	peak
4824.000	46.61	0.08	46.69	54	-7.31	AVG
7236.000	50.32	2.21	52.53	74	-21.47	peak
7236.000	41.22	2.21	43.43	54	-10.57	AVG

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

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EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHz	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4874.000	56.3	0.14	56.44	74	-17.56	peak
4874.000	46.42	0.14	46.56	54	-7.44	AVG
7311.000	51.66	2.36	54.02	74	-19.98	peak
7311.000	41.73	2.36	44.09	54	-9.91	AVG

Remark:

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

EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHz	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4874.000	56.31	0.14	56.45	74	-17.55	peak
4874.000	46.19	0.14	46.33	54	-7.67	AVG
7311.000	50.42	2.36	52.78	74	-21.22	peak
7311.000	41.66	2.36	44.02	54	-9.98	AVG

Remark:

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

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EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHz	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Value Type
4924.000	55.91	0.22	56.13	74	-17.87	peak
4924.000	46.69	0.22	46.91	54	-7.09	Avg
7386.000	50.41	2.64	53.05	74	-20.95	peak
7386.000	42.79	2.64	45.43	54	-8.57	Avg
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHz	Antenna	Vertical

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Value Type
4924.000	56.43	0.22	56.65	74	-17.35	peak
4924.000	46.39	0.22	46.61	54	-7.39	Avg
7386.000	51.22	2.64	53.86	74	-20.14	peak
7386.000	42.07	2.64	44.71	54	-9.29	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, Margin= Emission Level-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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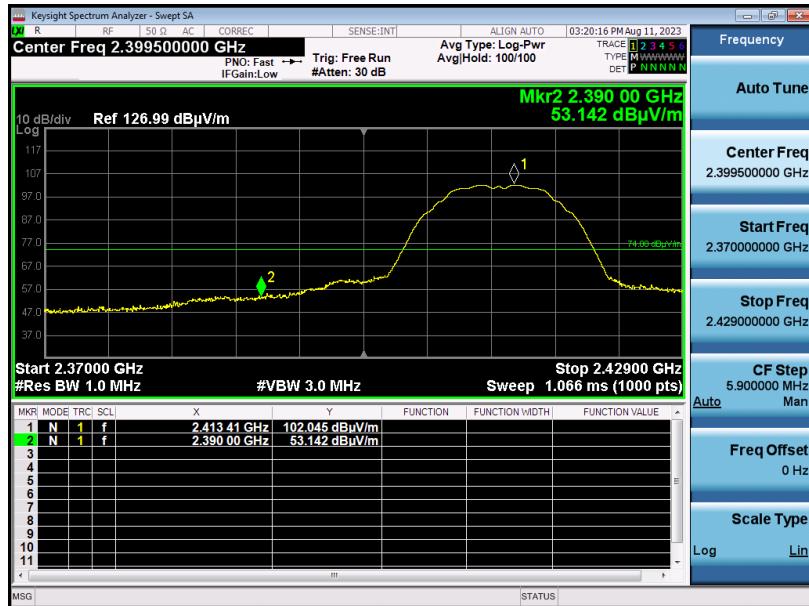
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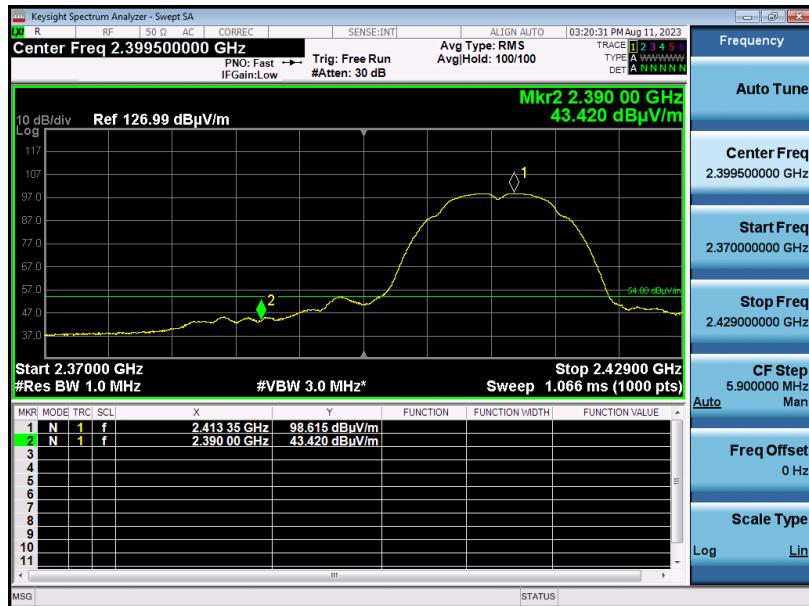
Test result for band edge emission at restricted bands

EUT	WIFI Camera	Model Name	IPM004
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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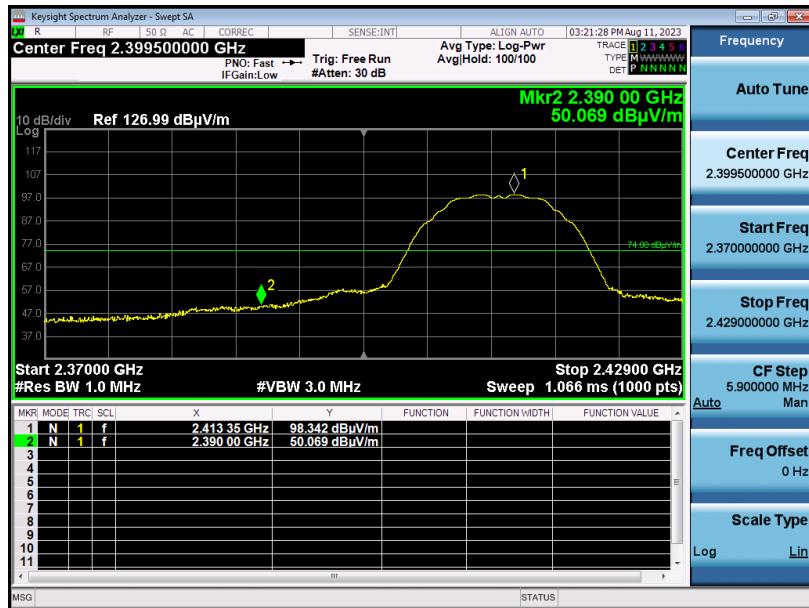
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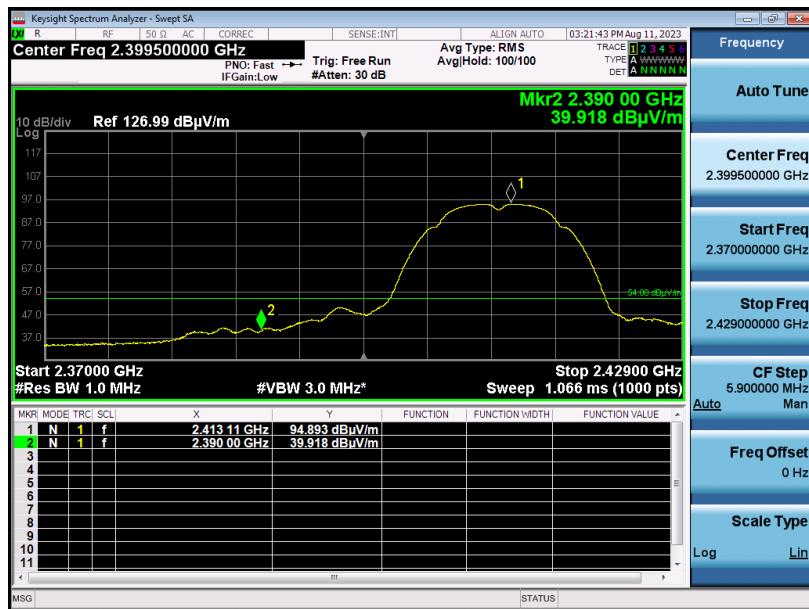
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EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



RESULT: PASS

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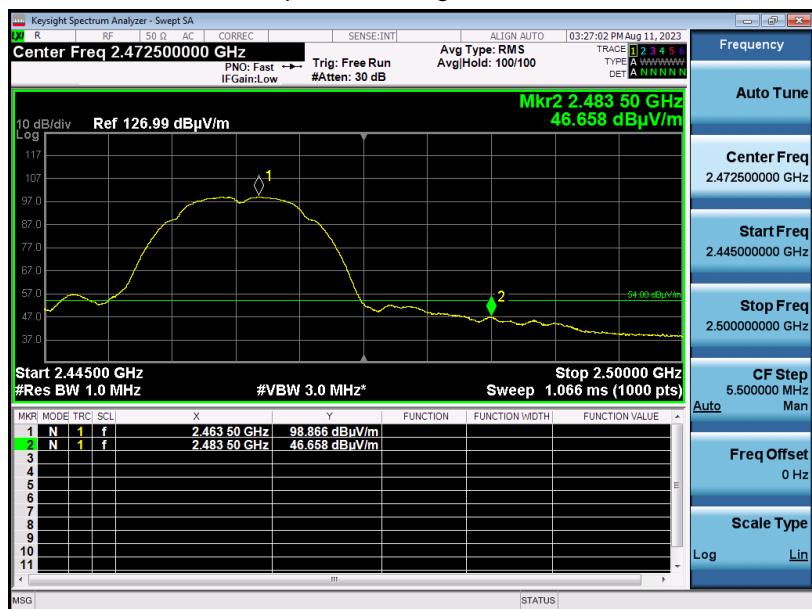
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EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHz	Antenna	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement



RESULT: PASS

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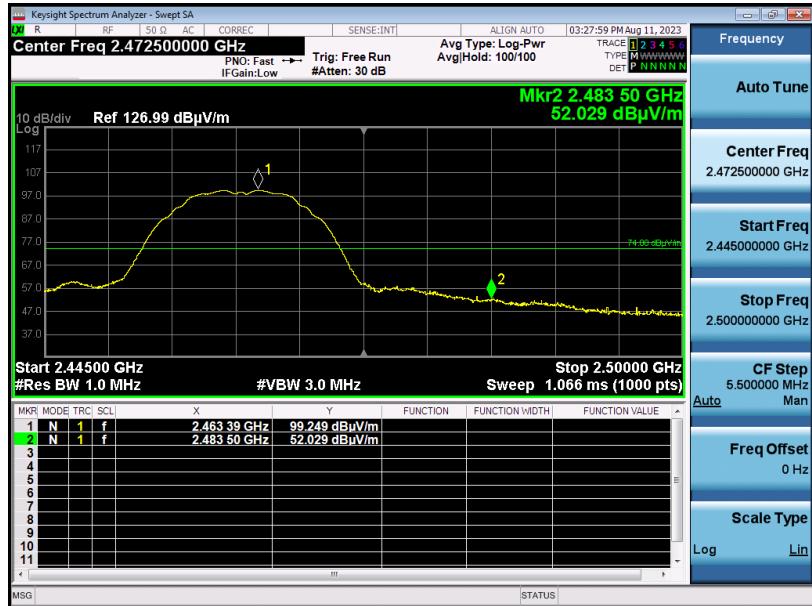
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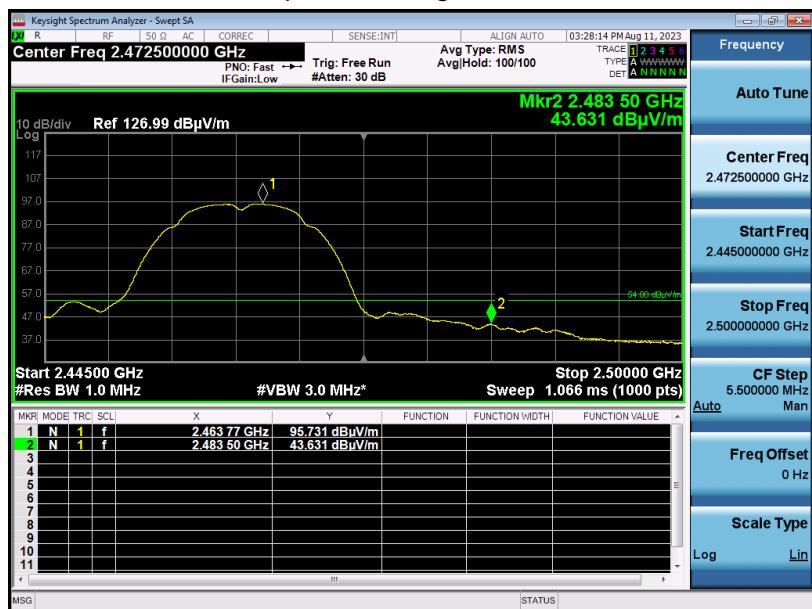
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EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



RESULT: PASS

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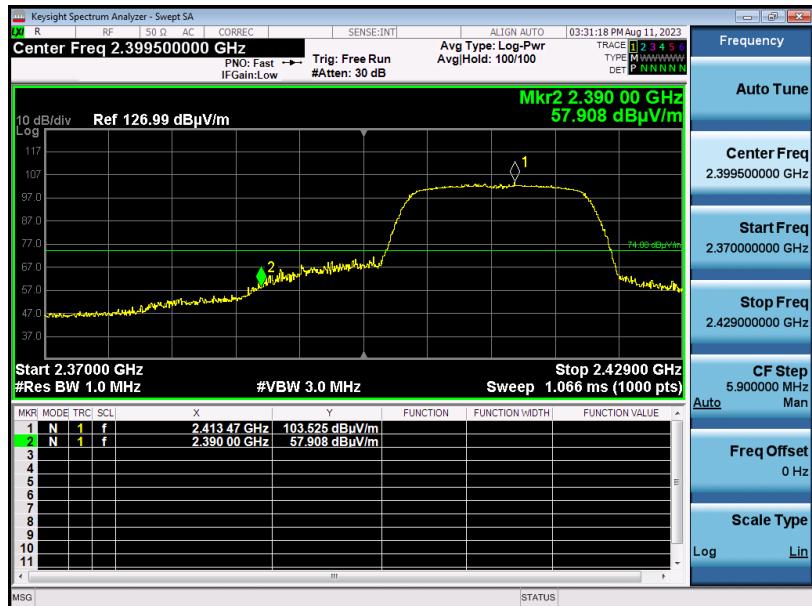
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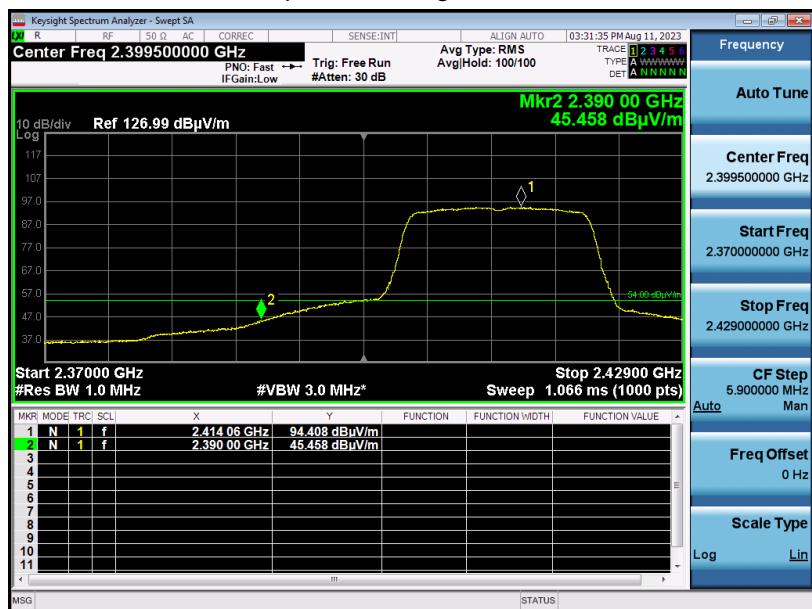
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EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2412MHz	Antenna	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement



RESULT: PASS

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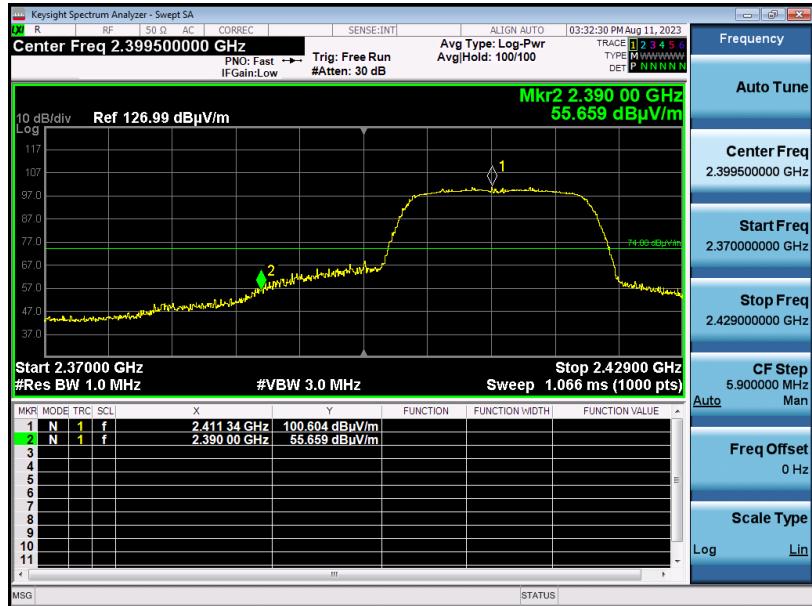
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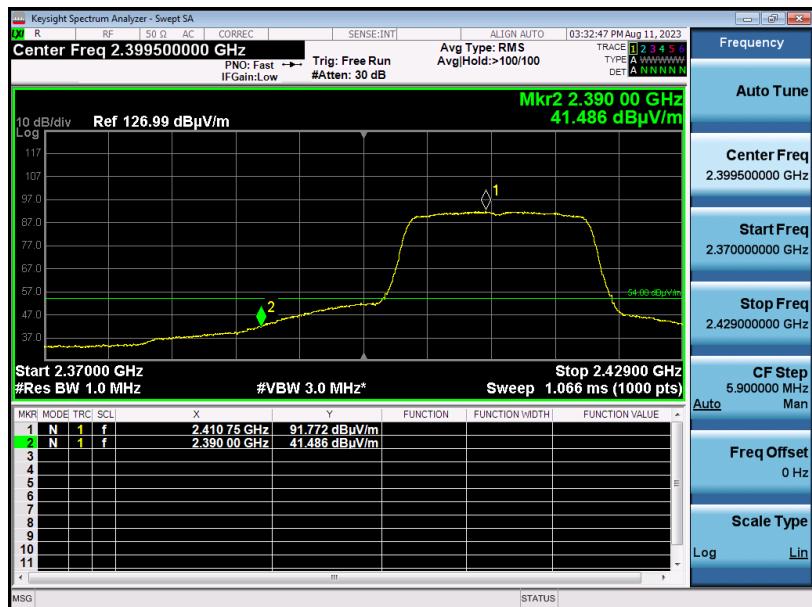
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EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2412MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



RESULT: PASS

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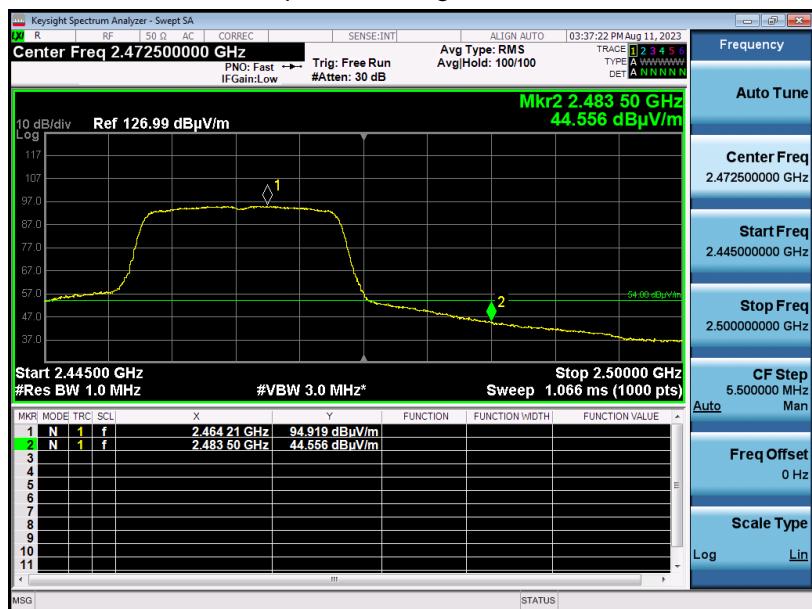
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EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2462MHz	Antenna	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement



RESULT: PASS

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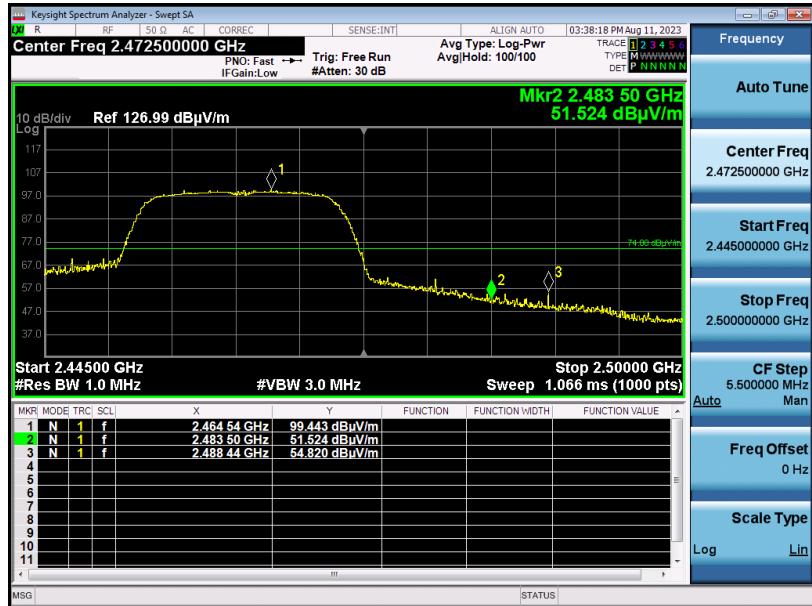
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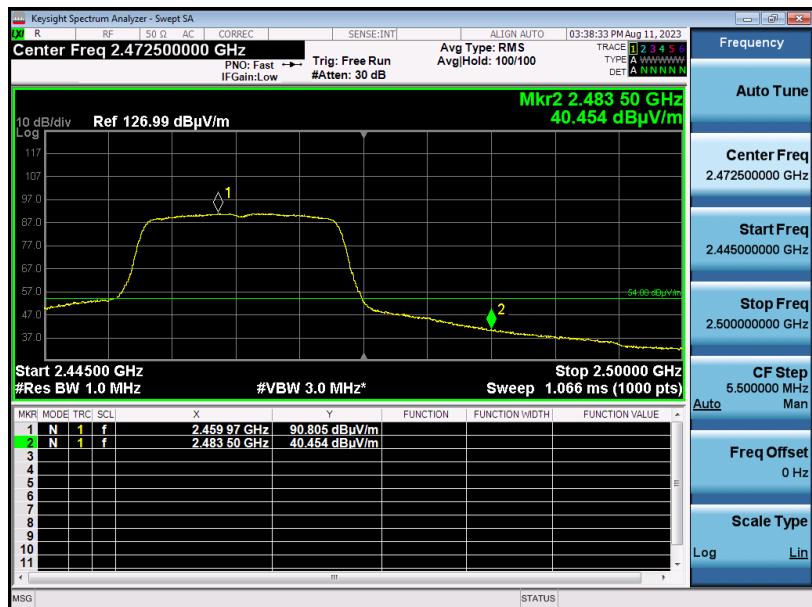
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Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2462MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



RESULT: PASS

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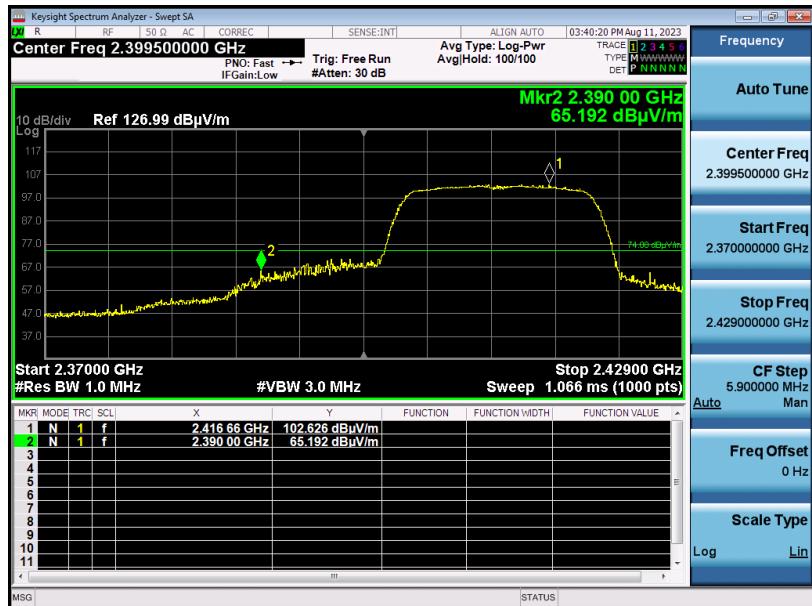
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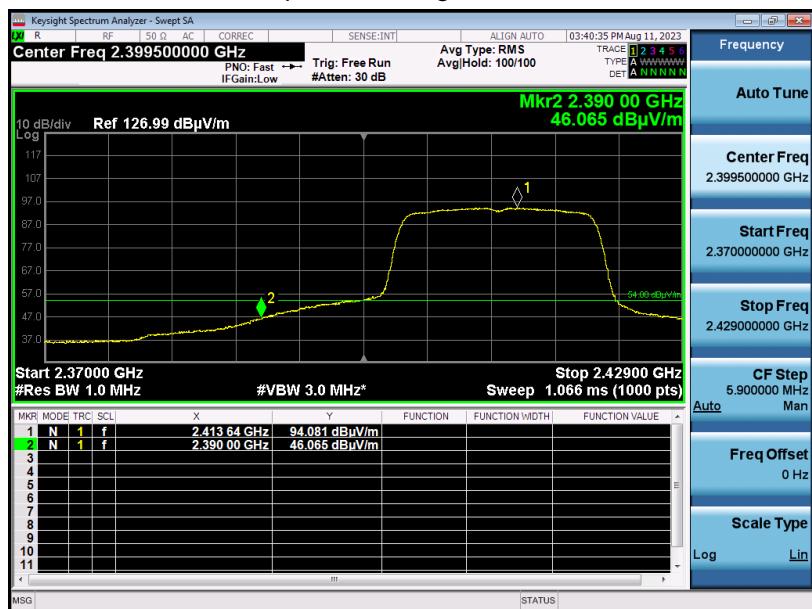
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EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20 with data rate 6.5 2412MHz	Antenna	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement



RESULT: PASS

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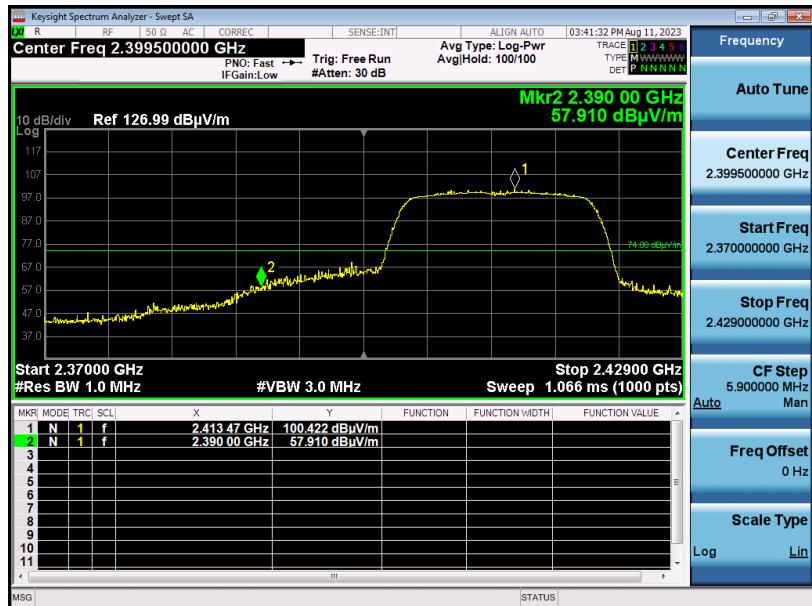
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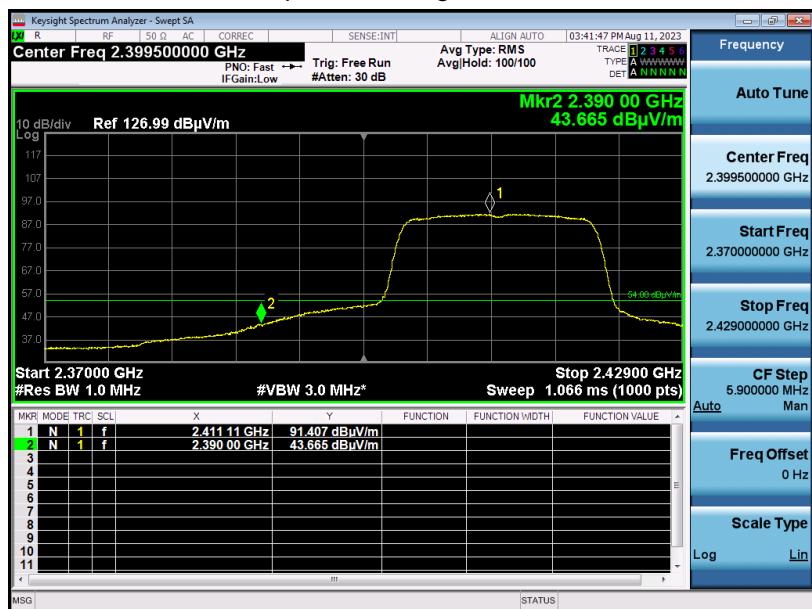
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EUT	WIFI Camera	Model Name	IPM004
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20 with data rate 6.5 2412MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



RESULT: PASS

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