
FCC Test Report

Report No.: AGC15705250439FR01

FCC ID : 2AJ551865D1P

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : RC quadcopter

BRAND NAME : N/A

MODEL NAME : HS440G, HS440S, HS440E, HS440Pro, HS440mini, HS480, HS490, HS450P, HS450D, HS450G

APPLICANT : Xiamen Huoshiquan Import & Export CO.,LTD.

DATE OF ISSUE : Jul. 09, 2025

STANDARD(S) : FCC Part 15 Subpart E §15.407

REPORT VERSION : V1.0

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jul. 09, 2025	Valid	Initial Release

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1. General Information

Applicant	Xiamen Huoshiquan Import & Export CO.,LTD.
Address	Unit 1, Room 501, Hongxiang Building, No.258 Hubin Nan Road, Siming District, XIAMEN, China
Manufacturer	Xiamen Huoshiquan Import & Export CO.,LTD.
Address	Unit 1, Room 501, Hongxiang Building, No.258 Hubin Nan Road, Siming District, XIAMEN, China
Factory	Xiamen Huoshiquan Import & Export CO.,LTD.
Address	Unit 1, Room 501, Hongxiang Building, No.258 Hubin Nan Road, Siming District, XIAMEN, China
Product Designation	RC quadcopter
Brand Name	N/A
Test Model	HS440G
Series Model(s)	HS440S, HS440E, HS440Pro, HS440mini, HS480, HS490, HS450P, HS450D, HS450G
Difference Description	All the series models are the same as the test model except for the model names.
Date of receipt of test item	Apr. 21, 2025
Date of Test	May 15, 2025~ Jul. 08, 2025
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCER-FCC-5G WLAN-V1

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

Prepared By



Cici Li

(Project Engineer)

Jul. 09, 2025

Reviewed By



Bibo Zhang

(Reviewer)

Jul. 09, 2025

Approved By



Angela Li

(Authorized Officer)

Jul. 09, 2025

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2. Product Information

2.1 Product Technical Description

Equipment Type	<input type="checkbox"/> Outdoor access points <input type="checkbox"/> Fixed P2P access points	<input type="checkbox"/> Indoor access points <input checked="" type="checkbox"/> Client devices
Operation Frequency	<input checked="" type="checkbox"/> U-NII 1:5150MHz~5250MHz <input type="checkbox"/> U-NII 2C:5470MHz~5725MHz	<input type="checkbox"/> U-NII 2A: 5250MHz~5350MHz <input checked="" type="checkbox"/> U-NII 3: 5725MHz~5850MHz
DFS Design Type	<input type="checkbox"/> Master <input type="checkbox"/> Slave with radar detection	<input checked="" type="checkbox"/> Slave without radar detection
TPC Function	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Hardware Version	V1.0	
Software Version	V1.0	
Test Frequency Range	For 802.11a: 5180~5240MHz/5745~5825MHz;	
RF Output Power	802.11a:14.90dBm	
Modulation	802.11a:(64-QAM, 16-QAM, QPSK, BPSK) OFDM	
Data Rate	802.11a:6/9/12/18/24/36/48/54Mbps;	
Number of channels	4 channels of U-NII-1 Band; 5 channels of U- NII 3 Band	
Antenna Designation	Dipole Antenna	
Antenna Gain	Chain A: 2.92dBi Chain B: 2.85dBi	
Power Supply	DC 7.6V by battery	

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2.2 Table of Carrier Frequency

For 5180~5240MHz:

4 channels are provided for 802.11a:

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

For 5745~5825MHz:

5 channels are provided for 802.11a:

Channel	Frequency	Channel	Frequency
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz	--	--

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2.3 IEEE 802.11n Modulation Scheme

MCS Index	Nss	Modulation	R	N _{BPSC}	N _{CBPS}	N _{DBPS}	Data rate (Mbps)
							800nsGI
					20MHz	20MHz	20MHz
0	1	BPSK	1/2	1	52	26	6.5
1	1	QPSK	1/2	2	104	52	13.0
2	1	QPSK	3/4	2	104	78	19.5
3	1	16-QAM	1/2	4	208	104	26.0
4	1	16-QAM	3/4	4	208	156	39.0
5	1	64-QAM	2/3	6	312	208	52.0
6	1	64-QAM	3/4	6	312	234	58.5
7	1	64-QAM	5/6	6	312	260	65.0

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

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2.4 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: 2AJ551865D1P filing to comply with the FCC Part 15 requirements.

2.5 Test Methodology

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
4	KDB 789033	789033 D02 General U-NII Test Procedures New Rules v02r01

2.6 Special Accessories

Refer to section 4.4.

2.7 Equipment Modifications

Not available for this EUT intended for grant.

2.8 Antenna Requirement

Standard Requirement
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
EUT Antenna: The non-detachable antenna inside the device cannot be replaced by the user at will. The gain of the antenna Chain A is 2.92dBi, The gain of the antenna Chain B is 2.85dBi.

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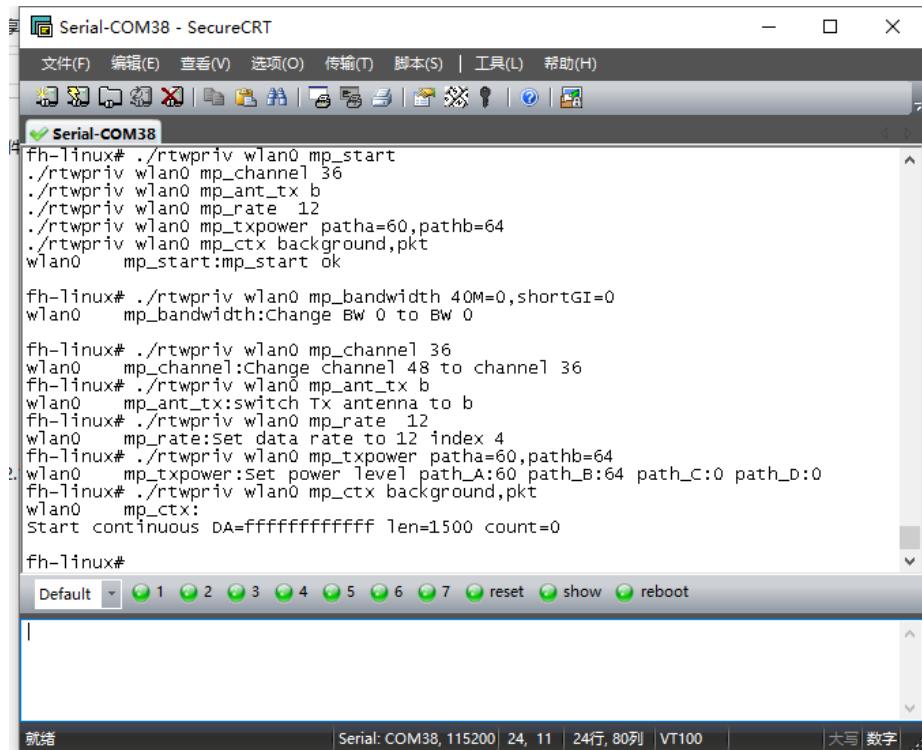
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2.9 Description of Test Software

For IEEE 802.11 mode:

The test utility software used during testing was “SecureCRT”, and the version was “4.0.00132.0”.

Software Setting Diagram



```

Serial-COM38 - SecureCRT
文件(F) 编辑(E) 查看(V) 选项(O) 传输(T) 脚本(S) | 工具(L) 帮助(H)
Serial-COM38
fh-linux# ./rtwpriv wlan0 mp_start
./rtwpriv wlan0 mp_channel 36
./rtwpriv wlan0 mp_ant_tx b
./rtwpriv wlan0 mp_rate 12
./rtwpriv wlan0 mp_txpower patha=60,pathb=64
./rtwpriv wlan0 mp_ctx background,pkt
wlan0 mp_start:mp_start ok

fh-linux# ./rtwpriv wlan0 mp_bandwidth 40M=0,shortGI=0
wlan0 mp_bandwidth:Change BW 0 to BW 0

fh-linux# ./rtwpriv wlan0 mp_channel 36
wlan0 mp_channel:Change channel 48 to channel 36
fh-linux# ./rtwpriv wlan0 mp_ant_tx b
wlan0 mp_ant_tx:switch Tx antenna to b
fh-linux# ./rtwpriv wlan0 mp_rate 12
wlan0 mp_rate:set data rate to 12 index 4
fh-linux# ./rtwpriv wlan0 mp_txpower patha=60,pathb=64
wlan0 mp_txpower:set power level path_A:60 path_B:64 path_C:0 path_D:0
fh-linux# ./rtwpriv wlan0 mp_ctx background,pkt
wlan0 mp_ctx:
Start continuous DA=ffffffffffff len=1500 count=0

fh-linux#
  Default 1 2 3 4 5 6 7 reset show reboot
| |
就绪 | Serial: COM38, 115200 24, 11 | 24行, 80列 | VT100 | 大写 数字 .,.

```

Test Mode	Channel	Power Index	
		Chain A	Chain B
802.11a	L/M/H	75	75

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3. Test Environment

3.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories.)

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842 (CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

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3.3 Environmental Conditions

	Normal Conditions
Temperature range (°C)	15 - 35
Relative humidity range	20% - 75%
Pressure range (kPa)	86 - 106
Power supply	DC 7.6V

3.4 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	$U_c = \pm 2 \%$
Uncertainty of Occupied Channel Bandwidth	$U_c = \pm 2.7 \%$

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3.5 List of Equipment Used

● RF Conducted Test System							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
<input checked="" type="checkbox"/>	AGC-ER-E036	Spectrum Analyzer	Agilent	N9020A	MY49100060	2025-05-08	2026-05-07
<input checked="" type="checkbox"/>	AGC-ER-E062	Power Sensor	Agilent	U2021XA	MY54110007	2025-01-14	2026-01-13
<input checked="" type="checkbox"/>	AGC-ER-E063	Power Sensor	Agilent	U2021XA	MY54110009	2025-01-14	2026-01-13
<input checked="" type="checkbox"/>	AGC-ER-A007	6dB Fixed Attenuator	Mini circuits	BW-S6-2W263A+	N/A	2025-01-30	2026-01-29
<input checked="" type="checkbox"/>	AGC-ER-A008	6dB Fixed Attenuator	Mini circuits	BW-K6-2W44+	N/A	2025-01-30	2026-01-29
<input type="checkbox"/>	AGC-ER-E083	Signal Generator	Agilent	E4421B	US39340815	2025-05-21	2026-05-20
<input checked="" type="checkbox"/>	N/A	RF Connection Cable	N/A	1#	N/A	Each time	N/A
<input checked="" type="checkbox"/>	N/A	RF Connection Cable	N/A	2#	N/A	Each time	N/A

● Radiated Spurious Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
<input checked="" type="checkbox"/>	AGC-EM-E046	EMI Test Receiver	R&S	ESCI	10096	2025-01-14	2026-01-13
<input checked="" type="checkbox"/>	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2025-05-08	2026-05-07
<input checked="" type="checkbox"/>	AGC-EM-E086	Loop Antenna	ZHINAN	ZN30900C	18051	2024-03-05	2026-03-04
<input checked="" type="checkbox"/>	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2025-03-14	2027-03-13
<input checked="" type="checkbox"/>	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2025-03-27	2026-03-26
<input checked="" type="checkbox"/>	AGC-EM-E082	Horn Antenna	SCHWARZBECK	BBHA 9170	#768	2023-09-24	2025-09-23
<input checked="" type="checkbox"/>	AGC-EM-E146	Pre-amplifier	ETS	3117-PA	00246148	2024-07-24	2026-07-23
<input checked="" type="checkbox"/>	AGC-EM-E083	Pre-amplifier	CHENGXI	EMC184045SE	980508	2023-09-20	2025-09-19
<input checked="" type="checkbox"/>	AGC-EM-A118	5G Filter	SongYi	N/A	N/A	2024-05-23	2025-05-22
<input checked="" type="checkbox"/>	AGC-EM-A118	5G Filter	SongYi	N/A	N/A	2025-05-16	2026-05-15
<input checked="" type="checkbox"/>	AGC-EM-A138	6dB Attenuator	Eatsheep	LM-XX-6-5W	N/A	2023-06-09	2025-06-08
<input checked="" type="checkbox"/>	AGC-EM-A138	6dB Attenuator	Eatsheep	LM-XX-6-5W	N/A	2025-05-16	2027-05-15
<input type="checkbox"/>	AGC-EM-A139	6dB Attenuator	Eatsheep	LM-XX-6-5W	N/A	2023-06-09	2025-06-08
<input type="checkbox"/>	AGC-EM-A139	6dB Attenuator	Eatsheep	LM-XX-6-5W	N/A	2025-05-16	2027-05-15

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● AC Power Line Conducted Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
<input type="checkbox"/>	AGC-EM-E045	EMI Test Receiver	R&S	ESPI	101206	2025-05-08	2026-05-07
<input type="checkbox"/>	AGC-EM-A171	Attenuator	Mini-Circuits	UNAT-10A+	N/A	2024-02-01	2026-01-31
<input type="checkbox"/>	AGC-EM-E023	AMN	R&S	100086	ESH2-Z5	2025-05-08	2026-05-07

● Test Software					
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information
<input type="checkbox"/>	AGC-EM-S001	CE Test System	R&S	ES-K1	V1.71
<input checked="" type="checkbox"/>	AGC-EM-S003	RE Test System	FARA	EZ-EMC	VRA-03A
<input checked="" type="checkbox"/>	AGC-EM-S004	RE Test System	Tonscend	TS+Ver2.1(JS32-RE)	4.0.0.0
<input checked="" type="checkbox"/>	AGC-ER-S012	BT/WIFI Test System	Tonscend	JS1120-2	2.6
<input checked="" type="checkbox"/>	AGC-EM-S011	RSE Test System	Tonscend	TS+-Ver2.1(JS36-RSE)	4.0.0.0

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4. System Test Configuration

4.1 EUT Configuration

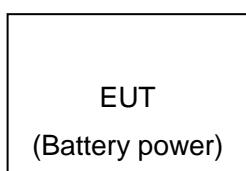
The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

4.3 Configuration of Tested System

Radiated Emission Configure:



4.4 Equipment Used in Tested System

The following peripheral devices and interface cables were connected during the measurement:

Test Accessories Come From The Laboratory

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	Redmi Notebook PC	Redmi	XMA2002-AB	--	--
2	Control Box	RISYM	USB-TTL	--	--

Test Accessories Come From The Manufacturer

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	--	--	--	--	--

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4.5 Summary of Test Results

Item	FCC Rules	Description of Test	Result
1	§15.203	Antenna Equipment	Pass
2	§15.407(a/1/3)	RF Output Power	Pass
3	§15.407(e)	6 dB Bandwidth	Pass
4	§15.407(a)	99% Occupied Bandwidth	Pass
5	§15.407(a/1/3)	Power Spectral Density	Pass
6	§15.407(g)	Frequency Stability	Pass (See Note 1)
7	§15.407(c)	Transmission Discontinuation Requirement	Pass (See Note 2)
8	§15.407(b)(1/4)	Conducted Band Edge and Out-of-Band Emissions	Pass
9	§15.209,§15.407(b)(1/4)	Radiated Spurious Emission	Pass
10	§15.207	AC Power Line Conducted Emission	Not applicable

Note:

1. Refer to the manufacturer's declaration in the user manual.
2. The device operates without the transmission of information.
3. The WIFI function cannot transmit when charging.

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5. Description of Test Modes

EUT Configure Mode	Applicable To				Description
	RE > 1G	RE < 1G	PLC	APCM	
A	--	--	--	--	Powered by Adapter with WIFI(5G) Link
B	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	--	<input checked="" type="checkbox"/>	Powered by Battery with WIFI(5G) Link
C	--	--	--	--	Powered by USB with WIFI(5G) Link

Where, **RE > 1G: Radiated Emission above 1GHz** **PLC: Power Line Conducted Emission**

RE < 1G: Radiated Emission below 1GHz **APCM: Antenna Port Conducted Measurement**

NOTE 1: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on X-plane.

NOTE 2: “--”means no effect.

- **Radiated Emission Test (Above 1GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen available modulations, data rates and antenna ports (IF EUT with antenna diversity architecture).
- Support 802.11ax, device debugging is tested in Full RU state
- The device under test has multiple antennas. The mode that do not support MIMO technology records the worst data, and records antenna A as the worst data.
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
B	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
B	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0

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- **Radiated Emission Test (Below 1GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen available modulations, data rates and antenna ports (If EUT with antenna diversity architecture).
- The device under test has multiple antennas. The mode that supports MIMO technology records the worst data, and records antenna A as the worst data.
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
B	802.11a	5180-5240	36 to 48	36	OFDM	MCS0

- **Power Line Conducted Emission Test:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen available modulations, data rates and antenna ports (If EUT with antenna diversity architecture).
- The device under test has multiple antennas. The mode that do not support MIMO technology records the worst data, and records antenna A as the worst data.
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
B	802.11a	5180-5240	36 to 48	36	OFDM	MCS0

- **Band edge Measurement:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen available modulations, data rates and antenna ports (If EUT with antenna diversity architecture).
- Support 802.11ax, device debugging is tested in Full RU state
- The device under test has multiple antennas. The mode that do not support MIMO technology records the worst data, and the worst datas of antenna A and antenna B have been reflected in the report.
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
B	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
B	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0

- **Antenna Port Conducted Measurement:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen available modulations, data rates and antenna ports (If EUT with antenna diversity architecture).
- Support 802.11ax, device debugging is tested in Full RU state
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
B	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
B	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0

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6. Duty Cycle Measurement

5GHz WLAN (NII) 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 = Average. 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:

Chain A

Operating mode	Data rates (Mbps)	Duty Cycle (%)	Duty Cycle Factor (dB)
Band U-NII1:5150MHz-5250MHz			
802.11a	6	90.34	0.44
Band U-NII 3:5725MHz-5850MHz			
802.11a	6	92.89	0.32

Chain B

Operating mode	Data rates (Mbps)	Duty Cycle (%)	Duty Cycle Factor (dB)
Band U-NII1:5150MHz-5250MHz			
802.11a	6	89.99	0.46
Band U-NII 3: 5725MHz-5850MHz			
802.11a	6	94.77	0.23

Remark:

1. Duty Cycle factor = $10 * \log (1 / \text{Duty cycle})$
2. The duty cycle of each frequency band mode reflects the determination requirements of the low channel measurement value.
3. Involving the test items of duty cycle compensation coefficient, the final results have been added and calculated by the software and presented.

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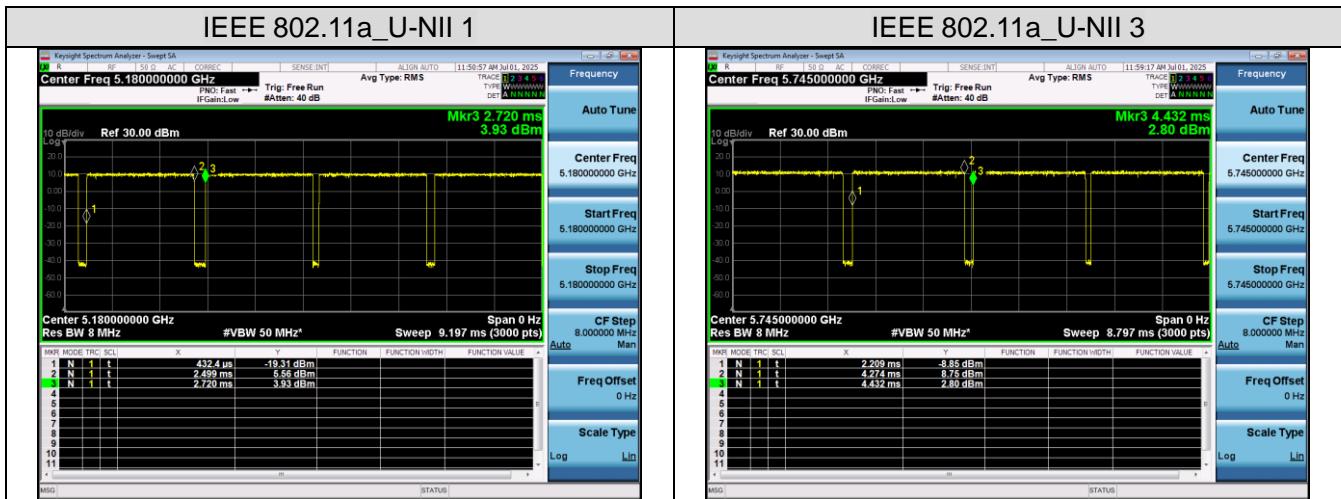
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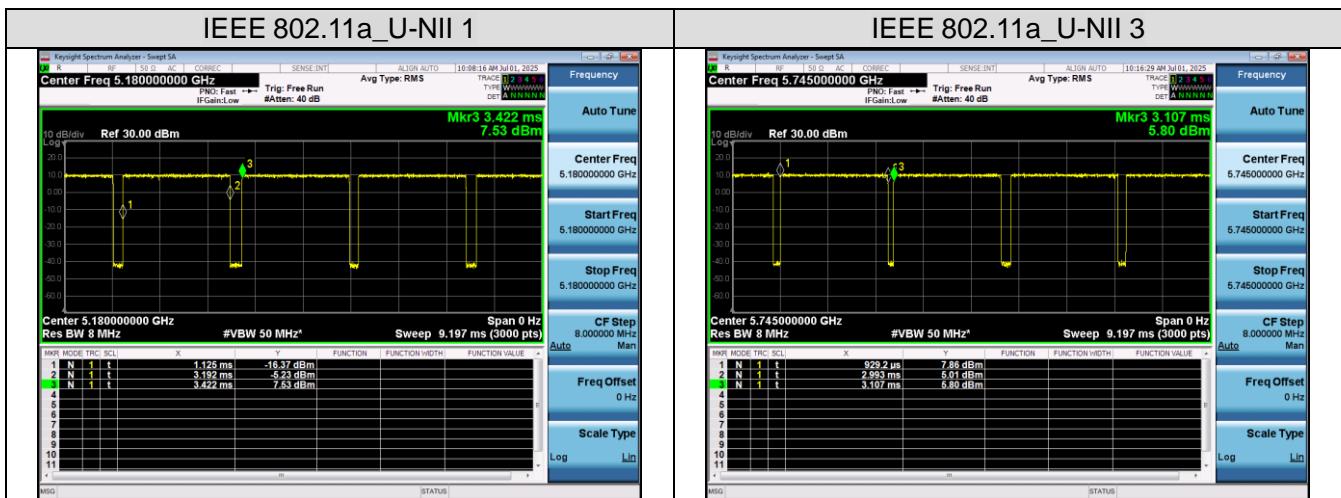
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The test plots as follows:

Chain A



Chain B



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7. RF Output Power Measurement

7.1 Provisions Applicable

Operation Band	EUT Category		LIMIT
U-NII-1	<input type="checkbox"/>	Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p < 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
	<input type="checkbox"/>	Fixed point-to-point Access Point	1 Watt (30 dBm)
	<input type="checkbox"/>	Indoor Access Point	1 Watt (30 dBm)
	<input checked="" type="checkbox"/>	Client devices	250mW (23.98 dBm)
U-NII-2A	/		250mW (23.98 dBm) or $11 \text{ dBm} + 10 \log B^*$
U-NII-2C	/		250mW (23.98 dBm) or $11 \text{ dBm} + 10 \log B^*$
U-NII-3	/		1 Watt (30 dBm)

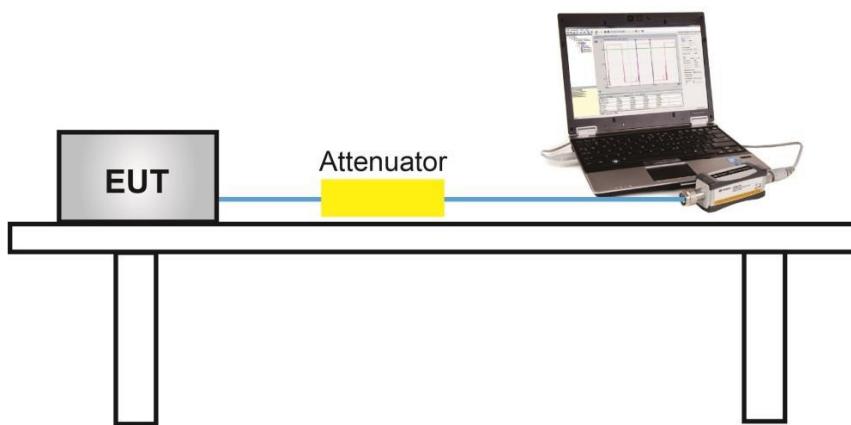
Note: Where B is the 26dB emission bandwidth in MHz.

7.2 Measurement Procedure

Method PM is Measurement using an RF average power meter. The procedure for this method is as follows:

1. The testing follows the ANSI C63.10 Section 12.3.3.1
2. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:
 3. The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
 4. At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
 5. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
 6. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
 7. Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
 8. Adjust the measurement in dBm by adding $[10 \log (1 / D)]$, where D is the duty cycle {e.g., $[10 \log (1 / 0.25)]$, if the duty cycle is 25%}.
 9. The final test results have been increased by the duty cycle factor and recorded in the report.

7.3 Measurement Setup (Block Diagram of Configuration)



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7.4 Measurement Result

Test Data of Conducted Output Power for band 5.15-5.25 GHz-Chain A				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5180	12.70	23.98	Pass
	5200	12.45	23.98	Pass
	5240	13.24	23.98	Pass

Test Data of Conducted Output Power for band 5.15-5.25 GHz-Chain B				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5180	12.74	23.98	Pass
	5200	12.47	23.98	Pass
	5240	13.04	23.98	Pass

Test Data of Conducted Output Power for band 5.725-5.850 GHz- Chain A				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5745	13.82	30	Pass
	5785	14.68	30	Pass
	5825	14.90	30	Pass

Test Data of Conducted Output Power for band 5.725-5.850 GHz- Chain B				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5745	12.82	30	Pass
	5785	13.50	30	Pass
	5825	13.70	30	Pass

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8. 6dB&26dB Bandwidth Measurement

8.1 Provisions Applicable

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

8.2 Measurement Procedure

◆ -6dB bandwidth (DTS bandwidth) Test setting:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on operation frequency individually.
3. Set RBW = 100kHz.
4. Set the VBW $\geq 3 \times$ RBW. Detector = Peak. Trace mode = max hold.
5. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.

◆ 99% occupied bandwidth test setting:

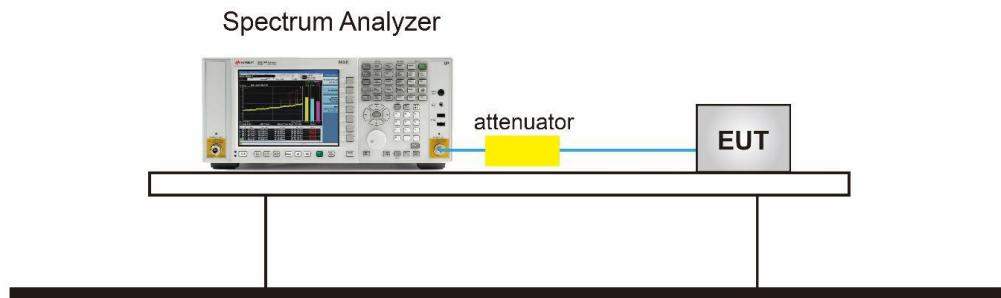
1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 1.5 to 5 times the OBW, centered on a nominal channel
The nominal IF filter bandwidth (3 dB RBW) shall 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.

◆ -26dB Bandwidth test setting:

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW > RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission.
Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Note: The EUT was tested according to KDB 789033 for compliance to FCC 47CFR 15.407 requirements.

8.3 Measurement Setup (Block Diagram of Configuration)



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8.4 Measurement Results

Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz-Chain A					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5180	16.327	18.473	N/A	Pass
	5200	16.330	18.418	N/A	Pass
	5240	16.336	18.391	N/A	Pass

Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz- Chain B					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5180	16.364	18.051	N/A	Pass
	5200	16.330	18.423	N/A	Pass
	5240	16.342	18.462	N/A	Pass

Test Data of Occupied Bandwidth and DTS Bandwidth for band 5.725-5.85 GHz- Chain A					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5745	16.358	16.366	0.5	Pass
	5785	16.366	16.339	0.5	Pass
	5825	16.404	16.057	0.5	Pass

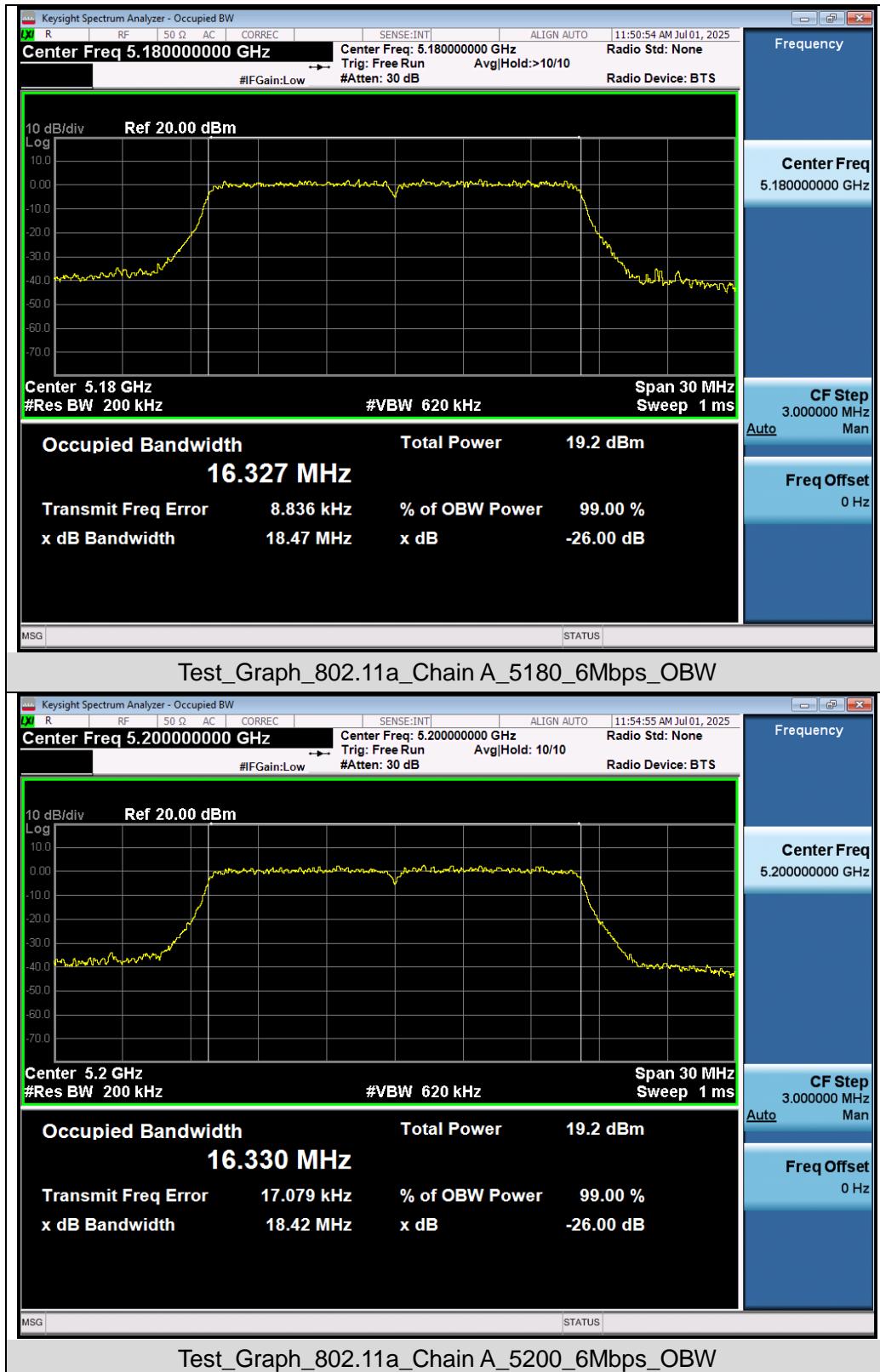
Test Data of Occupied Bandwidth and DTS Bandwidth for band 5.725-5.85 GHz- Chain B					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5745	16.334	16.352	0.5	Pass
	5785	16.338	16.344	0.5	Pass
	5825	16.331	16.331	0.5	Pass

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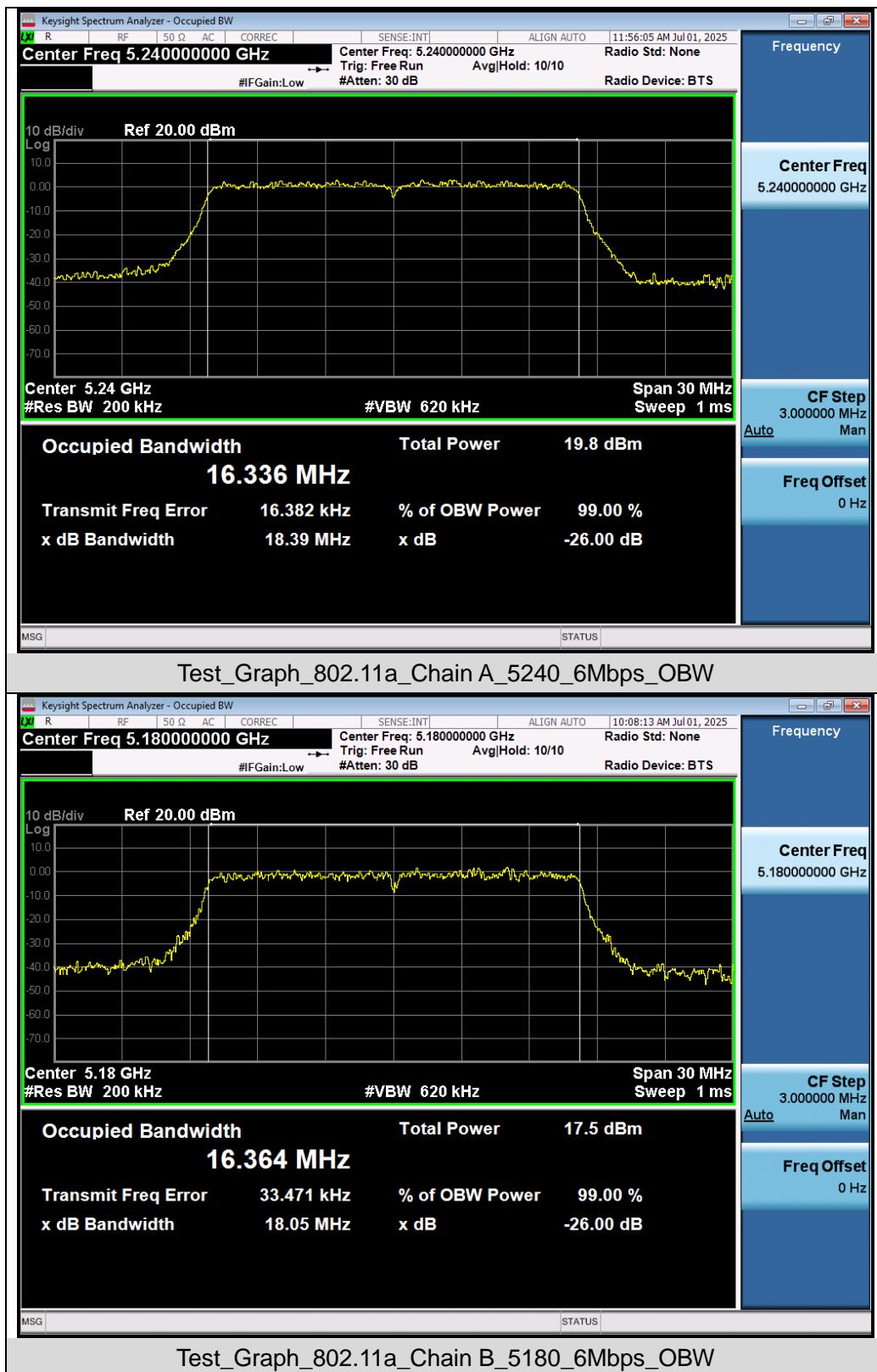
Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz


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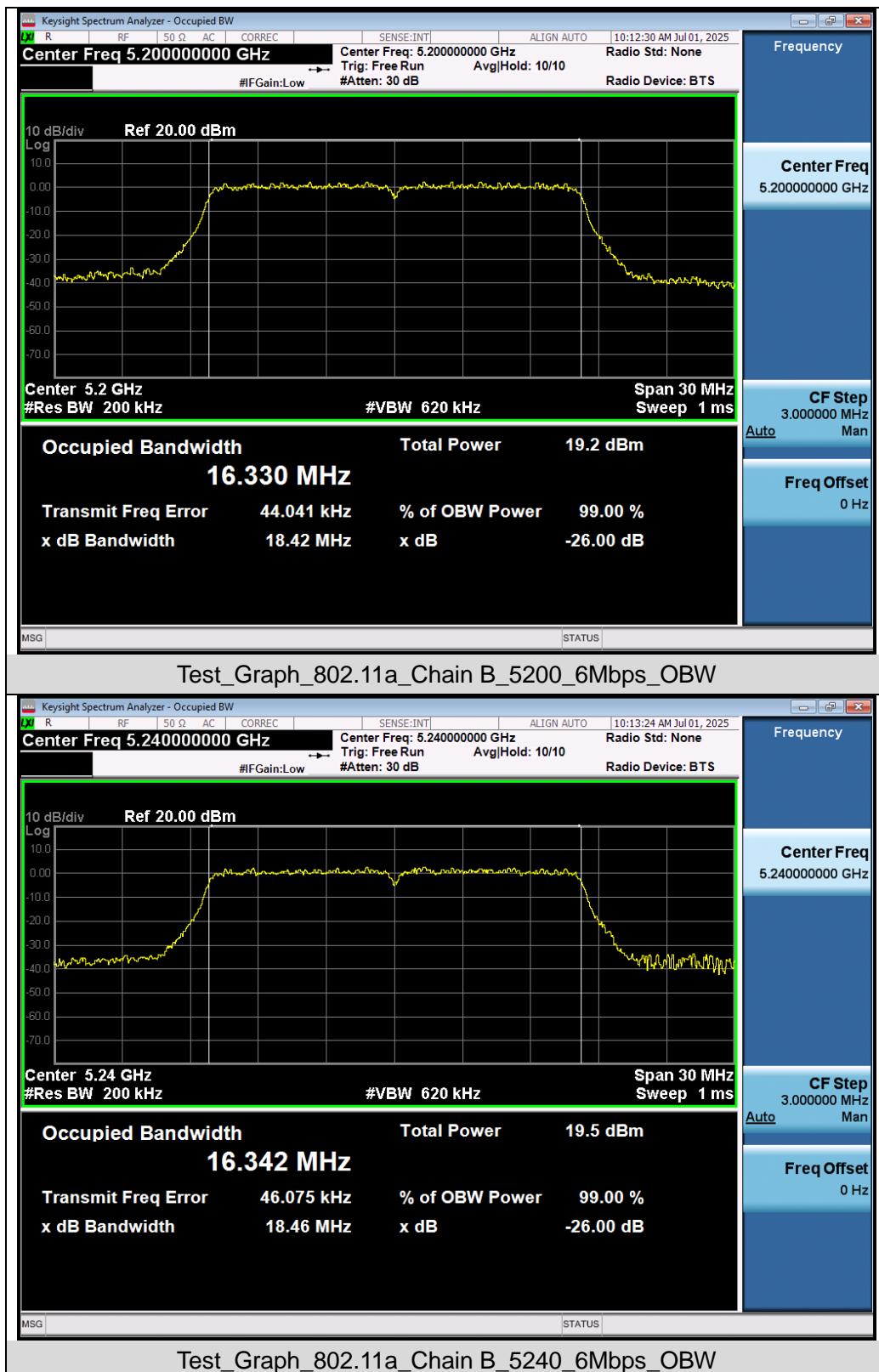


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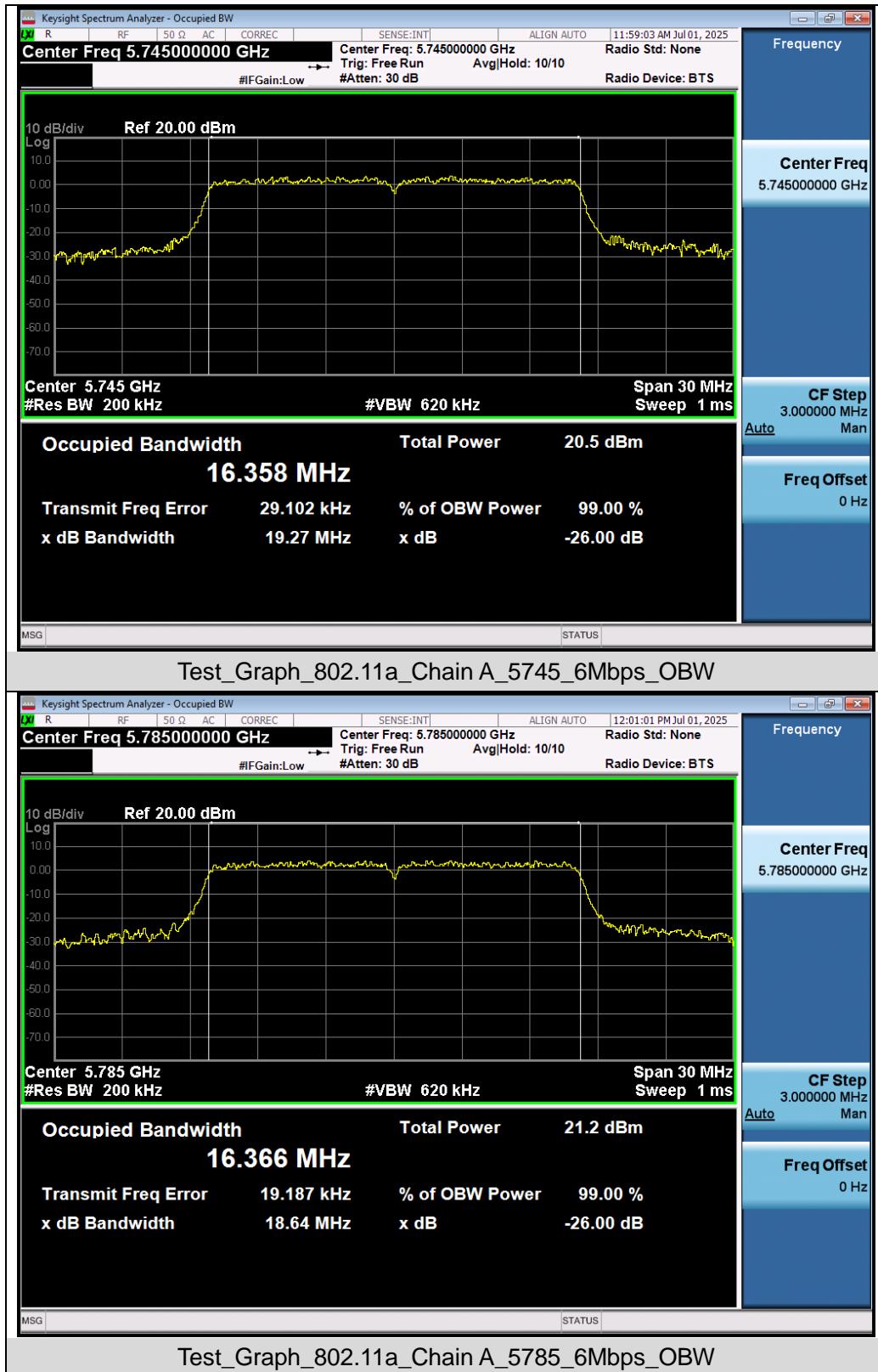


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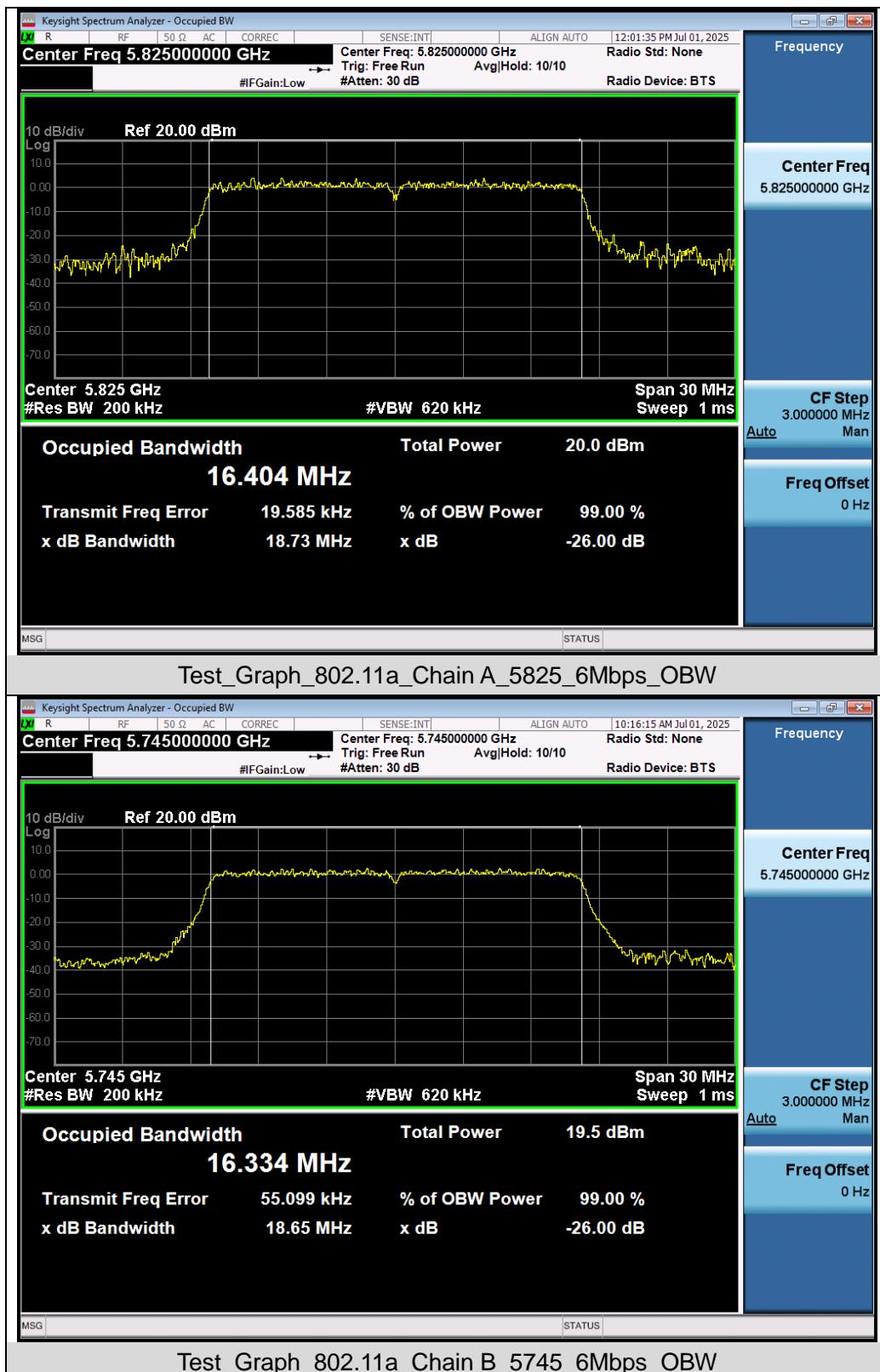
Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.745-5.825 GHz


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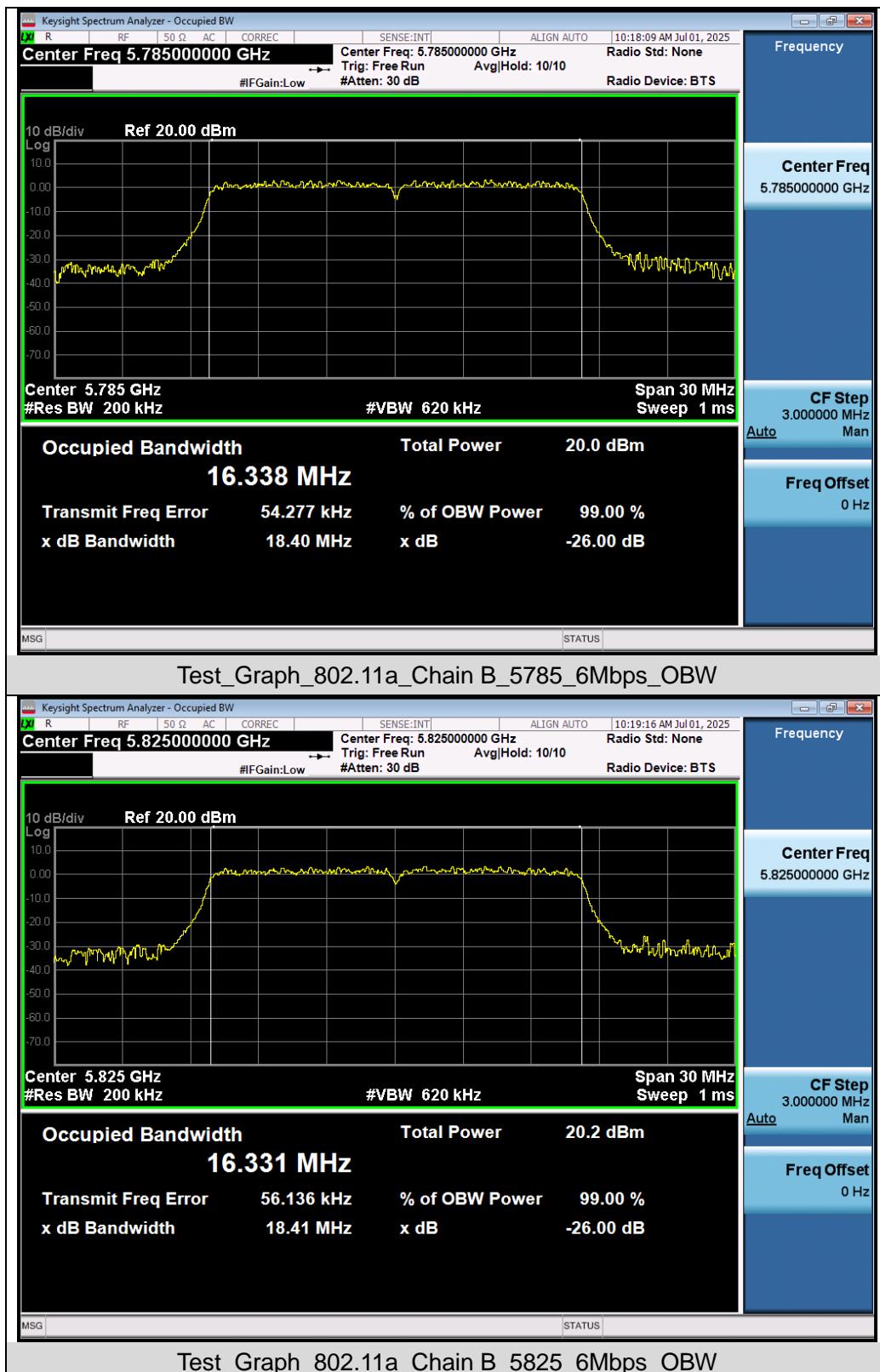


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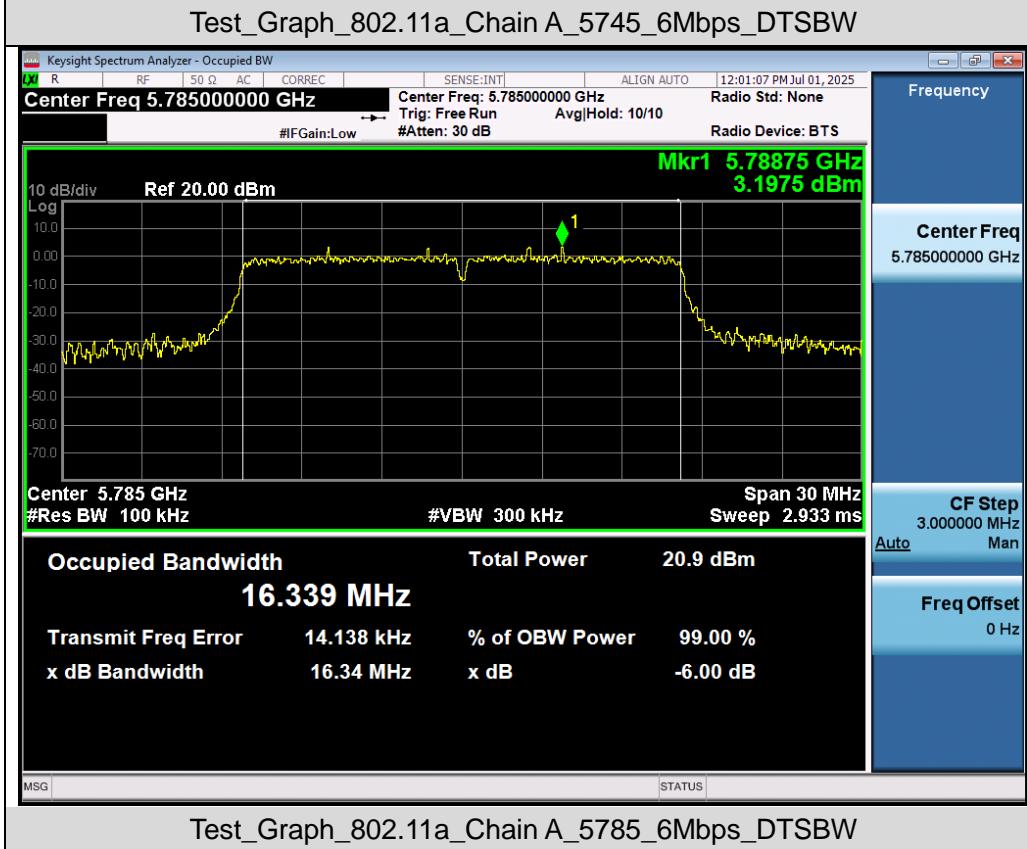
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Test Graphs of DTS Bandwidth for band 5.725-5.85 GHz

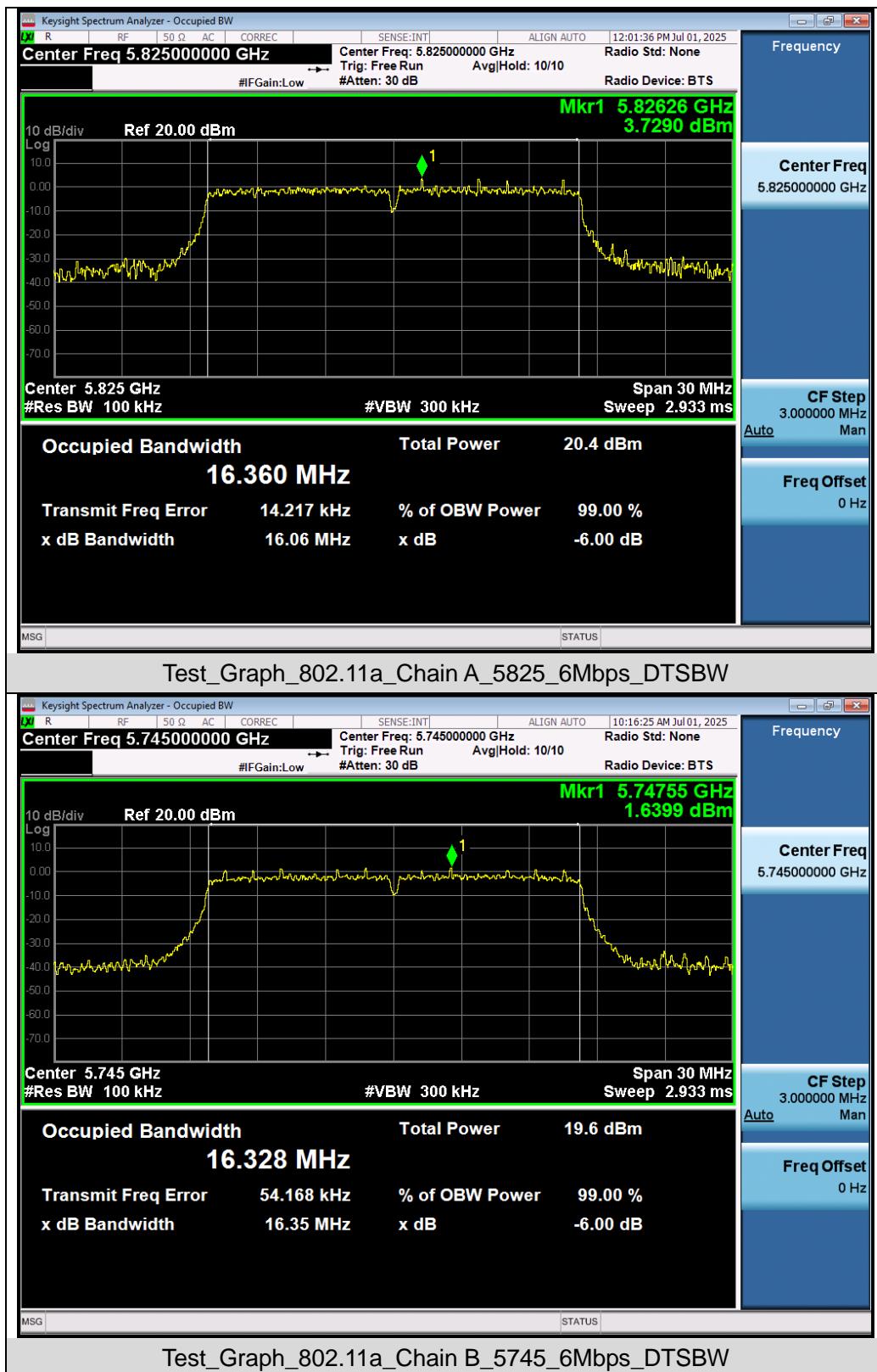


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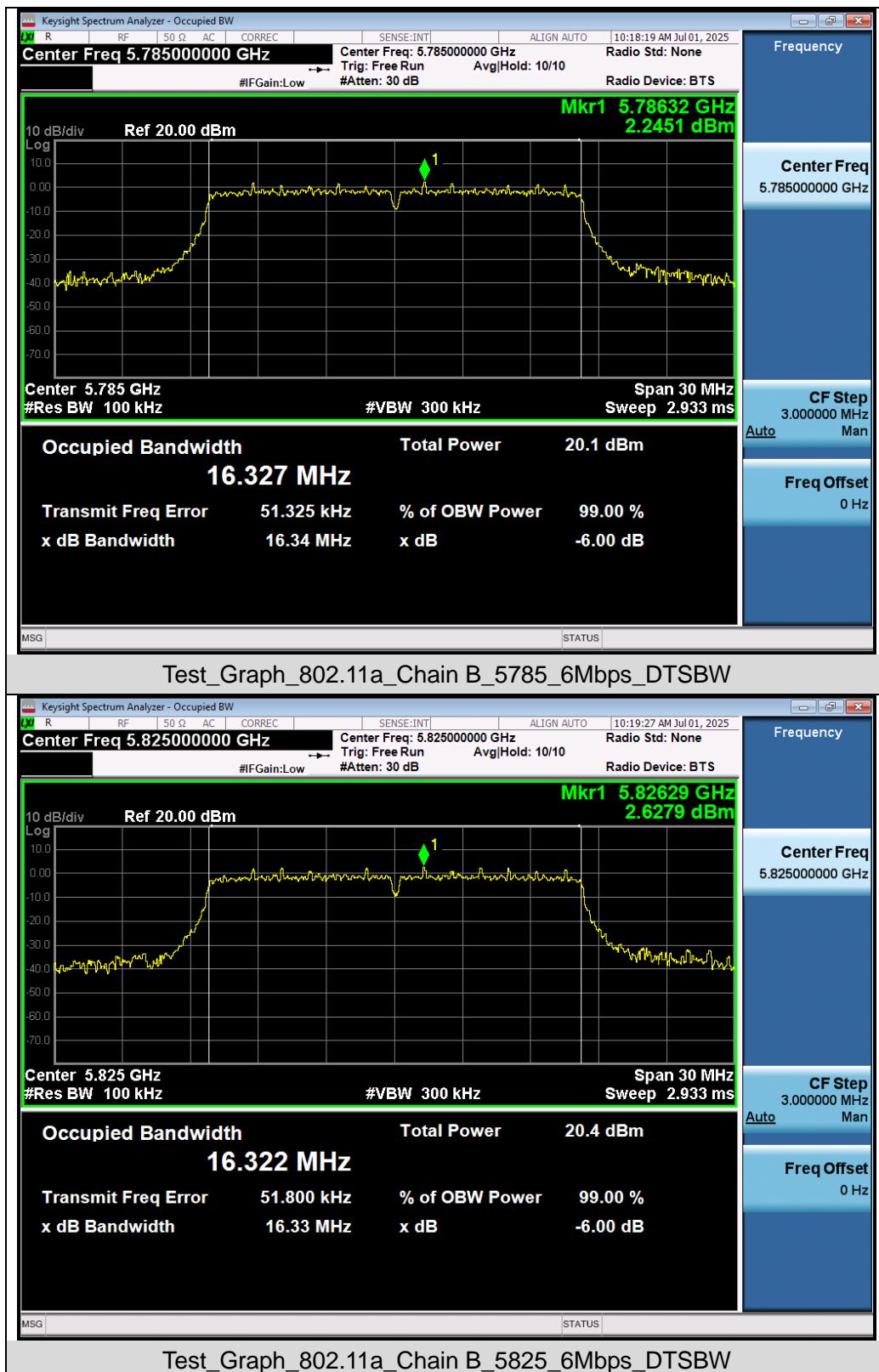


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9. Power Spectral Density Measurement

9.1 Provisions Applicable

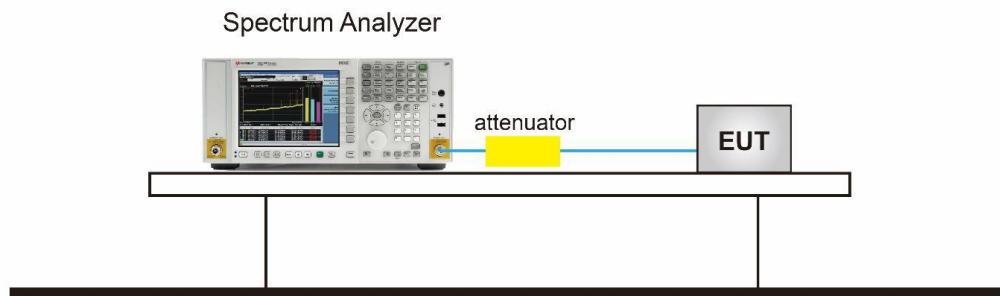
Operation Band	EUT Category		LIMIT
U-NII-1	<input type="checkbox"/>	Outdoor Access Point	17dBm/ MHz
	<input type="checkbox"/>	Fixed point-to-point Access Point	17dBm/ MHz
	<input type="checkbox"/>	Indoor Access Point	17dBm/ MHz
	<input checked="" type="checkbox"/>	Client devices	11dBm/ MHz
U-NII-2A	/		11dBm/ MHz
U-NII-2C	/		11dBm/ MHz
U-NII-3	/		30 dBm/500kHz

9.2 Measurement Procedure

For Average power spectral density test:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz.
4. If measurement bandwidth of Maximum PSD is specified in 500 kHz, RBW = 100KHz
5. Set VBW \geq [3 \times RBW].
6. Sweep Time=Auto couple.
7. Detector function=RMS (i.e., power averaging).
8. Trace average at least 100 traces in power averaging (rms) mode.
9. When the measurement bandwidth of Maximum PSD is specified in 100 kHz, add a constant factor $10 \times \log(500\text{kHz}/100\text{kHz}) = 6.99$ dB to the measured result.
10. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
11. Add $[10 \log (1/D)]$, where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add $[10 \log (1/0.25)] = 6$ dB if the duty cycle is 25%.
12. The final test results have been increased by the duty cycle factor and recorded in the report

9.3 Measurement Setup (Block Diagram of Configuration)



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9.4 Measurement Result

Test Data of Conducted Output Power Density for band 5.15-5.25 GHz-ANT 1

Test Mode	Test Channel (MHz)	Average Power Density (dBm/MHz)	Limits (dBm/MHz)	Pass or Fail
802.11a	5180	1.649	11	Pass
	5200	1.484	11	Pass
	5240	2.092	11	Pass

Test Data of Conducted Output Power Density for band 5.15-5.25 GHz-ANT 2

Test Mode	Test Channel (MHz)	Average Power Density (dBm/MHz)	Limits (dBm/MHz)	Pass or Fail
802.11a	5180	1.545	11	Pass
	5200	1.573	11	Pass
	5240	1.827	11	Pass

Test Data of Conducted Output Power Density for band 5.725-5.85 GHz-ANT 1

Test Mode	Test Channel (MHz)	Average Power Density (dBm/100kHz)	Average Power Density (dBm/500kHz)	Limits (dBm/500kHz)	Pass or Fail
802.11a	5745	-6.085	0.905	30	Pass
	5785	-5.178	1.812	30	Pass
	5825	-5.344	1.646	30	Pass

Test Data of Conducted Output Power Density for band 5.725-5.85 GHz-ANT 2

Test Mode	Test Channel (MHz)	Average Power Density (dBm/100kHz)	Average Power Density (dBm/500kHz)	Limits (dBm/500kHz)	Pass or Fail
802.11a	5745	-7.222	-0.232	30	Pass
	5785	-6.569	0.421	30	Pass
	5825	-6.315	0.675	30	Pass

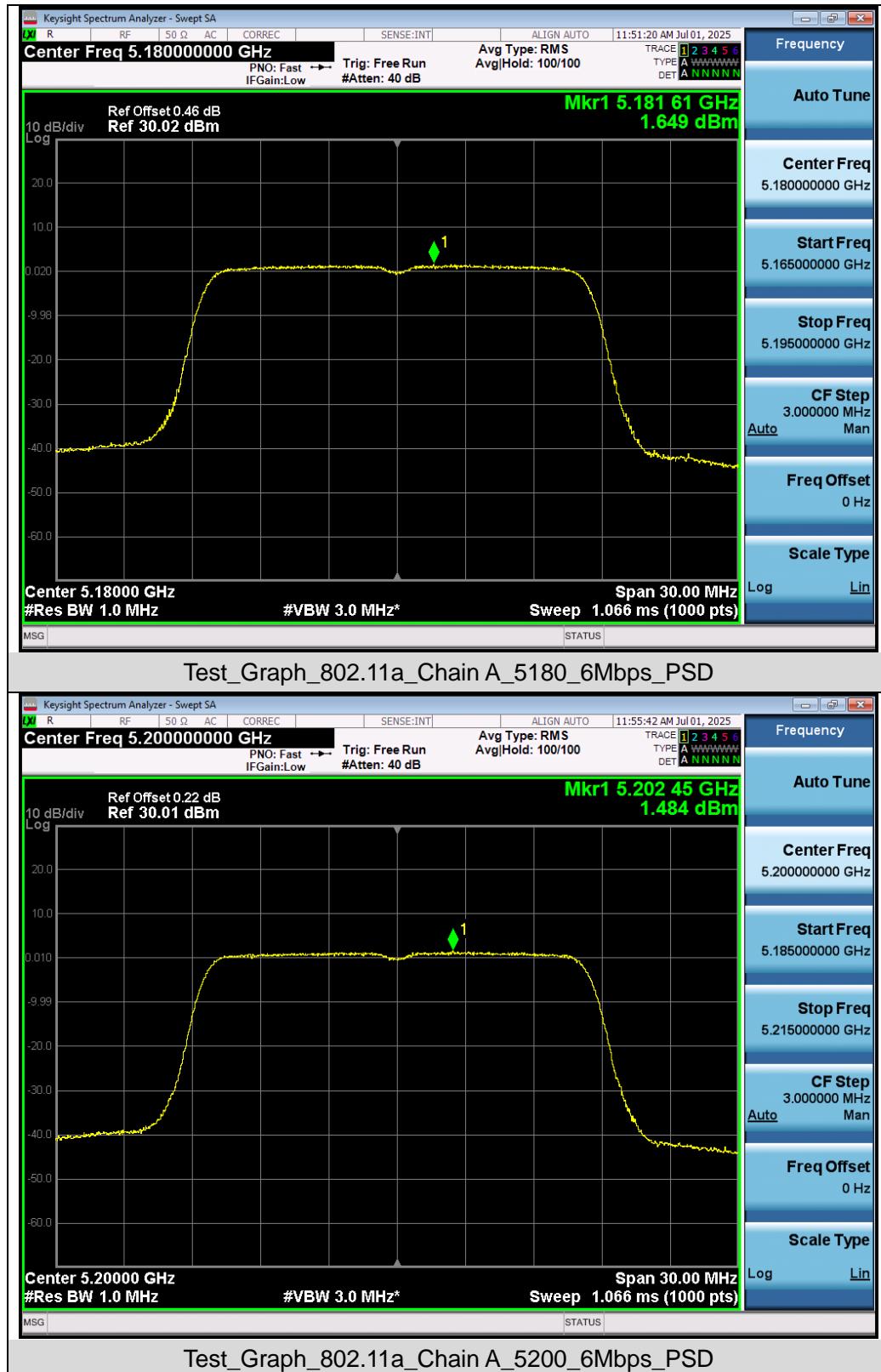
Note:1.Power density(dBm/500kHz) = Power density(dBm/100kHz)+10*log(500/100).

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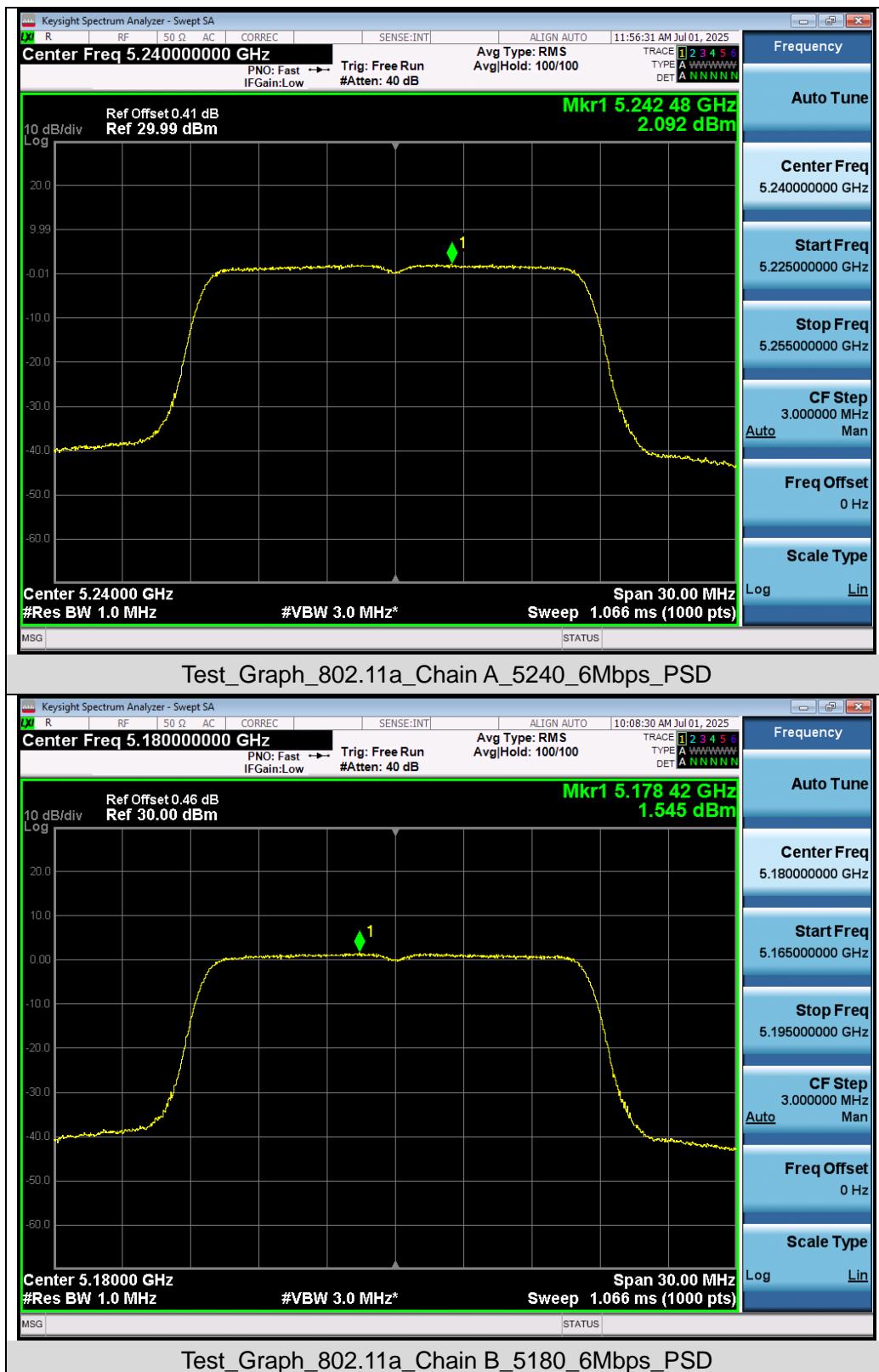
Test Graphs of Conducted Output Power Spectral Density for band 5.15-5.25 GHz


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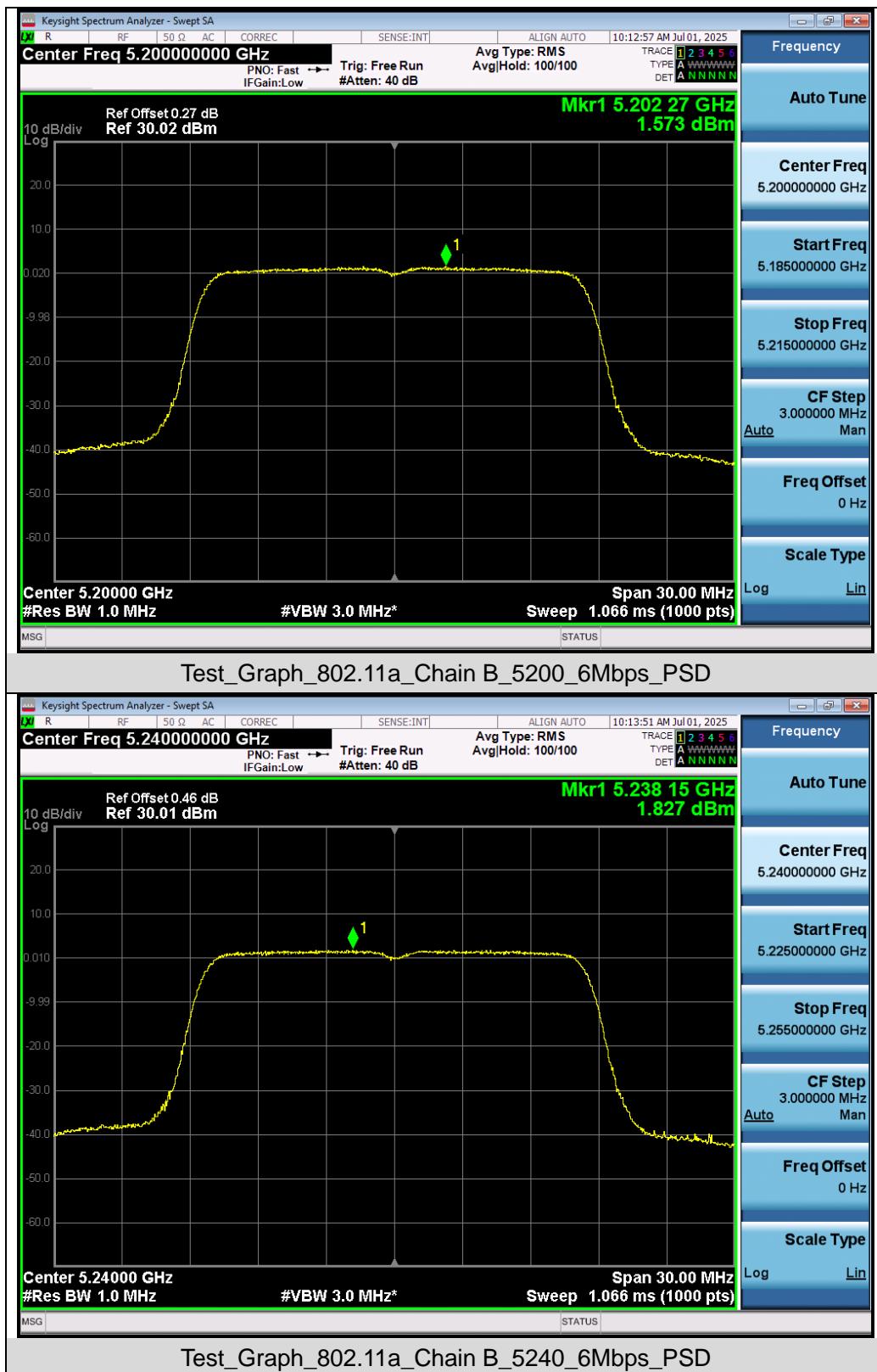


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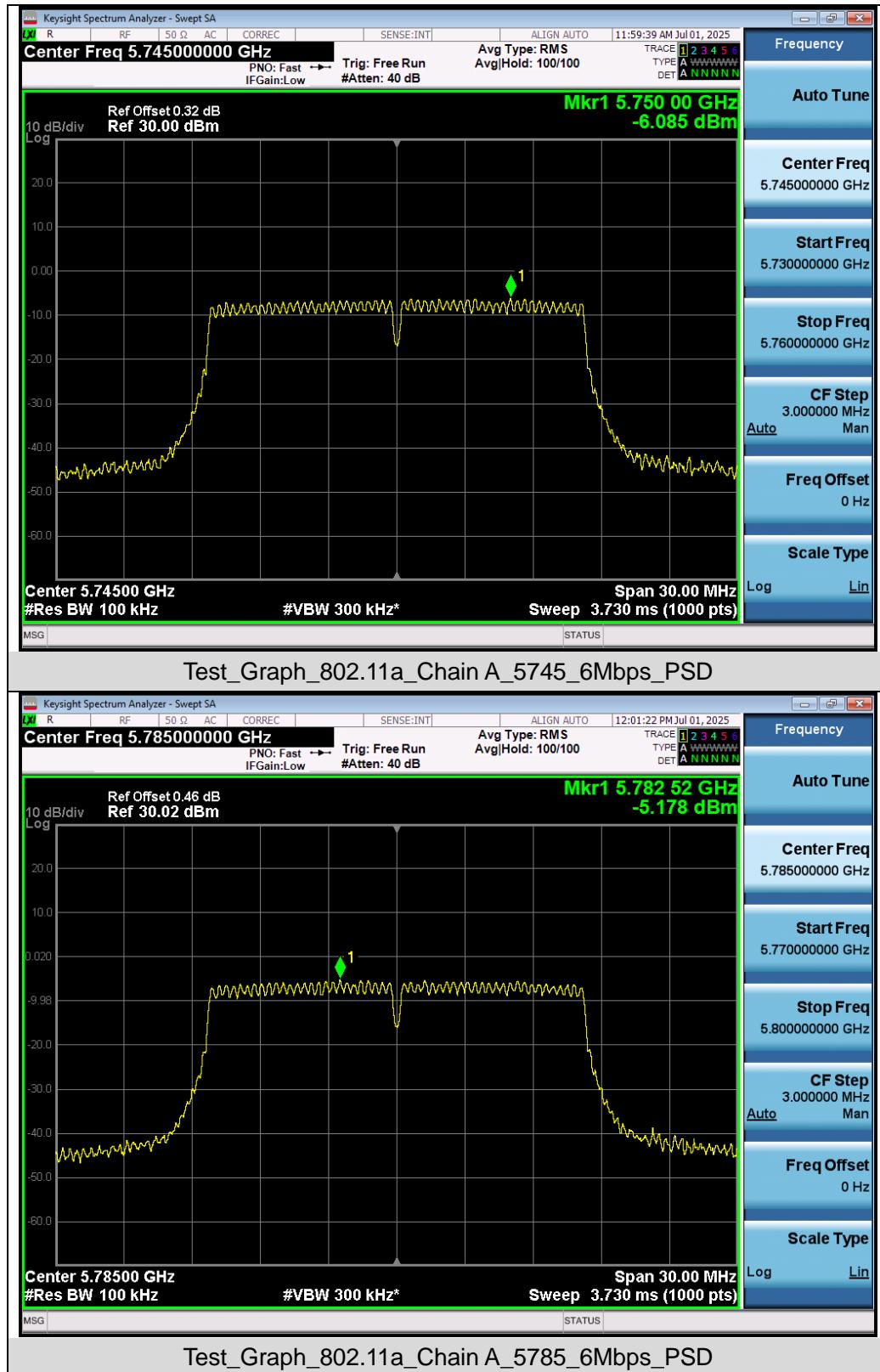


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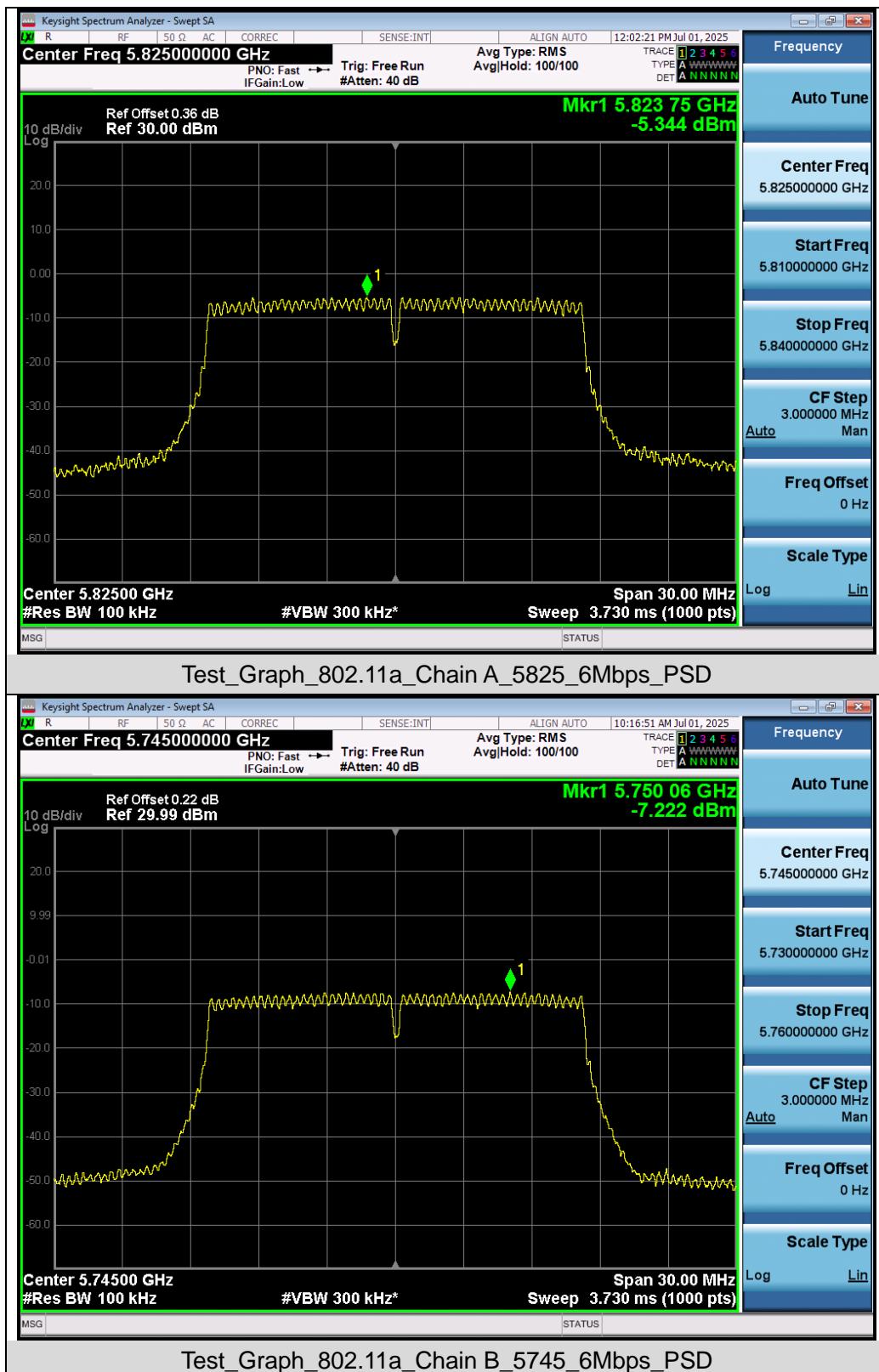
Test Graphs of Conducted Output Power Spectral Density for band 5.725-5.85 GHz


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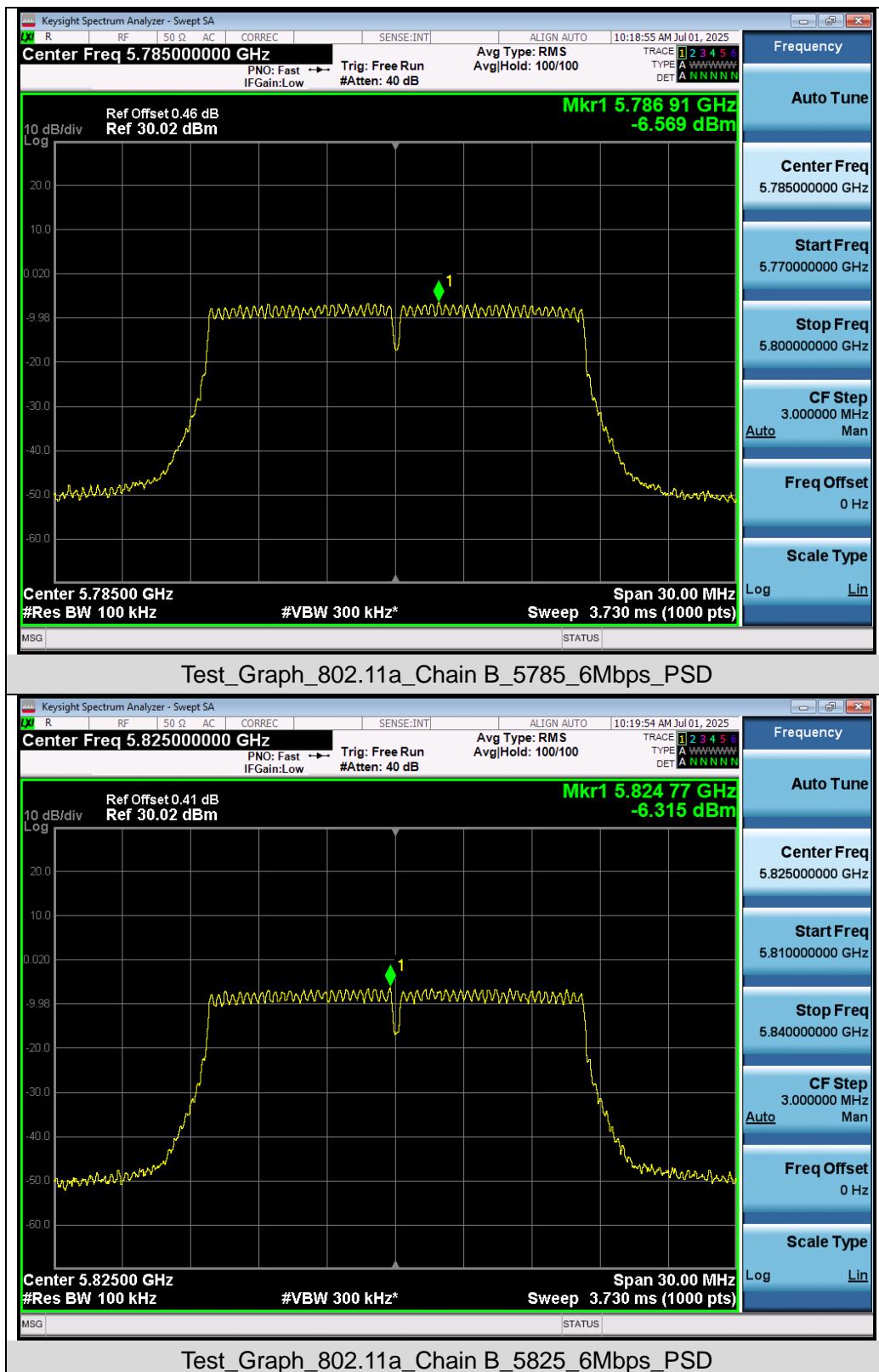


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10. Conducted Band Edge and Out-of-Band Emissions

10.1 Provisions Applicable

	Applicable to	Limit	
Restricted bands	789033 D02 General UNII Test Procedures New Rules v02r01	Field strength at 3m (dBuV/m)	
		PK: 74	AV: 54
Out of the restricted bands	Applicable to	EIRP Limit (dBm/MHz)	Equivalent field Strength at 3m (dBuV/m)
	FCC 15.407(b)(1)	PK: -27	PK: 68.2
	15.407(b)(2)		
	15.407(b)(3)		
	15.407(b)(4)	See Note 2	

Note 1: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000 \sqrt{30 P}}{3} \mu\text{V/m}, \text{ where } P \text{ is the eirp (Watts).}$$

Note 2: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

10.2 Measurement Procedure

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
3. RBW = 1MHz; VBW= 3MHz; Sweep = auto; Detector function = Peak. (Test frequency below 1GHz)
4. RBW = 1 MHz; VBW= 3 MHz; Sweep = auto; Detector function = Peak. (Test frequency Above 1GHz)
5. Set SPA Trace 1 Max hold, then View.
6. Antenna gain and path loss have been compensated to the Correction factor.
7. Mark the maximum useless stray point and compare it with the limit value to record the result.
8. The manufacturer of RF external cable claims that the cable loss is 0.5dB, and the cable loss and attenuator have been compensated into the Corrections Configuration of measuring equipment.
9. Input correction factor includes external cable loss and attenuator amplitude compensation. The formula is:

$$\text{Input compensation coefficient (dB)} = \text{Cable Loss (dB)} + \text{Attenuator attenuation value (dB)}$$

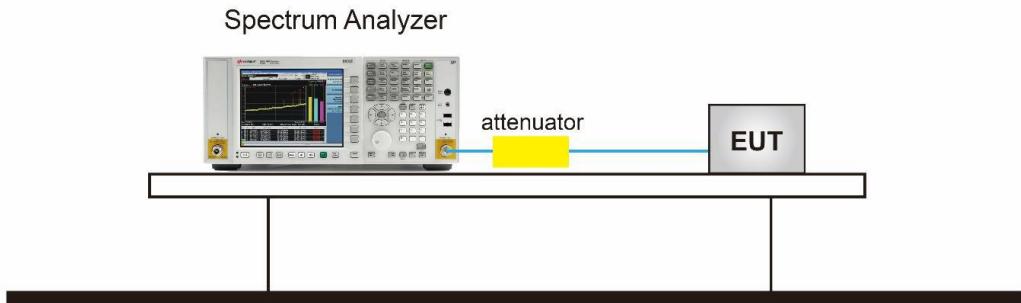
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10.3 Measurement Setup (Block Diagram of Configuration)



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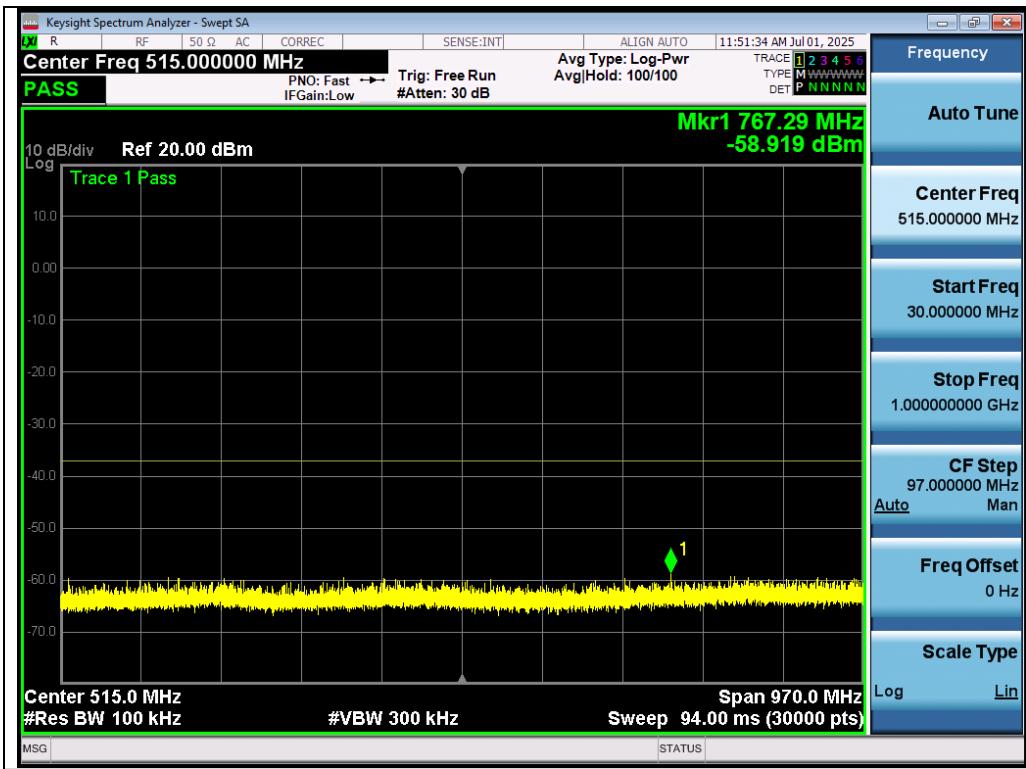
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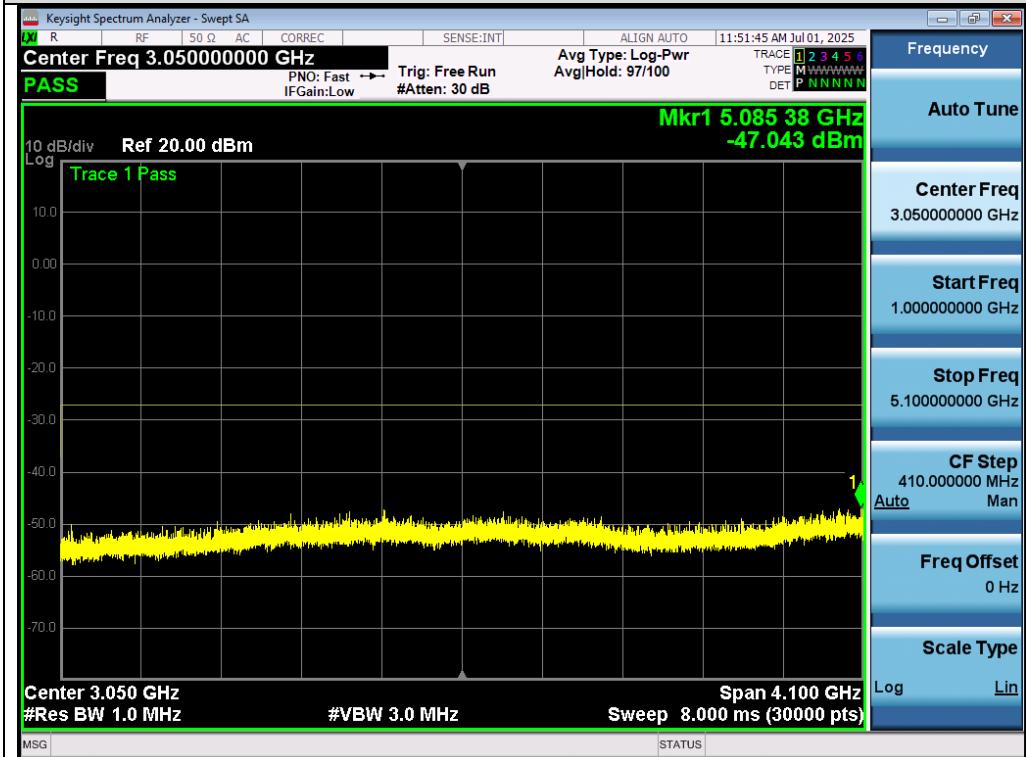
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10.4 Measurement Results

Test Graphs of Spurious Emissions outside of the 5.15-5.25 GHz band



Test_Graph_802.11a_Chain A_5180_6Mbps_Frequency Band 1



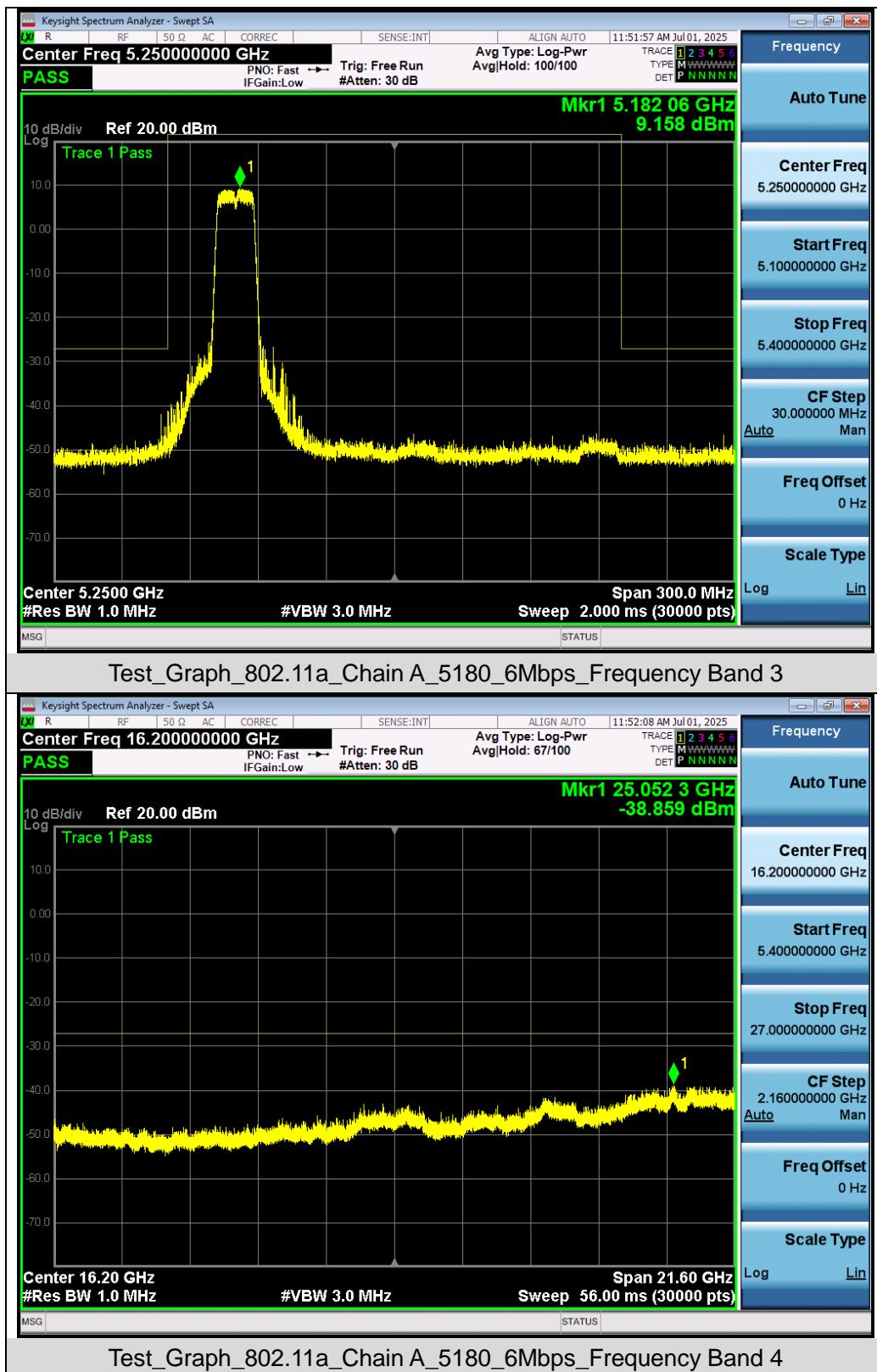
Test_Graph_802.11a_Chain A_5180_6Mbps_Frequency Band 2

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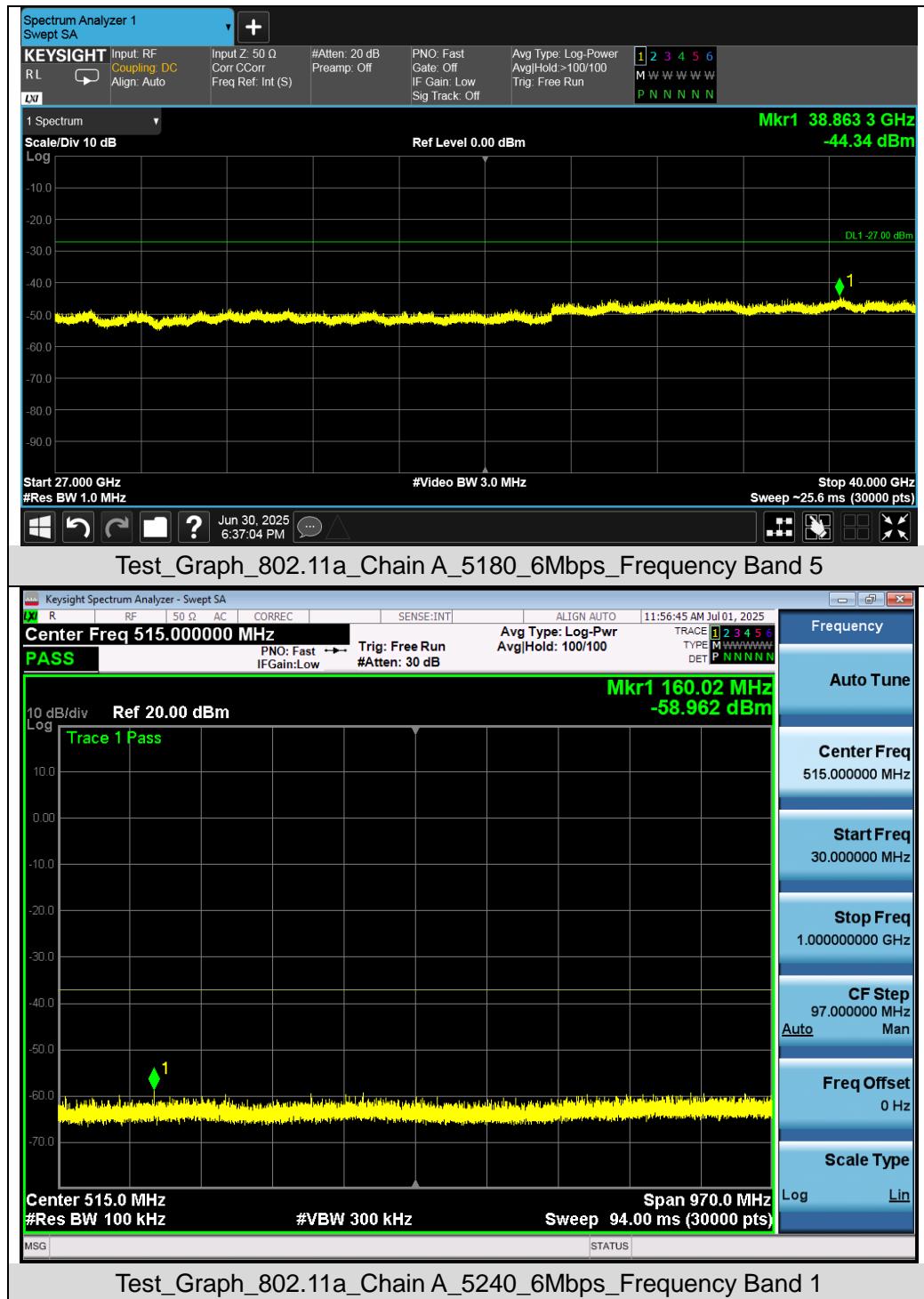


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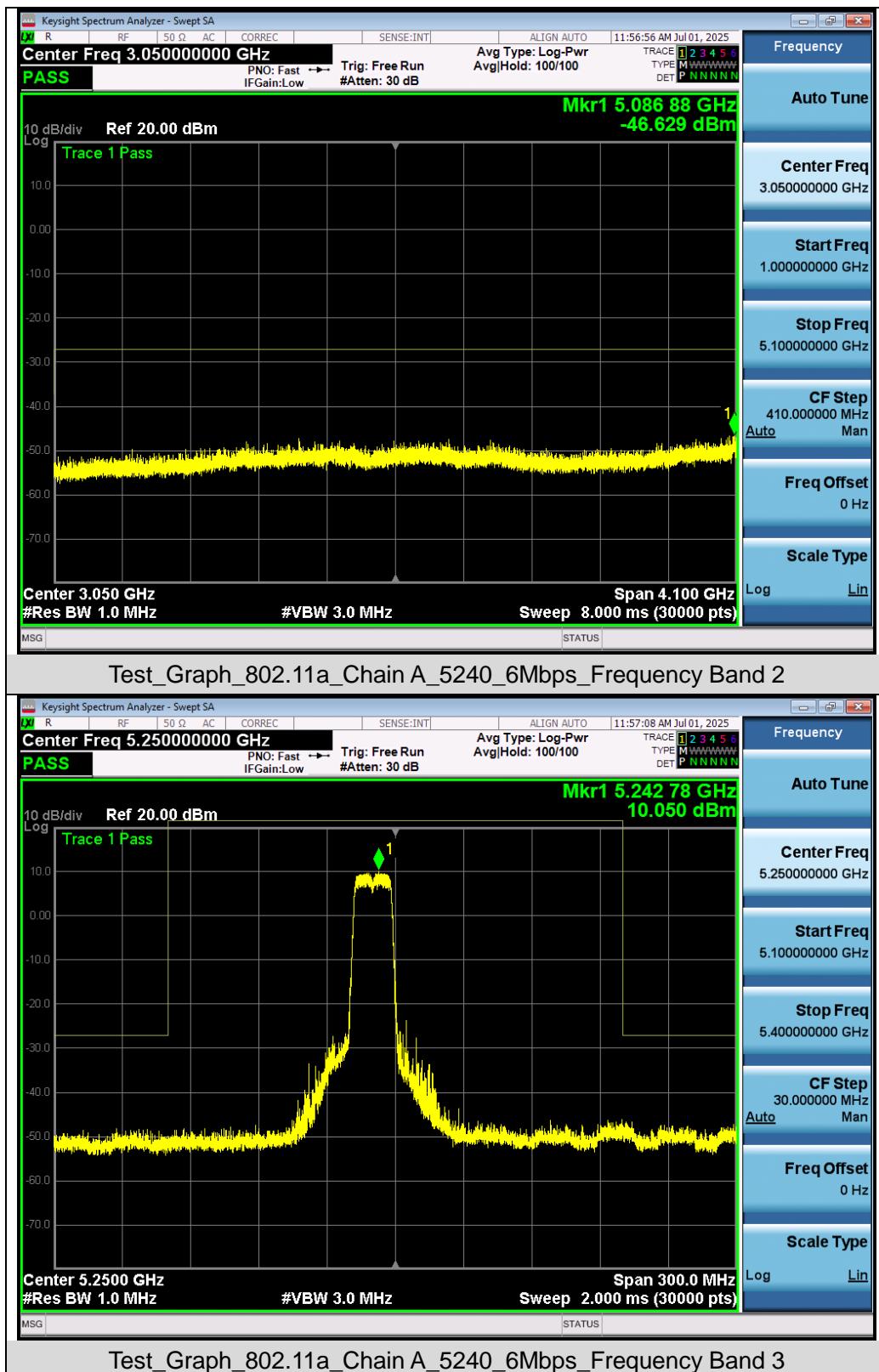


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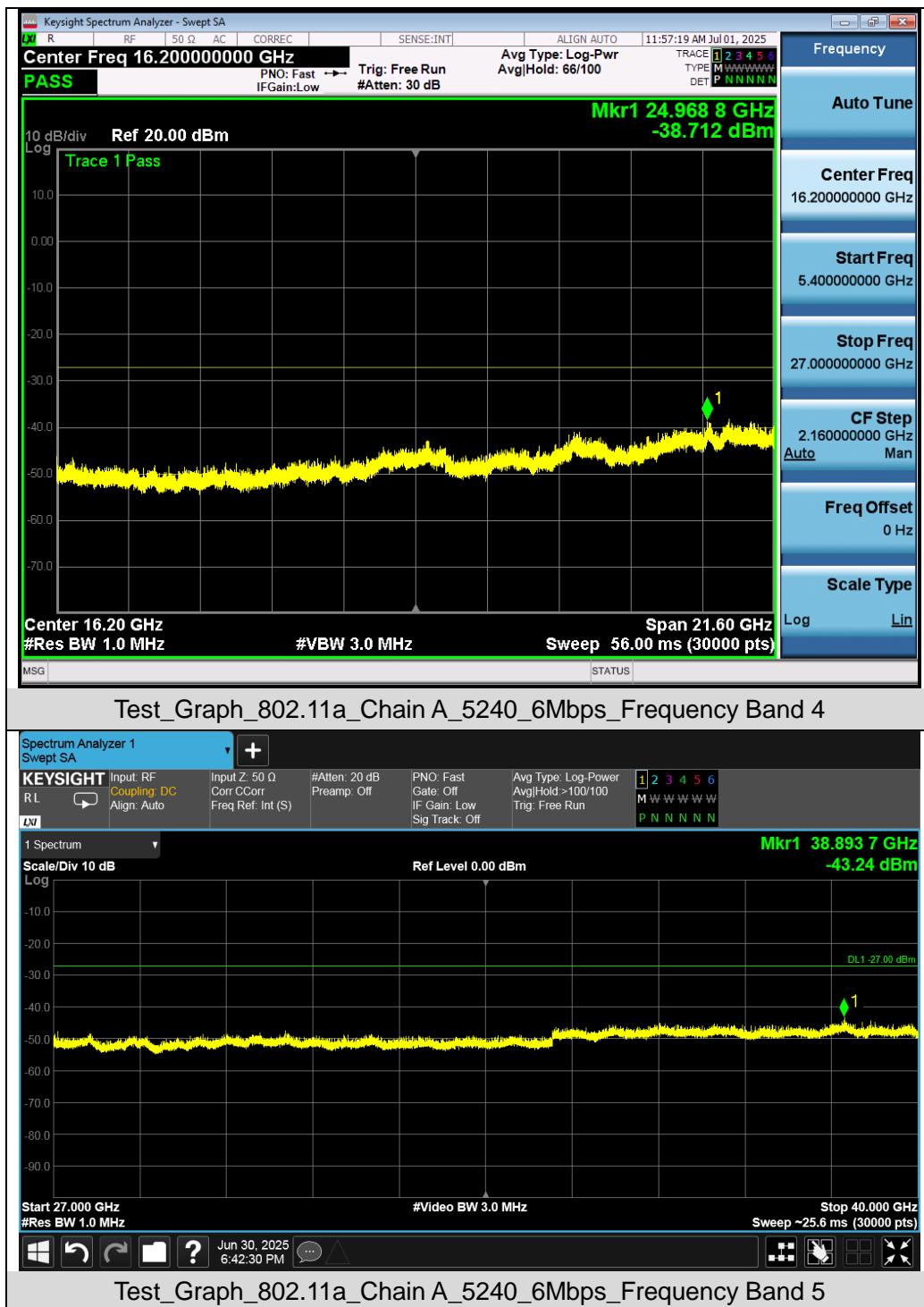


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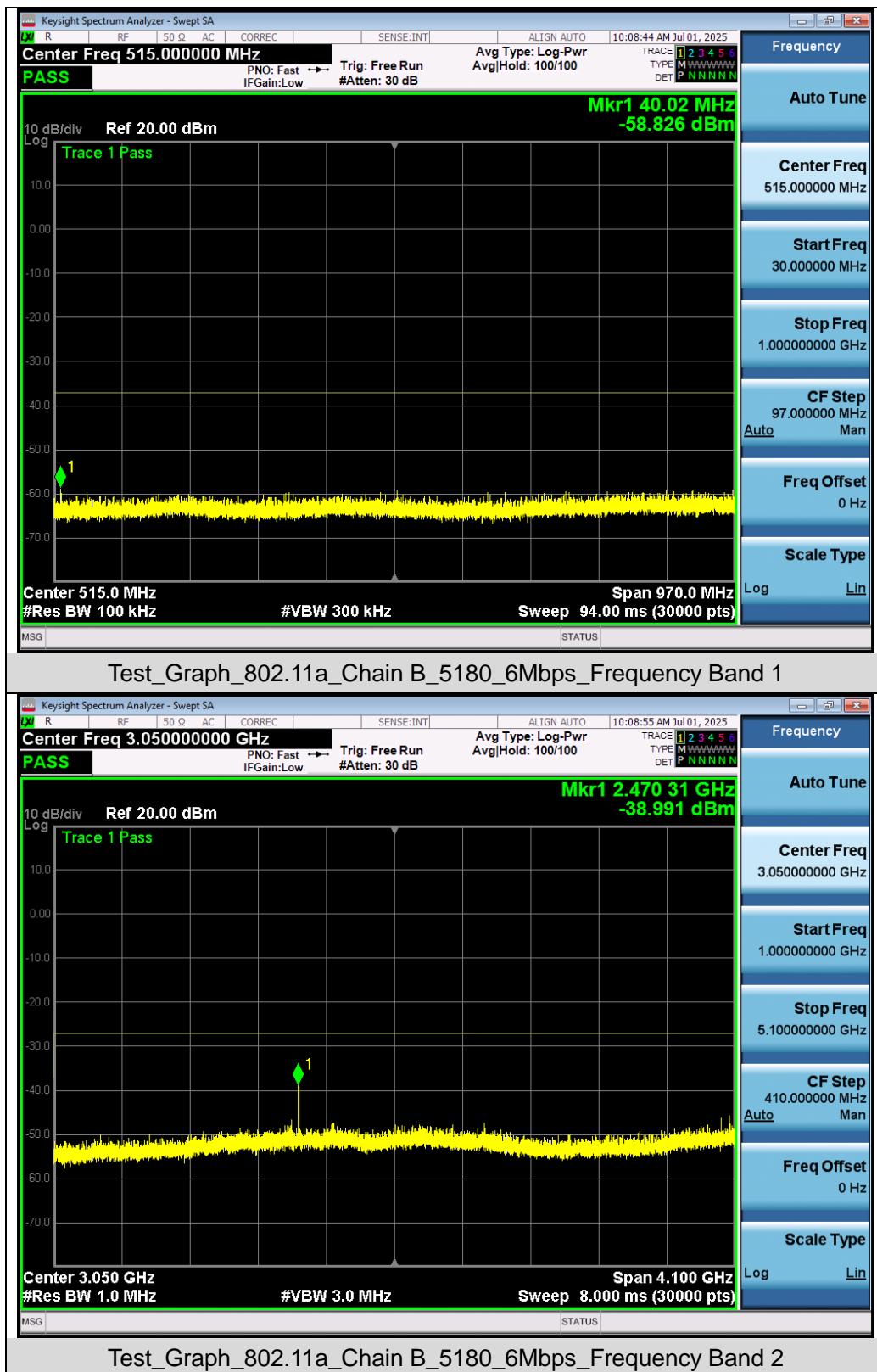


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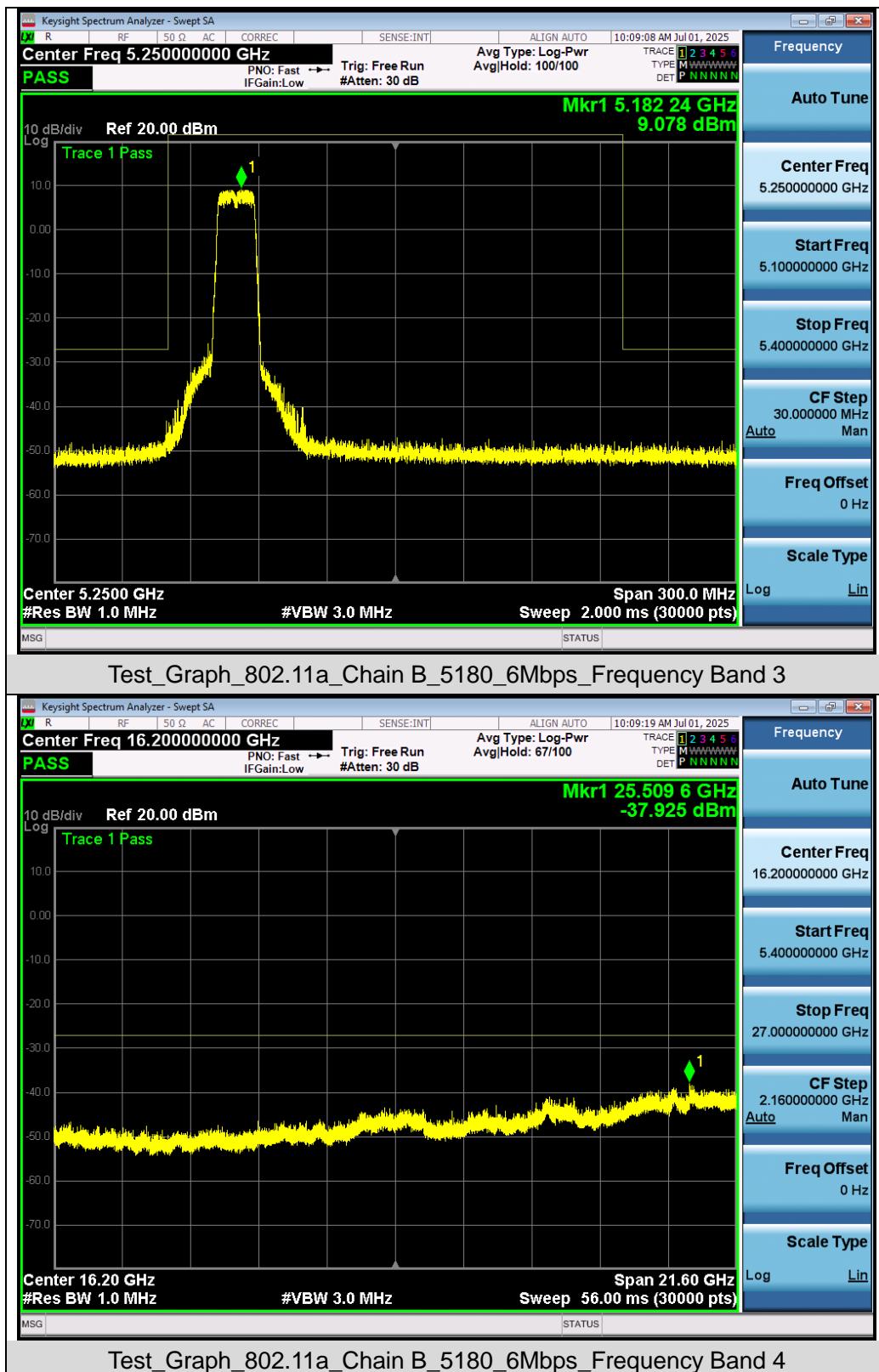


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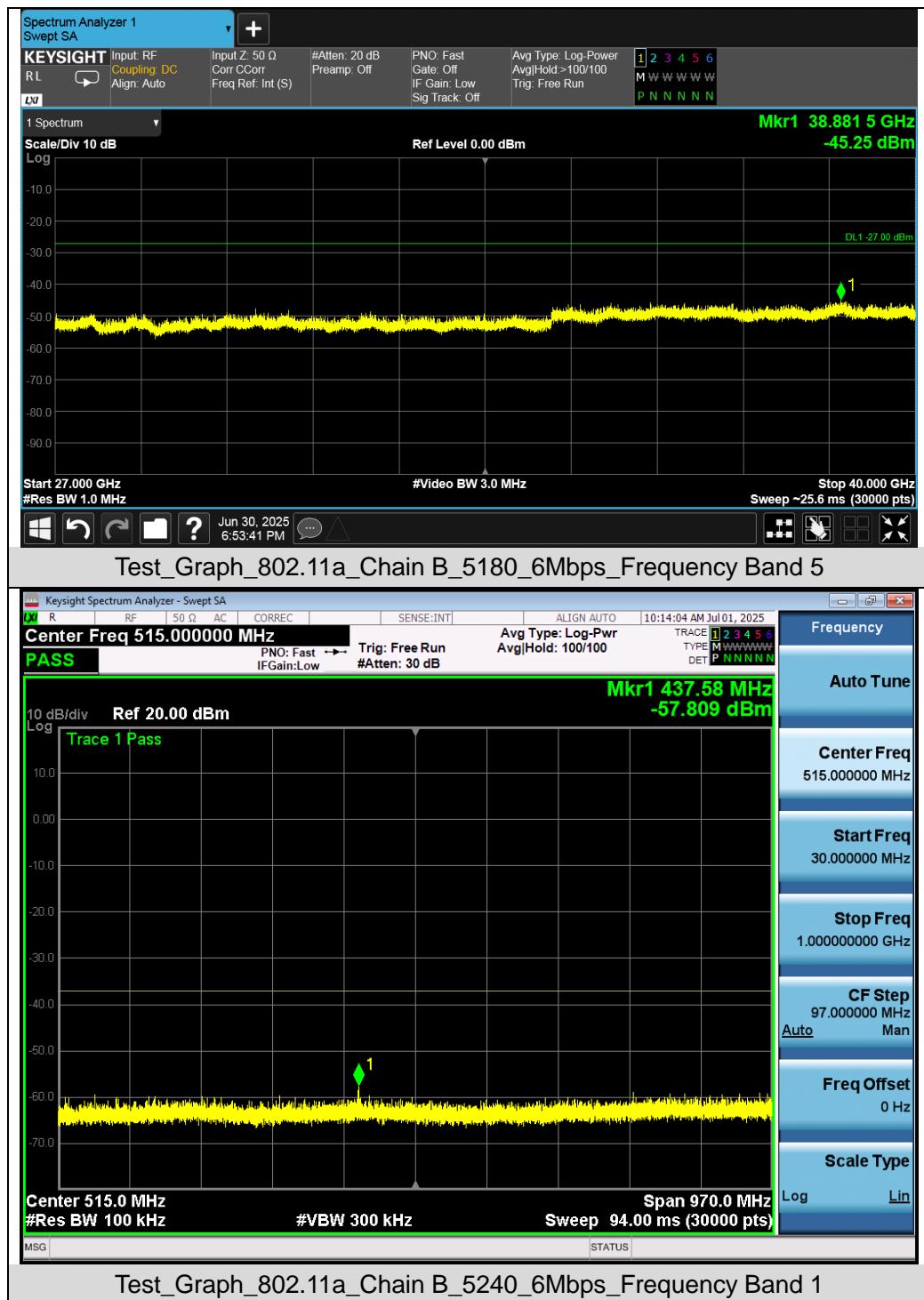


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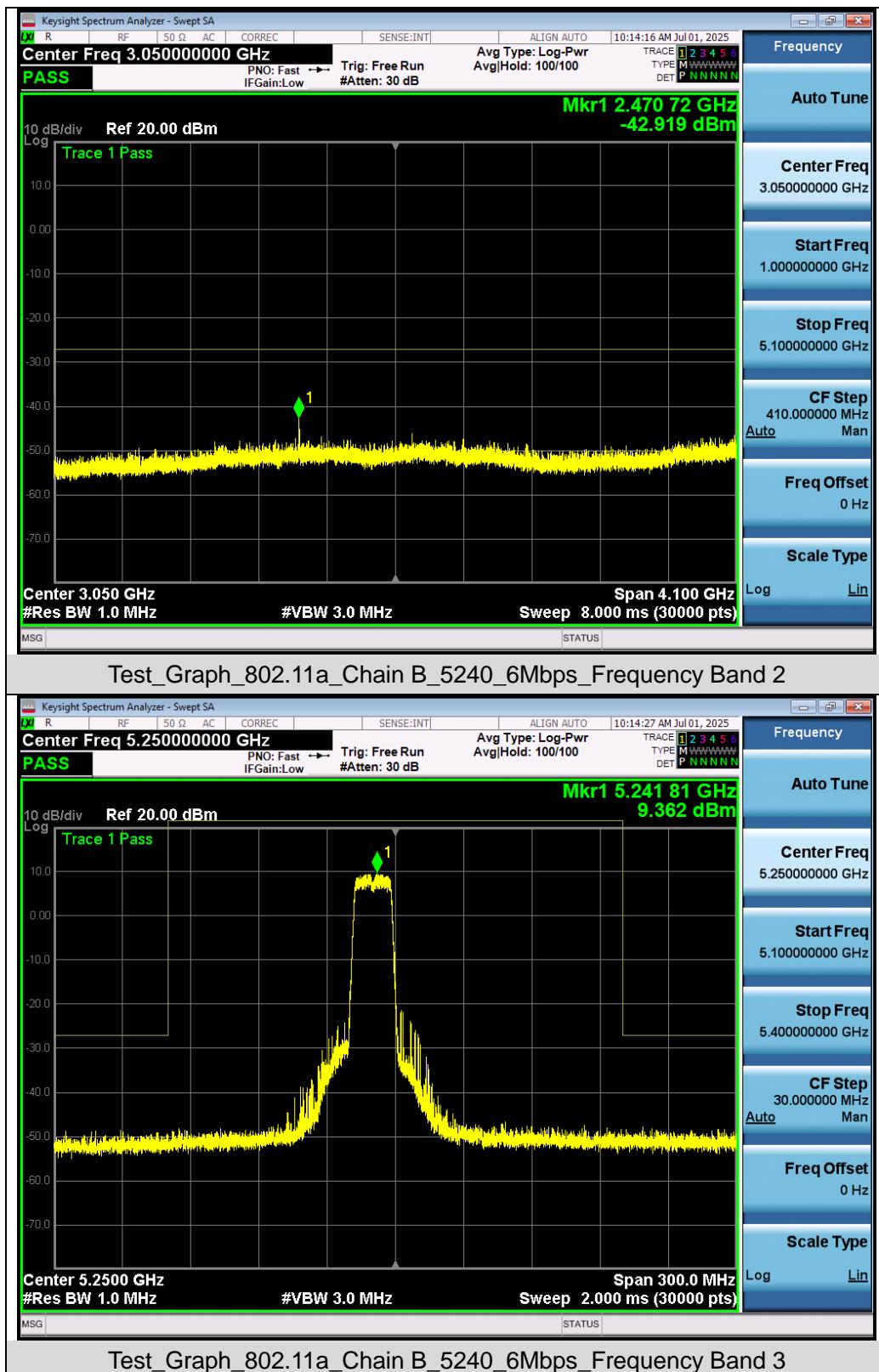


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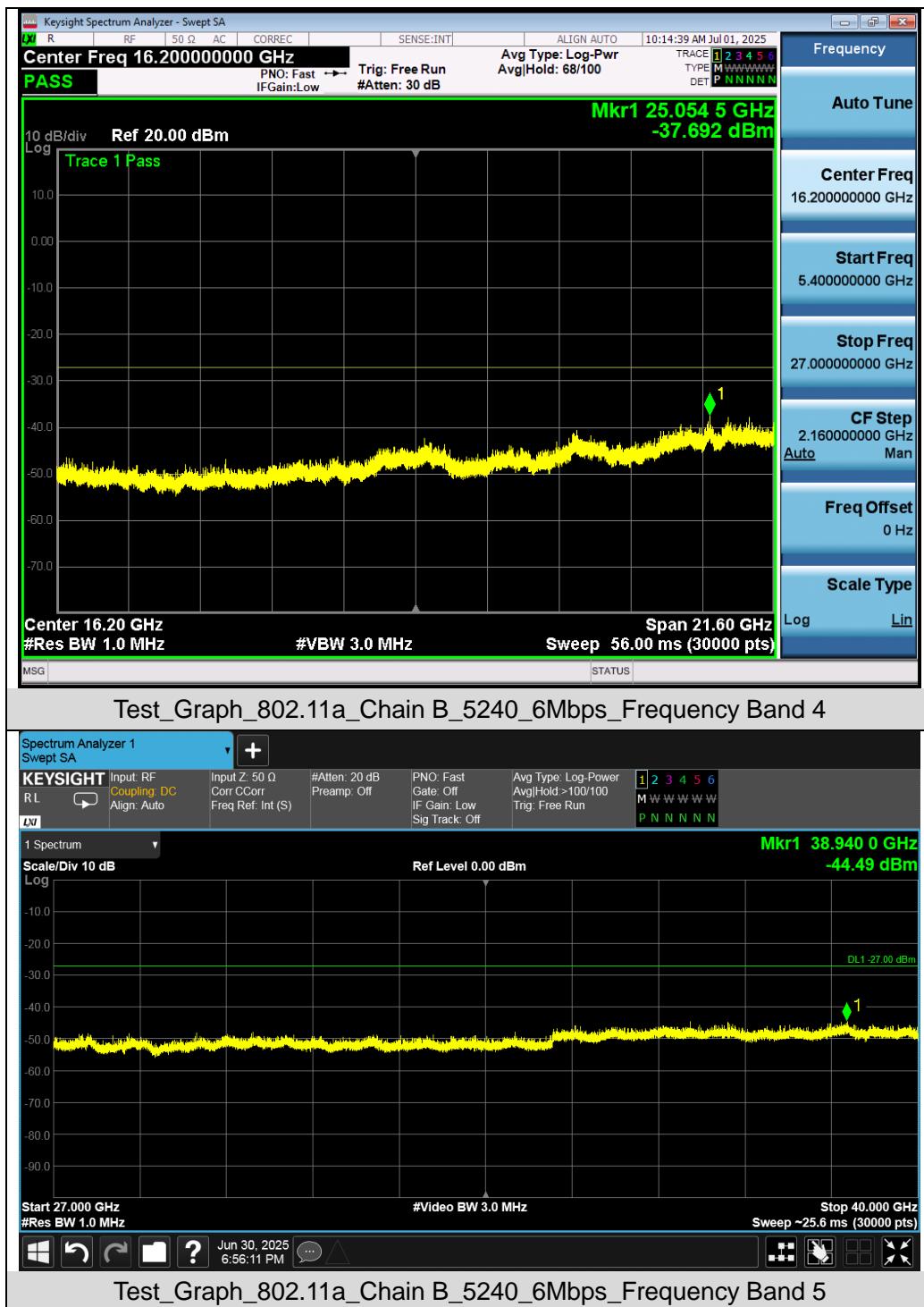


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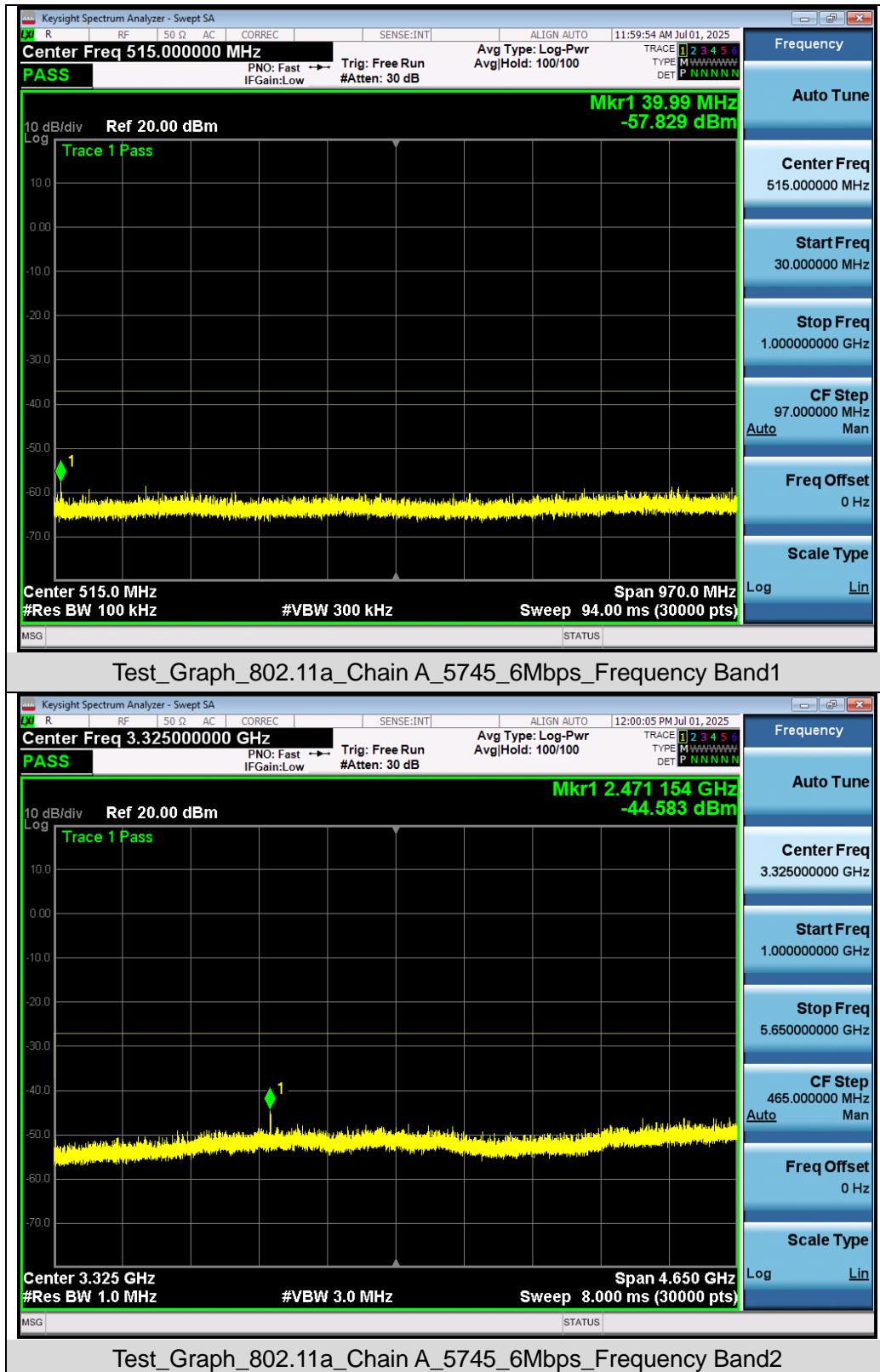


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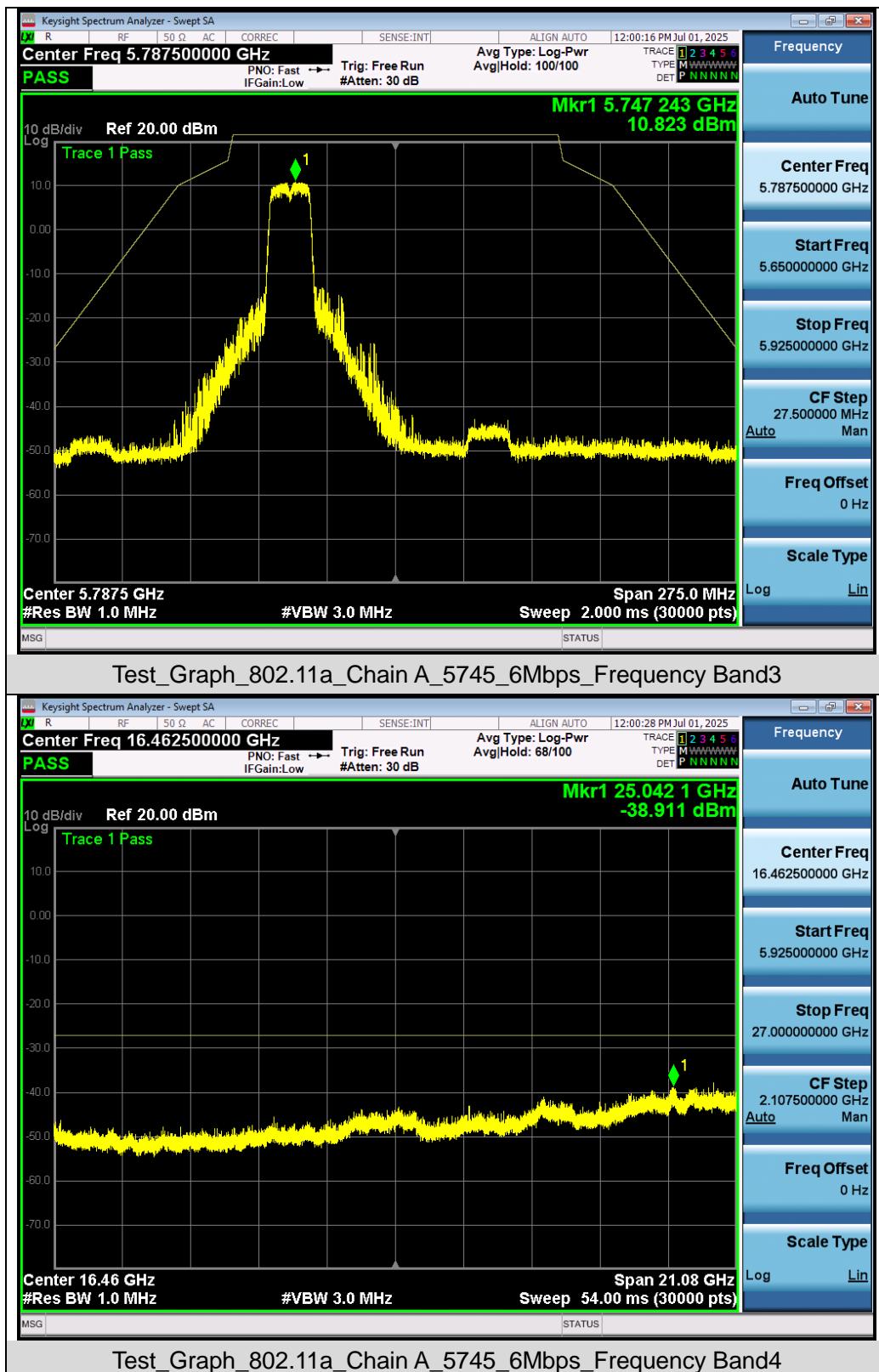
Test Graphs of Spurious Emissions outside of the 5.725-5.85 GHz band


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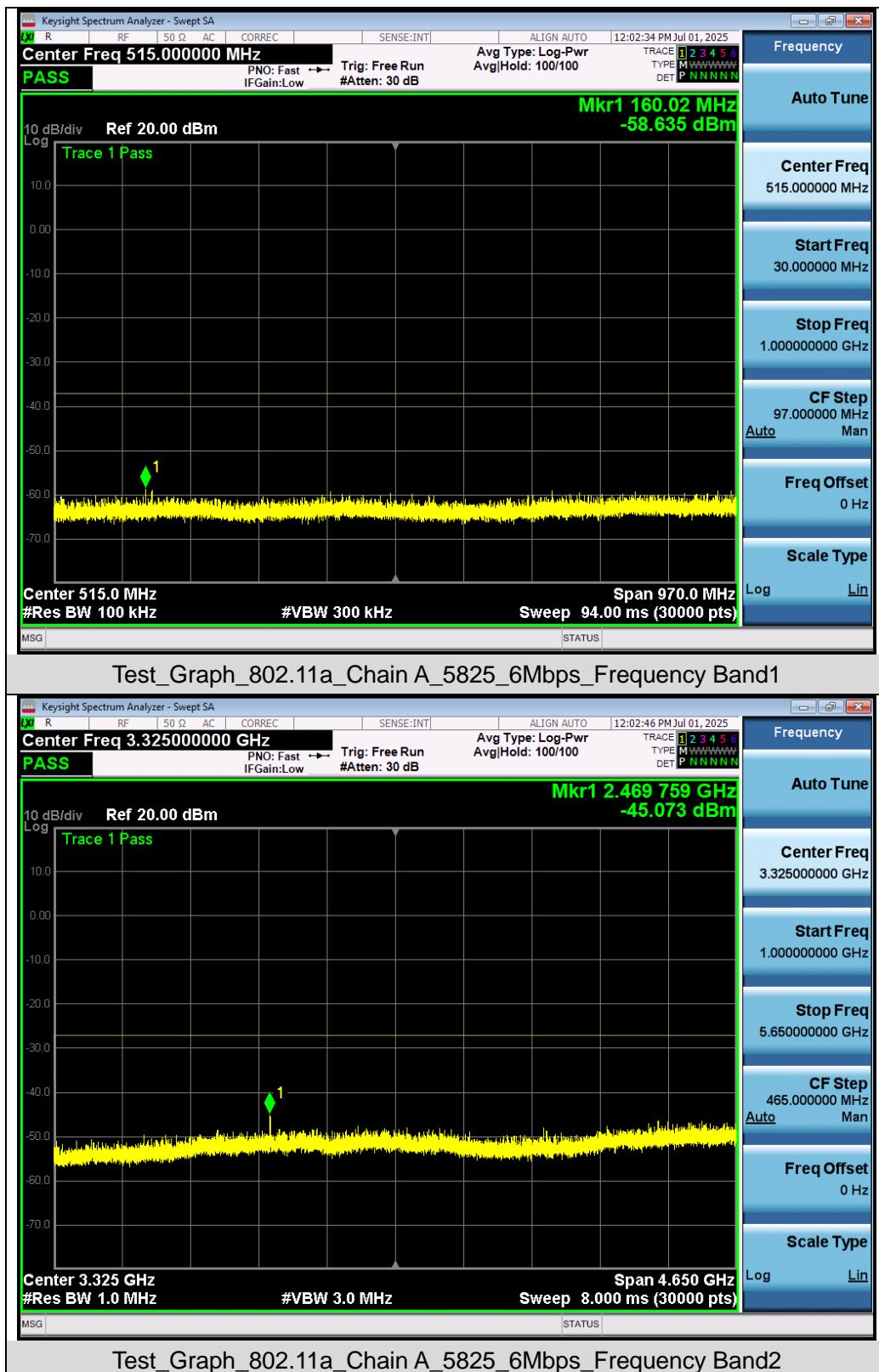


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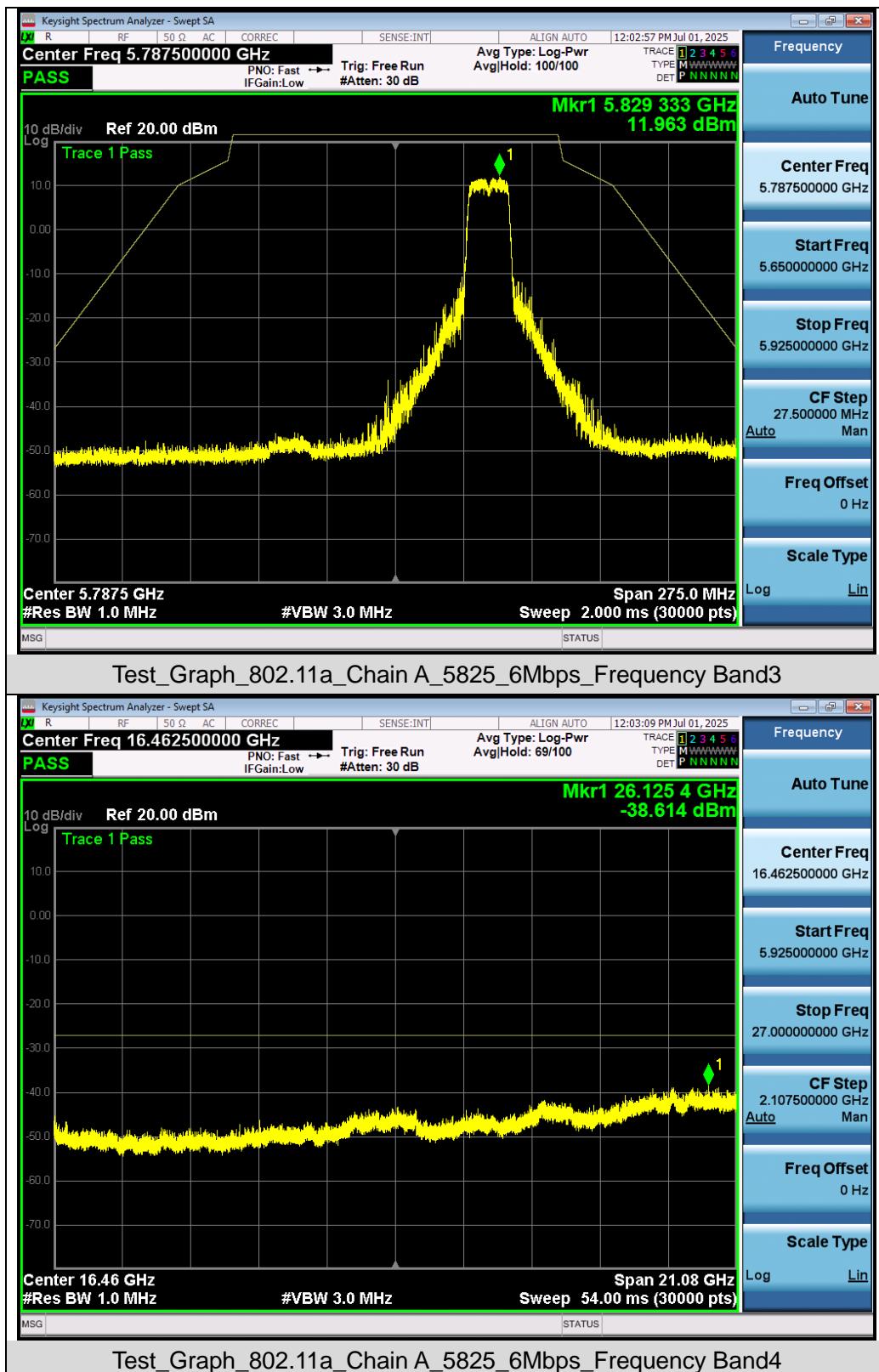


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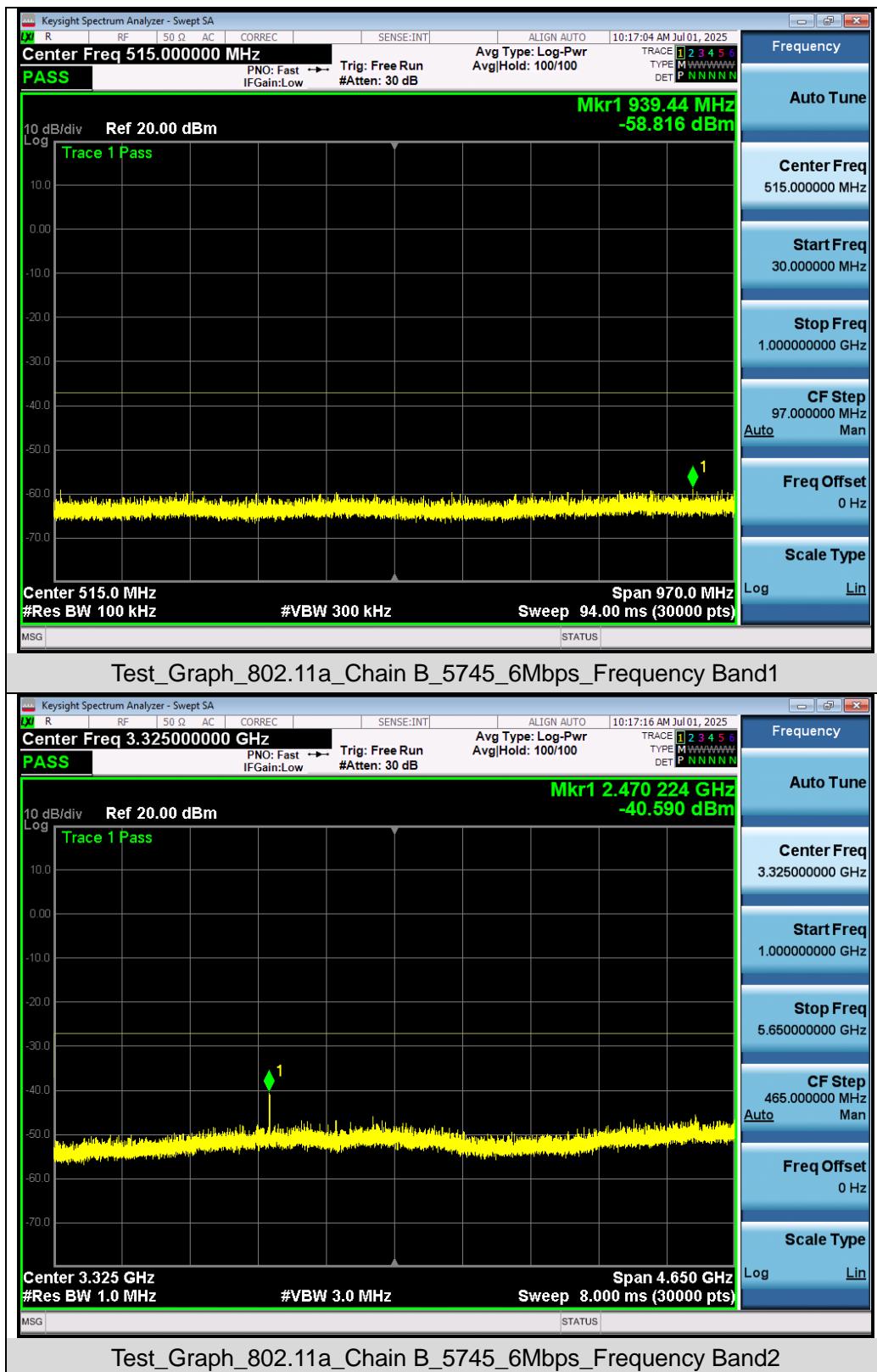


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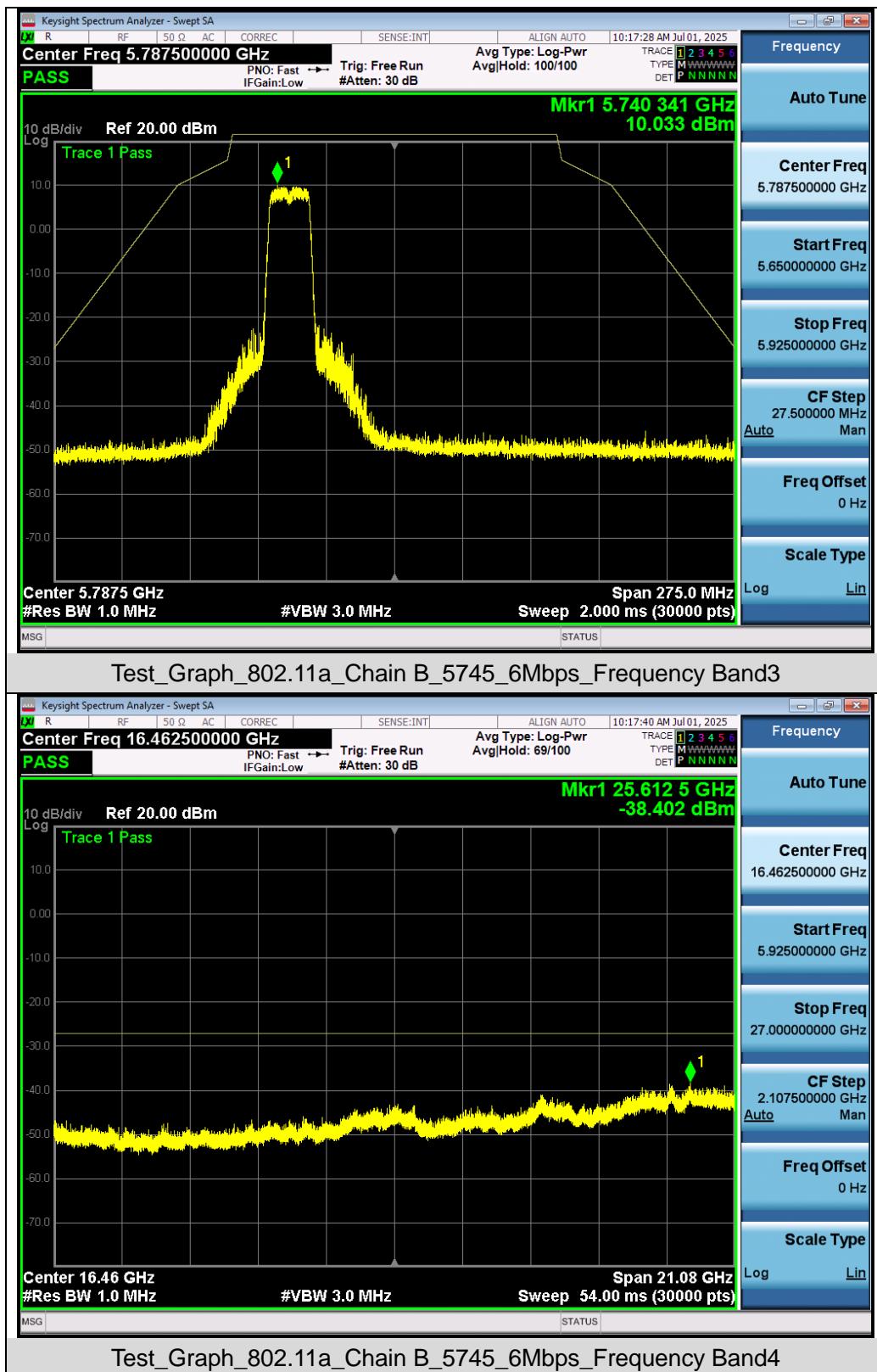


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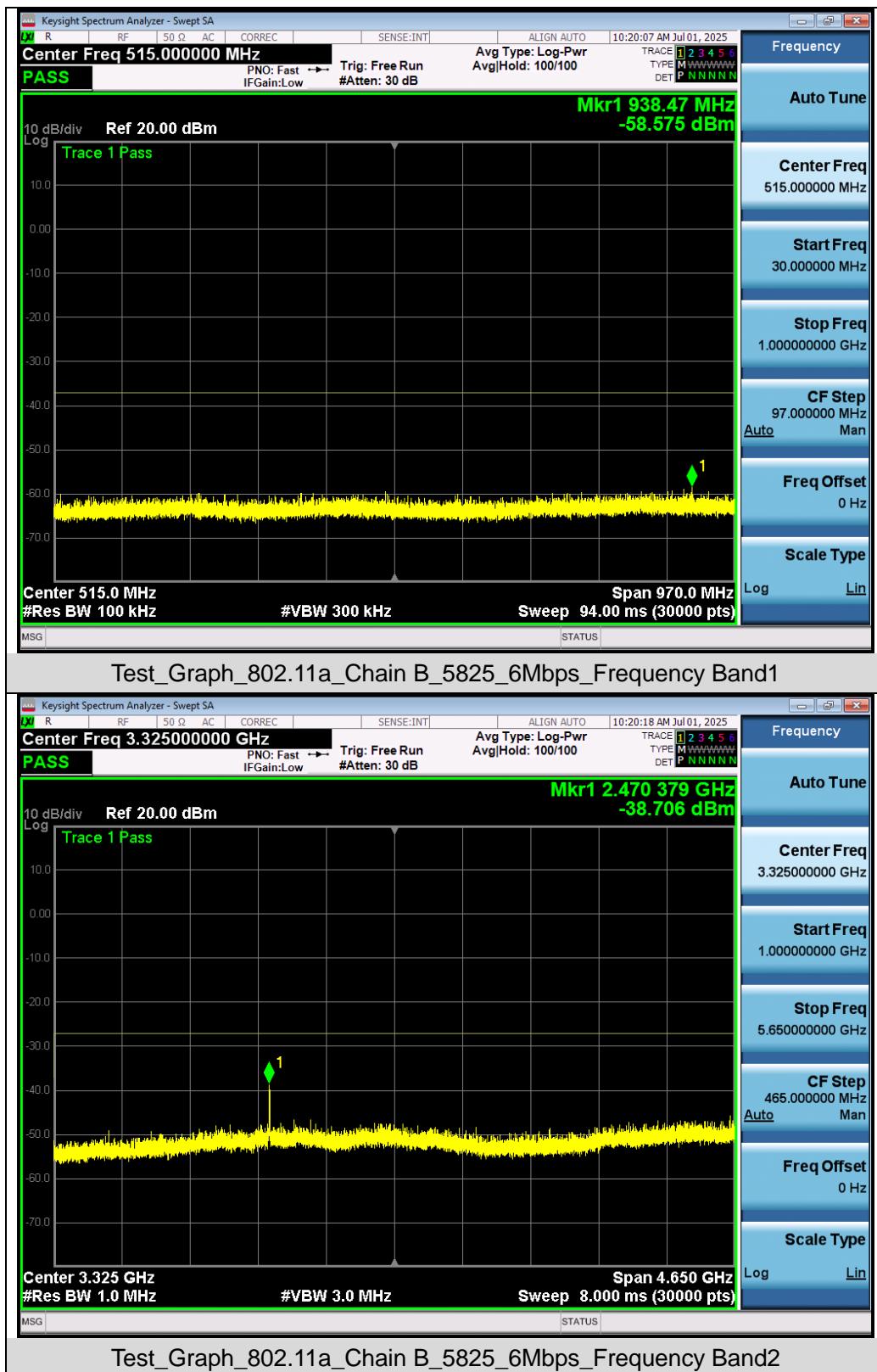


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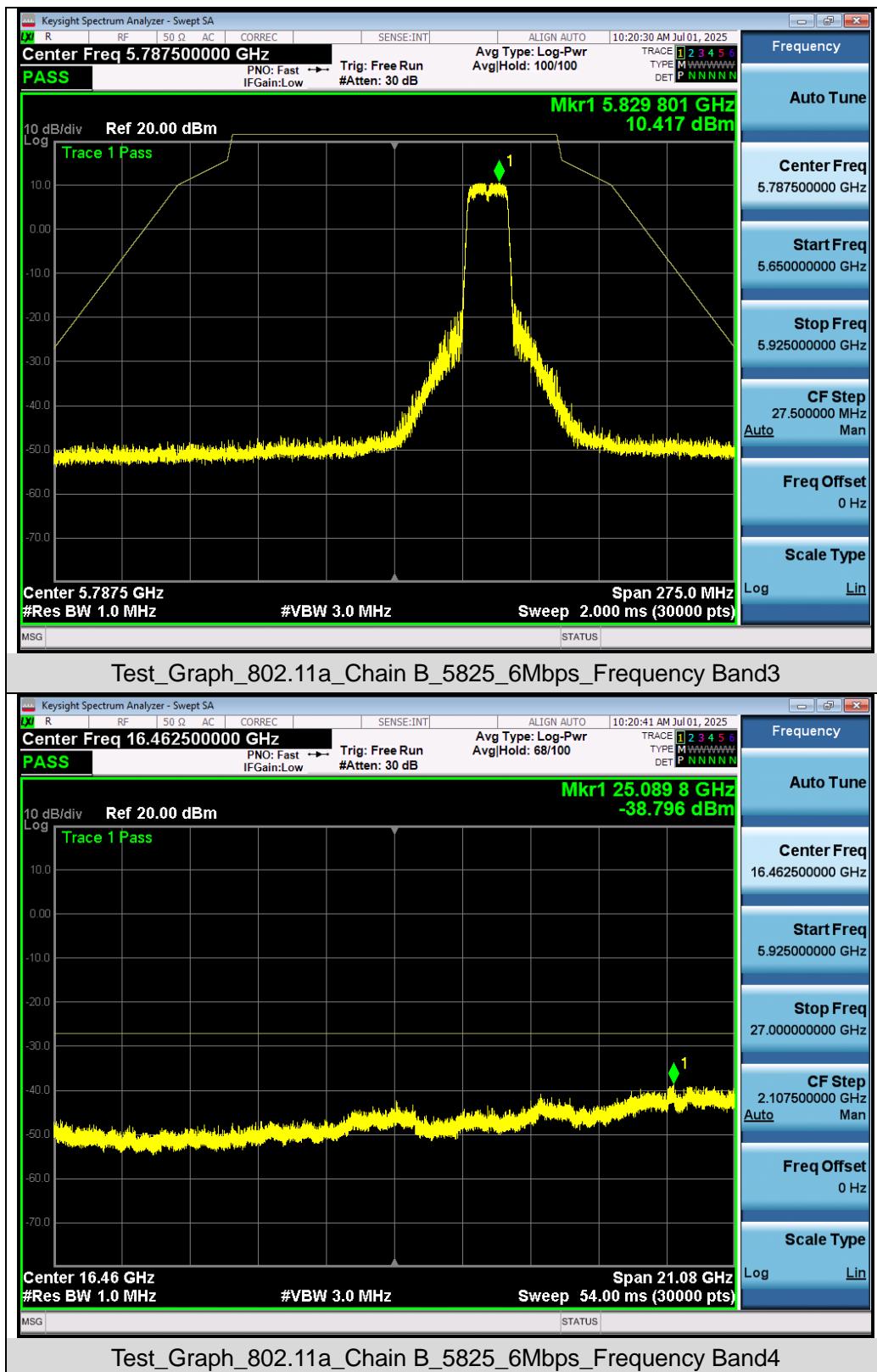


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11. Radiated Spurious Emission

11.1 Measurement Limit

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

Frequency (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:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Restricted bands	Applicable to	Limit	
		Field strength at 3m (dBuV/m)	
		PK: 74	AV: 54
Out of the restricted bands	Applicable to	EIRP Limit (dBm/MHz)	Equivalent field Strength at 3m (dBuV/m)
	FCC 15.407(b)(1)	PK: -27	PK: 68.2
	15.407(b)(2)		
	15.407(b)(3)		
	15.407(b)(4)	See Note 2	

Note 1: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000 \sqrt{30 P}}{3} \mu\text{V/m, where } P \text{ is the eirp (Watts).}$$

Note 2: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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11.2 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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The following table is the setting of spectrum analyzer and receiver.

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04.Section G)
Unwanted emissions measurement.

◆ **Procedure for Unwanted Emissions Measurements Below 1000MHz:**

- RBW = 120 kHz
- VBW = 300 kHz
- Detector = Peak
- Trace mode = max hold

◆ **Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz:**

- RBW = 1 MHz
- VBW \geq 3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

◆ **Procedures for Average Unwanted Emissions Measurements Above 1000MHz:**

- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW \geq 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

◆ **Procedures for Average Unwanted Emissions Measurements Above 1000MHz:**

- RBW = 1 MHz
- VBW = 3 MHz • Detector = power averaging (rms), set span/(# of points in sweep) \geq RBW/2.
- Averaging type = power averaging (RMS)
- The correction factor shall be offset is $10 \log (1/x)$, where x is the duty cycle.

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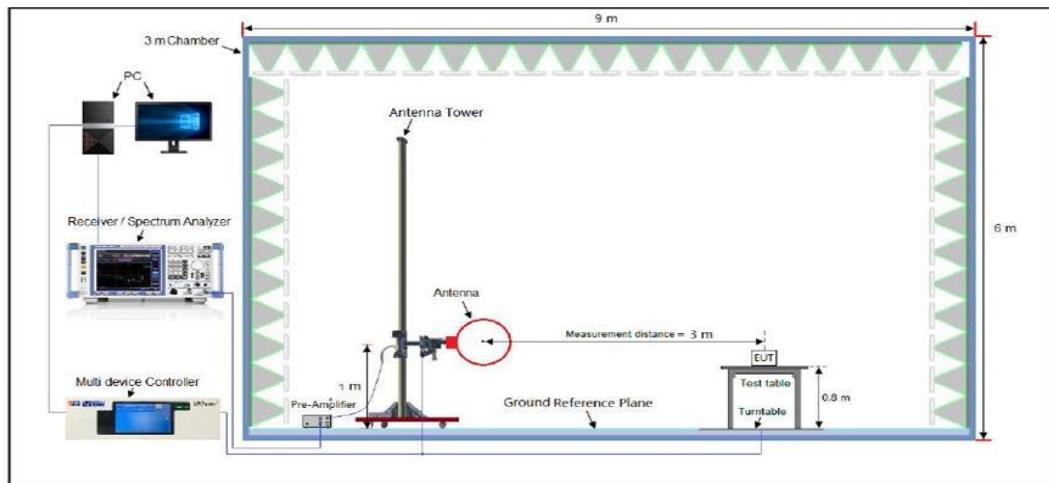
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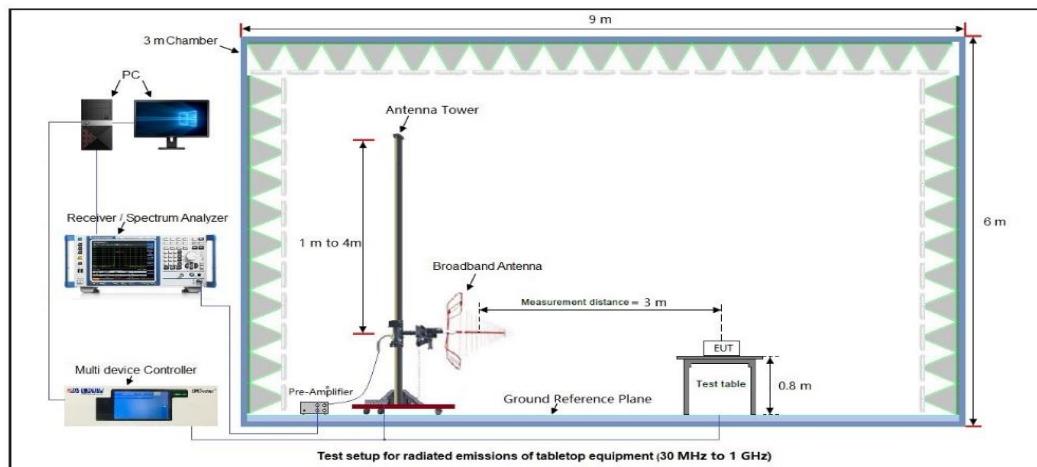
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11.3 Measurement Setup (Block Diagram of Configuration)

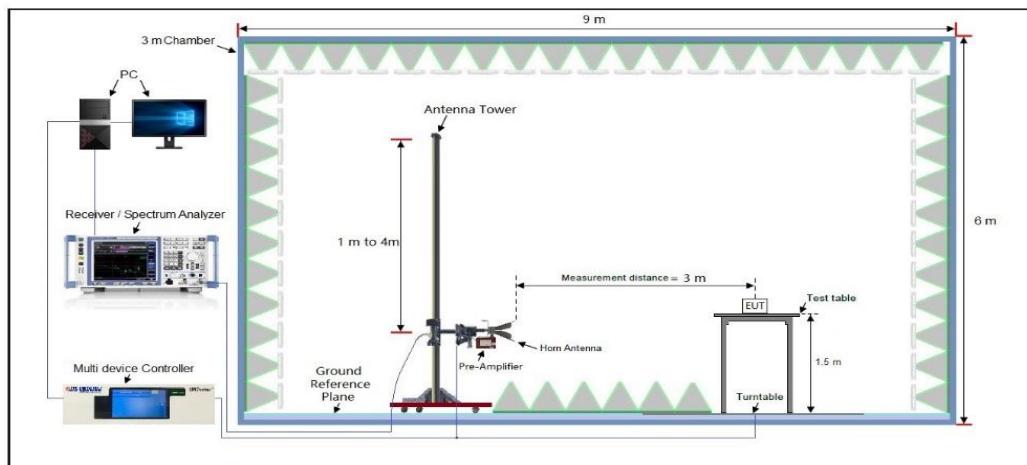
Radiated Emission Test Setup 9kHz-30MHz



Radiated Emission Test Setup 30MHz-1000MHz



Radiated Emission Test Setup Above 1000MHz



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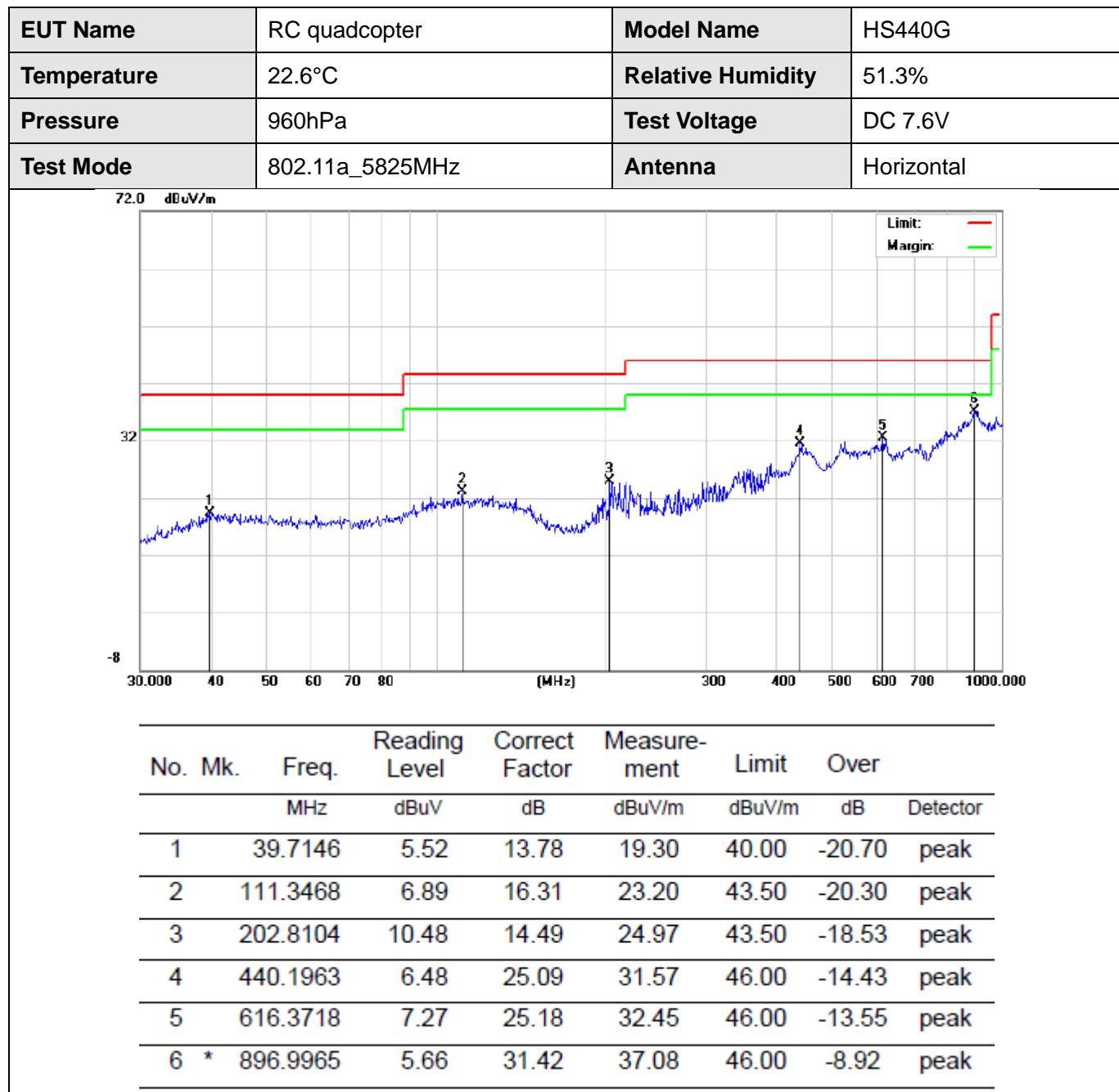
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11.4 Measurement Result

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.

Radiated Emission Test Results at 30MHz-1GHz



Result: Pass

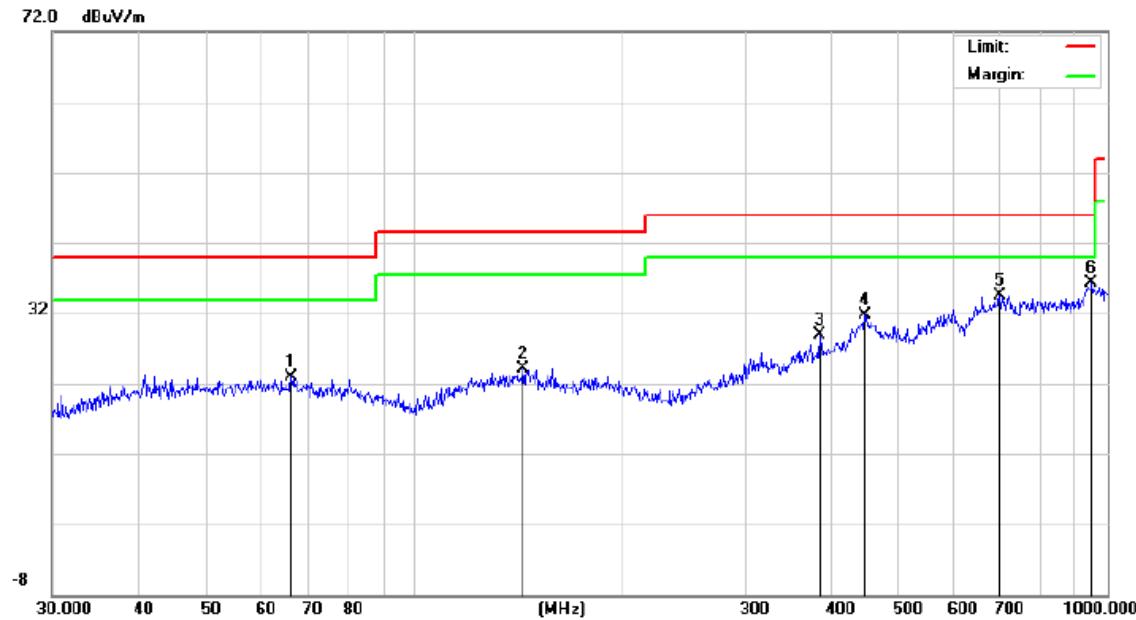
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EUT Name	RC quadcopter	Model Name	HS440G
Temperature	22.6°C	Relative Humidity	51.3%
Pressure	960hPa	Test Voltage	DC 7.6V
Test Mode	802.11a_5825MHz	Antenna	Vertical



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	66.2662	5.77	17.04	22.81	40.00	-17.19	peak	
2	143.3261	5.86	18.20	24.06	43.50	-19.44	peak	
3	383.9318	7.29	21.56	28.85	46.00	-17.15	peak	
4	446.4141	5.92	25.81	31.73	46.00	-14.27	peak	
5	699.3046	6.50	28.09	34.59	46.00	-11.41	peak	
6	*	948.7610	5.60	30.65	36.25	46.00	-9.75	peak

Result: Pass

Note:

1. Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.
2. All test modes had been pre-tested, Refer to Chapter 5 of the report for details.

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Radiated Emissions Test Results Above 1GHz

EUT Name	RC quadcopter	Model Name	HS440G
Temperature	22.6°C	Relative Humidity	51.3%
Pressure	960hPa	Test Voltage	DC 7.6V
Test Mode	802.11a_5180MHz	Antenna	Horizontal/Vertical

Radiated Emission Above 1GHz–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)	
10360.042	47.65	9.14	56.79	68.20	-11.41	peak
15540.063	40.28	10.22	50.50	74.00	-23.50	peak
15540.063	31.59	10.22	41.81	54.00	-12.19	AVG

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

Radiated Emission Above 1GHz–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)	
10360.042	47.16	9.14	56.30	68.20	-11.90	peak
15540.063	42.19	10.22	52.41	74.00	-21.59	peak
15540.063	31.52	10.22	41.74	54.00	-12.26	AVG

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

Result: Pass

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