Element Materials Technology
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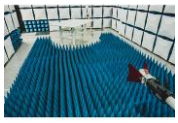

MEASUREMENT REPORT
FCC PART 15.407 / ISED RSS-247 UNII 802.11a/n/ac/ax(SU)

Applicant Name:
Apple Inc.
One Apple Park Way
Cupertino, CA 95014
United States

Date of Testing:
10/25/2024 - 1/14/2025
Test Report Issue Date:
1/29/2025
Test Site/Location:
Element Materials Technology, Morgan Hill, CA, USA
Test Report Serial No.:
1C2410210076-09.BCG

FCC ID:	**BCGA3354**
IC:	**579C-A3354**
APPLICANT:	**Apple Inc.**

Application Type:	Certification
Model/HVIN:	A3354
EUT Type:	Tablet Device
Frequency Range:	5180 – 5825MHz
Modulation Type:	OFDM
FCC Classification:	Unlicensed National Information Infrastructure (UNII)
FCC Rule Part(s):	Part 15 Subpart E (15.407)
ISED Specification:	RSS-247 Issue 3
Test Procedure(s):	ANSI C63.10-2020, KDB 789033 D02 v02r01 KDB 662911 D01 v02r01

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2020 and KDB 789033 D02 v02r01. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RJ Ortanez
Executive Vice President

ACCREDITED
CERT #2041.02

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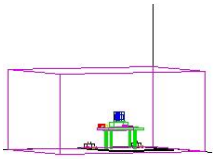
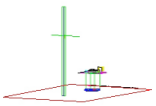


MEASUREMENT REPORT



UNII Band	Channel Bandwidth (MHz)	Mode	Tx Frequency (MHz)	SISO				CDD/SDM	
				Antenna WF7a		Antenna WF8		Summed	
				Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
1	20	802.11a/n	5180 - 5240	98.855	19.95	99.312	19.97	104.954	20.21
2A		802.11a/n	5260 - 5320	100.000	20.00	99.770	19.99	105.925	20.25
2C		802.11a/n	5500 - 5720	100.000	20.00	97.499	19.89	110.154	20.42
3		802.11a/n	5745 - 5825	96.828	19.86	94.189	19.74	157.761	21.98
1	40	802.11n	5190 - 5230	77.268	18.88	73.621	18.67	120.226	20.80
2A		802.11n	5270 - 5310	70.146	18.46	68.234	18.34	122.180	20.87
2C		802.11n	5510 - 5710	76.384	18.83	75.162	18.76	152.055	21.82
3		802.11n	5755 - 5795	74.989	18.75	79.433	19.00	150.661	21.78
1	80	802.11ac	5210	17.022	12.31	16.406	12.15	21.777	13.38
2A		802.11ac	5290	10.864	10.36	10.495	10.21	19.634	12.93
2C		802.11ac	5530 - 5690	77.090	18.87	78.886	18.97	149.624	21.75
3		802.11ac	5775	44.566	16.49	42.364	16.27	67.764	18.31
1	20	802.11ax (SU)	5180 - 5240	78.163	18.93	76.913	18.86	125.026	20.97
2A		802.11ax (SU)	5260 - 5320	78.705	18.96	77.983	18.92	117.761	20.71
2C		802.11ax (SU)	5500 - 5720	77.090	18.87	79.250	18.99	124.165	20.94
3		802.11ax (SU)	5745 - 5825	77.804	18.91	74.989	18.75	151.008	21.79
1	40	802.11ax (SU)	5190 - 5230	73.961	18.69	79.433	19.00	114.288	20.58
2A		802.11ax (SU)	5270 - 5310	65.464	18.16	63.826	18.05	103.039	20.13
2C		802.11ax (SU)	5510 - 5710	78.163	18.93	79.068	18.98	150.314	21.77
3		802.11ax (SU)	5755 - 5795	75.509	18.78	77.090	18.87	153.462	21.86
1	80	802.11ax (SU)	5210	14.191	11.52	15.524	11.91	22.387	13.50
2A		802.11ax (SU)	5290	8.974	9.53	9.840	9.93	16.218	12.10
2C		802.11ax (SU)	5530 - 5690	73.282	18.65	74.645	18.73	149.279	21.74
3		802.11ax (SU)	5775	41.210	16.15	41.687	16.20	68.077	18.33

FCC EUT Overview

UNII Band	Channel Bandwidth (MHz)	Mode	Tx Frequency (MHz)	SISO				CDD/SDM	
				Antenna WF7a		Antenna WF8		Summed	
				Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
1	20	802.11a/n	5180 - 5240	30.061	14.78	31.046	14.92	34.356	15.36
2A		802.11a/n	5260 - 5320	100.000	20.00	99.770	19.99	105.925	20.25
2C		802.11a/n	5500 - 5720	100.000	20.00	97.499	19.89	110.154	20.42
3		802.11a/n	5745 - 5825	96.828	19.86	94.189	19.74	157.761	21.98
1	40	802.11n	5190 - 5230	54.325	17.35	51.642	17.13	58.076	17.64
2A		802.11n	5270 - 5310	70.146	18.46	68.234	18.34	122.180	20.87
2C		802.11n	5510 - 5710	76.384	18.83	70.958	18.51	147.911	21.70
3		802.11n	5755 - 5795	74.989	18.75	79.433	19.00	150.661	21.78
1	80	802.11ac	5210	16.943	12.29	16.444	12.16	21.878	13.40
2A		802.11ac	5290	10.864	10.36	10.495	10.21	19.634	12.93
2C		802.11ac	5530 - 5690	77.090	18.87	78.886	18.97	149.624	21.75
3		802.11ac	5775	44.566	16.49	42.364	16.27	67.764	18.31
1	20	802.11ax (SU)	5180 - 5240	34.995	15.44	33.729	15.28	39.084	15.92
2A		802.11ax (SU)	5260 - 5320	78.705	18.96	77.983	18.92	117.761	20.71
2C		802.11ax (SU)	5500 - 5720	77.090	18.87	79.250	18.99	124.165	20.94
3		802.11ax (SU)	5745 - 5825	77.804	18.91	74.989	18.75	151.008	21.79
1	40	802.11ax (SU)	5190 - 5230	51.168	17.09	55.208	17.42	59.293	17.73
2A		802.11ax (SU)	5270 - 5310	65.464	18.16	63.826	18.05	103.039	20.13
2C		802.11ax (SU)	5510 - 5710	71.779	18.56	75.683	18.79	150.314	21.77
3		802.11ax (SU)	5755 - 5795	75.509	18.78	77.090	18.87	153.462	21.86
1	80	802.11ax (SU)	5210	14.125	11.50	15.417	11.88	21.281	13.28
2A		802.11ax (SU)	5290	8.974	9.53	9.840	9.93	16.218	12.10
2C		802.11ax (SU)	5530 - 5690	73.282	18.65	74.645	18.73	149.279	21.74
3		802.11ax (SU)	5775	41.210	16.15	41.687	16.20	68.077	18.33

ISED EUT Overview

1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2 Element Materials Technology Test Location

These measurement tests were conducted at the Element Materials Technology facility located at 18855 Adams Court, Morgan Hill, CA 95037. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014 and KDB 414788 D01 v01r01.

1.3 Test Facility / Accreditations

Measurements were performed at Element Materials Technology located in Morgan Hill, CA 95037, U.S.A.

- Element Materials Technology is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.02 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.

- Element Washington DC LLC TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).

- Element Materials Technology facility is a registered (22831) test laboratory with the site description on file with ISED.

- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreements (MRAs).

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Tablet Device FCC ID: BCGA3354** and **IC: 579C-A3354**. The test data contained in this report pertains only to the emissions due to the EUT's UNII 802.11a/n/ac/ax(SU) transmitter.

Test Device Serial No.: LCM6C3J3GN, C5G6DF4TJX, X7WY7H45F6, J0V7G4XLJ6, H9HHAD0006G0000VYN

2.2 Device Capabilities

This device contains the following capabilities:

802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE1M, LE2M,)

Channel puncturing function is not supported for this device.

Band 1		Band 2A		Band 2C		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
36	5180	52	5260	100	5500	149	5745
:	:	:	:	:	:	:	:
42	5210	56	5280	116	5580	157	5785
:	:	:	:	:	:	:	:
48	5240	64	5320	144	5720	165	5825

Table 2-1. 802.11a / 802.11n / 802.11ac / 802.11ax (20MHz) Frequency / Channel Operations

Band 1		Band 2A		Band 2C		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
38	5190	54	5270	102	5510	151	5755
:	:	:	:	:	:	:	:
46	5230	62	5310	110	5550	159	5795
				:	:		
				142	5710		

Table 2-2. 802.11n / 802.11ac / 802.11ax (40MHz BW) Frequency / Channel Operations

Band 1		Band 2A		Band 2C		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
42	5210	58	5290	106	5530	155	5775
				:	:		
				138	5690		

Table 2-3. 802.11ac / 802.11ax (80MHz BW) Frequency / Channel Operations

Notes:

1. TDWR channels are not supported for ISED.
2. 5GHz NII operation is possible in 20MHz, and 40MHz, 80MHz, and 160MHz 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 per the guidance of Section B)2)b) KDB 789033 D02 v02r01 and ANSI C63.10-2020. 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:

Measured Duty Cycles				
802.11 Mode/Band		Duty Cycle [%]		
		Antenna WF7a	Antenna WF8	CDD
5GHz	a (Low Data Rate)	98.55	98.23	98.45
	a (Mid Data Rate)	97.48	98.12	97.36
	a (High Data Rate)	97.25	97.02	97.22
	n (HT20) (Low Data Rate)	98.92	98.82	98.06
	n (HT20) (Mid Data Rate)	96.6	98.82	98.28
	n (HT20) (High Data Rate)	99.04	98.78	98.2
	ax(SU) (HE20) (Low Data Rate)	98.43	98.50	99.00
	ax(SU) (HE20) (Mid Data Rate)	98.86	98.63	98.74
	ax(SU) (HE20) (High Data Rate)	98.11	98.07	98.11
	n (HT40) (Low Data Rate)	99.12	98.91	98.13
	n (HT40) (Mid Data Rate)	98.71	98.88	97.96
	n (HT40) (High Data Rate)	98.16	98.28	96.45
	ax(SU) (HE40) (Low Data Rate)	98.71	98.63	98.58
	ax(SU) (HE40) (Mid Data Rate)	98.59	98.62	98.73
	ax(SU) (HE40) (High Data Rate)	96.29	96.29	97.02
	ac (VHT80) (Low Data Rate)	98.71	98.78	98.66
	ac (VHT80) (Mid Data Rate)	97.95	97.79	97.63
	ac (VHT80) (High Data Rate)	95.67	96.00	95.33
	ax(SU) (HE80) (Low Data Rate)	98.56	98.67	98.53
	ax(SU) (HE80) (Mid Data Rate)	97.34	97.72	97.71
	ax(SU) (HE80) (High Data Rate)	94.23	93.27	93.75

Table 2-4. Measured Duty Cycles

CDD/SDM = Antenna WF7a + Antenna WF8

3. The device employs MIMO technology. Below are the possible configurations.

WiFi Configurations		SISO		CDD		SDM		STBC	
		Antenna WF8	Antenna WF7a	Antenna WF8	Antenna WF7a	Antenna WF8	Antenna WF7a	Antenna WF8	Antenna WF7a
5GHz	11a	✓	✓	✓	✓	×	×	×	×
	11n (20MHz)	✓	✓	✓	✓	✓	✓	✓	✓
	11ax(SU) (20MHz)	✓	✓	✓	✓	✓	✓	✓	✓
	11n (40MHz)	✓	✓	✓	✓	✓	✓	✓	✓
	11ax(SU) (40MHz)	✓	✓	✓	✓	✓	✓	✓	✓
	11ac (80MHz)	✓	✓	✓	✓	✓	✓	✓	✓
	11ax(SU) (80MHz)	✓	✓	✓	✓	✓	✓	✓	✓
	11ac (160MHz)	✓	✓	✓	✓	✓	✓	✓	✓
	11ax(SU) (160MHz)	✓	✓	✓	✓	✓	✓	✓	✓

Table 2-5. WIFI Configurations

✓= Support ; × = NOT Support
SISO = Single Input Single Output
SDM = Spatial Diversity Multiplexing – MIMO function
CDD = Cyclic Delay Diversity - 2Tx Function
STBC = Space-Time Block Coding – 2Tx Function

4. The device supports the following data rates (shown in Mbps):

802.11a	MCS Index			Spatial	OFDM (802.11n/802.11ac)				OFDM (802.11ac)				OFDM (802.11ax)											
20MHz				Stream	20MHz		40MHz		80MHz		160MHz		20MHz			40MHz			80MHz			160MHz			
	HT	VHT	HE		0.8μs GI	0.4μs GI	0.8μs GI	0.4μs GI	0.8μs GI	0.4μs GI	0.8μs GI	0.4μs GI	0.8μs GI	1.6μs GI	3.2μs GI	0.8μs GI	1.6μs GI	3.2μs GI	0.8μs GI	1.6μs GI	3.2μs GI	0.8μs GI	1.6μs GI	3.2μs GI	
6	0	0	0	1	6.5	7.2	13.5	15	29.3	32.5	58.5	65	8.6	8.1	7.3	17.2	16.3	14.6	36	34	30.6	72.1	68.1	61.3	
9	1	1	1	1	13	14.4	27	30	58.5	65	117	130	17.2	16.3	14.6	34.4	32.5	29.3	72.1	68.1	61.3	144.1	136.1	122.5	Low rate
12	2	2	2	1	19.5	21.7	40.5	45	87.8	97.5	175.5	195	25.8	24.4	21.9	51.6	48.8	43.9	108.1	102.1	91.9	216.2	204.2	183.8	
18	3	3	3	1	26	28.9	54	60	117	130	234	260	34.4	32.5	29.3	68.8	65	58.5	144.1	136.1	122.5	288.2	272.2	245	Mid rate
24	4	4	4	1	39	43.3	81	90	175.5	195	351	390	51.6	48.8	43.9	103.2	97.5	87.8	216.2	204.2	183.8	432.4	408.3	367.5	
36	5	5	5	1	52	57.8	108	120	234	260	468	520	68.8	65	58.5	137.6	130	117	288.2	272.2	245	576.5	544.4	490	
48	6	6	6	1	58.5	65	121.5	135	263.3	292.5	526.5	585	77.4	73.1	65.8	154.9	146.3	131.6	324.3	306.3	275.6	648.5	612.5	551.3	
54	7	7	7	1	65	72.2	135	150	292.5	325	585	650	86	81.3	73.1	172.1	162.5	146.3	360.3	340.3	306.3	720.6	680.6	612.5	
-	-	8	8	1	-	-	162	180	351	390	702	780	103.2	97.5	87.8	206.5	195	175.5	432.4	408.3	367.5	864.7	816.7	735	High Rate
-	-	9	9	1	-	-	180	200	390	433.3	780	866.7	114.7	108.3	97.5	229.4	216.7	195	480.4	453.7	408.3	960.8	907.4	816.7	
-	-	-	10	1	-	-	-	-	-	-	-	-	129	121.9	109.7	258.1	243.8	219.4	540.4	510.4	459.4	1080.9	1020.8	918.8	
-	-	-	11	1	-	-	-	-	-	-	-	-	143.4	135.4	121.9	286.8	270.8	243.8	600.5	567.1	510.4	1201	1134.3	1020.8	
6	8	0	0	2	13	14.4	27	30	58.5	65	117	130	17.2	16.3	14.6	34.4	32.5	29.3	72.1	68.1	61.3	144.1	136.1	122.5	
9	9	1	1	2	26	28.9	54	60	117	130	234	260	34.4	32.5	29.3	68.8	65	58.5	144.1	136.1	122.5	288.2	272.2	245	Low rate
12	10	2	2	2	39	43.3	81	90	175.5	195	351	390	51.6	48.8	43.9	103.2	97.5	87.8	216.2	204.2	183.8	432.4	408.3	367.5	
18	11	3	3	2	52	57.8	108	120	234	260	468	520	68.8	65	58.5	137.6	130	117	288.2	272.2	245	576.5	544.4	490	Mid rate
24	12	4	4	2	78	86.7	162	180	351	390	702	780	103.2	97.5	87.8	206.5	195	175.5	432.4	408.3	367.5	864.7	816.7	735	
36	13	5	5	2	104	115.6	216	240	468	520	936	1040	137.6	130	117	275.3	260	234	576.5	544.4	490	1152.9	1088.9	980	
48	14	6	6	2	117	130	243	270	526.5	585	1053	1170	154.9	146.3	131.6	309.7	292.5	263.3	648.5	612.5	551.3	1297.1	1225	1102.5	
54	15	7	7	2	130	144.4	270	300	585	650	1170	1300	172.1	162.5	146.3	344.1	325	292.5	720.6	680.6	612.5	1441.2	1361.1	1225	
-	-	8	8	2	156	173.3	324	360	702	780	1404	1560	206.5	195	175.5	412.9	390	351	864.7	816.7	735	1729.4	1633.3	1470	High Rate
-	-	9	9	2	-	-	360	400	780	866.7	1560	1733.3	229.4	216.7	195	458.8	433.3	390	960.8	907.4	816.7	1921.6	1814.8	1633.3	
-	-	-	10	2	-	-	-	-	-	-	-	-	258.1	243.8	219.4	516.2	487.5	438.8	1080.9	1020.8	918.8	2161.8	2041.7	1837.5	
-	-	-	11	2	-	-	-	-	-	-	-	-	286.8	270.8	243.8	573.5	541.7	487.5	1201	1134.3	1020.8	2402	2268.5	2041.7	

Table 2-6. Supported Data Rates

5. This device supports simultaneous transmission operations, which allows multiple transmitters to transmit simultaneously on the same antenna or across separate antennas. The table below shows all configurations possible.

Antenna	Simultaneous Tx Config	Bluetooth 2.4GHz	WLAN	WIFI 5GHz
		BDR, EDR, LE1/2M	802.11 b/g/n/ax	802.11 a/n/ac/ax
Ant WF8	Config 1	✓	×	✓
Ant WF8	Config 2	×	✓	✓
*Ant WF8	Config 3	×	✓	×
*Ant W7a		×	×	✓

Table 2-7. Simultaneous Transmission Configurations

✓ = Support; × = Not Support
* = SDB enabled

Note:
All the above simultaneous transmission configurations have been tested and the worst-case configuration was found to be Config 1 and reported in RF Bluetooth and RF UNII OFDM test reports.

Specific 2.4 GHz Wi-Fi antenna that can only transmit simultaneously with 2.4 GHz Bluetooth antenna is listed in the SAR test report. For BT (2.4 GHz), in both connected and disconnected modes, and Wi-Fi (2.4 GHz) – Wi-Fi max power will not exceed minimum of (13.5dBm, SAR max cap, Reg max cap) power. Bluetooth can simultaneously transmit with IEEE 802.11a/n/ac/ax 5 GHz on separate antenna.

2.3 Antenna Description

Following antenna gains provided by manufacturer were used for the testing.

Frequency [GHz]	Antenna Gain (dBi)	
	Antenna WF7a	Antenna WF8
5.150 – 5.250	4.1	3.4
5.250 – 5.350	4.8	4.6
5.470 – 5.725	4.6	5.1
5725 – 5.850	4.6	4.9

Table 2-8. Highest Antenna Gain

2.4 Test Support Equipment

1	Apple MacBook Pro	Model:	A2141	S/N:	C02H604EQ05D
	w/AC/DC Adapter	Model:	A2166	S/N:	C4H042705ZNPM0WA6
2	Apple USB-C Cable	Model:	Spartan	S/N:	GXK1336018XKTR024
3	USB-C Cable	Model:	A246C	S/N:	DWH80115BK826GV19
	w/ AC Adapter	Model:	A2305	S/N:	C4H95160004PF4F4V
4	DC Power Supply	Model:	KPS3010D	S/N:	N/A

Table 2-9. Test Support Equipment List

2.5 Test Configuration

The EUT was tested per the guidance of ANSI C63.10-2020 and KDB 789033 D02 v02r01. ANSI C63.10-2020 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups, 3.3 for radiated emissions test setups, and 7.2, 7.3, 7.4, and 7.5 for antenna port conducted emissions test setups.

The EUT was also investigated with and without charger.

For emissions from 1GHz – 18GHz, low, mid, and high channels were tested with highest power and worst case configuration. The emissions below 1GHz and above 18GHz were tested with the highest transmitting power and the worst case channel.

The EUT was manipulated through three orthogonal planes of X-orientation (flatbed), Y-orientation (landscape), and Z-orientation (portrait) during the testing. Only the worst case emissions were reported in this test report.

For AC line conducted and radiated test below 1GHz, following configuration were investigated and EUT powered by AC/DC was the worst case.

- EUT powered by AC/DC adaptor via USB-C cable with wire charger
- EUT powered by host PC via USB-C cable with wire charger

802.11n HT20/40, 11ax(SU) HE20/40/80 and 11ac VHT80 2TX CDD/SDM mode test data provided in this report covers 802.11n HT20/40, 11ax(SU) HE20/40/80 and 802.11ac VHT80 2TX STBC mode

802.11ac VHT20 and VHT40 mode are different from 802.11n HT20 and HT40 only in control messages and have the same power settings.

The data rates have been categorized into three groups: low, middle, and high data rates (see Table 2-6). All three groups have been investigated, and only the worst-case data rate has been reported.

For 802.11ax (OFDMA) test result, see separate UNII report, 1C2410210076-10.BCG.

All possible simultaneous transmission configurations have been investigated and the worst case config has been reported.

Description	Bluetooth	802.11a/n/ac/ax 5GHz
Antenna	Antenna WF8	Antenna WF8
Channel	78	36
Operating Frequency (MHz)	2480	5180
Mode/Modulation	GFSK iPA	802.11n

Table 2-10. Worst Case Simultaneous Transmission Configuration

2.6 Software and Firmware

The test was conducted with firmware version 22D8 installed on the EUT.

2.7 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2020) and the guidance provided in KDB 789033 D02 v02r01 were used in the measurement of the EUT**.**

Deviation from measurement procedure……..…….....None

3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 7m x 3.66m x 2.7m shielded enclosure. The shielded enclosure is manufactured by AP Americas. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-6. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50µH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is EPCOS 2X60A Power Line Filter (100dB Attenuation, 14kHz-18GHz) and the two EPCOs 2X48A filters (100dB Minimum Insertion Loss, 14kHz - 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 7.8. Automated test software was used to perform the AC line conducted emissions testing. Automated measurement software utilized is Rohde & Schwarz EMC32, Version 10.50.40.

3.3 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. An 80cm tall test table made of Styrodur is placed on top of the turn table. For measurements above 1GHz, an additional Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

Per KDB 414788, radiated emission test sites other than open-field test sites (e.g., shielded anechoic chambers), may be employed for emission measurements below 30MHz if characterized so that the measurements correspond to those obtained at an open-field test site. To determine test site equivalency, a reference sample transmitting at 149kHz was measured on an open field test site (asphalt with no ground plane) and then measured in the 3m semi-anechoic chamber. A calibrated 60cm loop antenna was used while the reference device was rotated through the X, Y and Z axis in order to capture the worst case level. A maximum deviation of 2.77dB at 149kHz was measured when comparing the 3 meter semi-anechoic chamber to the open field site.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33 depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

3.4 Environmental Conditions

The temperature is controlled within range of 15ºC to 35ºC. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:
"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 shall be considered sufficient to comply with the provisions of this section."

- The antennas of the EUT are **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The EUT complies with the requirement of §15.203.

5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.23-2012. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	2.07
Line Conducted Disturbance	1.91
Radiated Disturbance (<30MHz)	4.12
Radiated Disturbance (30MHz - 1GHz)	4.85
Radiated Disturbance (1 - 18GHz)	5.08
Radiated Disturbance (>18GHz)	5.22

6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance with the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Anritsu	ML2495A	Power Meter	7/8/2024	Annual	7/8/2025	1039008
Anritsu	MA2411B	Pulse Power Sensor	7/1/2024	Annual	7/1/2025	1911105
Anritsu	MA2411B	Pulse Power Sensor	10/21/2024	Annual	10/21/2025	1027293
ATM	180-442A-KF	20dB Nominal Gain Horn Antenna	3/14/2024	Annual	3/14/2025	T058701-01
ETS-Lindgren	3117	Double Ridged Guide Antenna (1-18 GHz)	4/9/2024	Annual	4/9/2025	00218555
Fairview Microwave/MCL	FMCA1975-36/BW-K10-2W44+	30MHz-40GHz RF Cable/Attenuator *	6/10/2024	Annual	6/10/2025	-
Keysight Technology	N9040B	UXA Signal Analyzer	5/28/2024	Annual	5/28/2025	MY57212015
Keysight Technology	N9030A	PXA Signal Analyzer	7/11/2024	Annual	7/11/2025	MY49430244
Rohde & Schwarz	TS-PR18	Pre-Amplifier (1GHz - 18GHz)	3/1/2024	Annual	3/1/2025	102145
Rohde & Schwarz	TS-PR18	Pre-Amplifier (1GHz - 18GHz)	8/14/2024	Annual	8/14/2025	101648
Rohde & Schwarz	FSV40	Signal Analyzer (10Hz-40GHz)	5/29/2024	Annual	5/29/2025	101619
Rohde & Schwarz	ESW44	EMI Test Receiver	5/1/2024	Annual	5/1/2025	101867
Rohde & Schwarz	TS-PR8	Pre-Amplifier (30MHz - 8GHz)	7/3/2024	Annual	7/3/2025	102356
Rohde & Schwarz	TS-PR1840	Pre-Amplifier (18GHz - 40GHz)	6/10/2024	Annual	6/10/2025	100057
Rohde & Schwarz	HFH2-Z2	Loop Antenna	6/21/2024	Annual	6/21/2025	100519
Rohde & Schwarz	ENV216	Two-Line V-Network	4/24/2024	Annual	4/24/2025	101364
Schwarzbeck	VULB 9162	Bilog Antenna (30MHz - 6GHz)	4/29/2024	Annual	4/29/2025	00304

Table 6-1. Test Equipment List

Note:

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
2. * denotes passive equipment that have been internally verified/calibrated.

7.0 TEST RESULTS

7.1 Summary

Company Name: Apple Inc.
FCC ID: BCGA3354
IC: 579C-A3354
FCC Classification: Unlicensed National Information Infrastructure (UNII)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407	RSS-Gen [6.7]	26dB Bandwidth	N/A	CONDUCTED	N/A	Section 7.2
15.407(e)	RSS-Gen [6.7]	6dB Bandwidth	>500kHz(5725-5850MHz)		PASS	Section 7.3
2.1049	RSS-Gen [6.7]	Occupied Bandwidth	N/A		PASS	Section 7.2, Section 7.3
15.407 (a.1.iv), (a.2), (a.3.i)	RSS-247 [6.2]	Maximum Conducted Output Power	Maximum conducted powers must meet the limits detailed in 15.407 (a) (RSS-247 [6.2])		PASS	Section 7.4
15.407 (a.1.iv), (a.2), (a.3.i)	RSS-247 [6.2]	Maximum Power Spectral Density	Maximum power spectral density must meet the limits detailed in 15.407 (a) (RSS-247 [6.2])		PASS	Section 7.4
15.407(h)	RSS-247 [6.3]	Dynamic Frequency Selection	See DFS Test Report	RADIATED	PASS	See DFS Test Report (1C2410210076-08.BCG)
15.407(b.1), (b.2), (b.3), (b.4)	RSS-247 [6.2]	Undesirable Emissions	Undesirable emissions must meet the limits detailed in 15.407(b) (RSS-247 [6.2])		PASS	Section 7.5
15.205, 15.407(b.1), (b.2), (b.3), (b.4)	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-Gen [8.9])		PASS	Section 7.5, 7.7
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 (RSS-Gen [8.8]) limits	LINE CONDUCTED	PASS	Section 7.8

Table 7-1. Summary of Test Results

Notes:

1) All channels, modes, and modulations/data rates were investigated among all UNII bands. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.
4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is Element "Conducted Automation," Version 1.1.0.
5) For radiated testing, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is Element "Chamber Automation," Version 3.0.0.

7.2 26dB & 99% Bandwidth Measurement

§2.1049; §15.407; RSS-Gen [6.7]

Test Overview and Limit

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2020 and KDB 789033 D02 v02r01, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

The 26dB bandwidth is used to determine the conducted power limits, for ISED the 99% OBW is used.

Test Procedure Used

ANSI C63.10-2020 – Section 12.5.2
KDB 789033 D02 v02r01 – Section C

Test Settings

1. The signal analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = in the range of 1% to 5% of the emission bandwidth
3. VBW $\geq$ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

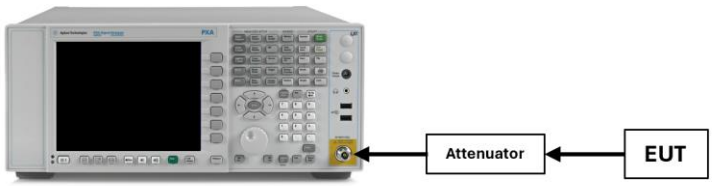


Figure 7-1. Test Instrument & Measurement Setup

Test Notes

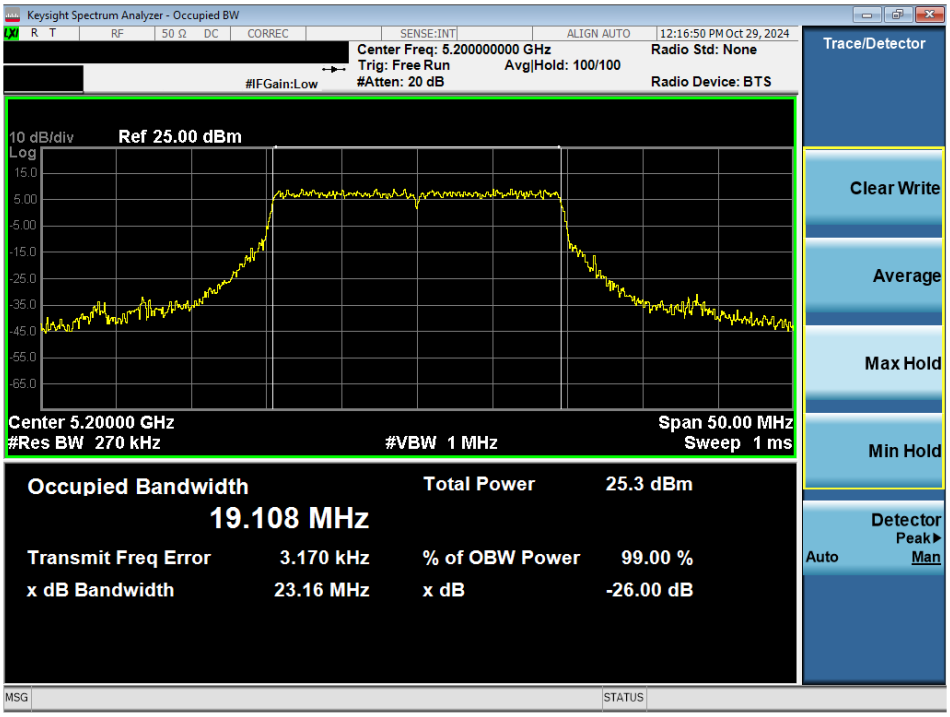
1. All data rates were investigated, and tabular data has been reported. Only the worst-case plot per bandwidth was reported.

7.2.1 Antenna WF7a 26dB & 99% Bandwidth Measurements

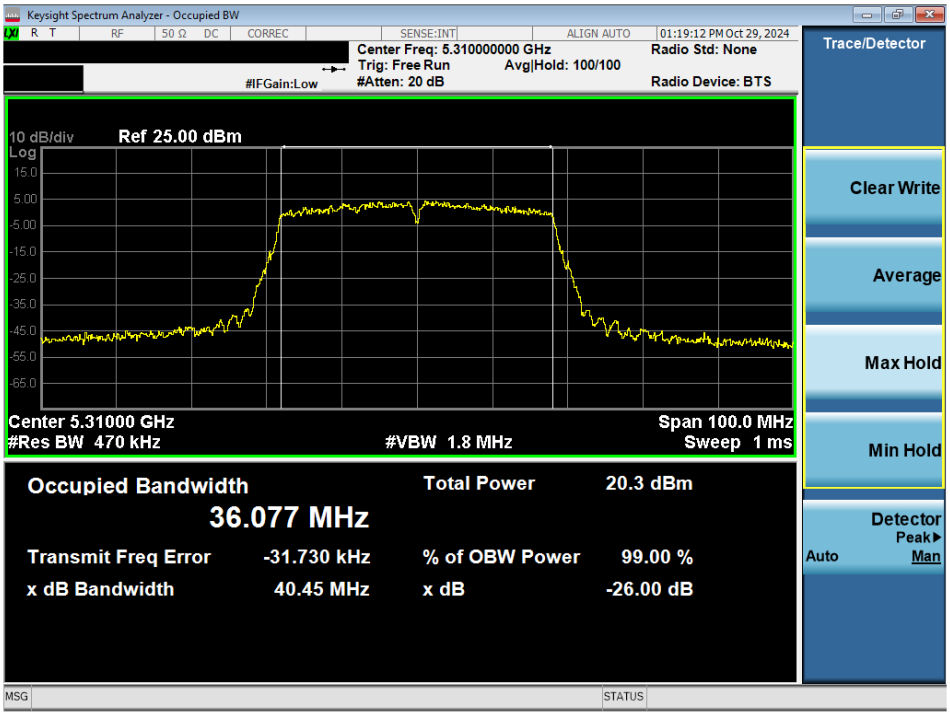
	Frequency [MHz]	Channel	802.11 MODE	Data Rate [Mbps]	Measured 99% Occupied Bandwidth [MHz]	Measured 26dB Bandwidth [MHz]
Band 1	5180	36	n (20MHz)	65/72.2 (MCS7)	17.75	21.08
	5200	40	n (20MHz)	65/72.2 (MCS7)	17.75	20.66
	5240	48	n (20MHz)	39/43.3 (MCS4)	17.77	20.86
	5180	36	ax (SU) (20MHz)	135/143.4 (MCS11)	19.10	21.96
	5200	40	ax (SU) (20MHz)	135/143.4 (MCS11)	19.11	23.16
	5240	48	ax (SU) (20MHz)	49/51.6 (MCS4)	19.00	21.46
	5190	38	n (40MHz)	135/150 (MCS7)	36.08	40.23
	5230	46	n (40MHz)	135/150 (MCS7)	36.16	40.33
	5190	38	ax (SU) (40MHz)	271/286 (MCS11)	37.95	39.92
	5230	46	ax (SU) (40MHz)	98/103.2 (MCS4)	37.67	39.65
	5210	42	ac (80MHz)	175.5/195 (MCS4)	75.43	79.87
	5210	42	ax (SU) (80MHz)	567/600.5 (MCS11)	77.51	80.64
Band 2A	5260	52	n (20MHz)	39/43.3 (MCS4)	17.77	21.23
	5300	60	n (20MHz)	65/72.2 (MCS7)	17.79	21.64
	5320	64	n (20MHz)	65/72.2 (MCS7)	17.76	21.17
	5260	52	ax (SU) (20MHz)	49/51.6 (MCS4)	19.06	22.01
	5300	60	ax (SU) (20MHz)	49/51.6 (MCS4)	19.02	21.90
	5320	64	ax (SU) (20MHz)	135/143.4 (MCS11)	19.13	21.89
	5270	54	n (40MHz)	135/150 (MCS7)	36.17	40.27
	5310	62	n (40MHz)	135/150 (MCS7)	36.08	40.45
	5270	54	ax (SU) (40MHz)	98/103.2 (MCS4)	37.52	39.55
	5310	62	ax (SU) (40MHz)	98/103.2 (MCS4)	37.71	39.66
	5290	58	ac (80MHz)	390/433.3 (MCS9)	75.96	79.97
	5290	58	ax (SU) (80MHz)	567/600.5 (MCS11)	77.46	80.51
Band 2C	5500	100	n (20MHz)	65/72.2 (MCS7)	17.71	20.92
	5580	116	n (20MHz)	39/43.3 (MCS4)	17.76	21.10
	5720	144	n (20MHz)	39/43.3 (MCS4)	17.77	21.28
	5500	100	ax (SU) (20MHz)	135/143.4 (MCS11)	19.04	22.28
	5580	116	ax (SU) (20MHz)	49/51.6 (MCS4)	19.01	21.56
	5720	144	ax (SU) (20MHz)	49/51.6 (MCS4)	19.04	21.98
	5510	102	n (40MHz)	135/150 (MCS7)	36.10	40.15
	5550	110	n (40MHz)	135/150 (MCS7)	36.12	40.19
	5710	142	n (40MHz)	81/90 (MCS4)	36.11	39.88
	5510	102	ax (SU) (40MHz)	271/286 (MCS11)	37.94	39.75
	5550	110	ax (SU) (40MHz)	98/103.2 (MCS4)	37.60	39.53
	5710	142	ax (SU) (40MHz)	49/51.6 (MCS2)	37.56	39.69
	5530	106	ac (80MHz)	390/433.3 (MCS9)	75.91	79.81
	5690	138	ac (80MHz)	87.8/97.5 (MCS2)	75.20	79.63
	5530	106	ax (SU) (80MHz)	567/600.5 (MCS11)	77.41	80.46
	*5610	122	ax (SU) (80MHz)	204/216.2 (MCS4)	76.92	80.18
	5690	138	ax (SU) (80MHz)	204/216.2 (MCS4)	76.82	80.19

Table 7-2. Conducted Bandwidth Measurements Antenna WF7a

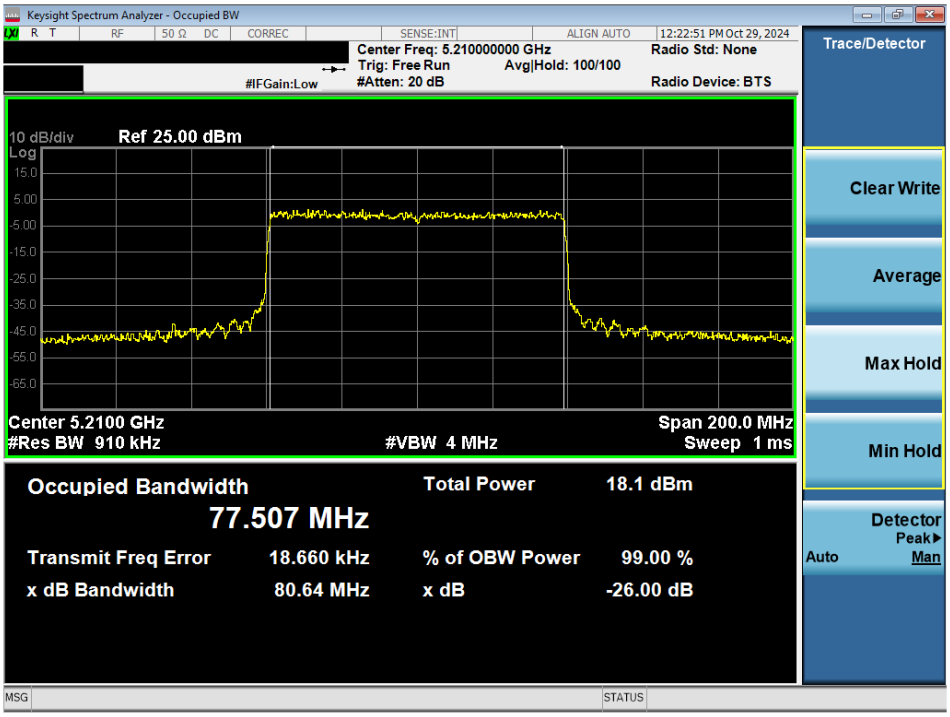
*TDWR channel is not supported for ISED (denoted by a * next to the frequency)



Plot 7-1. 26dB BW & 99% OBW Antenna WF7a (20MHz BW 802.11ax(SU) – Ch. 40)



Plot 7-2. 26dB BW & 99% OBW Antenna WF7a (40MHz BW 802.11n – Ch. 62)



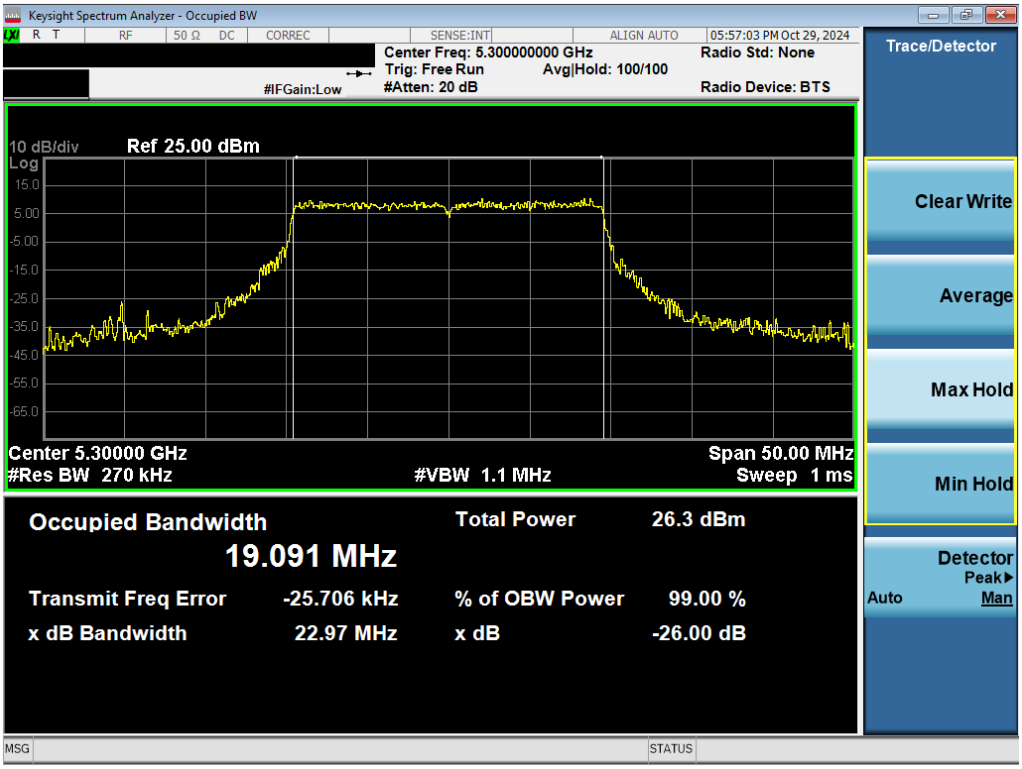
Plot 7-3. 26dB BW & 99% OBW Antenna WF7a (80MHz BW 802.11ac – Ch. 42)

7.2.2 Antenna WF8 26dB & 99% Bandwidth Measurements

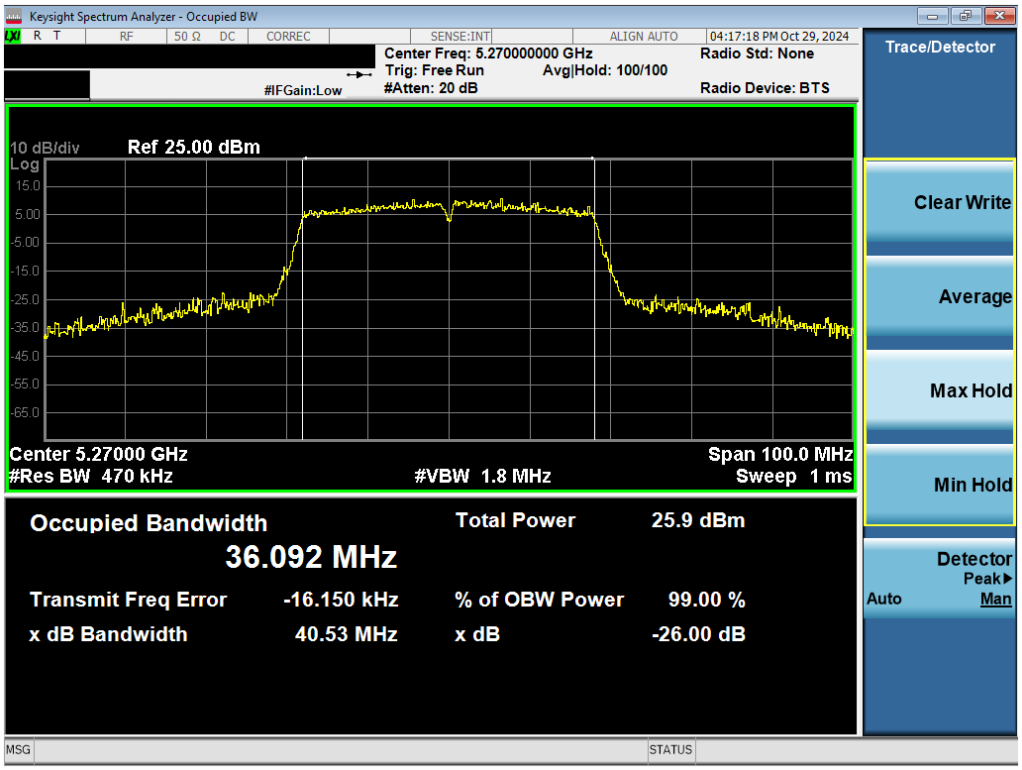
	Frequency [MHz]	Channel	802.11 MODE	Data Rate [Mbps]	Measured 99% Occupied Bandwidth [MHz]	Measured 26dB Bandwidth [MHz]
Band 1	5180	36	n (20MHz)	65/72.2 (MCS7)	17.75	20.71
	5200	40	n (20MHz)	65/72.2 (MCS7)	17.78	21.28
	5240	48	n (20MHz)	39/43.3 (MCS4)	17.79	21.11
	5180	36	ax (SU) (20MHz)	135/143.4 (MCS11)	19.07	22.19
	5200	40	ax (SU) (20MHz)	135/143.4 (MCS11)	19.08	21.81
	5240	48	ax (SU) (20MHz)	49/51.6 (MCS4)	18.99	21.61
	5190	38	n (40MHz)	135/150 (MCS7)	36.03	40.12
	5230	46	n (40MHz)	81/90 (MCS4)	36.07	40.05
	5190	38	ax (SU) (40MHz)	271/286 (MCS11)	37.94	39.79
	5230	46	ax (SU) (40MHz)	98/103.2 (MCS4)	37.57	39.65
	5210	42	ac (80MHz)	390/433.3 (MCS9)	75.85	80.17
	5210	42	ax (SU) (80MHz)	204/216.2 (MCS4)	77.06	80.47
Band 2A	5260	52	n (20MHz)	39/43.3 (MCS4)	17.75	20.86
	5300	60	n (20MHz)	65/72.2 (MCS7)	17.76	21.03
	5320	64	n (20MHz)	65/72.2 (MCS7)	17.73	20.75
	5260	52	ax (SU) (20MHz)	135/143.4 (MCS11)	19.06	22.02
	5300	60	ax (SU) (20MHz)	135/143.4 (MCS11)	19.09	22.97
	5320	64	ax (SU) (20MHz)	135/143.4 (MCS11)	19.07	22.31
	5270	54	n (40MHz)	40/40.5 (MCS2)	36.09	40.53
	5310	62	n (40MHz)	135/150 (MCS7)	36.14	40.05
	5270	54	ax (SU) (40MHz)	49/51.6 (MCS2)	37.50	39.45
	5310	62	ax (SU) (40MHz)	271/286 (MCS11)	37.93	39.85
	5290	58	ac (80MHz)	390/433.3 (MCS9)	75.92	79.87
	5290	58	ax (SU) (80MHz)	567/600.5 (MCS11)	77.54	80.49
Band 2C	5500	100	n (20MHz)	65/72.2 (MCS7)	17.72	20.77
	5580	116	n (20MHz)	39/43.3 (MCS4)	17.78	21.03
	5720	144	n (20MHz)	19.5/21.7 (MCS2)	17.80	21.40
	5500	100	ax (SU) (20MHz)	135/143.4 (MCS11)	19.05	21.76
	5580	116	ax (SU) (20MHz)	135/143.4 (MCS11)	19.11	21.82
	5720	144	ax (SU) (20MHz)	24/25.8 (MCS2)	19.02	21.98
	5510	102	n (40MHz)	135/150 (MCS7)	36.22	40.13
	5550	110	n (40MHz)	135/150 (MCS7)	36.11	39.99
	5710	142	n (40MHz)	81/90 (MCS4)	36.21	39.95
	5510	102	ax (SU) (40MHz)	271/286 (MCS11)	37.98	39.72
	5550	110	ax (SU) (40MHz)	98/103.2 (MCS4)	37.58	39.58
	5710	142	ax (SU) (40MHz)	49/51.6 (MCS2)	37.62	39.67
	5530	106	ac (80MHz)	390/433.3 (MCS9)	75.97	79.86
	5690	138	ac (80MHz)	87.8/97.5 (MCS2)	75.29	79.55
	5530	106	ax (SU) (80MHz)	204/216.2 (MCS4)	77.07	80.57
	*5610	122	ax (SU) (80MHz)	102/108.1 (MCS2)	76.75	80.26
	5690	138	ax (SU) (80MHz)	102/108.1 (MCS2)	76.97	80.22

Table 7-3. Conducted Bandwidth Measurements Antenna WF8

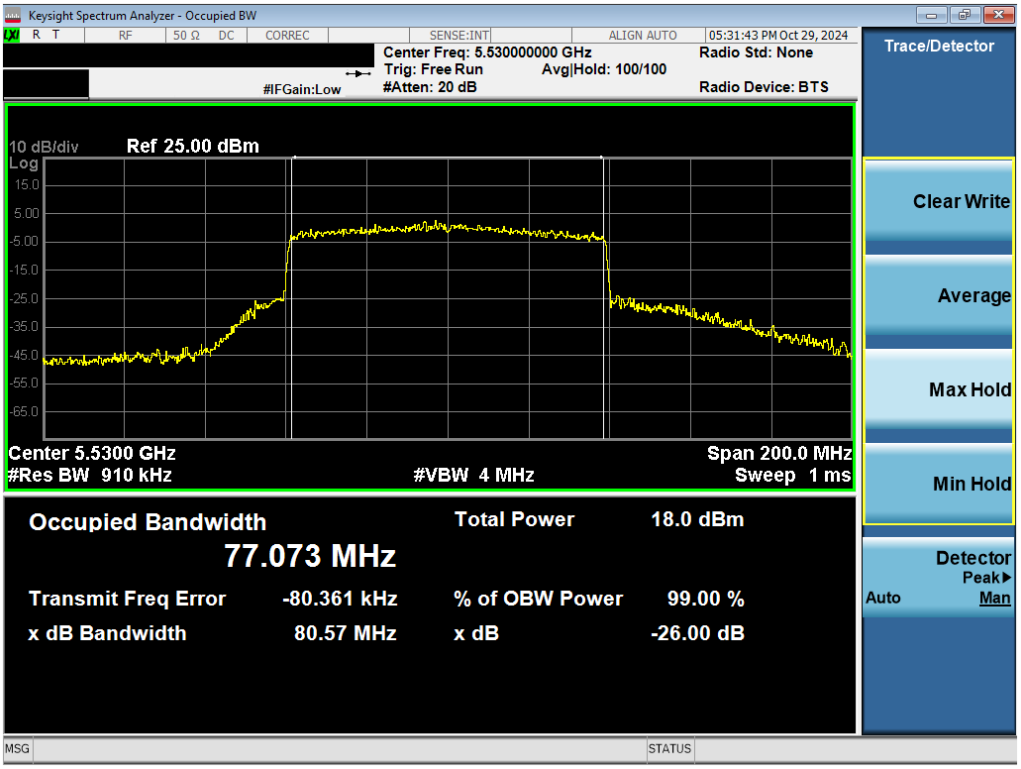
*TDWR channel is not supported for ISED (denoted by a * next to the frequency)



Plot 7-4. 26dB BW & 99% OBW Antenna WF8 (20MHz BW 802. 11ax(SU) – Ch. 60)



Plot 7-5. 26dB BW & 99% OBW Antenna WF8 (40MHz BW 11n – Ch. 54)



Plot 7-6. 26dB BW & 99% OBW Antenna WF8 (80MHz BW 802.11ax(SU) – Ch. 106)

7.3 6dB & 99% Bandwidth Measurement

§2.1049; §15.407 (e); RSS-Gen [6.7]

Test Overview and Limit

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2020 and KDB 789033 D02 v02r01, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 6dB bandwidth.

In the 5.725 – 5.850GHz band, the 6dB bandwidth must be ≥ 500 kHz.

Test Procedure Used

ANSI C63.10-2020 – Section 12.5.1
KDB 789033 D02 v02r01 – Section C

Test Settings

1. The signal analyzers' automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 100 kHz
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-2. Test Instrument & Measurement Setup

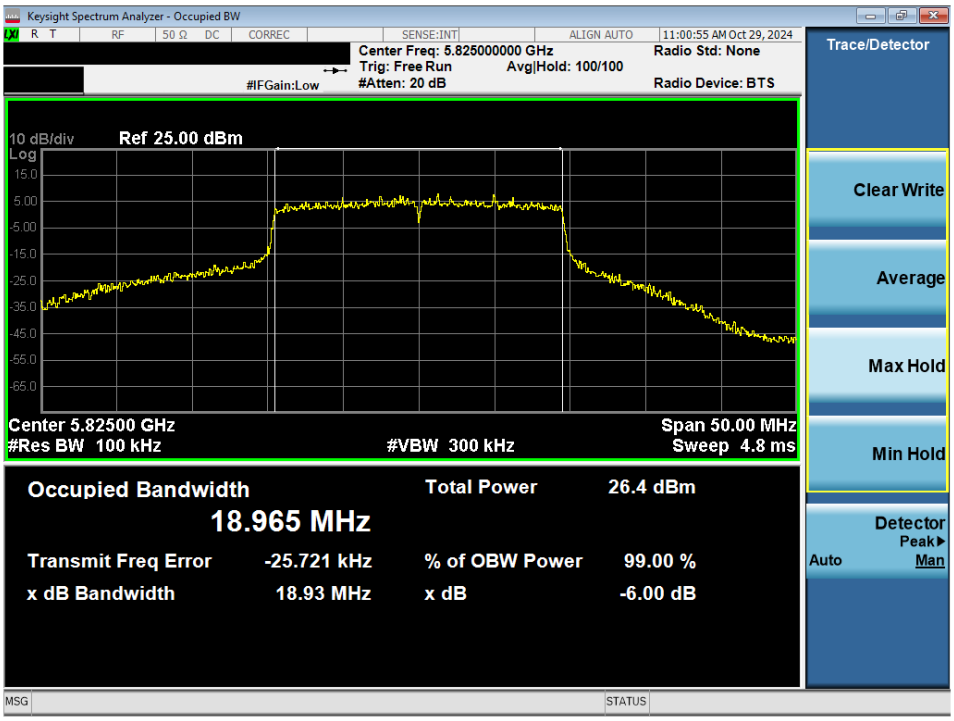
Test Notes

2. All data rates were investigated, and tabular data has been reported. Only the worst-case plot per bandwidth was reported.

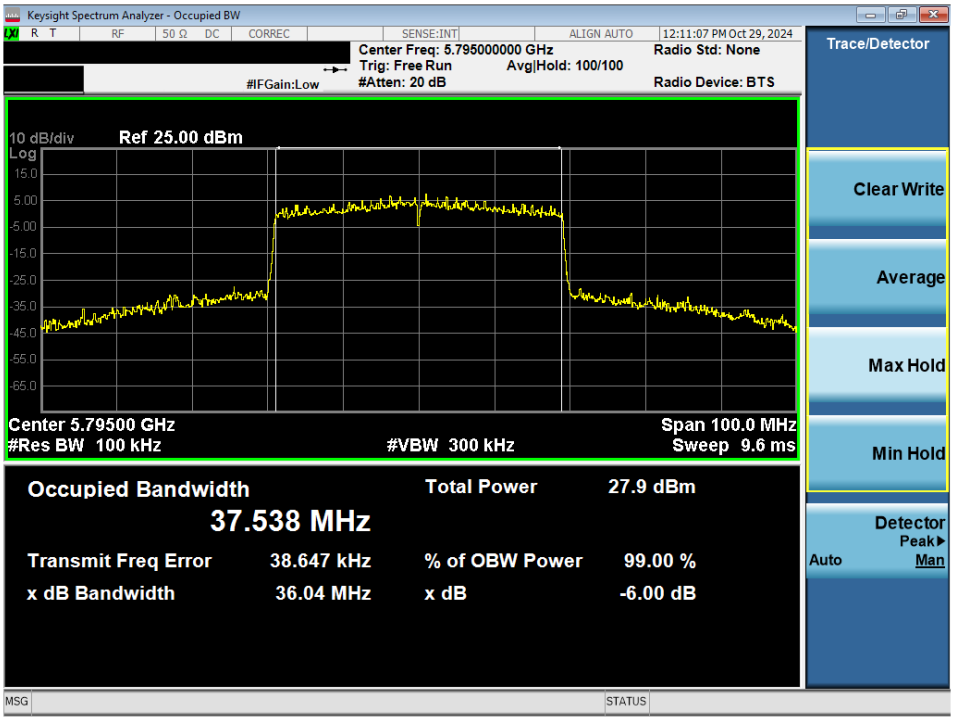
7.3.1 Antenna WF7a 6dB & 99% Bandwidth Measurements

	Frequency [MHz]	Channel	802.11 MODE	Data Rate [Mbps]	Measured 99% Occupied Bandwidth [MHz]	Measured 6dB Bandwidth [MHz]	Pass / Fail
Band 3	5745	149	n (20MHz)	19.5/21.7 (MCS2)	17.70	17.66	Pass
	5785	157	n (20MHz)	19.5/21.7 (MCS2)	17.65	17.60	Pass
	5825	165	n (20MHz)	19.5/21.7 (MCS2)	17.71	17.22	Pass
	5745	149	ax (SU) (20MHz)	49/51.6 (MCS4)	18.94	18.86	Pass
	5785	157	ax (SU) (20MHz)	24/25.8 (MCS2)	18.94	18.91	Pass
	5825	165	ax (SU) (20MHz)	24/25.8 (MCS2)	18.97	18.93	Pass
	5755	151	n (40MHz)	40/40.5 (MCS2)	36.13	35.23	Pass
	5795	159	n (40MHz)	40/40.5 (MCS2)	35.99	35.11	Pass
	5755	151	ax (SU) (40MHz)	49/51.6 (MCS2)	37.63	34.41	Pass
	5795	159	ax (SU) (40MHz)	98/103.2 (MCS4)	37.54	36.04	Pass
	5775	155	ac (80MHz)	175.5/195 (MCS4)	75.19	75.37	Pass
	5775	155	ax (SU) (80MHz)	102/108.1 (MCS2)	76.72	75.08	Pass

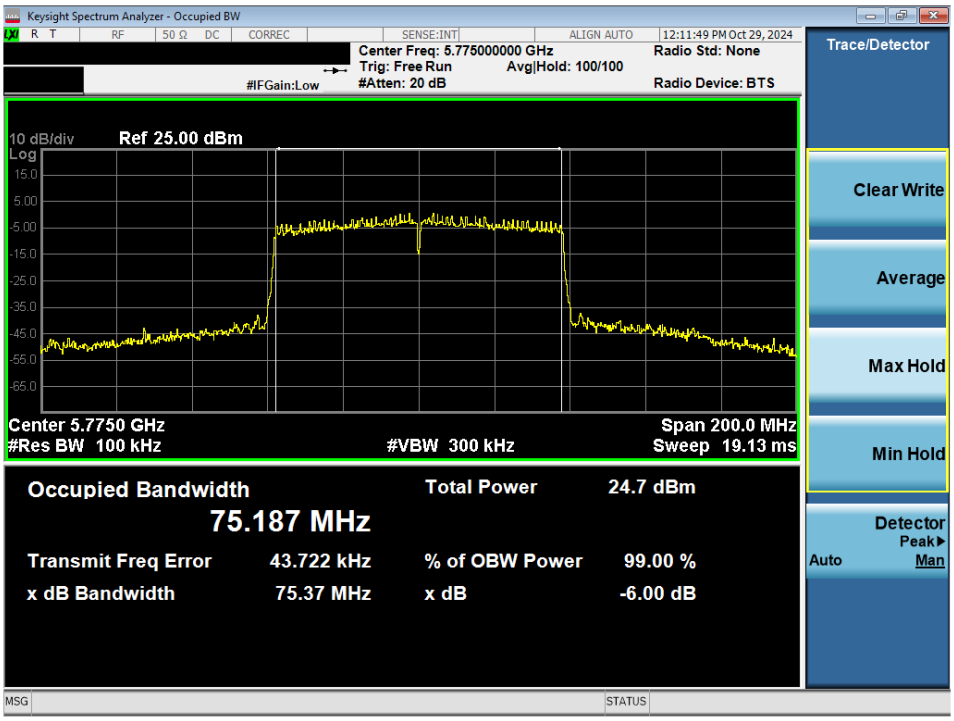
Table 7-4. Conducted Bandwidth Measurements Antenna WF7a



Plot 7-7. 6dB BW & 99% OBW Antenna WF7a (20MHz BW 802.11ax(SU) – Ch. 165)



Plot 7-8. 6dB BW & 99% OBW Antenna WF7a (40MHz BW 802.11ax (SU) – Ch. 159)

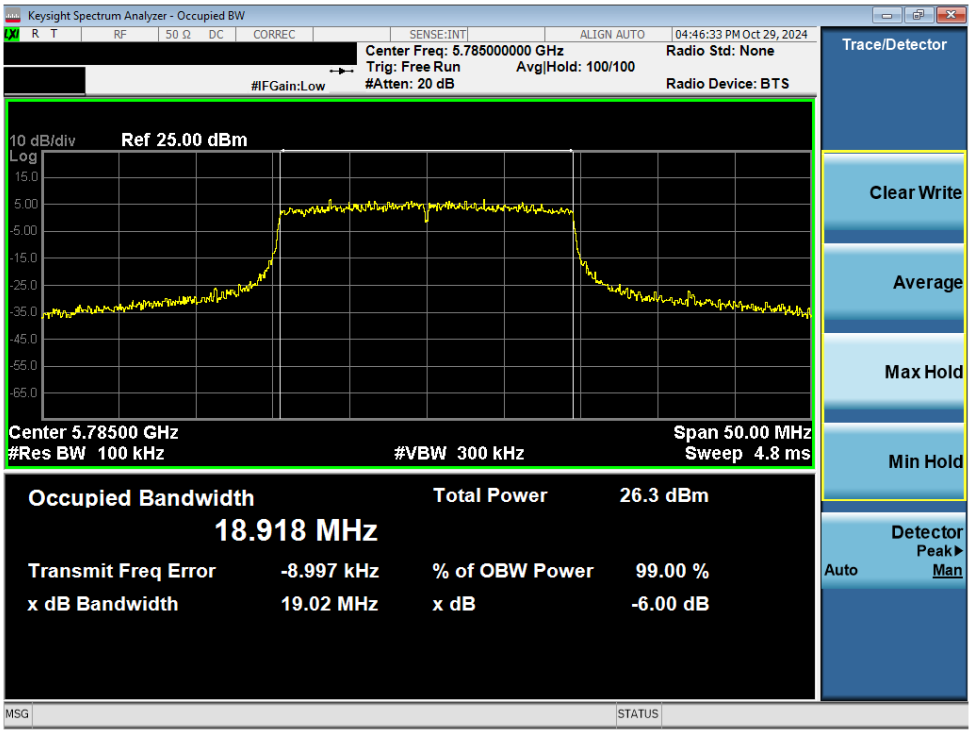


Plot 7-9. 6dB BW & 99% OBW Antenna WF7a (80MHz BW 802.11ac – Ch. 155)

7.3.2 Antenna WF8 6dB & 99% Bandwidth Measurements

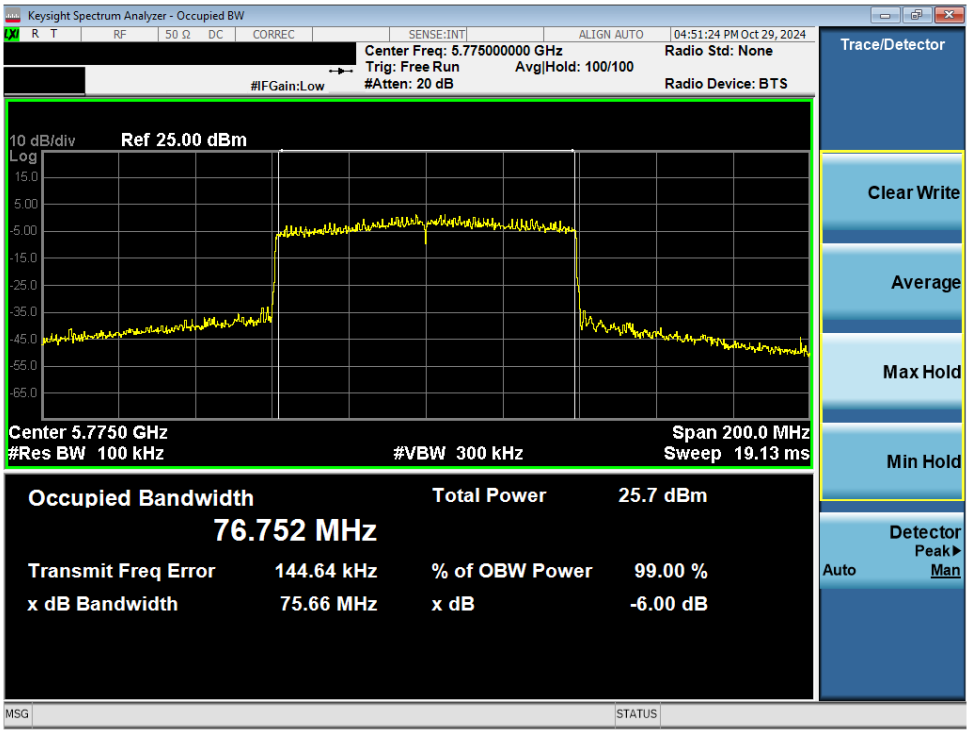
	Frequency [MHz]	Channel	802.11 MODE	Data Rate [Mbps]	Measured 99% Occupied Bandwidth [MHz]	Measured 6dB Bandwidth [MHz]	Pass / Fail
Band 3	5745	149	n (20MHz)	19.5/21.7 (MCS2)	17.68	17.35	Pass
	5785	157	n (20MHz)	19.5/21.7 (MCS2)	17.65	17.63	Pass
	5825	165	n (20MHz)	19.5/21.7 (MCS2)	17.69	17.63	Pass
	5745	149	ax (SU) (20MHz)	24/25.8 (MCS2)	18.92	18.70	Pass
	5785	157	ax (SU) (20MHz)	24/25.8 (MCS2)	18.92	19.02	Pass
	5825	165	ax (SU) (20MHz)	135/143.4 (MCS11)	19.01	18.90	Pass
	5755	151	n (40MHz)	40/40.5 (MCS2)	36.06	35.53	Pass
	5795	159	n (40MHz)	40/40.5 (MCS2)	36.00	33.95	Pass
	5755	151	ax (SU) (40MHz)	49/51.6 (MCS2)	37.57	33.96	Pass
	5795	159	ax (SU) (40MHz)	49/51.6 (MCS2)	37.58	36.28	Pass
	5775	155	ac (80MHz)	87.8/97.5 (MCS2)	75.11	73.94	Pass
	5775	155	ax (SU) (80MHz)	102/108.1 (MCS2)	76.75	75.66	Pass

Table 7-5. Conducted Bandwidth Measurements Antenna WF8



Plot 7-10. 6dB BW & 99% OBW Antenna WF8 (20MHz BW 802.11ax(SU) – Ch. 157)

Plot 7-11. 6dB BW & 99% OBW Antenna WF8 (40MHz BW 802.11ax(SU) – Ch. 159)



Plot 7-12. 6dB BW & 99% OBW Antenna WF8 (80MHz BW 802.11ax(SU) – Ch. 155)

7.4 Conducted Output Power and Max EIRP Measurement

§15.407(a.1.iv) §15.407(a.2) §15.407(a.3.i); RSS-247 [6.2]

Test Overview and Limits

A transmitter antenna terminal of the EUT is connected to the input of an RF pulse power sensor. Measurement is made using a broadband average power meter while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2020 and KDB 789033 D02 v02r01, and at the appropriate frequencies. B is the 99% OBW per ISED RSS-247 and 26dB BW is per FCC 15.407.

In the 5.15 – 5.25GHz band, the maximum permissible conducted output power is 250mW (23.98dBm). The maximum e.i.r.p. shall not exceed the lesser of 200 mW or 10 + 10 log$_{10}$B, dBm.

In the 5.25 – 5.35GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) or 11 dBm + 10log$_{10}$(B) dBm. The maximum e.i.r.p. shall not exceed the lesser of 1.0 W or 17 + 10 log$_{10}$B, dBm.

In the 5.47 – 5.725GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) or 11 dBm + 10log$_{10}$(B) dBm. The maximum e.i.r.p. shall not exceed the lesser of 1.0 W or 17 + 10 log$_{10}$B, dBm.

In the 5.725 – 5.850GHz band, the maximum permissible conducted output power is 1W (30dBm). The maximum e.i.r.p. is 36 dBm.

Test Procedure Used

ANSI C63.10-2020 – Section 12.4.3.2 Method PM-G
KDB 789033 D02 v02r01 – Section E)3)b) Method PM-G
ANSI C63.10-2020 – Section 14.4 Measure-and-Sum Technique
KDB 662911 v02r01 – Section E)1) Measure-and-Sum Technique

Test Settings

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-3. Test Instrument & Measurement Setup

Test Notes

1. Per RSS-247 Section 6.2.3, transmission on channels which overlap the 5600-5650 MHz is prohibited. This device operates under these frequencies only under the control of a certified master device and does not support active scanning on these channels. This device does not transmit any beacons or initiate any transmissions in UNII Bands 2A or 2C.

7.4.1 FCC Antenna WF7a Conducted Output Power Measurements

5GHz (20MHz Bandwidth)	Freq [MHz]	Channel	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]
				802.11a	802.11n	802.11ax		
	5180	36	AVG	17.94	17.66	17.81	23.98	-6.04
	5200	40	AVG	19.53	18.76	18.93	23.98	-4.45
	5240	48	AVG	19.95	18.64	18.91	23.98	-4.03
	5260	52	AVG	20.00	18.72	18.96	23.98	-3.98
	5300	60	AVG	19.89	18.65	18.80	23.98	-4.09
	5320	64	AVG	16.84	16.64	16.24	23.98	-7.14
	5500	100	AVG	16.37	16.13	15.41	23.98	-7.61
	5520	104	AVG	17.74	17.60	17.27	23.98	-6.24
	5540	108	AVG	19.67	18.52	18.66	23.98	-4.31
	5580	116	AVG	20.00	18.69	18.87	23.98	-3.98
	5660	132	AVG	17.99	18.33	17.54	23.98	-5.65
	5680	136	AVG	19.74	18.65	18.82	23.98	-4.24
	5700	140	AVG	15.96	15.69	15.39	23.98	-8.02
	5720	144	AVG	19.83	18.68	18.70	23.98	-4.15
	5745	149	AVG	19.86	18.66	18.85	30.00	-10.14
	5785	157	AVG	19.73	18.91	18.53	30.00	-10.27
	5825	165	AVG	19.52	18.74	18.91	30.00	-10.48

Table 7-6. FCC Antenna WF7a 20MHz BW (UNII) Maximum Conducted Output Power

5GHz (40MHz Bandwidth)	Freq [MHz]	Channel	Detector	Conducted Power [dBm]		Conducted Power Limit [dBm]	Conducted Power Margin [dB]
				802.11n	802.11ax		
	5190	38	AVG	14.42	14.23	23.98	-9.56
	5230	46	AVG	18.88	18.69	23.98	-5.10
	5270	54	AVG	18.46	18.16	23.98	-5.52
	5310	62	AVG	13.40	12.58	23.98	-10.58
	5510	102	AVG	13.38	13.10	23.98	-10.60
	5550	110	AVG	18.20	18.48	23.98	-5.50
	5590	118	AVG	18.54	18.70	23.98	-5.28
	5630	126	AVG	18.65	18.93	23.98	-5.05
	5670	134	AVG	17.98	17.13	23.98	-6.00
	5710	142	AVG	18.83	18.56	23.98	-5.15
	5755	151	AVG	18.55	18.78	30.00	-11.22
	5795	159	AVG	18.75	18.52	30.00	-11.25

Table 7-7. FCC Antenna WF7a 40MHz BW (UNII) Maximum Conducted Output Power

5GHz (80MHz Bandwidth)	Freq [MHz]	Channel	Detector	Conducted Power [dBm]		Conducted Power Limit [dBm]	Conducted Power Margin [dB]
				802.11ac	802.11ax		
	5210	42	AVG	12.31	11.52	23.98	-11.67
	5290	58	AVG	10.36	9.53	23.98	-13.62
	5530	106	AVG	10.24	9.90	23.98	-13.74
	5610	122	AVG	17.78	16.42	23.98	-6.20
	5690	138	AVG	18.87	18.65	23.98	-5.11
	5775	155	AVG	16.49	16.15	30.00	-13.51

Table 7-8. FCC Antenna WF7a 80MHz BW (UNII) Maximum Conducted Output Power

7.4.2 ISED Antenna WF7a Conducted Output Power Measurements

	Freq [MHz]	Channel	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
				802.11a	802.11n	802.11ax						
5GHz (20MHz Bandwidth)	5180	36	AVG	14.30	14.62	15.27	-	-	4.10	19.37	23.01	-3.65
	5200	40	AVG	14.29	14.78	15.44	-	-	4.10	19.54	23.01	-3.47
	5240	48	AVG	14.24	14.71	15.38	-	-	4.10	19.48	23.01	-3.53
	5260	52	AVG	20.00	18.72	18.96	23.98	-3.98	4.80	24.80	30.00	-5.20
	5300	60	AVG	19.89	18.65	18.80	23.98	-4.09	4.80	24.69	30.00	-5.31
	5320	64	AVG	16.84	16.64	16.24	23.98	-7.14	4.80	21.64	30.00	-8.36
	5500	100	AVG	16.37	16.13	15.41	23.98	-7.61	4.60	20.97	30.00	-9.03
	5520	104	AVG	17.74	17.60	17.27	23.98	-6.24	4.60	22.34	30.00	-7.66
	5540	108	AVG	19.67	18.52	18.66	23.98	-4.31	4.60	24.27	30.00	-5.73
	5580	116	AVG	20.00	18.69	18.87	23.98	-3.98	4.60	24.60	30.00	-5.40
	5660	132	AVG	17.99	18.33	17.54	23.98	-5.65	4.60	22.93	30.00	-7.07
	5680	136	AVG	19.74	18.65	18.82	23.98	-4.24	4.60	24.34	30.00	-5.66
	5700	140	AVG	15.96	15.69	15.39	23.98	-8.02	4.60	20.56	30.00	-9.44
	5720	144	AVG	19.83	18.68	18.70	23.98	-4.15	4.60	24.43	30.00	-5.58
	5745	149	AVG	19.86	18.66	18.85	30.00	-10.14	4.60	24.46	-	-
	5785	157	AVG	19.73	18.91	18.53	30.00	-10.27	4.60	24.33	-	-
	5825	165	AVG	19.52	18.74	18.91	30.00	-10.48	4.60	24.12	-	-

Table 7-9. ISED Antenna WF7a 20MHz BW (UNII) Maximum Conducted Output Power and Max EIRP

	Freq [MHz]	Channel	Detector	Conducted Power [dBm]		Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
				802.11n	802.11ax						
5GHz (40MHz Bandwidth)	5190	38	AVG	14.46	14.30	-	-	4.10	18.56	23.01	-4.45
	5230	46	AVG	17.35	17.09	-	-	4.10	21.45	23.01	-1.56
	5270	54	AVG	18.46	18.16	23.98	-5.52	4.80	23.26	30.00	-6.74
	5310	62	AVG	13.40	12.58	23.98	-10.58	4.80	18.20	30.00	-11.80
	5510	102	AVG	13.38	13.10	23.98	-10.60	4.60	17.98	30.00	-12.02
	5550	110	AVG	18.20	18.48	23.98	-5.50	4.60	23.08	30.00	-6.92
	5670	134	AVG	17.98	17.13	23.98	-6.00	4.60	22.58	30.00	-7.42
	5710	142	AVG	18.83	18.56	23.98	-5.15	4.60	23.43	30.00	-6.57
	5755	151	AVG	18.55	18.78	30.00	-11.22	4.60	23.38	-	-
	5795	159	AVG	18.75	18.52	30.00	-11.25	4.60	23.35	-	-

Table 7-10. ISED Antenna WF7a 40MHz BW (UNII) Maximum Conducted Output Power and Max EIRP

	Freq [MHz]	Channel	Detector	Conducted Power [dBm]		Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
				802.11ac	802.11ax						
5GHz (80MHz Bandwidth)	5210	42	AVG	12.29	11.50	23.98	-11.69	4.10	16.39	23.01	-6.62
	5290	58	AVG	10.36	9.53	23.98	-13.62	4.80	15.16	30.00	-14.84
	5530	106	AVG	10.24	9.90	23.98	-13.74	4.60	14.84	30.00	-15.16
	5690	138	AVG	18.87	18.65	23.98	-5.11	4.60	23.47	30.00	-6.53
	5775	155	AVG	16.49	16.15	30.00	-13.51	4.60	21.09	-	-

Table 7-11. ISED Antenna WF7a 80MHz BW (UNII) Maximum Conducted Output Power and Max EIRP

7.4.3 FCC Antenna WF8 Conducted Output Power Measurements

5GHz (20MHz Bandwidth)	Freq [MHz]	Channel	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]
				802.11a	802.11n	802.11ax		
	5180	36	AVG	17.74	17.60	17.70	23.98	-6.24
	5200	40	AVG	19.97	18.74	18.86	23.98	-4.01
	5240	48	AVG	19.60	18.95	18.58	23.98	-4.38
	5260	52	AVG	19.69	18.96	18.62	23.98	-4.29
	5300	60	AVG	19.99	18.83	18.92	23.98	-3.99
	5320	64	AVG	16.99	16.88	16.45	23.98	-6.99
	5500	100	AVG	16.46	16.34	15.39	23.98	-7.52
	5520	104	AVG	17.69	17.71	17.31	23.98	-6.27
	5540	108	AVG	19.77	18.66	18.71	23.98	-4.21
	5580	116	AVG	19.49	18.78	18.95	23.98	-4.49
	5660	132	AVG	18.03	18.13	17.61	23.98	-5.85
	5680	136	AVG	19.89	18.86	18.87	23.98	-4.09
	5700	140	AVG	15.89	15.73	15.42	23.98	-8.09
	5720	144	AVG	19.59	18.81	18.99	23.98	-4.39
	5745	149	AVG	19.74	18.51	18.64	30.00	-10.26
	5785	157	AVG	19.59	18.84	18.75	30.00	-10.41
	5825	165	AVG	19.51	18.77	18.56	30.00	-10.50

Table 7-12. FCC Antenna WF8 20MHz BW (UNII) Maximum Conducted Output Power

5GHz (40MHz Bandwidth)	Freq [MHz]	Channel	Detector	Conducted Power [dBm]		Conducted Power Limit [dBm]	Conducted Power Margin [dB]
				802.11n	802.11ax		
	5190	38	AVG	14.38	14.11	23.98	-9.60
	5230	46	AVG	18.67	19.00	23.98	-4.98
	5270	54	AVG	18.34	18.05	23.98	-5.64
	5310	62	AVG	13.11	12.75	23.98	-10.87
	5510	102	AVG	13.05	13.33	23.98	-10.65
	5550	110	AVG	18.23	18.50	23.98	-5.48
	5590	118	AVG	18.61	18.84	23.98	-5.14
	5630	126	AVG	18.76	18.98	23.98	-5.00
	5670	134	AVG	17.81	17.21	23.98	-6.17
	5710	142	AVG	18.51	18.79	23.98	-5.19
	5755	151	AVG	19.00	18.66	30.00	-11.00
	5795	159	AVG	18.61	18.87	30.00	-11.13

Table 7-13. FCC Antenna WF8 40MHz BW (UNII) Maximum Conducted Output Power

5GHz (80MHz Bandwidth)	Freq [MHz]	Channel	Detector	Conducted Power [dBm]		Conducted Power Limit [dBm]	Conducted Power Margin [dB]
				802.11ac	802.11ax		
	5210	42	AVG	12.152	11.91	23.98	-11.83
	5290	58	AVG	10.21	9.93	23.98	-13.77
	5530	106	AVG	10.38	9.61	23.98	-13.60
	5610	122	AVG	17.92	16.31	23.98	-6.06
	5690	138	AVG	18.97	18.73	23.98	-5.01
	5775	155	AVG	16.27	16.20	30.00	-13.73

Table 7-14. FCC Antenna WF8 80MHz BW (UNII) Maximum Conducted Output Power

7.4.4 ISED Antenna WF8 Conducted Output Power Measurements

	Freq [MHz]	Channel	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
				802.11a	802.11n	802.11ax						
5GHz (20MHz Bandwidth)	5180	36	AVG	14.12	14.92	15.16	-	-	3.40	18.56	23.01	-4.45
	5200	40	AVG	14.27	14.70	15.28	-	-	3.40	18.68	23.01	-4.33
	5240	48	AVG	14.01	14.87	15.12	-	-	3.40	18.52	23.01	-4.49
	5260	52	AVG	19.69	18.96	18.62	23.98	-4.29	4.60	24.29	30.00	-5.71
	5300	60	AVG	19.99	18.83	18.92	23.98	-3.99	4.60	24.59	30.00	-5.41
	5320	64	AVG	16.99	16.88	16.45	23.98	-6.99	4.60	21.59	30.00	-8.41
	5500	100	AVG	16.46	16.34	15.39	23.98	-7.52	5.10	21.56	30.00	-8.44
	5520	104	AVG	17.69	17.71	17.31	23.98	-6.27	5.10	22.81	30.00	-7.20
	5540	108	AVG	19.77	18.66	18.71	23.98	-4.21	5.10	24.87	30.00	-5.13
	5580	116	AVG	19.49	18.78	18.95	23.98	-4.49	5.10	24.59	30.00	-5.41
	5660	132	AVG	18.03	18.13	17.61	23.98	-5.85	5.10	23.23	30.00	-6.77
	5680	136	AVG	19.89	18.86	18.87	23.98	-4.09	5.10	24.99	30.00	-5.01
	5700	140	AVG	15.89	15.73	15.42	23.98	-8.09	5.10	20.99	30.00	-9.01
	5720	144	AVG	19.59	18.81	18.99	23.98	-4.39	5.10	24.69	30.00	-5.31
	5745	149	AVG	19.74	18.51	18.64	30.00	-10.26	4.90	24.64	-	-
	5785	157	AVG	19.59	18.84	18.75	30.00	-10.41	4.90	24.49	-	-
	5825	165	AVG	19.51	18.77	18.56	30.00	-10.50	4.90	24.41	-	-

Table 7-15. ISED Antenna WF8 20MHz BW (UNII) Maximum Conducted Output Power and Max EIRP

	Freq [MHz]	Channel	Detector	Conducted Power [dBm]		Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
				802.11n	802.11ax						
5GHz (40MHz Bandwidth)	5190	38	AVG	14.38	14.20	-	-	3.40	17.78	23.01	-5.23
	5230	46	AVG	17.13	17.42	-	-	3.40	20.82	23.01	-2.19
	5270	54	AVG	18.34	18.05	23.98	-5.64	4.60	22.94	30.00	-7.07
	5310	62	AVG	13.11	12.75	23.98	-10.87	4.60	17.71	30.00	-12.29
	5510	102	AVG	13.05	13.33	23.98	-10.65	5.10	18.43	30.00	-11.57
	5550	110	AVG	18.23	18.50	23.98	-5.48	5.10	23.60	30.00	-6.40
	5670	134	AVG	17.81	17.21	23.98	-6.17	5.10	22.91	30.00	-7.09
	5710	142	AVG	18.51	18.79	23.98	-5.19	5.10	23.89	30.00	-6.11
	5755	151	AVG	19.00	18.66	30.00	-11.00	4.90	23.90	-	-
	5795	159	AVG	18.61	18.87	30.00	-11.13	4.90	23.77	-	-

Table 7-16. ISED Antenna WF8 40MHz BW (UNII) Maximum Conducted Output Power and Max EIRP

	Freq [MHz]	Channel	Detector	Conducted Power [dBm]		Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
				802.11ac	802.11ax						
5GHz (80MHz Bandwidth)	5210	42	AVG	12.159	11.88	-	-	3.40	15.56	23.01	-7.45
	5290	58	AVG	10.21	9.93	23.98	-13.77	4.60	14.81	30.00	-15.20
	5530	106	AVG	10.38	9.61	23.98	-13.60	5.10	15.48	30.00	-14.52
	5690	138	AVG	18.97	18.73	23.98	-5.01	5.10	24.07	30.00	-5.93
	5775	155	AVG	16.27	16.20	30.00	-13.73	4.90	21.17	-	-

Table 7-17. ISED Antenna WF8 80MHz BW (UNII) Maximum Conducted Output Power and Max EIRP

7.4.5 FCC CDD/SDM Conducted Output Power Measurements

	Freq [MHz]	Channel	Mode	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]
					Antenna WF7a	Antenna WF8	Summed		
5GHz (20MHz Bandwidth)	5180	36	CDD	AVG	16.36	16.28	19.33	23.98	-4.65
	5200	40	SDM	AVG	16.05	16.06	19.06	23.98	-4.92
	5240	48	SDM	AVG	16.20	16.19	19.21	23.98	-4.77
	5260	52	SDM	AVG	15.11	15.48	18.31	23.98	-5.67
	5300	60	SDM	AVG	15.50	15.21	18.37	23.98	-5.61
	5320	64	SDM	AVG	15.49	15.29	18.40	23.98	-5.58
	5500	100	SDM	AVG	15.01	15.15	18.09	23.98	-5.89
	5520	104	SDM	AVG	15.49	15.23	18.37	23.98	-5.61
	5540	108	SDM	AVG	15.47	15.01	18.26	23.98	-5.72
	5580	116	SDM	AVG	15.18	15.23	18.21	23.98	-5.77
	5660	132	SDM	AVG	15.24	15.24	18.25	23.98	-5.73
	5680	136	SDM	AVG	15.26	15.31	18.29	23.98	-5.69
	5700	140	CDD	AVG	14.98	14.95	17.97	23.98	-6.01
	5720	144	SDM	AVG	15.06	15.12	18.10	23.98	-5.88
	5745	149	CDD	AVG	18.89	18.68	21.80	30.00	-8.20
	5785	157	CDD	AVG	18.66	18.60	21.64	30.00	-8.36
	5825	165	CDD	AVG	19.00	18.76	21.89	30.00	-8.11

Table 7-18. FCC CDD/SDM 20MHz BW 802.11a (UNII) Maximum Conducted Output Power

	Freq [MHz]	Channel	Mode	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]
					Antenna WF7a	Antenna WF8	Summed		
5GHz (20MHz Bandwidth)	5180	36	CDD	AVG	16.17	16.07	19.13	23.98	-4.85
	5200	40	SDM	AVG	17.15	17.20	20.18	23.98	-3.80
	5240	48	SDM	AVG	17.04	17.35	20.21	23.98	-3.77
	5260	52	SDM	AVG	17.08	17.39	20.25	23.98	-3.73
	5300	60	SDM	AVG	17.07	17.29	20.19	23.98	-3.79
	5320	64	SDM	AVG	16.09	16.35	19.23	23.98	-4.75
	5500	100	SDM	AVG	16.12	16.36	19.25	23.98	-4.73
	5520	104	SDM	AVG	15.64	15.81	18.74	23.98	-5.24
	5540	108	SDM	AVG	17.11	17.43	20.29	23.98	-3.69
	5580	116	SDM	AVG	17.15	17.16	20.16	23.98	-3.82
	5660	132	SDM	AVG	17.39	17.44	20.42	23.98	-3.56
	5680	136	SDM	AVG	17.15	17.13	20.15	23.98	-3.83
	5700	140	CDD	AVG	14.67	14.67	17.68	23.98	-6.30
	5720	144	SDM	AVG	17.48	17.25	20.38	23.98	-3.60
	5745	149	CDD	AVG	18.67	18.99	21.84	30.00	-8.16
	5785	157	CDD	AVG	18.97	18.97	21.98	30.00	-8.02
	5825	165	CDD	AVG	18.80	18.76	21.79	30.00	-8.21

Table 7-19. FCC CDD/SDM 20MHz BW 802.11n (UNII) Maximum Conducted Output Power

	Freq [MHz]	Channel	Mode	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]
					Antenna WF7a	Antenna WF8	Summed		
5GHz (20MHz Bandwidth)	5180	36	CDD	AVG	16.30	16.21	19.27	23.98	-4.71
	5200	40	SDM	AVG	17.99	17.93	20.97	23.98	-3.01
	5240	48	SDM	AVG	17.74	17.58	20.67	23.98	-3.31
	5260	52	SDM	AVG	17.82	17.58	20.71	23.98	-3.27
	5300	60	SDM	AVG	17.83	17.54	20.70	23.98	-3.28
	5320	64	CDD	AVG	15.85	15.54	18.71	23.98	-5.27
	5500	100	CDD	AVG	14.77	14.99	17.89	23.98	-6.09
	5520	104	CDD	AVG	15.32	15.45	18.40	23.98	-5.58
	5540	108	SDM	AVG	17.76	17.89	20.83	23.98	-3.15
	5580	116	SDM	AVG	17.90	17.96	20.94	23.98	-3.04
	5660	132	SDM	AVG	16.64	16.62	19.64	23.98	-4.34
	5680	136	SDM	AVG	17.82	17.95	20.89	23.98	-3.09
	5700	140	CDD	AVG	14.32	14.39	17.37	23.98	-6.61
	5720	144	SDM	AVG	17.67	17.98	20.84	23.98	-3.14
	5745	149	CDD	AVG	18.83	18.71	21.78	30.00	-8.22
	5785	157	CDD	AVG	18.93	18.56	21.76	30.00	-8.24
	5825	165	CDD	AVG	18.98	18.56	21.79	30.00	-8.21

Table 7-20. FCC CDD/SDM 20MHz BW 802.11ax (SU) (UNII) Maximum Conducted Output Power

	Freq [MHz]	Channel	Mode	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]
					Antenna WF7a	Antenna WF8	Summed		
5GHz (40MHz Bandwidth)	5190	38	CDD	AVG	13.36	13.39	16.39	23.98	-7.59
	5230	46	CDD	AVG	17.86	17.71	20.80	23.98	-3.18
	5270	54	CDD	AVG	17.87	17.86	20.87	23.98	-3.11
	5310	62	CDD	AVG	12.89	12.64	15.78	23.98	-8.20
	5510	102	CDD	AVG	12.36	12.12	15.25	23.98	-8.73
	5550	110	CDD	AVG	17.15	17.36	20.26	23.98	-3.72
	5590	118	SDM	AVG	18.98	18.64	21.82	23.98	-2.16
	5630	126	CDD	AVG	17.88	17.83	20.86	23.98	-3.12
	5670	134	CDD	AVG	16.90	16.72	19.82	23.98	-4.16
	5710	142	SDM	AVG	18.86	18.52	21.70	23.98	-2.28
	5755	151	CDD	AVG	18.54	18.98	21.78	30.00	-8.22
	5795	159	CDD	AVG	18.71	18.57	21.65	30.00	-8.35

Table 7-21. FCC CDD/SDM 40MHz BW 802.11n (UNII) Maximum Conducted Output Power

5GHz (40MHz Bandwidth)	Freq [MHz]	Channel	Mode	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]
					Antenna WF7a	Antenna WF8	Summed		
	5190	38	CDD	AVG	11.66	11.70	14.69	23.98	-9.29
	5230	46	CDD	AVG	17.62	17.52	20.58	23.98	-3.40
	5270	54	CDD	AVG	17.11	17.13	20.13	23.98	-3.85
	5310	62	CDD	AVG	12.19	12.42	15.31	23.98	-8.67
	5510	102	CDD	AVG	11.62	11.91	14.78	23.98	-9.20
	5550	110	CDD	AVG	16.92	16.58	19.76	23.98	-4.22
	5590	118	SDM	AVG	18.80	18.50	21.66	23.98	-2.32
	5630	126	CDD	AVG	17.91	17.54	20.74	23.98	-3.24
	5670	134	CDD	AVG	16.60	16.70	19.66	23.98	-4.32
	5710	142	SDM	AVG	18.66	18.86	21.77	23.98	-2.21
	5755	151	CDD	AVG	18.88	18.82	21.86	30.00	-8.14
	5795	159	CDD	AVG	18.52	18.96	21.76	30.00	-8.24

Table 7-22. FCC CDD/SDM 40MHz BW 802.11ax (SU) (UNII) Maximum Conducted Output Power

5GHz (80MHz Bandwidth)	Freq [MHz]	Channel	Mode	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]
					Antenna WF7a	Antenna WF8	Summed		
	5210	42	CDD	AVG	10.29	10.45	13.38	23.98	-10.60
	5290	58	CDD	AVG	9.98	9.85	12.93	23.98	-11.05
	5530	106	CDD	AVG	9.41	9.45	12.44	23.98	-11.54
	5610	122	CDD	AVG	16.15	16.38	19.27	23.98	-4.71
	5690	138	CDD	AVG	18.90	18.57	21.75	23.98	-2.23
	5775	155	CDD	AVG	15.33	15.28	18.31	30.00	-11.69

Table 7-23. FCC CDD 80MHz BW 802.11ac (UNII) Maximum Conducted Output Power

5GHz (80MHz Bandwidth)	Freq [MHz]	Channel	Mode	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]
					Antenna WF7a	Antenna WF8	Summed		
	5210	42	CDD	AVG	10.49	10.49	13.50	23.98	-10.48
	5290	58	CDD	AVG	9.11	9.07	12.10	23.98	-11.88
	5530	106	CDD	AVG	9.13	9.37	12.26	23.98	-11.72
	5610	122	CDD	AVG	15.93	15.54	18.75	23.98	-5.23
	5690	138	CDD	AVG	18.57	18.88	21.74	23.98	-2.24
	5775	155	CDD	AVG	15.15	15.47	18.33	30.00	-11.67

Table 7-24. FCC CDD 80MHz BW 802.11ax (SU) (UNII) Maximum Conducted Output Power

ISED CDD/SDM Conducted Output Power Measurements

	Freq [MHz]	Channel	Mode	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
					Antenna WF7a	Antenna WF8	Summed						
5GHz (20MHz Bandwidth)	5180	36	CDD	AVG	9.46	9.45	12.47	-	-	4.10	16.57	23.01	-6.44
	5200	40	SDM	AVG	9.48	9.10	12.30	-	-	3.76	16.06	23.01	-6.95
	5240	48	SDM	AVG	9.11	9.48	12.31	-	-	3.76	16.07	23.01	-6.94
	5260	52	SDM	AVG	15.11	15.48	18.31	23.98	-5.67	4.70	23.01	30.00	-6.99
	5300	60	SDM	AVG	15.50	15.21	18.37	23.98	-5.61	4.70	23.07	30.00	-6.93
	5320	64	SDM	AVG	15.49	15.29	18.40	23.98	-5.58	4.70	23.10	30.00	-6.90
	5500	100	SDM	AVG	15.01	15.15	18.09	23.98	-5.89	4.86	22.95	30.00	-7.05
	5520	104	SDM	AVG	15.49	15.23	18.37	23.98	-5.61	4.86	23.23	30.00	-6.77
	5540	108	SDM	AVG	15.47	15.01	18.26	23.98	-5.72	4.86	23.12	30.00	-6.88
	5580	116	SDM	AVG	15.18	15.23	18.21	23.98	-5.77	4.86	23.07	30.00	-6.93
	5660	132	SDM	AVG	15.24	15.24	18.25	23.98	-5.73	4.86	23.11	30.00	-6.89
	5680	136	SDM	AVG	15.26	15.31	18.29	23.98	-5.69	4.86	23.15	30.00	-6.85
	5700	140	CDD	AVG	14.98	14.95	17.97	23.98	-6.01	5.10	23.07	30.00	-6.93
	5720	144	SDM	AVG	15.06	15.12	18.10	23.98	-5.88	4.86	22.96	30.00	-7.04
	5745	149	CDD	AVG	18.89	18.68	21.80	30.00	-8.20	4.90	26.70	-	-
	5785	157	CDD	AVG	18.66	18.60	21.64	30.00	-8.36	4.90	26.54	-	-
	5825	165	CDD	AVG	19.00	18.76	21.89	30.00	-8.11	4.90	26.79	-	-

Table 7-25. ISED CDD/SDM 20MHz BW 802.11a (UNII) Maximum Conducted Output Power and Max EIRP

	Freq [MHz]	Channel	Mode	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
					Antenna WF7a	Antenna WF8	Summed						
5GHz (20MHz Bandwidth)	5180	36	CDD	AVG	12.16	12.04	15.11	-	-	4.10	19.21	23.01	-3.80
	5200	40	SDM	AVG	12.23	12.20	15.22	-	-	3.76	18.98	23.01	-4.03
	5240	48	SDM	AVG	12.20	12.49	15.36	-	-	3.76	19.12	23.01	-3.89
	5260	52	SDM	AVG	17.08	17.39	20.25	23.98	-3.73	4.70	24.95	30.00	-5.05
	5300	60	SDM	AVG	17.07	17.29	20.19	23.98	-3.79	4.70	24.89	30.00	-5.11
	5320	64	SDM	AVG	16.09	16.35	19.23	23.98	-4.75	4.70	23.93	30.00	-6.07
	5500	100	SDM	AVG	16.12	16.36	19.25	23.98	-4.73	4.86	24.11	30.00	-5.89
	5520	104	SDM	AVG	15.64	15.81	18.74	23.98	-5.24	4.86	23.60	30.00	-6.40
	5540	108	SDM	AVG	17.11	17.43	20.29	23.98	-3.69	4.86	25.15	30.00	-4.85
	5580	116	SDM	AVG	17.15	17.16	20.16	23.98	-3.82	4.86	25.02	30.00	-4.98
	5660	132	SDM	AVG	17.39	17.44	20.42	23.98	-3.56	4.86	25.28	30.00	-4.72
	5680	136	SDM	AVG	17.15	17.13	20.15	23.98	-3.83	4.86	25.01	30.00	-4.99
	5700	140	CDD	AVG	14.67	14.67	17.68	23.98	-6.30	5.10	22.78	30.00	-7.22
	5720	144	SDM	AVG	17.48	17.25	20.38	23.98	-3.60	4.86	25.24	30.00	-4.76
	5745	149	CDD	AVG	18.67	18.99	21.84	30.00	-8.16	4.90	26.74	-	-
	5785	157	CDD	AVG	18.97	18.97	21.98	30.00	-8.02	4.90	26.88	-	-
	5825	165	CDD	AVG	18.80	18.76	21.79	30.00	-8.21	4.90	26.69	-	-

Table 7-26. ISED CDD/SDM 20MHz BW 802.11n (UNII) Maximum Conducted Output Power and Max EIRP

5GHz (20MHz Bandwidth)	Freq [MHz]	Channel	Mode	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
					Antenna WF7a	Antenna WF8	Summed						
	5180	36	CDD	AVG	12.88	12.79	15.84	-	-	4.10	19.94	23.01	-3.07
	5200	40	SDM	AVG	12.96	12.87	15.92	-	-	3.76	19.68	23.01	-3.33
	5240	48	SDM	AVG	12.87	12.69	15.79	-	-	3.76	19.55	23.01	-3.46
	5260	52	SDM	AVG	17.82	17.58	20.71	23.98	-3.27	4.70	25.41	30.00	-4.59
	5300	60	SDM	AVG	17.83	17.54	20.70	23.98	-3.28	4.70	25.40	30.00	-4.60
	5320	64	CDD	AVG	15.85	15.54	18.71	23.98	-5.27	4.80	23.51	30.00	-6.49
	5500	100	CDD	AVG	14.77	14.99	17.89	23.98	-6.09	5.10	22.99	30.00	-7.01
	5520	104	CDD	AVG	15.32	15.45	18.40	23.98	-5.58	5.10	23.50	30.00	-6.50
	5540	108	SDM	AVG	17.76	17.89	20.83	23.98	-3.15	4.86	25.69	30.00	-4.31
	5580	116	SDM	AVG	17.90	17.96	20.94	23.98	-3.04	4.86	25.80	30.00	-4.20
	5660	132	SDM	AVG	16.64	16.62	19.64	23.98	-4.34	4.86	24.50	30.00	-5.50
	5680	136	SDM	AVG	17.82	17.95	20.89	23.98	-3.09	4.86	25.75	30.00	-4.25
	5700	140	CDD	AVG	14.32	14.39	17.37	23.98	-6.61	5.10	22.47	30.00	-7.53
	5720	144	SDM	AVG	17.67	17.98	20.84	23.98	-3.14	4.86	25.70	30.00	-4.30
	5745	149	CDD	AVG	18.83	18.71	21.78	30.00	-8.22	4.90	26.68	-	-
	5785	157	CDD	AVG	18.93	18.56	21.76	30.00	-8.24	4.90	26.66	-	-
	5825	165	CDD	AVG	18.98	18.56	21.79	30.00	-8.21	4.90	26.69	-	-

Table 7-27. ISED CDD/SDM 20MHz BW 802.11ax (UNII) Maximum Conducted Output Power and Max EIRP

5GHz (40MHz Bandwidth)	Freq [MHz]	Channel	Mode	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
					Antenna WF7a	Antenna WF8	Summed						
	5190	38	CDD	AVG	13.50	13.46	16.49	-	-	4.10	20.59	23.01	-2.42
	5230	46	CDD	AVG	14.64	14.62	17.64	-	-	4.10	21.74	23.01	-1.27
	5270	54	CDD	AVG	17.87	17.86	20.87	23.98	-3.11	4.80	25.67	30.00	-4.33
	5310	62	CDD	AVG	12.89	12.64	15.78	23.98	-8.20	4.80	20.58	30.00	-9.42
	5510	102	CDD	AVG	12.36	12.12	15.25	23.98	-8.73	5.10	20.35	30.00	-9.65
	5550	110	CDD	AVG	17.15	17.36	20.26	23.98	-3.72	5.10	25.36	30.00	-4.64
	5670	134	CDD	AVG	16.90	16.72	19.82	23.98	-4.16	5.10	24.92	30.00	-5.08
	5710	142	SDM	AVG	18.86	18.52	21.70	23.98	-2.28	4.86	26.56	30.00	-3.44
	5755	151	CDD	AVG	18.54	18.98	21.78	30.00	-8.22	4.90	26.68	-	-
	5795	159	CDD	AVG	18.71	18.57	21.65	30.00	-8.35	4.90	26.55	-	-

Table 7-28. ISED CDD 40MHz BW 802.11n (UNII) Maximum Conducted Output Power and Max EIRP

5GHz (40MHz Bandwidth)	Freq [MHz]	Channel	Mode	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
					Antenna WF7a	Antenna WF8	Summed						
	5190	38	CDD	AVG	11.77	11.66	14.72	-	-	4.10	18.82	23.01	-4.19
	5230	46	CDD	AVG	14.58	14.87	17.73	-	-	4.10	21.83	23.01	-1.18
	5270	54	CDD	AVG	17.11	17.13	20.13	23.98	-3.85	4.80	24.93	30.00	-5.07
	5310	62	CDD	AVG	12.19	12.42	15.31	23.98	-8.67	4.80	20.11	30.00	-9.89
	5510	102	CDD	AVG	11.62	11.91	14.78	23.98	-9.20	5.10	19.88	30.00	-10.12
	5550	110	CDD	AVG	16.92	16.58	19.76	23.98	-4.22	5.10	24.86	30.00	-5.14
	5670	134	CDD	AVG	16.60	16.70	19.66	23.98	-4.32	5.10	24.76	30.00	-5.24
	5710	142	SDM	AVG	18.66	18.86	21.77	23.98	-2.21	4.86	26.63	30.00	-3.37
	5755	151	CDD	AVG	18.88	18.82	21.86	30.00	-8.14	4.90	26.76	-	-
	5795	159	CDD	AVG	18.52	18.96	21.76	30.00	-8.24	4.90	26.66	-	-

Table 7-29. ISED CDD 40MHz BW 802.11ax (UNII) Maximum Conducted Output Power and Max EIRP

5GHz (80MHz Bandwidth)	Freq [MHz]	Channel	Mode	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
					Antenna WF7a	Antenna WF8	Summed						
	5210	42	CDD	AVG	10.39	10.39	13.40	-	-	4.10	17.50	23.01	-5.51
	5290	58	CDD	AVG	9.98	9.85	12.93	23.98	-11.05	4.80	17.73	30.00	-12.27
	5530	106	CDD	AVG	9.41	9.45	12.44	23.98	-11.54	5.10	17.54	30.00	-12.46
	5690	138	CDD	AVG	18.90	18.57	21.75	23.98	-2.23	5.10	26.85	30.00	-3.15
	5775	155	CDD	AVG	15.33	15.28	18.31	30.00	-11.69	4.90	23.21	-	-

Table 7-30. ISED CDD 80MHz BW 802.11ac (UNII) Maximum Conducted Output Power and Max EIRP

5GHz (80MHz Bandwidth)	Freq [MHz]	Channel	Mode	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
					Antenna WF7a	Antenna WF8	Summed						
	5210	42	CDD	AVG	10.47	10.06	13.28	-	-	4.10	17.38	23.01	-5.63
	5290	58	CDD	AVG	9.11	9.07	12.10	23.98	-11.88	4.80	16.90	30.00	-13.10
	5530	106	CDD	AVG	9.13	9.37	12.26	23.98	-11.72	5.10	17.36	30.00	-12.64
	5690	138	CDD	AVG	18.57	18.88	21.74	23.98	-2.24	5.10	26.84	30.00	-3.16
	5775	155	CDD	AVG	15.15	15.47	18.33	30.00	-11.67	4.90	23.23	-	-

Table 7-31. ISED CDD 80MHz BW 802.11ax (UNII) Maximum Conducted Output Power and Max EIRP

Note:

Per ANSI C63.10-2020 and KDB 662911 v02r01 Section E)1), the conducted powers at Antenna WF7a and Antenna WF8 were first measured separately during CDD/SDM transmission as shown in the section above. The measured values were then summed in linear power units then converted back to dBm.

Per ANSI C63.10-2020 Section 14.6.3, the directional gain is calculated using the following formula, where G_N is the gain of the nth antenna and N_{ANT}, the total number of antennas used.

$$\text{Directional gain} = G_{ANT} + \text{Array Gain dBi}$$

Per ANSI C63.10-2020 Section 14.6.3, the uncorrelated directional gain is calculated using the following formula, where G_N is the gain of the nth antenna and N_{ANT}, the total number of antennas used.

$$\text{Directional gain} = 10 \log[(10^{G_1/10} + 10^{G_2/10} + \ldots + 10^{G_N/10}) / N_{ANT}] \text{ dBi}$$

Sample CDD/SDM Calculation:

At 5180MHz in 802.11n (20MHz BW) mode, the average conducted output power was measured to be 12.16 dBm for Antenna WF7a and 12.04 dBm for Antenna WF8.

Antenna WF7a + Antenna WF8 = CDD/SDM

(12.04 dBm + 12.16 dBm) = (16.00 mW + 16.44 mW) = 32.45 mW = 15.11 dBm

Sample e.i.r.p. Calculation:

At 5180MHz in 802.11n (20MHz BW) mode, the average MIMO conducted power was calculated to be 15.11 dBm with directional gain of 4.10 dBi.

e.i.r.p. (dBm) = Conducted Power (dBm) + Ant gain (dBi)

15.11 dBm + 4.10 dBi = 19.21 dBm

7.5 Maximum Power Spectral Density

§15.407(a.1.iv) §15.407(a.2) §15.407(a.3.i); RSS-247 [6.2]

Test Overview and Limit

The spectrum analyzer was connected to the antenna terminal while the EUT was operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2020 and KDB 789033 D02 v02r01, and at the appropriate frequencies. Method SA-1, as defined in ANSI C63.10-2020 and KDB 789033 D02 v02r01, was used to measure the power spectral density.

In the 5.15 – 5.25GHz, 5.25 – 5.35GHz, 5.47 – 5.725GHz bands, the maximum permissible power spectral density is 11dBm/MHz.

In the 5.15 – 5.25GHz band, the e.i.r.p. spectral density shall not exceed 10 dBm in any 1 MHz band.

In the 5.725 – 5.850GHz band, the maximum permissible power spectral density is 30dBm/500kHz.

Test Procedure Used

ANSI C63.10-2020 – Section 12.4.2.2
KDB 789033 D02 v02r01 – Section F
ANSI C63.10-2020 – Section 14.5.2.2 Measure-and-Sum Technique
KDB 662911 v02r01 – Section E)2) Measure-and-Sum Technique

Test Settings

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Set span to encompass the entire 99% OBW of the signal
3. RBW = 1MHz for U-NII 1, U-NII 2A, U-NII 2C; 500kHz for U-NII 3
4. VBW ≥ 3MHz for U-NII 1, U-NII 2A, U-NII 2C; ≥ 3 x RBW for U-NII 3
5. Number of sweep points ≥ 2 x (span/RBW)
6. Sweep time = auto
7. Detector = power averaging (RMS)
8. Trigger was set to free run for all modes
9. Trace was averaged over 100 sweeps
10. The peak search function of the spectrum analyzer was used to find the peak of the spectrum.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-4. Test Instrument & Measurement Setup

Test Notes

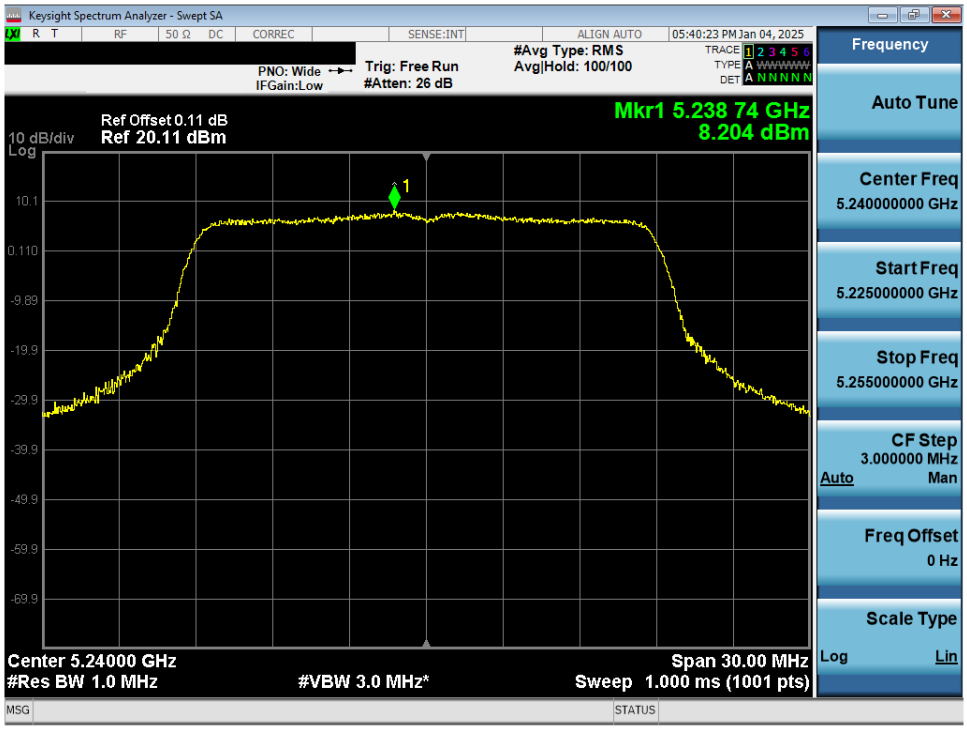
3. All data rates were investigated, and tabular data has been reported. Only the worst-case plot per bandwidth was reported.

7.5.1 Antenna WF7a Power Spectral Density Measurements

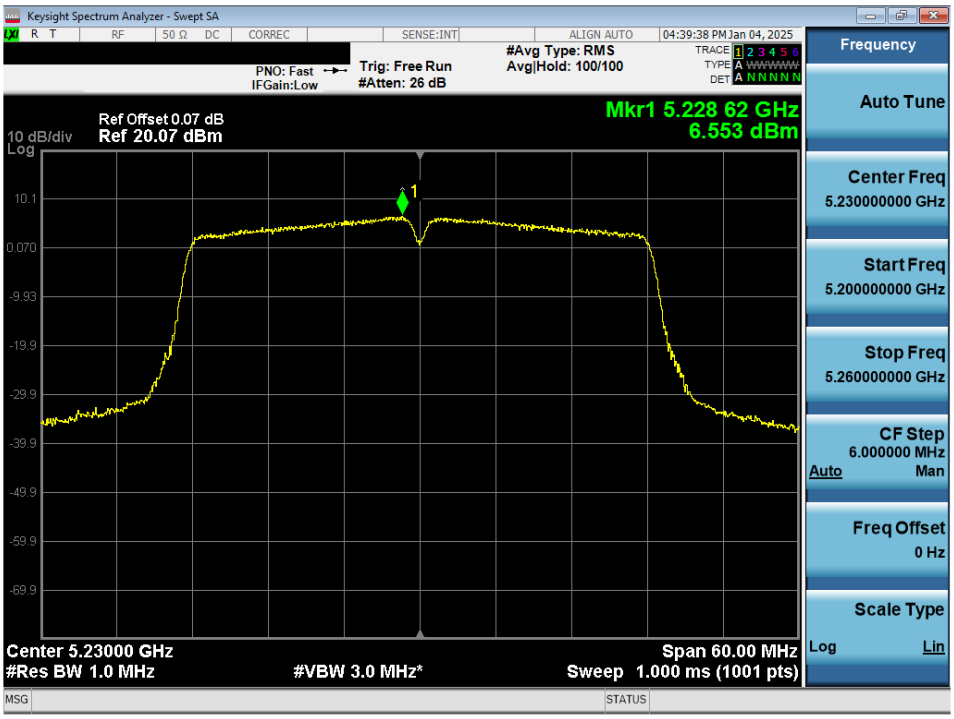
	Frequency [MHz]	Channel No.	802.11 MODE	Data Rate [Mbps]	Measured Power Density [dBm/MHz]	Max Power Density [dBm/MHz]	Margin [dB]
Band 1	5180	36	n (20MHz)	19.5/21.7 (MCS2)	7.00	11.00	-4.00
	5200	40	n (20MHz)	39/43.3 (MCS4)	8.10	11.00	-2.90
	5240	48	n (20MHz)	65/72.2 (MCS7)	8.20	11.00	-2.80
	5180	36	ax (SU) (20MHz)	24/25.8 (MCS2)	6.91	11.00	-4.09
	5200	40	ax (SU) (20MHz)	24/25.8 (MCS2)	7.99	11.00	-3.01
	5240	48	ax (SU) (20MHz)	24/25.8 (MCS2)	7.88	11.00	-3.13
	5190	38	n (40MHz)	40/40.5 (MCS2)	2.08	11.00	-8.92
	5230	46	n (40MHz)	40/40.5 (MCS2)	6.55	11.00	-4.45
	5190	38	ax (SU) (40MHz)	49/51.6 (MCS2)	1.65	11.00	-9.35
	5230	46	ax (SU) (40MHz)	49/51.6 (MCS2)	6.28	11.00	-4.72
	5210	42	ac (80MHz)	87.8/97.5 (MCS2)	-3.40	11.00	-14.40
	5210	42	ax (SU) (80MHz)	102/108.1 (MCS2)	-4.02	11.00	-15.02
Band 2A	5260	52	n (20MHz)	65/72.2 (MCS7)	7.69	11.00	-3.31
	5300	60	n (20MHz)	65/72.2 (MCS7)	8.04	11.00	-2.96
	5320	64	n (20MHz)	19.5/21.7 (MCS2)	5.36	11.00	-5.64
	5260	52	ax (SU) (20MHz)	24/25.8 (MCS2)	7.46	11.00	-3.54
	5300	60	ax (SU) (20MHz)	24/25.8 (MCS2)	7.49	11.00	-3.51
	5320	64	ax (SU) (20MHz)	24/25.8 (MCS2)	4.97	11.00	-6.03
	5270	54	n (40MHz)	135/150 (MCS7)	5.77	11.00	-5.23
	5310	62	n (40MHz)	40/40.5 (MCS2)	0.41	11.00	-10.59
	5270	54	ax (SU) (40MHz)	49/51.6 (MCS2)	5.10	11.00	-5.90
	5310	62	ax (SU) (40MHz)	49/51.6 (MCS2)	-0.26	11.00	-11.26
	5290	58	ac (80MHz)	175.5/195 (MCS4)	-5.69	11.00	-16.69
	5290	58	ax (SU) (80MHz)	204/216.2 (MCS4)	-4.09	11.00	-15.09
Band 2C	5500	100	n (20MHz)	19.5/21.7 (MCS2)	5.12	11.00	-5.88
	5580	116	n (20MHz)	65/72.2 (MCS7)	7.84	11.00	-3.16
	5700	140	n (20MHz)	39/43.3 (MCS4)	4.81	11.00	-6.19
	5720	144	n (20MHz)	65/72.2 (MCS7)	7.71	11.00	-3.29
	5500	100	ax (SU) (20MHz)	49/51.6 (MCS4)	4.08	11.00	-6.92
	5580	116	ax (SU) (20MHz)	49/51.6 (MCS4)	7.49	11.00	-3.52
	5700	140	ax (SU) (20MHz)	24/25.8 (MCS2)	4.07	11.00	-6.94
	5720	144	ax (SU) (20MHz)	49/51.6 (MCS4)	7.35	11.00	-3.65
	5510	102	n (40MHz)	81/90 (MCS4)	0.70	11.00	-10.31
	5550	110	n (40MHz)	40/40.5 (MCS2)	5.18	11.00	-5.82
	*5590	118	n (40MHz)	81/90 (MCS4)	5.65	11.00	-5.35
	5670	134	n (40MHz)	40/40.5 (MCS2)	5.31	11.00	-5.69
	5710	142	n (40MHz)	40/40.5 (MCS2)	6.00	11.00	-5.00
	5510	102	ax (SU) (40MHz)	49/51.6 (MCS2)	0.31	11.00	-10.69
	5550	110	ax (SU) (40MHz)	49/51.6 (MCS2)	5.62	11.00	-5.38
	*5590	118	ax (SU) (40MHz)	49/51.6 (MCS2)	5.49	11.00	-5.51
	5670	134	ax (SU) (40MHz)	49/51.6 (MCS2)	4.01	11.00	-6.99
	5710	142	ax (SU) (40MHz)	98/103.2 (MCS4)	6.19	11.00	-4.81
	5530	106	ac (80MHz)	175.5/195 (MCS4)	-5.83	11.00	-16.83
	*5610	122	ac (80MHz)	87.8/97.5 (MCS2)	1.57	11.00	-9.43
	5690	138	ac (80MHz)	87.8/97.5 (MCS2)	3.43	11.00	-7.58
	5530	106	ax (SU) (80MHz)	102/108.1 (MCS2)	-5.94	11.00	-16.94
	*5610	122	ax (SU) (80MHz)	102/108.1 (MCS2)	0.25	11.00	-10.75
	5690	138	ax (SU) (80MHz)	204/216.2 (MCS4)	3.60	11.00	-7.40

Table 7-32. Bands 1, 2A, 2C Power Spectral Density Measurements Antenna WF7a

*TDWR channel is not supported for ISED (denoted by a * next to the frequency)



Plot 7-13. PSD Antenna WF7a (20MHz BW 802.11n – Ch.48)

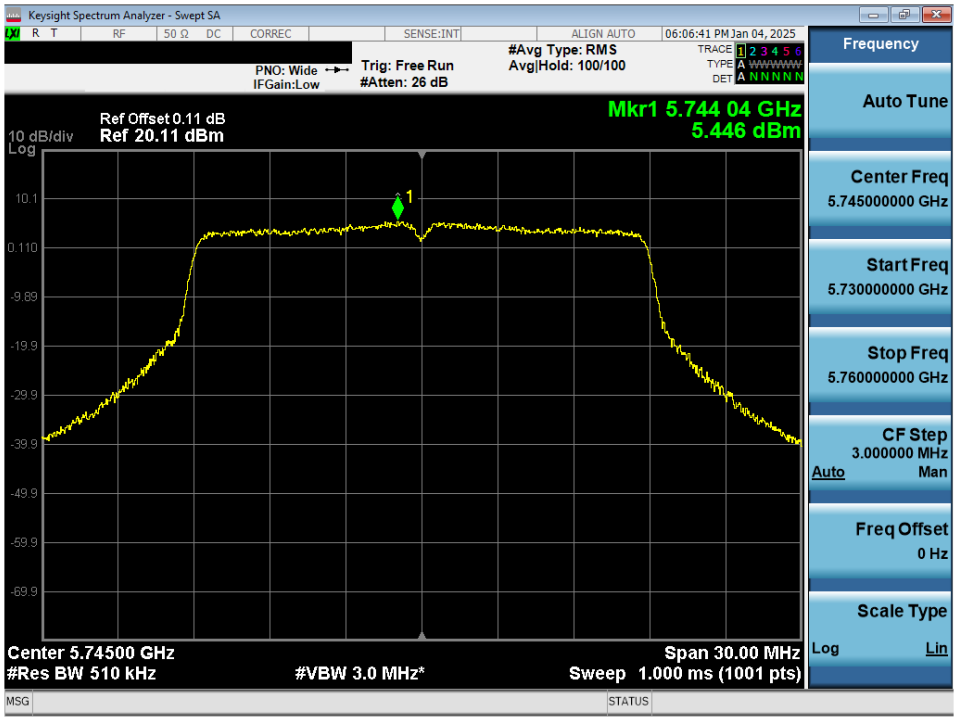


Plot 7-14. PSD Antenna WF7a (40MHz BW 802.11n – Ch. 46)

Plot 7-15. PSD Antenna WF7a (80MHz BW 802.11ax SU – Ch. 138)

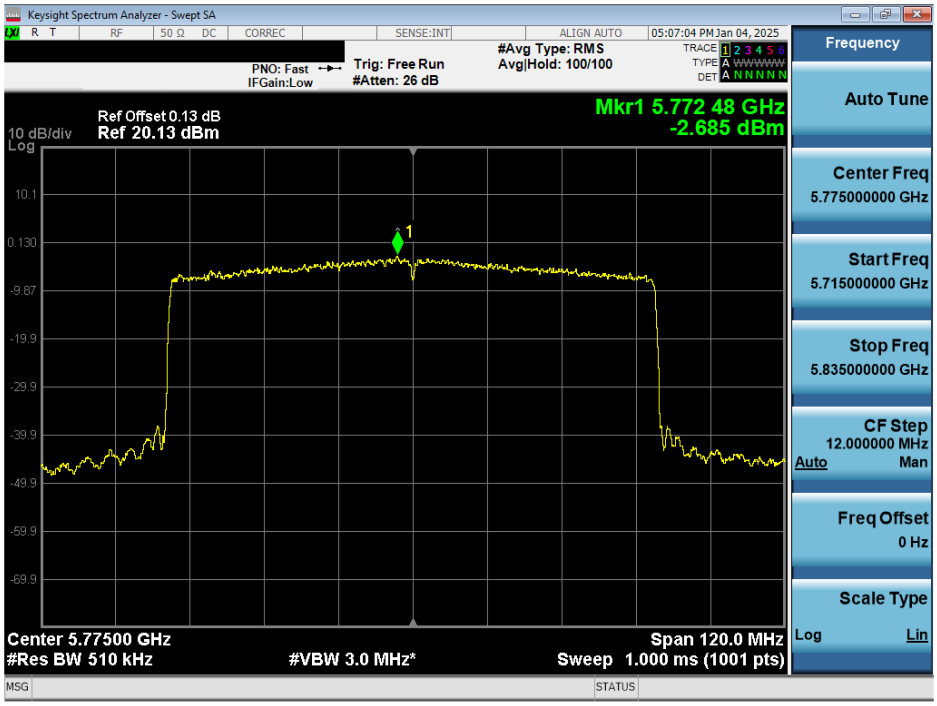
	Frequency [MHz]	Channel	802.11 MODE	Data Rate [Mbps]	Measured Power Density [dBm/500kHz]	Max Permissible Power Density [dBm/500kHz]	Margin [dB]
Band 3	5745	149	n (20MHz)	65/72.2 (MCS7)	5.45	30.0	-24.55
	5785	157	n (20MHz)	65/72.2 (MCS7)	5.23	30.0	-24.77
	5825	165	n (20MHz)	39/43.3 (MCS4)	4.86	30.0	-25.14
	5745	149	ax (SU) (20MHz)	49/51.6 (MCS4)	4.65	30.0	-25.35
	5785	157	ax (SU) (20MHz)	49/51.6 (MCS4)	4.33	30.0	-25.68
	5825	165	ax (SU) (20MHz)	49/51.6 (MCS4)	5.07	30.0	-24.93
	5755	151	n (40MHz)	81/90 (MCS4)	3.04	30.0	-26.96
	5795	159	n (40MHz)	135/150 (MCS7)	2.87	30.0	-27.13
	5755	151	ax (SU) (40MHz)	49/51.6 (MCS2)	3.17	30.0	-26.83
	5795	159	ax (SU) (40MHz)	98/103.2 (MCS4)	2.89	30.0	-27.11
	5775	155	ac (80MHz)	87.8/97.5 (MCS2)	-2.77	30.0	-32.77
	5775	155	ax (SU) (80MHz)	102/108.1 (MCS2)	-2.69	30.0	-32.69

Table 7-33. Band 3 Power Spectral Density Measurements Antenna WF7a



Plot 7-16. PSD Antenna WF7a (20MHz BW 802.11n – Ch. 149)

Plot 7-17. PSD Antenna WF7a (40MHz BW 802.11ax SU – Ch. 151)

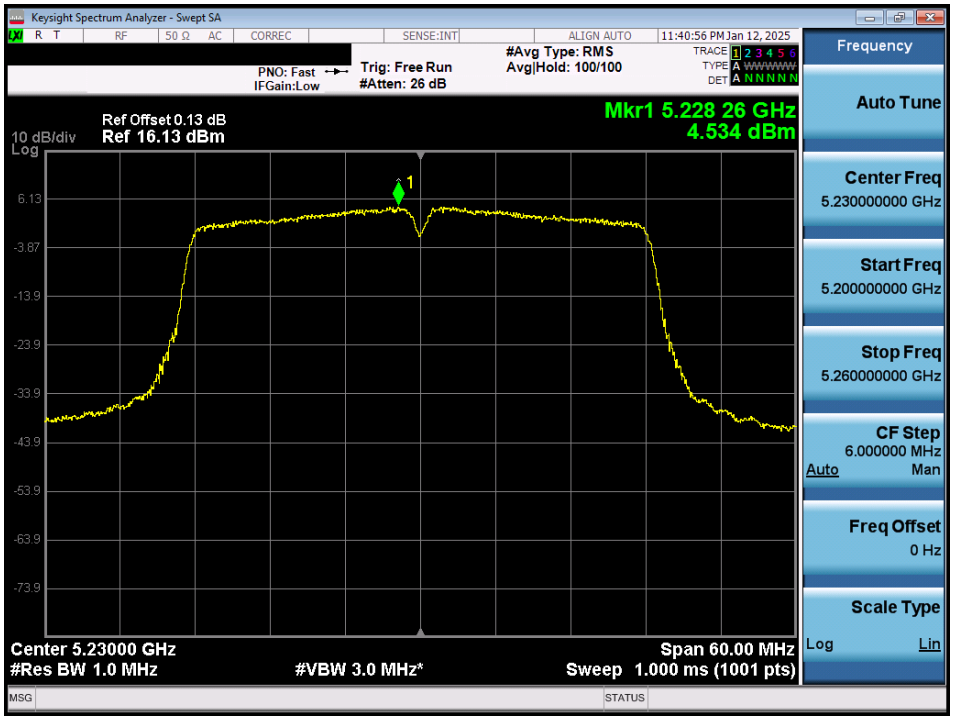


Plot 7-18. PSD Antenna WF7a (80MHz BW 802.11ax SU – Ch. 155)

	Frequency [MHz]	Channel No.	802.11 MODE	Data Rate [Mbps]	Measured Power Density [dBm/MHz]	Antenna Gain [dBi]	e.i.r.p. Power Density [dBm/MHz]	ISED Max e.i.r.p. Power Density [dBm/MHz]	Margin [dB]
Band 1	5180	36	n (20MHz)	65/72.2 (MCS7)	4.89	4.10	8.99	10.0	-1.01
	5200	40	n (20MHz)	65/72.2 (MCS7)	4.38	4.10	8.48	10.0	-1.52
	5240	48	n (20MHz)	65/72.2 (MCS7)	4.21	4.10	8.31	10.0	-1.69
	5180	36	ax (SU) (20MHz)	49/51.6 (MCS4)	4.70	4.10	8.80	10.0	-1.21
	5200	40	ax (SU) (20MHz)	49/51.6 (MCS4)	5.00	4.10	9.10	10.0	-0.90
	5240	48	ax (SU) (20MHz)	24/25.8 (MCS2)	4.71	4.10	8.81	10.0	-1.19
	5190	38	n (40MHz)	135/150 (MCS7)	2.14	4.10	6.24	10.0	-3.76
	5230	46	n (40MHz)	81/90 (MCS4)	4.53	4.10	8.63	10.0	-1.37
	5190	38	ax (SU) (40MHz)	49/51.6 (MCS2)	1.47	4.10	5.57	10.0	-4.43
	5230	46	ax (SU) (40MHz)	49/51.6 (MCS2)	4.24	4.10	8.34	10.0	-1.66
	5210	42	ac (80MHz)	87.8/97.5 (MCS2)	-4.01	4.10	0.09	10.0	-9.91
	5210	42	ax (SU) (80MHz)	102/108.1 (MCS2)	-3.81	4.10	0.29	10.0	-9.71

Table 7-34. ISED Band 1 e.i.r.p. Power Spectral Density Measurements Antenna WF7a

Plot 7-19. ISED PSD Antenna WF7a (20MHz BW 11ax SU – Ch.40)



Plot 7-20. ISED PSD Antenna WF7a (40MHz BW 11ax SU – Ch.46)

Plot 7-21. ISED PSD Antenna WF7a (80MHz BW 11ax SU – Ch.42)

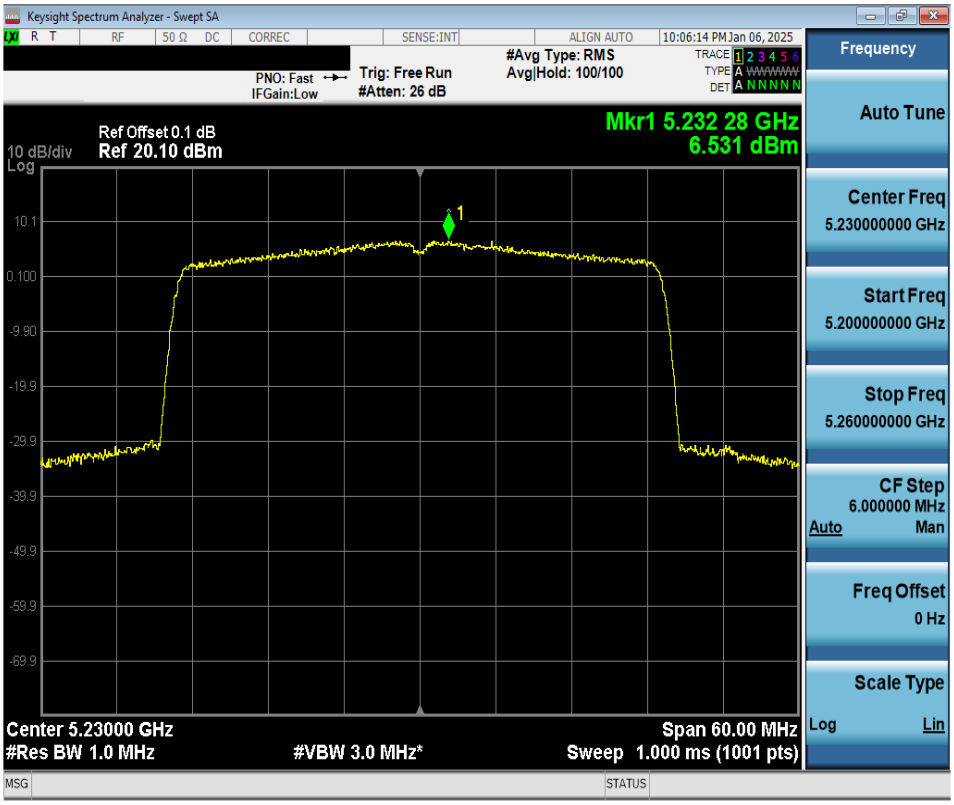
7.5.2 Antenna WF8 Power Spectral Density Measurements

	Frequency [MHz]	Channel No.	802.11 MODE	Data Rate [Mbps]	Measured Power Density [dBm/MHz]	Max Power Density [dBm/MHz]	Margin [dB]
Band 1	5180	36	n (20MHz)	19.5/21.7 (MCS2)	6.64	11.00	-4.36
	5200	40	n (20MHz)	39/43.3 (MCS4)	7.82	11.00	-3.18
	5240	48	n (20MHz)	65/72.2 (MCS7)	8.07	11.00	-2.93
	5180	36	ax (SU) (20MHz)	24/25.8 (MCS2)	6.61	11.00	-4.39
	5200	40	ax (SU) (20MHz)	49/51.6 (MCS4)	7.74	11.00	-3.26
	5240	48	ax (SU) (20MHz)	24/25.8 (MCS2)	7.64	11.00	-3.36
	5190	38	n (40MHz)	135/150 (MCS7)	1.70	11.00	-9.30
	5230	46	n (40MHz)	40/40.5 (MCS2)	6.37	11.00	-4.63
	5190	38	ax (SU) (40MHz)	49/51.6 (MCS2)	1.73	11.00	-9.28
	5230	46	ax (SU) (40MHz)	49/51.6 (MCS2)	6.53	11.00	-4.47
	5210	42	ac (80MHz)	87.8/97.5 (MCS2)	-3.59	11.00	-14.59
	5210	42	ax (SU) (80MHz)	102/108.1 (MCS2)	-3.68	11.00	-14.68
Band 2A	5260	52	n (20MHz)	19.5/21.7 (MCS2)	8.15	11.00	-2.85
	5300	60	n (20MHz)	19.5/21.7 (MCS2)	7.69	11.00	-3.31
	5320	64	n (20MHz)	19.5/21.7 (MCS2)	5.75	11.00	-5.25
	5260	52	ax (SU) (20MHz)	24/25.8 (MCS2)	7.52	11.00	-3.49
	5300	60	ax (SU) (20MHz)	49/51.6 (MCS4)	7.44	11.00	-3.56
	5320	64	ax (SU) (20MHz)	24/25.8 (MCS2)	5.01	11.00	-5.99
	5270	54	n (40MHz)	40/40.5 (MCS2)	5.76	11.00	-5.24
	5310	62	n (40MHz)	40/40.5 (MCS2)	0.27	11.00	-10.73
	5270	54	ax (SU) (40MHz)	49/51.6 (MCS2)	5.21	11.00	-5.79
	5310	62	ax (SU) (40MHz)	49/51.6 (MCS2)	0.00	11.00	-11.00
	5290	58	ac (80MHz)	87.8/97.5 (MCS2)	-5.71	11.00	-16.71
	5290	58	ax (SU) (80MHz)	102/108.1 (MCS2)	-5.64	11.00	-16.64
Band 2C	5500	100	n (20MHz)	19.5/21.7 (MCS2)	5.48	11.00	-5.52
	5580	116	n (20MHz)	39/43.3 (MCS4)	7.43	11.00	-3.58
	5700	140	n (20MHz)	19.5/21.7 (MCS2)	4.83	11.00	-6.17
	5720	144	n (20MHz)	19.5/21.7 (MCS2)	8.01	11.00	-2.99
	5500	100	ax (SU) (20MHz)	24/25.8 (MCS2)	4.26	11.00	-6.74
	5580	116	ax (SU) (20MHz)	24/25.8 (MCS2)	7.79	11.00	-3.21
	5700	140	ax (SU) (20MHz)	24/25.8 (MCS2)	4.19	11.00	-6.81
	5720	144	ax (SU) (20MHz)	24/25.8 (MCS2)	8.46	11.00	-2.54
	5510	102	n (40MHz)	40/40.5 (MCS2)	0.53	11.00	-10.47
	5550	110	n (40MHz)	40/40.5 (MCS2)	5.60	11.00	-5.40
	*5590	118	n (40MHz)	40/40.5 (MCS2)	5.32	11.00	-5.68
	5670	134	n (40MHz)	40/40.5 (MCS2)	5.35	11.00	-5.65
	5710	142	n (40MHz)	81/90 (MCS4)	6.41	11.00	-4.59
	5510	102	ax (SU) (40MHz)	49/51.6 (MCS2)	0.76	11.00	-10.25
	5550	110	ax (SU) (40MHz)	19.5/21.7 (MCS2)	5.75	11.00	-5.25
	*5590	118	ax (SU) (40MHz)	49/51.6 (MCS2)	5.29	11.00	-5.71
	5670	134	ax (SU) (40MHz)	49/51.6 (MCS2)	3.66	11.00	-7.34
	5710	142	ax (SU) (40MHz)	49/51.6 (MCS2)	5.85	11.00	-5.16
	5530	106	ac (80MHz)	87.8/97.5 (MCS2)	-5.53	11.00	-16.53
	*5610	122	ac (80MHz)	87.8/97.5 (MCS2)	1.39	11.00	-9.62
	5690	138	ac (80MHz)	87.8/97.5 (MCS2)	2.73	11.00	-8.27
	5530	106	ax (SU) (80MHz)	102/108.1 (MCS2)	-6.27	11.00	-17.27
	*5610	122	ax (SU) (80MHz)	102/108.1 (MCS2)	0.52	11.00	-10.49
	5690	138	ax (SU) (80MHz)	102/108.1 (MCS2)	2.39	11.00	-8.61

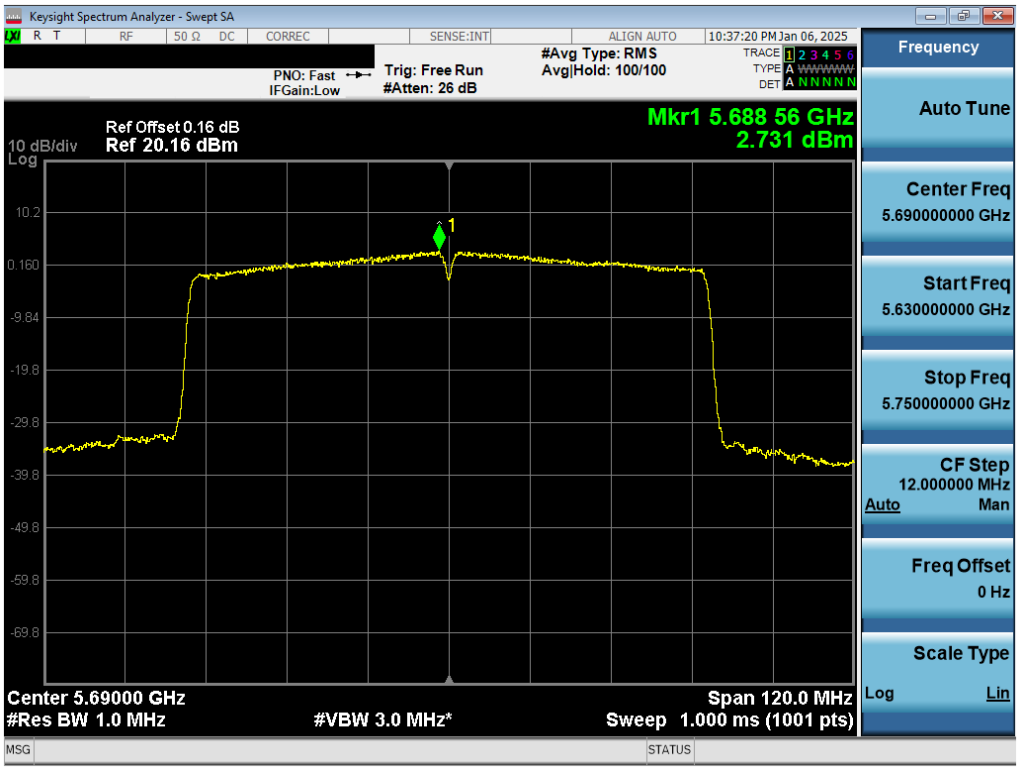
Table 7-35. Bands 1, 2A, 2C Power Spectral Density Measurements Antenna WF8

*TDWR channel is not supported for ISED (denoted by a * next to the frequency)

Plot 7-22. PSD Antenna WF8 (20MHz BW 802.11ax SU – Ch.144)



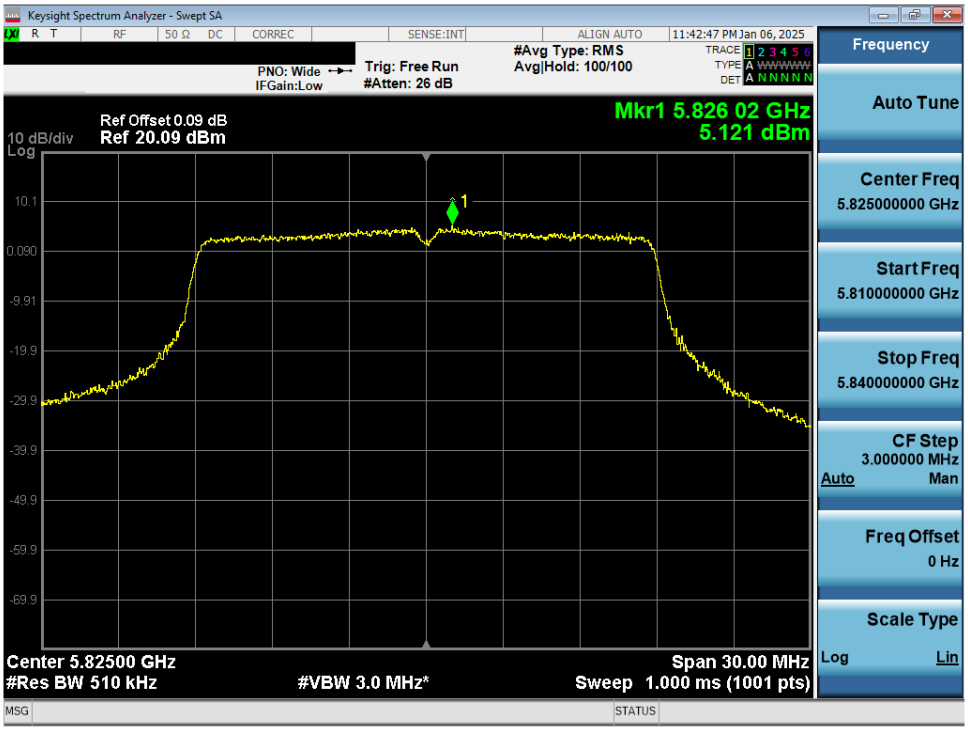
Plot 7-23. PSD Antenna WF8 (40MHz BW 802.11ax SU – Ch. 46)



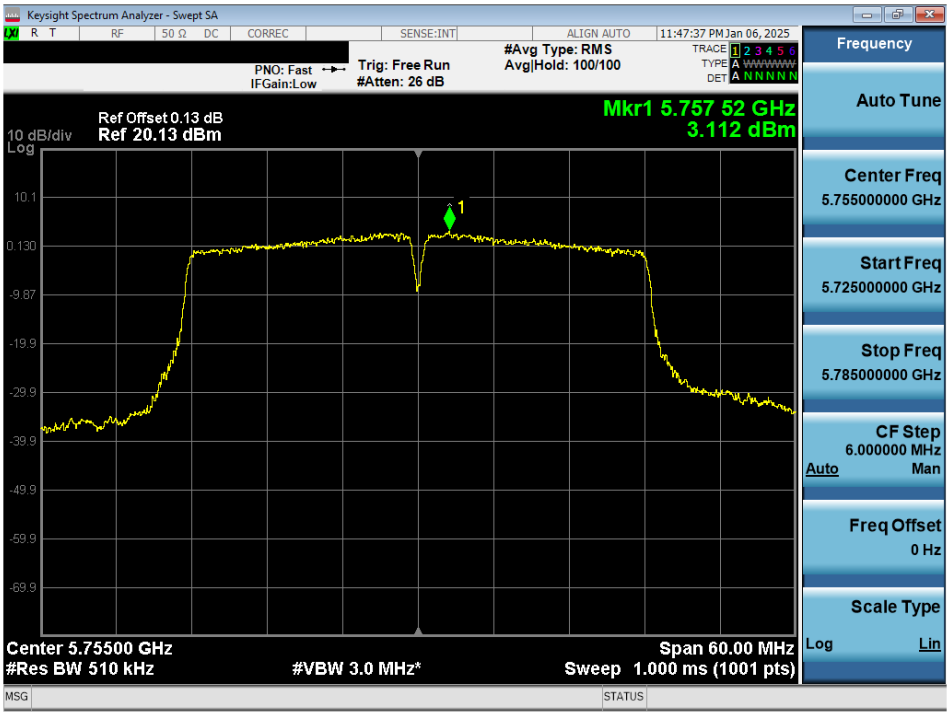
Plot 7-24. PSD Antenna WF8 (80MHz BW 802.11ac – Ch. 138)

	Frequency [MHz]	Channel	802.11 MODE	Data Rate [Mbps]	Measured Power Density [dBm/500kHz]	Max Permissible Power Density [dBm/500kHz]	Margin [dB]
Band 3	5745	149	n (20MHz)	65/72.2 (MCS7)	4.46	30.0	-25.55
	5785	157	n (20MHz)	19.5/21.7 (MCS2)	4.76	30.0	-25.24
	5825	165	n (20MHz)	39/43.3 (MCS4)	5.12	30.0	-24.88
	5745	149	ax (SU) (20MHz)	24/25.8 (MCS2)	4.35	30.0	-25.66
	5785	157	ax (SU) (20MHz)	49/51.6 (MCS4)	4.92	30.0	-25.08
	5825	165	ax (SU) (20MHz)	49/51.6 (MCS4)	4.55	30.0	-25.45
	5755	151	n (40MHz)	81/90 (MCS4)	3.11	30.0	-26.89
	5795	159	n (40MHz)	40/40.5 (MCS2)	2.36	30.0	-27.64
	5755	151	ax (SU) (40MHz)	49/51.6 (MCS2)	2.80	30.0	-27.20
	5795	159	ax (SU) (40MHz)	49/51.6 (MCS2)	2.35	30.0	-27.65
	5775	155	ac (80MHz)	175.5/195 (MCS4)	-3.18	30.0	-33.18
	5775	155	ax (SU) (80MHz)	102/108.1 (MCS2)	-2.48	30.0	-32.48

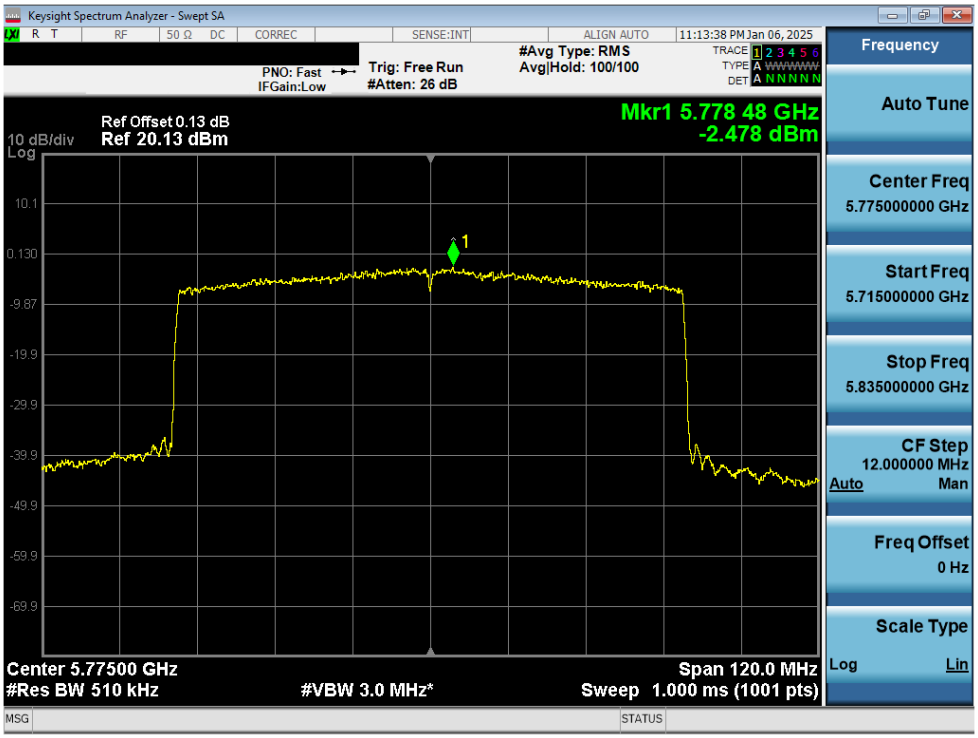
Table 7-36. Band 3 Power Spectral Density Measurements Antenna WF8



Plot 7-25. PSD Antenna WF8 (20MHz BW 802.11n – Ch. 165)



Plot 7-26. PSD Antenna WF8 (40MHz BW 802.11n – Ch. 151)

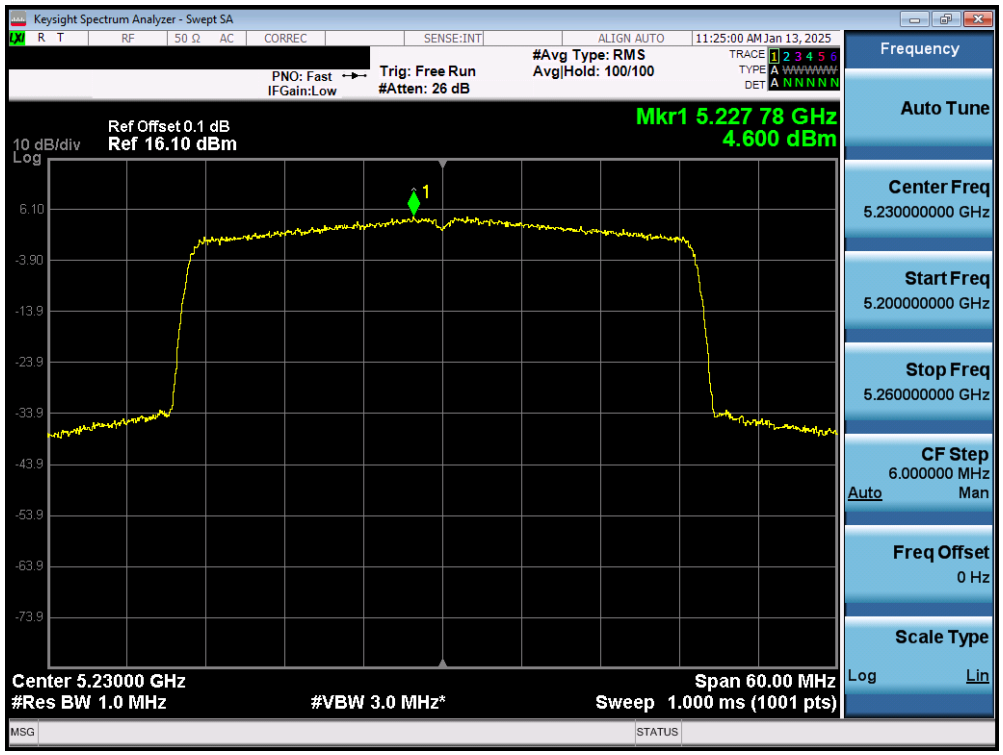


Plot 7-27. PSD Antenna WF8 (80MHz BW 802.11ax SU – Ch. 155)

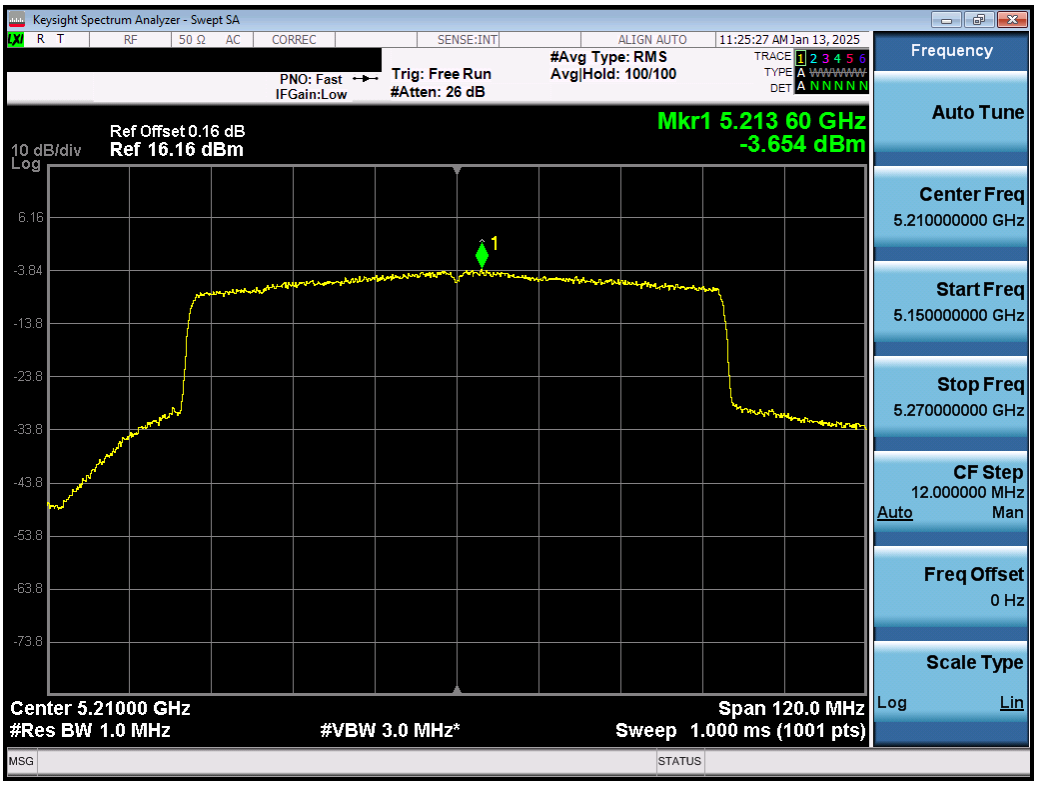
	Frequency [MHz]	Channel No.	802.11 MODE	Data Rate [Mbps]	Measured Power Density [dBm/MHz]	Antenna Gain [dBi]	e.i.r.p. Power Density [dBm/MHz]	ISED Max e.i.r.p. Power Density [dBm/MHz]	Margin [dB]
Band 1	5180	36	n (20MHz)	65/72.2 (MCS7)	4.61	3.40	8.01	10.0	-1.99
	5200	40	n (20MHz)	39/43.3 (MCS4)	4.65	3.40	8.05	10.0	-1.95
	5240	48	n (20MHz)	19.5/21.7 (MCS2)	4.63	3.40	8.03	10.0	-1.97
	5180	36	ax (SU) (20MHz)	49/51.6 (MCS4)	4.39	3.40	7.79	10.0	-2.21
	5200	40	ax (SU) (20MHz)	49/51.6 (MCS4)	4.90	3.40	8.30	10.0	-1.70
	5240	48	ax (SU) (20MHz)	49/51.6 (MCS4)	4.17	3.40	7.57	10.0	-2.43
	5190	38	n (40MHz)	135/150 (MCS7)	1.84	3.40	5.24	10.0	-4.76
	5230	46	n (40MHz)	135/150 (MCS7)	4.52	3.40	7.92	10.0	-2.08
	5190	38	ax (SU) (40MHz)	98/103.2 (MCS4)	1.67	3.40	5.07	10.0	-4.93
	5230	46	ax (SU) (40MHz)	49/51.6 (MCS2)	4.60	3.40	8.00	10.0	-2.00
	5210	42	ac (80MHz)	87.8/97.5 (MCS2)	-4.23	3.40	-0.83	10.0	-10.83
	5210	42	ax (SU) (80MHz)	102/108.1 (MCS2)	-3.65	3.40	-0.25	10.0	-10.25

Table 7-37. ISED Band 1 e.i.r.p. Power Spectral Density Measurements Antenna WF8

Plot 7-28. ISED PSD Antenna WF8 (20MHz BW 11ax SU – Ch.40)



Plot 7-29. ISED PSD Antenna WF8 (40MHz BW 11ax SU – Ch.46)



Plot 7-30. ISED PSD Antenna WF8 (80MHz BW 11ax SU – Ch.42)

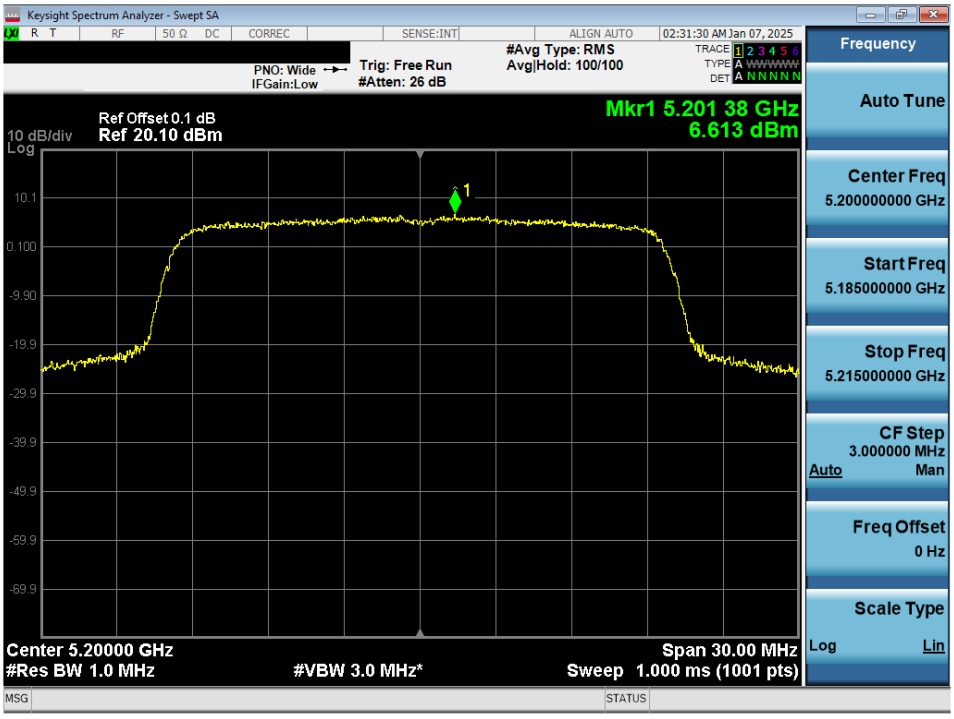
7.5.3 Summed CDD/SDM Power Spectral Density Measurements

	Frequency [MHz]	Channel No.	802.11 MODE	Mode	Data Rate [Mbps]	Antenna WF7a Power Density [dBm/MHz]	Antenna WF8 Power Density [dBm/MHz]	Summed Power Density [dBm/MHz]	Max Power Density [dBm/MHz]	Margin [dB]
Band 1	5180	36	n (20MHz)	CDD	78/86.7 (MCS12)	5.57	5.03	8.32	11.00	-2.68
	5200	40	n (20MHz)	SDM	130/144.4 (MCS15)	7.19	6.12	9.70	11.00	-1.30
	5240	48	n (20MHz)	SDM	130/144.4 (MCS15)	6.24	6.27	9.26	11.00	-1.74
	5180	36	ax (SU) (20MHz)	CDD	98/103.2 (MCS4)	5.36	5.08	8.23	11.00	-2.77
	5200	40	ax (SU) (20MHz)	SDM	48/51.6 (MCS2)	7.24	6.24	9.78	11.00	-1.22
	5240	48	ax (SU) (20MHz)	SDM	48/51.6 (MCS2)	6.69	6.24	9.48	11.00	-1.52
	5190	38	n (40MHz)	CDD	81/60 (MCS10)	0.94	0.69	3.83	11.00	-7.17
	5230	46	n (40MHz)	CDD	270/300 (MCS15)	5.32	5.24	8.29	11.00	-2.71
	5190	38	ax (SU) (40MHz)	CDD	196/206.5 (MCS4)	-1.03	-1.28	1.85	11.00	-9.15
	5230	46	ax (SU) (40MHz)	CDD	196/206.5 (MCS4)	4.93	5.34	8.15	11.00	-2.85
	5210	42	ac (80MHz)	CDD	175.5/195 (MCS2)	-5.46	-5.93	-2.68	11.00	-13.68
	5210	42	ax (SU) (80MHz)	CDD	204/216.2 (MCS2)	-5.22	-5.75	-2.47	11.00	-13.47
Band 2A	5260	52	n (20MHz)	SDM	78/86.7 (MCS12)	6.31	6.36	9.34	11.00	-1.66
	5300	60	n (20MHz)	SDM	130/144.4 (MCS15)	6.54	5.95	9.26	11.00	-1.74
	5320	64	n (20MHz)	SDM	39/43.3 (MCS10)	5.01	4.85	7.94	11.00	-3.06
	5260	52	ax (SU) (20MHz)	SDM	48/51.6 (MCS2)	6.34	6.00	9.18	11.00	-1.82
	5300	60	ax (SU) (20MHz)	SDM	98/103.2 (MCS4)	6.24	6.18	9.22	11.00	-1.78
	5320	64	ax (SU) (20MHz)	CDD	98/103.2 (MCS4)	4.63	4.15	7.41	11.00	-3.59
	5270	54	n (40MHz)	CDD	81/60 (MCS10)	5.17	4.76	7.98	11.00	-3.02
	5310	62	n (40MHz)	CDD	162/180 (MCS12)	-0.16	-0.46	2.70	11.00	-8.30
	5270	54	ax (SU) (40MHz)	CDD	196/206.5 (MCS4)	4.17	4.58	7.39	11.00	-3.61
	5310	62	ax (SU) (40MHz)	CDD	98/103.2 (MCS2)	-0.83	-0.77	2.21	11.00	-8.79
	5290	58	ac (80MHz)	CDD	175.5/195 (MCS2)	-6.19	-6.05	-3.11	11.00	-14.11
	5290	58	ax (SU) (80MHz)	CDD	204/216.2 (MCS2)	-6.80	-6.79	-3.78	11.00	-14.78
Band 2C	5500	100	n (20MHz)	SDM	39/43.3 (MCS10)	5.08	5.29	8.19	11.00	-2.81
	5580	116	n (20MHz)	SDM	130/144.4 (MCS15)	6.13	5.95	9.05	11.00	-1.95
	5700	140	n (20MHz)	CDD	39/43.3 (MCS10)	3.64	3.55	6.61	11.00	-4.39
	5720	144	n (20MHz)	SDM	78/86.7 (MCS12)	6.38	6.16	9.28	11.00	-1.72
	5500	100	ax (SU) (20MHz)	CDD	48/51.6 (MCS2)	3.44	3.67	6.56	11.00	-4.44
	5580	116	ax (SU) (20MHz)	SDM	48/51.6 (MCS2)	6.45	6.27	9.37	11.00	-1.63
	5700	140	ax (SU) (20MHz)	CDD	48/51.6 (MCS2)	3.17	3.08	6.13	11.00	-4.87
	5720	144	ax (SU) (20MHz)	SDM	98/103.2 (MCS4)	6.35	7.52	9.98	11.00	-1.02
	5510	102	n (40MHz)	CDD	81/60 (MCS10)	-0.26	-0.67	2.55	11.00	-8.45
	5550	110	n (40MHz)	CDD	81/60 (MCS10)	4.20	4.11	7.16	11.00	-3.84
	5590	118	n (40MHz)	SDM	270/300 (MCS15)	5.73	4.89	8.34	11.00	-2.66
	5670	134	n (40MHz)	CDD	81/60 (MCS10)	4.12	3.62	6.89	11.00	-4.11
	5710	142	n (40MHz)	SDM	162/180 (MCS12)	5.69	5.92	8.82	11.00	-2.18
	5510	102	ax (SU) (40MHz)	CDD	196/206.5 (MCS4)	-0.99	-0.84	2.10	11.00	-8.90
	5550	110	ax (SU) (40MHz)	CDD	98/103.2 (MCS2)	4.11	3.45	6.80	11.00	-4.20
	5590	118	ax (SU) (40MHz)	SDM	196/206.5 (MCS4)	5.35	5.20	8.29	11.00	-2.71
	5670	134	ax (SU) (40MHz)	CDD	98/103.2 (MCS2)	3.61	3.02	6.33	11.00	-4.67
	5710	142	ax (SU) (40MHz)	SDM	196/206.5 (MCS4)	6.06	5.70	8.89	11.00	-2.11
	5530	106	ac (80MHz)	CDD	175.5/195 (MCS2)	-6.37	-6.59	-3.47	11.00	-14.47
	5610	122	ac (80MHz)	CDD	175.5/195 (MCS2)	-0.22	-0.42	2.69	11.00	-8.31
	5690	138	ac (80MHz)	CDD	351/390 (MCS4)	3.29	3.48	6.40	11.00	-4.60
	5530	106	ax (SU) (80MHz)	CDD	204/216.2 (MCS2)	-6.52	-7.16	-3.81	11.00	-14.81
	5610	122	ax (SU) (80MHz)	CDD	408/432.4 (MCS4)	-0.27	-1.07	2.36	11.00	-8.64
	5690	138	ax (SU) (80MHz)	CDD	204/216.2 (MCS2)	2.81	2.31	5.58	11.00	-5.42

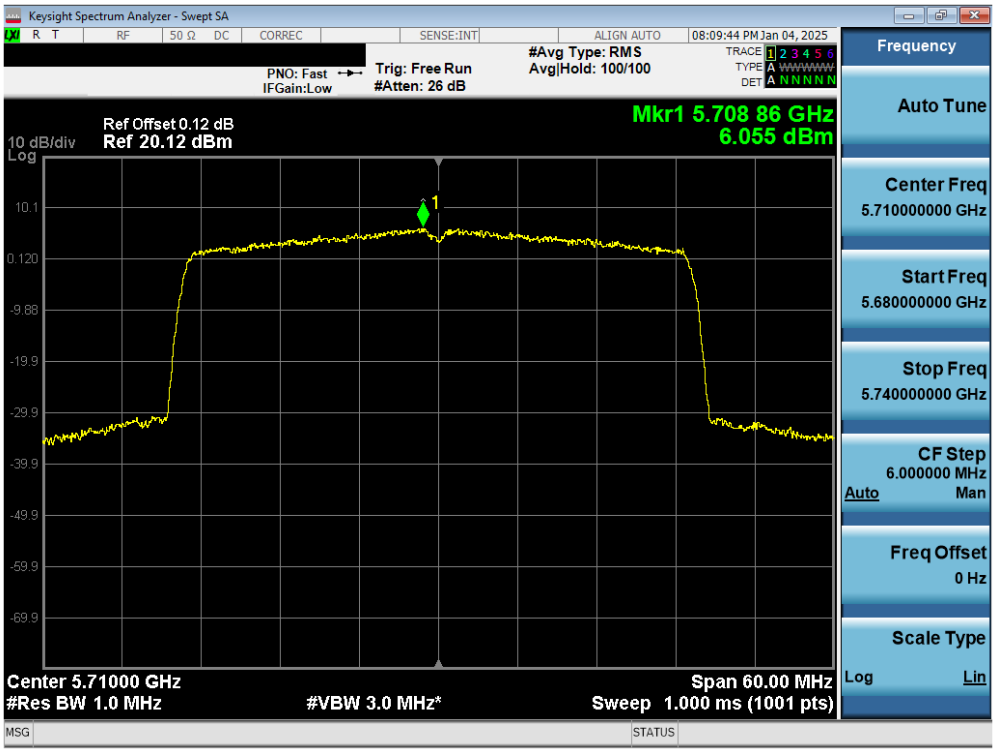
Table 7-38. Bands 1, 2A, 2C CDD/SDM Power Spectral Density Measurements

*TDWR channel is not supported for ISED (denoted by a * next to the frequency)

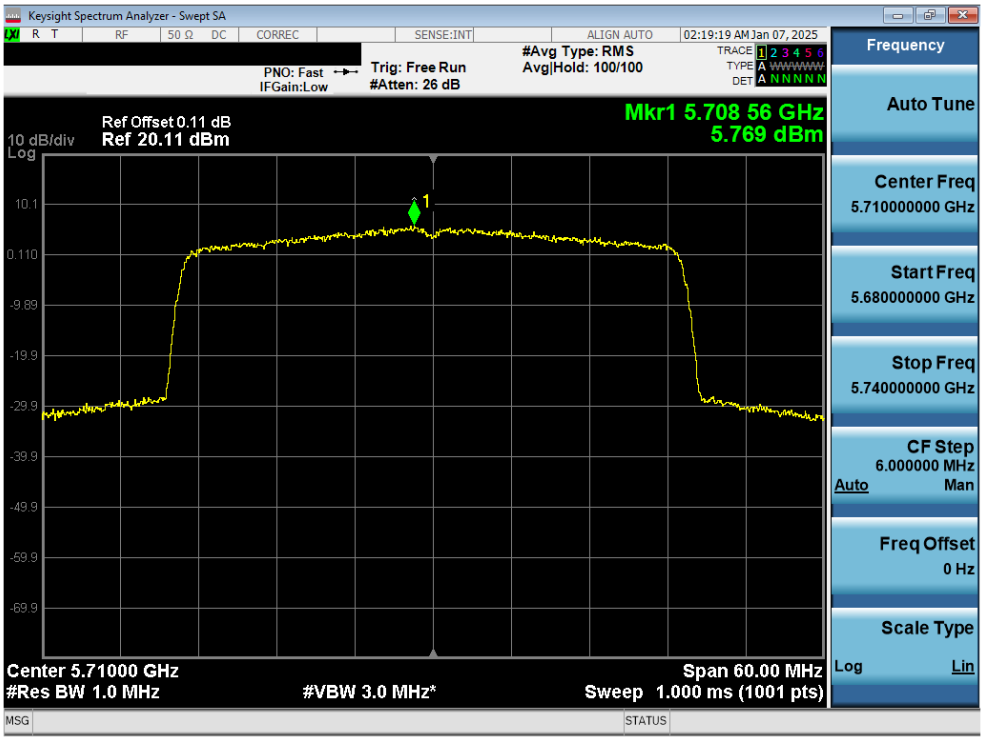
Plot 7-31. PSD SDM Antenna WF7a (20MHz BW 802.11ax SU – Ch. 40)



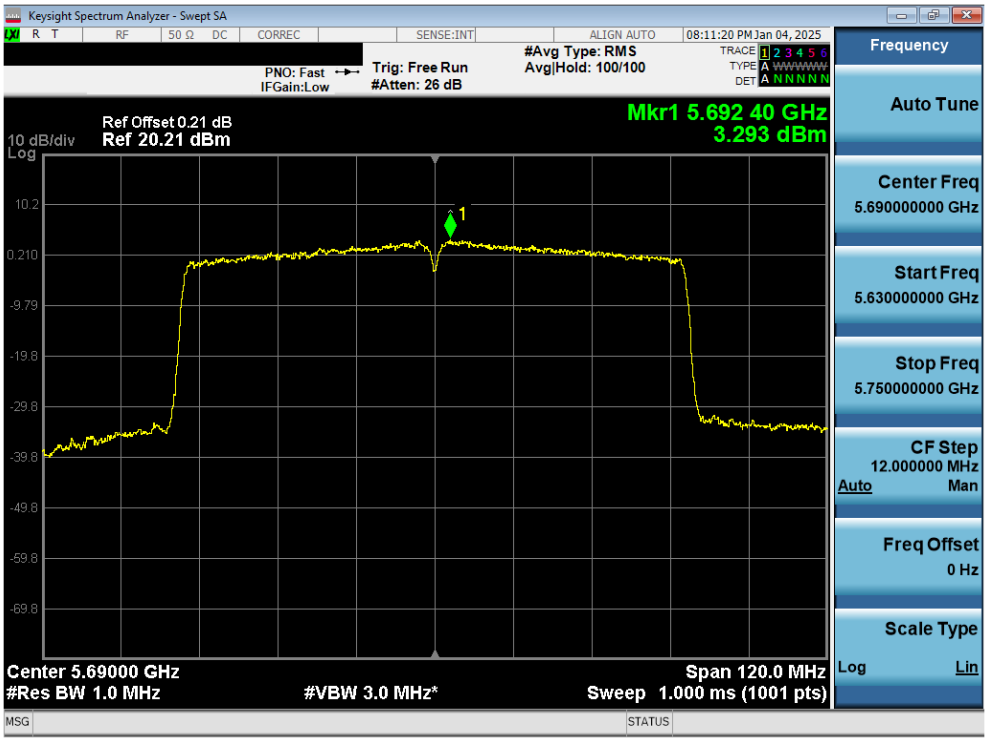
Plot 7-32. PSD SDM Antenna WF8 (20MHz BW 802.11ax SU – Ch. 40)



Plot 7-33. PSD SDM Antenna WF7a (40MHz BW 802.11ax SU – Ch. 142)



Plot 7-34. PSD SDM Antenna WF8 (40MHz BW 802.11ax SU – Ch. 142)

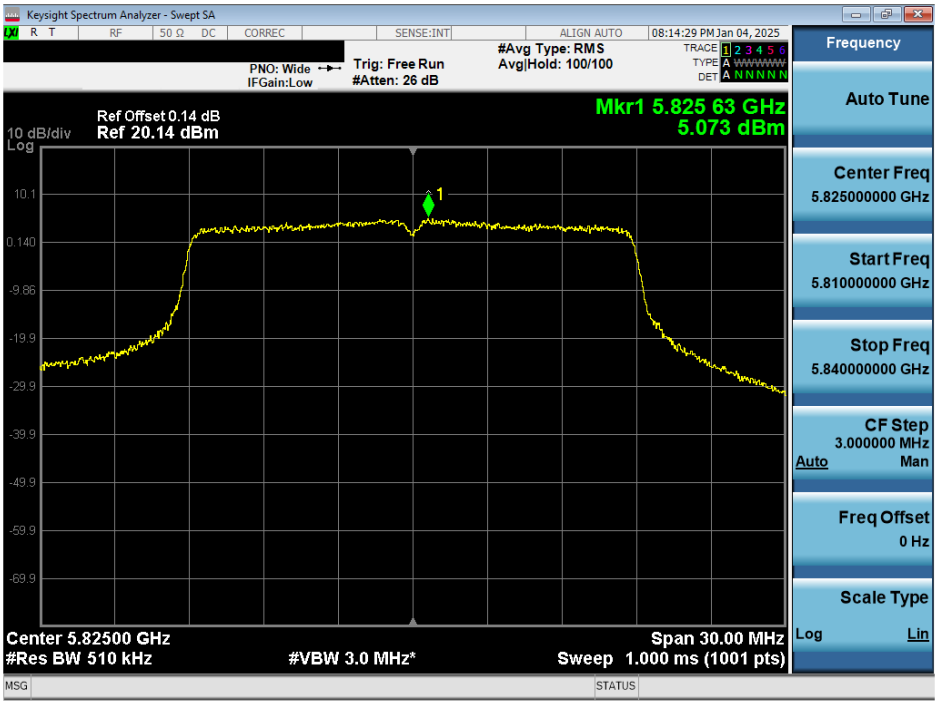


Plot 7-35. PSD CDD Antenna WF7a (80MHz BW 802.11ac– Ch. 138)

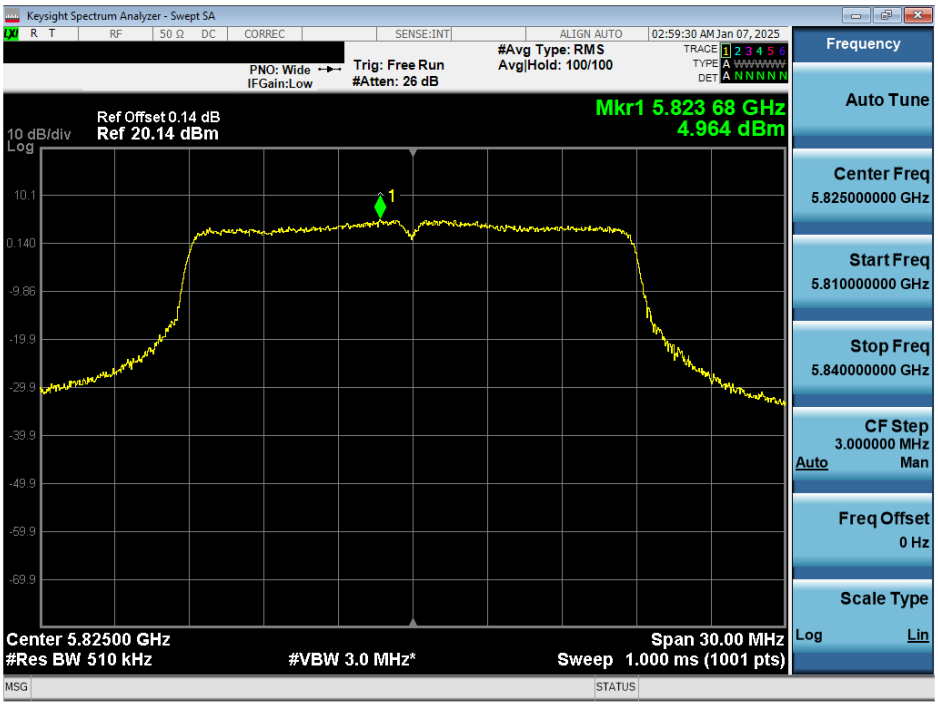
Plot 7-36. PSD CDD Antenna WF8 (80MHz BW 802.11ac– Ch. 138)

	Frequency [MHz]	Channel	802.11 MODE	Mode	Data Rate [Mbps]	Antenna WF7a Power Density [dBm/500kHz]	Antenna WF8 Power Density [dBm/500kHz]	Summed Power Density [dBm/500kHz]	Max Permissible Power Density [dBm/500kHz]	Margin [dB]
Band 3	5745	149	n (20MHz)	CDD	39/43.3 (MCS10)	4.90	5.06	7.99	30.0	-22.01
	5785	157	n (20MHz)	CDD	130/144.4 (MCS15)	5.34	3.89	7.68	30.0	-22.32
	5825	165	n (20MHz)	CDD	78/86.7 (MCS12)	5.07	4.96	8.03	30.0	-21.97
	5745	149	ax (SU) (20MHz)	CDD	48/51.6 (MCS2)	5.05	4.46	7.77	30.0	-22.23
	5785	157	ax (SU) (20MHz)	CDD	98/103.2 (MCS4)	4.07	4.28	7.19	30.0	-22.81
	5825	165	ax (SU) (20MHz)	CDD	270/286.8 (MCS11)	4.68	4.85	7.78	30.0	-22.22
	5755	151	n (40MHz)	CDD	270/300 (MCS15)	3.91	2.95	6.47	30.0	-23.53
	5795	159	n (40MHz)	CDD	162/180 (MCS12)	3.05	3.60	6.34	30.0	-23.66
	5755	151	ax (SU) (40MHz)	CDD	98/103.2 (MCS2)	3.52	2.72	6.15	30.0	-23.85
	5795	159	ax (SU) (40MHz)	CDD	98/103.2 (MCS2)	2.78	2.67	5.74	30.0	-24.26
	5775	155	ac (80MHz)	CDD	351/390 (MCS4)	-3.56	-4.05	-0.79	30.0	-30.79
	5775	155	ax (SU) (80MHz)	CDD	204/216.2 (MCS2)	-3.74	-3.97	-0.85	30.0	-30.85

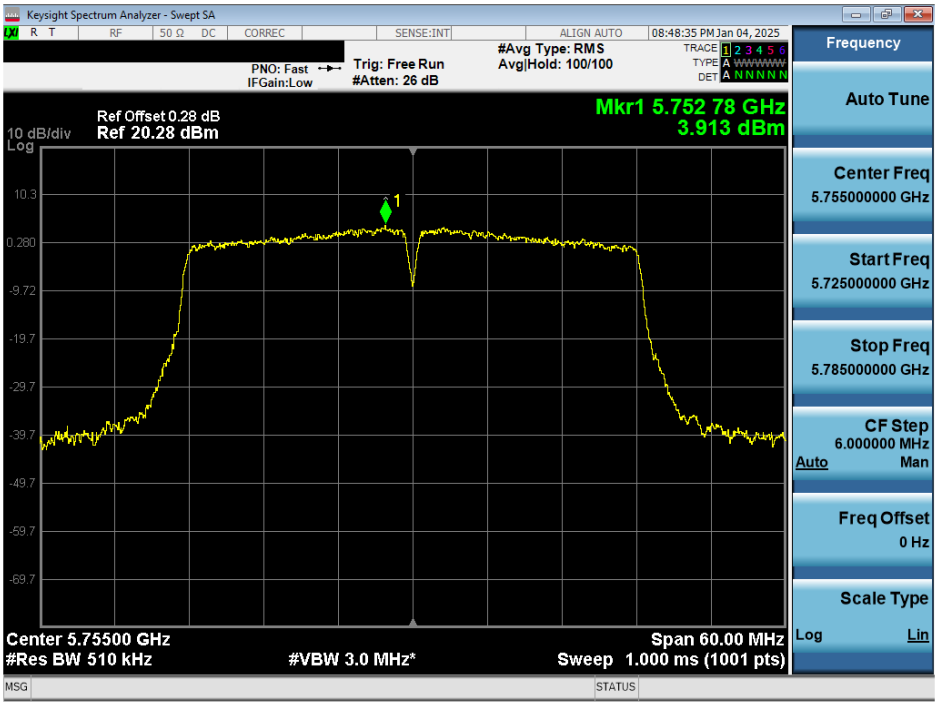
Table 7-39. Band 3 Power Spectral Density Measurements CDD



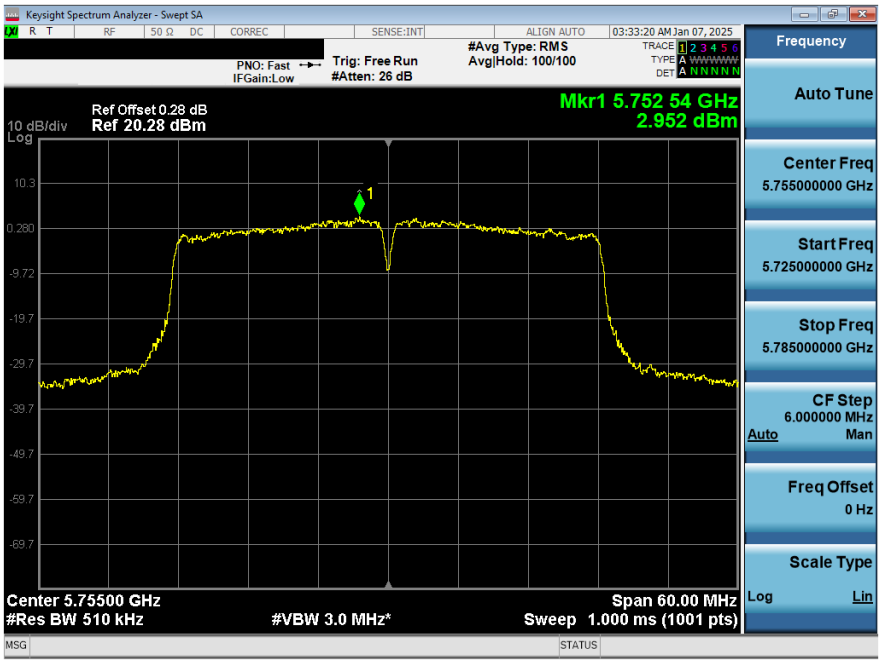
Plot 7-37. PSD CDD Antenna WF7a (20MHz BW 802.11n – Ch. 165)



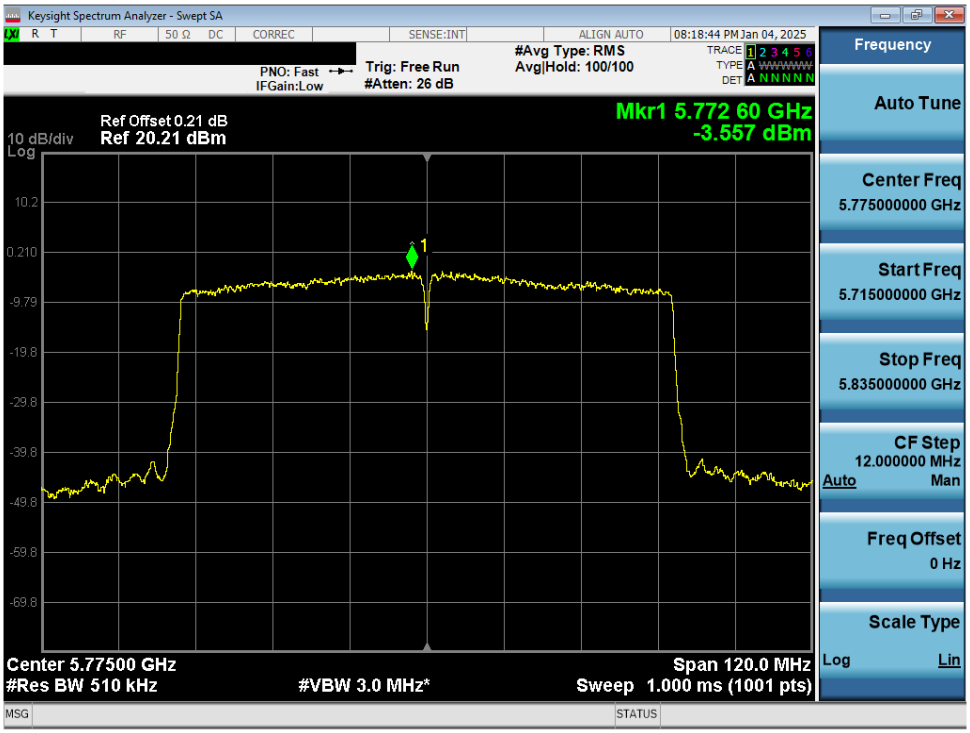
Plot 7-38. PSD CDD Antenna WF7a (20MHz BW 802.11n – Ch. 165)



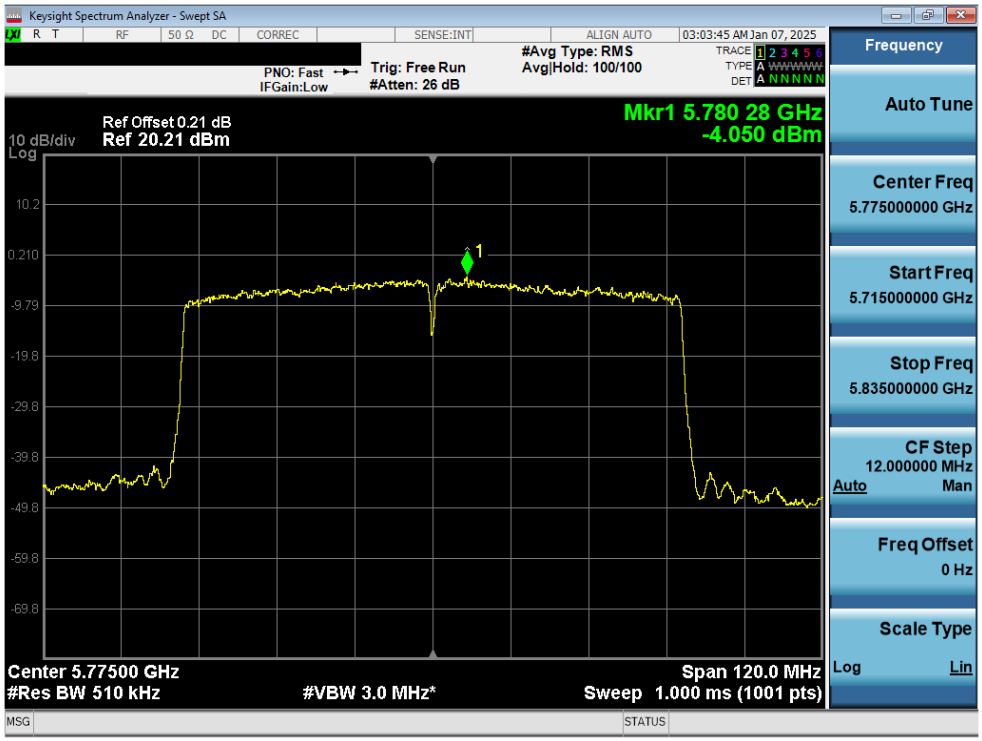
Plot 7-39. PSD CDD Antenna WF7a (40MHz BW 802.11n – Ch. 151)



Plot 7-40. PSD CDD Antenna WF8 (40MHz BW 802.11n – Ch. 151)



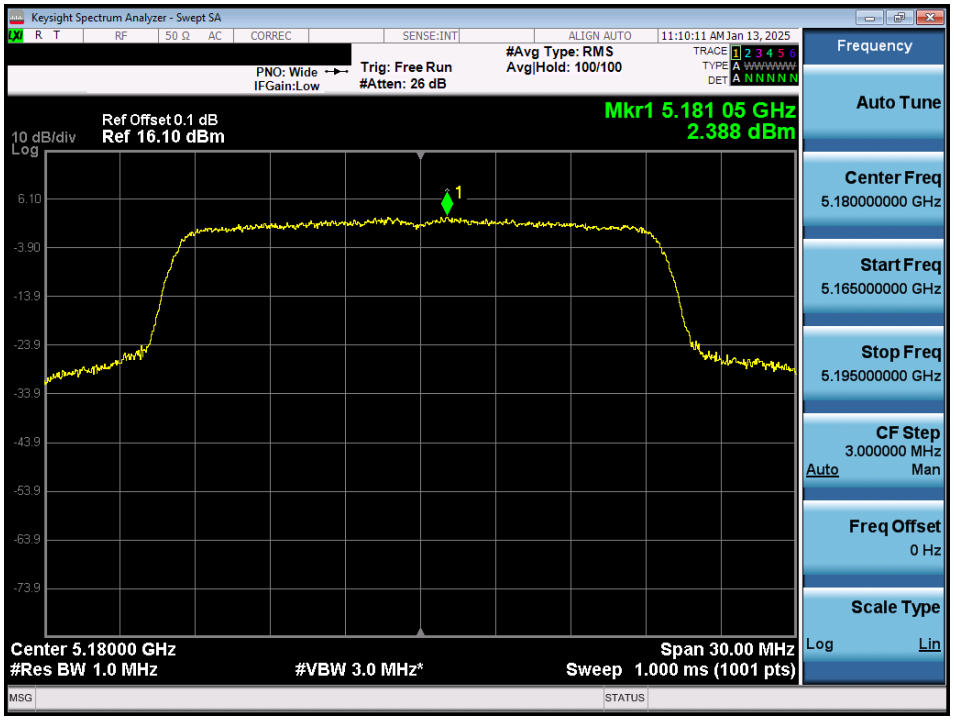
Plot 7-41. PSD CDD Antenna WF7a (80MHz BW 802.11ac – Ch. 155)



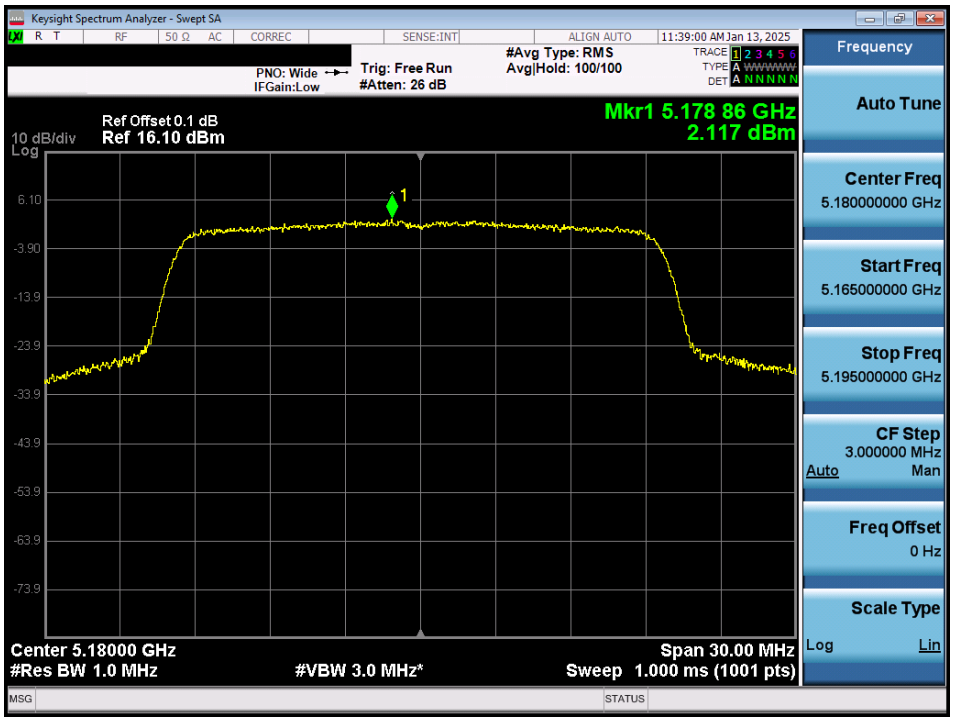
Plot 7-42. PSD CDD Antenna WF8 (80MHz BW 802.11ac – Ch. 155)

	Frequency [MHz]	Channel No.	802.11 MODE	Mode	Data Rate [Mbps]	Antenna WF7a Power Density [dBm/MHz]	Antenna WF8 Power Density [dBm/MHz]	Summed Power Density [dBm/MHz]	Directoinal Antenna Gain [dBi]	e.i.r.p. Power Density [dBm/MHz]	ISED Max e.i.r.p. Power Density [dBm/MHz]	Margin [dB]
Band 1	5180	36	n (20MHz)	CDD	130/144.4 (MCS15)	2.25	1.96	5.12	3.76	8.88	10.0	-1.12
	5200	40	n (20MHz)	SDM	130/144.4 (MCS15)	2.02	2.28	5.16	3.76	8.92	10.0	-1.08
	5240	48	n (20MHz)	SDM	78/86.7 (MCS12)	1.89	2.16	5.04	3.76	8.80	10.0	-1.20
	5180	36	ax (SU) (20MHz)	CDD	98/103.2 (MCS4)	2.39	2.12	5.26	3.76	9.03	10.0	-0.97
	5200	40	ax (SU) (20MHz)	SDM	48/51.6 (MCS2)	2.09	2.41	5.26	3.76	9.03	10.0	-0.97
	5240	48	ax (SU) (20MHz)	SDM	98/103.2 (MCS4)	2.16	2.03	5.10	3.76	8.87	10.0	-1.13
	5190	38	n (40MHz)	CDD	81/60 (MCS10)	0.96	0.59	3.79	3.76	7.55	10.0	-2.45
	5230	46	n (40MHz)	CDD	162/180 (MCS12)	1.95	2.01	4.99	3.76	8.76	10.0	-1.24
	5190	38	ax (SU) (40MHz)	CDD	98/103.2 (MCS2)	-1.07	-1.24	1.86	3.76	5.62	10.0	-4.38
	5230	46	ax (SU) (40MHz)	CDD	196/206.5 (MCS4)	2.21	1.83	5.03	3.76	8.80	10.0	-1.20
	5210	42	ac (80MHz)	CDD	175.5/195 (MCS2)	-5.28	-5.93	-2.58	3.76	1.18	10.0	-8.82
	5210	42	ax (SU) (80MHz)	CDD	204/216.2 (MCS2)	-5.45	-5.79	-2.61	3.76	1.16	10.0	-8.84

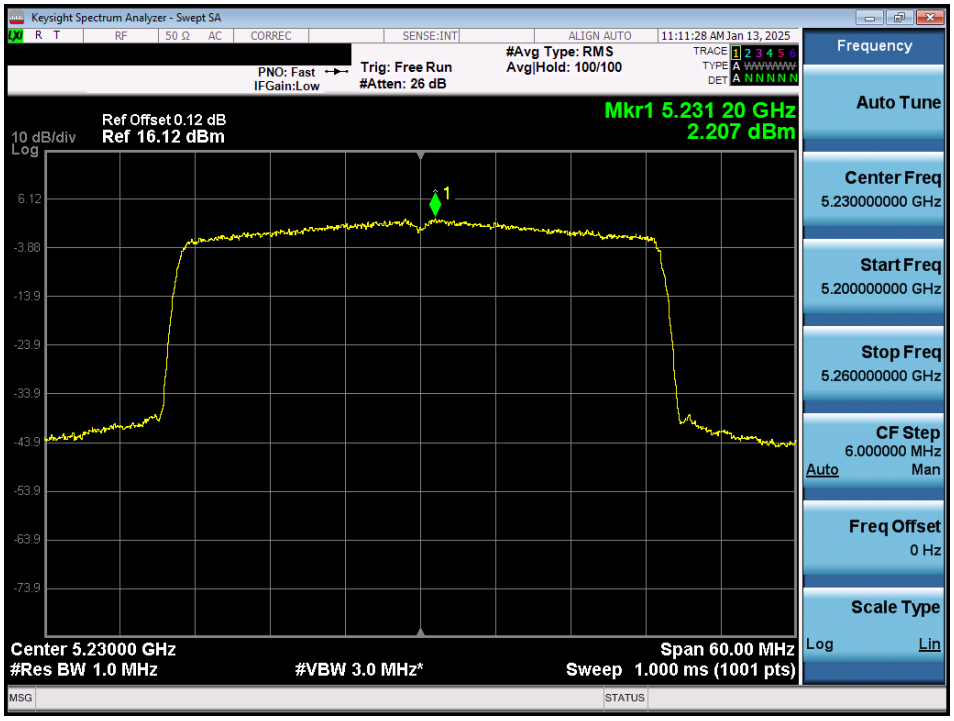
Table 7-40. ISED Band 1 e.i.r.p. Power Spectral Density Measurements CDD/SDM



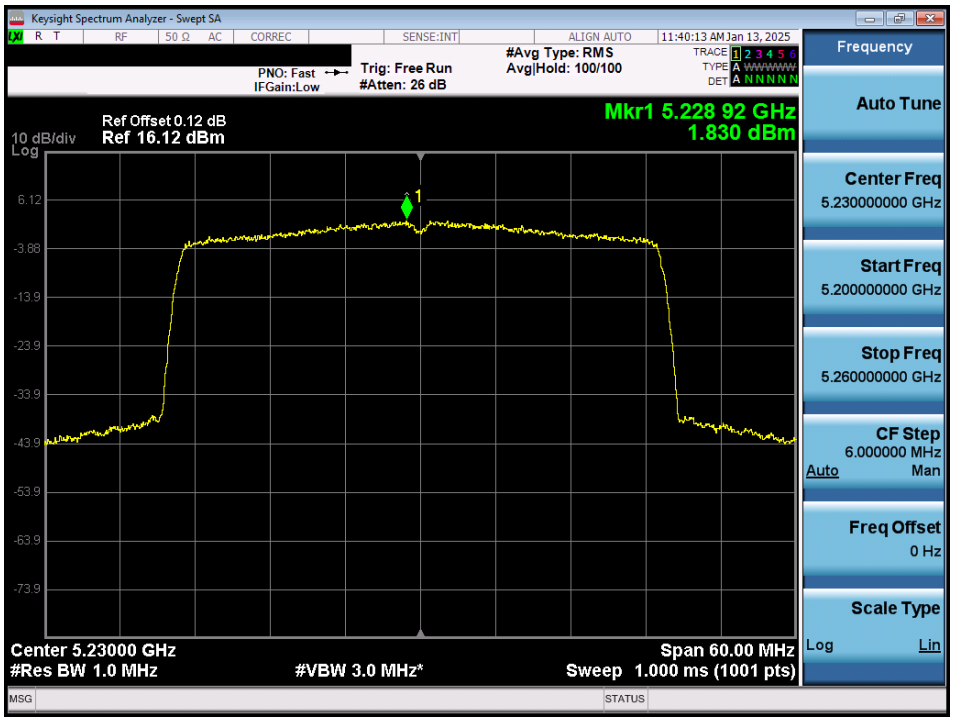
Plot 7-43. ISED PSD CDD Antenna WF7a (20MHz BW 11ax(SU) – Ch.36)



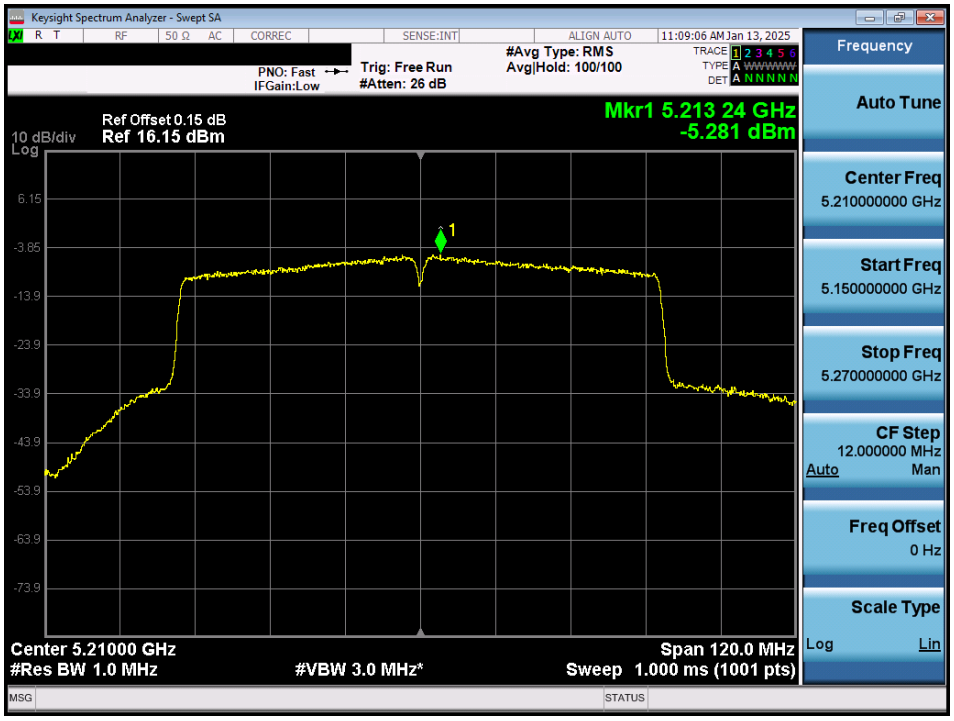
Plot 7-44. ISED PSD CDD Antenna WF8 (20MHz BW 11ax(SU) – Ch.36)



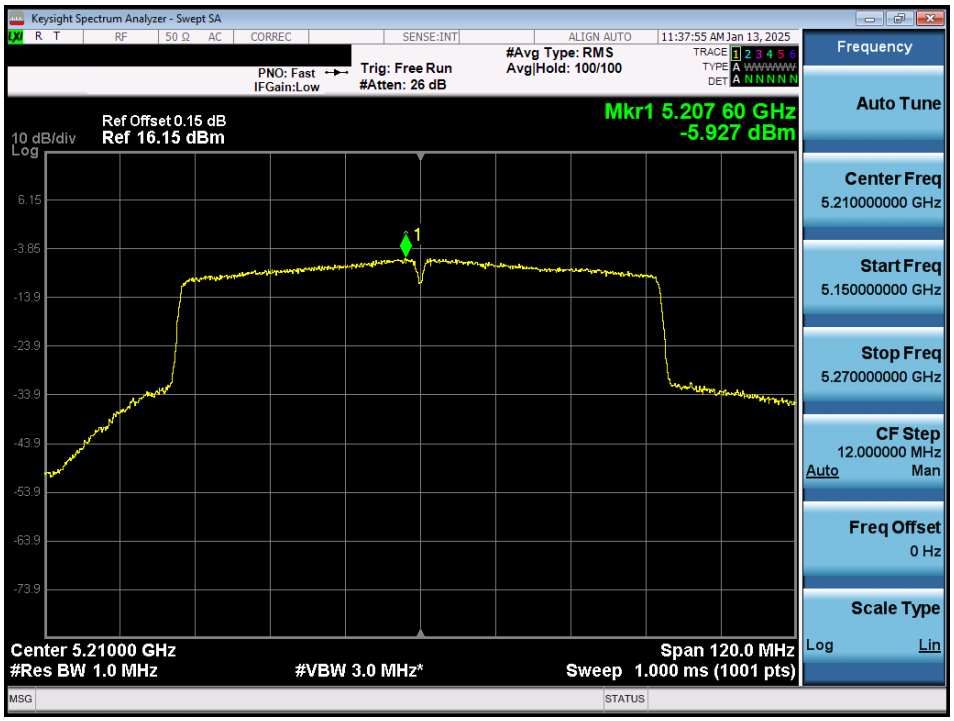
Plot 7-45. ISED PSD CDD Antenna WF7a (40MHz BW 11ax(SU) – Ch.46)



Plot 7-46. ISED PSD CDD Antenna WF8 (40MHz BW 11ax(SU) – Ch.46)



Plot 7-47. ISED PSD CDD Antenna WF7a (80MHz BW 11ac – Ch.42)



Plot 7-48. ISED PSD CDD Antenna WF8 (80MHz BW 11ac – Ch.42)

Note:

Per ANSI C63.10-2020 and KDB 662911 v02r01 Section E)1), the conducted powers at Antenna WF7a and Antenna WF8 were first measured separately during CDD/SDM transmission as shown in the section above. The measured values were then summed in linear power units then converted back to dBm.

Per ANSI C63.10-2020 Section 14.6.3, the directional gain is calculated using the following formula, where G_N is the gain of the nth antenna and N_{ANT}, the total number of antennas used.

$$\text{Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \ldots + 10^{G_N/20})^2 / N_{ANT}] \text{ dBi}$$

Per ANSI C63.10-2020 Section 14.6.3, the uncorrelated directional gain is calculated using the following formula, where G_N is the gain of the nth antenna and N_{ANT}, the total number of antennas used.

$$\text{Directional gain} = 10 \log[(10^{G_1/10} + 10^{G_2/10} + \ldots + 10^{G_N/10}) / N_{ANT}] \text{ dBi}$$

Sample CDD/SDM Calculation:

At 5180MHz in 802.11n (20MHz BW) mode, the average conducted output power was measured to be 2.25 dBm for Antenna WF7a and 1.96 dBm for Antenna WF8.

Antenna WF7a + Antenna WF8 = CDD/SDM

(2.25 dBm + 1.96 dBm) = (1.679 mW + 1.570 mW) = 3.25 mW = 5.12 dBm

Sample e.i.r.p. Calculation:

At 5180MHz in 802.11n (20MHz BW) mode, the average MIMO conducted power was calculated to be 5.12 dBm with directional gain of 3.76 dBi.

e.i.r.p. (dBm) = Conducted Power (dBm) + Ant gain (dBi)

5.12 dBm + 3.76 dBi = 8.88 dBm

7.6 Radiated Spurious Emissions – Above 1GHz

§15.407(b) §15.205 §15.209; RSS-Gen [8.9]

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2020 and KDB 789033 D02 v02r01, and at the appropriate frequencies. All channels, modes (e.g. 802.11a, 802.11n, 802.11ax(SU) (20MHz BW), 802.11n, 802.11ax(SU) (40MHz BW), and 802.11ac, 802.11ax(SU) (80MHz), and modulations/data rates were investigated among all UNII bands. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

For transmitters operating in the 5.15-5.25 GHz and 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of −27 dBm/MHz.

For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of −27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: 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.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 7 of RSS-Gen (8.10) must not exceed the limits shown in Table 7-41 per Section 15.209 and RSS-Gen (8.9).

Frequency	Field Strength [μV/m]	Measured Distance [Meters]
Above 960.0 MHz	500	3

Table 7-41. Radiated Limits

Test Procedures Used

ANSI C63.10-2020 – Sections 12.7.7, 12.7.6
KDB 789033 D02 v02r01 – Section G

Test Settings

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be ≥ 2 x span/RBW)
6. Averaging type = power (RMS)
7. Sweep time = auto couple
8. Trace was averaged over 100 sweeps

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

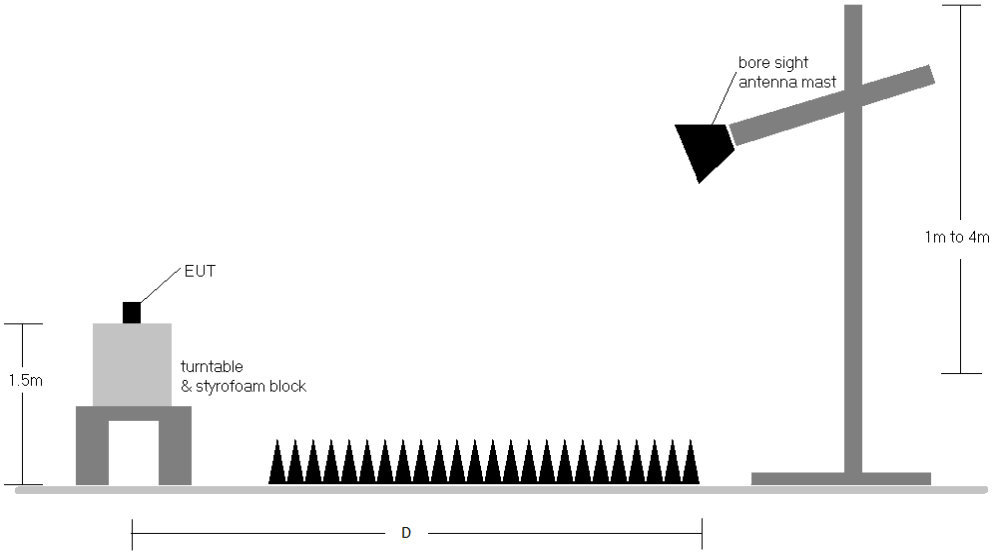


Figure 7-5. Test Instrument & Measurement Setup

Test Notes

1. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-41.
2. All spurious emissions lying in restricted bands specified in §15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-41. All spurious emissions that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. This unit was tested with its standard battery.
5. The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas.
6. D is the measurement test distance and emissions 1-18GHz were measured at a 3 meters test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
7. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. Any emissions found to be within 20dB of the limit are fully investigated and the results are shown in this section.
8. All data rates and antenna configurations were investigated and only the worst case is reported.
9. The unit was tested with all possible modes and only the highest emission is reported.
10. The unit was tested at its highest output power.
11. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Sample Calculations

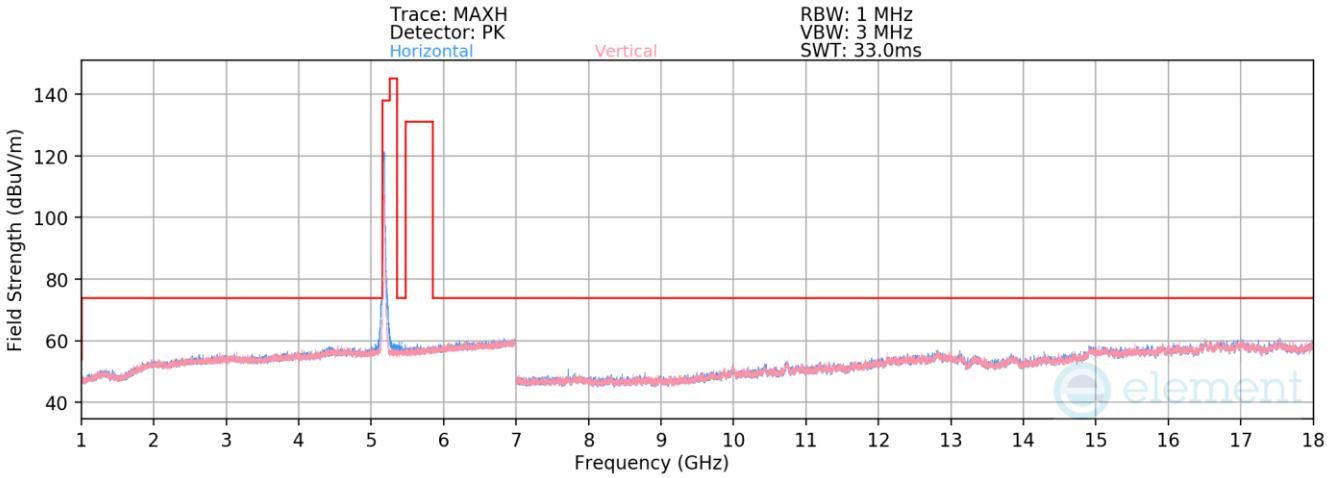
Determining Spurious Emissions Levels

- Field Strength Level [dBμV/m] = Analyzer Level [dBm] + 107 + AFCL [dB/m]
- AFCL [dB/m] = Antenna Factor [dB/m] + Cable Loss [dB] – Preamplifier Gain [dB]
- Margin [dB] = Field Strength Level [dBμV/m] – Limit [dBμV/m]

Radiated Band Edge Measurement Offset

- The amplitude offset shown in the radiated restricted band edge plots in Section 7.6.3 to 7.6.11 was calculated using the formula:
  Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain

7.6.1 CDD/SDM Radiated Spurious Emission

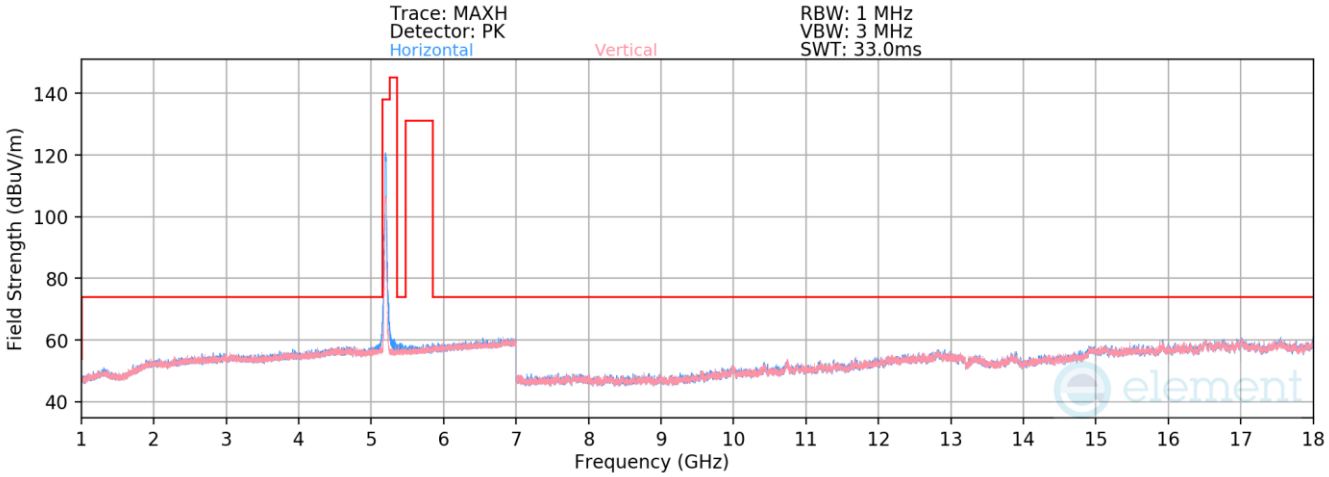


Plot 7-49. Radiated Spurious Emissions above 1GHz CDD (802.11n – Ch. 36)

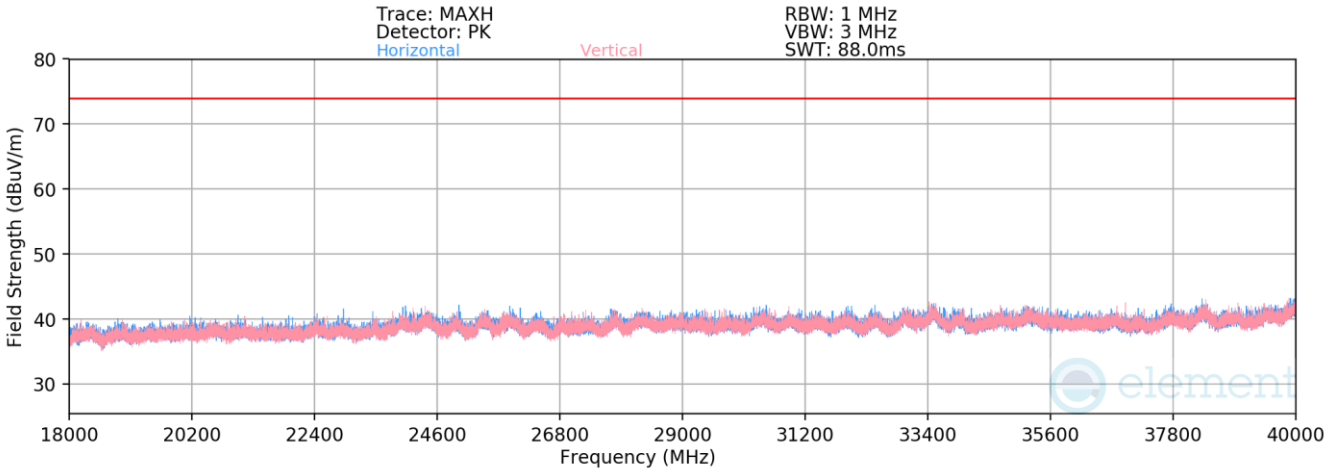
Mode:	802.11n
Data Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5180MHz
Channel:	36

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10360.00	Peak	V	-	-	-71.42	15.86	51.44	68.23	-16.79
*	15540.00	Average	V	-	-	-83.52	23.27	46.75	53.98	-7.23
*	15540.00	Peak	V	-	-	-72.21	23.27	58.06	73.98	-15.92

Table 7-42. Radiated Measurements CDD



Plot 7-50. Radiated Spurious Emissions above 1GHz SDM (802.11n – Ch. 40)

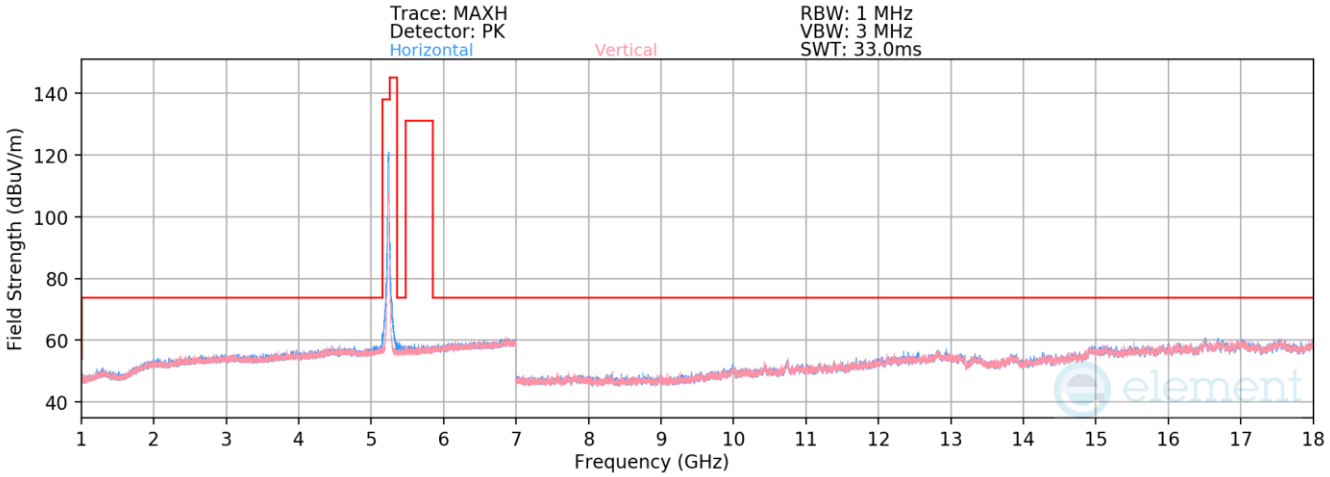


Plot 7-51. Radiated Spurious Emissions 18-40GHz SDM (802.11n – Ch. 40)

Mode:	802.11n
Data Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5200MHz
Channel:	40

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10400.00	Peak	H	-	-	-70.44	15.90	52.46	68.23	-15.77
*	15600.00	Average	V	-	-	-83.11	23.09	46.97	53.98	-7.01
*	15600.00	Peak	V	-	-	-72.88	23.59	57.71	73.98	-16.27

Table 7-43. Radiated Measurements SDM

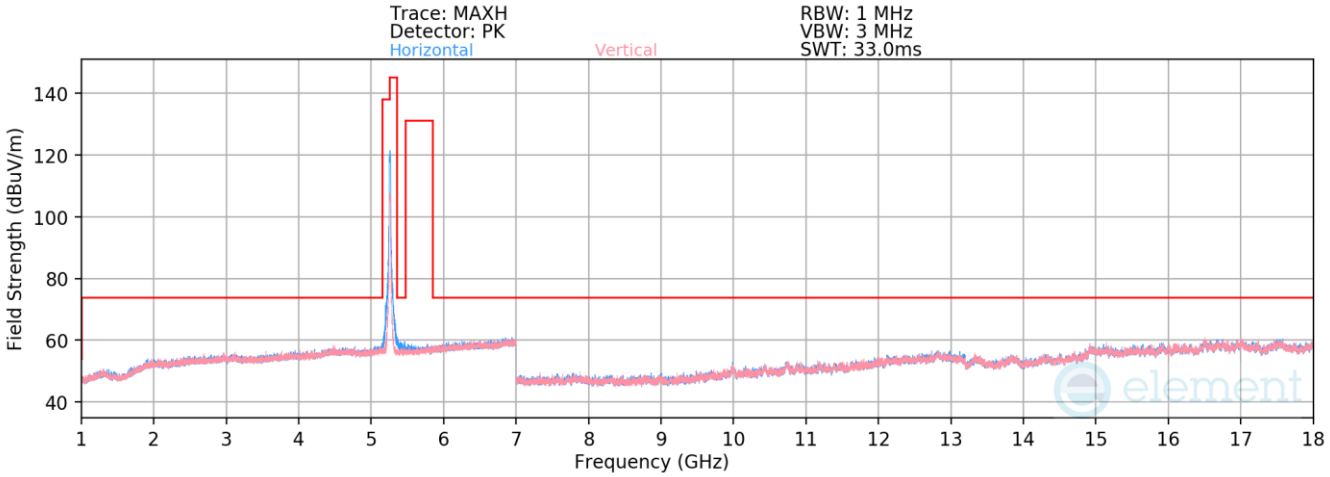


Plot 7-52. Radiated Spurious Emissions above 1GHz SDM (802.11n – Ch. 48)

Mode:	802.11n
Data Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5240MHz
Channel:	48

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10480.00	Peak	H	-	-	-71.61	16.06	51.45	68.23	-16.78
*	15720.00	Average	V	-	-	-83.63	23.70	47.07	53.98	-6.91
*	15720.00	Peak	V	-	-	-72.04	23.70	58.66	73.98	-15.32

Table 7-44. Radiated Measurements SDM

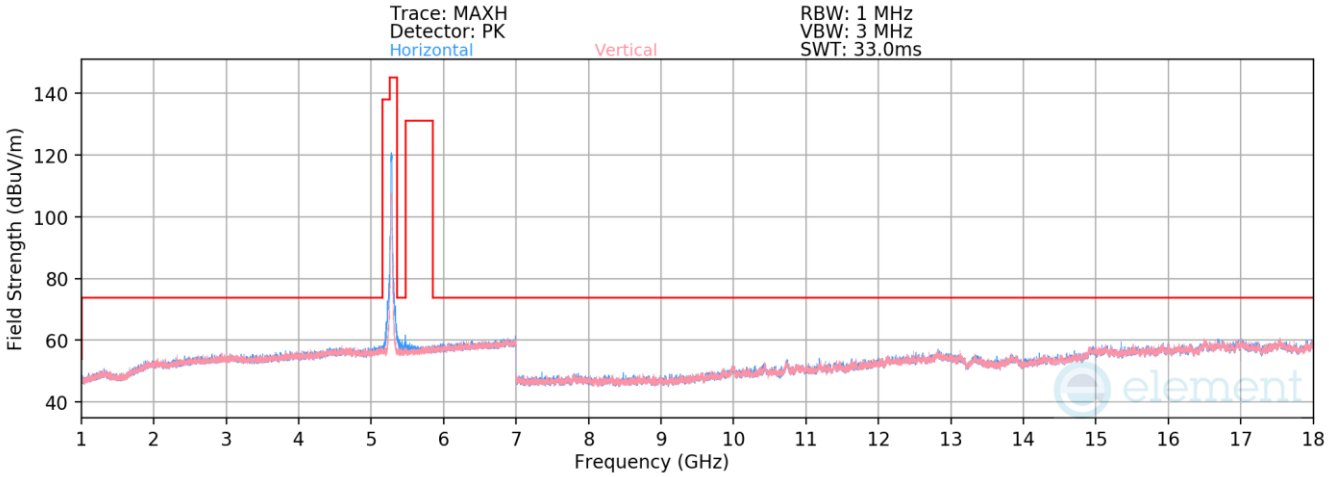


Plot 7-53. Radiated Spurious Emissions above 1GHz SDM (802.11n – Ch. 52)

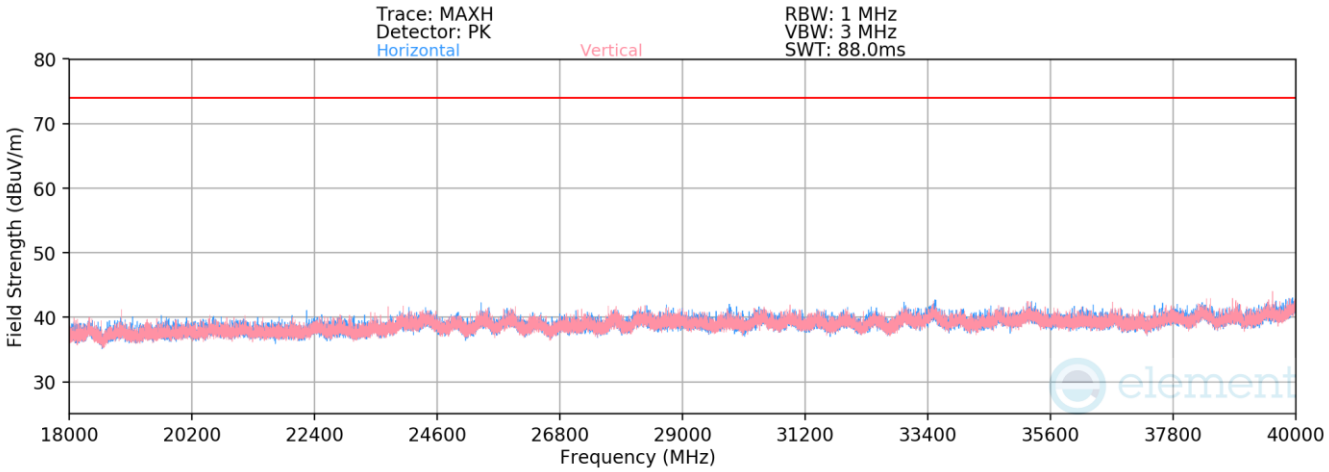
Mode:	802.11n
Data Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5260MHz
Channel:	52

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10520.00	Peak	H	-	-	-71.01	16.23	52.22	68.23	-16.01
*	15780.00	Average	V	-	-	-83.81	24.37	47.56	53.98	-6.42
*	15780.00	Peak	V	-	-	-72.09	24.37	59.28	73.98	-14.70

Table 7-45. Radiated Measurements SDM



Plot 7-54. Radiated Spurious Emissions above 1GHz SDM (802.11n – Ch. 56)

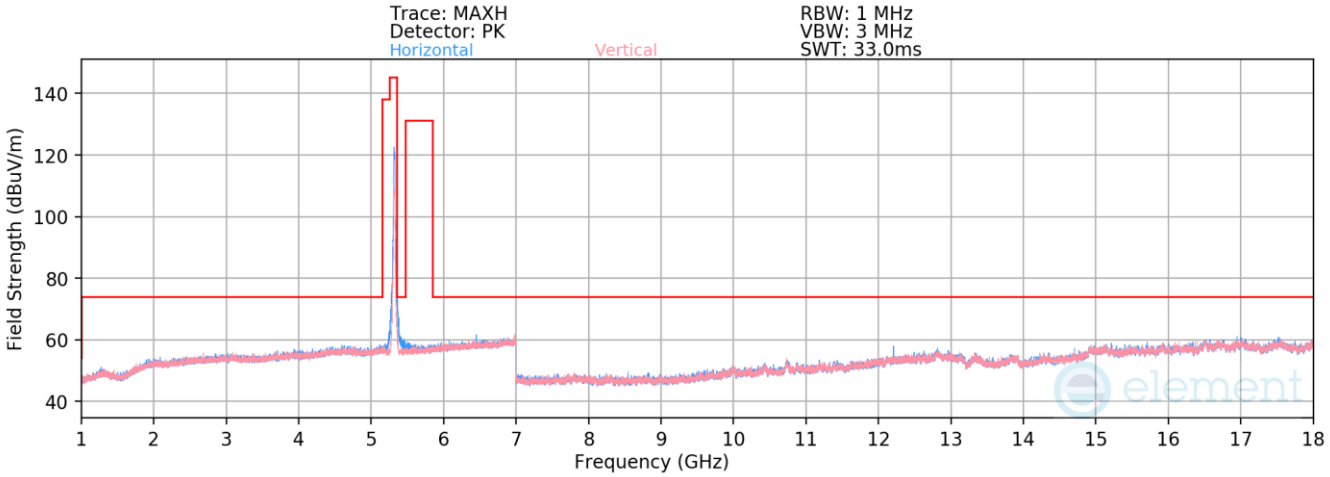


Plot 7-55. Radiated Spurious Emissions 18-40GHz SDM (802.11n – Ch. 56)

Mode:	802.11n
Data Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5280MHz
Channel:	56

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10560.00	Peak	H	-	-	-70.36	16.08	52.73	68.23	-15.50
*	15840.00	Average	V	-	-	-84.67	24.30	46.63	53.98	-7.35
*	15840.00	Peak	V	-	-	-73.20	24.30	58.10	73.98	-15.88

Table 7-46. Radiated Measurements SDM

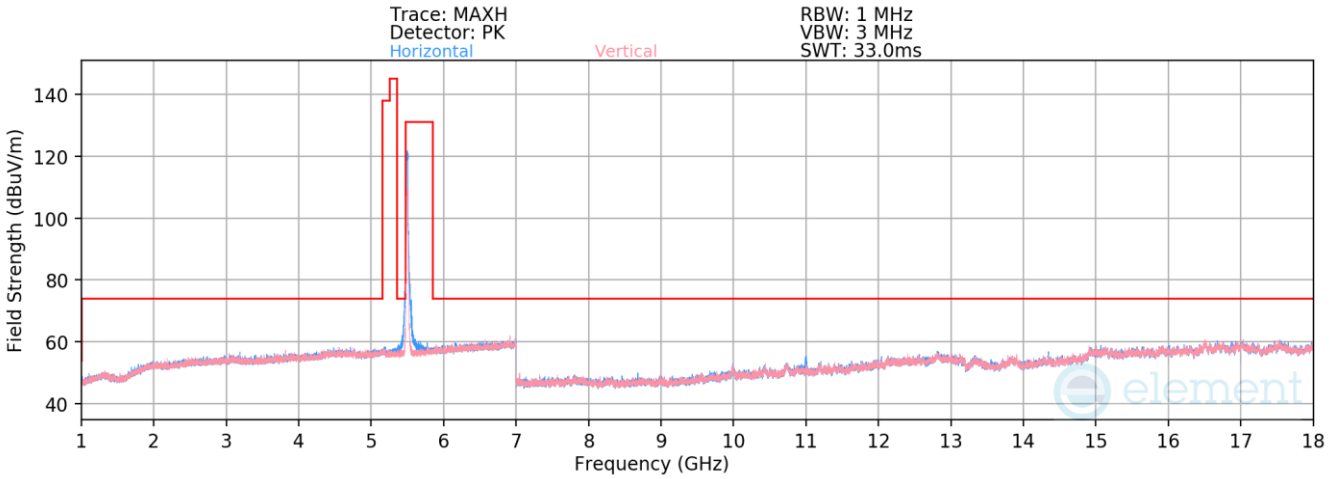


Plot 7-56. Radiated Spurious Emissions above 1GHz SDM (802.11n – Ch. 64)

Mode:	802.11n
Data Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5320MHz
Channel:	64

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	10640.00	Average	H	-	-	-82.57	15.70	40.13	53.98	-13.85
*	10640.00	Peak	H	-	-	-71.46	15.70	51.24	73.98	-22.74
*	15960.00	Average	H	-	-	-85.20	26.00	47.80	53.98	-6.18
*	15960.00	Peak	H	-	-	-74.80	26.00	58.20	73.98	-15.78

Table 7-47. Radiated Measurements SDM

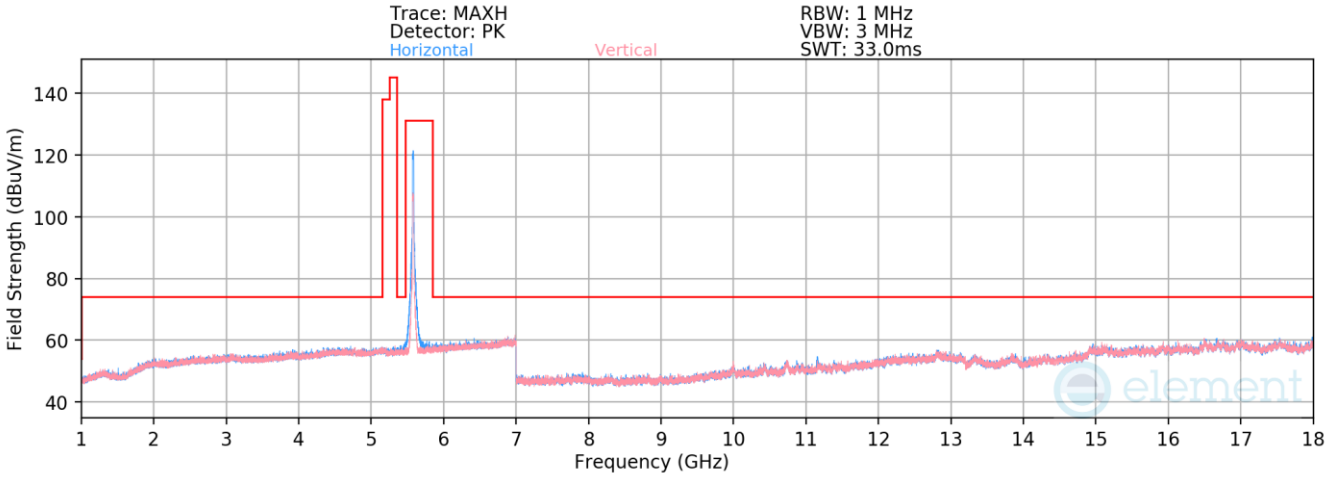


Plot 7-57. Radiated Spurious Emissions above 1GHz SDM (802.11n – Ch. 100)

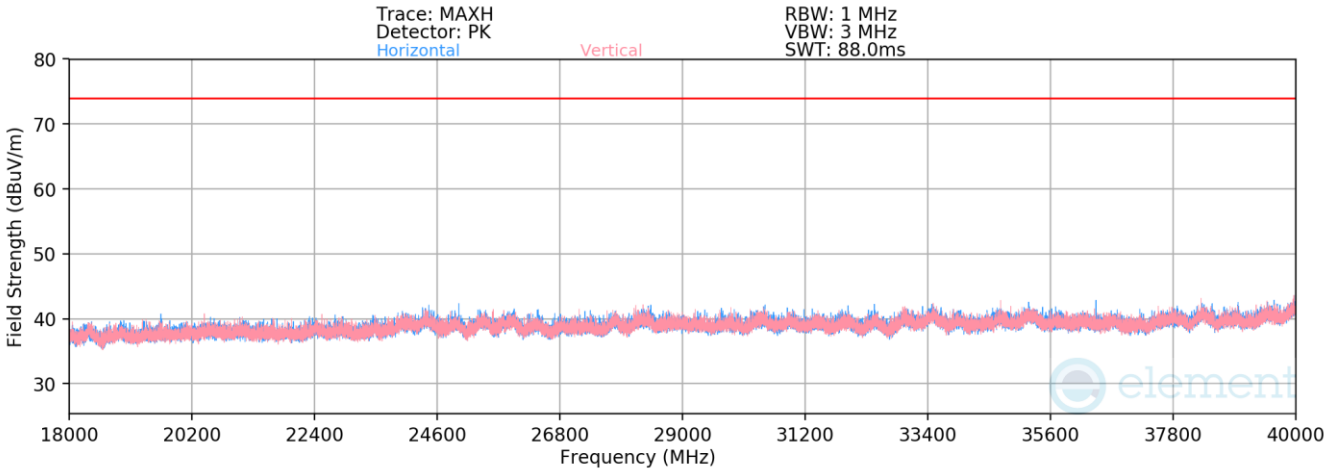
Mode:	802.11n
Data Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5500MHz
Channel:	100

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11000.00	Average	H	395	251	-77.77	16.61	45.84	53.98	-8.14
*	11000.00	Peak	H	395	251	-66.08	16.61	57.53	73.98	-16.45
	16500.00	Peak	H	-	-	-71.64	25.73	61.09	68.23	-7.14

Table 7-48. Radiated Measurements SDM



Plot 7-58. Radiated Spurious Emissions above 1GHz SDM (802.11n – Ch. 116)

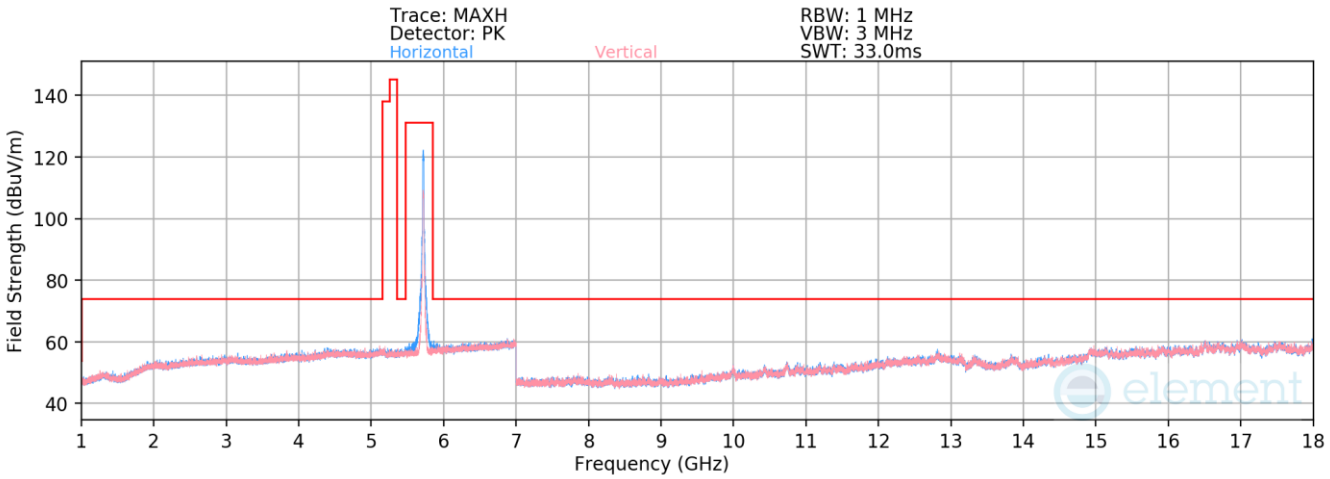


Plot 7-59. Radiated Spurious Emissions 18-40GHz SDM (802.11n – Ch. 116)

Mode:	802.11n
Data Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5580MHz
Channel:	116

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11160.00	Average	H	289	260	-78.56	17.23	45.67	53.98	-8.31
*	11160.00	Peak	H	289	260	-67.22	17.23	57.01	73.98	-16.97
	16740.00	Peak	V	-	-	-72.85	26.68	60.83	68.23	-7.40

Table 7-49. Radiated Measurements SDM

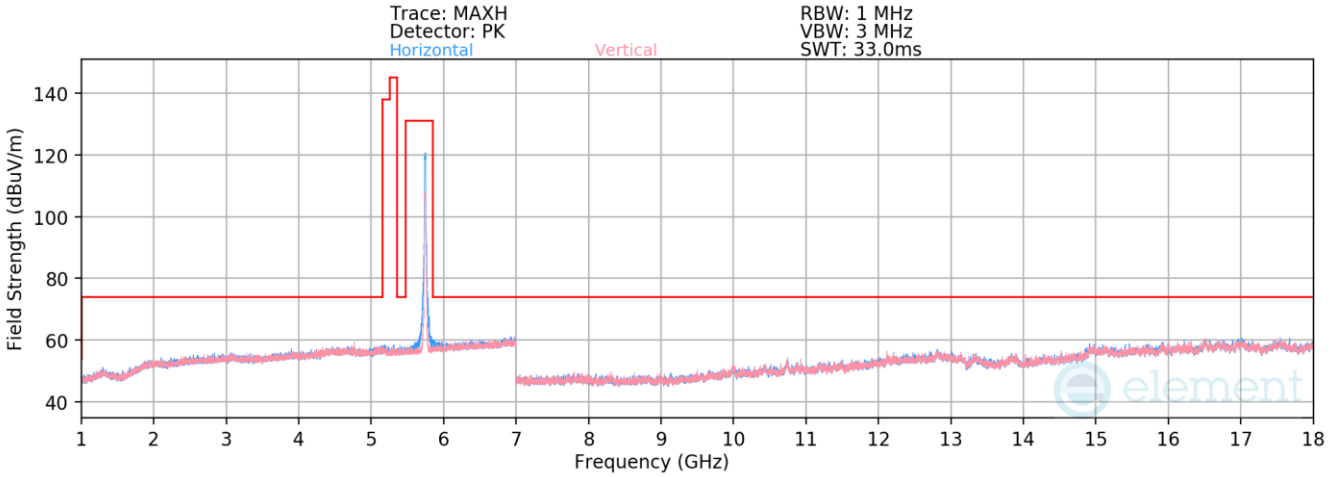


Plot 7-60. Radiated Spurious Emissions above 1GHz SDM (802.11n – Ch. 144)

Mode:	802.11n
Data Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5720MHz
Channel:	144

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11440.00	Average	H	-	-	-83.42	17.82	41.41	53.98	-12.57
*	11440.00	Peak	H	-	-	-71.74	17.82	53.08	73.98	-20.90
	17160.00	Peak	H	-	-	-72.75	25.90	60.15	68.23	-8.08

Table 7-50. Radiated Measurements SDM

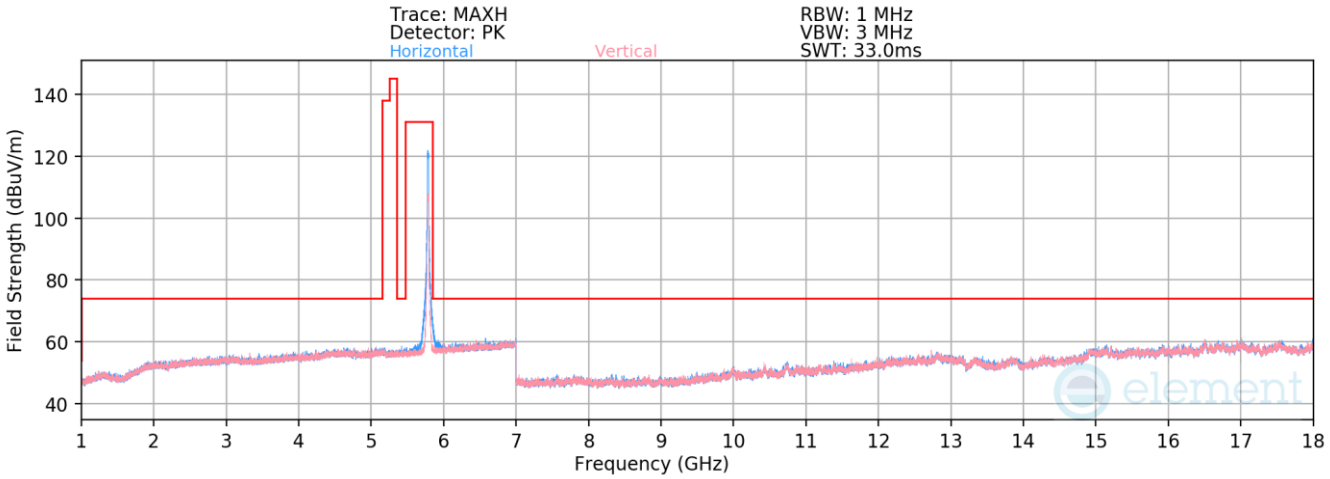


Plot 7-61. Radiated Spurious Emissions above 1GHz CDD (802.11n – Ch. 149)

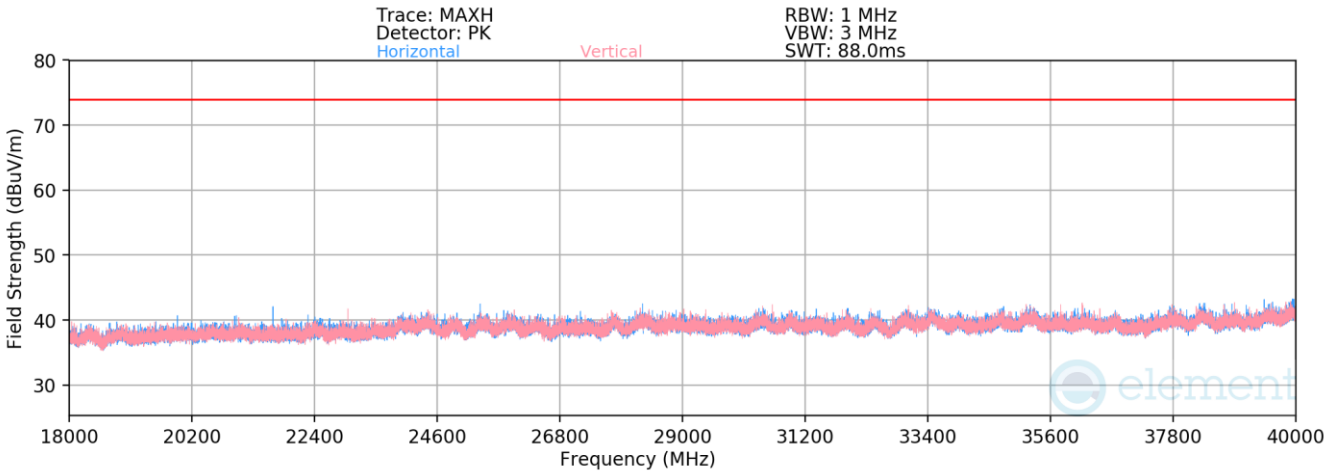
Mode:	802.11n
Data Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5745MHz
Channel:	149

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11490.00	Average	H	-	-	-83.16	17.74	41.58	53.98	-12.40
*	11490.00	Peak	H	-	-	-71.53	17.74	53.21	73.98	-20.77
	17235.00	Peak	H	-	-	-73.16	26.53	60.37	68.23	-7.86

Table 7-51. Radiated Measurements CDD



Plot 7-62. Radiated Spurious Emissions above 1GHz CDD (802.11n – Ch. 157)

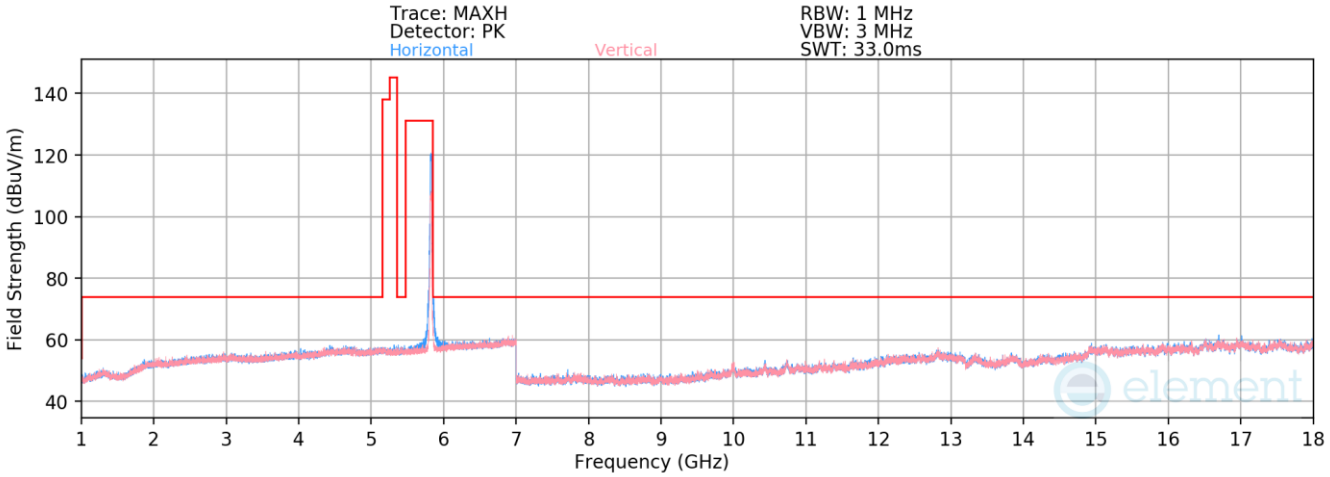


Plot 7-63. Radiated Spurious Emissions 18-40GHz CDD (802.11n – Ch. 157)

Mode:	802.11n
Data Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5785MHz
Channel:	157

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11570.00	Average	H	257	174	-81.17	17.61	43.44	53.98	-10.54
*	11570.00	Peak	H	257	174	-70.46	17.61	54.15	73.98	-19.83
	17355.00	Peak	H	-	-	-72.70	24.83	59.13	68.23	-9.10

Table 7-52. Radiated Measurements CDD

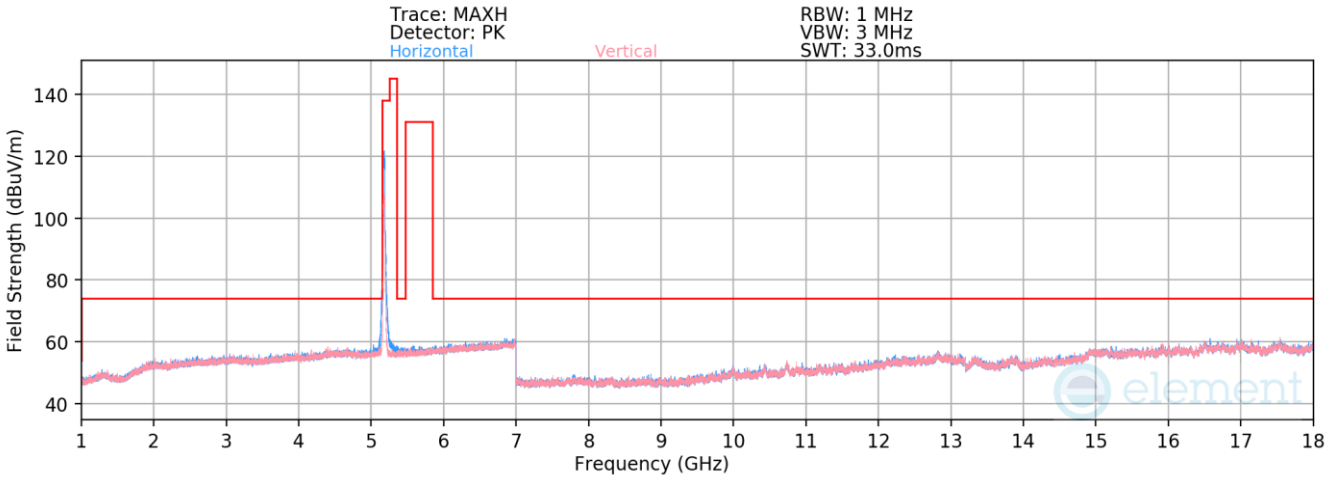


Plot 7-64. Radiated Spurious Emissions above 1GHz CDD (802.11n – Ch. 165)

Mode:	802.11n
Data Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	5825MHz
Channel:	165

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11650.00	Average	H	224	202	-81.11	18.14	44.04	53.98	-9.94
*	11650.00	Peak	H	224	202	-69.91	18.14	55.24	73.98	-18.74
	17475.00	Peak	H	-	-	-71.86	26.00	61.14	68.23	-7.09

Table 7-53. Radiated Measurements CDD

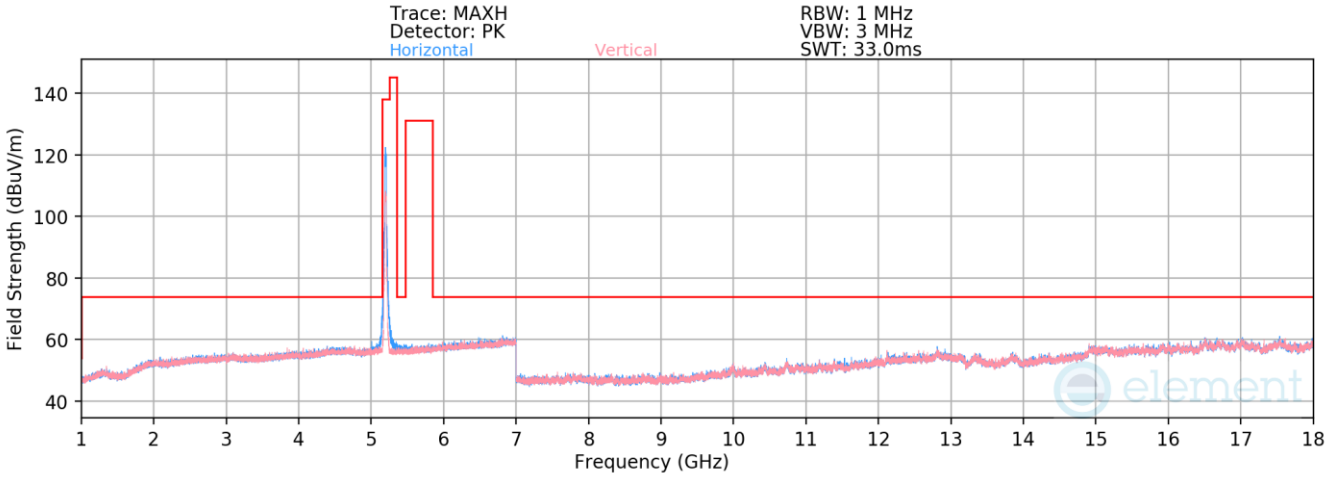


Plot 7-65. Radiated Spurious Emissions above 1GHz CDD (802.11ax(SU) – Ch. 36)

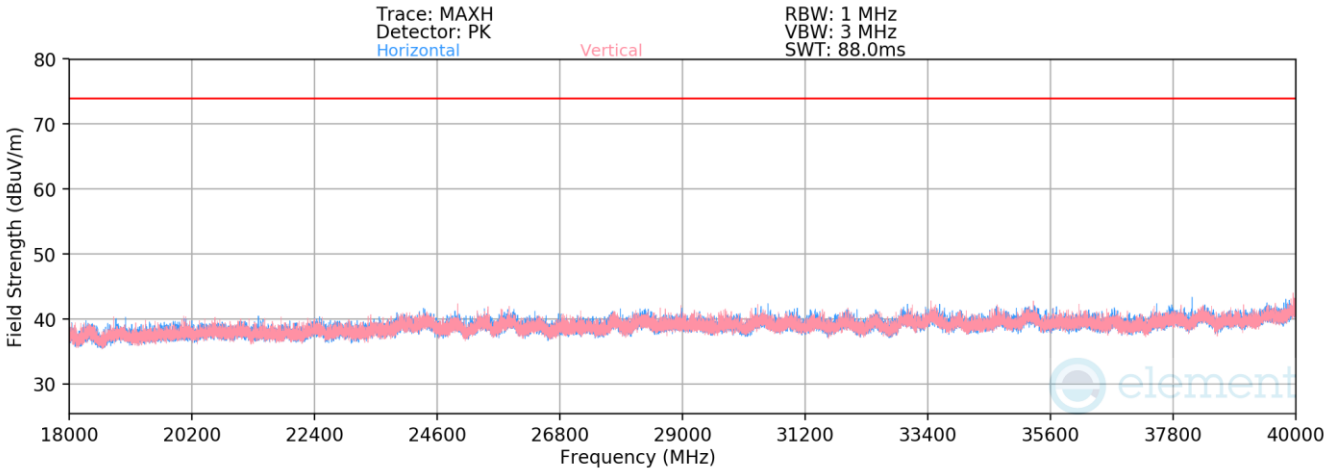
Mode:	802.11ax(SU)
Data Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5180MHz
Channel:	36

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10360.00	Peak	V	-	-	-72.02	16.46	51.44	68.23	-16.79
*	15540.00	Average	V	-	-	-82.69	22.74	47.05	53.98	-6.93
*	15540.00	Peak	V	-	-	-72.25	22.74	57.49	73.98	-16.49

Table 7-54. Radiated Measurements CDD



Plot 7-66. Radiated Spurious Emissions above 1GHz SDM (802.11ax(SU) – Ch. 40)

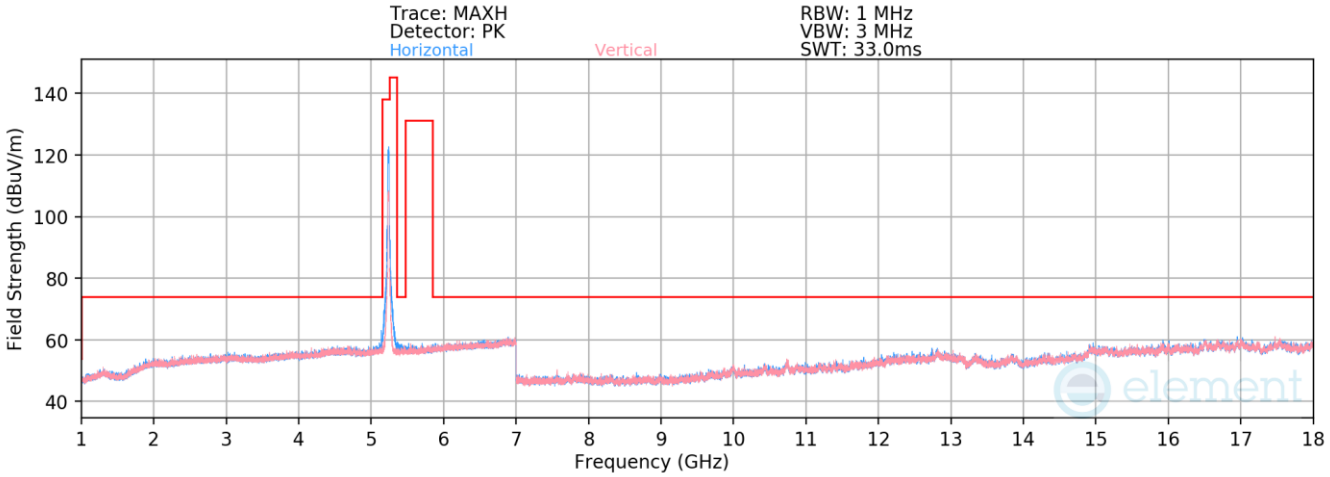


Plot 7-67. Radiated Spurious Emissions 18-40GHz SDM (802.11ax(SU) – Ch. 40)

Mode:	802.11ax(SU)
Data Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5200MHz
Channel:	40

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10400.00	Peak	H	-	-	-72.47	17.28	51.81	68.23	-16.42
*	15600.00	Average	H	-	-	-83.79	23.59	46.80	53.98	-7.18
*	15600.00	Peak	H	-	-	-71.20	23.59	59.39	73.98	-14.59

Table 7-55. Radiated Measurements SDM

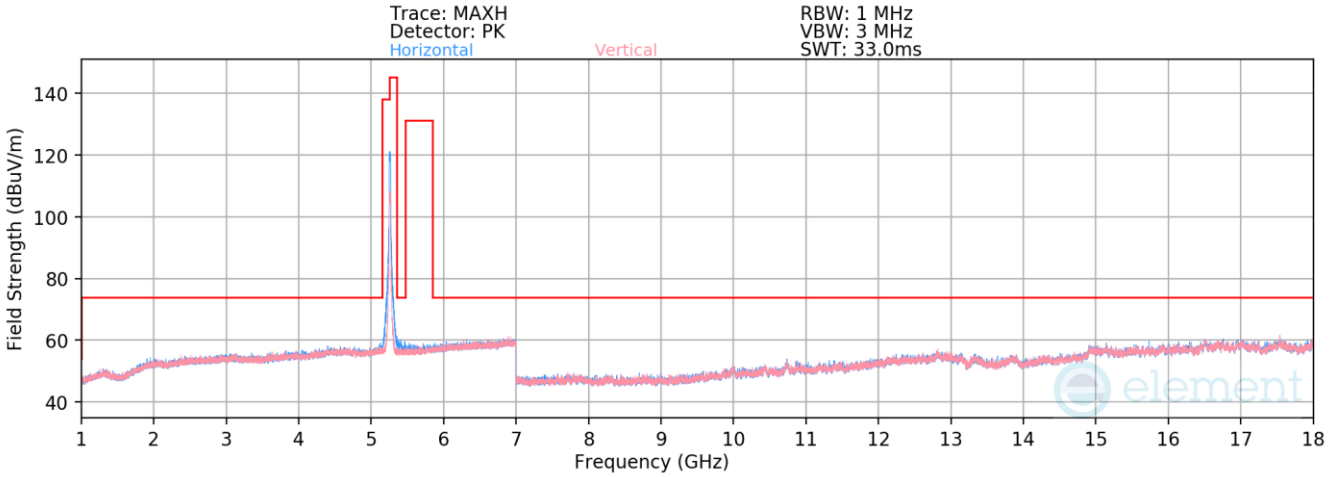


Plot 7-68. Radiated Spurious Emissions above 1GHz SDM (802.11ax(SU) – Ch. 48)

Mode:	802.11ax(SU)
Data Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5240MHz
Channel:	48

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10480.00	Peak	V	-	-	-72.20	17.58	52.39	68.23	-15.84
*	15720.00	Average	H	-	-	-83.62	23.70	47.08	53.98	-6.90
*	15720.00	Peak	H	-	-	-71.91	23.70	58.79	73.98	-15.19

Table 7-56. Radiated Measurements SDM



Plot 7-69. Radiated Spurious Emissions above 1GHz SDM (802.11ax(SU) – Ch. 52)

Mode:	802.11ax(SU)
Data Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5260MHz
Channel:	52

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10520.00	Peak	V	-	-	-71.77	16.55	51.78	68.23	-16.45
*	15780.00	Average	H	-	-	-83.88	24.37	47.49	53.98	-6.49
*	15780.00	Peak	H	-	-	-72.38	24.37	58.99	73.98	-14.99

Table 7-57. Radiated Measurements SDM