ELEMENT MATERIALS TECHNOLOGY,
Columbia MD
(formerly PCTEST)
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. 410.290.6652 / Fax 410.381.1520
http://www.element.com

MEASUREMENT REPORT

FCC Part 15.407 802.11a/ax/be WiFi 6GHz VLP (OFDM)

Applicant Name:
Samsung Electronics Co., Ltd.
129, Samsung-ro,
Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

Date of Testing:
9/2/2025 - 10/10/2025
Test Report Issue Date:
11/21/2025
Test Site/Location:
Element Lab., Columbia, MD, USA
Test Report Serial No.:
1M2508250078-24-R1.A3L

FCC ID:	**A3LSMS948U**
APPLICANT:	**Samsung Electronics Co., Ltd.**

Application Type:	Certification
Model:	SM-S948U
Additional Model(s):	SM-S948U1
EUT Type:	Portable Handset
Frequency Range:	5935 – 7115MHz
Modulation Type:	OFDM
FCC Classification:	15E 6GHz Very Low Power Device (6VL)
FCC Rule Part(s):	Part 15 Subpart E (15.407)
Test Procedure(s):	ANSI C63.10:2020, KDB 987594 D02 v03 KDB 648474 D03 v01r04

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. Test results reported herein relate only to the item(s) tested.

This revised Test Report (S/N: 1M2508250078-24-R1.A3L) supersedes and replaces the previously issued test report (S/N: 1M2508250078-24.A3L) on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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 #2041.01

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

TEST REPORT REVISION HISTORY

Rev. No.	Report S/N	Description	Issue Date
-	1M2508250078-24.A3L	Initial Release	10/31/2025
1	1M2508250078-24-R1.A3L	Addressed comments made by TCB reviewer	11/21/2025

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

TABLE OF CONTENTS

1.0 INTRODUCTION 6
1.1 Scope 6
1.2 Element Test Location 6
1.3 Test Facility / Accreditations 6
2.0 PRODUCT INFORMATION 7
2.1 Equipment Description 7
2.2 Device Capabilities 7
2.3 Antenna Description 10
2.4 Test Configuration 10
2.5 Software and Firmware 10
2.6 EMI Suppression Device(s) / Modifications 10
3.0 DESCRIPTION OF TESTS 11
3.1 Evaluation Procedure 11
3.2 AC Line Conducted Emissions 11
3.3 Radiated Emissions 12
3.4 Environmental Conditions 12
4.0 ANTENNA REQUIREMENTS 13
5.0 MEASUREMENT UNCERTAINTY 14
6.0 TEST EQUIPMENT CALIBRATION DATA 15
7.0 TEST RESULTS 17
7.1 Summary 17
7.2 26dB Bandwidth Measurement 19
7.2.1 MIMO Antenna-1 26 dB Bandwidth Measurements - (UNII Band 5) 22
7.2.2 MIMO Antenna-2 26 dB Bandwidth Measurements - (UNII Band 5) 27
7.3 UNII Output Power Measurement 32
7.4 Maximum Power Spectral Density 38
7.4.1 MIMO Antenna-1 Power Spectral Density Measurement - (UNII Band 5) 41
7.4.2 MIMO Antenna-2 Power Spectral Density Measurement - (UNII Band 5) 46
7.5 In-Band Emissions 52
7.5.1 MIMO Antenna-1 In-Band Emission Plot Measurement - (UNII Band 5) 56
7.5.2 MIMO Antenna-2 In-Band Emission Plot Measurement - (UNII Band 5) 61
7.6 Contention Based Protocol 66
7.6.1 AWGN Plots 69
7.6.2 CBP Timing Plots 70
7.6.3 Channel Move Plots 78
7.7 Transmit Power Control 80
7.8 Radiated Emission Measurements 84
7.8.1 MIMO Radiated Spurious Emission Measurements 88
7.8.2 MIMO Radiated Band Edge Measurements (20MHz BW) 95
7.8.3 MIMO Radiated Band Edge Measurements (40MHz BW) 97

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.8.4 MIMO Radiated Band Edge Measurements (80MHz BW) 98
7.8.5 MIMO Radiated Band Edge Measurements (80MHz BW - Punctured) 99
7.8.6 MIMO Radiated Band Edge Measurements (160MHz BW) 100
7.8.7 MIMO Radiated Band Edge Measurements (160MHz BW - Punctured) 101
7.8.8 MIMO Radiated Band Edge Measurements (320MHz BW) 102
7.8.9 MIMO Radiated Band Edge Measurements (320MHz BW – Punctured) 103
7.9 Line Conducted Test Data 104
8.0 CONCLUSION 114

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

MEASUREMENT REPORT

Channel Bandwidth [MHz]	UNII Band	Tx Frequency [MHz]	MIMO	
			Max. Power [mW]	Max. Power [dBm]
20	5	5955 - 6415	3.80	5.80
	6	6435 - 6515	4.45	6.49
	7	6535 - 6875	4.43	6.47
	8	6895 - 7115	4.59	6.62
40	5	5965 - 6405	7.83	8.94
	6	6445 - 6525	8.88	9.49
	7	6565 - 6845	8.80	9.45
	8	6885 - 7085	9.12	9.60
80	5	5985 - 6385	19.70	12.95
	6	6465	17.36	12.40
	7	6545 - 6865	17.93	12.54
	8	6945 - 7025	17.99	12.55
160	5	6025 - 6345	19.91	12.99
	6	6505	18.31	12.63
	7	6665 - 6825	17.90	12.53
	8	6985	17.66	12.47
320	5	6105 - 6265	19.12	12.81
	6	6425	17.77	12.50
	7	6585 - 6745	17.57	12.45
	8	6905	17.77	12.50

EUT Overview - EIRP

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

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 Test Location

Measurements were conducted at the Element laboratory(ies) indicated in Section 1.3 below. All measurement facilities are 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 lab located in Columbia, MD 21046, U.S.A.

- Element Washington DC LLC is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 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 Washington DC LLC facility is a registered test laboratory with the site description on file with ISED (Wireless Test Lab number 2451B) and FCC (Designation Number US1113).

- 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).

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Electronics Co., Ltd. Portable Handset FCC ID: A3LSMS948U**. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter while operating in the 6GHz band in very low power (VLP) mode.

Test Device Serial No.: 0500M, 0527M, 0529M, 0550M, 0520M

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR (FR1 and FR2), 802.11b/g/n/ac/ax/be WLAN, 802.11a/n/ac/ax/be UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer, UWB, NTN, SCS

Band 5		Band 6		Band 7		Band 8	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
2	5935	97	6435	117	6535	189	6895
:	:	:	:	:	:	:	:
45	6175	105	6475	149	6695	209	6995
:	:	:	:	:	:	:	:
93	6415	113	6515	185	6875	233	7115

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

Band 5		Band 6		Band 7		Band 8	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
3	5965	99	6445	123	6565	187	6885
:	:	:	:	:	:	:	:
43	6165	107	6485	155	6725	211	7005
:	:	:	:	:	:	:	:
91	6405	115	6525	179	6845	227	7085

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

Band 5		Band 6		Band 7		Band 8	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
7	5985	103	6465	119	6545	199	6945
:	:			:	:	:	:
39	6145			151	6705	215	7025
:	:			:	:		
87	6385			183	6865		

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

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

Band 5		Band 6		Band 7		Band 8	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
15	6025	111	6505	143	6665	207	6985
47	6185			175	6825		
79	6345						

Table 2-4. 802.11ax/be (160MHz BW) Frequency / Channel Operations

Band 5		Band 6		Band 7		Band 8	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
31	6105	95	6425	127	6585	191	6905
63	6265			159	6745		

Table 2-5. 802.11be (320MHz BW) Frequency / Channel Operations

Notes:

1. 6GHz NII operation is possible in 20MHz, 40MHz, 80MHz, 160MHz, and 320MHz 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) of 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:

802.11 Mode/Band		ANT1		ANT2		MIMO (1+2)	
		Duty Cycle [%]	Radiated DCCF [dB]	Duty Cycle [%]	Radiated DCCF [dB]	Duty Cycle [%]	Radiated DCCF [dB]
6GHz	a	93.73	0.28	93.73	0.28	93.73	0.28
	ax (HE20)	99.65	N/A	99.69	N/A	99.65	N/A
	be (EHT20)	99.67	N/A	99.67	N/A	99.67	N/A
	ax (HE40)	99.69	N/A	99.69	N/A	99.67	N/A
	be (EHT40)	99.69	N/A	99.85	N/A	99.65	N/A
	ax (HE80)	99.65	N/A	99.67	N/A	99.73	N/A
	be (EHT80)	99.67	N/A	99.69	N/A	99.67	N/A
	be (EHT80, 20MHz Puncture)	99.69	N/A	99.84	N/A	99.65	N/A
	ax (HE160)	99.69	N/A	99.60	N/A	99.63	N/A
	be (EHT160)	99.87	N/A	99.69	N/A	99.65	N/A
	be (EHT160, 20MHz Puncture)	99.71	N/A	99.69	N/A	99.62	N/A
	be (EHT160, 40MHz Puncture)	99.65	N/A	99.63	N/A	99.65	N/A
	be (EHT320)	99.67	N/A	99.65	N/A	99.63	N/A
	be (EHT320, 40MHz Puncture)	99.67	N/A	99.67	N/A	99.67	N/A
	be (EHT320, 80MHz Puncture)	99.67	N/A	99.69	N/A	99.65	N/A
	be (EHT320, 120MHz Puncture)	99.67	N/A	99.69	N/A	99.65	N/A

Table 2-6. Measured Duty Cycles

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

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

WiFi Configurations		SISO		CDD		SDM	
		ANT1	ANT2	ANT1	ANT2	ANT1	ANT2
6GHz	11a	✓	✓	✓	✓	×	×
	11ax	✓	✓	✓	✓	✓	✓
	11be	✓	✓	✓	✓	✓	✓

Table 2-7. Antenna / Technology Configurations

✓= Support; ×= NOT Support
SISO = Single Input Single Output
SDM = Spatial Diversity Multiplexing – MIMO function
CDD = Cyclic Delay Diversity – 2Tx Function

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

802.11a	MCS Index		Spatial Stream	OFDM (802.11ax/be)														
20MHz				20MHz			40MHz			80MHz			160MHz			320MHz		
	HT	EHT		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	0.8µs GI	1.6µs GI	3.2µs GI
6	0	0	1	8.6	8.1	7.3	17.2	16.3	14.6	36	34	30.6	72.1	68.1	61.3	144.1	136.1	122.5
9	1	1	1	17.2	16.3	14.6	34.4	32.5	29.3	72.1	68.1	61.3	144.1	136.1	122.5	288.2	272.2	245
12	2	2	1	25.8	24.4	21.9	51.6	48.8	43.9	108.1	102.1	91.9	216.2	204.2	183.8	432.4	408.3	367.5
18	3	3	1	34.4	32.5	29.3	68.8	65	58.5	144.1	136.1	122.5	288.2	272.2	245	576.5	544.4	490
24	4	4	1	51.6	48.8	43.9	103.2	97.5	87.8	216.2	204.2	183.8	432.4	408.3	367.5	864.7	816.7	735
36	5	5	1	68.8	65	58.5	137.6	130	117	288.2	272.2	245	576.5	544.4	490	1152.9	1088.9	980
48	7	6	1	77.4	73.1	65.8	154.9	146.3	131.6	324.3	306.3	275.6	648.5	612.5	551.3	1297.1	1225	1102.5
54		7	1	86	81.3	73.1	172.1	162.5	146.3	360.3	340.3	306.3	720.6	680.6	612.5	1441.2	1361.1	1225
		8	1	103.2	97.5	87.8	206.5	195	175.5	432.4	408.3	367.5	864.7	816.7	735	1729.4	1633.3	1470
		9	1	114.7	108.3	97.5	229.4	216.7	195	480.4	453.7	408.3	960.8	907.4	816.7	1921.6	1814.8	1633.3
		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	2161.8	2041.7	1837.5
		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	2402	2268.5	2041.7
		12	1	154.9	146.3	131.6	309.7	292.5	263.3	648.5	612.5	551.3	1297.1	1225	1102.5	2594.1	2450	2205
		13	1	172.1	162.5	146.3	344.1	325	292.5	720.6	680.6	612.5	1441.2	1361.1	1225	2882.4	2722.2	2450
6	8	0	2	17.2	16.3	14.6	34.4	32.5	29.3	72.1	68.1	61.3	144.1	136.1	122.5	288.2	272.2	245
9	9	1	2	34.4	32.5	29.3	68.8	65	58.5	144.1	136.1	122.5	288.2	272.2	245	576.5	544.4	490
12	10	2	2	51.6	48.8	43.9	103.2	97.5	87.8	216.2	204.2	183.8	432.4	408.3	367.5	864.7	816.7	735
18	11	3	2	68.8	65	58.5	137.6	130	117	288.2	272.2	245	576.5	544.4	490	1152.9	1088.9	980
24	12	4	2	103.2	97.5	87.8	206.5	195	175.5	432.4	408.3	367.5	864.7	816.7	735	1729.4	1633.3	1470
36	13	5	2	137.6	130	117	275.3	260	234	576.5	544.4	490	1152.9	1088.9	980	2305.9	2177.8	1960
48	14	6	2	154.9	146.3	131.6	309.7	292.5	263.3	648.5	612.5	551.3	1297.1	1225	1102.5	2594.1	2450	2205
54	15	7	2	172.1	162.5	146.3	344.1	325	292.5	720.6	680.6	612.5	1441.2	1361.1	1225	2882.4	2722.2	2450
		8	2	206.5	195	175.5	412.9	390	351	864.7	816.7	735	1729.4	1633.3	1470	3458.8	3266.7	2940
		9	2	229.4	216.7	195	458.8	433.3	390	960.8	907.4	816.7	1921.6	1814.8	1633.3	3843.1	3629.6	3266.7
		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	4323.5	4083.3	3675
		11	2	286.8	270.8	243.8	573.5	541.7	487.5	1201	1134.3	1020.8	2402	2268.5	2041.7	4803.9	4537	4083.3
		12	2	309.7	292.5	263.3	619.4	585	526.5	1297.1	1225	1102.5	2594.1	2450	2205	5188.2	4900	4410
		13	2	344.1	325	292.5	688.2	650	585	1441.2	1361.1	1225	2882.4	2722.2	2450	5764.7	5444.4	4900

Table 2-8. Supported Data Rates

4. The device supports either Standard Power (SP) or Low Power Indoor (LPI) operation in the following UNII bands:

UNII Band	Standard Power (SP)	Low Power Indoor (LPI)	Very Low Power (VLP)
UNII 5	✓	✓	✓
UNII 6	×	✓	✓
UNII 7	✓	✓	✓
UNII 8	×	✓	✓

Table 2-9. Power Operation

✓= Support; × = NOT Support

5. The device supports channel puncturing for 80MHz, 160MHz, and 320MHz bandwidths.

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

2.3 Antenna Description

The following antenna gains are used in this device per the "Unlicensed Band Antenna Gain" document provided by the client. This document is also included in the filing as a public exhibit.

Frequency	Ant1 Peak Gain [dBi]	Ant2 Peak Gain [dBi]
5925 MHz	-5.10	-6.68
6025 MHz	-6.25	-5.86
6125 MHz	-4.86	-5.98
6225 MHz	-6.81	-6.82
6325 MHz	-5.26	-4.97
6425 MHz	-6.11	-5.84
6525 MHz	-5.12	-5.35
6625MHz	-6.35	-6.33
6725MHz	-6.34	-6.19
6825MHz	-5.71	-6.86
6925MHz	-5.32	-6.20
7025MHz	-6.35	-5.28
7125MHz	-5.02	-6.89

Table 2-10 Antenna Peak Gain per Frequency

	Ant1 Peak Gain [dBi]	Ant2 Peak Gain [dBi]	Directional Gain [dBi]
5925 – 6425 MHz	-4.86	-4.97	-1.90
6425 – 6525 MHz	-5.12	-5.35	-2.22
6525 – 6875 MHz	-5.12	-5.35	-2.22
6875 – 7125 MHz	-5.02	-5.28	-2.14

Table 2-11. Antenna Peak Gain

2.4 Test Configuration

The EUT was tested per the guidance of ANSI C63.10:2020 and KDB 987594 D02 v03. 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, 7.5 and 7.6 for antenna port conducted emissions test setups.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) Model: NQ-WC-06 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

2.5 Software and Firmware

The test was conducted with firmware version S948USQU0AYIB installed on the EUT.

2.6 EMI Suppression Device(s) / Modifications

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

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

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 987594 D02 v03 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 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. 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 an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (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 groundplane. 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 7.9. The EMI Receiver mode of the Agilent MXE was used to perform AC line conducted emissions testing.

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

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.

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 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 precautions were 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 were 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.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4:2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01 v01r01.

3.4 Environmental Conditions

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

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

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.

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10:2020. 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)
Contention Based Protocol Conducted Measurements	0.86
Conducted Bench Top Measurements	1.13
Line Conducted Disturbance	3.09
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

Table 5-1. Measurement Uncertainty Budget

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

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 to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	MD 1M 18-40	EMC Cable and Switch System	2/25/2025	Annual	2/25/2026	MD 1M 40
-	AP2-001	EMC Cable and Switch System	2/25/2025	Annual	2/25/2026	AP2-001
-	AP2-002	EMC Cable and Switch System	2/25/2025	Annual	2/25/2026	AP2-002
-	ETS-001	EMC Cable and Switch System	12/11/2024	Annual	12/11/2025	ETS-001
-	ETS-002	EMC Cable and Switch System	12/11/2024	Annual	12/11/2025	ETS-002
-	WL25-1	Conducted Cable Set (25GHz)	2/25/2025	Annual	2/25/2026	WL25-1
-	WL25-2	Conducted Cable Set (25GHz)	2/25/2025	Annual	2/25/2026	WL25-2
-	WL40-1	Conducted Cable Set (40GHz)	2/25/2025	Annual	2/25/2026	WL40-1
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	11/25/2024	Annual	11/25/2025	100348
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	3/25/2025	Annual	3/25/2026	101716
Agilent	N9038A	MXE EMI Receiver	9/16/2024	Annual	11/22/2025	MY51210133
Agilent	N9030A	50GHz PXA Signal Analyzer	8/22/2025	Annual	8/22/2026	US51350301
Agilent	N9030A	3Hz-44GHz PXA Signal Analyzer	9/15/2025	Annual	9/15/2026	MY49430494
Rohde & Schwarz	ENV216	Two-Line V-Network	3/21/2025	Biennial	3/21/2027	101380
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	6/4/2025	Biennial	6/4/2027	125518
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Test Antenna	4/15/2024	Biennial	4/15/2026	101058
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	9/11/2024	Biennial	9/11/2026	A051107
Sunol	JB6	Bi-Log Antenna (30M - 6GHz)	3/24/2025	Biennial	3/24/2027	A082816
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	6/6/2025	Annual	6/6/2026	MY52350166
Keysight Technologies	N9020A	MXA Signal Analyzer	5/7/2025	Annual	5/7/2026	US46470561
Keysight Technologies	N9020A	MXA Signal Analyzer	6/4/2025	Annual	6/4/2026	MY54500644
EMCO	3116	Horn Antenna (18-40GHz)	7/5/2024	Biennial	7/5/2026	9203-2178
Sunol Sciences	DRH-118	Horn Antenna (1-18GHz)	3/19/2025	Biennial	3/19/2027	A102416-2
Anritsu	MA24408A	Microwave Peak Power Sensor	10/2/2024	Annual	10/2/2025	11675
Anritsu	MA24406A	Microwave Peak Power Sensor	1/16/2025	Annual	1/16/2026	11240

Table 6-1. Test Equipment Calibration Table

Note:
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.

Component	Serial Number
MegaPhase Cable TM26-S1S1-36	18160103 003
Pasternack 6dB Attenuator PE7005-6	N/A

Table 6-2. WL25-1 Conducted Cable Set Components

Component	Serial Number
MiniCircuirs Cable CBL-2FT-SMSM+	77743
MCL 6dB Attenuator BW-S6W2+	1314

Table 6-3. WL25-2 Conducted Cable Set Components

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

Component	Serial Number
MegaPhase Cable TM40K1K1-36	18160102 001
MCL 10dB Attenuator BW-K10 2W44+	1902

Table 6-4. WL40-1 Conducted Cable Set Components

Component	Serial Number
Pasternak Cable RG214/U	111815
Sucoflex Cable 106A	246420-001
Rohde & Schwarz SF Unit	102134

Table 6-5. ETS-001 EMC Cable and Switch System Components

Component	Serial Number
MiniCircuits Cable CBL-0.5M-SMNM+	47261
Micro-Coax Utiflex Cable UFB311A-Q-3346-50U50U MFR 64639	231978-001
Micro-Coax Utiflex Cable UFB311A-1-0629-50U50U MFR 64639	231986-002
MegaPhase Cable NC29-N1N1-324	19046401 001
MegaPhase Flex Cable 10511-1	15044701-006
Micro-Coas Utiflex Cable UFB311A-Q-3446-50U50U MFR 64639	231978-002
Micro-Coas Utiflex Cable UFB311A-1-0629-50U50U MFR 64639	231986-001
Micro-Coas Utiflex Cable UFB142A-0-0659-50U50U MFR 64639	232069-001
Rohde & Schwarz SF Unit	102138

Table 6-6. AP2-001 EMC Cable and Switch System Components

Component	Serial Number
MegaPhase Cable TM40-K1K1-30	20233002-004
UTIPLEX Cable	64639 232063-001
Rohde & Schwarz Pre-amp RS-PR1840 18G-40G	9037.7670.02

Table 6-7. MD 1M 18-40 EMC Cable and Switch System Components

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.
FCC ID: A3LSMS948U
FCC Classification: 15E 6GHz Very Low Power Device (6VL)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1046, 15.407(a)(12)	Maximum Conducted Output Power	N/A	CONDUCTED	PASS	Section 7.3
15.407(a)(9)	Maximum Radiated Output Power	< 14dBm e.i.r.p.		PASS	Section 7.3
2.1049, 15.407(a)(11)	Occupied Bandwidth/ 26dB Bandwidth	99% of the occupied bandwidth of any channel must be contained within each of its respective U-NII sub bands. The maximum transmitter channel bandwidth for U-NII devices in the 5.925-7.125 GHz band is 320 megahertz.		PASS	Section 7.2
15.407(a)(9)	Maximum Power Spectral Density	< -5dBm/MHz e.i.r.p.		PASS	Section 7.4
15.407(b)(7)	In-Band Emissions	EUT must meet the limits detailed in 15.407(b)(7)		PASS	Section 7.5
15.407(d)(6)	Contention Based Protocol	EUT must detect AWGN signal with 90% (or better) certainty	RADIATED	PASS	Section 7.6
15.407(d)(10)	Transmit Power Control	Must operate at least 6 dB below the maximum EIRP power spectral density (PSD) value of −5 dBm/MHz		PASS	Section 7.7
15.407(b)(6)	Undesirable Emissions	< -27dBm/MHz e.i.r.p. outside of the 5.925 – 7.125GHz band		PASS	Section 7.8
15.205, 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS	Section 7.8
15.407(b)(9)	AC Conducted Emissions (150kHz – 30MHz)	< FCC 15.207 limits	LINE CONDUCTED	PASS	Section 7.9

Table 7-1. Summary of Test Results

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

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 "EMC Software Tool" Version 2.3.0.
5) For radiated band edge, 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 1.6.1.

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.2 26dB Bandwidth Measurement

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 at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

Test Procedure Used

ANSI C63.10:2020 – Section 12.5

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 = approximately 1% 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 cases were investigated; a subset of the plots taken were included to represent relevant settings and measurements.
2. In this section, the bandwidth data table (Table 7-2, 7-3) includes mainly the 26dB bandwidth measurements. In case of 320MHz operation, an occupied bandwidth measurement was included in the table to demonstrate compliance. Thus, all measurements in the tables are 26dB bandwidth measurements except for the 320MHz bandwidth cases which are occupied bandwidth measurements.

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

	Frequency [MHz]	Channel	802.11 MODE	Antenna-1 26dB Bandwidth [MHz]	Antenna-2 26dB Bandwidth [MHz]	Antenna-1 Occupied Bandwidth [MHz]	Antenna-2 Occupied Bandwidth [MHz]
Band 5	5935	2	a	24.49	22.13	17.69	17.03
	6175	45	a	25.41	24.12	18.82	18.26
	6415	93	a	23.62	22.76	17.53	17.05
	5935	2	be (20MHz)	24.04	23.64	19.55	19.39
	6175	45	be (20MHz)	24.16	23.79	19.37	19.49
	6415	93	be (20MHz)	23.85	23.90	19.39	19.48
	5695	3	be (40MHz)	45.67	44.94	38.68	38.52
	6165	43	be (40MHz)	46.06	45.15	38.70	38.55
	6405	91	be (40MHz)	45.24	44.90	38.70	38.50
	5985	7	be (80MHz)	91.89	90.76	78.58	78.39
	6145	39	be (80MHz)	91.15	90.50	78.72	78.45
	6385	87	be (80MHz)	90.70	90.49	78.67	78.45
	6025	15	be (160MHz)	180.40	176.14	157.92	157.81
	6185	47	be (160MHz)	178.47	176.17	158.02	157.67
	6345	79	be (160MHz)	179.83	175.53	157.92	157.37
	6105	31	be (320MHz)	-	-	317.70	314.04
	6265	63	be (320MHz)	-	-	316.56	315.12
Band 6	6435	97	a	24.16	22.48	17.56	17.15
	6475	105	a	23.84	22.79	17.49	17.09
	6515	113	a	23.54	22.25	17.44	17.21
	6435	97	be (20MHz)	24.12	24.06	19.52	19.41
	6475	105	be (20MHz)	24.13	23.63	19.41	19.47
	6515	113	be (20MHz)	24.25	24.61	19.46	19.40
	6445	99	be (40MHz)	44.98	45.00	38.53	38.60
	6485	107	be (40MHz)	46.17	44.27	38.77	38.53
	6525	115	be (40MHz)	45.93	45.65	38.54	38.45
	6465	103	be (80MHz)	90.01	90.52	78.53	78.45
	6505	111	be (160MHz)	179.98	176.10	158.43	157.69
Band 5/6/7	6425	95	be (320MHz)	-	-	315.20	315.59
Band 7	6535	117	a	24.06	22.54	17.37	17.17
	6695	149	a	24.19	22.95	17.49	17.29
	6875	185	a	24.83	23.07	17.55	17.29
	6535	117	be (20MHz)	24.38	23.78	19.46	19.42
	6695	149	be (20MHz)	24.09	24.07	19.49	19.41
	6875	185	be (20MHz)	23.84	23.69	19.43	19.33
	6565	123	be (40MHz)	46.99	44.80	38.80	38.53
	6725	155	be (40MHz)	45.25	45.53	38.55	38.54
	6885	179	be (40MHz)	46.35	44.74	38.87	38.52
	6545	119	be (80MHz)	90.51	91.19	78.37	78.49
	6705	151	be (80MHz)	90.39	90.35	78.41	78.48
	6865	183	be (80MHz)	91.13	89.92	78.23	78.33
	6665	143	be (160MHz)	178.15	176.76	157.79	157.76
	6825	175	be (160MHz)	178.75	175.03	157.85	157.33
Band 6/7	6585	127	be (320MHz)	-	-	315.67	315.35
Band 7/8	6745	159	be (320MHz)	-	-	315.55	314.51
Band 8	6895	189	a	24.58	23.33	17.54	17.27
	6995	209	a	24.19	23.12	17.49	17.29
	7115	233	a	24.03	22.60	17.49	17.28
	6895	189	be (20MHz)	24.32	23.95	19.46	19.35
	6995	209	be (20MHz)	24.20	23.96	19.53	19.39
	7115	233	be (20MHz)	23.44	23.73	19.41	19.41
	6925	187	be (40MHz)	45.75	45.27	38.61	38.56
	7005	211	be (40MHz)	45.71	45.00	38.62	38.43
	7085	227	be (40MHz)	45.46	45.49	38.60	38.51
	6945	199	be (80MHz)	90.60	91.03	78.48	78.49
	7025	215	be (80MHz)	90.53	90.86	78.48	78.35
	6985	207	be (160MHz)	177.01	175.51	157.70	157.25
Band 7/8	6905	191	be (320MHz)	-	-	315.01	314.66

Table 7-2. 26dB Bandwidth Results - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

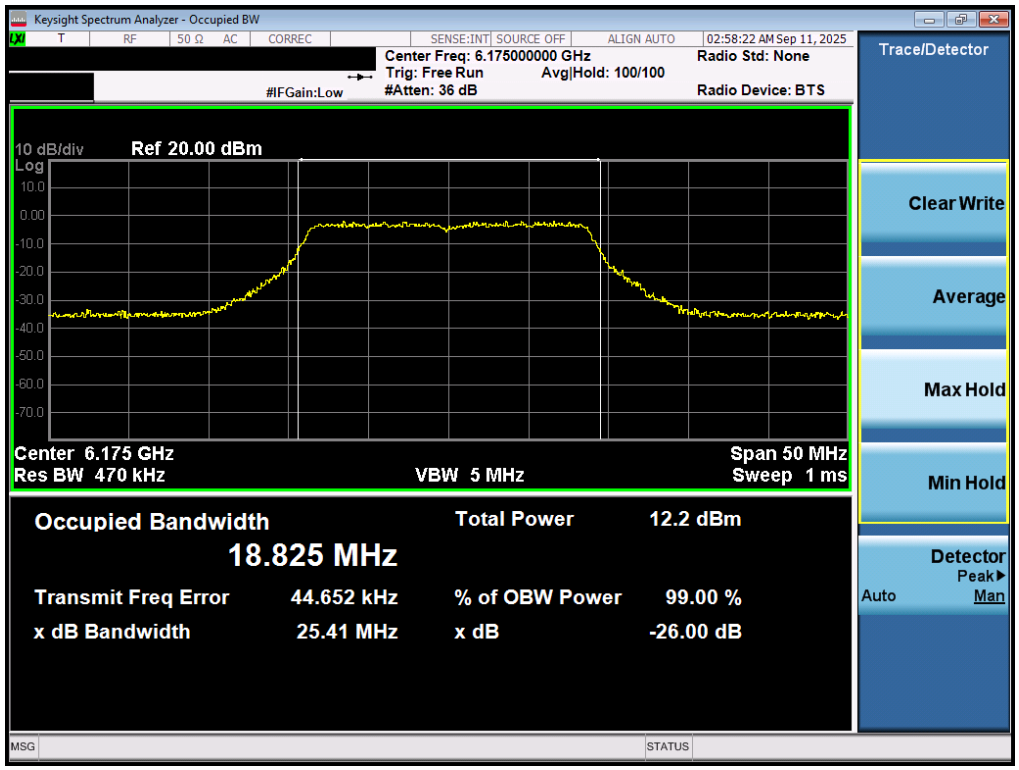
	Frequency [MHz]	Channel	802.11 MODE	Puncture Size	Antenna-1 26dB Bandwidth [MHz]	Antenna-2 26dB Bandwidth [MHz]	Antenna-1 Occupied Bandwidth [MHz]	Antenna-2 Occupied Bandwidth [MHz]
Band 5	6145	39	be (80MHz)	20MHz	93.08	90.00	79.45	78.88
	6185	47	be (160MHz)	20MHz	177.46	175.86	158.26	157.92
	6185	47	be (160MHz)	40MHz	176.31	175.40	158.68	158.50
	6105	31	be (320MHz)	40MHz	-	-	315.25	315.15
	6105	31	be (320MHz)	80MHz	341.68	339.44	316.67	316.29
	6105	31	be (320MHz)	120MHz	299.23	306.94	238.34	237.72
Band 6	6465	103	be (80MHz)	20MHz	91.01	90.94	79.16	78.75
	6505	111	be (160MHz)	20MHz	177.04	176.22	157.95	157.85
	6505	111	be (160MHz)	40MHz	176.71	177.61	158.55	158.46
Band 5/6/7	6425	95	be (320MHz)	40MHz	315.56	315.17	315.56	315.17
	6425	95	be (320MHz)	80MHz	316.52	314.87	316.52	314.87
	6425	95	be (320MHz)	120MHz	238.34	237.21	238.34	237.21
Band 7	6705	151	be (80MHz)	20MHz	92.49	90.04	79.10	78.92
	6665	143	be (160MHz)	20MHz	176.52	176.74	158.36	157.67
	6665	143	be (160MHz)	40MHz	178.06	175.76	158.55	158.45
Band 7/8	6745	159	be (320MHz)	40MHz	316.16	315.18	316.16	315.18
	6745	159	be (320MHz)	80MHz	316.47	316.07	316.47	316.07
	6745	159	be (320MHz)	120MHz	238.05	237.37	238.05	237.37
Band 8	7025	215	be (80MHz)	20MHz	91.87	90.53	79.17	78.96
	6985	207	be (160MHz)	20MHz	177.98	175.05	157.82	157.63
	6985	207	be (160MHz)	40MHz	177.71	176.17	158.42	158.16
Band 7/8	6905	191	be (320MHz)	40MHz	314.52	314.48	314.52	314.48
	6905	191	be (320MHz)	80MHz	316.13	316.25	316.13	316.25
	6905	191	be (320MHz)	120MHz	237.47	237.35	237.47	237.35

Table 7-3. 26dB Bandwidth Results – Punctured Cases – VLP

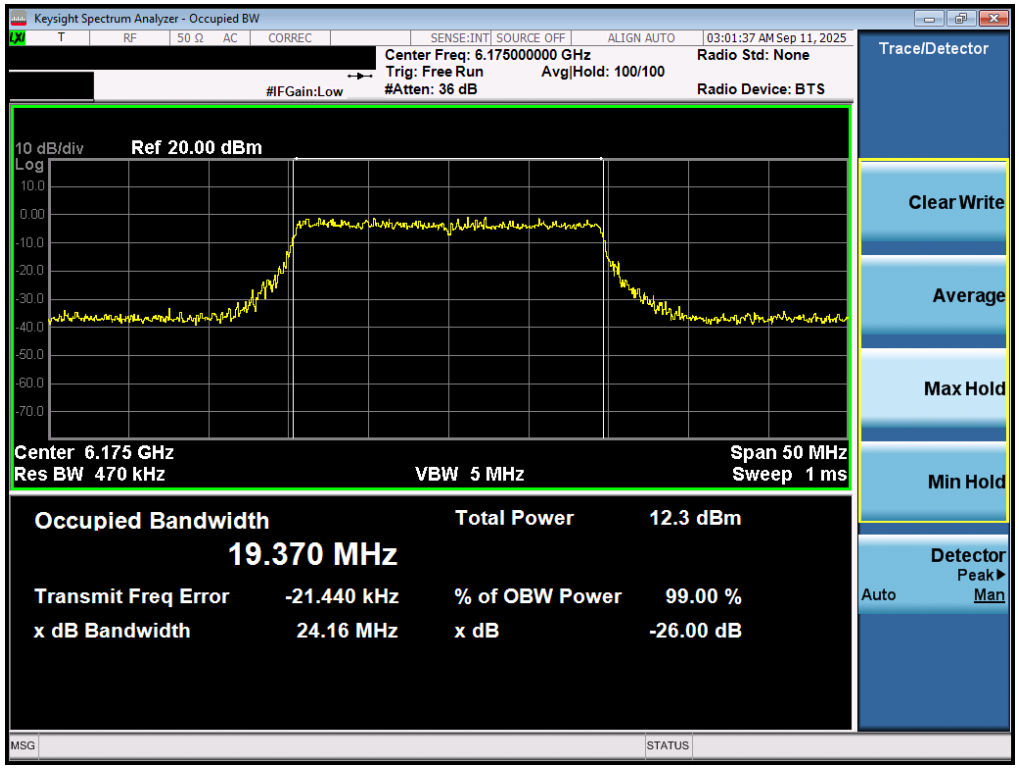
© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.2.1 MIMO Antenna-1 26 dB Bandwidth Measurements - (UNII Band 5)



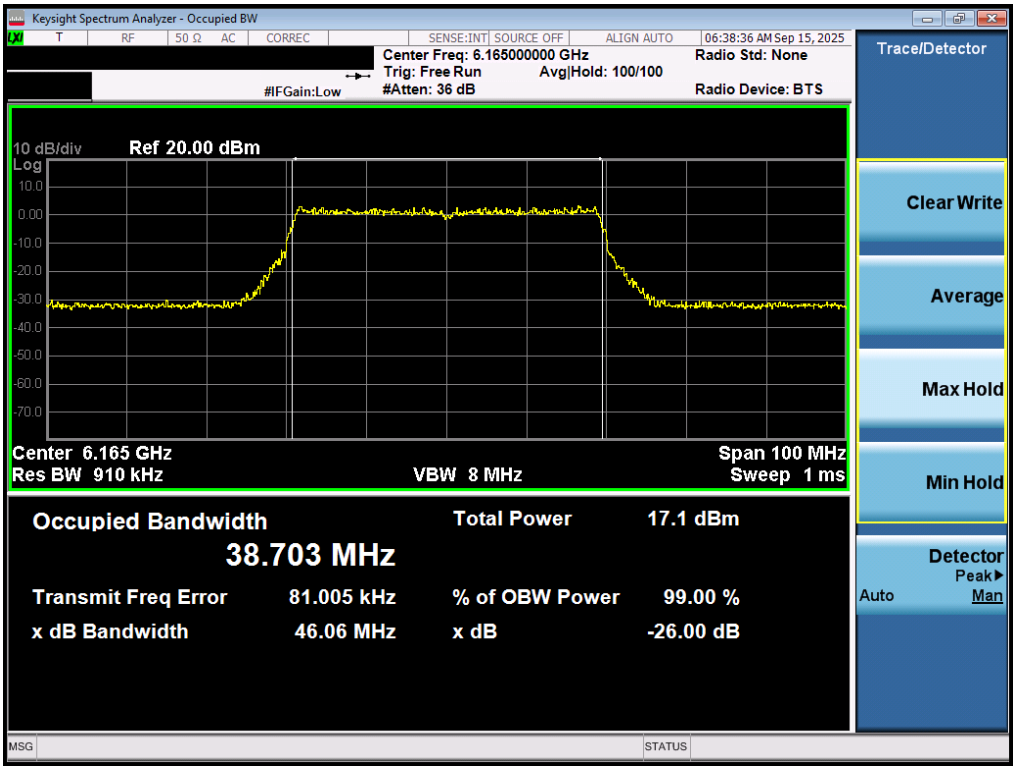
Plot 7-1. 26dB Bandwidth Plot MIMO ANT1 (20MHz 802.11a (UNII Band 5) – Ch. 45) - VLP



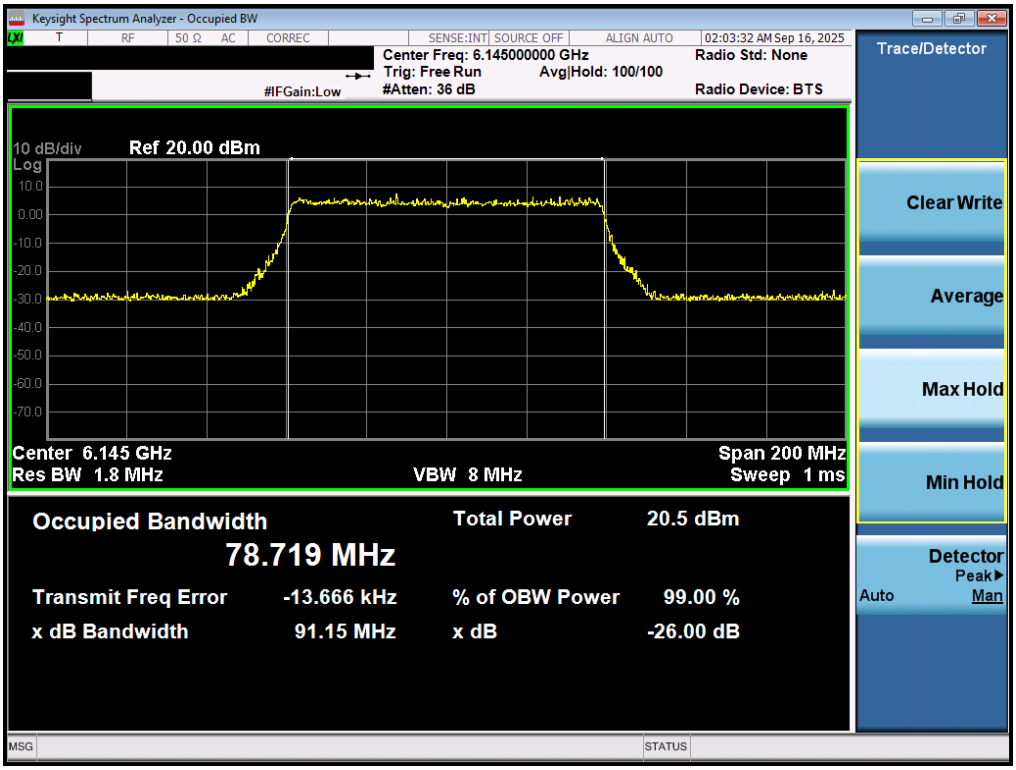
Plot 7-2. 26dB Bandwidth Plot MIMO ANT1 (20MHz 802.11ax/be (UNII Band 5) – Ch. 45) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



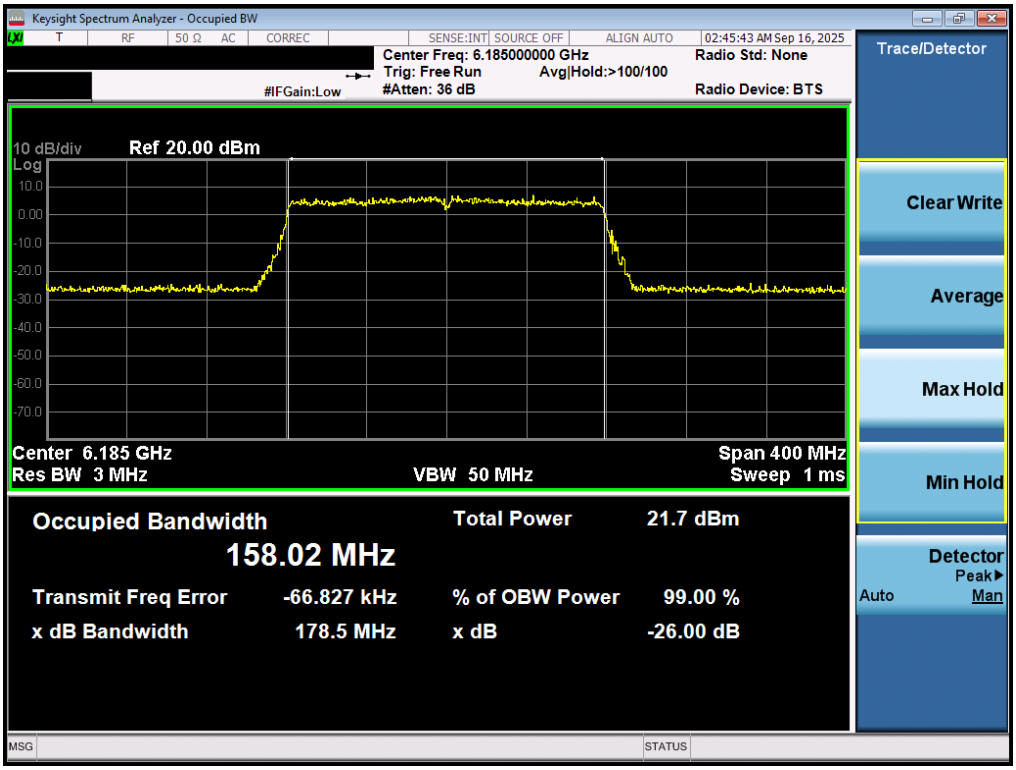
Plot 7-3. 26dB Bandwidth Plot MIMO ANT1 (40MHz 802.11ax/be (UNII Band 5) – Ch. 43) - VLP



Plot 7-4. 26dB Bandwidth Plot MIMO ANT1 (80MHz 802.11ax/be (UNII Band 5) – Ch. 39) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

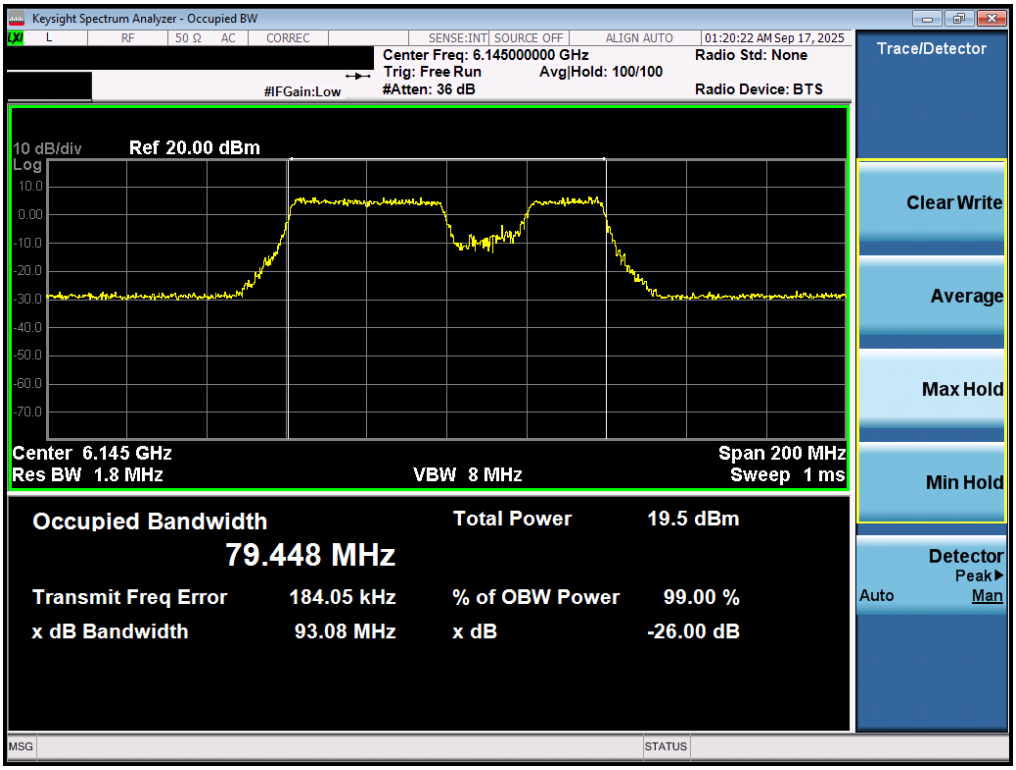


Plot 7-5. 26dB Bandwidth Plot MIMO ANT1 (160MHz 802.11ax/be (UNII Band 5) – Ch. 47) - VLP

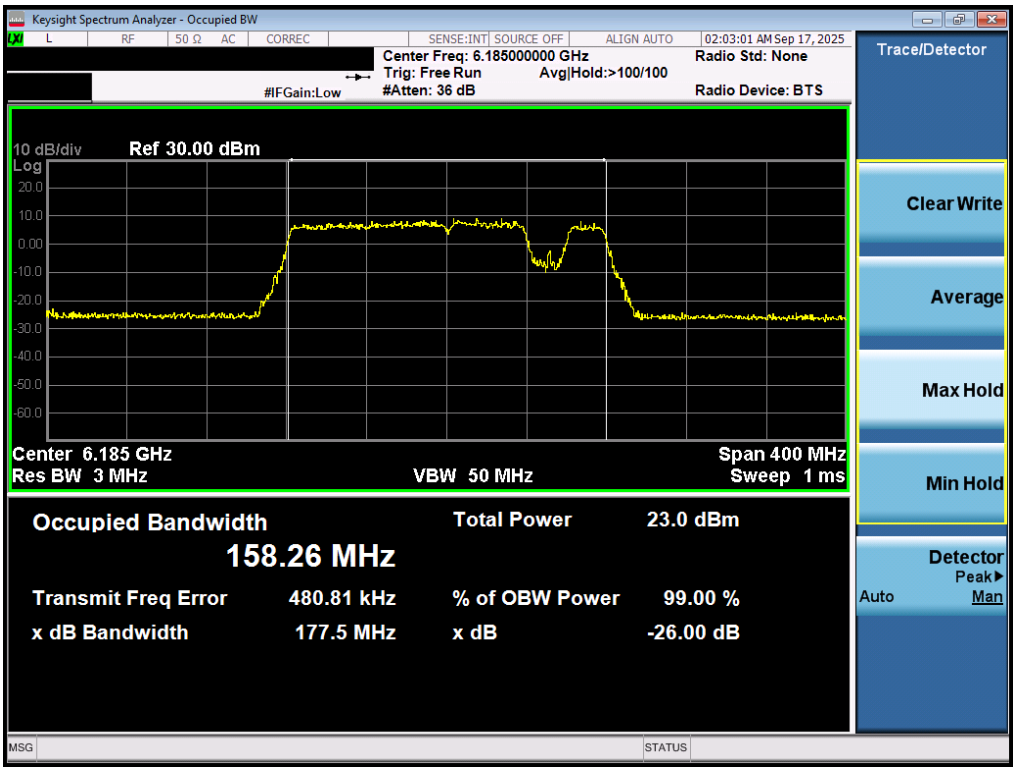
Plot 7-6. 26dB Bandwidth Plot MIMO ANT1 (320MHz 802.11ax/be (UNII Band 5) – Ch. 31) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

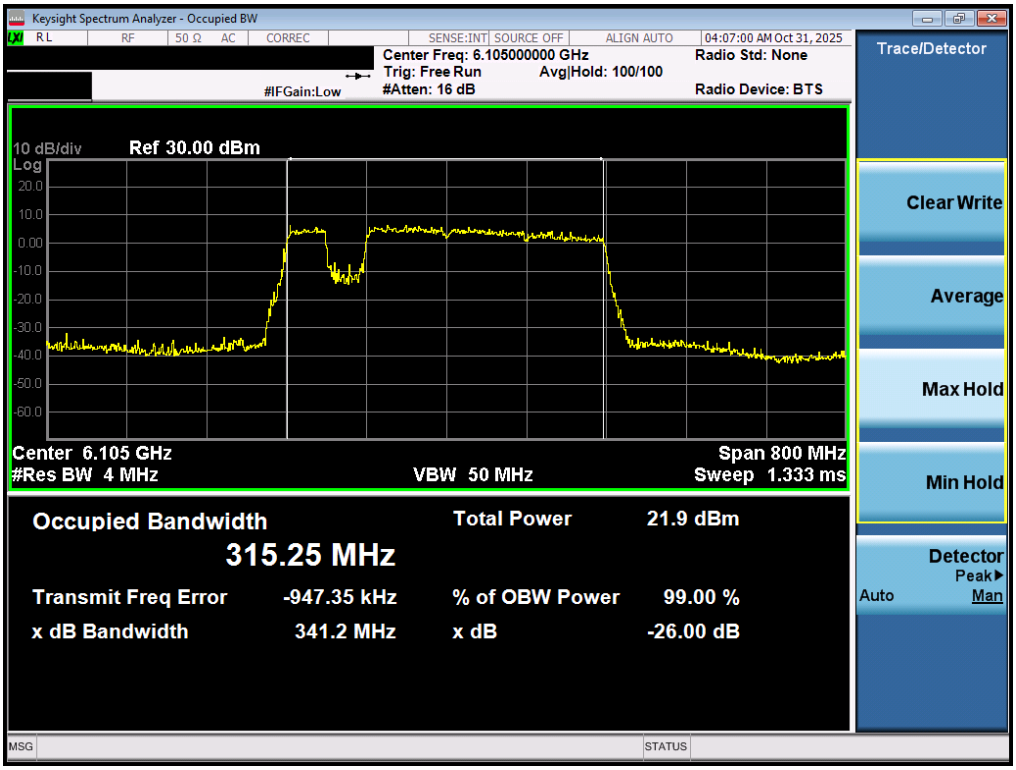


Plot 7-7. 26dB Bandwidth Plot MIMO ANT1 (80MHz 802.11be (UNII Band 5) – Ch. 39) – 20MHz Punctured - VLP



Plot 7-8. 26dB Bandwidth Plot MIMO ANT1 (160MHz 802.11be (UNII Band 5) – Ch. 47) – 20MHz Punctured - VLP

© 2025 ELEMENT
V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

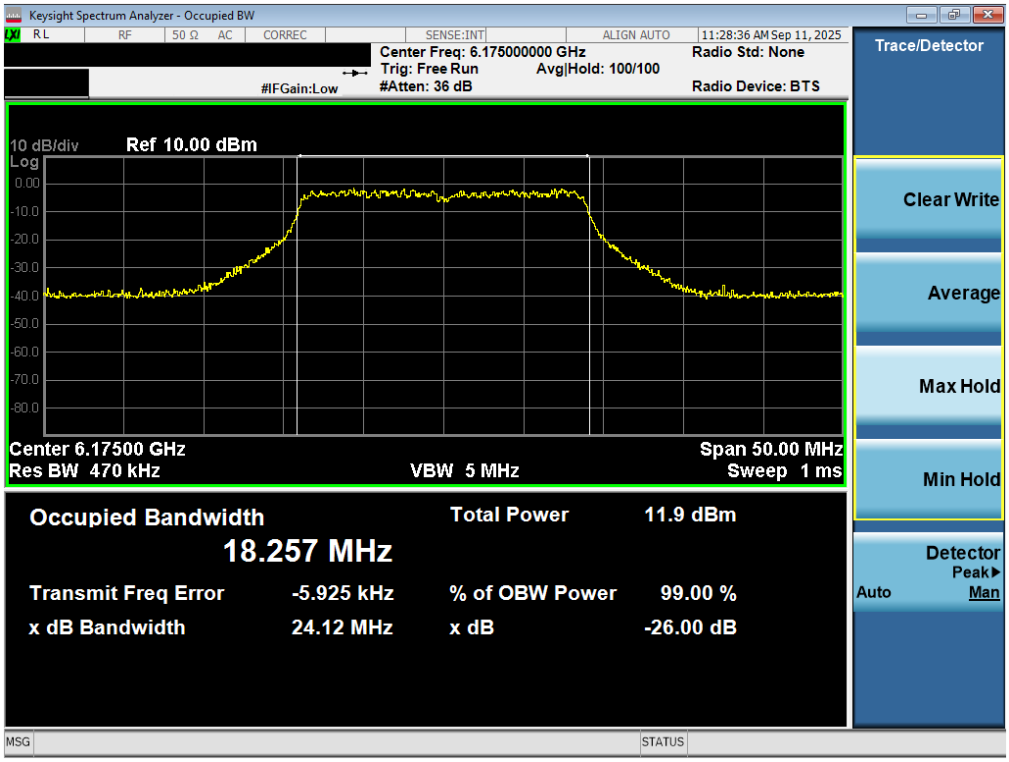


Plot 7-9. 26dB Bandwidth Plot MIMO ANT1 (320MHz 802.11be (UNII Band 5) – Ch. 31) – 40MHz Punctured - VLP

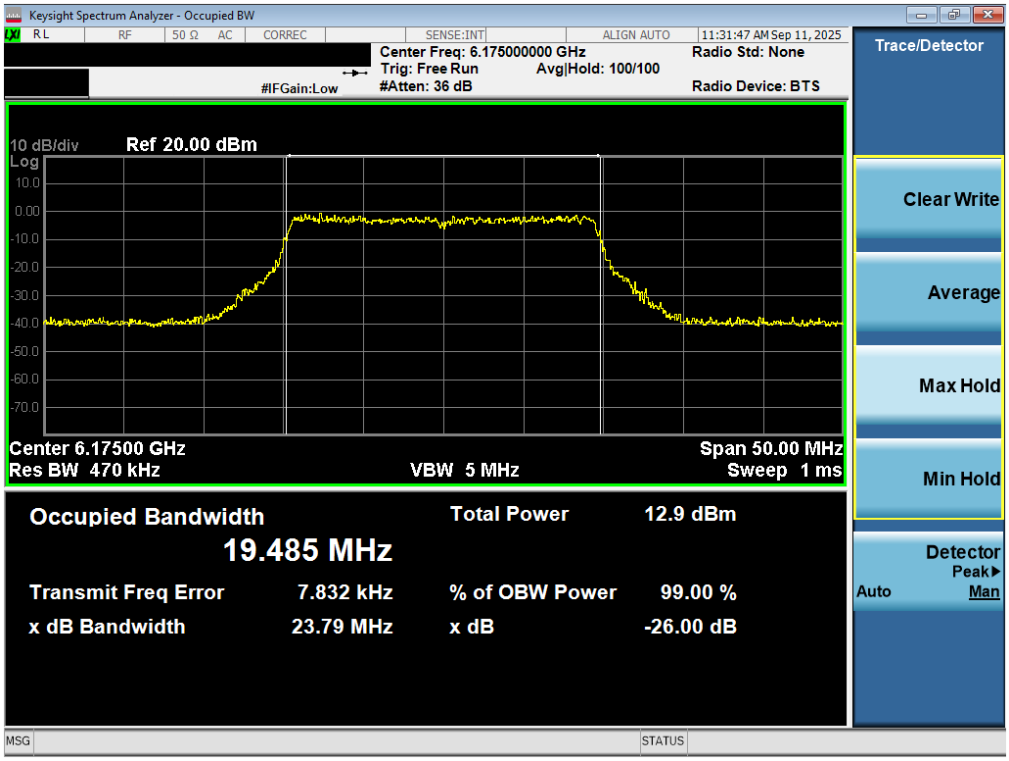
© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.2.2 MIMO Antenna-2 26 dB Bandwidth Measurements - (UNII Band 5)



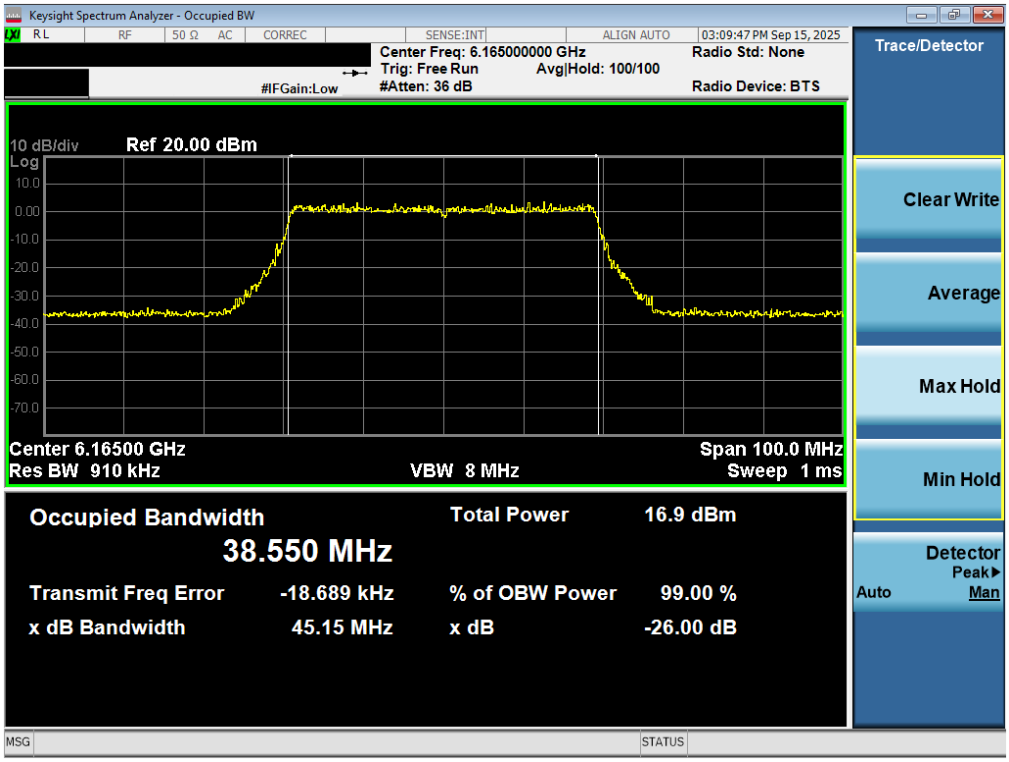
Plot 7-10. 26dB Bandwidth Plot MIMO ANT2 (20MHz 802.11a (UNII Band 5) – Ch. 45) - VLP



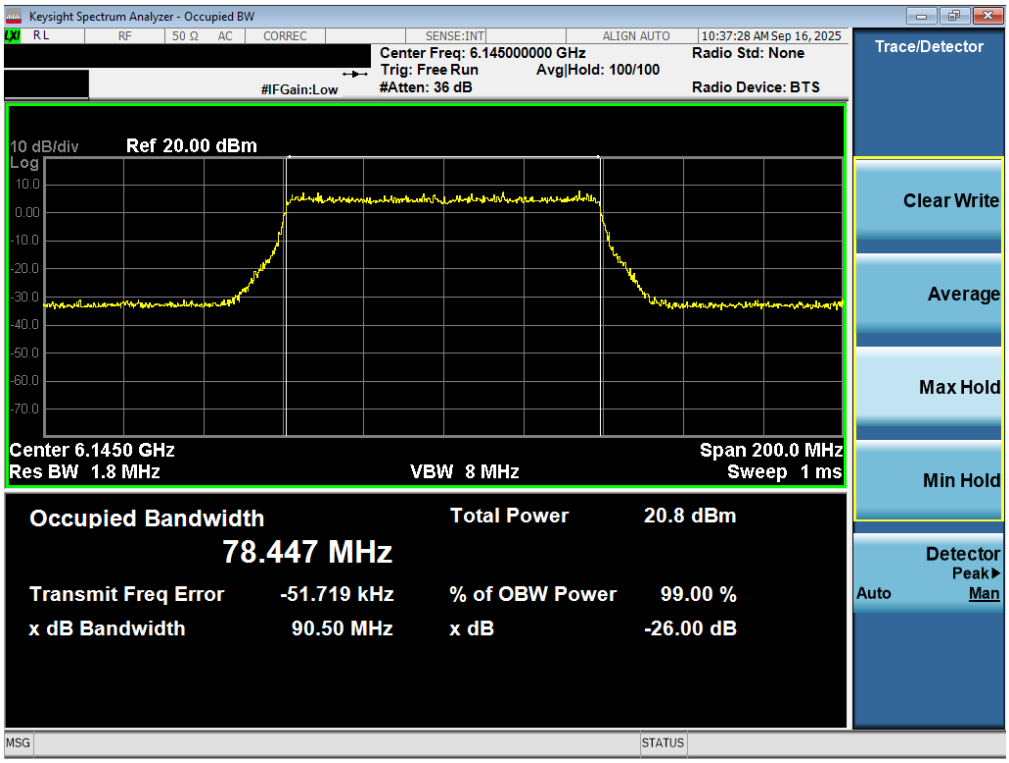
Plot 7-11. 26dB Bandwidth Plot MIMO ANT2 (20MHz 802.11ax/be (UNII Band 5) – Ch. 45) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



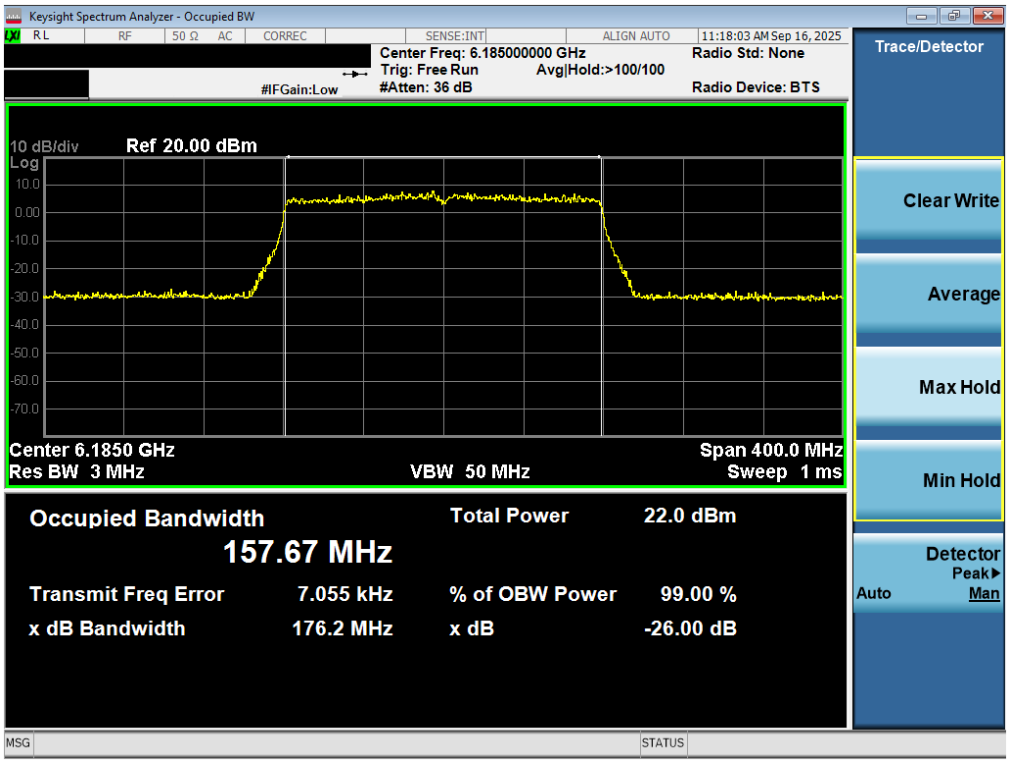
Plot 7-12. 26dB Bandwidth Plot MIMO ANT2 (40MHz 802.11ax/be (UNII Band 5) – Ch. 43) - VLP



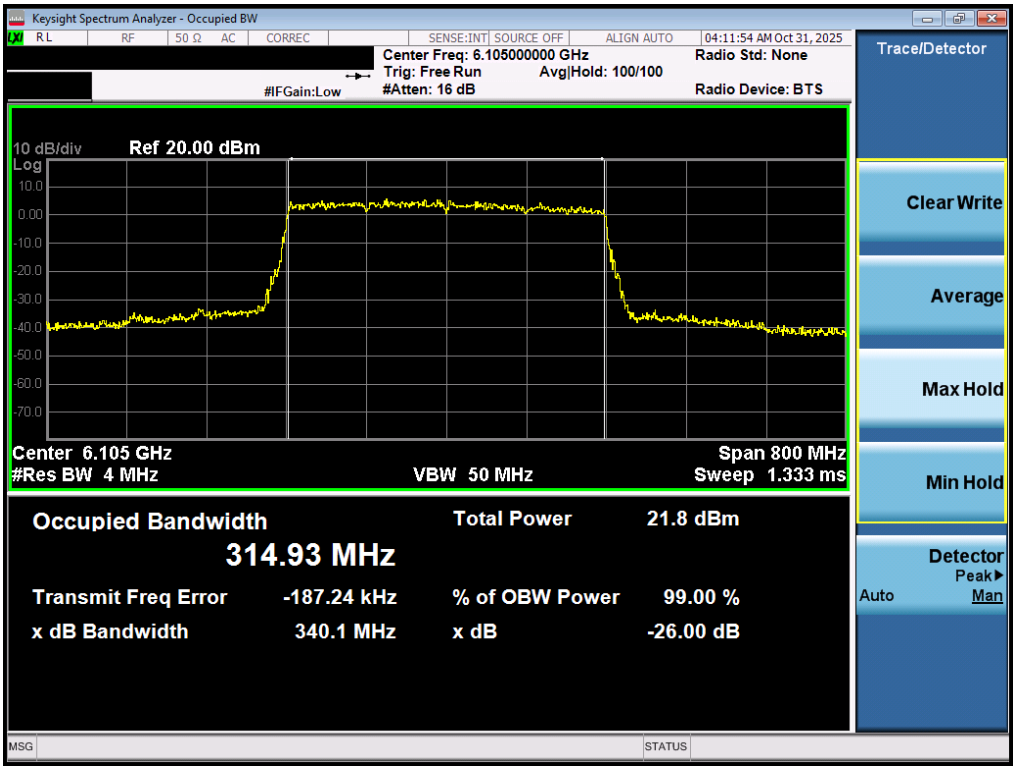
Plot 7-13. 26dB Bandwidth Plot MIMO ANT2 (80MHz 802.11ax/be (UNII Band 5) – Ch. 39) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



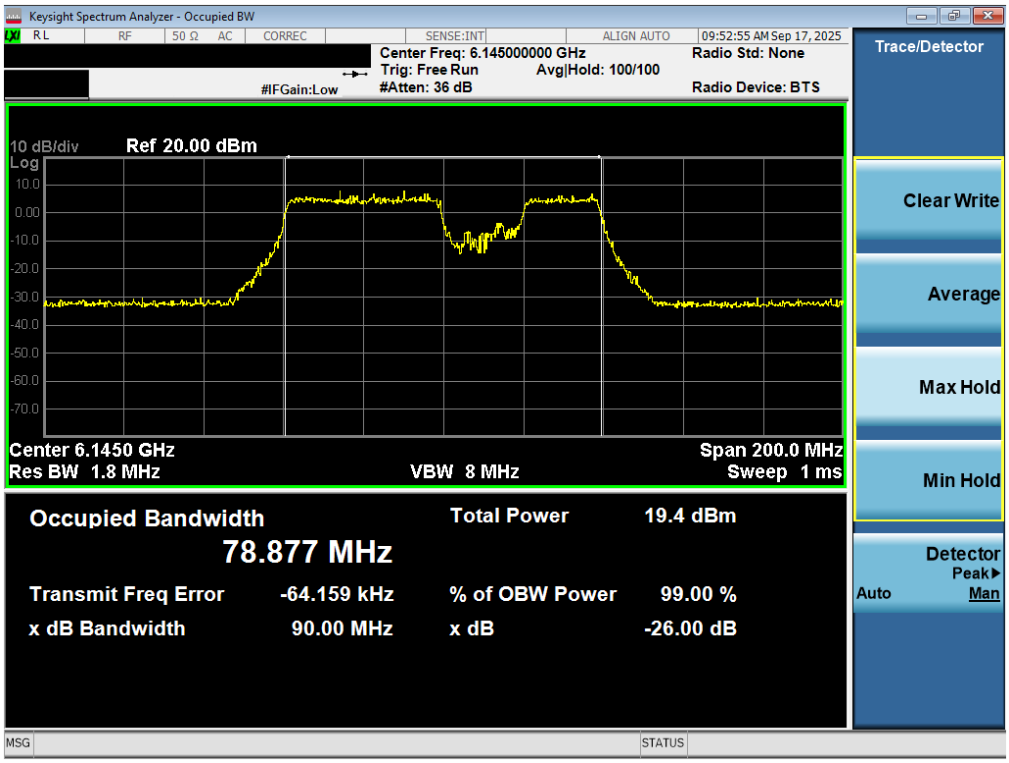
Plot 7-14. 26dB Bandwidth Plot MIMO ANT2 (160MHz 802.11ax/be (UNII Band 5) – Ch. 47) - VLP



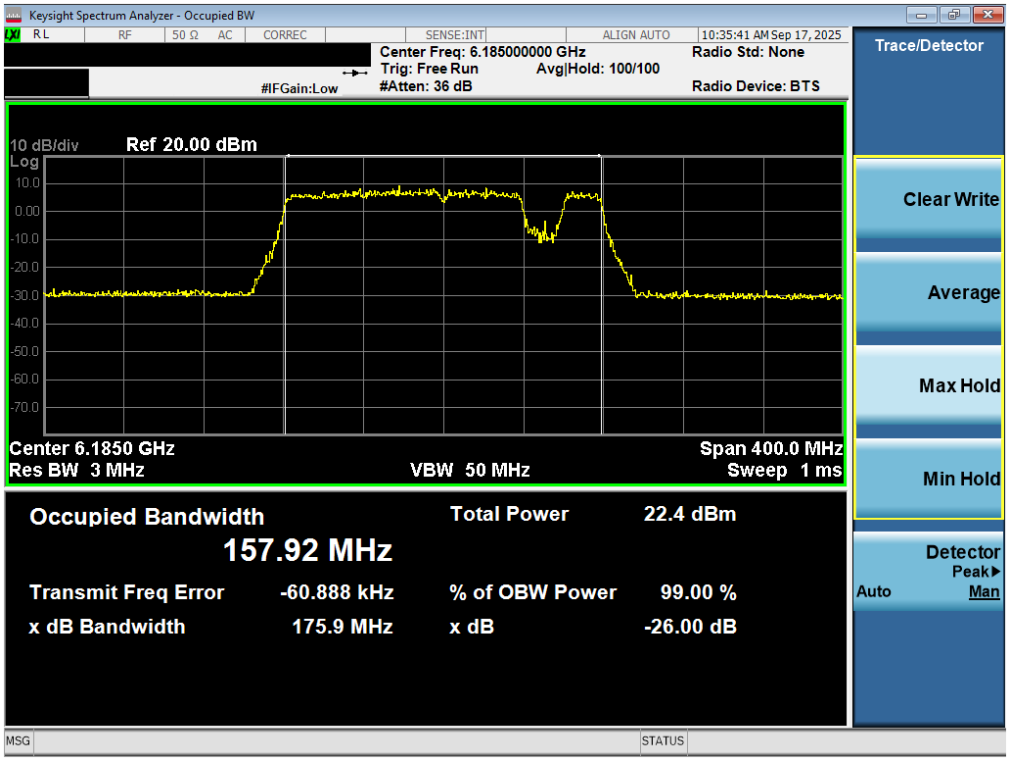
Plot 7-15. 26dB Bandwidth Plot MIMO ANT2 (320MHz 802.11ax/be (UNII Band 5) – Ch. 31) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



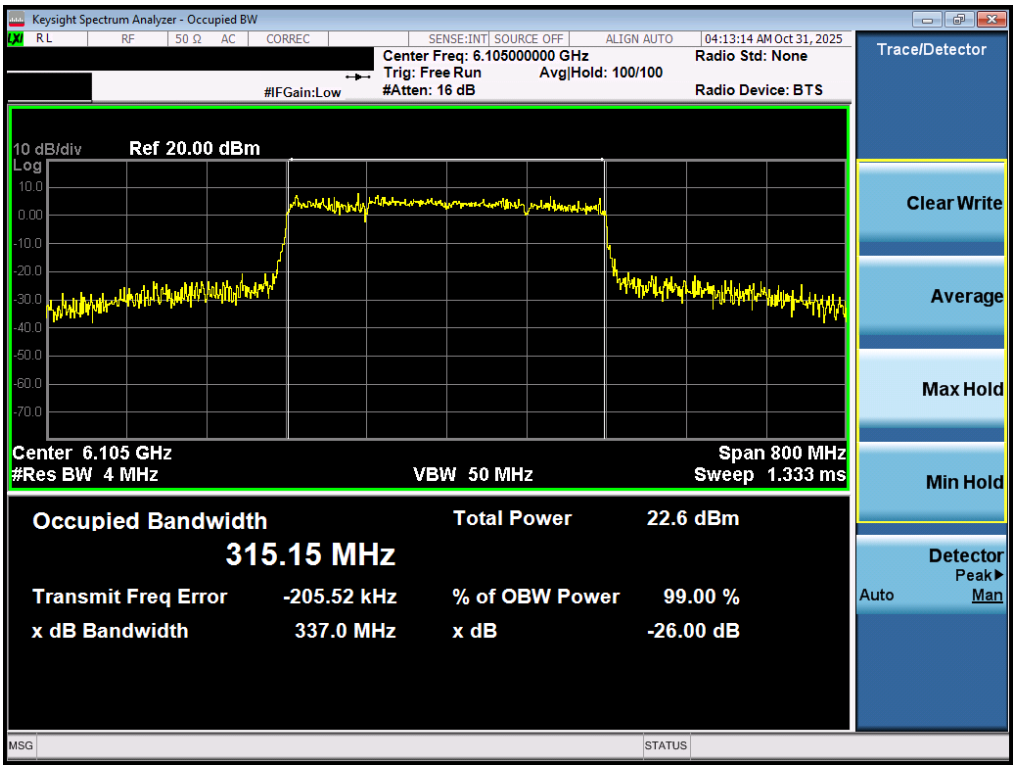
Plot 7-16. 26dB Bandwidth Plot MIMO ANT2 (80MHz 802.11be (UNII Band 5) – Ch. 39) – 20MHz Punctured - VLP



Plot 7-17. 26dB Bandwidth Plot MIMO ANT2 (160MHz 802.11be (UNII Band 5) – Ch. 47) – 20MHz Punctured - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Plot 7-18. 26dB Bandwidth Plot MIMO ANT2 (320MHz 802.11be (UNII Band 5) – Ch. 31) – 40MHz Punctured - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.3 UNII Output Power Measurement

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.

For very low power devices operating in the 5.925-7.125 GHz band, the maximum power spectral density must not exceed −5 dBm e.i.r.p in any 1-megahertz band and the maximum e.i.r.p must not exceed 14 dBm.

Test Procedure Used

ANSI C63.10:2020 – Section 12.4.3.2 Method PM-G
ANSI C63.10:2020 – Section 14.5.2.3 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.

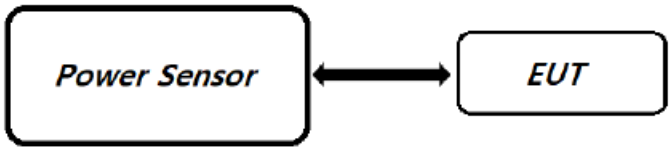


Figure 7-2. Test Instrument & Measurement Setup

Test Notes

Power targets for punctured test cases match the next smallest bandwidth. E.g. 80MHz punctured target = 40MHz full bandwidth target, 160MHz punctured target = 80MHz full bandwidth target, etc.

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

MIMO Maximum Conducted Output Power Measurements

6GHz WIFI (20MHz 802.11a MIMO)						Directional Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
Band	Freq [MHz]	Channel	Avg. Conducted Powers [dBm]						
			ANT1	ANT2	MIMO				
UNII-5	5935	2	3.21	3.90	6.58	-1.90	4.68	14.00	-9.32
	5955	1	3.37	3.73	6.56	-1.90	4.66	14.00	-9.34
	6175	45	3.41	3.22	6.33	-1.90	4.43	14.00	-9.57
	6415	93	3.37	3.66	6.53	-1.90	4.63	14.00	-9.37
UNII-6	6435	97	4.21	4.03	7.13	-2.22	4.91	14.00	-9.09
	6475	105	4.32	4.38	7.36	-2.22	5.14	14.00	-8.86
	6515	113	3.80	4.60	7.23	-2.22	5.01	14.00	-8.99
UNII-7	6535	117	3.79	4.57	7.21	-2.22	4.99	14.00	-9.01
	6675	145	4.00	4.13	7.08	-2.22	4.86	14.00	-9.14
	6695	149	4.01	4.15	7.09	-2.22	4.87	14.00	-9.13
	6875	185	3.96	4.35	7.17	-2.14	5.03	14.00	-8.97
UNII-8	6895	189	4.00	4.42	7.23	-2.14	5.09	14.00	-8.91
	6995	209	4.99	3.90	7.49	-2.14	5.35	14.00	-8.65
	7115	233	4.92	3.99	7.49	-2.14	5.35	14.00	-8.65

Table 7-4. MIMO 20MHz BW 802.11a (UNII) Maximum Conducted Output Power

6GHz WIFI (20MHz 802.11ax MIMO)						Directional Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
Band	Freq [MHz]	Channel	Avg. Conducted Powers [dBm]						
			ANT1	ANT2	MIMO				
UNII-5	5935	2	4.22	4.86	7.56	-1.90	5.66	14.00	-8.34
	5955	1	4.33	4.75	7.56	-1.90	5.66	14.00	-8.34
	6175	45	4.92	4.23	7.60	-1.90	5.70	14.00	-8.30
	6415	93	4.77	4.60	7.70	-1.90	5.80	14.00	-8.20
UNII-6	6435	97	5.19	4.92	8.07	-2.22	5.85	14.00	-8.15
	6475	105	5.26	5.35	8.32	-2.22	6.10	14.00	-7.90
	6515	113	5.38	5.96	8.69	-2.22	6.47	14.00	-7.53
UNII-7	6535	117	5.37	5.92	8.66	-2.22	6.44	14.00	-7.56
	6675	145	5.75	4.92	8.37	-2.22	6.15	14.00	-7.85
	6695	149	5.66	4.95	8.33	-2.22	6.11	14.00	-7.89
	6875	185	5.79	5.38	8.60	-2.14	6.46	14.00	-7.54
UNII-8	6895	189	5.90	5.55	8.74	-2.14	6.60	14.00	-7.40
	6995	209	5.99	5.50	8.76	-2.14	6.62	14.00	-7.38
	7115	233	5.86	5.28	8.59	-2.14	6.45	14.00	-7.55

Table 7-5. MIMO 20MHz BW 802.11ax (UNII) Maximum Conducted Output Power

6GHz WIFI (20MHz 802.11be MIMO)						Directional Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
Band	Freq [MHz]	Channel	Avg. Conducted Powers [dBm]						
			ANT1	ANT2	MIMO				
UNII-5	5935	2	4.28	4.86	7.59	-1.90	5.69	14.00	-8.31
	5955	1	4.25	4.78	7.53	-1.90	5.63	14.00	-8.37
	6175	45	4.83	4.26	7.56	-1.90	5.66	14.00	-8.34
	6415	93	4.72	4.57	7.66	-1.90	5.76	14.00	-8.24
UNII-6	6435	97	5.20	5.00	8.11	-2.22	5.89	14.00	-8.11
	6475	105	5.19	5.24	8.23	-2.22	6.01	14.00	-7.99
	6515	113	5.38	5.99	8.71	-2.22	6.49	14.00	-7.51
UNII-7	6535	117	5.43	5.92	8.69	-2.22	6.47	14.00	-7.53
	6675	145	5.65	4.90	8.30	-2.22	6.08	14.00	-7.92
	6695	149	5.53	4.92	8.25	-2.22	6.03	14.00	-7.97
	6875	185	5.76	5.31	8.55	-2.14	6.41	14.00	-7.59
UNII-8	6895	189	5.87	5.52	8.71	-2.14	6.57	14.00	-7.43
	6995	209	5.99	5.50	8.76	-2.14	6.62	14.00	-7.38
	7115	233	5.84	5.27	8.57	-2.14	6.43	14.00	-7.57

Table 7-6. MIMO 20MHz BW 802.11be (UNII) Maximum Conducted Output Power

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

6GHz WIFI (40MHz 802.11ax MIMO)						Directional Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
Band	Freq [MHz]	Channel	Avg. Conducted Powers [dBm]						
			ANT1	ANT2	MIMO				
UNII-5	5965	3	7.36	7.84	10.62	-1.90	8.72	14.00	-5.28
	6165	43	7.97	7.58	10.79	-1.90	8.89	14.00	-5.11
	6285	67	7.60	7.50	10.56	-1.90	8.66	14.00	-5.34
	6405	91	7.72	7.31	10.53	-1.90	8.63	14.00	-5.37
UNII-6	6445	99	8.92	8.37	11.66	-2.22	9.44	14.00	-4.56
	6485	107	8.40	8.72	11.57	-2.22	9.35	14.00	-4.65
	6525	115	8.39	8.99	11.71	-2.22	9.49	14.00	-4.51
UNII-7	6565	123	8.32	8.98	11.67	-2.22	9.45	14.00	-4.55
	6685	147	8.46	8.66	11.57	-2.22	9.35	14.00	-4.65
	6725	155	8.57	8.69	11.64	-2.22	9.42	14.00	-4.58
	6845	179	8.40	8.90	11.67	-2.22	9.45	14.00	-4.55
UNII-8	6885	187	8.42	8.90	11.68	-2.14	9.54	14.00	-4.46
	7005	211	8.86	8.59	11.74	-2.14	9.60	14.00	-4.40
	7085	227	8.64	8.27	11.47	-2.14	9.33	14.00	-4.67

Table 7-7. MIMO 40MHz BW 802.11ax (UNII) Maximum Conducted Output Power

6GHz WIFI (40MHz 802.11be MIMO)						Directional Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
Band	Freq [MHz]	Channel	Avg. Conducted Powers [dBm]						
			ANT1	ANT2	MIMO				
UNII-5	5965	3	7.36	7.90	10.65	-1.90	8.75	14.00	-5.25
	6165	43	7.99	7.66	10.84	-1.90	8.94	14.00	-5.06
	6285	67	7.63	7.40	10.53	-1.90	8.63	14.00	-5.37
	6405	91	7.69	7.36	10.54	-1.90	8.64	14.00	-5.36
UNII-6	6445	99	8.86	8.44	11.67	-2.22	9.45	14.00	-4.55
	6485	107	8.30	8.72	11.53	-2.22	9.31	14.00	-4.69
	6525	115	8.33	8.99	11.68	-2.22	9.46	14.00	-4.54
UNII-7	6565	123	8.30	8.98	11.66	-2.22	9.44	14.00	-4.56
	6685	147	8.50	8.58	11.55	-2.22	9.33	14.00	-4.67
	6725	155	8.53	8.67	11.61	-2.22	9.39	14.00	-4.61
	6845	179	8.42	8.79	11.62	-2.22	9.40	14.00	-4.60
UNII-8	6885	187	8.47	8.90	11.70	-2.14	9.56	14.00	-4.44
	7005	211	8.82	8.60	11.72	-2.14	9.58	14.00	-4.42
	7085	227	8.60	8.32	11.47	-2.14	9.33	14.00	-4.67

Table 7-8. MIMO 40MHz BW 802.11be (UNII) Maximum Conducted Output Power

6GHz WIFI (80MHz 802.11ax MIMO)						Directional Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
Band	Freq [MHz]	Channel	Avg. Conducted Powers [dBm]						
			ANT1	ANT2	MIMO				
UNII-5	5985	7	11.70	11.98	14.85	-1.90	12.95	14.00	-1.05
	6145	39	11.55	11.65	14.61	-1.90	12.71	14.00	-1.29
	6305	71	11.67	10.98	14.35	-1.90	12.45	14.00	-1.55
	6385	87	11.74	11.29	14.53	-1.90	12.63	14.00	-1.37
UNII-6	6465	103	11.66	11.54	14.61	-2.22	12.39	14.00	-1.61
UNII-7	6545	119	11.00	11.67	14.36	-2.22	12.14	14.00	-1.86
	6705	151	11.62	11.88	14.76	-2.22	12.54	14.00	-1.46
	6785	167	11.36	11.79	14.59	-2.22	12.37	14.00	-1.63
	6865	183	11.00	11.57	14.30	-2.14	12.16	14.00	-1.84
UNII-8	6945	199	11.28	11.67	14.49	-2.14	12.35	14.00	-1.65
	7025	215	11.58	11.63	14.62	-2.14	12.48	14.00	-1.52

Table 7-9. MIMO 80MHz BW 802.11ax (UNII) Maximum Conducted Output Power

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

6GHz WIFI (80MHz 802.11be MIMO)						Directional Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
Band	Freq [MHz]	Channel	Avg. Conducted Powers [dBm]						
			ANT1	ANT2	MIMO				
UNII-5	5985	7	11.68	11.98	14.84	-1.90	12.94	14.00	-1.06
	6145	39	11.55	11.62	14.60	-1.90	12.70	14.00	-1.30
	6305	71	11.67	10.92	14.32	-1.90	12.42	14.00	-1.58
	6385	87	11.72	11.20	14.48	-1.90	12.58	14.00	-1.42
UNII-6	6465	103	11.63	11.58	14.62	-2.22	12.40	14.00	-1.60
UNII-7	6545	119	11.00	11.68	14.36	-2.22	12.14	14.00	-1.86
	6705	151	11.59	11.89	14.75	-2.22	12.53	14.00	-1.47
	6785	167	11.38	11.86	14.64	-2.22	12.42	14.00	-1.58
	6865	183	11.01	11.65	14.35	-2.14	12.21	14.00	-1.79
UNII-8	6945	199	11.26	11.71	14.50	-2.14	12.36	14.00	-1.64
	7025	215	11.74	11.61	14.69	-2.14	12.55	14.00	-1.45

Table 7-10. MIMO 80MHz BW 802.11be (UNII) Maximum Conducted Output Power

6GHz WIFI (160MHz 802.11ax MIMO)						Directional Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
Band	Freq [MHz]	Channel	Avg. Conducted Powers [dBm]						
			ANT1	ANT2	MIMO				
UNII-5	6025	15	11.24	11.40	14.33	-1.90	12.43	14.00	-1.57
	6185	47	11.46	11.41	14.45	-1.90	12.55	14.00	-1.45
	6345	79	11.52	11.00	14.28	-1.90	12.38	14.00	-1.62
UNII-6	6505	111	10.72	11.78	14.29	-2.22	12.07	14.00	-1.93
UNII-7	6665	143	11.23	11.49	14.37	-2.22	12.15	14.00	-1.85
	6825	175	11.22	11.82	14.54	-2.14	12.40	14.00	-1.60
UNII-8	6985	207	11.36	11.35	14.37	-2.14	12.23	14.00	-1.77

Table 7-11. MIMO 160MHz BW 802.11ax (UNII) Maximum Conducted Output Power

6GHz WIFI (160MHz 802.11be MIMO)						Directional Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
Band	Freq [MHz]	Channel	Avg. Conducted Powers [dBm]						
			ANT1	ANT2	MIMO				
UNII-5	6025	15	11.26	11.36	14.32	-1.90	12.42	14.00	-1.58
	6185	47	11.47	11.33	14.41	-1.90	12.51	14.00	-1.49
	6345	79	11.03	11.42	14.24	-1.90	12.34	14.00	-1.66
UNII-6	6505	111	10.70	11.63	14.20	-2.22	11.98	14.00	-2.02
UNII-7	6665	143	11.24	11.44	14.35	-2.22	12.13	14.00	-1.87
	6825	175	11.01	11.82	14.44	-2.14	12.30	14.00	-1.70
UNII-8	6985	207	11.28	11.35	14.33	-2.14	12.19	14.00	-1.81

Table 7-12. MIMO 160MHz BW 802.11be (UNII) Maximum Conducted Output Power

6GHz WIFI (320MHz 802.11be MIMO)						Directional Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
Band	Freq [MHz]	Channel	Avg. Conducted Powers [dBm]						
			ANT1	ANT2	MIMO				
UNII-5	6105	31	11.94	11.39	14.68	-1.90	12.78	14.00	-1.22
UNII-5	6265	63	11.40	10.70	14.07	-1.90	12.17	14.00	-1.83
UNII-6	6425	95	11.29	11.97	14.65	-2.22	12.43	14.00	-1.57
UNII-7	6585	127	11.32	11.52	14.43	-2.22	12.21	14.00	-1.79
UNII-7	6745	159	11.21	11.82	14.54	-2.22	12.32	14.00	-1.68
UNII-8	6905	191	11.05	11.99	14.56	-2.14	12.42	14.00	-1.58

Table 7-13. MIMO 320MHz BW 802.11be (UNII) Maximum Conducted Output Power

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

80MHz BW	Band	Freq [MHz]	Channel	Puncture Size	Average Conducted Power (dBm) Puncture Case 90 ANT1	90 ANT2	90 MIMO	91 ANT1	91 ANT2	91 MIMO	93 ANT1	93 ANT2	93 MIMO	Dir. Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
	5	5985	7	20MHz	7.67	7.81	10.75	7.65	7.89	10.78	7.90	7.99	10.96	-1.90	9.05	14.00	-4.95
		6145	39	20MHz	7.65	7.90	10.79	7.28	7.55	10.43	7.32	7.60	10.47	-1.90	8.88	14.00	-5.12
		6385	87	20MHz	7.99	7.00	10.53	7.65	6.70	10.21	7.99	7.00	10.53	-1.90	8.63	14.00	-5.37
	6	6465	103	20MHz	8.98	8.15	11.60	8.47	7.85	11.18	8.57	7.88	11.25	-2.22	9.37	14.00	-4.63
	7	6545	119	20MHz	8.90	8.72	11.82	8.56	8.34	11.46	8.71	8.46	11.60	-2.22	9.60	14.00	-4.40
		6705	151	20MHz	8.99	8.50	11.76	8.74	8.09	11.44	8.92	8.05	11.52	-2.22	9.54	14.00	-4.46
		6865	183	20MHz	8.98	8.75	11.88	8.55	8.38	11.48	8.72	8.56	11.65	-2.14	9.74	14.00	-4.26
	8	6945	199	20MHz	8.99	8.90	11.96	8.89	8.69	11.80	8.96	8.86	11.92	-2.14	9.82	14.00	-4.18
		7025	215	20MHz	8.97	8.52	11.76	8.78	8.15	11.49	8.99	8.28	11.66	-2.14	9.62	14.00	-4.38

Table 7-14. MIMO 80MHz BW 802.11be (UNII) Maximum Conducted Output Power – 40MHz Puncture

160MHz BW	Band	Freq [MHz]	Channel	Puncture Size	Average Conducted Power (dBm) Puncture Case 96 ANT1	96 ANT2	96 MIMO	99 ANT1	99 ANT2	99 MIMO	1099 ANT1	1099 ANT2	1099 MIMO	Dir. Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
	5	6025	15	20MHz	11.70	11.85	14.79	11.40	11.56	14.49	11.57	11.77	14.68	-1.90	12.88	14.00	-1.12
		6185	47	20MHz	11.84	11.93	14.90	11.53	11.62	14.59	11.56	11.71	14.65	-1.90	12.99	14.00	-1.01
		6345	79	20MHz	11.83	10.83	14.37	11.53	10.52	14.06	11.50	10.65	14.11	-1.90	12.46	14.00	-1.54
	6	6505	111	20MHz	11.85	11.83	14.85	11.51	11.54	14.54	11.60	11.64	14.63	-2.22	12.63	14.00	-1.37
	7	6665	143	20MHz	11.87	11.23	14.57	11.57	10.94	14.28	11.75	10.99	14.40	-2.22	12.35	14.00	-1.65
		6825	175	20MHz	11.84	11.64	14.75	11.56	11.32	14.45	11.65	11.34	14.51	-2.14	12.61	14.00	-1.39
	8	6985	207	20MHz	11.86	11.32	14.61	11.54	11.01	14.29	11.68	11.20	14.46	-2.14	12.47	14.00	-1.53

Table 7-15. MIMO 160MHz BW 802.11be (UNII) Maximum Conducted Output Power – 20MHz Puncture

160MHz BW	Band	Freq [MHz]	Channel	Puncture Size	Average Conducted Power (dBm) Puncture Case 94 ANT1	94 ANT2	94 MIMO	95 ANT1	95 ANT2	95 MIMO	1094 ANT1	1094 ANT2	1094 MIMO	Dir. Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
	5	6025	15	40MHz	11.46	11.70	14.59	11.28	11.43	14.37	11.52	11.60	14.57	-1.90	12.69	14.00	-1.31
		6185	47	40MHz	11.77	11.94	14.87	11.44	11.51	14.49	11.53	11.52	14.54	-1.90	12.96	14.00	-1.04
		6345	79	40MHz	11.78	10.70	14.28	11.99	10.80	14.45	11.78	10.90	14.37	-1.90	12.54	14.00	-1.46
	6	6505	111	40MHz	11.70	11.66	14.69	11.40	11.43	14.43	11.47	11.55	14.52	-2.22	12.47	14.00	-1.53
	7	6665	143	40MHz	11.72	11.09	14.43	11.50	10.80	14.17	11.62	10.87	14.27	-2.22	12.20	14.00	-1.80
		6825	175	40MHz	11.71	11.43	14.58	11.46	11.09	14.29	11.56	11.20	14.39	-2.14	12.44	14.00	-1.56
	8	6985	207	40MHz	11.69	11.01	14.37	11.40	10.92	14.18	11.68	11.06	14.39	-2.14	12.25	14.00	-1.75

Table 7-16. MIMO 160MHz BW 802.11be (UNII) Maximum Conducted Output Power – 40MHz Puncture

320MHz BW	Band	Freq [MHz]	Channel	Puncture Size	Average Conducted Power (dBm) Puncture Case 100 ANT1	100 ANT2	100 MIMO	1101 ANT1	1101 ANT2	1101 MIMO	11103 ANT1	11103 ANT2	11103 MIMO	Dir. Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
	5	6105	31	40MHz	11.57	10.80	14.21	11.97	11.43	14.72	11.99	11.38	14.71	-1.90	12.81	14.00	-1.19
		6265	63	40MHz	11.80	10.70	14.30	10.70	10.55	13.64	11.78	10.89	14.37	-1.90	12.46	14.00	-1.54
	6	6425	95	40MHz	11.86	11.54	14.71	11.68	11.39	14.55	11.55	11.20	14.39	-2.22	12.49	14.00	-1.51
	7	6585	127	40MHz	10.40	10.50	13.46	11.99	10.90	14.49	11.75	11.11	14.45	-2.22	12.27	14.00	-1.73
		6745	159	40MHz	11.16	11.33	14.26	11.15	11.20	14.19	11.14	11.19	14.18	-2.22	12.03	14.00	-1.97
	8	6905	191	40MHz	11.55	11.66	14.62	11.40	11.46	14.44	11.60	11.65	14.64	-2.14	12.50	14.00	-1.50

Table 7-17. MIMO 320MHz BW 802.11be (UNII) Maximum Conducted Output Power – 40MHz Puncture

320MHz BW	Band	Freq [MHz]	Channel	Puncture Size	Average Conducted Power (dBm) Puncture Case 104 ANT1	104 ANT2	104 MIMO	1104 ANT1	1104 ANT2	1104 MIMO	11104 ANT1	11104 ANT2	11104 MIMO	Dir. Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
	5	6105	31	80MHz	11.39	10.69	14.06	11.68	10.90	14.32	11.51	11.06	14.30	-1.90	12.41	14.00	-1.59
		6265	63	80MHz	11.75	10.43	14.15	11.55	10.02	13.86	11.42	10.36	13.93	-1.90	12.25	14.00	-1.75
	6	6425	95	80MHz	11.70	11.38	14.55	11.62	11.42	14.53	11.40	11.23	14.33	-2.22	12.33	14.00	-1.67
	7	6585	127	80MHz	11.59	11.12	14.37	11.69	11.03	14.38	11.60	10.72	14.19	-2.22	12.16	14.00	-1.84
		6745	159	80MHz	11.51	11.52	14.53	11.23	11.35	14.30	11.22	11.36	14.30	-2.22	12.30	14.00	-1.70
	8	6905	191	80MHz	11.28	11.39	14.35	11.20	11.50	14.36	11.52	11.56	14.55	-2.14	12.41	14.00	-1.59

Table 7-18. MIMO 320MHz BW 802.11be (UNII) Maximum Conducted Output Power – 80MHz Puncture

320MHz BW	Band	Freq [MHz]	Channel	Puncture Size	Average Conducted Power (dBm) Puncture Case 105 ANT1	105 ANT2	105 MIMO	1106 ANT1	1106 ANT2	1106 MIMO	11106 ANT1	11106 ANT2	11106 MIMO	Dir. Ant. Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
	5	6105	31	120MHz	11.33	10.69	14.03	11.46	10.80	14.15	11.60	10.93	14.29	-1.90	12.38	14.00	-1.62
		6265	63	120MHz	11.80	10.40	14.17	11.26	10.03	13.70	11.63	10.45	14.09	-1.90	12.26	14.00	-1.74
	6	6425	95	120MHz	11.79	11.42	14.62	11.45	11.16	14.32	11.78	11.64	14.72	-2.22	12.50	14.00	-1.50
	7	6585	127	120MHz	11.90	11.23	14.59	11.67	11.00	14.36	11.90	11.20	14.57	-2.22	12.36	14.00	-1.64
		6745	159	120MHz	11.49	11.66	14.59	11.52	11.80	14.67	11.62	11.69	14.67	-2.22	12.45	14.00	-1.55
	8	6905	191	120MHz	11.40	11.69	14.56	11.48	11.67	14.58	11.39	11.42	14.42	-2.14	12.45	14.00	-1.55

Table 7-19. MIMO 320MHz BW 802.11be (UNII) Maximum Conducted Output Power – 120MHz Puncture

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

Sample MIMO Calculation:

At 5935MHz in 802.11a (20MHz BW) mode, the average conducted output power was measured to be 3.21 dBm for Antenna-1 and 3.90 dBm for Antenna-2.

Antenna 1 + Antenna 2 = MIMO

(3.21 dBm + 3.90 dBm) = (2.094 mW + 2.455 mW) = 4.549 mW = 6.58 dBm

Sample Directional Gain Calculation:

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.

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

Sample e.i.r.p. Calculation:

At 5935MHz in 802.11a (20MHz BW) mode, the average MIMO conducted power was calculated to be 6.58 dBm with directional gain of -1.90 dBi.

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

6.58 dBm + -1.90 dBi = 4.68 dBm

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.4 Maximum Power Spectral Density

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 at the appropriate frequencies. Method SA-1, as defined in ANSI C63.10:2020, was used to measure the power spectral density for 802.11a/ax and 802.11be.

For very low power devices operating in the 5.925-7.125 GHz band, the maximum power spectral density must not exceed −5 dBm e.i.r.p in any 1-megahertz band and the maximum e.i.r.p must not exceed 14 dBm

Test Procedure Used

ANSI C63.10:2020 – Section 12.4.2.2
ANSI C63.10:2020 – Section 14.5.2.3 Measure-and-Sum Technique

Test Settings

1. Analyzer was set to the center frequency of the UNII channel under investigation.
2. Span was set to encompass the entire emission bandwidth of the signal.
3. RBW = 1MHz
4. VBW = 3MHz
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 7-3. Test Instrument & Measurement Setup

Test Notes

None.

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

MIMO Power Spectral Density Measurements

	Frequency [MHz]	Channel	802.11 MODE	Antenna-1 Power Density [dBm]	Antenna-2 Power Density [dBm]	Antenna-1 Gain [dBi]	Antenna-2 Gain [dBi]	Summed MIMO Power Density [dBm/MHz]	Directional Gain [dBi]	DCCF [dB]	EIRP Density [dBm/MHz]	EIRP Density Limit [dBm/MHz]	Margin [dB]
Band 5	5935	2	a	-7.11	-6.67	-4.86	-4.97	-3.87	-1.90	0.28	-5.50	-5	-0.50
	6175	45	a	-6.59	-6.69	-4.86	-4.97	-3.63	-1.90	0.28	-5.26	-5	-0.26
	6415	93	a	-7.39	-5.91	-4.86	-4.97	-3.58	-1.90	0.28	-5.21	-5	-0.21
	5935	2	be (20MHz)	-7.38	-7.37	-4.86	-4.97	-4.36	-1.90	0.00	-6.27	-5	-1.27
	6175	45	be (20MHz)	-6.62	-7.08	-4.86	-4.97	-3.84	-1.90	0.00	-5.74	-5	-0.74
	6415	93	be (20MHz)	-7.05	-7.99	-4.86	-4.97	-4.49	-1.90	0.00	-6.39	-5	-1.39
	5965	3	be (40MHz)	-6.29	-6.60	-4.86	-4.97	-3.43	-1.90	0.00	-5.34	-5	-0.34
	6165	43	be (40MHz)	-6.01	-6.45	-4.86	-4.97	-3.22	-1.90	0.00	-5.12	-5	-0.12
	6405	91	be (40MHz)	-6.33	-7.82	-4.86	-4.97	-4.00	-1.90	0.00	-5.90	-5	-0.90
	5985	7	be (80MHz)	-6.31	-6.66	-4.86	-4.97	-3.47	-1.90	0.00	-5.37	-5	-0.37
	6145	39	be (80MHz)	-6.81	-6.67	-4.86	-4.97	-3.73	-1.90	0.00	-5.63	-5	-0.63
	6385	87	be (80MHz)	-6.11	-7.51	-4.86	-4.97	-3.75	-1.90	0.00	-5.65	-5	-0.65
	6025	15	be (160MHz)	-8.46	-8.96	-4.86	-4.97	-5.69	-1.90	0.00	-7.60	-5	-2.60
	6185	47	be (160MHz)	-8.48	-8.55	-4.86	-4.97	-5.50	-1.90	0.00	-7.41	-5	-2.41
	6345	79	be (160MHz)	-8.60	-9.70	-4.86	-4.97	-6.10	-1.90	0.00	-8.01	-5	-3.01
	6105	31	be (320MHz)	-10.08	-11.33	-4.86	-4.97	-7.65	-1.90	0.00	-9.56	-5	-4.56
	6265	63	be (320MHz)	-10.84	-11.17	-4.86	-4.97	-7.99	-1.90	0.00	-9.90	-5	-4.90
Band 6	6435	97	a	-6.38	-7.10	-5.12	-5.35	-3.71	-2.22	0.28	-5.66	-5	-0.66
	6475	105	a	-6.22	-6.58	-5.12	-5.35	-3.39	-2.22	0.28	-5.33	-5	-0.33
	6515	113	a	-7.69	-6.92	-5.12	-5.35	-4.27	-2.22	0.28	-6.22	-5	-1.22
	6435	97	be (20MHz)	-5.24	-7.43	-5.12	-5.35	-3.19	-2.22	0.00	-5.41	-5	-0.41
	6475	105	be (20MHz)	-6.76	-6.46	-5.12	-5.35	-3.59	-2.22	0.00	-5.82	-5	-0.82
	6515	113	be (20MHz)	-7.12	-5.68	-5.12	-5.35	-3.33	-2.22	0.00	-5.56	-5	-0.56
	6445	99	be (40MHz)	-6.08	-7.49	-5.12	-5.35	-3.72	-2.22	0.00	-5.94	-5	-0.94
	6485	107	be (40MHz)	-5.88	-6.74	-5.12	-5.35	-3.28	-2.22	0.00	-5.50	-5	-0.50
	6525	115	be (40MHz)	-6.55	-5.87	-5.12	-5.35	-3.19	-2.22	0.00	-5.41	-5	-0.41
	6465	103	be (80MHz)	-6.44	-7.22	-5.12	-5.35	-3.80	-2.22	0.00	-6.02	-5	-1.02
	6505	111	be (160MHz)	-8.81	-8.42	-5.12	-5.35	-5.60	-2.22	0.00	-7.82	-5	-2.82
Band 5/6/7	6425	95	be (320MHz)	-10.71	-11.77	-4.86	-4.97	-8.20	-1.90	0.00	-10.10	-5	-5.10
Band 7	6535	117	a	-7.73	-7.26	-5.12	-5.35	-4.48	-2.22	0.28	-6.42	-5	-1.42
	6695	149	a	-5.76	-6.57	-5.12	-5.35	-3.14	-2.22	0.28	-5.08	-5	-0.08
	6875	185	a	-6.99	-7.09	-5.12	-5.35	-4.03	-2.22	0.28	-5.97	-5	-0.97
	6535	117	be (20MHz)	-7.15	-5.79	-5.12	-5.35	-3.40	-2.22	0.00	-5.63	-5	-0.63
	6695	149	be (20MHz)	-6.56	-6.23	-5.12	-5.35	-3.38	-2.22	0.00	-5.61	-5	-0.61
	6875	185	be (20MHz)	-5.61	-6.71	-5.12	-5.35	-3.12	-2.22	0.00	-5.34	-5	-0.34
	6565	123	be (40MHz)	-6.54	-6.03	-5.12	-5.35	-3.27	-2.22	0.00	-5.49	-5	-0.49
	6725	155	be (40MHz)	-6.19	-6.30	-5.12	-5.35	-3.23	-2.22	0.00	-5.46	-5	-0.46
	6885	179	be (40MHz)	-6.50	-5.89	-5.12	-5.35	-3.17	-2.22	0.00	-5.39	-5	-0.39
	6545	119	be (80MHz)	-6.22	-7.03	-5.12	-5.35	-3.59	-2.22	0.00	-5.82	-5	-0.82
	6705	151	be (80MHz)	-6.16	-6.98	-5.12	-5.35	-3.54	-2.22	0.00	-5.76	-5	-0.76
	6865	183	be (80MHz)	-5.84	-6.50	-5.12	-5.35	-3.15	-2.22	0.00	-5.37	-5	-0.37
	6665	143	be (160MHz)	-8.31	-9.22	-5.12	-5.35	-5.73	-2.22	0.00	-7.95	-5	-2.95
	6825	175	be (160MHz)	-7.99	-8.27	-5.12	-5.35	-5.11	-2.22	0.00	-7.34	-5	-2.34
Band 6/7	6585	127	be (320MHz)	-10.25	-9.40	-5.12	-5.35	-6.80	-2.22	0.00	-9.02	-5	-4.02
Band 7/8	6745	159	be (320MHz)	-9.84	-10.35	-5.02	-5.28	-7.08	-2.14	0.00	-9.21	-5	-4.21
Band 8	6895	189	a	-5.81	-6.59	-5.02	-5.28	-3.17	-2.14	0.28	-5.03	-5	-0.03
	6995	209	a	-5.69	-6.86	-5.02	-5.28	-3.23	-2.14	0.28	-5.08	-5	-0.08
	7115	233	a	-5.84	-7.68	-5.02	-5.28	-3.65	-2.14	0.28	-5.51	-5	-0.51
	6895	189	be (20MHz)	-7.22	-6.89	-5.02	-5.28	-4.04	-2.14	0.00	-6.18	-5	-1.18
	6995	209	be (20MHz)	-6.13	-7.12	-5.02	-5.28	-3.59	-2.14	0.00	-5.72	-5	-0.72
	7115	233	be (20MHz)	-6.37	-7.43	-5.02	-5.28	-3.86	-2.14	0.00	-5.99	-5	-0.99
	6925	187	be (40MHz)	-6.18	-6.10	-5.02	-5.28	-3.13	-2.14	0.00	-5.27	-5	-0.27
	7005	211	be (40MHz)	-5.20	-6.95	-5.02	-5.28	-2.98	-2.14	0.00	-5.11	-5	-0.11
	7085	227	be (40MHz)	-5.87	-6.55	-5.02	-5.28	-3.19	-2.14	0.00	-5.33	-5	-0.33
	6945	199	be (80MHz)	-5.94	-6.54	-5.02	-5.28	-3.22	-2.14	0.00	-5.36	-5	-0.36
	7025	215	be (80MHz)	-6.18	-7.12	-5.02	-5.28	-3.61	-2.14	0.00	-5.75	-5	-0.75
	6985	207	be (160MHz)	-7.49	-8.19	-5.02	-5.28	-4.82	-2.14	0.00	-6.95	-5	-1.95
Band 7/8	6905	191	be (320MHz)	-10.32	-10.24	-5.02	-5.28	-7.27	-2.14	0.00	-9.41	-5	-4.41

Table 7-20. MIMO e.i.r.p. Conducted Power Spectral Density Measurements VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

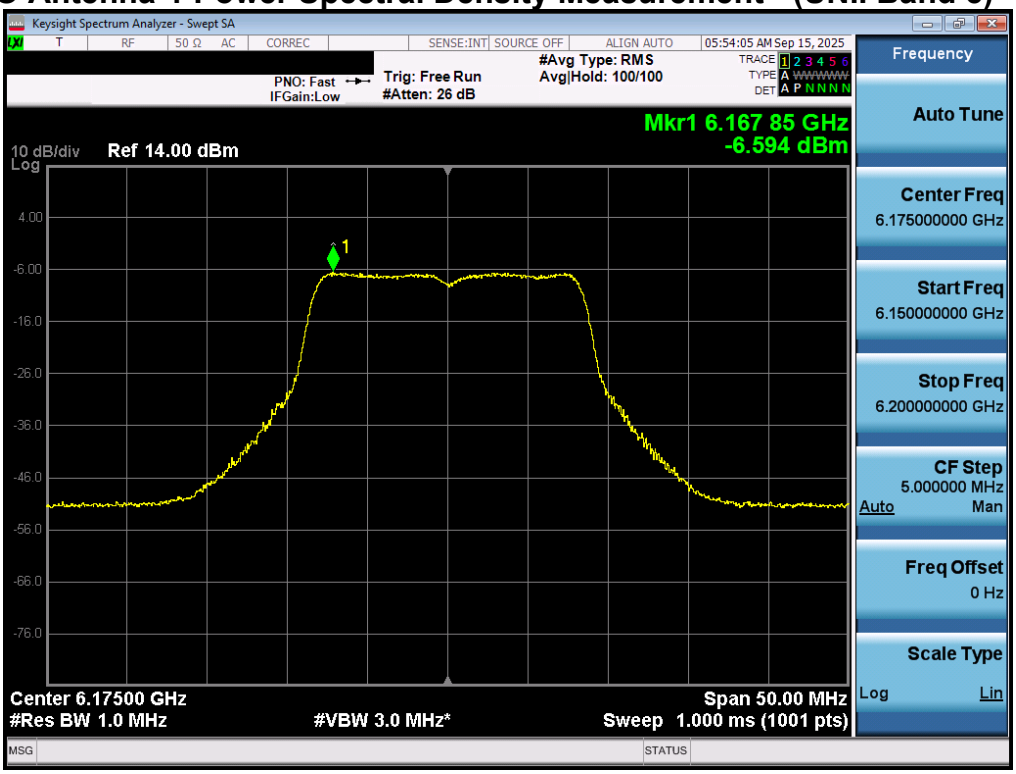
	Frequency [MHz]	Channel	802.11 MODE	Puncture Size	Antenna-1 Power Density [dBm]	Antenna-2 Power Density [dBm]	Antenna-1 Gain [dBi]	Antenna-2 Gain [dBi]	Summed MIMO Power Density [dBm/MHz]	Directional Gain [dBi]	EIRP Density [dBm/MHz]	EIRP Density Limit [dBm/MHz]	Margin [dB]
Band 5	6145	39	be (80MHz)	20MHz	-6.85	-7.22	-4.86	-4.97	-4.02	-1.90	-5.93	-5	-0.93
	6185	47	be (160MHz)	20MHz	-7.12	-7.85	-4.86	-4.97	-4.46	-1.90	-6.36	-5	-1.36
	6185	47	be (160MHz)	40MHz	-6.68	-6.86	-4.86	-4.97	-3.76	-1.90	-5.66	-5	-0.66
	6105	31	be (320MHz)	40MHz	-10.59	-10.78	-5.12	-5.35	-7.68	-2.22	-9.90	-5	-4.90
	6105	31	be (320MHz)	80MHz	-9.84	-9.74	-5.12	-5.35	-6.78	-2.22	-9.00	-5	-4.00
	6105	31	be (320MHz)	120MHz	-9.20	-9.51	-5.12	-5.35	-6.34	-2.22	-8.57	-5	-3.57
Band 6	6465	103	be (80MHz)	20MHz	-6.56	-8.02	-5.12	-5.35	-4.22	-2.22	-6.44	-5	-1.44
	6505	111	be (160MHz)	20MHz	-7.14	-7.78	-5.12	-5.35	-4.44	-2.22	-6.66	-5	-1.66
	6505	111	be (160MHz)	40MHz	-6.28	-6.86	-5.12	-5.35	-3.55	-2.22	-5.77	-5	-0.77
Band 5/6/7	6425	95	be (320MHz)	40MHz	-10.02	-11.11	-4.86	-4.97	-7.52	-1.90	-9.43	-5	-4.43
	6425	95	be (320MHz)	80MHz	-10.73	-11.20	-4.86	-4.97	-7.95	-1.90	-9.85	-5	-4.85
	6425	95	be (320MHz)	120MHz	-8.46	-9.52	-4.86	-4.97	-5.95	-1.90	-7.85	-5	-2.85
Band 7	6705	151	be (80MHz)	20MHz	-6.46	-7.18	-5.12	-5.35	-3.79	-2.22	-6.02	-5	-1.02
	6665	143	be (160MHz)	20MHz	-7.17	-8.25	-5.12	-5.35	-4.66	-2.22	-6.89	-5	-1.89
	6665	143	be (160MHz)	40MHz	-6.51	-7.52	-5.12	-5.35	-3.98	-2.22	-6.20	-5	-1.20
Band 7/8	6745	159	be (320MHz)	40MHz	-9.43	-10.06	-5.02	-5.28	-6.72	-2.14	-8.86	-5	-3.86
	6745	159	be (320MHz)	80MHz	-8.99	-9.81	-5.02	-5.28	-6.37	-2.14	-8.50	-5	-3.50
	6745	159	be (320MHz)	120MHz	-8.57	-9.08	-5.02	-5.28	-5.81	-2.14	-7.95	-5	-2.95
Band 8	7025	215	be (80MHz)	20MHz	-5.98	-7.07	-5.02	-5.28	-3.48	-2.14	-5.62	-5	-0.62
	6985	207	be (160MHz)	20MHz	-6.42	-7.31	-5.02	-5.28	-3.83	-2.14	-5.97	-5	-0.97
	6985	207	be (160MHz)	40MHz	-6.21	-7.09	-5.02	-5.28	-3.62	-2.14	-5.76	-5	-0.76
Band 7/8	6905	191	be (320MHz)	40MHz	-9.44	-9.23	-5.02	-5.28	-6.32	-2.14	-8.46	-5	-3.46
	6905	191	be (320MHz)	80MHz	-8.74	-8.75	-5.02	-5.28	-5.73	-2.14	-7.87	-5	-2.87
	6905	191	be (320MHz)	120MHz	-8.41	-8.65	-5.02	-5.28	-5.52	-2.14	-7.65	-5	-2.65

Table 7-21. MIMO e.i.r.p. Conducted Power Spectral Density Measurements – Punctured Cases VLP

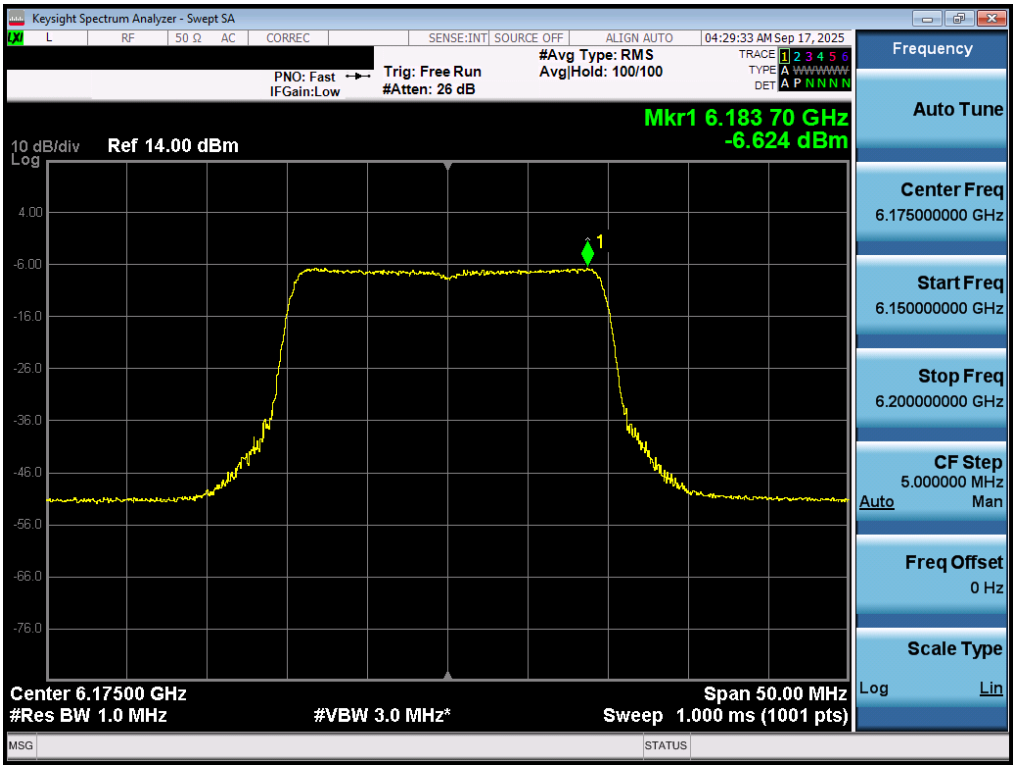
© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.4.1 MIMO Antenna-1 Power Spectral Density Measurement - (UNII Band 5)



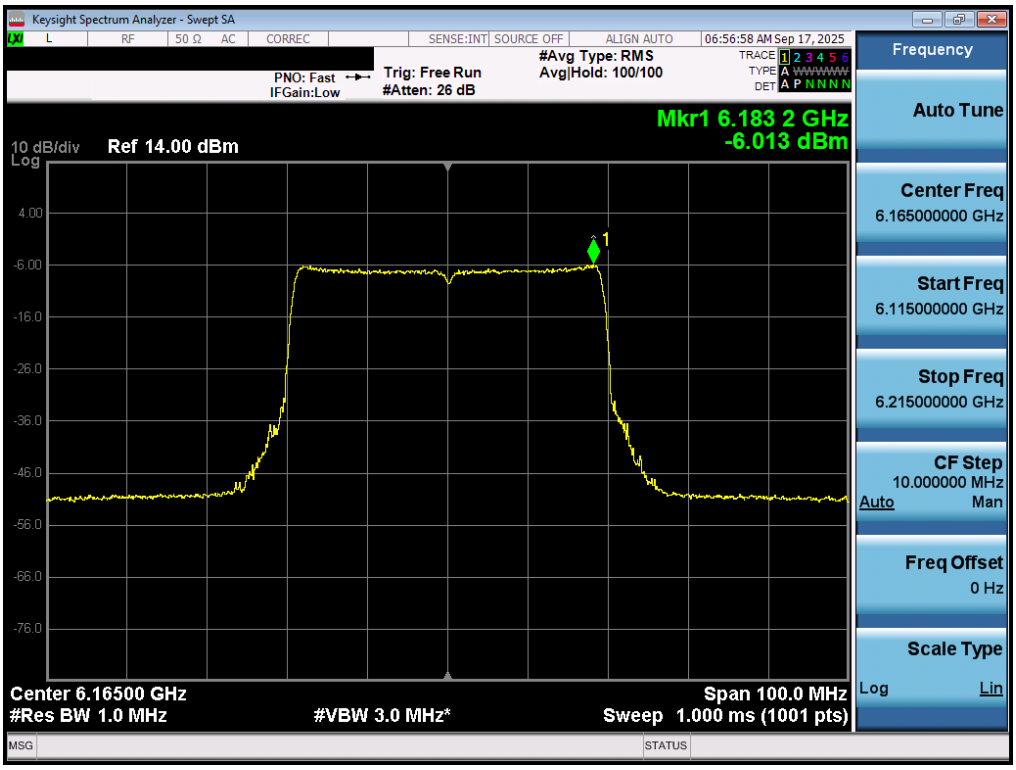
Plot 7-19. Power Spectral Density Plot MIMO ANT1 (20MHz 802.11a (UNII Band 5) – Ch. 45) - VLP



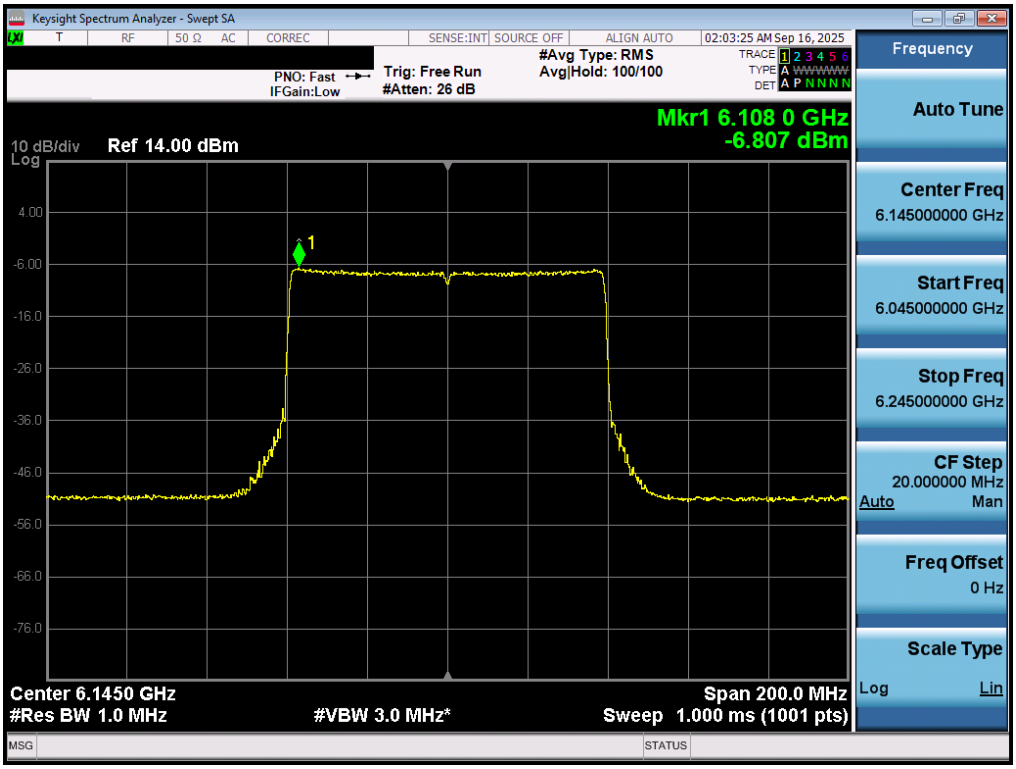
Plot 7-20. Power Spectral Density Plot MIMO ANT1 (20MHz 802.11ax/be (UNII Band 5) – Ch. 45) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



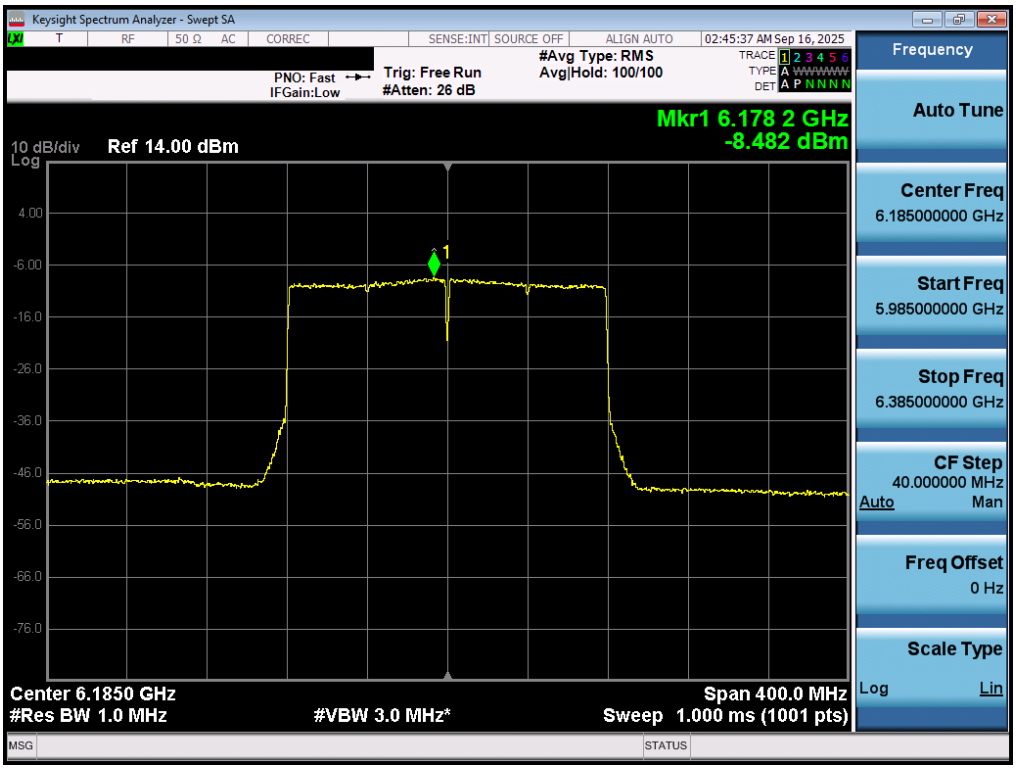
Plot 7-21. Power Spectral Density Plot MIMO ANT1 (40MHz 802.11ax/be (UNII Band 5) – Ch. 43) - VLP



Plot 7-22. Power Spectral Density Plot MIMO ANT1 (80MHz 802.11ax/be (UNII Band 5) – Ch. 39) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

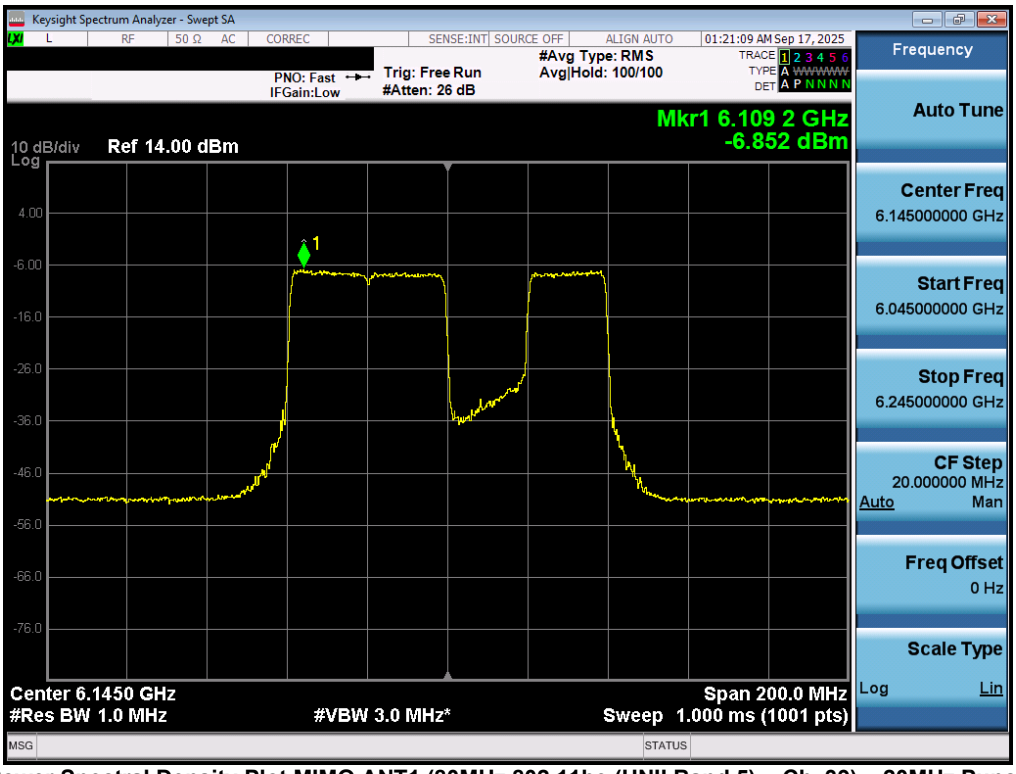


Plot 7-23. Power Spectral Density Plot MIMO ANT1 (160MHz 802.11ax/be (UNII Band 5) – Ch. 47) - VLP

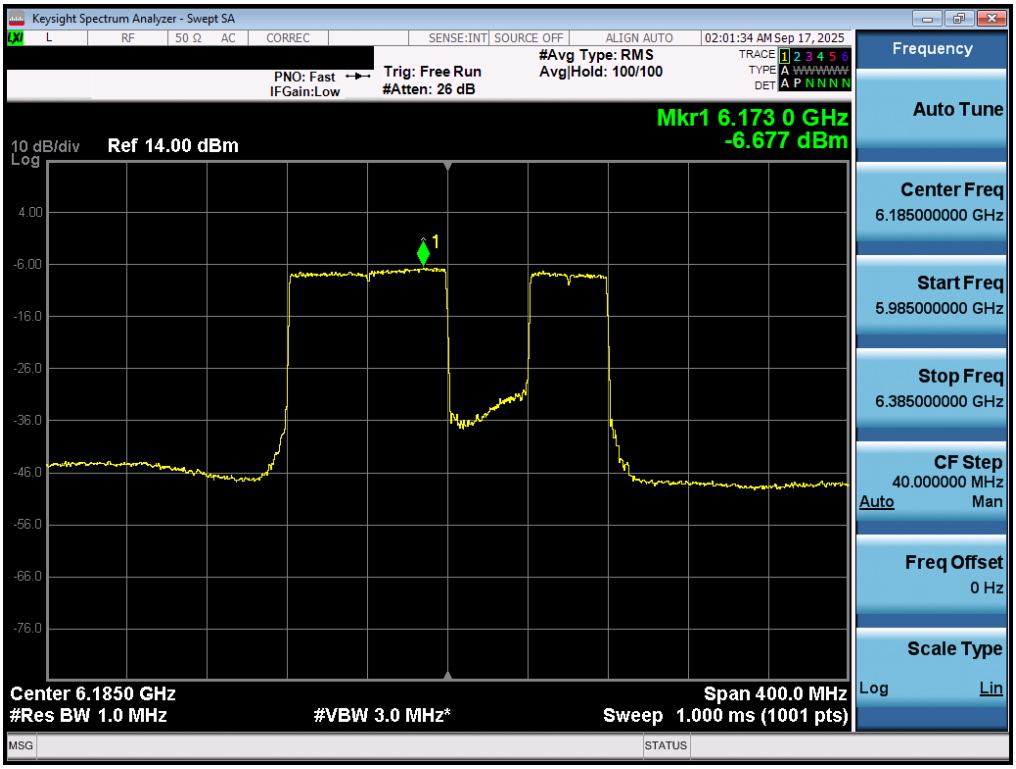
Plot 7-24. Power Spectral Density Plot MIMO ANT1 (320MHz 802.11ax/be (UNII Band 5) – Ch. 31) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



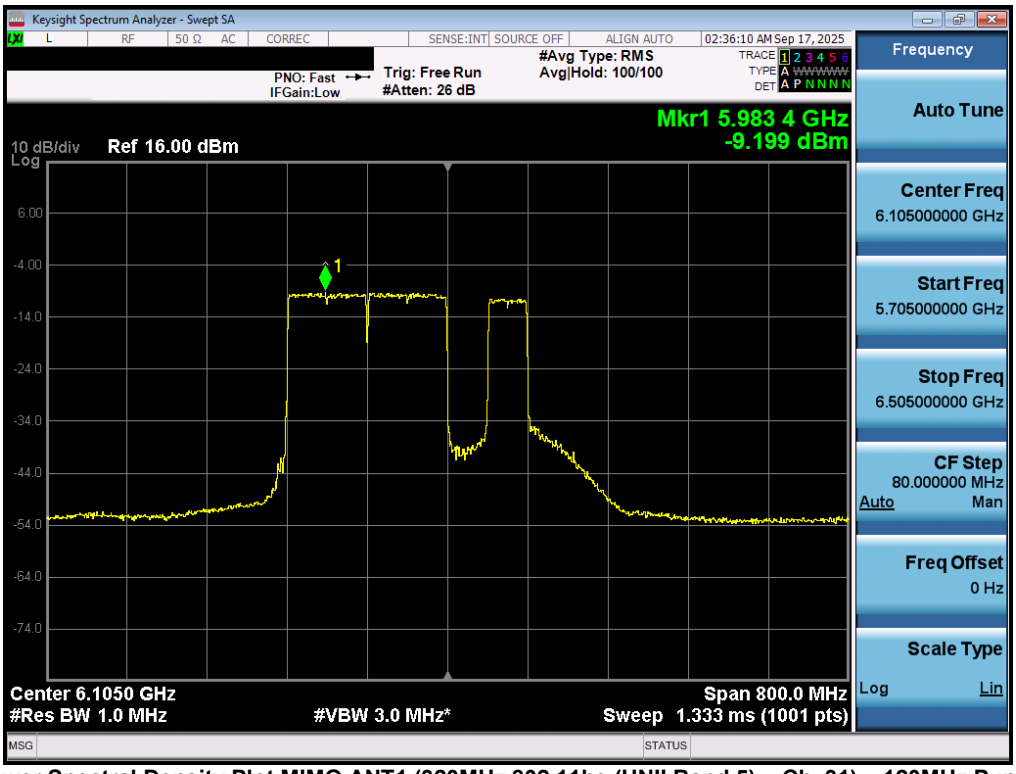
Plot 7-25. Power Spectral Density Plot MIMO ANT1 (80MHz 802.11be (UNII Band 5) – Ch. 39) – 20MHz Punctured - VLP



Plot 7-26. Power Spectral Density Plot MIMO ANT1 (160MHz 802.11be (UNII Band 5) – Ch. 47) – 40MHz Punctured - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

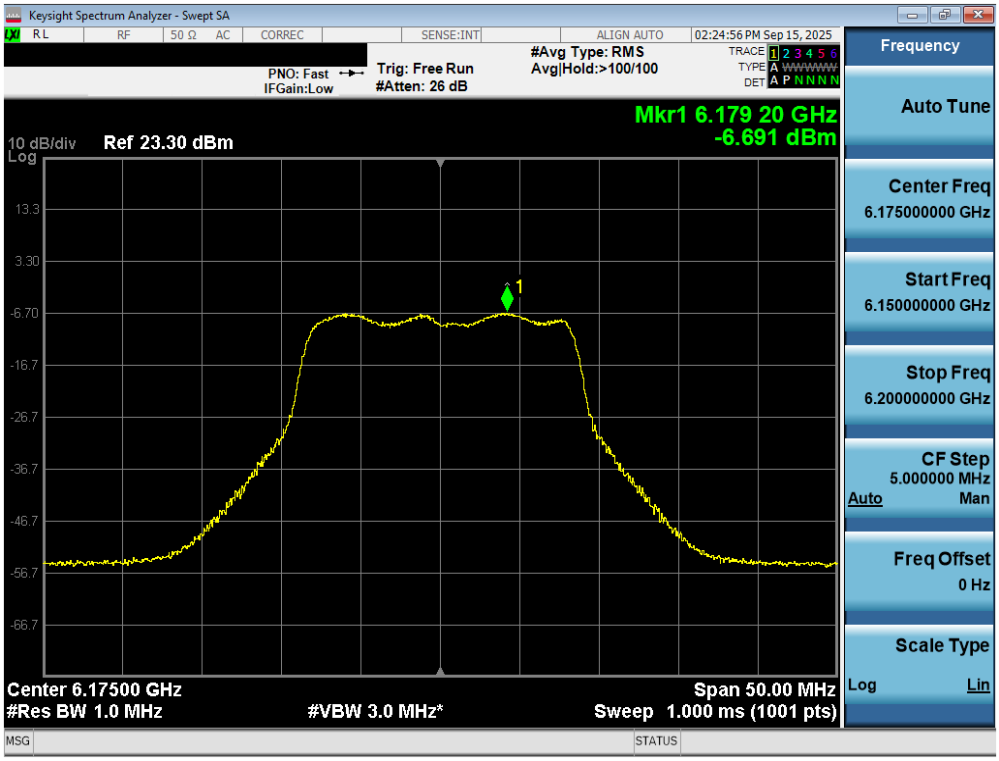


Plot 7-27. Power Spectral Density Plot MIMO ANT1 (320MHz 802.11be (UNII Band 5) – Ch. 31) – 120MHz Punctured - VLP

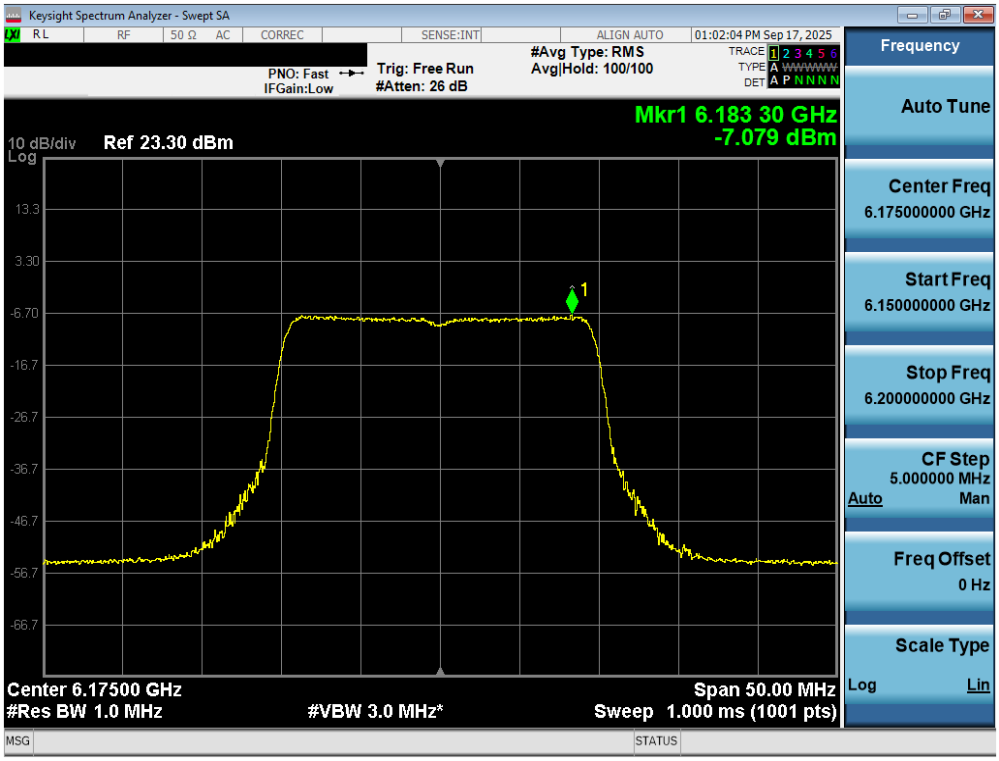
© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.4.2 MIMO Antenna-2 Power Spectral Density Measurement - (UNII Band 5)



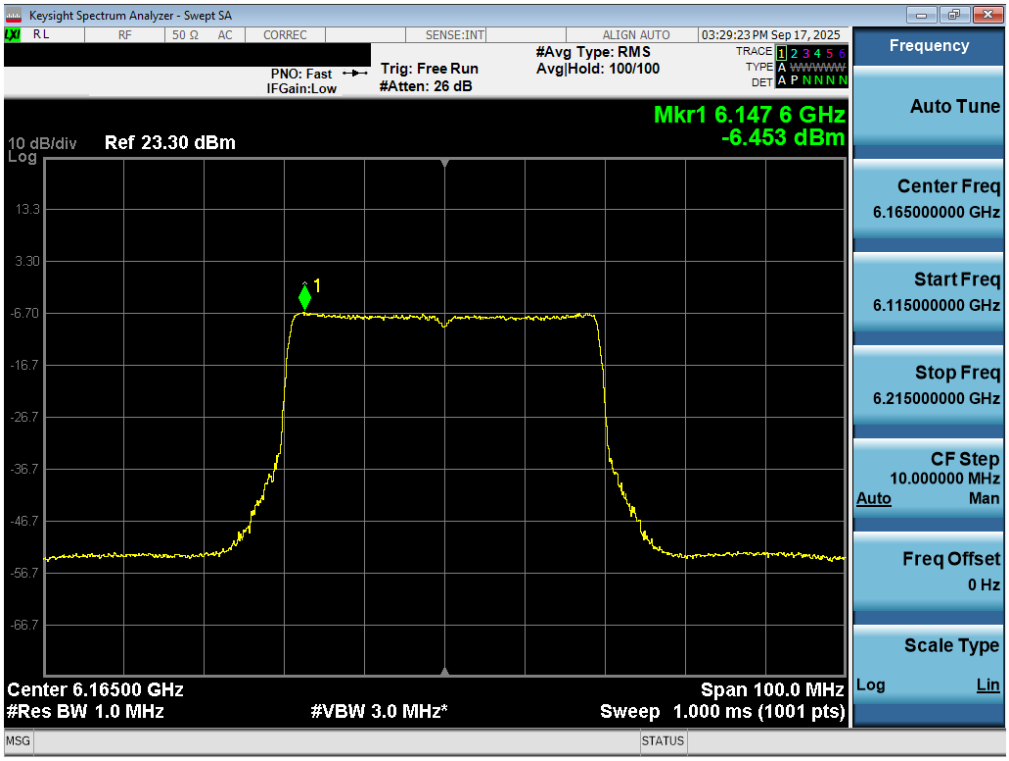
Plot 7-28. Power Spectral Density Plot MIMO ANT2 (20MHz 802.11a (UNII Band 5) – Ch. 45) - VLP



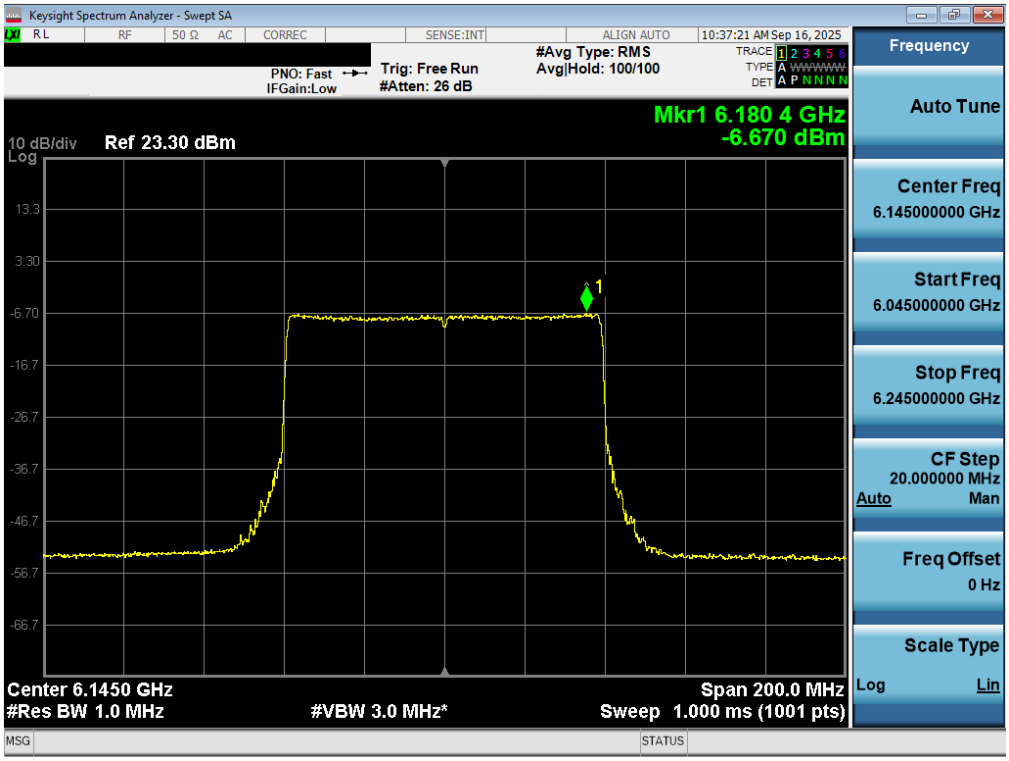
Plot 7-29. Power Spectral Density Plot MIMO ANT2 (20MHz 802.11ax/be (UNII Band 5) – Ch. 45) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



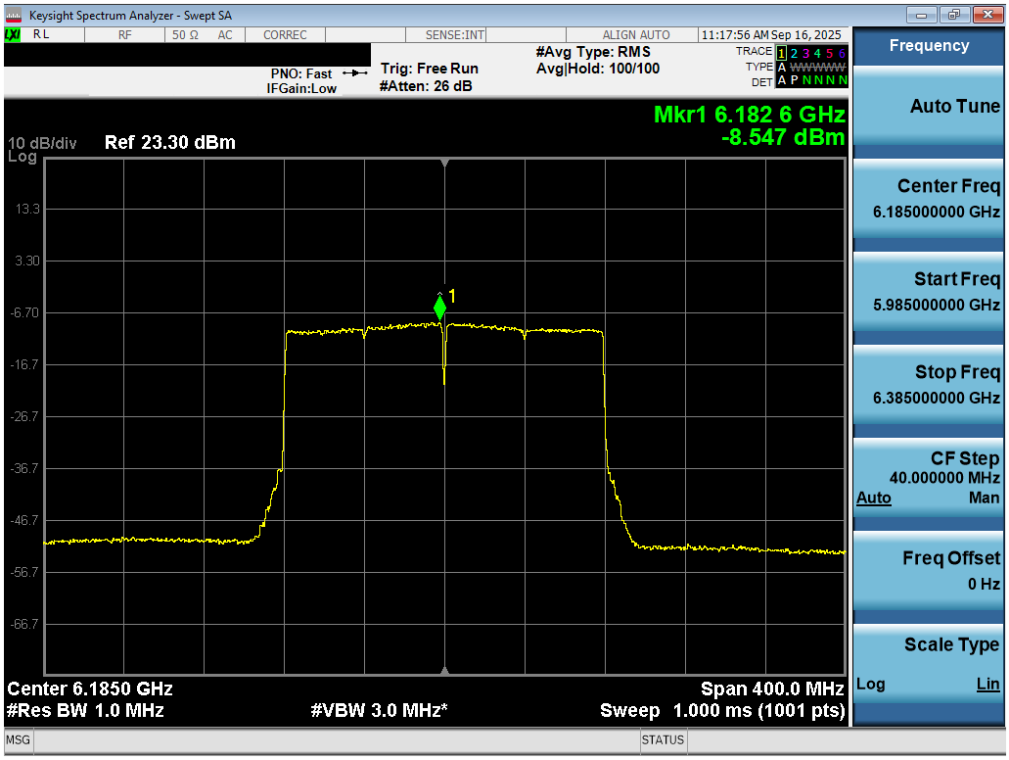
Plot 7-30. Power Spectral Density Plot MIMO ANT2 (40MHz 802.11ax/be (UNII Band 5) – Ch. 43) - VLP



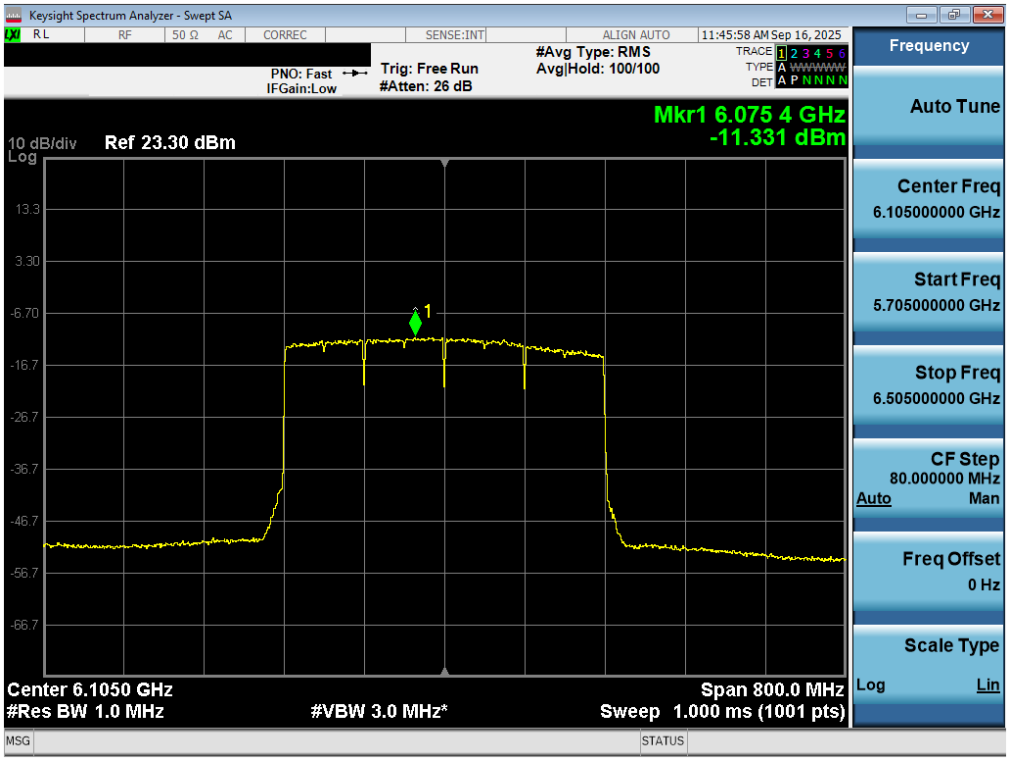
Plot 7-31. Power Spectral Density Plot MIMO ANT2 (80MHz 802.11ax/be (UNII Band 5) – Ch. 39) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

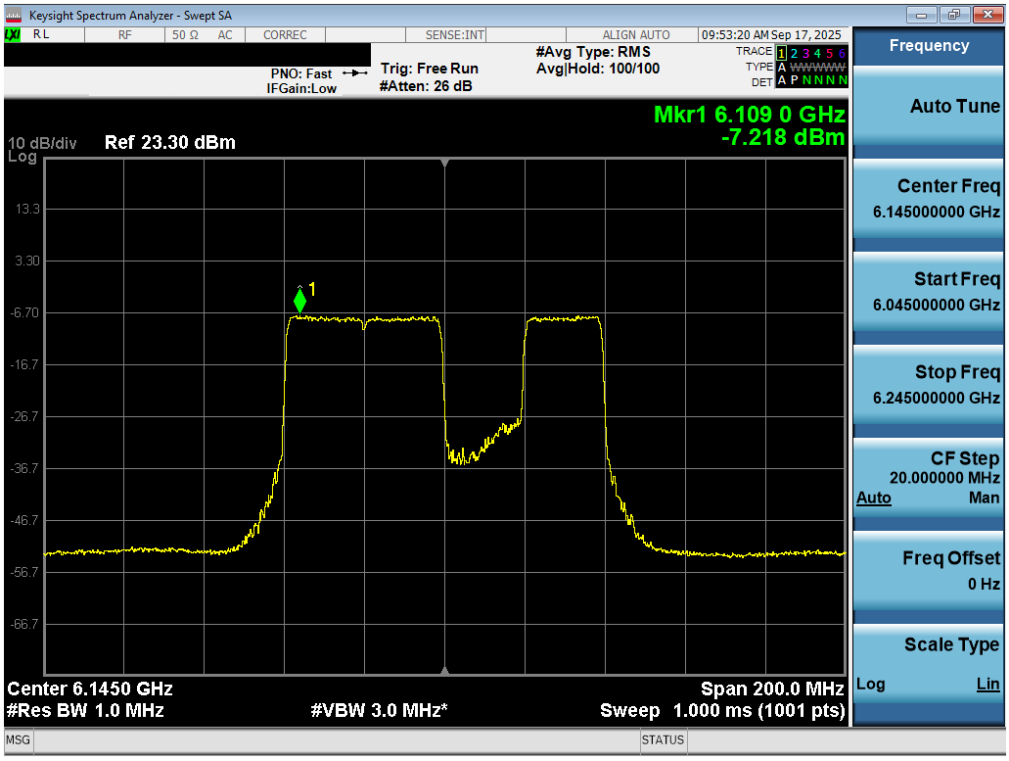


Plot 7-32. Power Spectral Density Plot MIMO ANT2 (160MHz 802.11ax/be (UNII Band 5) – Ch. 47) - VLP

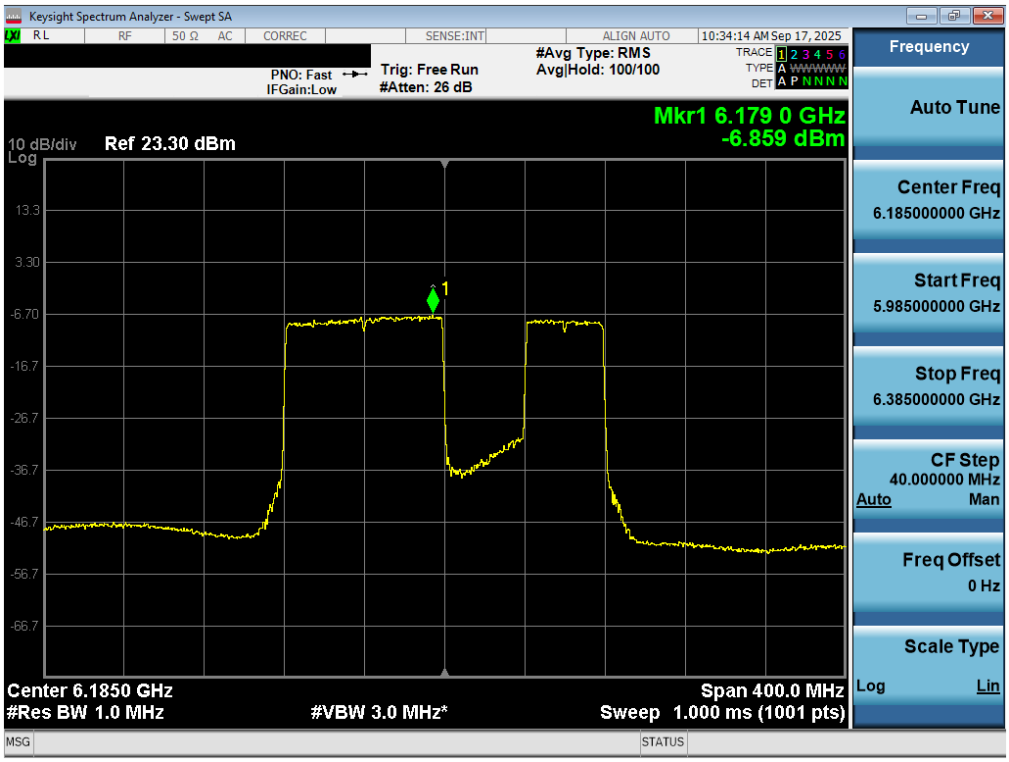


Plot 7-33. Power Spectral Density Plot MIMO ANT2 (320MHz 802.11ax/be (UNII Band 5) – Ch. 31) - VLP

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

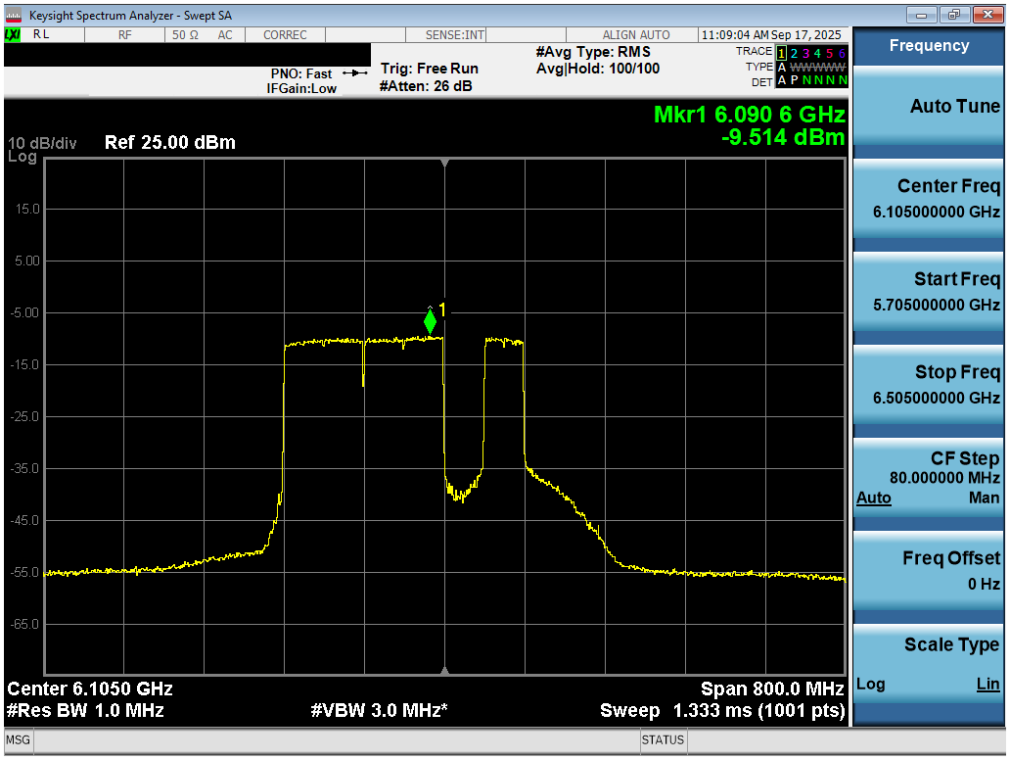


Plot 7-34. Power Spectral Density Plot MIMO ANT2 (80MHz 802.11be (UNII Band 5) – Ch. 39) – 20MHz Punctured - VLP



Plot 7-35. Power Spectral Density Plot MIMO ANT2 (160MHz 802.11be (UNII Band 5) – Ch. 47) – 40MHz Punctured - VLP

© 2025 ELEMENT
V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Plot 7-36. Power Spectral Density Plot MIMO ANT2 (320MHz 802.11be (UNII Band 5) – Ch. 31) – 120MHz Punctured – VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

Note:

Per ANSI C63.10:2020 Section 14.5.2.3 the power spectral density at Antenna 1 and Antenna 2 were first measured separately 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.

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

Sample MIMO Calculation:

At 5935MHz in 802.11a (20MHz BW) mode, the average conducted power spectral density was measured to be -7.11 dBm for Antenna-1 and -6.67 dBm for Antenna-2.

Antenna 1 + Antenna 2 = MIMO

(-7.11 dBm + -6.67 dBm) = (0.195 mW + 0.215 mW) = 0.410 mW = -3.87 dBm

Sample e.i.r.p Power Spectral Density Calculation:

At 5935 MHz in 802.11a (20MHz BW) mode, the average MIMO power density was calculated to be -3.87 dBm with directional gain of -1.90 dBi.

e.i.r.p. Power Spectral Density(dBm) = Power Spectral Density (dBm) + Ant gain (dBi) + DCCF (dB)

-3.87 dBm + -1.90 dBi + 0.28 dB = -5.50 dBm

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.5 In-Band Emissions

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 at the appropriate frequencies.

For transmitters operating within the 5.925-7.125 GHz bands: Power spectral density must be suppressed by 20 dB at 1 MHz outside of channel edge, by 28 dB at one channel bandwidth from the channel center, and by 40 dB at one- and one-half times the channel bandwidth away from channel center. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression, and at frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression. Emissions removed from the channel center by more than one- and one-half times the channel bandwidth must be suppressed by at least 40 dB.

Test Procedure Used

KDB 987594 D02 v03

Test Settings

1. Connect output of the antenna port to a spectrum analyzer or EMI receiver, with appropriate attenuation, as to not damage the instrumentation.
2. Set the reference level of the measuring equipment in accordance with procedure 4.1.6.2 of ANSI C63.10:2020.
3. Measure the 26 dB EBW using the test procedure 12.5.2 of ANSI C63.10:2020. (This will be used to determine the channel edge.)
4. Measure the power spectral density (which will be used for emissions mask reference) using the following procedure:
    a) Set the span to encompass the entire 26 dB EBW of the signal.
    b) Set RBW = same RBW used for 26 dB EBW measurement.
    c) Set VBW ≥ 3 X RBW
    d) Number of points in sweep ≥ [2 X span / RBW].
    e) Sweep time = auto.
    f) Detector = RMS (i.e., power averaging)
    g) Trace average at least 100 traces in power averaging (rms) mode.
    h) Use the peak search function on the instrument to find the peak of the spectrum.
5. For the purposes of developing the emission mask, the channel bandwidth is defined as the 26 dB EBW.
6. Using the measuring equipment limit line function, develop the emissions mask based on the following requirements. The emissions power spectral density must be reduced below the peak power spectral density (in dB) as follows:
    i) Suppressed by 20 dB at 1 MHz outside of the channel edge. (The channel edge is defined as the 26-dB point on either side of the carrier center frequency.)
    j) Suppressed by 28 dB at one channel bandwidth from the channel center.
    k) Suppressed by 40 dB at one- and one-half times the channel bandwidth from the channel center.
7. Adjust the span to encompass the entire mask as necessary.
8. Clear trace.
9. Trace average at least 100 traces in power averaging (rms) mode.
10. Adjust the reference level as necessary so that the crest of the channel touches the top of the emission mask.

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

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

None.

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

	Frequency [MHz]	Channel	802.11 MODE	Antenna-1 In-Band Emission	Antenna-2 In-Band Emission
Band 5	5935	2	a	PASS	PASS
	6175	45	a	PASS	PASS
	6415	93	a	PASS	PASS
	5935	2	be (20MHz)	PASS	PASS
	6175	45	be (20MHz)	PASS	PASS
	6415	93	be (20MHz)	PASS	PASS
	5965	3	be (40MHz)	PASS	PASS
	6165	43	be (40MHz)	PASS	PASS
	6405	91	be (40MHz)	PASS	PASS
	5985	7	be (80MHz)	PASS	PASS
	6145	39	be (80MHz)	PASS	PASS
	6385	87	be (80MHz)	PASS	PASS
	6025	15	be (160MHz)	PASS	PASS
	6185	47	be (160MHz)	PASS	PASS
	6345	79	be (160MHz)	PASS	PASS
	6105	31	be (320MHz)	PASS	PASS
	6265	63	be (320MHz)	PASS	PASS
Band 6	6435	97	a	PASS	PASS
	6475	105	a	PASS	PASS
	6515	113	a	PASS	PASS
	6435	97	be (20MHz)	PASS	PASS
	6475	105	be (20MHz)	PASS	PASS
	6515	113	be (20MHz)	PASS	PASS
	6445	99	be (40MHz)	PASS	PASS
	6485	107	be (40MHz)	PASS	PASS
	6525	115	be (40MHz)	PASS	PASS
	6465	103	be (80MHz)	PASS	PASS
	6505	111	be (160MHz)	PASS	PASS
Band 5/6/7	6425	95	be (320MHz)	PASS	PASS
Band 7	6535	117	a	PASS	PASS
	6695	149	a	PASS	PASS
	6875	185	a	PASS	PASS
	6535	117	be (20MHz)	PASS	PASS
	6695	149	be (20MHz)	PASS	PASS
	6875	185	be (20MHz)	PASS	PASS
	6565	123	be (40MHz)	PASS	PASS
	6725	155	be (40MHz)	PASS	PASS
	6885	179	be (40MHz)	PASS	PASS
	6545	119	be (80MHz)	PASS	PASS
	6705	151	be (80MHz)	PASS	PASS
	6865	183	be (80MHz)	PASS	PASS
	6665	143	be (160MHz)	PASS	PASS
	6825	175	be (160MHz)	PASS	PASS
Band 6/7	6665	127	be (320MHz)	PASS	PASS
Band 7/8	6745	159	be (320MHz)	PASS	PASS
Band 8	6895	189	a	PASS	PASS
	6995	209	a	PASS	PASS
	7115	233	a	PASS	PASS
	6895	189	be (20MHz)	PASS	PASS
	6995	209	be (20MHz)	PASS	PASS
	7115	233	be (20MHz)	PASS	PASS
	6925	187	be (40MHz)	PASS	PASS
	7005	211	be (40MHz)	PASS	PASS
	7085	227	be (40MHz)	PASS	PASS
	6945	199	be (80MHz)	PASS	PASS
	7025	215	be (80MHz)	PASS	PASS
	6985	207	be (160MHz)	PASS	PASS
Band 7/8	6905	191	be (320MHz)	PASS	PASS

Table 7-22. MIMO In-Band Emissions Results – VLP

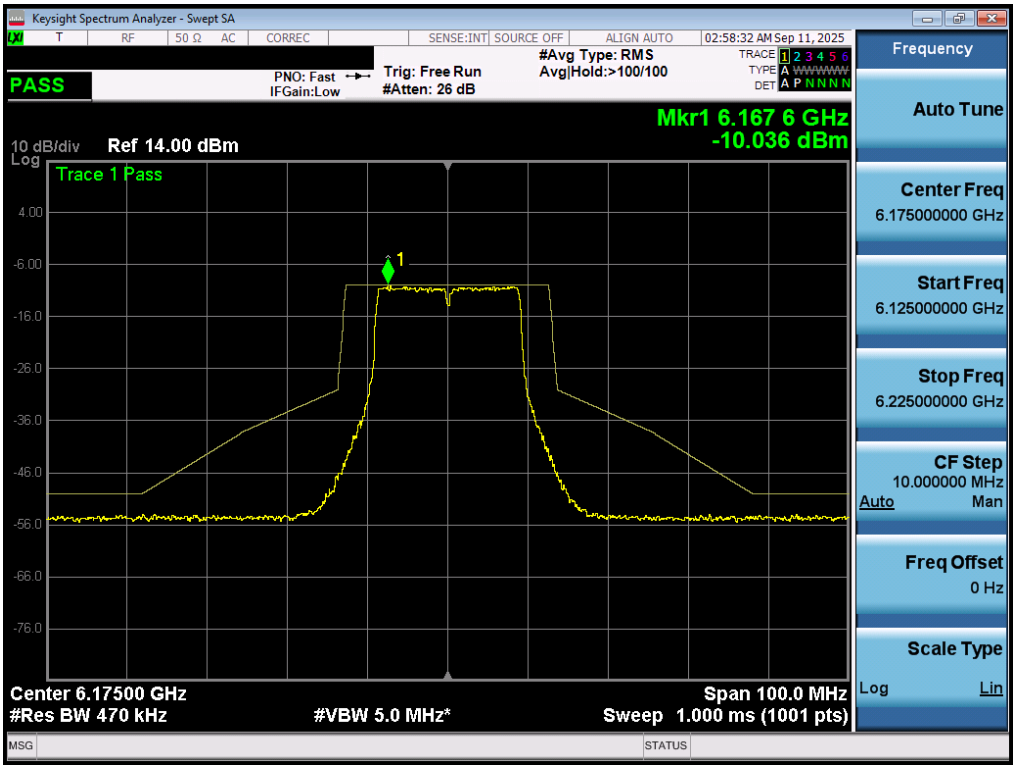
© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

	Frequency [MHz]	Channel	802.11 MODE	Puncture Size	Antenna-1 In-Band Emission	Antenna-2 In-Band Emission
Band 5	6145	39	be (80MHz)	20MHz	PASS	PASS
	6185	47	be (160MHz)	20MHz	PASS	PASS
	6185	47	be (160MHz)	40MHz	PASS	PASS
	6105	31	be (320MHz)	40MHz	PASS	PASS
	6105	31	be (320MHz)	80MHz	PASS	PASS
	6105	31	be (320MHz)	120MHz	PASS	PASS
Band 6	6465	103	be (80MHz)	20MHz	PASS	PASS
	6505	111	be (160MHz)	20MHz	PASS	PASS
	6505	111	be (160MHz)	40MHz	PASS	PASS
Band 5/6/7	6425	95	be (320MHz)	40MHz	PASS	PASS
	6425	95	be (320MHz)	80MHz	PASS	PASS
	6425	95	be (320MHz)	120MHz	PASS	PASS
Band 7	6705	151	be (80MHz)	20MHz	PASS	PASS
	6665	143	be (160MHz)	20MHz	PASS	PASS
	6665	143	be (160MHz)	40MHz	PASS	PASS
Band 7/8	6745	159	be (320MHz)	40MHz	PASS	PASS
	6745	159	be (320MHz)	80MHz	PASS	PASS
	6745	159	be (320MHz)	120MHz	PASS	PASS
Band 8	7025	215	be (80MHz)	20MHz	PASS	PASS
	6985	207	be (160MHz)	20MHz	PASS	PASS
	6985	207	be (160MHz)	40MHz	PASS	PASS
Band 7/8	6905	191	be (320MHz)	40MHz	PASS	PASS
	6905	191	be (320MHz)	80MHz	PASS	PASS
	6905	191	be (320MHz)	120MHz	PASS	PASS

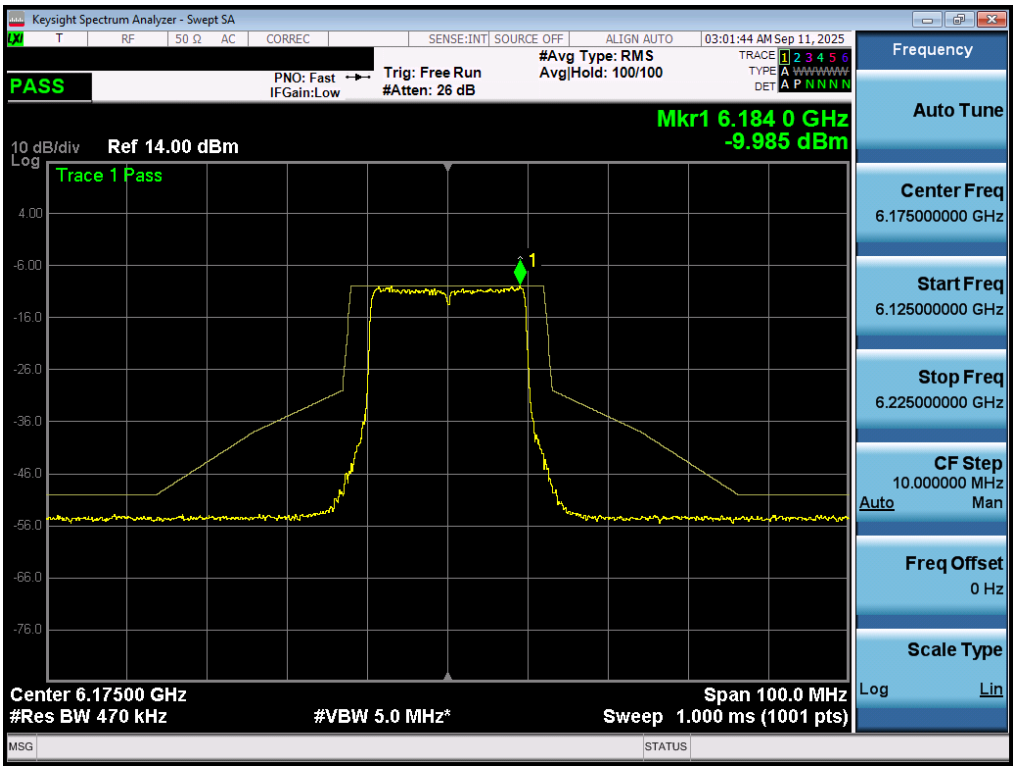
Table 7-23. MIMO In-Band Emissions Results – Punctured Cases – VLP

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.5.1 MIMO Antenna-1 In-Band Emission Plot Measurement - (UNII Band 5)



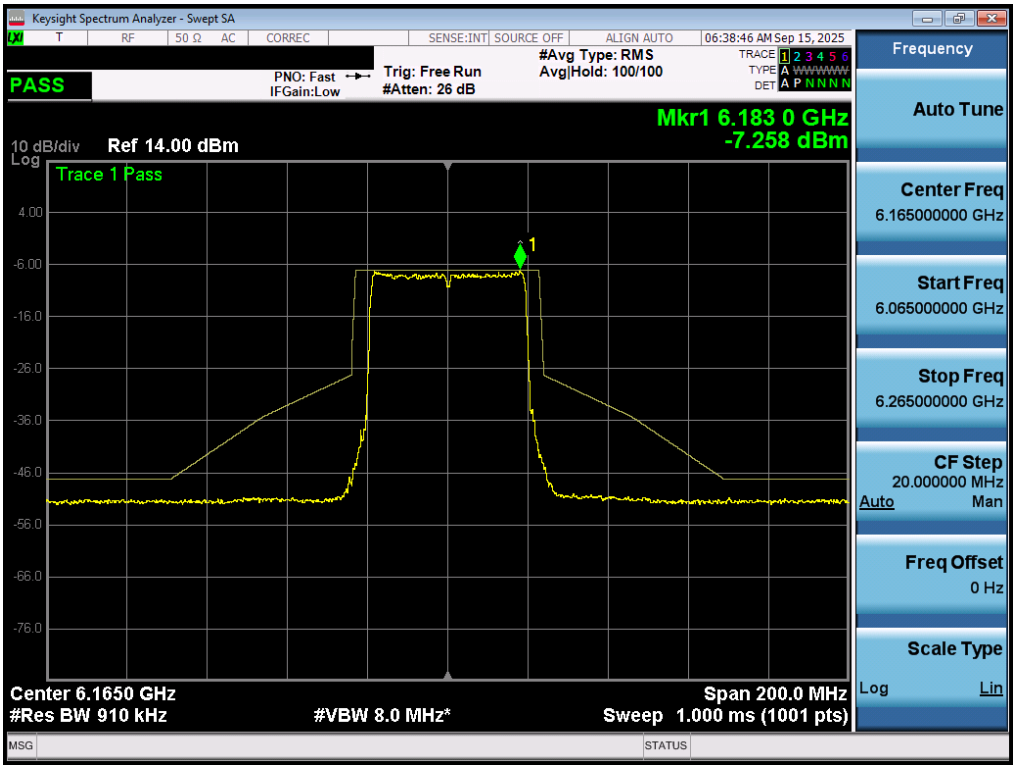
Plot 7-37. In Band Emissions Plot MIMO ANT1 (20MHz 802.11a (UNII Band 5) – Ch. 45) - VLP



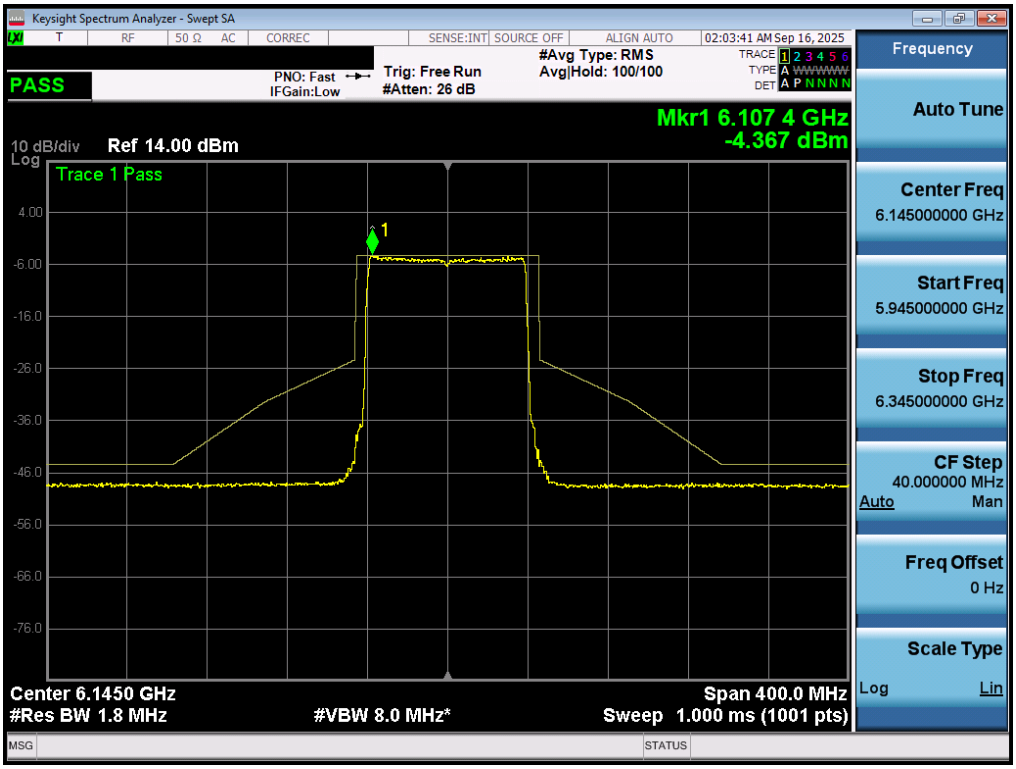
Plot 7-38. In Band Emissions Plot MIMO ANT1 (20MHz 802.11ax/be (UNII Band 5) – Ch. 45) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



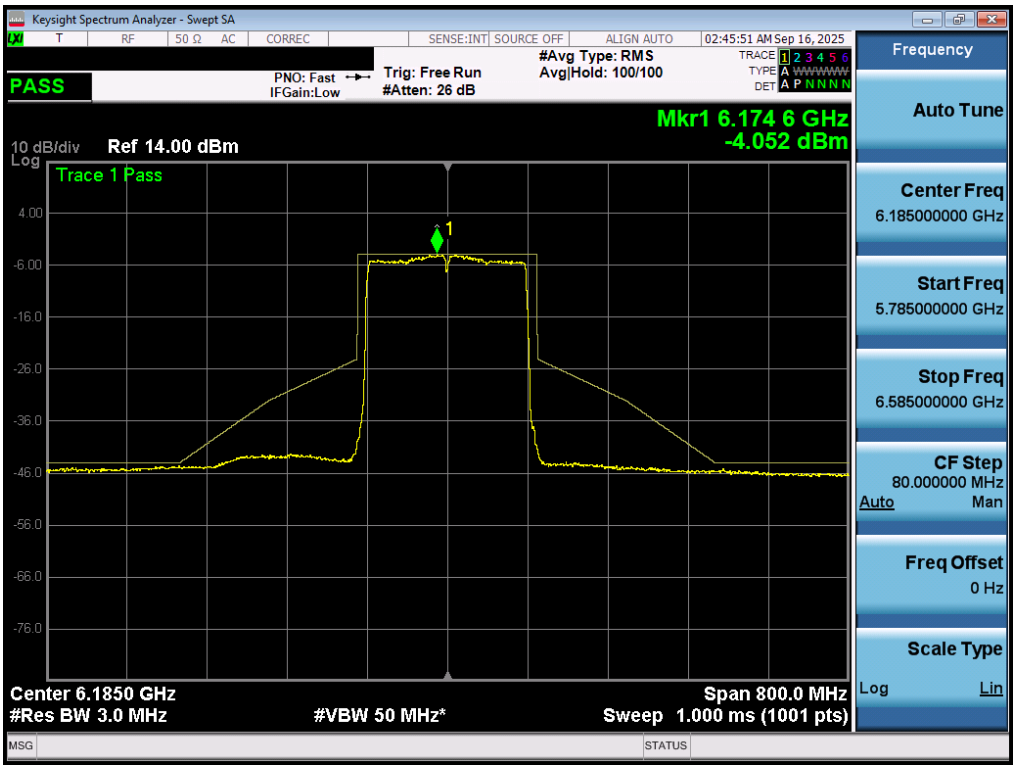
Plot 7-39. In Band Emissions Plot MIMO ANT1 (40MHz 802.11ax/be (UNII Band 5) – Ch. 43) - VLP



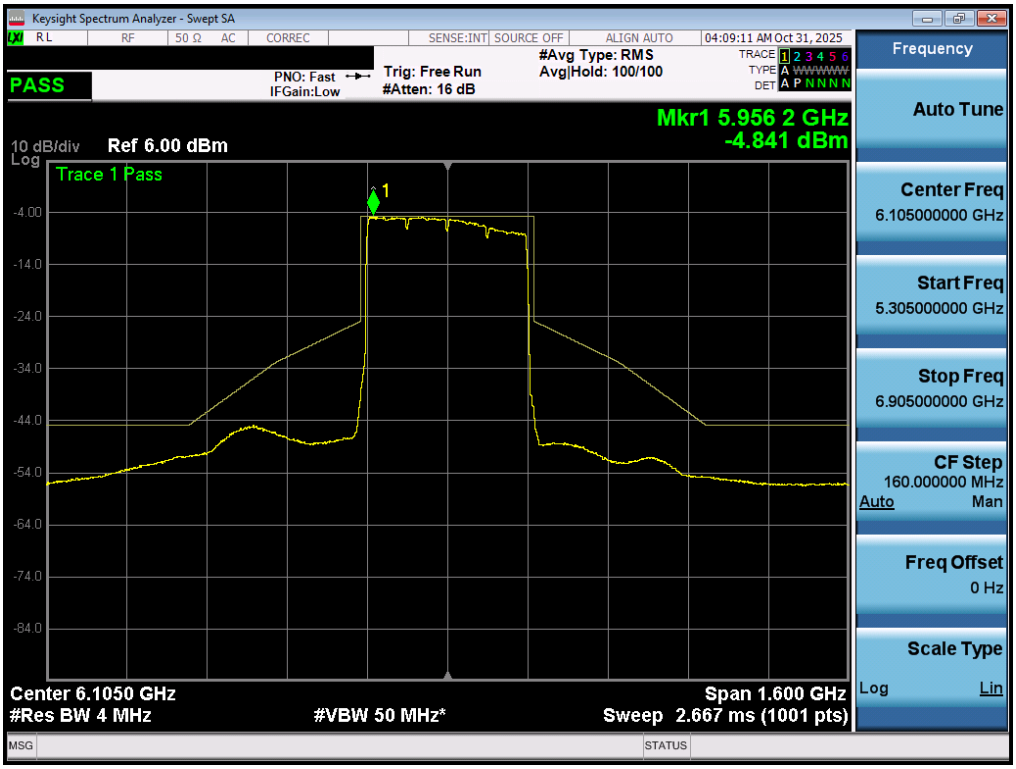
Plot 7-40. In Band Emissions Plot MIMO ANT1 (80MHz 802.11ax/be (UNII Band 5) – Ch. 39) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



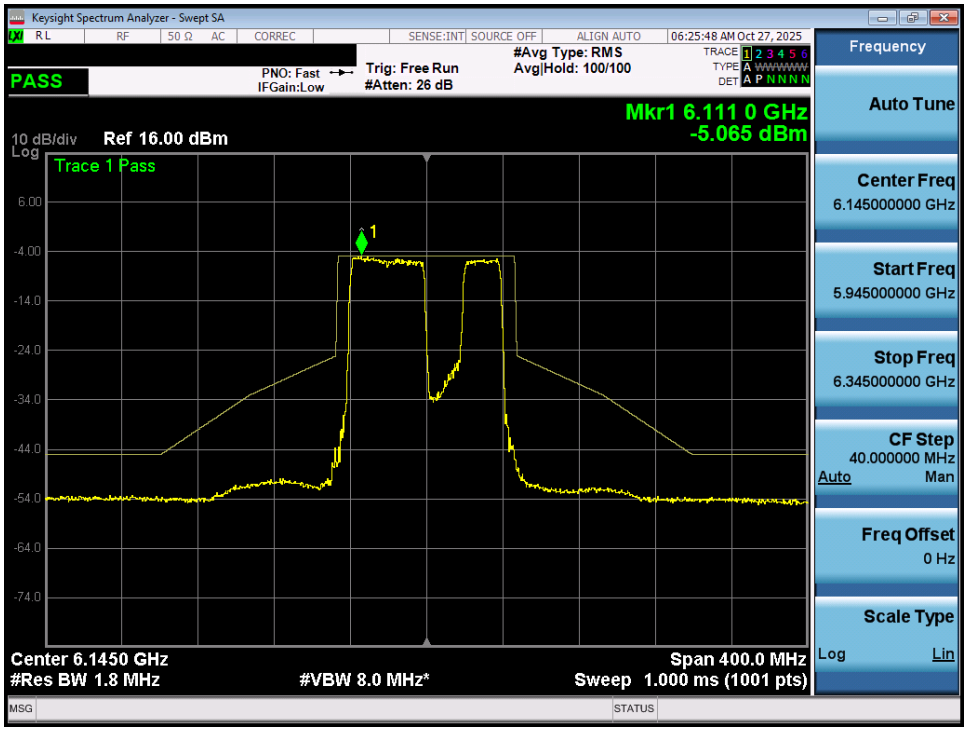
Plot 7-41. In Band Emissions Plot MIMO ANT1 (160MHz 802.11ax/be (UNII Band 5) – Ch. 47) - VLP



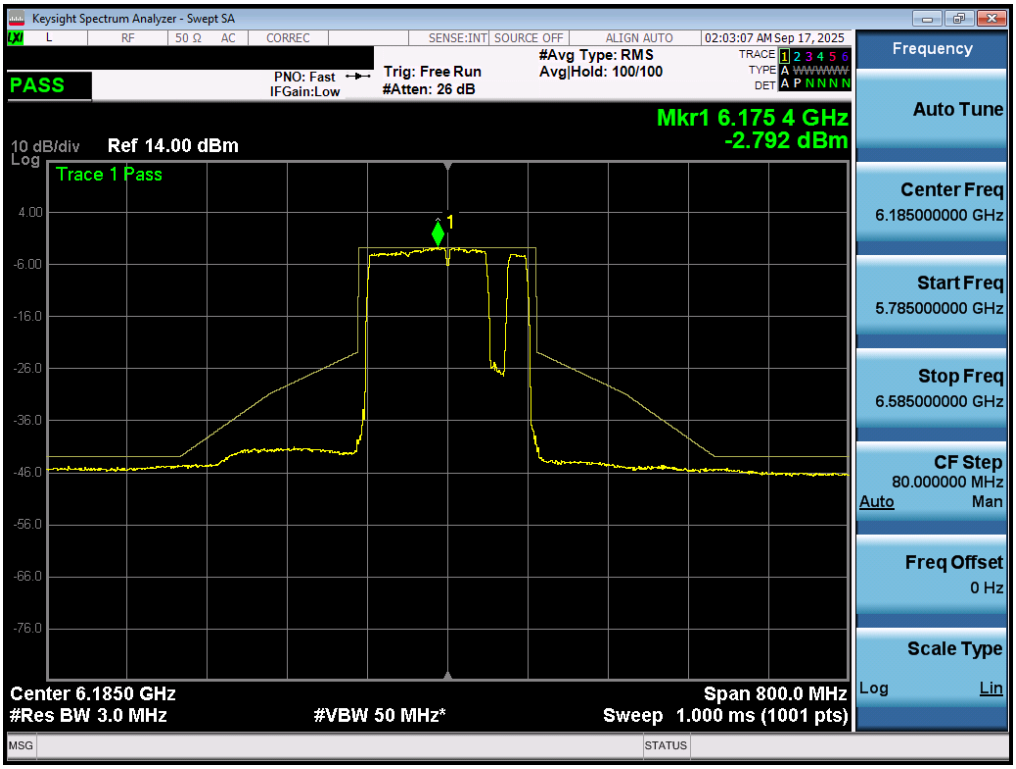
Plot 7-42. In Band Emissions Plot MIMO ANT1 (320MHz 802.11ax/be (UNII Band 5) – Ch. 31) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



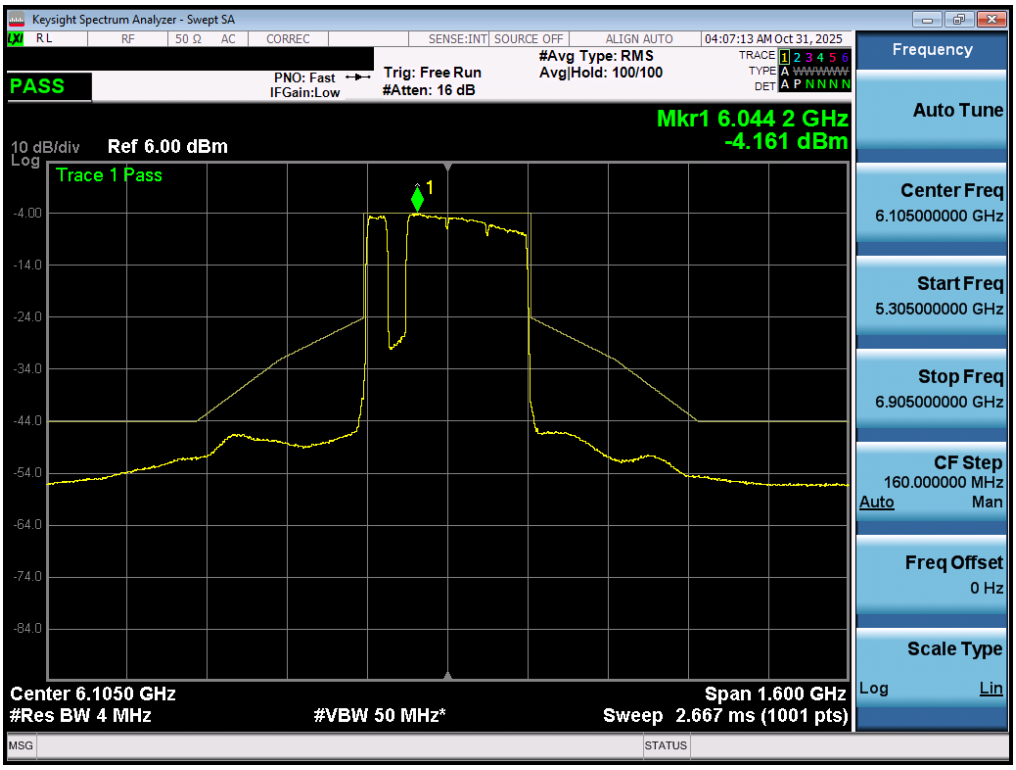
Plot 7-43. In Band Emissions Plot MIMO ANT1 (80MHz 802.11be (UNII Band 5) – Ch. 39) – 20MHz Punctured - VLP



Plot 7-44. In Band Emissions Plot MIMO ANT1 (160MHz 802.11be (UNII Band 5) – Ch. 47) – 20MHz Punctured - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

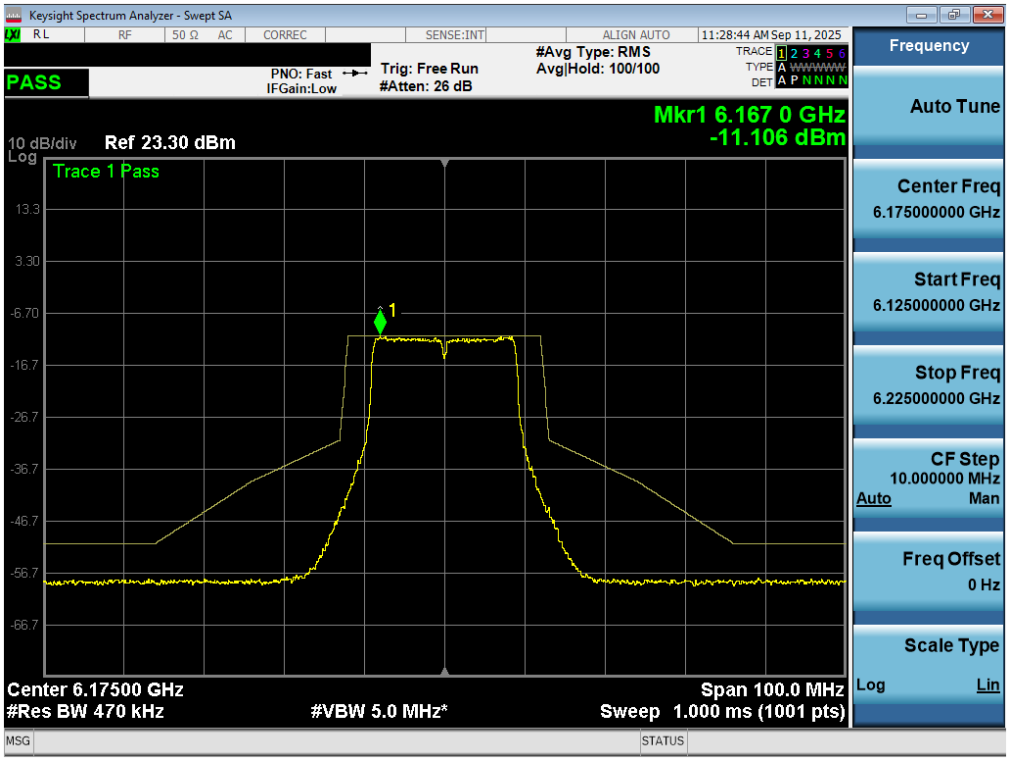


Plot 7-45. In Band Emissions Plot MIMO ANT1 (320MHz 802.11be (UNII Band 5) – Ch. 31) – 40MHz Punctured - VLP

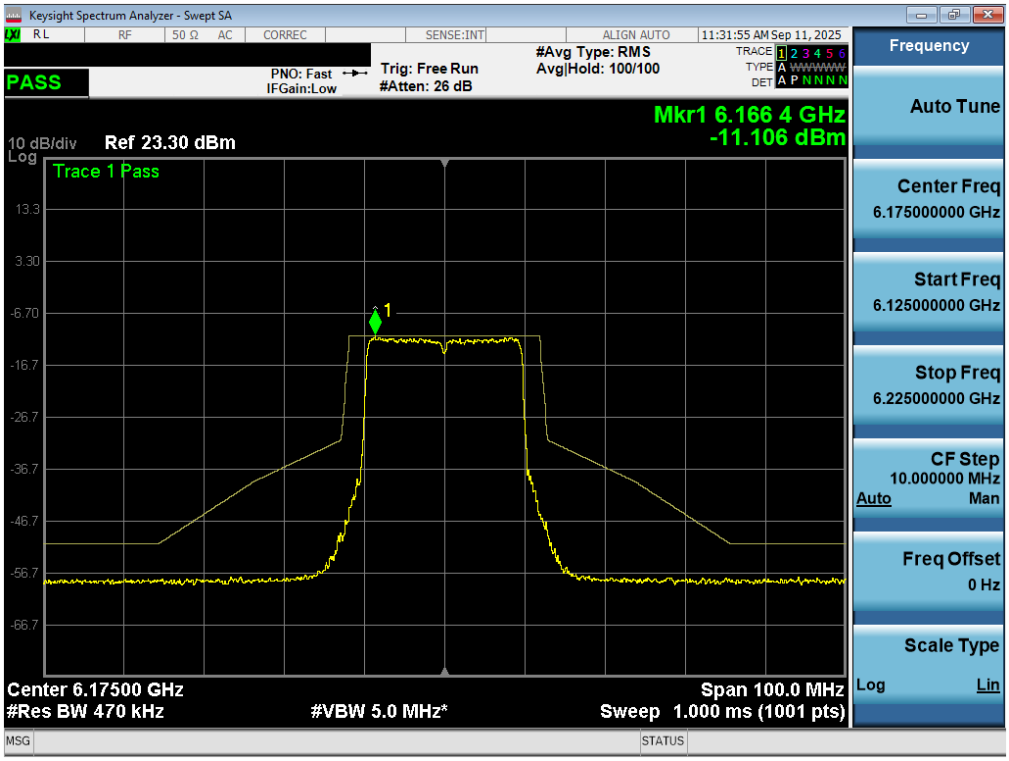
© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.5.2 MIMO Antenna-2 In-Band Emission Plot Measurement - (UNII Band 5)



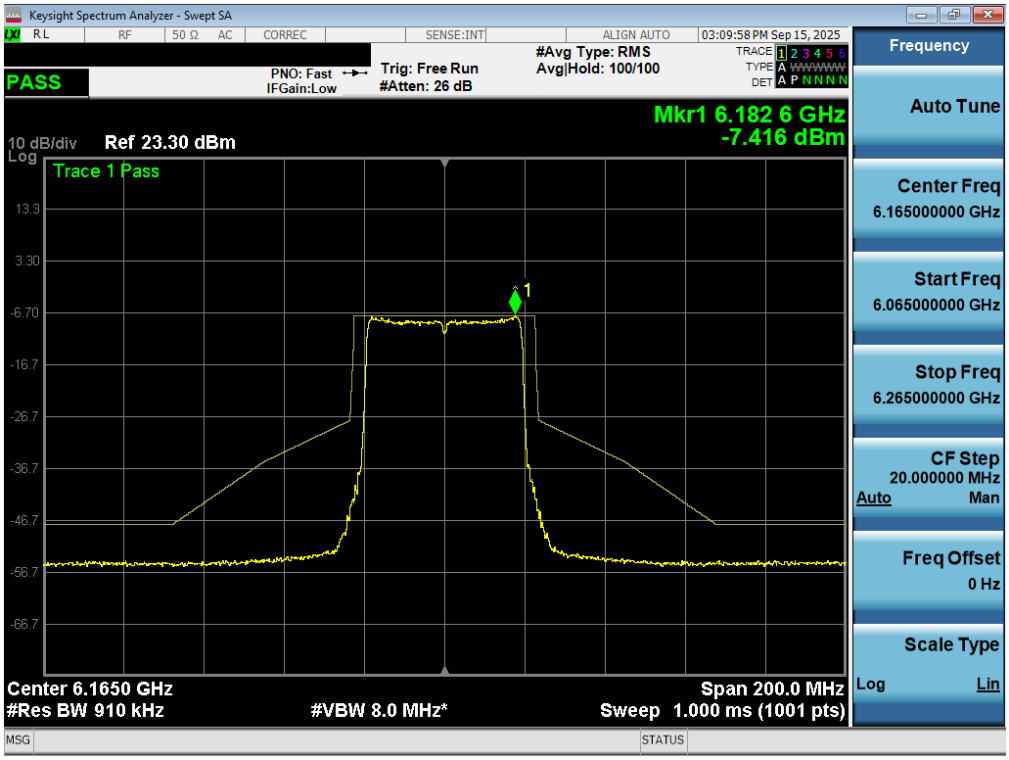
Plot 7-46. In Band Emissions Plot MIMO ANT2 (20MHz 802.11a (UNII Band 5) – Ch. 45) - VLP



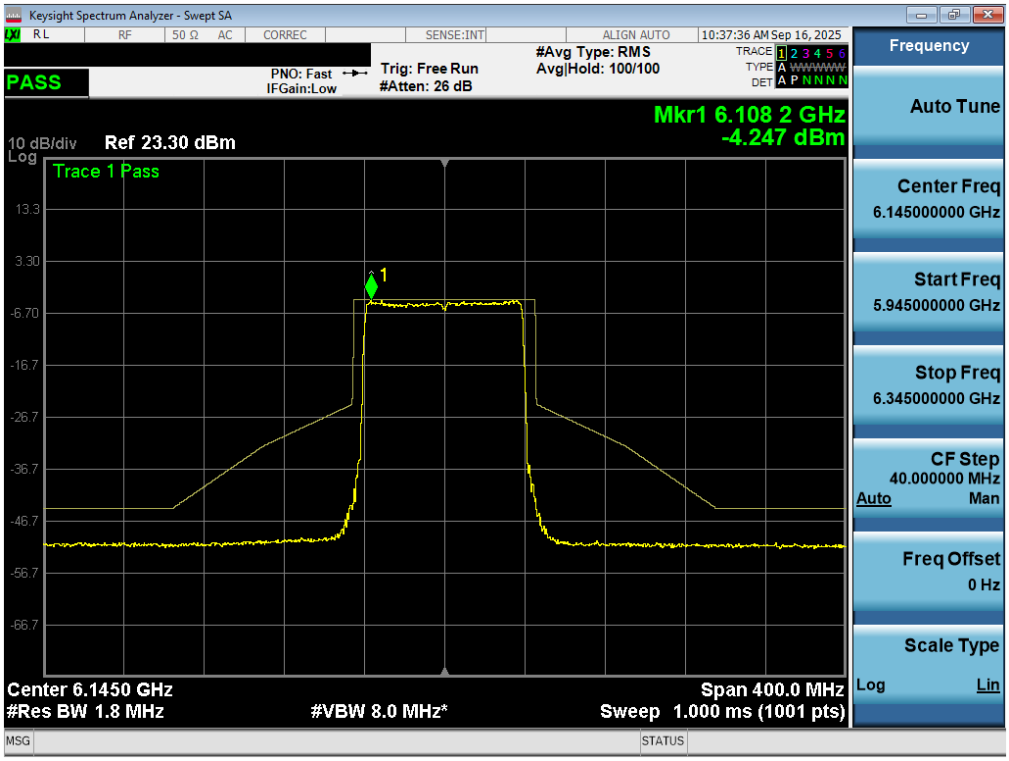
Plot 7-47. In Band Emissions Plot MIMO ANT2 (20MHz 802.11ax/be (UNII Band 5) – Ch. 45) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



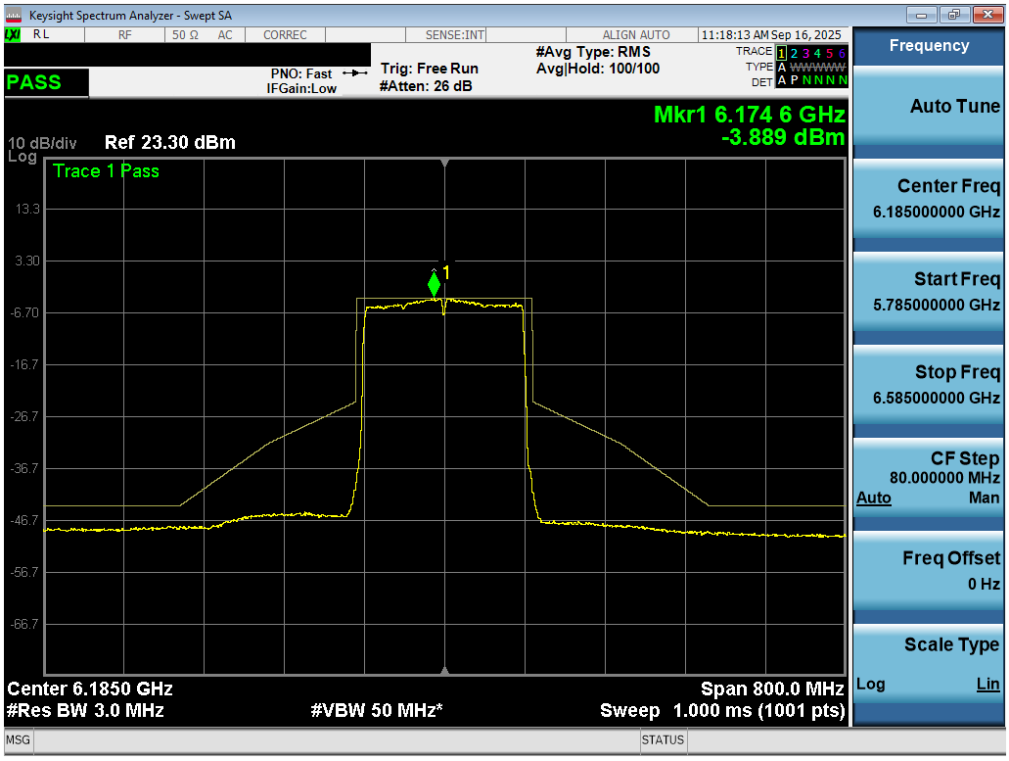
Plot 7-48. In Band Emissions Plot MIMO ANT2 (40MHz 802.11ax/be (UNII Band 5) – Ch. 43) - VLP



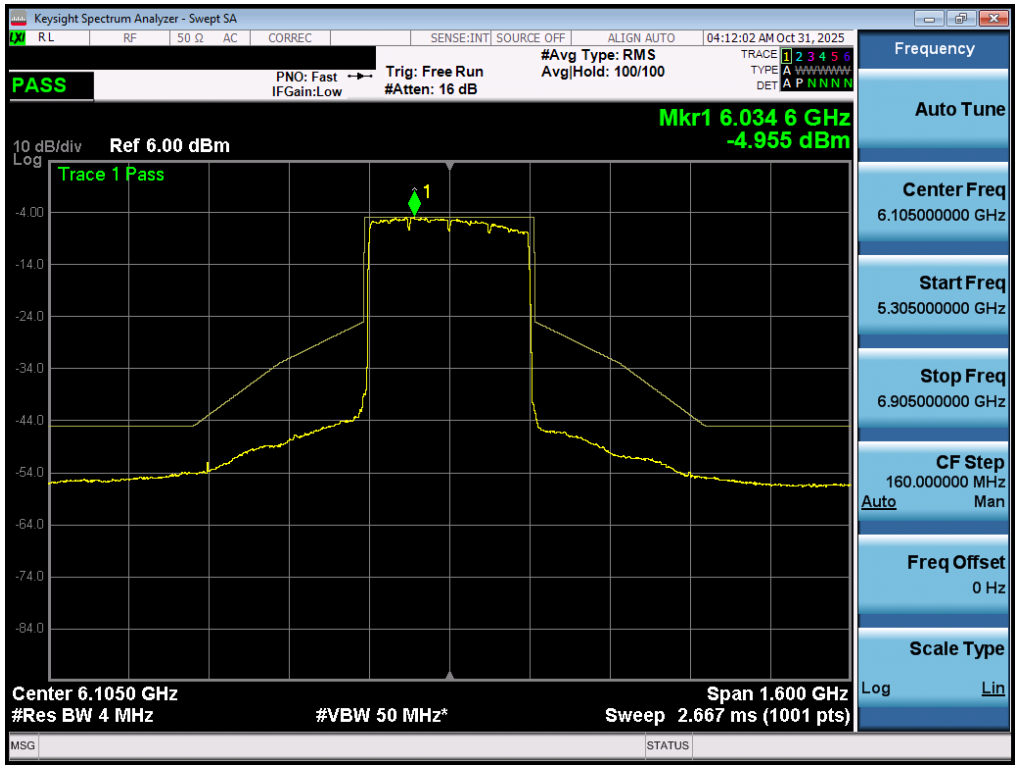
Plot 7-49. In Band Emissions Plot MIMO ANT2 (80MHz 802.11ax/be (UNII Band 5) – Ch. 39) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



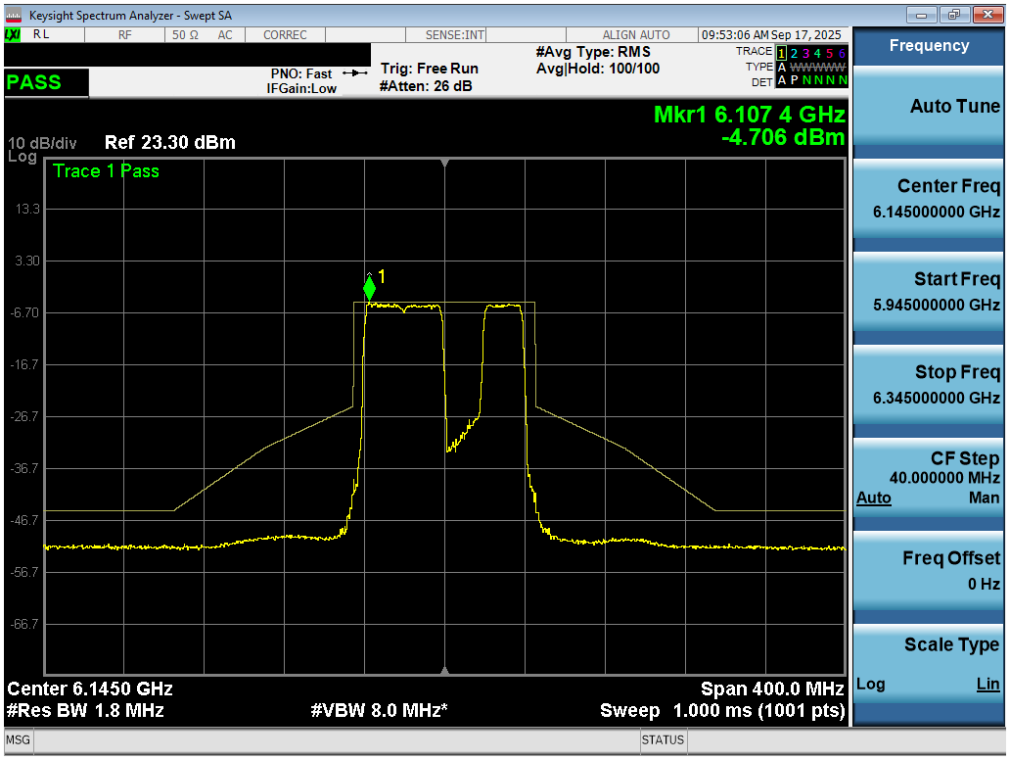
Plot 7-50. In Band Emissions Plot MIMO ANT2 (160MHz 802.11ax/be (UNII Band 5) – Ch. 47) - VLP



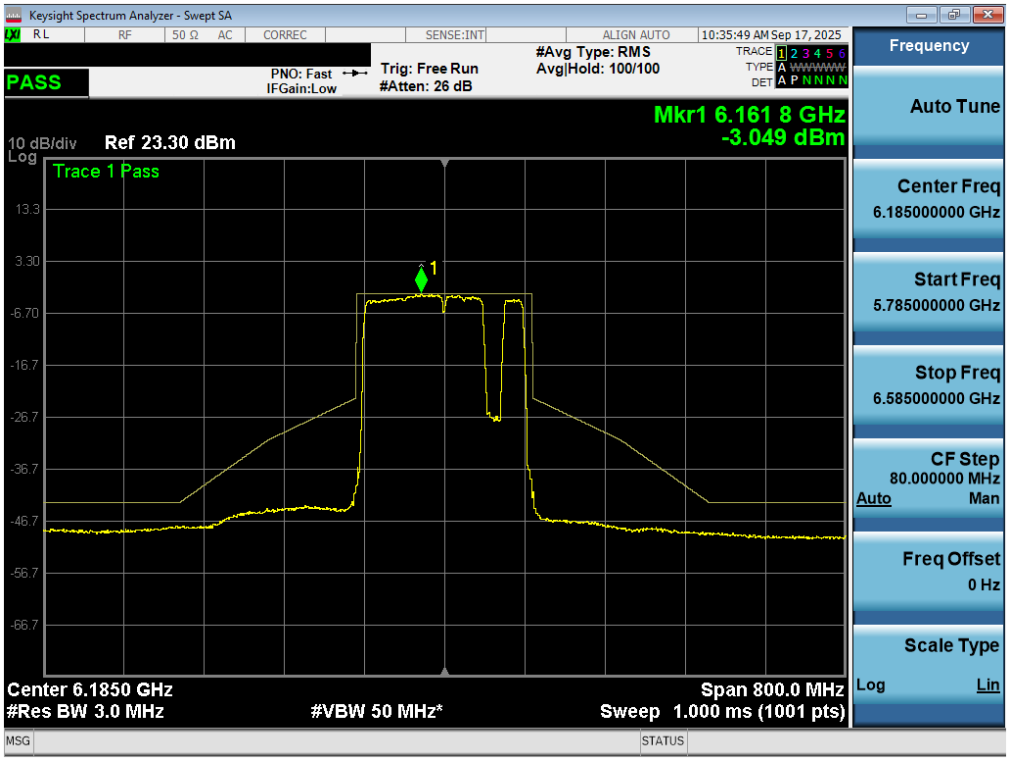
Plot 7-51. In Band Emissions Plot MIMO ANT2 (320MHz 802.11ax/be (UNII Band 5) – Ch. 31) - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



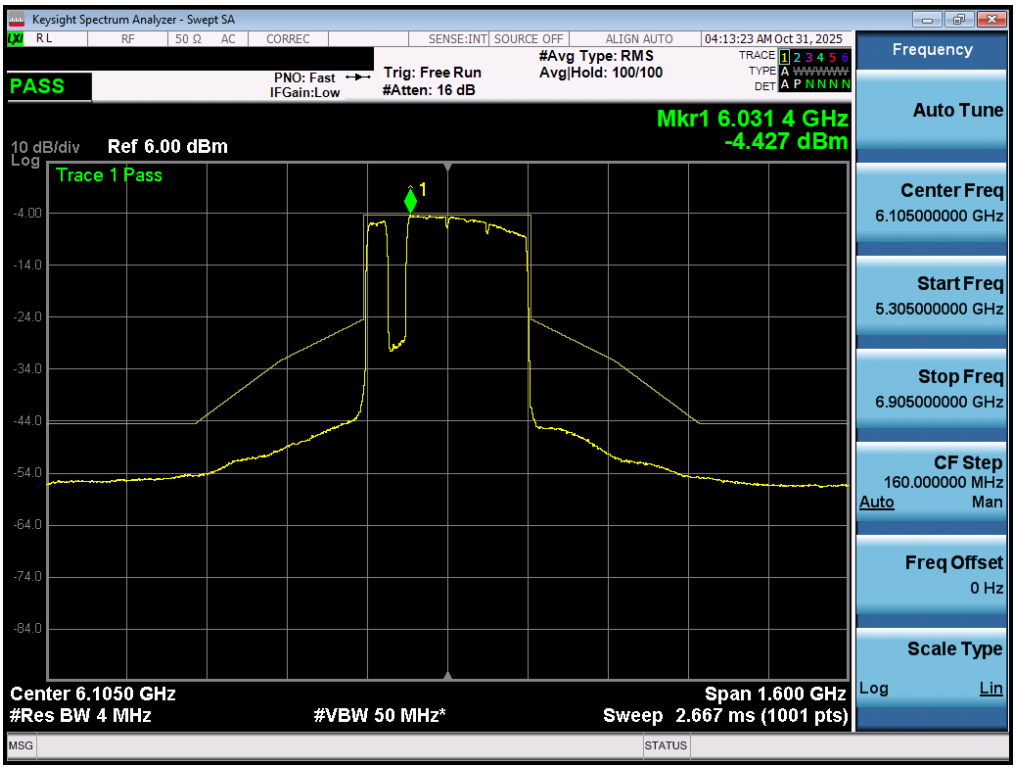
Plot 7-52. In Band Emissions Plot MIMO ANT2 (80MHz 802.11be (UNII Band 5) – Ch. 39) – 20MHz Punctured - VLP



Plot 7-53. In Band Emissions Plot MIMO ANT2 (160MHz 802.11be (UNII Band 5) – Ch. 47) – 20MHz Punctured - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Plot 7-54. In Band Emissions Plot MIMO ANT2 (320MHz 802.11be (UNII Band 5) – Ch. 31) – 40MHz Punctured - VLP

© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.6 Contention Based Protocol

Test Overview and Limit

Indoor access points, subordinate devices, very low power devices, and client devices operating in the 5.925-7.125 GHz band (herein referred to as unlicensed devices) are required to use technologies that include a contention-based protocol to avoid co-channel interference with incumbent devices sharing the band. To ensure incumbent co-channel operations are detected in a technology-agnostic manner, unlicensed devices are required to detect co-channel radio frequency energy (energy detect) and avoid simultaneous transmission.

Unlicensed indoor low-power devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel and stay off the channel if detected radio frequency power is equal to or greater than the threshold (-62 dBm). The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain.

To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel.

Test Procedure Used

KDB 987594 D02 v03

Test Settings

1. Configure the EUT to transmit with a constant duty cycle.
2. Set the operating parameters of the EUT including power level, operating frequency, modulation, and bandwidth.
3. Set the signal analyzer center frequency to the nominal EUT channel center frequency. The span range of the signal analyzer shall be between two times and five times the OBW of the EUT. Connect the output port of the EUT to the signal analyzer 2. Ensure that the attenuator 2 provides enough attenuation to not overload the signal analyzer 2 receiver.
4. Monitoring the signal analyzer 2, verify the EUT is operating and transmitting with the parameters set at step two.
5. Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 MHz-wide AWGN signal. Use Table 1 to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.
6. Set the AWGN signal power to an extremely low level (more than 20 dB below the -62 dBm threshold). Connect the AWGN signal source, via a 3-dB splitter, to the signal analyzer 1 and the EUT as shown in Figure 2.
7. Transmit the AWGN signal (RF ON) and verify its characteristics on the signal analyzer 1.
8. Monitor the signal analyzer 2 to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.
9. (Including all losses in the RF paths) Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.
10. Refer to Table 1 of KDB 987594 D02 v03 to determine the number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step 5, choose a different center frequency for the AWGN signal, and repeat the process.

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

Test Setup

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

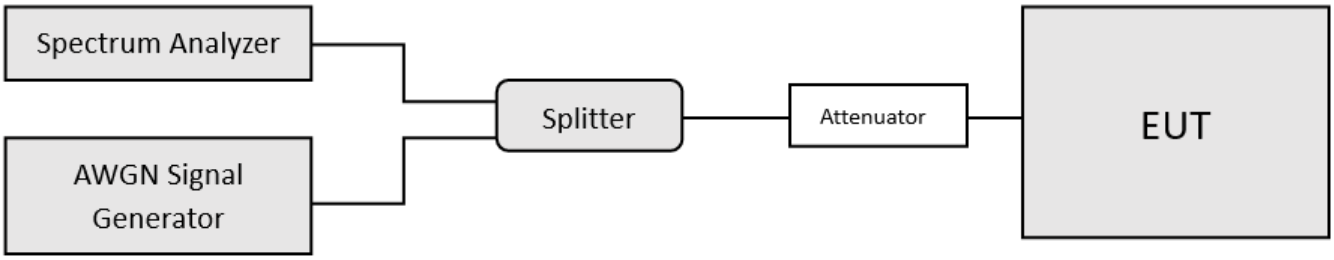


Figure 7-5. Contention-based protocol test setup conducted method.

Test Notes

1. Per guidance from KDB 987594 D02 v03, contention-based protocol was tested using an AWGN signal with a bandwidth of 10MHz. The amplitude of the signal was increased until detected by the EUT, signaled by the ceasing of transmission, M1 indicates the point at which the AWGN signal is introduced. D1 indicates where the AWGN signal is terminated, at least 10 seconds following M1.
2. 15 trials were run to assure that at least 90% of certainty was met.
3. Per Guidance from KDB 987594 D04 v03, contention-based protocol was tested with receiver with the lowest antenna gain.
4. All CBP Timing Plots shown are for the ceased condition.
5. A Rohde & Schwarz CMX500 base station simulator was used as a WiFi AP for this test.

Detection Level = Injected AWGN Power (dBm) – Antenna Gain (dBi) + Path Loss (dB)

Equation 7-1. Detection Level Calculation

`	Channel	Channel Freq [MHz]	Channel BW [MHz]	Incumbent Freq [MHz]	Injected (AWGN) [dBm]	Antenna Gain [dBi]	Path Loss (dB)	Adjusted Power Level [dBm]	Detection Limit [dBm]	Margin [dB]
UNII Band 5	53	6215	20	6215	-73.18	-6.82	0.58	-65.78	-62.0	-3.78
	63	6265	320	6110	-70.65	-6.82	0.58	-63.25	-62.0	-1.25
				6265	-71.90	-6.82	0.58	-64.50	-62.0	-2.50
				6420	-76.27	-6.82	0.58	-68.87	-62.0	-6.87
UNII Band 6	101	6455	20	6455	-74.78	-6.11	0.58	-68.09	-62.0	-6.09
	95	6425	320	6270	-73.99	-6.11	0.58	-67.30	-62.0	-5.30
				6425	-71.04	-6.11	0.58	-64.35	-62.0	-2.35
				6580	-77.78	-6.11	0.58	-71.09	-62.0	-9.09
UNII Band 7	149	6695	20	6695	-72.86	-6.86	0.58	-65.42	-62.0	-3.42
	159	6745	320	6590	-81.04	-6.86	0.58	-73.60	-62.0	-11.60
				6745	-72.63	-6.86	0.58	-65.19	-62.0	-3.19
				6900	-72.52	-6.86	0.58	-65.08	-62.0	-3.08
UNII Band 8	197	6935	20	6935	-74.53	-6.89	0.58	-67.06	-62.0	-5.06
	191	6905	320	6750	-76.65	-6.89	0.58	-69.18	-62.0	-7.18
				6905	-74.60	-6.89	0.58	-67.13	-62.0	-5.13
				7060	-80.68	-6.89	0.58	-73.21	-62.0	-11.21

Table 7-24. Contention Based Protocol – Incumbent Detection Results

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

Band	Channel	Channel Freq [MHz]	Channel BW [MHz]	Incumbent Freq [MHz]	Antenna Gain [dBi]	EUT Transmission Status Adjusted AWGN Power (dBm)			Detection Limit [dBm]	Margin [dB]
						Normal	Minimal	Ceased		
UNII Band 5	53	6215	20	6215	-6.82	-71.22	-67.56	-65.78	-62.0	-3.78
	63	6265	320	6110	-6.82	-68.10	-64.68	-63.25	-62.0	-1.25
				6265	-6.82	-69.36	-65.09	-64.50	-62.0	-2.50
				6420	-6.82	-72.13	-69.65	-68.87	-62.0	-6.87
UNII Band 6	101	6455	20	6455	-6.11	-70.78	-70.37	-68.09	-62.0	-6.09
	95	6425	320	6270	-6.11	-69.89	-68.26	-67.30	-62.0	-5.30
				6425	-6.11	-66.97	-66.03	-64.35	-62.0	-2.35
				6580	-6.11	-80.63	-73.78	-71.09	-62.0	-9.09
UNII Band 7	149	6695	20	6695	-6.86	-70.37	-66.37	-65.42	-62.0	-3.42
	159	6745	320	6590	-6.86	-75.09	-74.75	-73.60	-62.0	-11.60
				6745	-6.86	-74.58	-67.82	-65.19	-62.0	-3.19
				6900	-6.86	-69.53	-67.27	-65.08	-62.0	-3.08
UNII Band 8	197	6935	20	6935	-6.89	-72.52	-69.80	-67.06	-62.0	-5.06
	191	6905	320	6750	-6.89	-77.65	-70.91	-69.18	-62.0	-7.18
				6905	-6.89	-68.75	-67.22	-67.13	-62.0	-5.13
				7060	-6.89	-78.52	-75.69	-73.21	-62.0	-11.21

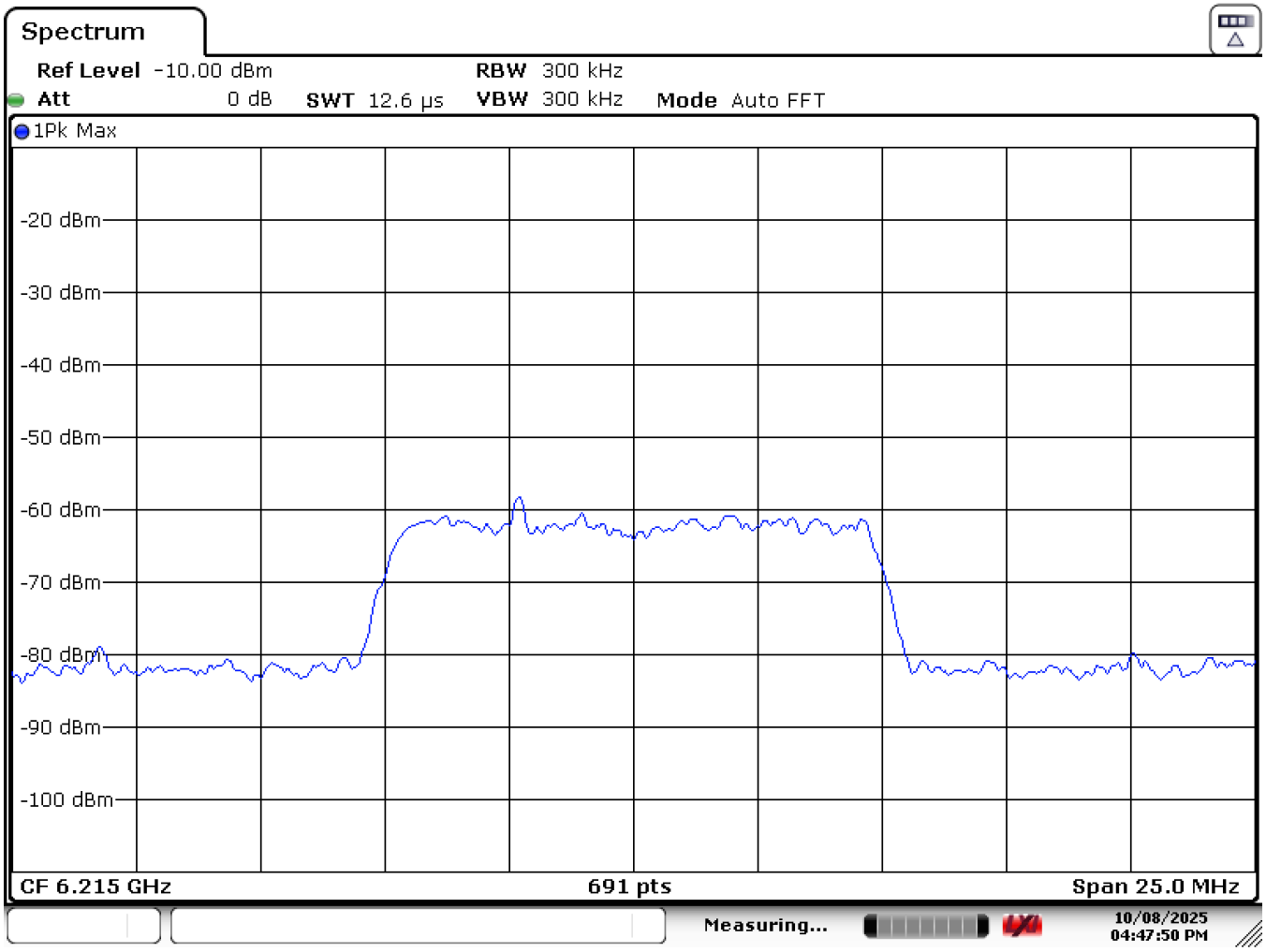
Table 7-25. Contention Based Protocol – Detection Results – All Tx Cases

CBP Detection (1 = Detection, Blank = No Detection)																			
Band	Channel	Channel Freq [MHz]	Channel BW [MHz]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Detection Rate (%)
UNII Band 5	53	6215	20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
	63	6265	320	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
UNII Band 6	101	6455	20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
	95	6425	320	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
UNII Band 7	149	6695	20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
	159	6745	320	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
UNII Band 8	197	6935	20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
	191	6905	320	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100

Table 7-26. Contention Based Protocol – Incumbent Detection Trial Results

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.6.1 AWGN Plots



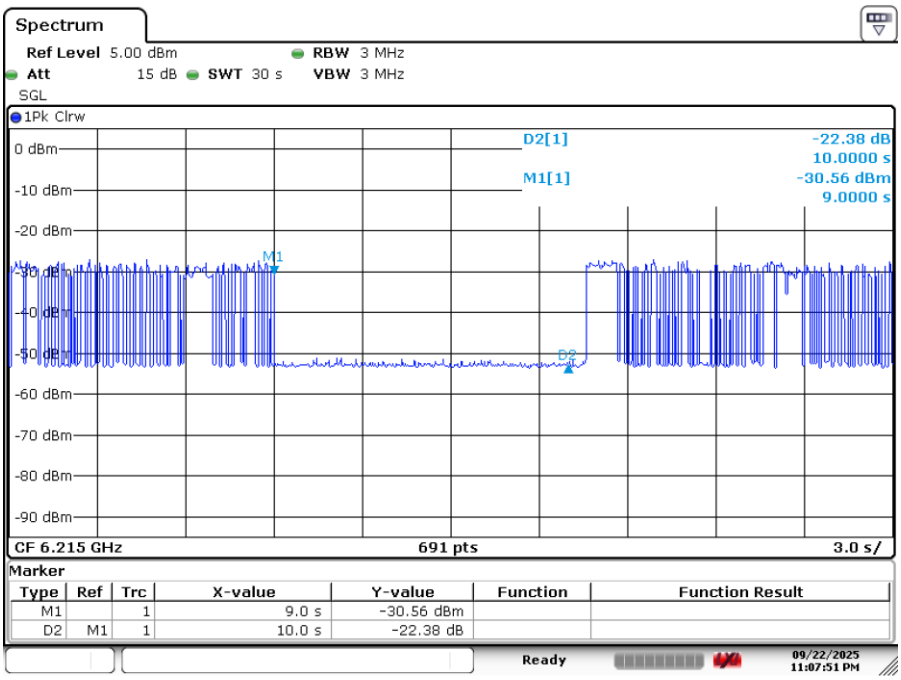
Date: 8.OCT.2025 16:47:50

Plot 7-55. AWGN Signal (Demonstration)

© 2025 ELEMENT V 11.3 5/14/2025

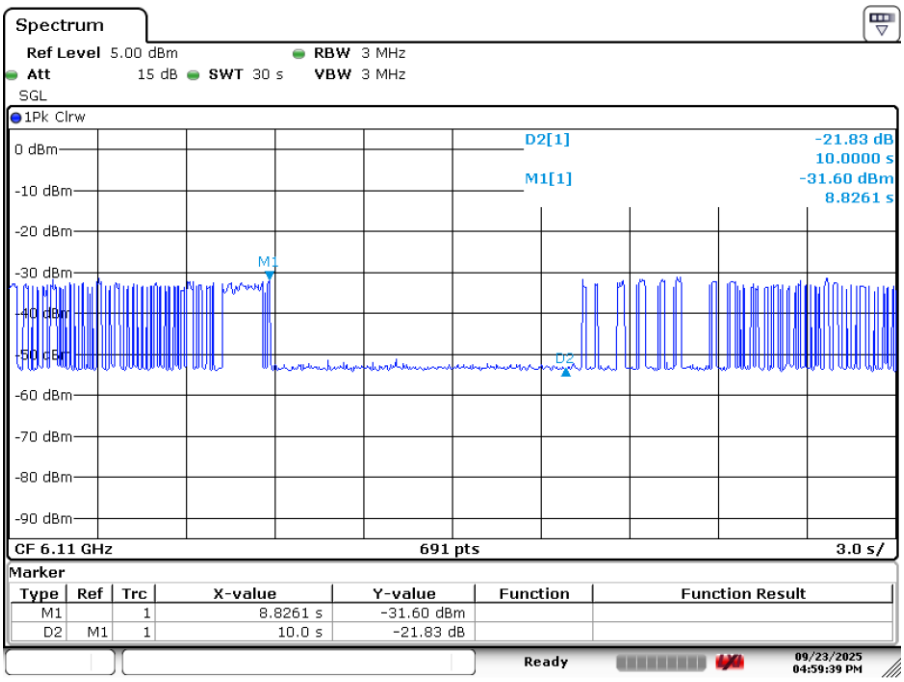
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.6.2 CBP Timing Plots



Date: 22.SEP.2025 23:07:50

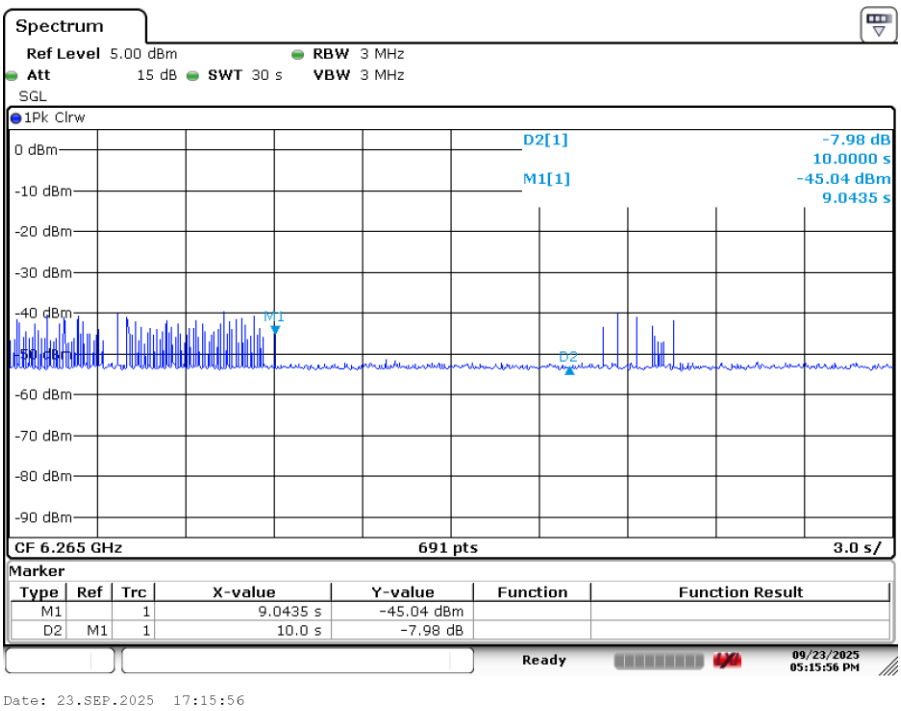
Plot 7-56. Contention Based Protocol Timing Plot (20MHz (UNII Band 5) – Ch. 53)



Date: 23.SEP.2025 16:59:39

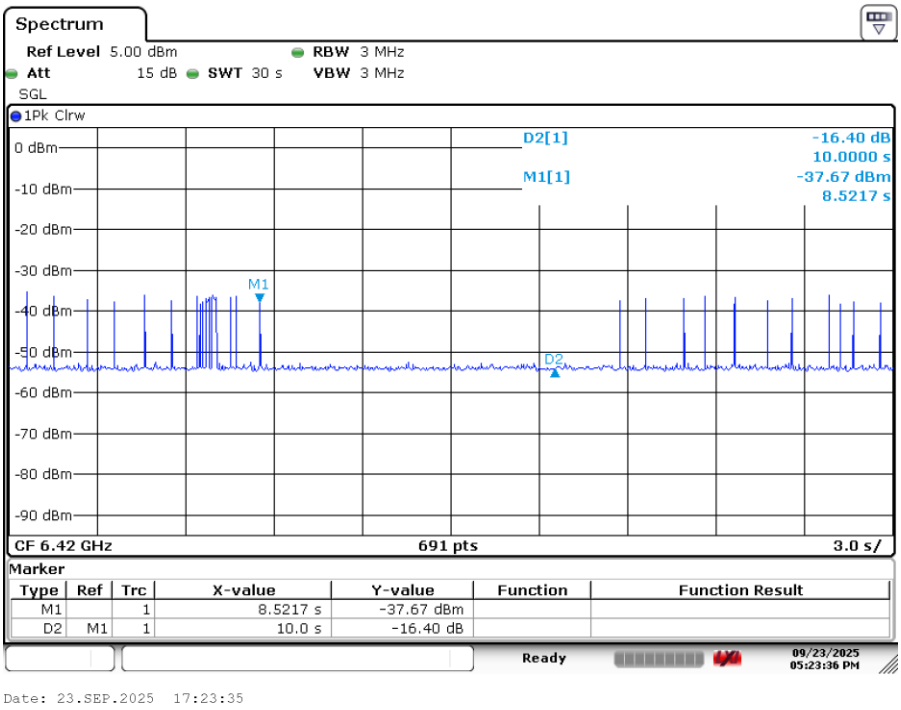
Plot 7-57. Contention Based Protocol Timing Plot (320MHz (UNII Band 5) – Ch. 63 Low)

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Date: 23.SEP.2025 17:15:56

Plot 7-58. Contention Based Protocol Timing Plot (320MHz (UNII Band 5) – Ch. 63 Mid)

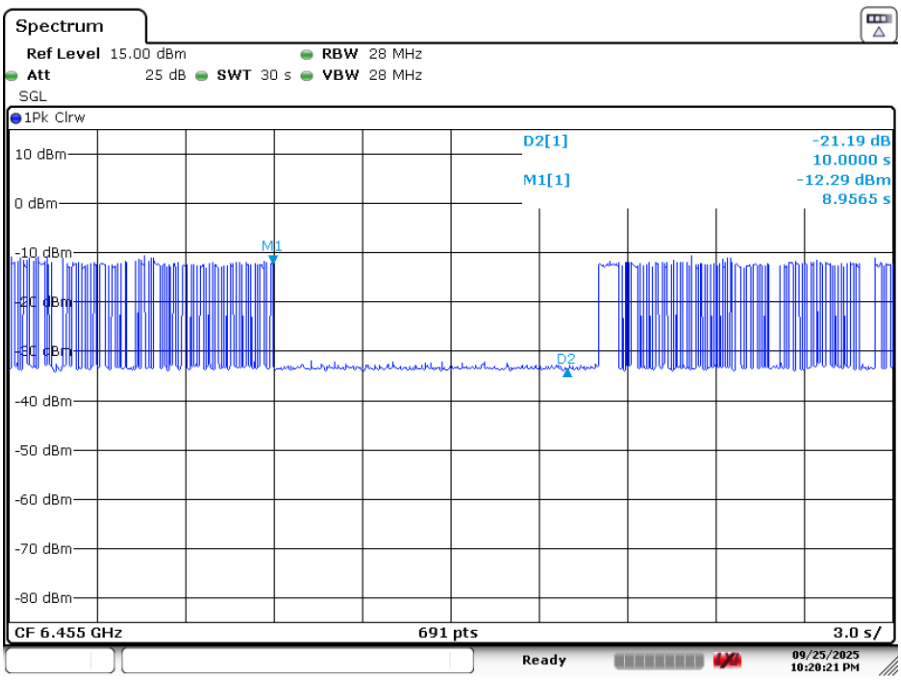


Date: 23.SEP.2025 17:23:35

Plot 7-59. Contention Based Protocol Timing Plot (320MHz (UNII Band 5) – Ch. 63 High)

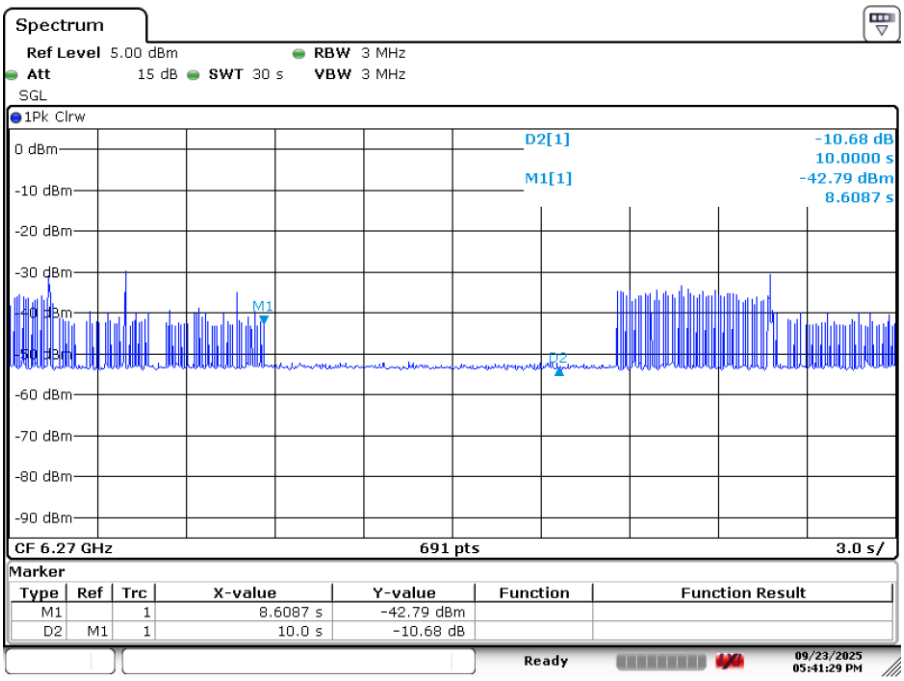
© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Date: 25.SEP.2025 22:20:21

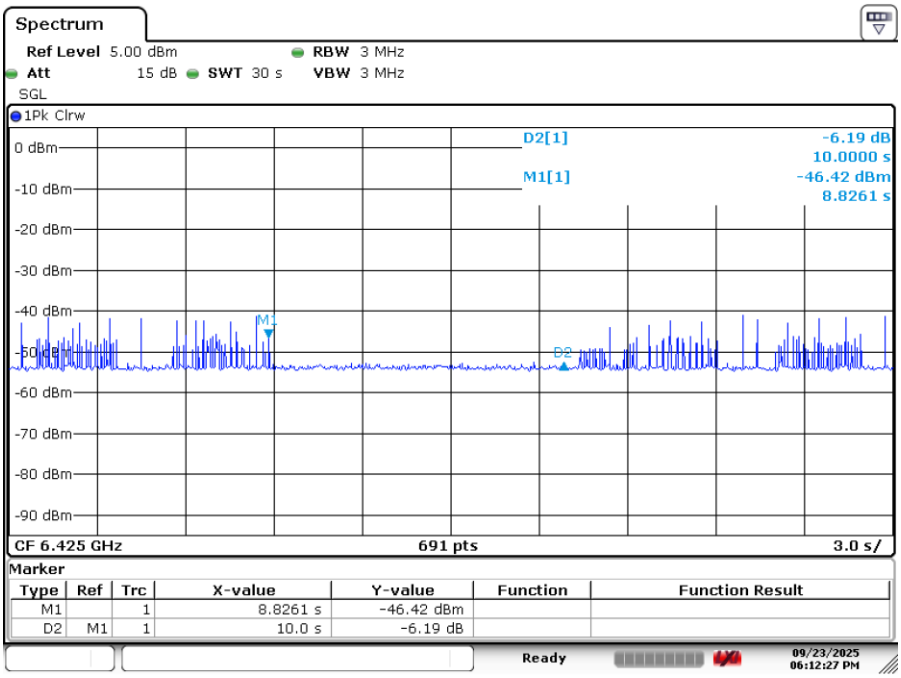
Plot 7-60. Contention Based Protocol Timing Plot (20MHz (UNII Band 6) – Ch. 101)



Date: 23.SEP.2025 17:41:29

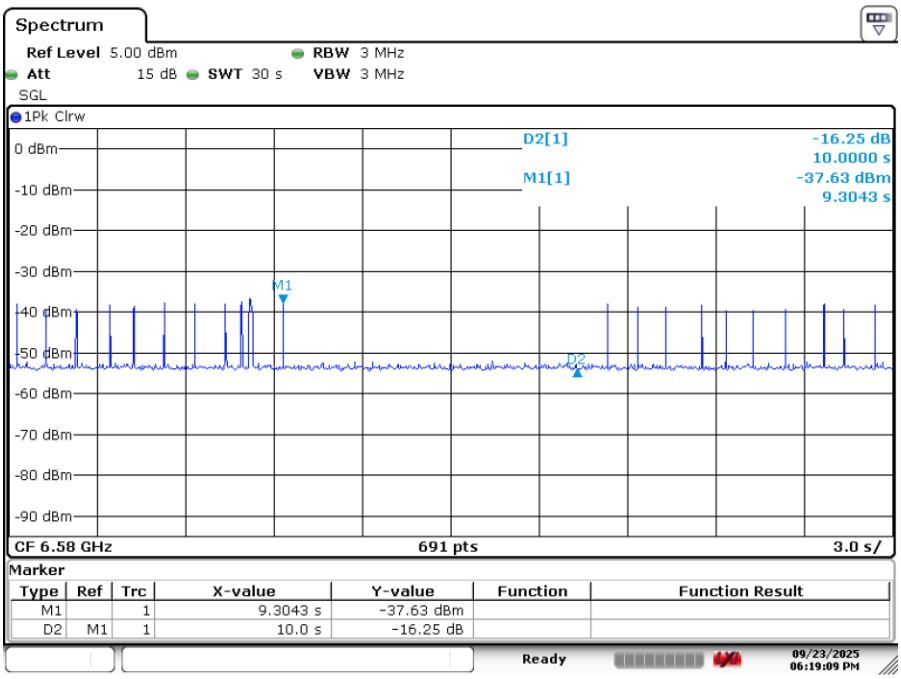
Plot 7-61. Contention Based Protocol Timing Plot (320MHz (UNII Band 6) – Ch. 95 Low)

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Date: 23.SEP.2025 18:12:26

Plot 7-62. Contention Based Protocol Timing Plot (320MHz (UNII Band 6) – Ch. 95 Mid)

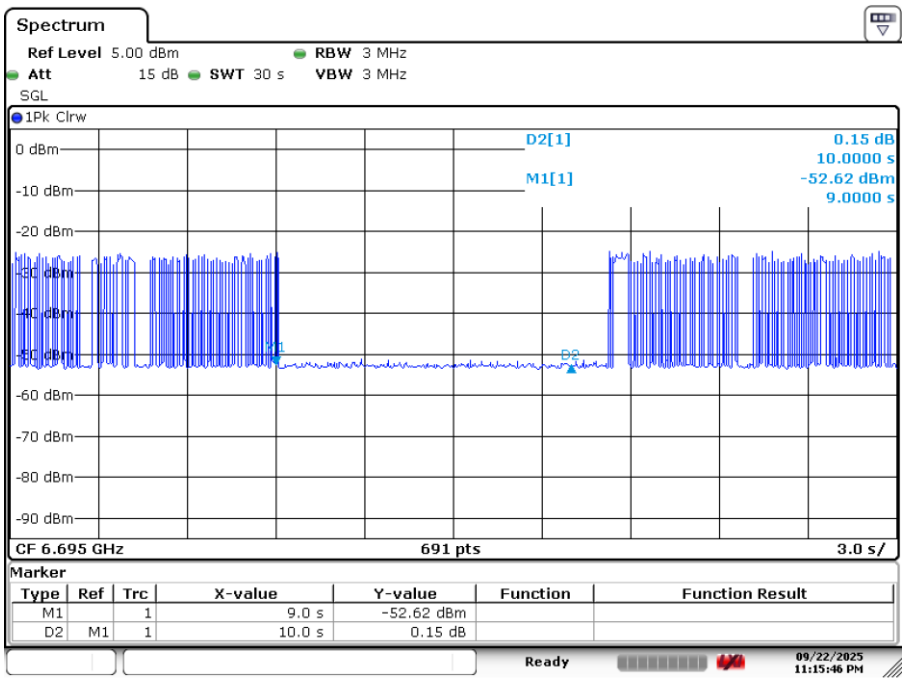


Date: 23.SEP.2025 18:19:09

Plot 7-63. Contention Based Protocol Timing Plot (320MHz (UNII Band 6) – Ch. 95 High)

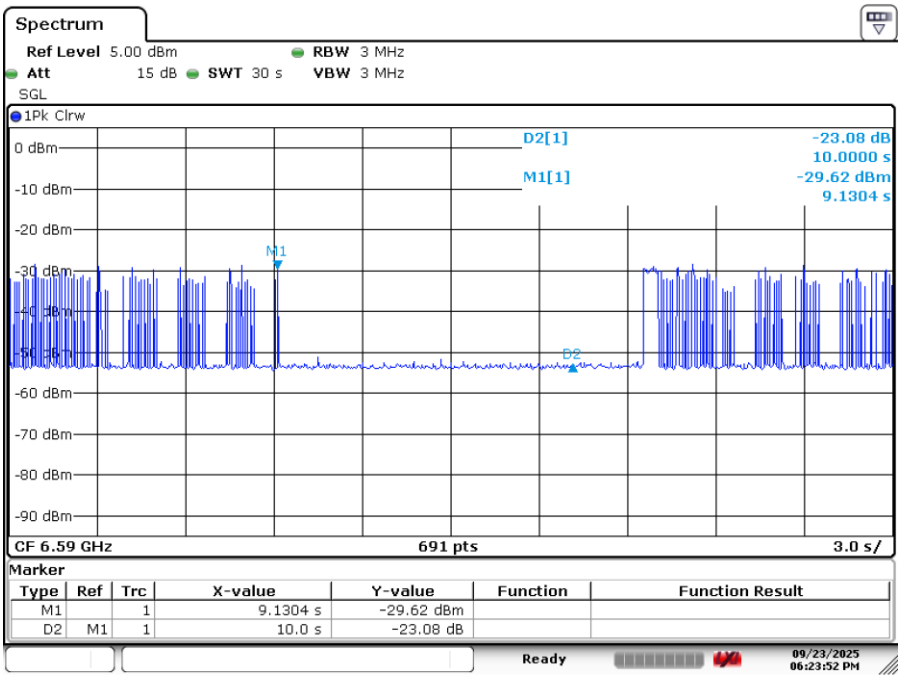
© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Date: 22.SEP.2025 23:15:46

Plot 7-64. Contention Based Protocol Timing Plot (20MHz (UNII Band 7) – Ch. 149)

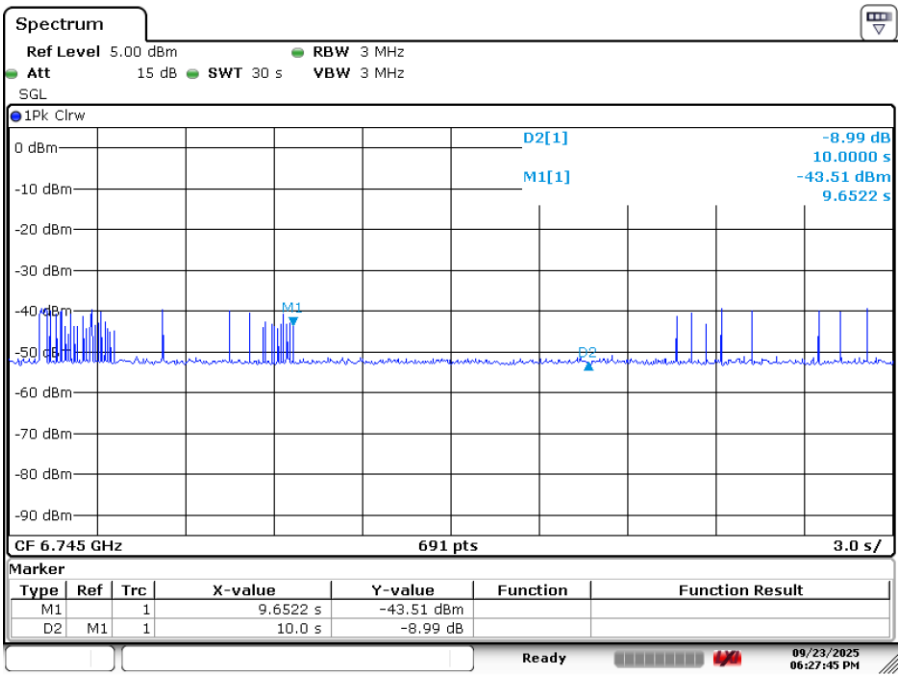


Date: 23.SEP.2025 18:23:52

Plot 7-65. Contention Based Protocol Timing Plot (320MHz (UNII Band 7) – Ch. 159 Low)

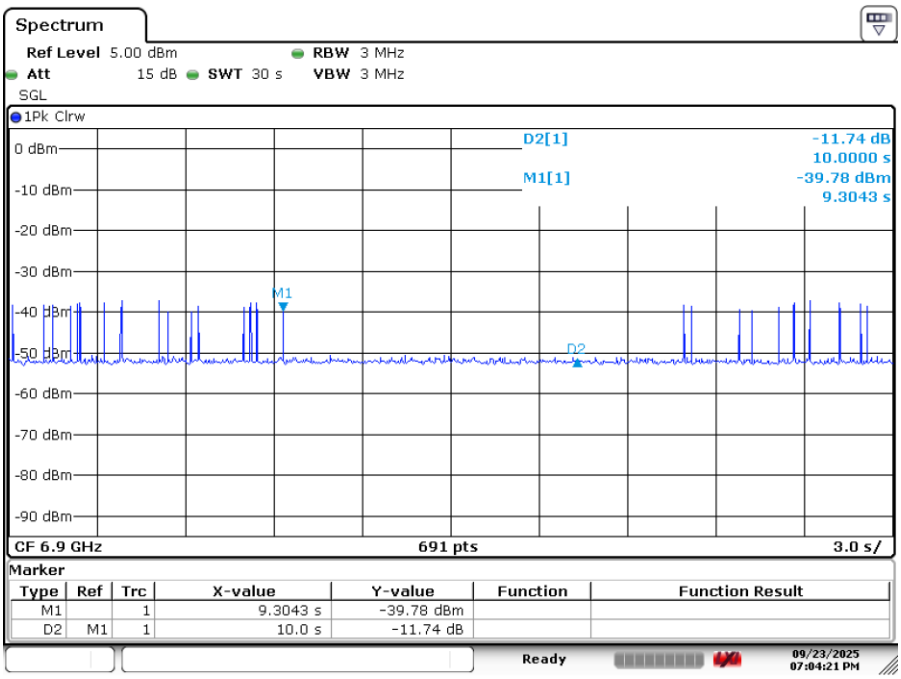
© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Date: 23.SEP.2025 18:27:45

Plot 7-66. Contention Based Protocol Timing Plot (320MHz (UNII Band 7) – Ch. 159 Mid)

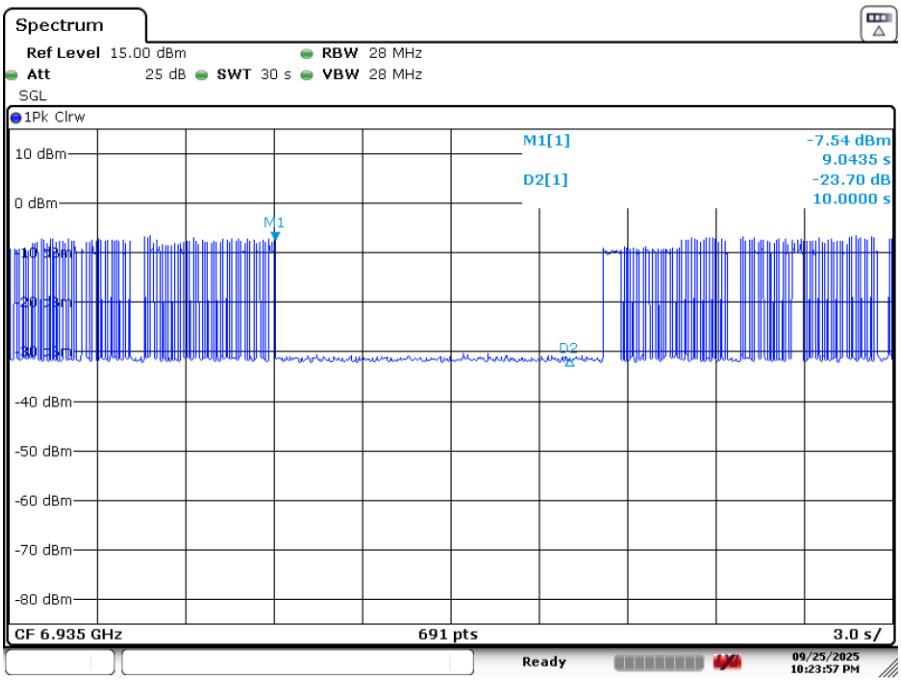


Date: 23.SEP.2025 19:04:21

Plot 7-67. Contention Based Protocol Timing Plot (320MHz (UNII Band 7) – Ch. 159 High)

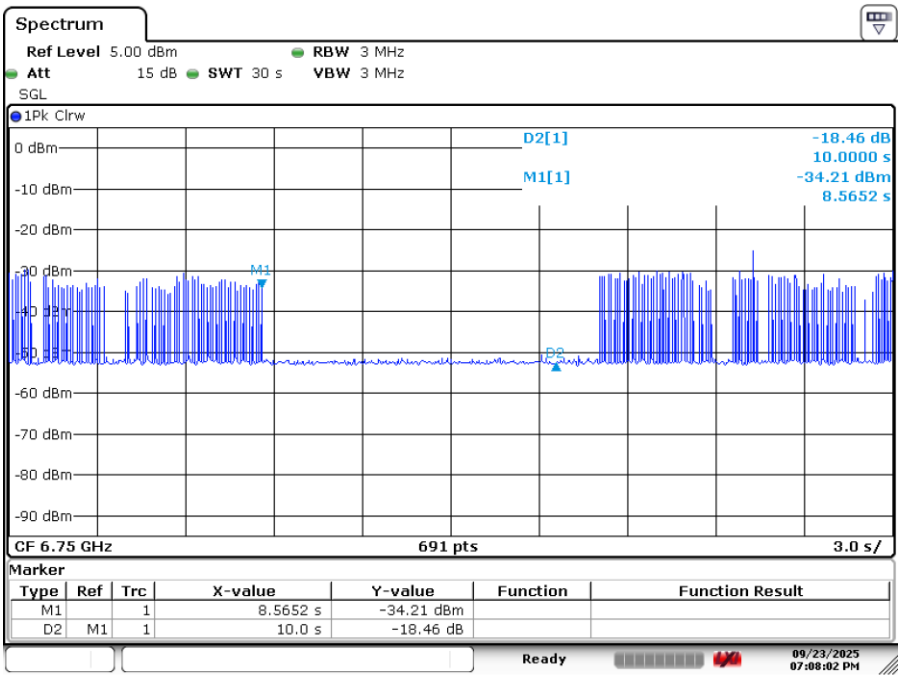
© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Date: 25.SEP.2025 22:23:57

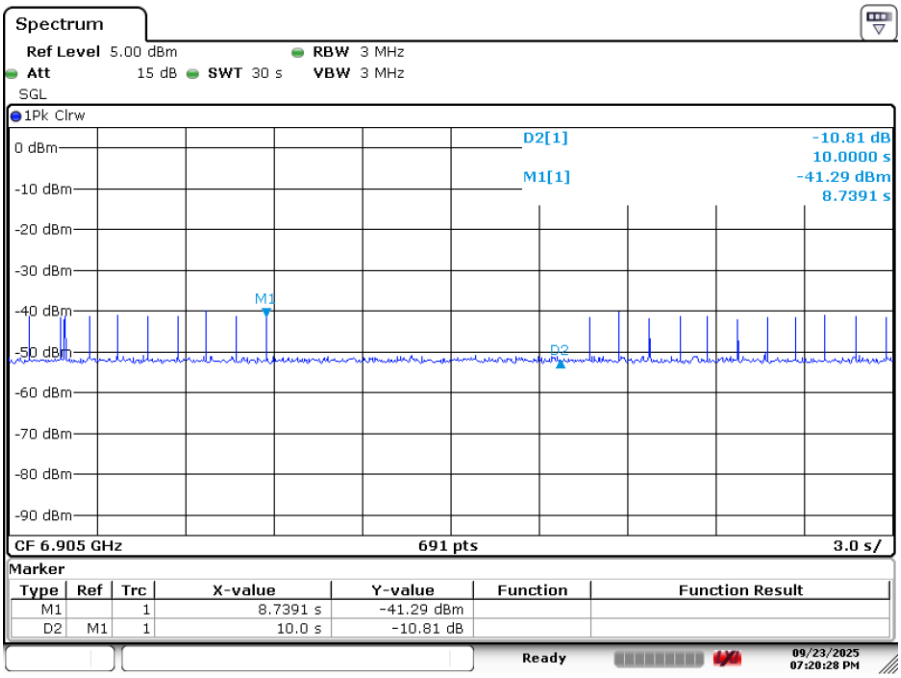
Plot 7-68. Contention Based Protocol Timing Plot (20MHz (UNII Band 8) – Ch. 197)



Date: 23.SEP.2025 19:08:02

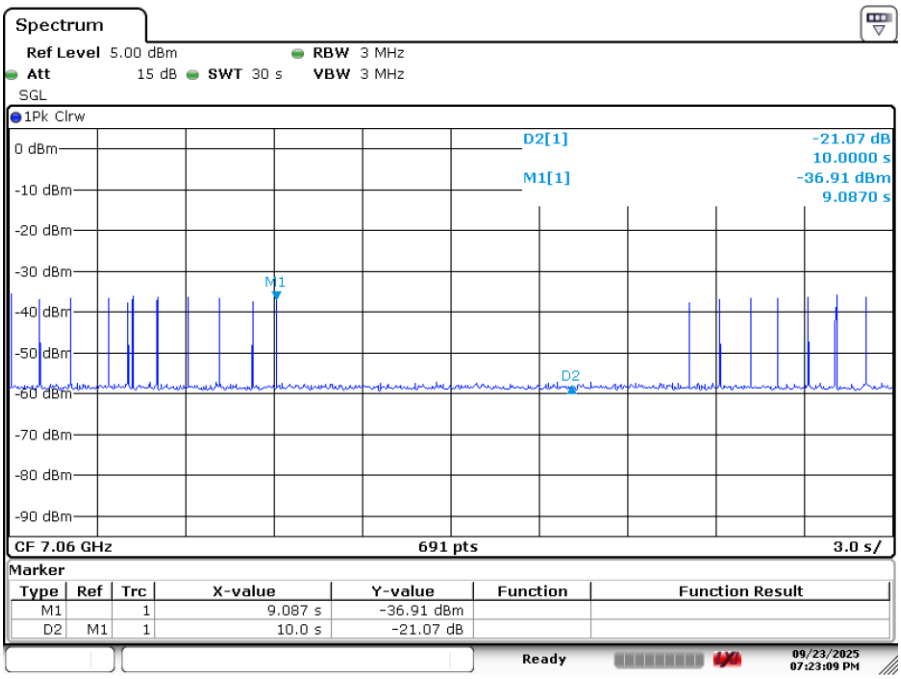
Plot 7-69. Contention Based Protocol Timing Plot (320MHz (UNII Band 8) – Ch. 191 Low)

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Date: 23.SEP.2025 19:20:27

Plot 7-70. Contention Based Protocol Timing Plot (320MHz (UNII Band 8) – Ch. 191 Mid)



Date: 23.SEP.2025 19:23:09

Plot 7-71. Contention Based Protocol Timing Plot (320MHz (UNII Band 8) – Ch. 191 High)

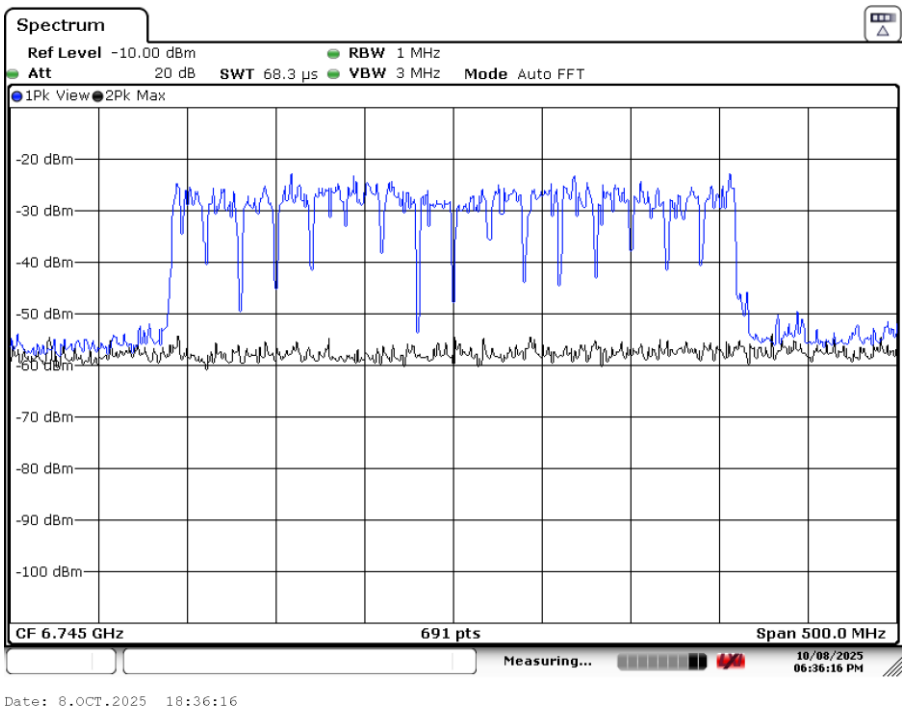
© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.6.3 Channel Move Plots

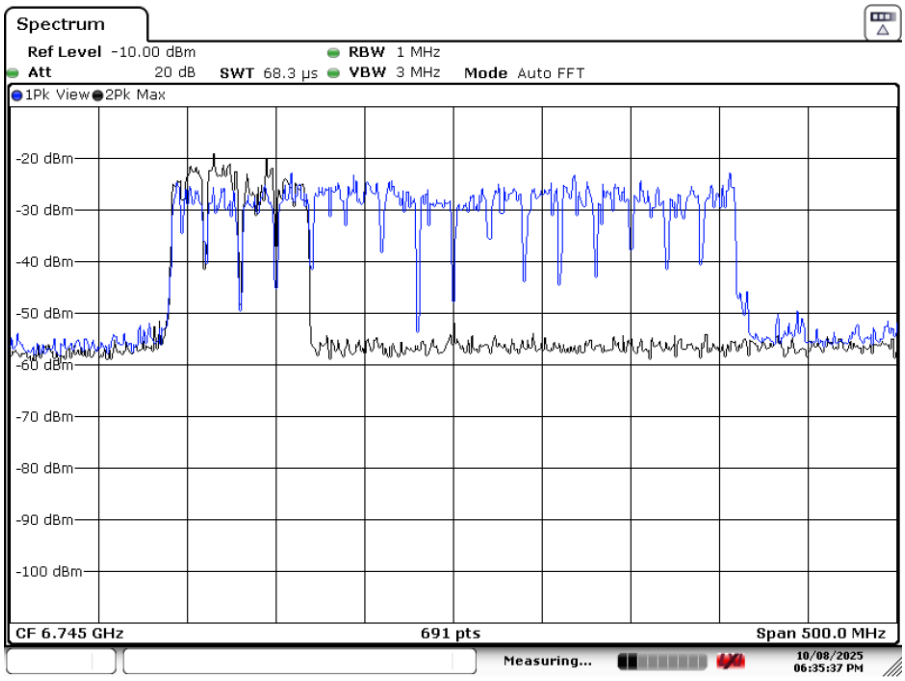
This section demonstrates the effect of injecting the AWGN signal at various locations throughout the 802.11be 320MHz signal. The blue trace shows the full 320MHz signal prior to AWGN injection while the black trace shows the spectrum following AWGN injection. The following items were observed as demonstrated in the three plots shown below:

- When a 10 MHz AWGN signal centered at 6590 MHz (lower edge of channel) is injected, the channel completely stops transmitting.
- When a 10 MHz AWGN signal centered at 6745 MHz (middle of channel) is injected, the channel did not completely cease transmission; however, a reduction in the transmission bandwidth was observed.
- When a 10 MHz AWGN signal centered at 6900 MHz (upper edge of channel) is injected, the channel did not completely cease transmission; however, a reduction in the transmission bandwidth was observed.



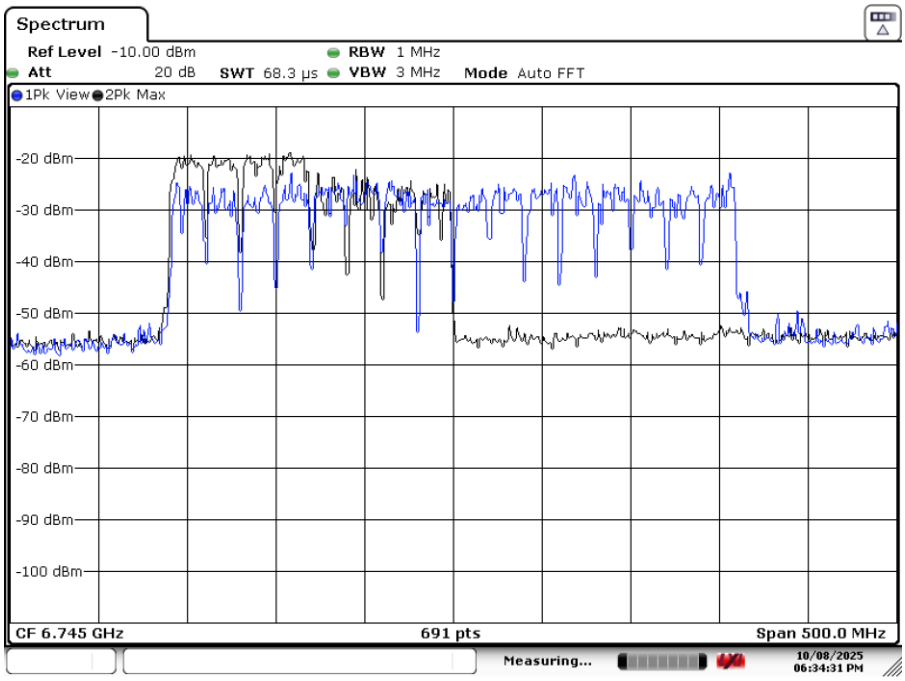
Plot 7-72. CBP 320MHz Channel - Injection Lower Edge – [6590 MHz]

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Date: 8.OCT.2025 18:35:37

Plot 7-73. CBP 320MHz Channel - Injection Center – [6745 MHz]



Date: 8.OCT.2025 18:34:31

Plot 7-74. CBP 320MHz Channel - Injection Upper Edge – [6900 MHz]

© 2025 ELEMENT
V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.7 Transmit Power Control

Test Overview and Limit

Very low-power devices operating in the 5.925–6.425 and 6.525-6.875 GHz bands shall employ a TPC mechanism. A very low-power device must demonstrate the capability to operate at least 6 dB below the maximum EIRP PSD value of -5 dBm/MHz.

Test Procedures Used

KDB 987594 D02 v03
ANSI C63.10:2020 Section 12.4.2.6 (Using Method SA-3)

Test Settings

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire emission bandwidth of the signal
3. RBW = 1MHz
4. VBW = 3MHz
5. Number of sweep points ≥ 2 x (span/RBW)
6. Sweep time = 2s (i.e. sweep time < # points x T, per Section 12.3.2.6)
7. Detector = power averaging (RMS)
8. Trace was set to max hold to allow the trace to stabilize
9. Trigger was set to free run for all modes
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.

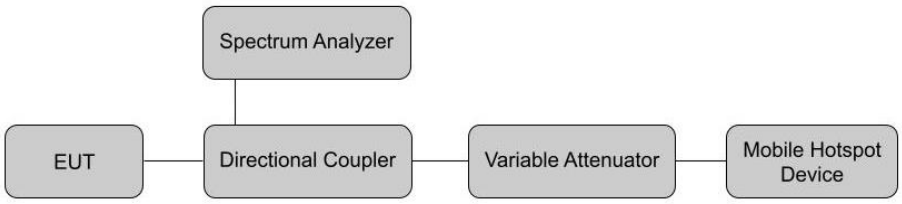


Figure 7-6. Test Instrument & Measurement Setup

This test demonstrates the ability of the device to increase and decrease power by the required 6dB as the RSSI is decreased and increased via attenuation from a variable attenuator.

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

1. Configure EUT and Mobile Hotspot Device for connection as shown in figure above
2. Set variable attenuator to 0dB (noise free spectral environment, high RSSI simulation)
3. Establish connection between EUT and Mobile Hotspot Device
4. Capture PSD on Spectrum analyzer
5. Adjust attenuator to set high attenuation (noisy spectral environment, low RSSI simulation)
6. Capture PSD on Spectrum analyzer
7. Compare the highest PSD captured in step 4 to the highest PSD on step 6

Test Notes

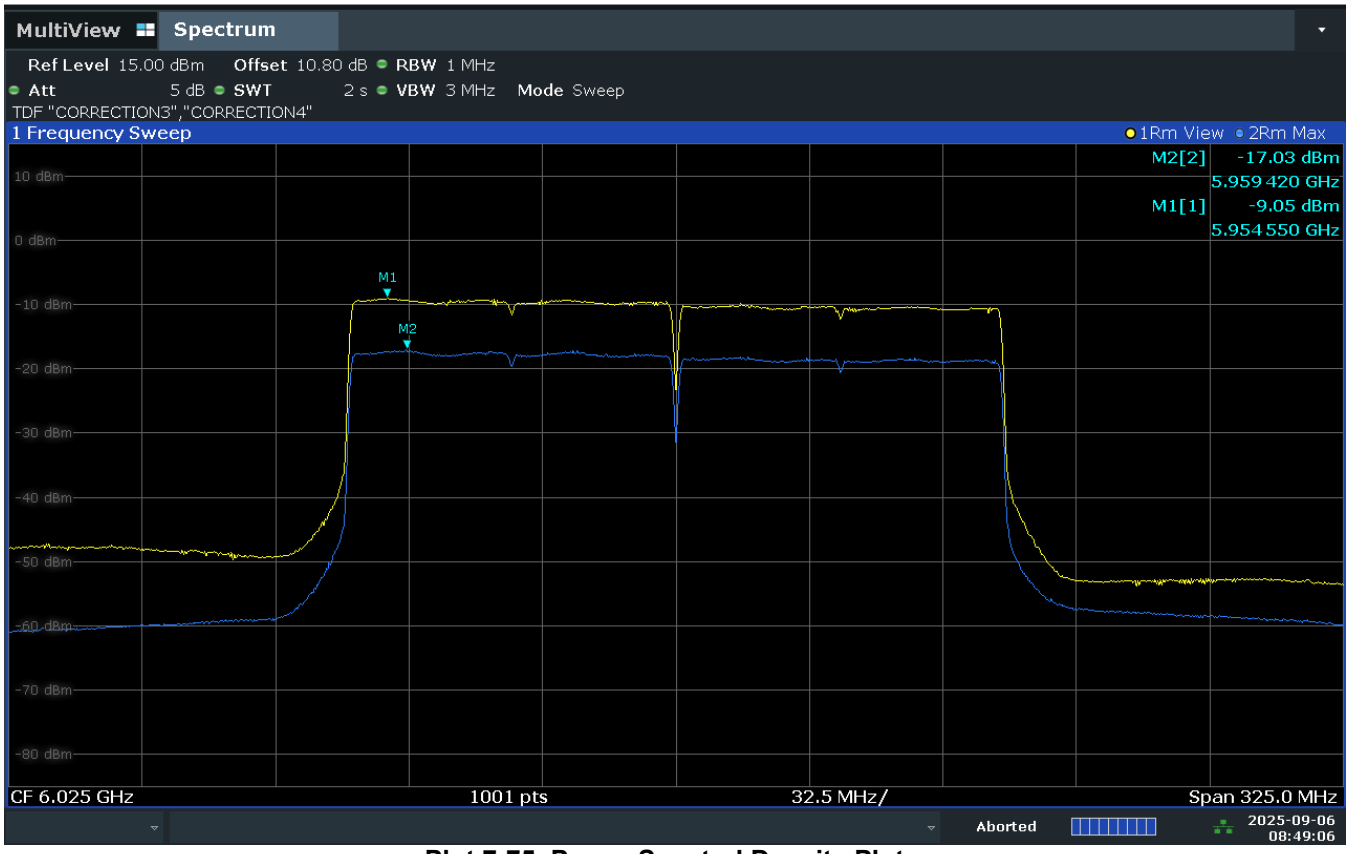
1. TPC is triggered when high RSSI condition is detected. As RSSI decreases via an increase in channel attenuation, the transmitters' output power will increase back to maximum allowed power
2. Implementation Expectation: Tx power Backoff is enabled at -26dBm or higher RSSI level. Backoff is disabled at -35dBm or lower RSSI Level.
3. The e.i.r.p. density is measured across both antenna ports and accounting for directional gain as shown below.

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

Frequency [MHz]	Channel	802.11 MODE	RSSI Level [dBm]	Antenna-1 Power Density [dBm]	Antenna-2 Power Density [dBm]	Antenna-1 Gain [dBi]	Antenna-2 Gain [dBi]	Summed MIMO Power Density [dBm/MHz]	Directional Gain [dBi]	e.i.r.p Density [dBm/MHz]	Max EIRP Density [dBm/MHz]	Margin [dB]
6025	15	ax (160MHz)	-47	-9.05	-9.22	-4.86	-4.97	-6.12	-1.90	-8.03	-5	-3.03
			-26	-17.03	-17.22	-4.86	-4.97	-14.11	-1.90	-16.02	-11	-5.02

Table 7-27. e.i.r.p. Power Spectral Density Measurements

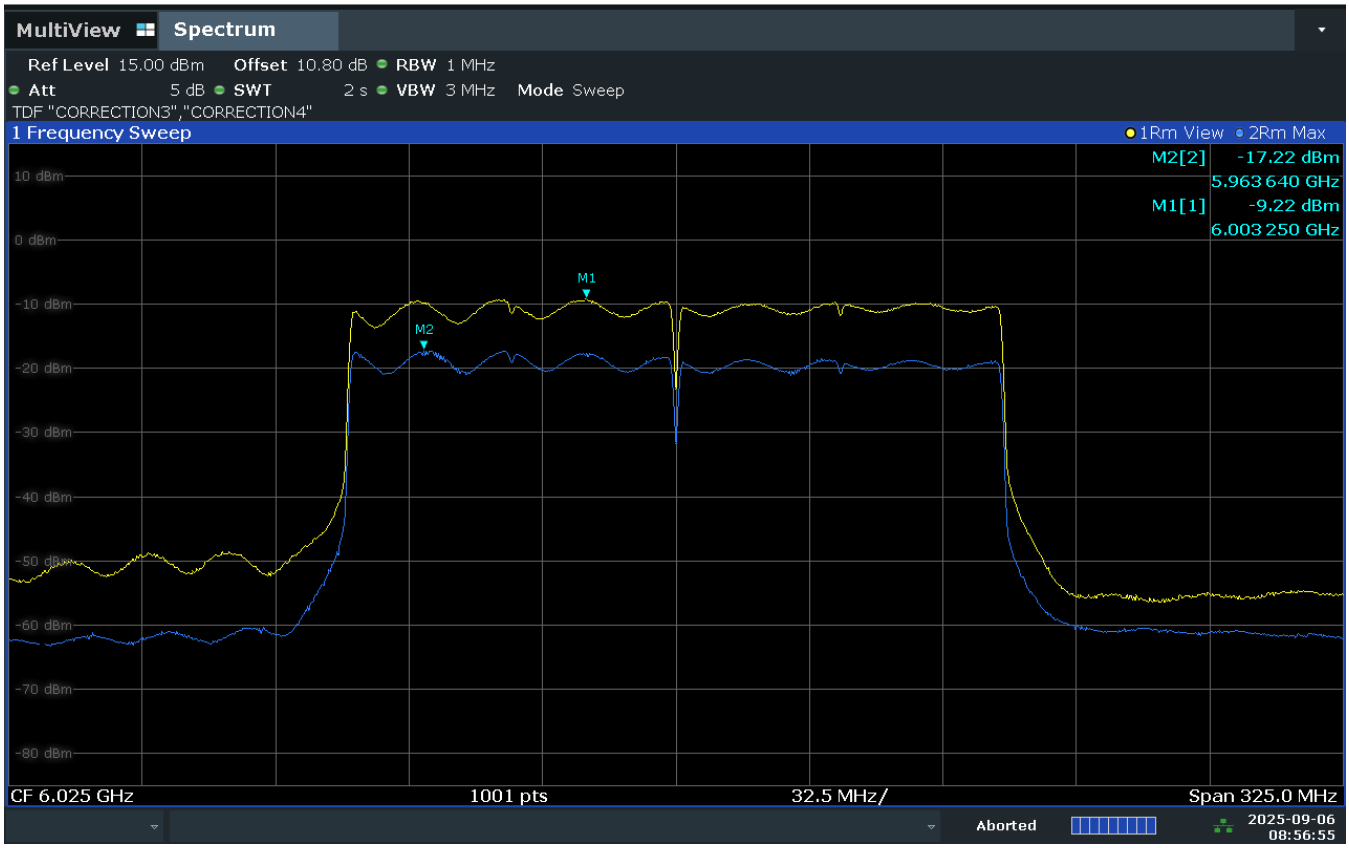
ACLR Results



Plot 7-75. Power Spectral Density Plot –
ANT1 (160MHz Bandwidth, RSSI level at -47dBm (yellow) and -26dBm (blue))

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

ACLRResults



Plot 7-76. Power Spectral Density Plot –
ANT2 (160MHz Bandwidth, RSSI level at -47dBm (yellow) and -26dBm (blue))

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.8 Radiated Emission Measurements

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 at the appropriate frequencies. All channels, modes (e.g. 802.11a, 802.11ax, 802.11be (20/40/80/160/320MHz), 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 5.925-7.125 GHz band: All emissions outside of the 5.925-7.125 GHz band shall not exceed an EIRP of -27dBm/MHz (68.2dBuV/m at a 3m distance). Emissions found in a restricted band are subject to the limits of 15.209 as shown in the table below.

Frequency	Field Strength [µV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400\F (kHz)	300
0.490 – 1.705 MHz	24000\F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 7-28. Radiated Limits

Test Procedures Used

ANSI C63.10:2020 – Sections 12.7.7.2, 12.7.6, 12.7.5

Test Settings – Above 1GHz

Average Field Strength Measurements (Method AD – Average Detection)

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. Sweep time = auto
7. Trace (RMS) averaging was performed over at least 100 traces.

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

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 Settings – Below 1GHz

Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest.
2. RBW = 120kHz (for emissions from 30MHz – 1GHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize.

Test Setup

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

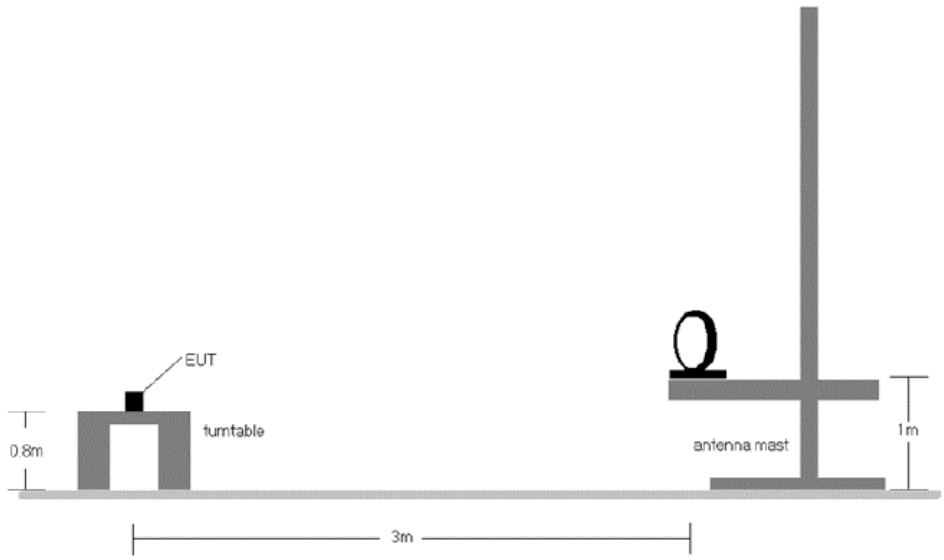


Figure 7-7. Radiated Test Setup < 30MHz

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

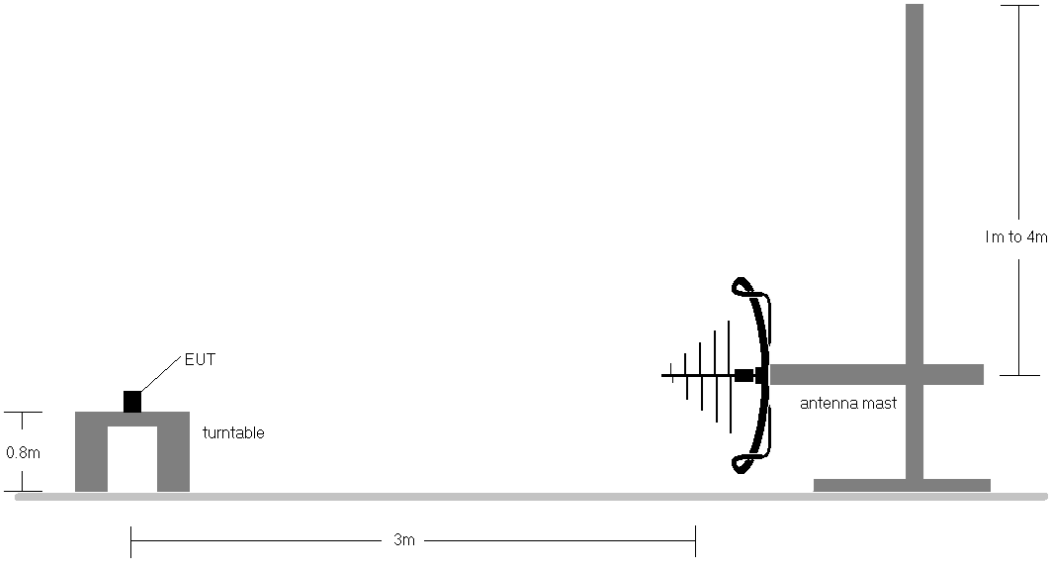


Figure 7-8. Radiated Test Setup < 1GHz

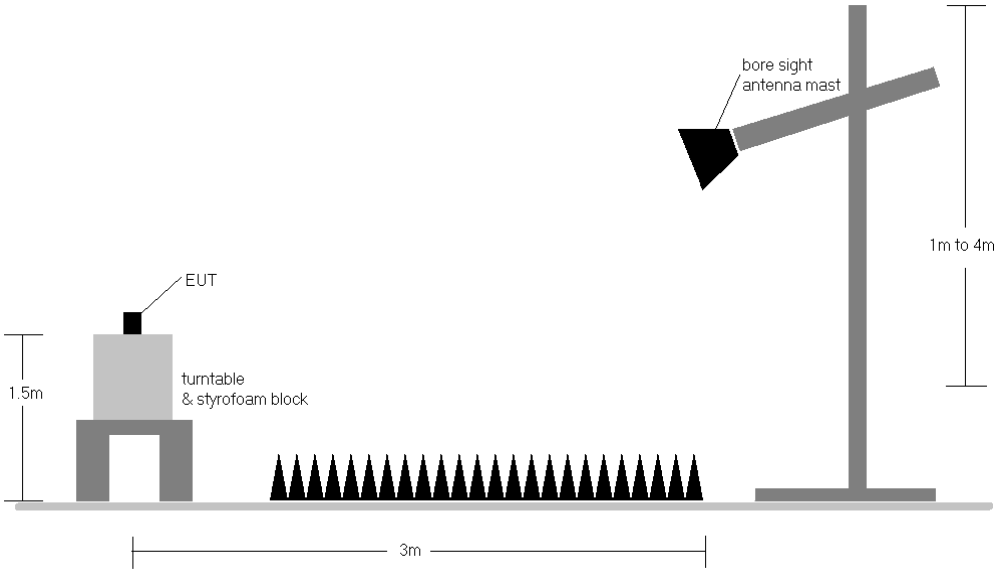


Figure 7-9. Radiated Test Setup > 1GHz

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

Test Notes

1. All spurious emissions lying in restricted bands specified in §15.205 are below the limits specified in §15.209. All spurious emissions that do not lie in a restricted band are subject to an average limit of -27dBm/MHz. At 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.
2. All spurious emissions that do not lie in a restricted band are subject to a peak limit not to exceed 20dB of the average limit [68.2dBμV/m]. If a peak measurement passes the average limit, it was determined no further investigation is necessary.
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. The worst-case emissions are reported, however emissions whose levels were not within 20dB of the respective limits were not reported.
6. Emissions below 18GHz were measured at a 3-meter 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. The "-" shown in the following RSE tables are used to denote a noise floor measurement.
8. In the case where a peak-detector measurement passed the given RMS limit it was determined sufficient to demonstrate compliance.
9. The results recorded using the broadband antenna are known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.

Sample Calculations

Determining Spurious Emissions Levels

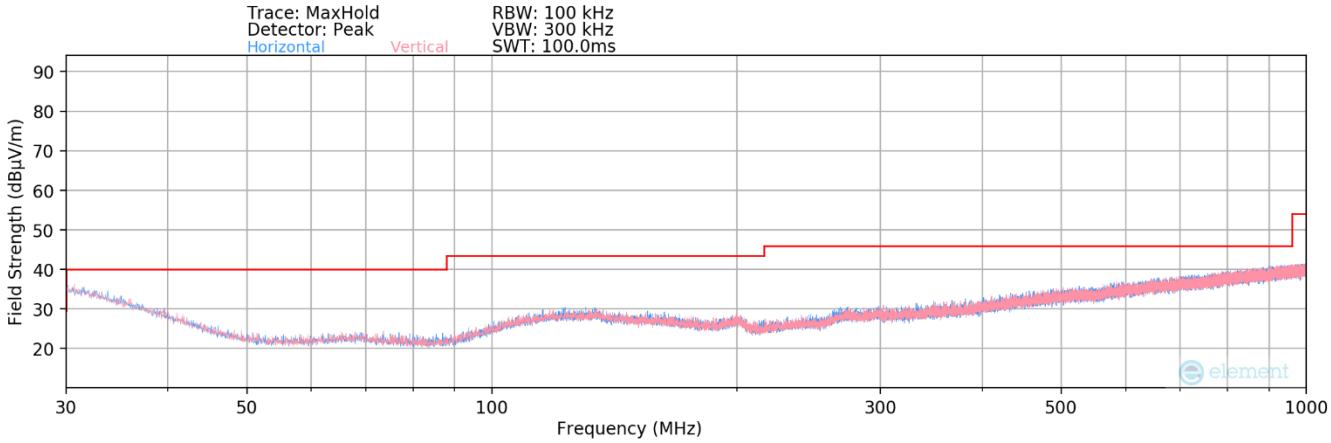
- Field Strength Level $_{[dB\mu V/m]}$ = Analyzer Level $_{[dBm]}$ + 107 + AFCL $_{[dB/m]}$
- AFCL $_{[dB/m]}$ = Antenna Factor $_{[dB/m]}$ + Cable Loss $_{[dB]}$
- Margin $_{[dB]}$ = Field Strength Level $_{[dB\mu V/m]}$ – Limit $_{[dB\mu V/m]}$

Radiated Band Edge Measurement Offset

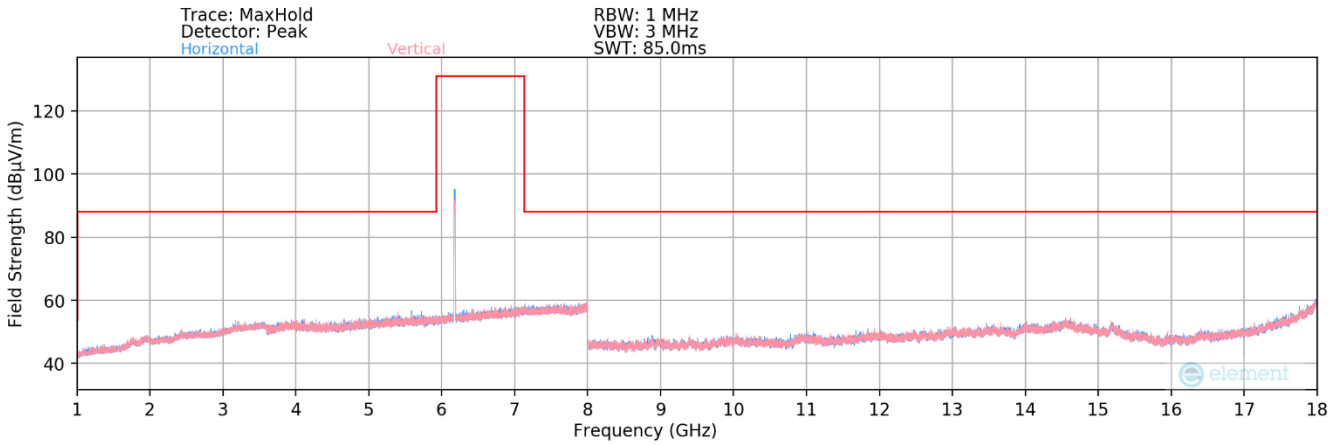
The amplitude offset shown in the radiated restricted band edge plots was calculated using the formula:
Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

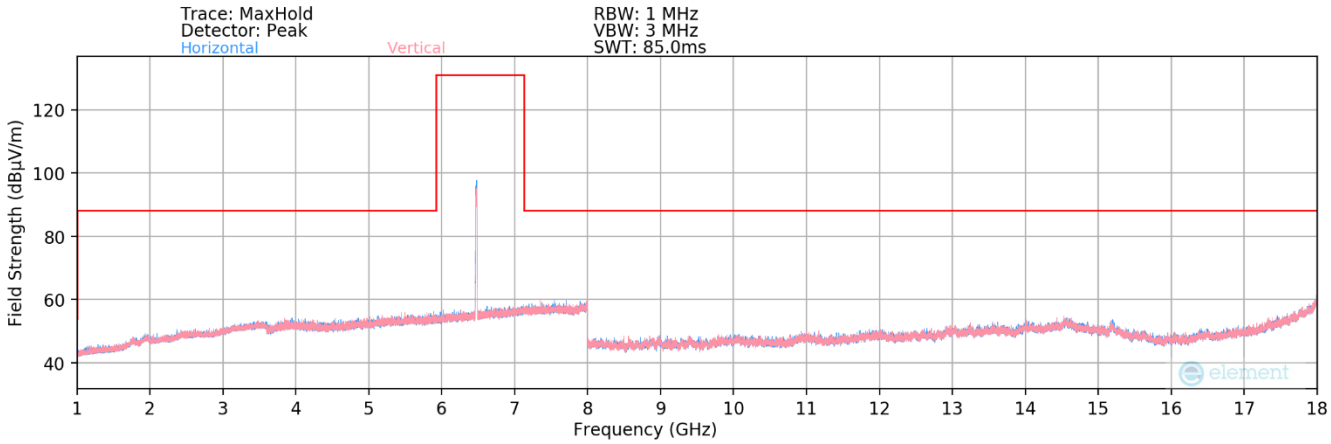
7.8.1 MIMO Radiated Spurious Emission Measurements



Plot 7-77. Radiated Spurious Plot below 1GHz MIMO (802.11a)

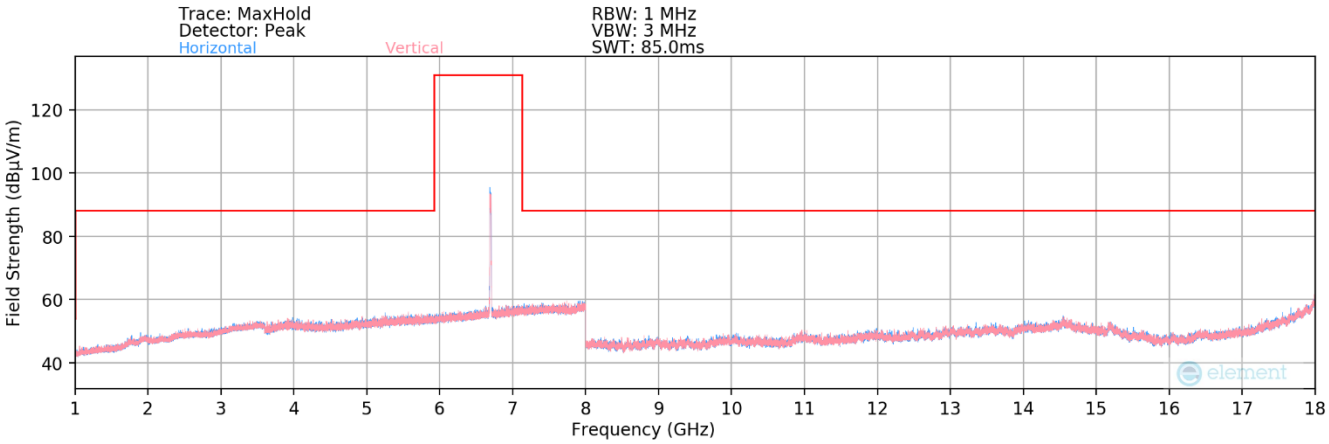


Plot 7-78. Radiated Spurious Plot 1GHz – 18GHz MIMO (802.11a – UNII Band 5 Ch. 45)

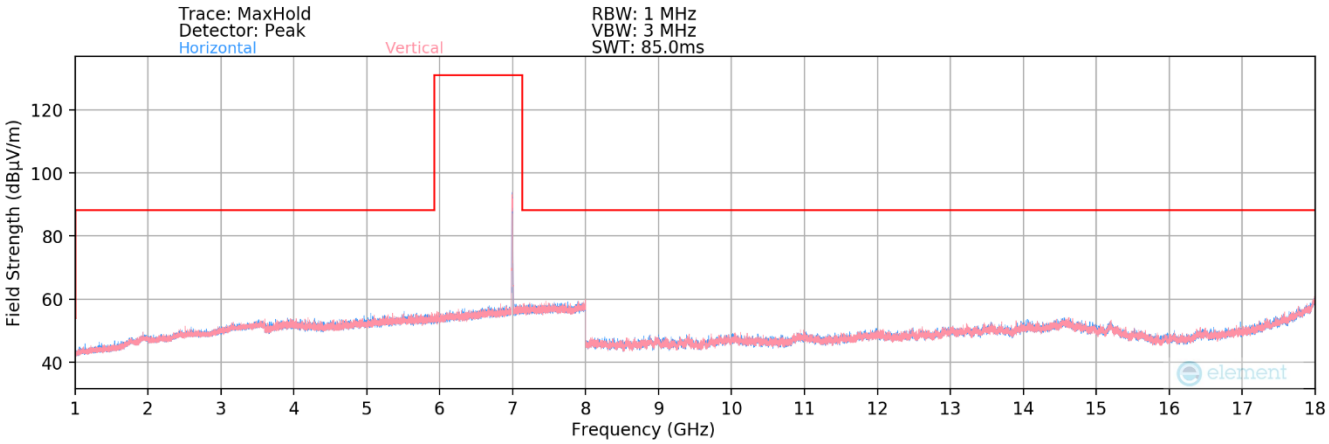


Plot 7-79. Radiated Spurious Plot 1GHz – 18GHz MIMO (802.11a – UNII Band 6 Ch. 105)

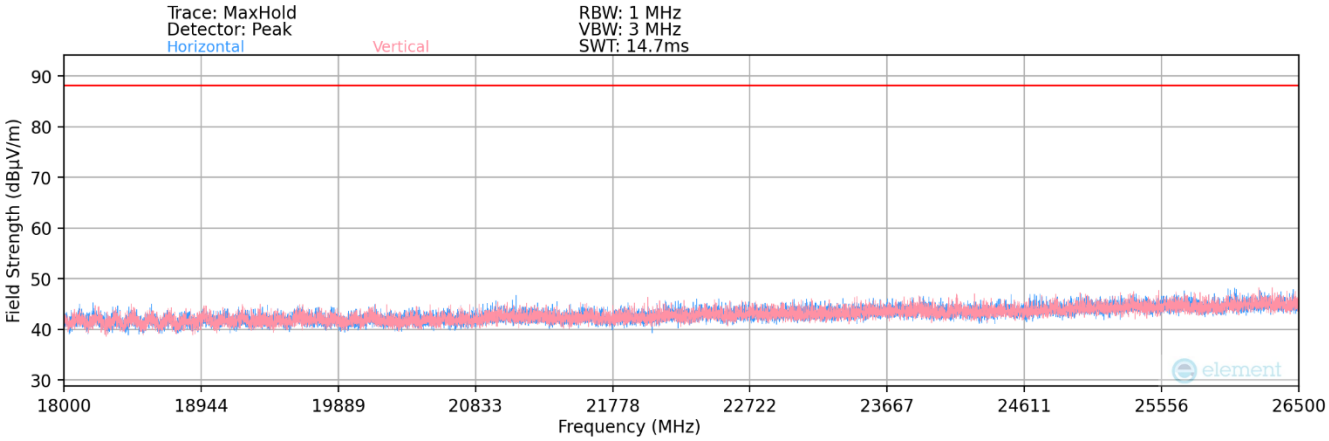
© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Plot 7-80. Radiated Spurious Plot 1GHz – 18GHz MIMO (802.11a – UNII Band 7 Ch. 149)

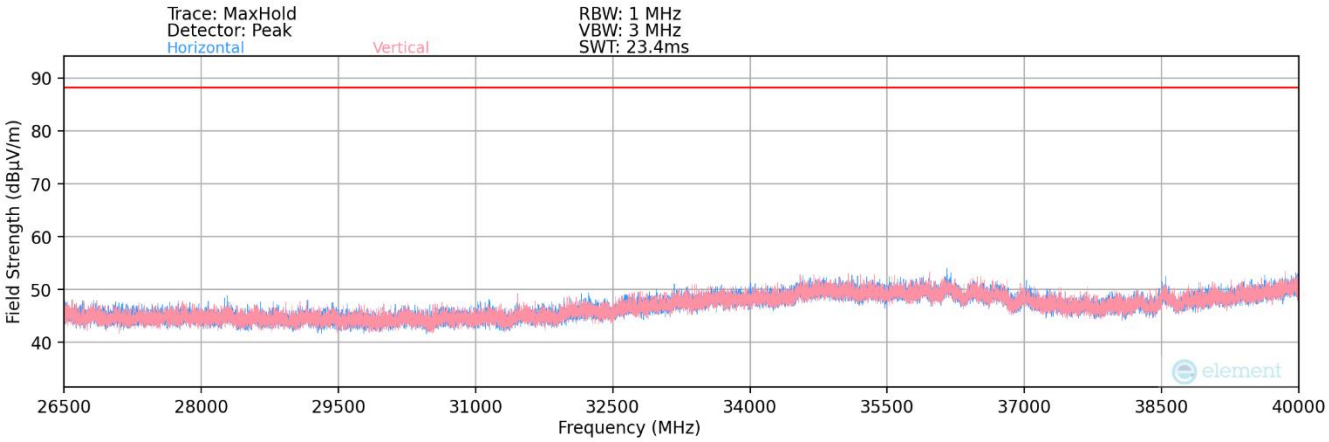


Plot 7-81. Radiated Spurious Plot 1GHz – 18GHz MIMO (802.11a – UNII Band 8 Ch. 209)

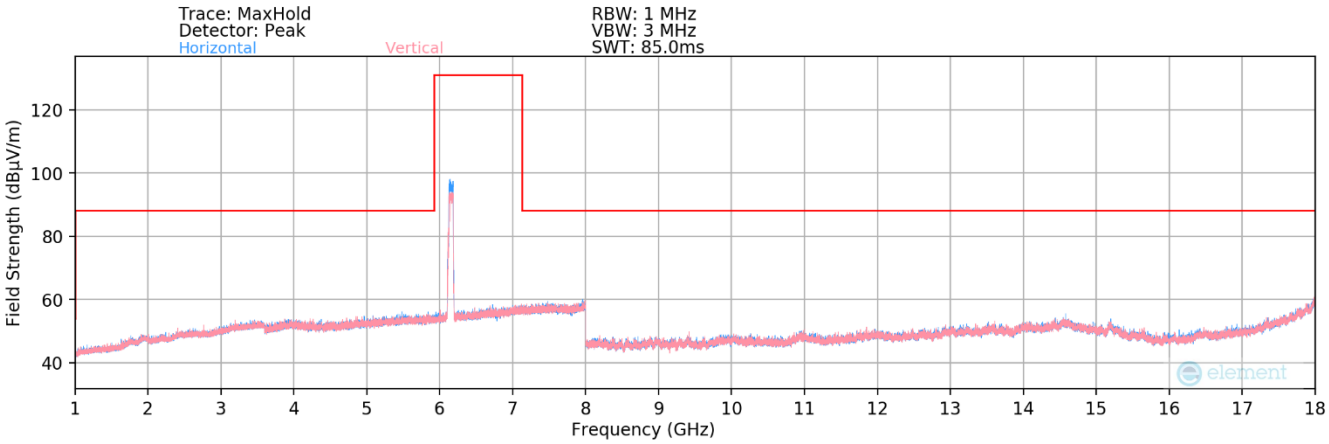


Plot 7-82. Radiated Spurious Plot 18GHz - 26.5GHz (802.11a) – Ch.149

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Plot 7-83. Radiated Spurious Plot 26.5GHz - 40GHz (802.11a) – Ch.149



Plot 7-84. Radiated Spurious Plot 1GHz – 18GHz MIMO (802.11be 80MHz BW (20MHz Puncture – UNII Band 5 Ch. 45)

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

MIMO Radiated Spurious Emission Measurements – UNII Band 5

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters

Mode	Antenna	UNII Band	Channel	Test Channel Freq. [MHz]	Restricted	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
802.11a	MIMO	5	2	5935	*	11870.00	Average	V	-	-	-78.21	9.41	0.00	38.20	53.98	-15.78
					*	11870.00	Peak	V	-	-	-66.17	9.41	0.00	50.24	73.98	-23.74
					*	17805.00	Average	V	-	-	-77.80	16.76	0.00	45.96	53.98	-8.02
					*	17805.00	Peak	V	-	-	-66.14	16.76	0.00	57.62	73.98	-16.36
					*	23740.00	Average	V	-	-	-63.20	4.02	-9.54	38.28	53.98	-15.70
					*	23740.00	Peak	V	-	-	-51.18	4.02	-9.54	50.30	73.98	-23.68
						29675.00	Peak	V	-	-	-52.47	5.01	-9.54	50.00	68.20	-18.20
			45	6175	*	12350.00	Average	V	-	-	-78.68	9.78	0.00	38.10	53.98	-15.88
					*	12350.00	Peak	V	-	-	-67.17	9.78	0.00	49.61	73.98	-24.37
					*	18525.00	Average	V	-	-	-63.11	1.00	-9.54	35.35	53.98	-18.63
					*	18525.00	Peak	V	-	-	-50.70	1.00	-9.54	47.76	73.98	-26.22
						24700.00	Peak	V	-	-	-50.63	4.23	-9.54	51.06	68.20	-17.14
						30875.00	Peak	V	-	-	-51.77	5.66	-9.54	51.35	68.20	-16.85
			93	6415		12830.00	Peak	V	-	-	-65.58	10.40	0.00	51.82	68.20	-16.38
					*	19245.00	Average	V	-	-	-61.37	1.74	-9.54	37.83	53.98	-16.15
					*	19245.00	Peak	V	-	-	-50.29	1.74	-9.54	48.91	73.98	-25.07
						25660.00	Peak	V	-	-	-51.31	4.69	-9.54	50.84	68.20	-17.36
						32075.00	Peak	V	-	-	-51.98	6.47	-9.54	51.95	68.20	-16.25

Table 7-29. Radiated Measurements MIMO – VLP

Mode	Antenna	UNII Band	Channel	Test Channel Freq. [MHz]	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
802.11a	ANT1	5	45	6175	150.00	Quasi-Peak	V	-	-	-91.02	19.70	0.00	35.68	43.52	-7.84
					250.00	Quasi-Peak	V	-	-	-90.60	18.76	0.00	36.23	46.02	-9.79
					450.00	Quasi-Peak	V	-	-	-89.81	24.62	0.00	36.79	46.02	-9.23

Table 7-30. Radiated Measurements MIMO below 1GHz

Mode	Antenna	UNII Band	Channel	Test Channel Freq. [MHz]	Restricted	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
802.11a	MIMO	5	45	6175	*	12350.00	Average	V	-	-	-79.01	9.78	0.00	37.77	53.98	-16.21
					*	12350.00	Peak	V	-	-	-67.13	9.78	0.00	49.65	73.98	-24.33
					*	18525.00	Average	V	-	-	-65.23	1.00	0.00	42.77	53.98	-11.21
					*	18525.00	Peak	V	-	-	-56.42	1.00	-9.54	42.04	73.98	-31.94
						24700.00	Peak	V	-	-	-55.17	4.23	-9.54	46.52	68.20	-21.68
						30875.00	Peak	V	-	-	-55.31	5.66	-9.54	47.81	68.20	-20.39

Table 7-31. Radiated Measurements MIMO – with WCP

© 2025 ELEMENT
V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

MIMO Radiated Spurious Emission Measurements – UNII Band 6

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters

Mode	Antenna	UNII Band	Channel	Test Channel Freq. [MHz]	Restricted	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
802.11a	MIMO	6	97	6435		12870.00	Peak	V	-	-	-67.01	10.56	0.00	50.55	68.20	-17.65
					*	19305.00	Average	V	-	-	-62.27	1.65	-9.54	36.84	53.98	-17.14
					*	19305.00	Peak	V	-	-	-50.29	1.65	-9.54	48.82	73.98	-25.16
						25740.00	Peak	V	-	-	-51.17	4.71	-9.54	51.00	68.20	-17.20
						32175.00	Peak	V	-	-	-52.24	6.76	-9.54	51.98	68.20	-16.22
			105	6475		12950.00	Peak	V	-	-	-66.40	10.59	0.00	51.19	68.20	-17.01
					*	19425.00	Average	V	-	-	-62.46	1.76	-9.54	36.76	53.98	-17.22
					*	19425.00	Peak	V	-	-	-50.46	1.76	-9.54	48.76	73.98	-25.22
						25900.00	Peak	V	-	-	-51.34	4.78	-9.54	50.90	68.20	-17.30
						32375.00	Peak	V	-	-	-51.93	6.56	-9.54	52.09	68.20	-16.11
			113	6515		13030.00	Peak	V	-	-	-66.27	10.85	0.00	51.58	68.20	-16.62
					*	19545.00	Average	V	-	-	-62.85	1.89	-9.54	36.50	53.98	-17.48
					*	19545.00	Peak	V	-	-	-50.81	1.89	-9.54	48.54	73.98	-25.44
						26060.00	Peak	V	-	-	-51.22	4.92	-9.54	51.16	68.20	-17.04
						32575.00	Peak	V	-	-	-52.15	6.76	-9.54	52.07	68.20	-16.13

Table 7-32. Radiated Measurements MIMO – VLP

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

MIMO Radiated Spurious Emission Measurements – UNII Band 7

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters

Mode	Antenna	UNII Band	Channel	Test Channel Freq. [MHz]	Restricted	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
802.11a	MIMO	7	117	6535		13070.00	Peak	V	-	-	-66.26	10.74	0.00	51.48	68.20	-16.72
					*	19605.00	Average	V	-	-	-62.29	2.20	-9.54	37.37	53.98	-16.61
					*	19605.00	Peak	V	-	-	-49.56	2.20	-9.54	50.10	73.98	-23.88
						26140.00	Peak	V	-	-	-51.36	4.98	-9.54	51.08	68.20	-17.12
						32675.00	Peak	V	-	-	-52.29	7.14	-9.54	52.31	68.20	-15.89
			149	6695	*	13390.00	Average	V	-	-	-78.36	11.04	0.00	39.68	53.98	-14.30
					*	13390.00	Peak	V	-	-	-65.90	11.04	0.00	52.14	73.98	-21.84
					*	20085.00	Average	V	-	-	-62.24	2.07	-9.54	37.29	53.98	-16.69
					*	20085.00	Peak	V	-	-	-50.67	2.07	-9.54	48.86	73.98	-25.12
						26780.00	Peak	V	-	-	-50.89	5.18	-9.54	51.75	68.20	-16.45
						33475.00	Peak	V	-	-	-51.96	8.48	-9.54	53.98	68.20	-14.22
			185	6875		13750.00	Peak	V	-	-	-65.65	11.51	0.00	52.86	68.20	-15.34
					*	20625.00	Average	V	-	-	-63.21	2.36	-9.54	36.61	53.98	-17.37
					*	20625.00	Peak	V	-	-	-51.05	2.36	-9.54	48.77	73.98	-25.21
						27500.00	Peak	V	-	-	-50.60	5.00	-9.54	51.86	68.20	-16.34
						34375.00	Peak	V	-	-	-52.61	9.46	-9.54	54.31	68.20	-13.89

Table 7-33. Radiated Measurements MIMO – VLP

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

MIMO Radiated Spurious Emission Measurements – UNII Band 8

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters

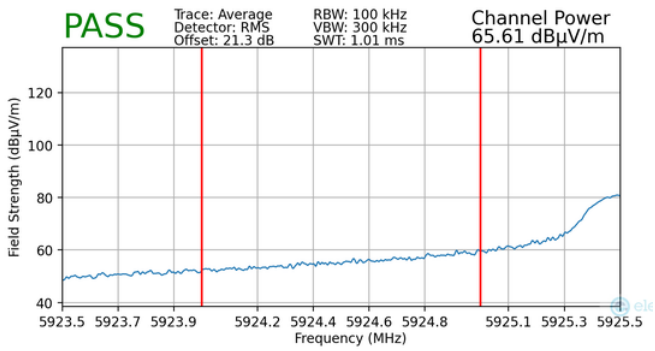
Mode	Antenna	UNII Band	Channel	Test Channel Freq. [MHz]	Restricted	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
802.11a	MIMO	8	189	6895		13790.00	Peak	V	-	-	-66.42	11.38	0.00	51.96	68.20	-16.24
					*	20685.00	Average	V	-	-	-63.52	2.33	-9.54	36.27	53.98	-17.71
					*	20685.00	Peak	V	-	-	-51.67	2.33	-9.54	48.12	73.98	-25.86
						27580.00	Peak	V	-	-	-51.58	5.33	-9.54	51.21	68.20	-16.99
						34475.00	Peak	V	-	-	-52.89	9.33	-9.54	53.90	68.20	-14.30
			209	6995		13990.00	Peak	V	-	-	-65.83	11.63	0.00	52.80	68.20	-15.40
					*	20985.00	Average	V	-	-	-63.72	2.83	-9.54	36.57	53.98	-17.41
					*	20985.00	Peak	V	-	-	-51.95	2.83	-9.54	48.34	73.98	-25.64
						27980.00	Peak	V	-	-	-51.66	5.30	-9.54	51.10	68.20	-17.10
						34975.00	Peak	V	-	-	-53.40	9.79	-9.54	53.85	68.20	-14.35
			233	7115		14230.00	Peak	V	-	-	-65.97	12.35	0.00	53.38	68.20	-14.82
					*	21345.00	Average	V	-	-	-63.08	2.85	-9.54	37.23	53.98	-16.75
					*	21345.00	Peak	V	-	-	-51.15	2.85	-9.54	49.16	73.98	-24.82
						28460.00	Peak	V	-	-	-52.01	5.34	-9.54	50.79	68.20	-17.41
						35575.00	Peak	V	-	-	-52.11	9.53	-9.54	54.88	68.20	-13.32

Table 7-34. Radiated Measurements MIMO – VLP

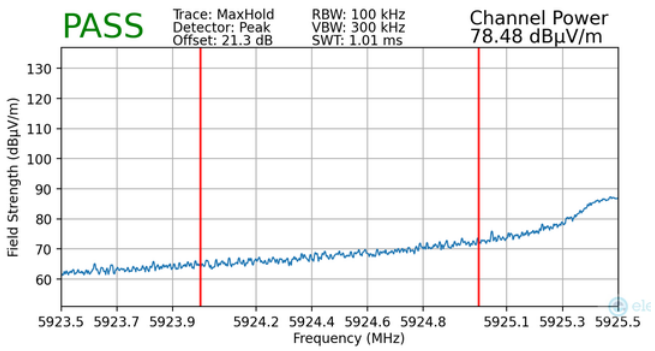
© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.8.2 MIMO Radiated Band Edge Measurements (20MHz BW)

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5935MHz
Channel:	2

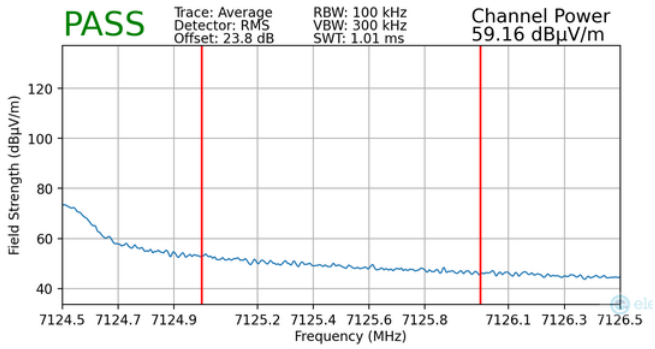


Plot 7-85. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 5)

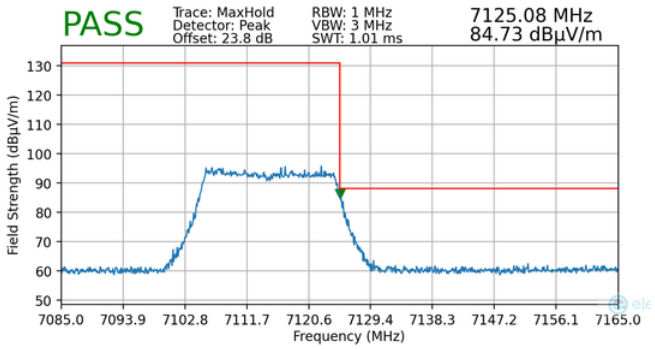


Plot 7-86. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 5)

Worst Case Mode:	802.11be
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	7115MHz
Channel:	233



Plot 7-87. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 8)

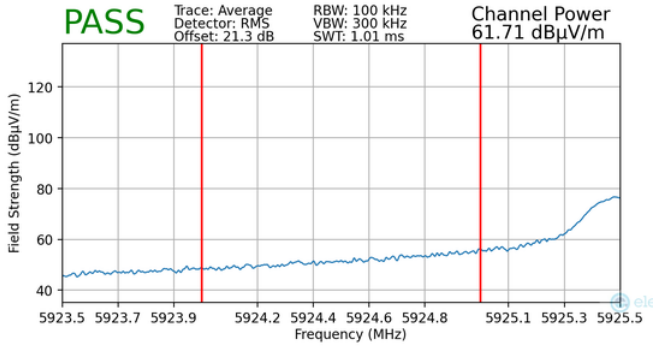


Plot 7-88. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 8)

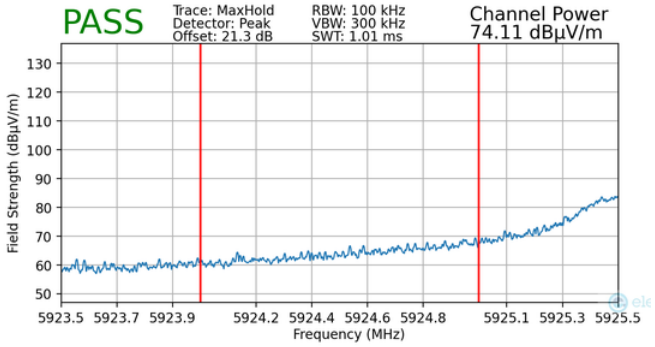
© 2025 ELEMENT V 11.3 5/14/2025

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5935MHz
Channel:	2



Plot 7-89. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 5) – WCP



Plot 7-90. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 5) – WCP

© 2025 ELEMENT V 11.3 5/14/2025
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.