

FCC and ISED Test Report

Apple Inc
Model: A2780

In accordance with FCC 47 CFR Part 15E, ISED
RSS-247 and ISED RSS-GEN
(5 GHz WLAN)

Prepared for: Apple Inc
One Apple Park Way
Cupertino, California
95014, USA

FCC ID: BCGA2780

IC: 579C-A2780



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Document 75955429-15 Issue 01

SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Matthew Russell	Chief Engineer	Authorised Signatory	08 December 2022

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15E, ISED RSS-247 and ISED RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Report Generation	Lauren Walters	08 December 2022	

FCC Accreditation

90987 Octagon House, Fareham Test Laboratory

ISED Accreditation

12669A Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15E: 2021, ISED RSS-247: Issue 2 (2017-02) and ISED RSS-GEN: Issue 5 (2018-04) + A2 (2021-02) for the tests detailed in section 1.3.



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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	08 December 2022

Table 1

1.2 Introduction

Applicant	Apple Inc
Manufacturer	Apple Inc
Model Number(s)	A2780
Serial Number(s)	D33YNXDVT4, FWC3JLYYHC, CY9H XKDF2L, HY6FDH9F6Y and NW3J007K67
Hardware Version(s)	REV 1.0
Software Version(s)	22A330, 22A31991j, 22A42770m, 22A322 and 22A42770m
Number of Samples Tested	5
Test Specification/Issue/Date	FCC 47 CFR Part 15E: 2021 ISED RSS-247: Issue 2 (2017-02) ISED RSS-GEN: Issue 5 (2018-04) + A2 (2021-02)
Order Number	0540246998
Start of Test	15-July-2022
Finish of Test	10-November-2022
Name of Engineer(s)	Stefan Gilfedder, Daniel Cameron, Thomas Biddlecombe, Taha Shafique, Danial Shafique, Nicolae Mihailiuc, Elliot Callender, Colin Brain, James Woods, Ian Hart, Ioan-Alexandru Bogatu and Mohammad Malik
Related Document(s)	KDB 662911 D01 v02r01 KDB 789033 D02 v02r01 ANSI C63.10 (2013) ANSI C63.10 (2020) KDB 905462 D02 v02



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15E, ISSED RSS-247 and ISSED RSS-GEN is shown below.

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 15E	RSS-247	RSS-GEN			
Configuration and Mode: 5 GHz WLAN						
-	15.203	-	-	Antenna Requirement	N/T	The device complies with the provisions of this section, as it uses permanently attached integral antennas.
2.1	15.205	-	8.10	Restricted Band Edges	Pass	
2.2	15.407 (a)	6.2	-	Emission Bandwidth	Pass	
2.3	15.407 (a)	6.2	-	Maximum Conducted Output Power	Pass	
2.4	15.407 (a)	6.2	-	Maximum Conducted Power Spectral Density	Pass	
2.5	15.407 (b)	6.2	-	Authorised Band Edges	Pass	
2.6	15.407 (b) and 15.209	6.2	6.13 and 8.9	Spurious Radiated Emissions	Pass	
2.7	15.407 (h)(2)(iii)(iv)	6.3.2(c)(d)(e)	-	Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period	Pass	
Configuration and Mode: 5 GHz WLAN - Client to Client						
2.7	15.407 (h)(2)(iii)(iv)	6.3.2(c)(d)(e)	-	Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period	Pass	

Table 2



1.4 Product Information

1.4.1 Technical Description

The equipment under test was an Apple laptop computer with Bluetooth® and IEEE 802.11 a/b/g/n/ac/ax Wi-Fi capabilities in the 2.4GHz, 5GHz and 6GHz bands.

1.4.2 Test Modes

The EUT's 5 GHz 802.11 radio supported Single Input/Single Output (SISO) and 2x2 MIMO (Multiple Input/Multiple Output) modes. 802.11a supports 20 MHz bandwidth only. 802.11n supported 20 MHz and 40 MHz bandwidths and 802.11ac, and ax supported 20 MHz, 40 MHz, 80MHz and 160 MHz bandwidths.

802.11a mode supported SISO operation only. 802.11n, ac and ax supported SISO, Cyclic Delay Diversity (CDD) and Space Division Multiplexing (SDM) modes. The EUT supported 802.11ax Single User (SU) and Multi-User (MU-MIMO) with all Resource Unit (RU) sizes from 26 subcarriers, up to the maximum allowed, dependent on channel bandwidth other than in U-NII-2A and U-NII-2C where RU-26 is not supported.

The EUT uses different output powers per core dependent on how many cores are used. The EUT also uses different power tables for Cyclic Delay Diversity (CDD) and Space Division Multiplexing (SDM) modes. It uses the same conducted power across all cores in any given mode, but due to the different antenna gains the radiated powers per core differ.

US and CA country codes changed the power table used for U-NII band 1. Therefore U-NII-1 channels were tested using both power settings for each country's respective limits.

After preliminary investigations were performed to find worst-case operation, the EUT was tested in the following modes:

SISO Modes (5 GHz Core 0 for U-NII-1 / 2A / 2C / 3):

- 802.11a – 12 Mbps
- 802.11n HT20 – MCS2
- 802.11n HT40 – MCS2
- 802.11ac VHT80 – MCS2x1
- 802.11ac VHT160 – MCS2x1
- 802.11ax HE20 SU – MCS2x1
- 802.11ax HE40 SU – MCS2x1
- 802.11ax HE80 SU – MCS2x1
- 802.11ax HE160 SU – MCS2x1
- 802.11ax HE20 MU RU26/52/106 – MCS2x1

2x2 MIMO Modes (Core 0+1 for U-NII-1 / 2A / 2C / 3):

- 802.11n HT20 - CDD (MCS2), SDM (MCS10) and TxBF (MCS10)
- 802.11n HT40 - CDD (MCS2), SDM (MCS10) and TxBF (MCS10)
- 802.11ac VHT80 – CDD (MCS2x1), SDM (MCS2x2) and TxBF (MCS2x1)
- 802.11ac VHT160 – CDD (MCS2x1), SDM (MCS2x2)
- 802.11ax HE20 SU – CDD (MCS2x1) and SDM (MCS2x2) and TxBF (MCS2x1)
- 802.11ax HE40 SU – CDD (MCS2x1) and SDM (MCS2x2)
- 802.11ax HE80 SU – CDD (MCS2x1), SDM (MCS2x2)
- 802.11ax HE160 SU – CDD (MCS2x2), SDM (MCS2x2)
- 802.11ax HE20 MU RU26/52/106 – CDD (MCS2x1) and SDM (MCS2x2)



*Note: The RU offset for bottom and middle channels were placed in the lowest position and on the top channel, the offset was placed in the upper most position.

1.4.3 Test Setup

For conducted tests the EUT antennas were disconnected and replaced with U.FL to SMA test cables to enable conducted testing on each core. The loss of these test cables were known and compensated for in any conducted measurements.

For all testing except DFS the EUT was put into a continuous transmit test mode with the chipset manufacturer's test commands via a script running in the EUTs terminal application. The EUT then transmitted the required type of packeted 802.11 data frames of fixed length, containing the standard headers and with pseudo-random data content, ensuring the measured signals were representative and contained all the symbols at the highest power control level.

The test setup used for DFS is described in the test result section of the present document.

1.4.4 Antenna Gain Table

Antenna Port	Frequency Range (MHz)	Peak Gain (dBi)	Conducted Cable Loss (dB)
Core 0	5150 to 5250	6.03	1.10
	5250 to 5350	6.56	1.10
	5470 to 5725	5.58	1.20
	5725 to 5850	7.28	1.20
Core 1	5150 to 5250	4.08	1.10
	5250 to 5350	6.14	1.10
	5470 to 5725	4.79	1.20
	5725 to 5850	5.80	1.20

Table 3

1.5 Deviations from the Standard

No deviations from the applicable test standard were made during testing.



1.6 EUT Modification Record

The table below details modifications made to the EUT during the test programme.

The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Model: A2780, Serial Number: CY9HXKDF2L			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A2780, Serial Number: NW3J007K67			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A2780, Serial Number: D33YNXDVT4			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A2780, Serial Number: HY6FDH9F6Y			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A2780, Serial Number: FWC3JLYYHC			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 4



1.7 Test Location

TÜV SÜD conducted the following tests at our Octagon House Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: 5 GHz WLAN		
Restricted Band Edges	Taha Shafique, Danial Shafique, Nicolae Mihailiuc, Elliot Callender, Colin Brain, James Woods, Ian Hart, Ioan-Alexandru Bogatu and Mohammad Malik	UKAS
Emission Bandwidth	Daniel Cameron and Thomas Biddlecombe	UKAS
Maximum Conducted Output Power	Daniel Cameron and Thomas Biddlecombe	UKAS
Maximum Conducted Power Spectral Density	Daniel Cameron and Thomas Biddlecombe	UKAS
Authorised Band Edges	Taha Shafique, Danial Shafique, Nicolae Mihailiuc, Elliot Callender, Colin Brain, James Woods, Ian Hart, Ioan-Alexandru Bogatu and Mohammad Malik.	UKAS
Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period	Stefan Gilfedder	UKAS
Configuration and Mode: 5 GHz WLAN - Client to Client		
Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period	Stefan Gilfedder	UKAS

Table 5

Office Address:

TÜV SÜD
Octagon House
Concorde Way
Fareham
Hampshire
PO15 5RL
United Kingdom



TÜV SÜD conducted the following tests at our Concorde Park Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: 5 GHz WLAN		
Restricted Band Edges	Taha Shafique, Danial Shafique, Nicolae Mihailiuc, Elliot Callender, Colin Brain, James Woods, Ian Hart, Ioan-Alexandru Bogatu and Mohammad Malik	UKAS
Authorised Band Edges	Taha Shafique, Danial Shafique, Nicolae Mihailiuc, Elliot Callender, Colin Brain, James Woods, Ian Hart, Ioan-Alexandru Bogatu and Mohammad Malik.	UKAS
Spurious Radiated Emissions	Nicolae Mihailiuc, Ioan-Alexandru Bogatu, Taha Shafique and Danial Shafique	UKAS

Table 6

Office Address:

TÜV SÜD
Concorde Park
Concorde Way
Fareham
Hampshire
PO15 5FG
United Kingdom



2 Test Details

2.1 Restricted Band Edges

2.1.1 Specification Reference

FCC 47 CFR Part 15E, Clause 15.205
ISED RSS-GEN, Clause 8.10

2.1.2 Equipment Under Test and Modification State

A2780, S/N: FWC3JLYYHC - Modification State 0

2.1.3 Date of Test

15-July-2022 to 01-November-2022

2.1.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.10.5.

Restricted Band Edge measurements were performed with the device operating in SISO, MIMO and TxBF, across the various modes supported by the device.

The measurements displayed within this report have been limited to those modes which have been shown to be worst case.

Where duty cycle corrections were required for average results, these are included in the result tables but are not shown on the plots.

Further measurements are held on file by TÜV SÜD and are available if required.

2.1.5 Environmental Conditions

Ambient Temperature	20.2 - 24.8 °C
Relative Humidity	40.7 - 58.8 %



2.1.6 Test Results

5 GHz WLAN

20 MHz Bandwidth (SISO)

Mode	Data Rate/ MCS	Resource Size	Resource Index	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
802.11a, Core 0	24 Mbps	-	-	5180	5150	65.30	51.23
802.11n HT20, Core 0	MCS 7	-	-	5180	5150	68.98	50.61
802.11ax HE20, Core 0	MCS 4x1	SU	-	5180	5150	66.28	51.22
802.11ax HE20, Core 0	MCS 11x1	26	0	5180	5150	56.88	45.08
802.11a, Core 0	54 Mbps	-	-	5320	5350	68.12	51.34
802.11n HT20, Core 0	MCS 4	-	-	5320	5350	65.68	51.36
802.11ax HE20, Core 0	MCS 2x1	SU	-	5320	5350	63.28	50.81
802.11ax HE20, Core 0	MCS 11x1	52	40	5320	5350	59.66	47.63
802.11a, Core 1	24 Mbps	-	-	5500	5460	-	48.28
802.11n HT20, Core 1	MCS 2	-	-	5500	5460	-	49.18
802.11ax HE20, Core 1	MCS 2x1	SU	-	5500	5460	-	49.73
802.11ax HE20, Core 1	MCS 11x1	52	37	5500	5460	-	46.77

Table 7 - SISO Restricted Band Edge Results

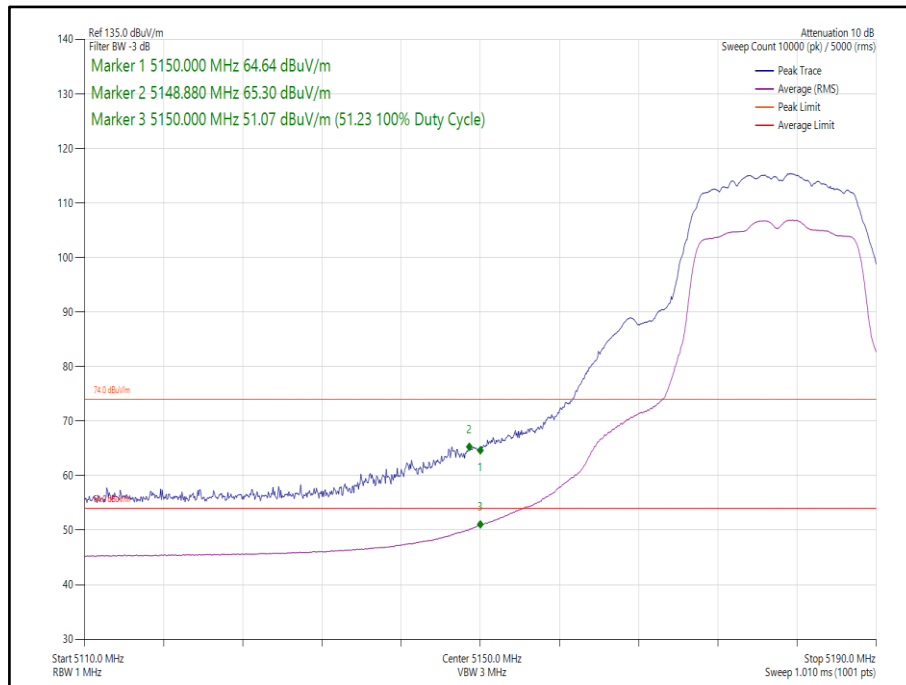


Figure 1 - 802.11a, Core 0 - 5180 MHz, Band Edge Frequency 5150 MHz

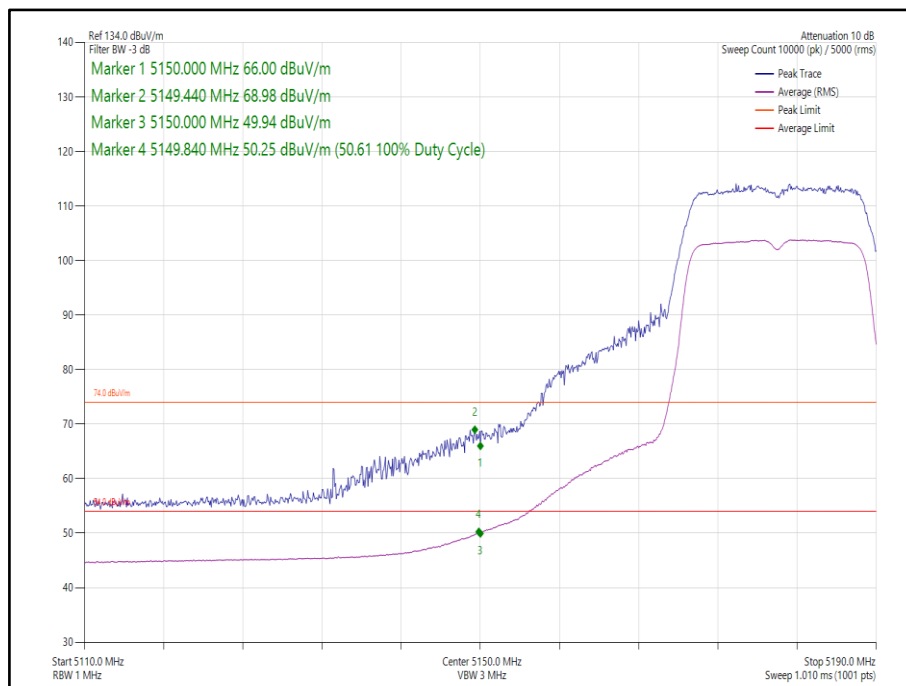


Figure 2 - 802.11n HT20, Core 0 - 5180 MHz, Band Edge Frequency 5150 MHz

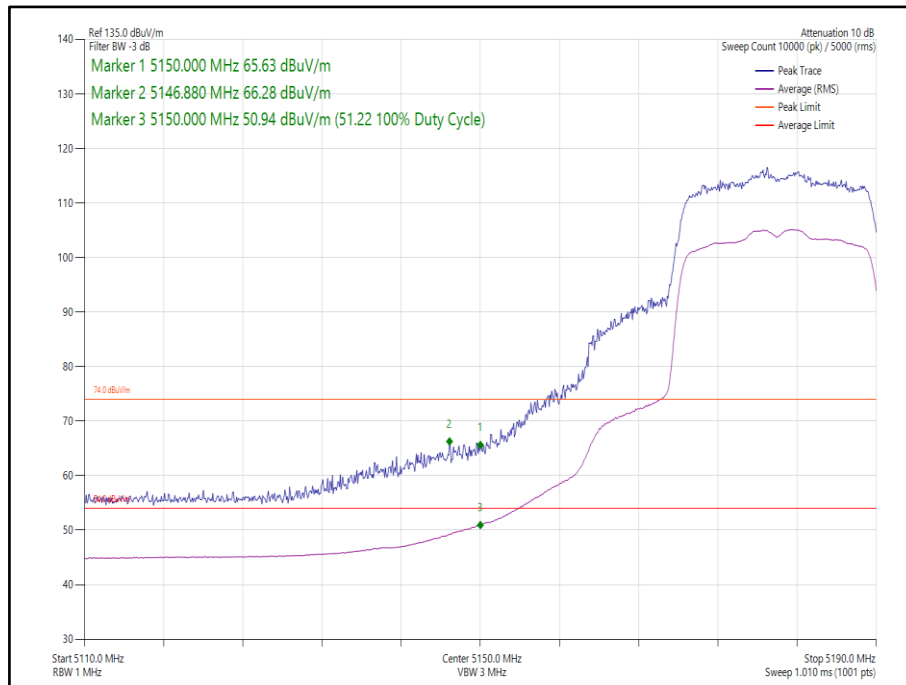


Figure 3 - 802.11ax HE20, Core 0, SU - 5180 MHz, Band Edge Frequency 5150 MHz

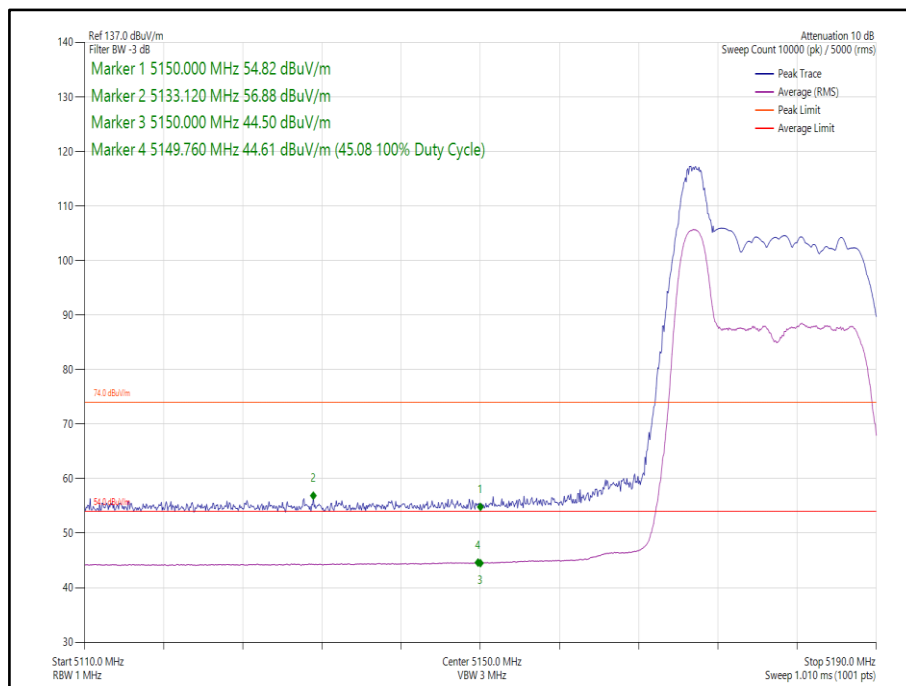


Figure 4 - 802.11ax HE20, Core 0, 26-0 - 5180 MHz, Band Edge Frequency 5150 MHz

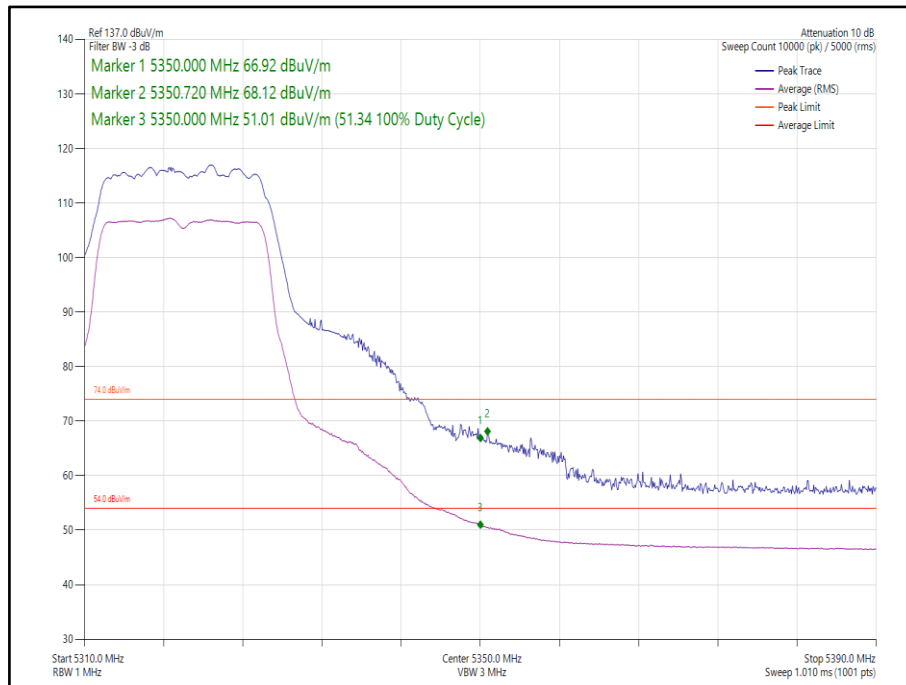


Figure 5 - 802.11a, Core 0 - 5320 MHz, Band Edge Frequency 5350 MHz

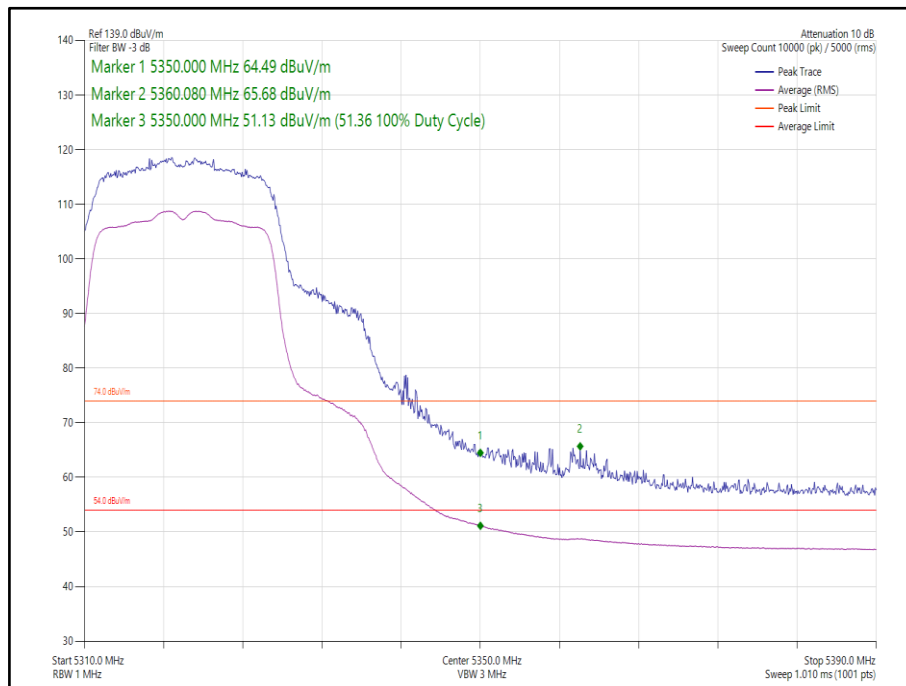


Figure 6 - 802.11n HT20, Core 0 - 5320 MHz, Band Edge Frequency 5350 MHz

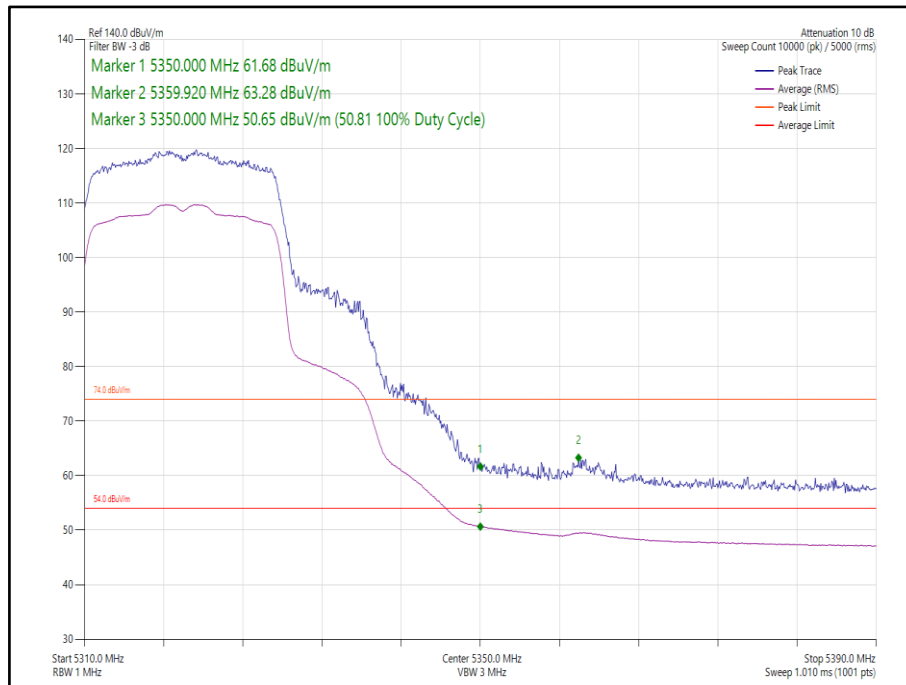


Figure 7 - 802.11ax HE20, Core 0, SU - 5320 MHz, Band Edge Frequency 5350 MHz

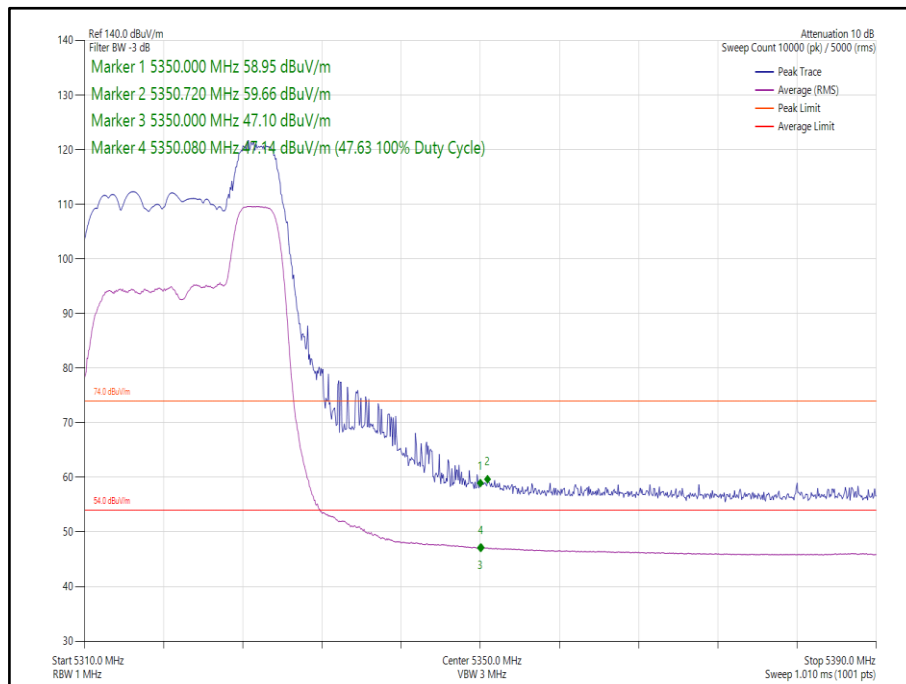


Figure 8 - 802.11ax HE20, Core 0, 52-40 - 5320 MHz, Band Edge Frequency 5350 MHz

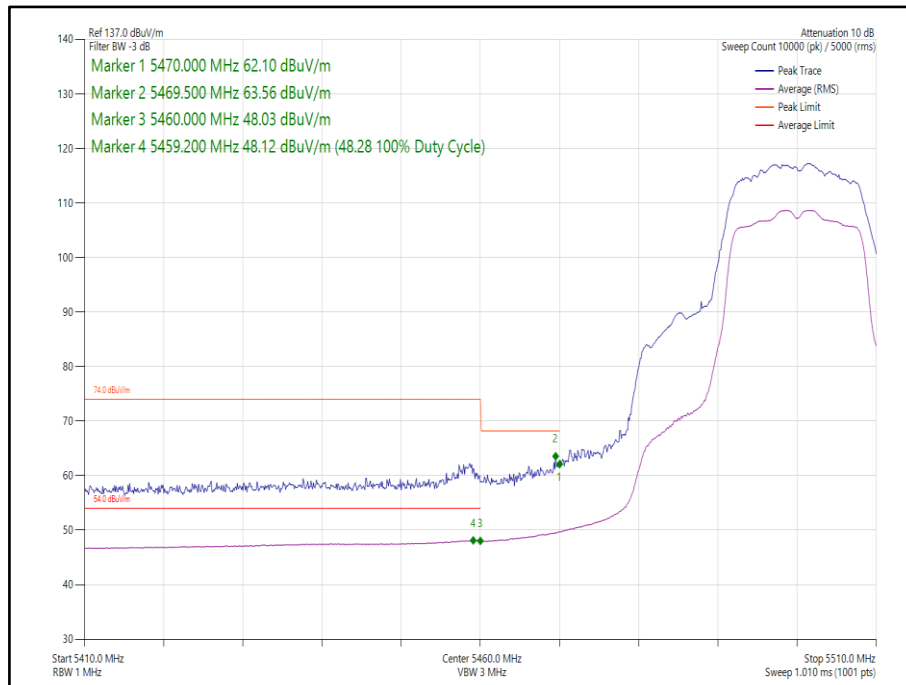


Figure 9 - 802.11a, Core 1 - 5500 MHz, Band Edge Frequency 5460 MHz

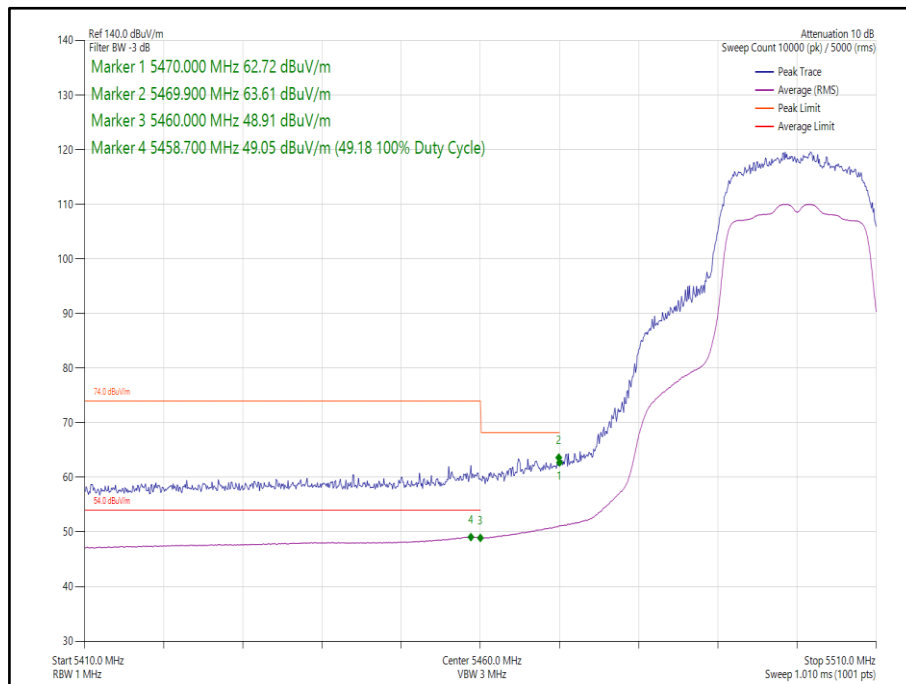


Figure 10 - 802.11n HT20, Core 1 - 5500 MHz, Band Edge Frequency 5460 MHz

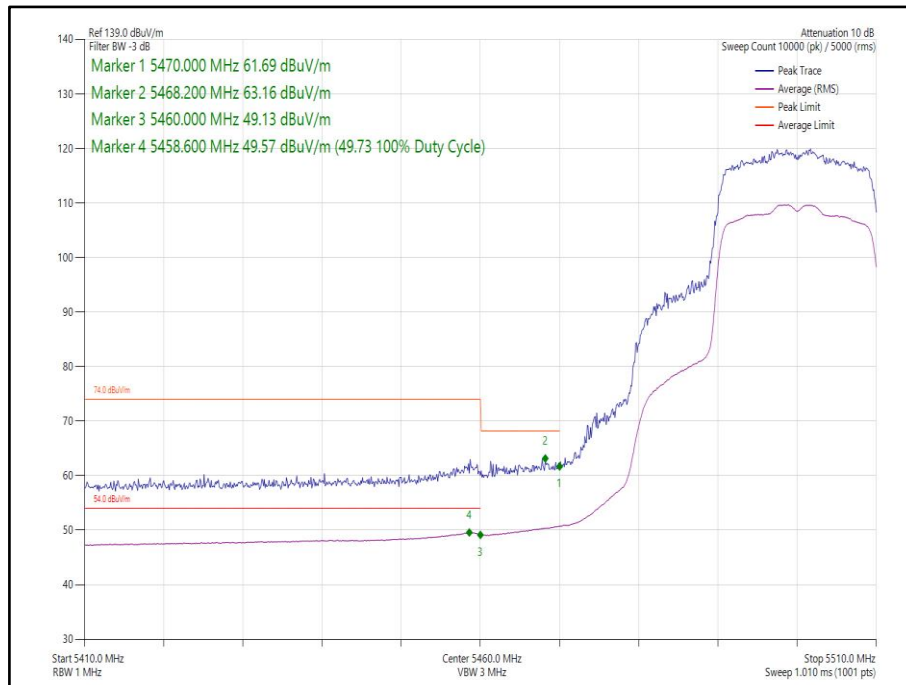


Figure 11 - 802.11ax HE20, Core 1, SU - 5500 MHz, Band Edge Frequency 5460 MHz

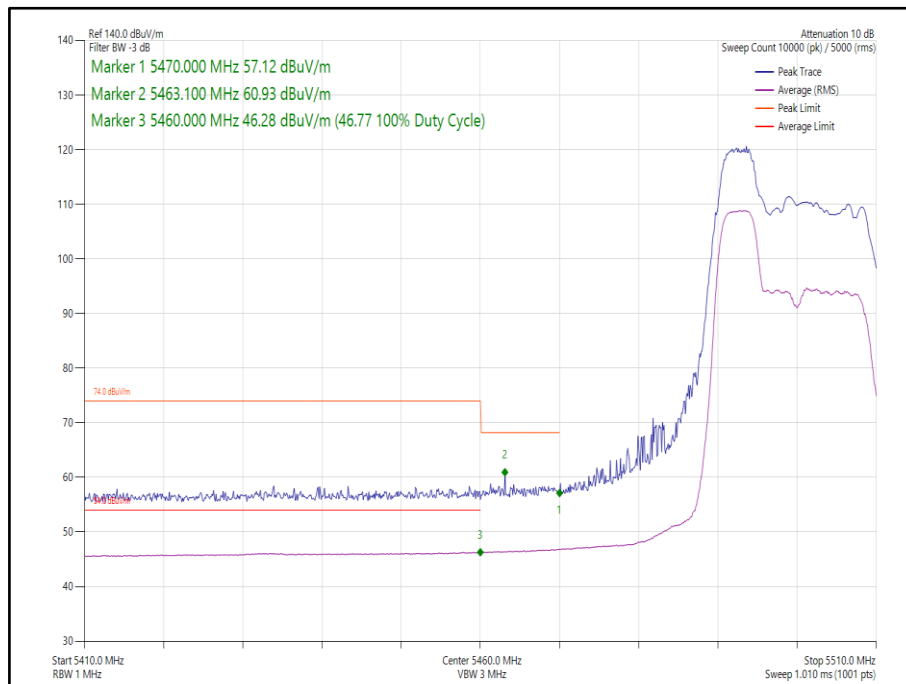


Figure 12 - 802.11ax HE20, Core 1, 52-37 - 5500 MHz, Band Edge Frequency 5460 MHz



20 MHz Bandwidth (2TX MIMO)

Mode	Modulation Coding Scheme	Resource size	Resource Index	Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
802.11n HT20 CDD, Cores 0-1	MCS 2	-	-	5180	5150	64.31	51.44
802.11n HT20 SDM, Cores 0-1	MCS 10	-	-	5180	5150	63.81	51.07
802.11ax HE20 CDD Cores 0-1	MCS 2x1	SU	-	5180	5150	64.22	51.16
802.11ax HE20 CDD, Cores 0-1	MCS 11x1	26	0	5180	5150	57.96	45.86
802.11ax HE20 SDM, Cores 0-1	MCS 4x2	SU	-	5180	5150	64.81	51.45
802.11ax HE20 SDM, Cores 0-1	MCS 11x2	26	0	5180	5150	57.93	45.81
802.11n HT20 CDD, Cores 0-1	MCS 4	-	-	5320	5350	65.44	51.31
802.11n HT20 SDM, Cores 0-1	MCS 10	-	-	5320	5350	63.92	51.44
802.11ax HE20 CDD, Cores 0-1	MCS 4x1	SU	-	5320	5350	65.02	51.32
802.11ax HE20 CDD, Cores 0-1	MCS 11x1	52	40	5320	5350	59.86	48.06
802.11ax HE20 SDM, Cores 0-1	MCS 2x2	SU	-	5320	5350	64.12	51.24
802.11ax HE20 SDM, Cores 0-1	MCS 11x2	52	40	5320	5350	59.79	48.26
802.11n HT20 CDD, Cores 0-1	MCS 2	-	-	5500	5460	-	50.22
802.11n HT20 SDM, Cores 0-1	MCS 10	-	-	5500	5460	-	50.00
802.11ax HE20 CDD, Cores 0-1	MCS 2x1	SU	-	5500	5460	-	50.85
802.11ax HE20 CDD, Cores 0-1	MCS 11x1	52	37	5500	5460	-	47.63
802.11ax HE20 SDM, Cores 0-1	MCS 2x2	SU	-	5500	5460	-	50.37
802.11ax HE20 SDM, Cores 0-1	MCS 11x2	52	37	5500	5460	-	47.66

Table 8 - MIMO 2TX Restricted Band Edge Results

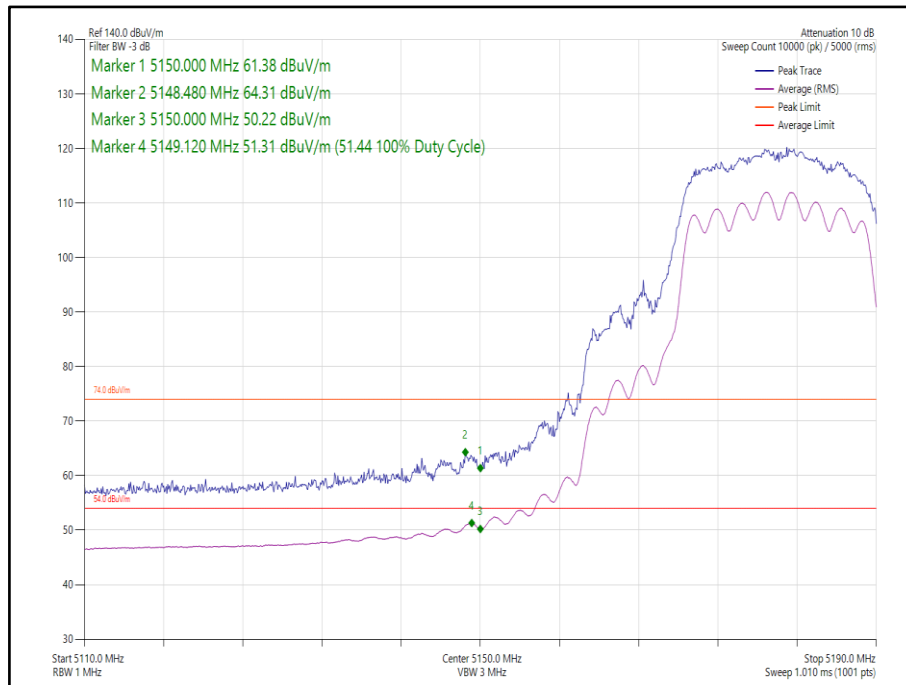


Figure 13 - 802.11n HT20 CDD, Cores 0-1 - 5180 MHz, Band Edge Frequency 5150 MHz

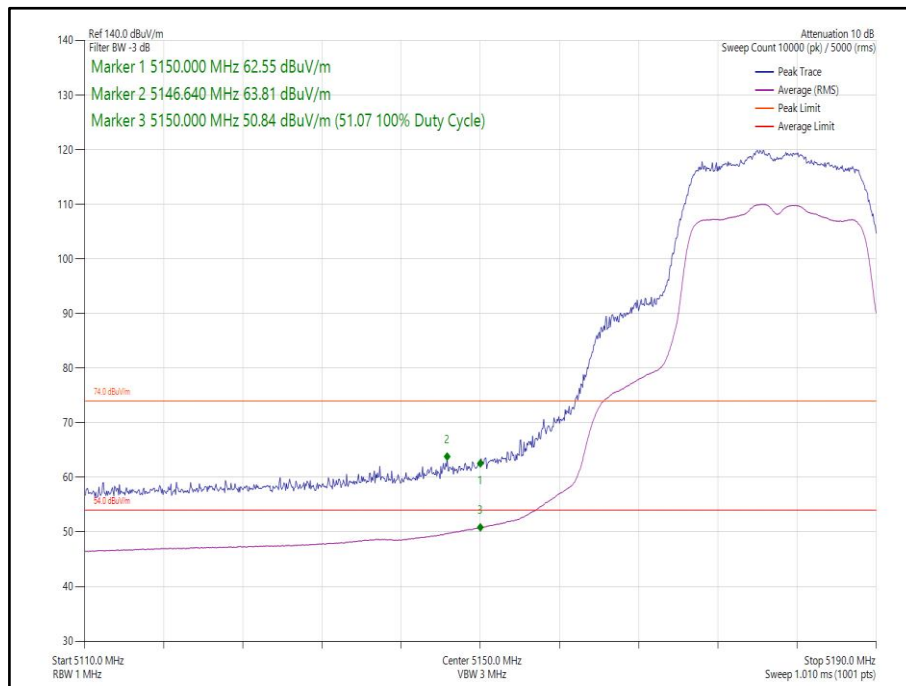


Figure 14 - 802.11n HT20 SDM, Cores 0-1 - 5180 MHz, Band Edge Frequency 5150 MHz

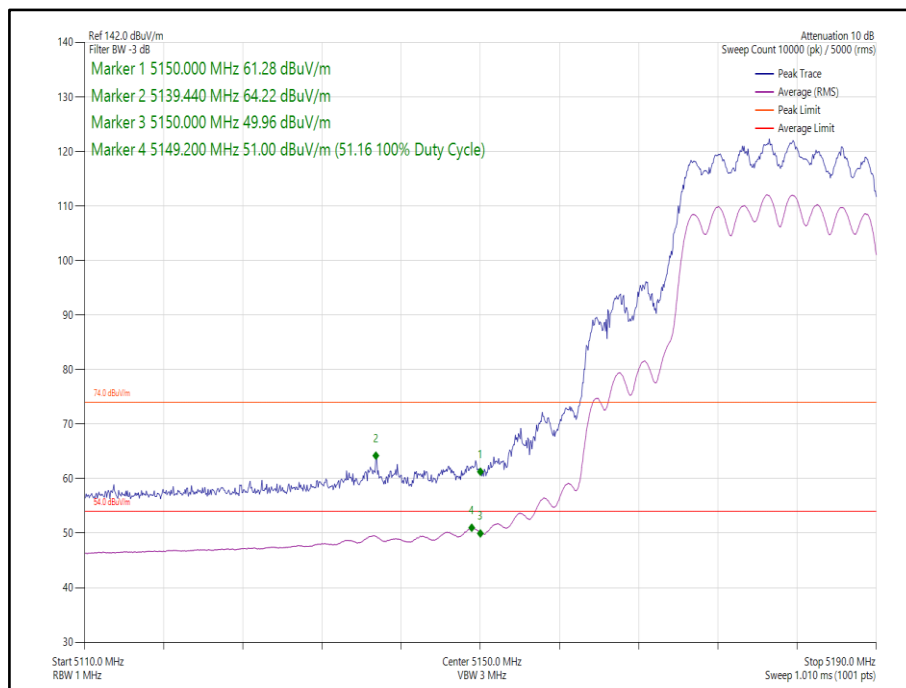


Figure 15 - 802.11ax HE20 CDD, Cores 0-1 SU - 5180 MHz, Band Edge Frequency 5150 MHz

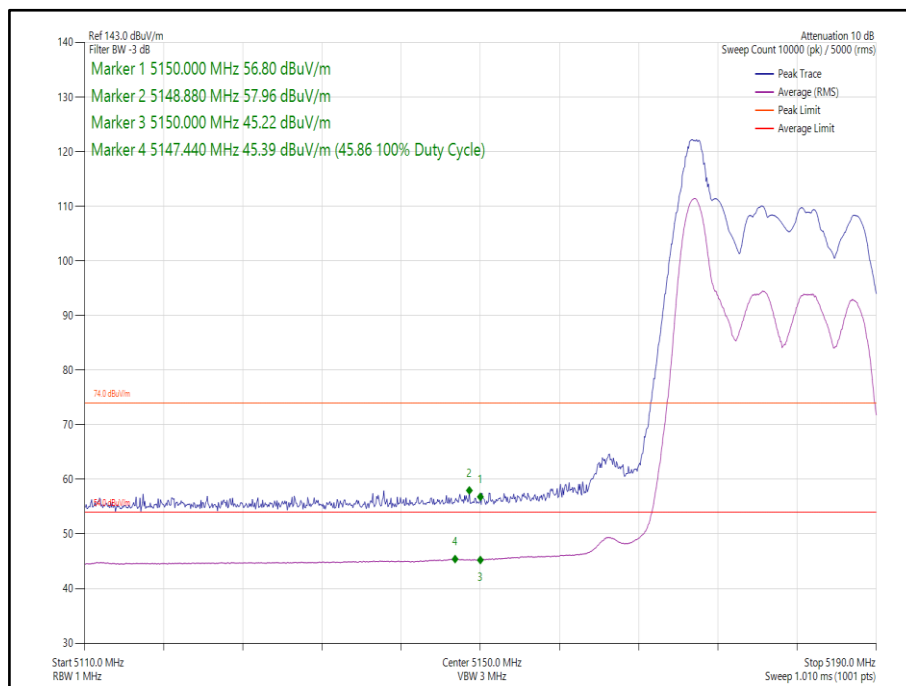


Figure 16 - 802.11ax HE20 CDD, Cores 0-1, 26-0 - 5180 MHz, Band Edge Frequency 5150 MHz

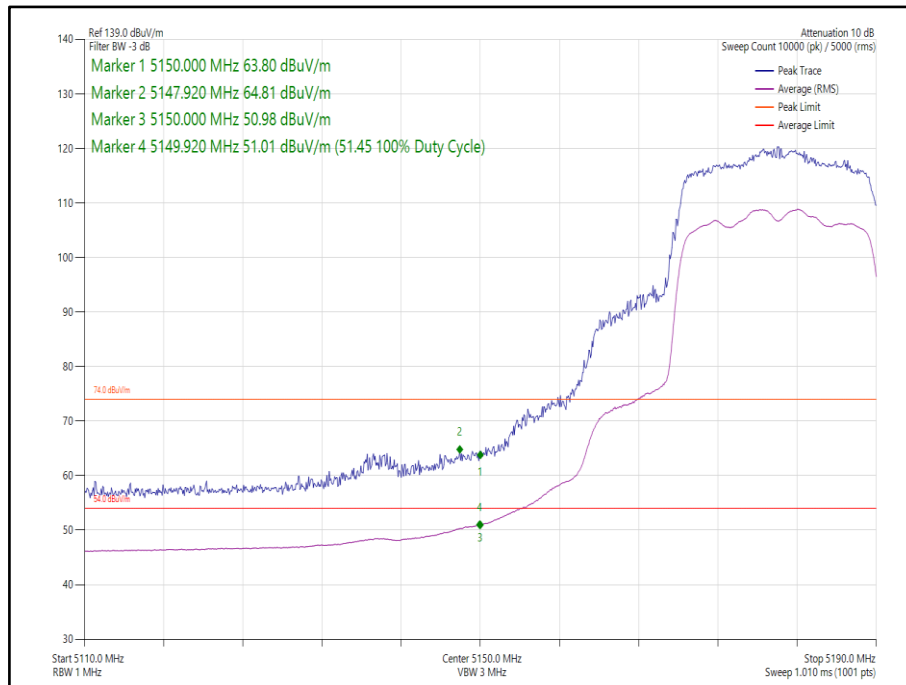


Figure 17 - 802.11ax HE20 SDM, Cores 0-1, SU - 5180 MHz, Band Edge Frequency 5150 MHz

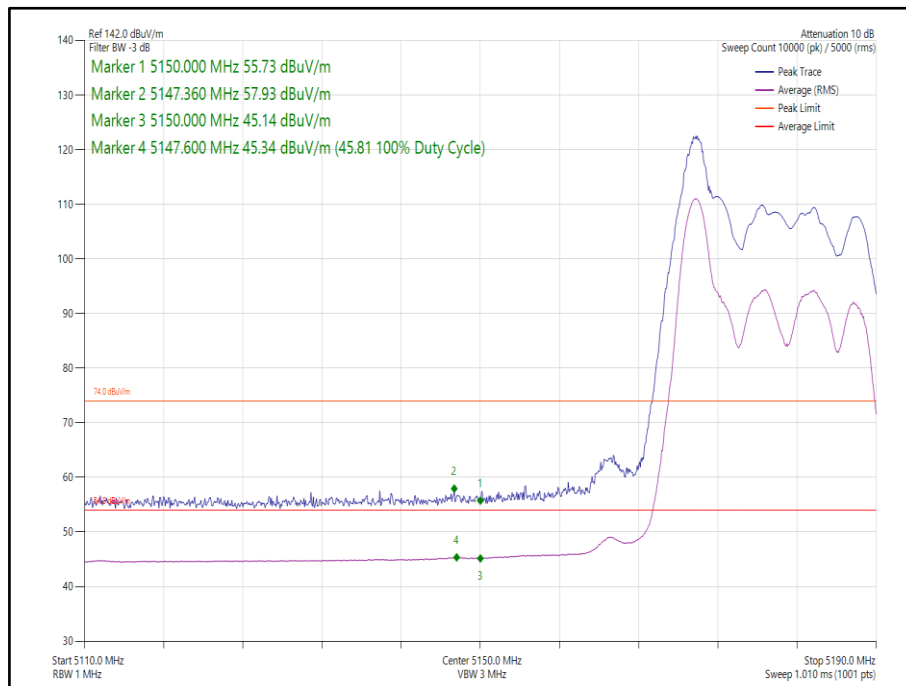


Figure 18 - 802.11ax HE20 SDM, Cores 0-1, 26-0 - 5180 MHz, Band Edge Frequency 5150 MHz

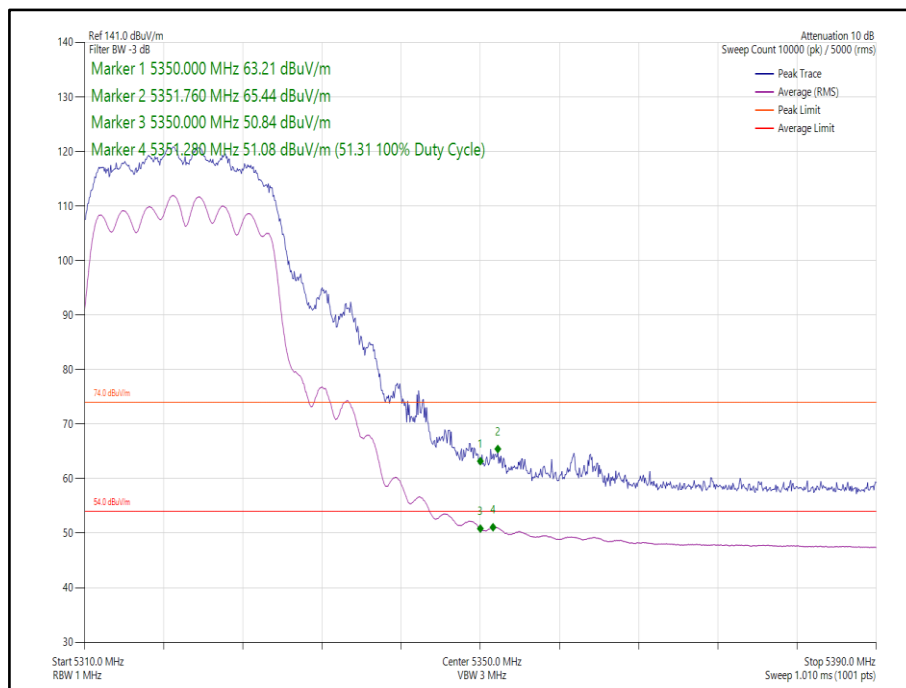


Figure 19 - 802.11n HT20 CDD, Cores 0-1 - 5320 MHz, Band Edge Frequency 5350 MHz

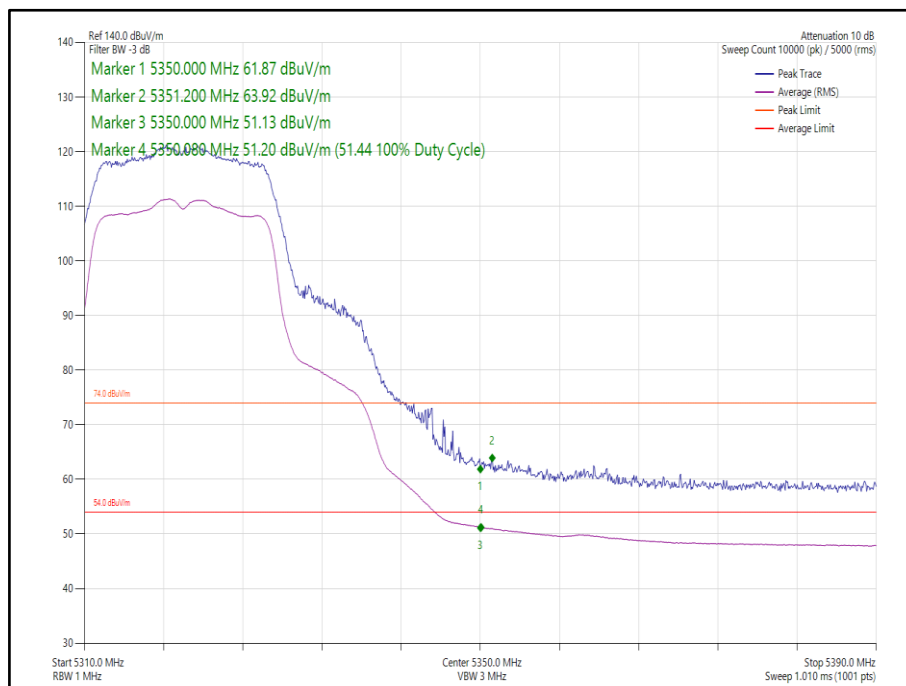


Figure 20 - 802.11n HT20 SDM, Cores 0-1 - 5320 MHz, Band Edge Frequency 5350 MHz

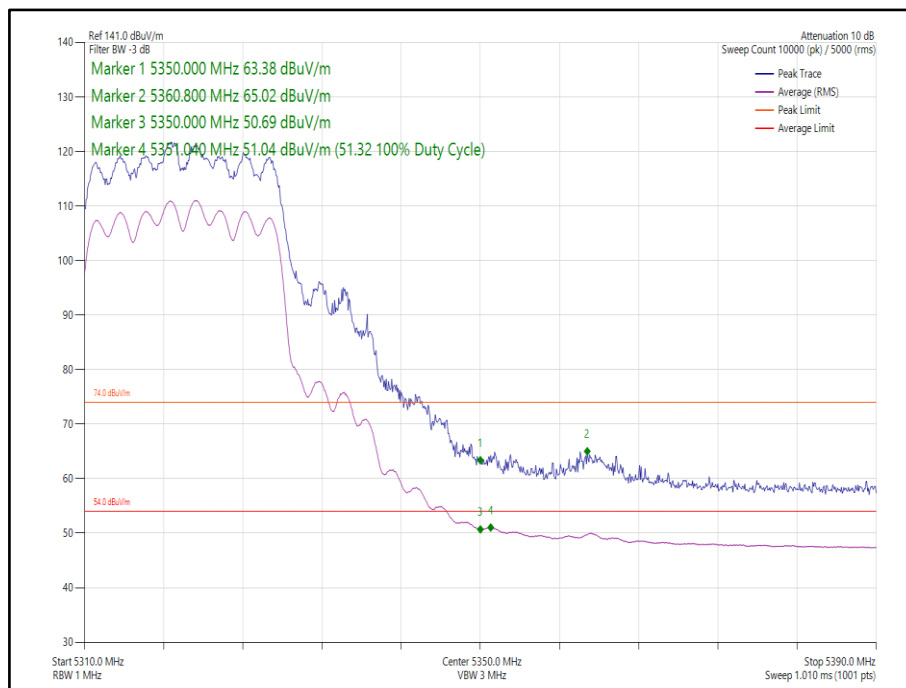


Figure 21 - 802.11ax HE20 CDD, Cores 0-1, SU - 5320 MHz, Band Edge Frequency 5350 MHz

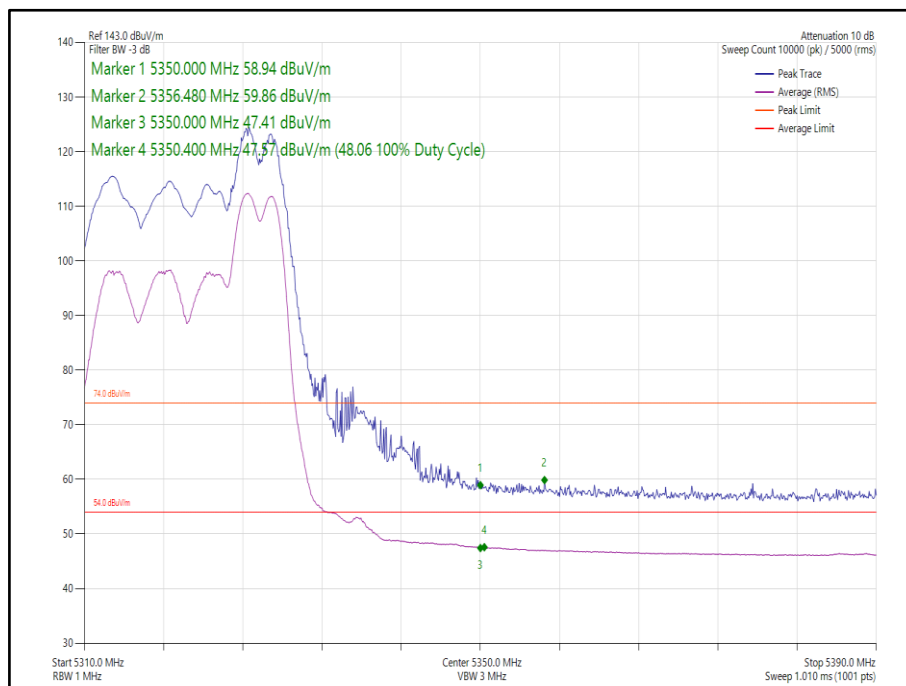


Figure 22 - 802.11ax HE20 CDD, Cores 0-1, 52-40 - 5320 MHz, Band Edge Frequency 5350 MHz

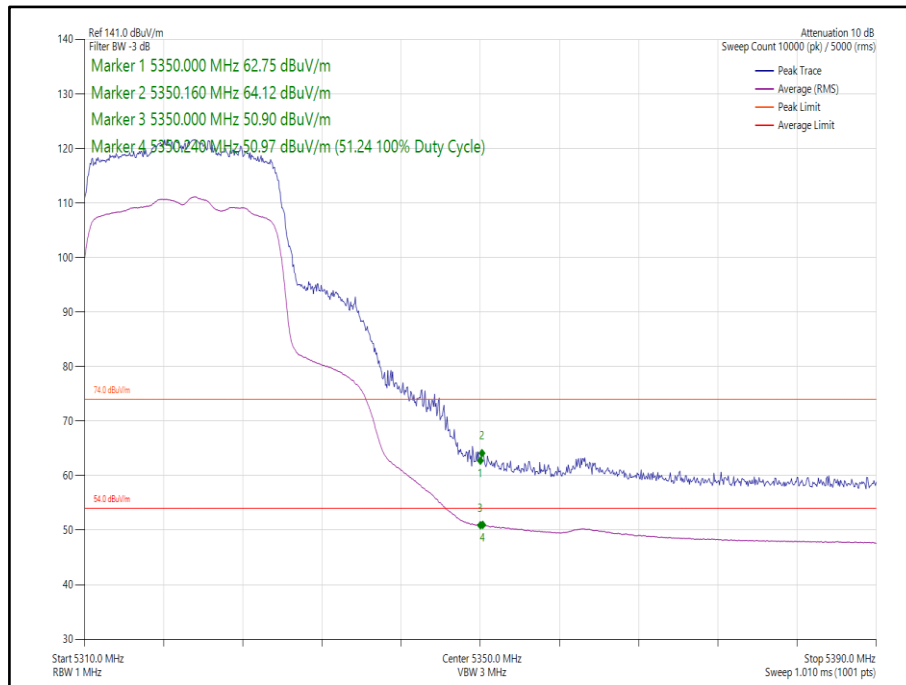


Figure 23 - 802.11ax HE20 SDM, Cores 0-1, SU - 5320 MHz, Band Edge Frequency 5350 MHz

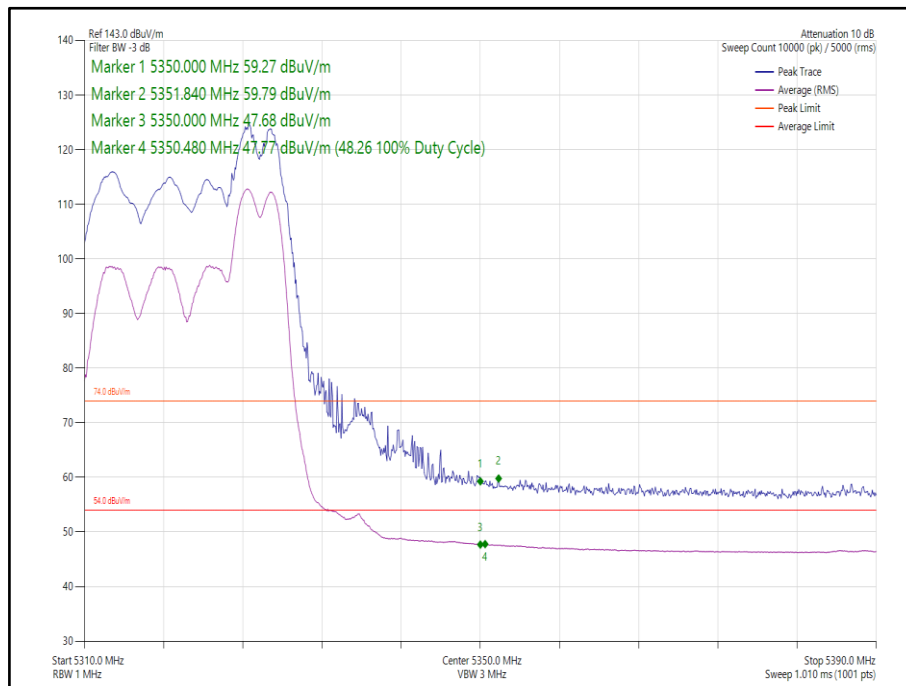


Figure 24 - 802.11ax HE20 SDM, Cores 0-1, 52-40 - 5320 MHz, Band Edge Frequency 5350 MHz

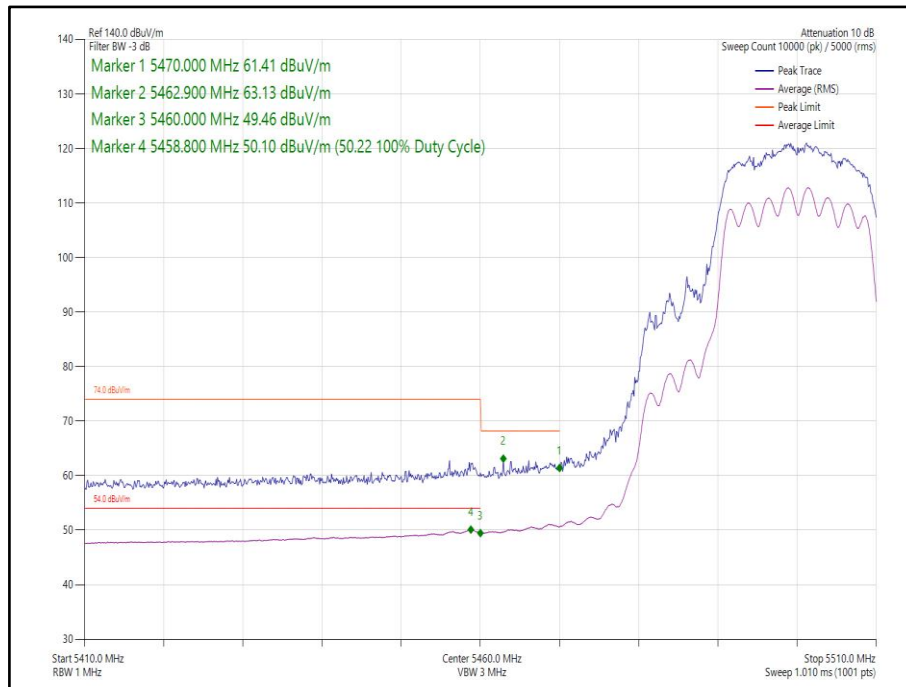


Figure 25 - 802.11n HT20 CDD, Cores 0-1 - 5500 MHz, Band Edge Frequency 5460 MHz

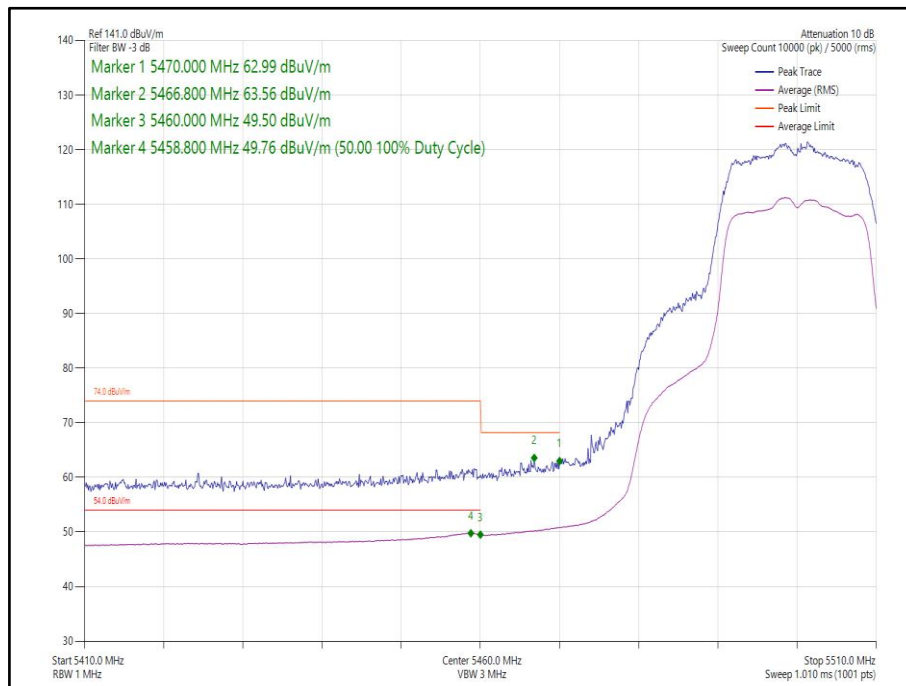


Figure 26 - 802.11n HT20 SDM, Cores 0-1 - 5500 MHz, Band Edge Frequency 5460 MHz

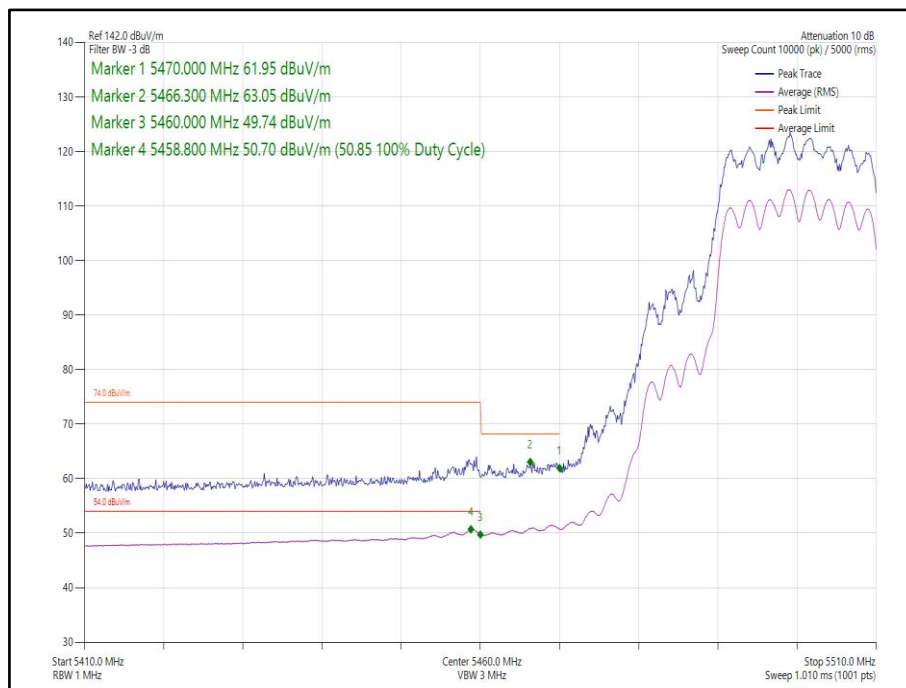


Figure 27 - 802.11ax HE20 CDD, Cores 0-1, SU- 5500 MHz, Band Edge Frequency 5460 MHz

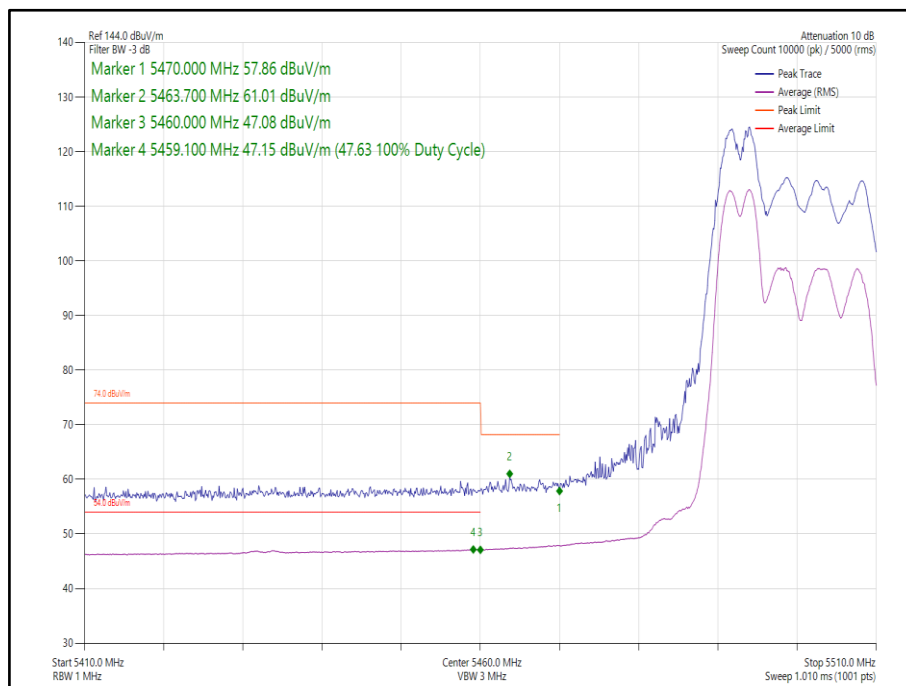


Figure 28 - 802.11ax HE20 CDD, Cores 0-1, 52-37 - 5500 MHz, Band Edge Frequency 5460 MHz

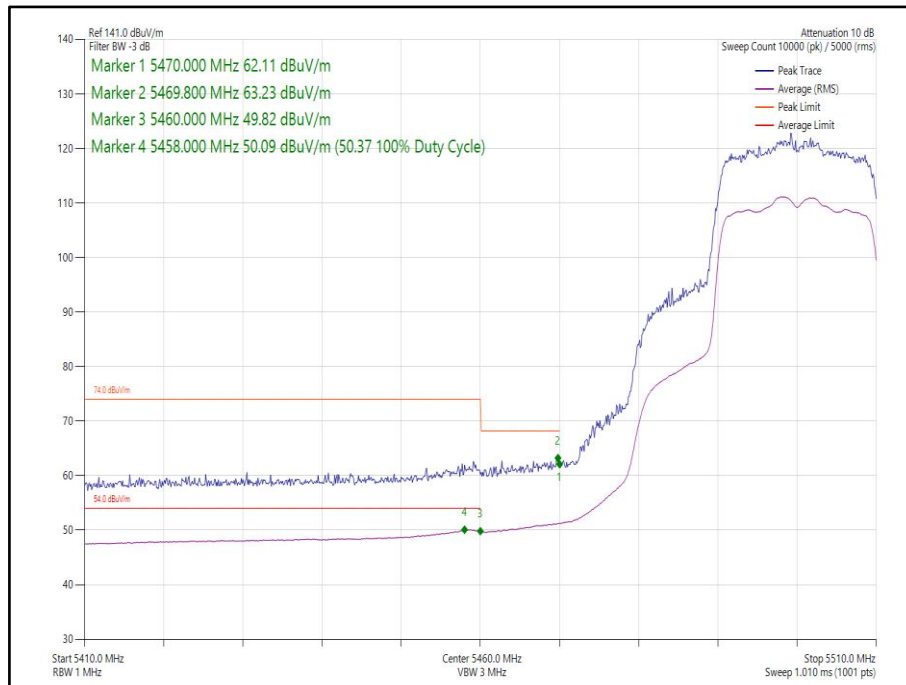


Figure 29 - 802.11ax HE20 SDM, Cores 0-1, SU- 5500 MHz Band Edge Frequency 5460 MHz

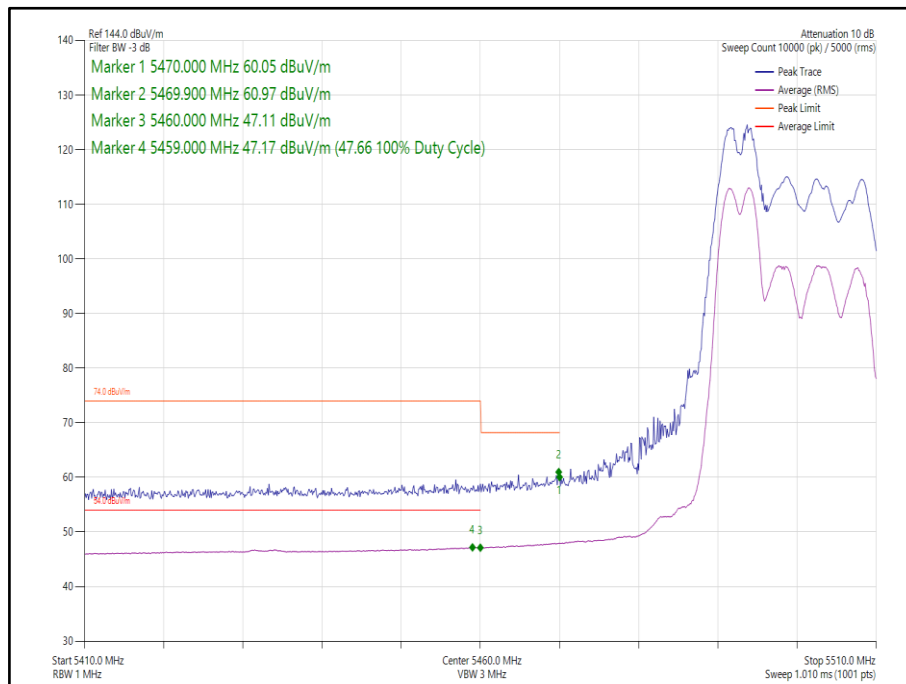


Figure 30 - 802.11ax HE20 SDM, Cores 0-1, 52-37 - 5500 MHz, Band Edge Frequency 5460 MHz



40 MHz Bandwidth (SISO)

Mode	Data Rate/ MCS	Resource Size	Resource Index	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
802.11n HT40, Core 0	MCS 2	-	-	5190	5150	64.23	50.18
802.11ax HE40, Core 0	MCS 2x1	SU	-	5190	5150	63.45	50.57
802.11ax HE40, Core 0	MCS 11x1	26	0	5190	5150	56.76	45.10
802.11n HT40, Core 0	MCS 2	-	-	5310	5350	64.37	51.17
802.11ax HE40, Core 0	MCS 2x1	SU	-	5310	5350	64.04	51.34
802.11ax HE40, Core 0	MCS 11x1	52	44	5310	5350	68.62	46.92
802.11n HT40, Core 0	MCS 2	-	-	5510	5460	-	49.47
802.11ax HE40, Core 0	MCS 2x1	SU	-	5510	5460	-	49.55
802.11ax HE40, Core 0	MCS 11x1	52	37	5510	5460	-	47.46

Table 9 - SISO Restricted Band Edge Results

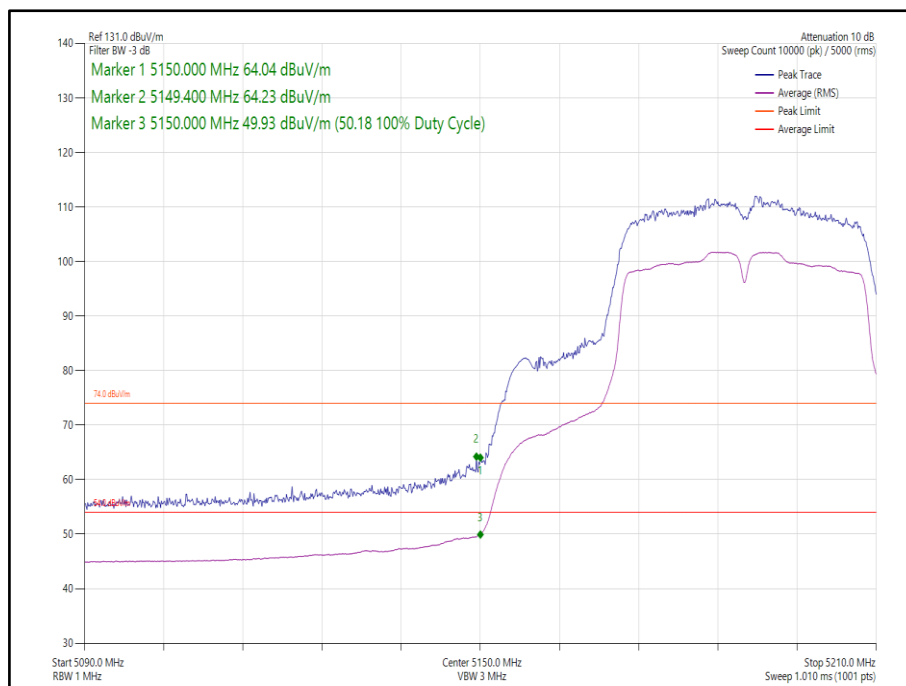


Figure 31 - 802.11n HT40, Core 0 - 5190 MHz, Band Edge Frequency 5150 MHz

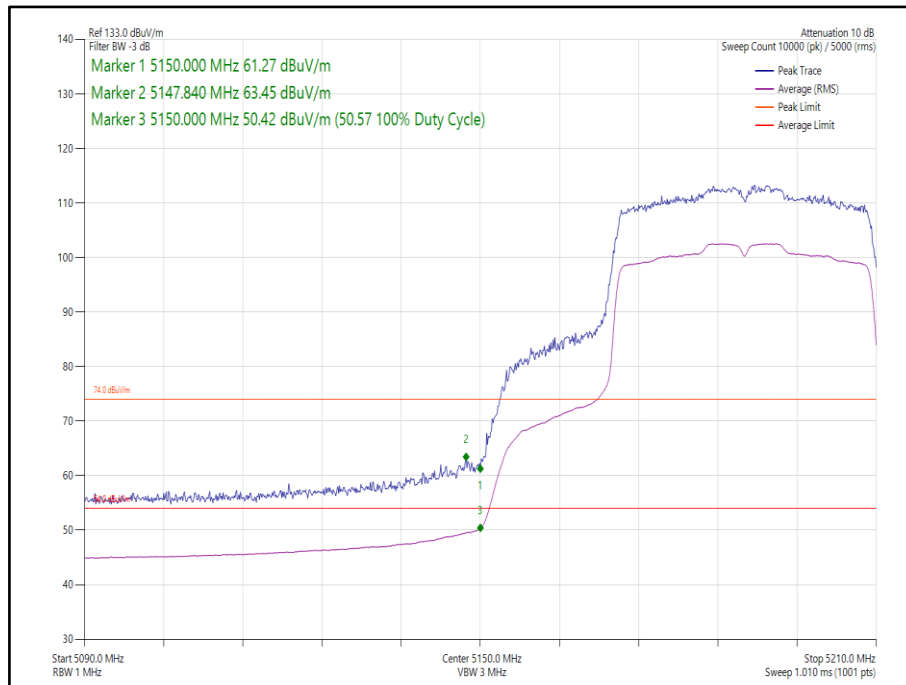


Figure 32 - 802.11ax HE40, Core 0, SU - 5190 MHz, Band Edge Frequency 5150 MHz

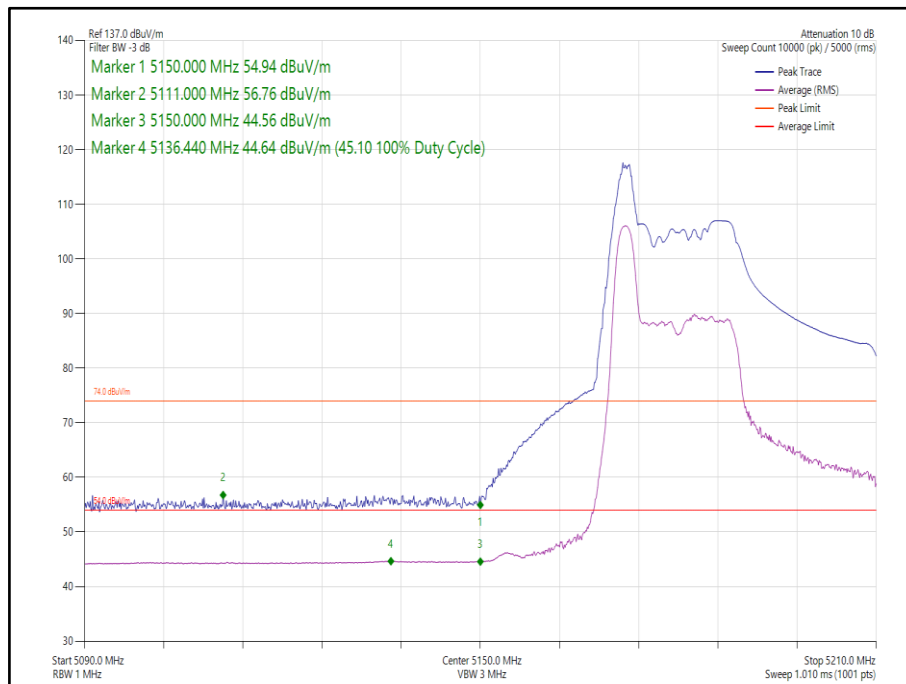


Figure 33 - 802.11ax HE40, Core 0, 26-0 - 5190 MHz, Band Edge Frequency 5150 MHz

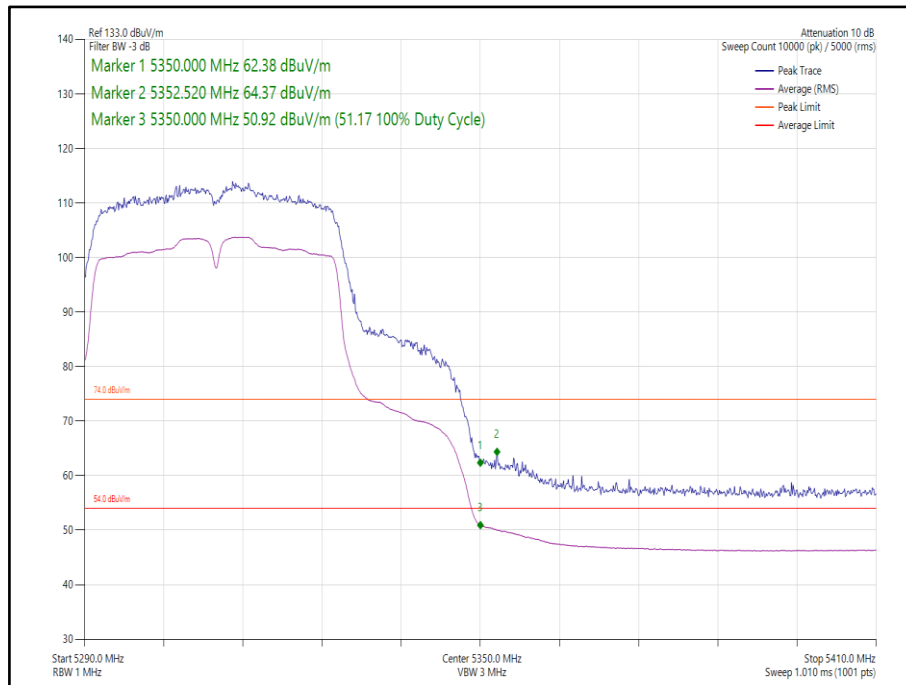


Figure 34 - 802.11n HT40, Core 0 - 5310 MHz, Band Edge Frequency 5350 MHz

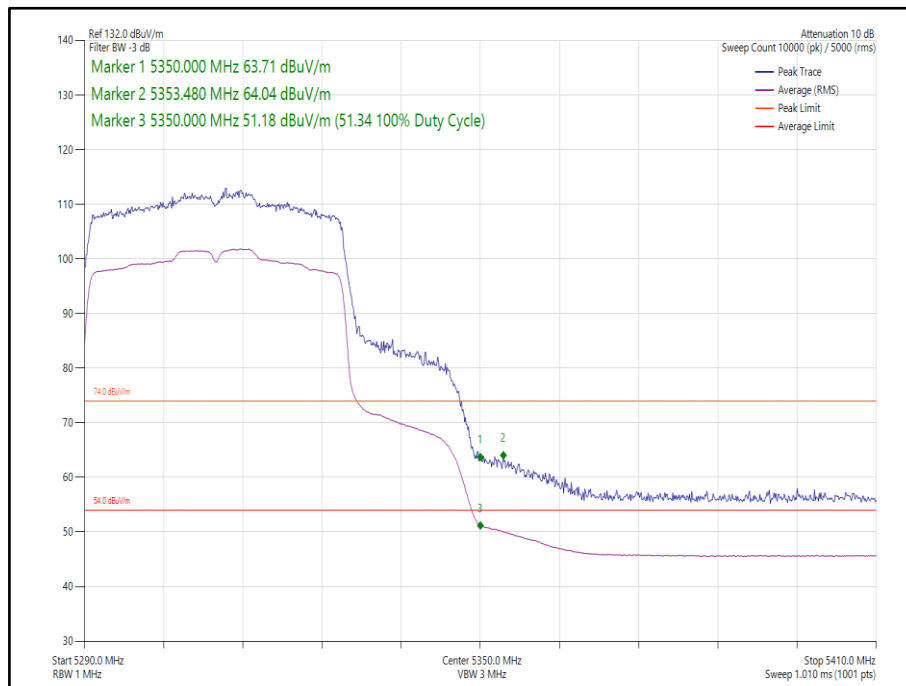


Figure 35 - 802.11ax HE40, Core 0, SU - 5310 MHz, Band Edge Frequency 5350 MHz

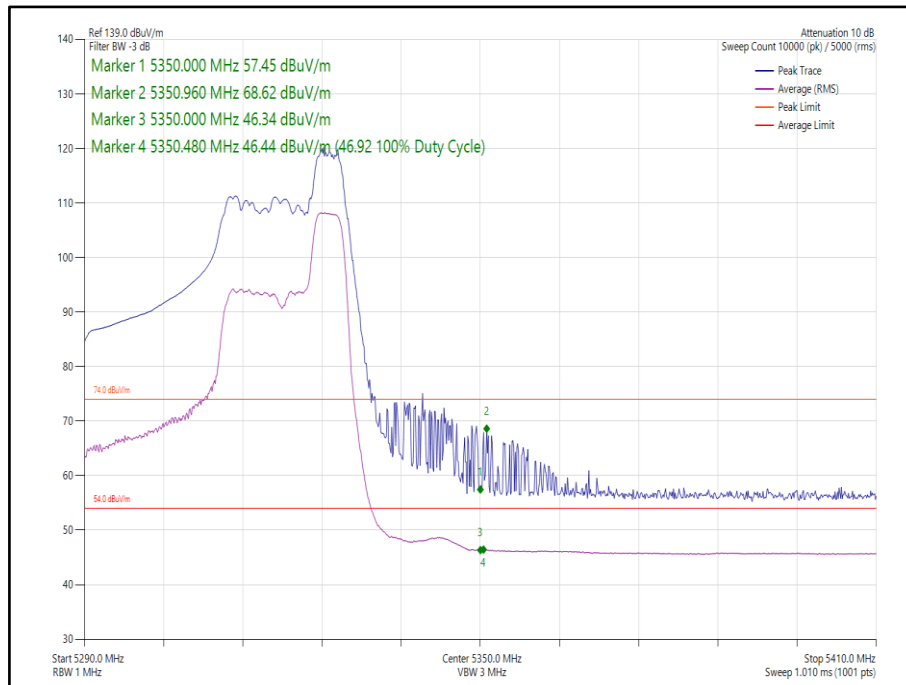


Figure 36 - 802.11ax HE40, Core 0, 52-44 - 5310 MHz, Band Edge Frequency 5350 MHz

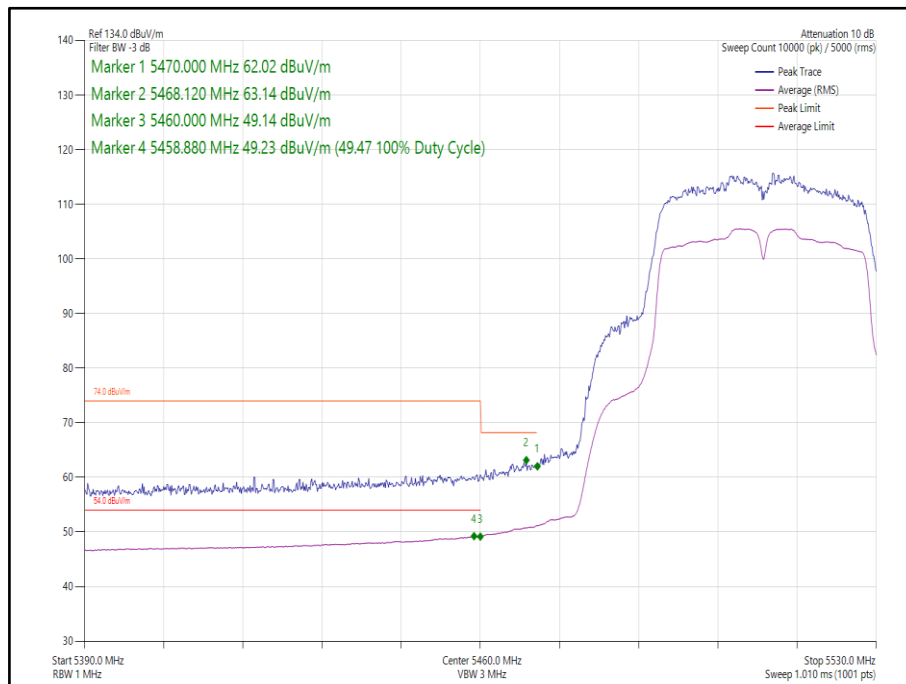


Figure 37 - 802.11n HT40, Core 0 - 5510 MHz, Band Edge Frequency 5460 MHz

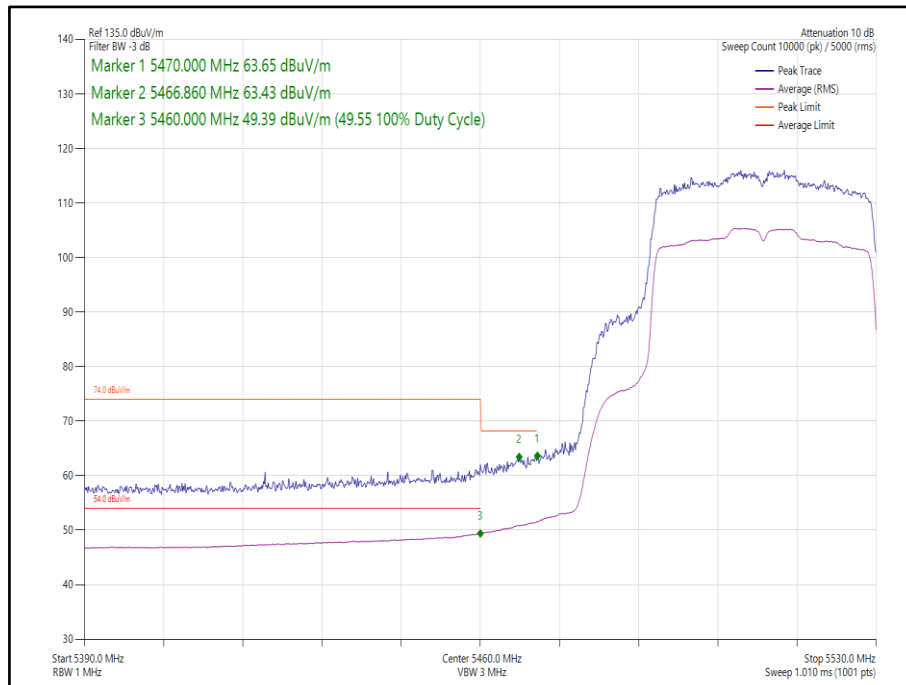


Figure 38 - 802.11ax HE40, Core 0, SU - 5510 MHz, Band Edge Frequency 5460 MHz

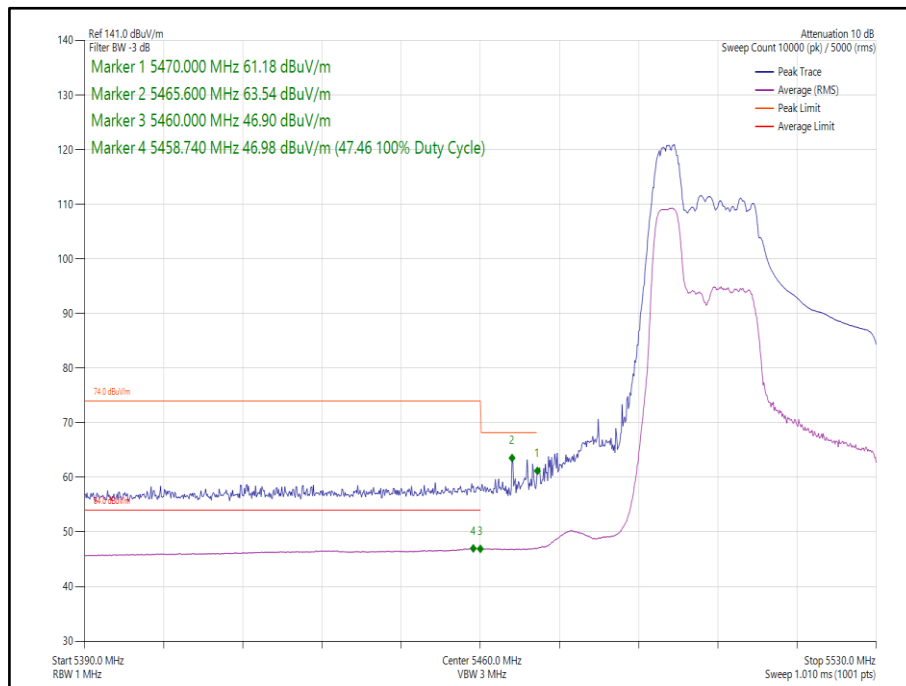


Figure 39 - 802.11ax HE40, Core 0, 52-37- 5510 MHz, Band Edge Frequency 5460 MHz



40 MHz Bandwidth (2TX MIMO)

Mode	Data Rate/ MCS	Resource Size	Resource Index	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
802.11n HT40 CDD, Cores 0-1	MCS 2	-	-	5190	5150	63.54	51.32
802.11n HT40 SDM, Cores 0-1	MCS 12	-	-	5190	5150	64.41	51.19
802.11ax HE40 CDD, Cores 0-1	MCS 4x1	SU	-	5190	5150	63.77	50.82
802.11ax HE40 CDD, Cores 0-1	MCS 11x1	26	0	5190	5150	59.05	45.96
802.11ax HE40 SDM, Cores 0-1	MCS 4x2	SU	-	5190	5150	64.22	51.43
802.11ax HE40 SDM, Cores 0-1	MCS 11x2	26	0	5190	5150	60.10	45.96
802.11n HT40 CDD, Cores 0-1	MCS 4	-	-	5310	5350	64.27	51.27
802.11n HT40 SDM, Cores 0-1	MCS 12	-	-	5310	5350	63.76	51.23
802.11ax HE40 CDD, Cores 0-1	MCS 4x1	SU	-	5310	5350	64.92	51.50
802.11ax HE40 CDD, Cores 0-1	MCS 11x1	52	44	5310	5350	69.08	48.10
802.11ax HE40 SDM, Cores 0-1	MCS 4x2	SU	-	5310	5350	64.15	51.45
802.11ax HE40 SDM, Cores 0-1	MCS 11x2	52	44	5310	5350	69.14	48.19
802.11n HT40 CDD, Cores 0-1	MCS 2	-	-	5510	5460	-	49.90
802.11n HT40 SDM, Cores 0-1	MCS 12	-	-	5510	5460	-	49.92
802.11ax HE40 CDD, Cores 0-1	MCS 2x1	SU	-	5510	5460	-	49.93
802.11ax HE40 CDD, Cores 0-1	MCS 11x1	52	37	5510	5460	-	47.96
802.11ax HE40 SDM, Cores 0-1	MCS 2x2	SU	-	5510	5460	-	49.70
802.11ax HE40 SDM, Cores 0-1	MCS 11x2	52	37	5510	5460	-	48.45

Table 10 - MIMO 2TX Restricted Band Edge Results

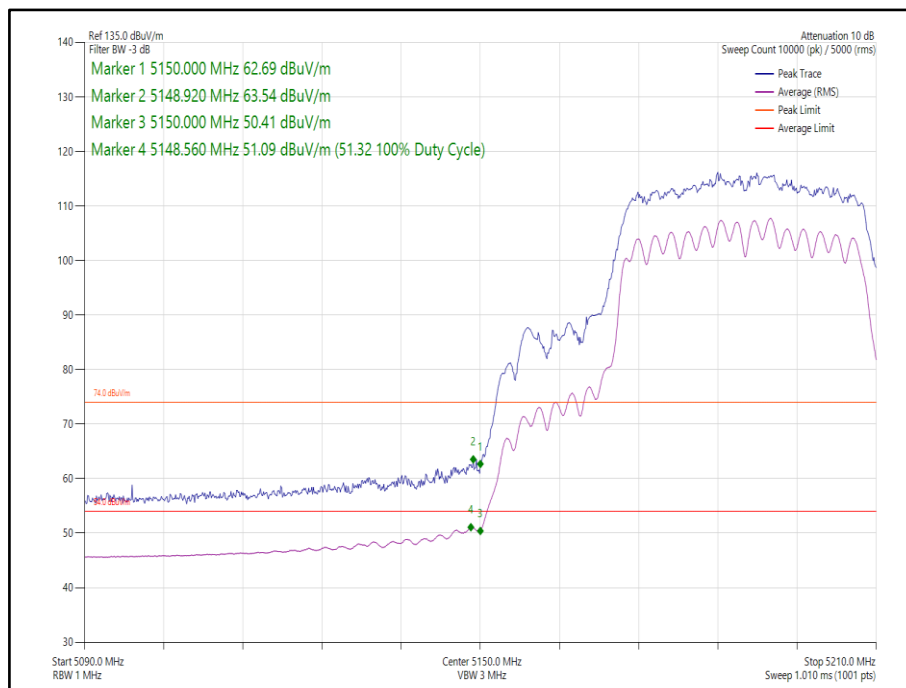


Figure 40 - 802.11n HT40 CDD Cores 0-1 - 5190 MHz, Band Edge Frequency 5150 MHz

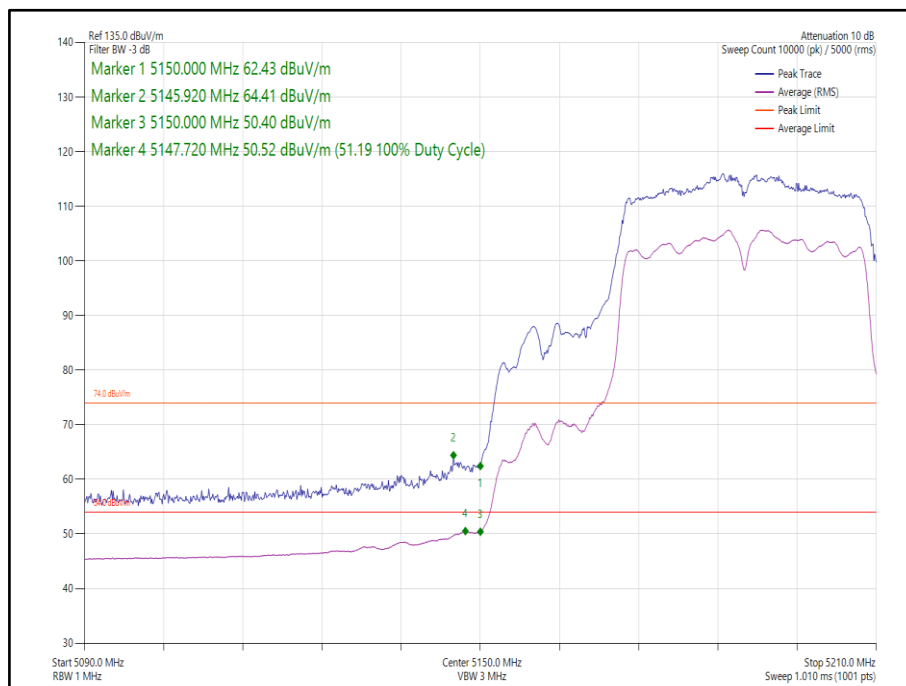


Figure 41 - 802.11n HT40 SDM Cores 0-1 - 5190 MHz, Band Edge Frequency 5150 MHz

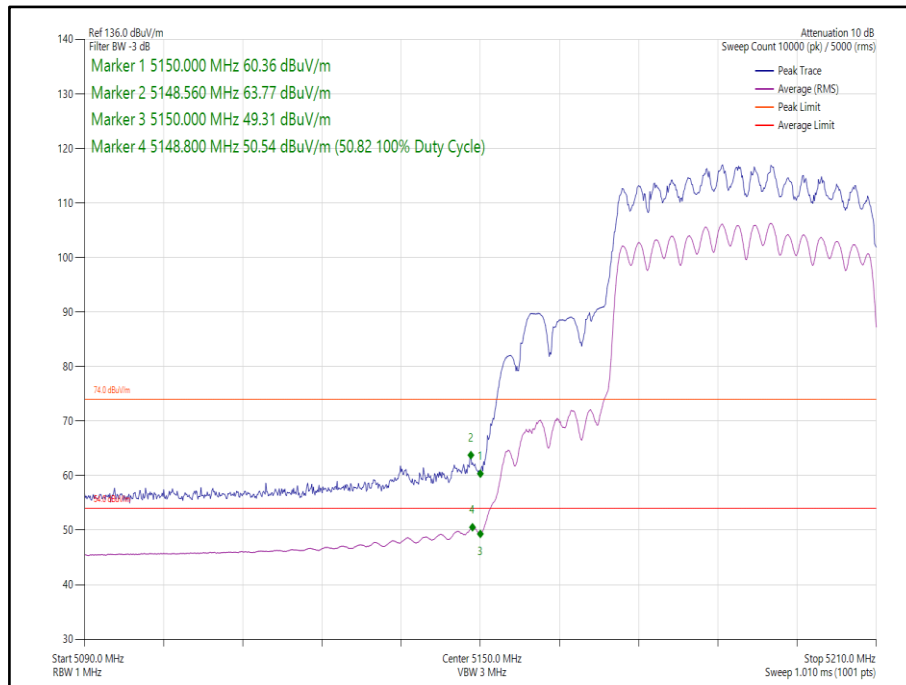


Figure 42 - 802.11ax HE40 CDD, Cores 0-1, SU - 5190 MHz, Band Edge Frequency 5150 MHz

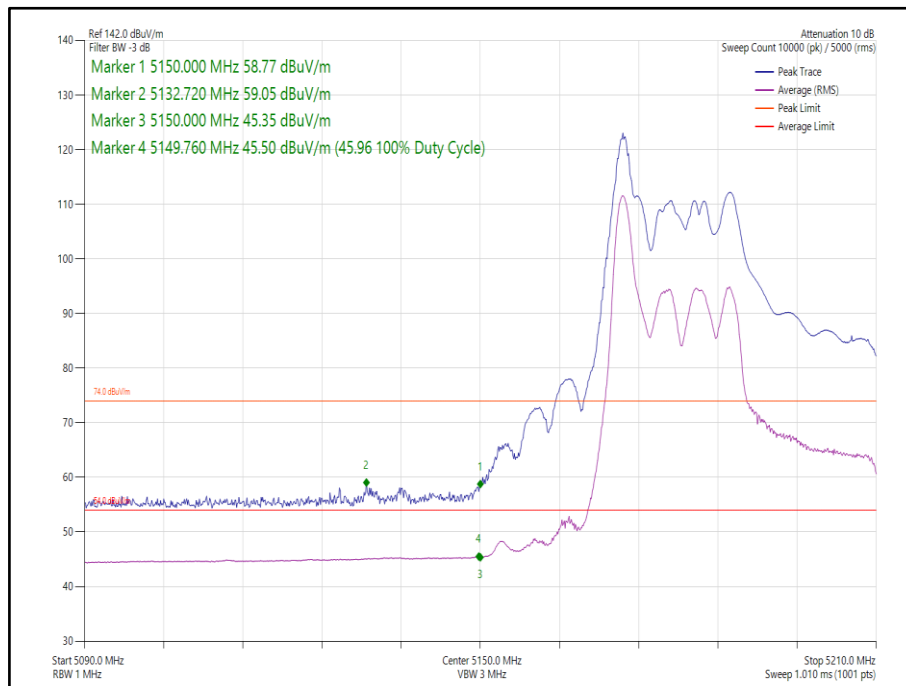


Figure 43 - 802.11ax HE40 CDD, Cores 0-1, 26-0 - 5190 MHz, Band Edge Frequency 5150 MHz

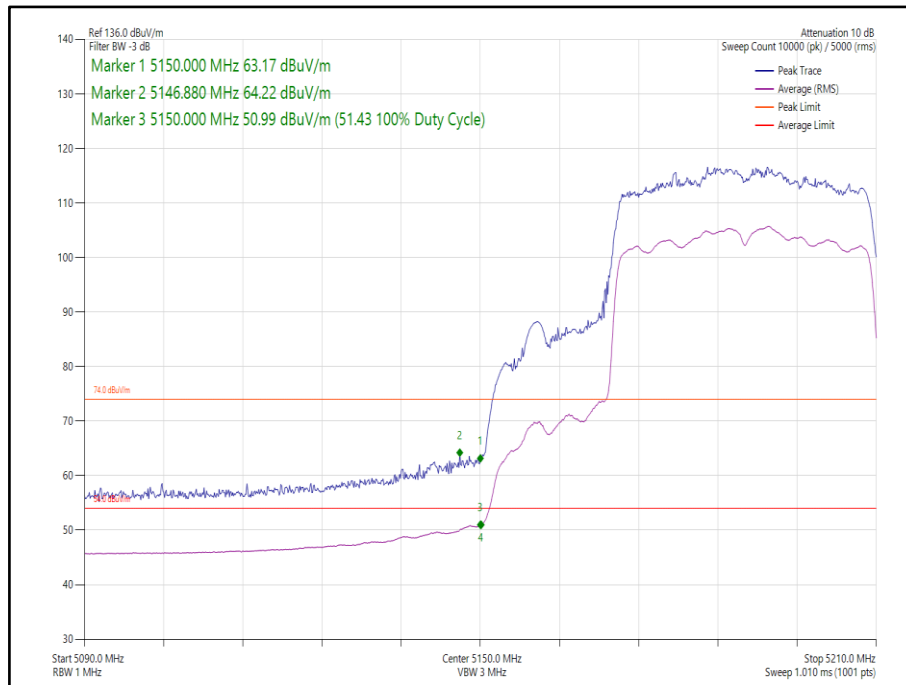


Figure 44 802.11ax HE40 SDM, Cores 0-1, SU - 5190 MHz, Band Edge Frequency 5150 MHz

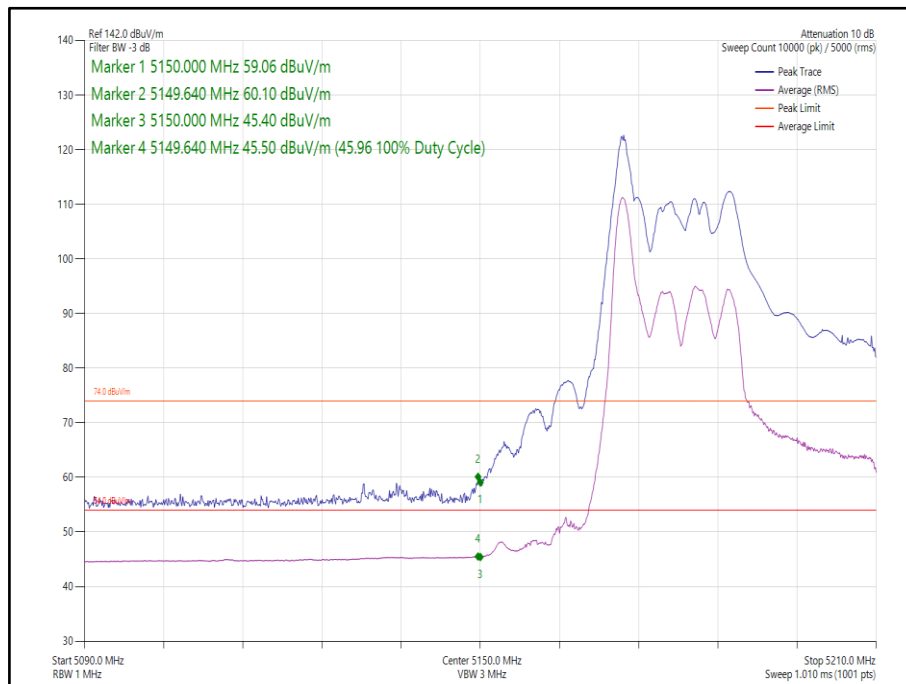


Figure 45 - 802.11ax HE40 SDM, Cores 0-1, 26-0 - 5190 MHz, Band Edge Frequency 5150 MHz

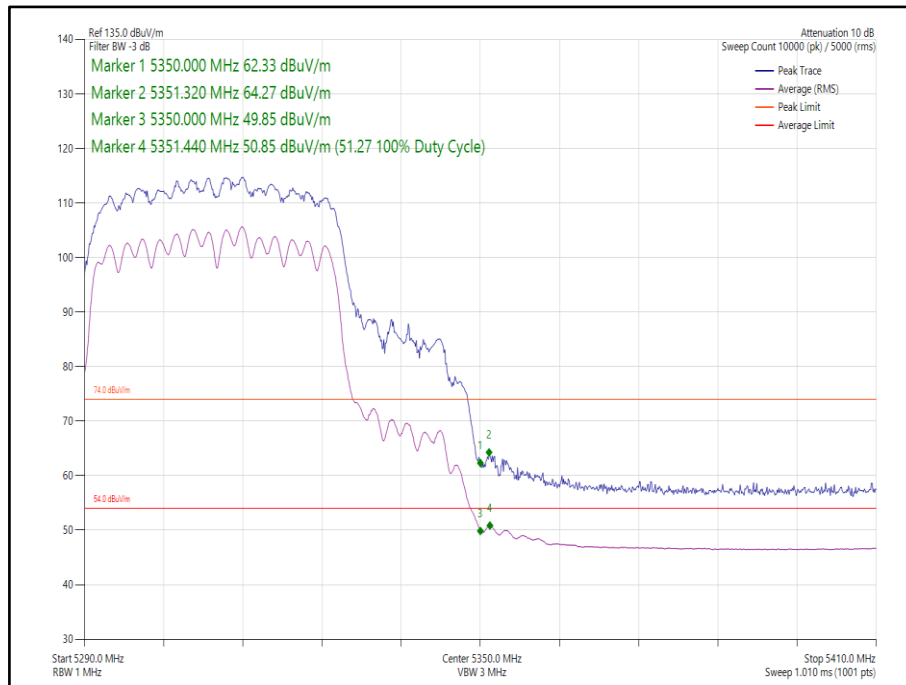


Figure 46 - 802.11n HT40 CDD, Cores 0-1 - 5310 MHz, Band Edge Frequency 5350 MHz

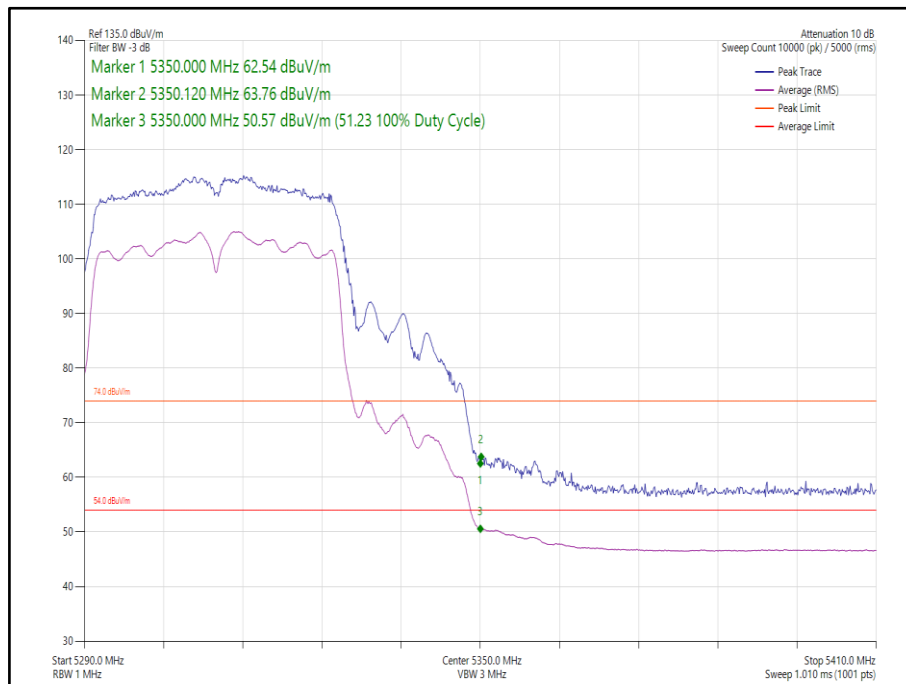


Figure 47 - 802.11n HT40 SDM, Cores 0-1 - 5310 MHz, Band Edge Frequency 5350 MHz

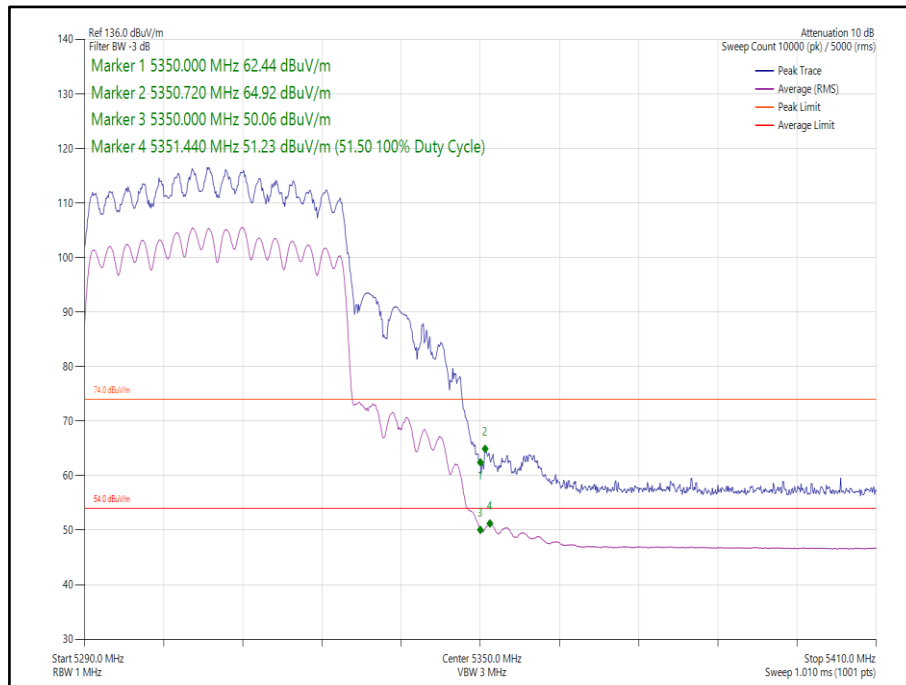


Figure 48 - 802.11ax HE40 CDD, Cores 0-1, SU - 5310 MHz, Band Edge Frequency 5350 MHz

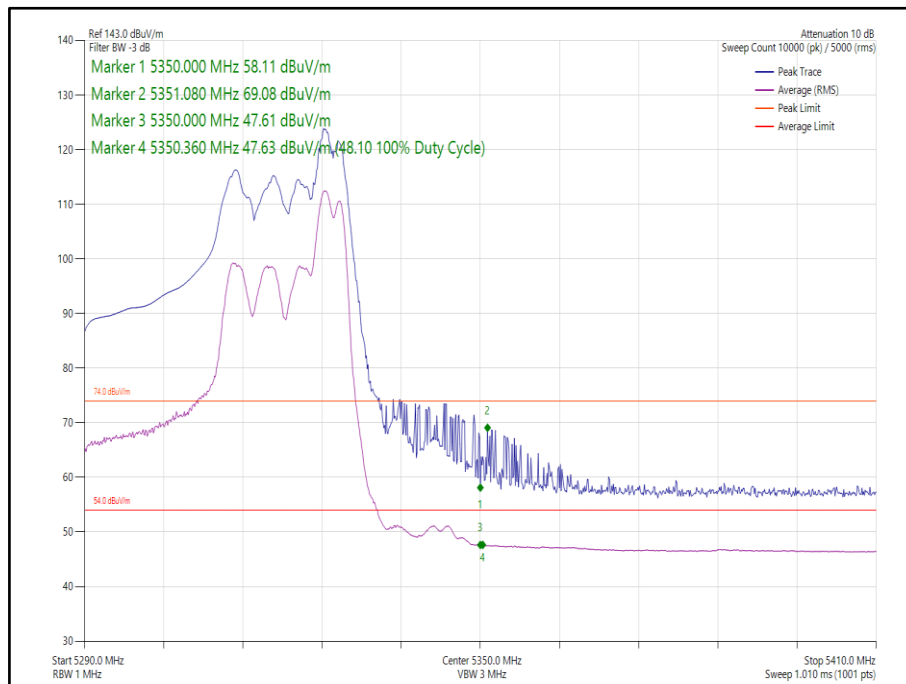


Figure 49 - 802.11ax HE40 CDD, Cores 0-1, 52-44 - 5310 MHz, Band Edge Frequency 5350 MHz

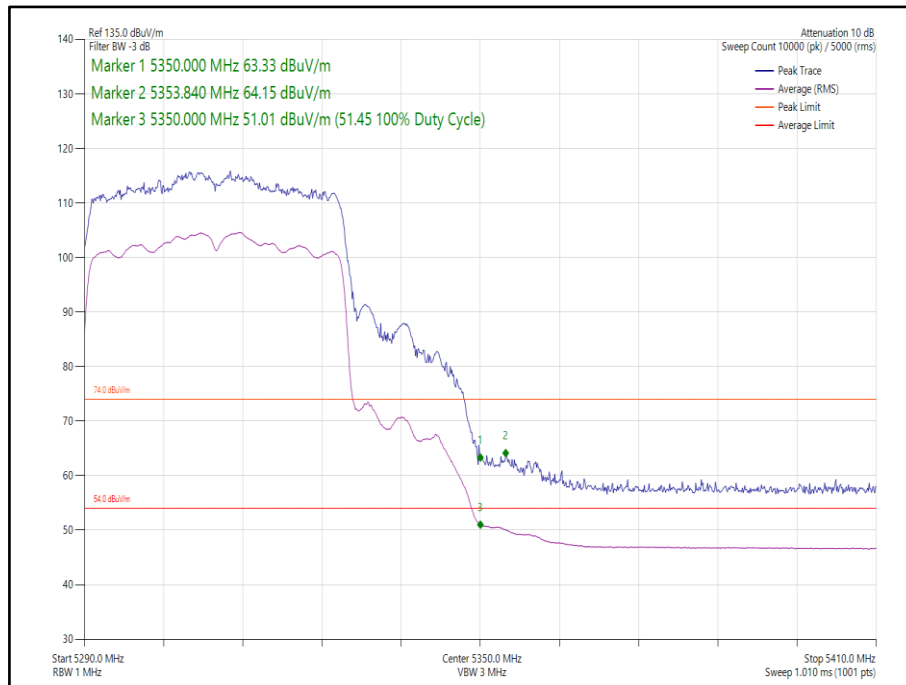


Figure 50 - 802.11ax HE40 SDM, Cores 0-1, SU - 5310 MHz, Band Edge Frequency 5350 MHz

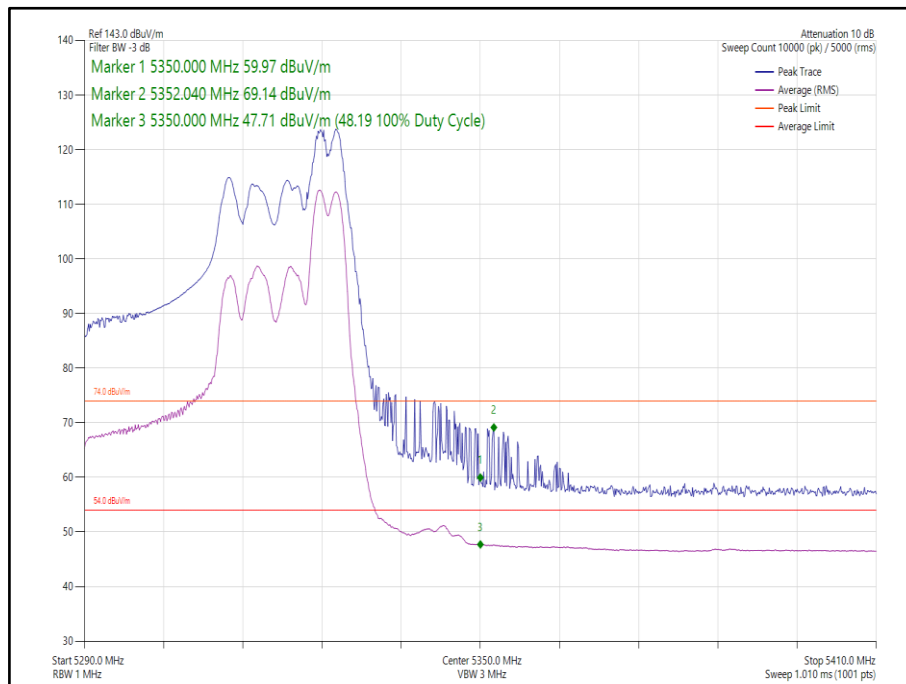


Figure 51 - 802.11ax HE40 SDM, Cores 0-1, 52-44 5310 MHz, Band Edge Frequency 5350 MHz

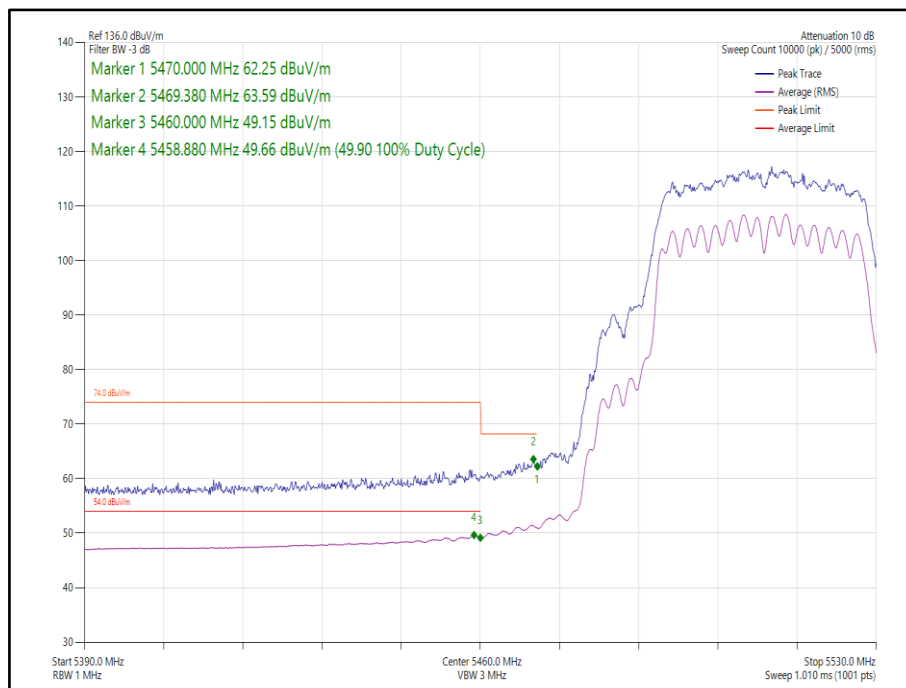


Figure 52 - 802.11n HT40 CDD, Cores 0-1 - 5510 MHz, Band Edge Frequency 5460 MHz

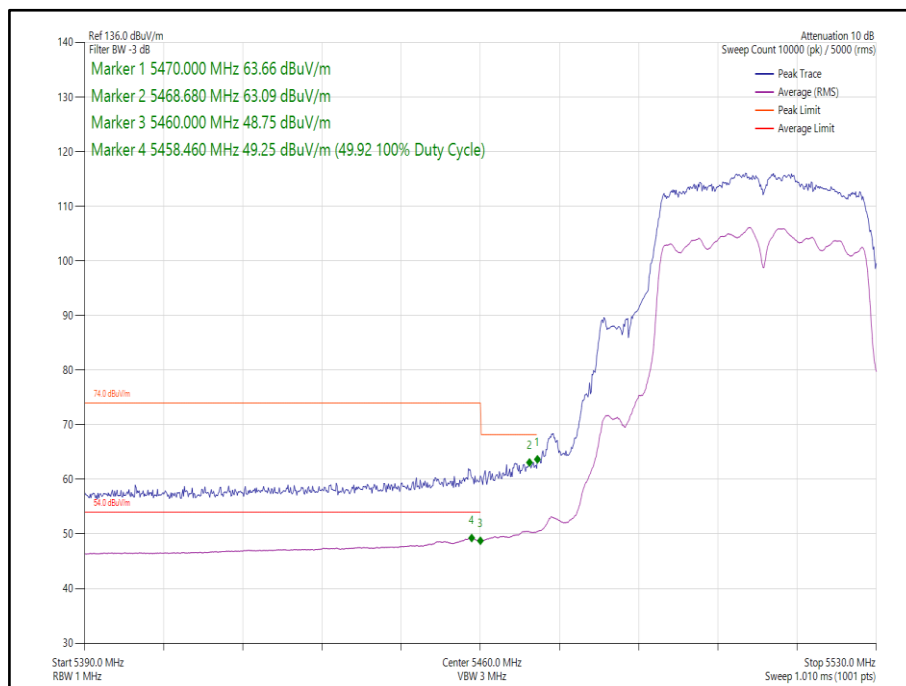


Figure 53 - 802.11n HT40 SDM, Cores 0-1 - 5510 MHz, Band Edge Frequency 5460 MHz

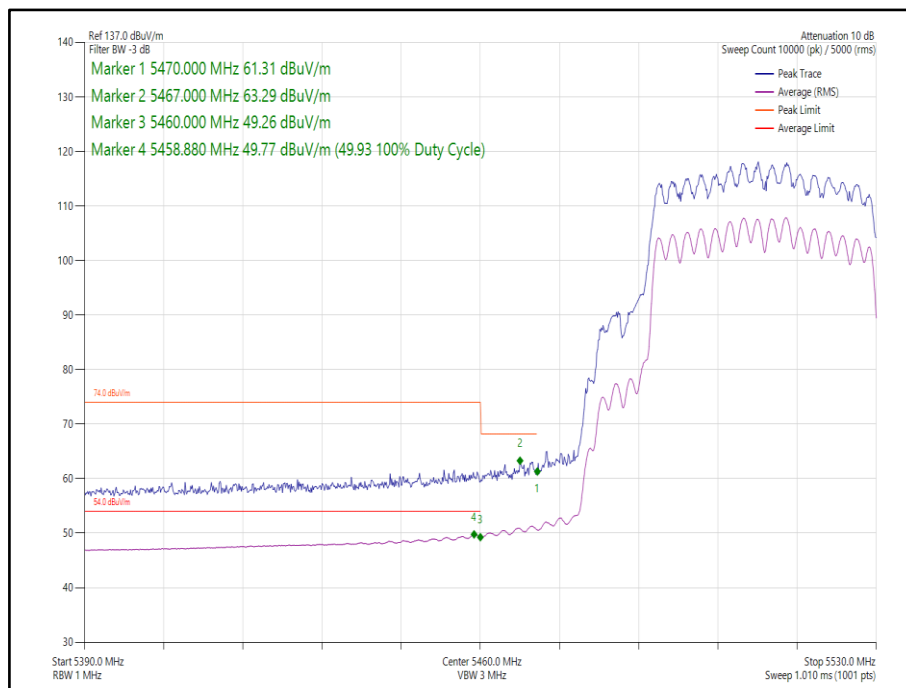


Figure 54 - 802.11ax HE40 CDD, Cores 0-1, SU - 5510 MHz, Band Edge Frequency 5460 MHz

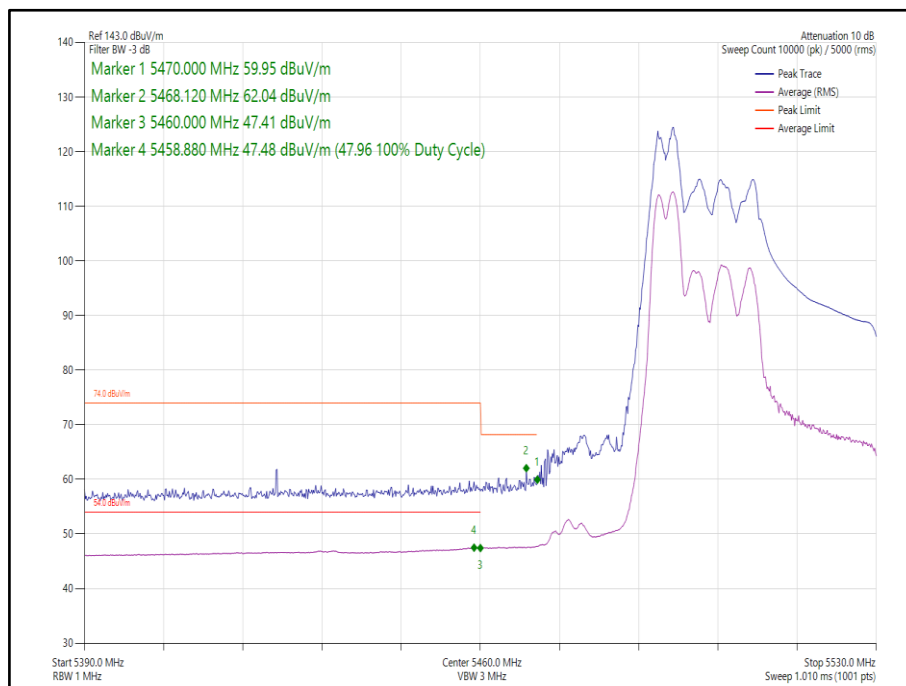


Figure 55 - 802.11ax HE40 CDD, Cores 0-1, 52-37 - 5510 MHz, Band Edge Frequency 5460 MHz

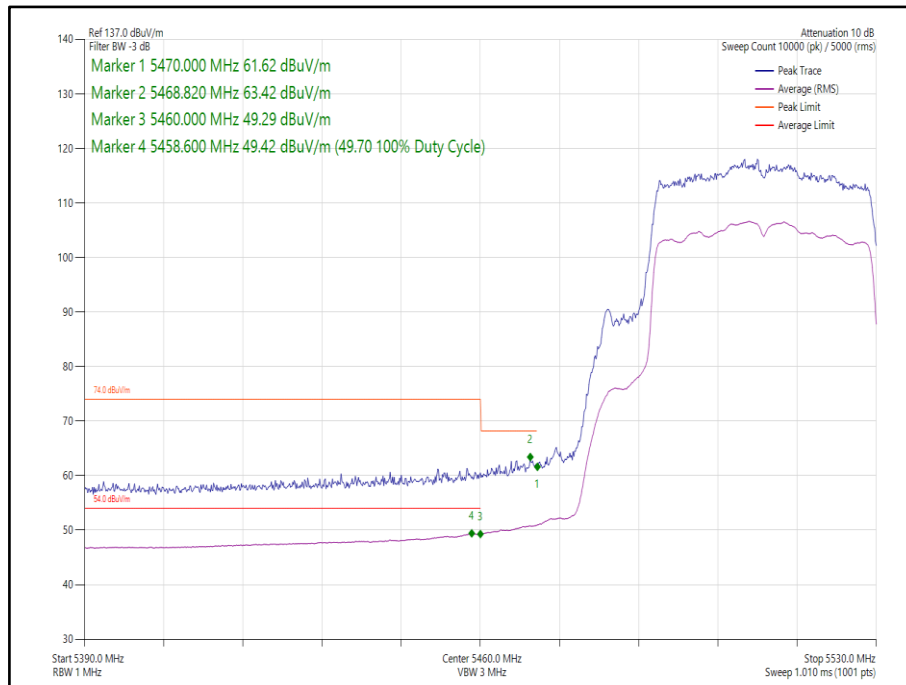


Figure 56 - 802.11ax HE40 SDM, Cores 0-1, SU - 5510 MHz, Band Edge Frequency 5460 MHz

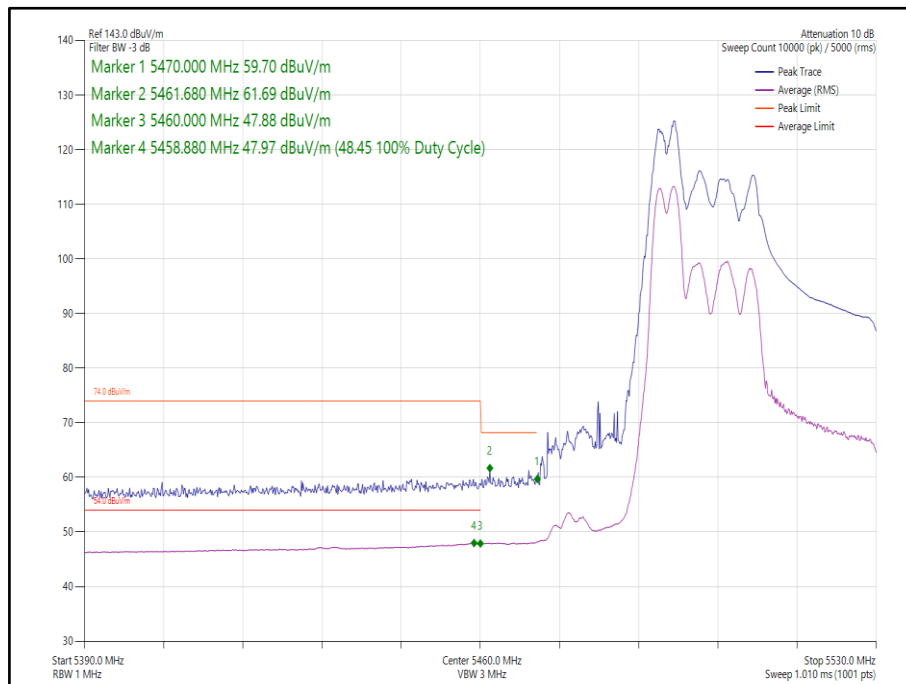


Figure 57 - 802.11ax HE40 SDM, Cores 0-1, 52-37 - 5510 MHz, Band Edge Frequency 5460 MHz