

FCC and ISED Test Report

Apple Inc
Model: A2901

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



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Document 75958006-09 Issue 01

SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Matthew Russell	Chief Engineer (RF)	Authorised Signatory	02 May 2023

Signatures in this approval box have checked this document in line with the requirements of TUV SUD 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	02 May 2023	

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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ACCREDITATION

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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	02-May-2023

Table 1

1.2 Introduction

Applicant	Apple Inc
Manufacturer	Apple Inc
Model Number(s)	A2901
Serial Number(s)	CMWNHDHDYJ, QXM2RLKFW6, HPXKWF6DJV, PXC62W93WY and XJCFQ12HP6
Hardware Version(s)	REV 1.0
Software Version(s)	22E61680r, 22E62160j, 22E126, 22E61680r and 22E209
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)
Start of Test	07-February-2023
Finish of Test	14-April-2023
Name of Engineer(s)	Stefan Gilfedder, Faisal Malyar, Ioan-Alexandru Bogatu, Akhil Rajendran Bhaskaran Nair, Colin Brain, Danial Shafique, Mustafa Murad, David Hill, Michael Evans, Mohammad Malik, Morsalin Hossain, James Woods and Elliot Callender
Related Document(s)	ANSI C63.10 (2020) ANSI C63.10 (2013) KDB 662911 D01 v02r01 KDB 905462 D02 v02 KDB 905462 D03 v01r02 KDB 789033 D02 v02r01



1.3 Brief

A brief carried out in

47 CFR Part 15E, ISED RSS-247 and ISED RSS-GEN is shown below.

Summary of Results

summary of the tests
 accordance with FCC

Section	Specification Clause		Test Description	Result	Comments/Base Standard
	FCC Part 15E	RSS-247			
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	3.3	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	15.209 and 15.407 (b)	6.2	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 (EUT) was an Apple desktop computer with Bluetooth®, Bluetooth® Low Energy, Thread and IEEE 802.11 a/b/g/n/ac/ax Wi-Fi capabilities in the 2.4 GHz, 5 GHz and 6 GHz bands.

1.4.2 Test Modes

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

The EUT supported 802.11ax Single User (SU) and Multi-User (MU) 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), Space Division Multiplexing (SDM) and Transmit Beamforming (TxBF) 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.

Band edge testing was performed in all modes with multiple modulation types, with only the worst-case reported. After band edge additional preliminary investigations were performed to find the worst-case mode of operation, the EUT was tested in the following supported transmit modes:

SISO Modes (Core 0):

- 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):

- 802.11n/ac (V)HT20 - CDD (MCS2), SDM (MCS10) and TxBF (MCS2x1)
- 802.11n/ac (V)HT40 - CDD (MCS2), SDM (MCS10) and TxBF (MCS2x1)
- 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)
- 802.11ax HE40 SU – CDD (MCS2x1) and SDM (MCS2x2)
- 802.11ax HE80 SU – CDD (MCS2x1) and SDM (MCS2x2)
- 802.11ax HE160 SU – CDD (MCS2x1) and 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. HT (802.11n) modes were used for CDD and SDM and VHT (802.11ac) modes were used for TxBF.

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. 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	3.76	1.07
	5250 to 5350	4.26	1.07
	5470 to 5725	2.73	1.17
	5725 to 5850	0.62	1.18
Core 1	5150 to 5250	0.08	1.07
	5250 to 5350	1.31	1.07
	5470 to 5725	1.83	1.17
	5725 to 5850	0.30	1.18

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: A2901, Serial Number: CMWNHDHDYJ			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A2901, Serial Number: QXM2RLKFW6			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A2901, Serial Number: HPXKWF6DJV			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A2901, Serial Number: PXC62W93WY			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A2901, Serial Number: XJCFQ12HP6			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 4



1.7 Test Location

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	Faisal Malyar, Ioan-Alexandru Bogatu, Akhil Rajendran Bhaskaran Nair, Colin Brain and Danial Shafique	UKAS
Emission Bandwidth	Mustafa Murad and David Hill	UKAS
Maximum Conducted Output Power	Mustafa Murad	UKAS
Maximum Conducted Power Spectral Density	Mustafa Murad and David Hill	UKAS
Authorised Band Edges	Faisal Malyar, Ioan-Alexandru Bogatu, Akhil Rajendran Bhaskaran Nair, Colin Brain and Danial Shafique	UKAS
Spurious Radiated Emissions	Michael Evans, Mohammad Malik, Morsalin Hossain, James Woods and Elliot Callender	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
 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-247, Clause 3.3
ISED RSS-GEN, Clause 8.10

2.1.2 Equipment Under Test and Modification State

A2901, S/N: CMWNHDHDYJ - Modification State 0

2.1.3 Date of Test

07-February-2023 to 13-February-2023

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.

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

2.1.5 Environmental Conditions

Ambient Temperature	19.8 - 24.1 °C
Relative Humidity	33.6 - 46.5 %



2.1.6 Test Results

5 GHz WLAN

20 MHz Bandwidth - Core 0 (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	54 Mbps	-	-	5180	5150	66.42	51.39
802.11n HT20	MCS4	-	-	5180	5150	67.33	51.48
802.11ax HE20	MCS11x1	SU	-	5180	5150	69.18	49.62
802.11ax HE20	MCS11x1	106	53	5180	5150	64.44	45.77
802.11a	54 Mbps	-	-	5320	5350	66.83	51.17
802.11n HT20	MCS4	-	-	5320	5350	68.77	51.46
802.11ax HE20	MCS4x1	SU	-	5320	5350	69.49	51.15
802.11ax HE20	MCS11x1	106	54	5320	5350	62.76	46.05
802.11a	54 Mbps	-	-	5500	5460	63.62	44.99
802.11n HT20	MCS7	-	-	5500	5460	63.60	44.39
802.11ax HE20	MCS11x1	SU	-	5500	5460	63.69	44.55
802.11ax HE20	MCS11x1	106	53	5500	5460	58.19	42.84

Table 6 - SISO Restricted Band Edge Results

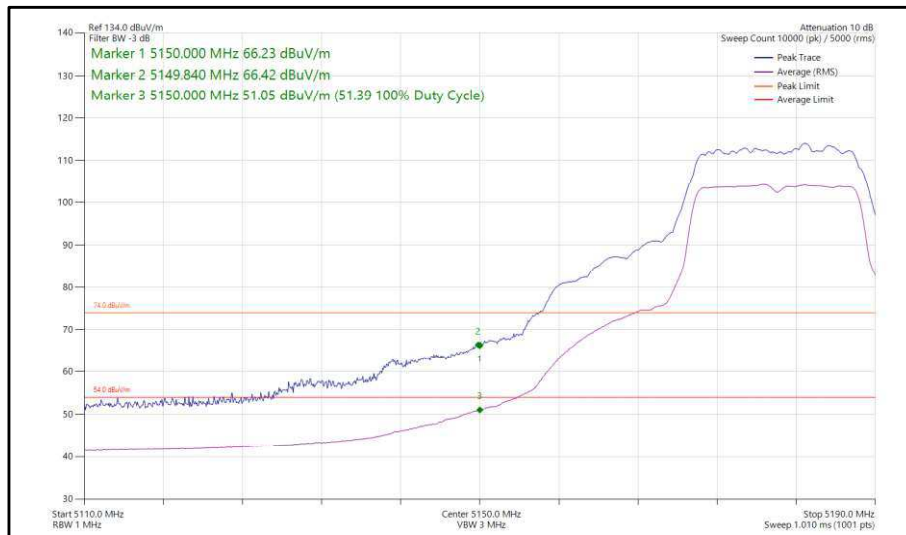
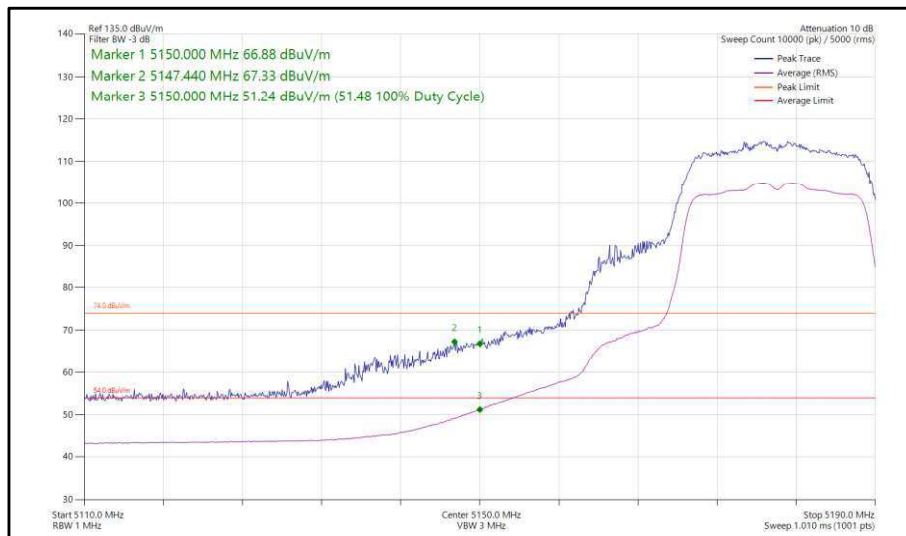
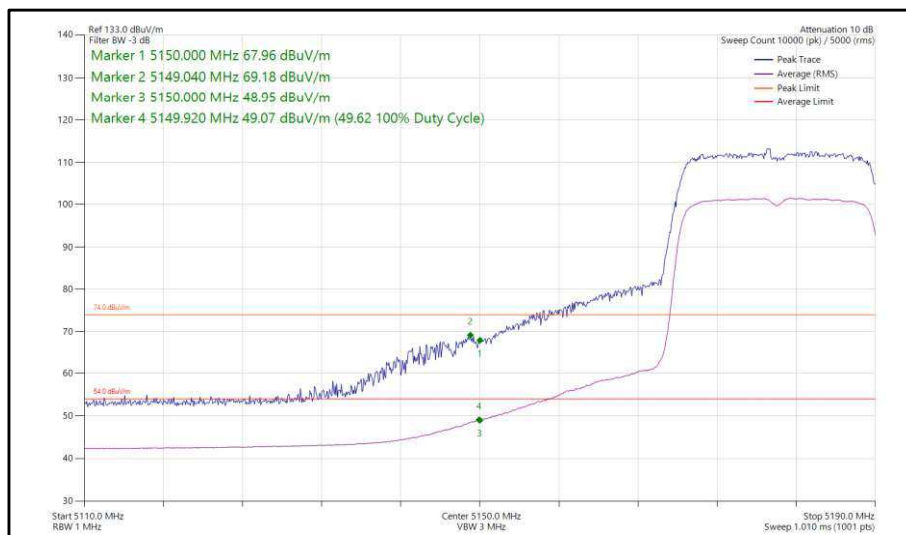


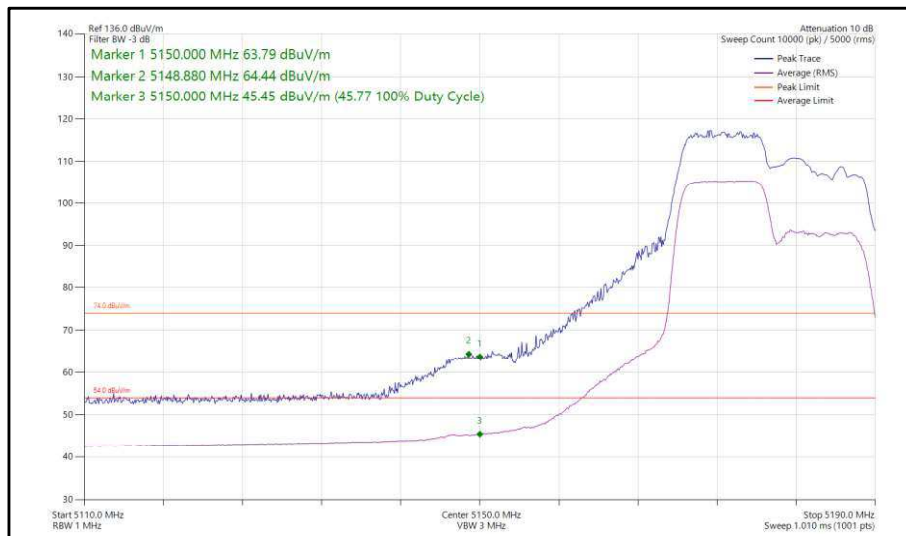
Figure 1 - 802.11a, SISO, Core 0 - 5180 MHz, Band Edge Frequency 5150 MHz



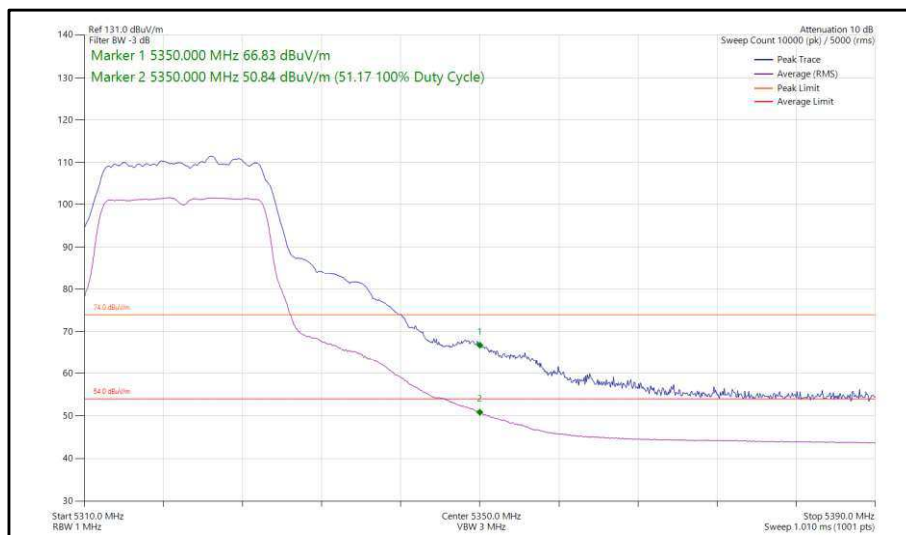
**Figure 2 - 802.11n, HT20, SISO, Core 0 - 5180 MHz,
Band Edge Frequency 5150 MHz**



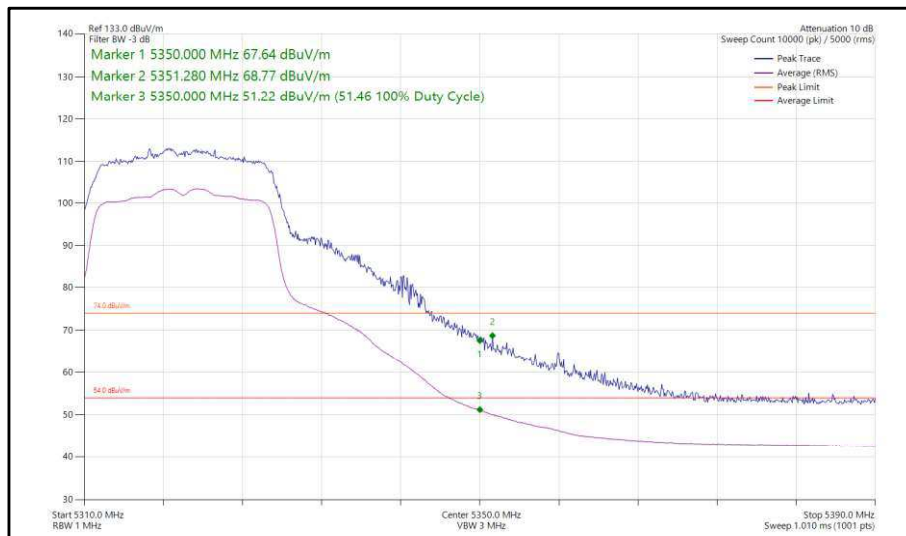
**Figure 3 - 802.11ax, HE20, SU, SISO, Core 0 - 5180 MHz,
Band Edge Frequency 5150 MHz**



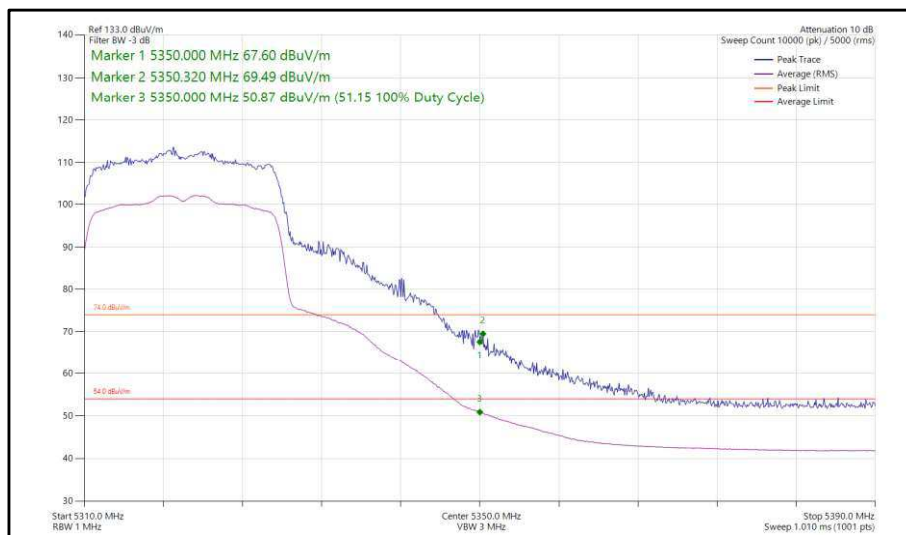
**Figure 4 - 802.11ax, HE20, RU 106-53, SISO, Core 0 - 5180 MHz,
Band Edge Frequency 5150 MHz**



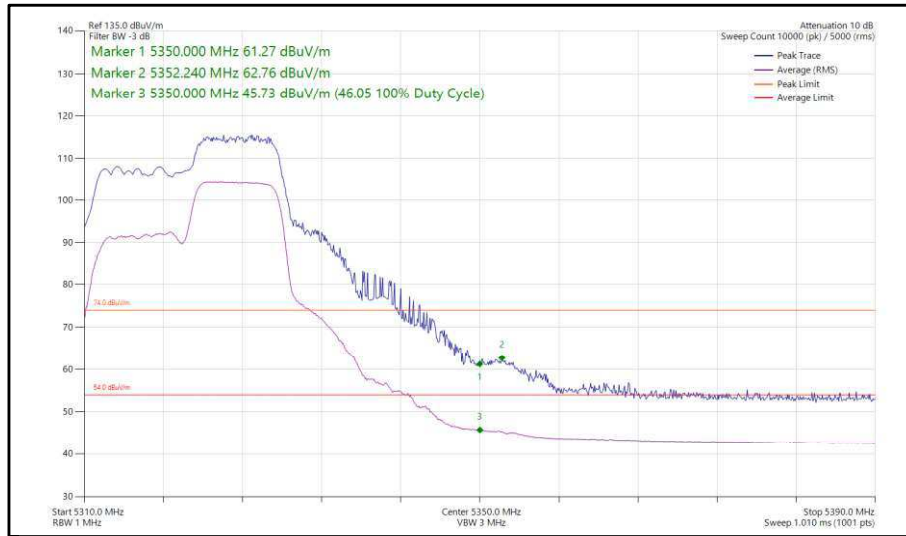
**Figure 5 - 802.11a, SISO, Core 0 - 5320 MHz,
Band Edge Frequency 5350 MHz**



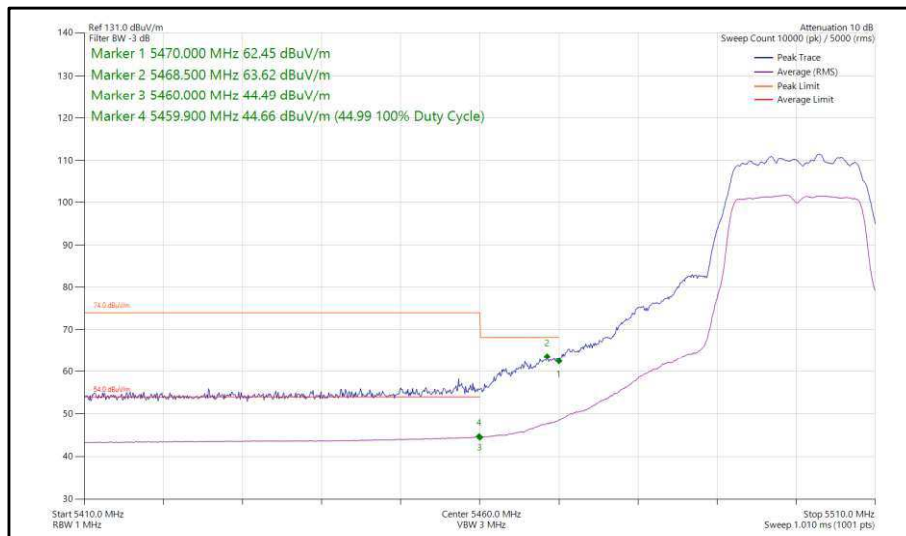
**Figure 6 - 802.11n, HT20, SISO, Core 0 - 5320 MHz,
Band Edge Frequency 5350 MHz**



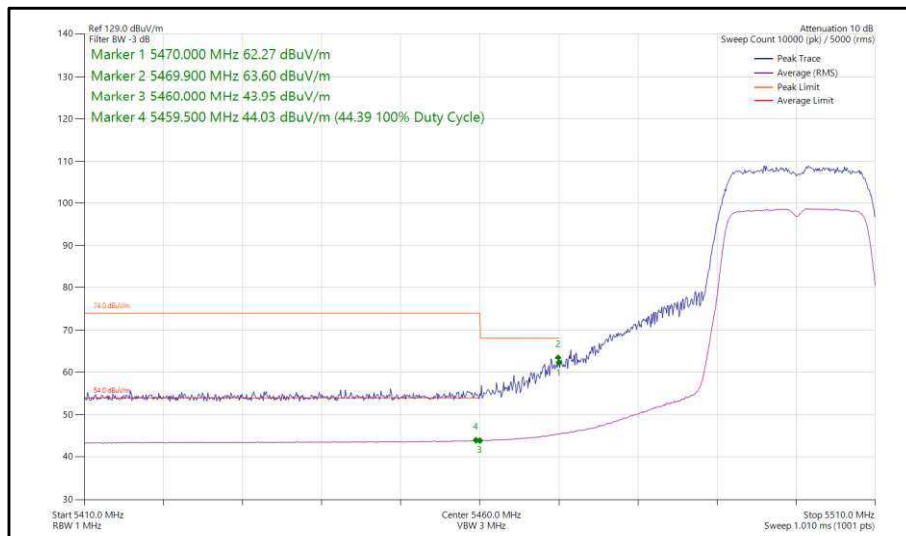
**Figure 7 - 802.11ax, HE20, SU, SISO, Core 0 - 5320 MHz,
Band Edge Frequency 5350 MHz**



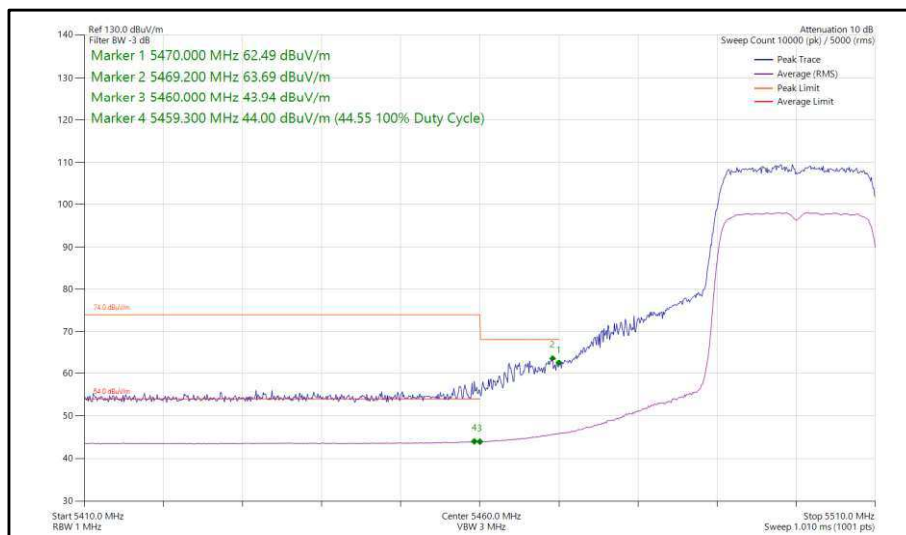
**Figure 8 - 802.11ax, HE20, RU 106-54, SISO, Core 0 - 5320 MHz,
Band Edge Frequency 5350 MHz**



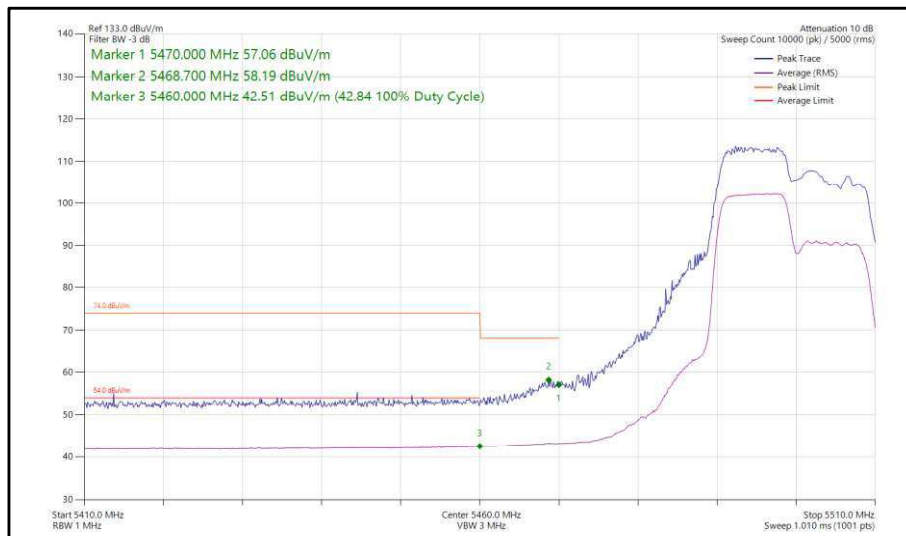
**Figure 9 - 802.11a, SISO, Core 0 - 5500 MHz,
Band Edge Frequency 5460 MHz**



**Figure 10 - 802.11n, HT20, SISO, Core 0 - 5500 MHz,
Band Edge Frequency 5460 MHz**



**Figure 11 - 802.11ax, HE20, SU, SISO, Core 0 - 5500 MHz,
Band Edge Frequency 5460 MHz**



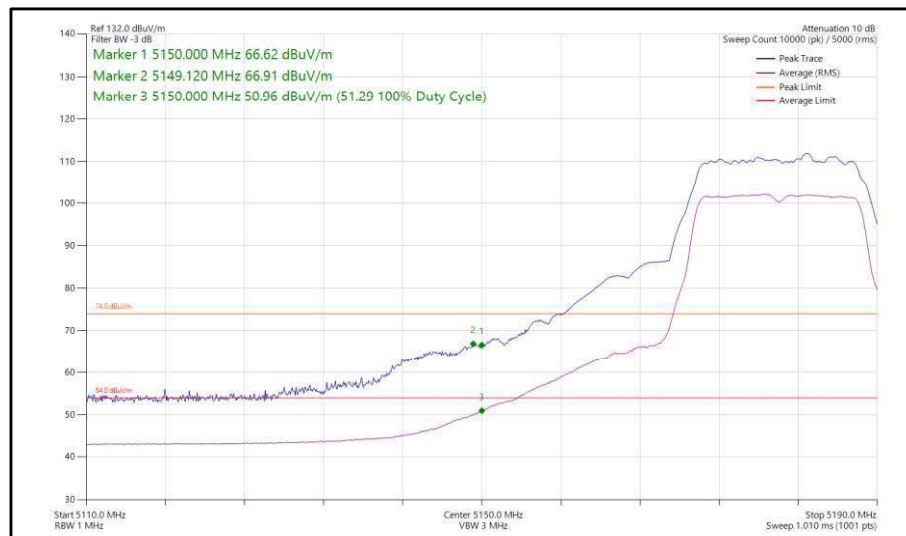
**Figure 12 - 802.11ax, HE20, RU 106-53, SISO, Core 0 - 5500 MHz,
Band Edge Frequency 5460 MHz**



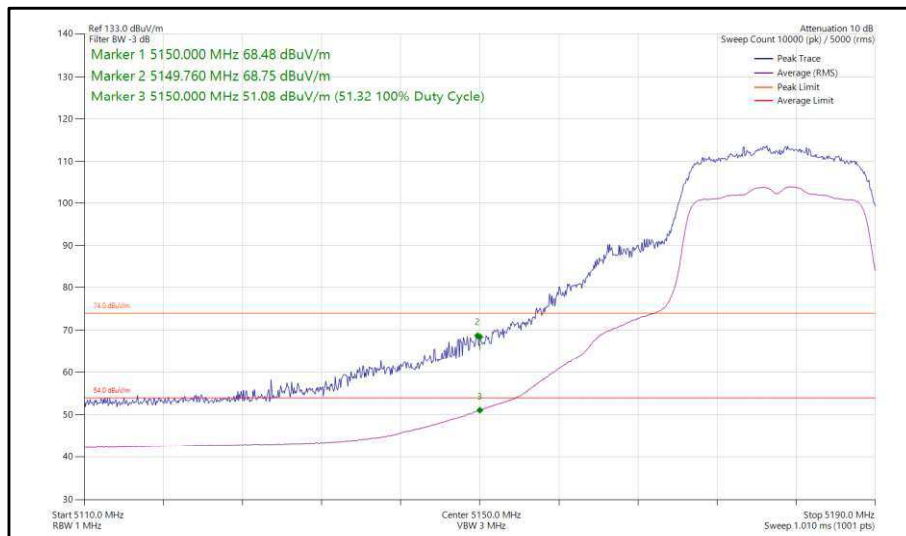
20 MHz Bandwidth - Core 1 (SISO)

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	54 Mbps	-	-	5180	5150	66.91	51.29
802.11n HT20	MCS4	-	-	5180	5150	68.75	51.32
802.11ax HE20	MCS4x1	SU	-	5180	5150	66.38	51.45
802.11ax HE20	MCS11x1	106	53	5180	5150	61.72	44.31
802.11a	54 Mbps	-	-	5320	5350	66.95	51.31
802.11n HT20	MCS4	-	-	5320	5350	67.42	51.48
802.11ax HE20	MCS4x1	SU	-	5320	5350	66.62	51.48
802.11ax HE20	MCS11x1	106	54	5320	5350	65.27	47.53
802.11a	24 Mbps	-	-	5500	5460	63.68	44.68
802.11n HT20	MCS7	-	-	5500	5460	63.54	44.13
802.11ax HE20	MCS4x1	SU	-	5500	5460	63.32	44.88
802.11ax HE20	MCS11x1	106	53	5500	5460	60.12	44.30

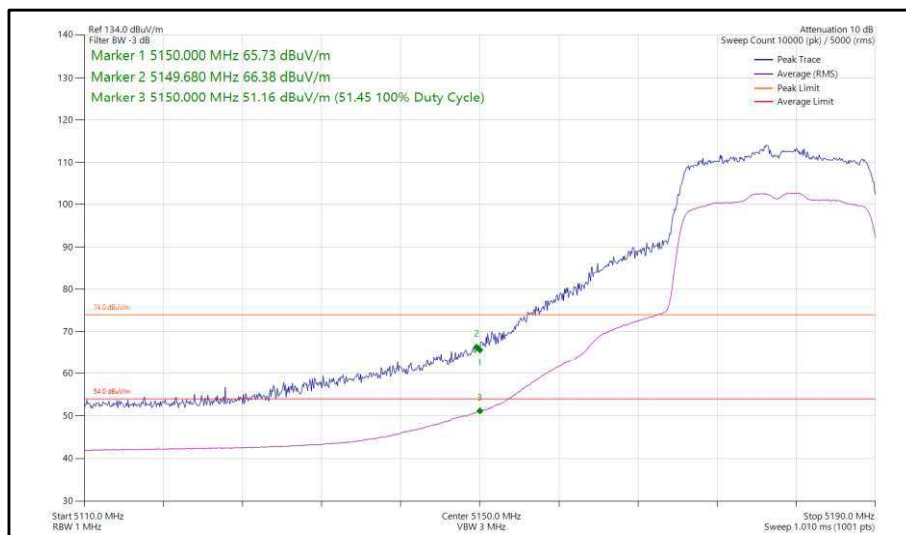
Table 7 - SISO Restricted Band Edge Results



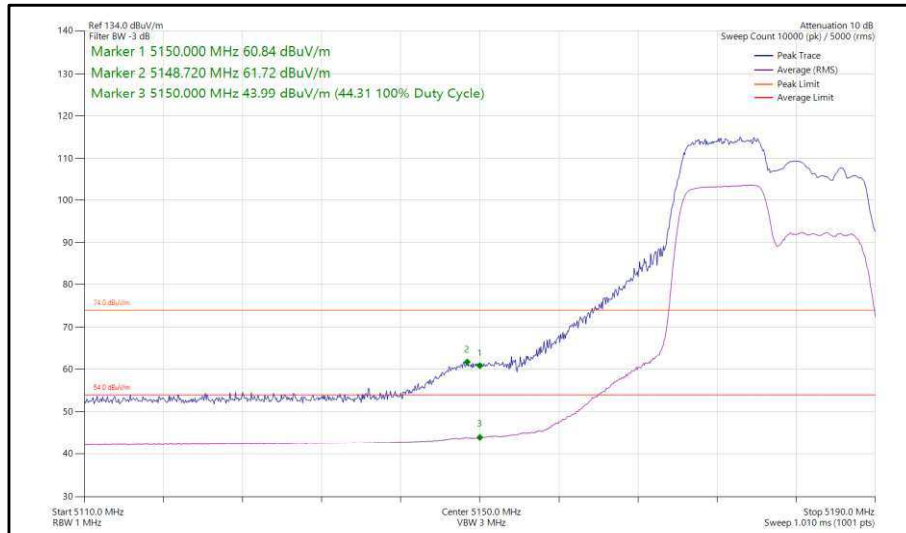
**Figure 13 - 802.11a, SISO, Core 1 - 5180 MHz,
 Band Edge Frequency 5150 MHz**



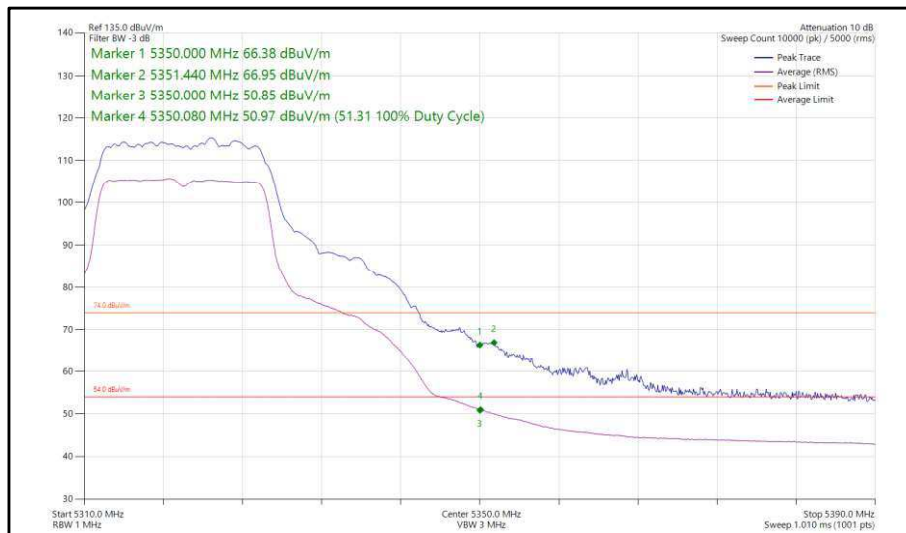
**Figure 14 - 802.11n, HT20, SISO, Core 1 - 5180 MHz,
Band Edge Frequency 5150 MHz**



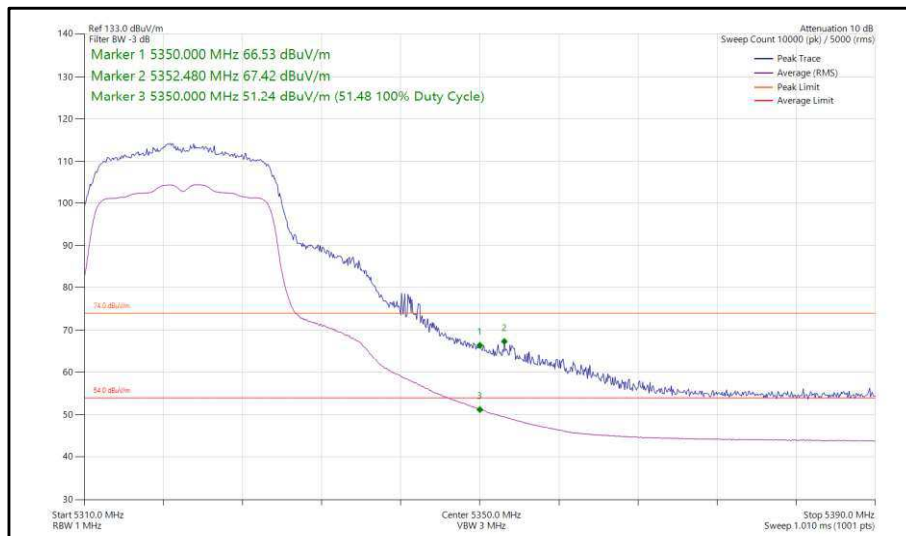
**Figure 15 - 802.11ax, HE20, SU, SISO, Core 1 - 5180 MHz,
Band Edge Frequency 5150 MHz**



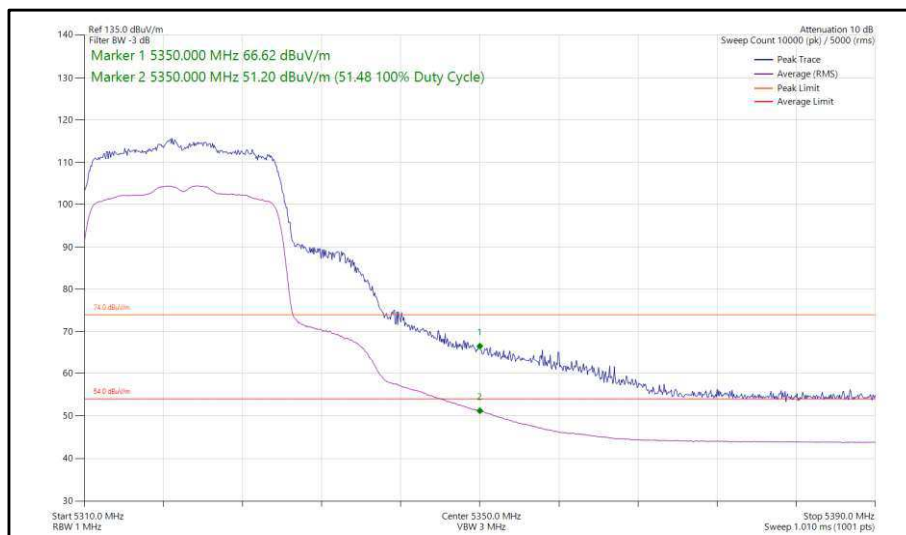
**Figure 16 - 802.11ax, HE20, RU 106-53, SISO, Core 1 - 5180 MHz,
Band Edge Frequency 5150 MHz**



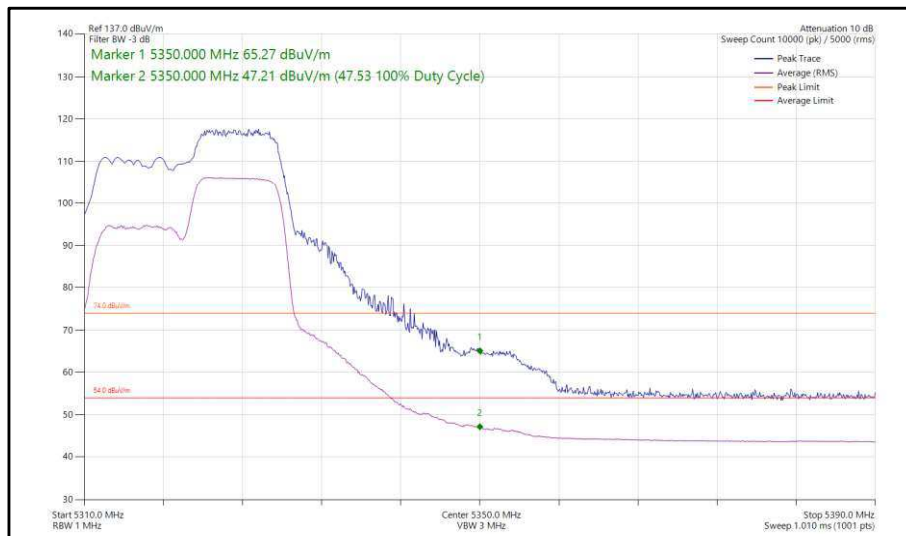
**Figure 17 - 802.11a, SISO, Core 1 - 5320 MHz,
Band Edge Frequency 5350 MHz**



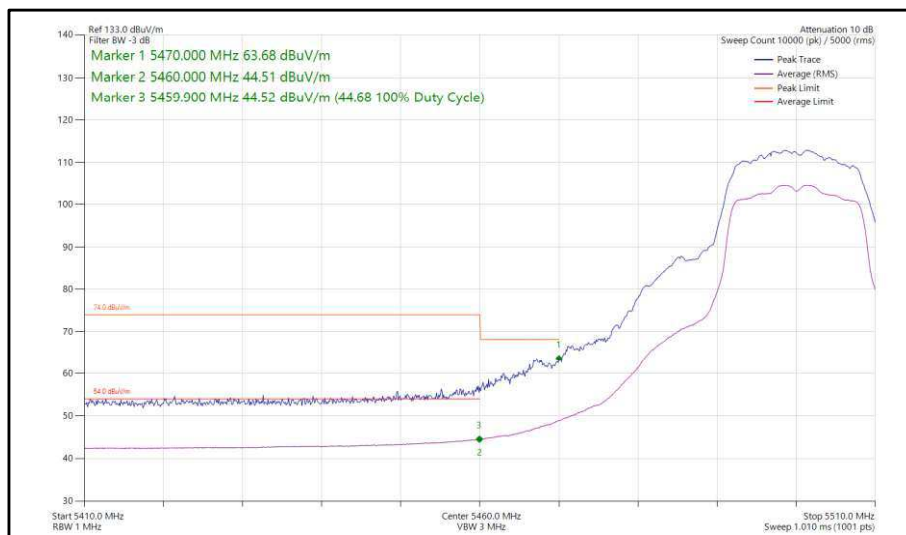
**Figure 18 - 802.11n, HT20, SISO, Core 1 - 5320 MHz,
Band Edge Frequency 5350 MHz**



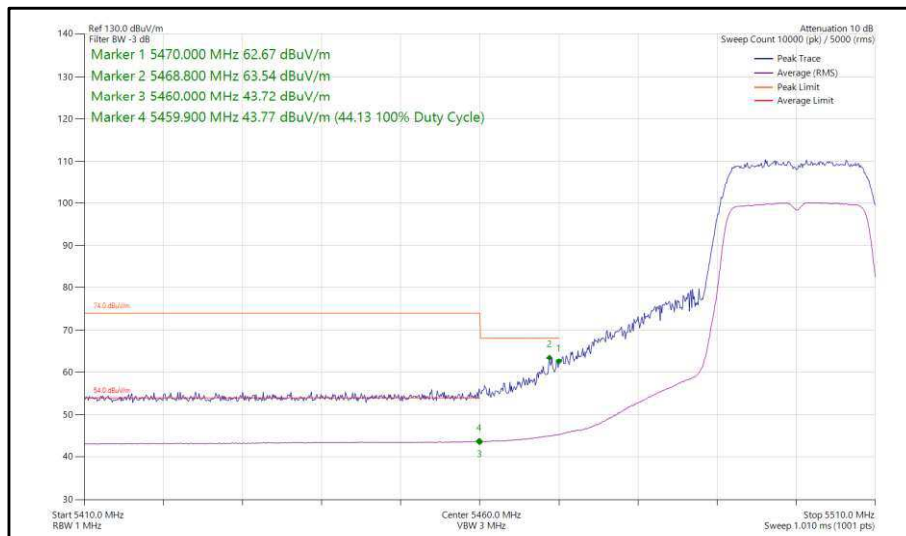
**Figure 19 - 802.11ax, HE20, SU, SISO, Core 1 - 5320 MHz,
Band Edge Frequency 5350 MHz**



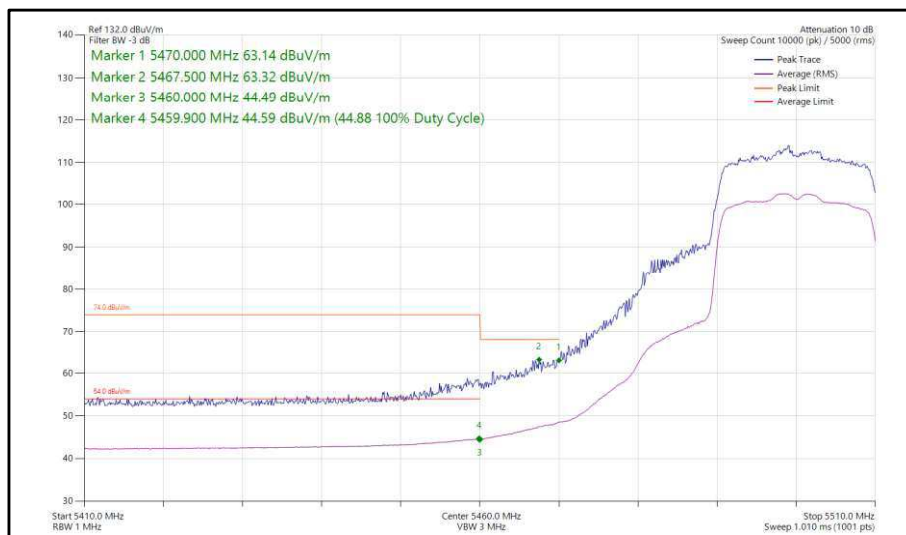
**Figure 20 - 802.11ax, HE20, RU 106-54, SISO, Core 1 - 5320 MHz,
Band Edge Frequency 5350 MHz**



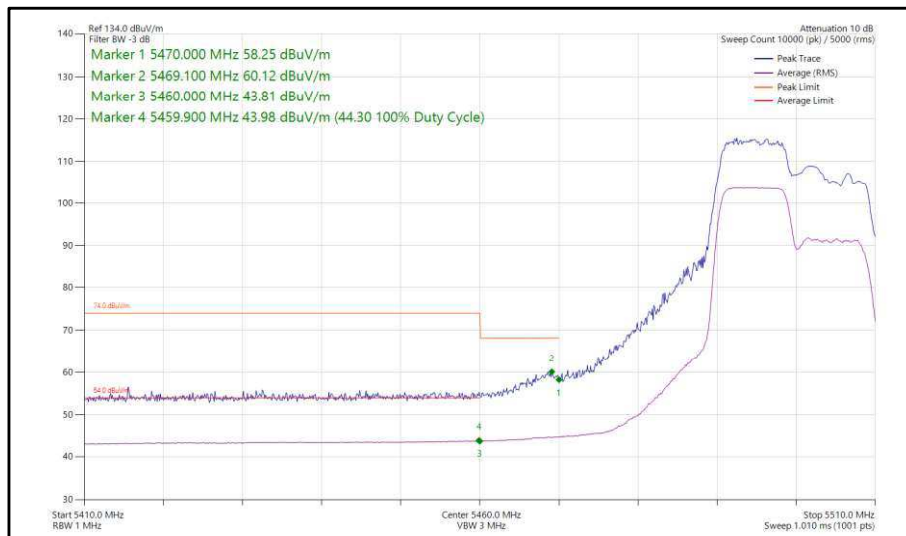
**Figure 21 - 802.11a, SISO, Core 1 - 5500 MHz,
Band Edge Frequency 5460 MHz**



**Figure 22 - 802.11n, HT20, SISO, Core 1 - 5500 MHz,
Band Edge Frequency 5460 MHz**



**Figure 23 - 802.11ax, HE20, SU, SISO, Core 1 - 5500 MHz,
Band Edge Frequency 5460 MHz**



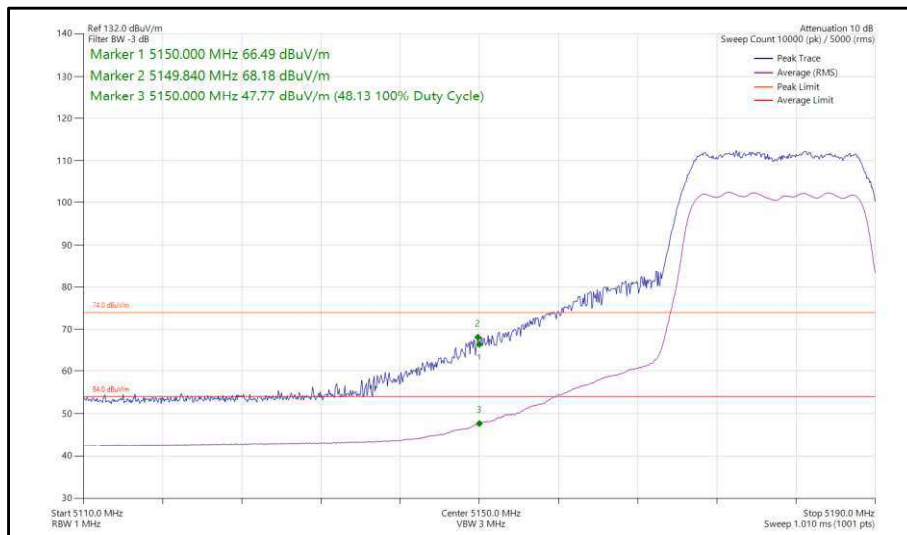
**Figure 24 - 802.11ax, HE20, RU 106-53, SISO, Core 1 - 5500 MHz,
Band Edge Frequency 5460 MHz**



20 MHz Bandwidth - Core 0-1 (CDD)

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 HT20	MCS7	-	-	5180	5150	68.18	48.13
802.11ax HE20	MCS4x1	SU	-	5180	5150	67.36	51.45
802.11ax HE20	MCS11x1	106	54	5180	5150	64.83	45.99
802.11n HT20	MCS4	-	-	5320	5350	66.68	51.42
802.11ax HE20	MCS4x1	SU	-	5320	5350	66.51	51.41
802.11ax HE20	MCS11x1	106	54	5320	5350	64.78	46.77
802.11n HT20	MCS4	-	-	5500	5460	63.67	43.82
802.11ax HE20	MCS4x1	SU	-	5500	5460	63.67	44.87
802.11ax HE20	MCS11x1	106	53	5500	5460	60.09	44.18

Table 8 - CDD Restricted Band Edge Results



**Figure 25 - 802.11n, HT20, CDD, Core 0-1 - 5180 MHz,
 Band Edge Frequency 5150 MHz**

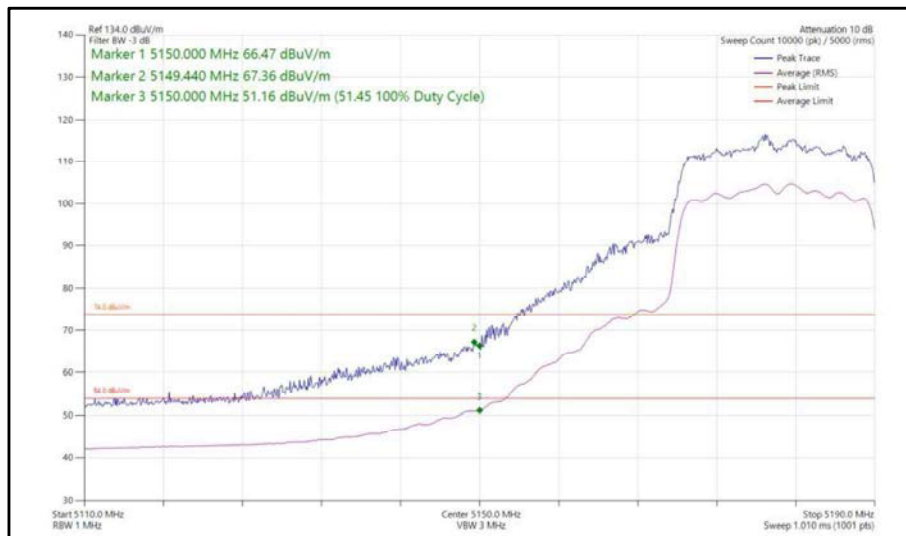


Figure 26 - 802.11ax, HE20, SU, CDD, Core 0-1 - 5180 MHz, Band Edge Frequency 5150 MHz

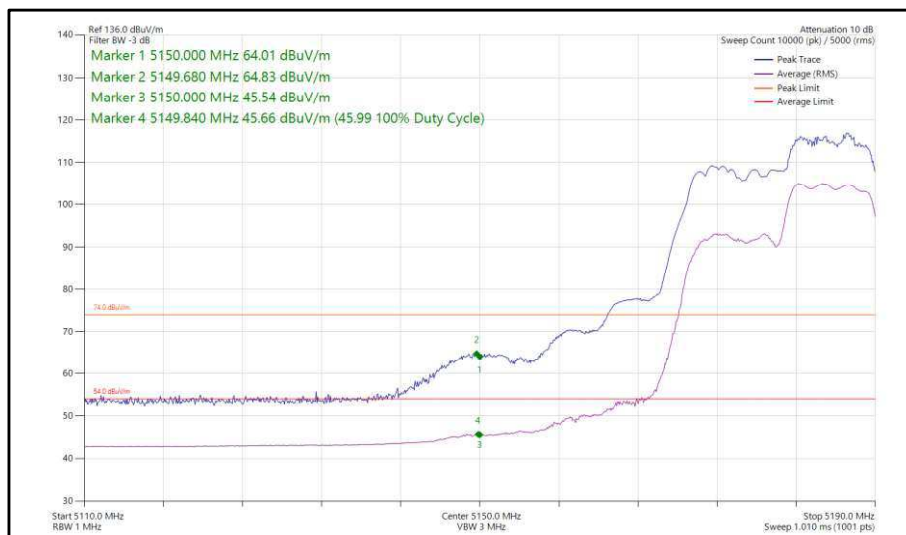


Figure 27 - 802.11ax, HE20, RU 106-54, CDD, Core 0-1 - 5180 MHz, Band Edge Frequency 5150 MHz

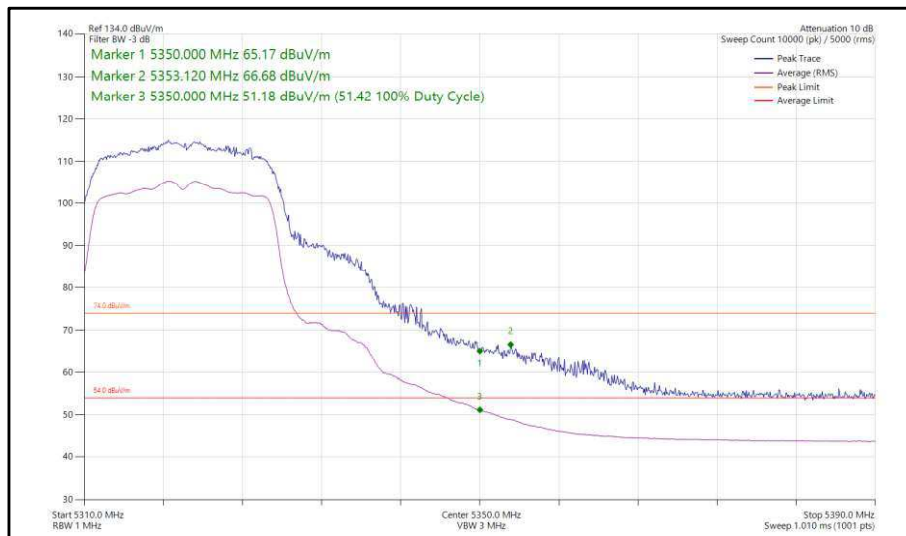


Figure 28 - 802.11n, HT20, CDD, Core 0-1 - 5320 MHz, Band Edge Frequency 5350 MHz

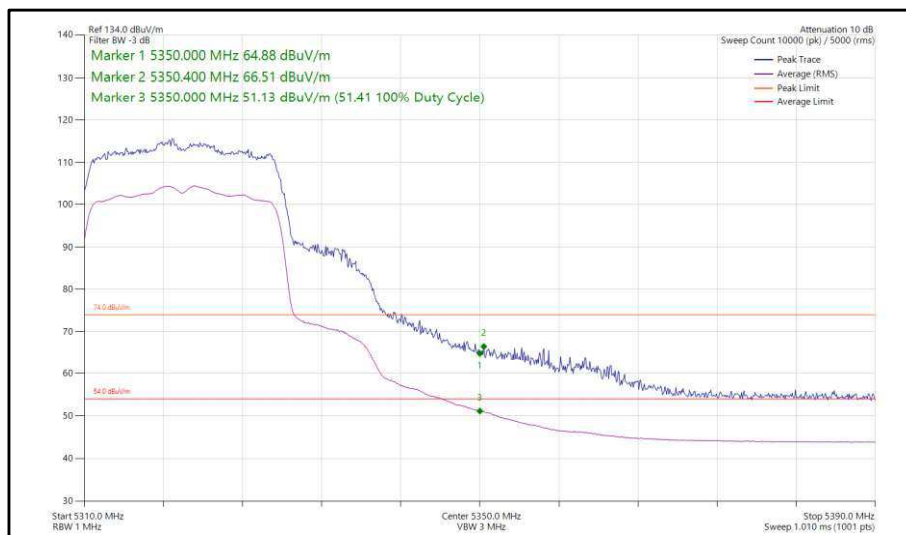


Figure 29 - 802.11ax, HE20, SU, CDD, Core 0-1 - 5320 MHz, Band Edge Frequency 5350 MHz

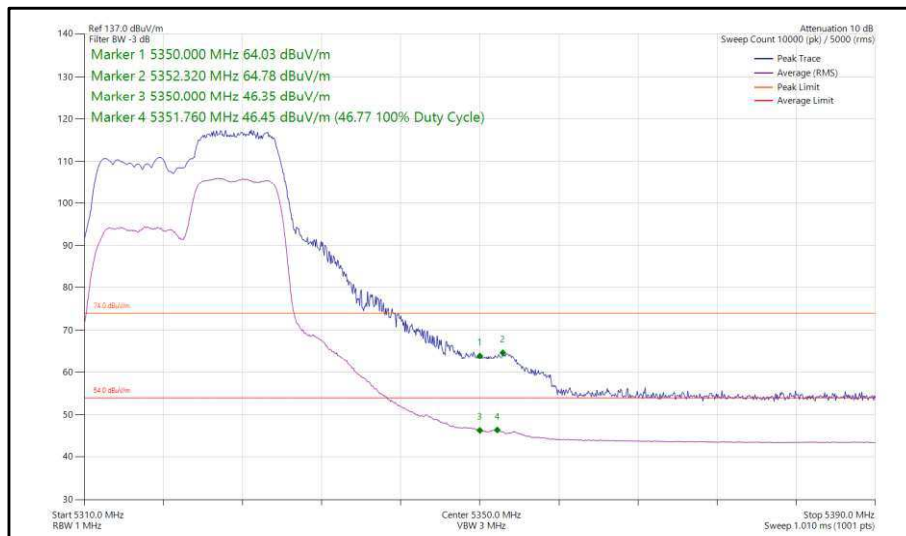


Figure 30 - 802.11ax, HE20, RU 106-54, CDD, Core 0-1 - 5320 MHz, Band Edge Frequency 5350 MHz

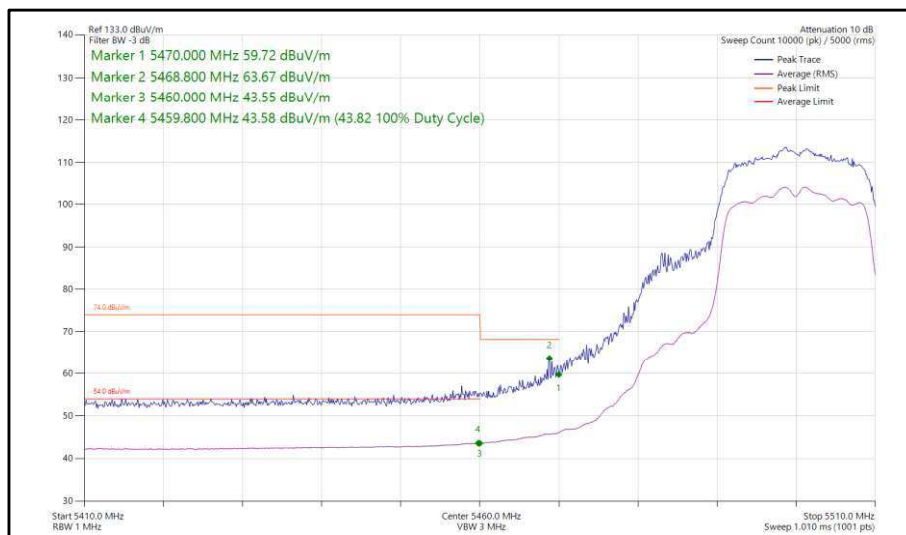
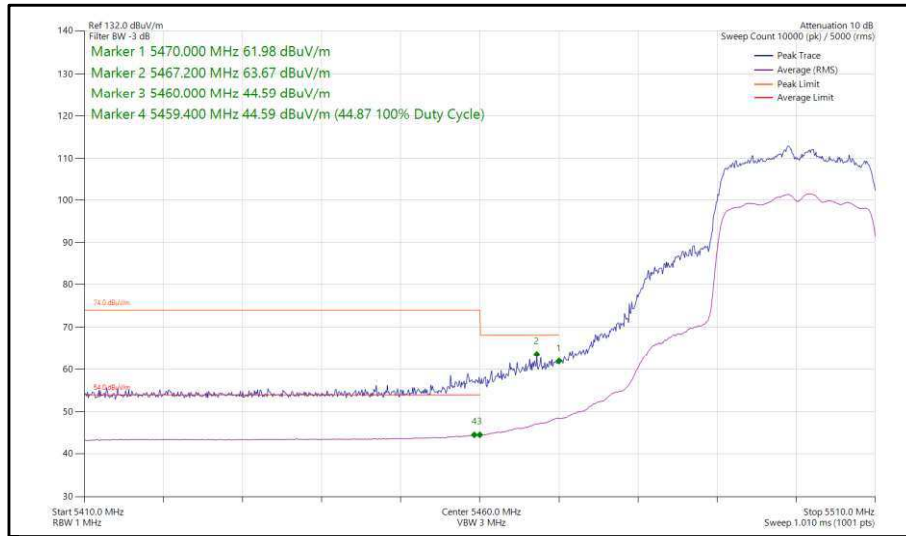
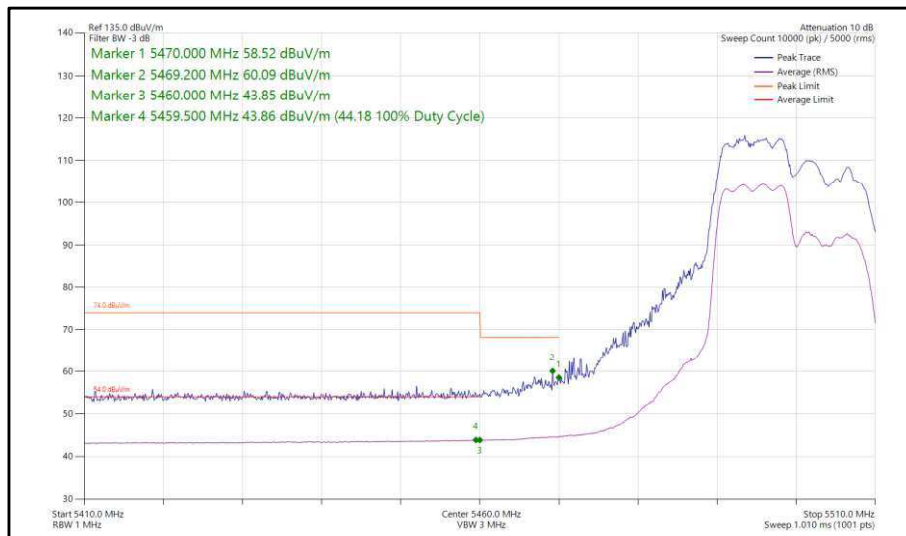


Figure 31 - 802.11n, HT20, CDD, Core 0-1 - 5500 MHz, Band Edge Frequency 5460 MHz



**Figure 32 - 802.11ax, HE20, SU, CDD, Core 0-1 - 5500 MHz,
Band Edge Frequency 5460 MHz**



**Figure 33 - 802.11ax, HE20, RU 106-53, CDD, Core 0-1 - 5500 MHz,
Band Edge Frequency 5460 MHz**



20 MHz Bandwidth - Core 0-1 (SDM)

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 HT20	MCS12	-	-	5180	5150	67.56	51.35
802.11ax HE20	MCS4x2	SU	-	5180	5150	67.09	51.46
802.11ax HE20	MCS11x2	106	53	5180	5150	65.22	46.52
802.11n HT20	MCS15	-	-	5320	5350	69.42	51.14
802.11ax HE20	MCS4x2	SU	-	5320	5350	66.12	51.41
802.11ax HE20	MCS11x2	106	54	5320	5350	64.50	46.77
802.11n HT20	MCS12	-	-	5500	5460	63.65	45.18
802.11ax HE20	MCS11x2	SU	-	5500	5460	63.61	42.86
802.11ax HE20	MCS11x2	106	53	5500	5460	60.69	44.62

Table 9 - SDM Restricted Band Edge Results

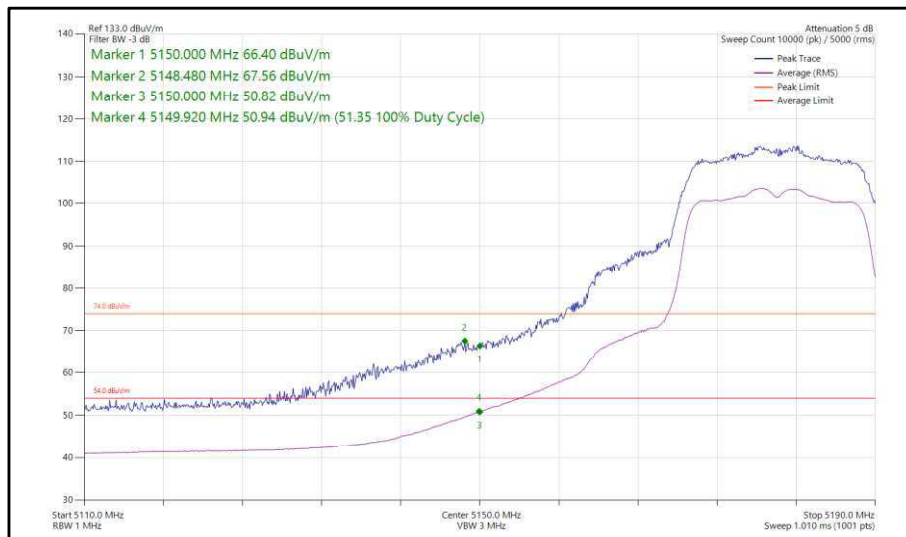
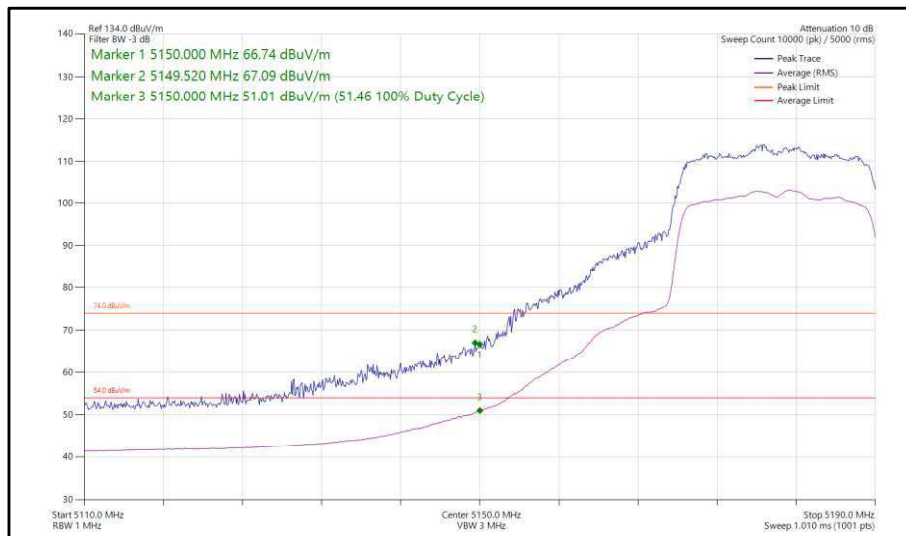
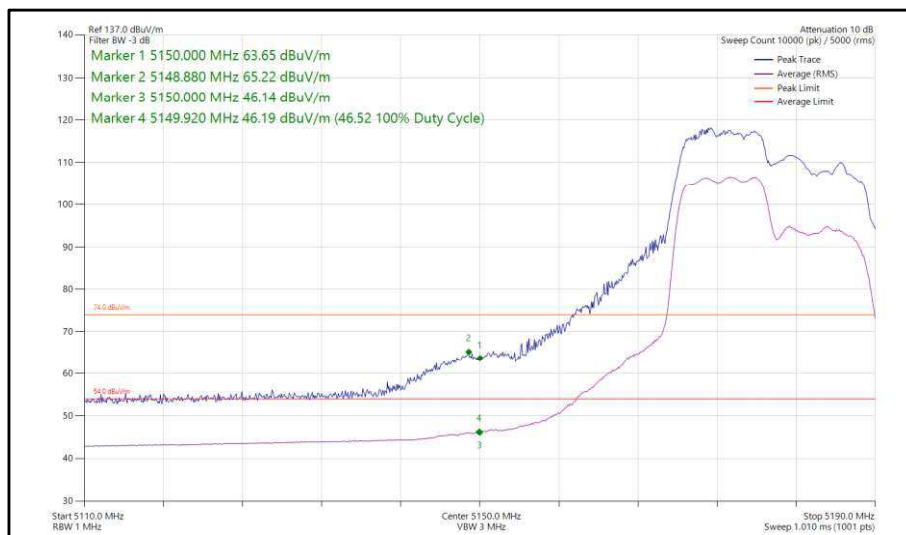


Figure 34 - 802.11n, HT20, SDM, Core 0-1 - 5180 MHz, Band Edge Frequency 5150 MHz



**Figure 35 - 802.11ax, HE20, SU, SDM, Core 0-1 - 5180 MHz,
Band Edge Frequency 5150 MHz**



**Figure 36 - 802.11ax, HE20, RU 106-53, SDM, Core 0-1 - 5180 MHz,
Band Edge Frequency 5150 MHz**

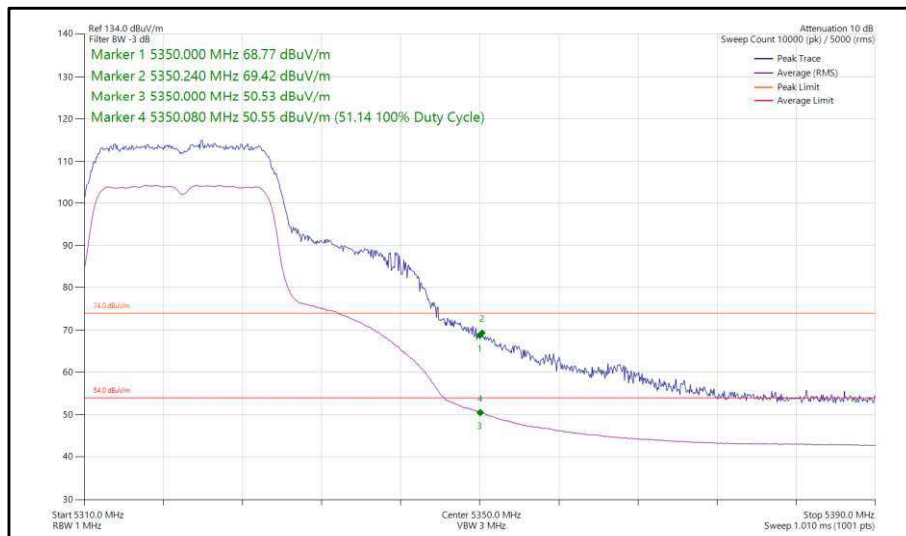


Figure 37 - 802.11n, HT20, SDM, Core 0-1 - 5320 MHz, Band Edge Frequency 5350 MHz

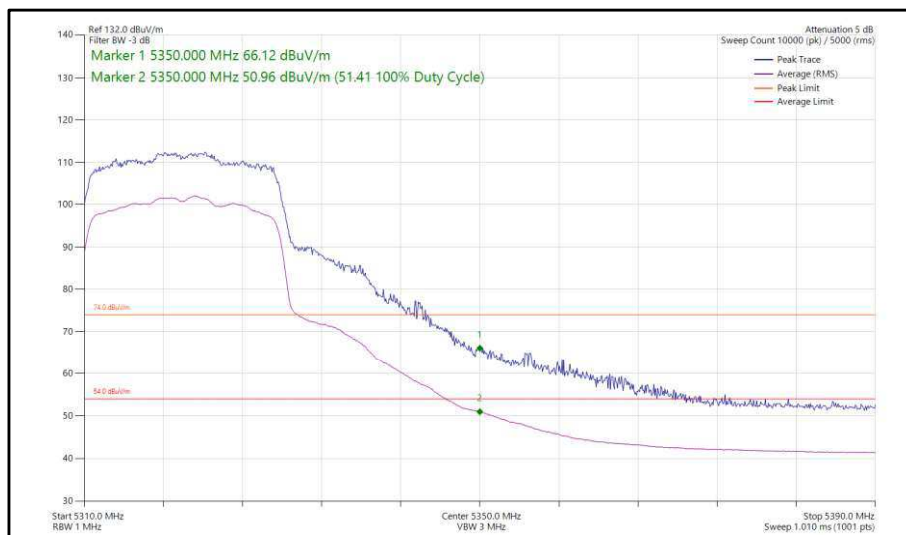


Figure 38 - 802.11ax, HE20, SU, SDM, Core 0-1 - 5320 MHz, Band Edge Frequency 5350 MHz

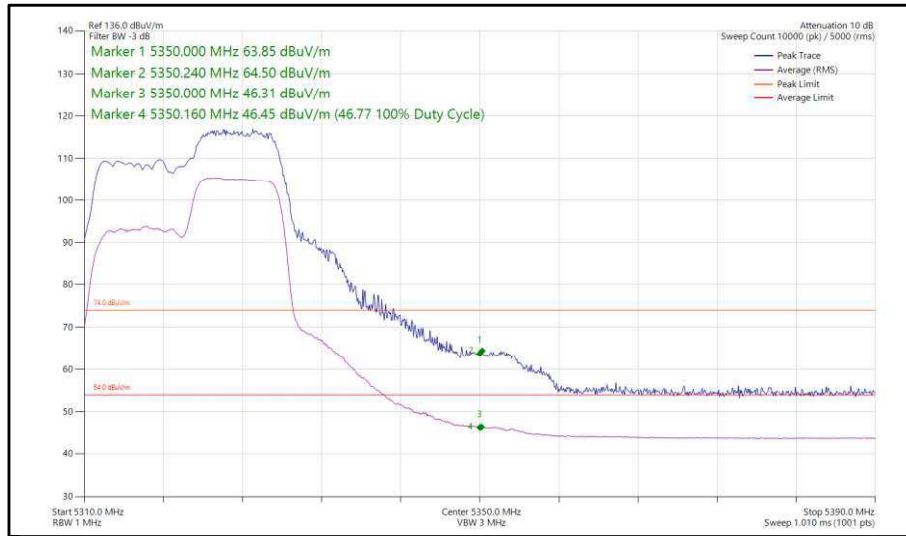


Figure 39 - 802.11ax, HE20, RU 106-54, SDM, Core 0-1 - 5320 MHz, Band Edge Frequency 5350 MHz

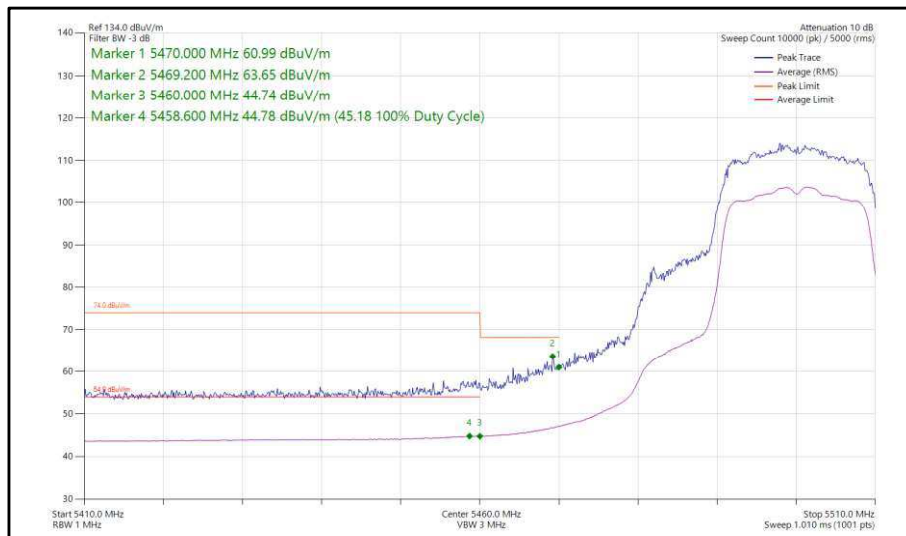
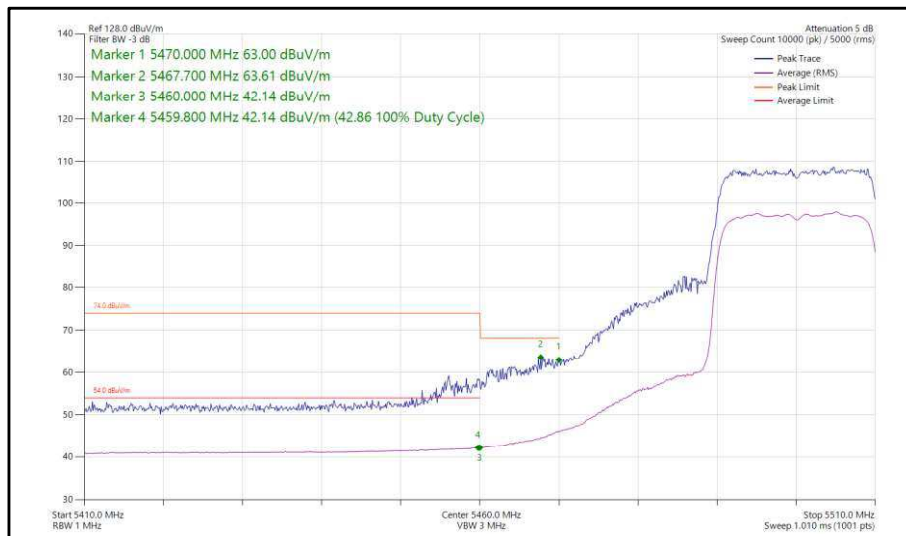
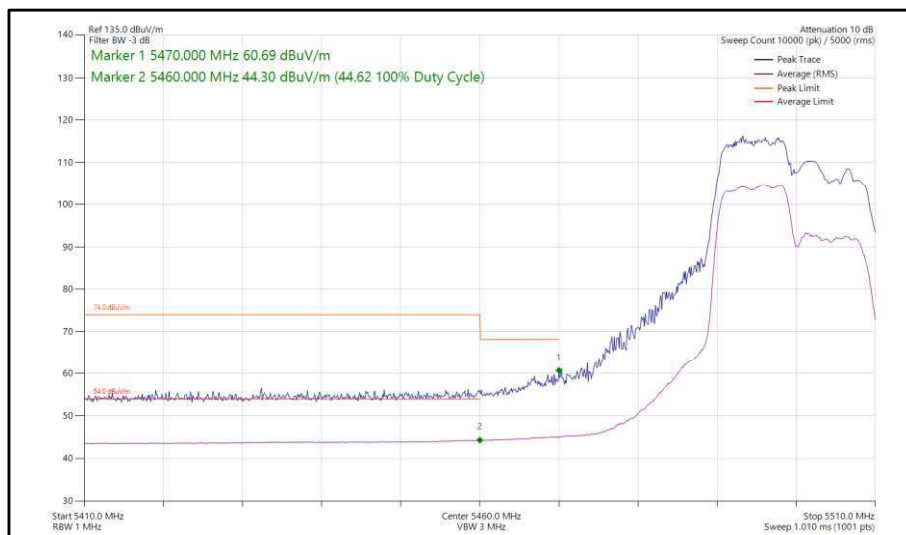


Figure 40 - 802.11n, HT20, SDM, Core 0-1 - 5500 MHz, Band Edge Frequency 5460 MHz



**Figure 41 - 802.11ax, HE20, SU, SDM, Core 0-1 - 5500 MHz,
Band Edge Frequency 5460 MHz**



**Figure 42 - 802.11ax, HE20, RU 106-53, SDM, Core 0-1 - 5500 MHz,
Band Edge Frequency 5460 MHz**



20 MHz Bandwidth - Core 0-1 (TxBF)

Mode	Data Rate/ MCS	Resource Size	Resource Index	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)
802.11n HT20	MCS2	-	-	5180	5150	67.04	51.48
802.11n HT20	MCS7	-	-	5320	5350	68.59	51.14
802.11n HT20	MCS4	-	-	5500	5460	63.50	45.02

Table 10 - TxBF Restricted Band Edge Results

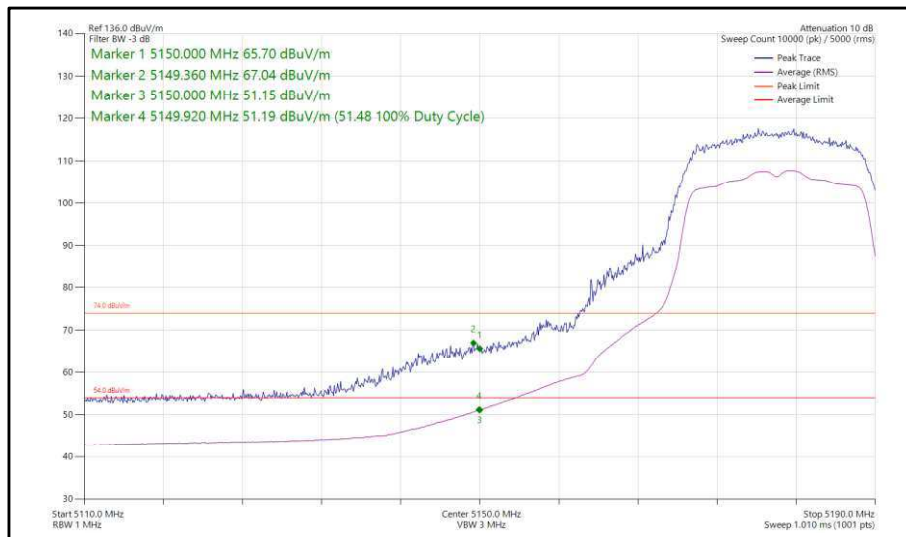


Figure 43 - 802.11n, HT20, TxBF, Core 0-1 - 5180 MHz,
 Band Edge Frequency 5150 MHz

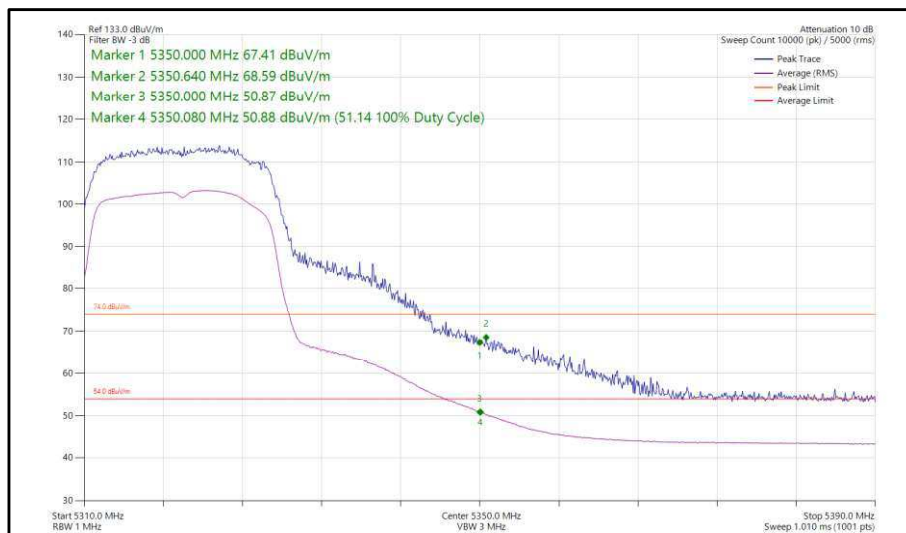
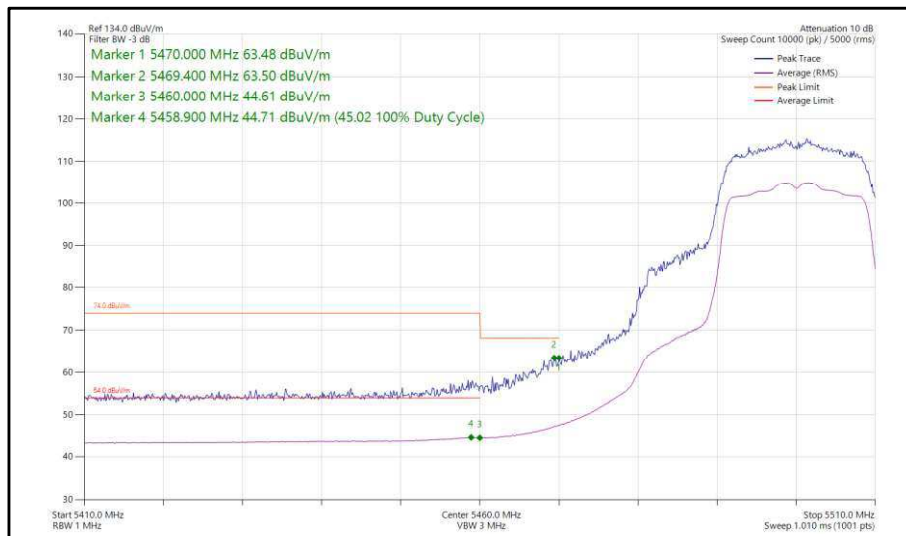


Figure 44 - 802.11n, HT20, TxBF, Core 0-1 - 5320 MHz,
 Band Edge Frequency 5350 MHz



**Figure 45 - 802.11n, HT20, TxBF, Core 0-1 - 5500 MHz,
Band Edge Frequency 5460 MHz**



40 MHz Bandwidth - Core 0 (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	MCS4	-	-	5190	5150	64.10	51.36
802.11ax HE40	MCS2x1	SU	-	5190	5150	63.76	51.44
802.11ax HE40	MCS11x1	106	53	5190	5150	69.31	46.12
802.11n HT40	MCS2	-	-	5310	5350	65.50	51.50
802.11ax HE40	MCS2x1	SU	-	5310	5350	64.89	51.30
802.11ax HE40	MCS11x1	106	56	5310	5350	69.03	45.11
802.11n HT40	MCS7	-	-	5510	5460	63.42	45.40
802.11ax HE40	MCS2x1	SU	-	5510	5460	63.68	45.85
802.11ax HE40	MCS11x1	106	53	5510	5460	63.42	43.71

Table 11 - SISO Restricted Band Edge Results

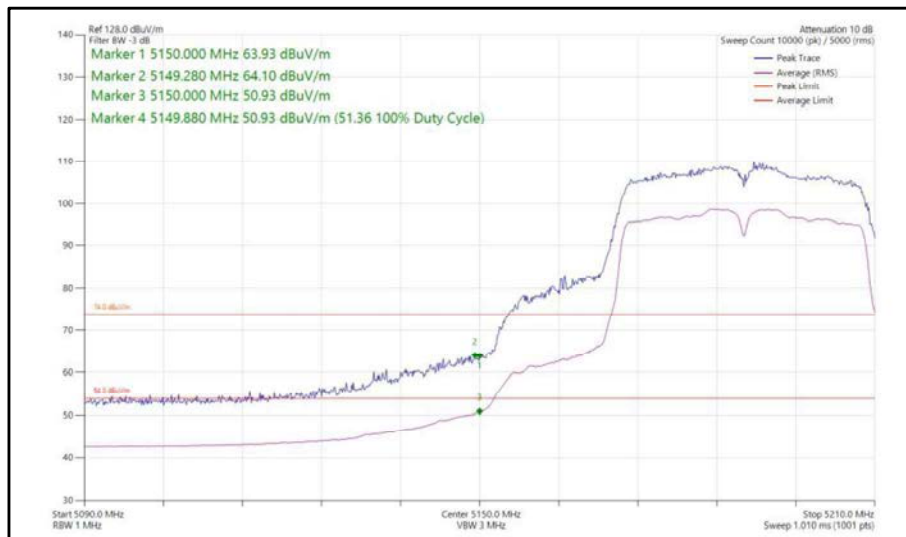
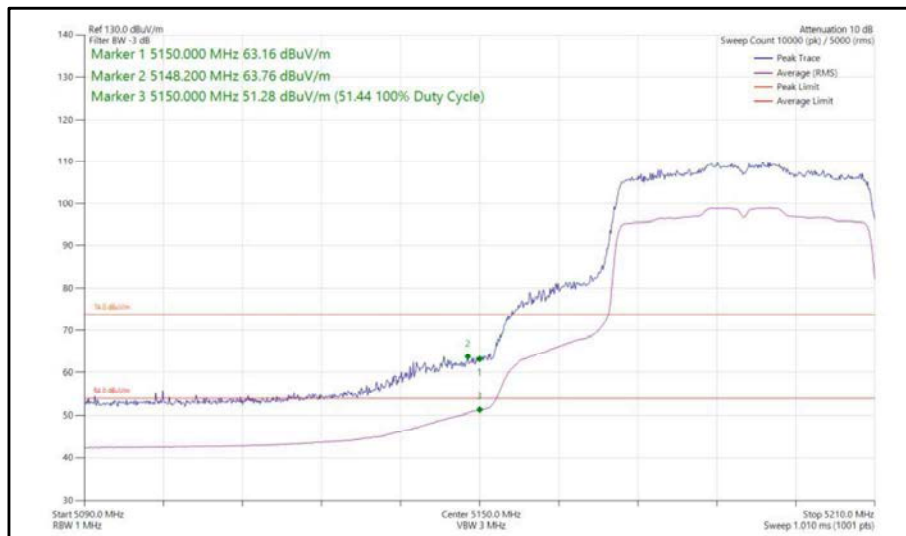
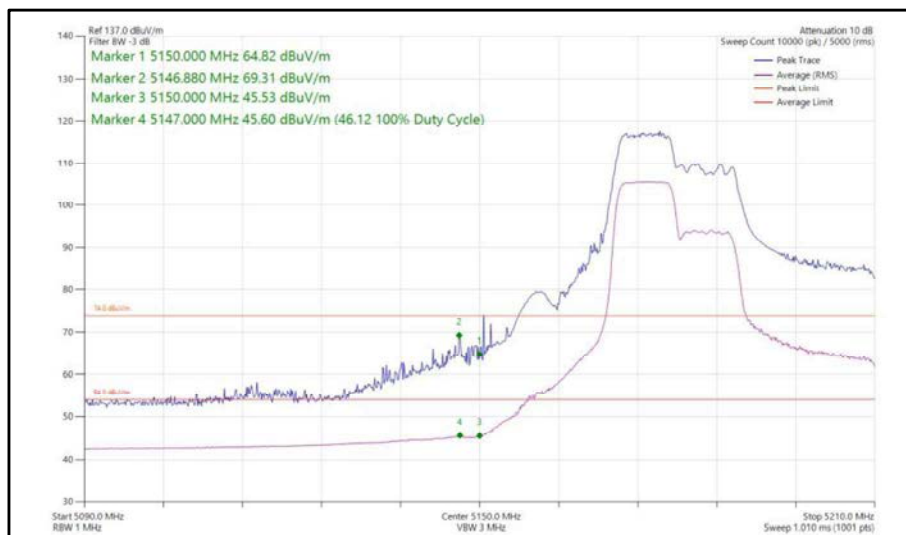


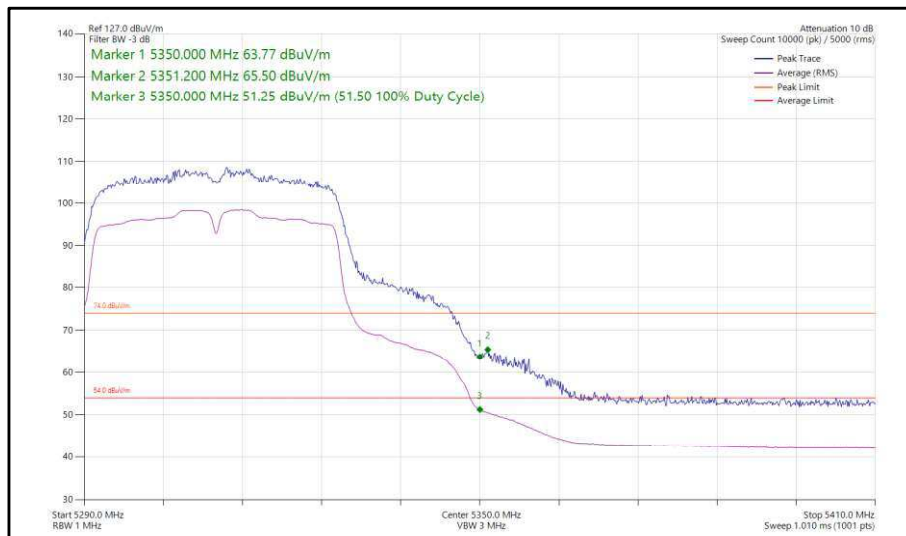
Figure 46 - 802.11n, HT40, SISO, Core 0 - 5190 MHz,
 Band Edge Frequency 5150 MHz



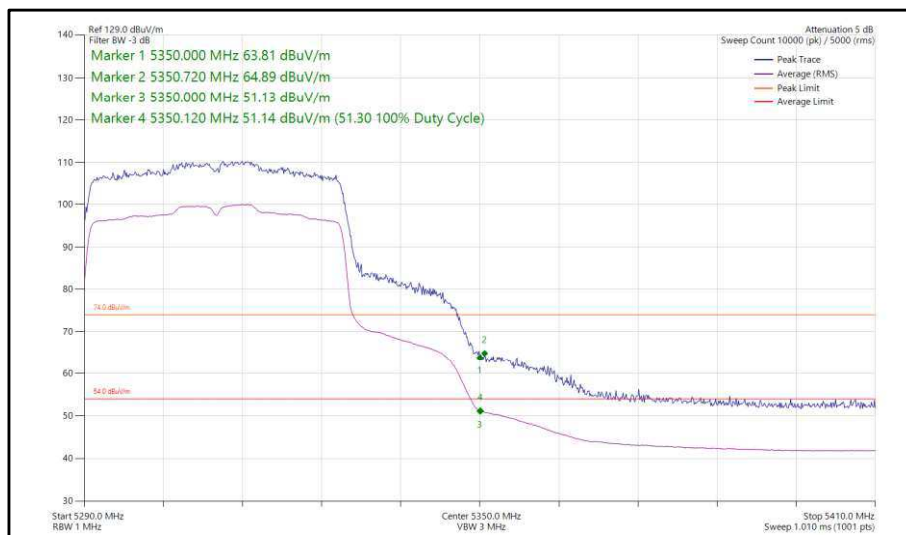
**Figure 47 - 802.11ax, HE40, SU, SISO, Core 0 - 5190 MHz,
Band Edge Frequency 5150 MHz**



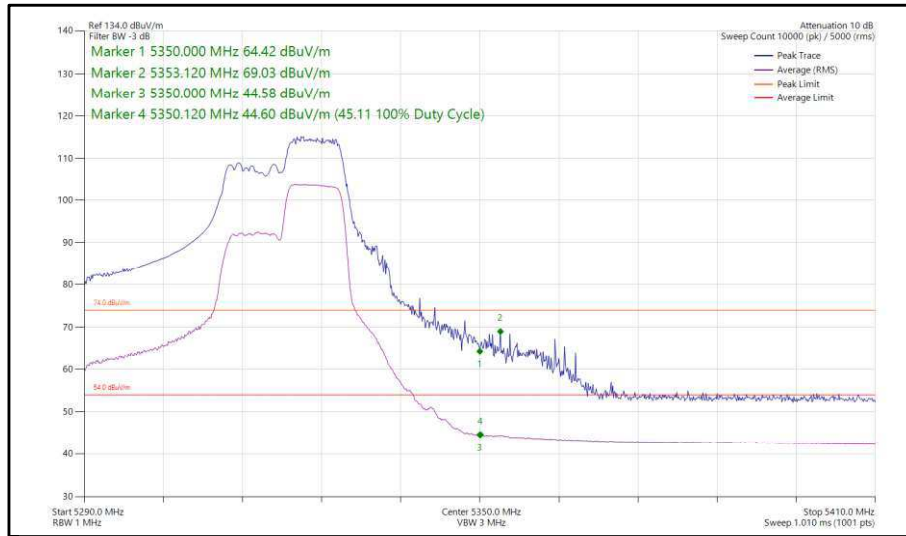
**Figure 48 - 802.11ax, HE40, RU 106-53, SISO, Core 0 - 5190 MHz,
Band Edge Frequency 5150 MHz**



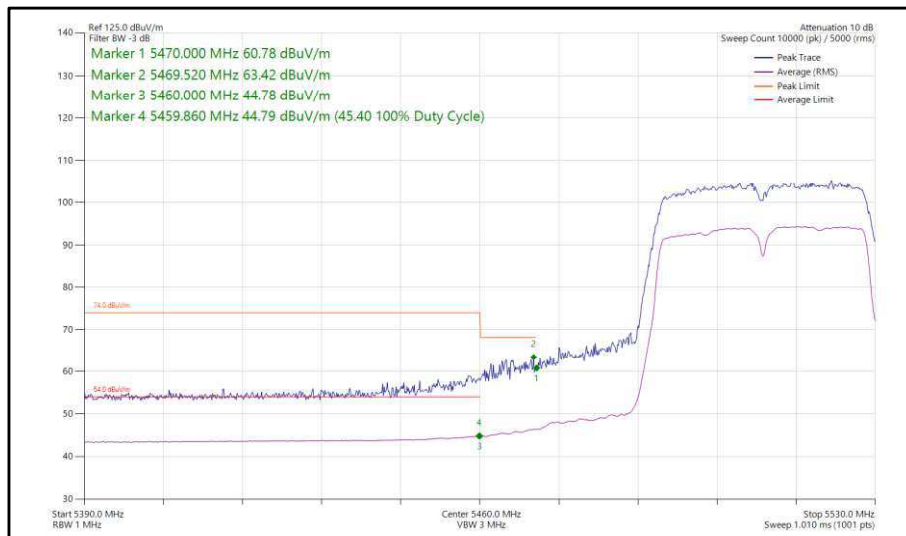
**Figure 49 - 802.11n, HT40, SISO, Core 0 - 5310 MHz,
Band Edge Frequency 5350 MHz**



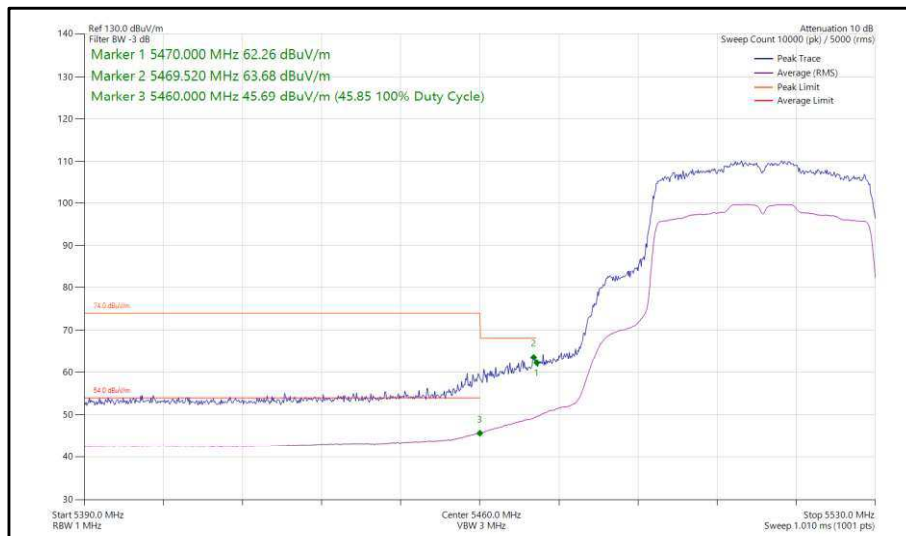
**Figure 50 - 802.11ax, HE40, SU, SISO, Core 0 - 5310 MHz,
Band Edge Frequency 5350 MHz**



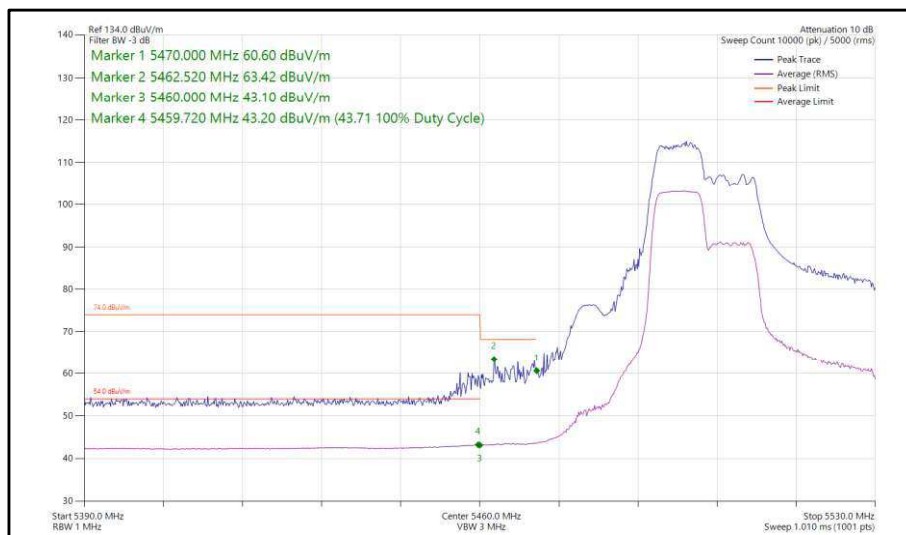
**Figure 51 - 802.11ax, HE40, RU 106-56, SISO, Core 0 - 5310 MHz,
Band Edge Frequency 5350 MHz**



**Figure 52 - 802.11n, HT40, SISO, Core 0 - 5510 MHz,
Band Edge Frequency 5460 MHz**



**Figure 53 - 802.11ax, HE40, SU, SISO, Core 0 - 5510 MHz,
Band Edge Frequency 5460 MHz**



**Figure 54 - 802.11ax, HE40, RU 106-53, SISO, Core 0 - 5510 MHz,
Band Edge Frequency 5460 MHz**



40 MHz Bandwidth - Core 1 (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	MCS4	-	-	5190	5150	64.07	51.34
802.11ax HE40	MCS2x1	SU	-	5190	5150	63.90	51.36
802.11ax HE40	MCS11x1	106	53	5190	5150	67.52	45.17
802.11n HT40	MCS2	-	-	5310	5350	64.70	51.34
802.11ax HE40	MCS2x1	SU	-	5310	5350	64.04	51.29
802.11ax HE40	MCS11x1	52	44	5310	5350	69.44	43.90
802.11n HT40	MCS2	-	-	5510	5460	63.32	45.52
802.11ax HE40	MCS11x1	SU	-	5510	5460	63.65	44.42
802.11ax HE40	MCS11x1	106	53	5510	5460	63.45	43.89

Table 12 - SISO Restricted Band Edge Results

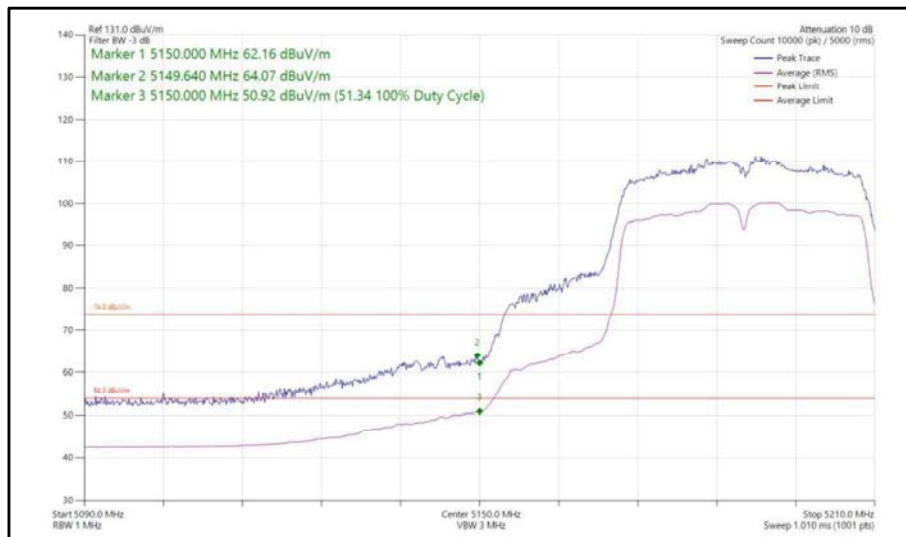
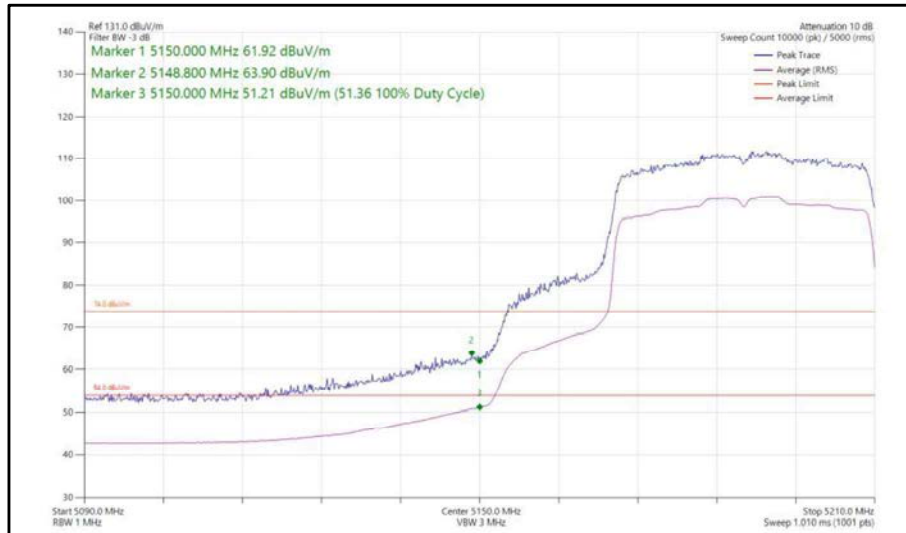
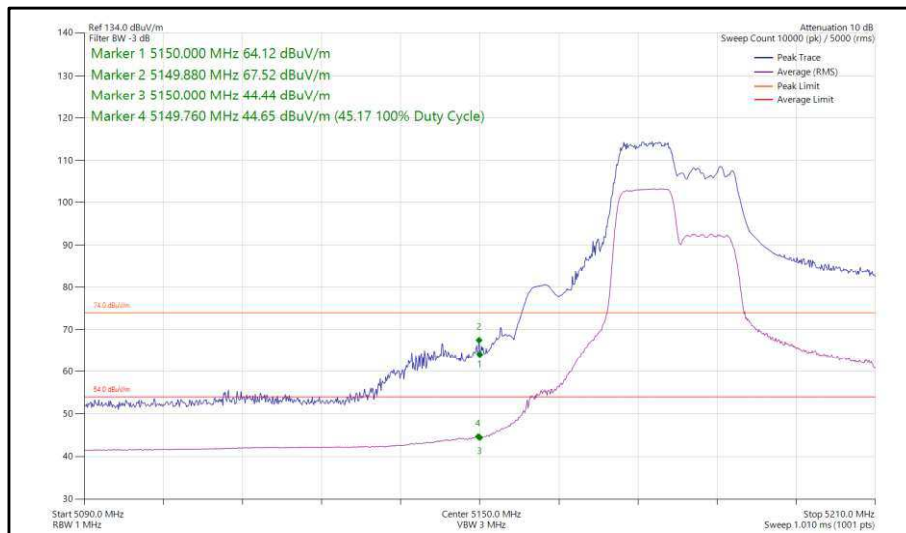


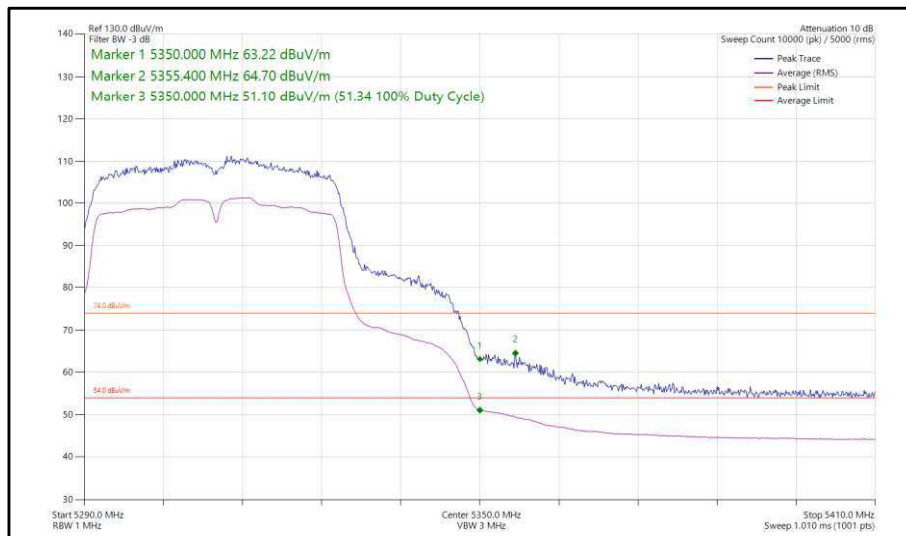
Figure 55 - 802.11n, HT40, SISO, Core 1 - 5190 MHz,
 Band Edge Frequency 5150 MHz



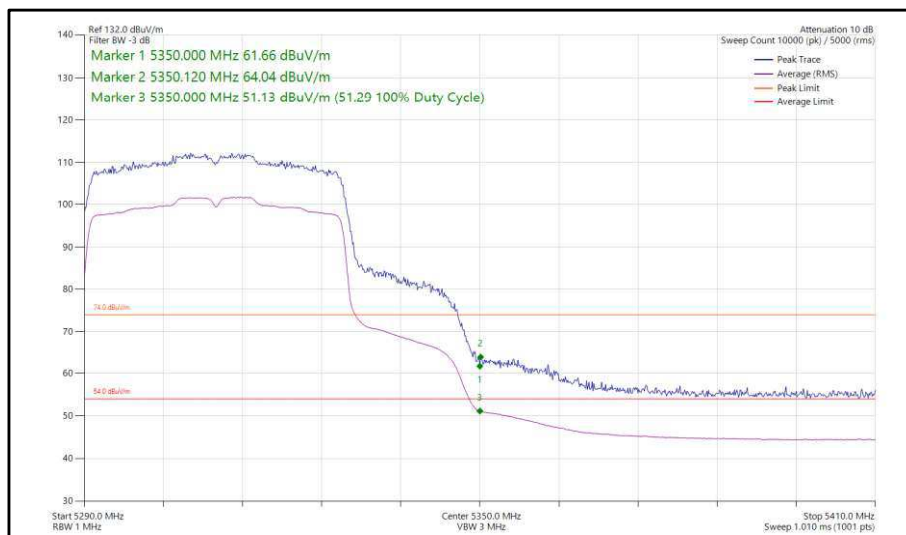
**Figure 56 - 802.11ax, HE40, SU, SISO, Core 1 - 5190 MHz,
Band Edge Frequency 5150 MHz**



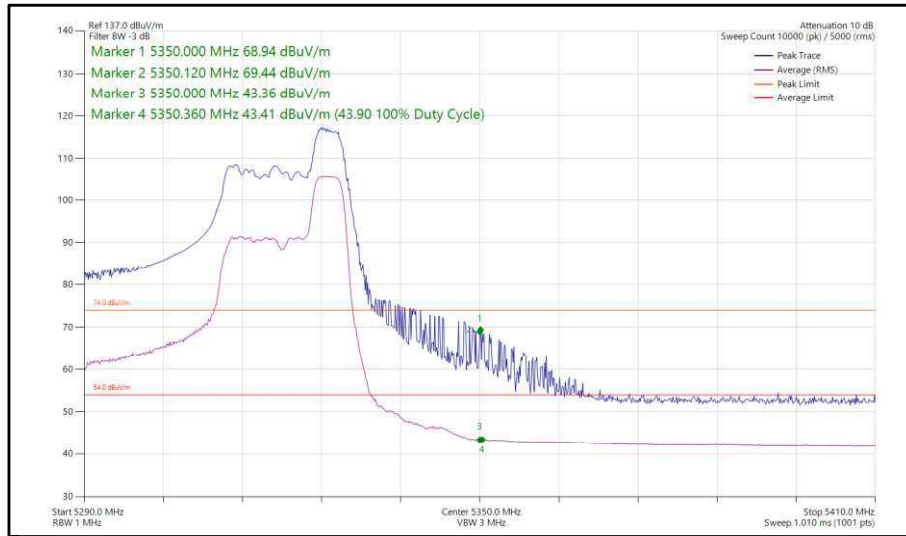
**Figure 57 - 802.11ax, HE40, RU 106-53, SISO, Core 1 - 5190 MHz,
Band Edge Frequency 5150 MHz**



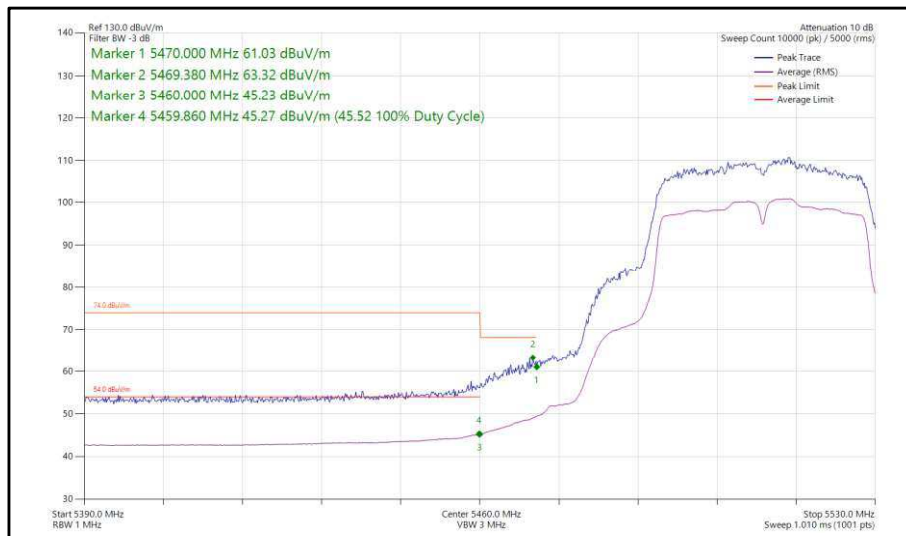
**Figure 58 - 802.11n, HT40, SISO, Core 1 - 5310 MHz,
Band Edge Frequency 5350 MHz**



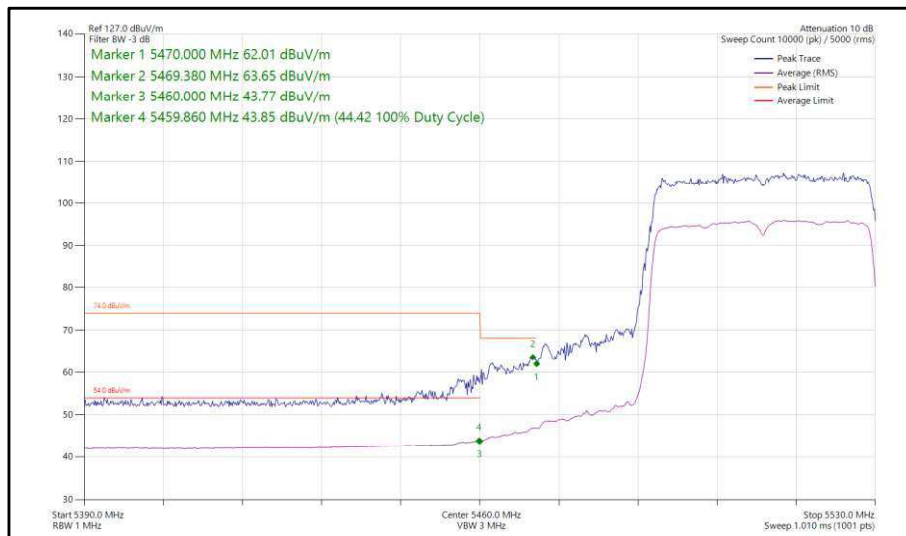
**Figure 59 - 802.11ax, HE40, SU, SISO, Core 1 - 5310 MHz,
Band Edge Frequency 5350 MHz**



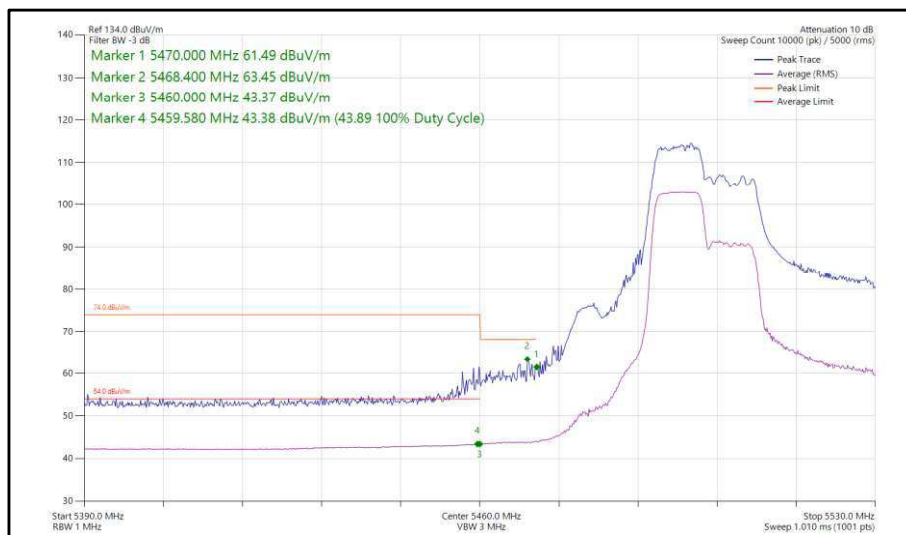
**Figure 60 - 802.11ax, HE40, RU 52-44, SISO, Core 1 - 5310 MHz,
Band Edge Frequency 5350 MHz**



**Figure 61 - 802.11n, HT40, SISO, Core 1 - 5510 MHz,
Band Edge Frequency 5460 MHz**



**Figure 62 - 802.11ax, HE40, SU, SISO, Core 1 - 5510 MHz,
Band Edge Frequency 5460 MHz**



**Figure 63 - 802.11ax, HE40, RU 106-53, SISO, Core 1 - 5510 MHz,
Band Edge Frequency 5460 MHz**



40 MHz Bandwidth - Core 0-1 (CDD)

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	MCS7	-	-	5190	5150	69.10	51.44
802.11ax HE40	MCS4x1	SU	-	5190	5150	64.48	51.40
802.11ax HE40	MCS11x1	52	37	5190	5150	69.32	44.67
802.11n HT40	MCS2	-	-	5310	5350	65.12	51.45
802.11ax HE40	MCS4x1	SU	-	5310	5350	65.88	51.41
802.11ax HE40	MCS11x1	106	56	5310	5350	69.11	45.12
802.11n HT40	MCS4	-	-	5510	5460	63.59	45.42
802.11ax HE40	MCS4x1	SU	-	5510	5460	63.70	45.72
802.11ax HE40	MCS11x1	106	53	5510	5460	63.36	43.71

Table 13 - CDD Restricted Band Edge Results

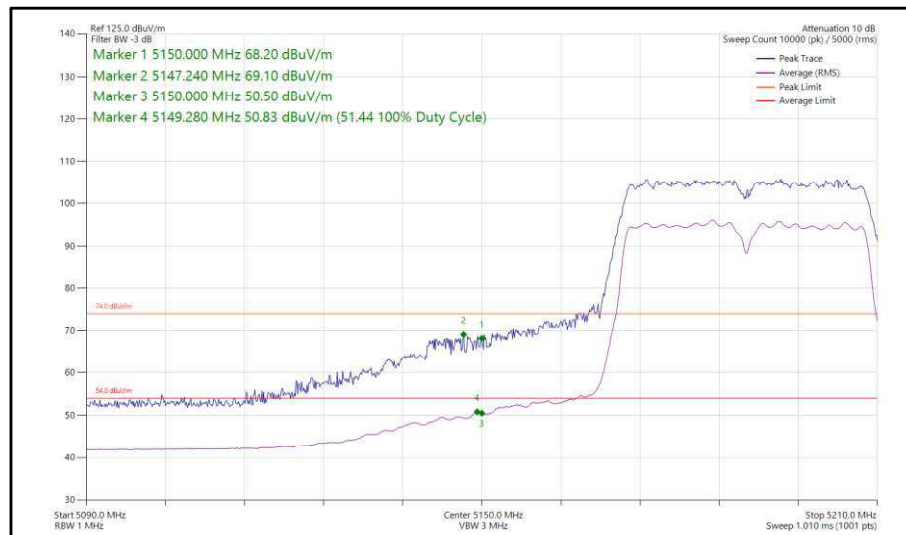
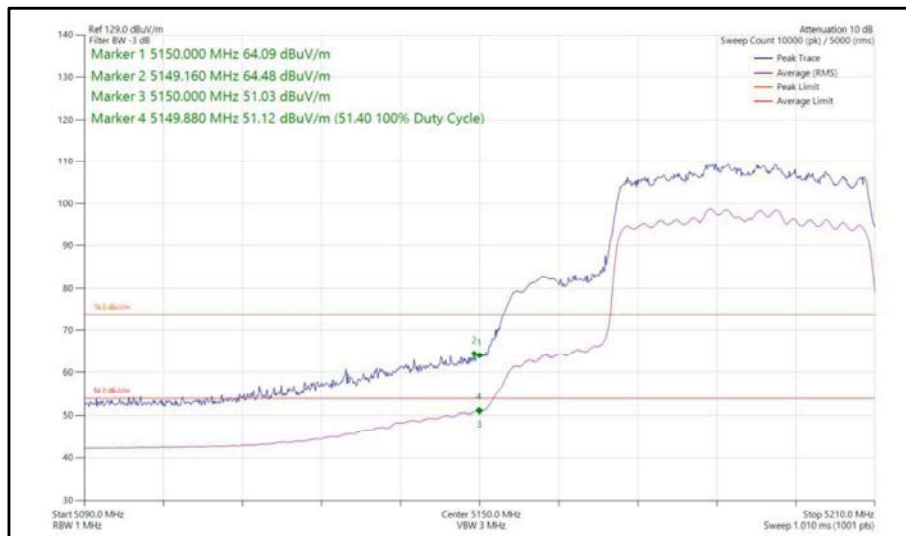
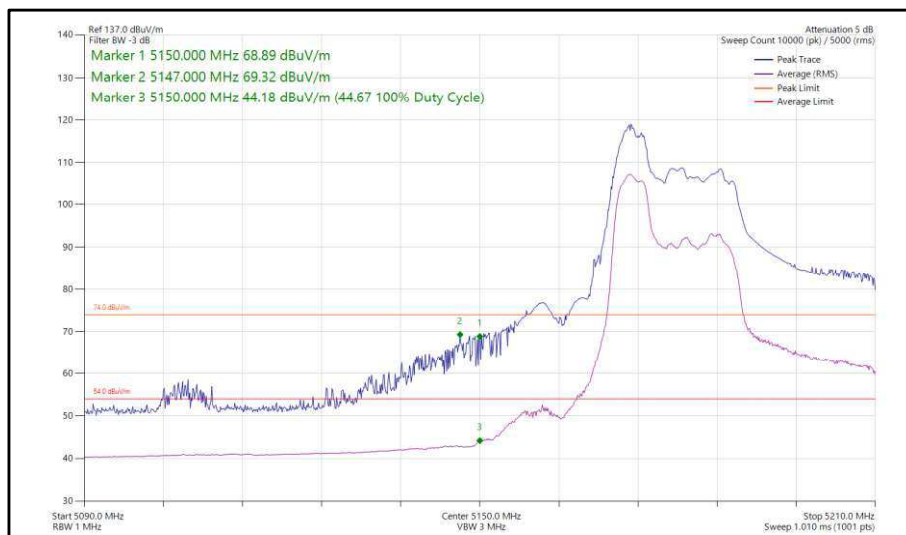


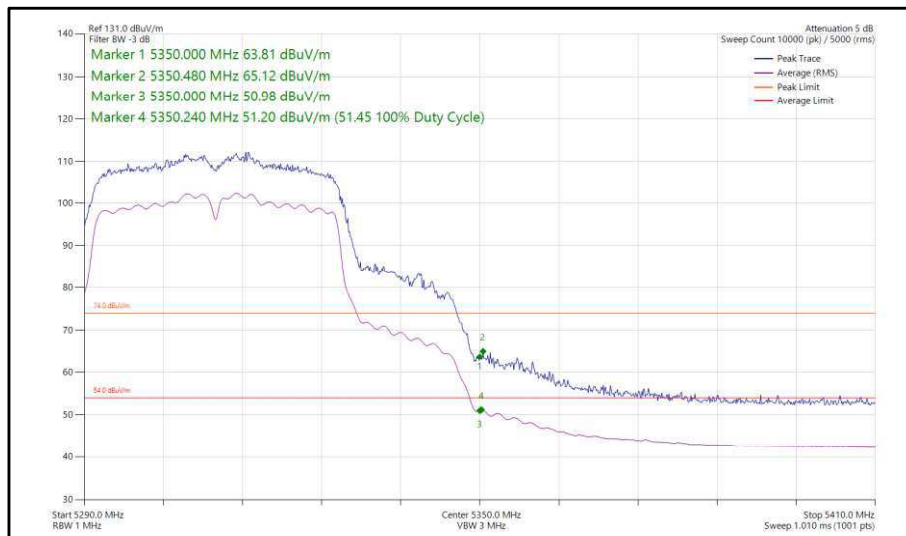
Figure 64 - 802.11n, HT40, CDD, Core 0-1 - 5190 MHz,
 Band Edge Frequency 5150 MHz



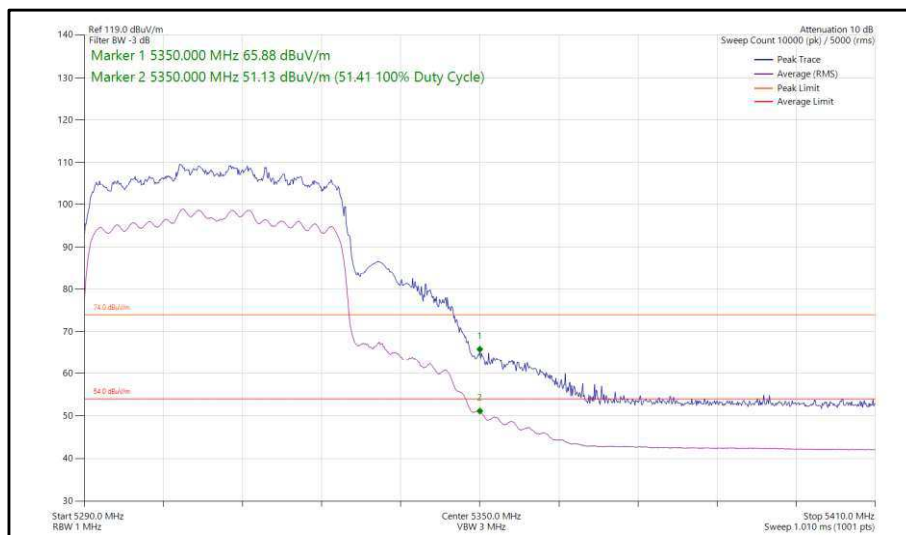
**Figure 65 - 802.11ax, HE40, SU, CDD, Core 0-1 - 5190 MHz,
Band Edge Frequency 5150 MHz**



**Figure 66 - 802.11ax, HE40, RU 52-37, CDD, Core 0-1 - 5190 MHz,
Band Edge Frequency 5150 MHz**



**Figure 67 - 802.11n, HT40, CDD, Core 0-1 - 5310 MHz,
Band Edge Frequency 5350 MHz**



**Figure 68 - 802.11ax, HE40, SU, CDD, Core 0-1 - 5310 MHz,
Band Edge Frequency 5350 MHz**

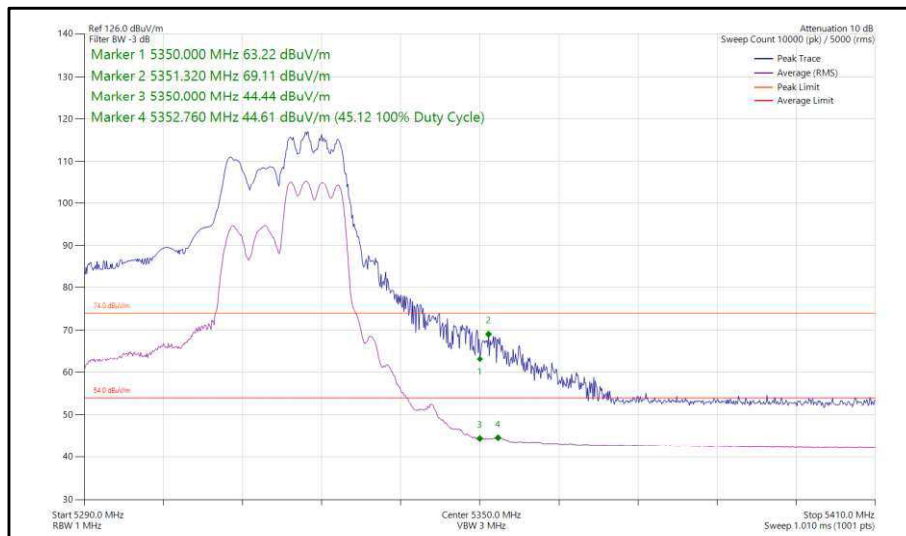


Figure 69 - 802.11ax, HE40, RU 106-56, CDD, Core 0-1 - 5310 MHz, Band Edge Frequency 5350 MHz

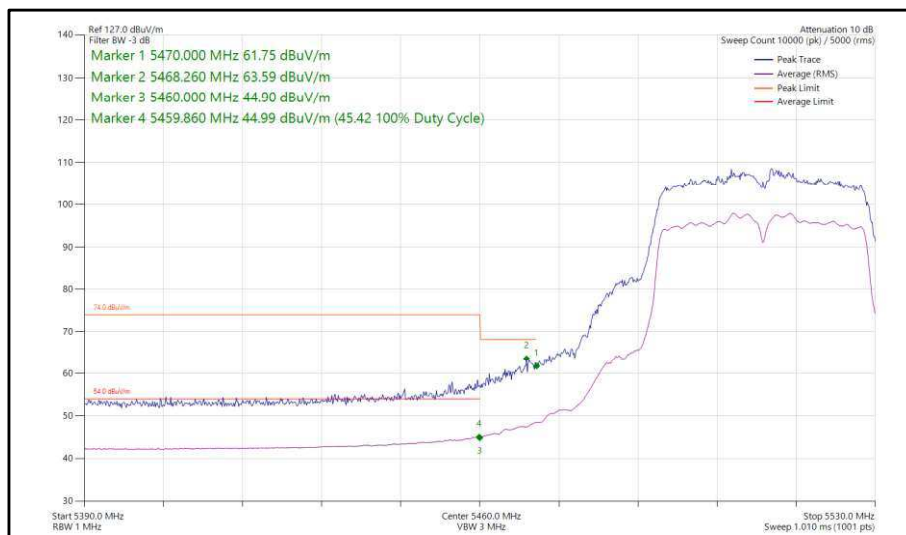
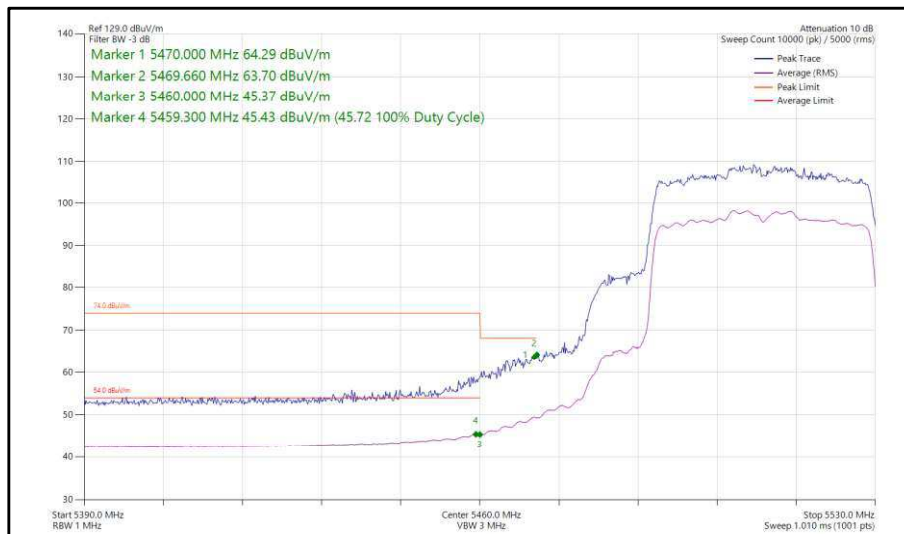
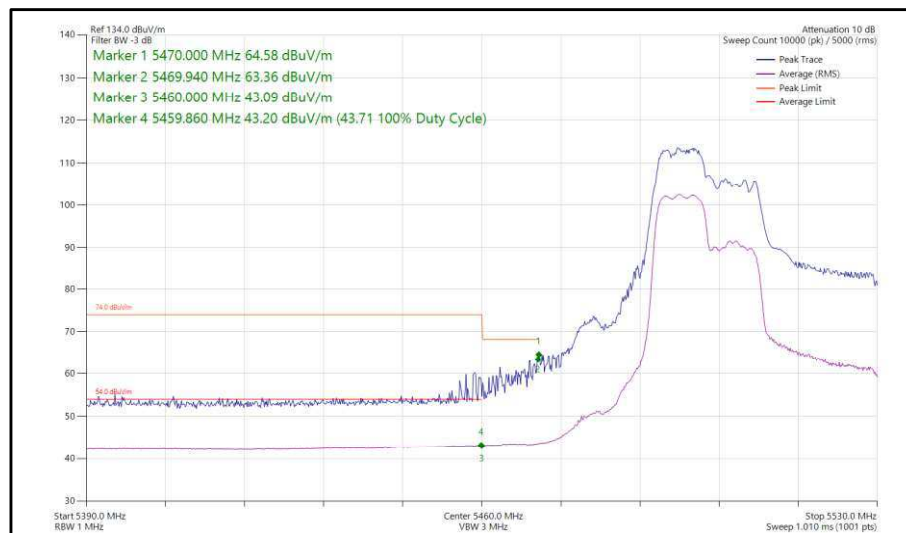


Figure 70 - 802.11n, HT40, CDD, Core 0-1 - 5510 MHz, Band Edge Frequency 5460 MHz



**Figure 71 - 802.11ax, HE40, SU, CDD, Core 0-1 - 5510 MHz,
Band Edge Frequency 5460 MHz**



**Figure 72 - 802.11ax, HE40, RU 106-53, CDD, Core 0-1 - 5510 MHz,
Band Edge Frequency 5460 MHz**



40 MHz Bandwidth - Core 0-1 (SDM)

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	MCS10	-	-	5190	5150	64.23	51.38
802.11ax HE40	MCS11x2	SU	-	5190	5150	67.90	51.21
802.11ax HE40	MCS11x2	106	53	5190	5150	67.80	45.55
802.11n HT40	MCS15	-	-	5310	5350	69.26	50.48
802.11ax HE40	MCS2x2	SU	-	5310	5350	64.15	51.37
802.11ax HE40	MCS11x2	106	56	5310	5350	69.44	46.72
802.11n HT40	MCS15	-	-	5510	5460	63.68	43.71
802.11ax HE40	MCS11x2	SU	-	5510	5460	63.64	44.11
802.11ax HE40	MCS11x2	106	53	5510	5460	63.18	43.99

Table 14 - SDM Restricted Band Edge Results

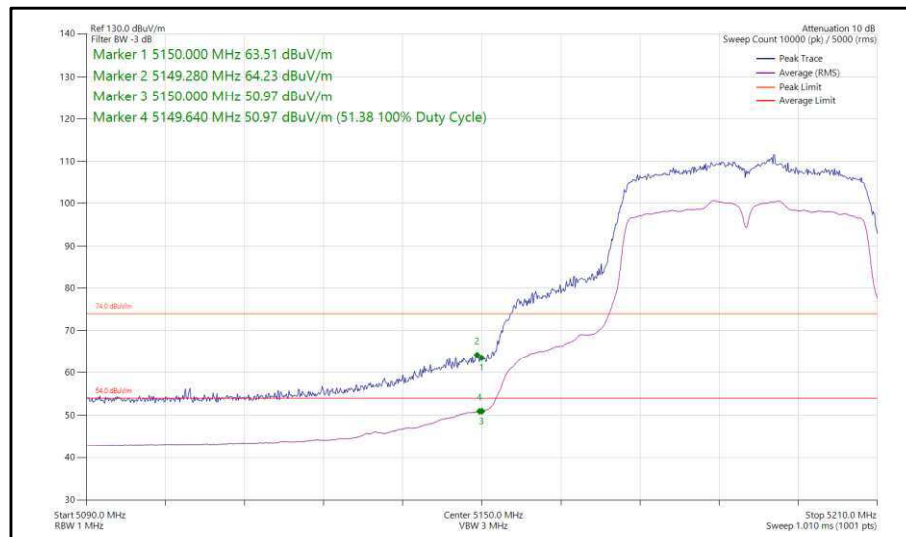
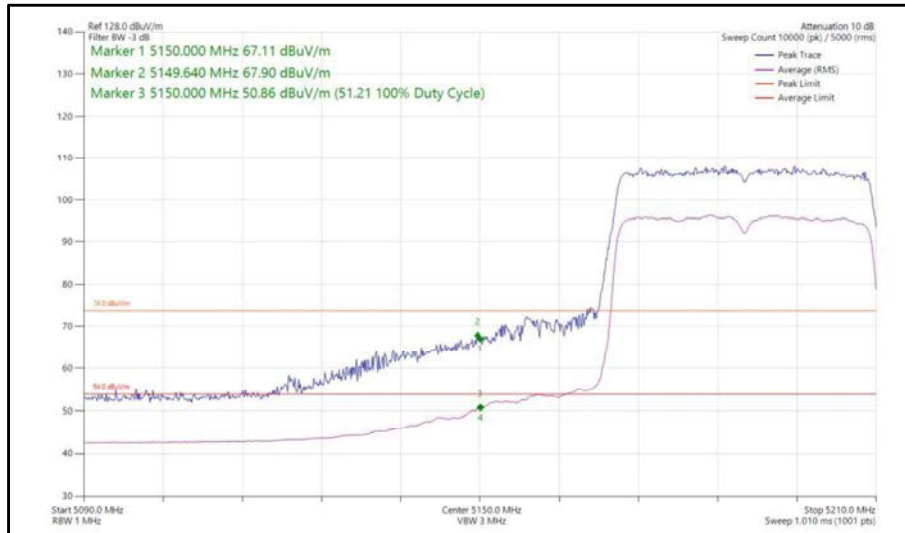
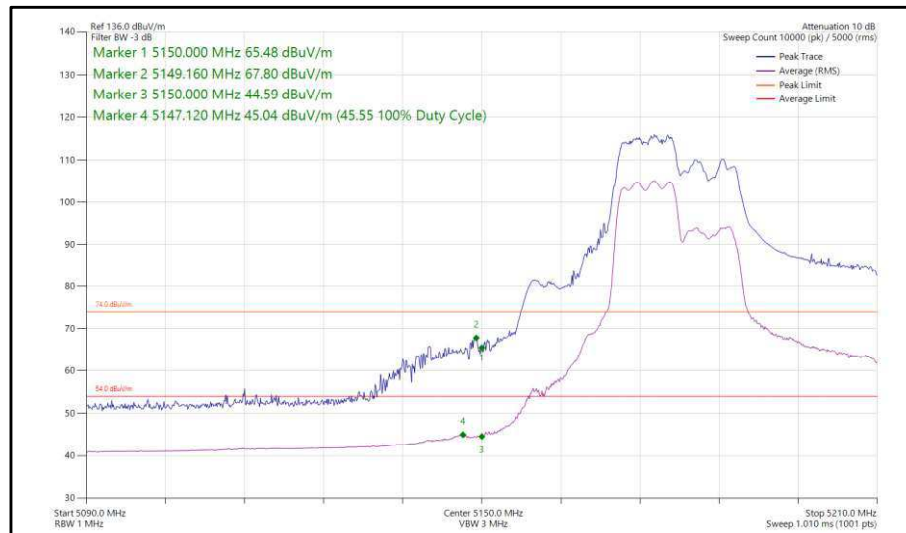


Figure 73 - 802.11n, HT40, SDM, Core 0-1 - 5190 MHz, Band Edge Frequency 5150 MHz



**Figure 74 - 802.11ax, HE40, SU, SDM, Core 0-1 - 5190 MHz,
Band Edge Frequency 5150 MHz**



**Figure 75 - 802.11ax, HE40, RU 106-53, SDM, Core 0-1 - 5190 MHz,
Band Edge Frequency 5150 MHz**

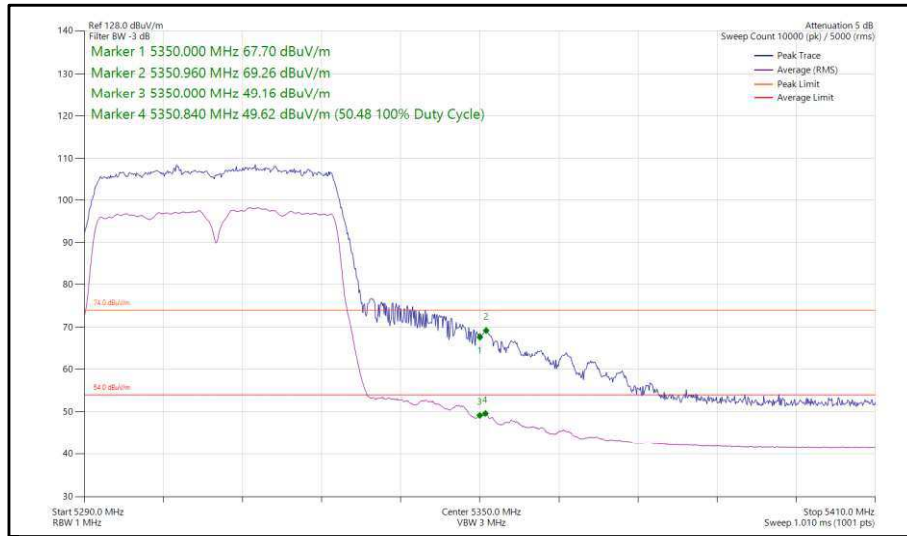


Figure 76 - 802.11n, HT40, SDM, Core 0-1 - 5310 MHz, Band Edge Frequency 5350 MHz

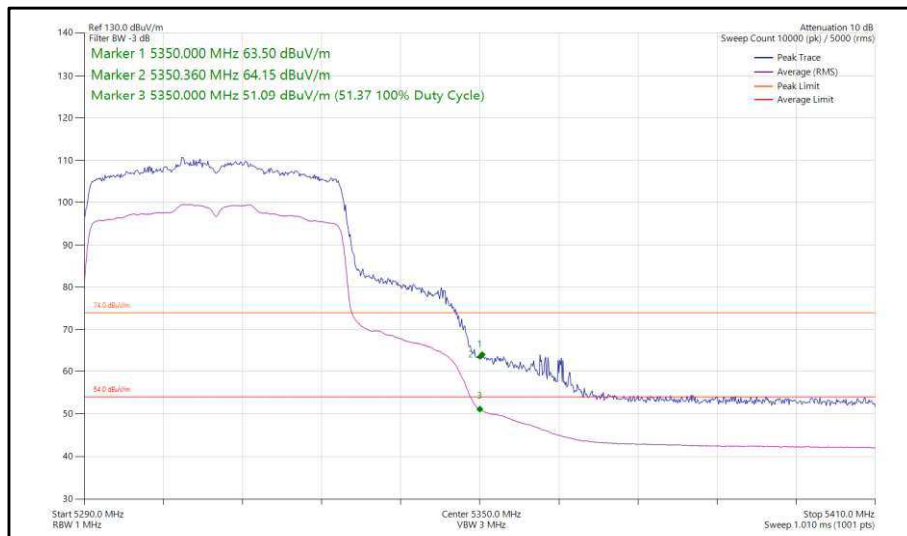


Figure 77 - 802.11ax, HE40, SU, SDM, Core 0-1 - 5310 MHz, Band Edge Frequency 5350 MHz

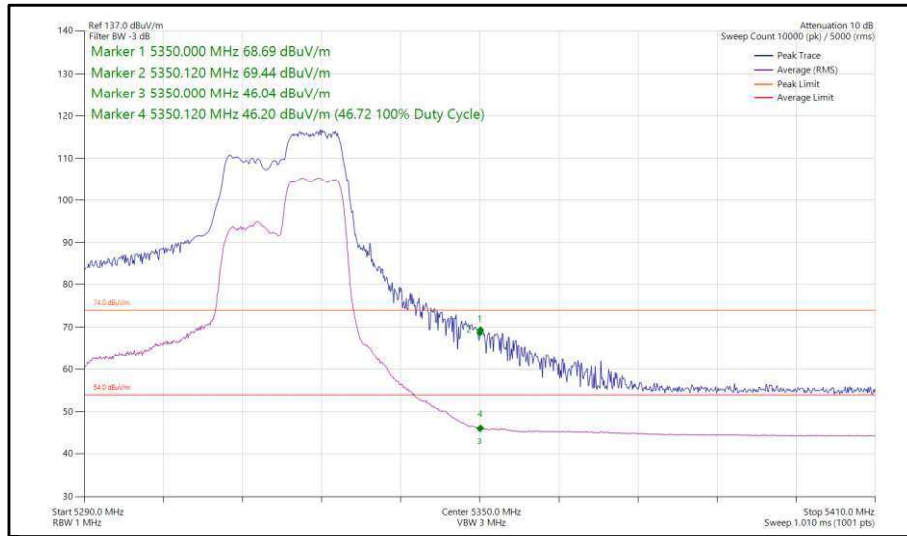


Figure 78 - 802.11ax, HE40, RU 106-56, SDM, Core 0-1 - 5310 MHz, Band Edge Frequency 5350 MHz

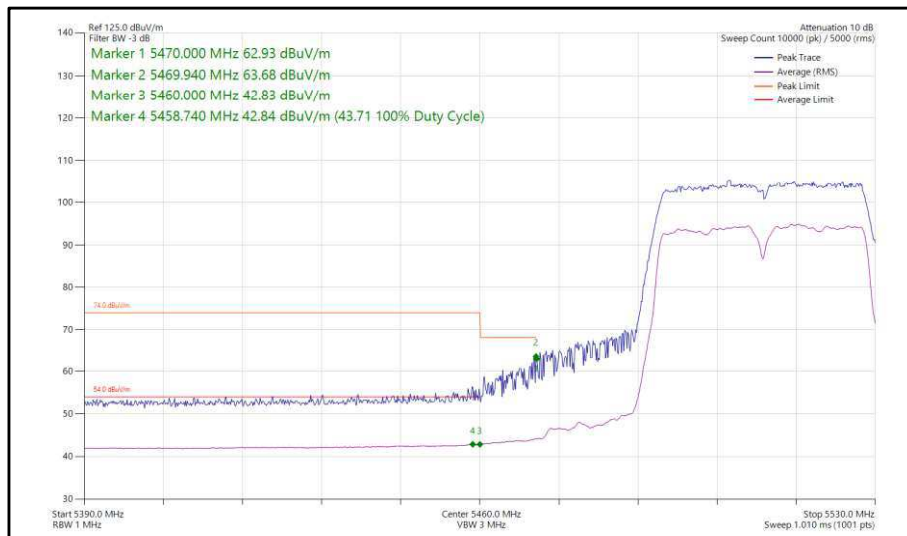
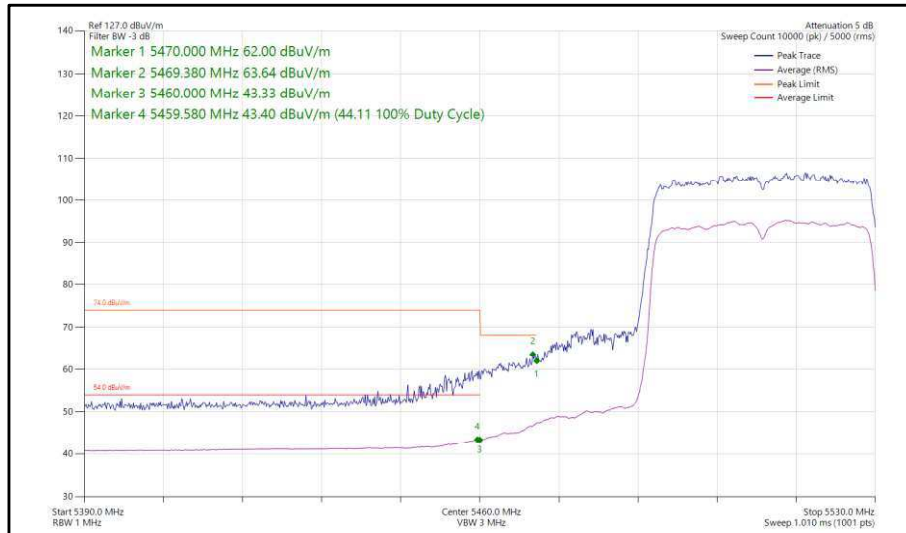
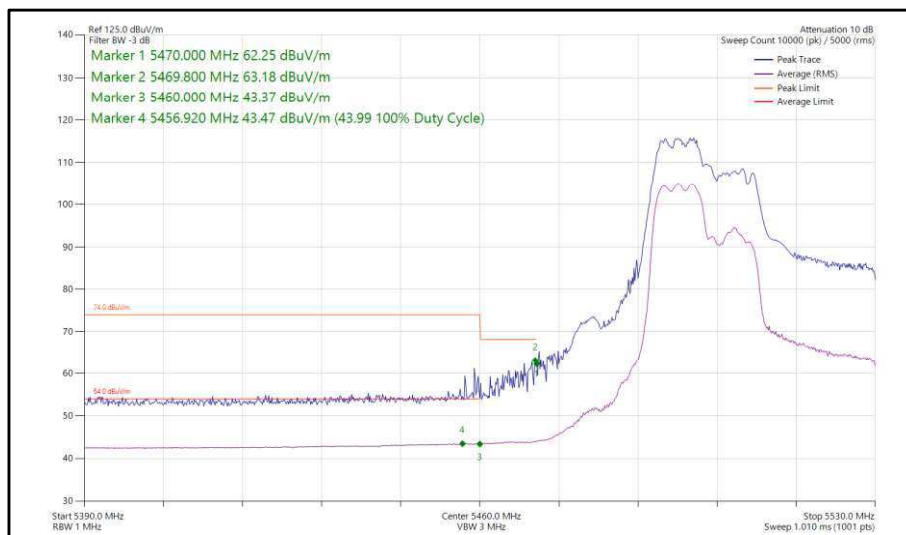


Figure 79 - 802.11n, HT40, SDM, Core 0-1 - 5510 MHz, Band Edge Frequency 5460 MHz



**Figure 80 - 802.11ax, HE40, SU, SDM, Core 0-1 - 5510 MHz,
Band Edge Frequency 5460 MHz**



**Figure 81 - 802.11ax, HE40, RU 106-53, SDM, Core 0-1 - 5510 MHz,
Band Edge Frequency 5460 MHz**



40 MHz Bandwidth - Core 0-1 (TxBF)

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	MCS2	-	-	5190	5150	64.39	51.29
802.11n HT40	MCS2	-	-	5310	5350	69.46	48.87
802.11n HT40	MCS2	-	-	5510	5460	63.38	45.24

Table 15 - TxBF Restricted Band Edge Results

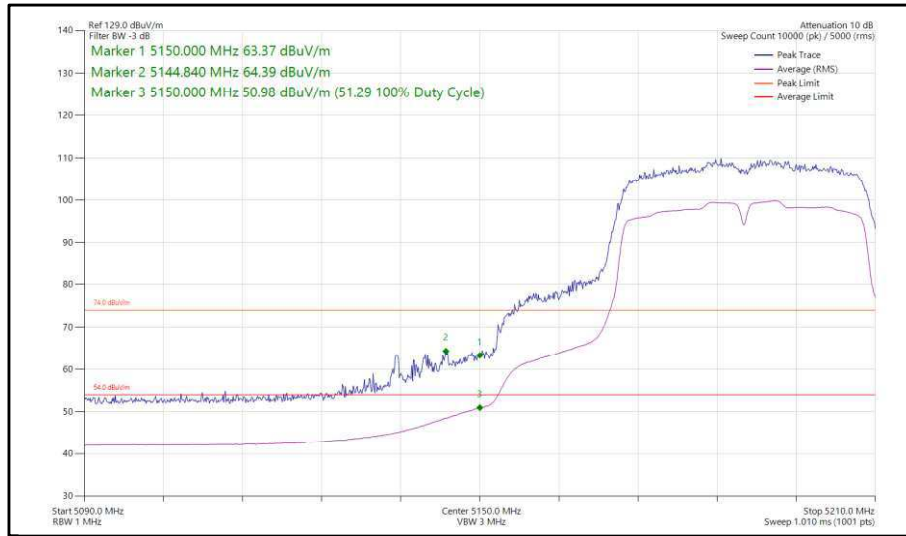


Figure 82 - 802.11n, HT40, TxBF, Core 0-1 - 5190 MHz, Band Edge Frequency 5150 MHz

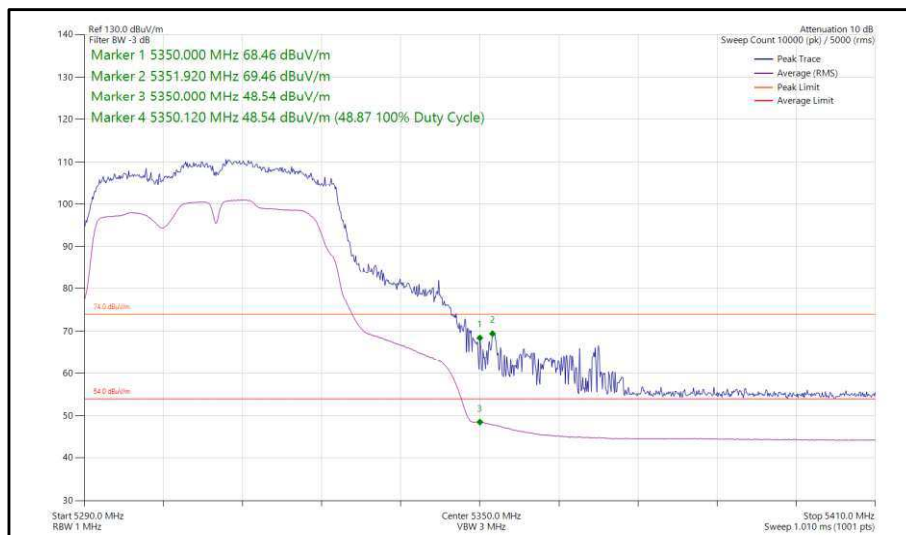
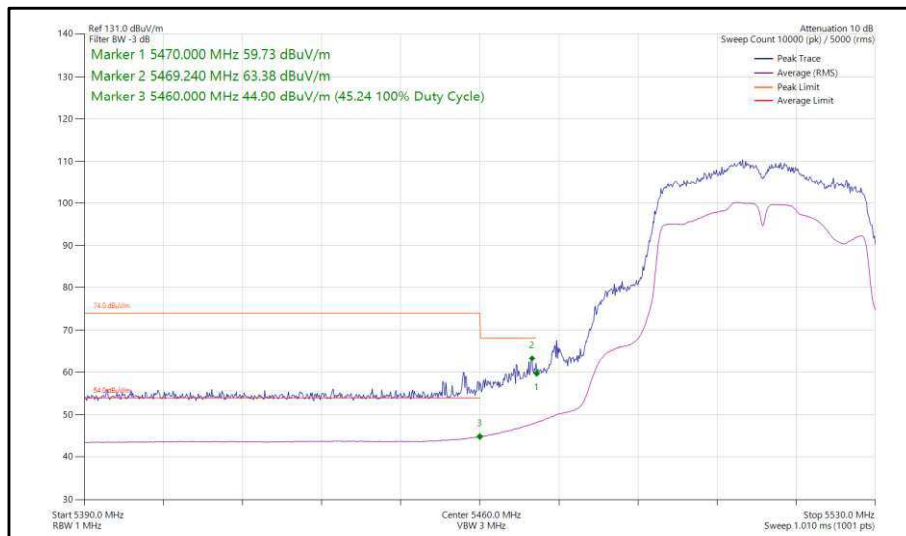


Figure 83 - 802.11n, HT40, TxBF, Core 0-1 - 5310 MHz, Band Edge Frequency 5350 MHz



**Figure 84 - 802.11n, HT40, TxBF, Core 0-1 - 5510 MHz,
Band Edge Frequency 5460 MHz**



80 MHz Bandwidth - Core 0 (SISO)

Mode	Data Rate/ MCS	Resource Size	Resource Index	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
802.11ac VHT80	MCS2x1	-	-	5210	5150	63.05	51.41
802.11ax HE80	MCS2x1	SU	-	5210	5150	63.38	51.42
802.11ax HE80	MCS11x1	106	53	5210	5150	69.37	47.40
802.11ac VHT80	MCS4x1	-	-	5290	5350	63.29	51.34
802.11ax HE80	MCS4x1	SU	-	5290	5350	63.91	51.21
802.11ax HE80	MCS11x1	106	60	5290	5350	69.45	45.59
802.11ac VHT80	MCS4x1	-	-	5530	5460	63.44	51.31
802.11ax HE80	MCS11x1	SU	-	5530	5460	63.69	47.85
802.11ax HE80	MCS11x1	52	37	5530	5460	63.16	44.83

Table 16 - SISO Restricted Band Edge Results

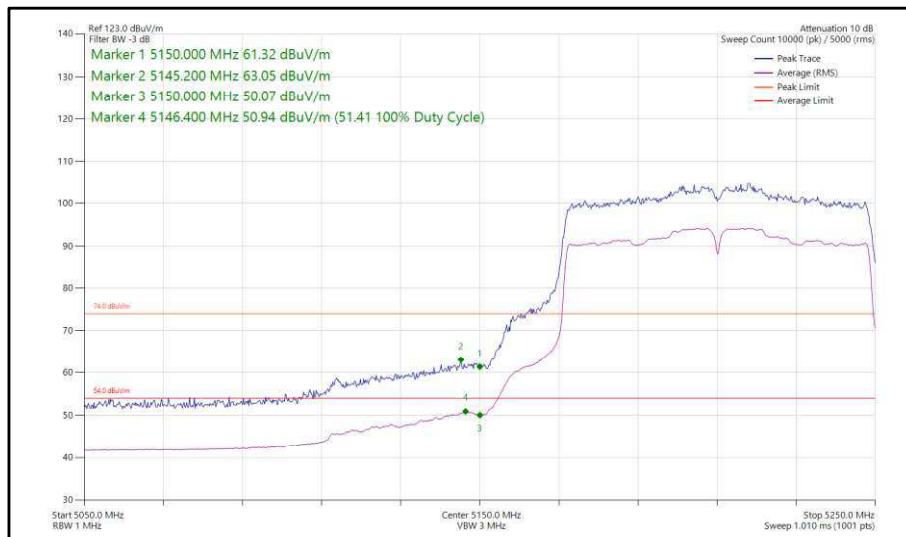
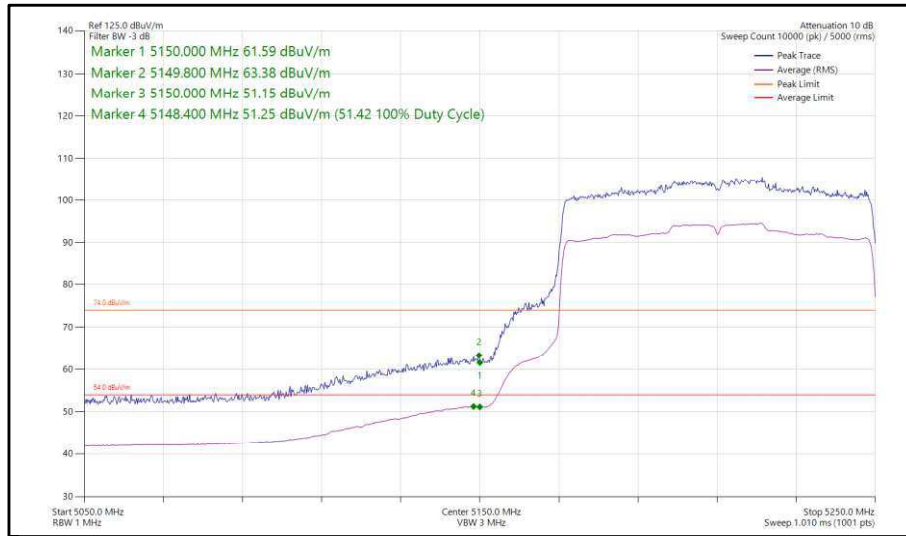
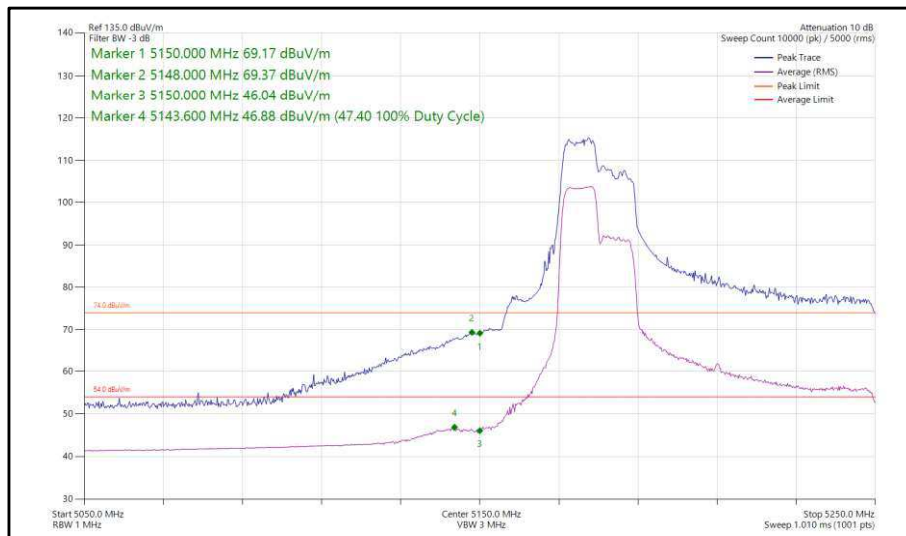


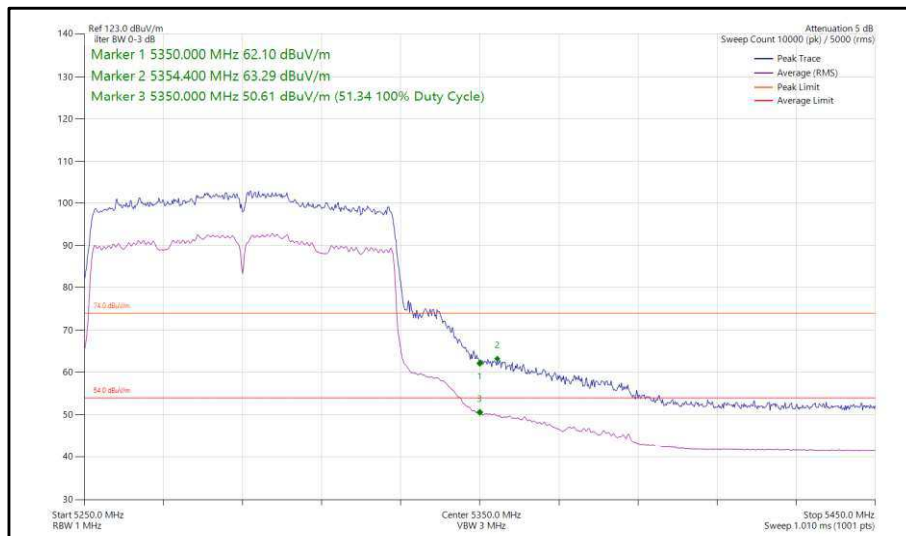
Figure 85 - 802.11ac, VHT80, SISO, Core 0 - 5210 MHz,
 Band Edge Frequency 5150 MHz



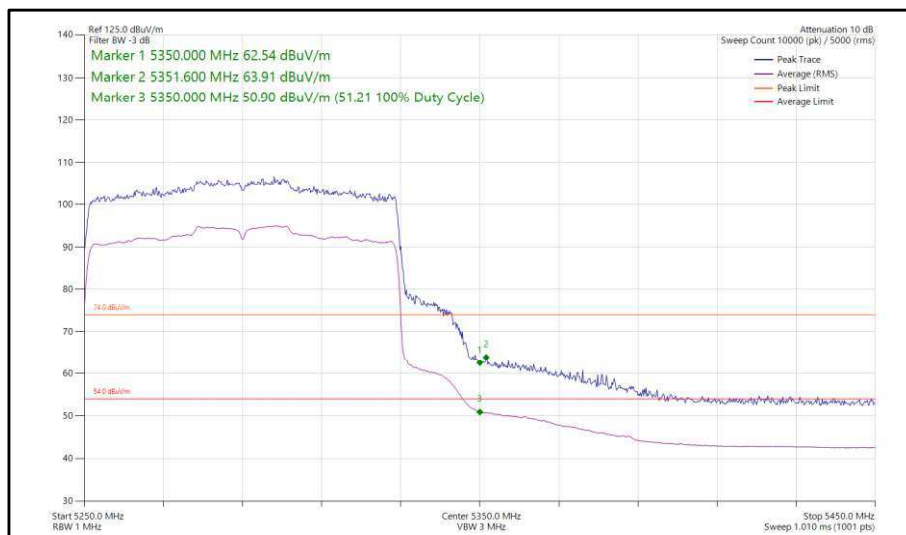
**Figure 86 - 802.11ax, HE80, SU, SISO, Core 0 - 5210 MHz,
Band Edge Frequency 5150 MHz**



**Figure 87 - 802.11ax, HE80, RU 106-53, SISO, Core 0 - 5210 MHz,
Band Edge Frequency 5150 MHz**



**Figure 88 - 802.11ac, VHT80, SISO, Core 0 - 5290 MHz,
Band Edge Frequency 5350 MHz**



**Figure 89 - 802.11ax, HE80, SU, SISO, Core 0 - 5290 MHz,
Band Edge Frequency 5350 MHz**

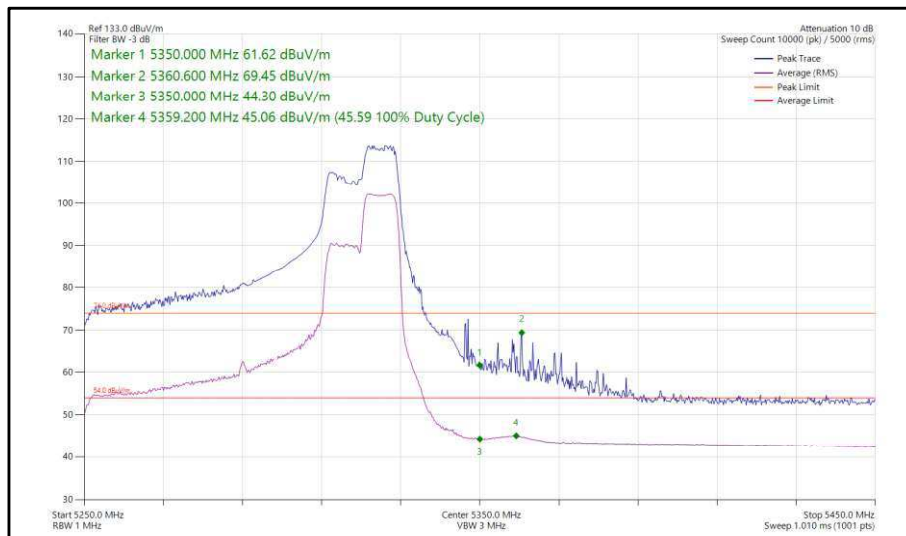


Figure 90 - 802.11ax, HE80, RU 106-60, SISO, Core 0 - 5290 MHz, Band Edge Frequency 5350 MHz

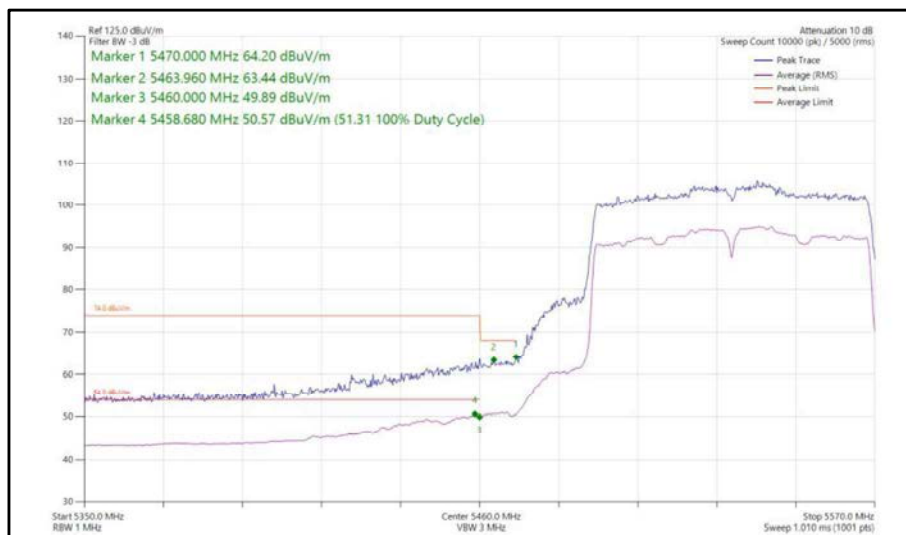
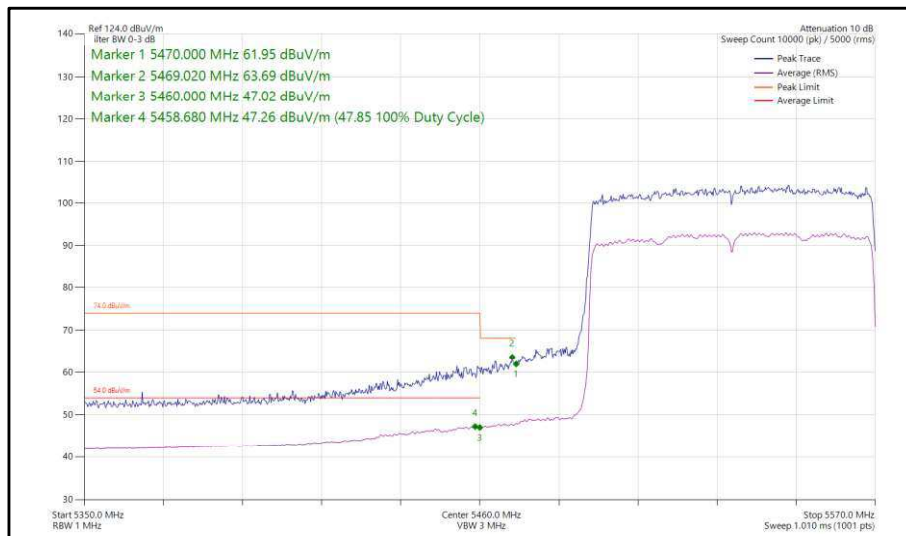
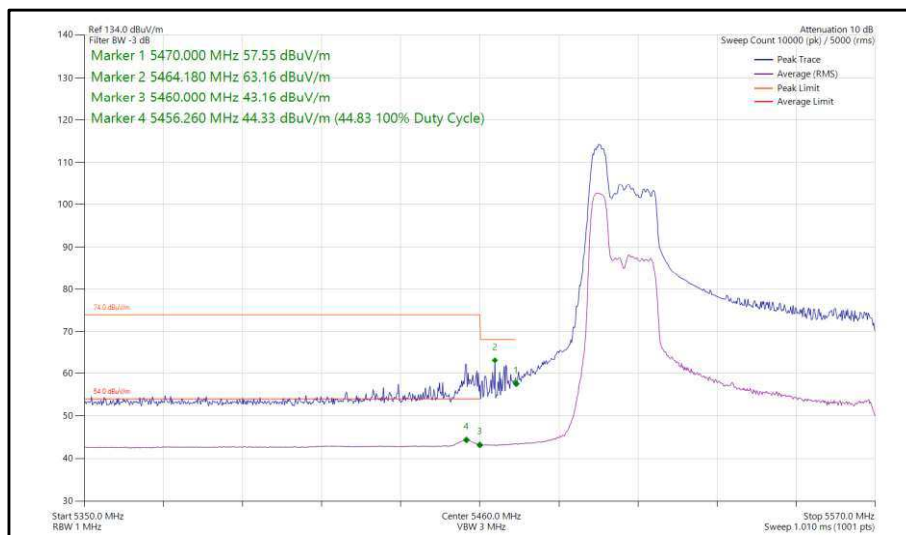


Figure 91 - 802.11ac, VHT80, SISO, Core 0 - 5530 MHz, Band Edge Frequency 5460 MHz



**Figure 92 - 802.11ax, HE80, SU, SISO, Core 0 - 5530 MHz,
Band Edge Frequency 5460 MHz**



**Figure 93 - 802.11ax, HE80, RU 52-37, SISO, Core 0 - 5530 MHz,
Band Edge Frequency 5460 MHz**



80 MHz Bandwidth - Core 1 (SISO)

Mode	Data Rate/ MCS	Resource Size	Resource Index	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
802.11ac VHT80	MCS2x1	-	-	5210	5150	62.53	51.19
802.11ax HE80	MCS11x1	SU	-	5210	5150	69.17	51.48
802.11ax HE80	MCS11x1	106	53	5210	5150	69.01	46.95
802.11ac VHT80	MCS4x1	-	-	5290	5350	63.59	51.24
802.11ax HE80	MCS11x1	SU	-	5290	5350	66.83	51.45
802.11ax HE80	MCS11x1	106	60	5290	5350	68.98	47.22
802.11ac VHT80	MCS8x1	-	-	5530	5460	63.63	49.71
802.11ax HE80	MCS4x1	SU	-	5530	5460	63.60	50.62
802.11ax HE80	MCS11x1	106	53	5530	5460	63.02	44.84

Table 17 - SISO Restricted Band Edge Results

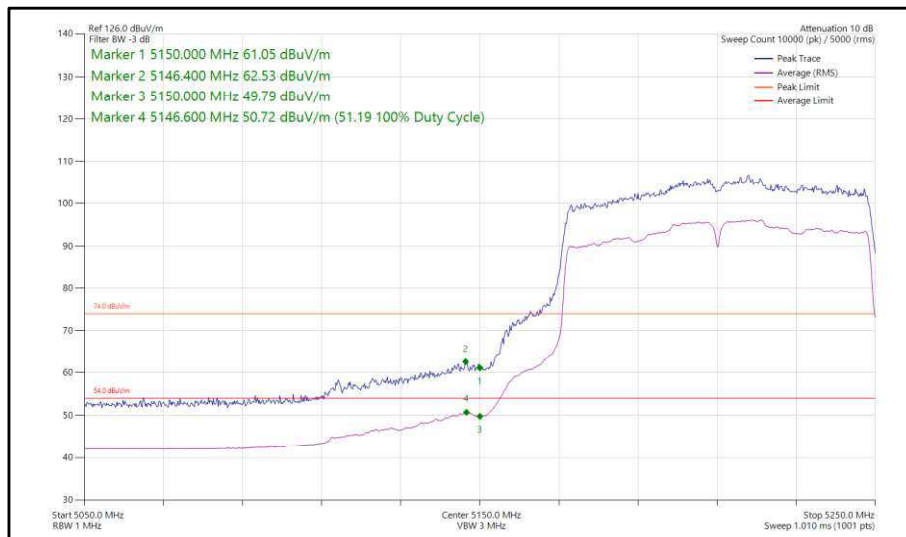
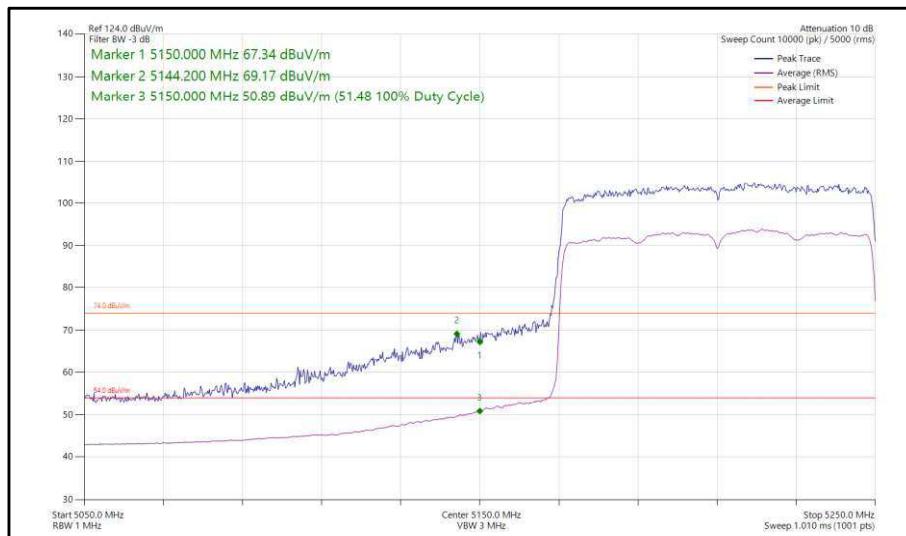
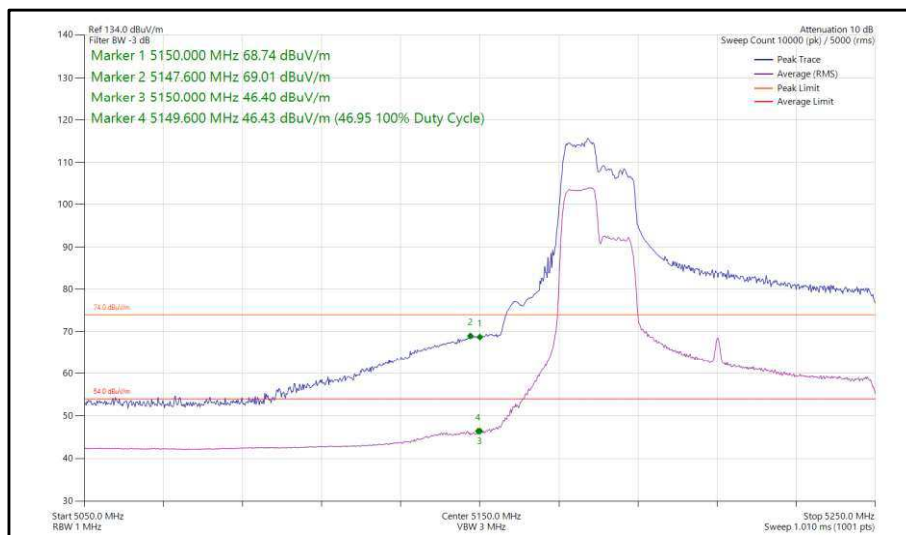


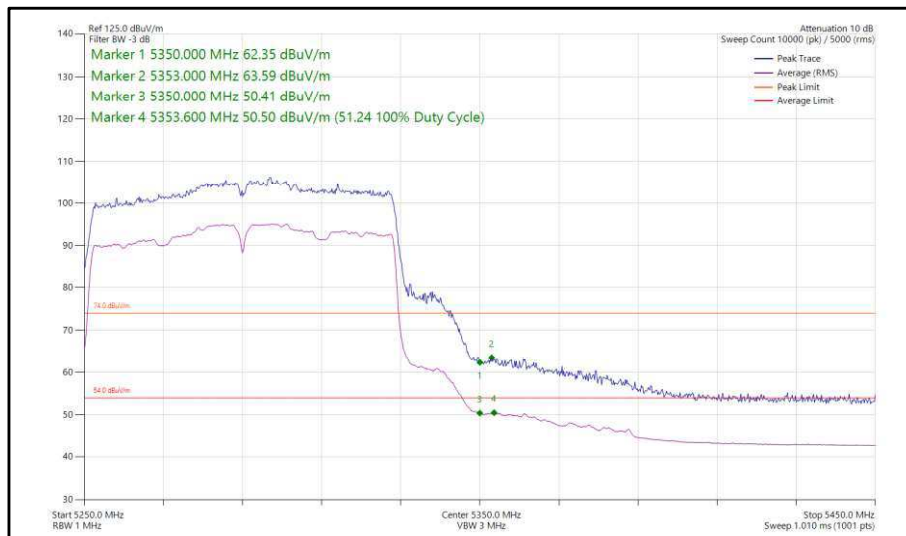
Figure 94 - 802.11ac, VHT80, SISO, Core 1 - 5210 MHz,
 Band Edge Frequency 5150 MHz



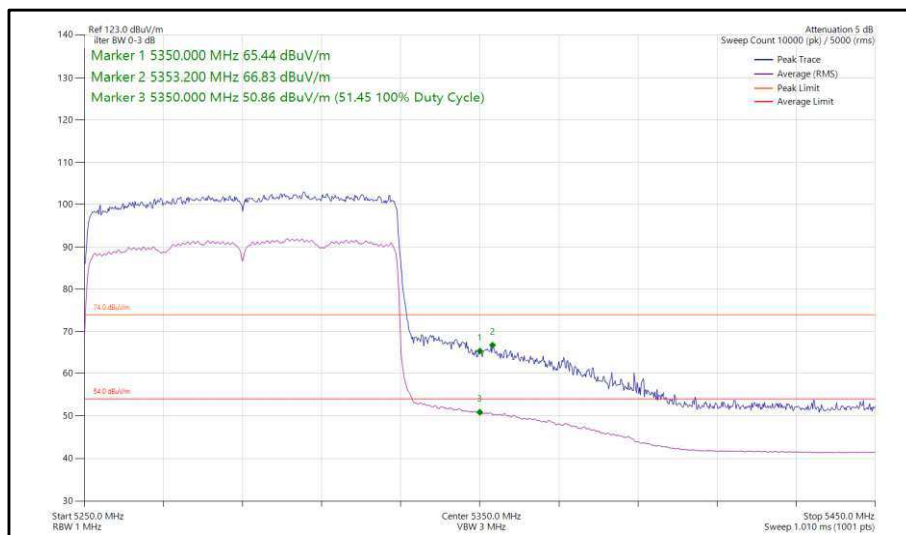
**Figure 95 - 802.11ax, HE80, SU, SISO, Core 1 - 5210 MHz,
Band Edge Frequency 5150 MHz**



**Figure 96 - 802.11ax, HE80, RU 106-53, SISO, Core 1 - 5210 MHz,
Band Edge Frequency 5150 MHz**



**Figure 97 - 802.11ac, VHT80, SISO, Core 1 - 5290 MHz,
Band Edge Frequency 5350 MHz**



**Figure 98 - 802.11ax, HE80, SU, SISO, Core 1 - 5290 MHz,
Band Edge Frequency 5350 MHz**

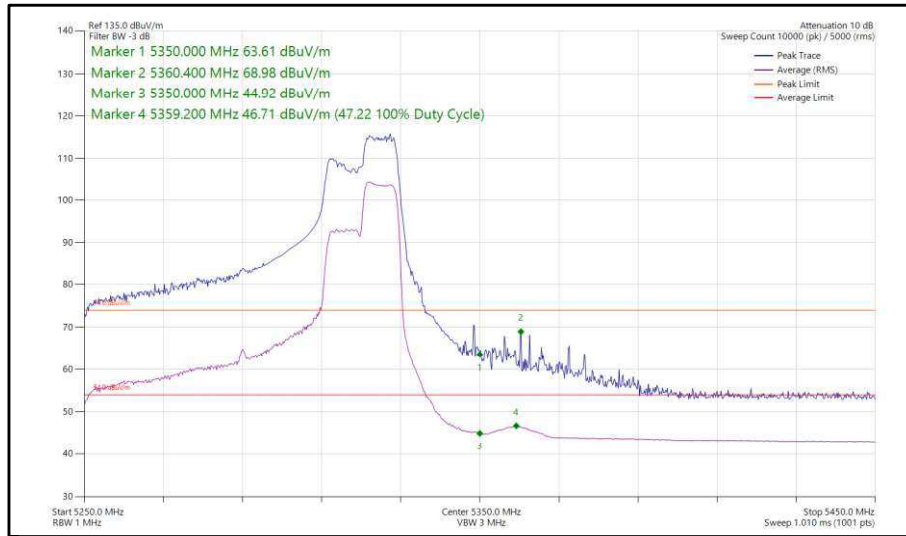


Figure 99 - 802.11ax, HE80, RU 106-60, SISO, Core 1 - 5290 MHz, Band Edge Frequency 5350 MHz

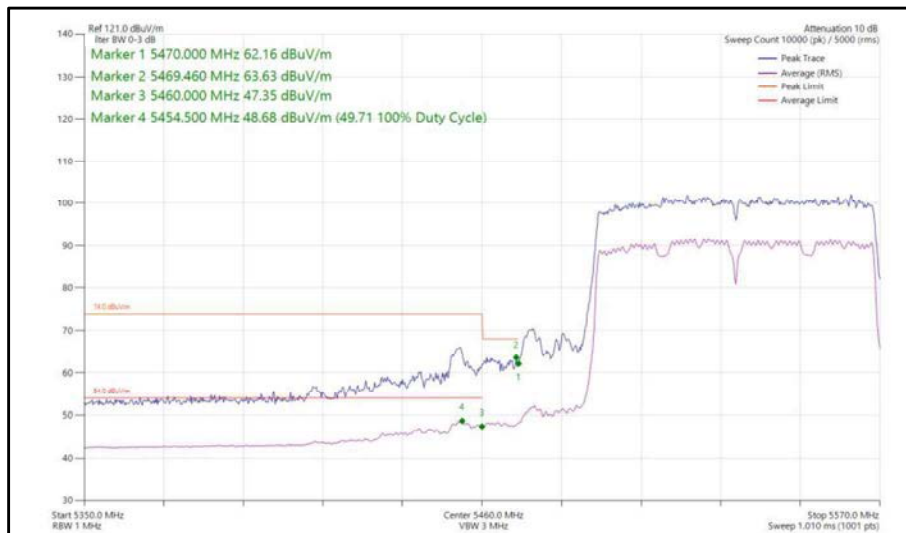


Figure 100 - 802.11ac, VHT80, SISO, Core 1 - 5530 MHz, Band Edge Frequency 5460 MHz

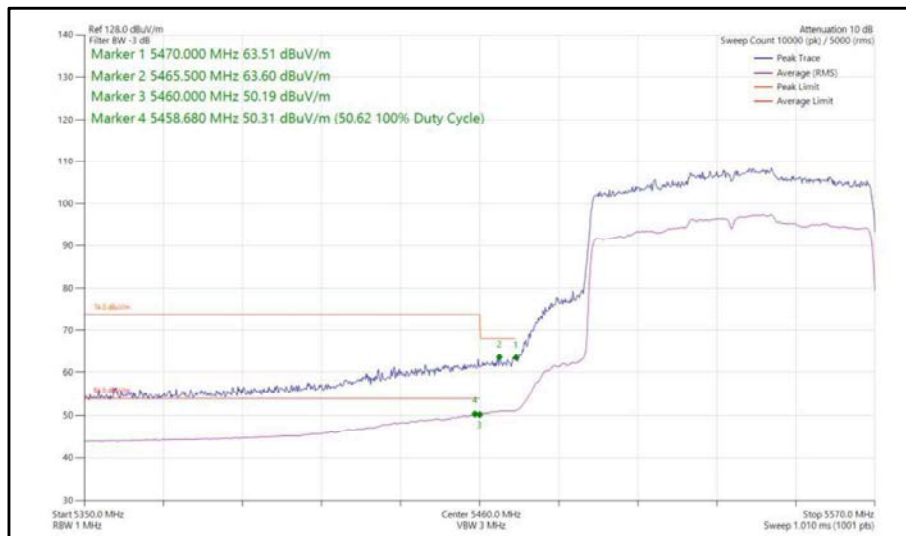


Figure 101 - 802.11ax, HE80, SU, SISO, Core 1 - 5530 MHz, Band Edge Frequency 5460 MHz

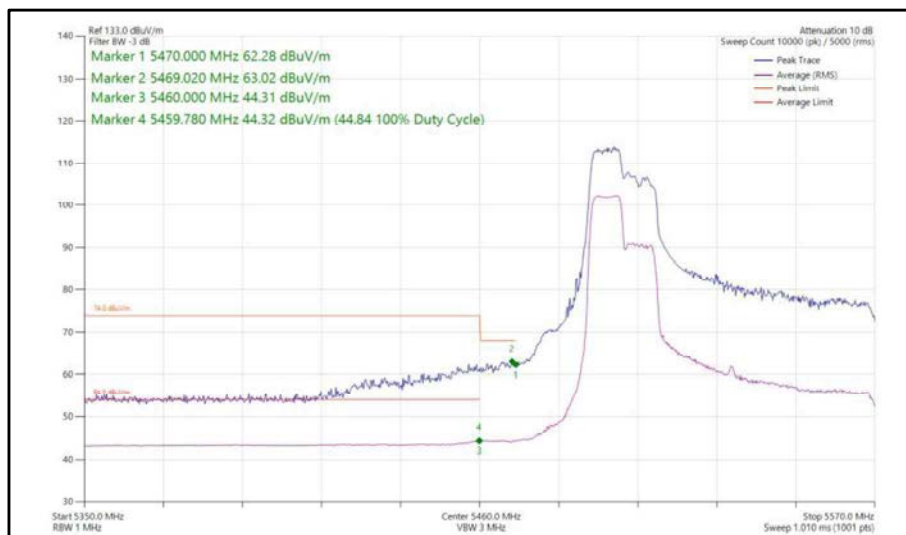


Figure 102 - 802.11ax, HE80, RU 106-53, SISO, Core 1 - 5530 MHz, Band Edge Frequency 5460 MHz



80 MHz Bandwidth - Core 0-1 (CDD)

Mode	Data Rate/ MCS	Resource Size	Resource Index	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
802.11ac VHT80	MCS8x1	-	-	5210	5150	67.72	51.41
802.11ax HE80	MCS11x1	SU	-	5210	5150	67.87	51.42
802.11ax HE80	MCS11x1	106	53	5210	5150	69.47	47.65
802.11ac VHT80	MCS8x1	-	-	5290	5350	65.25	51.50
802.11ax HE80	MCS2x1	SU	-	5290	5350	63.12	51.44
802.11ax HE80	MCS11x1	106	60	5290	5350	69.32	47.69
802.11ac VHT80	MCS8x1	-	-	5530	5460	63.62	47.98
802.11ax HE80	MCS2x1	SU	-	5530	5460	63.50	50.51
802.11ax HE80	MCS11x1	106	53	5530	5460	63.64	44.82

Table 18 - CDD Restricted Band Edge Results

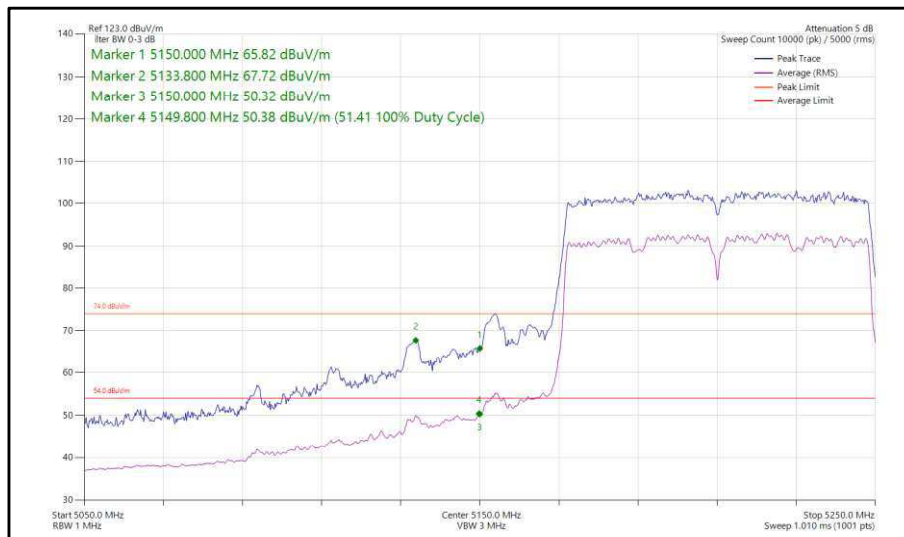
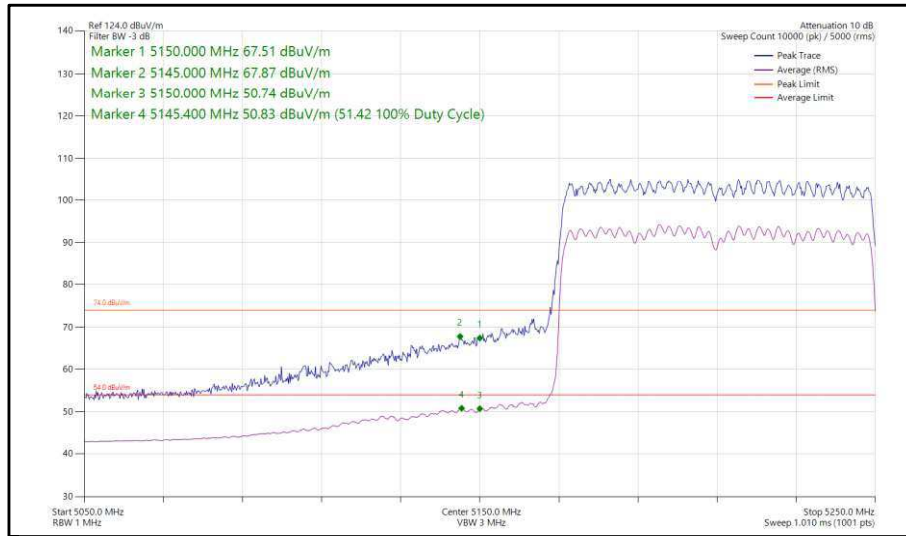
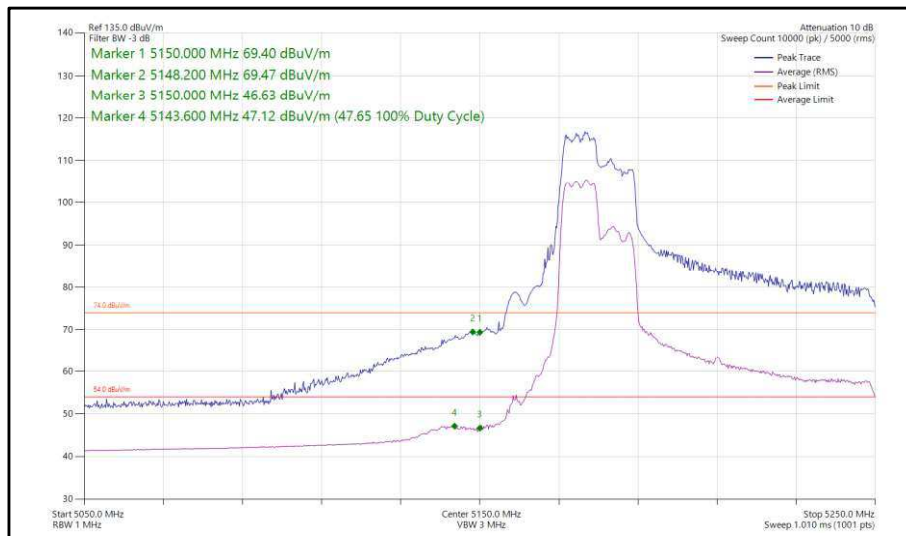


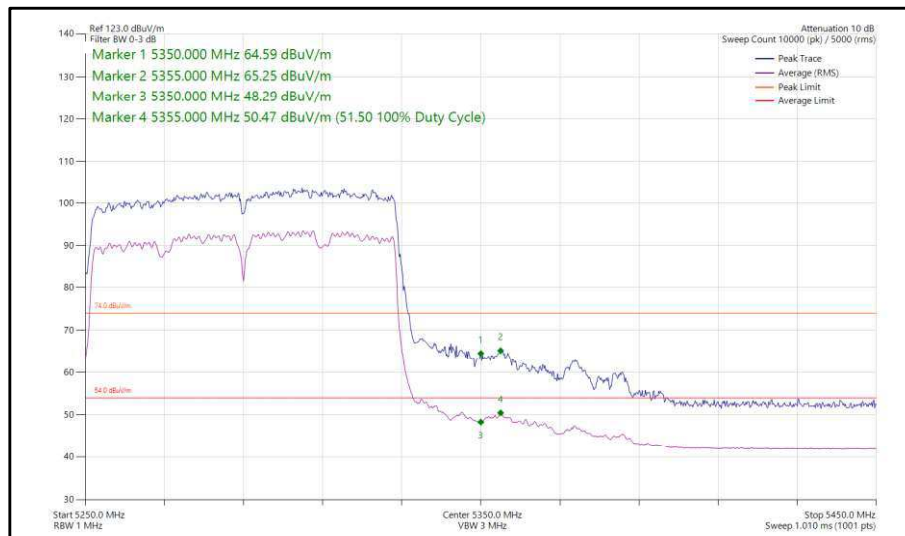
Figure 103 - 802.11ac, VHT80, CDD, Core 0-1 - 5210 MHz, Band Edge Frequency 5150 MHz



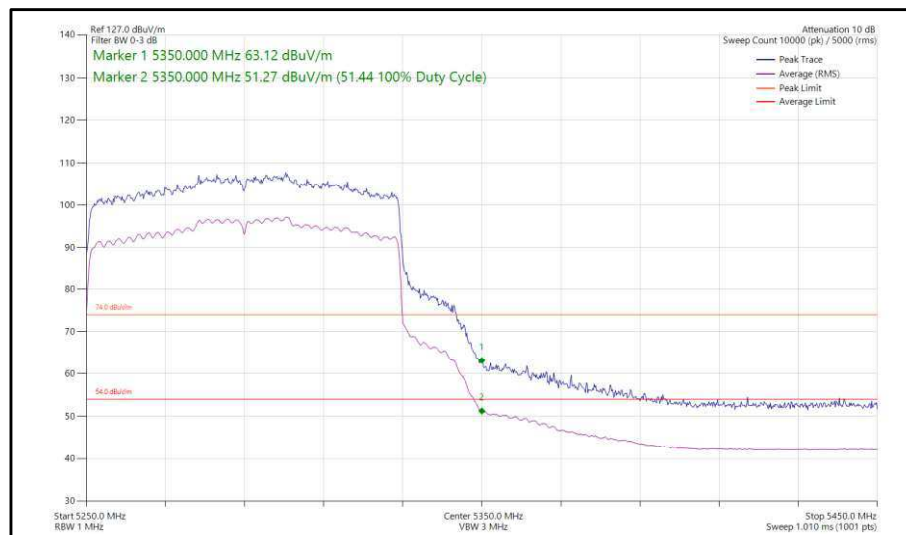
**Figure 104 - 802.11ax, HE80, SU, CDD, Core 0-1 - 5210 MHz,
Band Edge Frequency 5150 MHz**



**Figure 105 - 802.11ax, HE80, RU 106-53, CDD, Core 0-1 - 5210 MHz,
Band Edge Frequency 5150 MHz**



**Figure 106 - 802.11ac, VHT80, CDD, Core 0-1 - 5290 MHz,
Band Edge Frequency 5350 MHz**



**Figure 107 - 802.11ax, HE80, SU, CDD, Core 0-1 - 5290 MHz,
Band Edge Frequency 5350 MHz**

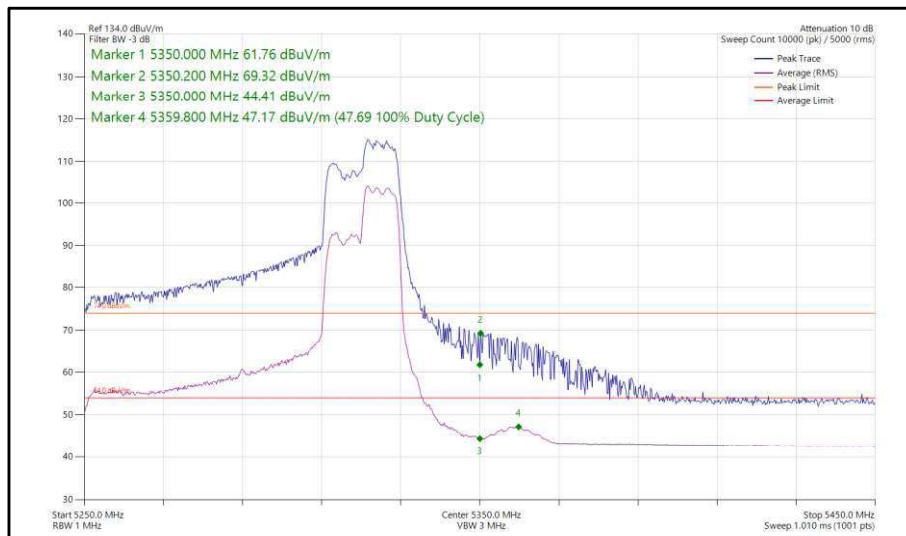


Figure 108 - 802.11ax, HE80, RU 106-60, CDD, Core 0-1 - 5290 MHz, Band Edge Frequency 5350 MHz

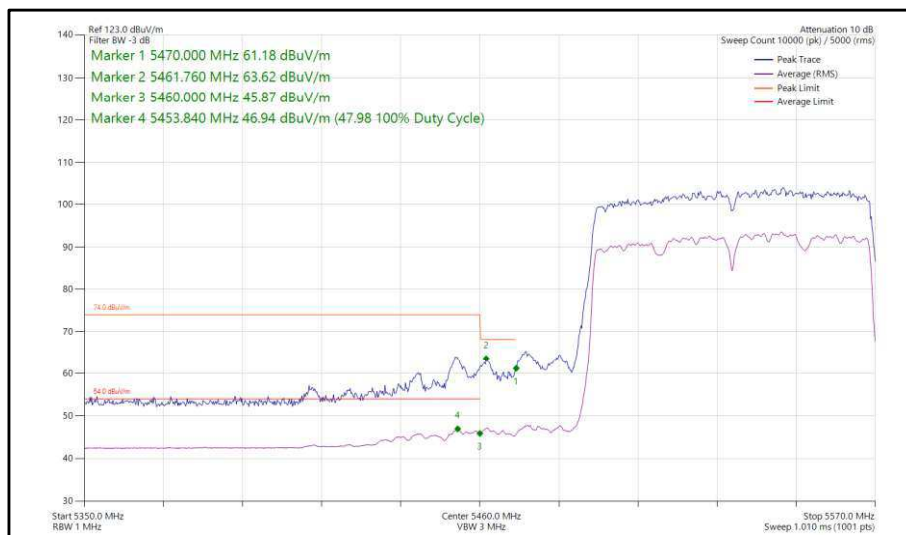
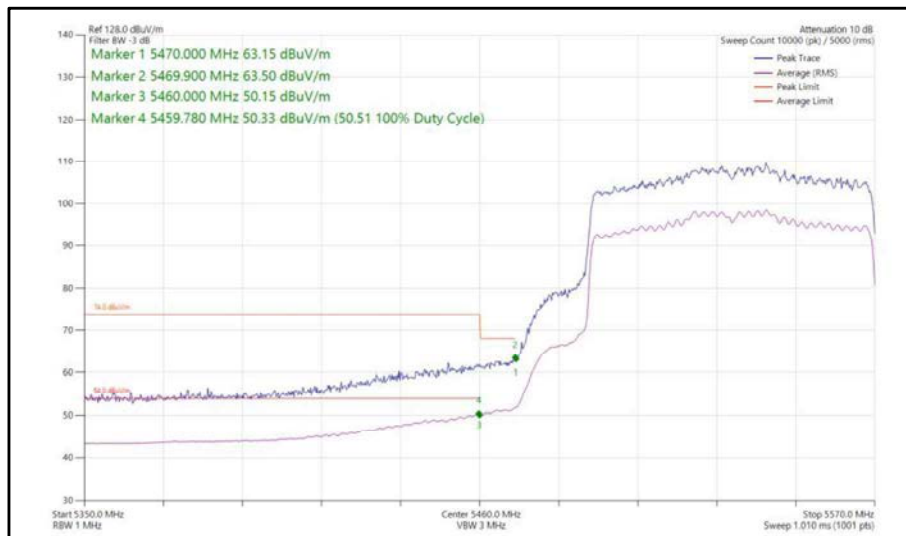
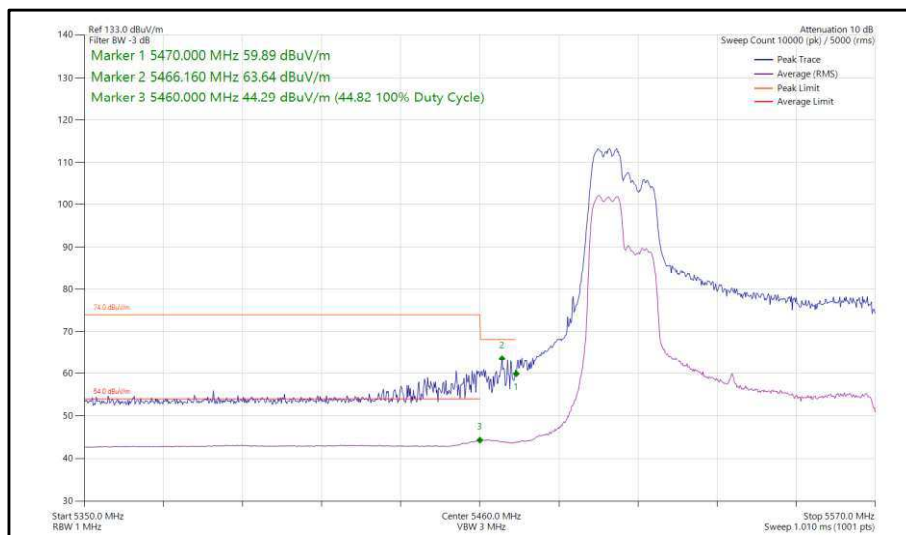


Figure 109 - 802.11ac, VHT80, CDD, Core 0-1 - 5530 MHz, Band Edge Frequency 5460 MHz



**Figure 110 - 802.11ax, HE80, SU, CDD, Core 0-1 - 5530 MHz,
Band Edge Frequency 5460 MHz**



**Figure 111 - 802.11ax, HE80, RU 106-53, CDD, Core 0-1 - 5530 MHz,
Band Edge Frequency 5460 MHz**



80 MHz Bandwidth - Core 0-1 (SDM)

Mode	Data Rate/ MCS	Resource Size	Resource Index	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
802.11ac VHT80	MCS8x2	-	-	5210	5150	67.80	51.33
802.11ax HE80	MCS11x2	SU	-	5210	5150	69.30	49.06
802.11ax HE80	MCS11x2	106	53	5210	5150	68.94	46.30
802.11ac VHT80	MCS8x2	-	-	5290	5350	66.47	51.39
802.11ax HE80	MCS4x2	SU	-	5290	5350	64.29	51.33
802.11ax HE80	MCS11x2	52	52	5290	5350	69.48	50.12
802.11ac VHT80	MCS2x2	-	-	5530	5460	63.02	51.46
802.11ax HE80	MCS4x2	SU	-	5530	5460	63.67	48.85
802.11ax HE80	MCS11x2	106	53	5530	5460	63.59	45.21

Table 19 - SDM Restricted Band Edge Results

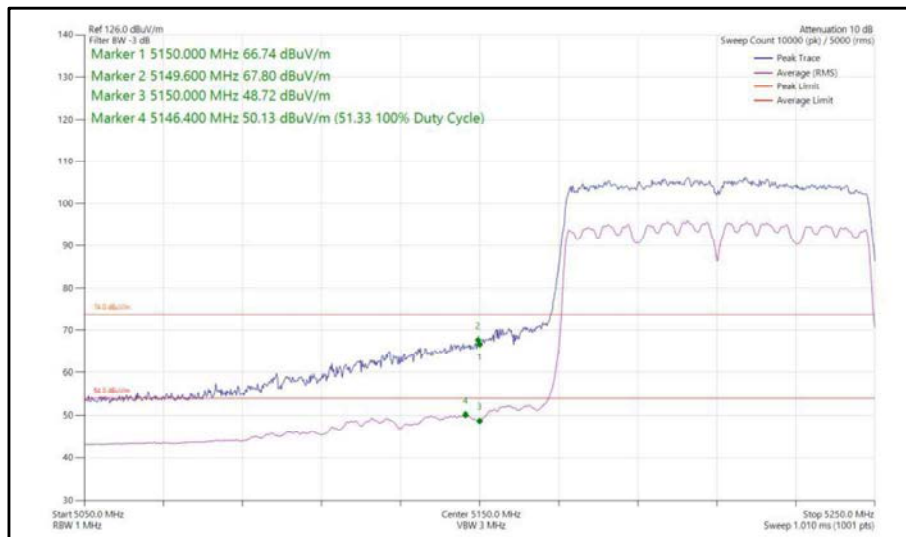


Figure 112 - 802.11ac, VHT80, SDM, Core 0-1 - 5210 MHz,
 Band Edge Frequency 5150 MHz