# FCC and ISED Test Report

## Apple Inc
## Model: A2787

## In accordance with FCC 47 CFR Part 15C, ISED RSS-247 and ISED RSS-GEN (2.4 GHz WLAN)

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

FCC ID: BCGA2787 IC: 579C-A2787

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TUV SUD Digitally signed by TUV SUD Date: 2023.03.13 09:53:02 Z

## COMMERCIAL-IN-CONFIDENCE

Document 75955427-08 Issue 01

| SIGNATURE | | | |
|---|---|---|---|
| | | | |
| **NAME** | **JOB TITLE** | **RESPONSIBLE FOR** | **ISSUE DATE** |
| Steve Marshall | Senior Engineer | Authorised Signatory | 13 March 2023 |

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 15C, 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 | 13 March 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 15C: 2021, ISED RSS-247: Issue 2 (02-2017) and ISED RSS-GEN: Issue 5 (04-2018) + A2 (02-2021) for the tests detailed in section 1.3.



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# Contents

# 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 | 13-March-2023 |

**Table 1**

## 1.2 Introduction

| | |
|---|---|
| Applicant | Apple Inc |
| Manufacturer | Apple Inc |
| Model Number(s) | A2787 |
| Serial Number(s) | V32VYX9RJ6, C2VL734Q54 and CR6T255FVT |
| Hardware Version(s) | REV 1.0 |
| Software Version(s) | 22E51010k, 22E71580u and 22E51010k |
| Number of Samples Tested | 3 |
| Test Specification/Issue/Date | FCC 47 CFR Part 15C: 2021<br>ISED RSS-247: Issue 2 (02-2017)<br>ISED RSS-GEN: Issue 5 (04-2018) + A2 (02-2021) |
| Order Number | 0540246998 |
| Start of Test | 08-November-2022 |
| Finish of Test | 13-February-2023 |
| Name of Engineer(s) | Thomas Biddlecombe, Daniel Cameron, Colin Brain, James Woods, Danial Shafique, Thomas Randall, Elliot Callender, Nicolae Mihailiuc, Ian Hart, Akhil Rajendran Bhaskaran Nair, Mohammad Malik, Ioan-Alexandru Bogatu and Taha Shafique |
| Related Document(s) | ANSI C63.10 (2020)<br>KDB 662911 D01 v02r01<br>ANSI C63.10 (2013)<br>ANSI C63.4 (2014) |

## 1.3 Brief Summary of Results

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

| Section | Specification Clause | | | Test Description | Result | Comments/Base Standard |
|---|---|---|---|---|---|---|
| | Part 15C | RSS-247 | RSS-GEN | | | |
| Configuration and Mode: 2.4 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 | 8.10 | Restricted Band Edges | Pass | |
| 2.2 | 15.247 (a)(2) | 5.2 | 6.7 | Emission Bandwidth | Pass | |
| 2.3 | 15.247 (b) | 5.4 | 6.12 | Maximum Conducted Output Power | Pass | |
| 2.4 | 15.209 and 15.247 (d) | 3.3 and 5.5 | 6.13 and 8.9 | Spurious Radiated Emissions | Pass | |
| 2.5 | 15.247 (d) | 5.5 | - | Authorised Band Edges | Pass | |
| 2.6 | 15.247 (e) | 5.2 | 6.12 | Power Spectral Density | Pass | |

**Table 2**

## 1.4 Product Information

### 1.4.1 Technical Description

The equipment under test was a rack mounted Apple computer, with Bluetooth® 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 2.4 GHz 802.11 radio supports Single Input/Single Output (SISO) and 2x2 Multiple Input/Multiple Output (MIMO) Cyclic Delay Diversity (CDD) modes. It supports 802.11b and g for SISO and 802.11n and ax at 20 MHz channel bandwidths for SISO and MIMO. The EUT supports 802.11ax Single User (SU) and Multi-User (MU) with all Resource Unit (RU) sizes of 26/52/106/242.

The EUT uses different output powers dependent on how many cores are active. It uses the same conducted power across all cores for any given mode/channel, but due to the different antenna gains the radiated powers per core differ.

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

SISO Modes (Core 1):

- 802.11b 1 Mbps
- 802.11g 12 Mbps
- 802.11n HT20 MCS2
- 802.11ax HE20 MCS2x1 SU, RU26/52/106*

2x2 MIMO Modes (Core 0 + Core 1):

- 802.11n HT20 MCS2 CDD
- 802.11ax HE20 MCS2x1 CDD SU, RU26/52/106*

*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.

Reduced output power is used on the narrower RU26/52/106 size 802.11ax multi-user (MU) modes to meet PSD and Band Edge limits. Therefore, only single user (SU) modes are reported for output power tests since these are always worst-case. All SU and the above MU RU sizes are reported for PSD.

### 1.4.3 Test Set-up

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 tests except, 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.

All testing was performed with the EUT powered via a 120 V AC, 60 Hz source.

### 1.4.4 Antenna Gain Table

| Antenna Port | Frequency Range (MHz) | Peak Gain (dBi) | Conducted Cable Loss (dB) |
|---|---|---|---|
| Core 0 | 2400 to 2480 | 4.99 | 0.70 |
| Core 1 | 2400 to 2480 | 4.65 | 0.70 |

**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: A2787, Serial Number: CR6T255FVT | | | |
| 0 | As supplied by the customer | Not Applicable | Not Applicable |
| Model: A2787, Serial Number: V32VYX9RJ6 | | | |
| 0 | As supplied by the customer | Not Applicable | Not Applicable |
| Model: A2787, Serial Number: C2VL734Q54 | | | |
| 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: 2.4 GHz WLAN | | |
| Restricted Band Edges | Elliot Callender, Nicolae Mihailiuc, Ian Hart, Akhil Rajendran Bhaskaran Nair, Mohammad Malik, Ioan-Alexandru Bogatu and Taha Shafique | UKAS |
| Emission Bandwidth | Thomas Biddlecombe and Daniel Cameron | UKAS |
| Maximum Conducted Output Power | Thomas Biddlecombe and Daniel Cameron | UKAS |
| Spurious Radiated Emissions | James Woods, Danial Shafique, Colin Brain and Thomas Randall | UKAS |
| Authorised Band Edges | Elliot Callender, Nicolae Mihailiuc, Ian Hart, Akhil Rajendran Bhaskaran Nair, Mohammad Malik, Ioan-Alexandru Bogatu and Taha Shafique | UKAS |
| Power Spectral Density | Thomas Biddlecombe and Daniel Cameron | 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 15C, Clause 15.205
ISED RSS-247, Clause 3.3
ISED RSS-GEN, Clause 8.10

### 2.1.2 Equipment Under Test and Modification State

A2787, S/N: CR6T255FVT - Modification State 0

### 2.1.3 Date of Test

08-November-2022 to 08-December-2022

### 2.1.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 6.10.5 and 11.12.1.

Plots for average measurements were taken in accordance with ANSI C63.10, clause 11.12.2.5.2.

The following conversion can be applied to convert from dBµV/m to µV/m:
10^(Field Strength in dBµV/m/20).

### 2.1.5 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 19.8 - 22.5 °C |
| Relative Humidity | 46.6 - 60.7 % |

### 2.1.6 Test Results

2.4 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 (dBuV/m) |
|---|---|---|---|---|---|---|---|
| 802.11b | 1 Mbps | - | - | 2412 | 2390 | 59.52 | 51.33 |
| 802.11g | 54 Mbps | - | - | 2412 | 2390 | 68.09 | 51.46 |
| 802.11n, HT20 | MCS7 | - | - | 2412 | 2390 | 66.75 | 51.48 |
| 802.11ax, HE20 | MCS4x1 | SU | - | 2412 | 2390 | 66.25 | 51.00 |
| 802.11ax, HE20 | MCS9x1 | 106 | 54 | 2412 | 2390 | 69.38 | 49.26 |
| 802.11b | 1 Mbps | - | - | 2462 | 2483.5 | 59.32 | 51.08 |
| 802.11b | 1 Mbps | - | - | 2467 | 2483.5 | 60.22 | 51.34 |
| 802.11b | 1 Mbps | - | - | 2472 | 2483.5 | 58.63 | 50.93 |
| 802.11g | 12 Mbps | - | - | 2462 | 2483.5 | 65.53 | 51.48 |
| 802.11g | 54 Mbps | - | - | 2467 | 2483.5 | 64.40 | 51.19 |
| 802.11g | 24 Mbps | - | - | 2472 | 2483.5 | 64.40 | 51.03 |
| 802.11n, HT20 | MCS4 | - | - | 2462 | 2483.5 | 66.09 | 51.13 |
| 802.11n, HT20 | MCS7 | - | - | 2467 | 2483.5 | 64.99 | 51.38 |
| 802.11n, HT20 | MCS2 | - | - | 2472 | 2483.5 | 64.31 | 51.48 |
| 802.11ax, HE20 | MCS9x1 | SU | - | 2462 | 2483.5 | 64.95 | 51.39 |
| 802.11ax, HE20 | MCS9x1 | 106 | 54 | 2462 | 2483.5 | 69.02 | 49.78 |
| 802.11ax, HE20 | MCS9x1 | SU | - | 2467 | 2483.5 | 64.63 | 51.14 |
| 802.11ax, HE20 | MCS9x1 | 106 | 53 | 2467 | 2483.5 | 66.72 | 51.49 |
| 802.11ax, HE20 | MCS9x1 | SU | - | 2472 | 2483.5 | 66.48 | 51.49 |
| 802.11ax, HE20 | MCS9x1 | 26 | 0 | 2472 | 2483.5 | 69.42 | 48.82 |

**Table 6 - SISO Restricted Band Edge Results**

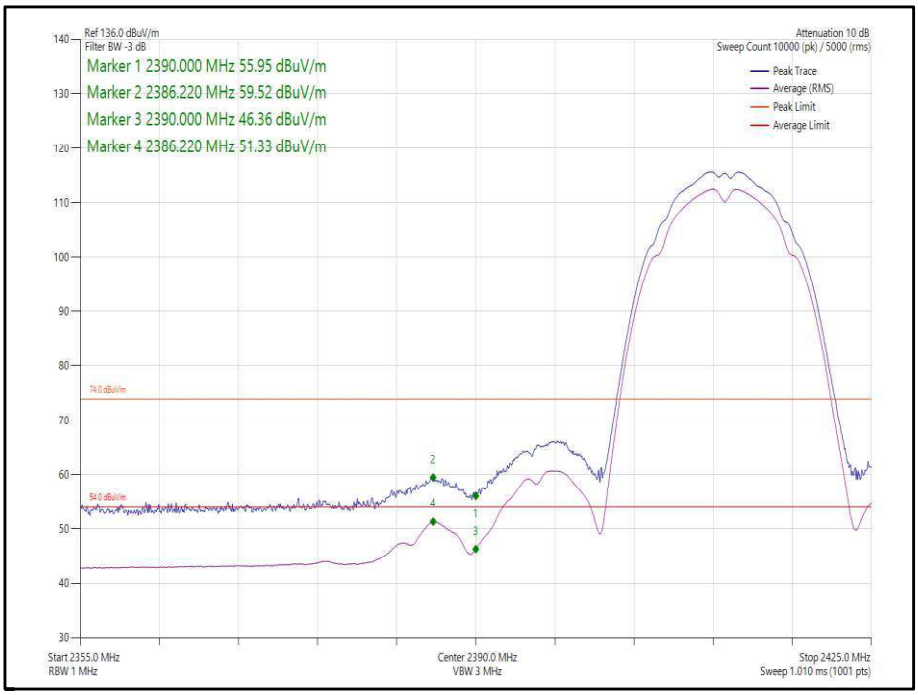


**Figure 1 - 802.11b, SISO, Core 0 - 2412 MHz,
Band Edge Frequency 2390 MHz**

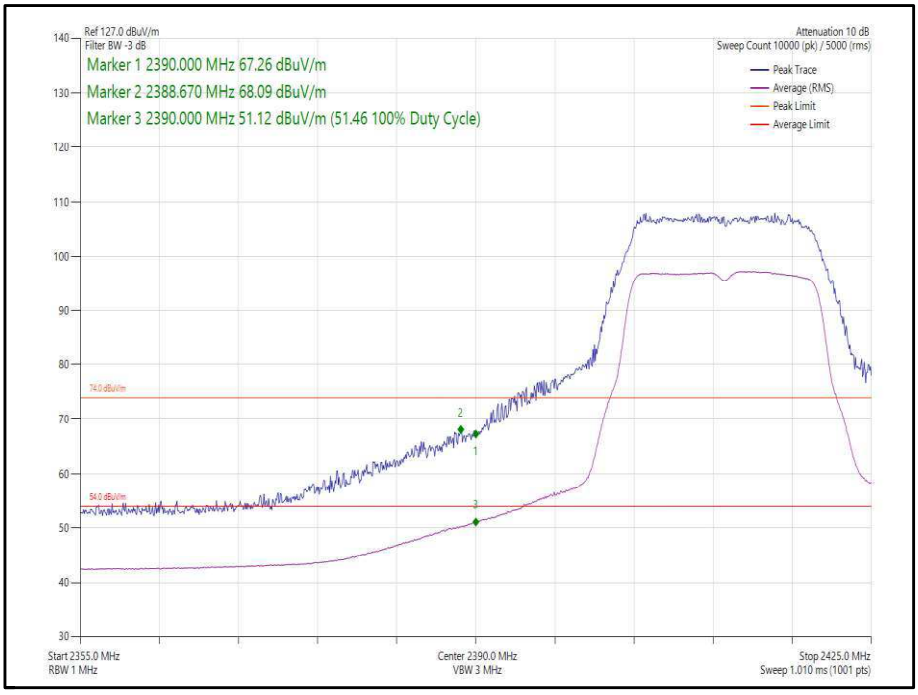


**Figure 2 - 802.11g, SISO, Core 0 - 2412 MHz,
Band Edge Frequency 2390 MHz**

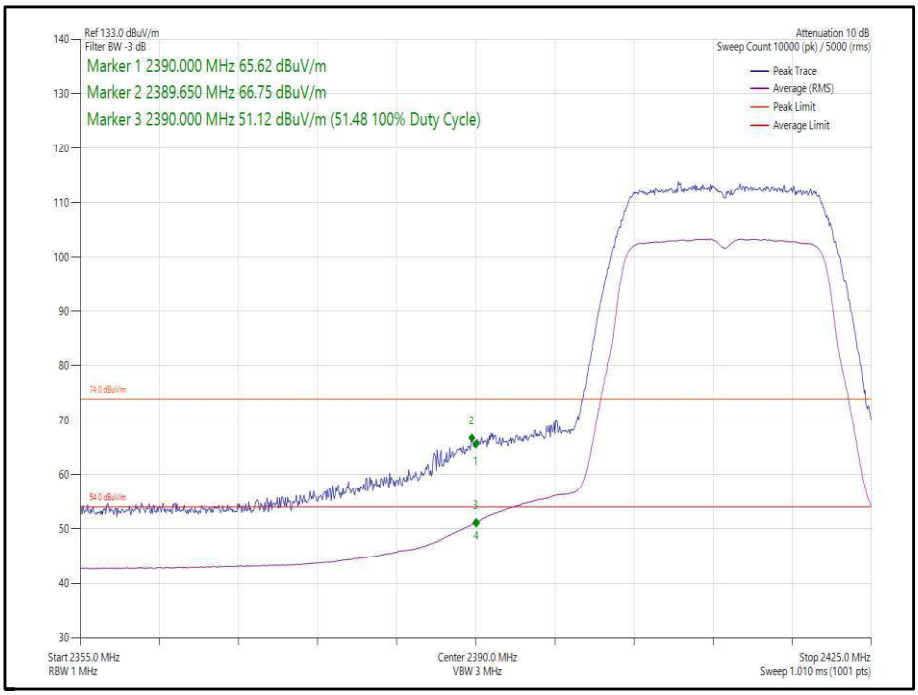


**Figure 3 - 802.11n, HT20, SISO, Core 0 - 2412 MHz,
Band Edge Frequency 2390 MHz**

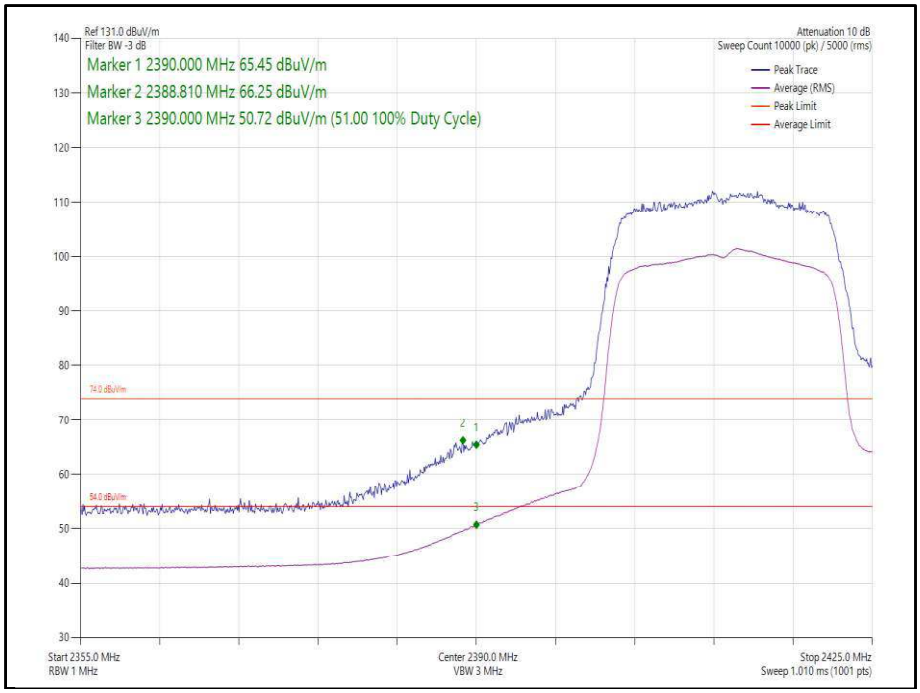


**Figure 4 - 802.11ax, HE20, SU, SISO, Core 0 - 2412 MHz,
Band Edge Frequency 2390 MHz**

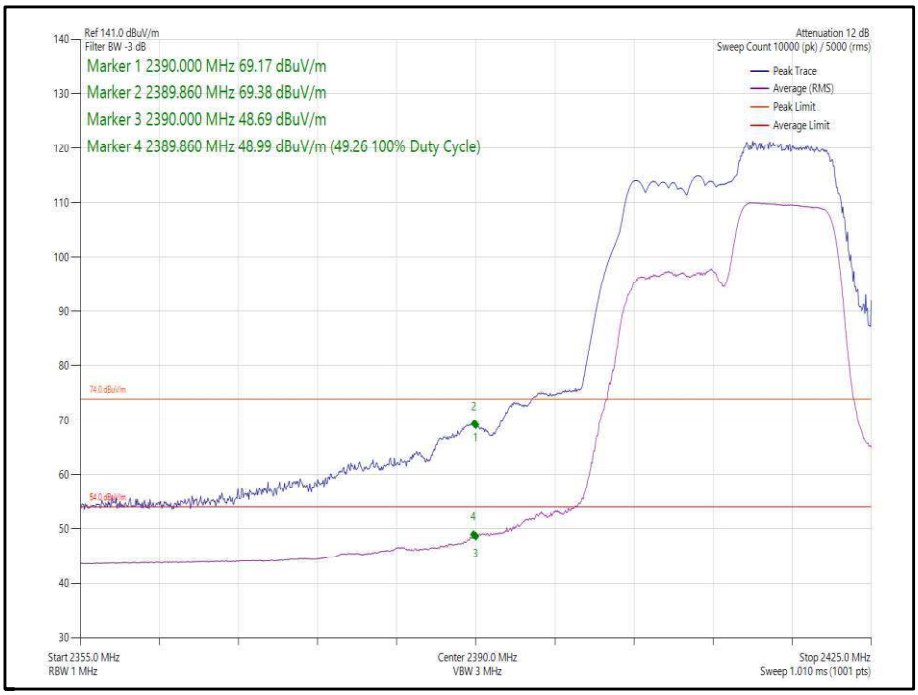


**Figure 5 - 802.11ax, HE20, RU 106-54, SISO, Core 0 - 2412 MHz, Band Edge Frequency 2390 MHz**

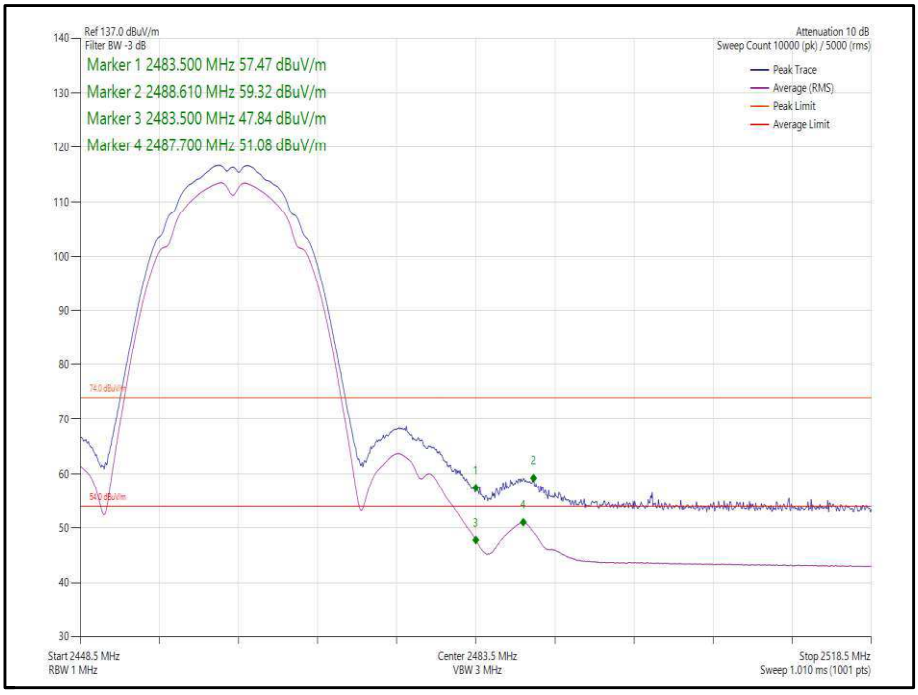


**Figure 6 - 802.11b, SISO, Core 0 - 2462 MHz, Band Edge Frequency 2483.5 MHz**

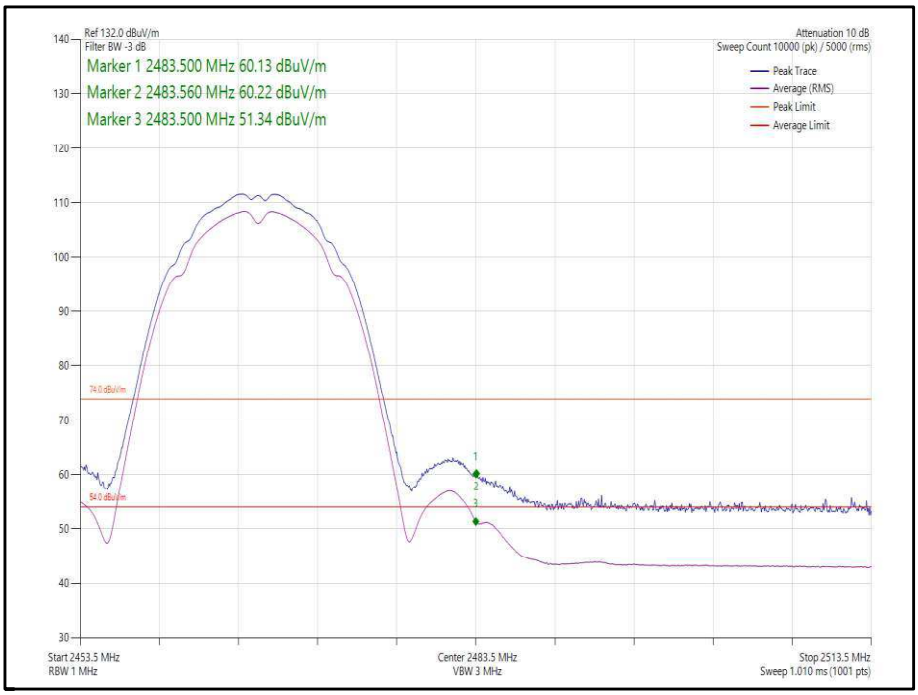


**Figure 7 - 802.11b, SISO, Core 0 - 2467 MHz,
Band Edge Frequency 2483.5 MHz**

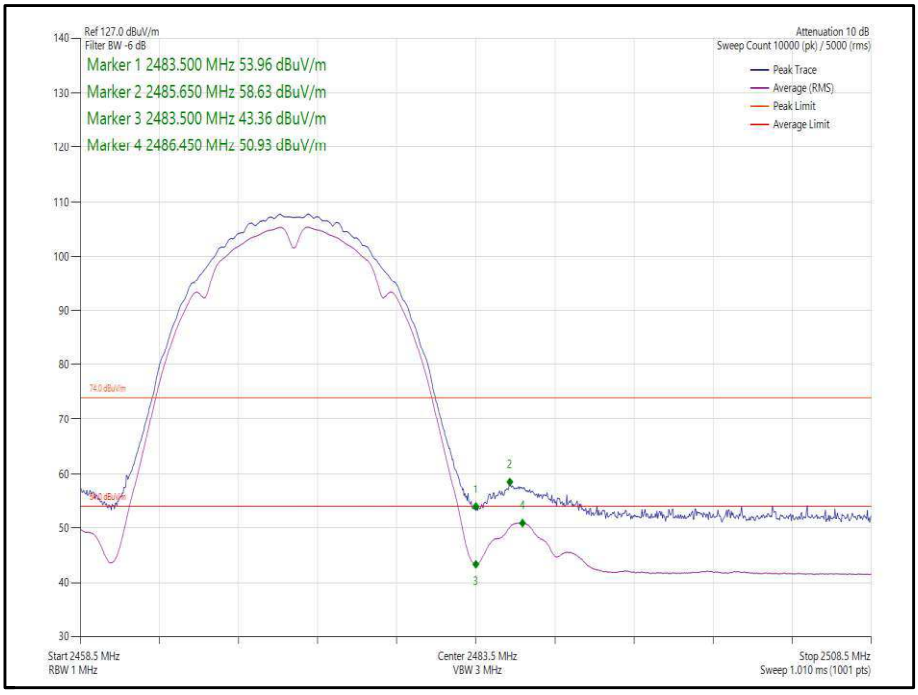


**Figure 8 - 802.11b, SISO, Core 0 - 2472 MHz,
Band Edge Frequency 2483.5 MHz**

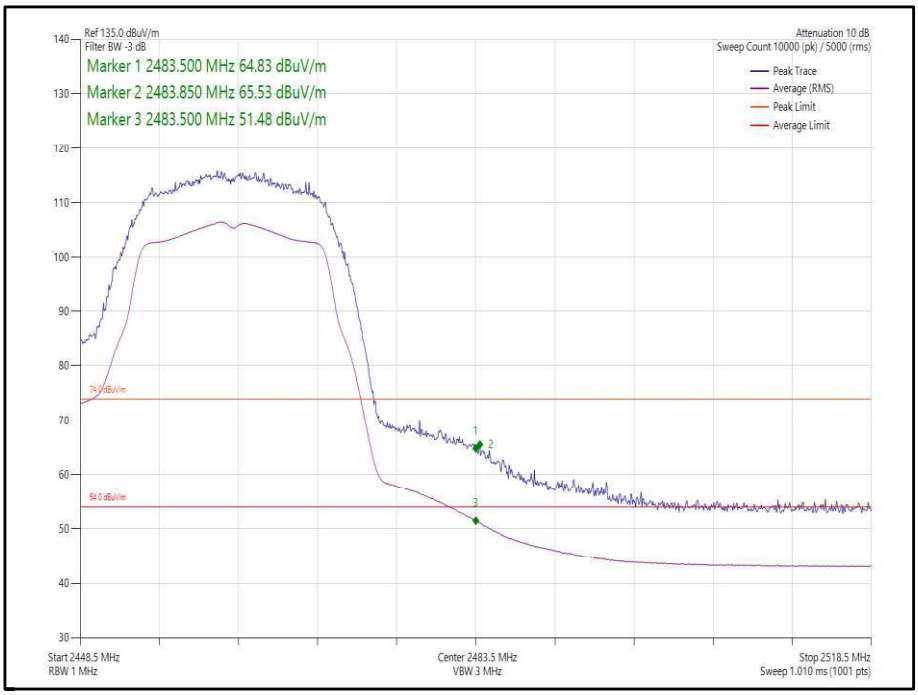


**Figure 9 - 802.11g, SISO, Core 0 - 2462 MHz,
Band Edge Frequency 2483.5 MHz**

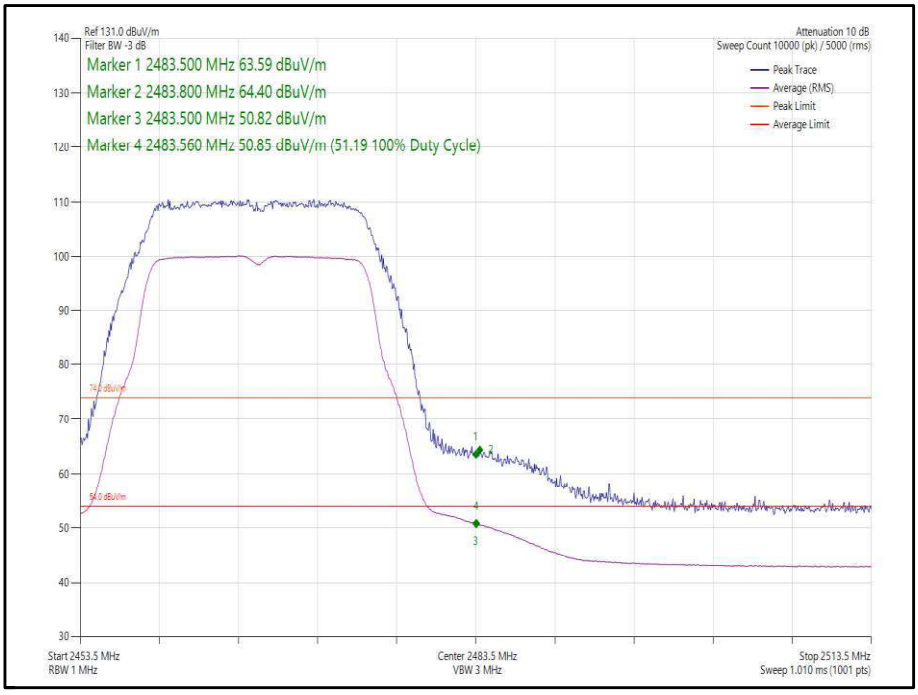


**Figure 10 - 802.11g, SISO, Core 0 - 2467 MHz,
Band Edge Frequency 2483.5 MHz**

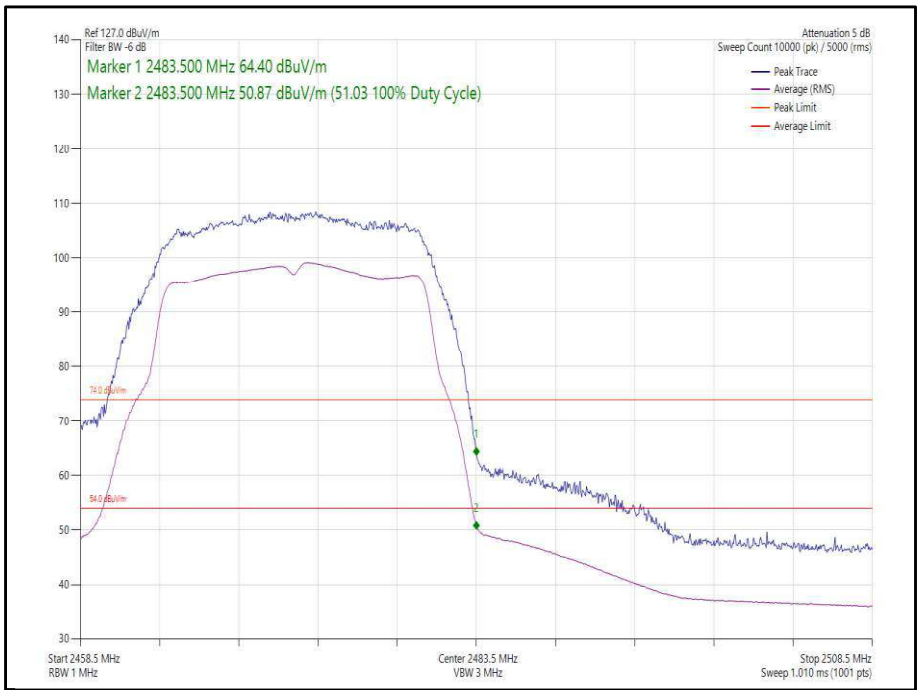


**Figure 11 - 802.11g, SISO, Core 0 - 2472 MHz,
Band Edge Frequency 2483.5 MHz**

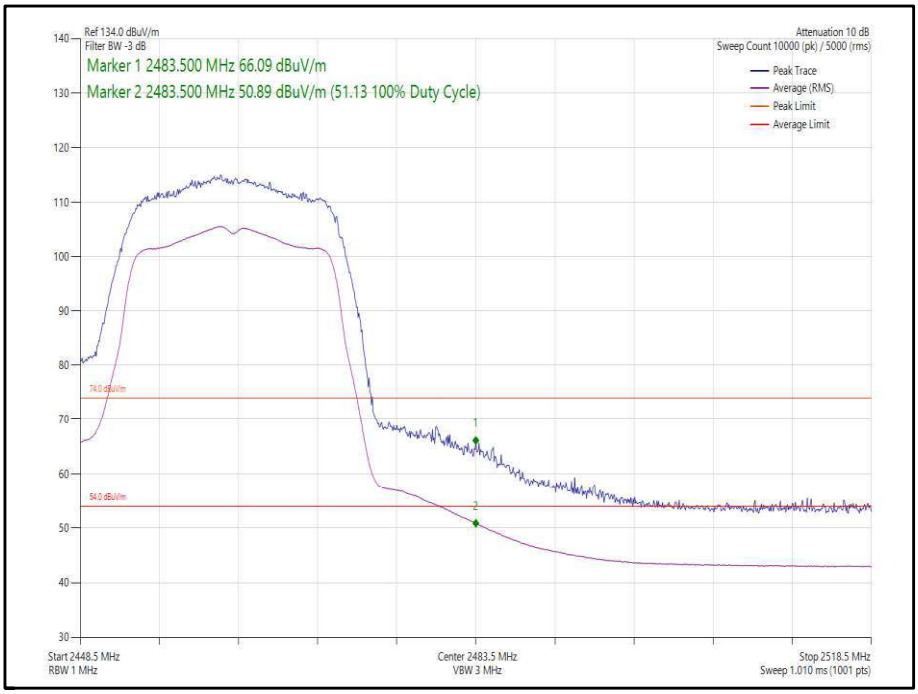


**Figure 12 - 802.11n, HT20, SISO, Core 0 - 2462 MHz,
Band Edge Frequency 2483.5 MHz**

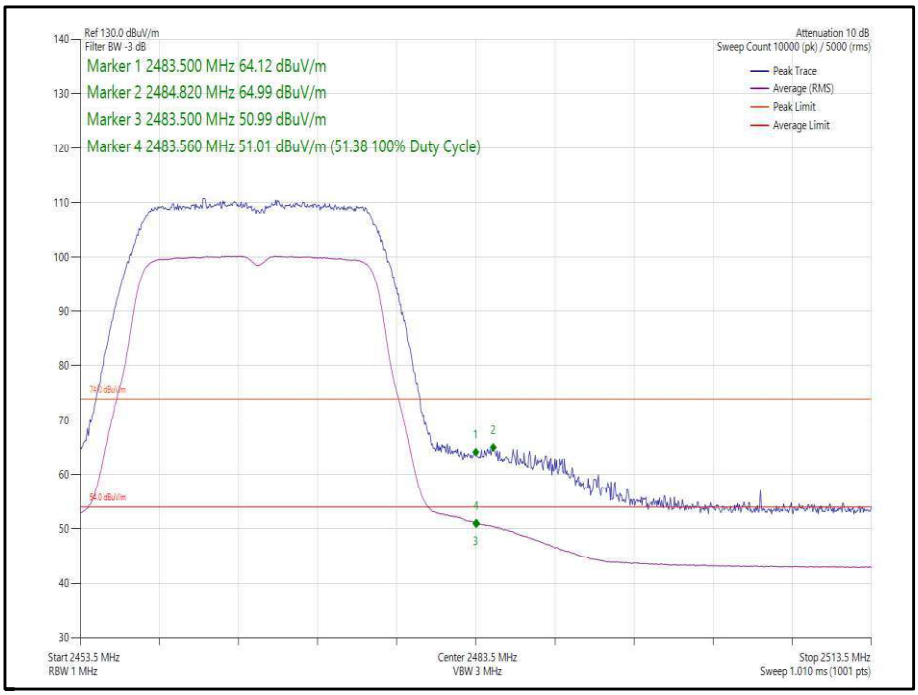


**Figure 13 - 802.11n, HT20, SISO, Core 0 - 2467 MHz, Band Edge Frequency 2483.5 MHz**

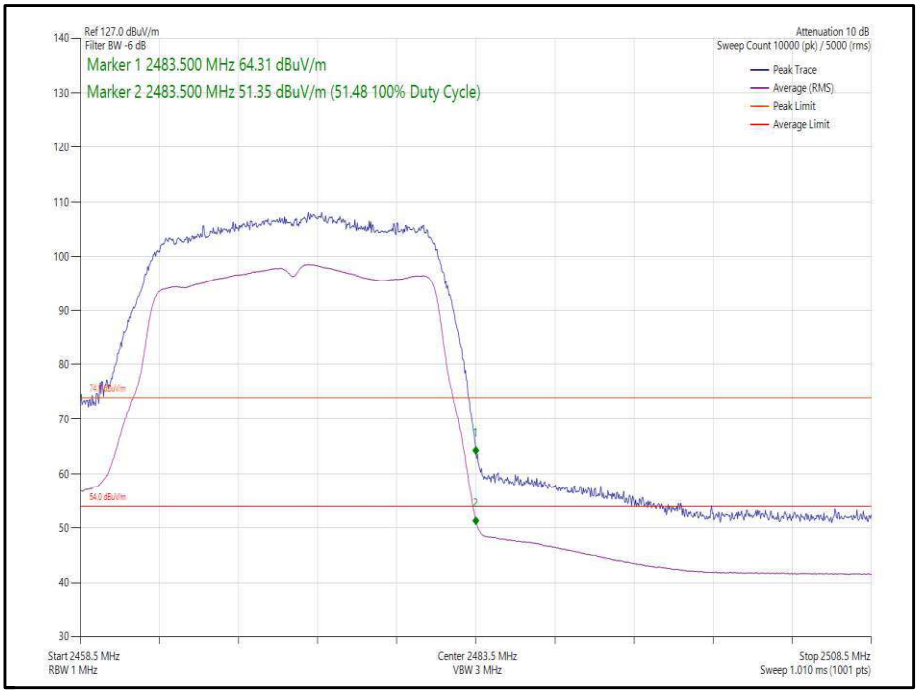


**Figure 14 - 802.11n, HT20, SISO, Core 0 - 2472 MHz, Band Edge Frequency 2483.5 MHz**

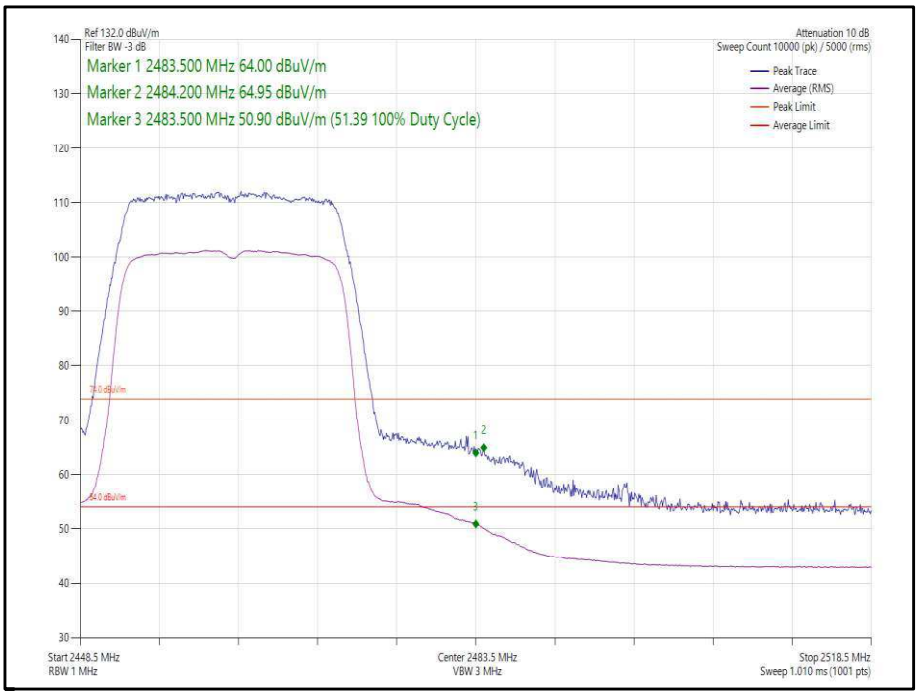


**Figure 15 - 802.11ax, HE20, SU, SISO Core 0 - 2462 MHz, Band Edge Frequency 2483.5 MHz**

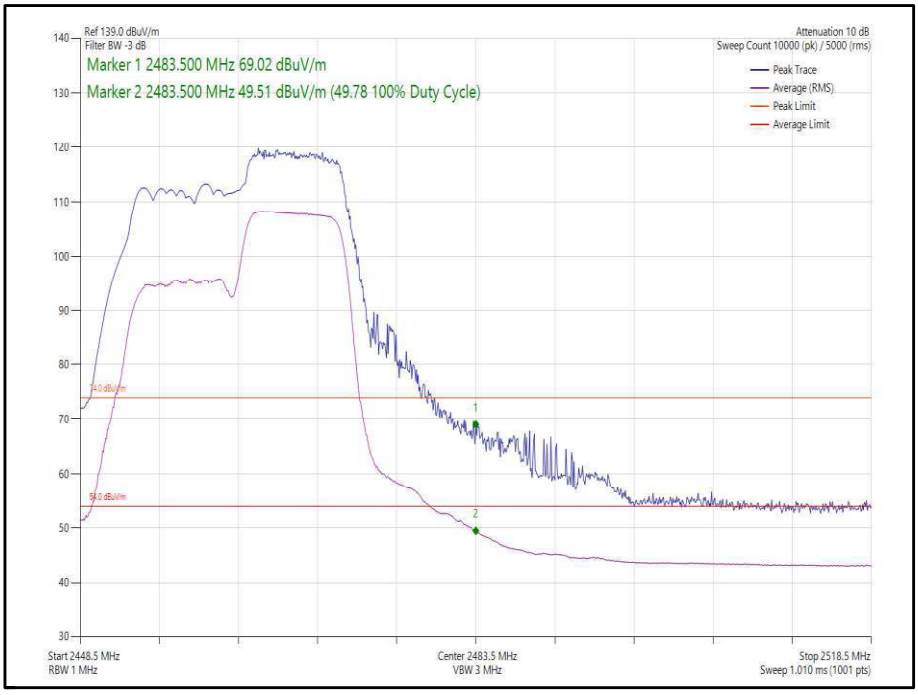


**Figure 16 - 802.11ax, HE20, RU 106-54, SISO, Core 0 - 2462 MHz, Band Edge Frequency 2483.5 MHz**

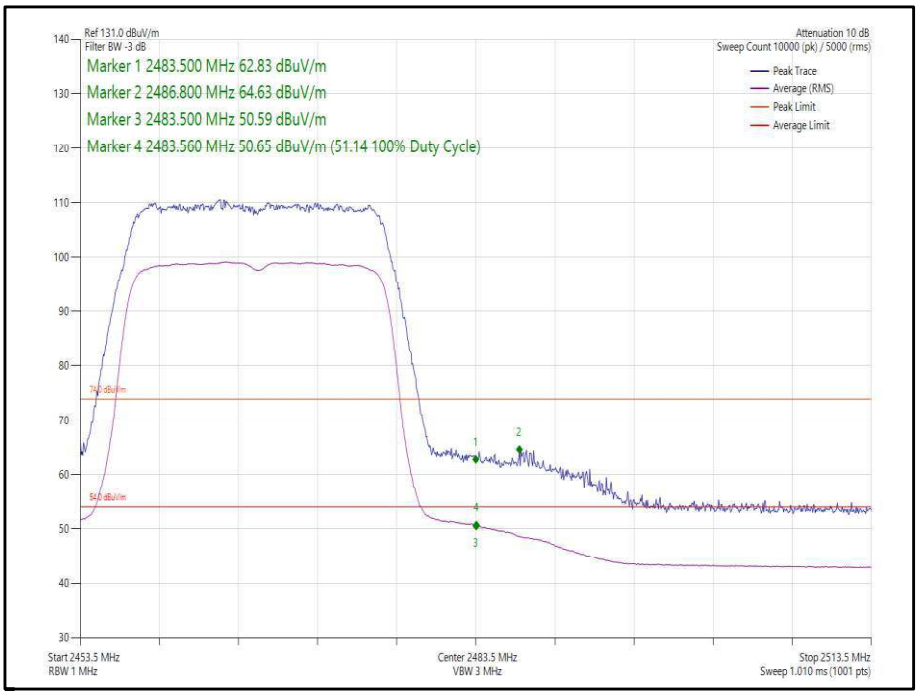


**Figure 17 - 802.11ax, HE20, SU, SISO, Core 0 - 2467 MHz, Band Edge Frequency 2483.5 MHz**

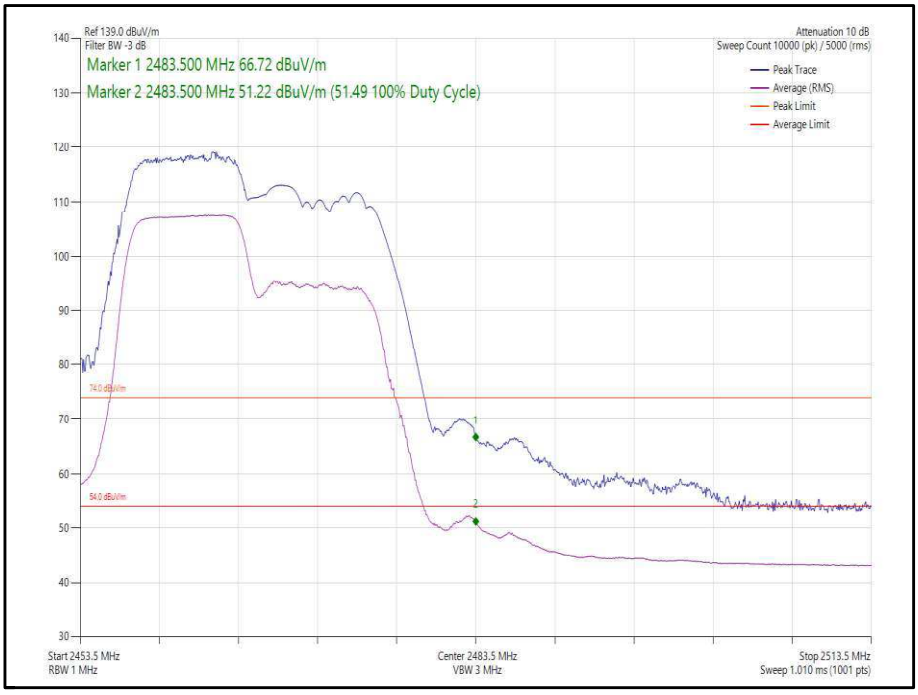


**Figure 18 - 802.11ax, HE20, RU 106-53, SISO, Core 0 - 2467 MHz, Band Edge Frequency 2483.5 MHz**

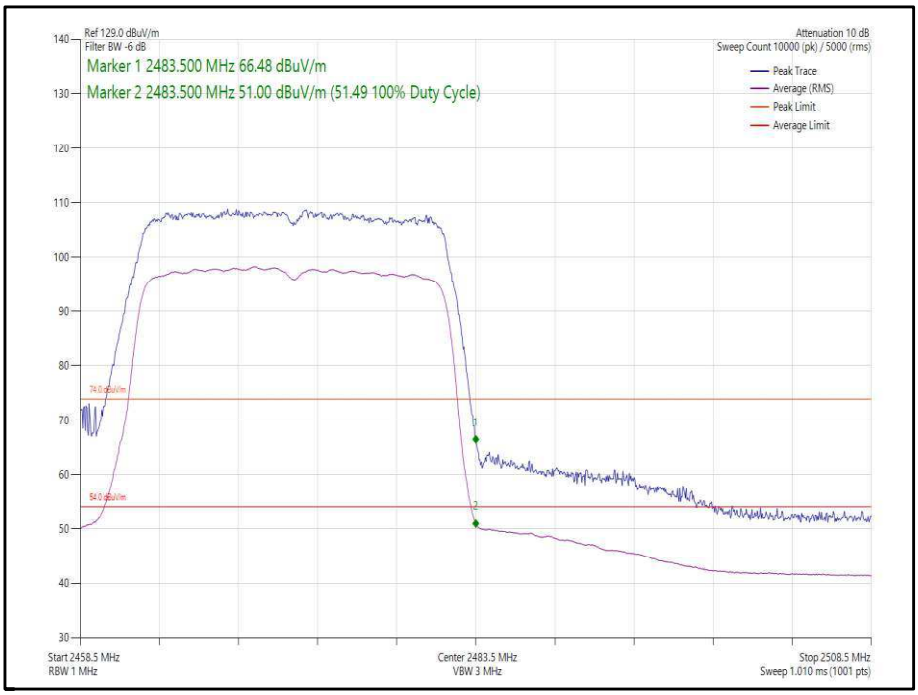


**Figure 19 - 802.11ax, HE20, SU, SISO, Core 0 - 2472 MHz, Band Edge Frequency 2483.5 MHz**

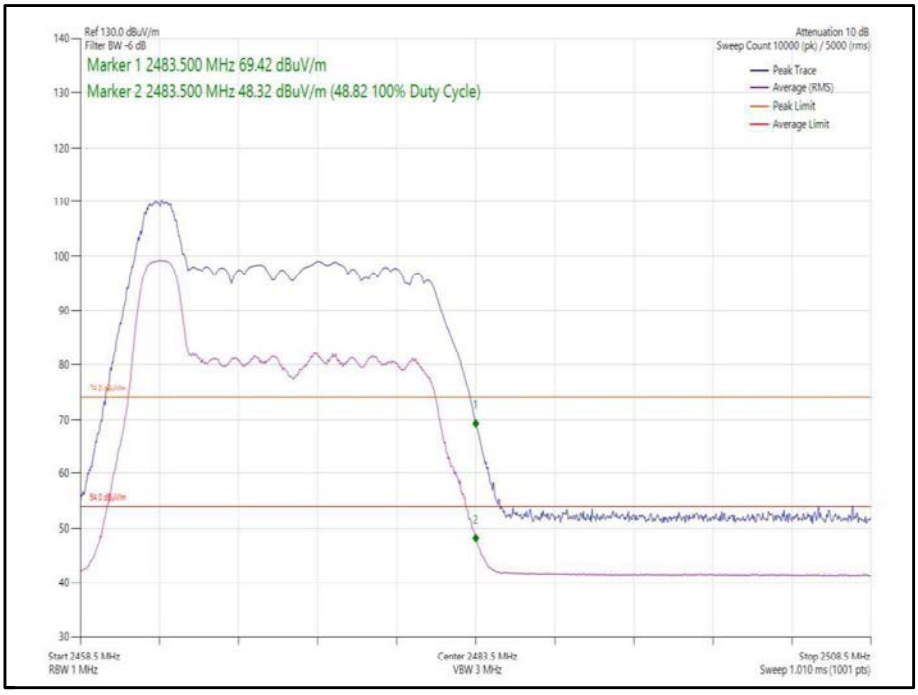


**Figure 20 - 802.11ax, HE20, RU 26-0, SISO, Core 0 - 2472 MHz, Band Edge Frequency 2483.5 MHz**

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 (dBuV/m) |
|---|---|---|---|---|---|---|---|
| 802.11b | 1 Mbps | - | - | 2412 | 2390 | 59.77 | 51.34 |
| 802.11g | 54 Mbps | - | - | 2412 | 2390 | 69.00 | 51.18 |
| 802.11n, HT20 | MCS4 | - | - | 2412 | 2390 | 67.17 | 51.13 |
| 802.11ax, HE20 | MCS4x1 | SU | - | 2412 | 2390 | 66.41 | 51.35 |
| 802.11ax, HE20 | MCS9x1 | 106 | 53 | 2412 | 2390 | 69.36 | 48.87 |
| 802.11b | 1 Mbps | - | - | 2462 | 2483.5 | 59.26 | 50.11 |
| 802.11b | 1 Mbps | - | - | 2467 | 2483.5 | 60.69 | 51.28 |
| 802.11b | 1 Mbps | - | - | 2472 | 2483.5 | 58.93 | 51.20 |
| 802.11g | 12 Mbps | - | - | 2462 | 2483.5 | 65.29 | 51.34 |
| 802.11g | 24 Mbps | - | - | 2467 | 2483.5 | 65.00 | 51.39 |
| 802.11g | 24 Mbps | - | - | 2472 | 2483.5 | 63.89 | 51.42 |
| 802.11n, HT20 | MCS7 | - | - | 2462 | 2483.5 | 67.26 | 51.46 |
| 802.11n, HT20 | MCS7 | - | - | 2467 | 2483.5 | 65.20 | 51.49 |
| 802.11n, HT20 | MCS2 | - | - | 2472 | 2483.5 | 65.39 | 51.49 |
| 802.11ax, HE20 | MCS2x1 | SU | - | 2462 | 2483.5 | 64.73 | 51.13 |
| 802.11ax, HE20 | MCS9x1 | 106 | 53 | 2462 | 2483.5 | 69.25 | 51.00 |
| 802.11ax, HE20 | MCS4x1 | SU | - | 2467 | 2483.5 | 64.48 | 51.44 |
| 802.11ax, HE20 | MCS9x1 | 106 | 54 | 2467 | 2483.5 | 63.36 | 51.03 |
| 802.11ax, HE20 | MCS4x1 | SU | - | 2472 | 2483.5 | 66.38 | 51.36 |
| 802.11ax, HE20 | MCS9x1 | 26 | 8 | 2472 | 2483.5 | 69.44 | 48.61 |

**Table 7 - SISO Restricted Band Edge Results**

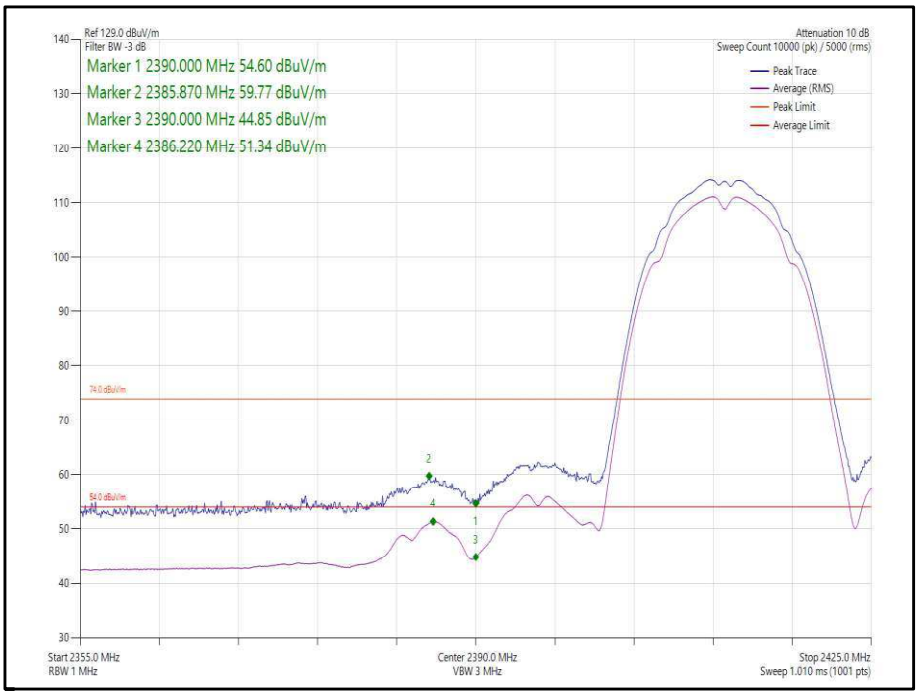


**Figure 21 - 802.11b, SISO, Core 1 - 2412 MHz,
Band Edge Frequency 2390 MHz**

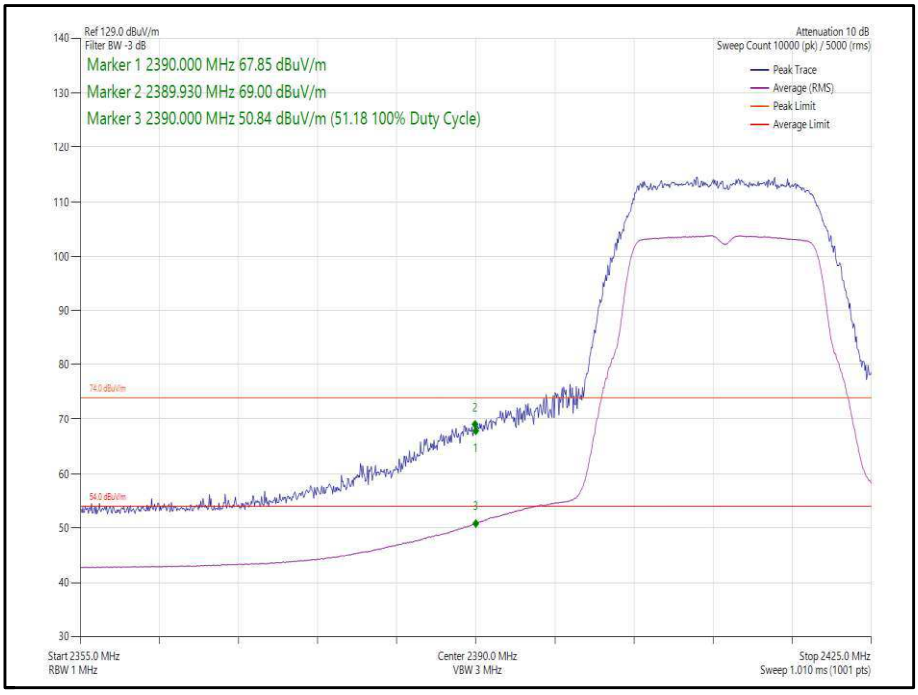


**Figure 22 - 802.11g, SISO, Core 1 - 2412 MHz,
Band Edge Frequency 2390 MHz**

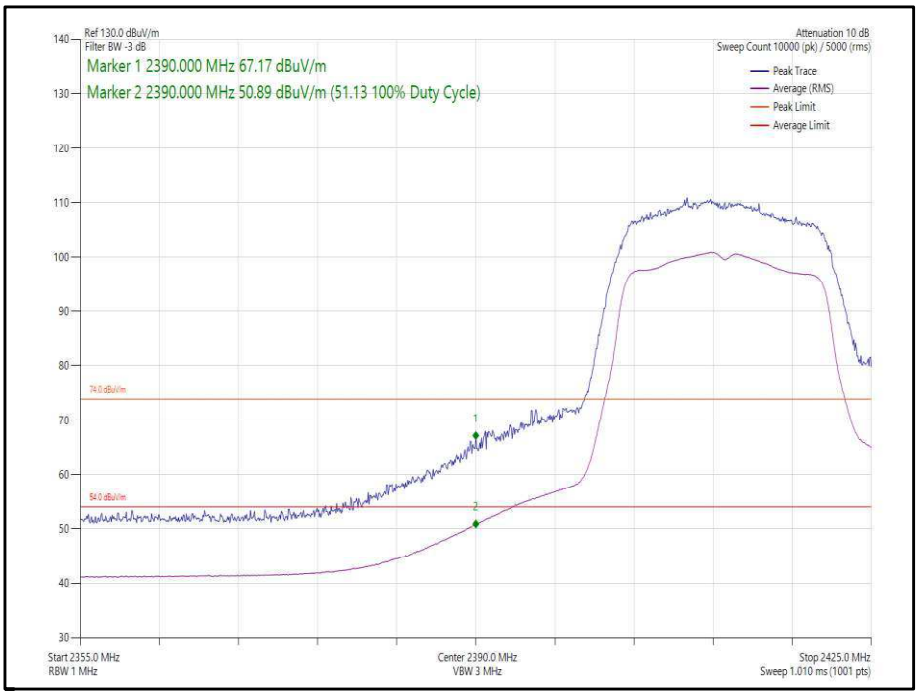


**Figure 23 - 802.11n, HT20, SISO, Core 1 - 2412 MHz, Band Edge Frequency 2390 MHz**

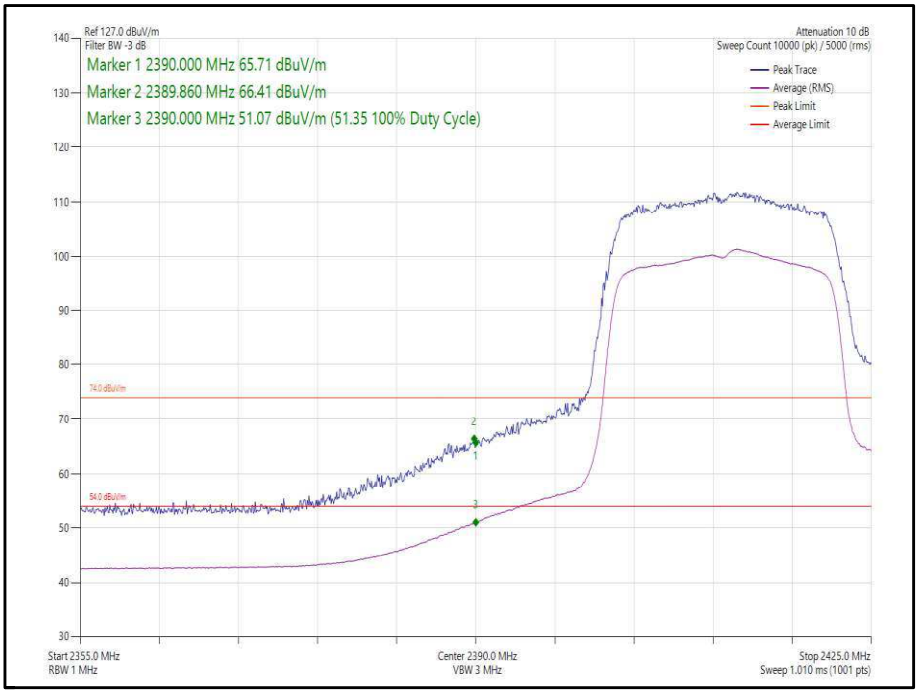


**Figure 24 - 802.11ax, HE20, SU, SISO, Core 1 - 2412 MHz, Band Edge Frequency 2390 MHz**

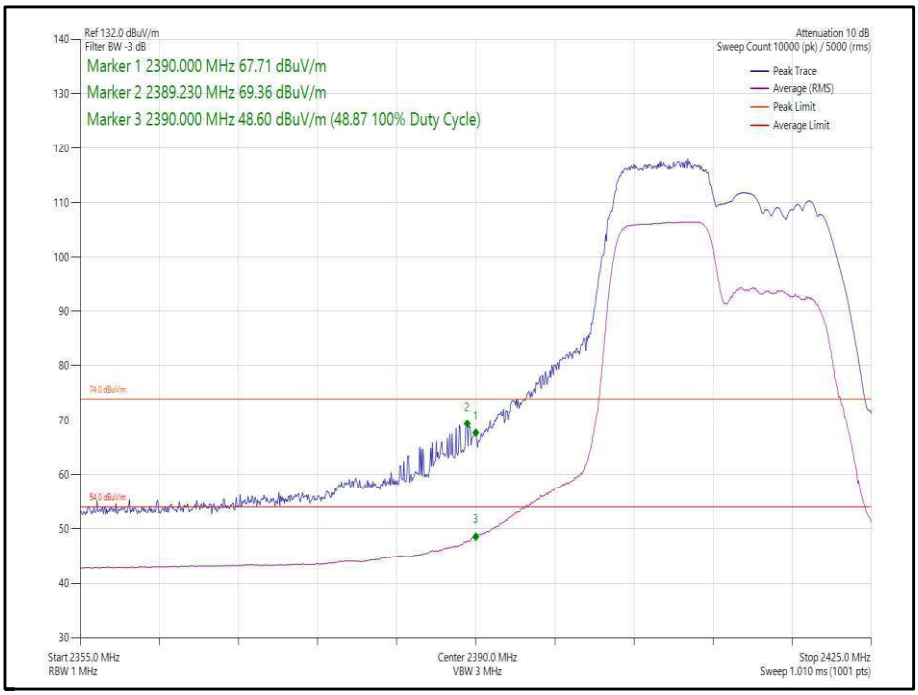


**Figure 25 - 802.11ax, HE20, RU 106-53, SISO, Core 1 - 2412 MHz, Band Edge Frequency 2390 MHz**

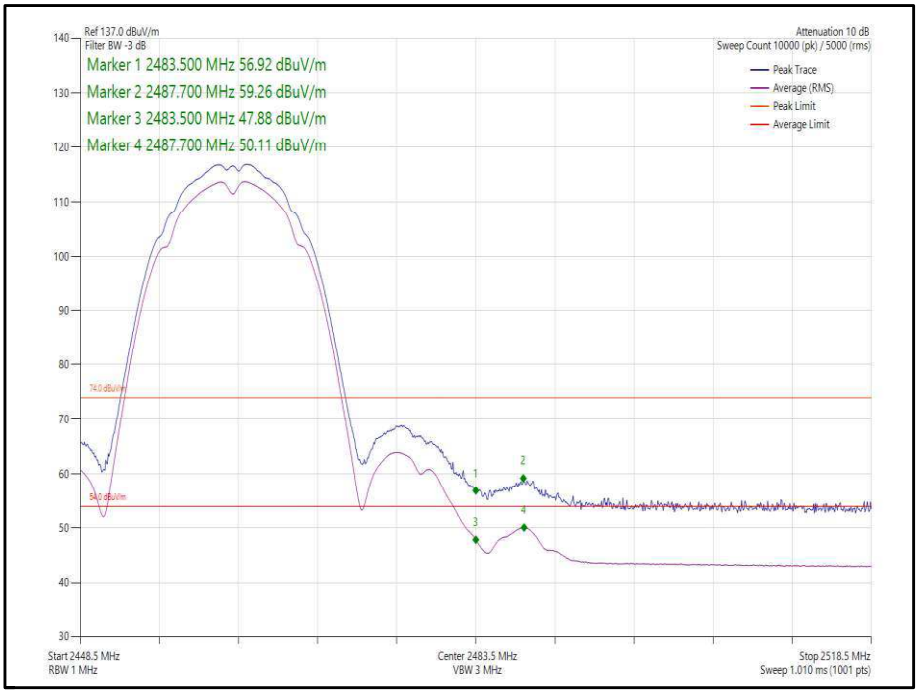


**Figure 26 - 802.11b, SISO, Core 1 - 2462 MHz, Band Edge Frequency 2483.5 MHz**

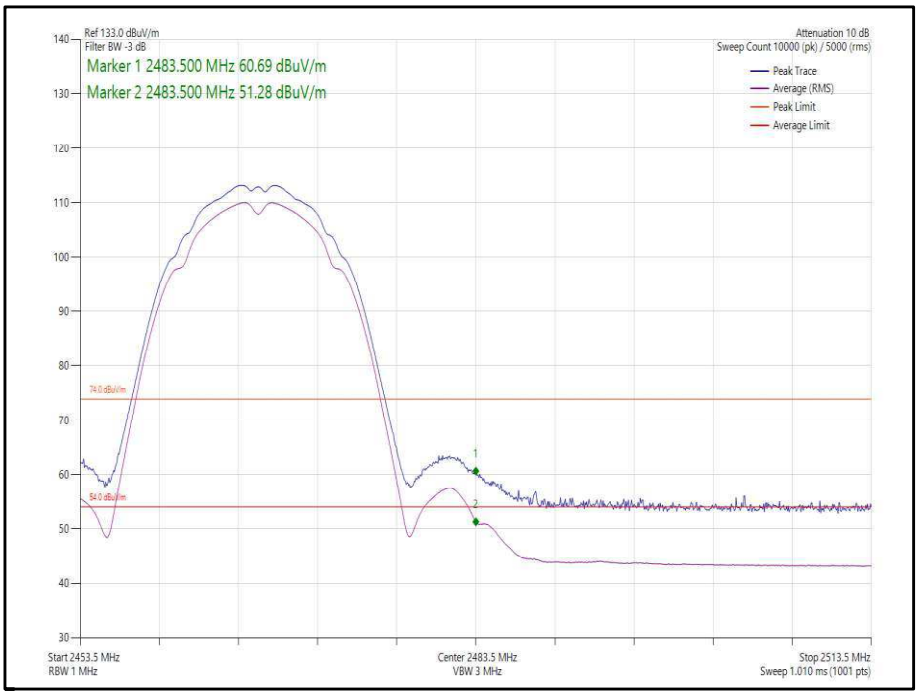


**Figure 27 - 802.11b, SISO, Core 1 - 2467 MHz,
Band Edge Frequency 2483.5 MHz**

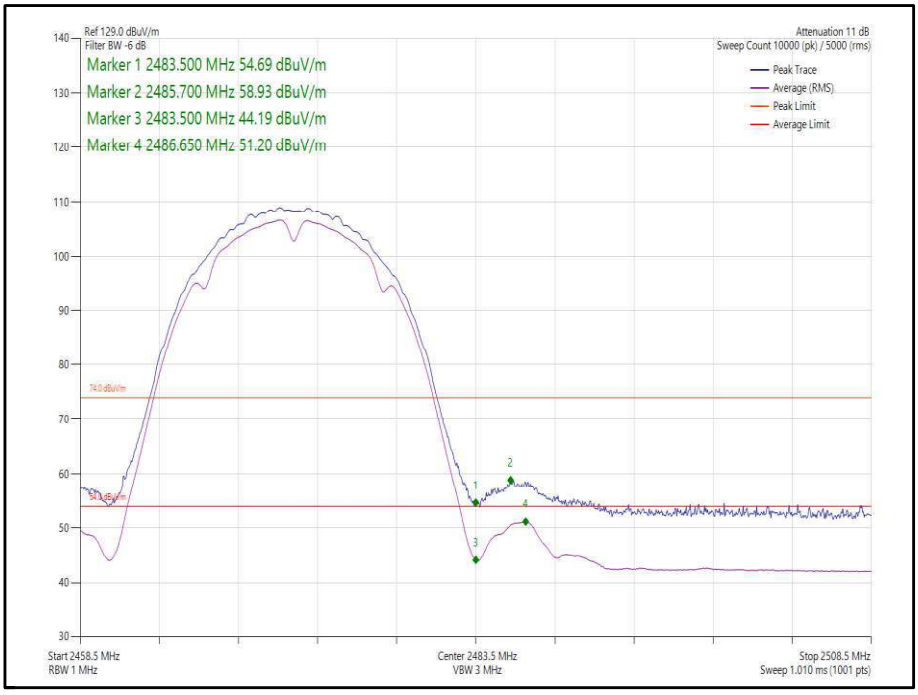


**Figure 28 - 802.11b, SISO, Core 1 - 2472 MHz,
Band Edge Frequency 2483.5 MHz**

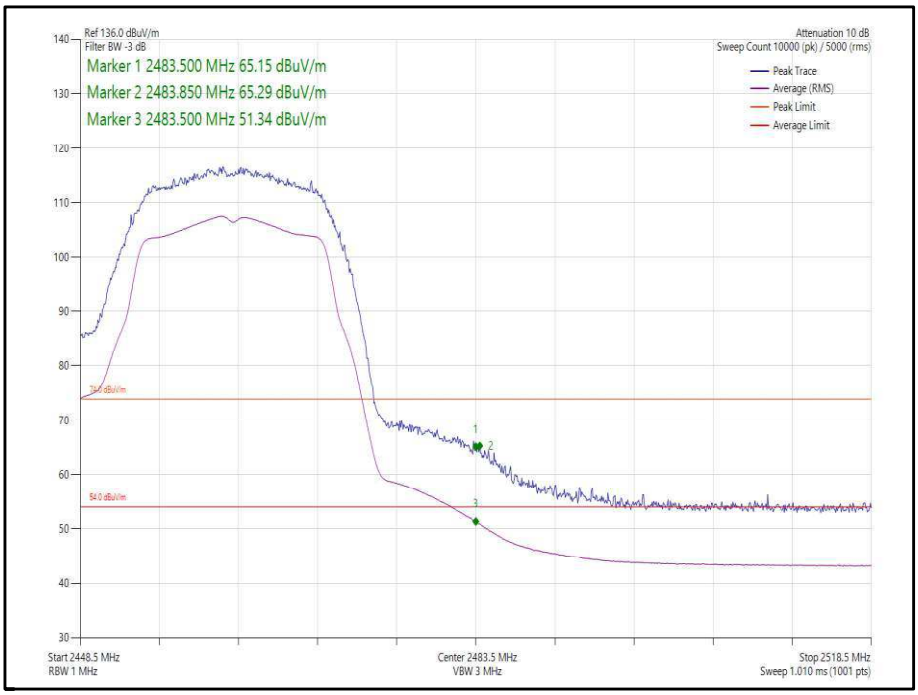


**Figure 29 - 802.11g, SISO, Core 1 - 2462 MHz,
Band Edge Frequency 2483.5 MHz**

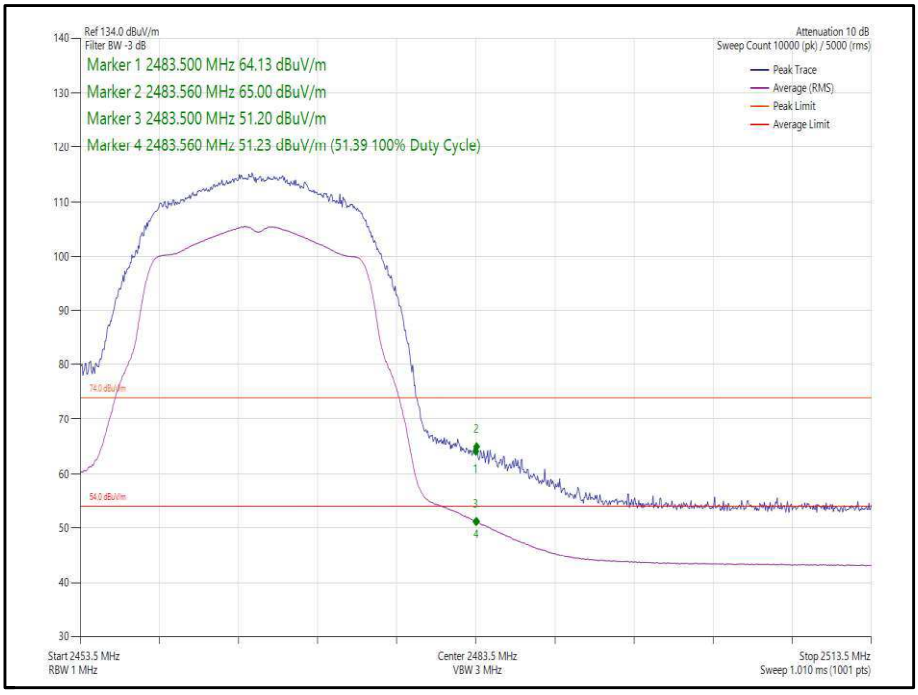


**Figure 30 - 802.11g, SISO, Core 1 - 2467 MHz,
Band Edge Frequency 2483.5 MHz**

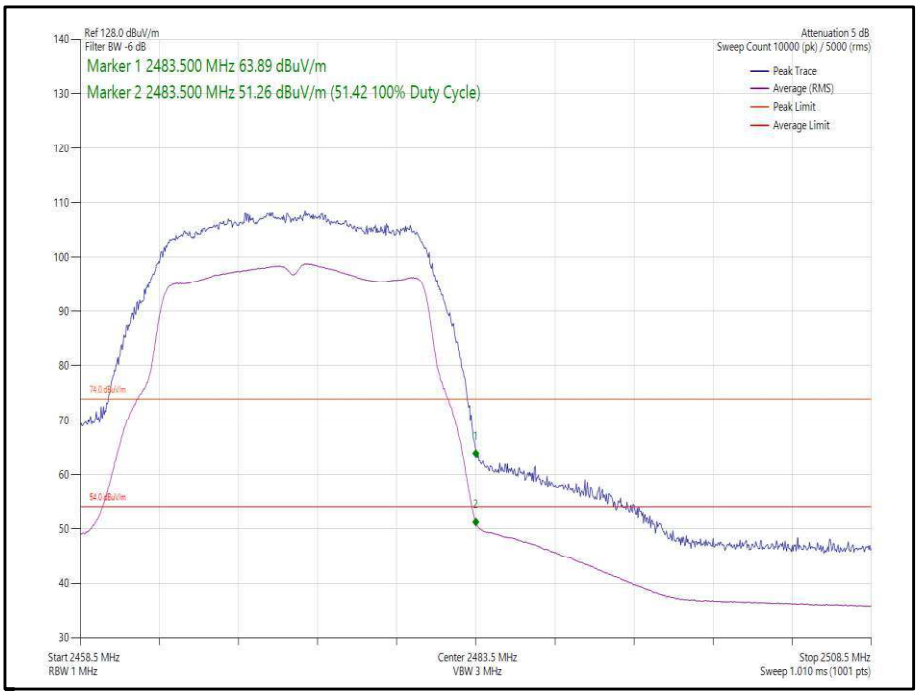


**Figure 31 - 802.11g, SISO, Core 1 - 2472 MHz,
Band Edge Frequency 2483.5 MHz**

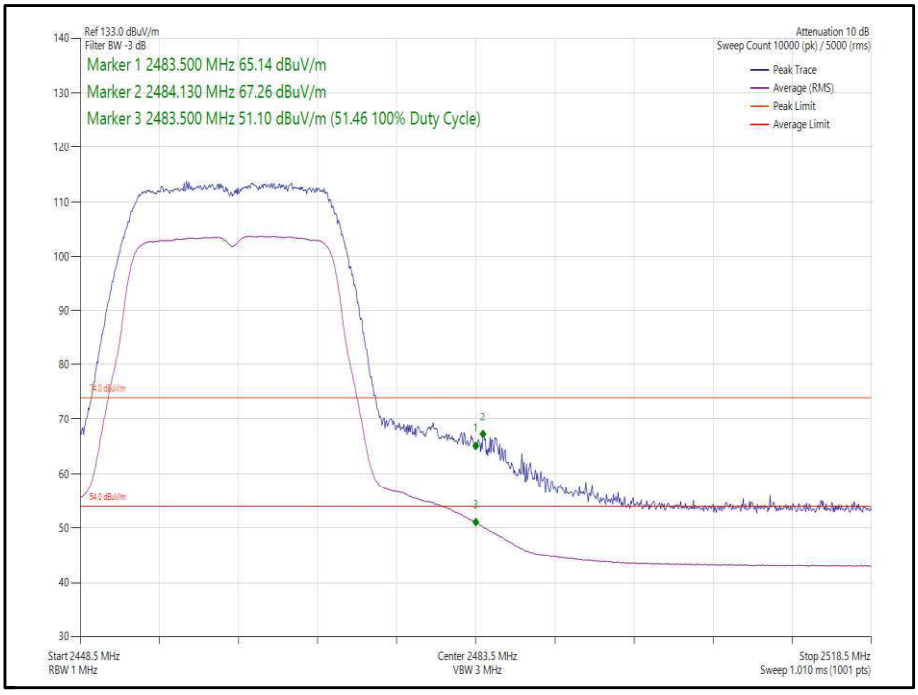


**Figure 32 - 802.11n, HT20, SISO, Core 1 - 2462 MHz,
Band Edge Frequency 2483.5 MHz**

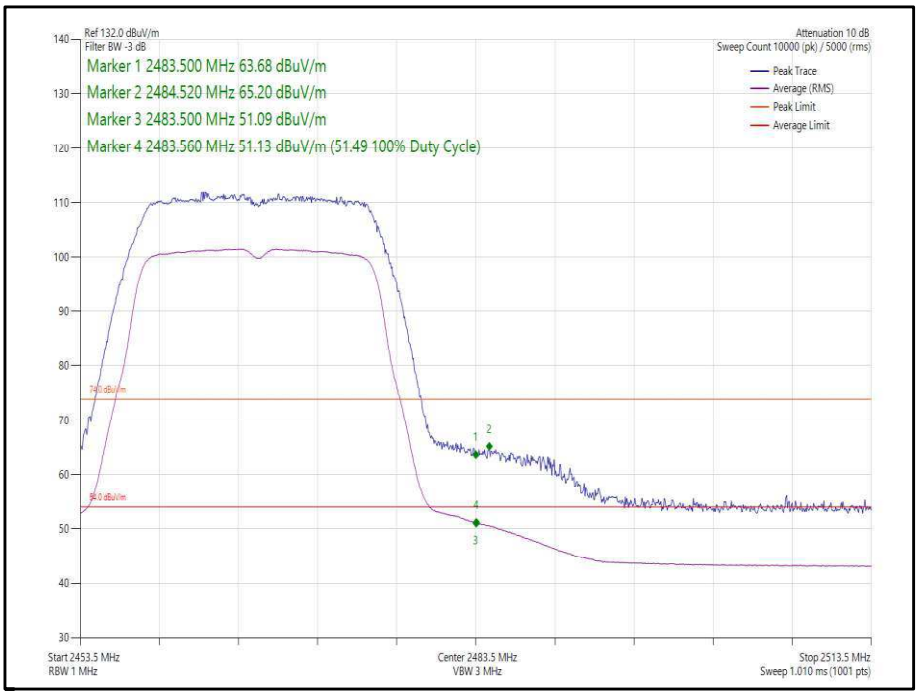


**Figure 33 - 802.11n, HT20, SISO, Core 1 - 2467 MHz, Band Edge Frequency 2483.5 MHz**

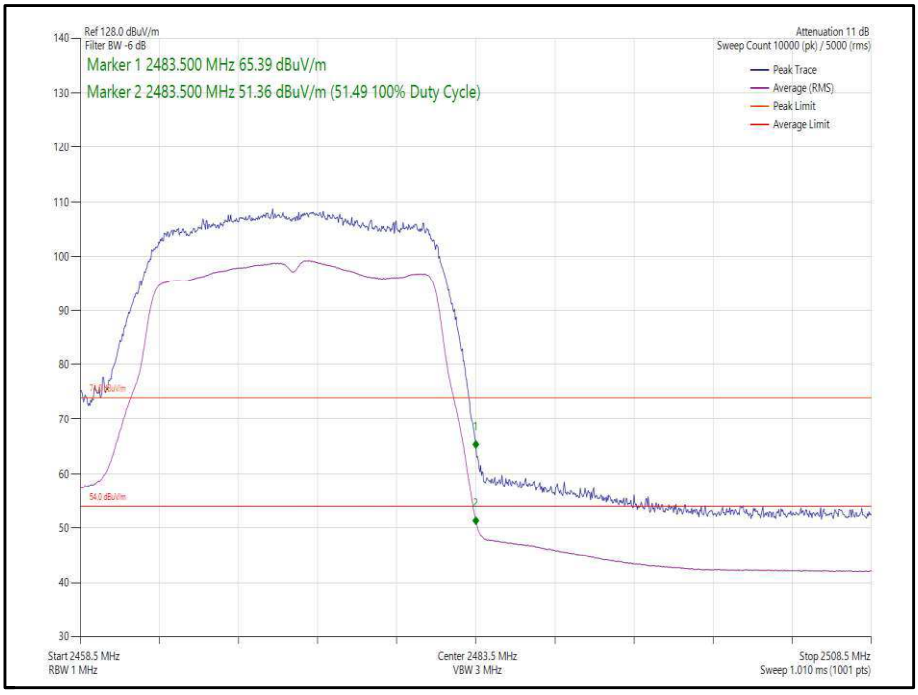


**Figure 34 - 802.11n, HT20, SISO, Core 1 - 2472 MHz, Band Edge Frequency 2483.5 MHz**

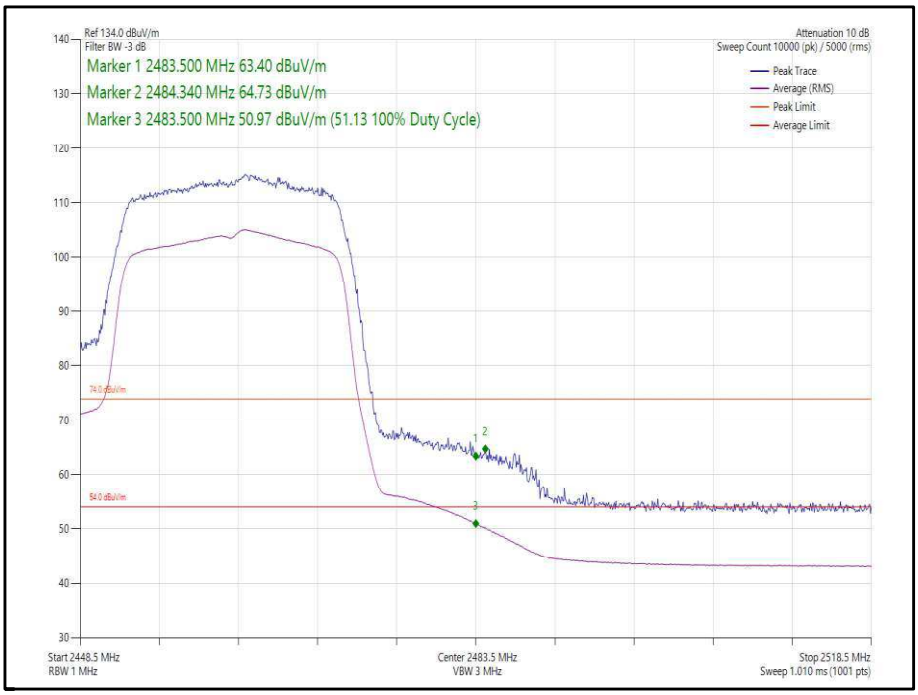


**Figure 35 - 802.11ax, HE20, SU, SISO, Core 1 - 2462 MHz, Band Edge Frequency 2483.5 MHz**

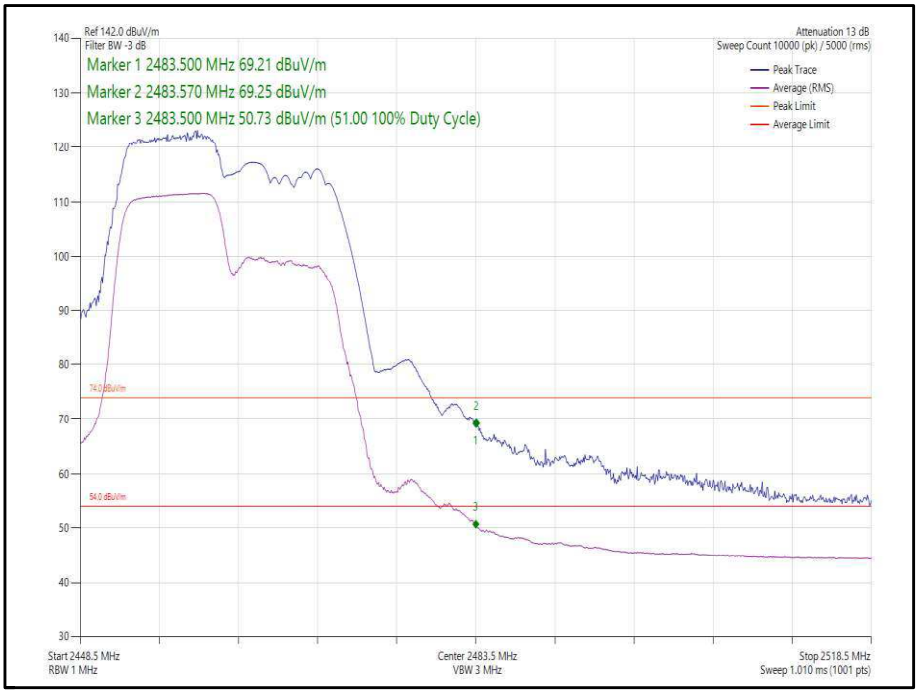


**Figure 36 - 802.11ax, HE20, RU 106-53, SISO, Core 1 - 2462 MHz, Band Edge Frequency 2483.5 MHz**

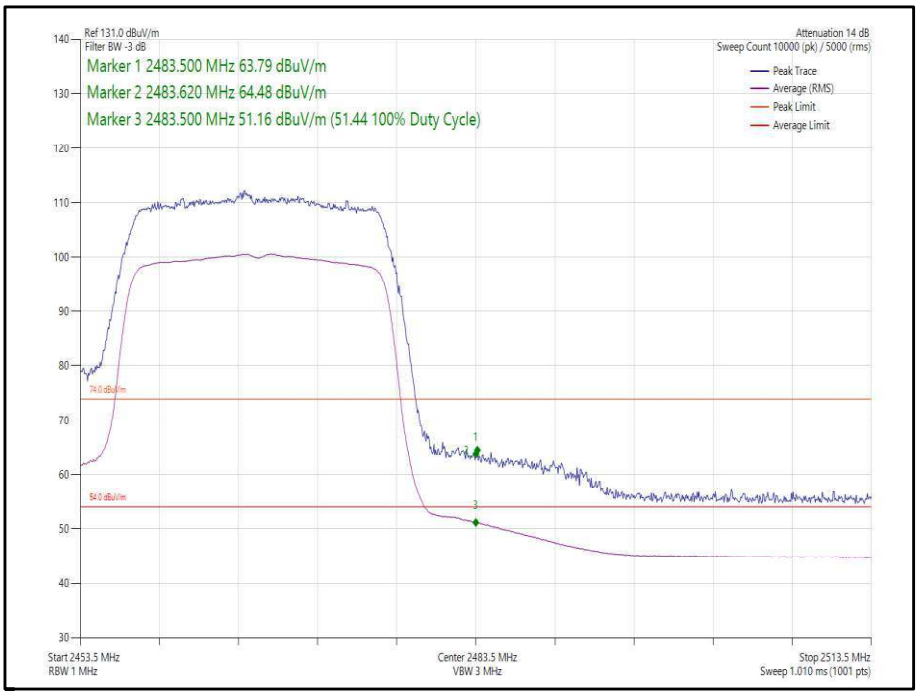


**Figure 37 - 802.11ax, HE20, SU, SISO, Core 1 - 2467 MHz, Band Edge Frequency 2483.5 MHz**

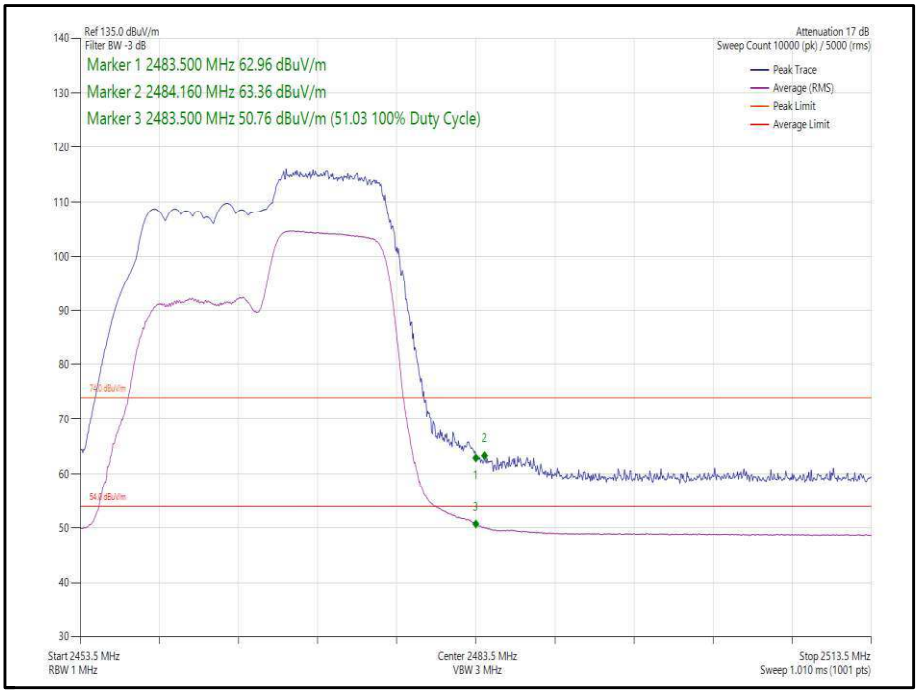


**Figure 38 - 802.11ax, HE20, RU 106-54, SISO, Core 1 - 2467 MHz, Band Edge Frequency 2483.5 MHz**

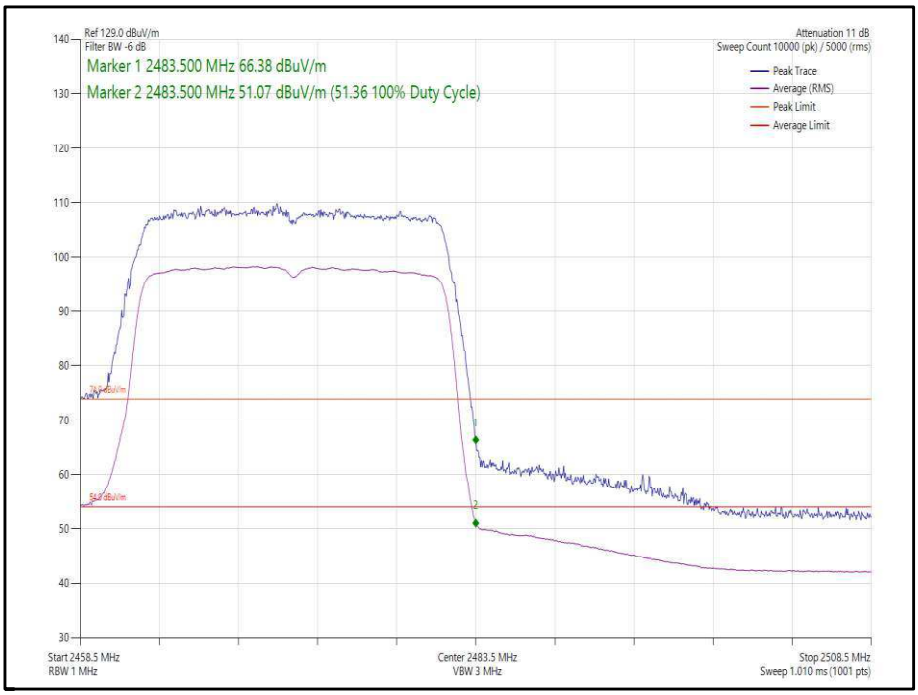


**Figure 39 - 802.11ax, HE20, SU, SISO, Core 1 - 2472 MHz, Band Edge Frequency 2483.5 MHz**

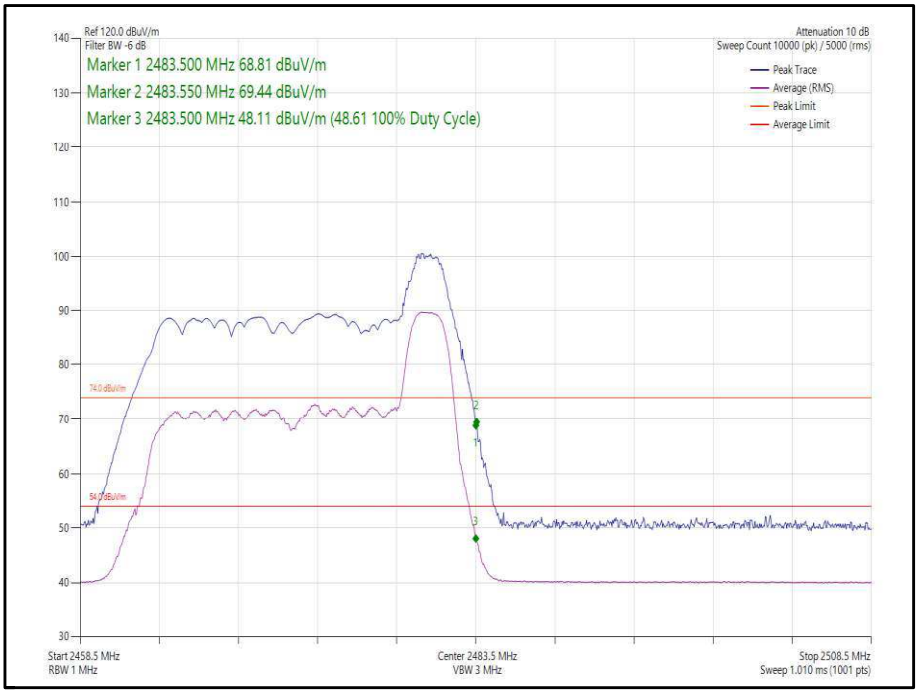


**Figure 40 - 802.11ax, HE20, RU 26-8, SISO, Core 1 - 2472 MHz, Band Edge Frequency 2483.5 MHz**

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 (dBuV/m) |
|---|---|---|---|---|---|---|---|
| 802.11n, HT20 | MCS4 | - | - | 2412 | 2390 | 67.13 | 51.39 |
| 802.11ax, HE20 | MCS2x1 | SU | - | 2412 | 2390 | 65.91 | 51.36 |
| 802.11ax, HE20 | MCS9x1 | 106 | 54 | 2412 | 2390 | 69.27 | 51.20 |
| 802.11n, HT20 | MCS4 | - | - | 2462 | 2483.5 | 65.35 | 51.36 |
| 802.11n, HT20 | MCS2 | - | - | 2467 | 2483.5 | 63.77 | 51.30 |
| 802.11n, HT20 | MCS4 | - | - | 2472 | 2483.5 | 64.52 | 51.46 |
| 802.11ax, HE20 | MCS2x1 | SU | - | 2462 | 2483.5 | 65.63 | 51.31 |
| 802.11ax, HE20 | MCS9x1 | 106 | 54 | 2462 | 2483.5 | 67.51 | 51.47 |
| 802.11ax, HE20 | MCS4x1 | SU | - | 2467 | 2483.5 | 64.68 | 51.30 |
| 802.11ax, HE20 | MCS9x1 | 106 | 54 | 2467 | 2483.5 | 68.47 | 51.49 |
| 802.11ax, HE20 | MCS4x1 | SU | - | 2472 | 2483.5 | 65.35 | 51.49 |
| 802.11ax, HE20 | MCS9x1 | 106 | 53 | 2472 | 2483.5 | 69.48 | 49.79 |

**Table 8 - CDD Restricted Band Edge Results**

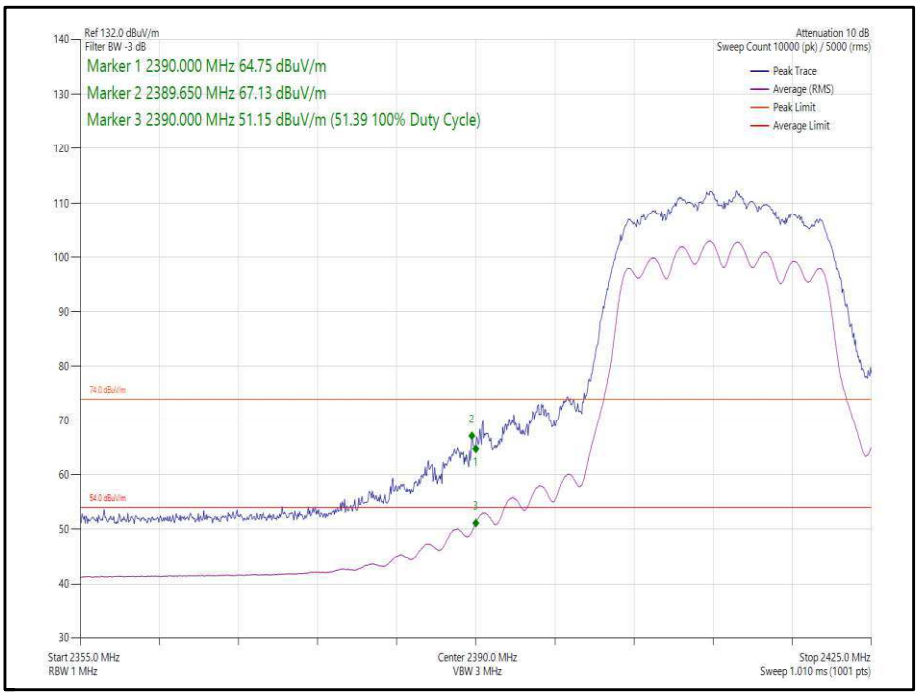


**Figure 41 - 802.11n, HT20, CDD, Core 0-1 - 2412 MHz, Band Edge Frequency 2390 MHz**

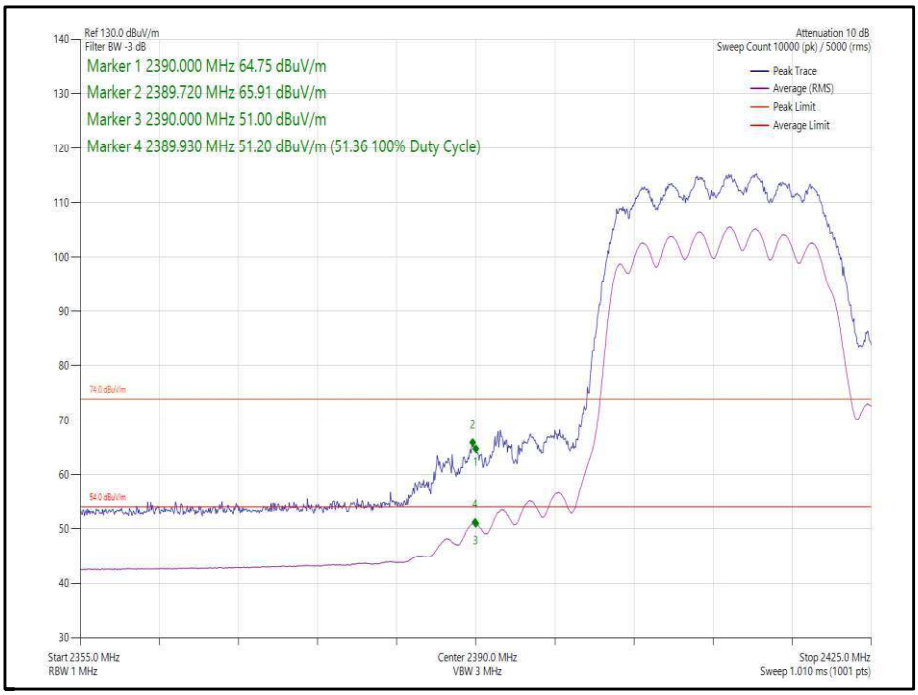


**Figure 42 - 802.11ax, HE20, SU, CDD, Core 0-1 - 2412 MHz, Band Edge Frequency 2390 MHz**

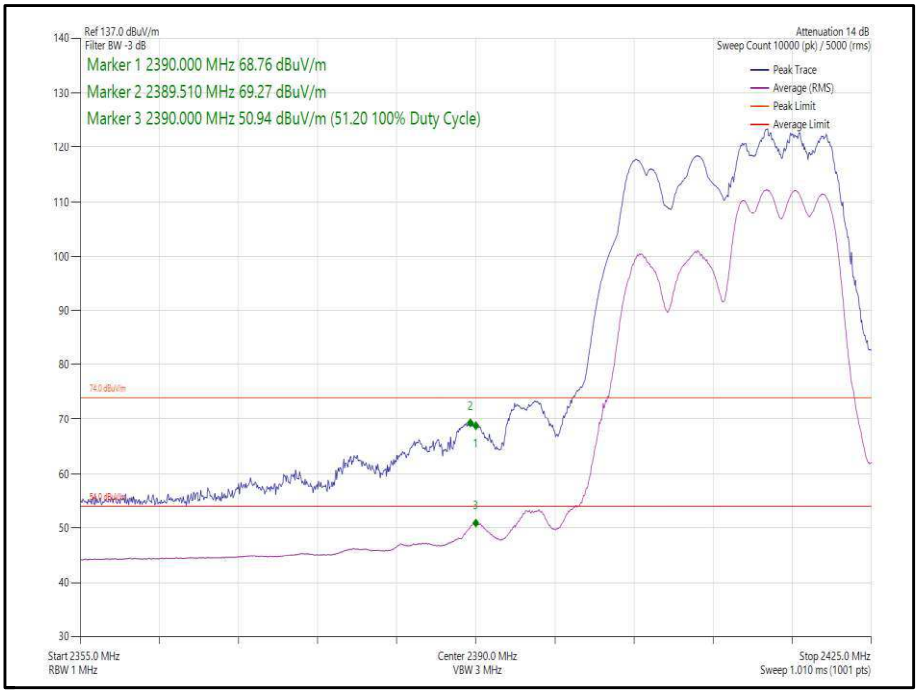


**Figure 43 - 802.11ax, HE20, RU 106-54, CDD, Core 0-1 - 2412 MHz, Band Edge Frequency 2390 MHz**

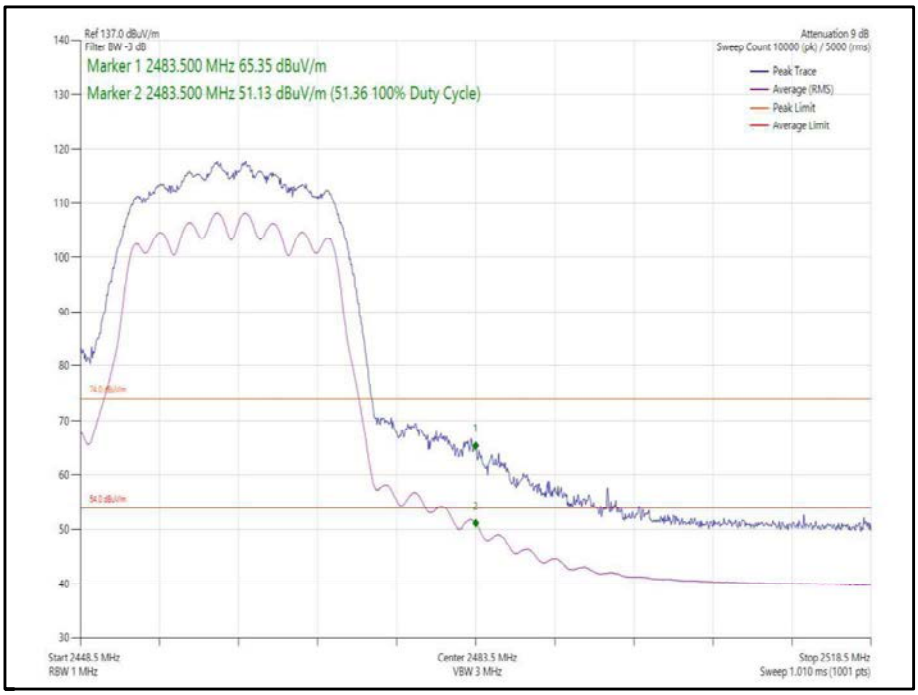


**Figure 44 - 802.11n, HT20, CDD, Core 0-1 - 2462 MHz, Band Edge Frequency 2483.5 MHz**

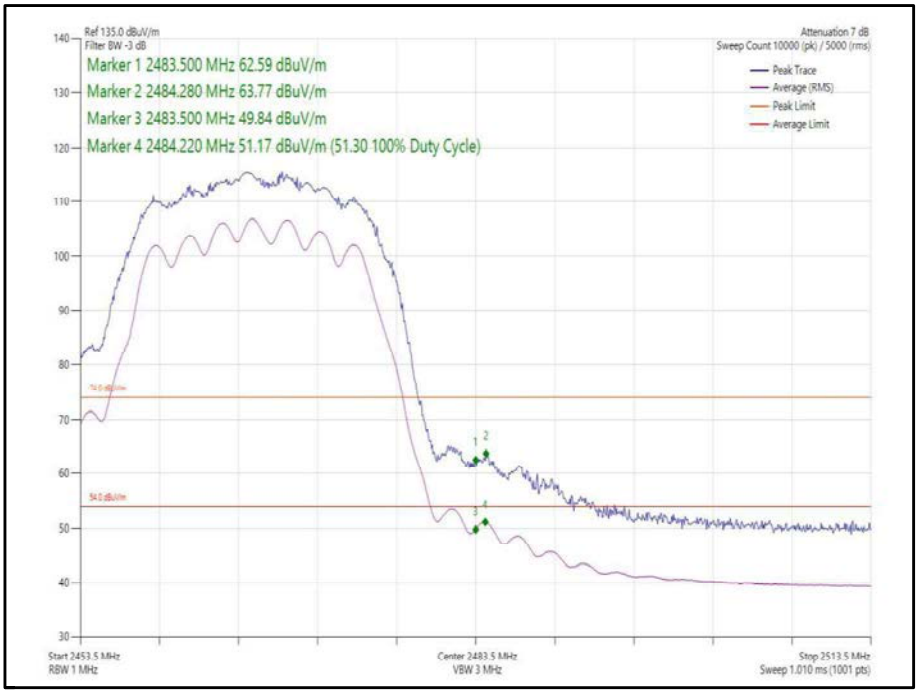


**Figure 45 - 802.11n, HT20, CDD, Core 0-1 - 2467 MHz, Band Edge Frequency 2483.5 MHz**

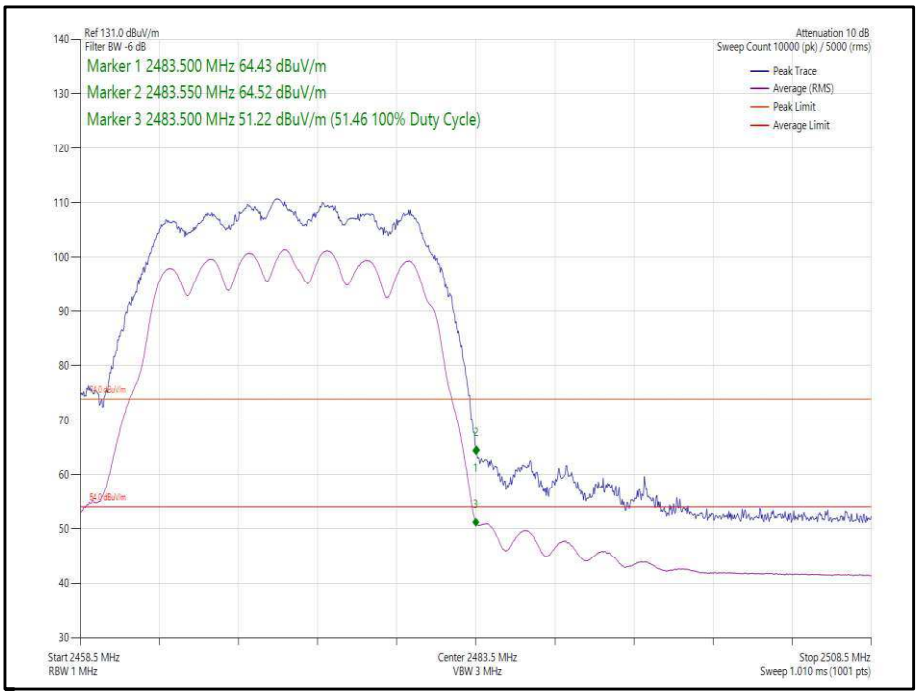


**Figure 46 - 802.11n, HT20, CDD, Core 0-1 - 2472 MHz,
Band Edge Frequency 2483.5 MHz**

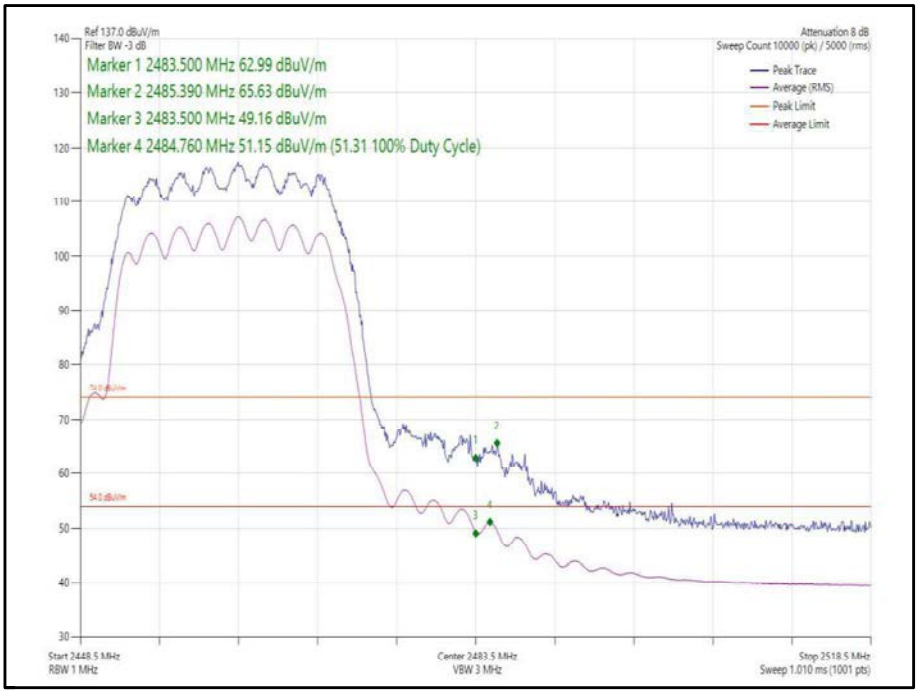


**Figure 47 - 802.11ax, HE20, SU, CDD, Core 0-1 - 2462 MHz,
Band Edge Frequency 2483.5 MHz**

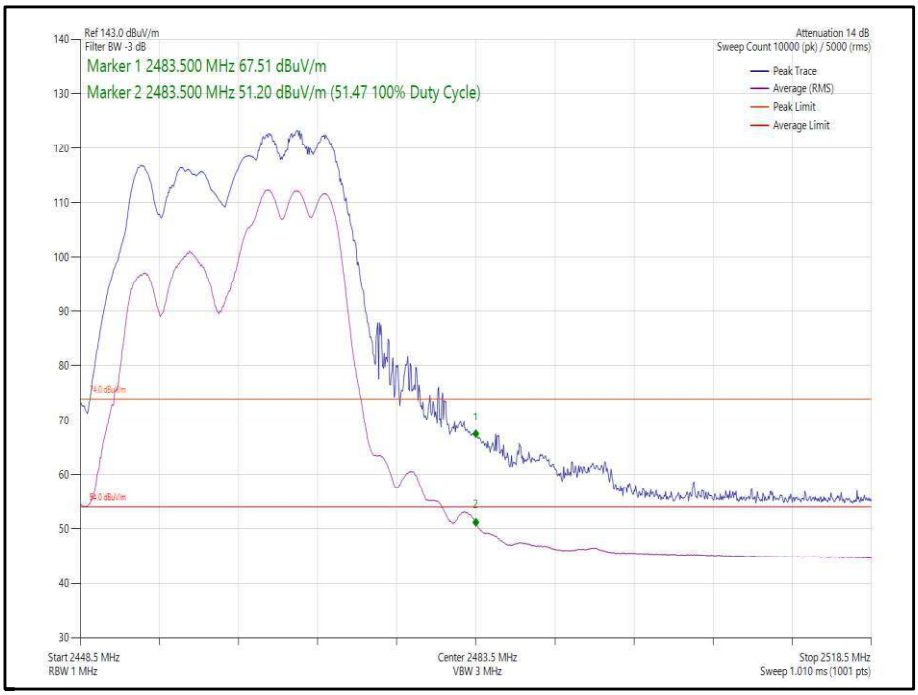


**Figure 48 - 802.11ax, HE20, RU 106-54, CDD, Core 0-1 - 2462 MHz, Band Edge Frequency 2483.5 MHz**

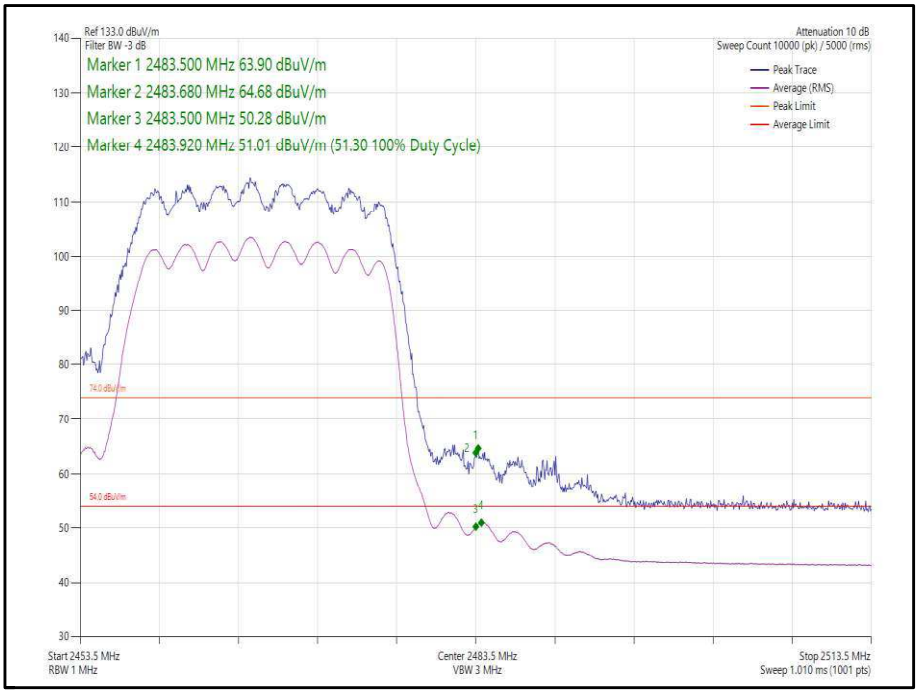


**Figure 49 - 802.11ax, HE20, SU, CDD, Core 0-1 - 2467 MHz, Band Edge Frequency 2483.5 MHz**

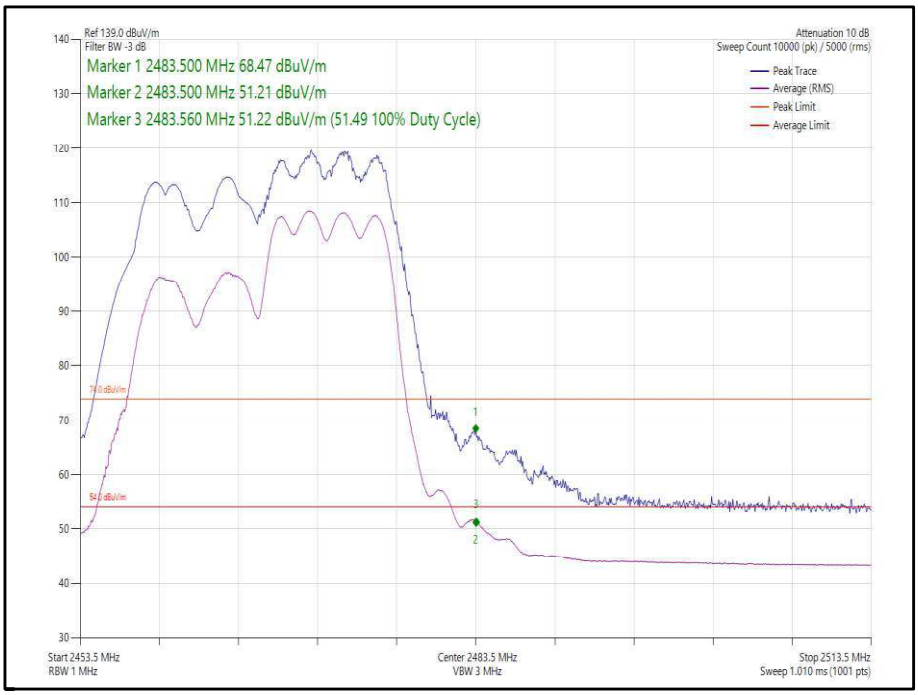


**Figure 50 - 802.11ax, HE20, RU 106-54, CDD, Core 0-1 - 2467 MHz, Band Edge Frequency 2483.5 MHz**

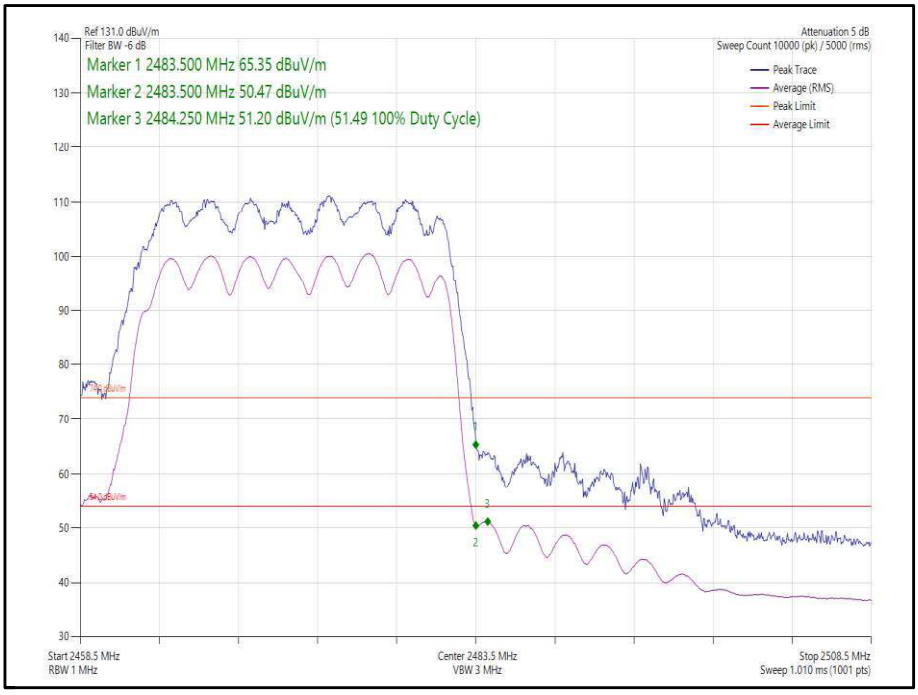


**Figure 51 - 802.11ax, HE20, SU, CDD, Core 0-1 - 2472 MHz, Band Edge Frequency 2483.5 MHz**

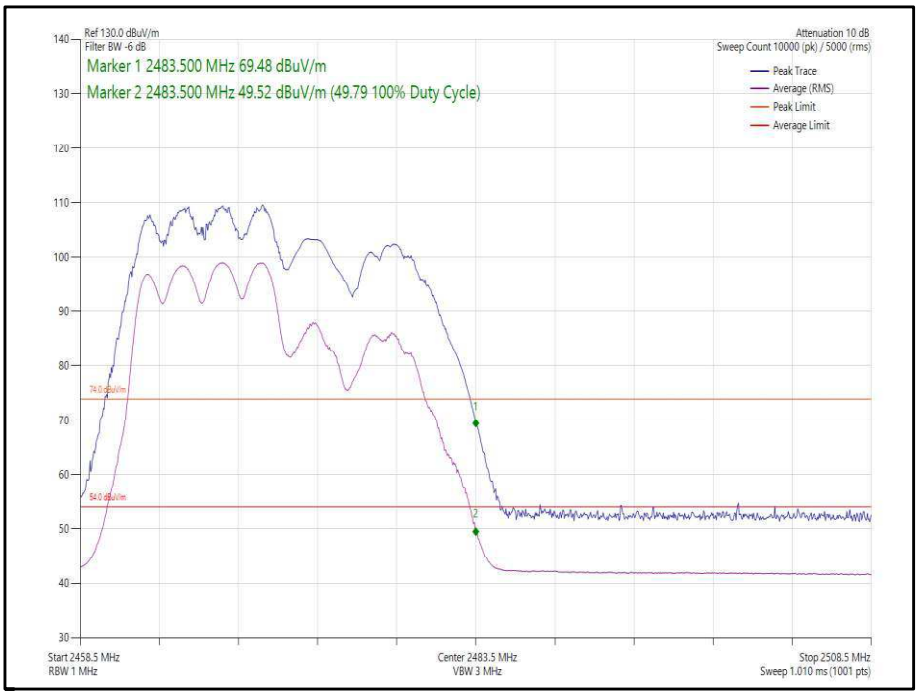


**Figure 52 - 802.11ax, HE20, RU 106-53, CDD, Core 0-1 - 2472 MHz, Band Edge Frequency 2483.5 MHz**

FCC 47 CFR Part 15, Limit Clause 15.209

| Frequency (MHz) | Field Strength (µV/m at 3 m) |
|---|---|
| 30 to 88 | 100 |
| 88 to 216 | 150 |
| 216 to 960 | 200 |
| Above 960 | 500 |

**Table 9**

ISED RSS-GEN, Limit Clause 8.9

| Frequency (MHz) | Field Strength (µV/m at 3 m) |
|---|---|
| 30 to 88 | 100 |
| 88 to 216 | 150 |
| 216 to 960 | 200 |
| Above 960* | 500 |

**Table 10**

*Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

### 2.1.7 Test Location and Test Equipment Used

This test was carried out in RF Chamber 14.

| Instrument | Manufacturer | Type No. | TE No. | Calibration Period (months) | Calibration Expiry Date |
|---|---|---|---|---|---|
| Emissions Software | TUV SUD | EmX V3.1.10 | 5125 | - | Software |
| EMI Test Receiver | Rohde & Schwarz | ESW44 | 5912 | 12 | 17-Feb-2023 |
| 1500W (300V 12A) AC Power Supply | iTech | IT7324 | 5956 | - | O/P Mon |
| 5m Semi-Anechoic Chamber (Dual-Axis) | Albatross Projects | RF Chamber 14 | 5958 | 36 | 26-Apr-2025 |
| Compact Antenna Mast | Maturo Gmbh | CAM4.0-P | 5859 | - | TU |
| Mast & Turntable Controller | Maturo Gmbh | FCU3.0 | 5960 | - | TU |
| Tilt Antenna Mast | Maturo Gmbh | BAM4.5-P | 5961 | - | TU |
| Turntable | Maturo Gmbh | TT1.5SI | 5962 | - | TU |
| Cable (SMA to SMA 1m) | Junkosha | MWX221-01000AMSAMS/A | 5997 | 12 | 06-Jun-2023 |
| Cable (SMA to SMA 6.5m) | Junkosha | MWX221-06500AMSAMS/B | 6003 | 12 | 07-Jun-2023 |
| Cable (SMA to SMA 1m) | Junkosha | MWX221-01000AMSAMS/A | 6008 | 12 | 06-Jun-2023 |
| Cable (N to N 1m) | Junkosha | MWX221-01000AMSAMS/B | 6009 | 12 | 07-Jun-2023 |
| Horn Antenna (1-10 GHz) | Schwarzbeck | BBHA9120B | 6141 | 12 | 21-Jun-2023 |
| SAC Switch Unit | TUV SUD | TUV_SSU_001 | 6144 | 12 | 05-Dec-2023 |
| Digital Multimeter | Fluke | 115 | 6145 | 12 | 17-Jun-2023 |
| Humidity & Temperature meter | R.S Components | 1364 | 6149 | 12 | 17-Jun-2023 |

**Table 11**

TU - Traceability Unscheduled
O/P Mon - Output Monitored using calibrated equipment

## 2.2 Emission Bandwidth

### 2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(2)
ISED RSS-247, Clause 5.2
ISED RSS-GEN, Clause 6.7

### 2.2.2 Equipment Under Test and Modification State

A2787, S/N: V32VYX9RJ6 - Modification State 0

### 2.2.3 Date of Test

22-January-2023 to 13-February-2023

### 2.2.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 11.8.1 for 6 dB BW and 6.9.3 for 99% occupied bandwidth measurements.

### 2.2.5 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 21.3 - 21.7 °C |
| Relative Humidity | 23.6 - 33.0 % |

### 2.2.6 Test Results

2.4 GHz WLAN

| SISO Protocol | 6 dB Bandwidth (MHz) | |
|---|---|---|
| | Minimum | Maximum |
| 802.11b | 8.640 | 9.120 |
| 802.11g | 15.240 | 16.380 |
| 802.11n HT20 | 15.240 | 17.400 |
| 802.11ax HE20 SU | 18.780 | 19.080 |

**Table 12 - 6 dB Bandwidth Summary Results - SISO**


**Figure 53 - 802.11b Minimum 6 dB EBW**

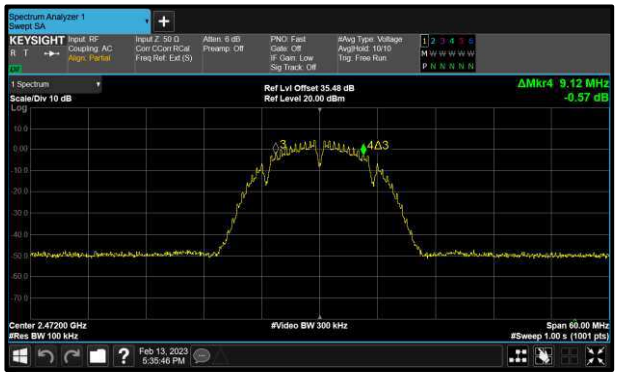


**Figure 54 - 802.11b Maximum 6 dB EBW**

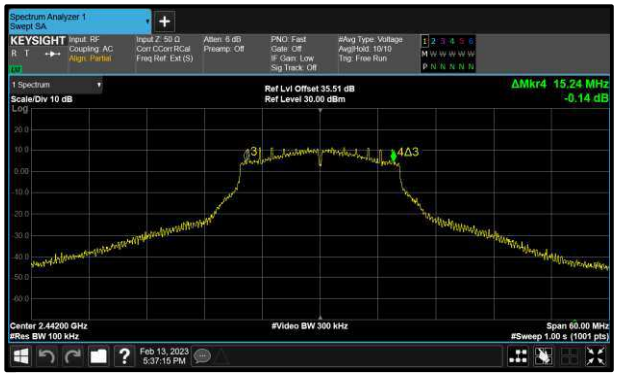


**Figure 55 - 802.11g Minimum 6 dB EBW**


**Figure 56 - 802.11g Maximum 6 dB EBW**

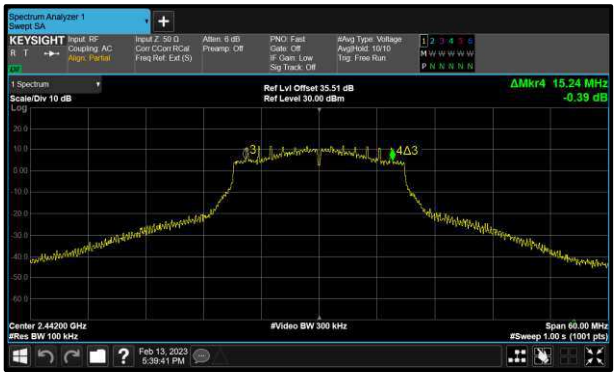


**Figure 57 - 802.11n HT20 Minimum 6 dB EBW**

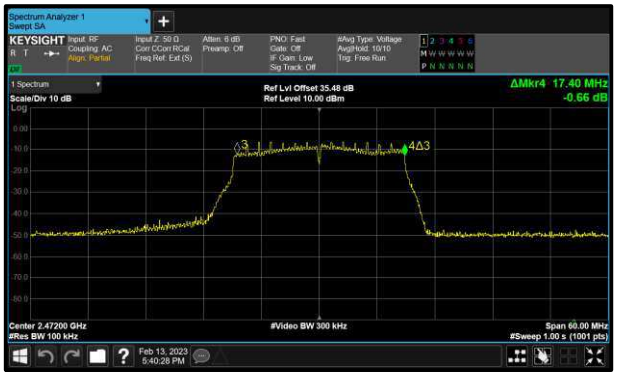


**Figure 58 - 802.11n HT20 Maximum 6 dB EBW**


**Figure 59 - 802.11ax HE20 SU Minimum 6 dB EBW**


**Figure 60 - 802.11ax HE20 SU Maximum 6 dB EBW**