

FCC and ISED Test Report

Apple Inc
Model: A2918

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: BCGA2918

IC: 579C-A2918



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Document 75957632-23 Issue 01

SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Matthew Russell	Chief Engineer	Authorised Signatory	22 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 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	22 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 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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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	22 May 2023

Table 1

1.2 Introduction

Applicant	Apple Inc
Manufacturer	Apple Inc
Model Number(s)	A2918
Serial Number(s)	D5WW0J3220, D2Q3YQPDWP and P09T66XTNP
Hardware Version(s)	REV 1.0
Software Version(s)	22E21820r, 22E21820r and 22E21820r
Number of Samples Tested	3
Test Specification/Issue/Date	FCC 47 CFR Part 15C: 2021 ISED RSS-247: Issue 2 (02-2017) ISED RSS-GEN: Issue 5 (04-2018) + A2 (02-2021)
Start of Test	27-February-2023
Finish of Test	27-April-2023
Name of Engineer(s)	Nicolae Mihailiuc, Morsalin Hossain, Ioan-Alexandru Bogatu, Akhil Rajendran Bhaskaran Nair, Jayvir Makwana, Mahmud Chowdhury, Elliot Callender, Mohammad Malik, Taha Shafique, James Woods and Nicolae Mihailiuc
Related Document(s)	ANSI C63.10 (2020) ANSI C63.10 (2013) KDB 662911 D01 v02r01 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, ISSED RSS-247 and ISSED RSS-GEN is shown below.

Section	Specification Clause		Test Description	Result	Comments/Base Standard
	Part 15C	RSS-247			
Configuration and Mode: 2.4 GHz WLAN					
-	15.203	-	-	N/T	The device complies with the provisions of this section, as it uses permanently attached integral antennas.
2.1	15.205, 3.3	3.3	Antenna Requirement	Pass	
2.2	15.247 (a)(2)	5.2	Restricted Band Edges	Pass	
2.3	15.247 (b)	5.4	Emission Bandwidth	Pass	
2.4	15.247 (d)	5.5	Maximum Conducted Output Power	Pass	
2.5	15.209 and 15.247 (d)	3.3 and 5.5	Authorised Band Edges	Pass	
2.6	15.247 (e)	5.2	Spurious Radiated Emissions	Pass	
			Power Spectral Density	Pass	

Table 2



1.4 Product Information

1.4.1 Technical Description

The equipment under test (EUT) was a portable laptop computer.

1.4.2 Test Modes

The EUT's 2.4 GHz 802.11 radio supports SISO (Single Input/Single Output) and 2x2 MIMO (Multiple Input/Multiple Output). It supports 802.11b and g for SISO and 802.11n and ax at 20 MHz channel bandwidths for SISO and MIMO. 802.11ax supports RU 26/52/106/242.

The EUT uses different output powers per core dependent on how many cores are used. 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 differs.

After preliminary investigations were performed, the EUT was therefore tested in the following worst-case 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.

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 was known and compensated for in any conducted measurements.

For all tests, 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.

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	5.03	0.71
Core 1	2400 to 2480	5.77	0.71

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: A2918, Serial Number: D2Q3YQPDWP			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A2918, Serial Number: D5WW0J3220			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A2918, Serial Number: P09T66XTNP			
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	Nicolae Mihailiuc, Morsalin Hossain, Ioan-Alexandru Bogatu and Akhil Rajendran Bhaskaran Nair	UKAS
Emission Bandwidth	Jayvir Makwana and Mahmud Chowdhury	UKAS
Maximum Conducted Output Power	Jayvir Makwana and Mahmud Chowdhury	UKAS
Authorised Band Edges	Nicolae Mihailiuc, Morsalin Hossain, Ioan-Alexandru Bogatu and Akhil Rajendran Bhaskaran Nair	UKAS
Spurious Radiated Emissions	Elliot Callender, Mohammad Malik, Taha Shafique, James Woods, Morsalin Hossain, Nicolae Mihailiuc and Ioan-Alexandru Bogatu	UKAS
Power Spectral Density	Jayvir Makwana and Mahmud Chowdhury	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

A2918, S/N: D5WW0J3220 - Modification State 0
A2918, S/N: D2Q3YQPDWP - Modification State 0

2.1.3 Date of Test

27-February-2023 to 07-March-2023

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 dB μ V/m to μ V/m:
 $10^{(\text{Field Strength in dB}\mu\text{V/m}/20)}$.

2.1.5 Environmental Conditions

Ambient Temperature	20.3 - 23.0 °C
Relative Humidity	23.0 - 36.5 %



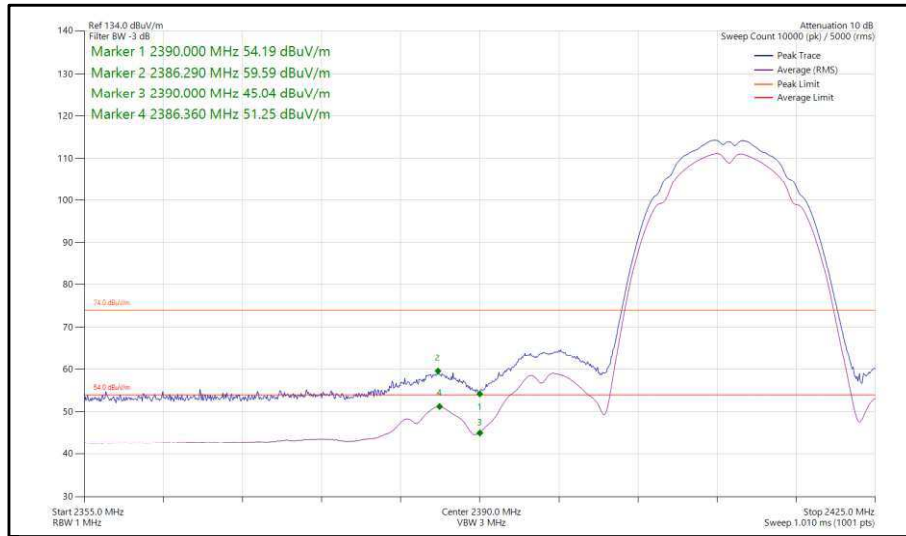
2.1.6 Test Results

2.4 GHz WLAN

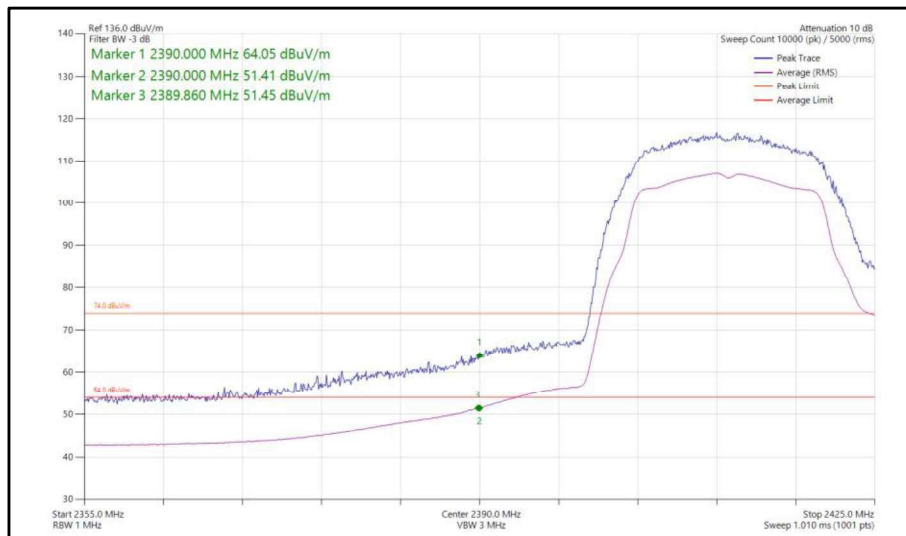
20 MHz Bandwidth - Core 0 (SISO)

Mode	Data Rate/ MCS	Resource Size	Resource Index	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dB μ V/m)	Average Level (dB μ V/m)
802.11b	1 Mbps	-	-	2412	2390	59.59	51.25
802.11g	12 Mbps	-	-	2412	2390	64.05	51.45
802.11n HT20	MCS4	-	-	2412	2390	66.19	51.45
802.11ax HE20	MCS9x1	SU	-	2412	2390	64.67	51.07
802.11ax HE20	MCS9x1	106	54	2412	2390	68.59	48.43
802.11b	1 Mbps	-	-	2462	2483.5	59.18	50.99
802.11b	1 Mbps	-	-	2467	2483.5	59.00	51.07
802.11b	1 Mbps	-	-	2472	2483.5	58.86	51.16
802.11g	12 Mbps	-	-	2462	2483.5	64.70	51.03
802.11g	54 Mbps	-	-	2467	2483.5	65.33	51.20
802.11g	54 Mbps	-	-	2472	2483.5	64.20	51.18
802.11n HT20	MCS2	-	-	2462	2483.5	65.36	51.49
802.11n HT20	MCS2	-	-	2467	2483.5	63.51	51.25
802.11n HT20	MCS4	-	-	2472	2483.5	67.43	51.27
802.11ax HE20	MCS2x1	SU	-	2462	2483.5	63.72	50.45
802.11ax HE20	MCS9x1	106	54	2462	2483.5	69.34	48.41
802.11ax HE20	MCS2x1	SU	-	2467	2483.5	63.32	51.49
802.11ax HE20	MCS9x1	106	54	2467	2483.5	69.50	49.10
802.11ax HE20	MCS9x1	SU	-	2472	2483.5	65.47	51.44
802.11ax HE20	MCS9x1	106	53	2472	2483.5	69.48	48.72

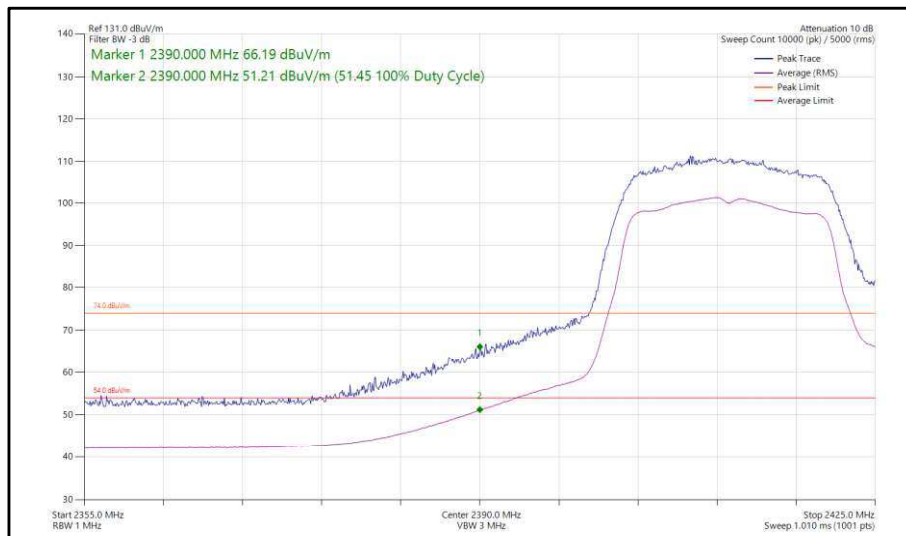
Table 6 - SISO Restricted Band Edge Results



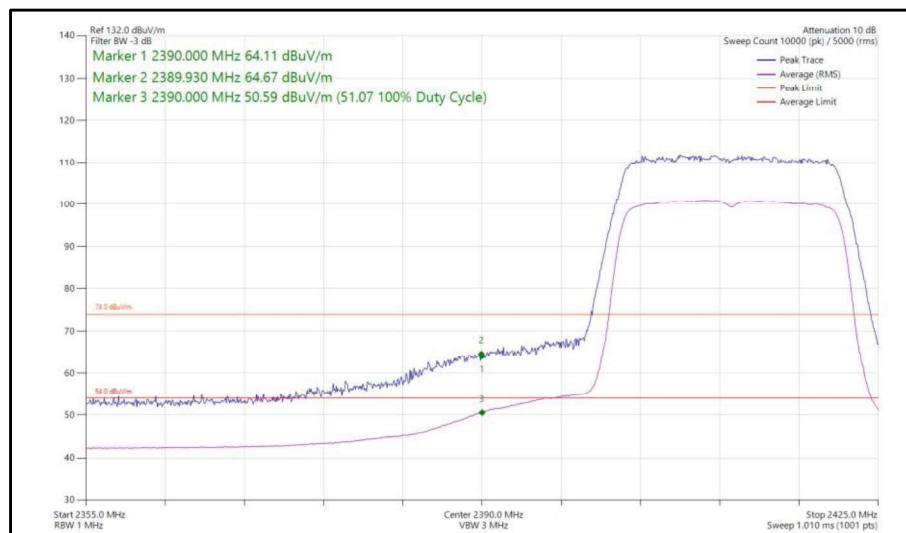
**Figure 1 - 802.11b, SISO, Core 0 - 2412 MHz,
Band Edge Frequency 2390 MHz**



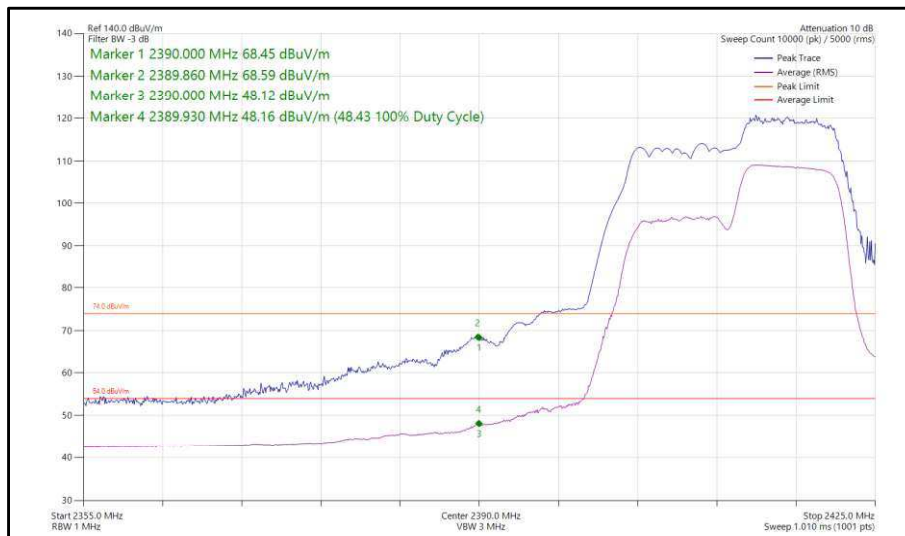
**Figure 2 - 802.11g, SISO, Core 0 - 2412 MHz,
Band Edge Frequency 2390 MHz**



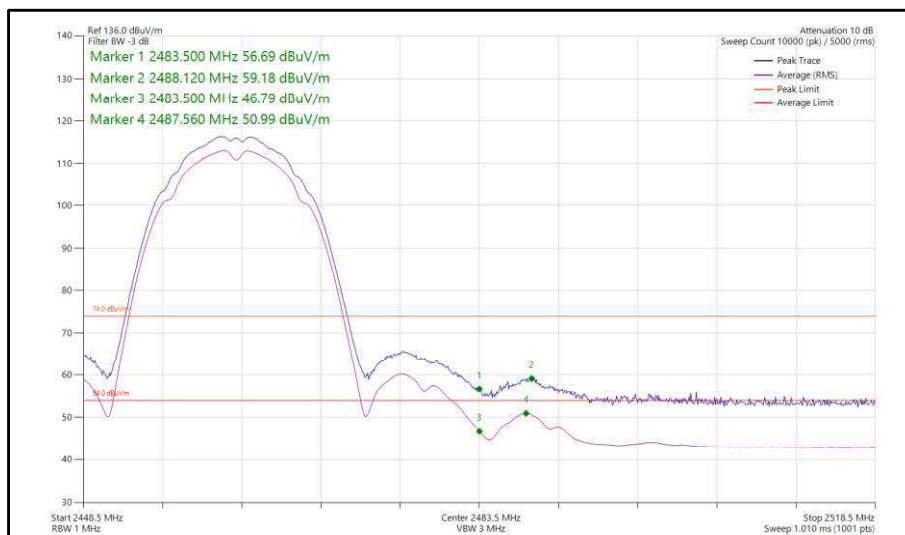
**Figure 3 - 802.11n, HT20, SISO, Core 0 - 2412 MHz,
Band Edge Frequency 2390 MHz**



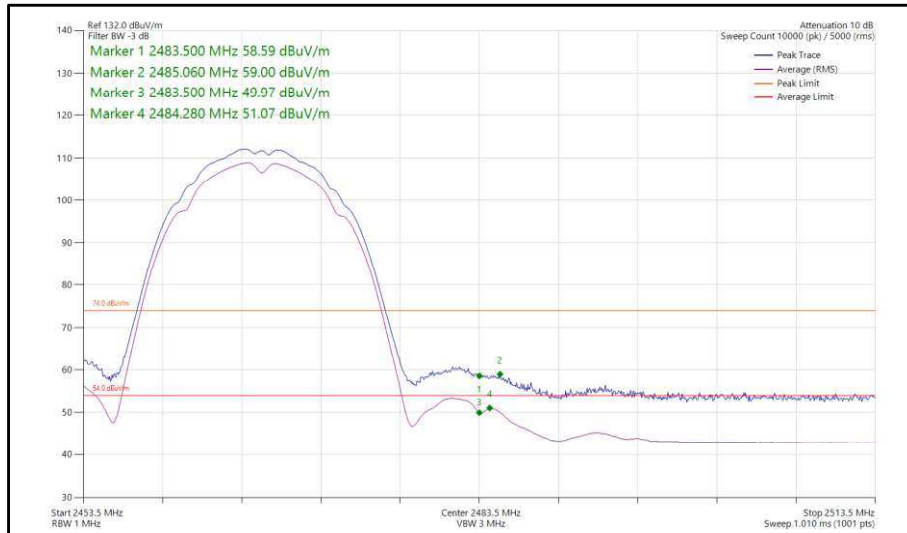
**Figure 4 - 802.11ax, HE20, SU, SISO, Core 0 - 2412 MHz,
Band Edge Frequency 2390 MHz**



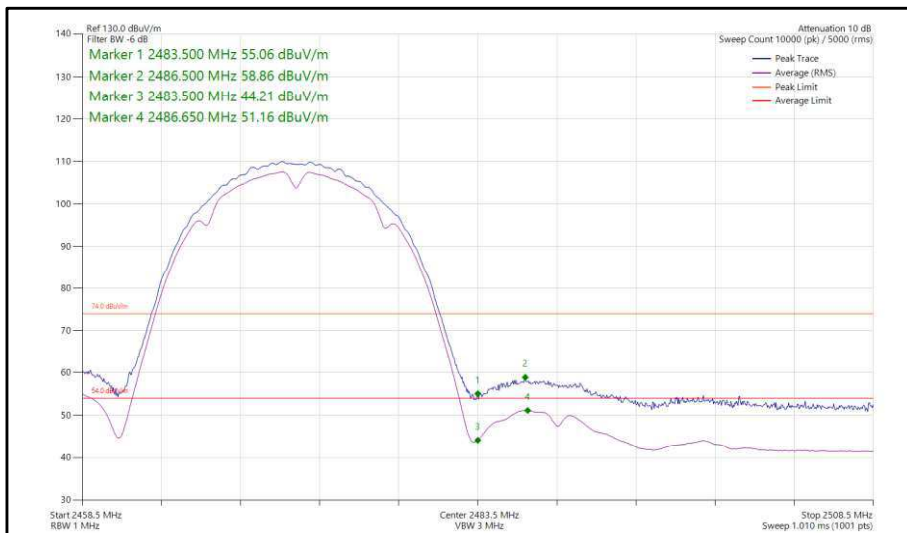
**Figure 5 - 802.11ax, HE20, RU 106-54, SISO, Core 0 - 2412 MHz,
Band Edge Frequency 2390 MHz**



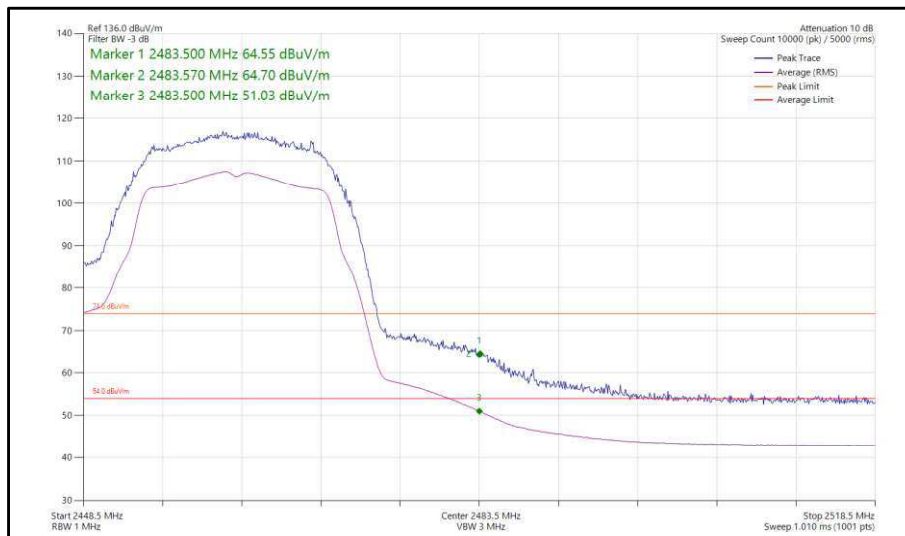
**Figure 6 - 802.11b, SISO, Core 0 - 2462 MHz,
Band Edge Frequency 2483.5 MHz**



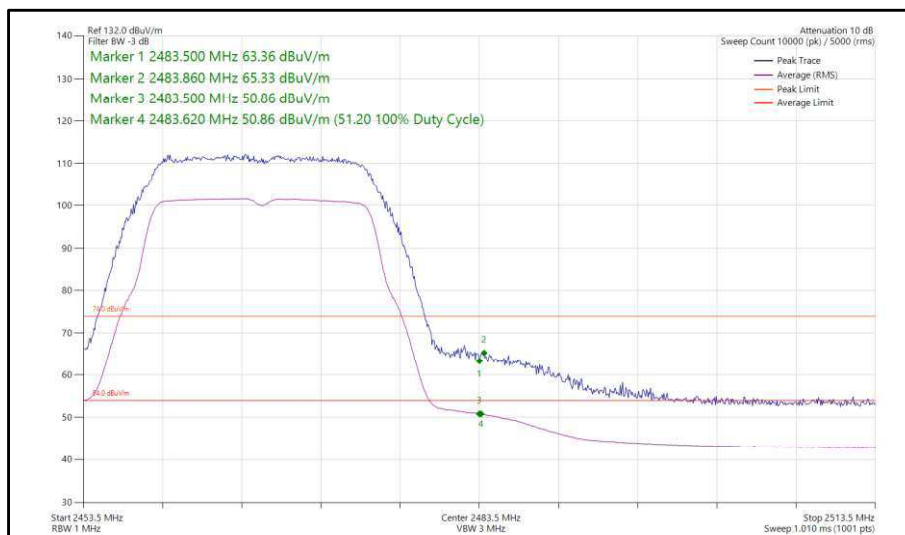
**Figure 7 - 802.11b, SISO, Core 0 - 2467 MHz,
Band Edge Frequency 2483.5 MHz**



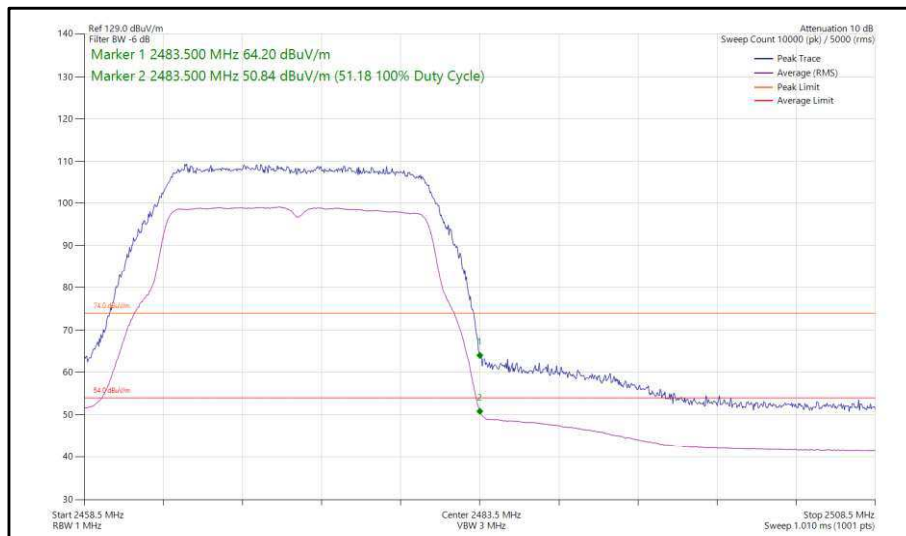
**Figure 8 - 802.11b, SISO, Core 0 - 2472 MHz,
Band Edge Frequency 2483.5 MHz**



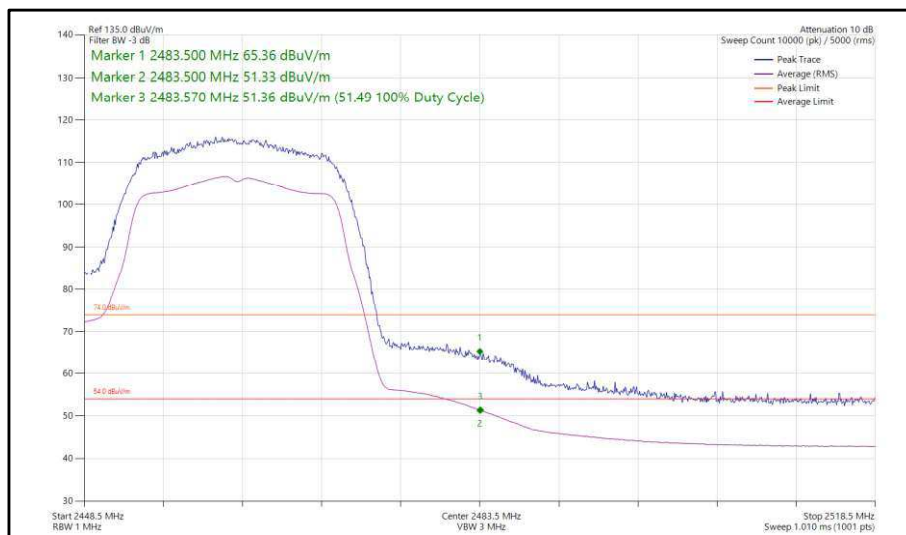
**Figure 9 - 802.11g, SISO, Core 0 - 2462 MHz,
Band Edge Frequency 2483.5 MHz**



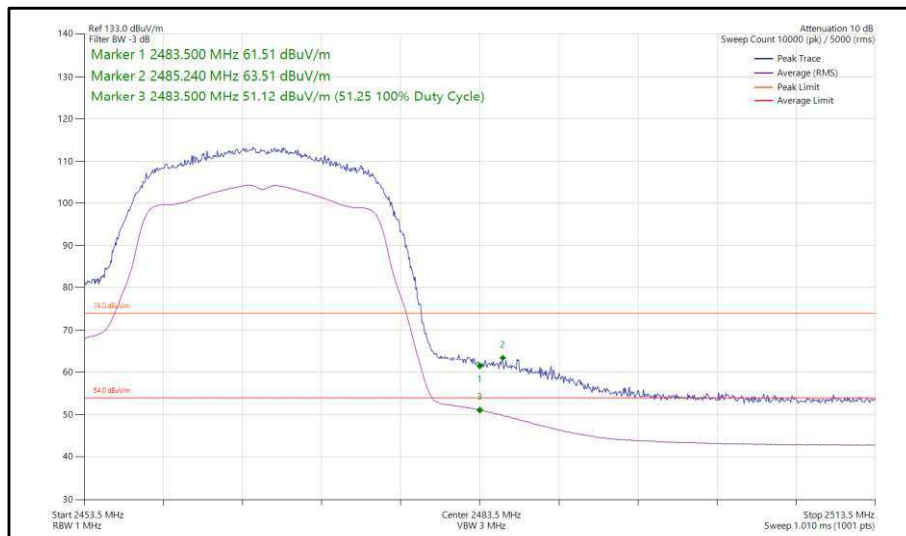
**Figure 10 - 802.11g, SISO, Core 0 - 2467 MHz,
Band Edge Frequency 2483.5 MHz**



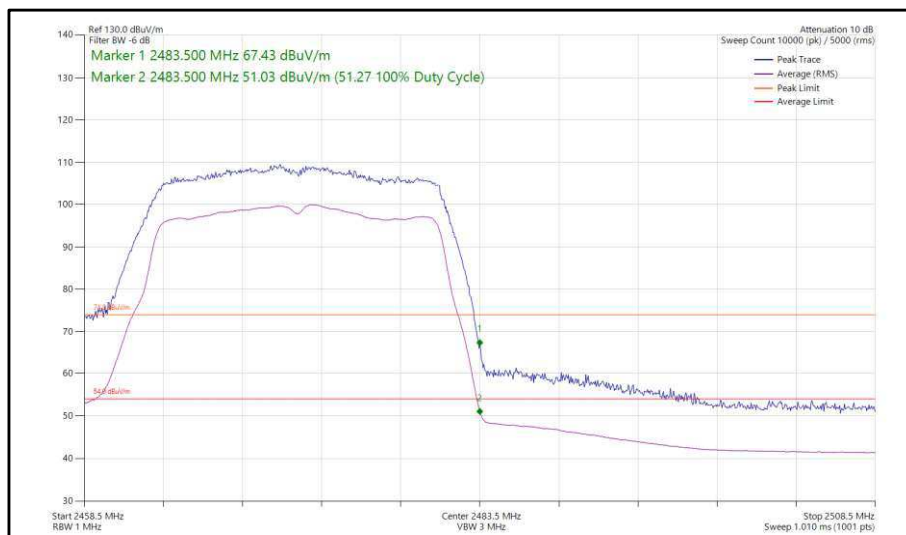
**Figure 11 - 802.11g, SISO, Core 0 - 2472 MHz,
Band Edge Frequency 2483.5 MHz**



**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**

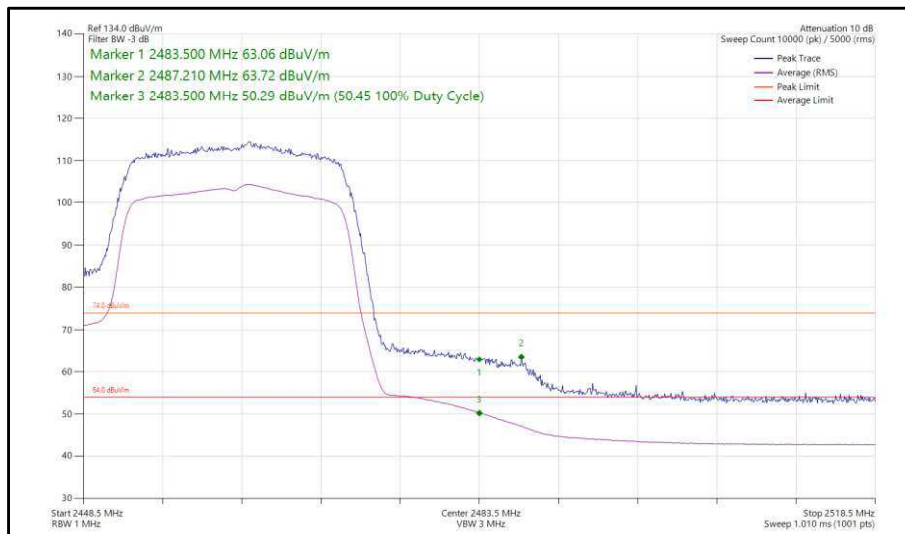


Figure 15 - 802.11ax, HE20, SU, SISO, Core 0 - 2462 MHz, Band Edge Frequency 2483.5 MHz

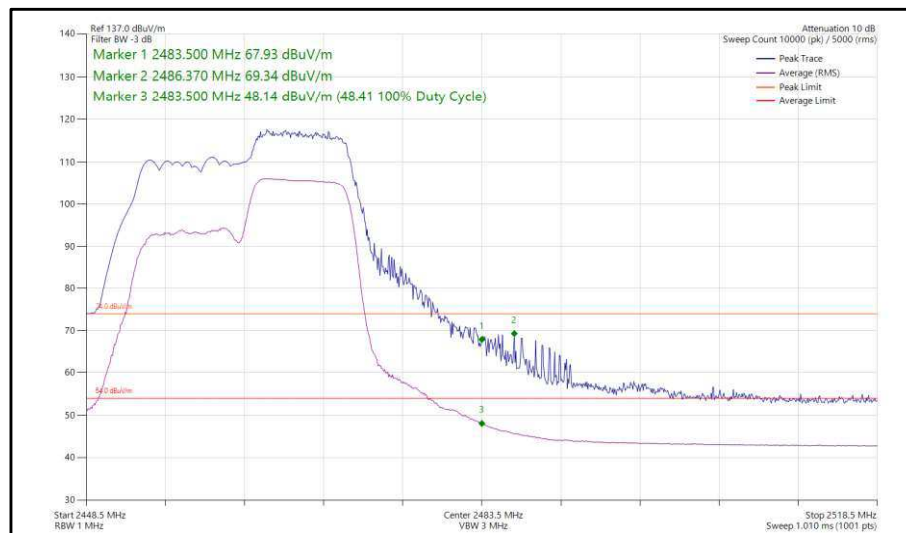
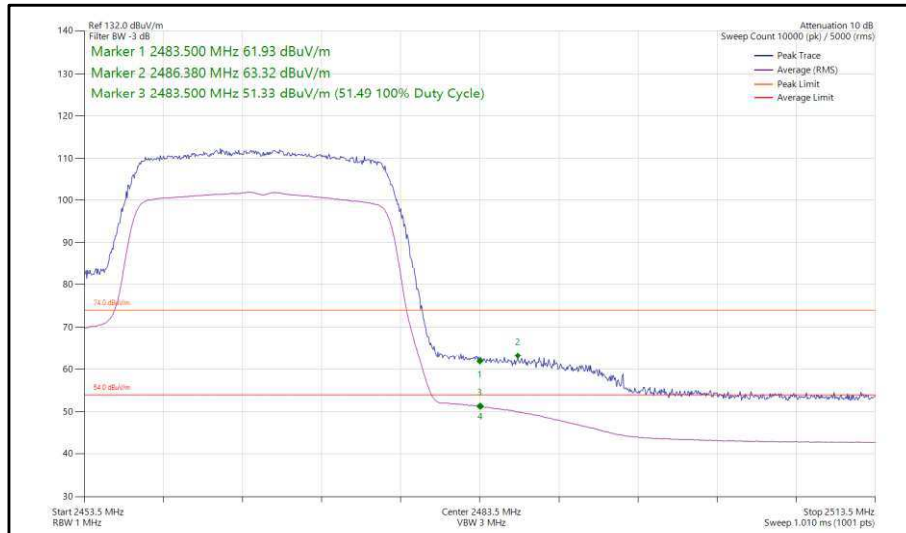
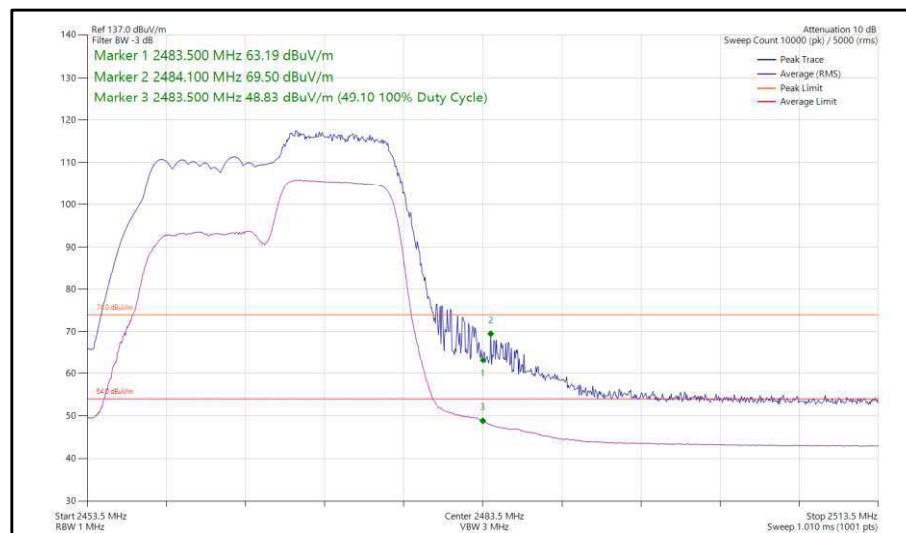


Figure 16 - 802.11ax, HE20, RU 106-54, SISO, Core 0 - 2462 MHz, Band Edge Frequency 2483.5 MHz



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



**Figure 18 - 802.11ax, HE20, RU 106-54, SISO, Core 0 - 2467 MHz,
Band Edge Frequency 2483.5 MHz**

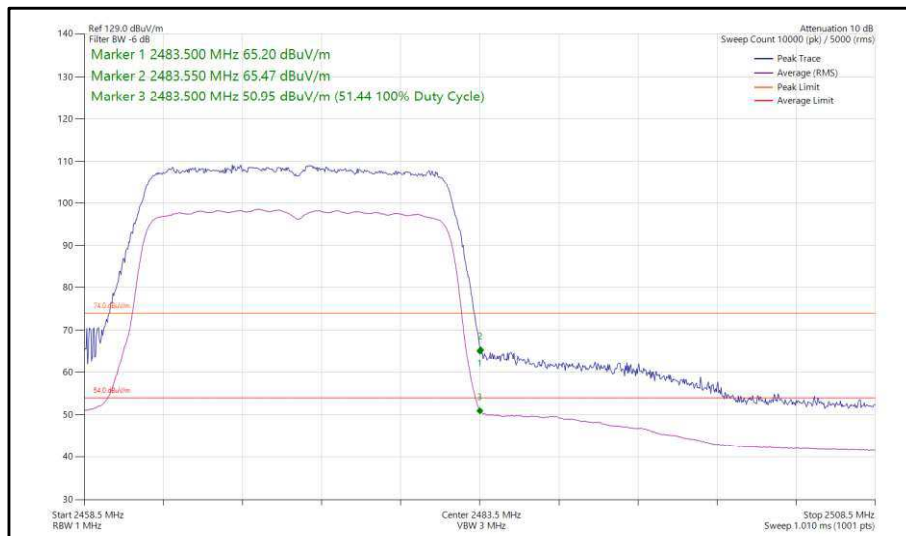


Figure 19 - 802.11ax, HE20, SU, SISO, Core 0 - 2472 MHz, Band Edge Frequency 2483.5 MHz

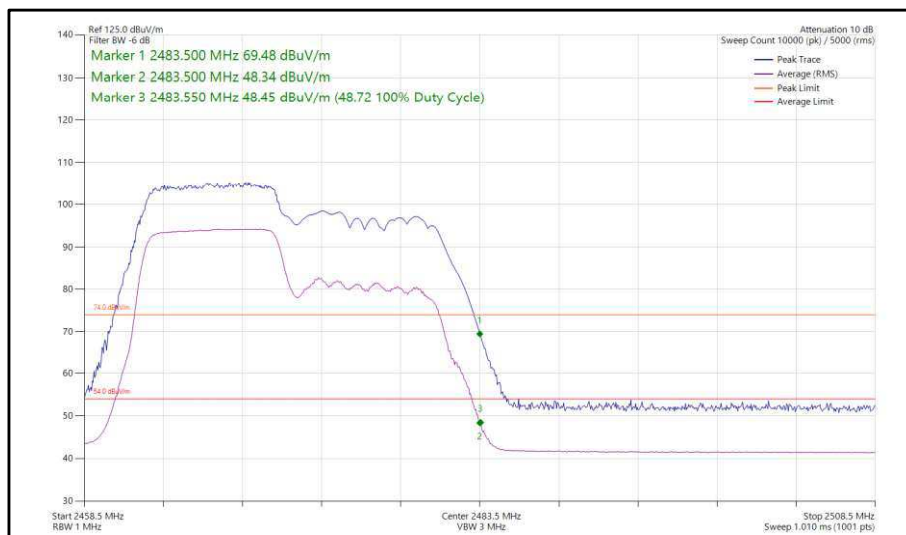


Figure 20 - 802.11ax, HE20, RU 106-53, SISO, Core 0 - 2472 MHz, Band Edge Frequency 2483.5 MHz



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 (dBμV/m)
802.11b	1 Mbps	-	-	2412	2390	59.89	51.49
802.11g	24 Mbps	-	-	2412	2390	65.50	51.49
802.11n HT20	MCS7	-	-	2412	2390	65.89	51.49
802.11ax HE20	MCS9x1	SU	-	2412	2390	66.33	50.88
802.11ax HE20	MCS9x1	106	53	2412	2390	68.83	48.85
802.11b	1 Mbps	-	-	2462	2483.5	59.60	51.26
802.11b	1 Mbps	-	-	2467	2483.5	59.63	51.36
802.11b	1 Mbps	-	-	2472	2483.5	58.51	51.20
802.11g	54 Mbps	-	-	2462	2483.5	66.68	51.40
802.11g	24 Mbps	-	-	2467	2483.5	64.42	51.44
802.11g	12 Mbps	-	-	2472	2483.5	63.59	51.39
802.11n HT20	MCS2	-	-	2462	2483.5	65.31	51.47
802.11n HT20	MCS2	-	-	2467	2483.5	63.31	51.44
802.11n HT20	MCS2	-	-	2472	2483.5	64.42	51.39
802.11ax HE20	MCS2x1	SU	-	2462	2483.5	65.84	51.46
802.11ax HE20	MCS9x1	106	54	2462	2483.5	69.11	49.87
802.11ax HE20	MCS9x1	SU	-	2467	2483.5	65.36	51.47
802.11ax HE20	MCS9x1	106	53	2467	2483.5	69.13	51.50
802.11ax HE20	MCS2x1	SU	-	2472	2483.5	65.75	51.46
802.11ax HE20	MCS9x1	52	37	2472	2483.5	69.50	50.44

Table 7 - SISO Restricted Band Edge Results

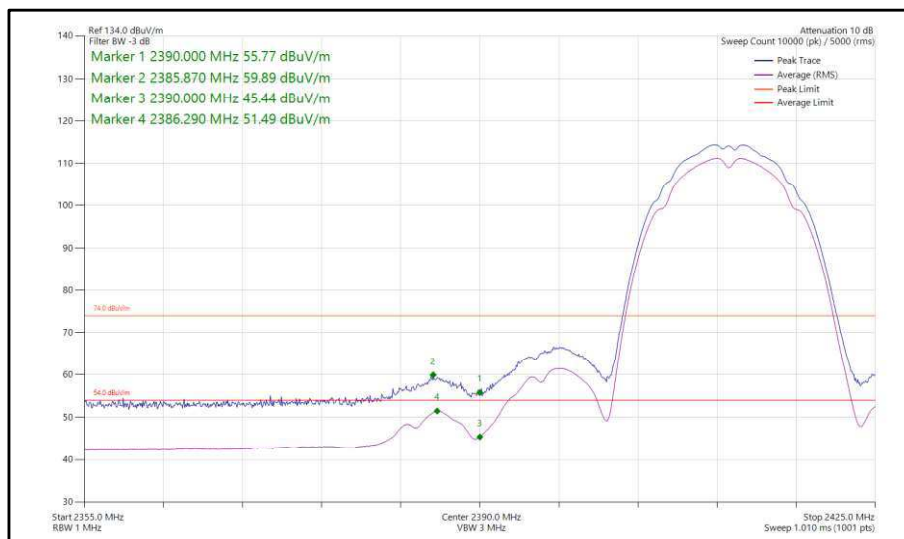
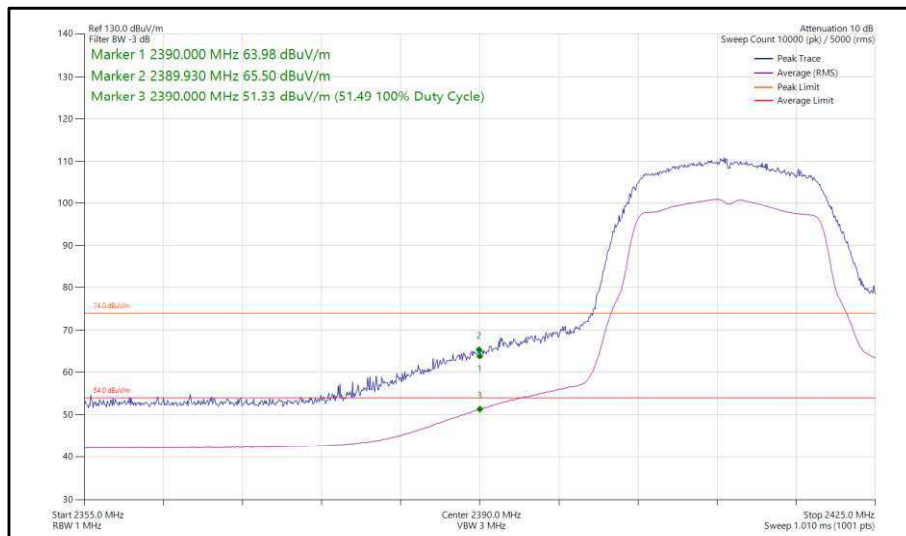
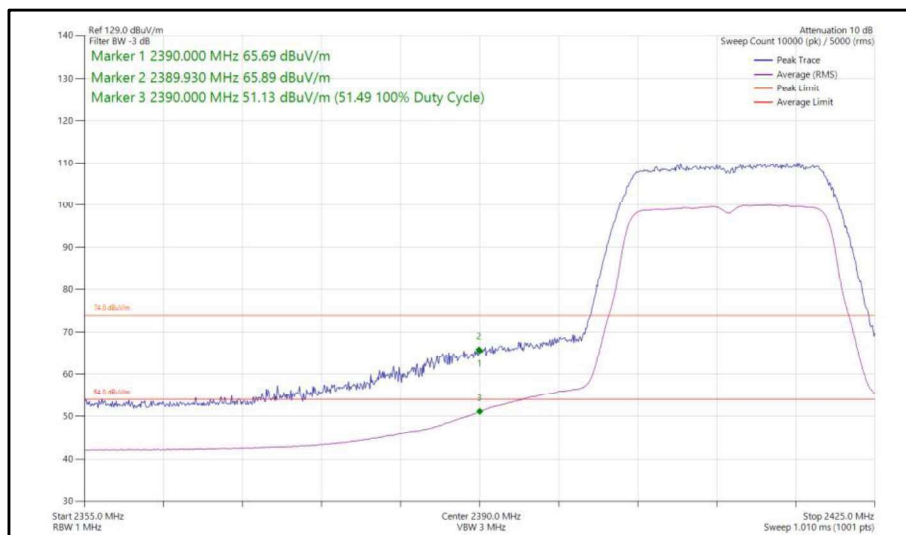


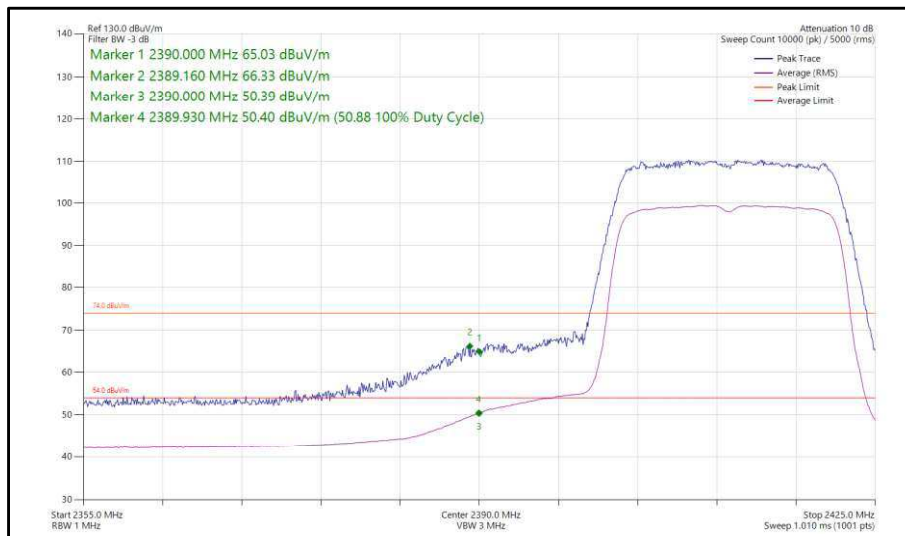
Figure 21 - 802.11b, SISO, Core 1 - 2412 MHz,
 Band Edge Frequency 2390 MHz



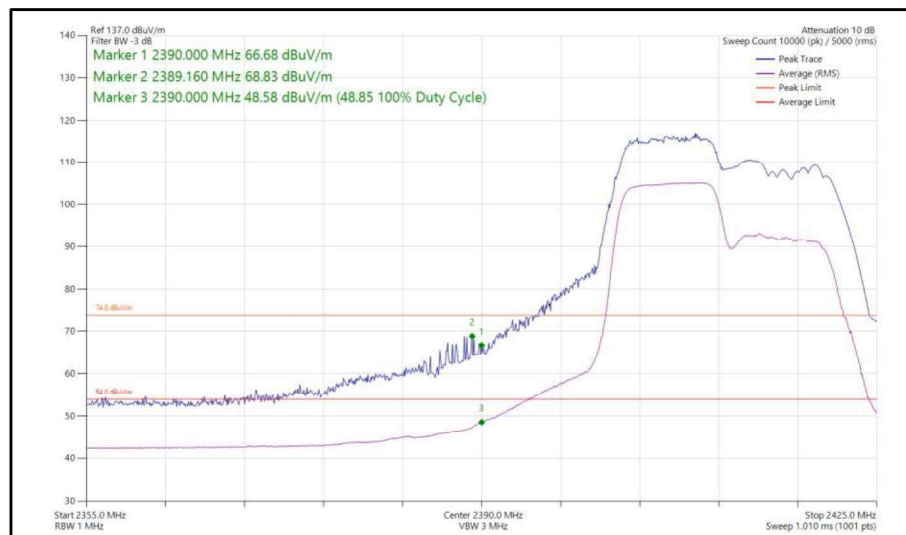
**Figure 22 - 802.11g, SISO, Core 1 - 2412 MHz,
Band Edge Frequency 2390 MHz**



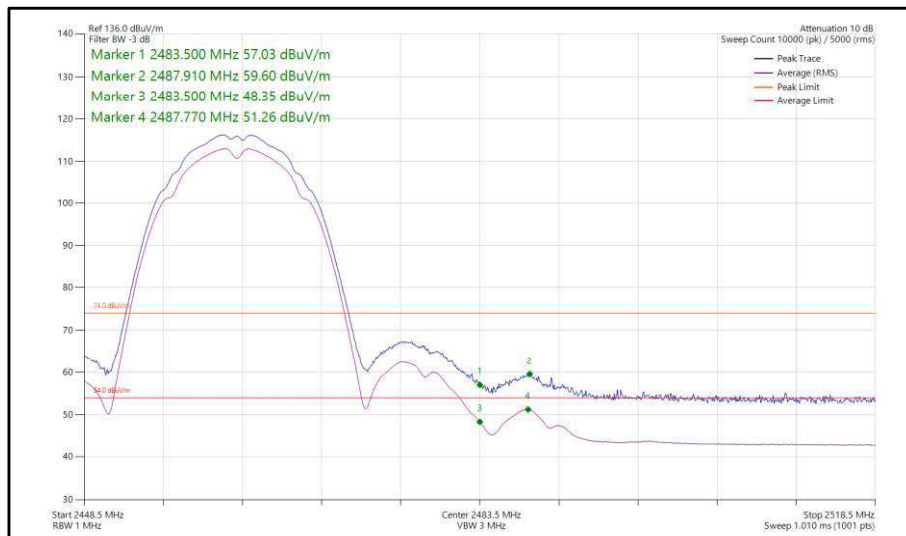
**Figure 23 - 802.11n, HT20, SISO, Core 1 - 2412 MHz,
Band Edge Frequency 2390 MHz**



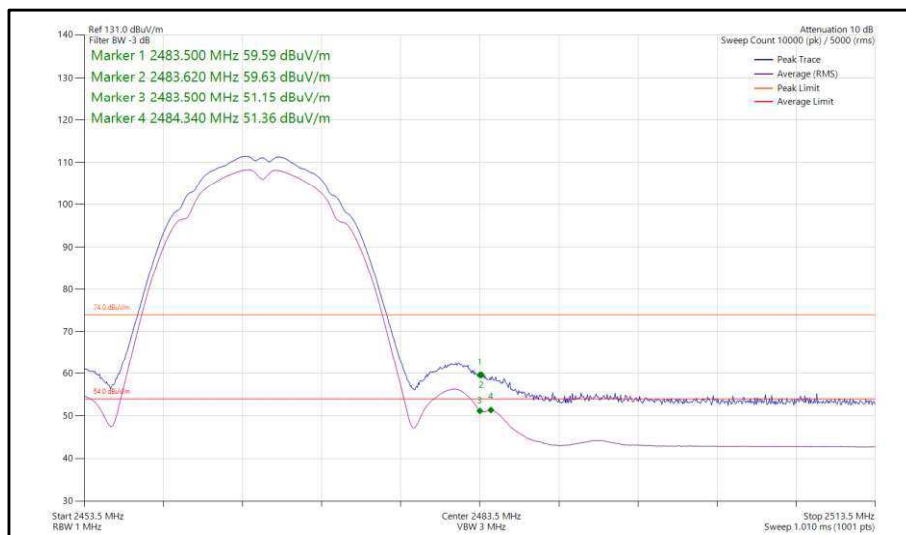
**Figure 24 - 802.11ax, HE20, SU, SISO, Core 1 - 2412 MHz,
Band Edge Frequency 2390 MHz**



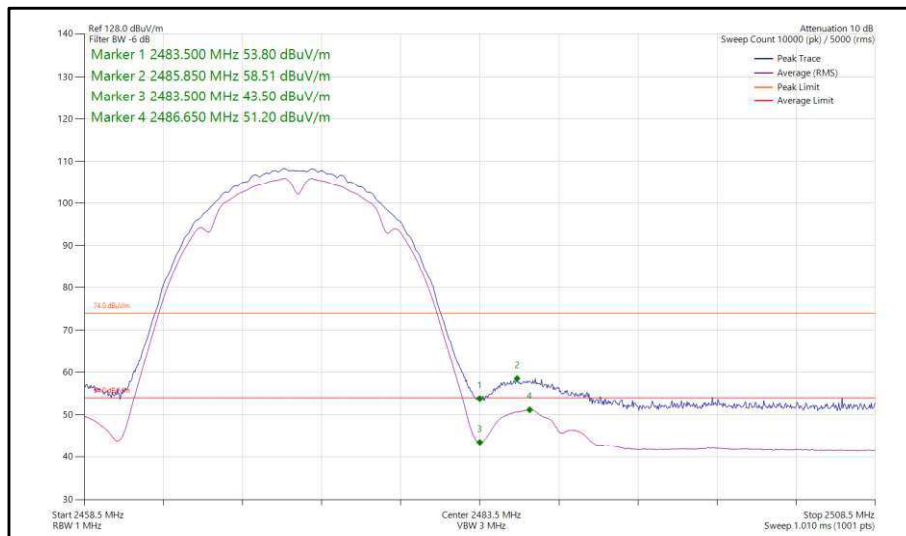
**Figure 25 - 802.11ax, HE20, RU 106-53, SISO, Core 1 - 2412 MHz,
Band Edge Frequency 2390 MHz**



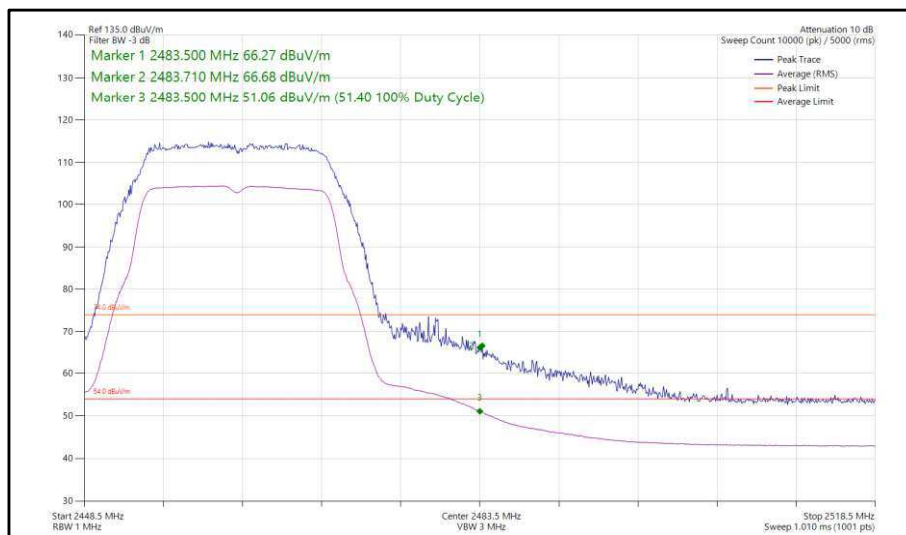
**Figure 26 - 802.11b, SISO, Core 1 - 2462 MHz,
Band Edge Frequency 2483.5 MHz**



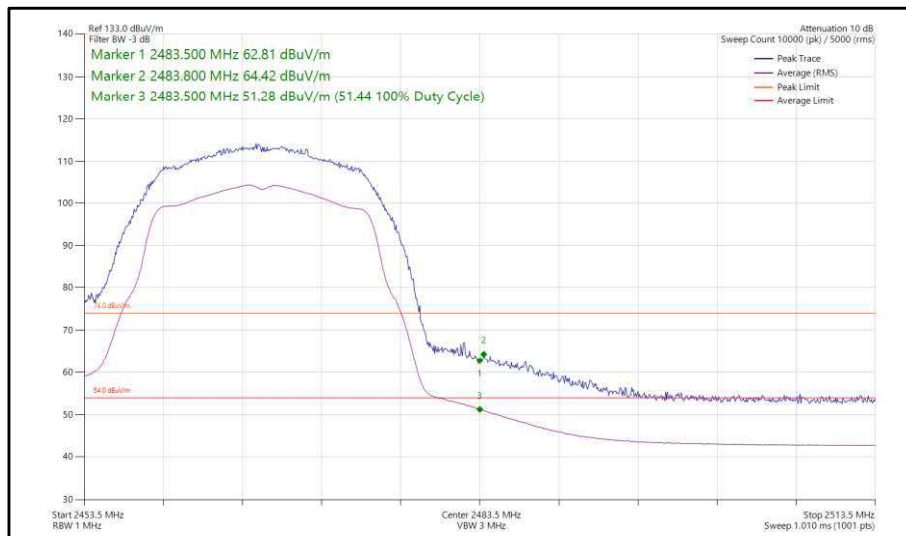
**Figure 27 - 802.11b, SISO, Core 1 - 2467 MHz,
Band Edge Frequency 2483.5 MHz**



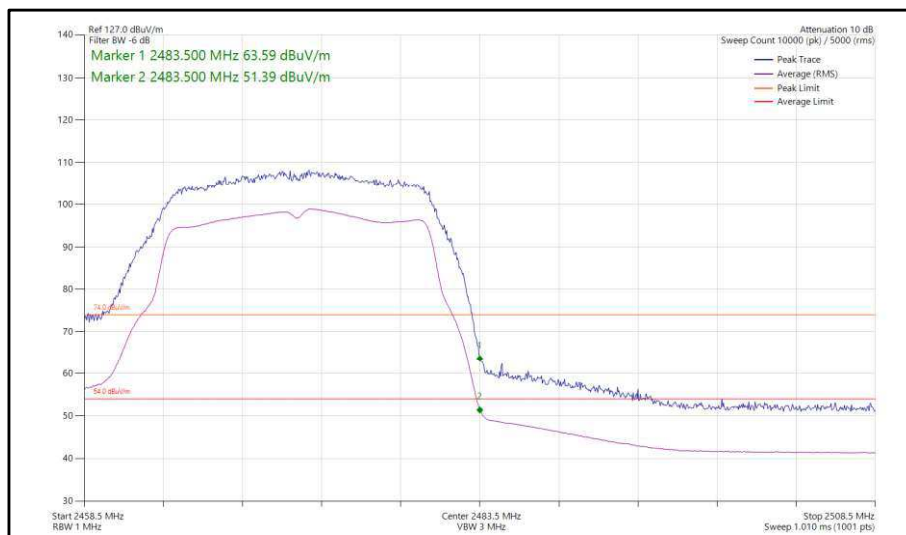
**Figure 28 - 802.11b, SISO, Core 1 - 2472 MHz,
Band Edge Frequency 2483.5 MHz**



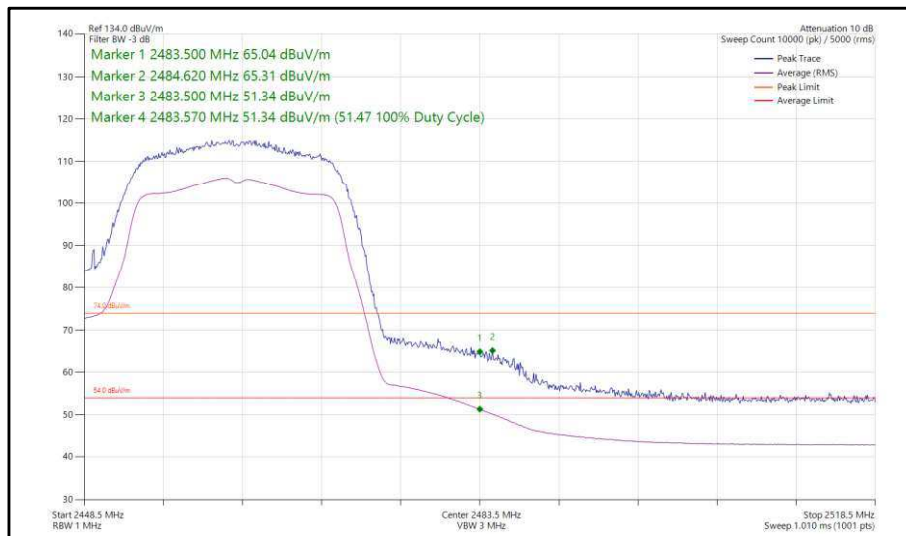
**Figure 29 - 802.11g, SISO, Core 1 - 2462 MHz,
Band Edge Frequency 2483.5 MHz**



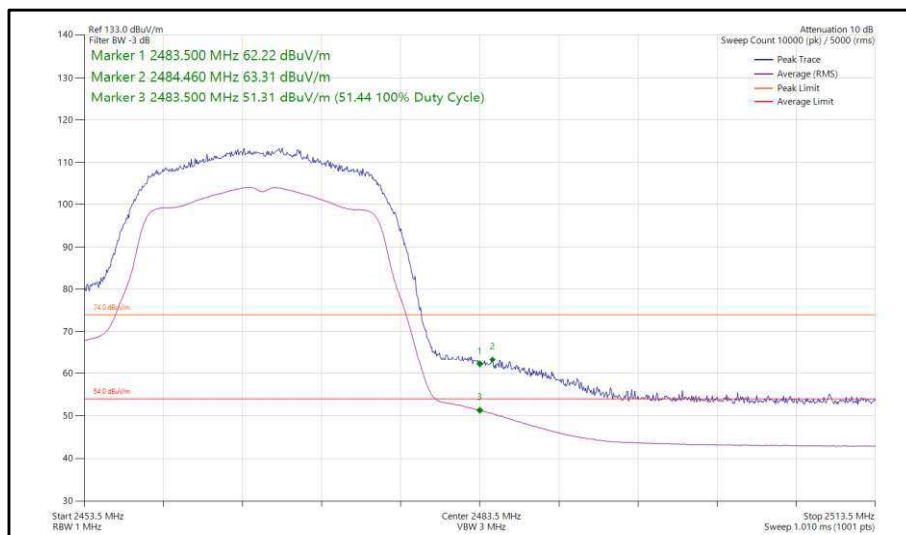
**Figure 30 - 802.11g, SISO, Core 1 - 2467 MHz,
Band Edge Frequency 2483.5 MHz**



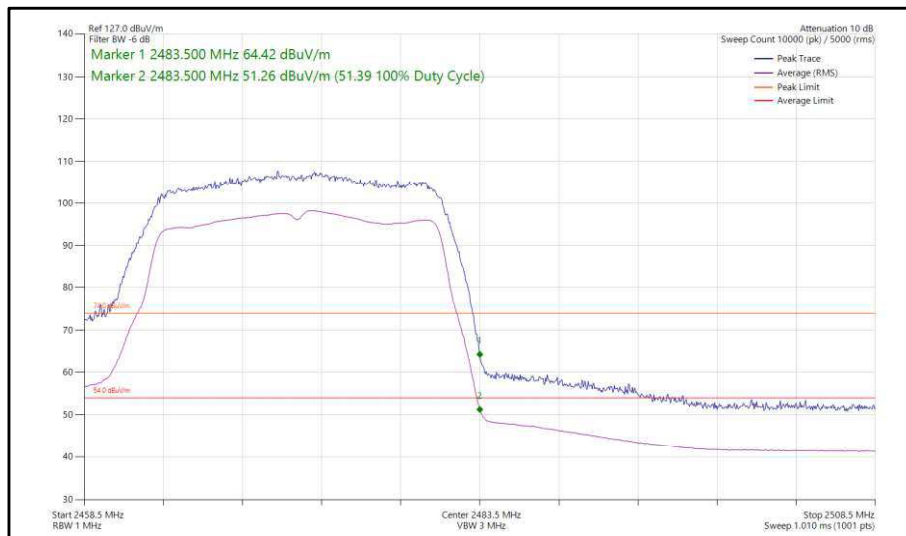
**Figure 31 - 802.11g, SISO, Core 1 - 2472 MHz,
Band Edge Frequency 2483.5 MHz**



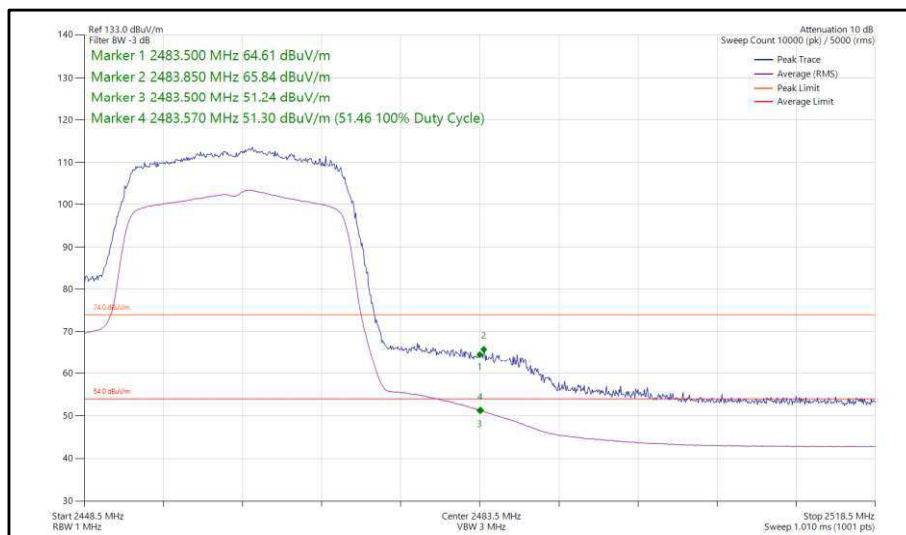
**Figure 32 - 802.11n, HT20, SISO, Core 1 - 2462 MHz,
Band Edge Frequency 2483.5 MHz**



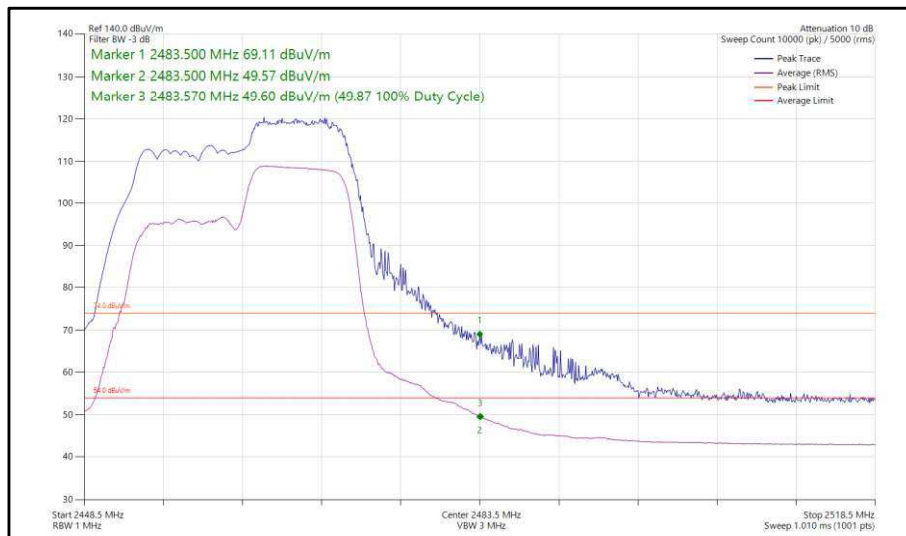
**Figure 33 - 802.11n, HT20, SISO, Core 1 - 2467 MHz,
Band Edge Frequency 2483.5 MHz**



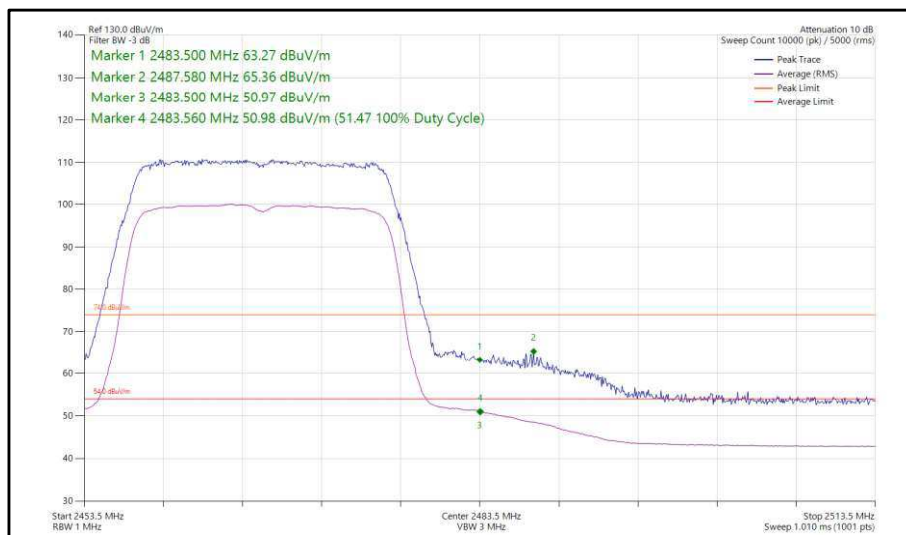
**Figure 34 - 802.11n, HT20, SISO, Core 1 - 2472 MHz,
Band Edge Frequency 2483.5 MHz**



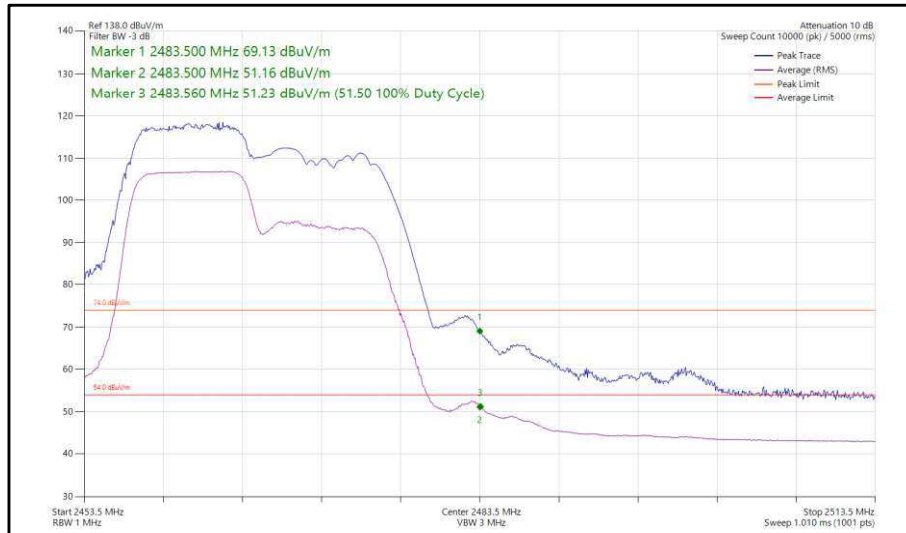
**Figure 35 - 802.11ax, HE20, SU, SISO, Core 1 - 2462 MHz,
Band Edge Frequency 2483.5 MHz**



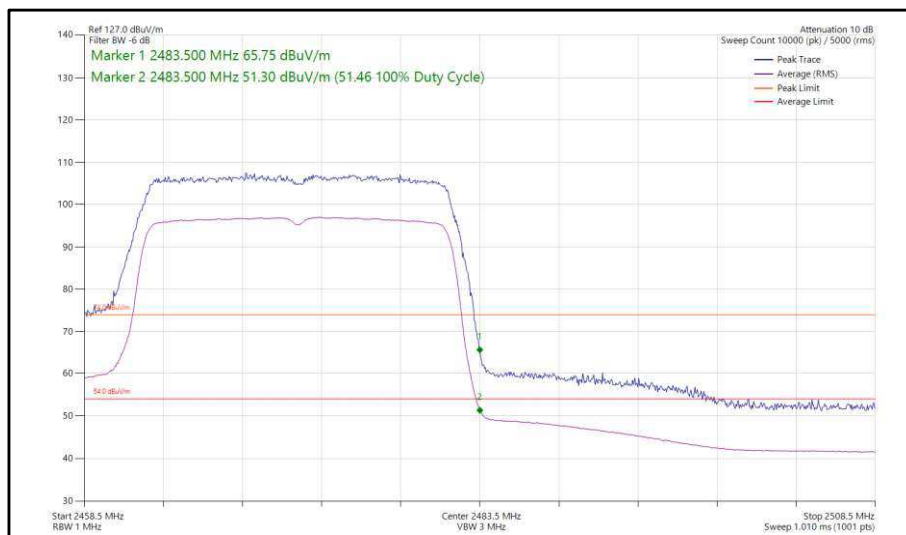
**Figure 36 - 802.11ax, HE20, RU 106-54, SISO, Core 1 - 2462 MHz,
Band Edge Frequency 2483.5 MHz**



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



**Figure 38 - 802.11ax, HE20, RU 106-53, 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**

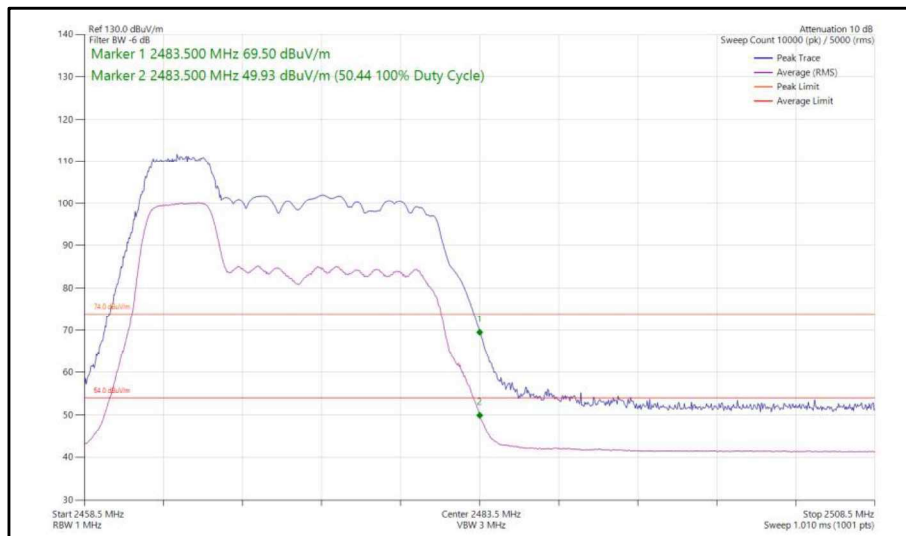


Figure 40 - 802.11ax, HE20, RU 52-37, SISO, Core 1 - 2472 MHz, Band Edge Frequency 2483.5 MHz



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 (dBμV/m)
802.11n HT20	MCS2	-	-	2412	2390	65.24	51.46
802.11ax HE20	MCS4x1	SU	-	2412	2390	66.66	51.15
802.11ax HE20	MCS9x1	106	53	2412	2390	68.44	51.28
802.11n HT20	MCS2	-	-	2462	2483.5	64.29	51.39
802.11n HT20	MCS2	-	-	2467	2483.5	64.30	51.45
802.11n HT20	MCS4	-	-	2472	2483.5	65.96	51.41
802.11ax HE20	MCS9x1	SU	-	2462	2483.5	65.74	51.49
802.11ax HE20	MCS9x1	106	53	2462	2483.5	69.41	51.35
802.11ax HE20	MCS2x1	SU	-	2467	2483.5	63.90	51.45
802.11ax HE20	MCS9x1	52	40	2467	2483.5	68.48	51.47
802.11ax HE20	MCS4x1	SU	-	2472	2483.5	68.28	51.13
802.11ax HE20	MCS9x1	26	0	2472	2483.5	69.42	48.60

Table 8 - CDD Restricted Band Edge Results

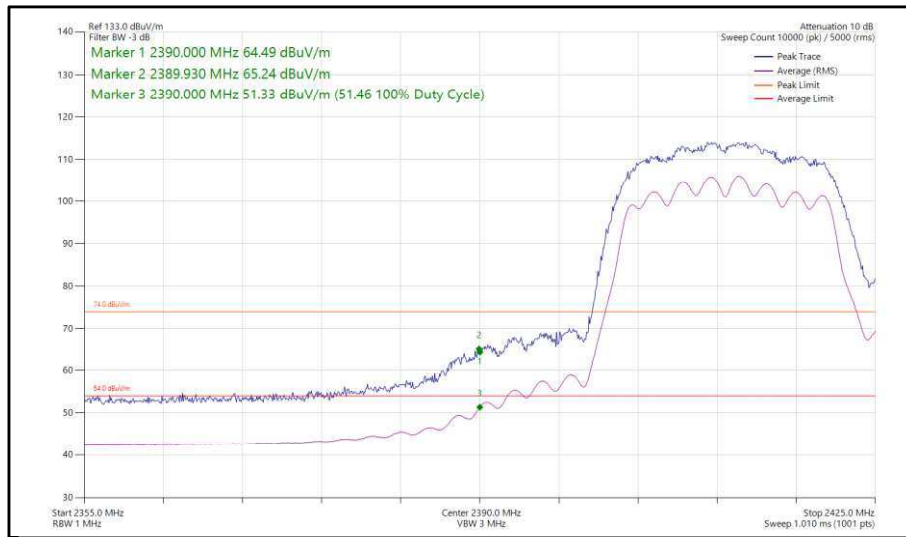
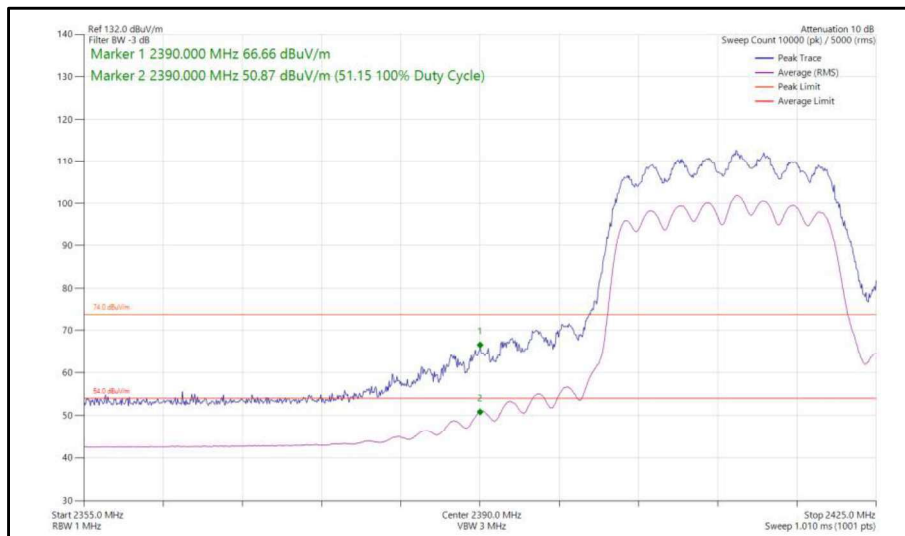
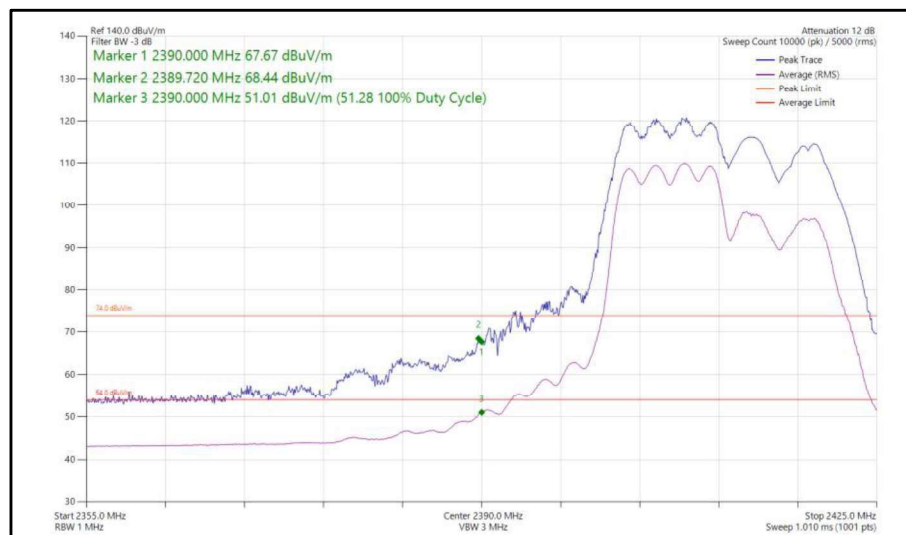


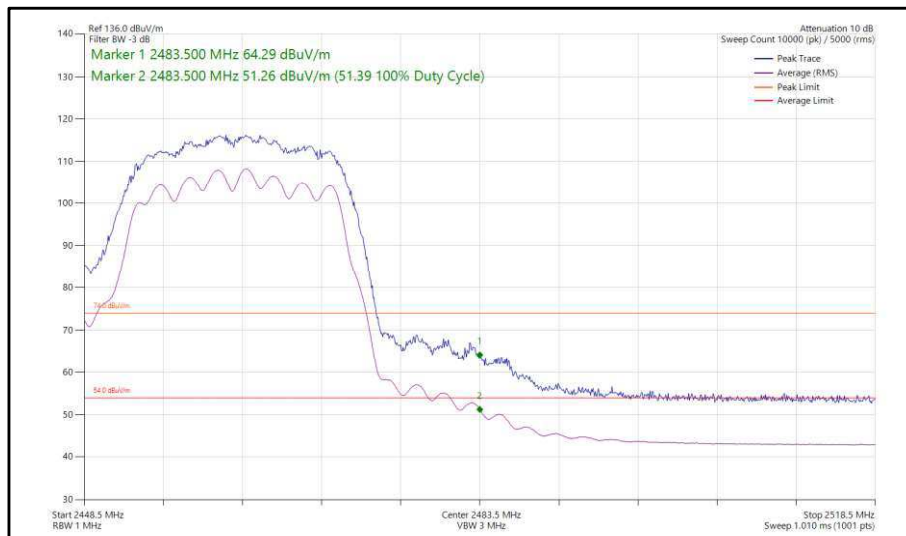
Figure 41 - 802.11n, HT20, CDD, Core 0-1 - 2412 MHz, Band Edge Frequency 2390 MHz



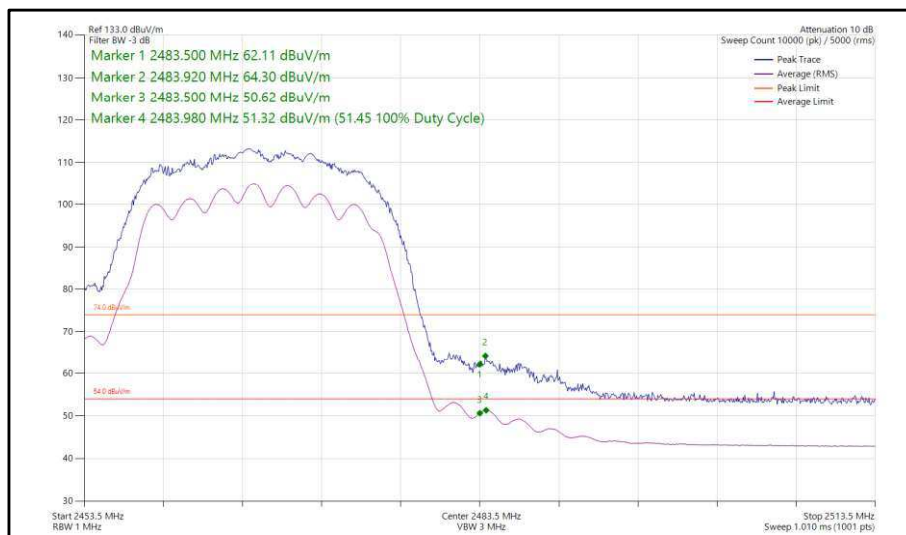
**Figure 42 - 802.11ax, HE20, SU, CDD, Core 0-1 - 2412 MHz,
Band Edge Frequency 2390 MHz**



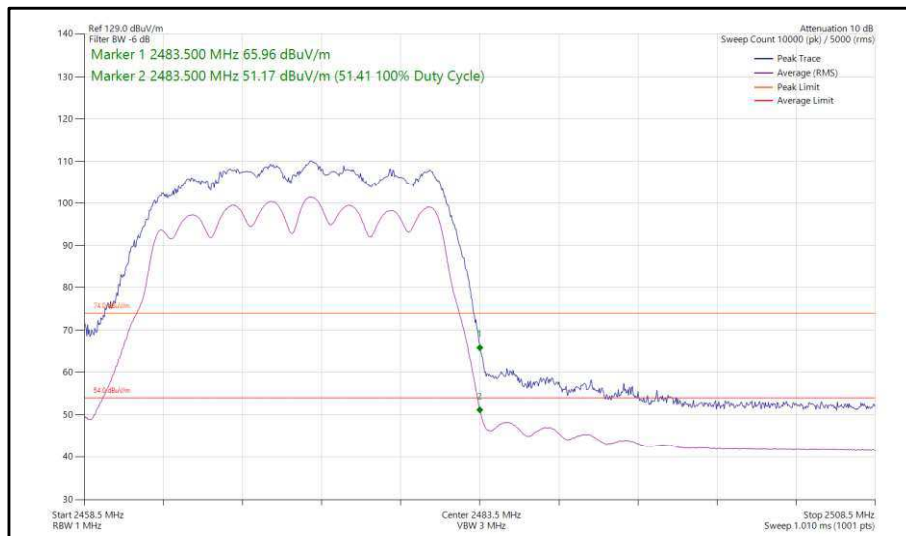
**Figure 43 - 802.11ax, HE20, RU 106-53, CDD, Core 0-1 - 2412 MHz,
Band Edge Frequency 2390 MHz**



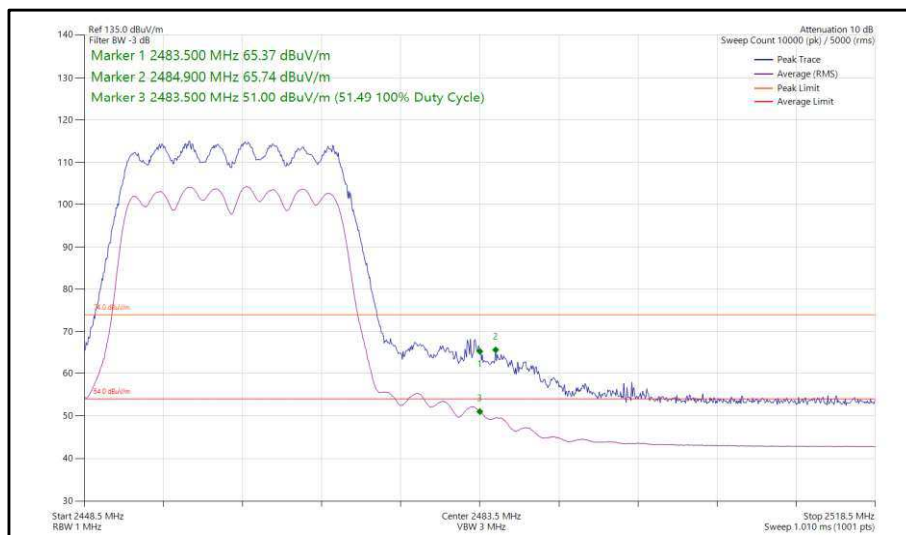
**Figure 44 - 802.11n, HT20, CDD, Core 0-1 - 2462 MHz,
Band Edge Frequency 2483.5 MHz**



**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**

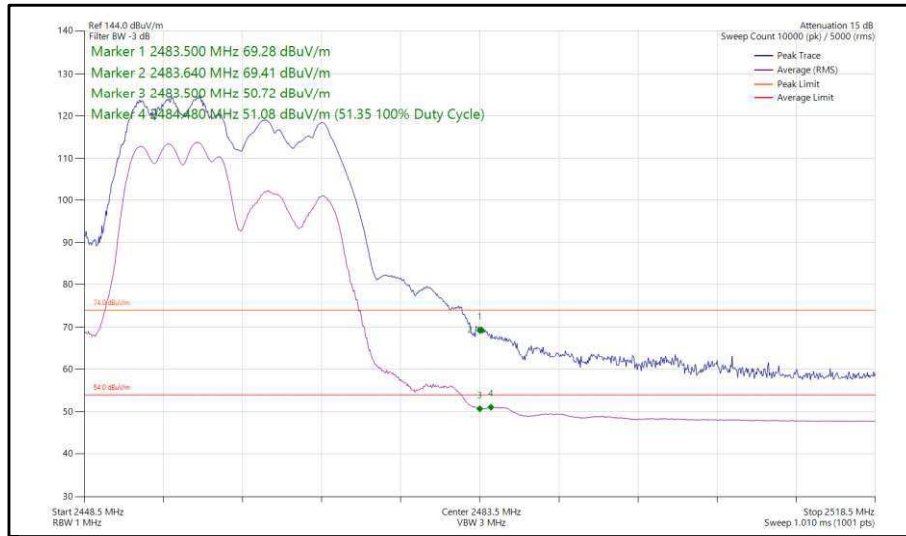


Figure 48 - 802.11ax, HE20, RU 106-53, CDD, Core 0-1 - 2462 MHz, Band Edge Frequency 2483.5 MHz

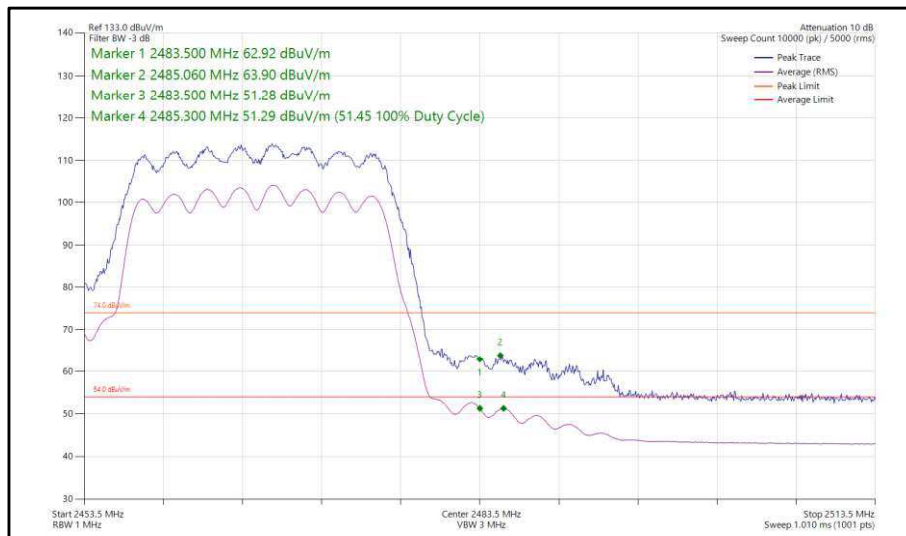
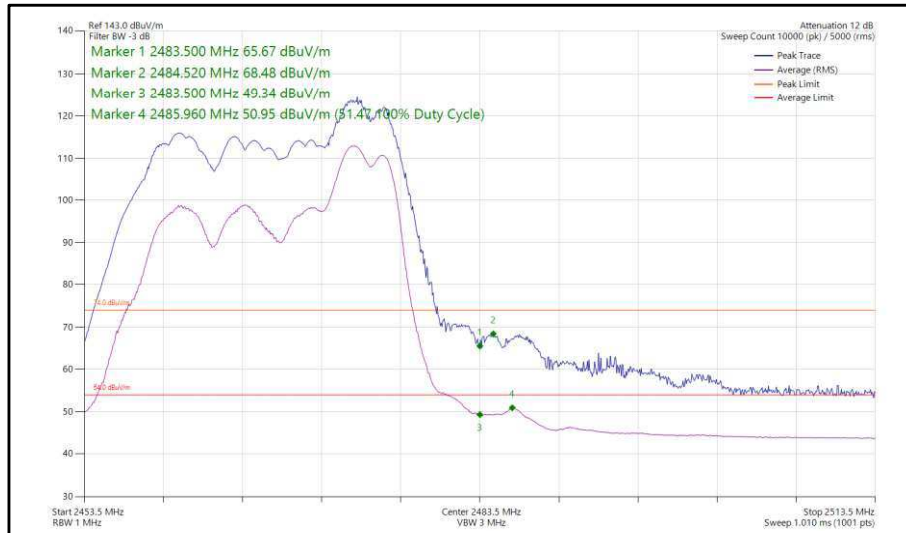
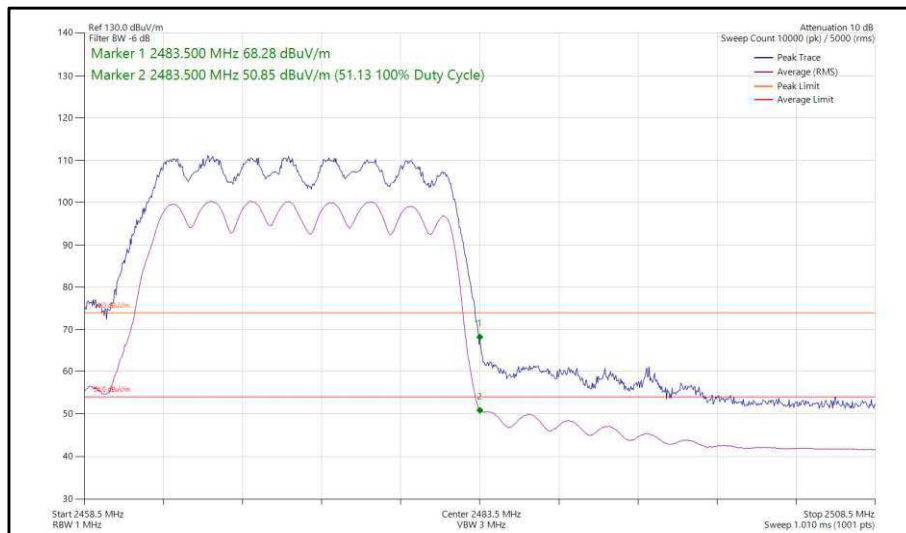


Figure 49 - 802.11ax, HE20, SU, CDD, Core 0-1 - 2467 MHz, Band Edge Frequency 2483.5 MHz



**Figure 50 - 802.11ax, HE20, RU 52-40, 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**

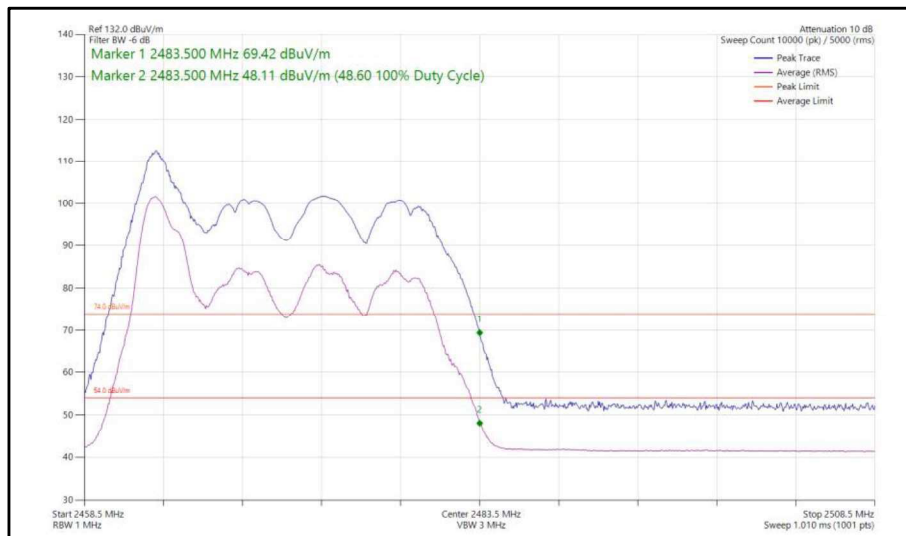


Figure 52 - 802.11ax, HE20, RU 26-0, CDD, Core 0-1 - 2472 MHz, Band Edge Frequency 2483.5 MHz

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$ 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 ($\mu\text{V}/\text{m}$ 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 16.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Expiry Date
Emissions Software	TUV SUD	EmX V3.1.10	5125	-	Software
1500W (300V 12A) AC Power Supply	iTech	IT7324	5957	-	O/P Mon
3m Semi-Anechoic Chamber	Schaffner	RF Chamber 16	5972	36	24-May-2025
Mast & Turntable Controller	Maturo Gmbh	FCU3.0	5973	-	TU
Tilt Antenna Mast	Maturo Gmbh	BAM4.5-P	5974	-	TU
Turntable	Maturo Gmbh	TT1.5SI	5975	-	TU
Cable (SMA to SMA 1m)	Junkosha	MWX221-01000AMSAMS/A	6018	12	06-Jun-2023
Horn Antenna (1-10 GHz)	Schwarzbeck	BBHA9120B	6142	12	26-Jun-2023
Digital Multimeter	Fluke	115	6146	12	16-Jun-2023
Humidity & Temperature meter	R.S Components	1364	6148	12	17-Jun-2023
SAC Switch Unit	TUV SUD	TUV_Ssu_001	6190	12	16-Dec-2023
EMI Test Receiver	Rohde & Schwarz	ESW44	6294	12	03-Nov-2023
Cable (SMA to SMA 8m)	Junkosha	MWX221-08000AMSAMS/B	6318	12	04-Feb-2024

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

A2918, S/N: P09T66XTNP - Modification State 0

2.2.3 Date of Test

26-April-2023 to 27-April-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	21.6 - 22.3 °C
Relative Humidity	31.5 - 32.5 %



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	16.500
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



Protocol	99% Bandwidth (MHz)	
	Minimum	Maximum
802.11b	12.900	12.960
802.11g	16.380	16.620
802.11n HT20	17.580	17.700
802.11ax HE20 SU	18.900	19.020

Table 13 - 99% Bandwidth Summary Results - SISO



Figure 61 - 802.11b Minimum 99% OBW



Figure 62 - 802.11b Maximum 99% OBW



Figure 63 - 802.11g Minimum 99% OBW



Figure 64 - 802.11g Maximum 99% OBW



Figure 65 - 802.11n HT20 Minimum 99% OBW



Figure 66 - 802.11n HT20 Maximum 99% OBW



Figure 67 - 802.11ax HE20 SU Minimum 99% OBW



Figure 68 - 802.11ax HE20 SU Maximum 99% OBW



MIMO CDD

Protocol	6 dB Bandwidth (MHz)	
	Minimum	Maximum
802.11n HT20	15.240	17.400
802.11ax HE20 SU	18.360	19.080

Table 14 - 6 dB Bandwidth Summary Results - MIMO CDD



Figure 69 - 802.11n HT20 Minimum 6 dB EBW



Figure 70 - 802.11n HT20 Maximum 6 dB EBW



Figure 71 - 802.11ax HE20 SU Minimum 6 dB EBW



Figure 72 - 802.11ax HE20 SU Maximum 6 dB EBW



Protocol	99% Bandwidth (MHz)	
	Minimum	Maximum
802.11n HT20	17.580	17.700
802.11ax HE20 SU	18.900	19.020

Table 15 - 99% Bandwidth Summary Results - MIMO CDD



Figure 73 - 802.11n HT20 Minimum 99% OBW



Figure 74 - 802.11n HT20 Maximum 99% OBW



Figure 75 - 802.11ax HE20 SU Minimum 99% OBW



Figure 76 - 802.11ax HE20 SU Maximum 99% OBW



SISO

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2) RSS-247 5.2 a)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	802.11b	Duty Cycle (%):	-
Data Rate:	1 Mbps	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	B (Core 1)	Active Chain(s):	1

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2412	-	8.640	-	-	≥500.0
2442	-	9.120	-	-	≥500.0
2472	-	9.120	-	-	≥500.0

Table 16 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2412	-	12.900	-	-	-
2442	-	12.900	-	-	-
2472	-	12.960	-	-	-

Table 17 - 99% Bandwidth Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2) RSS-247 5.2 a)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	802.11g	Duty Cycle (%):	-
Data Rate:	12 Mbps	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	B (Core 1)	Active Chain(s):	1

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2412	-	15.480	-	-	≥500.0
2442	-	15.240	-	-	≥500.0
2472	-	16.500	-	-	≥500.0

Table 18 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2412	-	16.620	-	-	-
2442	-	16.380	-	-	-
2472	-	16.560	-	-	-

Table 19 - 99% Bandwidth Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2) RSS-247 5.2 a)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	802.11n HT20	Duty Cycle (%):	-
Modulation Coding Scheme:	MCS2	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	B (Core 1)	Active Chain(s):	1

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit sss(kHz)
	A	B	C	D	
2412	-	16.440	-	-	≥500.0
2442	-	15.240	-	-	≥500.0
2472	-	17.400	-	-	≥500.0

Table 20 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2412	-	17.700	-	-	-
2442	-	17.580	-	-	-
2472	-	17.700	-	-	-

Table 21 - 99% Bandwidth Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2) RSS-247 5.2 a)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	802.11ax HE20 SU	Duty Cycle (%):	-
Modulation Coding Scheme:	MCS2x1	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	B (Core 1)	Active Chain(s):	1

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2412	-	18.780	-	-	≥500.0
2442	-	18.840	-	-	≥500.0
2472	-	19.080	-	-	≥500.0

Table 22 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2412	-	18.960	-	-	-
2442	-	18.900	-	-	-
2472	-	19.020	-	-	-

Table 23 - 99% Bandwidth Results



MIMO CDD

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2) RSS-247 5.2 a)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	802.11n HT20	Duty Cycle (%):	-
Modulation Coding Scheme:	MCS2	DCCF (dB):	-
Antenna Configuration:	MIMO CDD	Peak Antenna Gain (dBi):	-
Active Port(s):	A+B (Core 0 + Core 1)	Active Chain(s):	0+1

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2412	17.040	16.440	-	-	≥500.0
2442	15.240	15.300	-	-	≥500.0
2472	17.400	17.100	-	-	≥500.0

Table 24 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2412	17.700	17.700	-	-	-
2442	17.580	17.580	-	-	-
2472	17.700	17.700	-	-	-

Table 25 - 99% Bandwidth Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2) RSS-247 5.2 a)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	802.11ax HE20 SU	Duty Cycle (%):	-
Modulation Coding Scheme:	MCS2x1	DCCF (dB):	-
Antenna Configuration:	MIMO CDD	Peak Antenna Gain (dBi):	-
Active Port(s):	A+B (Core 0 + Core 1)	Active Chain(s):	0+1

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2412	18.720	18.360	-	-	≥500.0
2437	19.020	18.720	-	-	≥500.0
2472	19.020	19.080	-	-	≥500.0

Table 26 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2412	18.900	18.960	-	-	-
2437	18.900	18.900	-	-	-
2472	18.960	19.020	-	-	-

Table 27 - 99% Bandwidth Resultss

FCC 47 CFR Part 15, Limit Clause 15.247(a)(2) and ISED RSS-247, Clause 5.2(a)

The minimum 6 dB Bandwidth shall be at least 500 kHz.



2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 14.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Expiry Date
Hygrometer	Rotronic	I-1000	3068	12	21-Sep-2023
AC Programmable Power Supply	iTech	IT7324	5225	-	O/P Mon
MXA Signal Analyser	Keysight Technologies	N9020B	5529	24	13-Dec-2024
Climatic Chamber	Weiss Technik	TempEvent T/180/40/3	5894	12	27-May-2023
Digital Multimeter	Fluke	115	6145	12	17-Jun-2023
Signal Conditioning Unit	TUV SUD	SPECTRUM_SCU001	6426	12	09-Apr-2024

Table 28

O/P Mon – Output Monitored using calibrated equipment



2.3 Maximum Conducted Output Power

2.3.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (b)
ISED RSS-247, Clause 5.4
ISED RSS-GEN, Clause 6.12

2.3.2 Equipment Under Test and Modification State

A2918, S/N: P09T66XTNP - Modification State 0

2.3.3 Date of Test

26-April-2023 to 27-April-2023

2.3.4 Test Method

The test was performed in accordance with ANSI C63.10 clause 11.9.2.3.2 Method AVGPM-G

MIMO output port summing was performed in accordance with KDB 662911 D01. For the CDD results, the Directional Gain was calculated in accordance with clause F)2)f)(ii) using the calculations from F)2)f)(i) with worst-case individual gain and an array gain of zero.

2.3.5 Environmental Conditions

Ambient Temperature	21.6 - 22.3 °C
Relative Humidity	31.5 - 32.5 %



2.3.6 Test Results

2.4 GHz WLAN

SISO

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	802.11b	Duty Cycle (%):	99.6
Data Rate:	1 Mbps	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	5.77
Active Port(s):	B (Core 1)	Active Chain(s):	1

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2412	-	19.24	-	-	-	30.00	-10.76
2442	-	19.39	-	-	-	30.00	-10.61
2472	-	15.87	-	-	-	30.00	-14.13

Table 29 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	Σ					
2412	-	19.24	-	-	-	30.00	-10.76	25.01	36.00	-10.99
2442	-	19.39	-	-	-	30.00	-10.61	25.16	36.00	-10.84
2472	-	15.87	-	-	-	30.00	-14.13	21.64	36.00	-14.36

Table 30 - ISSED Maximum Conducted (average) Output Power Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	802.11g	Duty Cycle (%):	97.6
Data Rate:	12 Mbps	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	5.77
Active Port(s):	B (Core 1)	Active Chain(s):	1

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2412	-	17.36	-	-	-	30.00	-12.64
2442	-	22.22	-	-	-	30.00	-7.78
2472	-	6.99	-	-	-	30.00	-23.01

Table 31 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	Σ					
2412	-	17.36	-	-	-	30.00	-12.64	23.13	36.00	-12.87
2442	-	22.22	-	-	-	30.00	-7.78	27.99	36.00	-8.01
2472	-	6.99	-	-	-	30.00	-23.01	12.76	36.00	-23.24

Table 32 - ISED Maximum Conducted (average) Output Power Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	802.11n HT20	Duty Cycle (%):	96.7
Modulation Coding Scheme:	MCS2	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	5.77
Active Port(s):	B (Core 1)	Active Chain(s):	1

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2412	-	15.87	-	-	-	30.00	-14.13
2442	-	22.18	-	-	-	30.00	-7.82
2472	-	6.16	-	-	-	30.00	-23.84

Table 33 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	Σ					
2412	-	15.87	-	-	-	30.00	-14.13	21.64	36.00	-14.36
2442	-	22.18	-	-	-	30.00	-7.82	27.95	36.00	-8.05
2472	-	6.16	-	-	-	30.00	-23.84	11.93	36.00	-24.07

Table 34 - ISED Maximum Conducted (average) Output Power Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	802.11ax HE20 SU	Duty Cycle (%):	95.9
Modulation Coding Scheme:	MCS2x1	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	5.77
Active Port(s):	B (Core 1)	Active Chain(s):	1

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2412	-	15.48	-	-	-	30.00	-14.52
2442	-	22.38	-	-	-	30.00	-7.62
2472	-	5.92	-	-	-	30.00	-24.08

Table 35 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	Σ					
2412	-	15.48	-	-	-	30.00	-14.52	21.25	36.00	-14.75
2442	-	22.38	-	-	-	30.00	-7.62	28.15	36.00	-7.85
2472	-	5.92	-	-	-	30.00	-24.08	11.69	36.00	-24.31

Table 36 - ISED Maximum Conducted (average) Output Power Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	802.11ax HE20 RU26	Duty Cycle (%):	96.5
Modulation Coding Scheme:	MCS2x1	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	5.77
Active Port(s):	B (Core 1)	Active Chain(s):	1

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2412	-	14.19	-	-	-	30.00	-15.81
2442	-	14.38	-	-	-	30.00	-15.62
2472	-	-4.27	-	-	-	30.00	-34.27

Table 37 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	Σ					
2412	-	14.19	-	-	-	30.00	-15.81	19.96	36.00	-16.04
2442	-	14.38	-	-	-	30.00	-15.62	20.15	36.00	-15.85
2472	-	-4.27	-	-	-	30.00	-34.27	1.50	36.00	-34.50

Table 38 - ISD Maximum Conducted (average) Output Power Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	802.11ax HE20 RU52	Duty Cycle (%):	96.6
Modulation Coding Scheme:	MCS2x1	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	5.77
Active Port(s):	B (Core 1)	Active Chain(s):	1

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2412	-	17.17	-	-	-	30.00	-12.83
2442	-	17.38	-	-	-	30.00	-12.62
2472	-	-1.63	-	-	-	30.00	-31.63

Table 39 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	Σ					
2412	-	17.17	-	-	-	30.00	-12.83	22.94	36.00	-13.06
2442	-	17.38	-	-	-	30.00	-12.62	23.15	36.00	-12.85
2472	-	-1.63	-	-	-	30.00	-31.63	4.14	36.00	-31.86

Table 40 - ISED Maximum Conducted (average) Output Power Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	802.11ax HE20 RU106	Duty Cycle (%):	97.9
Modulation Coding Scheme:	MCS2x1	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	5.77
Active Port(s):	B (Core 1)	Active Chain(s):	1

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2412	-	18.37	-	-	-	30.00	-11.63
2442	-	20.31	-	-	-	30.00	-9.69
2472	-	-1.12	-	-	-	30.00	-31.12

Table 41 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	Σ					
2412	-	18.37	-	-	-	30.00	-11.63	24.14	36.00	-11.86
2442	-	20.31	-	-	-	30.00	-9.69	26.08	36.00	-9.92
2472	-	-1.12	-	-	-	30.00	-31.12	4.65	36.00	-31.35

Table 42 - ISED Maximum Conducted (average) Output Power Results



MIMO CDD

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	662911 D01 v02r01 F)2)f)(i), 662911 D01 v02r01 E)1)		

DUT Configuration			
Mode:	802.11n HT20	Duty Cycle (%):	96.4
Modulation Coding Scheme:	MCS2	DCCF (dB):	-
Antenna Configuration:	MIMO CDD	Peak Antenna Gain (dBi):	5.77
Active Port(s):	A+B (Core 0 + Core 1)	Active Chain(s):	0+1

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2412	15.56	15.94	-	-	18.76	30.00	-11.24
2442	21.78	22.17	-	-	24.98	30.00	-5.02
2472	4.51	4.88	-	-	7.70	30.00	-22.30

Table 43 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	Σ					
2412	15.56	15.94	-	-	18.76	30.00	-11.24	24.53	36.00	-11.47
2442	21.78	22.17	-	-	24.98	30.00	-5.02	30.75	36.00	-5.25
2472	4.51	4.88	-	-	7.70	30.00	-22.30	13.47	36.00	-22.53

Table 44 - ISSED Maximum Conducted (average) Output Power Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	662911 D01 v02r01 F)2)f)(i), 662911 D01 v02r01 E)1)		

DUT Configuration			
Mode:	802.11ax HE20 SU	Duty Cycle (%):	95.9
Modulation Coding Scheme:	MCS2x1	DCCF (dB):	-
Antenna Configuration:	MIMO CDD	Peak Antenna Gain (dBi):	5.77
Active Port(s):	A+B (Core 0 + Core 1)	Active Chain(s):	0+1

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2412	14.55	14.94	-	-	17.74	30.00	-12.26
2437	21.71	22.32	-	-	25.03	30.00	-4.97
2472	4.59	4.76	-	-	7.68	30.00	-22.32

Table 45 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	Σ					
2412	14.55	14.94	-	-	17.74	30.00	-12.26	23.51	36.00	-12.49
2437	21.71	22.32	-	-	25.03	30.00	-4.97	30.80	36.00	-5.20
2472	4.59	4.76	-	-	7.68	30.00	-22.32	13.45	36.00	-22.55

Table 46 - ISED Maximum Conducted (average) Output Power Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	662911 D01 v02r01 F)2)f)(i), 662911 D01 v02r01 E)1)		

DUT Configuration			
Mode:	802.11ax HE20 RU26	Duty Cycle (%):	96.6
Modulation Coding Scheme:	MCS2x1	DCCF (dB):	-
Antenna Configuration:	MIMO CDD	Peak Antenna Gain (dBi):	5.77
Active Port(s):	A+B (Core 0 + Core 1)	Active Chain(s):	0+1

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2412	14.17	14.50	-	-	17.35	30.00	-12.65
2442	14.04	14.42	-	-	17.24	30.00	-12.76
2472	-6.49	-6.49	-	-	-3.49	30.00	-33.49

Table 47 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	Σ					
2412	14.17	14.50	-	-	17.35	30.00	-12.65	23.12	36.00	-12.88
2442	14.04	14.42	-	-	17.24	30.00	-12.76	23.01	36.00	-12.99
2472	-6.49	-6.49	-	-	-3.49	30.00	-33.49	2.28	36.00	-33.72

Table 48 - ISED Maximum Conducted (average) Output Power Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	662911 D01 v02r01 F)2)f)(i), 662911 D01 v02r01 E)1)		

DUT Configuration			
Mode:	802.11ax HE20 RU52	Duty Cycle (%):	96.4
Modulation Coding Scheme:	MCS2x1	DCCF (dB):	-
Antenna Configuration:	MIMO CDD	Peak Antenna Gain (dBi):	5.77
Active Port(s):	A+B (Core 0 + Core 1)	Active Chain(s):	0+1

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2412	16.80	17.42	-	-	20.13	30.00	-9.87
2442	17.20	17.24	-	-	20.23	30.00	-9.77
2472	-3.04	-2.51	-	-	0.24	30.00	-29.76

Table 49 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	Σ					
2412	16.80	17.42	-	-	20.13	30.00	-9.87	25.90	36.00	-10.10
2442	17.20	17.24	-	-	20.23	30.00	-9.77	26.00	36.00	-10.00
2472	-3.04	-2.51	-	-	0.24	30.00	-29.76	6.01	36.00	-29.99

Table 50 - ISED Maximum Conducted (average) Output Power Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	662911 D01 v02r01 F)2)f)(i), 662911 D01 v02r01 E)1)		

DUT Configuration			
Mode:	802.11ax HE20 RU106	Duty Cycle (%):	97.9
Modulation Coding Scheme:	MCS2x1	DCCF (dB):	-
Antenna Configuration:	MIMO CDD	Peak Antenna Gain (dBi):	5.77
Active Port(s):	A+B (Core 0 + Core 1)	Active Chain(s):	0+1

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2412	16.93	17.42	-	-	20.16	30.00	-9.84
2442	20.07	20.48	-	-	23.28	30.00	-6.72
2472	-1.73	-1.27	-	-	1.51	30.00	-28.49

Table 51 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	Σ					
2412	16.93	17.42	-	-	20.16	30.00	-9.84	25.93	36.00	-10.07
2442	20.07	20.48	-	-	23.28	30.00	-6.72	29.05	36.00	-6.95
2472	-1.73	-1.27	-	-	1.51	30.00	-28.49	7.28	36.00	-28.72

Table 52 - ISED Maximum Conducted (average) Output Power Results

FCC 47 CFR Part 15, Limit Clause 15.247 (b)(3)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

ISED RSS-247, Limit Clause 5.4 (d)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e) of the specification.



2.3.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 14.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Expiry Date
Hygrometer	Rotronic	I-1000	3068	12	21-Sep-2023
AC Programmable Power Supply	iTech	IT7324	5225	-	O/P Mon
USB Power Sensor	Boonton	RTP5008	5820	12	12-Apr-2024
USB Power Sensor	Boonton	RTP5008	5821	12	12-Apr-2024
Digital Multimeter	Fluke	115	6145	12	17-Jun-2023
Signal Conditioning Unit	TUV SUD	SPECTRUM_SCU001	6426	12	09-Apr-2024

Table 53

O/P Mon – Output Monitored using calibrated equipment



2.4 Authorised Band Edges

2.4.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d)
ISED RSS-247, Clause 5.5

2.4.2 Equipment Under Test and Modification State

A2918, S/N: D5WW0J3220 - Modification State 0
A2918, S/N: D2Q3YQPDWP - Modification State 0

2.4.3 Date of Test

27-February-2023 to 07-March-2023

2.4.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.10.4.

2.4.5 Environmental Conditions

Ambient Temperature	20.8 - 23.0 °C
Relative Humidity	32.5 - 38.0 %



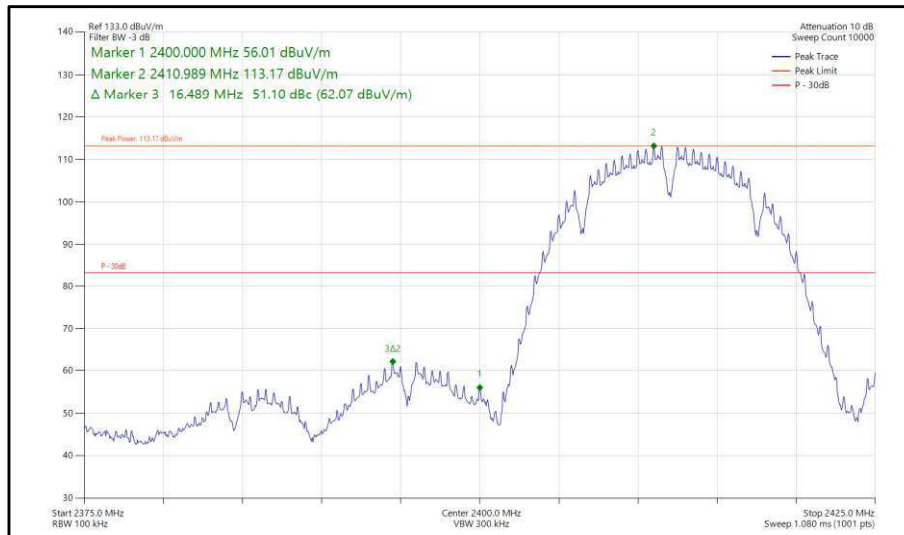
2.4.6 Test Results

2.4 GHz WLAN

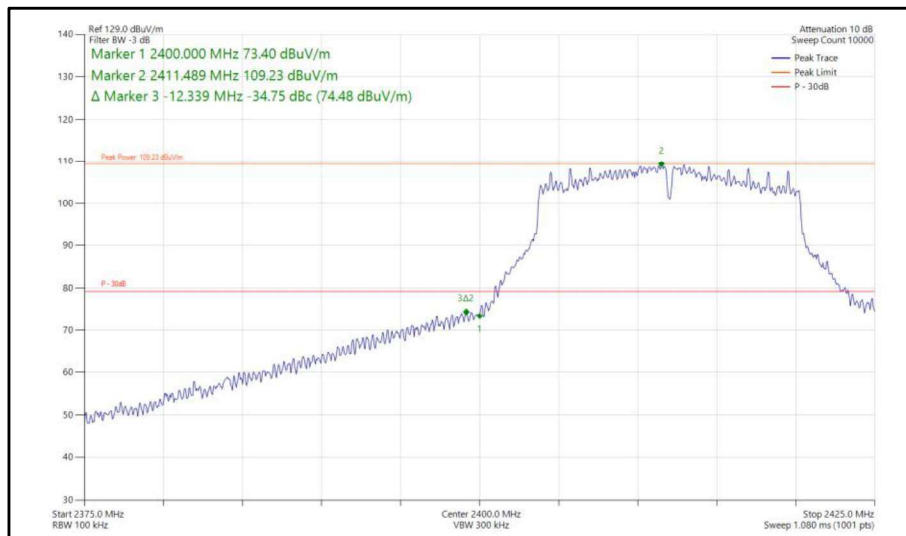
20 MHz Bandwidth - Core 0 (SISO)

Mode	Data Rate/ MCS	Resource Size	Resource Index	TX Frequency (MHz)	Band Edge Frequency (MHz)	Level (dBc)
802.11b	1 Mbps	-	-	2412	2400	-51.10
802.11g	24 Mbps	-	-	2412	2400	-34.75
802.11n HT20	MCS7	-	-	2412	2400	-34.54
802.11ax HE20	MCS4x1	SU	-	2412	2400	-36.32
802.11ax HE20	MCS9x1	106	53	2412	2400	-35.24

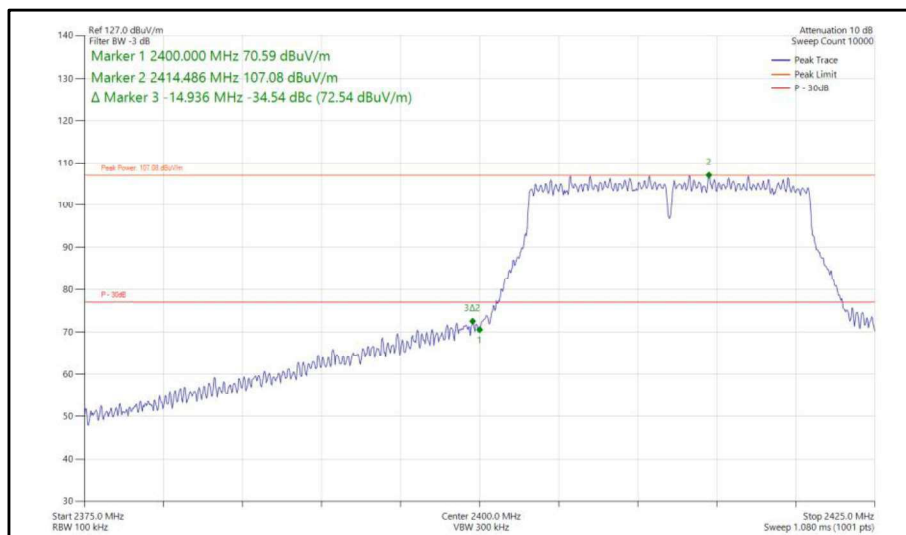
Table 54 - SISO Authorised Band Edge Results



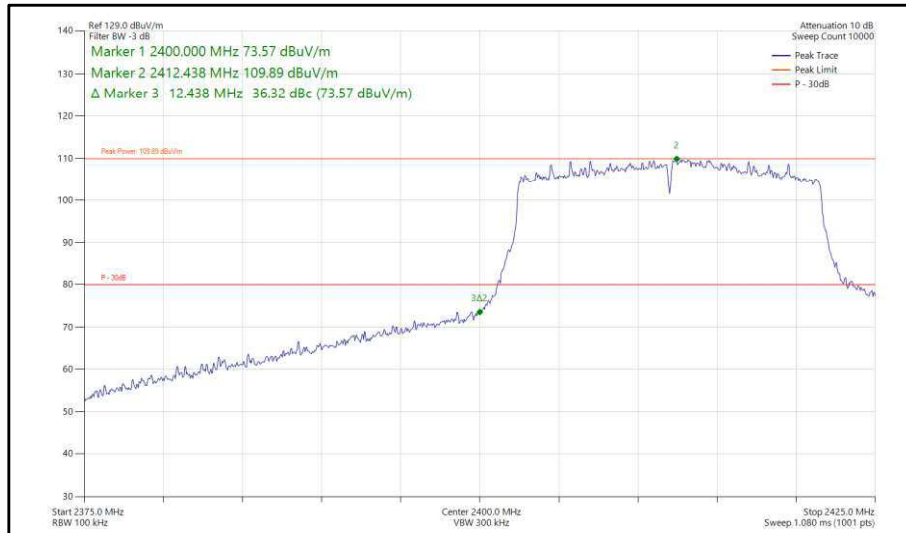
**Figure 77 - 802.11b, SISO, Core 0 - 2412 MHz,
 Band Edge Frequency 2400 MHz**



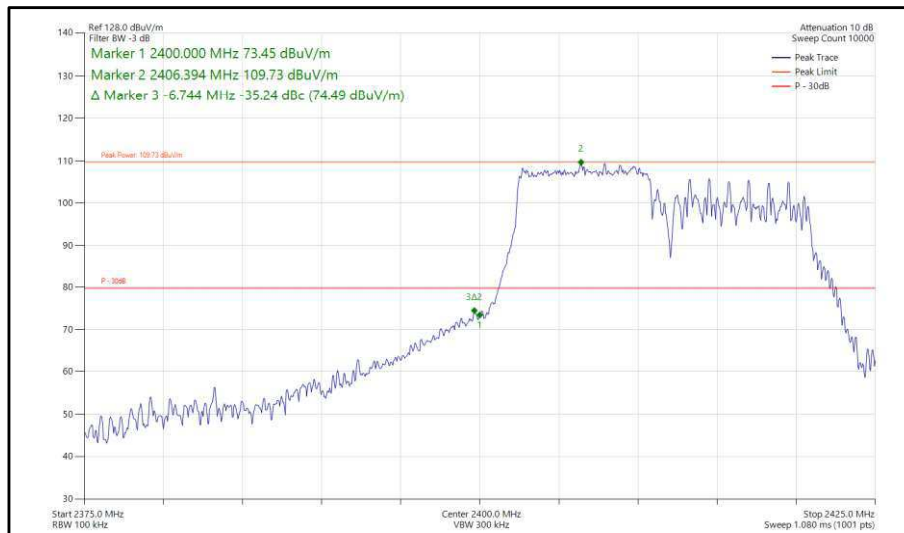
**Figure 78 - 802.11g, SISO, Core 0 - 2412 MHz,
Band Edge Frequency 2400 MHz**



**Figure 79 - 802.11n, HT20, SISO, Core 0 - 2412 MHz,
Band Edge Frequency 2400 MHz**



**Figure 80 - 802.11ax, HE20, SU, SISO, Core 0 - 2412 MHz,
Band Edge Frequency 2400 MHz**



**Figure 81 - 802.11ax, HE20, RU 106-53, SISO, Core 0 - 2412 MHz,
Band Edge Frequency 2400 MHz**



20 MHz Bandwidth - Core 1 (SISO)

Mode	Data Rate/ MCS	Resource Size	Resource Index	TX Frequency (MHz)	Band Edge Frequency (MHz)	Level (dBc)
802.11b	1 Mbps	-	-	2412	2400	-49.95
802.11g	24 Mbps	-	-	2412	2400	-34.55
802.11n HT20	MCS7	-	-	2412	2400	-34.44
802.11ax HE20	MCS9x1	SU	-	2412	2400	-34.30
802.11ax HE20	MCS9x1	106	53	2412	2400	-36.28

Table 55 - SISO Authorised Band Edge Results

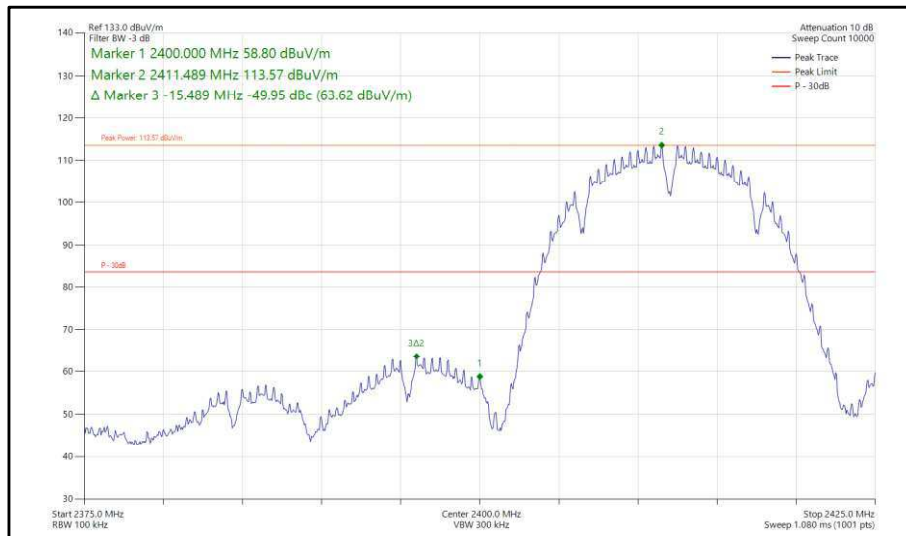


Figure 82 - 802.11b, SISO, Core 1 - 2412 MHz, Band Edge Frequency 2400 MHz

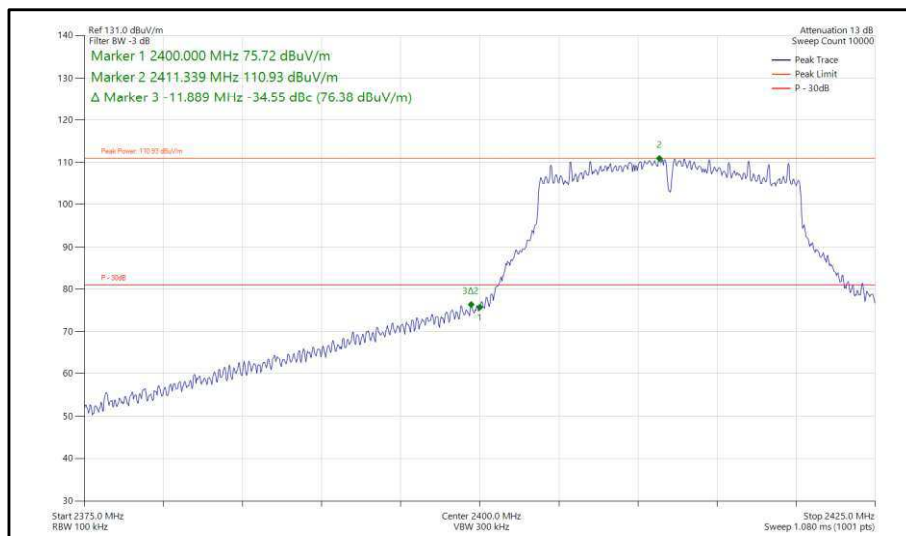
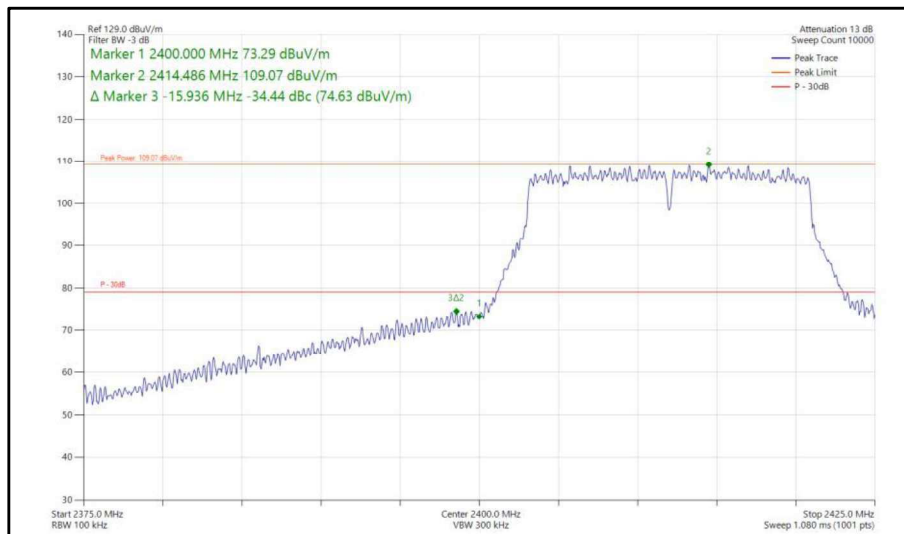
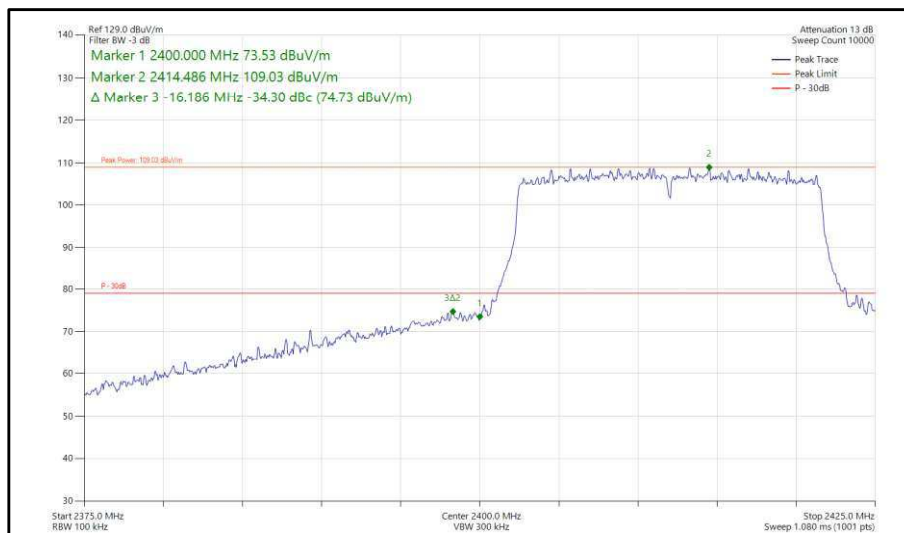


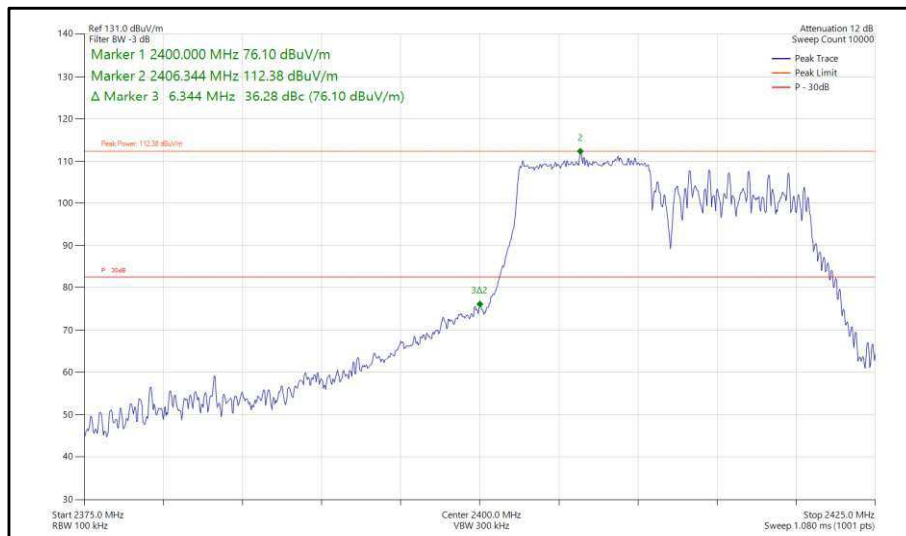
Figure 83 - 802.11g, SISO, Core 1 - 2412 MHz, Band Edge Frequency 2400 MHz



**Figure 84 - 802.11n, HT20, SISO, Core 1 - 2412 MHz,
Band Edge Frequency 2400 MHz**



**Figure 85 - 802.11ax, HE20, SU, SISO, Core 1 - 2412 MHz,
Band Edge Frequency 2400 MHz**



**Figure 86 - 802.11ax, HE20, RU 106-53, SISO, Core 1 - 2412 MHz,
Band Edge Frequency 2400 MHz**



20 MHz Bandwidth - Core 0-1 (CDD)

Mode	Data Rate/ MCS	Resource Size	Resource Index	TX Frequency (MHz)	Band Edge Frequency (MHz)	Level (dBc)
802.11n HT20	MCS7	-	-	2412	2400	-35.77
802.11ax HE20	MCS9x1	SU	-	2412	2400	-34.81
802.11ax HE20	MCS9x1	106	53	2412	2400	-37.13

Table 56 - CDD Authorised Band Edge Results

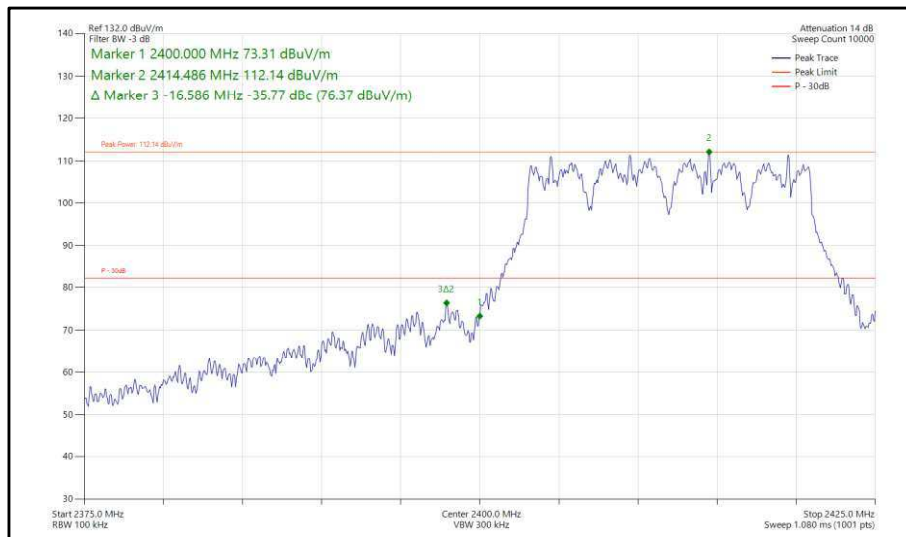


Figure 87 - 802.11n, HT20, CDD, Core 0-1 - 2412 MHz, Band Edge Frequency 2400 MHz

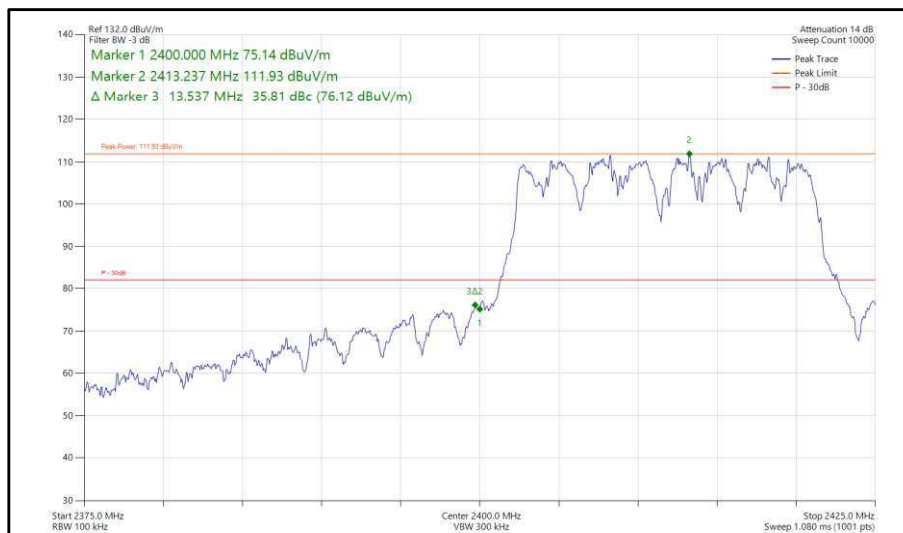
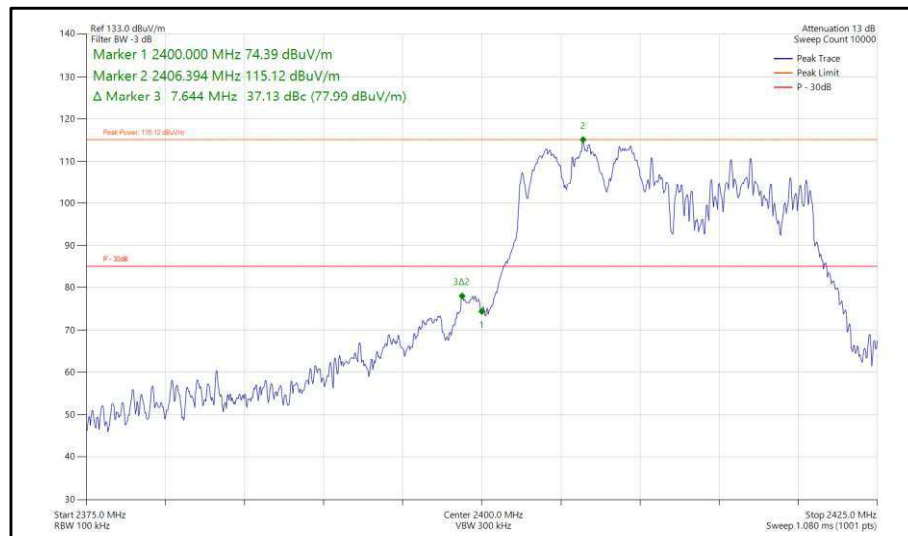


Figure 88 - 802.11ax, HE20, SU, CDD, Core 0-1 - 2412 MHz, Band Edge Frequency 2400 MHz



**Figure 89 - 802.11ax, HE20, RU 106-53, CDD, Core 0-1 - 2412 MHz,
Band Edge Frequency 2400 MHz**

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

ISED RSS-247, Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.