

FCC and ISED Test Report

Apple Inc
Model: A2941

In accordance with FCC 47 CFR Part 15C, ISED
RSS-247 and ISED RSS-GEN
(2.4 GHz Bluetooth Low Energy,
and Bluetooth HDR)

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



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FCC ID: BCGA2941

IC: 579C-A2941

COMMERCIAL-IN-CONFIDENCE

Document 75957632-10 Issue 01

SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Steve Marshall	Senior Engineer	Authorised Signatory	27 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	27 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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ACCREDITATION

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1 Report Summary

1.1 Report Modification Record

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

Issue	Description of Change	Date of Issue
1	First Issue	27-March-2023

Table 1

1.2 Introduction

Applicant	Apple Inc
Manufacturer	Apple Inc
Model Number(s)	A2941
Serial Number(s)	F91VYD72Q5, HGQQL724XY and GF6K93M959
Hardware Version(s)	REV 1.0
Software Version(s)	22E11180t, 22E11180t and 22E11181e
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	16-January-2023
Finish of Test	09-March-2023
Name of Engineer(s)	Elliot Callender, James Woods, Taha Shafique, Thomas Biddlecombe and Mohammad Malik
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	RSS-GEN			
Configuration and Mode: 2.4 GHz Bluetooth - DTS						
-	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	3.1	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 (EUT) was an Apple laptop computer with Bluetooth®, Bluetooth® Low Energy and IEEE 802.11 a/b/g/n/ac/ax Wi-Fi capabilities in the 2.4 GHz and 5 GHz bands.

1.4.2 Test Set-up

For conducted tests, a conducted test point was provided by the manufacturer via a UFL connector and cable. The loss of these test cables were known and compensated for in any conducted measurements.

During Spurious Radiated Emissions on Bluetooth, the worst-case modes from BDR/EDR/HDR & LE were selected for testing based on output power, channel bandwidth and spectral density. With BDR/EDR & LE1M deemed to be worst case. The spurious Radiated Emissions results for Bluetooth modes are documented across the following two reports.

- BDR/EDR: Document 75957632-09
- LE1M: Document 75957632-10

For tests in SISO operation, conducted tests were performed on the core with the highest EIRP, calculated by the max power table value added to the antenna gain.

The EUT supports Bluetooth ePA and iPA. Both modes were tested.

Bluetooth LE/HDR was assessed as a DTS system. The EUT supports Bluetooth in the following modes of operation across its antenna ports:

BT Core 0 (SISO) – iPA HDR/LE and ePA HDR
BT Core 1 (SISO) – iPA HDR/LE and ePA HDR
BT Core 0 + BT Core 1 (TxBF) – iPA HDR/LE and ePA HDR

For all tests, the EUT was put into a continuous transmit test mode with the manufacturer's test commands. The EUT then transmitted the required type of modulation/packet type on a static channel selected within the test script.

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

1.4.3 Antenna Gain Table

Antenna Port	Frequency Range (MHz)	Peak Gain (dBi)	Conducted Cable Loss (dB)
BT Core 0	2400 to 2480	4.85	0.8
BT Core 1	2400 to 2480	4.50	0.8

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: A2941, Serial Number: GF6K93M959			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A2941, Serial Number: F91VYD72Q5			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A2941, Serial Number: HGQQL724XY			
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 Bluetooth - DTS		
Restricted Band Edges	Elliot Callender, James Woods and Taha Shafique	UKAS
Emission Bandwidth	Thomas Biddlecombe	UKAS
Maximum Conducted Output Power	Thomas Biddlecombe	UKAS
Spurious Radiated Emissions	Mohammad Malik and Elliot Callender	UKAS
Authorised Band Edges	Elliot Callender, James Woods and Taha Shafique	UKAS
Power Spectral Density	Thomas Biddlecombe	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

A2941, S/N: F91VYD72Q5 - Modification State 0

2.1.3 Date of Test

16-January-2023 to 17-January-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	21.0 - 23.8 °C
Relative Humidity	41.4 - 43.0 %

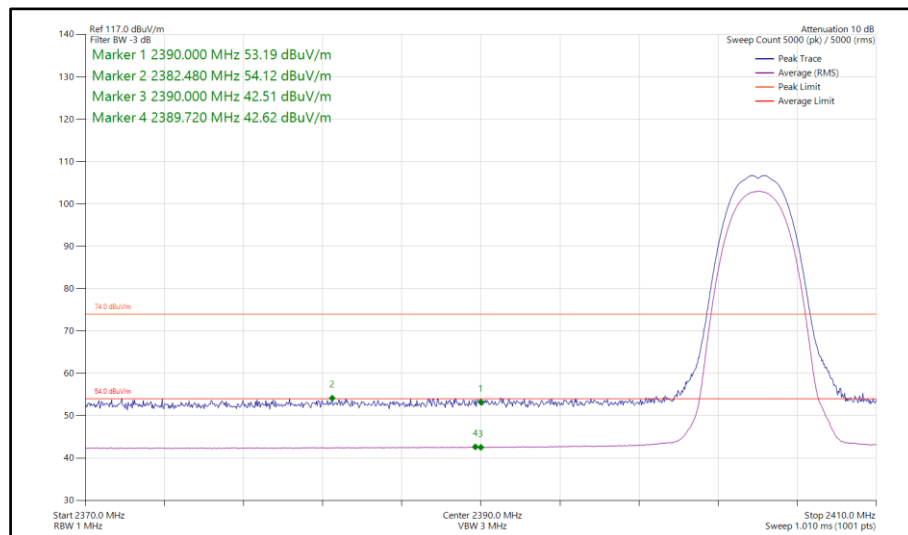
2.1.6 Test Results

2.4 GHz Bluetooth - DTS

iPA - BT HDR Core 0, BTLE Core 1 (SISO)

Mode	Packet Type	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
Static	HDR4	2404	2390	54.12	42.62
Static	HDR8	2404	2390	54.53	42.87
Static	LE1M	2402	2390	55.16	42.70
Static	LE2M	2402	2390	54.82	42.80
Static	HDR4	2476	2483.5	53.66	41.63
Static	HDR4	2478	2483.5	53.51	42.68
Static	HDR8	2476	2483.5	54.05	43.10
Static	HDR8	2478	2483.5	62.43	50.96
Static	LE1M	2478	2483.5	54.33	42.45
Static	LE1M	2480	2483.5	54.31	43.81
Static	LE2M	2478	2483.5	54.86	42.46
Static	LE2M	2480	2483.5	57.32	46.73

Table 6 - SISO Restricted Band Edge Results



**Figure 1 - Bluetooth HDR4, SISO, Core 0 - 2404 MHz,
Band Edge Frequency 2390 MHz**

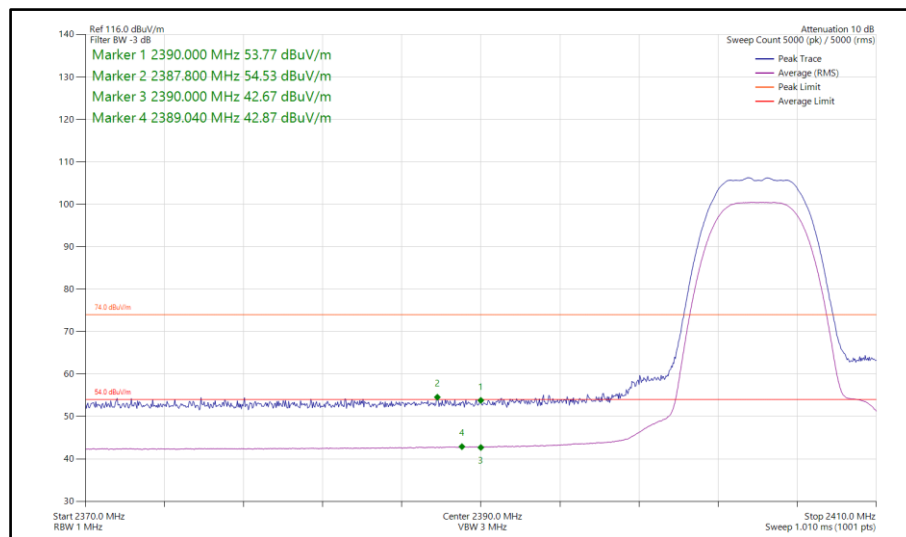


Figure 2 - Bluetooth HDR8, SISO, Core 0 - 2404 MHz, Band Edge Frequency 2390 MHz

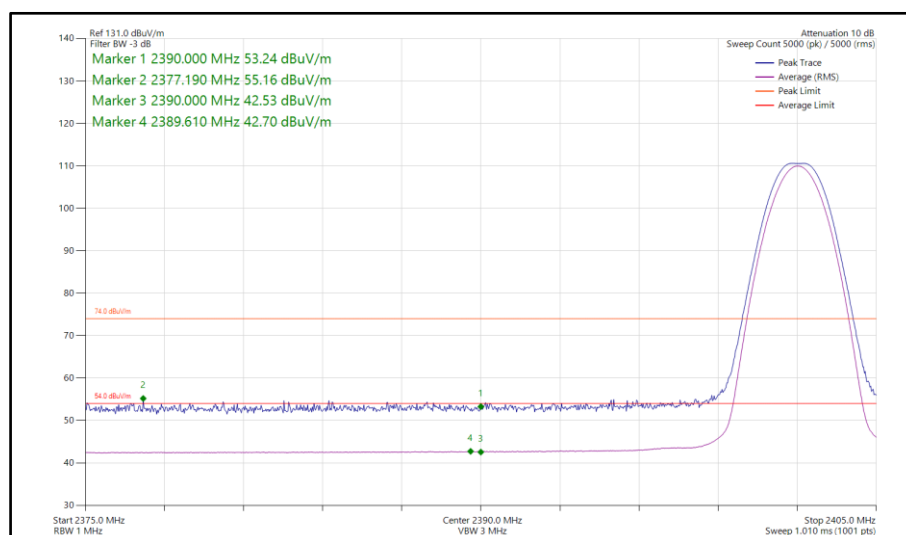


Figure 3 - Bluetooth LE1M, SISO, Core 1 - 2402 MHz Band Edge Frequency 2390 MHz

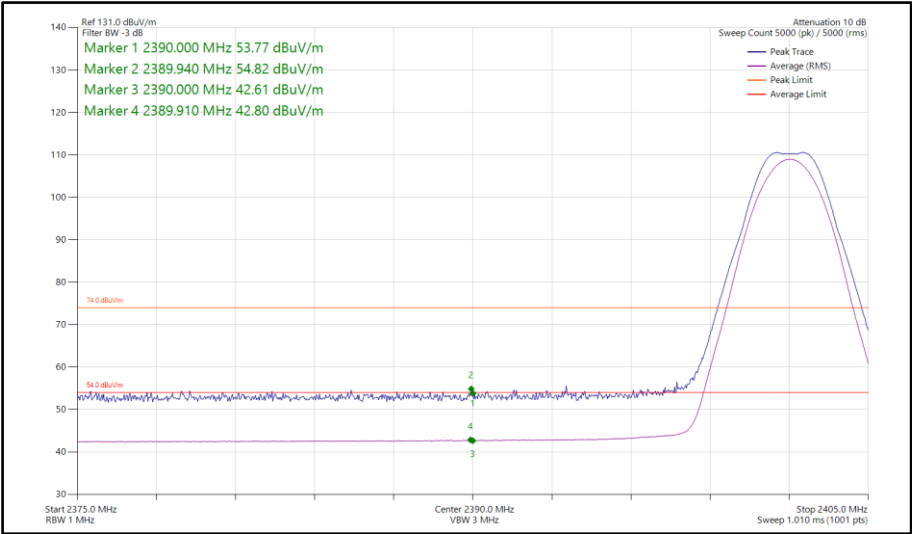


Figure 4 - Bluetooth LE2M, SISO, Core 1 - 2402 MHz Band Edge Frequency 2390 MHz

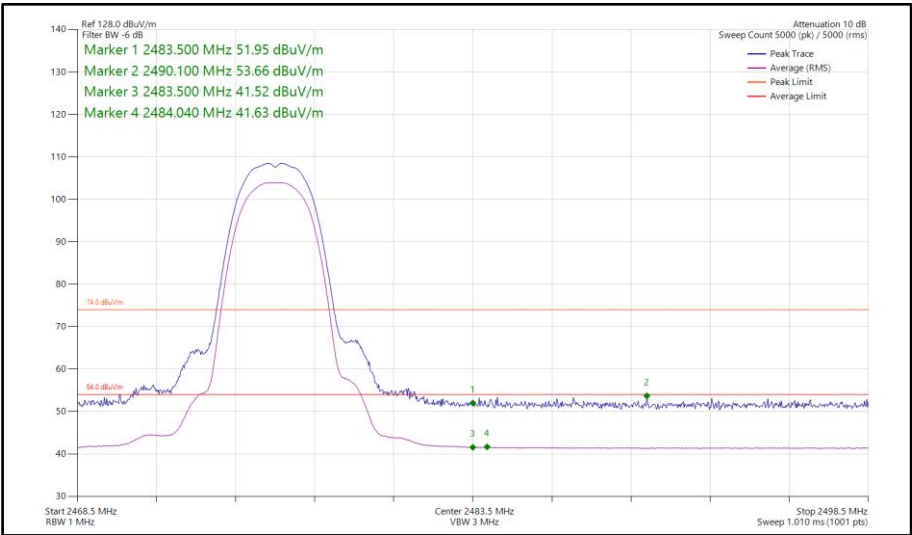
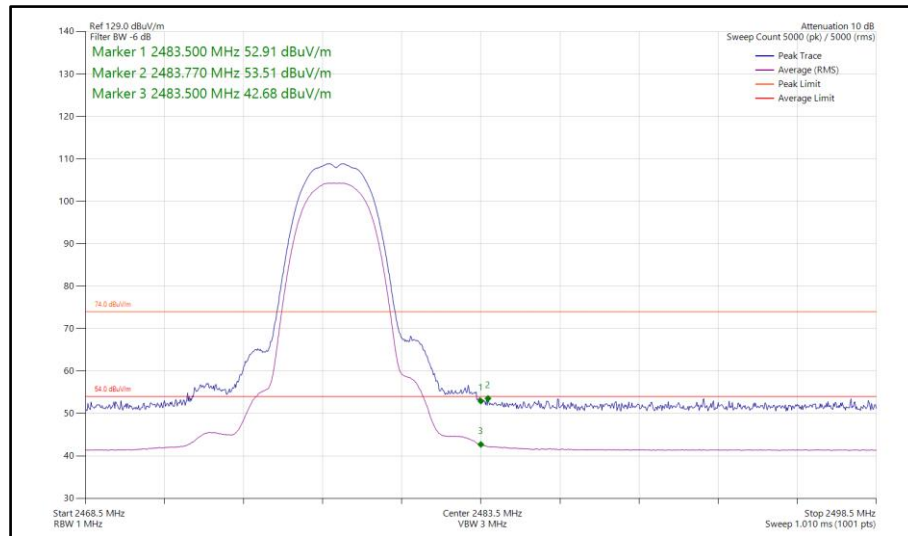
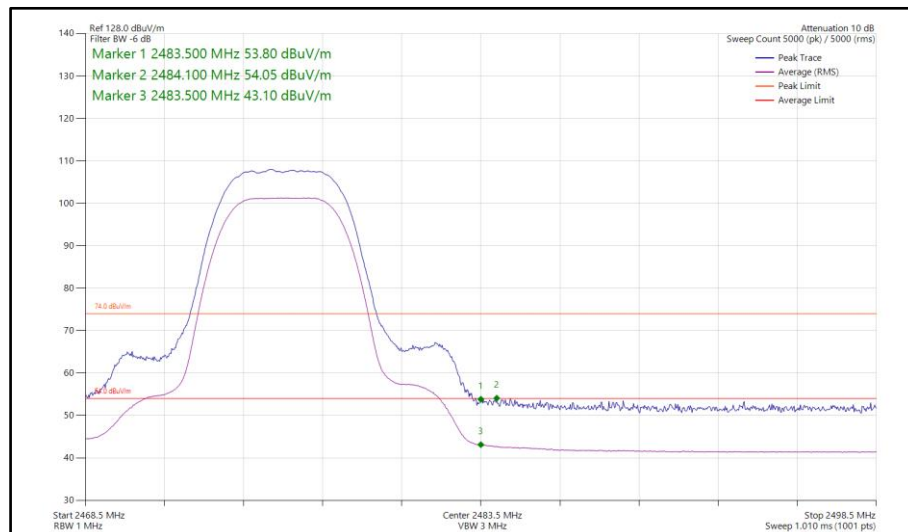


Figure 5 - Bluetooth HDR4, SISO, Core 0 - 2476 MHz, Band Edge Frequency 2483.5 MHz



**Figure 6 - Bluetooth HDR4, SISO, Core 0 - 2478 MHz,
Band Edge Frequency 2483.5 MHz**



**Figure 7 - Bluetooth HDR8, SISO, Core 0 - 2476 MHz,
Band Edge Frequency 2483.5 MHz**

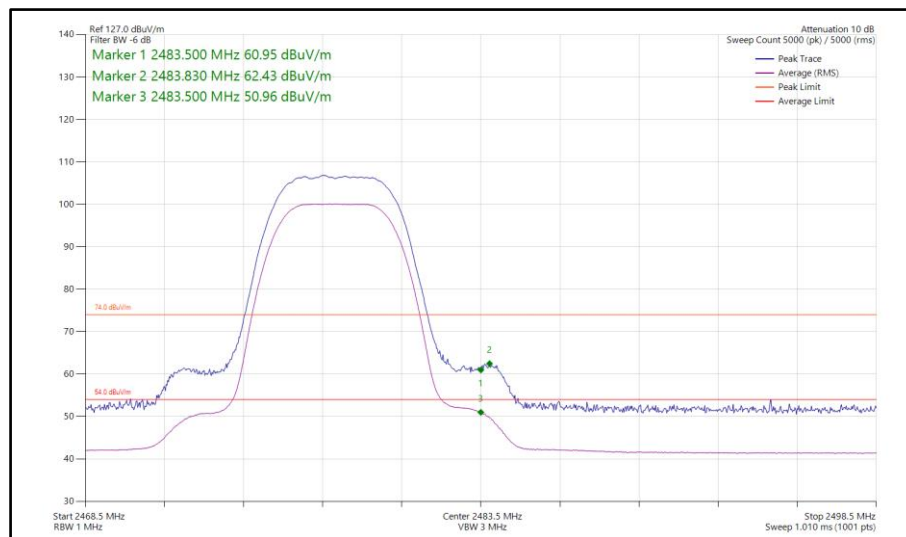


Figure 8 - Bluetooth HDR8, SISO, Core 0 - 2478 MHz, Band Edge Frequency 2483.5 MHz

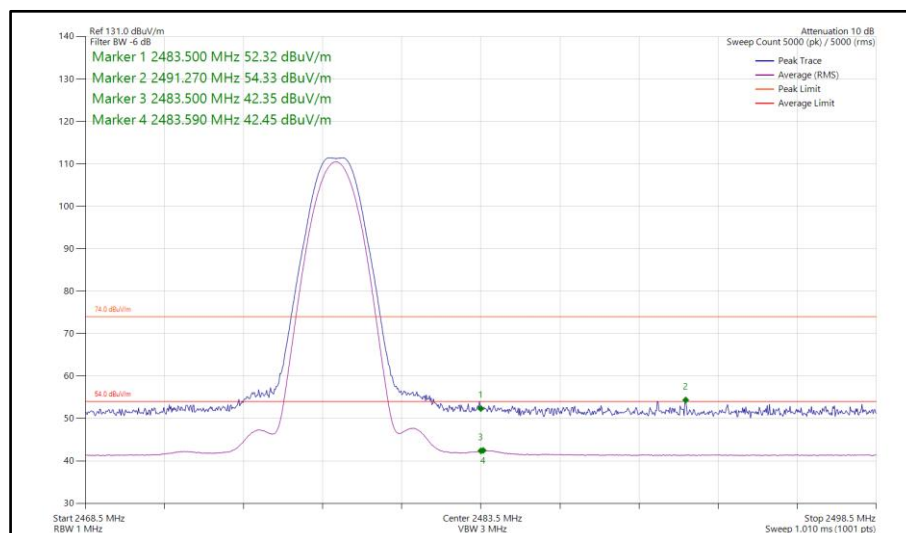


Figure 9 - Bluetooth LE1M, SISO, Core 1 - 2478 MHz Band Edge Frequency 2483.5 MHz

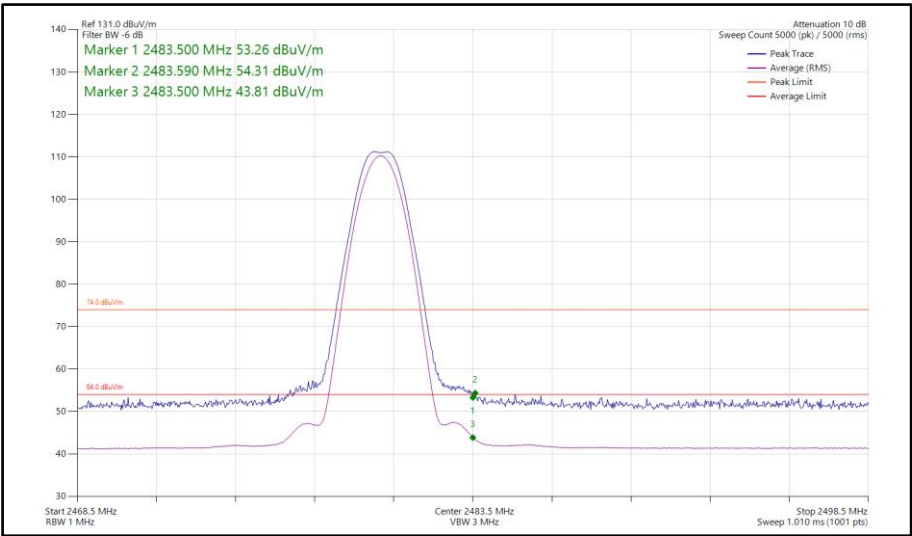


Figure 10 - Bluetooth LE1M, SISO, Core 1 - 2480 MHz Band Edge Frequency 2483.5 MHz

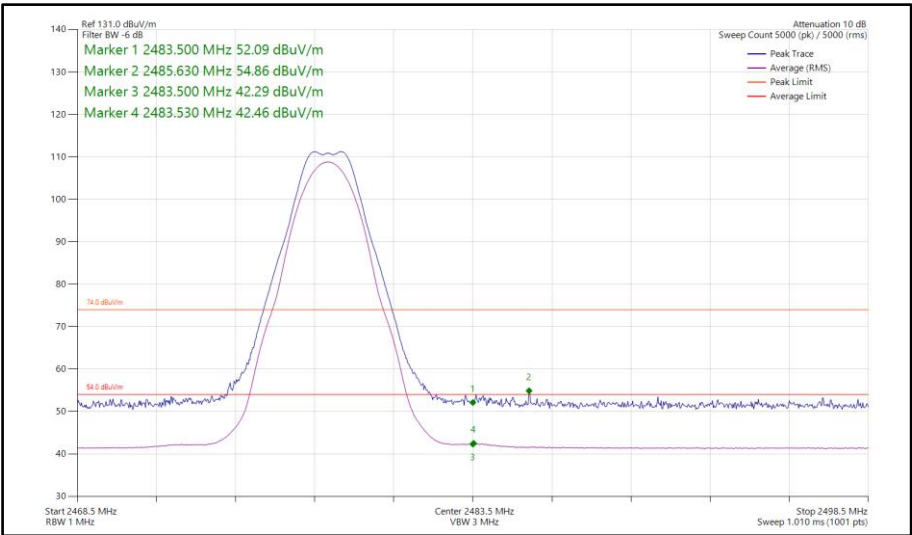


Figure 11 - Bluetooth LE2M, SISO, Core 1 - 2478 MHz Band Edge Frequency 2483.5 MHz

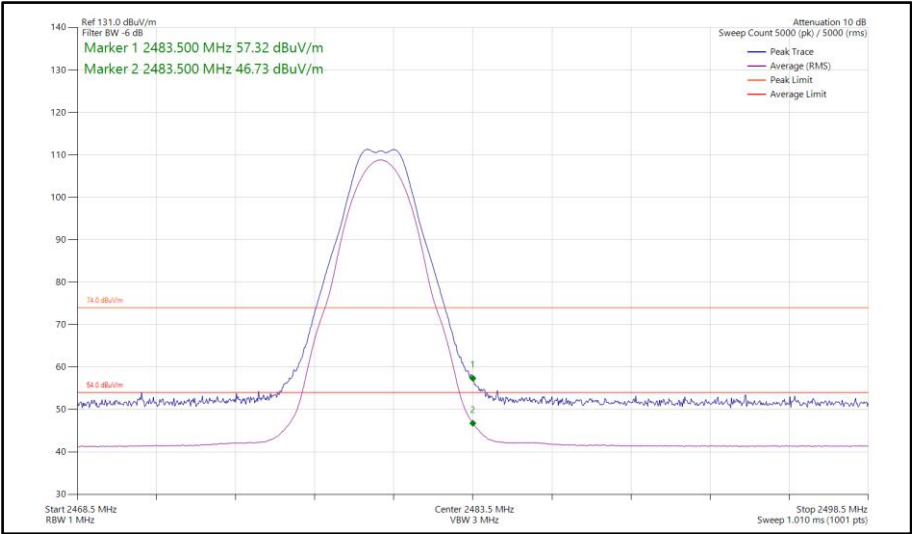


Figure 12 - Bluetooth LE2M, SISO, Core 1 - 2480 MHz Band Edge Frequency 2483.5 MHz

iPA - Core 0-1 (MIMO)

Mode	Packet Type	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
Static	HDR4	2404	2390	54.38	42.75
Static	HDR8	2404	2390	54.24	42.88
Static	LE1M	2402	2390	55.02	42.78
Static	LE2M	2402	2390	54.63	42.80
Static	HDR4	2476	2483.5	54.45	41.81
Static	HDR4	2478	2483.5	53.85	42.47
Static	HDR8	2476	2483.5	54.25	43.40
Static	HDR8	2478	2483.5	63.41	51.20
Static	LE1M	2478	2483.5	54.04	43.26
Static	LE1M	2480	2483.5	54.70	43.75
Static	LE2M	2478	2483.5	54.12	43.10
Static	LE2M	2480	2483.5	59.12	48.62

Table 7 - MIMO Restricted Band Edge Results

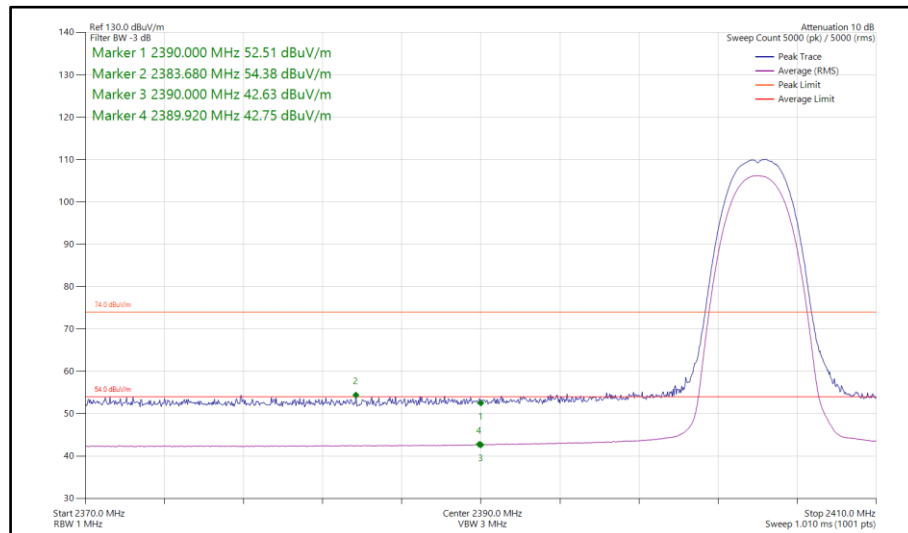
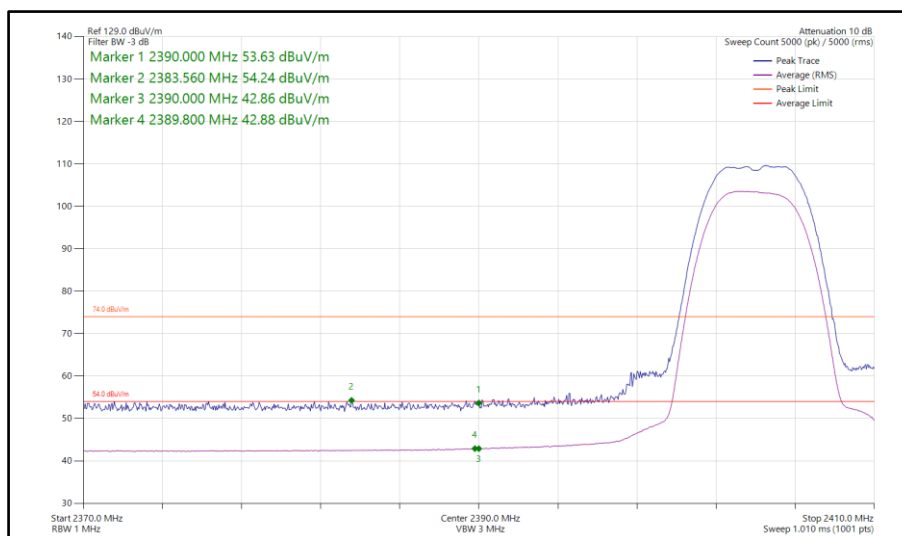
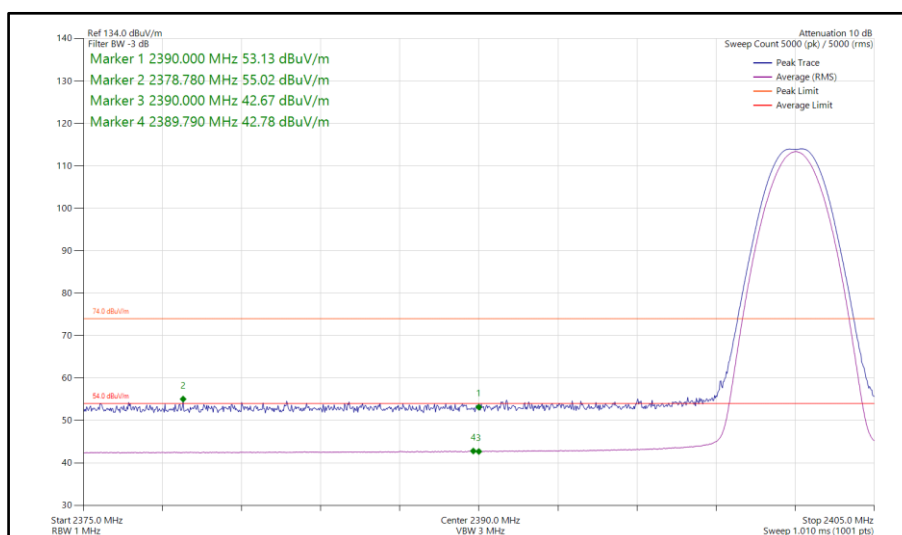


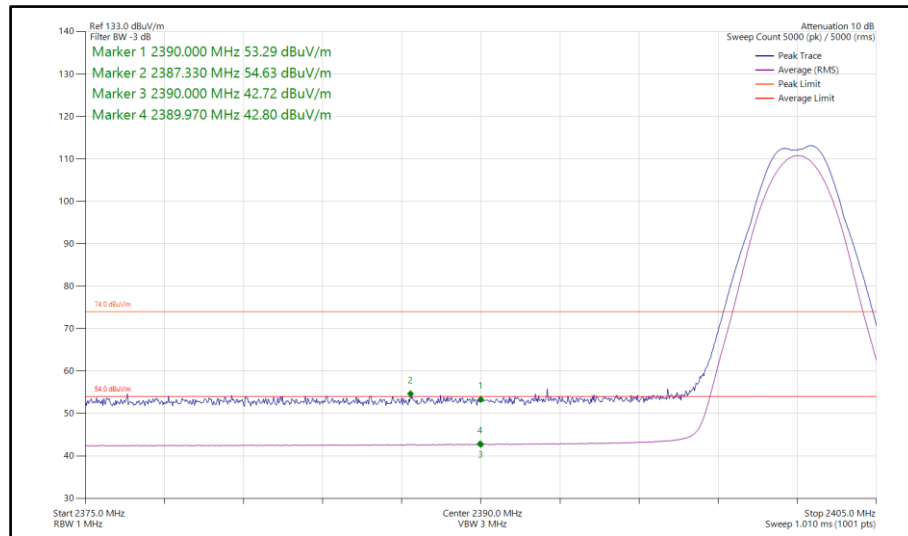
Figure 13 - Bluetooth HDR4, MIMO, Core 0-1 - 2404 MHz,
Band Edge Frequency 2390 MHz



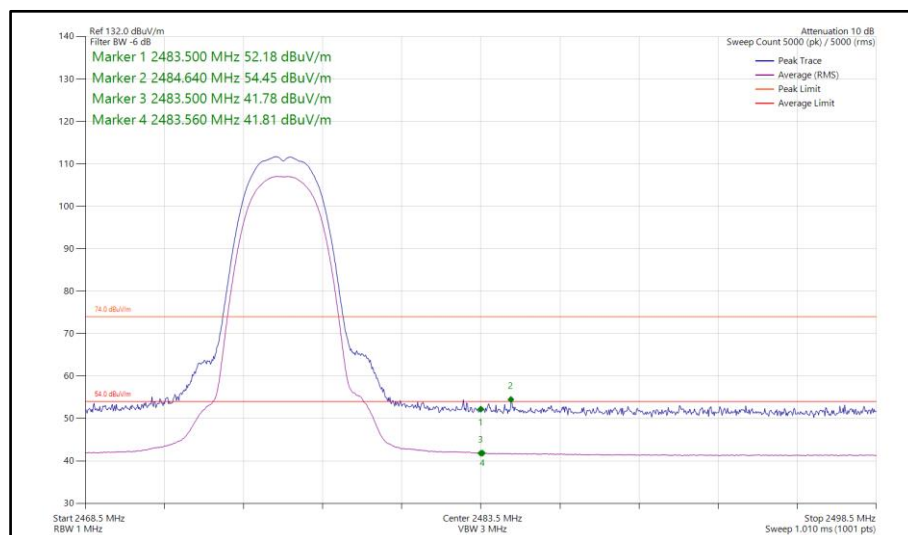
**Figure 14 - Bluetooth HDR8, MIMO, Core 0-1 - 2404 MHz,
Band Edge Frequency 2390 MHz**



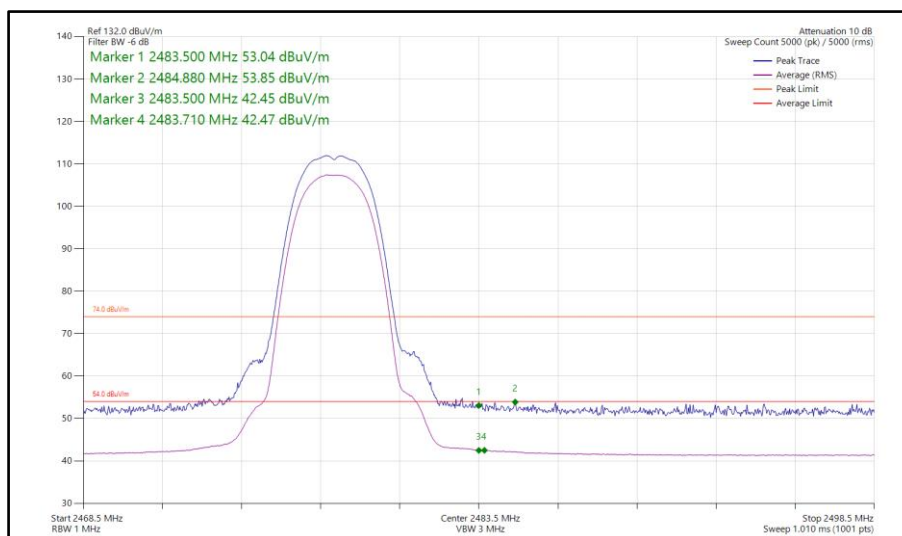
**Figure 15 - Bluetooth LE1M, MIMO, Core 0-1 - 2402 MHz,
Band Edge Frequency 2390 MHz**



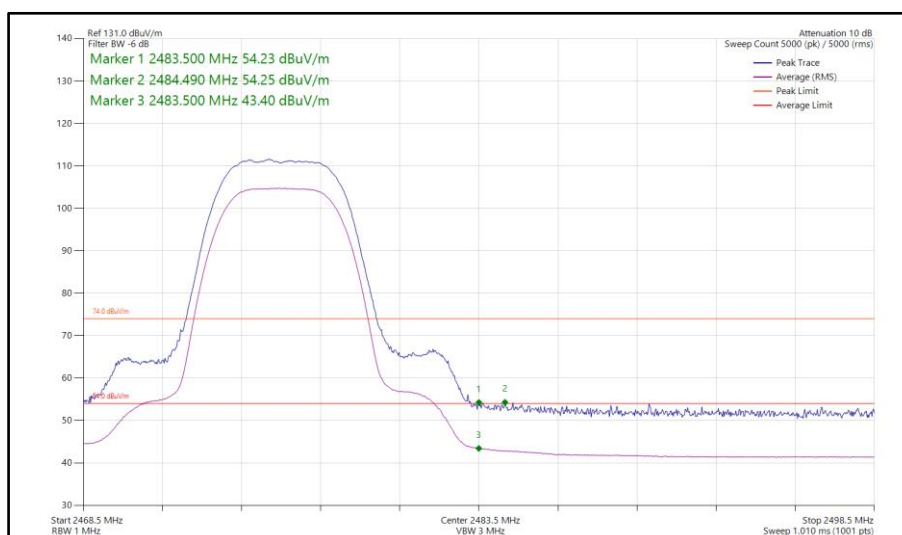
**Figure 16 - Bluetooth LE2M, MIMO, Core 0-1 - 2402 MHz,
Band Edge Frequency 2390 MHz**



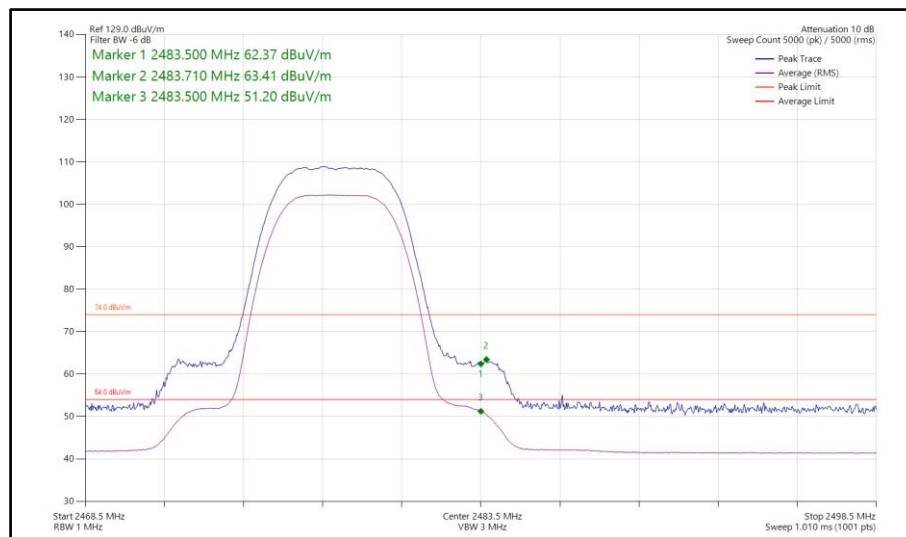
**Figure 17 - Bluetooth HDR4, MIMO, Core 0-1 - 2476 MHz,
Band Edge Frequency 2483.5 MHz**



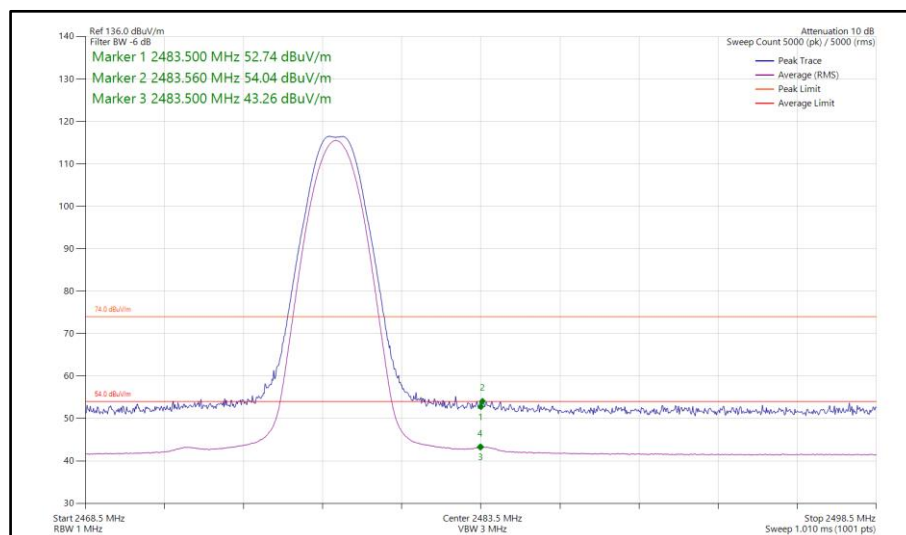
**Figure 18 - Bluetooth HDR4, MIMO, Core 0-1 - 2478 MHz,
Band Edge Frequency 2483.5 MHz**



**Figure 19 - Bluetooth HDR8, MIMO, Core 0-1 - 2476 MHz,
Band Edge Frequency 2483.5 MHz**



**Figure 20 - Bluetooth HDR8, MIMO, Core 0-1 - 2478 MHz,
Band Edge Frequency 2483.5 MHz**



**Figure 21 - Bluetooth LE1M, MIMO, Core 0-1 - 2478 MHz,
Band Edge Frequency 2483.5 MHz**

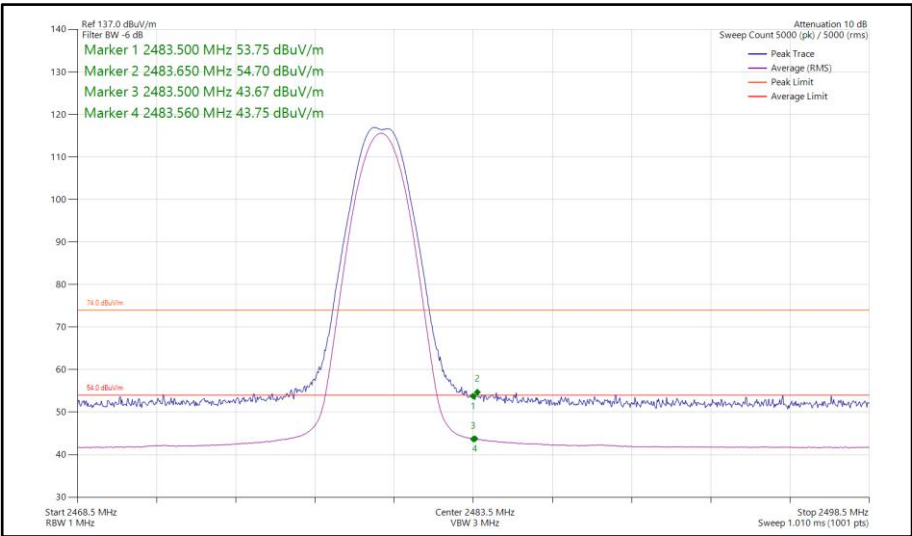


Figure 22 - Bluetooth LE1M, MIMO, Core 0-1 - 2480 MHz,
Band Edge Frequency 2483.5 MHz

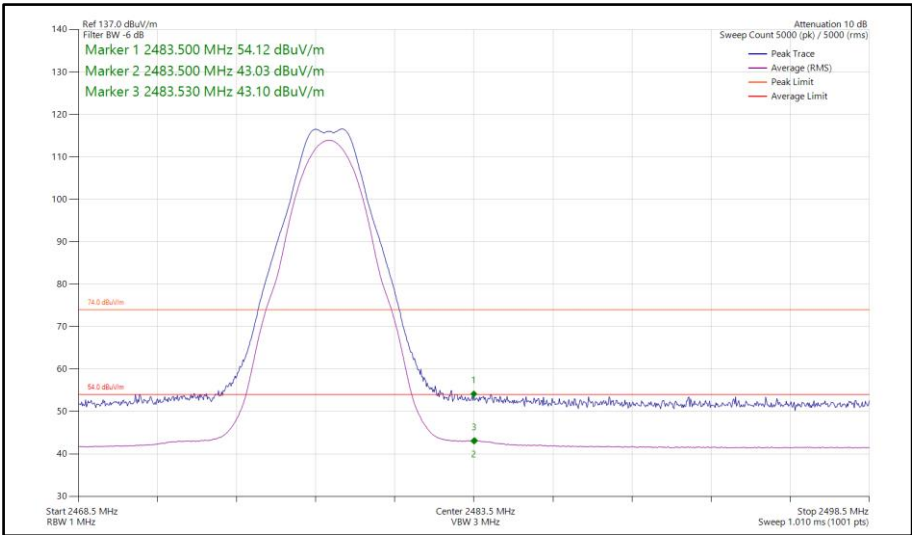


Figure 23 - Bluetooth LE2M, MIMO, Core 0-1 - 2478 MHz,
Band Edge Frequency 2483.5 MHz

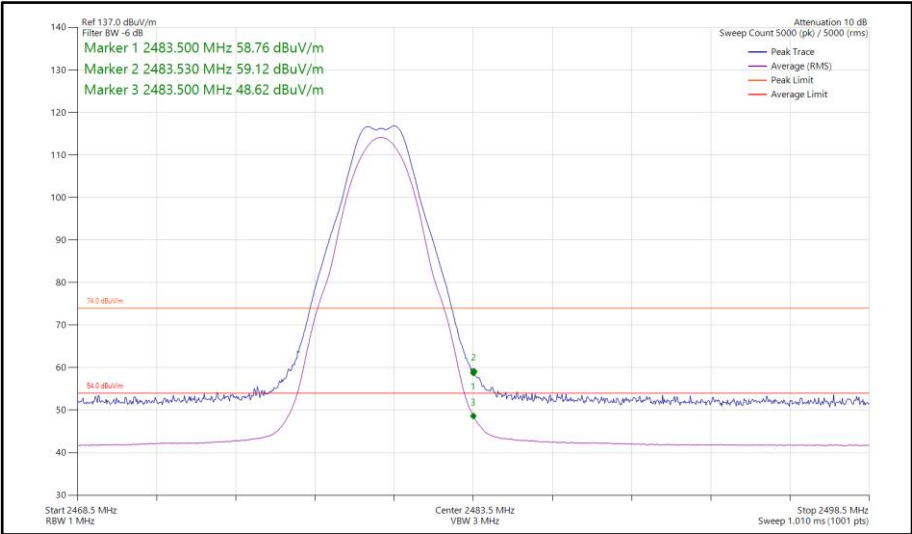
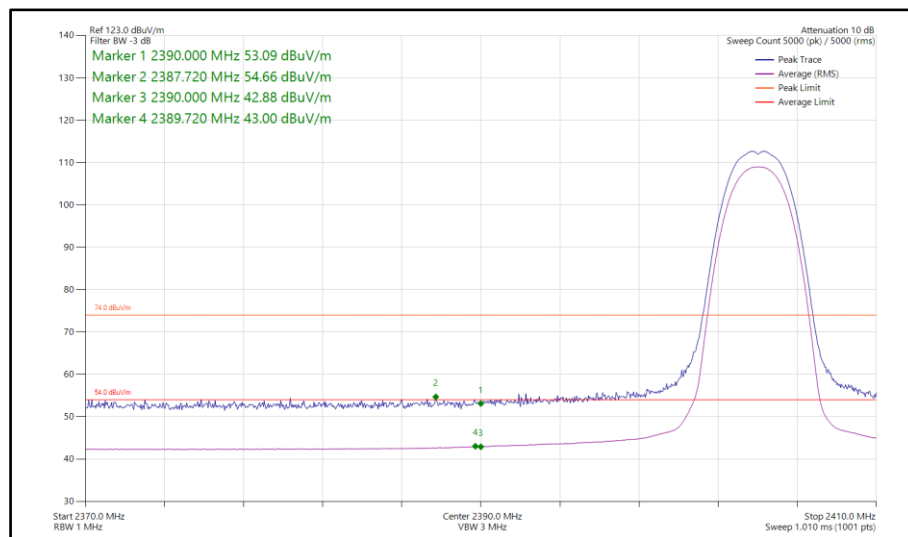


Figure 24 - Bluetooth LE2M, MIMO, Core 0-1 - 2480 MHz,
Band Edge Frequency 2483.5 MHz

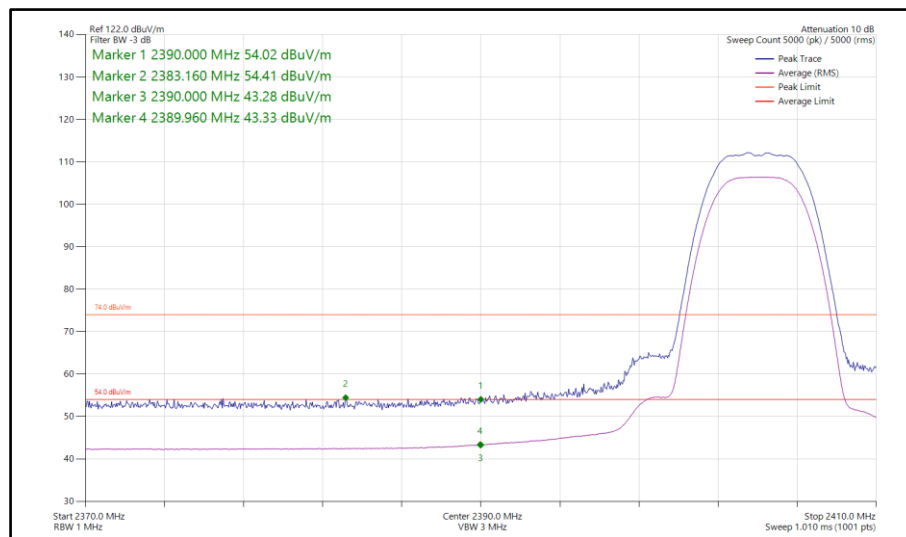
ePA - Core 0 (SISO)

Mode	Packet Type	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
Static	HDR4	2404	2390	54.66	43.00
Static	HDR8	2404	2390	54.41	43.33
Static	HDR4	2476	2483.5	54.40	42.68
Static	HDR4	2478	2483.5	54.84	43.80
Static	HDR8	2476	2483.5	55.33	44.37
Static	HDR8	2478	2483.5	59.19	48.30

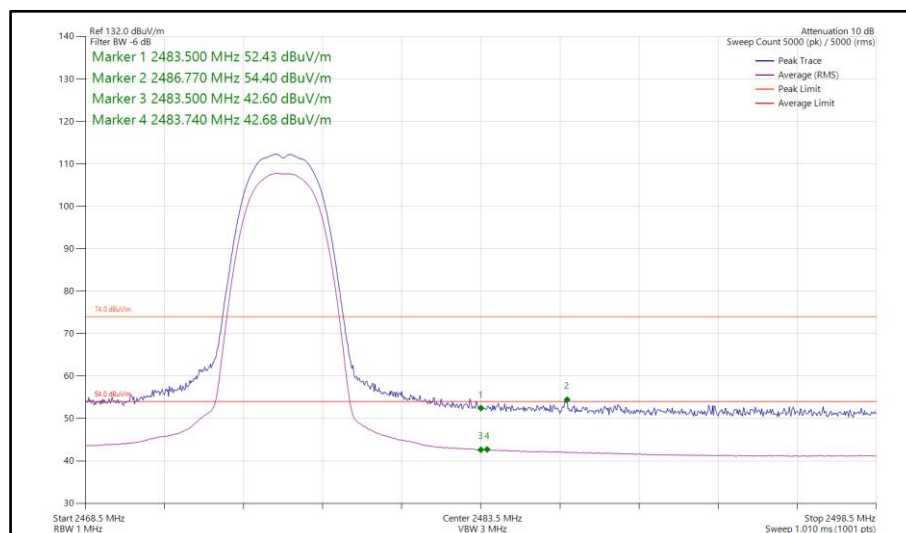
Table 8 - SISO Restricted Band Edge Results



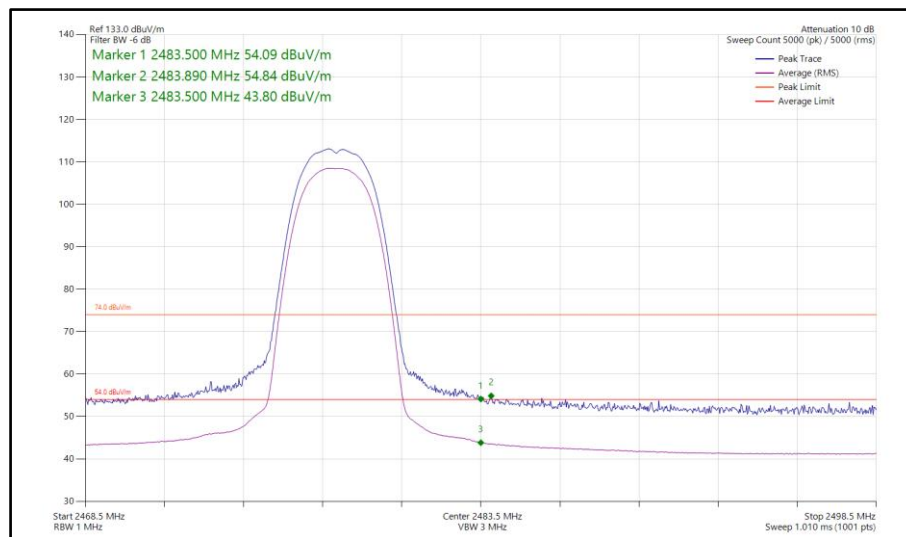
**Figure 25 - Bluetooth HDR4, SISO, Core 0 - 2404 MHz,
Band Edge Frequency 2390 MHz**



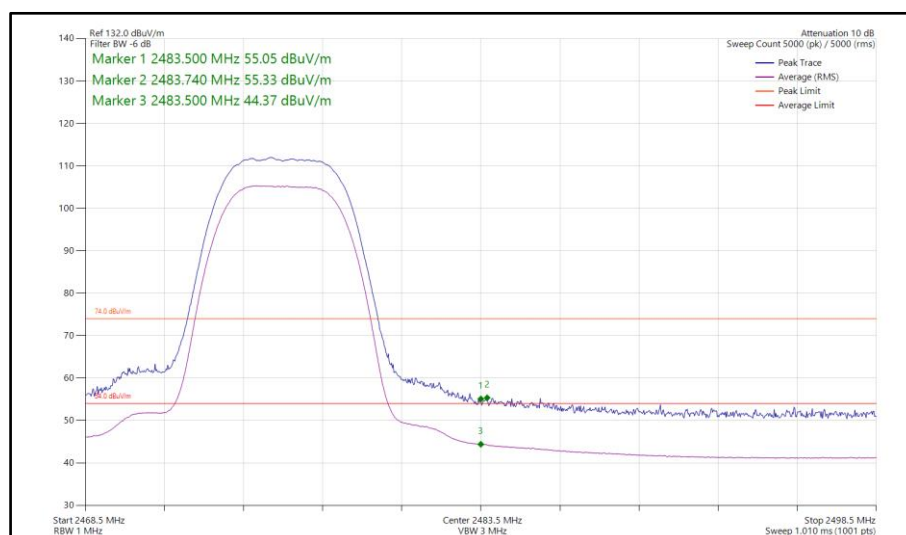
**Figure 26 - Bluetooth HDR8, SISO, Core 0 - 2404 MHz,
Band Edge Frequency 2390 MHz**



**Figure 27 - Bluetooth HDR4, SISO, Core 0 - 2476 MHz,
Band Edge Frequency 2483.5 MHz**



**Figure 28 - Bluetooth HDR4, SISO, Core 0 - 2478 MHz,
Band Edge Frequency 2483.5 MHz**



**Figure 29 - Bluetooth HDR8, SISO, Core 0 - 2476 MHz,
Band Edge Frequency 2483.5 MHz**

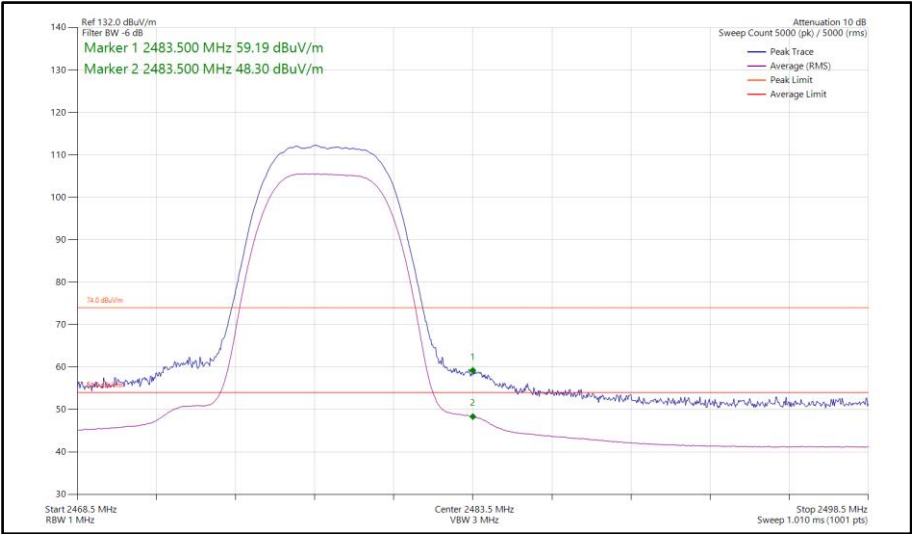
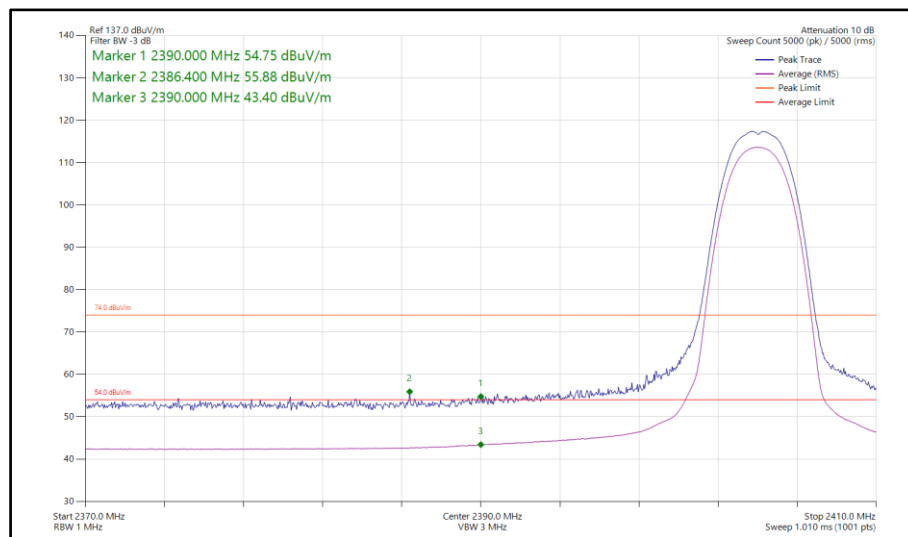


Figure 30 - Bluetooth HDR8, SISO, Core 0 - 2478 MHz,
Band Edge Frequency 2483.5 MHz

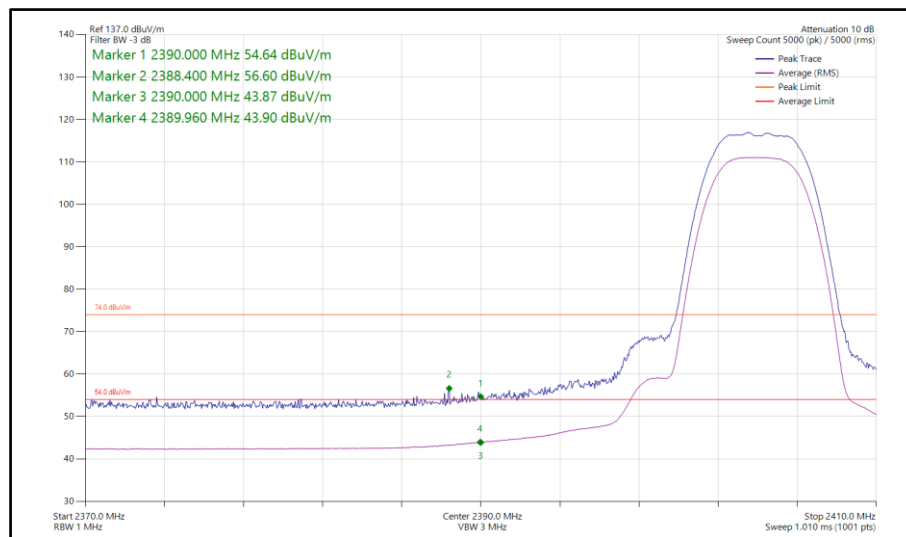
ePA - Core 0-1 (MIMO)

Mode	Packet Type	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
Static	HDR4	2404	2390	55.88	43.40
Static	HDR8	2404	2390	56.60	43.90
Static	HDR4	2476	2483.5	54.93	43.67
Static	HDR4	2478	2483.5	55.97	45.19
Static	HDR8	2476	2483.5	56.64	45.57
Static	HDR8	2478	2483.5	62.25	51.03

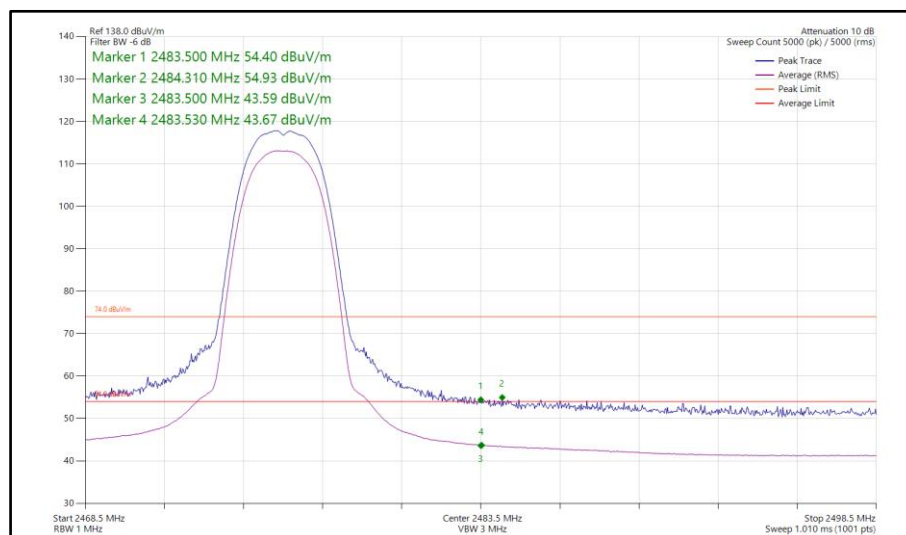
Table 9 - MIMO Restricted Band Edge Results



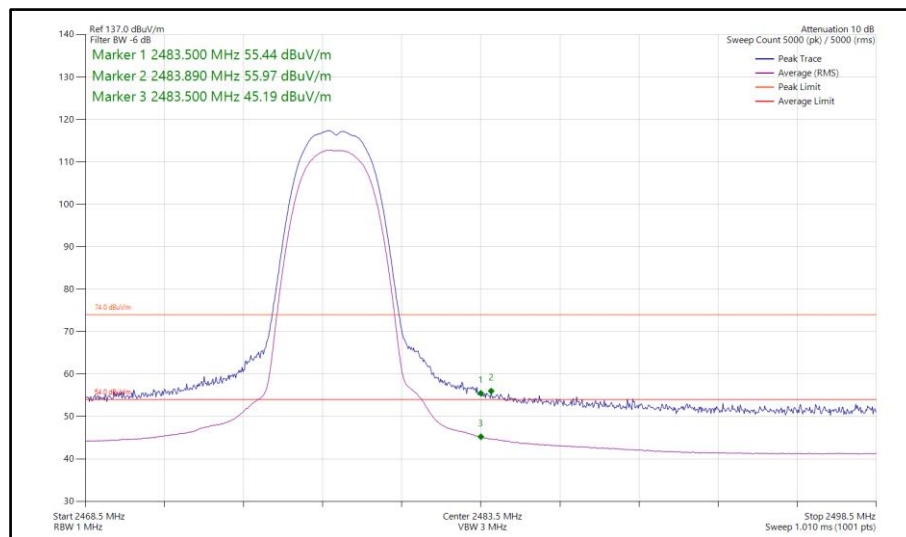
**Figure 31 - Bluetooth HDR4, MIMO, Core 0-1 - 2404 MHz,
Band Edge Frequency 2390 MHz**



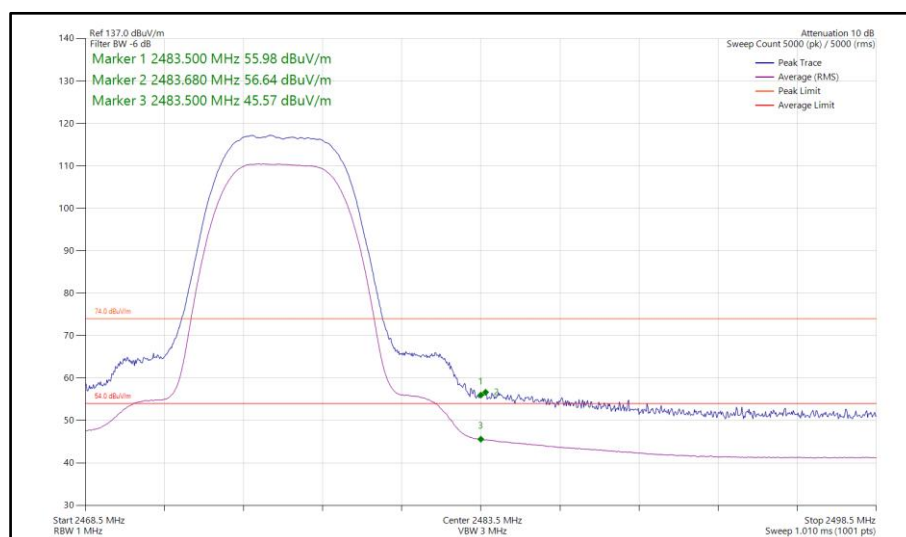
**Figure 32 - Bluetooth HDR8, MIMO, Core 0-1 - 2404 MHz,
Band Edge Frequency 2390 MHz**



**Figure 33 - Bluetooth HDR4, MIMO, Core 0-1 - 2476 MHz,
Band Edge Frequency 2483.5 MHz**



**Figure 34 - Bluetooth HDR4, MIMO, Core 0-1 - 2478 MHz,
Band Edge Frequency 2483.5 MHz**



**Figure 35 - Bluetooth HDR8, MIMO, Core 0-1 - 2476 MHz,
Band Edge Frequency 2483.5 MHz**

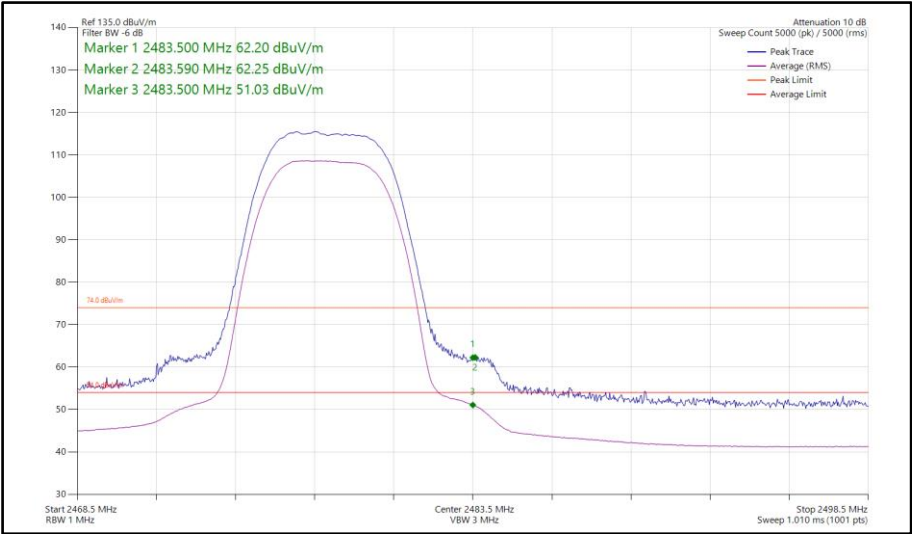


Figure 36 - Bluetooth HDR8, MIMO, Core 0-1 - 2478 MHz,
Band Edge Frequency 2483.5 MHz



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 10

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 11

*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 15.

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	5911	12	24-Mar-2023
1500W (300V 12A) AC Power Supply	iTech	IT7324	5956	-	O/P Mon
5m Semi-Anechoic Chamber (Dual-Axis)	Albatross Projects	RF Chamber 15	5963	36	28-Apr-2025
Mast & Turntable Controller	Maturo Gmbh	FCU3.0	5966	-	TU
Tilt Antenna Mast	Maturo Gmbh	BAM4.5-P	5967	-	TU
Turntable	Maturo Gmbh	TT1.5SI	5968	-	TU
Cable (SMA to SMA 1m)	Junkosha	MWX221-01000AMSAMS/A	5996	12	06-Jun-2023
Cable (SMA to SMA 1m)	Junkosha	MWX221-01000AMSAMS/A	6007	12	06-Jun-2023
Cable (SMA to SMA 6.5m)	Junkosha	MWX221-06500AMSAMS/B	6014	12	07-Jun-2023
Horn Antenna (1-10 GHz)	Schwarzbeck	BBHA9120B	6140	12	21-Jun-2023
Digital Multimeter	Fluke	115	6147	12	16-Jun-2023
Humidity & Temperature meter	R.S Components	1364	6150	12	17-Jun-2023
SAC Switch Unit	TUV SUD	TUV_SSU_001	6191	12	12-Dec-2023

Table 12

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

A2941, S/N: GF6K93M959 - Modification State 0

2.2.3 Date of Test

09-March-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	21.8 °C
Relative Humidity	32.6 %



2.2.6 Test Results

2.4 GHz Bluetooth - DTS

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:	ePA $\pi/4$ DQPSK (4-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	1.880	-	-	≥ 500.0
2441	-	1.904	-	-	≥ 500.0
2476	-	1.904	-	-	≥ 500.0

Table 13 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	2.328	-	-	-
2441	-	2.336	-	-	-
2476	-	2.328	-	-	-

Table 14 - 99% Bandwidth Results

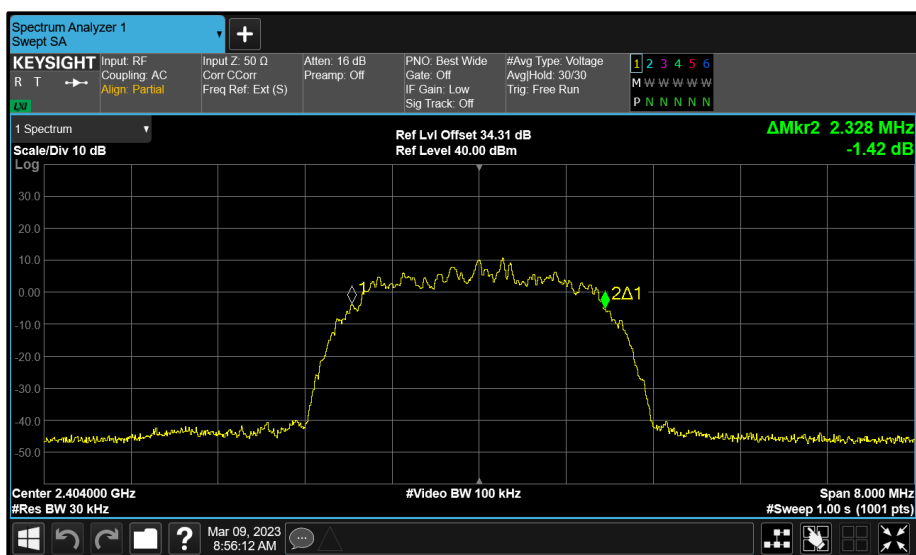


Figure 37 - Core 0 (B) 2404 MHz (CH2) 99% Bandwidth

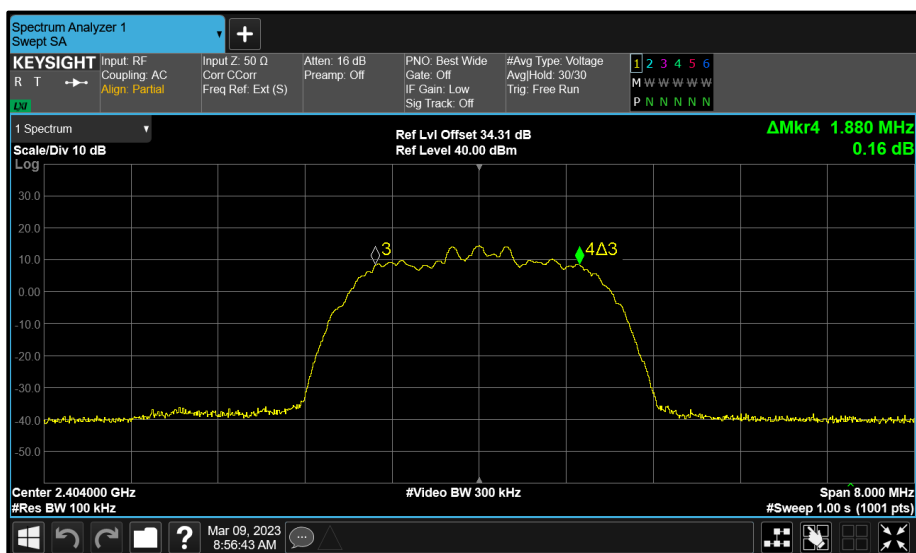


Figure 38 - Core 0 (B) 2404 MHz (CH2) 6 dB Bandwidth

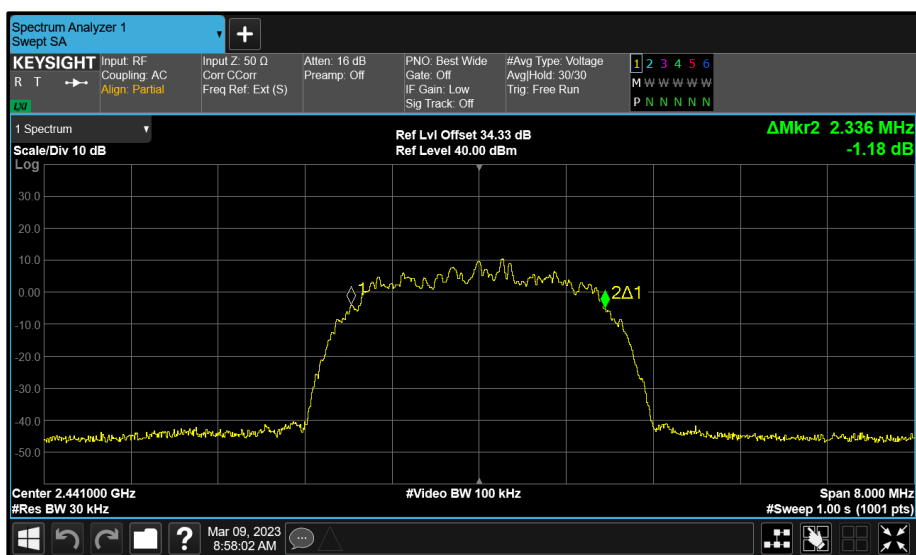


Figure 39 - Core 0 (B) 2441 MHz (CH39) 99% Bandwidth

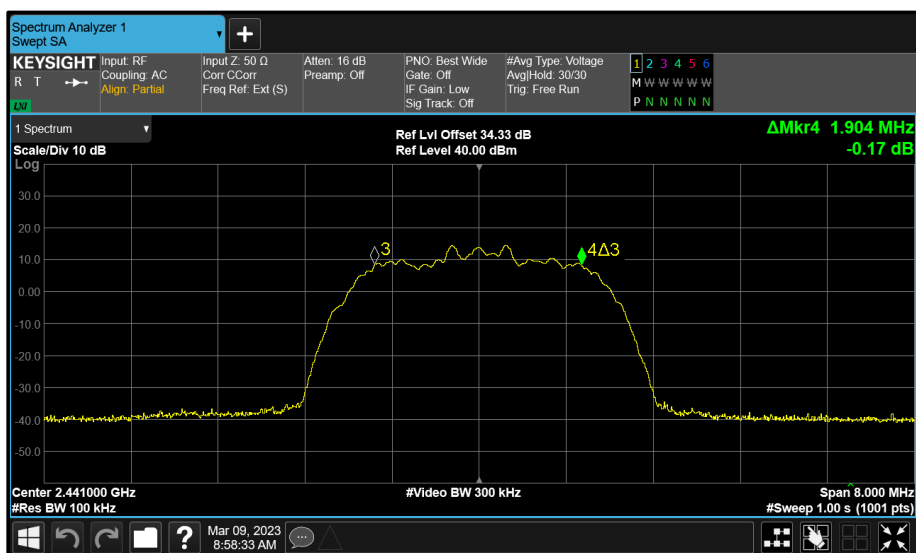


Figure 40 - Core 0 (B) 2441 MHz (CH39) 6 dB Bandwidth

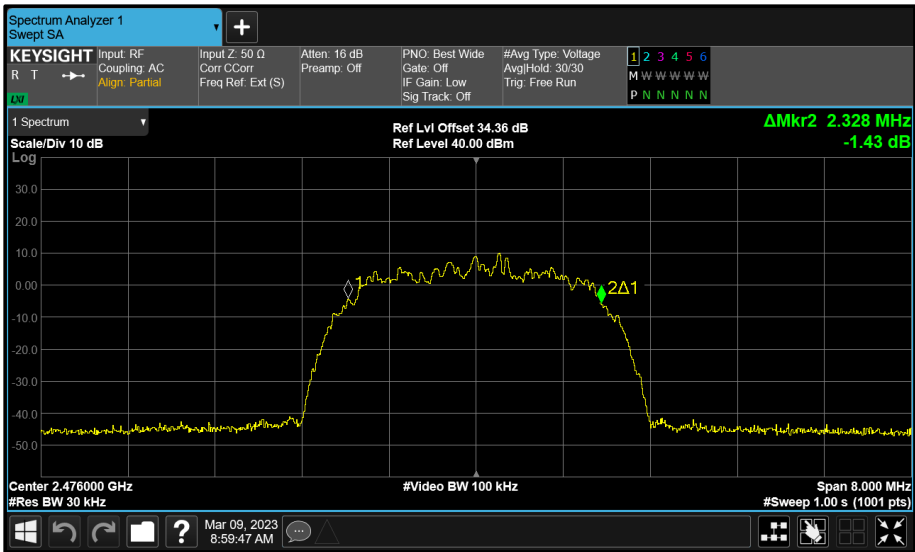


Figure 41 - Core 0 (B) 2476 MHz (CH74) 99% Bandwidth

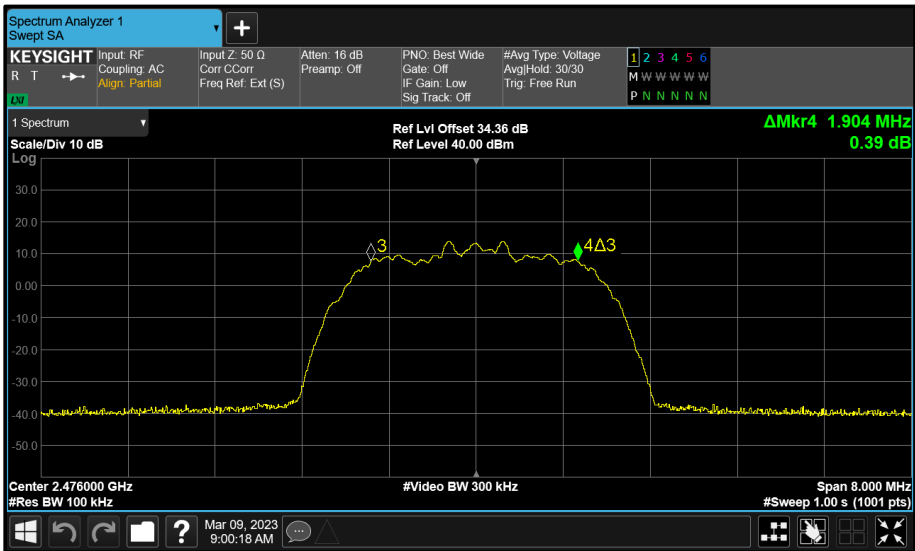


Figure 42 - Core 0 (B) 2476 MHz (CH74) 6 dB Bandwidth



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:	ePA $\pi/4$ DQPSK (8-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	1.020	-	-	≥ 500.0
2441	-	1.005	-	-	≥ 500.0
2476	-	1.020	-	-	≥ 500.0

Table 15 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	4.425	-	-	-
2441	-	4.425	-	-	-
2476	-	4.440	-	-	-

Table 16 - 99% Bandwidth Results

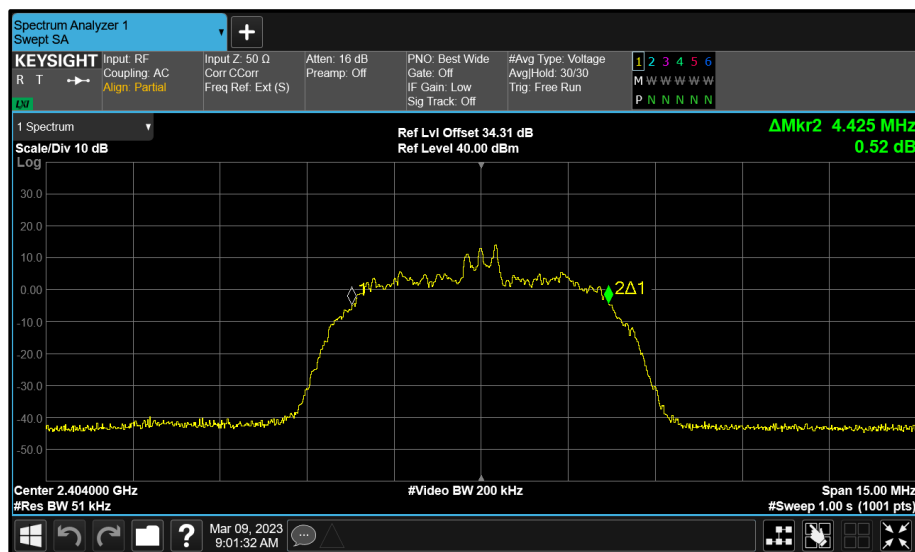


Figure 43 - Core 0 (B) 2404 MHz (CH2) 99% Bandwidth

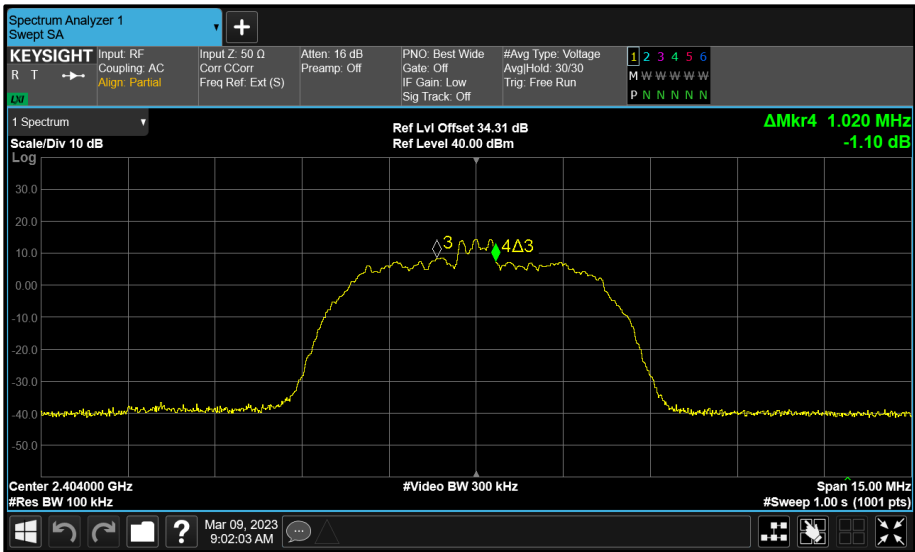


Figure 44 - Core 0 (B) 2404 MHz (CH2) 6 dB Bandwidth

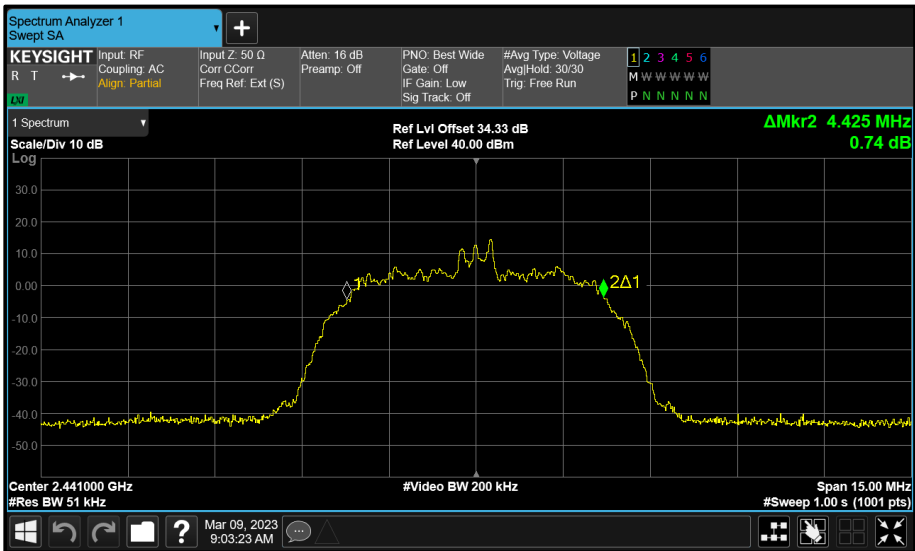


Figure 45 - Core 0 (B) 2441 MHz (CH39) 99% Bandwidth

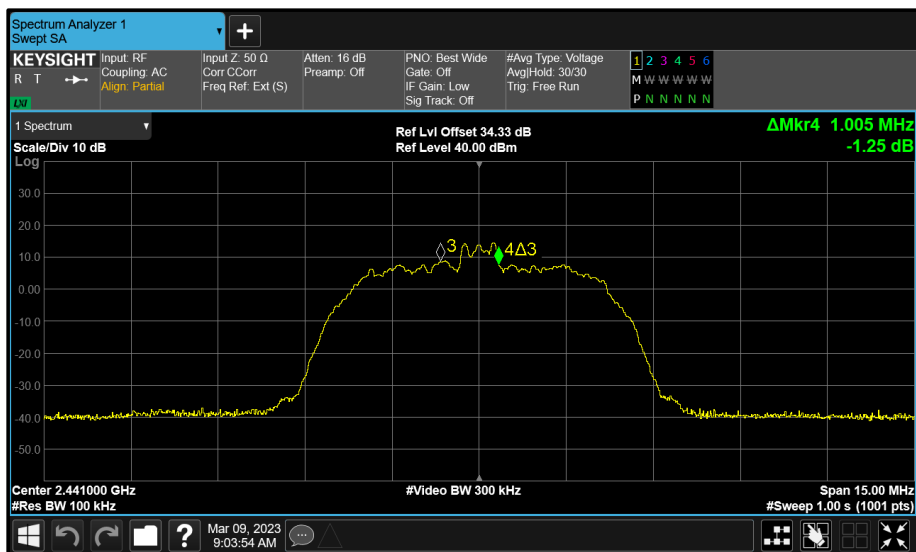


Figure 46 - Core 0 (B) 2441 MHz (CH39) 6 dB Bandwidth

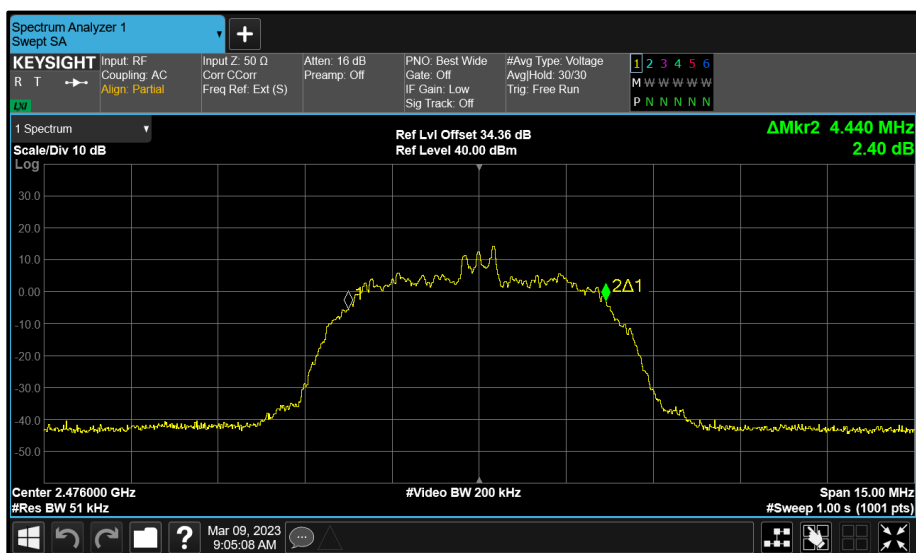


Figure 47 - Core 0 (B) 2476 MHz (CH74) 99% Bandwidth

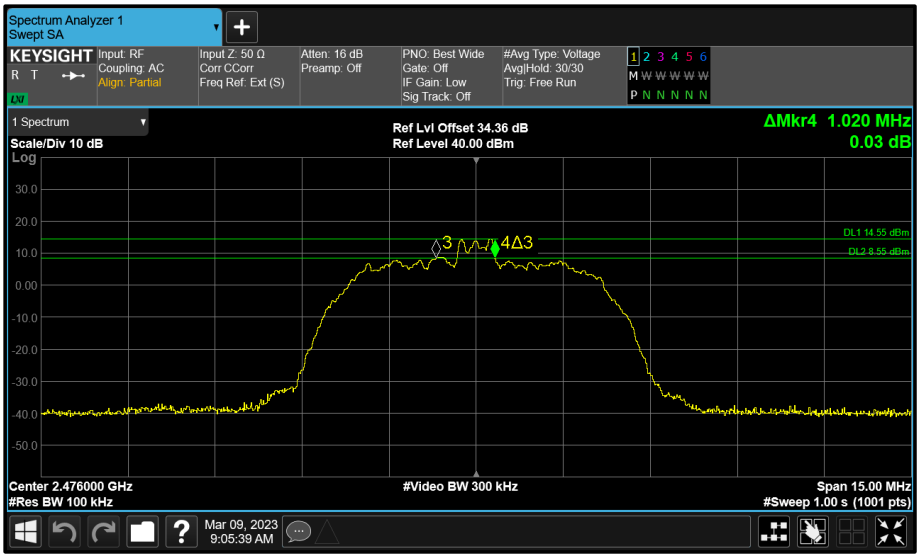


Figure 48 - Core 0 (B) 2476 MHz (CH74) 6 dB Bandwidth



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:	ePA $\pi/4$ DQPSK (4-DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	1.904	1.896	-	≥ 500.0
2441	-	1.896	1.896	-	≥ 500.0
2476	-	1.904	1.904	-	≥ 500.0

Table 17 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	2.328	2.328	-	-
2441	-	2.328	2.328	-	-
2476	-	2.336	2.328	-	-

Table 18 - 99% Bandwidth Results

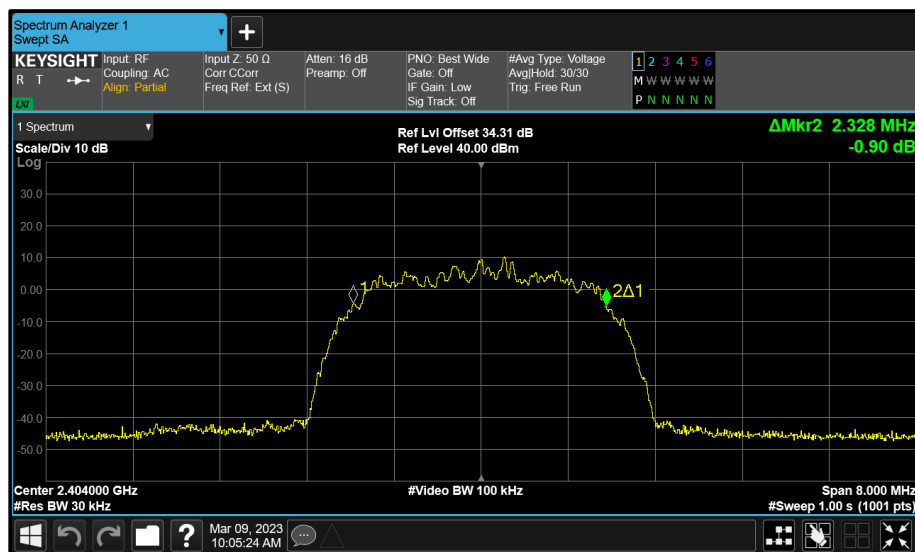


Figure 49 - Core 0 (B) 2404 MHz (CH2) 99% Bandwidth

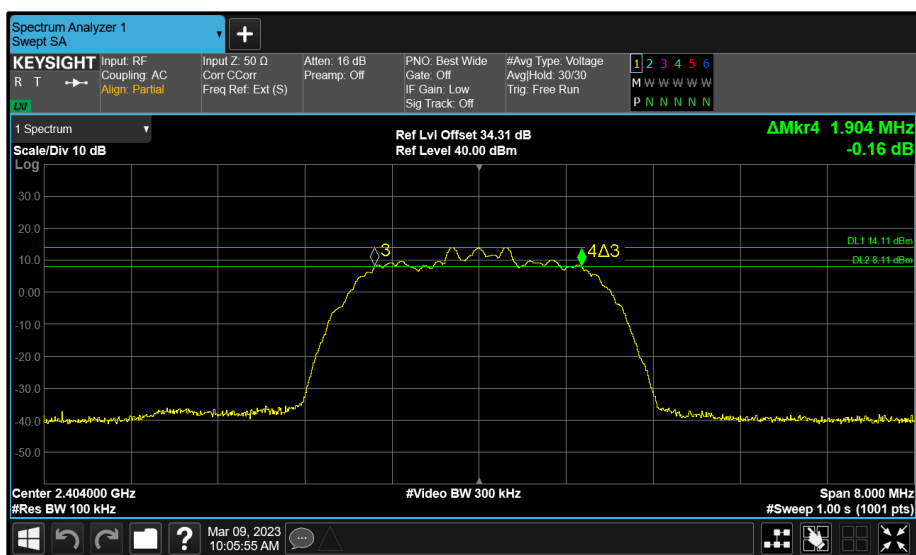


Figure 50 - Core 0 (B) 2404 MHz (CH2) 6 dB Bandwidth

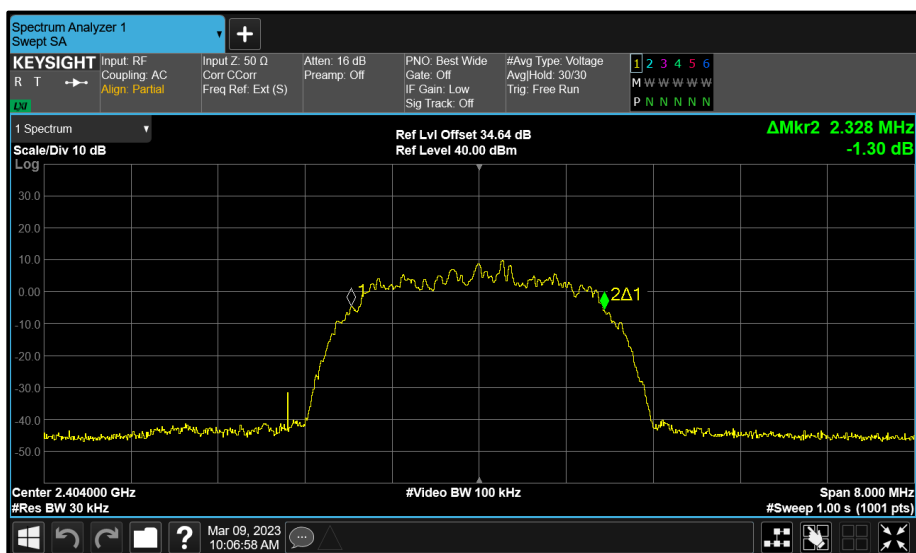


Figure 51 - Core 1 (C) 2404 MHz (CH2) 99% Bandwidth

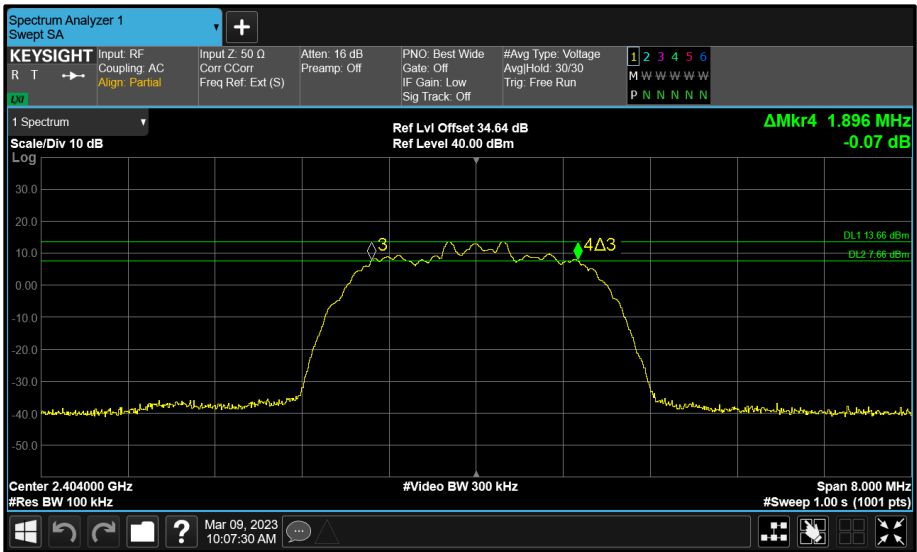


Figure 52 - Core 1 (C) 2404 MHz (CH2) 6 dB Bandwidth

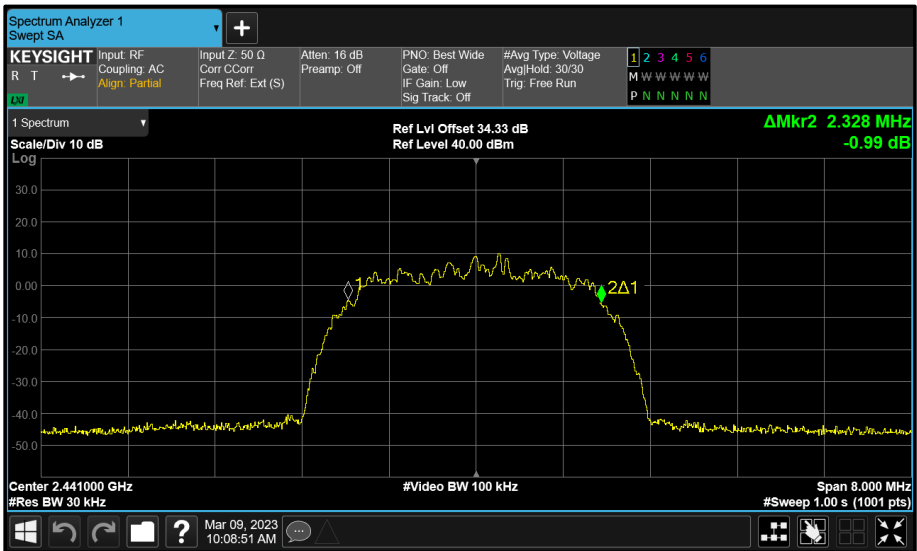


Figure 53 - Core 0 (B) 2441 MHz (CH39) 99% Bandwidth

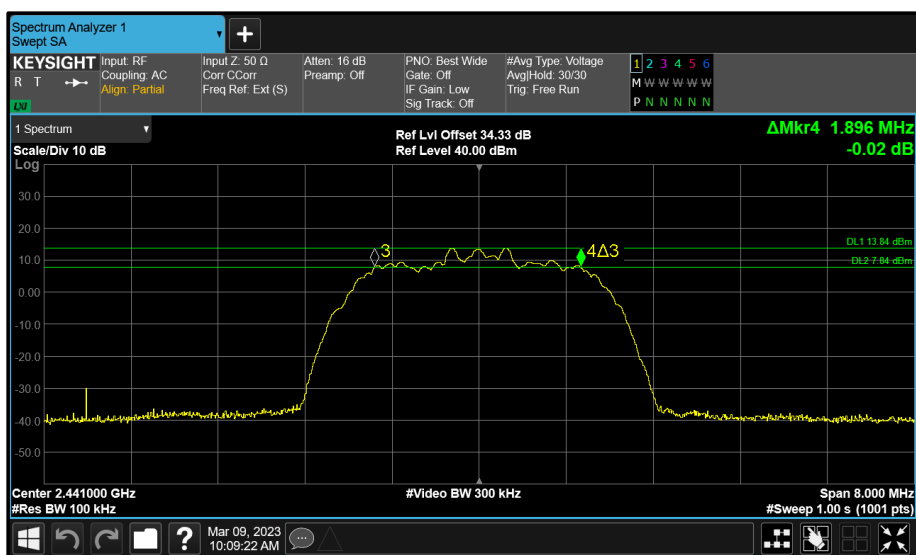


Figure 54 - Core 0 (B) 2441 MHz (CH39) 6 dB Bandwidth

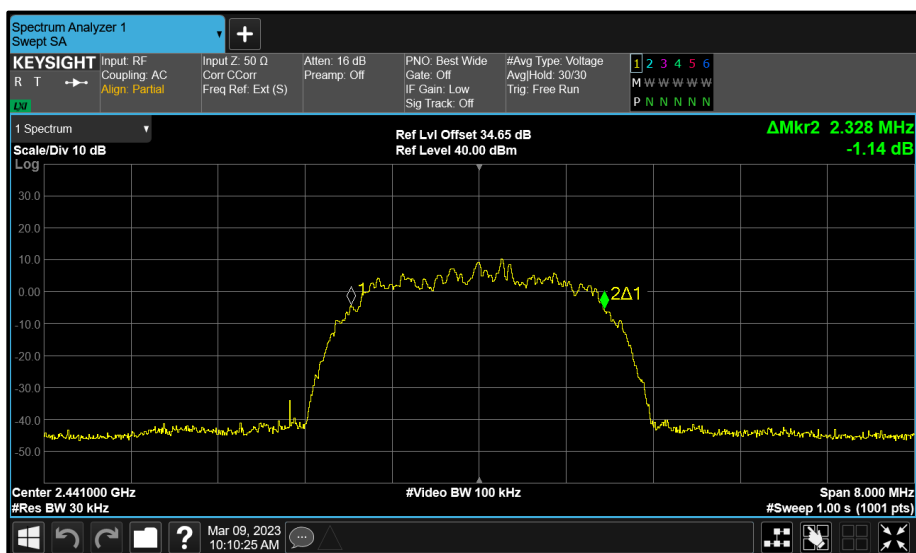


Figure 55 - Core 1 (C) 2441 MHz (CH39) 99% Bandwidth

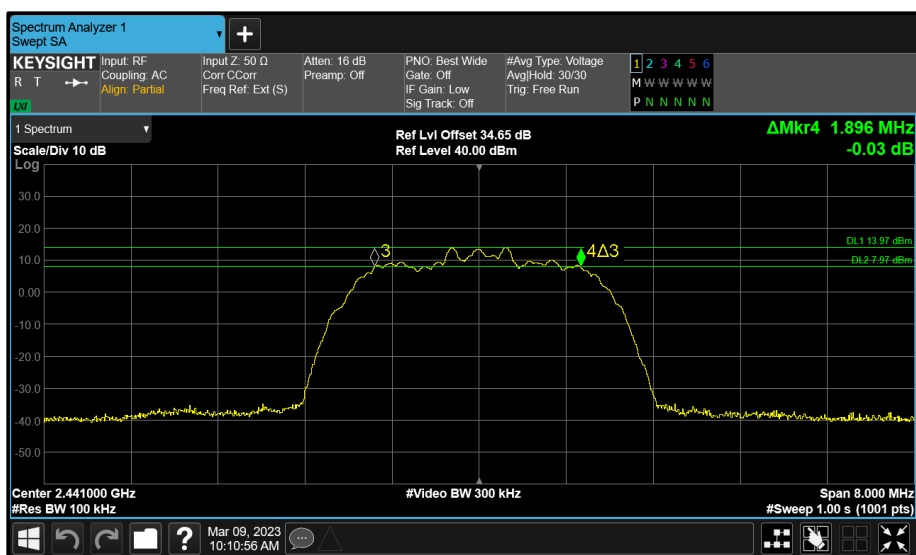


Figure 56 - Core 1 (C) 2441 MHz (CH39) 6 dB Bandwidth

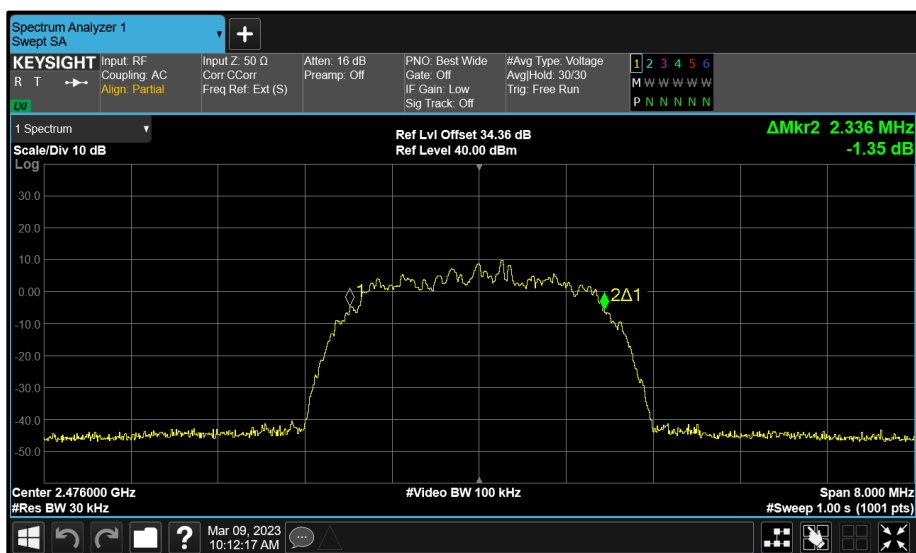


Figure 57 - Core 0 (B) 2476 MHz (CH74) 99% Bandwidth

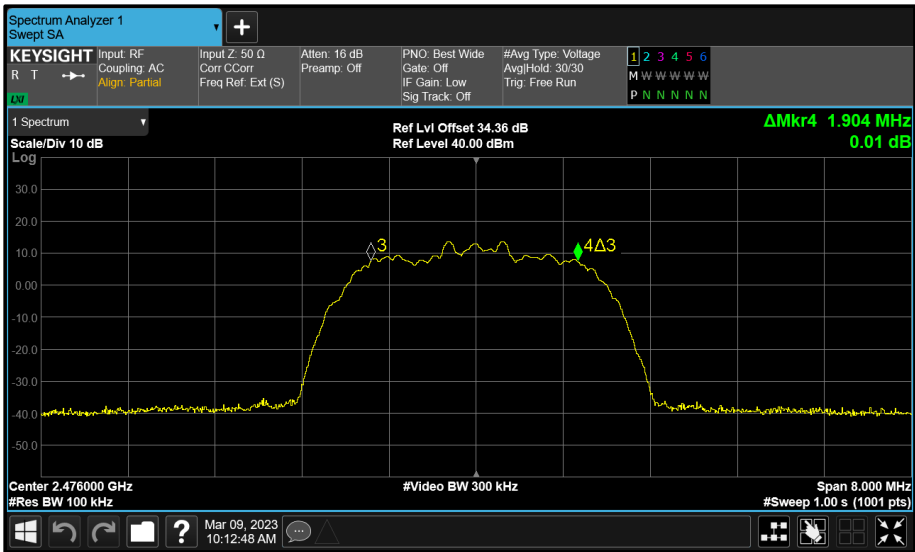


Figure 58 - Core 0 (B) 2476 MHz (CH74) 6 dB Bandwidth

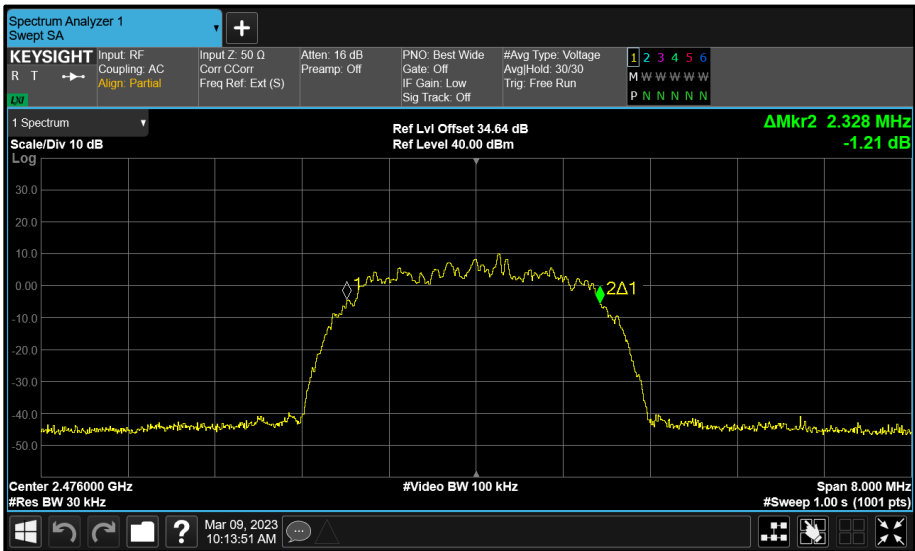


Figure 59 - Core 1 (C) 2476 MHz (CH74) 99% Bandwidth

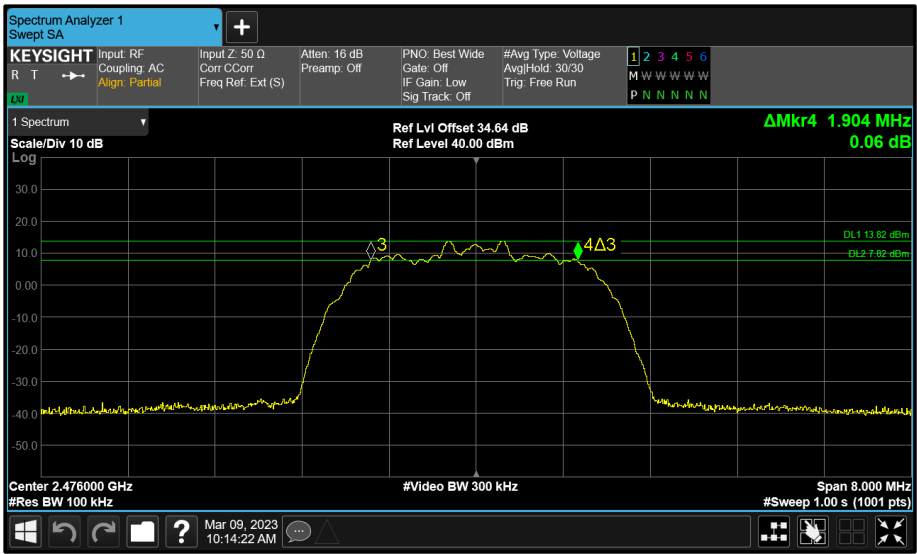


Figure 60 - Core 1 (C) 2476 MHz (CH74) 6 dB Bandwidth



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:	ePA $\pi/4$ DQPSK (8-DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	1.035	1.020	-	≥ 500.0
2441	-	1.005	1.020	-	≥ 500.0
2476	-	1.020	1.020	-	≥ 500.0

Table 19 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	4.425	4.425	-	-
2441	-	4.425	4.425	-	-
2476	-	4.440	4.440	-	-

Table 20 - 99% Bandwidth Results

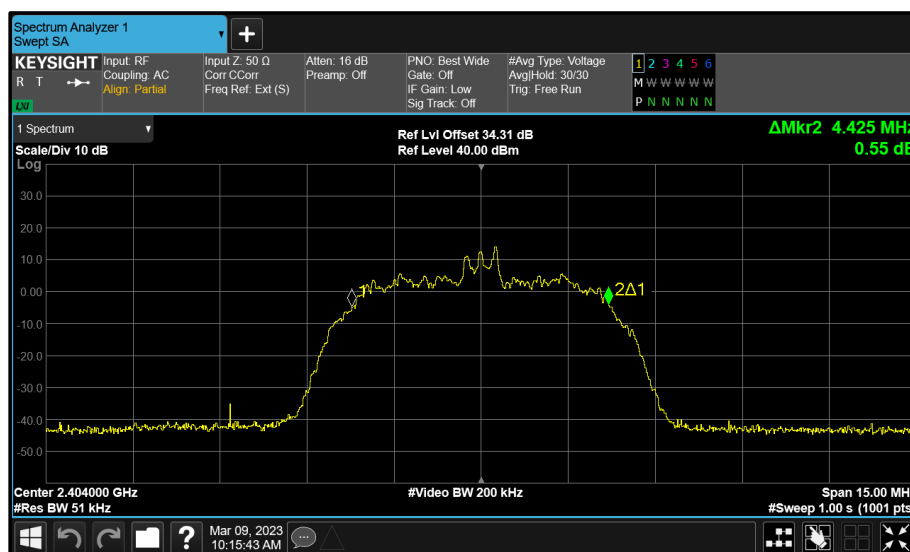


Figure 61 - Core 0 (B) 2404 MHz (CH2) 99% Bandwidth

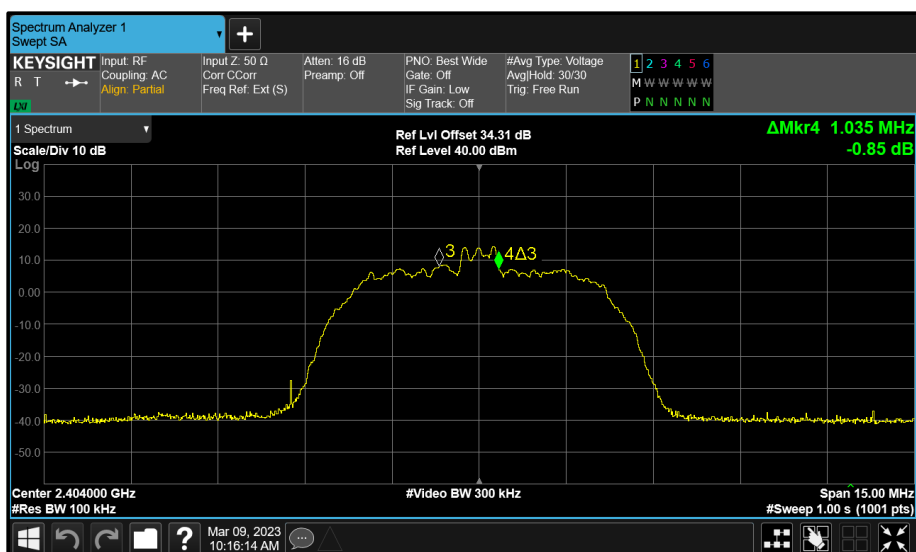


Figure 62 - Core 0 (B) 2404 MHz (CH2) 6 dB Bandwidth

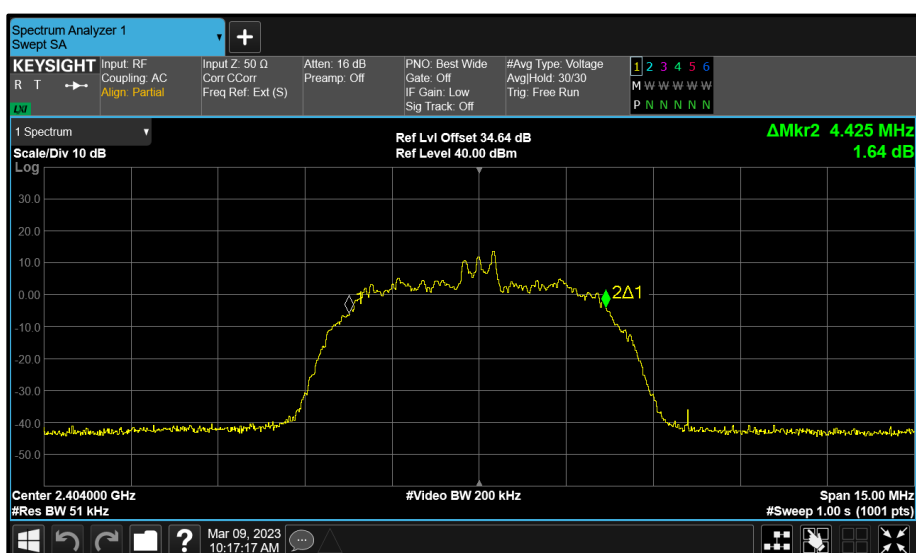


Figure 63 - Core 1 (C) 2404 MHz (CH2) 99% Bandwidth

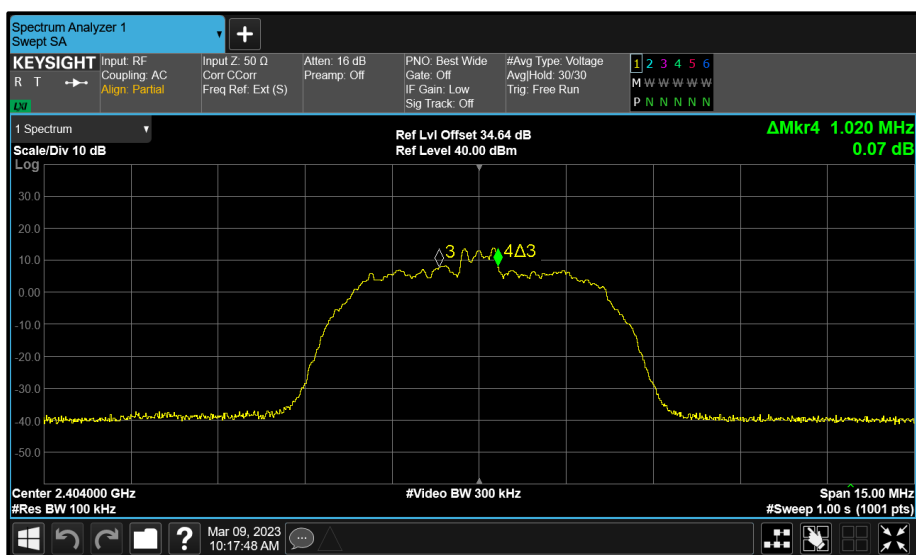


Figure 64 - Core 1 (C) 2404 MHz (CH2) 6 dB Bandwidth

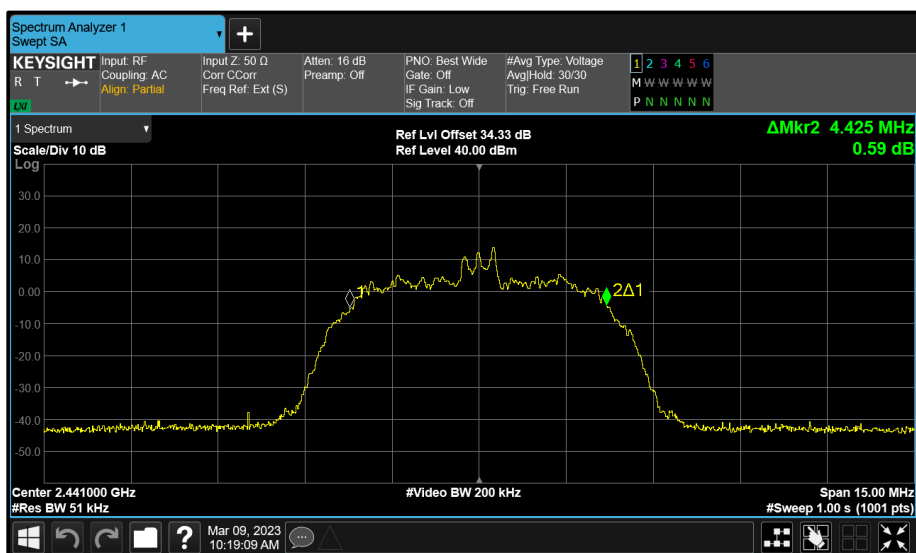


Figure 65 - Core 0 (B) 2441 MHz (CH39) 99% Bandwidth

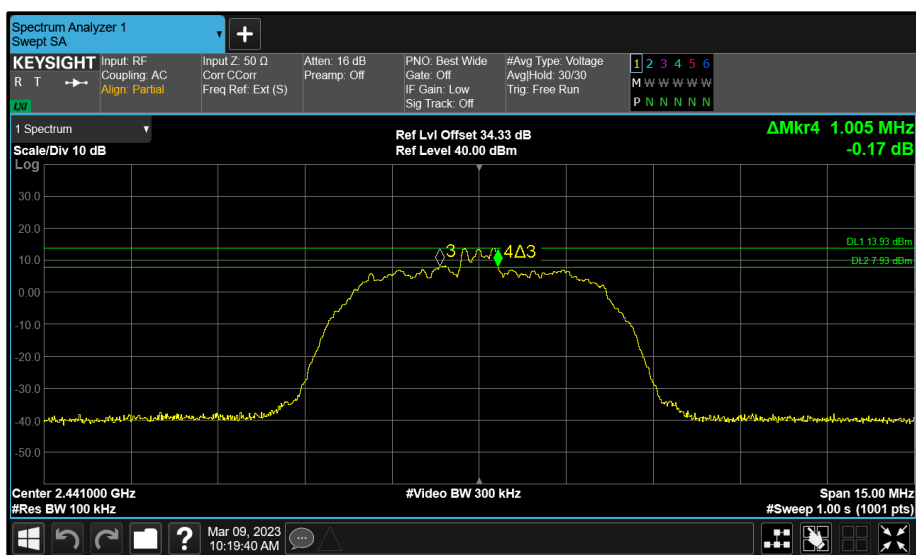


Figure 66 - Core 0 (B) 2441 MHz (CH39) 6 dB Bandwidth

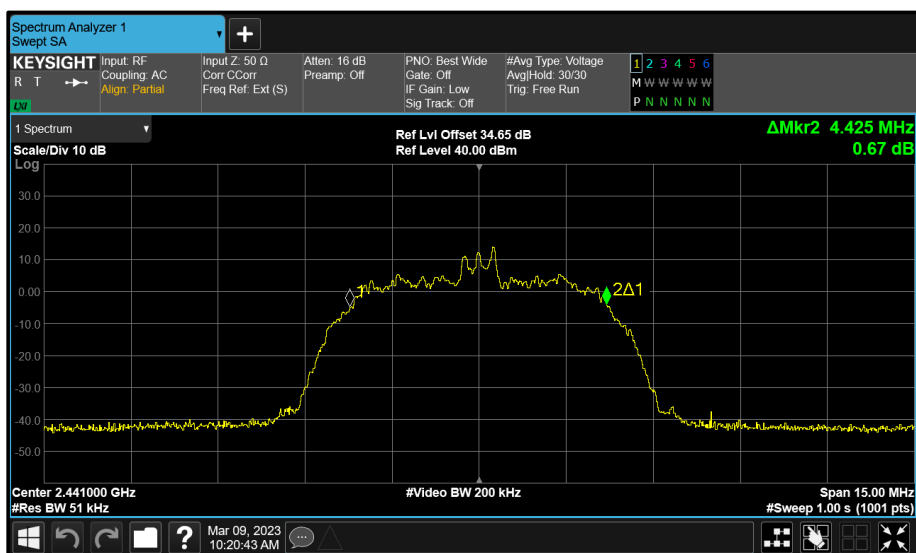


Figure 67 - Core 1 (C) 2441 MHz (CH39) 99% Bandwidth

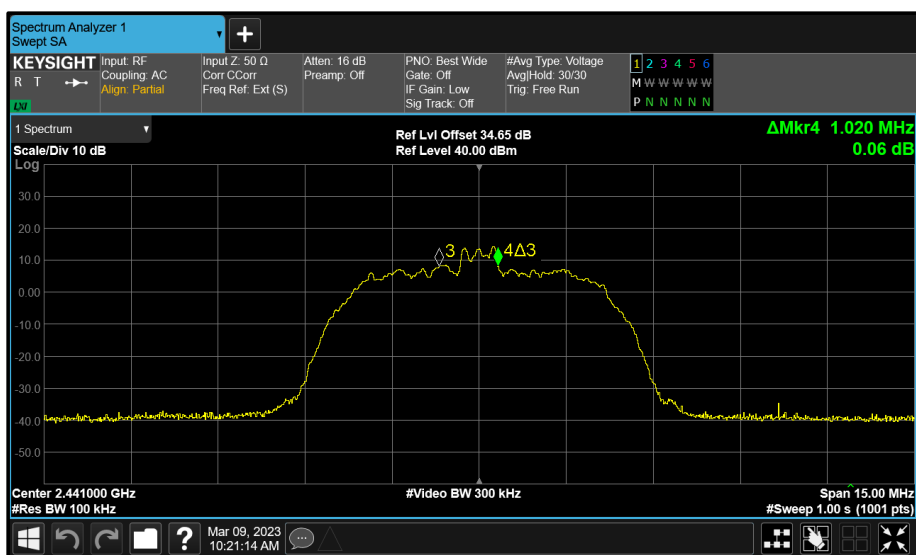


Figure 68 - Core 1 (C) 2441 MHz (CH39) 6 dB Bandwidth

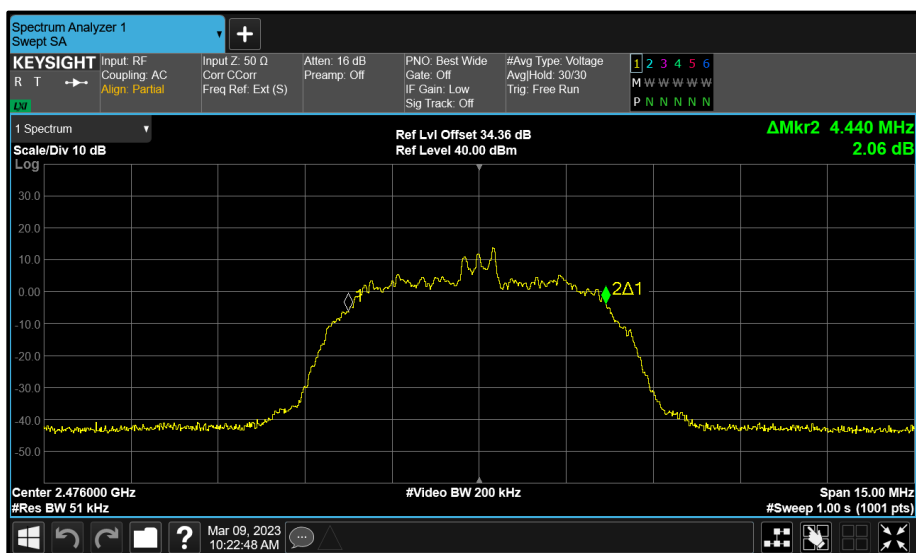


Figure 69 - Core 0 (B) 2476 MHz (CH74) 99% Bandwidth

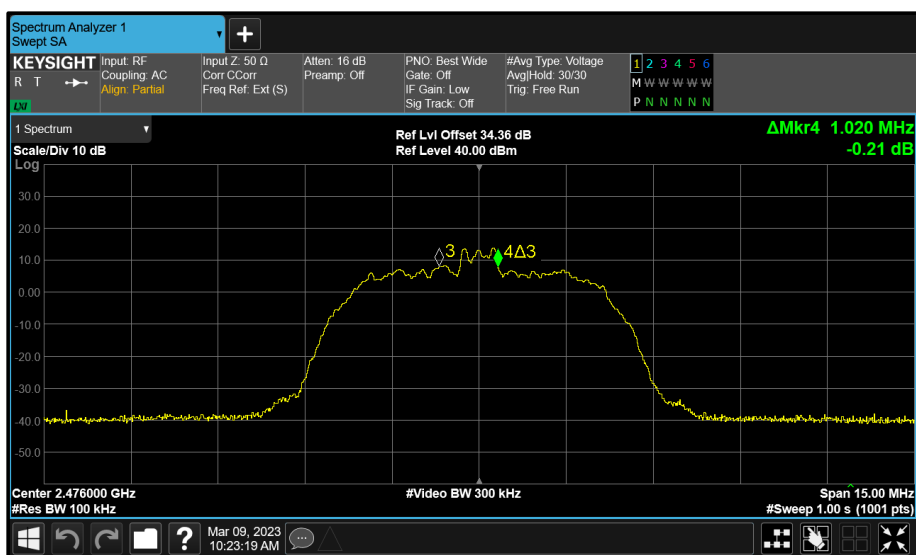


Figure 70 - Core 0 (B) 2476 MHz (CH74) 6 dB Bandwidth

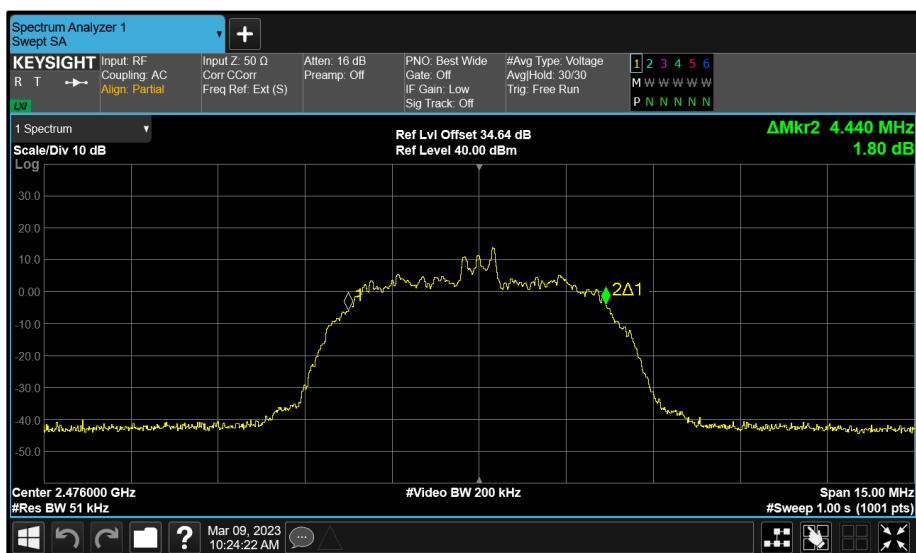


Figure 71 - Core 1 (C) 2476 MHz (CH74) 99% Bandwidth

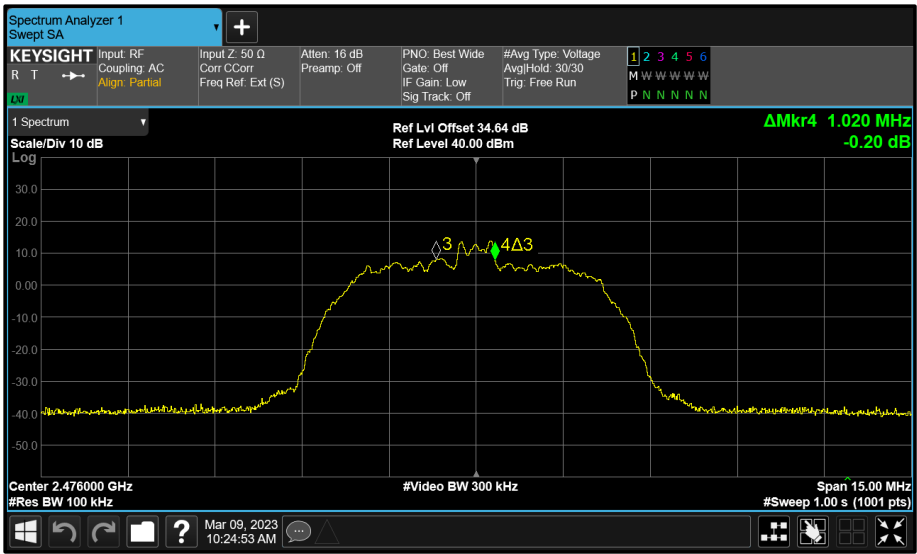


Figure 72 - Core 1 (C) 2476 MHz (CH74) 6 dB Bandwidth



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:	iPA $\pi/4$ DQPSK (4-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	1.896	-	-	≥ 500.0
2441	-	1.888	-	-	≥ 500.0
2476	-	1.896	-	-	≥ 500.0

Table 21 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	2.320	-	-	-
2441	-	2.320	-	-	-
2476	-	2.320	-	-	-

Table 22 - 99% Bandwidth Results

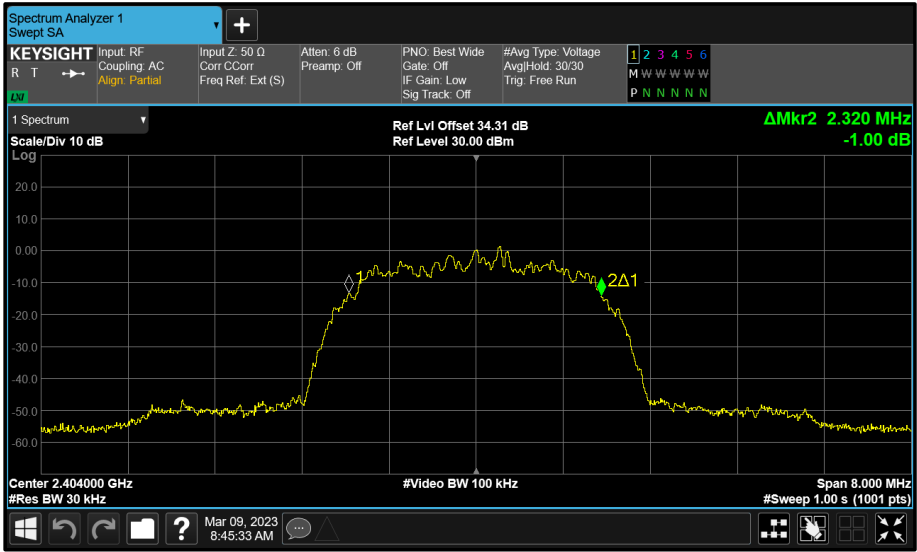


Figure 73 - Core 0 (B) 2404 MHz (CH2) 99% Bandwidth

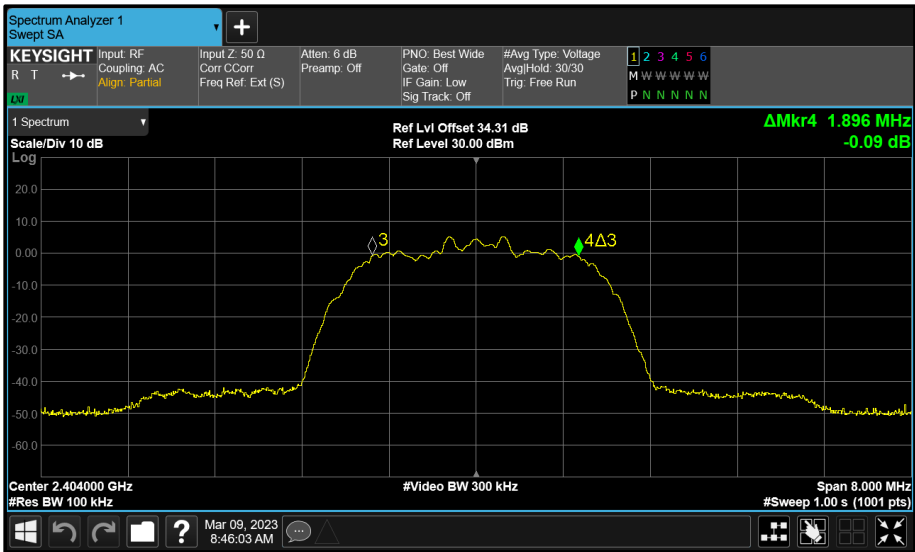


Figure 74 - Core 0 (B) 2404 MHz (CH2) 6 dB Bandwidth

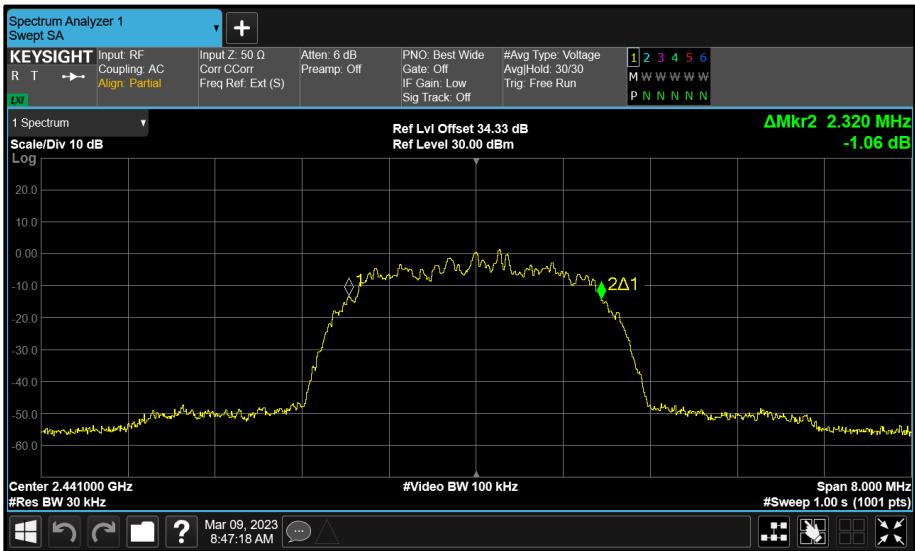


Figure 75 - Core 0 (B) 2441 MHz (CH39) 99% Bandwidth

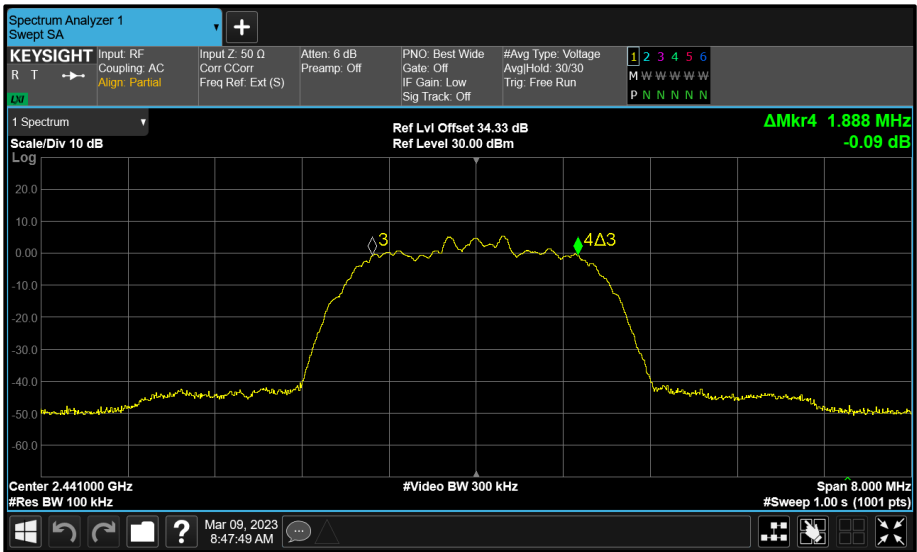


Figure 76 - Core 0 (B) 2441 MHz (CH39) 6 dB Bandwidth

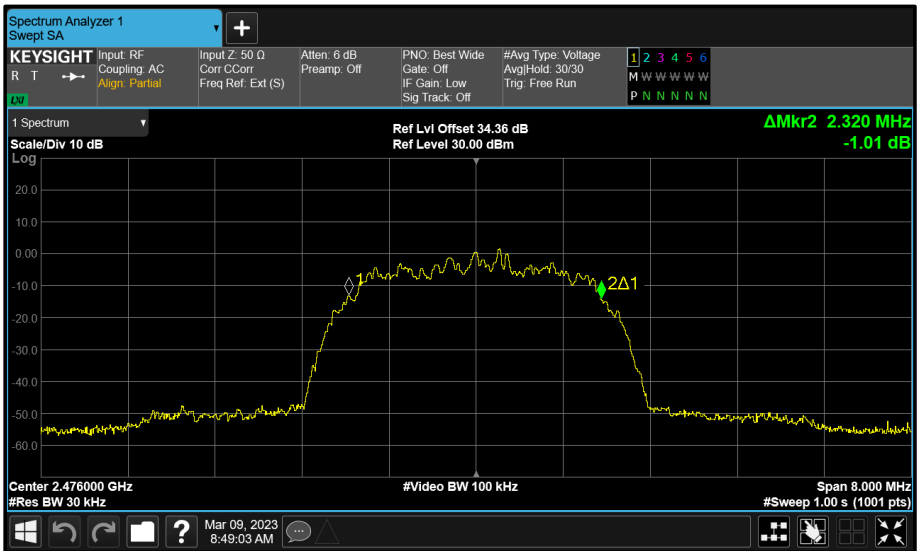


Figure 77 - Core 0 (B) 2476 MHz (CH74) 99% Bandwidth

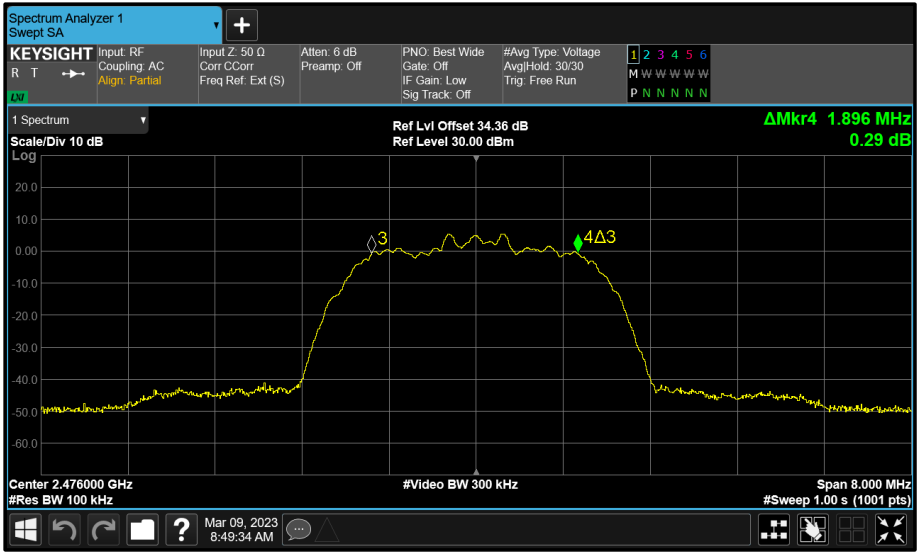


Figure 78 - Core 0 (B) 2476 MHz (CH74) 6 dB Bandwidth



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:	iPA $\pi/4$ DQPSK (8-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	1.020	-	-	≥ 500.0
2441	-	1.035	-	-	≥ 500.0
2476	-	1.005	-	-	≥ 500.0

Table 23 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	4.455	-	-	-
2441	-	4.455	-	-	-
2476	-	4.440	-	-	-

Table 24 - 99% Bandwidth Results

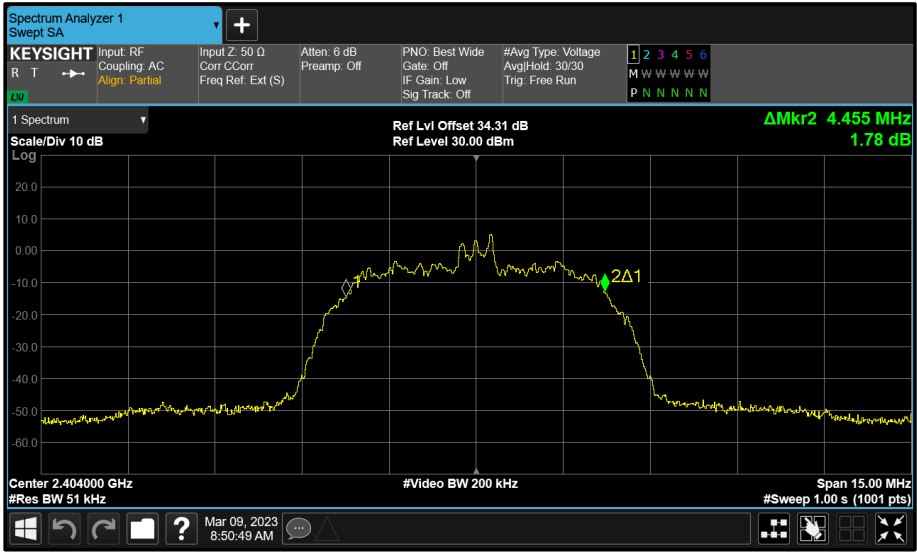


Figure 79 - Core 0 (B) 2404 MHz (CH2) 99% Bandwidth

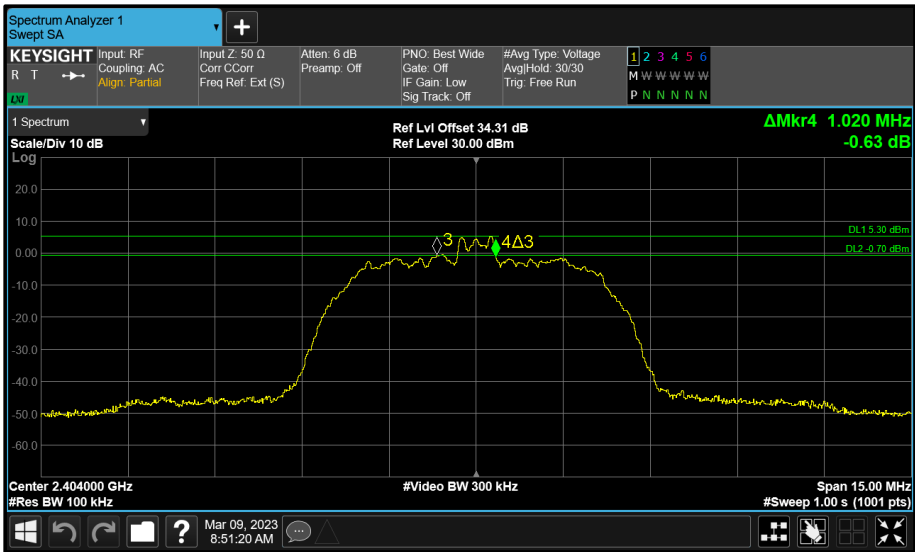


Figure 80 - Core 0 (B) 2404 MHz (CH2) 6 dB Bandwidth

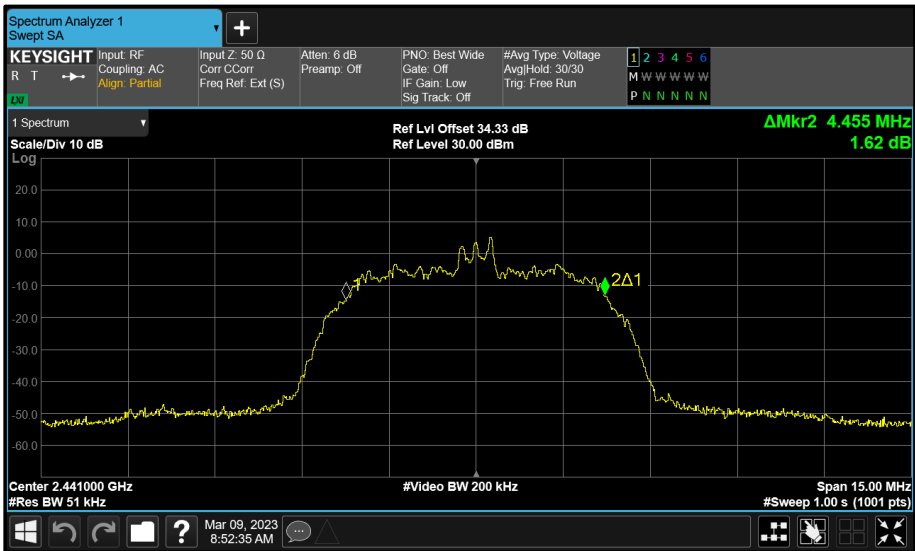


Figure 81 - Core 0 (B) 2441 MHz (CH39) 99% Bandwidth

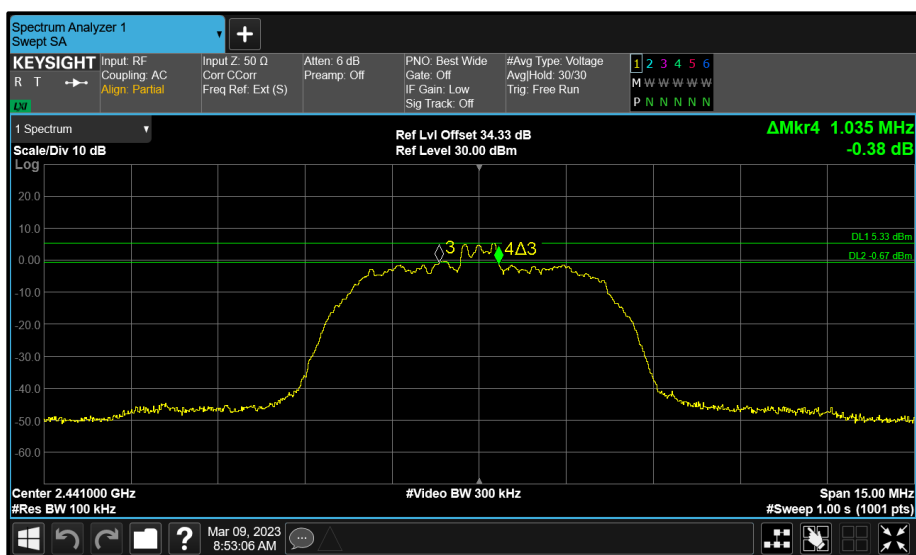


Figure 82 - Core 0 (B) 2441 MHz (CH39) 6 dB Bandwidth

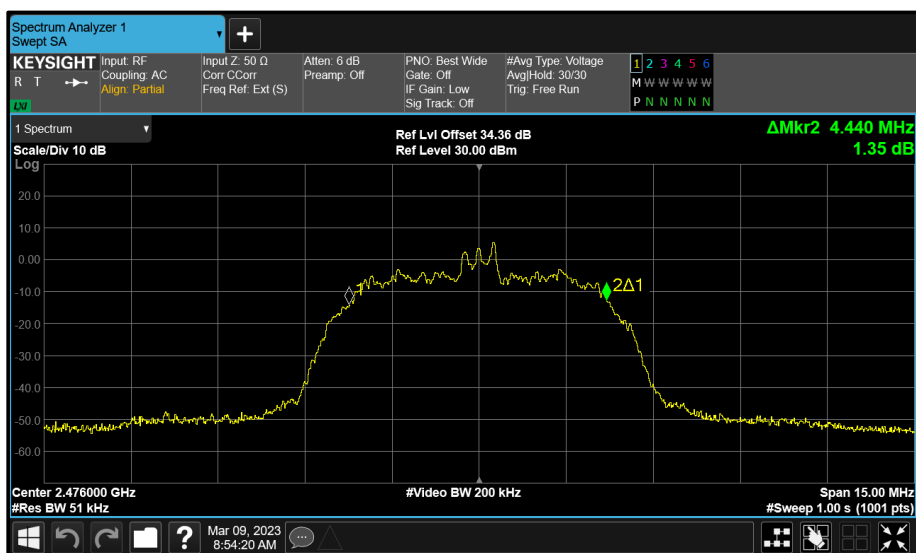


Figure 83 - Core 0 (B) 2476 MHz (CH74) 99% Bandwidth

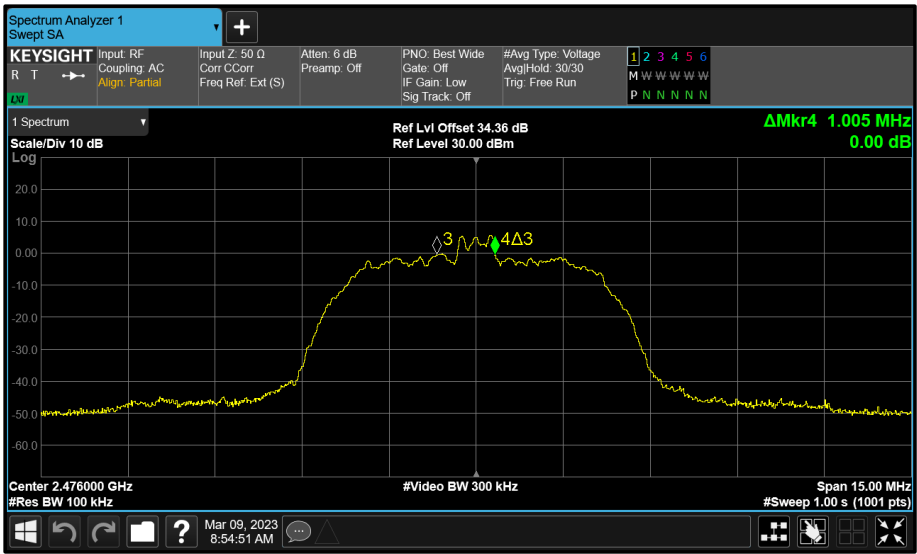


Figure 84 - Core 0 (B) 2476 MHz (CH74) 6 dB Bandwidth



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:	iPA $\pi/4$ DQPSK (4-DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	1.904	1.888	-	≥ 500.0
2441	-	1.888	1.904	-	≥ 500.0
2476	-	1.896	1.896	-	≥ 500.0

Table 25 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	2.320	2.320	-	-
2441	-	2.320	2.320	-	-
2476	-	2.320	2.320	-	-

Table 26 - 99% Bandwidth Results

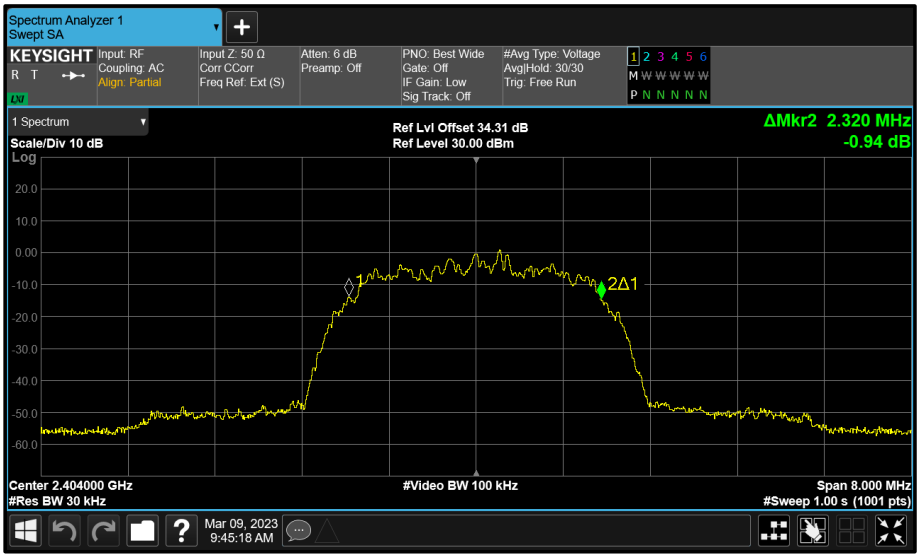


Figure 85 - Core 0 (B) 2404 MHz (CH2) 99% Bandwidth

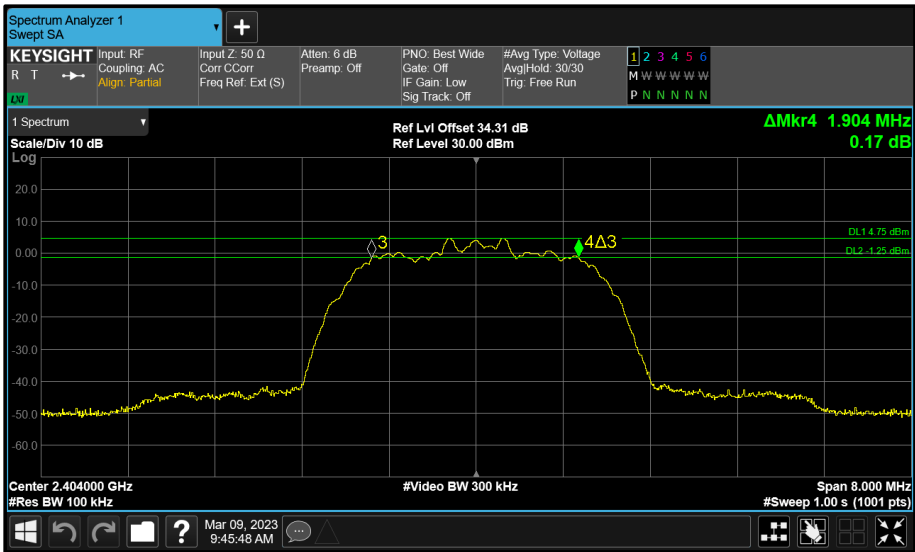


Figure 86 - Core 0 (B) 2404 MHz (CH2) 6 dB Bandwidth

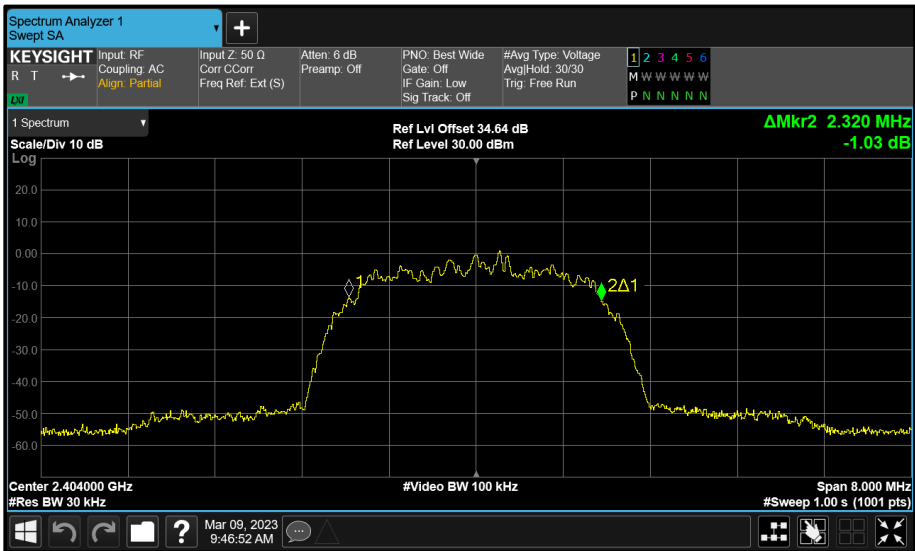


Figure 87 - Core 1 (C) 2404 MHz (CH2) 99% Bandwidth

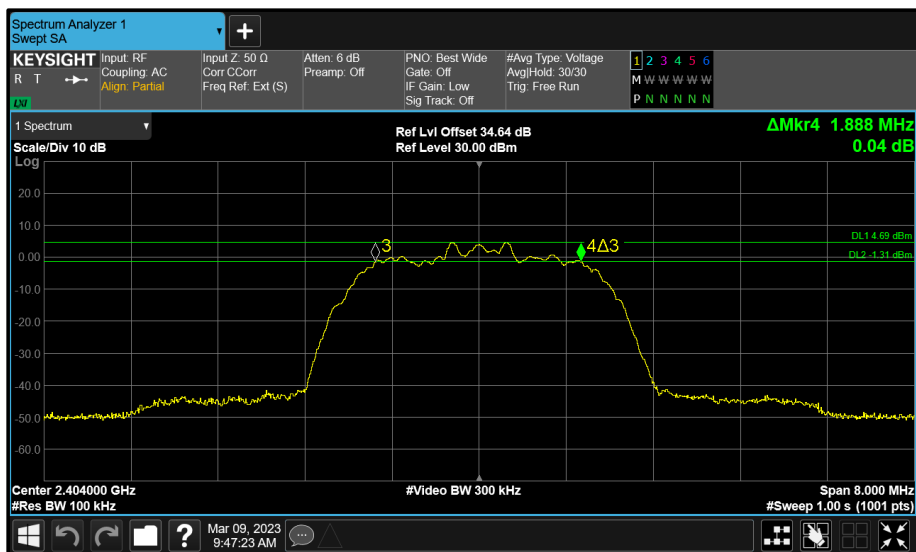


Figure 88 - Core 1 (C) 2404 MHz (CH2) 6 dB Bandwidth

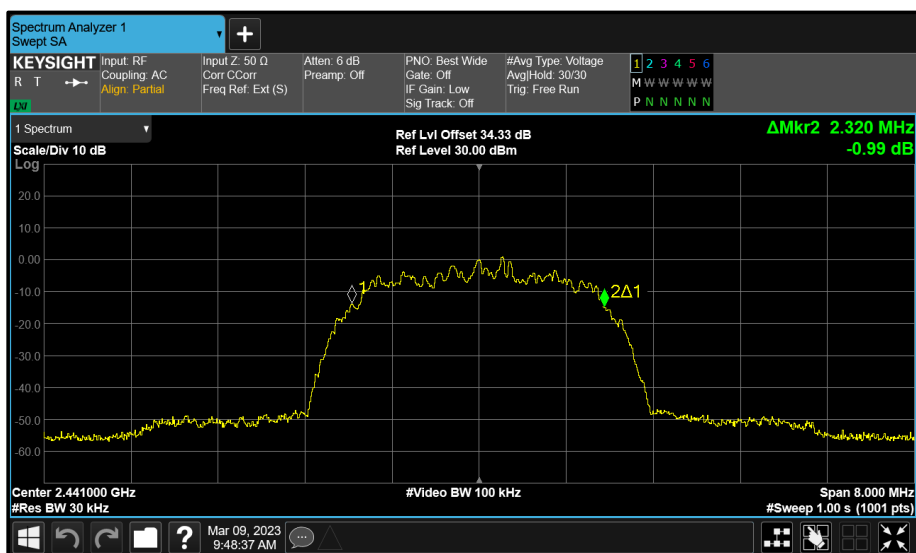


Figure 89 - Core 0 (B) 2441 MHz (CH39) 99% Bandwidth