FCC and ISED Test Report

Apple Inc
Model: A2780

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

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

FCC ID: BCGA2780 IC: 579C-A2780

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Document 75955429-13 Issue 01

SIGNATURE			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Steve Marshall	Senior Engineer	Authorised Signatory	18 November 2022

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

ENGINEERING STATEMENT
The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 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	Hollie Marshall	18 November 2022	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

ISED Accreditation
12669A Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15C: 2020, ISED RSS-247: Issue 2 (02-2017) and ISED RSS-GEN: Issue 5 (04-2018) + A2 (02-2021) for the tests detailed in section 1.3.

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Contents

1 Report Summary

1.1 Report Modification Record

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

Issue	Description of Change	Date of Issue
1	First Issue	17-November-2022

Table 1

1.2 Introduction

Applicant	Apple Inc
Manufacturer	Apple Inc
Model Number(s)	A2780
Serial Number(s)	FWC3JLYYHC and NW3J007K67
Hardware Version(s)	REV 1.0
Software Version(s)	22A31991j and 22A42770m
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 15C: 2020 ISED RSS-247: Issue 2 (02-2017) ISED RSS-GEN: Issue 5 (04-2018) + A2 (02-2021)
Order Number	0540246998
Start of Test	09-August-2022
Finish of Test	28-October-2022
Name of Engineer(s)	Faisal Malyar, James Woods, Nicolae Mihailiuc, Elliot Callender, Ioan-Alexandru Bogatu, and Thomas Biddlecombe
Related Document(s)	ANSI C63.10 (2013) ANSI C63.10 (2020) ANSI 63.4 (2014) KDB 662911 D01 v02r01

1.3 Brief Summary of Results

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

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	FCC 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 was an Apple laptop computer with Bluetooth® and IEEE 802.11 a/b/g/n/ac/ax Wi-Fi capabilities in the 2.4GHz, 5GHz and 6GHz bands.

1.4.2 Test 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.

For tests in SISO operation, conducted tests were performed on the BT Dedicated Core (BT Core 2) as well as the Core from the main radio with the highest antenna gain as Core 0 and Core 1 are identical but with unequal antenna gains.

Bluetooth LE/HDR was assessed as a DTS system. The EUT supports Bluetooth on the following mode of operations 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
BT Core 2 (SISO) – iPA HDR/LE

For all tests, the EUT was put into a continuous transmit test mode with the manufacturer's test commands via a script running in the EUTs terminal application. 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	4.60	0.70
BT Core 1	2400 to 2480	6.13	0.70
BT Core 2	2400 to 2480	6.02	0.70

Table 3

1.5 Deviations from the Standard

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

1.6 EUT Modification Record

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

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

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

Table 4

1.7 Test Location

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

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: 2.4 GHz Bluetooth - DTS		
Emission Bandwidth	Thomas Biddlecombe	UKAS
Maximum Conducted Output Power	Thomas Biddlecombe	UKAS
Power Spectral Density	Thomas Biddlecombe	UKAS

Table 5

Office Address:

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

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

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: 2.4 GHz Bluetooth - DTS		
Restricted Band Edges	Faisal Malyar, James Woods, Nicolae Mihailiuc and Elliot Callender	UKAS
Spurious Radiated Emissions	Ioan-Alexandru Bogatu and Nicolae Mihailiuc	UKAS
Authorised Band Edges	James Woods, Nicolae Mihailiuc, Faisal Malyar and Elliot Callender	UKAS

Table 6

Office Address:

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

2 Test Details

2.1 Restricted Band Edges

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.205
ISED RSS-247, Clause 6.1
ISED RSS-GEN, Clause 8.10

2.1.2 Equipment Under Test and Modification State

A2780, S/N: FWC3JLYYHC - Modification State 0

2.1.3 Date of Test

09-August-2022 to 11-August-2022

2.1.4 Test Method

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

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

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

2.1.5 Environmental Conditions

Ambient Temperature	21.7 - 23.0 °C
Relative Humidity	42.4 - 52.1 %

2.1.6 Test Results

2.4 GHz Bluetooth – DTS

Bluetooth LE - LE1M iPA

Modulation	Tx Frequency (MHz)	Core	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
GFSK/DH1	2402	Core 1	2390.0	54.46	42.19
GFSK/DH1	2480	Core 1	2483.5	53.28	42.21

Table 7 - Restricted Band Edge Results

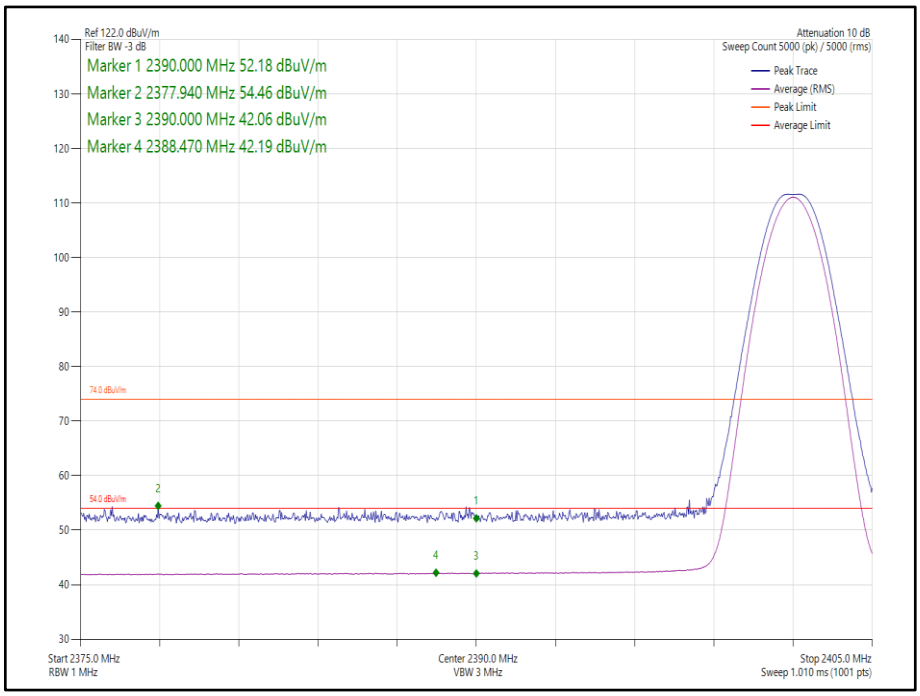

Figure 1 Core 1 – GFSK/DH1 - 2402 MHz - Band Edge Frequency 2390.0 MHz

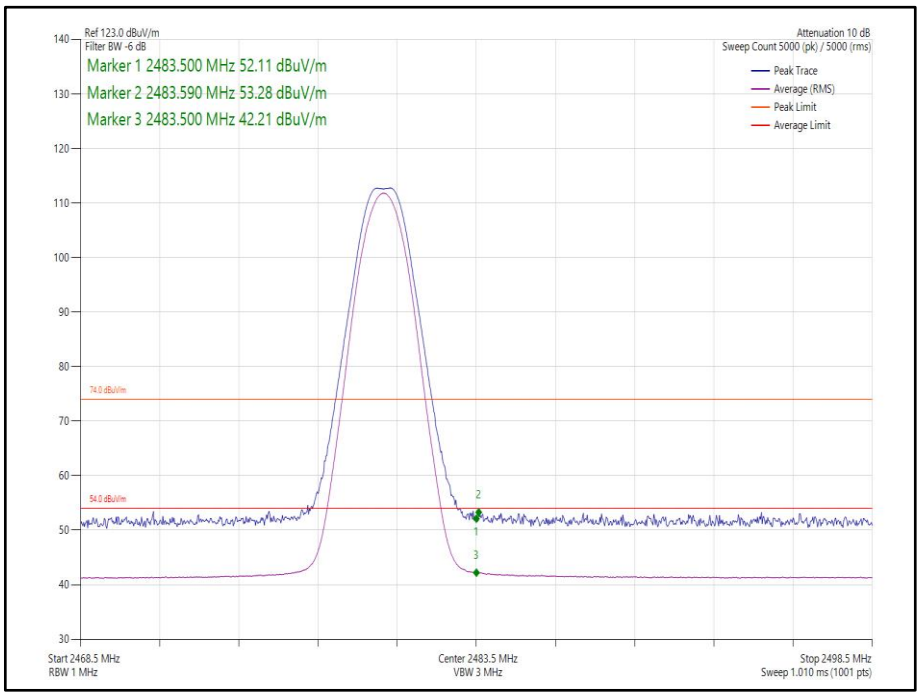

Figure 2 Core 1 – GFSK/DH1 - 2480 MHz - Band Edge Frequency 2483.5 MHz

Bluetooth LE - LE1M iPA

Modulation	Tx Frequency (MHz)	Core	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
GFSK/DH1	2402	Core 2	2390.0	54.56	42.23
GFSK/DH1	2480	Core 2	2483.5	53.79	42.46

Table 8 - Restricted Band Edge Results

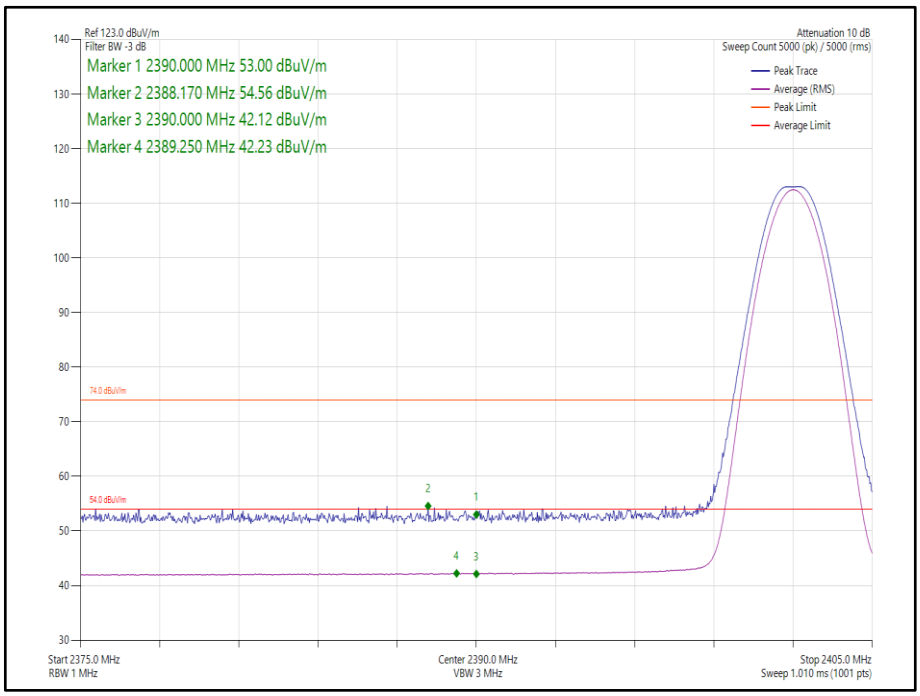

Figure 3 Core 2 – GFSK/DH1 - 2402 MHz - Band Edge Frequency 2390.0 MHz

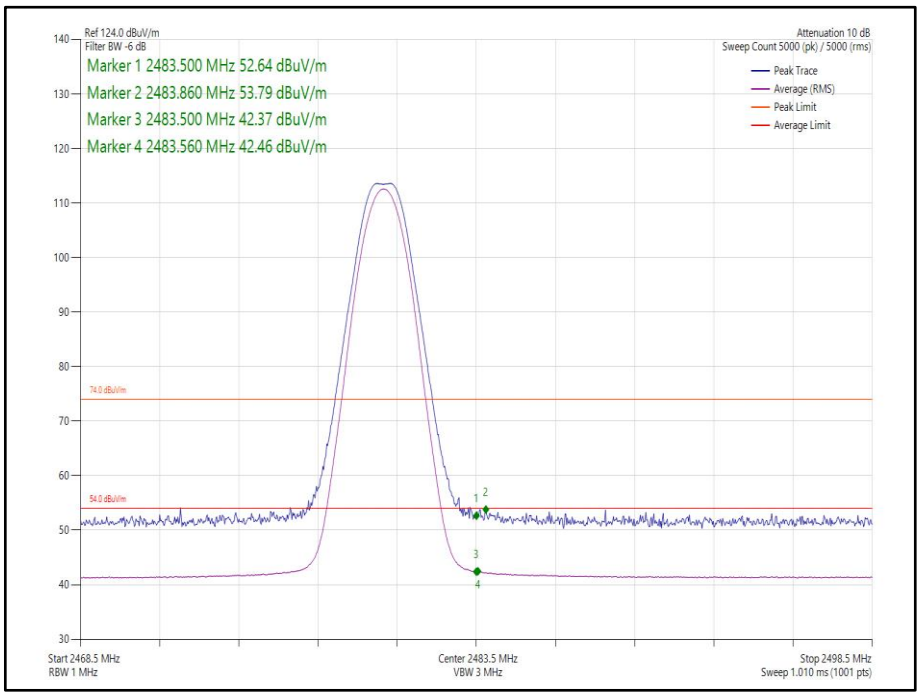

Figure 4 Core 2 – GFSK/DH1 - 2480 MHz - Band Edge Frequency 2483.5 MHz

Bluetooth LE - LE1M iPA

Modulation	Tx Frequency (MHz)	Core	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
GFSK/DH1	2402	Core 0-1	2390.0	54.81	43.10
GFSK/DH1	2480	Core 0-1	2483.5	55.98	44.14

Table 9 - Restricted Band Edge Results

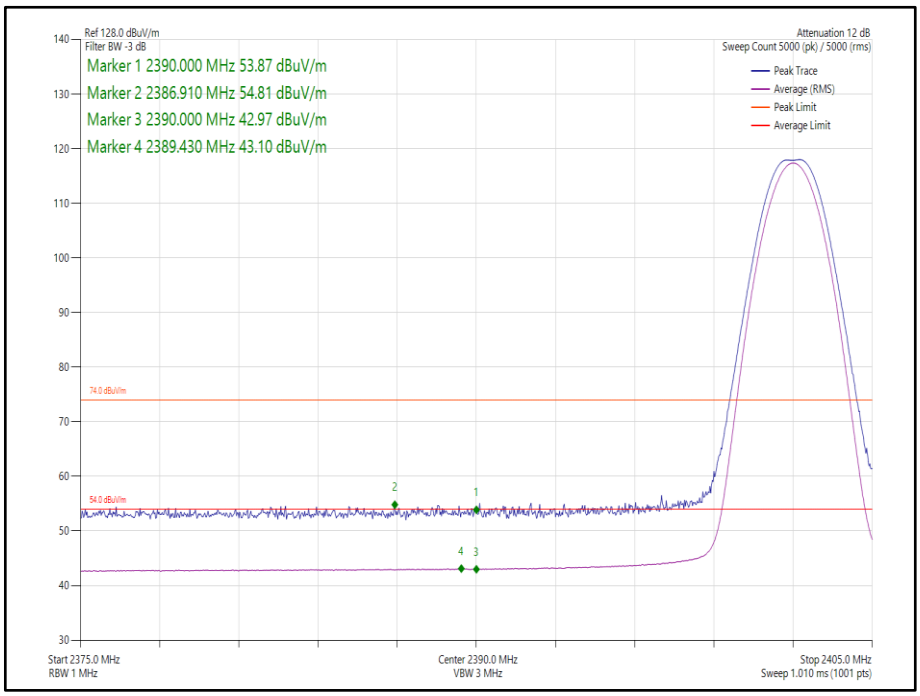

Figure 5 Core 0-1 – GFSK/DH1 - 2402 MHz - Band Edge Frequency 2390.0 MHz

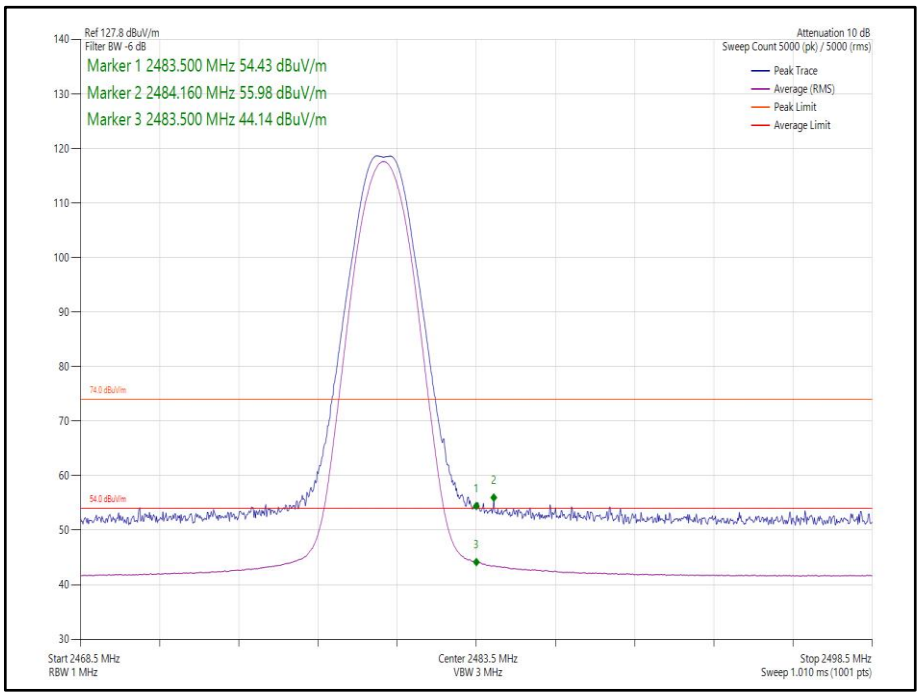

Figure 6 Core 0-1 – GFSK/DH1 - 2480 MHz - Band Edge Frequency 2483.5 MHz

Bluetooth LE – LE2M iPA

Modulation	Tx Frequency (MHz)	Core	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
GFSK/DH1	2402	Core 1	2390.0	54.87	42.15
GFSK/DH1	2480	Core 1	2483.5	58.97	49.67

Table 10 - Restricted Band Edge Results

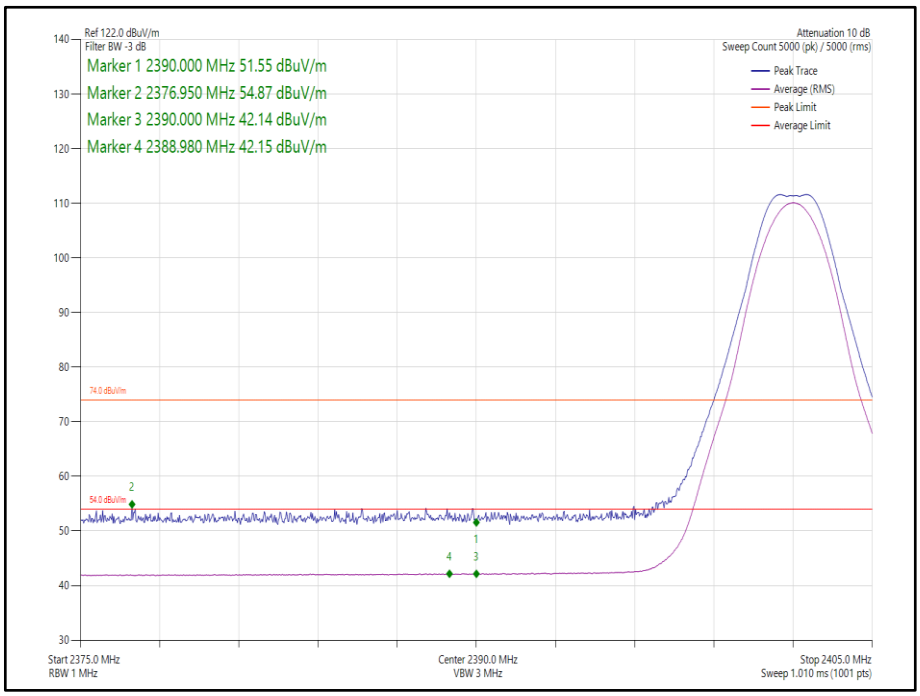

Figure 7 Core 1 – GFSK/DH1 - 2402 MHz - Band Edge Frequency 2390.0 MHz

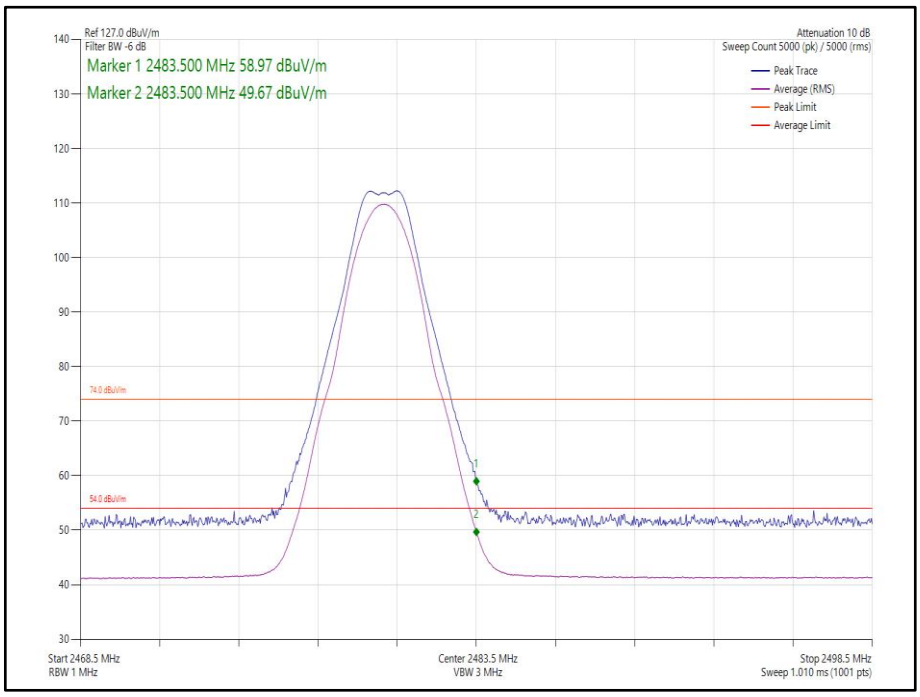

Figure 8 Core 1 – GFSK/DH1 - 2480 MHz - Band Edge Frequency 2483.5 MHz

Bluetooth LE – LE2M iPA

Modulation	Tx Frequency (MHz)	Core	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
GFSK/DH1	2402	Core 2	2390.0	54.20	42.26
GFSK/DH1	2480	Core 2	2483.5	61.37	51.18

Table 11 - Restricted Band Edge Results

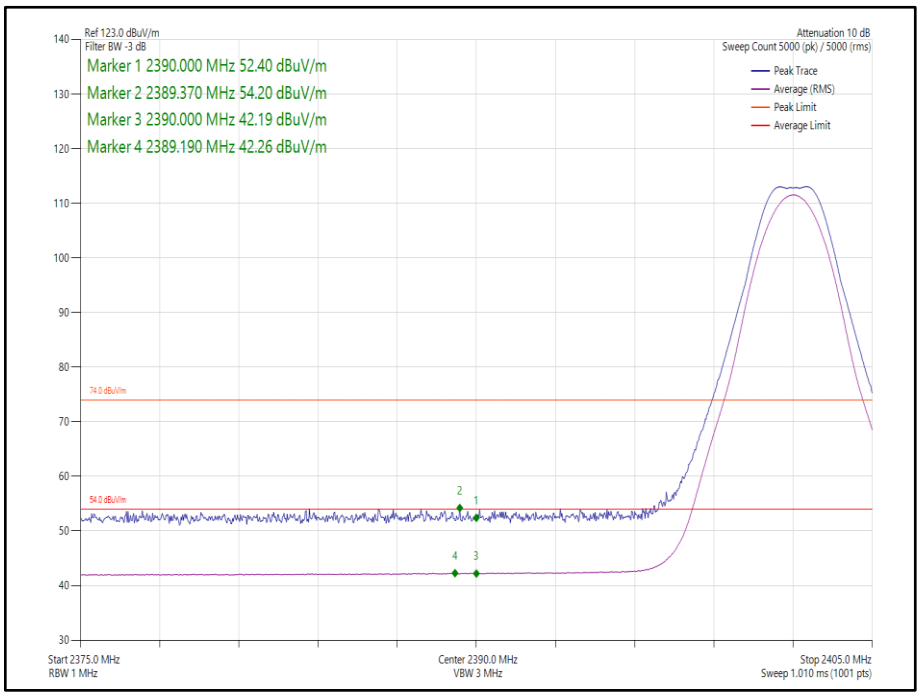

Figure 9 Core 2 – GFSK/DH1 - 2402 MHz - Band Edge Frequency 2390.0 MHz

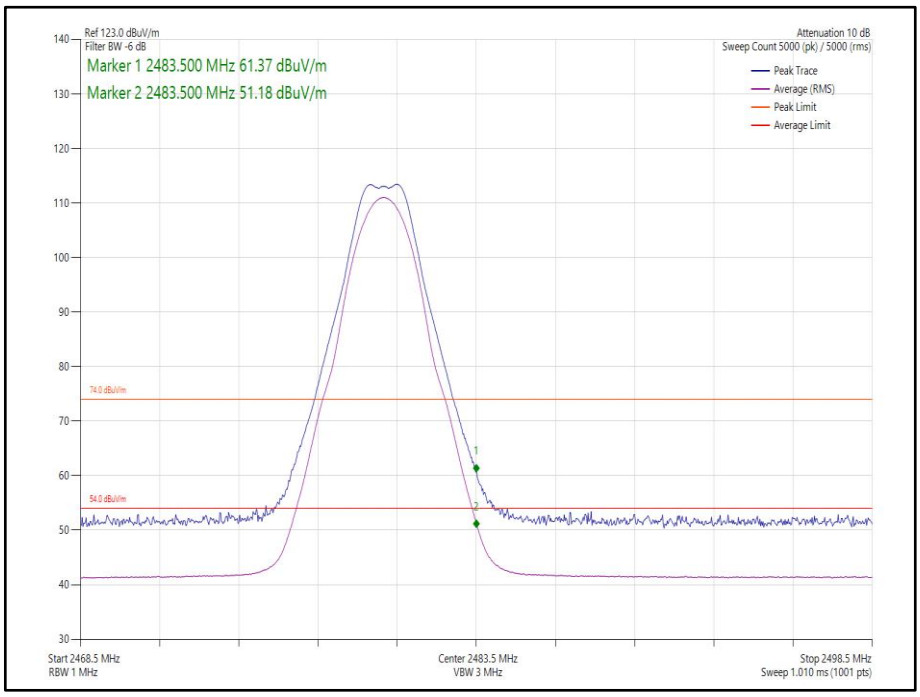

Figure 10 Core 2 – GFSK/DH1 - 2480 MHz - Band Edge Frequency 2483.5 MHz

Bluetooth LE – LE2M iPA

Modulation	Tx Frequency (MHz)	Core	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
GFSK/DH1	2402	Core 0-1	2390.0	55.58	43.08
GFSK/DH1	2480	Core 0-1	2483.5	61.34	51.36

Table 12 - Restricted Band Edge Results

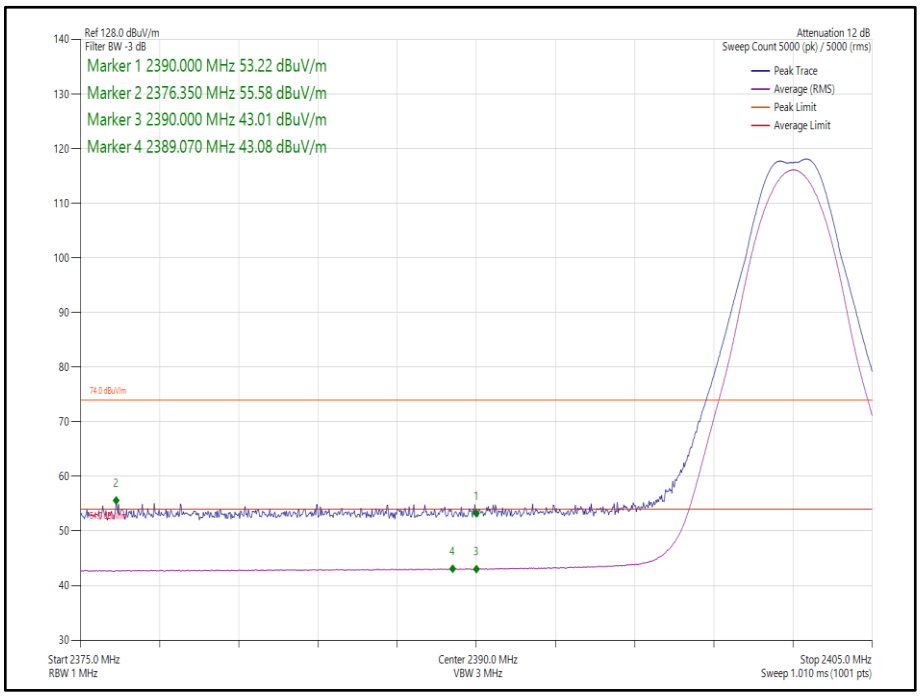

Figure 11 Core 0-1 – GFSK/DH1 - 2402 MHz - Band Edge Frequency 2390.0 MHz

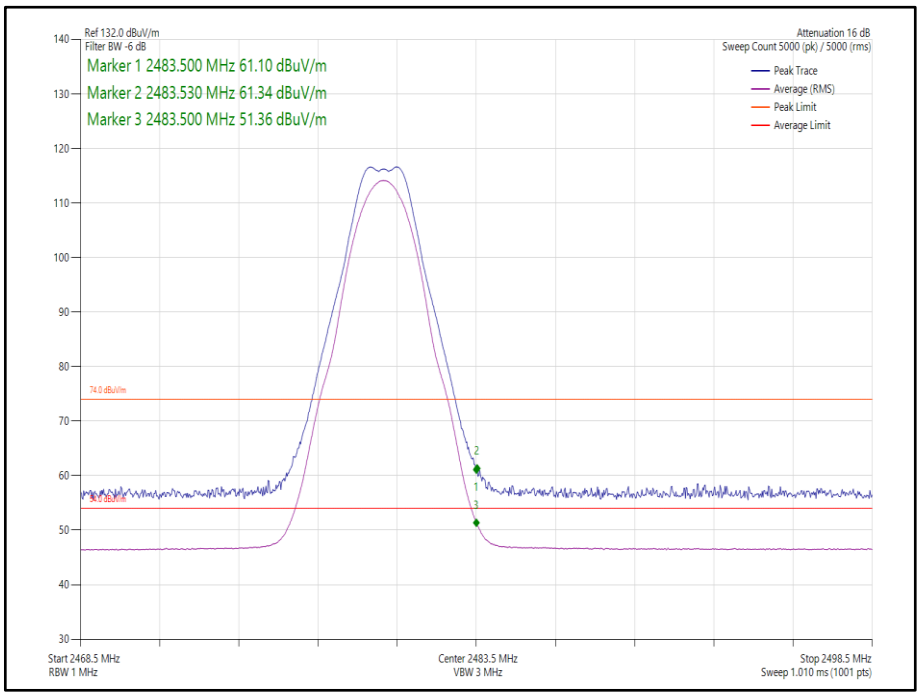

Figure 12 Core 0-1 – GFSK/DH1 - 2480 MHz - Band Edge Frequency 2483.5 MHz

2.4 GHz Bluetooth – HDR4 iPA

Mode	Modulation	Core	Packet Type	Tx Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	GFSK	Core 1	4-DH5	2404	2390.0	53.98	42.16
Static	GFSK	Core 1	4-DH5	2478	2483.5	53.08	42.34

Table 13 - Restricted Band Edge Results

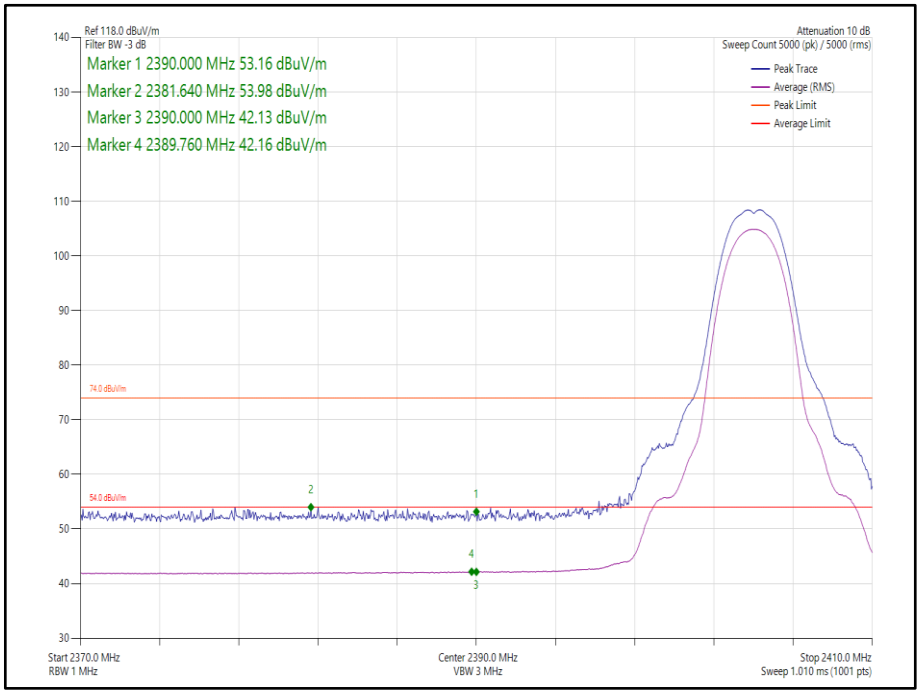

Figure 13 Core 1 - Static - GFSK/4-DH5 - 2404 MHz - Band Edge Frequency 2390.0 MHz

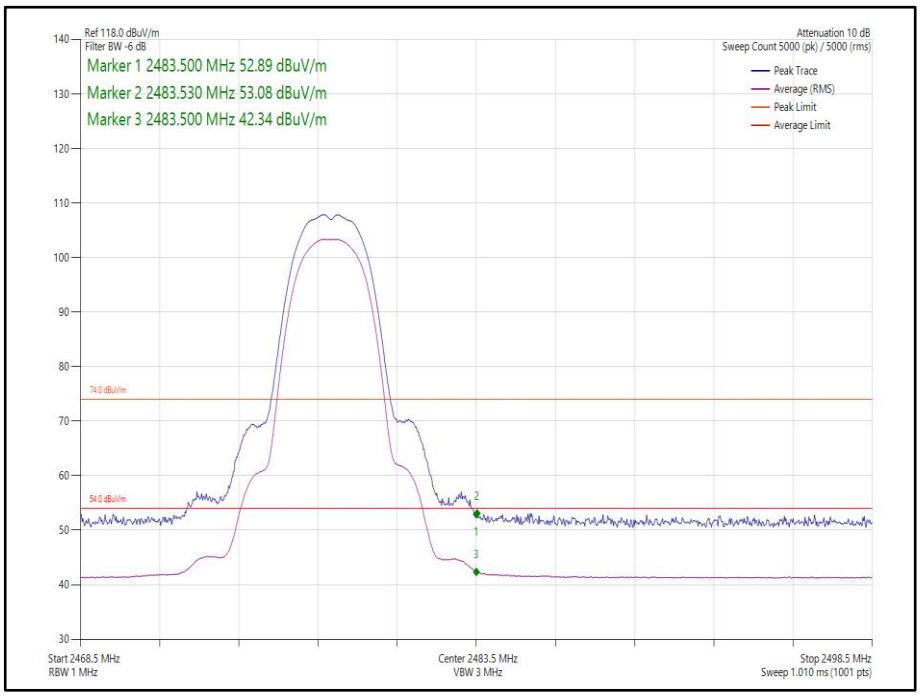

Figure 14 Core 1 - Static - GFSK/4-DH5 - 2478 MHz - Band Edge Frequency 2483.5 MHz

2.4 GHz Bluetooth – HDR4 ePA

Mode	Modulation	Core	Packet Type	Tx Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	GFSK	Core 1	4-DH5	2404	2390.0	55.29	43.15
Static	GFSK	Core 1	4-DH5	2478	2483.5	54.95	44.04

Table 14 - Restricted Band Edge Results

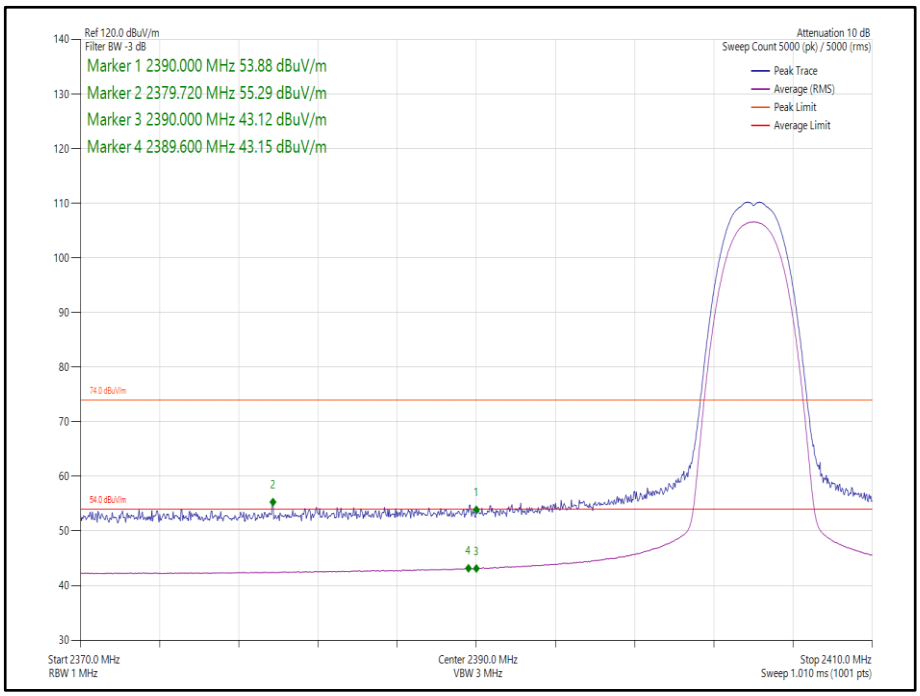

Figure 15 Core 1 - Static - GFSK/4-DH5 - 2404 MHz - Band Edge Frequency 2390.0 MHz

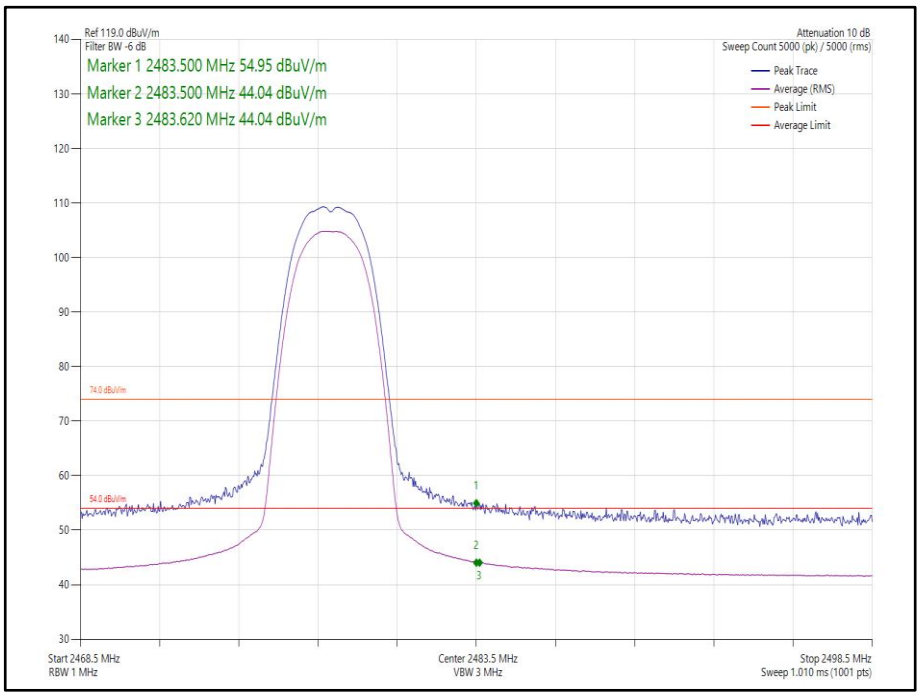

Figure 16 Core 1 - Static - GFSK/4-DH5 - 2478 MHz - Band Edge Frequency 2483.5 MHz

2.4 GHz Bluetooth – HDR8 iPA

Mode	Modulation	Core	Packet Type	Tx Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	GFSK	Core 1	8-DH5	2404	2390.0	54.95	43.33
Static	GFSK	Core 1	8-DH5	2478	2483.5	61.75	50.62

Table 15 - Restricted Band Edge Results

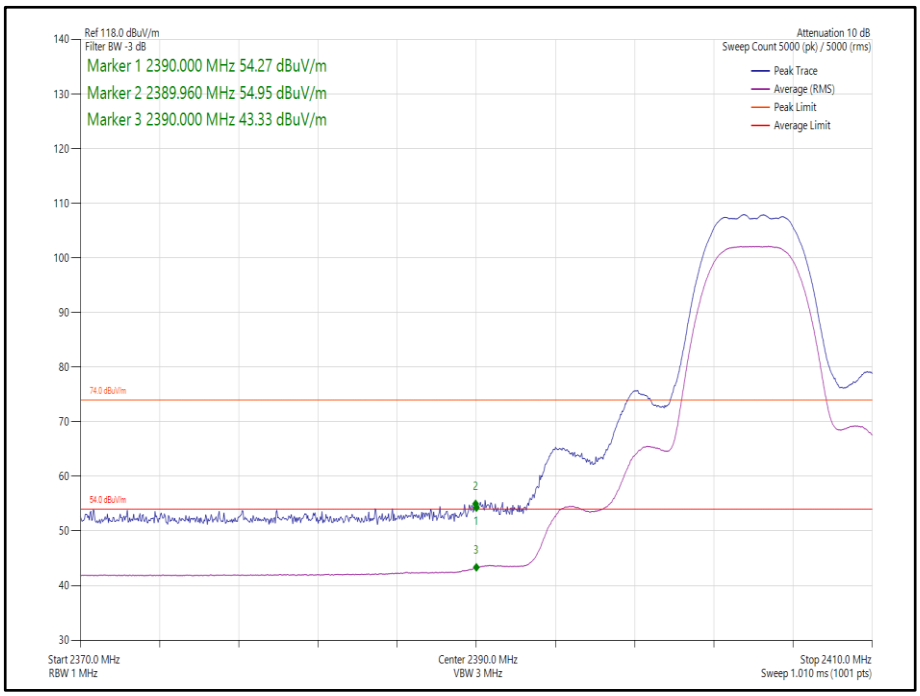

Figure 17 Core 1 - Static - GFSK/8-DH5 - 2404 MHz - Band Edge Frequency 2390.0 MHz

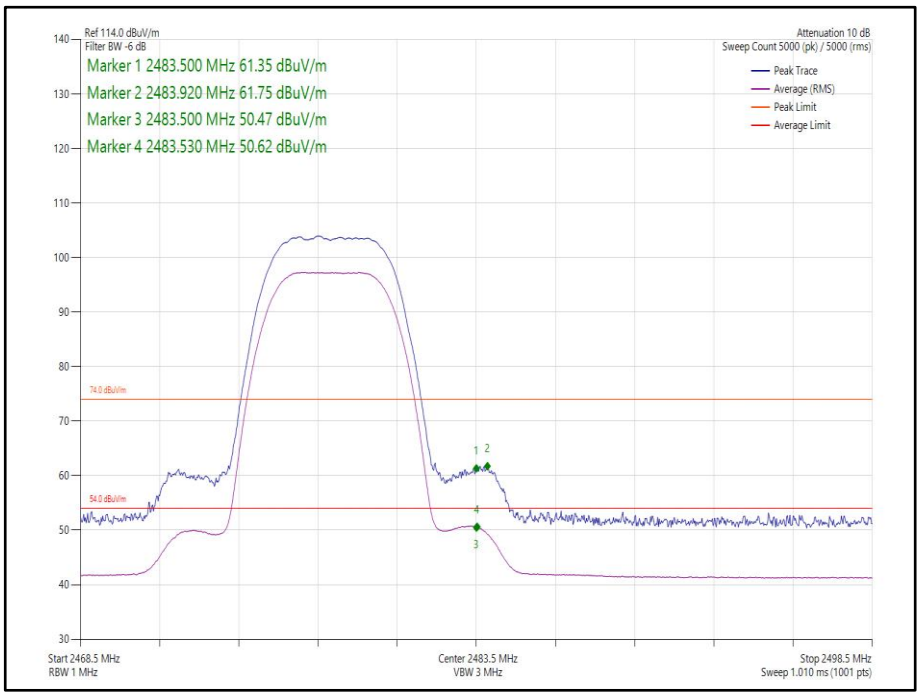

Figure 18 Core 1 - Static - GFSK/8-DH5 - 2478 MHz - Band Edge Frequency 2483.5 MHz

2.4 GHz Bluetooth – HDR8 ePA

Mode	Modulation	Core	Packet Type	Tx Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	GFSK	Core 1	8-DH5	2404	2390.0	57.20	44.74
Static	GFSK	Core 1	8-DH5	2478	2483.5	59.79	48.59

Table 16 - Restricted Band Edge Results

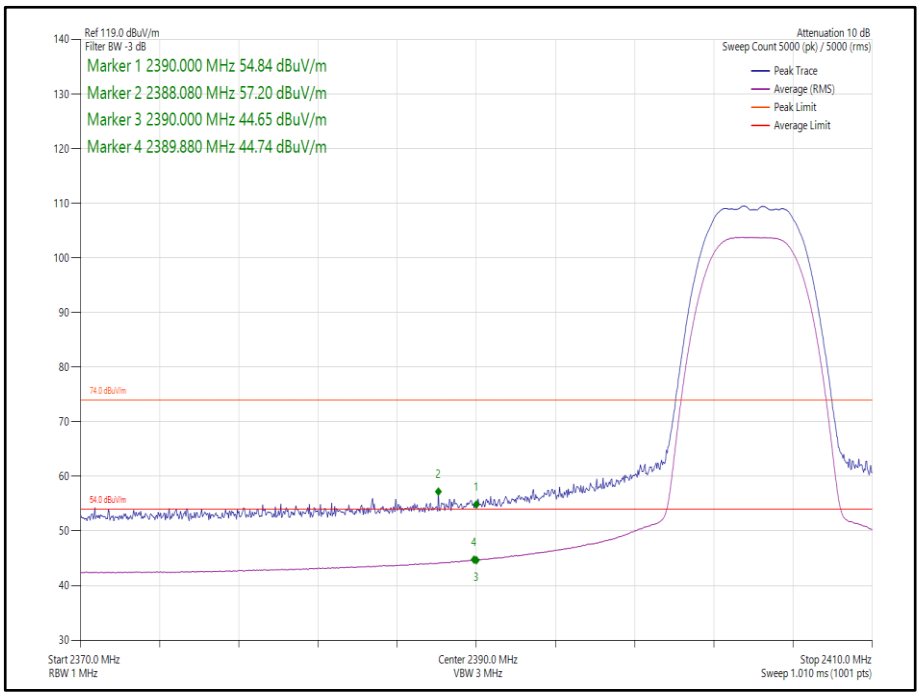

Figure 19 Core 1 - Static - GFSK/8-DH5 - 2404 MHz - Band Edge Frequency 2390.0 MHz

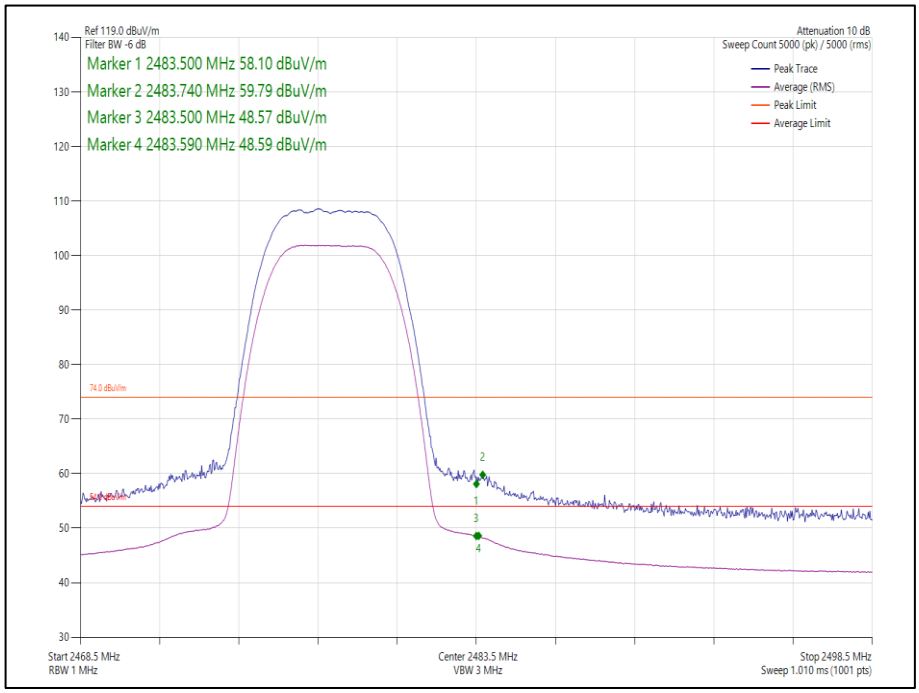

Figure 20 Core 1 - Static - GFSK/8-DH5 - 2478 MHz - Band Edge Frequency 2483.5 MHz

2.4 GHz Bluetooth – HDR4 iPA

Mode	Modulation	Core	Packet Type	Tx Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	GFSK	Core 2	4-DH5	2404	2390.0	54.34	42.15
Static	GFSK	Core 2	4-DH5	2478	2483.5	59.75	46.81

Table 17 - Restricted Band Edge Results

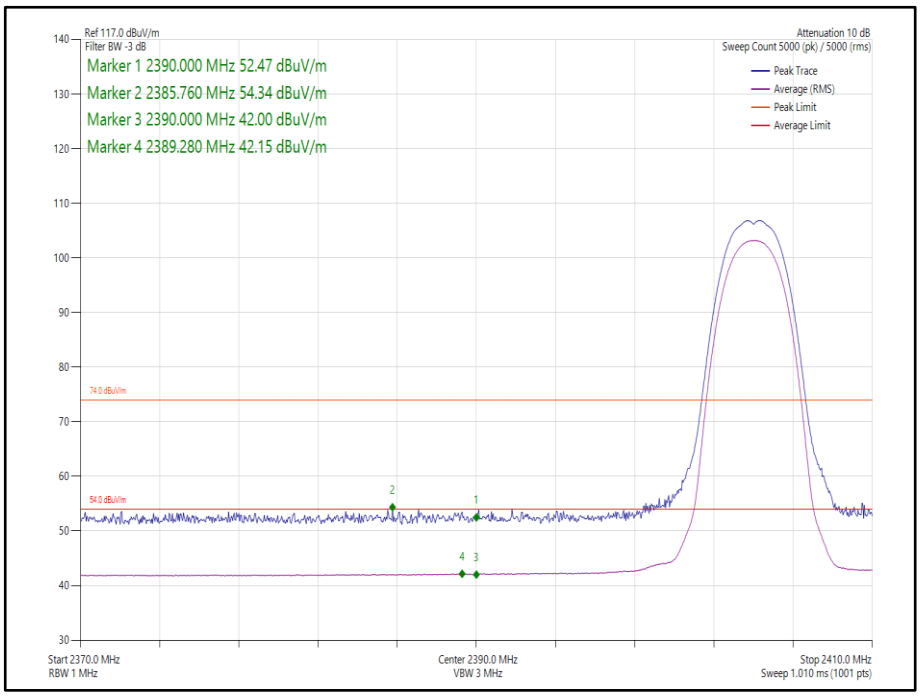

Figure 21 Core 2 - Static - GFSK/4-DH5 - 2404 MHz - Band Edge Frequency 2390.0 MHz

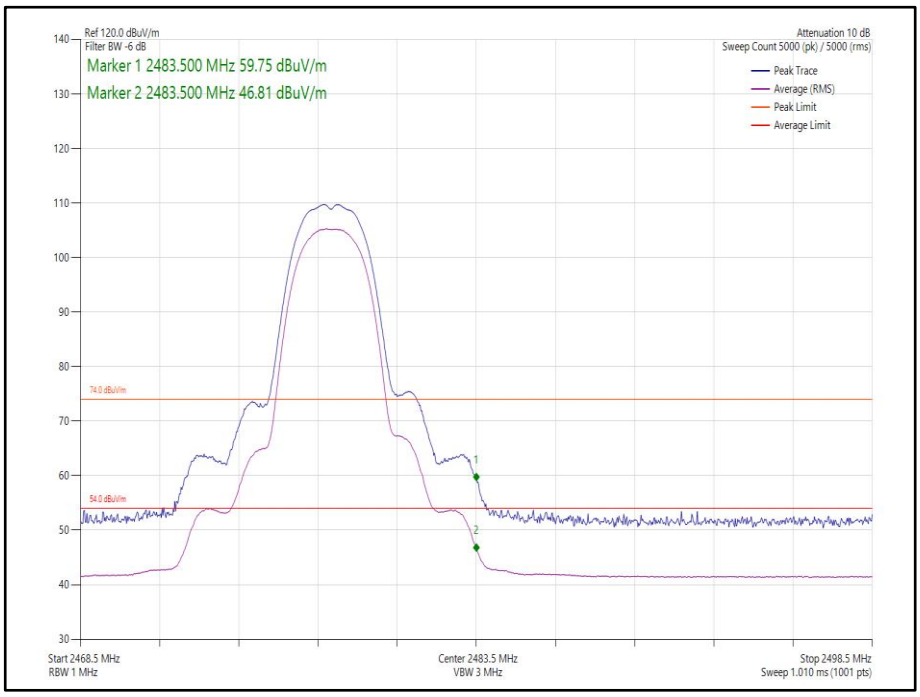

Figure 22 Core 2 - Static - GFSK/4-DH5 - 2478 MHz - Band Edge Frequency 2483.5 MHz

2.4 GHz Bluetooth – HDR8 iPA

Mode	Modulation	Core	Packet Type	Tx Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	GFSK	Core 2	8-DH5	2404	2390.0	54.95	42.36
Static	GFSK	Core 2	8-DH5	2478	2483.5	62.18	51.24

Table 18 - Restricted Band Edge Results

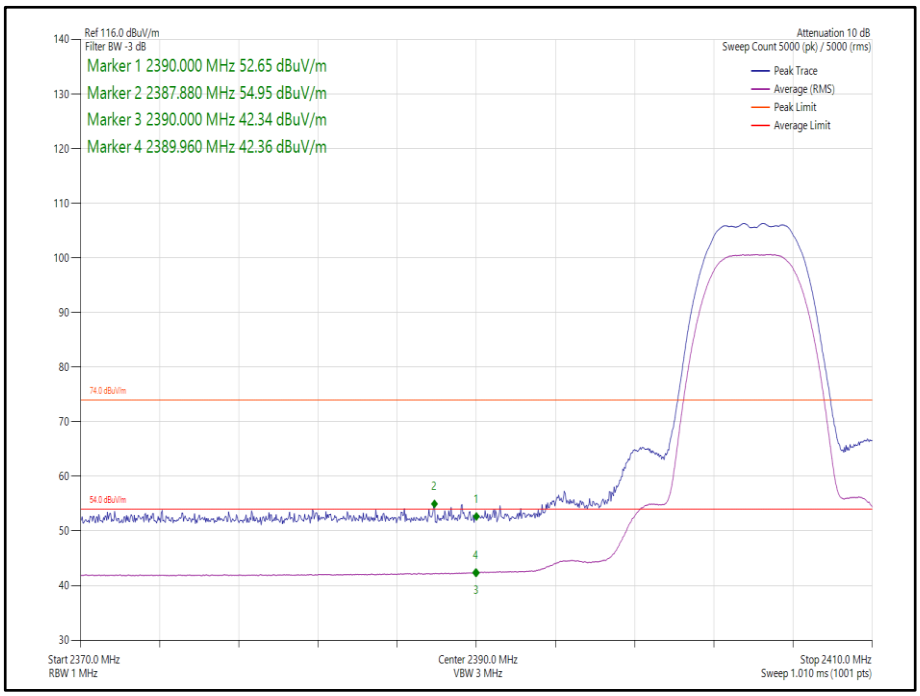

Figure 23 Core 2 - Static - GFSK/8-DH5 - 2404 MHz - Band Edge Frequency 2390.0 MHz

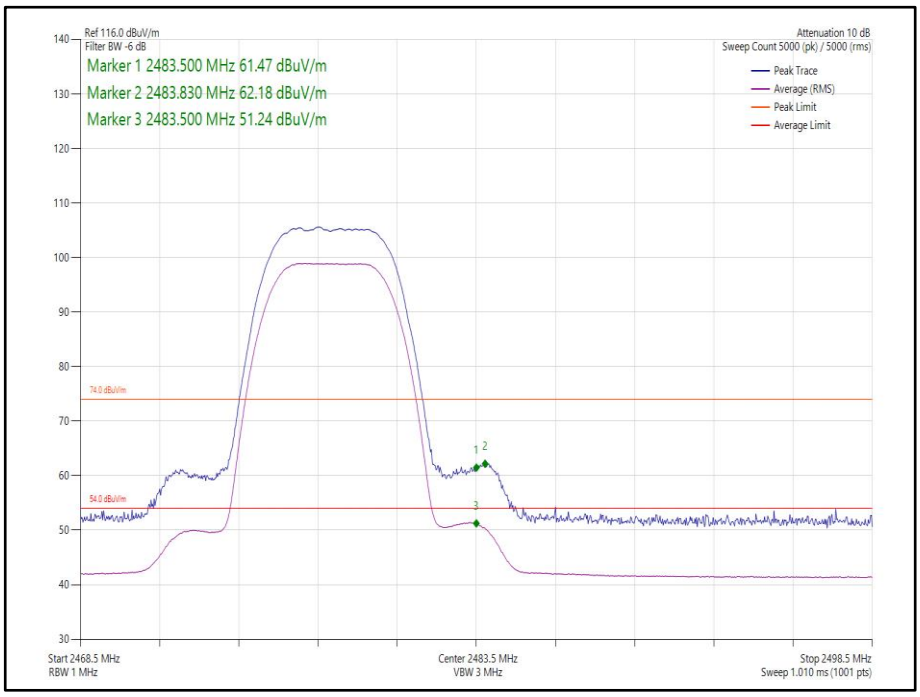

Figure 24 Core 2 - Static - GFSK/8-DH5 - 2478 MHz - Band Edge Frequency 2483.5 MHz

2.4 GHz Bluetooth – HDR4 iPA

Mode	Modulation	Core	Packet Type	Tx Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	GFSK	Core 0-1	4-DH5	2404	2390.0	53.96	42.21
Static	GFSK	Core 0-1	4-DH5	2478	2483.5	53.81	42.39

Table 19 - Restricted Band Edge Results

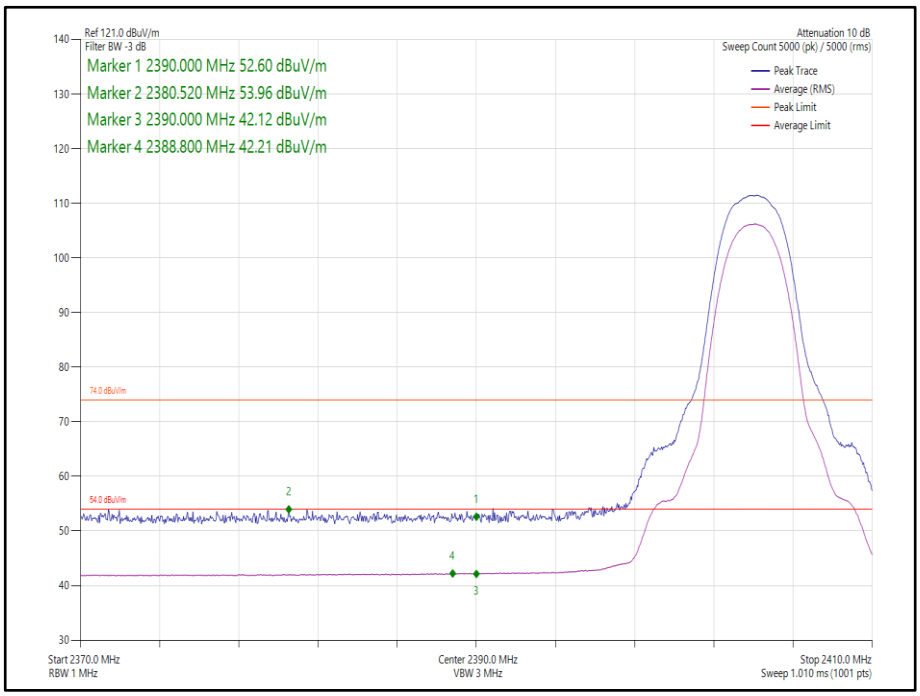

Figure 25 Core 0-1 - Static - GFSK/4-DH5 - 2404 MHz - Band Edge Frequency 2390.0 MHz

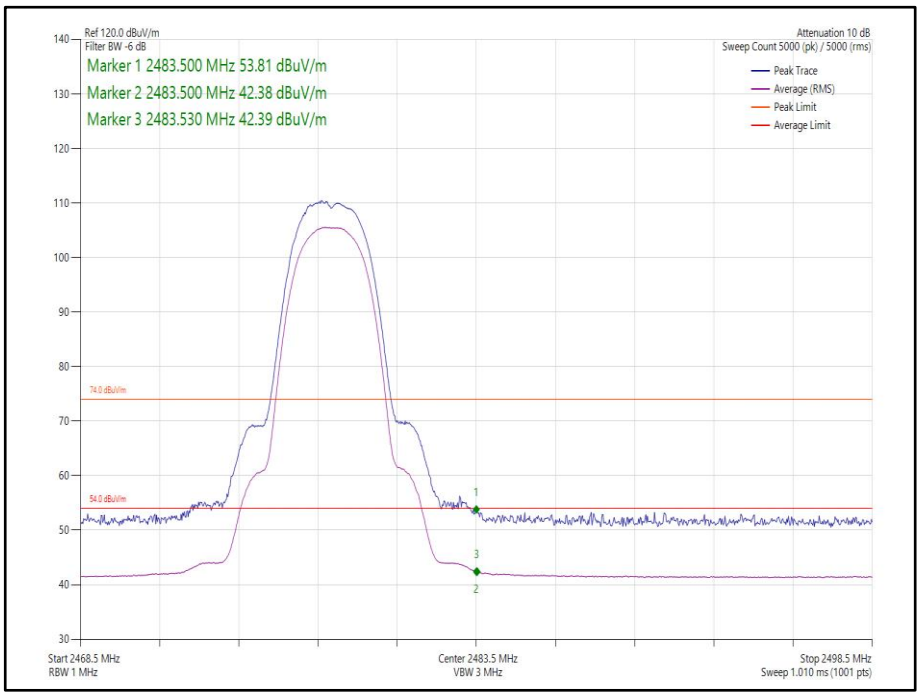

Figure 26 Core 0-1 - Static - GFSK/4-DH5 - 2478 MHz - Band Edge Frequency 2483.5 MHz

2.4 GHz Bluetooth – HDR4 ePA

Mode	Modulation	Core	Packet Type	Tx Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	GFSK	Core 0-1	4-DH5	2404	2390.0	55.84	43.72
Static	GFSK	Core 0-1	4-DH5	2478	2483.5	55.60	45.22

Table 20 - Restricted Band Edge Results

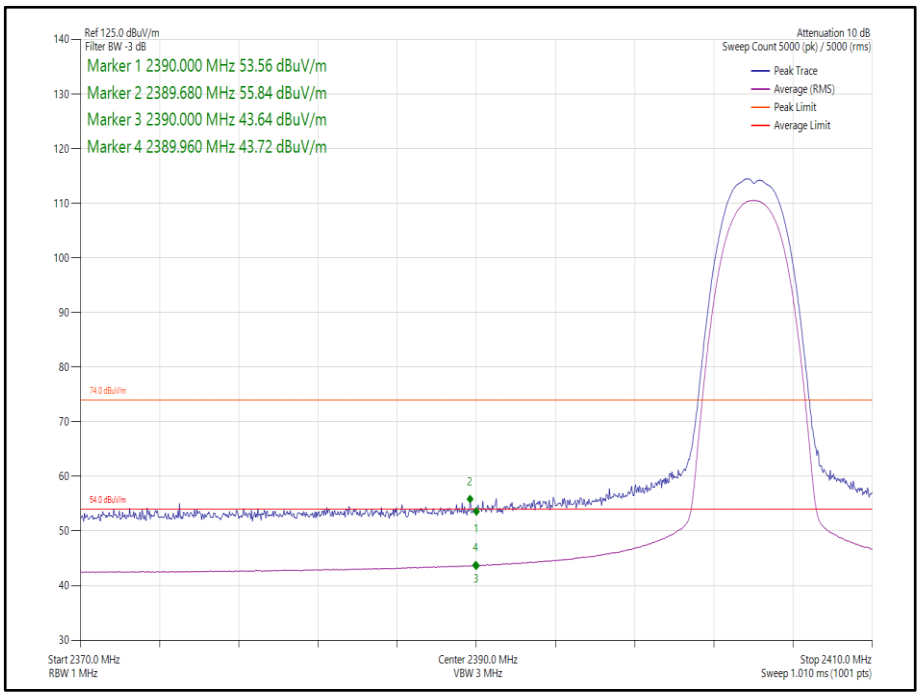

Figure 27 Core 0-1 - Static - GFSK/4-DH5 - 2404 MHz - Band Edge Frequency 2390.0 MHz

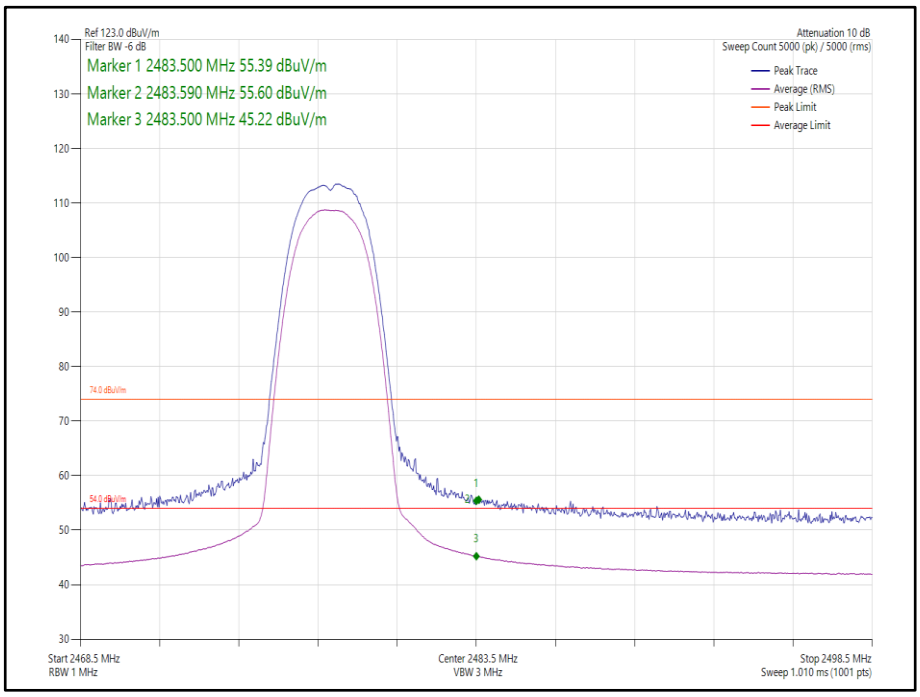

Figure 28 Core 0-1 - Static - GFSK/4-DH5 - 2478 MHz - Band Edge Frequency 2483.5 MHz

2.4 GHz Bluetooth – HDR8 iPA

Mode	Modulation	Core	Packet Type	Tx Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	GFSK	Core 0-1	8-DH5	2404	2390.0	55.33	43.31
Static	GFSK	Core 0-1	8-DH5	2478	2483.5	62.19	51.01

Table 21 - Restricted Band Edge Results

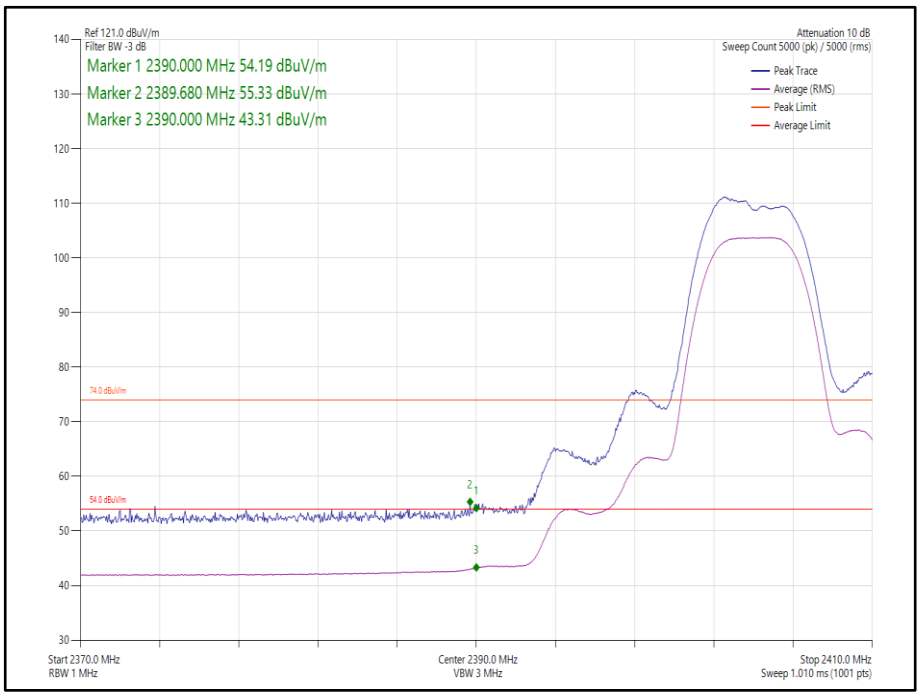

Figure 29 Core 0-1 - Static - GFSK/8-DH5 - 2404 MHz - Band Edge Frequency 2390.0 MHz

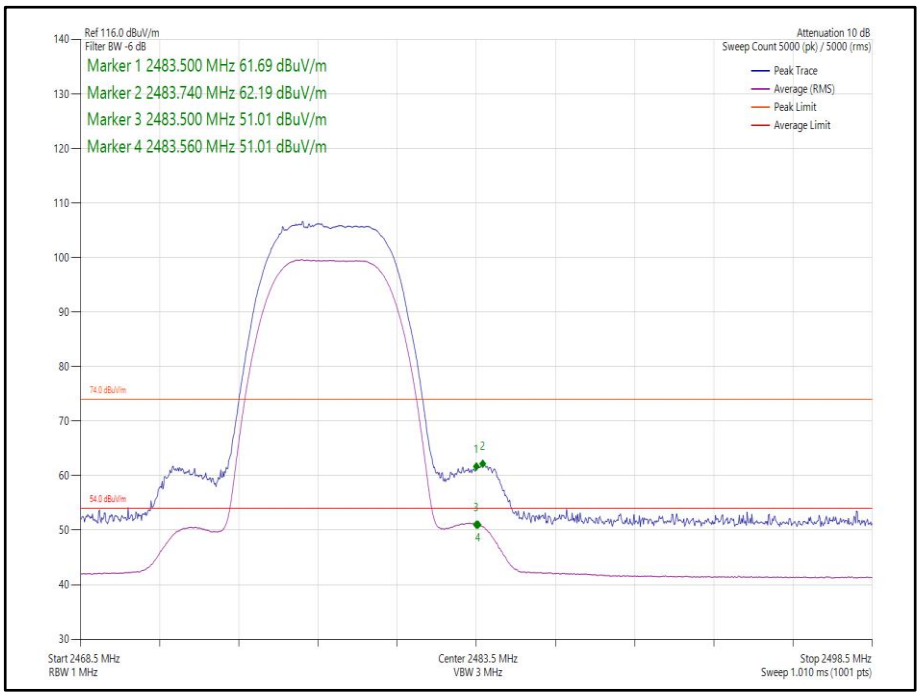

Figure 30 Core 0-1 - Static - GFSK/8-DH5 - 2478 MHz - Band Edge Frequency 2483.5 MHz

2.4 GHz Bluetooth – HDR8 ePA

Mode	Modulation	Core	Packet Type	Tx Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	GFSK	Core 0-1	8-DH5	2404	2390.0	56.34	45.39
Static	GFSK	Core 0-1	8-DH5	2478	2483.5	61.37	50.33

Table 22 - Restricted Band Edge Results

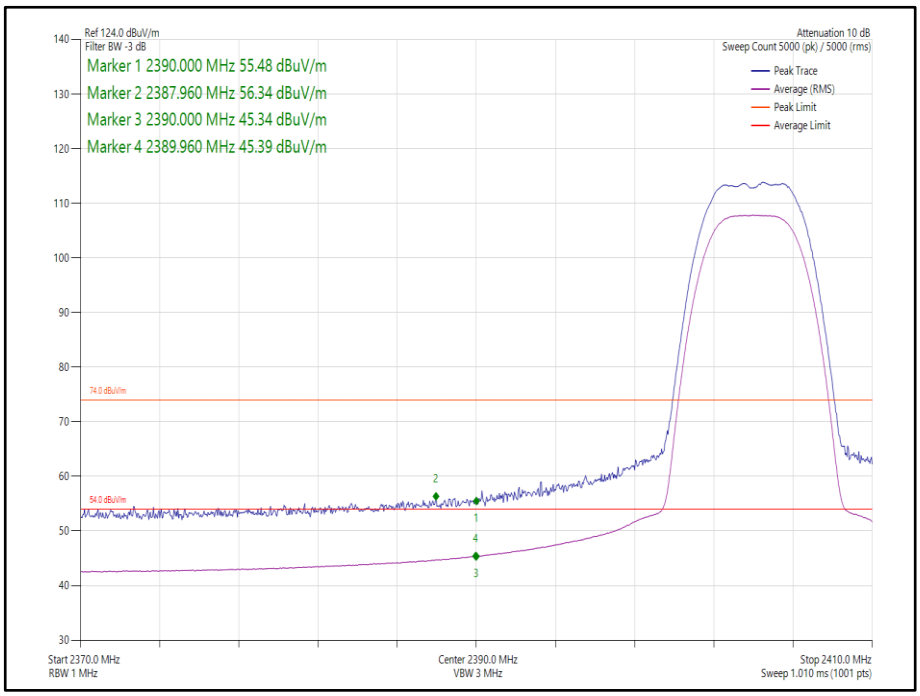

Figure 31 Core 0-1 - Static - GFSK/8-DH5 - 2404 MHz - Band Edge Frequency 2390.0 MHz

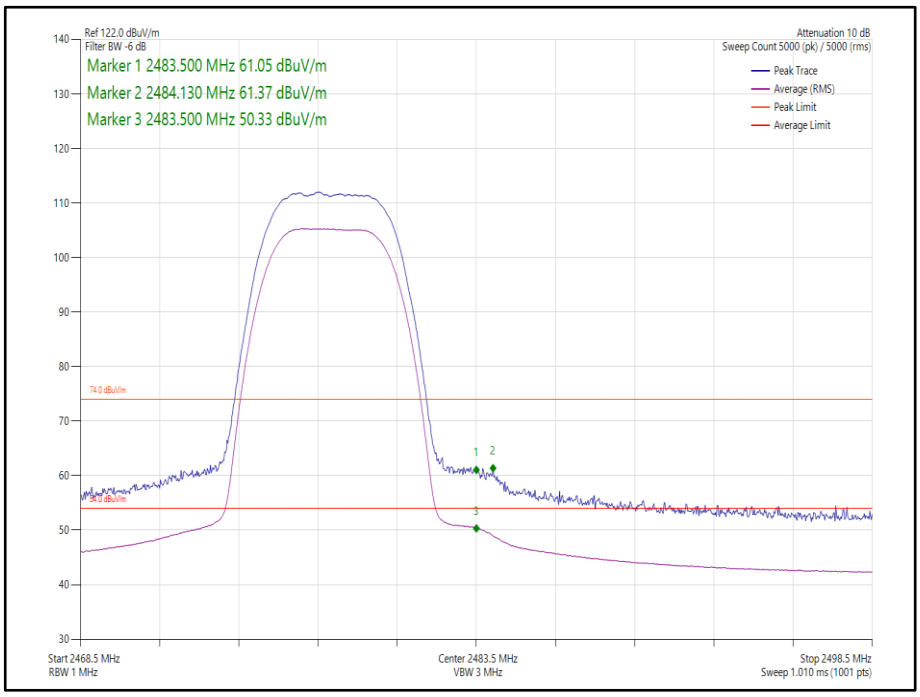

Figure 32 Core 0-1 - Static - GFSK/8-DH5 - 2478 MHz - Band Edge Frequency 2483.5 MHz

FCC 47 CFR Part 15, Limit Clause 15.209

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

Table 23

ISED RSS-GEN, Limit Clause 8.9

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

Table 24

*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 Expires
Test Receiver	Rohde & Schwarz	ESW44	5914	12	21-Feb-2023
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	5996	12	06-Jun-2023
Cable (N to N 1m)	Junkosha	MWX221-01000NMSNMS/B	5999	12	05-Jun-2023
Cable (N to N 7m)	Junkosha	MWX221-07000NMSNMS/B	6005	12	05-Jun-2023
Cable (N to N 8m)	Junkosha	MWX221-08000NMSNMS/A	6006	12	05-Jun-2023
Horn Antenna (1-10 GHz)	Schwarzbeck	BBHA9120B	6140	12	21-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	SSU003	6191	12	15-Jul-2023

Table 25

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

A2780, S/N: NW3J007K67 - Modification State 0

2.2.3 Date of Test

19-October-2022 to 28-October-2022

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	22.7 - 23.5 °C
Relative Humidity	52.3 - 56.9 %

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 π/4 DQPSK (4-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	1.464	-	-	≥500.0
2441	-	1.896	-	-	≥500.0
2476	-	1.904	-	-	≥500.0

Table 26 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	2.320	-	-	-
2441	-	2.328	-	-	-
2476	-	2.328	-	-	-

Table 27 - 99% Bandwidth Results

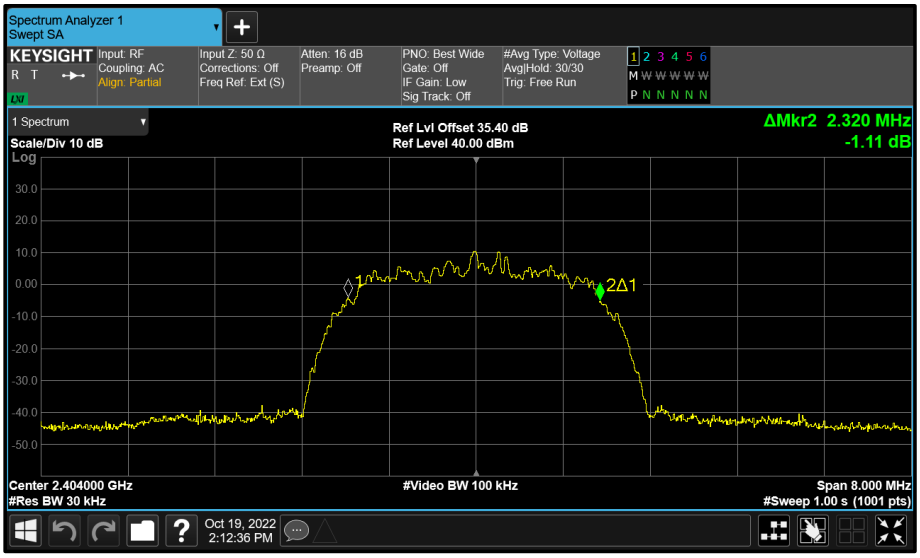

Figure 33 - Core 1 (B) 2404 MHz (CH2) 99% Bandwidth

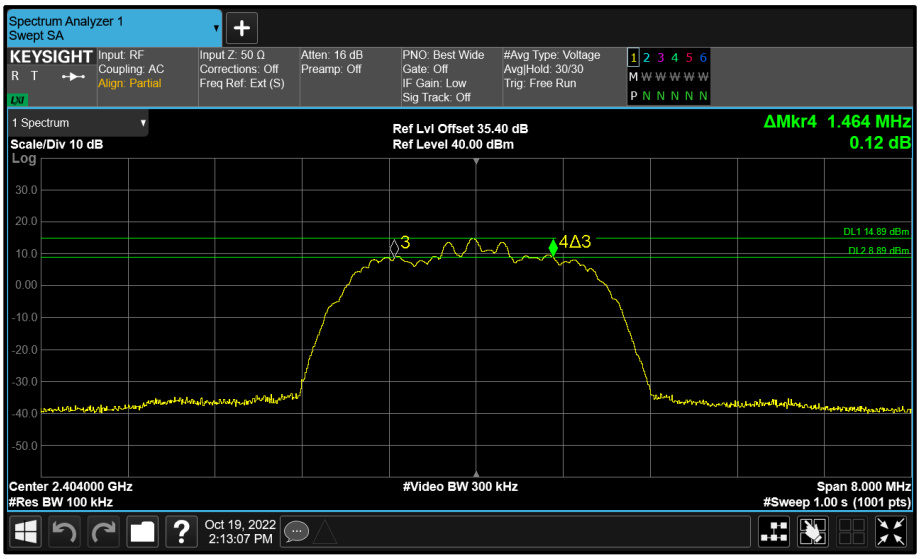

Figure 34 - Core 1 (B) 2404 MHz (CH2) 6 dB Bandwidth

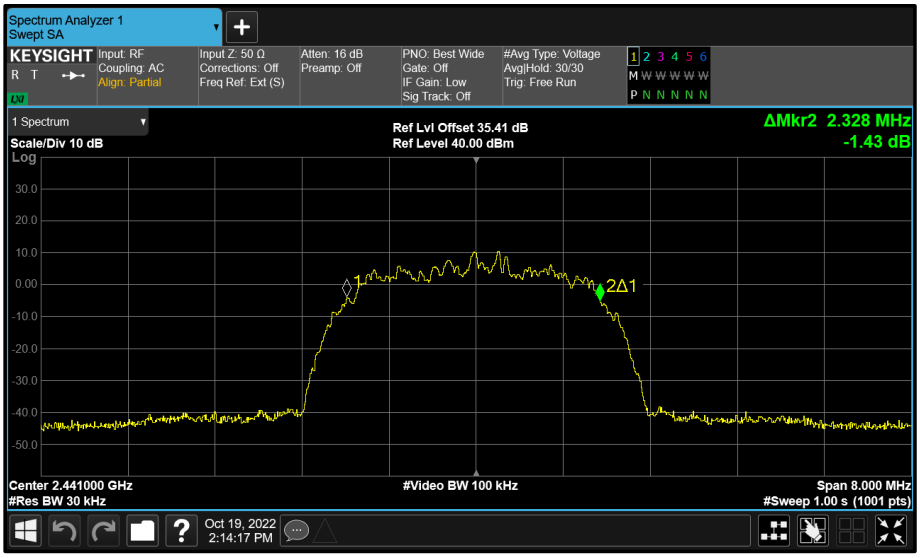

Figure 35 - Core 1 (B) 2441 MHz (CH39) 99% Bandwidth

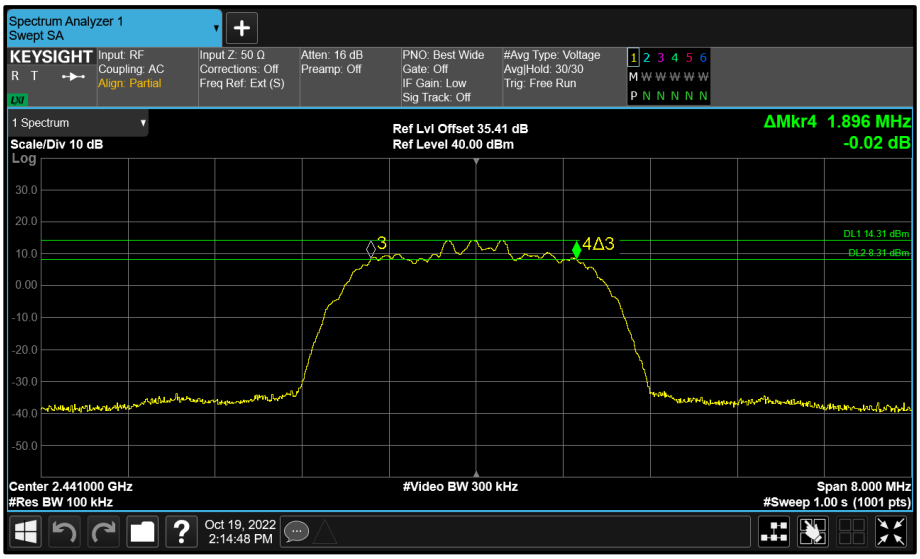

Figure 36 - Core 1 (B) 2441 MHz (CH39) 6 dB Bandwidth

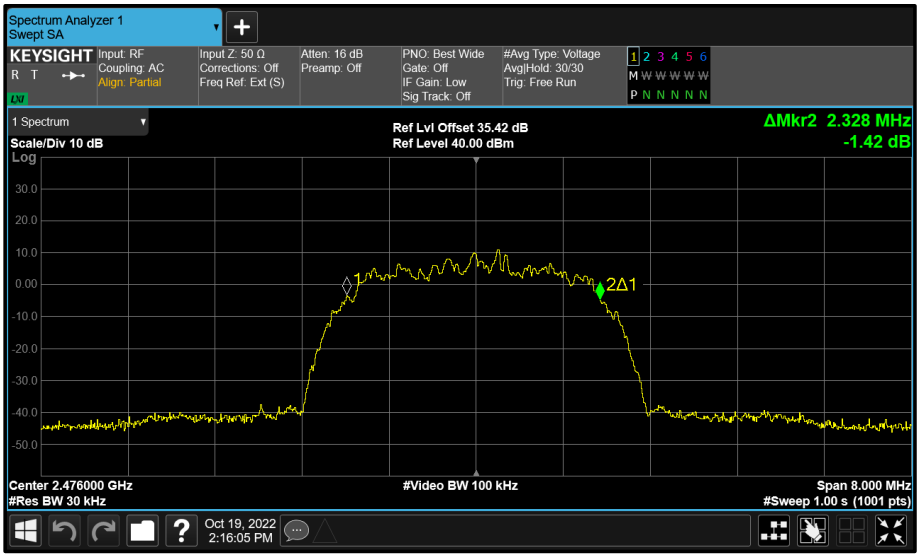

Figure 37 - Core 1 (B) 2476 MHz (CH74) 99% Bandwidth

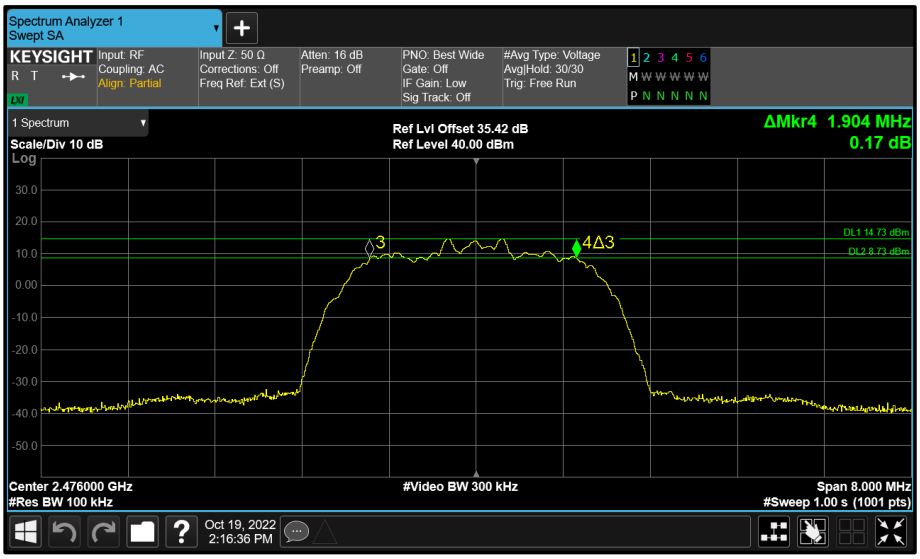

Figure 38 - Core 1 (B) 2476 MHz (CH74) 6 dB Bandwidth

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 π/4 DQPSK (8-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	0.660	-	-	≥500.0
2441	-	1.020	-	-	≥500.0
2476	-	1.020	-	-	≥500.0

Table 28 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	-	4.635	-	-	-
2441	-	4.635	-	-	-
2476	-	4.635	-	-	-

Table 29 - 99% Bandwidth Results

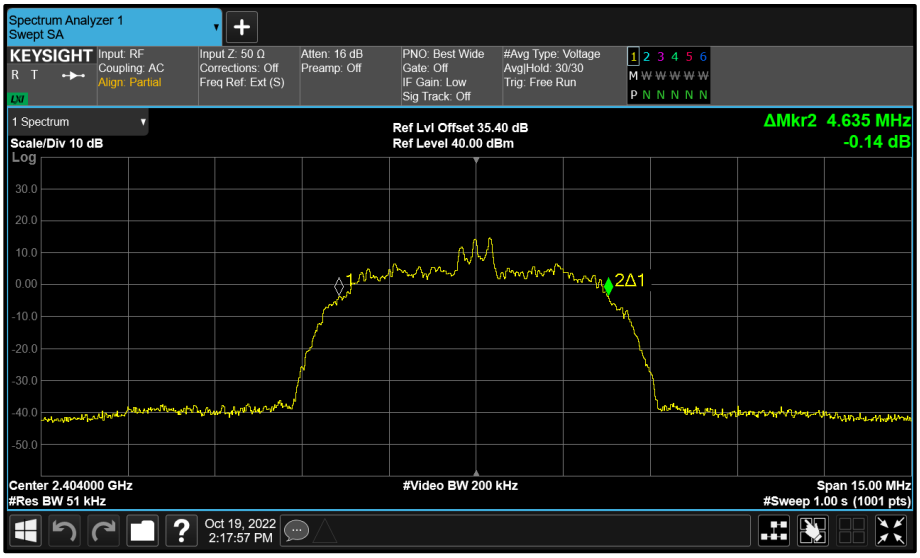

Figure 39 - Core 1 (B) 2404 MHz (CH2) 99% Bandwidth

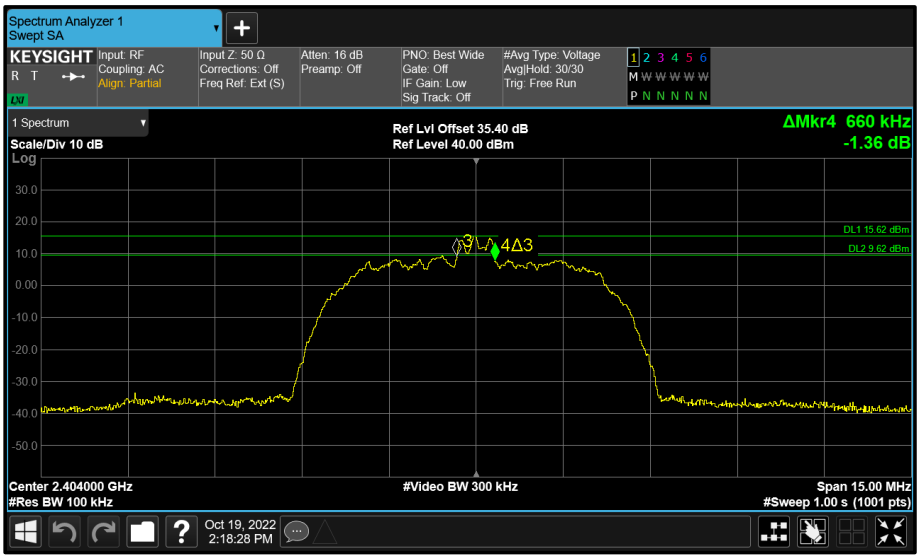

Figure 40 - Core 1 (B) 2404 MHz (CH2) 6 dB Bandwidth

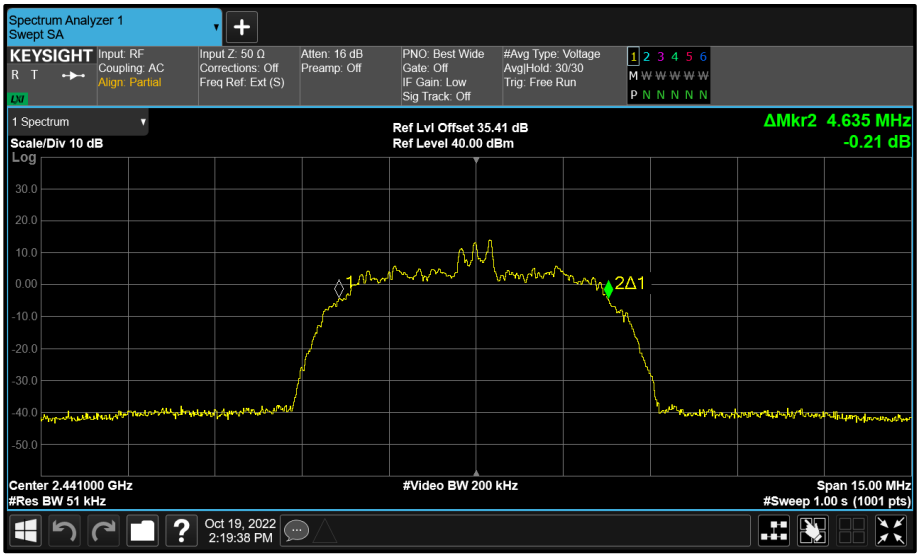

Figure 41 - Core 1 (B) 2441 MHz (CH39) 99% Bandwidth

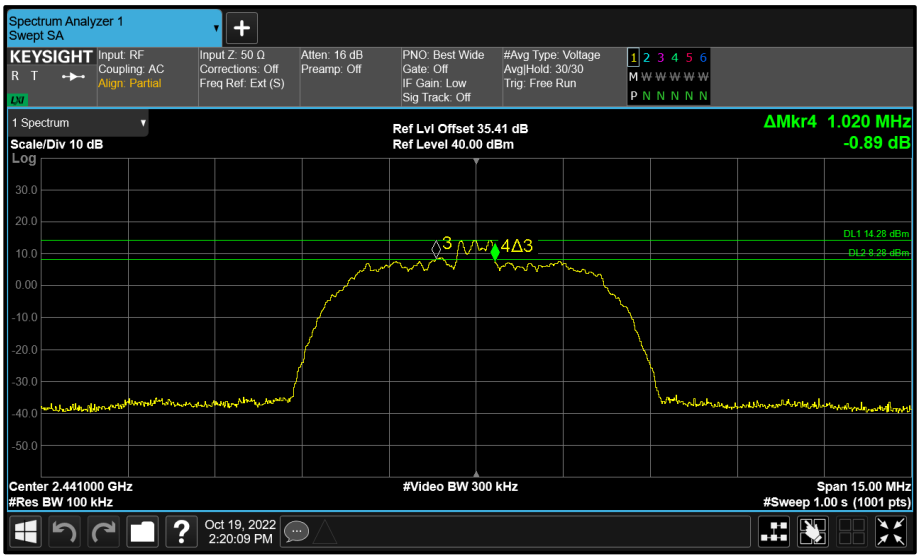

Figure 42 - Core 1 (B) 2441 MHz (CH39) 6 dB Bandwidth

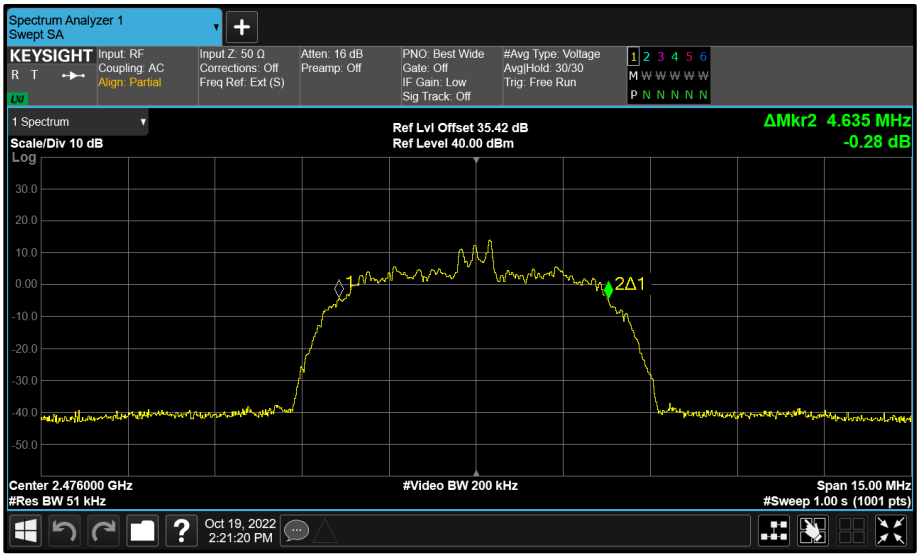

Figure 43 - Core 1 (B) 2476 MHz (CH74) 99% Bandwidth

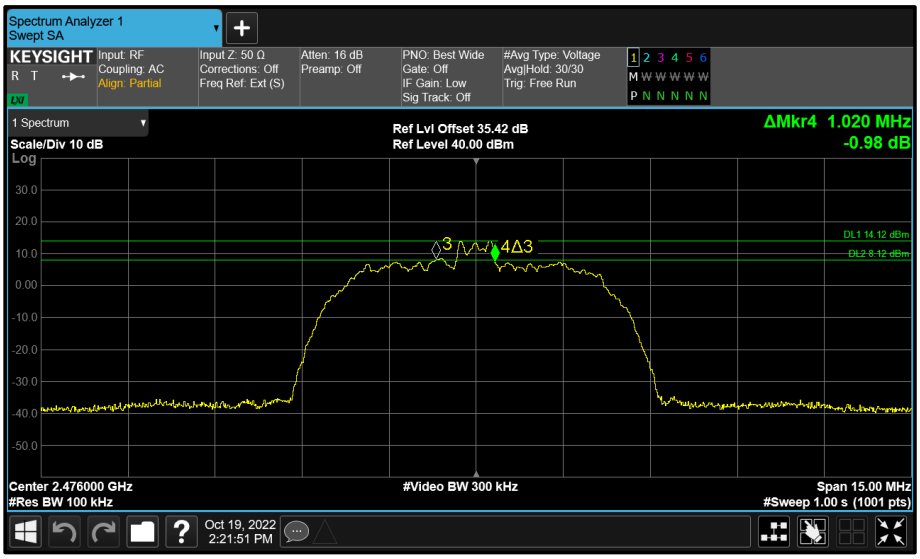

Figure 44 - Core 1 (B) 2476 MHz (CH74) 6 dB Bandwidth

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 π/4 DQPSK (4-DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	A+B (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	1.896	1.880	-	-	≥500.0
2441	1.680	1.904	-	-	≥500.0
2476	1.584	1.896	-	-	≥500.0

Table 30 - 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	2.320	2.336	-	-	-

Table 31 - 99% Bandwidth Results

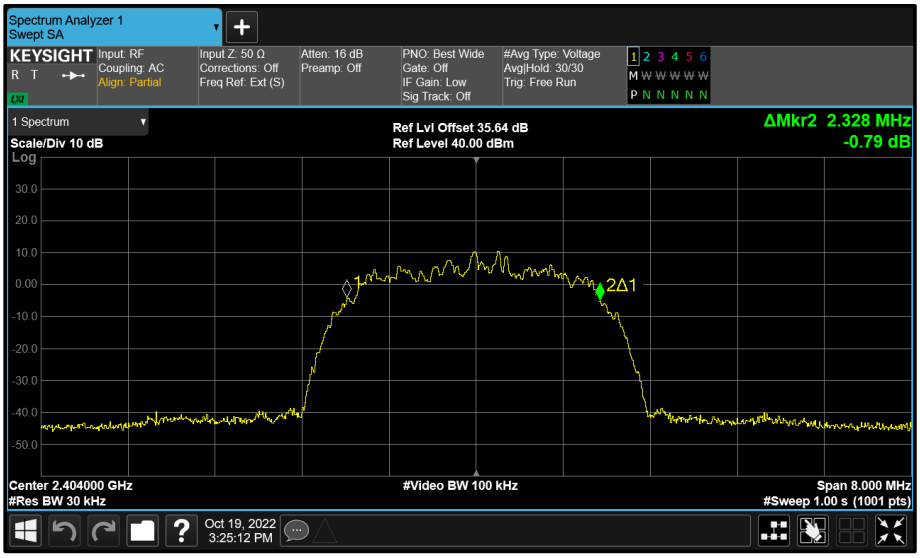

Figure 45 - Core 0 (A) 2404 MHz (CH2) 99% Bandwidth

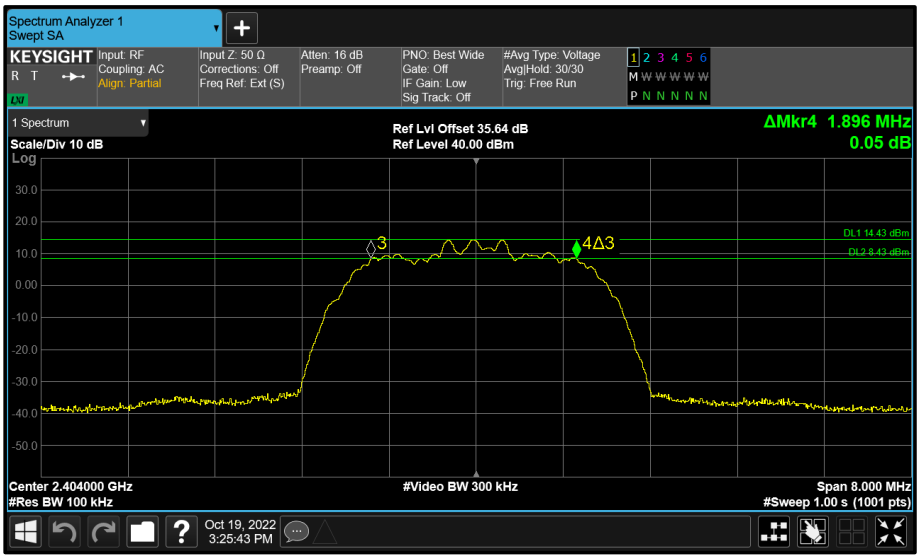

Figure 46 - Core 0 (A) 2404 MHz (CH2) 6 dB Bandwidth

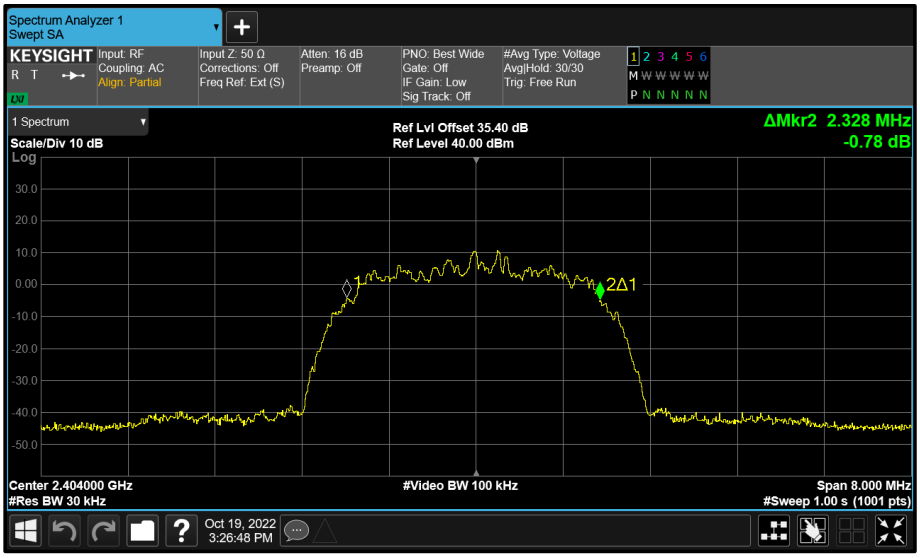

Figure 47 - Core 1 (B) 2404 MHz (CH2) 99% Bandwidth

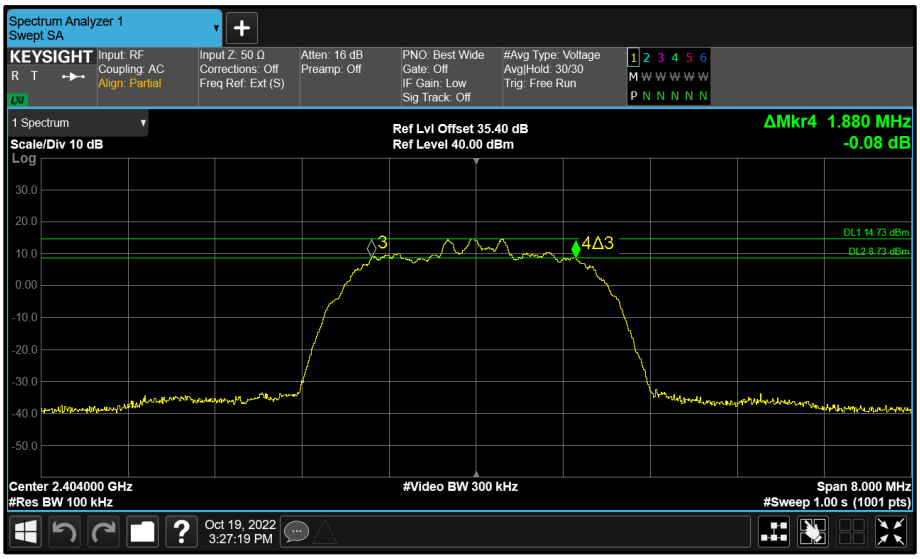

Figure 48 - Core 1 (B) 2404 MHz (CH2) 6 dB Bandwidth

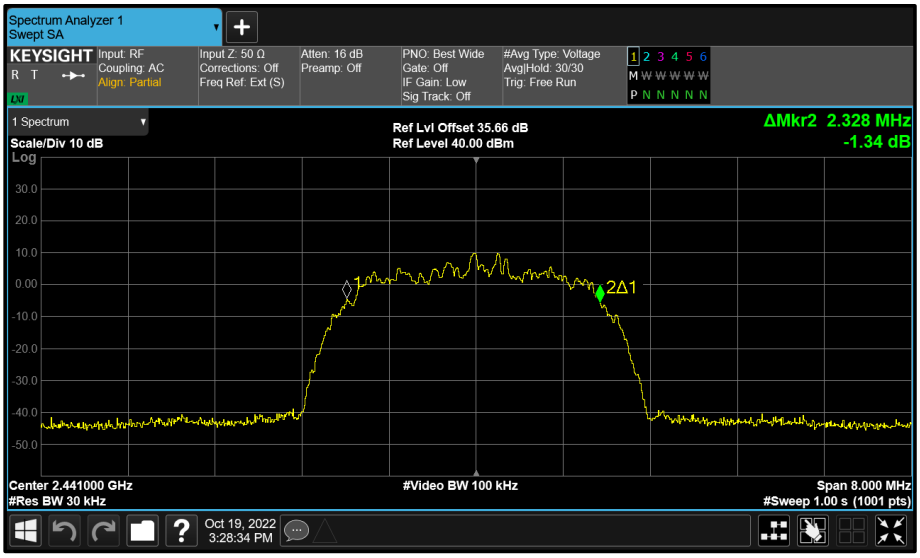

Figure 49 - Core 0 (A) 2441 MHz (CH39) 99% Bandwidth

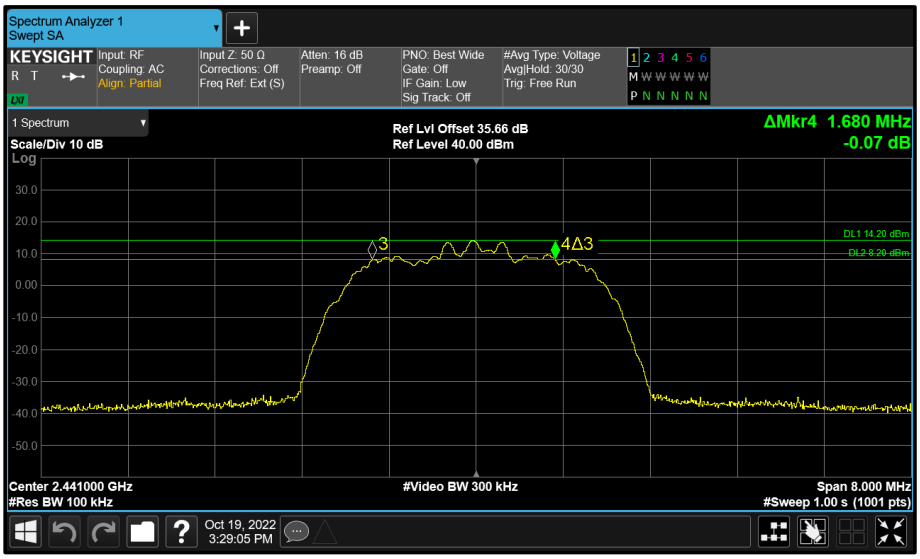

Figure 50 - Core 0 (A) 2441 MHz (CH39) 6 dB Bandwidth

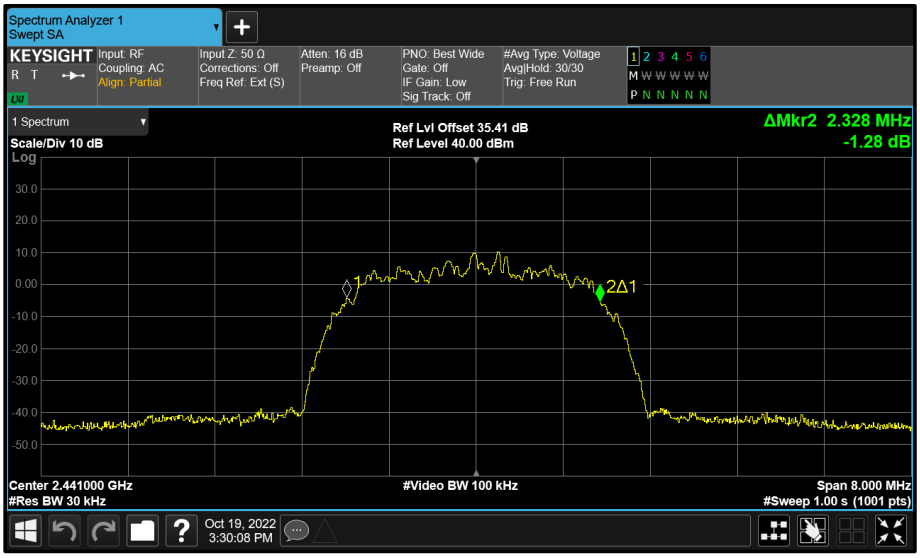

Figure 51 - Core 1 (B) 2441 MHz (CH39) 99% Bandwidth

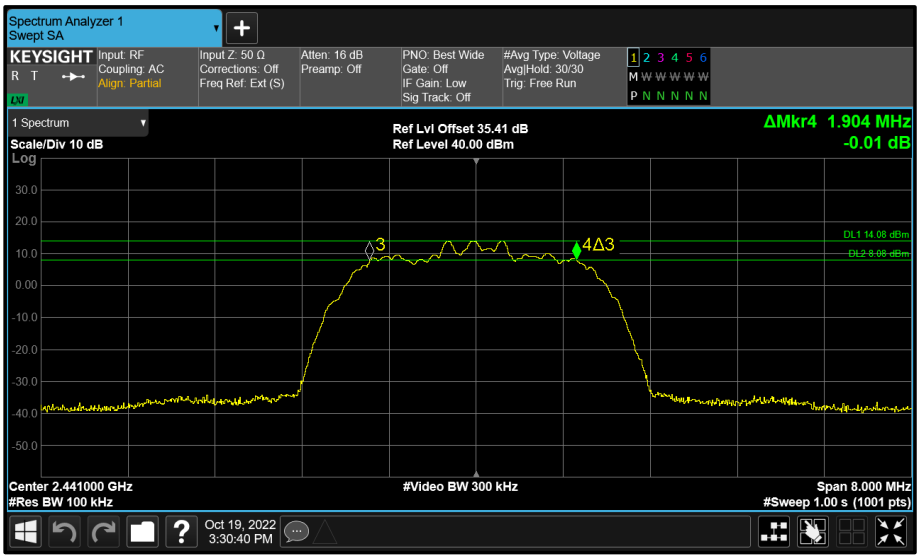

Figure 52 - Core 1 (B) 2441 MHz (CH39) 6 dB Bandwidth

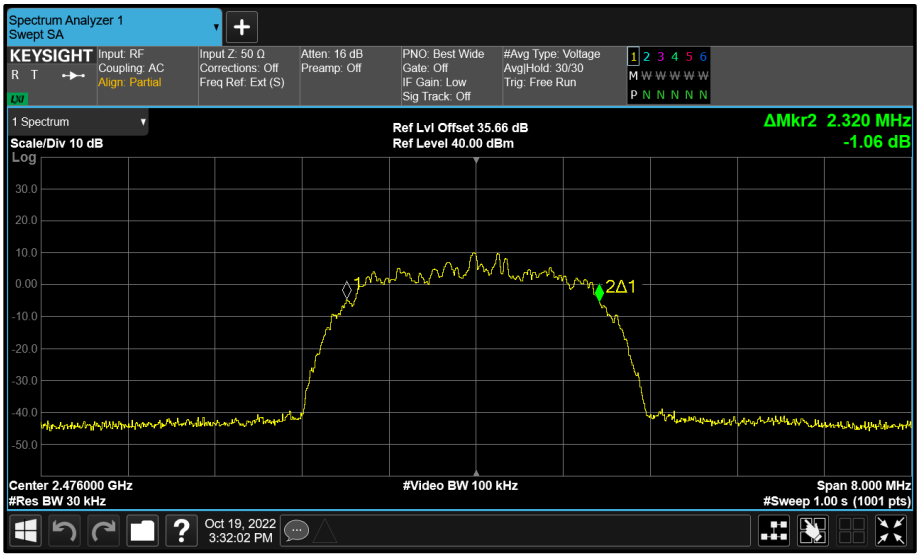

Figure 53 - Core 0 (A) 2476 MHz (CH74) 99% Bandwidth

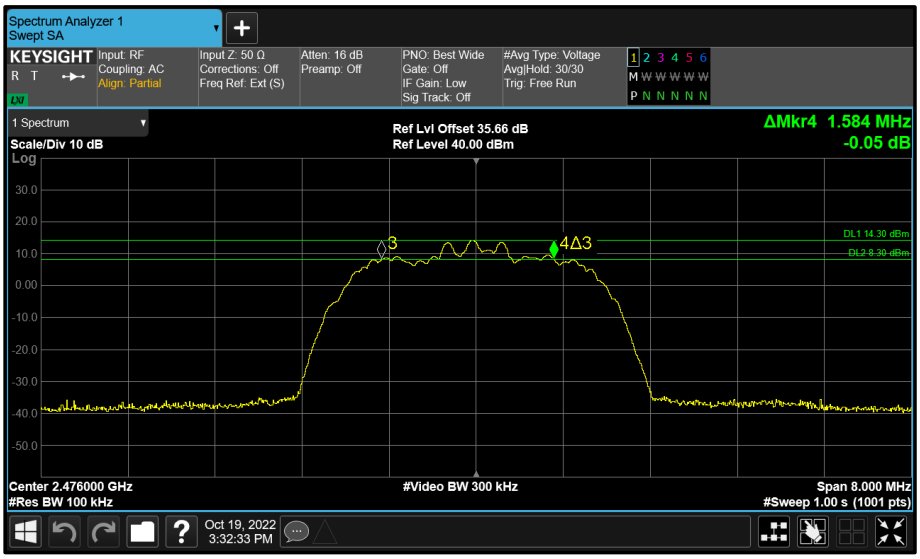

Figure 54 - Core 0 (A) 2476 MHz (CH74) 6 dB Bandwidth

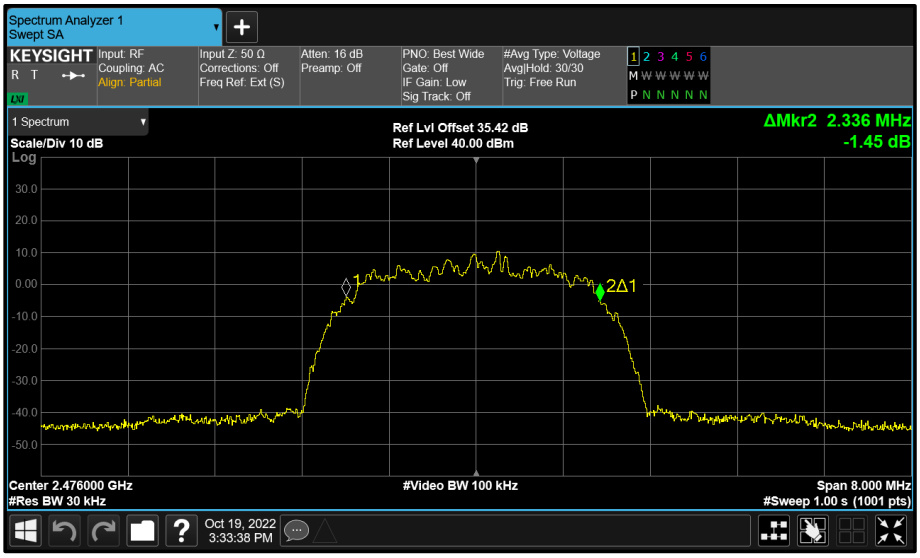

Figure 55 - Core 1 (B) 2476 MHz (CH74) 99% Bandwidth

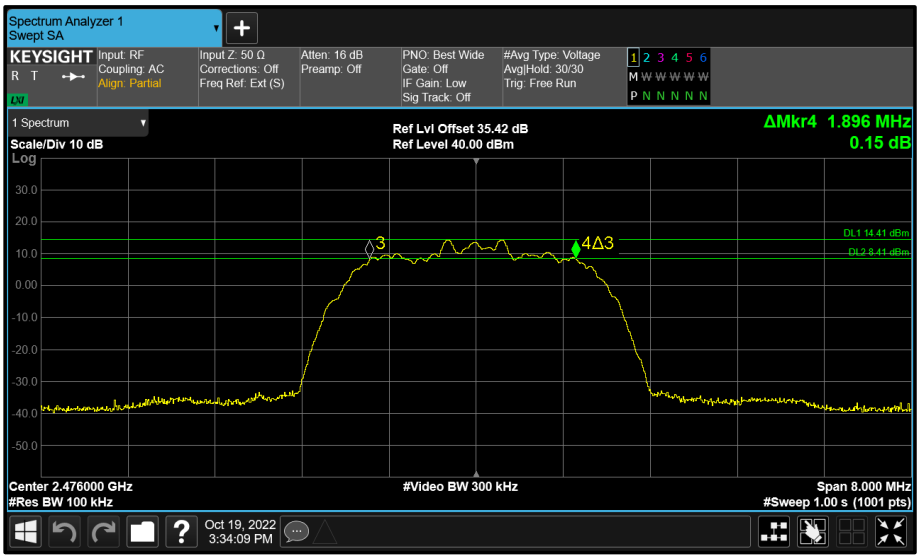

Figure 56 - Core 1 (B) 2476 MHz (CH74) 6 dB Bandwidth

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

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	0.660	0.675	-	-	≥500.0
2441	0.675	1.020	-	-	≥500.0
2476	0.660	1.035	-	-	≥500.0

Table 32 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2404	4.635	4.635	-	-	-
2441	4.620	4.620	-	-	-
2476	4.620	4.650	-	-	-

Table 33 - 99% Bandwidth Results

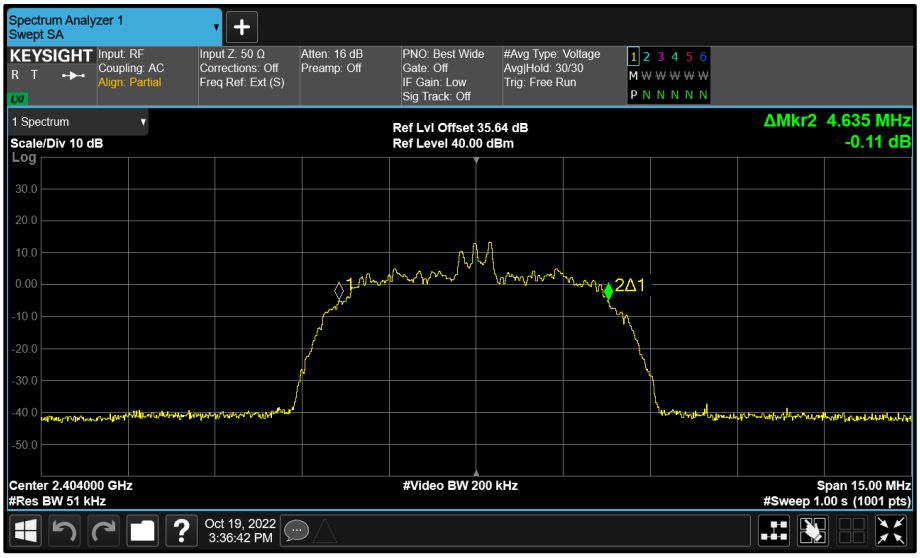

Figure 57 - Core 0 (A) 2404 MHz (CH2) 99% Bandwidth

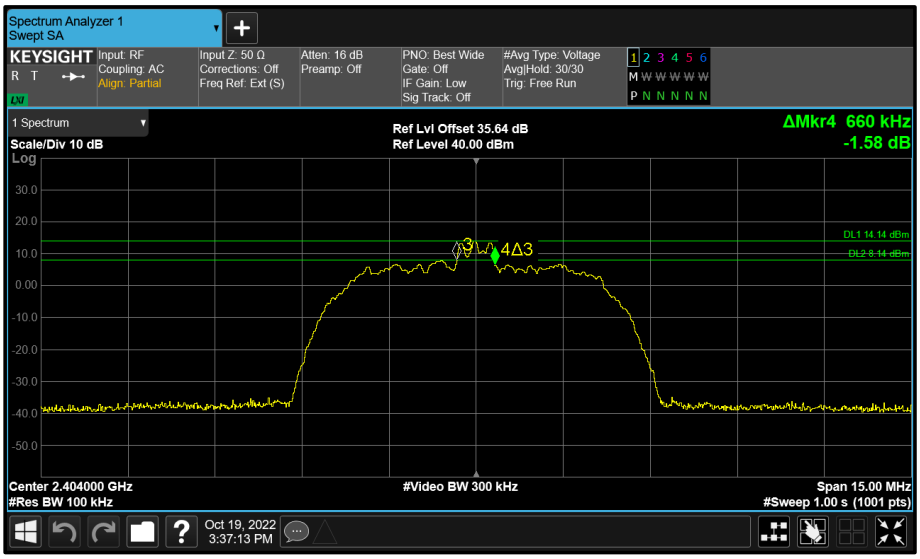

Figure 58 - Core 0 (A) 2404 MHz (CH2) 6 dB Bandwidth

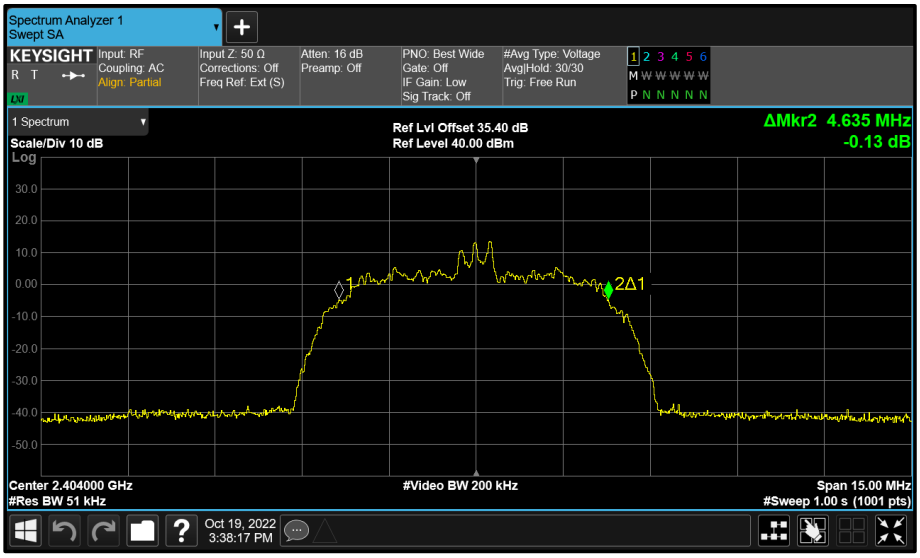

Figure 59 - Core 1 (B) 2404 MHz (CH2) 99% Bandwidth

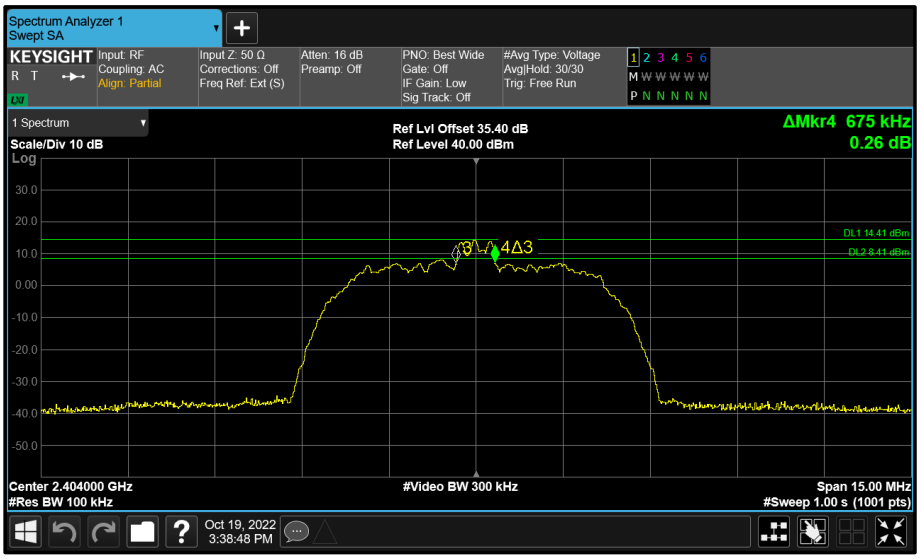

Figure 60 - Core 1 (B) 2404 MHz (CH2) 6 dB Bandwidth

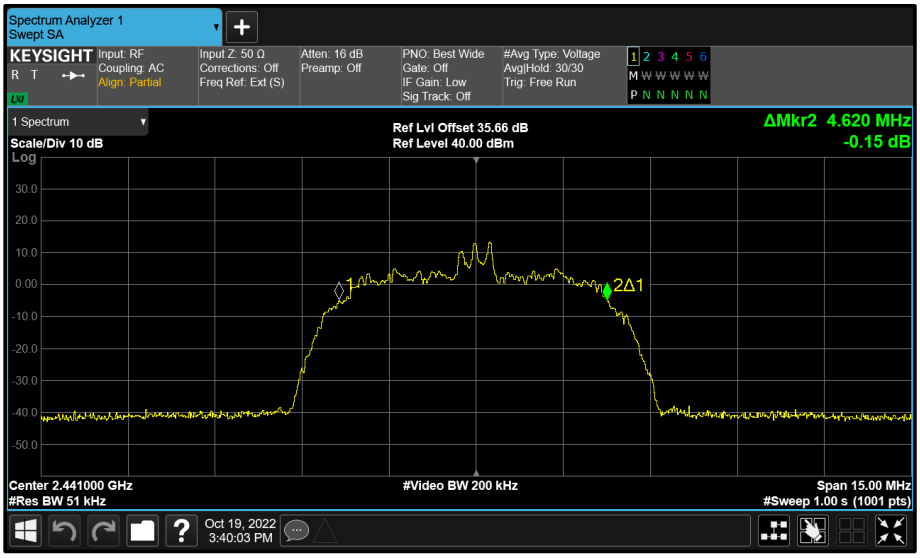

Figure 61 - Core 0 (A) 2441 MHz (CH39) 99% Bandwidth

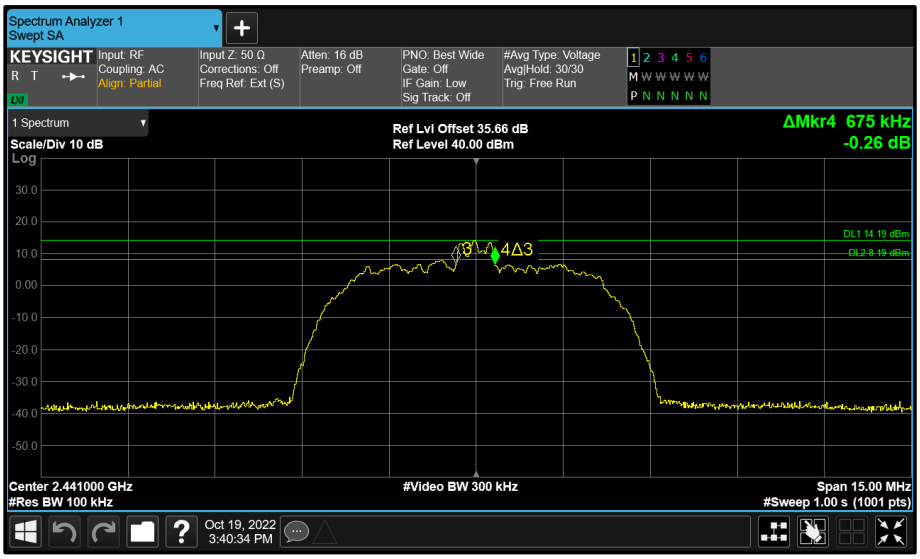

Figure 62 - Core 0 (A) 2441 MHz (CH39) 6 dB Bandwidth

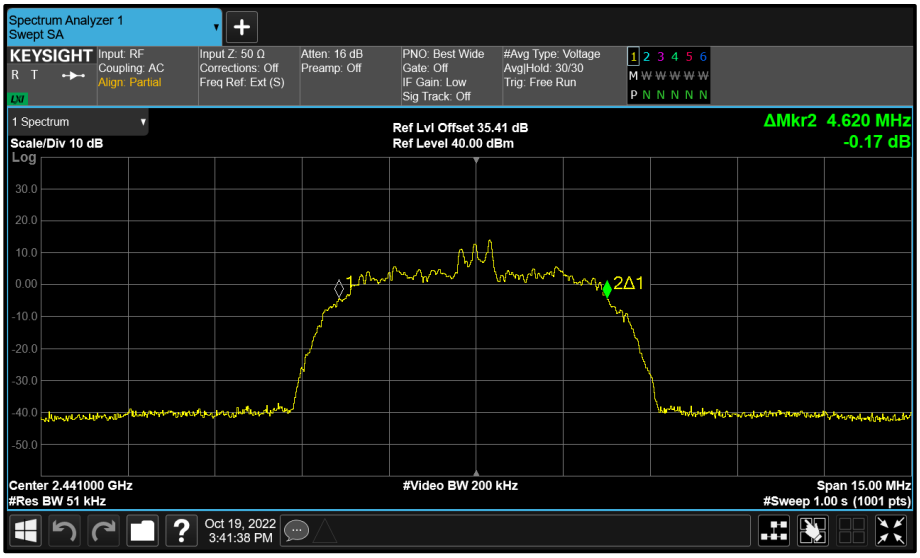

Figure 63 - Core 1 (B) 2441 MHz (CH39) 99% Bandwidth

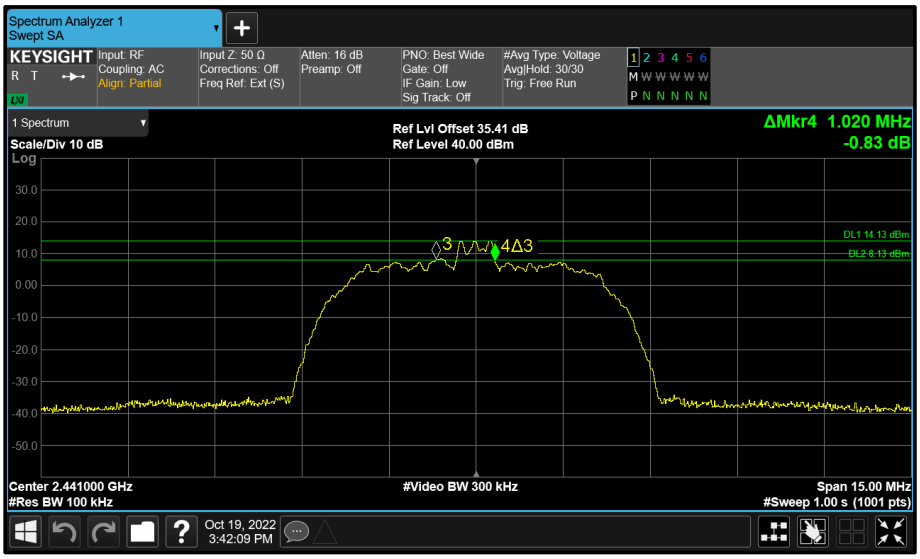

Figure 64 - Core 1 (B) 2441 MHz (CH39) 6 dB Bandwidth