FCC and ISED Test Report

Apple Inc
Model: A2348

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

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

FCC ID: BCGA2348 IC: 579C-A2348

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Document 75949235-09 Issue 01

SIGNATURE			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Steve Marshall	Senior Engineer	Authorised Signatory	14 October 2020

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
Testing	Daniel Cameron	14 October 2020	
Testing	Mehadi Choudhury	14 October 2020	
Testing	Faisal Malyar	14 October 2020	
Testing	Jaiyanth Balendrarajah	14 October 2020	
Testing	Mohammad Malik	14 October 2020	
Testing	Ahmad Javid	14 October 2020	
Testing	Liang Tian	14 October 2020	

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: 2019, ISED RSS-247: Issue 2 (02-2017) and ISED RSS-GEN: Issue 5 (04-2018) + A1 (03-2019) for the tests detailed in section 1.3.

ACCREDITATION

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation. Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

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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	14-October-2020

Table 1

1.2 Introduction

Applicant	Apple Inc
Manufacturer	Apple Inc
Model Number(s)	A2348
Serial Number(s)	C07CX00X02H6 and C07D100W02H7
Hardware Version(s)	REV1.0
Software Version(s)	20W102770t
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 15C: 2019 ISED RSS-247: Issue 2 (02-2017) ISED RSS-GEN: Issue 5 (04-2018) + A1 (03-2019)
Order Number Date	0540205400 07-April-2020
Date of Receipt of EUT	03-July-2020 & 17-August-2020
Start of Test	17-August-2020
Finish of Test	12-October-2020
Name of Engineer(s)	Daniel Cameron, Mehadi Choudhury, Faisal Malyar, Jaiyanth Balendrarajah, Mohammad Malik, Ahmad Javid and Liang Tian
Related Document(s)	ANSI C63.10 (2013) 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
	Part 15C	RSS-247	RSS-GEN			
Configuration and Mode: 2.4 GHz Bluetooth (FHSS)						
-	15.203	-	-	Antenna Requirement	N/T	The devices complies with the provisions of this section, as it uses a permanently attached antenna.
2.1	15.247 (a)(1)	5.1	-	Frequency Hopping Systems - Average Time of Occupancy	Pass	
2.2	15.247 (a)(1)	5.1	-	Frequency Hopping Systems - Channel Separation	Pass	
2.3	15.247 (a)(1)	5.1	-	Frequency Hopping Systems - Number of Hopping Channels	Pass	
2.4	15.247 (a)(1)	5.1	6.7	Frequency Hopping Systems - 20 dB Bandwidth	Pass	
2.5	15.247 (b)	5.4	6.12	Maximum Conducted Output Power	Pass	
2.6	15.247 (d)	5.5	-	Authorised Band Edges	Pass	
2.7	15.205	-	8.10	Restricted Band Edges	Pass	
2.8	15.247 (d) and 15.205	5.5	6.13	Spurious Radiated Emissions	Pass	

Table 2

1.4 Product Information

1.4.1 Technical Description

The Equipment Under Test (EUT) was a desktop computer with Bluetooth, Bluetooth Low Energy and 802.11 a/b/g/n/ac/ax 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.

For tests in SISO operation, conducted tests were performed on the Core with the highest antenna gain as Core 0 and Core 1 are identical but with unequal antenna gains. In addition conducted measurements were performed on BT Core 2 which is a dedicated Bluetooth Core. Radiated tests were performed on all Cores. The EUT supports TxBF on Core 0 + Core 1 only.

Bluetooth BDR/EDR was assessed as a FHSS system. The EUT supports Bluetooth on the following mode of operations across it's antenna ports:

- BT Core 0 – SISO (iPA and ePA), TxBF (iPA and ePA)
- BT Core 1 – SISO (iPA and ePA), TxBF (iPA and ePA)
- BT Core 2 – SISO (iPA)

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 either a static channel selected within the test script or frequency hopping over the maximum number of supported channels.

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

1.4.3 Antenna Gain Table (2.4GHz Bluetooth)

Antenna Port	Frequency Range (MHz)	Peak Gain (dBi)	Conducted Cable Loss (dB)
Core 0	2400 to 2483.5	5.00	0.70
Core 1	2400 to 2483.5	0.25	0.70
Core 2	2400 to 2483.5	0	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: A2348, Serial Number: C07CX00X02H6			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A2348, Serial Number: C07D100W02H7			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 4

1.7 Test Location

TÜV SÜD conducted the following tests at our Fareham Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: 2.4 GHz Bluetooth (FHSS)		
Maximum Conducted Output Power	Daniel Cameron and Mehadi Choudhury	UKAS
Frequency Hopping Systems - Average Time of Occupancy	Daniel Cameron and Mehadi Choudhury	UKAS
Frequency Hopping Systems - Channel Separation	Daniel Cameron and Mehadi Choudhury	UKAS
Frequency Hopping Systems - Number of Hopping Channels	Daniel Cameron and Mehadi Choudhury	UKAS
Frequency Hopping Systems - 20 dB Bandwidth	Daniel Cameron and Mehadi Choudhury	UKAS
Authorised Band Edges	Faisal Malyar, Jaiyanth Balendrarajah, Mohammad Malik, Ahmad Javid and Liang Tian	UKAS
Restricted Band Edges	Faisal Malyar, Jaiyanth Balendrarajah, Mohammad Malik, Ahmad Javid and Liang Tian	UKAS
Spurious Radiated Emissions	Faisal Malyar, Jaiyanth Balendrarajah, Mohammad Malik, Ahmad Javid and Liang Tian	UKAS

Table 5

Office Address:

Octagon House, Concorde Way
Segensworth North, Fareham
Hampshire, PO15 5RL, United Kingdom

2 Test Details

2.1 Frequency Hopping Systems - Average Time of Occupancy

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)
ISED RSS-247, Clause 5.1

2.1.2 Equipment Under Test and Modification State

A2348, S/N: C07CX00X02H6 - Modification State 0

2.1.3 Date of Test

02-September-2020

2.1.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 7.8.4.

2.1.5 Environmental Conditions

Ambient Temperature	22.6 - 23.0 °C
Relative Humidity	51.8 - 61.9 %

2.1.6 Test Results

2.4 GHz Bluetooth (FHSS)

ePA

Antenna Port: Core 0

Modulation	2402 MHz		
	Dwell Time (ms)	Number of Transmissions	Time of Occupancy (ms)
GFSK (DH5)	2.887	105	303.1

Table 6 - Accumulated Transmit Time and Frequency Occupation Results

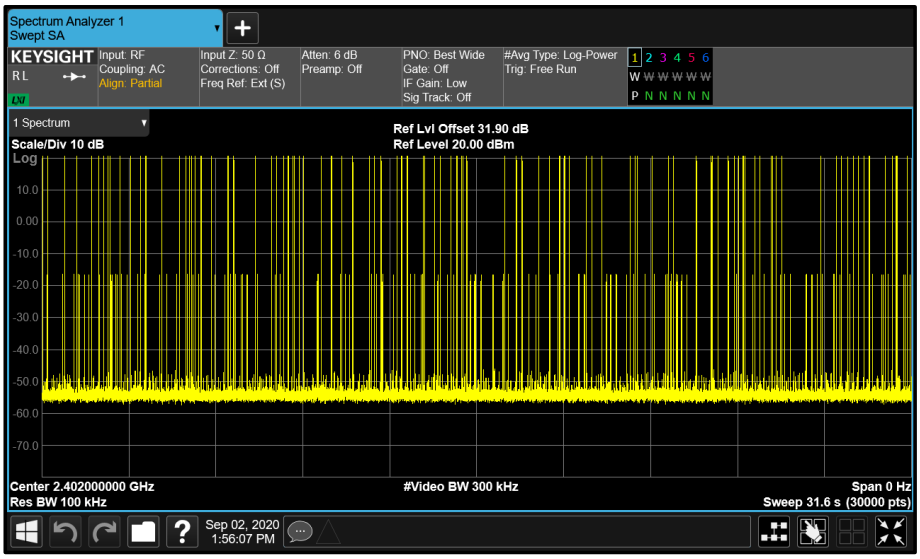

Figure 1 - GFSK (DH5) 2402 MHz – Time of Occupancy

FCC 47 CFR Part 15, Limit Clause 15.247 (a)(1)(iii)

Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

ISED RSS-247, Limit Clause 5.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds, multiplied by the number of hopping channels employed.

2.1.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	08-Nov-2020
Multimeter	Iso-tech	IDM101	2424	12	12-Dec-2020
Hygrometer	Rotronic	I-1000	3220	12	25-Sep-2020
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	08-Nov-2020
AC Programmable Power Supply	iTech	IT7324	5225	-	O/P Mon
MXA Signal Analyser	Keysight Technologies	N9020B	5528	24	04-Mar-2022
Signal Commissioning Unit	TUV SUD	SCU001	5546	12	15-Apr-2021

Table 7

O/P Mon – Output Monitored using calibrated equipment

2.2 Frequency Hopping Systems - Channel Separation

2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)
ISED RSS-247, Clause 5.1

2.2.2 Equipment Under Test and Modification State

A2348, S/N: C07CX00X02H6 - Modification State 0

2.2.3 Date of Test

02-September-2020

2.2.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 7.8.2.

2.2.5 Environmental Conditions

Ambient Temperature	22.6 - 23.0 °C
Relative Humidity	51.8 - 61.9 %

2.2.6 Test Results

2.4 GHz Bluetooth (FHSS)

ePA

Antenna Port: Core 0

Modulation	2441 MHz (CH39)		
	F1C (MHz)	F2C (MHz)	FHS (MHz)
GFSK	2441.011	2442.011	1.000
π/4 DQPSK	2440.995	2441.995	1.000
8-DPSK	2441.002	2442.002	1.000

Table 8 - Hopping Frequency Separation Results

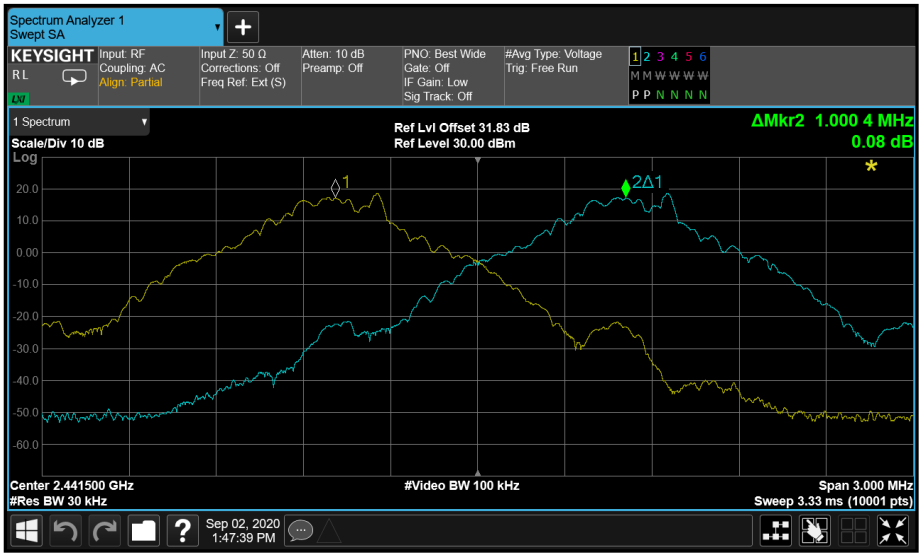

Figure 2- GFSK - 2441 MHz (CH 39)

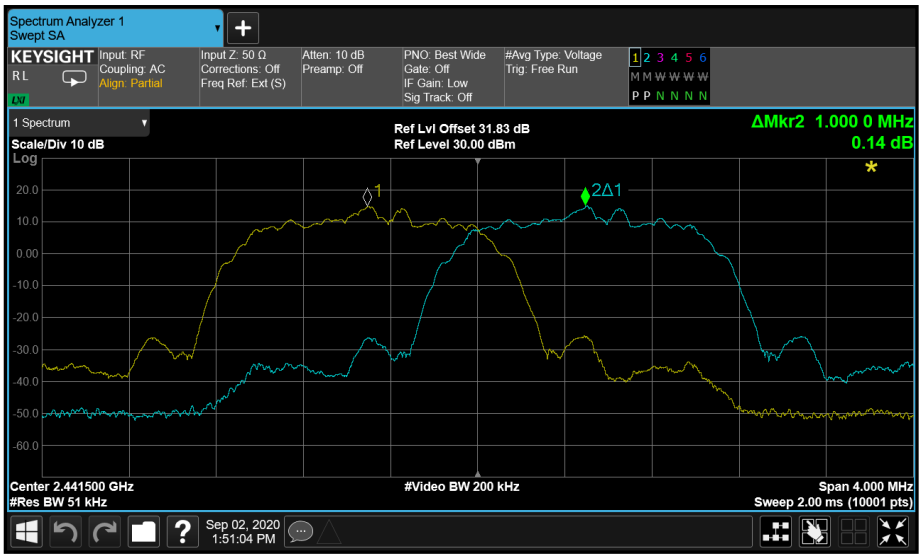

Figure 3 - π/4 DQPSK - 2441 MHz (CH 39)

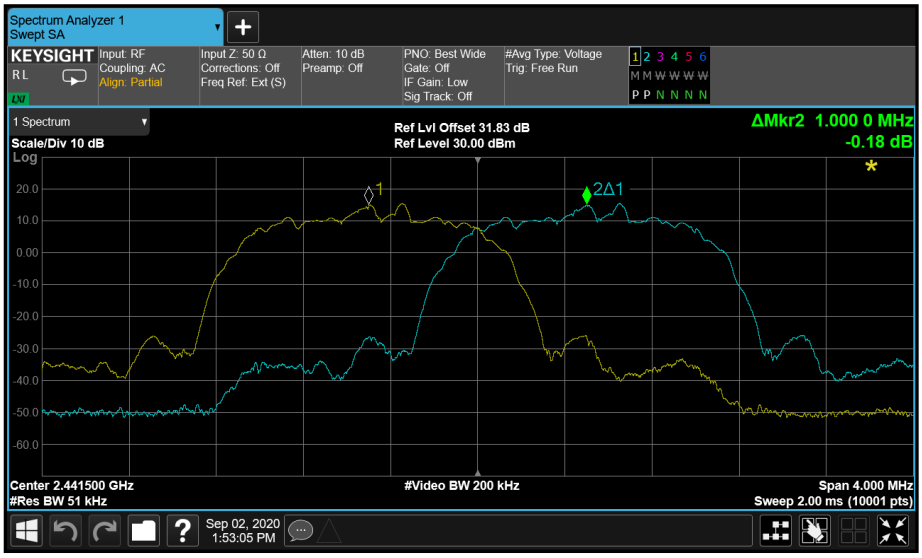

Figure 4 - 8-DPSK - 2441 MHz (CH 39)

FCC 47 CFR Part 15, Limit Clause 15.247 (a)(1)

If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

ISED RSS-247, Limit Clause 5.1 (c)

For FHSs in the band 902-928 MHz: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 20-second period. If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 10-second period. The maximum 20 dB bandwidth of the hopping channel shall be 500 kHz.

2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	08-Nov-2020
Multimeter	Iso-tech	IDM101	2424	12	12-Dec-2020
Hygrometer	Rotronic	I-1000	3220	12	25-Sep-2020
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	08-Nov-2020
AC Programmable Power Supply	iTech	IT7324	5225	-	O/P Mon
MXA Signal Analyser	Keysight Technologies	N9020B	5528	24	04-Mar-2022
Signal Commissioning Unit	TUV SUD	SCU001	5546	12	15-Apr-2021

Table 9

O/P Mon – Output Monitored using calibrated equipment

2.3 Frequency Hopping Systems - Number of Hopping Channels

2.3.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)
ISED RSS-247, Clause 5.1

2.3.2 Equipment Under Test and Modification State

A2348, S/N: C07CX00X02H6 - Modification State 0

2.3.3 Date of Test

02-September-2020

2.3.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 7.8.3.

2.3.5 Environmental Conditions

Ambient Temperature	22.6 - 23.0 °C
Relative Humidity	51.8 - 61.9 %

2.3.6 Test Results

2.4 GHz Bluetooth (FHSS)

ePA

Antenna Port: Core 0

Number of Hopping Channels: 79

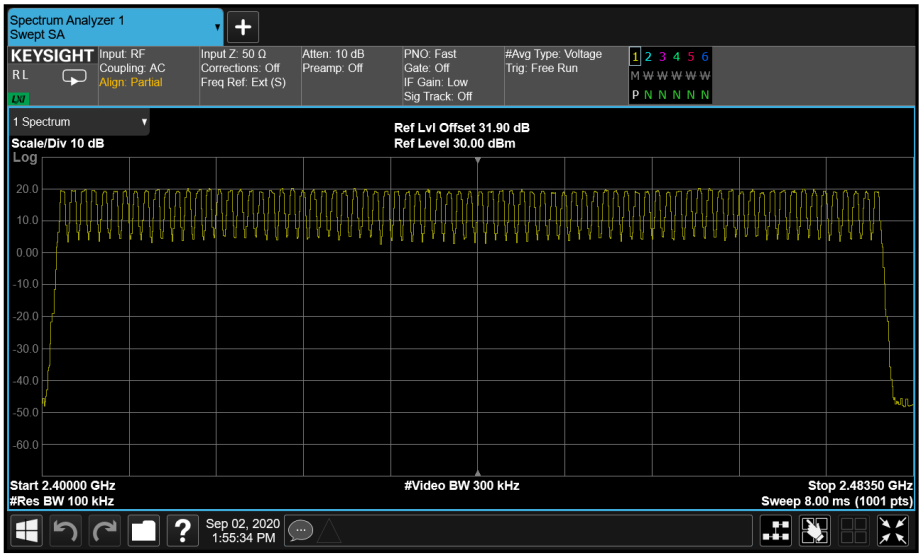

Figure 5 - GFSK (DH5) - Number of Hopping Channels

FCC 47 CFR Part 15, Limit Clause 15.247 (a)(1)(iii)

≥ 15 channels

ISED RSS-247, Limit Clause 5.1 (d)

FHSs operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels.

2.3.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	08-Nov-2020
Multimeter	Iso-tech	IDM101	2424	12	12-Dec-2020
Hygrometer	Rotronic	I-1000	3220	12	25-Sep-2020
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	08-Nov-2020
AC Programmable Power Supply	iTech	IT7324	5225	-	O/P Mon
MXA Signal Analyser	Keysight Technologies	N9020B	5528	24	04-Mar-2022
Signal Commissioning Unit	TUV SUD	SCU001	5546	12	15-Apr-2021

Table 10

O/P Mon – Output Monitored using calibrated equipment

2.4 Frequency Hopping Systems - 20 dB Bandwidth

2.4.1 Specification Reference

FCC 47 CFR Part 15C,
ISED RSS-247,
ISED RSS-GEN, Clause 15.247 (a)(1), 5.1 and 6.7

2.4.2 Equipment Under Test and Modification State

A2348, S/N: C07CX00X02H6 - Modification State 0

2.4.3 Date of Test

24-August-2020 to 02-September-2020

2.4.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.9.1.

2.4.5 Environmental Conditions

Ambient Temperature	22.6 - 23.0 °C
Relative Humidity	15.8 - 61.9 %

2.4.6 Test Results

2.4 GHz Bluetooth (FHSS)

iPA

Antenna Port Configuration: SISO Core 0 / Core 2

Modulation: GFSK (DH5)

Test Frequency (MHz)	20 dB Bandwidth (kHz)	
	Port(s)	
	Core 0	Core 2
2402	888.0	885.0
2441	885.0	888.0
2480	888.0	888.0

Table 11 - 20 dB Bandwidth Results

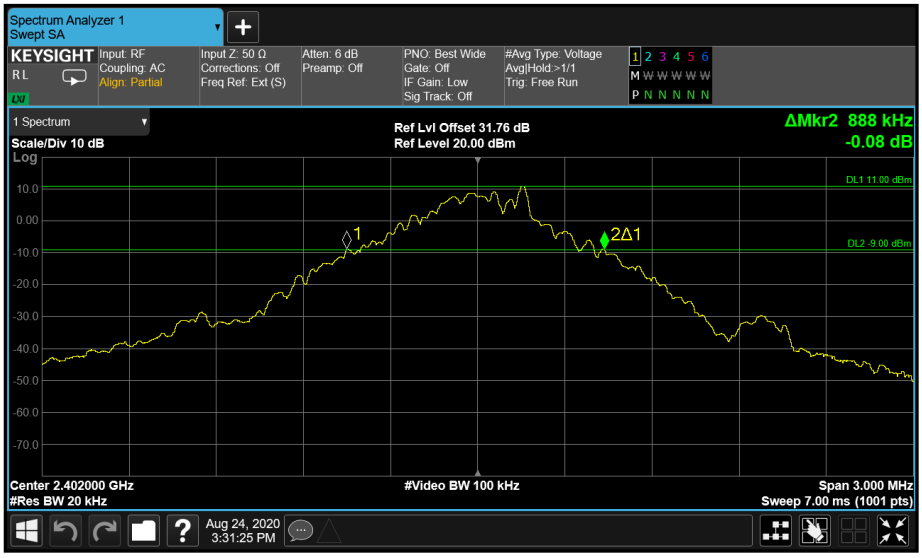

Figure 6 - Core 0 GFSK 2402 MHz (CH0)

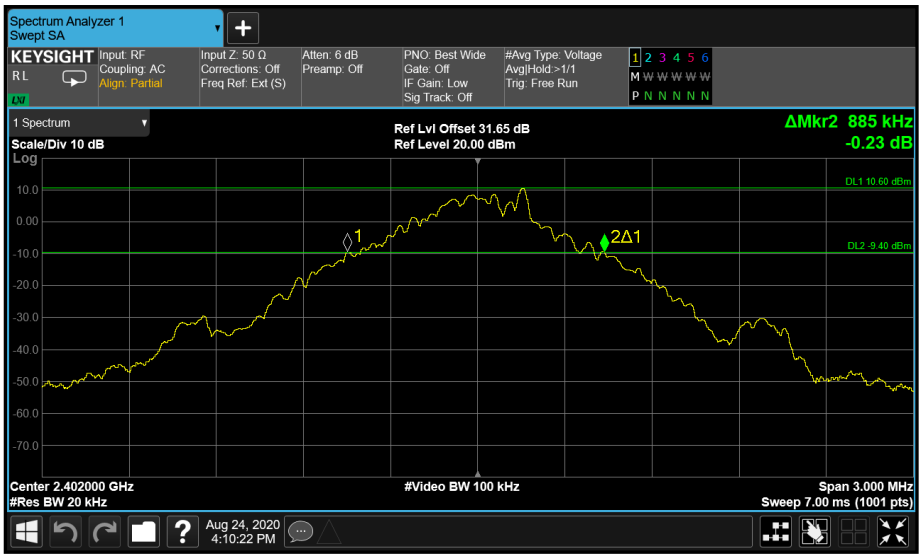

Figure 7 - Core 2 GFSK 2402 MHz (CH0)

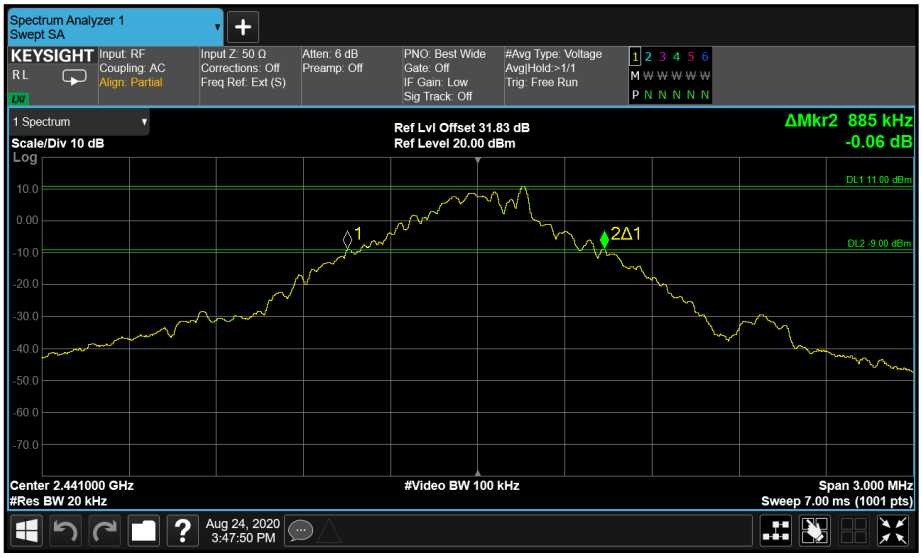

Figure 8 - Core 0 GFSK 2441 MHz (CH39)

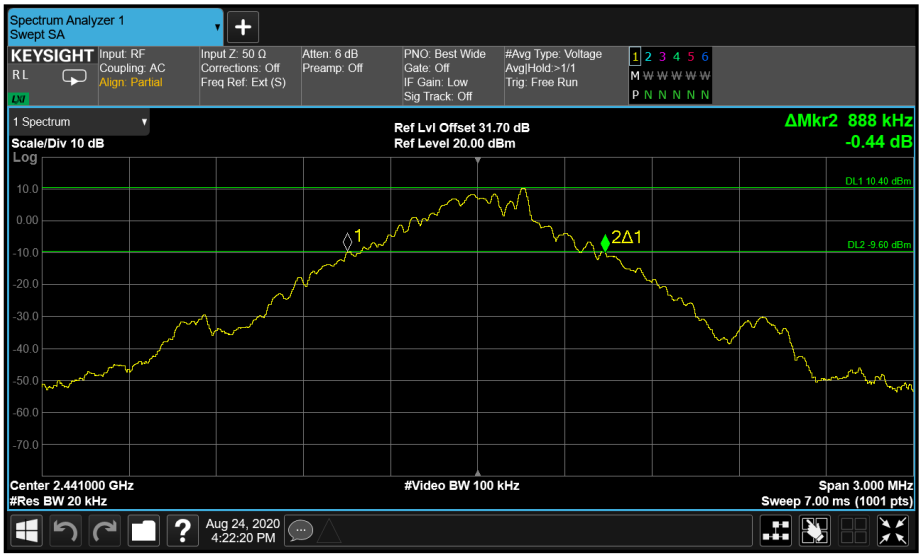

Figure 9 - Core 2 GFSK 2441 MHz (CH39)

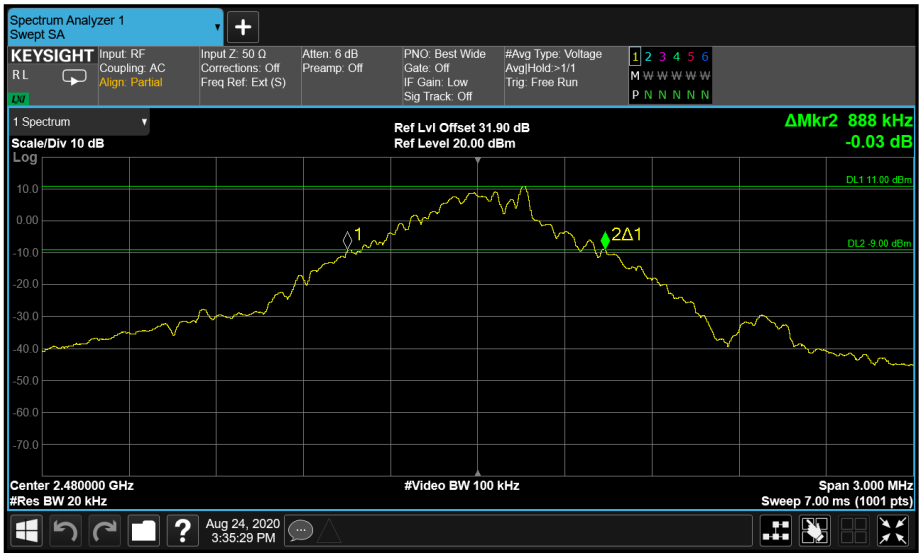

Figure 10 - Core 0 GFSK 2480 MHz (CH78)

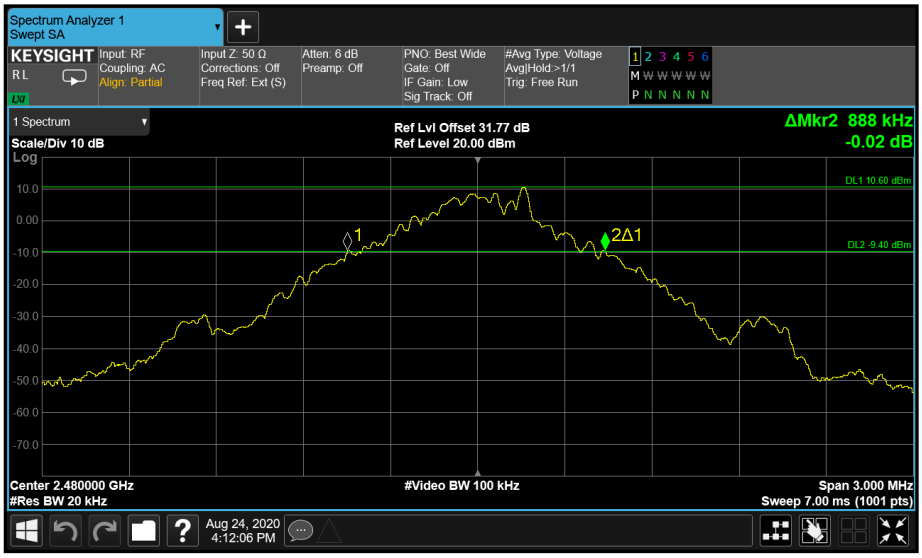

Figure 11 - Core 2 GFSK 2480 MHz (CH78)

Modulation: π/4 DQPSK

Test Frequency (MHz)	20 dB Bandwidth (kHz)	
	Port(s)	
	Core 0	Core 2
2402	1335.0	1330.0
2441	1340.0	1330.0
2480	1345.0	1335.0

Table 12 - 20 dB Bandwidth Results

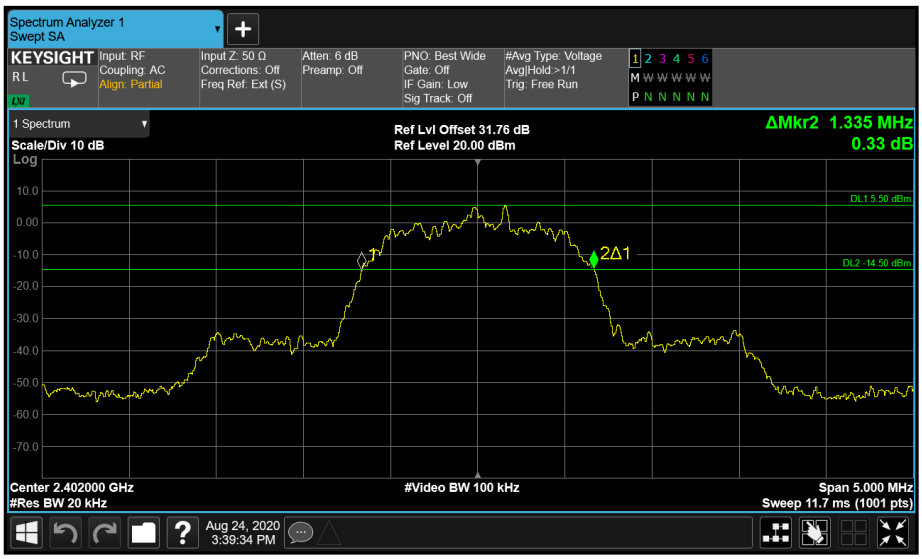

Figure 12 - Core 0 π/4 DQPSK 2402 MHz (CH0)

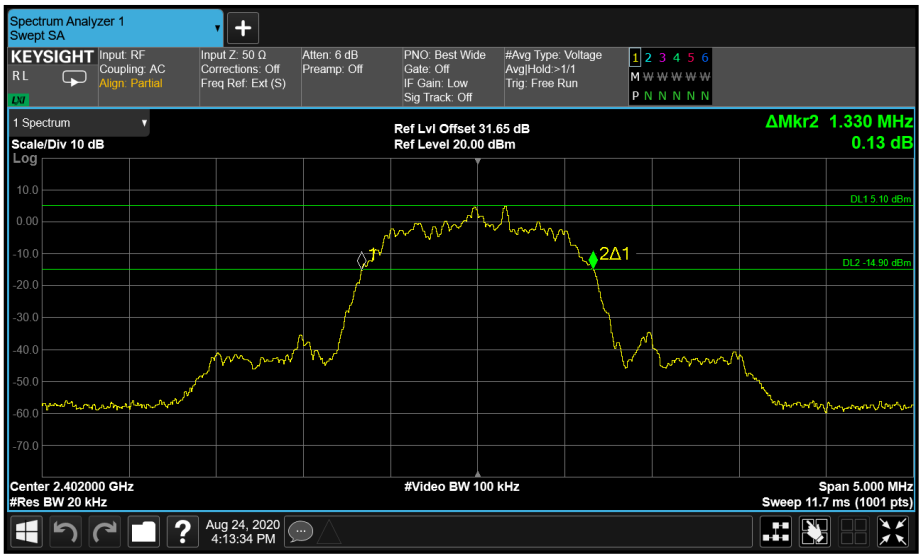

Figure 13 - Core 2 π/4 DQPSK 2402 MHz (CH0)

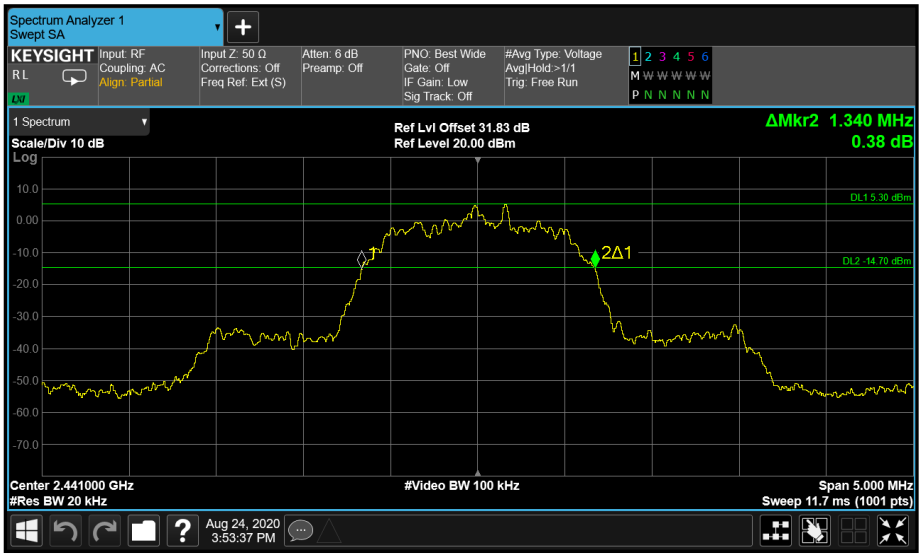

Figure 14 - Core 0 π/4 DQPSK 2441 MHz (CH39)

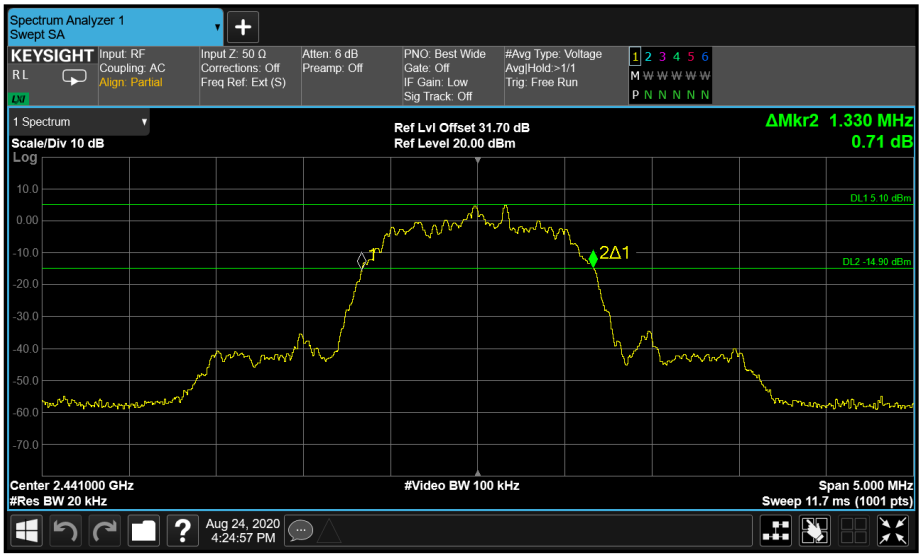

Figure 15 - Core 2 π/4 DQPSK 2441 MHz (CH39)

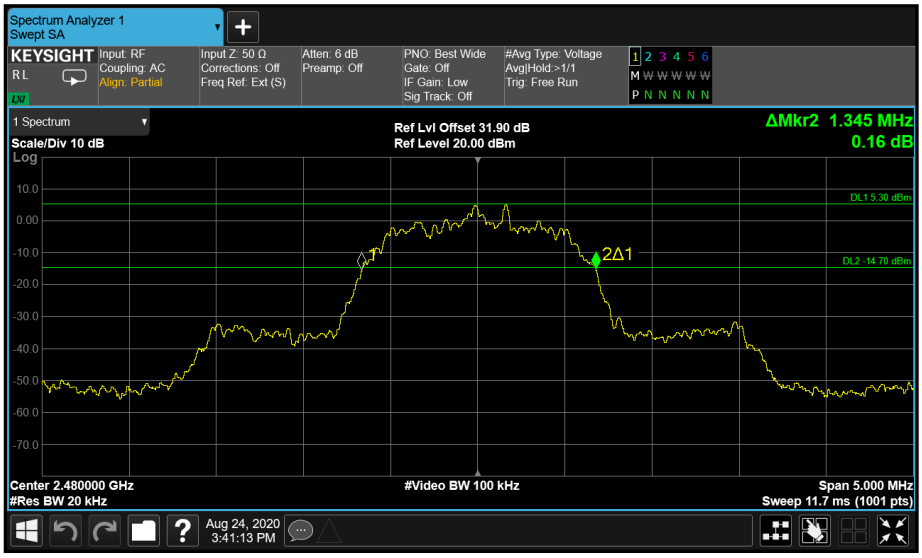

Figure 16 - Core 0 π/4 DQPSK 2480 MHz (CH78)

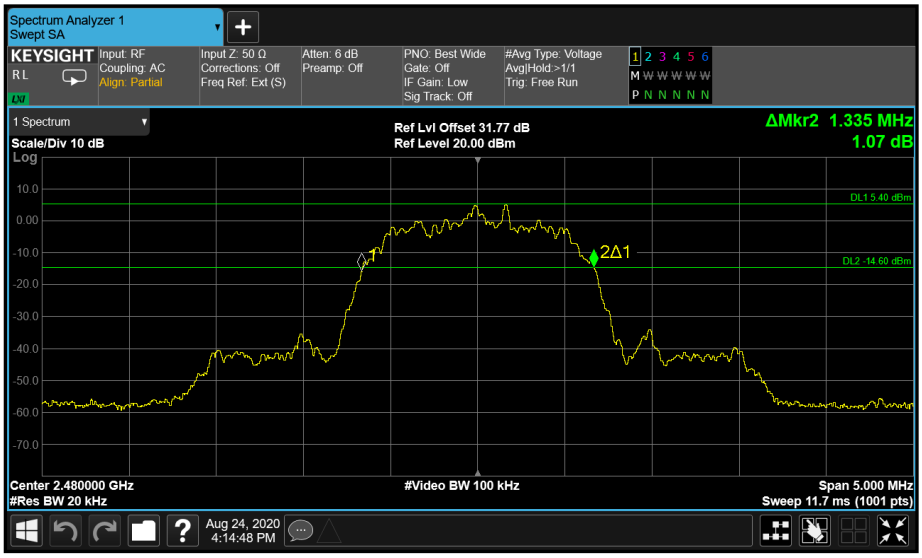

Figure 17 - Core 2 π/4 DQPSK 2480 MHz (CH78)

Modulation: 8DPSK

Test Frequency (MHz)	20 dB Bandwidth (kHz)	
	Port(s)	
	Core 0	Core 2
2402	1270.0	1270.0
2441	1270.0	1270.0
2480	1275.0	1270.0

Table 13 - 20 dB Bandwidth Results

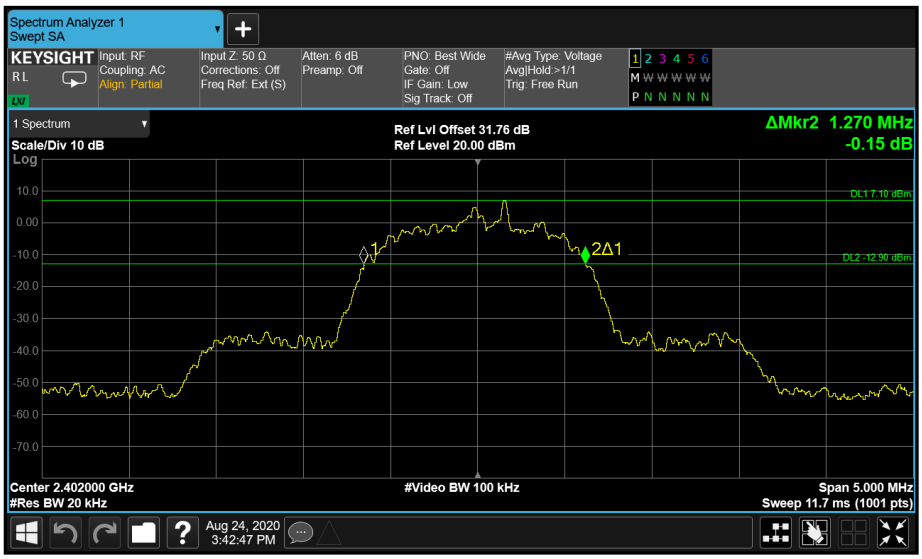

Figure 18 - Core 0 8DPSK 2402 MHz (CH0)

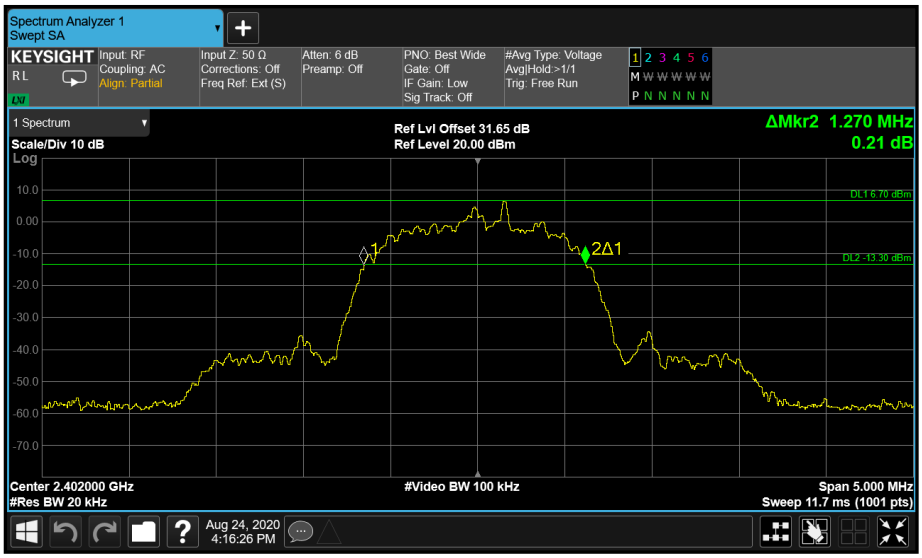

Figure 19 - Core 2 8DPSK 2402 MHz (CH0)

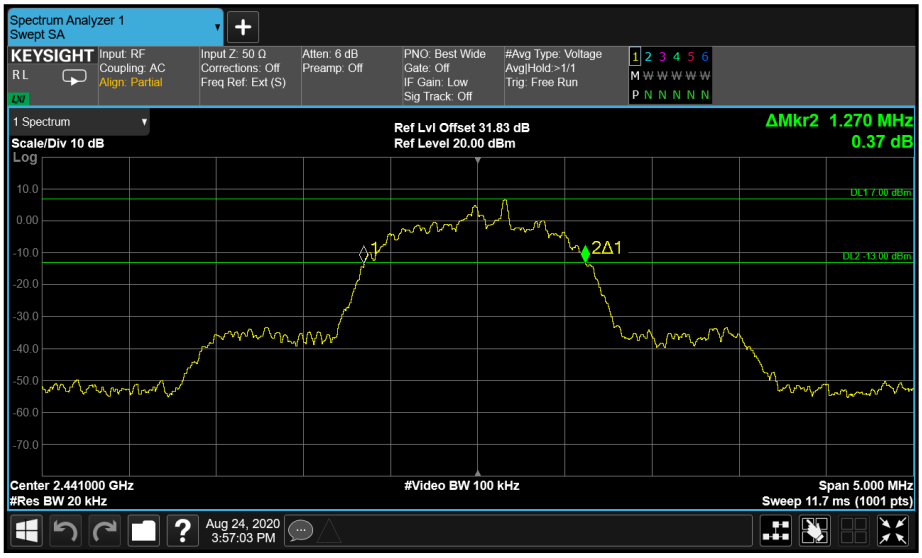

Figure 20 - Core 0 8DPSK 2441 MHz (CH39)

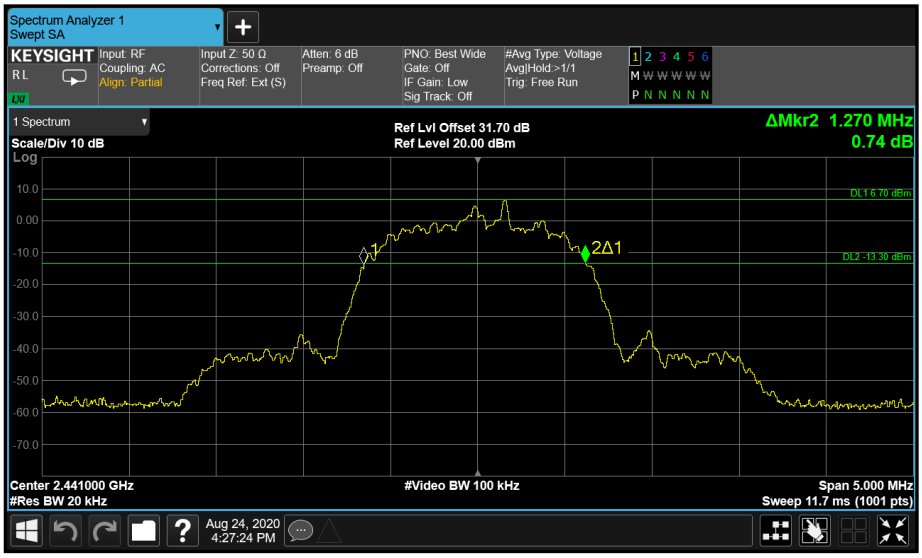

Figure 21 - Core 2 8DPSK 2441 MHz (CH39)

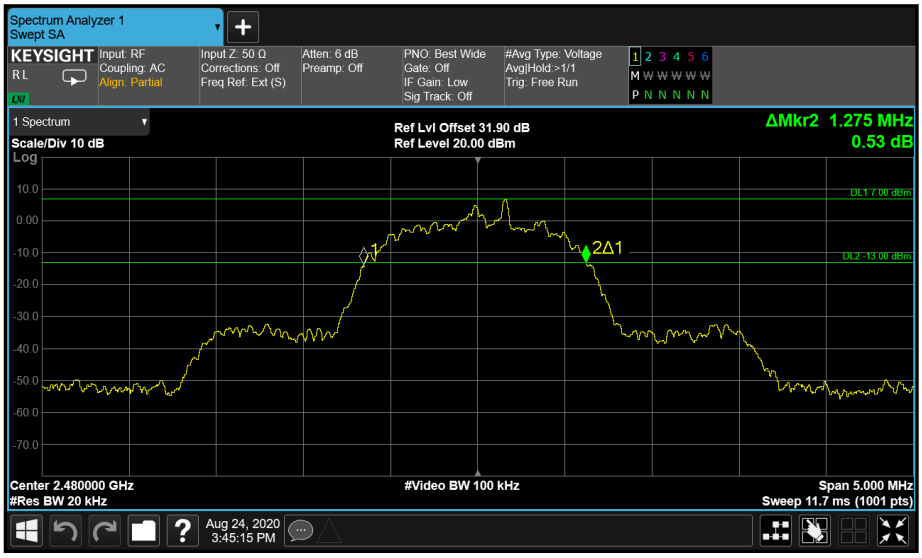

Figure 22 - Core 0 8DPSK 2480 MHz (CH78)

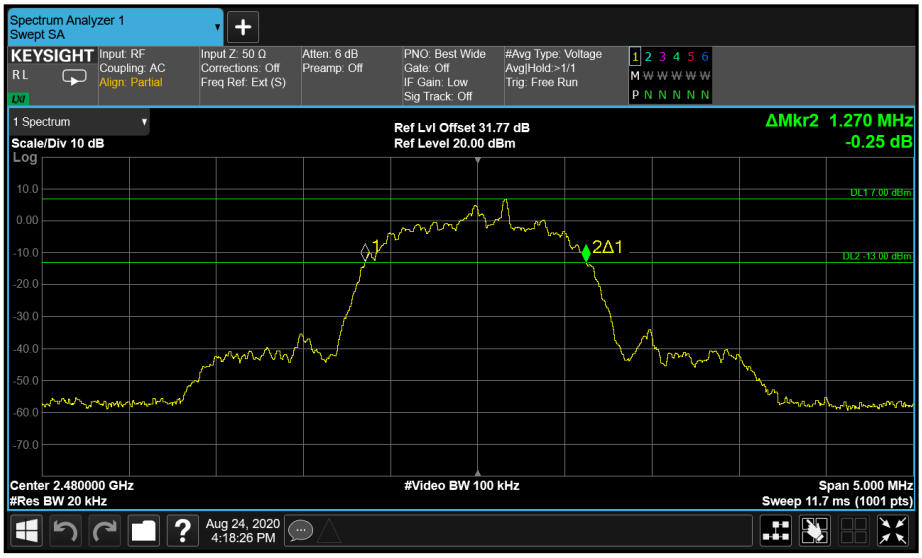

Figure 23 - Core 2 8DPSK 2480 MHz (CH78)

Antenna Port Configuration: Beamforming Core 0 + Core 1

Modulation: GFSK

Test Frequency (MHz)	20 dB Bandwidth (kHz)	
	Port(s)	
	Core 0	Core 1
2402	888.0	885.0
2441	852.0	885.0
2480	885.0	888.0

Table 14- 20 dB Bandwidth Results

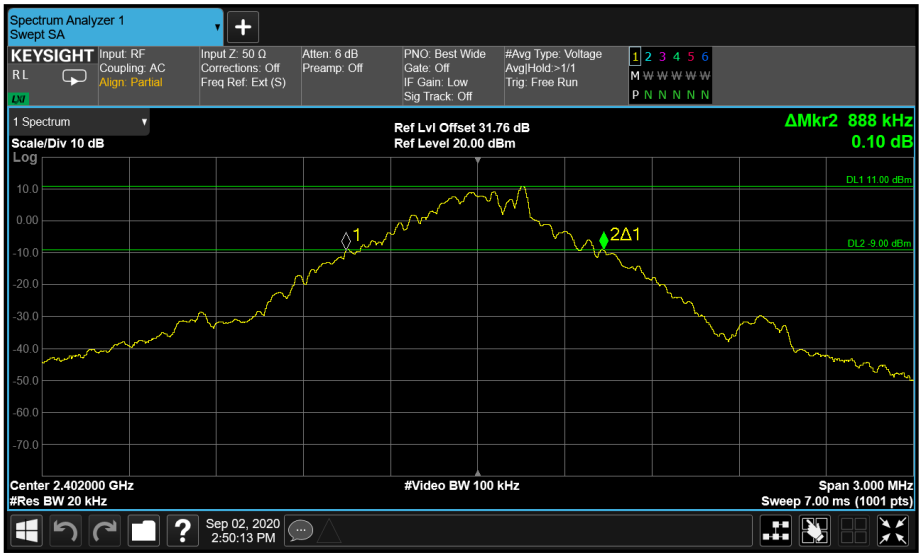

Figure 24 - Core 0 GFSK 2402 MHz (CH0)

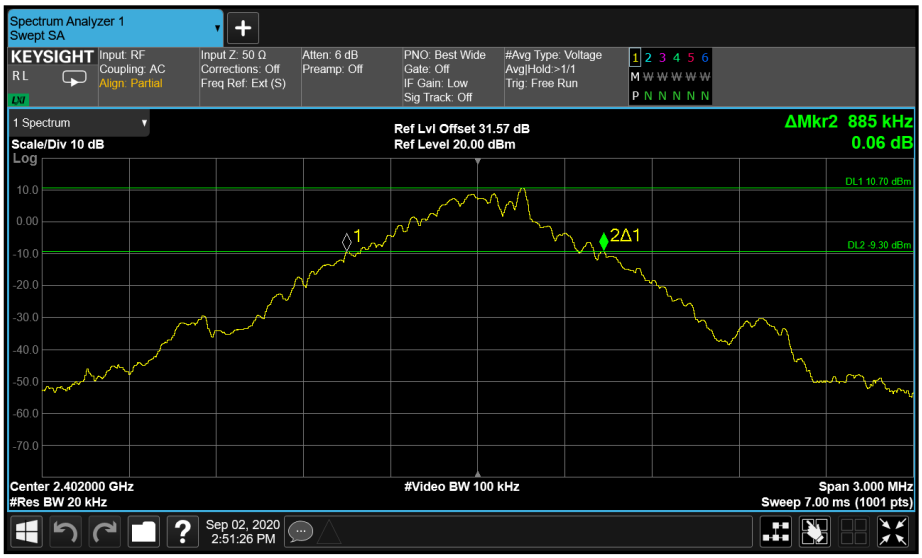

Figure 25 - Core 1 GFSK 2402 MHz (CH0)

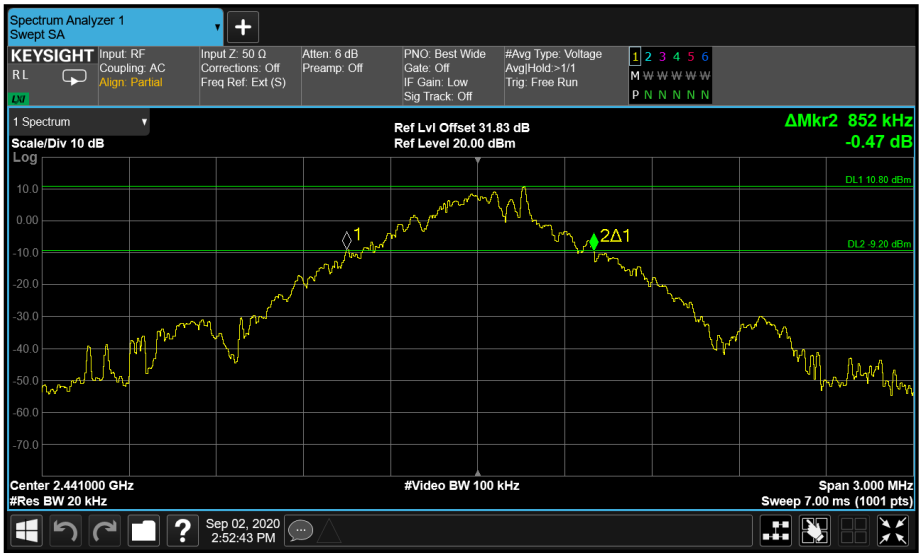

Figure 26 - Core 0 GFSK 2441 MHz (CH39)

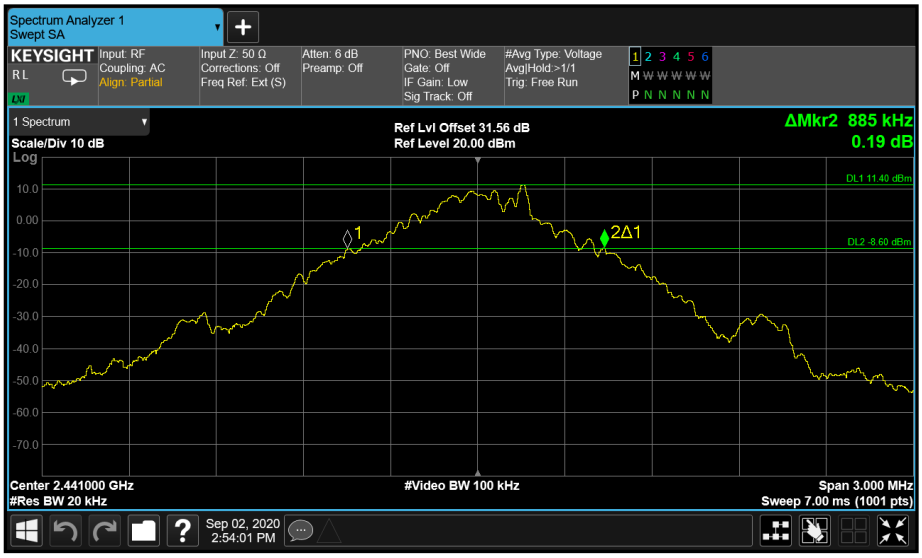

Figure 27 - Core 1 GFSK 2441 MHz (CH39)

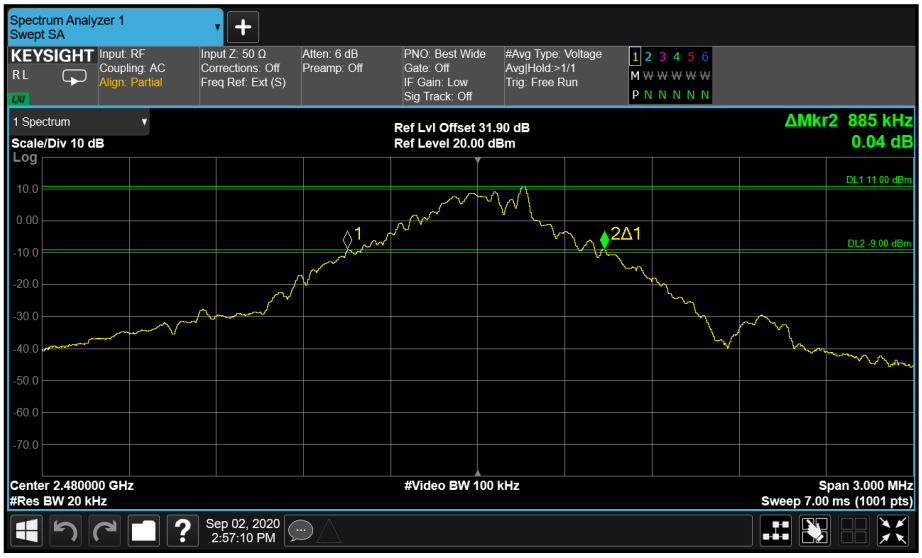

Figure 28 - Core 0 GFSK 2480 MHz (CH78)

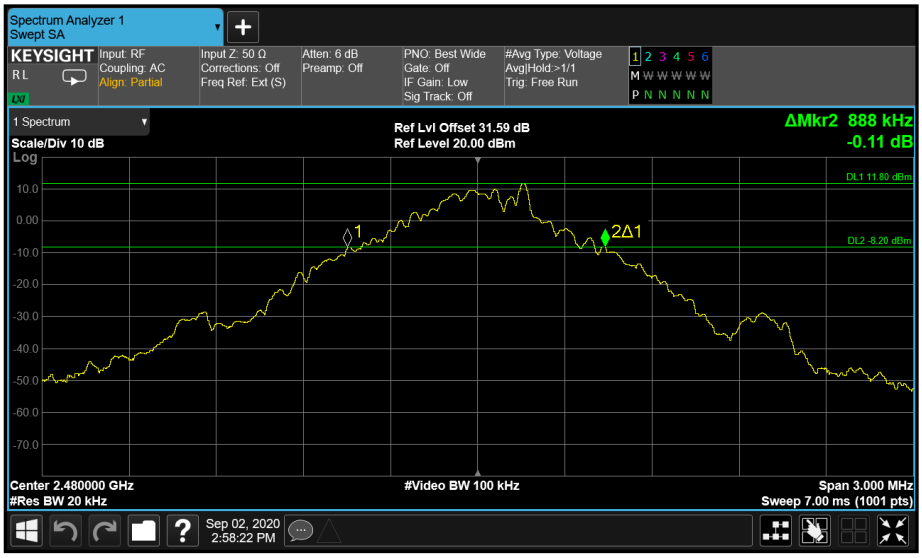

Figure 29 - Core 1 GFSK 2480 MHz (CH78)

Modulation: π/4 DQPSK

Test Frequency (MHz)	20 dB Bandwidth (kHz)	
	Port(s)	
	Core 0	Core 1
2402	1335.0	1330.0
2441	1340.0	1330.0
2480	1345.0	1335.0

Table 15- 20 dB Bandwidth Results

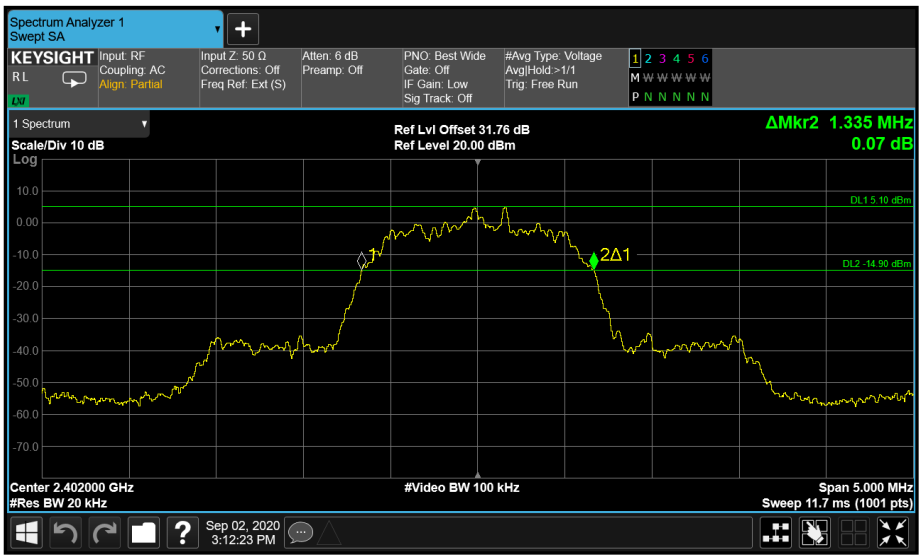

Figure 30 - Core 0 π/4 DQPSK 2402 MHz (CH0)

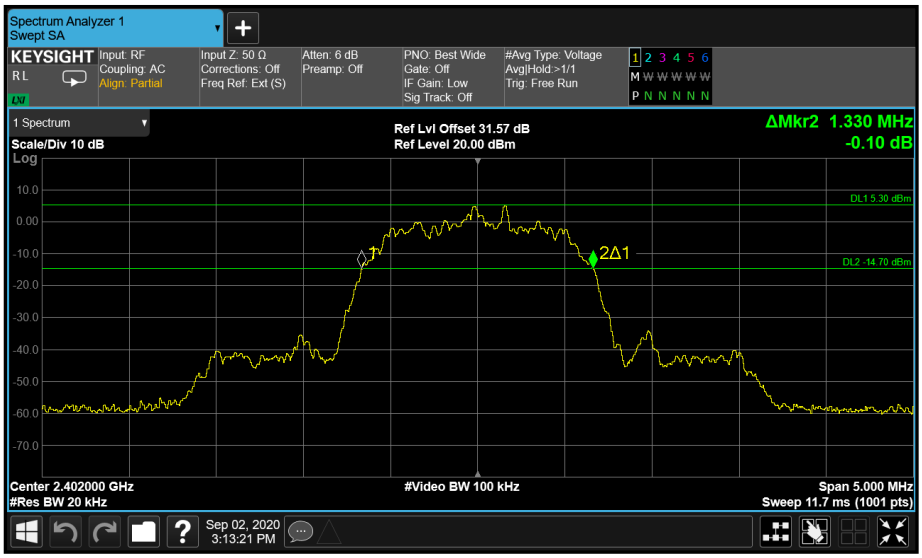

Figure 31 - Core 1 π/4 DQPSK 2402 MHz (CH0)

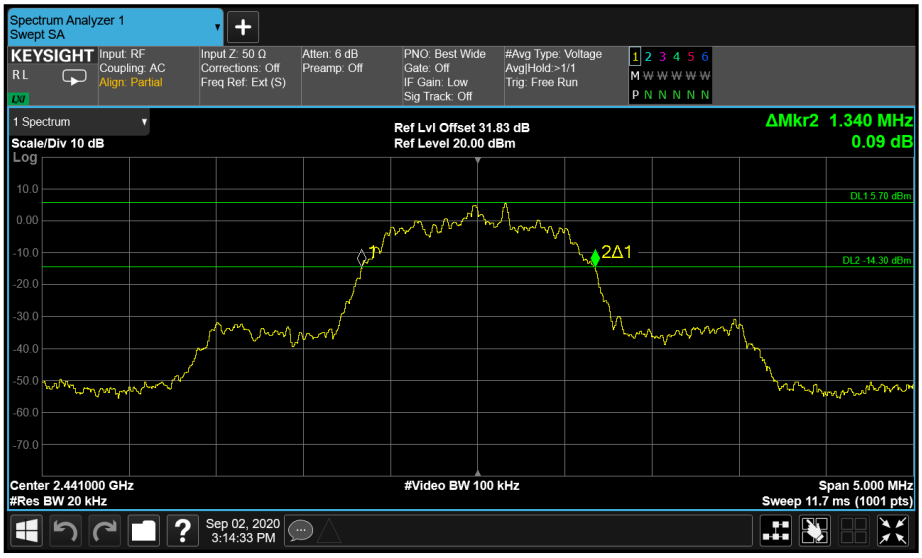

Figure 32 - Core 0 π/4 DQPSK 2441 MHz (CH39)

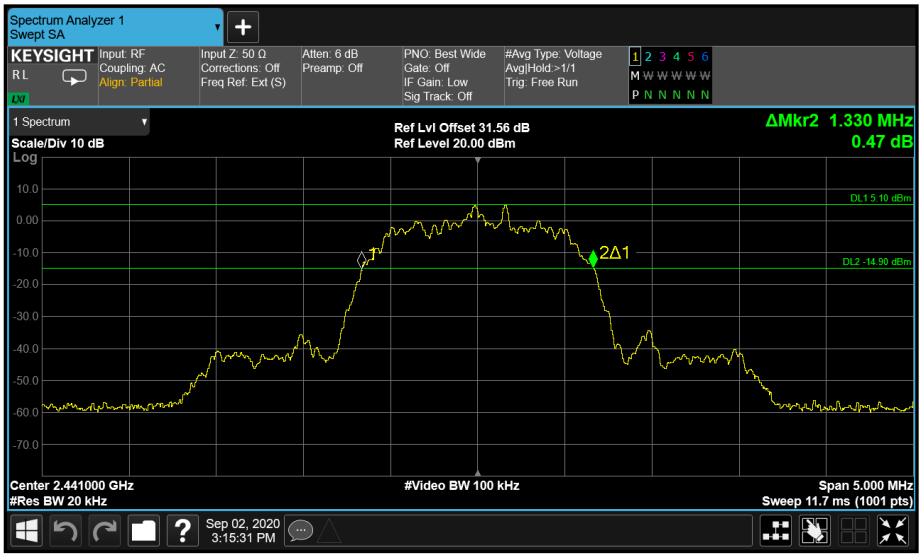

Figure 33 - Core 1 π/4 DQPSK 2441 MHz (CH39)

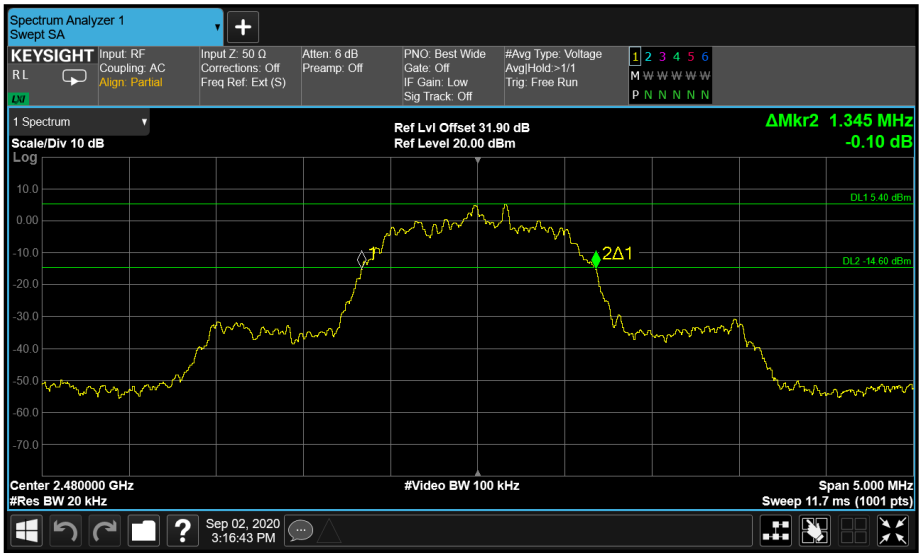

Figure 34 - Core 0 π/4 DQPSK 2480 MHz (CH78)

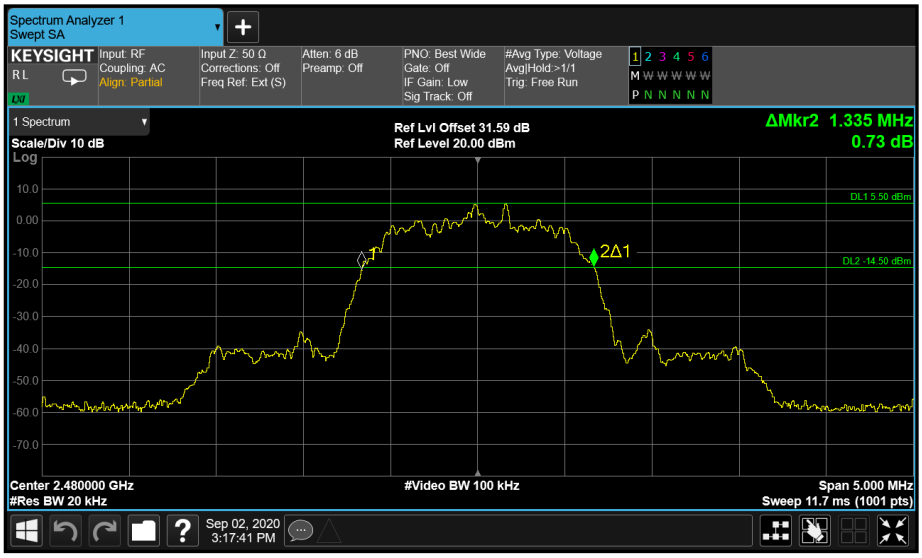

Figure 35 - Core 1 π/4 DQPSK 2480 MHz (CH78)

Modulation: 8DPSK

Test Frequency (MHz)	20 dB Bandwidth (kHz)	
	Port(s)	
	Core 0	Core 2
2402	1270.0	1270.0
2441	1270.0	1270.0
2480	1270.0	1275.0

Table 16- 20 dB Bandwidth Results

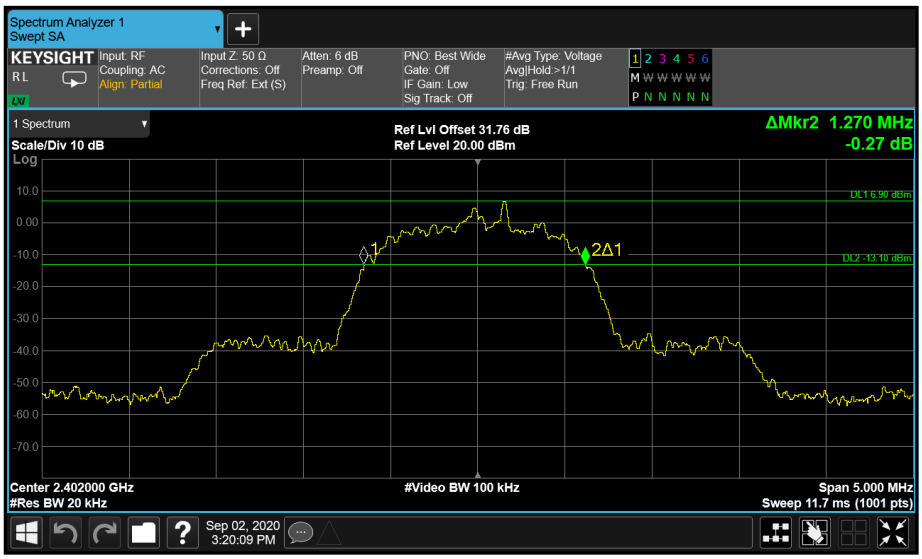

Figure 36 - Core 0 8DPSK 2402 MHz (CH0)

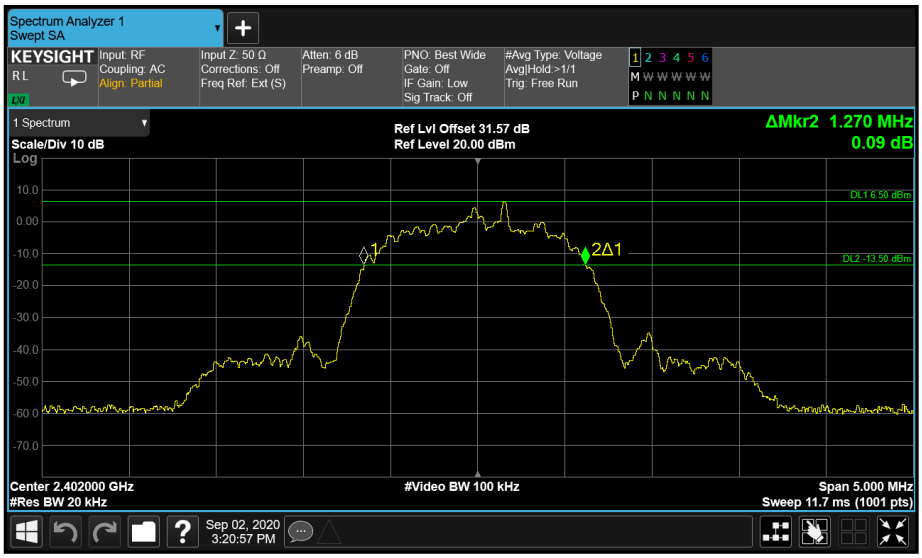

Figure 37 - Core 1 8DPSK 2402 MHz (CH0)

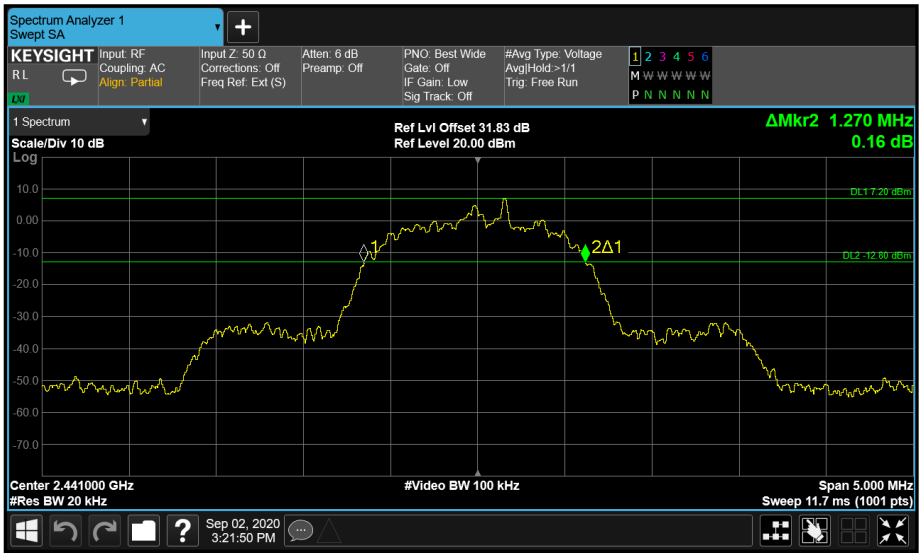

Figure 38 - Core 0 8DPSK 2441 MHz (CH39)

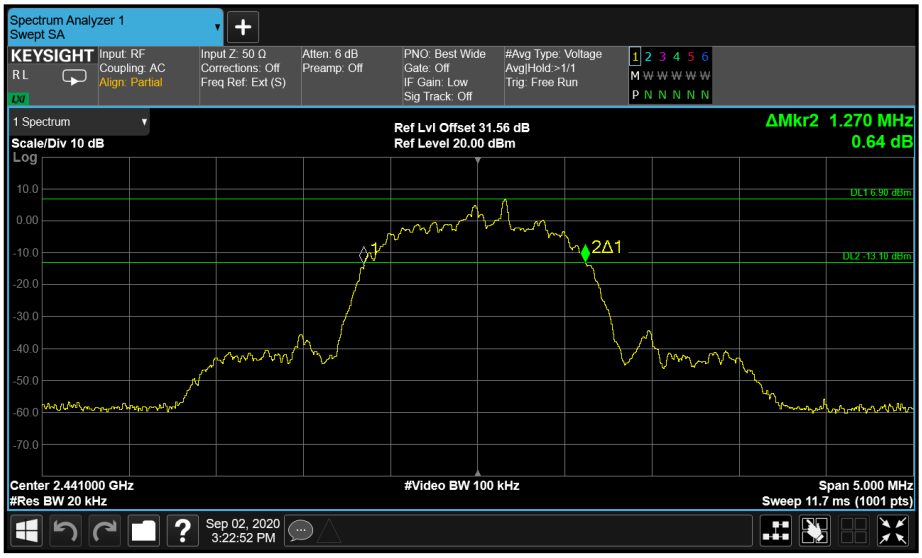

Figure 39 - Core 1 8DPSK 2441 MHz (CH39)

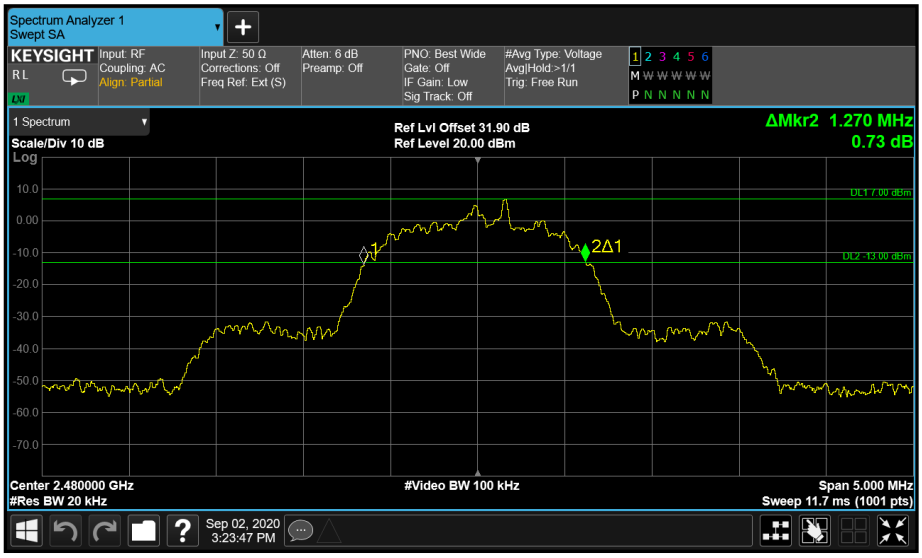

Figure 40 - Core 0 8DPSK 2480 MHz (CH78)

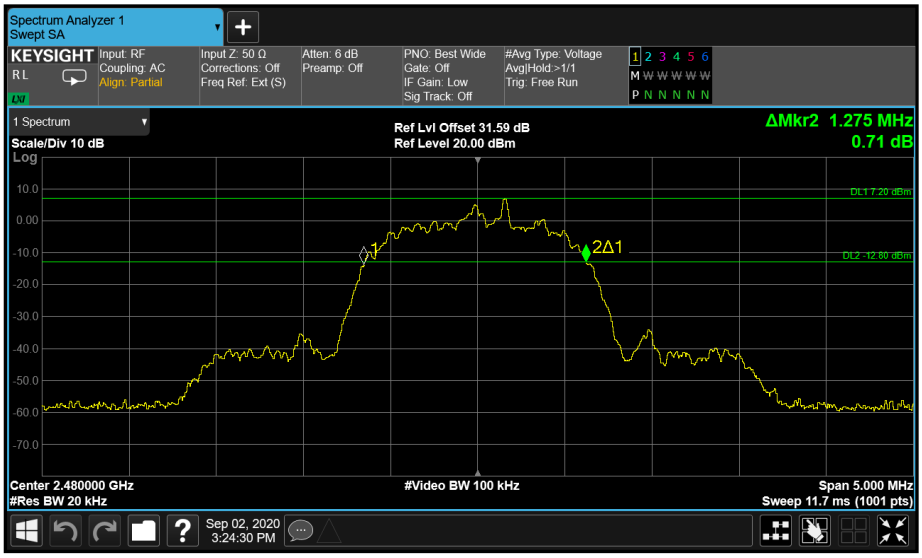

Figure 41 - Core 1 8DPSK 2480 MHz (CH78)

ePA

Antenna Port Configuration: SISO Core 0

Modulation: GFSK

Test Frequency (MHz)	20 dB Bandwidth (kHz)
	Port(s)
	Core 0
2402	843.0
2441	885.0
2480	843.0

Table 17- 20 dB Bandwidth Results

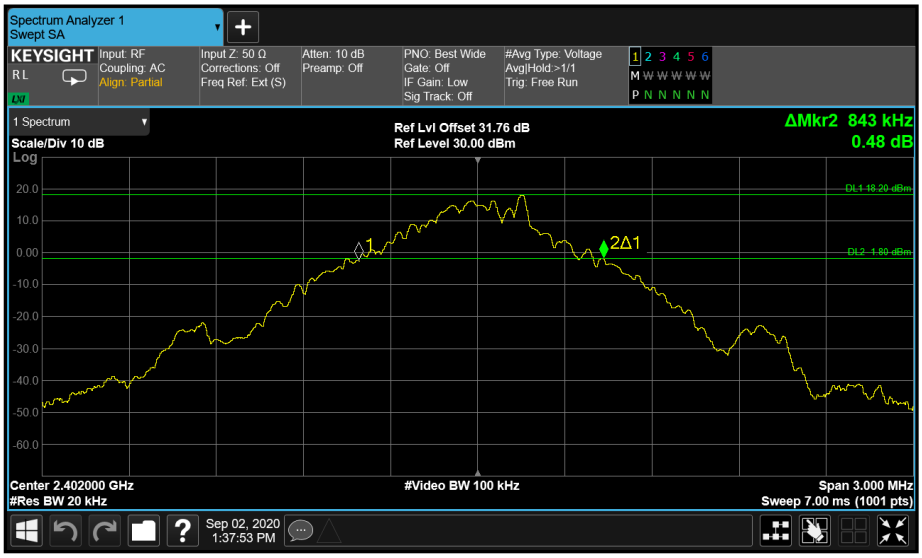

Figure 42 - Core 0 GFSK 2402 MHz (CH0)

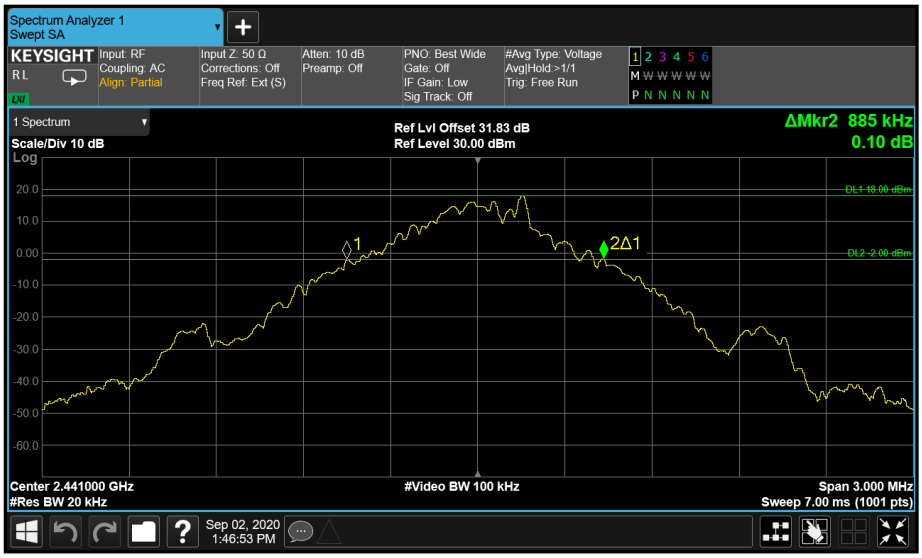

Figure 43 - Core 0 GFSK 2441 MHz (CH39)

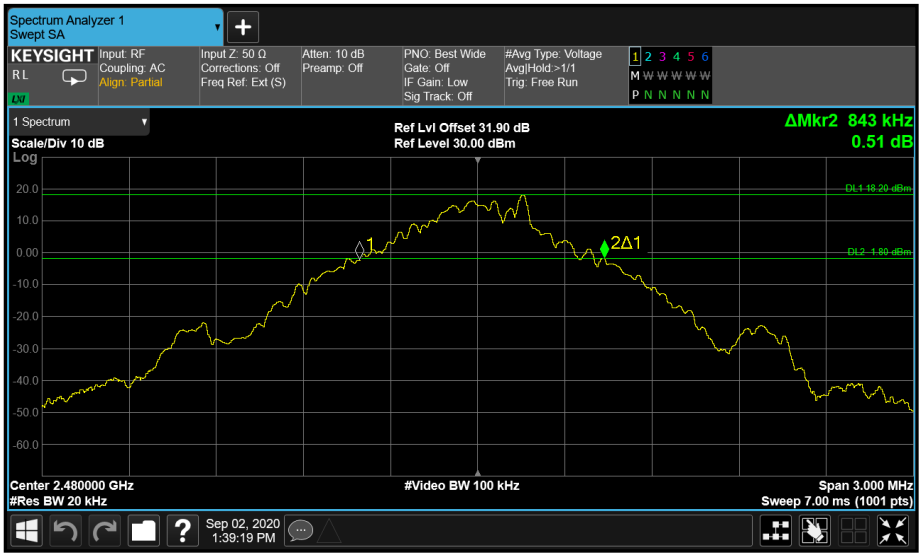

Figure 44 - Core 0 GFSK 2480 MHz (CH78)

Modulation: π/4 DQPSK

Test Frequency (MHz)	20 dB Bandwidth (kHz)
	Port(s)
	Core 0
2402	1335.0
2441	1335.0
2480	1330.0

Table 18- 20 dB Bandwidth Results

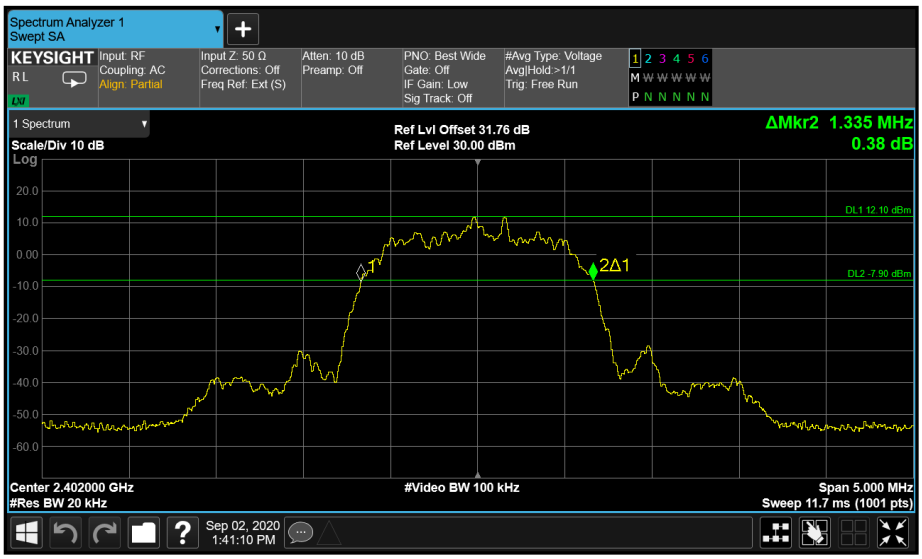

Figure 45 - Core 0 π/4 DQPSK 2402 MHz (CH0)

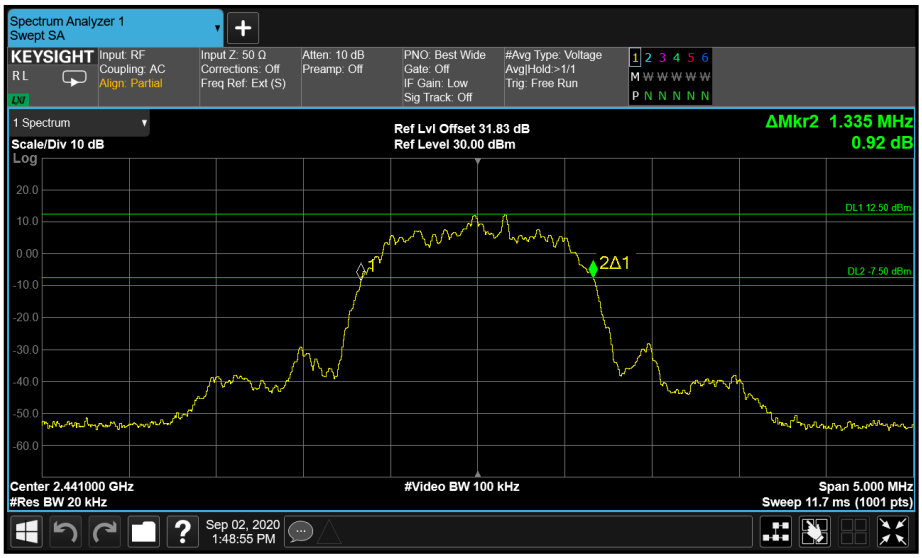

Figure 46 - Core 0 π/4 DQPSK 2441 MHz (CH39)

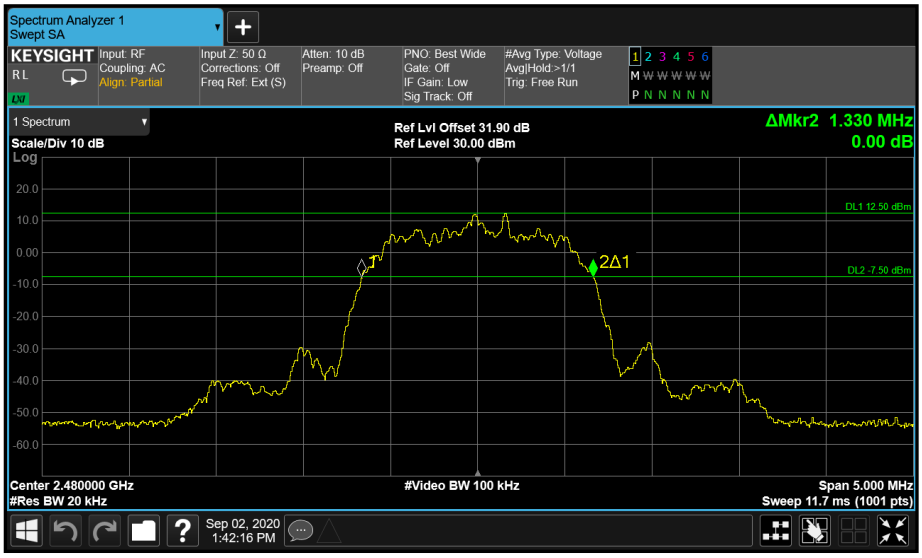

Figure 47 - Core 0 π/4 DQPSK 2480 MHz (CH78)

Modulation: 8DPSK

Test Frequency (MHz)	20 dB Bandwidth (kHz)
	Port(s)
	Core 0
2402	1280.0
2441	1275.0
2480	1275.0

Table 19 - 20 dB Bandwidth Results

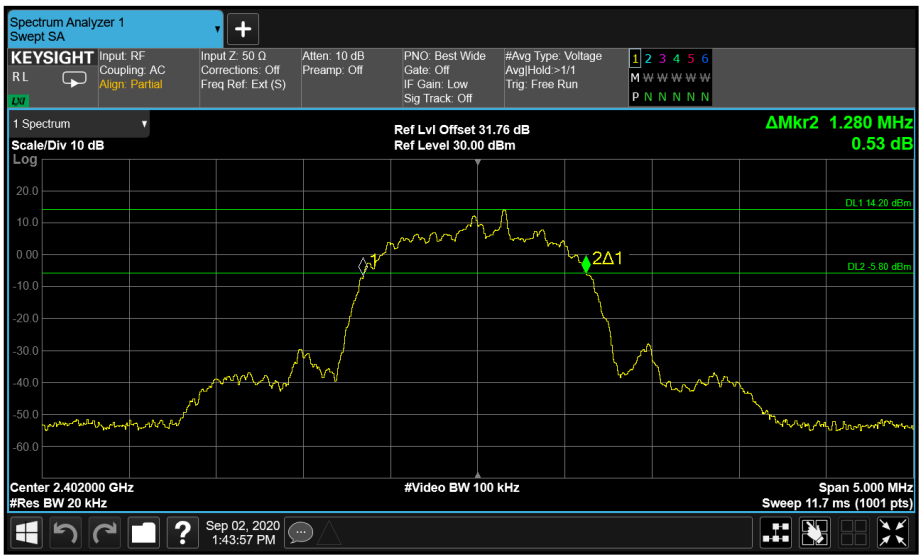

Figure 48 - Core 0 8DPSK 2402 MHz (CH0)

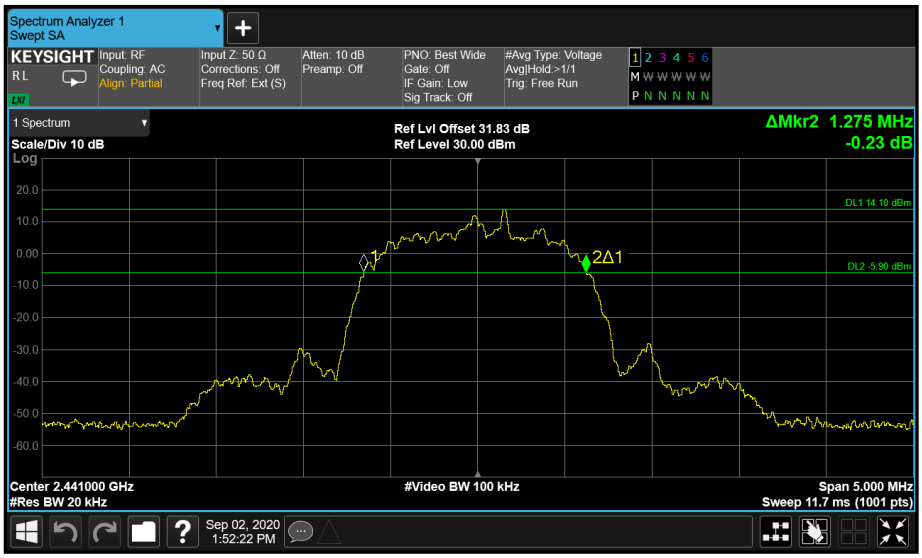

Figure 49 - Core 0 8DPSK 2441 MHz (CH39)

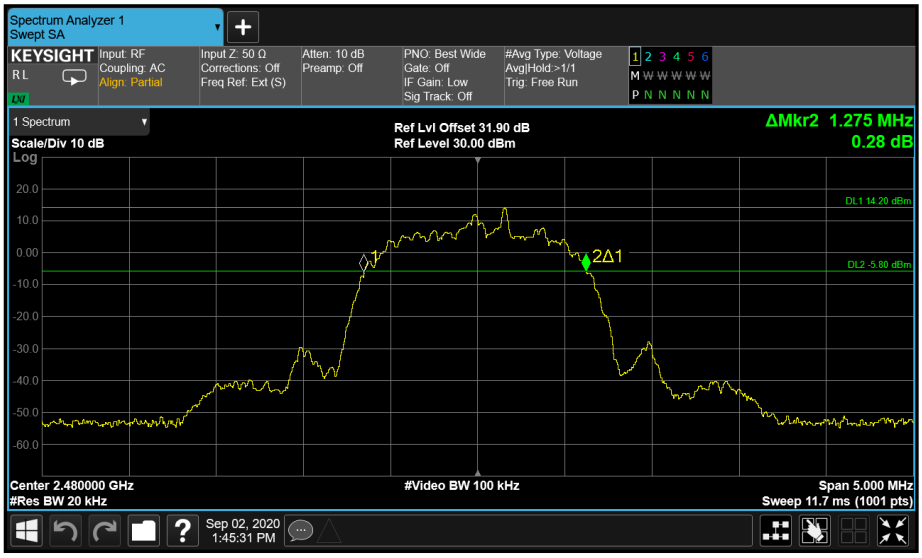

Figure 50 - Core 0 8DPSK 2480 MHz (CH78)

Antenna Port Configuration: Beamforming Core 0 + Core 1

Modulation: GFSK

Test Frequency (MHz)	20 dB Bandwidth (kHz)	
	Port(s)	
	Core 0	Core 1
2402	840.0	888.0
2441	843.0	807.0
2480	888.0	840.0

Table 20- 20 dB Bandwidth Results

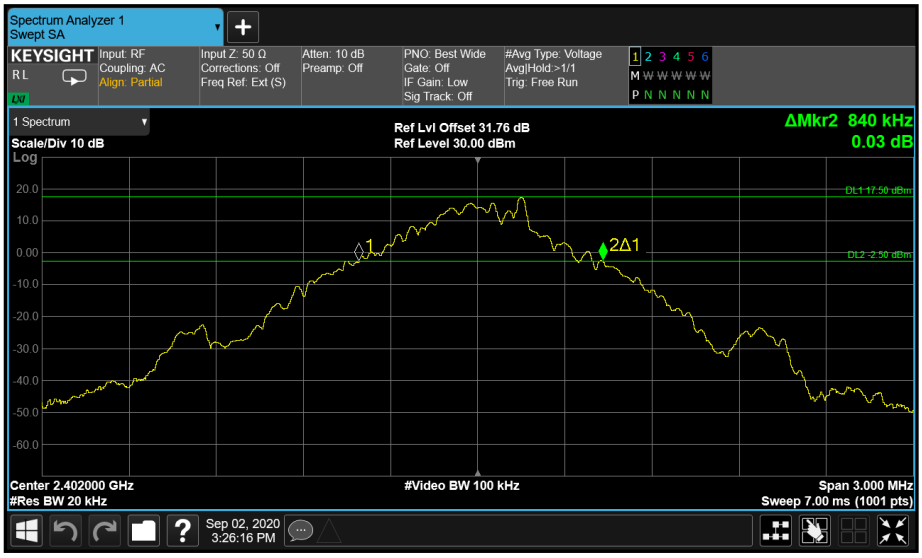

Figure 51 - Core 0 GFSK 2402 MHz (CH0)

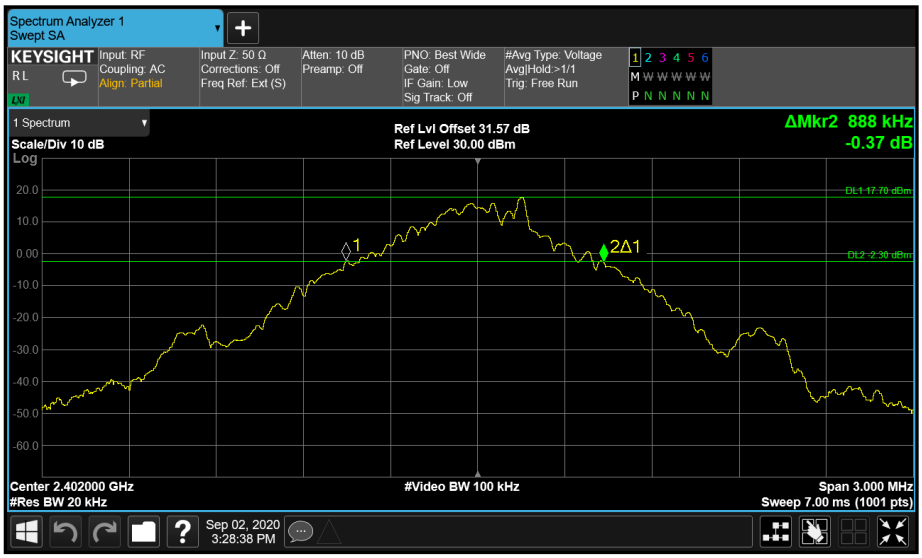

Figure 52 - Core 1 GFSK 2402 MHz (CH0)

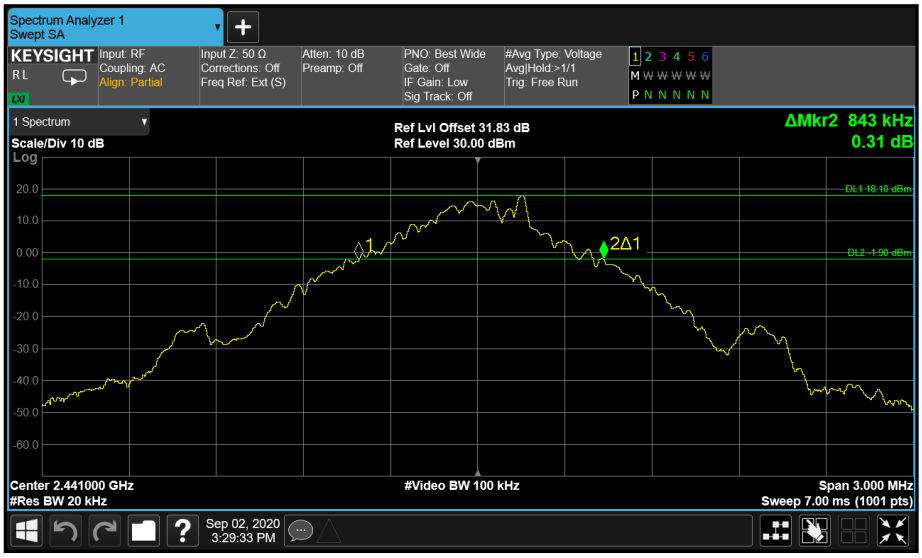

Figure 53 - Core 0 GFSK 2441 MHz (CH39)

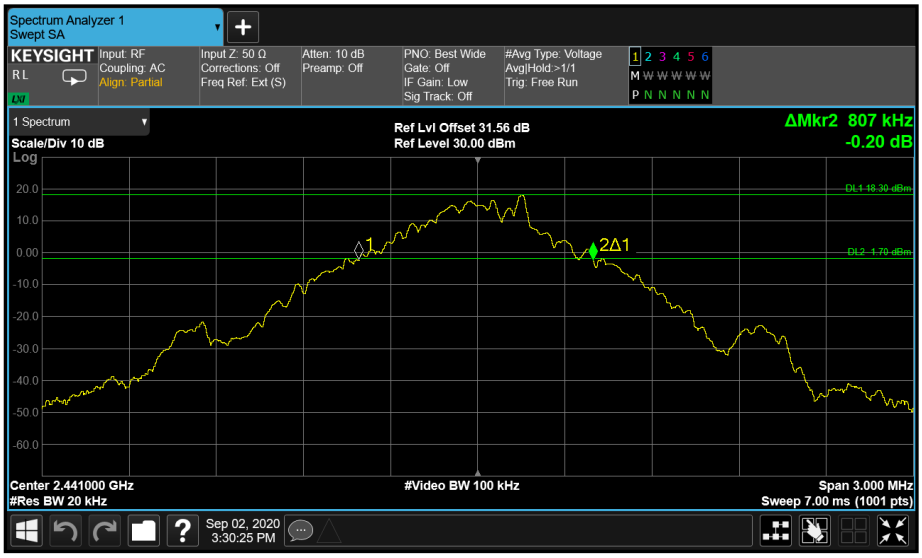

Figure 54 - Core 1 GFSK 2441 MHz (CH39)

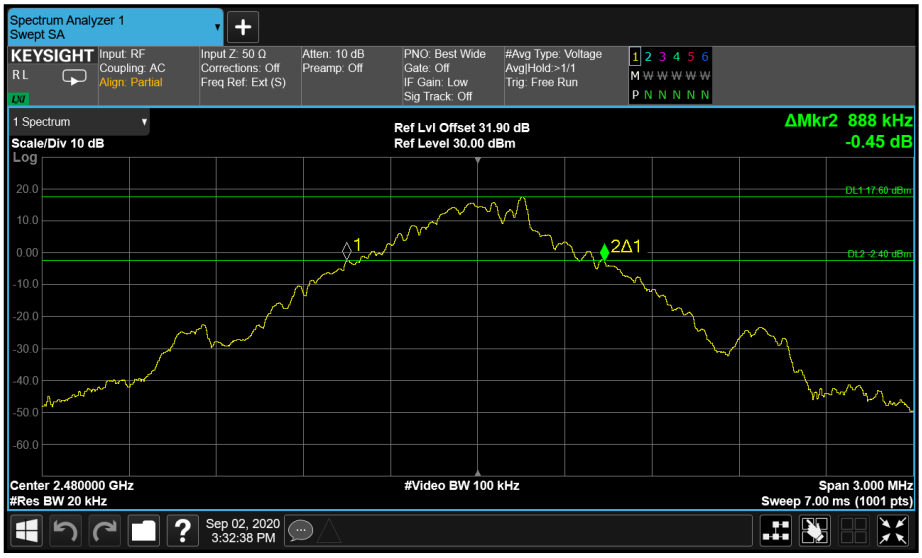

Figure 55 - Core 0 GFSK 2480 MHz (CH78)

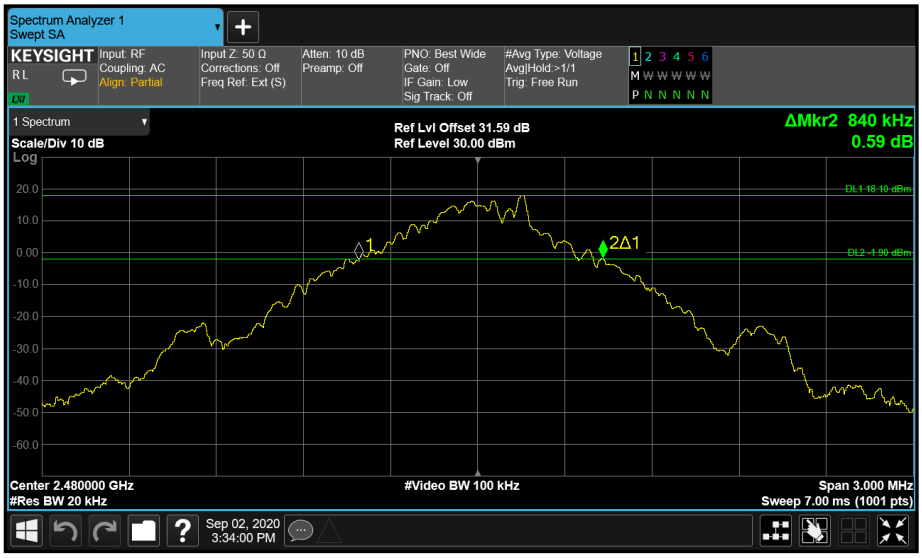

Figure 56 - Core 1 GFSK 2480 MHz (CH78)

Modulation: π/4 DQPSK

Test Frequency (MHz)	20 dB Bandwidth (kHz)	
	Port(s)	
	Core 0	Core 1
2402	1330.0	1330.0
2441	1330.0	1335.0
2480	1355.0	1335.0

Table 21 - 20 dB Bandwidth Results

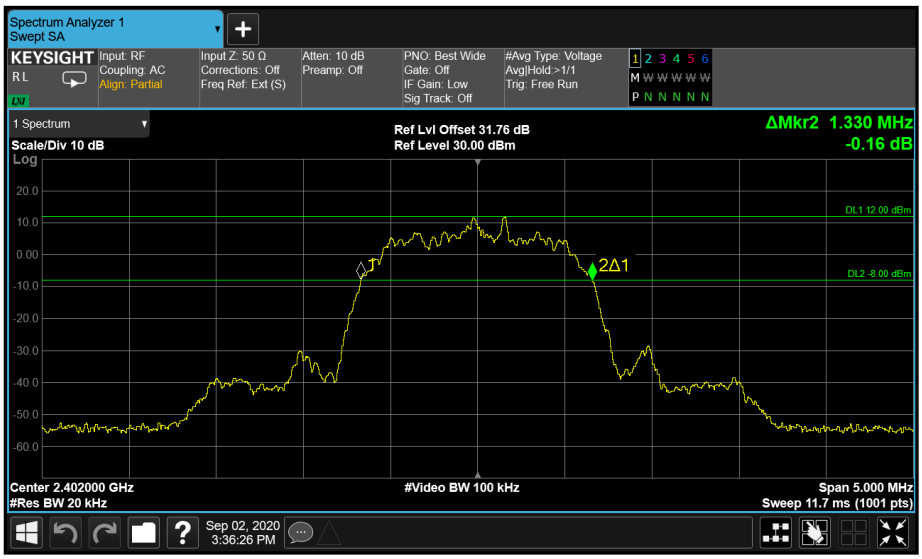

Figure 57 - Core 0 π/4 DQPSK 2402 MHz (CH0)

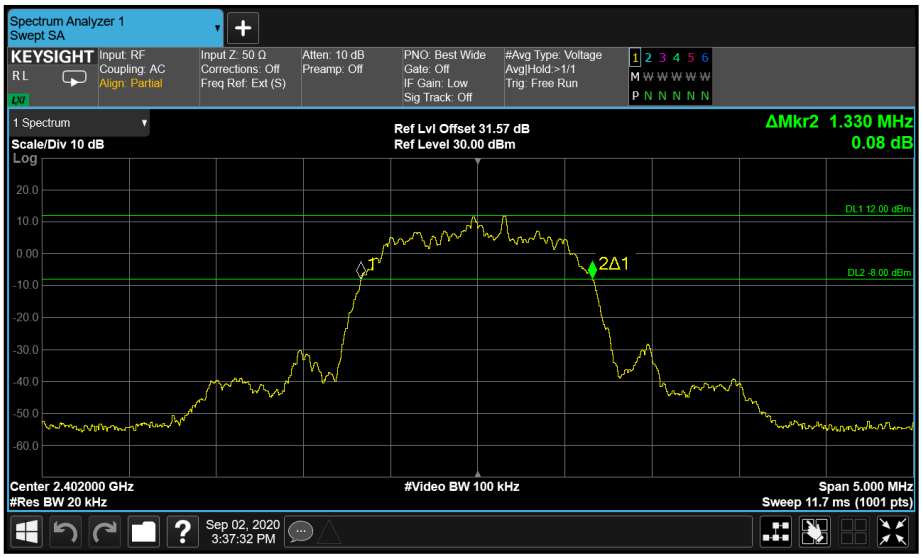

Figure 58 - Core 1 π/4 DQPSK 2402 MHz (CH0)

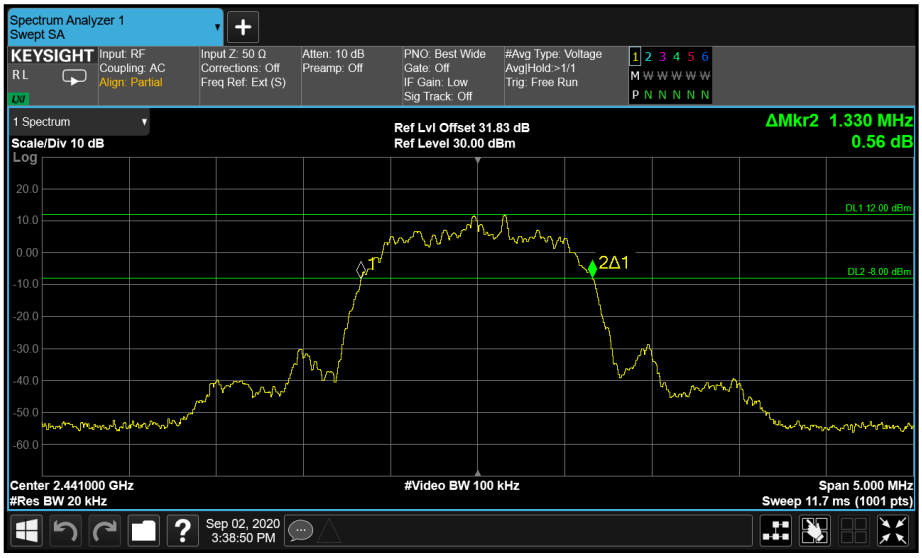

Figure 59 - Core 0 π/4 DQPSK 2441 MHz (CH39)

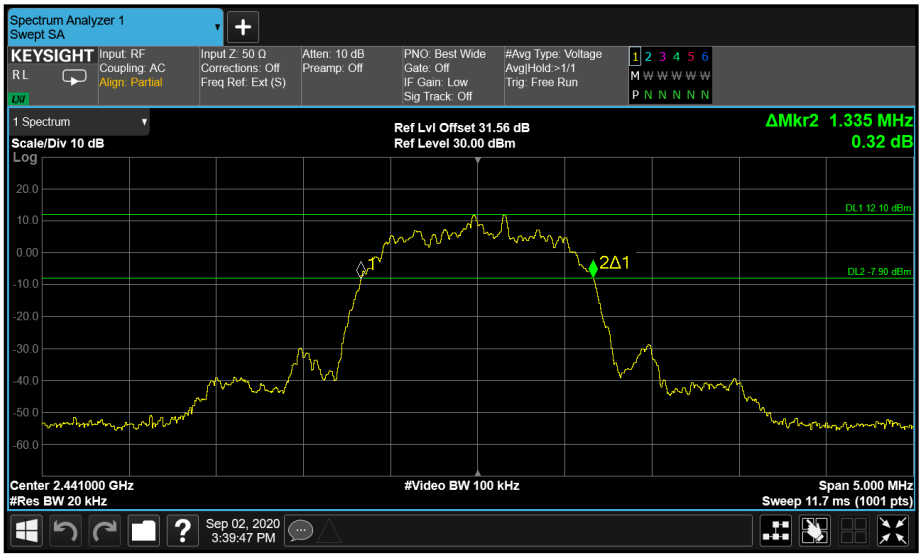

Figure 60 - Core 1 π/4 DQPSK 2441 MHz (CH39)

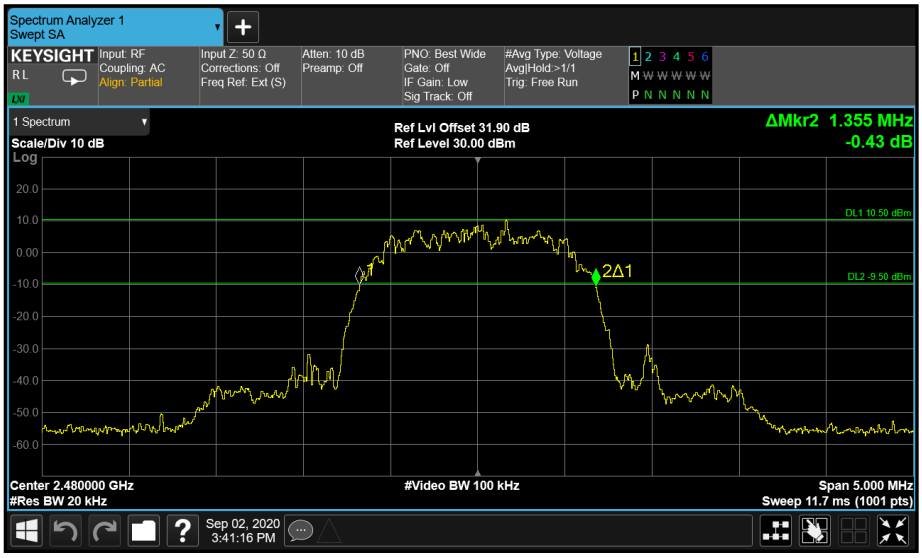

Figure 61 - Core 0 π/4 DQPSK 2480 MHz (CH78)

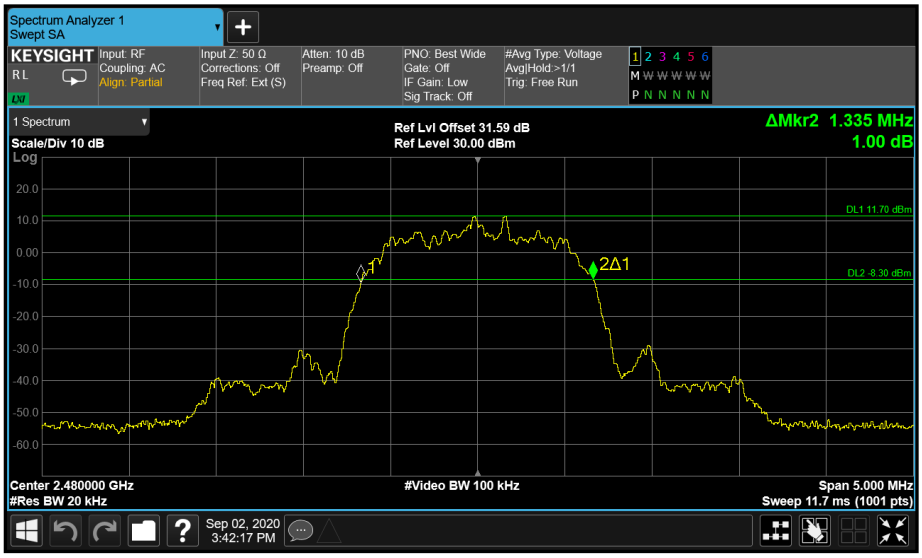

Figure 62 - Core 1 π/4 DQPSK 2480 MHz (CH78)

Modulation: 8DPSK

Test Frequency (MHz)	20 dB Bandwidth (kHz)	
	Port(s)	
	Core 0	Core 1
2402	1275.0	1275.0
2441	1280.0	1280.0
2480	1300.0	1280.0

Table 22 - 20 dB Bandwidth Results

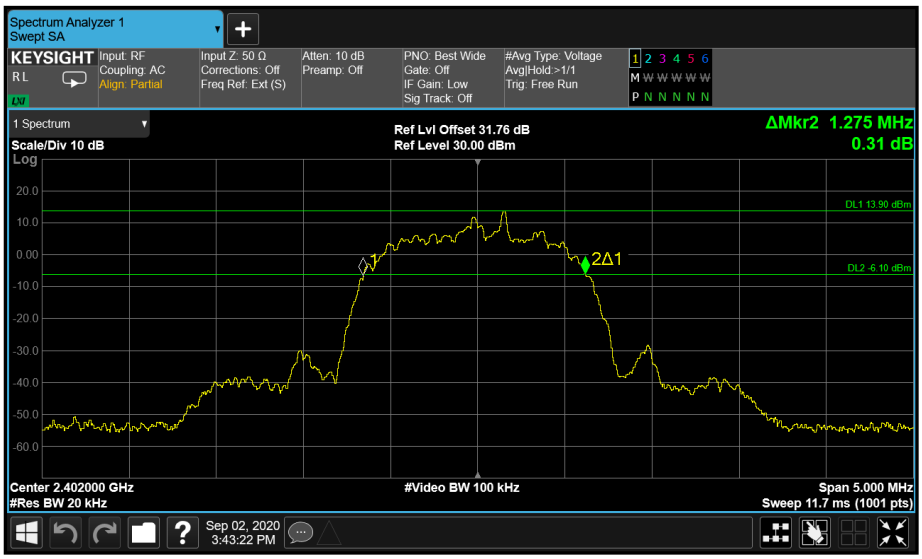

Figure 63 - Core 0 8DPSK 2402 MHz (CH0)

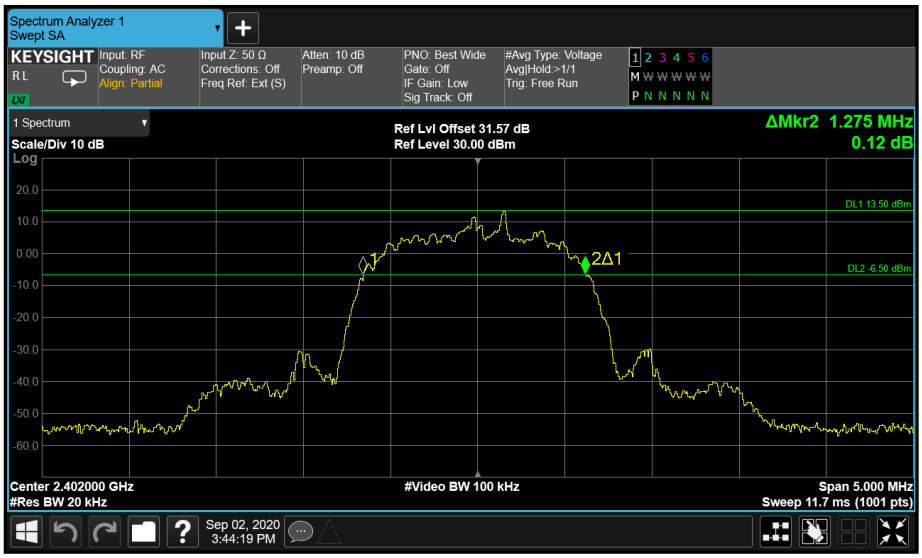

Figure 64 - Core 1 8DPSK 2402 MHz (CH0)

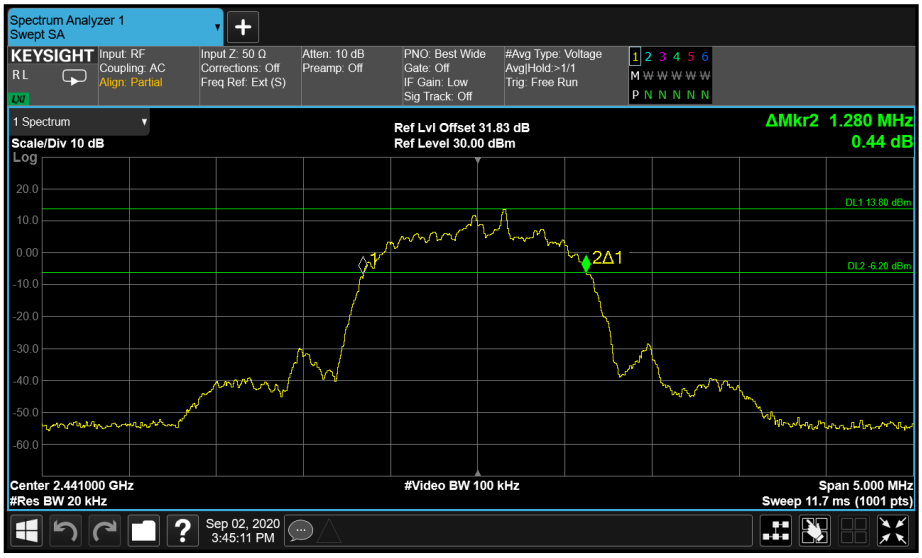

Figure 65 - Core 0 8DPSK 2441 MHz (CH39)

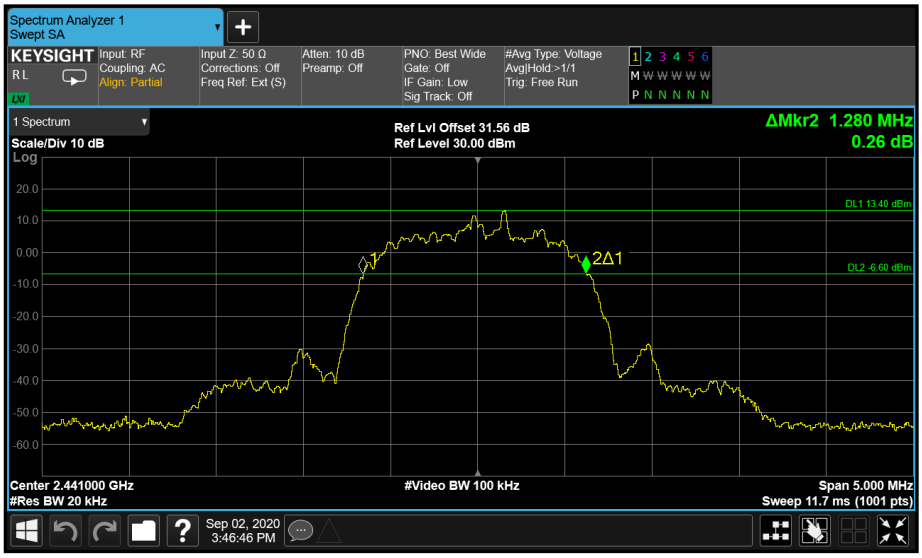

Figure 66 - Core 1 8DPSK 2441 MHz (CH39)

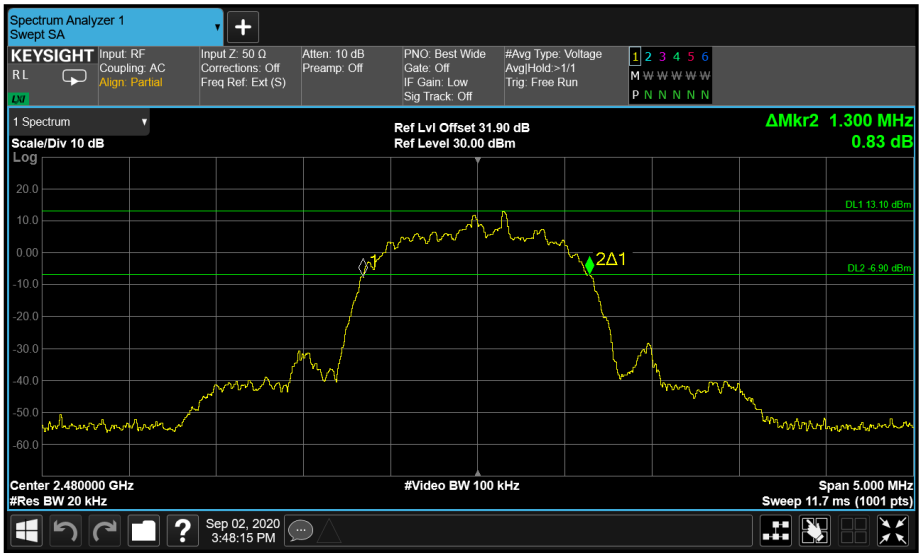

Figure 67 - Core 0 8DPSK 2480 MHz (CH78)

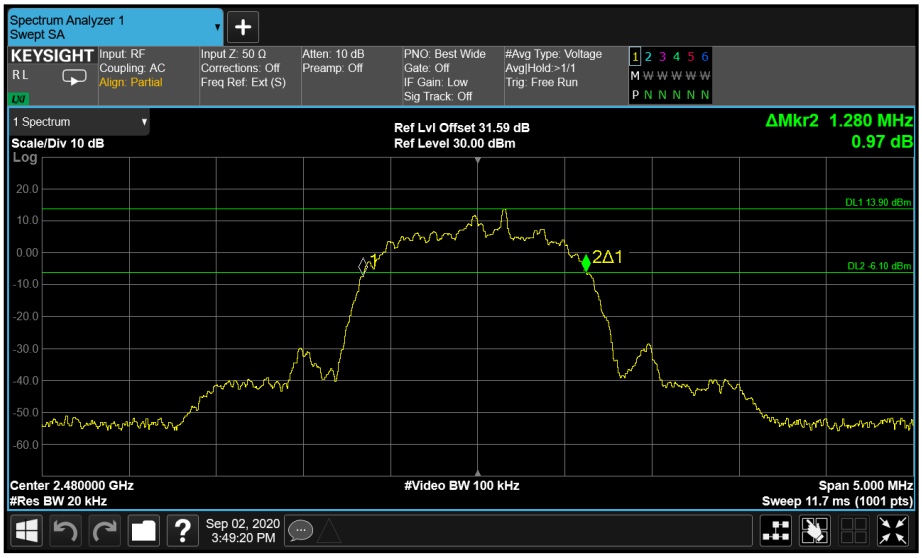

Figure 68 - Core 1 8DPSK 2480 MHz (CH78)

FCC 47 CFR Part 15 and ISED RSS-247 Limit Clause

None specified.

FCC 47 CFR Part 15, Limit Clause 15.247 (a)(1)(i) and ISED RSS-247, Limit Clause 5.1 (3)

The maximum 20 dB bandwidth of the hopping channel shall be 500 kHz.