

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 FHSS)

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



Add value.
Inspire trust.

FCC ID: BCGA2941

IC: 579C-A2941

COMMERCIAL-IN-CONFIDENCE

Document 75957632-09 Issue 01

SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Steve Marshall	Senior Engineer	Authorised Signatory	28 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	Hollie Marshall	28 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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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	28-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)	REV1.0
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)	James Woods, Taha Shafique, Elliot Callender, 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, 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 device complies with the provisions of this section, as it uses permanently attached integral antennas.
2.1	15.205	3.3	8.10	Restricted Band Edges	Pass	
2.2	15.247 (a)(1)	5.1	-	Frequency Hopping Systems - Average Time of Occupancy	Pass	
2.3	15.247 (a)(1)	5.1	-	Frequency Hopping Systems - Channel Separation	Pass	
2.4	15.247 (a)(1)	5.1	-	Frequency Hopping Systems - Number of Hopping Channels	Pass	
2.5	15.247 (a)(1)	5.1	6.7	Frequency Hopping Systems - 20 dB Bandwidth	Pass	
2.6	15.247 (b)	5.4	6.12	Maximum Conducted Output Power	Pass	
2.7	15.247 (d)	5.5	-	Authorised Band Edges	Pass	
2.8	15.209 and 15.247 (d)	3.3 and 5.5	6.13 and 8.9	Spurious Radiated Emissions	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 Setup

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 antenna gain as Core 0 and Core 1 are identical but with unequal antenna gains.

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

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

- BT Core 0 (SISO) – iPA BDR/EDR and ePA EDR
- BT Core 1 (SISO) – iPA BDR/EDR and ePA EDR
- BT Core 0 + BT Core 1 (TxBF) – iPA BDR/EDR and ePA EDR

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

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 FHSS		
Restricted Band Edges	James Woods, Taha Shafique and Elliot Callender	UKAS
Frequency Hopping Systems - Average Time of Occupancy	Thomas Biddlecombe	UKAS
Frequency Hopping Systems - Channel Separation	Thomas Biddlecombe	UKAS
Frequency Hopping Systems - Number of Hopping Channels	Thomas Biddlecombe	UKAS
Frequency Hopping Systems - 20 dB Bandwidth	Thomas Biddlecombe	UKAS
Maximum Conducted Output Power	Thomas Biddlecombe	UKAS
Authorised Band Edges	James Woods, Taha Shafique and Elliot Callender	UKAS
Spurious Radiated Emissions	Mohammad Malik and Elliot Callender	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.

Plots for average measurements were taken in accordance with ANSI C63.10, clause 4.1.5.2.6. These are shown for information purposes and were used to determine the worst-case measurement point. Final average measurements were then taken in accordance with ANSI C63.10, clause 4.1.4.2.2 to obtain the measurement result recorded in the test results tables.

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 %



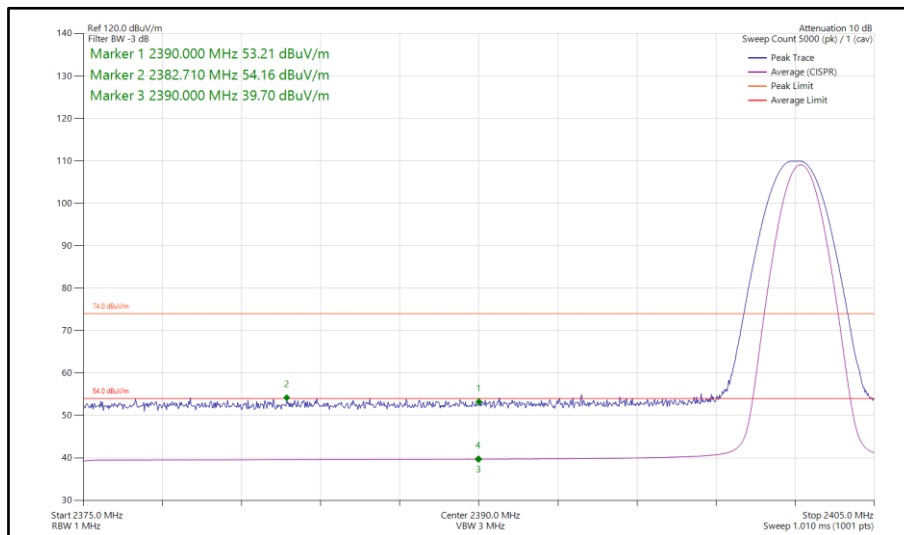
2.1.6 Test Results

2.4 GHz Bluetooth FHSS

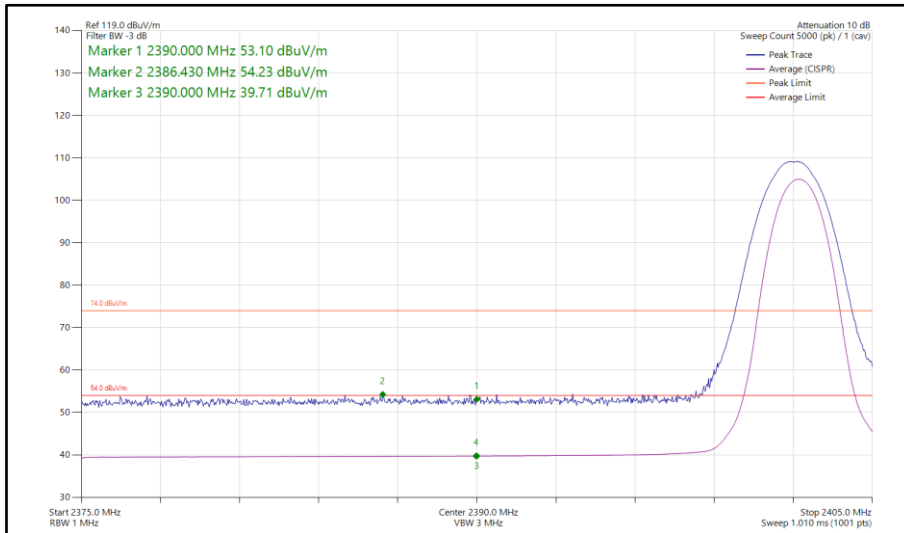
iPA - Core 0 (SISO)

Mode	Packet Type	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	DH5	2402	2390	54.16	39.70
Static	2-DH5	2402	2390	54.23	39.71
Static	3-DH5	2402	2390	54.44	39.68
Static	DH5	2480	2483.5	56.08	47.28
Static	2-DH5	2480	2483.5	54.77	43.27
Static	3-DH5	2480	2483.5	54.52	43.34

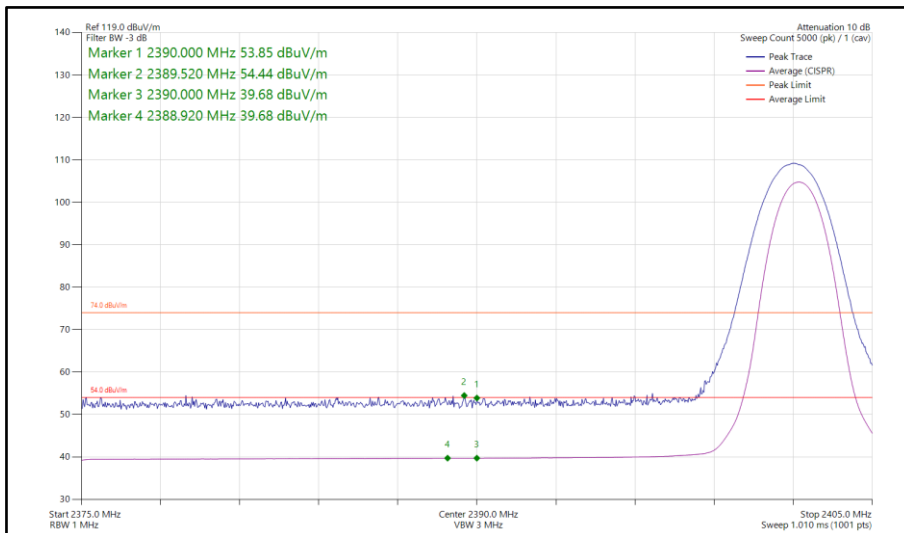
Table 6 - SISO Restricted Band Edge Results



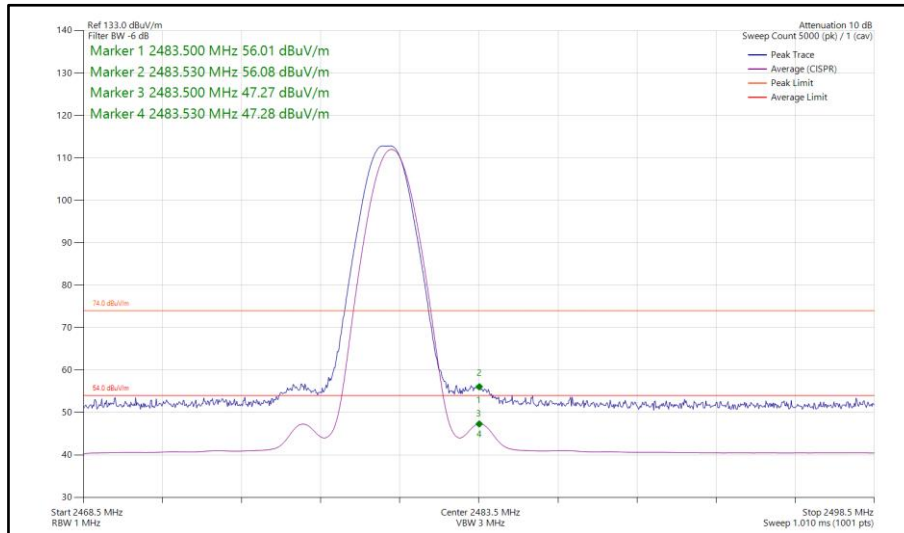
**Figure 1 - Bluetooth DH5, SISO, Core 0 - 2402 MHz,
 Band Edge Frequency 2390 MHz**



**Figure 2 - Bluetooth 2-DH5, SISO, Core 0 - 2402 MHz,
Band Edge Frequency 2390 MHz**



**Figure 3 - Bluetooth 3-DH5, SISO, Core 0 - 2402 MHz,
Band Edge Frequency 2390 MHz**



**Figure 4 - Bluetooth DH5, SISO, Core 0 - 2480 MHz,
Band Edge Frequency 2483.5 MHz**

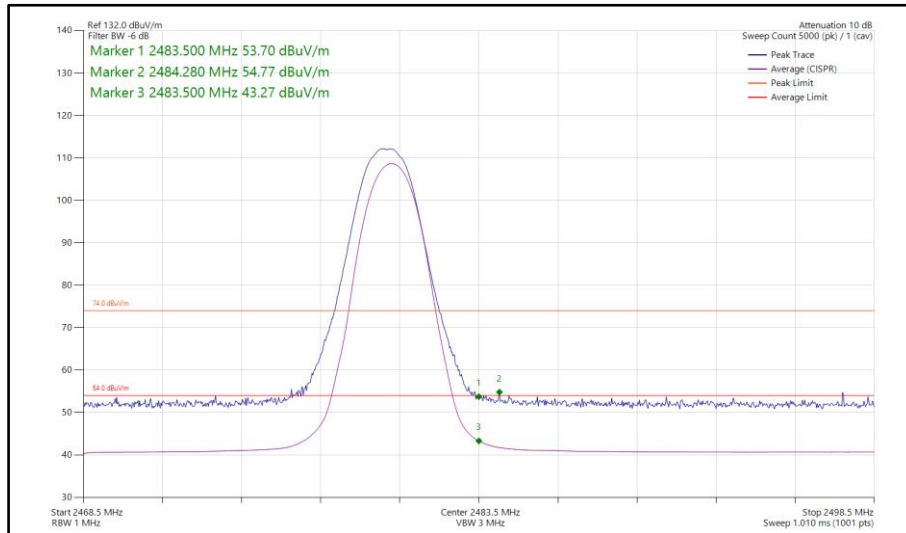


Figure 5 - Bluetooth 2-DH5, SISO, Core 0 - 2480 MHz, Band Edge Frequency 2483.5 MHz

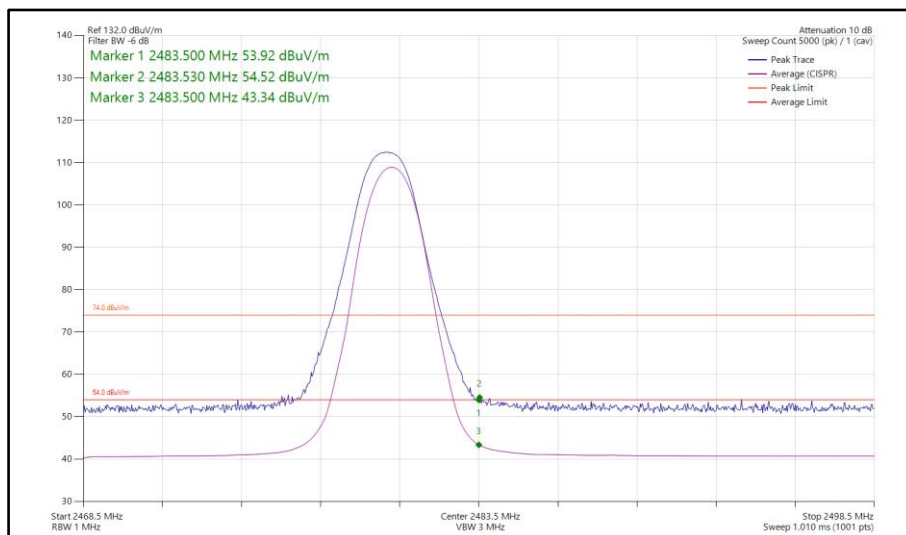


Figure 6 - Bluetooth 3-DH5, SISO, Core 0 - 2480 MHz, Band Edge Frequency 2483.5 MHz



iPA - Core 0-1 (MIMO)

Mode	Packet Type	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	DH5	2402	2390	54.47	40.15
Static	2-DH5	2402	2390	54.64	40.11
Static	3-DH5	2402	2390	54.98	40.11
Static	DH5	2480	2483.5	54.92	42.75
Static	2-DH5	2480	2483.5	55.49	43.60
Static	3-DH5	2480	2483.5	54.64	43.84

Table 7 - MIMO Restricted Band Edge Results

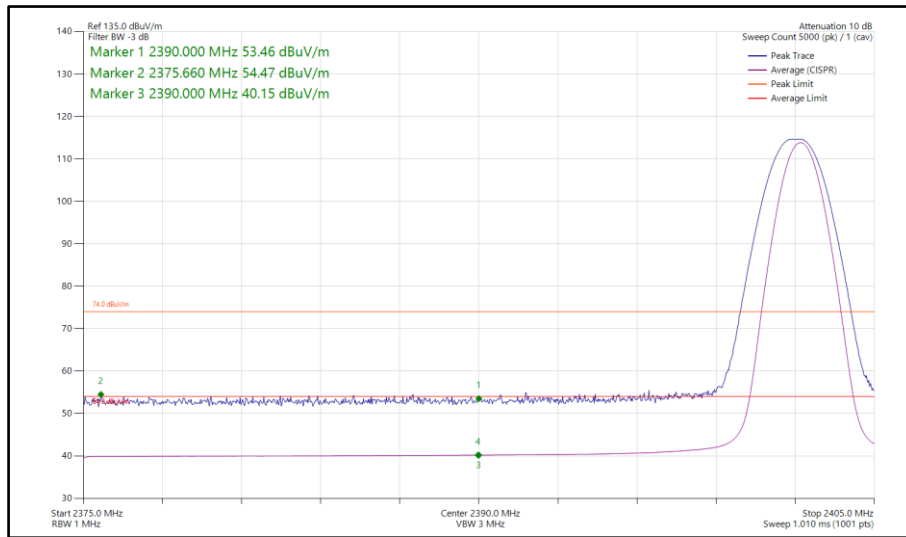
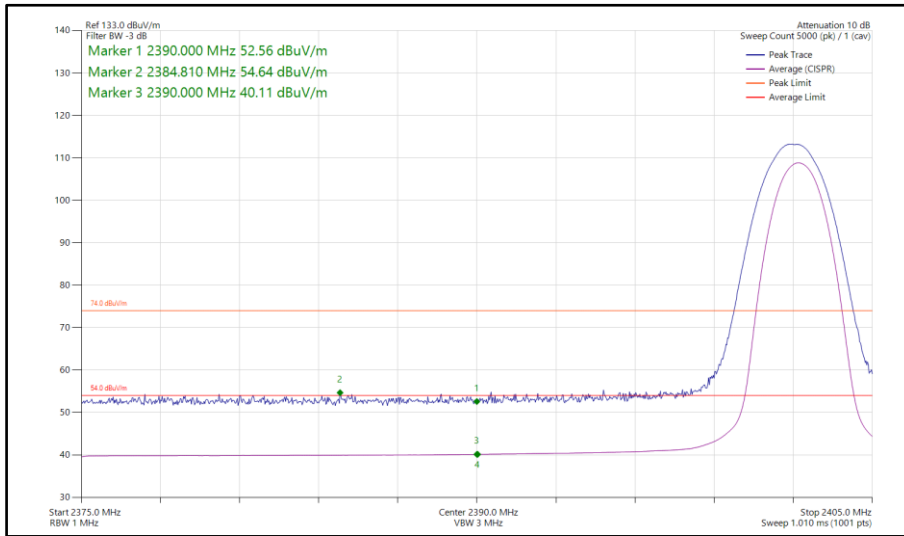
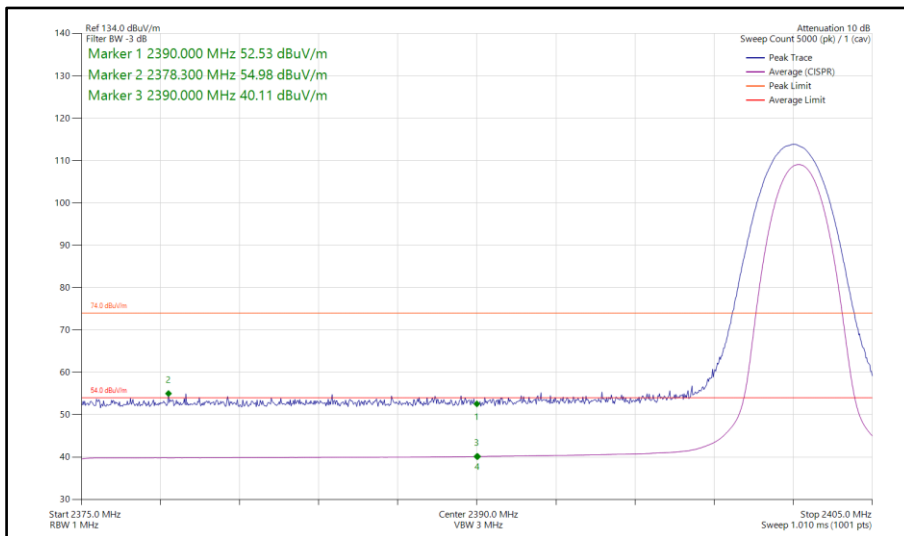


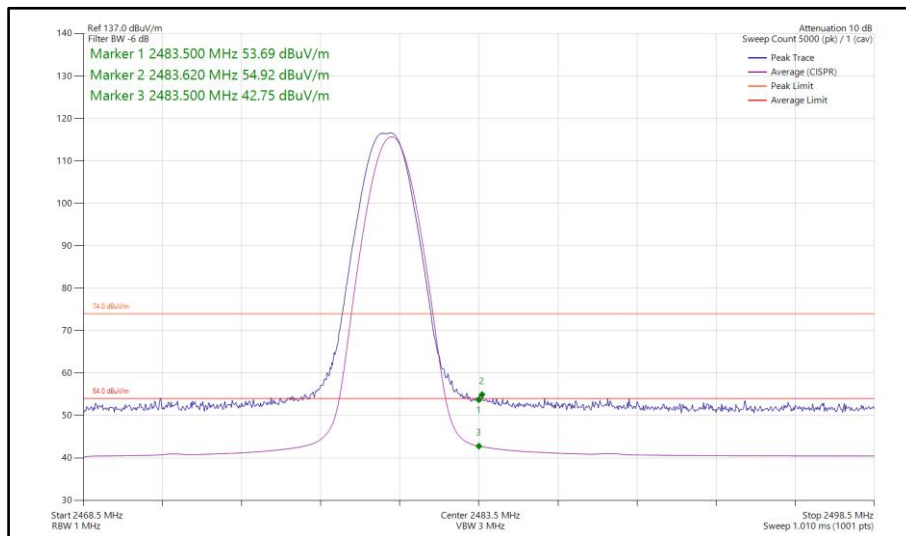
Figure 7 - Bluetooth DH5, MIMO, Core 0-1 - 2402 MHz, Band Edge Frequency 2390 MHz



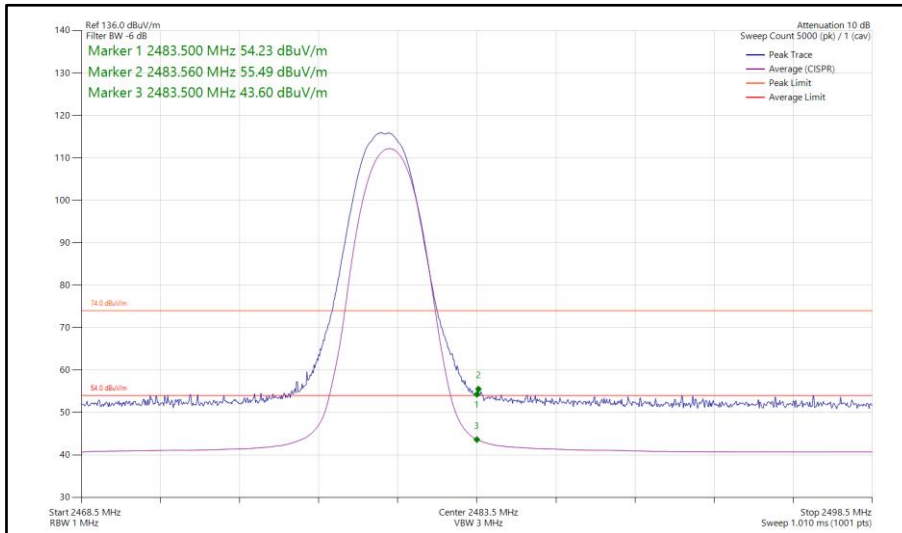
**Figure 8 - Bluetooth 2-DH5, MIMO, Core 0-1 - 2402 MHz,
Band Edge Frequency 2390 MHz**



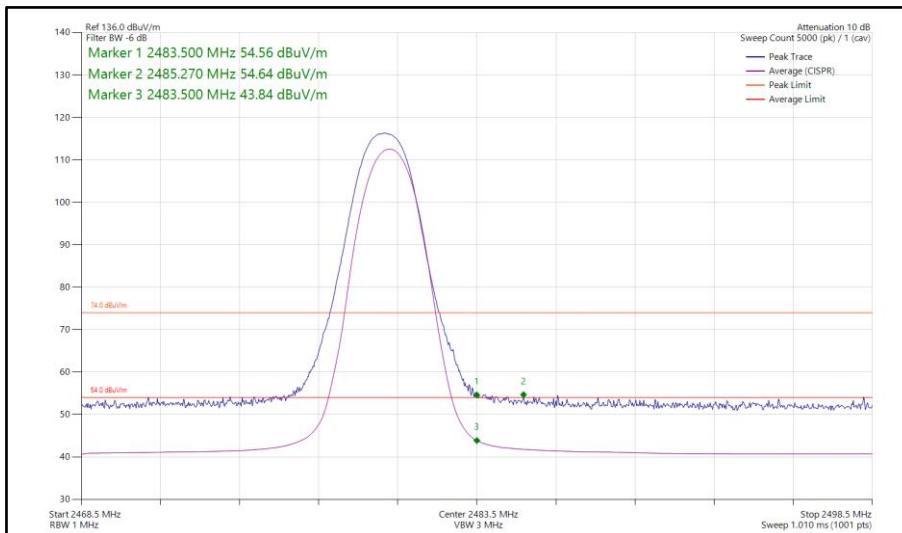
**Figure 9 - Bluetooth 3-DH5, MIMO, Core 0-1 - 2402 MHz,
Band Edge Frequency 2390 MHz**



**Figure 10 - Bluetooth DH5, MIMO, Core 0-1 - 2480 MHz,
Band Edge Frequency 2483.5 MHz**



**Figure 11 - Bluetooth 2-DH5, MIMO, Core 0-1 - 2480 MHz,
Band Edge Frequency 2483.5 MHz**



**Figure 12 - Bluetooth 3-DH5, 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	2-DH5	2402	2390	54.47	40.51
Static	3-DH5	2402	2390	54.74	40.69
Static	2-DH5	2480	2483.5	55.80	44.29
Static	3-DH5	2480	2483.5	56.62	45.36

Table 8 - SISO Restricted Band Edge Results

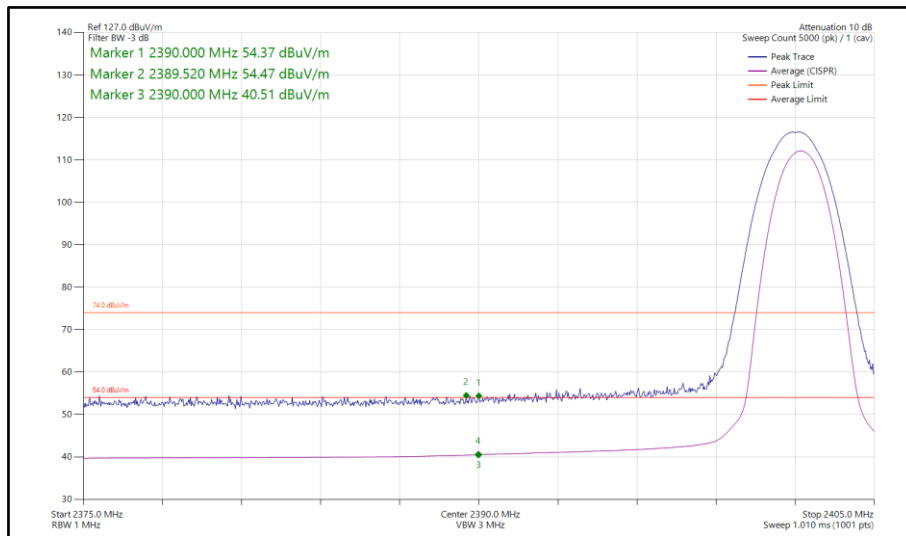


Figure 13 - Bluetooth 2-DH5, SISO, Core 0 - 2402 MHz, Band Edge Frequency 2390 MHz

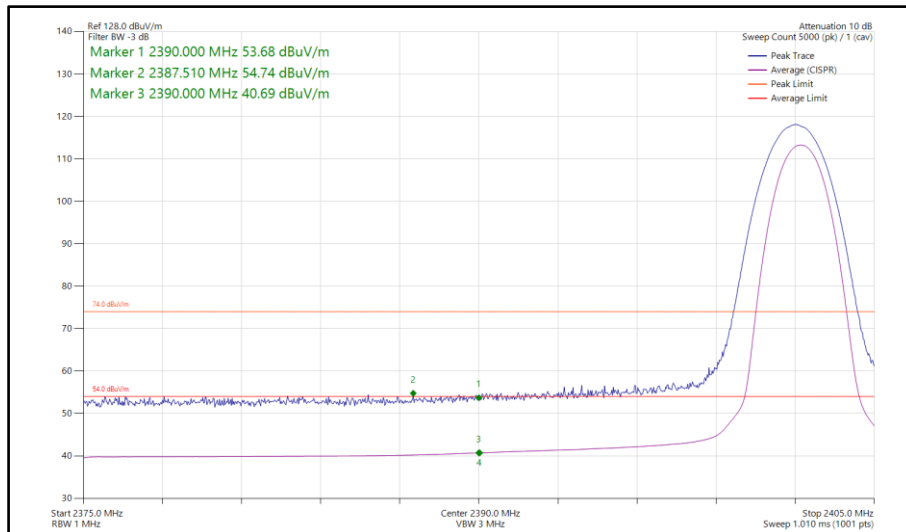
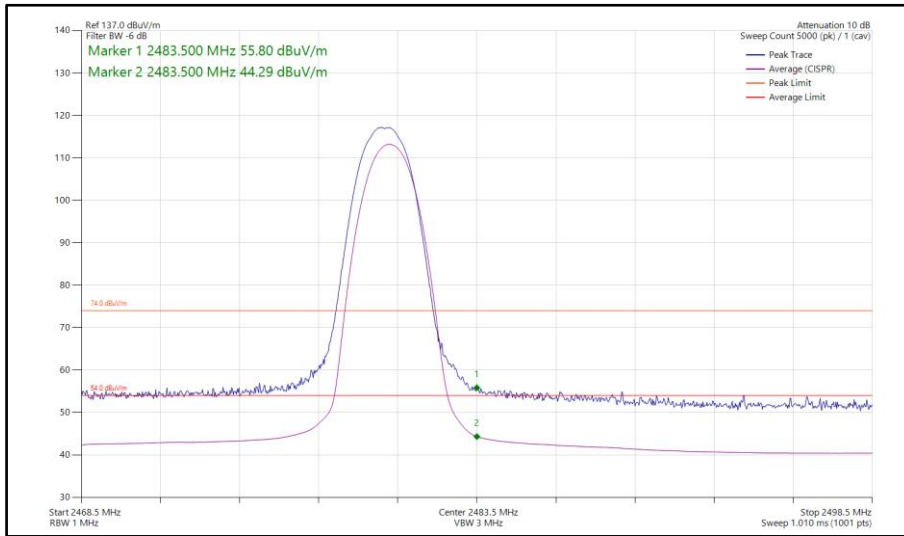
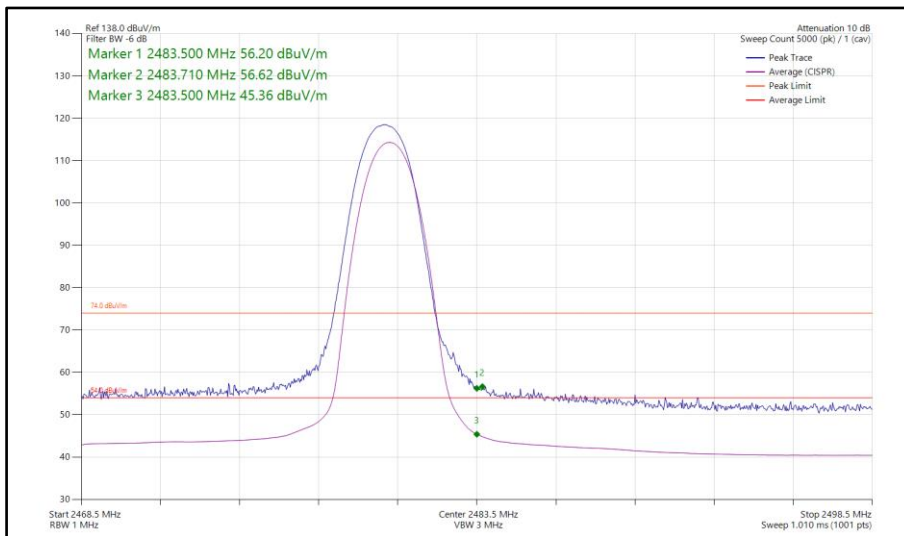


Figure 14 - Bluetooth 3-DH5, SISO, Core 0 - 2402 MHz, Band Edge Frequency 2390 MHz



**Figure 15 - Bluetooth 2-DH5, SISO, Core 0 - 2480 MHz,
Band Edge Frequency 2483.5 MHz**



**Figure 16 - Bluetooth 3-DH5, SISO, Core 0 - 2480 MHz,
Band Edge Frequency 2483.5 MHz**



ePA - Core 0-1 (MIMO)

Mode	Packet Type	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)
Static	2-DH5	2402	2390	55.56	41.14
Static	3-DH5	2402	2390	55.83	41.92
Static	2-DH5	2480	2483.5	58.24	47.29
Static	3-DH5	2480	2483.5	60.44	49.25

Table 9 - MIMO Restricted Band Edge Results

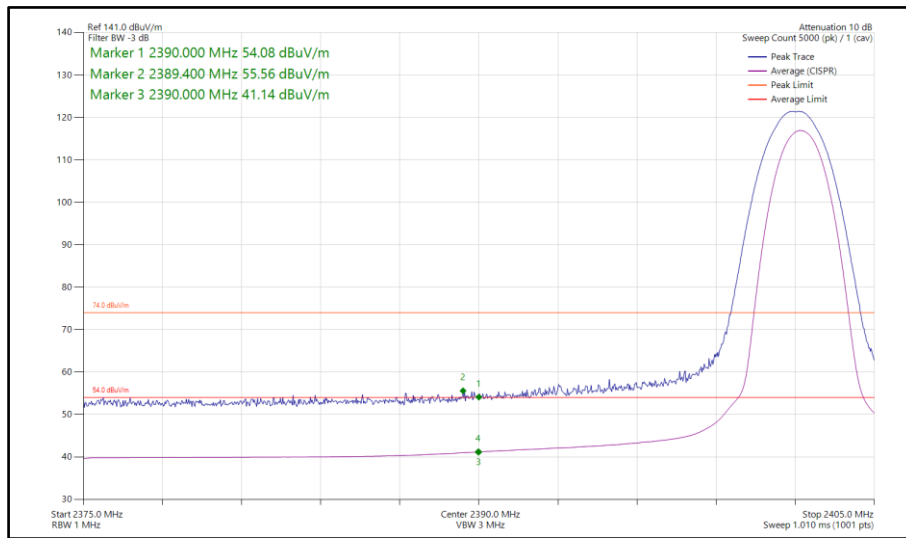


Figure 17 - Bluetooth 2-DH5, MIMO, Core 0-1 - 2402 MHz, Band Edge Frequency 2390 MHz

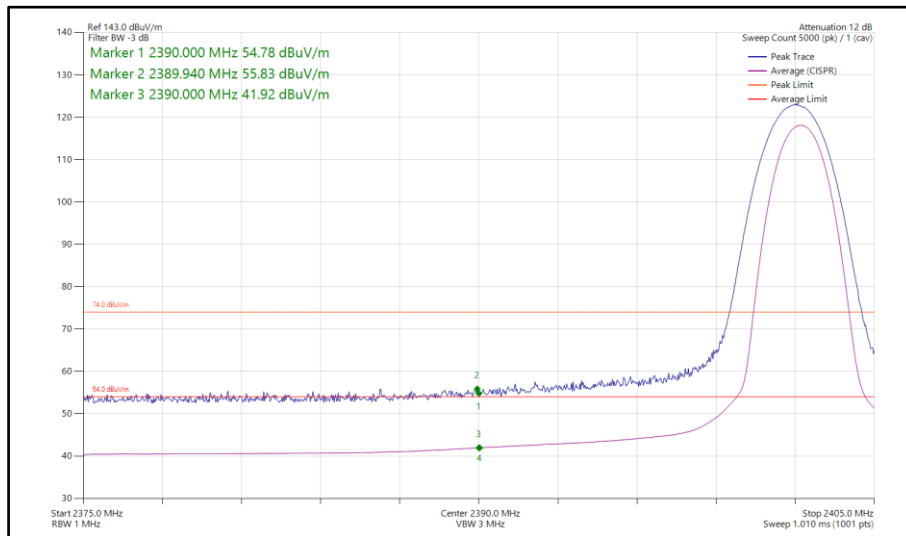
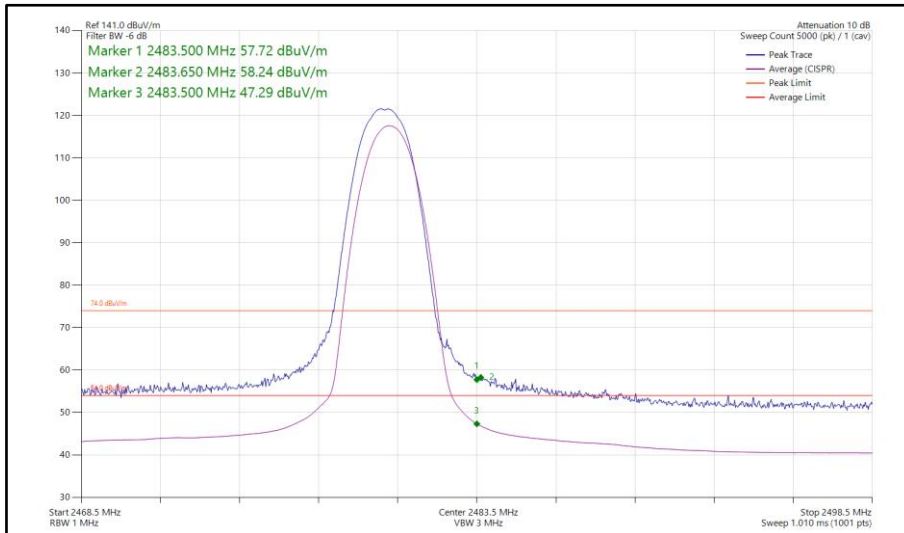
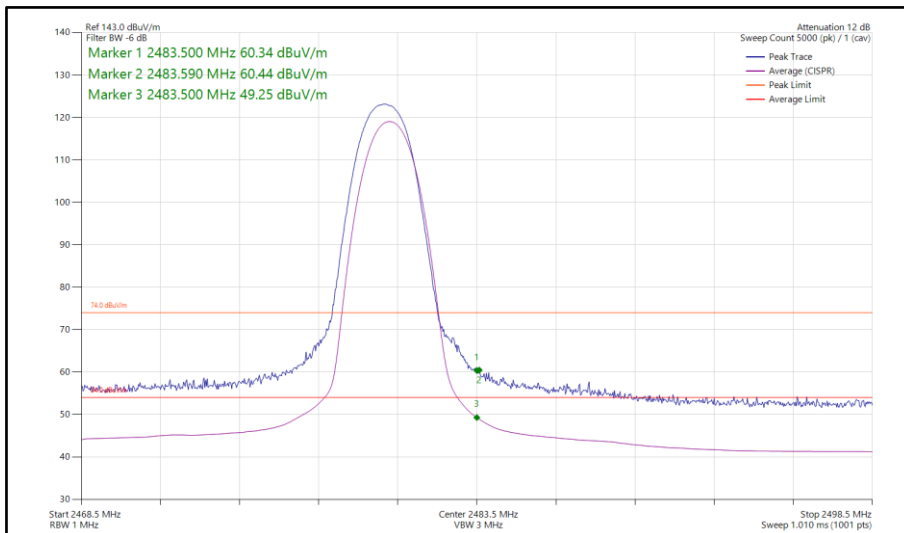


Figure 18 - Bluetooth 3-DH5, MIMO, Core 0-1 - 2402 MHz, Band Edge Frequency 2390 MHz



**Figure 19 - Bluetooth 2-DH5, MIMO, Core 0-1 - 2480 MHz,
Band Edge Frequency 2483.5 MHz**



**Figure 20 - Bluetooth 3-DH5, MIMO, Core 0-1 - 2480 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 Expires
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 Frequency Hopping Systems - Average Time of Occupancy

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

A2941, S/N: GF6K93M959 - Modification State 0

2.2.3 Date of Test

28-March-2023

2.2.4 Test Method

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

2.2.5 Environmental Conditions

Ambient Temperature	21.2 °C
Relative Humidity	34.3 %



2.2.6 Test Results

2.4 GHz Bluetooth FHSS

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1)(iii) RSS-247 5.1 d)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	76.8
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	A (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	Time of Occupancy			Limit (ms)
	Dwell Time (ms)	Number of Transmissions	Time of Occupancy (ms)	
2402	2.891	97	280.5	400.0

Table 13 - Time of Occupancy Results



Figure 21 - $\pi/4$ DQPSK - 2402 MHz Accumulated Transmit Time



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1)(iii) RSS-247 5.1 d)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	77.1
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	A+B (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	Time of Occupancy			Limit (ms)
	Dwell Time (ms)	Number of Transmissions	Time of Occupancy (ms)	
2402	2.891	99	286.2	400.0

Table 14 - Time of Occupancy Results

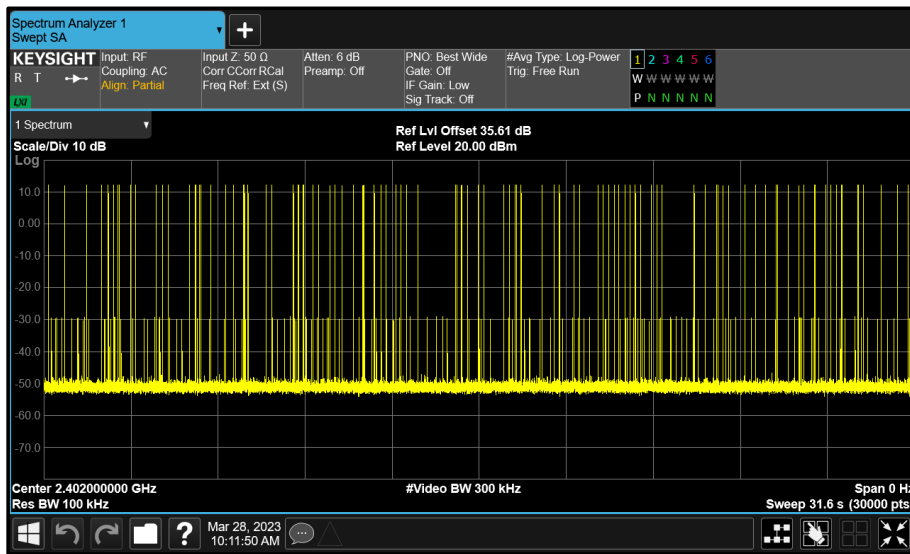


Figure 22 - $\pi/4$ DQPSK - 2402 MHz Accumulated Transmit Time



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1)(iii) RSS-247 5.1 d)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA GFSK (DH5)	Duty Cycle (%):	76.7
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	A (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	Time of Occupancy			Limit (ms)
	Dwell Time (ms)	Number of Transmissions	Time of Occupancy (ms)	
2402	2.888	112	323.5	400.0

Table 15 - Time of Occupancy Results

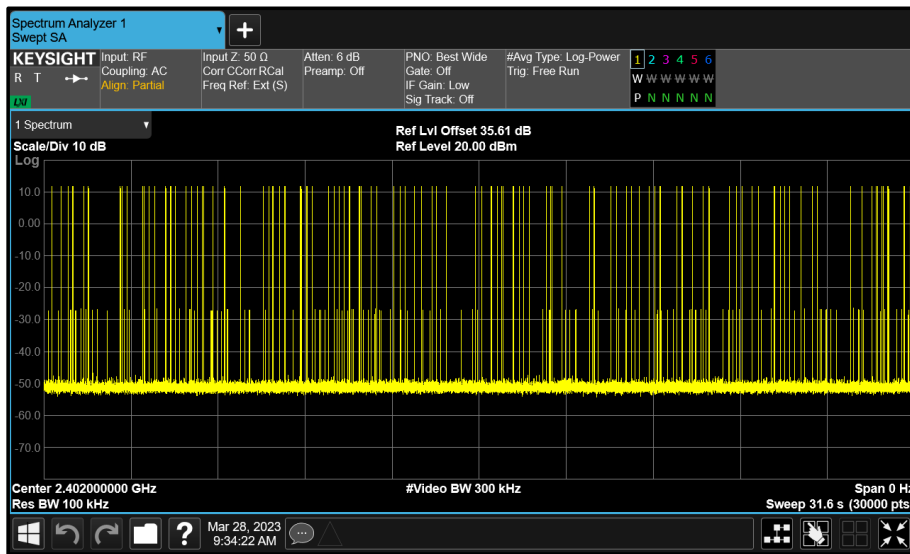


Figure 23 - GFSK - 2402 MHz Accumulated Transmit Time



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1)(iii) RSS-247 5.1 d)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA GFSK (DH5)	Duty Cycle (%):	76.7
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	A+B (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	Time of Occupancy			Limit (ms)
	Dwell Time (ms)	Number of Transmissions	Time of Occupancy (ms)	
2402	2.888	119	343.7	400.0

Table 16 - Time of Occupancy Results

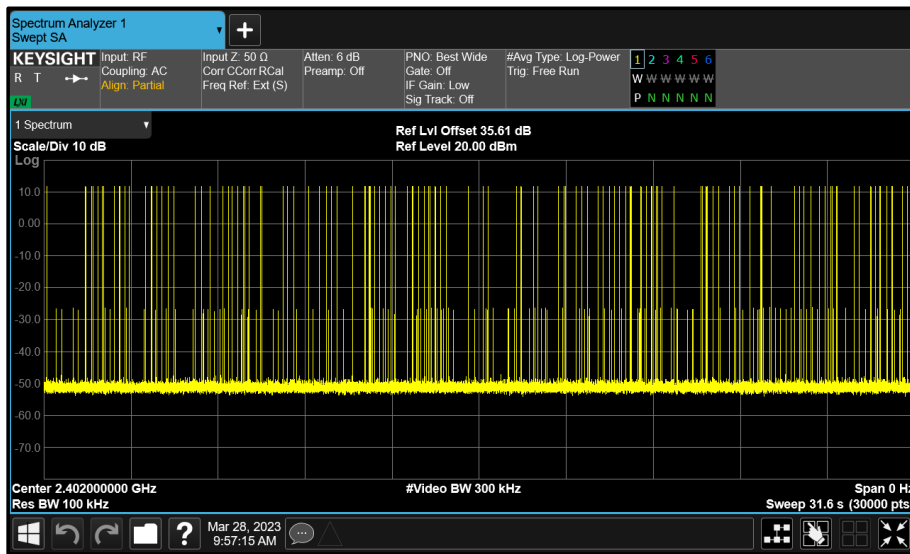


Figure 24 - GFSK - 2402 MHz Accumulated Transmit Time



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.

Industry Canada 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.

2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 14.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Hygrometer	Rotronic	I-1000	3068	12	21-Sep-2023
Multi-GNSS Simulator (GPS)	Spirent	GSS6700	4596	12	22-Aug-2023
AC Programmable Power Supply	iTech	IT7324	5225	-	O/P Mon
MXA Signal Analyser	Keysight Technologies	N9020B	5529	24	13-Dec-2024
Signal Conditioning Unit	TUV SUD	SPECTRUM SCU001	5546	12	06-Apr-2023
Digital Multimeter	Fluke	115	6147	12	16-Jun-2023

Table 17

O/P Mon – Output Monitored using calibrated equipment



2.3 Frequency Hopping Systems - Channel Separation

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

A2941, S/N: GF6K93M959 - Modification State 0

2.3.3 Date of Test

09-March-2023

2.3.4 Test Method

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

2.3.5 Environmental Conditions

Ambient Temperature	21.8 °C
Relative Humidity	32.6 %



2.3.6 Test Results

2.4 GHz Bluetooth FHSS

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1) RSS-247 5.1 b)	Test Method(s):	C63.10 7.8.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.351	2440.999	2441.998	0.999	≥ 900.8

Table 18 - Carrier Frequency Separation Results

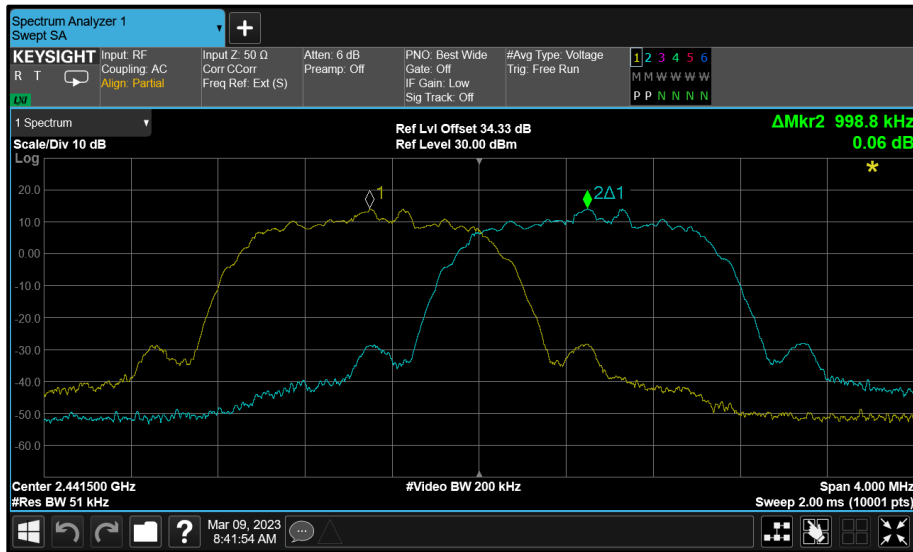


Figure 25 - $\pi/4$ DQPSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1) RSS-247 5.1 b)	Test Method(s):	C63.10 7.8.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA 8-DPSK (3-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.321	2441.006	2442.007	1.001	≥880.5

Table 19 - Carrier Frequency Separation Results



Figure 26 - 8-DPSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1) RSS-247 5.1 b)	Test Method(s):	C63.10 7.8.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.352	2440.996	2441.997	1.001	≥ 901.1

Table 20 - Carrier Frequency Separation Results



Figure 27 - $\pi/4$ DQPSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1) RSS-247 5.1 b)	Test Method(s):	C63.10 7.8.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA 8-DPSK (3-DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.321	2441.004	2442.005	1.001	≥880.8

Table 21 - Carrier Frequency Separation Results



Figure 28 - 8-DPSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1) RSS-247 5.1 b)	Test Method(s):	C63.10 7.8.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA GFSK (DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	0.924	2441.017	2442.016	0.999	≥615.8

Table 22 - Carrier Frequency Separation Results

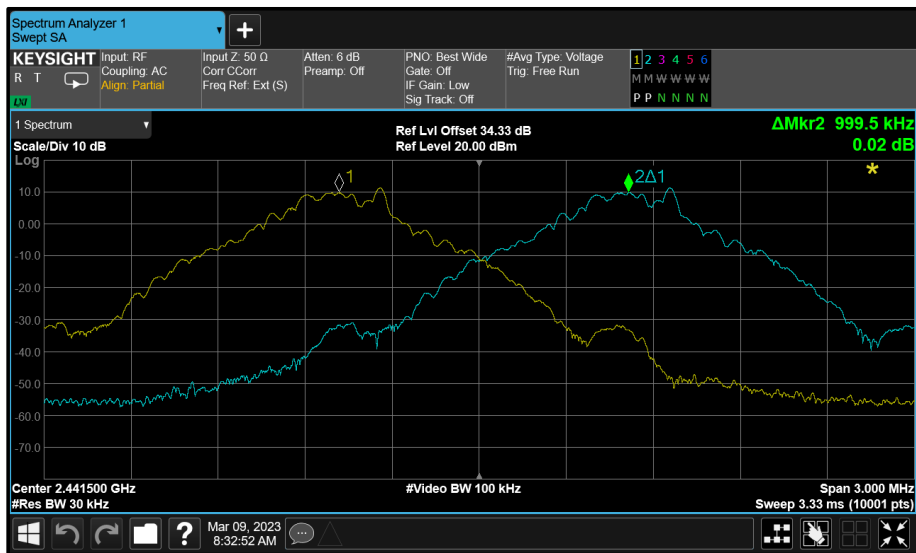


Figure 29 - GFSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1) RSS-247 5.1 b)	Test Method(s):	C63.10 7.8.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.353	2440.999	2441.999	1.000	≥ 901.9

Table 23 - Carrier Frequency Separation Results

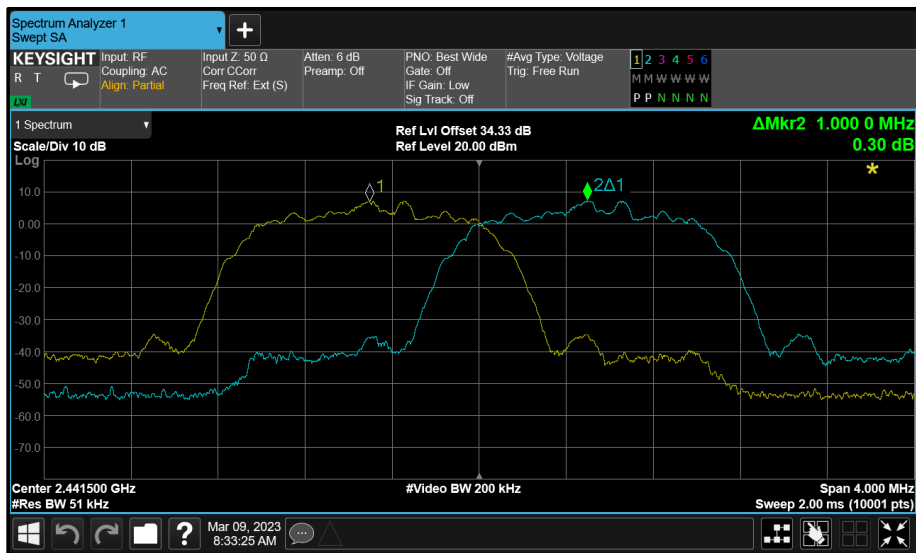


Figure 30 - $\pi/4$ DQPSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1) RSS-247 5.1 b)	Test Method(s):	C63.10 7.8.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA 8-DPSK (3-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.322	2441.007	2442.007	1.000	≥881.1

Table 24 - Carrier Frequency Separation Results



Figure 31 - 8-DPSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1) RSS-247 5.1 b)	Test Method(s):	C63.10 7.8.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA GFSK (DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	0.926	2441.017	2442.017	1.000	≥617.4

Table 25 - Carrier Frequency Separation Results

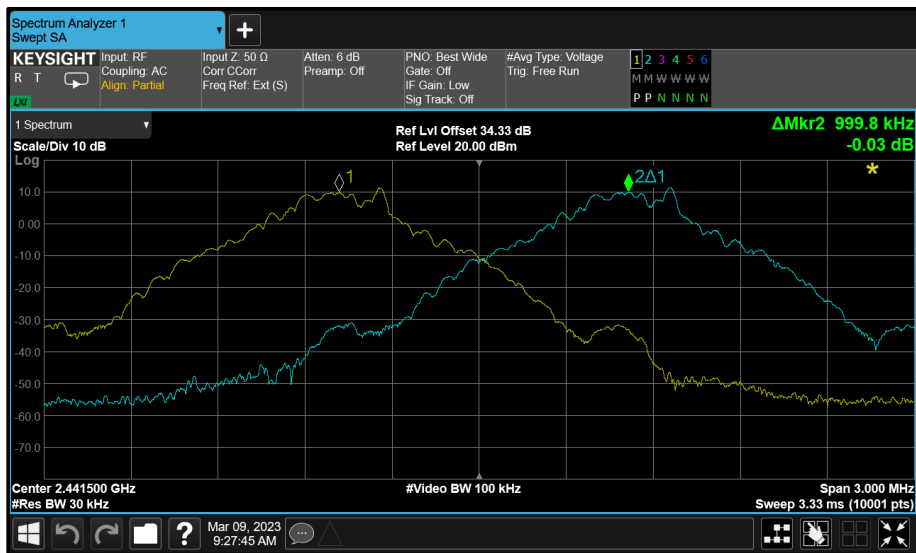


Figure 32 - GFSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1) RSS-247 5.1 b)	Test Method(s):	C63.10 7.8.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.353	2440.999	2441.998	0.999	≥ 902.1

Table 26 - Carrier Frequency Separation Results



Figure 33 - $\pi/4$ DQPSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1) RSS-247 5.1 b)	Test Method(s):	C63.10 7.8.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA 8-DPSK (3-DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.322	2441.007	2442.007	1.000	≥881.3

Table 27 - Carrier Frequency Separation Results



Figure 34 - 8-DPSK - 2441 MHz (CH39)



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

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125 W.

ISED RSS-247, Limit Clause 5.1 (b)

FHSs shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the -20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, FHSs operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125 W.

2.3.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 14.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Hygrometer	Rotronic	I-1000	3068	12	21-Sep-2023
Multi-GNSS Simulator (GPS)	Spirent	GSS6700	4596	12	22-Aug-2023
AC Programmable Power Supply	iTech	IT7324	5225	-	O/P Mon
MXA Signal Analyser	Keysight Technologies	N9020B	5529	24	13-Dec-2024
Signal Conditioning Unit	TUV SUD	SPECTRUM SCU001	5546	12	06-Apr-2023
Digital Multimeter	Fluke	115	6147	12	16-Jun-2023

Table 28

O/P Mon – Output Monitored using calibrated equipment



2.4 Frequency Hopping Systems - Number of Hopping Channels

2.4.1 Specification Reference

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

2.4.2 Equipment Under Test and Modification State

A2941, S/N: GF6K93M959 - Modification State 0

2.4.3 Date of Test

09-March-2023

2.4.4 Test Method

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

2.4.5 Environmental Conditions

Ambient Temperature	21.8 °C
Relative Humidity	32.6 %



2.4.6 Test Results

2.4 GHz Bluetooth FHSS

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)(iii) RSS-247 5.1 d)	Test Method(s):	C63.10 7.8.3
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Number of Hopping Frequencies	Limit
79	≥ 15.0

Table 29 - Number of Hopping Frequencies Results

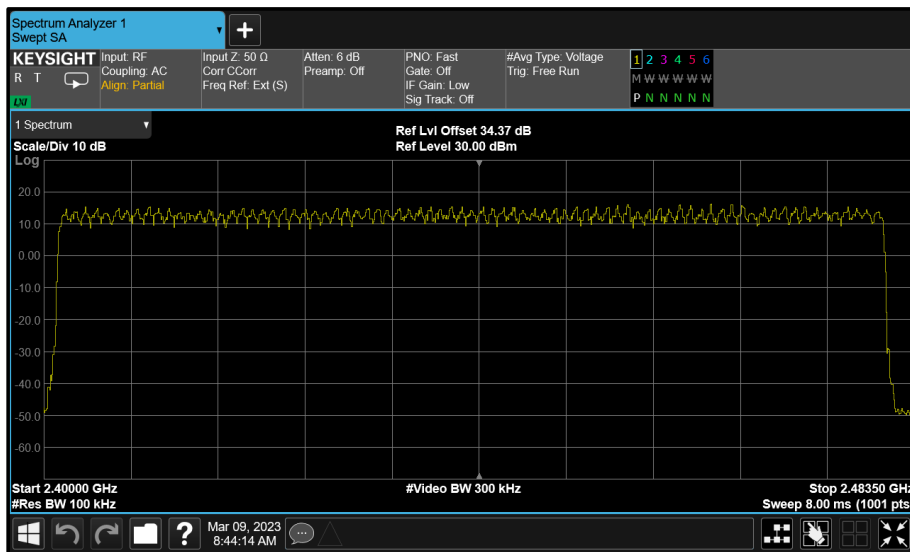


Figure 35 - $\pi/4$ DQPSK (2-DH5) - Number of Hopping Channels



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)(iii) RSS-247 5.1 d)	Test Method(s):	C63.10 7.8.3
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Number of Hopping Frequencies	Limit
79	≥ 15.0

Table 30 - Number of Hopping Frequencies Results

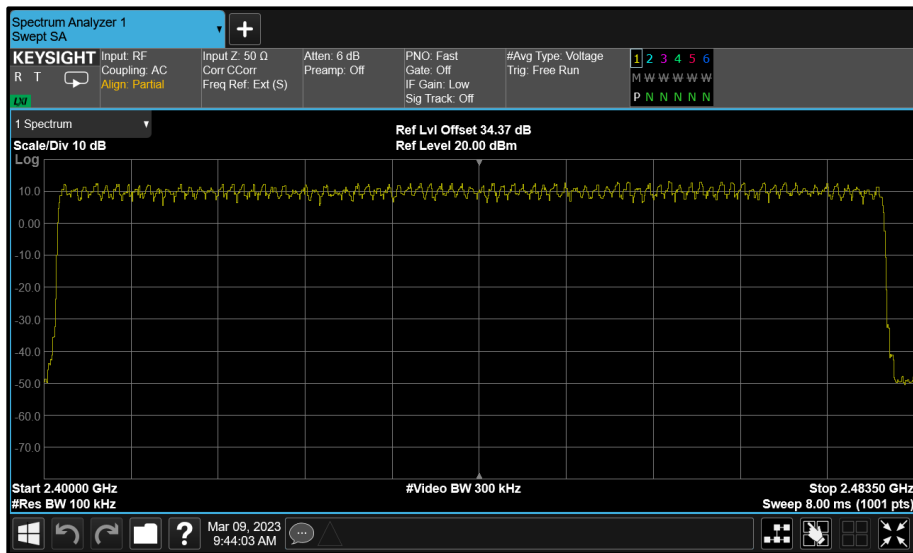


Figure 36 - $\pi/4$ DQPSK (2-DH5) - Number of Hopping Channels



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)(iii) RSS-247 5.1 d)	Test Method(s):	C63.10 7.8.3
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA GFSK (DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Number of Hopping Frequencies	Limit
79	≥15.0

Table 31 - Number of Hopping Frequencies Results

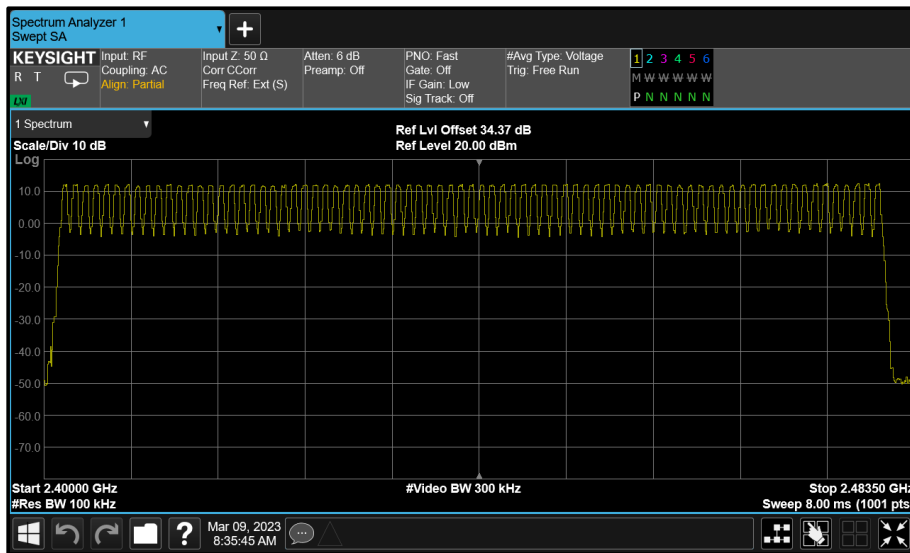


Figure 37 - GFSK (DH5) - Number of Hopping Channels



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)(iii) RSS-247 5.1 d)	Test Method(s):	C63.10 7.8.3
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA GFSK (DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Number of Hopping Frequencies	Limit
79	≥15.0

Table 32 - Number of Hopping Frequencies Results

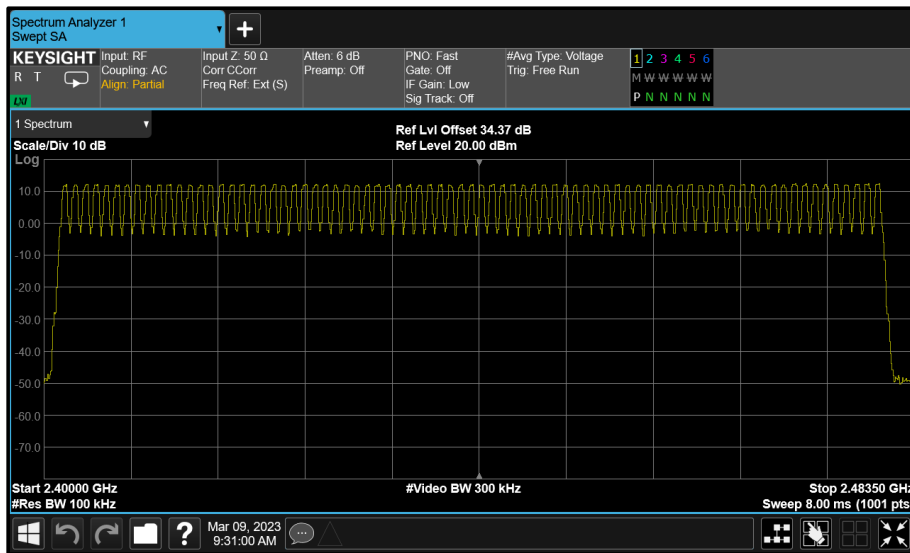


Figure 38 - GFSK (DH5) - Number of Hopping Channels

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.



2.4.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 14.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Hygrometer	Rotronic	I-1000	3068	12	21-Sep-2023
Multi-GNSS Simulator (GPS)	Spirent	GSS6700	4596	12	22-Aug-2023
AC Programmable Power Supply	iTech	IT7324	5225	-	O/P Mon
MXA Signal Analyser	Keysight Technologies	N9020B	5529	24	13-Dec-2024
Signal Conditioning Unit	TUV SUD	SPECTRUM SCU001	5546	12	06-Apr-2023
Digital Multimeter	Fluke	115	6147	12	16-Jun-2023

Table 33

O/P Mon – Output Monitored using calibrated equipment



2.5 Frequency Hopping Systems - 20 dB Bandwidth

2.5.1 Specification Reference

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

2.5.2 Equipment Under Test and Modification State

A2941, S/N: GF6K93M959 - Modification State 0

2.5.3 Date of Test

09-March-2023

2.5.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.9.2.

2.5.5 Environmental Conditions

Ambient Temperature	21.8 °C
Relative Humidity	32.6 %



2.5.6 Test Results

2.4 GHz Bluetooth FHSS

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1) RSS-247 5.1	Test Method(s):	C63.10 6.9.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)			
	A	B	C	D
2402	-	1.330	-	-
2441	-	1.325	-	-
2480	-	1.325	-	-

Table 34 - 20 dB Bandwidth Results

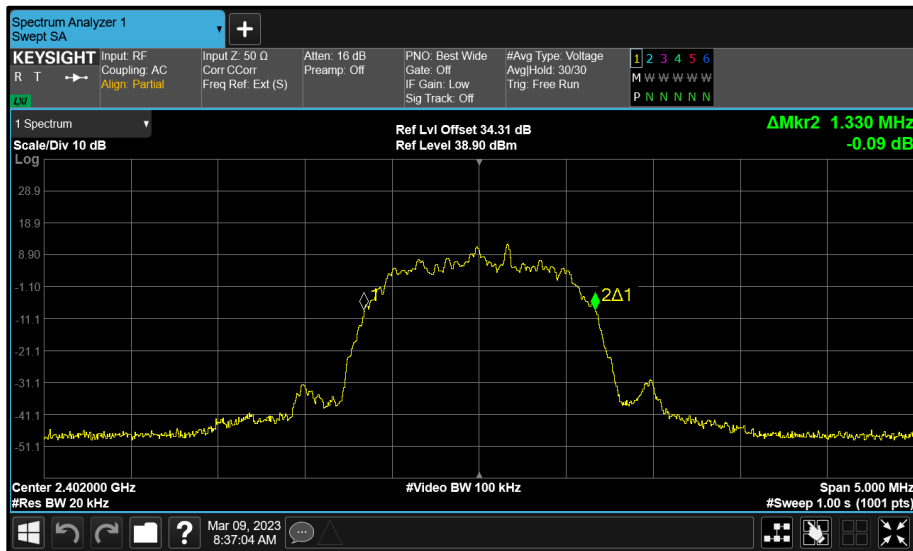


Figure 39 - Core 0 (B) 2402 MHz (CH0) 20 dB Bandwidth

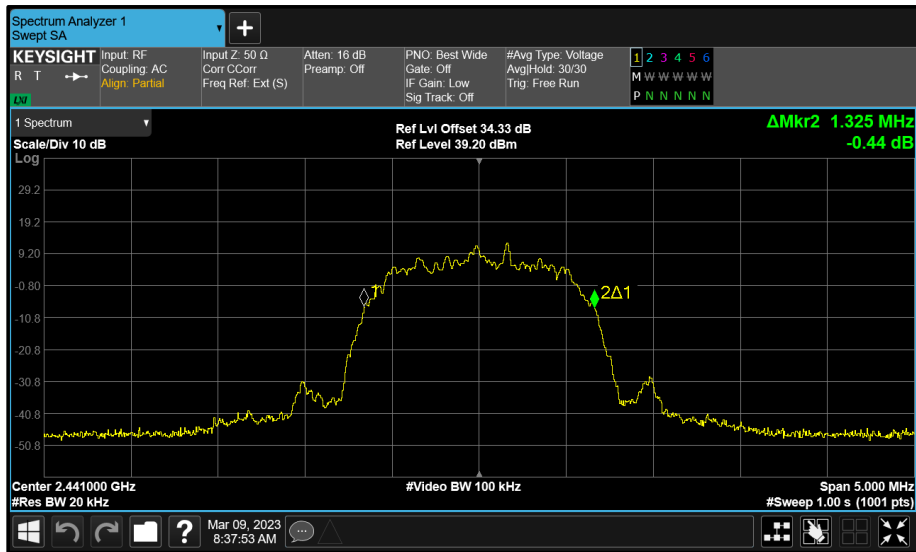


Figure 40 - Core 0 (B) 2441 MHz (CH39) 20 dB Bandwidth

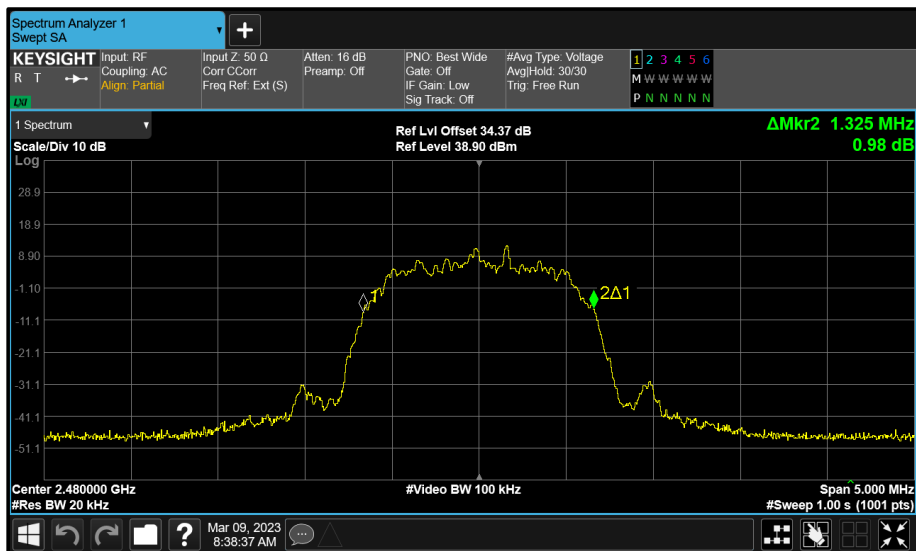


Figure 41 - Core 0 (B) 2480 MHz (CH78) 20 dB Bandwidth



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1) RSS-247 5.1	Test Method(s):	C63.10 6.9.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA 8-DPSK (3-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)			
	A	B	C	D
2402	-	1.260	-	-
2441	-	1.260	-	-
2480	-	1.260	-	-

Table 35 - 20 dB Bandwidth Results

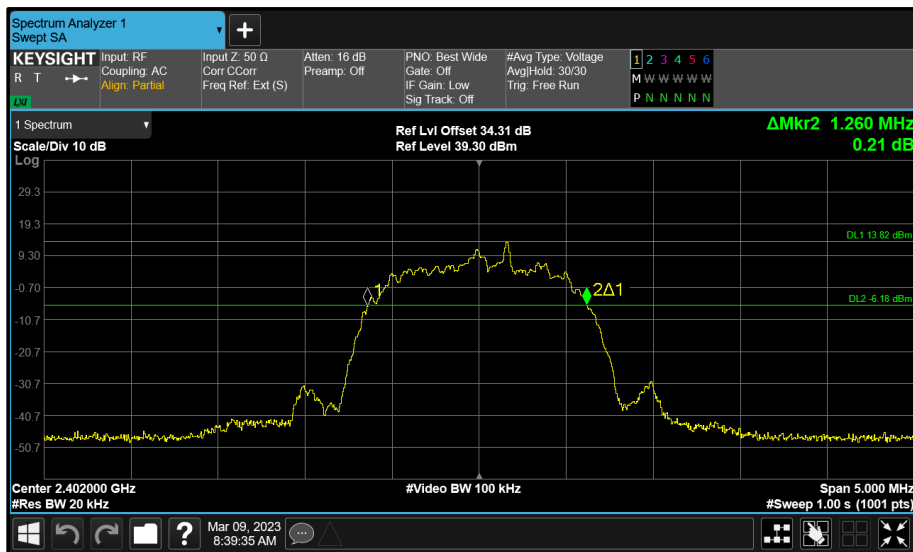


Figure 42 - Core 0 (B) 2402 MHz (CH0) 20 dB Bandwidth



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1) RSS-247 5.1	Test Method(s):	C63.10 6.9.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)			
	A	B	C	D
2402	-	1.325	1.325	-
2441	-	1.330	1.320	-
2480	-	1.325	1.325	-

Table 36 - 20 dB Bandwidth Results

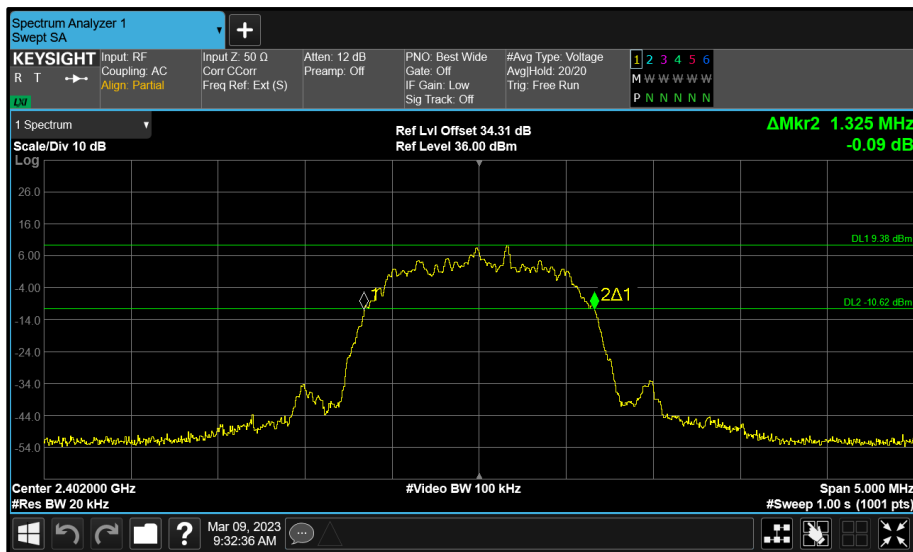


Figure 45 - Core 0 (B) 2402 MHz (CH0) 20 dB Bandwidth



Figure 46 - Core 1 (C) 2402 MHz (CH0) 20 dB Bandwidth

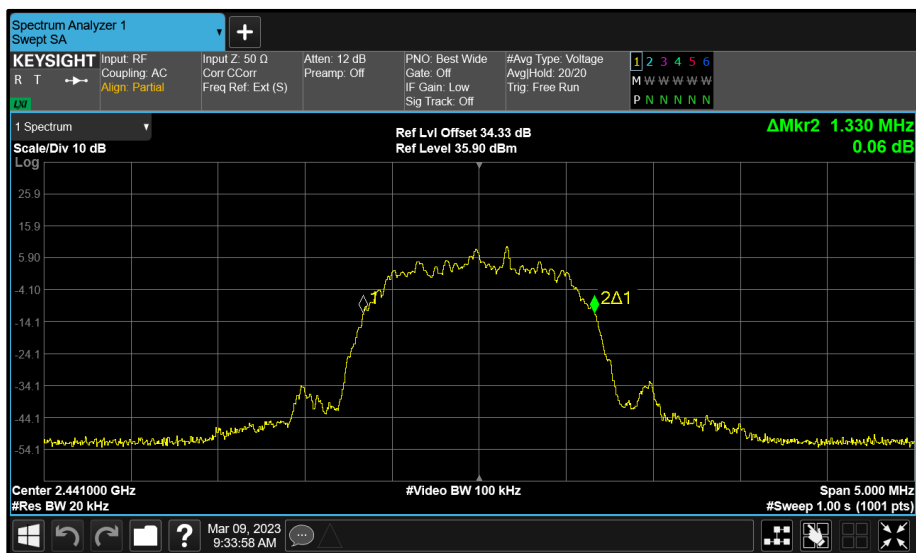


Figure 47 - Core 0 (B) 2441 MHz (CH39) 20 dB Bandwidth

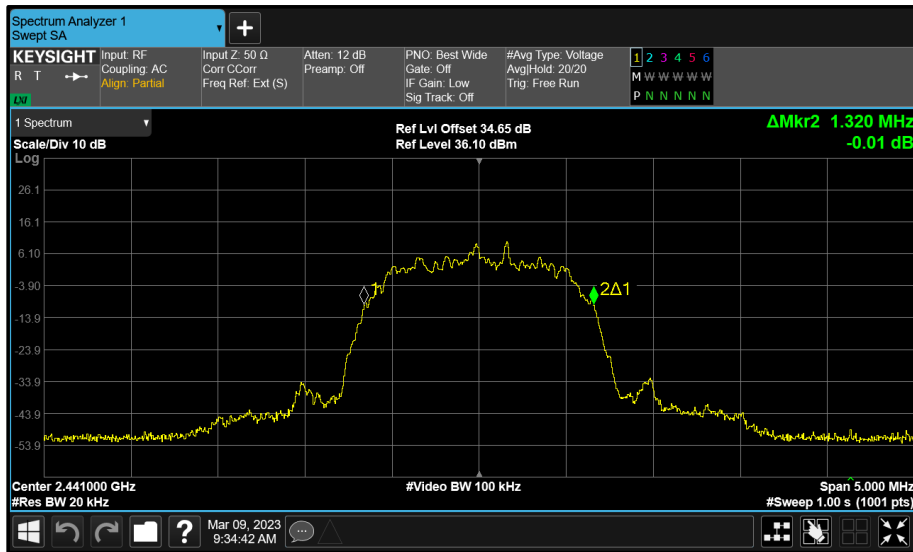


Figure 48 - Core 1 (C) 2441 MHz (CH39) 20 dB Bandwidth

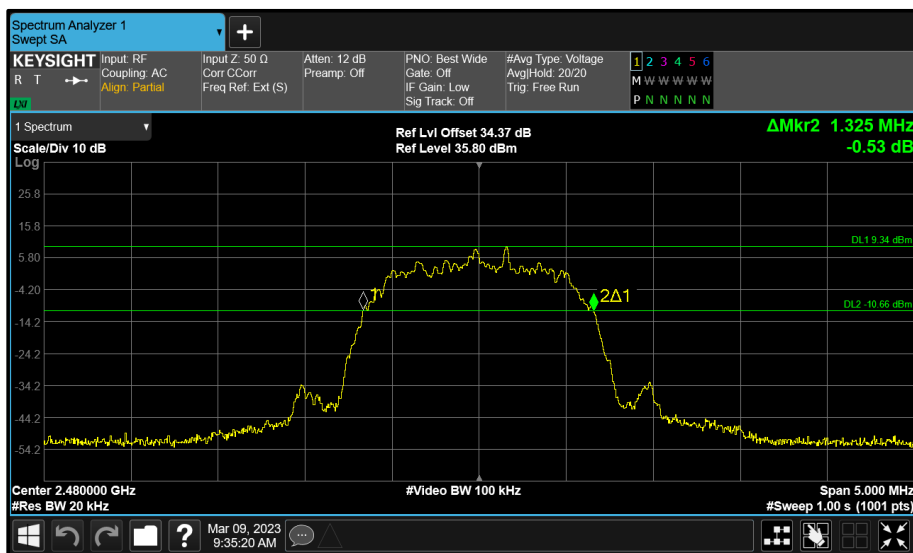


Figure 49 - Core 0 (B) 2480 MHz (CH78) 20 dB Bandwidth

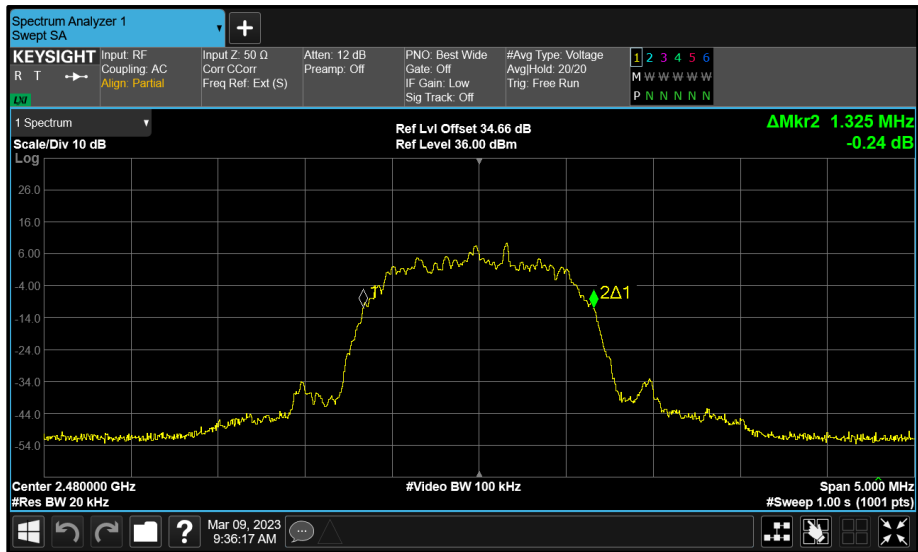


Figure 50 - Core 1 (C) 2480 MHz (CH78) 20 dB Bandwidth



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1) RSS-247 5.1	Test Method(s):	C63.10 6.9.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA 8-DPSK (3-DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)			
	A	B	C	D
2402	-	1.260	1.260	-
2441	-	1.260	1.255	-
2480	-	1.260	1.260	-

Table 37 - 20 dB Bandwidth Results

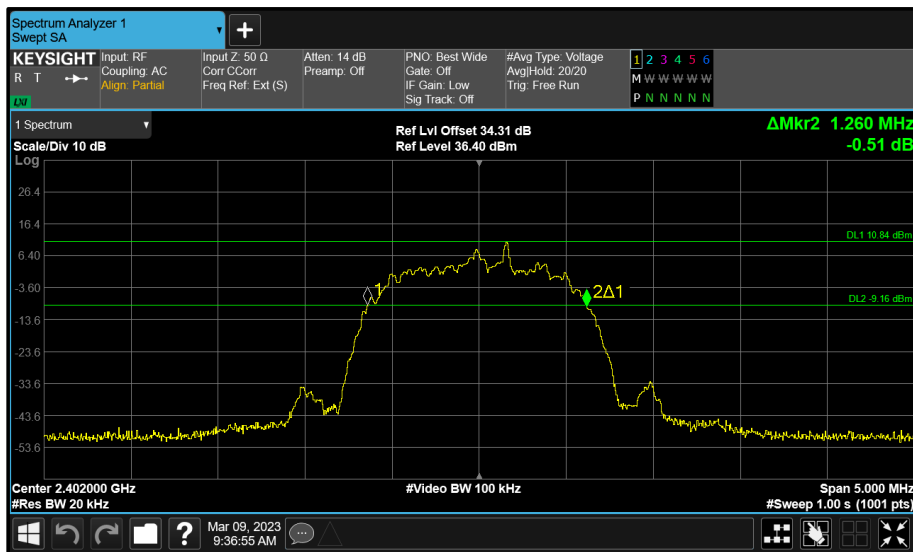


Figure 51 - Core 0 (B) 2402 MHz (CH0) 20 dB Bandwidth

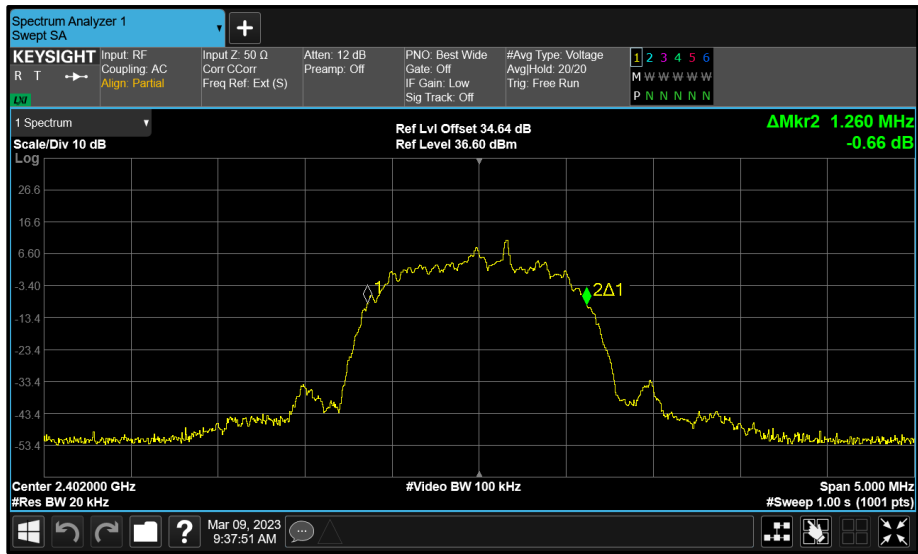


Figure 52 - Core 1 (C) 2402 MHz (CH0) 20 dB Bandwidth

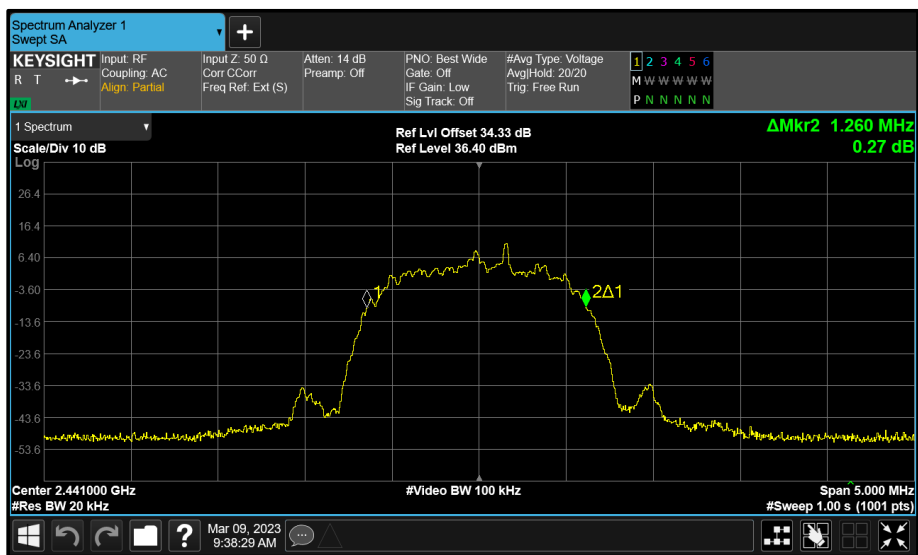


Figure 53 - Core 0 (B) 2441 MHz (CH39) 20 dB Bandwidth

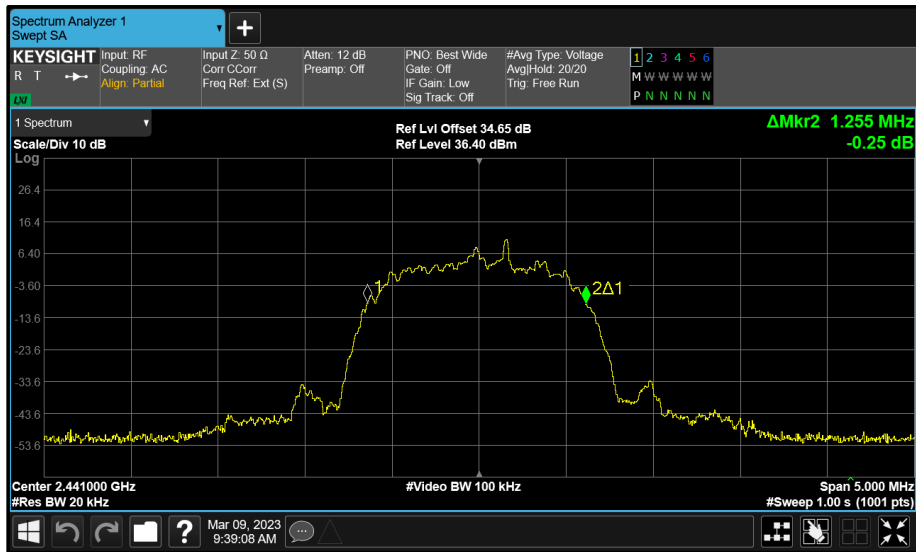


Figure 54 - Core 1 (C) 2441 MHz (CH39) 20 dB Bandwidth



Figure 55 - Core 0 (B) 2480 MHz (CH78) 20 dB Bandwidth

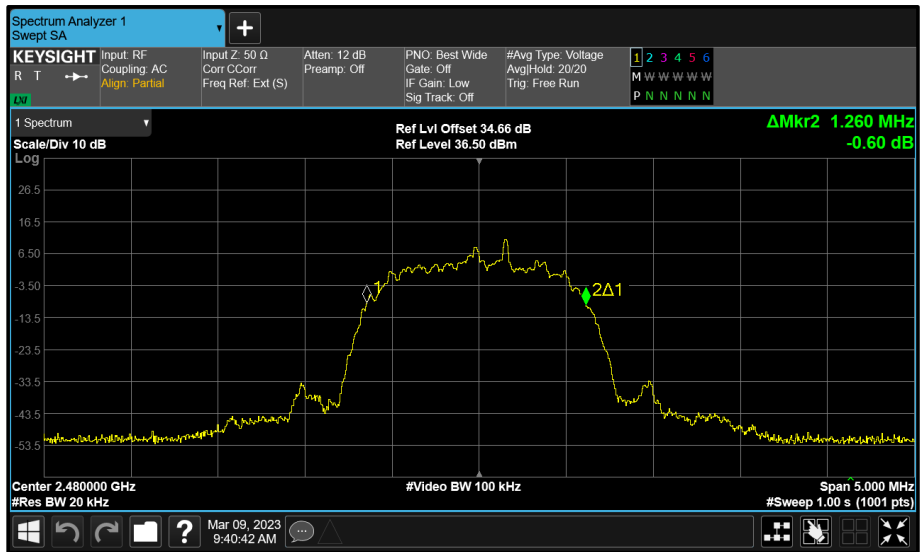


Figure 56 - Core 1 (C) 2480 MHz (CH78) 20 dB Bandwidth



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1) RSS-247 5.1	Test Method(s):	C63.10 6.9.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA GFSK (DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)			
	A	B	C	D
2402	-	0.855	-	-
2441	-	0.858	-	-
2480	-	0.855	-	-

Table 38 - 20 dB Bandwidth Results

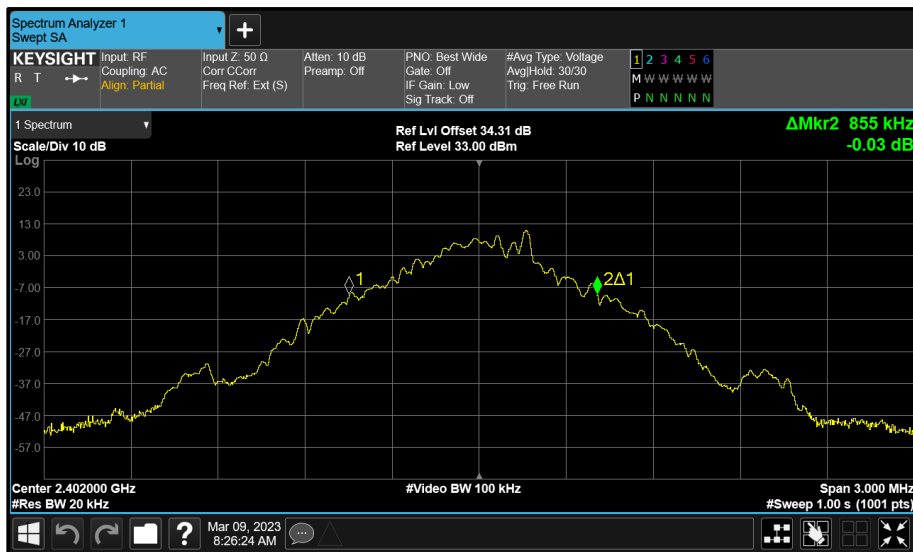


Figure 57 - Core 0 (B) 2402 MHz (CH0) 20 dB Bandwidth

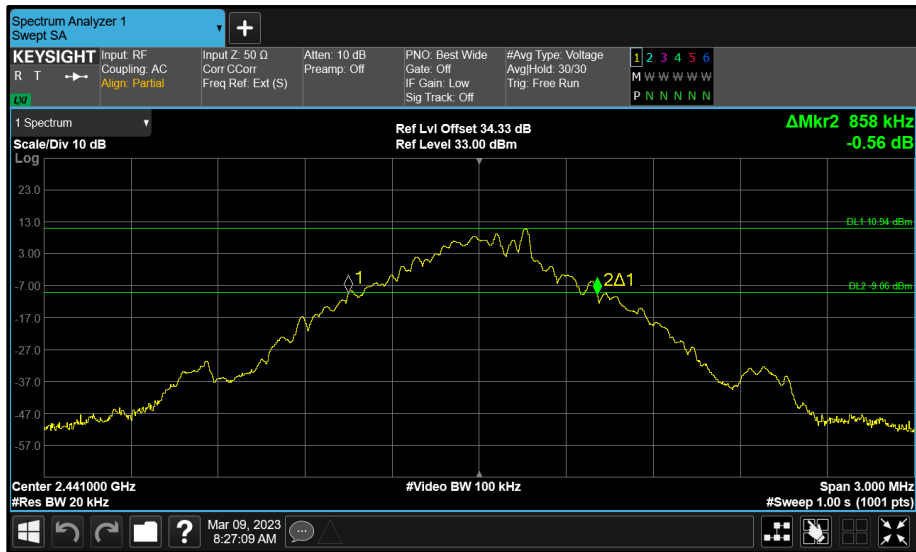


Figure 58 - Core 0 (B) 2441 MHz (CH39) 20 dB Bandwidth

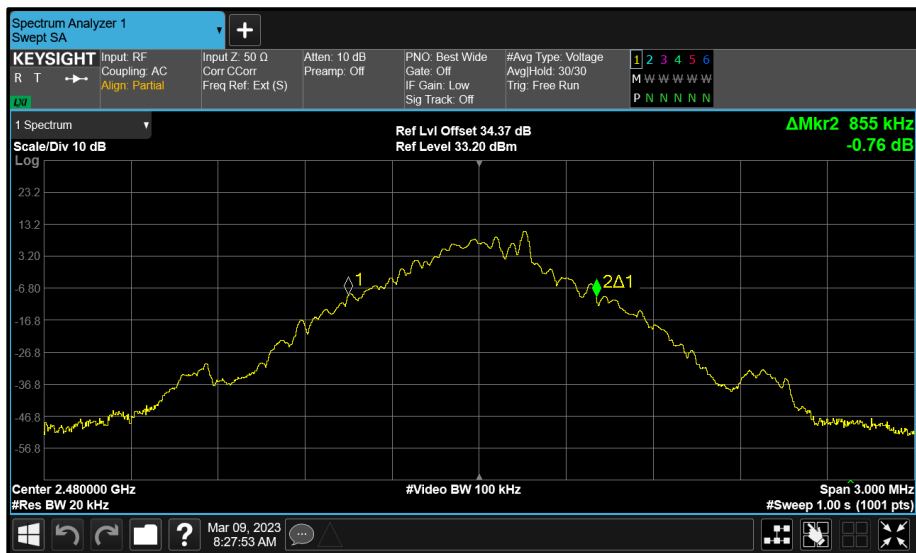


Figure 59 - Core 0 (B) 2480 MHz (CH78) 20 dB Bandwidth



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1) RSS-247 5.1	Test Method(s):	C63.10 6.9.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA GFSK (DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)			
	A	B	C	D
2402	-	0.855	0.855	-
2441	-	0.855	0.855	-
2480	-	0.855	0.855	-

Table 39 - 20 dB Bandwidth Results

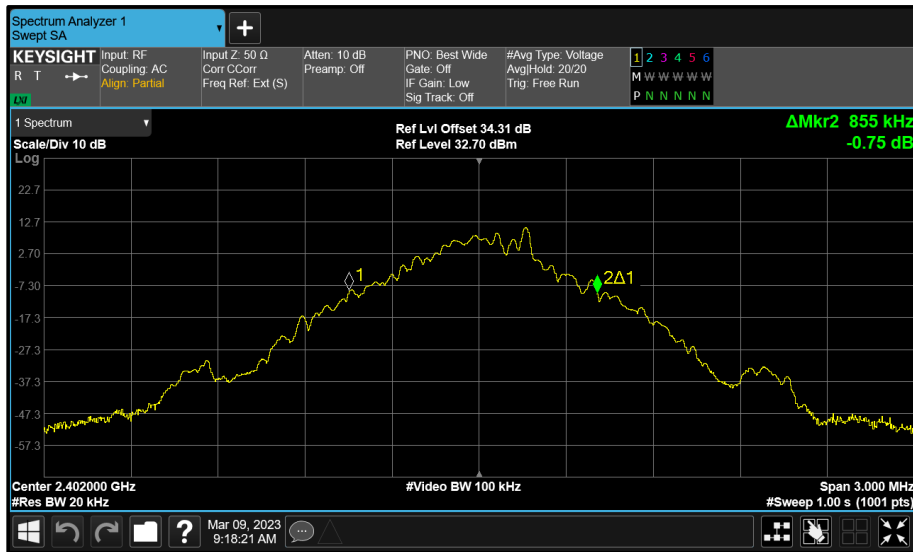


Figure 60 - Core 0 (B) 2402 MHz (CH0) 20 dB Bandwidth

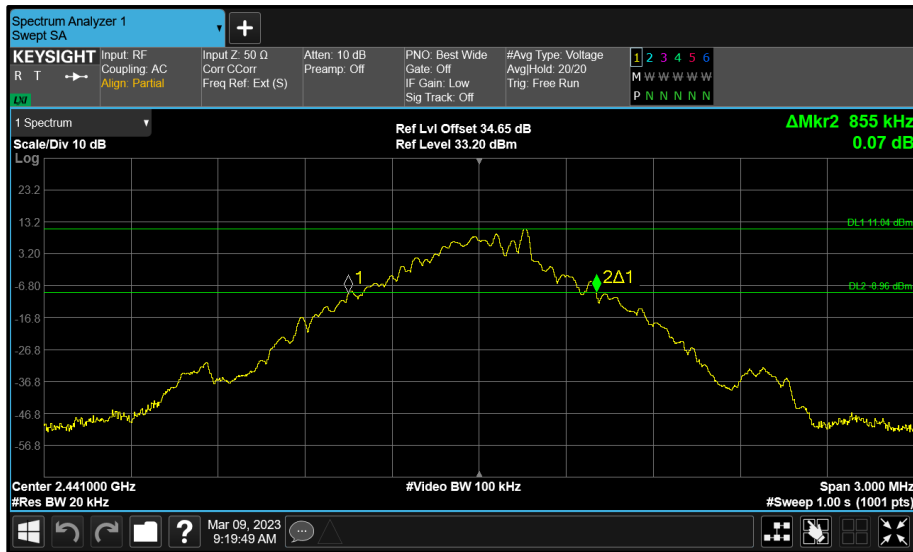


Figure 63 - Core 1 (C) 2441 MHz (CH39) 20 dB Bandwidth

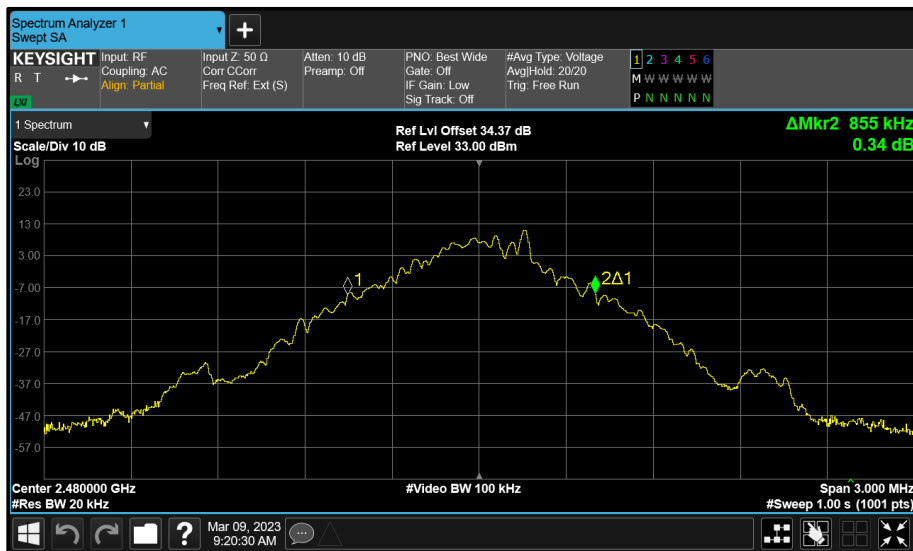


Figure 64 - Core 0 (B) 2480 MHz (CH78) 20 dB Bandwidth



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1) RSS-247 5.1	Test Method(s):	C63.10 6.9.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)			
	A	B	C	D
2402	-	1.330	-	-
2441	-	1.325	-	-
2480	-	1.330	-	-

Table 40 - 20 dB Bandwidth Results

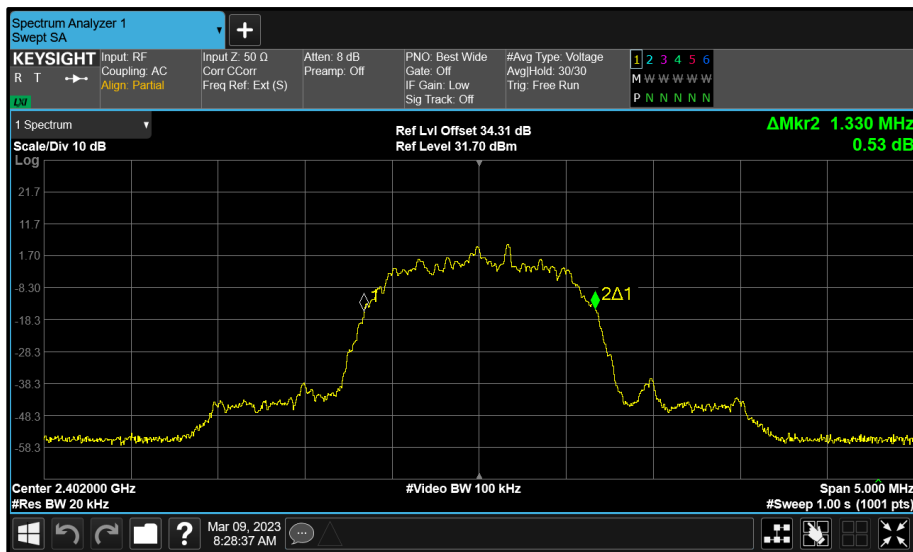


Figure 66 - Core 0 (B) 2402 MHz (CH0) 20 dB Bandwidth

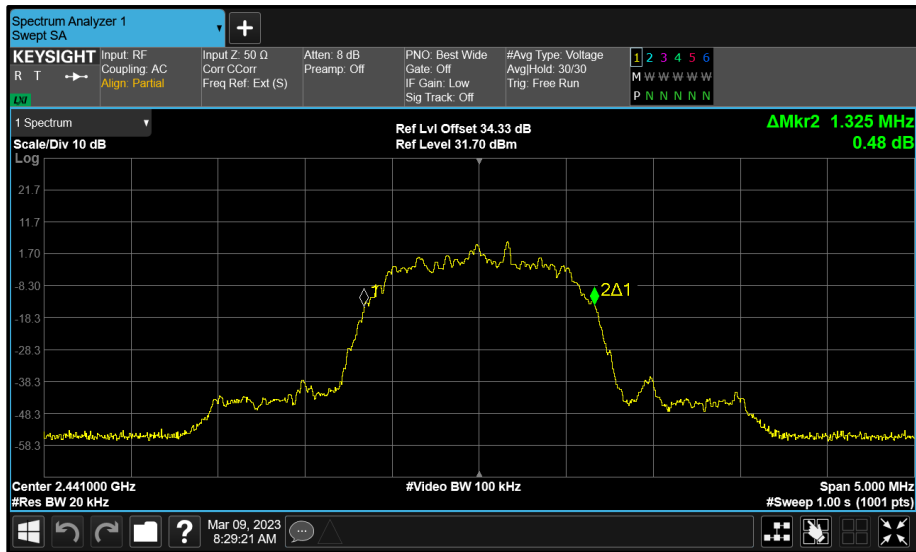


Figure 67 - Core 0 (B) 2441 MHz (CH39) 20 dB Bandwidth



Figure 68 - Core 0 (B) 2480 MHz (CH78) 20 dB Bandwidth



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1) RSS-247 5.1	Test Method(s):	C63.10 6.9.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA 8-DPSK (3-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)			
	A	B	C	D
2402	-	1.260	-	-
2441	-	1.260	-	-
2480	-	1.260	-	-

Table 41 - 20 dB Bandwidth Results

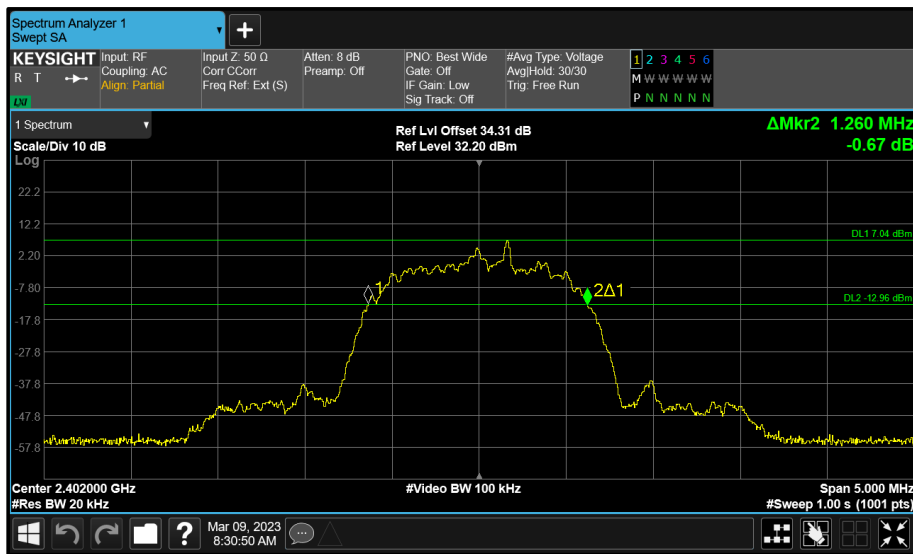


Figure 69 - Core 0 (B) 2402 MHz (CH0) 20 dB Bandwidth



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1) RSS-247 5.1	Test Method(s):	C63.10 6.9.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)			
	A	B	C	D
2402	-	1.330	1.330	-
2441	-	1.325	1.325	-
2480	-	1.330	1.330	-

Table 42 - 20 dB Bandwidth Results

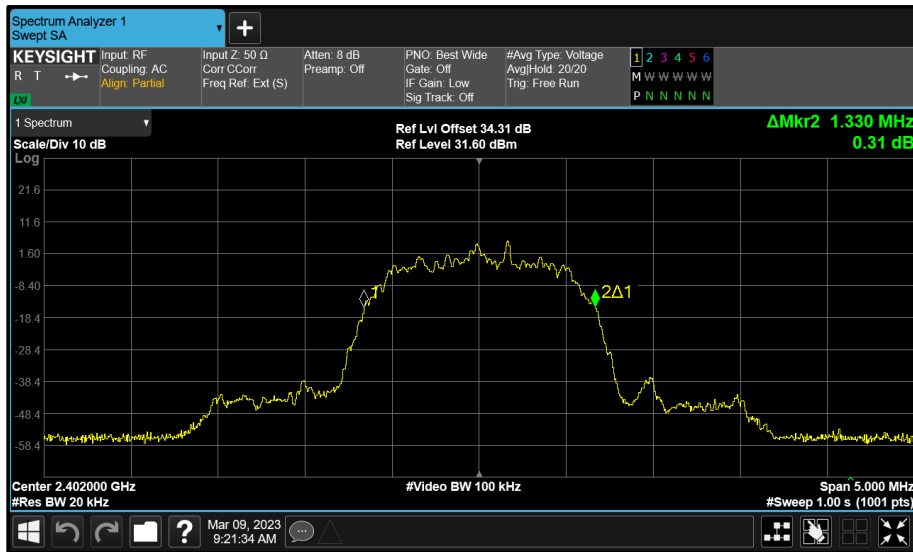


Figure 72 - Core 0 (B) 2402 MHz (CH0) 20 dB Bandwidth

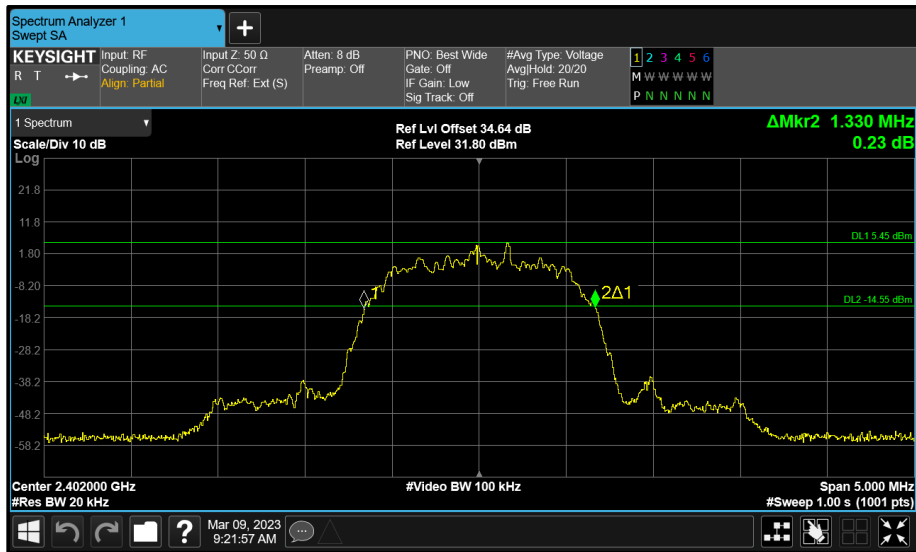


Figure 73 - Core 1 (C) 2402 MHz (CH0) 20 dB Bandwidth

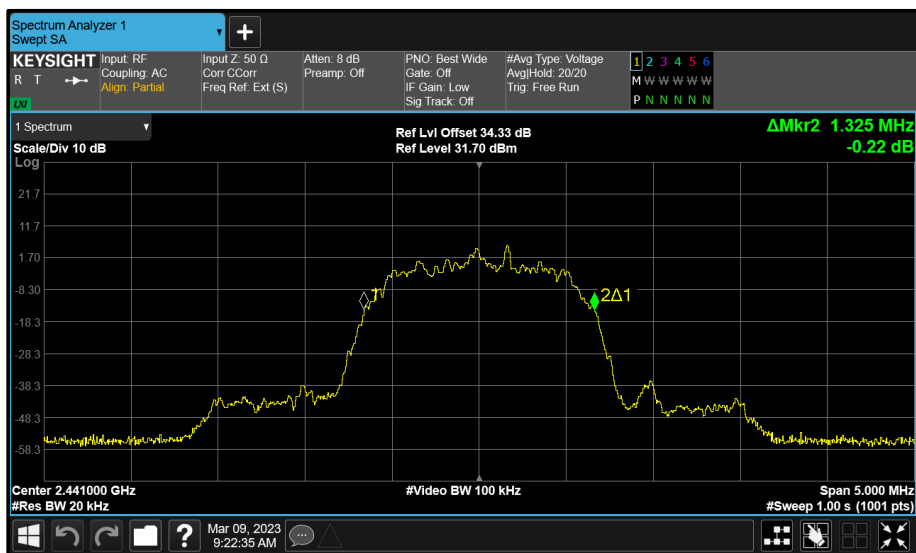


Figure 74 - Core 0 (B) 2441 MHz (CH39) 20 dB Bandwidth



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1) RSS-247 5.1	Test Method(s):	C63.10 6.9.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA 8-DPSK (3-DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	B+C (Core 0 + Core 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)			
	A	B	C	D
2402	-	1.260	1.260	-
2441	-	1.260	1.260	-
2480	-	1.265	1.265	-

Table 43 - 20 dB Bandwidth Results

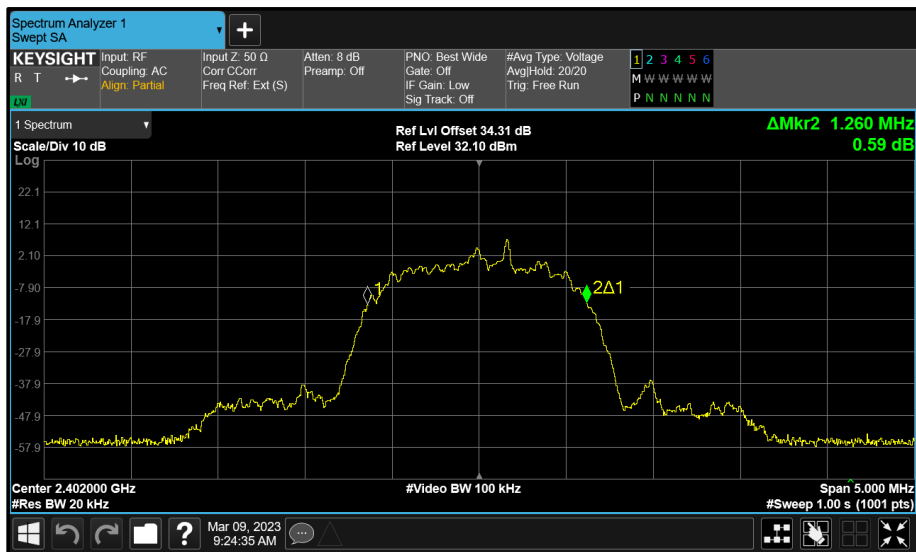


Figure 78 - Core 0 (B) 2402 MHz (CH0) 20 dB Bandwidth

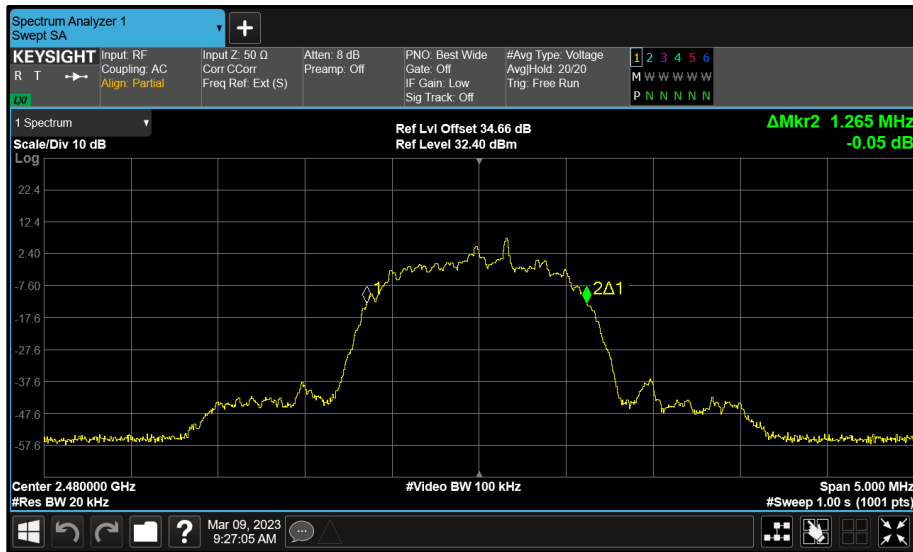


Figure 83 - Core 1 (C) 2480 MHz (CH78) 20 dB Bandwidth

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

None specified.

2.5.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 14.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Hygrometer	Rotronic	I-1000	3068	12	21-Sep-2023
Multi-GNSS Simulator (GPS)	Spirent	GSS6700	4596	12	22-Aug-2023
AC Programmable Power Supply	iTech	IT7324	5225	-	O/P Mon
MXA Signal Analyser	Keysight Technologies	N9020B	5529	24	13-Dec-2024
Signal Conditioning Unit	TUV SUD	SPECTRUM SCU001	5546	12	06-Apr-2023
Digital Multimeter	Fluke	115	6147	12	16-Jun-2023

Table 44

O/P Mon – Output Monitored using calibrated equipment