

# FCC Test Report

Apple Inc  
Model: A3401



## In accordance with FCC 47 CFR Part 15C (2.4 GHz Bluetooth BDR/EDR)

Prepared for: Apple Inc  
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California  
95014  
USA

FCC ID: BCGA3401

### COMMERCIAL-IN-CONFIDENCE

Document 75961394-67 Issue 01

#### SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Steve Marshall	Senior Engineer	Authorised Signatory	14-October-2024

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. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Report Generation	Rachael Watkins	14-October-2024	

FCC Accreditation  
553713/UK2026 Concorde Park, Fareham Test Laboratory

#### EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15C: 2023 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	14-October-2024

**Table 1**

## 1.2 Introduction

Applicant	Apple Inc
Manufacturer	Apple Inc
EUT/Sample Identification	Refer to section 1.6
Test Specification/Issue/Date	FCC 47 CFR Part 15C: 2023
Start of Test	04-September-2024
Finish of Test	08-October-2024
Name of Engineer(s)	Vineeth Nagaraj, Morsalin Hossain, Ioan-Alexandru Bogatu, Jayvir Makwana, Ahmed Al Dirdiri, Manohar Thota and Elliot Callender
Related Document(s)	ANSI C63.4 (2014) ANSI C63.10 (2020) 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 is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: 2.4 GHz Bluetooth BDR/EDR				
-	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	Restricted Band Edges	Pass	ANSI C63.10 (2020)
2.2	15.247 (a)(1)	Frequency Hopping Systems - Average Time of Occupancy	Pass	ANSI C63.10 (2020)
2.3	15.247 (a)(1)	Frequency Hopping Systems - Channel Separation	Pass	ANSI C63.10 (2020)
2.4	15.247 (a)(1)	Frequency Hopping Systems - Number of Hopping Channels	Pass	ANSI C63.10 (2020)
2.5	15.247 (a)(1)	Frequency Hopping Systems - 99% & 20 dB Bandwidth	Pass	ANSI C63.10 (2020)
2.6	15.247 (b)	Maximum Conducted Output Power	Pass	ANSI C63.10 (2020) KDB 662911 D01 v02r01
2.7	15.247 (d)	Authorised Band Edges	Pass	ANSI C63.10 (2020)
2.8	15.209 and 15.247 (d)	Spurious Radiated Emissions	Pass	ANSI C63.10 (2020) ANSI C63.4 (2014)

**Table 2**



## 1.4 Product Information

### 1.4.1 Technical Description

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

### 1.4.2 Test Modes

The EUT's 2.4 GHz Bluetooth radio supports SISO (Single Input/Single Output) operation on three different cores (Core 0, 1, and 2). It also supports MIMO (Multiple Input/Multiple Output) beamforming operation on Cores 0+1. The EUT supports Basic Rate and Enhanced Data Rate modes for FHSS operation.

Core 0 and core 1 also operate at two power settings: low power "iPA" and high power "ePA", with dedicated core 2 only supporting the lower power mode. The EUT uses different output powers per core dependent on how many cores are used.

After preliminary investigations, conducted tests on the EUT and Radiated Band Edge were performed in the following modes:

SISO modes:

- DH5 - iPA - Core 1
- 2-DH5 - iPA - Core 1
- 3-DH5 - iPA - Core 1
- DH5 - iPA - Core 2
- 2-DH5 - iPA - Core 2
- 3-DH5 - iPA - Core 2
- 2-DH5 - ePA - Core 1
- 3-DH5 - ePA - Core 1

MIMO modes (Core 0 + Core 1):

- DH5 - iPA
- 2-DH5 - iPA
- 3-DH5 - iPA
- 2-DH5 - ePA
- 3-DH5 - ePA

Spurious Radiated Emissions tests were limited to the modes shown below, with the device configured to operate at maximum output power. As this was deemed to be worst case.

SISO mode:

- DH5 - iPA - Core 2

MIMO modes:

- DH5 - iPA - Core 0 + Core 1
- 2-DH5 - ePA - Core 0 + Core 1



### 1.4.3 Test Setup

For conducted tests the EUT antennas were disconnected and replaced with U. FL to SMA test cables to enable conducted testing on each core. The loss of these test cables were known and compensated for in any conducted measurements.

For all tests the EUT was put into a continuous transmit/receive test mode with the chipset manufacturer's test commands. These ran the specified modulation types on either a fixed single channel or in Hopping mode, to ensure the measured signals were representative.

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

### 1.4.4 Antenna Gain Table

Antenna Port	Frequency Range (MHz)	Peak Gain (dBi)	Conducted Cable Loss (dB)
Core 0	2400 to 2480	4.5	0.71
Core 1	2400 to 2480	4.8	0.71
Core 2	2400 to 2480	4.8	0.71

Table 3

### 1.5 Deviations from the Standard

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

### 1.6 Identification of the EUT

The table below details identification of the EUT(s) that have been used to carry out the testing within this report.

Model: A3401			
Serial Number	Hardware Version	Software Version	Firmware
JVJC362FKV	REV1.0	24A32191s	22.1.65.459
H56R7RH7PK	REV1.0	24A32831c	22.1.65.459
HHJTCJ96L9	REV1.0	24A32191s	22.1.65.459

Table 4



**1.7 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: A3401, Serial Number: JVJC362FKV			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A3401, Serial Number: H56R7RH7PK			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A3401, Serial Number: HHJTCJ96L9			
0	As supplied by the customer	Not Applicable	Not Applicable

**Table 5**

**1.8 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 BDR/EDR		
Restricted Band Edges	Ioan-Alexandru Bogatu, Morsalin Hossain and Vineeth Nagaraj,	UKAS
Frequency Hopping Systems - Average Time of Occupancy	Jayvir Makwana	UKAS
Frequency Hopping Systems - Channel Separation	Jayvir Makwana	UKAS
Frequency Hopping Systems - Number of Hopping Channels	Jayvir Makwana	UKAS
Frequency Hopping Systems - 99% & 20 dB Bandwidth	Jayvir Makwana	UKAS
Maximum Conducted Output Power	Jayvir Makwana	UKAS
Authorised Band Edges	Ioan-Alexandru Bogatu, Morsalin Hossain and Vineeth Nagaraj,	UKAS
Spurious Radiated Emissions	Ahmed Al Dirdiri, Elliot Callender, Manohar Thota and Morsalin Hossain	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

#### 2.1.2 Equipment Under Test and Modification State

A3401, S/N: JVJC362FKV - Modification State 0  
A3401, S/N: H56R7RH7PK - Modification State 0

#### 2.1.3 Date of Test

04-September-2024 to 29-September-2024

#### 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 $\mu$ V/m to  $\mu$ V/m:

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

#### 2.1.5 Environmental Conditions

Ambient Temperature 22.3 - 24.5 °C

Relative Humidity 41.0 - 54.7 %





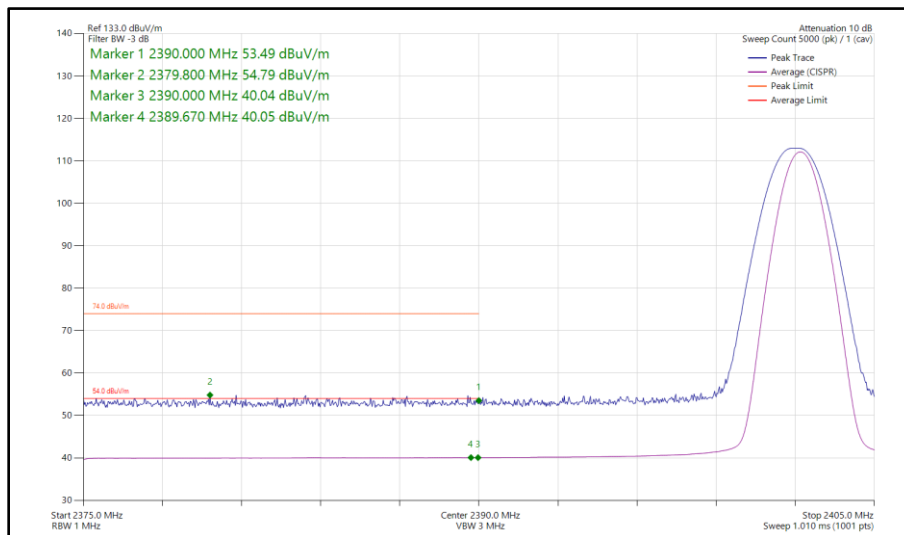
**2.1.6 Test Results**

2.4 GHz Bluetooth BDR/EDR

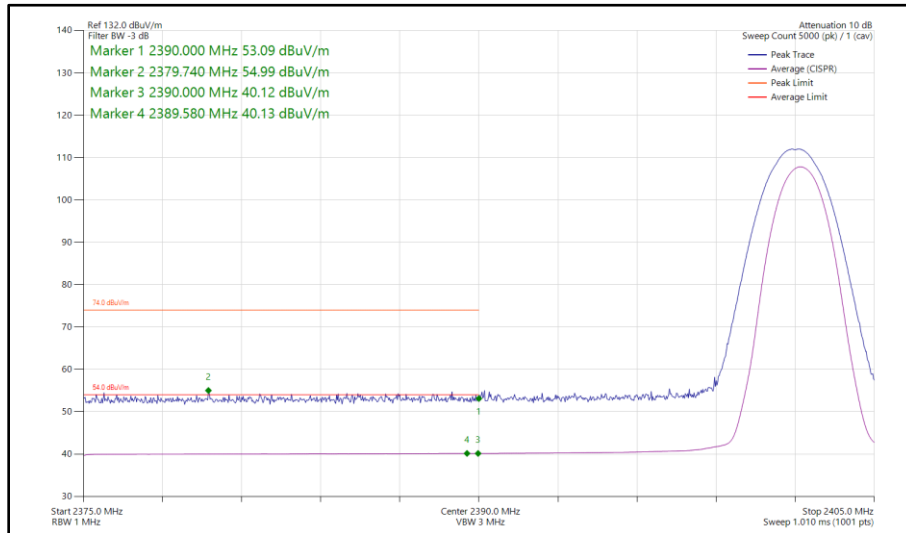
iPA - Core 0 (SISO)

Mode	Packet Type	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	DH5	2402	2390	54.79	40.05
Static	2-DH5	2402	2390	54.99	40.13
Static	3-DH5	2402	2390	55.60	40.12
Static	DH5	2480	2483.5	53.32	41.55
Static	2-DH5	2480	2483.5	53.78	41.52
Static	3-DH5	2480	2483.5	54.35	41.57

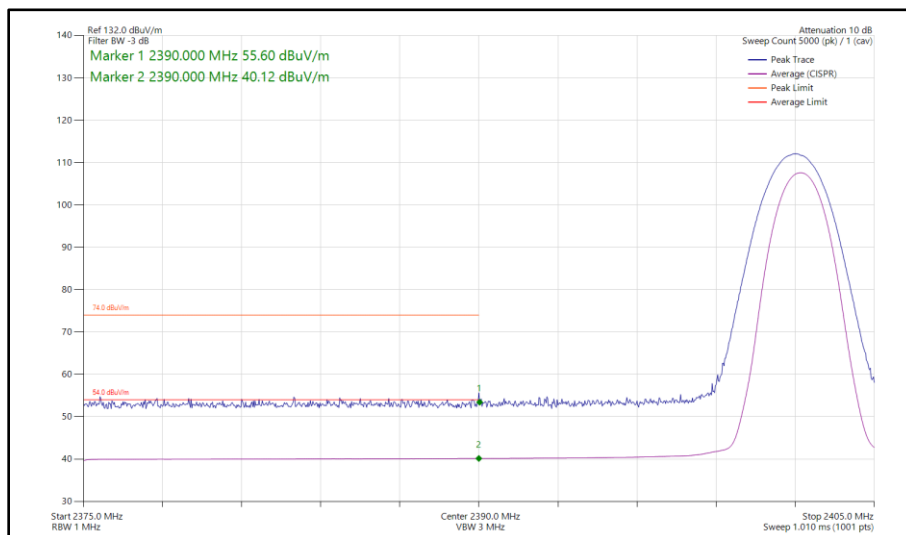
**Table 7 - SISO Restricted Band Edge Results**



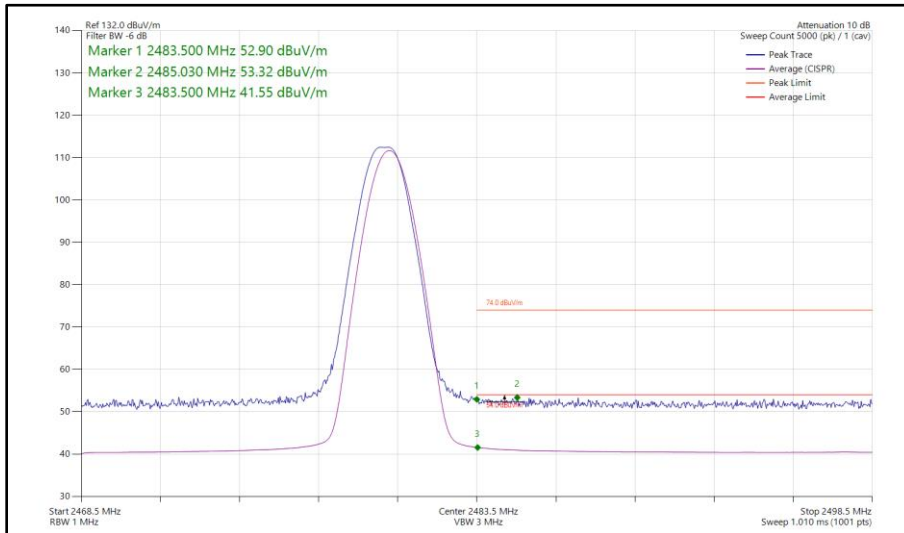
**Figure 1 - Bluetooth DH5, SISO, Core 0 - 2402 MHz Band Edge Frequency 2390 MHz**



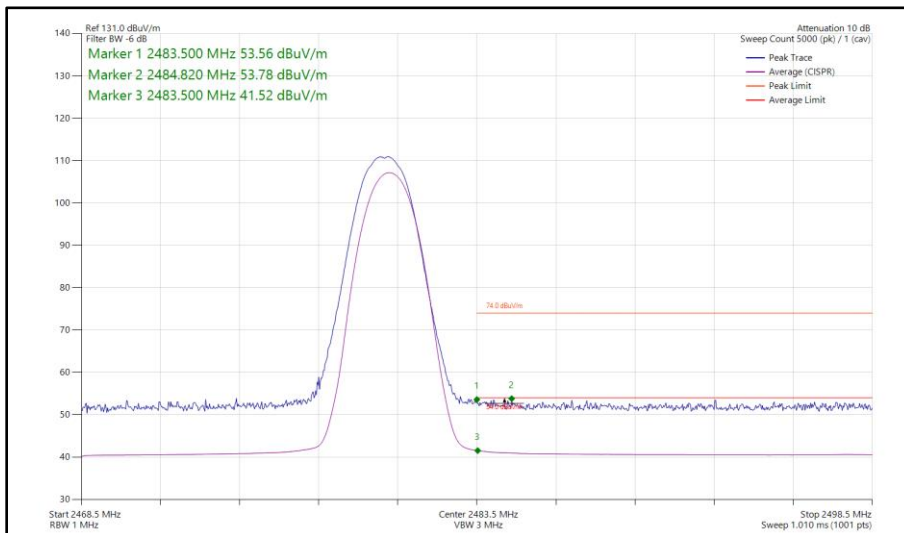
**Figure 2 - Bluetooth 2-DH5, SISO, Core 0 - 2402 MHz  
Band Edge Frequency 2390 MHz**



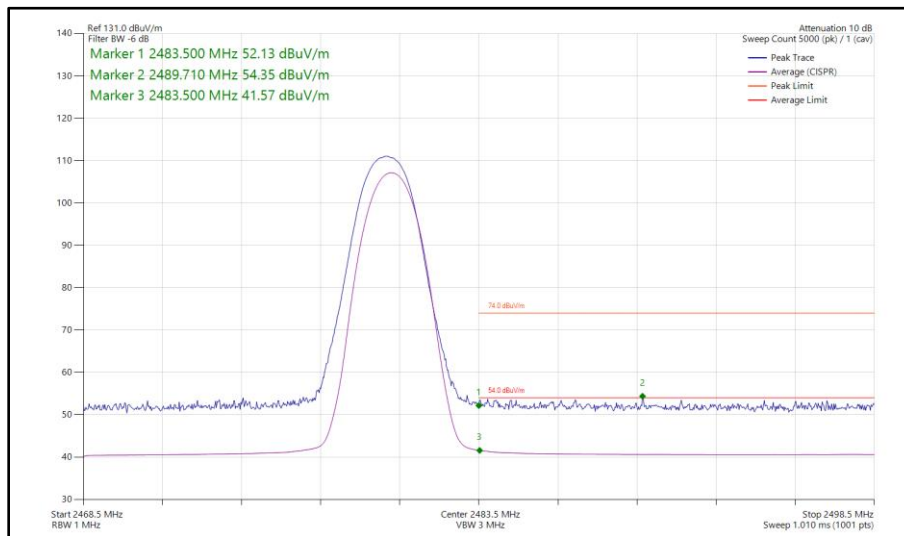
**Figure 3 - Bluetooth 3-DH5, SISO, Core 0 - 2402 MHz  
Band Edge Frequency 2390 MHz**



**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**



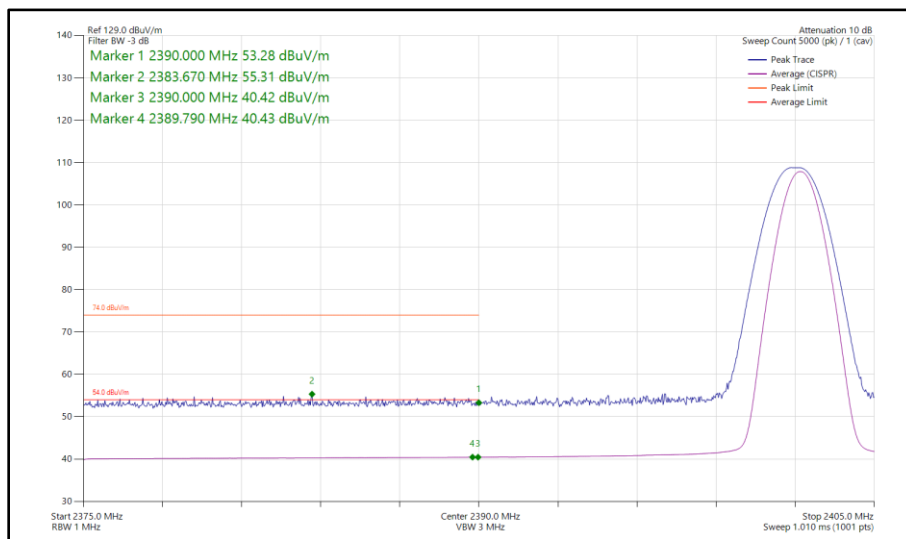
**Figure 6 - Bluetooth 3-DH5, SISO, Core 0 - 2480 MHz  
Band Edge Frequency 2483.5 MHz**



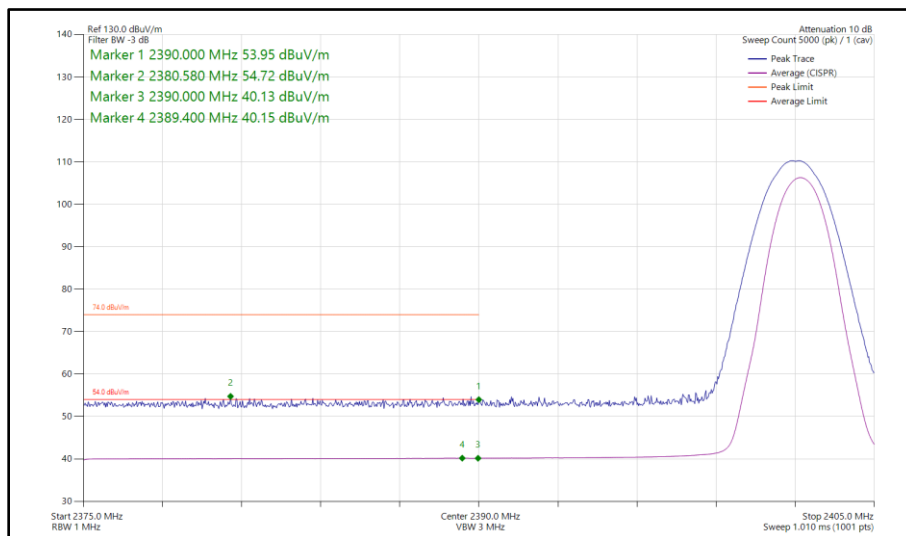
iPA - Core 1 (SISO)

Mode	Packet Type	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	DH5	2402	2390	55.31	40.43
Static	2-DH5	2402	2390	54.72	40.15
Static	3-DH5	2402	2390	55.03	40.14
Static	DH5	2480	2483.5	54.64	42.41
Static	2-DH5	2480	2483.5	54.21	41.76
Static	3-DH5	2480	2483.5	55.19	41.84

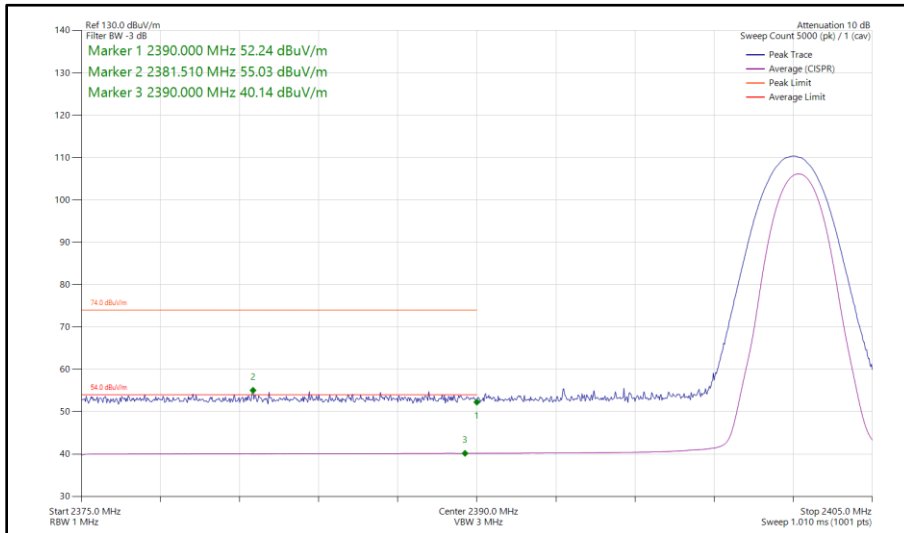
**Table 8 - SISO Restricted Band Edge Results**



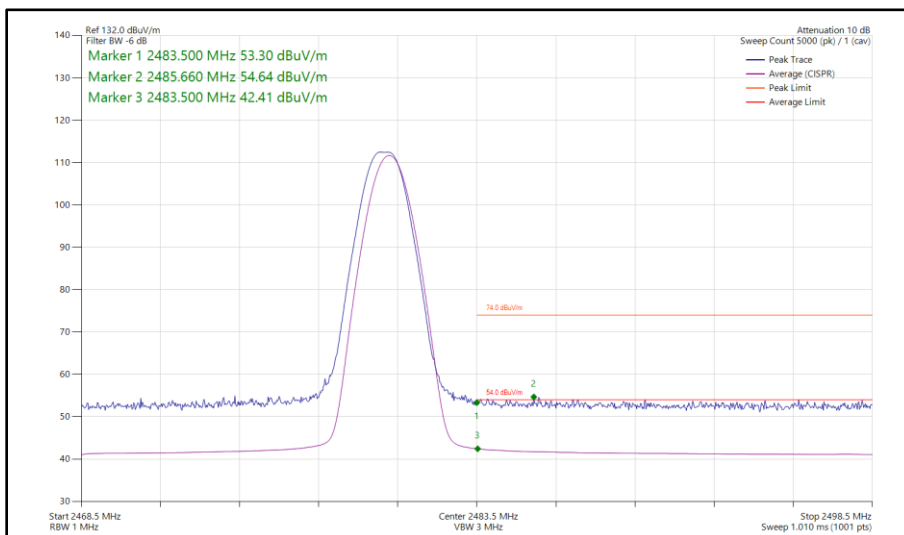
**Figure 7 - Bluetooth DH5, SISO, Core 1 - 2402 MHz Band Edge Frequency 2390 MHz**



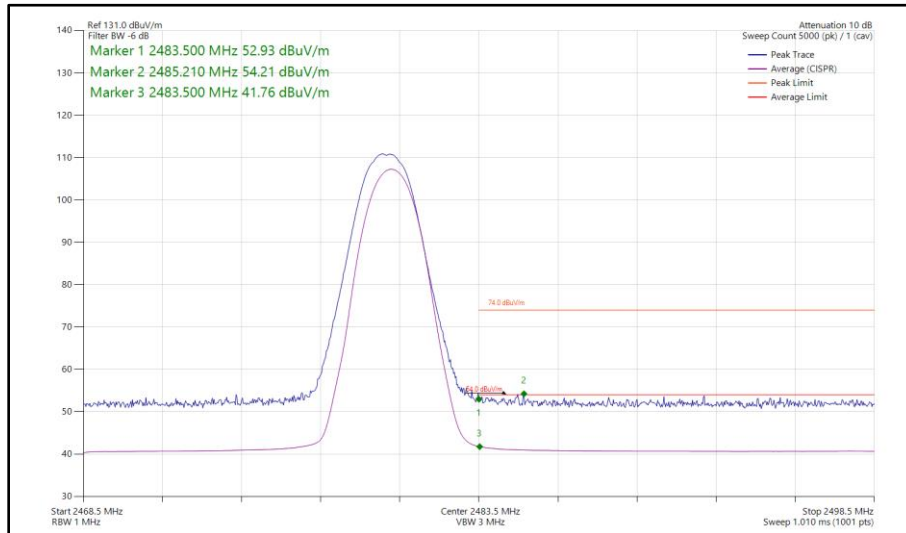
**Figure 8 - Bluetooth 2-DH5, SISO, Core 1 - 2402 MHz Band Edge Frequency 2390 MHz**



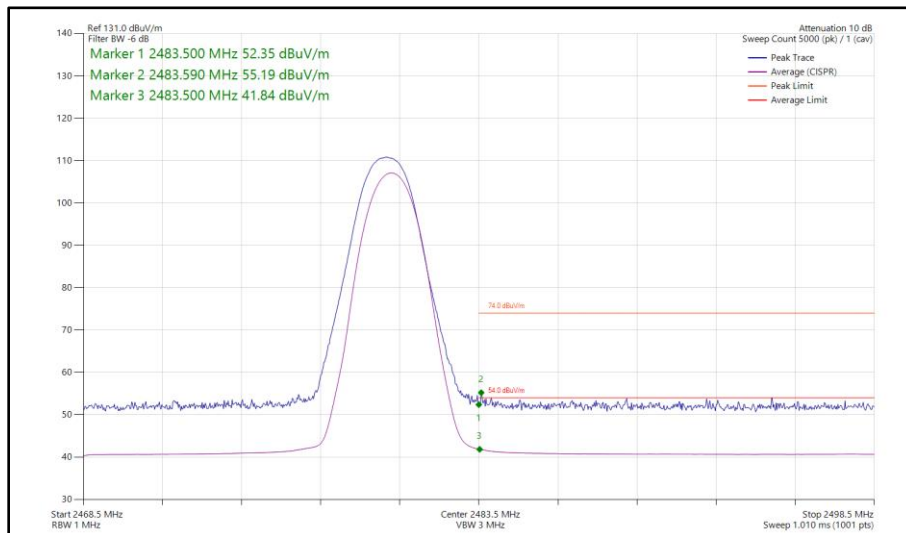
**Figure 9 - Bluetooth 3-DH5, SISO, Core 1 - 2402 MHz  
Band Edge Frequency 2390 MHz**



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



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



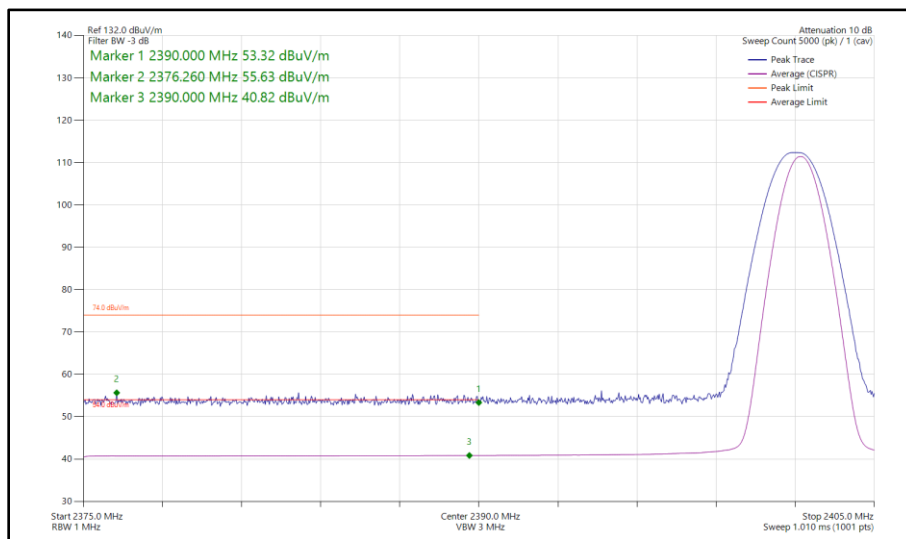
**Figure 12 - Bluetooth 3-DH5, SISO, Core 1 - 2480 MHz  
Band Edge Frequency 2483.5 MHz**



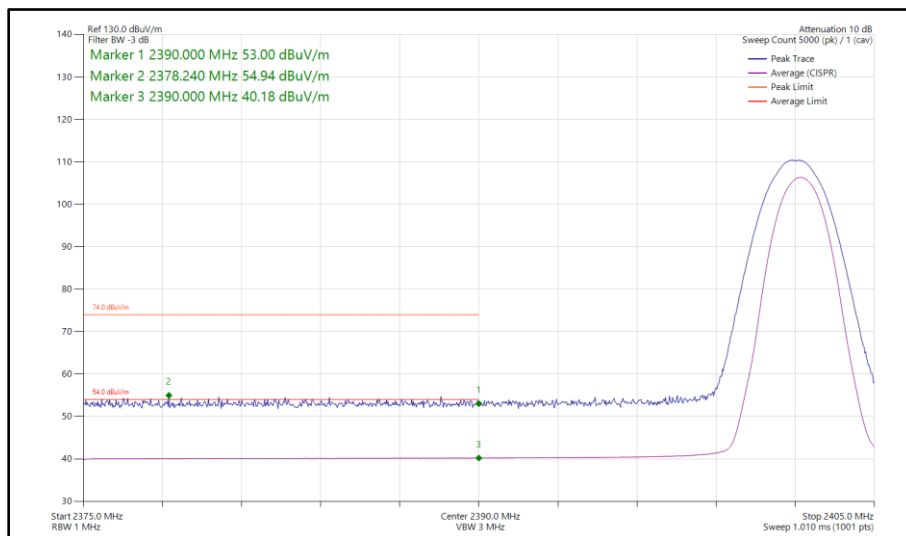
iPA - Core 2 (SISO)

Mode	Packet Type	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	DH5	2402	2390	55.63	40.82
Static	2-DH5	2402	2390	54.94	40.18
Static	3-DH5	2402	2390	55.57	40.85
Static	DH5	2480	2483.5	55.28	42.20
Static	2-DH5	2480	2483.5	53.82	41.71
Static	3-DH5	2480	2483.5	55.24	42.34

**Table 9 - SISO Restricted Band Edge Results**

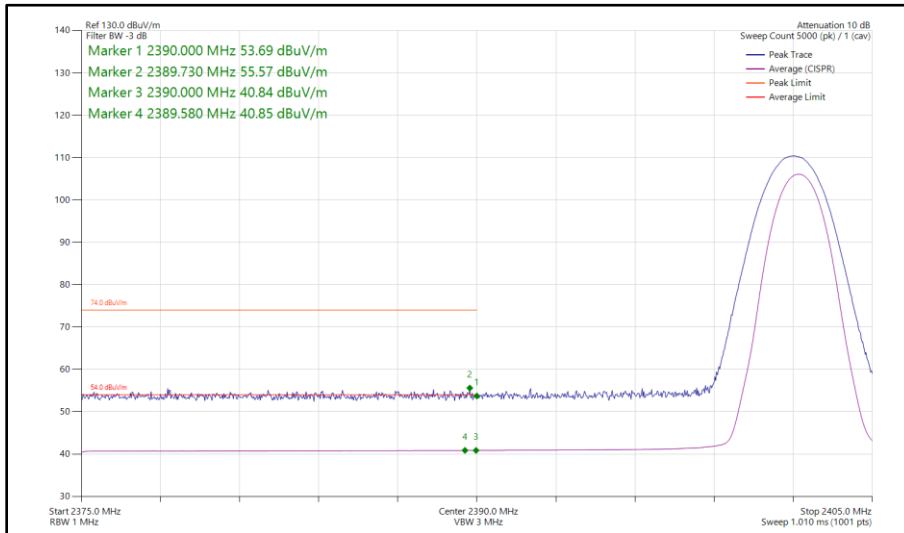


**Figure 13 - Bluetooth DH5, SISO, Core 2 - 2402 MHz  
 Band Edge Frequency 2390 MHz**

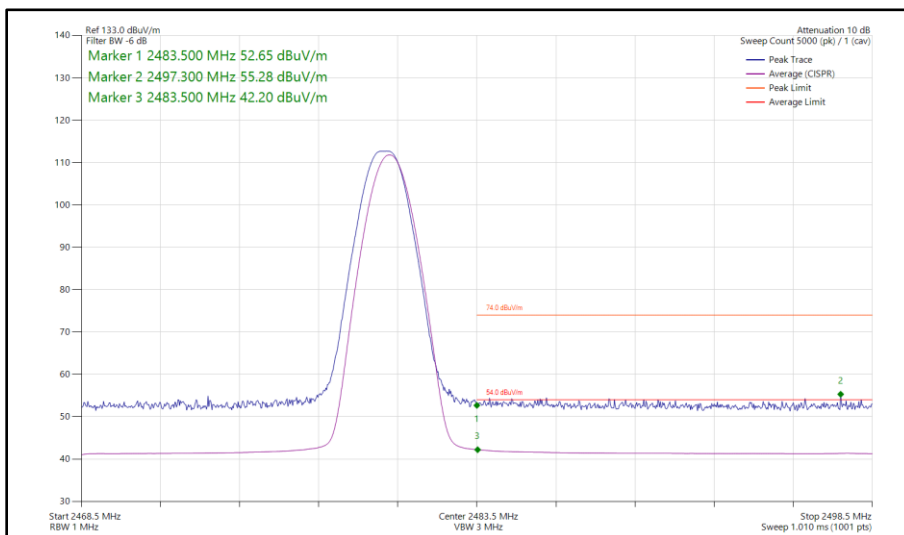


**Figure 14 - Bluetooth 2-DH5, SISO, Core 2 - 2402 MHz  
 Band Edge Frequency 2390 MHz**

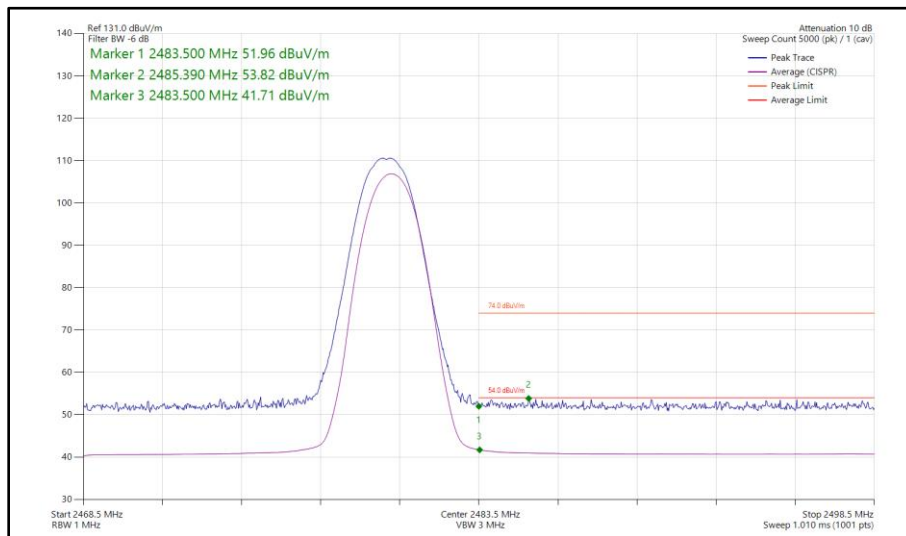




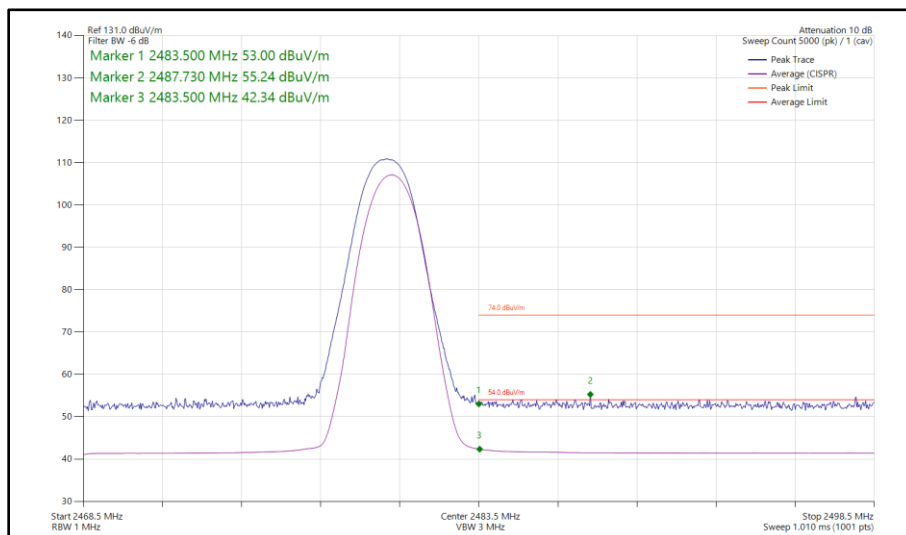
**Figure 15 - Bluetooth 3-DH5, SISO, Core 2 - 2402 MHz  
Band Edge Frequency 2390 MHz**



**Figure 16 - Bluetooth DH5, SISO, Core 2 - 2480 MHz  
Band Edge Frequency 2483.5 MHz**



**Figure 17 - Bluetooth 2-DH5, SISO, Core 2 - 2480 MHz  
Band Edge Frequency 2483.5 MHz**



**Figure 18 - Bluetooth 3-DH5, SISO, Core 2 - 2480 MHz  
Band Edge Frequency 2483.5 MHz**



iPA - Core 0 - Core 1 (MIMO)

Mode	Packet Type	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	DH5	2402	2390	55.54	41.11
Static	2-DH5	2402	2390	55.30	40.33
Static	3-DH5	2402	2390	54.95	40.36
Static	DH5	2480	2483.5	55.24	43.31
Static	2-DH5	2480	2483.5	55.71	42.80
Static	3-DH5	2480	2483.5	54.44	42.75

Table 10 - MIMO Restricted Band Edge Results

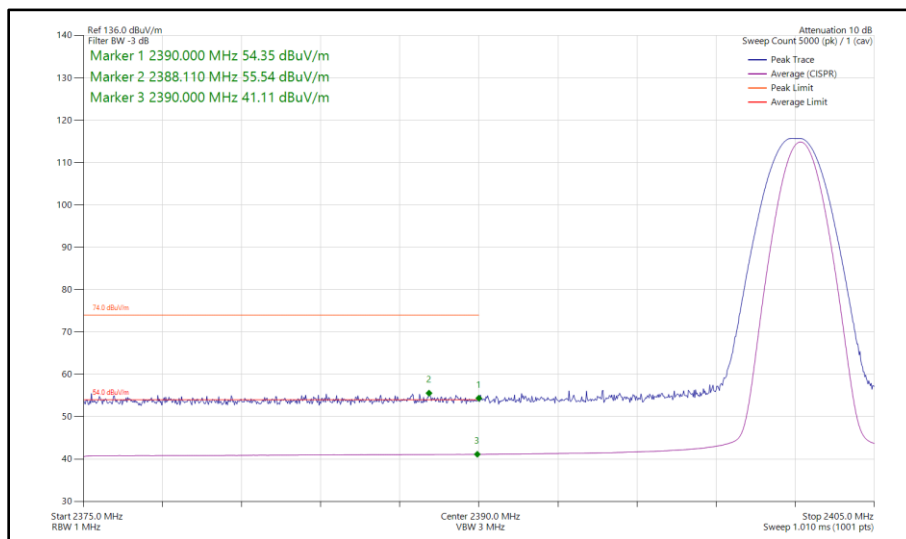


Figure 19 - Bluetooth DH5, MIMO, Core 0 - Core 1 - 2402 MHz Band Edge Frequency 2390 MHz

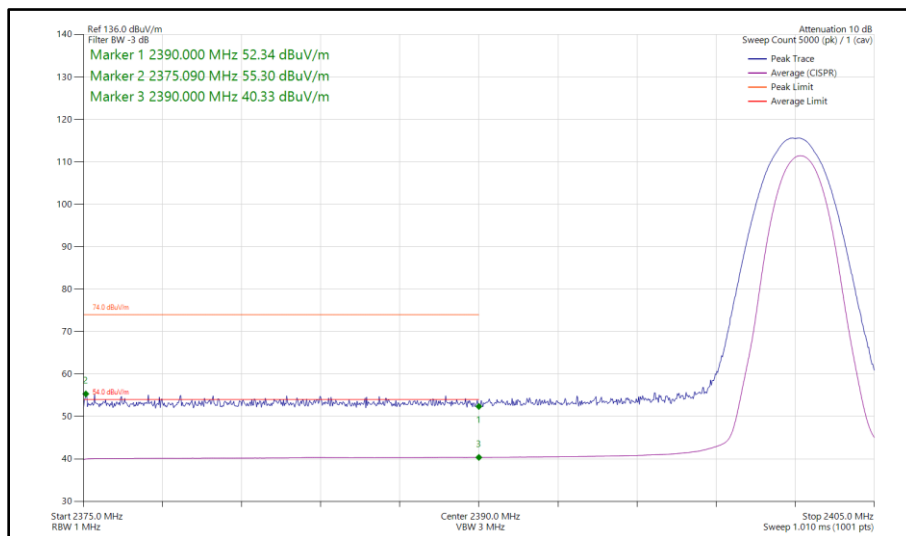
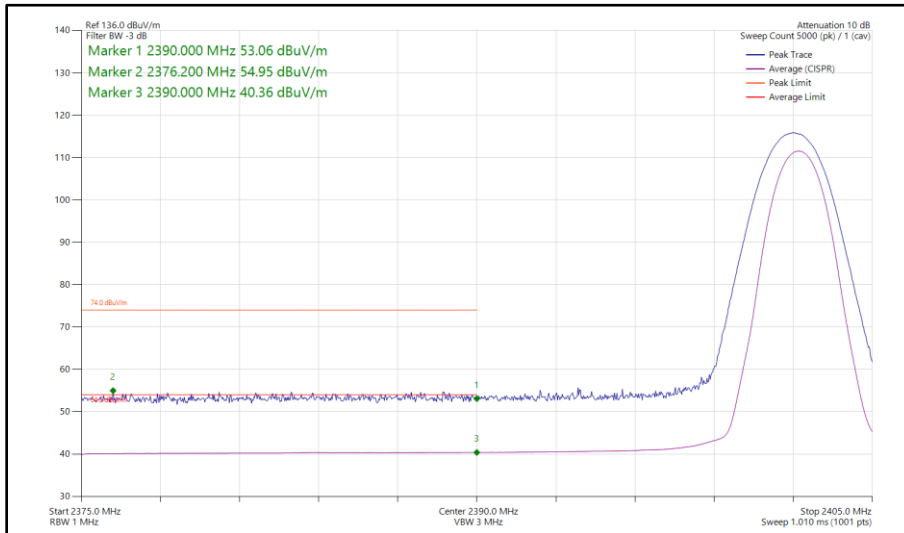
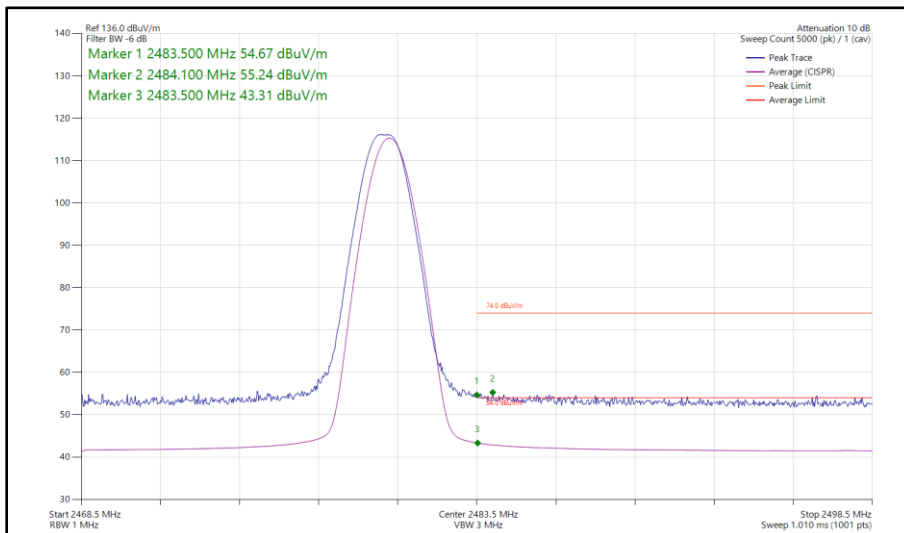


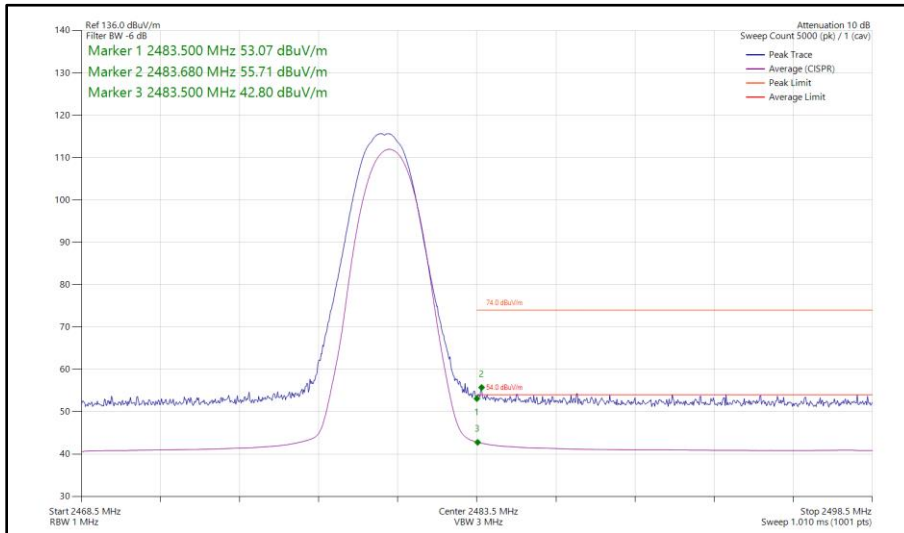
Figure 20 - Bluetooth 2-DH5, MIMO, Core 0 - Core 1 - 2402 MHz Band Edge Frequency 2390 MHz



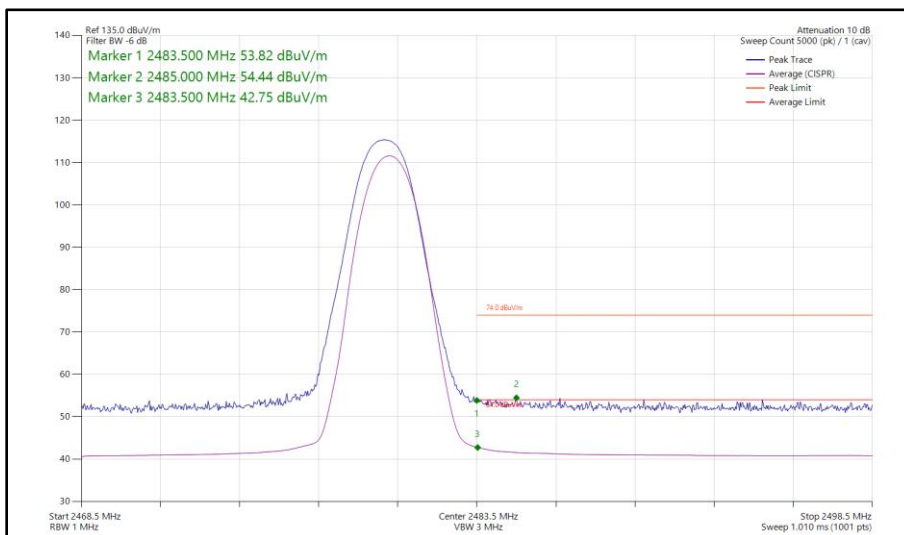
**Figure 21 - Bluetooth 3-DH5, MIMO, Core 0 - Core 1 - 2402 MHz  
Band Edge Frequency 2390 MHz**



**Figure 22 - Bluetooth DH5, MIMO, Core 0 - Core 1 - 2480 MHz  
Band Edge Frequency 2483.5 MHz**



**Figure 23 - Bluetooth 2-DH5, MIMO, Core 0 - Core 1 - 2480 MHz  
Band Edge Frequency 2483.5 MHz**



**Figure 24 - Bluetooth 3-DH5, MIMO, Core 0 - Core 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	56.47	41.53
Static	3-DH5	2402	2390	56.02	41.34
Static	2-DH5	2480	2483.5	57.73	44.96
Static	3-DH5	2480	2483.5	59.30	46.17

Table 11 - SISO Restricted Band Edge Results

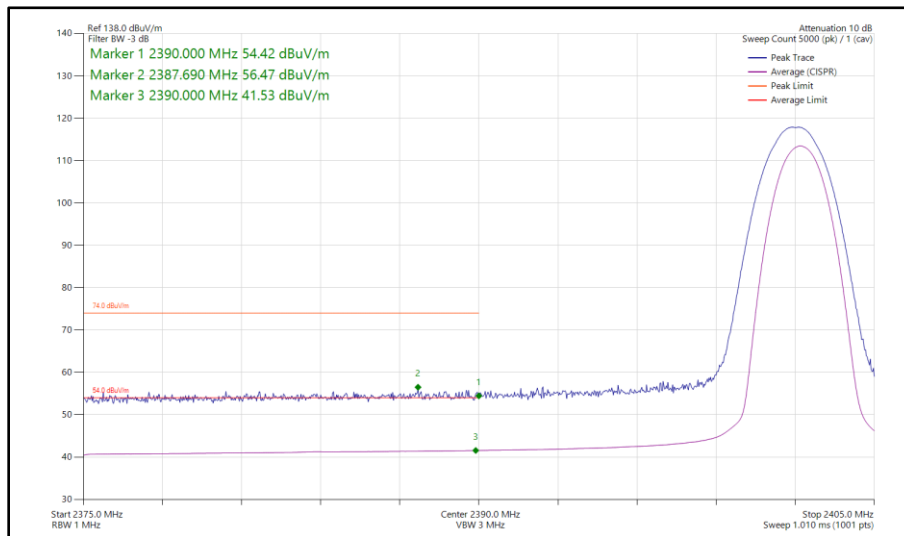


Figure 25 - Bluetooth 2-DH5, SISO, Core 0 - 2402 MHz  
 Band Edge Frequency 2390 MHz

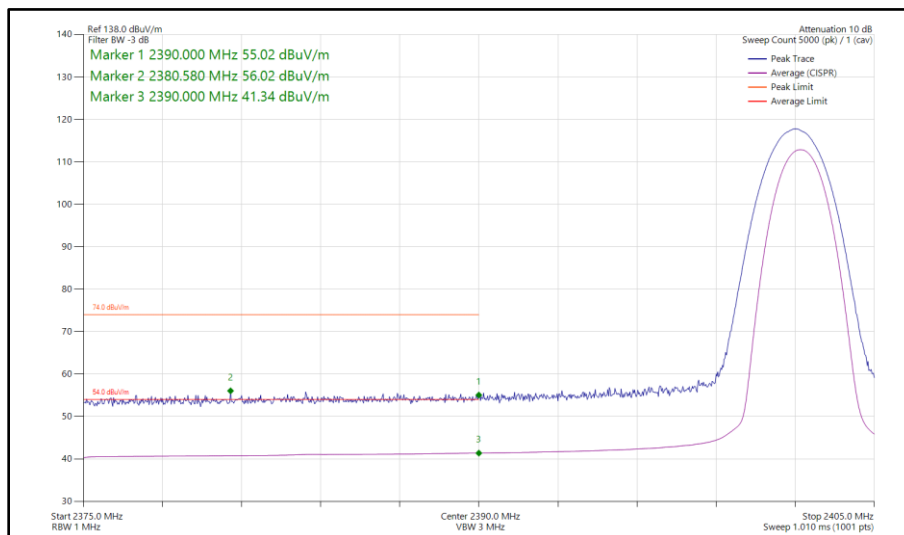
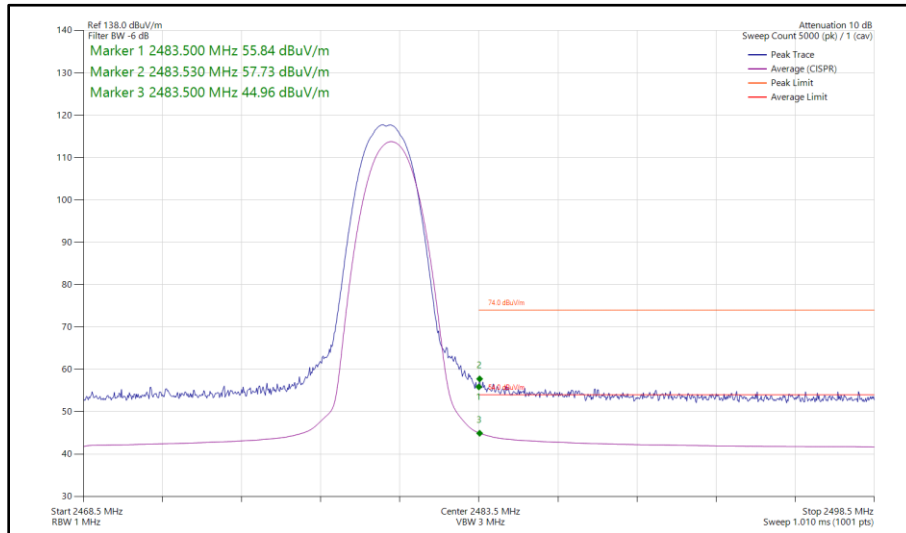
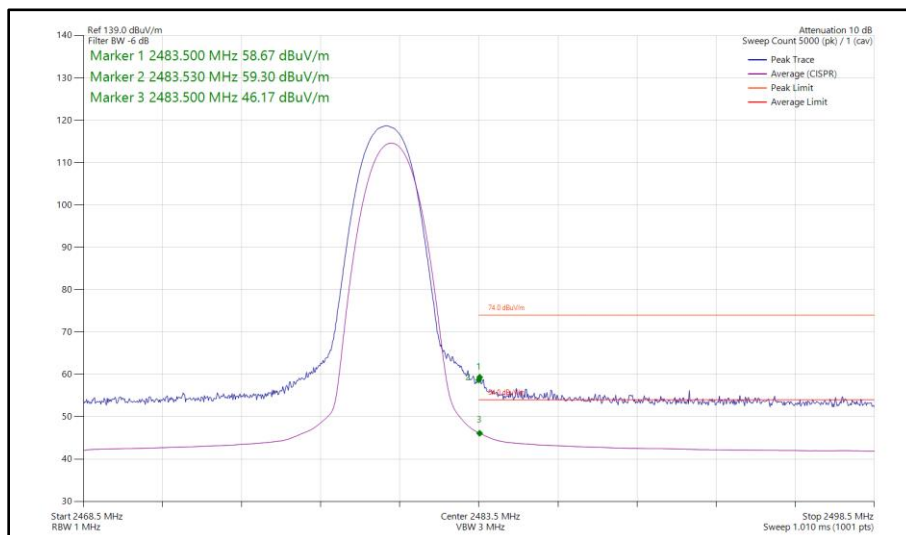


Figure 26 - Bluetooth 3-DH5, SISO, Core 0 - 2402 MHz  
 Band Edge Frequency 2390 MHz



**Figure 27 - Bluetooth 2-DH5, SISO, Core 0 - 2480 MHz  
Band Edge Frequency 2483.5 MHz**



**Figure 28 - Bluetooth 3-DH5, SISO, Core 0 - 2480 MHz  
Band Edge Frequency 2483.5 MHz**



ePA - Core 1 (SISO)

Mode	Packet Type	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	2-DH5	2402	2390	55.65	41.14
Static	3-DH5	2402	2390	55.36	41.06
Static	2-DH5	2480	2483.5	57.55	45.35
Static	3-DH5	2480	2483.5	58.96	46.05

Table 12 - SISO Restricted Band Edge Results

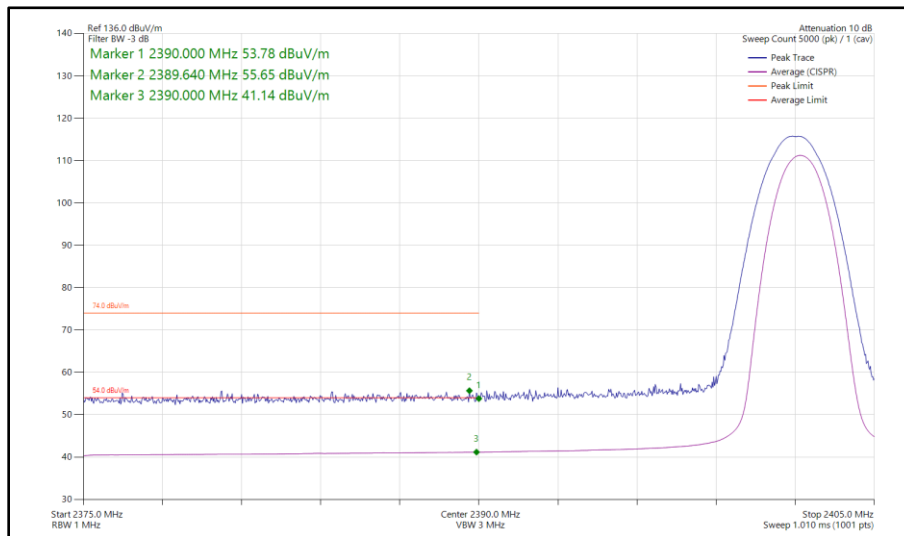


Figure 29 - Bluetooth 2-DH5, SISO, Core 1 - 2402 MHz  
 Band Edge Frequency 2390 MHz

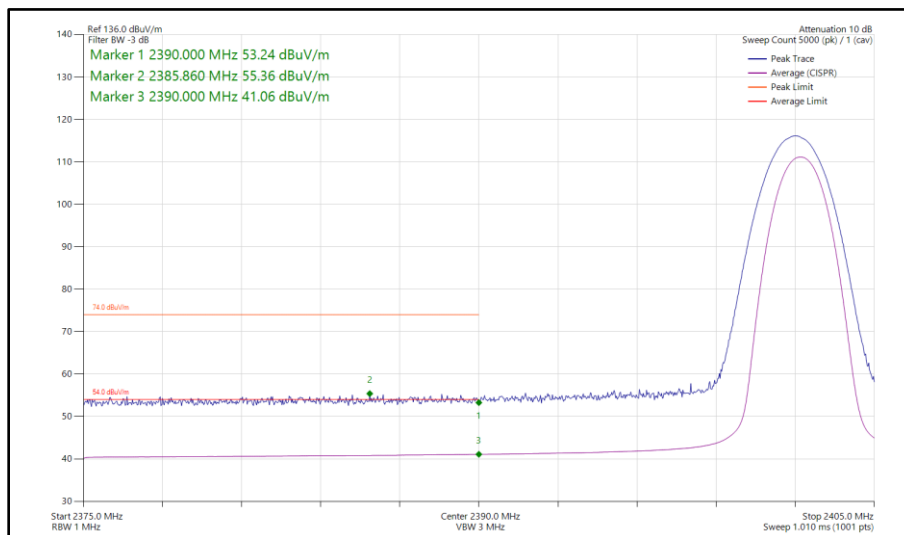
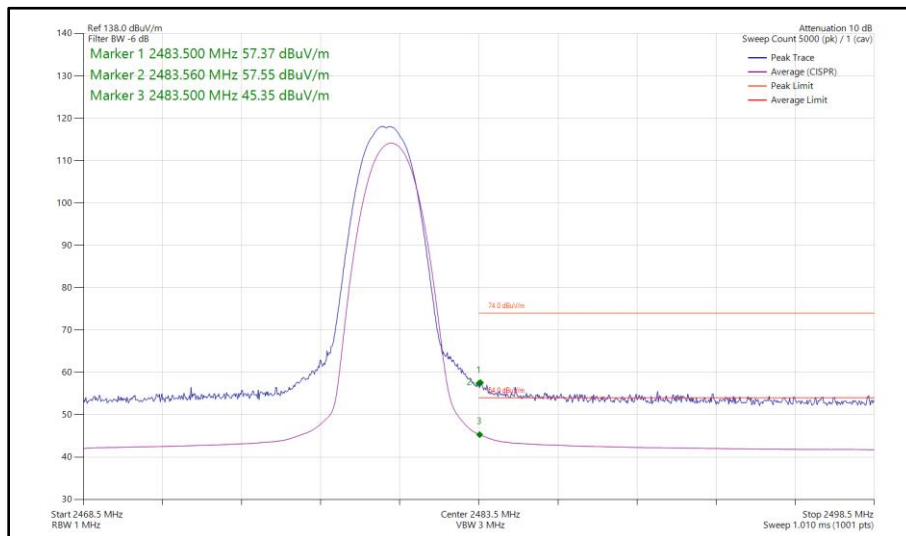
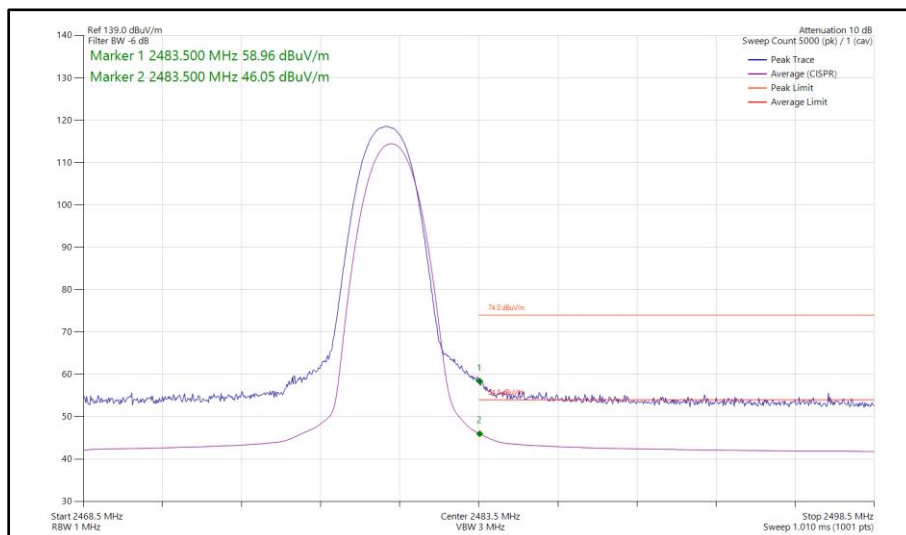


Figure 30 - Bluetooth 3-DH5, SISO, Core 1 - 2402 MHz  
 Band Edge Frequency 2390 MHz





**Figure 31 - Bluetooth 2-DH5, SISO, Core 1 - 2480 MHz  
Band Edge Frequency 2483.5 MHz**



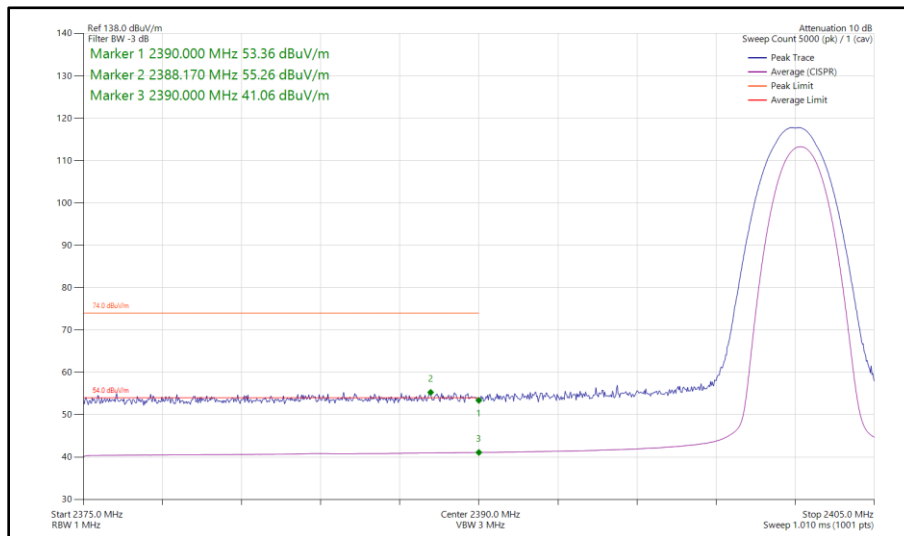
**Figure 32 - Bluetooth 3-DH5, SISO, Core 1 - 2480 MHz  
Band Edge Frequency 2483.5 MHz**



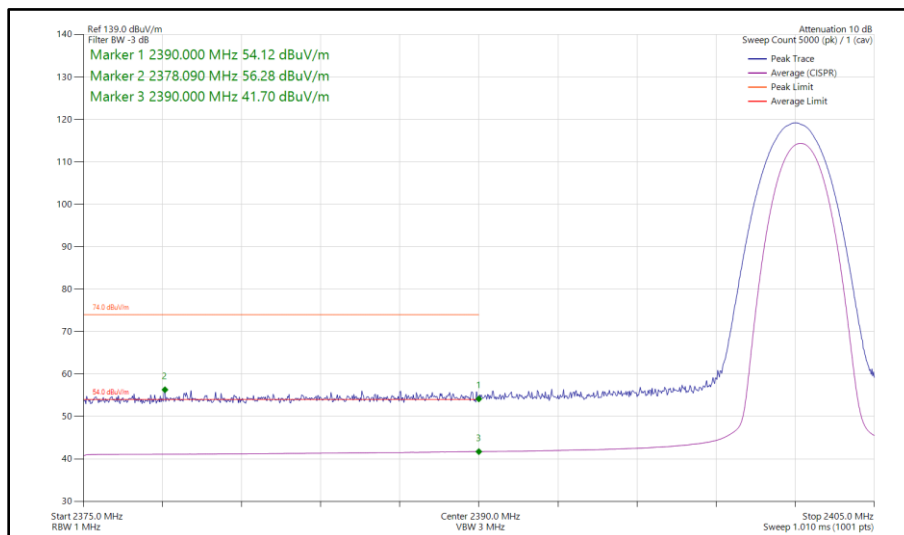
ePA - Core 0 - Core 1 (MIMO)

Mode	Packet Type	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	2-DH5	2402	2390	55.26	41.06
Static	3-DH5	2402	2390	56.28	41.70
Static	2-DH5	2480	2483.5	56.28	44.46
Static	3-DH5	2480	2483.5	57.30	44.99

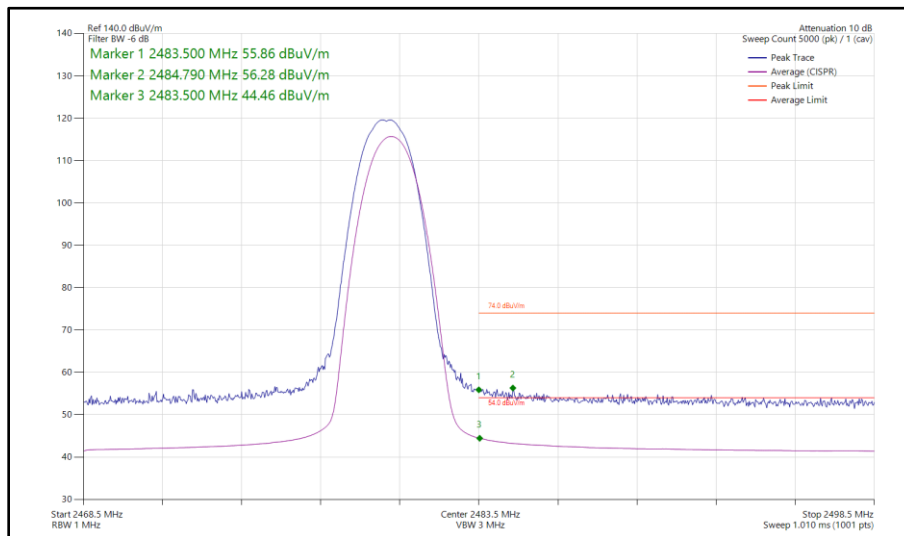
**Table 13 - MIMO Restricted Band Edge Results**



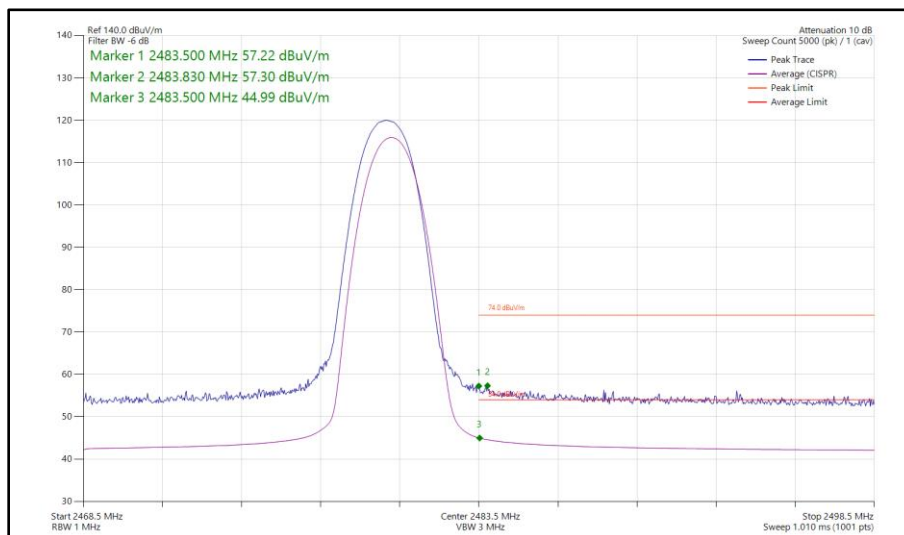
**Figure 33 - Bluetooth 2-DH5, MIMO, Core 0 - Core 1 - 2402 MHz  
 Band Edge Frequency 2390 MHz**



**Figure 34 - Bluetooth 3-DH5, MIMO, Core 0 - Core 1 - 2402 MHz  
 Band Edge Frequency 2390 MHz**



**Figure 35 - Bluetooth 2-DH5, MIMO, Core 0 - Core 1 - 2480 MHz  
 Band Edge Frequency 2483.5 MHz**



**Figure 36 - Bluetooth 3-DH5, MIMO, Core 0 - Core 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 14**



### 2.1.7 Test Location and Test Equipment Used

This test was carried out in RF Chamber 14 and RF Chamber 17.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Expiry Date
Emissions Software	TUV SUD	EmX V3.4.2	5125	-	Software
EMI Test Receiver	Rohde & Schwarz	ESW44	5912	12	07-Aug-2025
1500W (300V 12A) AC Power Supply	iTech	IT7324	5956	-	O/P Mon
5m Semi-Anechoic Chamber (Dual-Axis)	Albatross Projects	RF Chamber 14	5958	36	26-Apr-2025
Compact Antenna Mast	Maturo Gmbh	CAM4.0-P	5959	-	TU
Mast & Turntable Controller	Maturo Gmbh	FCU3.0	5960	-	TU
Tilt Antenna Mast	Maturo Gmbh	BAM4.5-P	5961	-	TU
Turntable	Maturo Gmbh	TT1.5SI	5962	-	TU
Cable (SMA to SMA 1m)	Junkosha	MWX221-01000AMSAMS/A	6007	12	20-May-2025
Horn Antenna (1-10 GHz)	Schwarzbeck	BBHA9120B	6141	12	05-May-2025
Horn Antenna (1-10 GHz)	Schwarzbeck	BBHA9120B	6142	12	05-May-2025
Digital Multimeter	Fluke	115	6145	12	06-Jun-2025
Digital Multimeter	Fluke	115	6146	12	06-Jun-2025
Humidity & Temperature meter	R.S Components	1364	6148	12	29-Jul-2025
Humidity & Temperature meter	R.S Components	1364	6149	12	12-Aug-2025
SAC Switch Unit	TUV SUD	TUV_SSU_001	6190	12	22-Dec-2024
EMI Test Receiver	Rohde & Schwarz	ESW44	6294	12	06-Jan-2025
AC Power Supply	iTech	IT7324	6657	-	O/P Mon
3m Semi-Anechoic Chamber	Albatross Projects	RF Chamber 17	6658	36	28-Jan-2026
Mast and Turntable Controller	Maturo Gmbh	FCU3.0	6659	-	TU
Tilt Antenna Mast	Maturo Gmbh	BAM4.5-P	6660	-	TU
Turntable	Maturo Gmbh	TT1.5SI	6661	-	TU
1m Cable	Junkosha	MWX241-01000AMSAMS/B	6741	12	01-Feb-2025
8m Cable	Junkosha	MWX221-08000AMSAMS/B	6748	12	01-Feb-2025
8M SMA Cable	Junkosha	MWX221-08000AMSAMS/B	6834	12	14-Aug-2025

**Table 15**

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)

### **2.2.2 Equipment Under Test and Modification State**

A3401, S/N: HHJTCJ96L9 - Modification State 0

### **2.2.3 Date of Test**

07-October-2024 to 08-October-2024

### **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	21.5 - 22.4°C
Relative Humidity	56.8 - 57.5 %



**2.2.6 Test Results**

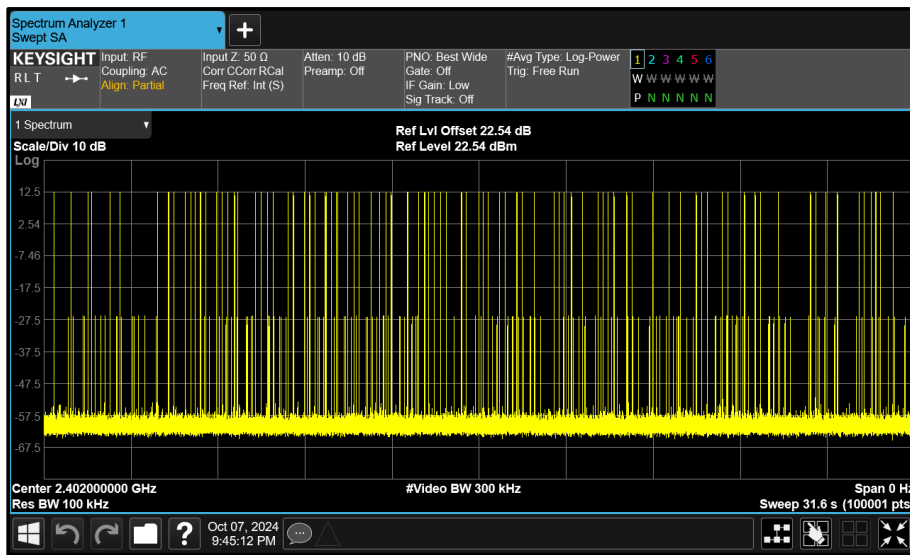
2.4 GHz Bluetooth BDR/EDR

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1)(iii)	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):	B (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	2.892	99	286.4	400.0

**Table 16 - Time of Occupancy Results**



**Figure 37 - 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)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	76.8
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (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	2.896	106	307.0	400.0

Table 17 - Time of Occupancy Results



Figure 38 -  $\pi/4$  DQPSK - 2402 MHz Accumulated Transmit Time

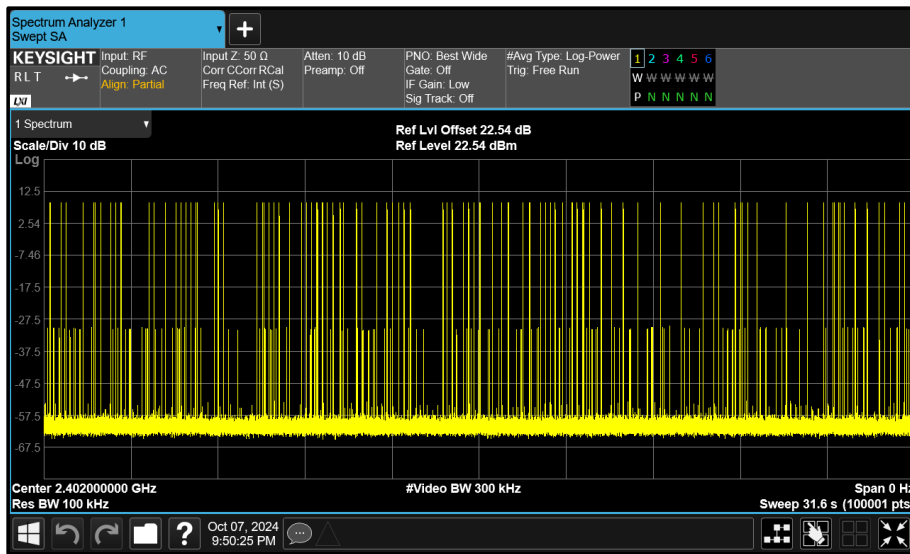


Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1)(iii)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA 8-DPSK (3-DH5)	Duty Cycle (%):	76.9
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (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	2.900	103	298.7	400.0

**Table 18 - Time of Occupancy Results**



**Figure 39 - 8-DPSK - 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)	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):	C (Core 2)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	Time of Occupancy			Limit (ms)
	Dwell Time (ms)	Number of Transmissions	Time of Occupancy (ms)	
2402	2.896	113	327.3	400.0

**Table 19 - Time of Occupancy Results**



**Figure 40 - 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)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

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

Test Frequency (MHz)	Time of Occupancy			Limit (ms)
	Dwell Time (ms)	Number of Transmissions	Time of Occupancy (ms)	
2402	2.899	110	318.9	400.0

Table 20 - Time of Occupancy Results

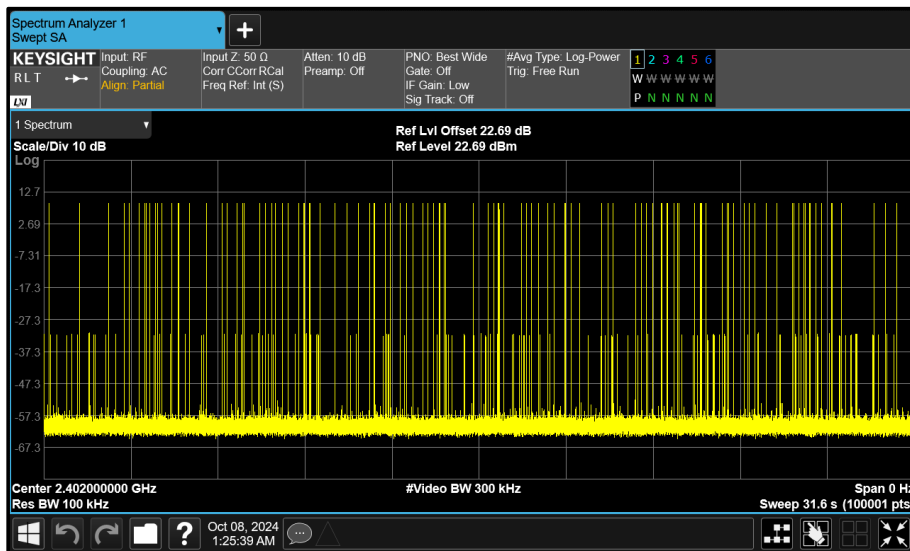


Figure 41 -  $\pi/4$  DQPSK - 2402 MHz Accumulated Transmit Time

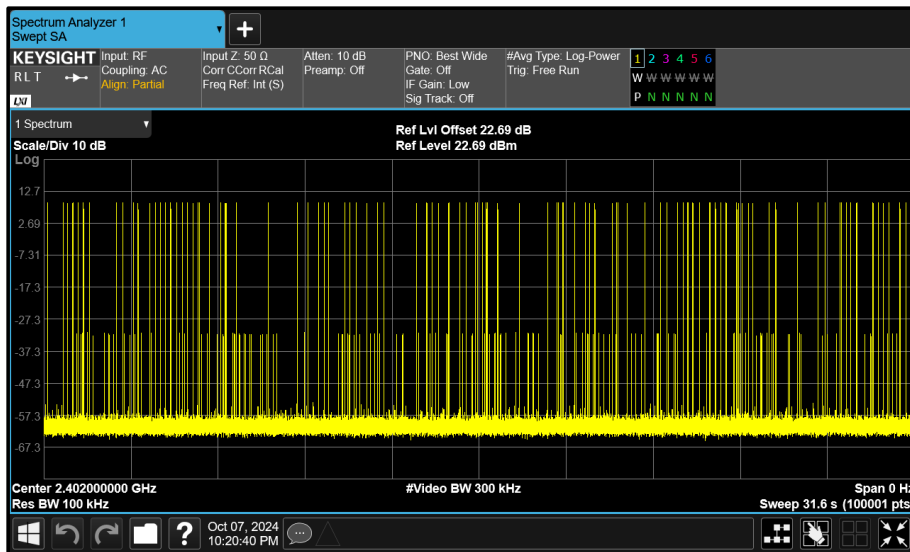


Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1)(iii)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA 8-DPSK (3-DH5)	Duty Cycle (%):	77.1
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	C (Core 2)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	Time of Occupancy			Limit (ms)
	Dwell Time (ms)	Number of Transmissions	Time of Occupancy (ms)	
2402	2.899	110	318.9	400.0

**Table 21 - Time of Occupancy Results**



**Figure 42 - 8-DPSK - 2402 MHz Accumulated Transmit Time**

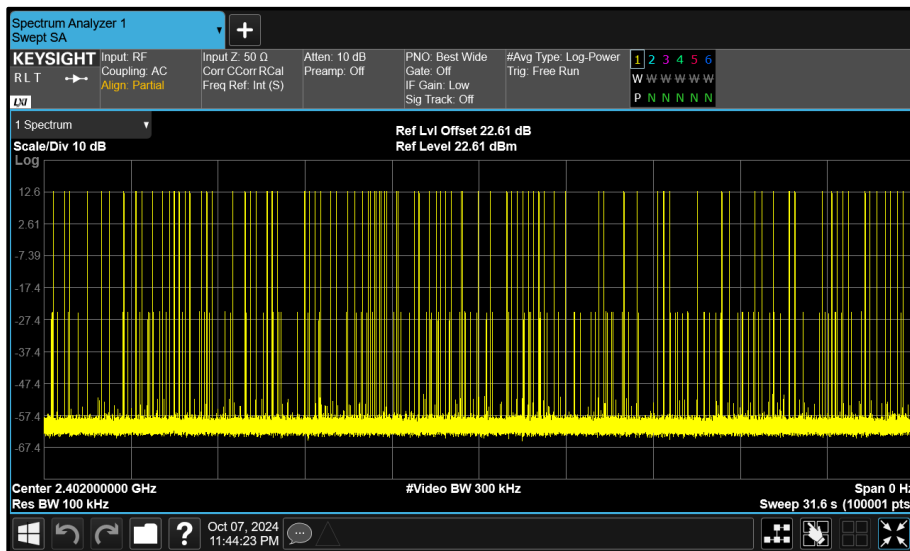


Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1)(iii)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

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	2.893	98	283.5	400.0

**Table 22 - Time of Occupancy Results**



**Figure 43 - GFSK - 2402 MHz Accumulated Transmit Time**

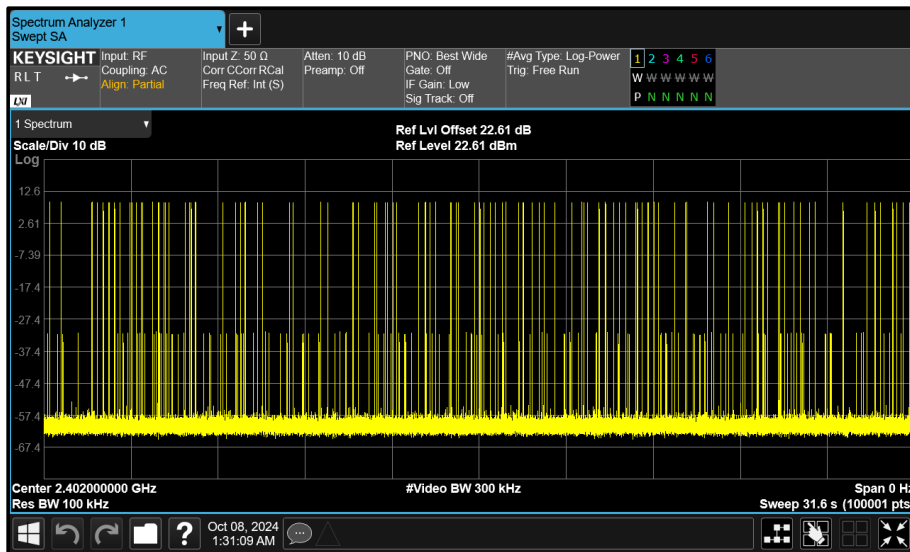


Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1)(iii)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	76.8
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	2.896	110	318.6	400.0

**Table 23 - Time of Occupancy Results**



**Figure 44 -  $\pi/4$  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)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA 8-DPSK (3-DH5)	Duty Cycle (%):	76.9
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	2.900	108	313.2	400.0

**Table 24 - Time of Occupancy Results**



**Figure 45 - 8-DPSK - 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)	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):	B (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	2.895	103	298.2	400.0

**Table 25 - Time of Occupancy Results**



**Figure 46 -  $\pi/4$  DQPSK - 2402 MHz Accumulated Transmit Time**

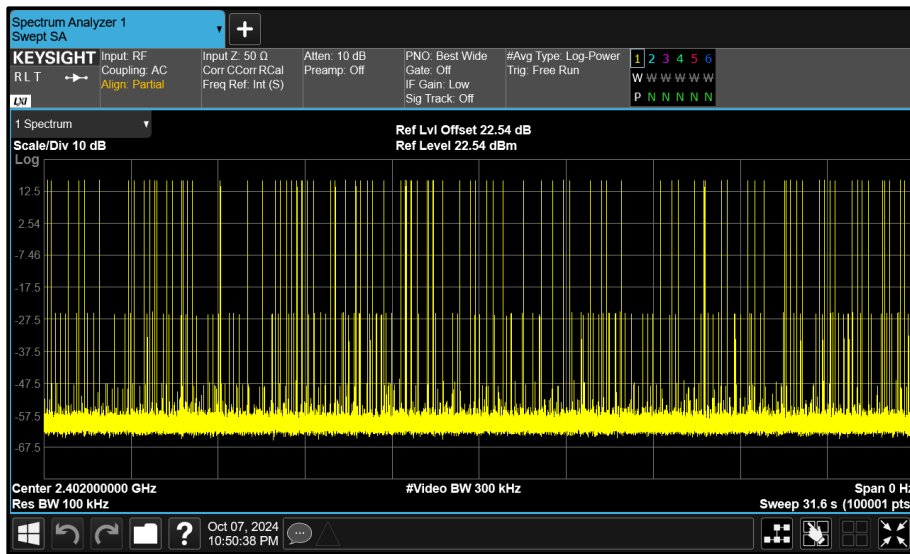


Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1)(iii)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA 8-DPSK (3-DH5)	Duty Cycle (%):	76.9
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	B (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	2.901	96	278.4	400.0

**Table 26 - Time of Occupancy Results**



**Figure 47 - 8-DPSK - 2402 MHz Accumulated Transmit Time**



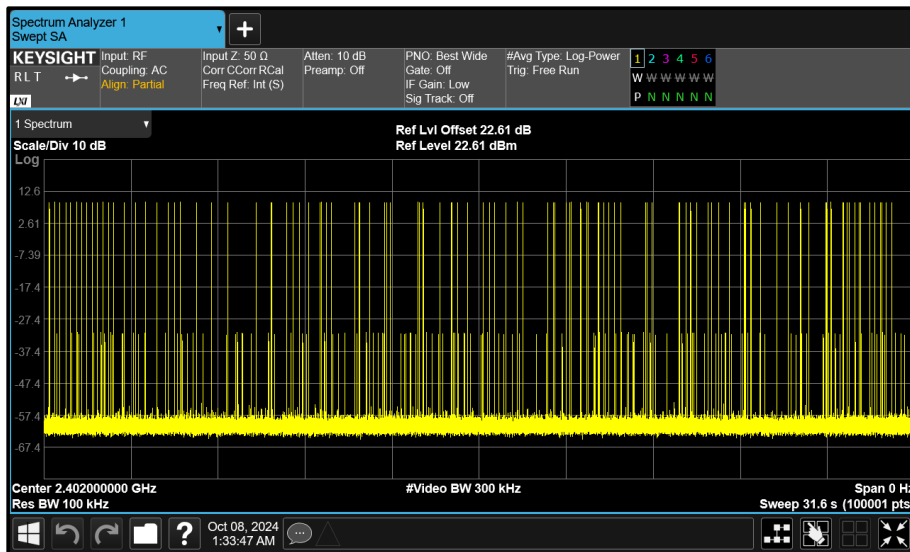


Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1)(iii)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	76.8
Antenna Configuration:	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	2.895	105	304.0	400.0

**Table 27 - Time of Occupancy Results**



**Figure 48 -  $\pi/4$  DQPSK - 2402 MHz Accumulated Transmit Time**

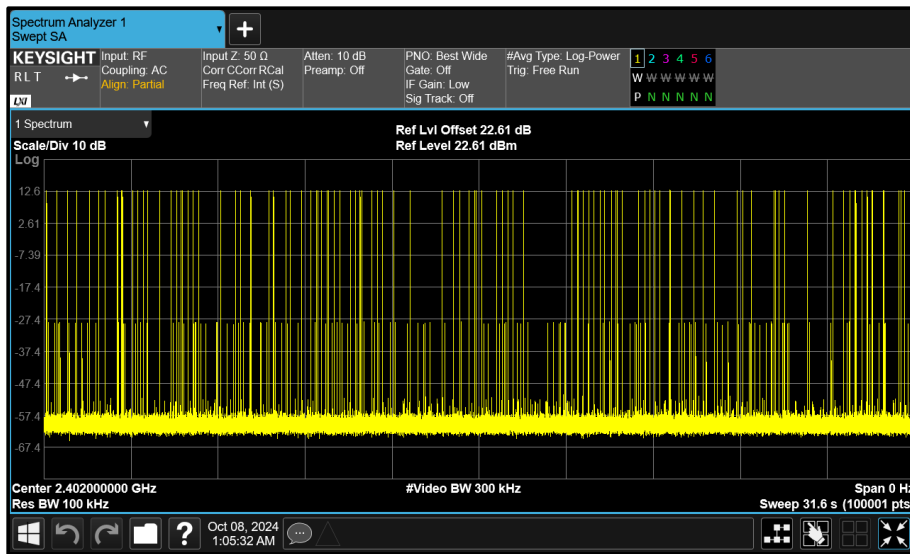


Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247 (a)(1)(iii)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA 8-DPSK (3-DH5)	Duty Cycle (%):	76.9
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	2.898	105	304.3	400.0

**Table 28 - Time of Occupancy Results**



**Figure 49 - 8-DPSK - 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.



### 2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Chamber 18.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Expiry Date
Hygrometer	Rotronic	I-1000	3068	12	07-Nov-2024
Digital Multimeter	Fluke	115	6145	12	06-Jun-2025
MXA Signal Analyser	Keysight Technologies	N9020B	6419	24	28-Feb-2025
Signal Conditioning Unit	TUV SUD	SPECTRUM_SCU001	6517	12	22-Feb-2025
SCU Cable Assembly	TUV SUD	SPECTRUM_SCU_CA	6526	12	22-Feb-2025
SCU Cable Assembly	TUV SUD	SPECTRUM_SCU_CA	6527	12	05-Mar-2025
SCU Cable Assembly	TUV SUD	SPECTRUM_SCU_CA	6528	12	22-Feb-2025
AC Programmable Power Supply	iTech	IT7324	6665	-	O/P Mon

**Table 29**

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)

### **2.3.2 Equipment Under Test and Modification State**

A3401, S/N: HHJTCJ96L9 - Modification State 0

### **2.3.3 Date of Test**

07-October-2024

### **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	21.5 °C
Relative Humidity	26.8 %



2.3.6 Test Results

2.4 GHz Bluetooth BDR/EDR

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)	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 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	0.928	2441.011	2442.011	1.000	≥618.4

Table 30 - Carrier Frequency Separation Results

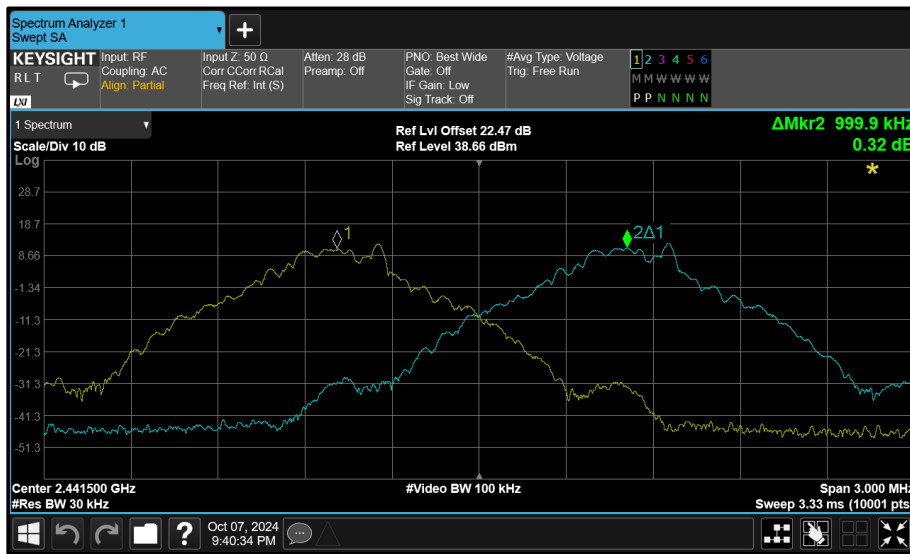


Figure 50 - GFSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)	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 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.354	2440.993	2441.994	1.001	$\geq 902.9$

Table 31 - Carrier Frequency Separation Results



Figure 51 -  $\pi/4$  DQPSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)	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 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.324	2441.002	2442.001	0.999	≥882.4

Table 32 - Carrier Frequency Separation Results



Figure 52 - 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)	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):	C (Core 2)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	0.906	2441.005	2442.013	1.008	≥603.8

Table 33 - Carrier Frequency Separation Results

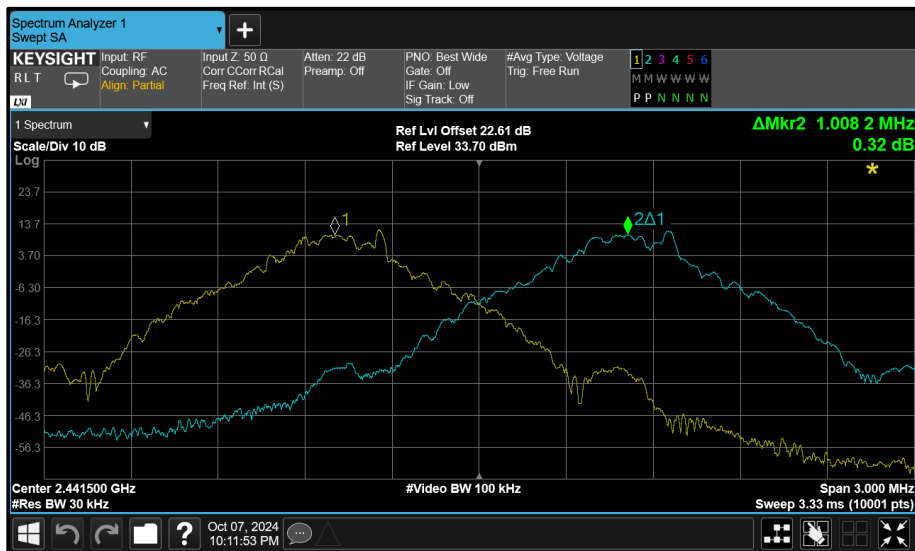


Figure 53 - GFSK - 2441 MHz (CH39)





Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)	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):	C (Core 2)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.350	2440.994	2441.994	1.000	$\geq 899.7$

Table 34 - Carrier Frequency Separation Results

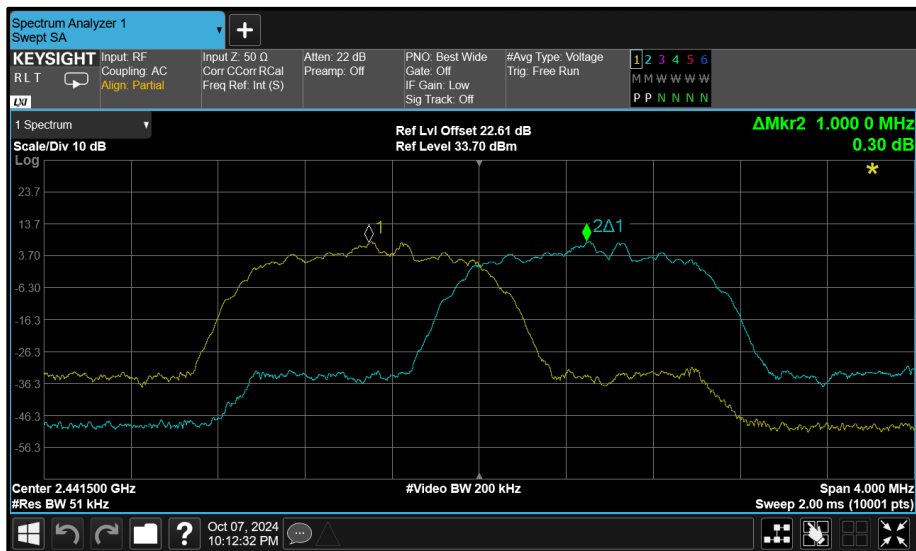


Figure 54 -  $\pi/4$  DQPSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)	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):	C (Core 2)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.322	2441.003	2442.002	0.999	≥881.1

Table 35 - Carrier Frequency Separation Results



Figure 55 - 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)	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):	A+B (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	0.934	2441.005	2442.010	1.005	≥622.6

Table 36 - Carrier Frequency Separation Results

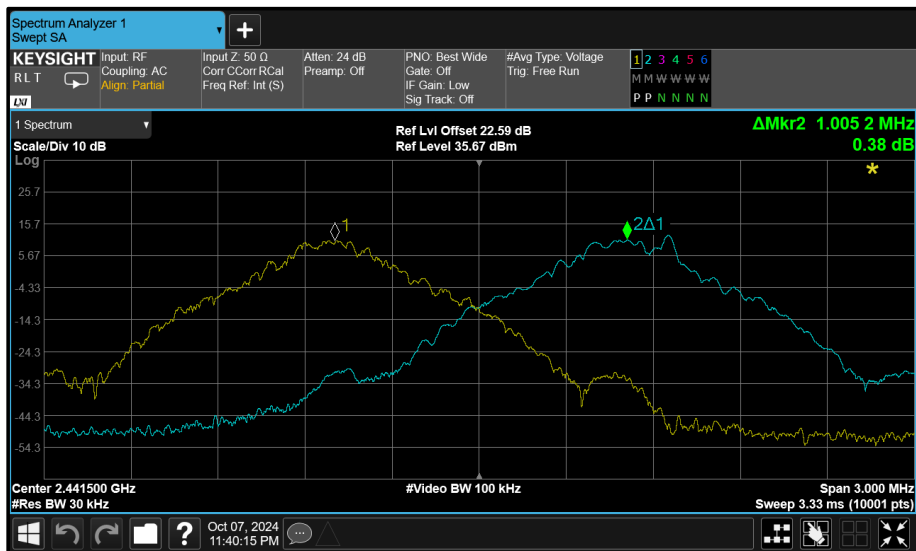


Figure 56 - GFSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)	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):	A+B (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	1.346	2440.995	2441.994	0.999	$\geq 897.3$

Table 37 - Carrier Frequency Separation Results

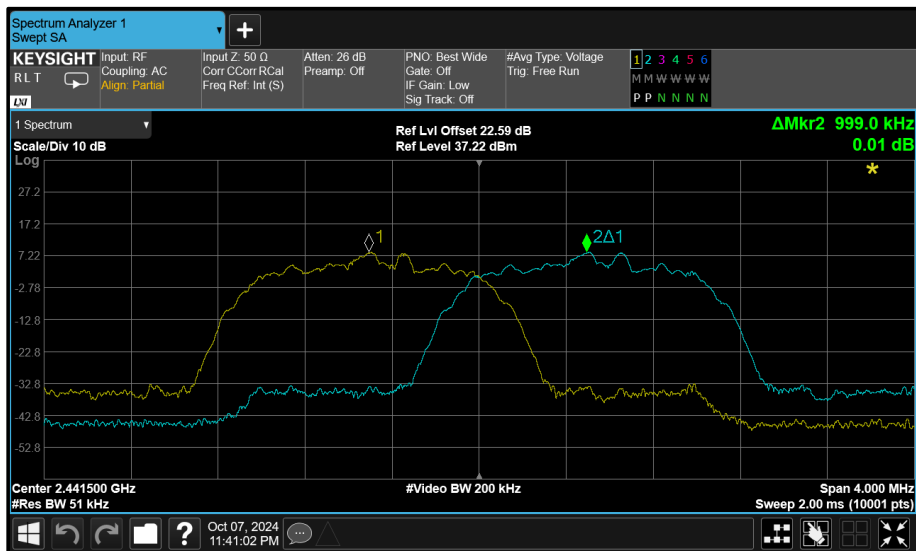


Figure 57 -  $\pi/4$  DQPSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)	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):	A+B (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	1.326	2441.002	2442.002	1.000	≥884.0

Table 38 - Carrier Frequency Separation Results

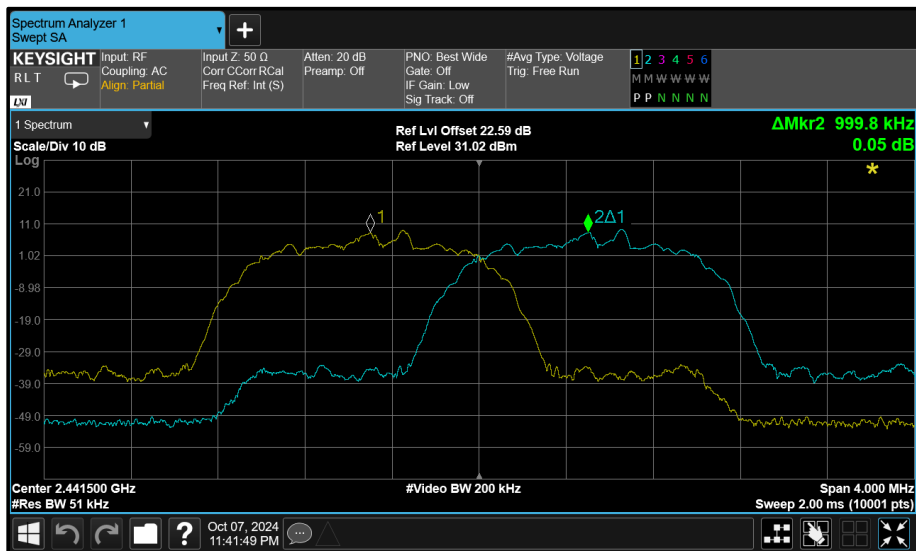


Figure 58 - 8-DPSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)	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 1)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.352	2440.994	2441.995	1.001	$\geq 901.6$

Table 39 - Carrier Frequency Separation Results

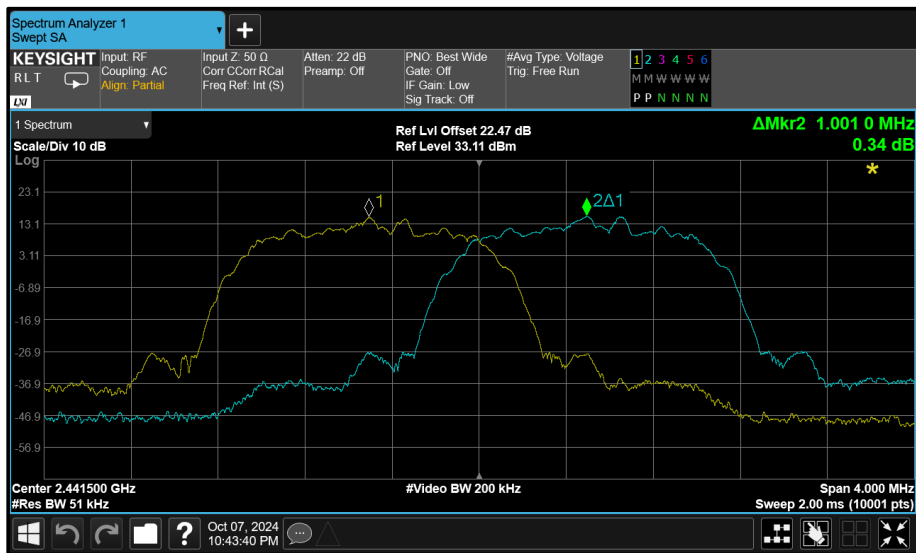


Figure 59 -  $\pi/4$  DQPSK - 2441 MHz (CH39)

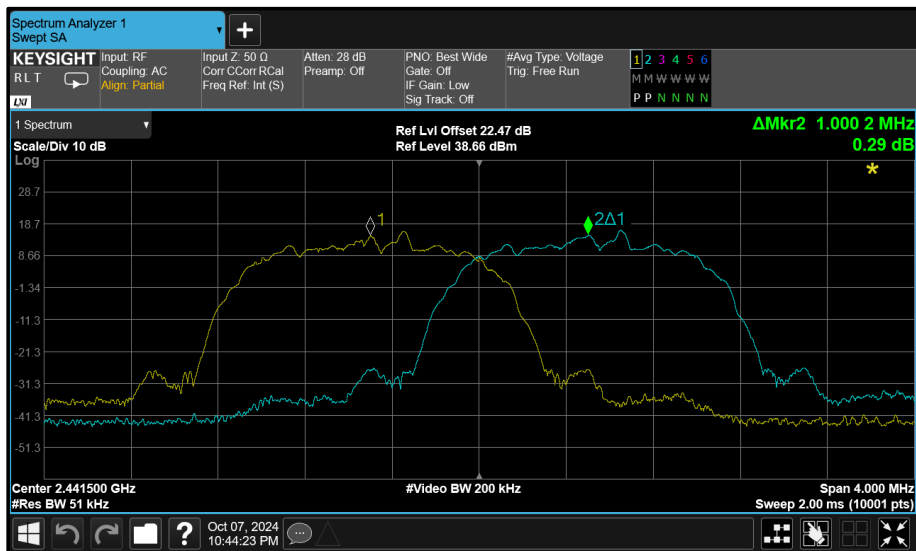


Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)	Test Method(s):	C63.10 7.8.2
Additional Reference(s):	-		

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

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.320	2441.002	2442.002	1.000	≥880.3

**Table 40 - Carrier Frequency Separation Results**



**Figure 60 - 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)	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):	A+B (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	1.351	2440.994	2441.994	1.000	$\geq 900.8$

Table 41 - Carrier Frequency Separation Results

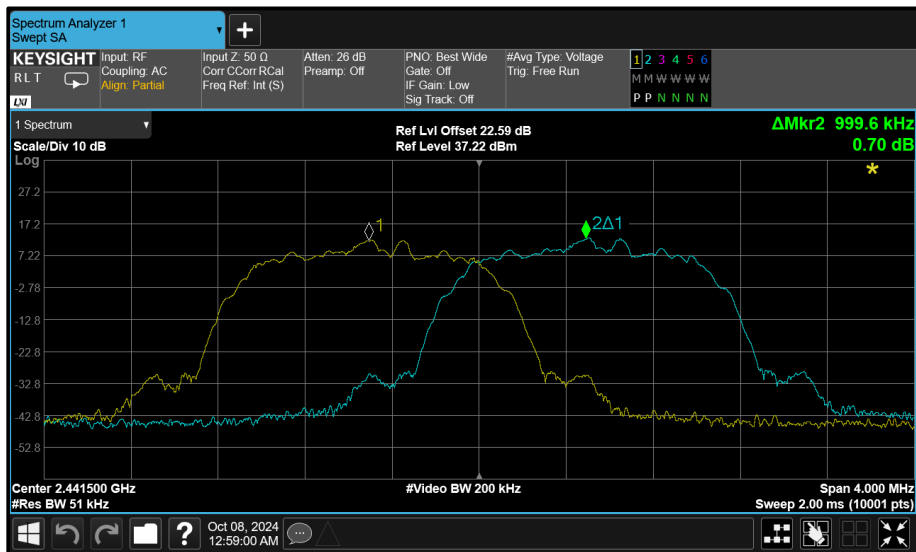


Figure 61 -  $\pi/4$  DQPSK - 2441 MHz (CH39)



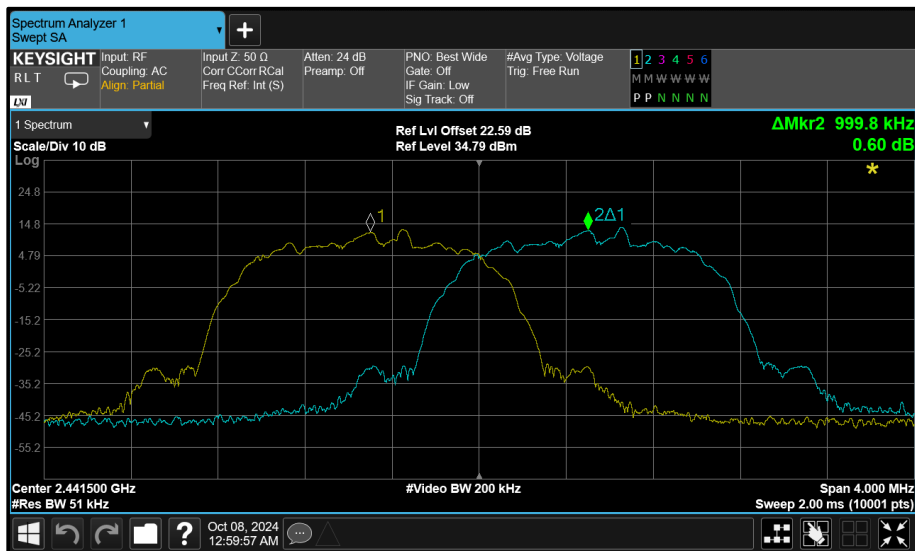


Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1) RSS-247 5.1 b)	Test Method(s):	C63.10 7.8.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA 8-DPSK (3-DH5)	Duty Cycle (%):	-
Antenna Configuration:	Beamforming	DCCF (dB):	-
Active Port(s):	A+B (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	2441.002	2442.002	1.000	≥881.3

**Table 42 - Carrier Frequency Separation Results**



**Figure 62 - 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.



**2.3.7 Test Location and Test Equipment Used**

This test was carried out in RF Chamber 18.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Expiry Date
Hygrometer	Rotronic	I-1000	3068	12	07-Nov-2024
Digital Multimeter	Fluke	115	6145	12	06-Jun-2025
MXA Signal Analyser	Keysight Technologies	N9020B	6419	24	28-Feb-2025
Signal Conditioning Unit	TUV SUD	SPECTRUM_SCU001	6517	12	22-Feb-2025
SCU Cable Assembly	TUV SUD	SPECTRUM_SCU_CA	6526	12	22-Feb-2025
SCU Cable Assembly	TUV SUD	SPECTRUM_SCU_CA	6527	12	05-Mar-2025
SCU Cable Assembly	TUV SUD	SPECTRUM_SCU_CA	6528	12	22-Feb-2025
AC Programmable Power Supply	iTech	IT7324	6665	-	O/P Mon

**Table 43**

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)

**2.4.2 Equipment Under Test and Modification State**

A3401, S/N: HHJTCJ96L9 - Modification State 0

**2.4.3 Date of Test**

07-October-2024

**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 21.5 °C

Relative Humidity 56.8 %



**2.4.6 Test Results**

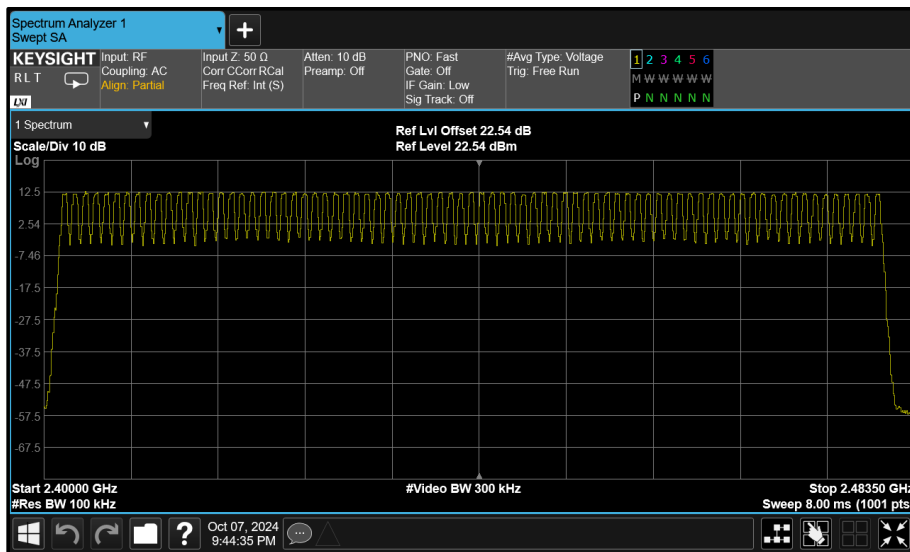
2.4 GHz Bluetooth BDR/EDR

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)(iii)	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 1)	Peak Antenna Gain (dBi):	-

Number of Hopping Frequencies	Limit
79	≥15.0

**Table 44 - Number of Hopping Frequencies Results**



**Figure 63 - GFSK (DH5) - Number of Hopping Channels**

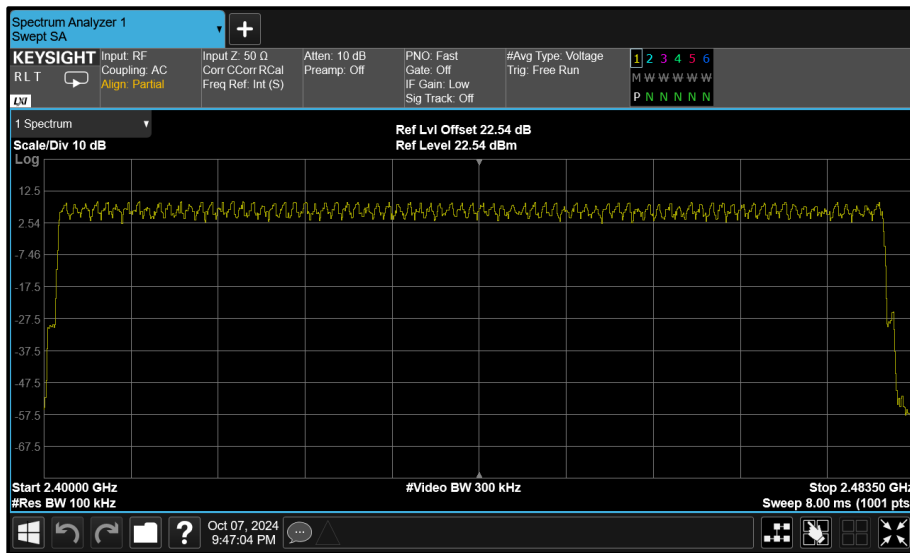


Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1)(iii)	Test Method(s):	C63.10 7.8.3
Additional Reference(s):	-		

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

Number of Hopping Frequencies	Limit
79	$\geq 15.0$

**Table 45 - Number of Hopping Frequencies Results**



**Figure 64 -  $\pi/4$  DQPSK (2-DH5) - Number of Hopping Channels**