

FCC and ISED Test Report

Apple Inc
Model: A3247



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

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

FCC ID: BCGA3247 IC: 579C-A3247

COMMERCIAL-IN-CONFIDENCE

Document 75960488-13 Issue 01

SIGNATURE			
NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Steve Marshall	Senior Engineer	Authorised Signatory	04 September 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, ISED RSS-247 and ISED RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Report Generation	Lauren Walters	04 September 2024	

FCC Accreditation 553713/UK2026 Concorde Park, Fareham Test Laboratory	ISED Accreditation 28798/UK0003 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, ISED RSS-247: Issue 3 (2023-08) and ISED RSS-GEN: Issue 5 (2018-04) + A2 (2021-02) for the tests detailed in section 1.3.

	DISCLAIMER AND COPYRIGHT
	This non-binding report has been prepared by TÜV SÜD with all reasonable skill and care. The document is confidential to the potential Client and TÜV SÜD. No part of this document may be reproduced without the prior written approval of TÜV SÜD. © 2024 TÜV SÜD. This report relates only to the actual item/items tested.
	ACCREDITATION Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation. Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited). Results of tests covered by our Flexible UKAS Accreditation Schedule are marked FS (Flexible Scope).

TÜV SÜD is a trading name of TÜV SÜD Ltd Registered in Scotland at East Kilbride, Glasgow G75 0QF, United Kingdom Registered number: SC215164	TÜV SÜD Ltd is a TÜV SÜD Group Company	Phone: +44 (0) 1489 558100 Fax: +44 (0) 1489 558101 www.tuvsud.com/en	TÜV SÜD Octagon House Concorde Way Fareham Hampshire PO15 5RL United Kingdom
---	---	--	---



Contents

1	Report Summary	2
1.1	Report Modification Record.....	2
1.2	Introduction.....	2
1.3	Brief Summary of Results	3
1.4	Product Information	4
1.5	Deviations from the Standard.....	5
1.6	Identification of the EUT	6
1.7	EUT Modification Record	6
1.8	Test Location	7
2	Test Details	8
2.1	Restricted Band Edges.....	8
2.2	Frequency Hopping Systems - Average Time of Occupancy	40
2.3	Frequency Hopping Systems - Channel Separation.....	57
2.4	Frequency Hopping Systems - Number of Hopping Channels	74
2.5	Frequency Hopping Systems - 99% & 20 dB Bandwidth.....	91
2.6	Maximum Conducted Output Power	170
2.7	Authorised Band Edges	187
2.8	Spurious Radiated Emissions	217
3	Measurement Uncertainty	234



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	04-Sept-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 ISED RSS-247: Issue 3 (2023-08) ISED RSS-GEN: Issue 5 (2018-04) + A2 (2021-02)
Start of Test	14-April-2024
Finish of Test	08-August-2024
Name of Engineer(s)	Ahmed Al Derdiri, Elliot Callender, Ioan-Alexandru Bogatu, Manohar Thota, Mahmud Bari Chowdhury, Mustafa Murad, Akhil Rajendran Bhaskaran Nair, Ian Hart, David Hill and Vineeth Nagaraj
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 and ISED RSS-247 and ISED RSS-GEN is shown below.

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	FCC Part 15C	RSS-247	RSS-GEN			
Configuration and Mode: 2.4 GHz Bluetooth 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	3.3	8.10	Restricted Band Edges	Pass	ANSI C63.10 (2020)
2.2	15.247 (a)(1)	5.1	-	Frequency Hopping Systems - Average Time of Occupancy	Pass	ANSI C63.10 (2020)
2.3	15.247 (a)(1)	5.1	-	Frequency Hopping Systems - Channel Separation	Pass	ANSI C63.10 (2020)
2.4	15.247 (a)(1)	5.1	-	Frequency Hopping Systems - Number of Hopping Channels	Pass	ANSI C63.10 (2020)
2.5	15.247 (a)(1)	5.1	6.7	Frequency Hopping Systems - 99% & 20 dB Bandwidth	Pass	ANSI C63.10 (2020)
2.6	15.247 (b)	5.4	6.12	Maximum Conducted Output Power	Pass	ANSI C63.10 (2020) KDB 662911 D01 v02r01
2.7	15.247 (d)	5.5	-	Authorised Band Edges	Pass	ANSI C63.10 (2020)
2.8	15.209 and 15.247 (d)	3.3 and 5.5	6.13 and 8.9	Spurious Radiated Emissions	Pass	ANSI C63.4 (2014) ANSI C63.10 (2020)

Table 2



1.4 Product Information

1.4.1 Technical Description

The equipment under test (EUT) was a desktop 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 0
- 2-DH5 - iPA - Core 0
- 3-DH5 - iPA - Core 0
- DH5 - iPA - Core 2
- 2-DH5 - iPA - Core 2
- 3-DH5 - iPA - Core 2
- DH5 - ePA - Core 0
- 2-DH5 - ePA - Core 0
- 3-DH5 - ePA - Core 0

MIMO modes:

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

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 - ePA - Core 0 + Core 1
- DH5 - iPA - 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	2.60	1.32
Core 1	2400 to 2480	2.30	1.37
Dedicated Core 2	2400 to 2480	1.40	1.31

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: A3247 and A2388			
Serial Number	Hardware Version	Software Version	Firmware
KN47NTDQRY	REV1.0	24A81452a	22.1.65.459
CMVW5QCY3C	REV1.0	24A81452a	22.1.65.459
CFK34L4W7N	REV1.0	24A81452a	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: A3247, Serial Number: KN47NTDQRY			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A3247, Serial Number: CFK34L4W7N			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A3247, Serial Number: CMVW5QCY3C			
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	Ahmed Al Derdiri, Elliot Callender, Ioan-Alexandru Bogatu and Manohar Thota	UKAS
Frequency Hopping Systems - Average Time of Occupancy	Mahmud Bari Chowdhury	UKAS
Frequency Hopping Systems - Channel Separation	Mahmud Bari Chowdhury	UKAS
Frequency Hopping Systems - Number of Hopping Channels	Mahmud Bari Chowdhury and Mustafa Murad	UKAS
Frequency Hopping Systems - 99% & 20 dB Bandwidth	Mahmud Bari Chowdhury	UKAS
Maximum Conducted Output Power	David Hill and Mahmud Bari Chowdhury	UKAS
Authorised Band Edges	Ahmed Al Derdiri, Elliot Callender, Ioan-Alexandru Bogatu and Manohar Thota	UKAS
Spurious Radiated Emissions	Akhil Rajendran Bhaskaran Nair, Elliot Callender, Ian Hart, Ioan-Alexandru Bogatu and Vineeth Nagaraj	UKAS

Table 6

Office Address:

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



2 Test Details

2.1 Restricted Band Edges

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.205
ISED RSS-247, Clause 3.3
ISED RSS-GEN, Clause 8.10

2.1.2 Equipment Under Test and Modification State

A3247, S/N: KN47NTDQRY - Modification State 0

2.1.3 Date of Test

14-May-2024 to 22-May-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 dBμV/m to μV/m:
 $10^{(\text{Field Strength in dB}\mu\text{V/m}/20)}$.

2.1.5 Environmental Conditions

Ambient Temperature	21.0 - 23.1 °C
Relative Humidity	41.0 - 52.6 %



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	55.87	40.60
Static	2-DH5	2402	2390	55.44	40.72
Static	3-DH5	2402	2390	55.46	40.73
Static	DH5	2480	2483.5	54.02	41.57
Static	2-DH5	2480	2483.5	54.16	41.81
Static	3-DH5	2480	2483.5	54.17	41.89

Table 7 - SISO Restricted Band Edge Results

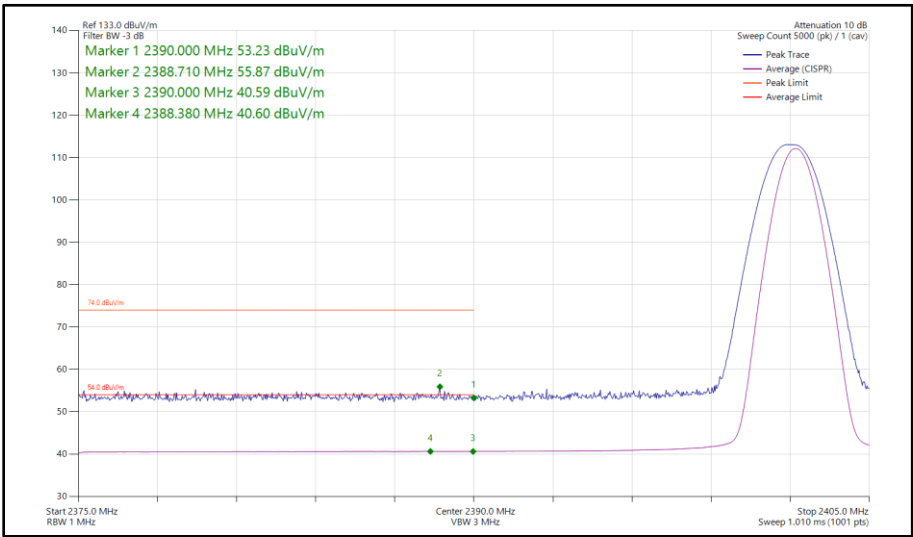


Figure 1 - Bluetooth DH5, SISO, Core 0 - 2402 MHz
Band Edge Frequency 2390 MHz

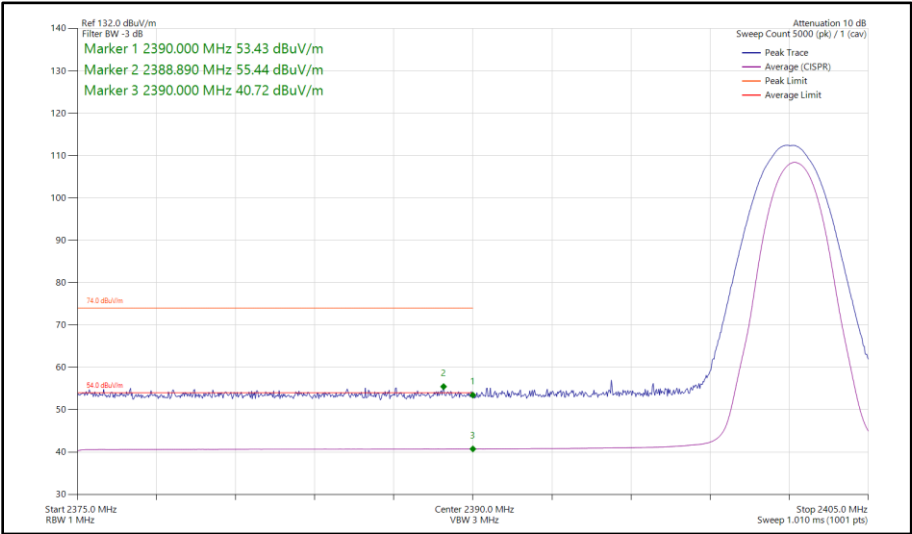


Figure 2 - Bluetooth 2-DH5, SISO, Core 0 - 2402 MHz
Band Edge Frequency 2390 MHz

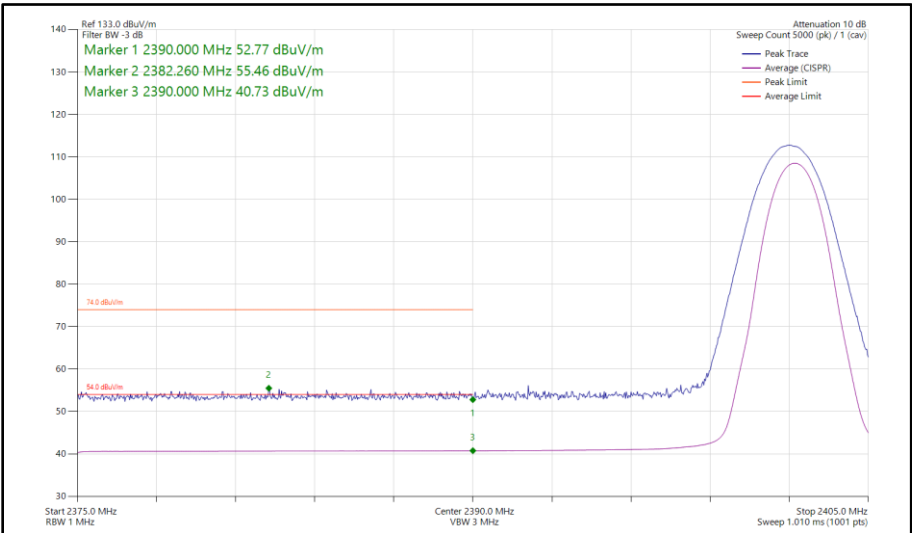


Figure 3 - Bluetooth 3-DH5, SISO, Core 0 - 2402 MHz
Band Edge Frequency 2390 MHz

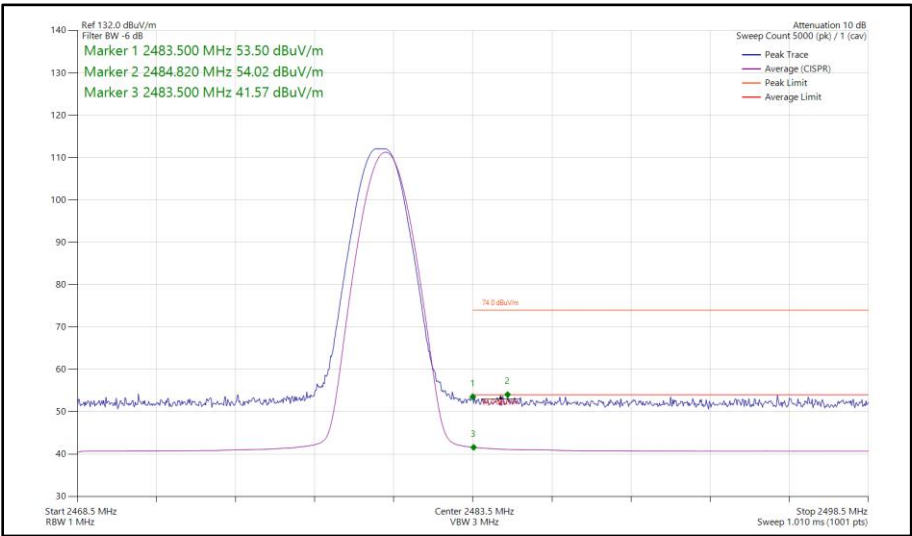


Figure 4 - Bluetooth DH5, SISO, Core 0 - 2480 MHz
Band Edge Frequency 2483.5 MHz

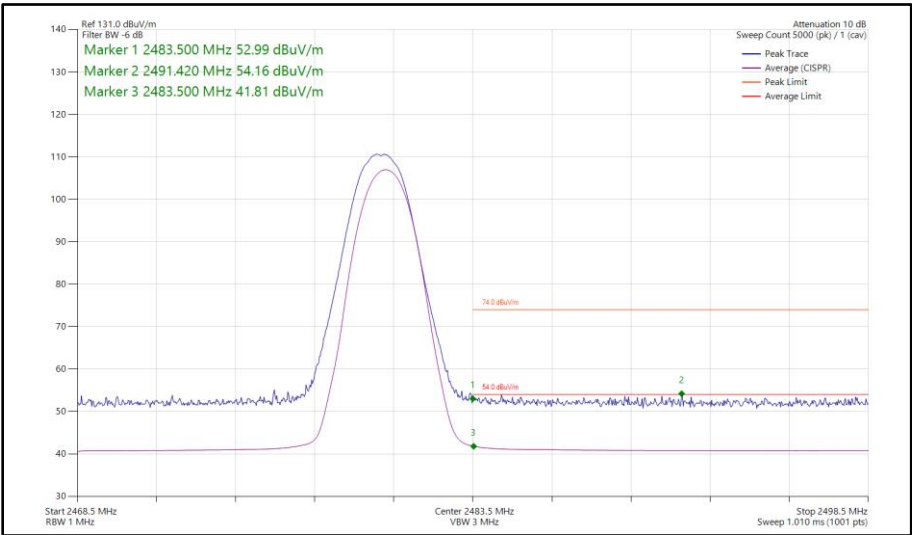
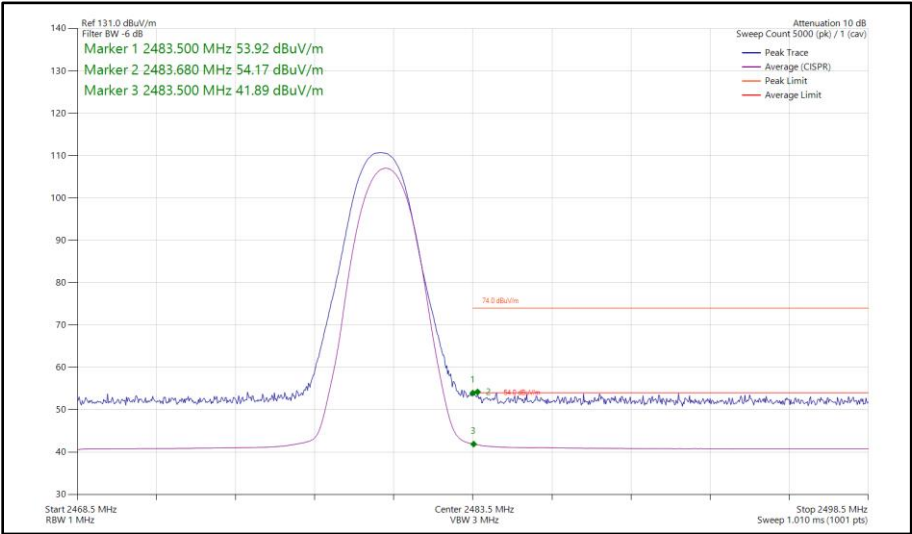


Figure 5 - Bluetooth 2-DH5, SISO, Core 0 - 2480 MHz
Band Edge Frequency 2483.5 MHz



**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	56.99	40.92
Static	2-DH5	2402	2390	56.10	40.50
Static	3-DH5	2402	2390	55.42	40.50
Static	DH5	2480	2483.5	54.40	42.13
Static	2-DH5	2480	2483.5	55.60	42.87
Static	3-DH5	2480	2483.5	56.06	42.59

Table 8 - SISO Restricted Band Edge Results

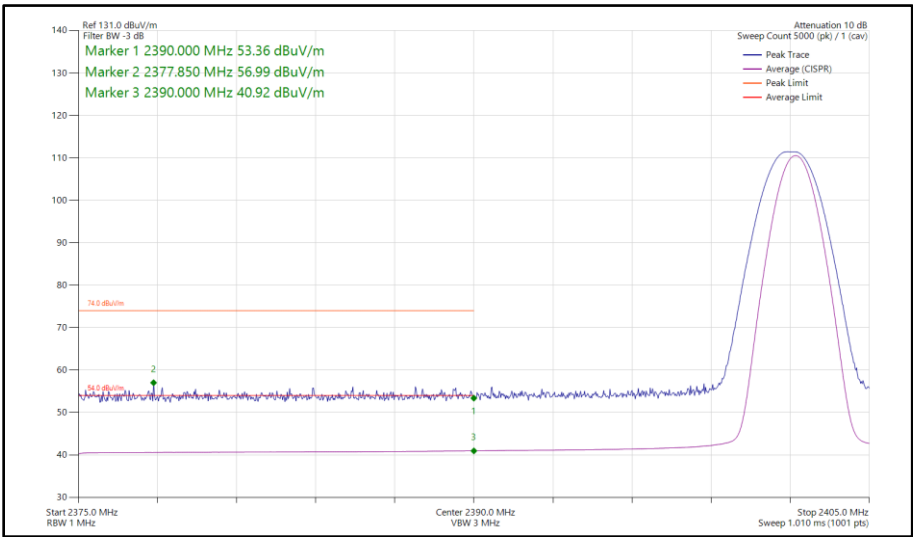


Figure 7 - Bluetooth DH5, SISO, Core 1 - 2402 MHz
Band Edge Frequency 2390 MHz

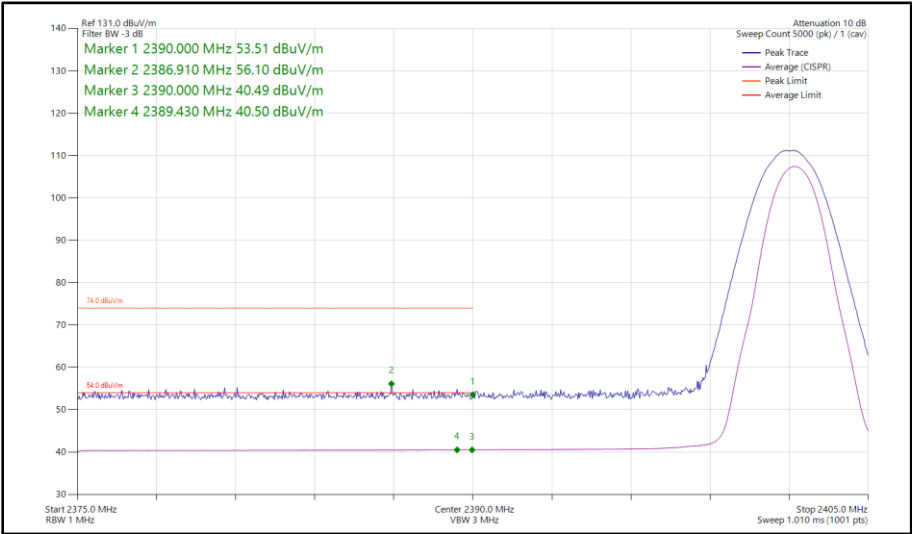


Figure 8 - Bluetooth 2-DH5, SISO, Core 1 - 2402 MHz
Band Edge Frequency 2390 MHz

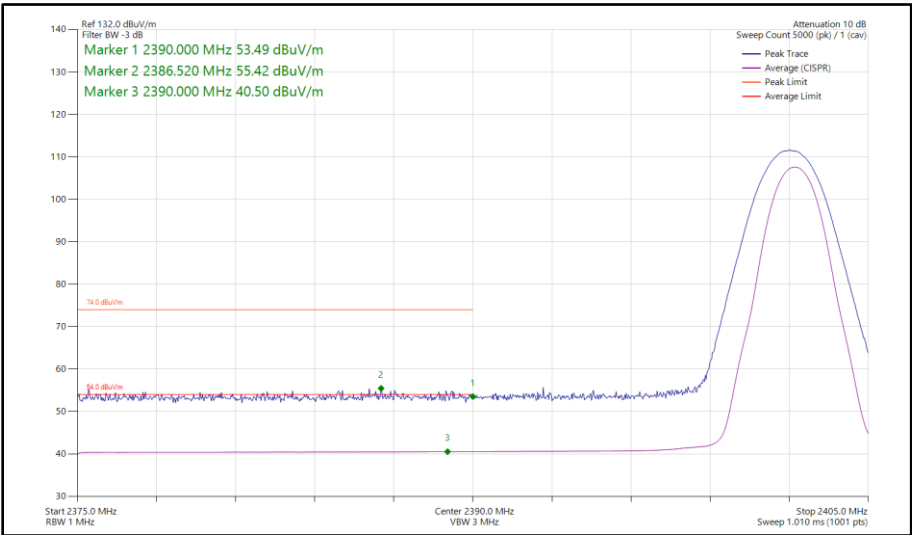


Figure 9 - Bluetooth 3-DH5, SISO, Core 1 - 2402 MHz
Band Edge Frequency 2390 MHz

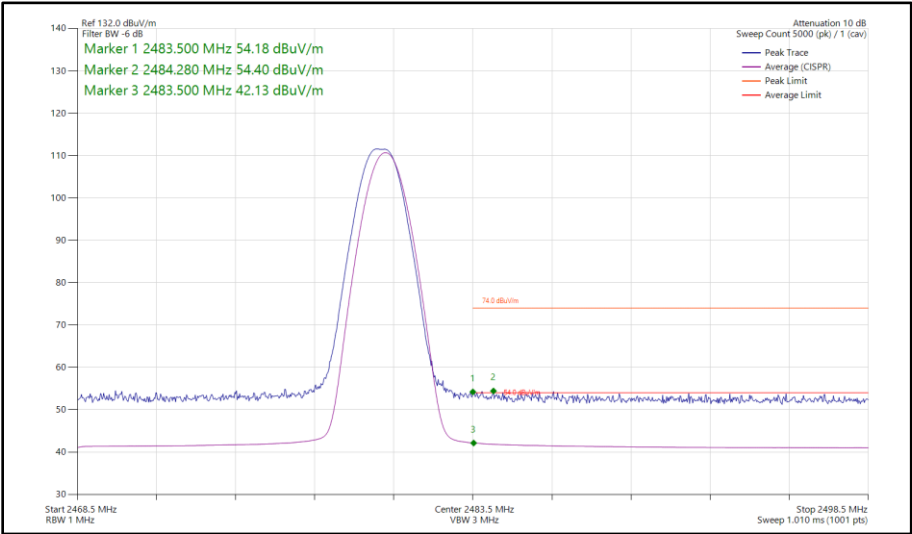


Figure 10 - Bluetooth DH5, SISO, Core 1 - 2480 MHz
Band Edge Frequency 2483.5 MHz

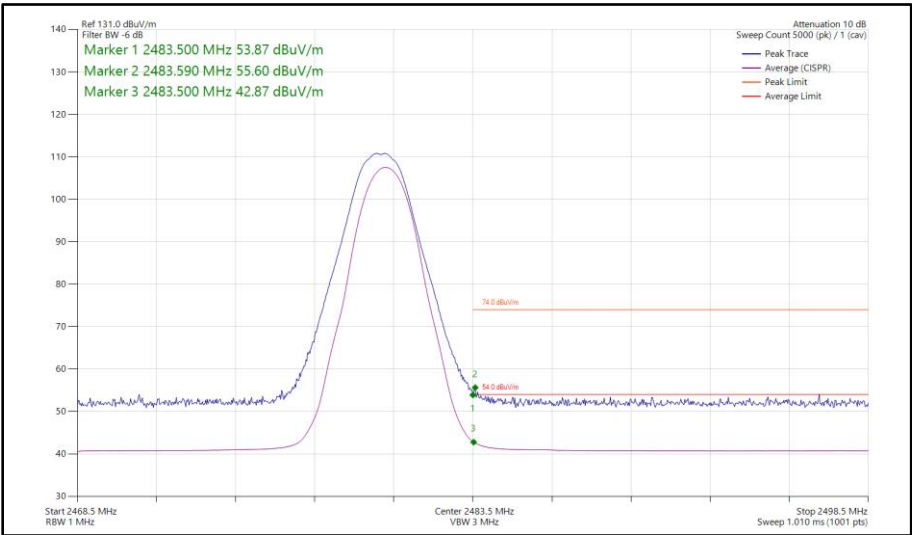
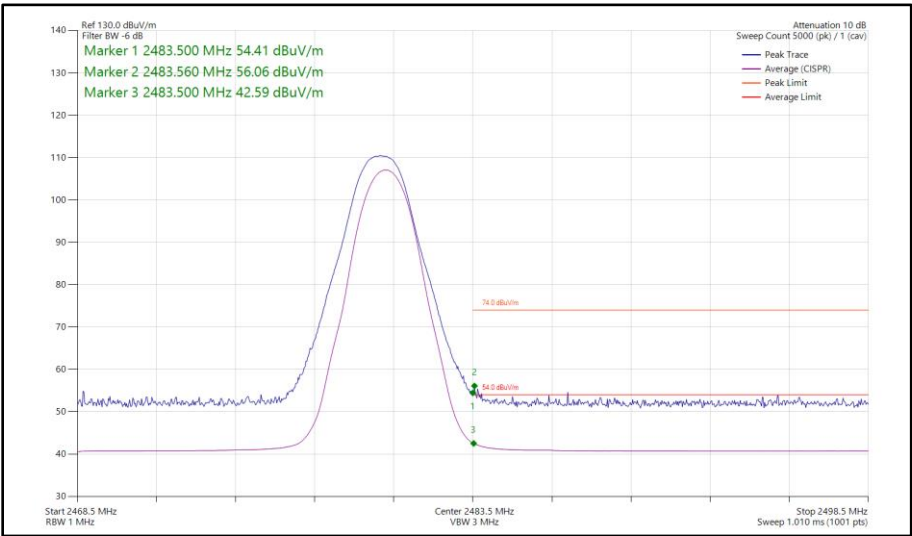


Figure 11 - Bluetooth 2-DH5, SISO, Core 1 - 2480 MHz
Band Edge Frequency 2483.5 MHz



**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	56.15	41.50
Static	2-DH5	2402	2390	56.39	41.52
Static	3-DH5	2402	2390	56.42	41.53
Static	DH5	2480	2483.5	55.02	42.27
Static	2-DH5	2480	2483.5	55.17	42.57
Static	3-DH5	2480	2483.5	55.16	42.62

Table 9 - SISO Restricted Band Edge Results

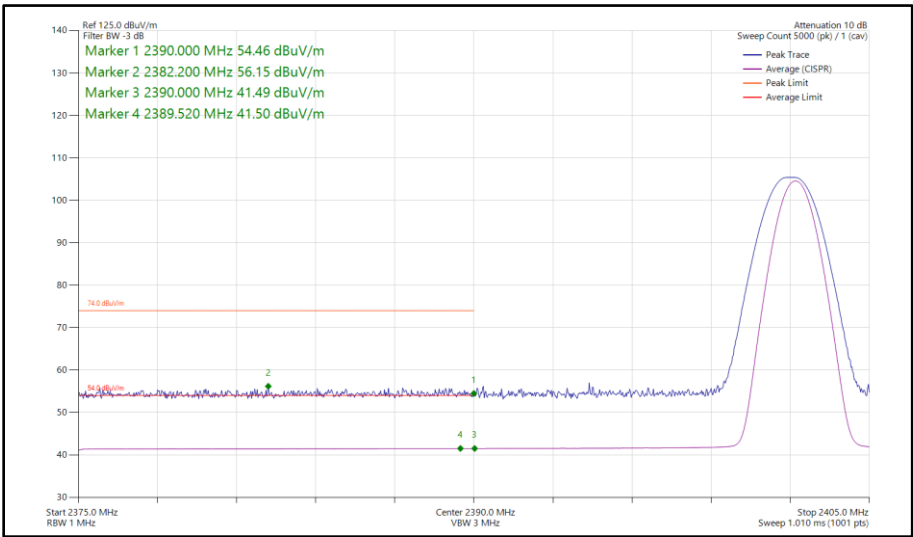


Figure 13 - Bluetooth DH5, SISO, Core 2 - 2402 MHz
Band Edge Frequency 2390 MHz

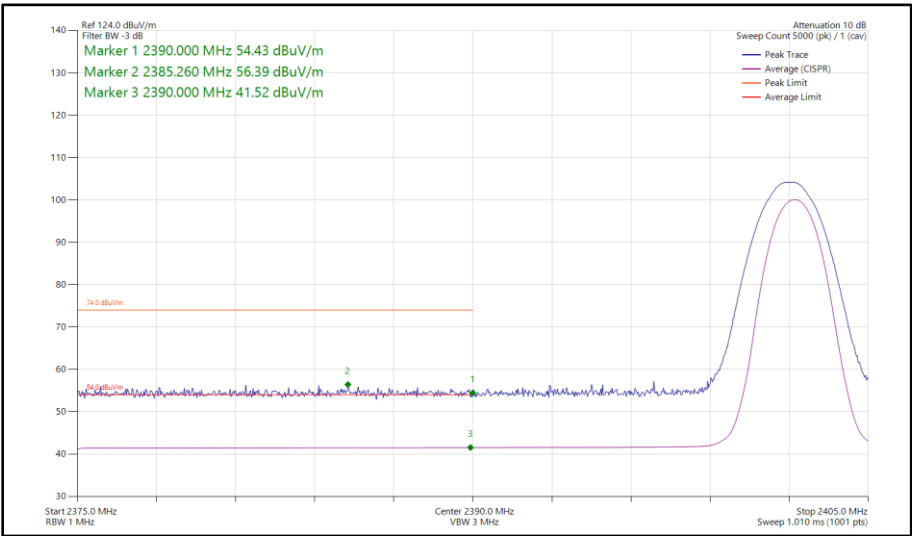


Figure 14 - Bluetooth 2-DH5, SISO, Core 2 - 2402 MHz
Band Edge Frequency 2390 MHz

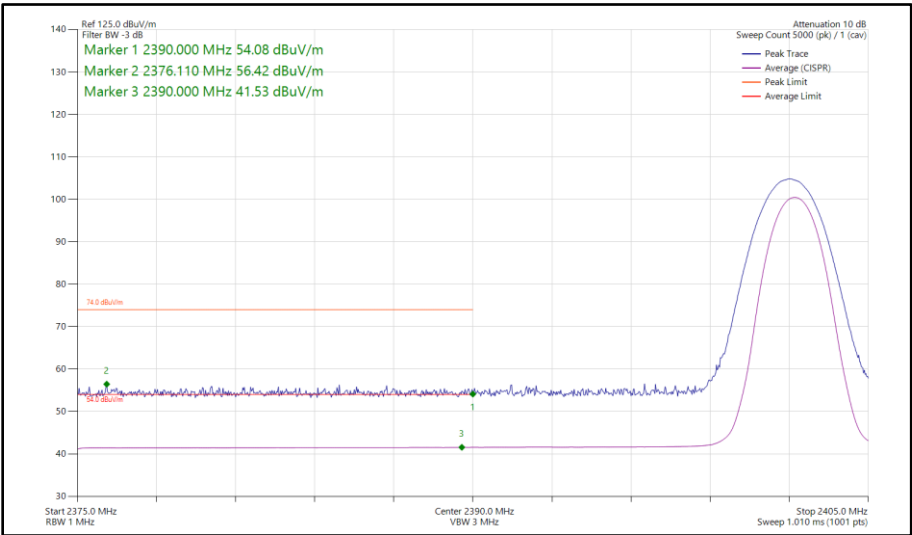


Figure 15 - Bluetooth 3-DH5, SISO, Core 2 - 2402 MHz
Band Edge Frequency 2390 MHz

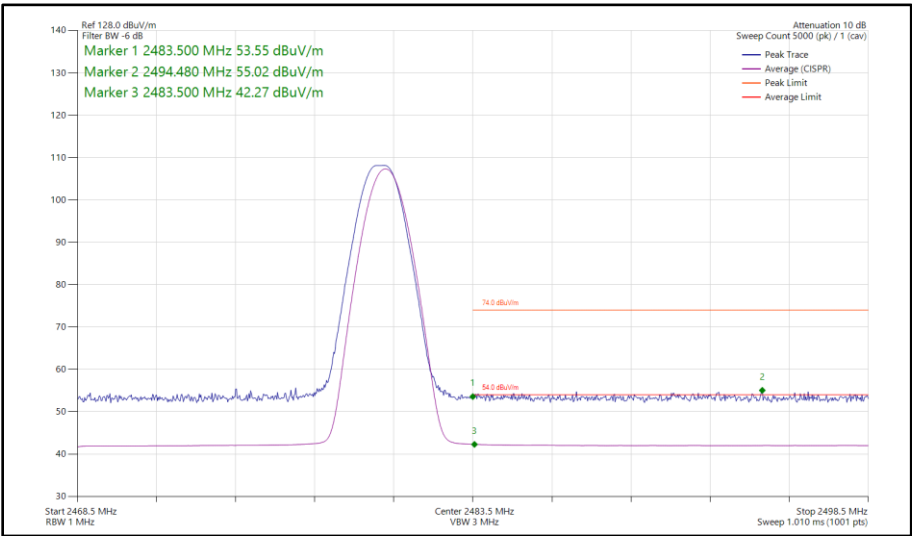


Figure 16 - Bluetooth DH5, SISO, Core 2 - 2480 MHz
Band Edge Frequency 2483.5 MHz

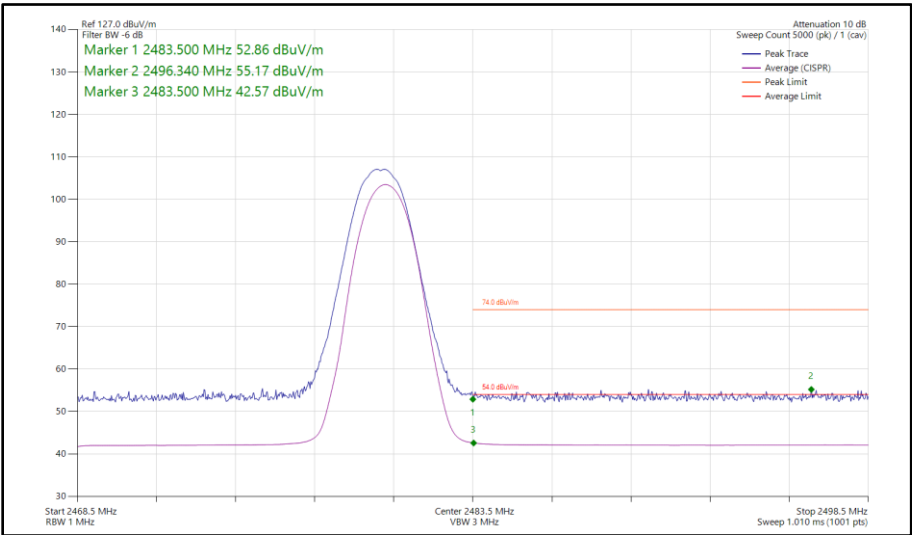
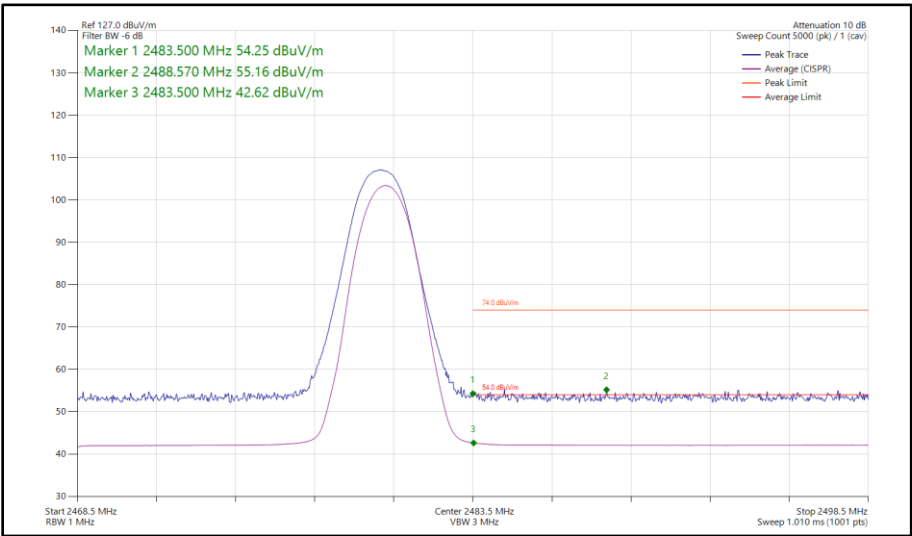


Figure 17 - Bluetooth 2-DH5, SISO, Core 2 - 2480 MHz
Band Edge Frequency 2483.5 MHz



**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	56.49	41.62
Static	2-DH5	2402	2390	57.06	41.61
Static	3-DH5	2402	2390	56.62	41.60
Static	DH5	2480	2483.5	55.31	42.89
Static	2-DH5	2480	2483.5	55.32	43.07
Static	3-DH5	2480	2483.5	55.64	43.10

Table 10 - MIMO Restricted Band Edge Results

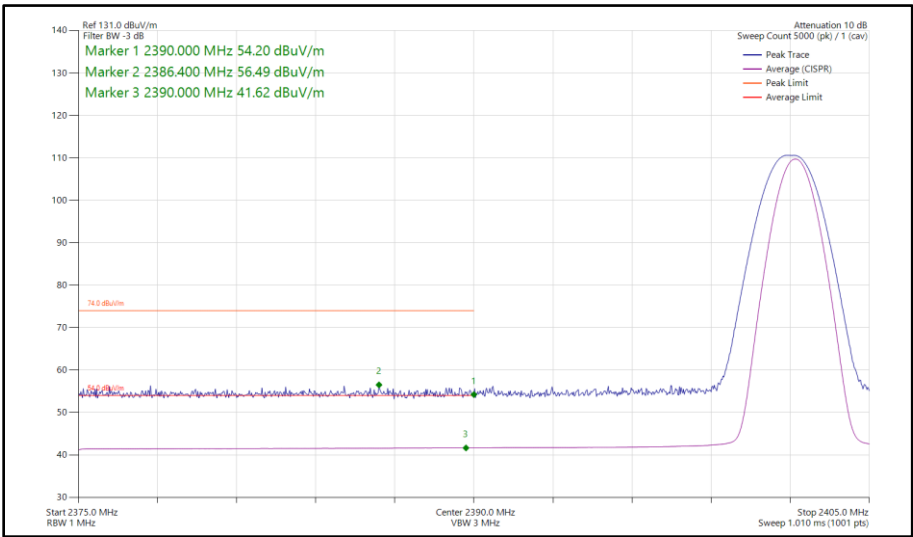
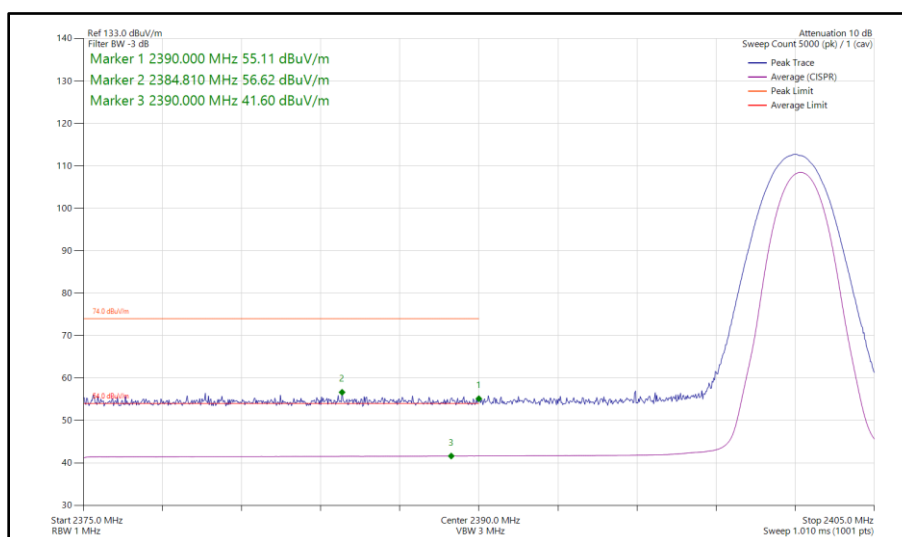
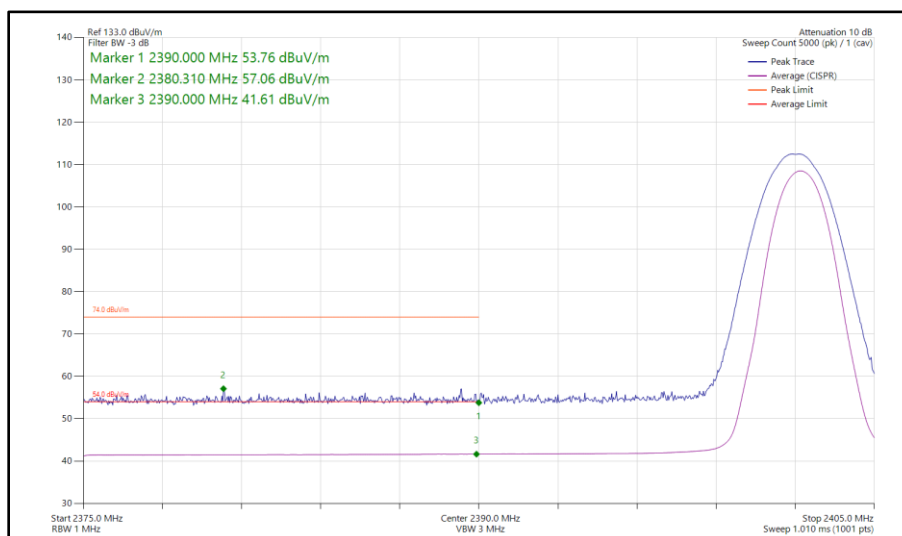


Figure 19 - Bluetooth DH5, MIMO, Core 0 - Core 1 - 2402 MHz
Band Edge Frequency 2390 MHz



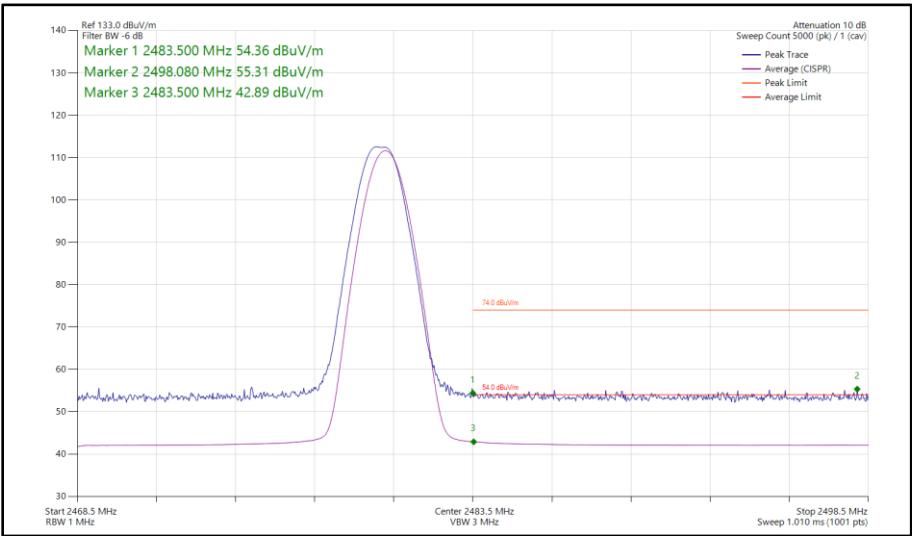


Figure 22 - Bluetooth DH5, MIMO, Core 0 - Core 1 - 2480 MHz
Band Edge Frequency 2483.5 MHz

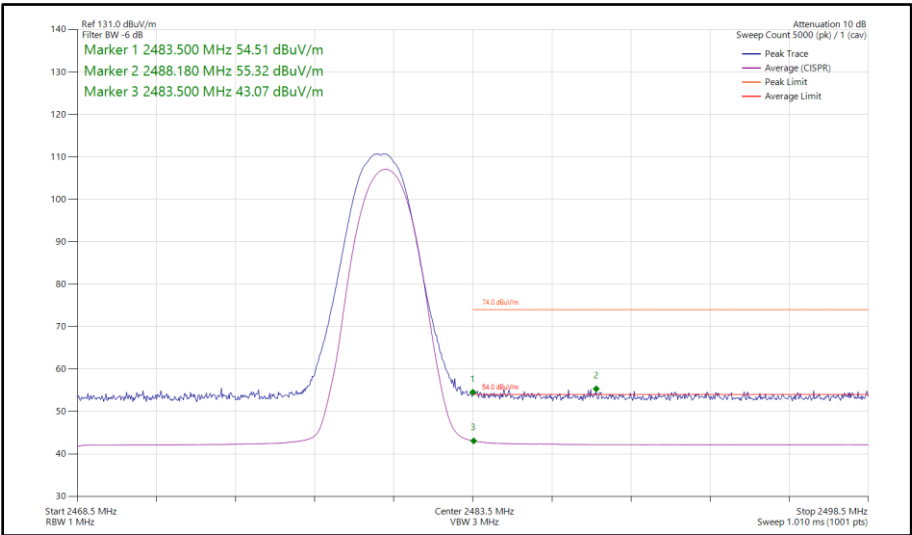


Figure 23 - Bluetooth 2-DH5, MIMO, Core 0 - Core 1 - 2480 MHz
Band Edge Frequency 2483.5 MHz

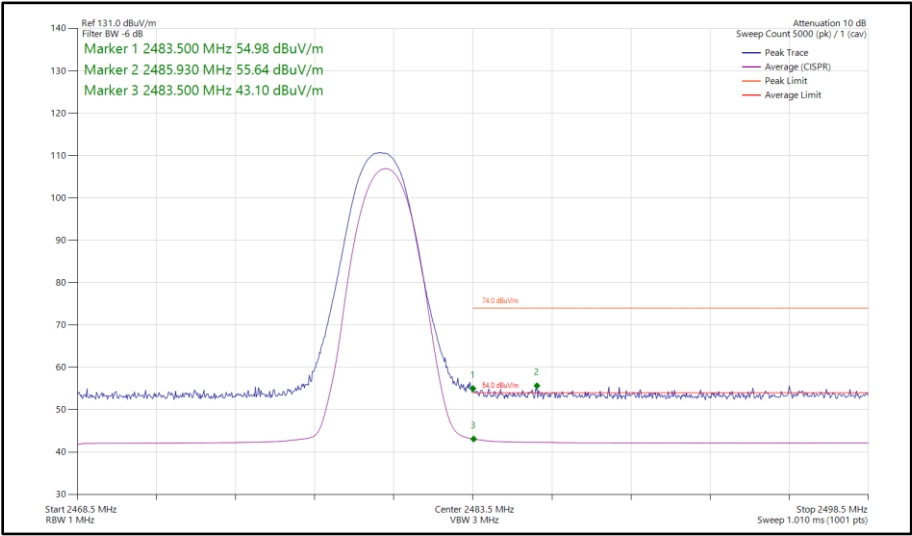


Figure 24 - Bluetooth 3-DH5, MIMO, Core 0 - Core 1 - 2480 MHz
Band Edge Frequency 2483.5 MHz



ePA - Core 0 (SISO)

Mode	Packet Type	TX Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
Static	DH5	2402	2390	57.58	43.02
Static	2-DH5	2402	2390	56.83	42.61
Static	3-DH5	2402	2390	58.32	42.89
Static	DH5	2480	2483.5	57.22	45.42
Static	2-DH5	2480	2483.5	61.52	49.69
Static	3-DH5	2480	2483.5	62.87	50.45

Table 11 - SISO Restricted Band Edge Results

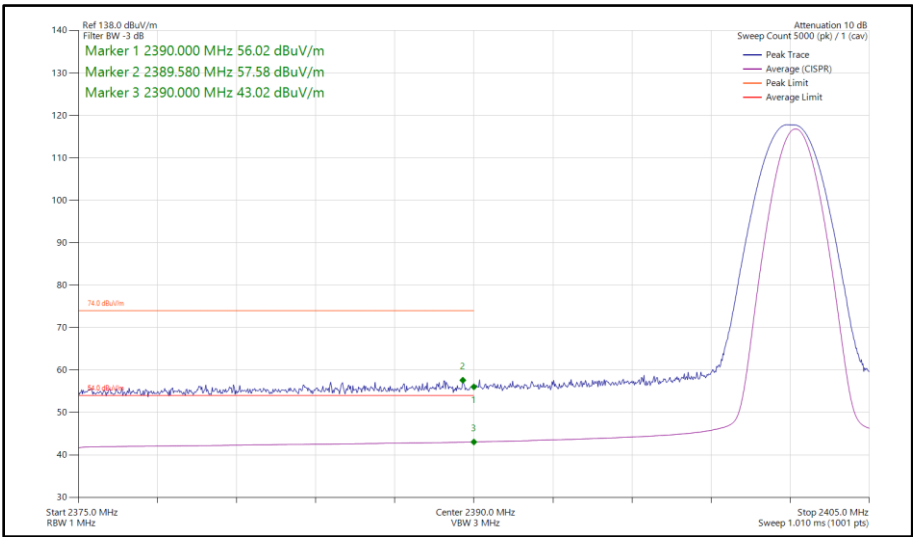


Figure 25 - Bluetooth DH5, SISO, Core 0 - 2402 MHz
Band Edge Frequency 2390 MHz

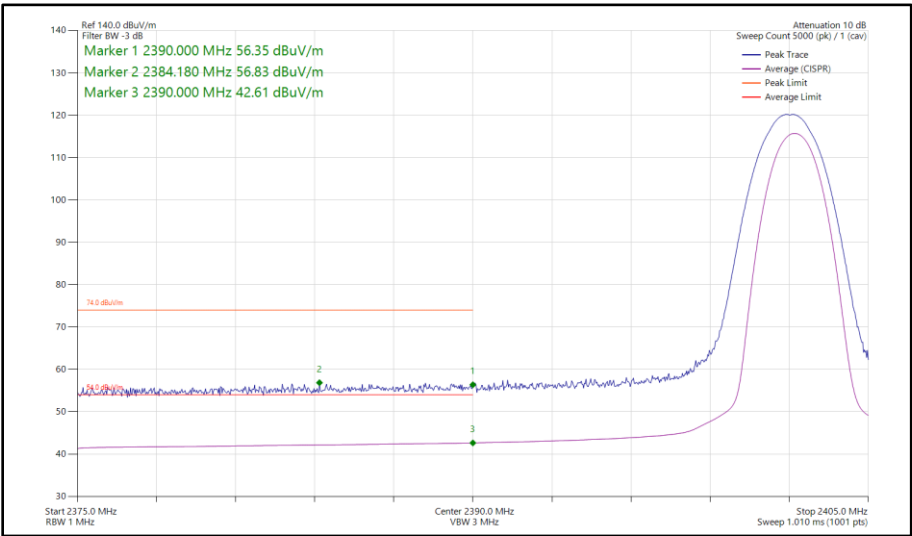


Figure 26 - Bluetooth 2-DH5, SISO, Core 0 - 2402 MHz
Band Edge Frequency 2390 MHz

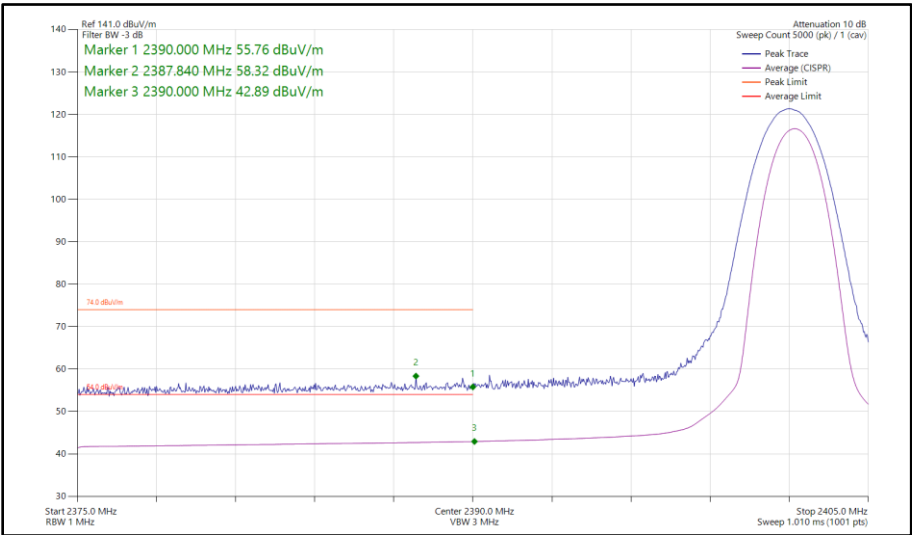


Figure 27 - Bluetooth 3-DH5, SISO, Core 0 - 2402 MHz
Band Edge Frequency 2390 MHz

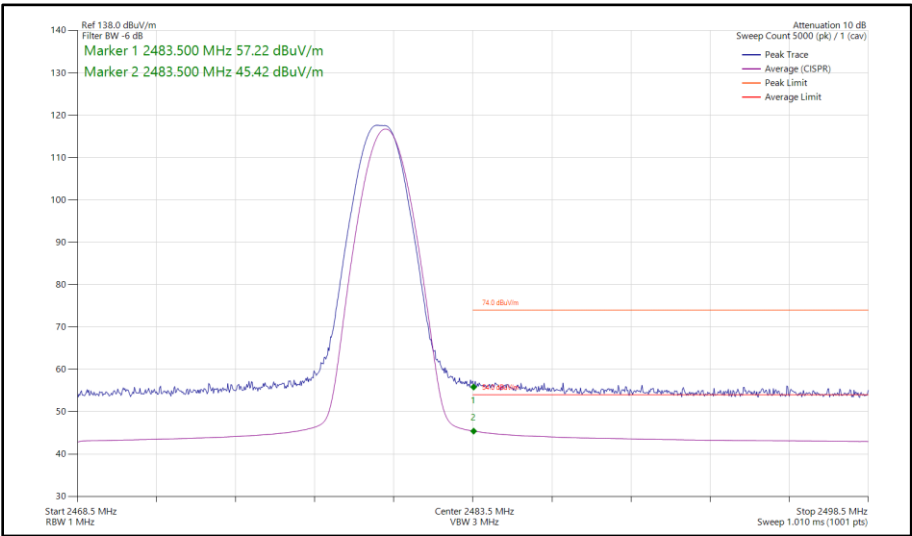


Figure 28 - Bluetooth DH5, SISO, Core 0 - 2480 MHz
Band Edge Frequency 2483.5 MHz

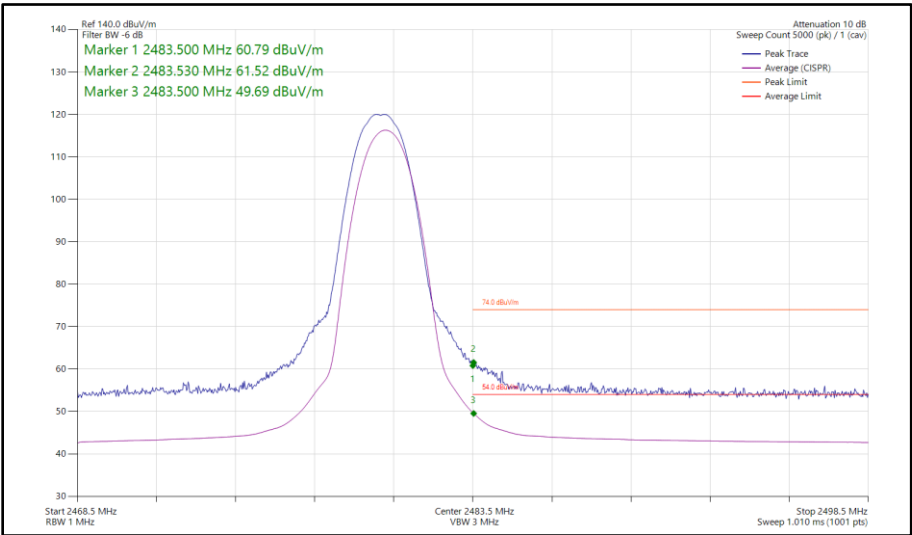
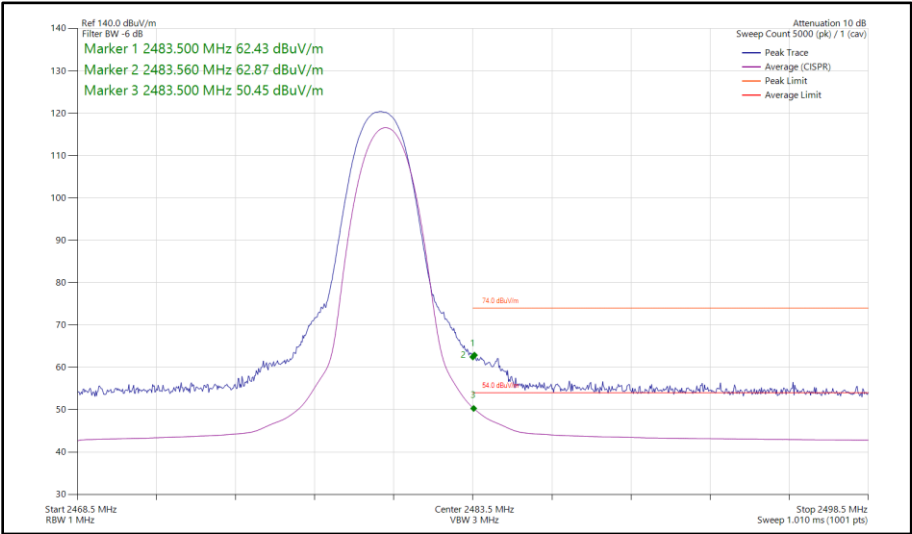


Figure 29 - Bluetooth 2-DH5, SISO, Core 0 - 2480 MHz
Band Edge Frequency 2483.5 MHz



**Figure 30 - 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	DH5	2402	2390	63.60	42.39
Static	2-DH5	2402	2390	61.04	41.95
Static	3-DH5	2402	2390	60.37	42.03
Static	DH5	2480	2483.5	58.13	44.80
Static	2-DH5	2480	2483.5	60.76	47.93
Static	3-DH5	2480	2483.5	61.93	48.65

Table 12 - SISO Restricted Band Edge Results

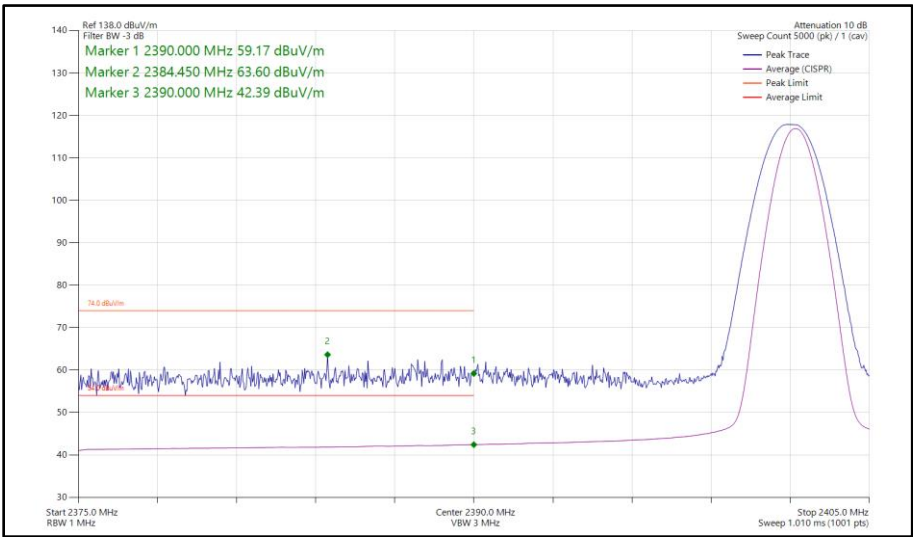


Figure 31 - Bluetooth DH5, SISO, Core 1 - 2402 MHz
Band Edge Frequency 2390 MHz

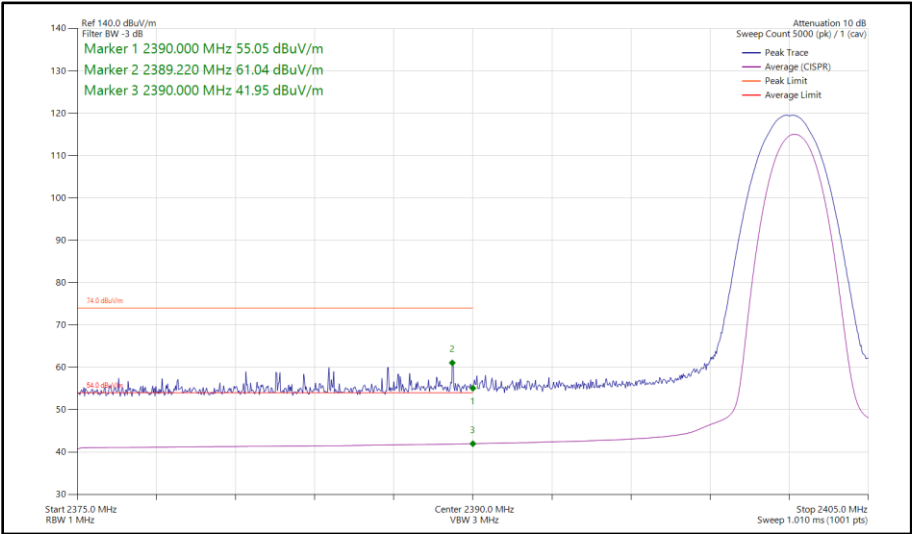


Figure 32 - Bluetooth 2-DH5, SISO, Core 1 - 2402 MHz
Band Edge Frequency 2390 MHz

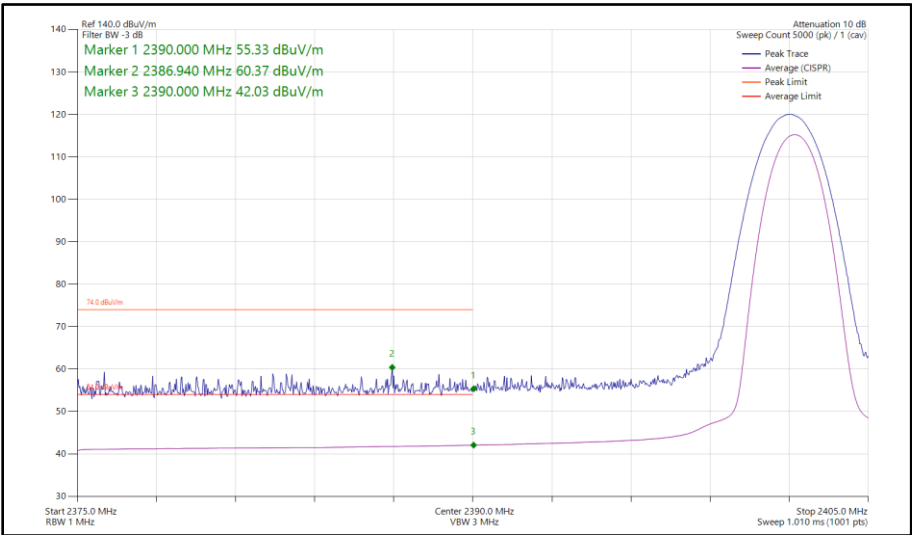


Figure 33 - Bluetooth 3-DH5, SISO, Core 1 - 2402 MHz
Band Edge Frequency 2390 MHz

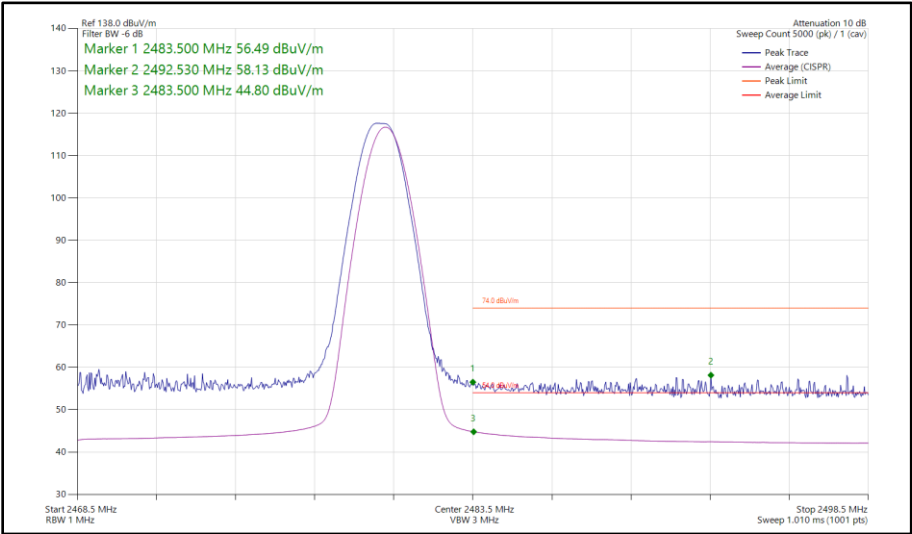


Figure 34 - Bluetooth DH5, SISO, Core 1 - 2480 MHz
Band Edge Frequency 2483.5 MHz

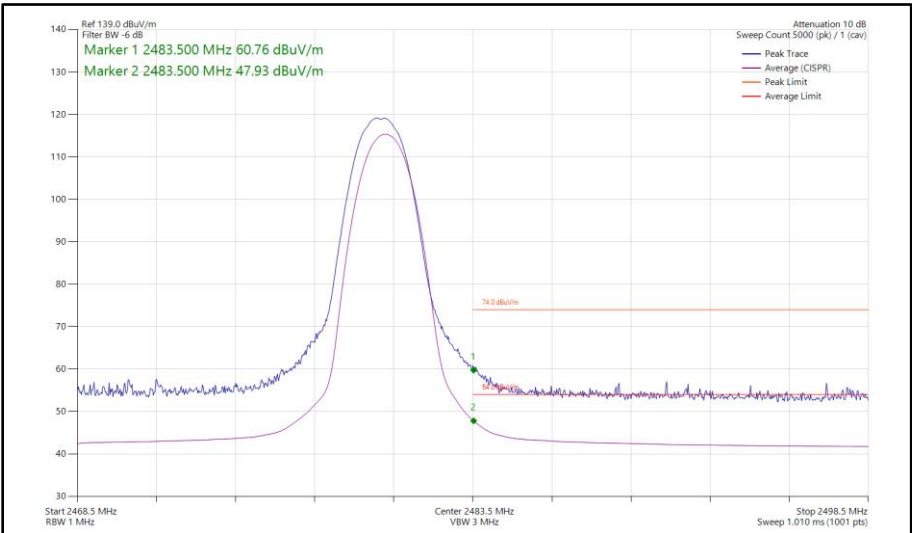
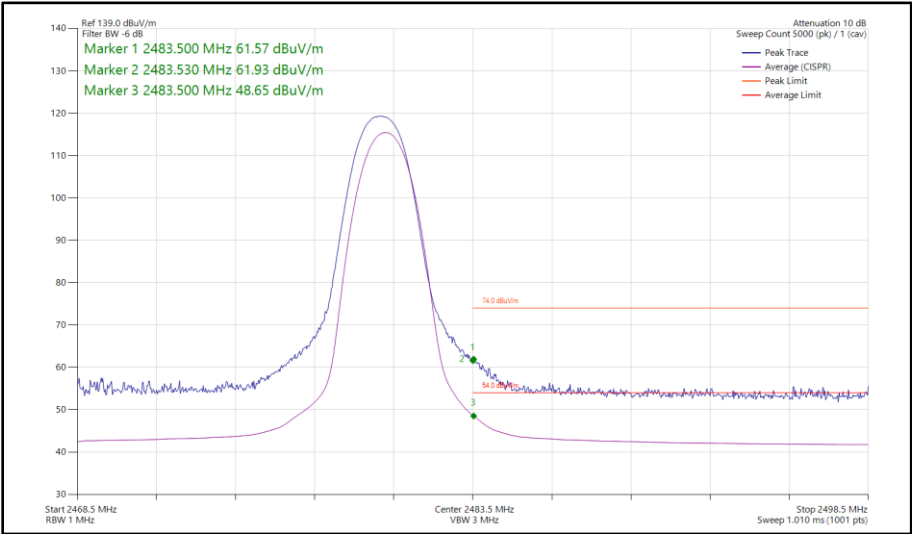


Figure 35 - Bluetooth 2-DH5, SISO, Core 1 - 2480 MHz
Band Edge Frequency 2483.5 MHz



**Figure 36 - 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	DH5	2402	2390	57.07	42.72
Static	2-DH5	2402	2390	57.47	42.68
Static	3-DH5	2402	2390	57.08	42.77
Static	DH5	2480	2483.5	57.46	45.64
Static	2-DH5	2480	2483.5	60.52	48.96
Static	3-DH5	2480	2483.5	62.83	49.73

Table 13 - MIMO Restricted Band Edge Results

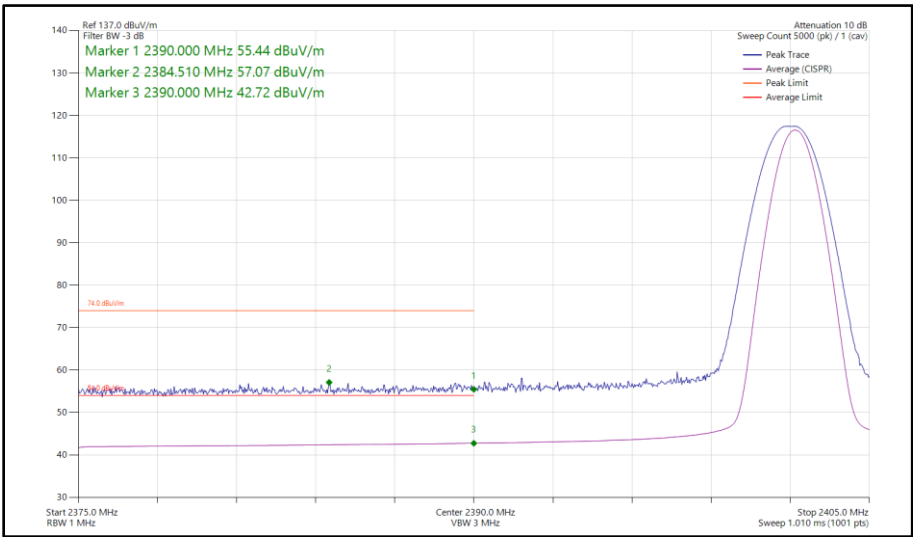


Figure 37 - Bluetooth DH5, MIMO, Core 0 - Core 1 - 2402 MHz
Band Edge Frequency 2390 MHz

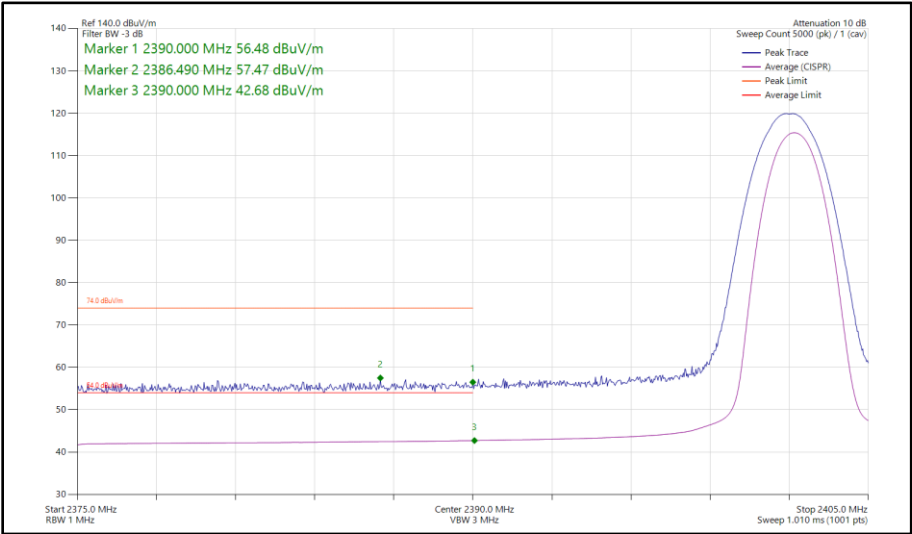


Figure 38 - Bluetooth 2-DH5, MIMO, Core 0 - Core 1 - 2402 MHz
Band Edge Frequency 2390 MHz

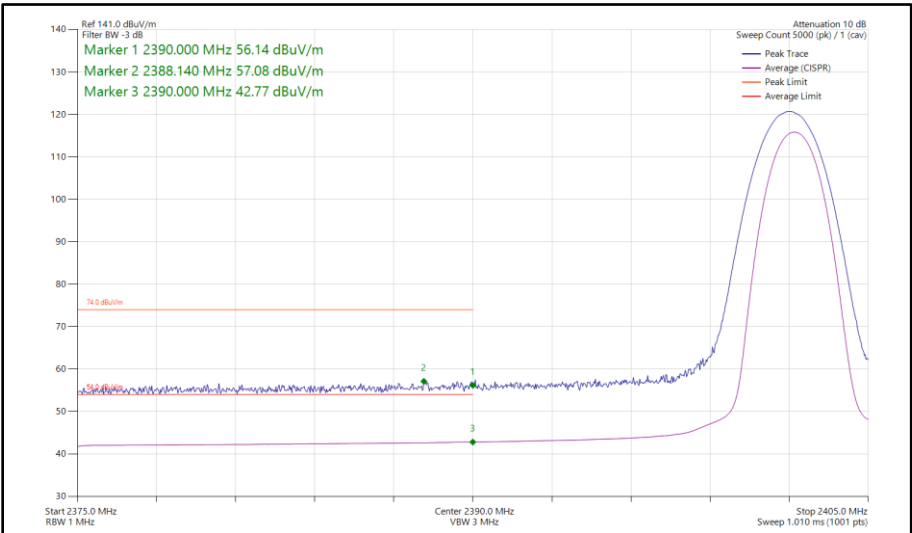


Figure 39 - Bluetooth 3-DH5, MIMO, Core 0 - Core 1 - 2402 MHz
Band Edge Frequency 2390 MHz

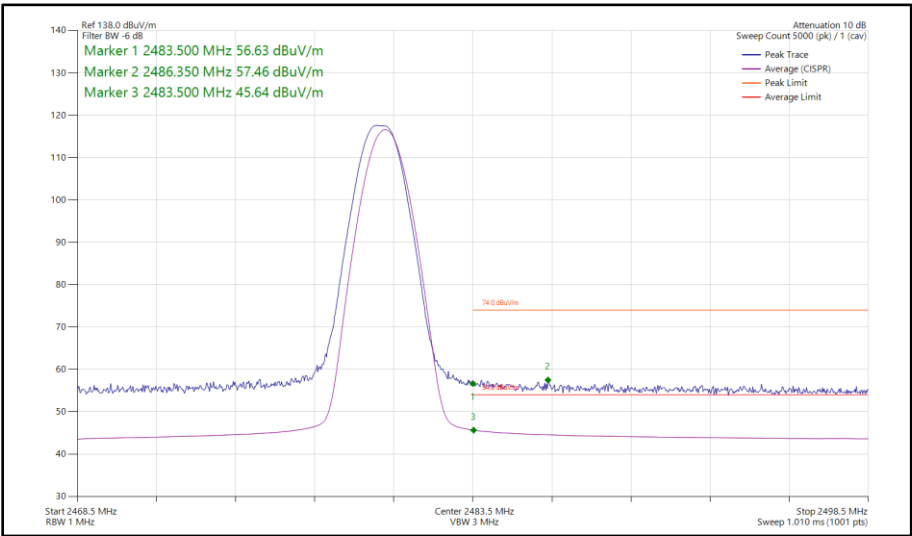


Figure 40 - Bluetooth DH5, MIMO, Core 0 - Core 1 - 2480 MHz
Band Edge Frequency 2483.5 MHz

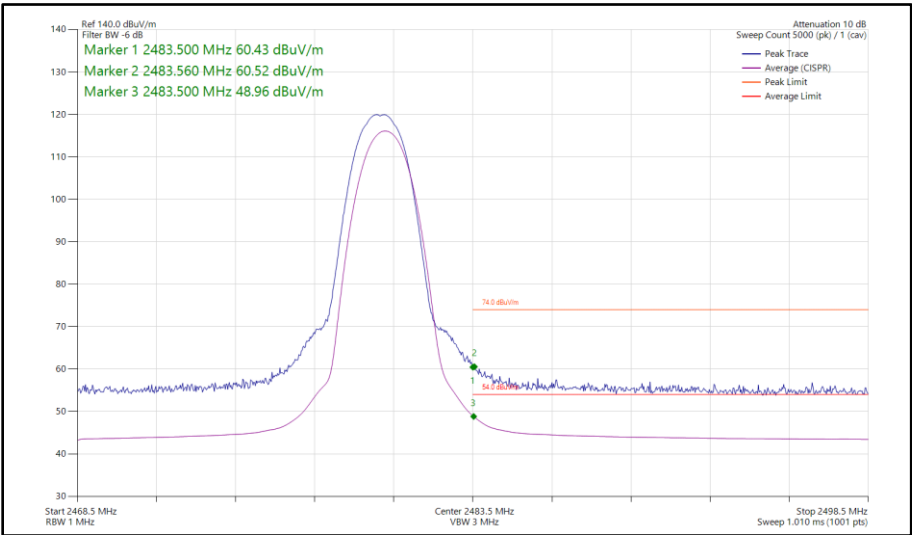


Figure 41 - Bluetooth 2-DH5, MIMO, Core 0 - Core 1 - 2480 MHz
Band Edge Frequency 2483.5 MHz

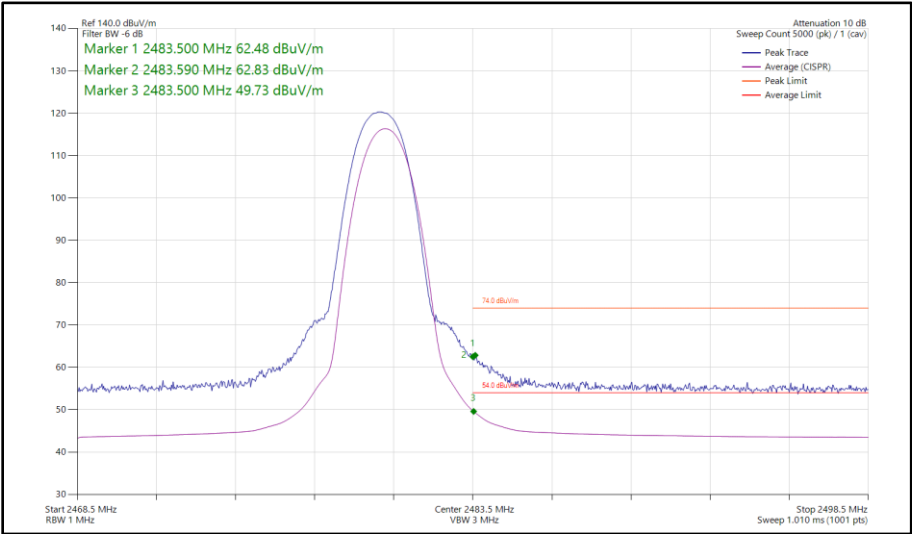


Figure 42 - Bluetooth 3-DH5, MIMO, Core 0 - Core 1 - 2480 MHz
Band Edge Frequency 2483.5 MHz



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

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 15

*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 14 and RF Chamber 15.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Expiry Date
Emissions Software	TUV SUD	EmX V3.2.0	5125	-	Software
EMI Test Receiver	Rohde & Schwarz	ESW44	5911	12	11-Sep-2024
EMI Test Receiver	Rohde & Schwarz	ESW44	5912	12	05-Jul-2024
1500W (300V 12A) AC Power Supply	iTech	IT7324	5955	-	O/P Mon
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
5m Semi-Anechoic Chamber (Dual-Axis), Chamber 15	Albatross Projects	RF Chamber 15	5963	36	28-Apr-2025
Compact Antenna Mast	Maturo Gmbh	CAM4.0-P	5964	-	TU
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	20-May-2025
Cable (SMA to SMA 1m)	Junkosha	MWX221-01000AMSAMS/A	5997	12	14-Sep-2024
Cable (SMA to SMA 6.5m)	Junkosha	MWX221-06500AMSAMS/B	6003	12	05-Jun-2024
Cable (SMA to SMA 1m)	Junkosha	MWX221-01000AMSAMS/A	6007	12	05-Jun-2024
Cable (SMA to SMA 1m)	Junkosha	MWX221-01000AMSAMS/A	6007	12	20-May-2025
Cable (N to N 1m)	Junkosha	MWX221-01000AMSAMS/B	6009	12	05-Jun-2024
Cable (N to N 1m)	Junkosha	MWX221-01000AMSAMS/B	6009	12	20-May-2025
Horn Antenna (1-10 GHz)	Schwarzbeck	BBHA9120B	6141	12	26-Aug-2024
Horn Antenna (1-10 GHz)	Schwarzbeck	BBHA9120B	6142	12	26-Aug-2024
Digital Multimeter	Fluke	115	6145	12	15-Jun-2024
Digital Multimeter	Fluke	115	6147	12	16-Jun-2024
Humidity and Temperature Meter	R.S Components	1364	6148	12	21-Jul-2024
Humidity & Temperature meter	R.S Components	1364	6149	12	07-Jul-2024



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Expiry Date
SAC Switch Unit	TUV SUD	TUV_SSU_001	6191	12	18-Dec-2024
SAC Switch Unit	TUV SUD	TUV_SSU_004 PLC	6349	12	07-May-2025
1m Cable	Junkosha	MWX241-01000AMSAMS/B	6740	12	01-Feb-2025
1m Cable	Junkosha	MWX241-01000AMSAMS/B	6741	12	01-Feb-2025
6.5m Cable	Junkosha	MWX221-06500AMSAMS/B	6744	12	01-Feb-2025

Table 16

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

A3247, S/N: CMVW5QCY3C - Modification State 0

2.2.3 Date of Test

03-July-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	22.5 °C
Relative Humidity	52.5 %



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) 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	2.901	93	269.8	400.0

Table 17 - 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) RSS-247 5.1 d)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	77.1
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	2.899	104	301.5	400.0

Table 18 - 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) RSS-247 5.1 d)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA 8-DPSK (3-DH5)	Duty Cycle (%):	77.0
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	2.904	103	299.1	400.0

Table 19 - 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) RSS-247 5.1 d)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	iPA GFSK (DH5)	Duty Cycle (%):	76.8
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	2.913	103	300.1	400.0

Table 20 - Time of Occupancy Results



Figure 46 - 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 $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	76.9
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	2.921	115	335.9	400.0

Table 21 - Time of Occupancy Results



Figure 47 - $\pi/4$ 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 8-DPSK (3-DH5)	Duty Cycle (%):	76.9
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	2.928	106	310.3	400.0

Table 22 - Time of Occupancy Results

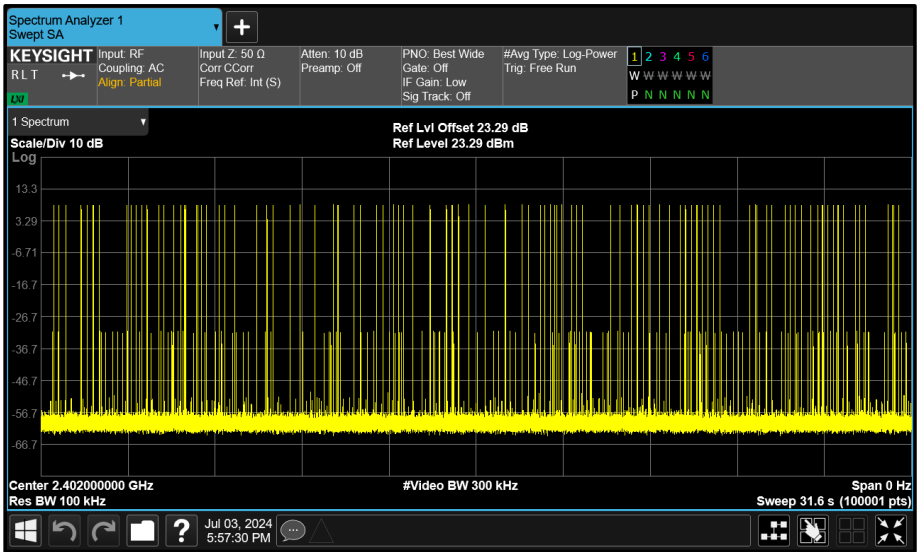


Figure 48 - 8-DPSK - 2402 MHz Accumulated Transmit Time



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

DUT Configuration			
Mode:	ePA 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	2.906	100	290.6	400.0

Table 23 - Time of Occupancy Results



Figure 49 - 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:	ePA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	77.1
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	2.900	100	290.0	400.0

Table 24 - Time of Occupancy Results



Figure 50 - $\pi/4$ 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 8-DPSK (3-DH5)	Duty Cycle (%):	77.2
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	2.903	113	328.0	400.0

Table 25 - Time of Occupancy Results



Figure 51 - 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) 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	2.903	97	281.6	400.0

Table 26 - Time of Occupancy Results



Figure 52 - 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 $\pi/4$ 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	2.900	110	319.0	400.0

Table 27 - Time of Occupancy Results



Figure 53 - $\pi/4$ 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 8-DPSK (3-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	2.902	108	313.4	400.0

Table 28 - Time of Occupancy Results



Figure 54 - 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) RSS-247 5.1 d)	Test Method(s):	C63.10 7.8.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	ePA 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	2.904	113	328.2	400.0

Table 29 - Time of Occupancy Results



Figure 55 - 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:	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	2.901	114	330.7	400.0

Table 30 - Time of Occupancy Results



Figure 56 - $\pi/4$ 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 8-DPSK (3-DH5)	Duty Cycle (%):	77.2
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	2.910	112	325.9	400.0

Table 31 - Time of Occupancy Results



Figure 57 - 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.

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 Chamber 18.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Expiry Date
Hygrometer	Rotronic	I-1000	3068	12	07-Nov-2024
AC Programmable Power Supply	iTech	IT7324	5225	-	O/P Mon
MXA Signal Analyser	Keysight Technologies	N9020B	5529	24	13-Dec-2024
Digital Multimeter	Fluke	115	6145	12	06-Jun-2025
Signal Conditioning Unit	TUV SUD	SPECTRUM_SCU001	6426	12	07-Feb-2025
SCU Cable Assembly	TUV SUD	SPECTRUM_SCU_CA	6752	12	06-Feb-2025
SCU Cable Assembly	TUV SUD	SPECTRUM_SCU_CA	6753	12	06-Feb-2025
SCU Cable Assembly	TUV SUD	SPECTRUM_SCU_CA	6754	0	06-Feb-2025

Table 32

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

A3247, S/N: CMVW5QCY3C - Modification State 0

2.3.3 Date of Test

03-July-2024 to 04-July-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	22.1 - 22.2 °C
Relative Humidity	52.5 - 59.1 %



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) 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):	A (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	2442.019	1.002	≥616.0

Table 33 - Carrier Frequency Separation Results

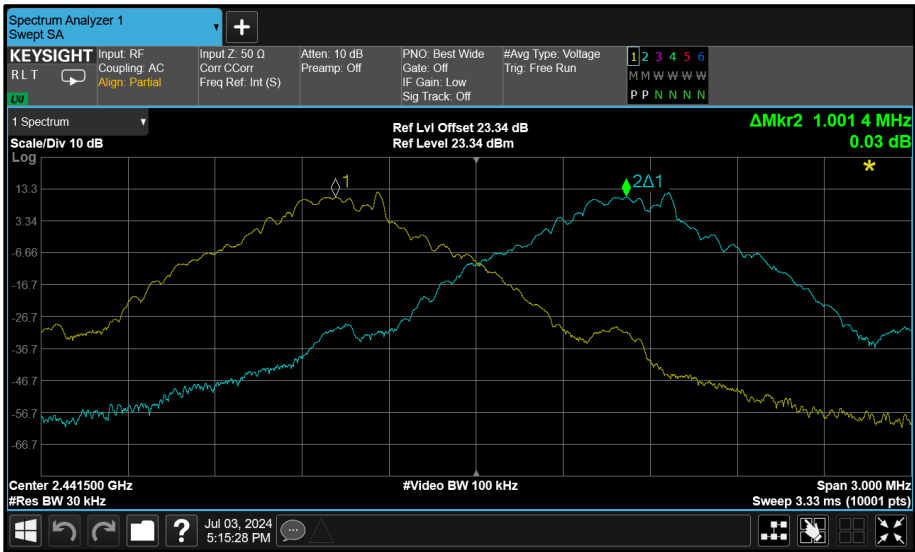


Figure 58 - GFSK - 2441 MHz (CH39)



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):	A (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.354	2441.000	2441.999	0.999	≥ 902.9

Table 34 - Carrier Frequency Separation Results

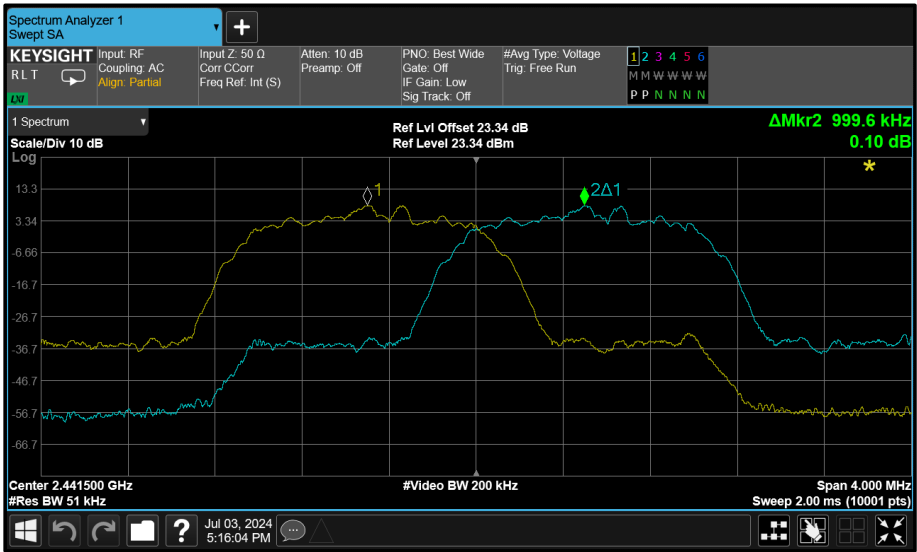


Figure 59 - $\pi/4$ DQPSK - 2441 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	FCC 15.247(a)(1) 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):	A (Core 0)	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.323	2441.008	2442.008	1.000	≥881.9

Table 35 - Carrier Frequency Separation Results

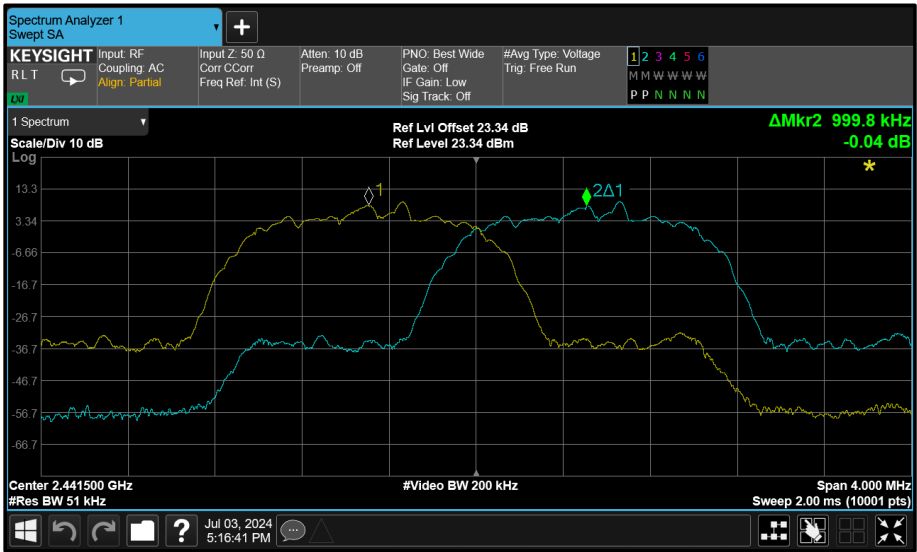


Figure 60 - 8-DPSK - 2441 MHz (CH39)



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

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	0.924	2441.017	2442.016	0.999	≥616.2

Table 36 - Carrier Frequency Separation Results

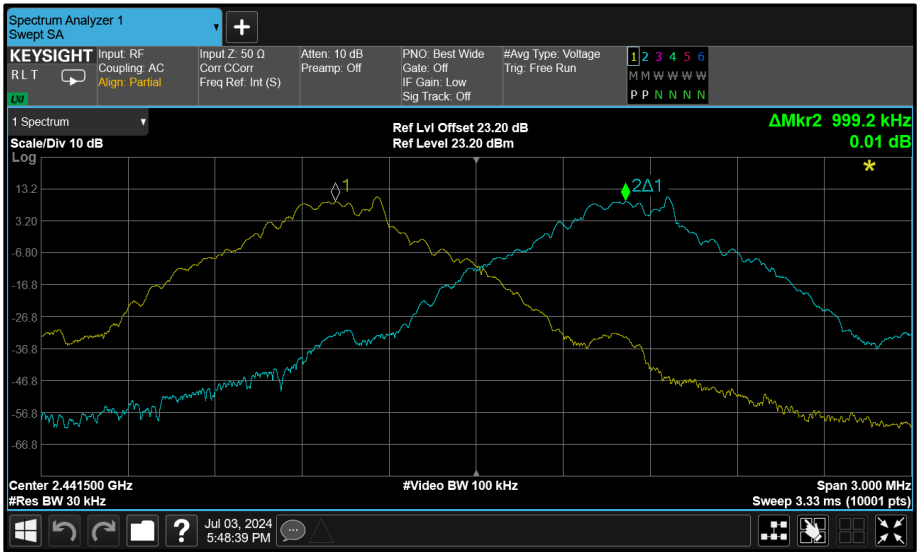


Figure 61 - GFSK - 2441 MHz (CH39)



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

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	1.352	2441.000	2441.999	0.999	≥ 901.3

Table 37 - Carrier Frequency Separation Results

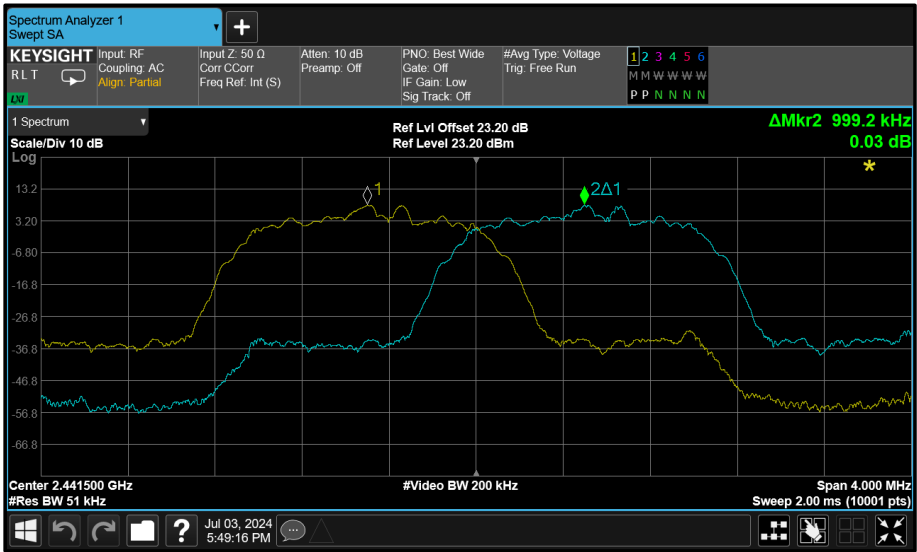


Figure 62 - $\pi/4$ DQPSK - 2441 MHz (CH39)



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):	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	2441.007	2442.007	1.000	≥881.3

Table 38 - Carrier Frequency Separation Results

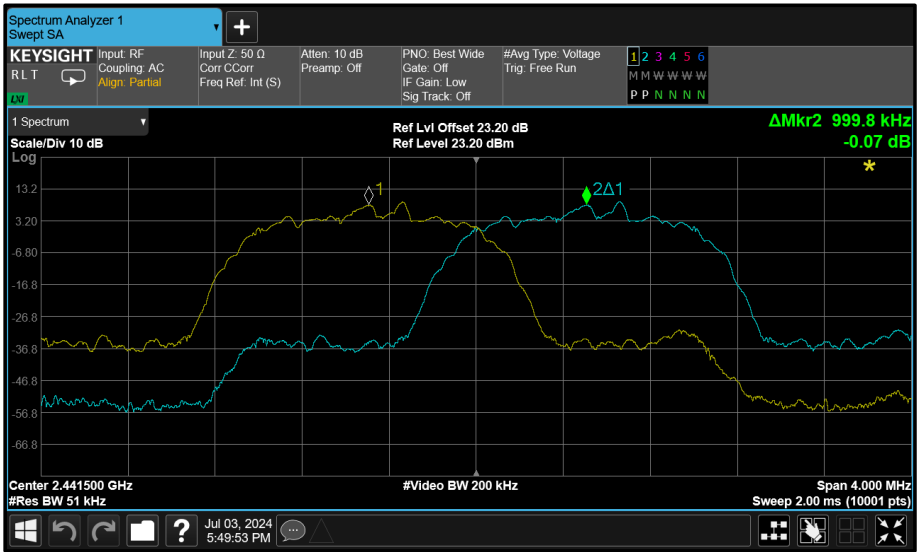


Figure 63 - 8-DPSK - 2441 MHz (CH39)



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

Test Frequency (MHz)	20 dB Bandwidth (MHz)	Carrier Frequency Separation (MHz)			Limit (kHz)
		F1C	F2C	FHS	
2441	0.960	2441.009	2442.018	1.009	≥640.0

Table 39 - Carrier Frequency Separation Results

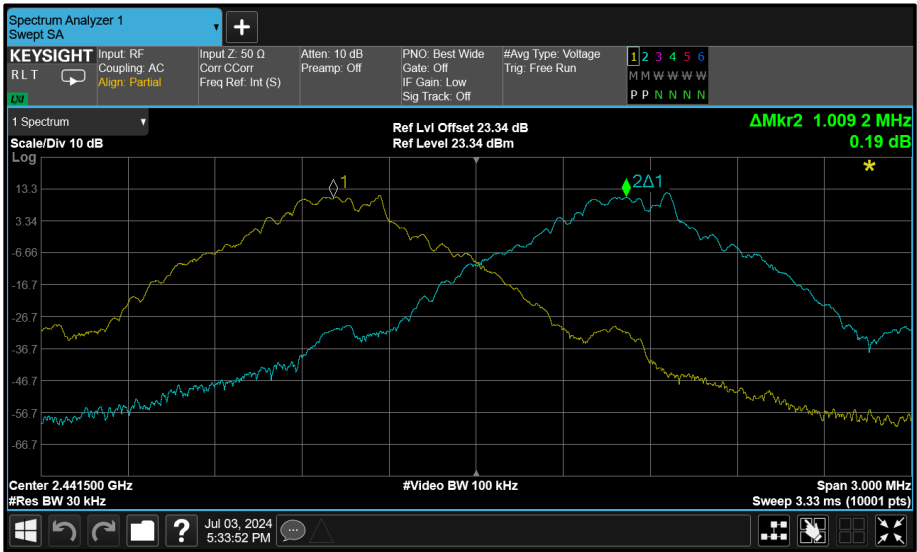


Figure 64 - GFSK - 2441 MHz (CH39)



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:	ePA $\pi/4$ DQPSK (2-DH5)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	A (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	2441.000	2442.000	1.000	≥ 902.1

Table 40 - Carrier Frequency Separation Results



Figure 65 - $\pi/4$ 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):	A (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	2441.007	2442.007	1.000	≥880.5

Table 41 - Carrier Frequency Separation Results



Figure 66 - 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):	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	0.928	2441.018	2442.014	0.996	≥618.8

Table 42 - Carrier Frequency Separation Results

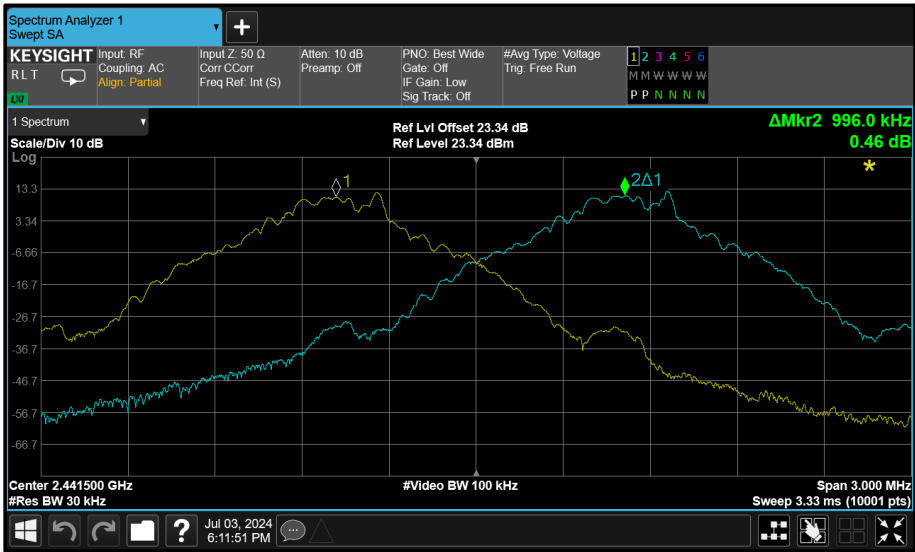


Figure 67 - GFSK - 2441 MHz (CH39)



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):	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	1.352	2441.000	2441.999	0.999	≥ 901.3

Table 43 - Carrier Frequency Separation Results

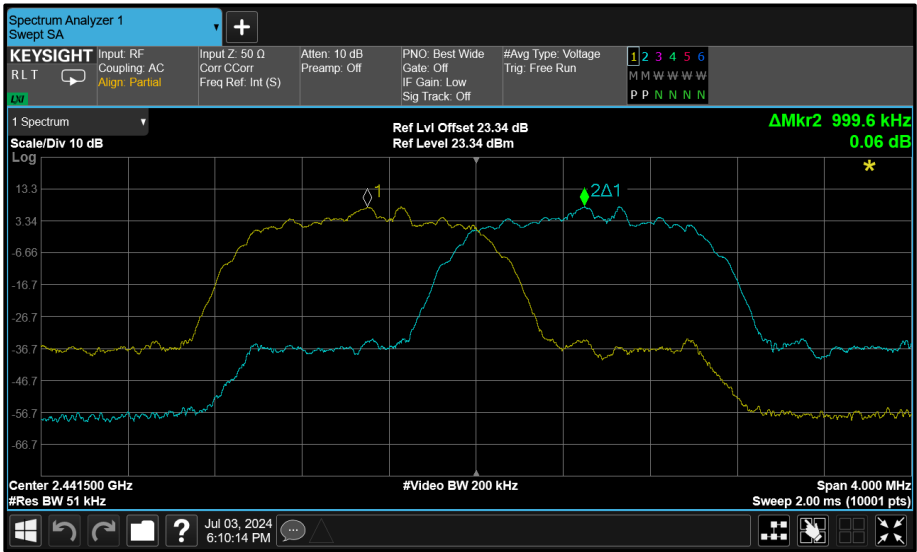


Figure 68 - $\pi/4$ DQPSK - 2441 MHz (CH39)

