

# FCC and ISED Test Report

Apple Inc  
Model: A3241



In accordance with FCC 47 CFR Part 15E,  
ISED RSS-247 and ISED RSS-GEN  
(Narrowband)

Prepared for: Apple Inc  
One Apple Park Way  
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95014  
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FCC ID: BCGA3241

IC: 579C-A3241

## COMMERCIAL-IN-CONFIDENCE

Document 75962766-41 Issue 01

### SIGNATURE

| NAME                   | JOB TITLE         | RESPONSIBLE FOR      | ISSUE DATE       |
|------------------------|-------------------|----------------------|------------------|
| Tiago De Camargo Alves | Technical Support | Authorised Signatory | 13 December 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 15E, 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 | 13 December 2024 |           |

|                                                                                                                                   |                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| FCC Accreditation<br>492497/UK2010 Octagon House, Fareham Test Laboratory<br>553713/UK2026 Concorde Park, Fareham Test Laboratory | ISED Accreditation<br>12669A/UK0003 Octagon House, Fareham Test Laboratory<br>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 15E: 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.



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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           | 13-Dec-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 15E: 2023<br>ISED RSS-247: Issue 3 (2023-08)<br>ISED RSS-GEN: Issue 5 (2018-04) + A2 (2021-02)                                          |
| Start of Test                 | 30-September-2024                                                                                                                                       |
| Finish of Test                | 09-December-2024                                                                                                                                        |
| Name of Engineer(s)           | Thomas Biddlecombe, Ahmed Al Derdiri, Colin Brain,<br>Manohar Thota, Marius Vasii, Mustafa Murad,<br>Akhil Rajendran Bhaskaran Nair and Vineeth Nagaraj |
| Related Document(s)           | ANSI C63.10 (2020)<br>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 15E, ISSED RSS-247 and ISSED RSS-GEN is shown below.

| Section                            | Specification Clause  |         |              | Test Description                         | Result | Comments/Base Standard                                                                                      |
|------------------------------------|-----------------------|---------|--------------|------------------------------------------|--------|-------------------------------------------------------------------------------------------------------------|
|                                    | Part 15E              | RSS-247 | RSS-GEN      |                                          |        |                                                                                                             |
| Configuration and Mode: Narrowband |                       |         |              |                                          |        |                                                                                                             |
| -                                  | 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                                | 15.407 (a)            | 6.2     | -            | Emission Bandwidth                       | Pass   | ANSI C63.10 (2020)                                                                                          |
| 2.3                                | 15.407 (a)            | 6.2     | -            | Maximum Conducted Output Power           | Pass   | ANSI C63.10 (2020)<br>KDB 662911 D01 v02r01                                                                 |
| 2.4                                | 15.407 (a)            | 6.2     | -            | Maximum Conducted Power Spectral Density | Pass   | ANSI C63.10 (2020)<br>KDB 662911 D01 v02r01                                                                 |
| 2.5                                | 15.407 (b)            | 6.2     | -            | Authorised Band Edges                    | Pass   | ANSI C63.10 (2020)                                                                                          |
| 2.6                                | 15.209 and 15.407 (b) | 6.2     | 6.13 and 8.9 | Spurious Radiated Emissions              | Pass   | ANSI C63.10 (2020)                                                                                          |

**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**

Narrowband operation was supported in the following frequency bands:

- US: 5162-5245 MHz
- US and Canada: 5733-5844 MHz

It supports SISO (Single Input/Single Output) operation on two different cores (Core 0 and Core 1). It also supports MIMO (Multiple Input/Multiple Output) beamforming operation on Core 0 + Core 1 simultaneously.

It operates at two power settings: low power “iPA” and high power “ePA” and uses different output powers per core dependent on how many cores are used.

Both power modes support HDR4 (4-DH5) and HDR8 (8-DH5). iPA mode additionally supports Basic Rate (DH5).

After preliminary investigations, conducted tests on the EUT were performed in the following modes:

SISO modes:

- DH5 - iPA - Core 1 (UNII-1) & Core 1 (UNII-3)
- HDR4 - iPA - Core 1 (UNII-1) & Core 1 (UNII-3)
- HDR8 - iPA - Core 1 (UNII-1) & Core 1 (UNII-3)
- HDR4 - ePA - Core 1 (UNII-1) & Core 1 (UNII-3)
- HDR8 - ePA - Core 1 (UNII-1) & Core 1 (UNII-3)

MIMO modes:

- DH5 - iPA - Core 0 + Core 1
- HDR4 - iPA - Core 0 + Core 1
- HDR8 - iPA - Core 0 + Core1
- HDR4 - ePA - Core 0 + Core 1
- HDR8 - ePA - Core 0 + Core1

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

MIMO modes:

- DH5 - iPA - Core 0 + Core 1(UNII-1) & (UNII-3)
- DH5- ePA - Core 0 + Core 1(UNII-1)
- HDR4 - ePA - Core 0 + Core 1 (UNII-3)



### 1.4.3 Test Setup

For conducted tests, a conducted test point was provided by the manufacturer via a UFL connector and cable. The loss of these test cables were known and compensated for in any conducted measurements.

For all tests, the EUT was put into a continuous transmit test mode with the manufacturer's test commands via a script running in the EUTs terminal application. The EUT then transmitted the required type of modulation/packet type on a static channel selected within the test script.

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

### 1.4.4 Antenna Gain Table

| Antenna Port | Frequency Range (MHz) | Peak Gain (dBi) | Conducted Cable Loss (dB) |
|--------------|-----------------------|-----------------|---------------------------|
| Core 0       | 5150 to 5250          | 7.14            | 1.07                      |
|              | 5725 to 5850          | 4.83            | 1.18                      |
| Core 1       | 5150 to 5250          | 7.19            | 1.07                      |
|              | 5725 to 5850          | 5.17            | 1.18                      |

**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: A3241  |                  |                  |
|---------------|------------------|------------------|
| Serial Number | Hardware Version | Software Version |
| DT7LYX5QXT    | REV1.0           | 24A12461c        |
| K2K9N270NG    | REV1.0           | 24A12461c        |
| HJKCRQM3K9    | REV1.0           | 24A12461c        |
| G0Q65Y9HP6    | REV1.0           | 24A12461c        |
| FWKQMY7GHY    | REV1.0           | 24A12461c        |

**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: A3241, Serial Number: K2K9N270NG |                                                 |                        |                          |
| 0                                       | As supplied by the customer                     | Not Applicable         | Not Applicable           |
| Model: A3241, Serial Number: HJKCRQM3K9 |                                                 |                        |                          |
| 0                                       | As supplied by the customer                     | Not Applicable         | Not Applicable           |
| Model: A3241, Serial Number: DT7LYX5QXT |                                                 |                        |                          |
| 0                                       | As supplied by the customer                     | Not Applicable         | Not Applicable           |
| Model: A3241, Serial Number: G0Q65Y9HP6 |                                                 |                        |                          |
| 0                                       | As supplied by the customer                     | Not Applicable         | Not Applicable           |
| Model: A3241, Serial Number: FWKQMY7GHY |                                                 |                        |                          |
| 0                                       | As supplied by the customer                     | Not Applicable         | Not Applicable           |

**Table 5**



## 1.8 Test Location

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

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

**Table 6**

Office Address:

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

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

| Test Name                                | Name of Engineer(s)                                             | Accreditation |
|------------------------------------------|-----------------------------------------------------------------|---------------|
| Configuration and Mode: Narrowband       |                                                                 |               |
| Restricted Band Edges                    | Ahmed Al Derdiri, Colin Brain, Manohar Thota and Marius Vasii   | UKAS          |
| Emission Bandwidth                       | Mustafa Murad                                                   | UKAS          |
| Maximum Conducted Output Power           | Mustafa Murad                                                   | UKAS          |
| Maximum Conducted Power Spectral Density | Mustafa Murad                                                   | UKAS          |
| Authorised Band Edges                    | Ahmed Al Derdiri, Colin Brain, Manohar Thota and Marius Vasii   | UKAS          |
| Spurious Radiated Emissions              | Akhil Rajendran Bhaskaran Nair, Colin Brain and Vineeth Nagaraj | UKAS          |

**Table 7**

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 15E, Clause 15.205  
ISED RSS-247, Clause 3.3  
ISED RSS-GEN, Clause 8.10

#### 2.1.2 Equipment Under Test and Modification State

A3241, S/N: HJKCRQM3K9 - Modification State 0

#### 2.1.3 Date of Test

30-September-2024 to 06-October-2024

#### 2.1.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.10.5.

Restricted Band Edge measurements were performed with the device operating in SISO, MIMO and TxBF, across the various modes supported by the device.

The measurements displayed within this report have been limited to those modes which have been shown to be worst case.

Further measurements are held on file by TÜV SÜD and are available if required.

#### 2.1.5 Environmental Conditions

|                     |                |
|---------------------|----------------|
| Ambient Temperature | 21.9 - 23.2 °C |
| Relative Humidity   | 44.5 - 59.3 %  |

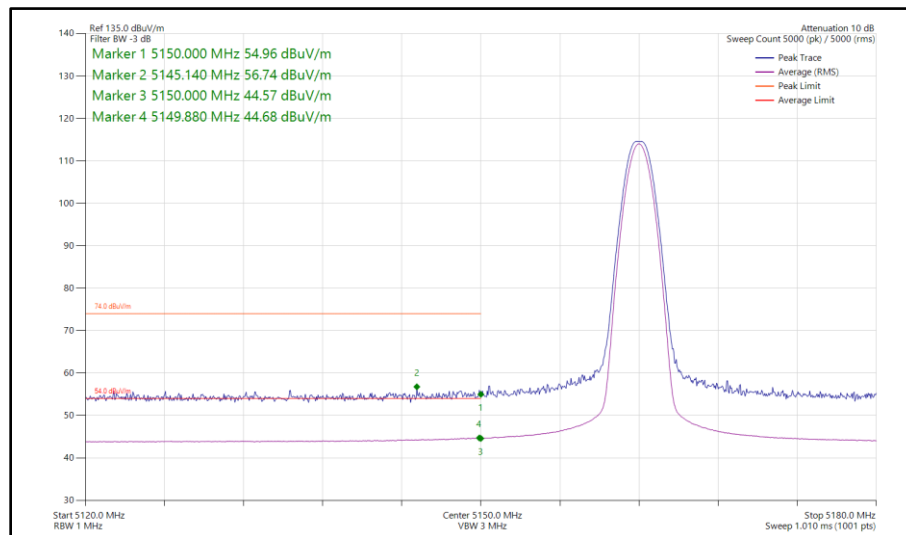
## 2.1.6 Test Results

### Narrowband

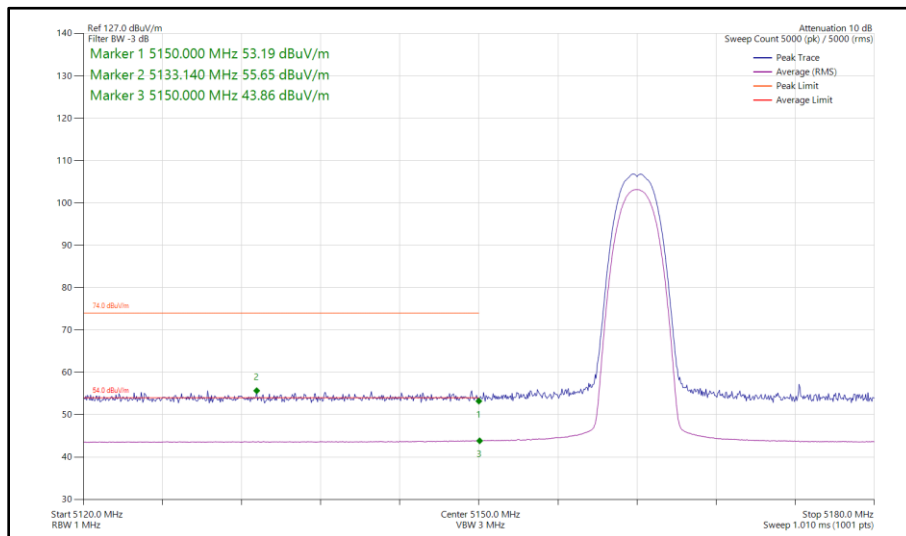
#### iPA - Core 0 (SISO)

| Mode   | Packet Type | TX Frequency (MHz) | Band Edge Frequency (MHz) | Peak Level (dBμV/m) | Average Level (dBμV/m) |
|--------|-------------|--------------------|---------------------------|---------------------|------------------------|
| Static | DH5         | 5162               | 5150                      | 56.74               | 44.68                  |
| Static | HDR4        | 5162               | 5150                      | 55.65               | 43.86                  |
| Static | HDR8        | 5162               | 5150                      | 56.12               | 44.50                  |
| Static | DH5         | 5245               | 5350                      | 57.35               | 45.34                  |
| Static | HDR4        | 5245               | 5350                      | 57.10               | 45.19                  |
| Static | HDR8        | 5245               | 5350                      | 57.05               | 45.12                  |

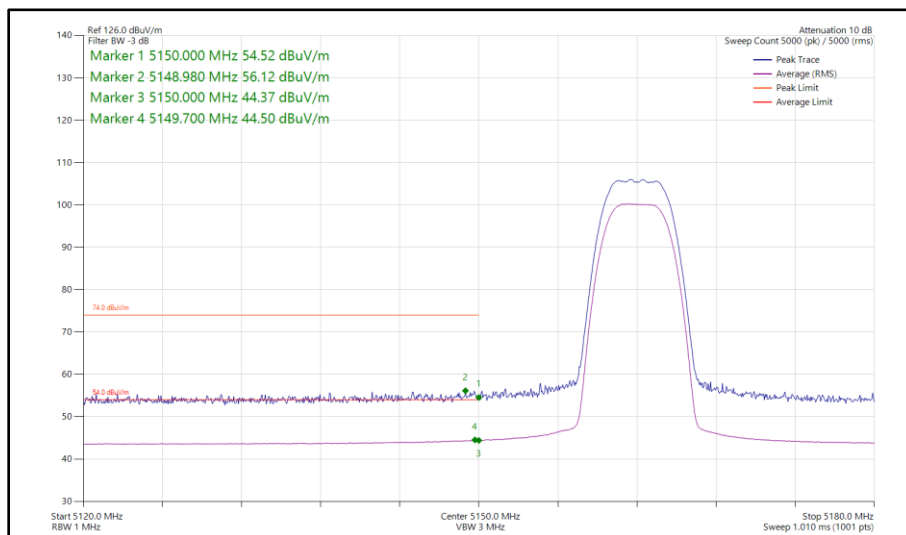
**Table 8 - SISO Restricted Band Edge Results**



**Figure 1 - Bluetooth DH5, SISO, Core 0 - 5162 MHz  
Band Edge Frequency 5150 MHz**



**Figure 2 - Bluetooth HDR4, SISO, Core 0 - 5162 MHz  
Band Edge Frequency 5150 MHz**



**Figure 3 - Bluetooth HDR8, SISO, Core 0 - 5162 MHz  
Band Edge Frequency 5150 MHz**

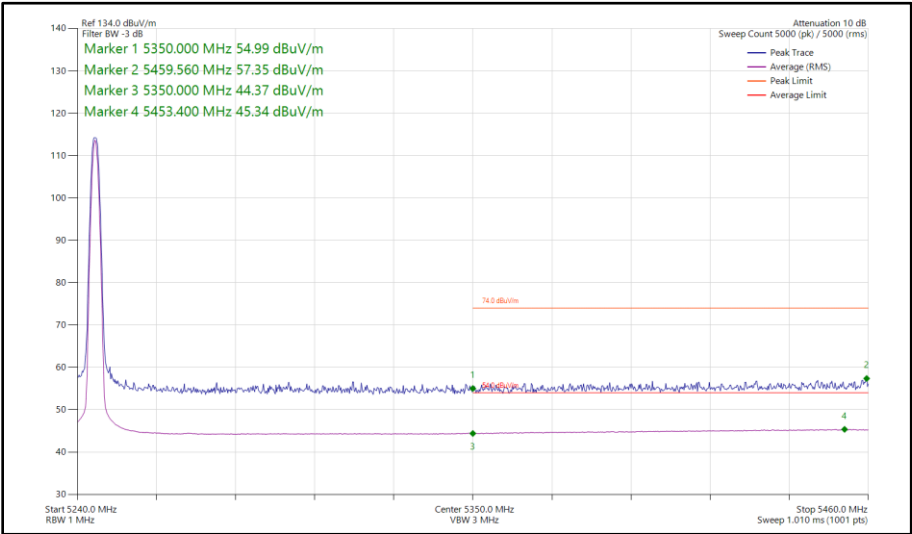


Figure 4 - Bluetooth DH5, SISO, Core 0 - 5245 MHz  
Band Edge Frequency 5350 MHz

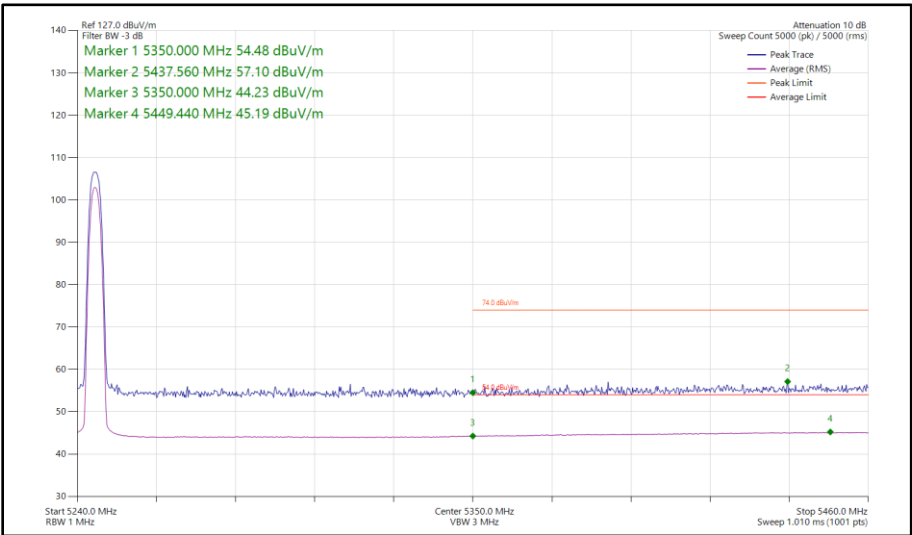
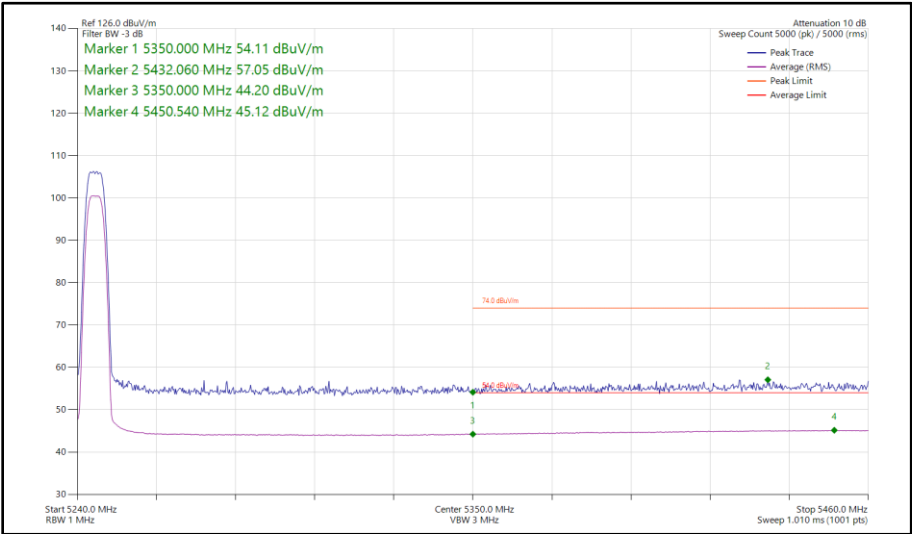


Figure 5 - Bluetooth HDR4, SISO, Core 0 - 5245 MHz  
Band Edge Frequency 5350 MHz

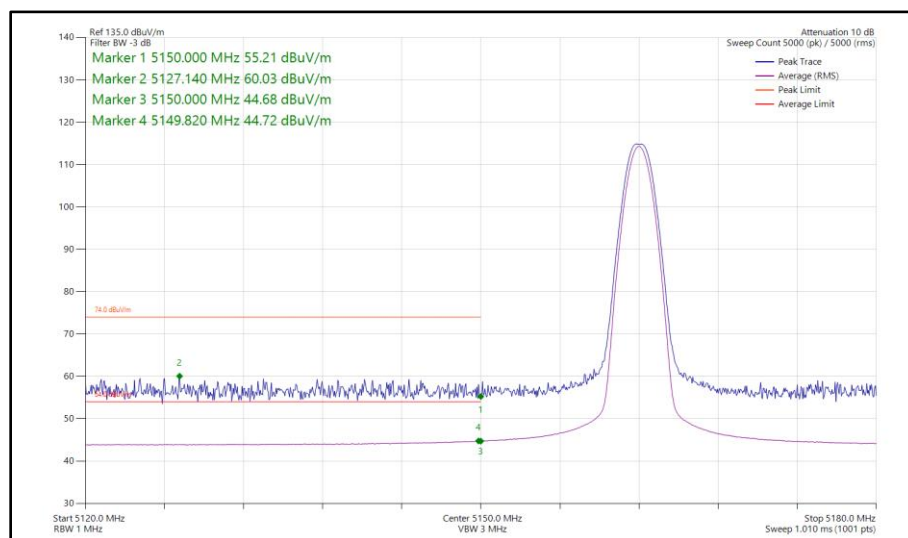


**Figure 6 - Bluetooth HDR8, SISO, Core 0 - 5245 MHz  
Band Edge Frequency 5350 MHz**

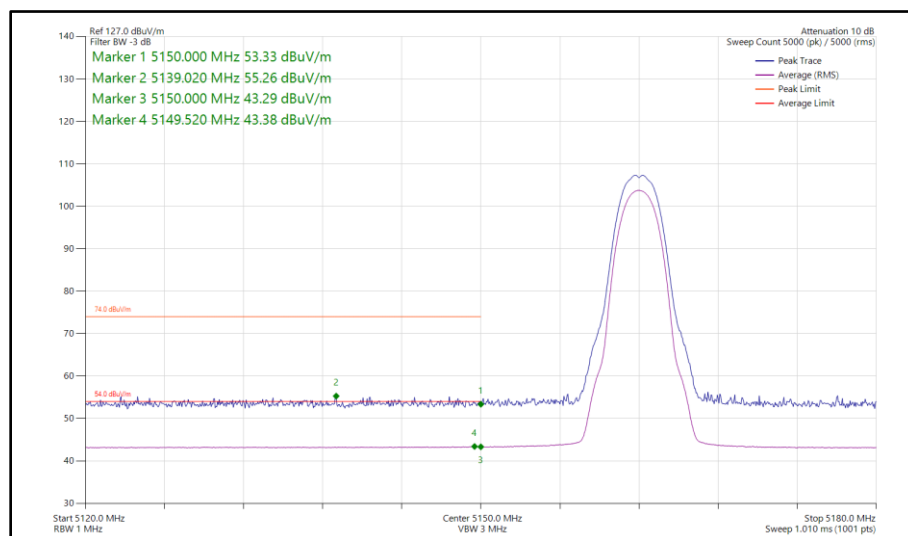
iPA - Core 1 (SISO)

| Mode   | Packet Type | TX Frequency (MHz) | Band Edge Frequency (MHz) | Peak Level (dBμV/m) | Average Level (dBμV/m) |
|--------|-------------|--------------------|---------------------------|---------------------|------------------------|
| Static | DH5         | 5162               | 5150                      | 60.03               | 44.72                  |
| Static | HDR4        | 5162               | 5150                      | 55.26               | 43.38                  |
| Static | HDR8        | 5162               | 5150                      | 55.30               | 43.66                  |
| Static | DH5         | 5245               | 5350                      | 57.39               | 45.12                  |
| Static | HDR4        | 5245               | 5350                      | 56.79               | 45.00                  |
| Static | HDR8        | 5245               | 5350                      | 57.42               | 44.99                  |

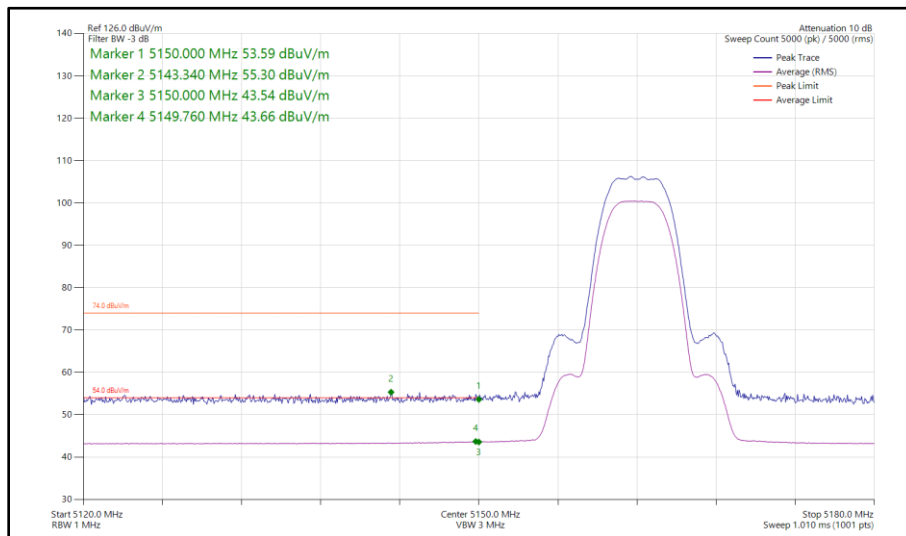
**Table 9 - SISO Restricted Band Edge Results**



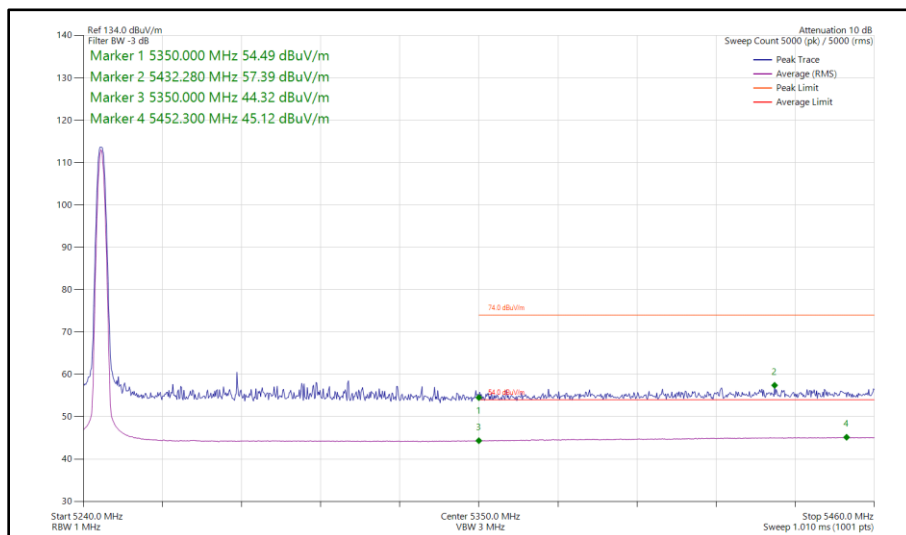
**Figure 7 - Bluetooth DH5, SISO, Core 1 - 5162 MHz  
Band Edge Frequency 5150 MHz**



**Figure 8 - Bluetooth HDR4, SISO, Core 1 - 5162 MHz  
Band Edge Frequency 5150 MHz**



**Figure 9 - Bluetooth HDR8, SISO, Core 1 - 5162 MHz  
Band Edge Frequency 5150 MHz**



**Figure 10 - Bluetooth DH5, SISO, Core 1 - 5245 MHz  
Band Edge Frequency 5350 MHz**

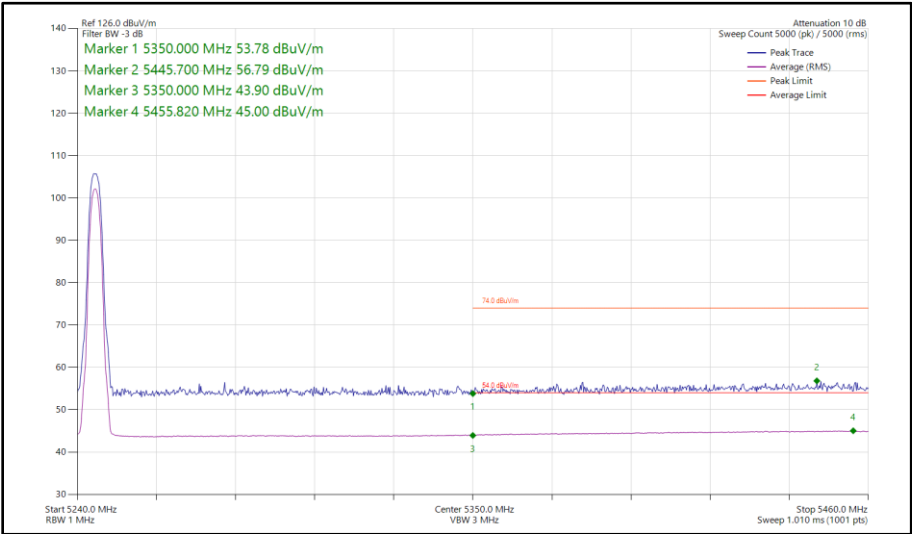


Figure 11 - Bluetooth HDR4, SISO, Core 1 - 5245 MHz  
Band Edge Frequency 5350 MHz

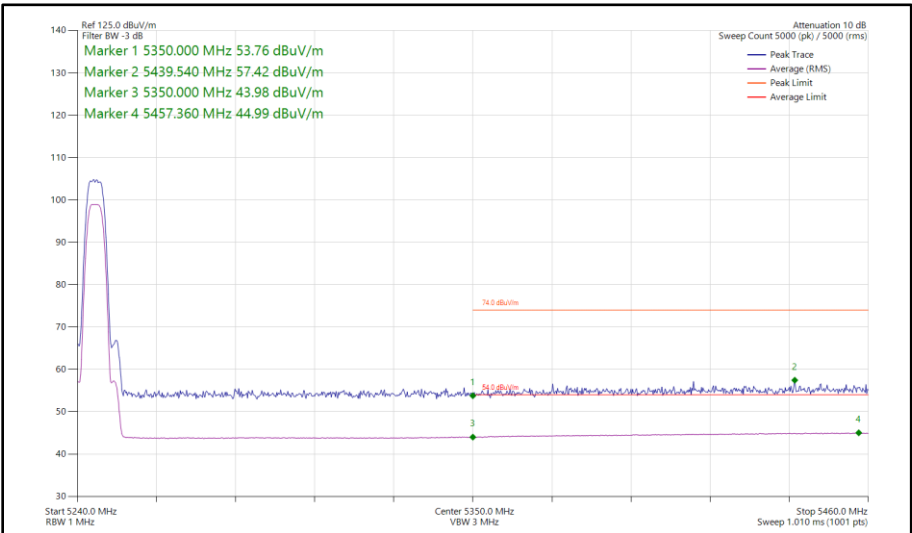


Figure 12 - Bluetooth HDR8, SISO, Core 1 - 5245 MHz  
Band Edge Frequency 5350 MHz

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         | 5162               | 5150                      | 57.01               | 44.53                  |
| Static | HDR4        | 5162               | 5150                      | 55.43               | 43.50                  |
| Static | HDR8        | 5162               | 5150                      | 55.56               | 43.74                  |
| Static | DH5         | 5245               | 5350                      | 57.85               | 45.36                  |
| Static | HDR4        | 5245               | 5350                      | 57.15               | 45.11                  |
| Static | HDR8        | 5245               | 5350                      | 56.91               | 45.13                  |

Table 10 - MIMO Restricted Band Edge Results

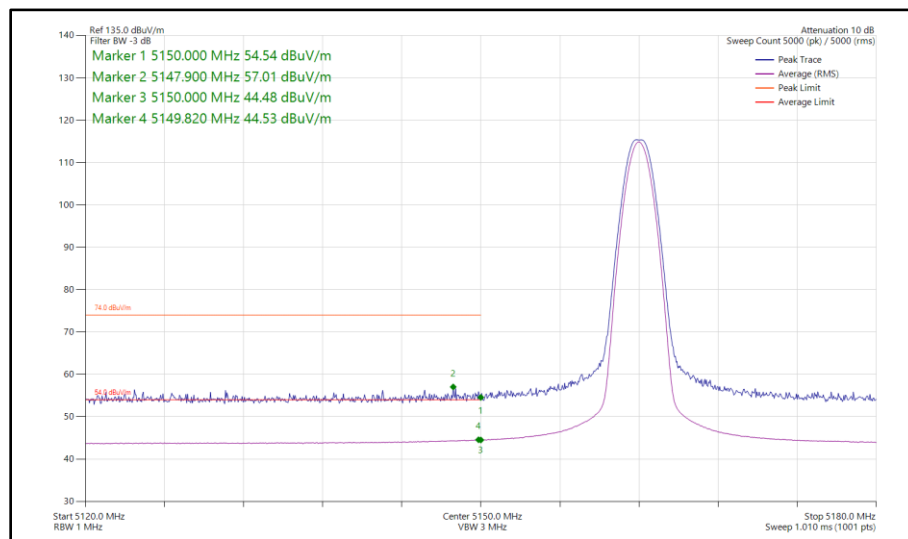


Figure 13 - Bluetooth DH5, MIMO, Core 0 - Core 1 - 5162 MHz  
Band Edge Frequency 5150 MHz

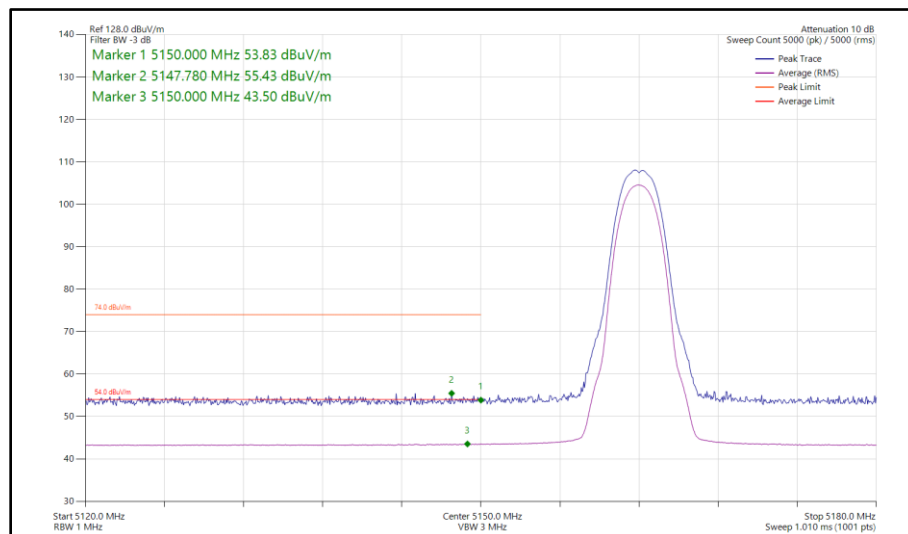
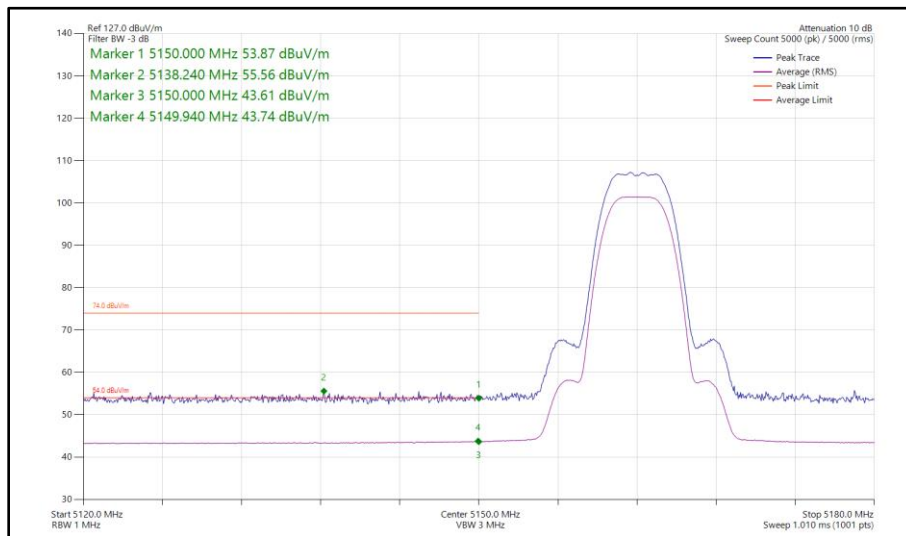
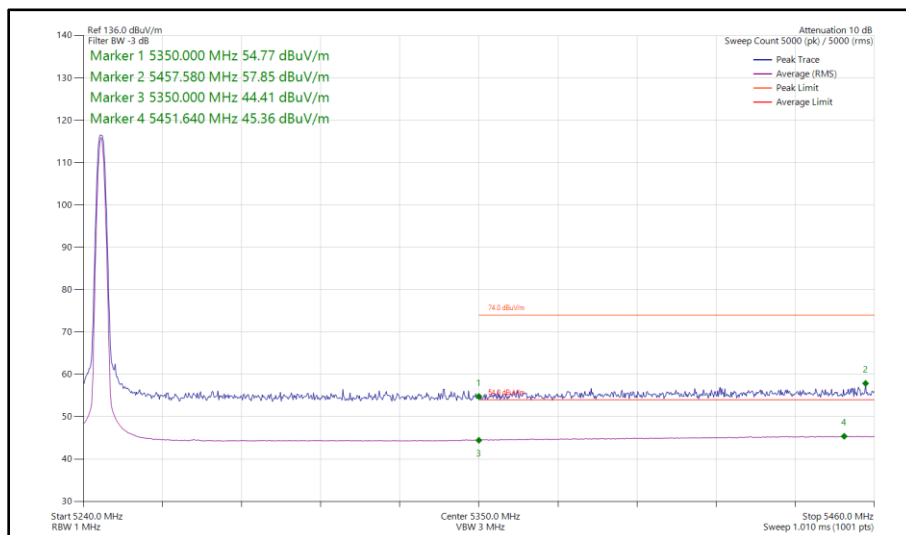


Figure 14 - Bluetooth HDR4, MIMO, Core 0 - Core 1 - 5162 MHz  
Band Edge Frequency 5150 MHz



**Figure 15 - Bluetooth HDR8, MIMO, Core 0 - Core 1 - 5162 MHz  
Band Edge Frequency 5150 MHz**



**Figure 16 - Bluetooth DH5, MIMO, Core 0 - Core 1 - 5245 MHz  
Band Edge Frequency 5350 MHz**

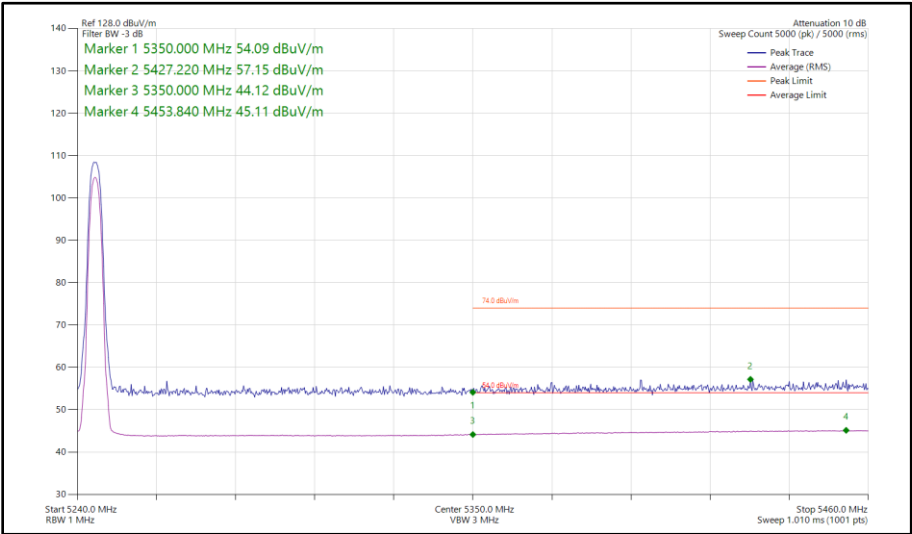


Figure 17 - Bluetooth HDR4, MIMO, Core 0 - Core 1 - 5245 MHz  
Band Edge Frequency 5350 MHz

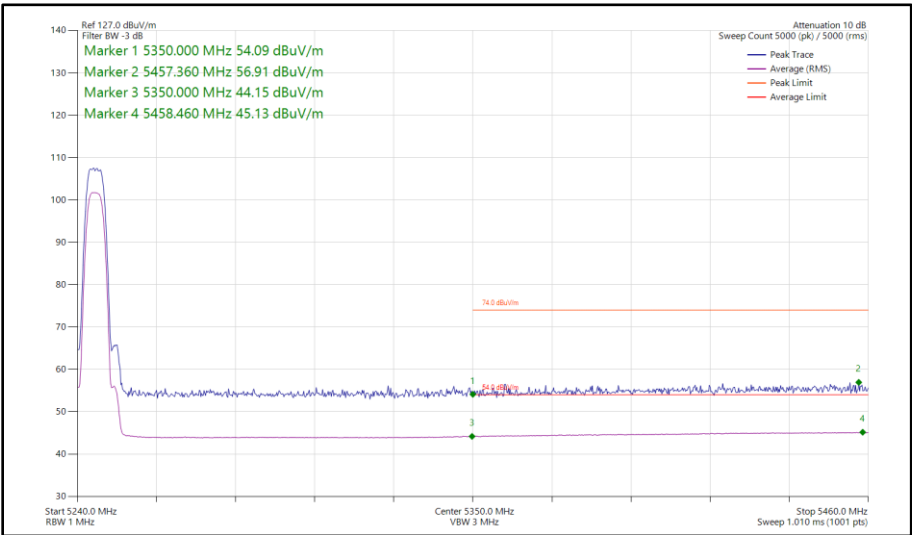


Figure 18 - Bluetooth HDR8, MIMO, Core 0 - Core 1 - 5245 MHz  
Band Edge Frequency 5350 MHz

ePA - Core 0 (SISO)

| Mode   | Packet Type | TX Frequency (MHz) | Band Edge Frequency (MHz) | Peak Level (dBμV/m) | Average Level (dBμV/m) |
|--------|-------------|--------------------|---------------------------|---------------------|------------------------|
| Static | HDR4        | 5162               | 5150                      | 58.54               | 46.94                  |
| Static | HDR8        | 5162               | 5150                      | 61.03               | 49.96                  |
| Static | HDR4        | 5245               | 5350                      | 57.83               | 45.77                  |
| Static | HDR8        | 5245               | 5350                      | 57.65               | 45.87                  |

Table 11 - SISO Restricted Band Edge Results

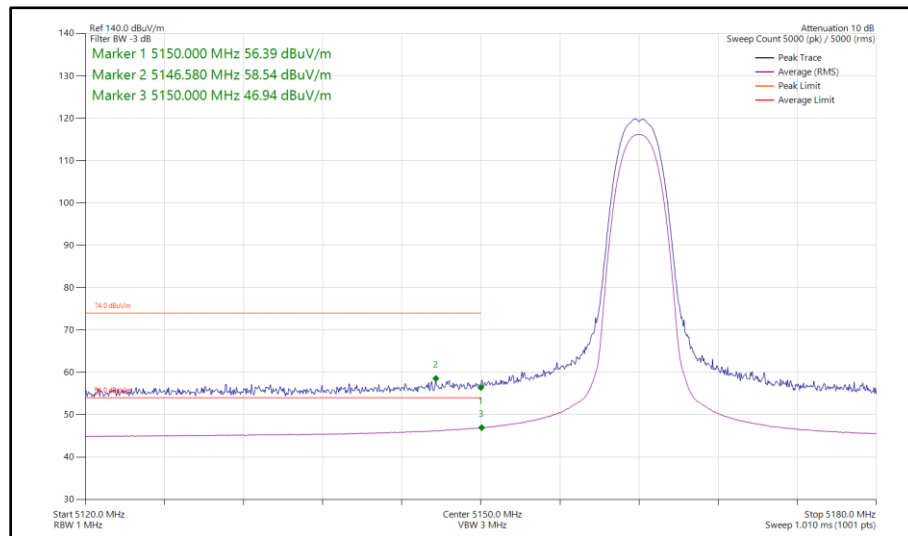


Figure 19 - Bluetooth HDR4, SISO, Core 0 - 5162 MHz  
Band Edge Frequency 5150 MHz

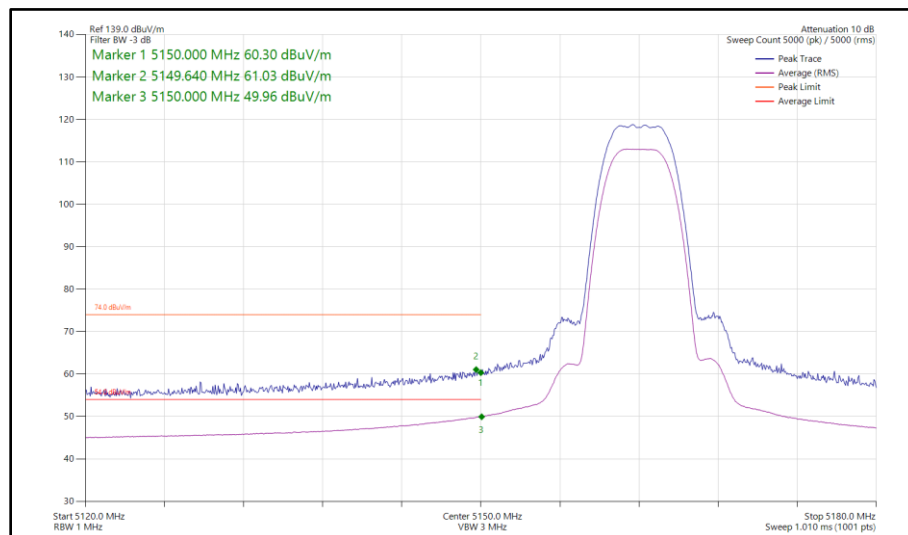
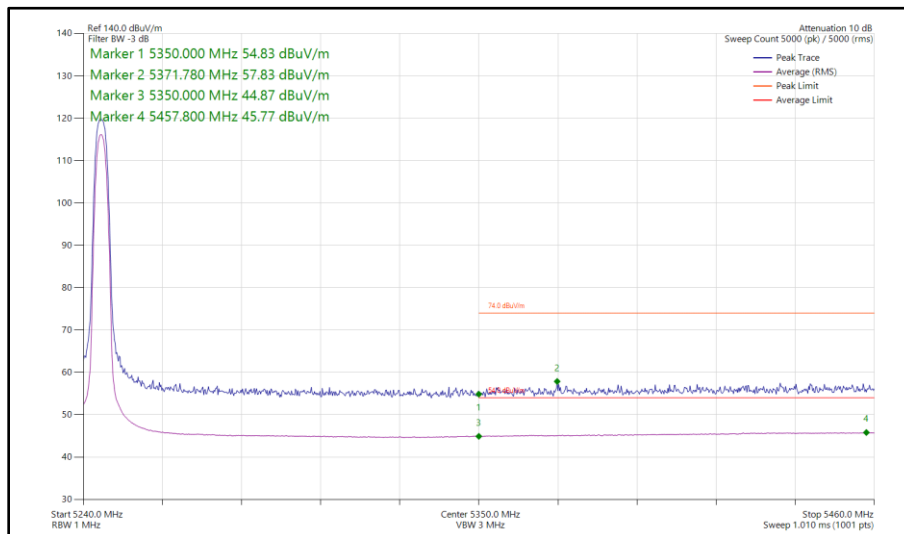
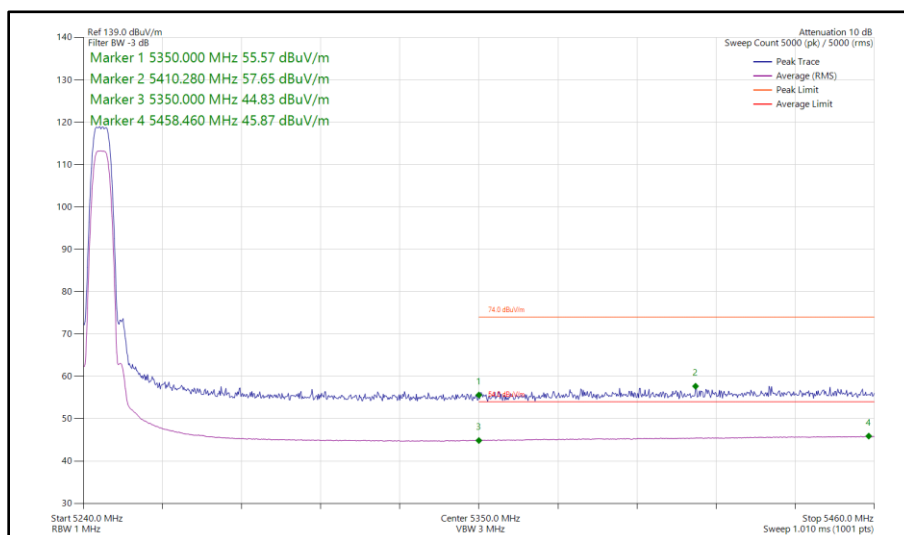


Figure 20 - Bluetooth HDR8, SISO, Core 0 - 5162 MHz  
Band Edge Frequency 5150 MHz



**Figure 21 - Bluetooth HDR4, SISO, Core 0 - 5245 MHz  
Band Edge Frequency 5350 MHz**



**Figure 22 - Bluetooth HDR8, SISO, Core 0 - 5245 MHz  
Band Edge Frequency 5350 MHz**

ePA - Core 1 (SISO)

| Mode   | Packet Type | TX Frequency (MHz) | Band Edge Frequency (MHz) | Peak Level (dBμV/m) | Average Level (dBμV/m) |
|--------|-------------|--------------------|---------------------------|---------------------|------------------------|
| Static | HDR4        | 5162               | 5150                      | 58.16               | 46.74                  |
| Static | HDR8        | 5162               | 5150                      | 59.90               | 48.83                  |
| Static | HDR4        | 5245               | 5350                      | 57.17               | 45.32                  |
| Static | HDR8        | 5245               | 5350                      | 57.61               | 45.38                  |

Table 12 - SISO Restricted Band Edge Results

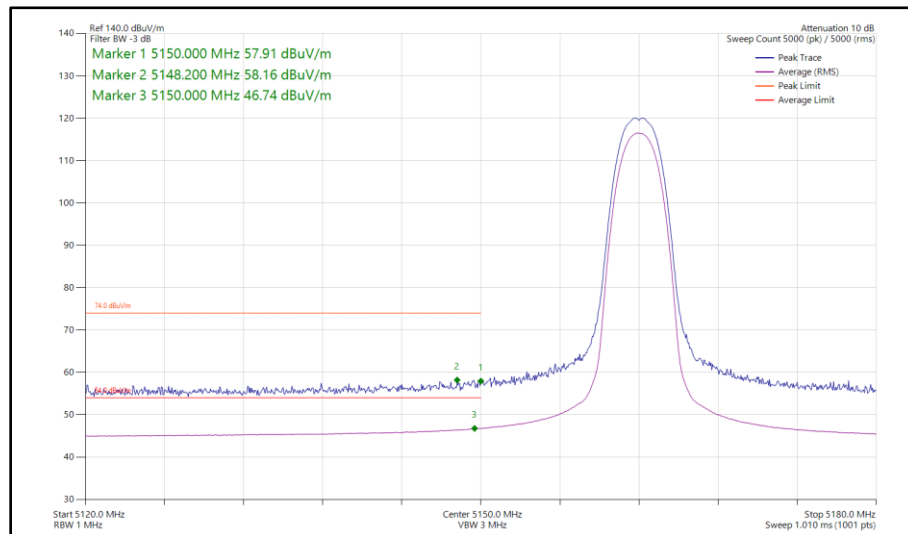


Figure 23 - Bluetooth HDR4, SISO, Core 1 - 5162 MHz  
Band Edge Frequency 5150 MHz

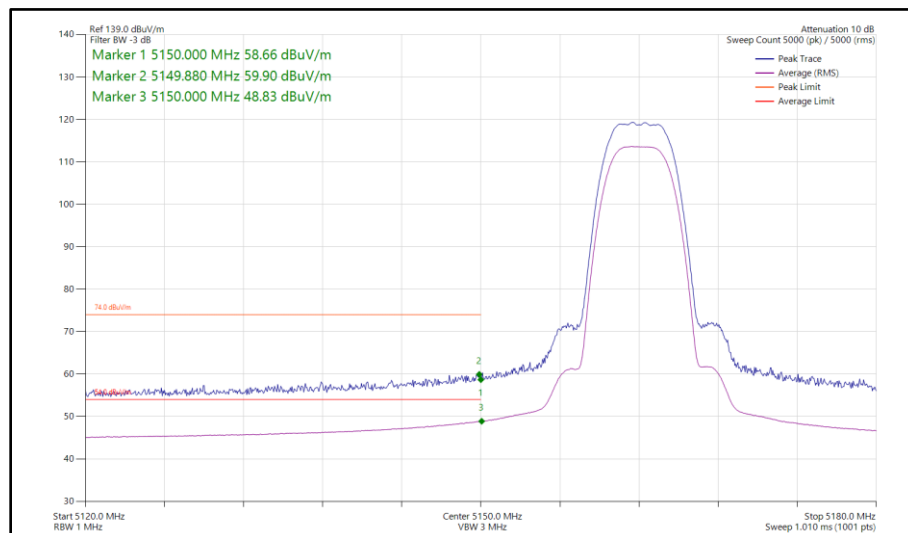
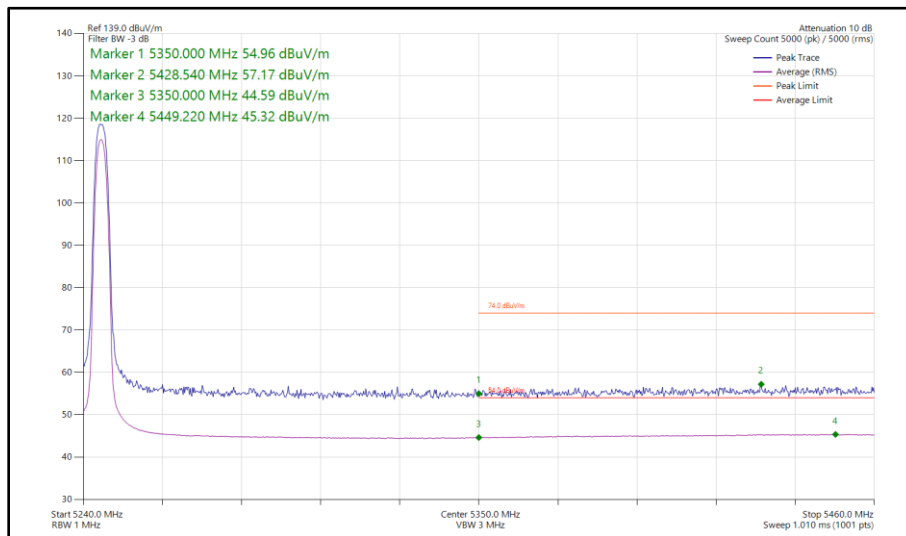
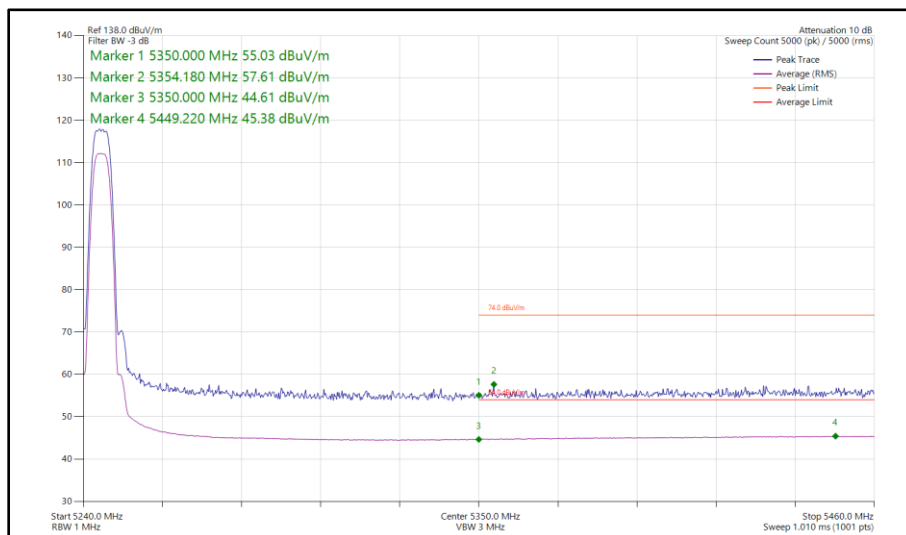


Figure 24 - Bluetooth HDR8, SISO, Core 1 - 5162 MHz  
Band Edge Frequency 5150 MHz



**Figure 25 - Bluetooth HDR4, SISO, Core 1 - 5245 MHz  
Band Edge Frequency 5350 MHz**

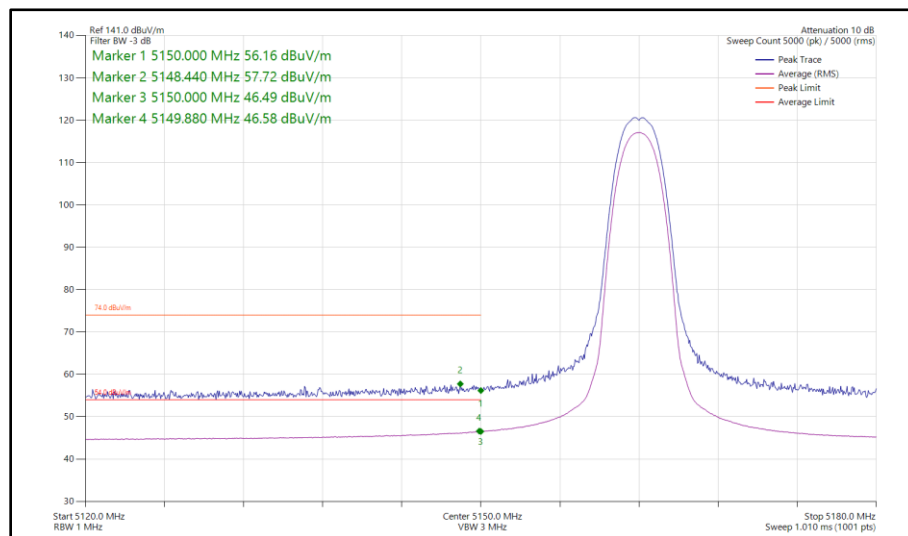


**Figure 26 - Bluetooth HDR8, SISO, Core 1 - 5245 MHz  
Band Edge Frequency 5350 MHz**

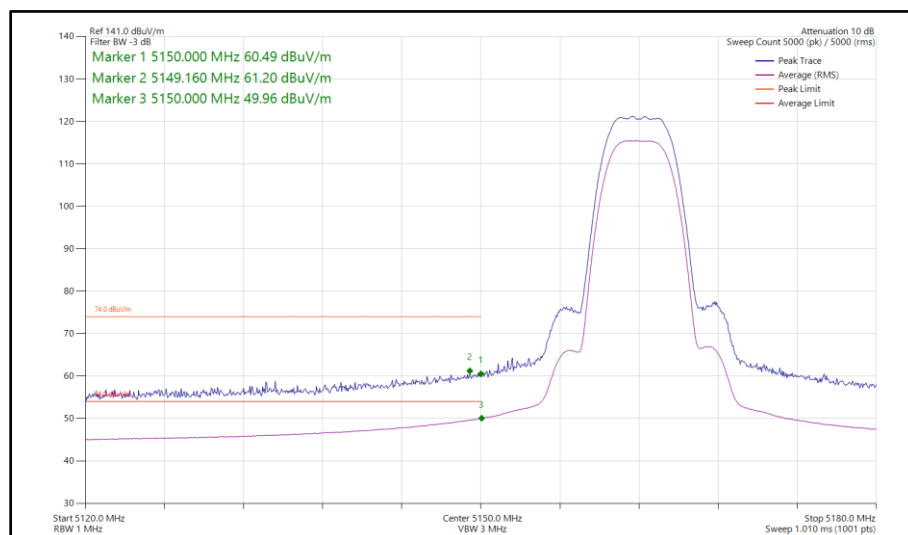
ePA - Core 0 - Core 1 (MIMO)

| Mode   | Packet Type | TX Frequency (MHz) | Band Edge Frequency (MHz) | Peak Level (dBμV/m) | Average Level (dBμV/m) |
|--------|-------------|--------------------|---------------------------|---------------------|------------------------|
| Static | HDR4        | 5162               | 5150                      | 57.72               | 46.58                  |
| Static | HDR8        | 5162               | 5150                      | 61.20               | 49.96                  |
| Static | HDR4        | 5245               | 5350                      | 57.57               | 45.83                  |
| Static | HDR8        | 5245               | 5350                      | 57.75               | 45.96                  |

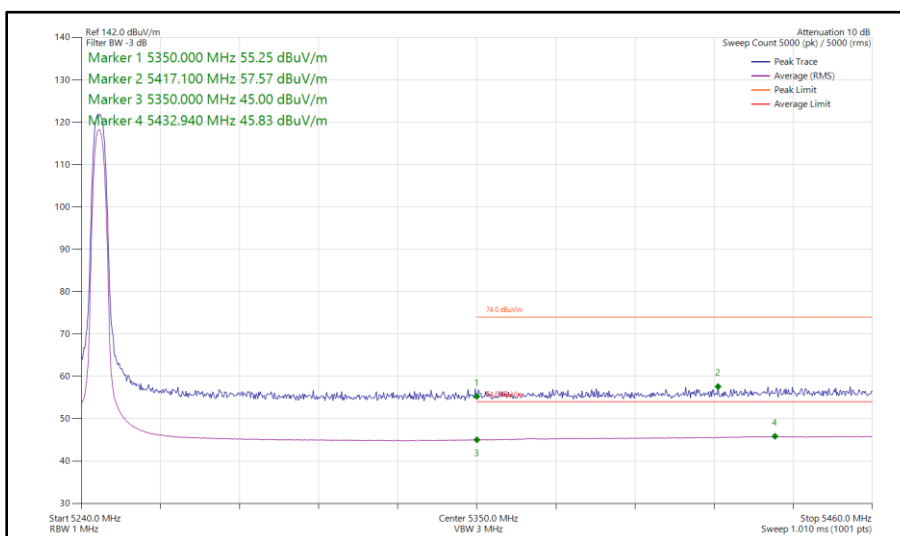
**Table 13 - MIMO Restricted Band Edge Results**



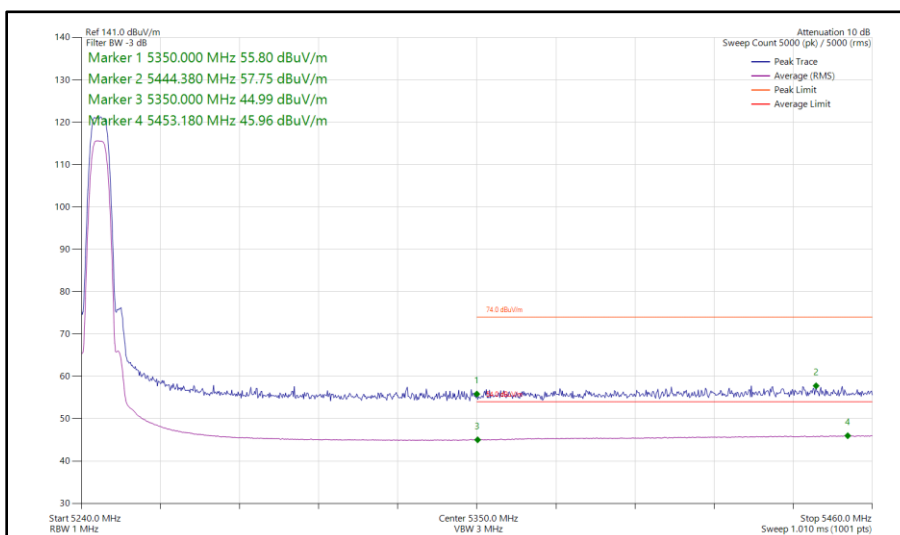
**Figure 27 - Bluetooth HDR4, MIMO, Core 0 - Core 1 - 5162 MHz  
Band Edge Frequency 5150 MHz**



**Figure 28 - Bluetooth HDR8, MIMO, Core 0 - Core 1 - 5162 MHz  
Band Edge Frequency 5150 MHz**



**Figure 29 - Bluetooth HDR4, MIMO, Core 0 - Core 1 - 5245 MHz  
Band Edge Frequency 5350 MHz**



**Figure 30 - Bluetooth HDR8, MIMO, Core 0 - Core 1 - 5245 MHz  
Band Edge Frequency 5350 MHz**

FCC 47 CFR Part 15, Limit Clause 15.205 and ISED RSS-GEN Limit Clause 8.10

|                               | Peak (dBμV/m) | Average (dBμV/m) |
|-------------------------------|---------------|------------------|
| Restricted Bands of Operation | 74            | 54               |

**Table 14 - Restricted Band Edge Limit Table**



## 2.1.7 Test Location and Test Equipment Used

This test was carried out in RF Chamber 16.

| Instrument                          | Manufacturer       | Type No.             | TE No. | Calibration Period (months) | Calibration Expiry Date |
|-------------------------------------|--------------------|----------------------|--------|-----------------------------|-------------------------|
| Emissions Software                  | TUV SUD            | EmX V3.4.2           | 5125   | -                           | Software                |
| Cable 2.92m                         | Junkosha           | MWX241-01000KMS      | 5413   | 12                          | 23-May-2025             |
| EMI Test Receiver                   | Rohde & Schwarz    | ESW44                | 5912   | 12                          | 07-Aug-2025             |
| 1500W (300V 12A) AC Power Supply    | iTech              | IT7324               | 5957   | -                           | O/P Mon                 |
| 3m Semi-Anechoic Chamber, Chamber16 | Albatross Projects | RF Chamber 16        | 5972   | 36                          | 24-May-2025             |
| Mast & Turntable Controller         | Maturo Gmbh        | FCU3.0               | 5973   | -                           | TU                      |
| Tilt Antenna Mast                   | Maturo Gmbh        | BAM4.5-P             | 5974   | -                           | TU                      |
| Turntable                           | Maturo Gmbh        | TT1.5SI              | 5975   | -                           | TU                      |
| WR15 Attenuator                     | Eravant            | STA 30 15 M1         | 6125   | -                           | O/P Mon                 |
| Horn Antenna (1-10 GHz)             | Schwarzbeck        | BBHA9120B            | 6142   | 12                          | 05-May-2025             |
| Digital Multimeter                  | Fluke              | 115                  | 6147   | 12                          | 06-Jun-2025             |
| USB Spectrum Analyser               | Signal Hound       | SA124B               | 6383   | -                           | TU                      |
| 10dB attenuator                     | RF-Lambda          | RFS5G08B10SMF        | 6732   | 12                          | 07-Jan-2025             |
| Preamplifier                        | Hewlett Packard    | HP8449B              | 6762   | 12                          | 28-Feb-2025             |
| 8M SMA Cable                        | Junkosha           | MWX221-08000AMSAMS/B | 6833   | 12                          | 14-Aug-2025             |
| Handheld Hygrometer                 | Fluke              | 971                  | 6838   | 12                          | 27-Aug-2025             |
| Cable Assembly                      | SpecTech           | PE300-60             | 6857   | -                           | TU                      |
| Cable Assembly                      | SpecTech           | PE300-60             | 6858   | -                           | TU                      |

**Table 15**

TU - Traceability Unscheduled

O/P Mon - Output Monitored using calibrated equipment



## **2.2 Emission Bandwidth**

### **2.2.1 Specification Reference**

FCC 47 CFR Part 15E, Clause 15.407 (a)  
ISED RSS-247, Clause 6.2

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

A3241, S/N: G0Q65Y9HP6 - Modification State 0  
A3241, S/N: FWKQMY7GHY - Modification State 0

### **2.2.3 Date of Test**

04-November-2024 to 09-December-2024

### **2.2.4 Test Method**

The test was performed in accordance with ANSI C63.10 clause 6.9.2 for 6 dB & 26 dB bandwidth measurements and clause 6.9.3 for 99% occupied bandwidth.

For modes of operation using multiple cores, measurements were made on each core but only the worst case results are reported. Worst case was considered as the narrowest results for 6 dB bandwidth and the widest result for 26 dB bandwidth and 99% occupied bandwidth.

### **2.2.5 Environmental Conditions**

|                     |                |
|---------------------|----------------|
| Ambient Temperature | 20.6 - 22.3 °C |
| Relative Humidity   | 36.4 - 49.2 %  |



## 2.2.6 Test Results

### Narrowband

| Test Configuration       |                 |                 |                              |
|--------------------------|-----------------|-----------------|------------------------------|
| Frequency Range:         | 5.150-5.250 GHz | Band:           | U-NII-1                      |
| Limit Clause(s):         | -               | Test Method(s): | C63.10 6.9.2<br>C63.10 6.9.3 |
| Additional Reference(s): | -               |                 |                              |

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

| Test Frequency (MHz) | 26 dB Bandwidth (MHz) |       |   |   | Limit (kHz) |
|----------------------|-----------------------|-------|---|---|-------------|
|                      | A                     | B     | C | D |             |
| 5162                 | -                     | 2.792 | - | - | -           |
| 5204                 | -                     | 2.776 | - | - | -           |
| 5245                 | -                     | 2.776 | - | - | -           |

**Table 16 - 26 dB Bandwidth Results**

| Test Frequency (MHz) | 99% Bandwidth (MHz) |       |   |   | Limit (kHz) |
|----------------------|---------------------|-------|---|---|-------------|
|                      | A                   | B     | C | D |             |
| 5162                 | -                   | 2.352 | - | - | -           |
| 5204                 | -                   | 2.344 | - | - | -           |
| 5245                 | -                   | 2.344 | - | - | -           |

**Table 17 - 99% Bandwidth Results**

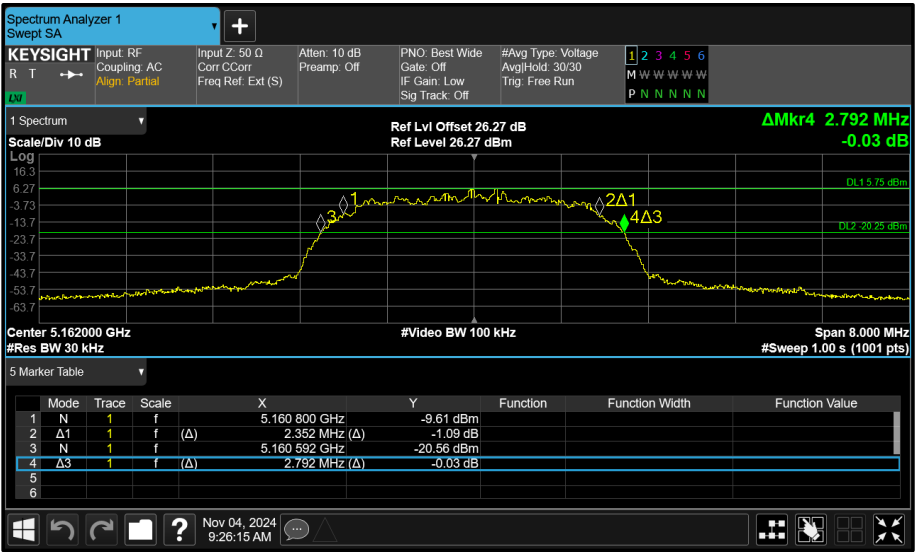


Figure 31 - Core 1 (B) 5162 MHz (CH12) 26 dB and 99% Bandwidth

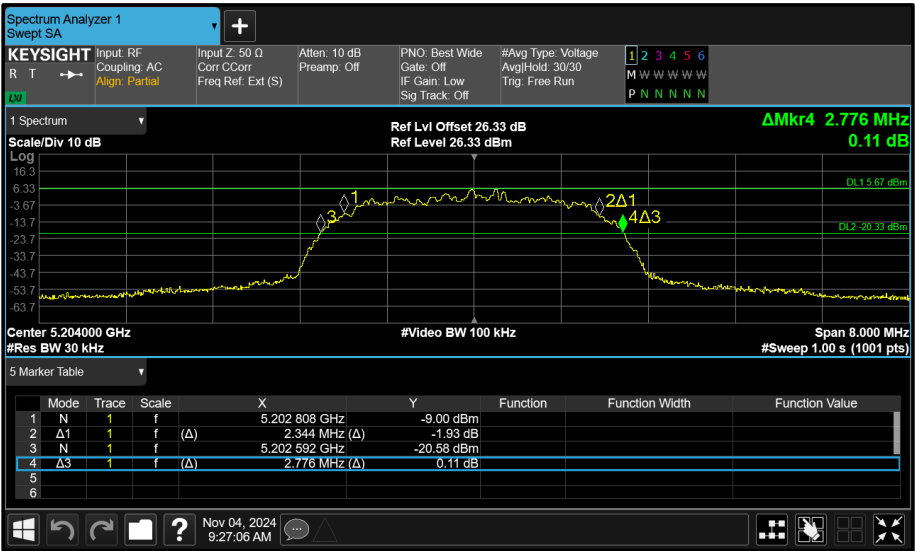


Figure 32 - Core 1 (B) 5204 MHz (CH54) 26 dB and 99% Bandwidth

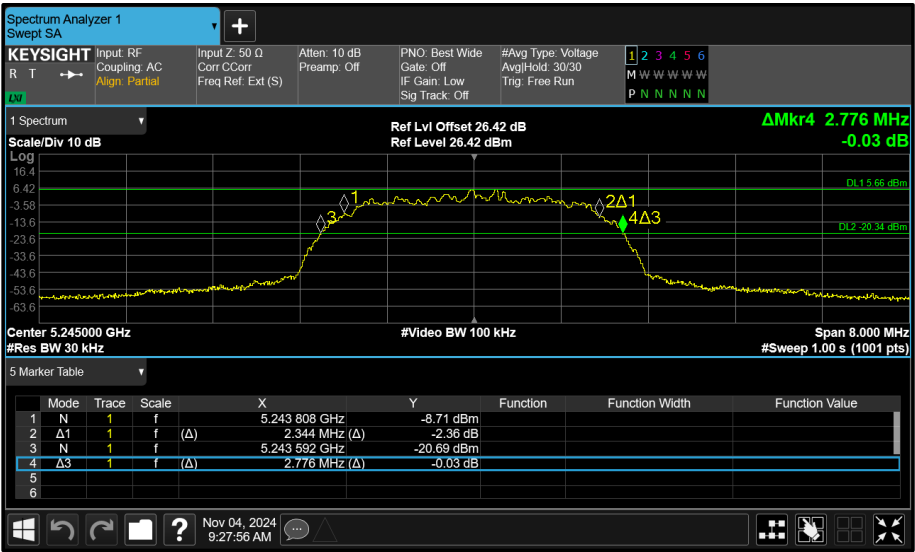


Figure 33 - Core 1 (B) 5245 MHz (CH95) 26 dB and 99% Bandwidth



| Test Configuration       |                 |                 |                              |
|--------------------------|-----------------|-----------------|------------------------------|
| Frequency Range:         | 5.150-5.250 GHz | Band:           | U-NII-1                      |
| Limit Clause(s):         | -               | Test Method(s): | C63.10 6.9.2<br>C63.10 6.9.3 |
| Additional Reference(s): | -               |                 |                              |

| DUT Configuration      |                           |                          |   |
|------------------------|---------------------------|--------------------------|---|
| Mode:                  | ePA $\pi/4$ DQPSK (8-DH5) | Duty Cycle (%):          | - |
| Antenna Configuration: | SISO                      | DCCF (dB):               | - |
| Active Port(s):        | B (Core 1)                | Peak Antenna Gain (dBi): | - |

| Test Frequency (MHz) | 26 dB Bandwidth (MHz) |       |   |   | Limit (kHz) |
|----------------------|-----------------------|-------|---|---|-------------|
|                      | A                     | B     | C | D |             |
| 5162                 | -                     | 5.310 | - | - | -           |
| 5204                 | -                     | 5.325 | - | - | -           |
| 5245                 | -                     | 5.340 | - | - | -           |

**Table 18 - 26 dB Bandwidth Results**

| Test Frequency (MHz) | 99% Bandwidth (MHz) |       |   |   | Limit (kHz) |
|----------------------|---------------------|-------|---|---|-------------|
|                      | A                   | B     | C | D |             |
| 5162                 | -                   | 4.635 | - | - | -           |
| 5204                 | -                   | 4.635 | - | - | -           |
| 5245                 | -                   | 4.665 | - | - | -           |

**Table 19 - 99% Bandwidth Results**

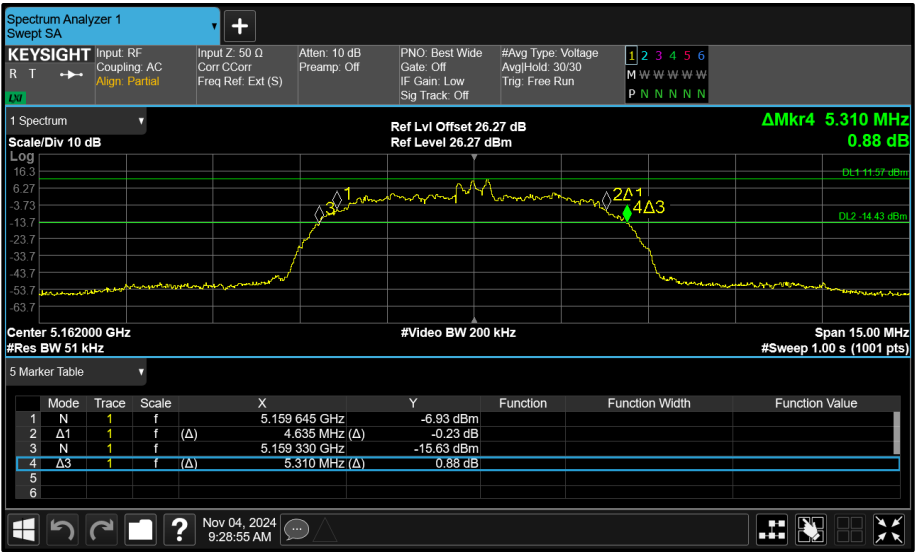


Figure 34 - Core 1 (B) 5162 MHz (CH12) 26 dB and 99% Bandwidth

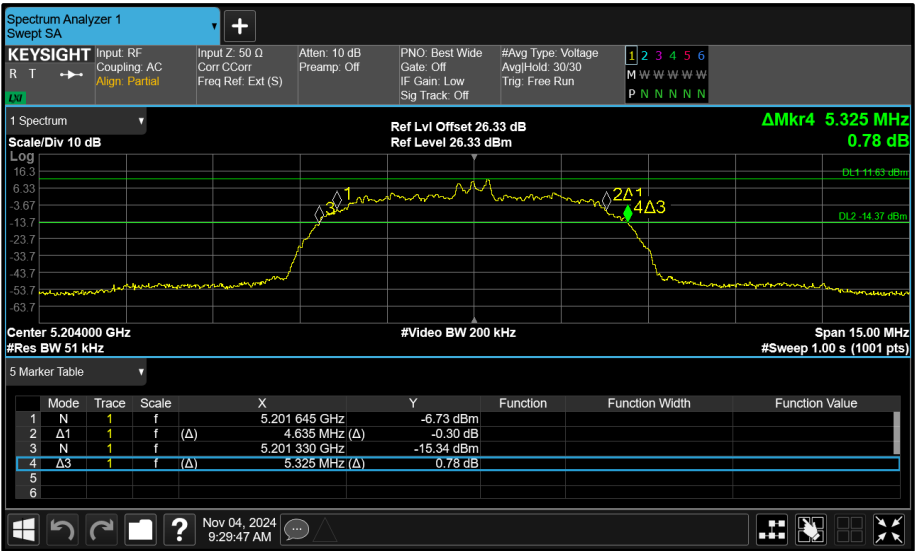


Figure 35 - Core 1 (B) 5204 MHz (CH54) 26 dB and 99% Bandwidth

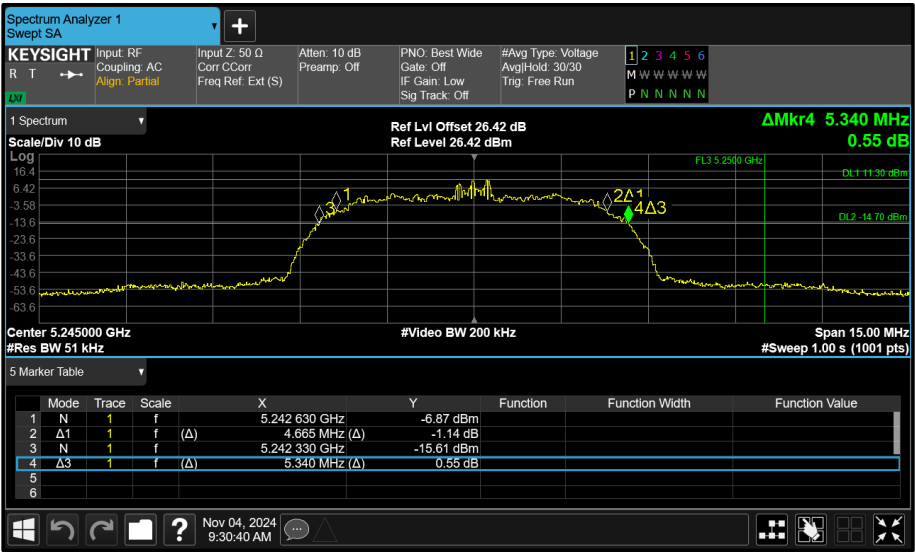


Figure 36 - Core 1 (B) 5245 MHz (CH95) 26 dB and 99% Bandwidth



| Test Configuration       |                 |                 |                              |
|--------------------------|-----------------|-----------------|------------------------------|
| Frequency Range:         | 5.150-5.250 GHz | Band:           | U-NII-1                      |
| Limit Clause(s):         | -               | Test Method(s): | C63.10 6.9.2<br>C63.10 6.9.3 |
| Additional Reference(s): | -               |                 |                              |

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

| Test Frequency (MHz) | 26 dB Bandwidth (MHz) |       |   |   | Limit (kHz) |
|----------------------|-----------------------|-------|---|---|-------------|
|                      | A                     | B     | C | D |             |
| 5162                 | 2.800                 | 2.800 | - | - | -           |
| 5204                 | 2.816                 | 2.776 | - | - | -           |
| 5245                 | 2.776                 | 2.800 | - | - | -           |

**Table 20 - 26 dB Bandwidth Results**

| Test Frequency (MHz) | 99% Bandwidth (MHz) |       |   |   | Limit (kHz) |
|----------------------|---------------------|-------|---|---|-------------|
|                      | A                   | B     | C | D |             |
| 5162                 | 2.368               | 2.352 | - | - | -           |
| 5204                 | 2.368               | 2.352 | - | - | -           |
| 5245                 | 2.344               | 2.360 | - | - | -           |

**Table 21 - 99% Bandwidth Results**

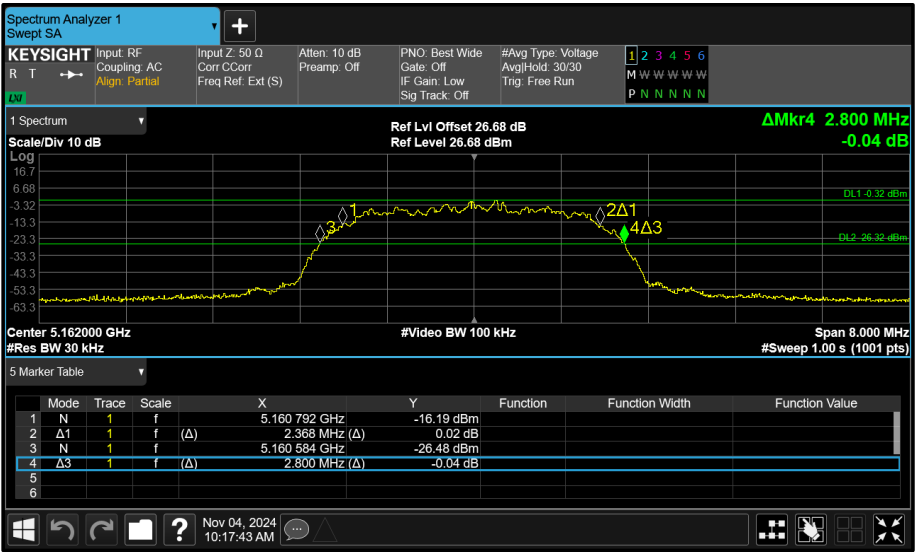


Figure 37 - Core 0 (A) 5162 MHz (CH12) 26 dB and 99% Bandwidth

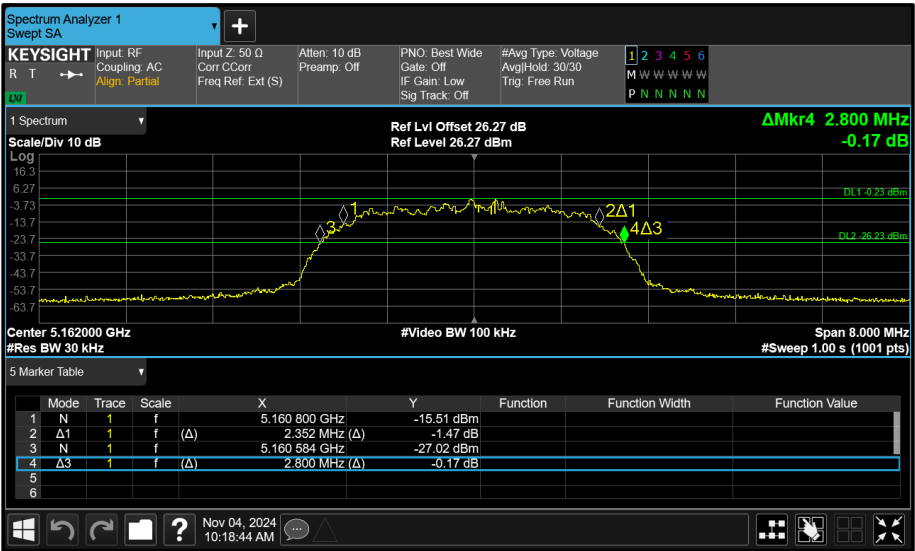


Figure 38 - Core 1 (B) 5162 MHz (CH12) 26 dB and 99% Bandwidth

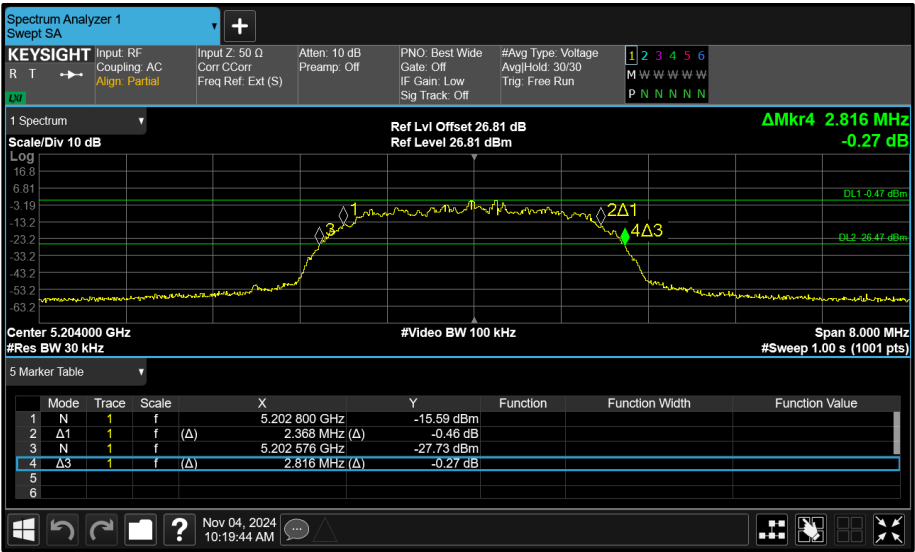


Figure 39 - Core 0 (A) 5204 MHz (CH54) 26 dB and 99% Bandwidth

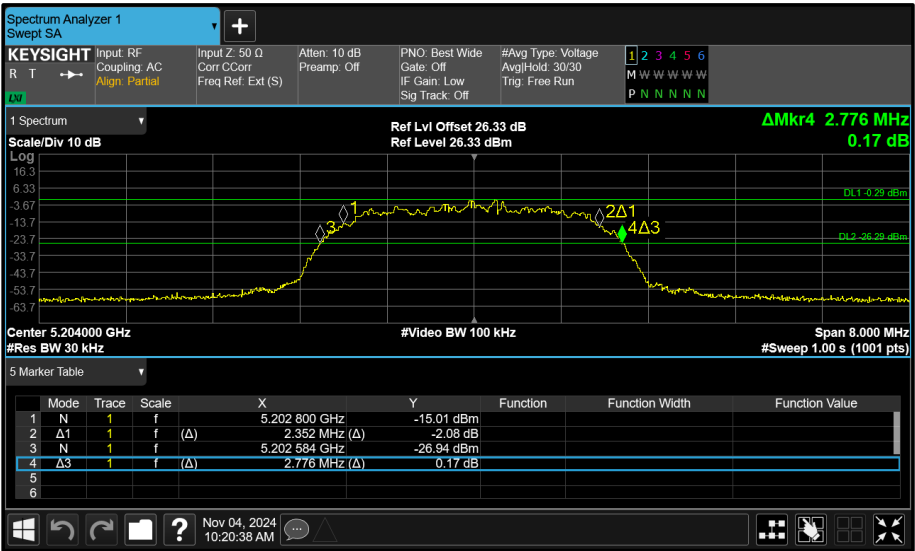


Figure 40 - Core 1 (B) 5204 MHz (CH54) 26 dB and 99% Bandwidth

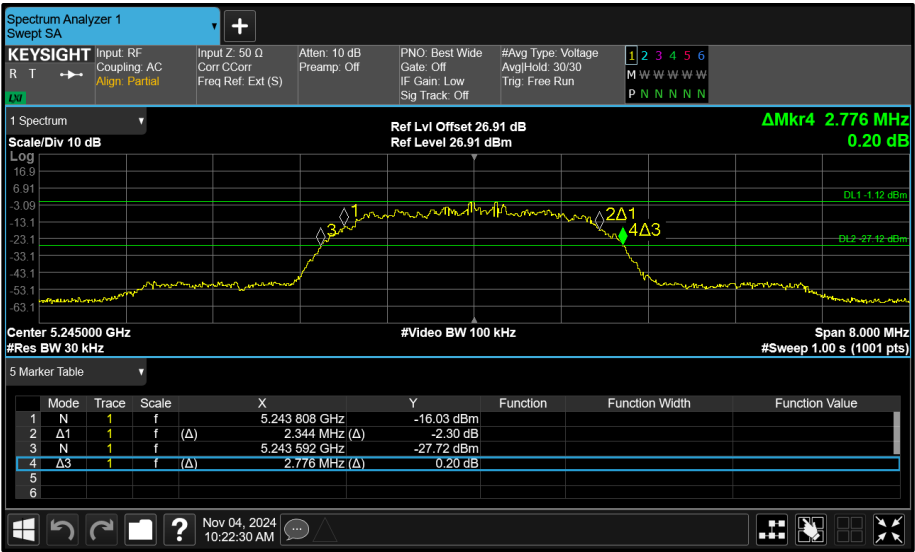


Figure 41 - Core 0 (A) 5245 MHz (CH95) 26 dB and 99% Bandwidth

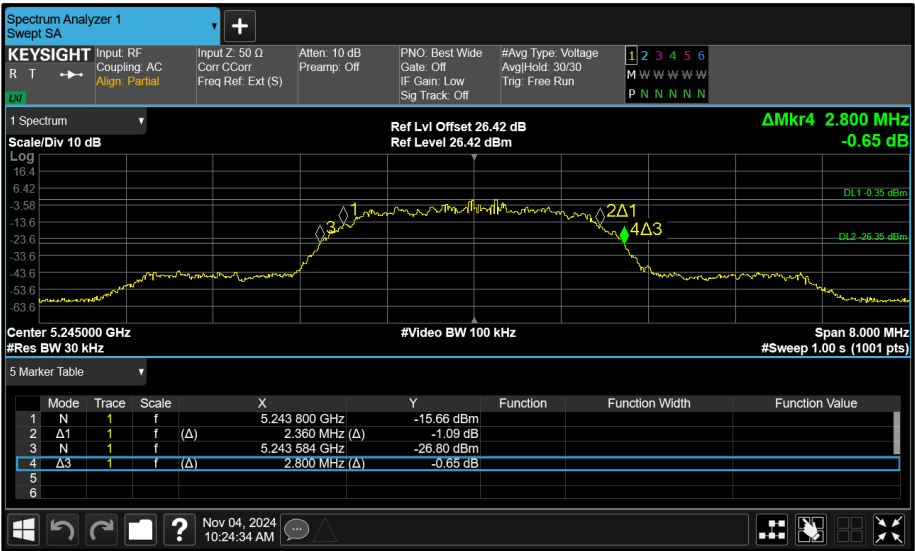


Figure 42 - Core 1 (B) 5245 MHz (CH95) 26 dB and 99% Bandwidth



| Test Configuration       |                 |                 |                              |
|--------------------------|-----------------|-----------------|------------------------------|
| Frequency Range:         | 5.150-5.250 GHz | Band:           | U-NII-1                      |
| Limit Clause(s):         | -               | Test Method(s): | C63.10 6.9.2<br>C63.10 6.9.3 |
| Additional Reference(s): | -               |                 |                              |

| DUT Configuration      |                           |                          |   |
|------------------------|---------------------------|--------------------------|---|
| Mode:                  | ePA $\pi/4$ DQPSK (8-DH5) | Duty Cycle (%):          | - |
| Antenna Configuration: | Beamforming               | DCCF (dB):               | - |
| Active Port(s):        | A+B (Core 0 + Core 1)     | Peak Antenna Gain (dBi): | - |

| Test Frequency (MHz) | 26 dB Bandwidth (MHz) |       |   |   | Limit (kHz) |
|----------------------|-----------------------|-------|---|---|-------------|
|                      | A                     | B     | C | D |             |
| 5162                 | 5.415                 | 5.310 | - | - | -           |
| 5204                 | 5.400                 | 5.310 | - | - | -           |
| 5245                 | 5.355                 | 5.325 | - | - | -           |

**Table 22 - 26 dB Bandwidth Results**

| Test Frequency (MHz) | 99% Bandwidth (MHz) |       |   |   | Limit (kHz) |
|----------------------|---------------------|-------|---|---|-------------|
|                      | A                   | B     | C | D |             |
| 5162                 | 4.725               | 4.665 | - | - | -           |
| 5204                 | 4.725               | 4.650 | - | - | -           |
| 5245                 | 4.725               | 4.635 | - | - | -           |

**Table 23 - 99% Bandwidth Results**

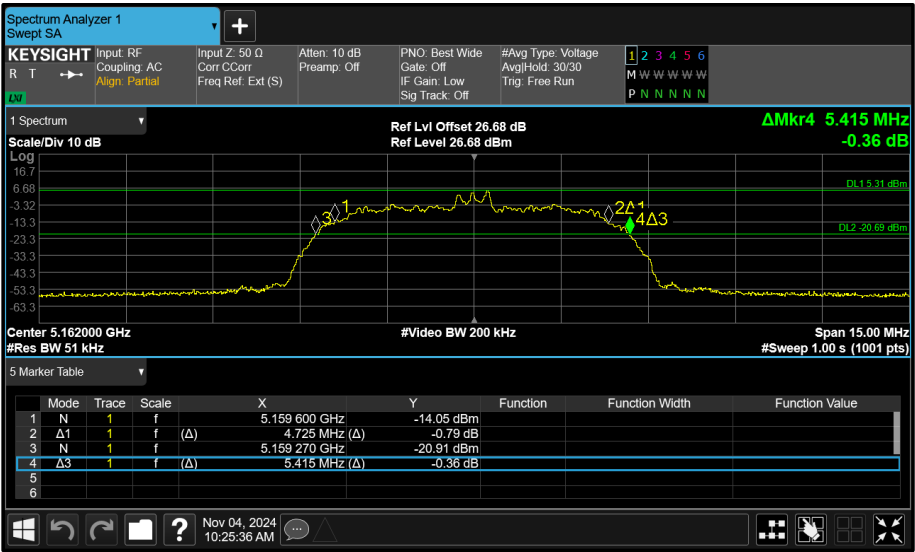


Figure 43 - Core 0 (A) 5162 MHz (CH12) 26 dB and 99% Bandwidth

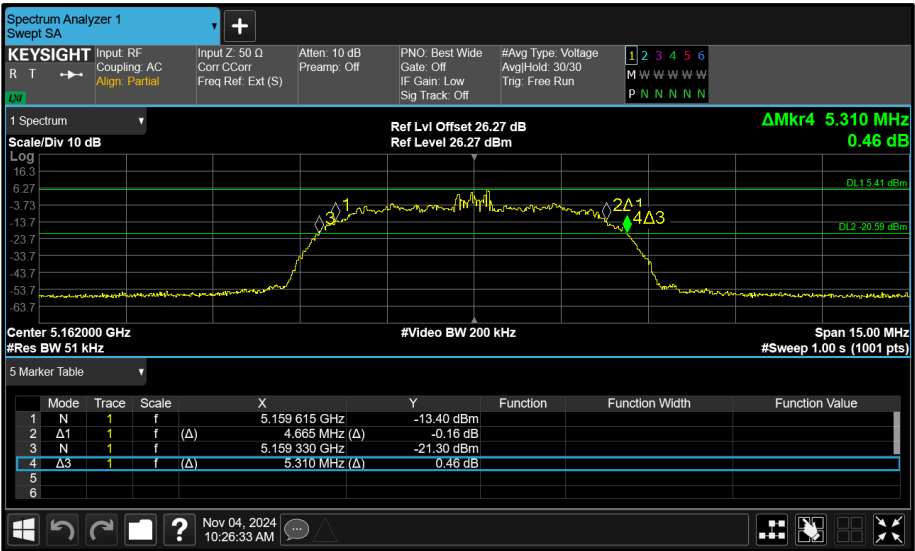


Figure 44 - Core 1 (B) 5162 MHz (CH12) 26 dB and 99% Bandwidth

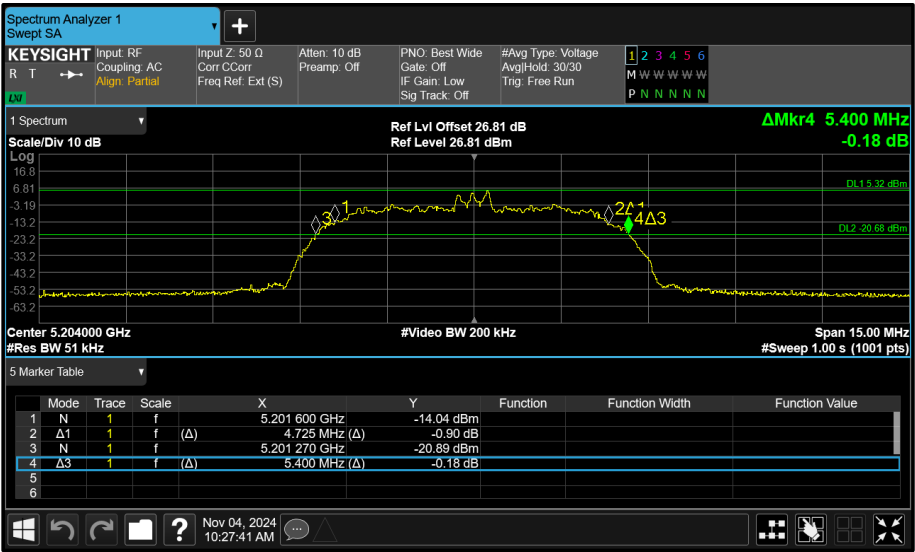


Figure 45 - Core 0 (A) 5204 MHz (CH54) 26 dB and 99% Bandwidth

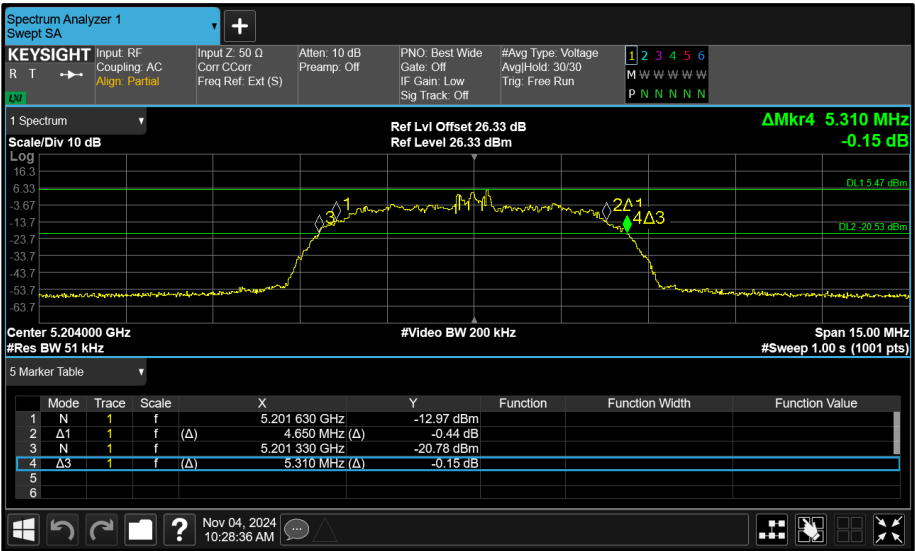


Figure 46 - Core 1 (B) 5204 MHz (CH54) 26 dB and 99% Bandwidth

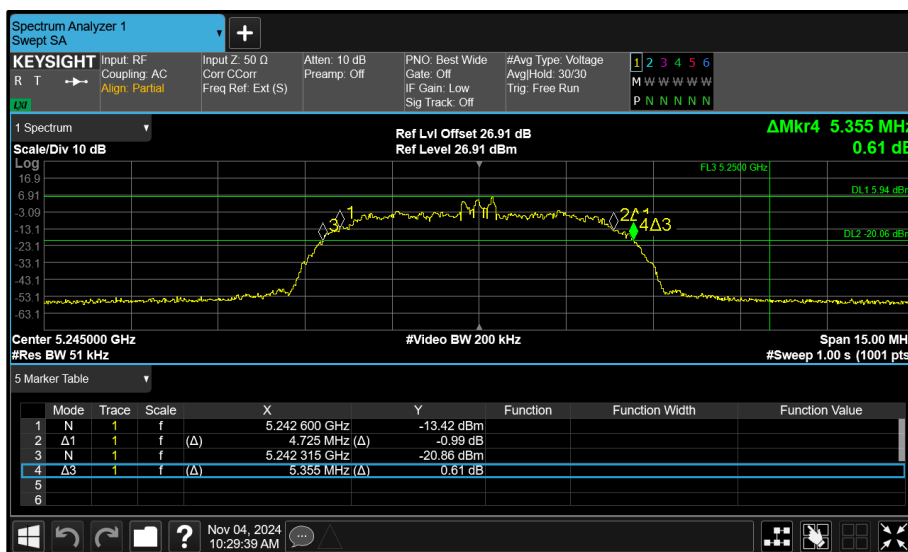


Figure 47 - Core 0 (A) 5245 MHz (CH95) 26 dB and 99% Bandwidth

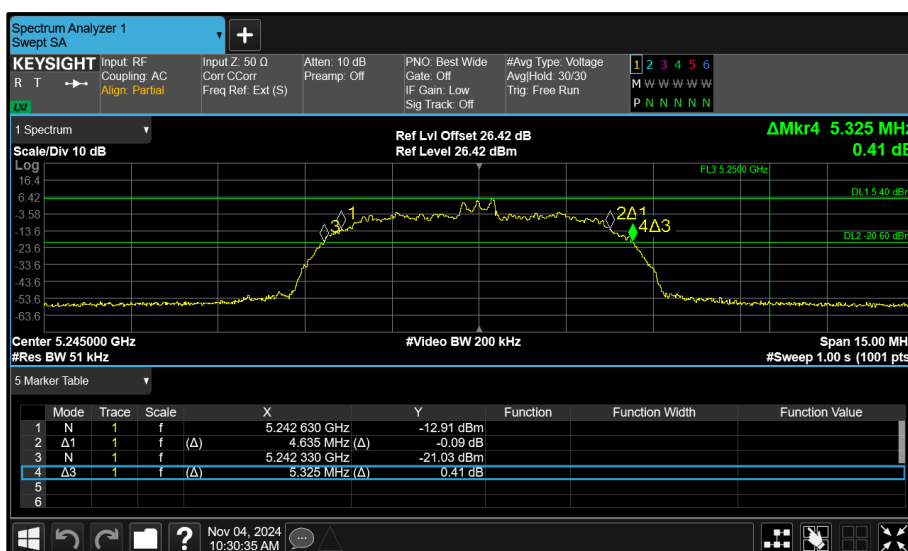


Figure 48 - Core 1 (B) 5245 MHz (CH95) 26 dB and 99% Bandwidth



| Test Configuration       |                              |                 |                                           |
|--------------------------|------------------------------|-----------------|-------------------------------------------|
| Frequency Range:         | 5.725-5.850 GHz              | Band:           | U-NII-3                                   |
| Limit Clause(s):         | 15.407(e)<br>RSS-247 6.2.4.1 | Test Method(s): | C63.10 6.9.3<br>789033 D02 v02r01 II.C.2. |
| Additional Reference(s): | -                            |                 |                                           |

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

| Test Frequency (MHz) | 6 dB Bandwidth (MHz) |       |   |   | Limit (kHz)  |
|----------------------|----------------------|-------|---|---|--------------|
|                      | A                    | B     | C | D |              |
| 5733                 | -                    | 1.880 | - | - | $\geq 500.0$ |
| 5789                 | -                    | 1.896 | - | - | $\geq 500.0$ |
| 5844                 | -                    | 1.904 | - | - | $\geq 500.0$ |

**Table 24 - 6 dB Bandwidth Results**

| Test Frequency (MHz) | 99% Bandwidth (MHz) |       |   |   | Limit (kHz) |
|----------------------|---------------------|-------|---|---|-------------|
|                      | A                   | B     | C | D |             |
| 5733                 | -                   | 2.352 | - | - | -           |
| 5789                 | -                   | 2.352 | - | - | -           |
| 5844                 | -                   | 2.360 | - | - | -           |

**Table 25 - 99% Bandwidth Results**

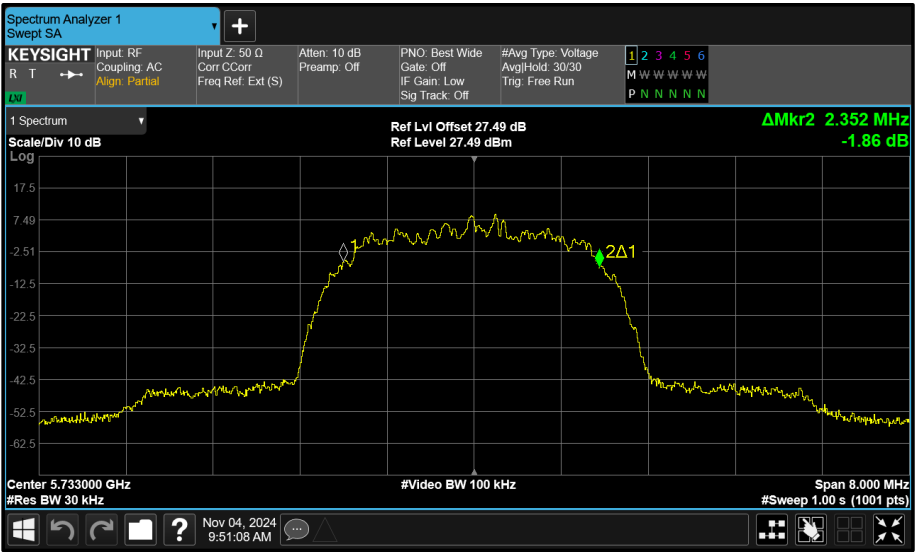


Figure 49 - Core 1 (B) 5733 MHz (CH8) 99% Bandwidth

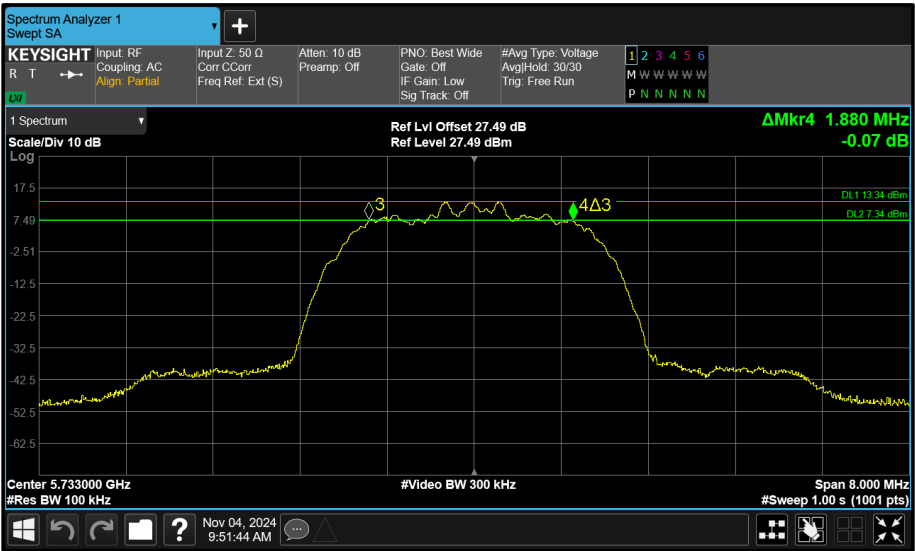


Figure 50 - Core 1 (B) 5733 MHz (CH8) 6 dB Bandwidth

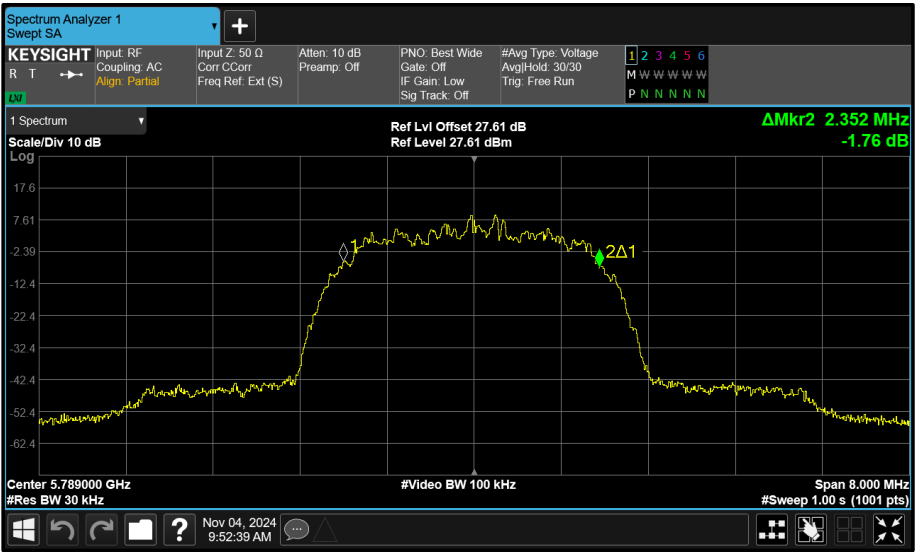


Figure 51 - Core 1 (B) 5789 MHz (CH64) 99% Bandwidth

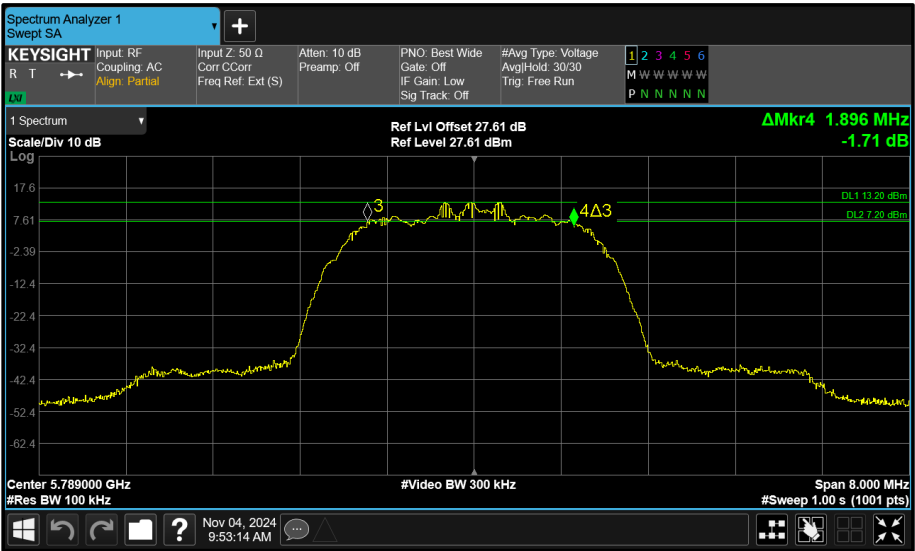


Figure 52 - Core 1 (B) 5789 MHz (CH64) 6 dB Bandwidth

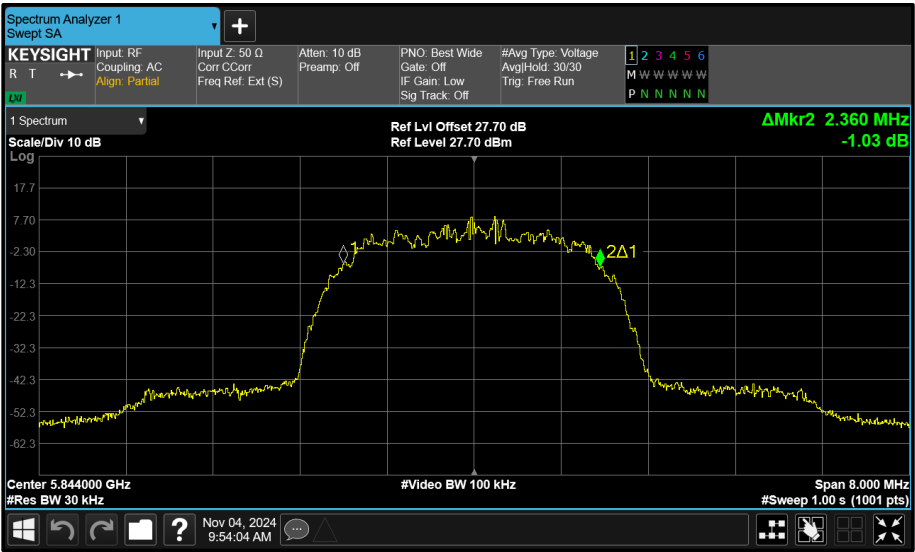


Figure 53 - Core 1 (B) 5844 MHz (CH119) 99% Bandwidth

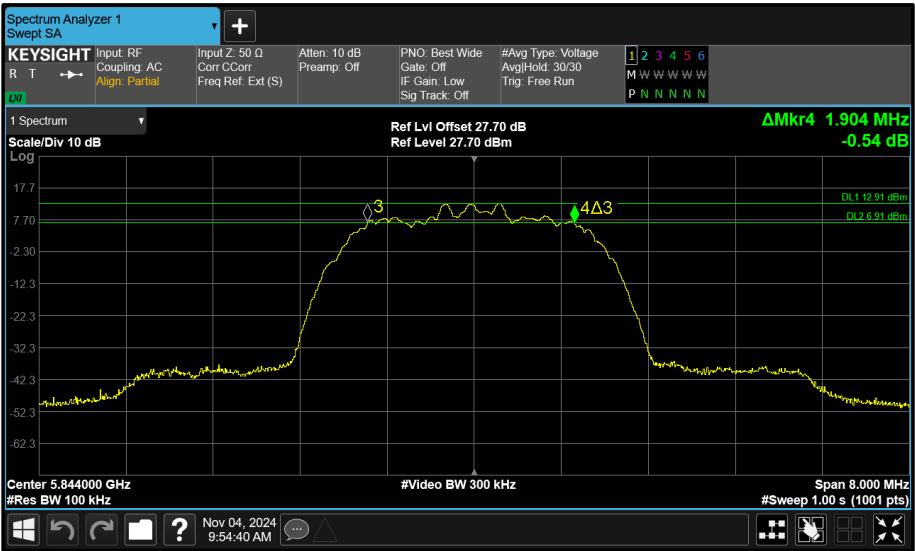


Figure 54 - Core 1 (B) 5844 MHz (CH119) 6 dB Bandwidth



| Test Configuration       |                              |                 |                                           |
|--------------------------|------------------------------|-----------------|-------------------------------------------|
| Frequency Range:         | 5.725-5.850 GHz              | Band:           | U-NII-3                                   |
| Limit Clause(s):         | 15.407(e)<br>RSS-247 6.2.4.1 | Test Method(s): | C63.10 6.9.3<br>789033 D02 v02r01 II.C.2. |
| Additional Reference(s): | -                            |                 |                                           |

| DUT Configuration      |                           |                          |   |
|------------------------|---------------------------|--------------------------|---|
| Mode:                  | ePA $\pi/4$ DQPSK (8-DH5) | Duty Cycle (%):          | - |
| Antenna Configuration: | SISO                      | DCCF (dB):               | - |
| Active Port(s):        | B (Core 1)                | Peak Antenna Gain (dBi): | - |

| Test Frequency (MHz) | 6 dB Bandwidth (MHz) |       |   |   | Limit (kHz)  |
|----------------------|----------------------|-------|---|---|--------------|
|                      | A                    | B     | C | D |              |
| 5733                 | -                    | 1.020 | - | - | $\geq 500.0$ |
| 5789                 | -                    | 1.035 | - | - | $\geq 500.0$ |
| 5844                 | -                    | 1.005 | - | - | $\geq 500.0$ |

**Table 26 - 6 dB Bandwidth Results**

| Test Frequency (MHz) | 99% Bandwidth (MHz) |       |   |   | Limit (kHz) |
|----------------------|---------------------|-------|---|---|-------------|
|                      | A                   | B     | C | D |             |
| 5733                 | -                   | 4.620 | - | - | -           |
| 5789                 | -                   | 4.620 | - | - | -           |
| 5844                 | -                   | 4.650 | - | - | -           |

**Table 27 - 99% Bandwidth Results**

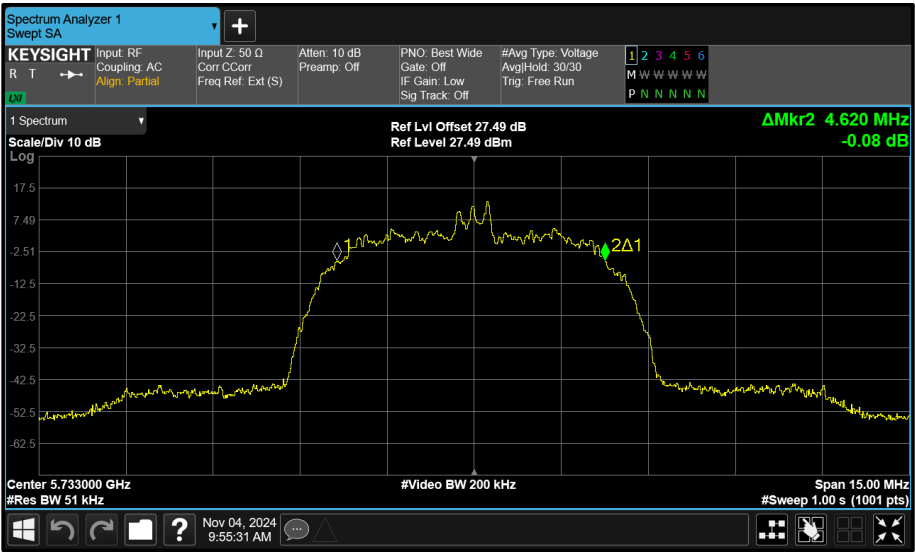


Figure 55 - Core 1 (B) 5733 MHz (CH8) 99% Bandwidth

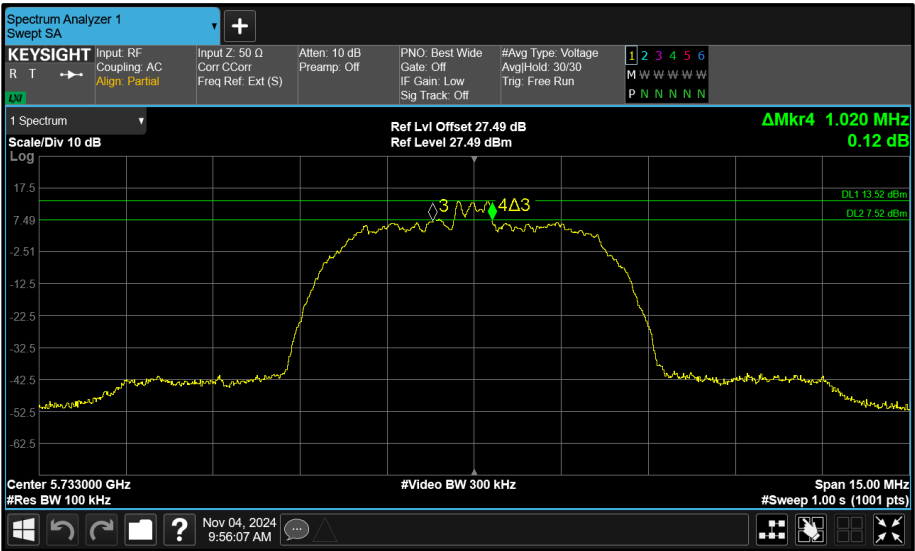


Figure 56 - Core 1 (B) 5733 MHz (CH8) 6 dB Bandwidth



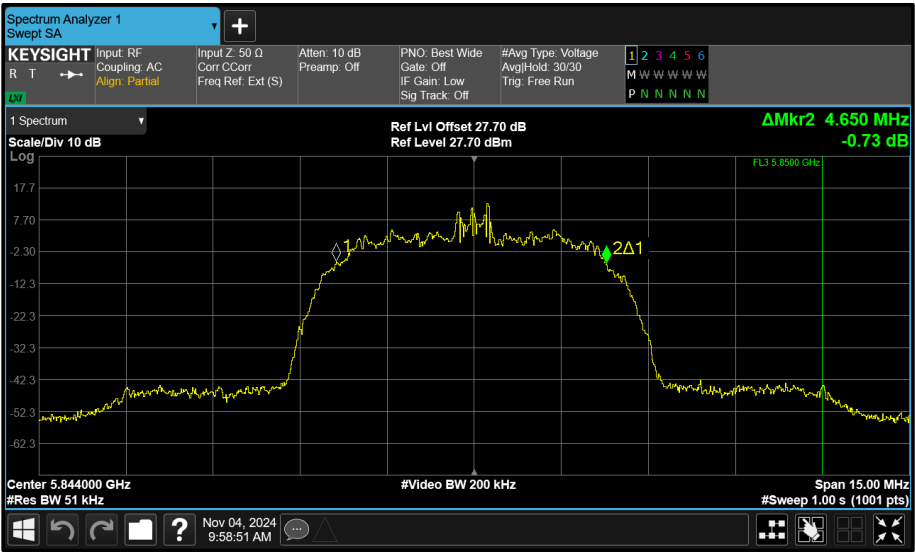


Figure 59 - Core 1 (B) 5844 MHz (CH119) 99% Bandwidth

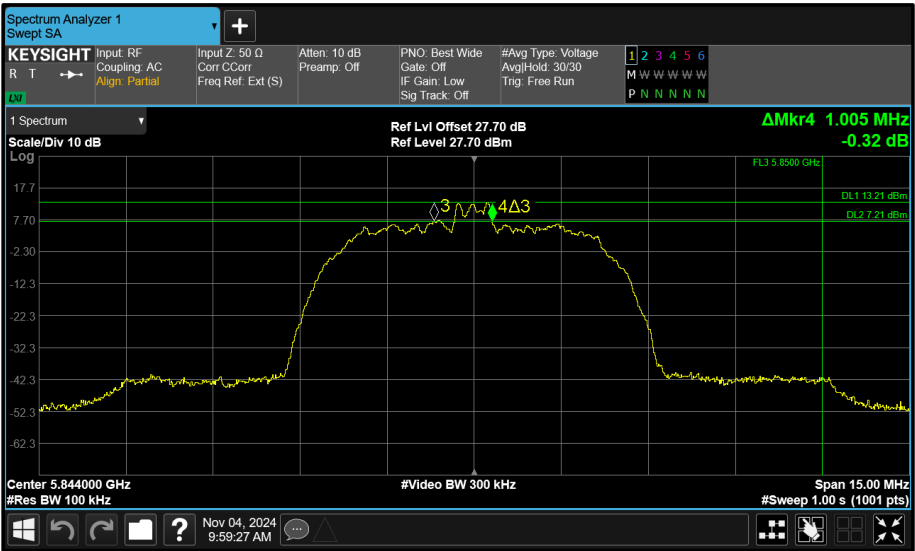


Figure 60 - Core 1 (B) 5844 MHz (CH119) 6 dB Bandwidth



| Test Configuration       |                              |                 |                                           |
|--------------------------|------------------------------|-----------------|-------------------------------------------|
| Frequency Range:         | 5.725-5.850 GHz              | Band:           | U-NII-3                                   |
| Limit Clause(s):         | 15.407(e)<br>RSS-247 6.2.4.1 | Test Method(s): | C63.10 6.9.3<br>789033 D02 v02r01 II.C.2. |
| Additional Reference(s): | -                            |                 |                                           |

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

| Test Frequency (MHz) | 6 dB Bandwidth (MHz) |       |   |   | Limit (kHz)  |
|----------------------|----------------------|-------|---|---|--------------|
|                      | A                    | B     | C | D |              |
| 5733                 | 1.912                | 1.896 | - | - | $\geq 500.0$ |
| 5789                 | 1.912                | 1.896 | - | - | $\geq 500.0$ |
| 5844                 | 1.912                | 1.896 | - | - | $\geq 500.0$ |

**Table 28 - 6 dB Bandwidth Results**

| Test Frequency (MHz) | 99% Bandwidth (MHz) |       |   |   | Limit (kHz) |
|----------------------|---------------------|-------|---|---|-------------|
|                      | A                   | B     | C | D |             |
| 5733                 | 2.368               | 2.344 | - | - | -           |
| 5789                 | 2.376               | 2.360 | - | - | -           |
| 5844                 | 2.368               | 2.344 | - | - | -           |

**Table 29 - 99% Bandwidth Results**

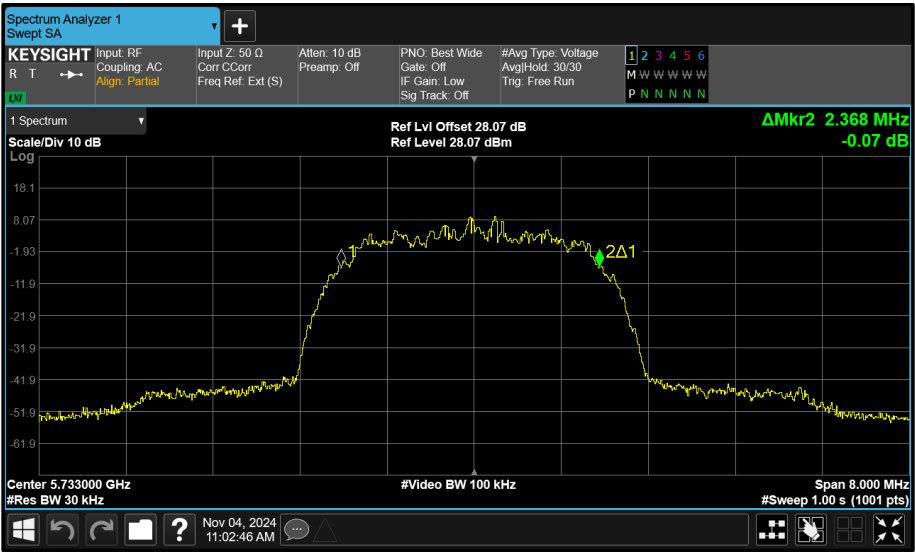


Figure 61 - Core 0 (A) 5733 MHz (CH8) 99% Bandwidth

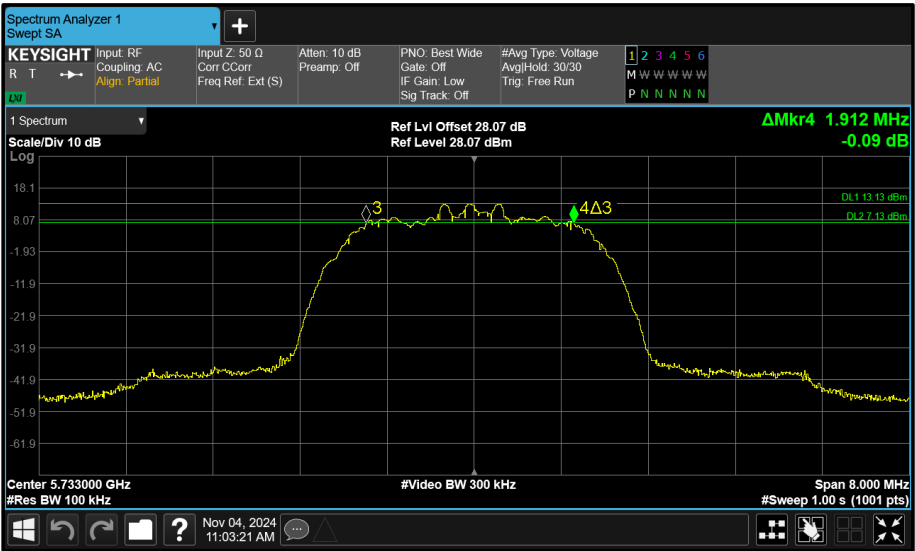


Figure 62 - Core 0 (A) 5733 MHz (CH8) 6 dB Bandwidth

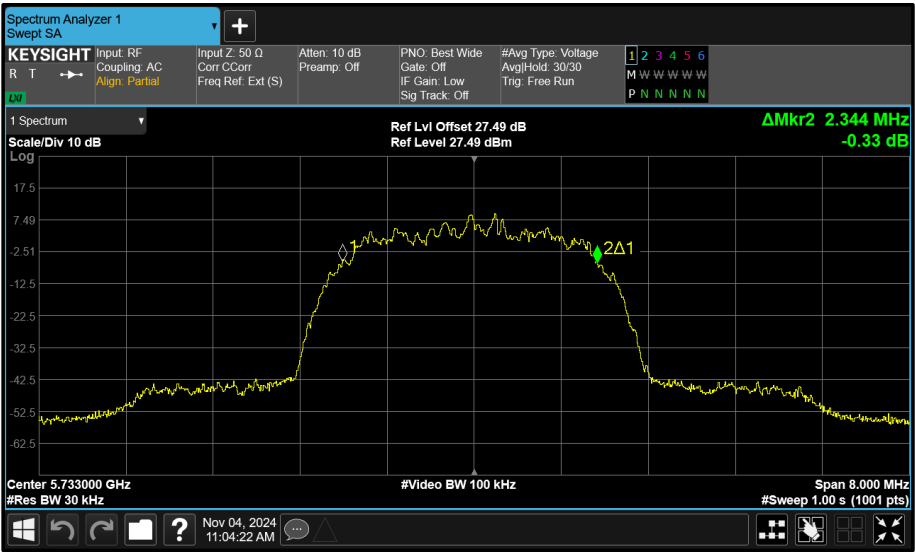


Figure 63 - Core 1 (B) 5733 MHz (CH8) 99% Bandwidth

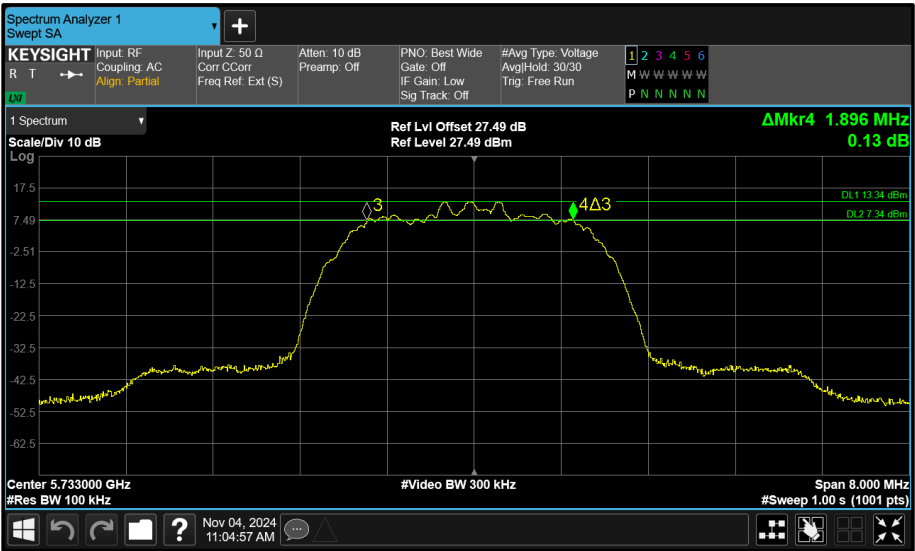


Figure 64 - Core 1 (B) 5733 MHz (CH8) 6 dB Bandwidth

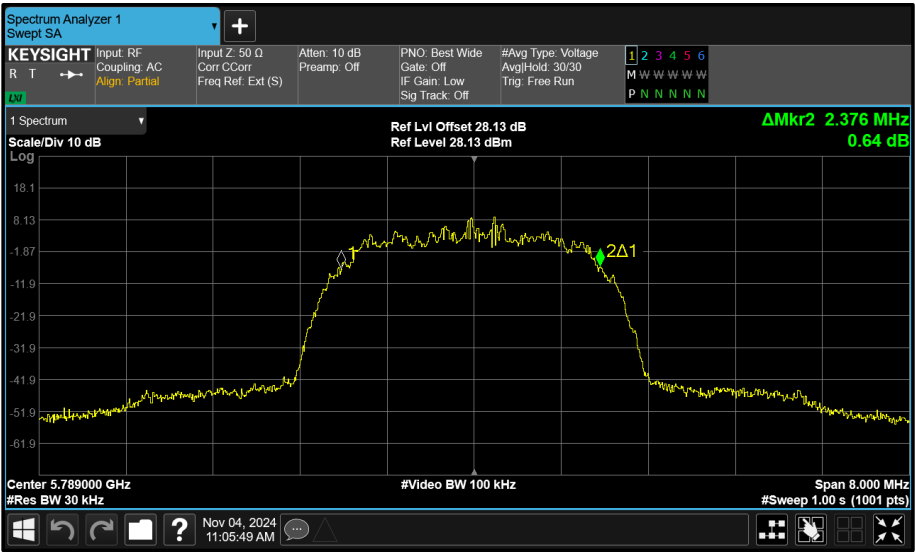


Figure 65 - Core 0 (A) 5789 MHz (CH64) 99% Bandwidth

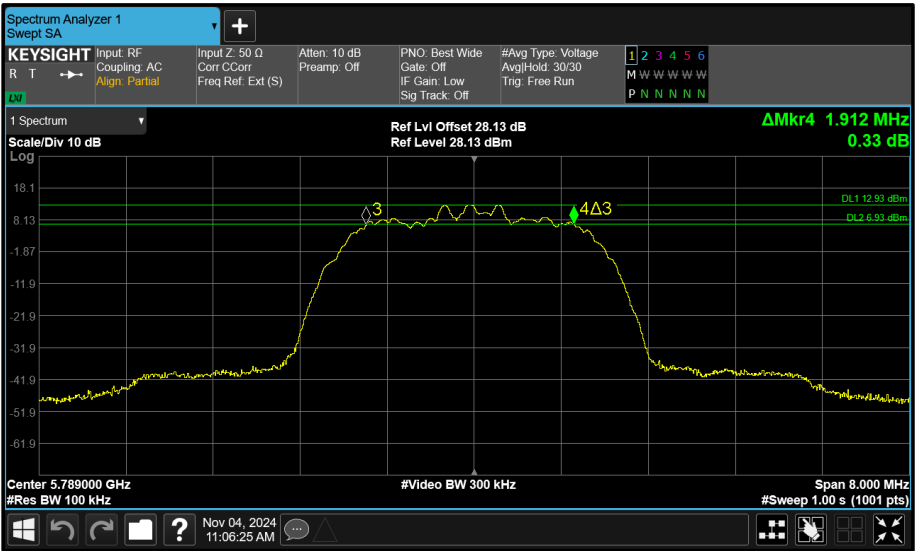


Figure 66 - Core 0 (A) 5789 MHz (CH64) 6 dB Bandwidth