



#### 2.4.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

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

**Table 23**

O/P Mon – Output Monitored using calibrated equipment



## **2.5 Maximum Conducted Output Power**

### **2.5.1 Specification Reference**

FCC 47 CFR Part 15C, Clause 15.247 (b)  
ISED RSS-247, Clause 5.4  
ISED RSS-GEN, Clause 6.12

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

A2348, S/N: C07CX00X02H6 - Modification State 0

### **2.5.3 Date of Test**

12-October-2020

### **2.5.4 Test Method**

Peak power measurements were performed in accordance with ANSI C63.10 11.9.1.3 PKPM1 and average measurements in accordance with clause 11.9.2.3.2 Method AVGPM-G.

All antennas used are less than 6 dBi (5.00 dBi, 0.25 dBi and 0 dBi for Cores 0, 1 & 2 respectively). This means for non-TxBF modes, the 1 Watt FCC conducted limit does not need to be reduced, and the ISED 1 Watt conducted limit is more stringent than the 4 Watt (36 dBm) EIRP limit. The conducted non-TxBF results presented below can therefore be directly compared to the 1 Watt (30 dBm) limit to show compliance.

For TxBF the combined powers were calculated using the measure and sum method. Both the power per chain and the antenna gains differed, therefore directional antenna gain was calculated using the worst-case highest antenna gain, two transmit chains, and a single correlated spatial stream as per the first formula in KDB 662911 D01 v02r01 section e) (ii) with  $N_{SS} = 1$  and  $G_{ANT MAX}$  of 5.00 dBi. This resulted in a directional gain of 8.01 dBi. This results in:

- the 1 Watt (30 dBm) FCC conducted limit for a maximum of 6 dBi antenna gain being reduced by 2.01 dB to 27.99 dBm.
- the 4 Watt (36 dBm) ISED EIRP limit minus 8.01 dBi directional gain, also resulting in an equivalent conducted limit of 27.99 dBm.

### **2.5.5 Environmental Conditions**

|                     |         |
|---------------------|---------|
| Ambient Temperature | 23.3 °C |
| Relative Humidity   | 39.4 %  |



## 2.5.6 Test Results

### 2.4 GHz Bluetooth (FHSS)

iPA

Antenna Port Configuration: SISO Core 0 / Core 2

Modulation: GFSK

| Frequency (MHz) | Maximum Conducted Output Power (dBm) |        |            |        |
|-----------------|--------------------------------------|--------|------------|--------|
|                 | Average Power                        |        | Peak Power |        |
|                 | Core 0                               | Core 2 | Core 0     | Core 2 |
| 2402            | 12.4                                 | 12.0   | 13.0       | 13.0   |
| 2441            | 12.4                                 | 11.9   | 12.8       | 12.9   |
| 2480            | 12.3                                 | 12.0   | 12.6       | 12.9   |

**Table 24 - Maximum Conducted Output Power Results**

Modulation:  $\pi/4$  DQPSK

| Frequency (MHz) | Maximum Conducted Output Power (dBm) |        |            |        |
|-----------------|--------------------------------------|--------|------------|--------|
|                 | Average Power                        |        | Peak Power |        |
|                 | Core 0                               | Core 2 | Core 0     | Core 2 |
| 2402            | 8.4                                  | 8.3    | 10.6       | 10.8   |
| 2441            | 8.4                                  | 8.3    | 10.5       | 10.8   |
| 2480            | 8.2                                  | 8.4    | 10.3       | 10.9   |

**Table 25 - Maximum Conducted Output Power Results**

Modulation: 8DPSK

| Frequency (MHz) | Maximum Conducted Output Power (dBm) |        |            |        |
|-----------------|--------------------------------------|--------|------------|--------|
|                 | Average Power                        |        | Peak Power |        |
|                 | Core 0                               | Core 2 | Core 0     | Core 2 |
| 2402            | 8.4                                  | 8.3    | 10.9       | 11.2   |
| 2441            | 8.4                                  | 8.3    | 10.7       | 11.1   |
| 2480            | 8.3                                  | 8.4    | 10.5       | 11.2   |

**Table 26 - Maximum Conducted Output Power Results**



Antenna Port Configuration: Beamforming Core 0 + Core 1

Modulation: GFSK (DH5)

| Frequency (MHz) | Maximum Conducted Output Power (dBm) |        |          |            |        |          |
|-----------------|--------------------------------------|--------|----------|------------|--------|----------|
|                 | Average Power                        |        |          | Peak Power |        |          |
|                 | Core 0                               | Core 1 | $\Sigma$ | Core 0     | Core 1 | $\Sigma$ |
| 2402            | 12.0                                 | 12.2   | 15.1     | 12.6       | 13.0   | 15.8     |
| 2441            | 12.0                                 | 12.2   | 15.1     | 12.4       | 13.1   | 15.8     |
| 2480            | 12.1                                 | 12.4   | 15.2     | 12.4       | 13.1   | 15.8     |

**Table 27 - Maximum Conducted Output Power Results**

Modulation:  $\pi/4$  DQPSK (2-DH5)

| Frequency (MHz) | Maximum Conducted Output Power (dBm) |        |          |            |        |          |
|-----------------|--------------------------------------|--------|----------|------------|--------|----------|
|                 | Average Power                        |        |          | Peak Power |        |          |
|                 | Core 0                               | Core 1 | $\Sigma$ | Core 0     | Core 1 | $\Sigma$ |
| 2402            | 8.2                                  | 8.0    | 11.1     | 10.5       | 10.5   | 13.5     |
| 2441            | 8.4                                  | 8.3    | 11.3     | 10.5       | 10.8   | 13.6     |
| 2480            | 8.3                                  | 8.0    | 11.2     | 10.3       | 10.5   | 13.4     |

**Table 28 - Maximum Conducted Output Power Results**

Modulation: 8DPSK (3-DH5)

| Frequency (MHz) | Maximum Conducted Output Power (dBm) |        |          |            |        |          |
|-----------------|--------------------------------------|--------|----------|------------|--------|----------|
|                 | Average Power                        |        |          | Peak Power |        |          |
|                 | Core 0                               | Core 1 | $\Sigma$ | Core 0     | Core 1 | $\Sigma$ |
| 2402            | 8.0                                  | 8.1    | 11.1     | 10.6       | 11.0   | 13.8     |
| 2441            | 8.3                                  | 8.4    | 11.4     | 10.7       | 11.2   | 14.0     |
| 2480            | 8.3                                  | 8.0    | 11.2     | 10.6       | 10.9   | 13.7     |

**Table 29 - Maximum Conducted Output Power Results**



ePA

Antenna Port: SISO Core 0

Modulation: GFSK (DH5)

| Frequency (MHz) | Maximum Conducted Output Power (dBm) |            |
|-----------------|--------------------------------------|------------|
|                 | Average Power                        | Peak Power |
|                 | Core 0                               | Core 0     |
| 2402            | 18.8                                 | 20.3       |
| 2441            | 19.7                                 | 21.1       |
| 2480            | 19.8                                 | 21.1       |

**Table 30 - Maximum Conducted Output Power Results**

Modulation:  $\pi/4$  DQPSK (2-DH5)

| Frequency (MHz) | Maximum Conducted Output Power (dBm) |            |
|-----------------|--------------------------------------|------------|
|                 | Average Power                        | Peak Power |
|                 | Core 0                               | Core 0     |
| 2402            | 15.7                                 | 18.6       |
| 2441            | 15.5                                 | 18.4       |
| 2480            | 15.6                                 | 18.5       |

**Table 31 - Maximum Conducted Output Power Results**

Modulation: 8DPSK (3-DH5)

| Frequency (MHz) | Maximum Conducted Output Power (dBm) |            |
|-----------------|--------------------------------------|------------|
|                 | Average Power                        | Peak Power |
|                 | Core 0                               | Core 0     |
| 2402            | 15.9                                 | 19.2       |
| 2441            | 15.9                                 | 19.3       |
| 2480            | 16.0                                 | 19.3       |

**Table 32 - Maximum Conducted Output Power Results**



Antenna Port Configuration: Beamforming Core 0 + Core 1

Modulation: GFSK (DH5)

| Frequency (MHz) | Maximum Conducted Output Power (dBm) |        |          |            |        |          |
|-----------------|--------------------------------------|--------|----------|------------|--------|----------|
|                 | Average Power                        |        |          | Peak Power |        |          |
|                 | Core 0                               | Core 1 | $\Sigma$ | Core 0     | Core 1 | $\Sigma$ |
| 2402            | 13.7                                 | 13.9   | 16.8     | 15.1       | 15.2   | 18.2     |
| 2441            | 13.9                                 | 13.6   | 16.8     | 15.2       | 15.0   | 18.1     |
| 2480            | 13.7                                 | 13.6   | 16.7     | 15.0       | 14.9   | 18.0     |

**Table 33 - Maximum Conducted Output Power Results**

Modulation:  $\pi/4$  DQPSK (2-DH5)

| Frequency (MHz) | Maximum Conducted Output Power (dBm) |        |          |            |        |          |
|-----------------|--------------------------------------|--------|----------|------------|--------|----------|
|                 | Average Power                        |        |          | Peak Power |        |          |
|                 | Core 0                               | Core 1 | $\Sigma$ | Core 0     | Core 1 | $\Sigma$ |
| 2402            | 13.1                                 | 13.4   | 16.3     | 16.0       | 16.3   | 19.2     |
| 2441            | 13.5                                 | 13.4   | 16.4     | 16.3       | 16.3   | 19.3     |
| 2480            | 13.7                                 | 13.6   | 16.6     | 16.6       | 16.5   | 19.6     |

**Table 34 - Maximum Conducted Output Power Results**

Modulation: 8DPSK (3-DH5)

| Frequency (MHz) | Maximum Conducted Output Power (dBm) |        |          |            |        |          |
|-----------------|--------------------------------------|--------|----------|------------|--------|----------|
|                 | Average Power                        |        |          | Peak Power |        |          |
|                 | Core 0                               | Core 1 | $\Sigma$ | Core 0     | Core 1 | $\Sigma$ |
| 2402            | 13.6                                 | 13.4   | 16.5     | 16.8       | 16.7   | 19.7     |
| 2441            | 13.4                                 | 13.5   | 16.4     | 16.6       | 16.7   | 19.7     |
| 2480            | 13.8                                 | 13.8   | 16.8     | 17.0       | 17.0   | 20.0     |

**Table 35 - Maximum Conducted Output Power Results**

FCC 47 CFR Part 15, Limit Clause 15.247 (b)(3)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

ISED RSS-247, Limit Clause 5.4 (b)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e) of the specification.



## 2.5.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

| Instrument                   | Manufacturer | Type No | TE No | Calibration Period (months) | Calibration Due |
|------------------------------|--------------|---------|-------|-----------------------------|-----------------|
| Multimeter                   | Iso-tech     | IDM101  | 2424  | 12                          | 12-Dec-2020     |
| Hygrometer                   | Rotronic     | A1      | 2760  | 12                          | 02-Jan-2021     |
| USB Power Sensor             | Boonton      | RTP5006 | 5184  | 12                          | 09-Jan-2021     |
| USB Power Sensor             | Boonton      | RTP5006 | 5186  | 12                          | 28-Nov-2020     |
| USB Power Sensor             | Boonton      | RTP5006 | 5187  | 12                          | 09-Jan-2021     |
| AC Programmable Power Supply | iTech        | IT7324  | 5225  | -                           | O/P Mon         |
| Signal Commissioning Unit    | TUV SUD      | SCU001  | 5546  | 12                          | 15-Apr-2021     |

**Table 36**

O/P Mon – Output Monitored using calibrated equipment



## 2.6 Authorised Band Edges

### 2.6.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d)  
ISED RSS-247, Clause 5.5

### 2.6.2 Equipment Under Test and Modification State

A2348, S/N: C07D100W02H7 - Modification State 0

### 2.6.3 Date of Test

18-August-2020 to 24-August-2020

### 2.6.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.10.4.

### 2.6.5 Environmental Conditions

Ambient Temperature 20.7-27.2°C  
Relative Humidity 48.1-61.1%

### 2.6.6 Test Results

2.4 GHz Bluetooth (FHSS)

iPA

| Mode    | Modulation    | Core | Packet Type | Tx Frequency (MHz) | Band Edge Frequency (MHz) | Level (dBc) |
|---------|---------------|------|-------------|--------------------|---------------------------|-------------|
| Static  | GFSK          | 0    | DH5         | 2402               | 2400.0                    | -59.82      |
| Static  | $\pi/4$ DQPSK | 0    | 2DH5        | 2402               | 2400.0                    | -52.97      |
| Static  | 8-DPSK        | 0    | 3DH5        | 2402               | 2400.0                    | -52.33      |
| Hopping | GFSK          | 0    | DH5         | 2402               | 2400.0                    | -60.57      |
| Hopping | $\pi/4$ DQPSK | 0    | 2DH5        | 2402               | 2400.0                    | -53.67      |
| Hopping | 8-DPSK        | 0    | 3DH5        | 2402               | 2400.0                    | -53.37      |

**Table 37 - Authorised Band Edge Results**

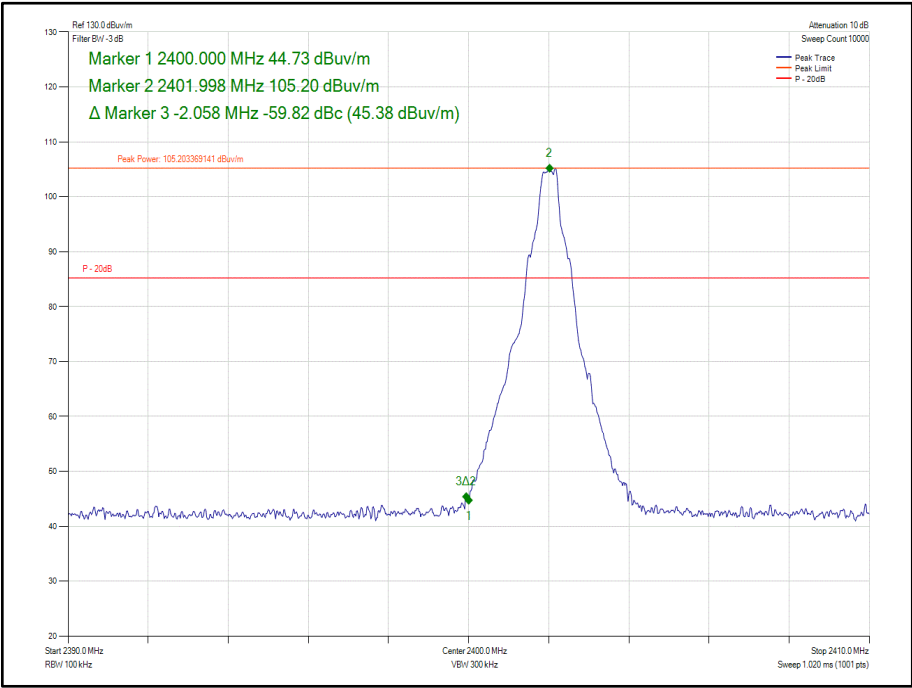


Figure 69 - Core 0 - Static - GFSK/DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

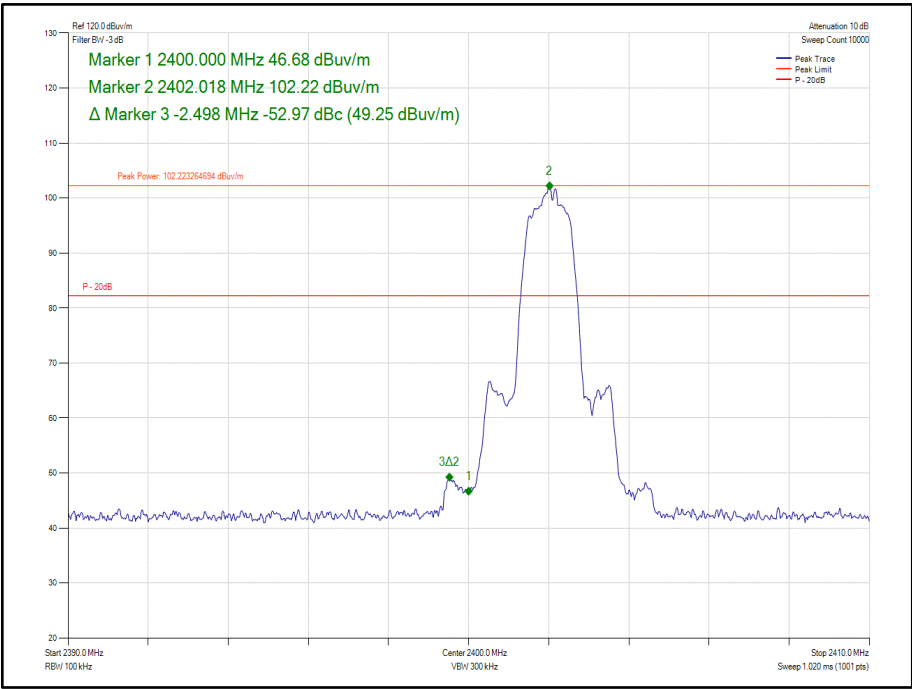


Figure 70 - Core 0 - Static -  $\pi/4$  DQPSK/2DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

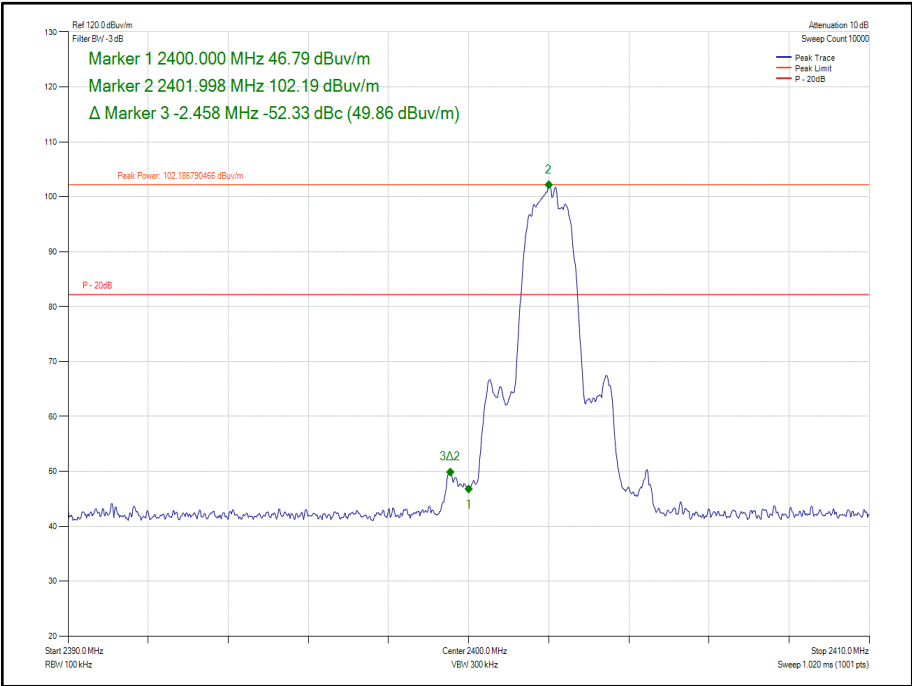


Figure 71 - Core 0 - Static - 8-DPSK/3DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

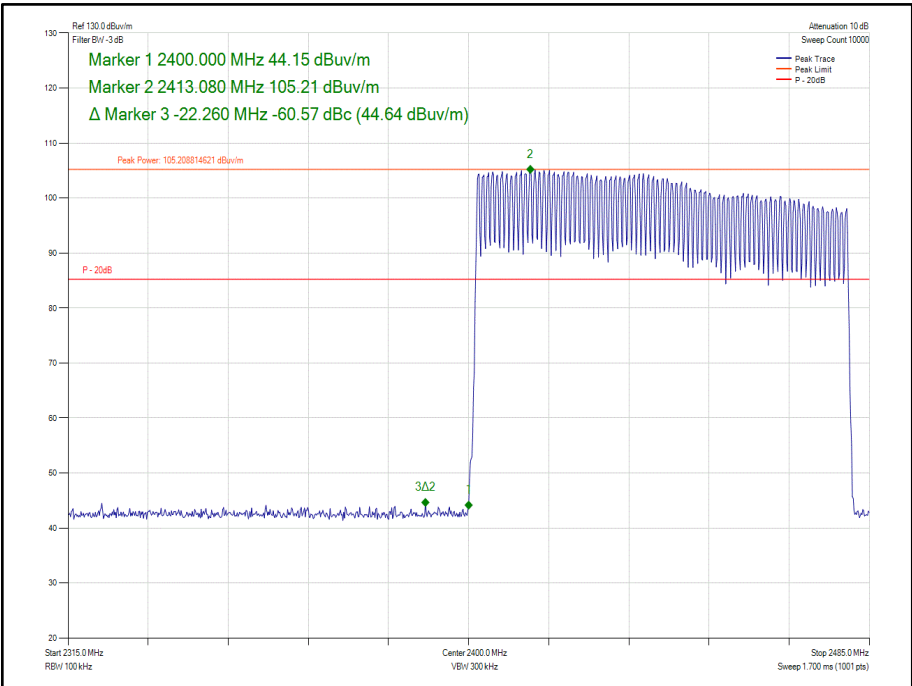


Figure 72 - Core 0 - Hopping - GFSK/DH5 - Band Edge Frequency 2400.0 MHz

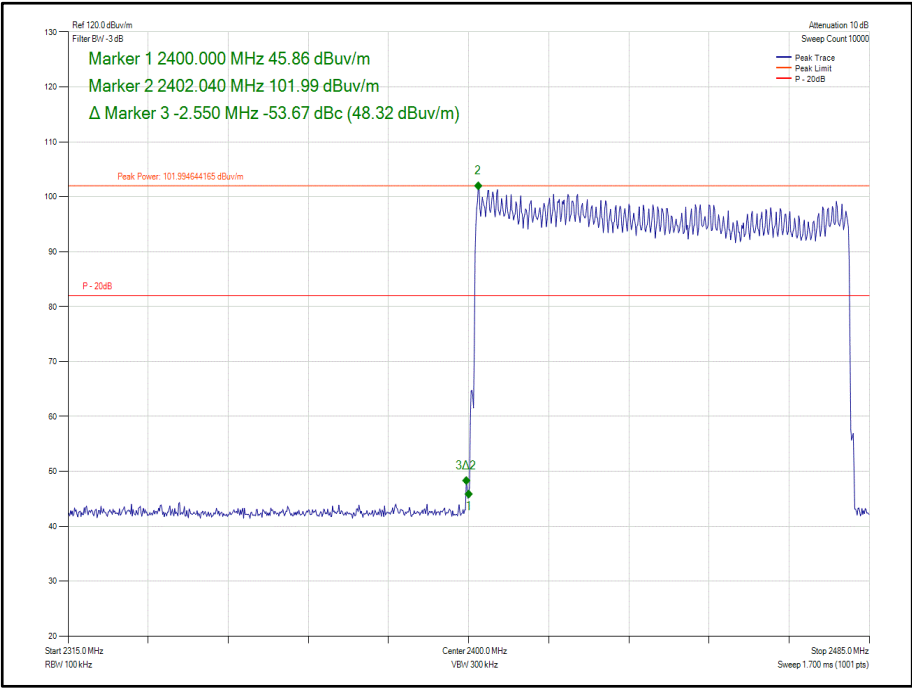


Figure 73 - Core 0 - Hopping -  $\pi/4$  DQPSK/2DH5 - Band Edge Frequency 2400.0 MHz

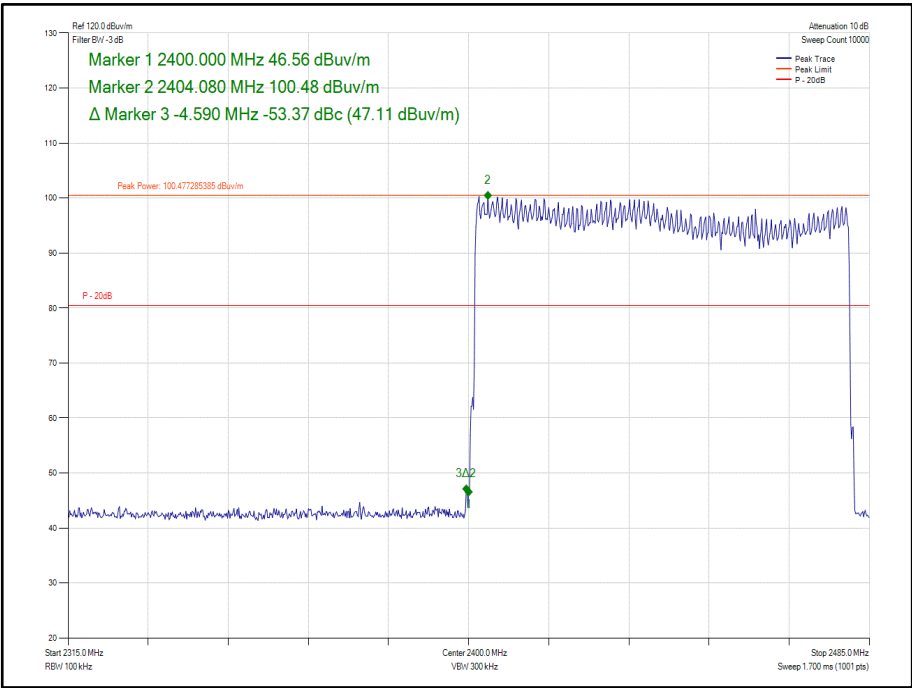
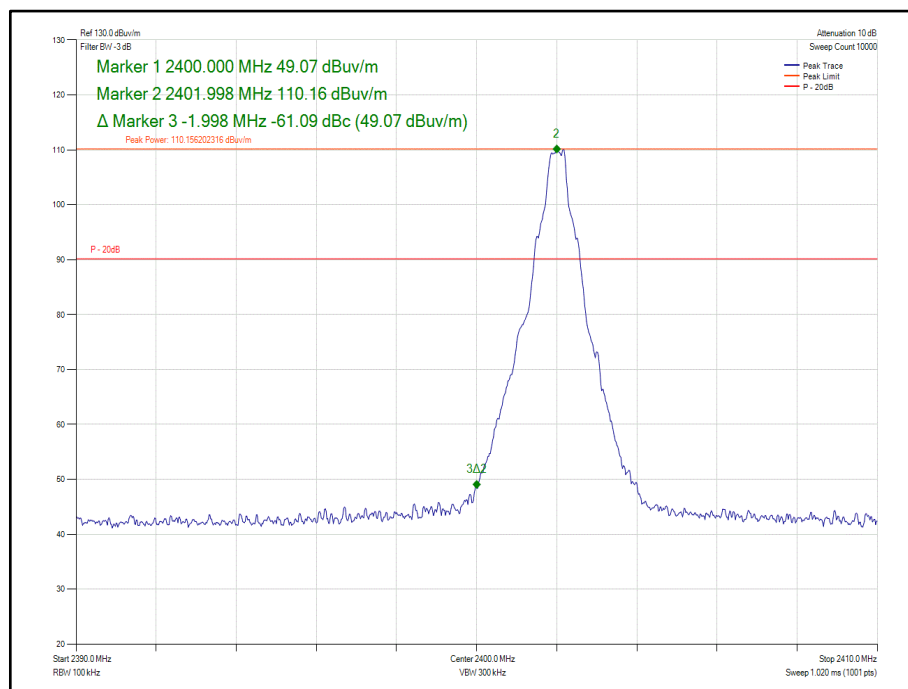


Figure 74 - Core 0 - Hopping - 8-DPSK/3DH5 - Band Edge Frequency 2400.0 MHz

| Mode    | Modulation    | Core | Packet Type | Tx Frequency (MHz) | Band Edge Frequency (MHz) | Level (dBc) |
|---------|---------------|------|-------------|--------------------|---------------------------|-------------|
| Static  | GFSK          | 1    | DH5         | 2402               | 2400.0                    | -61.09      |
| Static  | $\pi/4$ DQPSK | 1    | 2DH5        | 2402               | 2400.0                    | -55.86      |
| Static  | 8-DPSK        | 1    | 3DH5        | 2402               | 2400.0                    | -55.79      |
| Hopping | GFSK          | 1    | DH5         | 2402               | 2400.0                    | -64.26      |
| Hopping | $\pi/4$ DQPSK | 1    | 2DH5        | 2402               | 2400.0                    | -58.62      |
| Hopping | 8-DPSK        | 1    | 3DH5        | 2402               | 2400.0                    | -56.84      |

**Table 38 - Authorised Band Edge Results**



**Figure 75 - Core 1 - Static - GFSK/DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz**

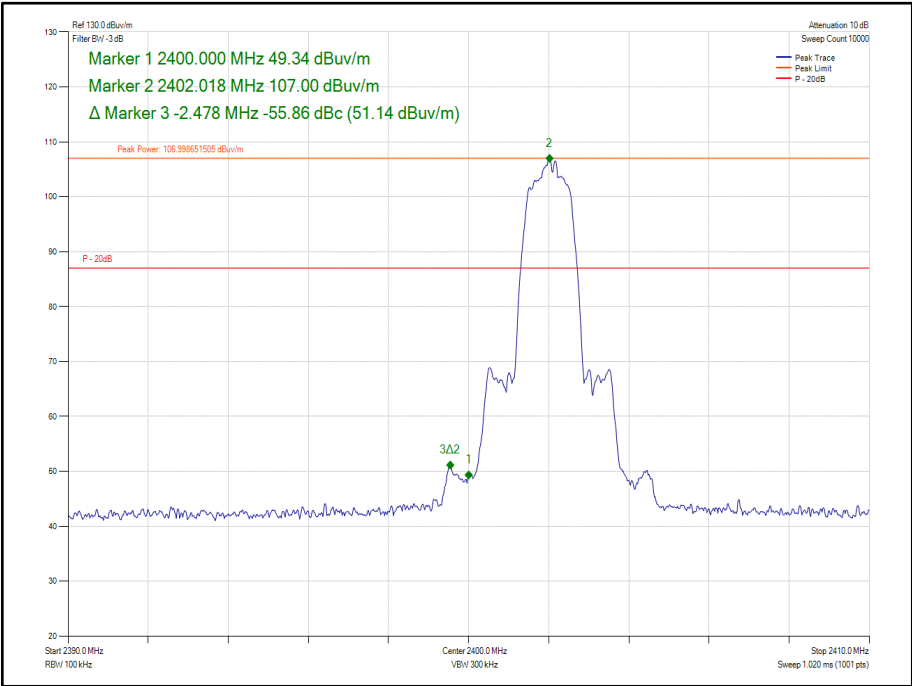


Figure 76 - Core 1 - Static -  $\pi/4$  DQPSK/2DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

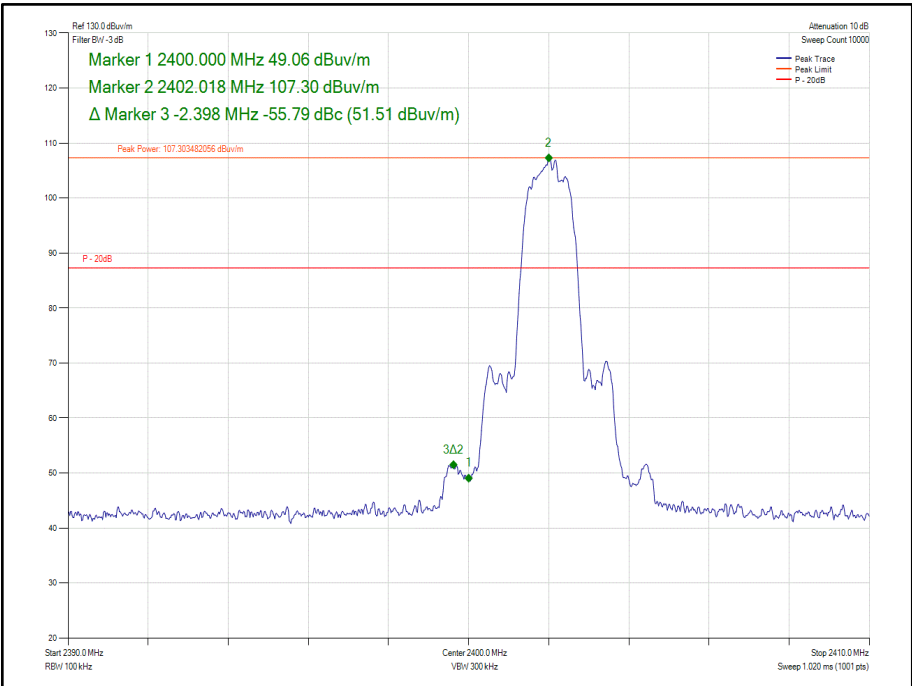


Figure 77 - Core 1 - Static - 8-DPSK/3DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

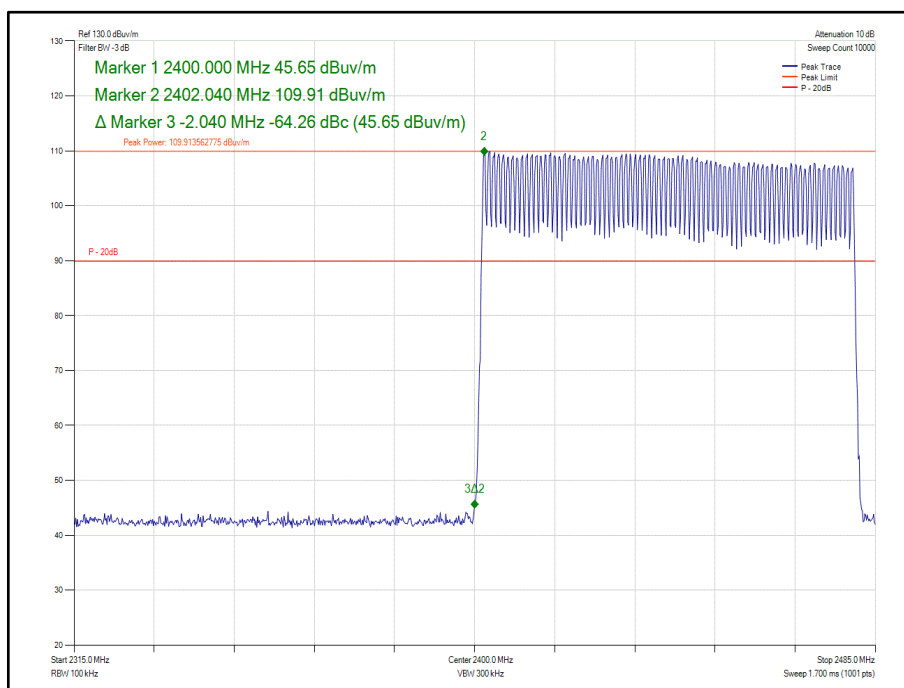


Figure 78 - Core 1 - Hopping - GFSK/DH5 - Band Edge Frequency 2400.0 MHz

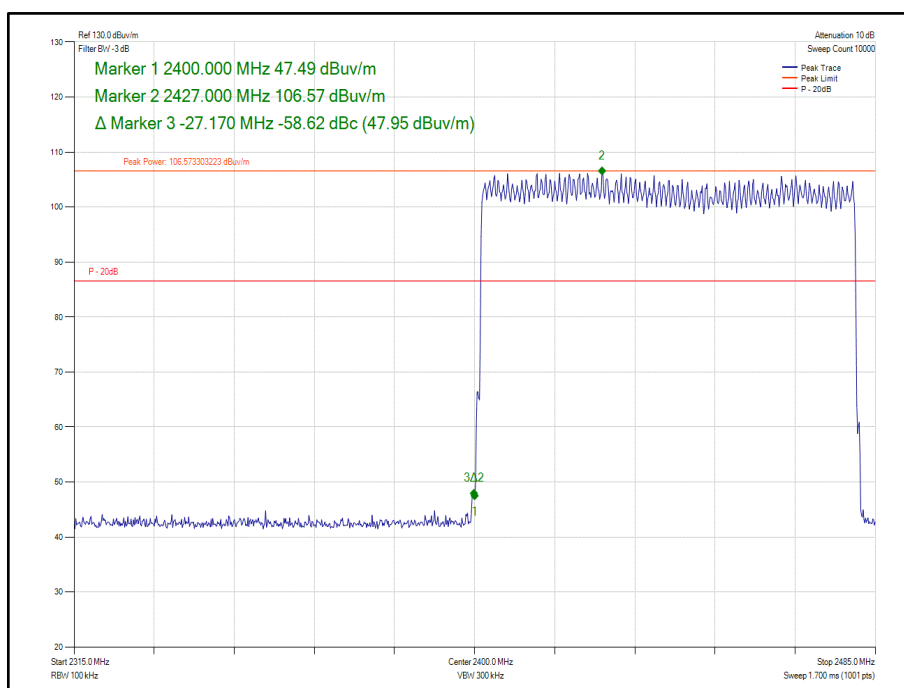


Figure 79 - Core 1 - Hopping -  $\pi/4$  DQPSK/2DH5 - Band Edge Frequency 2400.0 MHz

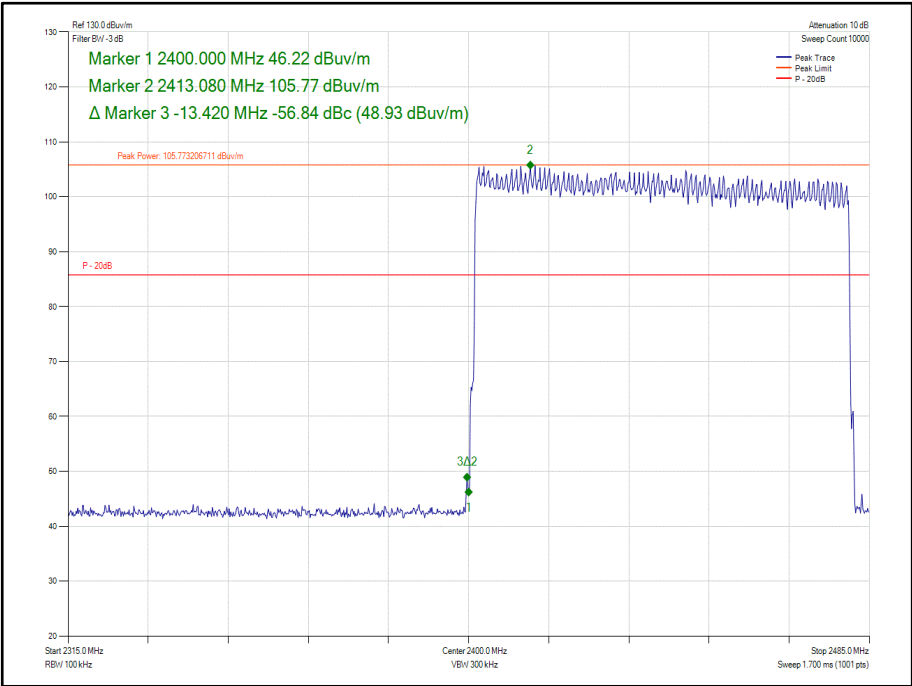
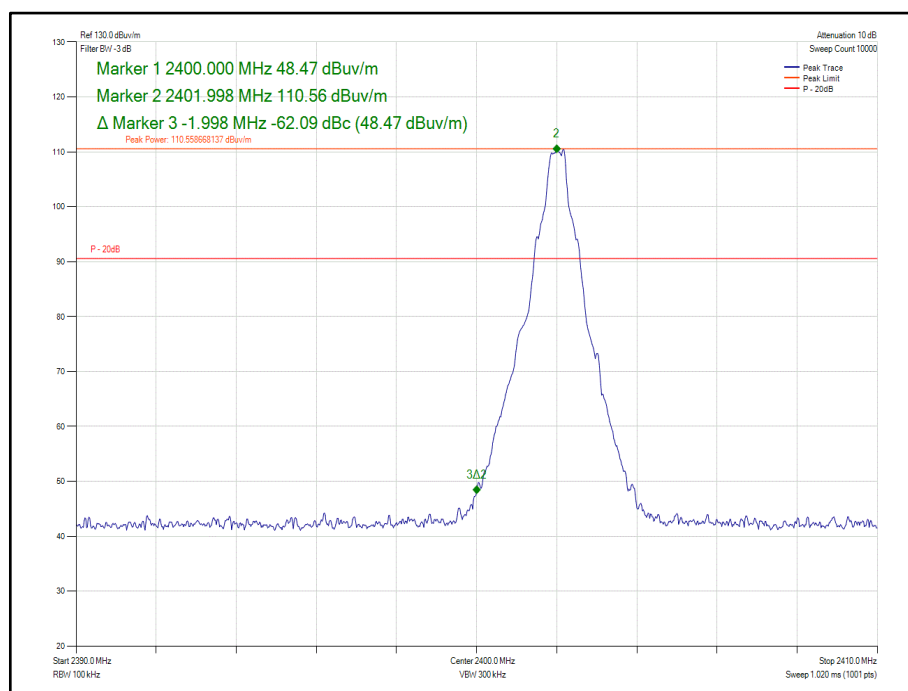


Figure 80 - Core 1 - Hopping - 8-DPSK/3DH5 - Band Edge Frequency 2400.0 MHz

| Mode    | Modulation    | Core | Packet Type | Tx Frequency (MHz) | Band Edge Frequency (MHz) | Level (dBc) |
|---------|---------------|------|-------------|--------------------|---------------------------|-------------|
| Static  | GFSK          | 2    | DH5         | 2402               | 2400.0                    | -62.09      |
| Static  | $\pi/4$ DQPSK | 2    | 2DH5        | 2402               | 2400.0                    | -50.60      |
| Static  | 8-DPSK        | 2    | 3DH5        | 2402               | 2400.0                    | -50.16      |
| Hopping | GFSK          | 2    | DH5         | 2402               | 2400.0                    | -66.06      |
| Hopping | $\pi/4$ DQPSK | 2    | 2DH5        | 2402               | 2400.0                    | -52.04      |
| Hopping | 8-DPSK        | 2    | 3DH5        | 2402               | 2400.0                    | -51.06      |

**Table 39 - Authorised Band Edge Results**



**Figure 81 - Core 2 - Static - GFSK/DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz**

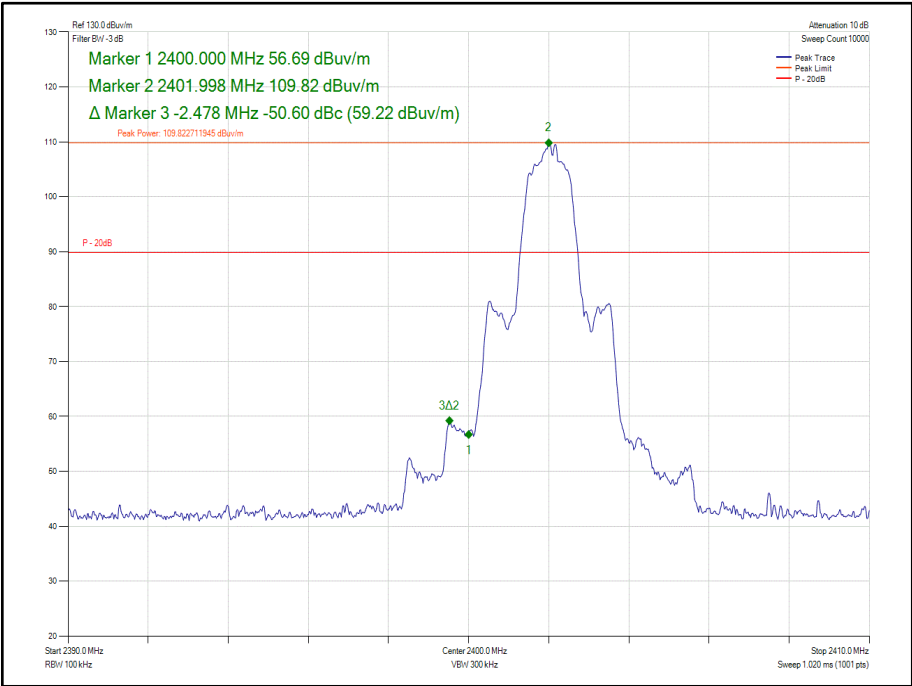


Figure 82 - Core 2 - Static -  $\pi/4$  DQPSK/2DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

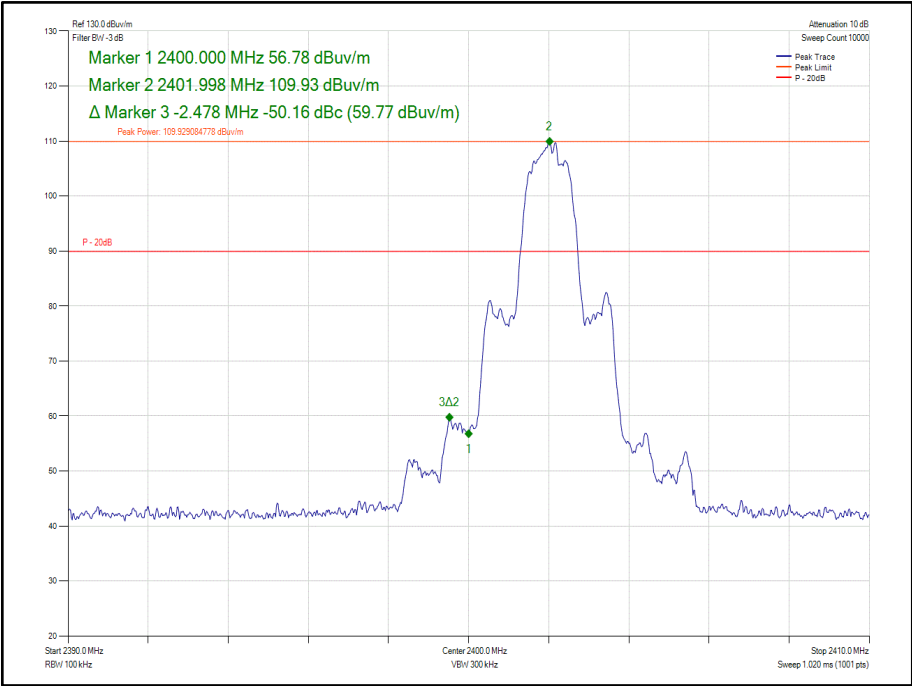


Figure 83 - Core 2 - Static - 8-DPSK/3DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

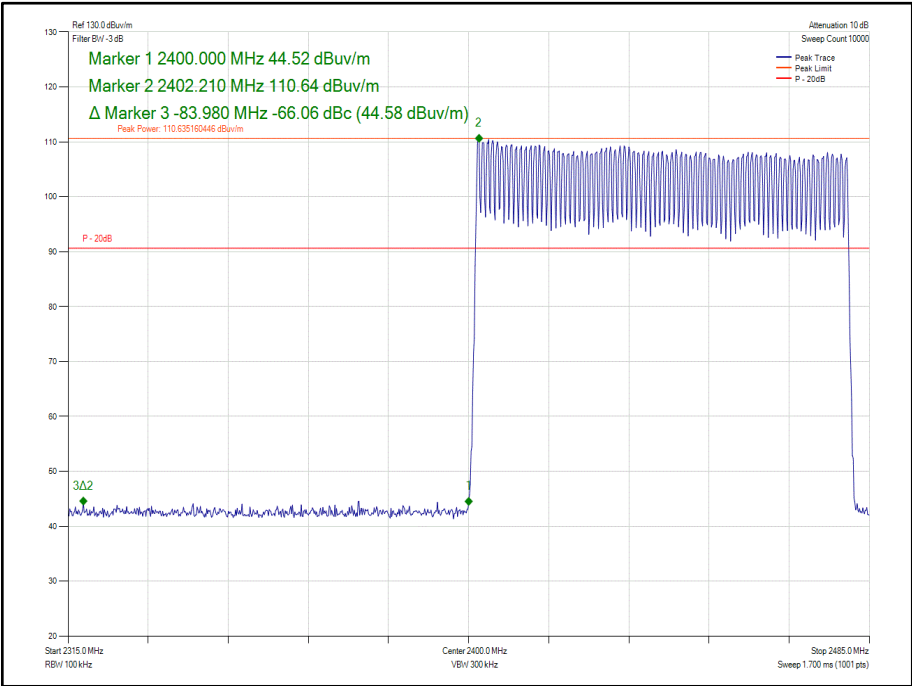


Figure 84 - Core 2 - Hopping - GFSK/DH5 - Band Edge Frequency 2400.0 MHz

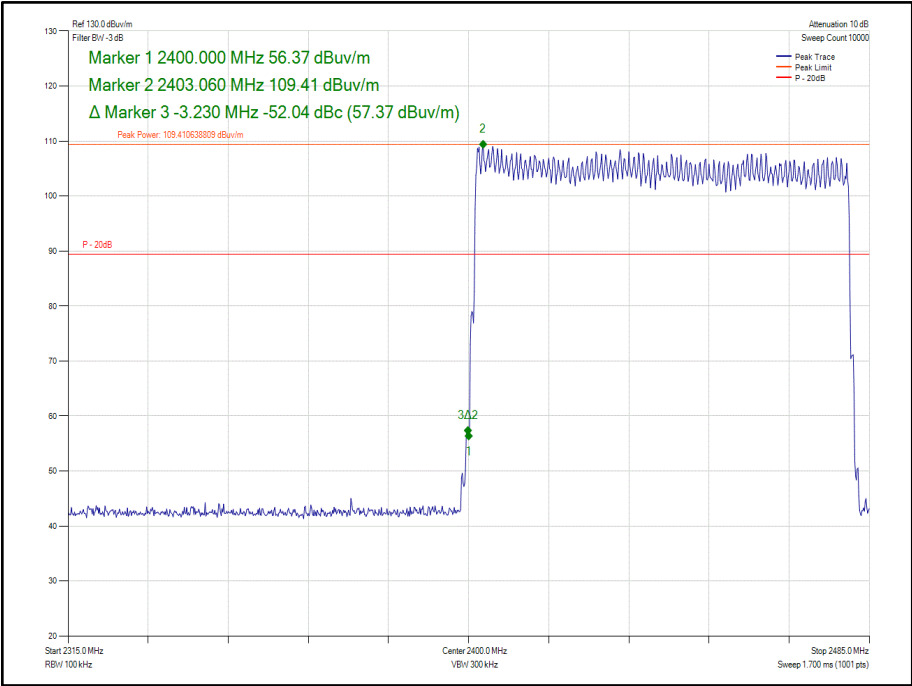


Figure 85 - Core 2 - Hopping -  $\pi/4$  DQPSK/2DH5 - Band Edge Frequency 2400.0 MHz

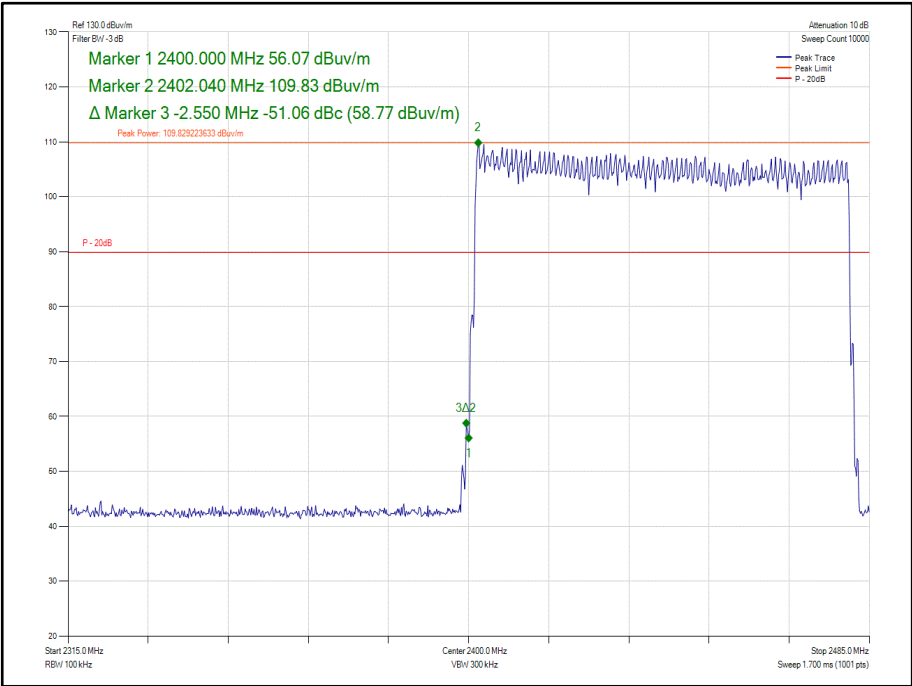
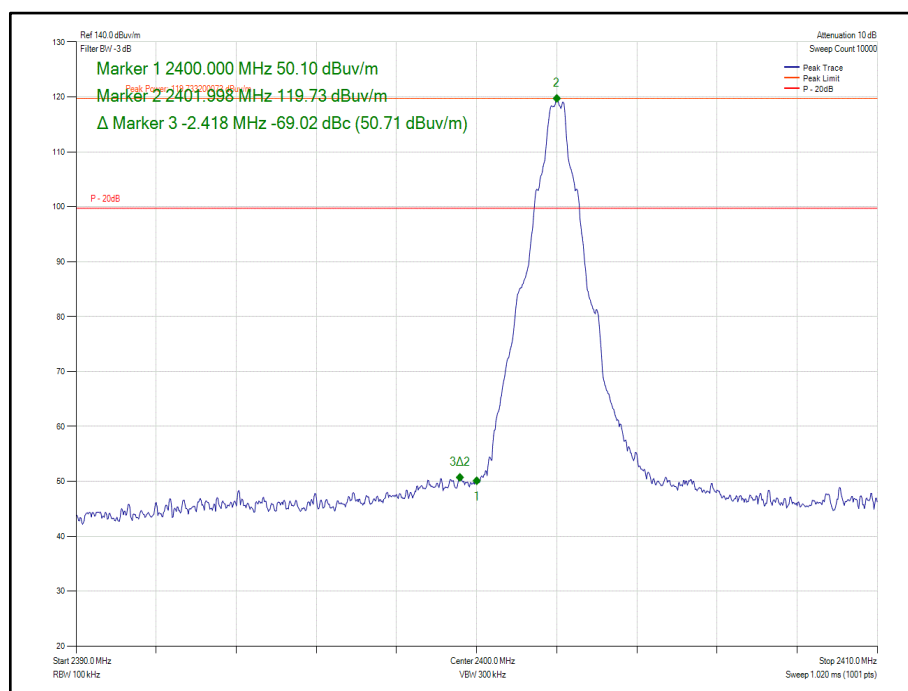


Figure 86 - Core 2 - Hopping - 8-DPSK/3DH5 - Band Edge Frequency 2400.0 MHz

| Mode    | Modulation    | Core | Packet Type | Tx Frequency (MHz) | Band Edge Frequency (MHz) | Level (dBc) |
|---------|---------------|------|-------------|--------------------|---------------------------|-------------|
| Static  | GFSK          | 0-1  | DH5         | 2402               | 2400.0                    | -69.02      |
| Static  | $\pi/4$ DQPSK | 0-1  | 2DH5        | 2402               | 2400.0                    | -55.73      |
| Static  | 8-DPSK        | 0-1  | 3DH5        | 2402               | 2400.0                    | -55.43      |
| Hopping | GFSK          | 0-1  | DH5         | 2402               | 2400.0                    | -70.79      |
| Hopping | $\pi/4$ DQPSK | 0-1  | 2DH5        | 2402               | 2400.0                    | -60.86      |
| Hopping | 8-DPSK        | 0-1  | 3DH5        | 2402               | 2400.0                    | -58.93      |

**Table 40 - Authorised Band Edge Results**



**Figure 87 - Core 0-1 - Static - GFSK/DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz**

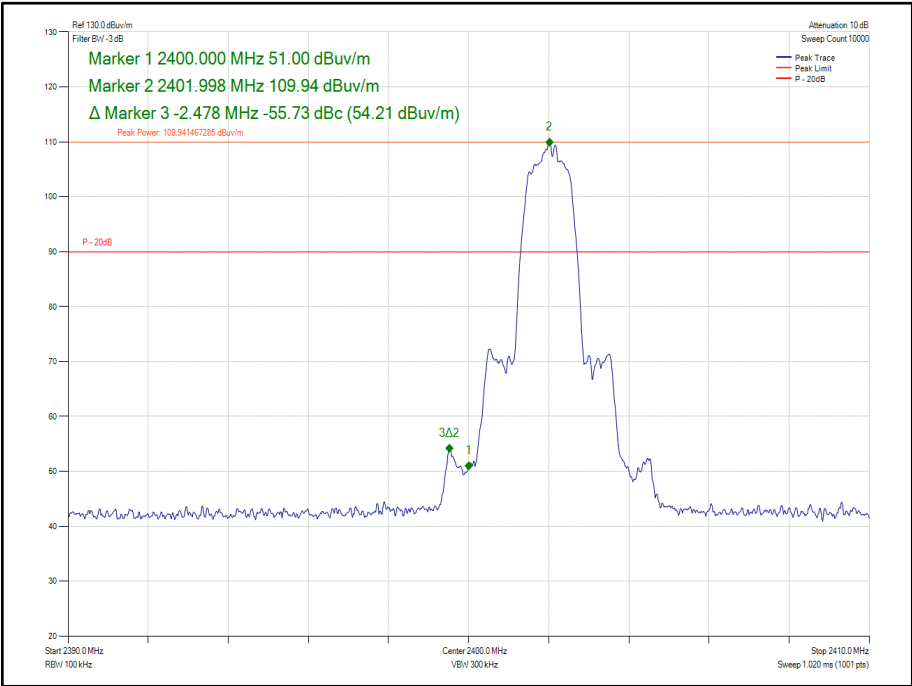


Figure 88 - Core 0-1 - Static -  $\pi/4$  DQPSK/2DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

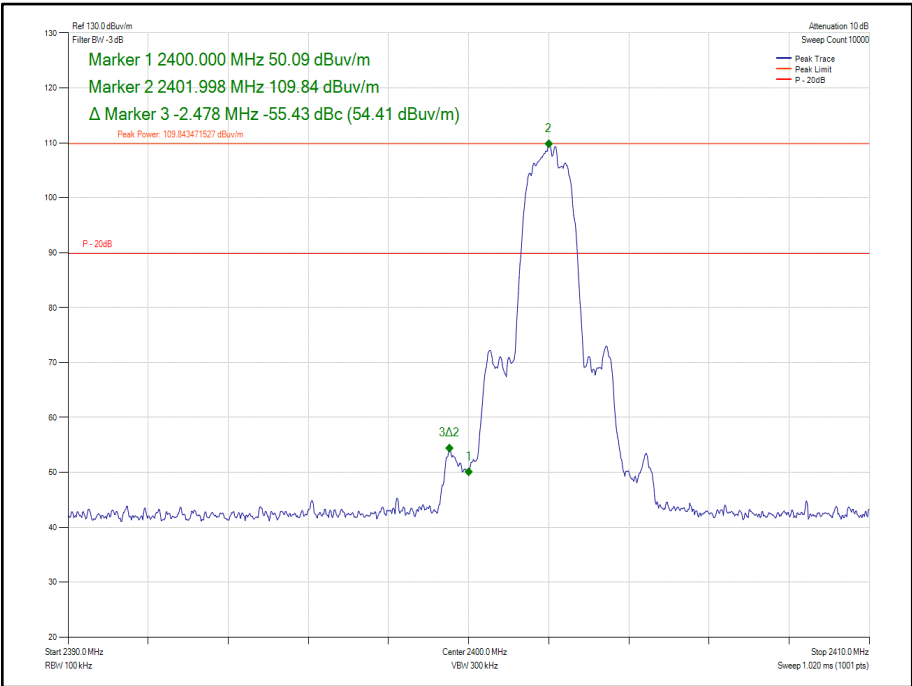


Figure 89 - Core 0-1 - Static - 8-DPSK/3DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

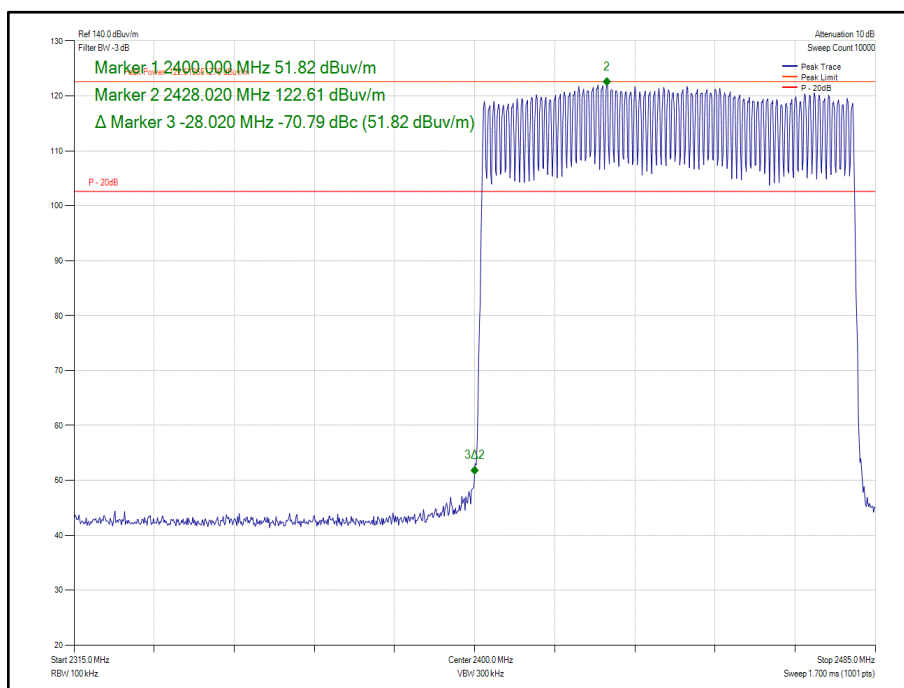


Figure 90 - Core 0-1 - Hopping - GFSK/DH5 - Band Edge Frequency 2400.0 MHz

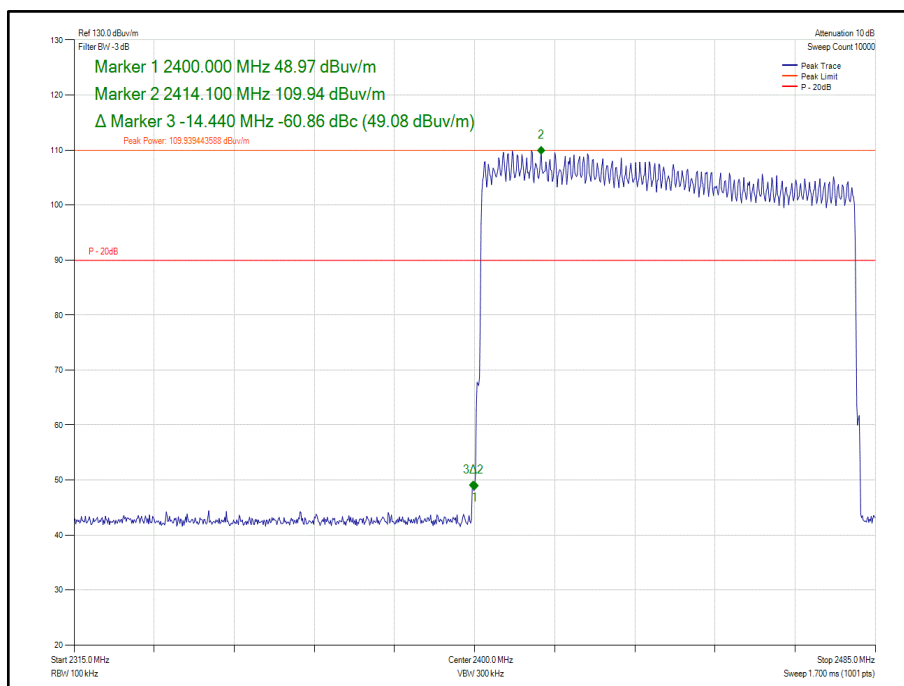


Figure 91 - Core 0-1 - Hopping -  $\pi/4$  DQPSK/2DH5 - Band Edge Frequency 2400.0 MHz

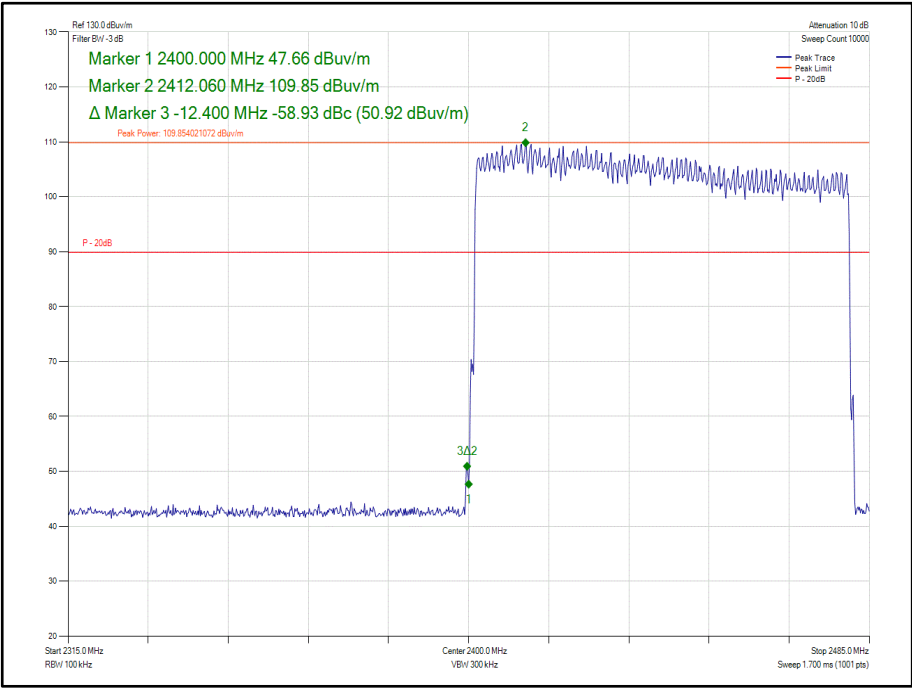
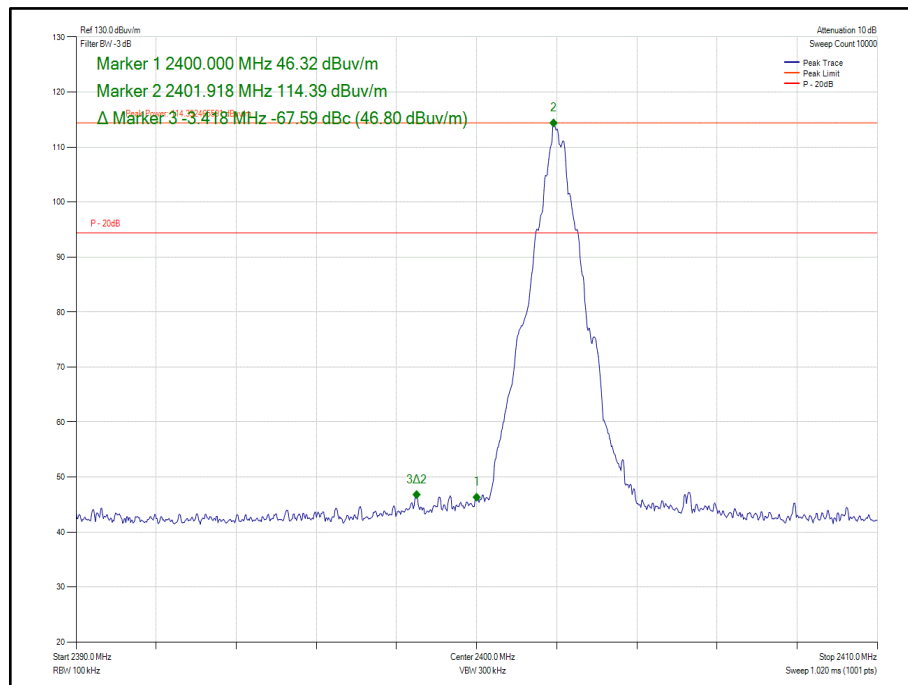


Figure 92 - Core 0-1 - Hopping - 8-DPSK/3DH5 - Band Edge Frequency 2400.0 MHz

ePA

| Mode    | Modulation    | Core | Packet Type | Tx Frequency (MHz) | Band Edge Frequency (MHz) | Level (dBc) |
|---------|---------------|------|-------------|--------------------|---------------------------|-------------|
| Static  | GFSK          | 0    | DH5         | 2402               | 2400.0                    | -67.59      |
| Static  | $\pi/4$ DQPSK | 0    | 2DH5        | 2402               | 2400.0                    | -62.07      |
| Static  | 8-DPSK        | 0    | 3DH5        | 2402               | 2400.0                    | -62.10      |
| Hopping | GFSK          | 0    | DH5         | 2402               | 2400.0                    | -65.19      |
| Hopping | $\pi/4$ DQPSK | 0    | 2DH5        | 2402               | 2400.0                    | -63.93      |
| Hopping | 8-DPSK        | 0    | 3DH5        | 2402               | 2400.0                    | -63.95      |

**Table 41 - Authorised Band Edge Results**



**Figure 93 - Core 0 - Static - GFSK/DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz**

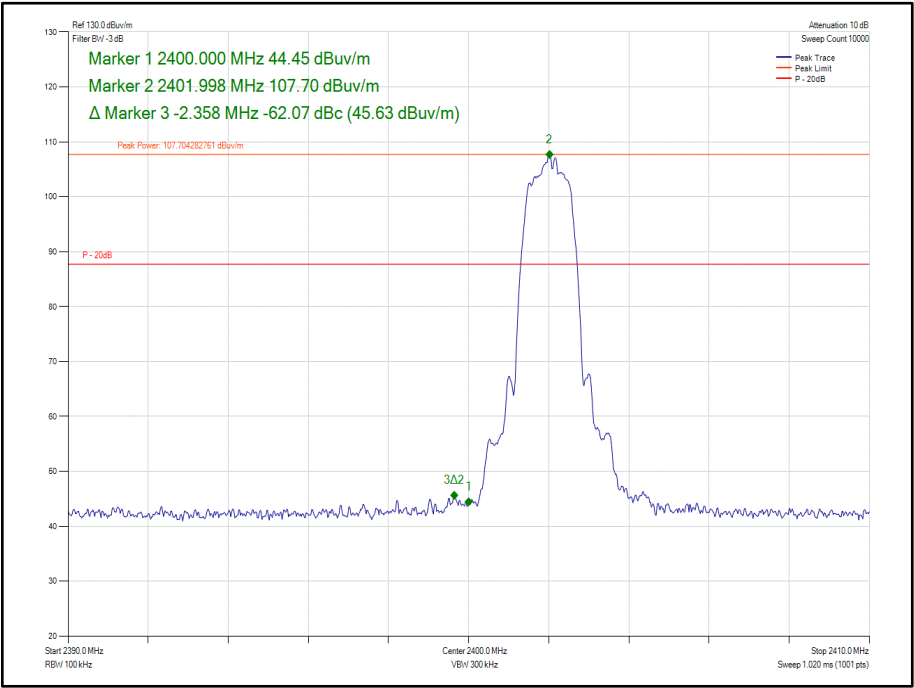


Figure 94 - Core 0 - Static -  $\pi/4$  DQPSK/2DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

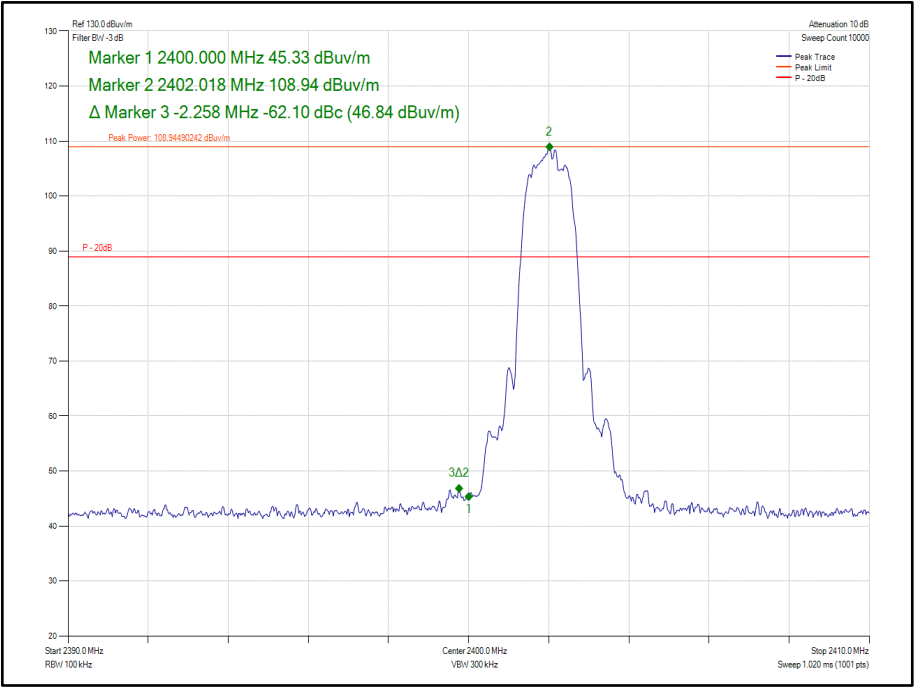


Figure 95 - Core 0 - Static - 8-DPSK/3DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

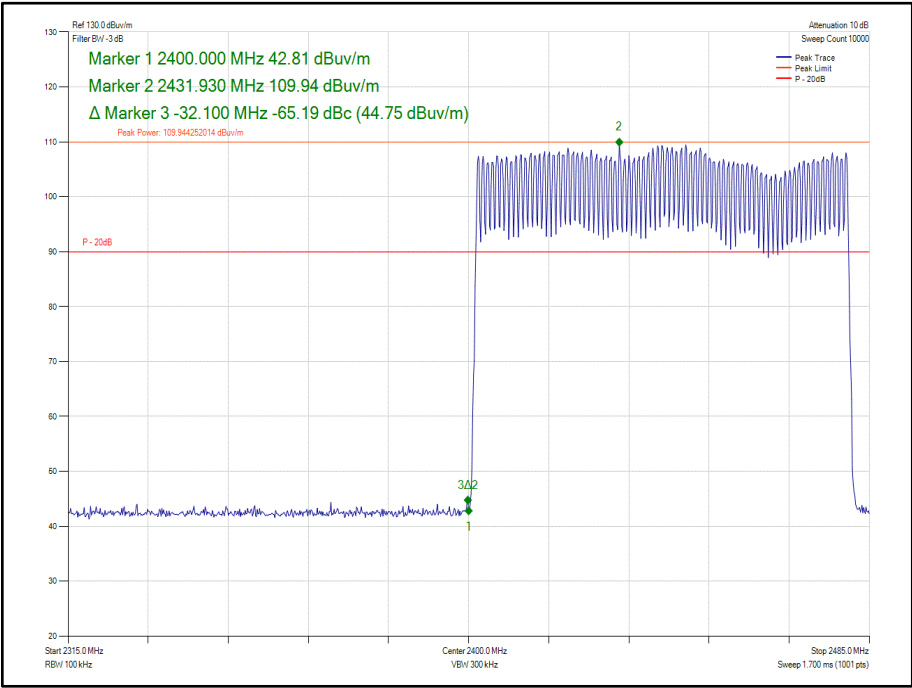


Figure 96 - Core 0 - Hopping - GFSK/DH5 - Band Edge Frequency 2400.0 MHz

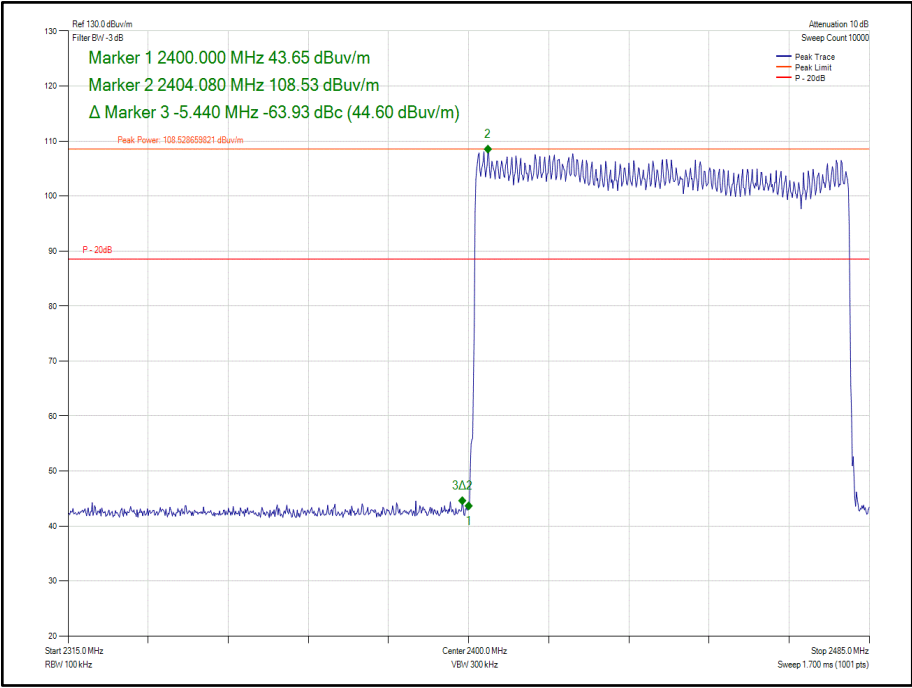


Figure 97 - Core 0 - Hopping -  $\pi/4$  DQPSK/2DH5 - Band Edge Frequency 2400.0 MHz

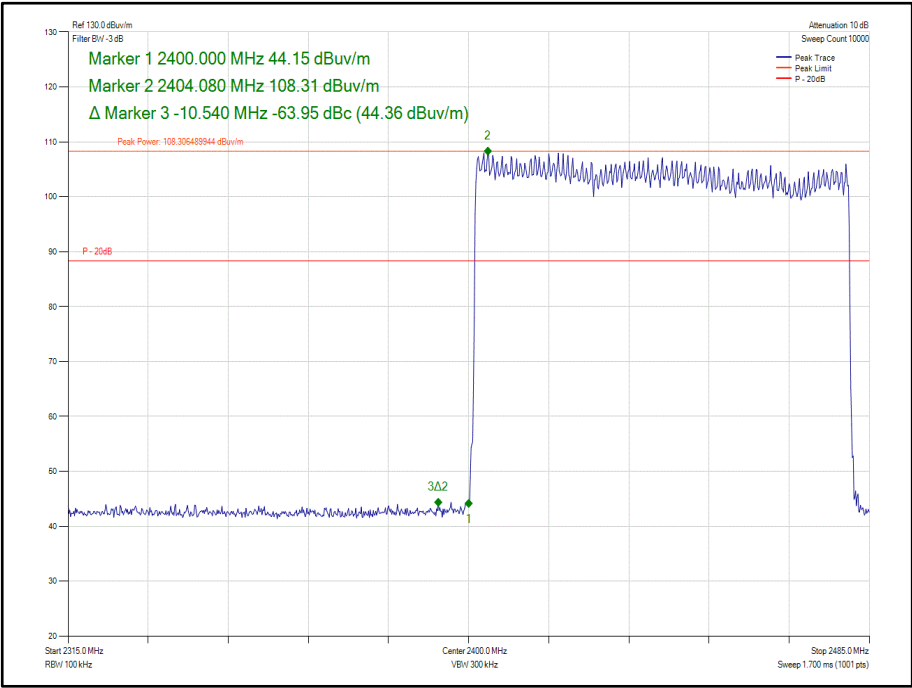
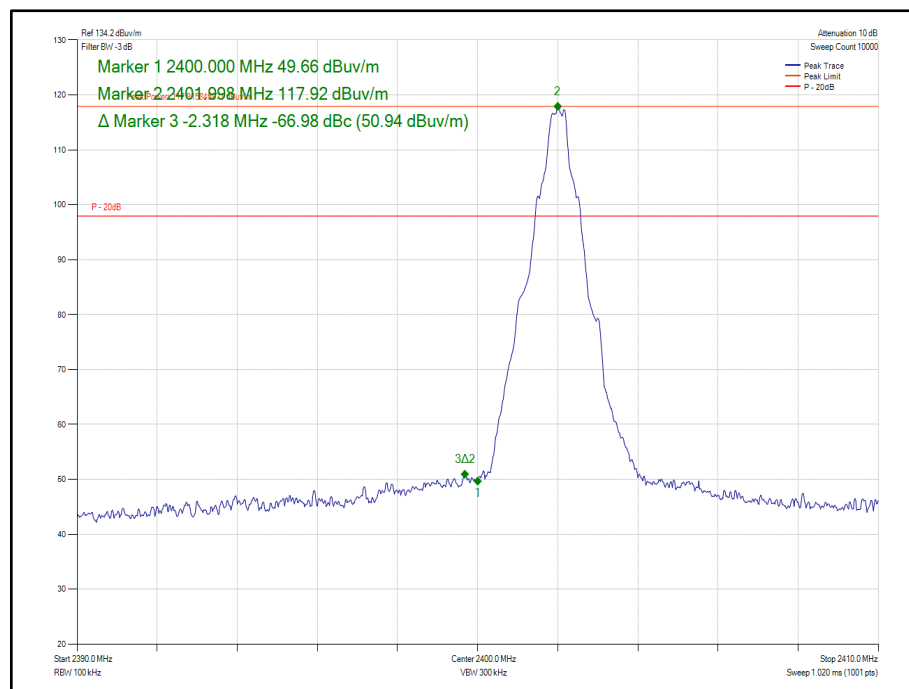


Figure 98 - Core 0 - Hopping - 8-DPSK/3DH5 - Band Edge Frequency 2400.0 MHz

| Mode    | Modulation    | Core | Packet Type | Tx Frequency (MHz) | Band Edge Frequency (MHz) | Level (dBc) |
|---------|---------------|------|-------------|--------------------|---------------------------|-------------|
| Static  | GFSK          | 1    | DH5         | 2402               | 2400.0                    | -66.98      |
| Static  | $\pi/4$ DQPSK | 1    | 2DH5        | 2402               | 2400.0                    | -63.15      |
| Static  | 8-DPSK        | 1    | 3DH5        | 2402               | 2400.0                    | -63.37      |
| Hopping | GFSK          | 1    | DH5         | 2402               | 2400.0                    | -67.36      |
| Hopping | $\pi/4$ DQPSK | 1    | 2DH5        | 2402               | 2400.0                    | -64.44      |
| Hopping | 8-DPSK        | 1    | 3DH5        | 2402               | 2400.0                    | -63.60      |

**Table 42 - Authorised Band Edge Results**



**Figure 99 - Core 1 - Static - GFSK/DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz**

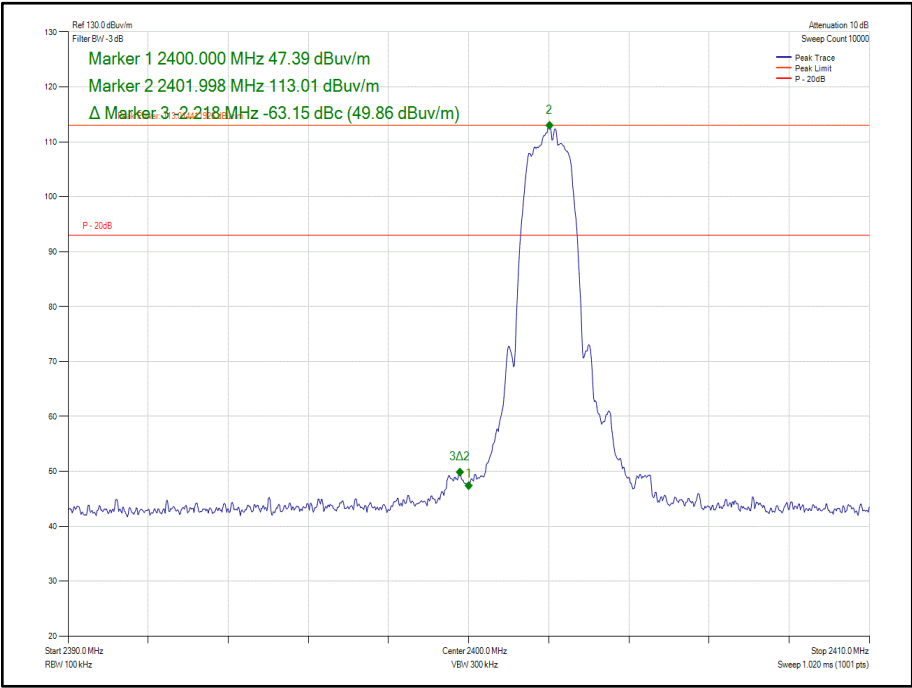


Figure 100 - Core 1 - Static -  $\pi/4$  DQPSK/2DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

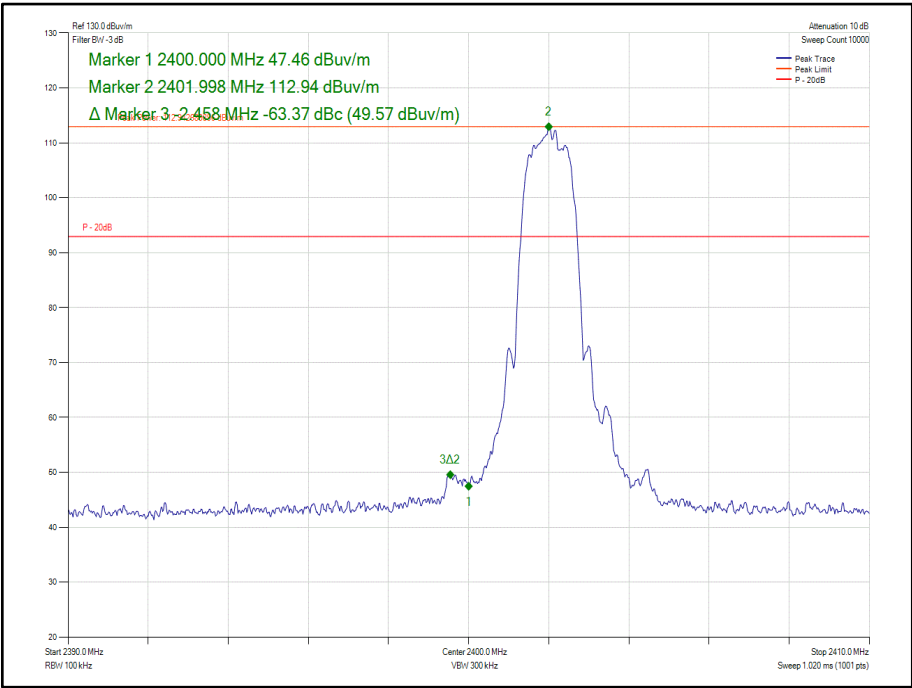


Figure 101 - Core 1 - Static - 8-DPSK/3DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

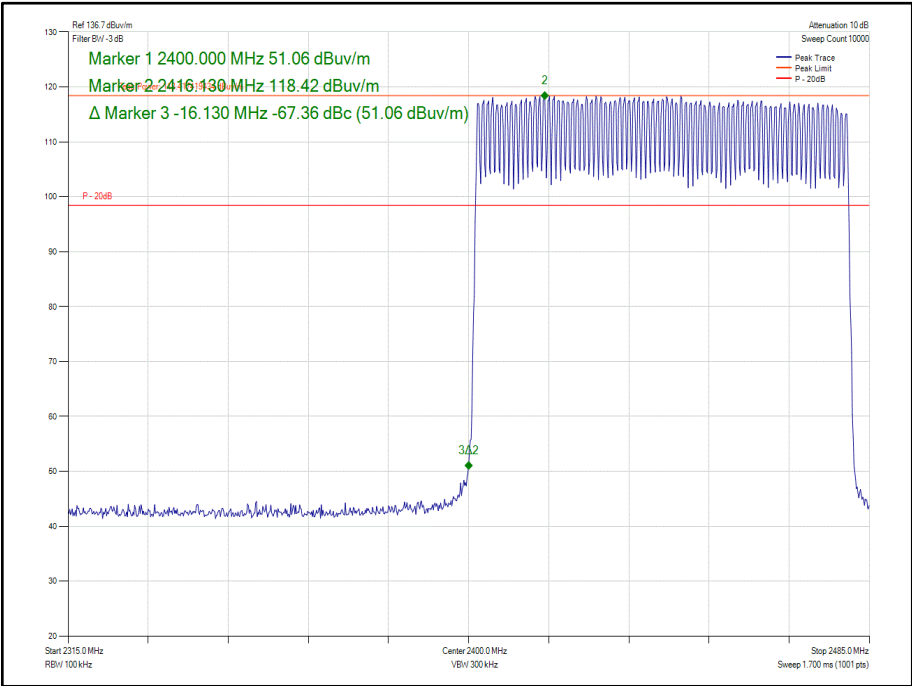


Figure 102 - Core 1 - Hopping - GFSK/DH5 - Band Edge Frequency 2400.0 MHz

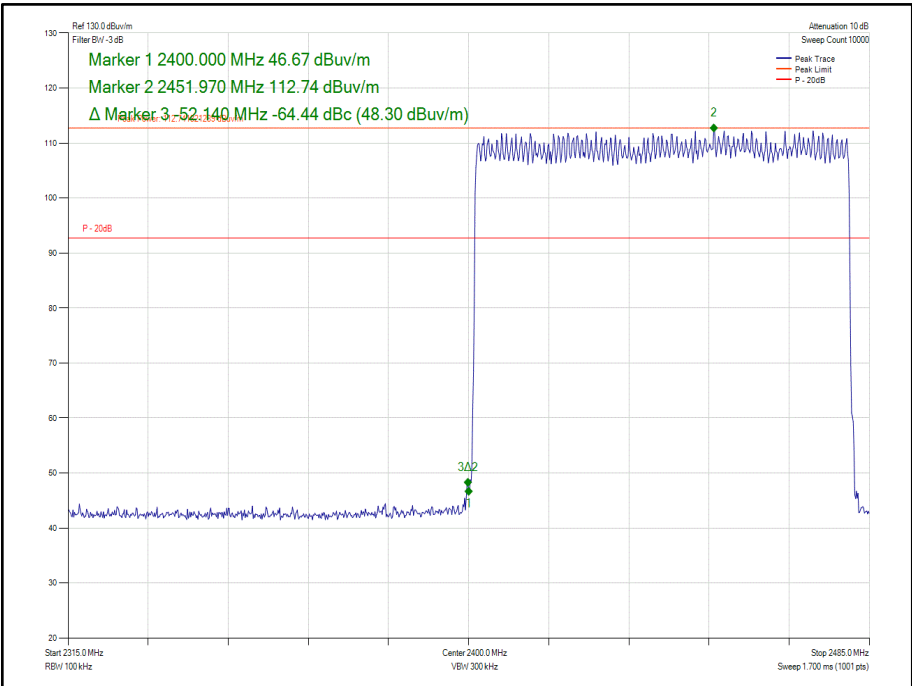


Figure 103 - Core 1 - Hopping -  $\pi/4$  DQPSK/2DH5 - Band Edge Frequency 2400.0 MHz

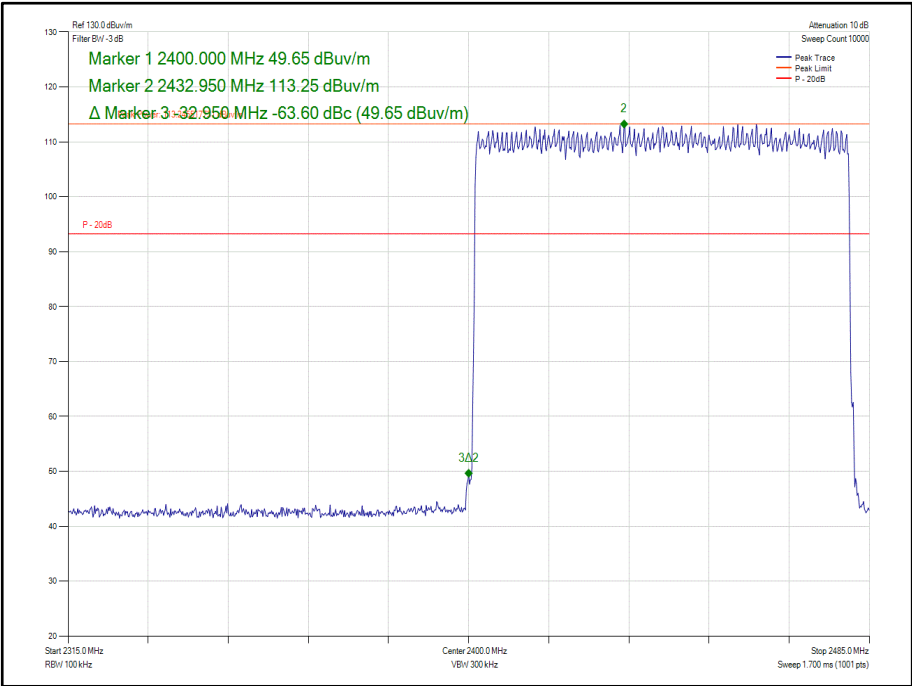
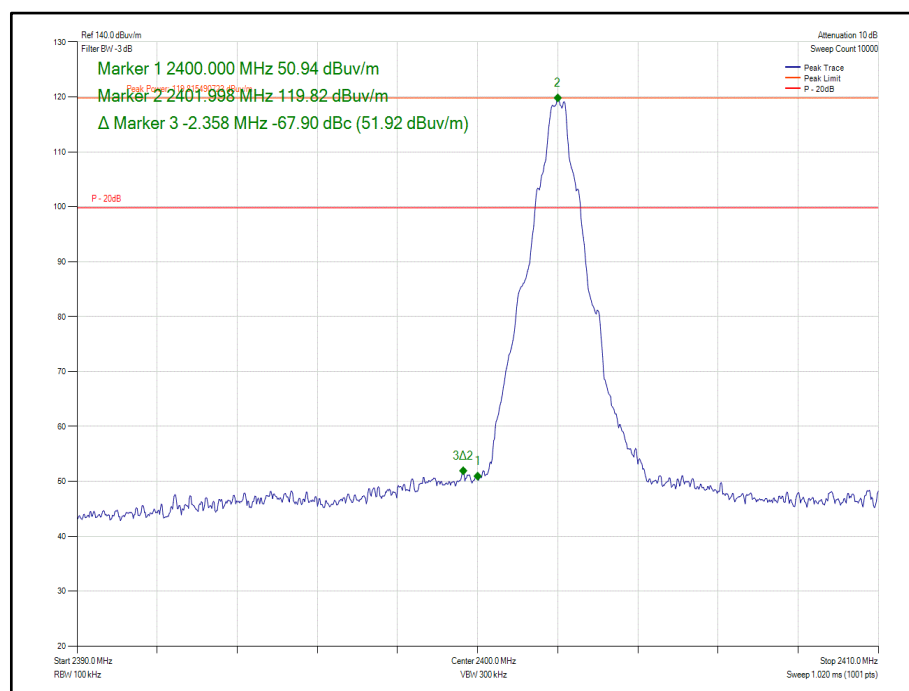


Figure 104 - Core 1 - Hopping - 8-DPSK/3DH5 - Band Edge Frequency 2400.0 MHz

| Mode    | Modulation    | Core | Packet Type | Tx Frequency (MHz) | Band Edge Frequency (MHz) | Level (dBc) |
|---------|---------------|------|-------------|--------------------|---------------------------|-------------|
| Static  | GFSK          | 0-1  | DH5         | 2402               | 2400.0                    | -67.90      |
| Static  | $\pi/4$ DQPSK | 0-1  | 2DH5        | 2402               | 2400.0                    | -63.93      |
| Static  | 8-DPSK        | 0-1  | 3DH5        | 2402               | 2400.0                    | -63.40      |
| Hopping | GFSK          | 0-1  | DH5         | 2402               | 2400.0                    | -69.51      |
| Hopping | $\pi/4$ DQPSK | 0-1  | 2DH5        | 2402               | 2400.0                    | -64.94      |
| Hopping | 8-DPSK        | 0-1  | 3DH5        | 2402               | 2400.0                    | -66.45      |

**Table 43 - MIMO 2TX Authorised Band Edge Results**



**Figure 105 - Core 0-1 - Static - GFSK/DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz**

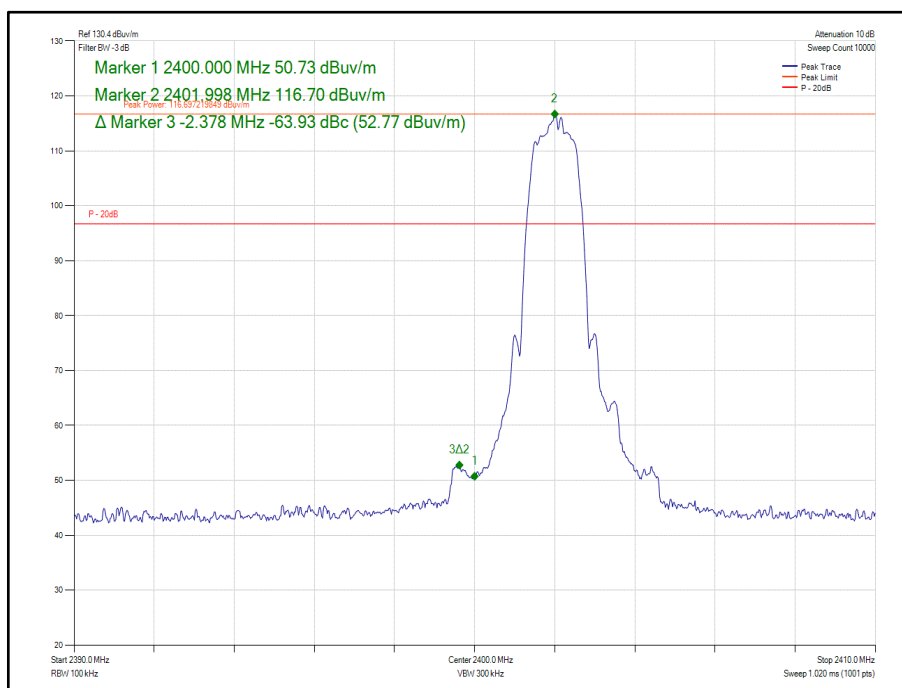


Figure 106 - Core 0-1 - Static -  $\pi/4$  DQPSK/2DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

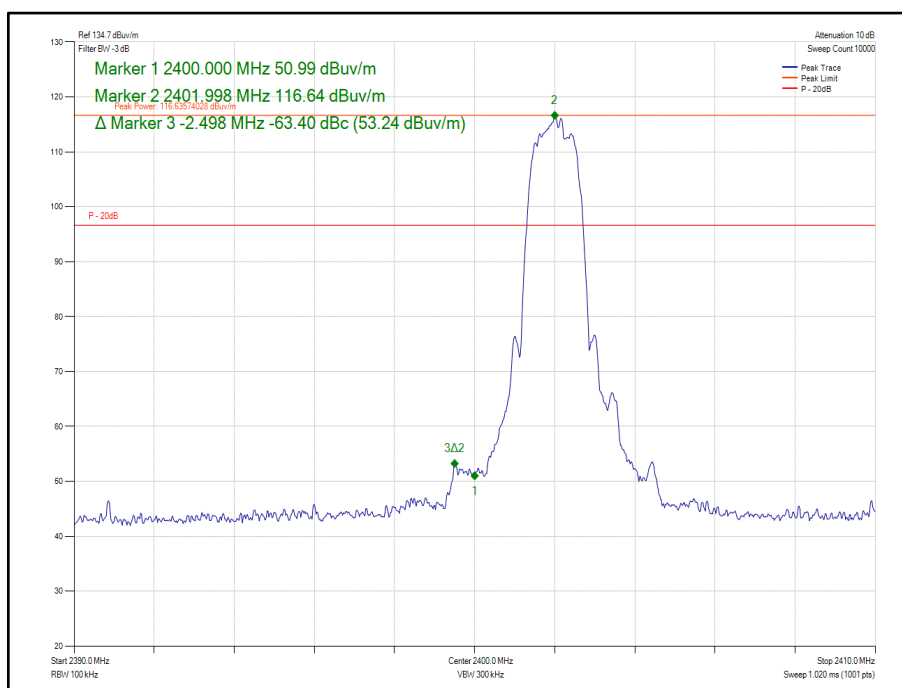


Figure 107 - Core 0-1 - Static - 8-DPSK/3DH5 - 2402 MHz - Band Edge Frequency 2400.0 MHz

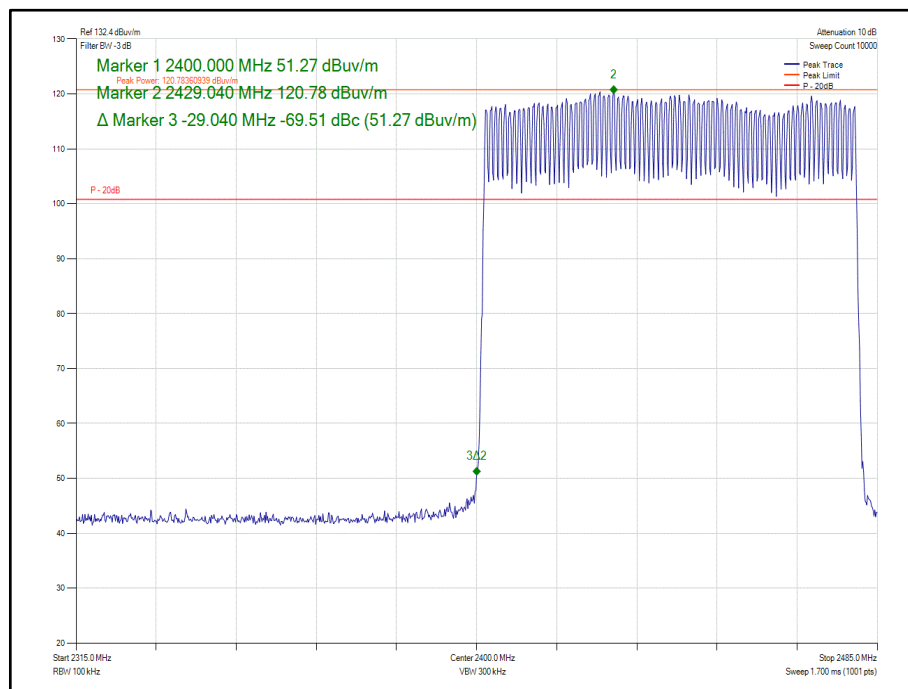


Figure 108 - Core 0-1 - Hopping - GFSK/DH5 - Band Edge Frequency 2400.0 MHz

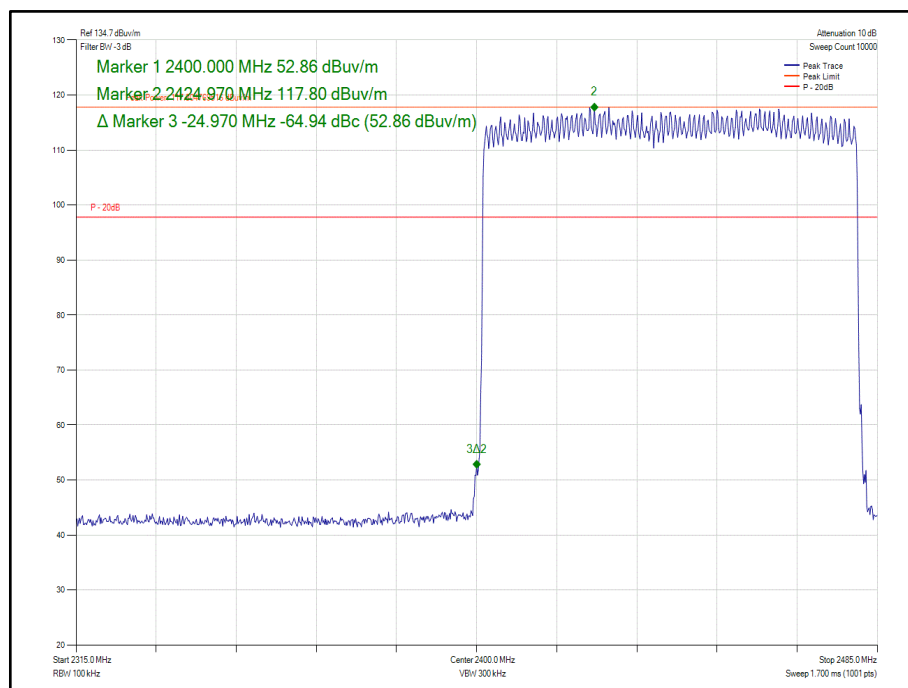
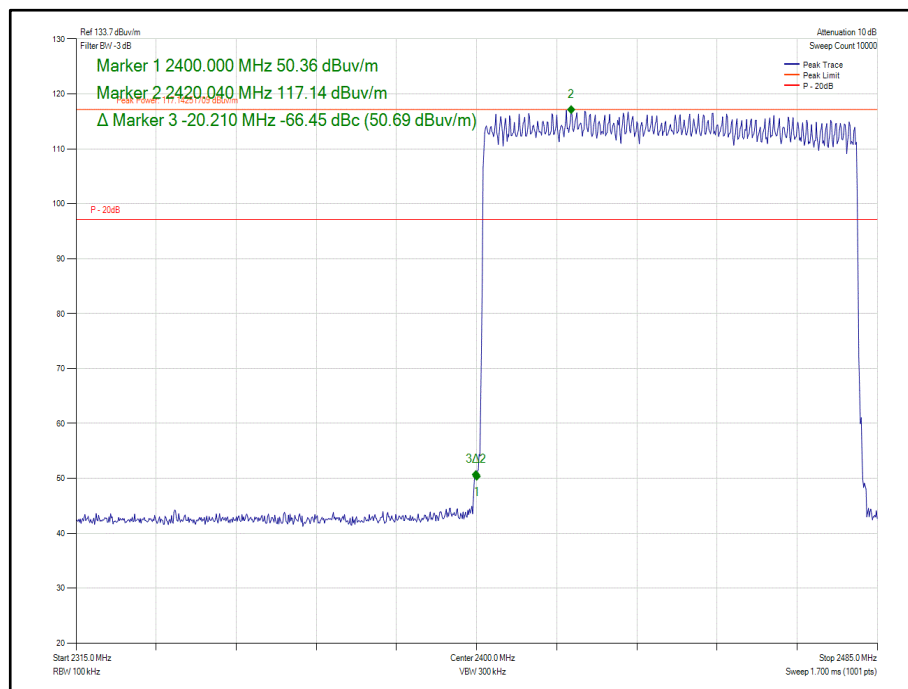


Figure 109 - Core 0-1 - Hopping -  $\pi/4$  DQPSK/2DH5 - Band Edge Frequency 2400.0 MHz



**Figure 110 - Core 0-1 - Hopping - 8-DPSK/3DH5 - Band Edge Frequency 2400.0 MHz**

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

ISED RSS-247, Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.



## 2.6.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5 and RF Chamber 11.

| Instrument                    | Manufacturer    | Type No              | TE No | Calibration Period (months) | Calibration Due |
|-------------------------------|-----------------|----------------------|-------|-----------------------------|-----------------|
| Power Supply Unit             | Farnell         | LB30-4               | 158   | 12                          | O/P Mon         |
| Screened Room (5)             | Rainford        | Rainford             | 1545  | 36                          | 23-Jan-2021     |
| Turntable Controller          | Inn-Co GmbH     | CO 1000              | 1606  | -                           | TU              |
| Mast Controller               | Maturo GmbH     | NCD                  | 4810  | -                           | TU              |
| Tilt Antenna Mast             | Maturo GmbH     | TAM 4.0-P            | 4811  | -                           | TU              |
| Horn Antenna (1-10GHz)        | Schwarzbeck     | BBHA 9120 B          | 4848  | 12                          | 10-Mar-2021     |
| EMI Test Receiver             | Rohde & Schwarz | ESW44                | 5084  | 12                          | 28-Nov-2020     |
| Cable (18 GHz)                | Rosenberger     | LU7-071-1000         | 5102  | 12                          | 06-Oct-2020     |
| Cable (18 GHz)                | Rosenberger     | LU7-071-1000         | 5103  | 12                          | 06-Oct-2020     |
| Cable (18 GHz)                | Rosenberger     | LU7-071-1000         | 5104  | 12                          | 09-Dec-2020     |
| EmX Emissions Software        | TUV SUD         | EmX                  | 5125  | -                           | Software        |
| Screened Room (11)            | Rainford        | Rainford             | 5136  | 36                          | 01-Nov-2021     |
| Mast                          | Maturo          | TAM 4.0-P            | 5158  | -                           | TU              |
| Mast and Turntable Controller | Maturo          | Maturo NCD           | 5159  | -                           | TU              |
| Turntable                     | Maturo          | TT 15WF              | 5160  | -                           | TU              |
| Horn Antenna (1-10GHz)        | Schwarzbeck     | BBHA 9120 B          | 5215  | 12                          | 10-Mar-2021     |
| Thermo-Hygro-Barometer        | PCE Instruments | PCE-THB-40           | 5475  | 12                          | 17-Mar-2021     |
| Attenuator 5W 10dB DC-18GHz   | Aaren           | AT40A-4041-D18-10    | 5494  | 12                          | 14-Apr-2021     |
| 2m SMA Cable                  | Junkosha        | MWX221-02000AMSAMS/A | 5518  | 12                          | 01-Apr-2021     |
| 8m N Type Cable               | Junkosha        | MWX221-08000NMSNMS/B | 5522  | 12                          | 24-Mar-2021     |
| EMI Test Receiver             | Rohde & Schwarz | ESW44                | 5527  | 12                          | 06-Feb-2021     |

**Table 44**

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment



## 2.7 Restricted Band Edges

### 2.7.1 Specification Reference

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

### 2.7.2 Equipment Under Test and Modification State

A2348, S/N: C07D100W02H7 - Modification State 0

### 2.7.3 Date of Test

18-August-2020 to 24-August-2020

### 2.7.4 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 4.1.4.2.5. 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:  
 $10^{(\text{Field Strength in dB}\mu\text{V/m}/20)}$

### 2.7.5 Environmental Conditions

Ambient Temperature 20.7-27.2°C  
Relative Humidity 48.1-61.1%

### 2.7.6 Test Results

#### 2.4 GHz Bluetooth (FHSS)

#### iPA

| Mode   | Modulation | Core | Packet Type | Tx Frequency (MHz) | Band Edge Frequency (MHz) | Peak Level (dBμV/m) | Average Level (dBμV/m) |
|--------|------------|------|-------------|--------------------|---------------------------|---------------------|------------------------|
| Static | GFSK       | 0    | DH5         | 2402               | 2390.0                    | 54.68               | 39.40                  |
| Static | π/4 DQPSK  | 0    | 2DH5        | 2402               | 2390.0                    | 53.77               | 39.38                  |
| Static | 8-DPSK     | 0    | 3DH5        | 2402               | 2390.0                    | 53.74               | 39.37                  |
| Static | GFSK       | 0    | DH5         | 2480               | 2483.5                    | 52.50               | 40.17                  |
| Static | π/4 DQPSK  | 0    | 2DH5        | 2480               | 2483.5                    | 52.34               | 39.91                  |
| Static | 8-DPSK     | 0    | 3DH5        | 2480               | 2483.5                    | 51.99               | 39.75                  |

**Table 45 - Restricted Band Edge Results**

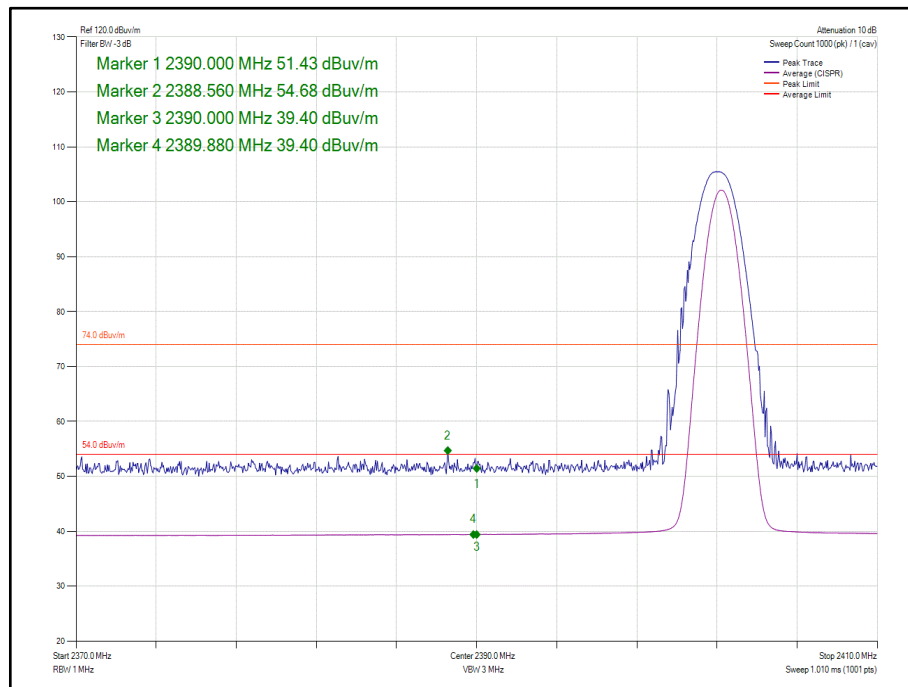


Figure 111 - Core 0 - Static - GFSK/DH5 - 2402 MHz - Band Edge Frequency 2390.0 MHz

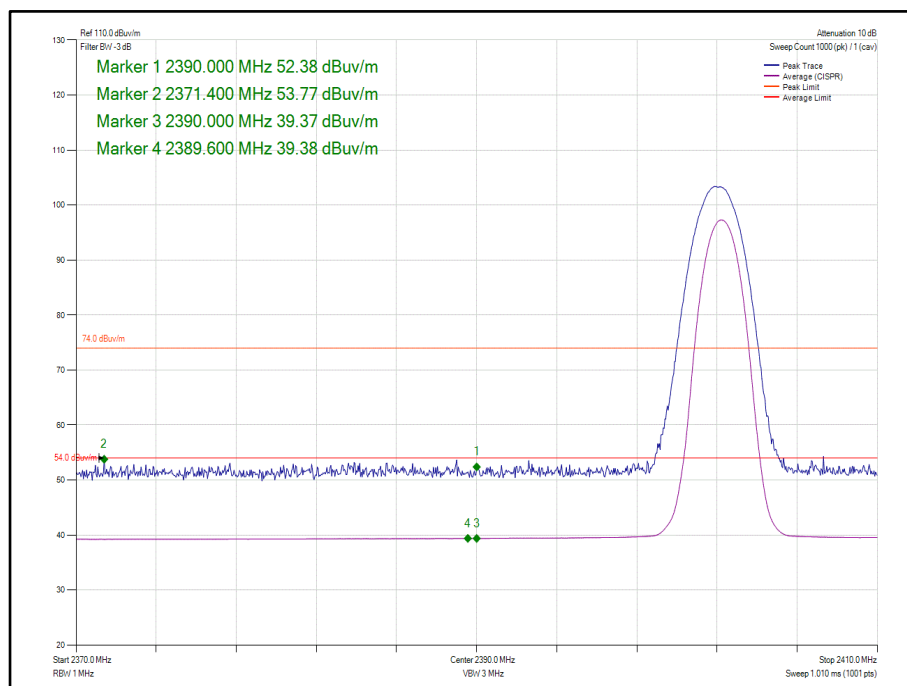


Figure 112 - Core 0 - Static -  $\pi/4$  DQPSK/2DH5 - 2402 MHz - Band Edge Frequency 2390.0 MHz

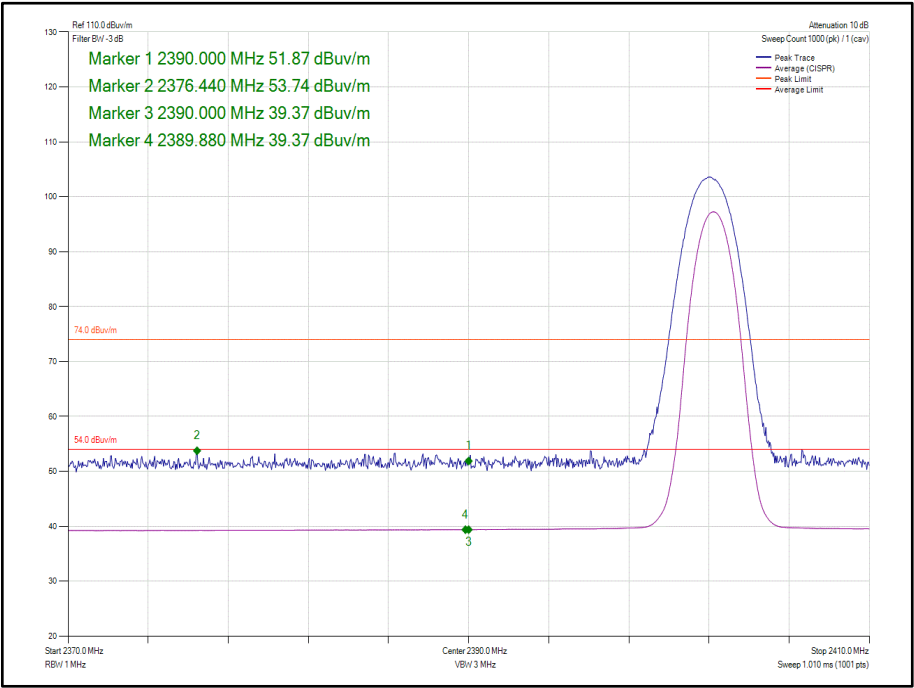


Figure 113 - Core 0 - Static - 8-DPSK/3DH5 - 2402 MHz Band Edge Frequency 2390.0 MHz

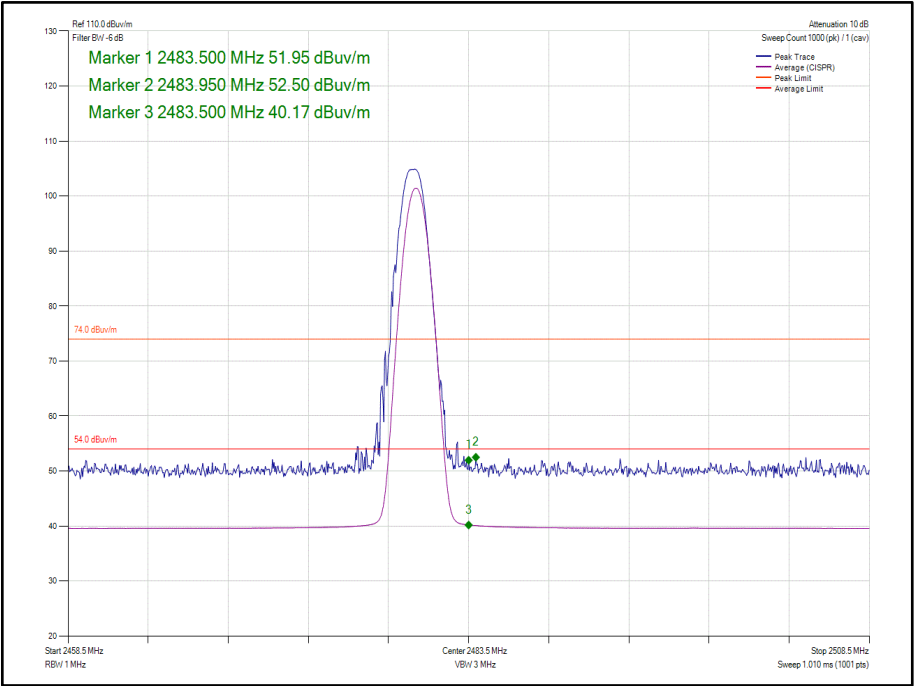


Figure 114 - Core 0 - Static - GFSK/DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

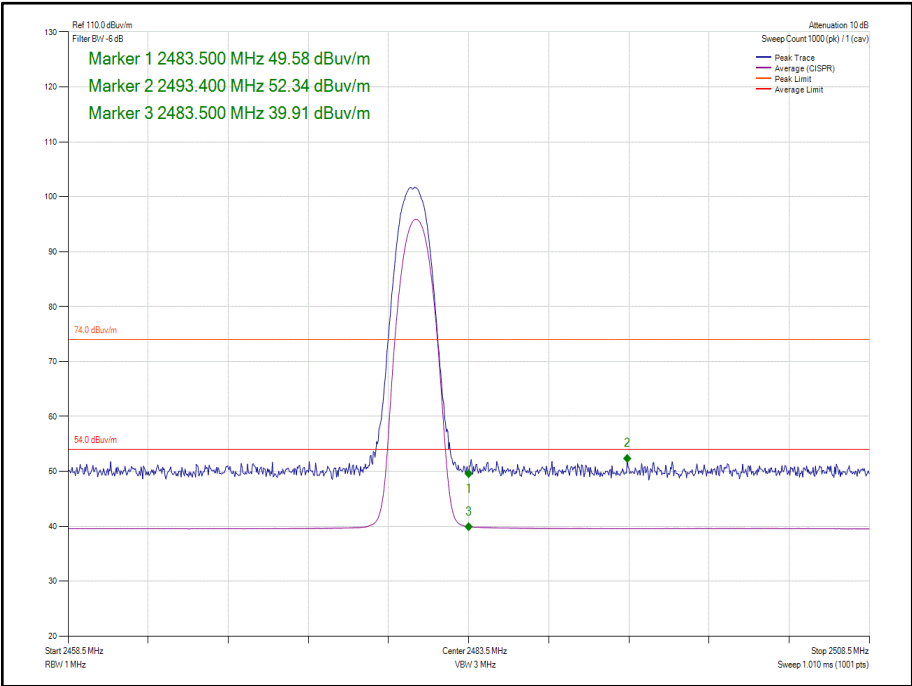


Figure 115 - Core 0 - Static -  $\pi/4$  DQPSK/2DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

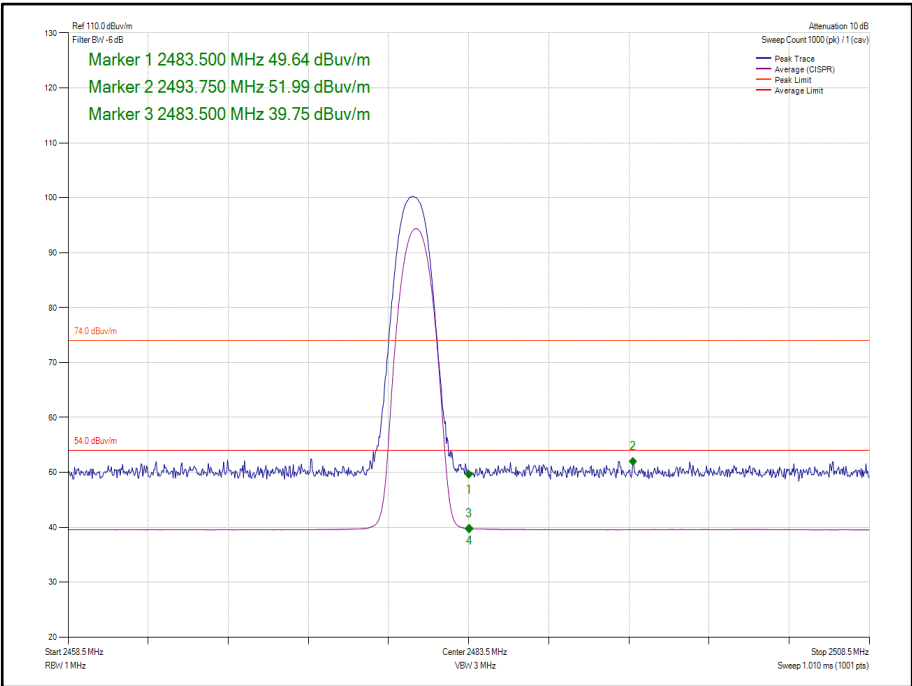
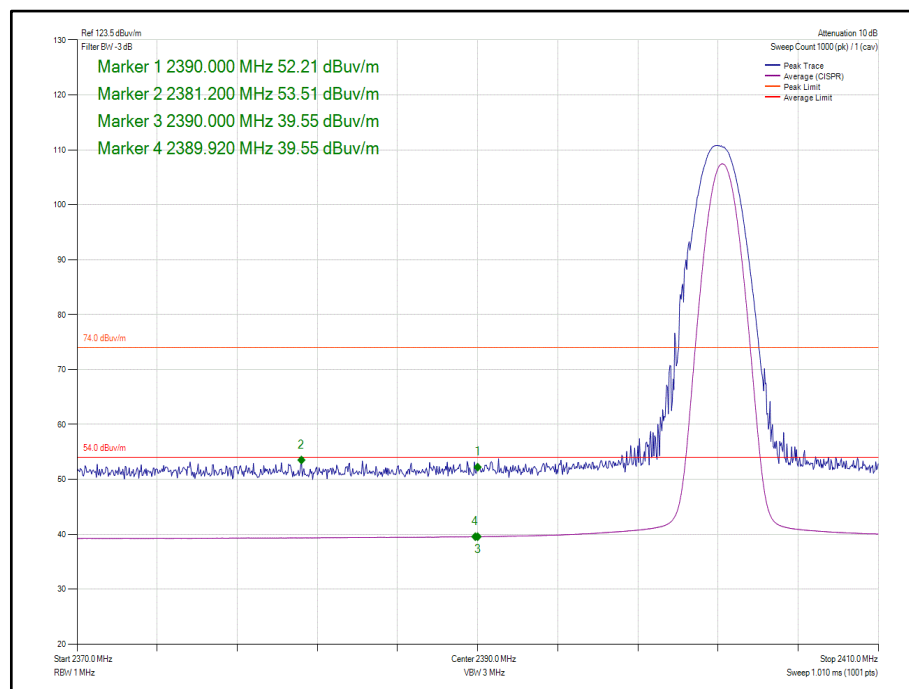


Figure 116 - Core 0 - Static - 8-DPSK/3DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

| Mode   | Modulation    | Core | Packet Type | Tx Frequency (MHz) | Band Edge Frequency (MHz) | Peak Level (dBμV/m) | Average Level (dBμV/m) |
|--------|---------------|------|-------------|--------------------|---------------------------|---------------------|------------------------|
| Static | GFSK          | 1    | DH5         | 2402               | 2390.0                    | 53.51               | 39.55                  |
| Static | $\pi/4$ DQPSK | 1    | 2DH5        | 2402               | 2390.0                    | 53.67               | 39.44                  |
| Static | 8-DPSK        | 1    | 3DH5        | 2402               | 2390.0                    | 53.73               | 39.44                  |
| Static | GFSK          | 1    | DH5         | 2480               | 2483.5                    | 53.50               | 41.04                  |
| Static | $\pi/4$ DQPSK | 1    | 2DH5        | 2480               | 2483.5                    | 52.56               | 40.45                  |
| Static | 8-DPSK        | 1    | 3DH5        | 2480               | 2483.5                    | 52.45               | 40.46                  |

**Table 46 - Restricted Band Edge Results**



**Figure 117 - Core 1 - Static - GFSK/DH5 - 2402 MHz - Band Edge Frequency 2390.0 MHz**

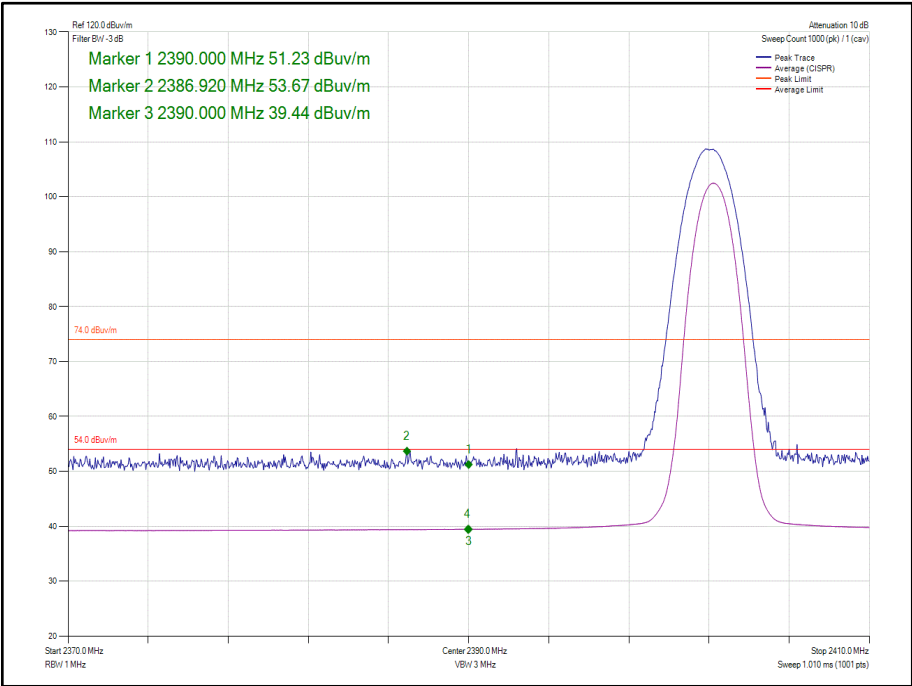


Figure 118 - Core 1 - Static -  $\pi/4$  DQPSK/2DH5 - 2402 MHz - Band Edge Frequency 2390.0 MHz

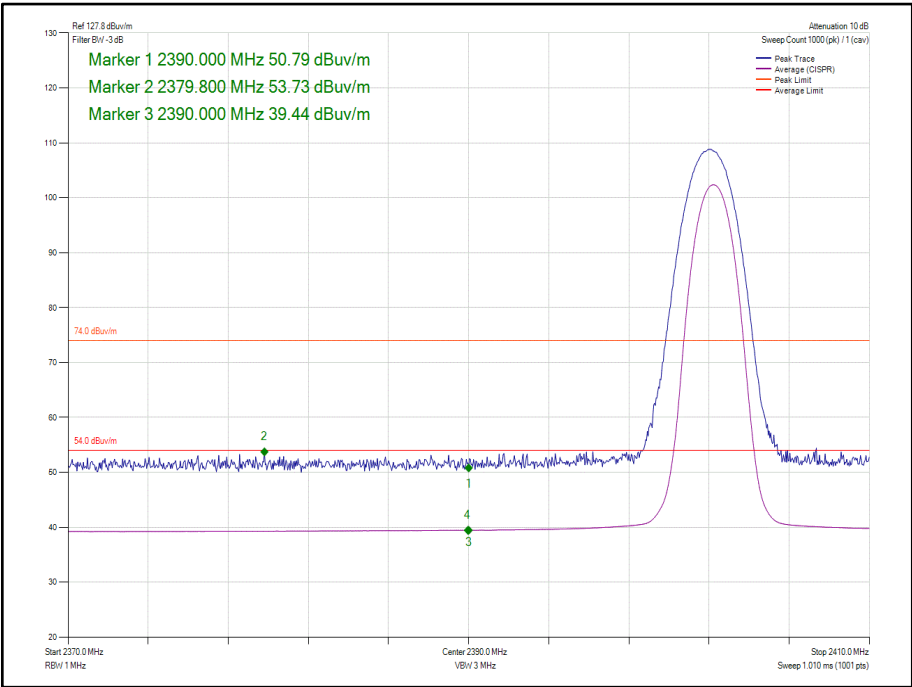


Figure 119 - Core 1 - Static - 8-DPSK/3DH5 - 2402 MHz Band Edge Frequency 2390.0 MHz

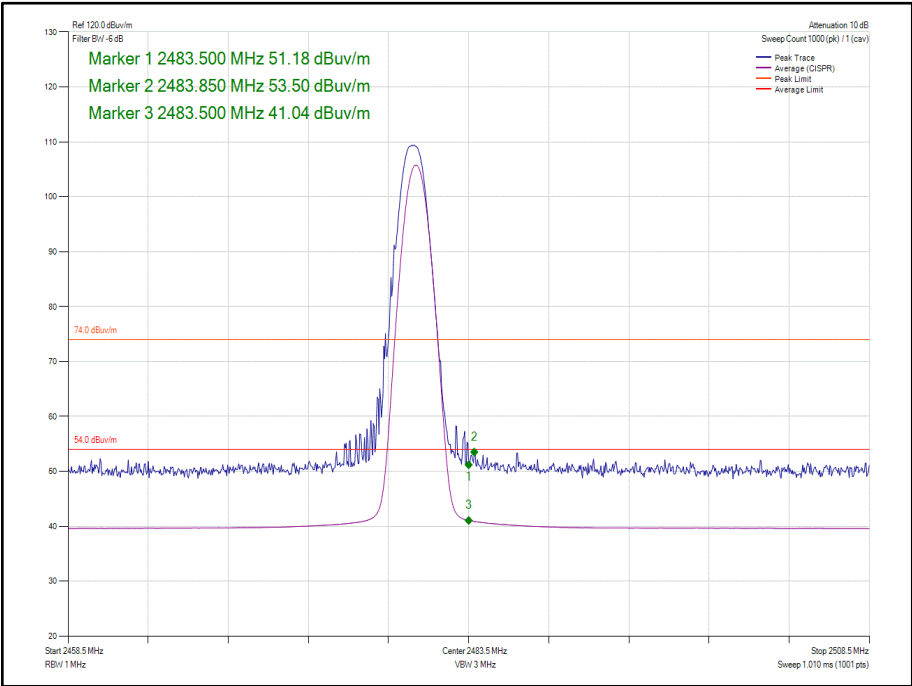


Figure 120 - Core 1 - Static - GFSK/DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

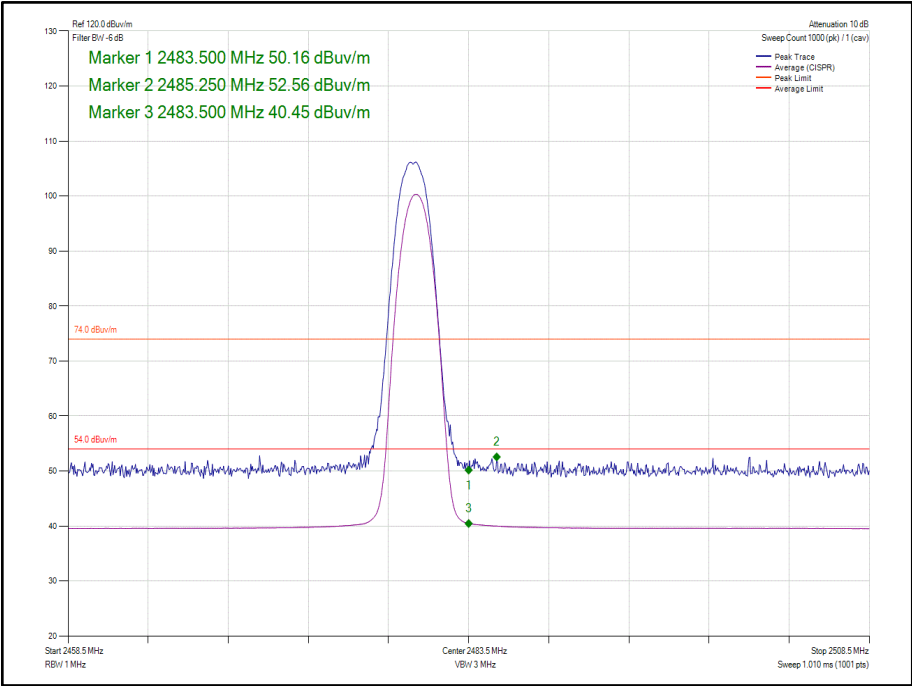


Figure 121 - Core 1 - Static -  $\pi/4$  DQPSK/2DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

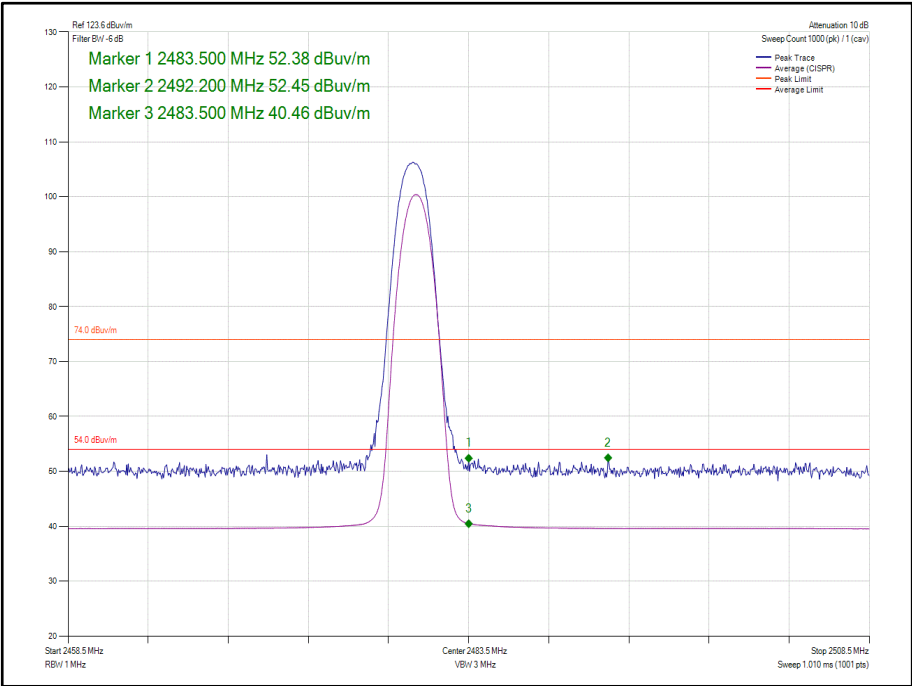
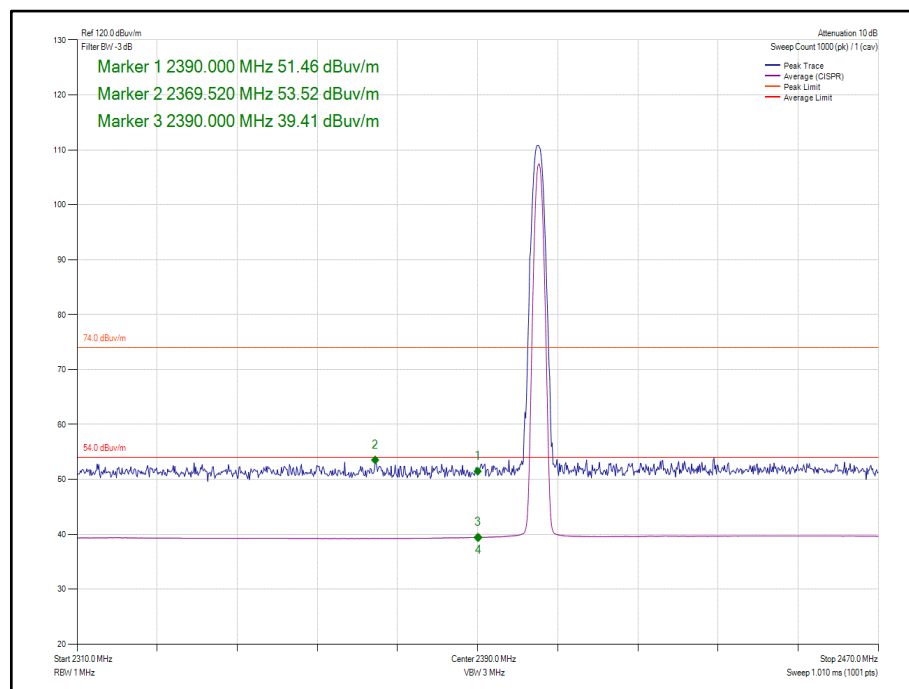


Figure 122 - Core 1 - Static - 8-DPSK/3DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

| Mode   | Modulation    | Core | Packet Type | Tx Frequency (MHz) | Band Edge Frequency (MHz) | Peak Level (dBμV/m) | Average Level (dBμV/m) |
|--------|---------------|------|-------------|--------------------|---------------------------|---------------------|------------------------|
| Static | GFSK          | 2    | DH5         | 2402               | 2390.0                    | 53.52               | 39.41                  |
| Static | $\pi/4$ DQPSK | 2    | 2DH5        | 2402               | 2390.0                    | 53.73               | 39.41                  |
| Static | 8-DPSK        | 2    | 3DH5        | 2402               | 2390.0                    | 53.52               | 39.42                  |
| Static | GFSK          | 2    | DH5         | 2480               | 2483.5                    | 52.72               | 40.05                  |
| Static | $\pi/4$ DQPSK | 2    | 2DH5        | 2480               | 2483.5                    | 53.62               | 40.55                  |
| Static | 8-DPSK        | 2    | 3DH5        | 2480               | 2483.5                    | 52.52               | 40.58                  |

**Table 47 - Restricted Band Edge Results**



**Figure 123 Core 2 - Static - GFSK/DH5 - 2402 MHz - Band Edge Frequency 2390.0 MHz**

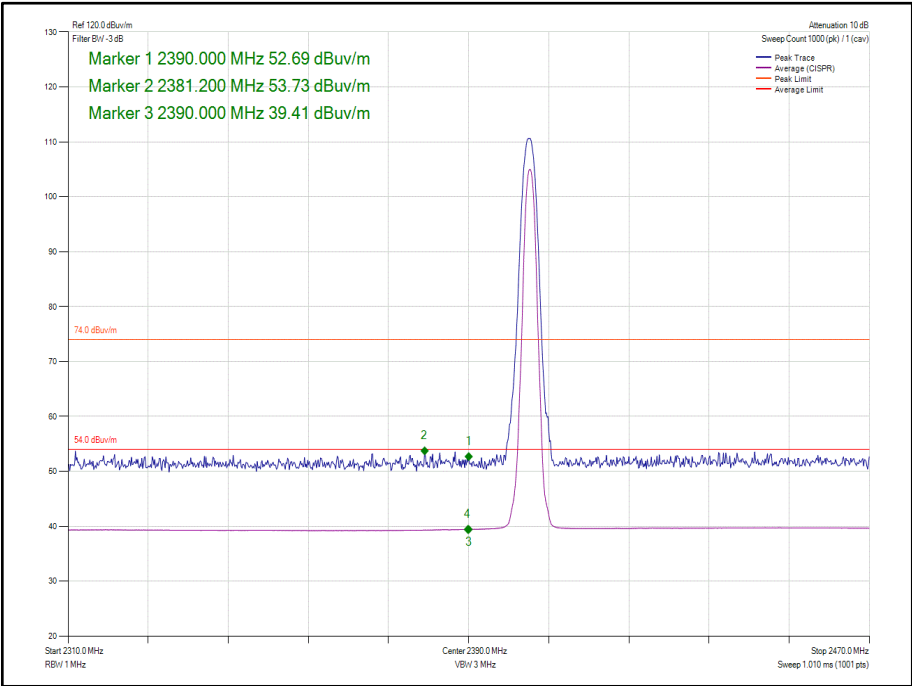


Figure 124 Core 2 - Static -  $\pi/4$  DQPSK/2DH5 - 2402 MHz - Band Edge Frequency 2390.0 MHz

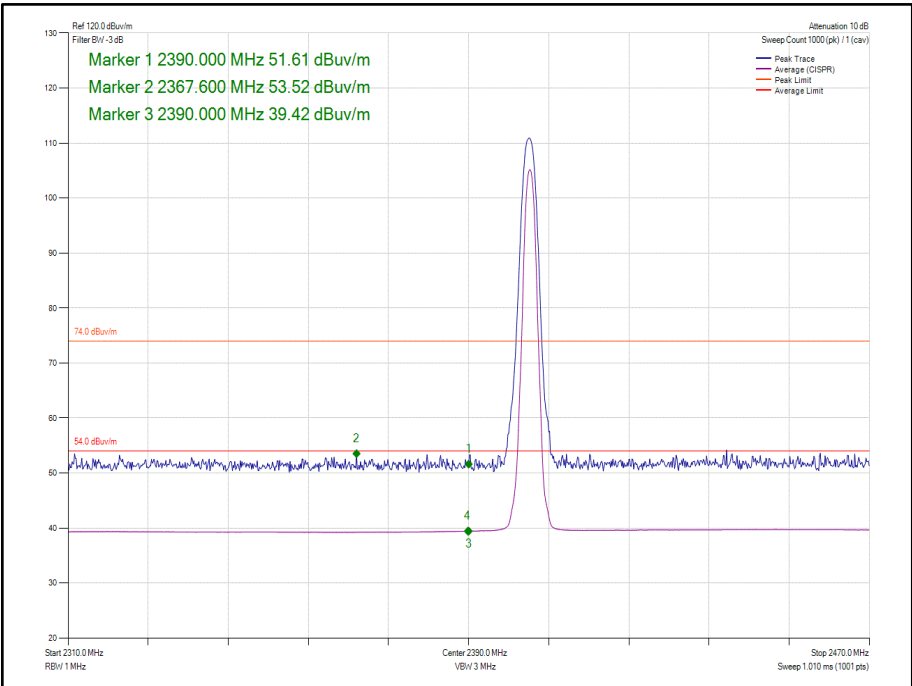


Figure 125 Core 2 - Static - 8-DPSK/3DH5 - 2402 MHz Band Edge Frequency 2390.0 MHz

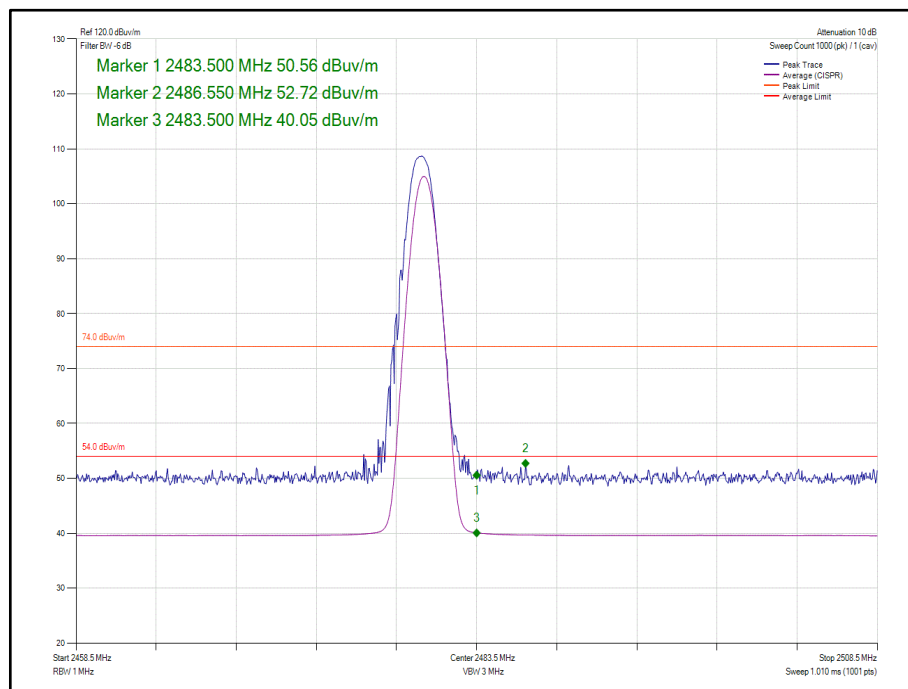


Figure 126 Core 2 - Static - GFSK/DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

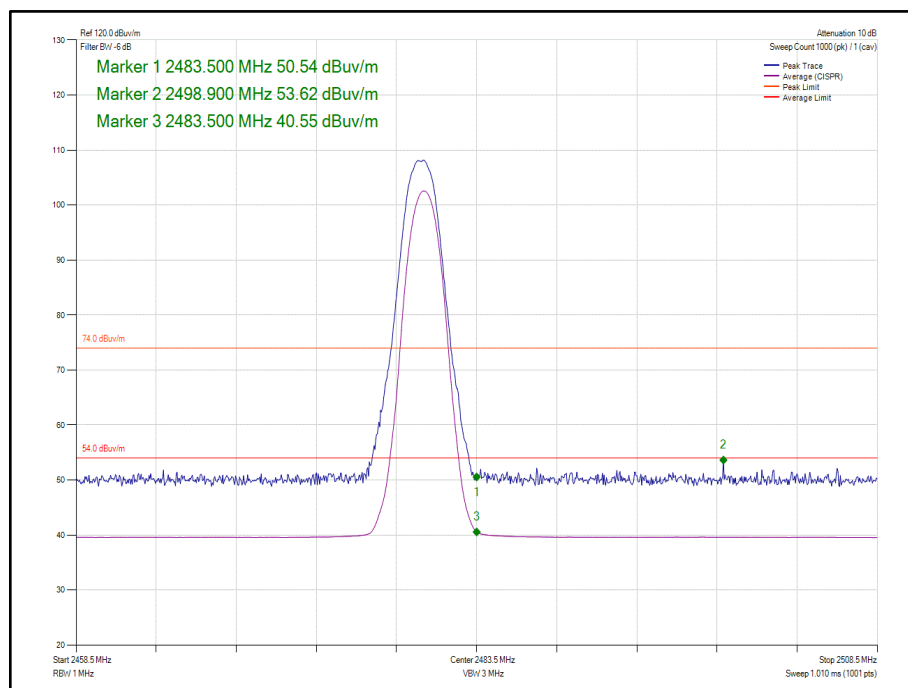


Figure 127 Core 2 - Static -  $\pi/4$  DQPSK/2DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

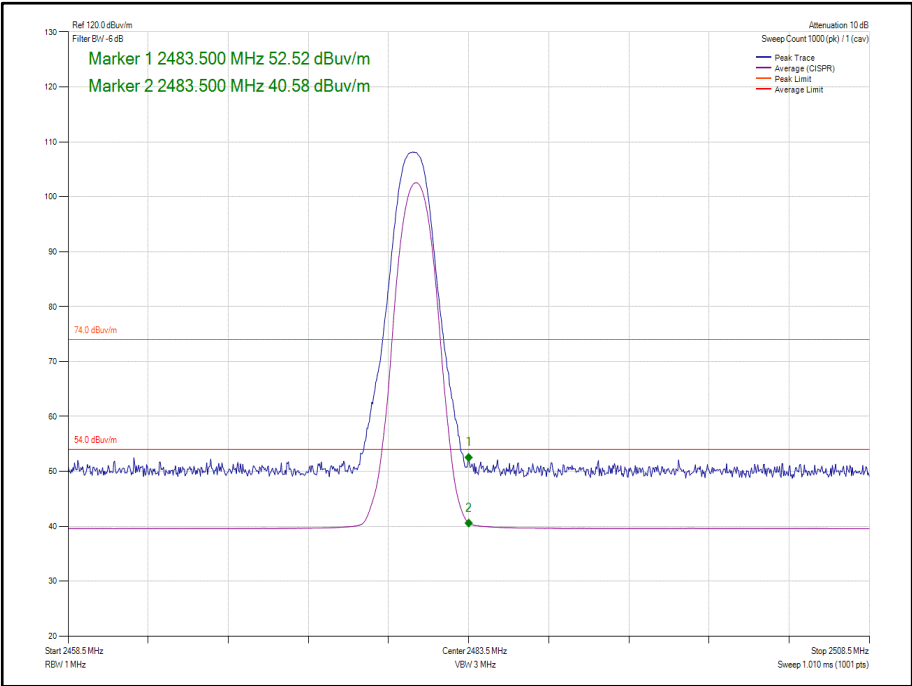
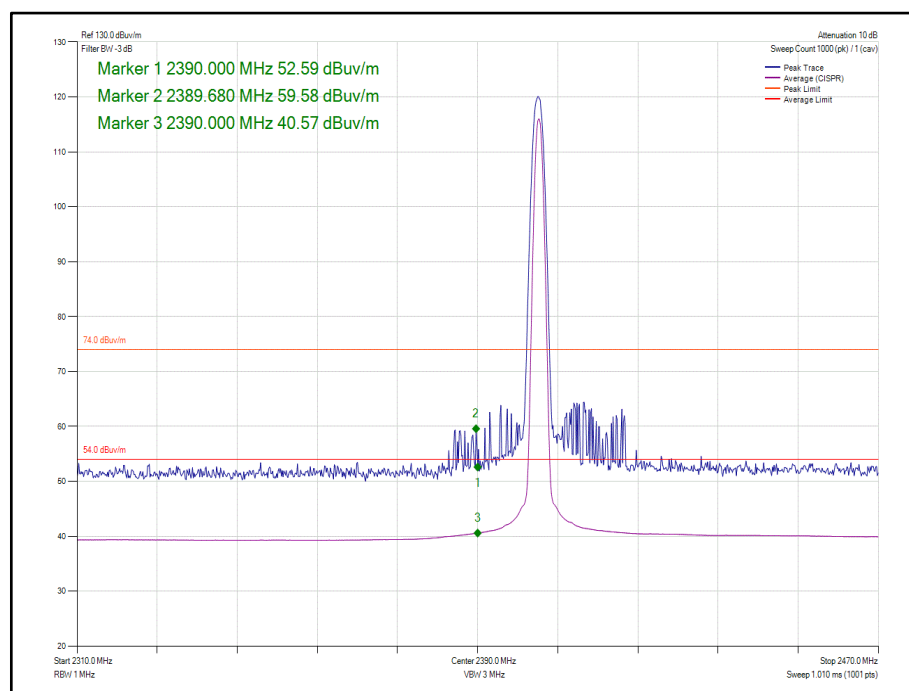


Figure 128 Core 2 - Static - 8-DPSK/3DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

| Mode   | Modulation    | Core | Packet Type | Tx Frequency (MHz) | Band Edge Frequency (MHz) | Peak Level (dBμV/m) | Average Level (dBμV/m) |
|--------|---------------|------|-------------|--------------------|---------------------------|---------------------|------------------------|
| Static | GFSK          | 0-1  | DH5         | 2402               | 2390.0                    | 59.58               | 40.57                  |
| Static | $\pi/4$ DQPSK | 0-1  | 2DH5        | 2402               | 2390.0                    | 53.49               | 39.47                  |
| Static | 8-DPSK        | 0-1  | 3DH5        | 2402               | 2390.0                    | 53.85               | 39.45                  |
| Static | GFSK          | 0-1  | DH5         | 2480               | 2483.5                    | 58.22               | 45.11                  |
| Static | $\pi/4$ DQPSK | 0-1  | 2DH5        | 2480               | 2483.5                    | 52.55               | 40.14                  |
| Static | 8-DPSK        | 0-1  | 3DH5        | 2480               | 2483.5                    | 52.54               | 40.14                  |

**Table 48 - MIMO 2Tx Restricted Band Edge Results**



**Figure 129 Core 0-1 – Static - GFSK/DH5 - 2402 MHz - Band Edge Frequency 2390.0 MHz**

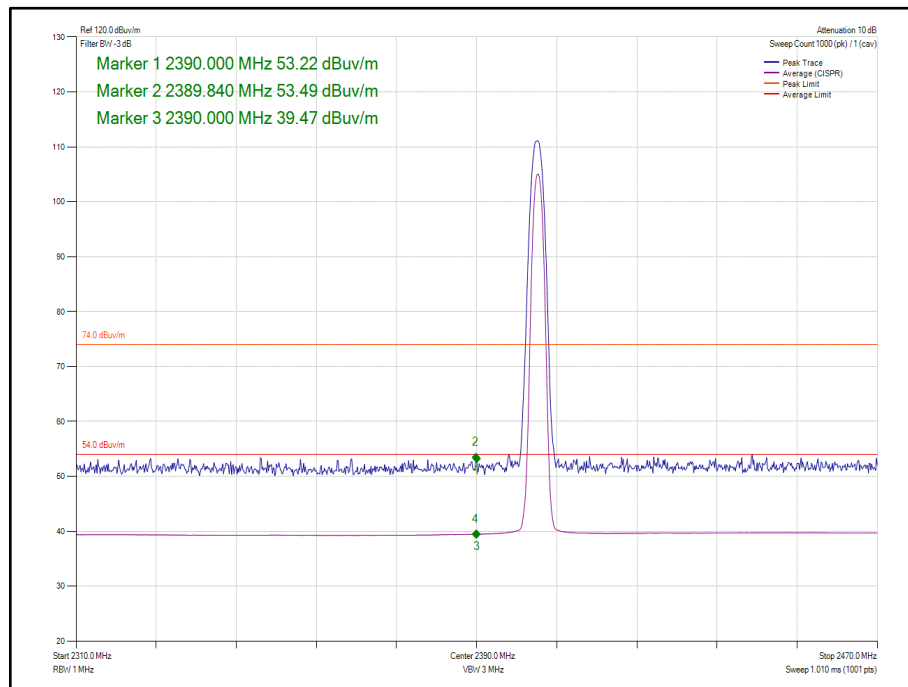


Figure 130 Core 0-1 - Static -  $\pi/4$  DQPSK/2DH5 - 2402 MHz - Band Edge Frequency 2390.0 MHz

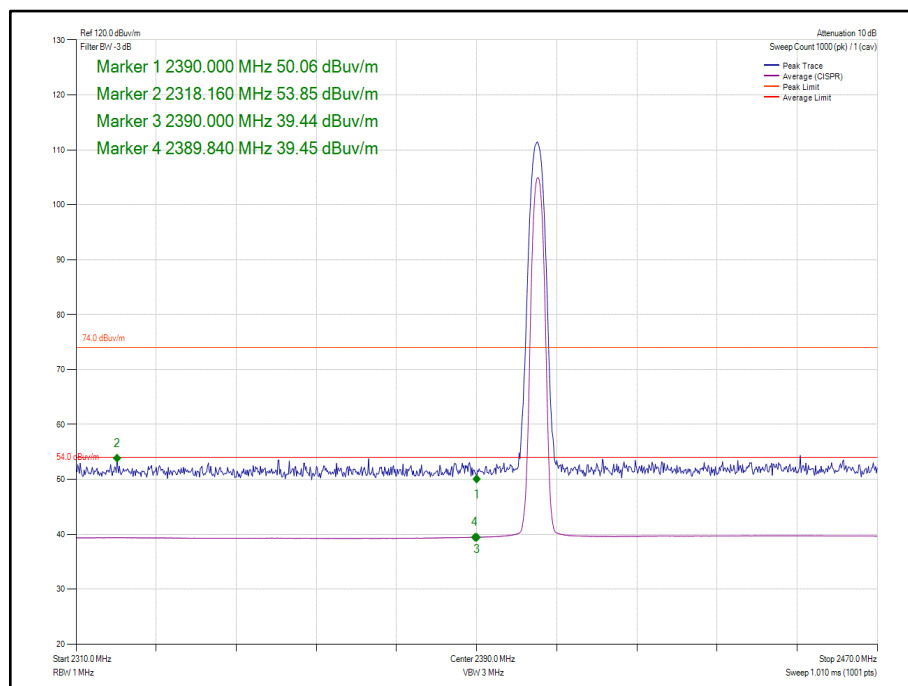


Figure 131 Core 0-1 - Static - 8-DPSK/3DH5 - 2402 MHz Band Edge Frequency 2390.0 MHz

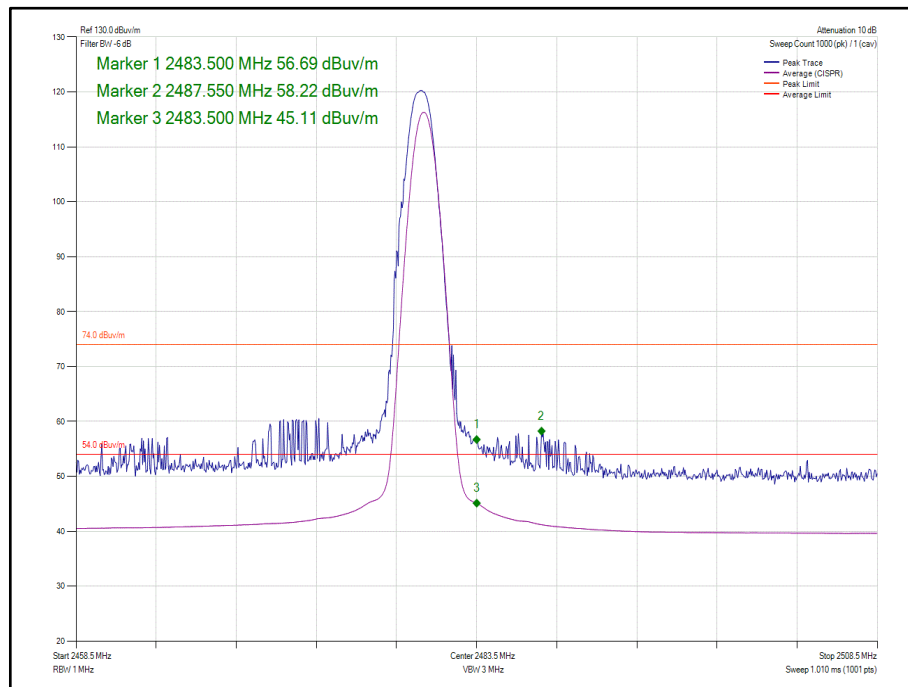


Figure 132 Core 0-1 - Static - GFSK/DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

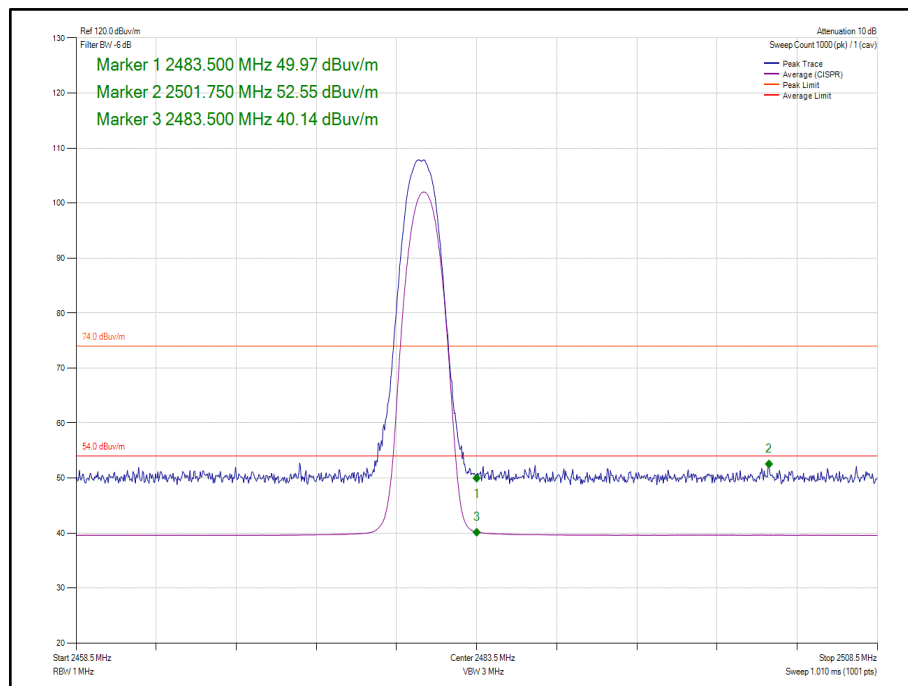


Figure 133 Core 0-1 - Static -  $\pi/4$  DQPSK/2DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

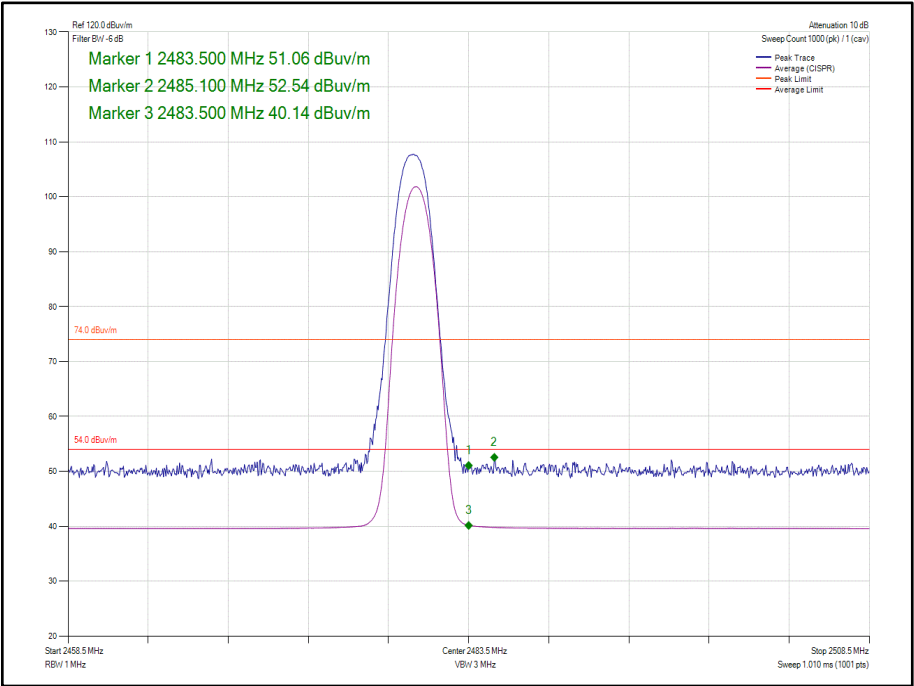


Figure 134 Core 0-1 – Static - Core - 8-DPSK/3DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

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| Mode   | Modulation    | Core | Packet Type | Tx Frequency (MHz) | Band Edge Frequency (MHz) | Peak Level (dBμV/m) | Average Level (dBμV/m) |
|--------|---------------|------|-------------|--------------------|---------------------------|---------------------|------------------------|
| Static | GFSK          | 0    | DH5         | 2402               | 2390.0                    | 53.99               | 39.61                  |
| Static | $\pi/4$ DQPSK | 0    | 2DH5        | 2402               | 2390.0                    | 53.89               | 39.51                  |
| Static | 8-DPSK        | 0    | 3DH5        | 2402               | 2390.0                    | 53.55               | 39.65                  |
| Static | GFSK          | 0    | DH5         | 2480               | 2483.5                    | 54.79               | 42.66                  |
| Static | $\pi/4$ DQPSK | 0    | 2DH5        | 2480               | 2483.5                    | 53.00               | 40.31                  |
| Static | 8-DPSK        | 0    | 3DH5        | 2480               | 2483.5                    | 53.08               | 40.81                  |

Table 49 - Restricted Band Edge Results

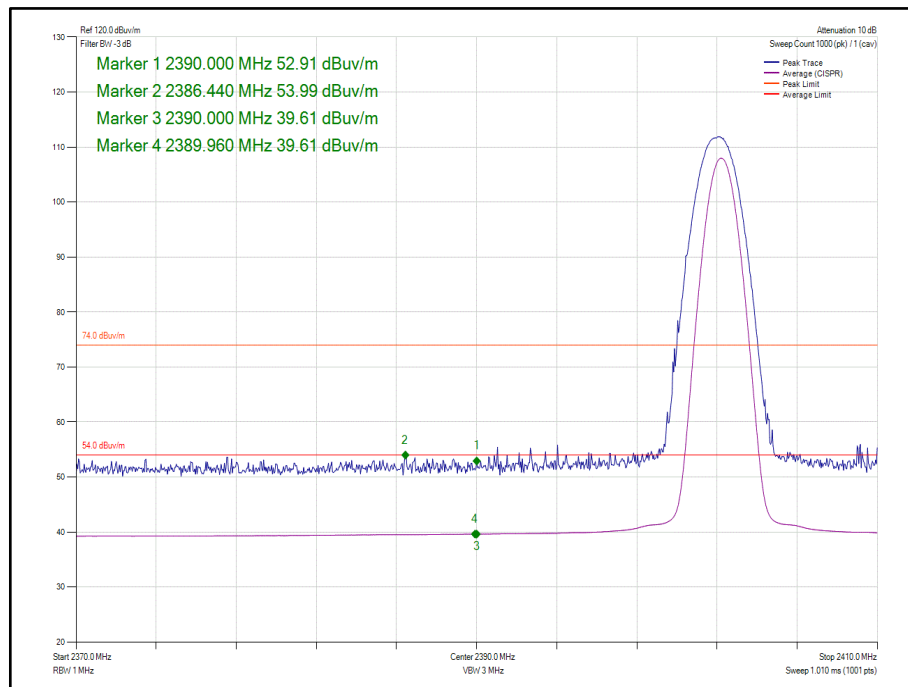


Figure 135 - Core 0 - Static - GFSK/DH5 - 2402 MHz - Band Edge Frequency 2390.0 MHz

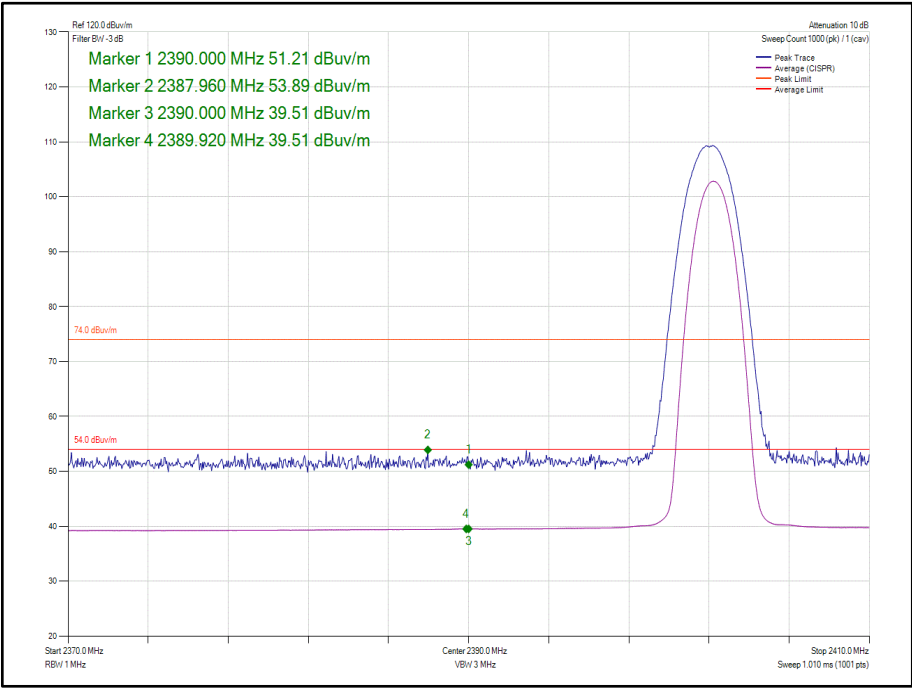


Figure 136 - Core 0 - Static -  $\pi/4$  DQPSK/2DH5 - 2402 MHz - Band Edge Frequency 2390.0 MHz

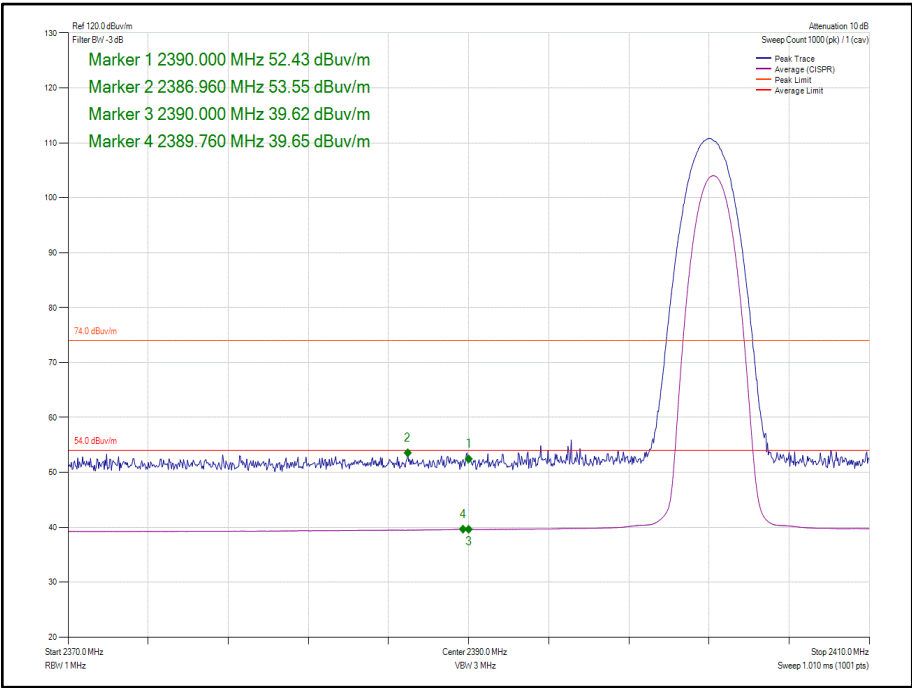


Figure 137 - Core 0 - Static - 8-DPSK/3DH5 - 2402 MHz Band Edge Frequency 2390.0 MHz

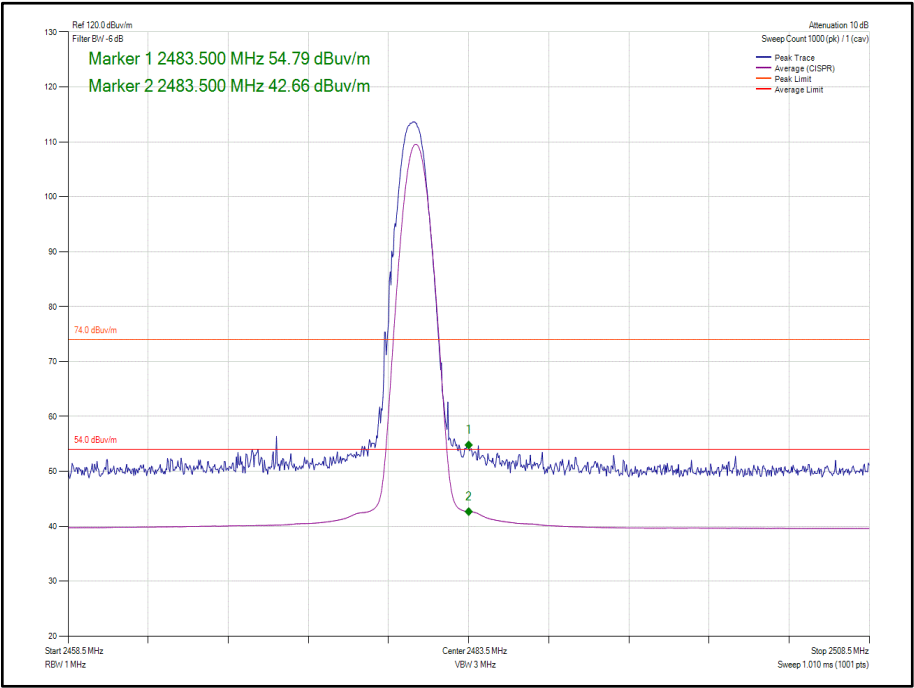


Figure 138 - Core 0 - Static - GFSK/DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

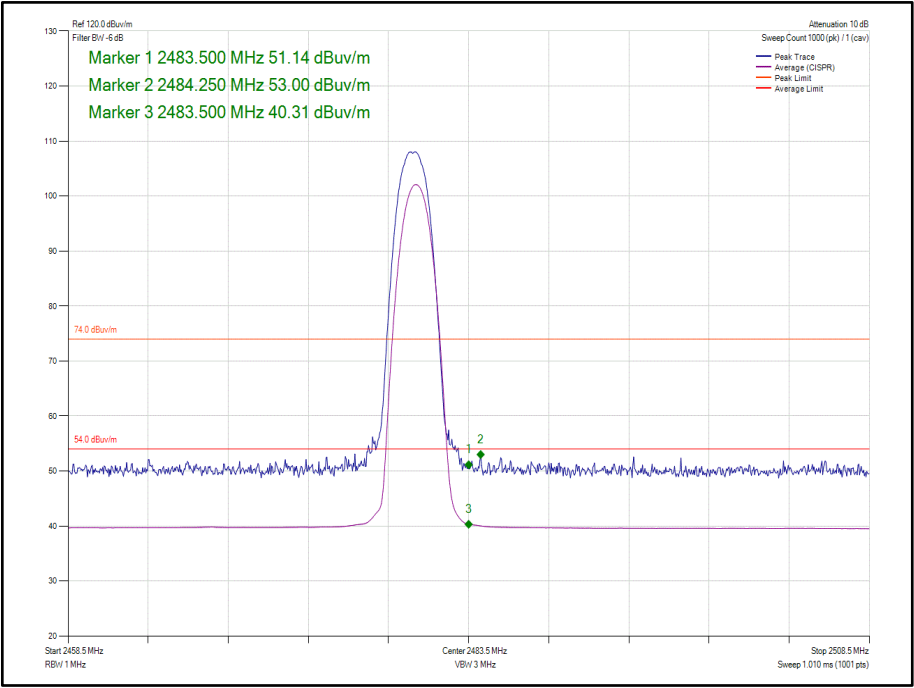


Figure 139 - Core 0 - Static -  $\pi/4$  DQPSK/2DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

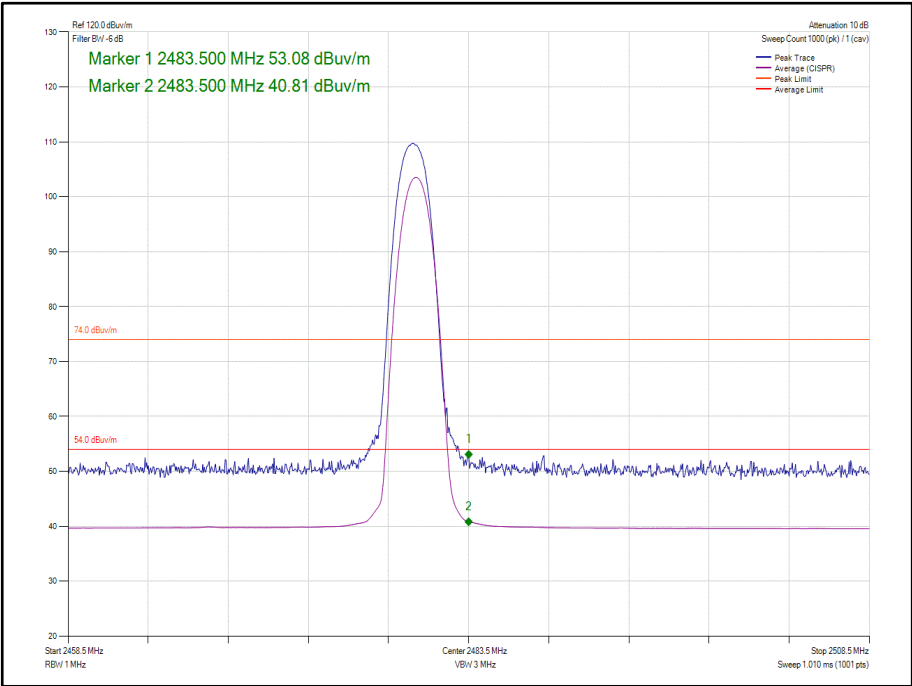


Figure 140 - Core 0 - Static – 8 - DPSK/3DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz



| Mode   | Modulation | Core | Packet Type | Tx Frequency (MHz) | Band Edge Frequency (MHz) | Peak Level (dBμV/m) | Average Level (dBμV/m) |
|--------|------------|------|-------------|--------------------|---------------------------|---------------------|------------------------|
| Static | GFSK       | 1    | DH5         | 2402               | 2390.0                    | 60.10               | 40.47                  |
| Static | π/4 DQPSK  | 1    | 2DH5        | 2402               | 2390.0                    | 56.19               | 40.39                  |
| Static | 8-DPSK     | 1    | 3DH5        | 2402               | 2390.0                    | 56.05               | 40.41                  |
| Static | GFSK       | 1    | DH5         | 2480               | 2483.5                    | 60.64               | 45.37                  |
| Static | π/4 DQPSK  | 1    | 2DH5        | 2480               | 2483.5                    | 56.51               | 42.19                  |
| Static | 8-DPSK     | 1    | 3DH5        | 2480               | 2483.5                    | 56.28               | 42.31                  |

Table 50 - Restricted Band Edge Results

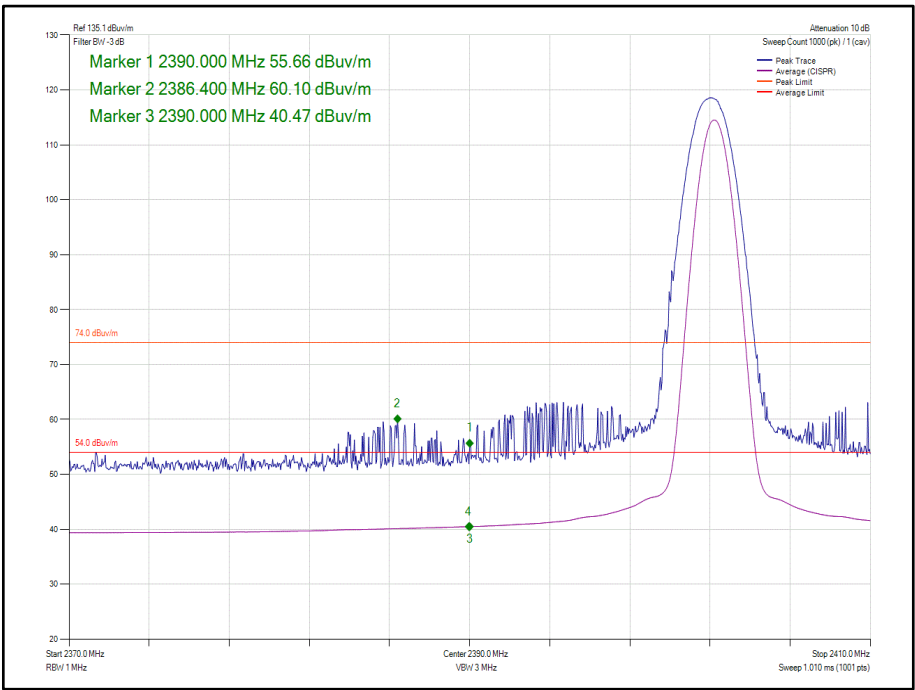


Figure 141 - Core 1 - Static - GFSK/DH5 - 2402 MHz - Band Edge Frequency 2390.0 MHz

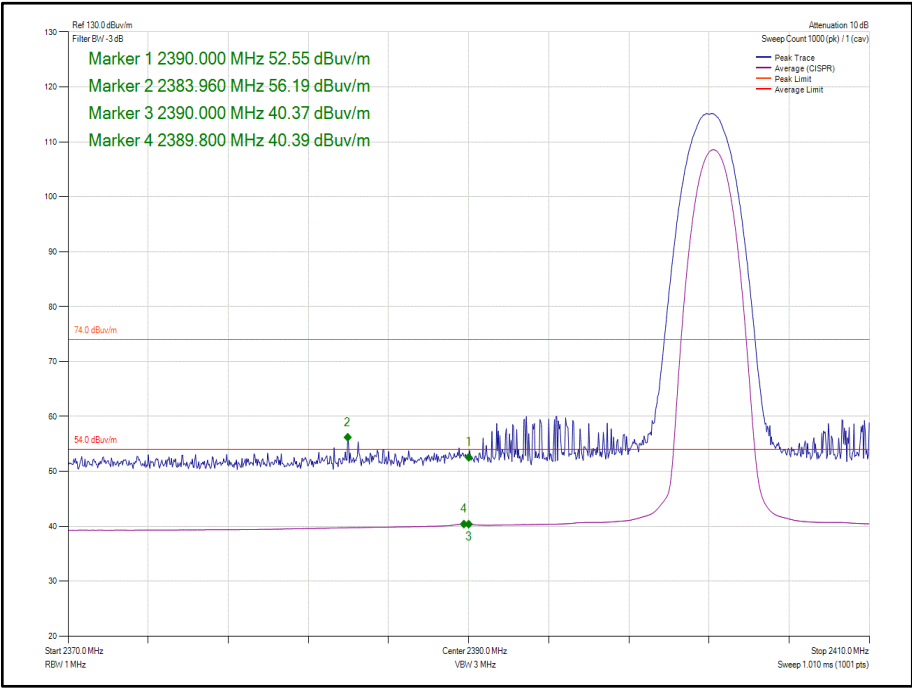


Figure 142 - Core 1 - Static -  $\pi/4$  DQPSK/2DH5 - 2402 MHz - Band Edge Frequency 2390.0 MHz

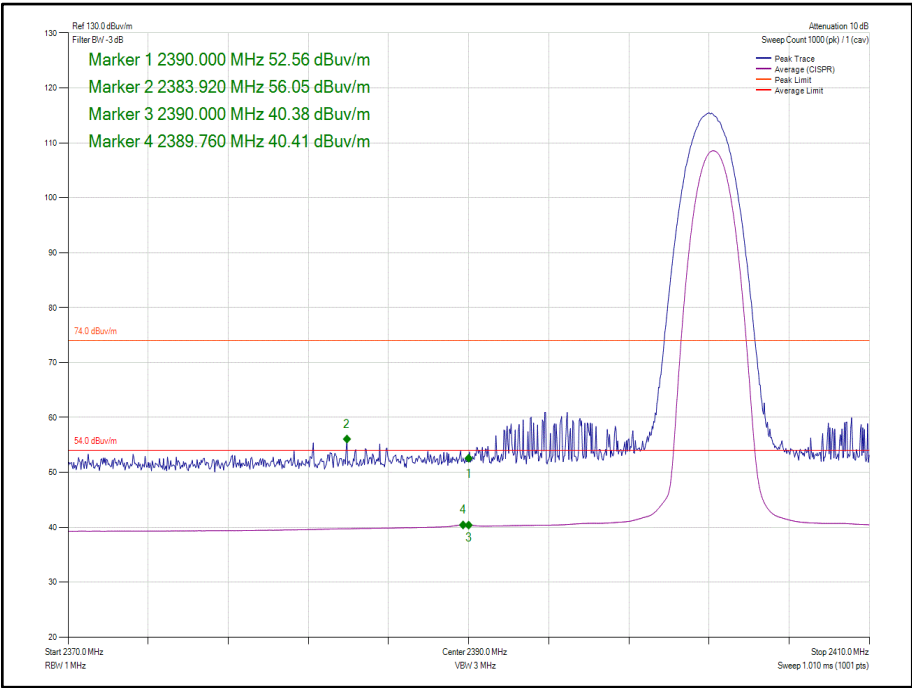


Figure 143 - Core 1 - Static - 8-DPSK/3DH5 - 2402 MHz Band Edge Frequency 2390.0 MHz

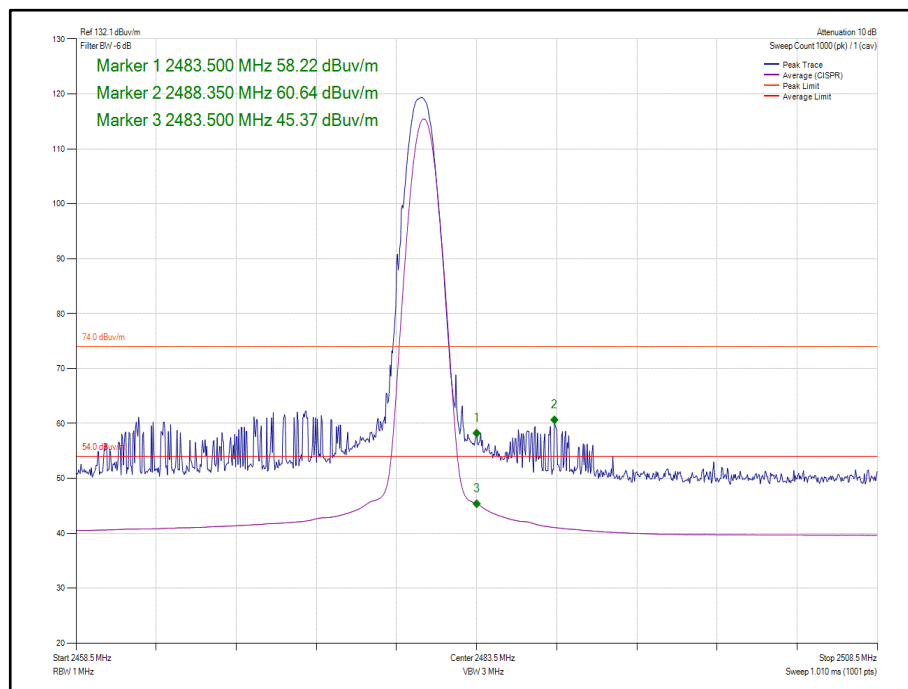


Figure 144 - Core 1 - Static - GFSK/DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

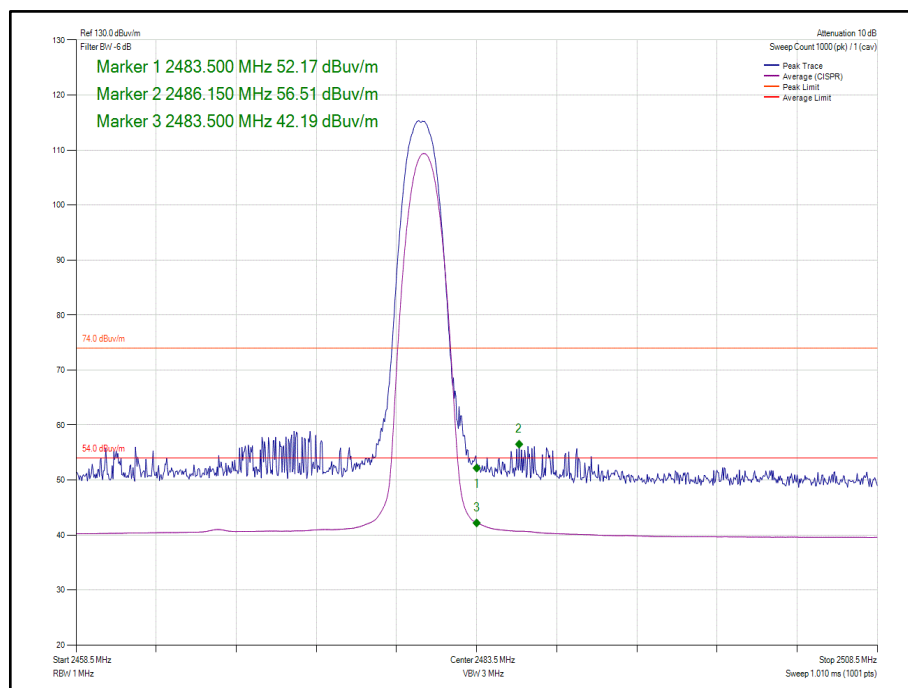


Figure 145 - Core 1 - Static -  $\pi/4$  DQPSK/2DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

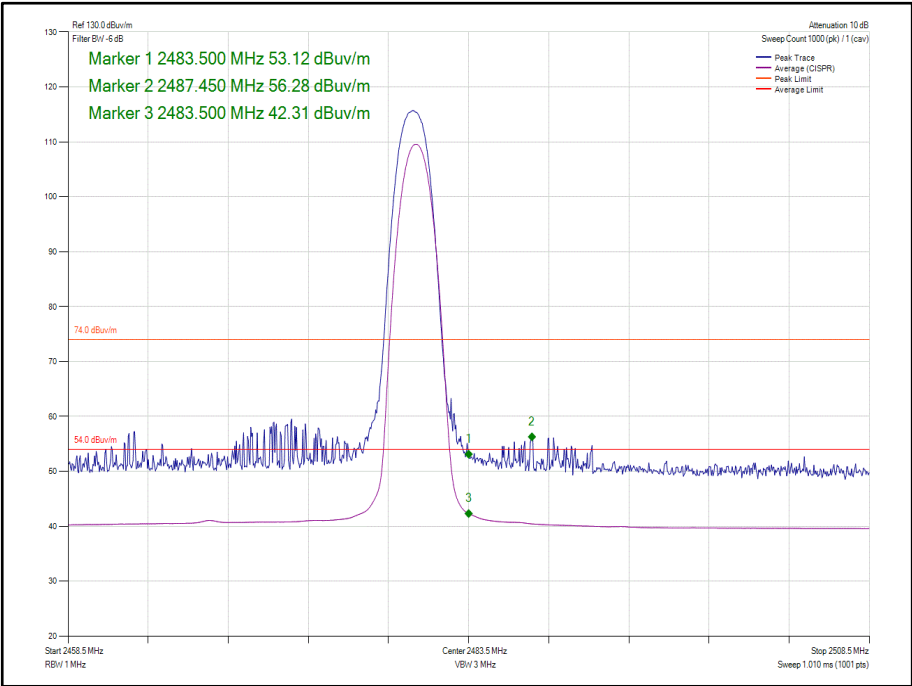
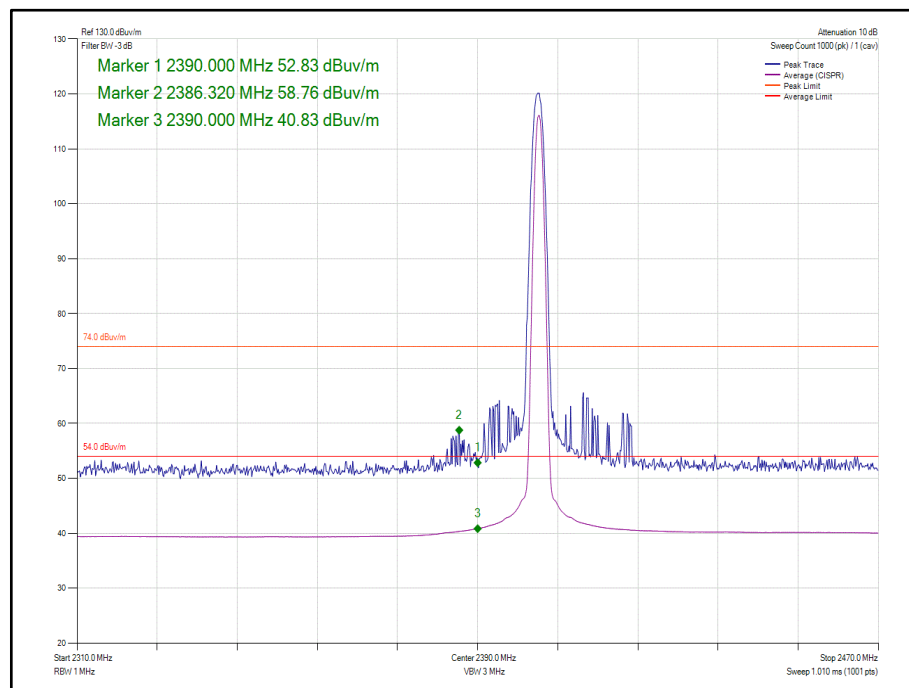


Figure 146 - Core 1 - Static - 8-DPSK/3DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

| Mode   | Modulation    | Core | Packet Type | Tx Frequency (MHz) | Band Edge Frequency (MHz) | Peak Level (dBμV/m) | Average Level (dBμV/m) |
|--------|---------------|------|-------------|--------------------|---------------------------|---------------------|------------------------|
| Static | GFSK          | 0-1  | DH5         | 2402               | 2390.0                    | 58.76               | 40.83                  |
| Static | $\pi/4$ DQPSK | 0-1  | 2DH5        | 2402               | 2390.0                    | 53.61               | 40.61                  |
| Static | 8-DPSK        | 0-1  | 3DH5        | 2402               | 2390.0                    | 53.73               | 40.57                  |
| Static | GFSK          | 0-1  | DH5         | 2480               | 2483.5                    | 57.78               | 45.01                  |
| Static | $\pi/4$ DQPSK | 0-1  | 2DH5        | 2480               | 2483.5                    | 55.24               | 42.33                  |
| Static | 8-DPSK        | 0-1  | 3DH5        | 2480               | 2483.5                    | 55.86               | 42.40                  |

**Table 51 - MIMO 2Tx Restricted Band Edge Results**



**Figure 147 Core 0-1 - Static - GFSK/DH5 - 2402 MHz - Band Edge Frequency 2390.0 MHz**

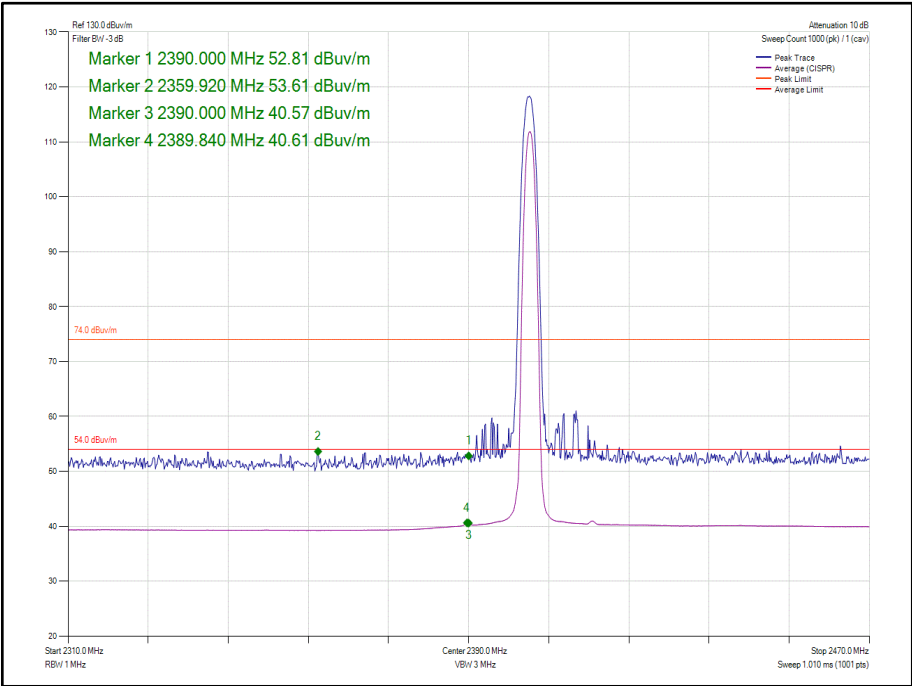


Figure 148 Core 0-1 - Static -  $\pi/4$  DQPSK/2DH5 - 2402 MHz - Band Edge Frequency 2390.0 MHz

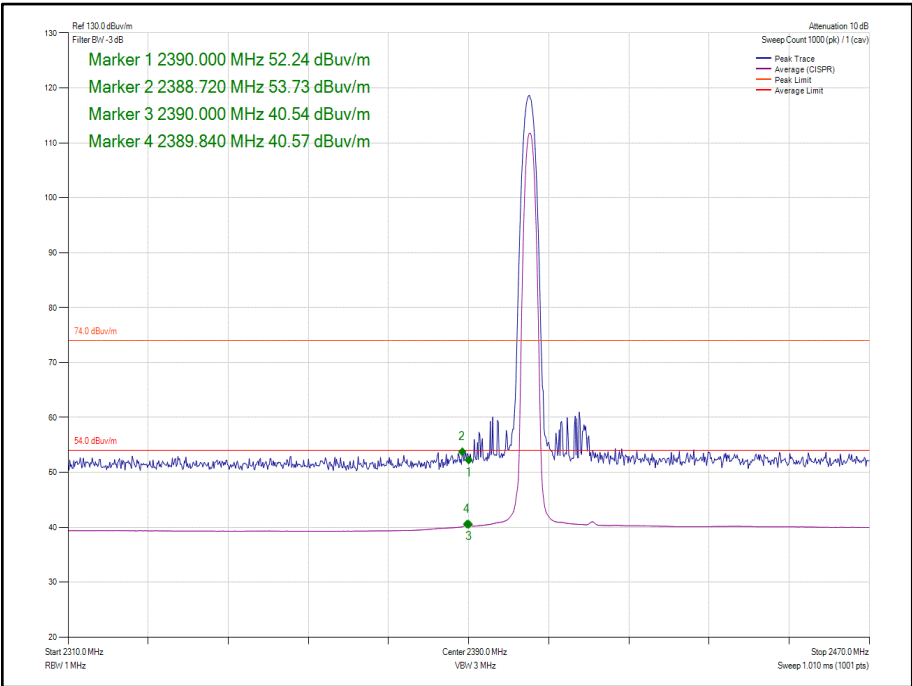


Figure 149 Core 0-1 - Static - 8-DPSK/3DH5 - 2402 MHz Band Edge Frequency 2390.0 MHz

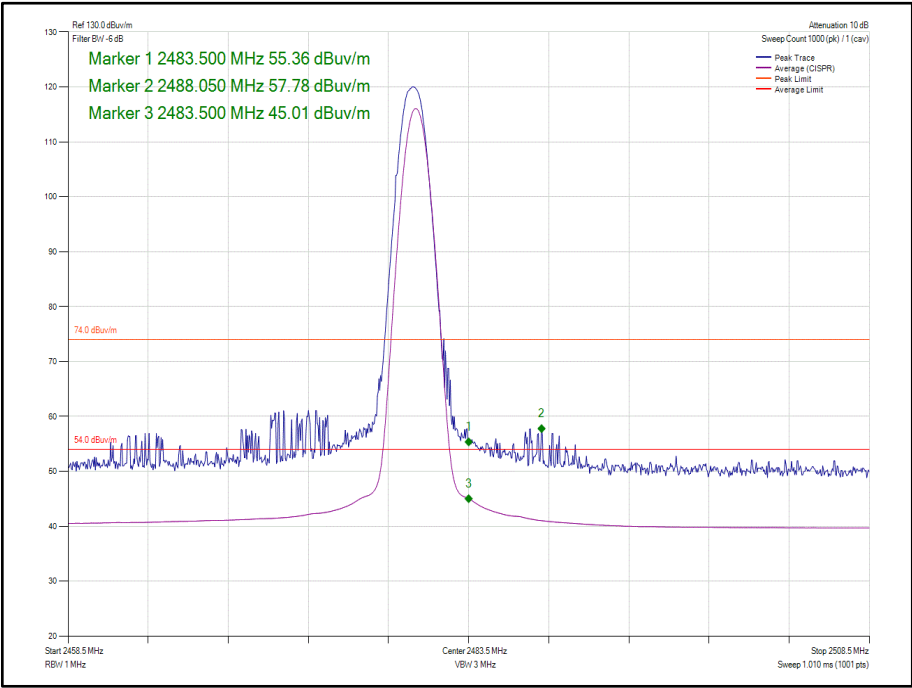


Figure 150 Core 0-1 - Static - GFSK/DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz

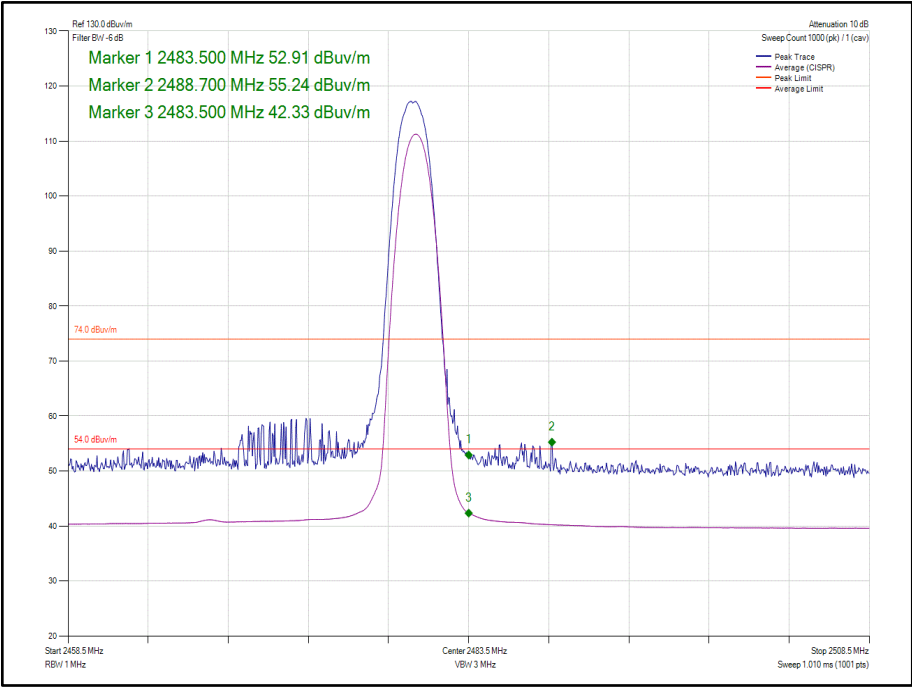


Figure 151 Core 0-1 - Static -  $\pi/4$  DQPSK/2DH5 - 2480 MHz - Band Edge Frequency 2483.5 MHz