

## 5.7 Time of Occupancy (Dwell Time)

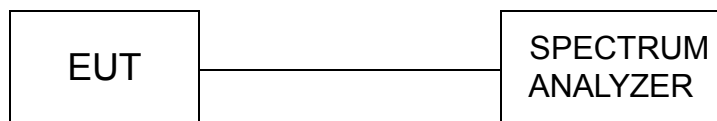
### Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. Set center frequency of spectrum analyzer=operating frequency with 1MHz RBW and 1MHz VBW, Span 0Hz.

### Test Configuration

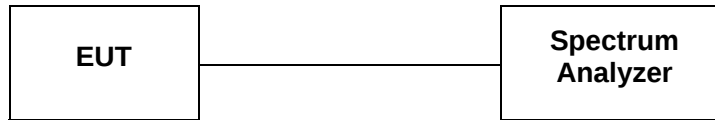


### Test Results

See Appendix V

## 5.8 Spurious RF Conducted Emission

### TEST CONFIGURATION



### TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBW= 300KHz to measure the peak field strength, and measure frequency range from 9KHz to 25GHz.

### LIMIT

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

### Test Results

See Appendix IV

## 5.9 Pseudorandom Frequency Hopping Sequence

### TEST APPLICABLE

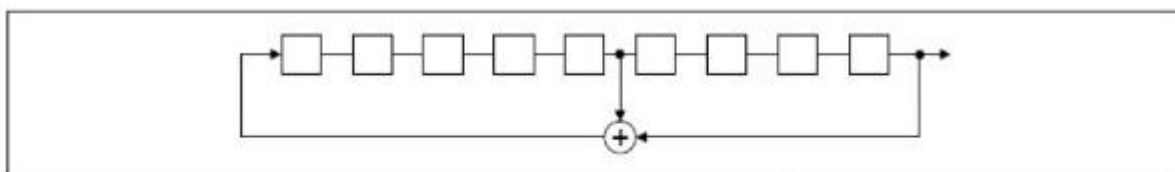
#### **For 47 CFR Part 15C section 15.247 (a) (1) requirement:**

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hop-ping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hop-ping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

#### **EUT Pseudorandom Frequency Hopping Sequence Requirement**

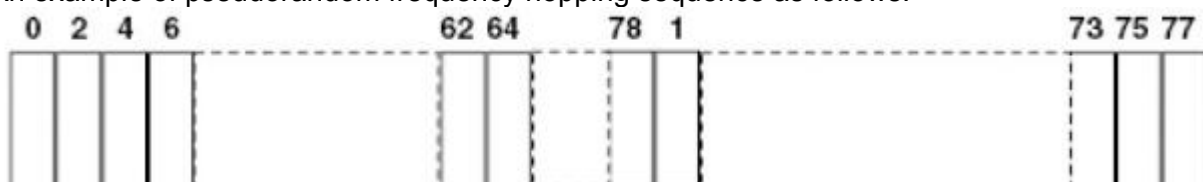
The pseudorandom frequency hopping sequence may be generated in a nine-stage shift register whose 5<sup>th</sup> and 9<sup>th</sup> stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive ones, for example: the shift register is initialized with nine ones.

- Number of shift register stages:9
- Length of pseudo-random sequence:29-1=511 bits
- Longest sequence of zeros:8(non-inverted signal)



*Linear Feedback Shift Register for Generation of the PRBS sequence*

An example of pseudorandom frequency hopping sequence as follows:



Each frequency used equally one the average by each transmitter.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.

## 5.10 Antenna Requirement

### **Standard Applicable**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **Refer to statement below for compliance**

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

### **Antenna Connected Construction**

The directional gains of antenna used for transmitting is 4.54dBi, and the antenna is a FPC Antenna connect to PCB board and no consideration of replacement. Please see EUT photo for details.

Results: Compliance.

## 6 Test Setup Photos of the EUT

(HK5910(second display: 15.6 inch))  
CE TEST SETUP



(Adapter:FSP060-DAAN3)

CE TEST SETUP



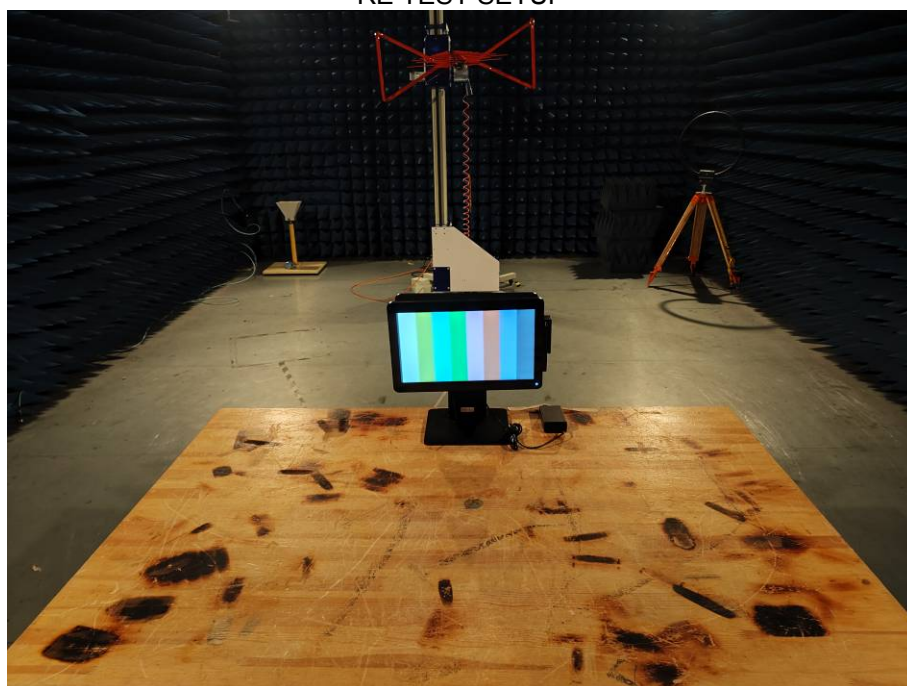
(Adapter:GM60-240250-F)

CE TEST SETUP



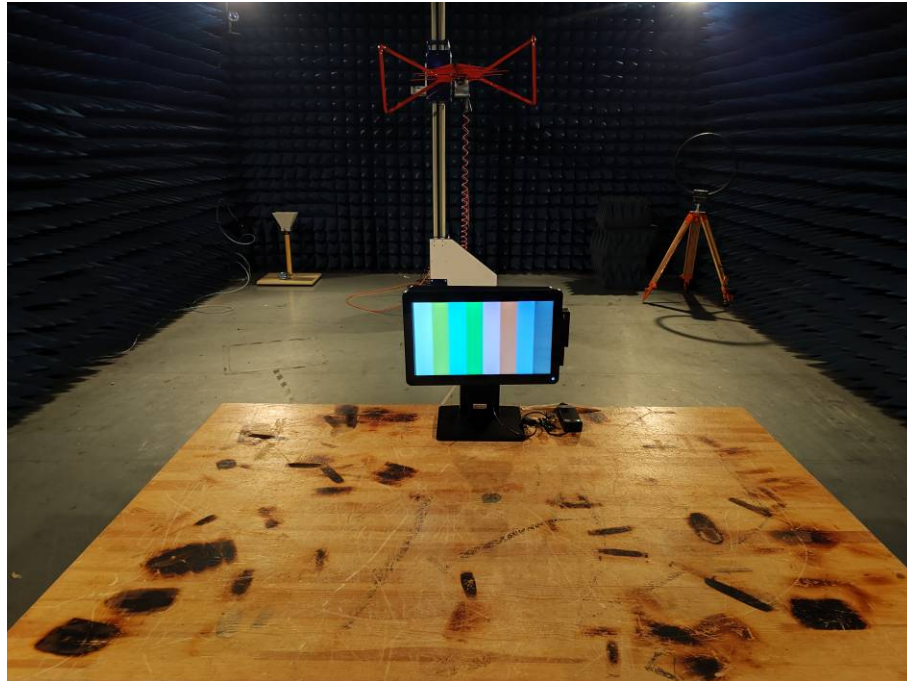
(Adapter:FSP120-AAAN3)

RE TEST SETUP



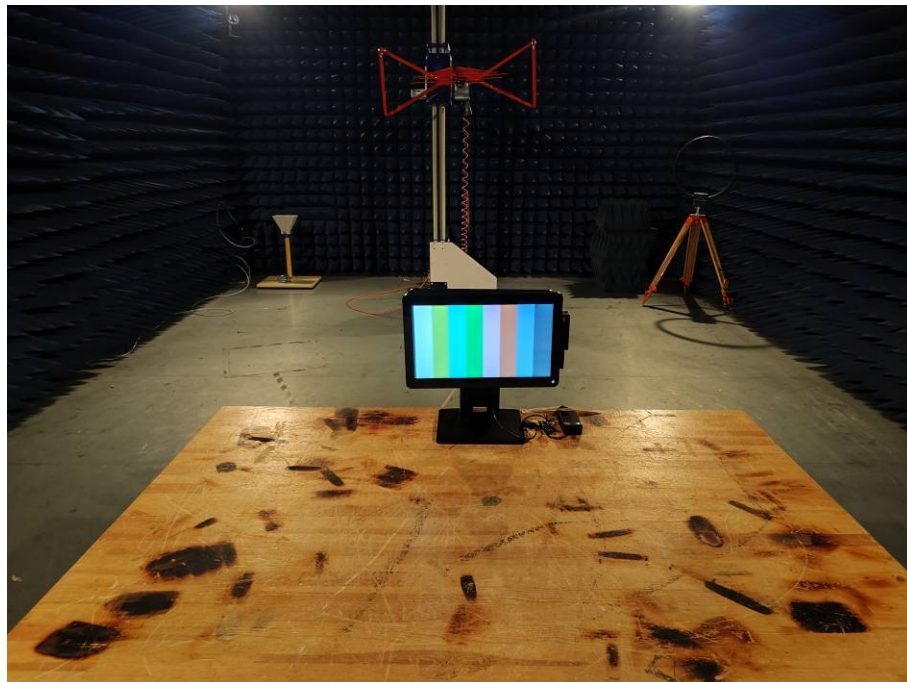
(Adapter:FSP060-DAAN3)

RE TEST SETUP



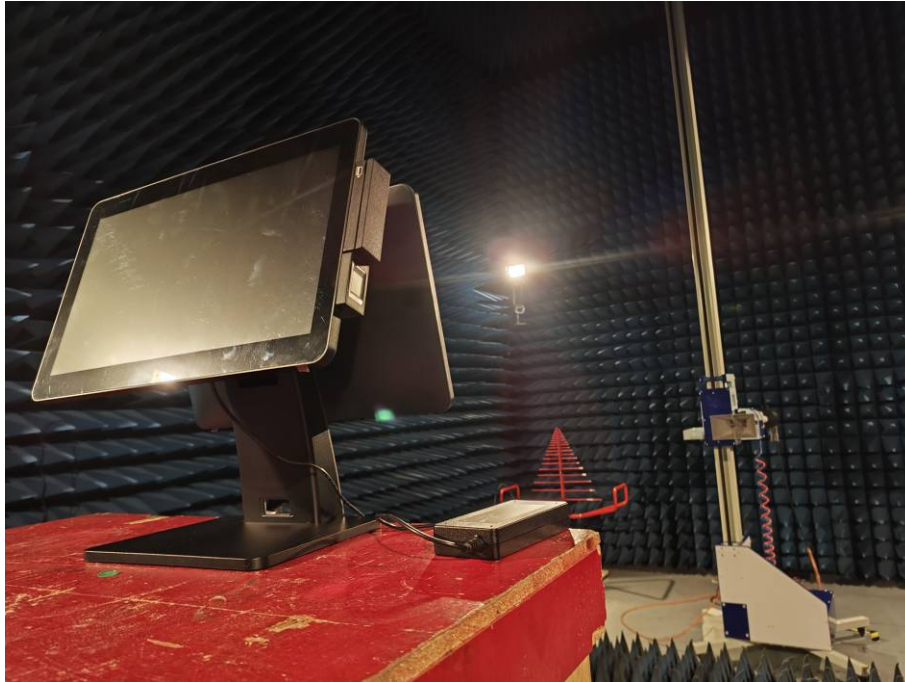
(Adapter:GM60-240250-F)

RE TEST SETUP



(Adapter:FSP120-AAAN3)

RE TEST SETUP



(HK316K(second display: 10.1 inch))  
CE TEST SETUP



(Adapter:FSP060-DAAN3)

CE TEST SETUP



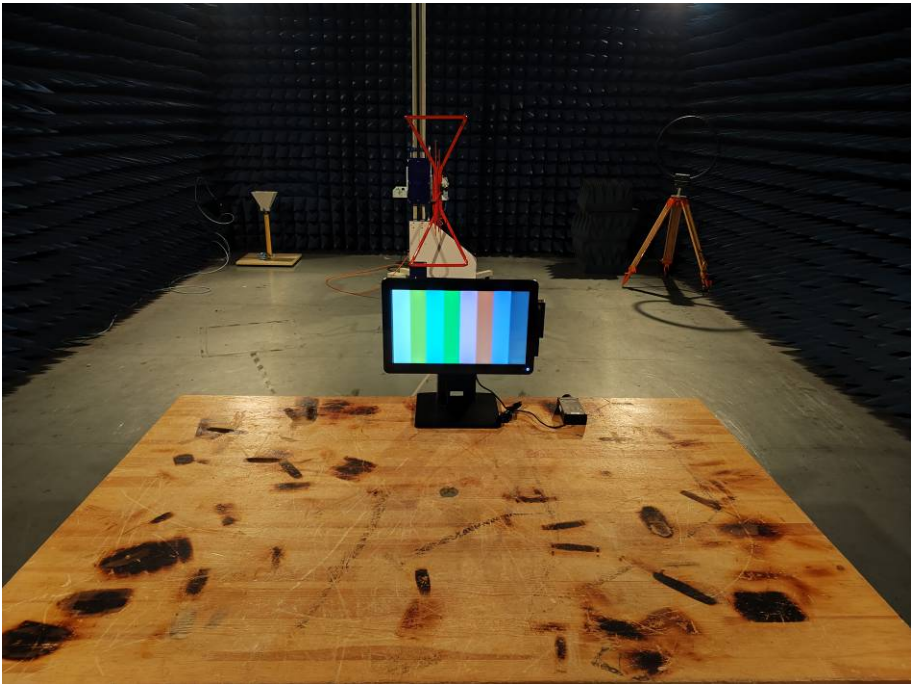
(Adapter:GM60-240250-F)

CE TEST SETUP



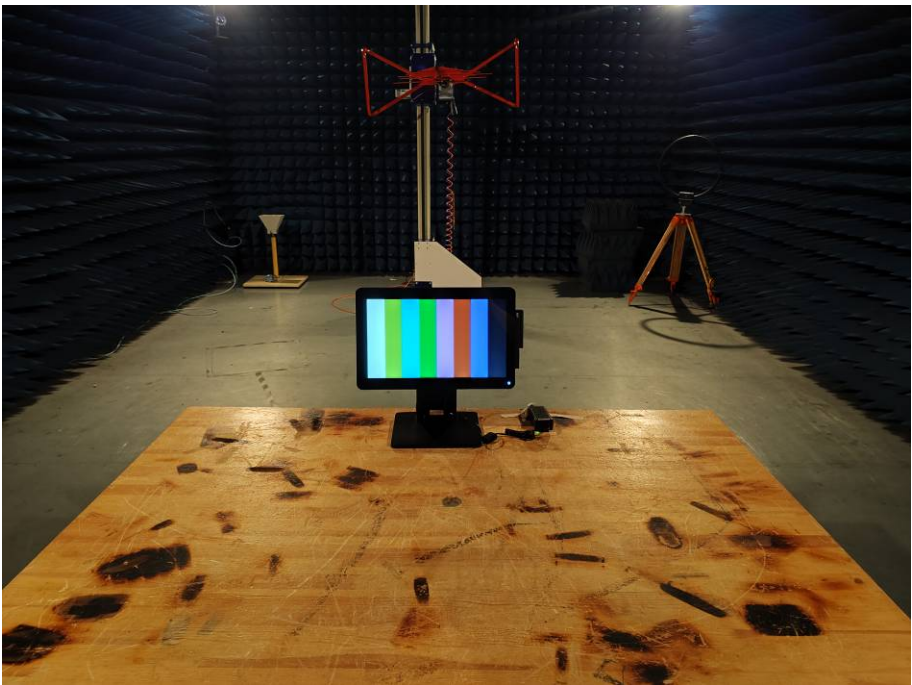
(Adapter:FSP120-AAAN3)

RE TEST SETUP



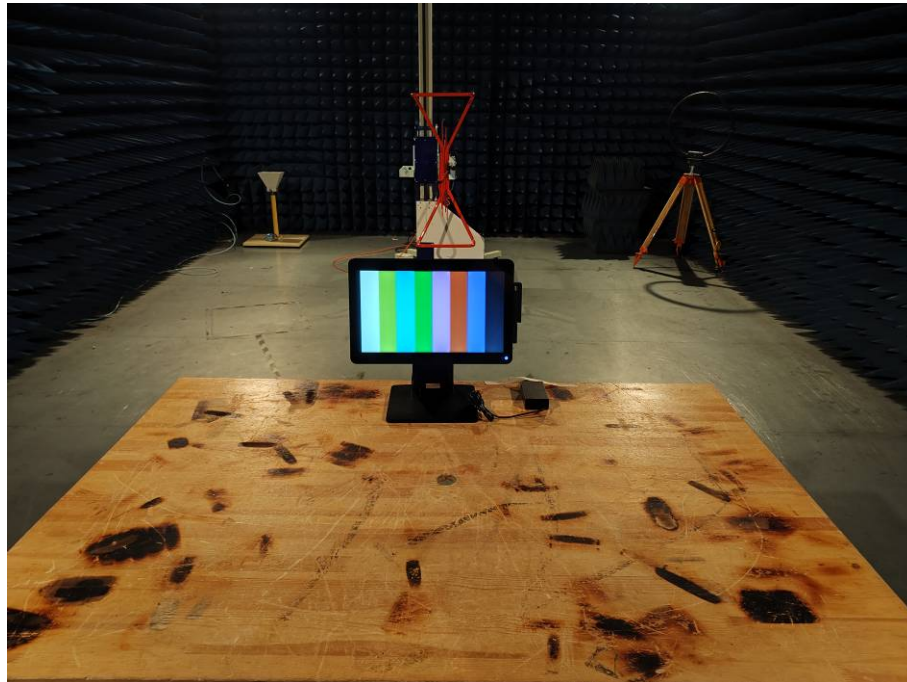
(Adapter:FSP060-DAAN3)

RE TEST SETUP



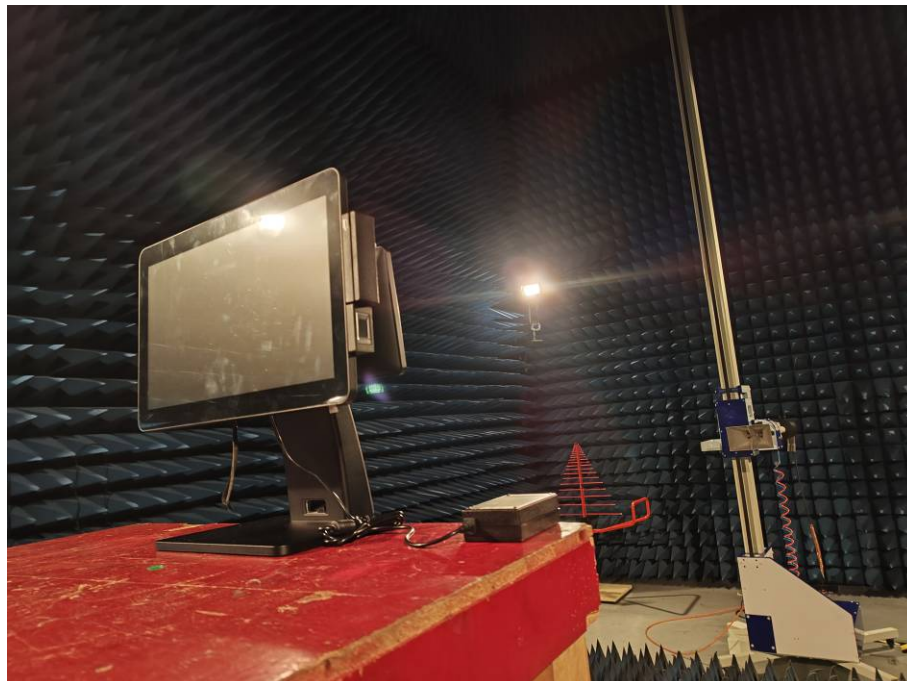
(Adapter:GM60-240250-F)

RE TEST SETUP



(Adapter:FSP120-AAAN3)

RE TEST SETUP



## **7 Photos of the EUT**

See photo report

**APPENDIX I. Conducted Peak Output Power****Test Result**

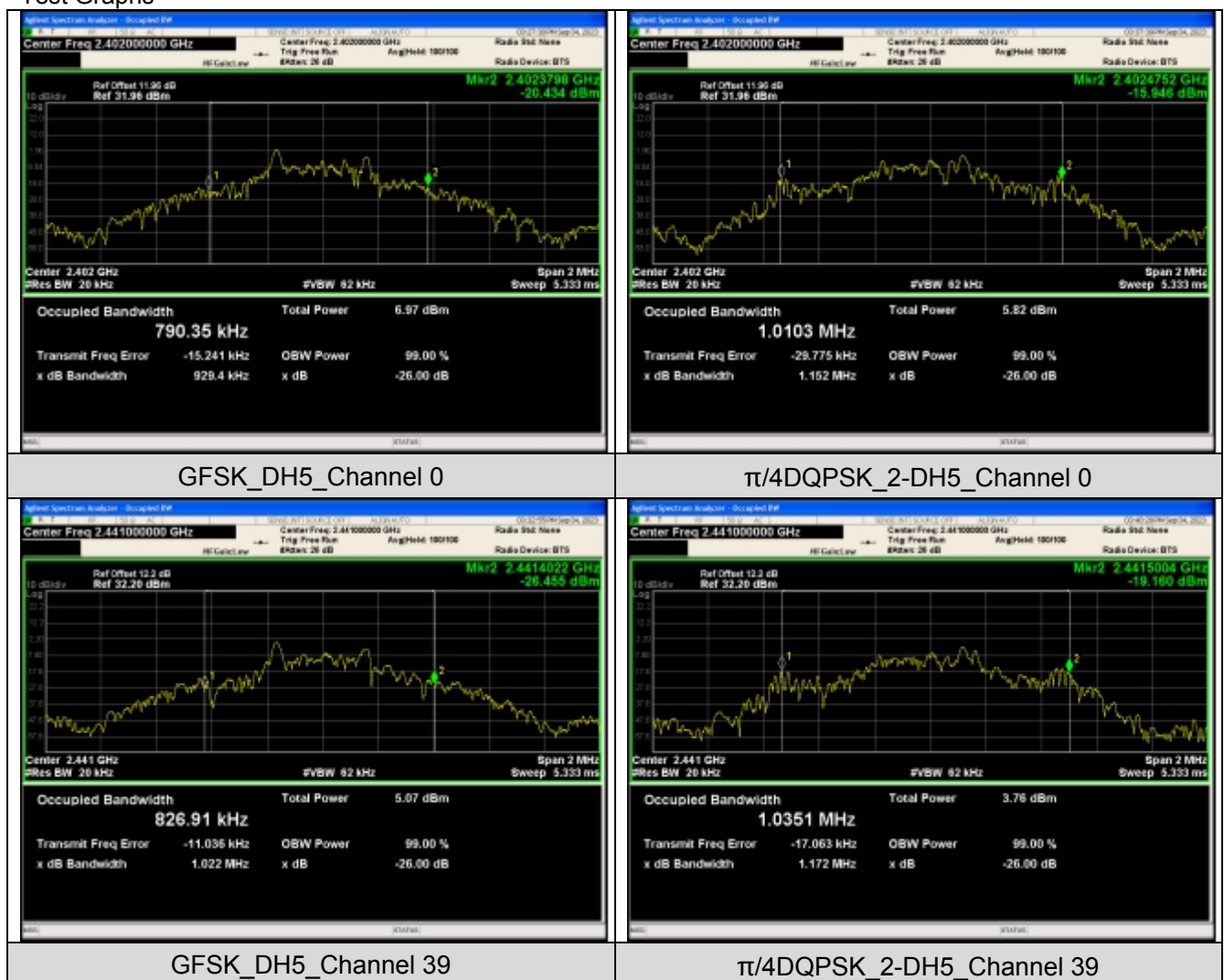
| Modulation    | Packet Type | Channel | Peak Output Power (dBm) | Peak Output Power (mW) | Max. Avg. Power (dBm) | Limit (dBm) | Result |
|---------------|-------------|---------|-------------------------|------------------------|-----------------------|-------------|--------|
| GFSK          | DH5         | 0       | 3.154                   | 2.067                  | None                  | 30          | PASS   |
|               |             | 39      | 0.807                   | 1.204                  | None                  |             | PASS   |
|               |             | 78      | -5.323                  | 0.294                  | None                  |             | PASS   |
| $\pi/4$ DQPSK | 2-DH5       | 0       | 2.104                   | 1.623                  | None                  | 20.97       | PASS   |
|               |             | 39      | -0.064                  | 0.985                  | None                  |             | PASS   |
|               |             | 78      | -5.990                  | 0.252                  | None                  |             | PASS   |
| 8DPSK         | 3-DH5       | 0       | 2.103                   | 1.623                  | None                  |             | PASS   |
|               |             | 39      | -0.015                  | 0.997                  | None                  |             | PASS   |
|               |             | 78      | -6.022                  | 0.250                  | None                  |             | PASS   |

## APPENDIX II. 99% Bandwidth

### Test Result

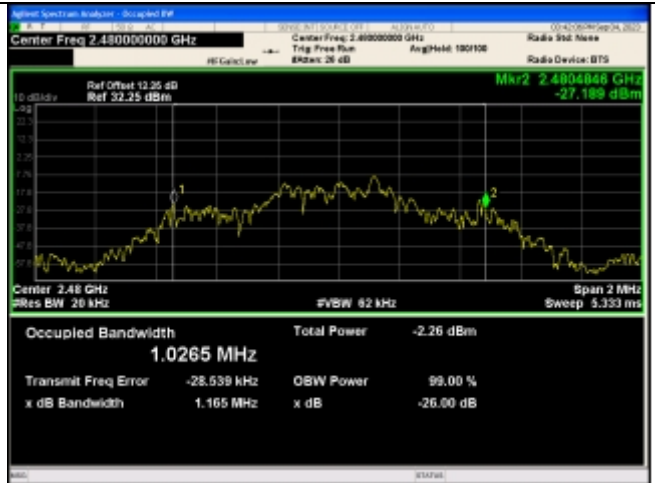
| Modulation    | Channel | 99% BW (MHz) |
|---------------|---------|--------------|
| GFSK          | 0       | 0.79035      |
|               | 39      | 0.82691      |
|               | 78      | 0.88263      |
| $\pi/4$ DQPSK | 0       | 1.0103       |
|               | 39      | 1.0351       |
|               | 78      | 1.0265       |
| 8DPSK         | 0       | 0.99398      |
|               | 39      | 1.0143       |
|               | 78      | 1.0324       |

### Test Graphs





GFSK\_DH5\_Channel 78



$\pi/4$ DQPSK\_2-DH5\_Channel 78



8DPSK\_3-DH5\_Channel 0



8DPSK\_3-DH5\_Channel 39



8DPSK\_3-DH5\_Channel 78

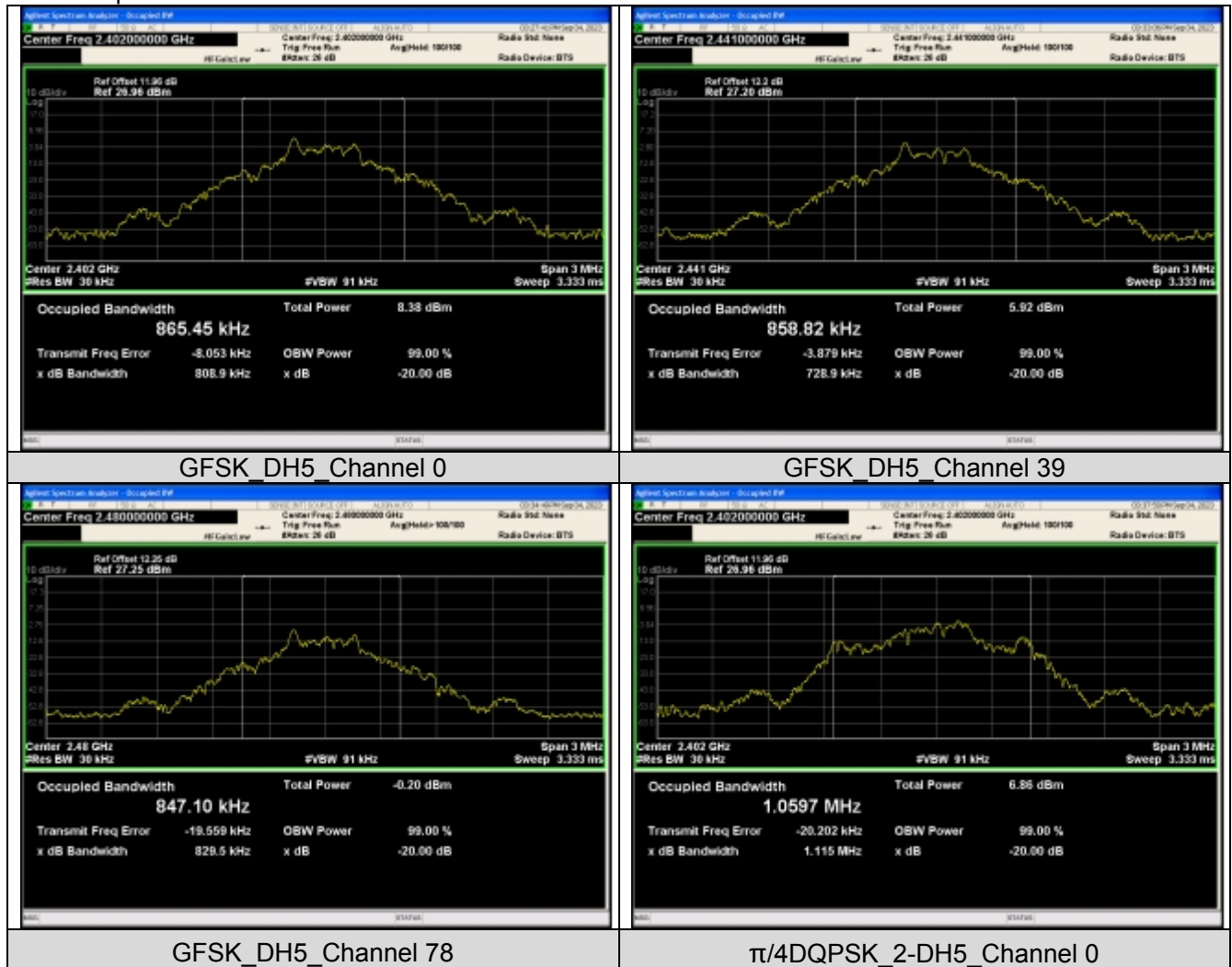
Void

## APPENDIX III. 20dB Bandwidth

### Test Result

| Modulation    | Channel | Center Frequency (MHz) | 20 dB Bandwidth (MHz) |
|---------------|---------|------------------------|-----------------------|
| GFSK          | 0       | 2402 MHz               | 0.8089                |
|               | 39      | 2441 MHz               | 0.7289                |
|               | 78      | 2480 MHz               | 0.8295                |
| $\pi/4$ DQPSK | 0       | 2402 MHz               | 1.115                 |
|               | 39      | 2441 MHz               | 1.112                 |
|               | 78      | 2480 MHz               | 1.096                 |
| 8DPSK         | 0       | 2402 MHz               | 1.124                 |
|               | 39      | 2441 MHz               | 1.104                 |
|               | 78      | 2480 MHz               | 1.126                 |

### Test Graphs





$\pi/4$ DQPSK\_2-DH5\_Channel 39



$\pi/4$ DQPSK\_2-DH5\_Channel 78



8DPSK\_3-DH5\_Channel 0



8DPSK\_3-DH5\_Channel 39



8DPSK\_3-DH5\_Channel 78

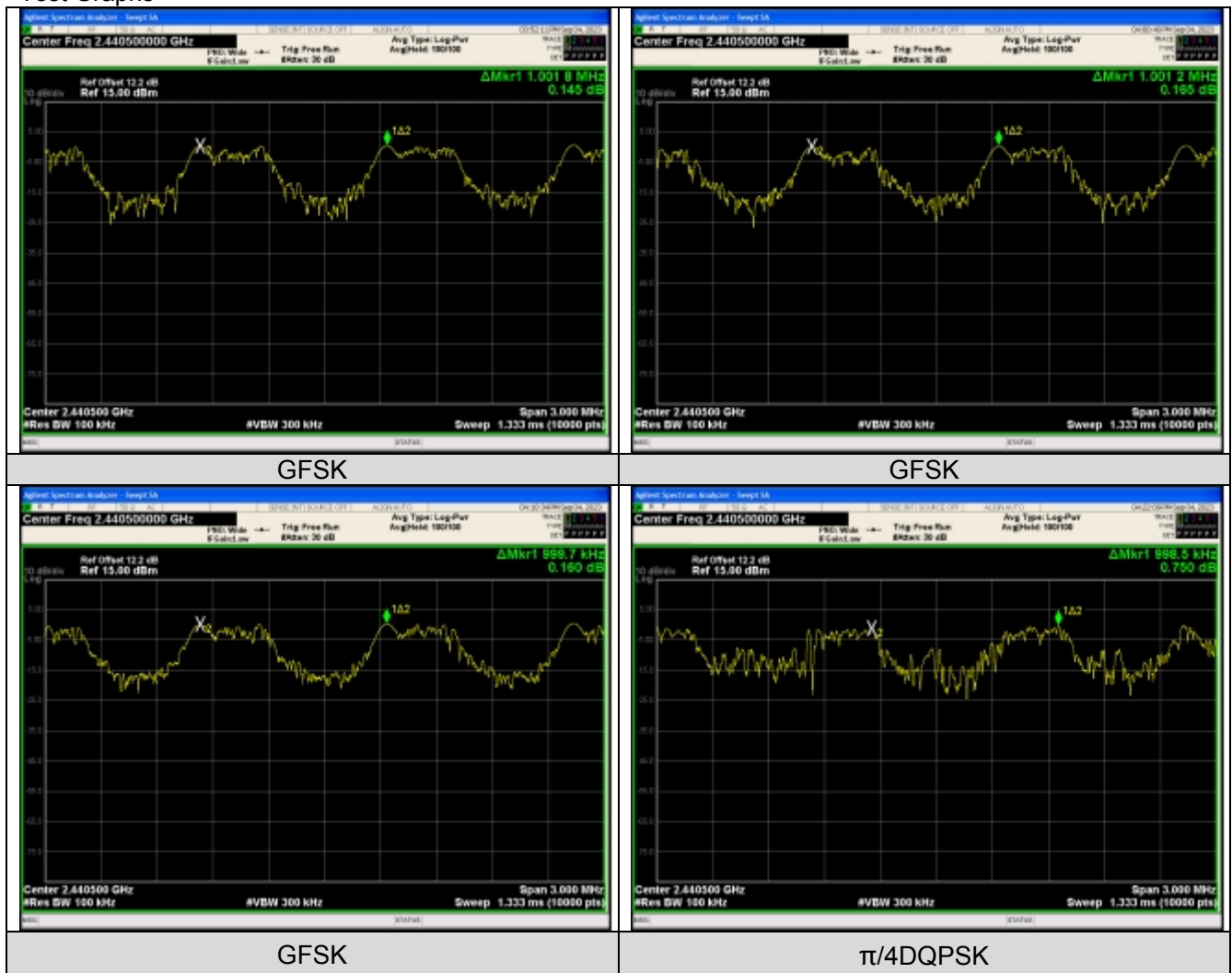
Void

## APPENDIX IV. Carrier Frequencies Separation

### Test Result

| Modulation    | Packet | Left Center frequency (MHz) | Right Center frequency (MHz) | Hopping Frequency Separation (MHz) | Limit (MHz) | Result |
|---------------|--------|-----------------------------|------------------------------|------------------------------------|-------------|--------|
| GFSK          | DH5    | 2439.832                    | 2440.8338                    | 1.0018                             | 0.539       | PASS   |
| GFSK          | DH5    | 2439.832                    | 2440.8332                    | 1.0012                             | 0.486       | PASS   |
| GFSK          | DH5    | 2439.8332                   | 2440.8329                    | 0.9997                             | 0.553       | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 2440.1539                   | 2441.1524                    | 0.9985                             | 0.743       | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 2440.1578                   | 2441.1434                    | 0.9856                             | 0.741       | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 2440.1452                   | 2441.1356                    | 0.9904                             | 0.731       | PASS   |
| 8DPSK         | 3-DH5  | 2440.0                      | 2441.141                     | 1.1410                             | 0.749       | PASS   |
| 8DPSK         | 3-DH5  | 2439.8329                   | 2440.8329                    | 1.0000                             | 0.736       | PASS   |
| 8DPSK         | 3-DH5  | 2440.1467                   | 2441.1335                    | 0.9868                             | 0.751       | PASS   |

### Test Graphs





$\pi/4$ DQPSK



$\pi/4$ DQPSK



8DPSK



8DPSK

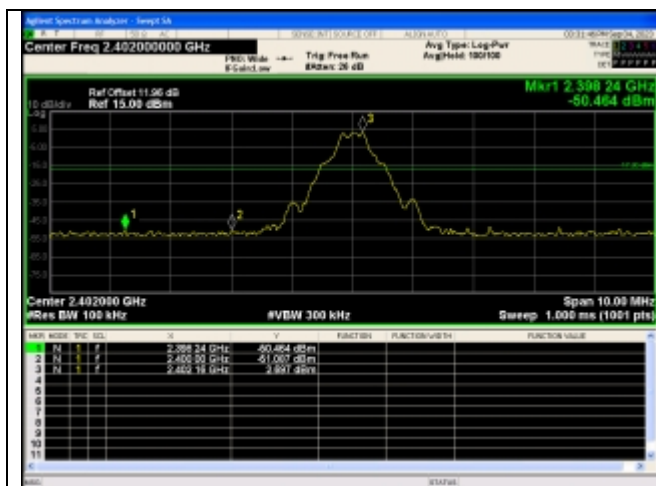


8DPSK

Void

**APPENDIX V. Conducted Out Of Band Emission****Test Result**  
Non-Hopping

| Modulation    | Packet | Channel | OOB<br>Emission<br>Frequency<br>(MHz) | OOB<br>Emission<br>Level<br>(dBm) | Limit<br>(dBm) | Over Limit<br>(dB) | Result |
|---------------|--------|---------|---------------------------------------|-----------------------------------|----------------|--------------------|--------|
| GFSK          | DH5    | 0       | 2400.00                               | -51.087                           | -17.3          | -33.787            | PASS   |
|               |        |         | 2398.24                               | -50.464                           | -17.3          | -33.164            | PASS   |
|               |        |         | 4803.80                               | -56.132                           | -17.3          | -38.832            | PASS   |
|               |        |         | 7205.90                               | -63.299                           | -17.3          | -45.999            | PASS   |
|               |        |         | 9608.70                               | -64.085                           | -17.3          | -46.785            | PASS   |
|               |        |         | 24951.9                               | -46.518                           | -17.3          | -29.218            | PASS   |
|               |        | 39      | 4881.79                               | -53.299                           | -19.81         | -33.489            | PASS   |
|               |        |         | 7322.05                               | -62.965                           | -19.81         | -43.155            | PASS   |
|               |        |         | 9763.55                               | -61.856                           | -19.81         | -42.046            | PASS   |
|               |        |         | 24993.8                               | -44.797                           | -19.81         | -24.987            | PASS   |
|               |        | 78      | 2483.50                               | -51.779                           | -25.62         | -26                | PASS   |
|               |        |         | 4959.83                               | -55.108                           | -25.62         | -29.488            | PASS   |
|               |        |         | 7440.03                               | -62.037                           | -25.62         | -36.417            | PASS   |
|               |        |         | 9919.62                               | -64.108                           | -25.62         | -38.488            | PASS   |
|               |        |         | 24908.2                               | -44.466                           | -25.62         | -18.846            | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 0       | 2400.00                               | -52.144                           | -18.21         | -33.934            | PASS   |
|               |        |         | 2398.02                               | -50.984                           | -18.21         | -32.774            | PASS   |
|               |        |         | 4804.40                               | -56.628                           | -18.21         | -38.418            | PASS   |
|               |        |         | 7205.90                               | -61.925                           | -18.21         | -43.715            | PASS   |
|               |        |         | 9607.50                               | -63.553                           | -18.21         | -45.343            | PASS   |
|               |        |         | 24982.5                               | -46.185                           | -18.21         | -27.975            | PASS   |
|               |        | 39      | 4882.42                               | -56.735                           | -20.49         | -36.245            | PASS   |
|               |        |         | 7322.05                               | -62.726                           | -20.49         | -42.236            | PASS   |
|               |        |         | 9764.17                               | -63.010                           | -20.49         | -42.520            | PASS   |
|               |        |         | 24945.1                               | -45.460                           | -20.49         | -24.970            | PASS   |
|               |        | 78      | 2483.50                               | -52.694                           | -26.46         | -26                | PASS   |
|               |        |         | 4960.45                               | -56.948                           | -26.46         | -30.488            | PASS   |
|               |        |         | 7440.66                               | -64.502                           | -26.46         | -38.042            | PASS   |
|               |        |         | 9920.24                               | -64.656                           | -26.46         | -38.196            | PASS   |
|               |        |         | 24930.7                               | -45.066                           | -26.46         | -18.605            | PASS   |
| 8DPSK         | 3-DH5  | 0       | 2400.00                               | -52.623                           | -18.09         | -34.533            | PASS   |
|               |        |         | 2398.20                               | -50.273                           | -18.09         | -32.183            | PASS   |
|               |        |         | 4803.80                               | -59.177                           | -18.09         | -41.087            | PASS   |
|               |        |         | 7206.60                               | -61.383                           | -18.09         | -43.293            | PASS   |
|               |        |         | 9608.70                               | -62.318                           | -18.09         | -44.228            | PASS   |
|               |        |         | 24991.9                               | -45.837                           | -18.09         | -27.747            | PASS   |
|               |        | 39      | 4881.79                               | -58.063                           | -20.59         | -37.473            | PASS   |
|               |        |         | 7323.92                               | -63.358                           | -20.59         | -42.768            | PASS   |
|               |        |         | 9764.17                               | -63.607                           | -20.59         | -43.017            | PASS   |
|               |        |         | 24991.3                               | -45.735                           | -20.59         | -25.145            | PASS   |
|               |        | 78      | 2483.50                               | -51.389                           | -26.47         | -25                | PASS   |
|               |        |         | 4959.83                               | -56.149                           | -26.47         | -29.679            | PASS   |
|               |        |         | 7440.03                               | -63.455                           | -26.47         | -36.985            | PASS   |
|               |        |         | 9920.24                               | -62.513                           | -26.47         | -36.043            | PASS   |
|               |        |         | 24976.3                               | -45.448                           | -26.47         | -18.978            | PASS   |



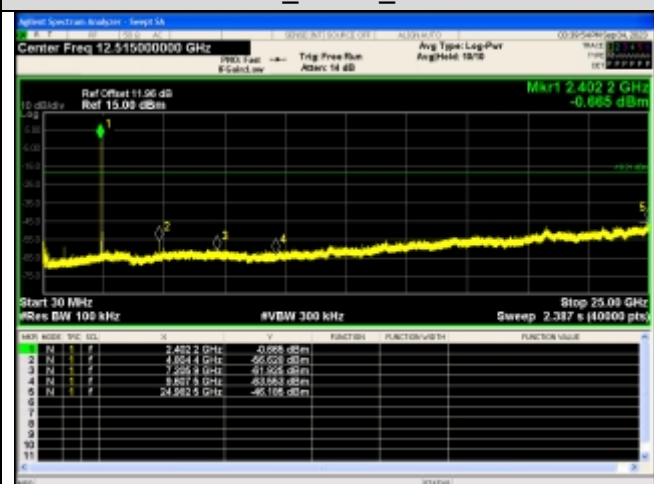
Out Of Band Emission  
GFSK\_DH5\_Channel 0



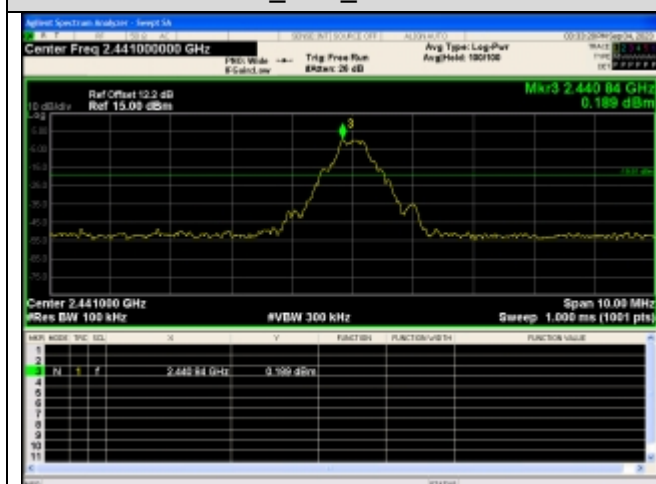
Out Of Band Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 0



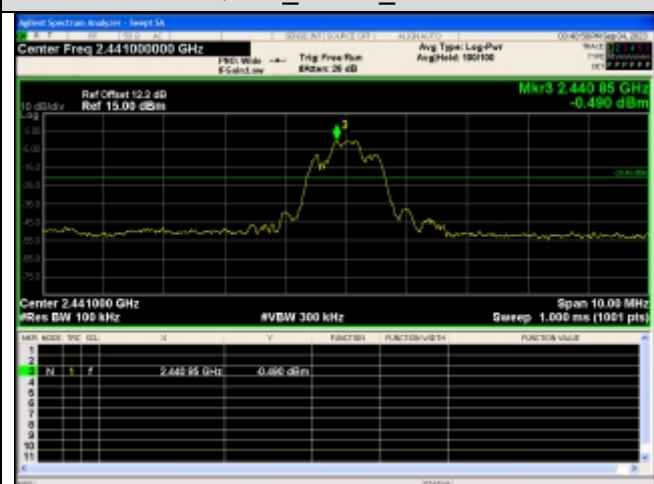
Spurious Emission  
GFSK\_DH5\_Channel 0



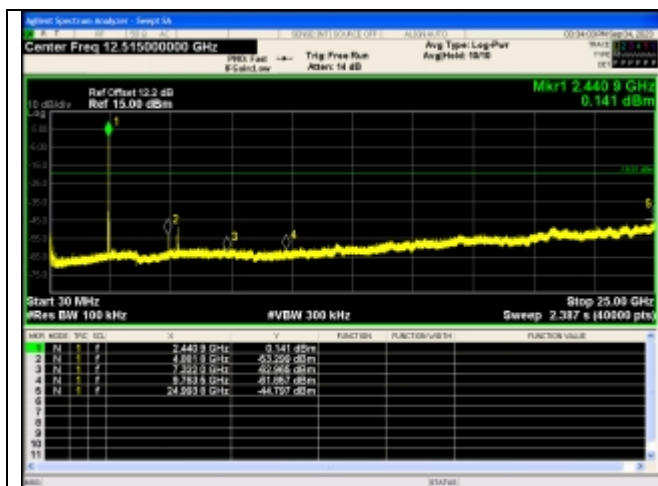
Spurious Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 0



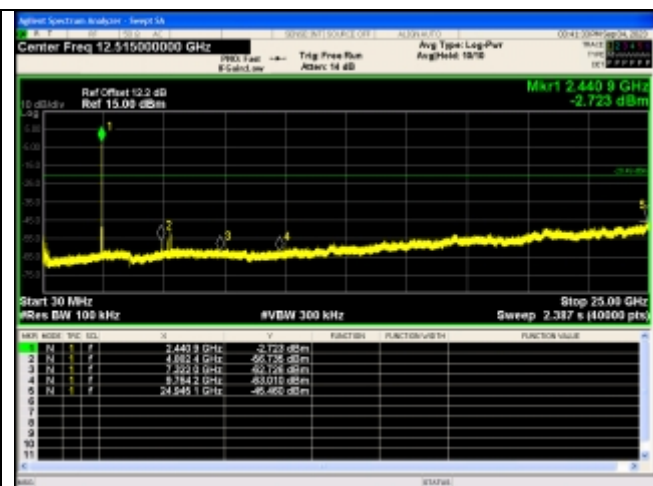
Out Of Band Emission  
GFSK\_DH5\_Channel 39



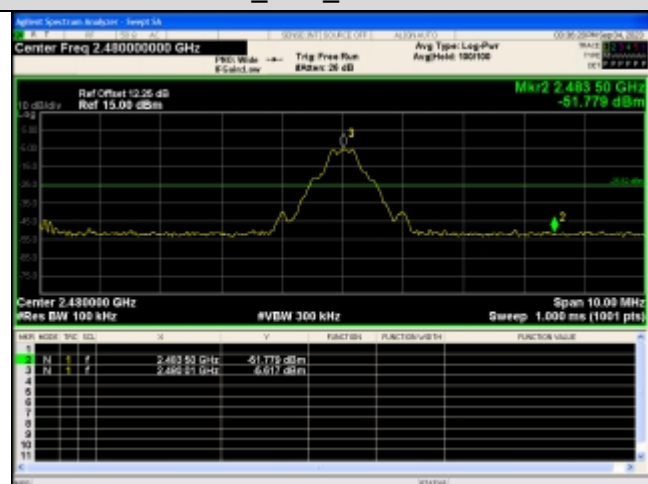
Out Of Band Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 39



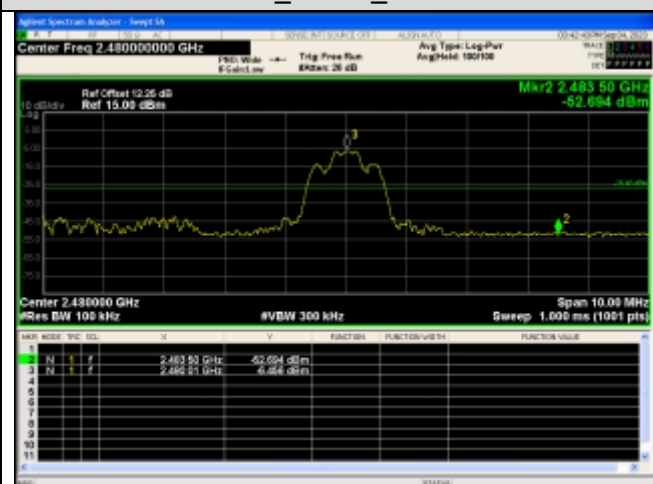
Spurious Emissions  
GFSK\_DH5\_Channel 39



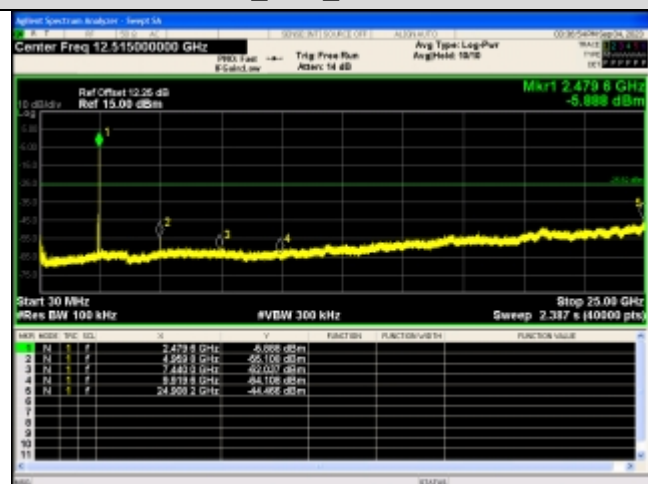
Spurious Emissions  
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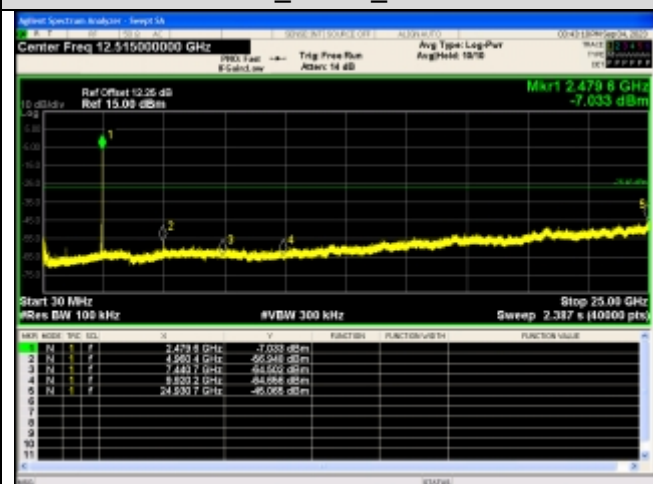
Out Of Band Emission  
GFSK\_DH5\_Channel 78



Out Of Band Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 78



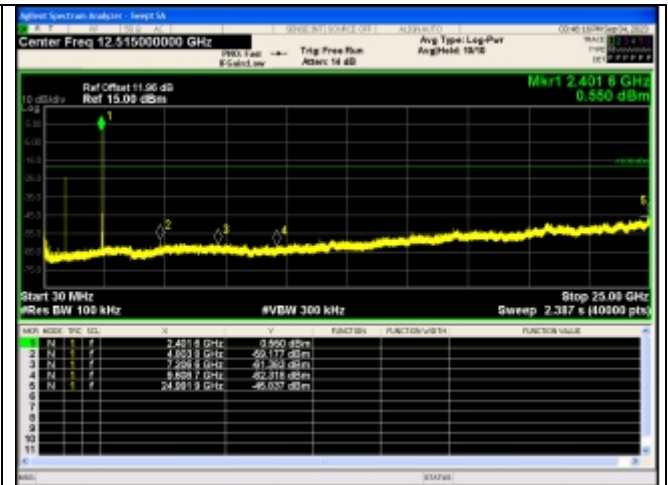
Spurious Emission  
GFSK\_DH5\_Channel 78



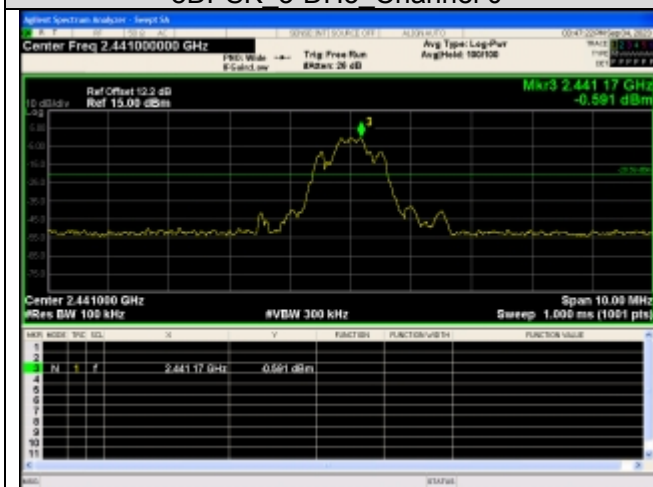
Spurious Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 78



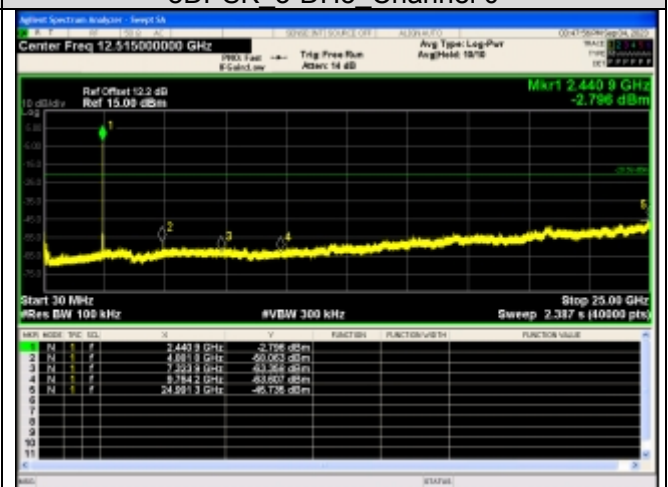
Out Of Band Emission  
8DPSK 3-DH5 Channel 0



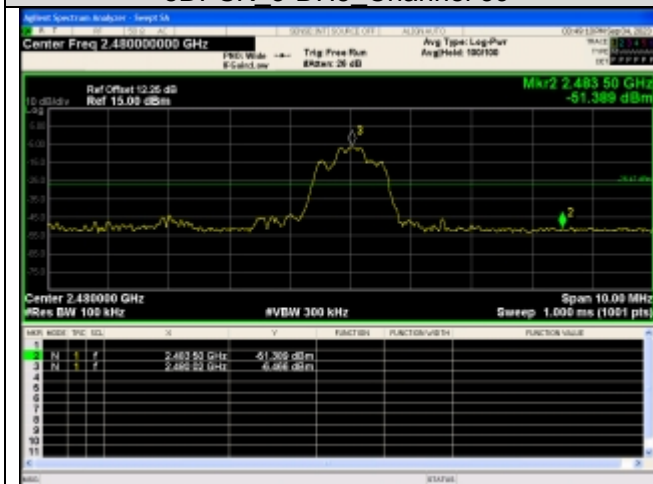
Spurious Emission  
8DPSK 3-DH5 Channel 0



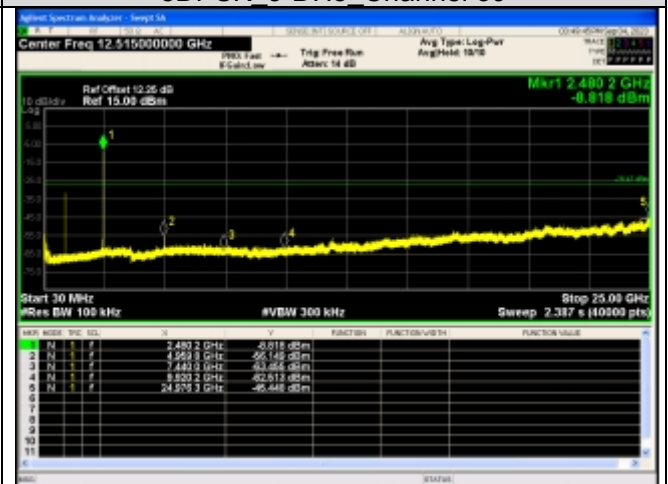
Out Of Band Emission  
8DPSK 3-DH5 Channel 39



Spurious Emissions  
8DPSK 3-DH5 Channel 39

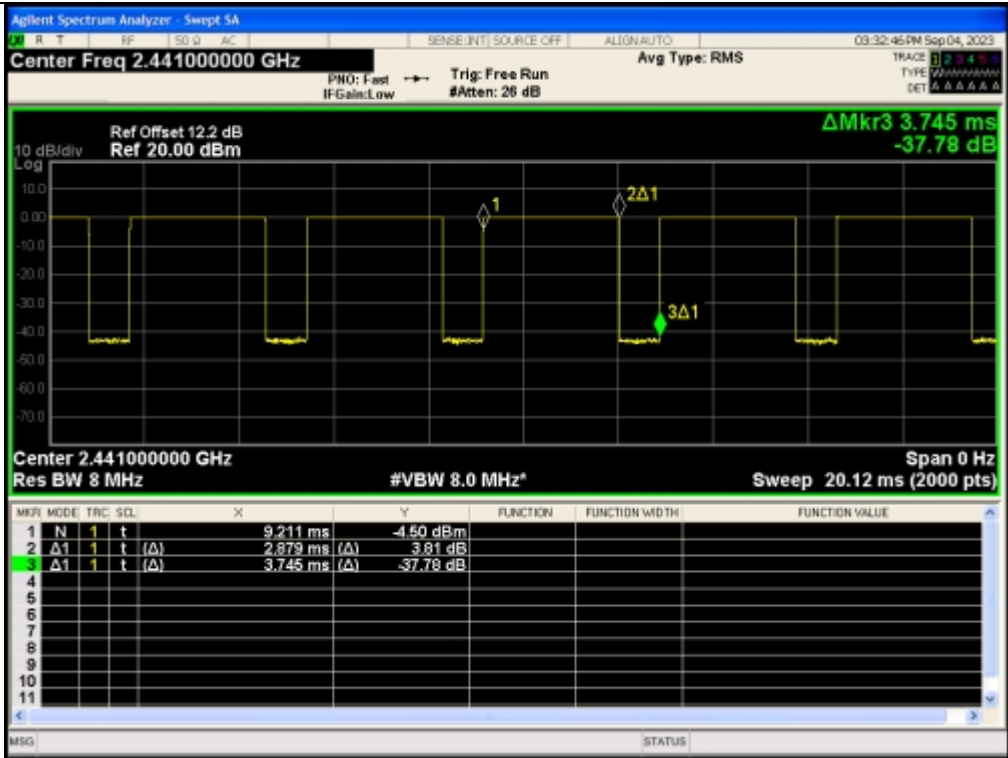


Out Of Band Emission  
8DPSK 3-DH5 Channel 78

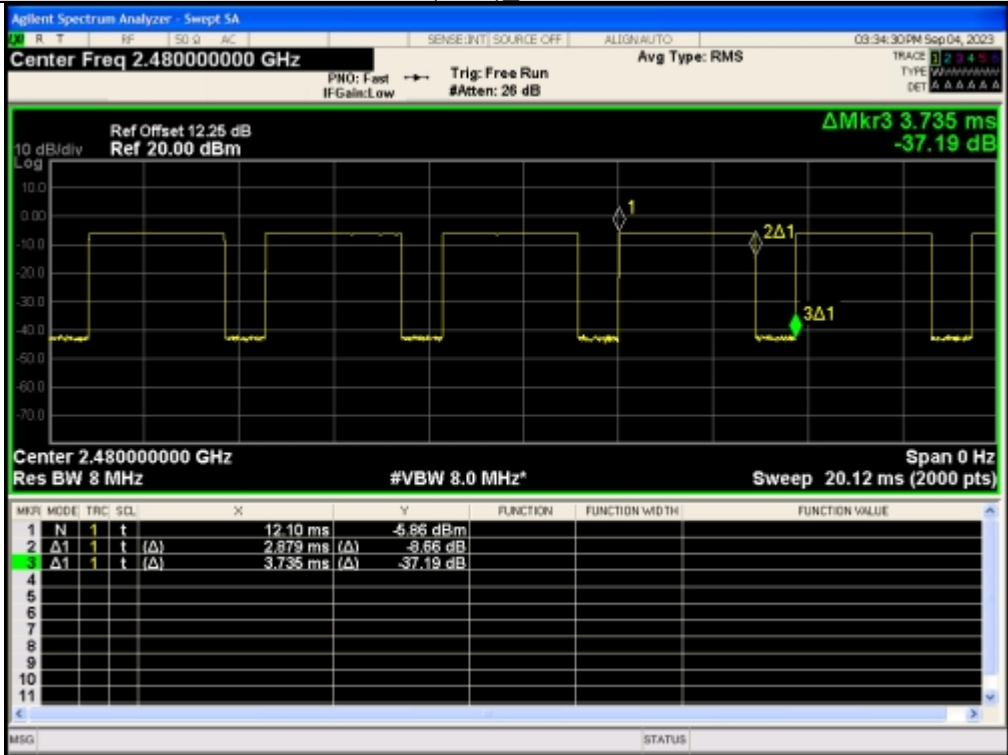


Spurious Emission  
8DPSK 3-DH5 Channel 78

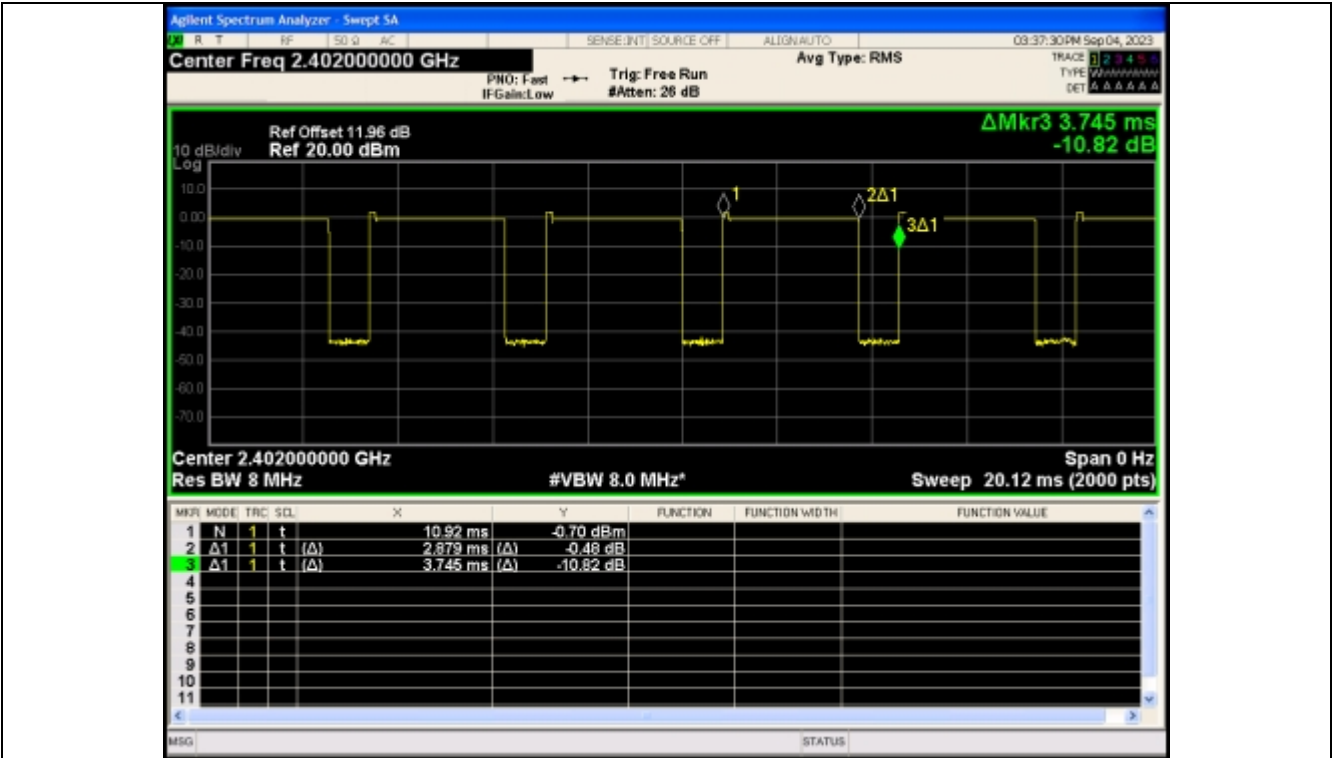




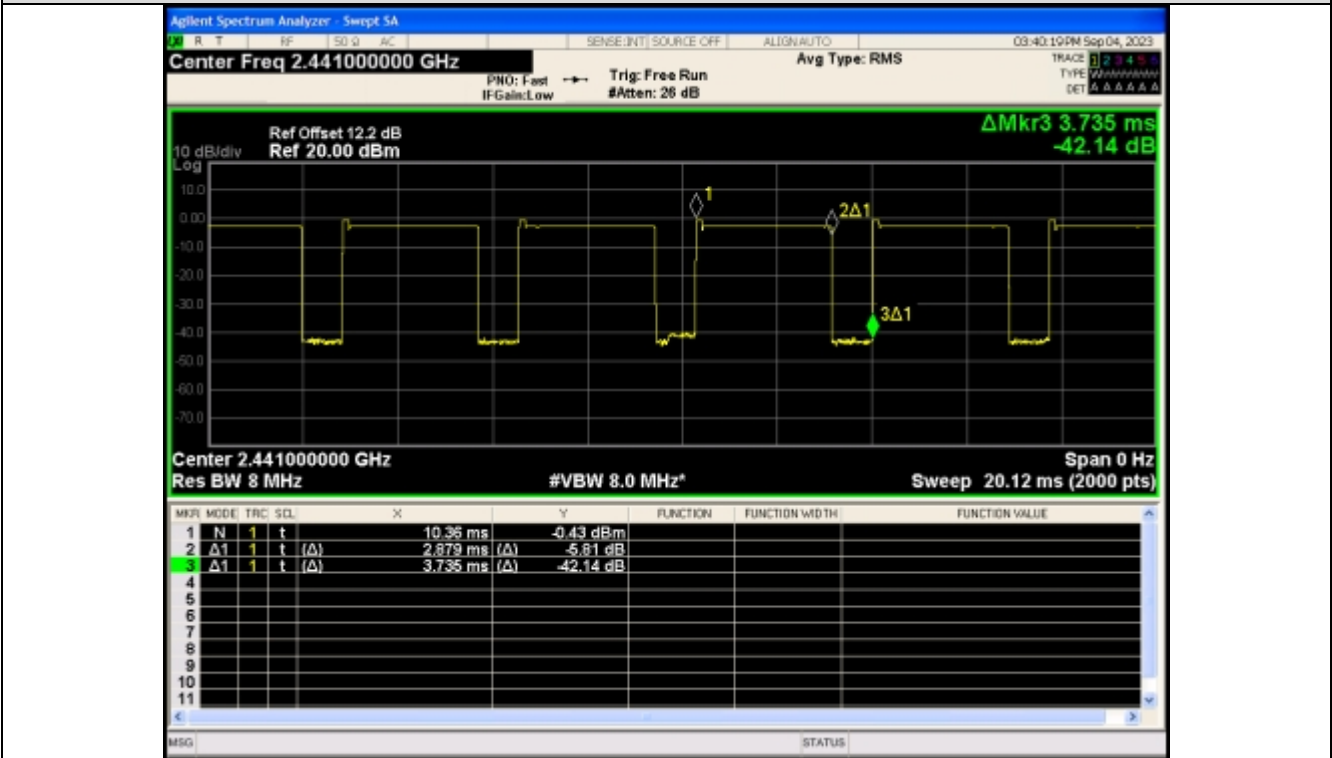
GFSK(DH5)\_Channel 39



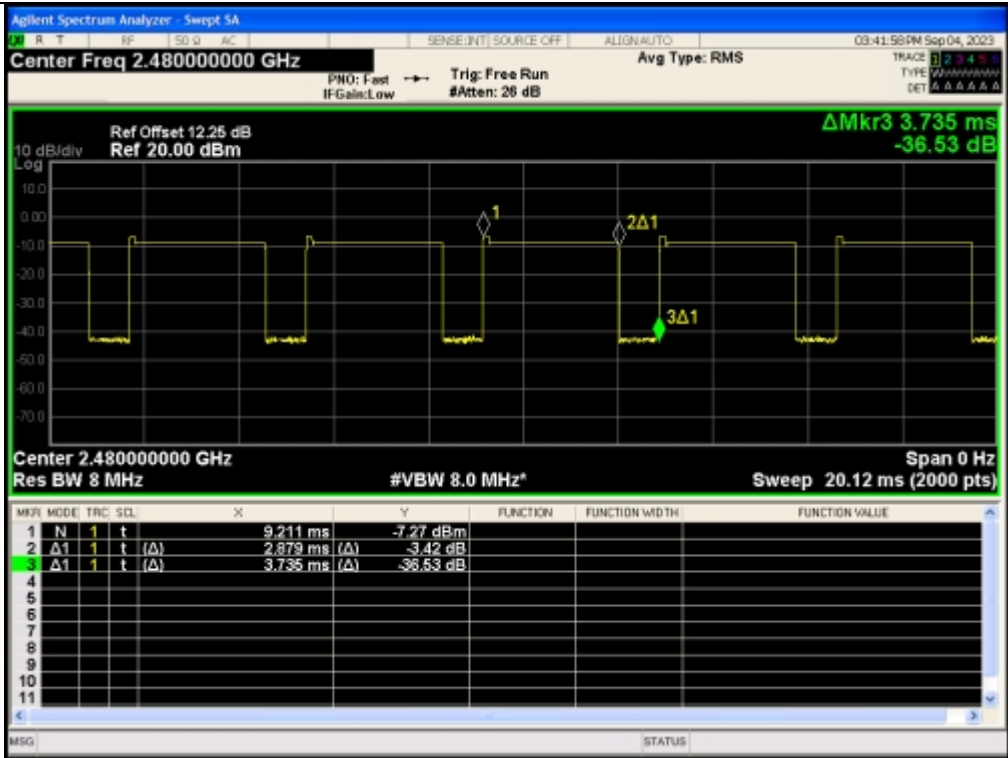
GFSK(DH5)\_Channel 78



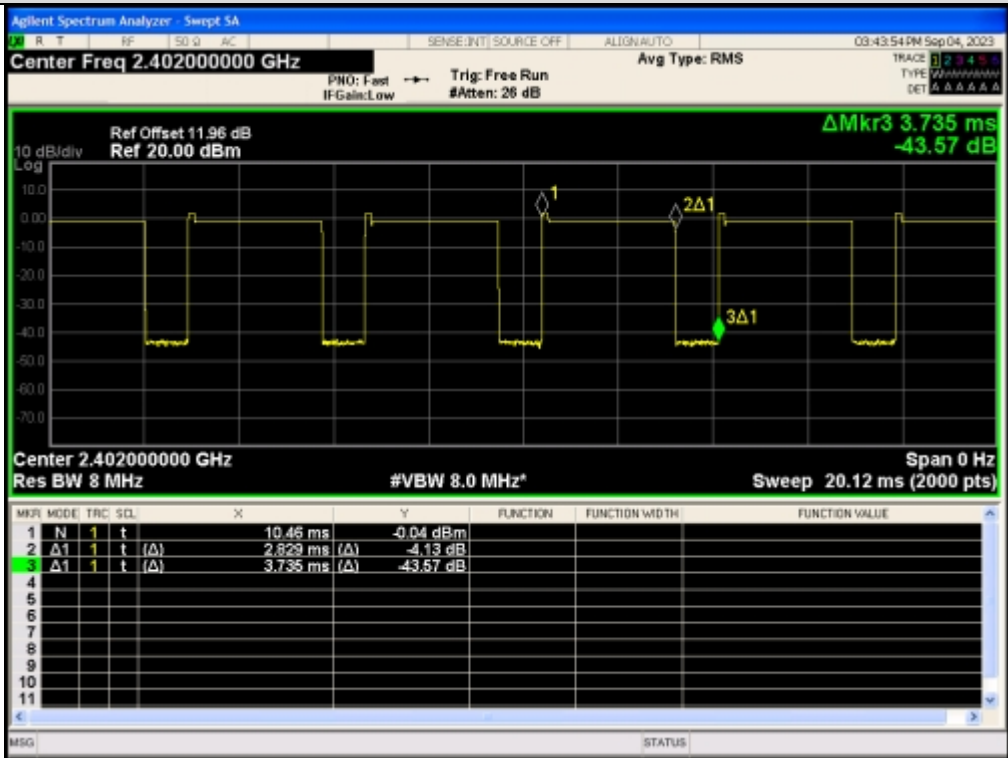
π/4DQPSK(2-DH5)\_Channel 0



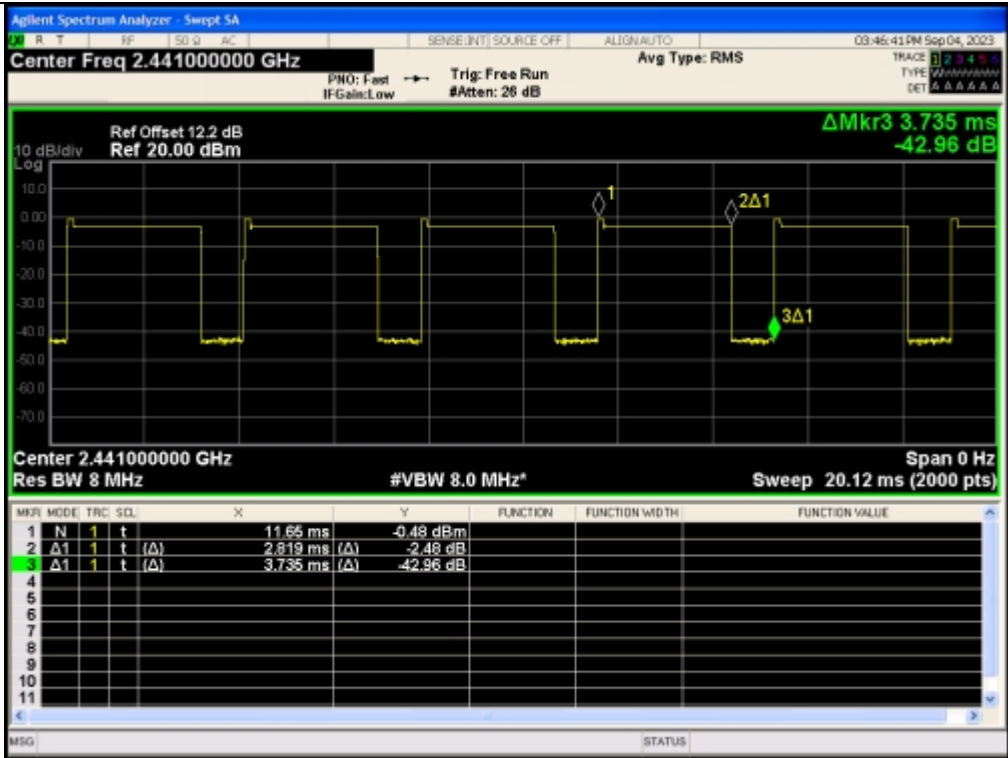
π/4DQPSK(2-DH5)\_Channel 39



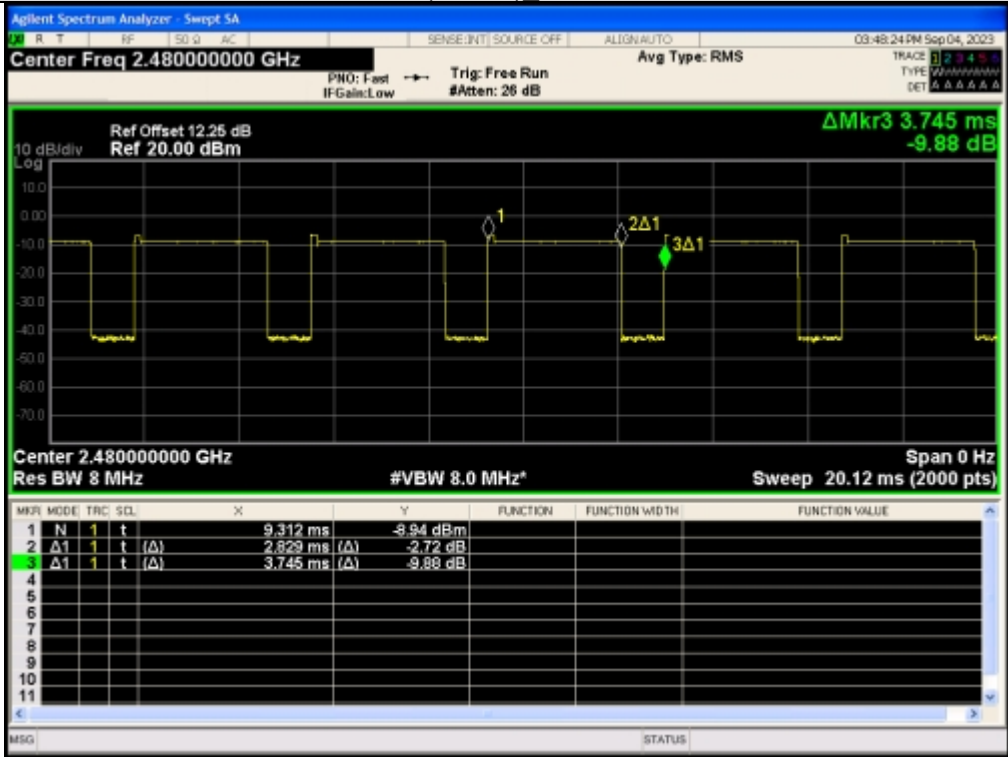
$\pi/4$ DQPSK(2-DH5)\_Channel 78



8DPSK(3-DH5)\_Channel 0



8DPSK(3-DH5)\_Channel 39



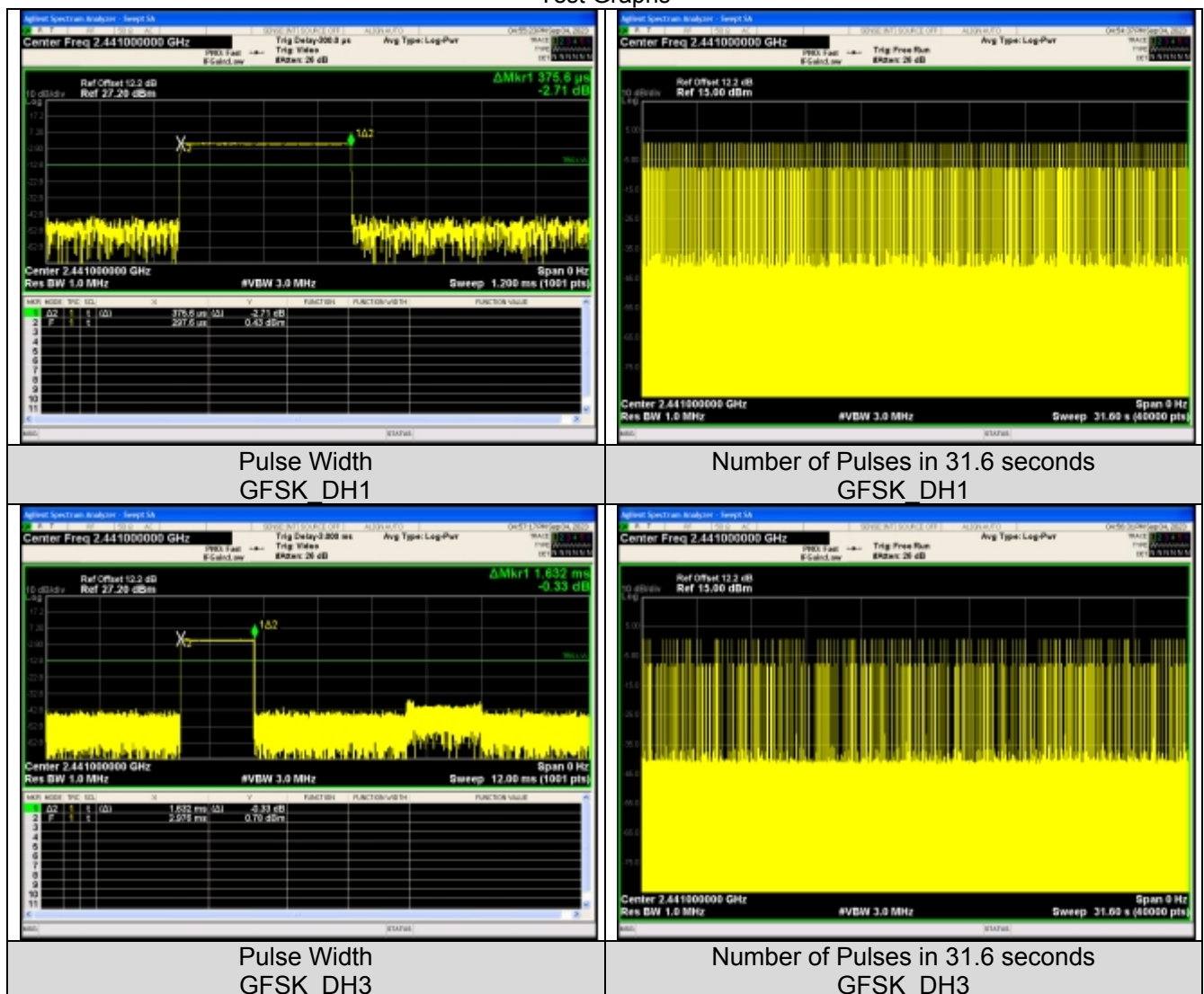
8DPSK(3-DH5)\_Channel 78

## APPENDIX VII. Dwell Time

### Test Result

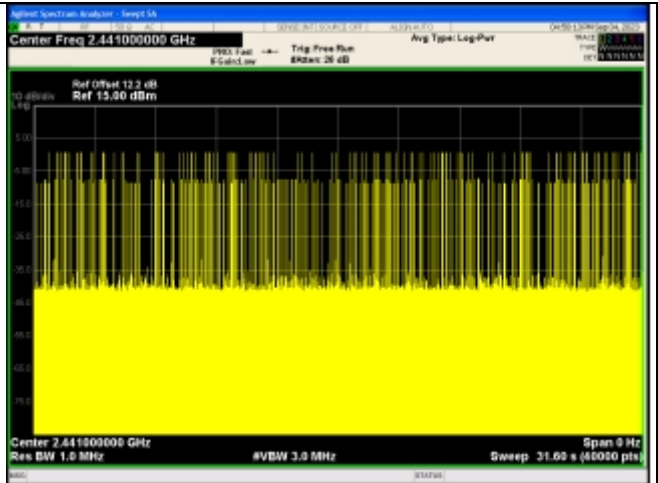
| Modulation    | Packet | Channel           | Pulse Width (ms) | Number of Pulses in 31.6 seconds | Dwell Time (ms) | Limit (ms) | Result |
|---------------|--------|-------------------|------------------|----------------------------------|-----------------|------------|--------|
| GFSK          | DH1    | CH39<br>(2441MHz) | 0.3756           | 312                              | 117.19          | < 400      | PASS   |
|               | DH3    |                   | 1.632            | 158                              | 257.86          |            | PASS   |
|               | DH5    |                   | 2.880            | 114                              | 328.32          |            | PASS   |
| $\pi/4$ DQPSK | 2-DH1  |                   | 0.3840           | 311                              | 119.42          |            | PASS   |
|               | 2-DH3  |                   | 1.656            | 159                              | 263.3           |            | PASS   |
|               | 2-DH5  |                   | 2.880            | 115                              | 331.2           |            | PASS   |
| 8DPSK         | 3-DH1  |                   | 0.3852           | 312                              | 120.18          |            | PASS   |
|               | 3-DH3  |                   | 1.632            | 159                              | 259.49          |            | PASS   |
|               | 3-DH5  |                   | 2.832            | 114                              | 322.85          |            | PASS   |

### Test Graphs

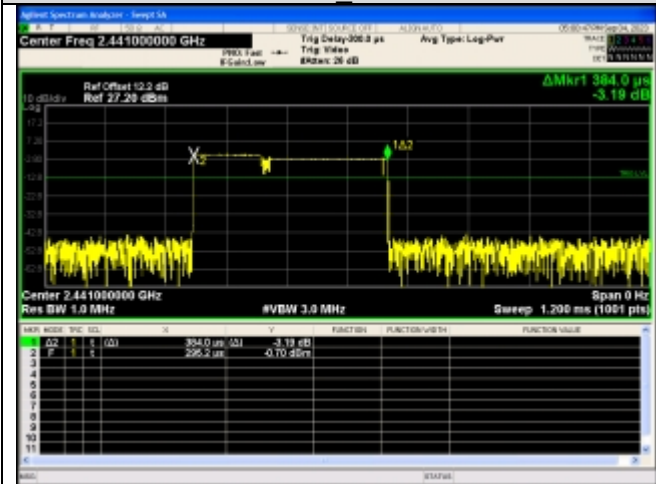




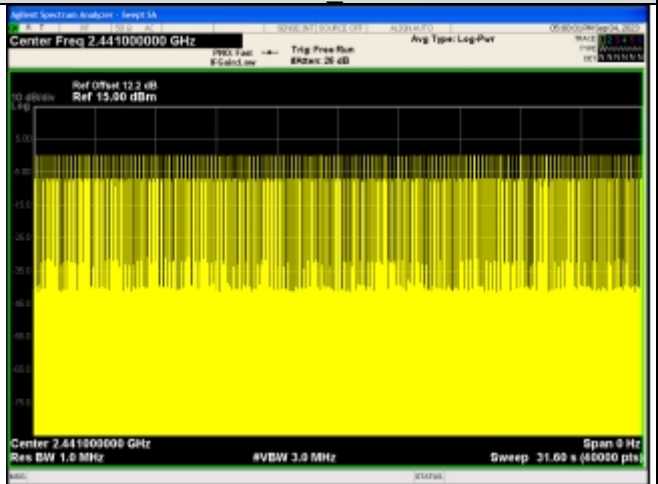
Pulse Width  
GFSK DH5



Number of Pulses in 31.6 seconds  
GFSK DH5



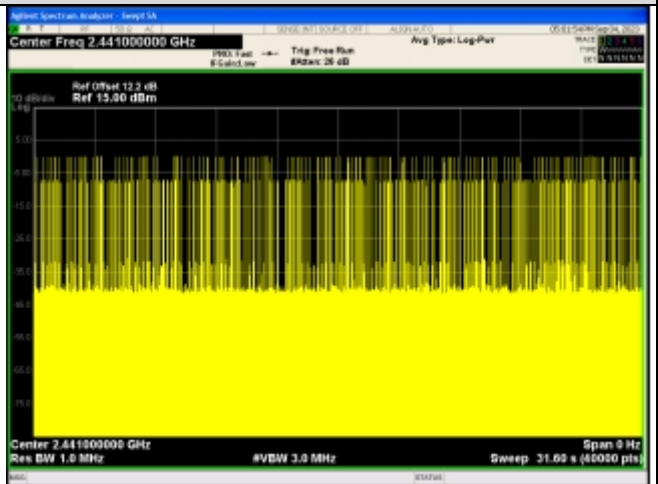
Pulse Width  
 $\pi/4$ DQPSK\_2-DH1



Number of Pulses in 31.6 seconds  
 $\pi/4$ DQPSK\_2-DH1



Pulse Width  
 $\pi/4$ DQPSK\_2-DH3



Number of Pulses in 31.6 seconds  
 $\pi/4$ DQPSK\_2-DH3