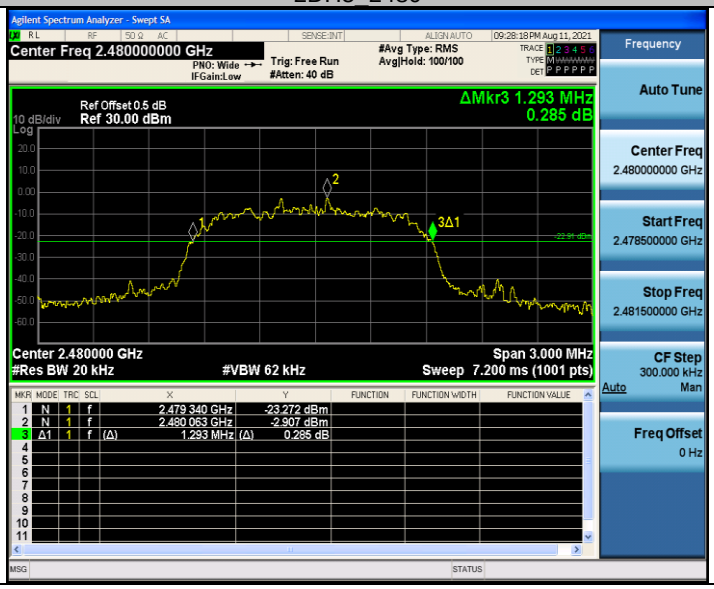
2DH5_2402

2DH5_2441

2DH5_2480



3DH5_2402

3DH5_2441

3DH5_2480

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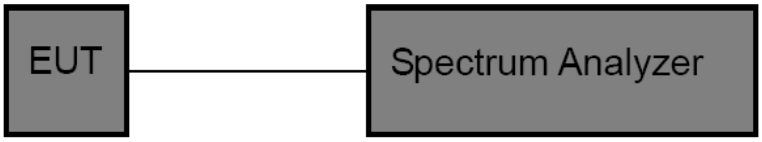
## 3.6. Channel Separation

**Limit**

**FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1)/ RSS-247 5.1 b :**

| Test Item | Limit | Frequency Range(MHz) |
|---|---|---|
| Channel Separation | >25KHz or >two-thirds of the 20 dB bandwidth Which is greater | 2400~2483.5 |

**Test Configuration**




**Test Procedure**

7. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
8. Spectrum Setting:
   (1) Set RBW = 100 kHz.
   (2) Set the video bandwidth (VBW) ≥ 3 RBW.
   (3) Detector = Peak.
   (4) Trace mode = Max hold.
   (5) Sweep = Auto couple.

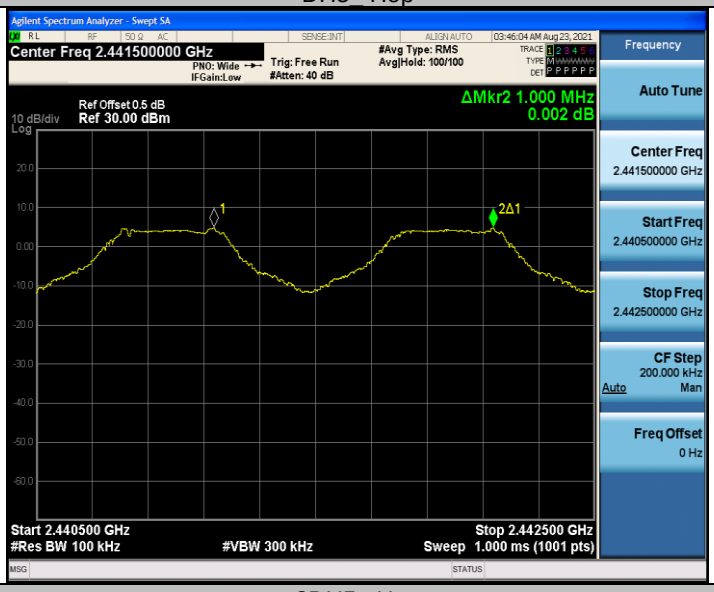
**Test Mode**

Please refer to the clause 2.4.

**Test Results**

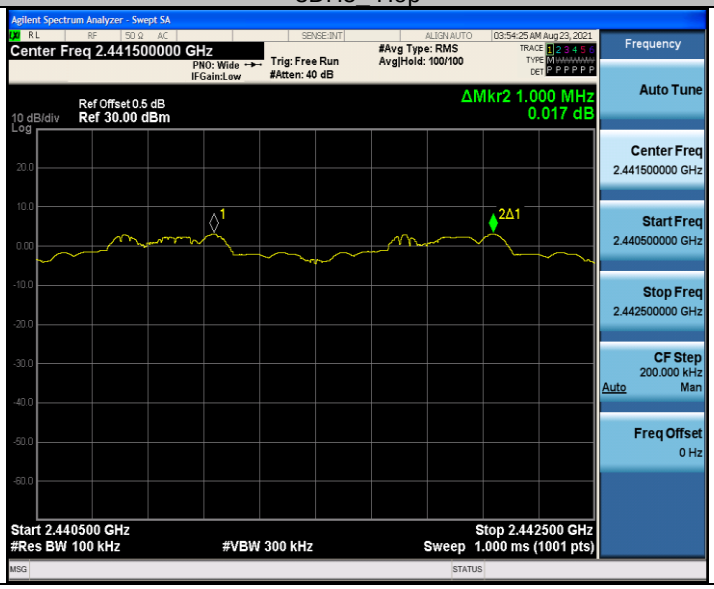
| Test Mode | Frequency(MHz) | Result[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|
| GFSK | Hop_2441 | 1.000 | >=0.632 | PASS |
| π/4-DQPSK | Hop_2441 | 1.014 | >=0.870 | PASS |
| 8-DPSK | Hop_2441 | 1.000 | >=0.880 | PASS |

DH5_Hop




2DH5_Hop

3DH5_Hop





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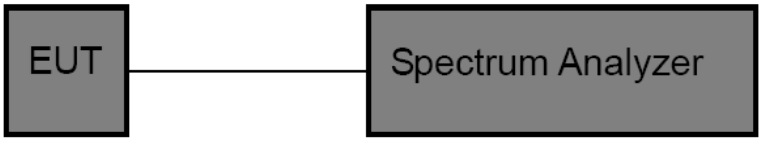
## 3.7. Number of Hopping Channel

**Limit**

**FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(iii)/ RSS-247 5.1 d:**

| Section | Test Item | Limit |
|---|---|---|
| 15.247 (a)(iii)/ RSS-247 5.1 d: | Number of Hopping Channel | >15 |

**Test Configuration**




**Test Procedure**

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Peak Detector: RBW=100 kHz, VBW≥RBW, Sweep time= Auto.

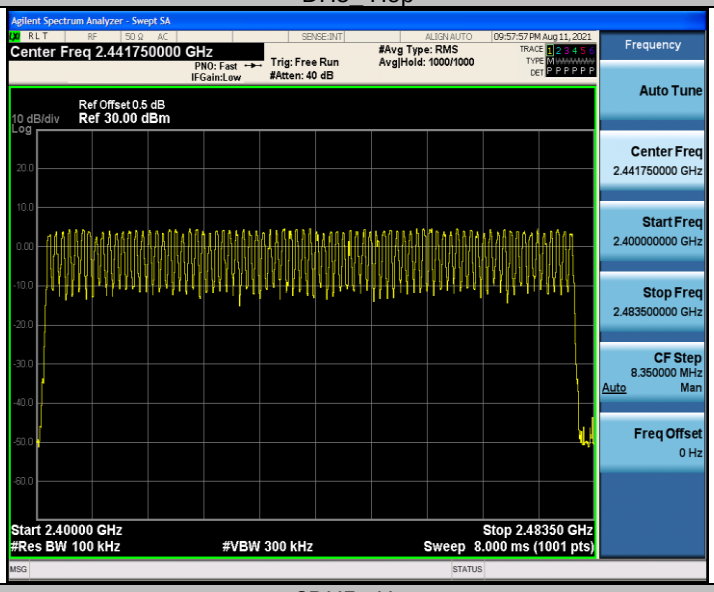
**Test Mode**

Please refer to the clause 2.4.

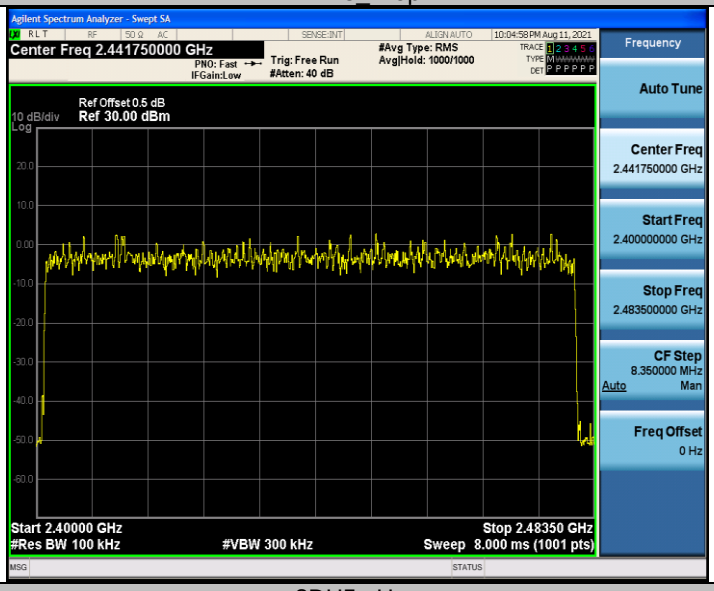
**Test Result**

| Modulation type | Channel number | Limit | Result |
|---|---|---|---|
| GFSK | 79 | ≥15.00 | Pass |
| π /4-DQPSK | 79 | | |
| 8DPSK | 79 | | |

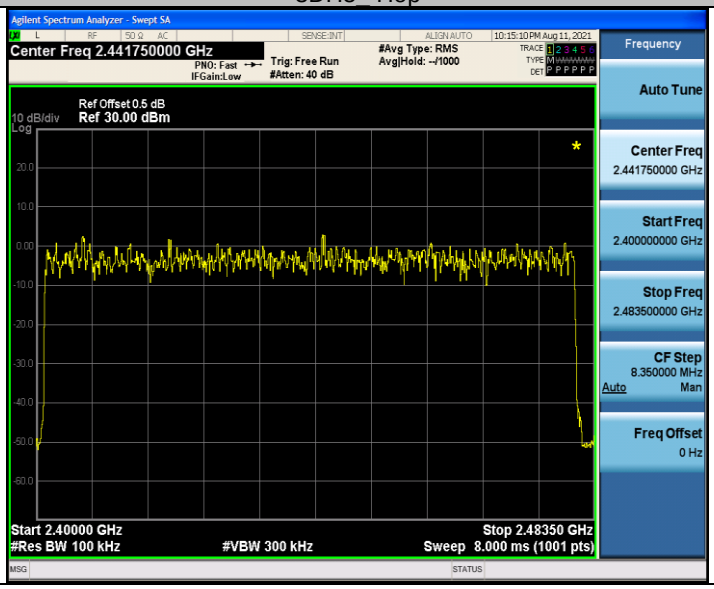
DH5_Hop




2DH5_Hop




3DH5_Hop

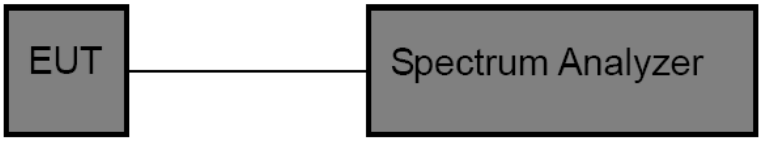


## 3.8. Dwell Time

**Limit**

| Section | Test Item | Limit |
|---|---|---|
| 15.247(a)(iii)/ RSS-247 5.1 d | Average Time of Occupancy | 0.4 sec |

**Test Configuration**




**Test Procedure**

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Spectrum Setting: RBW=1MHz, VBW≥RBW.
   (2) Use video trigger with the trigger level set to enable triggering only on full pulses.
   (3) Sweep Time is more than once pulse time.
   (4) Set the center frequency on any frequency would be measure and set the frequency span to zero.
   (5) Measure the maximum time duration of one single pulse.
   (6) Set the EUT for packet transmitting.

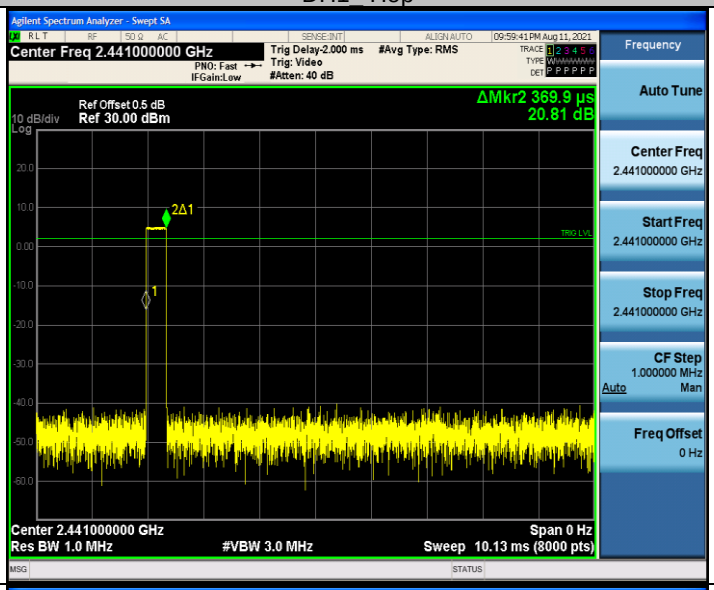
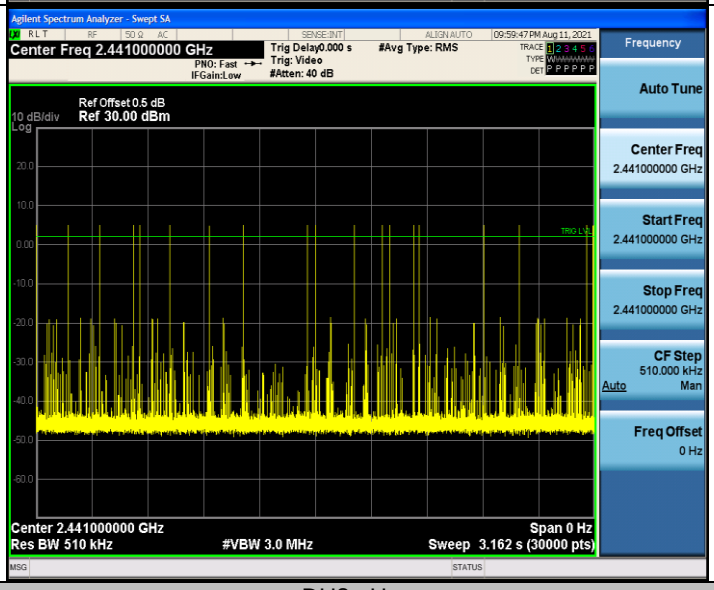
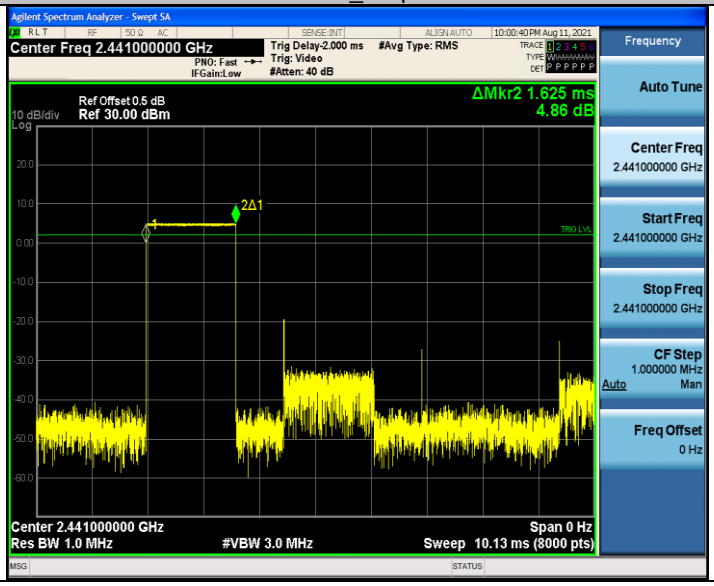
**Test Mode**

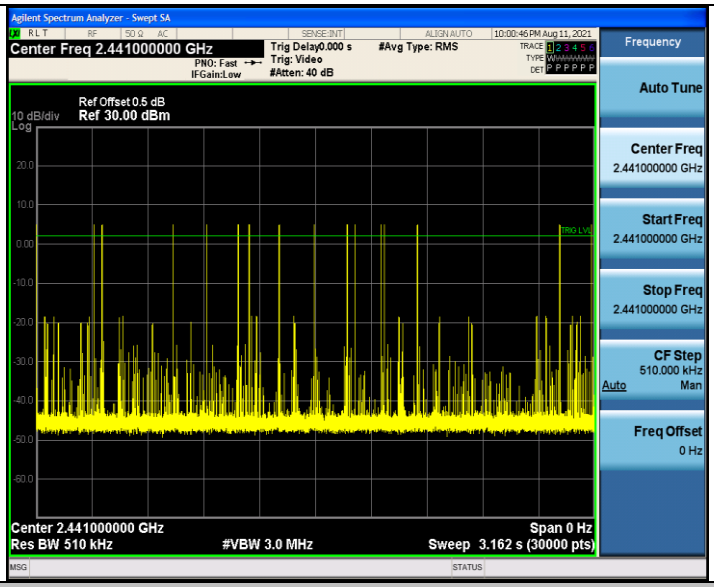
Please refer to the clause 2.4.

**Test Result**

| Modulation type | Channel | Frequency (MHz) | Pulse Time (ms) | Total of Dwell (ms) | Period Time (ms) | Limit (Second) | Result |
|---|---|---|---|---|---|---|---|
| GFSK | DH1 | 2441 | 0.37 | 118.40 | 31.60 | ≤ 0.40 | Pass |
| | DH3 | 2441 | 1.63 | 260.80 | 31.60 | | |
| | DH5 | 2441 | 2.87 | 306.13 | 31.60 | | |
| π /4-DQPSK | 2DH1 | 2441 | 0.38 | 121.60 | 31.60 | ≤ 0.40 | Pass |
| | 2DH3 | 2441 | 1.63 | 260.80 | 31.60 | | |
| | 2DH5 | 2441 | 2.88 | 307.20 | 31.60 | | |
| 8-DPSK | 3DH1 | 2441 | 0.38 | 121.60 | 31.60 | ≤ 0.40 | Pass |
| | 3DH3 | 2441 | 1.63 | 260.80 | 31.60 | | |
| | 3DH5 | 2441 | 2.88 | 307.20 | 31.60 | | |

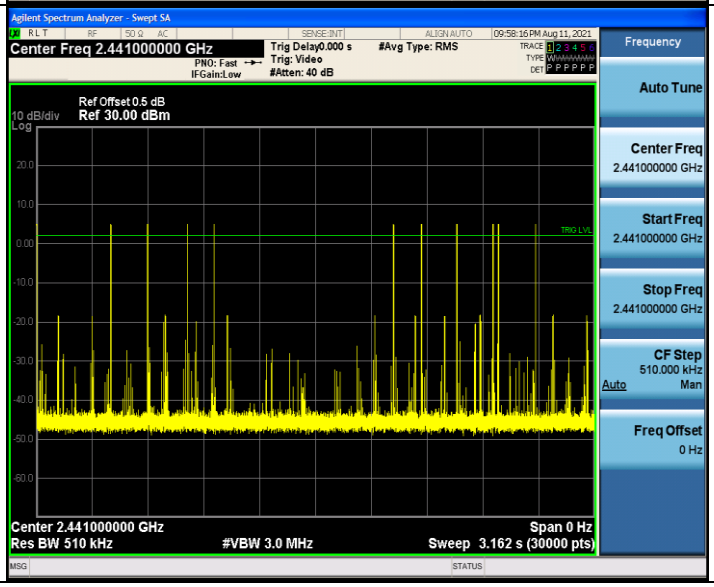
*Note: 1DH1/2DH1/3DH1 Total of Dwell= Pulse Time*(1600/2)*31.6/79*
*1DH3/2DH3/3DH3 Total of Dwell= Pulse Time*(1600/4)*31.6/79*
*1DH5/2DH5/3DH5 Total of Dwell= Pulse Time*(1600/6)*31.6/79*

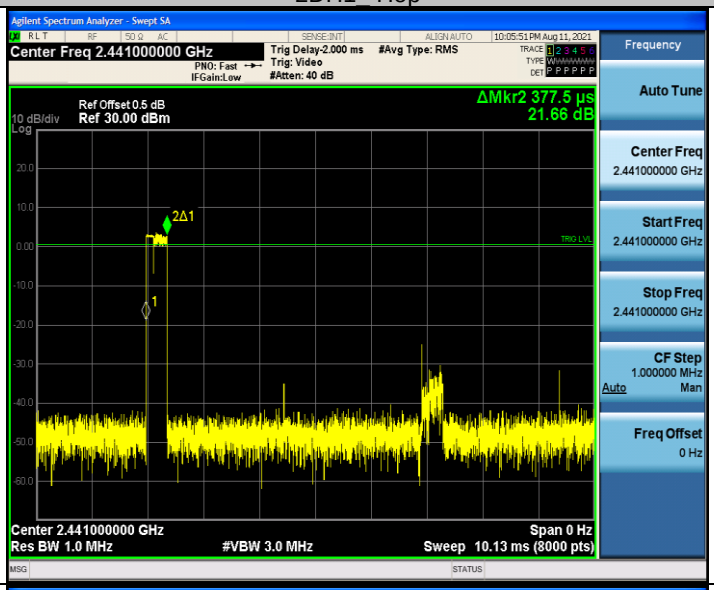
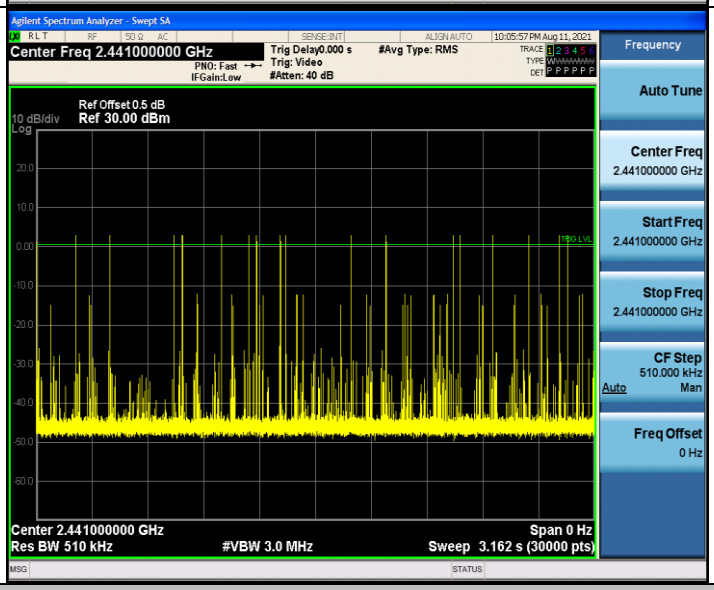
| DH1_ Hop |
| --- |
|  |
|  |
| DH3_ Hop |
|  |


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay0.000 s
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
10:00:46 PM Aug 11, 2021
Ref Offset 0.5 dB
10 dB/div
Ref 30.00 dBm
Log
Center 2.441000000 GHz
Res BW 510 kHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 3.162 s (30000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
510.000 kHz
Auto
Man
Freq Offset
0 Hz

DH5_ Hop

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay-2.000 ms
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
09:58:10 PM Aug 11, 2021
Ref Offset 0.5 dB
10 dB/div
Ref 30.00 dBm
ΔMkr2 2.874 ms
12.61 dB
2Δ1
1
Log
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 10.13 ms (8000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay0.000 s
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
09:58:16 PM Aug 11, 2021
Ref Offset 0.5 dB
10 dB/div
Ref 30.00 dBm
Log
Center 2.441000000 GHz
Res BW 510 kHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 3.162 s (30000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
510.000 kHz
Auto
Man
Freq Offset
0 Hz

| 2DH1_ Hop |
| --- |
|  |
|  |
| 2DH3_ Hop |
| |





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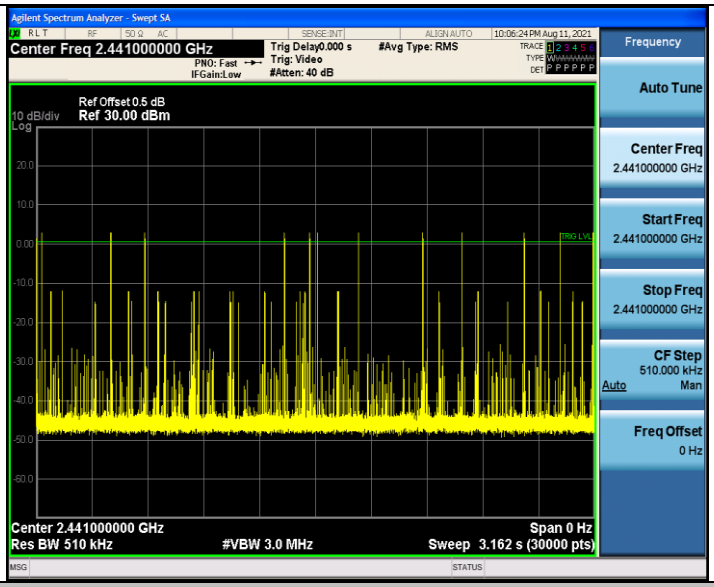
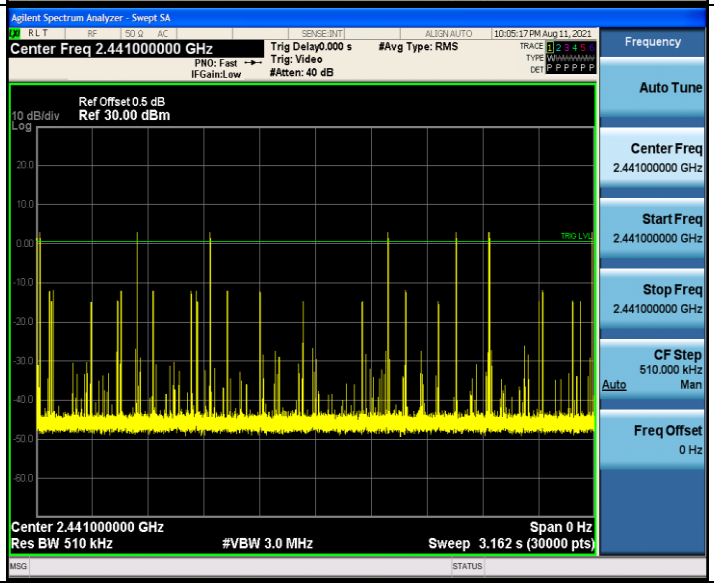
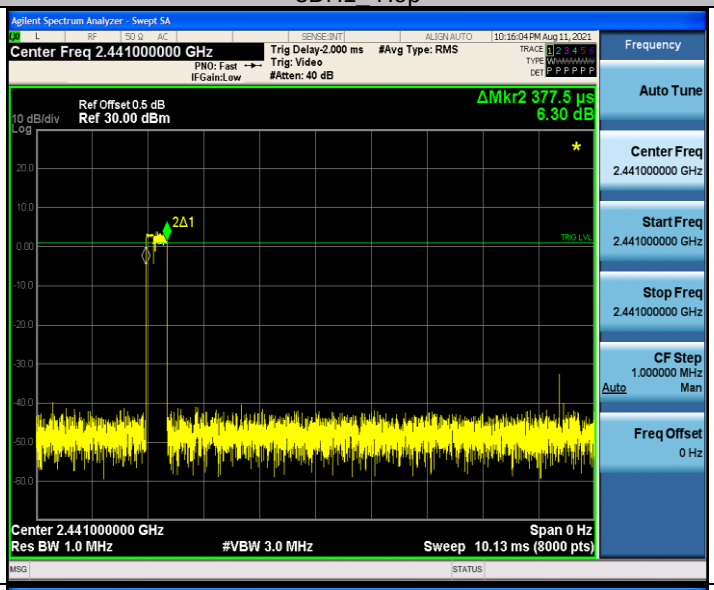
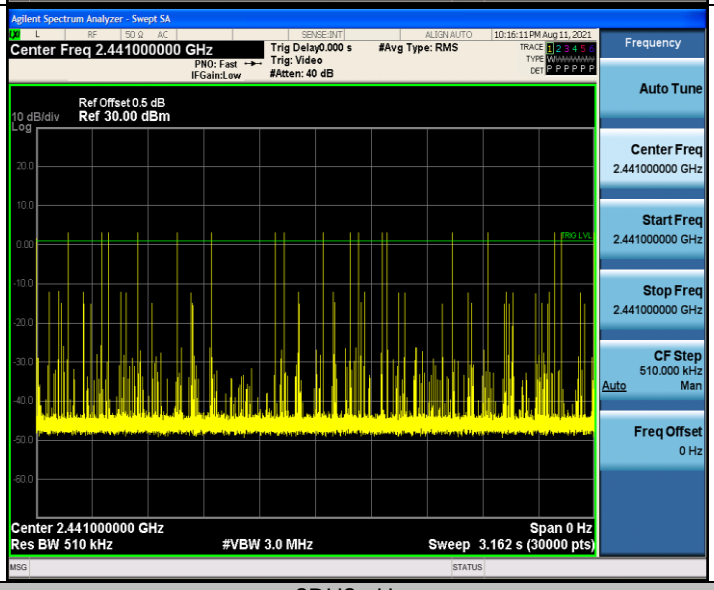

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay0.000 s
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
10:06:24 PM Aug 11, 2021
Ref Offset 0.5 dB
10 dB/div
Ref 30.00 dBm
Log
Center 2.441000000 GHz
Res BW 510 kHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 3.162 s (30000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
510.000 kHz
Auto
Man
Freq Offset
0 Hz

2DH5_ Hop

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay-2.000 ms
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
10:05:11 PM Aug 11, 2021
Ref Offset 0.5 dB
10 dB/div
Ref 30.00 dBm
ΔMkr2 2.878 ms
18.95 dB
2Δ1
1
Log
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 10.13 ms (8000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay0.000 s
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
10:05:17 PM Aug 11, 2021
Ref Offset 0.5 dB
10 dB/div
Ref 30.00 dBm
Log
Center 2.441000000 GHz
Res BW 510 kHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 3.162 s (30000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
510.000 kHz
Auto
Man
Freq Offset
0 Hz

| 3DH1_ Hop |
| --- |
|  |
|  |
| 3DH3_ Hop |
| |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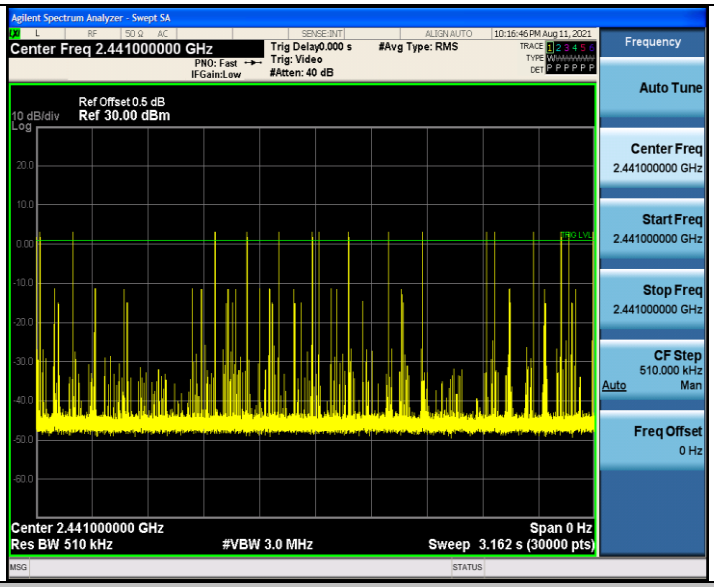
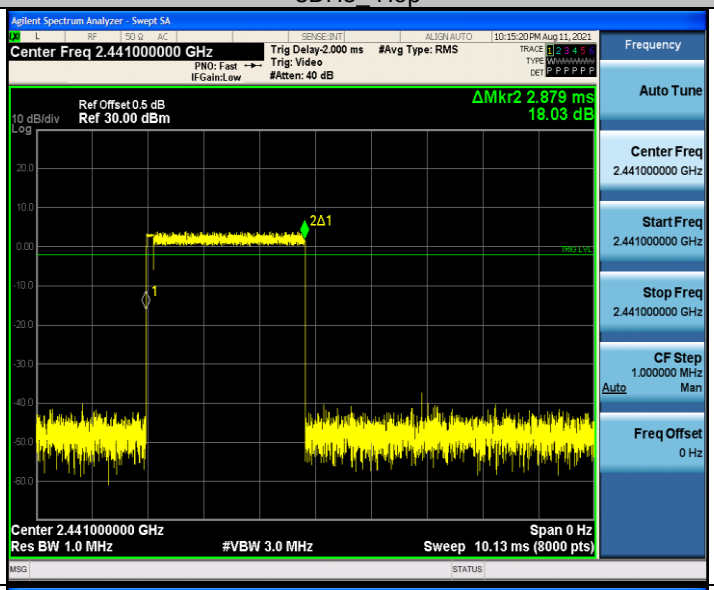
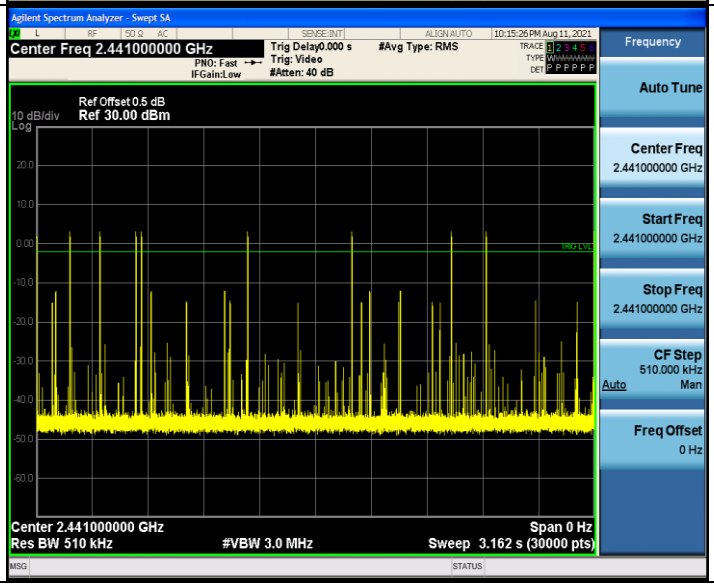

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay0.000 s
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
10:16:46 PM Aug 11, 2021
Ref Offset 0.5 dB
10 dB/div
Ref 30.00 dBm
Log
Center 2.441000000 GHz
Res BW 510 kHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 3.162 s (30000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
510.000 kHz
Auto
Man
Freq Offset
0 Hz

3DH5_ Hop


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay-2.000 ms
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
10:15:20 PM Aug 11, 2021
ΔMkr2 2.879 ms
18.03 dB
Ref Offset 0.5 dB
10 dB/div
Ref 30.00 dBm
Log
2Δ1
1
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 10.13 ms (8000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay0.000 s
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
10:15:26 PM Aug 11, 2021
Ref Offset 0.5 dB
10 dB/div
Ref 30.00 dBm
Log
Center 2.441000000 GHz
Res BW 510 kHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 3.162 s (30000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
510.000 kHz
Auto
Man
Freq Offset
0 Hz

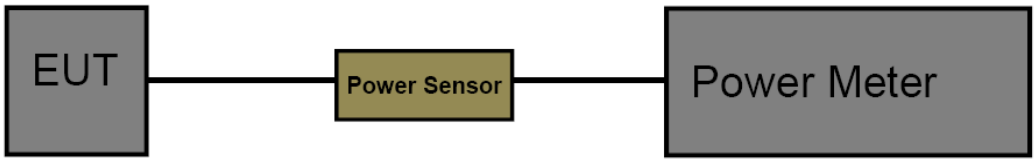
## 3.9. Peak Output Power

**Limit**

**FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1) / RSS-247 5.4 b:**

| Test Item | Limit | Frequency Range(MHz) |
|---|---|---|
| Peak Output Power | Hopping Channels>75 Power<1W(30dBm)<br>Other <125mW(21dBm) | 2400~2483.5 |

**Test Configuration**




**Test Procedure**

1. The EUT was directly connected to the Power Meter and antenna output port as show in the block diagram above.
2. Read the power value in the test software and record it.

**Test Mode**

Please refer to the clause 2.4.

**Test Result**

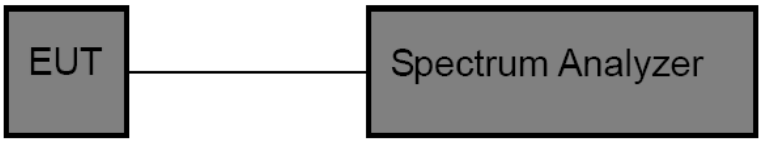
| Test Mode | Frequency (MHz) | Result[dBm] | Limit[dBm] | Verdict |
|---|---|---|---|---|
| GFSK | 2402 | 4.83 | <=21 | PASS |
| | 2441 | 5.15 | <=21 | PASS |
| | 2480 | 4.99 | <=21 | PASS |
| π/4-DQPSK | 2402 | 3.64 | <=21 | PASS |
| | 2441 | 4.22 | <=21 | PASS |
| | 2480 | 3.96 | <=21 | PASS |
| 8-DPSK | 2402 | 4.14 | <=21 | PASS |
| | 2441 | 4.42 | <=21 | PASS |
| | 2480 | 4.31 | <=21 | PASS |

## 3.10. Duty Cycle

**Limit**

None, for report purposes only.

**Test Configuration**




**Test Procedure**

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05r02.
3. Spectrum Setting:

Set analyzer center frequency to test channel center frequency.
Set the span to 0Hz
Set the RBW to 10MHz
Set the VBW to 10MHz
Detector: Peak
Sweep time: Auto

Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

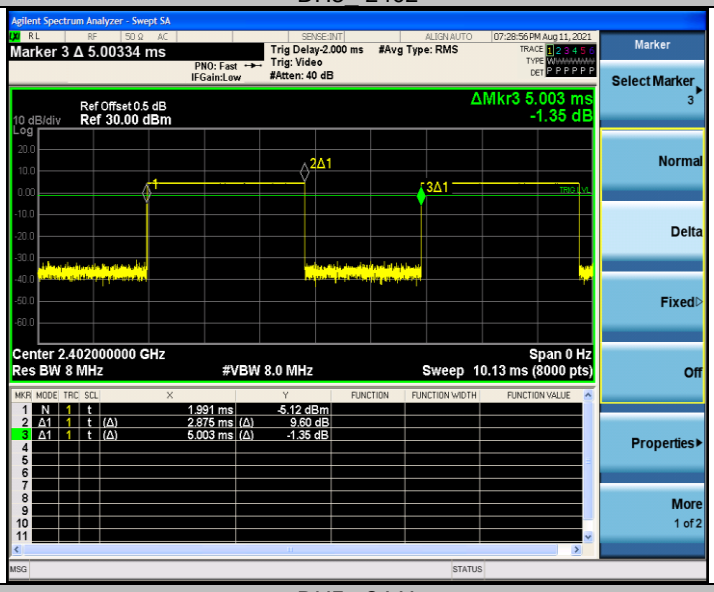
**Test Mode**

Please refer to the clause 2.4.

**Test Result**

| Test Mode | Frequency (MHz) | Transmission Duration [ms] | Transmission Period [ms] | Duty Cycle [%] | 1/T Minimum VBW (kHz) | Final setting For VBW (kHz) |
|---|---|---|---|---|---|---|
| GFSK | 2402 | 2.875 | 5.003 | 0.57 | 0.20 | 1 |
| | 2441 | 2.879 | 5.006 | 0.58 | 0.20 | 1 |
| | 2480 | 2.880 | 5.005 | 0.58 | 0.20 | 1 |
| π /4-DQPSK | 2402 | 2.884 | 5.005 | 0.58 | 0.20 | 1 |
| | 2441 | 2.883 | 5.002 | 0.58 | 0.20 | 1 |
| | 2480 | 2.884 | 5.005 | 0.58 | 0.20 | 1 |
| 8-DPSK | 2402 | 2.885 | 5.005 | 0.58 | 0.20 | 1 |
| | 2441 | 2.887 | 5.001 | 0.58 | 0.20 | 1 |
| | 2480 | 2.878 | 4.993 | 0.58 | 0.20 | 1 |

DH5_2402

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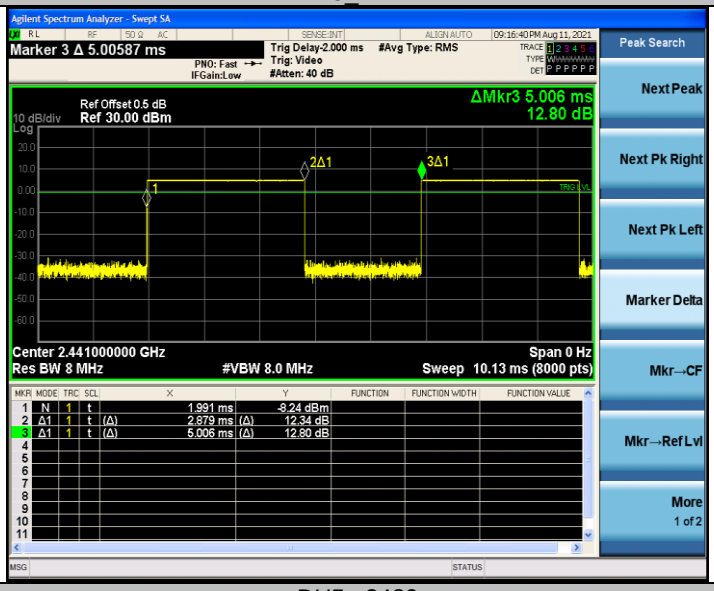


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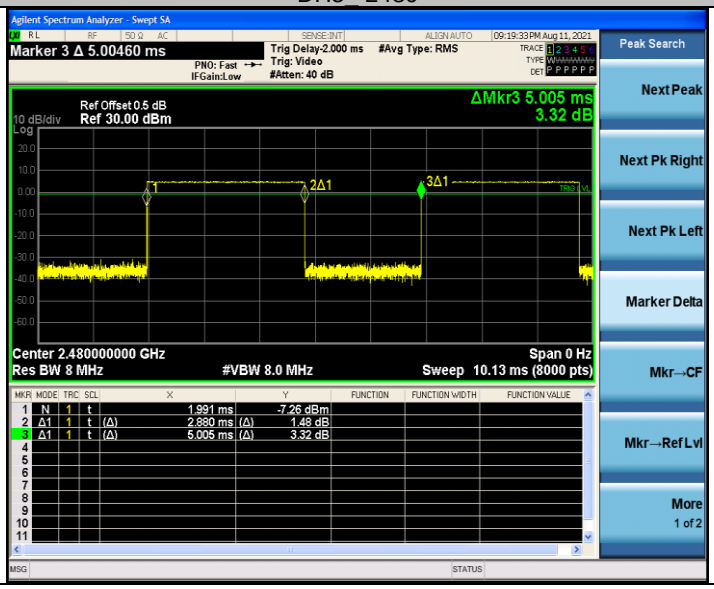

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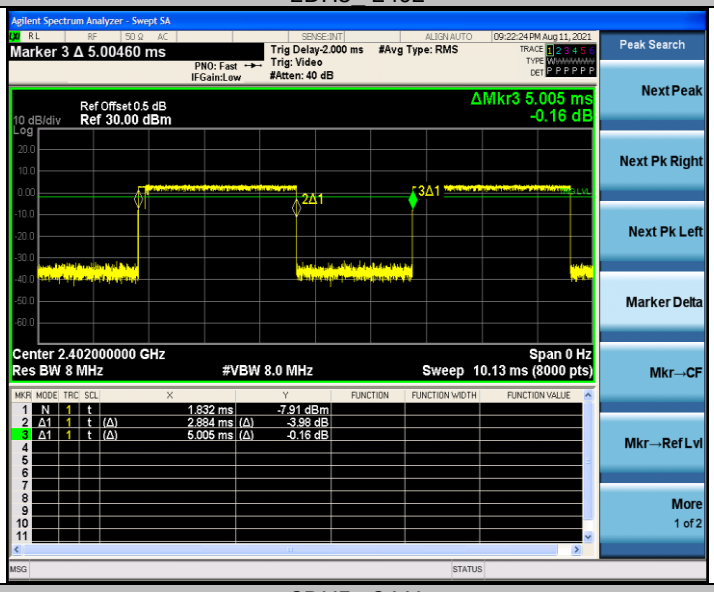


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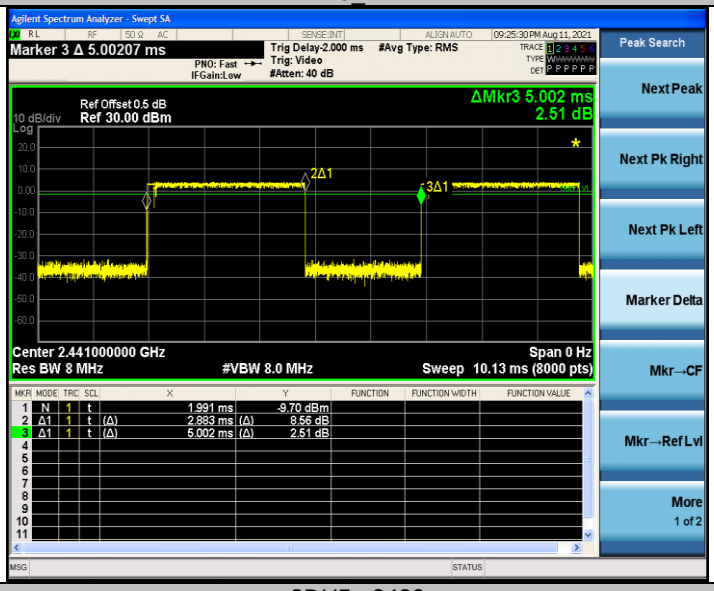


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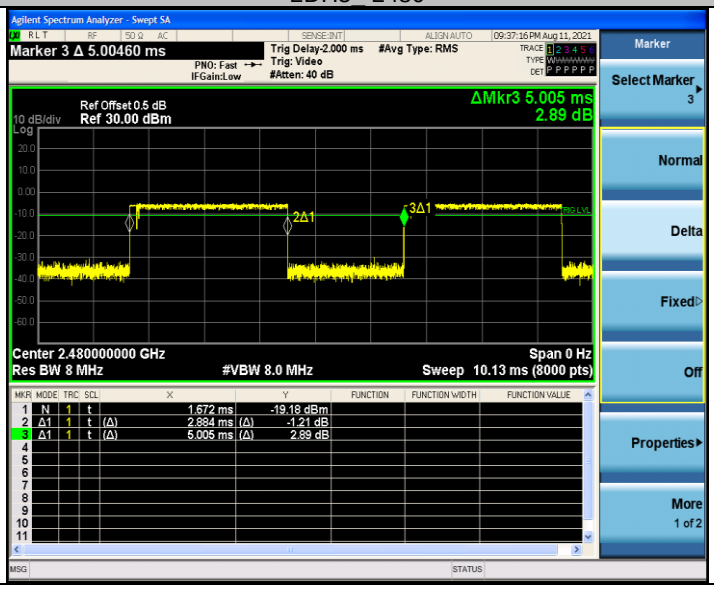



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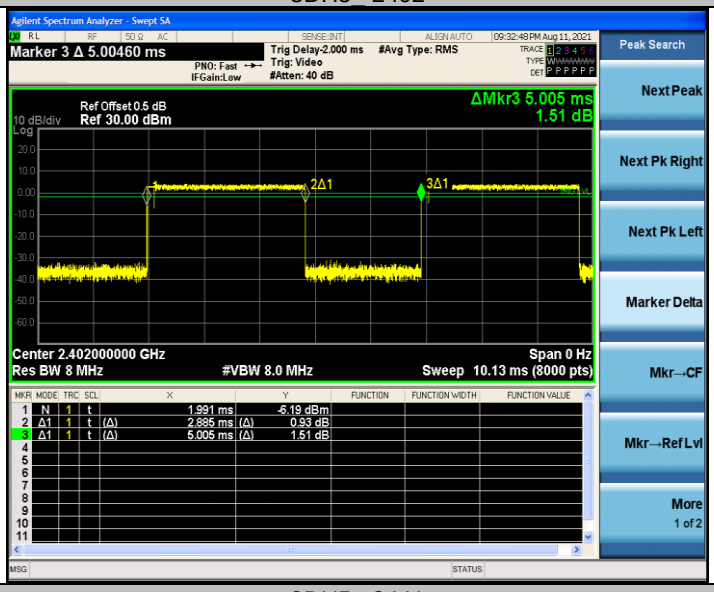
3DH5_2402

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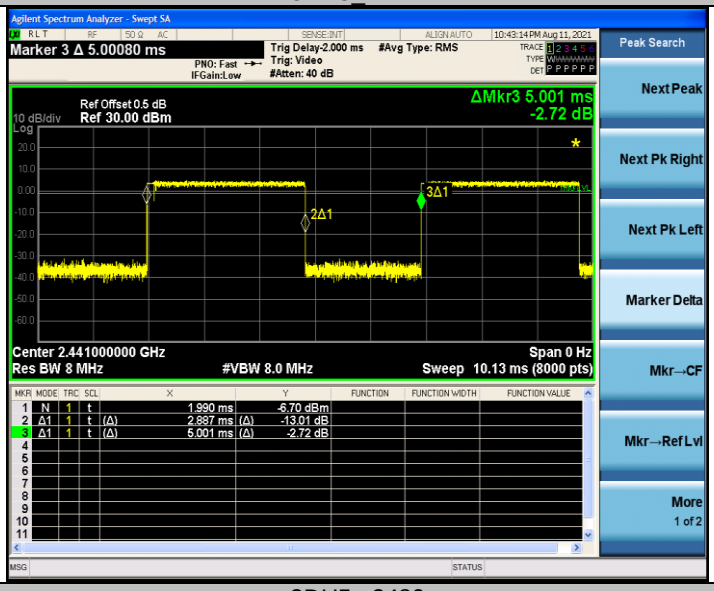


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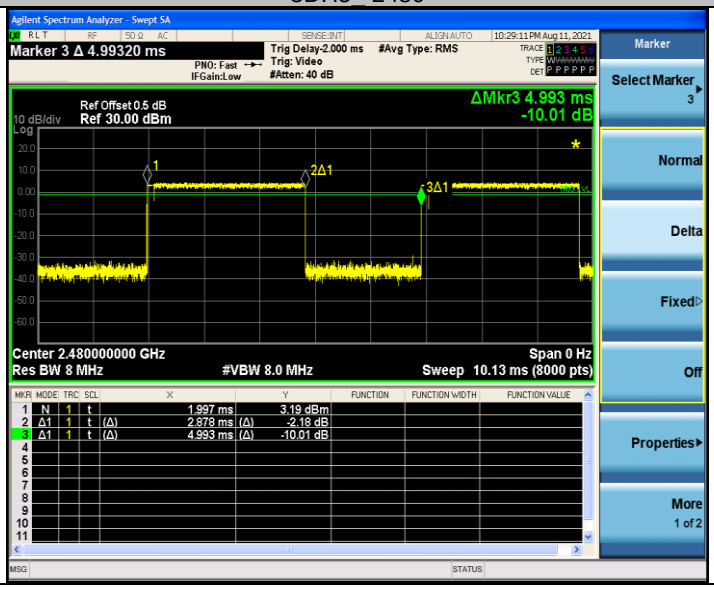

## 3.11. Antenna Requirement

**Requirement**

**FCC CFR Title 47 Part 15 Subpart C 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. The use of a permanently attached antenna or of antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

**FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):**

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

**Test Result**

Complies

Directional gain = $G_{ANT}$ = 5dBi
Note: Bluetooth mode only supports SISO mode and does not support MIMO transmission.

**************************THE END*************************