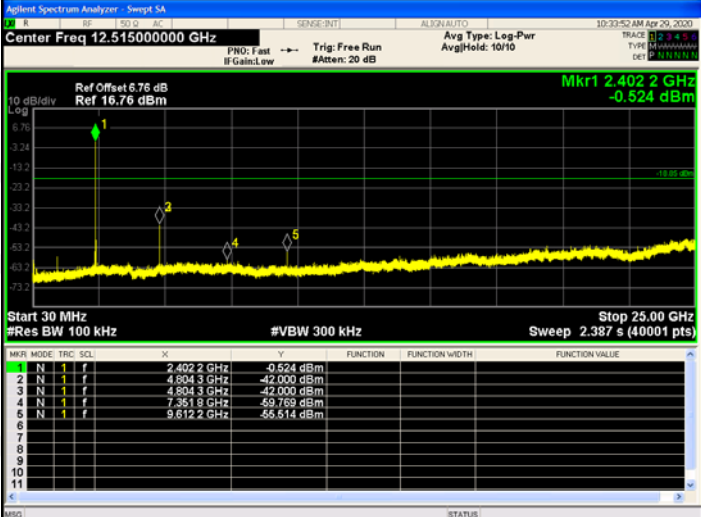
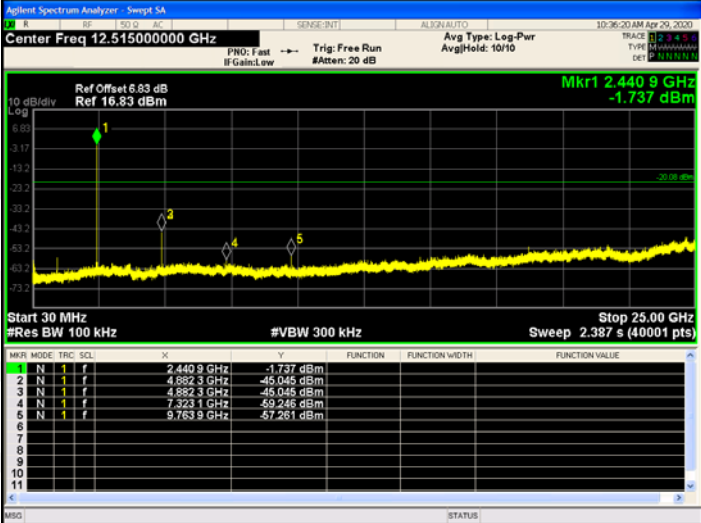
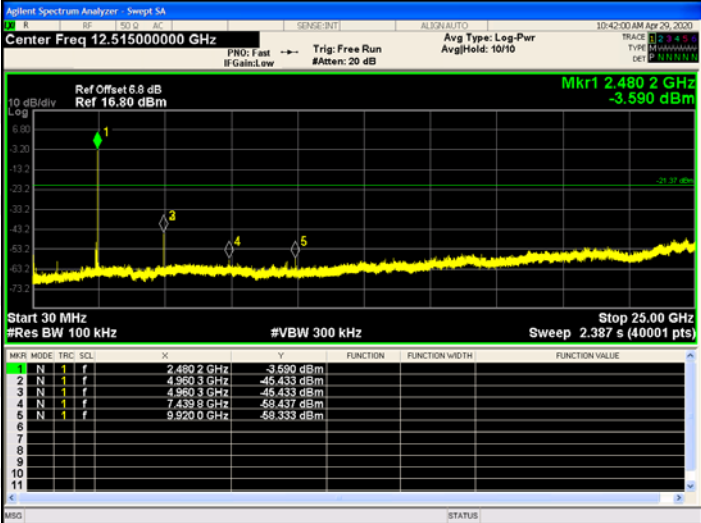
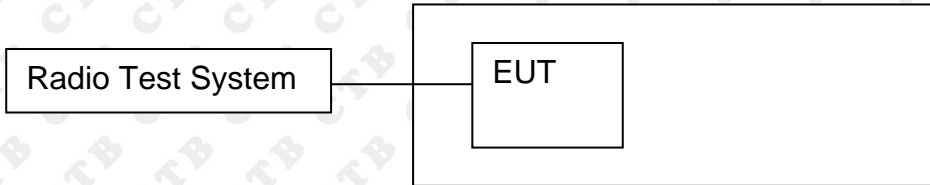


| <p>8DPSK/LCH<br/>p</p> |  <table border="1" data-bbox="592 577 1295 745"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.402 2 GHz</td> <td>-0.524 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>4.804 3 GHz</td> <td>-42.000 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>4.804 3 GHz</td> <td>-42.000 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>7.351 8 GHz</td> <td>-59.769 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>N</td> <td>1</td> <td>f</td> <td>9.612 2 GHz</td> <td>-56.614 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>     | MKR | MODE | TRC         | SCL         | X        | Y              | FUNCTION       | FUNCTION WIDTH | FUNCTION VALUE | 1 | N | 1 | f | 2.402 2 GHz | -0.524 dBm |  |  |  | 2 | N | 1 | f | 4.804 3 GHz | -42.000 dBm |  |  |  | 3 | N | 1 | f | 4.804 3 GHz | -42.000 dBm |  |  |  | 4 | N | 1 | f | 7.351 8 GHz | -59.769 dBm |  |  |  | 5 | N | 1 | f | 9.612 2 GHz | -56.614 dBm |  |  |  |  |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------------|-------------|----------|----------------|----------------|----------------|----------------|---|---|---|---|-------------|------------|--|--|--|---|---|---|---|-------------|-------------|--|--|--|---|---|---|---|-------------|-------------|--|--|--|---|---|---|---|-------------|-------------|--|--|--|---|---|---|---|-------------|-------------|--|--|--|--|
| MKR                    | MODE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TRC | SCL  | X           | Y           | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 1                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 2.402 2 GHz | -0.524 dBm  |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 2                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 4.804 3 GHz | -42.000 dBm |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 3                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 4.804 3 GHz | -42.000 dBm |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 4                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 7.351 8 GHz | -59.769 dBm |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 5                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 9.612 2 GHz | -56.614 dBm |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| <p>8DPSK/MCH</p>       |  <table border="1" data-bbox="592 1106 1295 1279"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.440 9 GHz</td> <td>-1.737 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>4.882 3 GHz</td> <td>-45.045 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>4.882 3 GHz</td> <td>-45.045 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>7.323 1 GHz</td> <td>-59.246 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>N</td> <td>1</td> <td>f</td> <td>9.763 9 GHz</td> <td>-57.281 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>  | MKR | MODE | TRC         | SCL         | X        | Y              | FUNCTION       | FUNCTION WIDTH | FUNCTION VALUE | 1 | N | 1 | f | 2.440 9 GHz | -1.737 dBm |  |  |  | 2 | N | 1 | f | 4.882 3 GHz | -45.045 dBm |  |  |  | 3 | N | 1 | f | 4.882 3 GHz | -45.045 dBm |  |  |  | 4 | N | 1 | f | 7.323 1 GHz | -59.246 dBm |  |  |  | 5 | N | 1 | f | 9.763 9 GHz | -57.281 dBm |  |  |  |  |
| MKR                    | MODE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TRC | SCL  | X           | Y           | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 1                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 2.440 9 GHz | -1.737 dBm  |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 2                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 4.882 3 GHz | -45.045 dBm |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 3                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 4.882 3 GHz | -45.045 dBm |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 4                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 7.323 1 GHz | -59.246 dBm |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 5                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 9.763 9 GHz | -57.281 dBm |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| <p>8DPSK/HCH</p>       |  <table border="1" data-bbox="592 1635 1295 1809"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.480 2 GHz</td> <td>-3.590 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>4.960 3 GHz</td> <td>-45.433 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>4.960 3 GHz</td> <td>-45.433 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>7.439 8 GHz</td> <td>-59.437 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>N</td> <td>1</td> <td>f</td> <td>9.920 0 GHz</td> <td>-59.333 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | MKR | MODE | TRC         | SCL         | X        | Y              | FUNCTION       | FUNCTION WIDTH | FUNCTION VALUE | 1 | N | 1 | f | 2.480 2 GHz | -3.590 dBm |  |  |  | 2 | N | 1 | f | 4.960 3 GHz | -45.433 dBm |  |  |  | 3 | N | 1 | f | 4.960 3 GHz | -45.433 dBm |  |  |  | 4 | N | 1 | f | 7.439 8 GHz | -59.437 dBm |  |  |  | 5 | N | 1 | f | 9.920 0 GHz | -59.333 dBm |  |  |  |  |
| MKR                    | MODE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TRC | SCL  | X           | Y           | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 1                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 2.480 2 GHz | -3.590 dBm  |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 2                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 4.960 3 GHz | -45.433 dBm |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 3                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 4.960 3 GHz | -45.433 dBm |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 4                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 7.439 8 GHz | -59.437 dBm |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |
| 5                      | N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | f    | 9.920 0 GHz | -59.333 dBm |          |                |                |                |                |   |   |   |   |             |            |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |   |   |   |   |             |             |  |  |  |  |

## 9. COUDUCTED PEAK OUTPUT POWER

### 9.1 Block Diagram Of Test Setup



### 9.2 Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

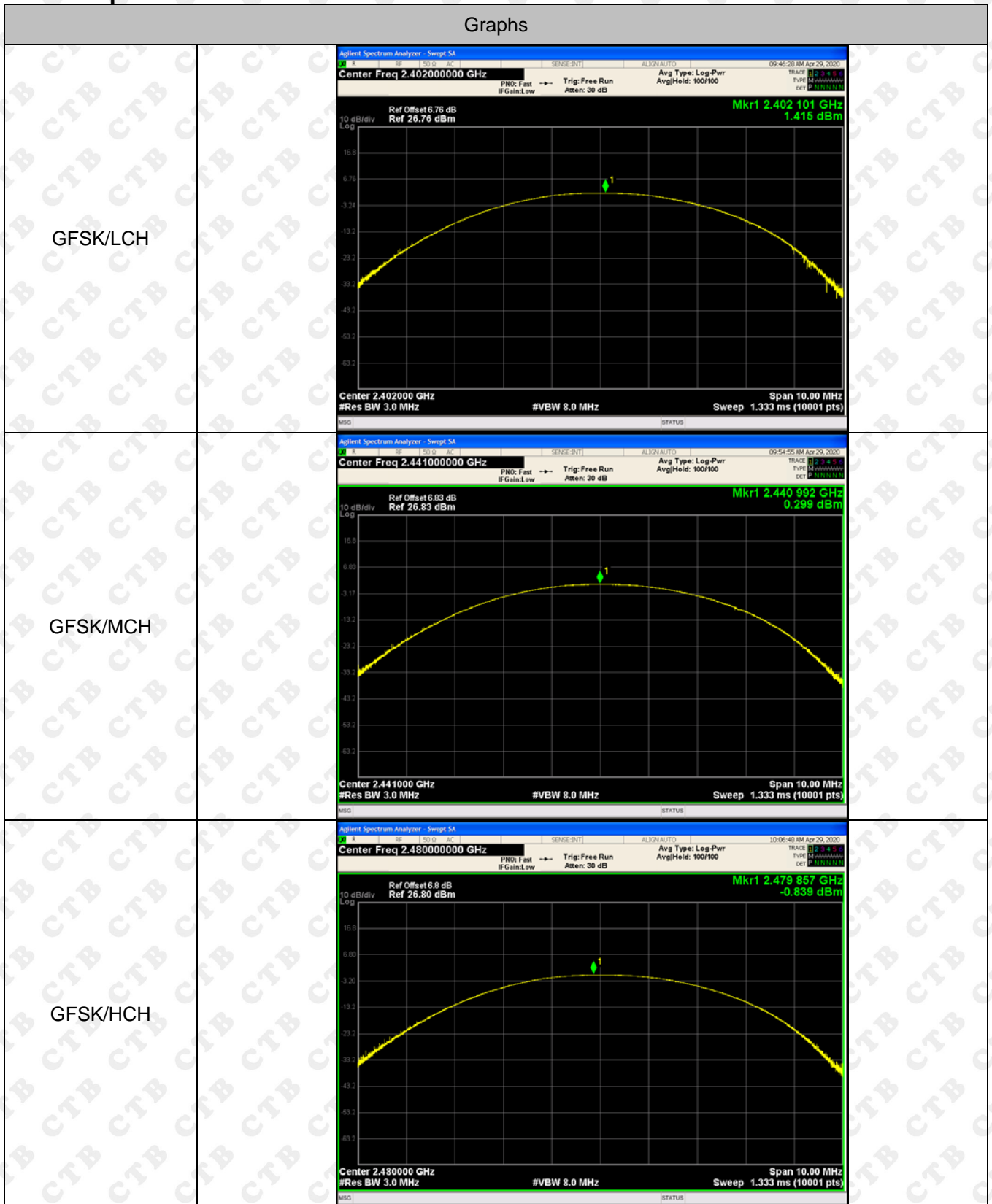
### 9.3 Test procedure

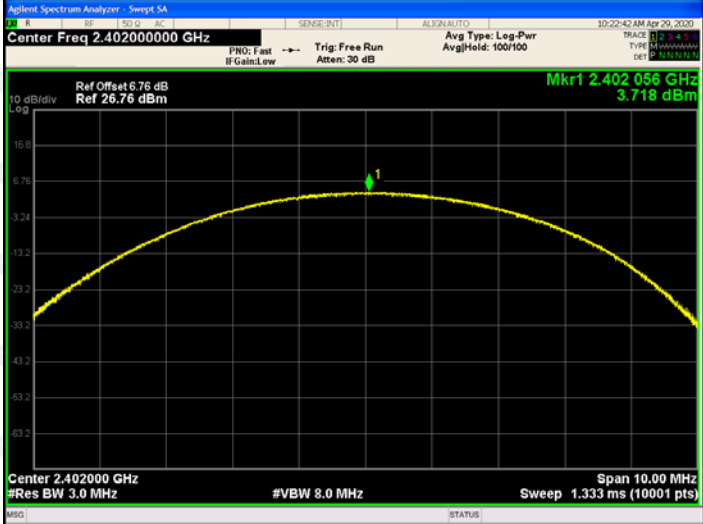
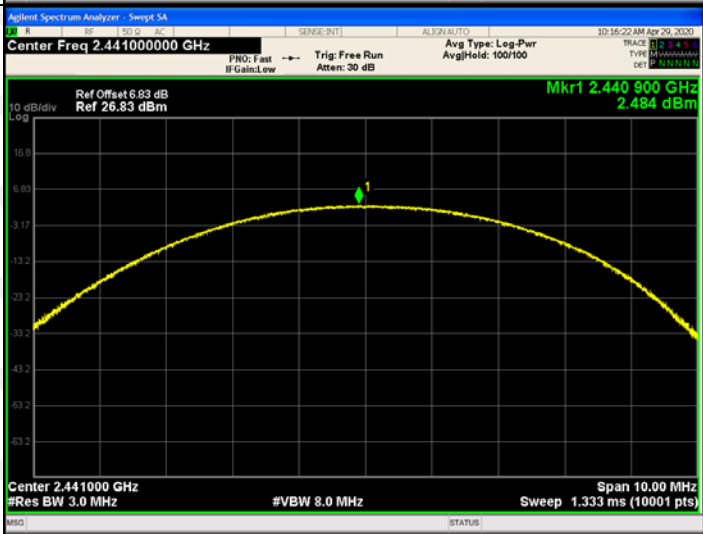
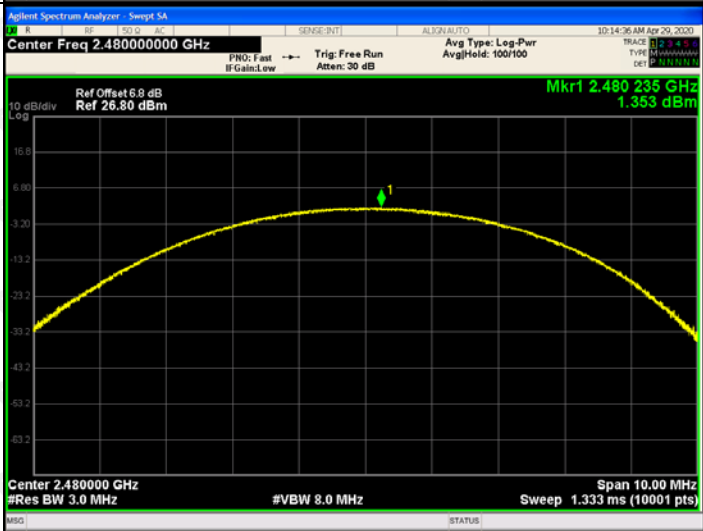
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3MHz. VBW = 3MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, middle and highest channel individually. Record the max value.

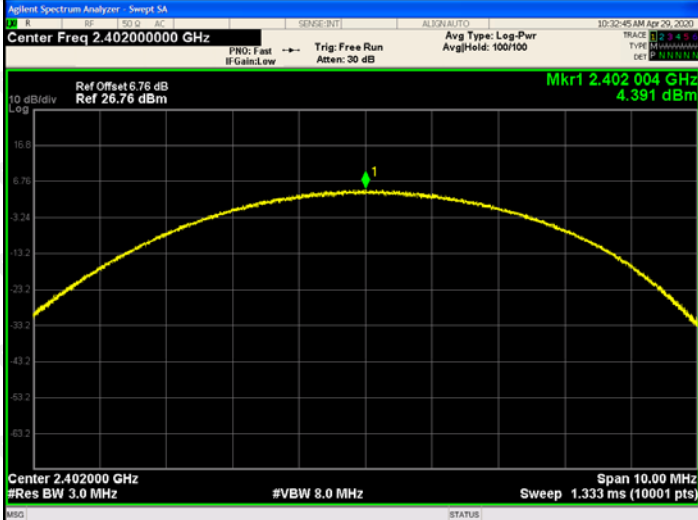
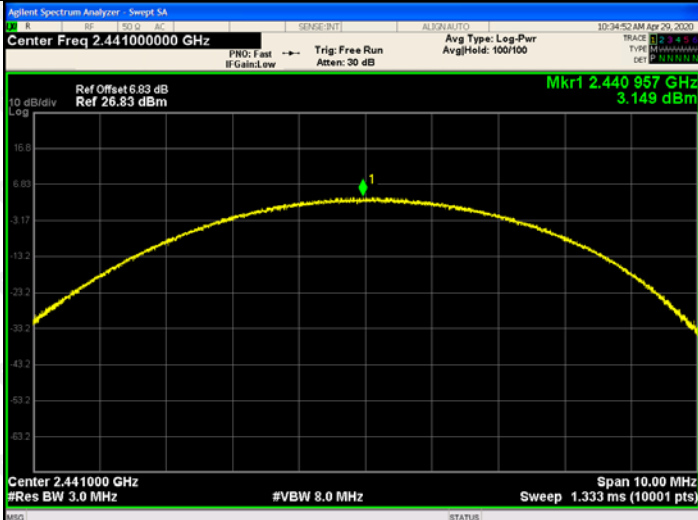
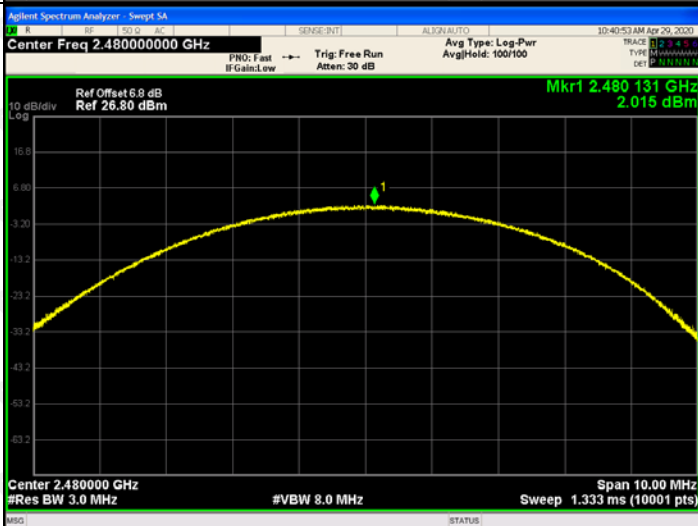
## 9.4 Test Result

| Mode                         | Channel. | Maximum Peak Output Power [dBm] | Verdict |
|------------------------------|----------|---------------------------------|---------|
| BDR mode<br>(GFSK)           | LCH      | 1.415                           | PASS    |
|                              | MCH      | 0.299                           | PASS    |
|                              | HCH      | -0.839                          | PASS    |
| EDR mode<br>( $\pi/4$ DQPSK) | LCH      | 3.718                           | PASS    |
|                              | MCH      | 2.484                           | PASS    |
|                              | HCH      | 1.353                           | PASS    |
| EDR mode<br>(8DPSK)          | LCH      | 4.391                           | PASS    |
|                              | MCH      | 3.149                           | PASS    |
|                              | HCH      | 2.015                           | PASS    |

Test Graph:

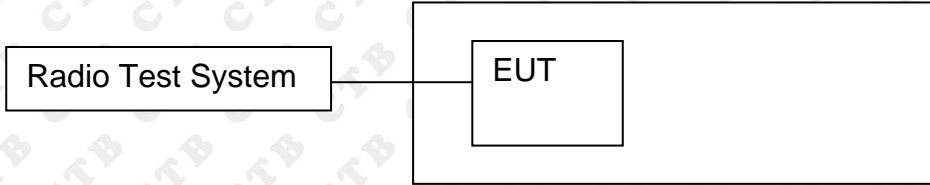


|                                    |                                                                                      |
|------------------------------------|--------------------------------------------------------------------------------------|
| <p><math>\pi/4</math>DQPSK/LCH</p> |    |
| <p><math>\pi/4</math>DQPSK/MCH</p> |   |
| <p><math>\pi/4</math>DQPSK/HCH</p> |  |

|                  |                                                                                      |  |
|------------------|--------------------------------------------------------------------------------------|--|
| <p>8DPSK/LCH</p> |    |  |
| <p>8DPSK/MCH</p> |   |  |
| <p>8DPSK/HCH</p> |  |  |

## 10. 20DB OCCUPIED BANDWIDTH

### 10.1 Block Diagram Of Test Setup



### 10.2 Limit

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mw.

### 10.3 Test procedure

1. Rem1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### 10.4 Test Result

| Test Mode     | Frequency    | 20dB Bandwidth (MHz) | Result      |
|---------------|--------------|----------------------|-------------|
| GFSK          | Low channel  | 0.8981               | <b>PASS</b> |
|               | Mid channel  | 0.921                | <b>PASS</b> |
|               | High channel | 0.9218               | <b>PASS</b> |
| $\pi/4$ DQPSK | Low channel  | 1.3038               | <b>PASS</b> |
|               | Mid channel  | 1.2894               | <b>PASS</b> |
|               | High channel | 1.3161               | <b>PASS</b> |
| 8DPSK         | Low channel  | 1.2609               | <b>PASS</b> |
|               | Mid channel  | 1.3256               | <b>PASS</b> |
|               | High channel | 1.2894               | <b>PASS</b> |

Note: All modes of operation were Pre-scan and the worst-case emissions are reported.

Test Graph:

|                              |                                                                                                                                                                                                                                                                                                                                     |  |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p>GFSK<br/>Low channel</p>  | <p>Agilent Spectrum Analyzer - Occupied BW<br/>Center Freq: 2.40200000 GHz<br/>#Res BW: 30 kHz<br/>#VBW: 100 kHz<br/>Span: 2 MHz<br/>Sweep: 2.667 ms<br/>Total Power: 0.55 dBm<br/>Occupied Bandwidth: 816.10 kHz<br/>Transmit Freq Error: 55.508 kHz<br/>x dB Bandwidth: 898.1 kHz<br/>OBW Power: 99.00 %<br/>x dB: -20.00 dB</p>  |  |
| <p>GFSK<br/>Mid channel</p>  | <p>Agilent Spectrum Analyzer - Occupied BW<br/>Center Freq: 2.44100000 GHz<br/>#Res BW: 30 kHz<br/>#VBW: 100 kHz<br/>Span: 2 MHz<br/>Sweep: 2.667 ms<br/>Total Power: -0.27 dBm<br/>Occupied Bandwidth: 794.70 kHz<br/>Transmit Freq Error: 63.764 kHz<br/>x dB Bandwidth: 921.0 kHz<br/>OBW Power: 99.00 %<br/>x dB: -20.00 dB</p> |  |
| <p>GFSK<br/>High channel</p> | <p>Agilent Spectrum Analyzer - Occupied BW<br/>Center Freq: 2.48000000 GHz<br/>#Res BW: 30 kHz<br/>#VBW: 100 kHz<br/>Span: 2 MHz<br/>Sweep: 2.667 ms<br/>Total Power: -1.55 dBm<br/>Occupied Bandwidth: 811.76 kHz<br/>Transmit Freq Error: 63.644 kHz<br/>x dB Bandwidth: 921.8 kHz<br/>OBW Power: 99.00 %<br/>x dB: -20.00 dB</p> |  |

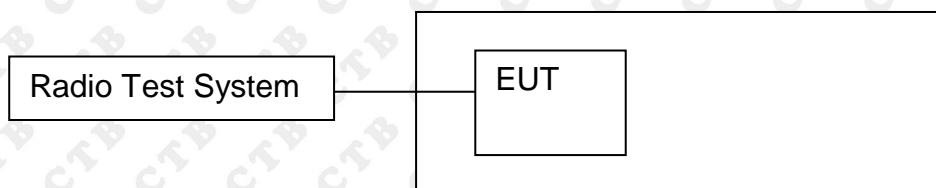


|                                                  |                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><math>\pi/4</math>-DQPSK<br/>Low channel</p>  | <p>Agilent Spectrum Analyzer - Occupied BW<br/>Center Freq 2.402000000 GHz<br/>#IF Gain: Low<br/>#Res BW 30 kHz<br/>#VBW 100 kHz<br/>Sweep 2.667 ms<br/>Span 2 MHz<br/>Total Power 1.27 dBm<br/>Occupied Bandwidth 1.1722 MHz<br/>Transmit Freq Error 60.293 kHz<br/>x dB Bandwidth 1.304 MHz<br/>OBW Power 99.00 %<br/>x dB -20.00 dB</p>  |
| <p><math>\pi/4</math>-DQPSK<br/>Mid channel</p>  | <p>Agilent Spectrum Analyzer - Occupied BW<br/>Center Freq 2.441000000 GHz<br/>#IF Gain: Low<br/>#Res BW 30 kHz<br/>#VBW 100 kHz<br/>Sweep 2.667 ms<br/>Span 2 MHz<br/>Total Power 0.00 dBm<br/>Occupied Bandwidth 1.1749 MHz<br/>Transmit Freq Error 59.925 kHz<br/>x dB Bandwidth 1.289 MHz<br/>OBW Power 99.00 %<br/>x dB -20.00 dB</p>  |
| <p><math>\pi/4</math>-DQPSK<br/>High channel</p> | <p>Agilent Spectrum Analyzer - Occupied BW<br/>Center Freq 2.480000000 GHz<br/>#IF Gain: Low<br/>#Res BW 30 kHz<br/>#VBW 100 kHz<br/>Sweep 2.667 ms<br/>Span 2 MHz<br/>Total Power -1.15 dBm<br/>Occupied Bandwidth 1.1738 MHz<br/>Transmit Freq Error 61.771 kHz<br/>x dB Bandwidth 1.316 MHz<br/>OBW Power 99.00 %<br/>x dB -20.00 dB</p> |

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>8DPSK<br/>Low channel</p>  | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.40200000 GHz</p> <p>Center Freq: 2.40200000 GHz</p> <p>Trig: Free Run Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>10 dB/Div Ref 20.00 dBm</p> <p>Center 2.402 GHz Span 2 MHz</p> <p>#Res BW 30 kHz #VBW 100 kHz Sweep 2.667 ms</p> <p>Occupied Bandwidth 1.1779 MHz</p> <p>Total Power 1.56 dBm</p> <p>Transmit Freq Error 63.097 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 1.261 MHz x dB -20.00 dB</p> |
| <p>8DPSK<br/>Mid channel</p>  | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.44100000 GHz</p> <p>Center Freq: 2.44100000 GHz</p> <p>Trig: Free Run Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>10 dB/Div Ref 20.00 dBm</p> <p>Center 2.441 GHz Span 2 MHz</p> <p>#Res BW 30 kHz #VBW 100 kHz Sweep 2.667 ms</p> <p>Occupied Bandwidth 1.1848 MHz</p> <p>Total Power 0.15 dBm</p> <p>Transmit Freq Error 60.730 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 1.326 MHz x dB -20.00 dB</p> |
| <p>8DPSK<br/>High channel</p> | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.48000000 GHz</p> <p>Center Freq: 2.48000000 GHz</p> <p>Trig: Free Run Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>10 dB/Div Ref 20.00 dBm</p> <p>Center 2.48 GHz Span 2 MHz</p> <p>#Res BW 30 kHz #VBW 100 kHz Sweep 2.667 ms</p> <p>Occupied Bandwidth 1.1802 MHz</p> <p>Total Power -0.98 dBm</p> <p>Transmit Freq Error 59.282 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 1.289 MHz x dB -20.00 dB</p> |

## 11. CARRIER FREQUENCIES SEPARATION

### 11.1 Block Diagram Of Test Setup



### 11.2 Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping 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 0.125W.

### 11.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 30kHz. VBW = 100kHz , Span = 3.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

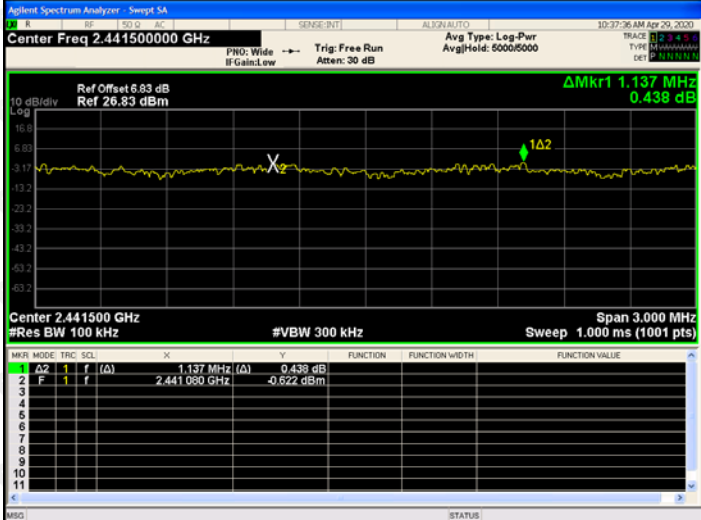
### 11.4 Test Result

| Mode          | Channel. | Carrier Frequency Separation [MHz] | Verdict |
|---------------|----------|------------------------------------|---------|
| GFSK          | LCH      | 0.993                              | PASS    |
| GFSK          | MCH      | 0.999                              | PASS    |
| GFSK          | HCH      | 0.999                              | PASS    |
| $\pi/4$ DQPSK | LCH      | 1.02                               | PASS    |
| $\pi/4$ DQPSK | MCH      | 0.987                              | PASS    |
| $\pi/4$ DQPSK | HCH      | 1.068                              | PASS    |
| 8DPSK         | LCH      | 0.936                              | PASS    |
| 8DPSK         | MCH      | 1.137                              | PASS    |
| 8DPSK         | HCH      | 1.323                              | PASS    |

Test Graph

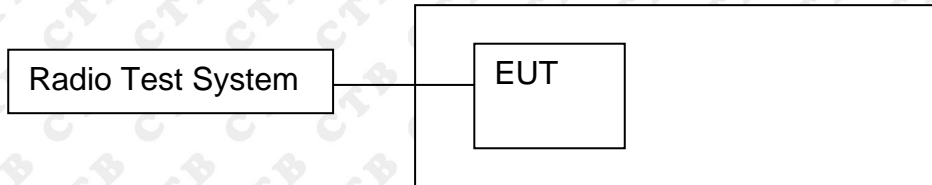


|                                    |                                                                                      |  |
|------------------------------------|--------------------------------------------------------------------------------------|--|
| <p><math>\pi/4</math>DQPSK/LCH</p> |    |  |
| <p><math>\pi/4</math>DQPSK/MCH</p> |   |  |
| <p><math>\pi/4</math>DQPSK/HCH</p> |  |  |

| <p>8DPSK/LCH</p> |  <p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.40250000 GHz</p> <p>Ref Offset 6.76 dB<br/>Ref 26.76 dBm</p> <p><math>\Delta</math>Mkr1 936 kHz<br/>0.627 dB</p> <p>Center 2.402500 GHz<br/>#Res BW 100 kHz #VBW 300 kHz Span 3.000 MHz<br/>Sweep 1.000 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>MKR MODE</th> <th>TRG</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>A2</td> <td>1</td> <td>f</td> <td>(<math>\Delta</math>)</td> <td>936 kHz (<math>\Delta</math>)</td> <td></td> <td>0.627 dB</td> </tr> <tr> <td>2</td> <td>F</td> <td>1</td> <td>f</td> <td>(<math>\Delta</math>)</td> <td>2.402 116 GHz</td> <td></td> <td>0.369 dBm</td> </tr> </tbody> </table>       | MKR MODE | TRG | SCL          | X                      | Y              | FUNCTION       | FUNCTION WIDTH | FUNCTION VALUE | 1 | A2 | 1 | f | ( $\Delta$ ) | 936 kHz ( $\Delta$ )   |  | 0.627 dB | 2 | F | 1 | f | ( $\Delta$ ) | 2.402 116 GHz |  | 0.369 dBm  |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----|--------------|------------------------|----------------|----------------|----------------|----------------|---|----|---|---|--------------|------------------------|--|----------|---|---|---|---|--------------|---------------|--|------------|
| MKR MODE         | TRG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SCL      | X   | Y            | FUNCTION               | FUNCTION WIDTH | FUNCTION VALUE |                |                |   |    |   |   |              |                        |  |          |   |   |   |   |              |               |  |            |
| 1                | A2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1        | f   | ( $\Delta$ ) | 936 kHz ( $\Delta$ )   |                | 0.627 dB       |                |                |   |    |   |   |              |                        |  |          |   |   |   |   |              |               |  |            |
| 2                | F                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1        | f   | ( $\Delta$ ) | 2.402 116 GHz          |                | 0.369 dBm      |                |                |   |    |   |   |              |                        |  |          |   |   |   |   |              |               |  |            |
| <p>8DPSK/MCH</p> |  <p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.44150000 GHz</p> <p>Ref Offset 6.83 dB<br/>Ref 26.83 dBm</p> <p><math>\Delta</math>Mkr1 1.137 MHz<br/>0.438 dB</p> <p>Center 2.441500 GHz<br/>#Res BW 100 kHz #VBW 300 kHz Span 3.000 MHz<br/>Sweep 1.000 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>MKR MODE</th> <th>TRG</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>A2</td> <td>1</td> <td>f</td> <td>(<math>\Delta</math>)</td> <td>1.137 MHz (<math>\Delta</math>)</td> <td></td> <td>0.438 dB</td> </tr> <tr> <td>2</td> <td>F</td> <td>1</td> <td>f</td> <td>(<math>\Delta</math>)</td> <td>2.441 080 GHz</td> <td></td> <td>-0.622 dBm</td> </tr> </tbody> </table> | MKR MODE | TRG | SCL          | X                      | Y              | FUNCTION       | FUNCTION WIDTH | FUNCTION VALUE | 1 | A2 | 1 | f | ( $\Delta$ ) | 1.137 MHz ( $\Delta$ ) |  | 0.438 dB | 2 | F | 1 | f | ( $\Delta$ ) | 2.441 080 GHz |  | -0.622 dBm |
| MKR MODE         | TRG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SCL      | X   | Y            | FUNCTION               | FUNCTION WIDTH | FUNCTION VALUE |                |                |   |    |   |   |              |                        |  |          |   |   |   |   |              |               |  |            |
| 1                | A2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1        | f   | ( $\Delta$ ) | 1.137 MHz ( $\Delta$ ) |                | 0.438 dB       |                |                |   |    |   |   |              |                        |  |          |   |   |   |   |              |               |  |            |
| 2                | F                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1        | f   | ( $\Delta$ ) | 2.441 080 GHz          |                | -0.622 dBm     |                |                |   |    |   |   |              |                        |  |          |   |   |   |   |              |               |  |            |
| <p>8DPSK/HCH</p> |  <p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.47950000 GHz</p> <p>Ref Offset 6.8 dB<br/>Ref 26.80 dBm</p> <p><math>\Delta</math>Mkr1 1.323 MHz<br/>1.207 dB</p> <p>Center 2.479500 GHz<br/>#Res BW 100 kHz #VBW 300 kHz Span 3.000 MHz<br/>Sweep 1.000 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>MKR MODE</th> <th>TRG</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>A2</td> <td>1</td> <td>f</td> <td>(<math>\Delta</math>)</td> <td>1.323 MHz (<math>\Delta</math>)</td> <td></td> <td>1.207 dB</td> </tr> <tr> <td>2</td> <td>F</td> <td>1</td> <td>f</td> <td>(<math>\Delta</math>)</td> <td>2.478 908 GHz</td> <td></td> <td>-2.726 dBm</td> </tr> </tbody> </table> | MKR MODE | TRG | SCL          | X                      | Y              | FUNCTION       | FUNCTION WIDTH | FUNCTION VALUE | 1 | A2 | 1 | f | ( $\Delta$ ) | 1.323 MHz ( $\Delta$ ) |  | 1.207 dB | 2 | F | 1 | f | ( $\Delta$ ) | 2.478 908 GHz |  | -2.726 dBm |
| MKR MODE         | TRG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SCL      | X   | Y            | FUNCTION               | FUNCTION WIDTH | FUNCTION VALUE |                |                |   |    |   |   |              |                        |  |          |   |   |   |   |              |               |  |            |
| 1                | A2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1        | f   | ( $\Delta$ ) | 1.323 MHz ( $\Delta$ ) |                | 1.207 dB       |                |                |   |    |   |   |              |                        |  |          |   |   |   |   |              |               |  |            |
| 2                | F                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1        | f   | ( $\Delta$ ) | 2.478 908 GHz          |                | -2.726 dBm     |                |                |   |    |   |   |              |                        |  |          |   |   |   |   |              |               |  |            |

## 12. HOPPING CHANNEL NUMBER

### 12.1 Block Diagram Of Test Setup



### 12.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

### 12.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;

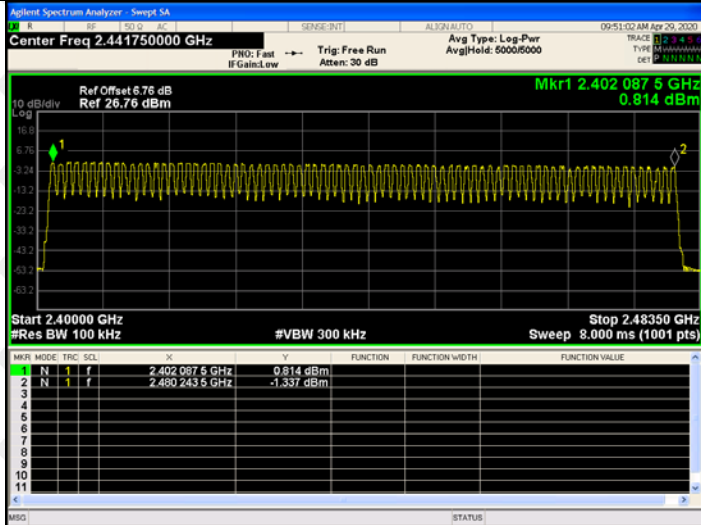
### 12.4 Test Result

| Mode          | Channel. | Number of Hopping Channel | Verdict |
|---------------|----------|---------------------------|---------|
| GFSK          | Hop      | 79                        | PASS    |
| $\pi/4$ DQPSK | Hop      | 79                        | PASS    |
| 8DPSK         | Hop      | 79                        | PASS    |

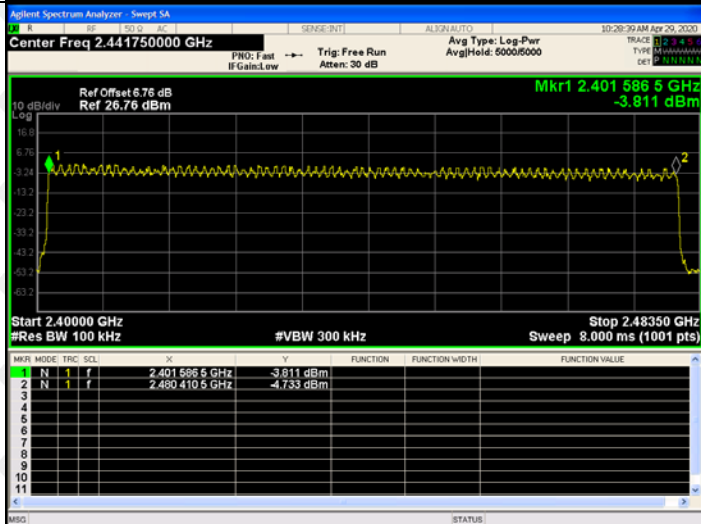
Test Graph

Graphs

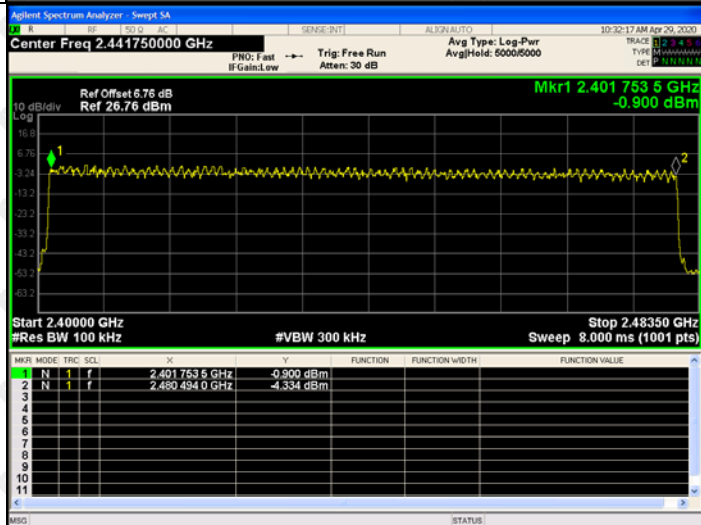
GFSK/Hop



$\pi/4$ DQPSK/Hop



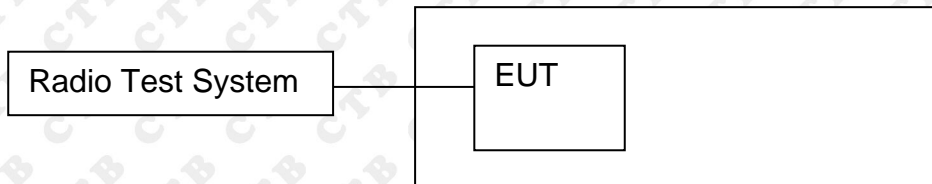
8DPSK/Hop





## 13. DWELL TIME

### 13.1 Block Diagram Of Test Setup



### 13.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

### 13.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set spectrum analyzer span = 0. Centred on a hopping channel;
3. Set RBW = 1MHz and VBW = 3MHz. Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.
4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

### 13.4 Test Result

| Mode | Packet | Channel | Pulse Time (ms) | Total Dwell Time (ms) | Limit (ms) | Verdict |
|------|--------|---------|-----------------|-----------------------|------------|---------|
| GFSK | DH1    | LCH     | 0.385           | 123.20                | 400        | PASS    |
|      | DH1    | MCH     | 0.385           | 123.20                | 400        | PASS    |
|      | DH1    | HCH     | 0.385           | 123.20                | 400        | PASS    |
|      | DH3    | LCH     | 1.646           | 263.36                | 400        | PASS    |
|      | DH3    | MCH     | 1.646           | 263.36                | 400        | PASS    |
|      | DH3    | HCH     | 1.646           | 263.36                | 400        | PASS    |
|      | DH5    | LCH     | 2.897           | 309.01                | 400        | PASS    |
|      | DH5    | MCH     | 2.896           | 308.91                | 400        | PASS    |
|      | DH5    | HCH     | 2.897           | 309.01                | 400        | PASS    |

Remark: DH5 Packet permit maximum 1600 / 79 / 6 hops per second in each channel (5 time slots RX, 1 time slot TX).

DH3 Packet permit maximum 1600 / 79 / 4 hops per second in each channel (3 time slots RX, 1 time slot TX).

DH1 Packet permit maximum 1600 / 79 / 2 hops per second in each channel (1 time slot RX, 1 time slot TX). So, the Dwell Time can be calculated as follows:

DH5:  $1600/79/6*0.4*79*(MkrDelta)/1000$

DH3:  $1600/79/4*0.4*79*(MkrDelta)/1000$

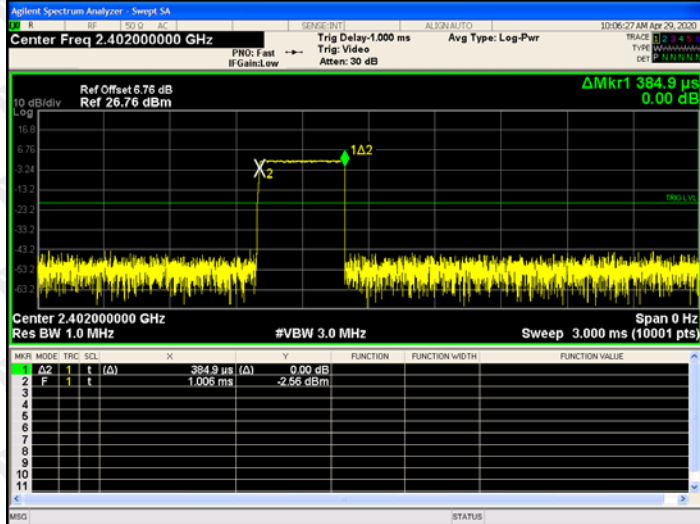
DH1:  $1600/79/2*0.4*79*(MkrDelta)/1000$

Remark: Mkr Delta is once pulse time.

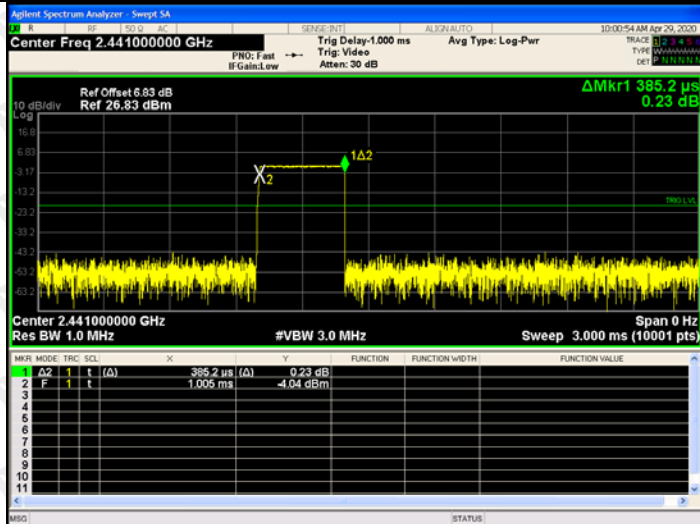
Test Graph

Graphs

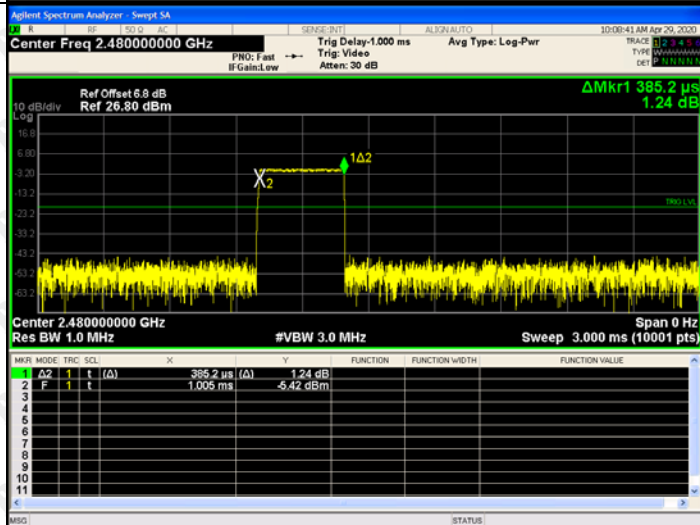
GFSK\_DH1/LCH



GFSK\_DH1/MCH



GFSK\_DH1/HCH







## 14. PSEUDORANDOM FREQUENCY

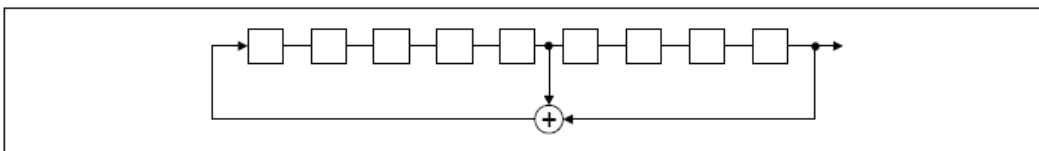
### 14.1 Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping 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 Pseudorandom 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 hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

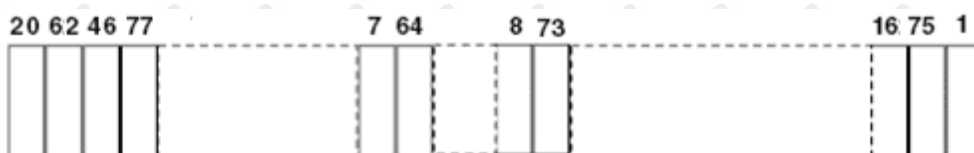
### 14.2 Test procedure

The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th 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; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence:  $2^9 - 1 = 511$  bits
- Longest sequence of zeros: 8 (non-inverted signal)



An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter. The system receivers have input bandwidths that match the hopping channel bandwidths of their Corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

### 14.3 Test Result

The device does not have the ability to be coordinated with other FHSS systems in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

## 15. ANTENNA REQUIREMENT

15.203 requirement:

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 an 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.

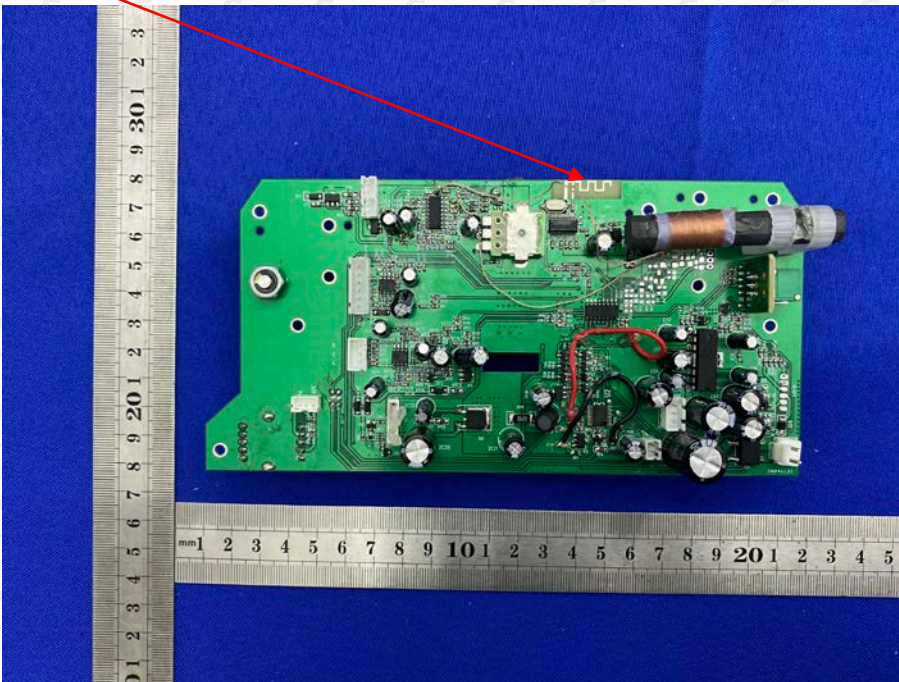
15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### EUT Antenna:

The antenna is PCB antenna. The best case gain of the antenna is 0.8dBi.

ANT:





## 16. EUT PHOTOGRAPHS

EUT Photo 1



EUT Photo 2



**EUT Photo 3****EUT Photo 4**

**EUT Photo 5****EUT Photo 6**

EUT Photo 7



## 17. EUT TEST SETUP PHOTOGRAPHS

### Radiated Emission

Below 1G



Above 1G



Conducted Emission



\*\*\*\*\* END OF REPORT \*\*\*\*\*