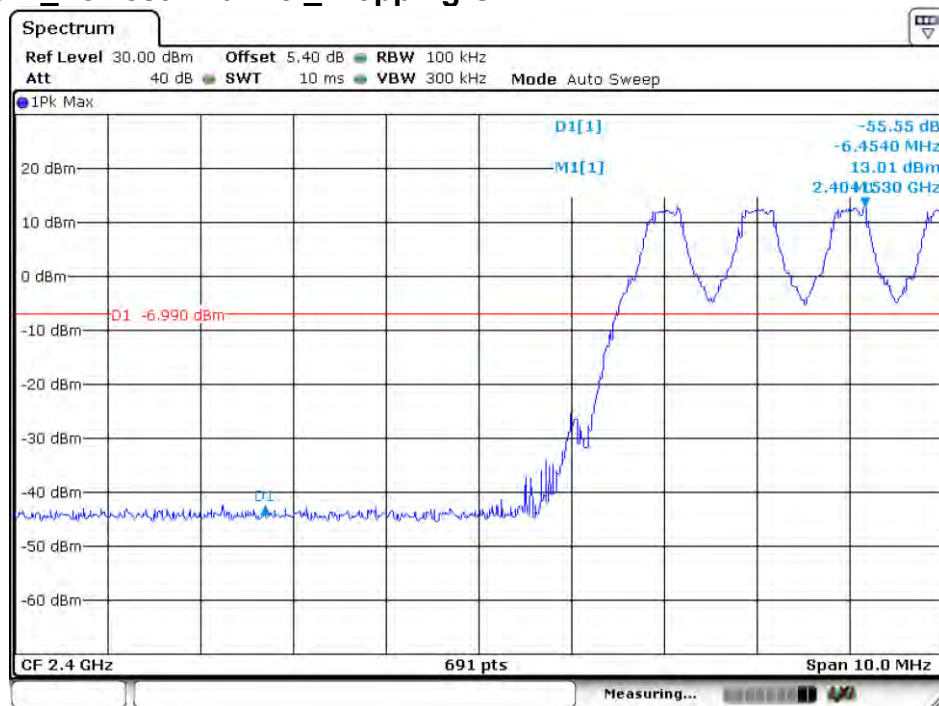


4.9.1 Test plots

4.9.1.1 GFSK_Lowest Channel_ Hopping ON



Date: 27.AUG.2020 21:41:54



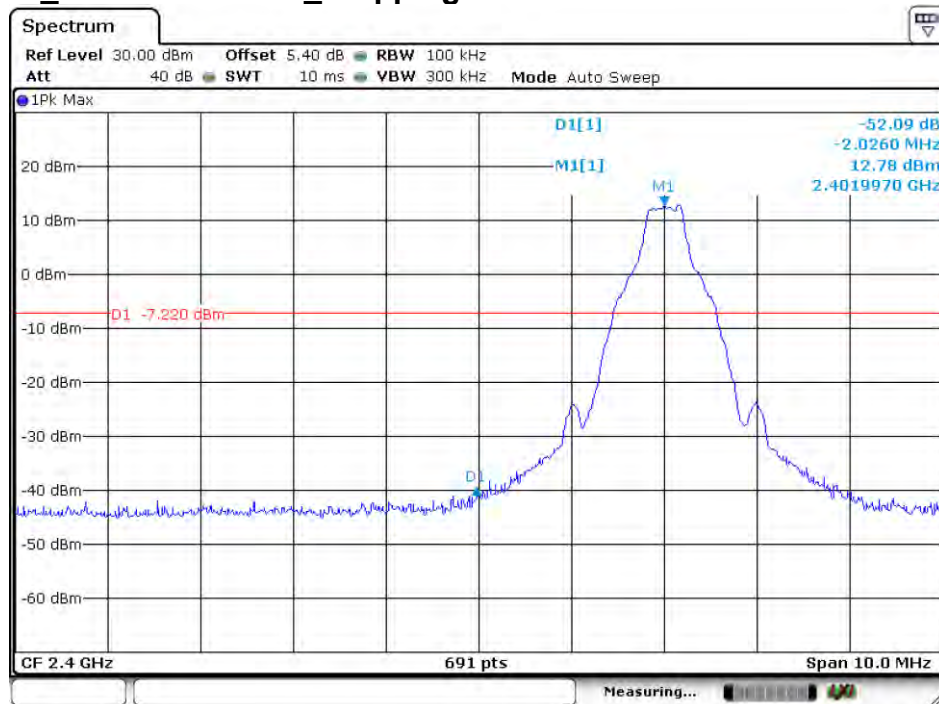
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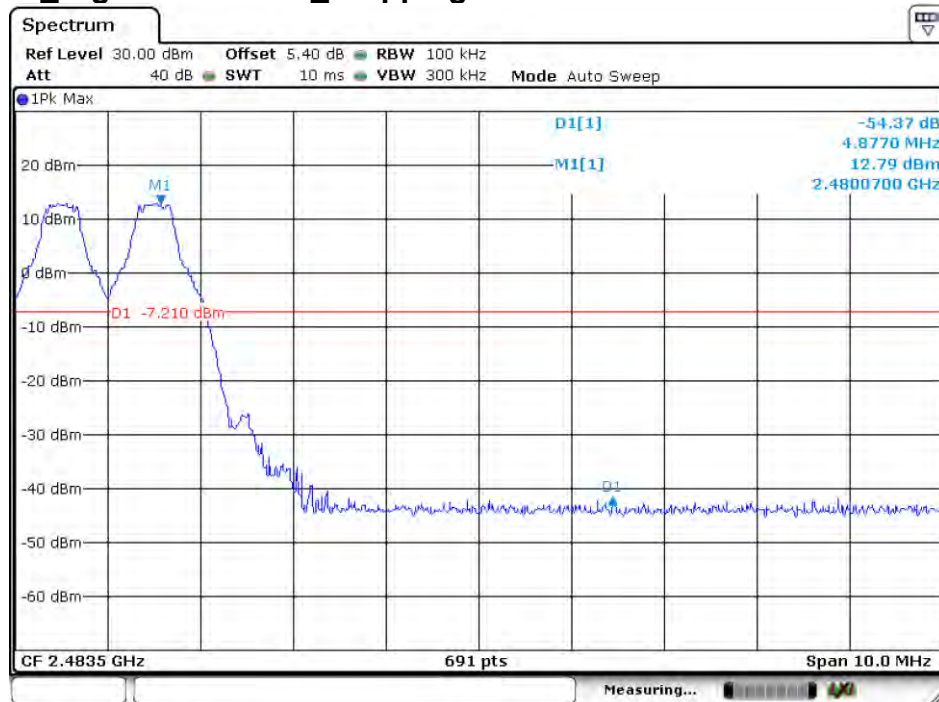
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4.9.1.2 GFSK _Lowest Channel_ Hopping OFF



Date: 27.AUG.2020 21:33:55

4.9.1.3 GFSK _Highest Channel_ Hopping ON



Date: 27.AUG.2020 21:42:40

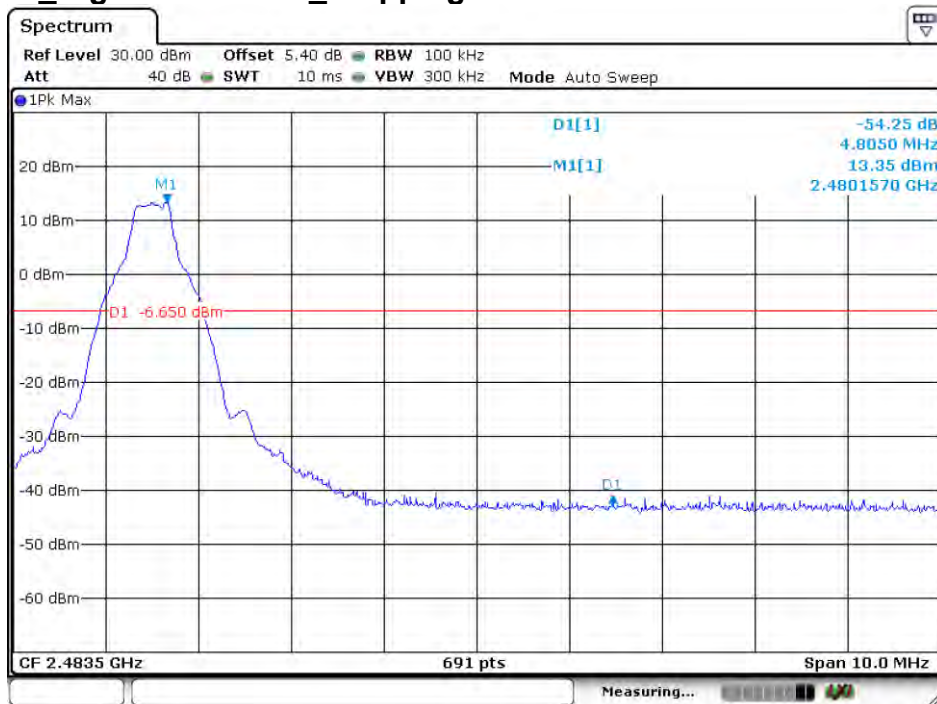


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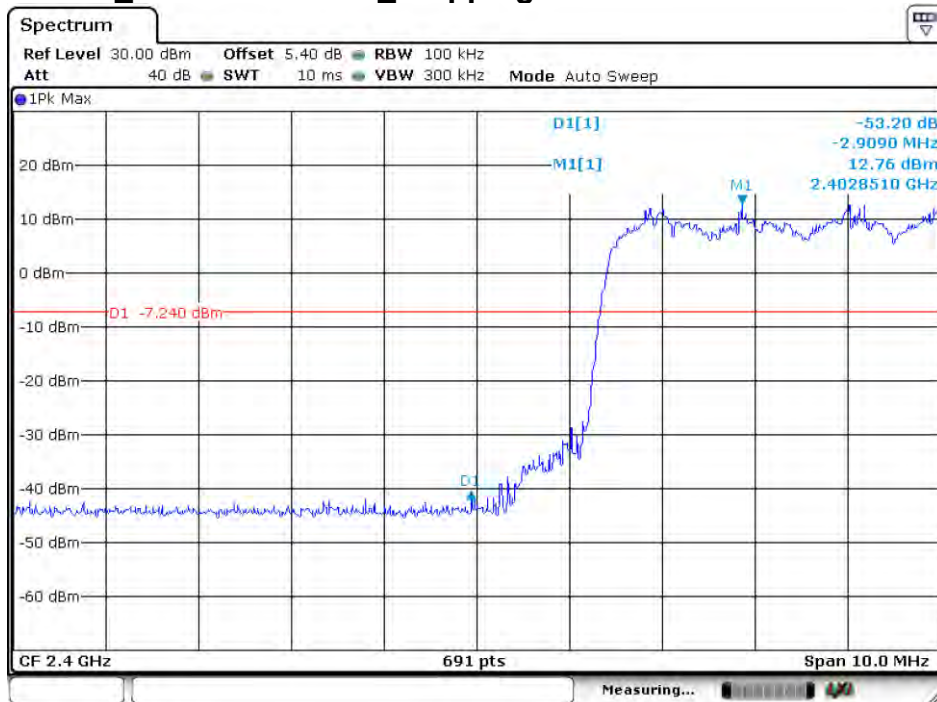
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4.9.1.4 GFSK_Highest Channel_ Hopping OFF



Date: 27.AUG.2020 21:33:11

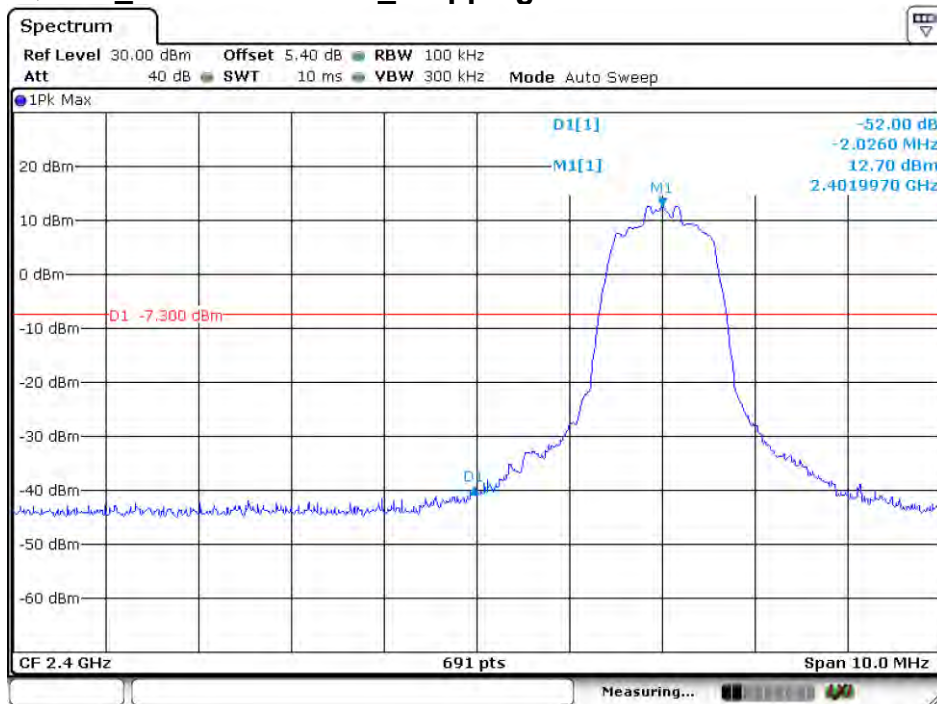
4.9.1.5 $\pi/4$ DQPSK_Lowest Channel_ Hopping ON



Date: 27.AUG.2020 21:41:08

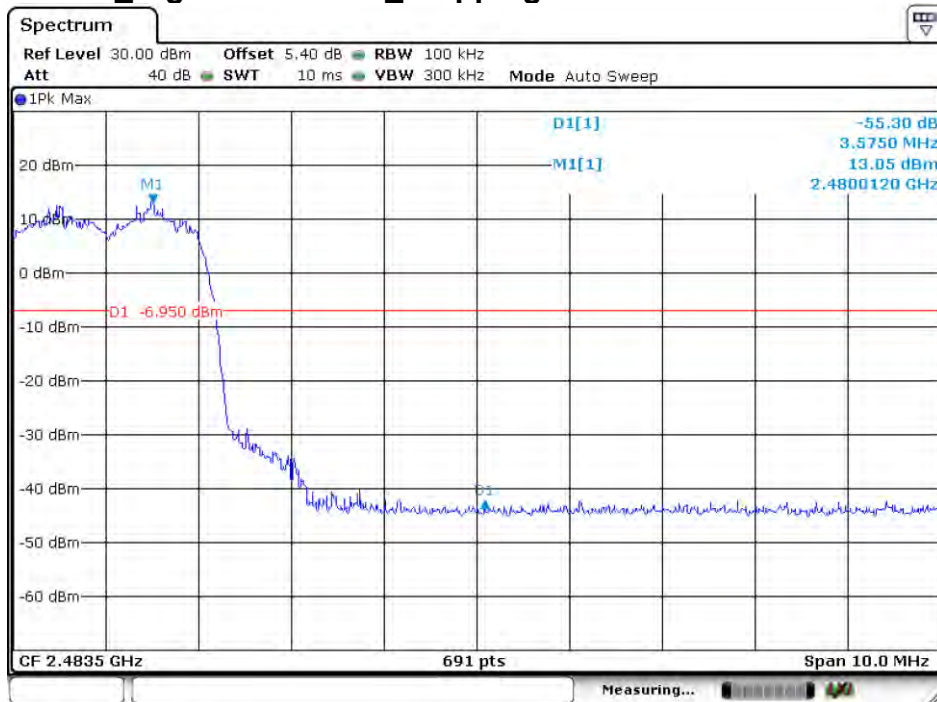


4.9.1.6 $\pi/4$ DQPSK _Lowest Channel_ Hopping OFF



Date: 27.AUG.2020 21:34:50

4.9.1.7 $\pi/4$ DQPSK _Highest Channel_ Hopping ON



Date: 27.AUG.2020 21:40:19



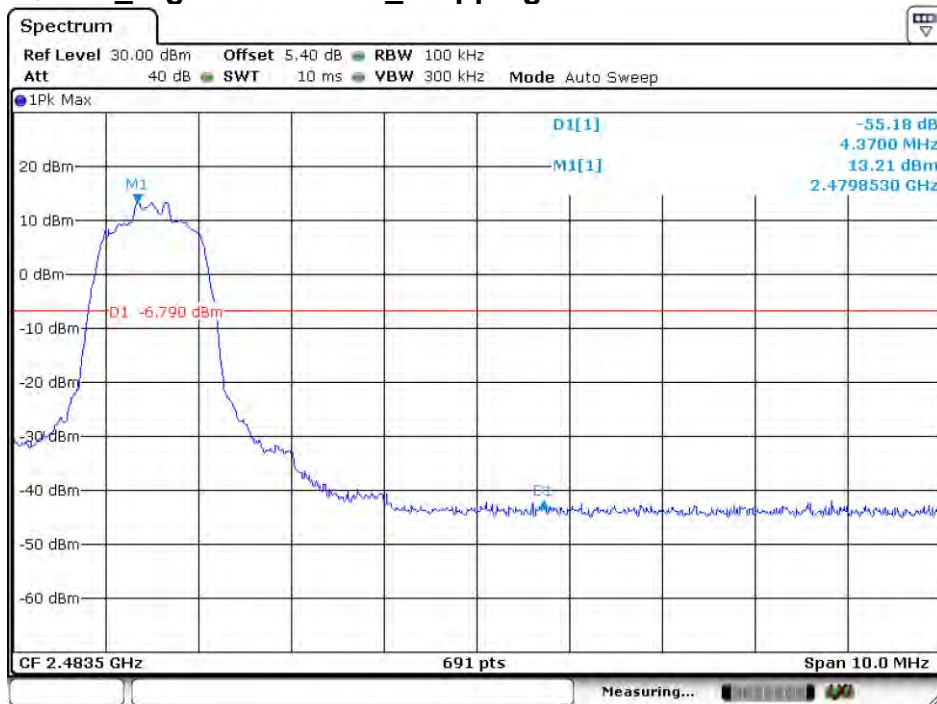
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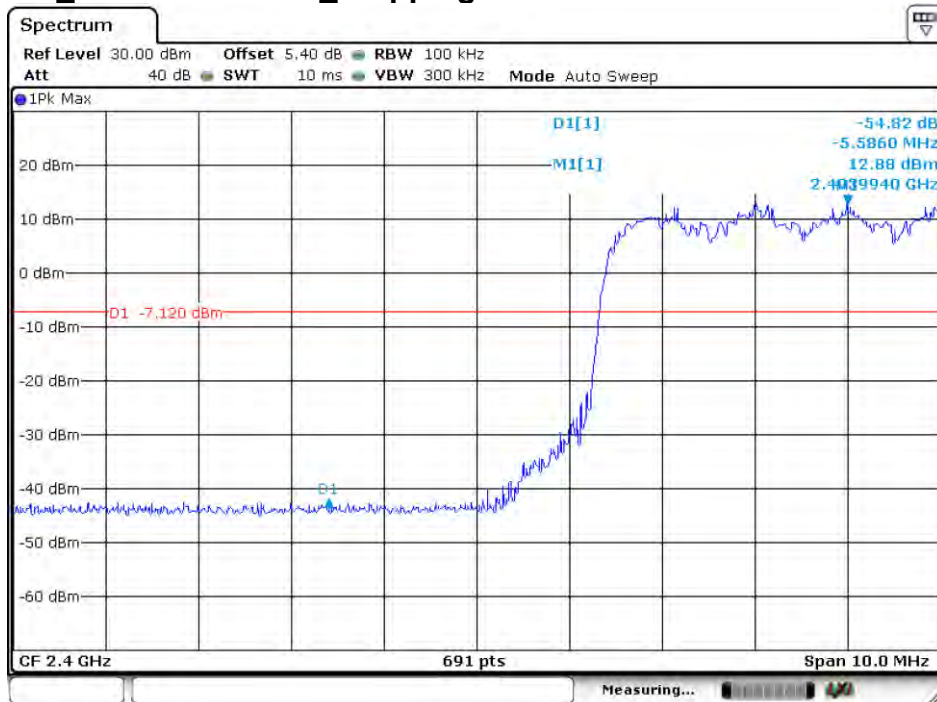
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4.9.1.8 $\pi/4$ DQPSK _Highest Channel_ Hopping OFF



Date: 27.AUG.2020 21:35:26

4.9.1.9 8DPSK _Lowest Channel_ Hopping ON



Date: 27.AUG.2020 21:38:50



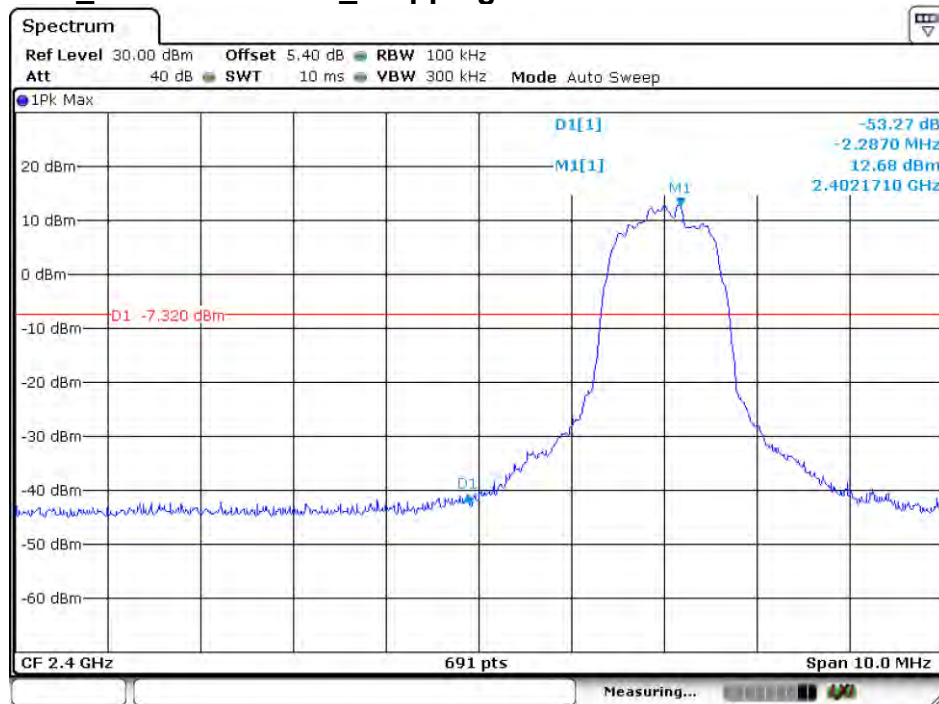
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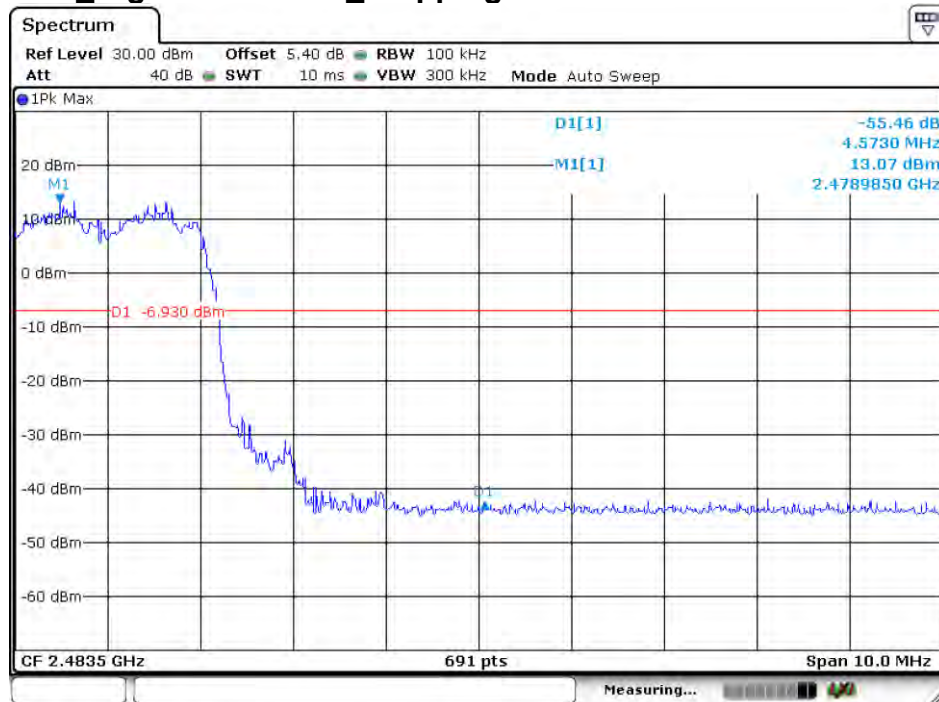
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4.9.1.10 8DPSK _Lowest Channel_ Hopping OFF



Date: 27.AUG.2020 21:37:32

4.9.1.11 8DPSK _Highest Channel_ Hopping ON



Date: 27.AUG.2020 21:39:35



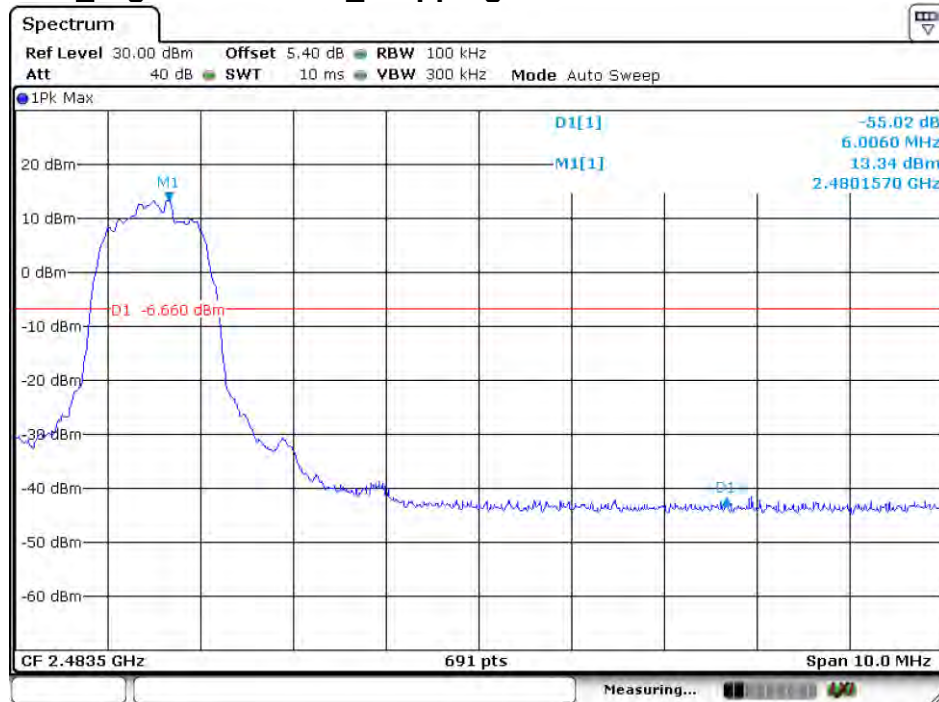
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4.9.1.12 8DPSK_Highest Channel_ Hopping OFF



Date: 27.AUG.2020 21:36:40



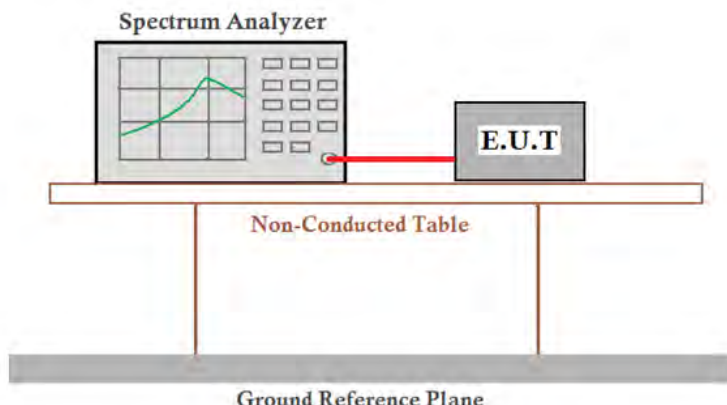
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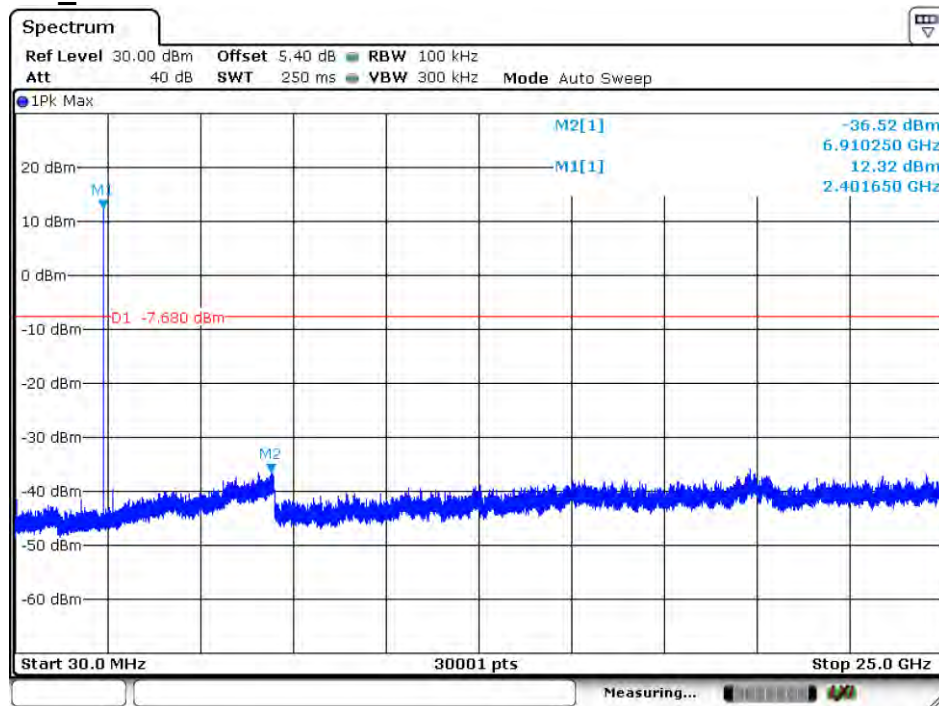
4.10 Spurious RF Conducted Emissions

| | |
|------------------------|---|
| Test Requirement: | 47 CFR Part 15C Section 15.247 (d) |
| Test Method: | ANSI C63.10:2013 Section 7.8.8 |
| Test Setup: |  |
| Limit: | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. |
| Exploratory Test Mode: | Non-hopping transmitting with all kind of modulation and all kind of data type |
| Final Test Mode: | Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type. |
| Instruments Used: | Refer to section 5.10 for details |
| Test Results: | Pass |



4.10.1 Test plots

4.10.1.1 GFSK_Lowest Channel



Date: 27.AUG.2020 21:56:18



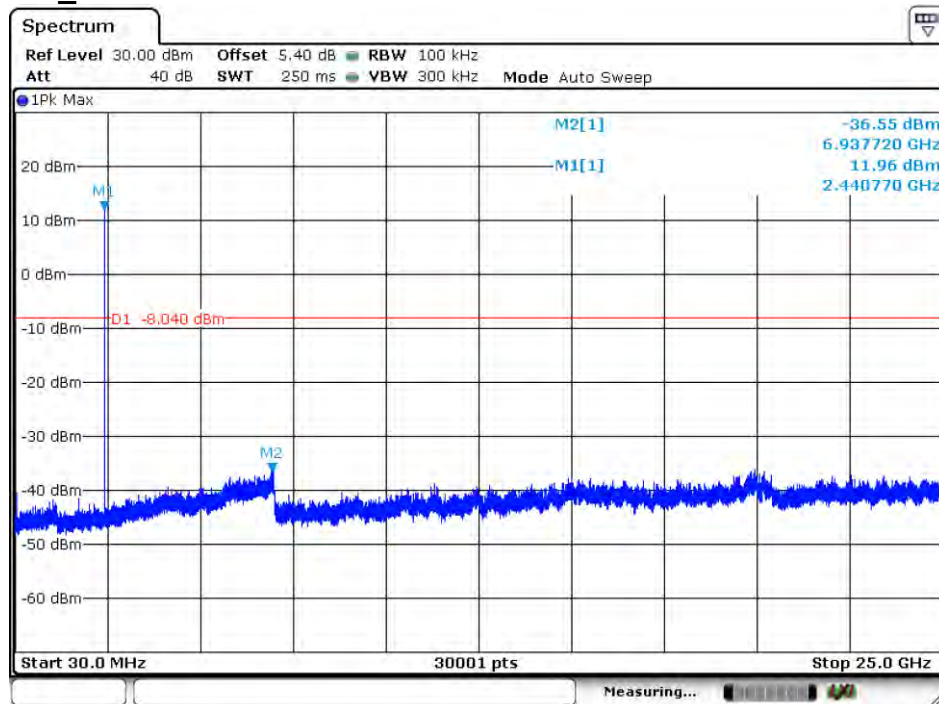
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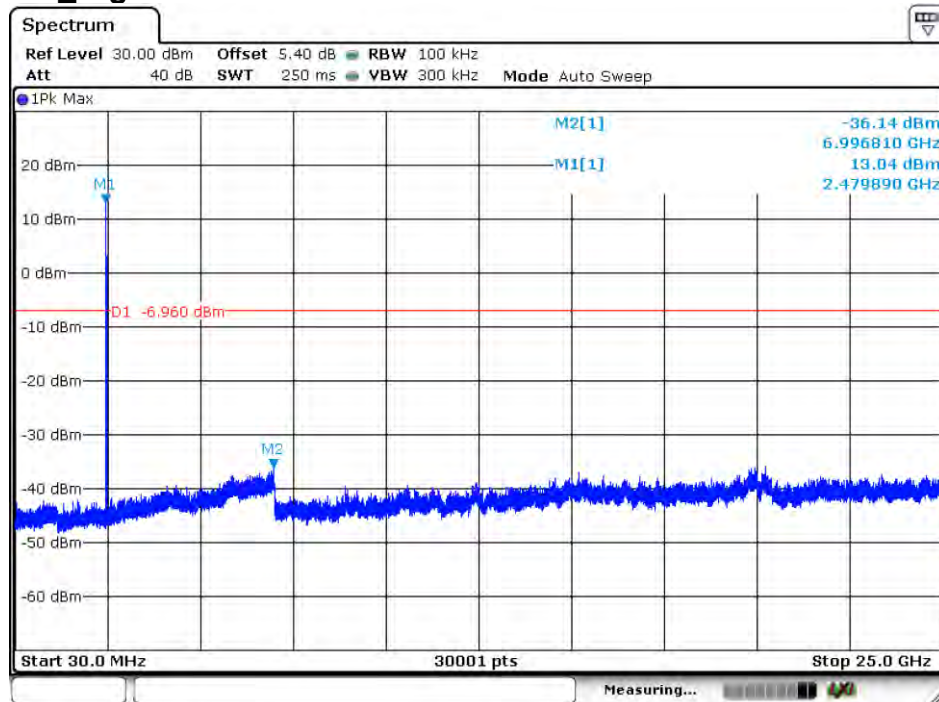
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4.10.1.2 GFSK_Middle Channel



Date: 27.AUG.2020 21:57:24

4.10.1.3 GFSK_Highest Channel



Date: 27.AUG.2020 21:58:21



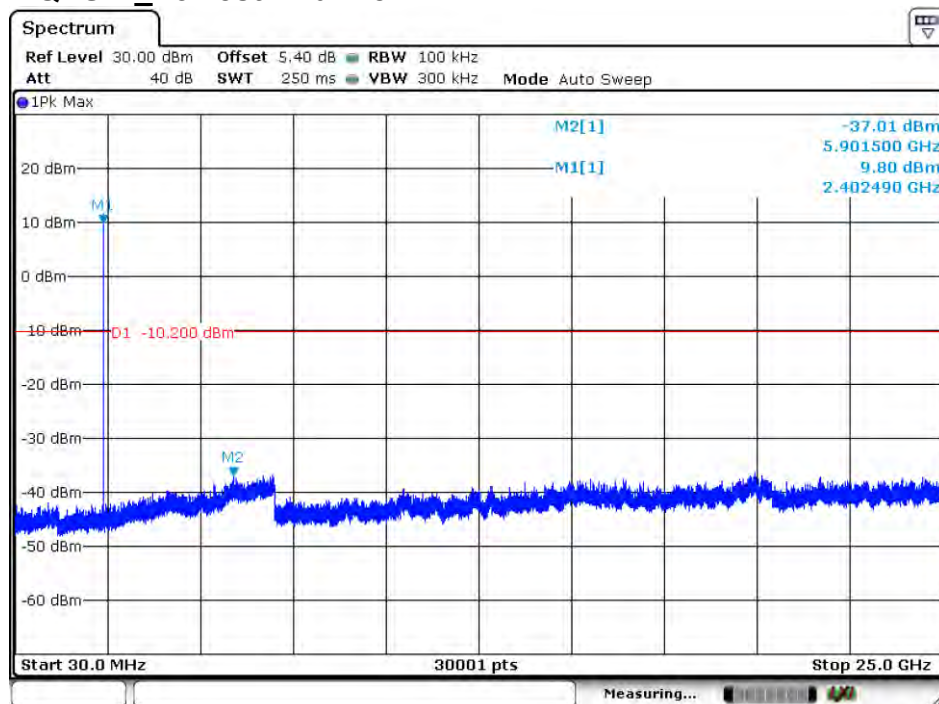
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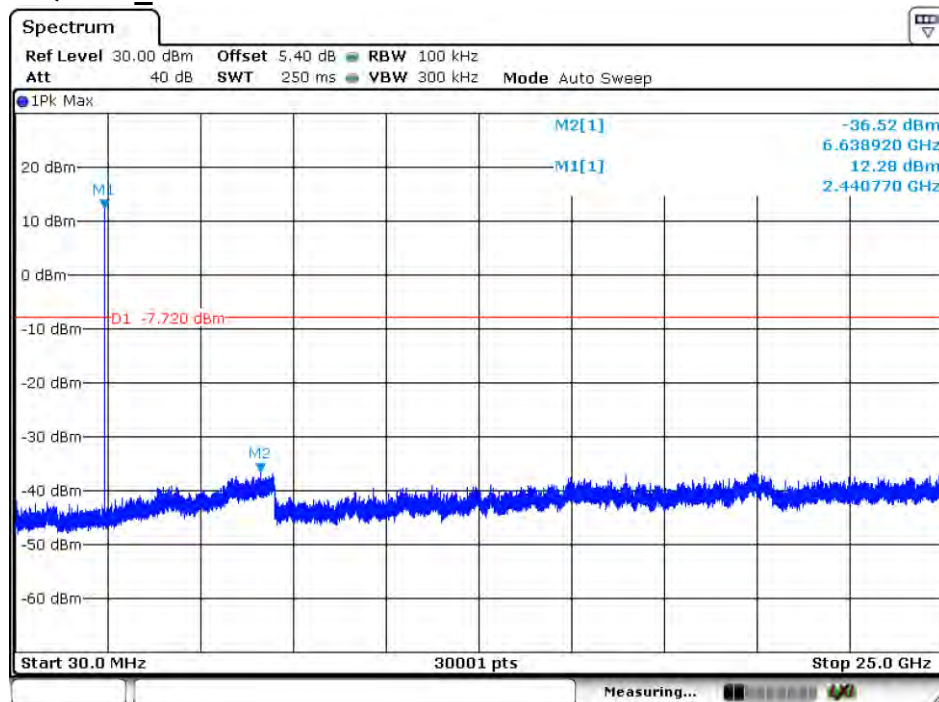
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4.10.1.4 $\pi/4$ DQPSK Lowest Channel



Date: 27.AUG.2020 22:01:32

4.10.1.5 $\pi/4$ DQPSK Middle Channel



Date: 27.AUG.2020 22:00:34



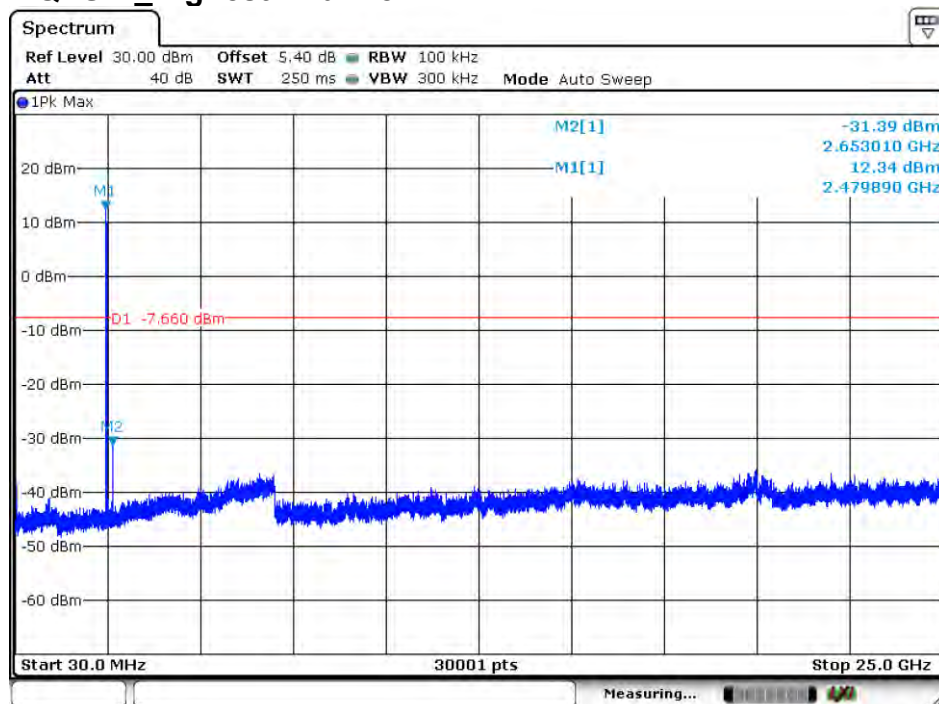
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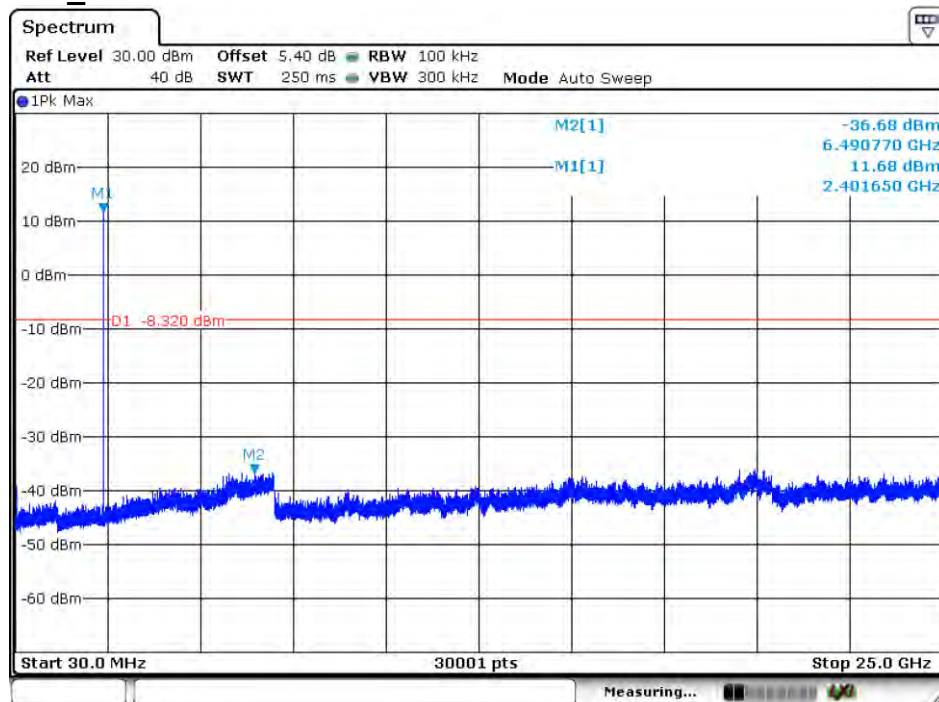


4.10.1.6 $\pi/4$ DQPSK_Highest Channel



Date: 27.AUG.2020 21:59:32

4.10.1.7 8DPSK_Lowest Channel



Date: 27.AUG.2020 22:03:09



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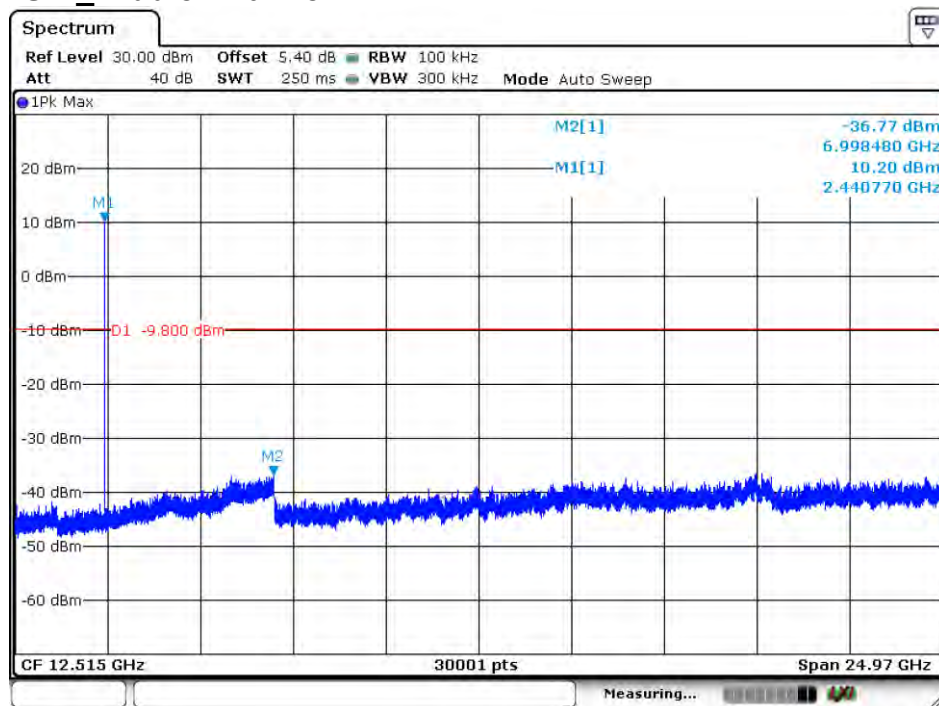
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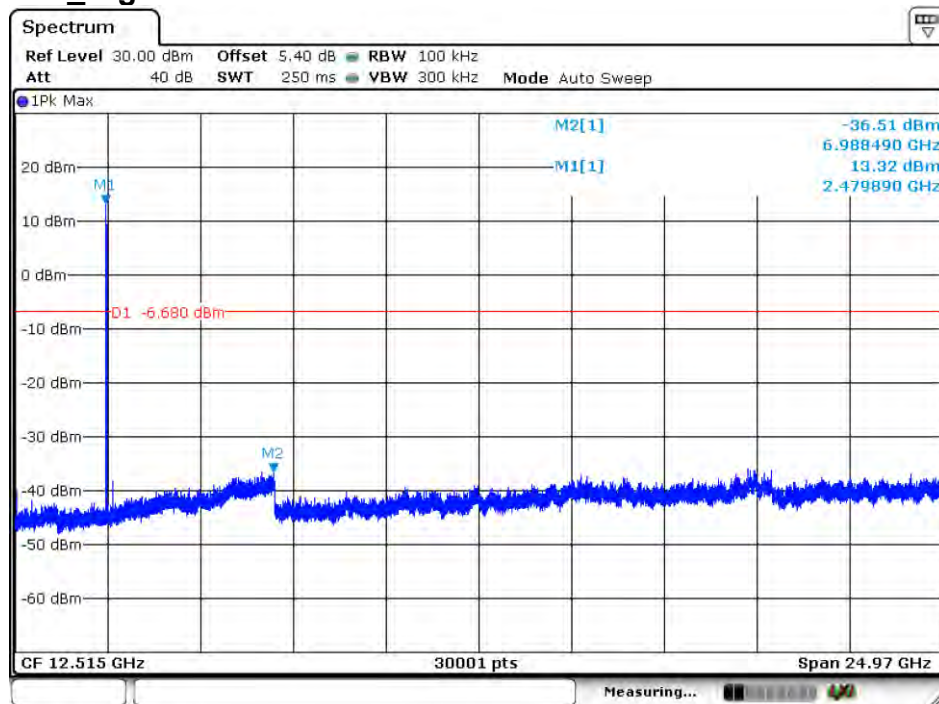


4.10.1.8 8DPSK_Middle Channel



Date: 27.AUG.2020 22:04:01

4.10.1.9 8DPSK_Highest Channel



Date: 27.AUG.2020 22:05:21



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Remark:

Scan from 9kHz to 25GHz, the disturbance between 9KHz to 30MHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.



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4.11 Radiated Spurious Emission

| | | | | | |
|-------------------|---|----------------------------------|----------------|------------|--------------------------|
| Test Requirement: | 47 CFR Part 15C Section 15.209 and 15.205 | | | | |
| Test Method: | ANSI C63.10: 2013 | | | | |
| Test Site: | Measurement Distance: 3m or 10m (Semi-Anechoic Chamber) | | | | |
| Receiver Setup: | Frequency | Detector | RBW | VBW | Remark |
| | 0.009MHz-0.090MHz | Peak | 10kHz | 30kHz | Peak |
| | 0.009MHz-0.090MHz | Average | 10kHz | 30kHz | Average |
| | 0.090MHz-0.110MHz | Quasi-peak | 10kHz | 30kHz | Quasi-peak |
| | 0.110MHz-0.490MHz | Peak | 10kHz | 30kHz | Peak |
| | 0.110MHz-0.490MHz | Average | 10kHz | 30kHz | Average |
| | 0.490MHz -30MHz | Quasi-peak | 10kHz | 30kHz | Quasi-peak |
| | 30MHz-1GHz | Quasi-peak | 100 kHz | 300kHz | Quasi-peak |
| | Above 1GHz | Peak | 1MHz | 3MHz | Peak |
| | | Peak | 1MHz | 10Hz | Average |
| Limit: | Frequency | Field strength (microvolt/meter) | Limit (dBuV/m) | Remark | Measurement distance (m) |
| | 0.009MHz-0.490MHz | 2400/F(kHz) | - | - | 300 |
| | 0.490MHz-1.705MHz | 24000/F(kHz) | - | - | 30 |
| | 1.705MHz-30MHz | 30 | - | - | 30 |
| | 30MHz-88MHz | 100 | 40.0 | Quasi-peak | 3 |
| | 88MHz-216MHz | 150 | 43.5 | Quasi-peak | 3 |
| | 216MHz-960MHz | 200 | 46.0 | Quasi-peak | 3 |
| | 960MHz-1GHz | 500 | 54.0 | Quasi-peak | 3 |
| | Above 1GHz | 500 | 54.0 | Average | 3 |
| | Remark: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device. | | | | |



Test Setup:

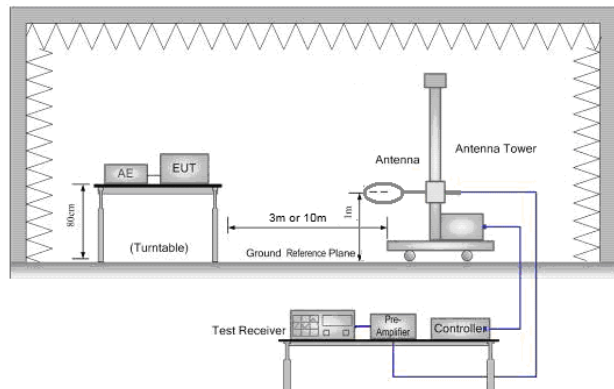


Figure 1. Below 30MHz

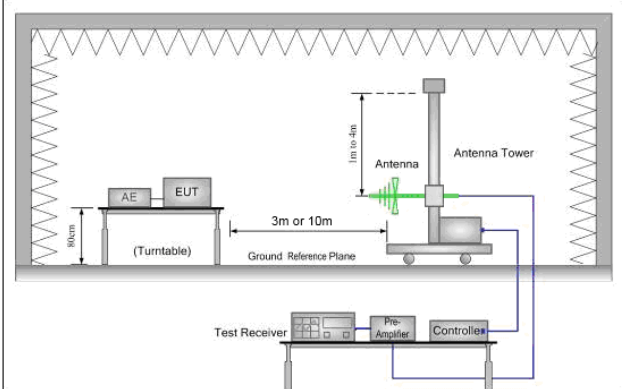


Figure 2. 30MHz to 1GHz

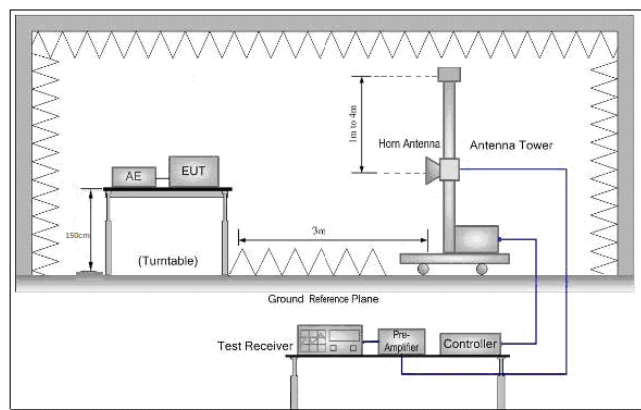


Figure 3. Above 1 GHz





| | |
|-------------------------------|--|
| <p>Test Procedure:</p> | <ul style="list-style-type: none"> a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. e. Use the following spectrum analyzer settings: <ul style="list-style-type: none"> (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=100 kHz for $f < 1 \text{ GHz}$, RBW=1MHz for $f > 1 \text{ GHz}$; VBW \geq RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak (3) For average measurement: use duty cycle correction factor method per 15.35(c). Duty cycle = On time/100 milliseconds On time = $N_1 * L_1 + N_2 * L_2 + \dots + N_{n-1} * L_{n-1} + N_n * L_n$ Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc. Average Emission Level = Peak Emission Level + $20 \cdot \log(\text{Duty cycle})$ f. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. g. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. h. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. i. Test the EUT in the lowest channel (2402MHz), the middle channel (2441MHz), the Highest channel (2480MHz) j. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. k. Repeat above procedures until all frequencies measured was complete. |
| <p>Exploratory Test Mode:</p> | <p>Non-hopping transmitting mode with all kind of modulation and all kind of data type</p> |





| | |
|-------------------|---|
| | Charge + Transmitting mode. |
| Final Test Mode: | Through Pre-scan, find the DH5 of data type and GFSK modulation is the worst case. Pretest the EUT at Charge + Transmitting mode For below 1GHz part, through pre-scan, the worst case is the lowest channel. Only the worst case is recorded in the report. |
| Instruments Used: | Refer to section 5.10 for details |
| Test Results: | Pass |



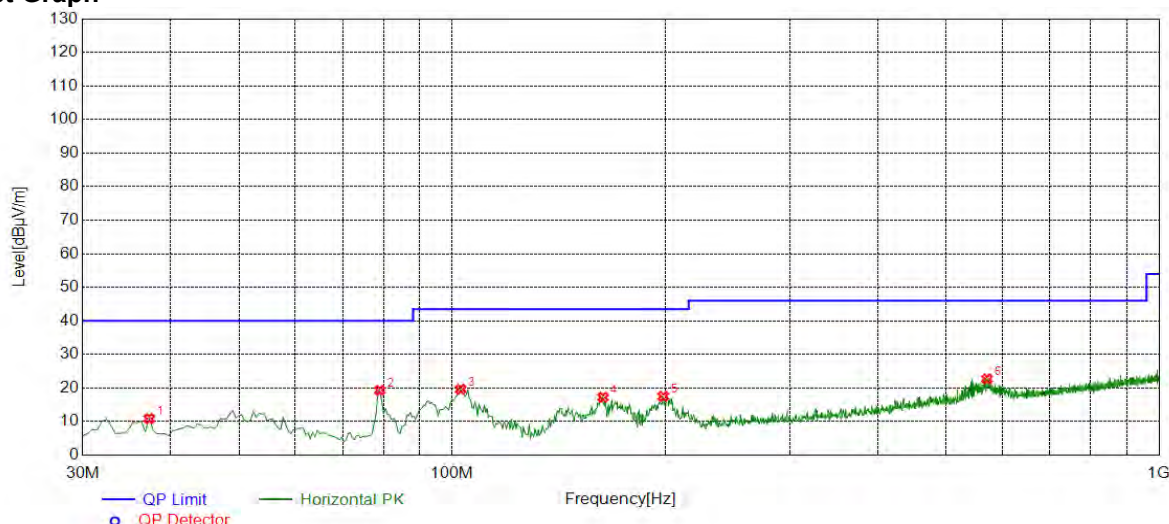


4.11.1 Radiated Emission below 1GHz

4.11.1.1 Charge + Transmitting

| Project Information | | | |
|---------------------|---------------------|-----------|--|
| Mode: | GFSK | State: | |
| Environment: | Temp: 25℃; Humi:60% | Engineer: | |

Test Graph



Suspected List

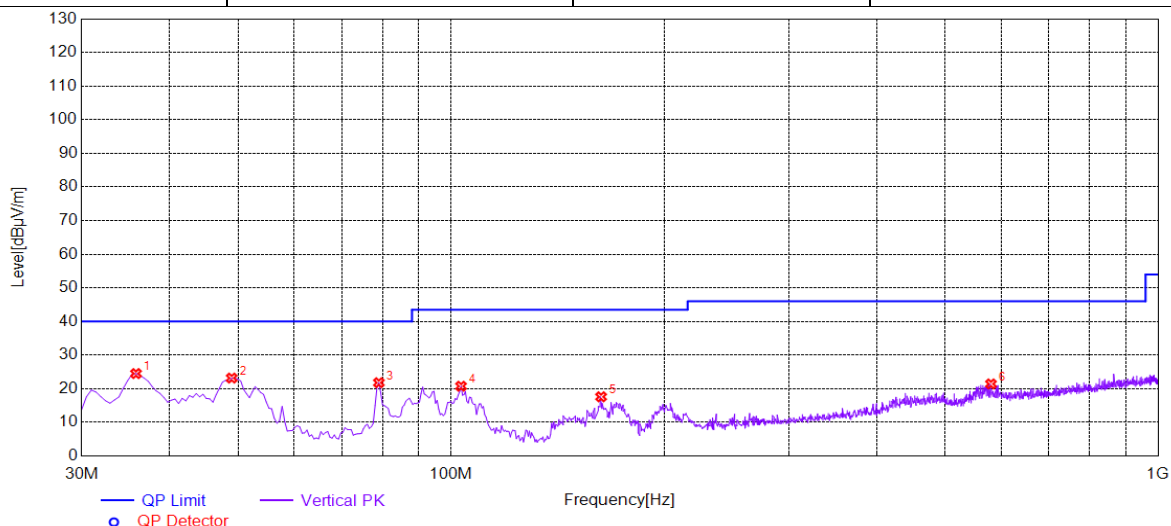
| Suspected List | | | | | | | | |
|----------------|-------------|----------------|-------------|----------------|-------------|-------------|-----------|------------|
| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 37.2786 | 10.91 | -32.03 | 40.00 | 29.09 | 140 | 244 | Horizontal |
| 2 | 79.0095 | 19.30 | -35.71 | 40.00 | 20.70 | 240 | 119 | Horizontal |
| 3 | 102.786 | 19.64 | -31.68 | 43.50 | 23.86 | 181 | 253 | Horizontal |
| 4 | 163.441 | 17.24 | -34.06 | 43.50 | 26.26 | 232 | 225 | Horizontal |
| 5 | 198.864 | 17.51 | -30.93 | 43.50 | 25.99 | 172 | 225 | Horizontal |
| 6 | 571.045 | 22.72 | -20.87 | 46.00 | 23.28 | 244 | 20 | Horizontal |

Final Data List





| Project Information | | | |
|---------------------|---------------------|-----------|--|
| Mode: | GFSK | State: | |
| Environment: | Temp: 25℃; Humi:60% | Engineer: | |



| Suspected List | | | | | | | | |
|----------------|-------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 35.8229 | 24.52 | -32.50 | 40.00 | 15.48 | 187 | 180 | Vertical |
| 2 | 48.9245 | 23.18 | -30.19 | 40.00 | 16.82 | 236 | 329 | Vertical |
| 3 | 79.0095 | 21.81 | -35.71 | 40.00 | 18.19 | 236 | 121 | Vertical |
| 4 | 103.271 | 20.76 | -31.68 | 43.50 | 22.74 | 275 | 50 | Vertical |
| 5 | 162.956 | 17.62 | -34.10 | 43.50 | 25.88 | 191 | 339 | Vertical |
| 6 | 580.265 | 21.44 | -20.62 | 46.00 | 24.56 | 226 | 299 | Vertical |

Final Data List



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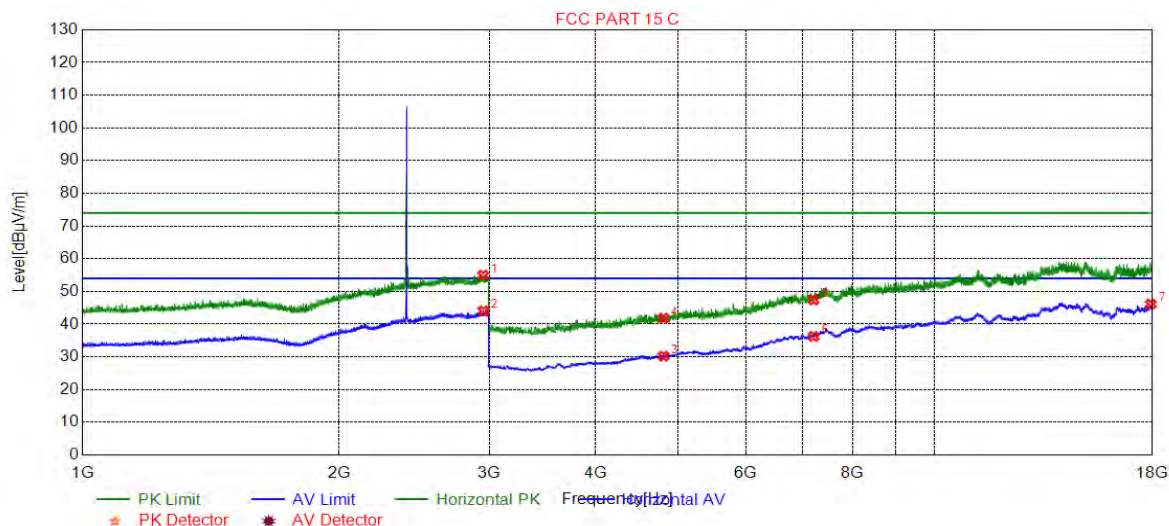
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4.11.2 Transmitter Emission above 1GHz

4.11.2.1 GFSK_Channel 0



Suspected List

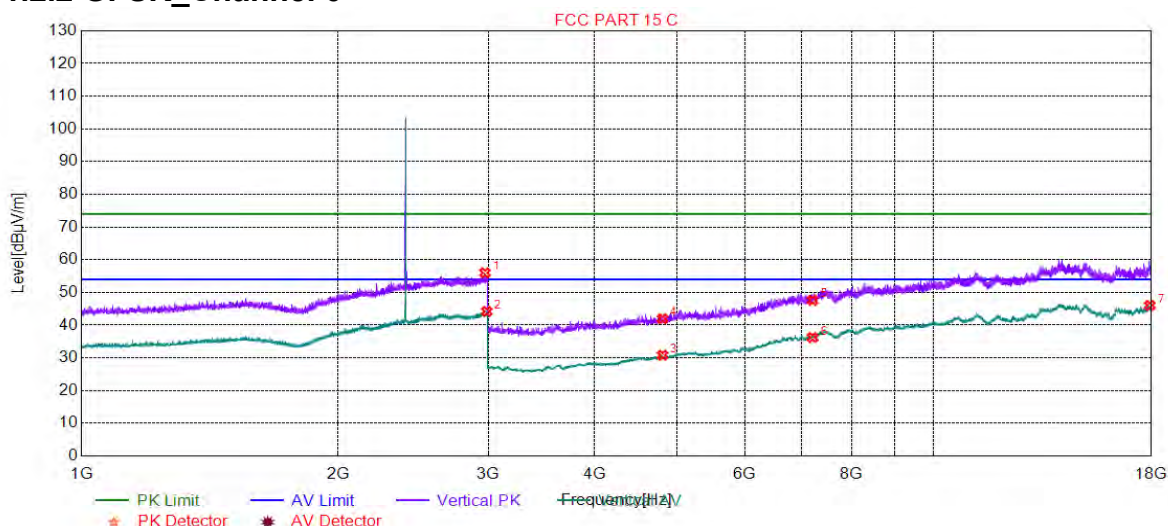
| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|----------------|-------------|----------------|-------------|-------------|-----------|------------|
| 1 | 2950.98 | 54.96 | 9.68 | 74.00 | 19.04 | 154 | 288 | Horizontal |
| 2 | 2953.48 | 44.06 | 9.66 | 54.00 | 9.94 | 103 | 247 | Horizontal |
| 3 | 4804.00 | 30.24 | -18.30 | 54.00 | 23.76 | 212 | 14 | Horizontal |
| 4 | 4804.00 | 41.86 | -18.30 | 74.00 | 32.14 | 142 | 315 | Horizontal |
| 5 | 7206.00 | 47.44 | -9.82 | 74.00 | 26.56 | 210 | 41 | Horizontal |
| 6 | 7206.00 | 36.26 | -9.82 | 54.00 | 17.74 | 168 | 261 | Horizontal |
| 7 | 17912.9 | 46.14 | -1.31 | 54.00 | 7.86 | 162 | 152 | Horizontal |

Final Data List





4.11.2.2 GFSK_Channel 0



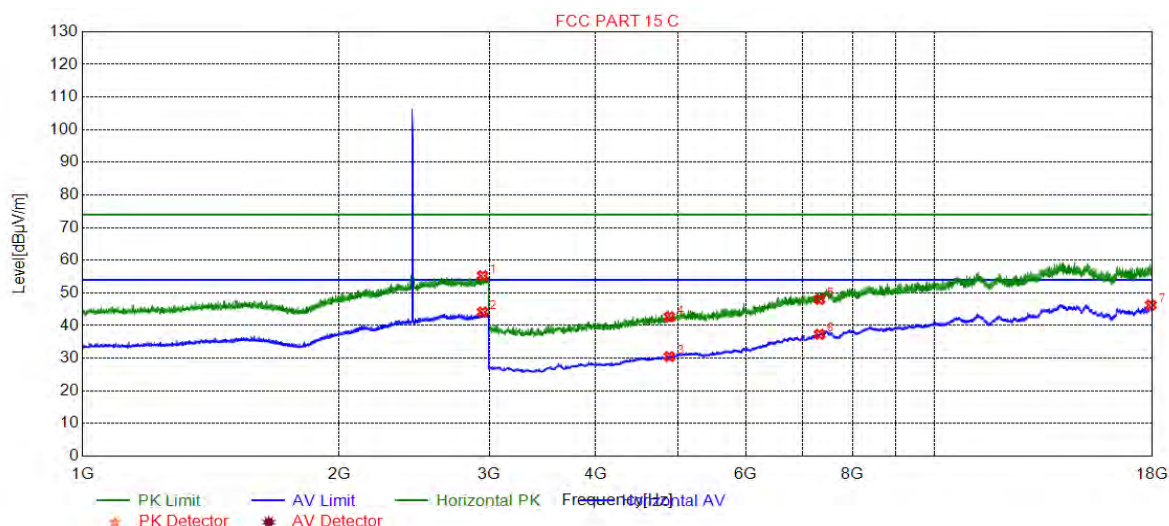
Suspected List

| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| 1 | 2973.99 | 56.03 | 9.57 | 74.00 | 17.97 | 198 | 167 | Vertical |
| 2 | 2988.49 | 44.22 | 9.50 | 54.00 | 9.78 | 175 | 345 | Vertical |
| 3 | 4804.00 | 30.84 | -18.30 | 54.00 | 23.16 | 222 | 348 | Vertical |
| 4 | 4804.00 | 41.96 | -18.30 | 74.00 | 32.04 | 152 | 320 | Vertical |
| 5 | 7206.00 | 47.62 | -9.82 | 74.00 | 26.38 | 150 | 45 | Vertical |
| 6 | 7206.00 | 36.23 | -9.82 | 54.00 | 17.77 | 197 | 237 | Vertical |
| 7 | 17917.4 | 46.04 | -1.30 | 54.00 | 7.96 | 184 | 18 | Vertical |

Final Data List



4.11.2.3 GFSK Channel 39



| Suspected List | | | | | | | | |
|----------------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|
| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 2946.98 | 55.29 | 9.65 | 74.00 | 18.71 | 192 | 2 | Horizontal |
| 2 | 2947.48 | 44.19 | 9.65 | 54.00 | 9.81 | 139 | 192 | Horizontal |
| 3 | 4882.00 | 30.51 | -17.96 | 54.00 | 23.49 | 111 | 204 | Horizontal |
| 4 | 4882.00 | 42.71 | -17.96 | 74.00 | 31.29 | 170 | 342 | Horizontal |
| 5 | 7323.00 | 48.03 | -9.53 | 74.00 | 25.97 | 143 | 177 | Horizontal |
| 6 | 7323.00 | 37.34 | -9.53 | 54.00 | 16.66 | 152 | 67 | Horizontal |
| 7 | 17917.4 | 46.31 | -1.30 | 54.00 | 7.69 | 150 | 231 | Horizontal |

Final Data List



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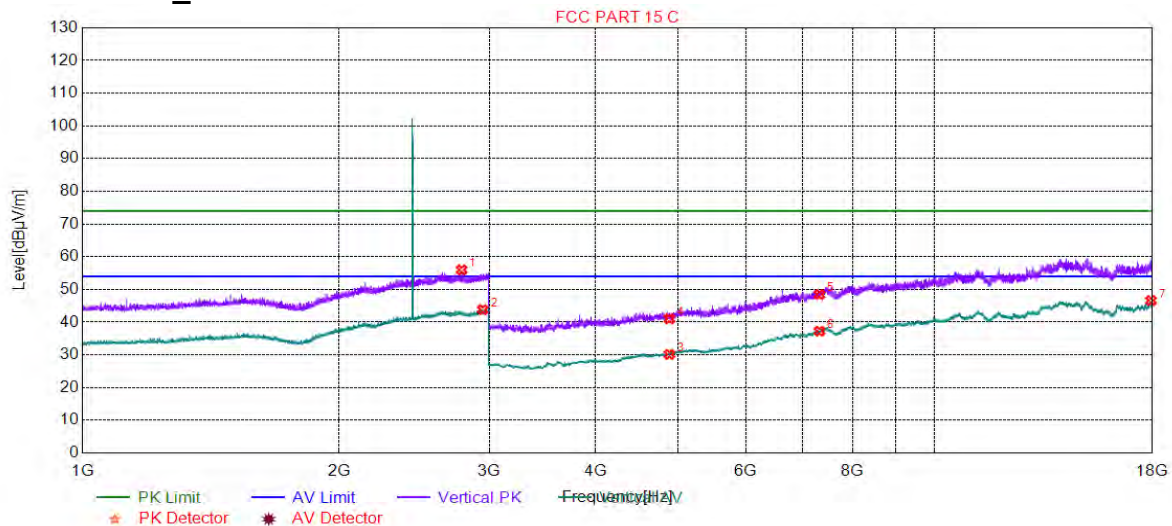
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4.11.2.4 GFSK_Channel 39



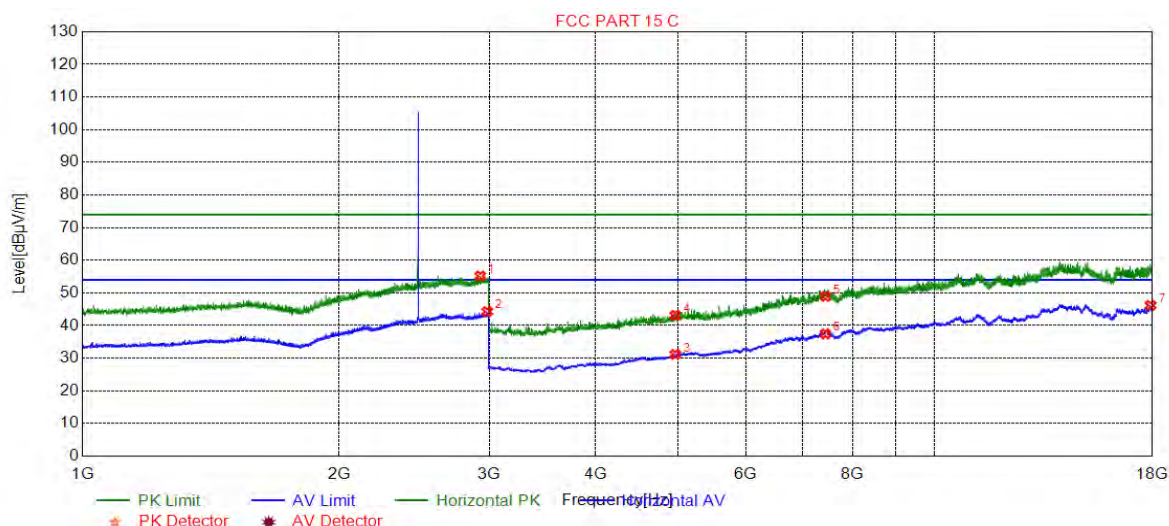
Suspected List

| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| 1 | 2784.94 | 56.00 | 9.02 | 74.00 | 18.00 | 261 | 318 | Vertical |
| 2 | 2947.98 | 43.84 | 9.66 | 54.00 | 10.16 | 207 | 223 | Vertical |
| 3 | 4882.00 | 30.16 | -17.96 | 54.00 | 23.84 | 181 | 265 | Vertical |
| 4 | 4882.00 | 41.03 | -17.96 | 74.00 | 32.97 | 246 | 293 | Vertical |
| 5 | 7323.00 | 48.46 | -9.53 | 74.00 | 25.54 | 288 | 18 | Vertical |
| 6 | 7323.00 | 37.25 | -9.53 | 54.00 | 16.75 | 207 | 100 | Vertical |
| 7 | 17927.9 | 46.60 | -1.30 | 54.00 | 7.40 | 232 | 155 | Vertical |

Final Data List



4.11.2.5 GFSK Channel 78



| Suspected List | | | | | | | | |
|----------------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|
| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 2928.98 | 55.18 | 9.45 | 74.00 | 18.82 | 215 | 191 | Horizontal |
| 2 | 2983.49 | 44.31 | 9.53 | 54.00 | 9.69 | 220 | 136 | Horizontal |
| 3 | 4960.00 | 31.19 | -17.47 | 54.00 | 22.81 | 145 | 342 | Horizontal |
| 4 | 4960.00 | 43.14 | -17.47 | 74.00 | 30.86 | 127 | 97 | Horizontal |
| 5 | 7440.00 | 48.93 | -9.02 | 74.00 | 25.07 | 233 | 152 | Horizontal |
| 6 | 7440.00 | 37.47 | -9.02 | 54.00 | 16.53 | 221 | 42 | Horizontal |
| 7 | 17908.4 | 46.21 | -1.31 | 54.00 | 7.79 | 218 | 97 | Horizontal |

Final Data List



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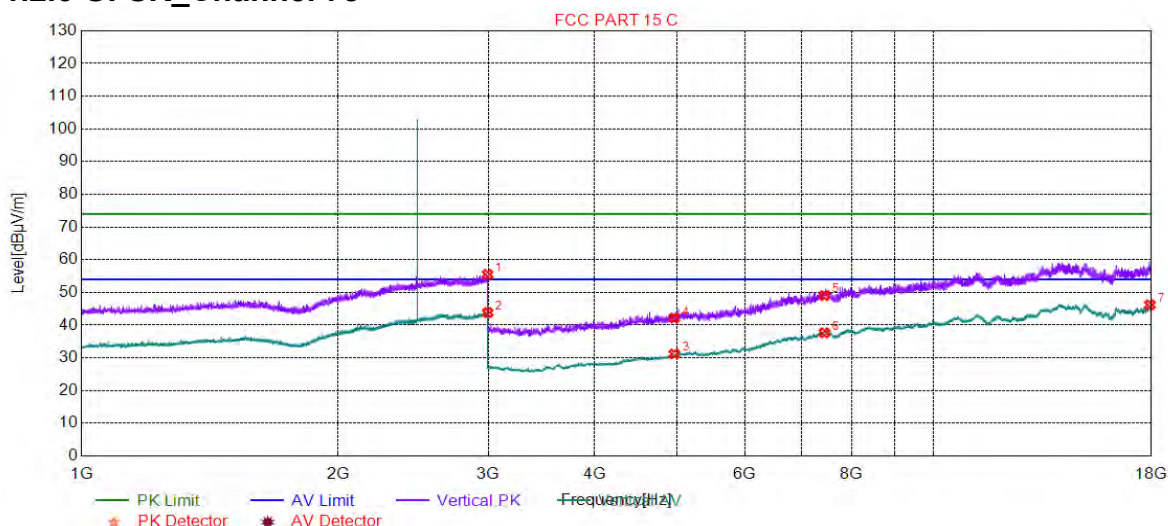
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4.11.2.6 GFSK_Channel 78



Suspected List

| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| 1 | 2994.99 | 55.52 | 9.47 | 74.00 | 18.48 | 210 | 250 | Vertical |
| 2 | 2995.99 | 43.85 | 9.47 | 54.00 | 10.15 | 201 | 210 | Vertical |
| 3 | 4960.00 | 31.21 | -17.47 | 54.00 | 22.79 | 187 | 18 | Vertical |
| 4 | 4960.00 | 42.20 | -17.47 | 74.00 | 31.80 | 293 | 18 | Vertical |
| 5 | 7440.00 | 49.05 | -9.02 | 74.00 | 24.95 | 218 | 45 | Vertical |
| 6 | 7440.00 | 37.65 | -9.02 | 54.00 | 16.35 | 286 | 264 | Vertical |
| 7 | 17923.4 | 46.24 | -1.30 | 54.00 | 7.76 | 183 | 154 | Vertical |

Final Data List

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz, the disturbance between 9KHz to 30MHz and 18GHz to 25GHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

3) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

4) All Modes have been tested, but only the worst case data displayed in this report.



4.12 Restricted bands around fundamental frequency

| | | | |
|-------------------|---|--------------------|------------------|
| Test Requirement: | 47 CFR Part 15C Section 15.209 and 15.205 | | |
| Test Method: | ANSI C63.10: 2013 | | |
| Test Site: | Measurement Distance: 3m or 10m (Semi-Anechoic Chamber) | | |
| Limit: | Frequency | Limit (dBuV/m @3m) | Remark |
| | 30MHz-88MHz | 40.0 | Quasi-peak Value |
| | 88MHz-216MHz | 43.5 | Quasi-peak Value |
| | 216MHz-960MHz | 46.0 | Quasi-peak Value |
| | 960MHz-1GHz | 54.0 | Quasi-peak Value |
| | Above 1GHz | 54.0 | Average Value |
| | | 74.0 | Peak Value |
| Test Setup: | | | |

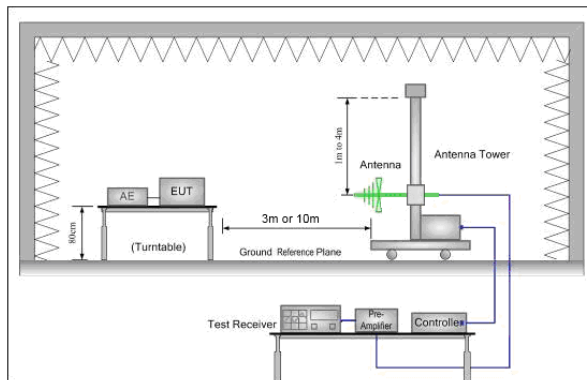


Figure 1. 30MHz to 1GHz

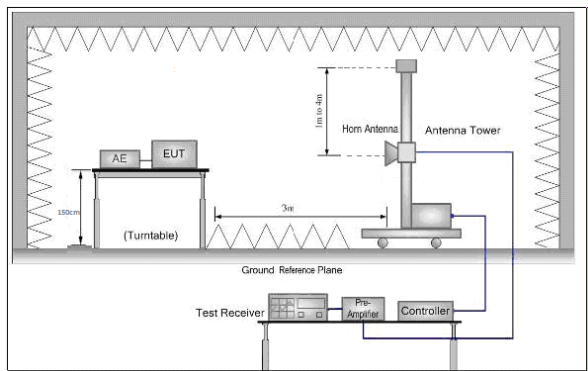


Figure 2. Above 1 GHz





| | |
|------------------------|--|
| Test Procedure: | <ul style="list-style-type: none"> a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. g. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel h. Test the EUT in the lowest channel , the Highest channel i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. j. Repeat above procedures until all frequencies measured was complete. |
| Exploratory Test Mode: | Non-hopping transmitting mode with all kind of modulation and all kind of data type Charge + Transmitting mode. |
| Final Test Mode: | Through Pre-scan, find the DH5 of data type and GFSK modulation is the worst case. Pretest the EUT at Charge + Transmitting mode, Only the worst case is recorded in the report. |
| Instruments Used: | Refer to section 5.10 for details |
| Test Results: | Pass |

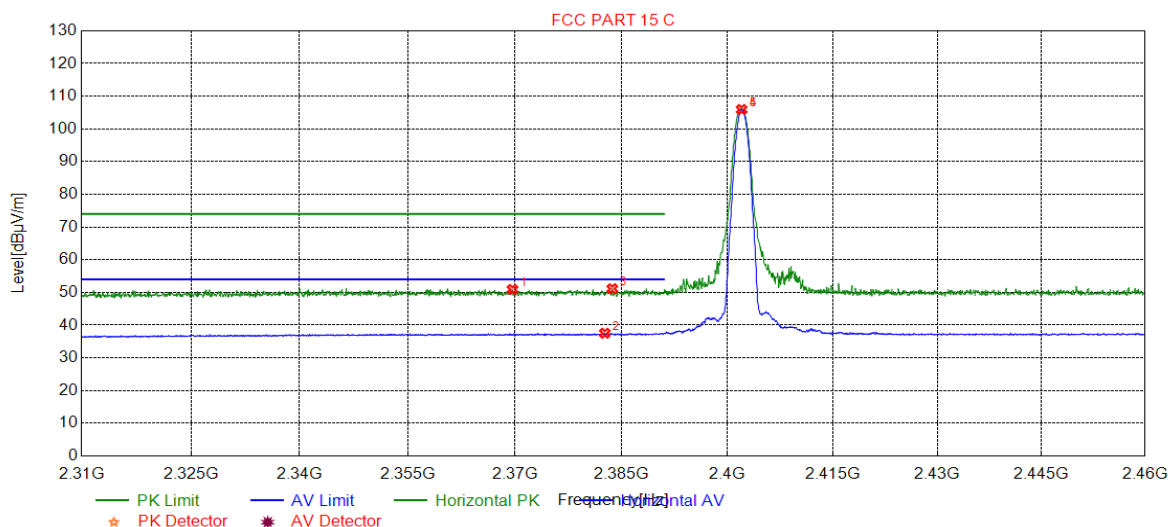




4.12.1 Test plots

4.12.1.1 Worst Case Mode (GFSK(DH5) _Lowest Channel

4.12.1.2 GFSK_Channel 0



Suspected List

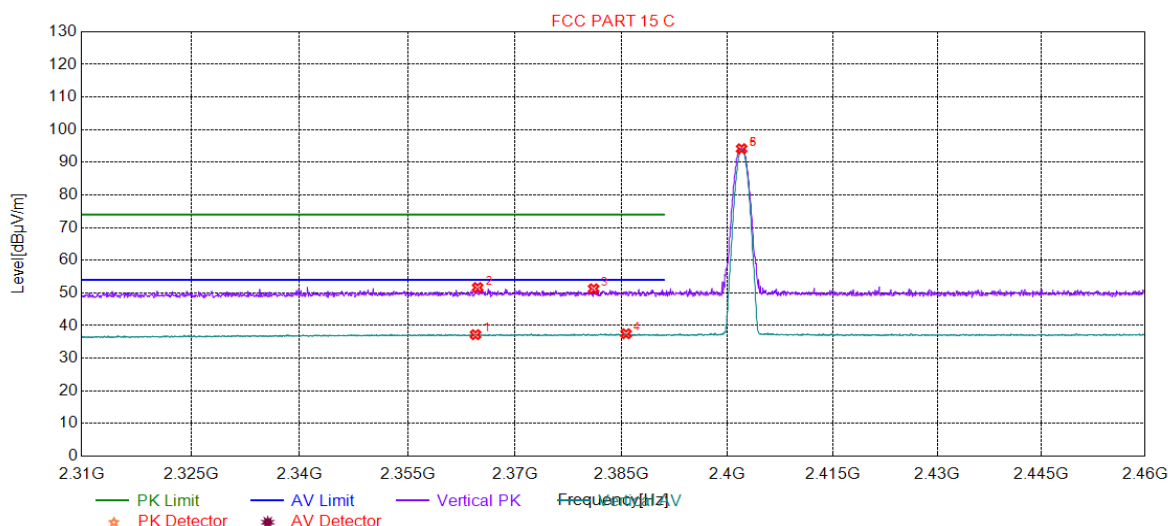
| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|----------------|-------------|----------------|-------------|-------------|-----------|------------|
| 1 | 2369.65 | 50.93 | 7.79 | 74.00 | 23.07 | 144 | 266 | Horizontal |
| 2 | 2382.63 | 37.54 | 7.78 | 54.00 | 16.46 | 134 | 178 | Horizontal |
| 3 | 2383.68 | 51.14 | 7.78 | 74.00 | 22.86 | 113 | 346 | Horizontal |
| 4 | 2402.00 | 105.95 | 7.77 | 0.00 | -105.95 | 189 | 57 | Horizontal |
| 5 | 2402.00 | 106.07 | 7.77 | 0.00 | -106.07 | 109 | 52 | Horizontal |

Final Data List





4.12.1.3 GFSK_Channel 0



Suspected List

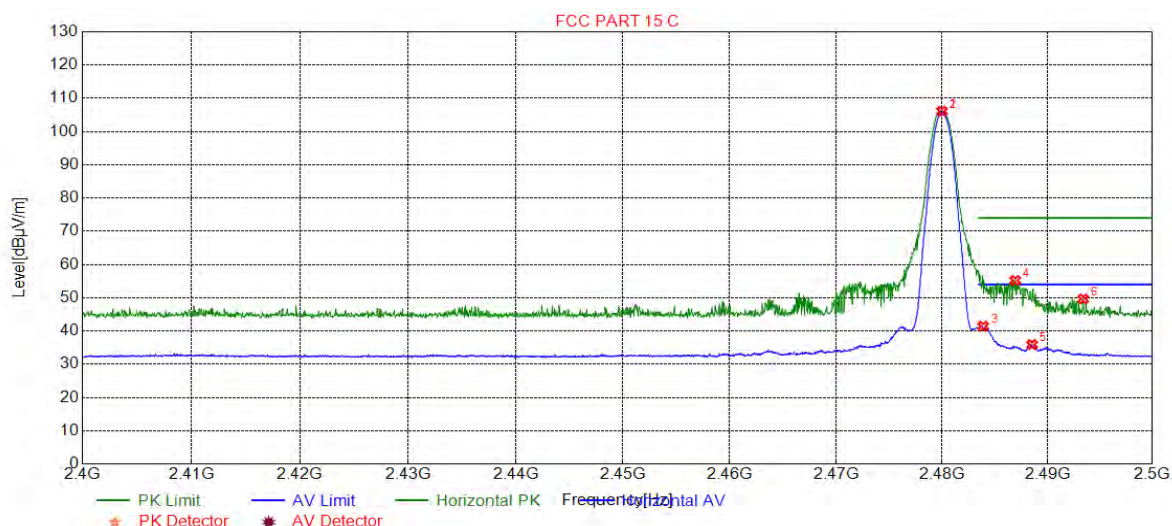
| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| 1 | 2364.47 | 37.22 | 7.80 | 54.00 | 16.78 | 155 | 107 | Vertical |
| 2 | 2364.77 | 51.65 | 7.80 | 74.00 | 22.35 | 272 | 351 | Vertical |
| 3 | 2381.06 | 51.29 | 7.78 | 74.00 | 22.71 | 279 | 80 | Vertical |
| 4 | 2385.63 | 37.51 | 7.77 | 54.00 | 16.49 | 282 | 14 | Vertical |
| 5 | 2402.00 | 94.18 | 7.77 | 0.00 | -94.18 | 213 | 118 | Vertical |
| 6 | 2402.00 | 94.05 | 7.77 | 0.00 | -94.05 | 166 | 118 | Vertical |

Final Data List





4.12.1.4 GFSK_Channel 39



Suspected List

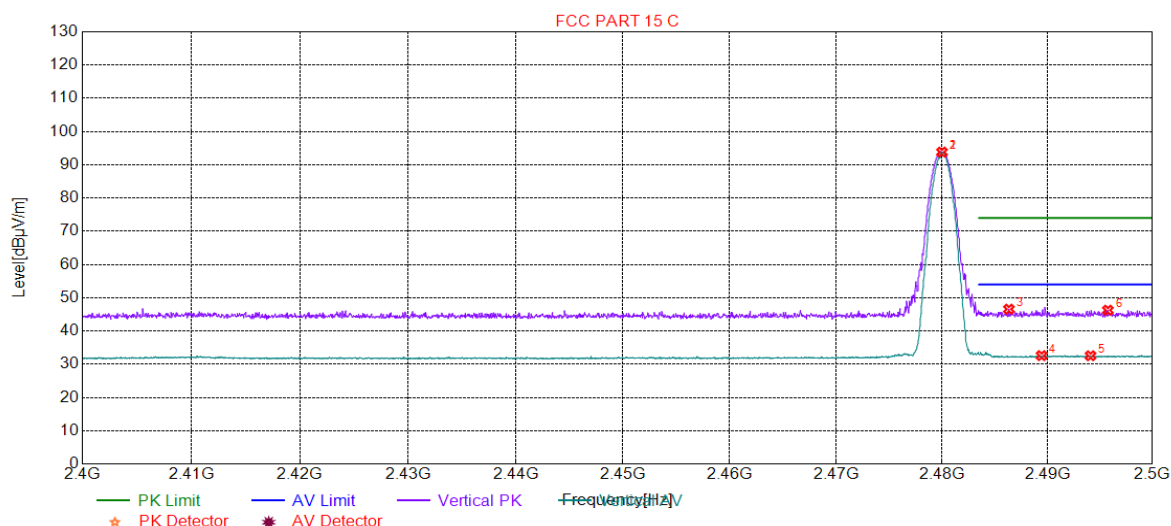
| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|----------------|-------------|----------------|-------------|-------------|-----------|------------|
| 1 | 2480.00 | 106.12 | 8.01 | 0.00 | -106.12 | 166 | 62 | Horizontal |
| 2 | 2480.00 | 106.03 | 8.01 | 0.00 | -106.03 | 243 | 62 | Horizontal |
| 3 | 2483.89 | 41.45 | 8.01 | 54.00 | 12.55 | 145 | 188 | Horizontal |
| 4 | 2486.94 | 55.25 | 8.01 | 74.00 | 18.75 | 165 | 62 | Horizontal |
| 5 | 2488.54 | 35.93 | 8.02 | 54.00 | 18.07 | 216 | 67 | Horizontal |
| 6 | 2493.39 | 49.65 | 8.02 | 74.00 | 24.35 | 108 | 51 | Horizontal |

Final Data List





4.12.1.5 GFSK_Channel 78



| Suspected List | | | | | | | | |
|----------------|-------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 2480.00 | 93.83 | 8.01 | 0.00 | -93.83 | 238 | 319 | Vertical |
| 2 | 2480.00 | 93.69 | 8.01 | 0.00 | -93.69 | 158 | 313 | Vertical |
| 3 | 2486.34 | 46.59 | 8.01 | 74.00 | 27.41 | 229 | 46 | Vertical |
| 4 | 2489.44 | 32.62 | 8.02 | 54.00 | 21.38 | 158 | 145 | Vertical |
| 5 | 2494.09 | 32.58 | 8.02 | 54.00 | 21.42 | 272 | 341 | Vertical |
| 6 | 2495.74 | 46.28 | 8.02 | 74.00 | 27.72 | 200 | 68 | Vertical |

Final Data List

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

All Modes have been tested, but only the worst case data displayed in this report.





5 Measurement Uncertainty (95% confidence levels, k=2)

Lab A:

| No. | Item | Measurement Uncertainty |
|-----|-------------------------------|-------------------------|
| 1 | Total RF power, conducted | $\pm 0.75\text{dB}$ |
| 2 | RF power density, conducted | $\pm 2.84\text{dB}$ |
| 3 | Spurious emissions, conducted | $\pm 0.75\text{dB}$ |
| 4 | Temperature test | $\pm 1^{\circ}\text{C}$ |
| 5 | Humidity test | $\pm 3\%$ |
| 6 | DC and low frequency voltages | $\pm 0.5\%$ |

Lab B:

| No. | Item | Measurement Uncertainty |
|-----|---------------------|--------------------------------------|
| 1 | Conduction Emission | $\pm 3.0\text{dB}$ (150kHz to 30MHz) |
| 2 | Radiated Emission | $\pm 4.8\text{dB}$ (Below 1GHz) |
| | | $\pm 4.8\text{dB}$ (1GHz to 6GHz) |
| | | $\pm 4.5\text{dB}$ (6GHz to 18GHz) |
| | | $\pm 5.02\text{dB}$ (Above 18GHz) |



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6 Equipment List

| RF conducted test | | | | | |
|---------------------|--------------------------|------------------|---------------|--------------|--------------|
| Test Equipment | Manufacturer | Model No. | Inventory No. | Cal. date | Cal.Duedate |
| | | | | (yyyy-mm-dd) | (yyyy-mm-dd) |
| DC Power Supply | Agilent Technologies Inc | 66311B | W009-09 | 2020/7/15 | 2021/7/15 |
| Signal Analyzer | Rohde & Schwarz | FSV | W025-05 | 2020/1/3 | 2021/1/2 |
| Coaxial Cable | SGS | N/A | SEM031-01 | 2020/6/12 | 2021/6/11 |
| Attenuator | Weinschel Associates | WA41 | SEM021-09 | N/A | N/A |
| Signal Generator | KEYSIGHT | N5173B | SEM006-05 | 2020/7/14 | 2021/7/14 |
| Temperature Chamber | GIANT FORCE | ICT-150-40-CP-AR | W027-03 | 2019/10/27 | 2020/10/27 |
| Power Meter | Rohde & Schwarz | NRVS | SEM014-02 | 2020/7/14 | 2021/7/14 |

| CE Test System | | | | | |
|--------------------------------|---------------|-------------|---------------|------------|--------------|
| Equipment | Manufacturer | Model No. | Inventory No. | Cal Date | Cal Due Date |
| Shielding Room | Brilliant-emc | N/A | XAW03-35-01 | 2019-09-11 | 2022-09-10 |
| Test receiver | ROHDE&SCHWARZ | ESR | XAW01-08-01 | 2019-09-07 | 2020-09-06 |
| Artificial network | ROHDE&SCHWARZ | ENV216 | XAW01-04-01 | 2020-08-04 | 2021-08-03 |
| Temperature and humidity meter | MingGao | TH101B | XAW01-01-01 | 2019-12-06 | 2020-12-05 |
| Measurement Software | Tonscend | TS+ CE V2.5 | XAW02-05-02 | NCR | NCR |



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| RSE Test System | | | | | |
|-------------------------------------|----------------|------------------|---------------|------------|--------------|
| Equipment | Manufacturer | Model No. | Inventory No. | Cal Date | Cal Due Date |
| Semi-Anechoic Chamber | Brilliant-emc | N/A | XAW03-35-01 | 2019-09-11 | 2022-09-10 |
| MXA signal analyzer | Keysight | N9020A | XAW01-06-01 | 2020-04-02 | 2021-04-01 |
| Test receiver | ROHDE&SCHWARZ | ESR | XAW01-08-05 | 2020-04-12 | 2021-04-11 |
| Receiving antenna (30MHz-3GHz) | Schwarzbeck | VULB 9163 | XAW01-09-01 | 2019-10-13 | 2021-10-12 |
| Receiving antenna (1GHz~18GHz) | Schwarzbeck | BBHA 9120D | XAW01-09-02 | 2019-10-13 | 2021-10-12 |
| Receiving antenna (15GHz~40GHz) | Schwarzbeck | BBHA 9170 | XAW01-09-03 | 2019-10-13 | 2021-10-12 |
| Directional antenna rack controller | Max-Full | MF-7802BS | XAW03-03-01 | NCR | NCR |
| High-speed antenna rack controller | Max-Full | MF-7802 | XAW03-04-01 | NCR | NCR |
| Filter bank | Tonscend | JS0806-F | XAW03-05-01 | NCR | NCR |
| Filter bank | Tonscend | JS0806s | XAW03-05-02 | NCR | NCR |
| Amplifier | Tonscend | TAP00903040 | XAW01-41-01 | 2019-11-18 | 2020-11-17 |
| Amplifier | Tonscend | TAP01018048 | XAW01-41-02 | 2019-11-18 | 2020-11-17 |
| Amplifier | Tonscend | TAP18040048 | XAW01-41-03 | 2019-12-03 | 2020-12-02 |
| Amplifier | Shanghai Steed | YX28980930 | XAW01-41-06 | 2019-11-18 | 2020-11-17 |
| Temperature and humidity meter | MingGao | TH101B | XAW01-01-01 | 2019-12-06 | 2020-12-05 |
| Measurement Software | Tonscend | TS+ RSE V3.0.0.2 | XAW02-05-01 | NCR | NCR |





7 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of Set-Up for ZR/2020/70008.

The End



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