(1GHz-25GHz) Spurious emission Requirements

1M PHY
GFSK

| Frequency | Meter Reading | Amplifier | Loss | Antenna Factor | Corrected Factor | Emission Level | Limits | Margin | Detector | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dBμV) | (dB) | (dB) | (dB/m) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | Type | |
| Low Channel (GFSK/2402 MHz) | | | | | | | | | | |
| 3264.73 | 61.54 | 44.70 | 6.70 | 28.20 | -9.80 | 51.74 | 74.00 | -22.26 | PK | Vertical |
| 3264.73 | 50.55 | 44.70 | 6.70 | 28.20 | -9.80 | 40.75 | 54.00 | -13.25 | AV | Vertical |
| 3264.62 | 61.17 | 44.70 | 6.70 | 28.20 | -9.80 | 51.37 | 74.00 | -22.63 | PK | Horizontal |
| 3264.62 | 50.35 | 44.70 | 6.70 | 28.20 | -9.80 | 40.55 | 54.00 | -13.45 | AV | Horizontal |
| 4804.32 | 58.97 | 44.20 | 9.04 | 31.60 | -3.56 | 55.41 | 74.00 | -18.59 | PK | Vertical |
| 4804.32 | 50.58 | 44.20 | 9.04 | 31.60 | -3.56 | 47.02 | 54.00 | -6.98 | AV | Vertical |
| 4804.53 | 58.18 | 44.20 | 9.04 | 31.60 | -3.56 | 54.62 | 74.00 | -19.38 | PK | Horizontal |
| 4804.53 | 49.59 | 44.20 | 9.04 | 31.60 | -3.56 | 46.03 | 54.00 | -7.97 | AV | Horizontal |
| 5359.85 | 48.29 | 44.20 | 9.86 | 32.00 | -2.34 | 45.95 | 74.00 | -28.05 | PK | Vertical |
| 5359.85 | 40.22 | 44.20 | 9.86 | 32.00 | -2.34 | 37.87 | 54.00 | -16.13 | AV | Vertical |
| 5359.77 | 48.57 | 44.20 | 9.86 | 32.00 | -2.34 | 46.23 | 74.00 | -27.77 | PK | Horizontal |
| 5359.77 | 39.29 | 44.20 | 9.86 | 32.00 | -2.34 | 36.95 | 54.00 | -17.05 | AV | Horizontal |
| 7205.90 | 54.84 | 43.50 | 11.40 | 35.50 | 3.40 | 58.24 | 74.00 | -15.76 | PK | Vertical |
| 7205.90 | 44.34 | 43.50 | 11.40 | 35.50 | 3.40 | 47.74 | 54.00 | -6.26 | AV | Vertical |
| 7205.71 | 53.92 | 43.50 | 11.40 | 35.50 | 3.40 | 57.32 | 74.00 | -16.68 | PK | Horizontal |
| 7205.71 | 43.87 | 43.50 | 11.40 | 35.50 | 3.40 | 47.27 | 54.00 | -6.73 | AV | Horizontal |
| Middle Channel (GFSK/2440 MHz) | | | | | | | | | | |
| 3263.09 | 61.84 | 44.70 | 6.70 | 28.20 | -9.80 | 52.04 | 74.00 | -21.96 | PK | Vertical |
| 3263.09 | 50.85 | 44.70 | 6.70 | 28.20 | -9.80 | 41.05 | 54.00 | -12.95 | AV | Vertical |
| 3263.01 | 62.14 | 44.70 | 6.70 | 28.20 | -9.80 | 52.34 | 74.00 | -21.66 | PK | Horizontal |
| 3263.01 | 50.58 | 44.70 | 6.70 | 28.20 | -9.80 | 40.78 | 54.00 | -13.22 | AV | Horizontal |
| 4879.86 | 58.28 | 44.20 | 9.04 | 31.60 | -3.56 | 54.72 | 74.00 | -19.28 | PK | Vertical |
| 4879.86 | 50.02 | 44.20 | 9.04 | 31.60 | -3.56 | 46.46 | 54.00 | -7.54 | AV | Vertical |
| 4880.07 | 58.84 | 44.20 | 9.04 | 31.60 | -3.56 | 55.28 | 74.00 | -18.72 | PK | Horizontal |
| 4880.07 | 49.23 | 44.20 | 9.04 | 31.60 | -3.56 | 45.67 | 54.00 | -8.33 | AV | Horizontal |
| 5357.10 | 49.30 | 44.20 | 9.86 | 32.00 | -2.34 | 46.96 | 74.00 | -27.04 | PK | Vertical |
| 5357.10 | 39.12 | 44.20 | 9.86 | 32.00 | -2.34 | 36.78 | 54.00 | -17.22 | AV | Vertical |
| 5357.39 | 48.27 | 44.20 | 9.86 | 32.00 | -2.34 | 45.93 | 74.00 | -28.07 | PK | Horizontal |
| 5357.04 | 38.69 | 44.20 | 9.86 | 32.00 | -2.34 | 36.35 | 54.00 | -17.65 | AV | Horizontal |
| 7320.85 | 53.81 | 43.50 | 11.40 | 35.50 | 3.40 | 57.21 | 74.00 | -16.79 | PK | Vertical |
| 7320.85 | 44.39 | 43.50 | 11.40 | 35.50 | 3.40 | 47.79 | 54.00 | -6.21 | AV | Vertical |
| 7320.41 | 54.64 | 43.50 | 11.40 | 35.50 | 3.40 | 58.04 | 74.00 | -15.96 | PK | Horizontal |
| 7320.41 | 44.14 | 43.50 | 11.40 | 35.50 | 3.40 | 47.54 | 54.00 | -6.46 | AV | Horizontal |

| High Channel (GFSK/2480 MHz) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 3264.71 | 61.81 | 44.70 | 6.70 | 28.20 | -9.80 | 52.01 | 74.00 | -21.99 | PK | Vertical |
| 3264.71 | 50.88 | 44.70 | 6.70 | 28.20 | -9.80 | 41.08 | 54.00 | -12.92 | AV | Vertical |
| 3264.67 | 62.14 | 44.70 | 6.70 | 28.20 | -9.80 | 52.34 | 74.00 | -21.66 | PK | Horizontal |
| 3264.67 | 50.00 | 44.70 | 6.70 | 28.20 | -9.80 | 40.20 | 54.00 | -13.80 | AV | Horizontal |
| 4960.38 | 58.94 | 44.20 | 9.04 | 31.60 | -3.56 | 55.38 | 74.00 | -18.62 | PK | Vertical |
| 4960.38 | 49.28 | 44.20 | 9.04 | 31.60 | -3.56 | 45.72 | 54.00 | -8.28 | AV | Vertical |
| 4960.41 | 58.80 | 44.20 | 9.04 | 31.60 | -3.56 | 55.24 | 74.00 | -18.76 | PK | Horizontal |
| 4960.41 | 49.42 | 44.20 | 9.04 | 31.60 | -3.56 | 45.86 | 54.00 | -8.14 | AV | Horizontal |
| 5359.85 | 48.19 | 44.20 | 9.86 | 32.00 | -2.34 | 45.85 | 74.00 | -28.15 | PK | Vertical |
| 5359.85 | 40.03 | 44.20 | 9.86 | 32.00 | -2.34 | 37.68 | 54.00 | -16.32 | AV | Vertical |
| 5359.57 | 47.27 | 44.20 | 9.86 | 32.00 | -2.34 | 44.93 | 74.00 | -29.07 | PK | Horizontal |
| 5359.57 | 39.41 | 44.20 | 9.86 | 32.00 | -2.34 | 37.07 | 54.00 | -16.93 | AV | Horizontal |
| 7439.77 | 53.66 | 43.50 | 11.40 | 35.50 | 3.40 | 57.06 | 74.00 | -16.94 | PK | Vertical |
| 7439.77 | 43.79 | 43.50 | 11.40 | 35.50 | 3.40 | 47.19 | 54.00 | -6.81 | AV | Vertical |
| 7439.69 | 54.38 | 43.50 | 11.40 | 35.50 | 3.40 | 57.78 | 74.00 | -16.22 | PK | Horizontal |
| 7439.69 | 43.65 | 43.50 | 11.40 | 35.50 | 3.40 | 47.05 | 54.00 | -6.95 | AV | Horizontal |

Note:

1) Factor = Antenna Factor + Cable Loss – Pre-amplifier.
   Emission Level = Reading + Factor.
2) The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.

2M PHY
GFSK

| Frequency | Meter Reading | Amplifier | Loss | Antenna Factor | Corrected Factor | Emission Level | Limits | Margin | Detector | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dBμV) | (dB) | (dB) | (dB/m) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | Type | |
| Low Channel (GFSK/2402 MHz) | | | | | | | | | | |
| 3264.81 | 60.95 | 44.70 | 6.70 | 28.20 | -9.80 | 51.15 | 74.00 | -22.85 | PK | Vertical |
| 3264.81 | 50.50 | 44.70 | 6.70 | 28.20 | -9.80 | 40.70 | 54.00 | -13.30 | AV | Vertical |
| 3264.57 | 62.25 | 44.70 | 6.70 | 28.20 | -9.80 | 52.45 | 74.00 | -21.55 | PK | Horizontal |
| 3264.57 | 50.80 | 44.70 | 6.70 | 28.20 | -9.80 | 41.00 | 54.00 | -13.00 | AV | Horizontal |
| 4804.43 | 58.18 | 44.20 | 9.04 | 31.60 | -3.56 | 54.62 | 74.00 | -19.38 | PK | Vertical |
| 4804.43 | 49.63 | 44.20 | 9.04 | 31.60 | -3.56 | 46.07 | 54.00 | -7.93 | AV | Vertical |
| 4804.43 | 58.81 | 44.20 | 9.04 | 31.60 | -3.56 | 55.25 | 74.00 | -18.75 | PK | Horizontal |
| 4804.43 | 49.25 | 44.20 | 9.04 | 31.60 | -3.56 | 45.69 | 54.00 | -8.31 | AV | Horizontal |
| 5359.66 | 48.00 | 44.20 | 9.86 | 32.00 | -2.34 | 45.66 | 74.00 | -28.34 | PK | Vertical |
| 5359.66 | 39.34 | 44.20 | 9.86 | 32.00 | -2.34 | 36.99 | 54.00 | -17.01 | AV | Vertical |
| 5359.85 | 47.85 | 44.20 | 9.86 | 32.00 | -2.34 | 45.51 | 74.00 | -28.49 | PK | Horizontal |
| 5359.85 | 38.82 | 44.20 | 9.86 | 32.00 | -2.34 | 36.47 | 54.00 | -17.53 | AV | Horizontal |
| 7205.82 | 54.14 | 43.50 | 11.40 | 35.50 | 3.40 | 57.54 | 74.00 | -16.46 | PK | Vertical |
| 7205.82 | 44.72 | 43.50 | 11.40 | 35.50 | 3.40 | 48.12 | 54.00 | -5.88 | AV | Vertical |
| 7205.89 | 53.85 | 43.50 | 11.40 | 35.50 | 3.40 | 57.25 | 74.00 | -16.75 | PK | Horizontal |
| 7205.89 | 44.93 | 43.50 | 11.40 | 35.50 | 3.40 | 48.33 | 54.00 | -5.67 | AV | Horizontal |
| Middle Channel (GFSK/2440 MHz) | | | | | | | | | | |
| 3263.11 | 62.17 | 44.70 | 6.70 | 28.20 | -9.80 | 52.37 | 74.00 | -21.63 | PK | Vertical |
| 3263.11 | 51.41 | 44.70 | 6.70 | 28.20 | -9.80 | 41.61 | 54.00 | -12.39 | AV | Vertical |
| 3263.08 | 61.50 | 44.70 | 6.70 | 28.20 | -9.80 | 51.70 | 74.00 | -22.30 | PK | Horizontal |
| 3263.08 | 50.52 | 44.70 | 6.70 | 28.20 | -9.80 | 40.72 | 54.00 | -13.28 | AV | Horizontal |
| 4880.07 | 58.97 | 44.20 | 9.04 | 31.60 | -3.56 | 55.41 | 74.00 | -18.59 | PK | Vertical |
| 4880.07 | 50.54 | 44.20 | 9.04 | 31.60 | -3.56 | 46.98 | 54.00 | -7.02 | AV | Vertical |
| 4880.05 | 58.56 | 44.20 | 9.04 | 31.60 | -3.56 | 55.00 | 74.00 | -19.00 | PK | Horizontal |
| 4880.05 | 50.28 | 44.20 | 9.04 | 31.60 | -3.56 | 46.72 | 54.00 | -7.28 | AV | Horizontal |
| 5357.05 | 48.51 | 44.20 | 9.86 | 32.00 | -2.34 | 46.17 | 74.00 | -27.83 | PK | Vertical |
| 5357.05 | 39.92 | 44.20 | 9.86 | 32.00 | -2.34 | 37.57 | 54.00 | -16.43 | AV | Vertical |
| 5357.39 | 47.27 | 44.20 | 9.86 | 32.00 | -2.34 | 44.93 | 74.00 | -29.07 | PK | Horizontal |
| 5357.15 | 38.50 | 44.20 | 9.86 | 32.00 | -2.34 | 36.16 | 54.00 | -17.84 | AV | Horizontal |
| 7320.85 | 53.59 | 43.50 | 11.40 | 35.50 | 3.40 | 56.99 | 74.00 | -17.01 | PK | Vertical |
| 7320.85 | 44.40 | 43.50 | 11.40 | 35.50 | 3.40 | 47.80 | 54.00 | -6.20 | AV | Vertical |
| 7320.28 | 53.85 | 43.50 | 11.40 | 35.50 | 3.40 | 57.25 | 74.00 | -16.75 | PK | Horizontal |
| 7320.28 | 44.63 | 43.50 | 11.40 | 35.50 | 3.40 | 48.03 | 54.00 | -5.97 | AV | Horizontal |

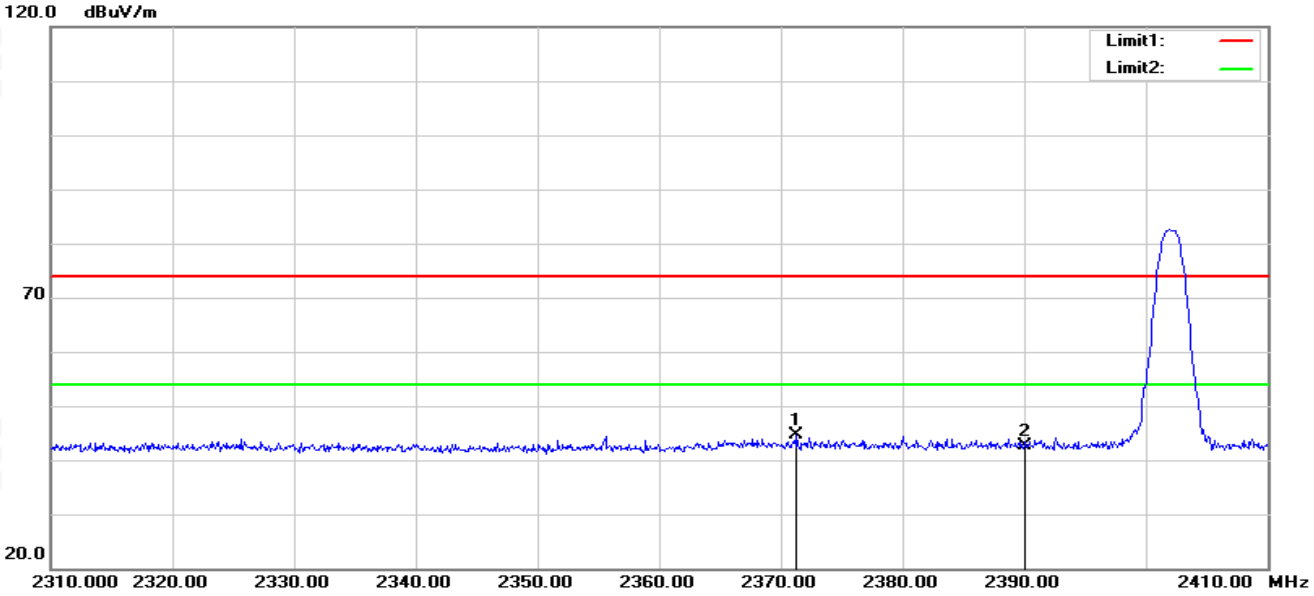
| High Channel (GFSK/2480 MHz) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 3264.76 | 61.32 | 44.70 | 6.70 | 28.20 | -9.80 | 51.52 | 74.00 | -22.48 | PK | Vertical |
| 3264.76 | 49.85 | 44.70 | 6.70 | 28.20 | -9.80 | 40.05 | 54.00 | -13.95 | AV | Vertical |
| 3264.70 | 61.05 | 44.70 | 6.70 | 28.20 | -9.80 | 51.25 | 74.00 | -22.75 | PK | Horizontal |
| 3264.70 | 50.38 | 44.70 | 6.70 | 28.20 | -9.80 | 40.58 | 54.00 | -13.42 | AV | Horizontal |
| 4960.36 | 59.05 | 44.20 | 9.04 | 31.60 | -3.56 | 55.49 | 74.00 | -18.51 | PK | Vertical |
| 4960.36 | 49.67 | 44.20 | 9.04 | 31.60 | -3.56 | 46.11 | 54.00 | -7.89 | AV | Vertical |
| 4960.37 | 59.55 | 44.20 | 9.04 | 31.60 | -3.56 | 55.99 | 74.00 | -18.01 | PK | Horizontal |
| 4960.37 | 50.20 | 44.20 | 9.04 | 31.60 | -3.56 | 46.64 | 54.00 | -7.36 | AV | Horizontal |
| 5359.84 | 48.79 | 44.20 | 9.86 | 32.00 | -2.34 | 46.44 | 74.00 | -27.56 | PK | Vertical |
| 5359.84 | 40.15 | 44.20 | 9.86 | 32.00 | -2.34 | 37.81 | 54.00 | -16.19 | AV | Vertical |
| 5359.76 | 47.43 | 44.20 | 9.86 | 32.00 | -2.34 | 45.08 | 74.00 | -28.92 | PK | Horizontal |
| 5359.76 | 39.09 | 44.20 | 9.86 | 32.00 | -2.34 | 36.75 | 54.00 | -17.25 | AV | Horizontal |
| 7439.75 | 54.54 | 43.50 | 11.40 | 35.50 | 3.40 | 57.94 | 74.00 | -16.06 | PK | Vertical |
| 7439.75 | 43.74 | 43.50 | 11.40 | 35.50 | 3.40 | 47.14 | 54.00 | -6.86 | AV | Vertical |
| 7439.91 | 54.23 | 43.50 | 11.40 | 35.50 | 3.40 | 57.63 | 74.00 | -16.37 | PK | Horizontal |
| 7439.91 | 43.94 | 43.50 | 11.40 | 35.50 | 3.40 | 47.34 | 54.00 | -6.66 | AV | Horizontal |

Note:

1) Factor = Antenna Factor + Cable Loss – Pre-amplifier.
   Emission Level = Reading + Factor.
2) The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.

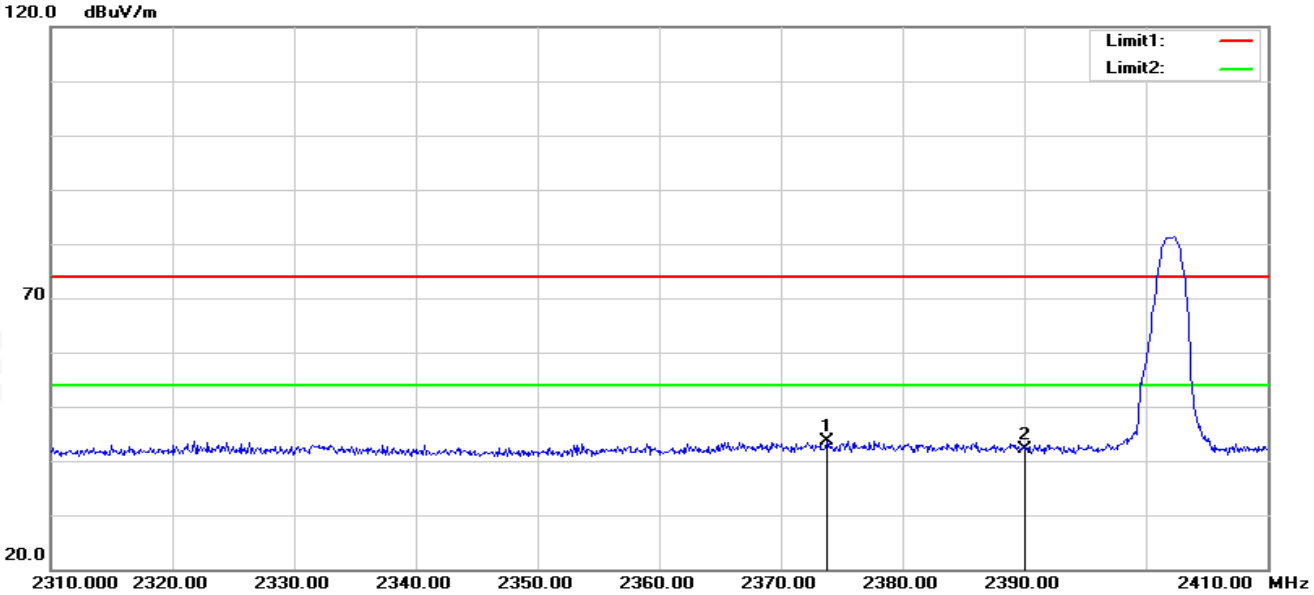
4.6 TEST RESULTS (Restricted Bands Requirements)

1M PHY
GFSK-Low
Horizontal



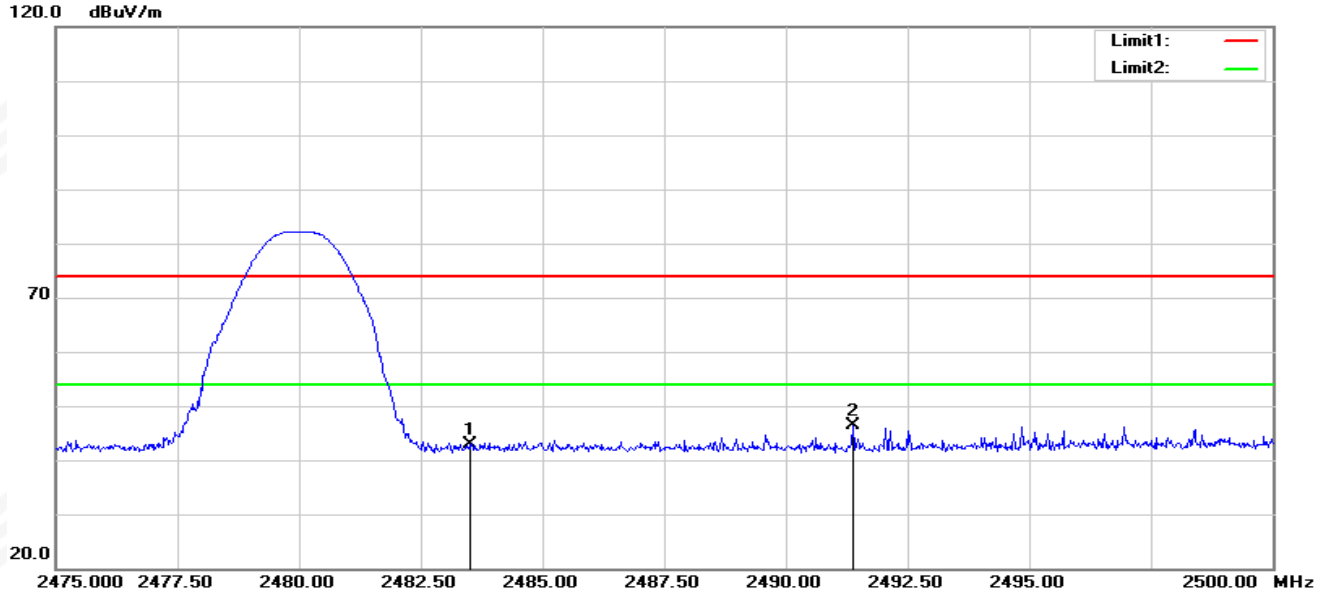

| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2371.300 | 40.55 | 4.06 | 44.61 | 74.00 | -29.39 | peak |
| 2 | 2390.000 | 38.36 | 4.34 | 42.70 | 74.00 | -31.30 | peak |

Vertical



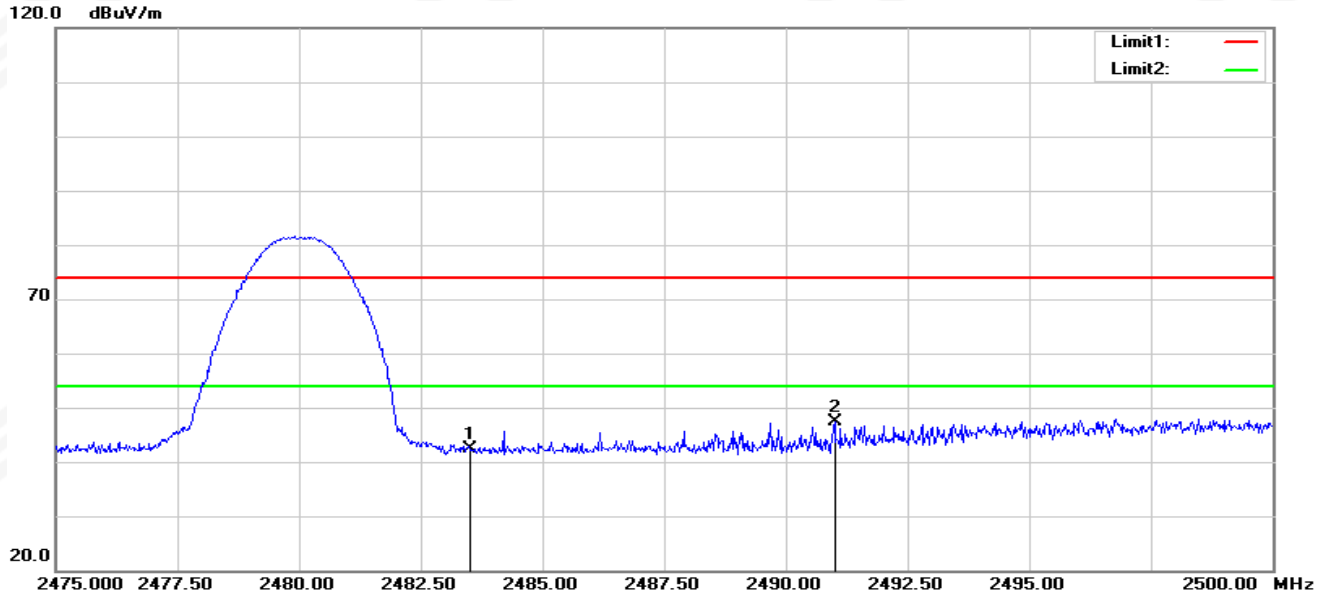

| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2373.800 | 39.57 | 4.10 | 43.67 | 74.00 | -30.33 | peak |
| 2 | 2390.000 | 37.74 | 4.34 | 42.08 | 74.00 | -31.92 | peak |

GFSK-High
Horizontal



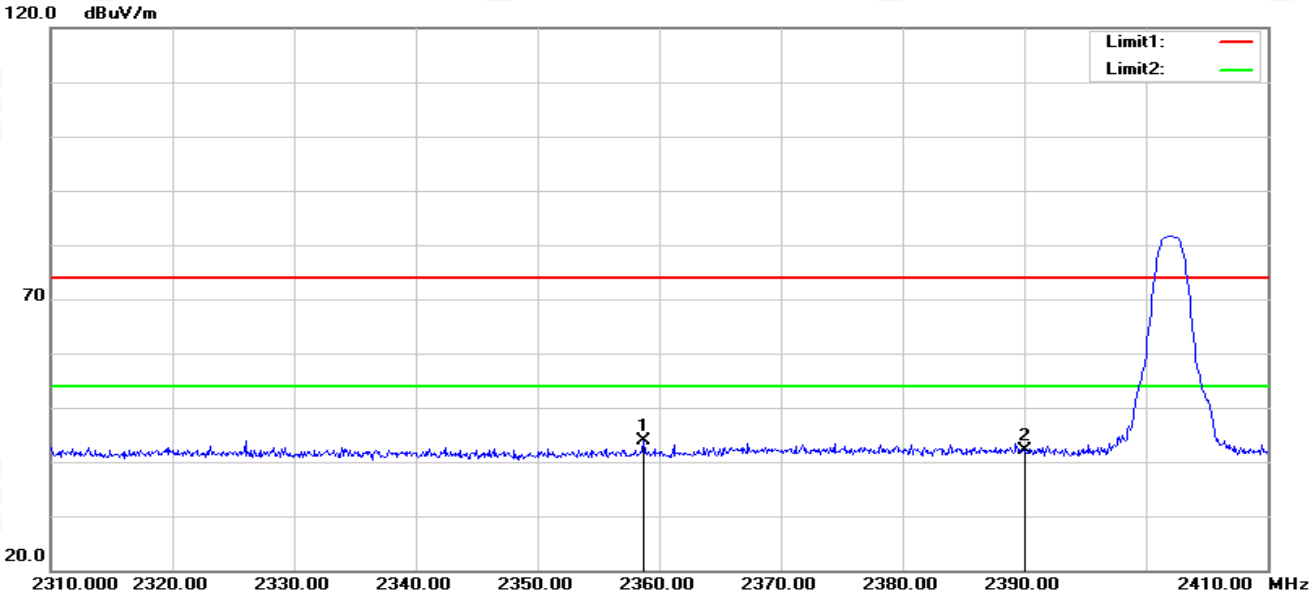

| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 38.24 | 4.60 | 42.84 | 74.00 | -31.16 | peak |
| 2 | 2491.375 | 41.66 | 4.63 | 46.29 | 74.00 | -27.71 | peak |

Vertical



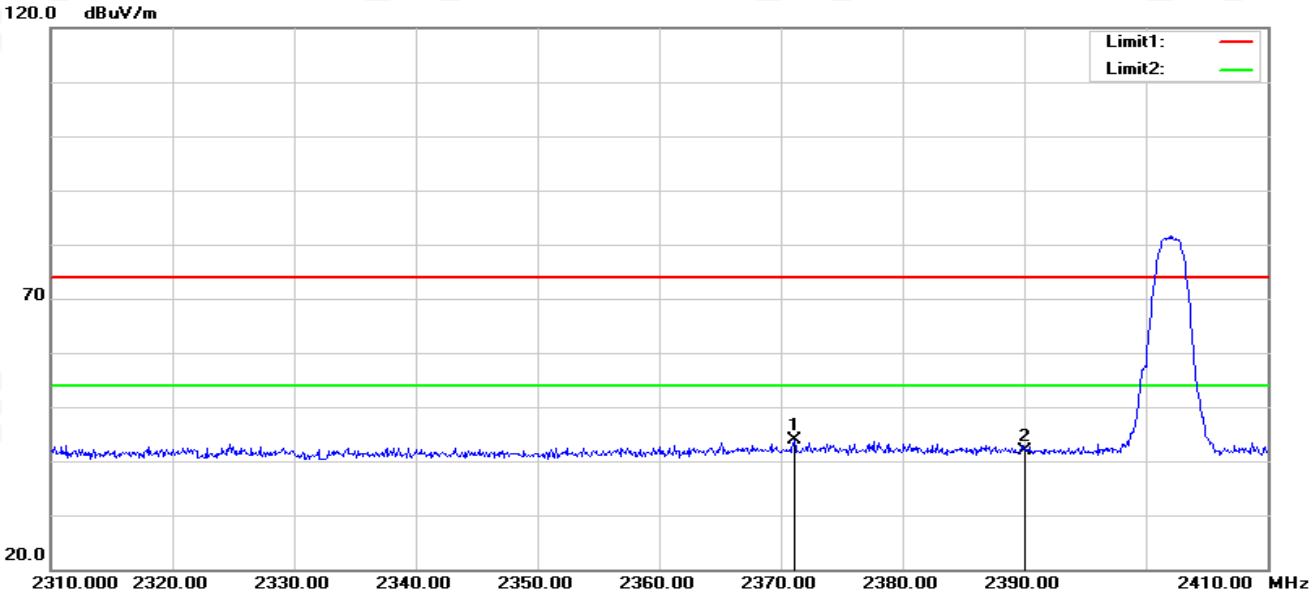

| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 37.86 | 4.60 | 42.46 | 74.00 | -31.54 | peak |
| 2 | 2491.000 | 42.82 | 4.63 | 47.45 | 74.00 | -26.55 | peak |

2M PHY
GFSK-Low
Horizontal



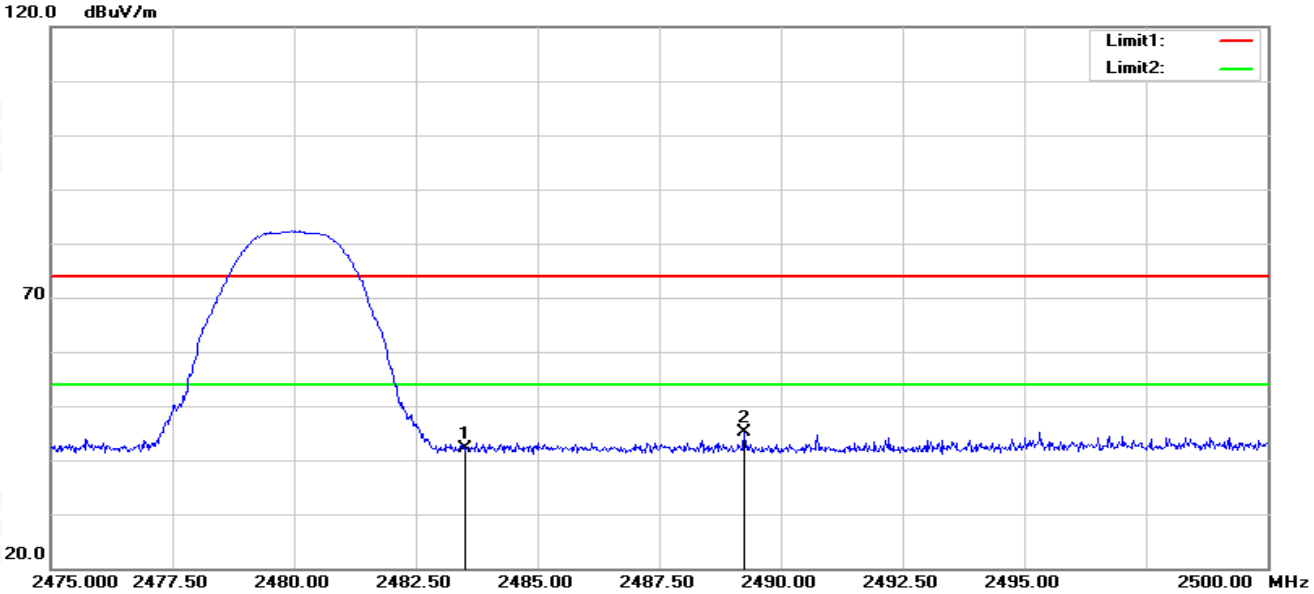

| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 2358.700 | 39.92 | 3.87 | 43.79 | 74.00 | -30.21 | peak |
| 2 | 2390.000 | 37.67 | 4.34 | 42.01 | 74.00 | -31.99 | peak |

Vertical



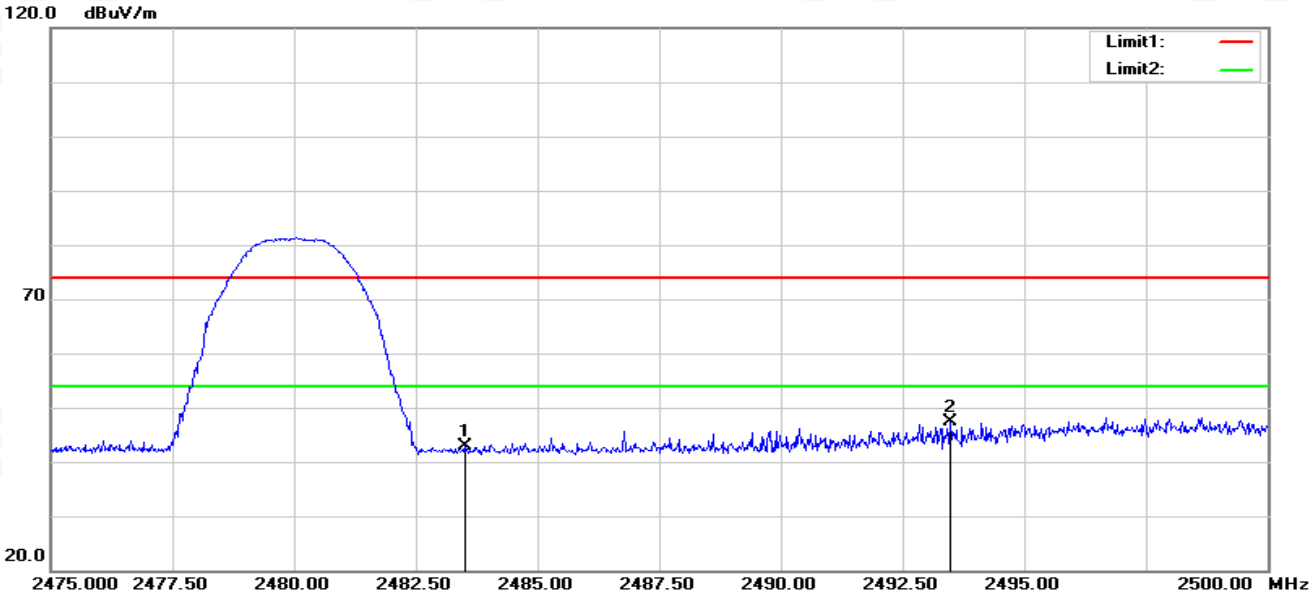

| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 2371.100 | 39.87 | 4.05 | 43.92 | 74.00 | -30.08 | peak |
| 2 | 2390.000 | 37.56 | 4.34 | 41.90 | 74.00 | -32.10 | peak |

GFSK-High
Horizontal




| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 37.41 | 4.60 | 42.01 | 74.00 | -31.99 | peak |
| 2 | 2489.250 | 40.61 | 4.62 | 45.23 | 74.00 | -28.77 | peak |

Vertical




| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 38.31 | 4.60 | 42.91 | 74.00 | -31.09 | peak |
| 2 | 2493.475 | 42.85 | 4.64 | 47.49 | 74.00 | -26.51 | peak |

# 5. CONDUCTED SPURIOUS & BAND EDGE EMISSION

## 5.1 LIMIT

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

## 5.2 TEST PROCEDURE

| Spectrum Parameter | Setting |
|---|---|
| Detector | Peak |
| Start/Stop Frequency | 30 MHz to 10th carrier harmonic |
| RB / VB (emission in restricted band) | 100 KHz/300 KHz |
| Trace-Mode: | Max hold |

For Band edge

| Spectrum Parameter | Setting |
|---|---|
| Detector | Peak |
| Start/Stop Frequency | Lower Band Edge: 2300 – 2407 MHz<br>Upper Band Edge: 2475 – 2500 MHz |
| RB / VB (emission in restricted band) | 100 KHz/300 KHz |
| Trace-Mode: | Max hold |

## 5.3 TEST SETUP


The EUT is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna termina is 50 Ohm; the path loss as the factor is calibrated to correct the reading. Make the measurement with the spectrum analyzer's resolution bandwidth(RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

## 5.4 EUT OPERATION CONDITIONS

Please refer to section 3.4 of this report.

## 5.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

# 6. POWER SPECTRAL DENSITY TEST

## 6.1 LIMIT

| FCC Part 15.247,Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247(e) | Power Spectral Density | ≤8 dBm (RBW≥3KHz) | 2400-2483.5 | PASS |

## 6.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW to: 100 kHz ≥ RBW ≥ 3 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

## 6.3 TEST SETUP


## 6.4 EUT OPERATION CONDITIONS

Please refer to section 3.4 of this report.

## 6.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

# 7. BANDWIDTH TEST

## 7.1 LIMIT

| FCC Part 15.247,Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247(a)(2) | Bandwidth | >= 500KHz (6dB bandwidth) | 2400-2483.5 | PASS |

## 7.2 TEST PROCEDURE

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW≥3RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be≥6 dB.

## 7.3 TEST SETUP


## 7.4 EUT OPERATION CONDITIONS

Please refer to section 3.4 of this report.

## 7.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

# 8. PEAK OUTPUT POWER TEST

## 8.1 LIMIT

| FCC Part 15.247,Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247(b)(3) | Output Power | 1 watt or 30dBm | 2400-2483.5 | PASS |

## 8.2 TEST PROCEDURE

One of the following procedures may be used to determine the averaging conducted output power of a DTS EUT.

Method AVGSA-2 uses trace averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction. The procedure for this method is as follows:

a) Measure the duty cycle D of the transmitter output signal as described in 11.6.
b) Set span to at least 1.5 times the OBW.
c) Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
d) Set VBW ≥ [3 × RBW].
e) Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)
f) Sweep time = auto.
g) Detector = RMS (i.e., power averaging), if available. Otherwise, use the sample detector mode. h) Do not use sweep triggering. Allow the sweep to “free run.”
i) Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the ON and OFF periods of the transmitter.
j) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
k) Add [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is 25%.

One of the following procedures may be used to determine the maximum peak conducted output power of a DTS EUT.

RBW ≥ DTS bandwidth

The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ [3 × RBW].
c) Set span ≥ [3 × RBW].
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

8.3 TEST SETUP


8.4 EUT OPERATION CONDITIONS
Please refer to section 3.4 of this report.

8.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

# 9. ANTENNA REQUIREMENT

## 9.1 STANDARD REQUIREMENT

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

## 9.2 EUT ANTENNA

The EUT antenna is PCB Antenna. It comply with the standard requirement.

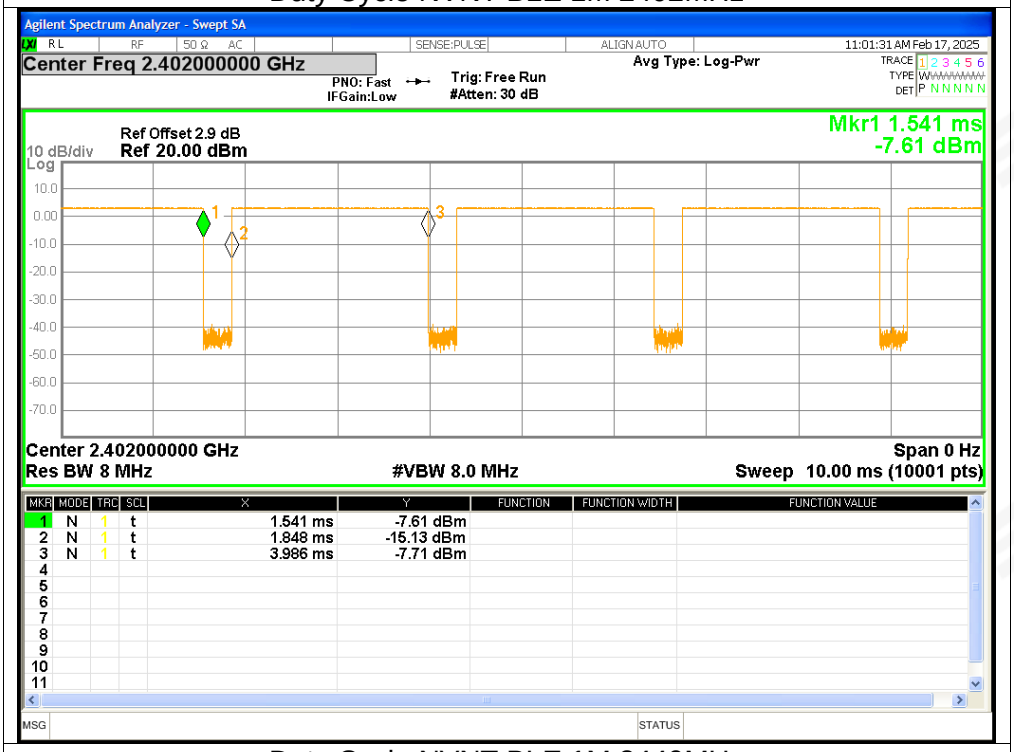
APPENDIX 1-TEST DATA

# 1. Duty Cycle

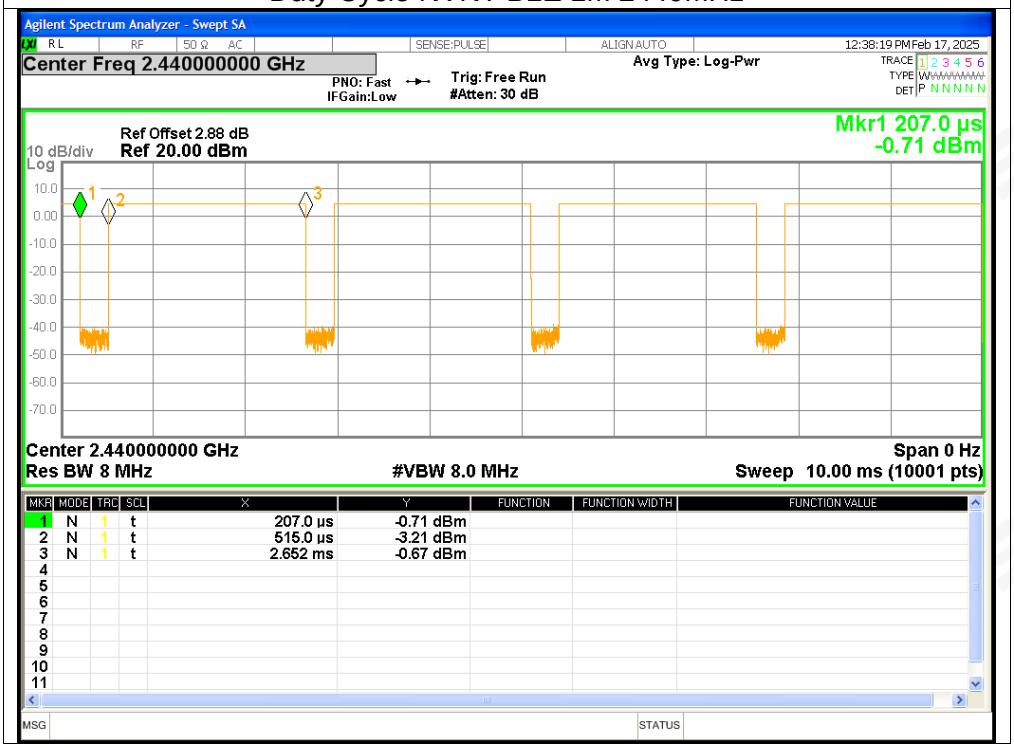
| Condition | Mode | Frequency (MHz) | Duty Cycle (%) | Correction Factor (dB) | 1/T (kHz) |
|---|---|---|---|---|---|
| NVNT | BLE 1M | 2402 | 87.44 | 0.58 | 0.47 |
| NVNT | BLE 1M | 2440 | 87.4 | 0.58 | 0.47 |
| NVNT | BLE 1M | 2480 | 87.44 | 0.58 | 0.47 |
| NVNT | BLE 2M | 2402 | 77.77 | 1.09 | 0.93 |
| NVNT | BLE 2M | 2440 | 77.83 | 1.09 | 0.93 |
| NVNT | BLE 2M | 2480 | 77.9 | 1.08 | 0.92 |

## Test Graphs

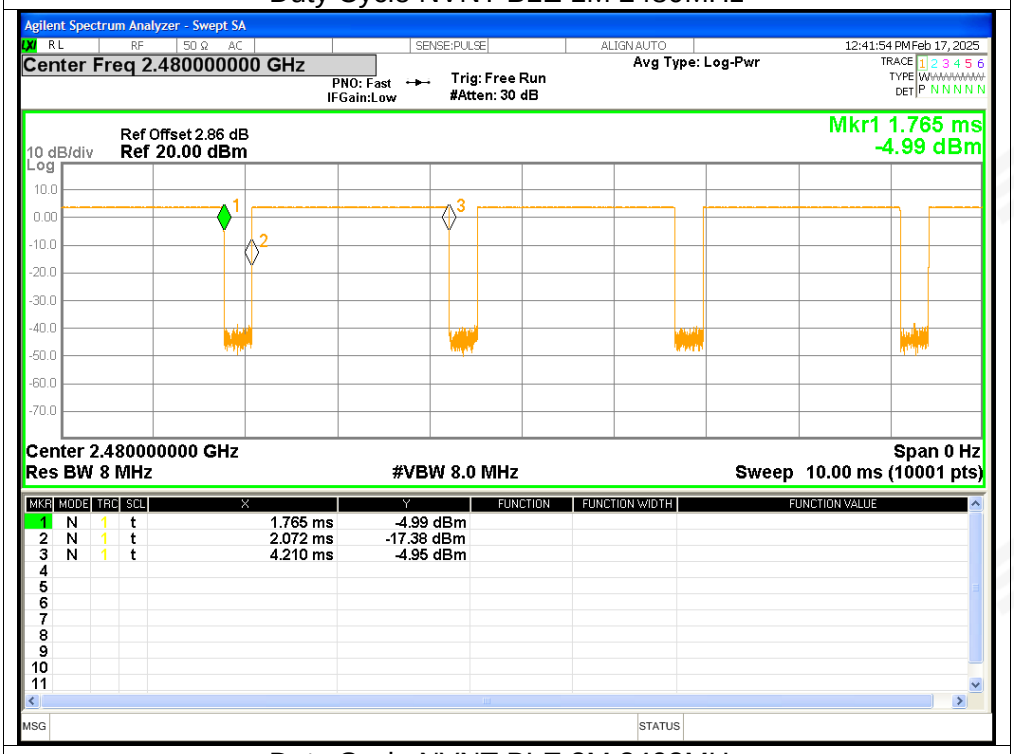
### Duty Cycle NVNT BLE 1M 2402MHz



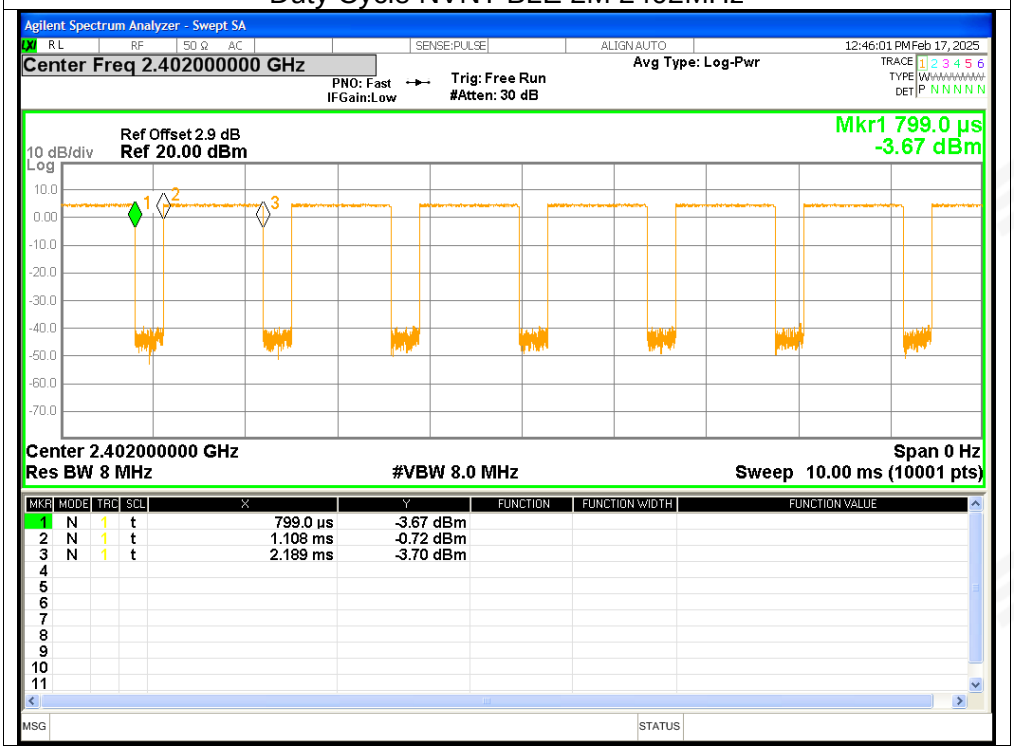

### Duty Cycle NVNT BLE 1M 2440MHz



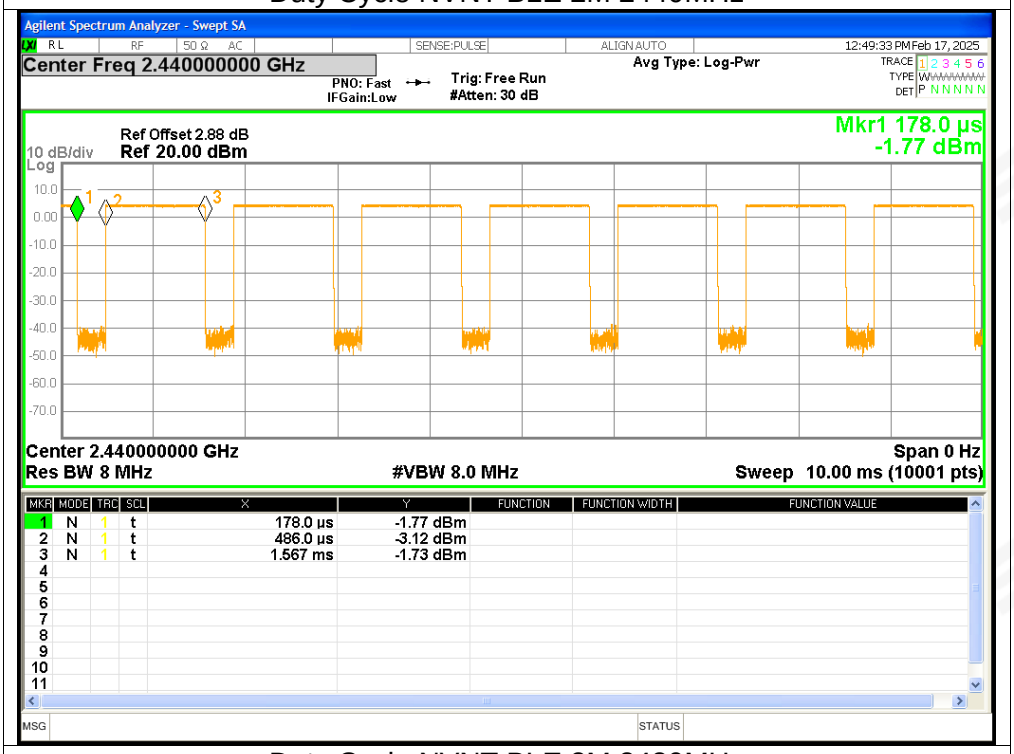
Duty Cycle NVNT BLE 1M 2480MHz



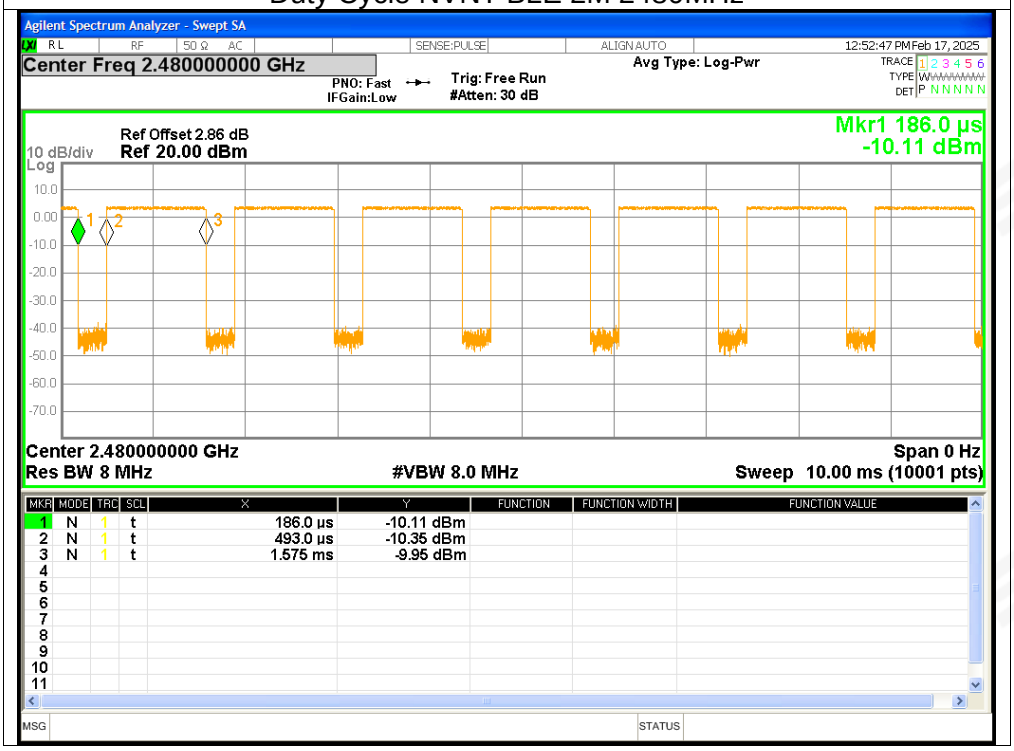

Duty Cycle NVNT BLE 2M 2402MHz



Duty Cycle NVNT BLE 2M 2440MHz




Duty Cycle NVNT BLE 2M 2480MHz

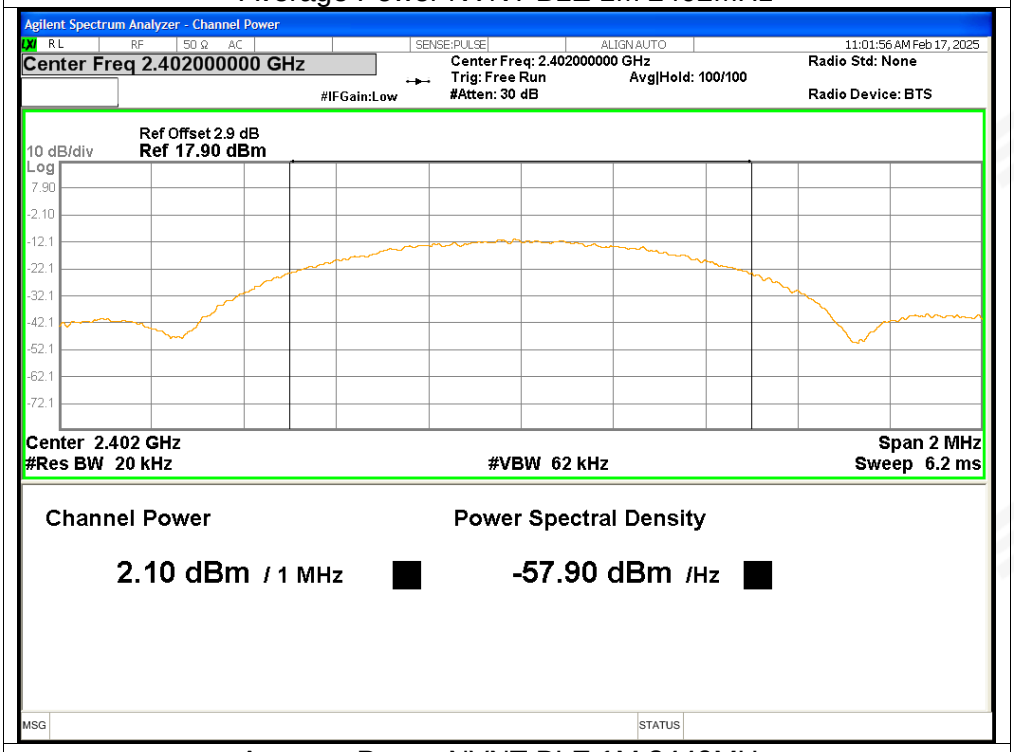


# 2. Maximum Average Conducted Output Power

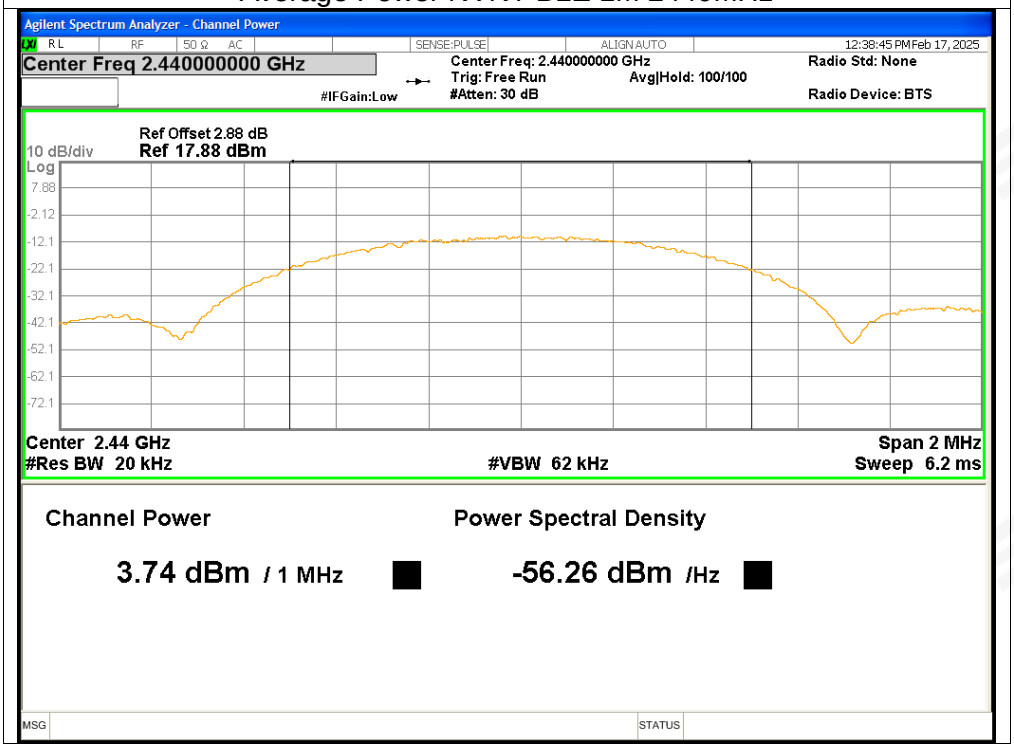
| Condition | Mode | Frequency (MHz) | Conducted Power (dBm) | Duty Factor (dB) | Total Power (dBm) | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|---|
| NVNT | BLE 1M | 2402 | 2.1 | 0.58 | 2.68 | <=30 | Pass |
| NVNT | BLE 1M | 2440 | 3.74 | 0.58 | 4.32 | <=30 | Pass |
| NVNT | BLE 1M | 2480 | 2.73 | 0.58 | 3.31 | <=30 | Pass |
| NVNT | BLE 2M | 2402 | 3.12 | 1.09 | 4.21 | <=30 | Pass |
| NVNT | BLE 2M | 2440 | 2.87 | 1.09 | 3.96 | <=30 | Pass |
| NVNT | BLE 2M | 2480 | 1.88 | 1.08 | 2.96 | <=30 | Pass |

## Test Graphs

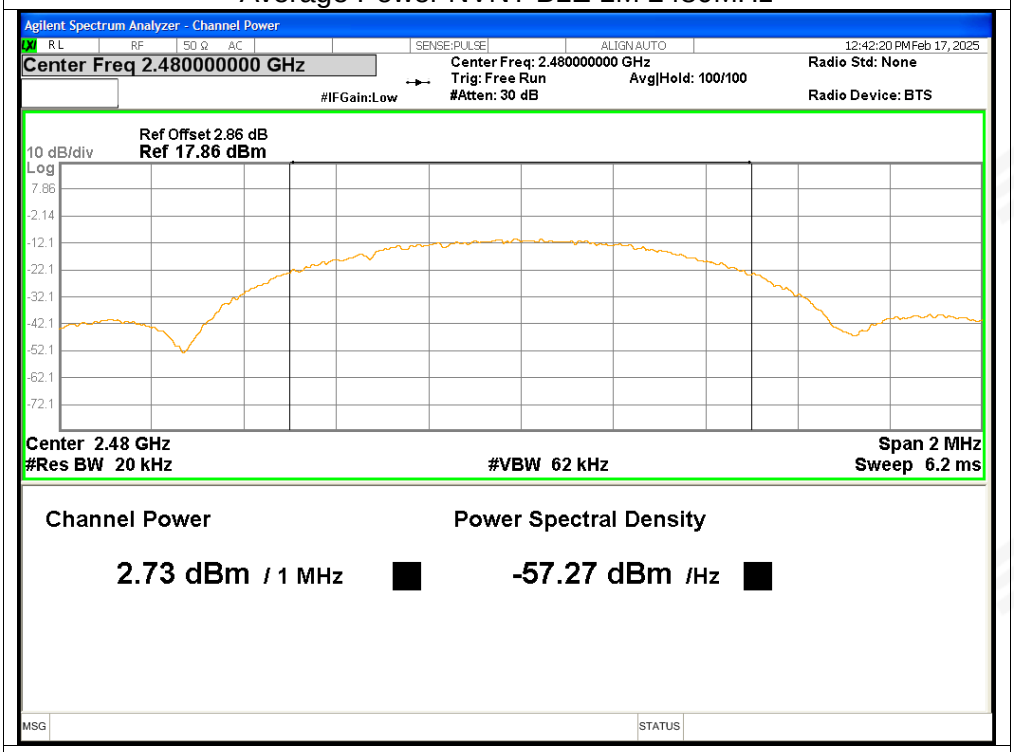
### Average Power NVNT BLE 1M 2402MHz



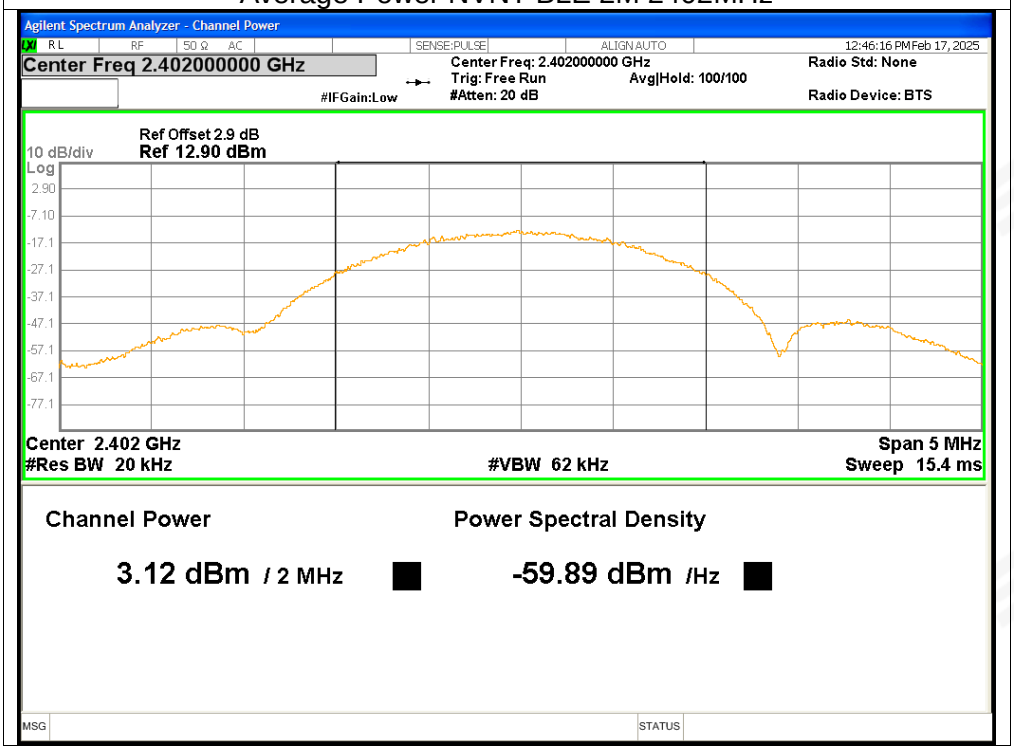

### Average Power NVNT BLE 1M 2440MHz



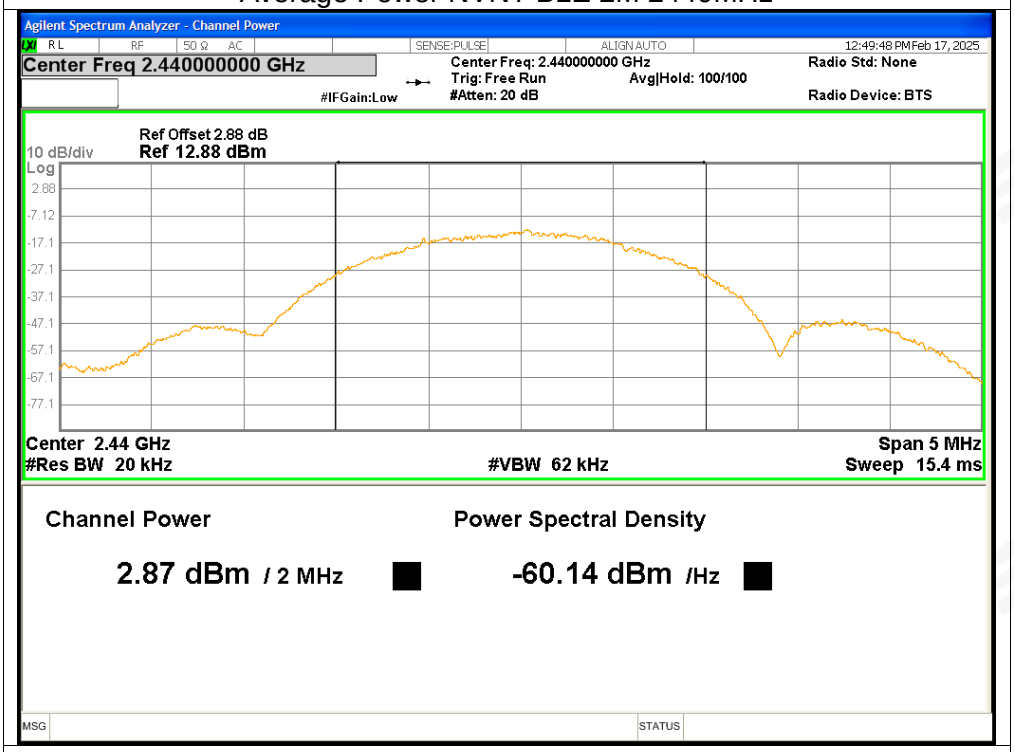
Average Power NVNT BLE 1M 2480MHz



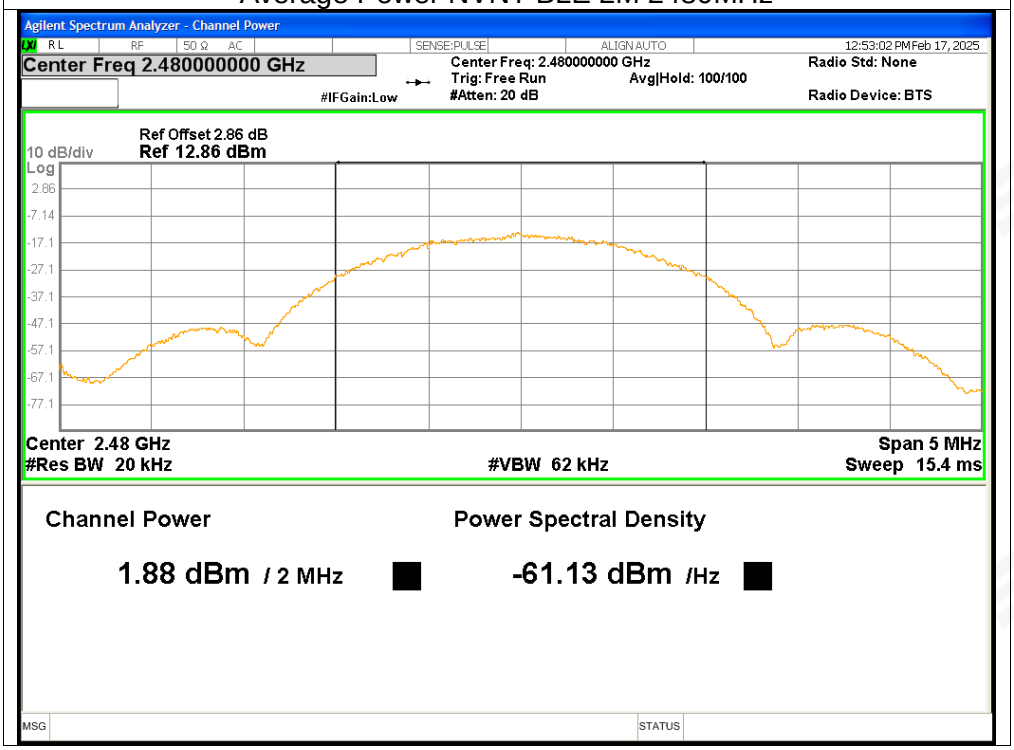

Average Power NVNT BLE 2M 2402MHz



Average Power NVNT BLE 2M 2440MHz



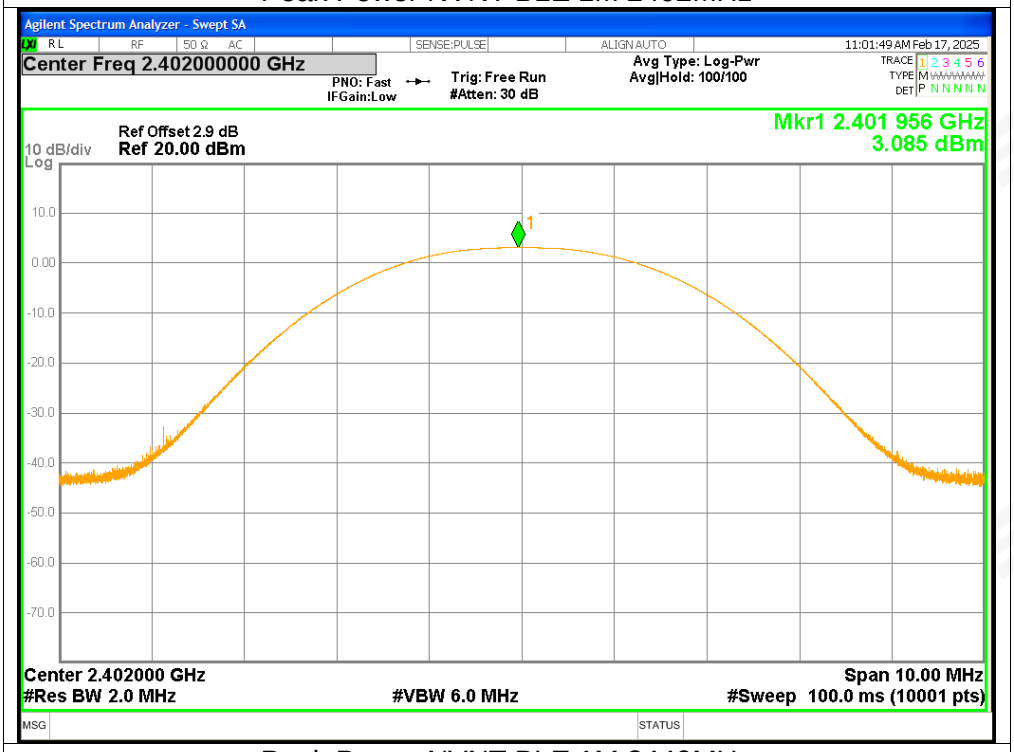

Average Power NVNT BLE 2M 2480MHz



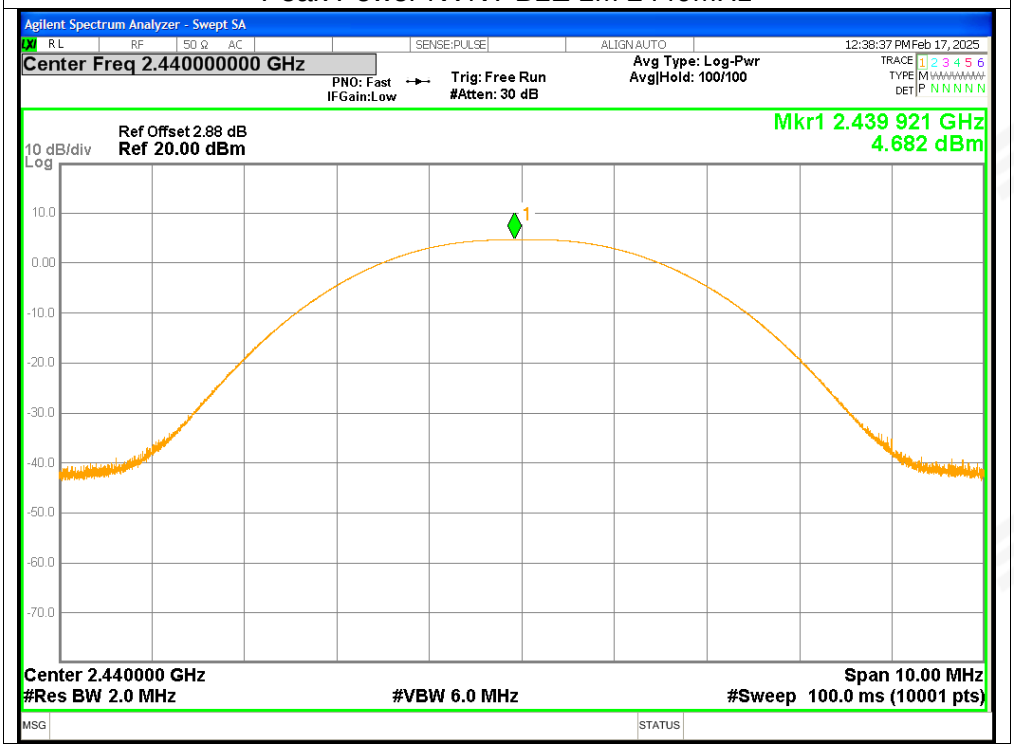
# 3. Maximum Peak Conducted Output Power

| Condition | Mode | Frequency (MHz) | Conducted Power (dBm) | Limit (dBm) | Verdict |
|---|---|---|---|---|---|
| NVNT | BLE 1M | 2402 | 3.09 | <=30 | Pass |
| NVNT | BLE 1M | 2440 | 4.68 | <=30 | Pass |
| NVNT | BLE 1M | 2480 | 3.81 | <=30 | Pass |
| NVNT | BLE 2M | 2402 | 4.64 | <=30 | Pass |
| NVNT | BLE 2M | 2440 | 4.43 | <=30 | Pass |
| NVNT | BLE 2M | 2480 | 3.64 | <=30 | Pass |

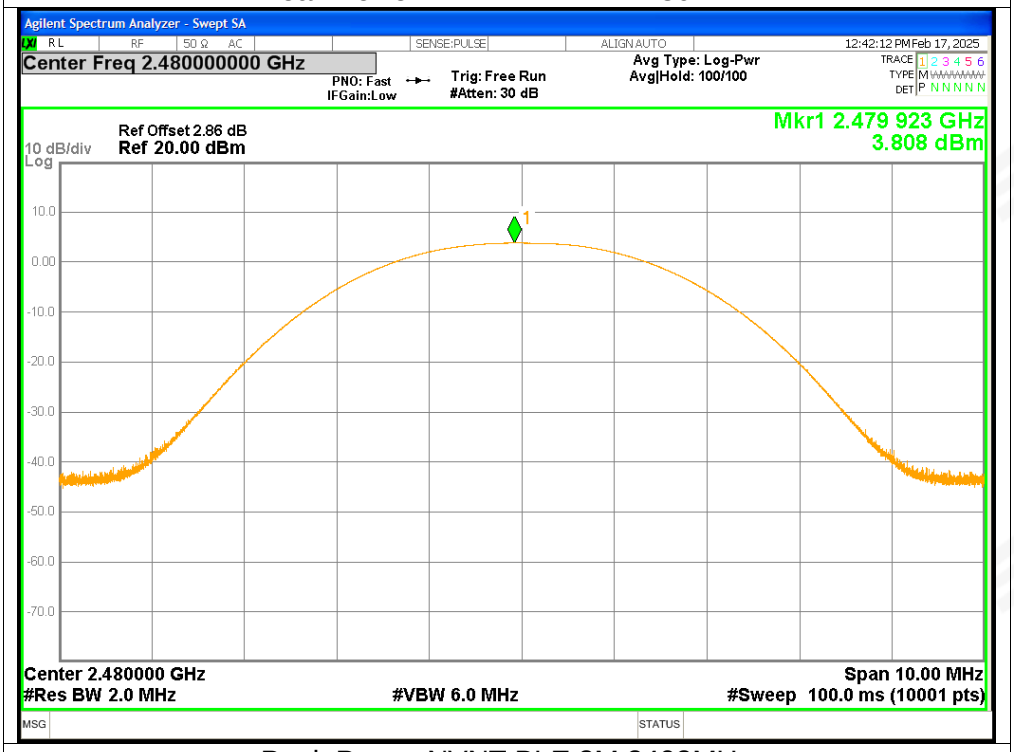
| Test Graphs |
| --- |
| Peak Power NVNT BLE 1M 2402MHz |



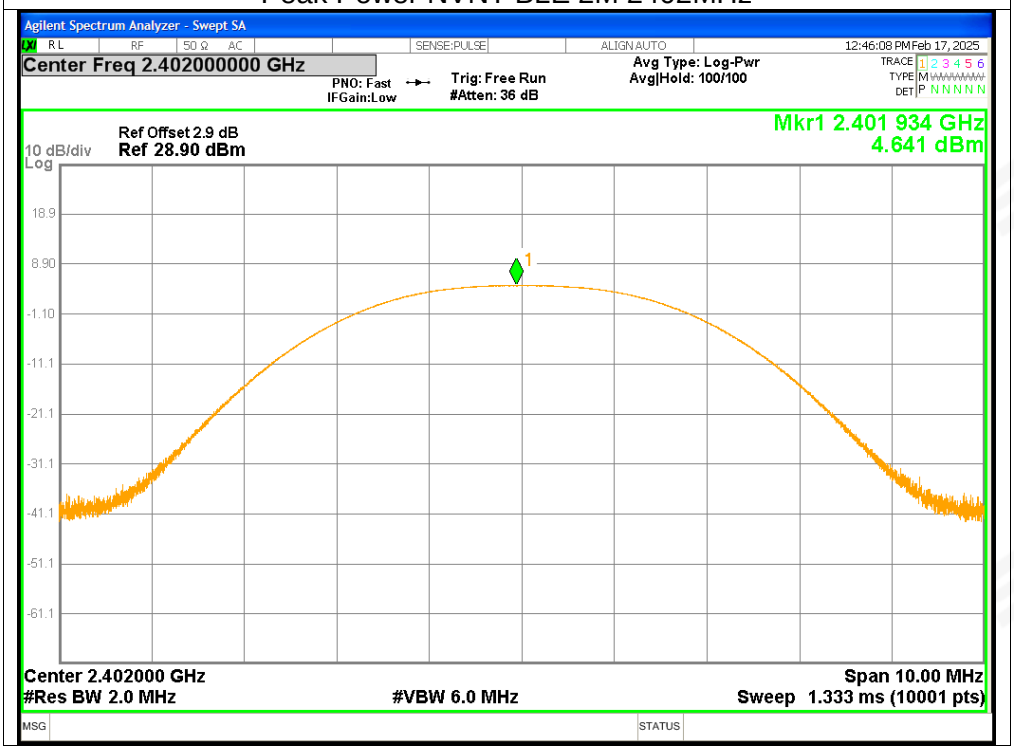

| Peak Power NVNT BLE 1M 2440MHz |
| --- |



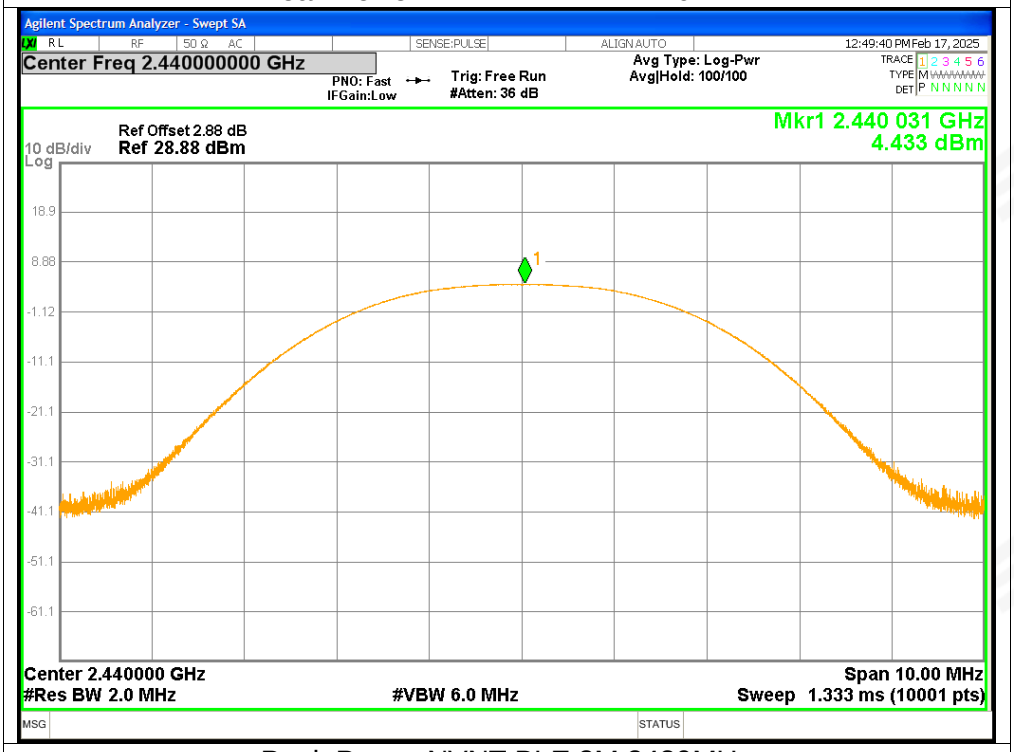
Peak Power NVNT BLE 1M 2480MHz



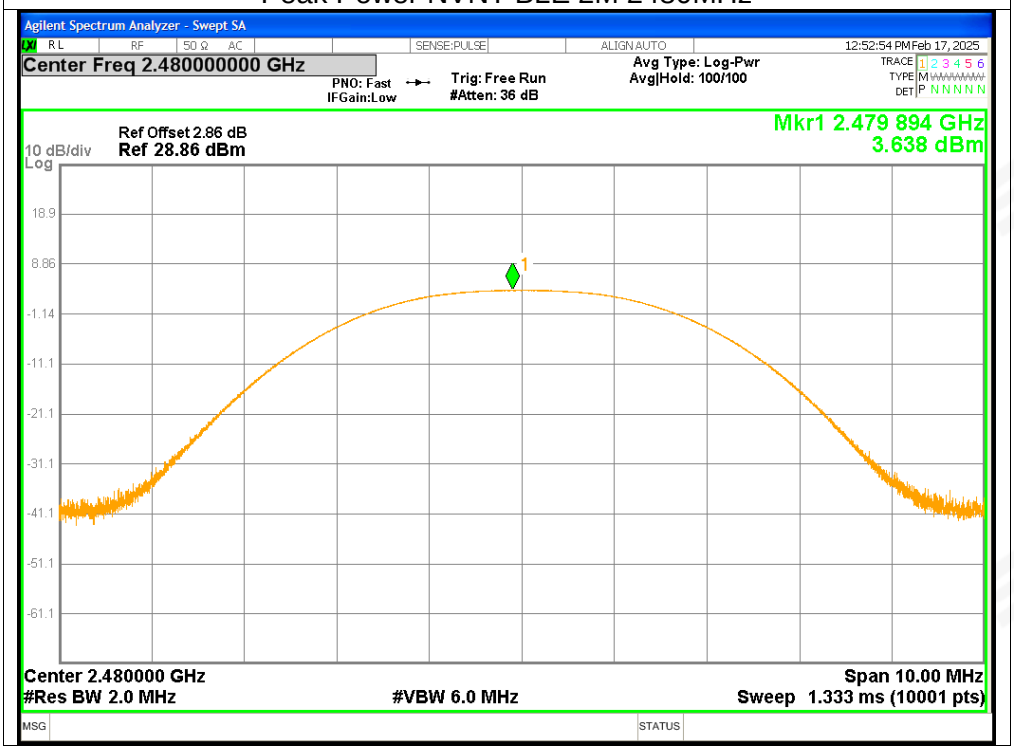

Peak Power NVNT BLE 2M 2402MHz



Peak Power NVNT BLE 2M 2440MHz




Peak Power NVNT BLE 2M 2480MHz



# 4. -6dB Bandwidth

| Condition | Mode | Frequency (MHz) | -6 dB Bandwidth (MHz) | Limit -6 dB Bandwidth (MHz) | Verdict |
|---|---|---|---|---|---|
| NVNT | BLE 1M | 2402 | 0.664 | >=0.5 | Pass |
| NVNT | BLE 1M | 2440 | 0.6665 | >=0.5 | Pass |
| NVNT | BLE 1M | 2480 | 0.7037 | >=0.5 | Pass |
| NVNT | BLE 2M | 2402 | 1.1394 | >=0.5 | Pass |
| NVNT | BLE 2M | 2440 | 1.1413 | >=0.5 | Pass |
| NVNT | BLE 2M | 2480 | 1.1341 | >=0.5 | Pass |