

# RF Test Data for Bluetooth LE (Conducted Measurements)

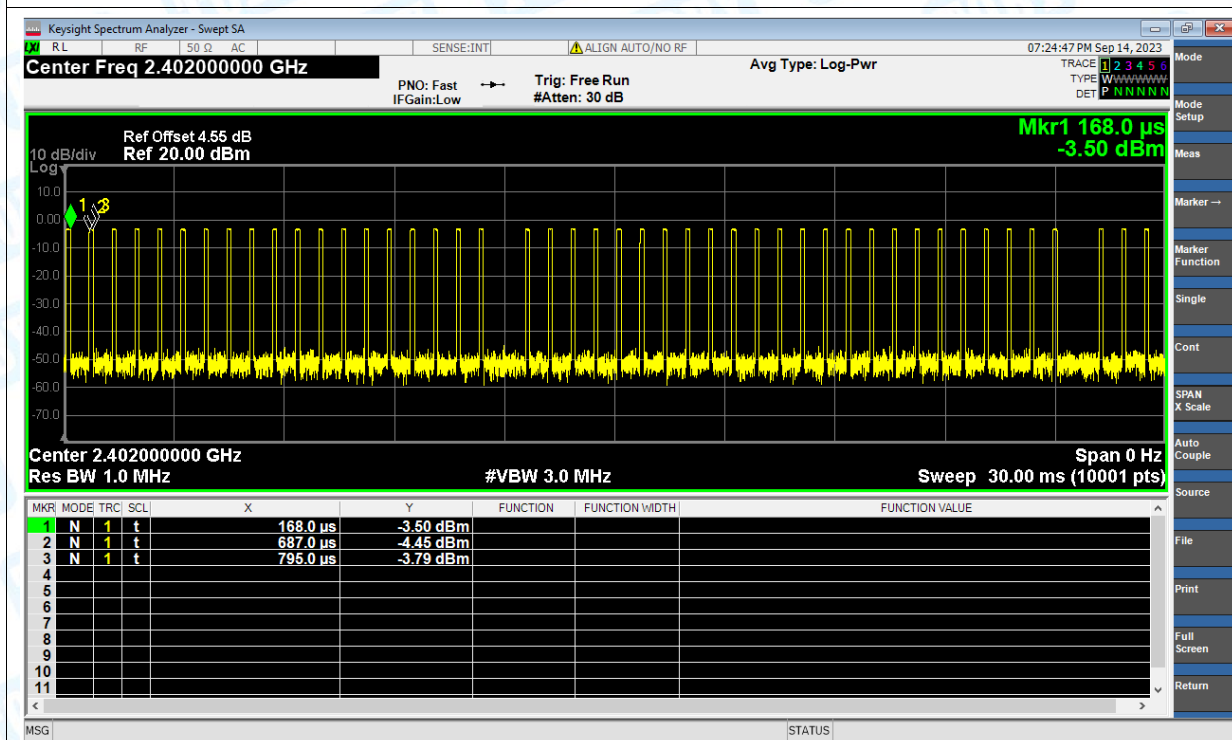
| General Description of EUT                                                                                                                  |                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Product Name:                                                                                                                               | MULTIFUNCTION LCD PROGRAM BOX Pro |
| Test Model:                                                                                                                                 | MULTIFUNCTION LCD PROGRAM BOX Pro |
| Sample ID:                                                                                                                                  | HC-C-202309-0059-01-02-2#         |
| Environmental Conditions                                                                                                                    |                                   |
| Temperature:                                                                                                                                | 24℃                               |
| Relative Humidity:                                                                                                                          | 50%                               |
| Test Voltage:                                                                                                                               | DC 5V                             |
| Test Engineer:                                                                                                                              | Liyingjing                        |
| Note: For a more detailed features description, please refer to the report TBR-C-202309-0059-1<br>The report only show the worst case data. |                                   |

## Duty Cycle

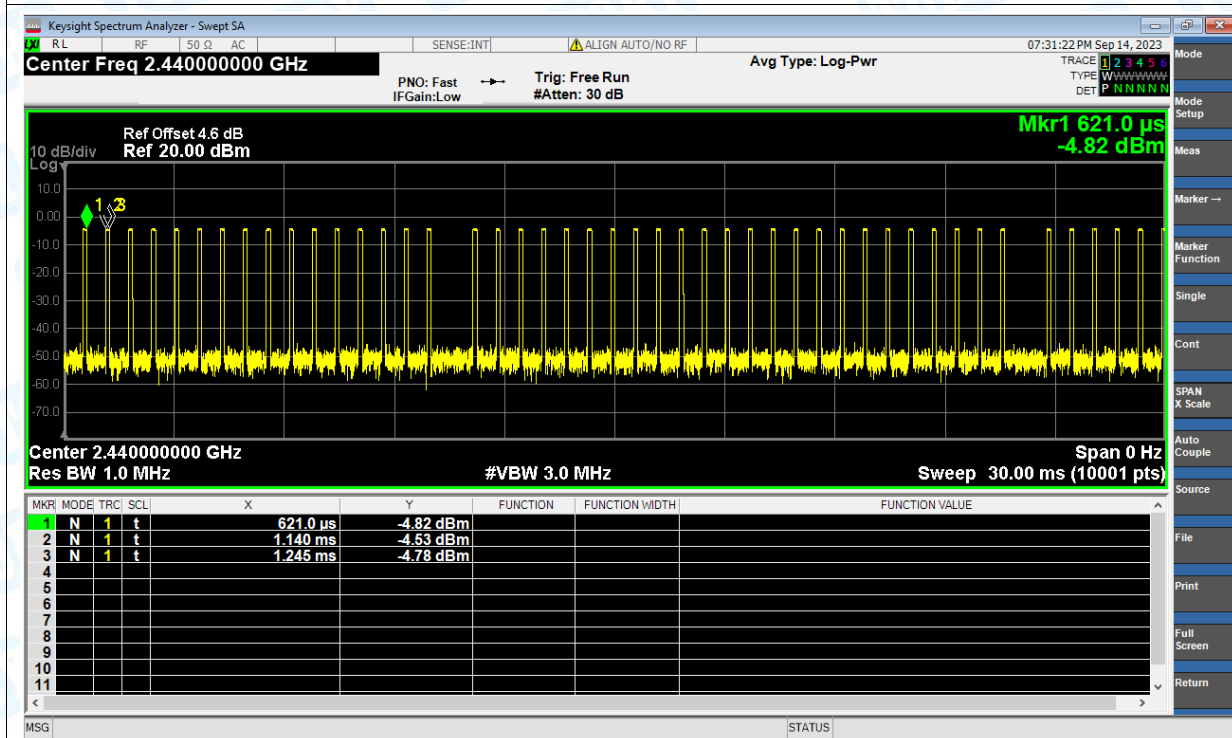
| Condition | Mode      | Frequency (MHz) | Antenna | Duty Cycle (%) | Correction Factor (dB) | 1/T (kHz) |
|-----------|-----------|-----------------|---------|----------------|------------------------|-----------|
| NVNT      | BLE 1Mbps | 2402            | Ant1    | 17.22          | 7.64                   | 9.26      |
| NVNT      | BLE 1Mbps | 2440            | Ant1    | 16.83          | 7.74                   | 9.52      |
| NVNT      | BLE 1Mbps | 2480            | Ant1    | 17.31          | 7.62                   | 9.26      |
| NVNT      | BLE 2Mbps | 2402            | Ant1    | 10.58          | 9.76                   | 15.15     |
| NVNT      | BLE 2Mbps | 2440            | Ant1    | 10.58          | 9.76                   | 15.15     |
| NVNT      | BLE 2Mbps | 2480            | Ant1    | 10.58          | 9.76                   | 15.15     |

## Test Graphs

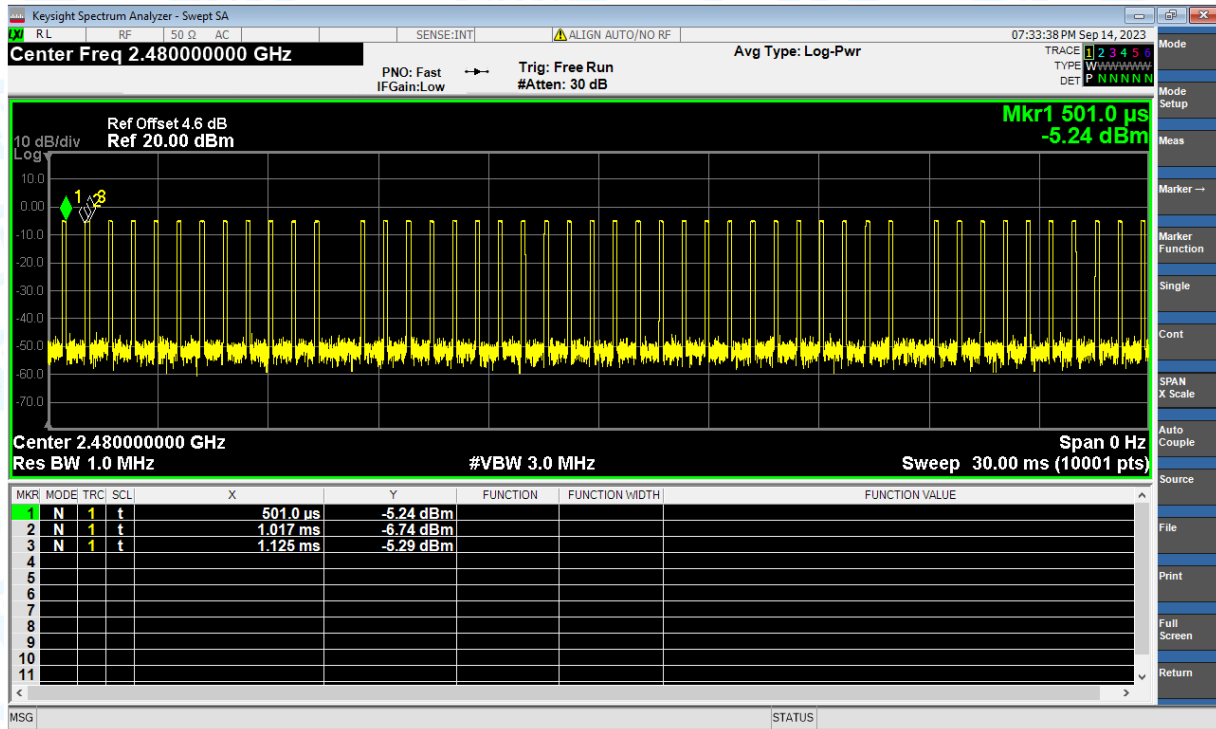
### Duty Cycle NVNT BLE 1Mbps 2402MHz Ant1



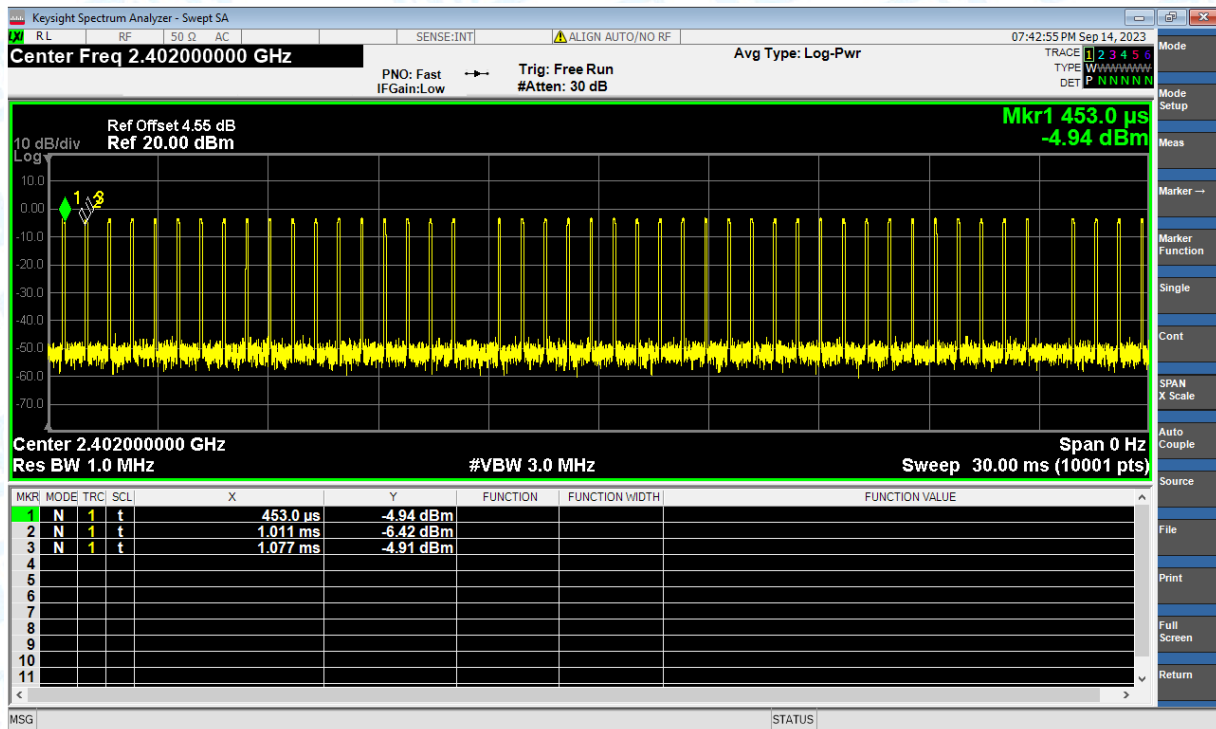
### Duty Cycle NVNT BLE 1Mbps 2440MHz Ant1



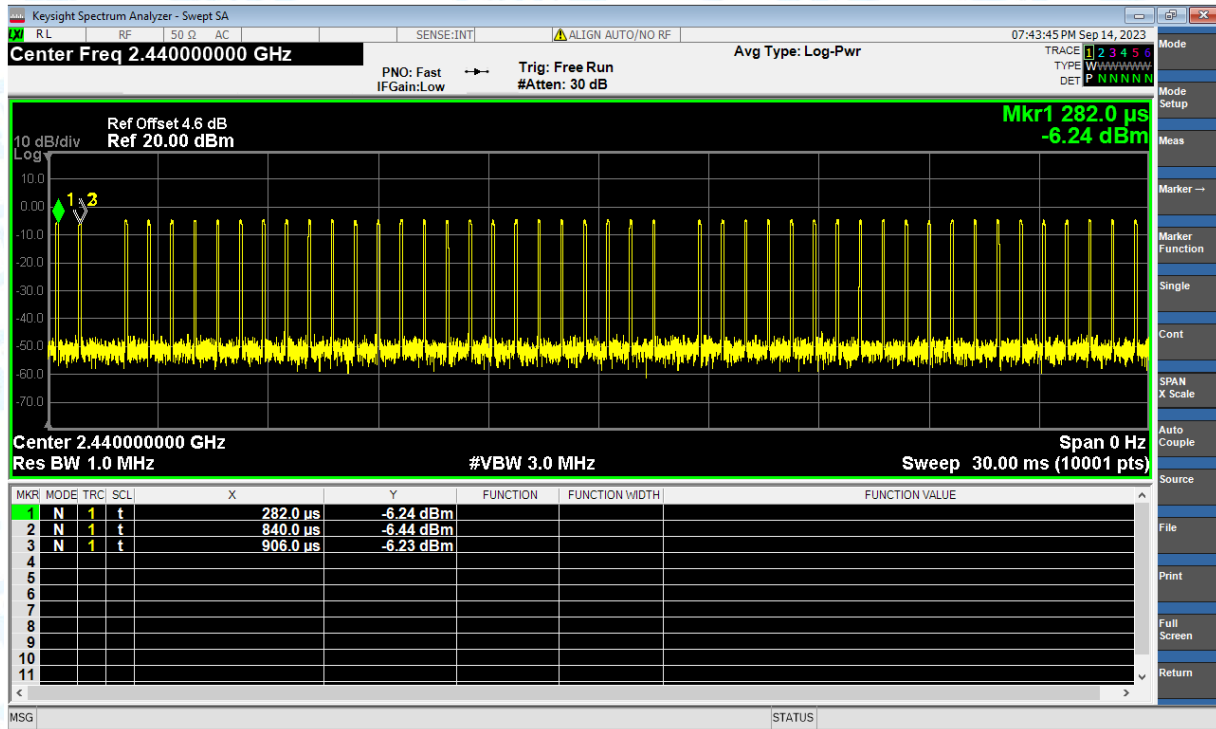
### Duty Cycle NVNT BLE 1Mbps 2480MHz Ant1



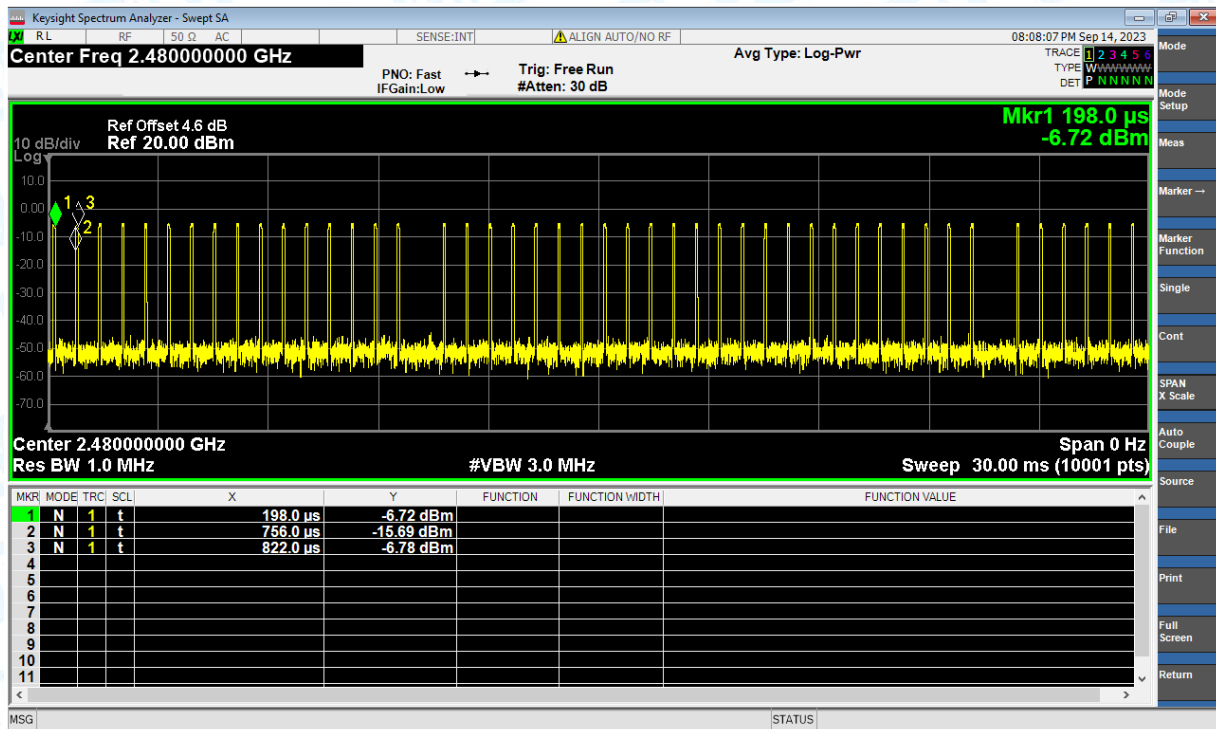
### Duty Cycle NVNT BLE 2Mbps 2402MHz Ant1



### Duty Cycle NVNT BLE 2Mbps 2440MHz Ant1



### Duty Cycle NVNT BLE 2Mbps 2480MHz Ant1

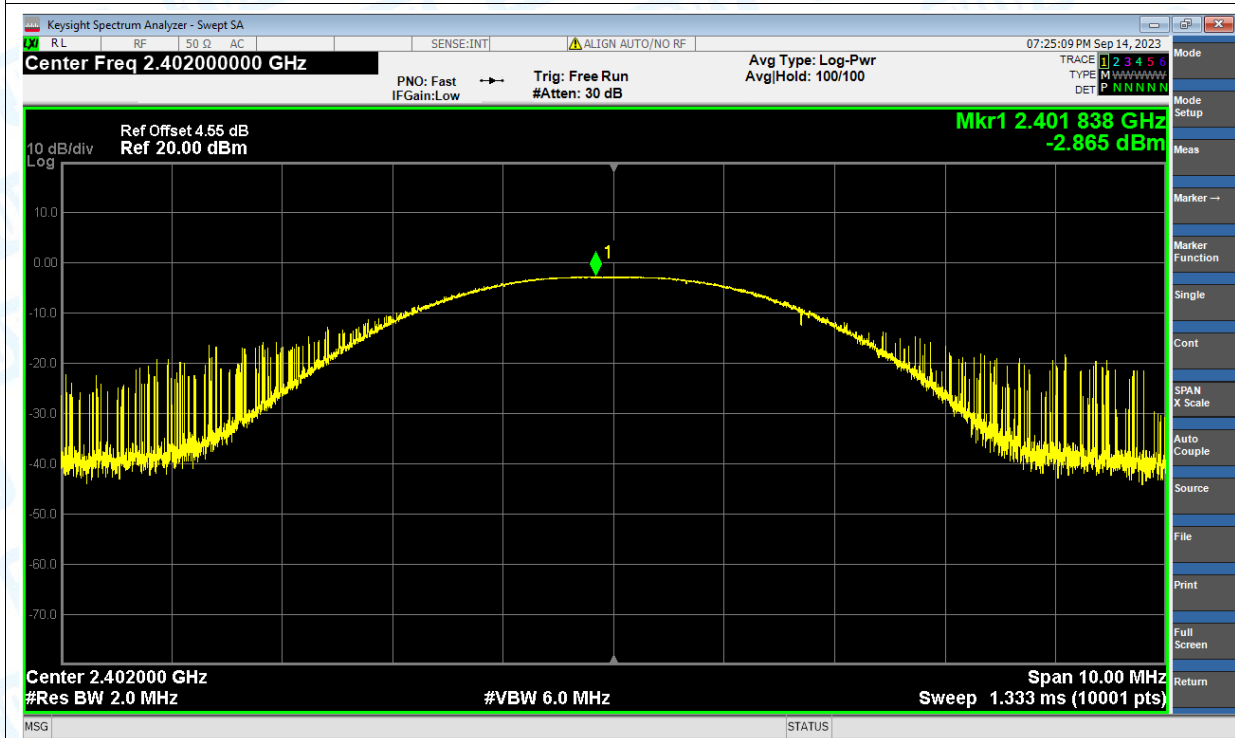


## Maximum Conducted Output Power

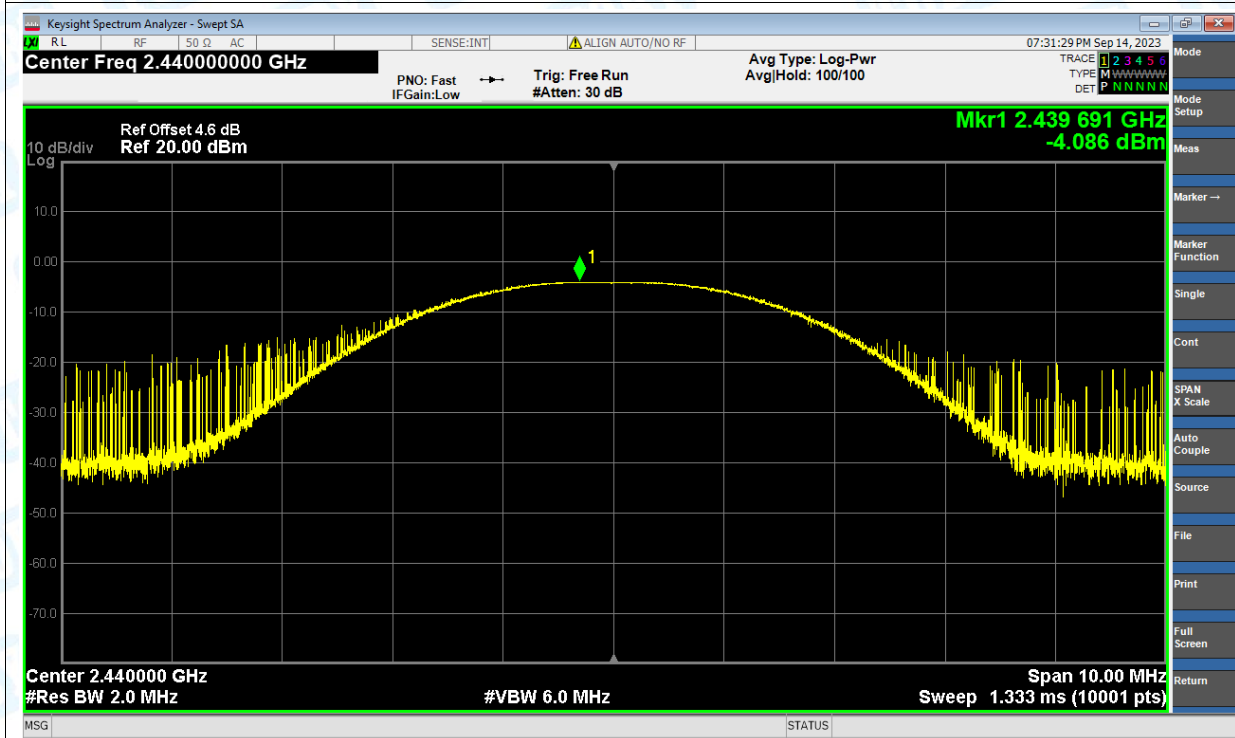
| Condition | Mode      | Frequency (MHz) | Antenna | Conducted Power (dBm) | Limit (dBm) | Verdict |
|-----------|-----------|-----------------|---------|-----------------------|-------------|---------|
| NVNT      | BLE 1Mbps | 2402            | Ant1    | -2.865                | 30          | Pass    |
| NVNT      | BLE 1Mbps | 2440            | Ant1    | -4.086                | 30          | Pass    |
| NVNT      | BLE 1Mbps | 2480            | Ant1    | -4.61                 | 30          | Pass    |
| NVNT      | BLE 2Mbps | 2402            | Ant1    | -2.845                | 30          | Pass    |
| NVNT      | BLE 2Mbps | 2440            | Ant1    | -4.085                | 30          | Pass    |
| NVNT      | BLE 2Mbps | 2480            | Ant1    | -4.62                 | 30          | Pass    |

## Test Graphs

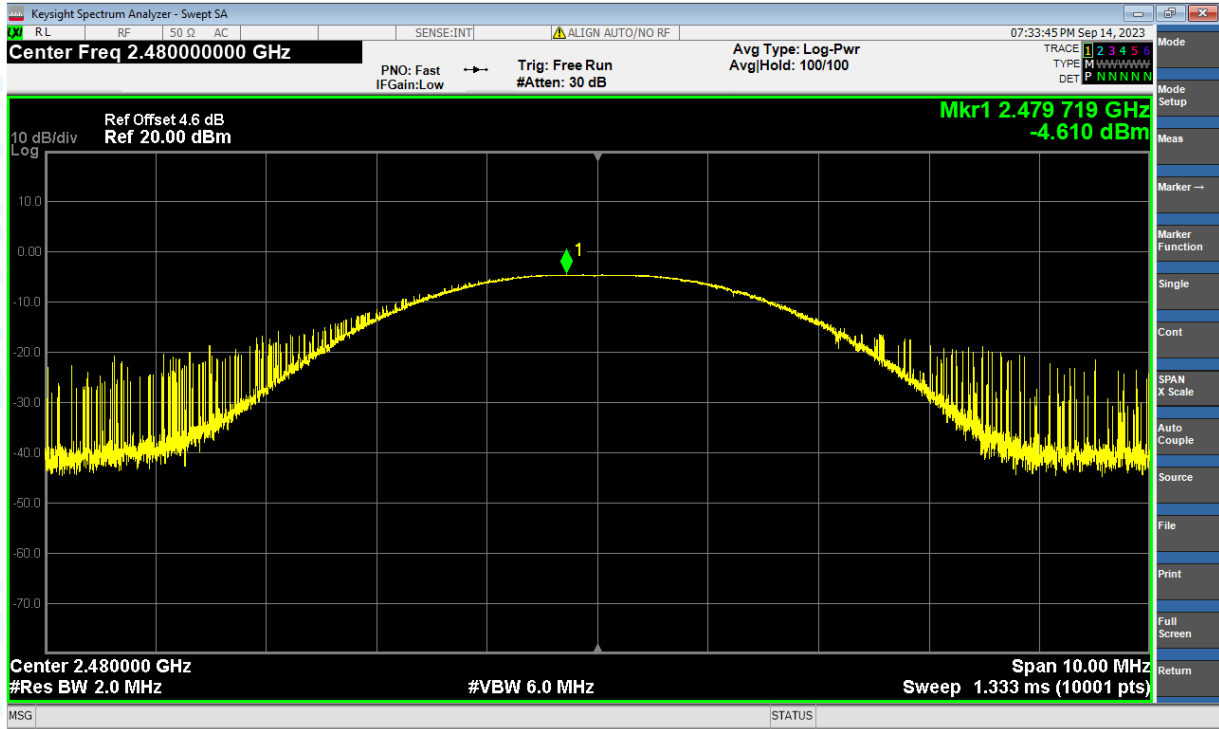
### Power NVNT BLE 1Mbps 2402MHz Ant1



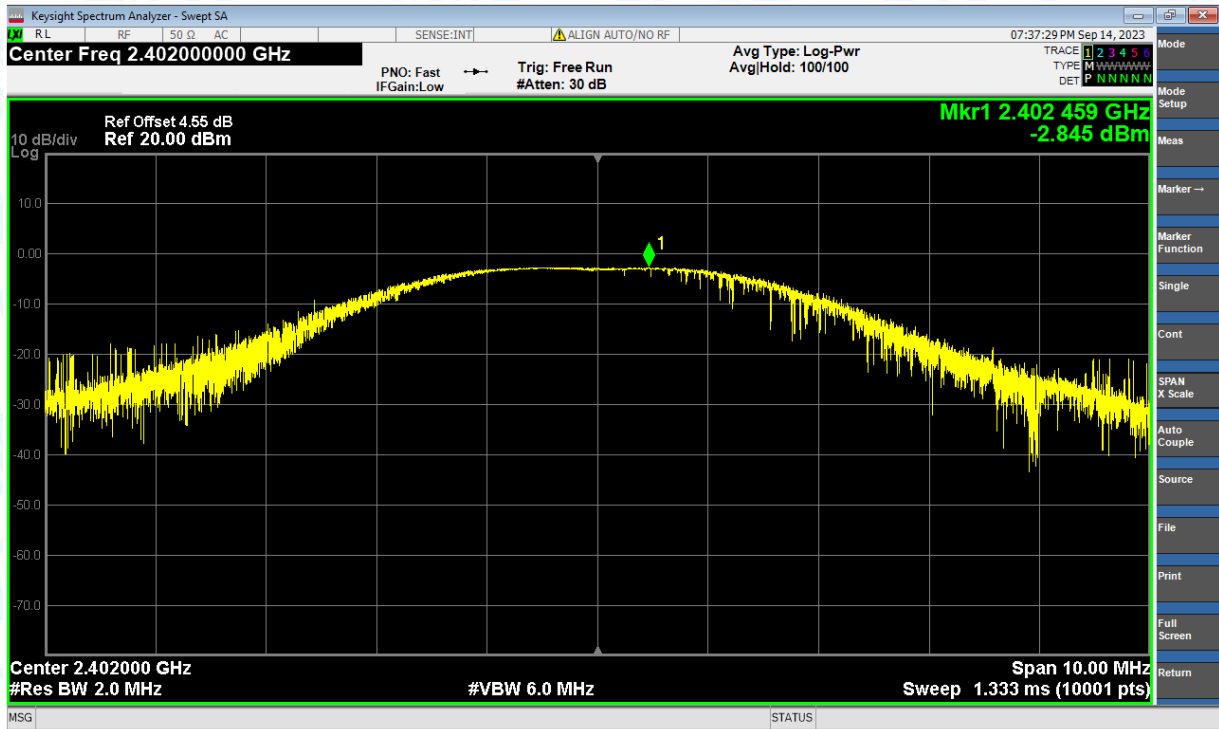
### Power NVNT BLE 1Mbps 2440MHz Ant1



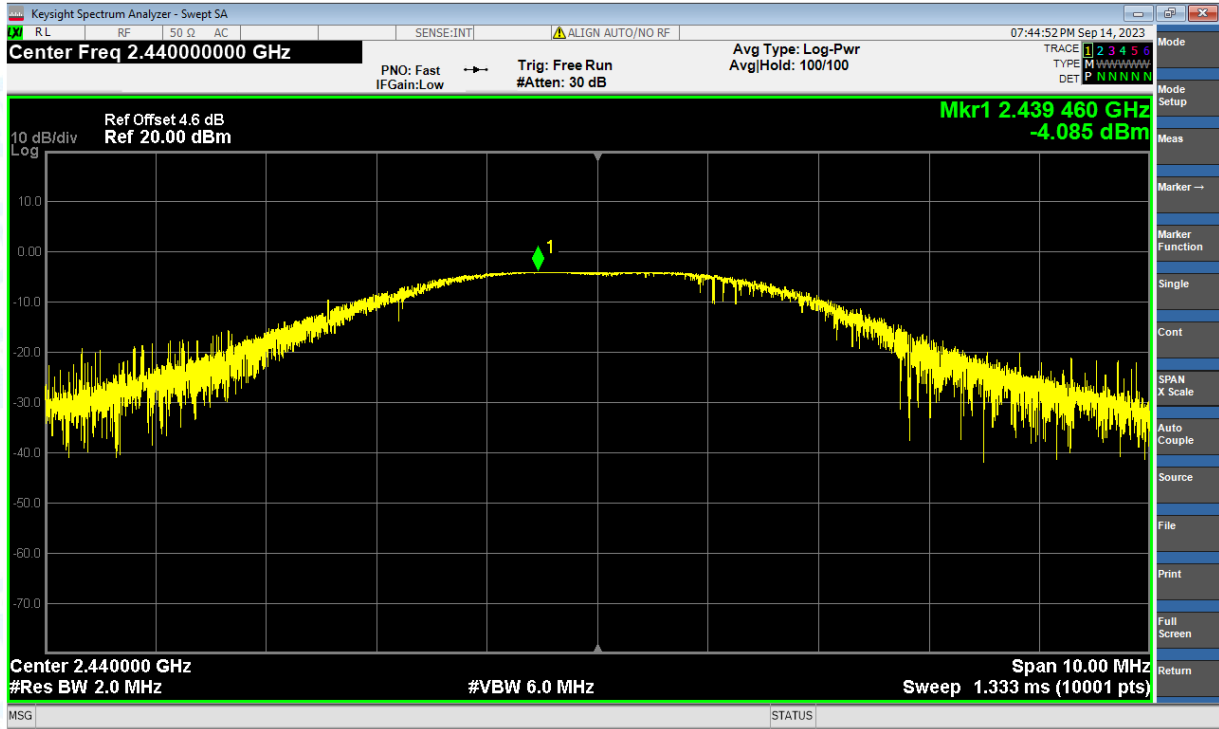
Power NVNT BLE 1Mbps 2480MHz Ant1



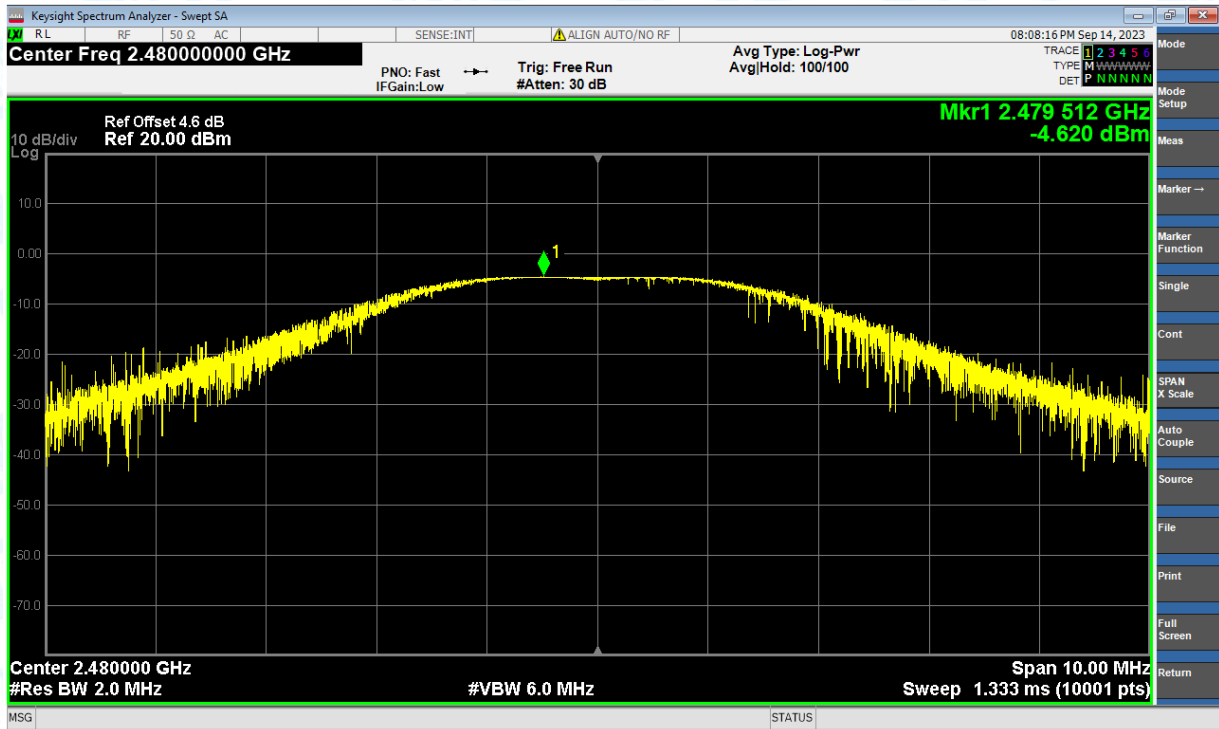
Power NVNT BLE 2Mbps 2402MHz Ant1



Power NVNT BLE 2Mbps 2440MHz Ant1



Power NVNT BLE 2Mbps 2480MHz Ant1

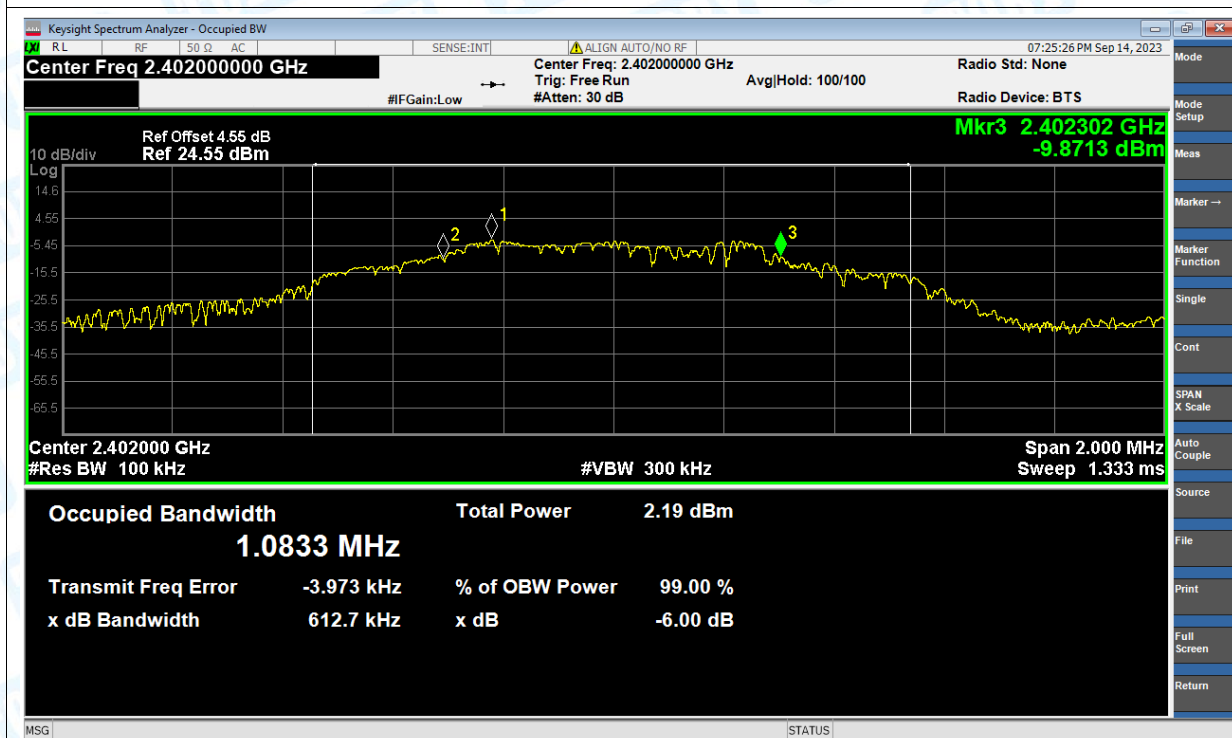


## -6dB Bandwidth

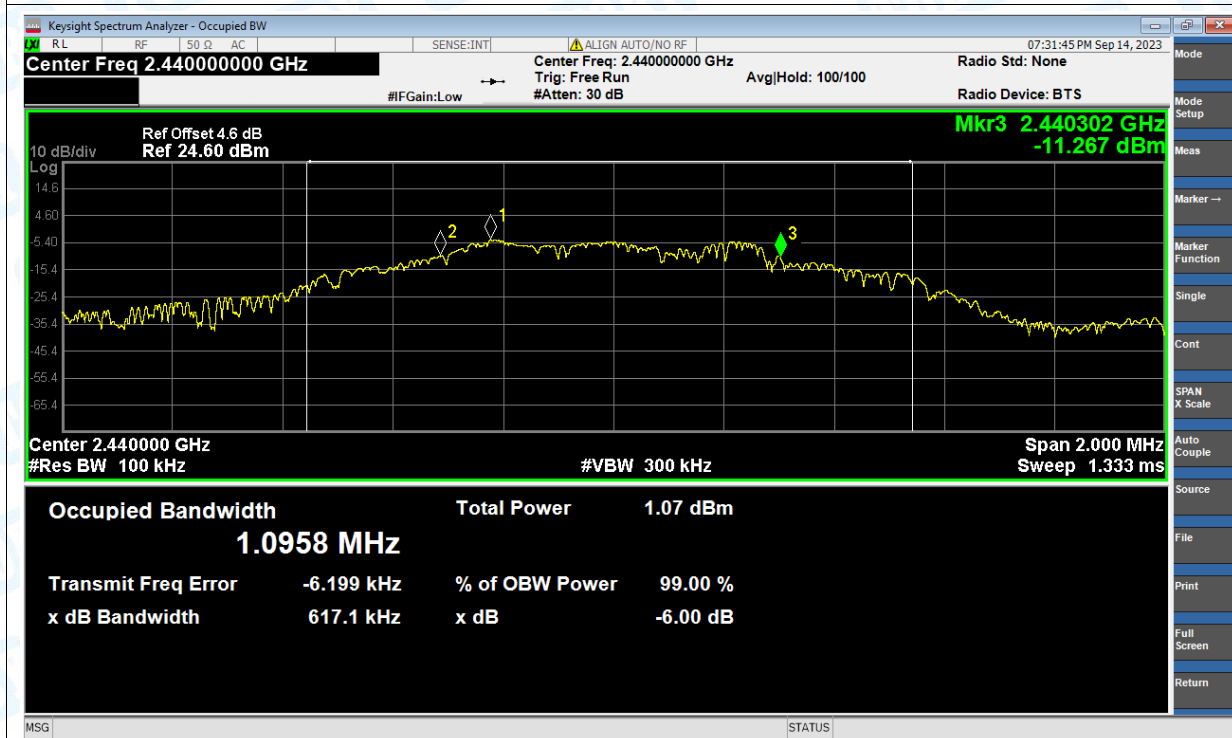
| Condition | Mode      | Frequency (MHz) | Antenna | -6 dB Bandwidth (MHz) | Limit -6 dB Bandwidth (MHz) | Verdict |
|-----------|-----------|-----------------|---------|-----------------------|-----------------------------|---------|
| NVNT      | BLE 1Mbps | 2402            | Ant1    | 0.61                  | 0.5                         | Pass    |
| NVNT      | BLE 1Mbps | 2440            | Ant1    | 0.62                  | 0.5                         | Pass    |
| NVNT      | BLE 1Mbps | 2480            | Ant1    | 0.6                   | 0.5                         | Pass    |
| NVNT      | BLE 2Mbps | 2402            | Ant1    | 1.06                  | 0.5                         | Pass    |
| NVNT      | BLE 2Mbps | 2440            | Ant1    | 1.07                  | 0.5                         | Pass    |
| NVNT      | BLE 2Mbps | 2480            | Ant1    | 1.07                  | 0.5                         | Pass    |

## Test Graphs

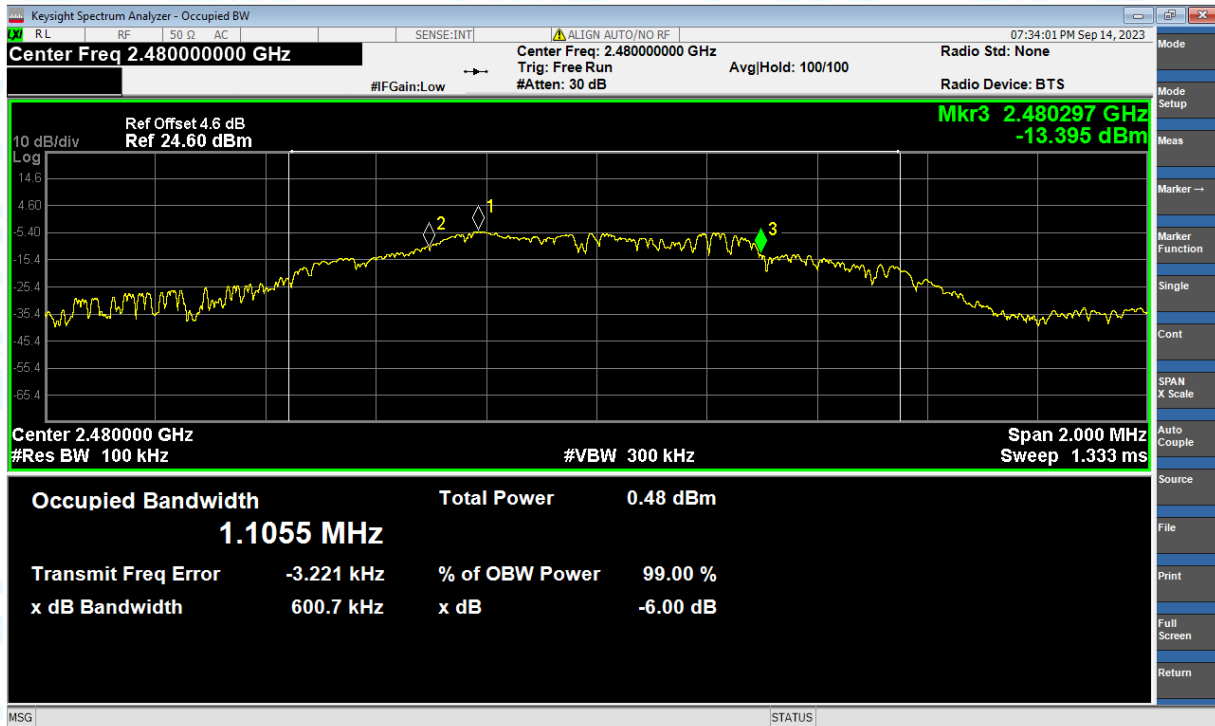
### -6dB Bandwidth NVNT BLE 1Mbps 2402MHz Ant1



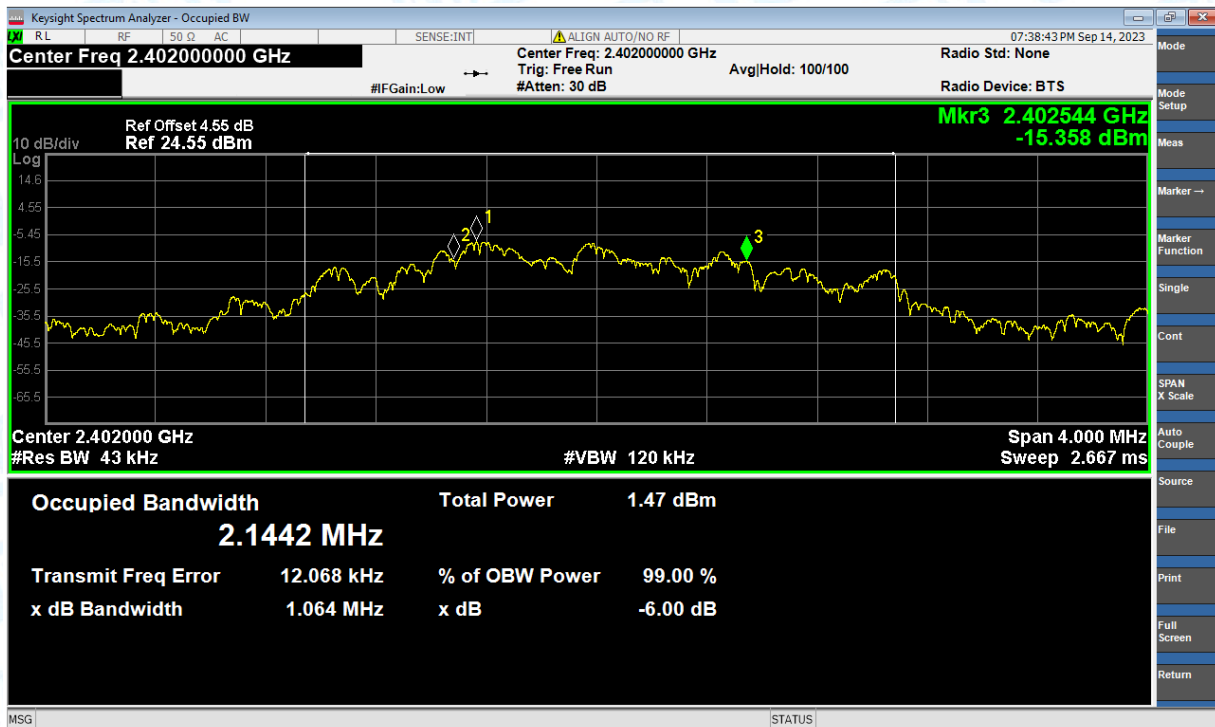
### -6dB Bandwidth NVNT BLE 1Mbps 2440MHz Ant1



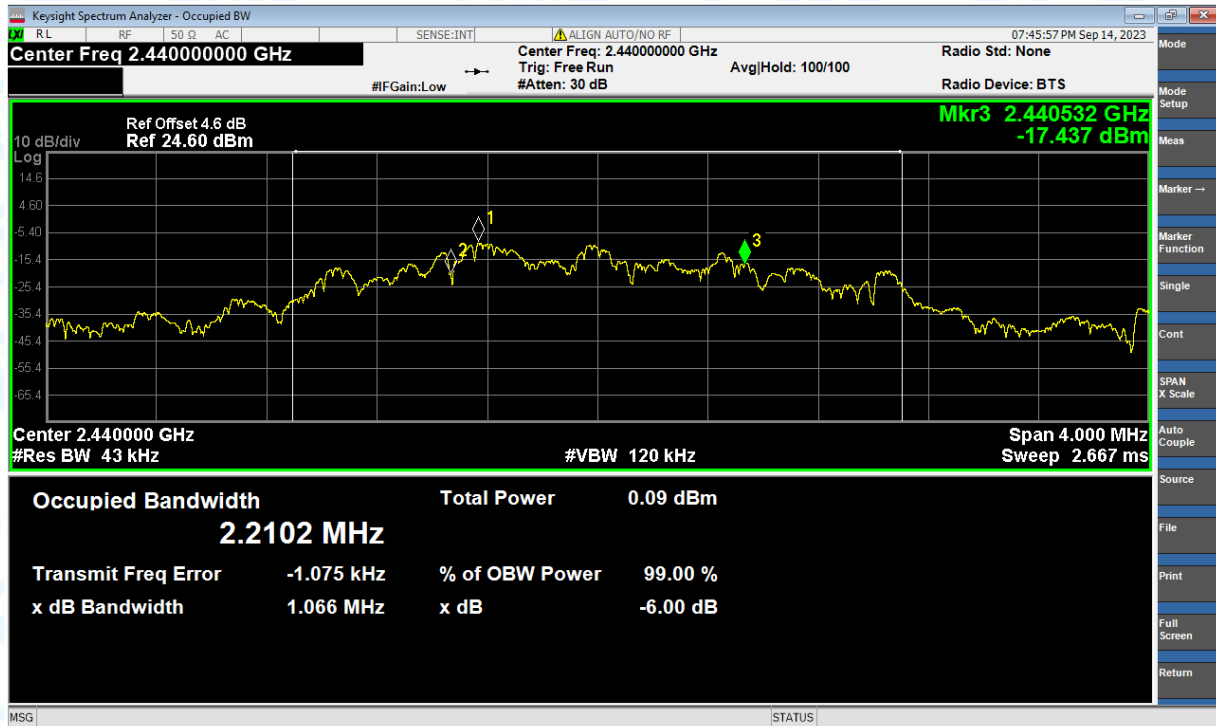
-6dB Bandwidth NVNT BLE 1Mbps 2480MHz Ant1



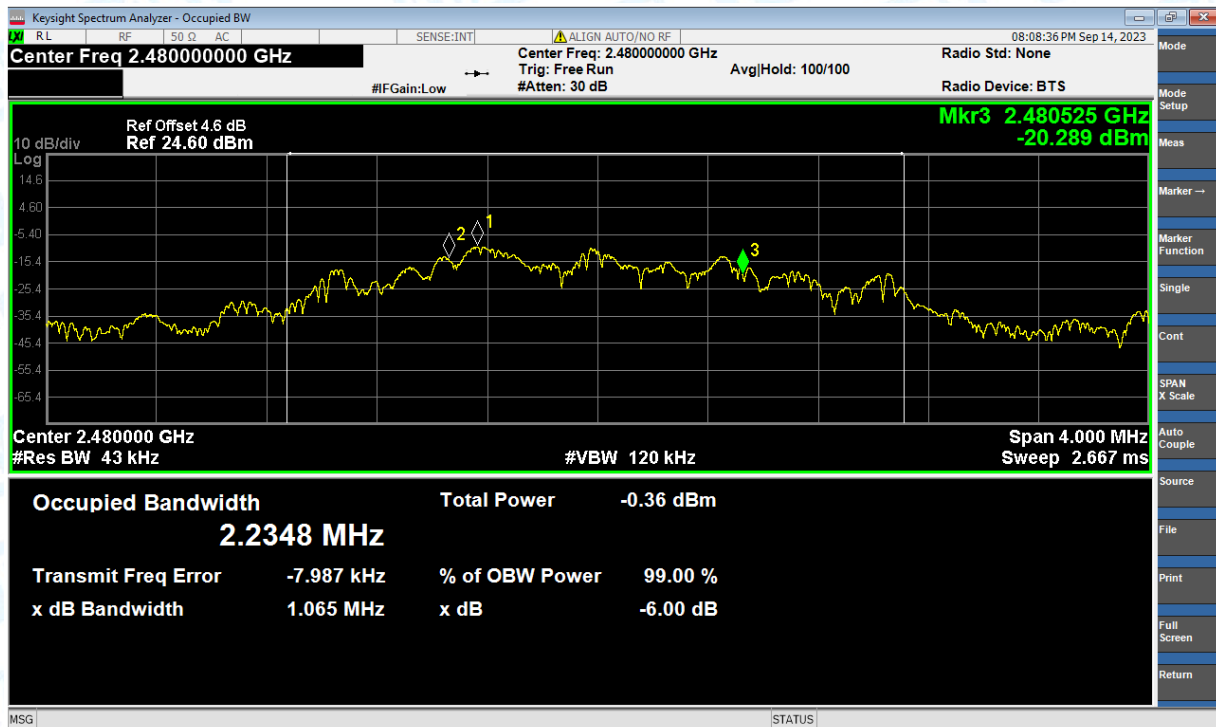
-6dB Bandwidth NVNT BLE 2Mbps 2402MHz Ant1



-6dB Bandwidth NVNT BLE 2Mbps 2440MHz Ant1



-6dB Bandwidth NVNT BLE 2Mbps 2480MHz Ant1

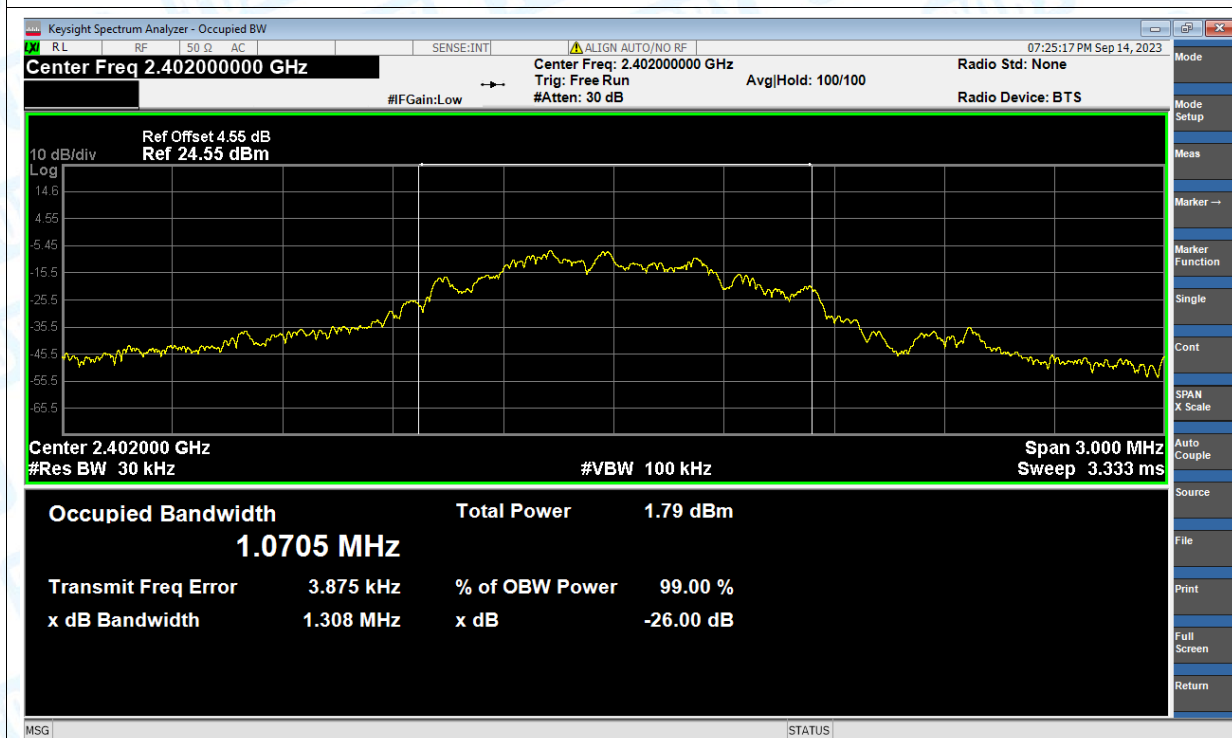


## Occupied Channel Bandwidth

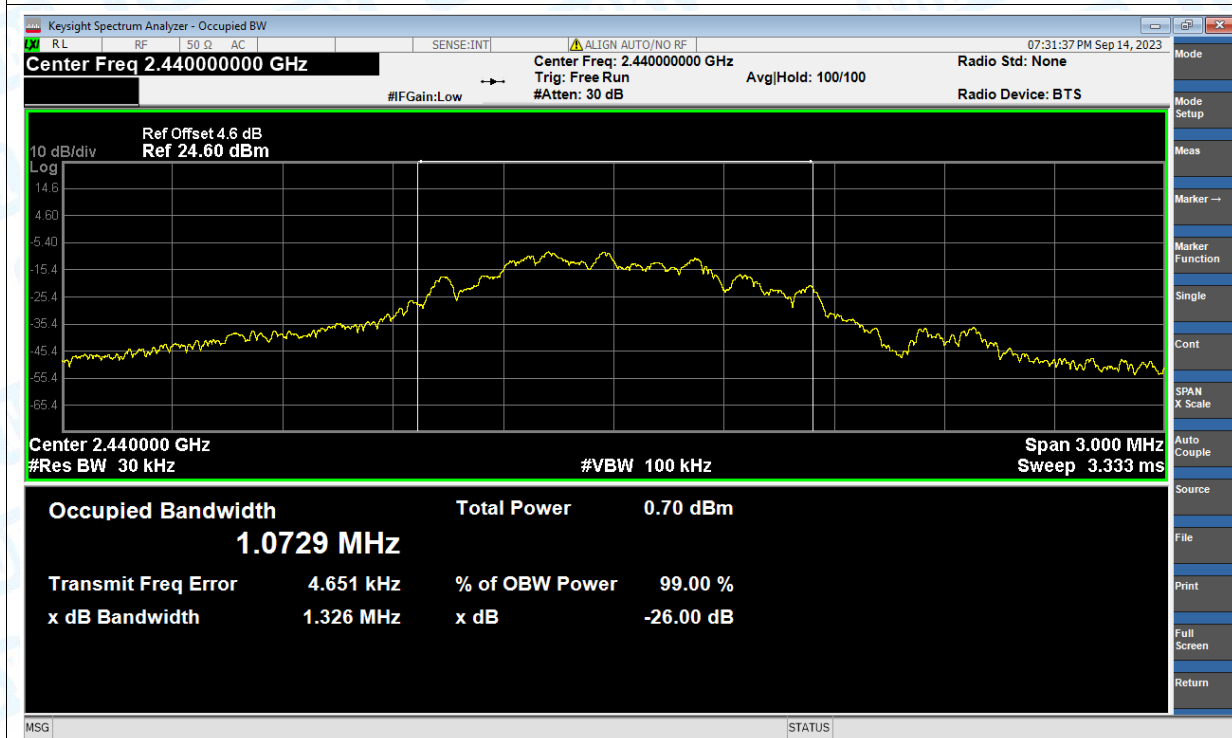
| Condition | Mode      | Frequency (MHz) | Antenna | 99% OBW (MHz) |
|-----------|-----------|-----------------|---------|---------------|
| NVNT      | BLE 1Mbps | 2402            | Ant1    | 1.071         |
| NVNT      | BLE 1Mbps | 2440            | Ant1    | 1.073         |
| NVNT      | BLE 1Mbps | 2480            | Ant1    | 1.09          |
| NVNT      | BLE 2Mbps | 2402            | Ant1    | 2.142         |
| NVNT      | BLE 2Mbps | 2440            | Ant1    | 2.175         |
| NVNT      | BLE 2Mbps | 2480            | Ant1    | 2.227         |

## Test Graphs

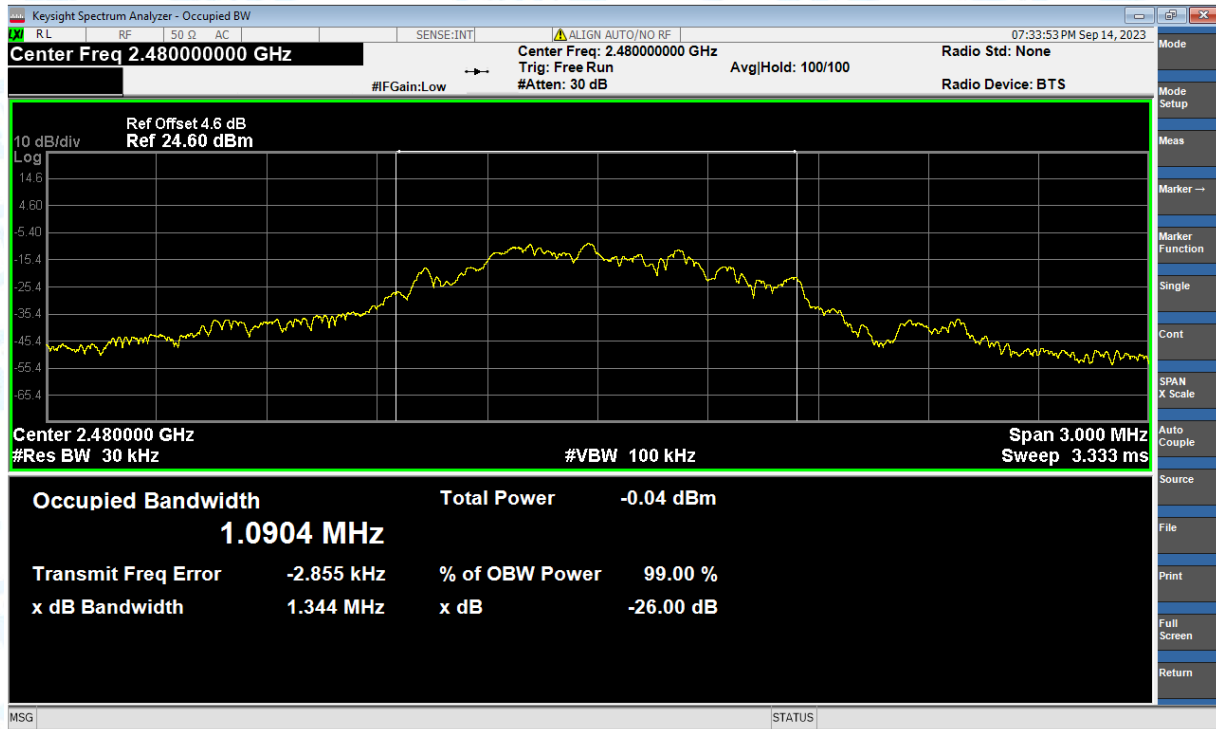
### OBW NVNT BLE 1Mbps 2402MHz Ant1



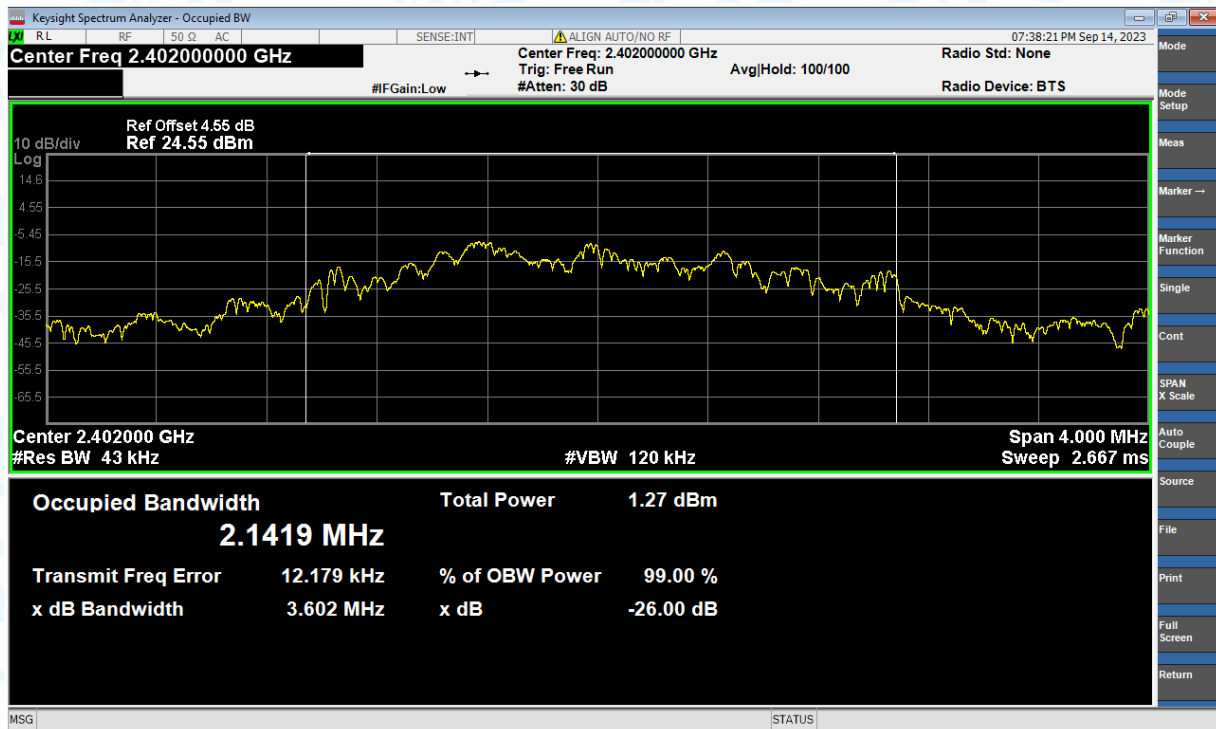
### OBW NVNT BLE 1Mbps 2440MHz Ant1



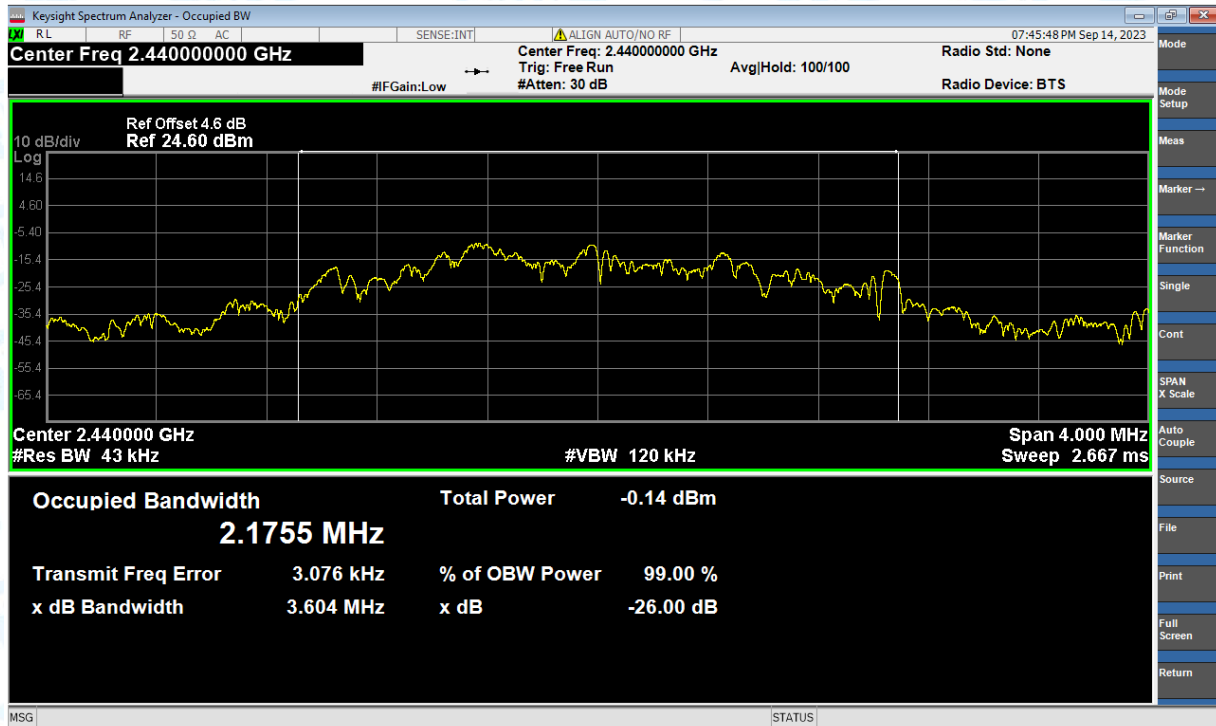
### OBW NVNT BLE 1Mbps 2480MHz Ant1



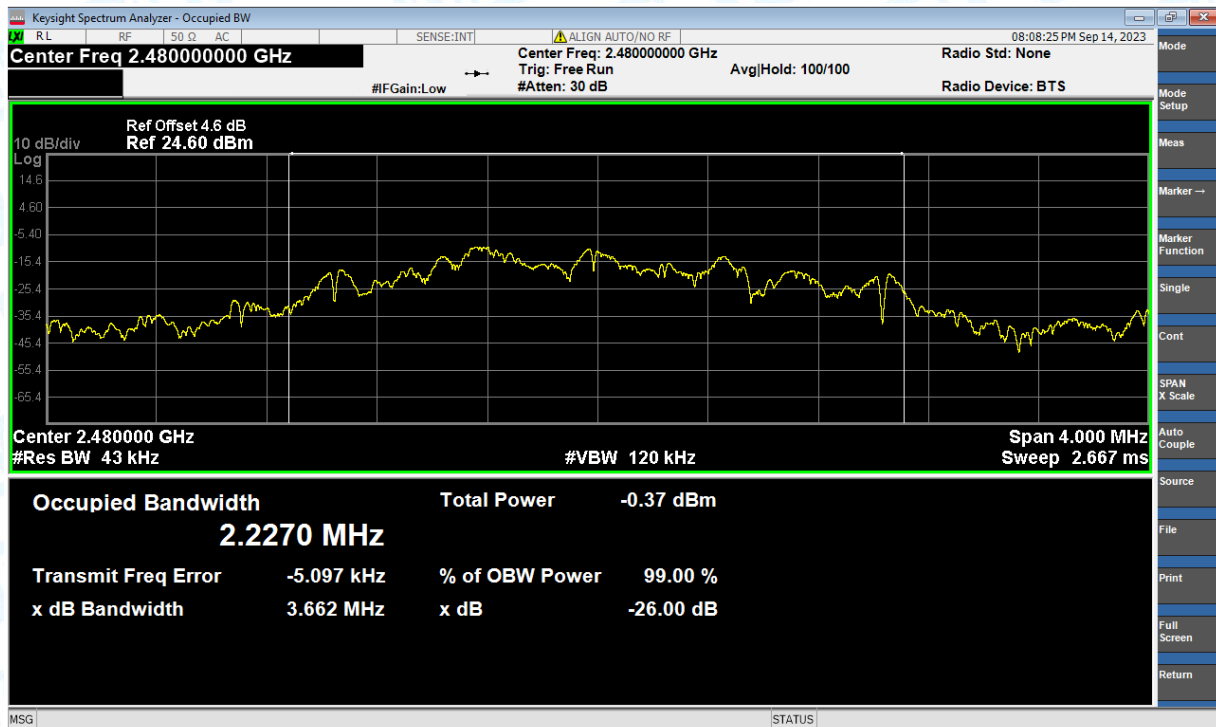
### OBW NVNT BLE 2Mbps 2402MHz Ant1



OBW NVNT BLE 2Mbps 2440MHz Ant1



OBW NVNT BLE 2Mbps 2480MHz Ant1

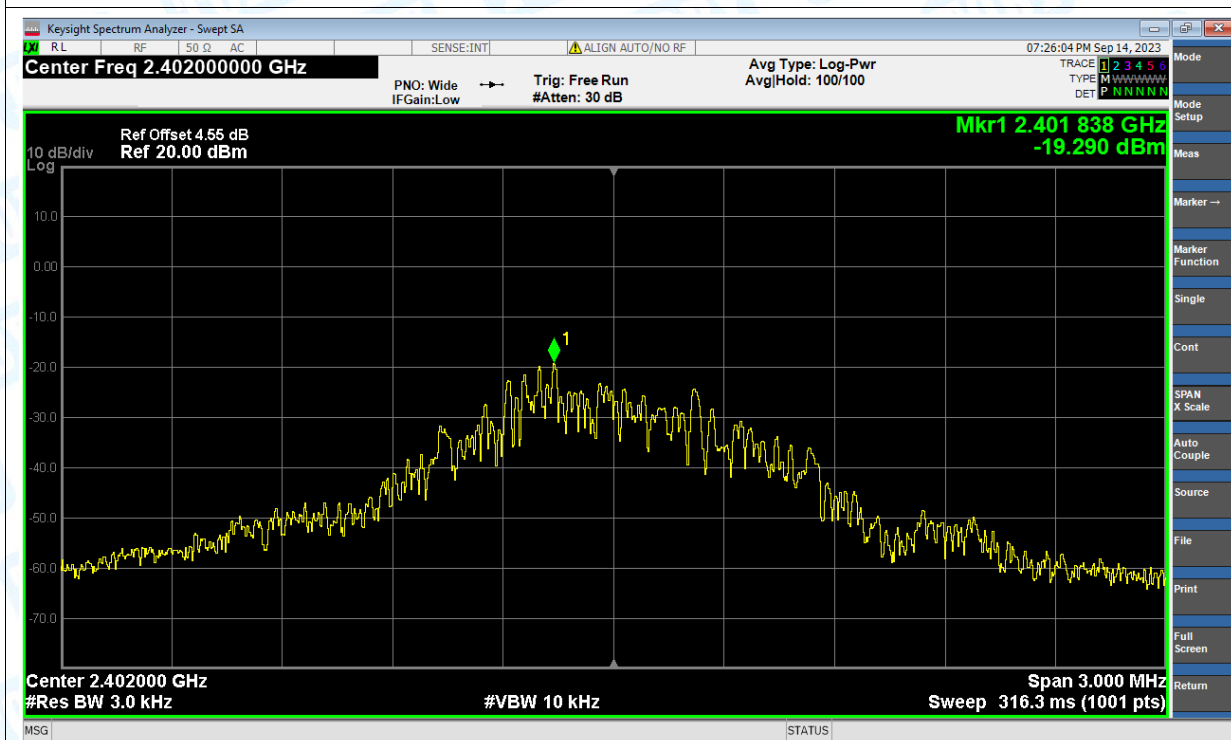


## Maximum Power Spectral Density Level

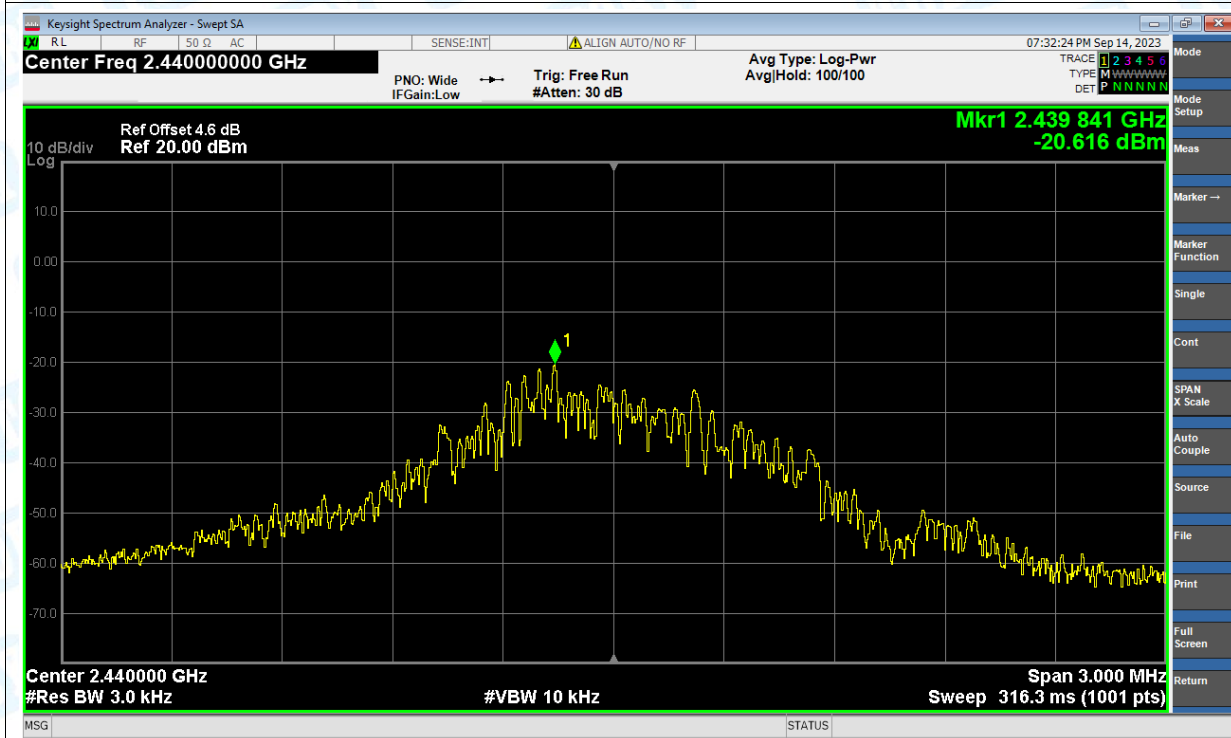
| Condition | Mode      | Frequency (MHz) | Antenna | Max PSD (dBm) | Limit (dBm) | Verdict |
|-----------|-----------|-----------------|---------|---------------|-------------|---------|
| NVNT      | BLE 1Mbps | 2402            | Ant1    | -19.29        | 8           | Pass    |
| NVNT      | BLE 1Mbps | 2440            | Ant1    | -20.616       | 8           | Pass    |
| NVNT      | BLE 1Mbps | 2480            | Ant1    | -21.001       | 8           | Pass    |
| NVNT      | BLE 2Mbps | 2402            | Ant1    | -21.719       | 8           | Pass    |
| NVNT      | BLE 2Mbps | 2440            | Ant1    | -23.384       | 8           | Pass    |
| NVNT      | BLE 2Mbps | 2480            | Ant1    | -23.944       | 8           | Pass    |

## Test Graphs

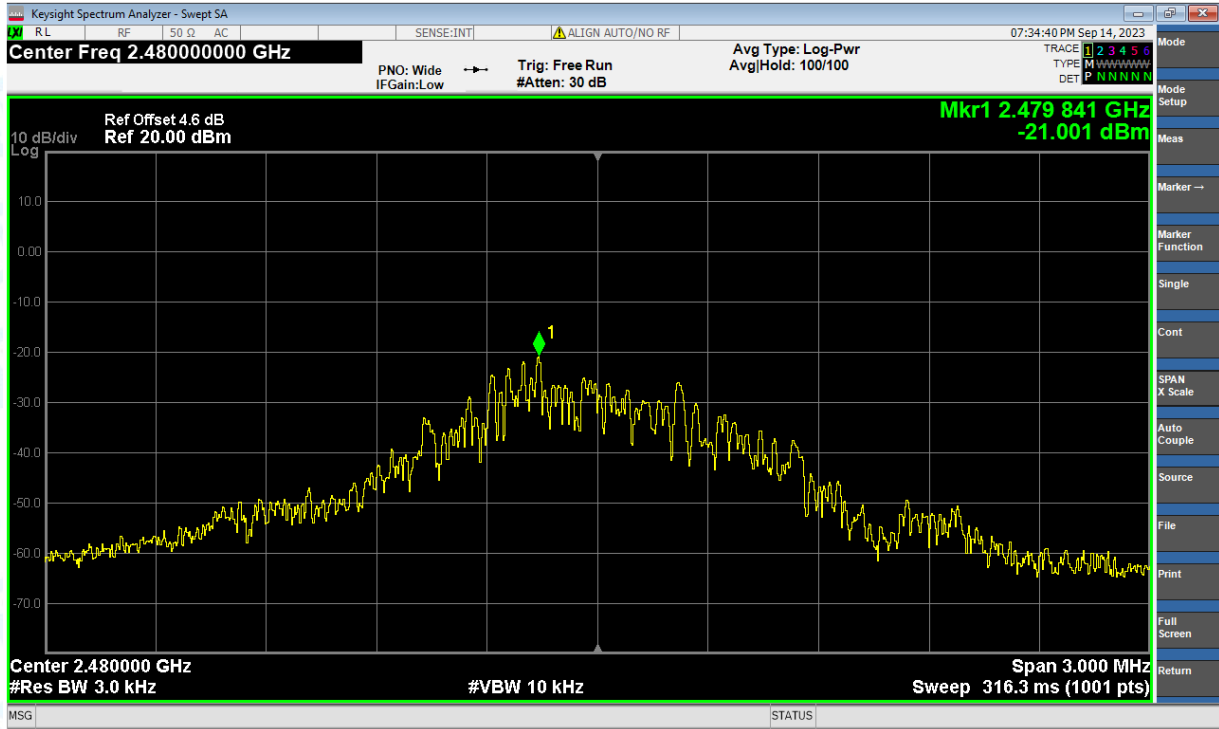
### PSD NVNT BLE 1Mbps 2402MHz Ant1



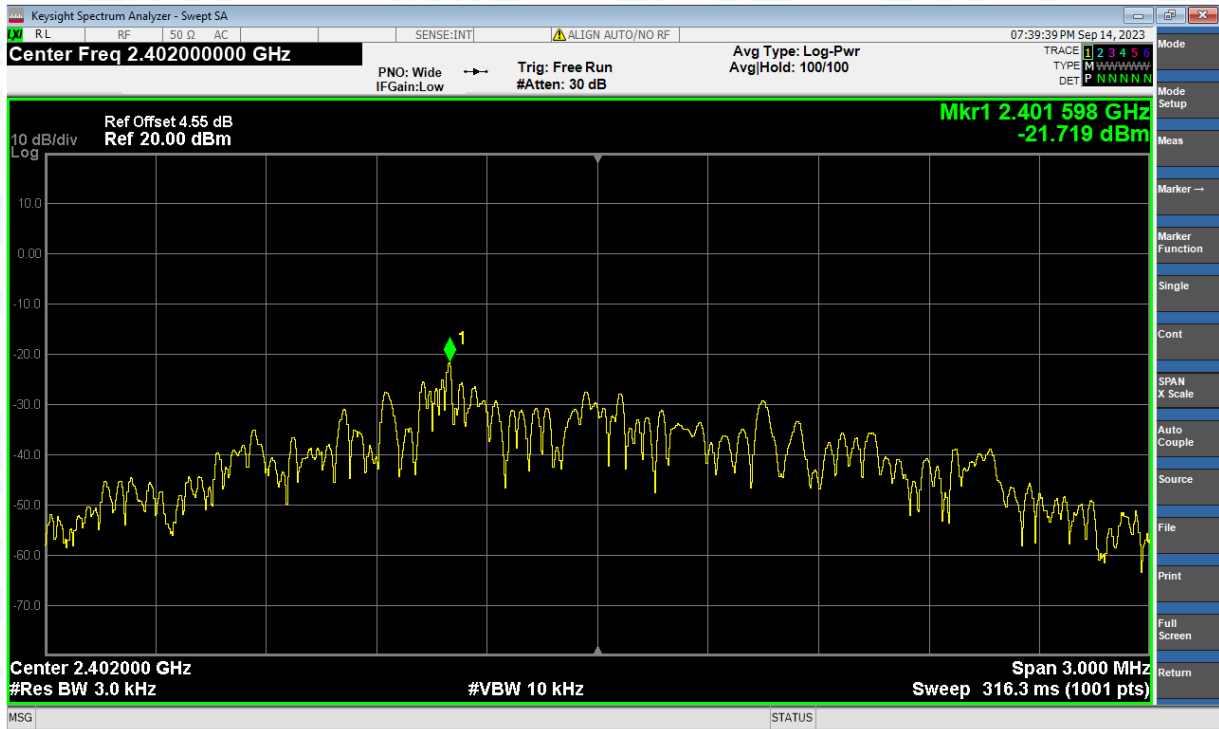
### PSD NVNT BLE 1Mbps 2440MHz Ant1



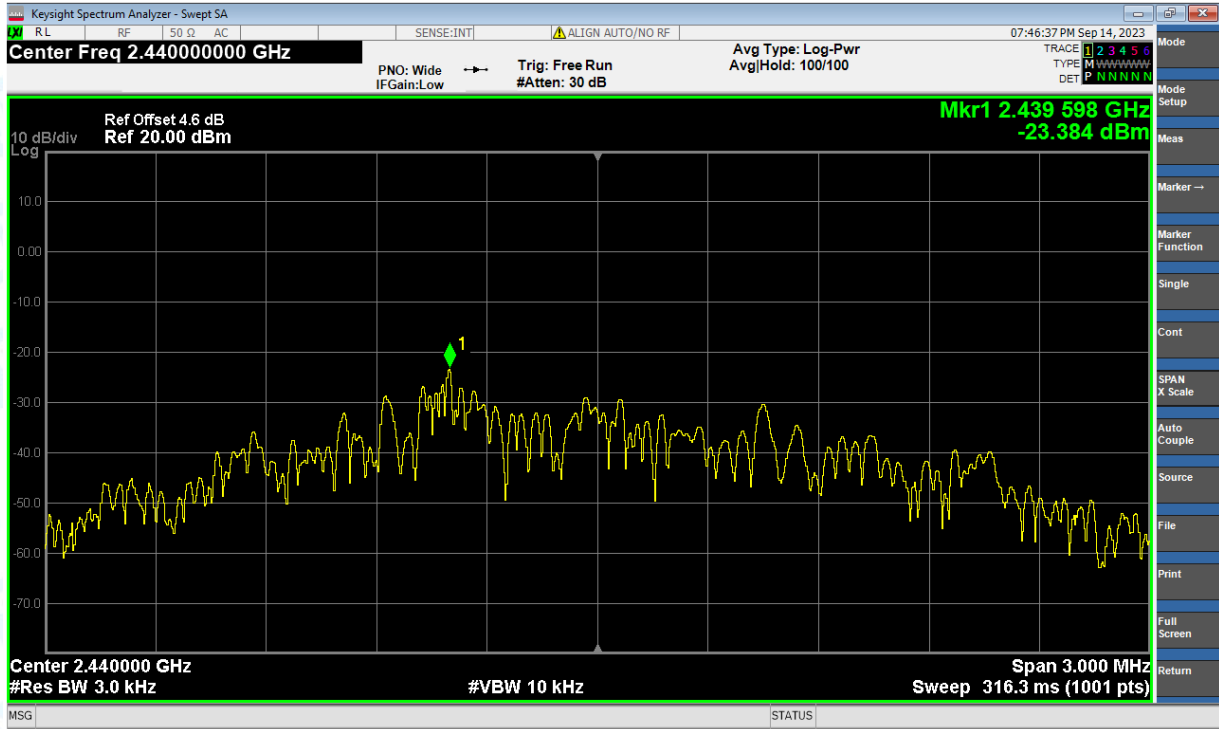
PSD NVNT BLE 1Mbps 2480MHz Ant1



PSD NVNT BLE 2Mbps 2402MHz Ant1



PSD NVNT BLE 2Mbps 2440MHz Ant1



PSD NVNT BLE 2Mbps 2480MHz Ant1

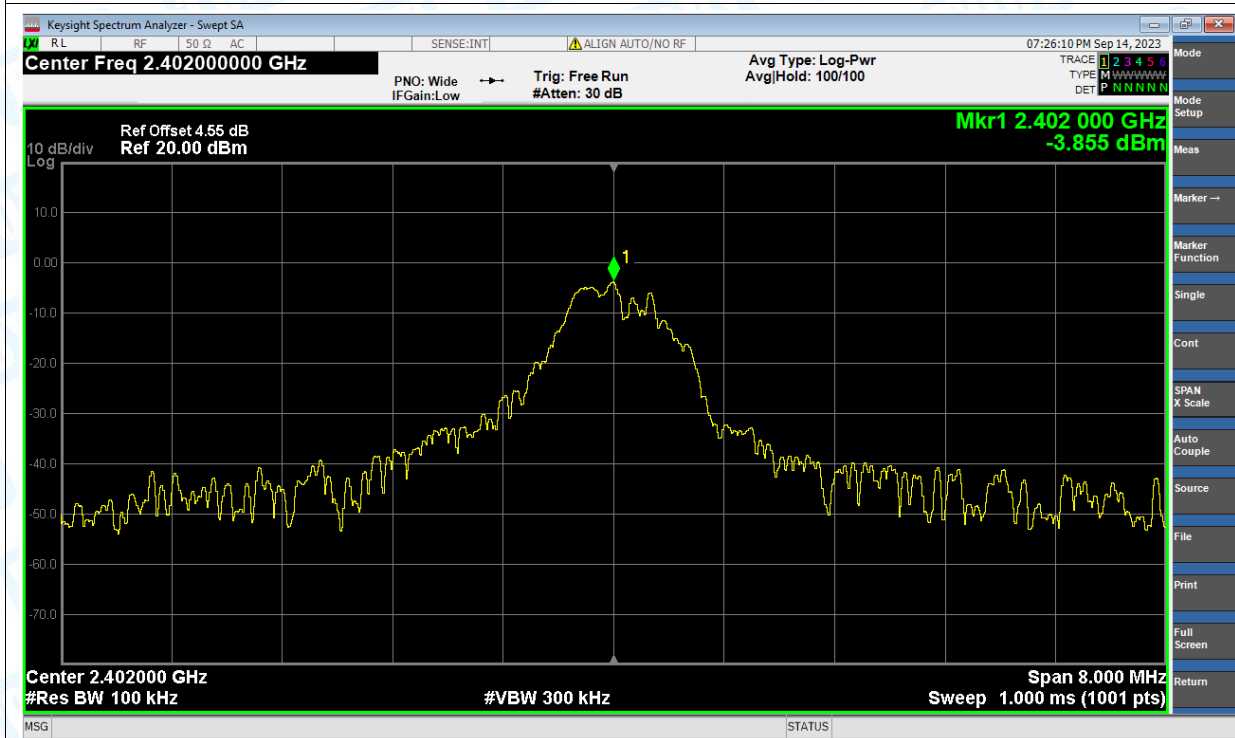


## Band Edge

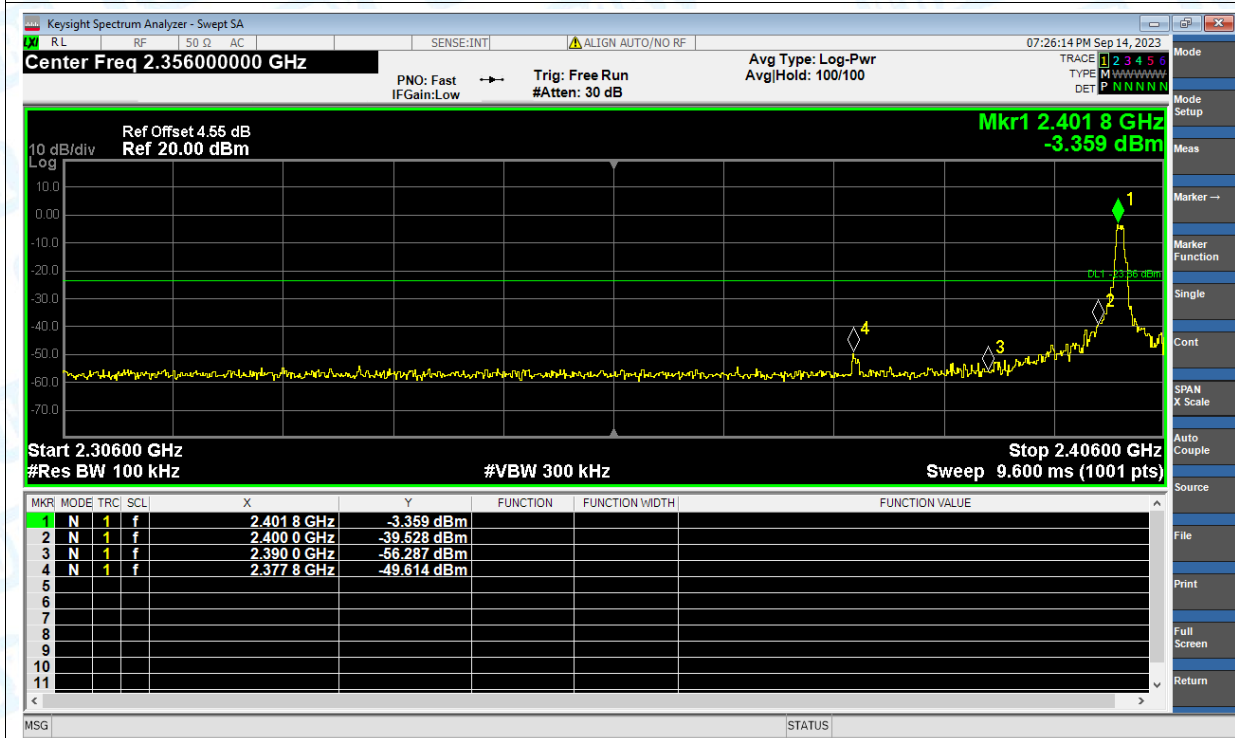
| Condition | Mode      | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|-----------|-----------|-----------------|---------|-----------------|-------------|---------|
| NVNT      | BLE 1Mbps | 2402            | Ant1    | -45.76          | -20         | Pass    |
| NVNT      | BLE 1Mbps | 2480            | Ant1    | -41.74          | -20         | Pass    |
| NVNT      | BLE 2Mbps | 2402            | Ant1    | -49.15          | -20         | Pass    |
| NVNT      | BLE 2Mbps | 2480            | Ant1    | -29.38          | -20         | Pass    |

### Test Graphs

#### Band Edge NVNT BLE 1Mbps 2402MHz Ant1 Ref



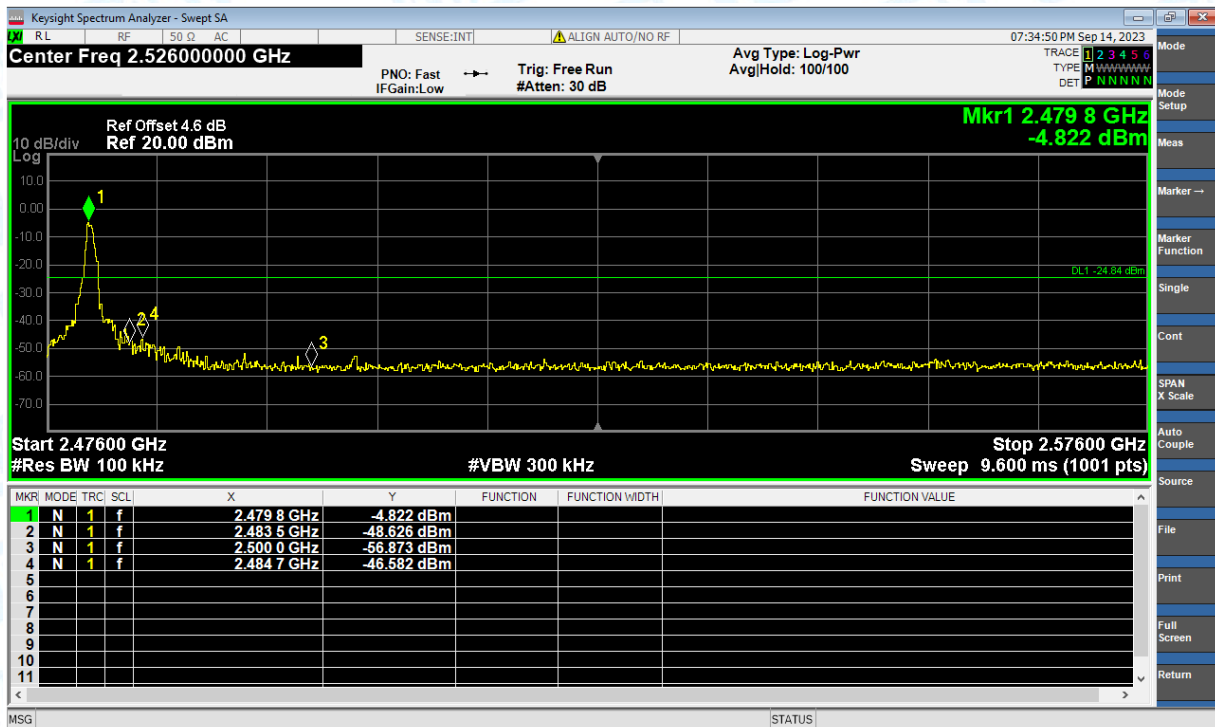
#### Band Edge NVNT BLE 1Mbps 2402MHz Ant1 Emission



### Band Edge NVNT BLE 1Mbps 2480MHz Ant1 Ref



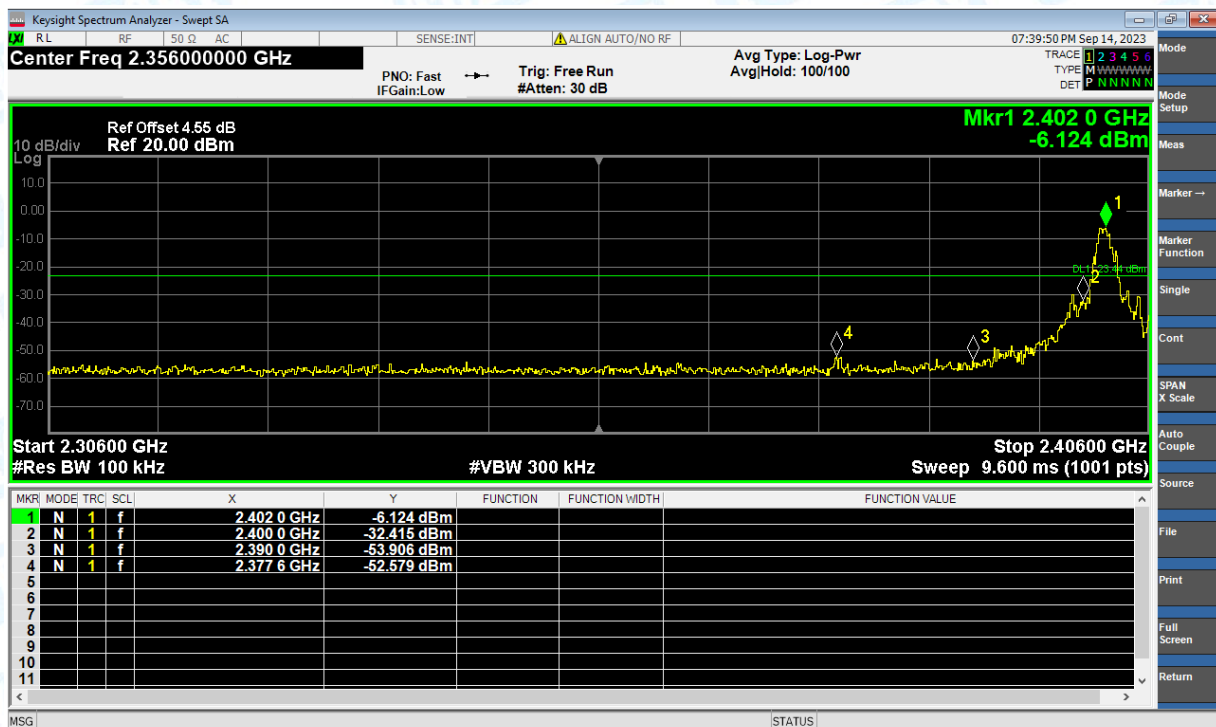
### Band Edge NVNT BLE 1Mbps 2480MHz Ant1 Emission



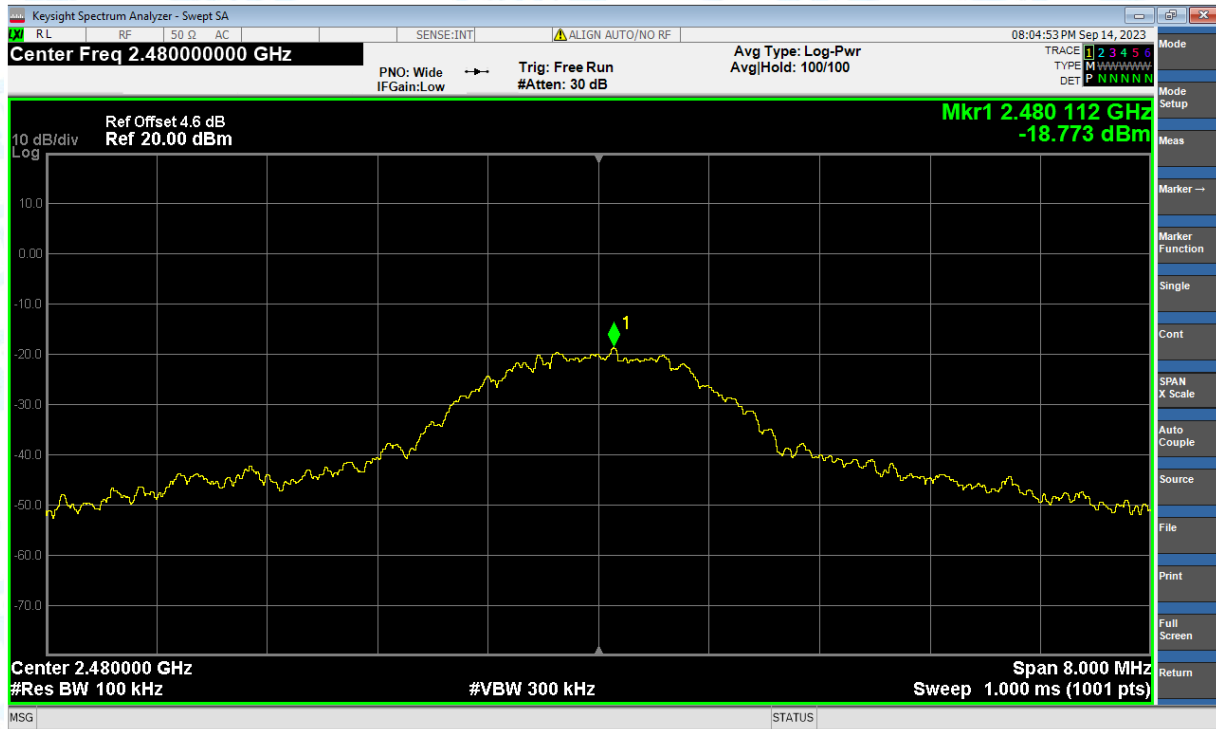
### Band Edge NVNT BLE 2Mbps 2402MHz Ant1 Ref



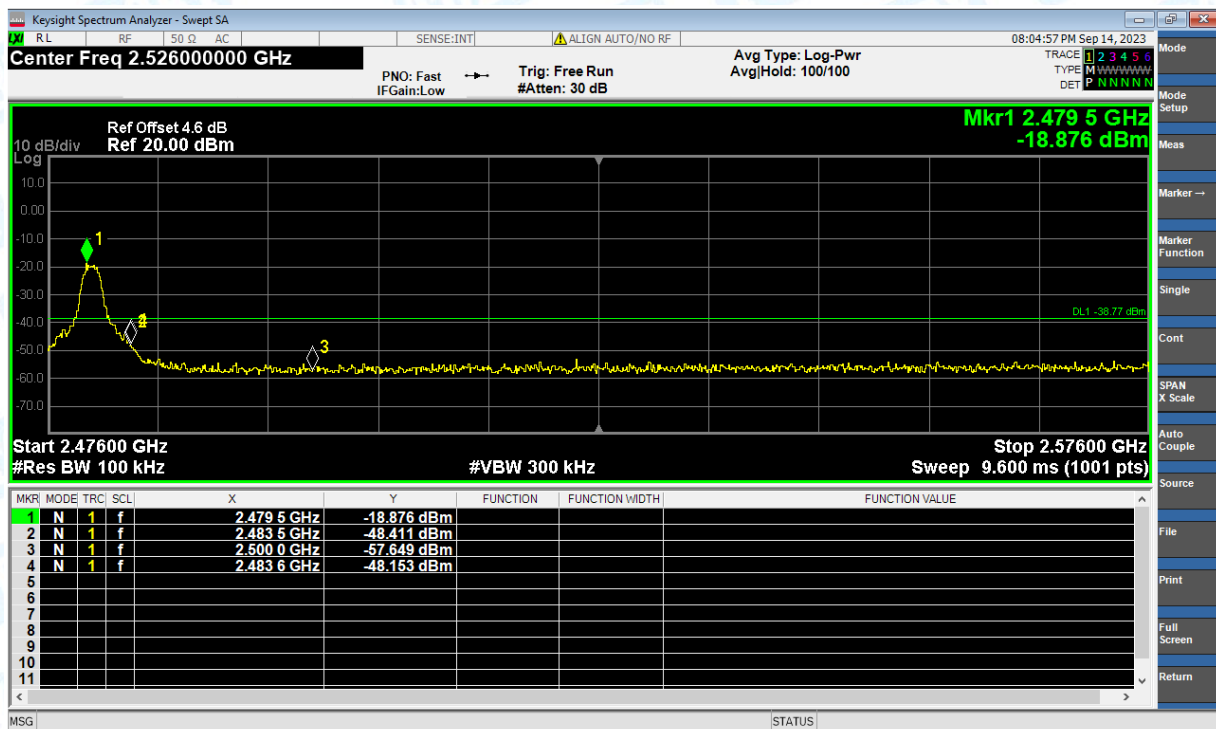
### Band Edge NVNT BLE 2Mbps 2402MHz Ant1 Emission



### Band Edge NVNT BLE 2Mbps 2480MHz Ant1 Ref



### Band Edge NVNT BLE 2Mbps 2480MHz Ant1 Emission



## Conducted RF Spurious Emission

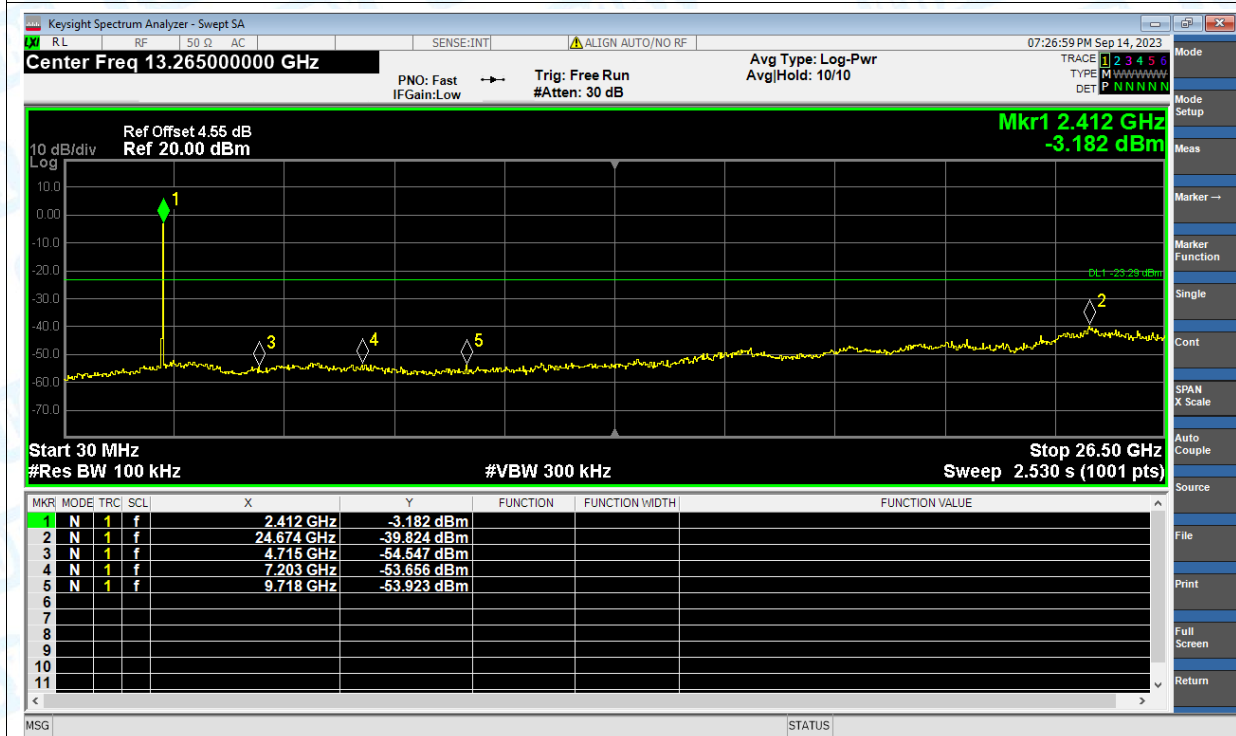
| Condition | Mode      | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|-----------|-----------|-----------------|---------|-----------------|-------------|---------|
| NVNT      | BLE 1Mbps | 2402            | Ant1    | -36.53          | -20         | Pass    |
| NVNT      | BLE 1Mbps | 2440            | Ant1    | -36.08          | -20         | Pass    |
| NVNT      | BLE 1Mbps | 2480            | Ant1    | -35.83          | -20         | Pass    |
| NVNT      | BLE 2Mbps | 2402            | Ant1    | -35.57          | -20         | Pass    |
| NVNT      | BLE 2Mbps | 2440            | Ant1    | -35.68          | -20         | Pass    |
| NVNT      | BLE 2Mbps | 2480            | Ant1    | -35.15          | -20         | Pass    |

## Test Graphs

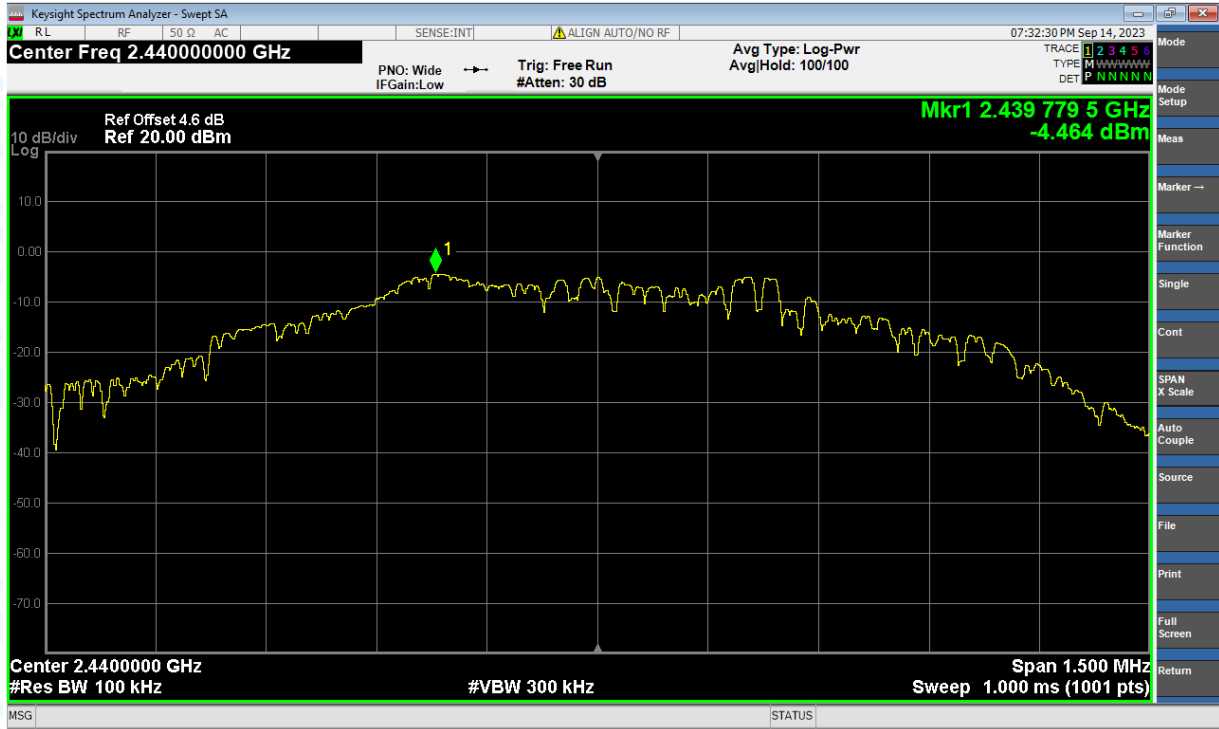
### Tx. Spurious NVNT BLE 1Mbps 2402MHz Ant1 Ref



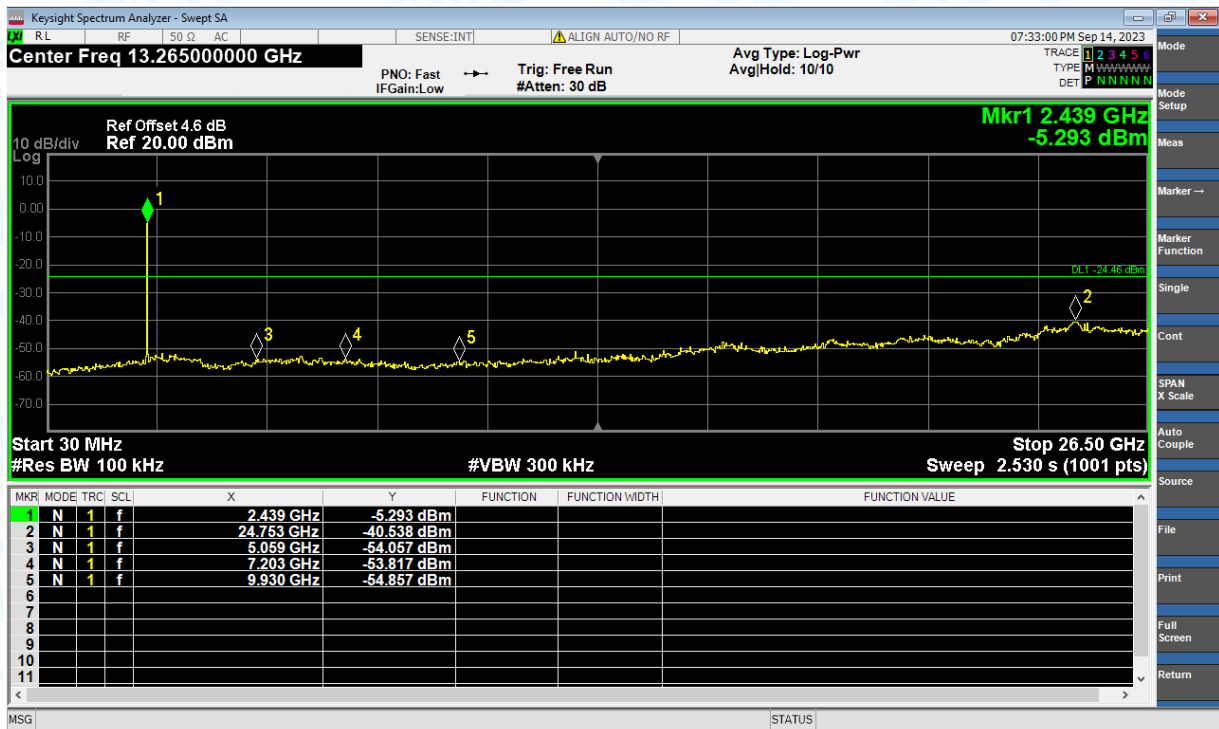
### Tx. Spurious NVNT BLE 1Mbps 2402MHz Ant1 Emission



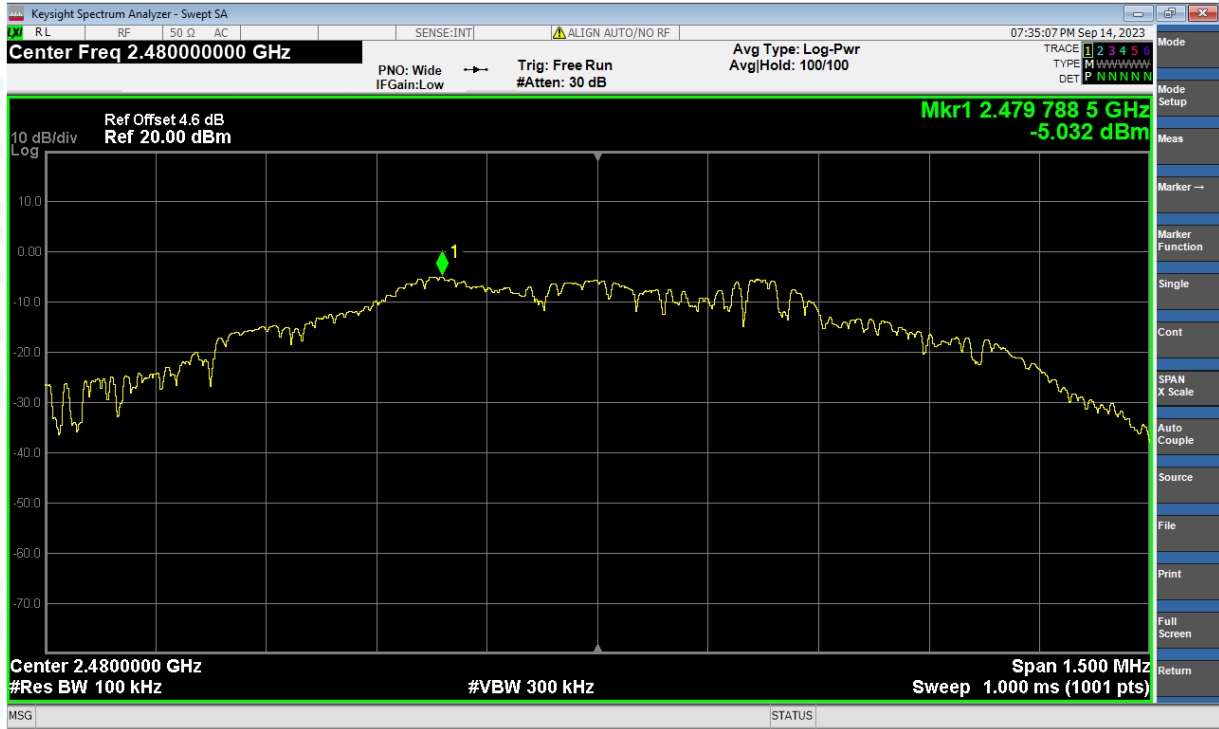
Tx. Spurious NVNT BLE 1Mbps 2440MHz Ant1 Ref



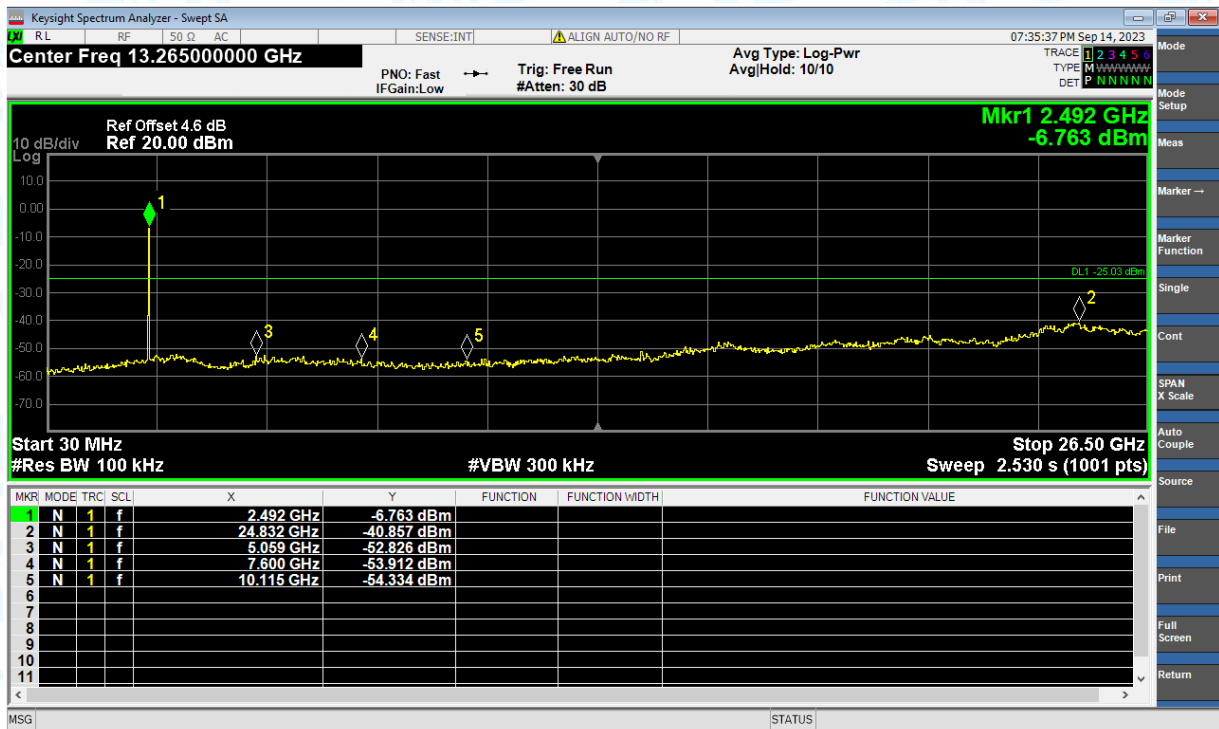
Tx. Spurious NVNT BLE 1Mbps 2440MHz Ant1 Emission



Tx. Spurious NVNT BLE 1Mbps 2480MHz Ant1 Ref



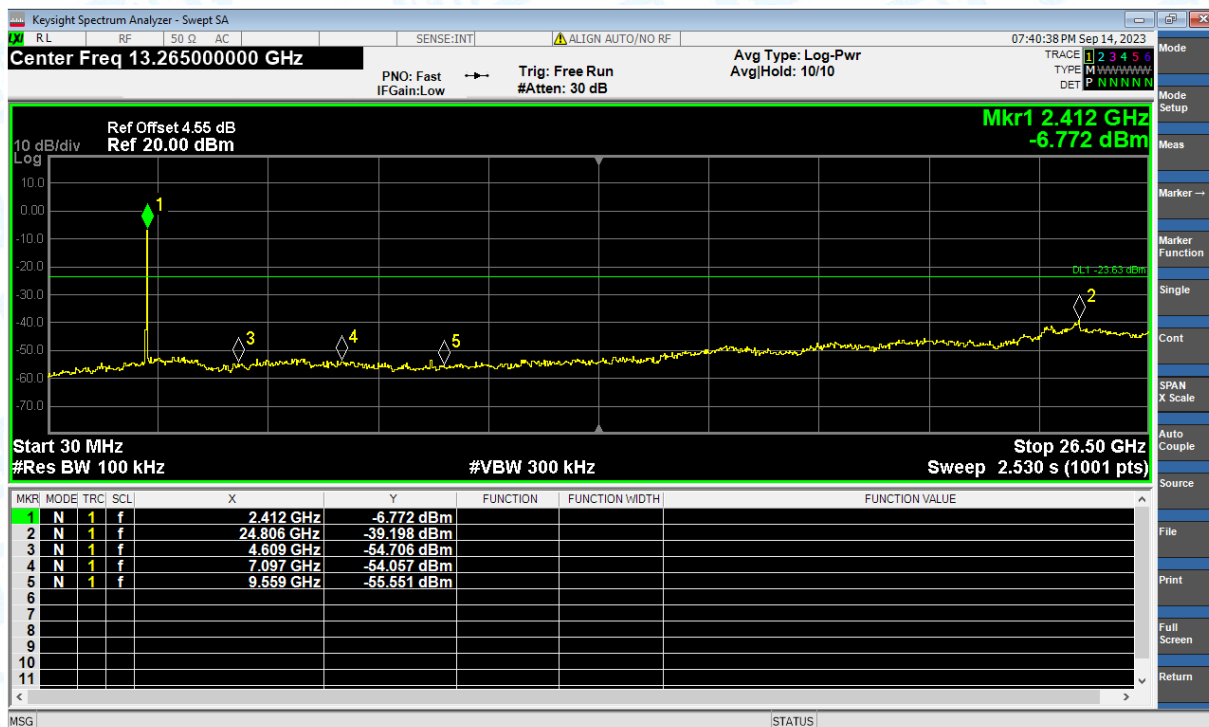
Tx. Spurious NVNT BLE 1Mbps 2480MHz Ant1 Emission



Tx. Spurious NVNT BLE 2Mbps 2402MHz Ant1 Ref



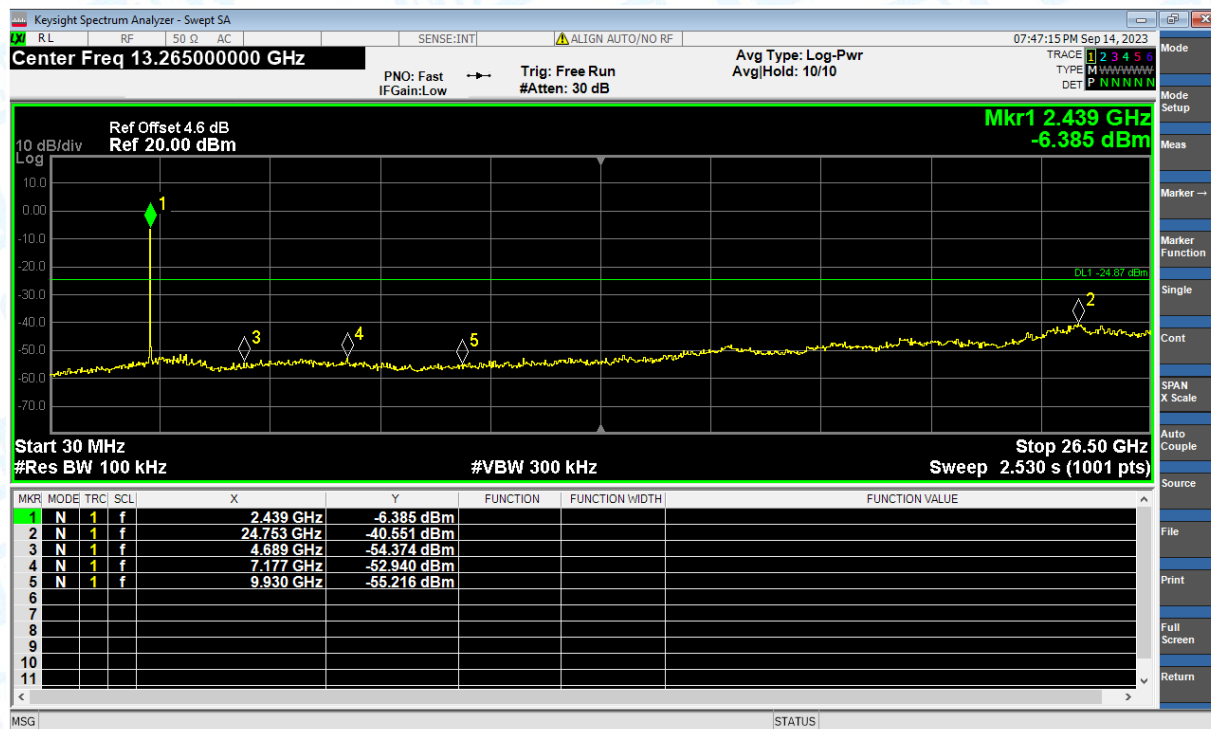
Tx. Spurious NVNT BLE 2Mbps 2402MHz Ant1 Emission



Tx. Spurious NVNT BLE 2Mbps 2440MHz Ant1 Ref



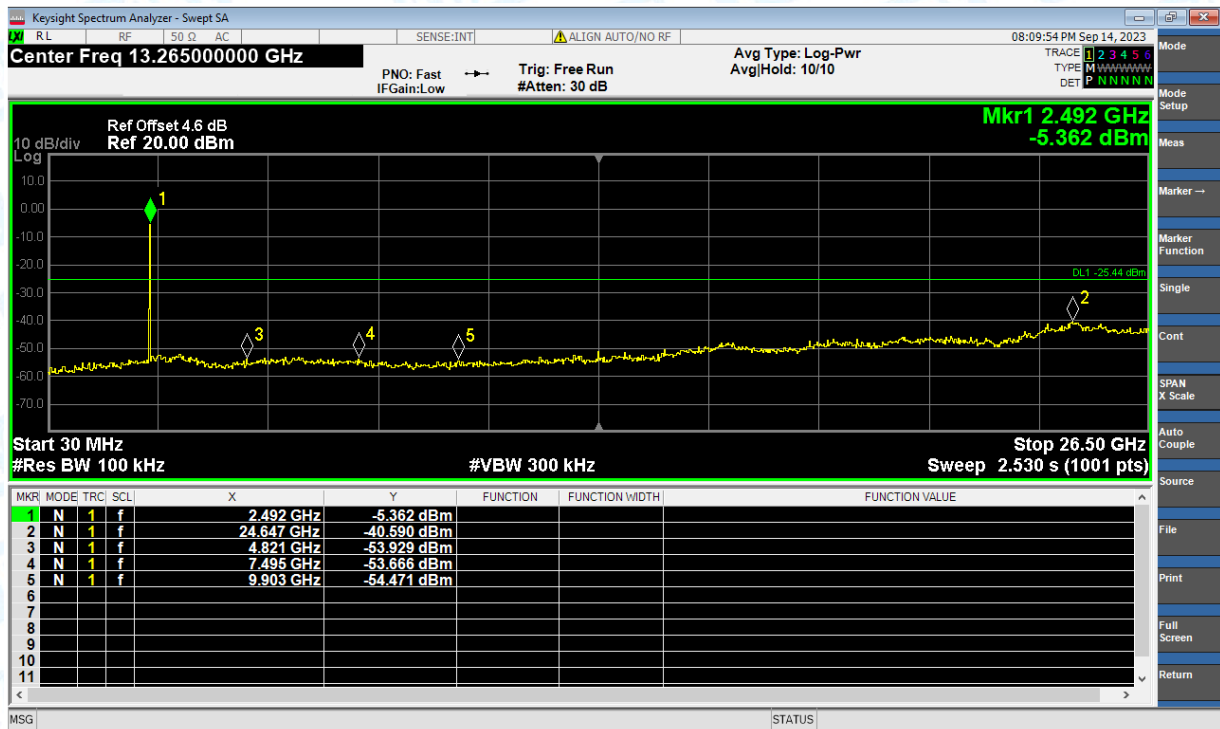
Tx. Spurious NVNT BLE 2Mbps 2440MHz Ant1 Emission



Tx. Spurious NVNT BLE 2Mbps 2480MHz Ant1 Ref



Tx. Spurious NVNT BLE 2Mbps 2480MHz Ant1 Emission



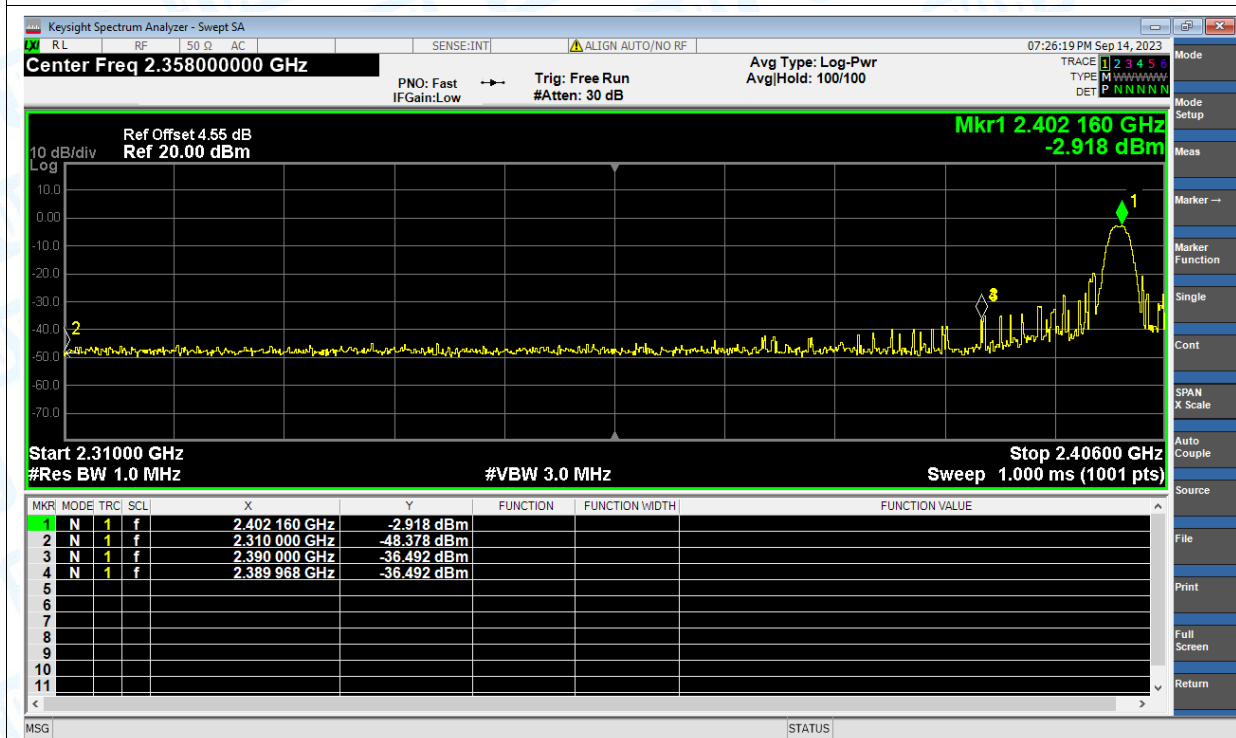
## Restrict Band

| Condition | Mode         | Frequency (MHz) | Antenna | Spur Freq (MHz) | Power (dBm) | Gain (dBi) | E (dBuV/m) | Detector | Limit (dBuV/m) | Verdict |
|-----------|--------------|-----------------|---------|-----------------|-------------|------------|------------|----------|----------------|---------|
| NVNT      | BLE<br>1Mbps | 2402            | Ant1    | 2310            | -48.38      | 2          | 48.88      | Peak     | 74             | Pass    |
| NVNT      | BLE<br>1Mbps | 2402            | Ant1    | 2310            | -56.19      | 2          | 41.07      | Average  | 54             | Pass    |
| NVNT      | BLE<br>1Mbps | 2402            | Ant1    | 2389.968        | -36.49      | 2          | 60.77      | Peak     | 74             | Pass    |
| NVNT      | BLE<br>1Mbps | 2402            | Ant1    | 2377.872        | -50.9       | 2          | 46.36      | Average  | 54             | Pass    |
| NVNT      | BLE<br>1Mbps | 2402            | Ant1    | 2390            | -44.62      | 2          | 52.64      | Peak     | 74             | Pass    |
| NVNT      | BLE<br>1Mbps | 2402            | Ant1    | 2390            | -54.67      | 2          | 42.59      | Average  | 54             | Pass    |
| NVNT      | BLE<br>1Mbps | 2480            | Ant1    | 2483.5          | -41.56      | 2          | 55.7       | Peak     | 74             | Pass    |
| NVNT      | BLE<br>1Mbps | 2480            | Ant1    | 2483.5          | -49.24      | 2          | 48.02      | Average  | 54             | Pass    |
| NVNT      | BLE<br>1Mbps | 2480            | Ant1    | 2484.712        | -27.28      | 2          | 69.98      | Peak     | 74             | Pass    |
| NVNT      | BLE<br>1Mbps | 2480            | Ant1    | 2483.944        | -48.03      | 2          | 49.23      | Average  | 54             | Pass    |
| NVNT      | BLE<br>1Mbps | 2480            | Ant1    | 2500            | -47.57      | 2          | 49.69      | Peak     | 74             | Pass    |
| NVNT      | BLE<br>1Mbps | 2480            | Ant1    | 2500            | -55.63      | 2          | 41.63      | Average  | 54             | Pass    |
| NVNT      | BLE<br>2Mbps | 2402            | Ant1    | 2310            | -47.93      | 2          | 49.33      | Peak     | 74             | Pass    |
| NVNT      | BLE<br>2Mbps | 2402            | Ant1    | 2310            | -55.21      | 2          | 42.05      | Average  | 54             | Pass    |
| NVNT      | BLE<br>2Mbps | 2402            | Ant1    | 2389.392        | -37.61      | 2          | 59.65      | Peak     | 74             | Pass    |
| NVNT      | BLE<br>2Mbps | 2402            | Ant1    | 2378.16         | -51.55      | 2          | 45.71      | Average  | 54             | Pass    |
| NVNT      | BLE<br>2Mbps | 2402            | Ant1    | 2390            | -46.04      | 2          | 51.22      | Peak     | 74             | Pass    |
| NVNT      | BLE<br>2Mbps | 2402            | Ant1    | 2390            | -52.22      | 2          | 45.04      | Average  | 54             | Pass    |
| NVNT      | BLE<br>2Mbps | 2480            | Ant1    | 2483.5          | -38.28      | 2          | 58.98      | Peak     | 74             | Pass    |
| NVNT      | BLE<br>2Mbps | 2480            | Ant1    | 2483.5          | -47.07      | 2          | 50.19      | Average  | 54             | Pass    |
| NVNT      | BLE<br>2Mbps | 2480            | Ant1    | 2483.632        | -37.15      | 2          | 60.11      | Peak     | 74             | Pass    |
| NVNT      | BLE<br>2Mbps | 2480            | Ant1    | 2483.632        | -46.81      | 2          | 50.45      | Average  | 54             | Pass    |

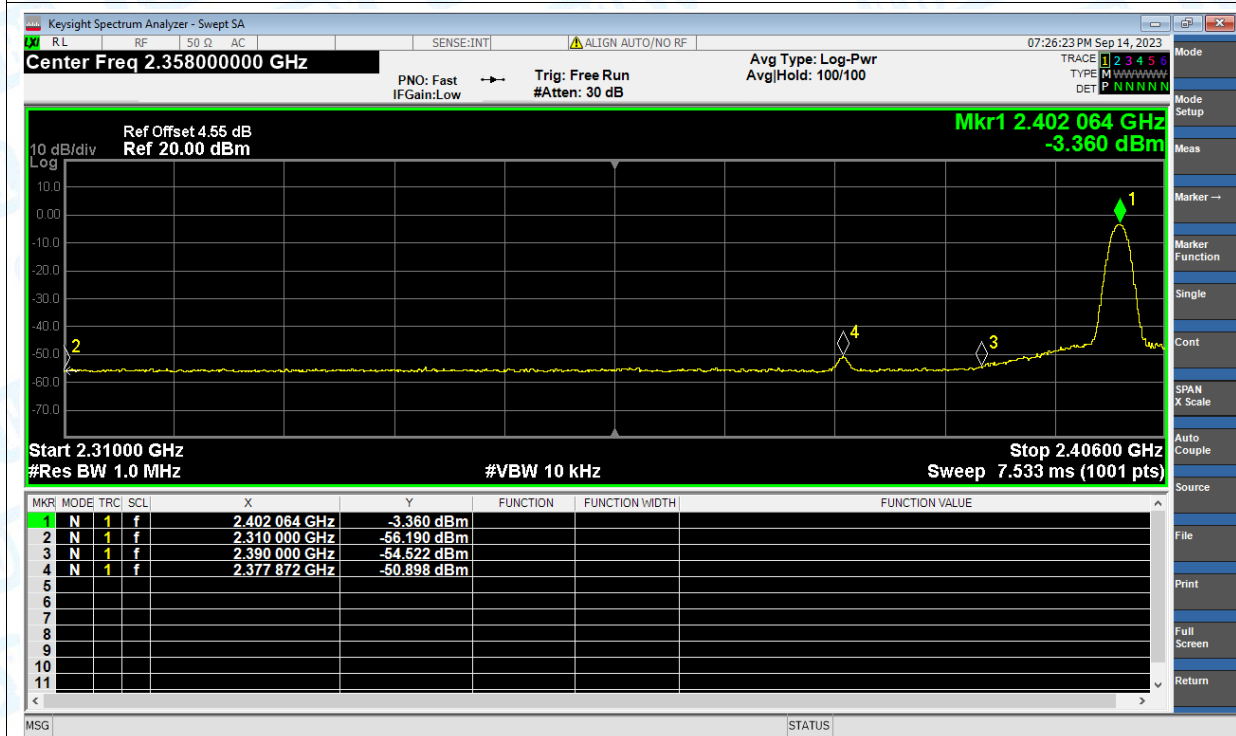
|      |              |      |      |      |        |   |       |         |    |      |
|------|--------------|------|------|------|--------|---|-------|---------|----|------|
|      | 2Mbps        |      |      |      |        |   |       |         |    |      |
| NVNT | BLE<br>2Mbps | 2480 | Ant1 | 2500 | -47.46 | 2 | 49.8  | Peak    | 74 | Pass |
| NVNT | BLE<br>2Mbps | 2480 | Ant1 | 2500 | -55.35 | 2 | 41.91 | Average | 54 | Pass |

## Test Graphs

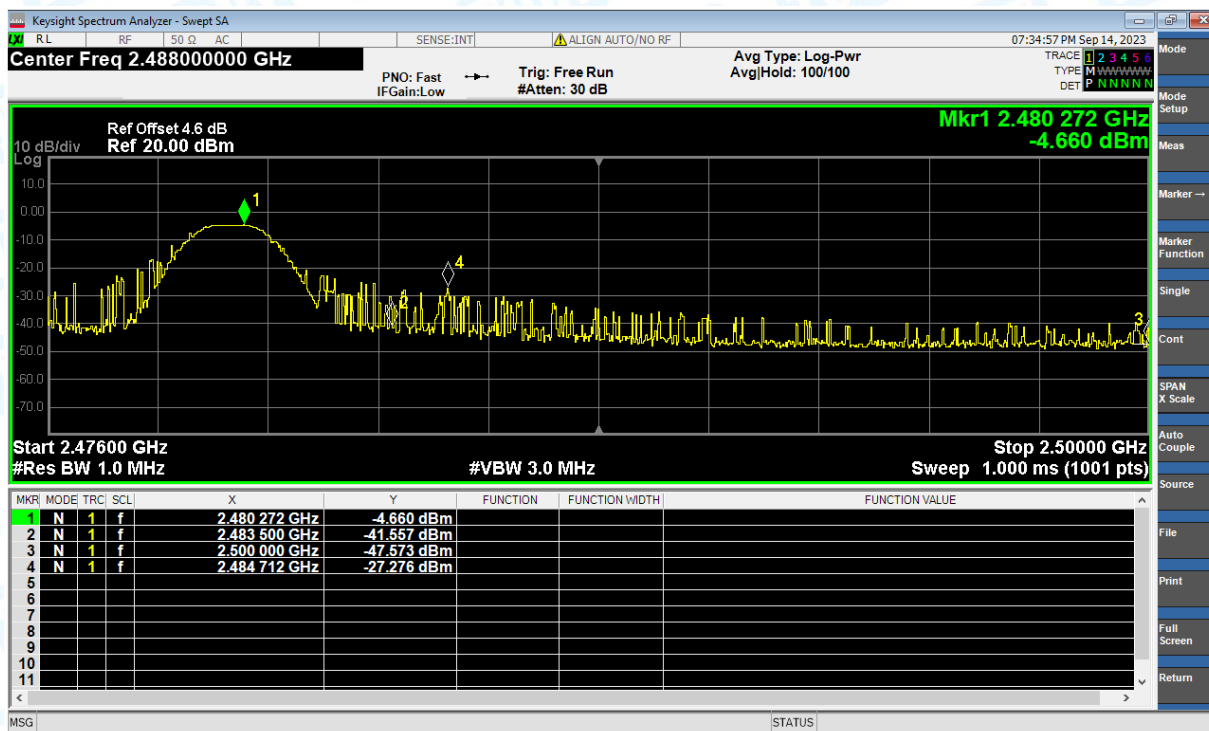
### Restrict Band NVNT BLE 1Mbps 2402MHz Ant1 Peak



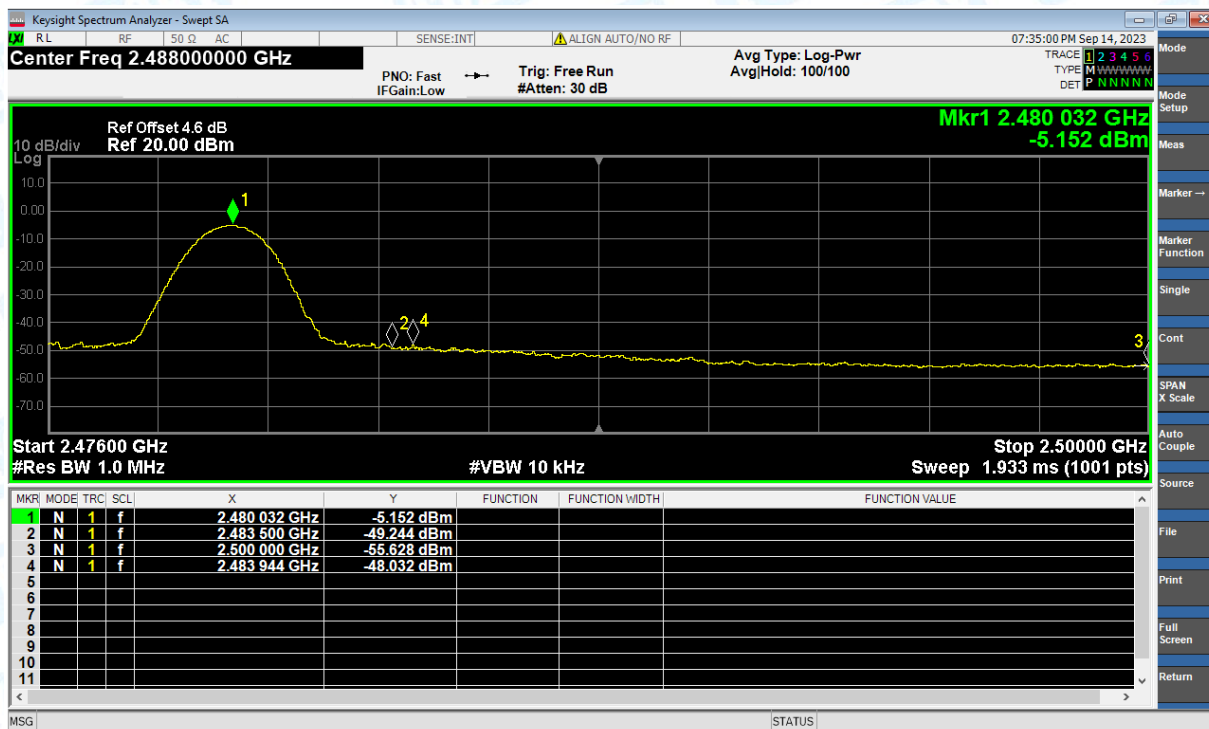
### Restrict Band NVNT BLE 1Mbps 2402MHz Ant1 Average



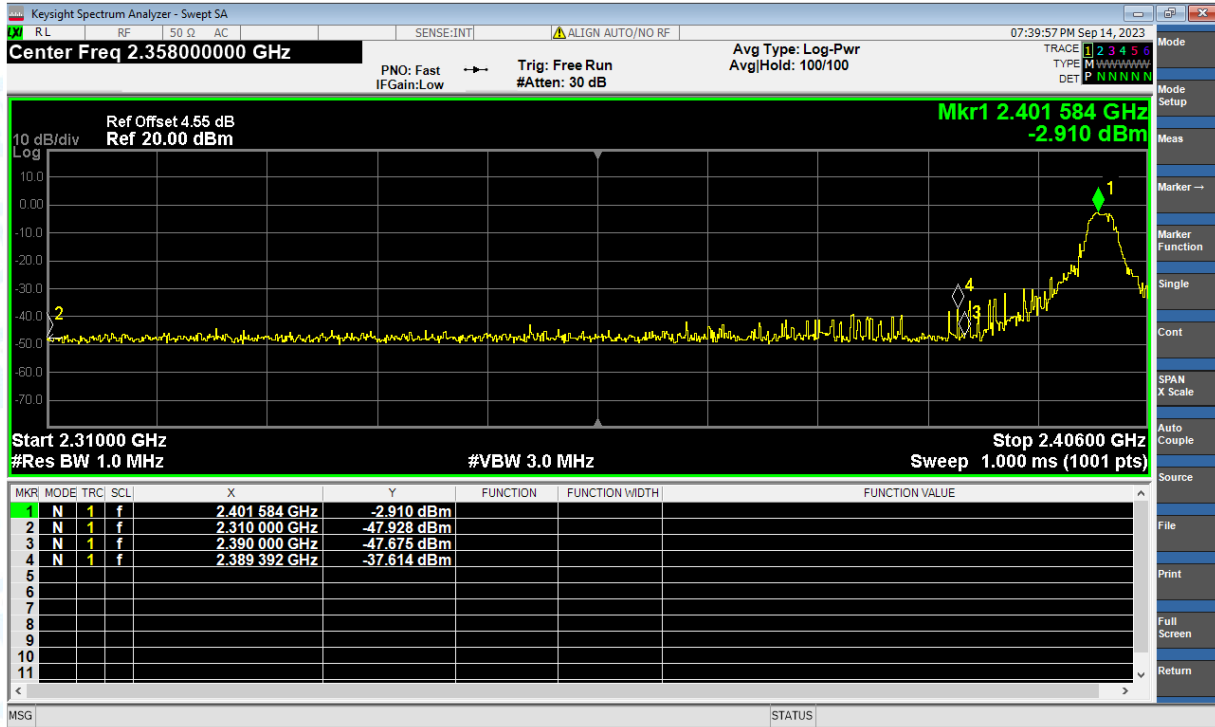
### Restrict Band NVNT BLE 1Mbps 2480MHz Ant1 Peak



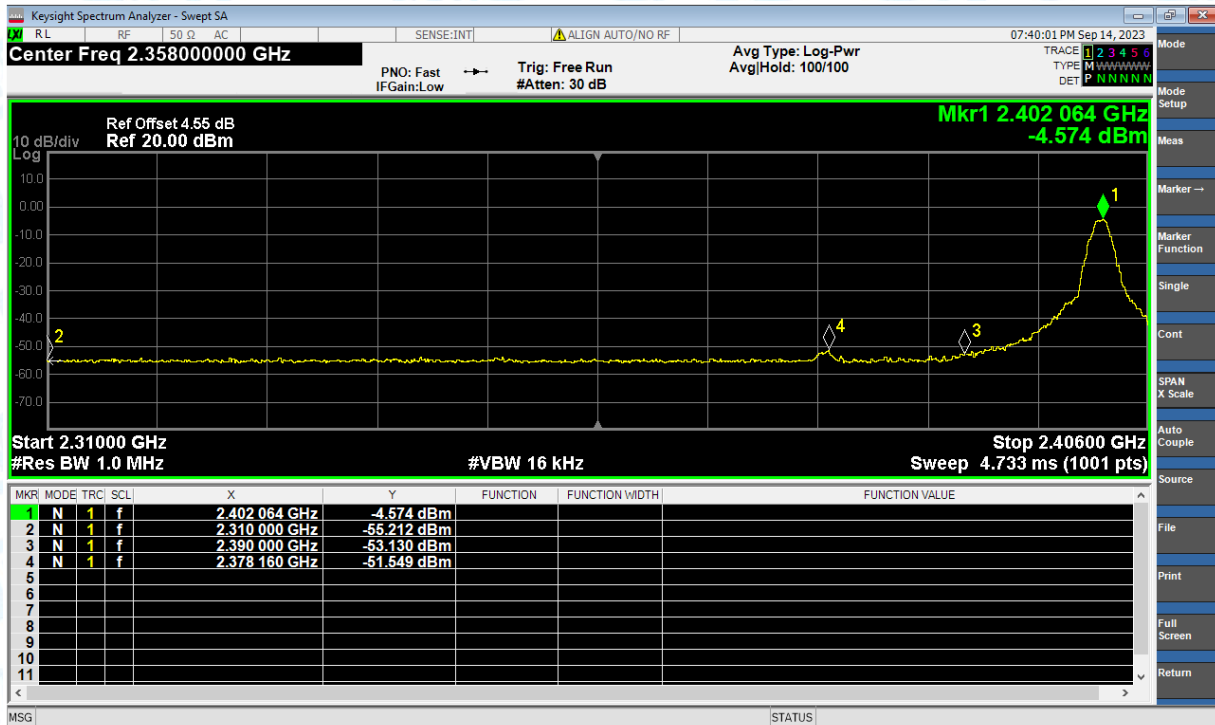
### Restrict Band NVNT BLE 1Mbps 2480MHz Ant1 Average



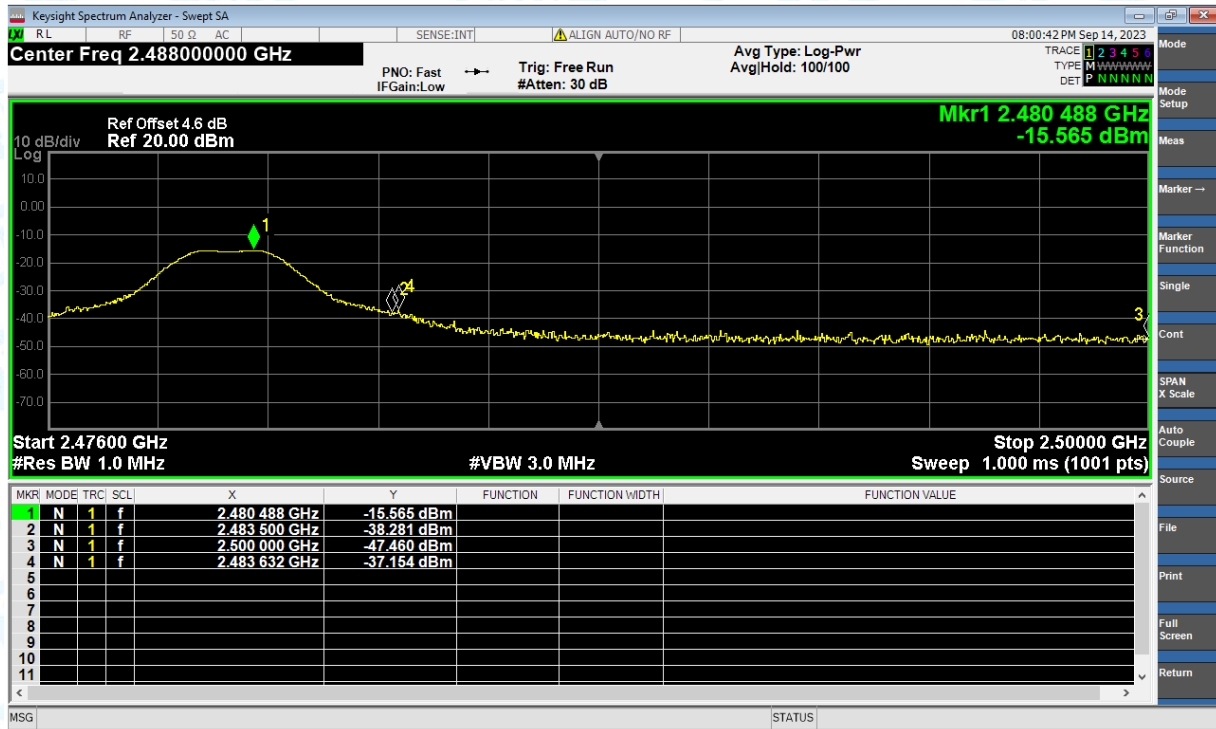
### Restrict Band NVNT BLE 2Mbps 2402MHz Ant1 Peak



### Restrict Band NVNT BLE 2Mbps 2402MHz Ant1 Average



### Restrict Band NVNT BLE 2Mbps 2480MHz Ant1 Peak



### Restrict Band NVNT BLE 2Mbps 2480MHz Ant1 Average

