



## Appendix B

### RF Test Data for BLE (Conducted Measurement)

Product Name: Marine Radio 1 Din

Test Model: SEI-SEMRN1DIN

#### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 23.5° C   |
| Relative Humidity: | 52.2%     |
| ATM Pressure:      | 100.0 kPa |
| Test Engineer:     | Joker Hu  |
| Supervised by:     | Ling Zhu  |



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## B.1 -6dB Bandwidth

| Condition | Mode | Frequency (MHz) | Antenna | -6 dB Bandwidth (MHz) | Limit -6 dB Bandwidth (MHz) | Verdict |
|-----------|------|-----------------|---------|-----------------------|-----------------------------|---------|
| NVNT      | BLE  | 2402            | Ant     | 0.674                 | $\geq 0.5$                  | Pass    |
| NVNT      | BLE  | 2440            | Ant     | 0.673                 | $\geq 0.5$                  | Pass    |
| NVNT      | BLE  | 2480            | Ant     | 0.666                 | $\geq 0.5$                  | Pass    |



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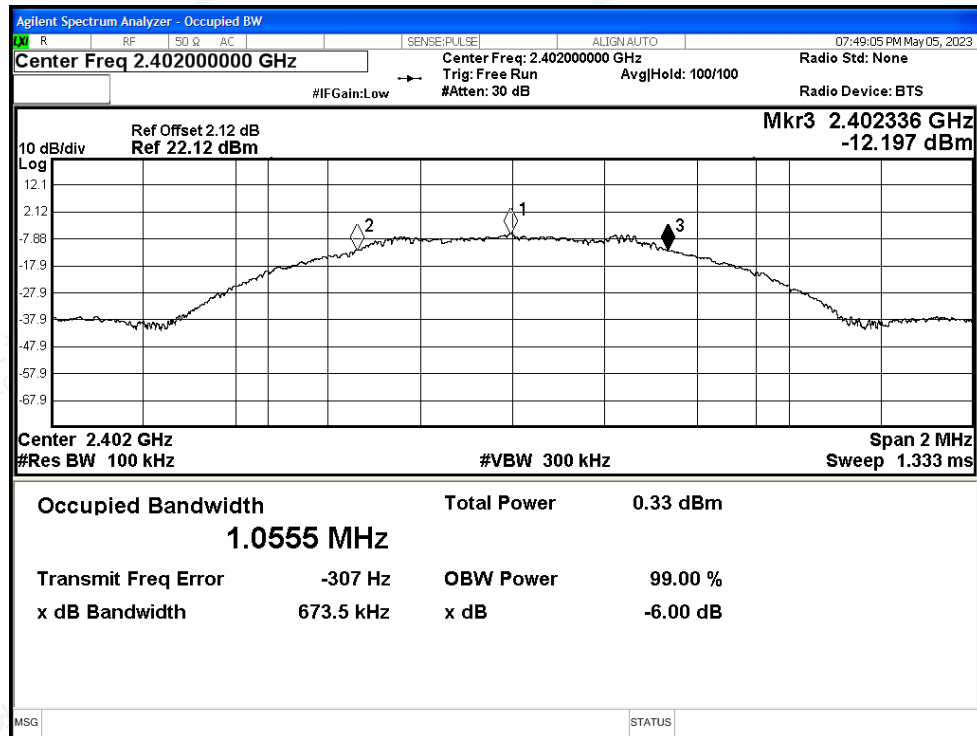
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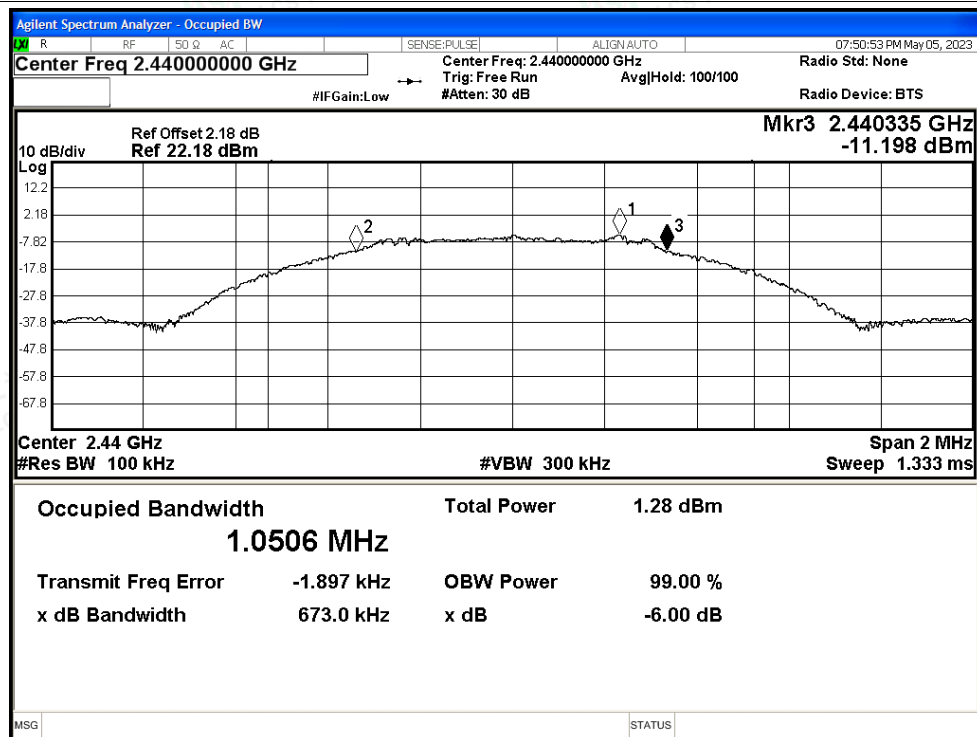


## Test Graphs

## -6dB Bandwidth NVNT BLE 2402MHz Ant



## -6dB Bandwidth NVNT BLE 2440MHz Ant

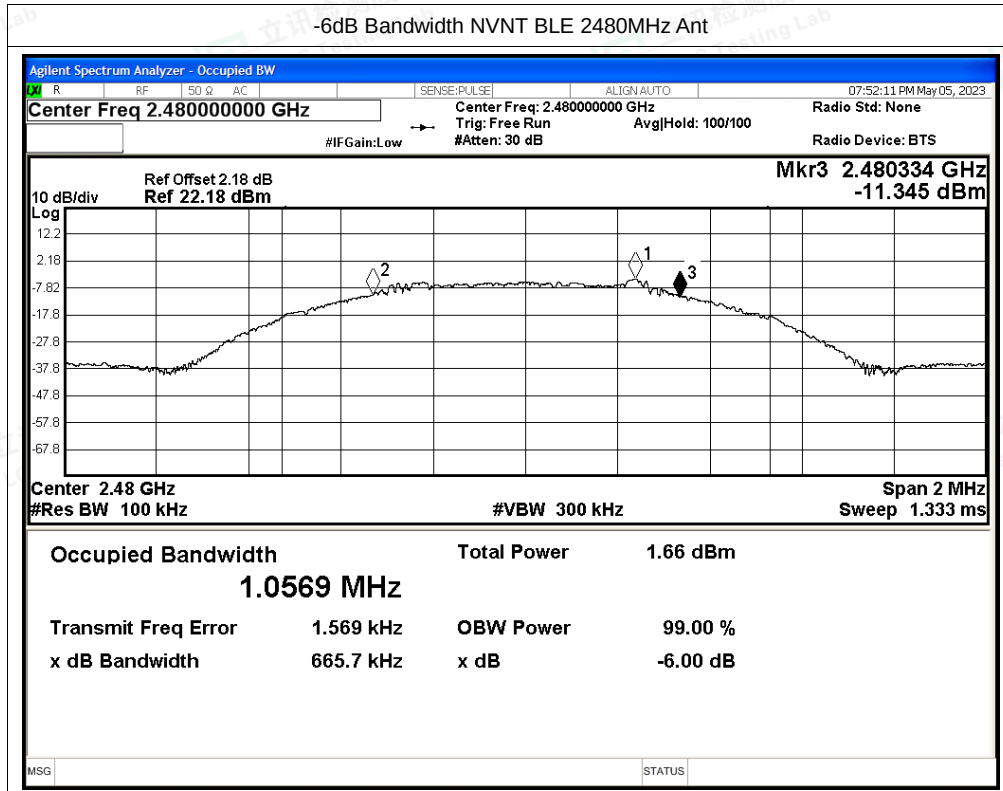


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## B.2 Occupied Channel Bandwidth

| Condition | Mode | Frequency (MHz) | Antenna | 99% OBW (MHz) |
|-----------|------|-----------------|---------|---------------|
| NVNT      | BLE  | 2402            | Ant     | 1.043         |
| NVNT      | BLE  | 2440            | Ant     | 1.046         |
| NVNT      | BLE  | 2480            | Ant     | 1.045         |



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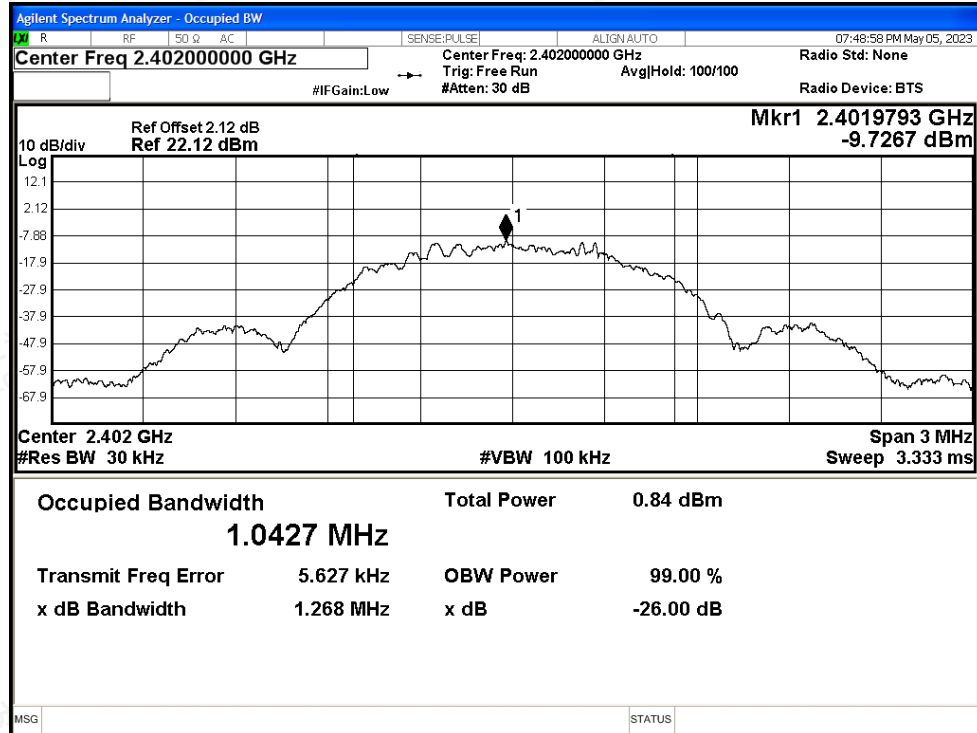
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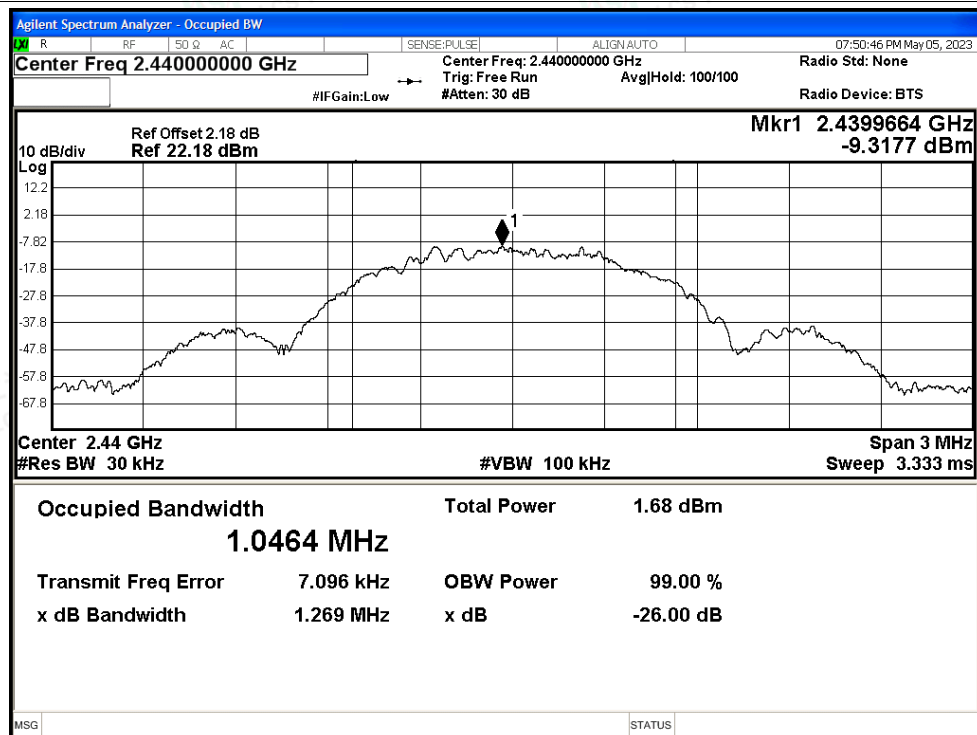


## Test Graphs

## OBW NVNT BLE 2402MHz Ant



## OBW NVNT BLE 2440MHz Ant

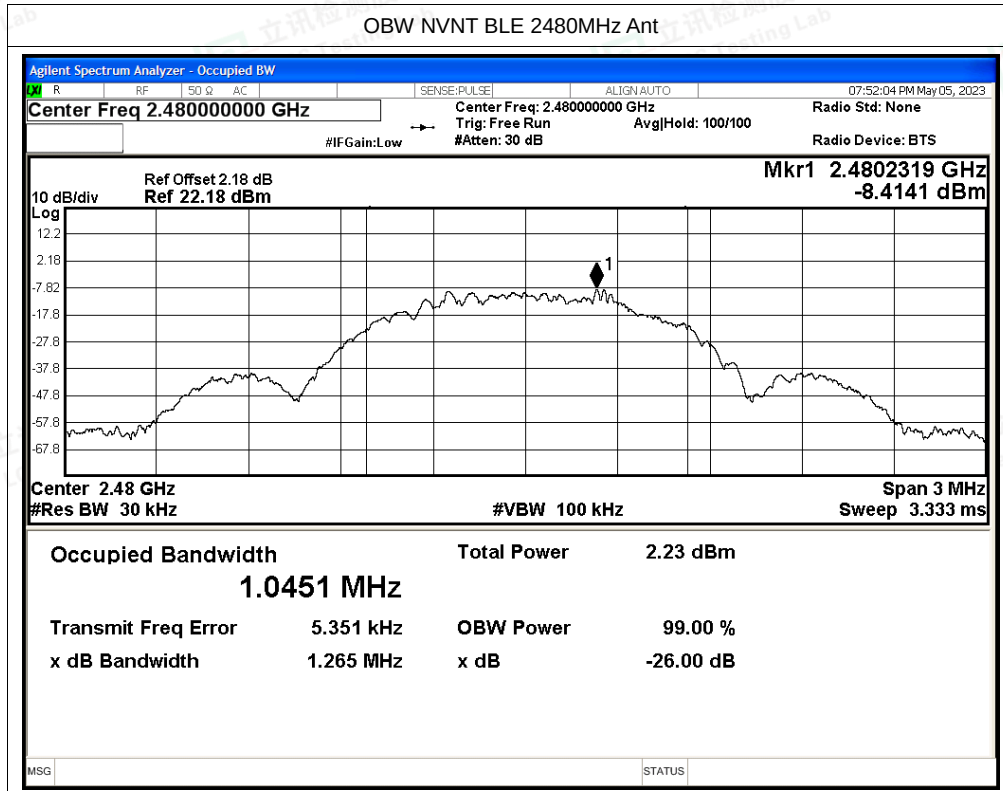


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### B.3 Maximum Conducted Output Power and e.i.r.p.

| Condition | Mode | Frequency (MHz) | Antenna | Total Power (dBm) | Limit (dBm) | Antenna Gain | Report EIRP Power(dBm) | Limit (dBm) | Verdict |
|-----------|------|-----------------|---------|-------------------|-------------|--------------|------------------------|-------------|---------|
| NVNT      | BLE  | 2402            | Ant     | -5.39             | 30          | 1.15         | -4.24                  | 36          | Pass    |
| NVNT      | BLE  | 2440            | Ant     | -4.46             | 30          | 1.15         | -3.31                  | 36          | Pass    |
| NVNT      | BLE  | 2480            | Ant     | -4.10             | 30          | 1.15         | -2.95                  | 36          | Pass    |



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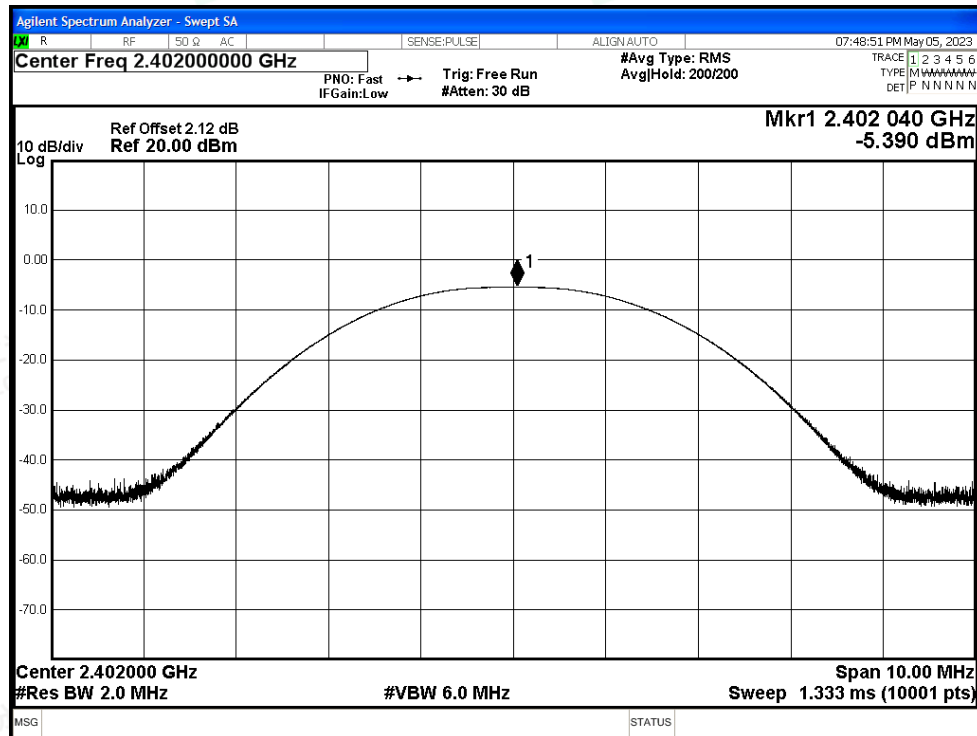
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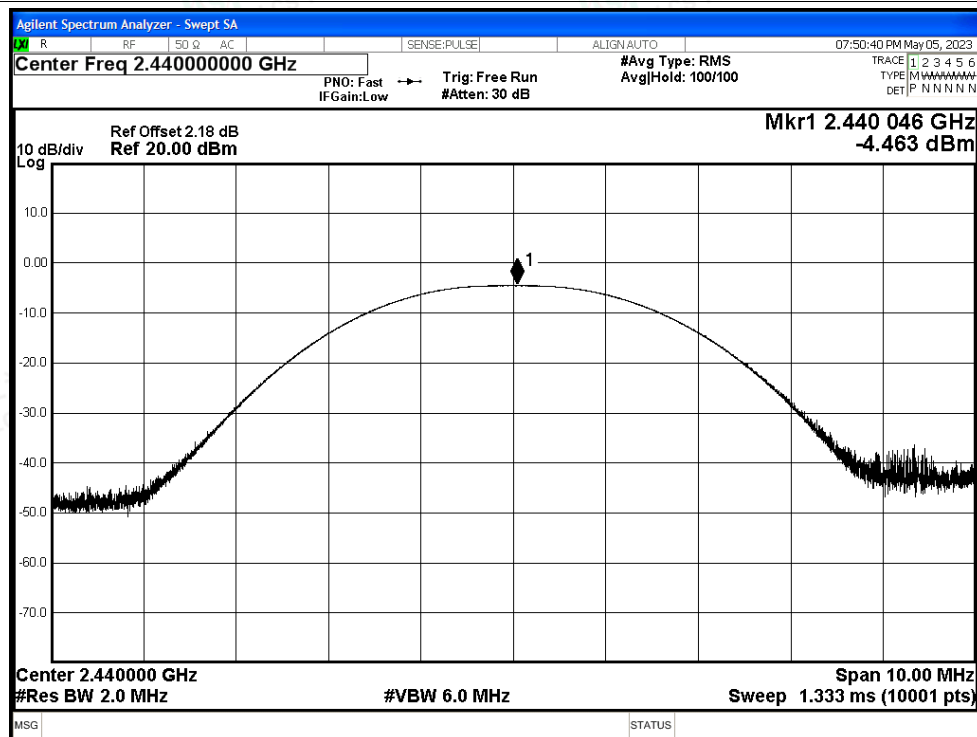


## Test Graphs

## Power NVNT BLE 2402MHz Ant



## Power NVNT BLE 2440MHz Ant

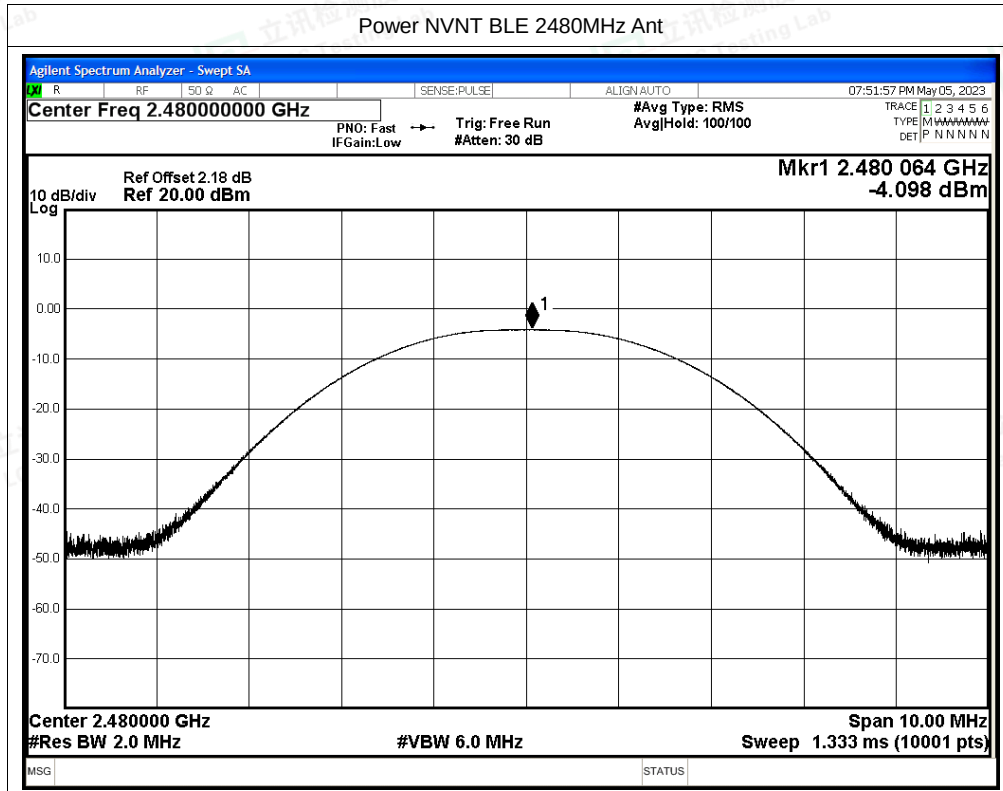


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## B.4 Maximum Power Spectral Density Level

| Condition | Mode | Frequency<br>(MHz) | Antenna | Total PSD<br>(dBm/3kHz) | Limit<br>(dBm/3kHz) | Verdict |
|-----------|------|--------------------|---------|-------------------------|---------------------|---------|
| NVNT      | BLE  | 2402               | Ant     | -21.63                  | 8                   | Pass    |
| NVNT      | BLE  | 2440               | Ant     | -21.09                  | 8                   | Pass    |
| NVNT      | BLE  | 2480               | Ant     | -20.68                  | 8                   | Pass    |



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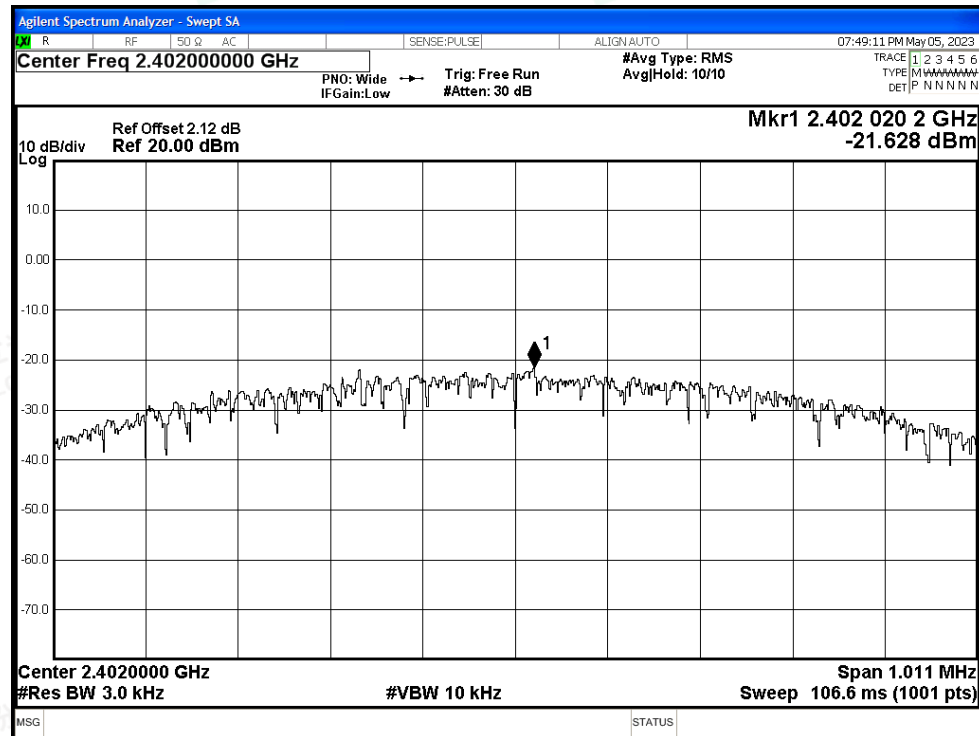
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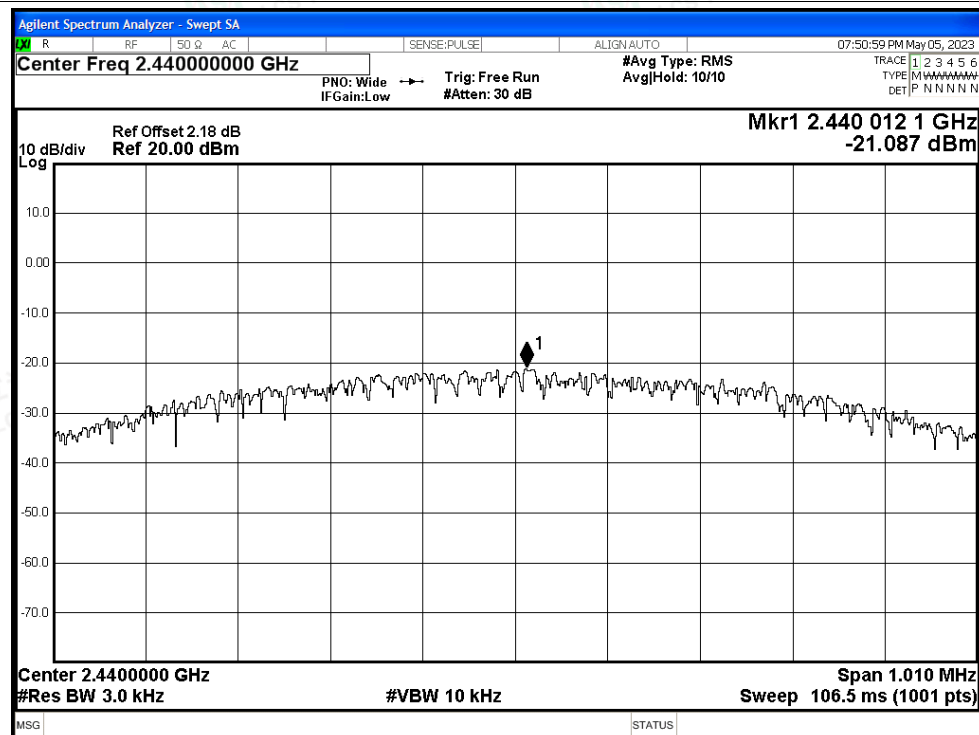


## Test Graphs

## PSD NVNT BLE 2402MHz Ant



## PSD NVNT BLE 2440MHz Ant

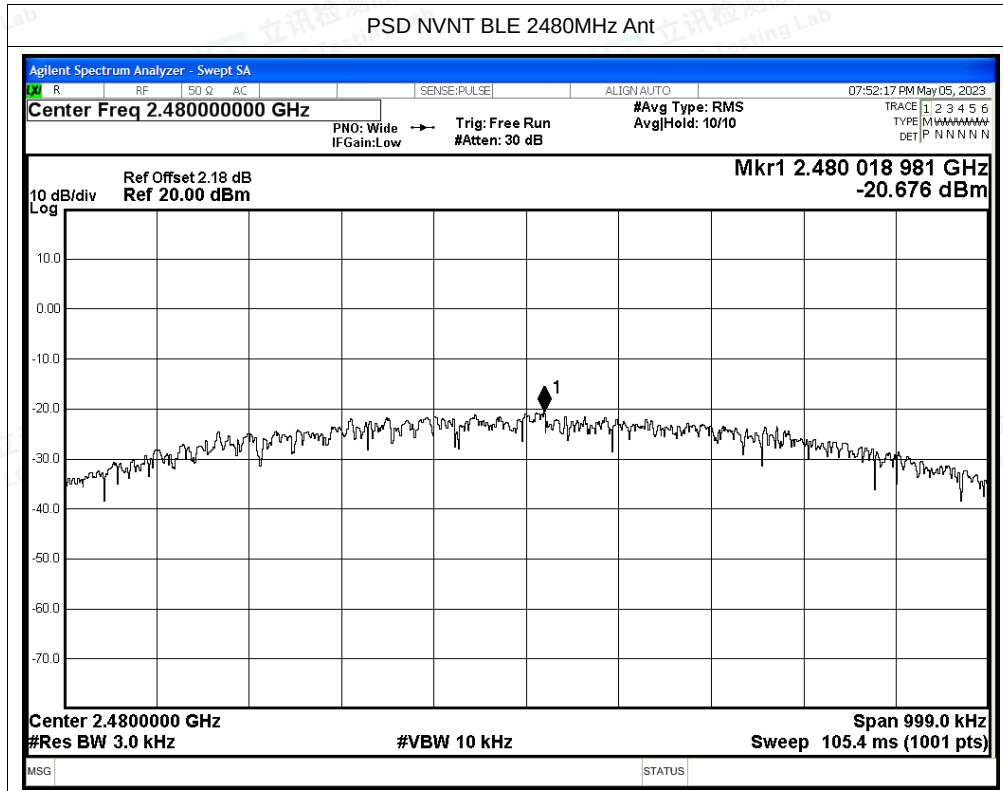


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## B.5 Band Edge

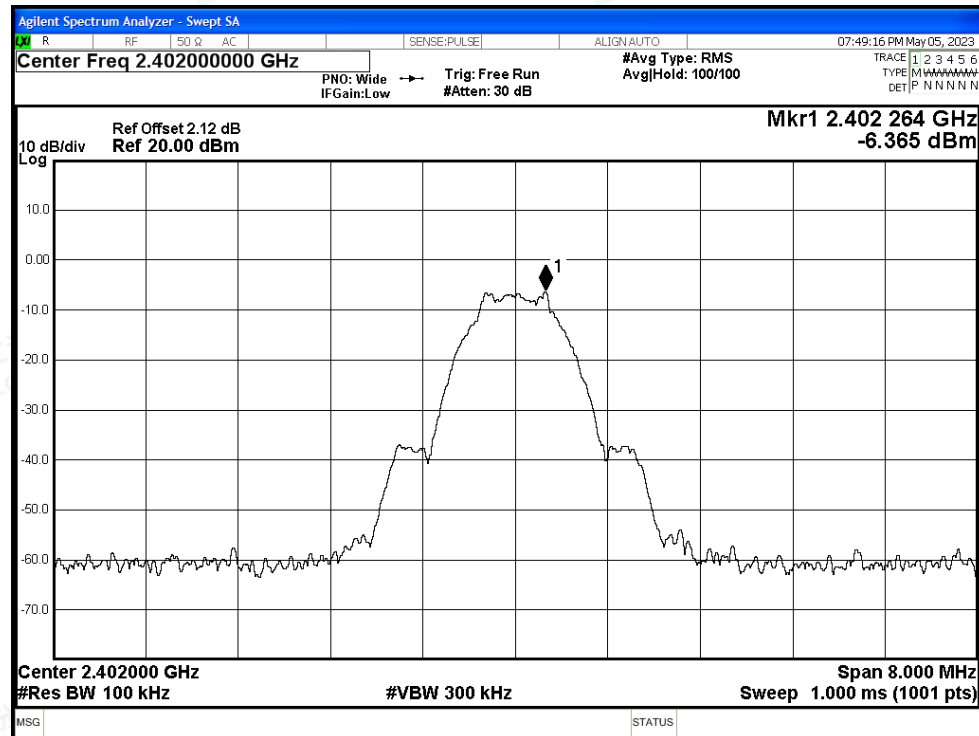
| Condition | Mode | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|-----------|------|-----------------|---------|-----------------|-------------|---------|
| NVNT      | BLE  | 2402            | Ant     | -50.54          | -20         | Pass    |
| NVNT      | BLE  | 2480            | Ant     | -51.58          | -20         | Pass    |



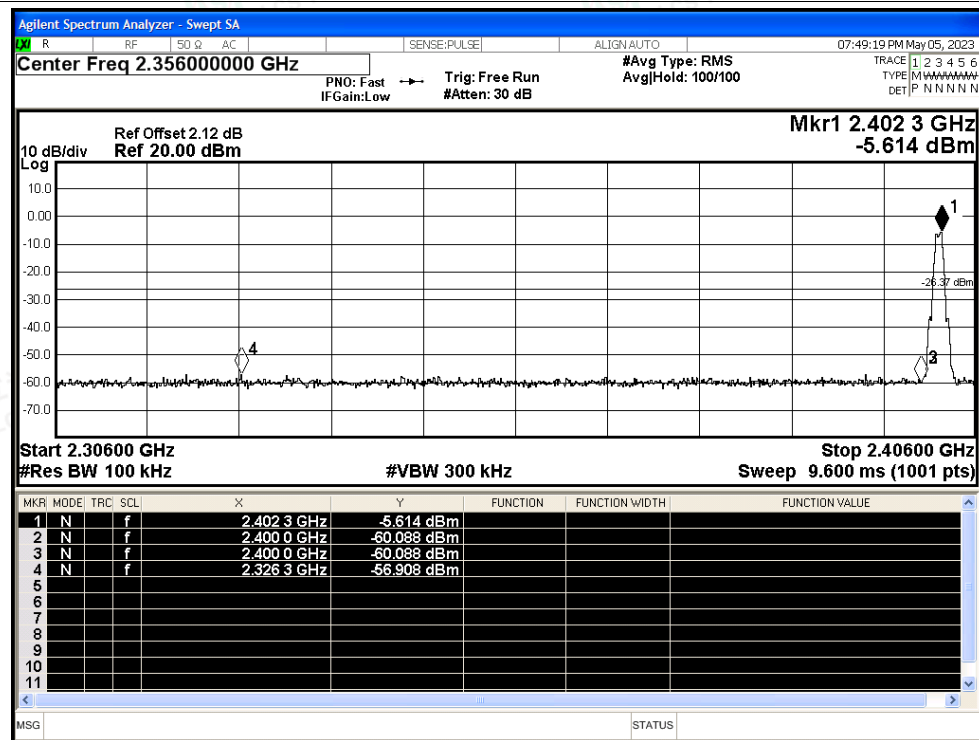


## Test Graphs

## Band Edge NVNT BLE 2402MHz Ant Ref



## Band Edge NVNT BLE 2402MHz Ant Emission



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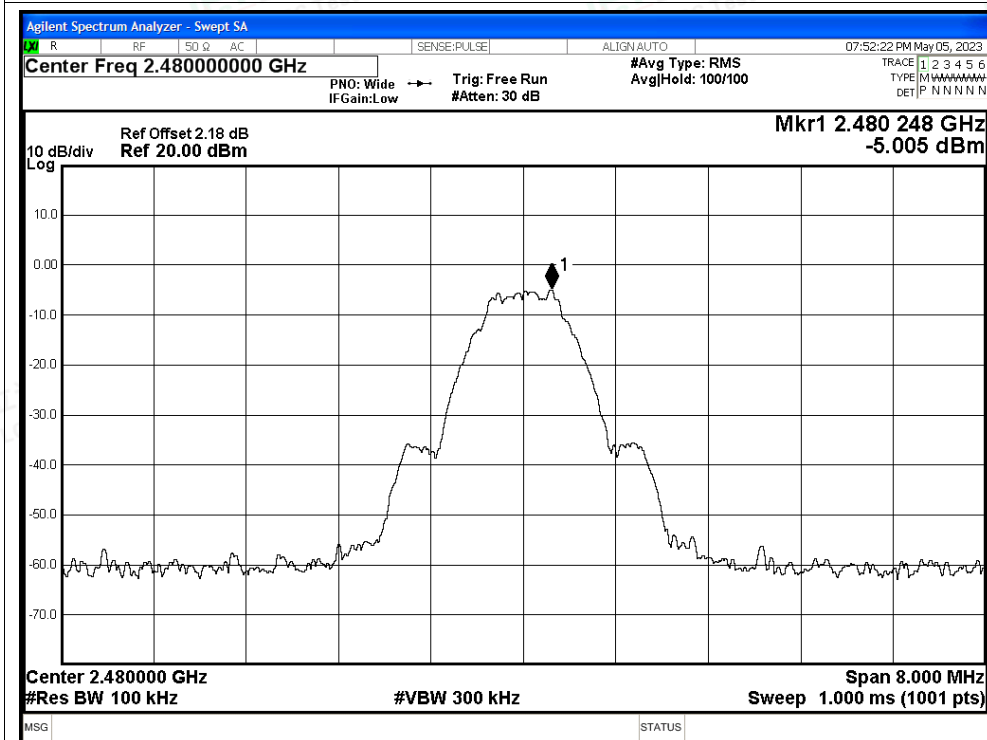
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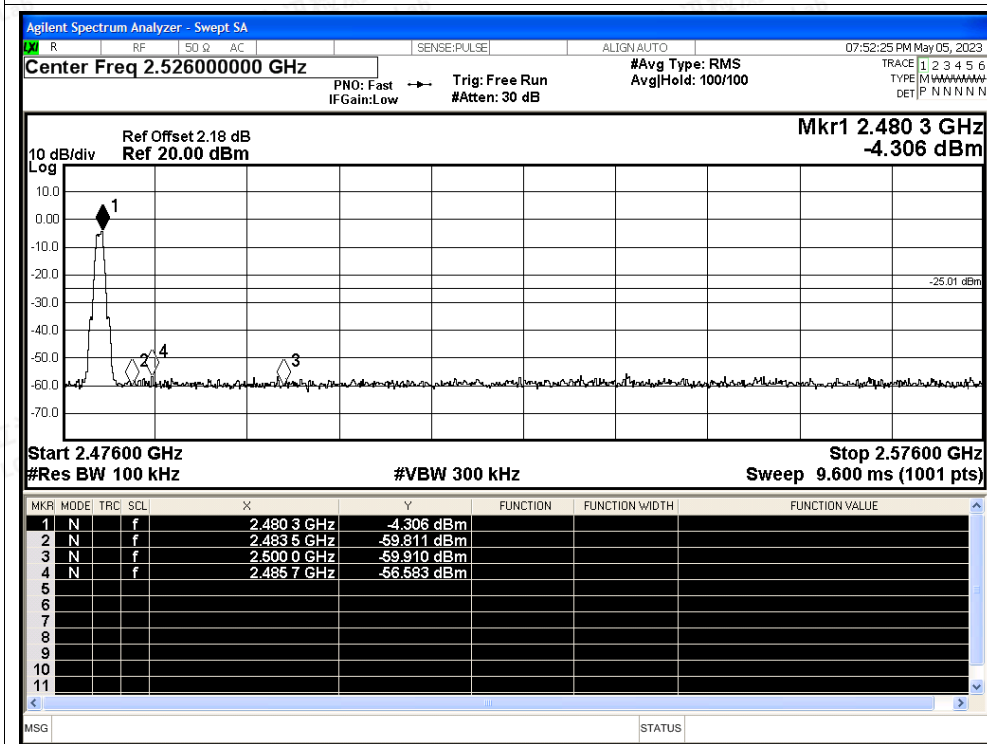
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## Band Edge NVNT BLE 2480MHz Ant Ref



## Band Edge NVNT BLE 2480MHz Ant Emission



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## B.6 Conducted RF Spurious Emission

| Condition | Mode | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|-----------|------|-----------------|---------|-----------------|-------------|---------|
| NVNT      | BLE  | 2402            | Ant     | -50.01          | -20         | Pass    |
| NVNT      | BLE  | 2440            | Ant     | -50.5           | -20         | Pass    |
| NVNT      | BLE  | 2480            | Ant     | -50.96          | -20         | Pass    |



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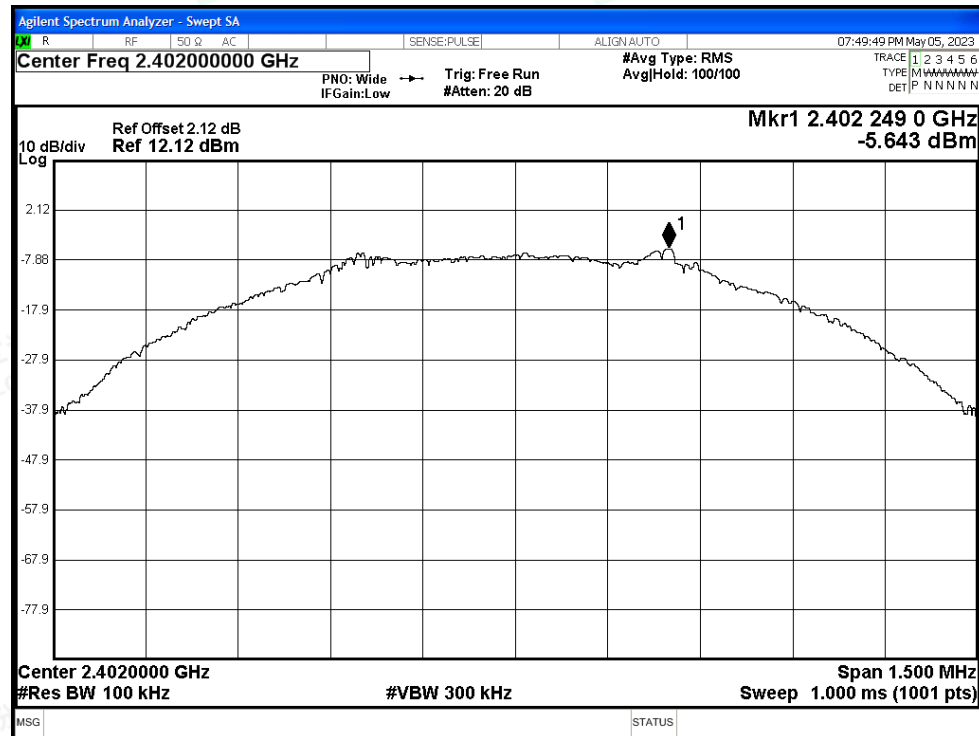
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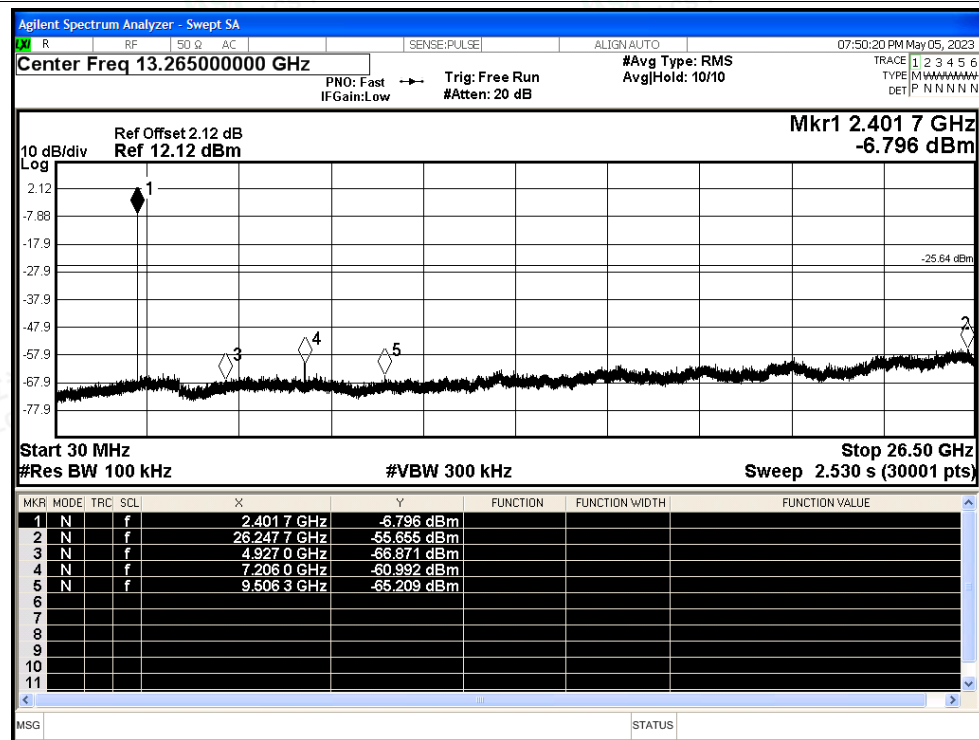


## Test Graphs

## Tx. Spurious NVNT BLE 2402MHz Ant Ref



## Tx. Spurious NVNT BLE 2402MHz Ant Emission



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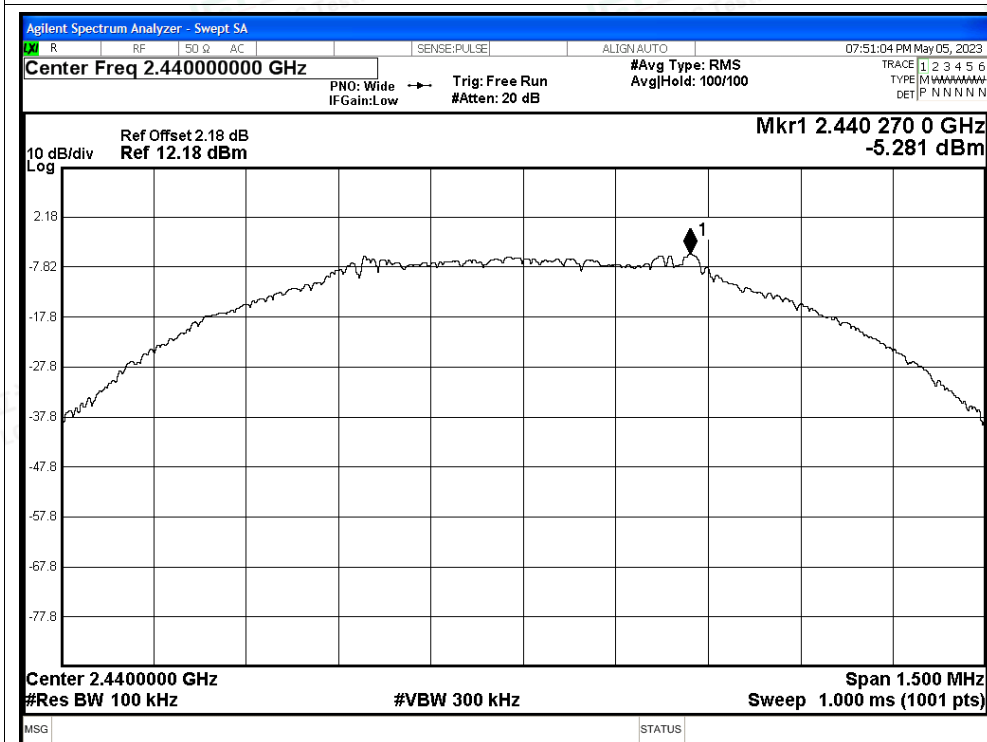
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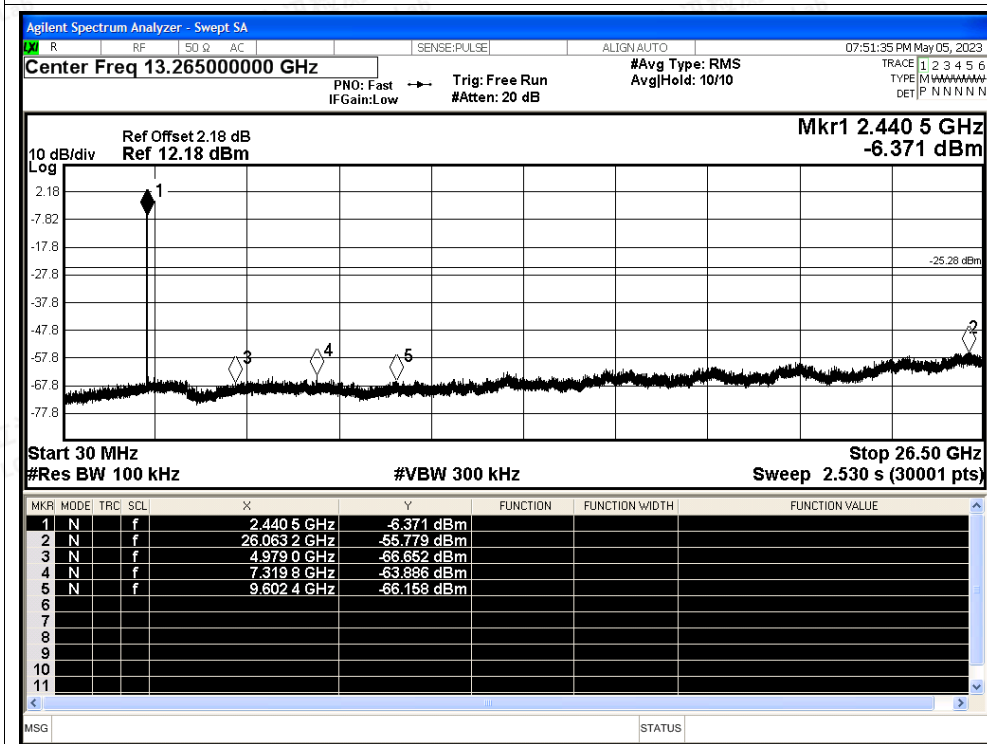
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## Tx. Spurious NVNT BLE 2440MHz Ant Ref



## Tx. Spurious NVNT BLE 2440MHz Ant Emission



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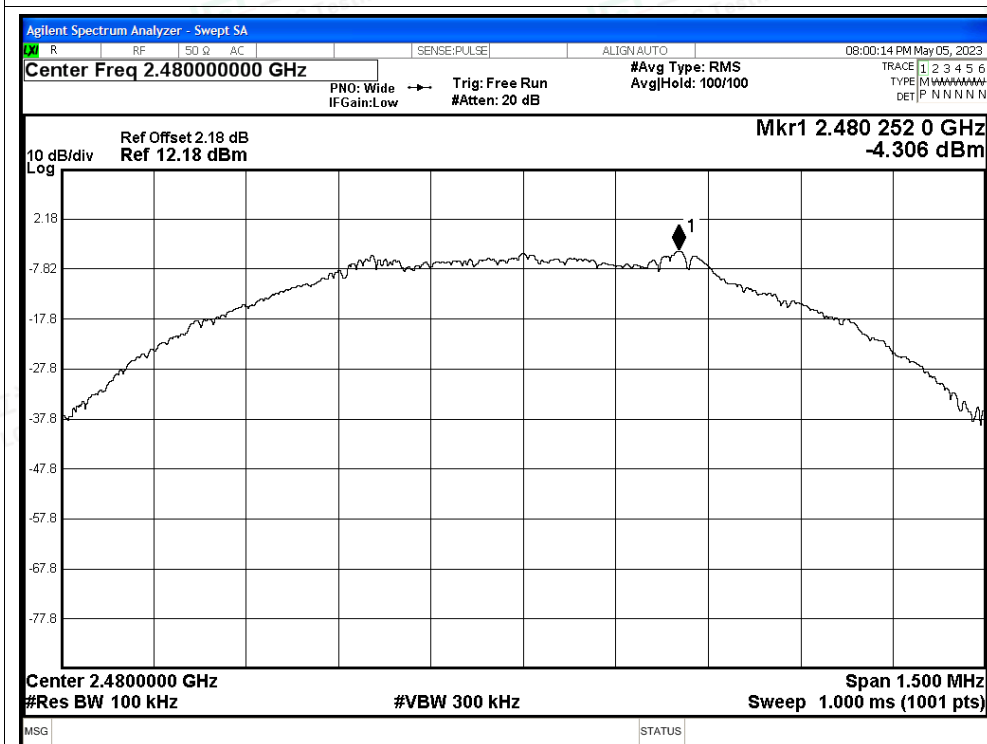
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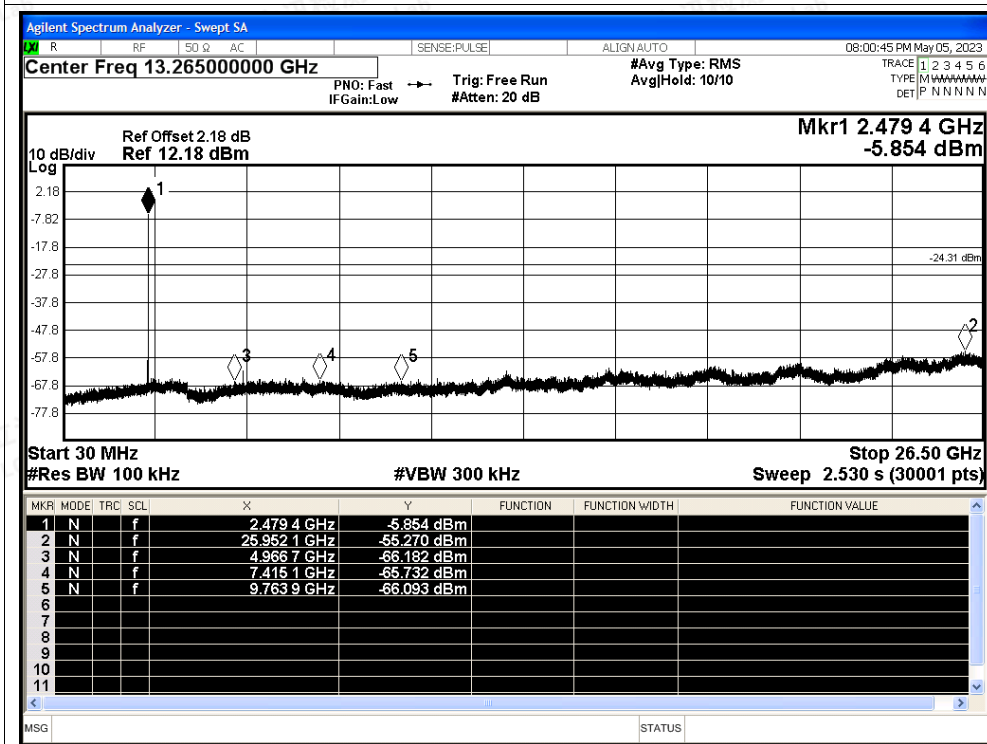
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## Tx. Spurious NVNT BLE 2480MHz Ant Ref



## Tx. Spurious NVNT BLE 2480MHz Ant Emission



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## B.7 Duty Cycle

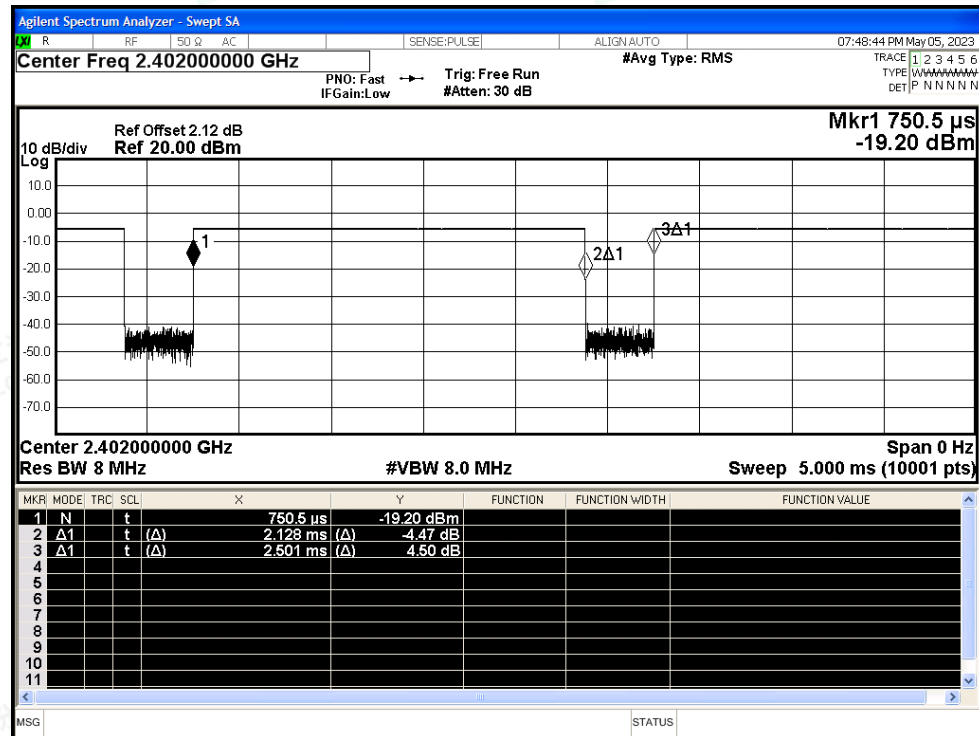
| Condition | Mode | Frequency (MHz) | Antenna | Duty Cycle (%) | Correction Factor (dB) | 1/T (kHz) |
|-----------|------|-----------------|---------|----------------|------------------------|-----------|
| NVNT      | BLE  | 2402            | Ant     | 85.1           | 0.7                    | 0.47      |
| NVNT      | BLE  | 2440            | Ant     | 85.1           | 0.7                    | 0.47      |
| NVNT      | BLE  | 2480            | Ant     | 85.12          | 0.7                    | 0.47      |



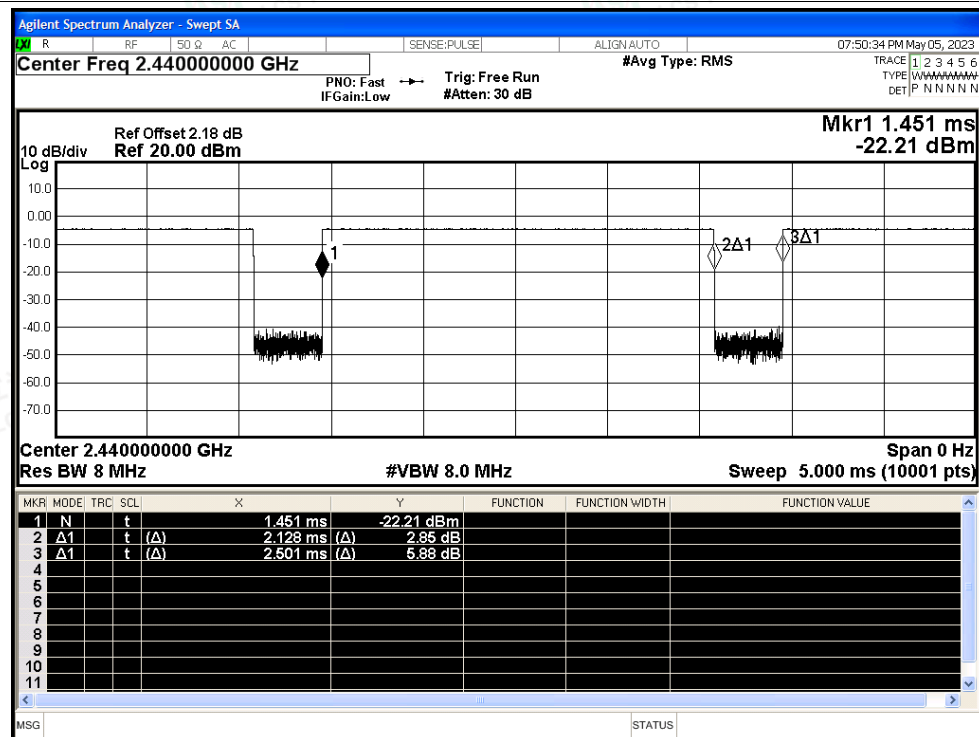


## Test Graphs

## Duty Cycle NVNT BLE 2402MHz Ant



## Duty Cycle NVNT BLE 2440MHz Ant

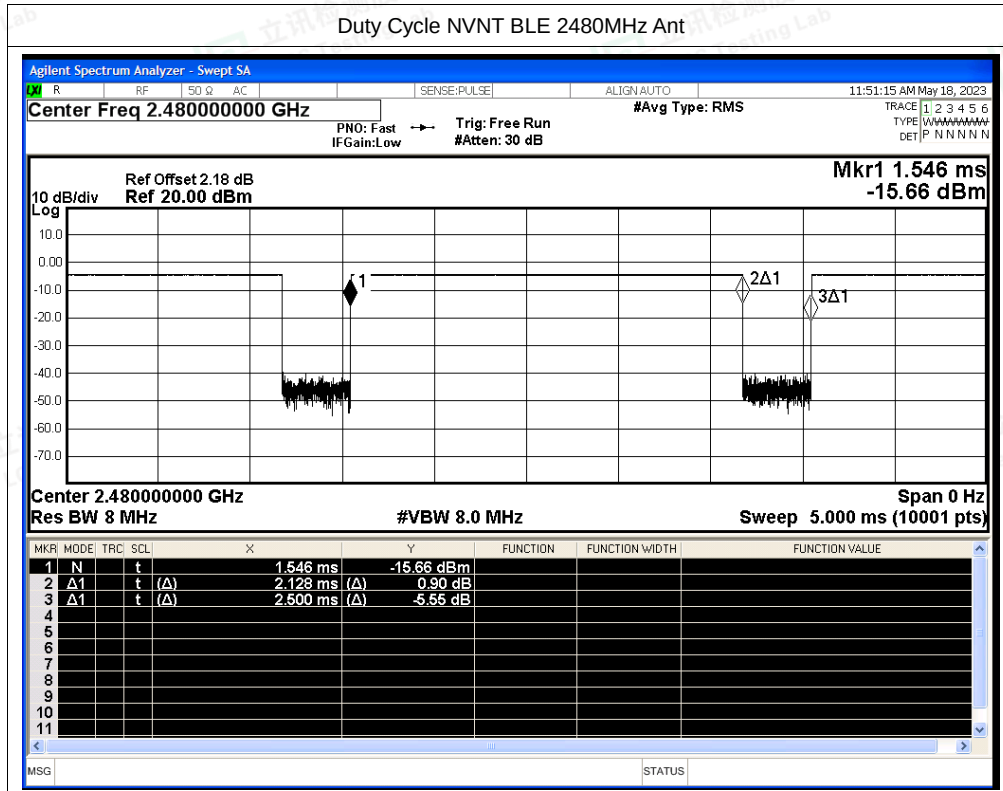


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## B.8 Restrict Band

| Condition | Mode | Frequency<br>(MHz) | Antenna | Spur Freq<br>(MHz) | Power<br>(dBm) | Gain<br>(dBi) | E<br>(dBuV/m) | Detector | Limit<br>(dBuV/m) | Verdict |
|-----------|------|--------------------|---------|--------------------|----------------|---------------|---------------|----------|-------------------|---------|
| NVNT      | BLE  | 2402               | Ant     | 2310               | -51.9          | 2             | 45.36         | Peak     | 74                | Pass    |
| NVNT      | BLE  | 2402               | Ant     | 2310               | -57.74         | 2             | 39.52         | Average  | 54                | Pass    |
| NVNT      | BLE  | 2402               | Ant     | 2357.424           | -47.6          | 2             | 49.66         | Peak     | 74                | Pass    |
| NVNT      | BLE  | 2402               | Ant     | 2388.528           | -57.35         | 2             | 39.91         | Average  | 54                | Pass    |
| NVNT      | BLE  | 2402               | Ant     | 2390               | -50.09         | 2             | 47.17         | Peak     | 74                | Pass    |
| NVNT      | BLE  | 2402               | Ant     | 2390               | -57.55         | 2             | 39.71         | Average  | 54                | Pass    |
| NVNT      | BLE  | 2480               | Ant     | 2483.5             | -50            | 2             | 47.26         | Peak     | 74                | Pass    |
| NVNT      | BLE  | 2480               | Ant     | 2483.5             | -56.87         | 2             | 40.39         | Average  | 54                | Pass    |
| NVNT      | BLE  | 2480               | Ant     | 2489.032           | -46.71         | 2             | 50.55         | Peak     | 74                | Pass    |
| NVNT      | BLE  | 2480               | Ant     | 2483.512           | -56.87         | 2             | 40.39         | Average  | 54                | Pass    |
| NVNT      | BLE  | 2480               | Ant     | 2500               | -50.75         | 2             | 46.51         | Peak     | 74                | Pass    |
| NVNT      | BLE  | 2480               | Ant     | 2500               | -57.51         | 2             | 39.75         | Average  | 54                | Pass    |



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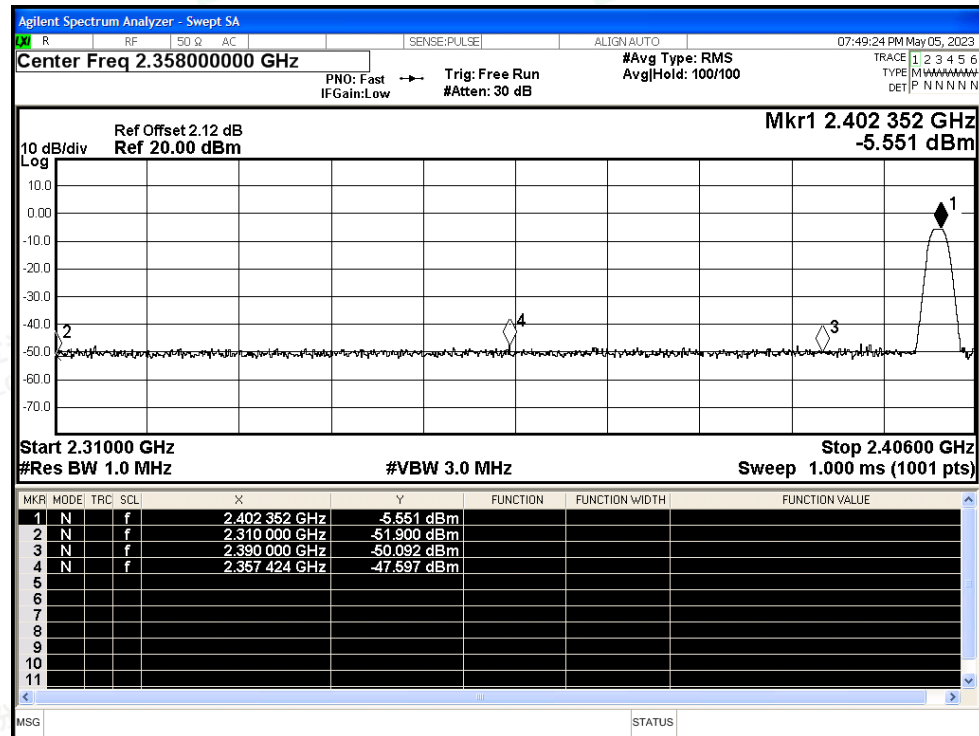
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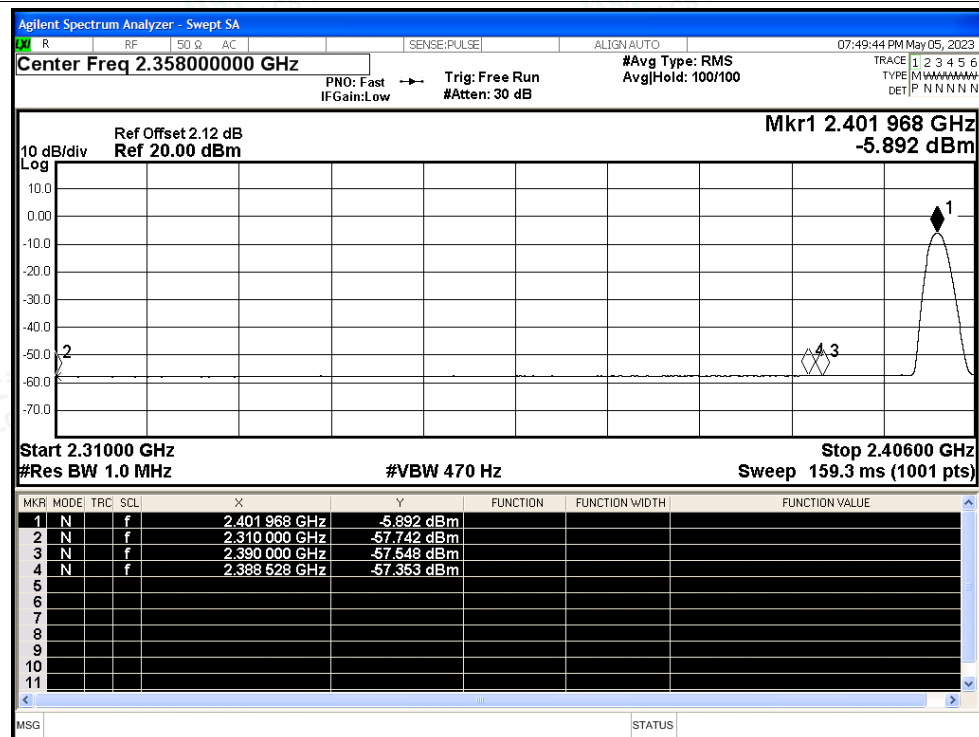


## Test Graphs

## Restrict Band NVNT BLE 2402MHz Ant Peak



## Restrict Band NVNT BLE 2402MHz Ant Average



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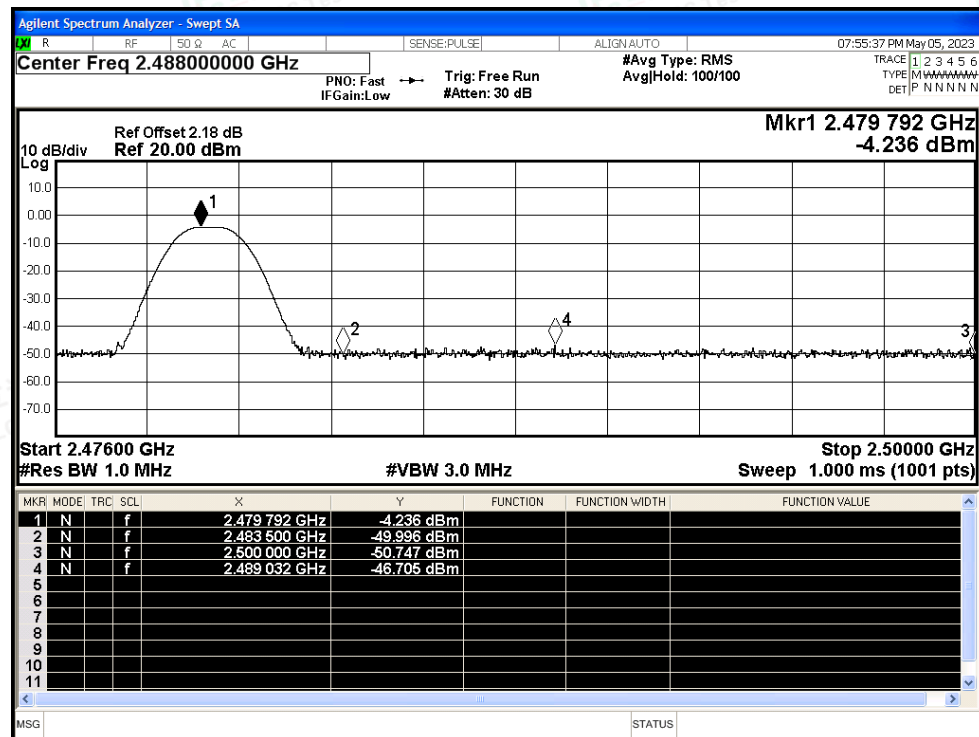
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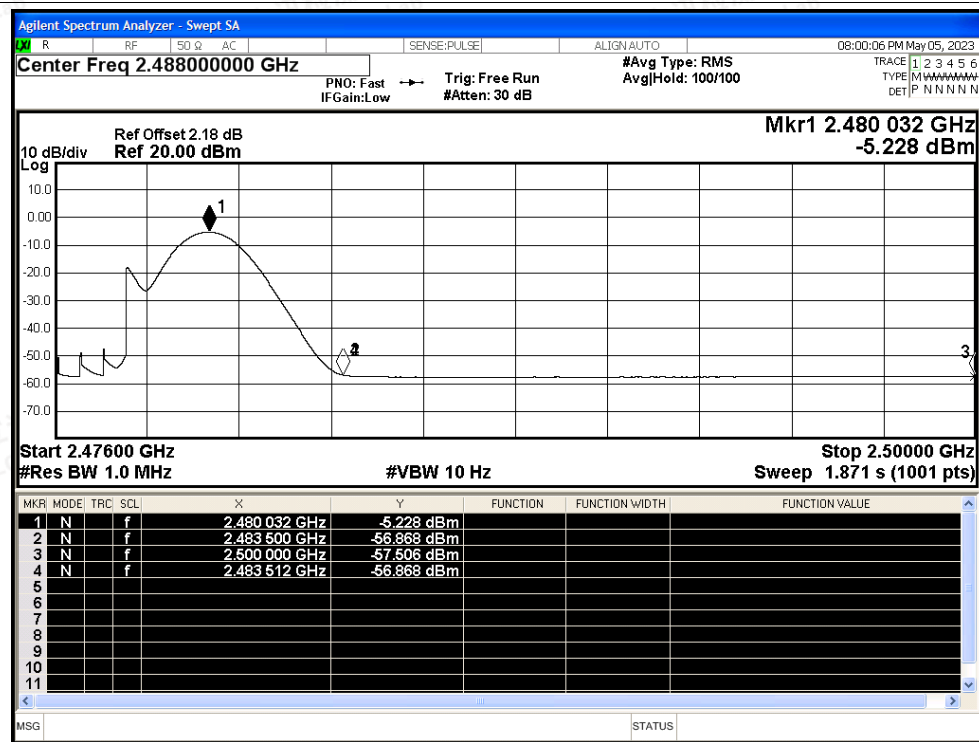
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## Restrict Band NVNT BLE 2480MHz Ant Peak



## Restrict Band NVNT BLE 2480MHz Ant Average



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