# Appendix A

## RF Test Data for BLE (Conducted Measurement)

**Product Name: TS Smart Mortise Lock**

**Test Model: e-Kontos-7100-IN**

**Environmental Conditions**

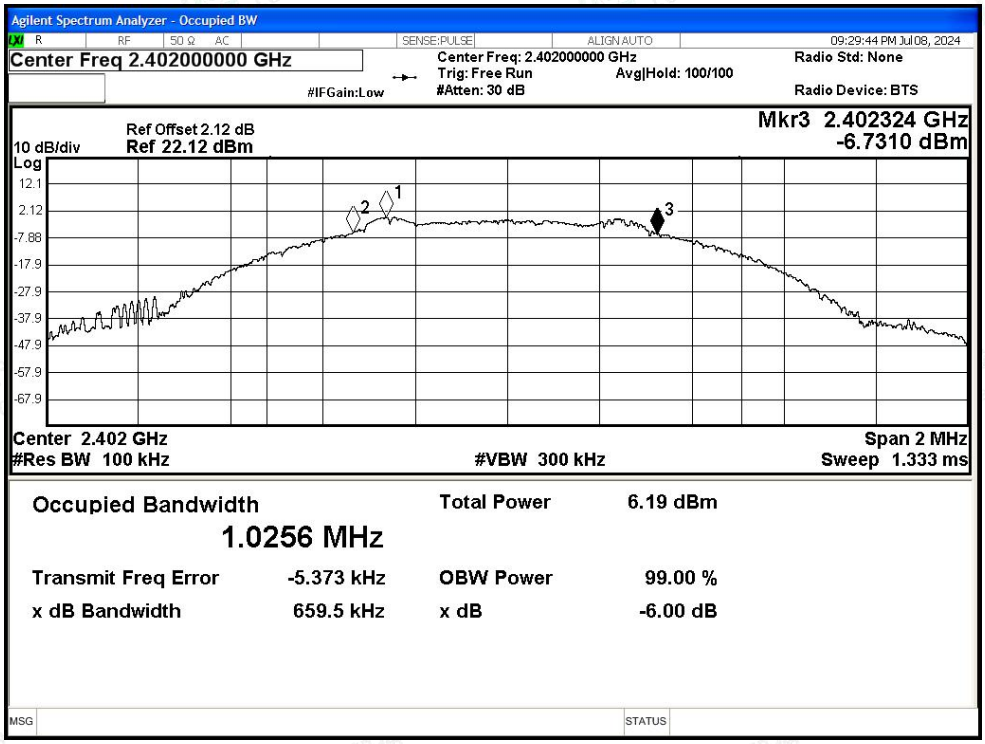
| | |
|---|---|
| Temperature: | 23.8° C |
| Relative Humidity: | 52.1% |
| ATM Pressure: | 100.0 kPa |
| Test Engineer: | Paddi Chen |
| Supervised by: | Nick Peng |

## A.1 -6dB Bandwidth

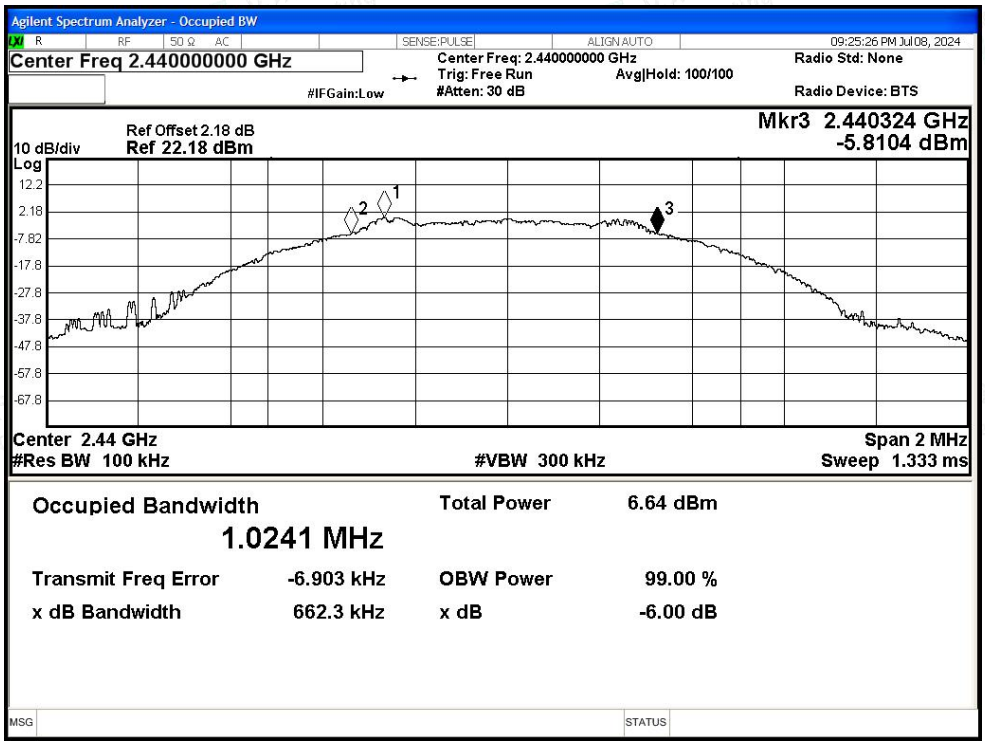
| Condition | Mode | Frequency (MHz) | Antenna | -6 dB Bandwidth (MHz) | Limit -6 dB Bandwidth (MHz) | Verdict |
|---|---|---|---|---|---|---|
| NVNT | BLE 1M | 2402 | Ant1 | 0.659 | >=0.5 | Pass |
| NVNT | BLE 1M | 2440 | Ant1 | 0.662 | >=0.5 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | 0.656 | >=0.5 | Pass |

Test Graphs

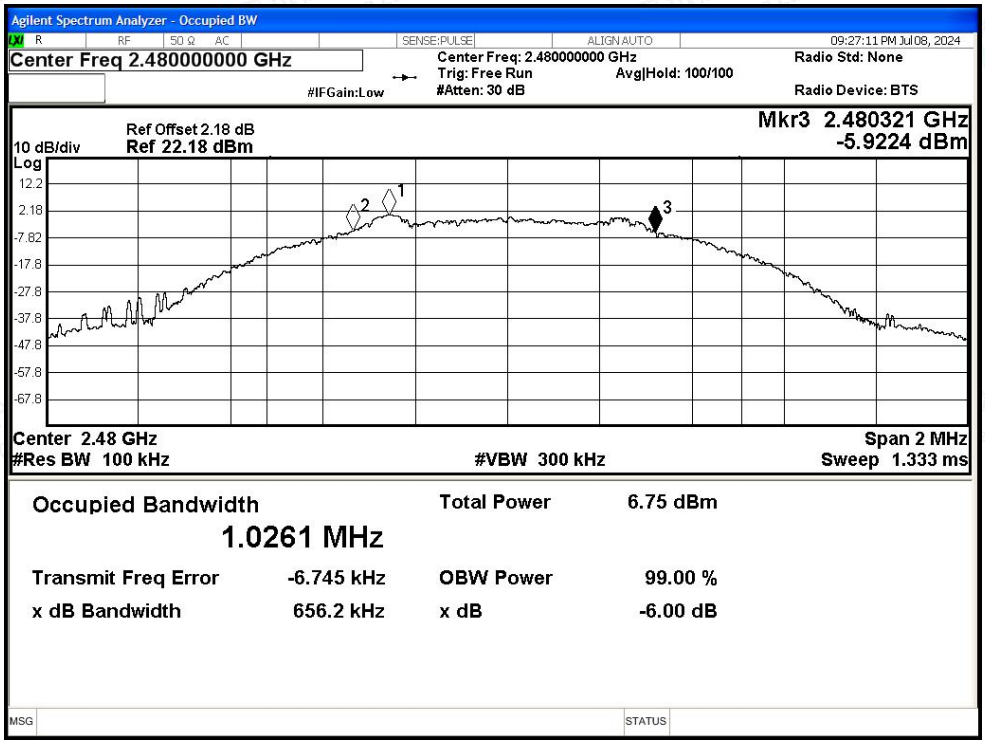
-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1




-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1

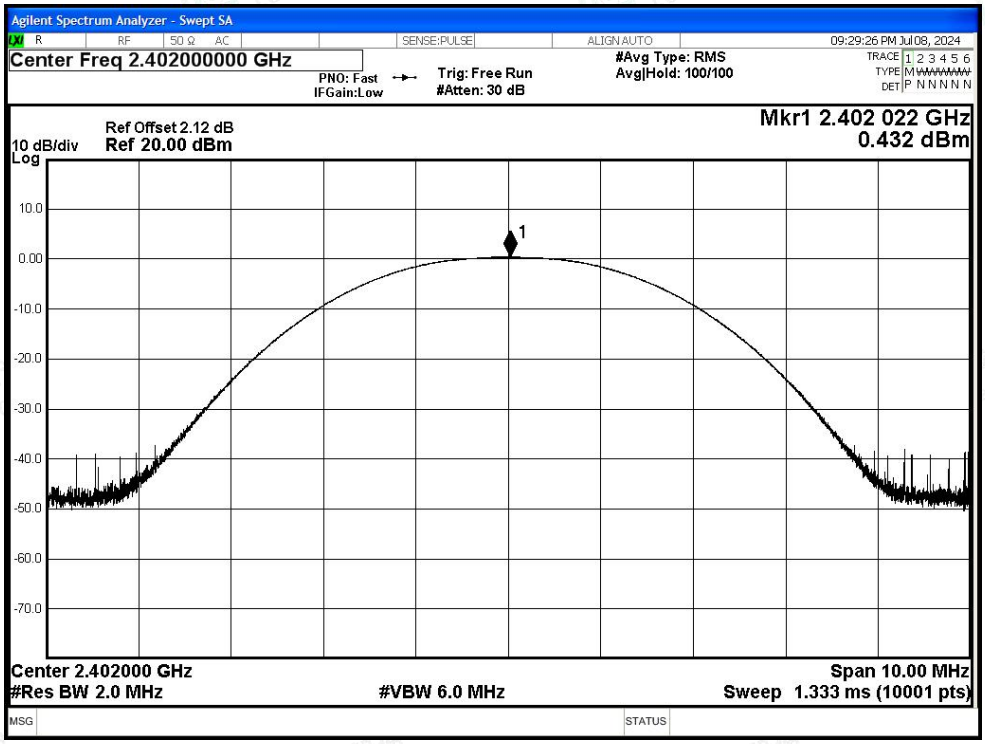


# A.2 Maximum Conducted Output Power

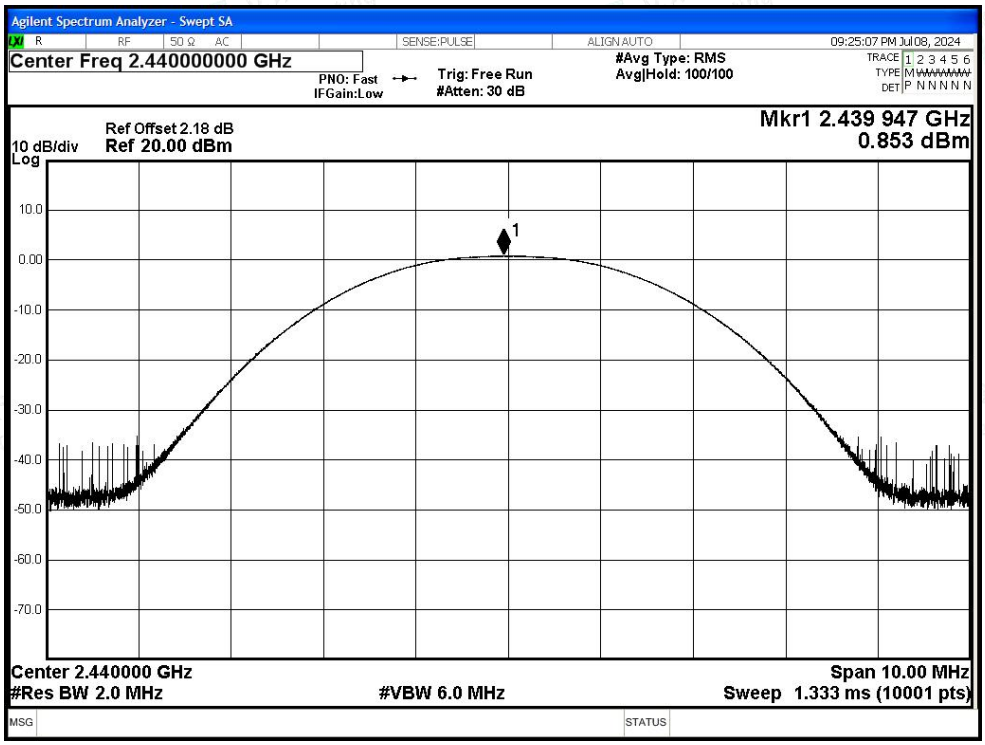
| Condition | Mode | Frequency (MHz) | Antenna | Conducted Power (dBm) | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|
| NVNT | BLE 1M | 2402 | Ant1 | 0.43 | 30 | Pass |
| NVNT | BLE 1M | 2440 | Ant1 | 0.85 | 30 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | 1.01 | 30 | Pass |

Test Graphs

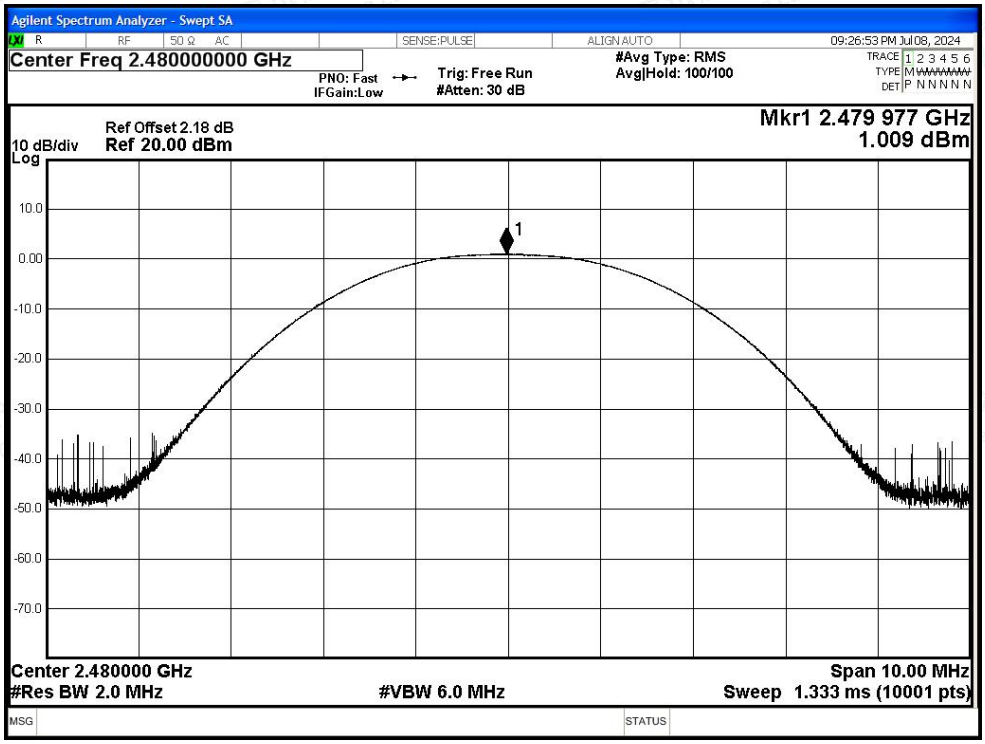
Power NVNT BLE 1M 2402MHz Ant1




Power NVNT BLE 1M 2440MHz Ant1



Power NVNT BLE 1M 2480MHz Ant1

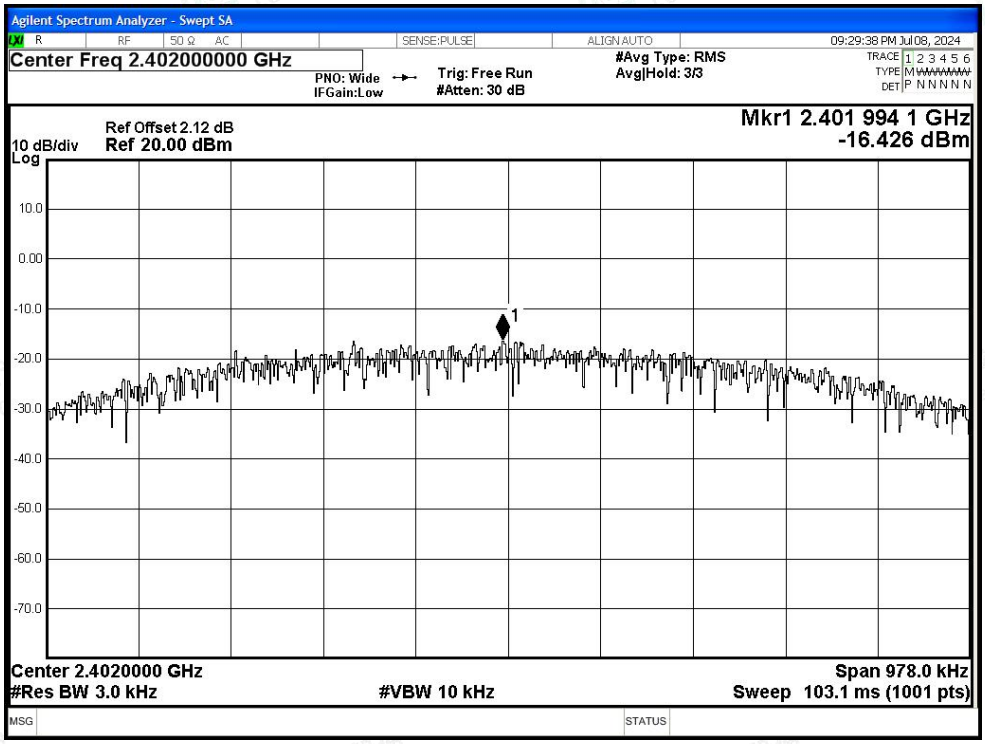


# A.3 Maximum Power Spectral Density Level

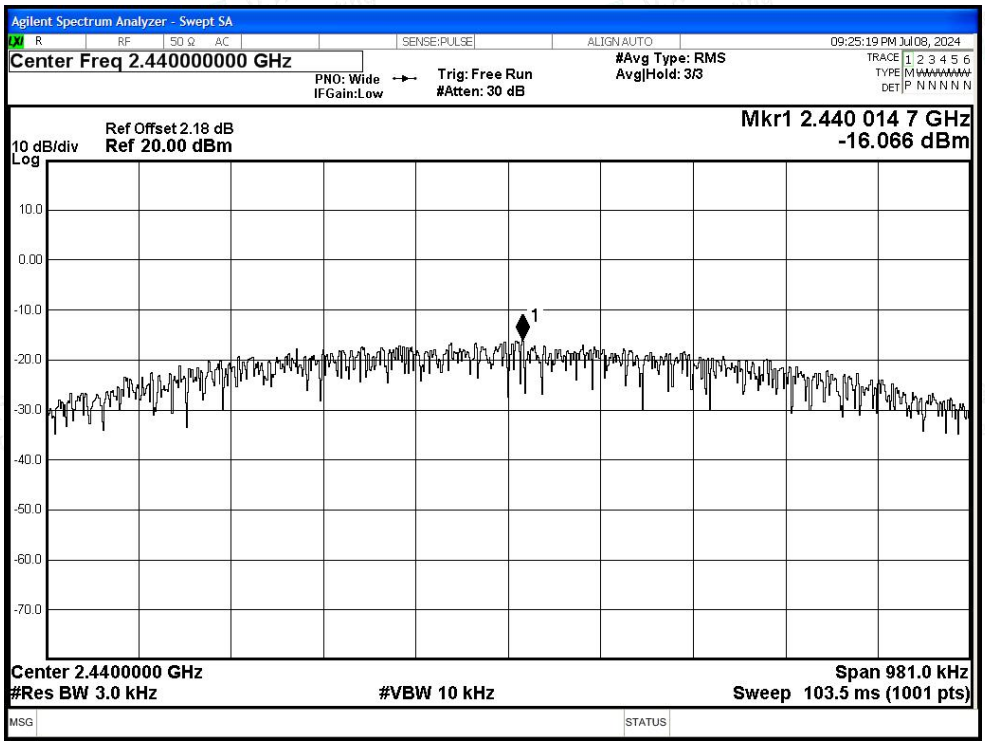
| Condition | Mode | Frequency (MHz) | Antenna | Conducted PSD (dBm/3kHz) | Limit (dBm/3kHz) | Verdict |
|---|---|---|---|---|---|---|
| NVNT | BLE 1M | 2402 | Ant1 | -16.43 | 8 | Pass |
| NVNT | BLE 1M | 2440 | Ant1 | -16.07 | 8 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | -15.77 | 8 | Pass |

Test Graphs

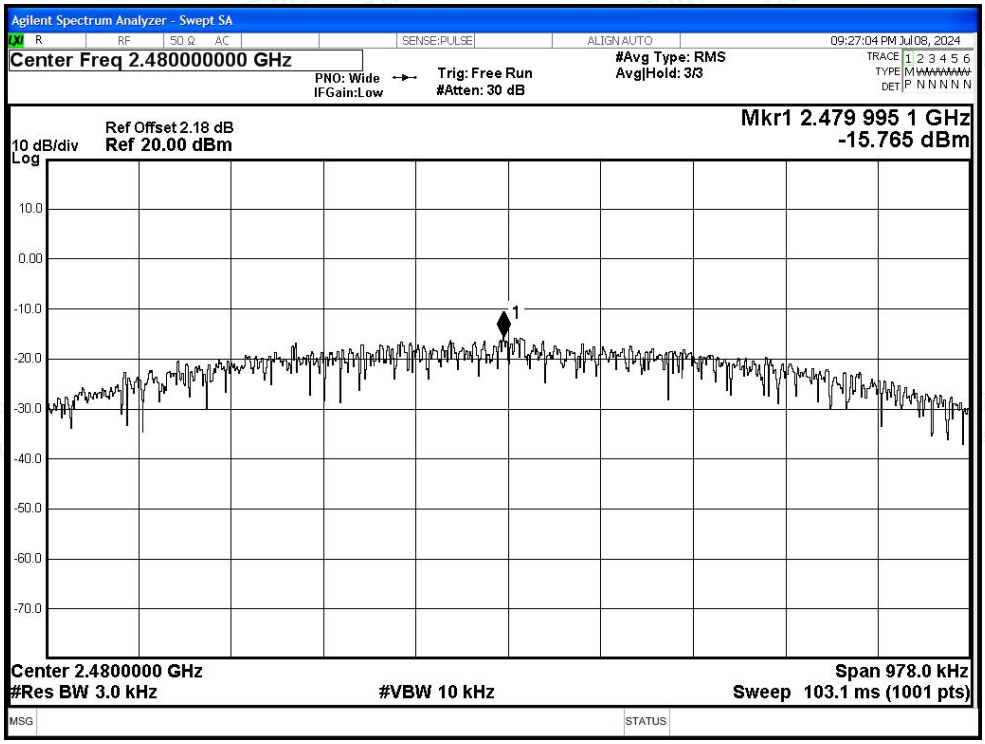
PSD NVNT BLE 1M 2402MHz Ant1




PSD NVNT BLE 1M 2440MHz Ant1



PSD NVNT BLE 1M 2480MHz Ant1

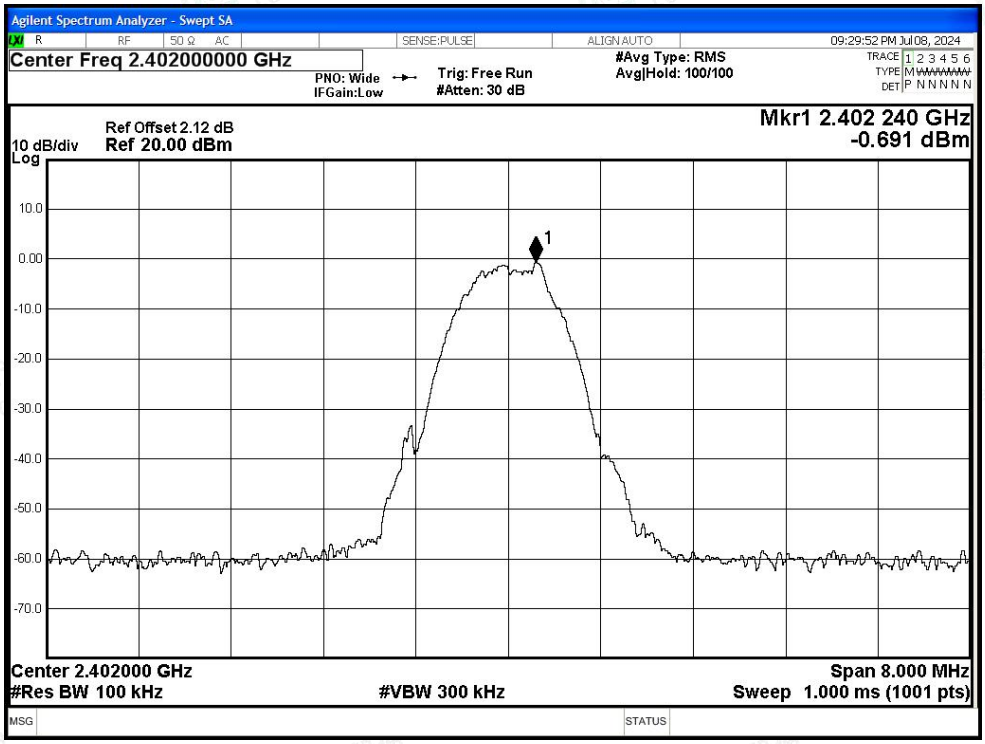


# A.4 Band Edge

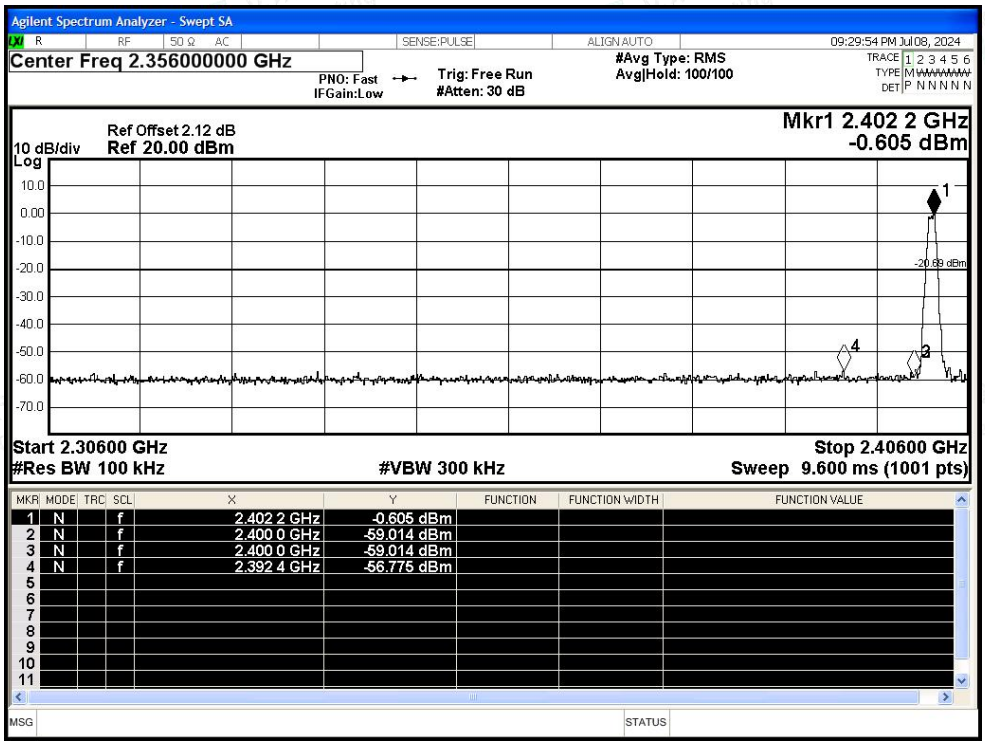
| Condition | Mode | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|---|---|---|---|---|---|---|
| NVNT | BLE 1M | 2402 | Ant1 | -56.08 | -20 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | -57.73 | -20 | Pass |

Test Graphs

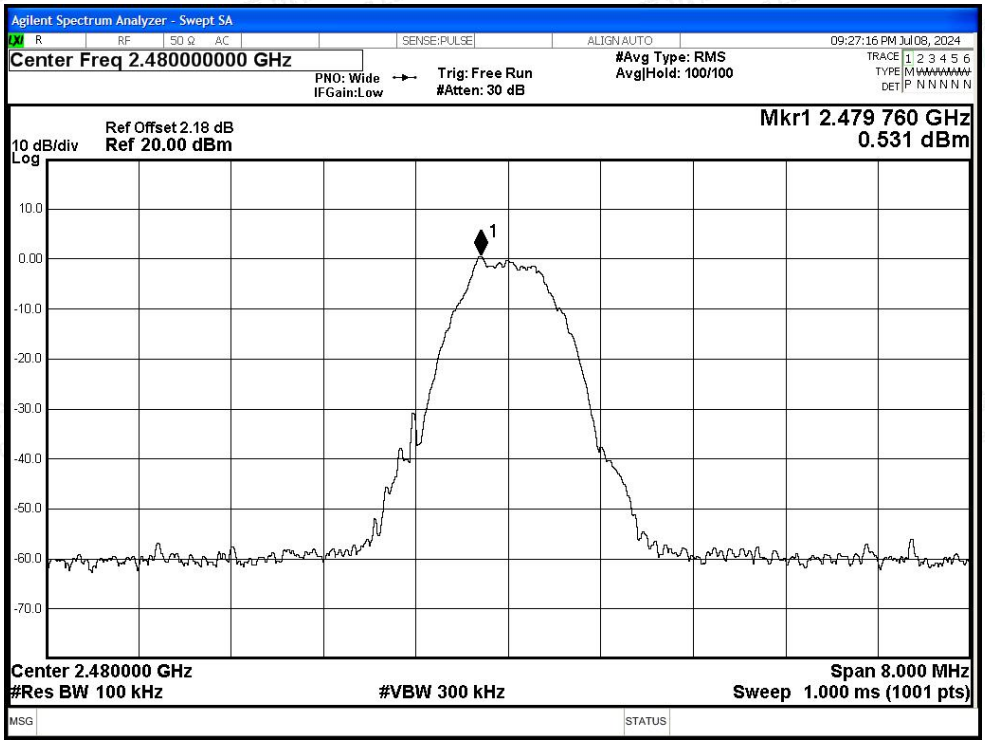
Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



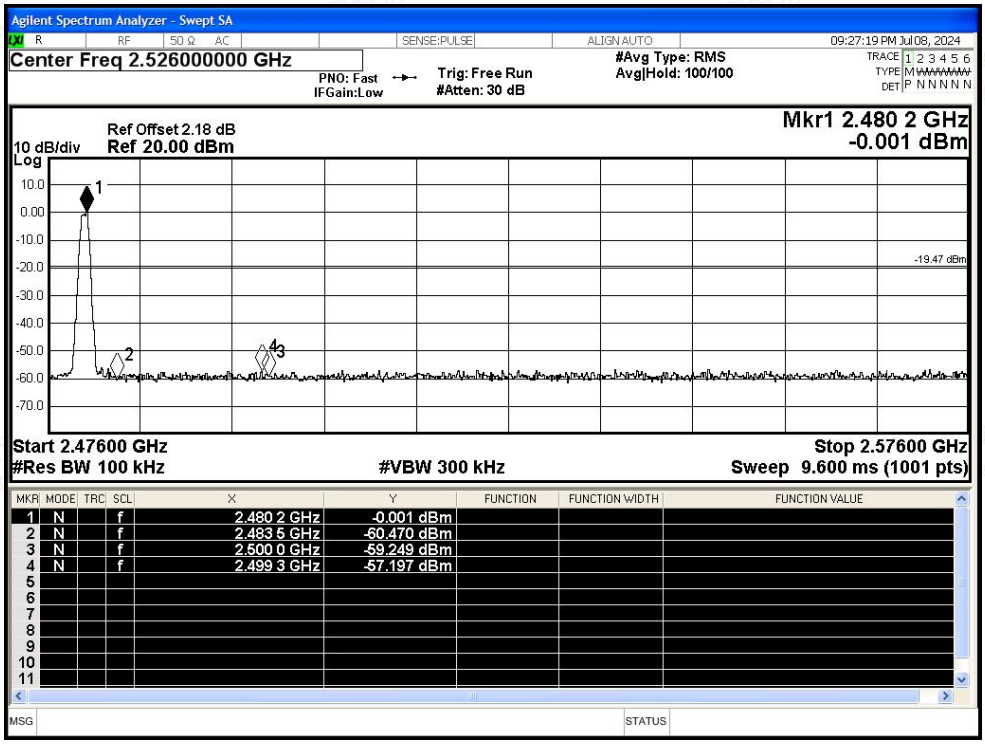

Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



Band Edge NVNT BLE 1M 2480MHz Ant1 Ref




Band Edge NVNT BLE 1M 2480MHz Ant1 Emission

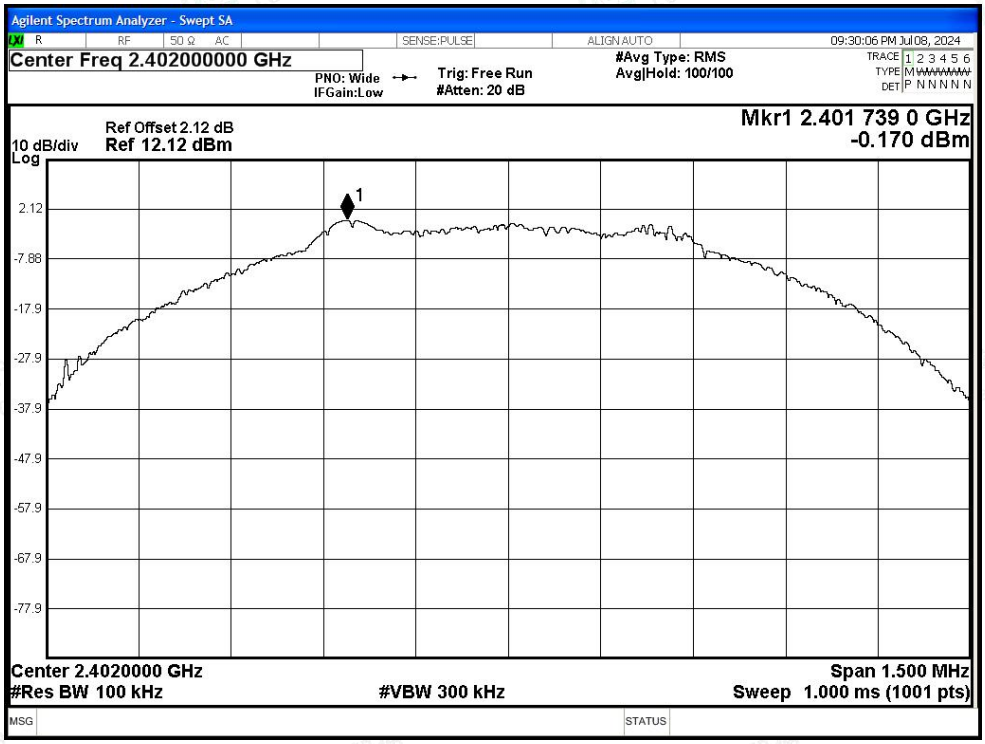


# A.5 Conducted RF Spurious Emission

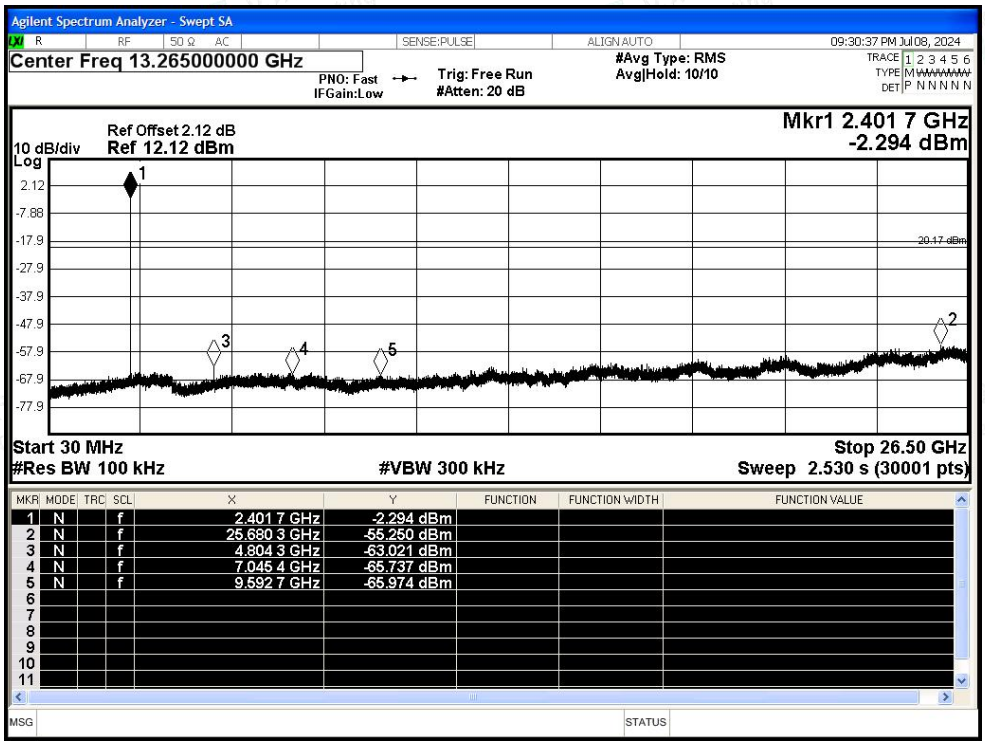
| Condition | Mode | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|---|---|---|---|---|---|---|
| NVNT | BLE 1M | 2402 | Ant1 | -55.08 | -20 | Pass |
| NVNT | BLE 1M | 2440 | Ant1 | -54.78 | -20 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | -55.5 | -20 | Pass |

Test Graphs

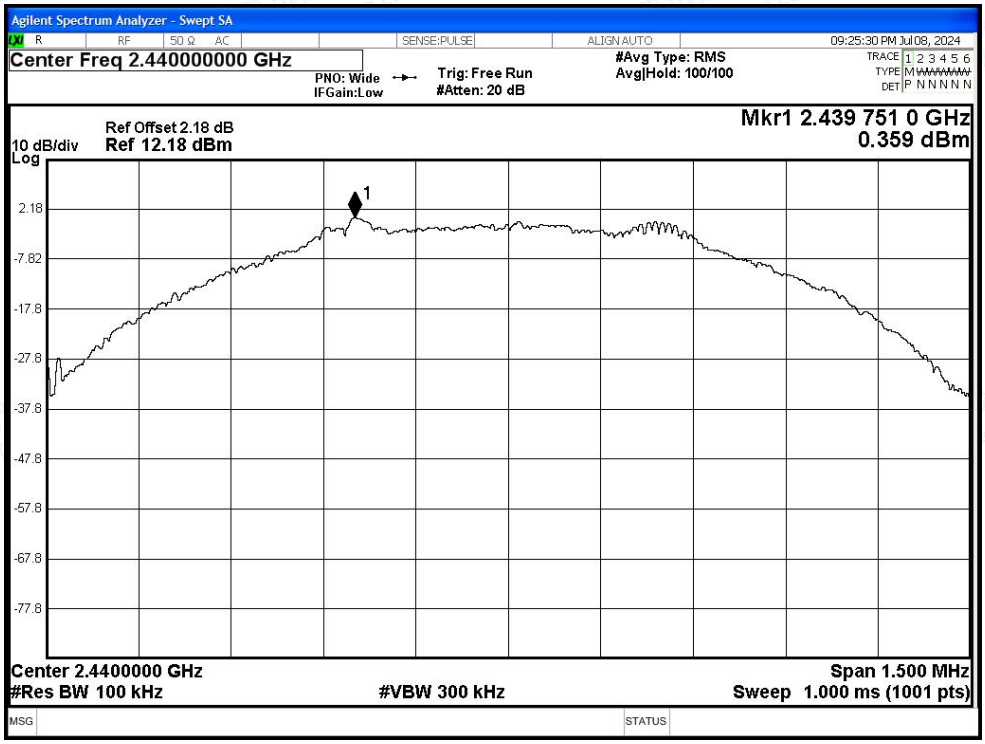
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



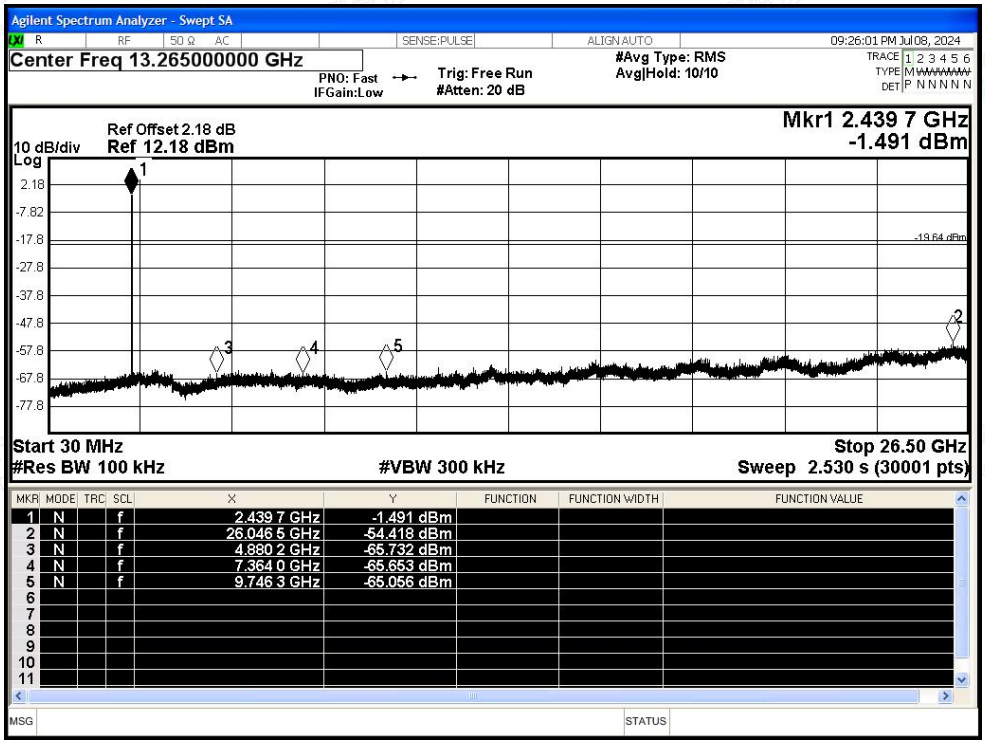

Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Ref

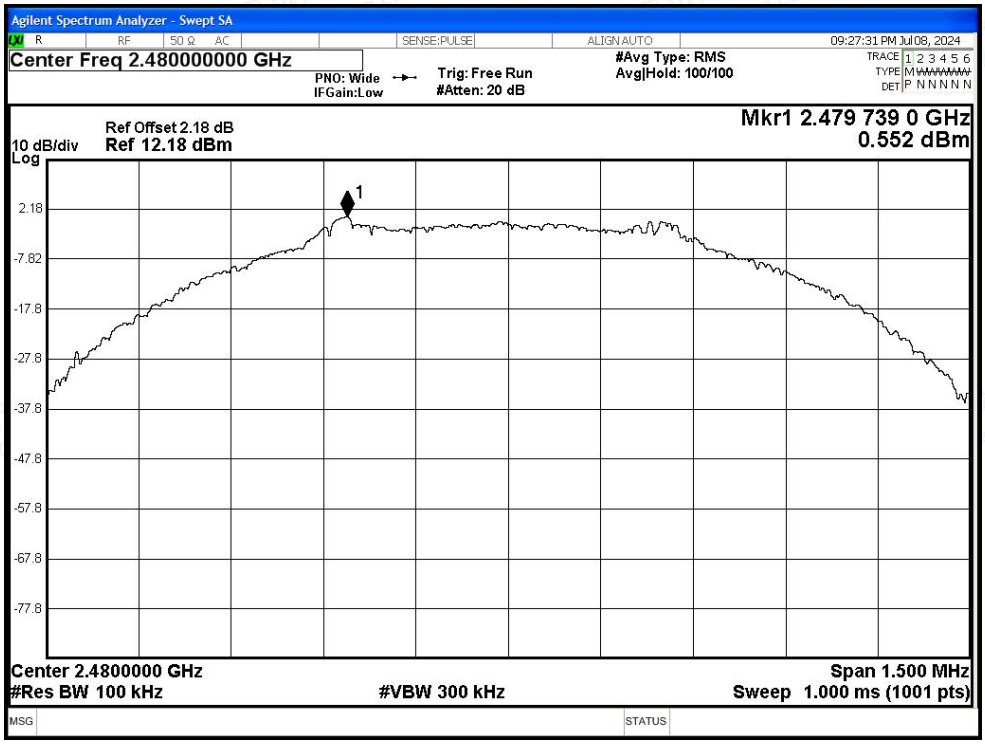



Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission

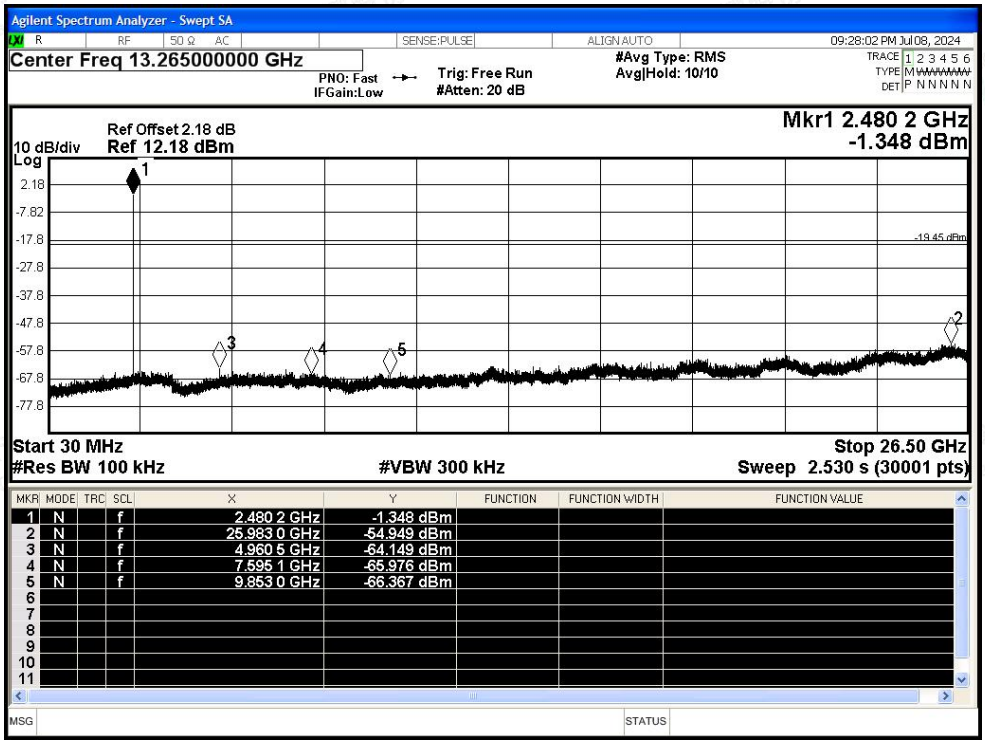



| MKR | MODE | TRC | SCL | X | Y | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE |
|---|---|---|---|---|---|---|---|---|
| 1 | N | | f | 2.439 7 GHz | -1.491 dBm | | | |
| 2 | N | | f | 26.046 5 GHz | -54.418 dBm | | | |
| 3 | N | | f | 4.880 2 GHz | -65.732 dBm | | | |
| 4 | N | | f | 7.364 0 GHz | -65.653 dBm | | | |
| 5 | N | | f | 9.746 3 GHz | -65.056 dBm | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |

Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref




Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission

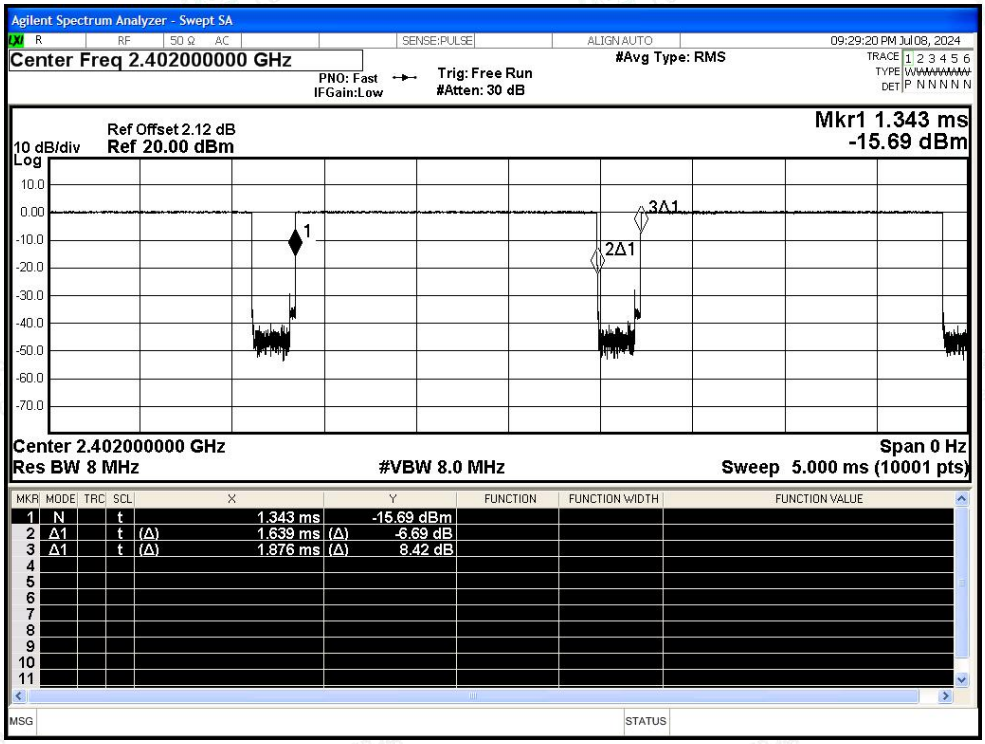


# A.6 Duty Cycle

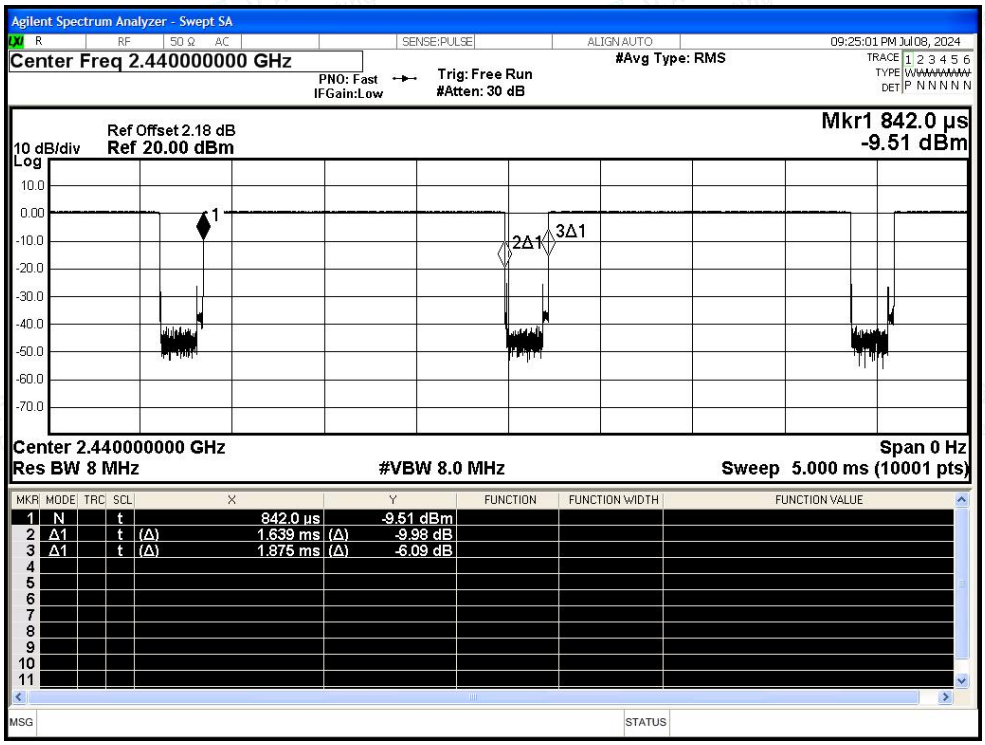
| Condition | Mode | Frequency (MHz) | Antenna | Duty Cycle (%) | Correction Factor (dB) | 1/T (kHz) |
|---|---|---|---|---|---|---|
| NVNT | BLE 1M | 2402 | Ant1 | 87.39 | 0.59 | 0.61 |
| NVNT | BLE 1M | 2440 | Ant1 | 87.39 | 0.59 | 0.61 |
| NVNT | BLE 1M | 2480 | Ant1 | 87.39 | 0.59 | 0.61 |

Test Graphs

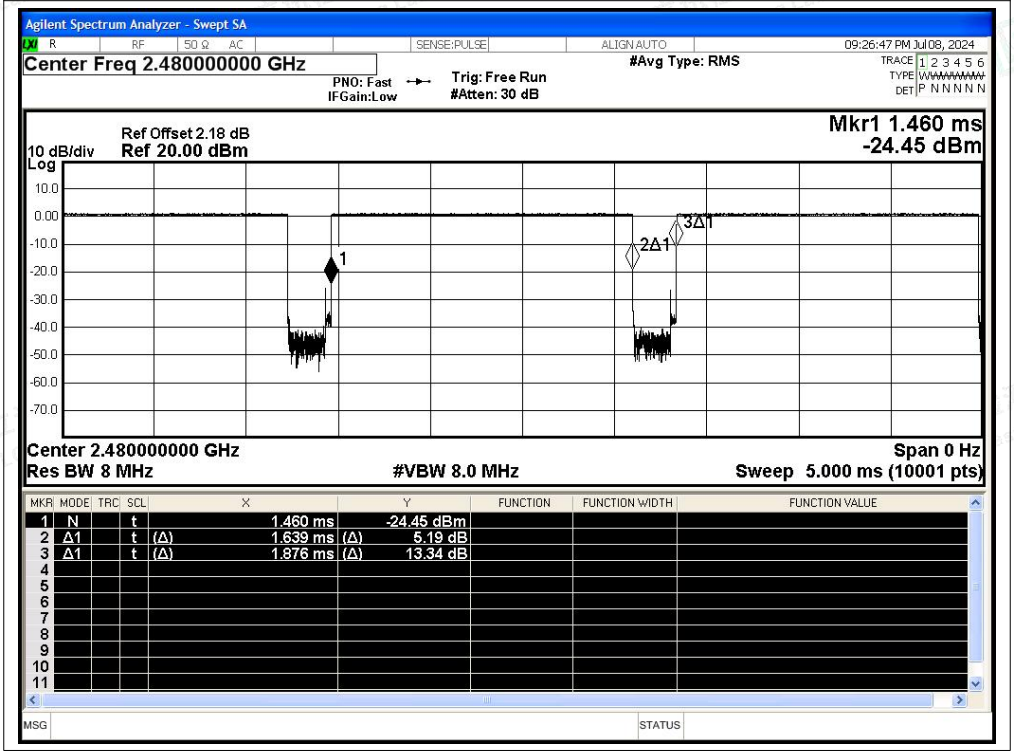
Duty Cycle NVNT BLE 1M 2402MHz Ant1




Duty Cycle NVNT BLE 1M 2440MHz Ant1



Duty Cycle NVNT BLE 1M 2480MHz Ant1

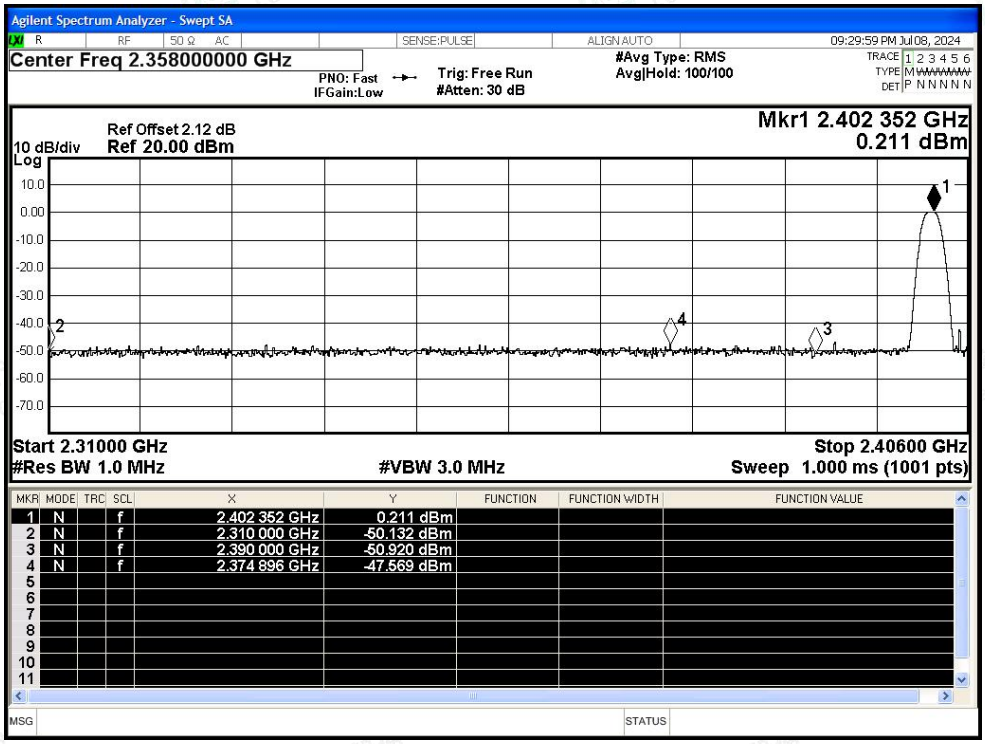


# A.7 Restrict Band

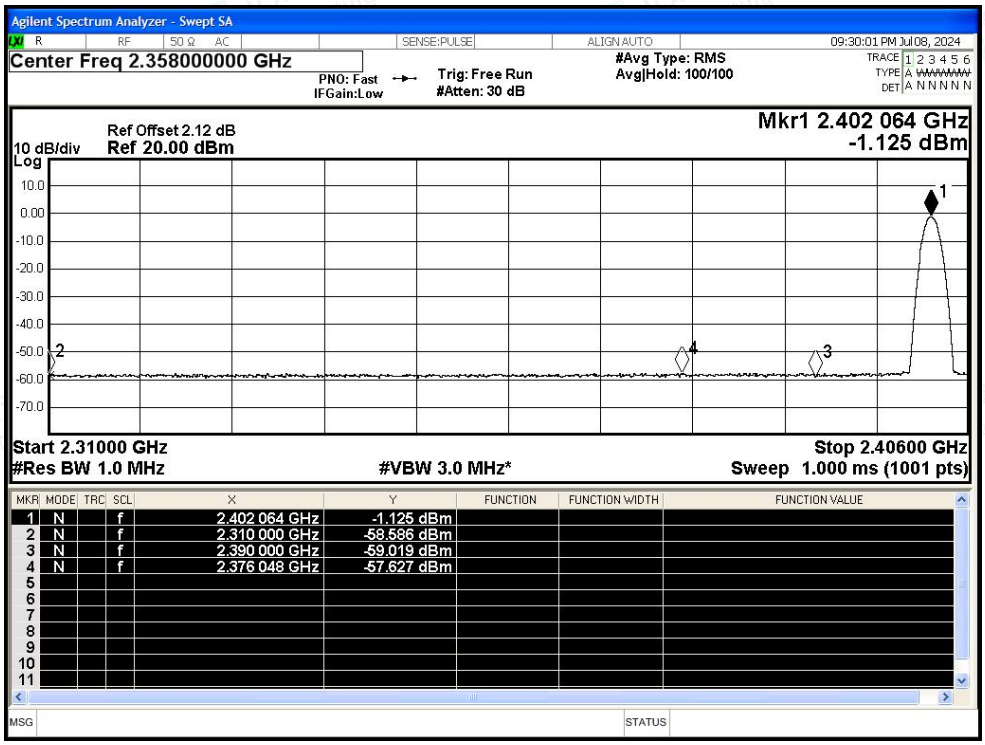
| Condition | Mode | Frequency (MHz) | Antenna | Spur Freq (MHz) | Power (dBm) | Gain (dBi) | Duty Factor (dB) | E (dBuV/m) | Detector | Limit (dBuV/m) | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NVNT | BLE 1M | 2402 | Ant1 | 2310 | -50.13 | 2.23 | - | 47.36 | Peak | 74 | Pass |
| NVNT | BLE 1M | 2402 | Ant1 | 2310 | -58.59 | 2.23 | 0.59 | 39.49 | Average | 54 | Pass |
| NVNT | BLE 1M | 2402 | Ant1 | 2374.896 | -47.57 | 2.23 | - | 49.92 | Peak | 74 | Pass |
| NVNT | BLE 1M | 2402 | Ant1 | 2376.048 | -57.63 | 2.23 | 0.59 | 40.45 | Average | 54 | Pass |
| NVNT | BLE 1M | 2402 | Ant1 | 2390 | -50.92 | 2.23 | - | 46.57 | Peak | 74 | Pass |
| NVNT | BLE 1M | 2402 | Ant1 | 2390 | -59.02 | 2.23 | 0.59 | 39.06 | Average | 54 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | 2483.5 | -43.79 | 2.23 | - | 53.70 | Peak | 74 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | 2483.5 | -57.6 | 2.23 | 0.59 | 40.48 | Average | 54 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | 2483.992 | -43.74 | 2.23 | - | 53.75 | Peak | 74 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | 2484.016 | -56.89 | 2.23 | 0.59 | 41.19 | Average | 54 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | 2500 | -50.02 | 2.23 | - | 47.47 | Peak | 74 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | 2500 | -58.06 | 2.23 | 0.59 | 40.02 | Average | 54 | Pass |

Test Graphs

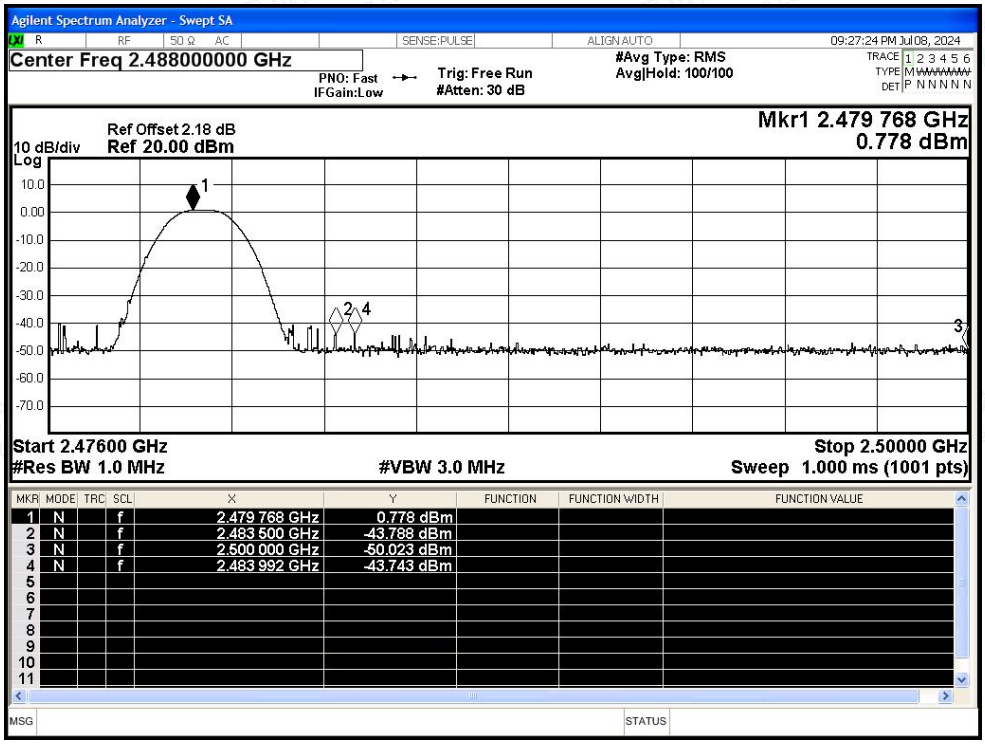
Restrict Band NVNT BLE 1M 2402MHz Ant1 Peak




Restrict Band NVNT BLE 1M 2402MHz Ant1 Average



Restrict Band NVNT BLE 1M 2480MHz Ant1 Peak




Restrict Band NVNT BLE 1M 2480MHz Ant1 Average