# RF TEST REPORT

Product Name: GP55MCS

Model Name: GP55M

FCC ID: 2BL96-GP55MCS

Issued For : Punt Gaming LLC

4265 SW 14TH ST. MIAMI, FL 33134, America

Issued By : Shenzhen LGT Test Service Co., Ltd.

Room 205, Building 13, Zone B, Zhenxiong Industrial Park, No.177, Renmin West Road, Jinsha, Kengzi Street, Pingshan District, Shenzhen, Guangdong, China

| | |
|---|---|
| Report Number: | LGT24J175RF02 |
| Sample Received Date: | Oct. 30, 2024 |
| Date of Test: | Oct. 30, 2024 ~ Dec. 13, 2024 |
| Date of Issue: | Dec. 13, 2024 |

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# TEST REPORT CERTIFICATION

**Applicant:** Punt Gaming LLC

Address: 4265 SW 14TH ST. MIAMI, FL 33134, America

**Manufacturer:** SHENZHEN PRETECH INDUSTRIAL CO., LTD

Address: 808,QIANCHENG COMMERCIAL CENTER,5 HAICHENG ROAD,MABU COMMUNITY,XIXIANG STREET,BAO'AN DISTRICT SHENZHEN GUANGDONG CHINA

Product Name: GP55MCS

Trademark: Punt Gaming

Model Name: GP55M

Sample Status: Normal

| APPLICABLE STANDARDS | |
|---|---|
| STANDARD | TEST RESULTS |
| FCC Part 15.247, Subpart C<br>ANSI C63.10-2013 | PASS |

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## Revision History

| Rev. | Issue Date | Revisions |
|---|---|---|
| 00 | Dec. 13, 2024 | Initial Issue |
| | | |

## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:
KDB 558074 D01 Part 15.247 Meas Guidance v05r02.

| FCC Part 15.247, Subpart C | | | |
|---|---|---|---|
| Standard Section | Test Item | Judgment | Remark |
| 15.207 | Conducted Emission | PASS | -- |
| 15.247 (a)(2) | 6dB Bandwidth | PASS | -- |
| 15.247 (b)(3) | Output Power | PASS | -- |
| 15.209 | Radiated Spurious Emission | PASS | -- |
| 15.247 (d) | Conducted Spurious & Band Edge Emission | PASS | (3) |
| 15.247 (e) | Power Spectral Density | PASS | -- |
| 15.205 | Restricted Band Edge Emission | PASS | -- |
| Part 15.247(d)/ Part 15.209(a) | Band Edge Emission | PASS | -- |
| 15.203 | Antenna Requirement | PASS | -- |

NOTE:

(1) 'N/A' denotes test is not applicable in this Test Report.

(2) All tests are according to ANSI C63.10-2013.

(3) The conduction Band edge limit is based on the conduction spurious limit.

## 1.1 TEST FACTORY

| | |
|---|---|
| Company Name: | Shenzhen LGT Test Service Co., Ltd. |
| Address: | Room 205, Building 13, Zone B, Zhenxiong Industrial Park, No.177, Renmin West Road, Jinsha, Kengzi Street, Pingshan District, Shenzhen, Guangdong, China |
| Accreditation Certificate | A2LA Certificate No.: 6727.01 |
| | FCC Registration No.: 746540 |
| | CAB ID: CN0136 |

## 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**, where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95** %.

| No. | Item | Uncertainty |
|---|---|---|
| 1 | RF output power, conducted | ±0.68dB |
| 2 | Unwanted Emissions, conducted | ±2.988dB |
| 3 | All emissions, radiated 9K-30MHz | ±2.84dB |
| 4 | All emissions, radiated 30M-1GHz | ±4.39dB |
| 5 | All emissions, radiated 1G-6GHz | ±5.10dB |
| 6 | All emissions, radiated>6G | ±5.48dB |
| 7 | Conducted Emission (9KHz-150KHz) | ±2.79dB |
| 8 | Conducted Emission (150KHz-30MHz) | ±2.80dB |

Note: The measurement uncertainty is not included in the test result.

# 2. GENERAL INFORMATION

## 2.1 GENERAL DESCRIPTION OF THE EUT

| | |
|---|---|
| Product Name: | GP55MCS |
| Trademark: | Punt Gaming |
| Model Name: | GP55M |
| Series Model: | N/A |
| Model Difference: | N/A |
| Product Description: | Operation Frequency: 2402~2480 MHz<br>Modulation Type: GFSK<br>Radio Technology: BLE<br>Bluetooth Configuration: BLE (1M PHY, 2M PHY)<br>Number Of Channel: 40<br>Antenna Designation: FPC<br>Antenna Gain (dBi) 2.36 |
| Channel List: | Please refer to the Note 3. |
| Battery: | Capacity: 6000mAh<br>Rated Voltage: 3.8V |
| Hardware Version: | RC-F451 U2.0 |
| Software Version: | N/A |
| Connecting I/O Port(s): | Please refer to the Note 1. |

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.
2. The antenna information refers to the manufacturer provide report, applicable only to the tested sample identified in the report. Due to the incorrect antenna information, a series of problems such as the accuracy of the test results will be borne by the customer.
3.

| Channel List | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 00 | 2402 | 10 | 2422 | 20 | 2442 | 30 | 2462 |
| 01 | 2404 | 11 | 2424 | 21 | 2444 | 31 | 2464 |
| 02 | 2406 | 12 | 2426 | 22 | 2446 | 32 | 2466 |
| 03 | 2408 | 13 | 2428 | 23 | 2448 | 33 | 2468 |
| 04 | 2410 | 14 | 2430 | 24 | 2450 | 34 | 2470 |
| 05 | 2412 | 15 | 2432 | 25 | 2452 | 35 | 2472 |
| 06 | 2414 | 16 | 2434 | 26 | 2454 | 36 | 2474 |
| 07 | 2416 | 17 | 2436 | 27 | 2456 | 37 | 2476 |
| 08 | 2418 | 18 | 2438 | 28 | 2458 | 38 | 2478 |
| 09 | 2420 | 19 | 2440 | 29 | 2460 | 39 | 2480 |

## 2.2 DESCRIPTION OF THE TEST MODES

For conducted test items and radiated spurious emissions
Each of these EUT operation mode(s) or test configuration mode(s) mentioned below was evaluated respectively.

| Worst Mode | Description | Data/Modulation |
|---|---|---|
| Mode 1 | TX CH00(2402MHz) | 1 MHz/GFSK |
| Mode 2 | TX CH19(2440MHz) | 1 MHz/GFSK |
| Mode 3 | TX CH39(2480MHz) | 1 MHz/GFSK |

| Worst Mode | Description | Data/Modulation |
|---|---|---|
| Mode 4 | TX CH00(2402MHz) | 2 MHz/GFSK |
| Mode 5 | TX CH19(2440MHz) | 2 MHz/GFSK |
| Mode 6 | TX CH39(2480MHz) | 2 MHz/GFSK |

Note:
(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.
(2) We have be tested for all avaiable U.S. voltage and frequency (For 120V,50/60Hz and 240V, 50/60Hz) for which the device is capable of operation, and the worst case of 120V/60Hz is shown in the report.
(3) The battery is fully-charged during the radited and RF conducted test.

For AC Conducted Emission

| Test Case | |
|---|---|
| AC Conducted Emission | Mode 7: Keeping BLE TX |

## 2.3 TEST SOFTWARE AND POWER LEVEL

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

| Test software Version | Test program: BLE | |
|---|---|---|
| DRTU | Mode Or Modulation type | Power setting |
| | 1M | Default |
| | 2M | Default |

## 2.4 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Accessories Equipment

| Description | Manufacturer | Model | S/N | Rating |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

Auxiliary Equipment

| Description | Manufacturer | Model | S/N | Rating |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

Note:

(1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

(2) “YES” is means “with core”; “NO” is means “without core”.

## 2.5 EQUIPMENTS LIST

| Conducted Emission | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Cal. Date** | **Cal. Until** |
| EMI Test Receiver | R&S | ESU8 | 100372 | 2024.03.09 | 2025.03.08 |
| LISN | COM-POWER | LI-115 | 02032 | 2024.03.09 | 2025.03.08 |
| LISN | SCHWARZBECK | NNLK 8122 | 00160 | 2024.03.09 | 2025.03.08 |
| Transient Limiter | CYBERTEK | EM5010A | E2250100049 | 2024.03.09 | 2025.03.08 |
| Temperature & Humidity | KTJ | TA218B | N.A | 2024.03.09 | 2025.03.08 |
| Testing Software | EMC-I_V1.4.0.3_SKET | | | | |

| Radiated Test equipment | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Cal. Date** | **Cal. Until** |
| EMI Test Receiver | R&S | ESU8 | 100372 | 2024.03.09 | 2025.03.08 |
| Active loop Antenna | ETS | 6502 | 00049544 | 2023.10.13 | 2025.10.12 |
| Spectrum Analyzer | Keysight | N9010B | MY60242508 | 2024.08.05 | 2025.08.04 |
| Bilog Antenna(30M-1G) | SCHWARZBECK | VULB 9168 | 2705 | 2022.12.12 | 2025.12.11 |
| Horn Antenna(1-18G) | SCHWARZBECK | 3115 | 10SL0060 | 2022.06.02 | 2025.06.01 |
| Horn Antenna(18-40G) | A-INFO | LB-180400-KF | J211060273 | 2022.06.08 | 2025.06.07 |
| Pre-amplifier(30M-1G) | EMtrace | RP01A | 02019 | 2024.03.09 | 2025.03.08 |
| Pre-amplifier(1-26.5G) | Agilent | 8449B | 3008A4722 | 2024.03.09 | 2025.03.08 |
| Pre-amplifier(18-40G) | com-mw | LNPA_18-40-01 | 18050003 | 2024.03.09 | 2025.03.08 |
| Wireless Communications Test Set | R&S | CMW 500 | 137737 | 2024.03.09 | 2025.03.08 |
| Antenna Tower | SAEMC | BK-4AT-BS-D | SK2021093008 | N.A | N.A |
| Temperature & Humidity | JINGCHUANG | BT-3 | N.A | 2024.03.11 | 2025.03.10 |
| Testing Software | EMC-I_V1.4.0.3_SKET | | | | |

| RF Conducted Test equipment | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Cal. Date** | **Cal. Until** |
| Signal Analyzer | Keysight | N9010B | MY60242508 | 2024.08.05 | 2025.08.04 |
| Signal Analyzer | Keysight | N9020A | MY50530994 | 2024.03.09 | 2025.03.08 |
| RF Automatic Test system | MW | MW100-RFCB | MW220322LG-033 | 2024.03.09 | 2025.03.08 |
| MXG Vector Signal Generator | Keysight | N5182B | MY59100717 | 2024.03.09 | 2025.03.08 |
| Temperature& Humidity test chamber | AISRY | LX-1000L | 171200018 | 2024.03.09 | 2025.03.08 |
| Attenuator | eastsheep | 90db | N.A | 2024.03.09 | 2025.03.08 |
| Temperature & Humidity | JINGCHUANG | BT-3 | N.A | 2024.03.11 | 2025.03.10 |
| Digital multimeter | MASTECH | MS8261 | MBGBC83053 | 2024.03.09 | 2025.03.08 |
| Testing Software | MTS8310_V2.0.0.0_MW | | | | |

# 3. EMC EMISSION TEST

## 3.1 CONDUCTED EMISSION MEASUREMENT

### 3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table.

| FREQUENCY (MHz) | Conducted Emission limit (dBuV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 -0.5 | 66 - 56 * | 56 - 46 * |
| 0.50 -5.0 | 56.00 | 46.00 |
| 5.0 -30.0 | 60.00 | 50.00 |

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

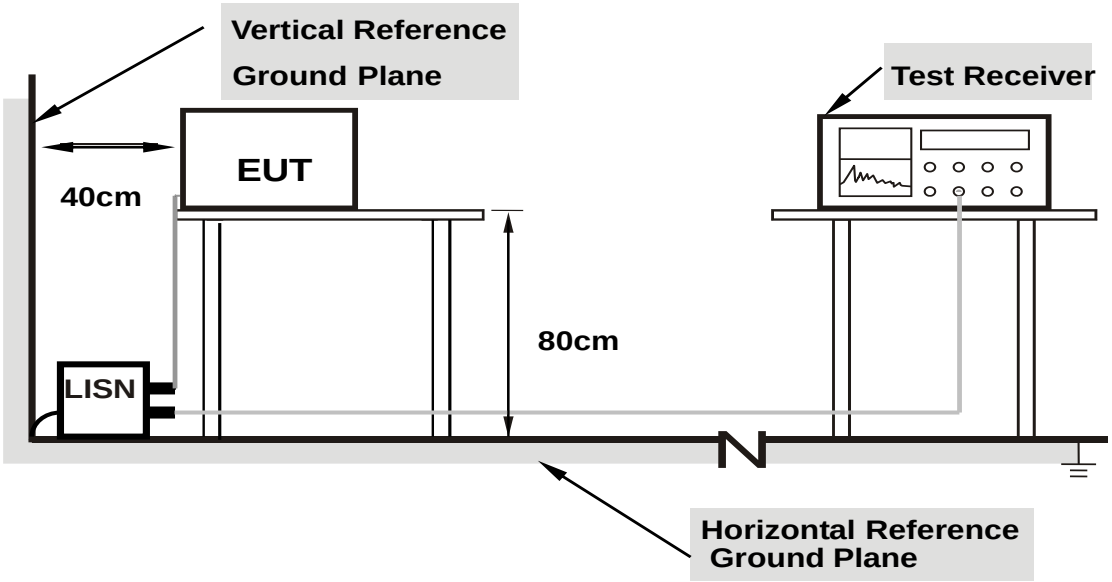
The following table is the setting of the receiver

| **Receiver Parameters** | **Setting** |
|---|---|
| Attenuation | 10 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| IF Bandwidth | 9 kHz |

3.2 TEST PROCEDURE

a. The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN is at least 80 cm from the nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3 TEST SETUP




**Note: 1. Support units were connected to second LISN.**

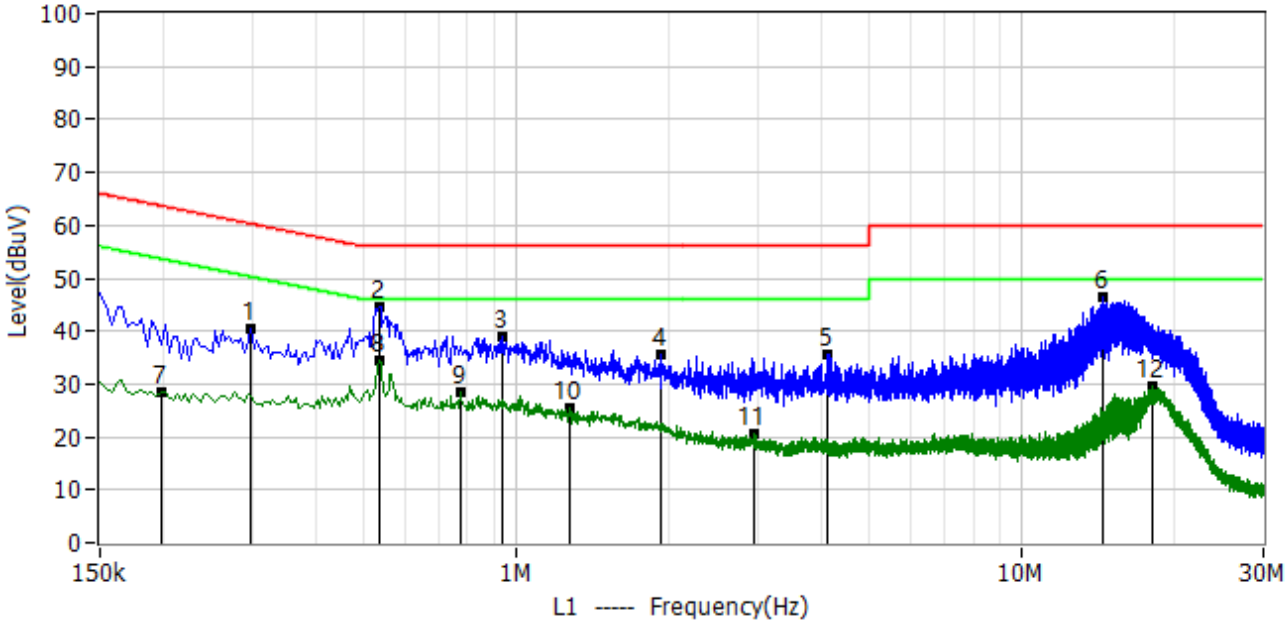
**2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.**

3.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

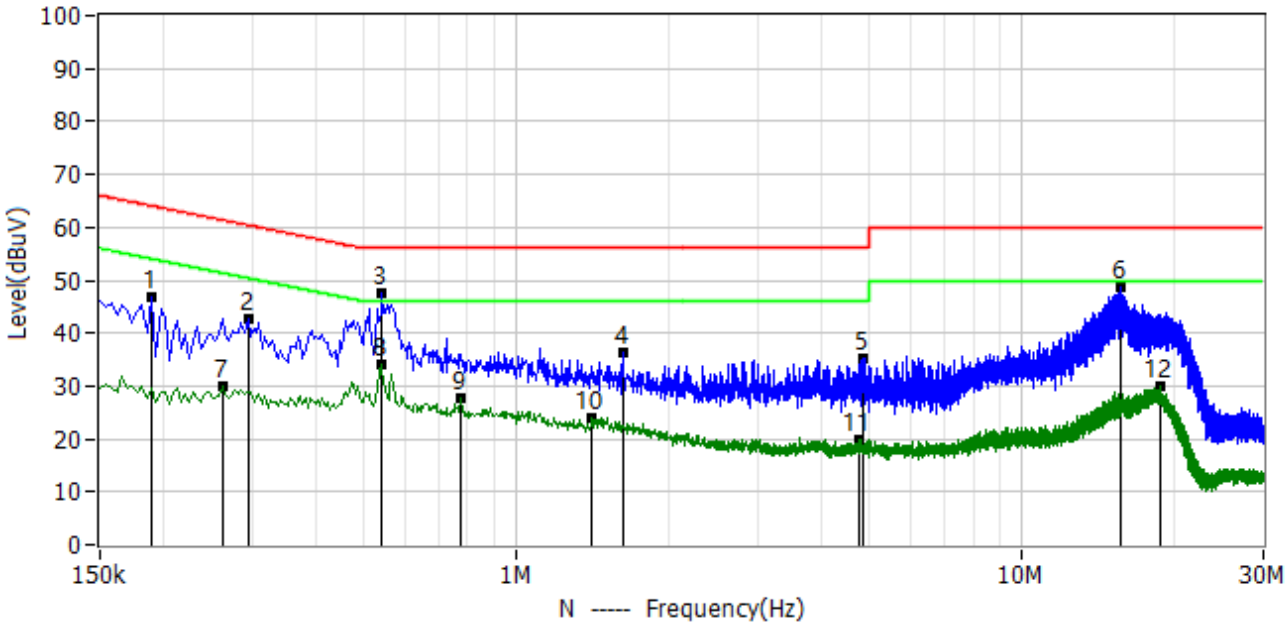
## 3.5 TEST RESULTS

| | |
|---|---|
| Project: LGT24J175 | Test Engineer: LiuH |
| EUT: GP55MCS | Temperature: 25.2℃ |
| M/N: GP55M | Humidity: 49%RH |
| Test Voltage: AC 120V/60Hz | Test Data: 2024-11-18 |
| Test Mode: TX BLE 2402 | |
| Note: | |




| No. | Frequency MHz | Reading dBuV | Factor dB | Level dBuV | Limit dBuV | Margin dB | Detector | Polar |
|---|---|---|---|---|---|---|---|---|
| 1* | 0.298 | 29.81 | 10.58 | 40.39 | 60.30 | -19.91 | QP | L1 |
| 2* | 0.534 | 33.87 | 10.57 | 44.44 | 56.00 | -11.56 | QP | L1 |
| 3* | 0.934 | 28.23 | 10.66 | 38.89 | 56.00 | -17.11 | QP | L1 |
| 4* | 1.922 | 24.65 | 10.97 | 35.62 | 56.00 | -20.38 | QP | L1 |
| 5* | 4.126 | 24.32 | 11.13 | 35.45 | 56.00 | -20.55 | QP | L1 |
| 6* | 14.386 | 35.10 | 11.34 | 46.44 | 60.00 | -13.56 | QP | L1 |
| 7* | 0.198 | 18.02 | 10.62 | 28.64 | 53.69 | -25.05 | AV | L1 |
| 8* | 0.534 | 23.81 | 10.57 | 34.38 | 46.00 | -11.62 | AV | L1 |
| 9* | 0.774 | 17.75 | 10.60 | 28.35 | 46.00 | -17.65 | AV | L1 |
| 10* | 1.270 | 14.54 | 10.77 | 25.31 | 46.00 | -20.69 | AV | L1 |
| 11* | 2.962 | 9.37 | 11.19 | 20.56 | 46.00 | -25.44 | AV | L1 |
| 12* | 18.110 | 18.20 | 11.54 | 29.74 | 50.00 | -20.26 | AV | L1 |

| | |
|---|---|
| Project: LGT24J175 | Test Engineer: LiuH |
| EUT: GP55MCS | Temperature: 25.2℃ |
| M/N: GP55M | Humidity: 49%RH |
| Test Voltage: AC 120V/60Hz | Test Data: 2024-11-18 |
| Test Mode: TX BLE 2402 | |
| Note: | |




| No. | Frequency MHz | Reading dBuV | Factor dB | Level dBuV | Limit dBuV | Margin dB | Detector | Polar |
|---|---|---|---|---|---|---|---|---|
| 1* | 0.190 | 36.25 | 10.56 | 46.81 | 64.04 | -17.23 | QP | N |
| 2* | 0.294 | 32.10 | 10.59 | 42.69 | 60.41 | -17.72 | QP | N |
| 3* | 0.542 | 37.20 | 10.54 | 47.74 | 56.00 | -8.26 | QP | N |
| 4* | 1.622 | 25.47 | 10.68 | 36.15 | 56.00 | -19.85 | QP | N |
| 5* | 4.826 | 24.27 | 10.84 | 35.11 | 56.00 | -20.89 | QP | N |
| 6* | 15.686 | 37.45 | 11.41 | 48.86 | 60.00 | -11.14 | QP | N |
| 7* | 0.262 | 19.32 | 10.58 | 29.90 | 51.37 | -21.47 | AV | N |
| 8* | 0.538 | 23.42 | 10.54 | 33.96 | 46.00 | -12.04 | AV | N |
| 9* | 0.778 | 17.07 | 10.56 | 27.63 | 46.00 | -18.37 | AV | N |
| 10* | 1.410 | 13.39 | 10.63 | 24.02 | 46.00 | -21.98 | AV | N |
| 11* | 4.762 | 9.09 | 10.83 | 19.92 | 46.00 | -26.08 | AV | N |
| 12* | 18.742 | 18.23 | 11.57 | 29.80 | 50.00 | -20.20 | AV | N |

# 4. RADIATED EMISSION MEASUREMENT

## 4.1 RADIATED EMISSION LIMITS

In case the emission fall within the Restricted band specified on Part15.205 (a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

LIMITS OF RADIATED EMISSION MEASUREMENT (1GHz-25 GHz)

| FREQUENCY (MHz) | (dBuV/m) (at 3M) | |
|---|---|---|
| | PEAK | AVERAGE |
| Above 1000 | 74 | 54 |

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RESTRICTED FREQUENCY BANDS

| FREQUENCY (MHz) | FREQUENCY (MHz) | FREQUENCY (MHz) | FREQUENCY (GHz) |
|---|---|---|---|
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| 0.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 25.5-25.67 | 1300-1427 | 8.025-8.5 |
| 4.17725-4.17775 | 37.5-38.25 | 1435-1626.5 | 9.0-9.2 |
| 4.20725-4.20775 | 73-74.6 | 1645.5-1646.5 | 9.3-9.5 |
| 6.215-6.218 | 74.8-75.2 | 1660-1710 | 10.6-12.7 |
| 6.26775-6.26825 | 108-121.94 | 1718.8-1722.2 | 13.25-13.4 |
| 6.31175-6.31225 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475-156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2690-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293 | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3600-4400 | Above 38.6 |
| 13.36-13.41 | | | |

For Radiated Emission

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Detector | Peak/QP/AV |
| Start Frequency | 9 KHz/150KHz (Peak/QP/AV) |
| Stop Frequency | 150KHz/30MHz (Peak/QP/AV) |
| RB / VB (emission in restricted band) | 200Hz (From 9kHz to 0.15MHz)/<br>9KHz (From 0.15MHz to 30MHz);<br>200Hz (From 9kHz to 0.15MHz)/<br>9KHz (From 0.15MHz to 30MHz) |

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Detector | Peak/QP |
| Start Frequency | 30 MHz (Peak/QP) |
| Stop Frequency | 1000 MHz (Peak/QP) |
| RB / VB (emission in restricted band) | 120 KHz / 300 KHz |

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Detector | Peak |
| Start Frequency | 1000 MHz (Peak/AV) |
| Stop Frequency | 10th carrier hamonic (Peak/AV) |
| RB / VB (emission in restricted band) | 1 MHz / 3 MHz(Peak)<br>1 MHz/1/T MHz(AVG) |

For Restricted band

| Spectrum Parameter | Setting |
|---|---|
| Detector | Peak |
| Start/Stop Frequency | Lower Band Edge: 2310 to 2410 MHz<br>Upper Band Edge: 2475 to 2500 MHz |
| RB / VB | 1 MHz / 3 MHz(Peak)<br>1 MHz/1/T MHz(AVG) |

| **Receiver Parameter** | **Setting** |
|---|---|
| Start ~ Stop Frequency | 9kHz~90kHz / RB 200Hz for PK & AV |
| Start ~ Stop Frequency | 90kHz~110kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 110kHz~490kHz / RB 200Hz for PK & AV |
| Start ~ Stop Frequency | 490kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

4.2 TEST PROCEDURE

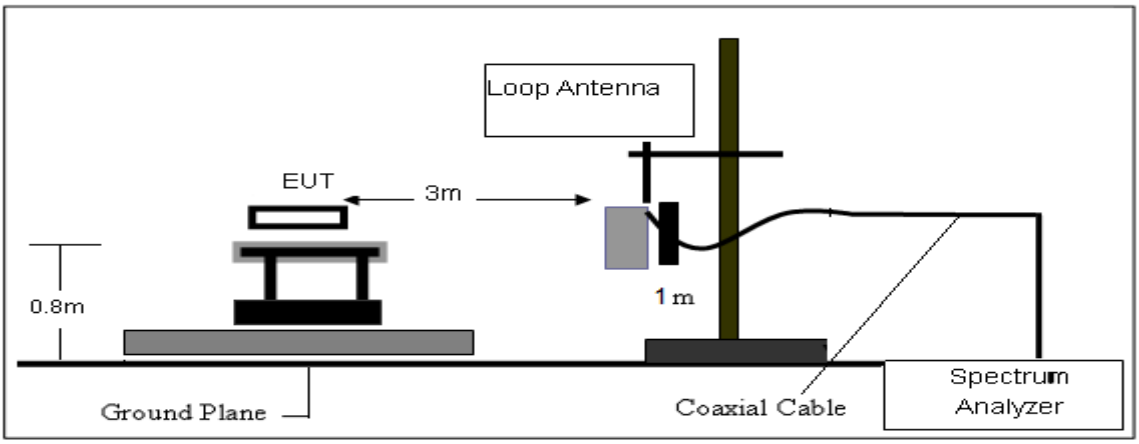
a. The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
b. The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position of the highest radiation.
c. The height of the equipment shall be 0.8 m(above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. Horizontal and vertical polarization of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and QuasiPeak detector mode will be re-measured.
e. If the Peak Mode measured value is compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and no additional QP Mode measurement was performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

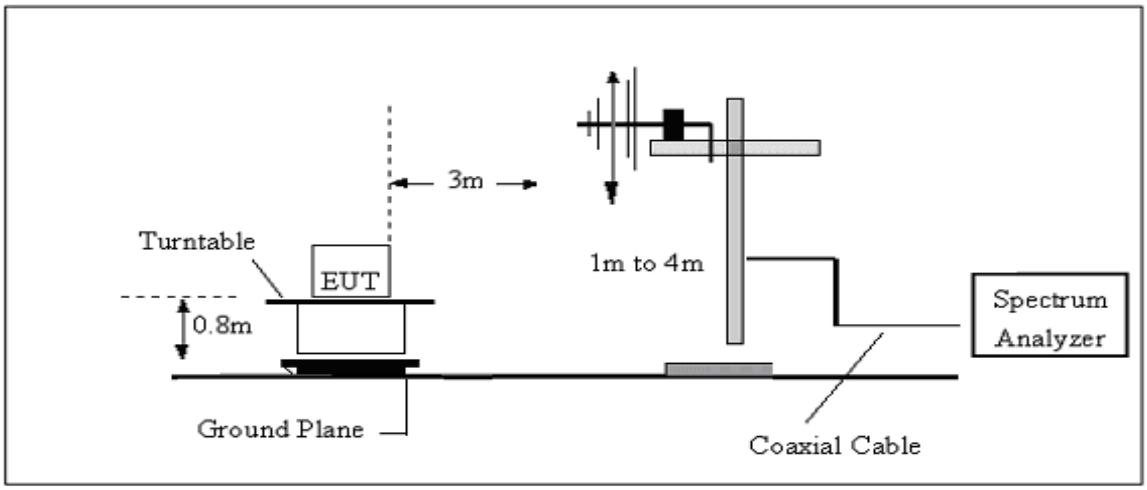
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

4.3 TEST SETUP

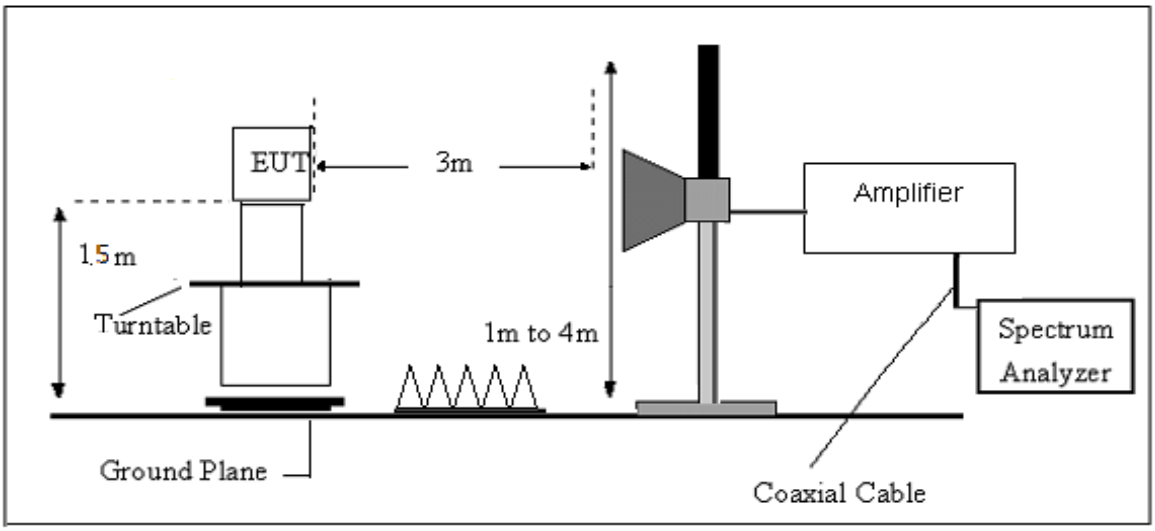
(A) Radiated Emission Test-Up Frequency Below 30MHz




(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz




4.4 EUT OPERATING CONDITIONS

Please refer to section 3.4 of this report.

4.5 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

| Frequency | FS | RA | AF | CL | AG | Factor |
|---|---|---|---|---|---|---|
| (MHz) | (dBμV/m) | (dBμV/m) | (dB) | (dB) | (dB) | (dB) |
| 300 | 40 | 58.1 | 12.2 | 1.6 | 31.9 | -18.1 |

Factor=AF+CL-AG

## 4.6 TEST RESULTS

Results of Radiated Emissions (9 KHz~30MHz)

| No. | Frequency | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Detector | Remark |
|---|---|---|---|---|---|---|---|---|
| 1* | - | - | - | - | - | - | - | See Note |

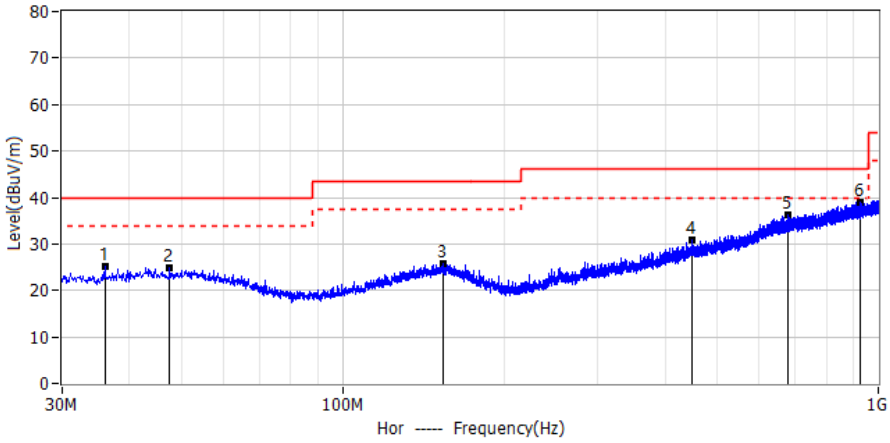
Note:

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and the permissible value has no need to be reported.

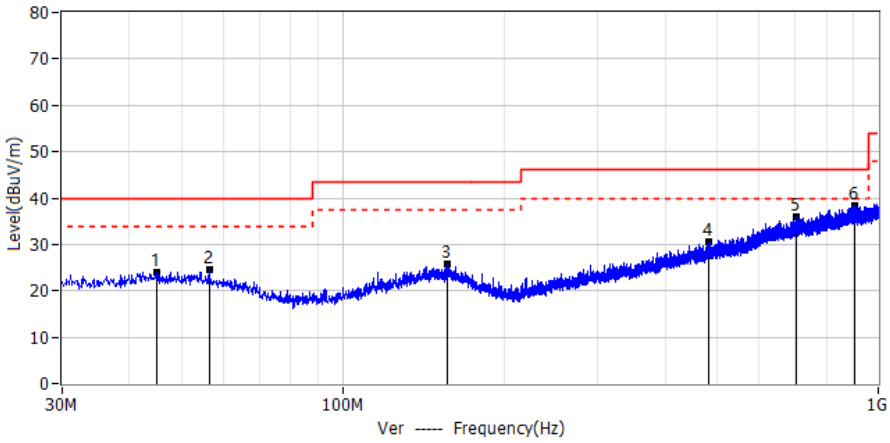
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.

## Results of Radiated Emissions (30MHz~1000MHz)

| | |
|---|---|
| Project: LGT24J175 | Test Engineer: LiuH |
| EUT: GP55MCS | Temperature: 25℃ |
| M/N: GP55M | Humidity: 54%RH |
| Test Voltage: Battery | Test Data: 2024-11-18 |
| Test Mode: TX BLE 2402 | |
| Note: | |




| No. | Frequency MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Detector | Polar |
|---|---|---|---|---|---|---|---|---|
| 1* | 36.063 | 5.32 | 19.94 | 25.26 | 40.00 | -14.74 | PK | Hor |
| 2* | 47.581 | 4.53 | 20.32 | 24.85 | 40.00 | -15.15 | PK | Hor |
| 3* | 154.524 | 4.33 | 21.46 | 25.79 | 43.50 | -17.71 | PK | Hor |
| 4* | 447.949 | 4.76 | 26.05 | 30.81 | 46.00 | -15.19 | PK | Hor |
| 5* | 677.718 | 6.34 | 29.86 | 36.20 | 46.00 | -9.80 | PK | Hor |
| 6* | 927.371 | 5.97 | 33.13 | 39.10 | 46.00 | -6.90 | PK | Hor |




| No. | Frequency MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Detector | Polar |
|---|---|---|---|---|---|---|---|---|
| 1* | 44.914 | 3.60 | 20.45 | 24.05 | 40.00 | -15.95 | PK | Ver |
| 2* | 56.433 | 4.89 | 19.78 | 24.67 | 40.00 | -15.33 | PK | Ver |
| 3* | 157.070 | 3.75 | 21.90 | 25.65 | 43.50 | -17.85 | PK | Ver |
| 4* | 482.141 | 3.87 | 26.55 | 30.42 | 46.00 | -15.58 | PK | Ver |
| 5* | 702.695 | 5.23 | 30.70 | 35.93 | 46.00 | -10.07 | PK | Ver |
| 6* | 905.668 | 5.31 | 33.15 | 38.46 | 46.00 | -7.54 | PK | Ver |

## Results of Radiated Emissions (Above 1000MHz)

| Frequency (MHz) | Reading (dBμV) | Corrected Factor (dB) | Result (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector | Polarity |
|---|---|---|---|---|---|---|---|
| Low Channel (2402 MHz) | | | | | | | |
| 3264.77 | 56.18 | -8.45 | 47.73 | 74.00 | -26.27 | PK | Vertical |
| 3264.77 | 45.61 | -8.45 | 37.16 | 54.00 | -16.84 | AV | Vertical |
| 3264.66 | 55.22 | -8.45 | 46.77 | 74.00 | -27.23 | PK | Horizontal |
| 3264.66 | 46.48 | -8.45 | 38.03 | 54.00 | -15.97 | AV | Horizontal |
| 4804.50 | 54.89 | -6.09 | 48.80 | 74.00 | -25.20 | PK | Vertical |
| 4804.50 | 45.24 | -6.09 | 39.15 | 54.00 | -14.85 | AV | Vertical |
| 4804.32 | 54.67 | -6.09 | 48.58 | 74.00 | -25.42 | PK | Horizontal |
| 4804.32 | 45.58 | -6.09 | 39.49 | 54.00 | -14.51 | AV | Horizontal |
| 5359.80 | 56.98 | -6.68 | 50.30 | 74.00 | -23.70 | PK | Vertical |
| 5359.80 | 46.96 | -6.68 | 40.28 | 54.00 | -13.72 | AV | Vertical |
| 5359.85 | 57.79 | -6.68 | 51.11 | 74.00 | -22.89 | PK | Horizontal |
| 5359.85 | 47.52 | -6.68 | 40.84 | 54.00 | -13.16 | AV | Horizontal |
| 7205.84 | 60.44 | -8.13 | 52.31 | 74.00 | -21.69 | PK | Vertical |
| 7205.84 | 50.89 | -8.13 | 42.76 | 54.00 | -11.24 | AV | Vertical |
| 7205.68 | 59.97 | -8.13 | 51.84 | 74.00 | -22.16 | PK | Horizontal |
| 7205.68 | 50.30 | -8.13 | 42.17 | 54.00 | -11.83 | AV | Horizontal |
| Middle Channel (2440 MHz) | | | | | | | |
| 3264.62 | 56.21 | -8.45 | 47.76 | 74.00 | -26.24 | PK | Vertical |
| 3264.62 | 46.78 | -8.45 | 38.33 | 54.00 | -15.67 | AV | Vertical |
| 3264.64 | 56.07 | -8.45 | 47.62 | 74.00 | -26.38 | PK | Horizontal |
| 3264.64 | 46.98 | -8.45 | 38.53 | 54.00 | -15.47 | AV | Horizontal |
| 4880.55 | 55.38 | -6.09 | 49.29 | 74.00 | -24.71 | PK | Vertical |
| 4880.55 | 44.88 | -6.09 | 38.79 | 54.00 | -15.21 | AV | Vertical |
| 4880.34 | 55.38 | -6.09 | 49.29 | 74.00 | -24.71 | PK | Horizontal |
| 4880.34 | 45.50 | -6.09 | 39.41 | 54.00 | -14.59 | AV | Horizontal |
| 5359.88 | 57.20 | -6.68 | 50.52 | 74.00 | -23.48 | PK | Vertical |
| 5359.88 | 46.95 | -6.68 | 40.27 | 54.00 | -13.73 | AV | Vertical |
| 5359.59 | 57.15 | -6.68 | 50.47 | 74.00 | -23.53 | PK | Horizontal |
| 5359.59 | 47.95 | -6.68 | 41.27 | 54.00 | -12.73 | AV | Horizontal |
| 7310.70 | 60.61 | -8.13 | 52.48 | 74.00 | -21.52 | PK | Vertical |
| 7310.70 | 50.83 | -8.13 | 42.70 | 54.00 | -11.30 | AV | Vertical |
| 7310.91 | 60.63 | -8.13 | 52.50 | 74.00 | -21.50 | PK | Horizontal |
| 7310.91 | 50.34 | -8.13 | 42.21 | 54.00 | -11.79 | AV | Horizontal |
| High Channel (2480 MHz) | | | | | | | |
| 3264.77 | 56.32 | -8.45 | 47.87 | 74.00 | -26.13 | PK | Vertical |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3264.77 | 45.49 | -8.45 | 37.04 | 54.00 | -16.96 | AV | Vertical |
| 3264.57 | 56.31 | -8.45 | 47.86 | 74.00 | -26.14 | PK | Horizontal |
| 3264.57 | 46.82 | -8.45 | 38.37 | 54.00 | -15.63 | AV | Horizontal |
| 4960.29 | 54.47 | -6.09 | 48.38 | 74.00 | -25.62 | PK | Vertical |
| 4960.29 | 44.35 | -6.09 | 38.26 | 54.00 | -15.74 | AV | Vertical |
| 4960.40 | 54.92 | -6.09 | 48.83 | 74.00 | -25.17 | PK | Horizontal |
| 4960.40 | 45.52 | -6.09 | 39.43 | 54.00 | -14.57 | AV | Horizontal |
| 5359.61 | 56.94 | -6.68 | 50.26 | 74.00 | -23.74 | PK | Vertical |
| 5359.61 | 47.43 | -6.68 | 40.75 | 54.00 | -13.25 | AV | Vertical |
| 5359.65 | 57.89 | -6.68 | 51.21 | 74.00 | -22.79 | PK | Horizontal |
| 5359.65 | 48.07 | -6.68 | 41.39 | 54.00 | -12.61 | AV | Horizontal |
| 7439.71 | 60.46 | -8.13 | 52.33 | 74.00 | -21.67 | PK | Vertical |
| 7439.71 | 50.13 | -8.13 | 42.00 | 54.00 | -12.00 | AV | Vertical |
| 7439.76 | 60.38 | -8.13 | 52.25 | 74.00 | -21.75 | PK | Horizontal |
| 7439.76 | 50.47 | -8.13 | 42.34 | 54.00 | -11.66 | AV | Horizontal |

Remark:

In frequency ranges 18~25GHz no any other harmonic emissions detected which are tested to compliance with the limit. No recording in the test report. No any other emissions level which are attenuated less than 20dB below the limit. No recording in the test report.

## 4.6 TEST RESULTS (BAND EDGE REQUIREMENTS)

| Frequency (MHz) | Reading (dBμV) | Corrected Factor (dB） | Result (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector | Polarity |
|---|---|---|---|---|---|---|---|
| GFSK | | | | | | | |
| 2390.00 | 13.67 | 34.10 | 47.77 | 74.00 | -26.23 | PK | Vertical |
| 2390.00 | 2.28 | 34.10 | 36.38 | 54.00 | -17.62 | AV | Vertical |
| 2390.00 | 12.69 | 34.10 | 46.79 | 74.00 | -27.21 | PK | Horizontal |
| 2390.00 | 1.46 | 34.10 | 35.56 | 54.00 | -18.44 | AV | Horizontal |
| 2483.50 | 15.20 | 34.44 | 49.64 | 74.00 | -24.36 | PK | Vertical |
| 2483.50 | 2.64 | 34.44 | 37.08 | 54.00 | -16.92 | AV | Vertical |
| 2483.50 | 15.26 | 34.44 | 49.70 | 74.00 | -24.30 | PK | Horizontal |
| 2483.50 | 1.90 | 34.44 | 36.34 | 54.00 | -17.66 | AV | Horizontal |
| Low measurement frequencies is range from 2310 to 2404 MHz, high measurement frequencies is range from 2478 to 2500 MHz. | | | | | | | |

# 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 which is powered by the ${ POWER BY}, is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal 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

For the measurement records, refer to the appendix I.

Note: Not recorded emission from 9 KHz to 30 MHz as emission level at least 20dBc lower than emission limit.

## 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

For the measurement records, refer to the appendix I.

# 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

For the measurement records, refer to the appendix I.

# 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 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.

Integrated band power method:

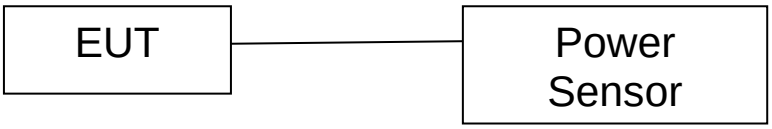
The following procedure can be used when the maximum available RBW of the instrument is less than the
DTS bandwidth:

a) Set the RBW = 1 MHz.
b) Set the VBW ≥ [3 × RBW].
c) Set the span ≥ [1.5 × DTS bandwidth].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector). If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.

PKPM1 Peak power meter method:

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

## 8.3 TEST SETUP




## 8.4 EUT OPERATION CONDITIONS

Please refer to section 3.4 of this report.

## 8.5 TEST RESULTS

For the measurement records, refer to the appendix I.

# 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 FPC Antenna. It comply with the standard requirement.

# APPENDIX I - TEST RESULTS

## ANNEX A. OUTPUT POWER

### 1. BLUETOOTH LOW ENERGY

1.1. A.1-OUTPUT POWER(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2402 | -3.593 |

1.2. A.1-OUTPUT POWER(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2440 | -2.702 |

1.3. A.1-OUTPUT POWER(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2480 | -4.028 |

## ANNEX A. OUTPUT POWER -2M

### 1. BLUETOOTH LOW ENERGY

1.1. A.1.1-OUTPUT POWER -2M(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2402 | -3.370 |

1.2. A.1.1-OUTPUT POWER -2M(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2440 | -2.487 |

1.3. A.1.1-OUTPUT POWER -2M(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2480 | -3.806 |

ANNEX A. 6DB BANDWIDTH

1. BLUETOOTH LOW ENERGY

1.1. A.2-6DB BANDWIDTH(NTNV)

| Center Frequency (MHz) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|
| 2402 | 6 | 0.1 | Peak | 0.5 | 0.682373 | Pass |

1.2. A.2-6DB BANDWIDTH(NTNV)

| Center Frequency (MHz) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|
| 2440 | 6 | 0.1 | Peak | 0.5 | 0.682373 | Pass |

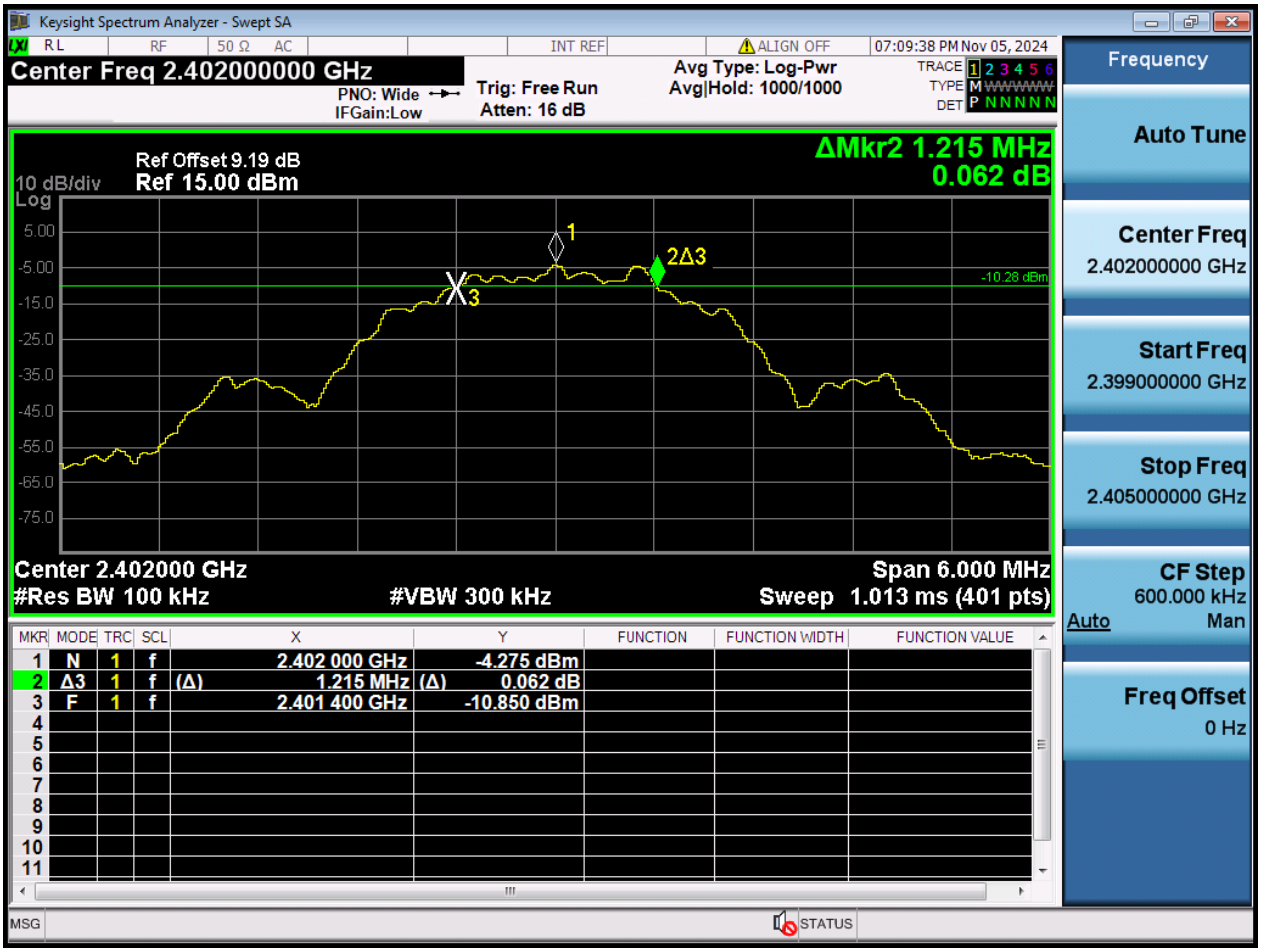
1.3. A.2-6DB BANDWIDTH(NTNV)

| Center Frequency (MHz) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|
| 2480 | 6 | 0.1 | Peak | 0.5 | 0.682373 | Pass |

2. BLUETOOTH LOW ENERGY -2M

2.1. A.2-6DB BANDWIDTH(NTNV)

| Center Frequency (MHz) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|
| 2402 | 6 | 0.1 | Peak | 0.5 | 1.215088 | Pass |



2.2. A.2-6DB BANDWIDTH(NTNV)

| Center Frequency (MHz) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|
| 2440 | 6 | 0.1 | Peak | 0.5 | 1.215088 | Pass |

2.3. A.2-6DB BANDWIDTH(NTNV)

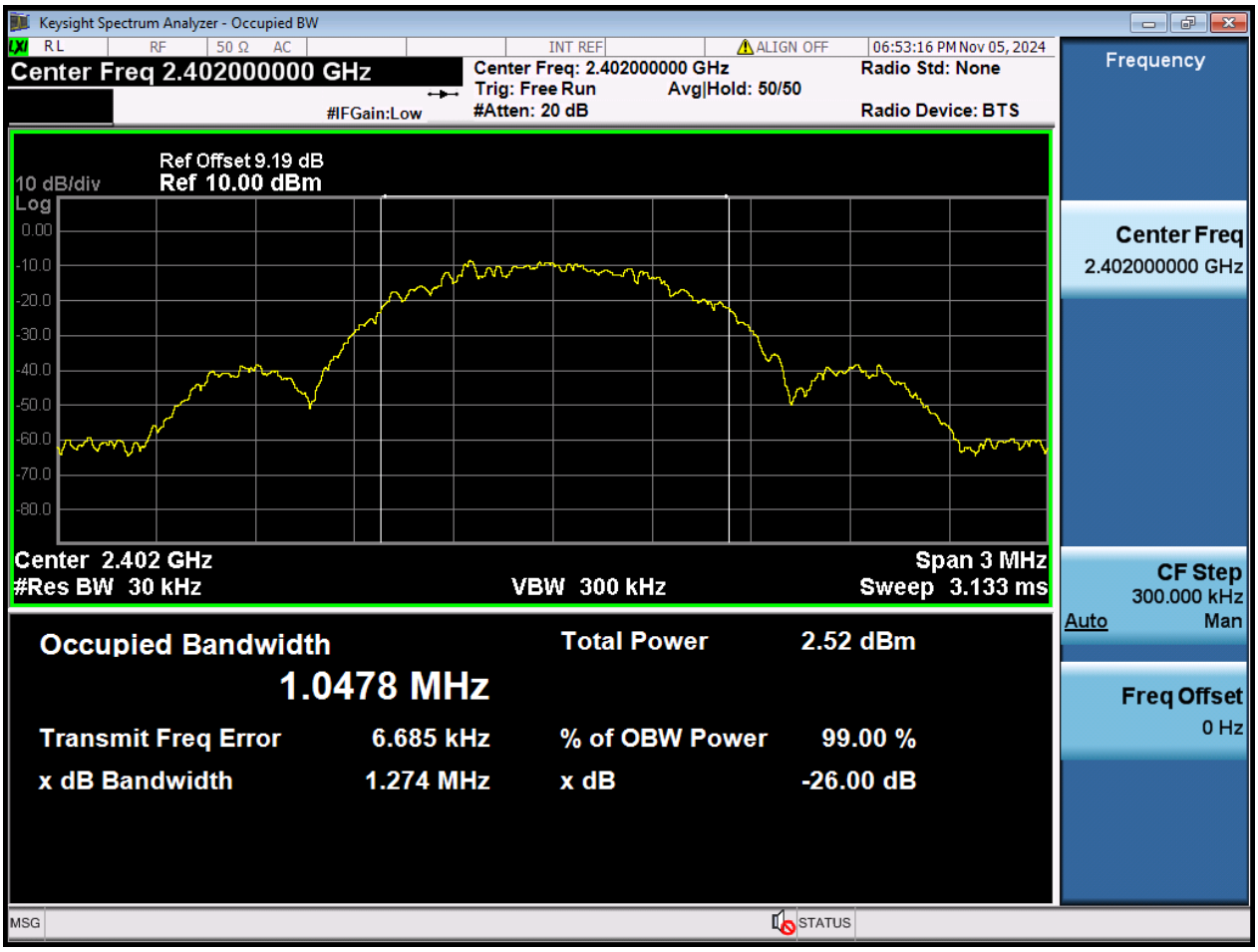
| Center Frequency (MHz) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|
| 2480 | 6 | 0.1 | Peak | 0.5 | 1.22998 | Pass |

ANNEX A. 99% BANDWIDTH

1. BLUETOOTH LOW ENERGY

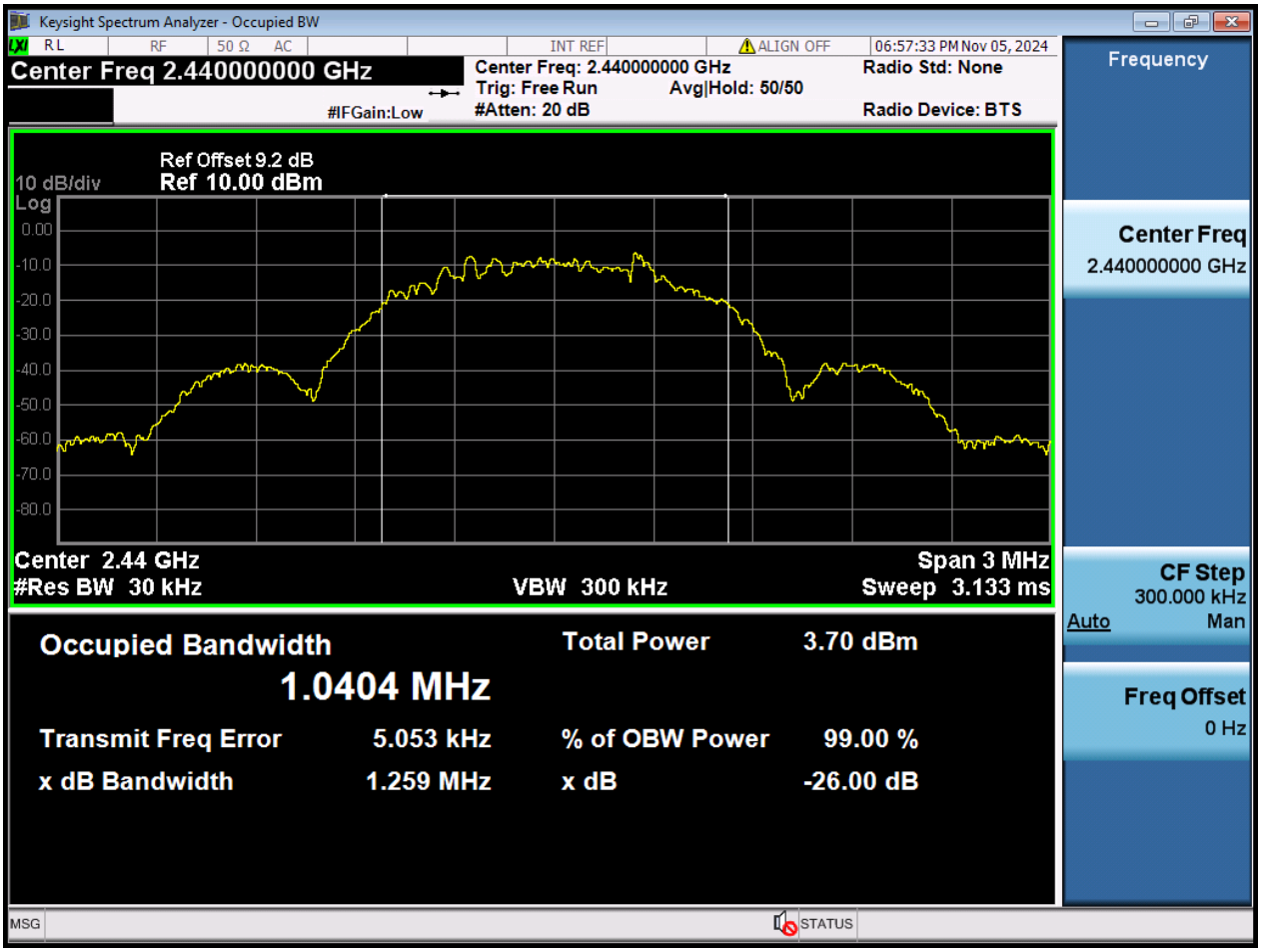
1.1. A.2.2-99% BANDWIDTH(NTNV)

| Center Frequency (MHz) | OBW Power (%) | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | Verdict |
|---|---|---|---|---|---|---|
| 2402 | 99 | 0.03 | Peak | 0.5 | 1.047763 | Pass |



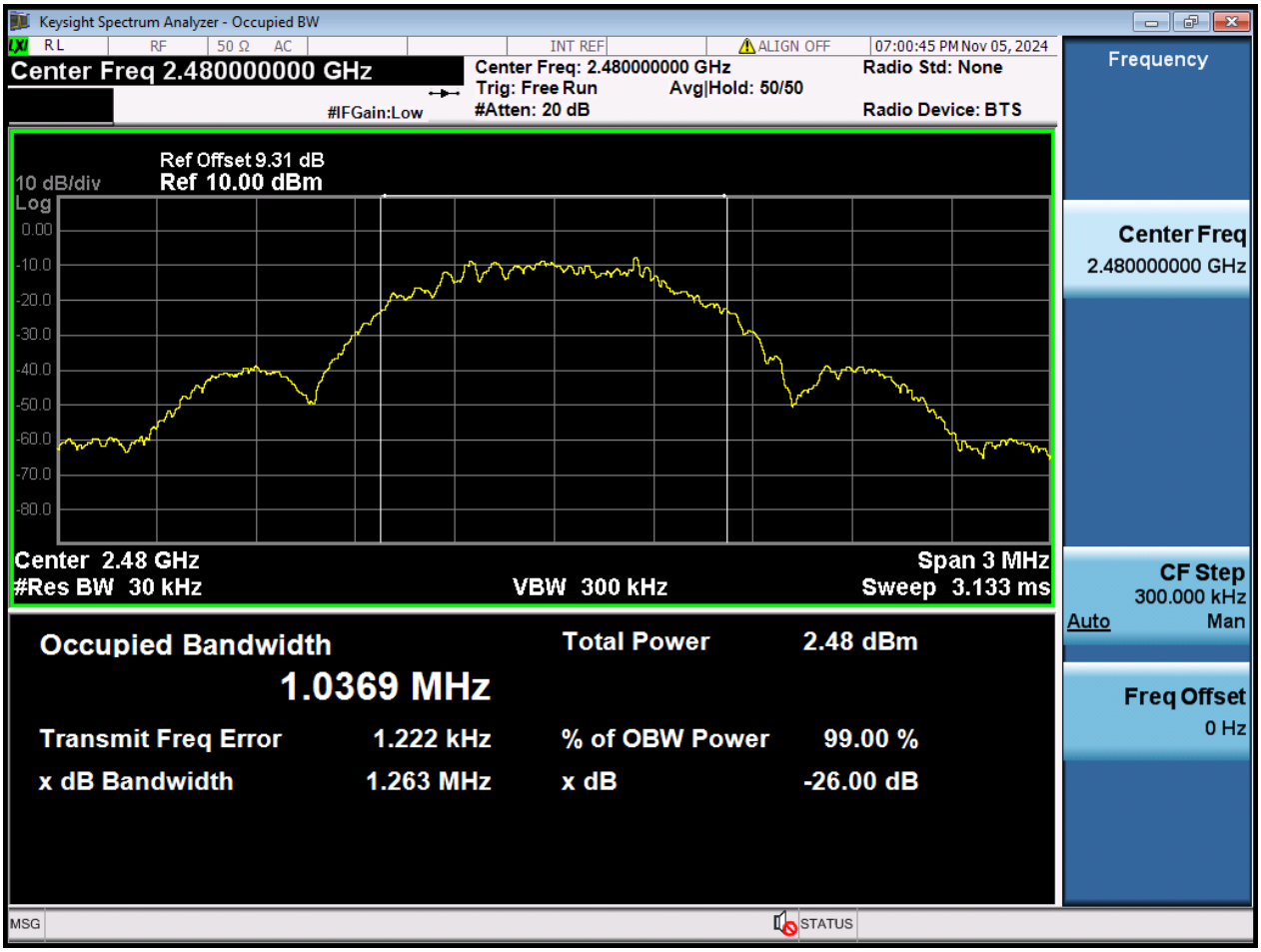
1.2. A.2.2-99% BANDWIDTH(NTNV)

| Center Frequency (MHz) | OBW Power (%) | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | Verdict |
|---|---|---|---|---|---|---|
| 2440 | 99 | 0.03 | Peak | 0.5 | 1.04039 | Pass |



1.3. A.2.2-99% BANDWIDTH(NTNV)

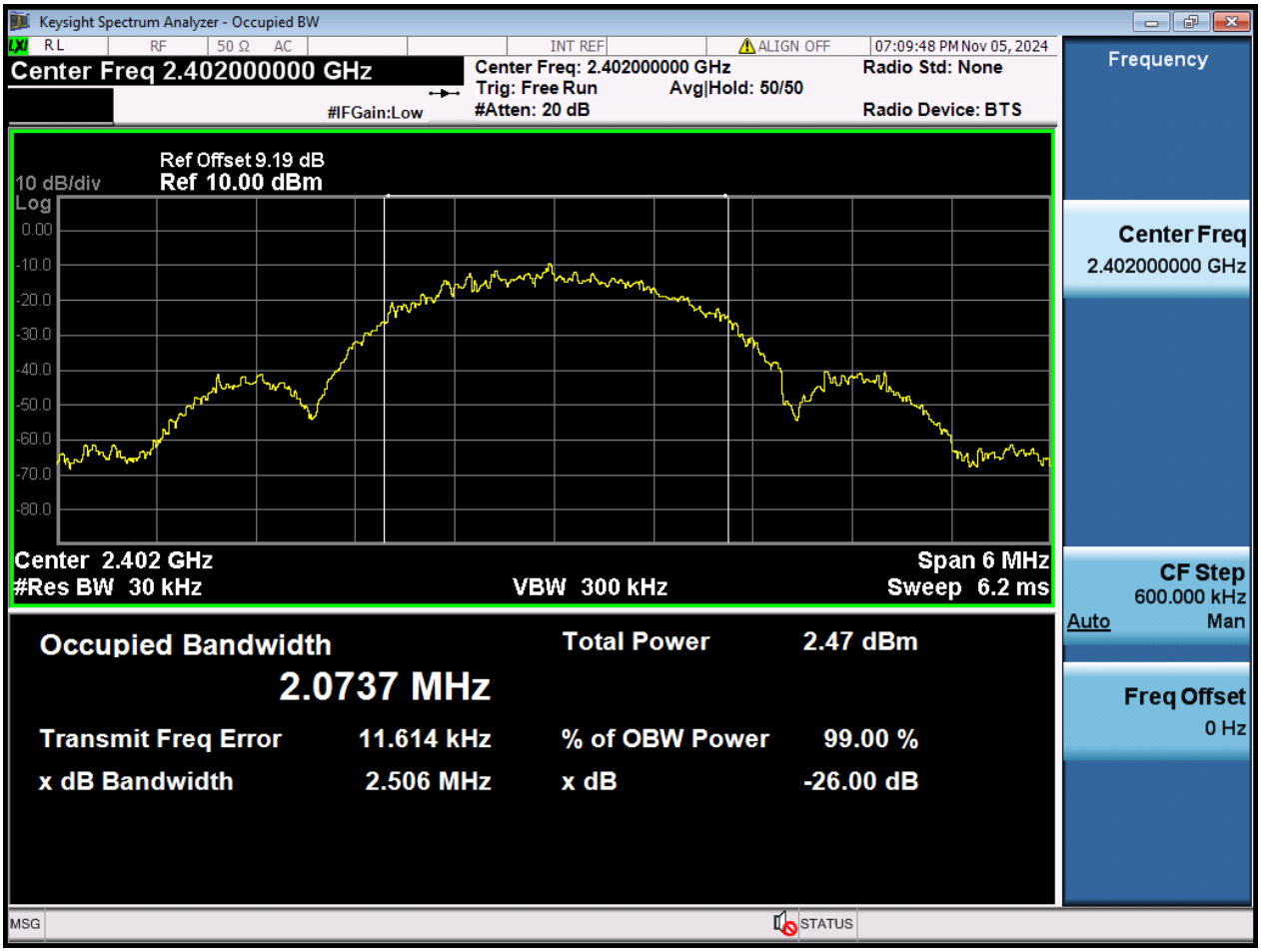
| Center Frequency (MHz) | OBW Power (%) | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | Verdict |
|---|---|---|---|---|---|---|
| 2480 | 99 | 0.03 | Peak | 0.5 | 1.036924 | Pass |



2. BLUETOOTH LOW ENERGY -2M

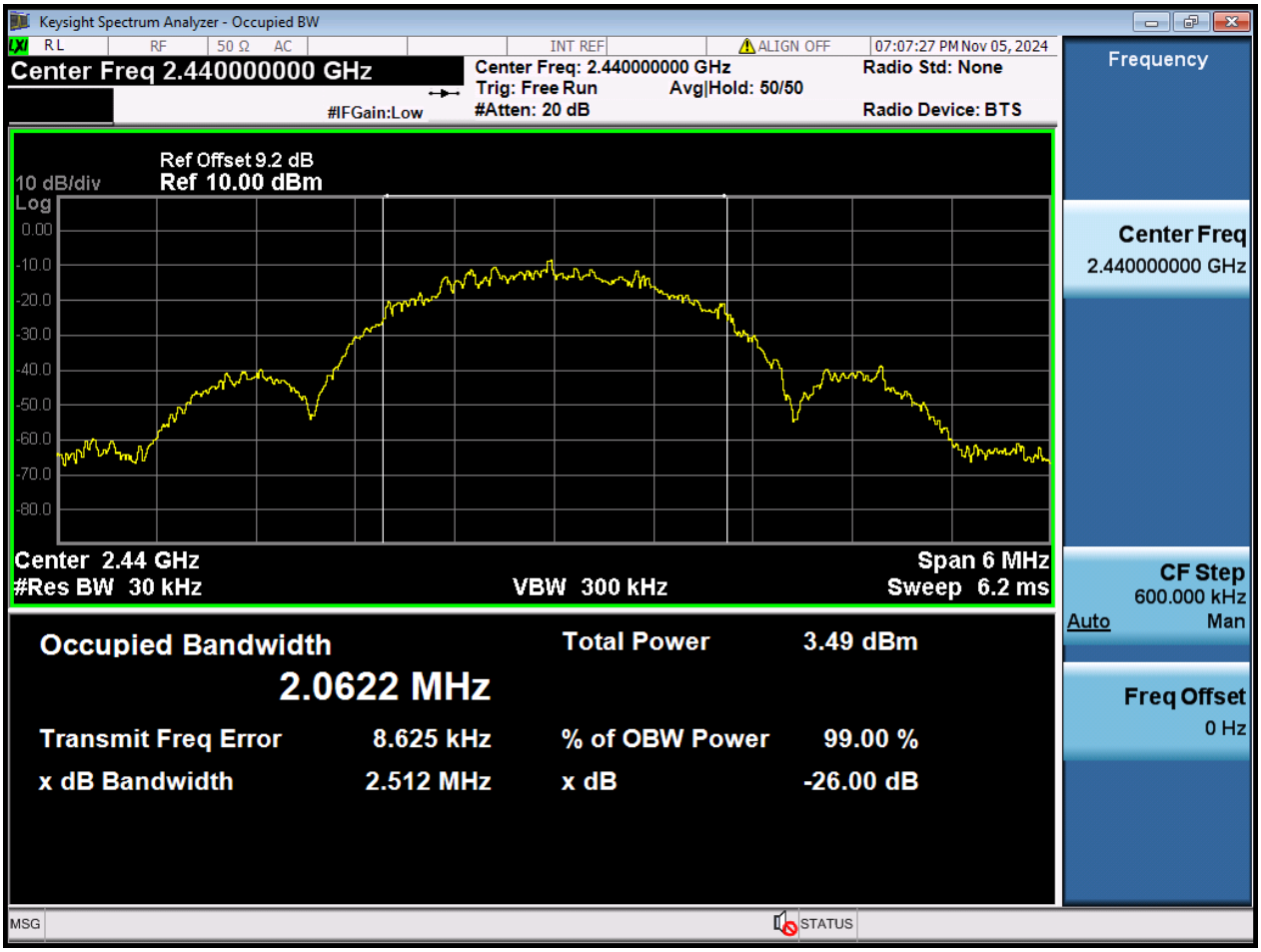
2.1. A.2.2-99% BANDWIDTH(NTNV)

| Center Frequency (MHz) | OBW Power (%) | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | Verdict |
|---|---|---|---|---|---|---|
| 2402 | 99 | 0.03 | Peak | 0.5 | 2.073707 | Pass |



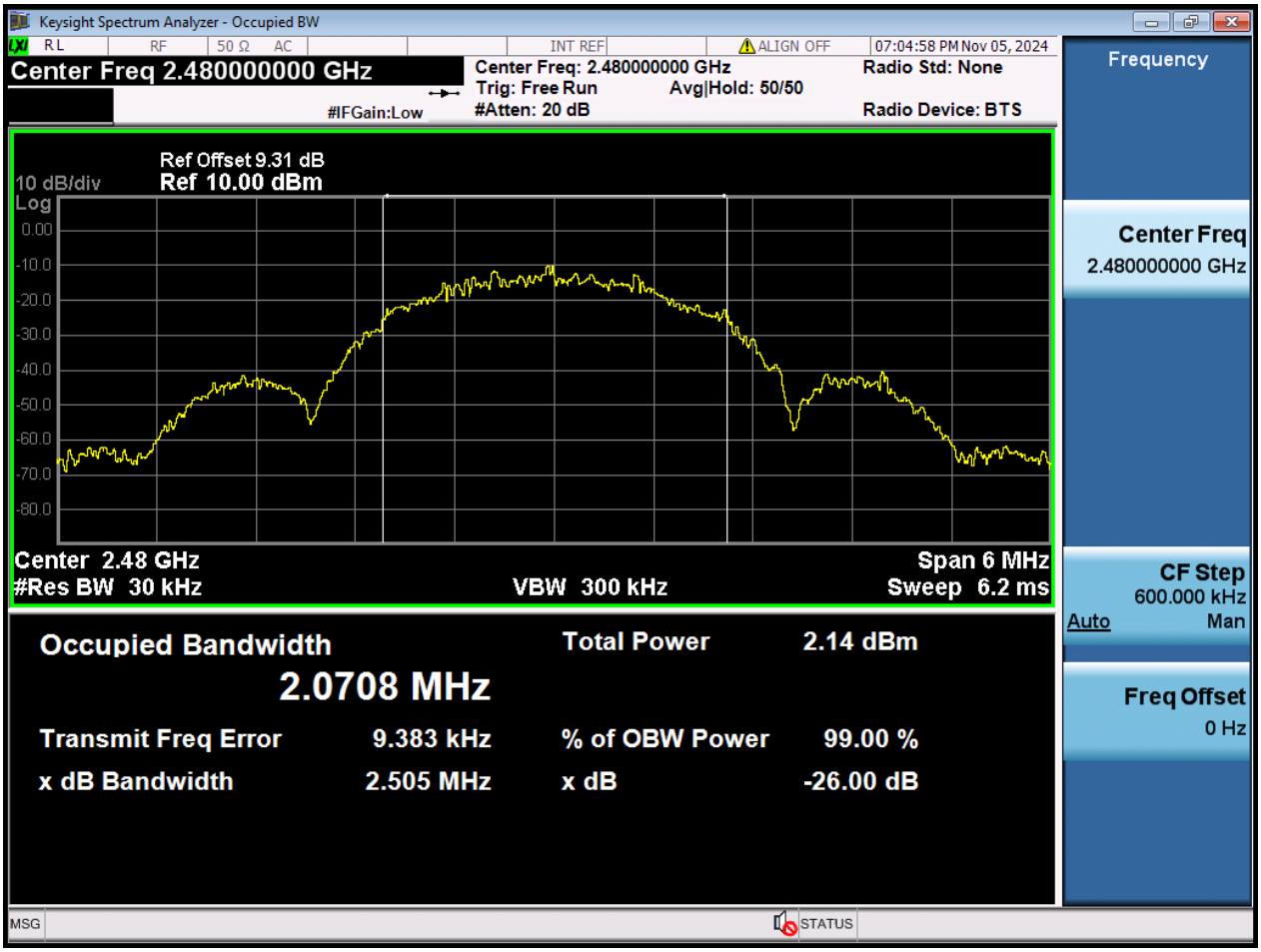
2.2. A.2.2-99% BANDWIDTH(NTNV)

| Center Frequency (MHz) | OBW Power (%) | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | Verdict |
|---|---|---|---|---|---|---|
| 2440 | 99 | 0.03 | Peak | 0.5 | 2.062174 | Pass |



2.3. A.2.2-99% BANDWIDTH(NTNV)

| Center Frequency (MHz) | OBW Power (%) | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | Verdict |
|---|---|---|---|---|---|---|
| 2480 | 99 | 0.03 | Peak | 0.5 | 2.070847 | Pass |

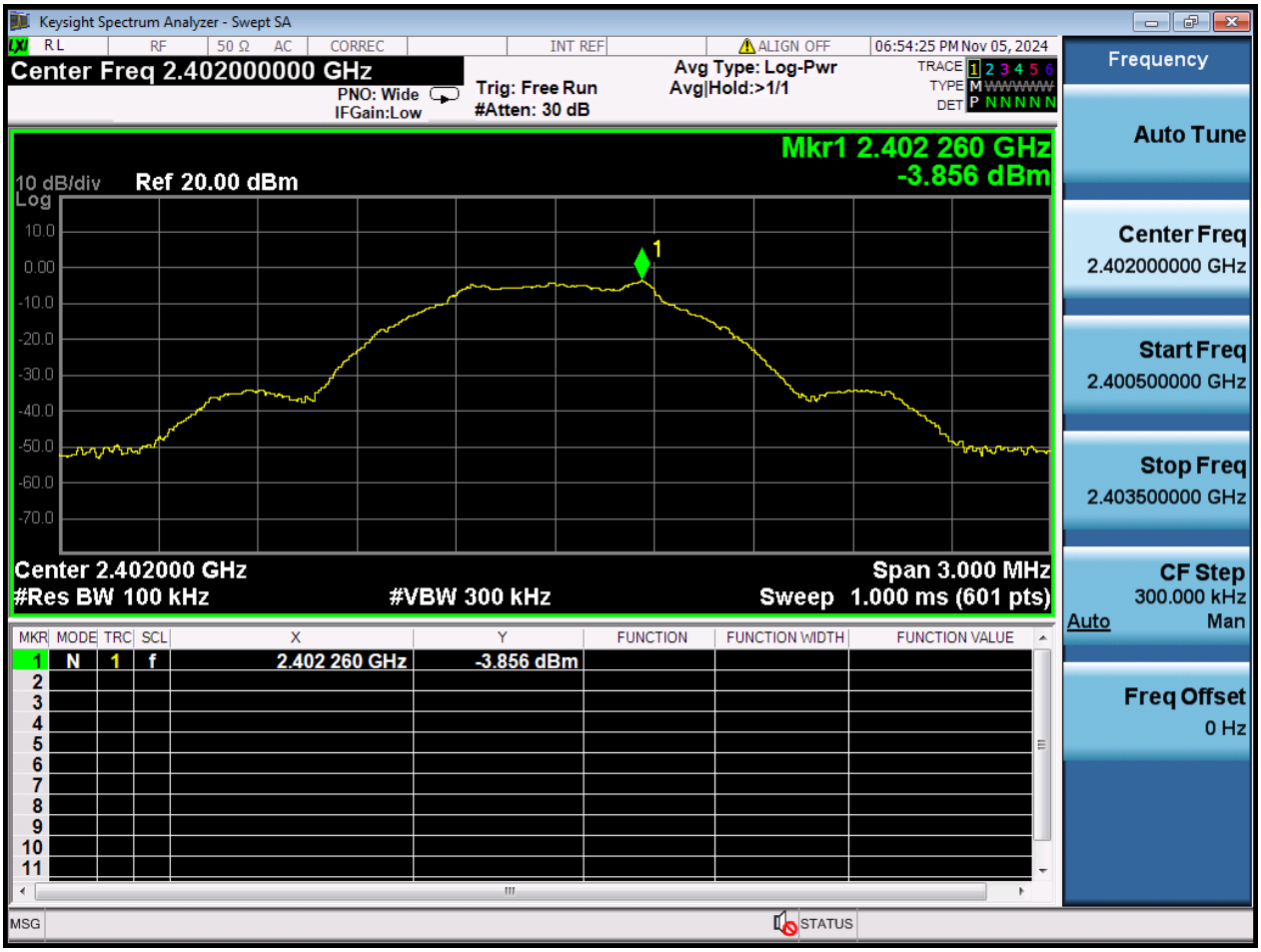


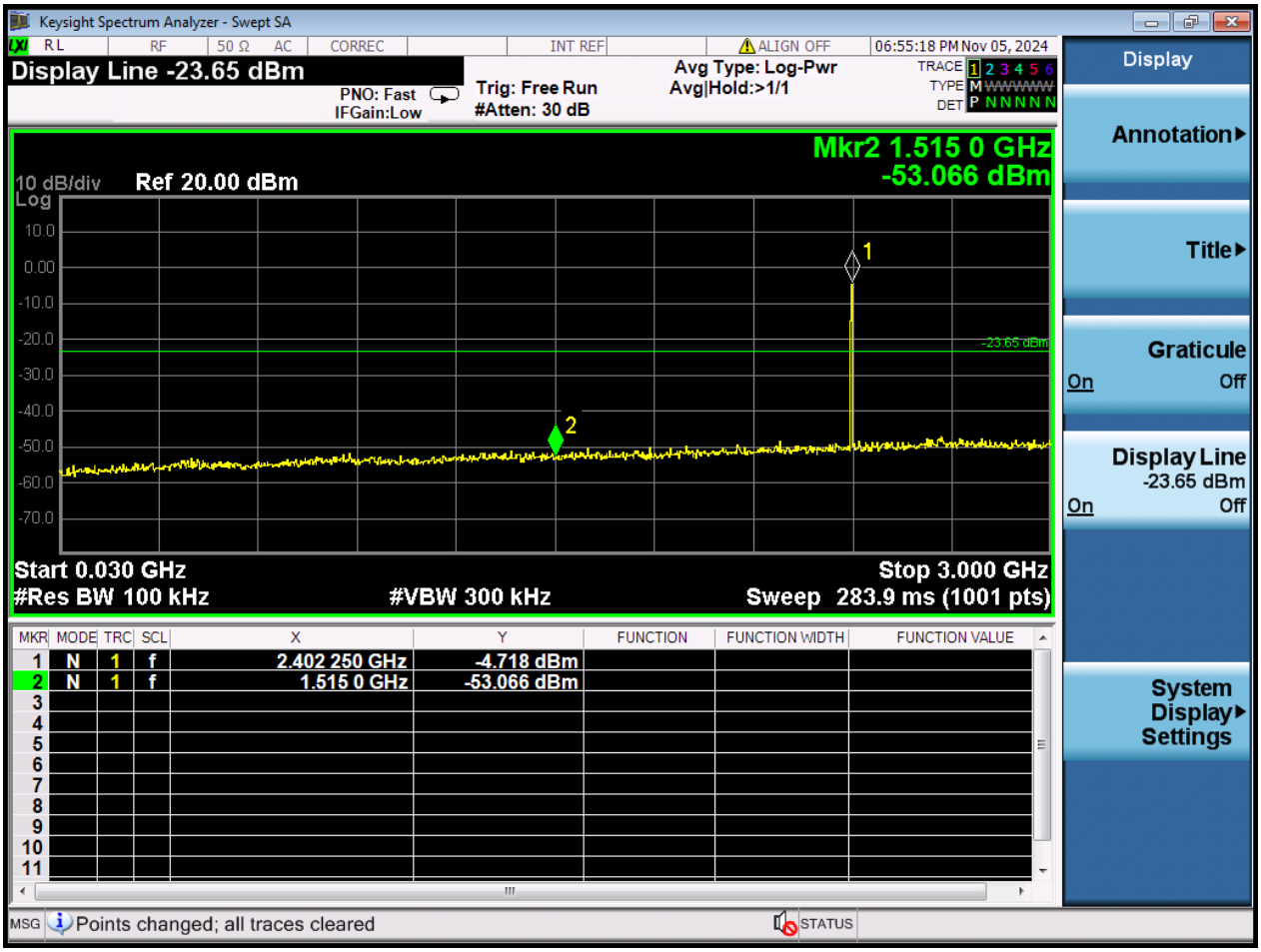
ANNEX A. CONDUCTED SPURIOUS EMISSIONS

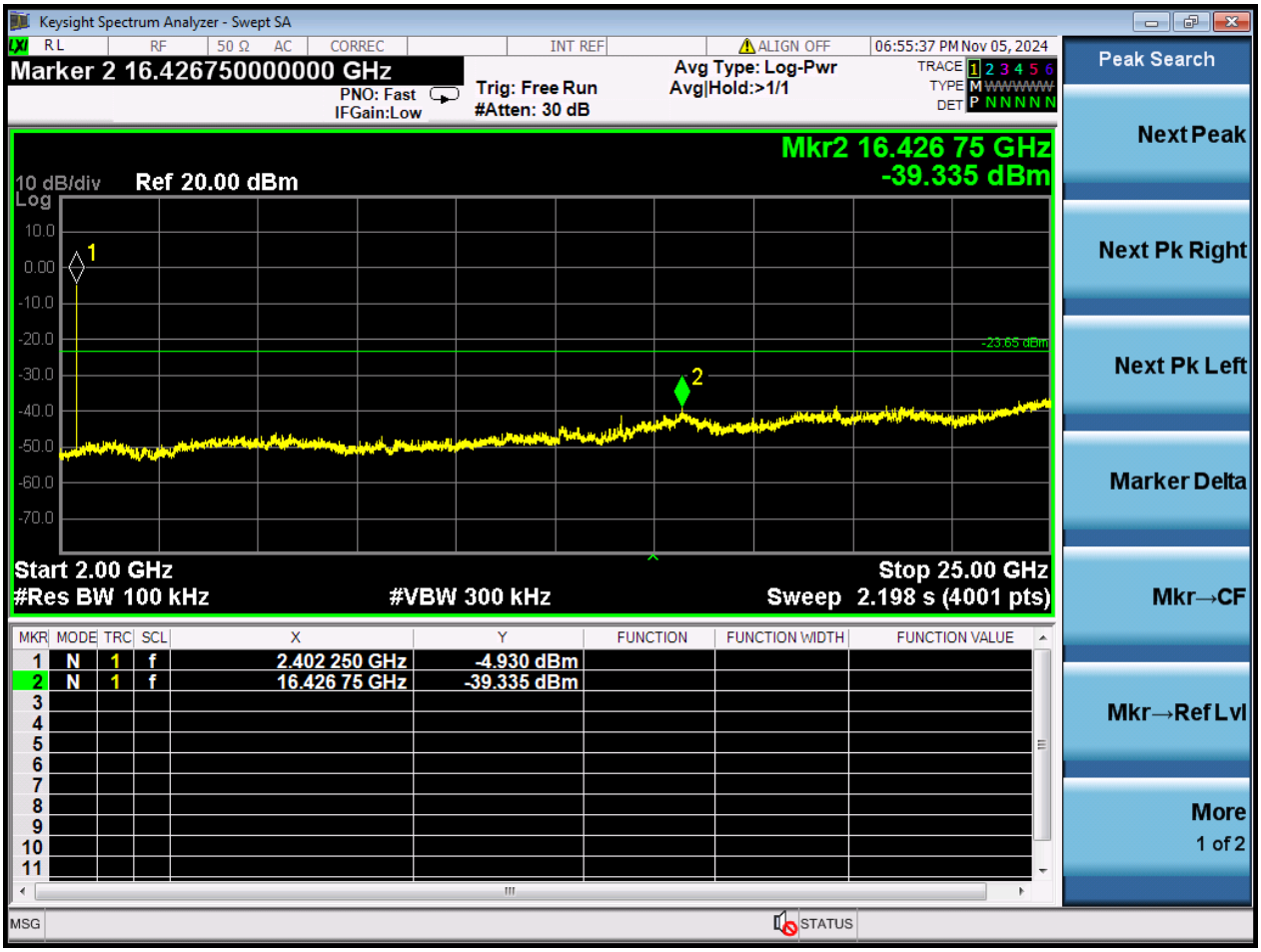
1. BLUETOOTH LOW ENERGY

1.1. A.3-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 1515 | -53.066 |
| 16426.75 | -39.335 |

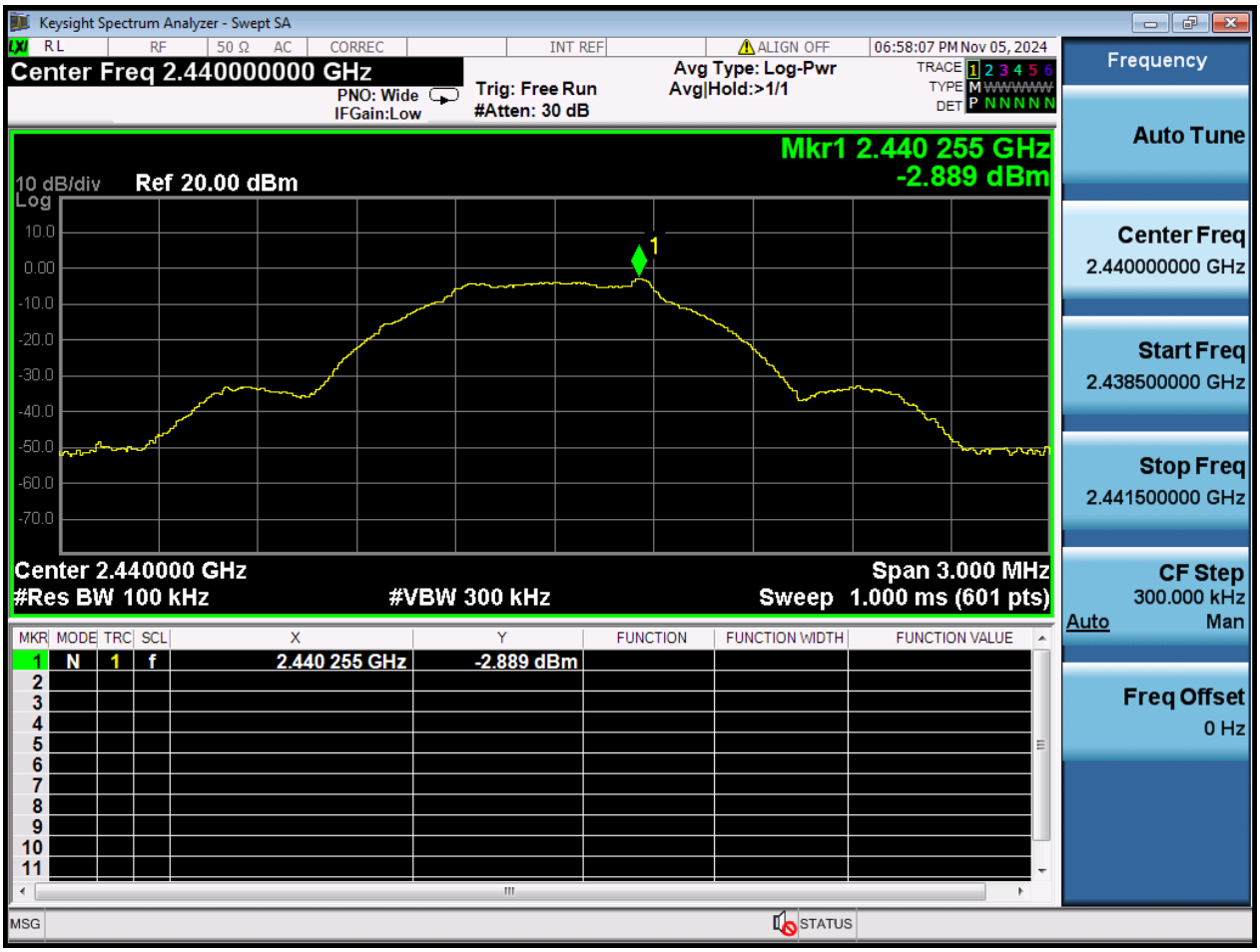


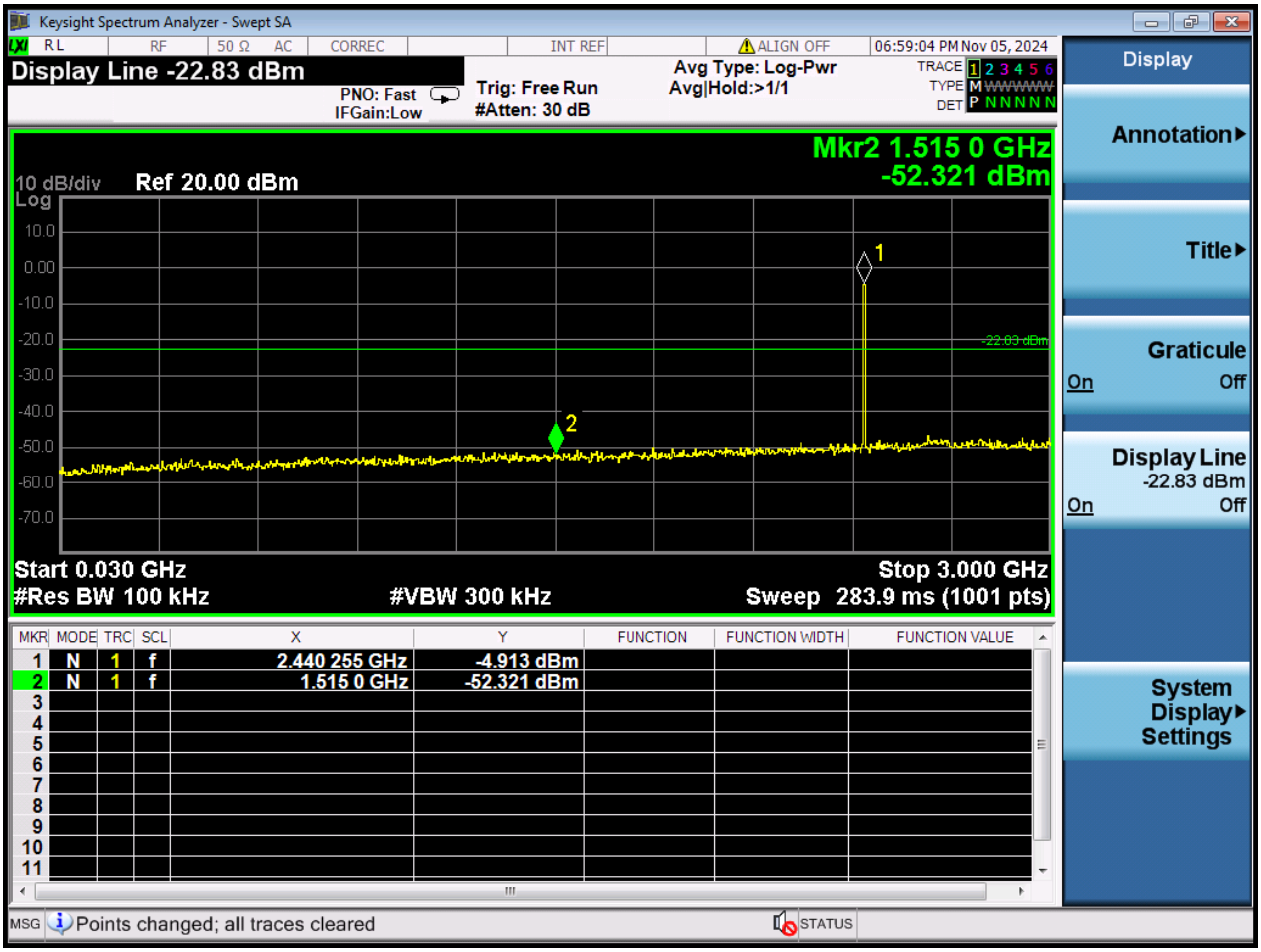

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
06:55:18 PM Nov 05, 2024
Display Line -23.65 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P NNNNNN
Mkr2 1.515 0 GHz
-53.066 dBm
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-23.65 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 283.9 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.402 250 GHz -4.718 dBm
2 N 1 f 1.515 0 GHz -53.066 dBm
Display
Annotation
Title
Graticule
On Off
Display Line
-23.65 dBm
On Off
System Display Settings
MSG
Points changed; all traces cleared
STATUS

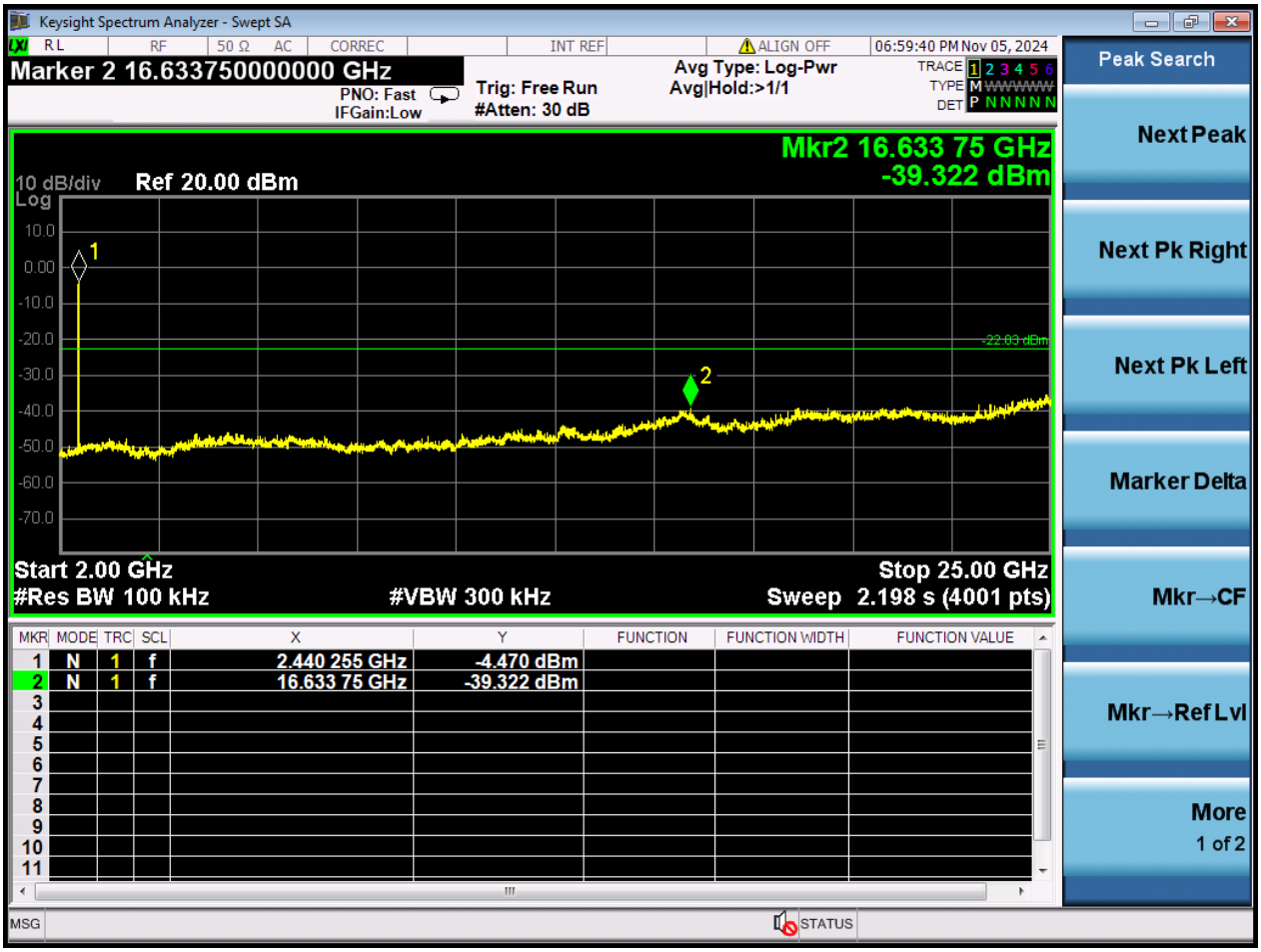

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
06:55:37 PM Nov 05, 2024
Marker 2 16.426750000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr2 16.426 75 GHz
-39.335 dBm
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-23.65 dBm
Start 2.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.198 s (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.402 250 GHz -4.930 dBm
2 N 1 f 16.426 75 GHz -39.335 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
STATUS

1.2. A.3-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 1515 | -52.321 |
| 16633.75 | -39.322 |

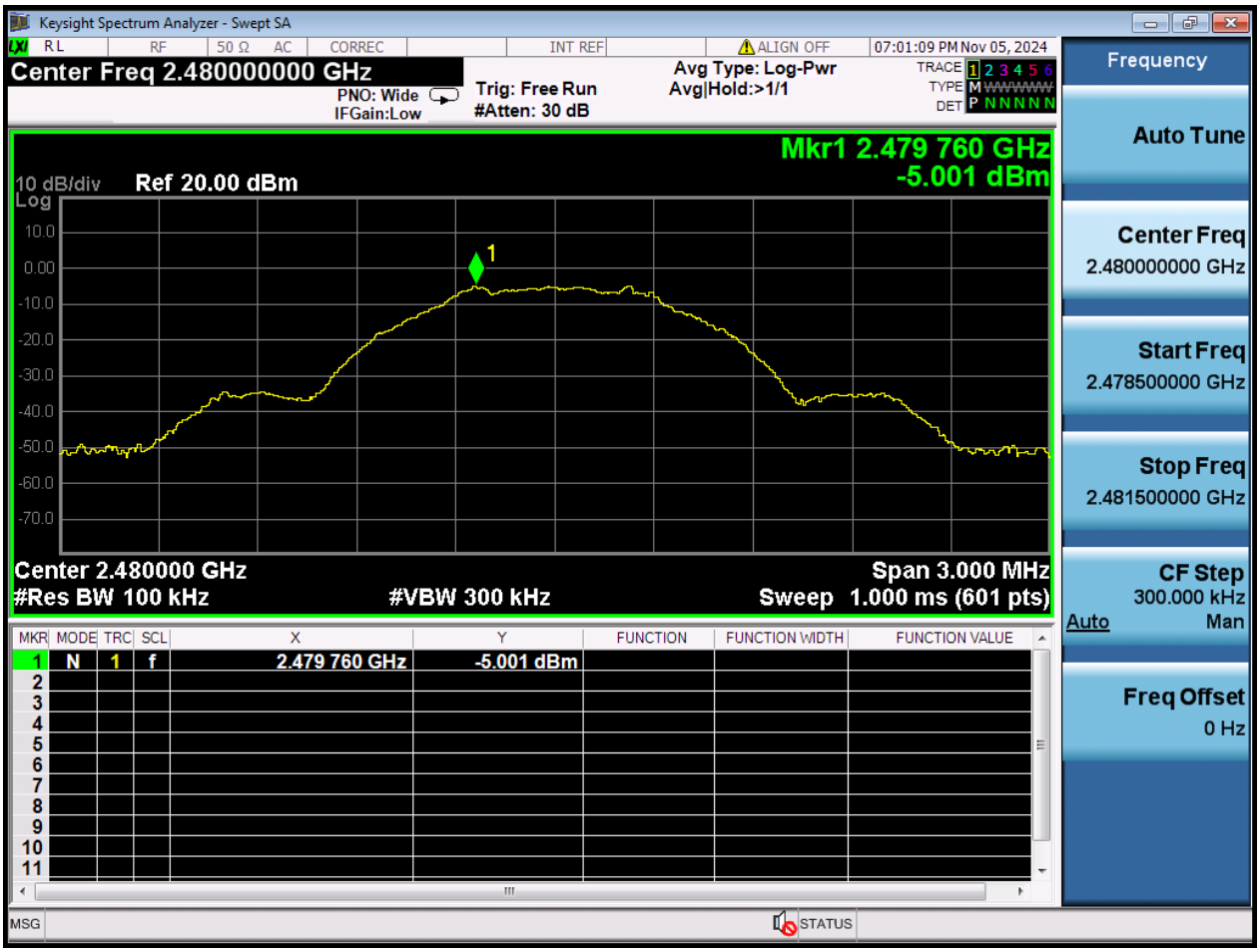


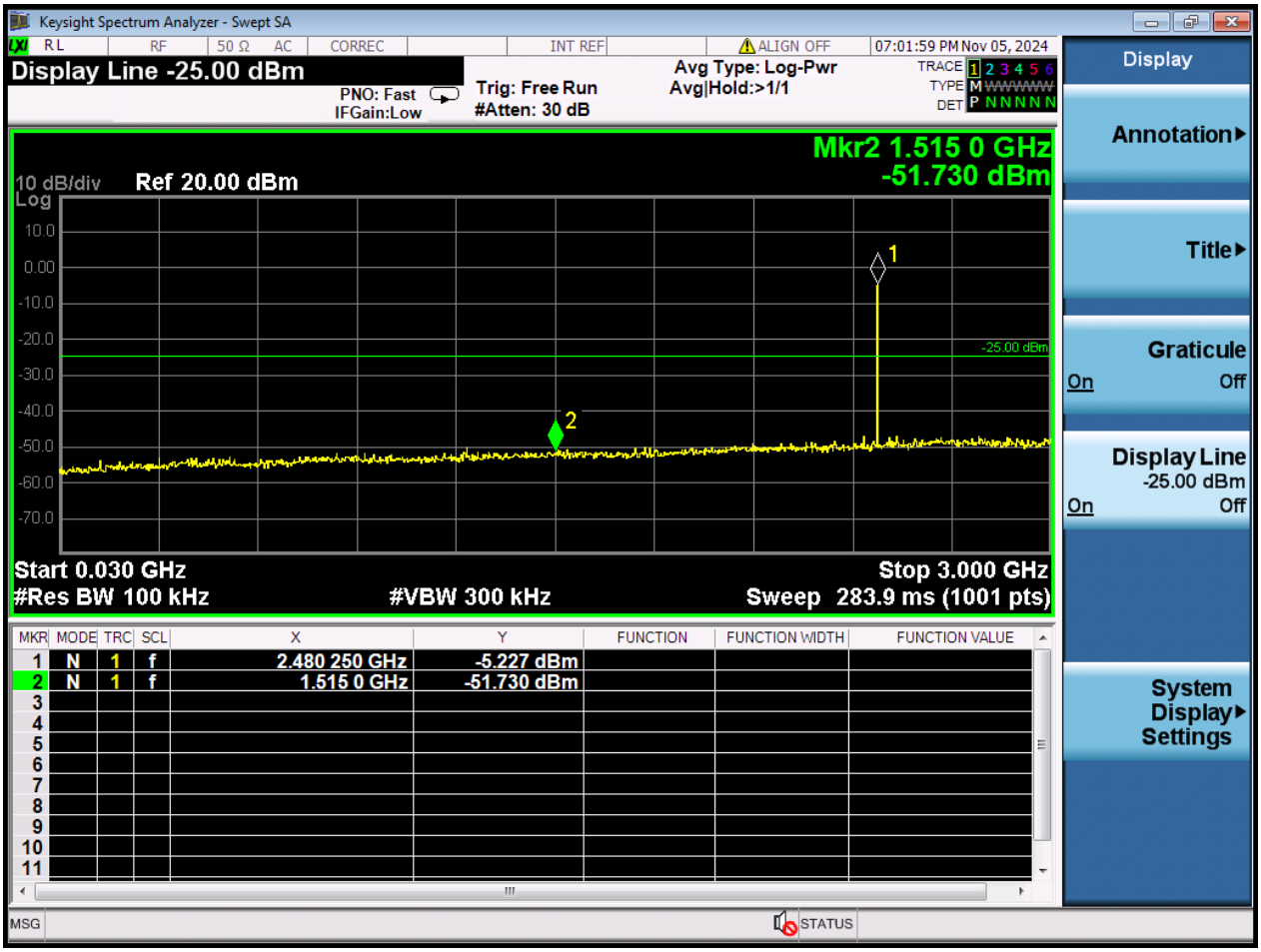

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
06:59:04 PM Nov 05, 2024
Display Line -22.83 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr2 1.515 0 GHz
-52.321 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-22.83 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 283.9 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.440 255 GHz -4.913 dBm
2 N 1 f 1.515 0 GHz -52.321 dBm
3
4
5
6
7
8
9
10
11
Display
Annotation
Title
Graticule
On Off
Display Line
-22.83 dBm
On Off
System Display Settings
MSG
Points changed; all traces cleared
STATUS

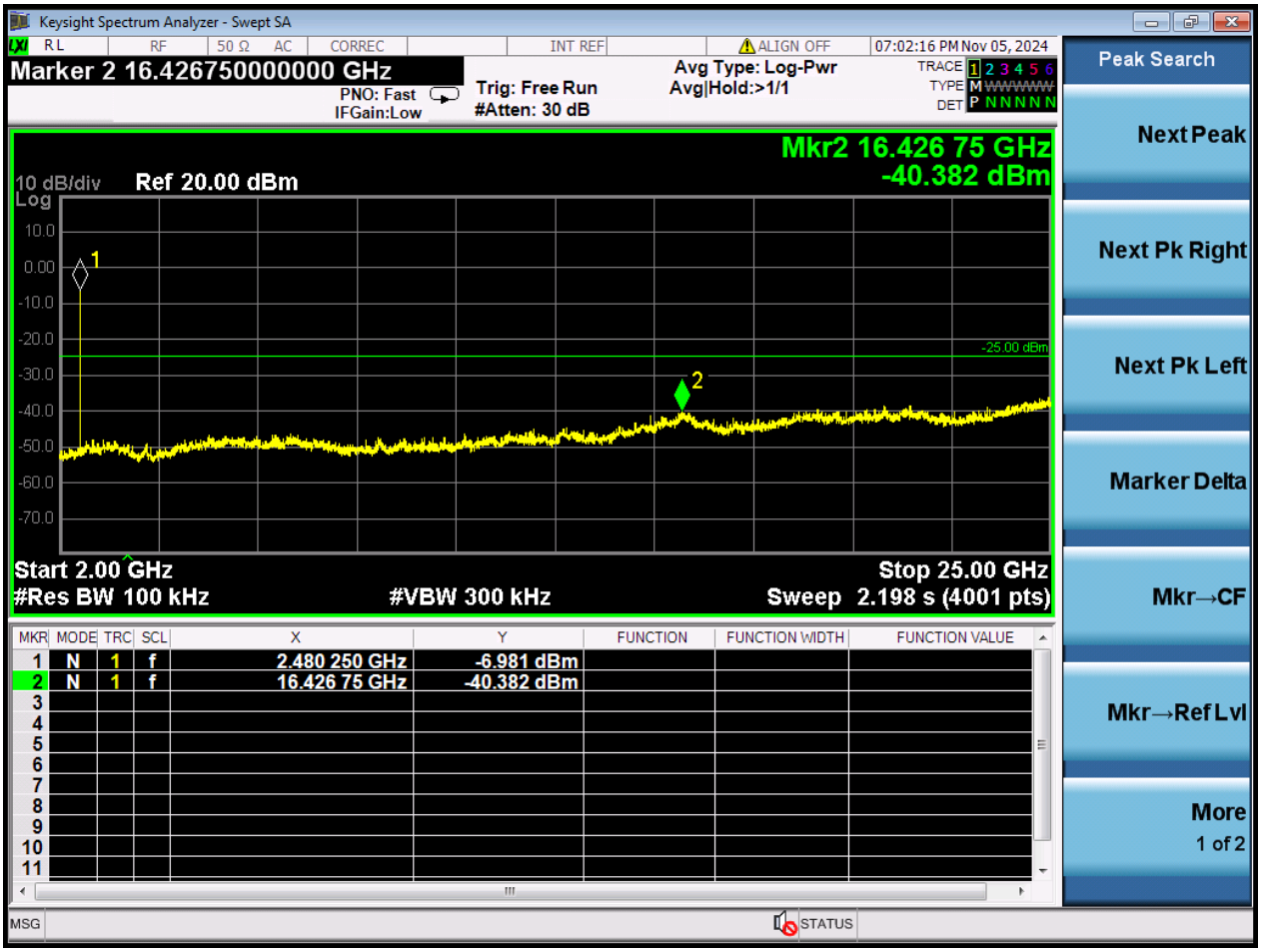

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
06:59:40 PM Nov 05, 2024
Marker 2 16.633750000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr2 16.633 75 GHz
-39.322 dBm
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-22.03 dBm
Start 2.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.198 s (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.440 255 GHz -4.470 dBm
2 N 1 f 16.633 75 GHz -39.322 dBm
3
4
5
6
7
8
9
10
11
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
STATUS

1.3. A.3-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 1515 | -51.73 |
| 16426.75 | -40.382 |



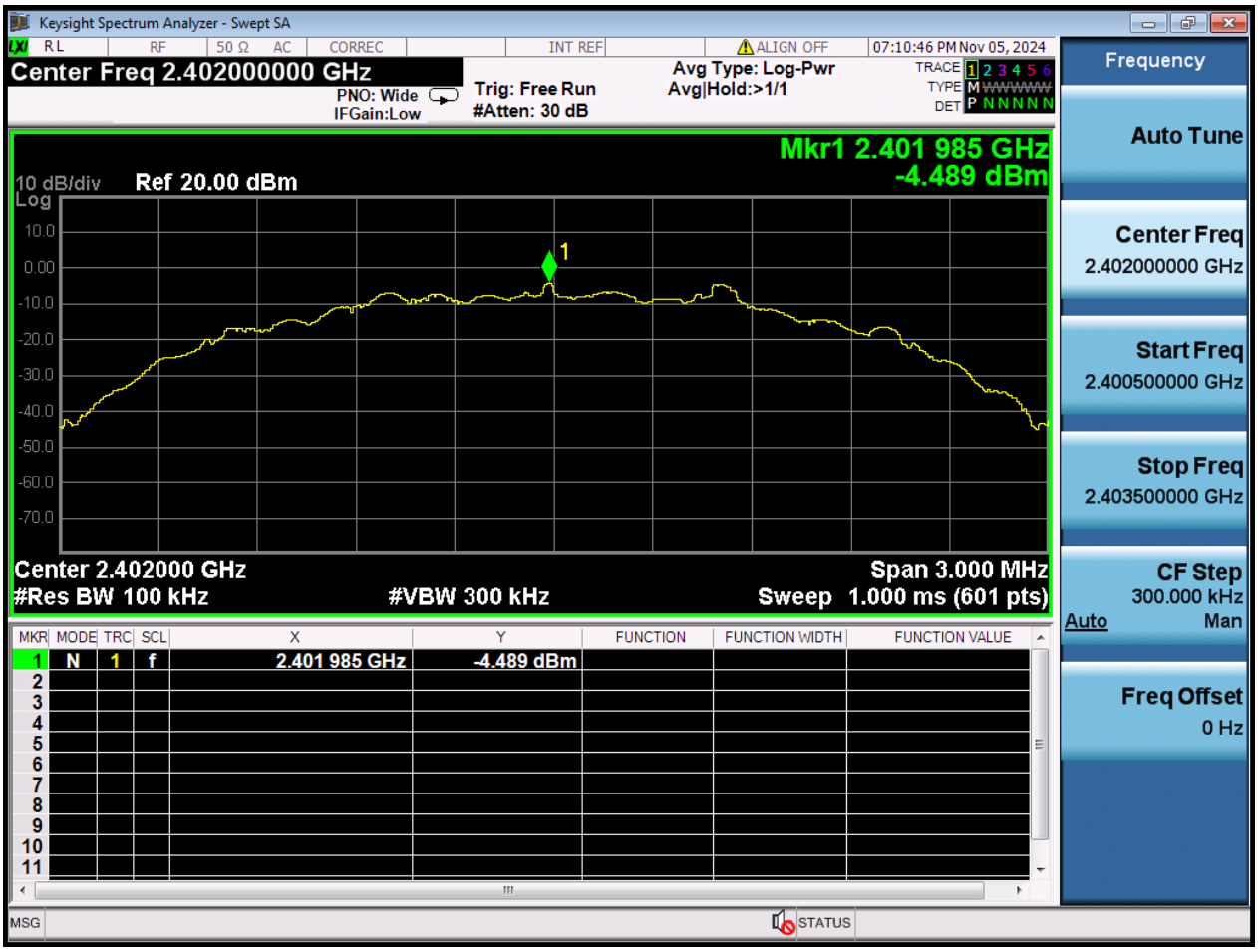

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
07:01:59 PM Nov 05, 2024
Display Line -25.00 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P NNNNNN
Mkr2 1.515 0 GHz
-51.730 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-25.00 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 283.9 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.480 250 GHz -5.227 dBm
2 N 1 f 1.515 0 GHz -51.730 dBm
Display
Annotation
Title
Graticule
On Off
Display Line
-25.00 dBm
On Off
System Display Settings
MSG
STATUS

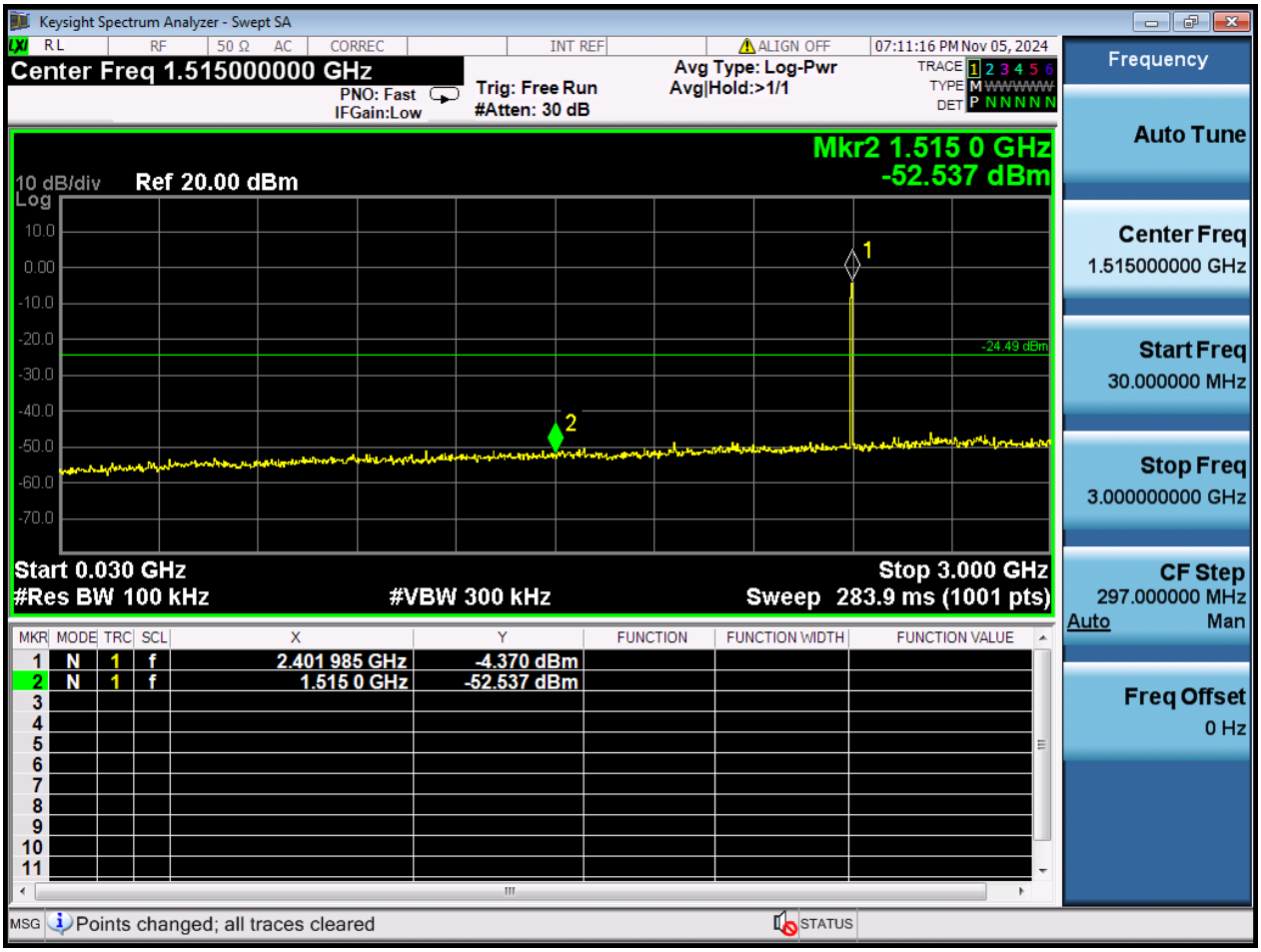

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
07:02:16 PM Nov 05, 2024
Marker 2 16.426750000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P NNNNN N
Mkr2 16.426 75 GHz
-40.382 dBm
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-25.00 dBm
Start 2.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.198 s (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.480 250 GHz -6.981 dBm
2 N 1 f 16.426 75 GHz -40.382 dBm
3
4
5
6
7
8
9
10
11
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
STATUS

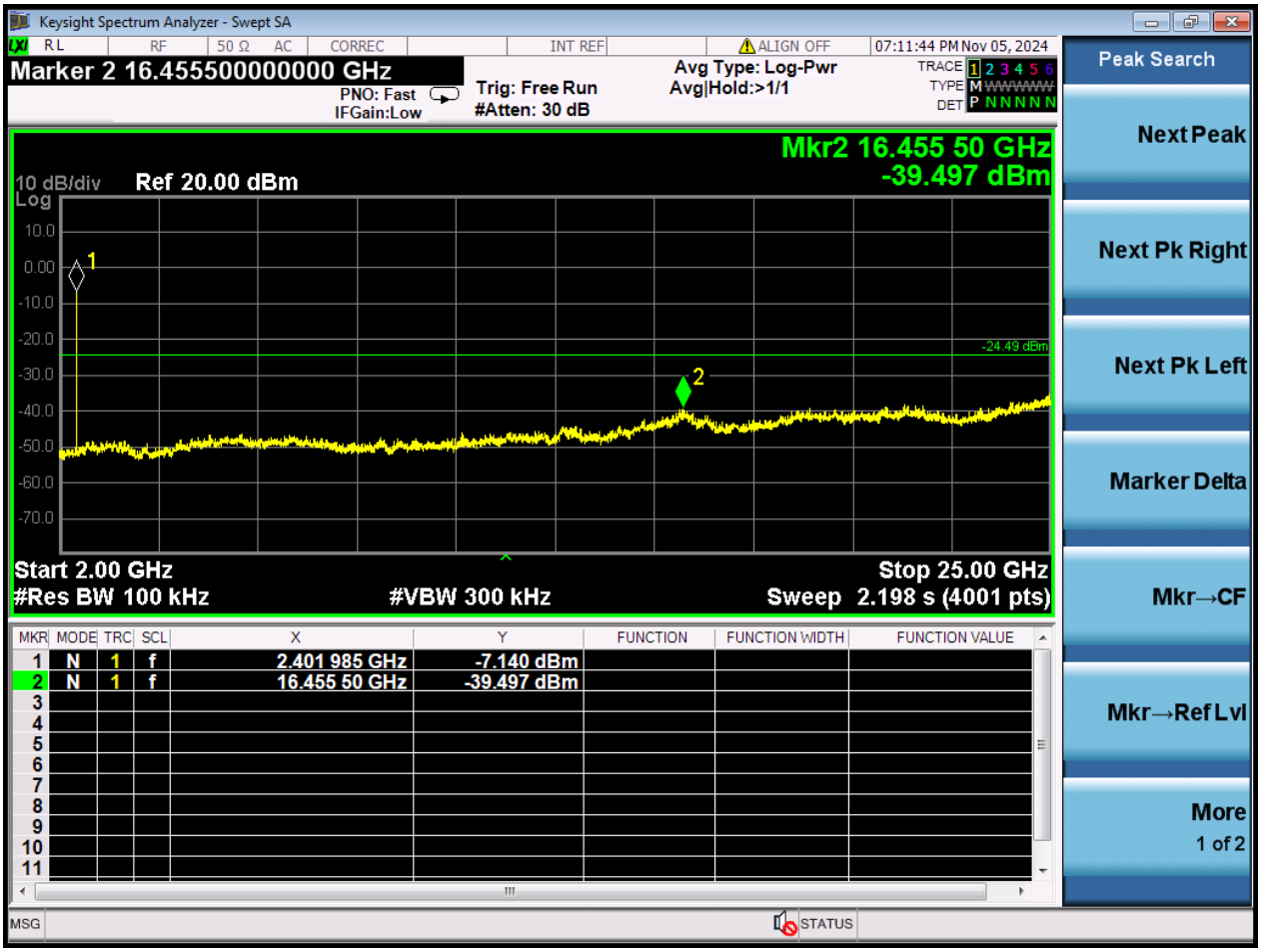
2. BLUETOOTH LOW ENERGY -2M

2.1. A.3-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 1515 | -52.537 |
| 16.4555 | -39.497 |

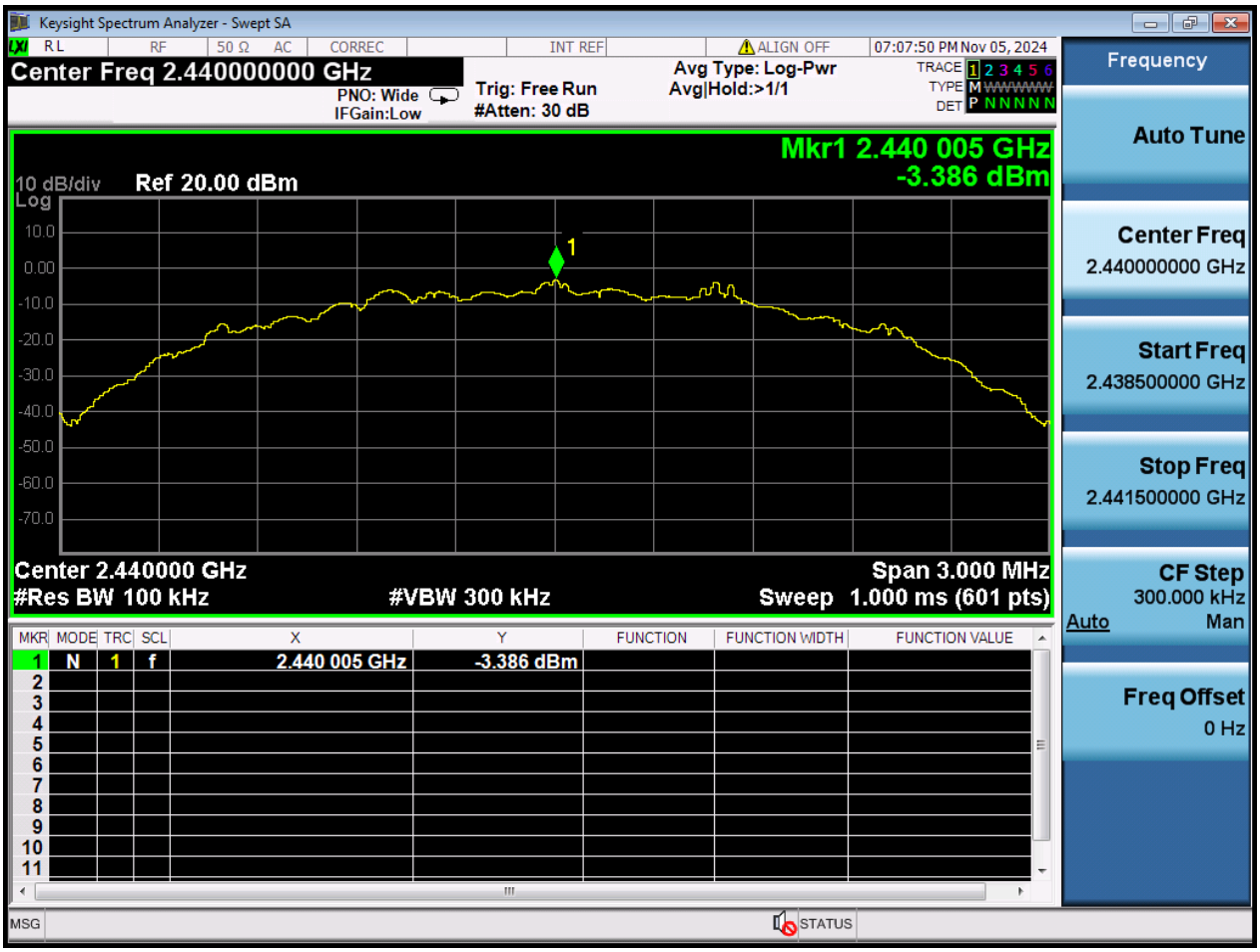


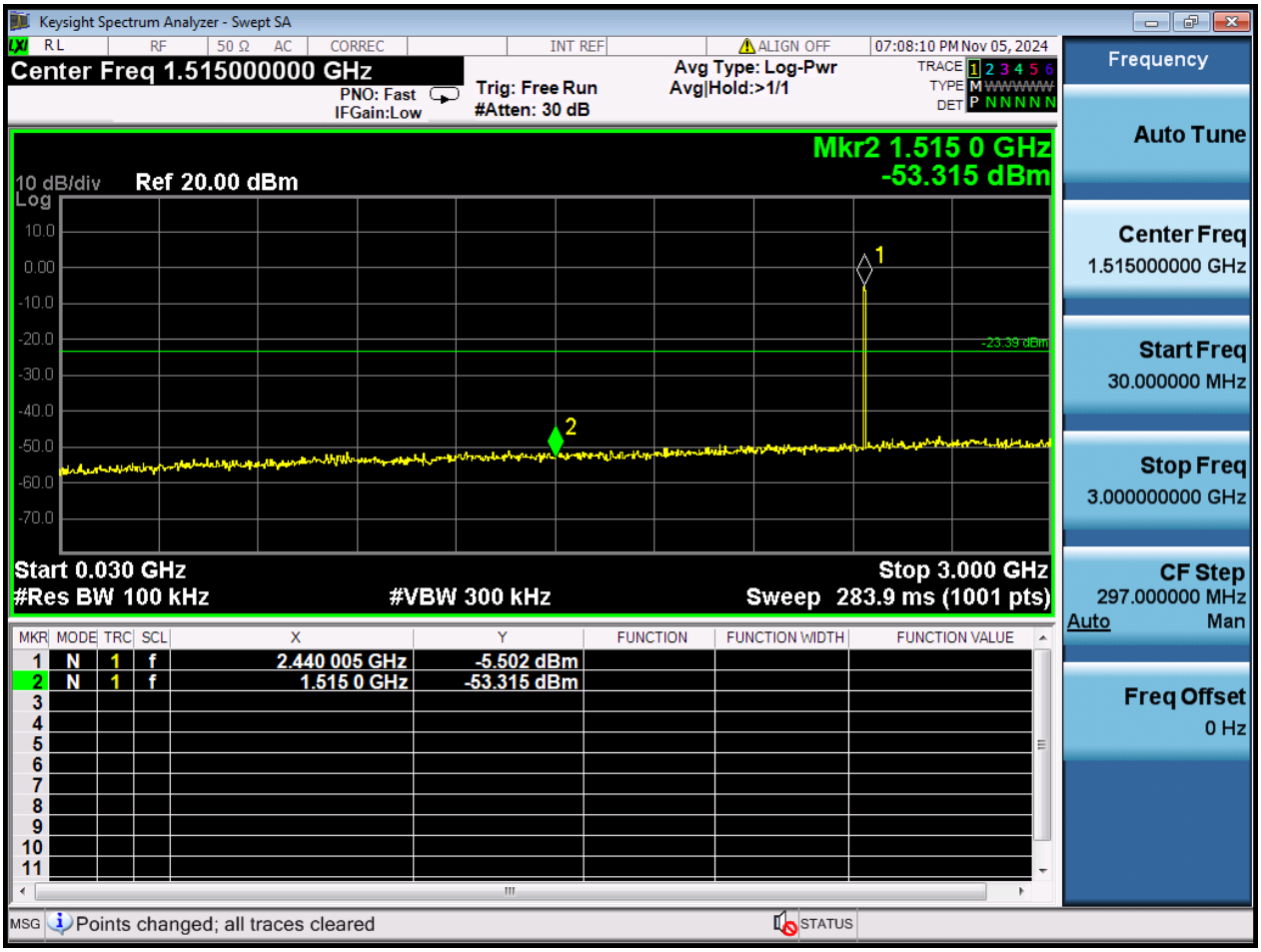

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
07:11:16 PM Nov 05, 2024
Center Freq 1.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P NNNNNN
Mkr2 1.515 0 GHz
-52.537 dBm
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-24.49 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 283.9 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.401 985 GHz -4.370 dBm
2 N 1 f 1.515 0 GHz -52.537 dBm
3
4
5
6
7
8
9
10
11
MSG
Points changed; all traces cleared
STATUS
Frequency
Auto Tune
Center Freq
1.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
3.000000000 GHz
CF Step
297.000000 MHz
Auto
Man
Freq Offset
0 Hz

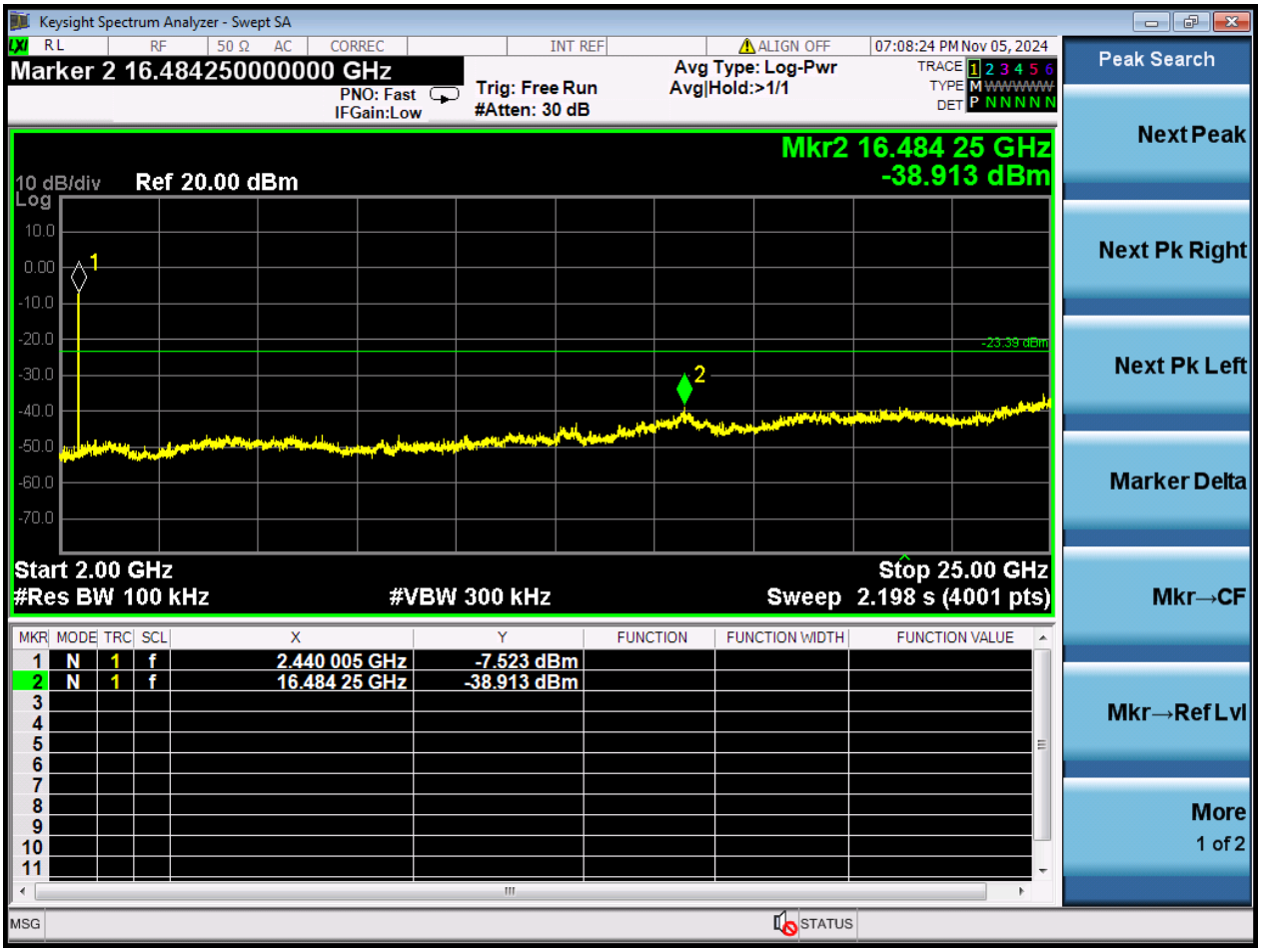

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
07:11:44 PM Nov 05, 2024
Marker 2 16.455500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr2 16.455 50 GHz
-39.497 dBm
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-24.49 dBm
Start 2.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.198 s (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.401 985 GHz -7.140 dBm
2 N 1 f 16.455 50 GHz -39.497 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
STATUS

2.2. A.3-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 1515 | -53.315 |
| 16484.25 | -38.913 |

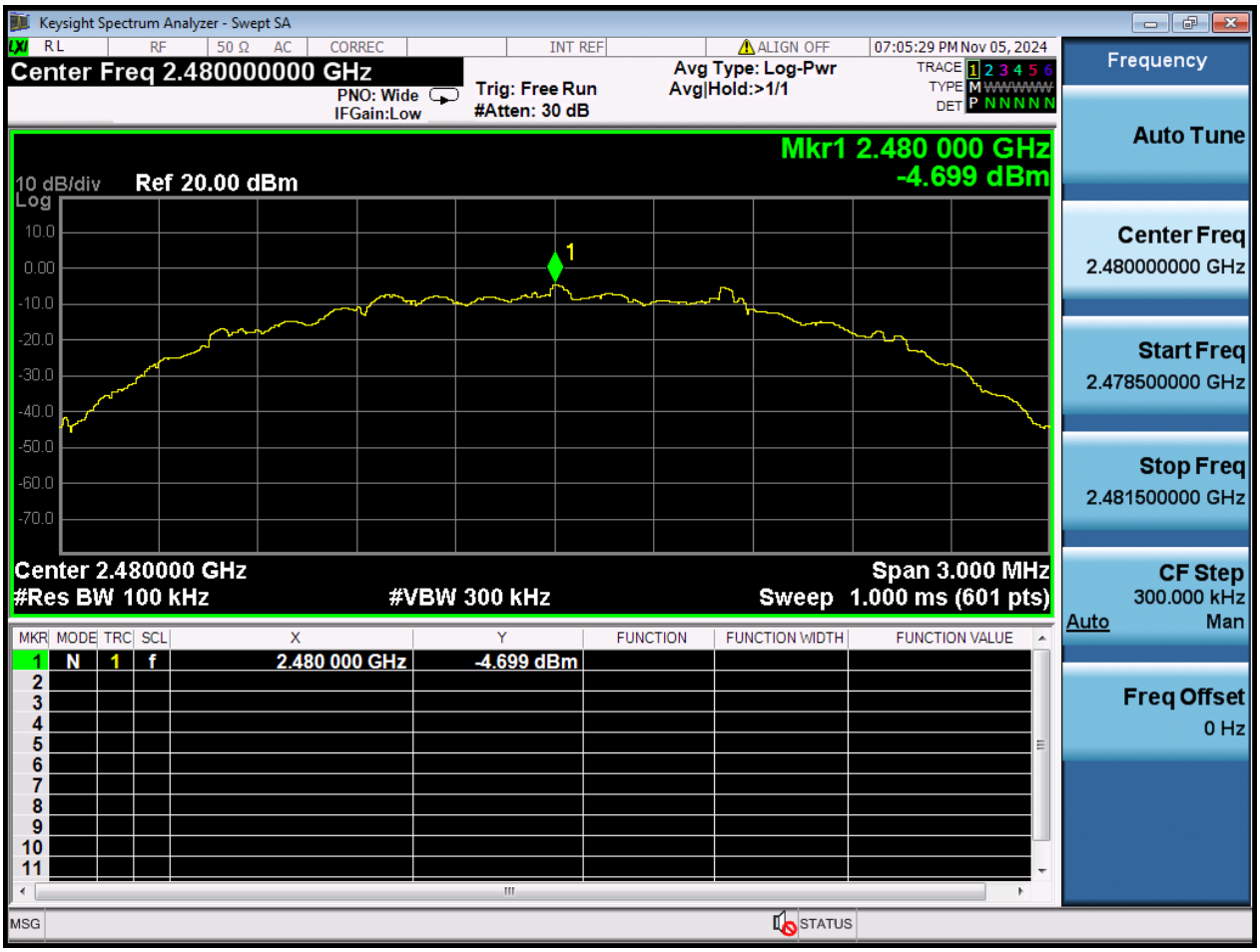


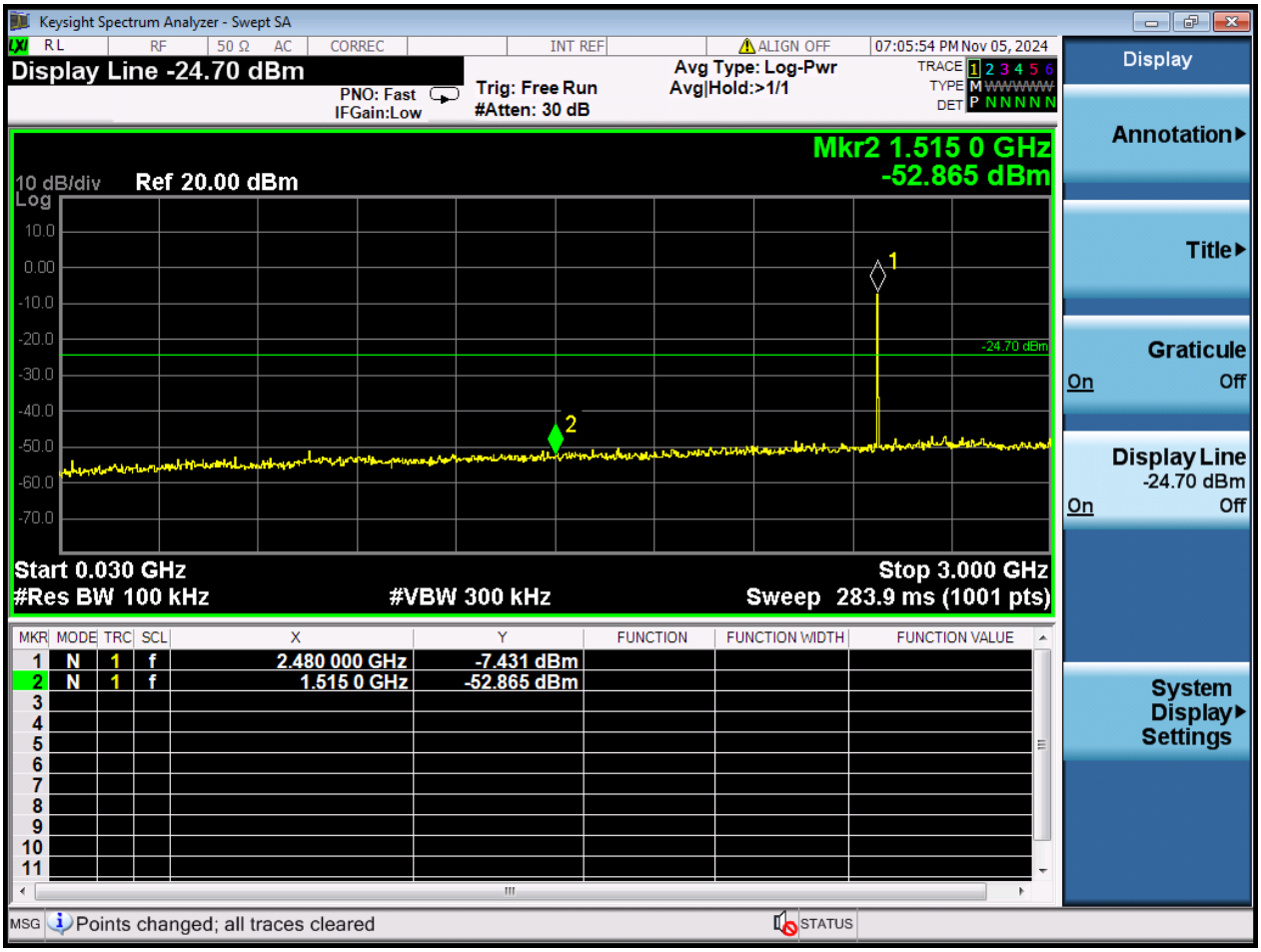

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
07:08:10 PM Nov 05, 2024
Center Freq 1.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P NNNNN N
Mkr2 1.515 0 GHz
-53.315 dBm
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-23.39 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 283.9 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.440 005 GHz -5.502 dBm
2 N 1 f 1.515 0 GHz -53.315 dBm
3
4
5
6
7
8
9
10
11
Frequency
Auto Tune
Center Freq
1.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
3.000000000 GHz
CF Step
297.000000 MHz
Auto
Man
Freq Offset
0 Hz
MSG
Points changed; all traces cleared
STATUS

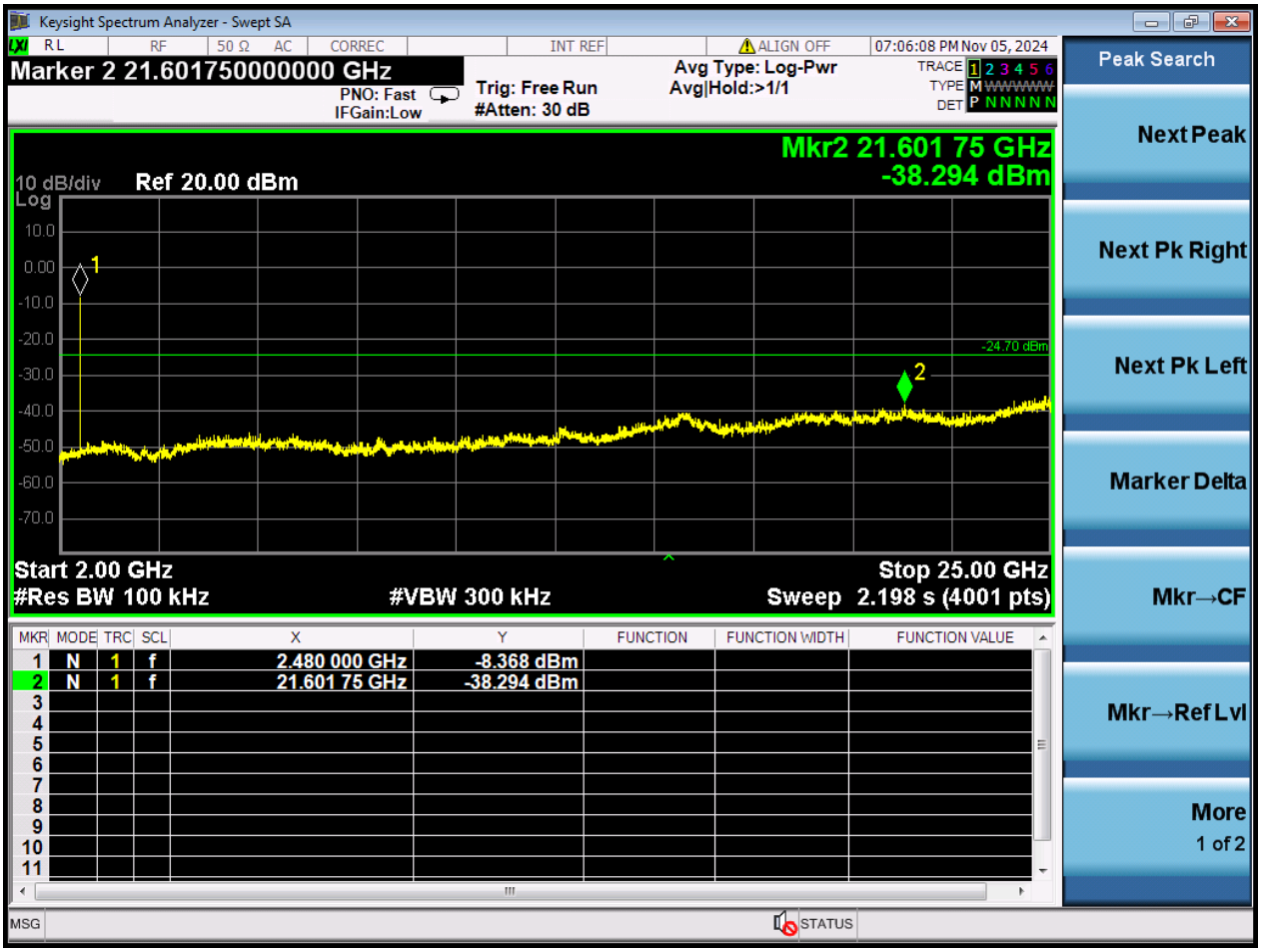

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
07:08:24 PM Nov 05, 2024
Marker 2 16.484250000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr2 16.484 25 GHz
-38.913 dBm
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-23.39 dBm
Start 2.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.198 s (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.440 005 GHz -7.523 dBm
2 N 1 f 16.484 25 GHz -38.913 dBm
3
4
5
6
7
8
9
10
11
MSG
STATUS
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

2.3. A.3-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 1515 | -52.865 |
| 21.60175 | -38.294 |




Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
07:05:54 PM Nov 05, 2024
Display Line -24.70 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr2 1.515 0 GHz
-52.865 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-24.70 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 283.9 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.480 000 GHz -7.431 dBm
2 N 1 f 1.515 0 GHz -52.865 dBm
3
4
5
6
7
8
9
10
11
Display
Annotation
Title
Graticule
On Off
Display Line
-24.70 dBm
On Off
System Display Settings
MSG
Points changed; all traces cleared
STATUS

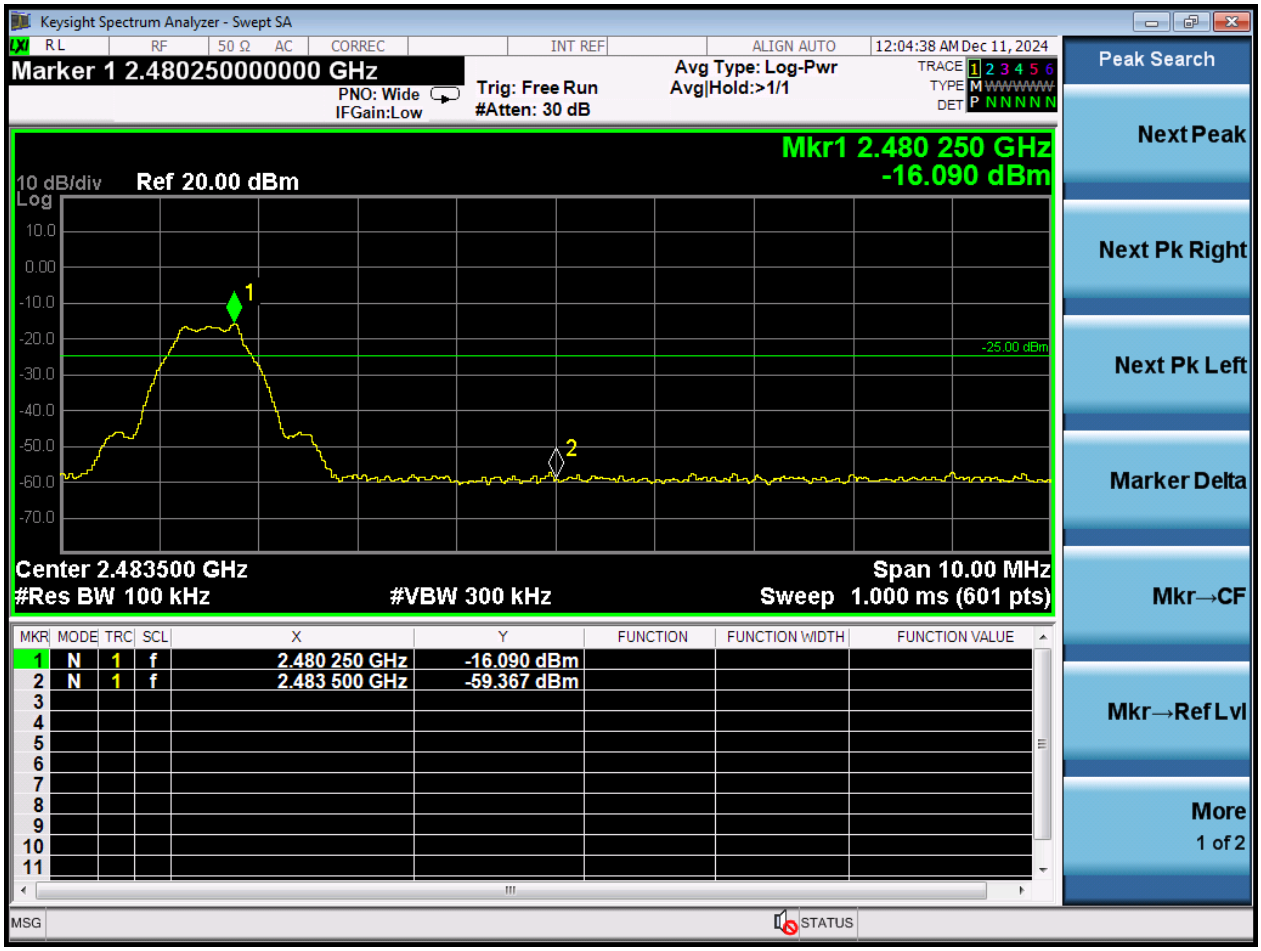

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
07:06:08 PM Nov 05, 2024
Marker 2 21.601750000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P NNNNNN
Mkr2 21.601 75 GHz
-38.294 dBm
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-24.70 dBm
Start 2.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.198 s (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.480 000 GHz -8.368 dBm
2 N 1 f 21.601 75 GHz -38.294 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
STATUS

ANNEX A. BANDEDGE(H)--CSE

1. BLUETOOTH LOW ENERGY

1.1. A.6-BANDEDGE(H)--CSE(NTNV)

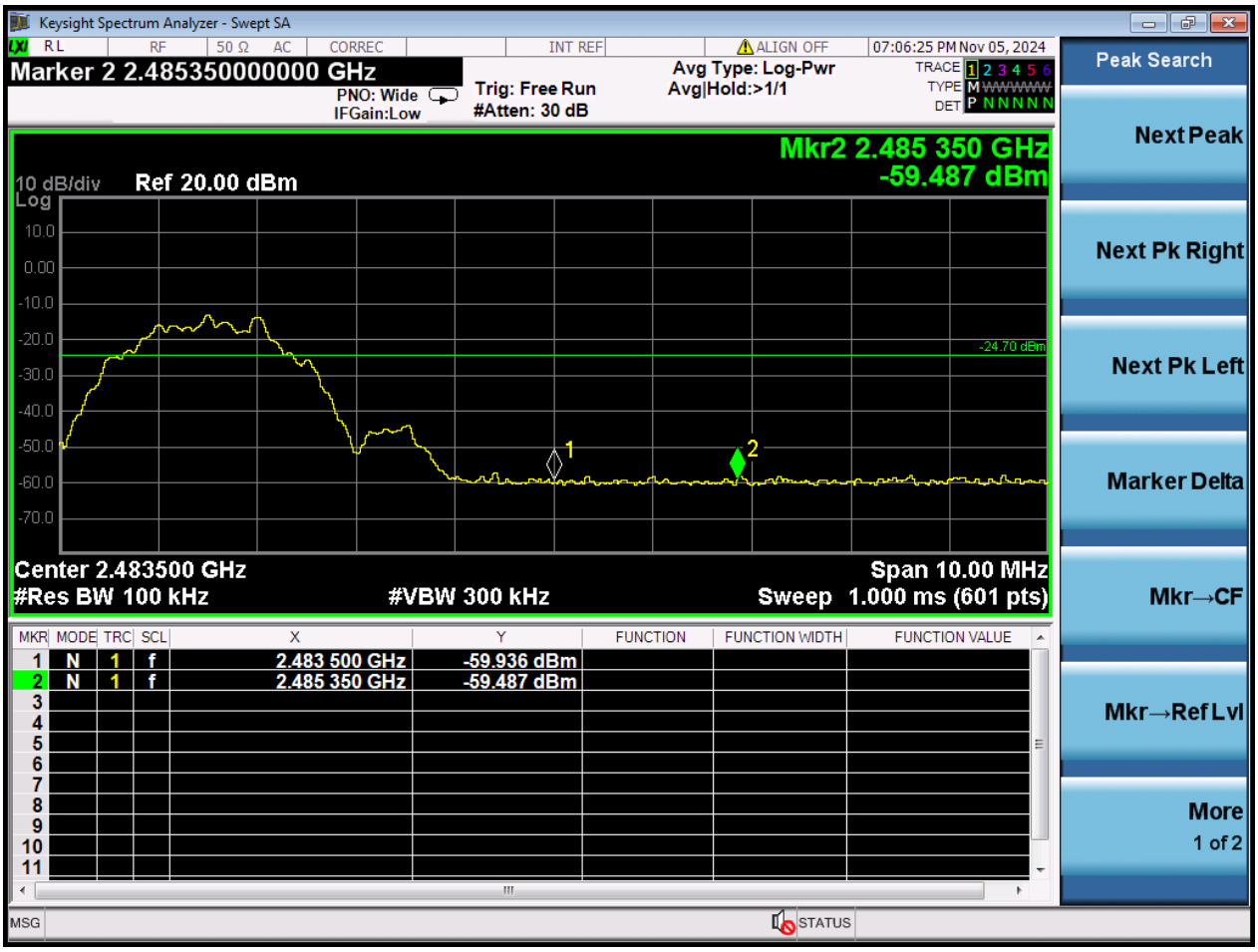
| Frequency(MHz) | Level(dBm) |
|---|---|



2. BLUETOOTH LOW ENERGY -2M

2.1. A.6-BANDEDGE(H)--CSE(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|

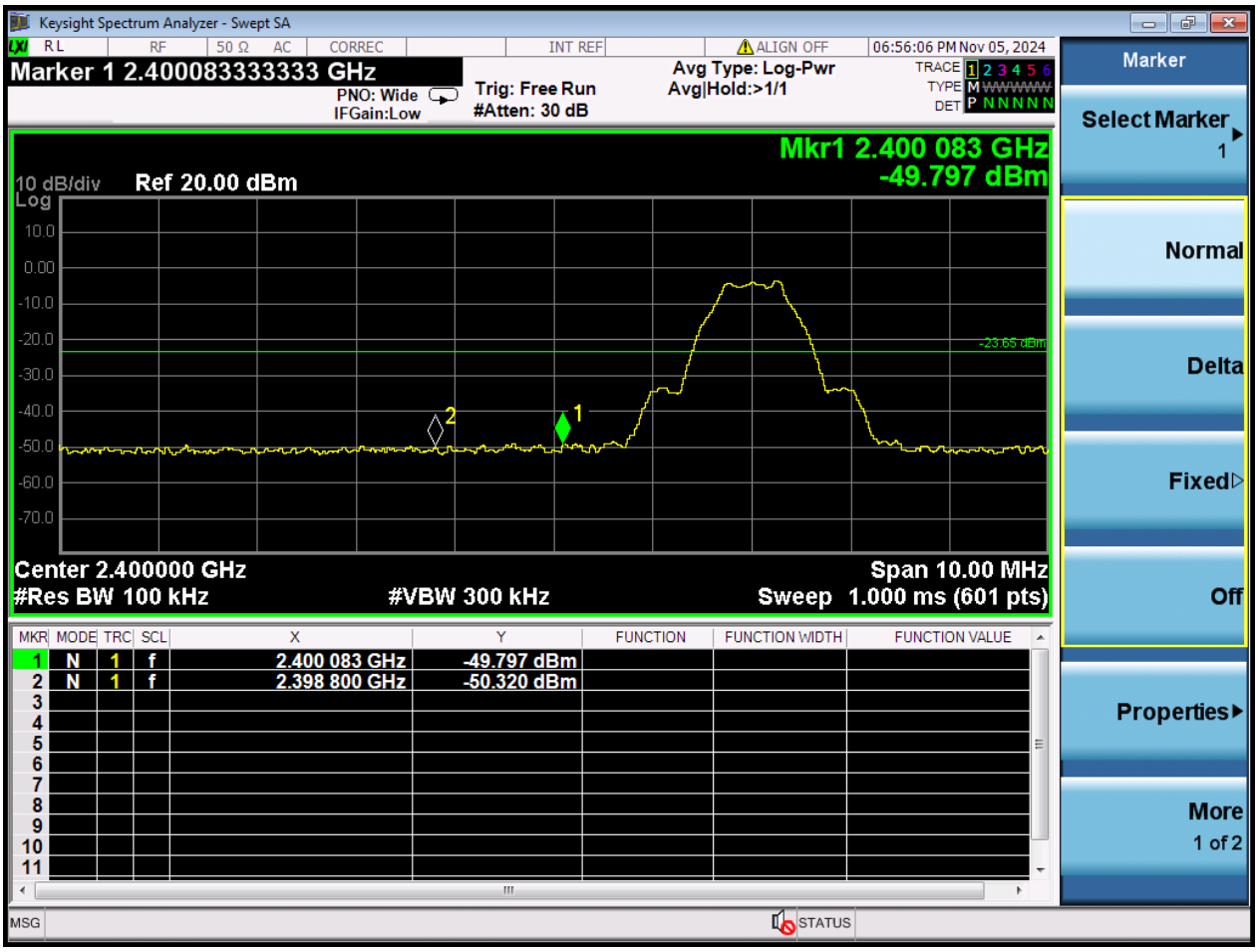


ANNEX A. BANDEDGE(L)--CSE

1. BLUETOOTH LOW ENERGY

1.1. A.6-BANDEDGE(L)--CSE(NTNV)

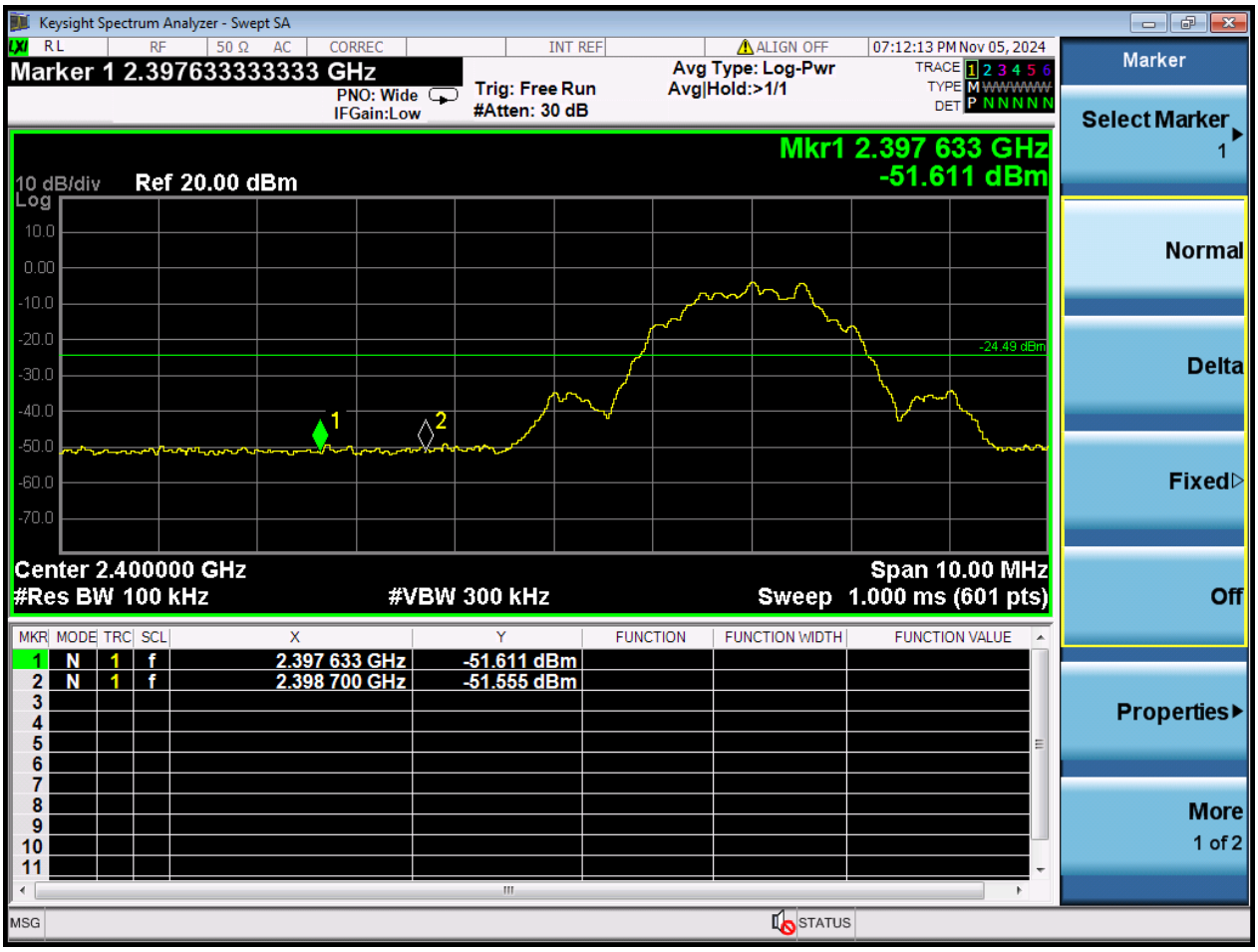
| Frequency(MHz) | Level(dBm) |
|---|---|



2. BLUETOOTH LOW ENERGY -2M

2.1. A.6-BANDEDGE(L)--CSE(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|



ANNEX A. POWER SPECTRAL DENSITY (PSD)

1. BLUETOOTH LOW ENERGY

1.1. A.7-POWER SPECTRAL DENSITY (PSD)(NTNV)

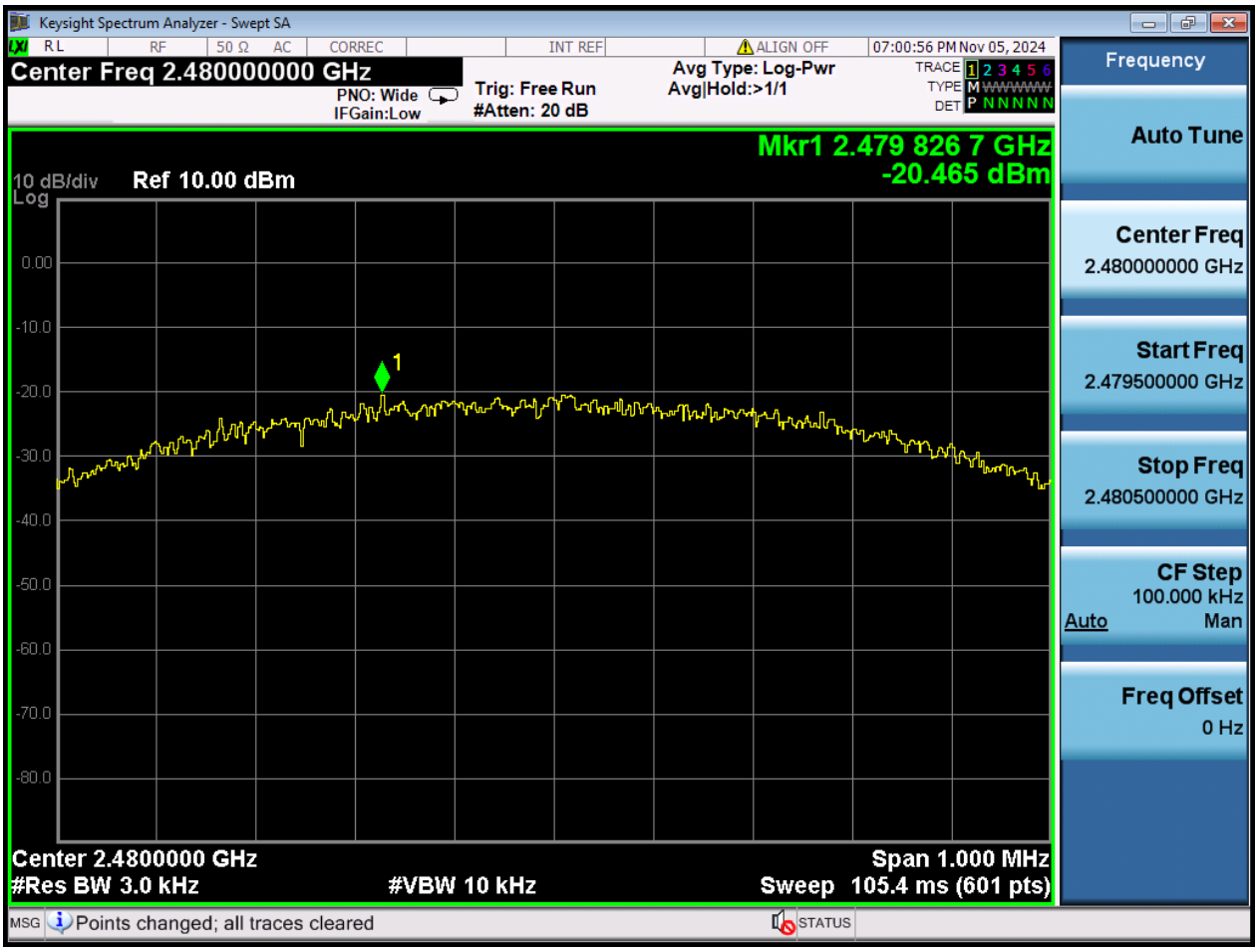
| Frequency(MHz) | Level(dBm/3kHz) | Limit(dBm/3kHz) | Verdict |
|---|---|---|---|
| 2402.0183 | -19.811 | 8 | Pass |

1.2. A.7-POWER SPECTRAL DENSITY (PSD)(NTNV)

| Frequency(MHz) | Level(dBm/3kHz) | Limit(dBm/3kHz) | Verdict |
|---|---|---|---|
| 2440.02 | -19.147 | 8 | Pass |

1.3. A.7-POWER SPECTRAL DENSITY (PSD)(NTNV)

| Frequency(MHz) | Level(dBm/3kHz) | Limit(dBm/3kHz) | Verdict |
|---|---|---|---|
| 2479.826667 | -20.465 | 8 | Pass |



ANNEX A. POWER SPECTRAL DENSITY (PSD)-2M

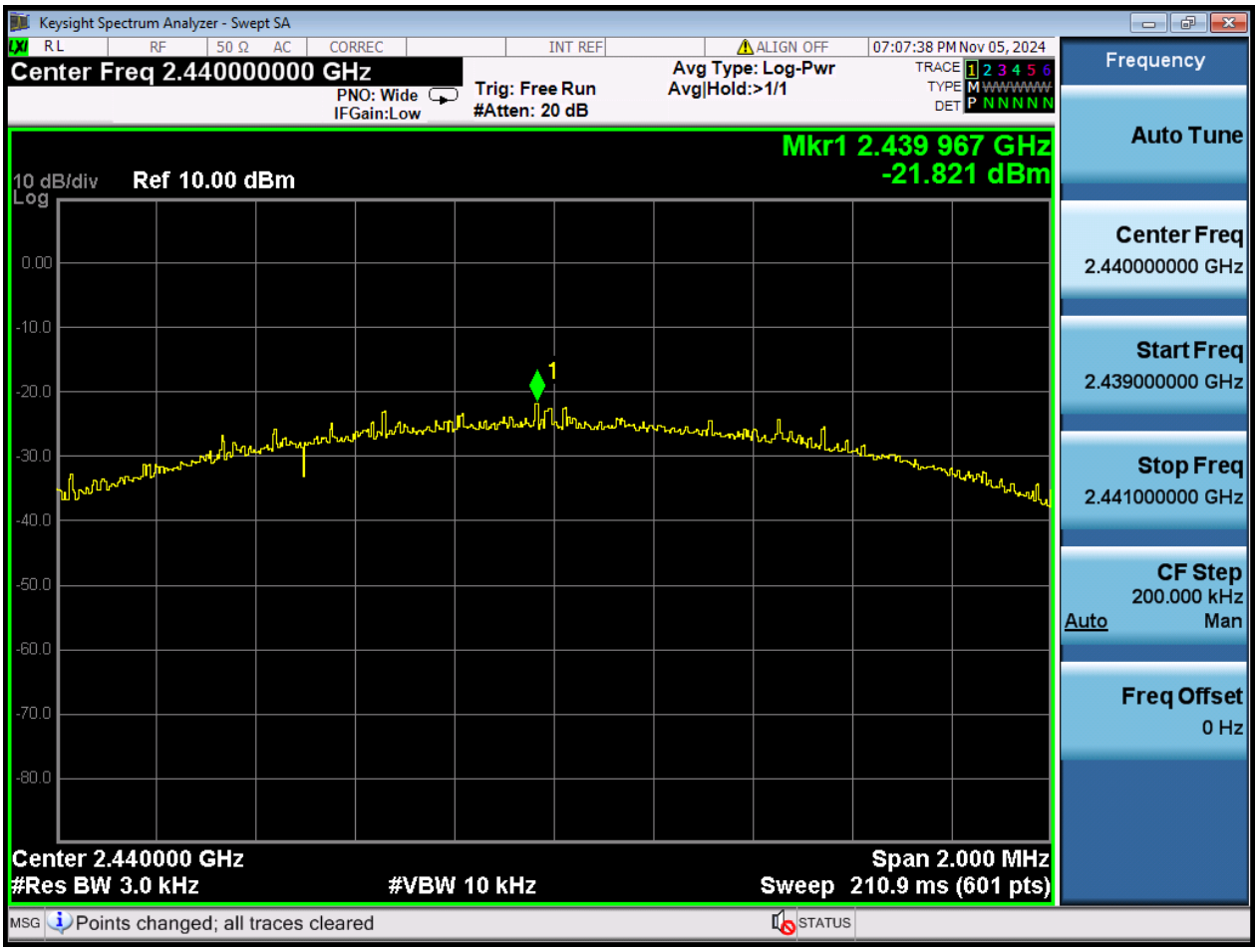
1. BLUETOOTH LOW ENERGY

1.1. A.7.1-POWER SPECTRAL DENSITY (PSD)-2M(NTNV)

| Frequency(MHz) | Level(dBm/3kHz) | Limit(dBm/3kHz) | Verdict |
|---|---|---|---|
| 2401.963333 | -22.215 | 8 | Pass |

1.2. A.7.1-POWER SPECTRAL DENSITY (PSD)-2M(NTNV)

| Frequency(MHz) | Level(dBm/3kHz) | Limit(dBm/3kHz) | Verdict |
|---|---|---|---|
| 2439.966667 | -21.821 | 8 | Pass |



1.3. A.7.1-POWER SPECTRAL DENSITY (PSD)-2M(NTNV)

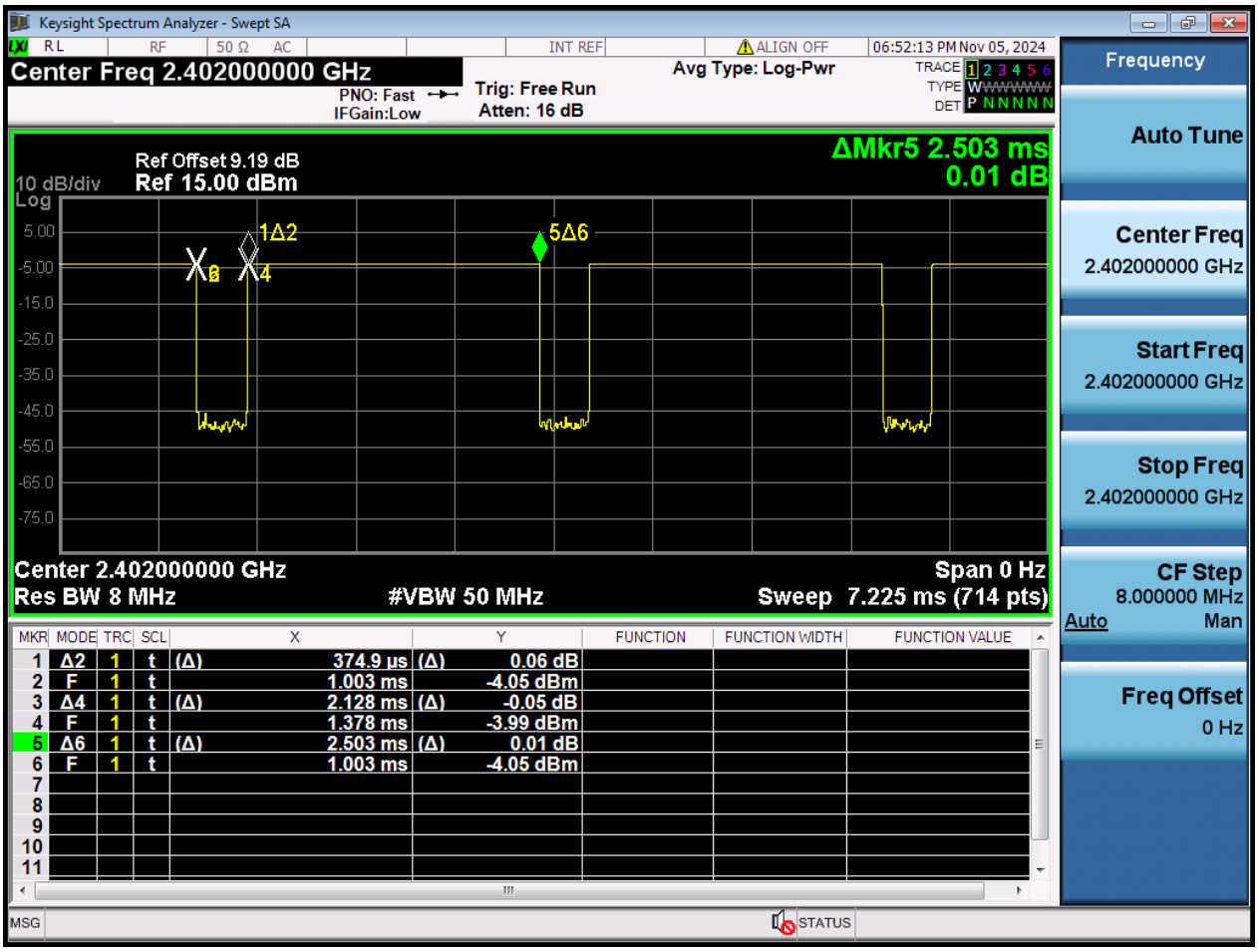
| Frequency(MHz) | Level(dBm/3kHz) | Limit(dBm/3kHz) | Verdict |
|---|---|---|---|
| 2479.963333 | -22.616 | 8 | Pass |

# ANNEX A. DUTY CYCLE

## 1. BLUETOOTH LOW ENERGY

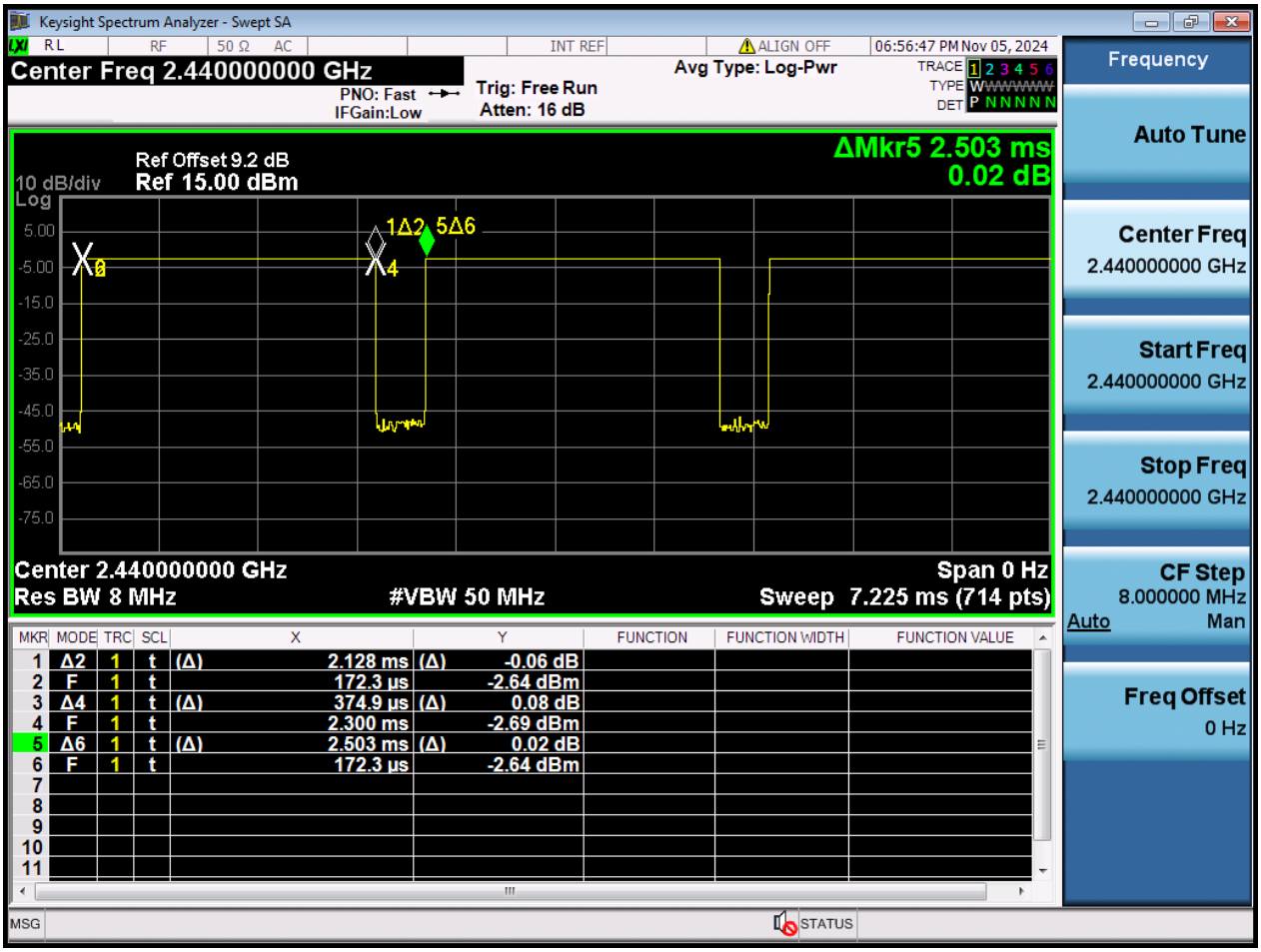
### 1.1. DUTY CYCLE(NTNV)

| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2402 | 8 | Peak | 0.002128 | 0.000375 | 0.002503 | 0.8502 | 0.1 | Pass |



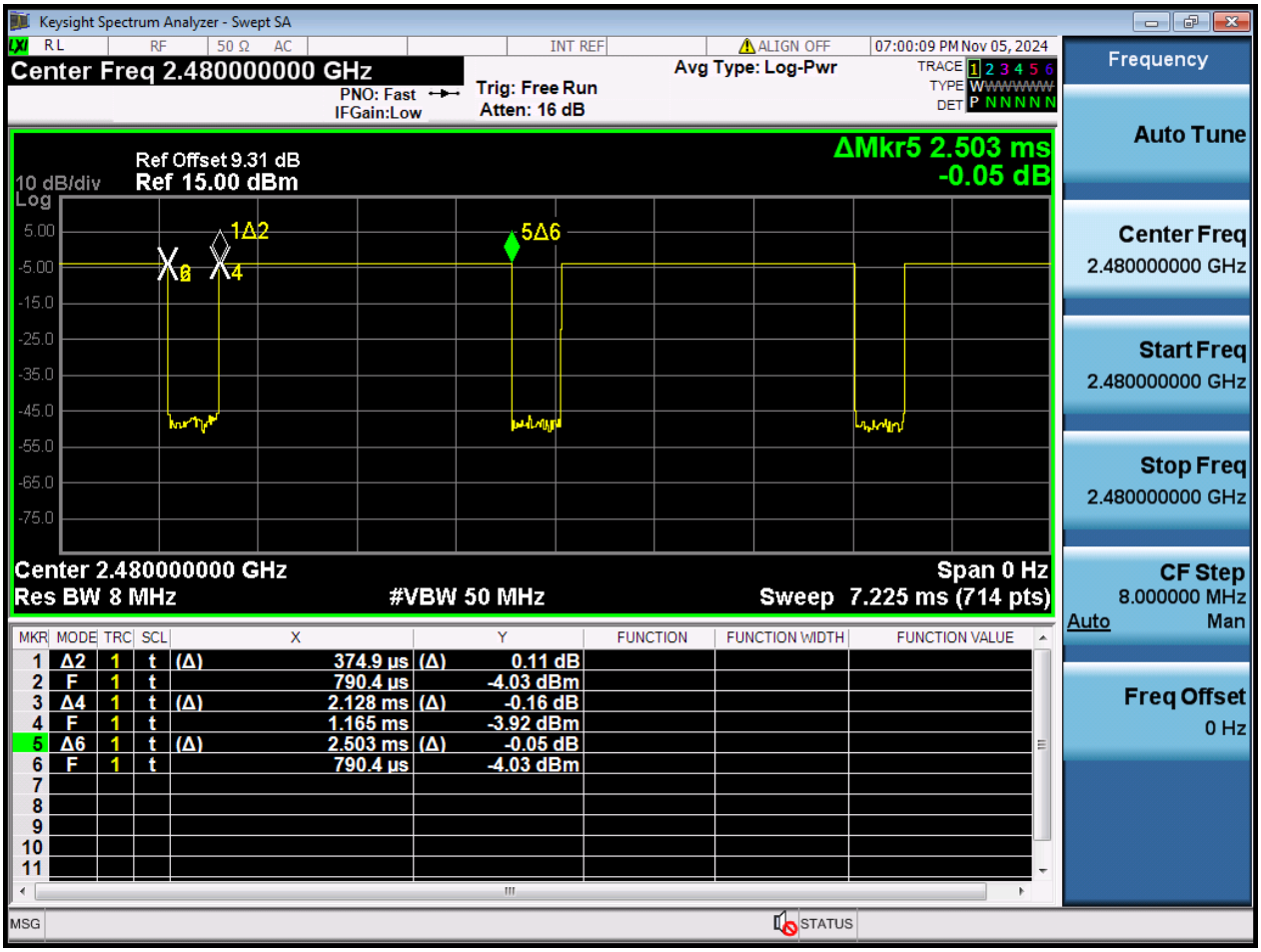
1.2. DUTY CYCLE(NTNV)

| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2440 | 8 | Peak | 0.002128 | 0.000375 | 0.002503 | 0.8502 | 0.1 | Pass |



1.3. DUTY CYCLE(NTNV)

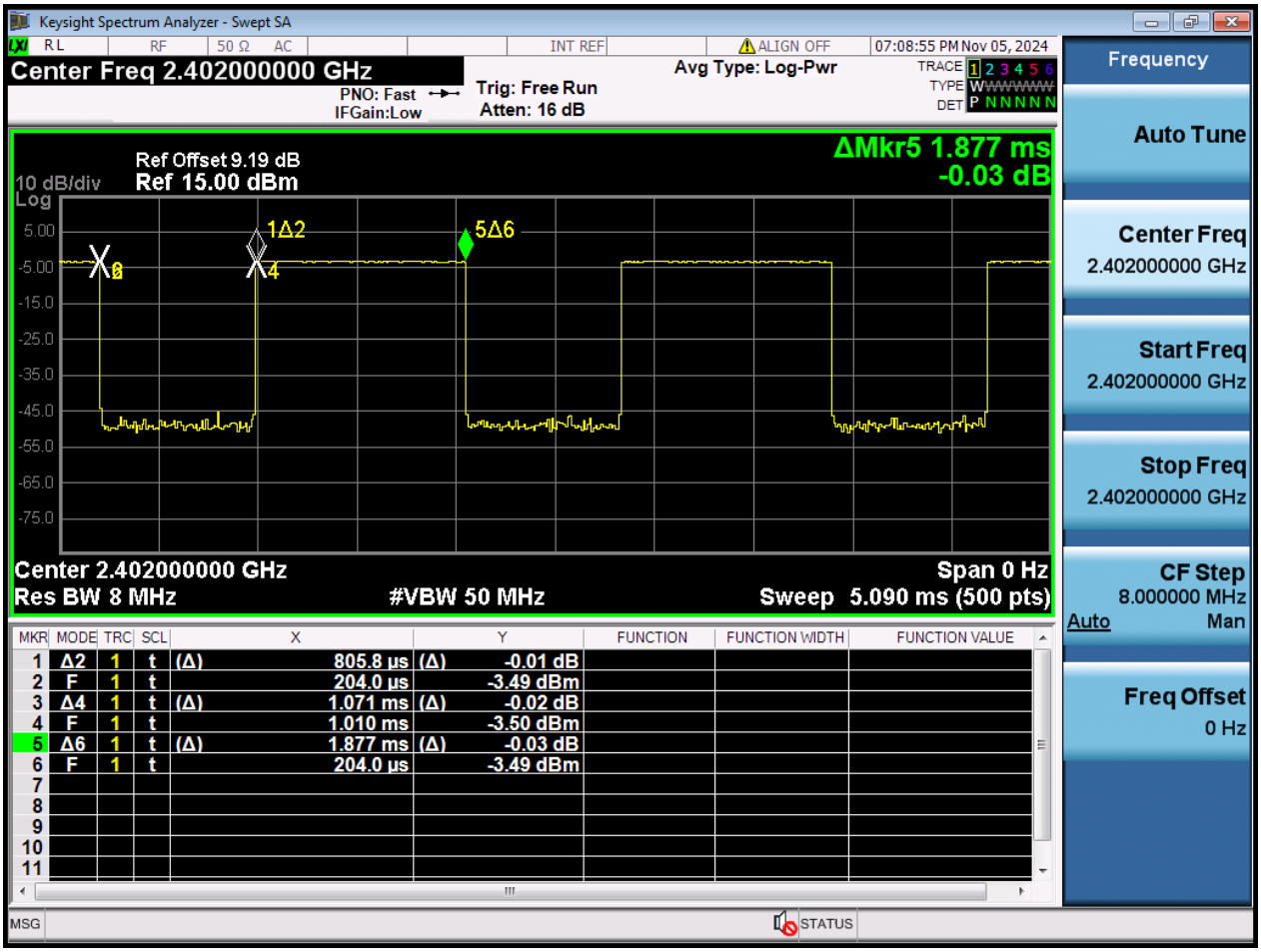
| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2480 | 8 | Peak | 0.002128 | 0.000375 | 0.002503 | 0.8502 | 0.1 | Pass |



2. BLUETOOTH LOW ENERGY -2M

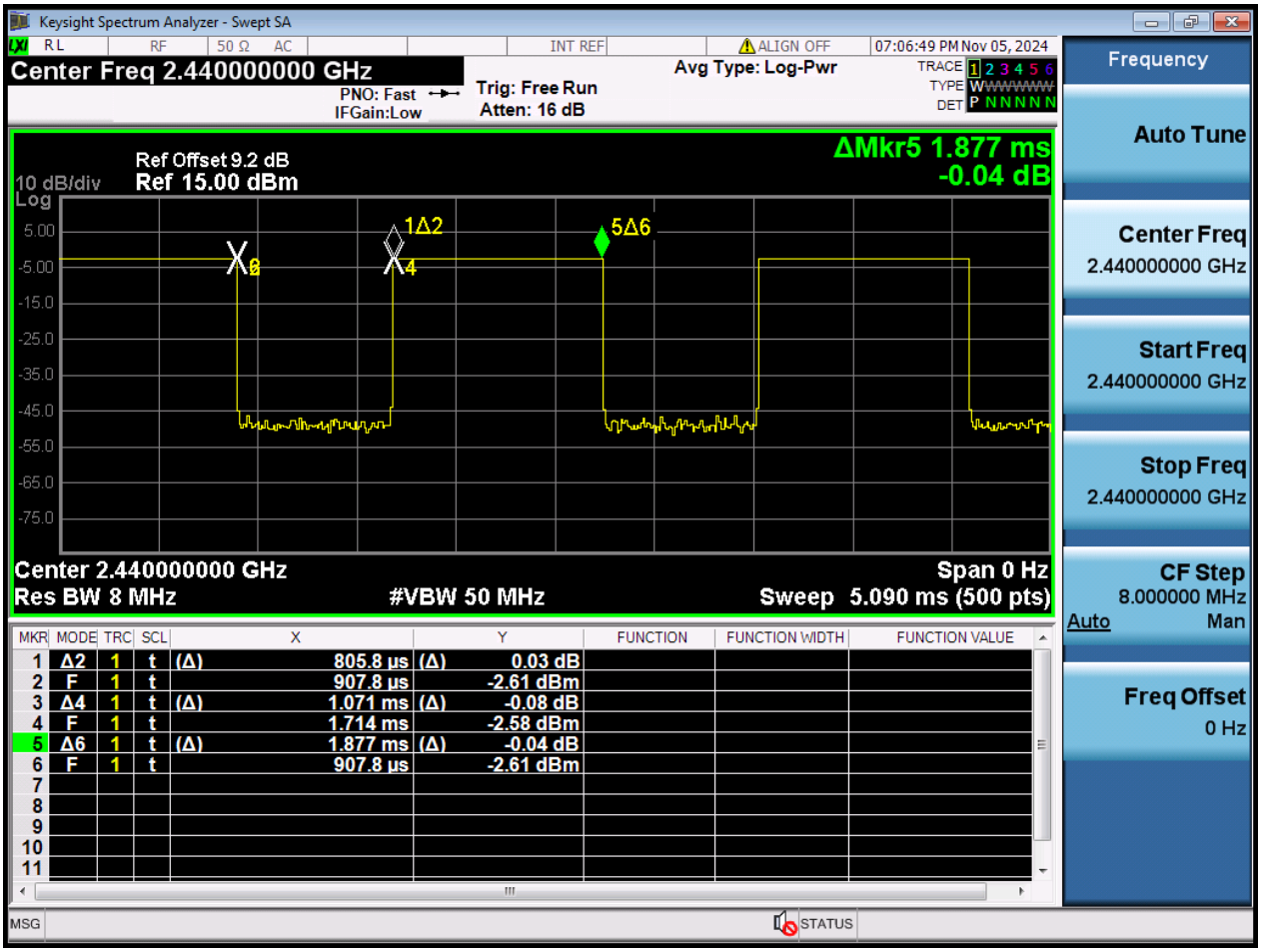
2.1. DUTY CYCLE(NTNV)

| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2402 | 8 | Peak | 0.001071 | 0.000806 | 0.001877 | 0.5707 | 0.1 | Pass |



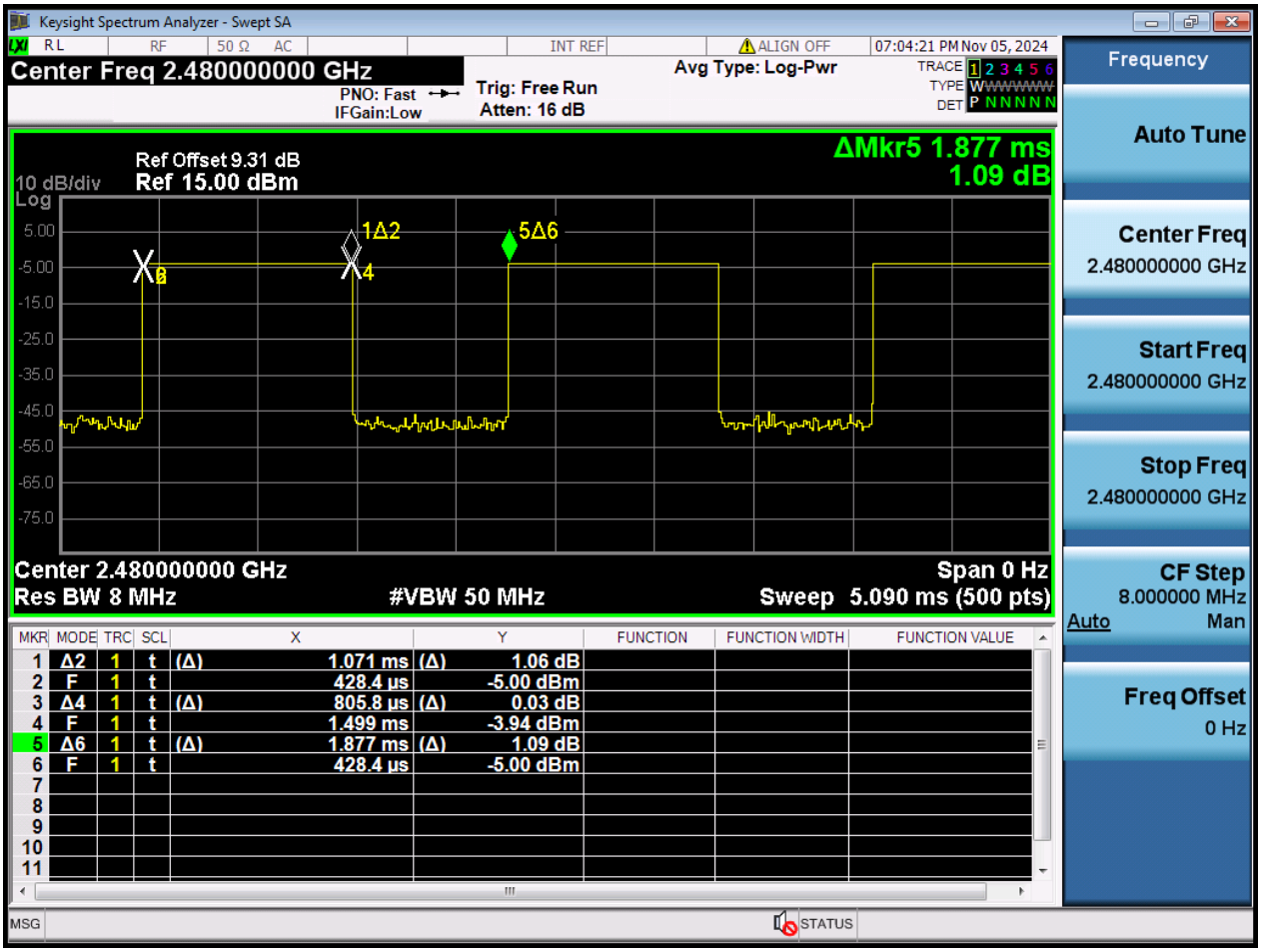
2.2. DUTY CYCLE(NTNV)

| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2440 | 8 | Peak | 0.001071 | 0.000806 | 0.001877 | 0.5707 | 0.1 | Pass |



2.3. DUTY CYCLE(NTNV)

| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2480 | 8 | Peak | 0.001071 | 0.000806 | 0.001877 | 0.5707 | 0.1 | Pass |



# APPENDIX II - MEASUREMENT PHOTOS

Note: Please see the attached RF_Test Setup photos for FCC ID.

※※※※※END OF THE REPORT※※※※※