# 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: | LGT24J175RF01 |
| Sample Received Date: | Oct. 30, 2024 |
| Date of Test: | Oct. 30, 2024 ~ Jan. 07, 2025 |
| Date of Issue: | Jan. 07, 2025 |

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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 |

Prepared by:

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SHENZHEN LGT TEST SERVICE CO., LTD. 领冠检测

**Table of Contents** **Page**


**1. SUMMARY OF TEST RESULTS** **7**
1.1 TEST FACTORY 8
1.2 MEASUREMENT UNCERTAINTY 8
**2. GENERAL INFORMATION** **9**
2.1 GENERAL DESCRIPTION OF THE EUT 9
2.2 DESCRIPTION OF THE TEST MODES 11
2.3 FREQUENCY HOPPING SYSTEM REQUIREMENTS 11
2.4 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING 13
2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS 13
2.6 EQUIPMENTS LIST 14
**3. EMC EMISSION TEST** **15**
3.1 CONDUCTED EMISSION MEASUREMENT 15
3.2 RADIATED EMISSION MEASUREMENT 19
**4. CONDUCTED SPURIOUS & BAND EDGE EMISSION** **29**
4.1 LIMIT 29
4.2 TEST PROCEDURE 29
4.3 TEST SETUP 30
4.4 EUT OPERATION CONDITIONS 30
4.5 TEST RESULTS 30
**5. NUMBER OF HOPPING CHANNEL** **31**
5.1 LIMIT 31
5.2 TEST PROCEDURE 31
5.3 TEST SETUP 31
5.4 EUT OPERATION CONDITIONS 31
5.5 TEST RESULTS 31
**6. AVERAGE TIME OF OCCUPANCY** **32**
6.1 LIMIT 32
6.2 TEST PROCEDURE 32
6.3 TEST SETUP 32
6.4 EUT OPERATION CONDITIONS 32
6.5 TEST RESULTS 32
**7. HOPPING CHANNEL SEPARATION MEASUREMEN** **33**
7.1 LIMIT 33
7.2 TEST PROCEDURE 33

7.3 TEST SETUP 33
7.4 EUT OPERATION CONDITIONS 33
7.5 TEST RESULTS 33
**8. BANDWIDTH TEST 34**
8.1 LIMIT 34
8.2 TEST PROCEDURE 34
8.3 TEST SETUP 34
8.4 EUT OPERATION CONDITIONS 34
8.5 TEST RESULTS 34
**9. OUTPUT POWER TEST 35**
9.1 LIMIT 35
9.2 TEST PROCEDURE 35
9.3 TEST SETUP 35
9.4 EUT OPERATION CONDITIONS 35
9.5 TEST RESULTS 35
**10. ANTENNA REQUIREMENT 36**
10.1 STANDARD REQUIREMENT 36
10.2 EUT ANTENNA 36
**APPENDIX I - TEST RESULTS 37**
**ANNEX A. PEAK OUTPUT POWER 37**
1. BLUETOOTH FOR CLASSIC- 1-DH5 37
2. BLUETOOTH FOR CLASSIC- 2-DH5 38
3. BLUETOOTH FOR CLASSIC- 3-DH5 39
**ANNEX A. OBW AND 20DB BANDWIDTH 40**
1. BLUETOOTH FOR CLASSIC-1-DH5 40
2. BLUETOOTH FOR CLASSIC-2-DH5 43
3. BLUETOOTH FOR CLASSIC-3-DH5 46
**ANNEX A. HOPPING FREQUENCY SEPARATION 49**
1. BLUETOOTH FOR CLASSIC_HOPPING-1-DH5 49
2. BLUETOOTH FOR CLASSIC_HOPPING-2-DH5 50
3. BLUETOOTH FOR CLASSIC_HOPPING-3-DH5 51
**ANNEX A. AVERAGE TIME OF OCCUPANCYC-HOPPING 52**
1. BLUETOOTH FOR CLASSIC-1-DH5 52
2. BLUETOOTH FOR CLASSIC_HOPPING-2-DH5 55
3. BLUETOOTH FOR CLASSIC_HOPPING-3-DH5 58

**ANNEX A. CONDUCTED SPURIOUS EMISSIONS** **61**
1. BLUETOOTH FOR CLASSIC-1-DH5 61
2. BLUETOOTH FOR CLASSIC-2-DH5 69
3. BLUETOOTH FOR CLASSIC-3-DH5 77
**ANNEX A. BANDEDGE(H)--CSE** **86**
1. BLUETOOTH FOR CLASSIC 86
**ANNEX A. BANDEDGE(HOPPING)--CSE** **89**
1. BLUETOOTH FOR CLASSIC_HOPPING 89
**ANNEX A. BANDEDGE(L)--CSE** **95**
1. BLUETOOTH FOR CLASSIC 95
**ANNEX A. NUMBER OF HOPPING FREQUENCY** **98**
1. BLUETOOTH FOR CLASSIC_HOPPING 99
**ANNEX A. DUTY CYCLE** **105**
1. BLUETOOTH FOR CLASSIC-1-DH5 105
2. BLUETOOTH FOR CLASSIC-2-DH5 108
3. BLUETOOTH FOR CLASSIC-3-DH5 111
**APPENDIX II - MEASUREMENT PHOTOS** **114**

## Revision History

| Rev. | Issue Date | Revisions |
|---|---|---|
| 00 | Jan. 07, 2025 | Initial Issue |
| | | |

## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:
KDB 558074 D01 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)(1) | Hopping Channel Separation | PASS | -- |
| 15.247(a)(1)&(b)(1) | Output Power | PASS | -- |
| 15.209 | Radiated Spurious Emission | PASS | -- |
| 15.247(d) | Conducted Spurious & Band Edge Emission | PASS | (3) |
| 15.247(a)(1)(iii) | Number of Hopping Frequency | PASS | -- |
| 15.247(a)(1)(iii) | Dwell Time | PASS | -- |
| 15.247(a)(1) | Bandwidth | PASS | -- |
| 15.205 | Restricted bands of operation | 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 |
| Channel List: | Please refer to the Note 3. |
| Bluetooth: | Frequency:2402 – 2480 MHz<br>Modulation: GFSK(1Mbps), π/4-DQPSK(2Mbps), 8DPSK(3Mbps) |
| Antenna Type: | FPC |
| Antenna Gain: | 2.36dBi |
| 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) |
| 00 | 2402 | 27 | 2429 | 54 | 2456 |
| 01 | 2403 | 28 | 2430 | 55 | 2457 |
| 02 | 2404 | 29 | 2431 | 56 | 2458 |
| 03 | 2405 | 30 | 2432 | 57 | 2459 |
| 04 | 2406 | 31 | 2433 | 58 | 2460 |
| 05 | 2407 | 32 | 2434 | 59 | 2461 |
| 06 | 2408 | 33 | 2435 | 60 | 2462 |
| 07 | 2409 | 34 | 2436 | 61 | 2463 |
| 08 | 2410 | 35 | 2437 | 62 | 2464 |
| 09 | 2411 | 36 | 2438 | 63 | 2465 |
| 10 | 2412 | 37 | 2439 | 64 | 2466 |
| 11 | 2413 | 38 | 2440 | 65 | 2467 |
| 12 | 2414 | 39 | 2441 | 66 | 2468 |
| 13 | 2415 | 40 | 2442 | 67 | 2469 |
| 14 | 2416 | 41 | 2443 | 68 | 2470 |
| 15 | 2417 | 42 | 2444 | 69 | 2471 |
| 16 | 2418 | 43 | 2445 | 70 | 2472 |
| 17 | 2419 | 44 | 2446 | 71 | 2473 |
| 18 | 2420 | 45 | 2447 | 72 | 2474 |
| 19 | 2421 | 46 | 2448 | 73 | 2475 |
| 20 | 2422 | 47 | 2449 | 74 | 2476 |
| 21 | 2423 | 48 | 2450 | 75 | 2477 |
| 22 | 2424 | 49 | 2451 | 76 | 2478 |
| 23 | 2425 | 50 | 2452 | 77 | 2479 |
| 24 | 2426 | 51 | 2453 | 78 | 2480 |
| 25 | 2427 | 52 | 2454 | | |
| 26 | 2428 | 53 | 2455 | | |

## 2.2 DESCRIPTION OF THE TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Worst Mode | Description | Data Rate/Modulation |
|---|---|---|
| Mode 1 | TX CH00 | 1Mbps/GFSK |
| Mode 2 | TX CH39 | 1Mbps/GFSK |
| Mode 3 | TX CH78 | 1Mbps/GFSK |
| Mode 4 | TX CH00 | 2 Mbps/π/4-DQPSK |
| Mode 5 | TX CH39 | 2 Mbps/π/4-DQPSK |
| Mode 6 | TX CH78 | 2 Mbps/π/4-DQPSK |
| Mode 7 | TX CH00 | 3 Mbps/8DPSK |
| Mode 8 | TX CH39 | 3 Mbps/8DPSK |
| Mode 9 | TX CH78 | 3 Mbps/8DPSK |
| Mode 10 | Hopping | GFSK |
| Mode 11 | Hopping | π/4-DQPSK |
| Mode 12 | Hopping | 8DPSK |

Note:

(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.

(2) We tested for all available U.S. voltage and frequencies (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 radiated and RF conducted test.

For AC Conducted Emission

| Test Case | |
|---|---|
| AC Conducted Emission | Mode 13: Keeping BT TX |

## 2.3 FREQUENCY HOPPING SYSTEM REQUIREMENTS

(1) Standard and Limit

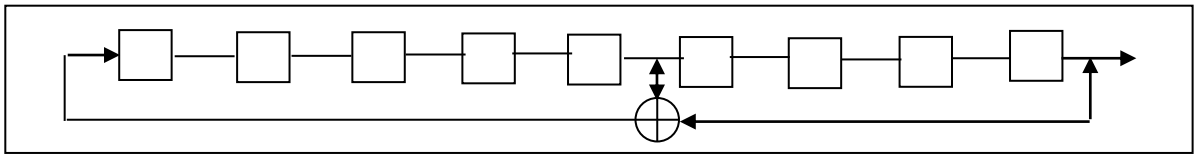
According to FCC Part 15.247(a)(1), The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hop sets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

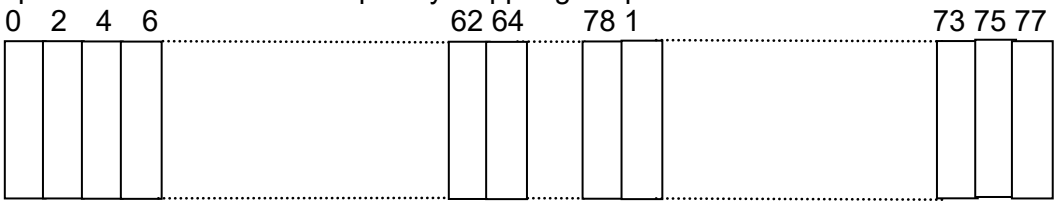
(2) The Pseudorandom sequence may be generated in a nin-stage shift register whose 5$^{th}$ and 9$^{th}$

stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive ones: i.e. the shift register is initialized with nine ones.
Numver of shift register stages:9
Length of pseudo-random sequence:$2^9$-1=511bits
Longest sequence of zeros: 8(non-inverted signal)



Liner Feedback Shift Register for Generator of the PRBS sequence

An example of Pseudorandom Frequency Hoppong Sequence as follow:




Each frequency used equally on th average by each transmitter.
The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies ini synchronization with the transmitted signals.

(3) Frequency Hopping System
This transmitter device is frequency hopping device and complies with FCC part 15.247 rule.

This device uses Bluetooth radio which operates in 2400-2483.5 MHz band. Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 bands (1 MHz each; centred from 2402 to 2480 MHz) in the range 2,400-2,483.5MHz. The transmitter switches hop frequencies 1,600 times per second to assure a high degree of data security. All Bluetooth devices participating in a given piconet are synchronized to the frequency-hopping channel for the piconet. The frequency hopping sequence is determined by the master's device address and the phase of the hopping sequence (the frequency to hop at a specific time) is determined by the master's internal clock. Therefore, all slaves in a piconet must know the master's device address and must synchronize their clocks with the master's clock.

Adaptive Frequency Hopping (AFH) was introduced in the Bluetooth specification to provide an effective way for a Bluetooth radio to counteract normal interference. AFH identifies "bad" channels, where either other wireless device are interfering with the Bluetooth signal or the Bluetooth signal is interfering with another device. The AFH-enabled Bluetooth device will then communicate with other devices within its piconet to share details of any identified bad channels. The devices will then switch to alternative available "good" channels, away from the areas of interference, thus having no impact on the bandwidth used.

This device was tested with a bluetooth system receiver to check that the device maintained hopping synchronization, and the device complied with these requirements FCC Part 15.247 rule.

## 2.4 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS.

| Test software Version | Test program: Bluetooth | |
|---|---|---|
| DRTU | Mode Or Modulation type | Power setting |
| | 1M | Default |
| | 2M | Default |
| | 3M | Default |

## 2.5 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”.

## 2.6 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 Emissionlimit (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.

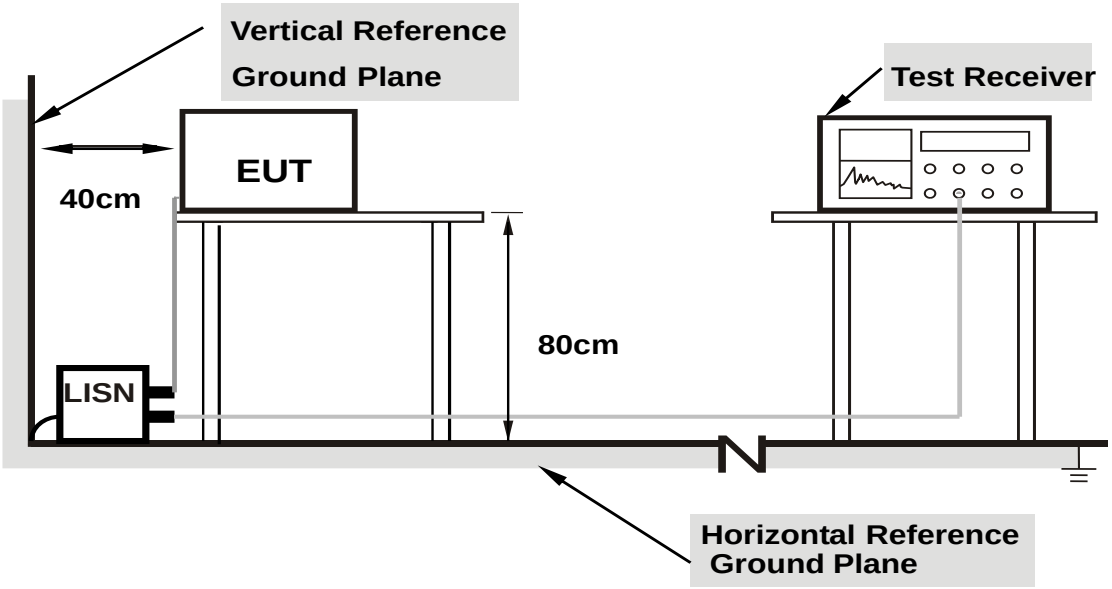
The following table is the setting of the receiver

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

3.1.2 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.

3.1.3 TEST SETUP




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

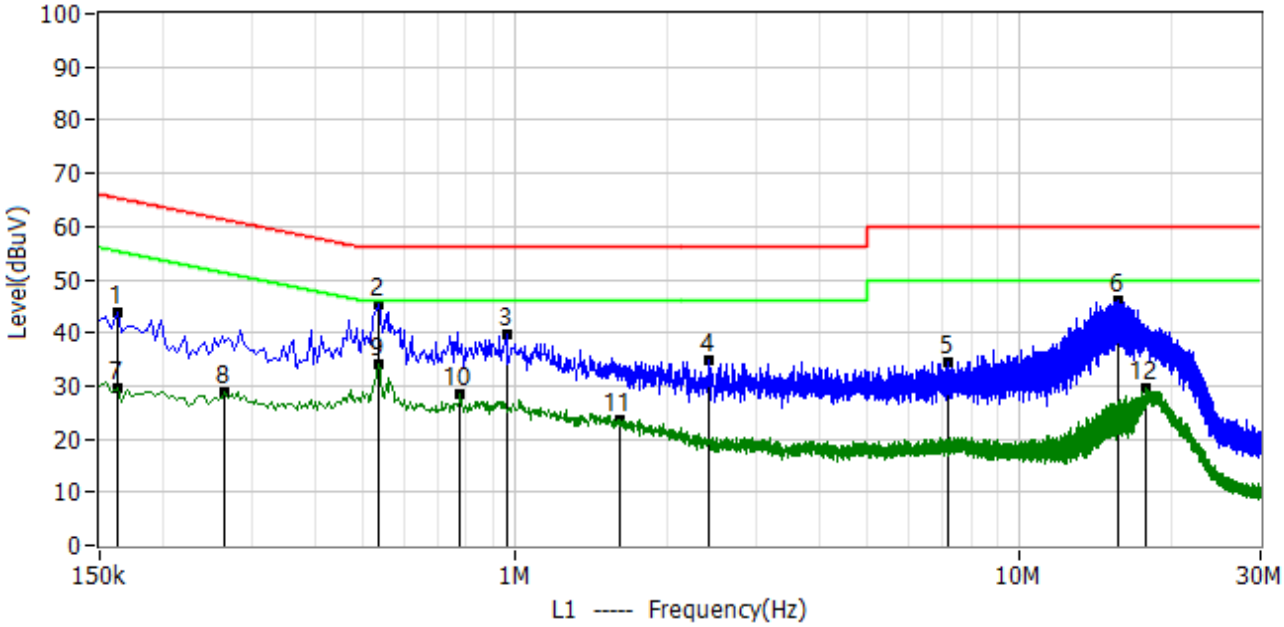
**2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.**

3.1.4 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.

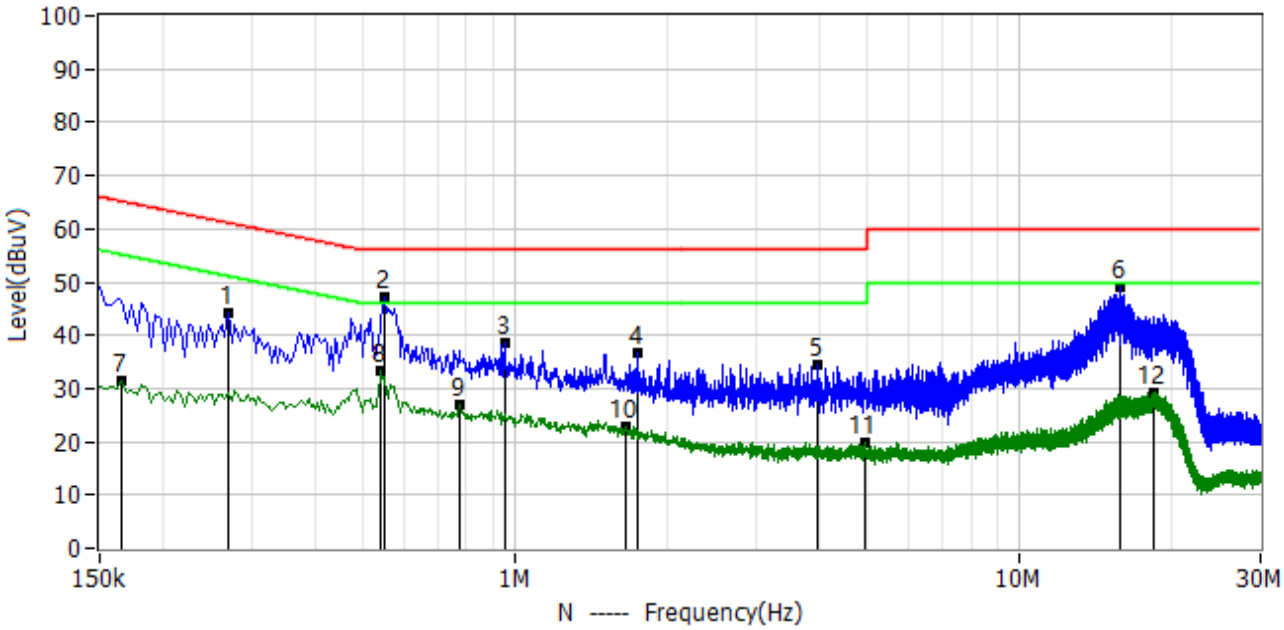
3.1.5 TEST RESULT

| | |
|---|---|
| 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 DH5 2402 | |
| Note: | |




| No. | Frequency MHz | Reading dBuV | Factor dB | Level dBuV | Limit dBuV | Margin dB | Detector | Polar |
|---|---|---|---|---|---|---|---|---|
| 1* | 0.162 | 33.33 | 10.59 | 43.92 | 65.36 | -21.45 | QP | L1 |
| 2* | 0.534 | 34.60 | 10.57 | 45.17 | 56.00 | -10.83 | QP | L1 |
| 3* | 0.962 | 29.17 | 10.67 | 39.84 | 56.00 | -16.16 | QP | L1 |
| 4* | 2.426 | 23.65 | 11.08 | 34.73 | 56.00 | -21.27 | QP | L1 |
| 5* | 7.226 | 23.37 | 10.99 | 34.36 | 60.00 | -25.64 | QP | L1 |
| 6* | 15.710 | 34.62 | 11.42 | 46.04 | 60.00 | -13.96 | QP | L1 |
| 7* | 0.162 | 18.90 | 10.59 | 29.49 | 55.36 | -25.87 | AV | L1 |
| 8* | 0.266 | 18.23 | 10.59 | 28.82 | 51.24 | -22.42 | AV | L1 |
| 9* | 0.534 | 23.64 | 10.57 | 34.21 | 46.00 | -11.79 | AV | L1 |
| 10* | 0.778 | 17.69 | 10.60 | 28.29 | 46.00 | -17.71 | AV | L1 |
| 11* | 1.610 | 12.87 | 10.87 | 23.74 | 46.00 | -22.26 | AV | L1 |
| 12* | 17.834 | 17.89 | 11.53 | 29.42 | 50.00 | -20.58 | 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 DH5 2402 | |
| Note: | |




| No. | Frequency MHz | Reading dBuV | Factor dB | Level dBuV | Limit dBuV | Margin dB | Detector | Polar |
|---|---|---|---|---|---|---|---|---|
| 1* | 0.270 | 33.47 | 10.58 | 44.05 | 61.12 | -17.07 | QP | N |
| 2* | 0.550 | 36.49 | 10.55 | 47.04 | 56.00 | -8.96 | QP | N |
| 3* | 0.954 | 27.95 | 10.54 | 38.49 | 56.00 | -17.51 | QP | N |
| 4* | 1.750 | 25.88 | 10.71 | 36.59 | 56.00 | -19.41 | QP | N |
| 5* | 3.986 | 23.83 | 10.81 | 34.64 | 56.00 | -21.36 | QP | N |
| 6* | 15.874 | 37.64 | 11.42 | 49.06 | 60.00 | -10.94 | QP | N |
| 7* | 0.166 | 20.92 | 10.56 | 31.48 | 55.16 | -23.67 | AV | N |
| 8* | 0.542 | 22.78 | 10.54 | 33.32 | 46.00 | -12.68 | AV | N |
| 9* | 0.774 | 16.28 | 10.56 | 26.84 | 46.00 | -19.16 | AV | N |
| 10* | 1.654 | 12.16 | 10.68 | 22.84 | 46.00 | -23.16 | AV | N |
| 11* | 4.918 | 9.10 | 10.84 | 19.94 | 46.00 | -26.06 | AV | N |
| 12* | 18.426 | 17.69 | 11.55 | 29.24 | 50.00 | -20.76 | AV | N |

## 3.2 RADIATED EMISSION MEASUREMENT

### 3.2.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. 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: 2476 to 2500 MHz |
| RB / VB | 1 MHz / 3 MHz(Peak)<br>1 MHz/1/T MHz(AVG) |

| **Receiver Parameter** | **Setting** |
|---|---|
| Attenuation | Auto |
| 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 |

### 3.2.2 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:

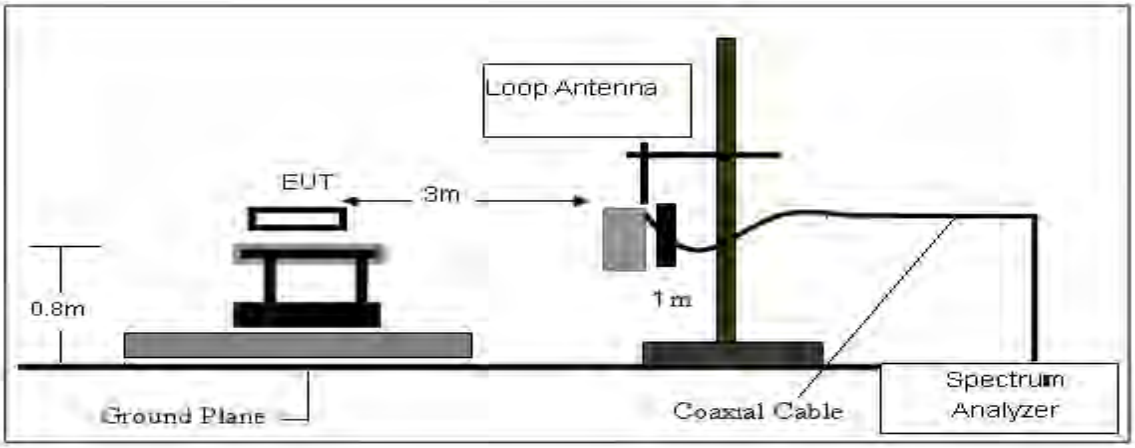
   Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

### 3.2.3 DEVIATION FROM TEST STANDARD

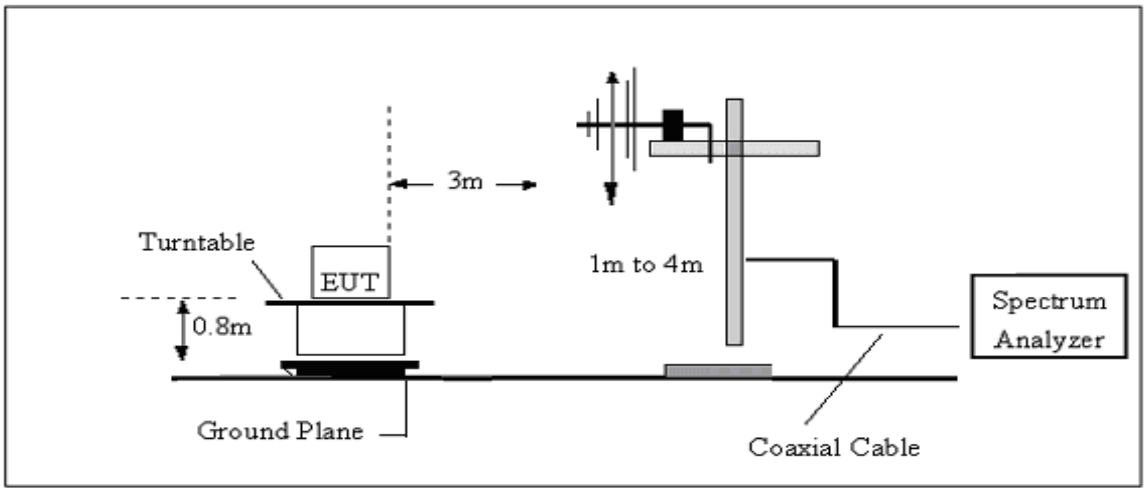
No deviation.

3.2.4 TESTSETUP

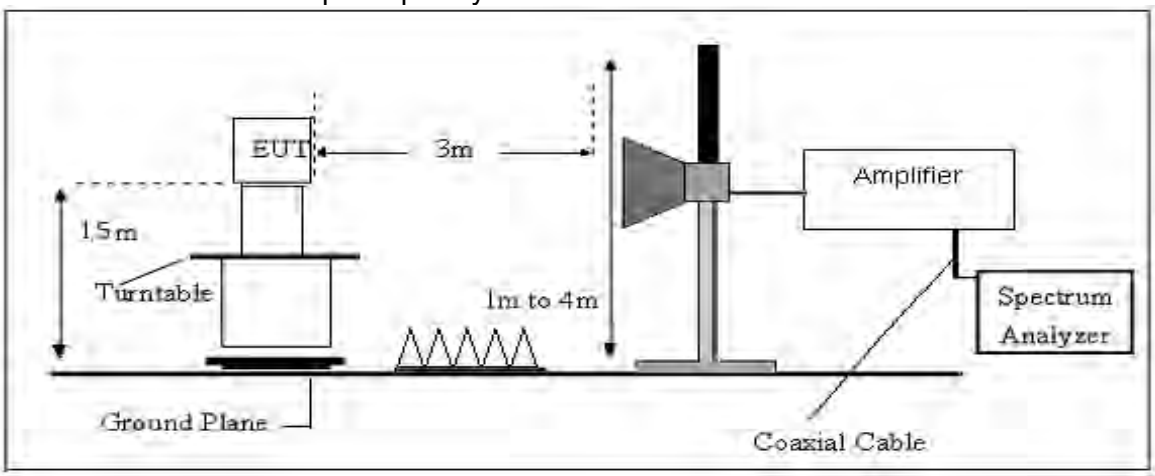
(A) Radiated Emission Test-Up Frequency Below 30MHz




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




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




3.2.5 EUT OPERATING CONDITIONS

Please refer to section 3.1.4 of this report.

### 3.2.6 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

### 3.2.7 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:

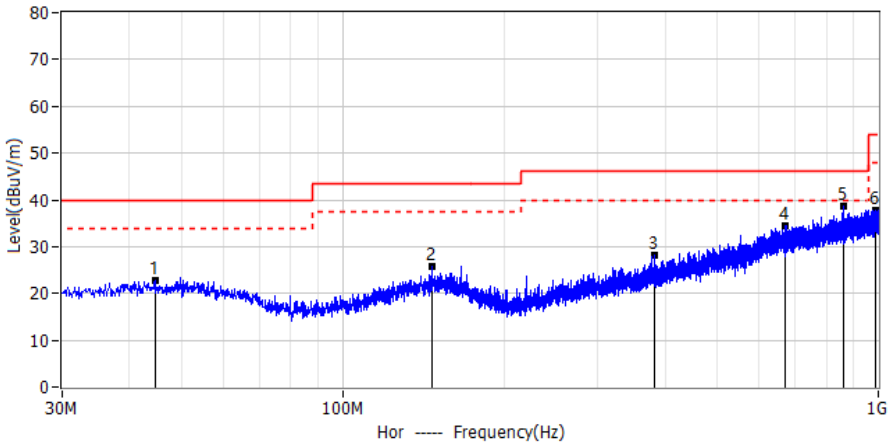
The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

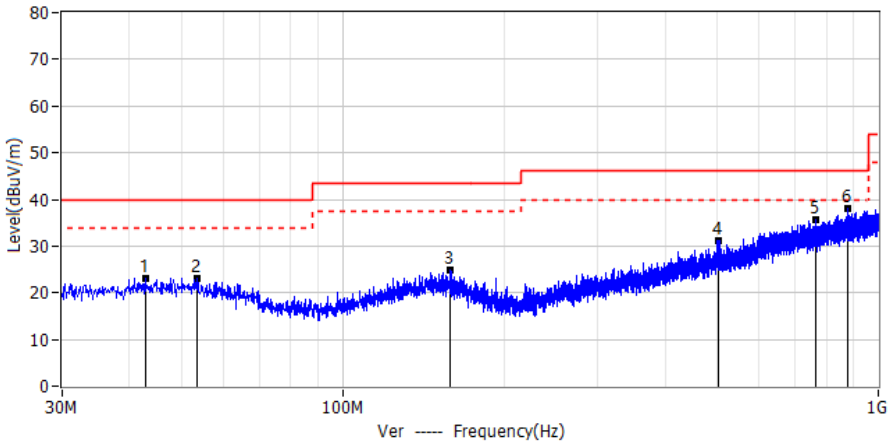
Limit line = specific limits (dBuV) + distance extrapolation factor.

## 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 DH5 2402 | |
| Note: | |




| No. | Frequency MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Detector | Polar |
|---|---|---|---|---|---|---|---|---|
| 1* | 44.671 | 2.36 | 20.52 | 22.88 | 40.00 | -17.12 | PK | Hor |
| 2* | 147.128 | 4.03 | 21.64 | 25.67 | 43.50 | -17.83 | PK | Hor |
| 3* | 381.140 | 4.45 | 23.57 | 28.02 | 46.00 | -17.98 | PK | Hor |
| 4* | 670.079 | 4.79 | 29.70 | 34.49 | 46.00 | -11.51 | PK | Hor |
| 5* | 861.411 | 6.02 | 32.54 | 38.56 | 46.00 | -7.44 | PK | Hor |
| 6* | 988.481 | 3.88 | 33.92 | 37.80 | 54.00 | -16.20 | PK | Hor |




| No. | Frequency MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Detector | Polar |
|---|---|---|---|---|---|---|---|---|
| 1* | 42.853 | 2.39 | 20.76 | 23.15 | 40.00 | -16.85 | PK | Ver |
| 2* | 53.644 | 2.69 | 20.43 | 23.12 | 40.00 | -16.88 | PK | Ver |
| 3* | 158.525 | 3.21 | 21.68 | 24.89 | 43.50 | -18.61 | PK | Ver |
| 4* | 501.663 | 4.56 | 26.75 | 31.31 | 46.00 | -14.69 | PK | Ver |
| 5* | 762.471 | 4.45 | 31.23 | 35.68 | 46.00 | -10.32 | PK | Ver |
| 6* | 874.749 | 5.14 | 32.80 | 37.94 | 46.00 | -8.06 | 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) | | | | | | | |
| 3264.78 | 56.40 | -8.45 | 47.95 | 74.00 | -26.05 | PK | Vertical |
| 3264.78 | 45.87 | -8.45 | 37.42 | 54.00 | -16.58 | AV | Vertical |
| 3264.57 | 55.50 | -8.45 | 47.05 | 74.00 | -26.95 | PK | Horizontal |
| 3264.57 | 45.35 | -8.45 | 36.90 | 54.00 | -17.10 | AV | Horizontal |
| 4804.42 | 54.01 | -6.09 | 47.92 | 74.00 | -26.08 | PK | Vertical |
| 4804.42 | 44.15 | -6.09 | 38.06 | 54.00 | -15.94 | AV | Vertical |
| 4804.60 | 54.33 | -6.09 | 48.24 | 74.00 | -25.76 | PK | Horizontal |
| 4804.60 | 44.59 | -6.09 | 38.50 | 54.00 | -15.50 | AV | Horizontal |
| 5359.82 | 57.85 | -6.68 | 51.17 | 74.00 | -22.83 | PK | Vertical |
| 5359.82 | 48.13 | -6.68 | 41.45 | 54.00 | -12.55 | AV | Vertical |
| 5359.77 | 57.59 | -6.68 | 50.91 | 74.00 | -23.09 | PK | Horizontal |
| 5359.77 | 48.06 | -6.68 | 41.38 | 54.00 | -12.62 | AV | Horizontal |
| 7205.92 | 60.42 | -8.13 | 52.29 | 74.00 | -21.71 | PK | Vertical |
| 7205.92 | 49.52 | -8.13 | 41.39 | 54.00 | -12.61 | AV | Vertical |
| 7205.67 | 60.10 | -8.13 | 51.97 | 74.00 | -22.03 | PK | Horizontal |
| 7205.67 | 50.11 | -8.13 | 41.98 | 54.00 | -12.02 | AV | Horizontal |
| Middle Channel (2441 MHz) | | | | | | | |
| 3264.89 | 55.54 | -8.45 | 47.09 | 74.00 | -26.91 | PK | Vertical |
| 3264.89 | 46.43 | -8.45 | 37.98 | 54.00 | -16.02 | AV | Vertical |
| 3264.58 | 55.72 | -8.45 | 47.27 | 74.00 | -26.73 | PK | Horizontal |
| 3264.58 | 46.33 | -8.45 | 37.88 | 54.00 | -16.12 | AV | Horizontal |
| 4882.43 | 54.01 | -6.09 | 47.92 | 74.00 | -26.08 | PK | Vertical |
| 4882.43 | 44.58 | -6.09 | 38.49 | 54.00 | -15.51 | AV | Vertical |
| 4882.42 | 55.19 | -6.09 | 49.10 | 74.00 | -24.90 | PK | Horizontal |
| 4882.42 | 44.43 | -6.09 | 38.34 | 54.00 | -15.66 | AV | Horizontal |
| 5359.66 | 57.91 | -6.68 | 51.23 | 74.00 | -22.77 | PK | Vertical |
| 5359.66 | 47.35 | -6.68 | 40.67 | 54.00 | -13.33 | AV | Vertical |
| 5359.66 | 57.90 | -6.68 | 51.22 | 74.00 | -22.78 | PK | Horizontal |
| 5359.66 | 47.43 | -6.68 | 40.75 | 54.00 | -13.25 | AV | Horizontal |
| 7313.88 | 59.83 | -8.13 | 51.70 | 74.00 | -22.30 | PK | Vertical |
| 7313.88 | 50.73 | -8.13 | 42.60 | 54.00 | -11.40 | AV | Vertical |
| 7313.72 | 60.04 | -8.13 | 51.91 | 74.00 | -22.09 | PK | Horizontal |
| 7313.72 | 50.54 | -8.13 | 42.41 | 54.00 | -11.59 | AV | Horizontal |
| High Channel (2480 MHz) | | | | | | | |
| 3264.70 | 55.78 | -8.45 | 47.33 | 74.00 | -26.67 | PK | Vertical |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3264.70 | 46.52 | -8.45 | 38.07 | 54.00 | -15.93 | AV | Vertical |
| 3264.81 | 55.22 | -8.45 | 46.77 | 74.00 | -27.23 | PK | Horizontal |
| 3264.81 | 46.47 | -8.45 | 38.02 | 54.00 | -15.98 | AV | Horizontal |
| 4960.53 | 55.07 | -6.09 | 48.98 | 74.00 | -25.02 | PK | Vertical |
| 4960.53 | 45.58 | -6.09 | 39.49 | 54.00 | -14.51 | AV | Vertical |
| 4960.37 | 54.02 | -6.09 | 47.93 | 74.00 | -26.07 | PK | Horizontal |
| 4960.37 | 44.99 | -6.09 | 38.90 | 54.00 | -15.10 | AV | Horizontal |
| 5359.85 | 57.60 | -6.68 | 50.92 | 74.00 | -23.08 | PK | Vertical |
| 5359.85 | 47.45 | -6.68 | 40.77 | 54.00 | -13.23 | AV | Vertical |
| 5359.83 | 57.41 | -6.68 | 50.73 | 74.00 | -23.27 | PK | Horizontal |
| 5359.83 | 48.19 | -6.68 | 41.51 | 54.00 | -12.49 | AV | Horizontal |
| 7439.83 | 60.15 | -8.13 | 52.02 | 74.00 | -21.98 | PK | Vertical |
| 7439.83 | 50.54 | -8.13 | 42.41 | 54.00 | -11.59 | AV | Vertical |
| 7439.71 | 60.26 | -8.13 | 52.13 | 74.00 | -21.87 | PK | Horizontal |
| 7439.71 | 50.08 | -8.13 | 41.95 | 54.00 | -12.05 | 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.

### 3.2.8 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 | 13.10 | 34.10 | 47.20 | 74.00 | -26.80 | PK | Vertical |
| 2390.00 | 0.96 | 34.10 | 35.06 | 54.00 | -18.94 | AV | Vertical |
| 2390.00 | 12.57 | 34.10 | 46.67 | 74.00 | -27.33 | PK | Horizontal |
| 2390.00 | 2.04 | 34.10 | 36.14 | 54.00 | -17.86 | AV | Horizontal |
| 2483.50 | 15.24 | 34.44 | 49.68 | 74.00 | -24.32 | PK | Vertical |
| 2483.50 | 2.64 | 34.44 | 37.08 | 54.00 | -16.92 | AV | Vertical |
| 2483.50 | 14.92 | 34.44 | 49.36 | 74.00 | -24.64 | PK | Horizontal |
| 2483.50 | 2.74 | 34.44 | 37.18 | 54.00 | -16.82 | AV | Horizontal |
| π/4-DQPSK | | | | | | | |
| 2390.00 | 13.24 | 34.10 | 47.34 | 74.00 | -26.66 | PK | Vertical |
| 2390.00 | 2.10 | 34.10 | 36.20 | 54.00 | -17.80 | AV | Vertical |
| 2390.00 | 12.59 | 34.10 | 46.69 | 74.00 | -27.31 | PK | Horizontal |
| 2390.00 | 1.51 | 34.10 | 35.61 | 54.00 | -18.39 | AV | Horizontal |
| 2483.50 | 14.20 | 34.44 | 48.64 | 74.00 | -25.36 | PK | Vertical |
| 2483.50 | 2.10 | 34.44 | 36.54 | 54.00 | -17.46 | AV | Vertical |
| 2483.50 | 13.92 | 34.44 | 48.36 | 74.00 | -25.64 | PK | Horizontal |
| 2483.50 | 3.28 | 34.44 | 37.72 | 54.00 | -16.28 | AV | Horizontal |
| 8DPSK | | | | | | | |
| 2390.00 | 12.90 | 34.10 | 47.00 | 74.00 | -27.00 | PK | Vertical |
| 2390.00 | 1.32 | 34.10 | 35.42 | 54.00 | -18.58 | AV | Vertical |
| 2390.00 | 12.81 | 34.10 | 46.91 | 74.00 | -27.09 | PK | Horizontal |
| 2390.00 | 2.42 | 34.10 | 36.52 | 54.00 | -17.48 | AV | Horizontal |
| 2483.50 | 14.36 | 34.44 | 48.80 | 74.00 | -25.20 | PK | Vertical |
| 2483.50 | 2.20 | 34.44 | 36.64 | 54.00 | -17.36 | AV | Vertical |
| 2483.50 | 15.40 | 34.44 | 49.84 | 74.00 | -24.16 | PK | Horizontal |
| 2483.50 | 3.10 | 34.44 | 37.54 | 54.00 | -16.46 | AV | Horizontal |
| Low measurement frequencies is range from 2310 to 2404 MHz, high measurement frequencies is range from 2478 to 2500 MHz. | | | | | | | |

# 4. CONDUCTED SPURIOUS & BAND EDGE EMISSION

## 4.1 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.

## 4.2 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 |

For Hopping Band edge

| Spectrum Parameter | Setting |
|---|---|
| Detector | Peak |
| Start/Stop Frequency | Lower Band Edge: 2300– 2403 MHz<br>Upper Band Edge: 2479 – 2500 MHz |
| RB / VB (emission in restricted band) | 100 KHz/300 KHz |
| Trace-Mode: | Max hold |

## 4.3 TEST SETUP

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

## 4.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

## 4.5 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.

## 5. NUMBER OF HOPPING CHANNEL

### 5.1 LIMIT

| FCC Part 15.247, Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | FrequencyRange (MHz) | Result |
| 15.247 (a)(1)(iii) | Number of Hopping Channel | ≥15 | 2400-2483.5 | PASS |

| Spectrum Parameters | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | > Operating FrequencyRange |
| RB | 300KHz |
| VB | 300KHz |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

### 5.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. Spectrum Setting: RBW= 300KHz, VBW=300KHz, Sweep time = Auto.

### 5.3 TEST SETUP

### 5.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

### 5.5 TEST RESULTS

For the measurement records, refer to the appendix I.

## 6. AVERAGE TIME OF OCCUPANCY

### 6.1 LIMIT

| FCC Part 15.247, Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | FrequencyRange (MHz) | Result |
| 15.247 (a)(1)(iii) | Average Time of Occupancy | 0.4sec | 2400-2483.5 | PASS |

### 6.2 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyzer.
b. Set RBW =1MHz/VBW =3MHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.
g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
h. Measure the maximum time duration of one single pulse.
i. DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is 3.37 x 31.6 = 106.6.
j. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is 5.06 x 31.6 = 160.
k. DH1 Packet permit maximum 1600 / 79 / 2 = 10.12 hops per second in each channel (1 time slot RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is 10.12 x 31.6 = 320.

### 6.3 TEST SETUP

### 6.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

### 6.5 TEST RESULTS

For the measurement records, refer to the appendix I.

# 7. HOPPING CHANNEL SEPARATION MEASUREMEN

## 7.1 LIMIT

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | > 20 dB Bandwidth or Channel Separation |
| RB | 30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation) |
| VB | 100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation) |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

## 7.2 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
c. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.

## 7.3 TEST SETUP

## 7.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

## 7.5 TEST RESULTS

For the measurement records, refer to the appendix I.

# 8. BANDWIDTH TEST

## 8.1 LIMIT

| FCC Part15 15.247, Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | FrequencyRange (MHz) | Result |
| 15.247 (a)(1) | Bandwidth | N/A | 2400-2483.5 | PASS |

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | > Measurement Bandwidth or Channel Separation |
| RB | 30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation) |
| VB | 100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation) |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

## 8.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Spectrum Setting: RBW= 30KHz, VBW=100KHz, Sweep time = Auto.

## 8.3 TEST SETUP

## 8.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

## 8.5 TEST RESULTS

For the measurement records, refer to the appendix I.

## 9. OUTPUT POWER TEST

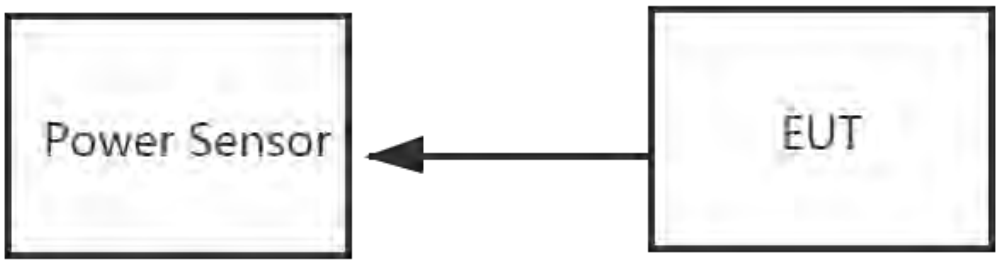
### 9.1 LIMIT

| FCC Part 15.247, Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247 (a)(1)&(b)(1) | Output Power | 1 W or 0.125W<br>if channel separation > 2/3 bandwidthprovided thesystems operatewith an output power no greater than125 mW(20.97dBm) | 2400-2483.5 | PASS |

### 9.2 TEST PROCEDURE

This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:
a) Use the following spectrum analyzer settings:
1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
2) RBW > 20 dB bandwidth of the emission being measured.
3) VBW ≥ RBW.
4) Sweep: Auto.
5) Detector function: Peak.
6) Trace: Max hold.
b) Allow trace to stabilize.
c) Use the marker-to-peak function to set the marker to the peak of the emission.
d) The indicated level is the peak output power, after any corrections for external attenuators and cables.
e) A plot of the test results and setup description shall be included in the test report.
NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.
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 DSS bandwidth and shall use a fast-responding diode detector.

### 9.3 TEST SETUP




### 9.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

### 9.5 TEST RESULTS

For the measurement records, refer to the appendix I.

# 10. ANTENNA REQUIREMENT

## 10.1 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.

## 10.2 EUT ANTENNA

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

# APPENDIX I - TEST RESULTS

## ANNEX A. PEAK OUTPUT POWER

1. BLUETOOTH FOR CLASSIC- 1-DH5

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

| Frequency(MHz) | Level(dBm) | Limit (dBm) | Verdict |
|---|---|---|---|
| 2402 | 5.204 | 21 | Pass |

1.2. A.2-PEAK OUTPUT POWER(NTNV)

| Frequency(MHz) | Level(dBm) | Limit (dBm) | Verdict |
|---|---|---|---|
| 2441 | 6.041 | 21 | Pass |

1.3. A.2-PEAK OUTPUT POWER(NTNV)

| Frequency(MHz) | Level(dBm) | Limit (dBm) | Verdict |
|---|---|---|---|
| 2480 | 4.763 | 21 | Pass |

2. BLUETOOTH FOR CLASSIC- 2-DH5

2.1. A.2-PEAK OUTPUT POWER(NTNV)

| Frequency(MHz) | Level(dBm) | Limit (dBm) | Verdict |
|---|---|---|---|
| 2402 | 4.44 | 21 | Pass |

2.2. A.2-PEAK OUTPUT POWER(NTNV)

| Frequency(MHz) | Level(dBm) | Limit (dBm) | Verdict |
|---|---|---|---|
| 2441 | 5.335 | 21 | Pass |

2.3. A.2-PEAK OUTPUT POWER(NTNV)

| Frequency(MHz) | Level(dBm) | Limit (dBm) | Verdict |
|---|---|---|---|
| 2480 | 4.02 | 21 | Pass |

3. BLUETOOTH FOR CLASSIC- 3-DH5

3.1. A.2-PEAK OUTPUT POWER(NTNV)

| Frequency(MHz) | Level(dBm) | Limit (dBm) | Verdict |
|---|---|---|---|
| 2402 | 4.413 | 21 | Pass |

3.2. A.2-PEAK OUTPUT POWER(NTNV)

| Frequency(MHz) | Level(dBm) | Limit (dBm) | Verdict |
|---|---|---|---|
| 2441 | 5.302 | 21 | Pass |

3.3. A.2-PEAK OUTPUT POWER(NTNV)

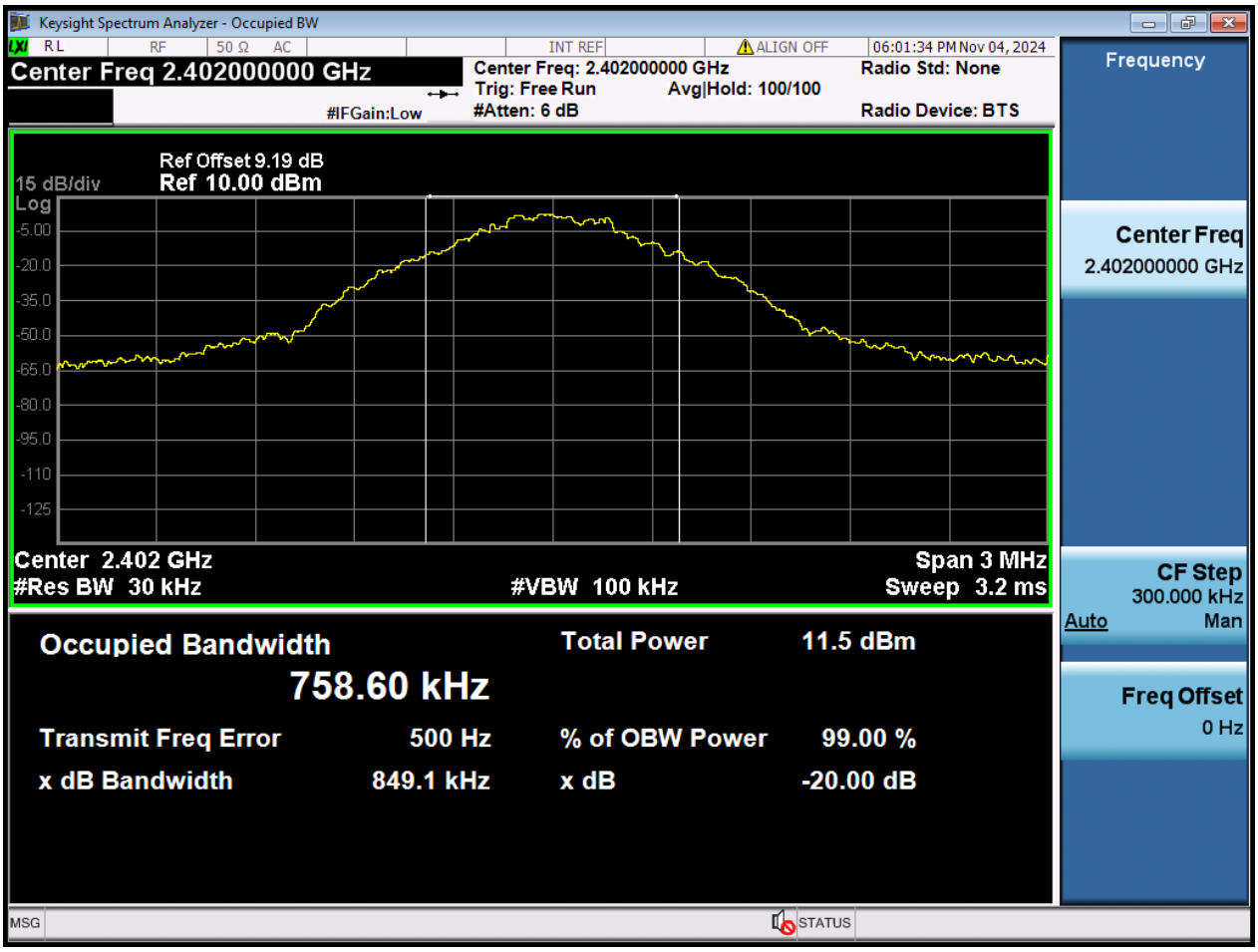
| Frequency(MHz) | Level(dBm) | Limit (dBm) | Verdict |
|---|---|---|---|
| 2480 | 3.99 | 21 | Pass |

# ANNEX A. OBW AND 20DB BANDWIDTH

## 1. BLUETOOTH FOR CLASSIC-1-DH5

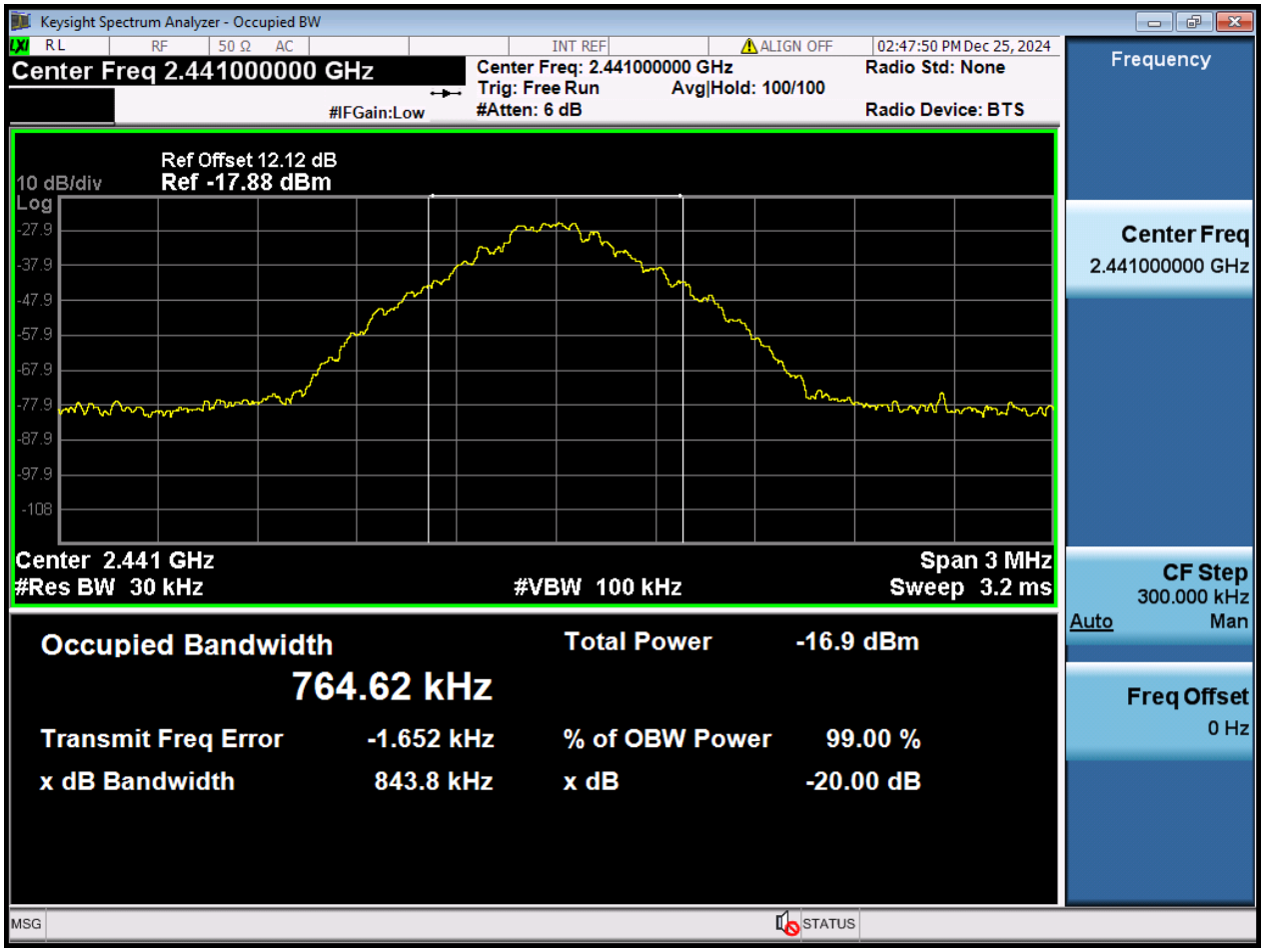
### 1.1. A.3-OBW AND 20DB BANDWIDTH(NTNV)

| Center Frequency (MHz) | OBW Power (%) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2402 | 99.00 | 20 | 0.03 | Peak | 7 | 0.758601 | 0.84907 | Pass |



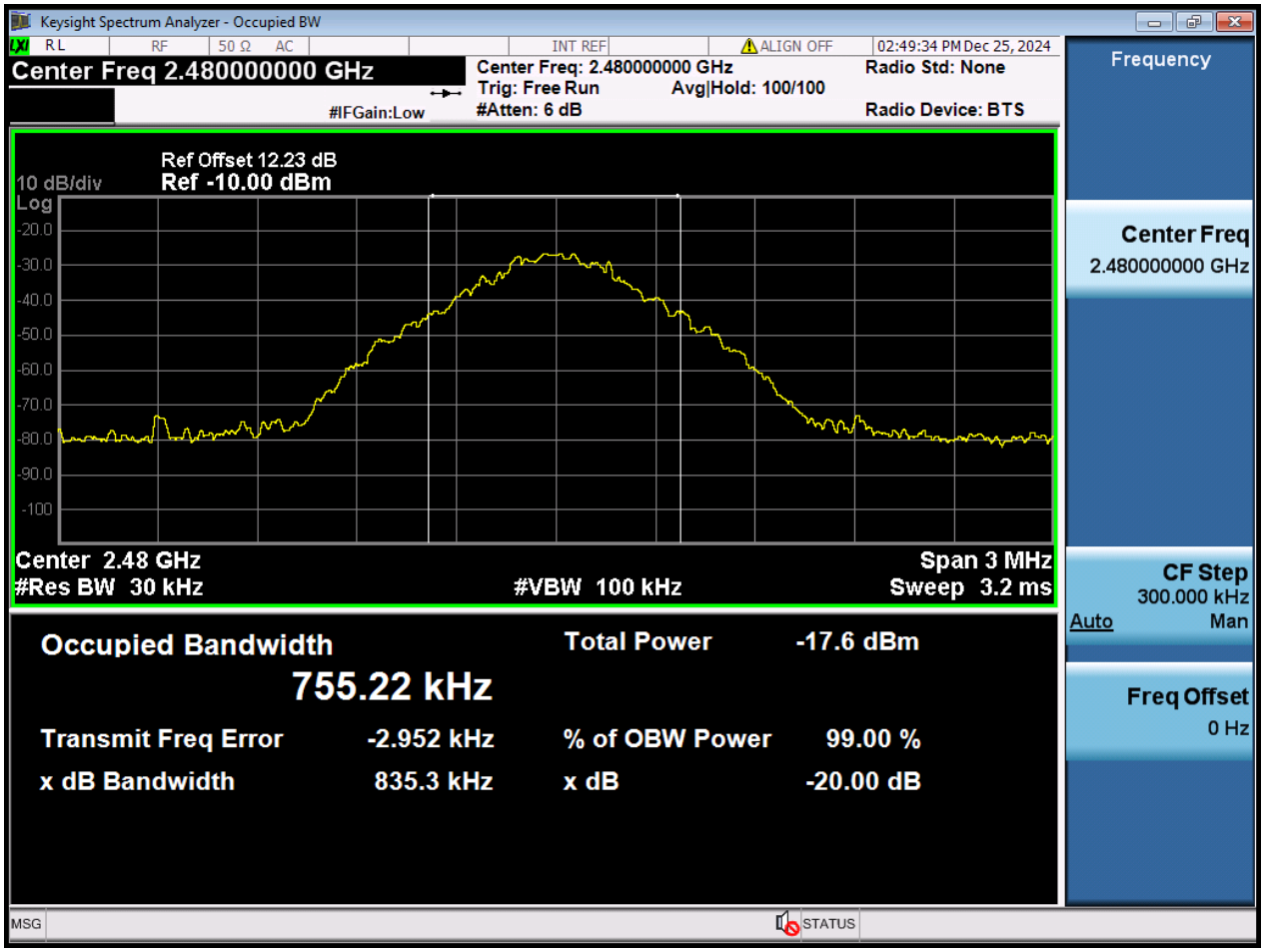
1.2. A.3-OBW AND 20DB BANDWIDTH(NTNV)

| Center Frequency (MHz) | OBW Power (%) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2441 | 99.00 | 20 | 0.03 | Peak | 7 | 0.76462 | 0.8438 | Pass |



1.3. A.3-OBW AND 20DB BANDWIDTH(NTNV)

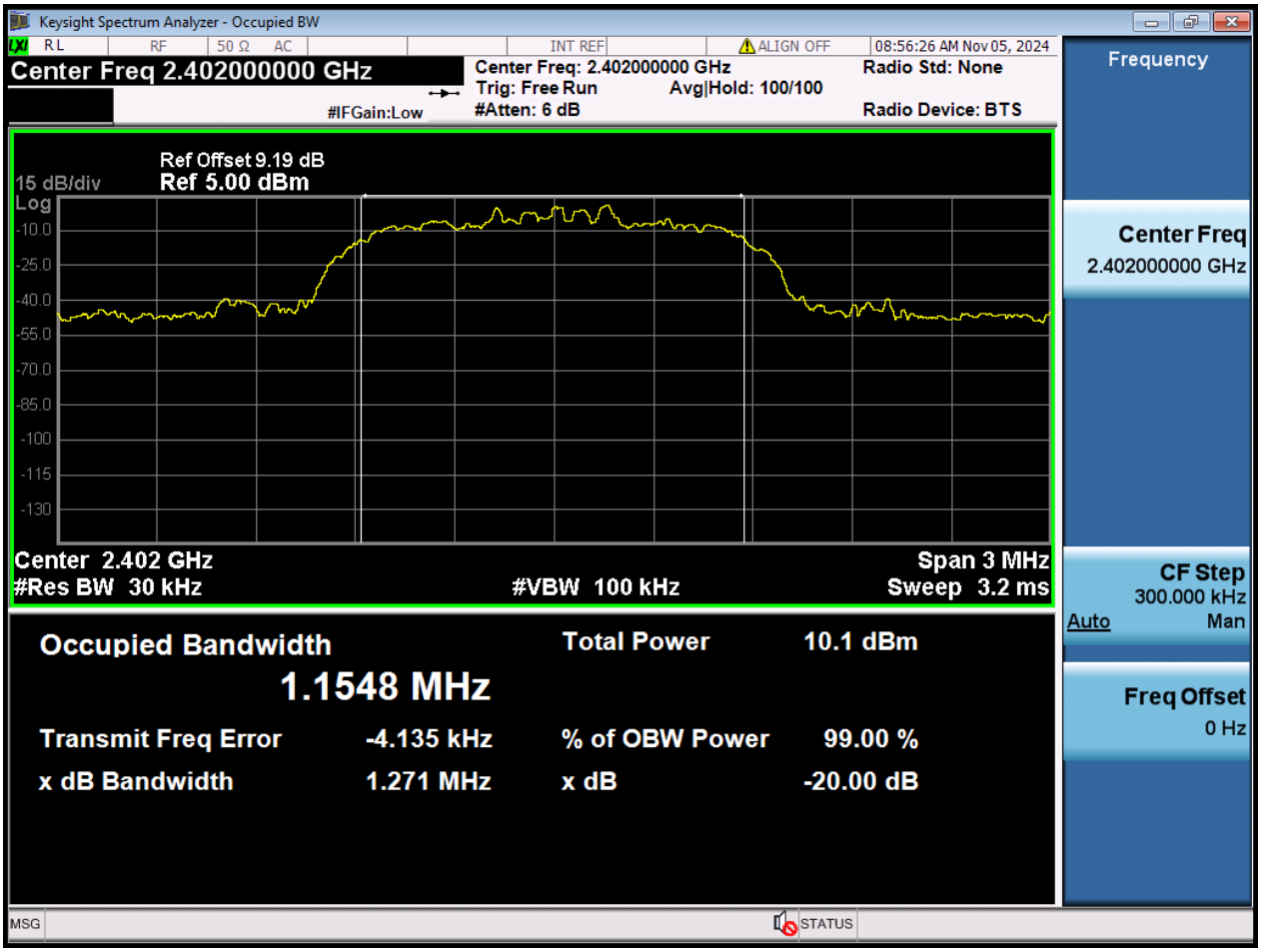
| Center Frequency (MHz) | OBW Power (%) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2480 | 99.00 | 20 | 0.03 | Peak | 7 | 0.75522 | 0.8353 | Pass |



2. BLUETOOTH FOR CLASSIC-2-DH5

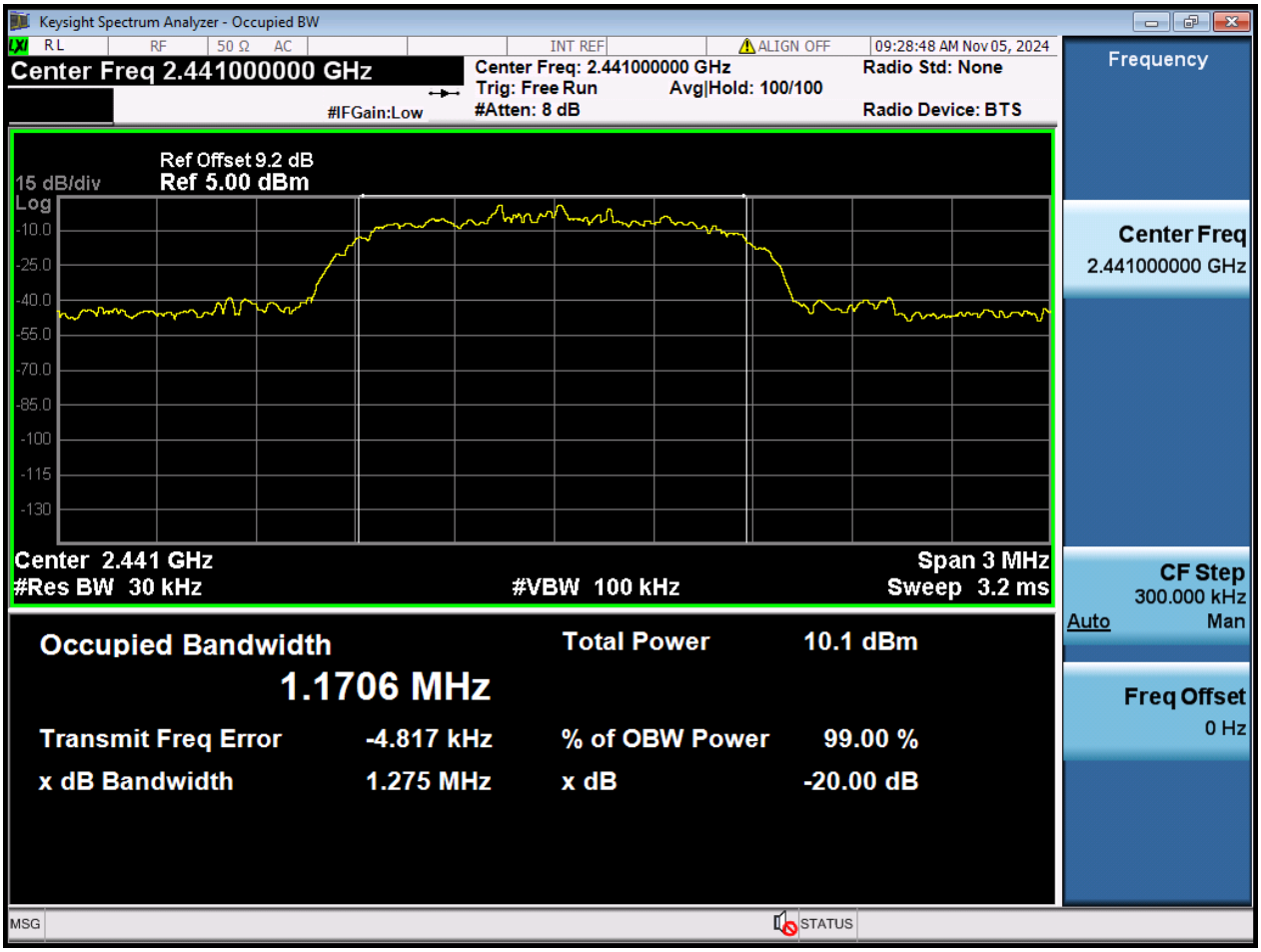
2.1. A.32-OBW AND 20DB BANDWIDTH(NTNV)

| Center Frequency (MHz) | OBW Power (%) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2402 | 99.00 | 20 | 0.03 | Peak | 7 | 1.15475 | 1.271197 | Pass |



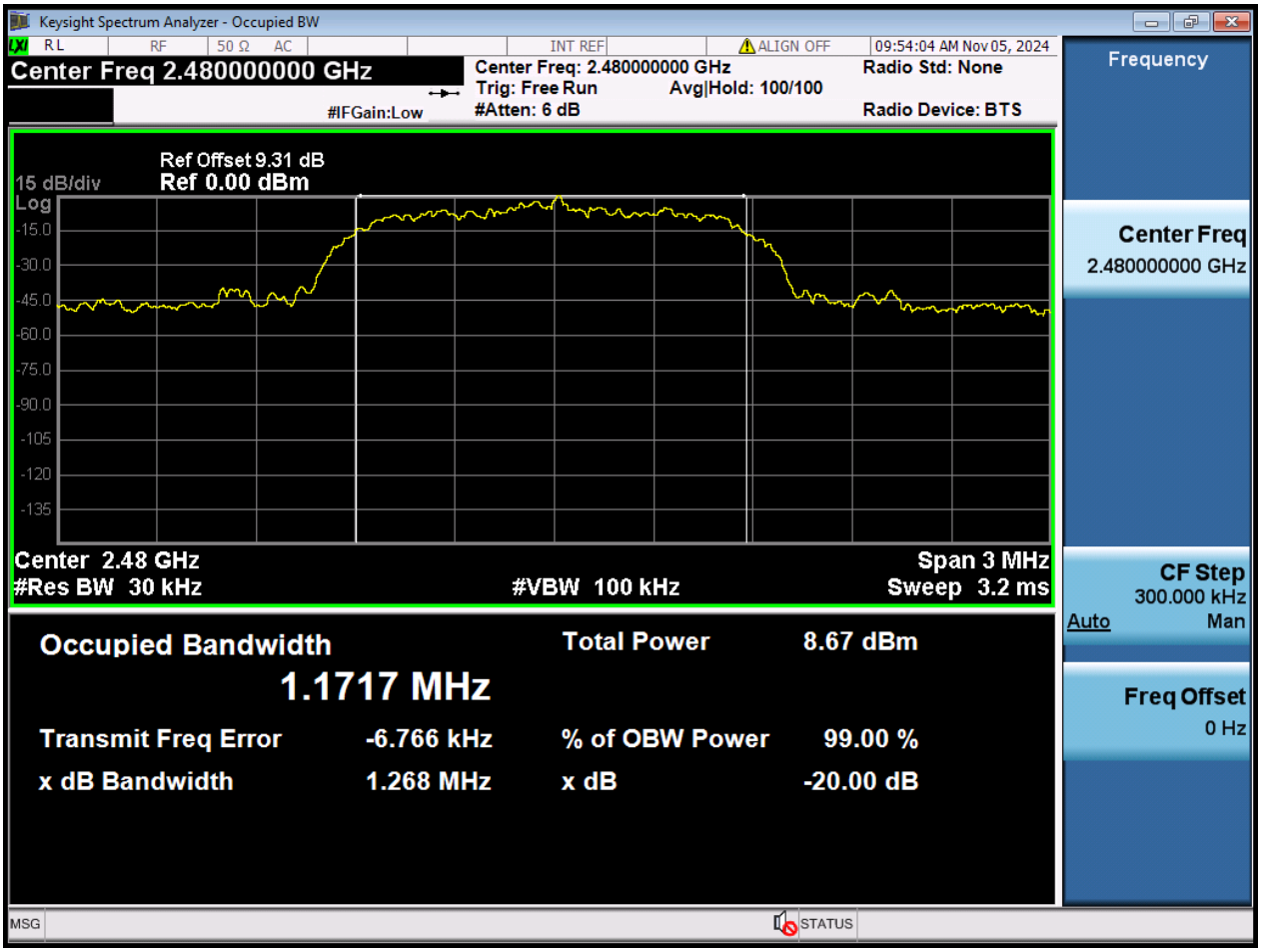
## 2.2. A.32-OBW AND 20DB BANDWIDTH(NTNV)

| Center Frequency (MHz) | OBW Power (%) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2441 | 99.00 | 20 | 0.03 | Peak | 7 | 1.17062 | 1.274553 | Pass |



## 2.3. A.32-OBW AND 20DB BANDWIDTH(NTNV)

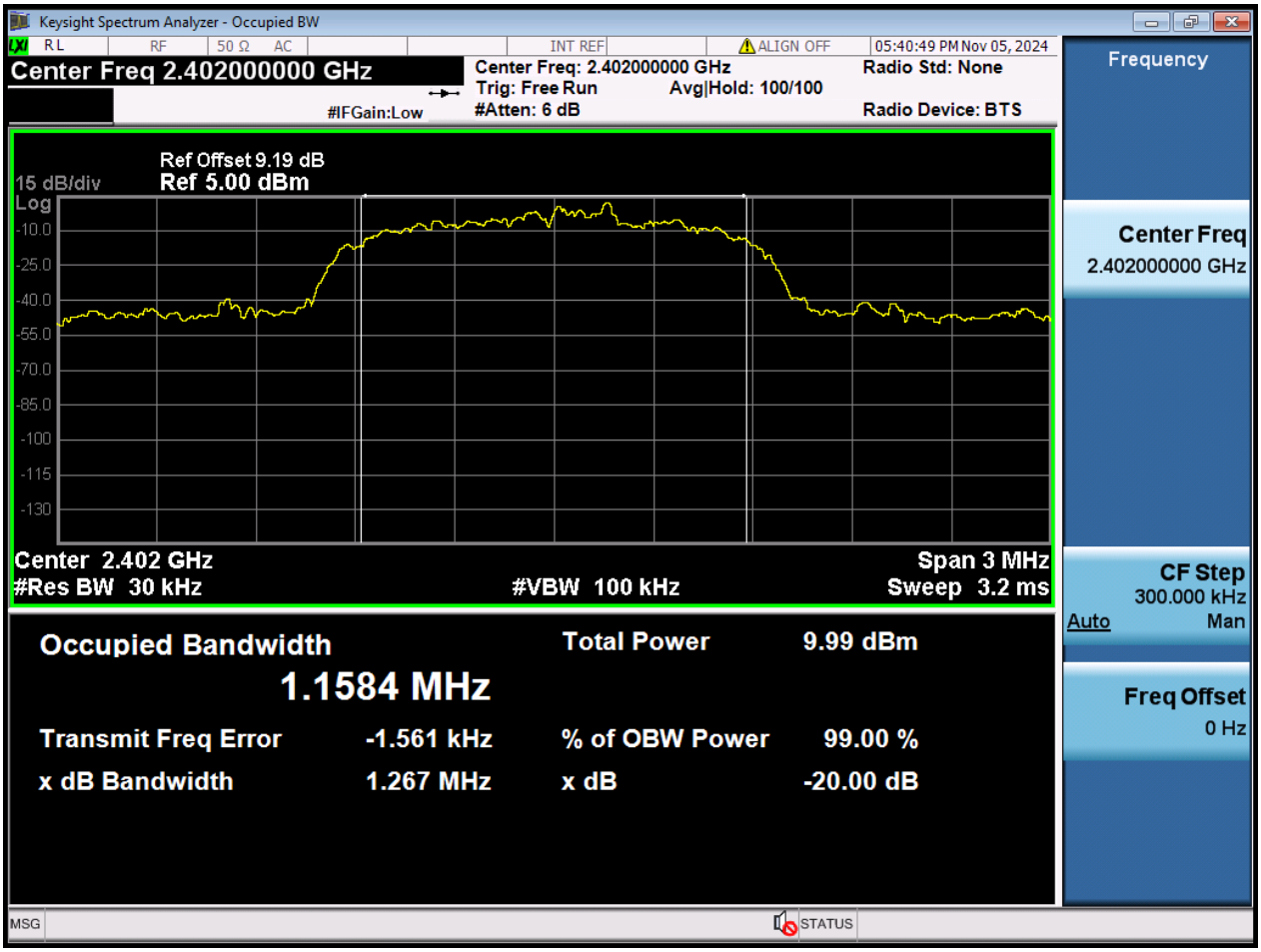
| Center Frequency (MHz) | OBW Power (%) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2480 | 99.00 | 20 | 0.03 | Peak | 7 | 1.171699 | 1.268354 | Pass |



3. BLUETOOTH FOR CLASSIC-3-DH5

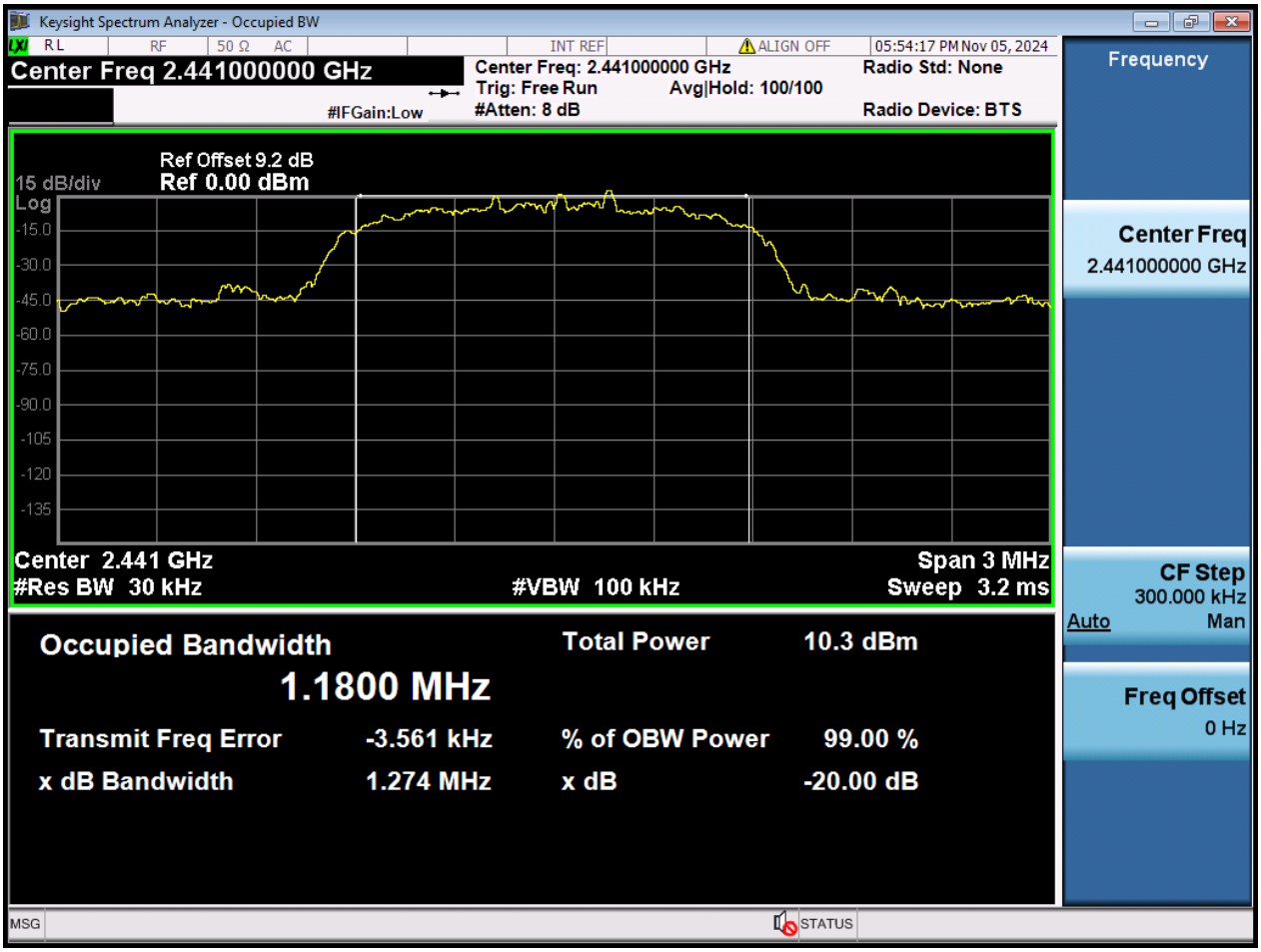
3.1. A.32-OBW AND 20DB BANDWIDTH(NTNV)

| Center Frequency (MHz) | OBW Power (%) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2402 | 99.00 | 20 | 0.03 | Peak | 7 | 1.158419 | 1.266842 | Pass |



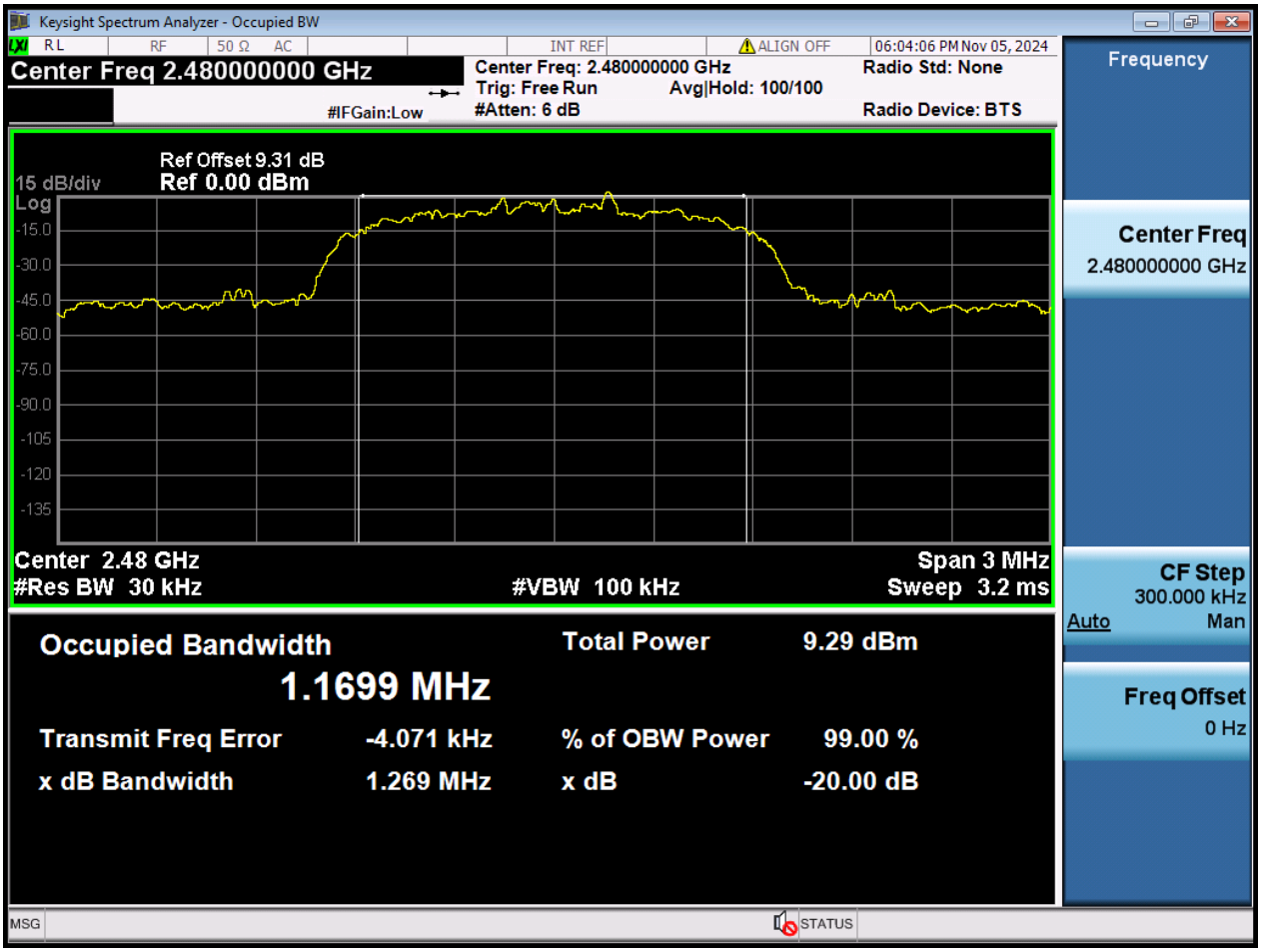
3.2. A.32-OBW AND 20DB BANDWIDTH(NTNV)

| Center Frequency (MHz) | OBW Power (%) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2441 | 99.00 | 20 | 0.03 | Peak | 7 | 1.18002 | 1.273889 | Pass |



3.3. A.32-OBW AND 20DB BANDWIDTH(NTNV)

| Center Frequency (MHz) | OBW Power (%) | XdB Down | RBW (MHz) | Detector | Limit (MHz) | OBW (MHz) | XdB BandWidth (MHz) | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2480 | 99.00 | 20 | 0.03 | Peak | 7 | 1.169917 | 1.269093 | Pass |

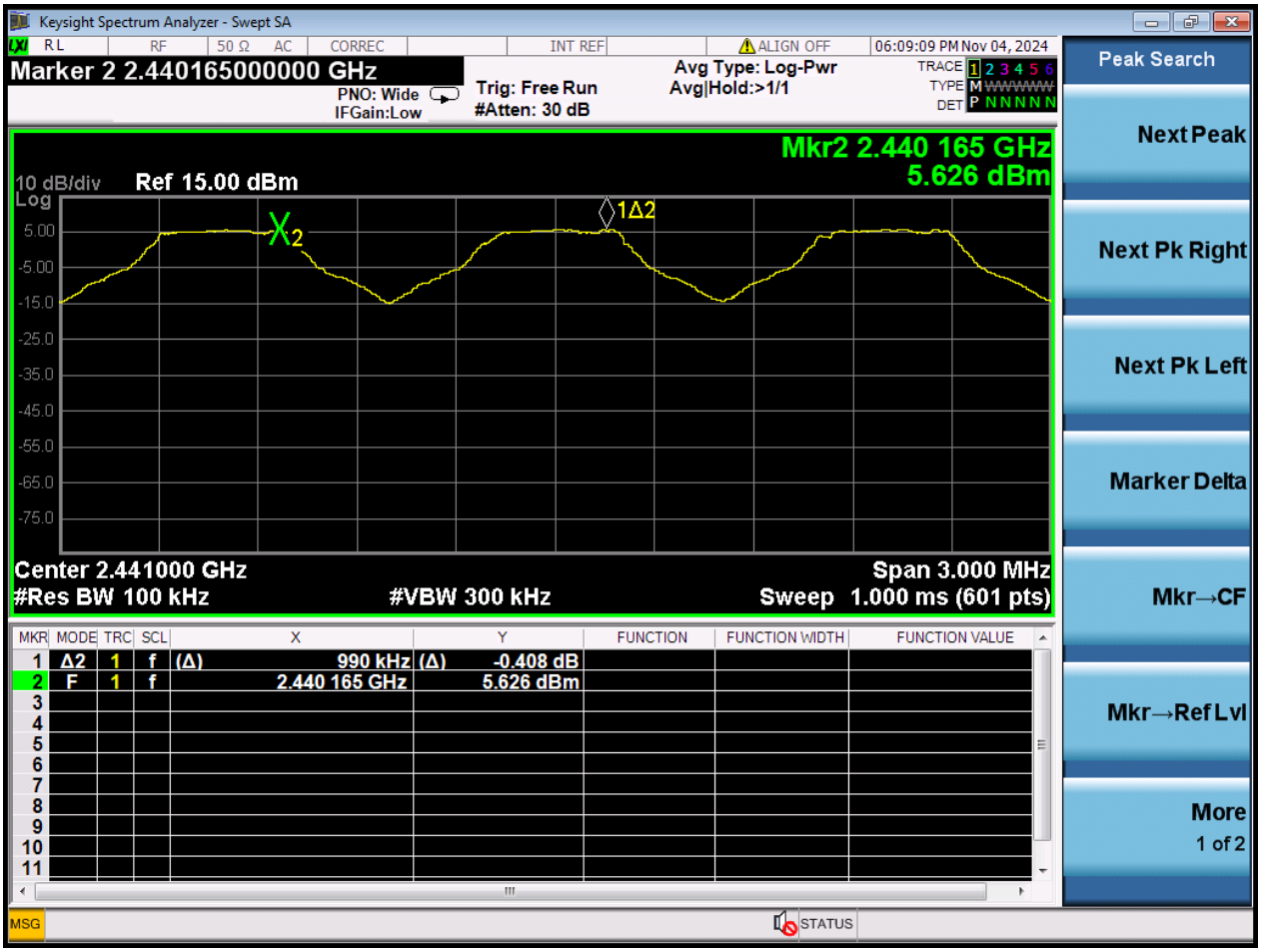


# ANNEX A. HOPPING FREQUENCY SEPARATION

## 1. BLUETOOTH FOR CLASSIC_HOPPING-1-DH5

### 1.1. A.4-HOPPING FREQUENCY SEPARATION(NTNV)

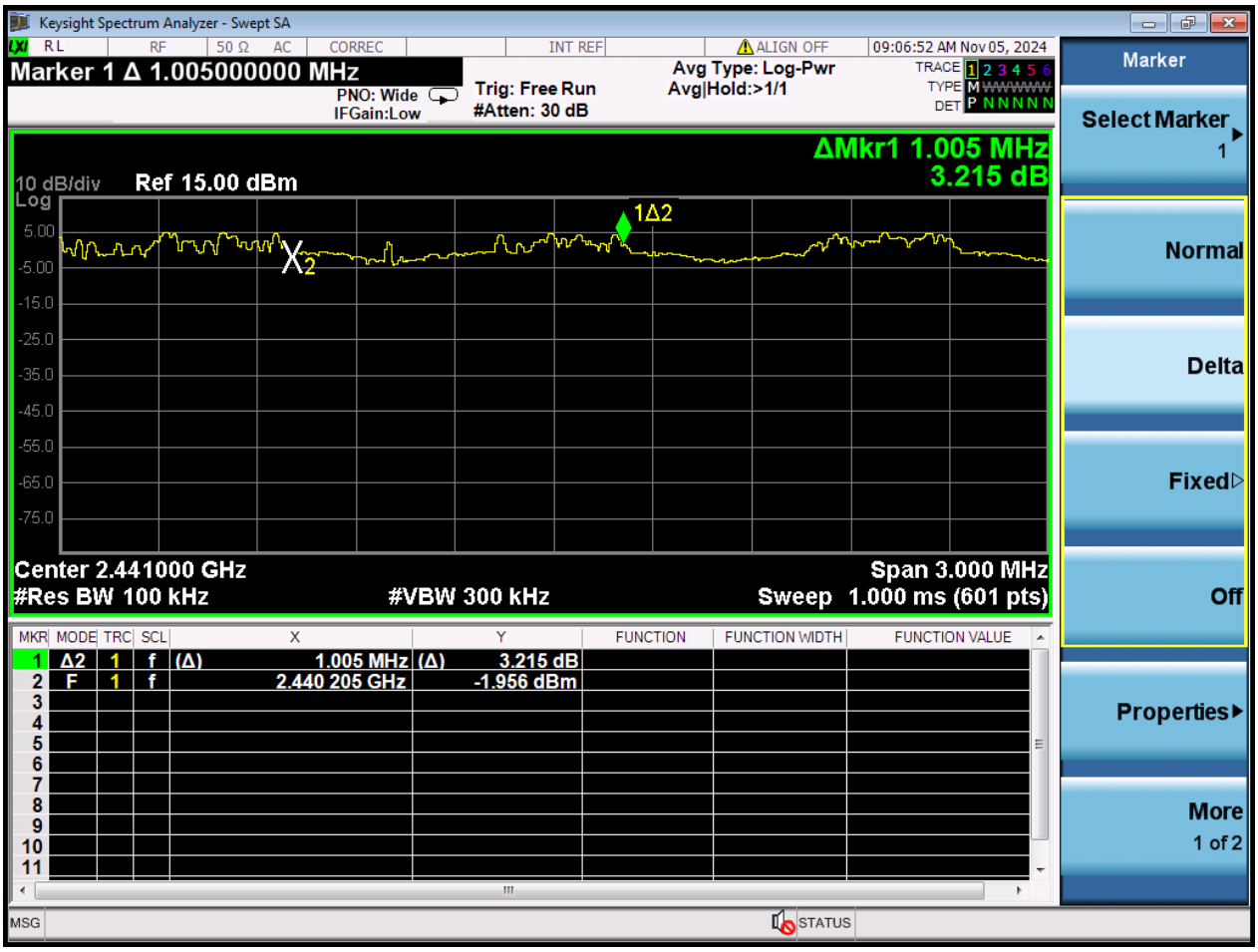
| Frequency(MHz) | HFS (MHz) | Limit (MHz) | Verdict |
|---|---|---|---|
| 2441 | 0.99 | 0.566 | Pass |



2. BLUETOOTH FOR CLASSIC_HOPPING-2-DH5

2.1. A.4-HOPPING FREQUENCY SEPARATION(NTNV)

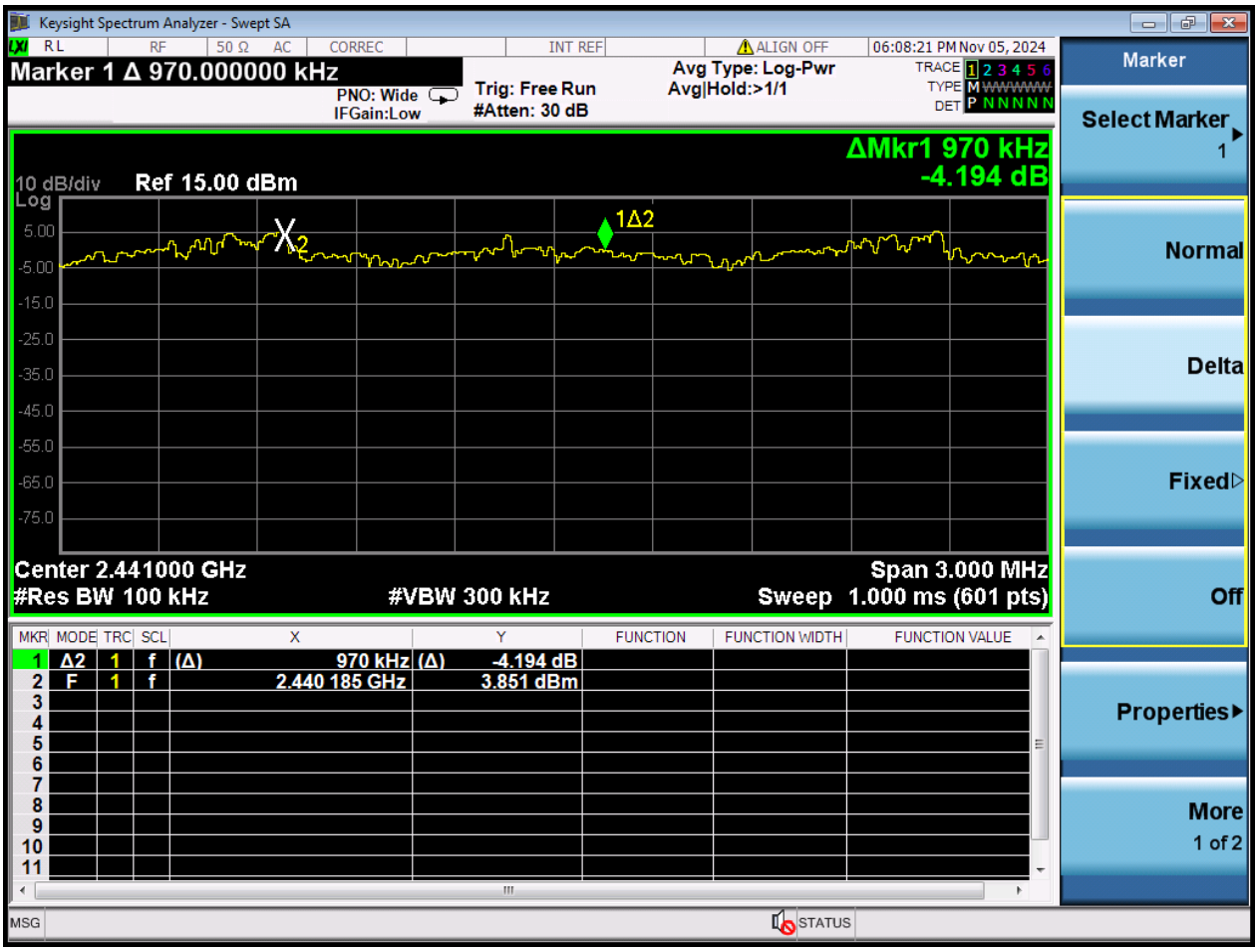
| Frequency(MHz) | HFS (MHz) | Limit (MHz) | Verdict |
|---|---|---|---|
| 2441 | 1.005 | 0.847 | Pass |



3. BLUETOOTH FOR CLASSIC_HOPPING-3-DH5

3.1. A.4-HOPPING FREQUENCY SEPARATION(NTNV)

| Frequency(MHz) | HFS (MHz) | Limit (MHz) | Verdict |
|---|---|---|---|
| 2441 | 0.97 | 0.845 | Pass |

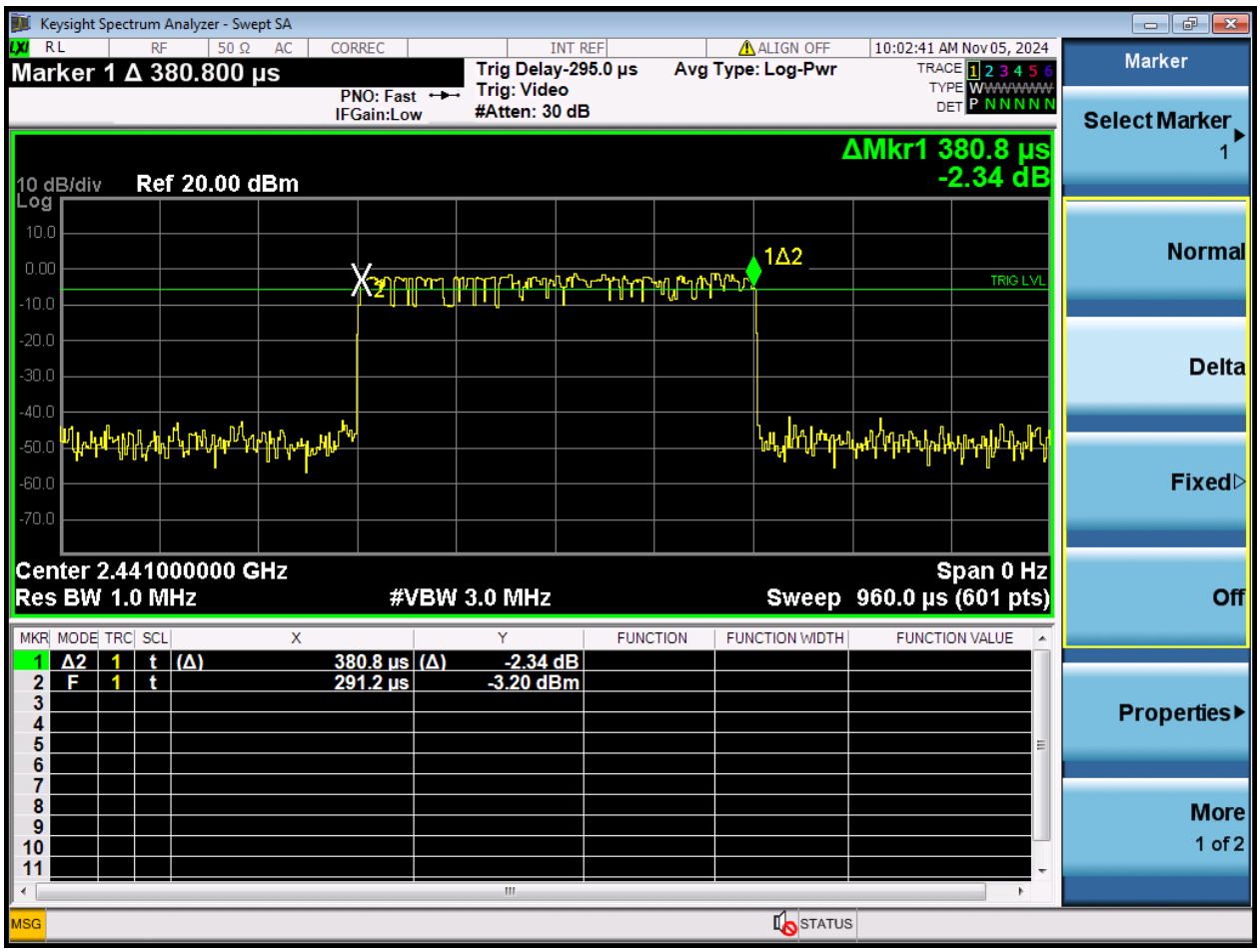


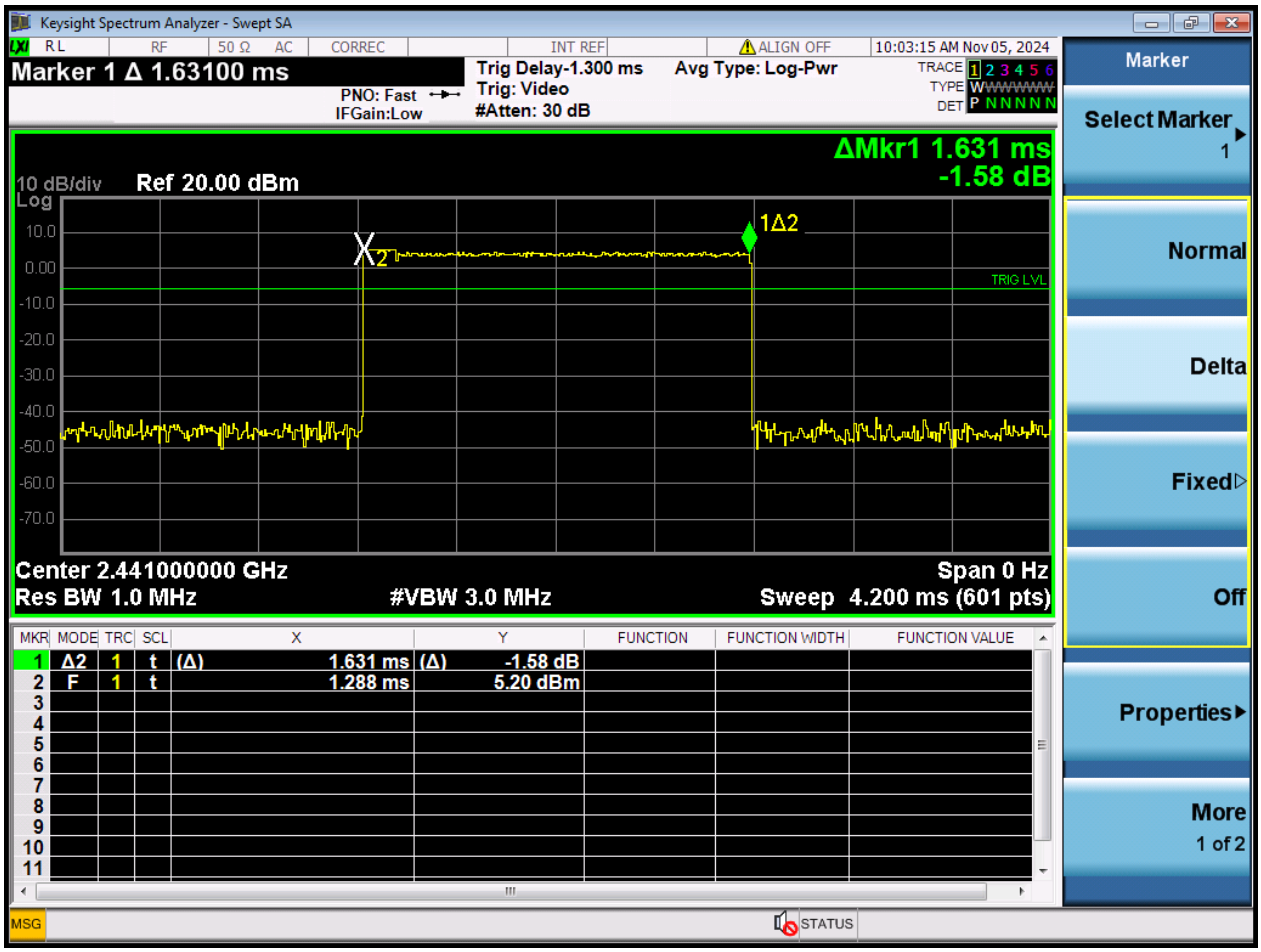
# ANNEX A. AVERAGE TIME OF OCCUPANCYC-HOPPING

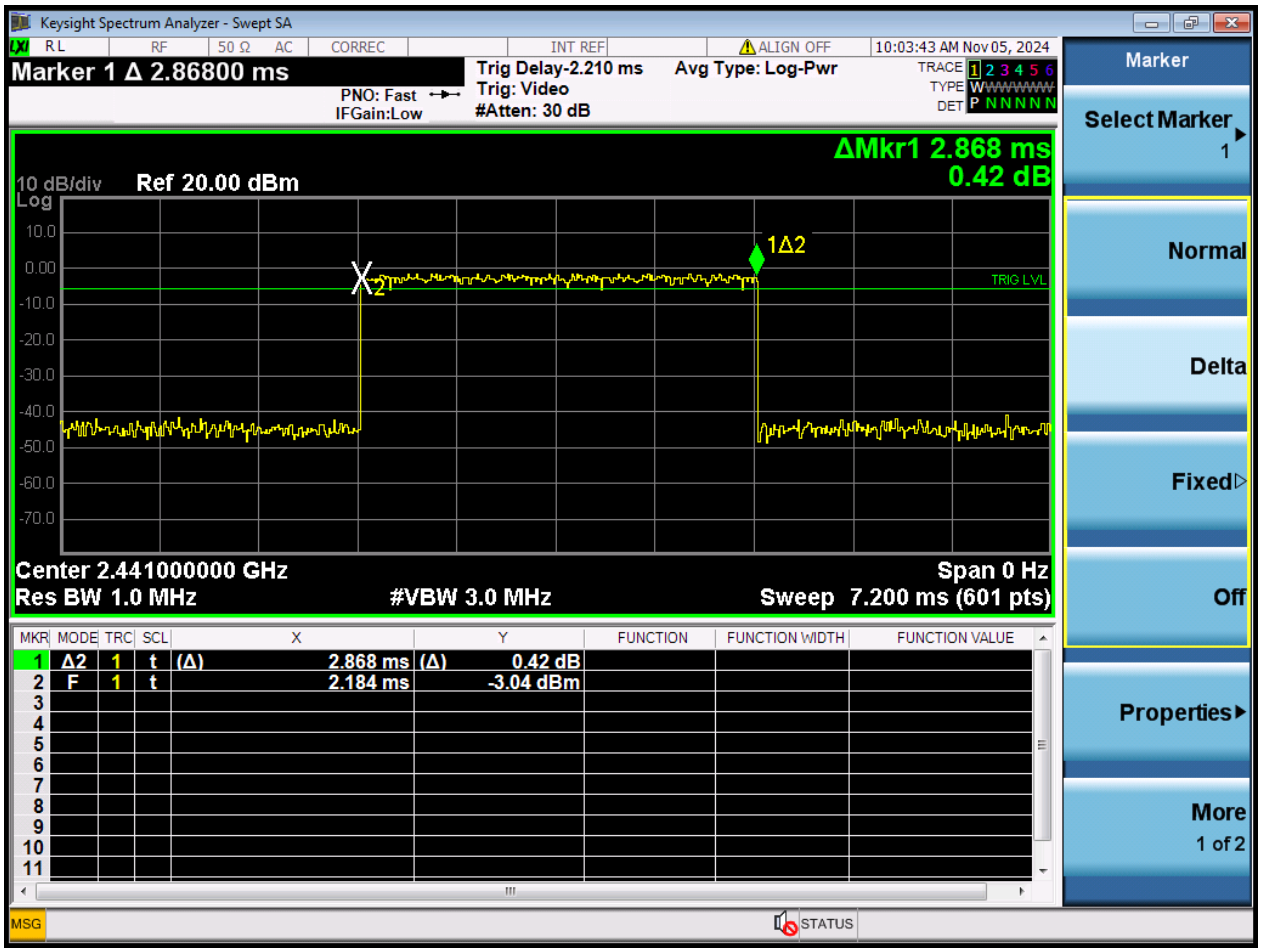
## 1. BLUETOOTH FOR CLASSIC-1-DH5

### 1.1 A.5-AVERAGE TIME OF OCCUPANCY(NTNV)

| Condition | Frequency (MHz) | Pulse Time (ms) | Total Dwell Time (ms) | Limit (ms) | Verdict |
|---|---|---|---|---|---|
| NVNT | 2441 | 0.3808 | 121.4752 | 400 | Pass |
| NVNT | 2441 | 1.631 | 274.008 | 400 | Pass |
| NVNT | 2441 | 2.868 | 289.668 | 400 | Pass |



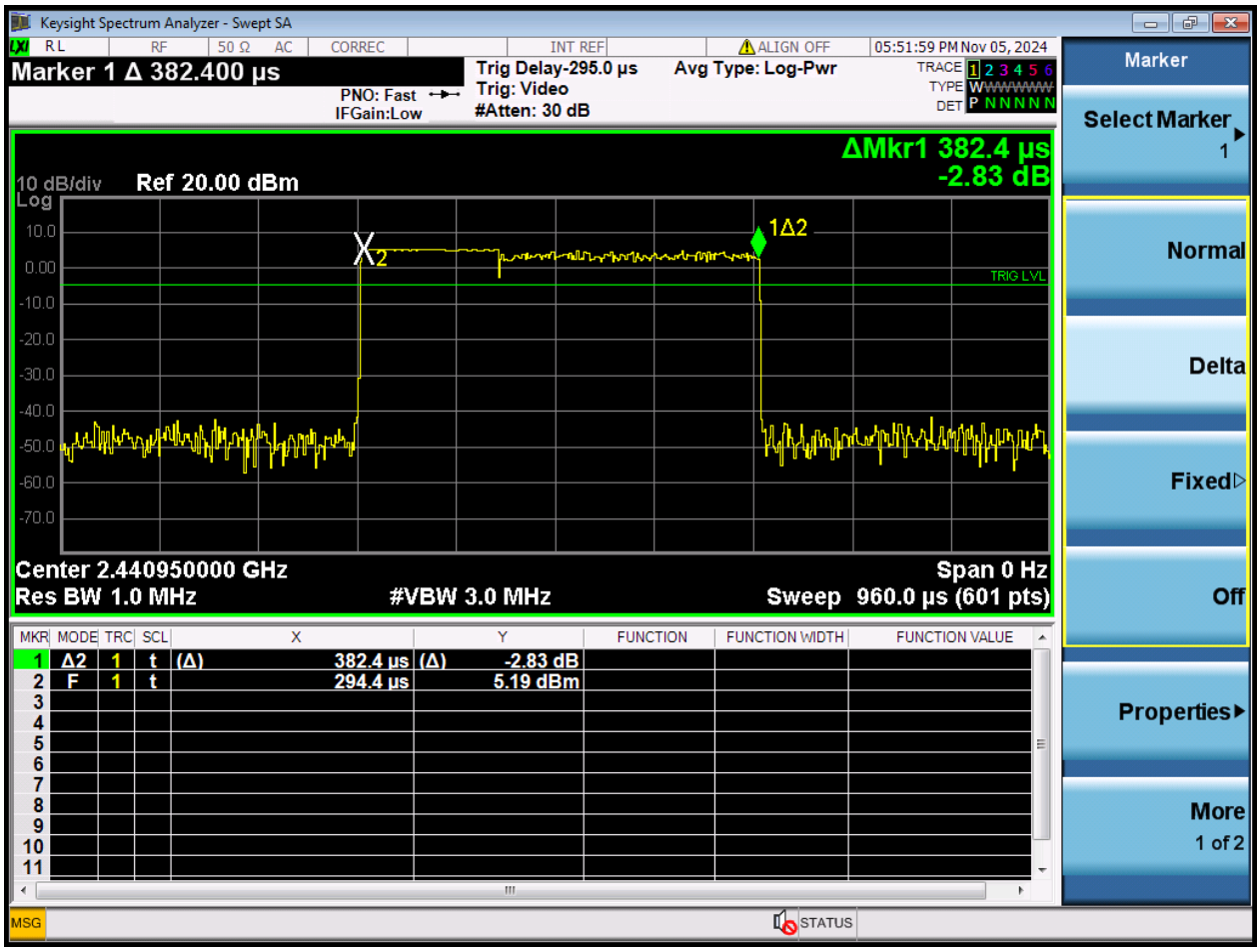

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
10:03:15 AM Nov 05, 2024
Marker 1 Δ 1.63100 ms
PNO: Fast
IFGain:Low
Trig Delay-1.300 ms
Trig: Video
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W W W W W W
DET P N N N N N
ΔMkr1 1.631 ms
-1.58 dB
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
X2
1Δ2
TRIG LVL
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 4.200 ms (601 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 Δ2 1 t (Δ) 1.631 ms (Δ) -1.58 dB
2 F 1 t 1.288 ms 5.20 dBm
3
4
5
6
7
8
9
10
11
MSG
STATUS
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2

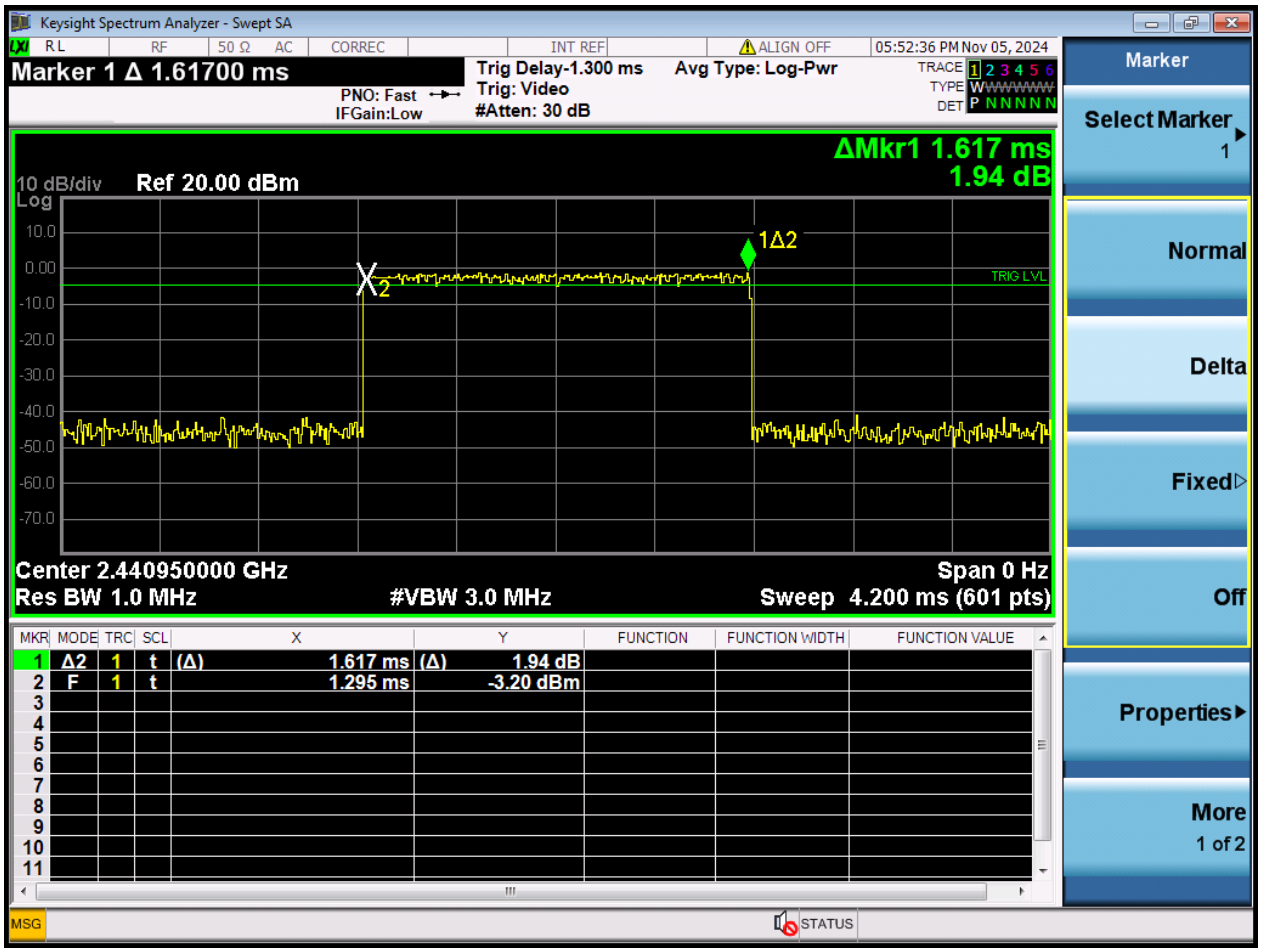

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
10:03:43 AM Nov 05, 2024
Marker 1 Δ 2.86800 ms
PNO: Fast
IFGain:Low
Trig Delay-2.210 ms
Trig: Video
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W W W W W W
DET P N N N N N
ΔMkr1 2.868 ms
0.42 dB
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1Δ2
TRIG LVL
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 7.200 ms (601 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 Δ2 1 t (Δ) 2.868 ms (Δ) 0.42 dB
2 F 1 t 2.184 ms -3.04 dBm
3
4
5
6
7
8
9
10
11
Marker
Select Marker 1
Normal
Delta
Fixed
Off
Properties
More 1 of 2
MSG
STATUS

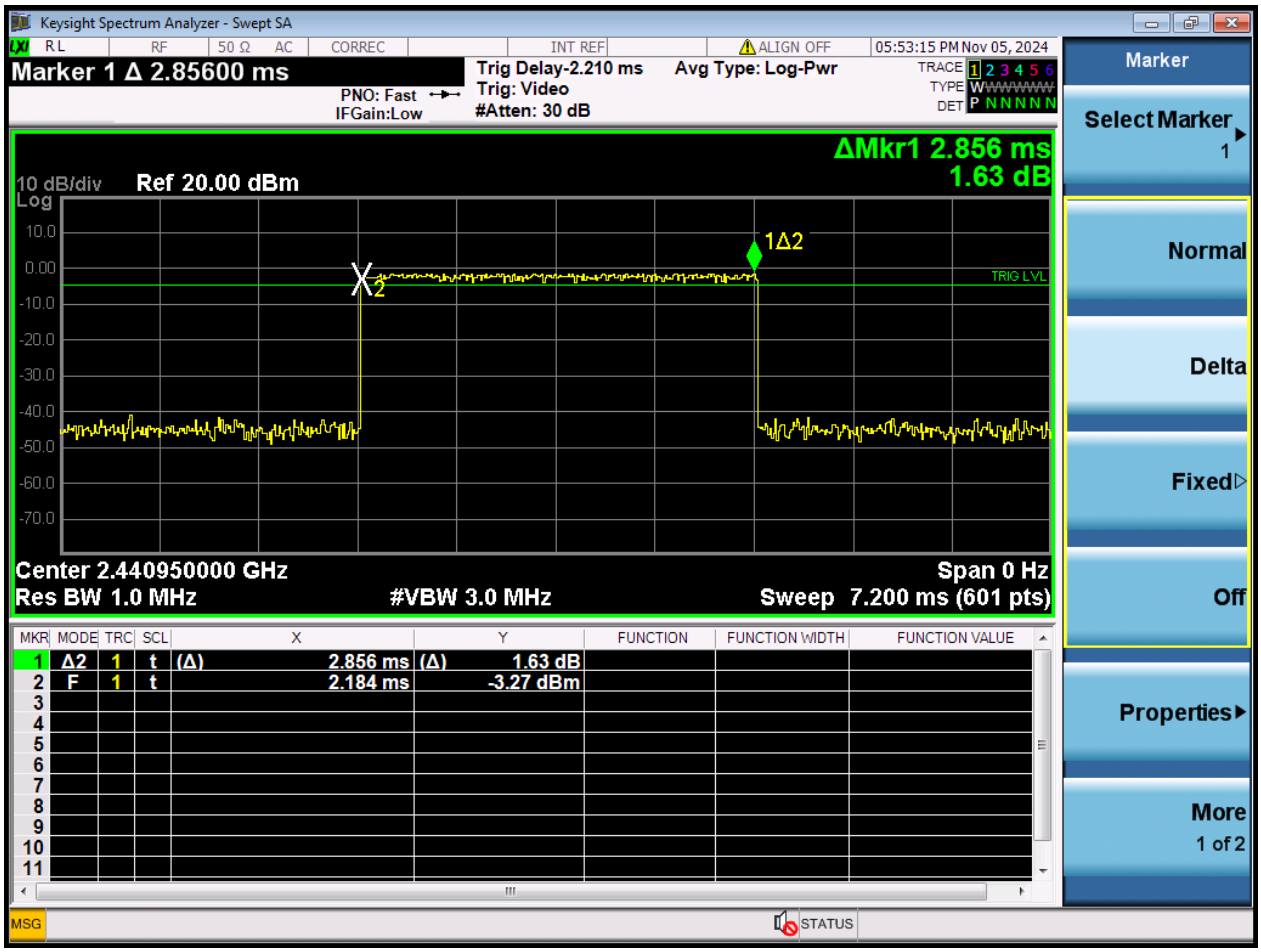
## 2. BLUETOOTH FOR CLASSIC_HOPPING-2-DH5

### 2.1. A.5-AVERAGE TIME OF OCCUPANCY(NTNV)

| Condition | Frequency (MHz) | Pulse Time (ms) | Total Dwell Time (ms) | Limit (ms) | Verdict |
|---|---|---|---|---|---|
| NVNT | 2441 | 0.3824 | 121.9856 | 400 | Pass |
| NVNT | 2441 | 1.617 | 260.337 | 400 | Pass |
| NVNT | 2441 | 2.856 | 282.744 | 400 | Pass |



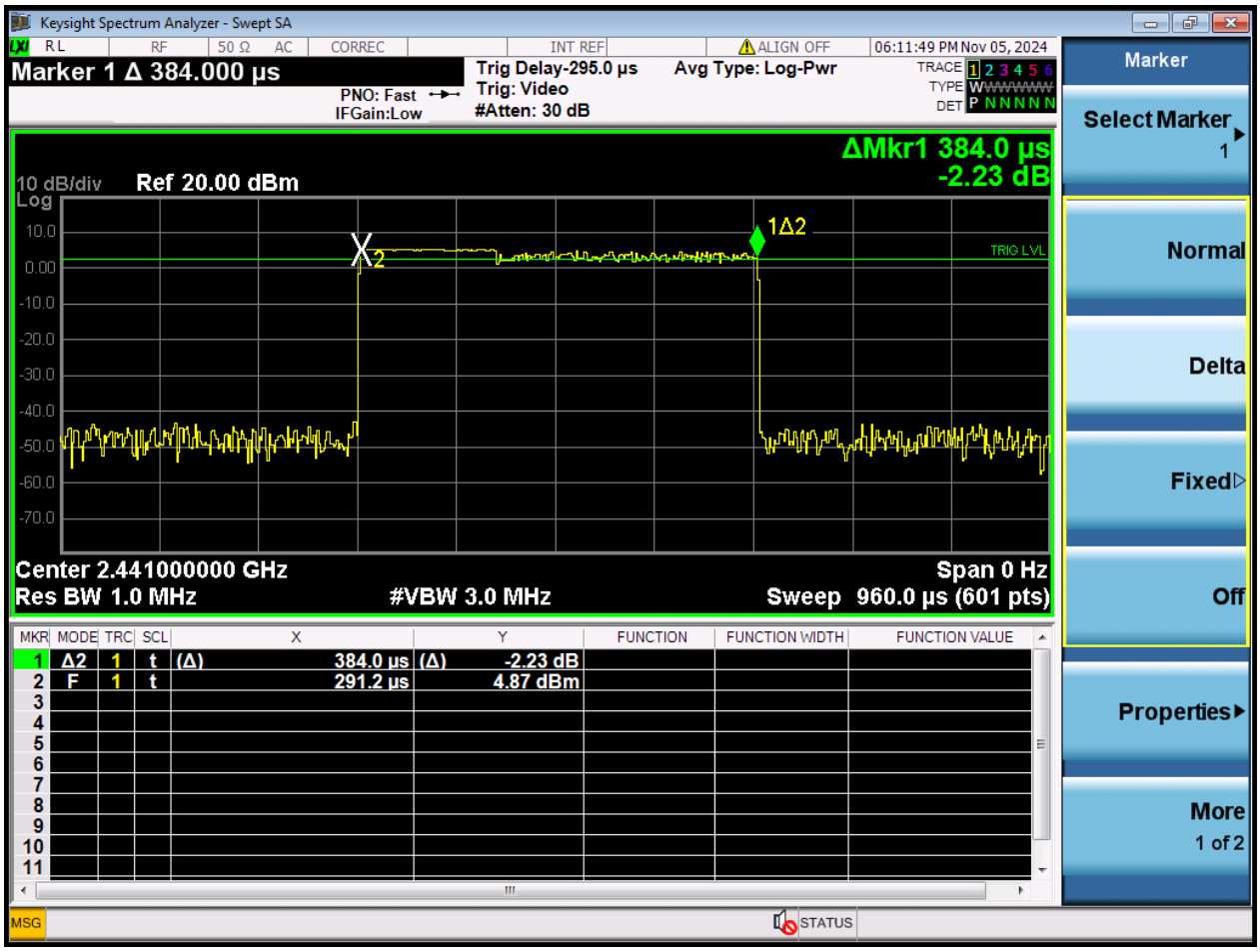

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
05:52:36 PM Nov 05, 2024
Marker 1 Δ 1.61700 ms
PNO: Fast
IFGain:Low
Trig Delay-1.300 ms
Trig: Video
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W W W W W W
DET P N N N N N
ΔMkr1 1.617 ms
1.94 dB
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1Δ2
X2
TRIG LVL
Center 2.440950000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 4.200 ms (601 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 Δ2 1 t (Δ) 1.617 ms (Δ) 1.94 dB
2 F 1 t 1.295 ms -3.20 dBm
3
4
5
6
7
8
9
10
11
Marker
Select Marker 1
Normal
Delta
Fixed
Off
Properties
More 1 of 2
MSG
STATUS

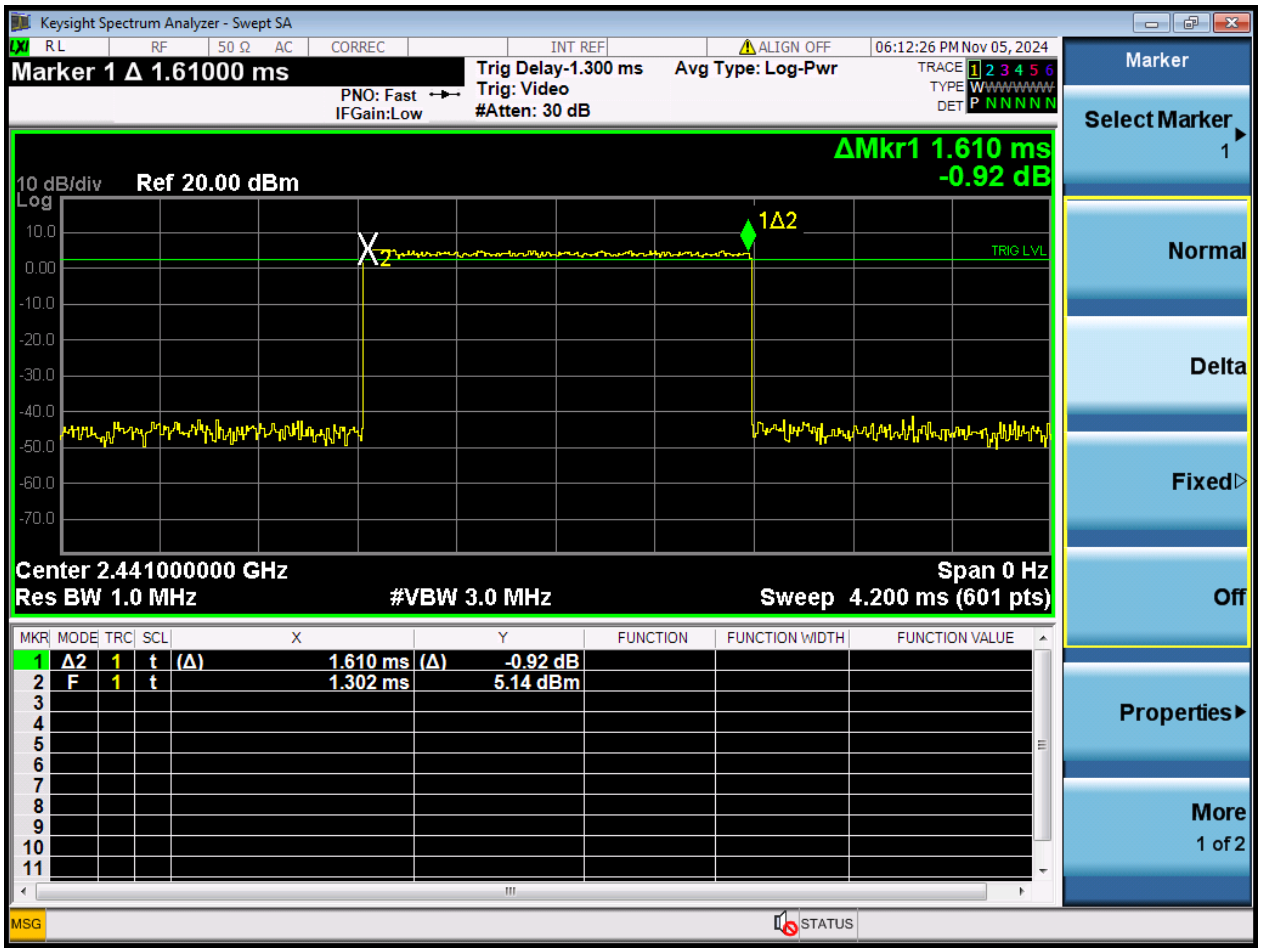

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
05:53:15 PM Nov 05, 2024
Marker 1 Δ 2.85600 ms
PNO: Fast
IFGain:Low
Trig Delay-2.210 ms
Trig: Video
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W W W W W W
DET P N N N N N
ΔMkr1 2.856 ms
1.63 dB
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1Δ2
X2
TRIG LVL
Center 2.440950000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 7.200 ms (601 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 Δ2 1 t (Δ) 2.856 ms (Δ) 1.63 dB
2 F 1 t 2.184 ms -3.27 dBm
3
4
5
6
7
8
9
10
11
Marker
Select Marker 1
Normal
Delta
Fixed
Off
Properties
More 1 of 2
MSG
STATUS

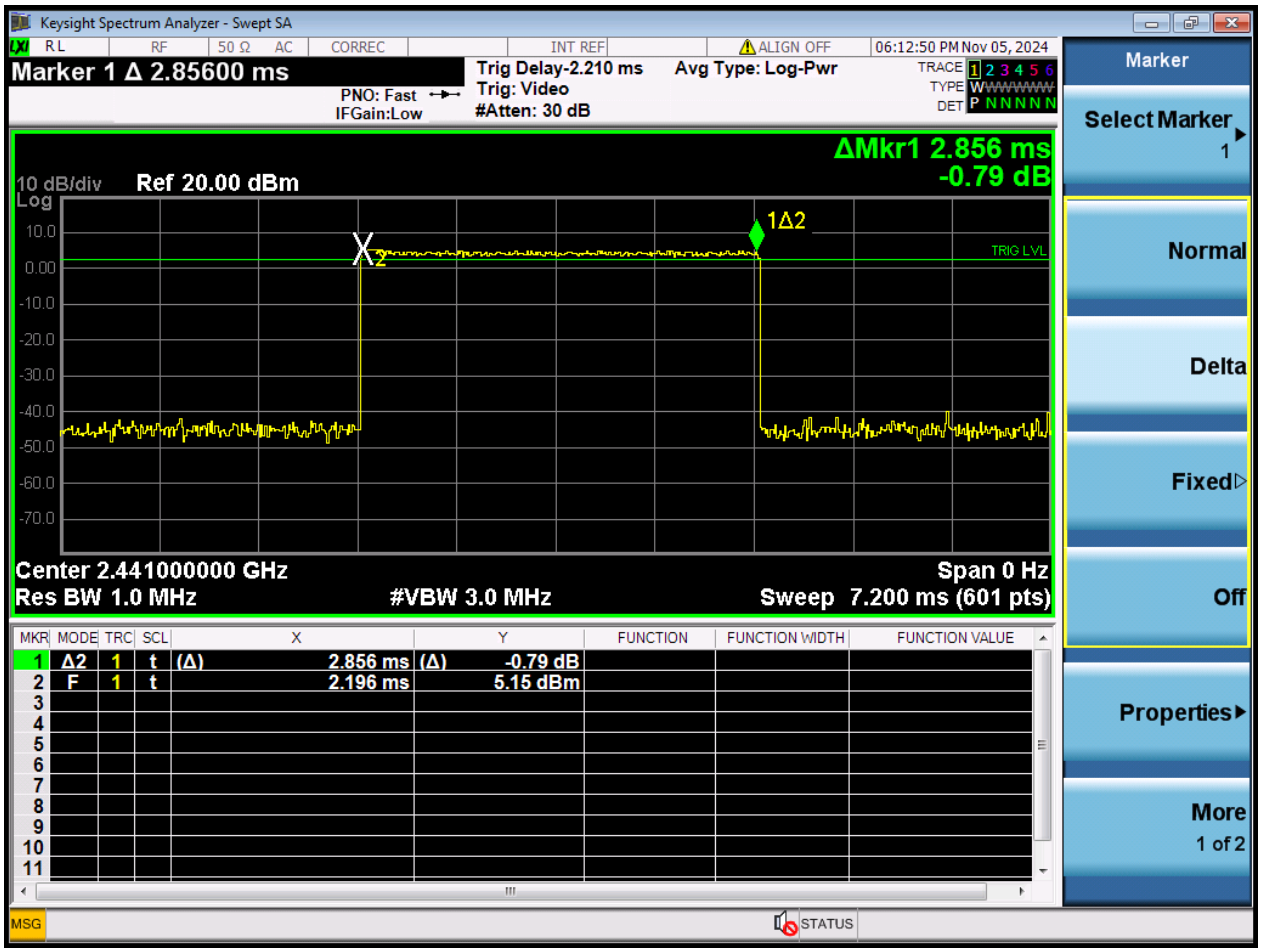
## 3. BLUETOOTH FOR CLASSIC_HOPPING-3-DH5

### 3.1. A.5-AVERAGE TIME OF OCCUPANCY(NTNV)

| Condition | Frequency (MHz) | Pulse Time (ms) | Total Dwell Time (ms) | Limit (ms) | Verdict |
|---|---|---|---|---|---|
| NVNT | 2441 | 0.384 | 122.496 | 400 | Pass |
| NVNT | 2441 | 1.610 | 270.48 | 400 | Pass |
| NVNT | 2441 | 2.856 | 305.592 | 400 | Pass |




Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
06:12:26 PM Nov 05, 2024
Marker 1 Δ 1.61000 ms
PNO: Fast
IFGain:Low
Trig Delay-1.300 ms
Trig: Video
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W W W W W W
DET P N N N N N
ΔMkr1 1.610 ms
-0.92 dB
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
1Δ2
TRIG LVL
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 4.200 ms (601 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 Δ2 1 t (Δ) 1.610 ms (Δ) -0.92 dB
2 F 1 t 1.302 ms 5.14 dBm
3
4
5
6
7
8
9
10
11
Marker
Select Marker 1
Normal
Delta
Fixed
Off
Properties
More 1 of 2
MSG
STATUS

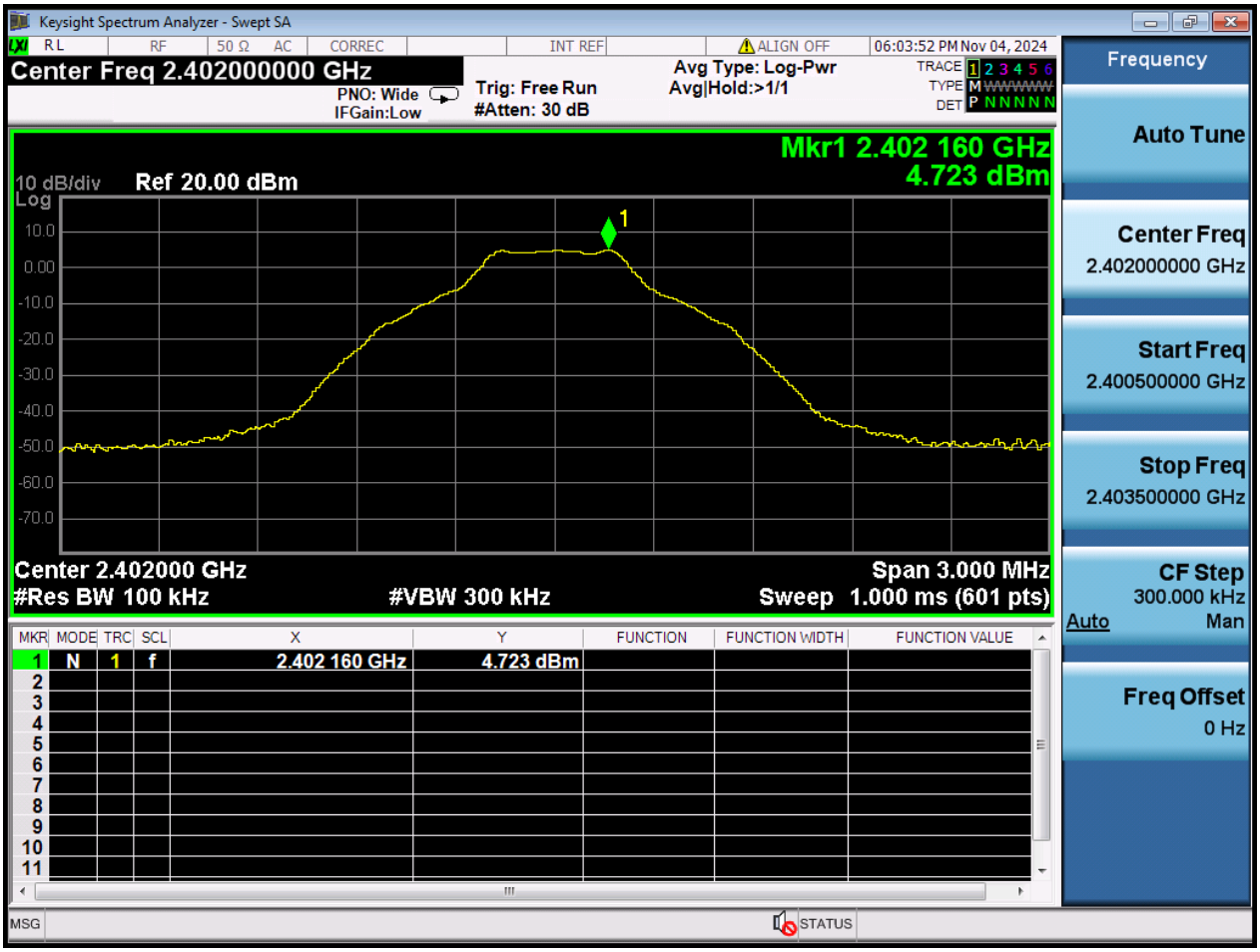

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
06:12:50 PM Nov 05, 2024
Marker 1 Δ 2.85600 ms
PNO: Fast
IFGain:Low
Trig Delay-2.210 ms
Trig: Video
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W W W W W W
DET P N N N N N
ΔMkr1 2.856 ms
-0.79 dB
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1Δ2
TRIG LVL
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 7.200 ms (601 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 Δ2 1 t (Δ) 2.856 ms (Δ) -0.79 dB
2 F 1 t 2.196 ms 5.15 dBm
3
4
5
6
7
8
9
10
11
Marker
Select Marker 1
Normal
Delta
Fixed
Off
Properties
More 1 of 2
MSG
STATUS

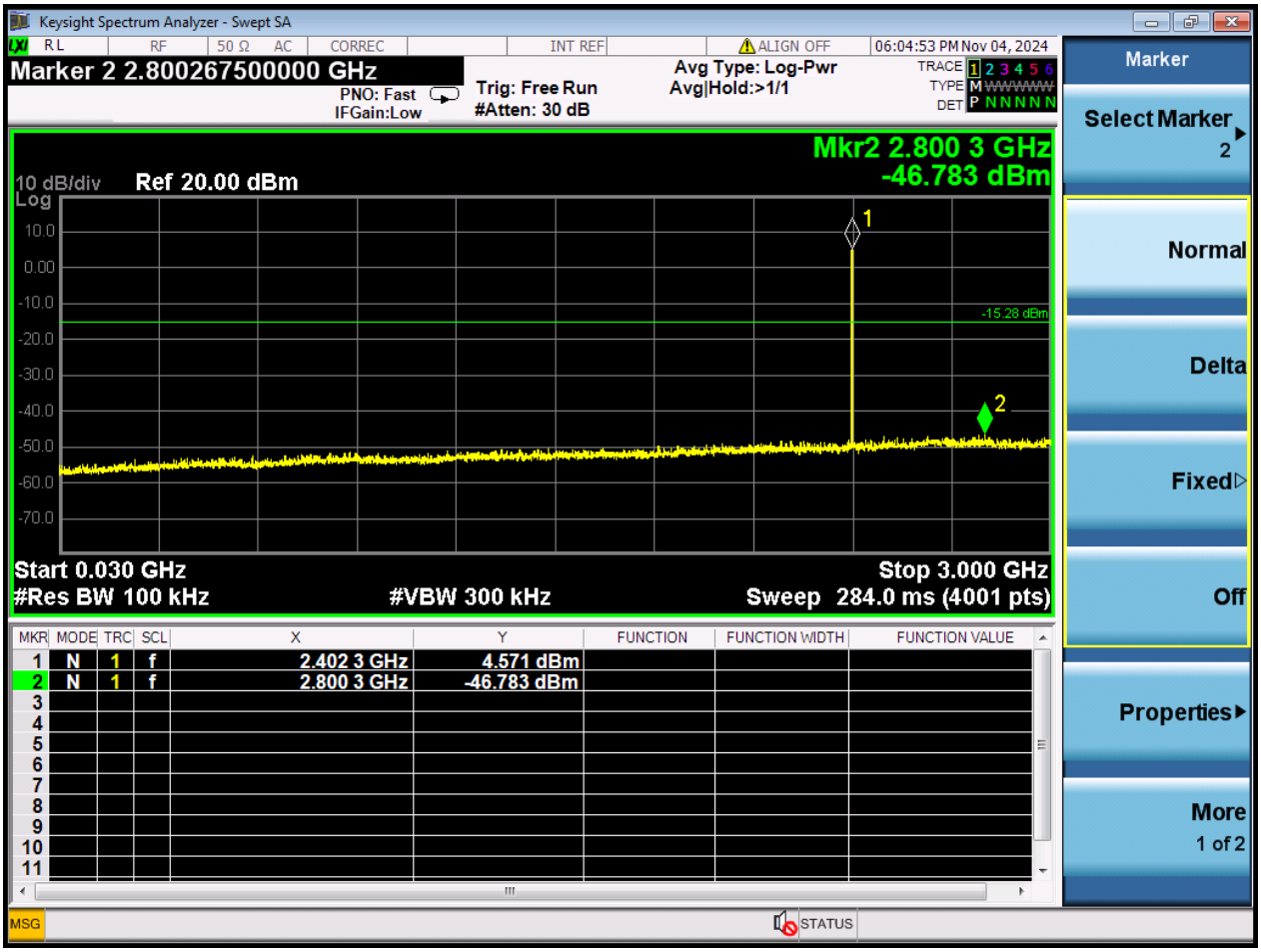
# ANNEX A. CONDUCTED SPURIOUS EMISSIONS

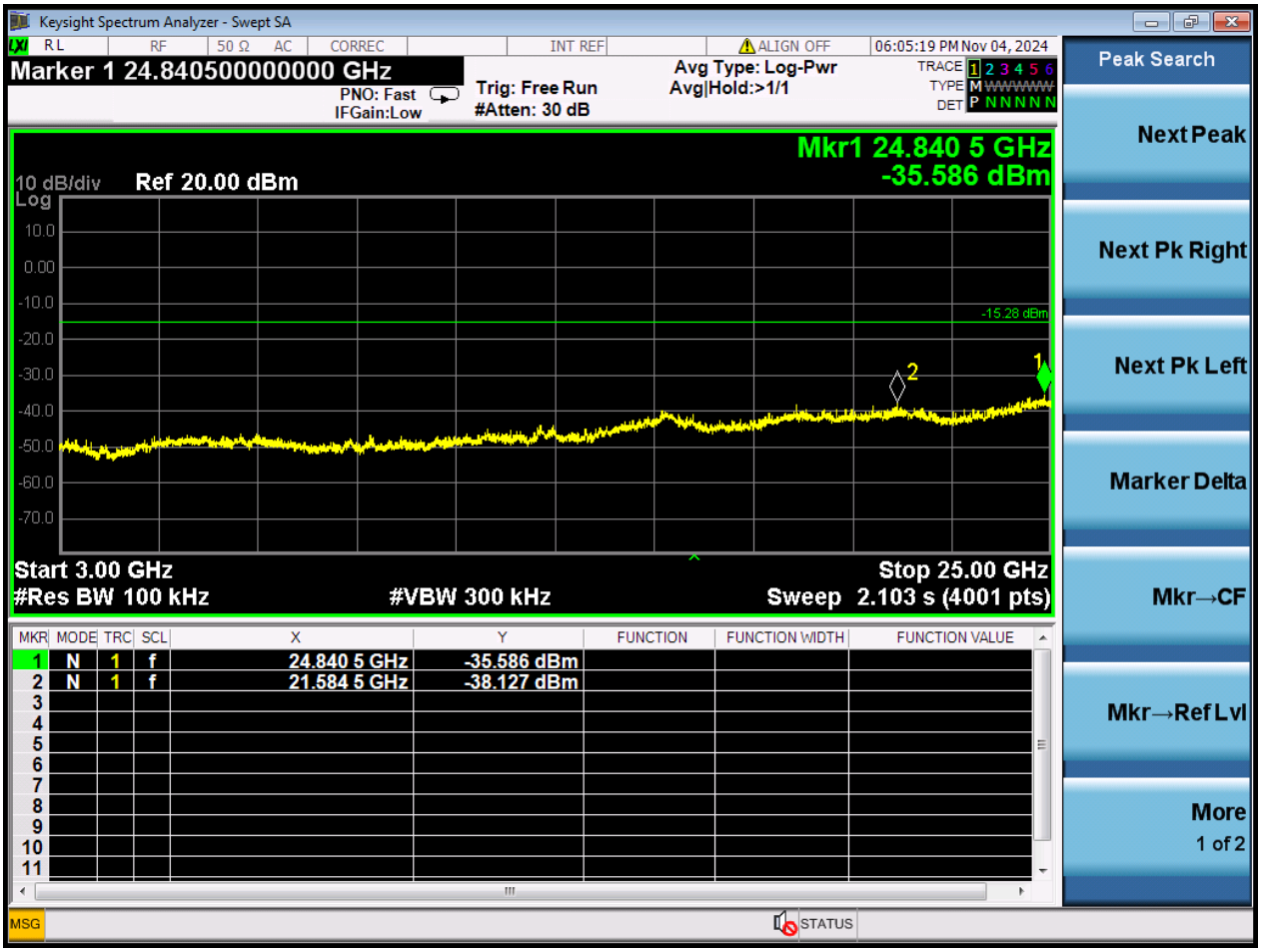
## 1. BLUETOOTH FOR CLASSIC-1-DH5

### 1.1. A.6-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2800.2675 | -46.783 |
| 21584.5 | -38.127 |

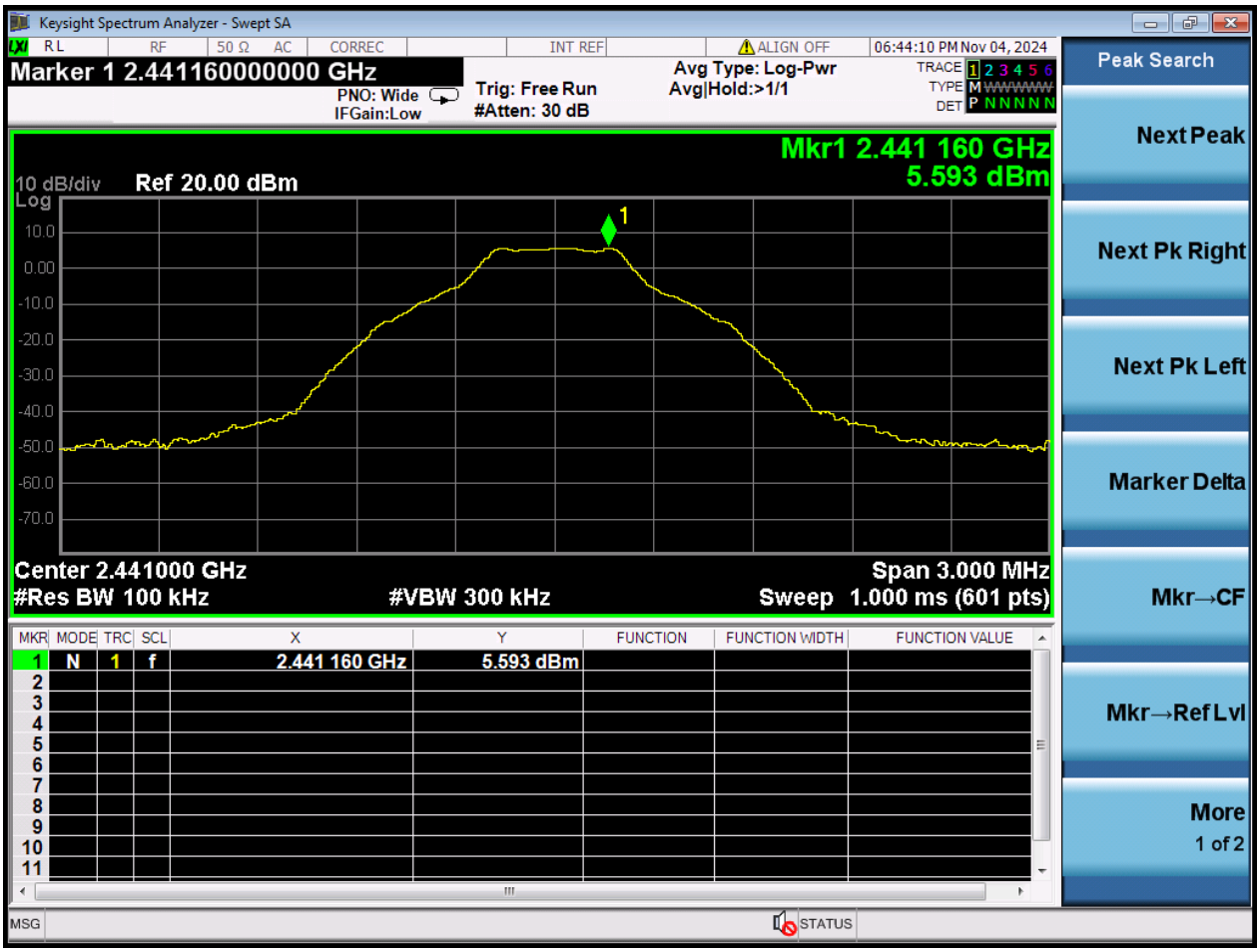


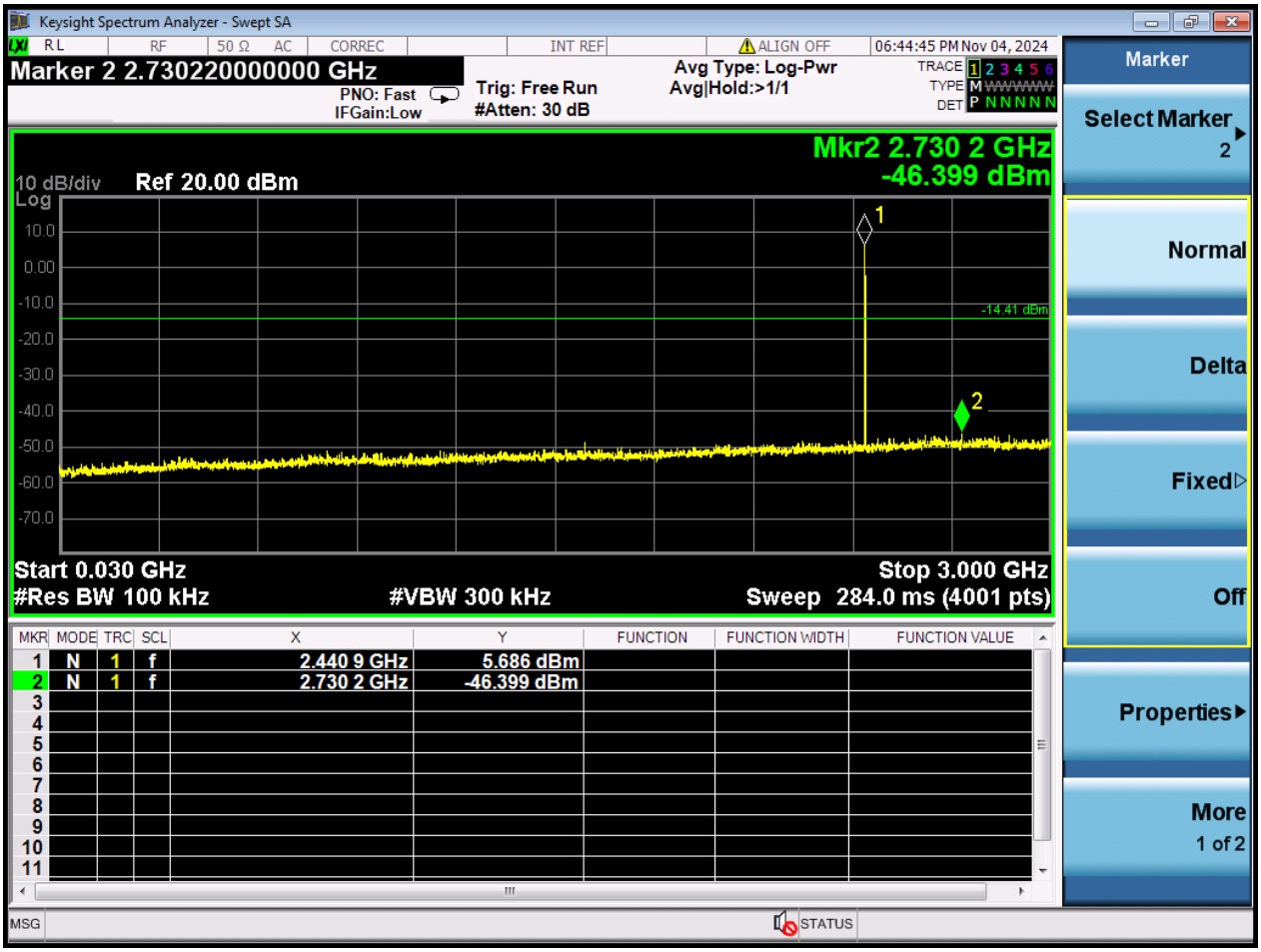

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
06:04:53 PM Nov 04, 2024
Marker 2 2.800267500000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P NNNNNN
Mkr2 2.800 3 GHz
-46.783 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-15.28 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 284.0 ms (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.402 3 GHz 4.571 dBm
2 N 1 f 2.800 3 GHz -46.783 dBm
Marker
Select Marker 2
Normal
Delta
Fixed
Off
Properties
More 1 of 2
MSG
STATUS

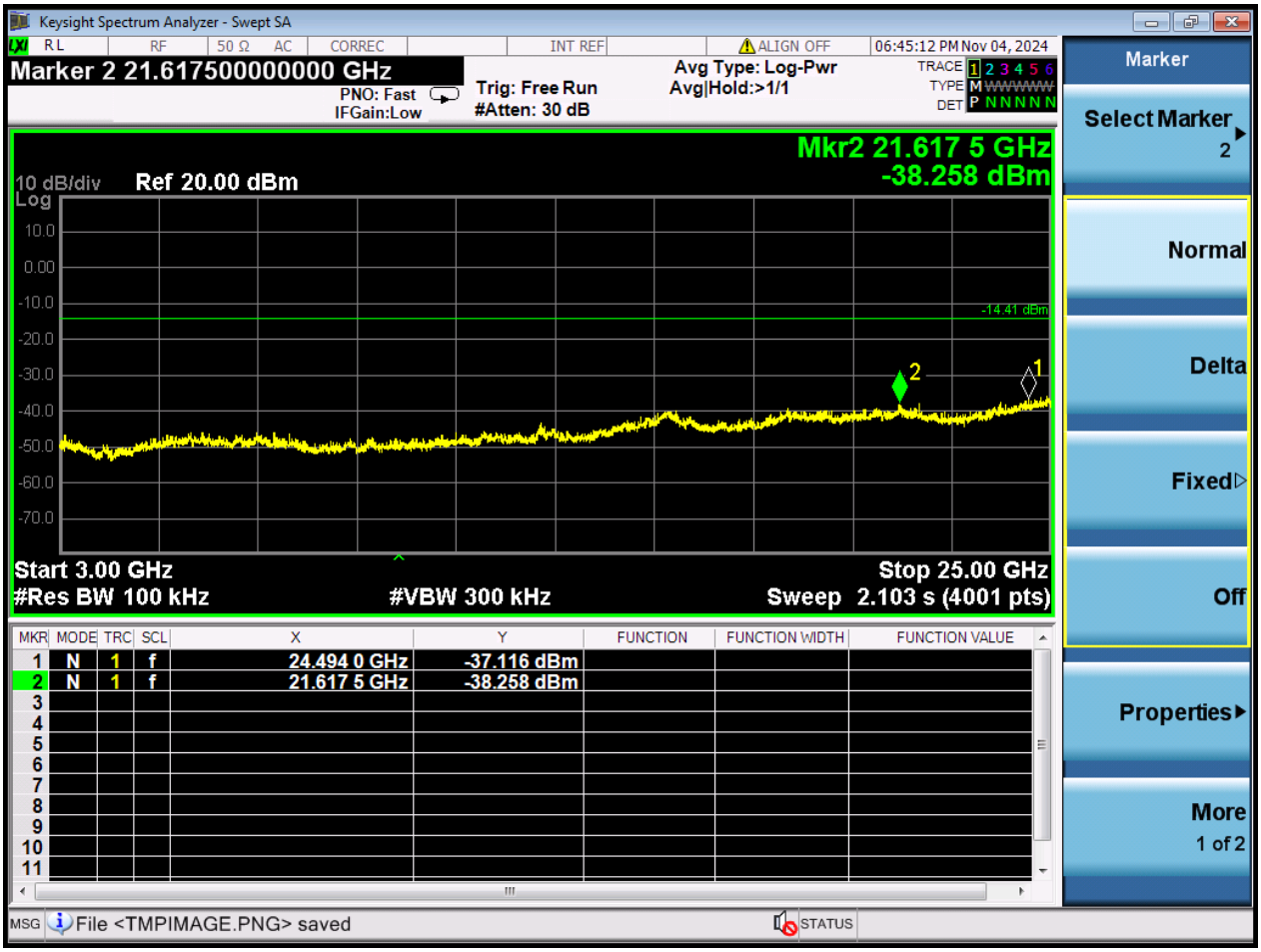

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
06:05:19 PM Nov 04, 2024
Marker 1 24.840500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr1 24.840 5 GHz
-35.586 dBm
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-15.28 dBm
Start 3.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.103 s (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 24.840 5 GHz -35.586 dBm
2 N 1 f 21.584 5 GHz -38.127 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.6-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2730.22 | -46.399 |
| 21617.5 | -38.258 |

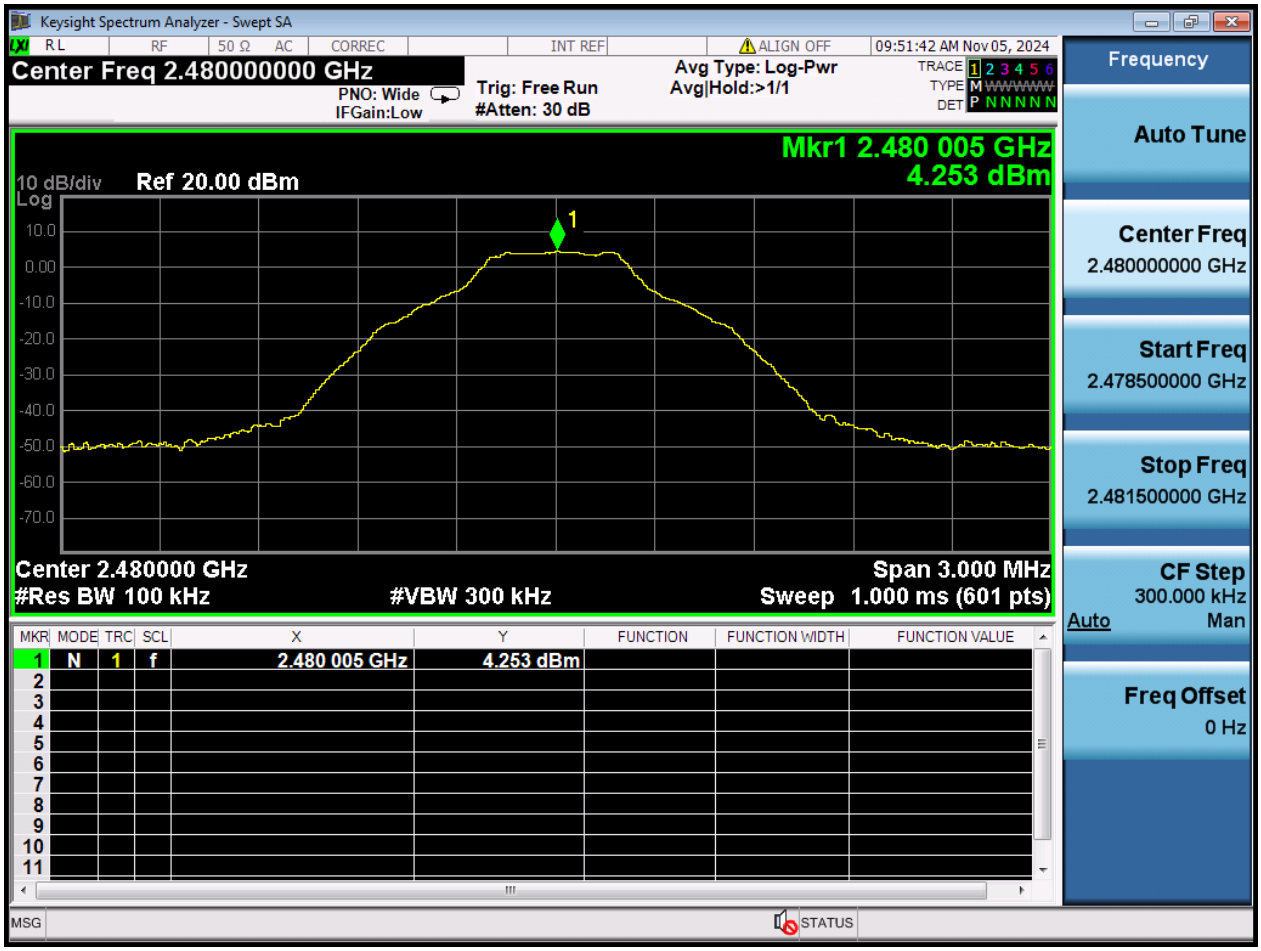


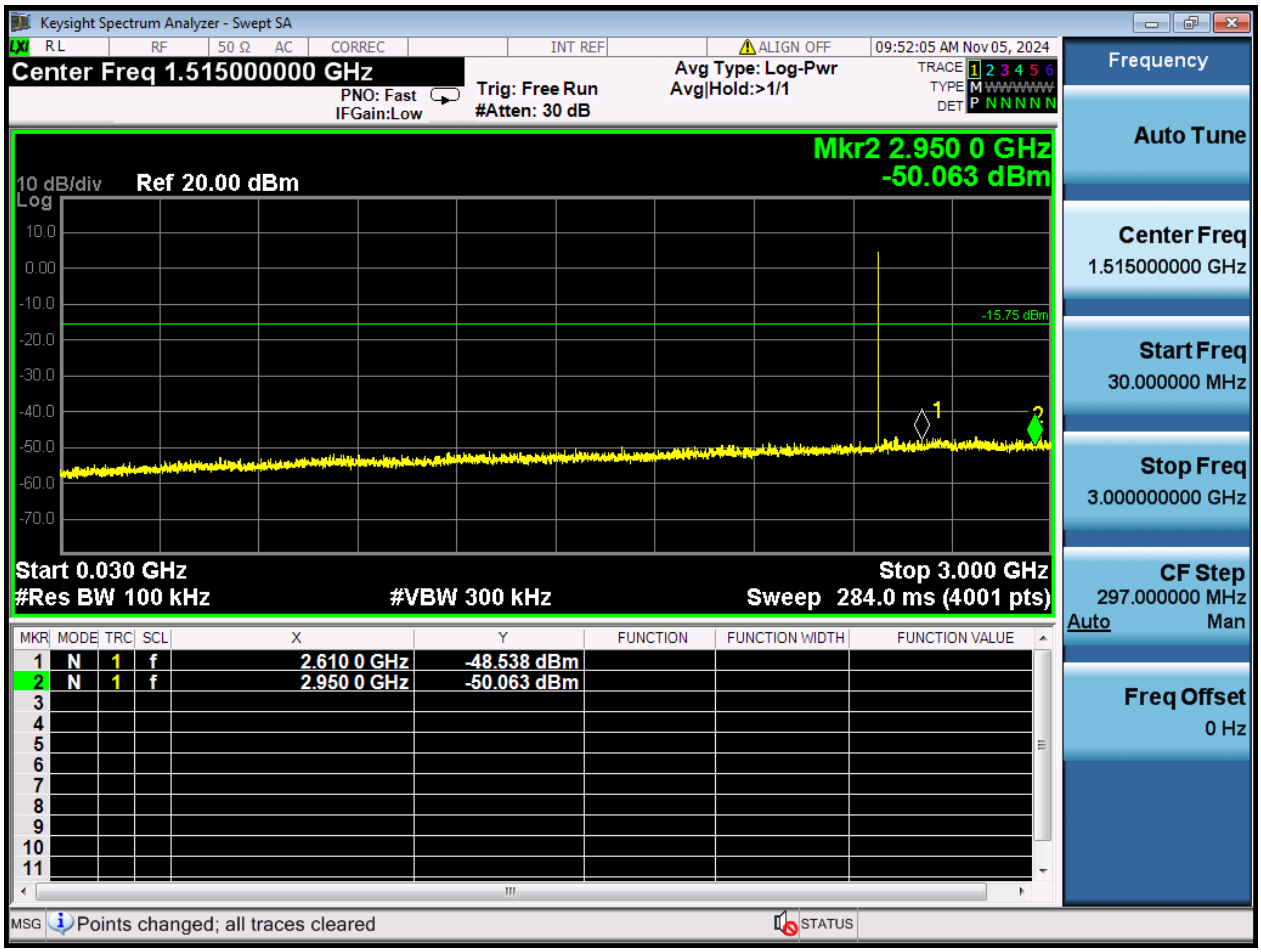

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
06:44:45 PM Nov 04, 2024
Marker 2 2.730220000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr2 2.730 2 GHz
-46.399 dBm
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-14.41 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 284.0 ms (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.440 9 GHz 5.686 dBm
2 N 1 f 2.730 2 GHz -46.399 dBm
Marker
Select Marker 2
Normal
Delta
Fixed
Off
Properties
More 1 of 2
MSG
STATUS

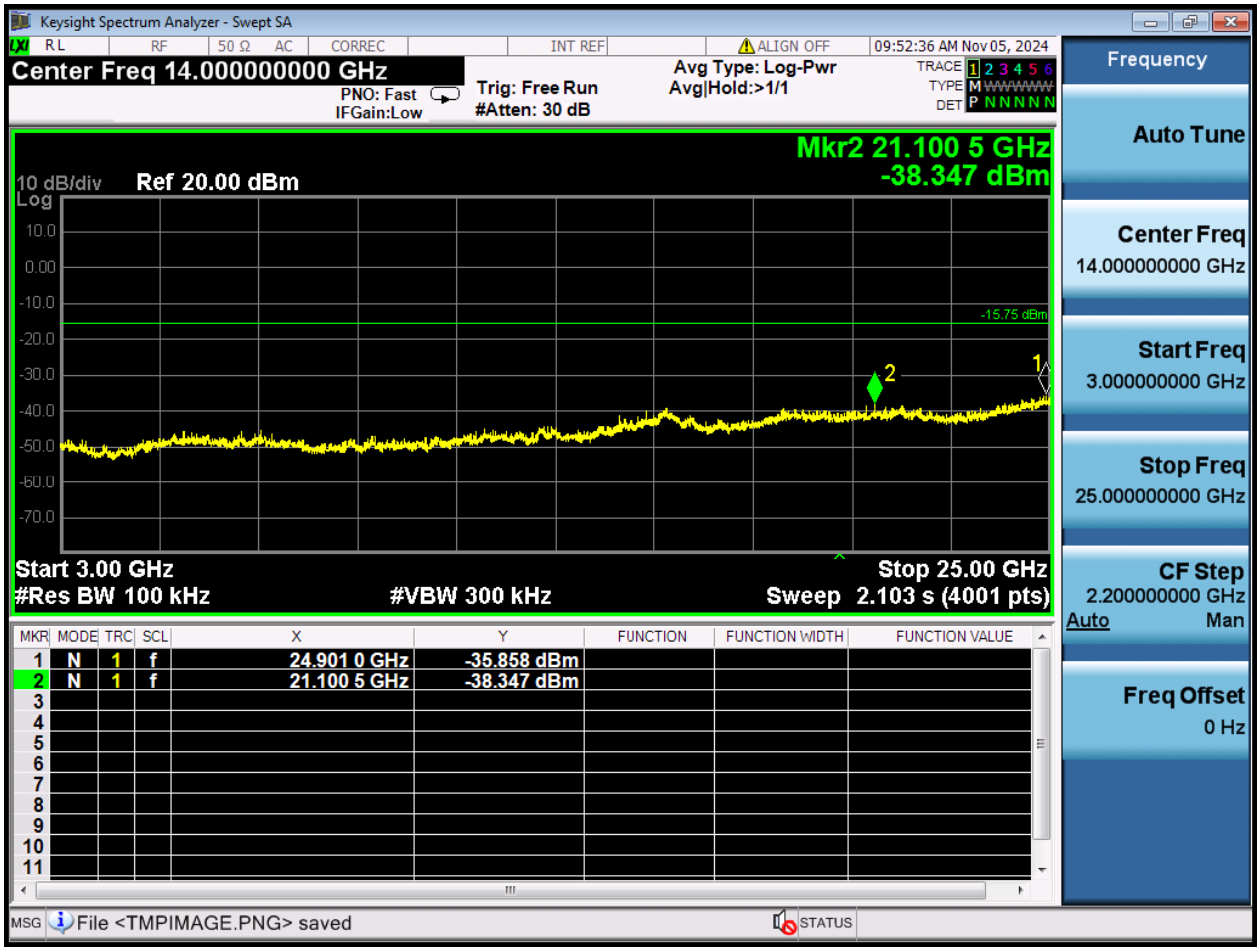

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
06:45:12 PM Nov 04, 2024
Marker 2 21.617500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr2 21.617 5 GHz
-38.258 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-14.41 dBm
Start 3.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.103 s (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 24.494 0 GHz -37.116 dBm
2 N 1 f 21.617 5 GHz -38.258 dBm
Marker
Select Marker 2
Normal
Delta
Fixed
Off
Properties
More 1 of 2
MSG
File <TMPIMAGE.PNG> saved
STATUS

1.3. A.6-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2950 | -50.063 |
| 21100.5 | -38.347 |



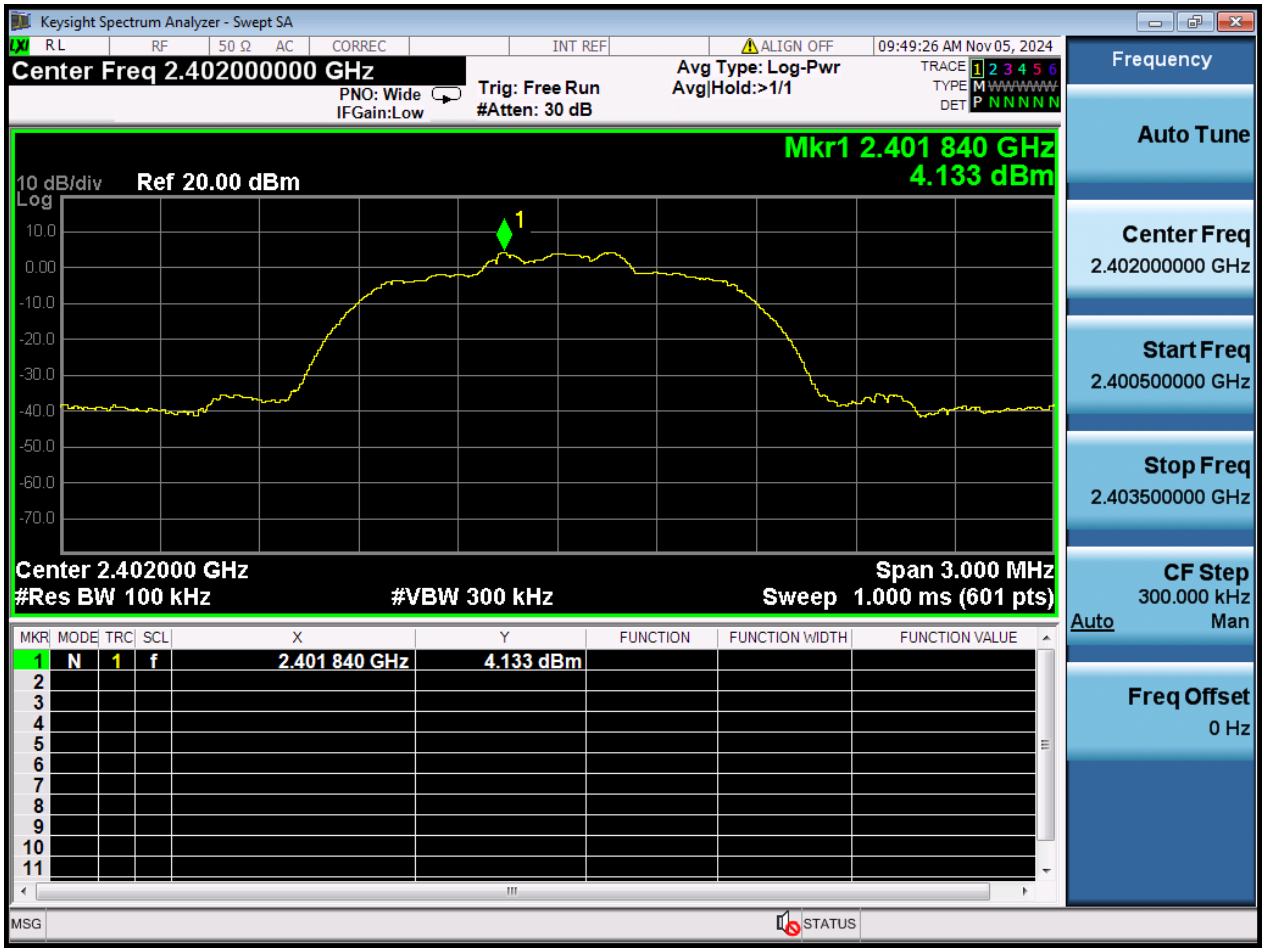

Keysight Spectrum Analyzer - Swept SA
RL RF 50 Ω AC CORREC INT REF ALIGN OFF 09:52:05 AM Nov 05, 2024
Center Freq 1.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Mkr2 2.950 0 GHz
-50.063 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-15.75 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 284.0 ms (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.610 0 GHz -48.538 dBm
2 N 1 f 2.950 0 GHz -50.063 dBm
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

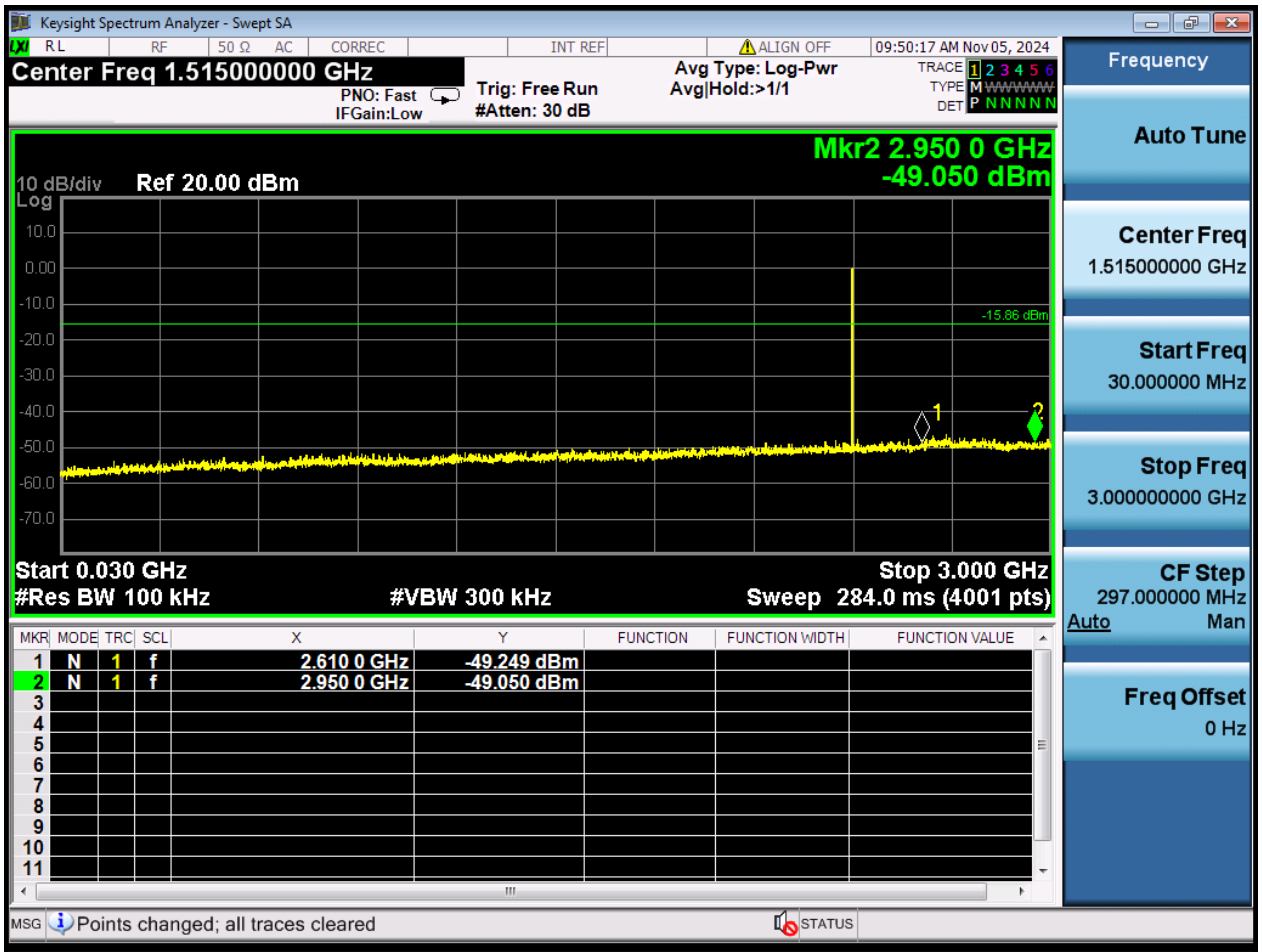

Keysight Spectrum Analyzer - Swept SA
RL RF 50 Ω AC CORREC INT REF ALIGN OFF 09:52:36 AM Nov 05, 2024
Center Freq 14.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Mkr2 21.100 5 GHz
-38.347 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-15.75 dBm
Start 3.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.103 s (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 24.901 0 GHz -35.858 dBm
2 N 1 f 21.100 5 GHz -38.347 dBm
Frequency
Auto Tune
Center Freq
14.000000000 GHz
Start Freq
3.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
2.200000000 GHz
Auto Man
Freq Offset
0 Hz
MSG File <TMPIMAGE.PNG> saved
STATUS

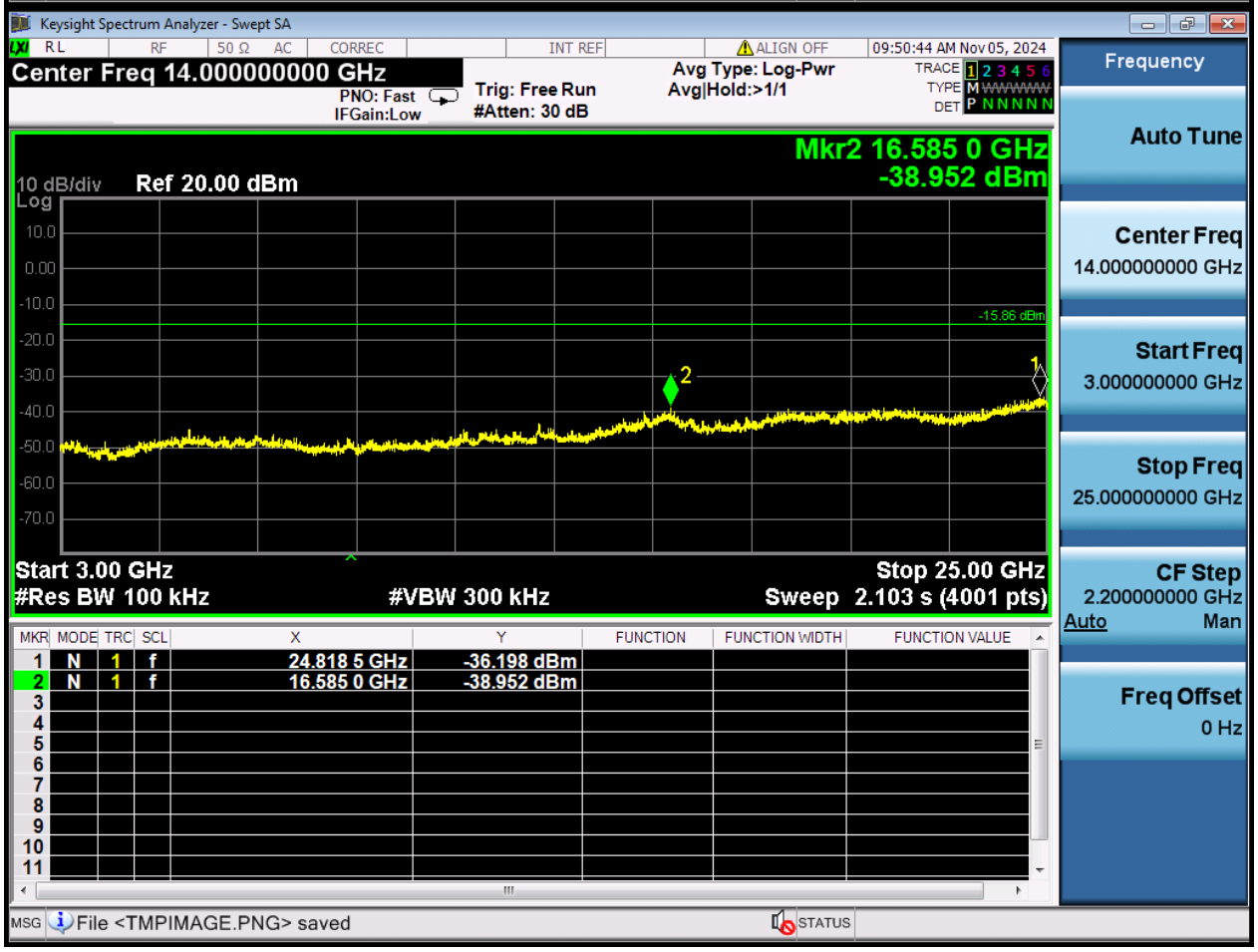
2. BLUETOOTH FOR CLASSIC-2-DH5

2.1. A.6-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2950 | -49.05 |
| 16585 | -38.952 |

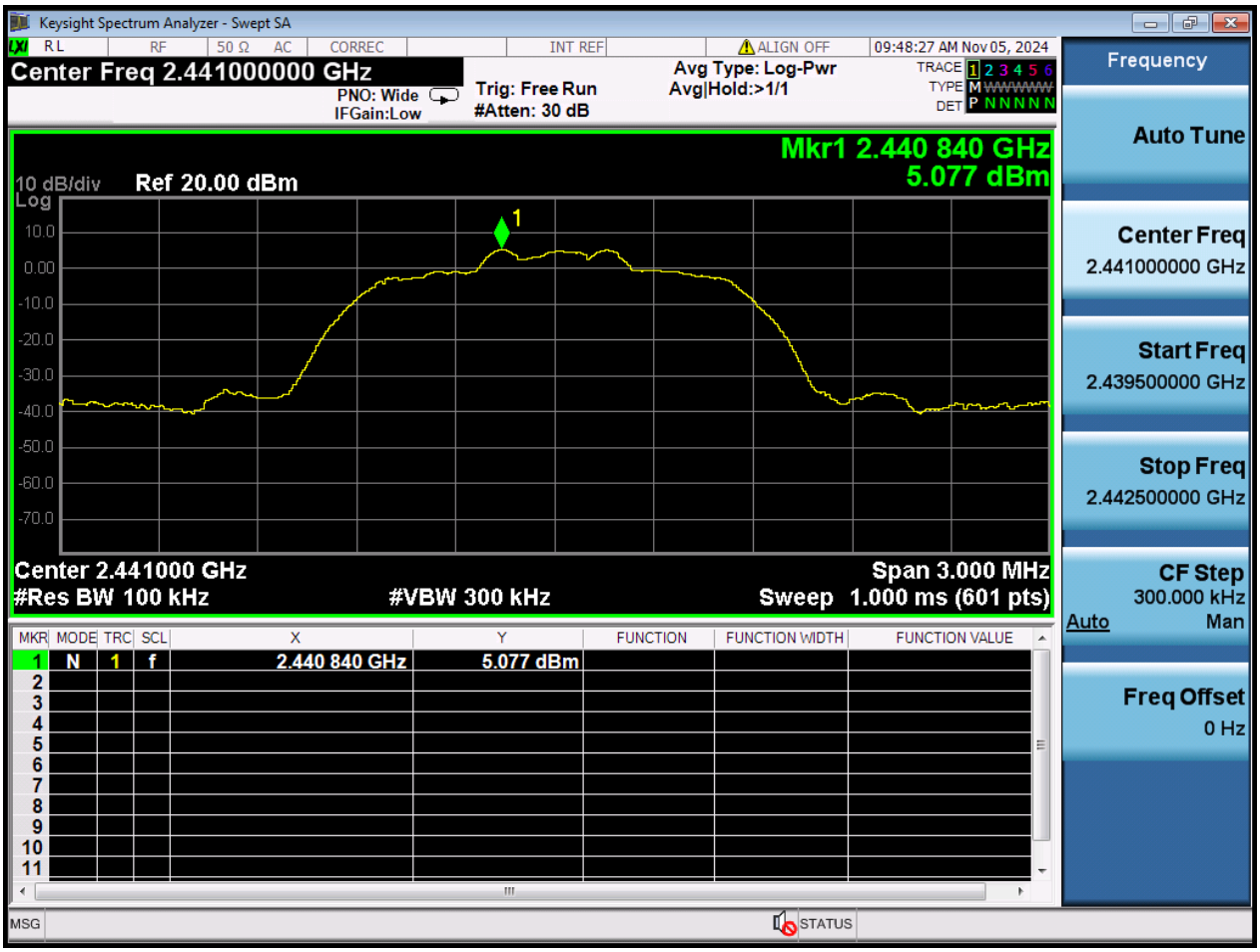


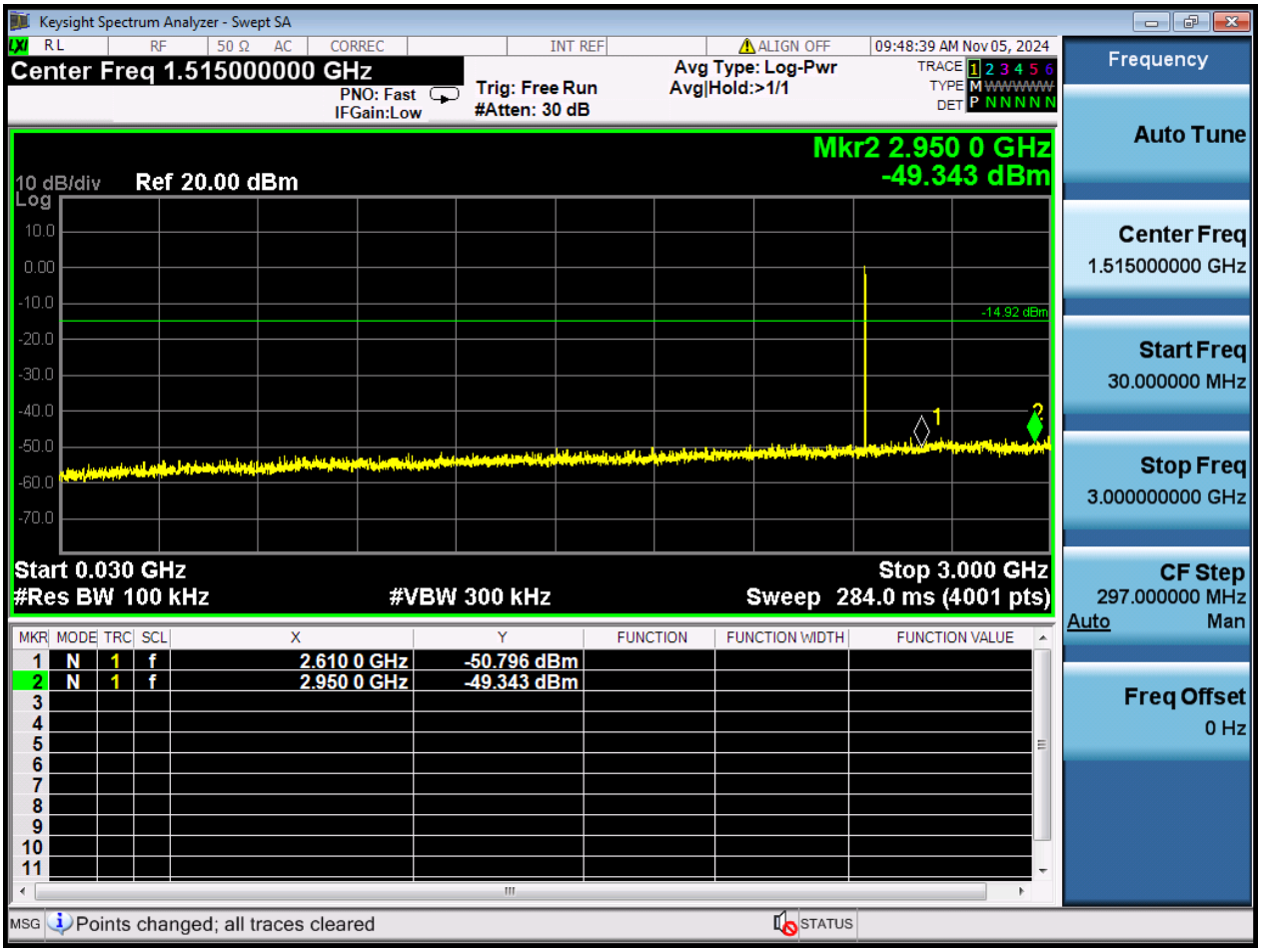

Keysight Spectrum Analyzer - Swept SA
RL RF 50 Ω AC CORREC INT REF ALIGN OFF 09:50:17 AM Nov 05, 2024
Center Freq 1.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
Mkr2 2.950 0 GHz
-49.050 dBm
10 dB/div Ref 20.00 dBm
Log
-15.86 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 284.0 ms (4001 pts)
1 N 1 f 2.610 0 GHz -49.249 dBm
2 N 1 f 2.950 0 GHz -49.050 dBm
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
Points changed; all traces cleared

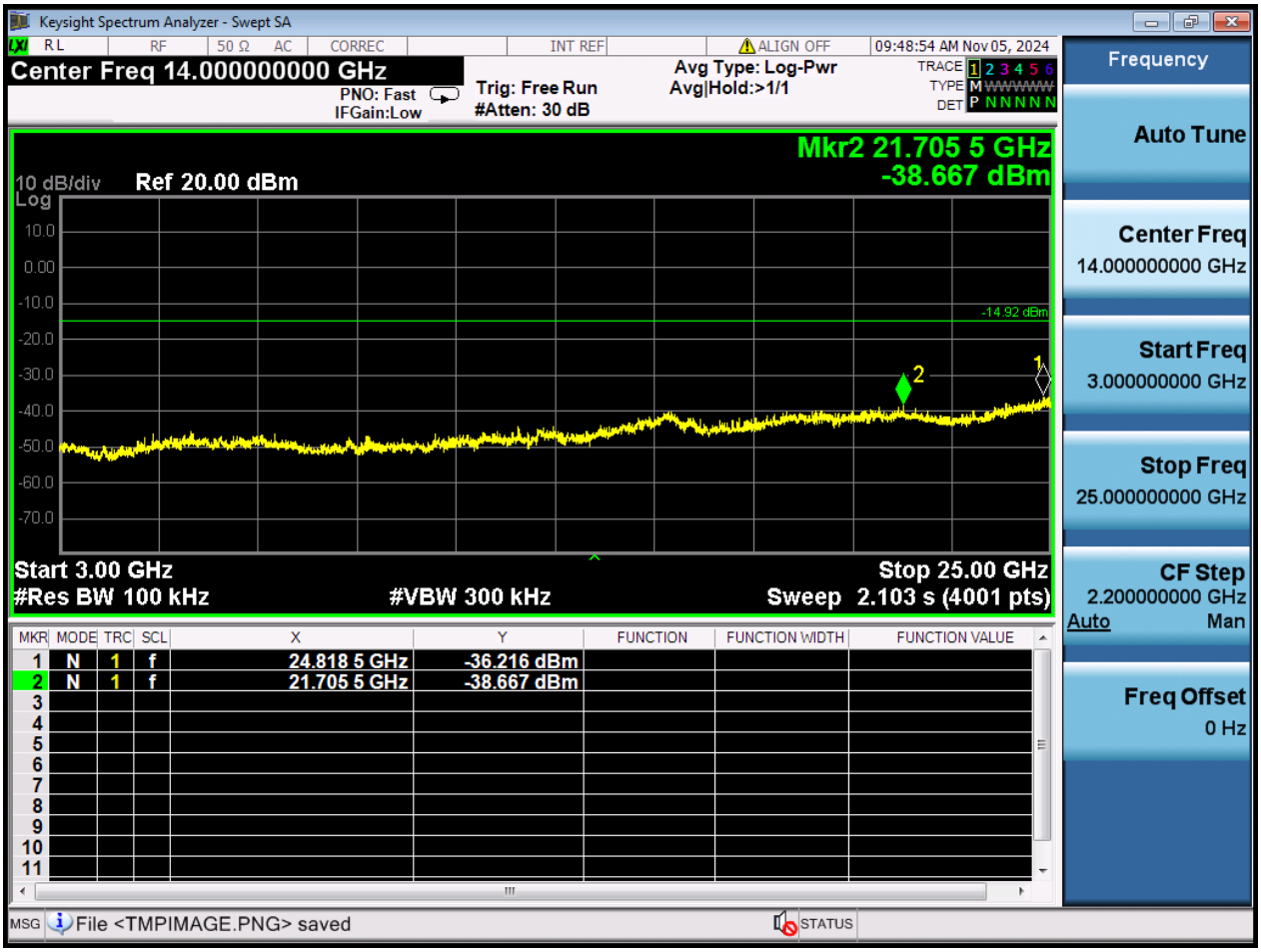

Keysight Spectrum Analyzer - Swept SA
RL RF 50 Ω AC CORREC INT REF ALIGN OFF 09:50:44 AM Nov 05, 2024
Center Freq 14.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
Mkr2 16.585 0 GHz
-38.952 dBm
10 dB/div Ref 20.00 dBm
Log
-15.86 dBm
Start 3.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.103 s (4001 pts)
1 N 1 f 24.818 5 GHz -36.198 dBm
2 N 1 f 16.585 0 GHz -38.952 dBm
Frequency
Auto Tune
Center Freq 14.000000000 GHz
Start Freq 3.000000000 GHz
Stop Freq 25.000000000 GHz
CF Step 2.200000000 GHz
Auto Man
Freq Offset 0 Hz
File <TMPIMAGE.PNG> saved

## 2.2. A.6-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2950 | -49.343 |
| 21705.5 | -38.667 |

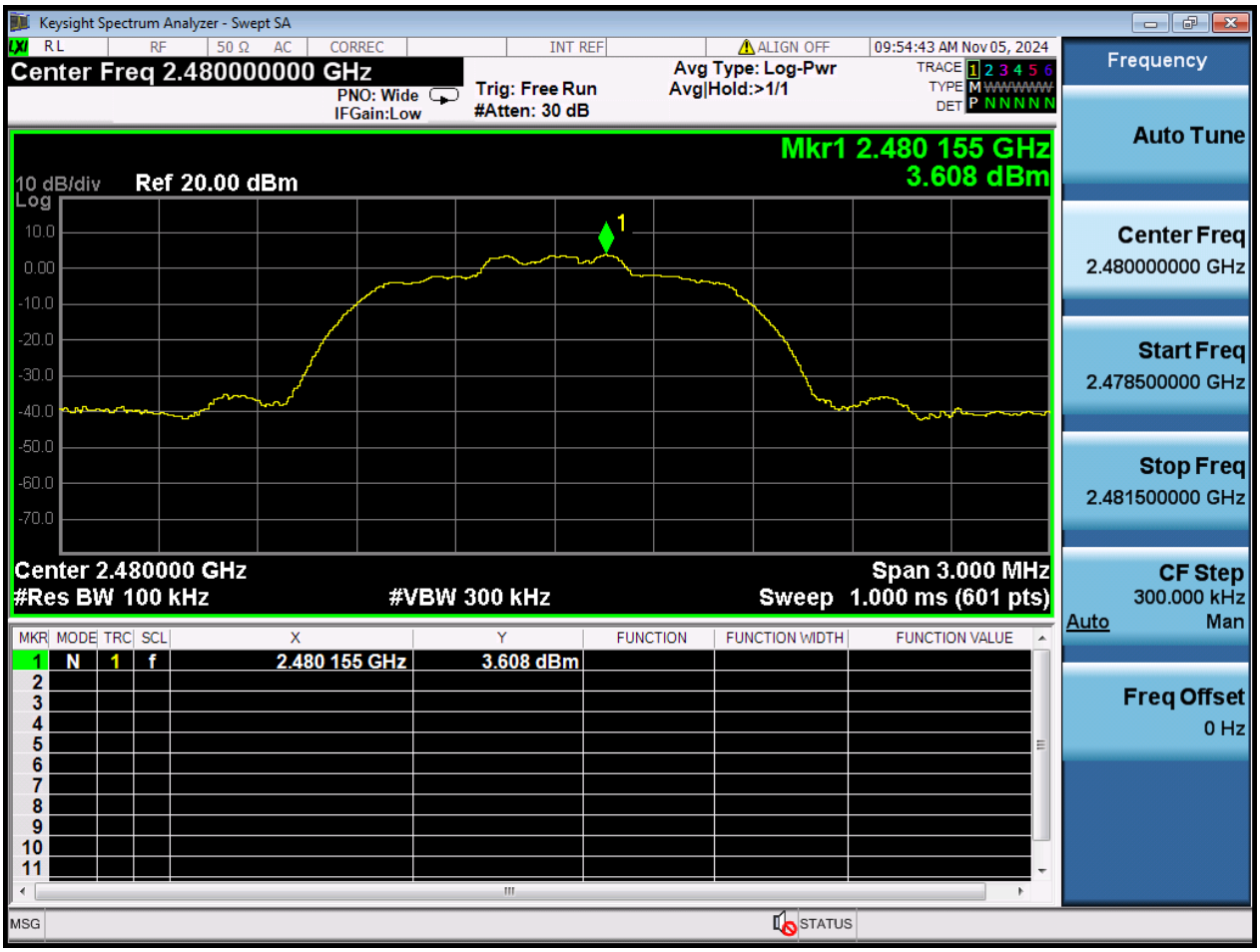


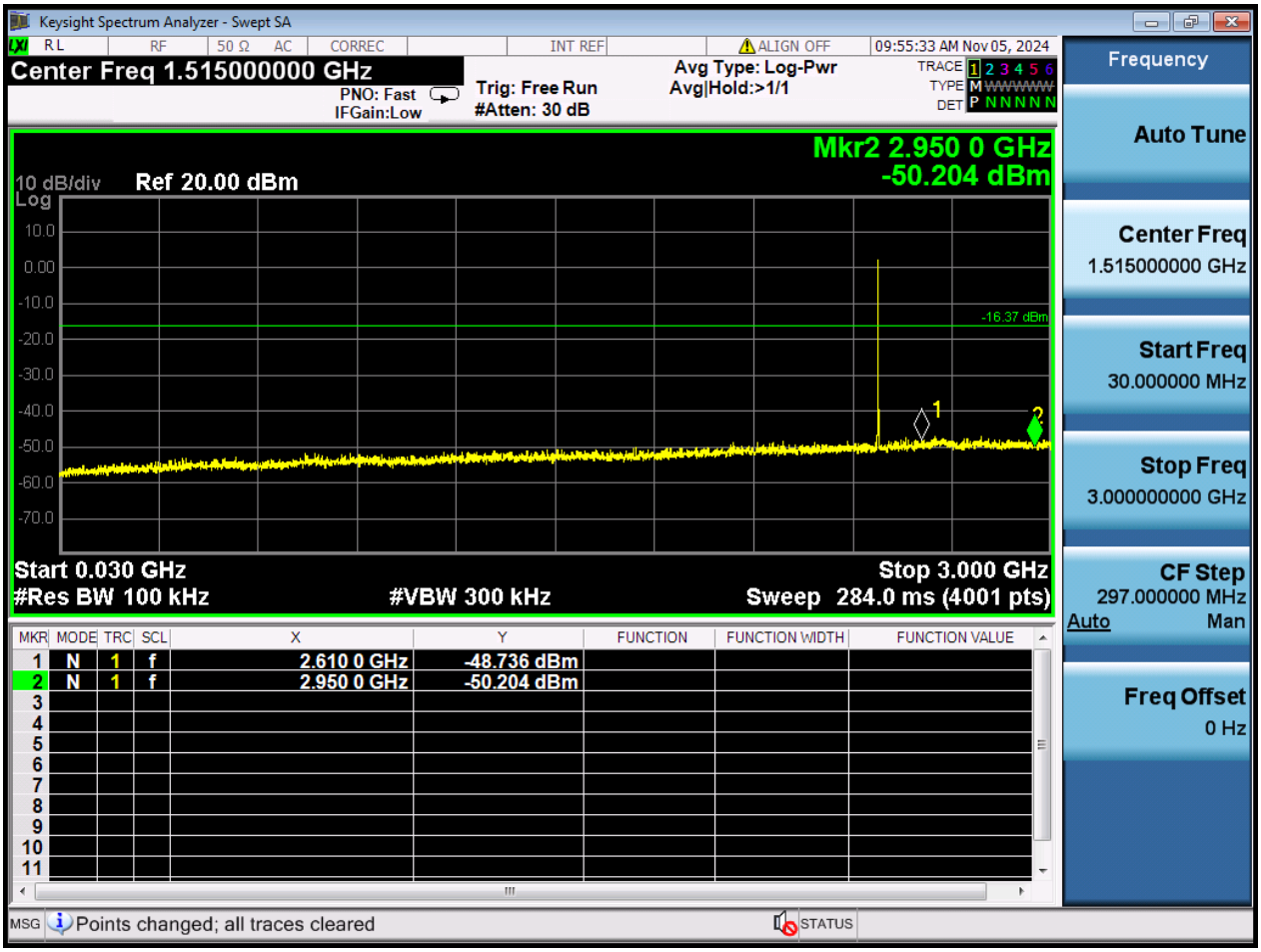

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
09:48:39 AM Nov 05, 2024
Center Freq 1.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr2 2.950 0 GHz
-49.343 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-14.92 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 284.0 ms (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.610 0 GHz -50.796 dBm
2 N 1 f 2.950 0 GHz -49.343 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

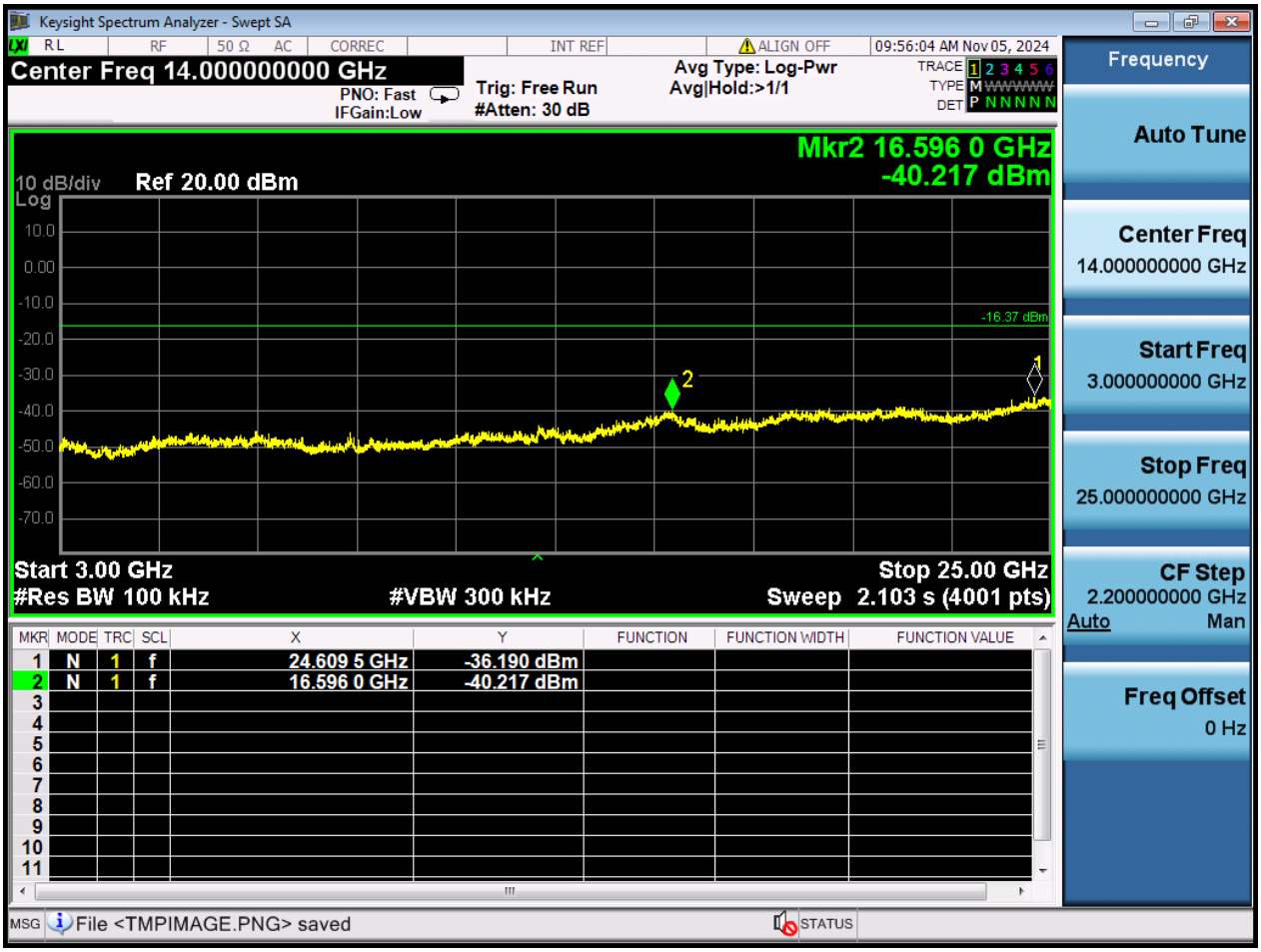

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
09:48:54 AM Nov 05, 2024
Center Freq 14.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P NNNNNN
Mkr2 21.705 5 GHz
-38.667 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-14.92 dBm
Start 3.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.103 s (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 24.818 5 GHz -36.216 dBm
2 N 1 f 21.705 5 GHz -38.667 dBm
3
4
5
6
7
8
9
10
11
Frequency
Auto Tune
Center Freq
14.000000000 GHz
Start Freq
3.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
2.200000000 GHz
Auto Man
Freq Offset
0 Hz
MSG
File <TMPIMAGE.PNG> saved
STATUS

2.3. A.6-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2950 | -50.204 |
| 16596 | -40.217 |



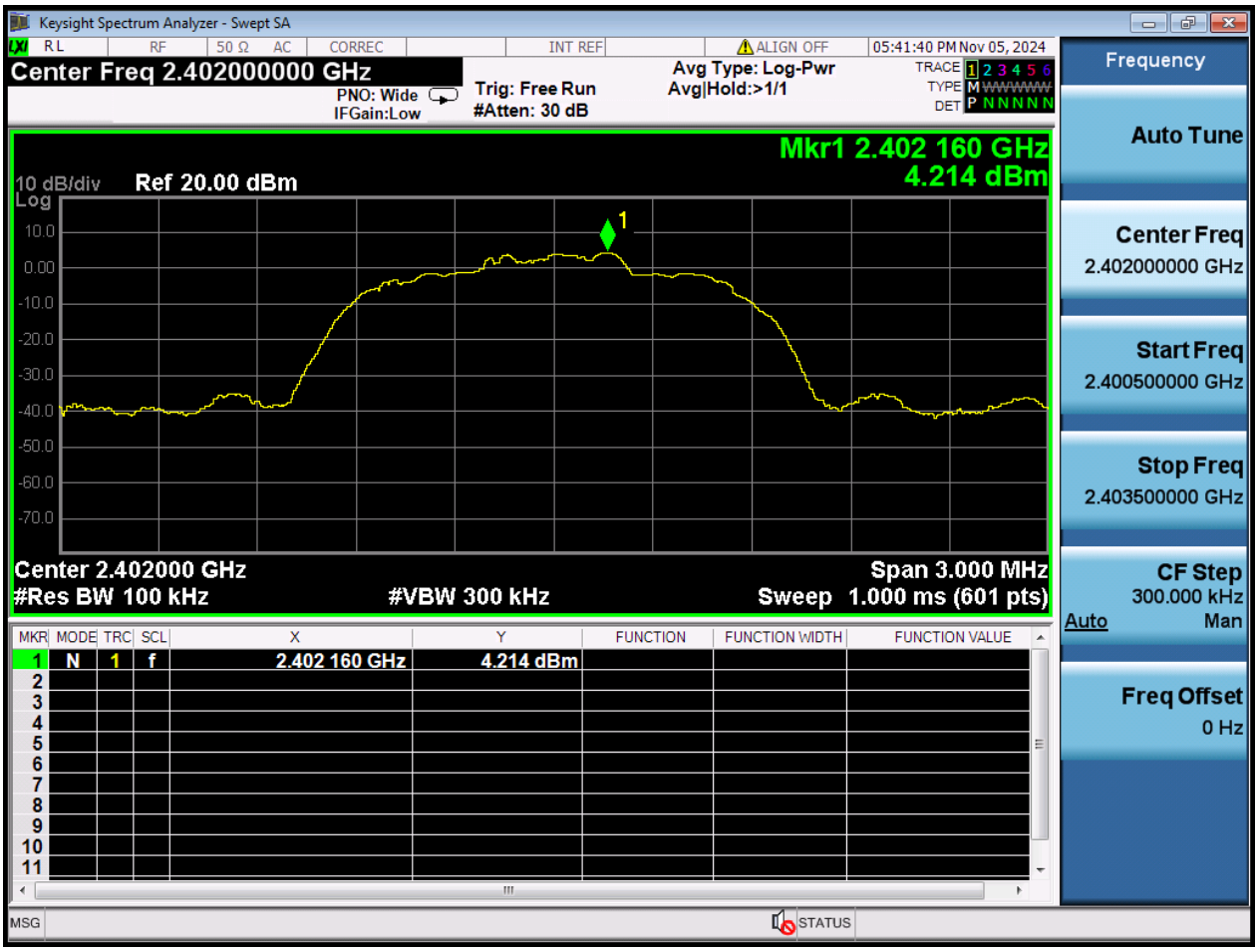

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
09:55:33 AM Nov 05, 2024
Center Freq 1.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P NNNNNN
Mkr2 2.950 0 GHz
-50.204 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-16.37 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 284.0 ms (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.610 0 GHz -48.736 dBm
2 N 1 f 2.950 0 GHz -50.204 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

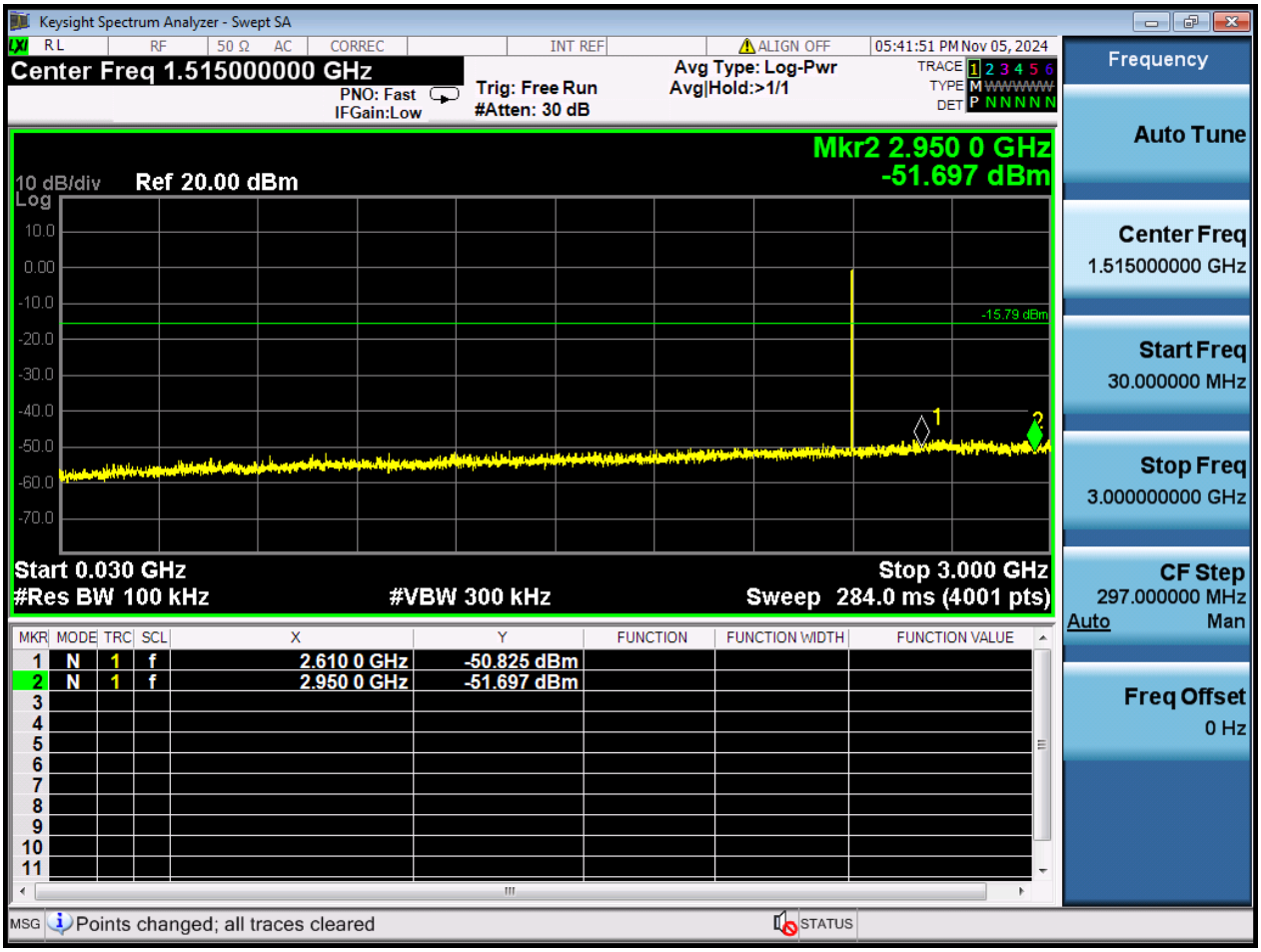

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
09:56:04 AM Nov 05, 2024
Center Freq 14.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P NNNNNN
Mkr2 16.596 0 GHz
-40.217 dBm
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-16.37 dBm
Start 3.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.103 s (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 24.609 5 GHz -36.190 dBm
2 N 1 f 16.596 0 GHz -40.217 dBm
3
4
5
6
7
8
9
10
11
Frequency
Auto Tune
Center Freq
14.000000000 GHz
Start Freq
3.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
2.200000000 GHz
Auto
Man
Freq Offset
0 Hz
MSG
File <TMPIMAGE.PNG> saved
STATUS

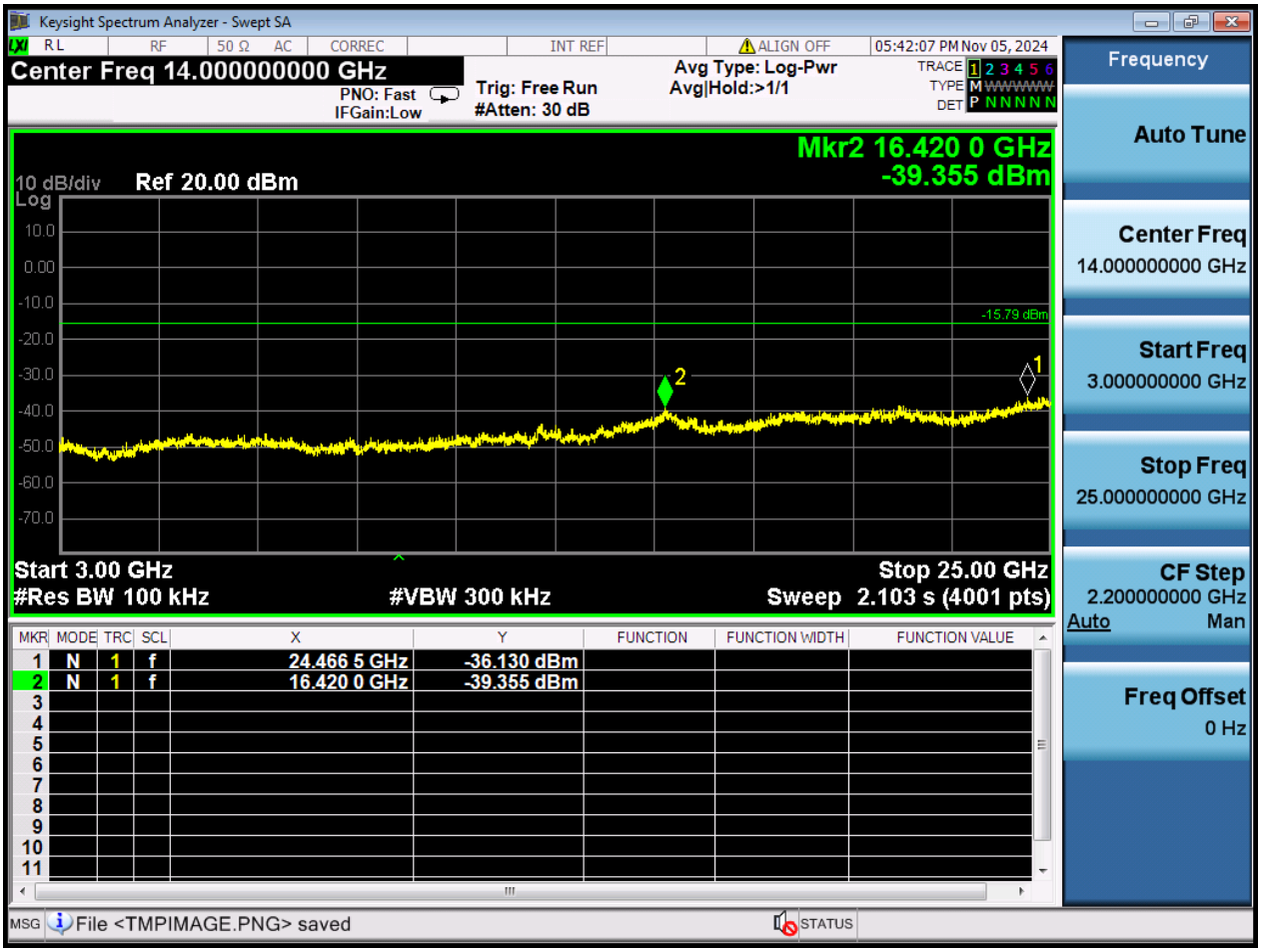
3. BLUETOOTH FOR CLASSIC-3-DH5

3.1. A.6-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2950 | -51.697 |
| 16420 | -39.355 |

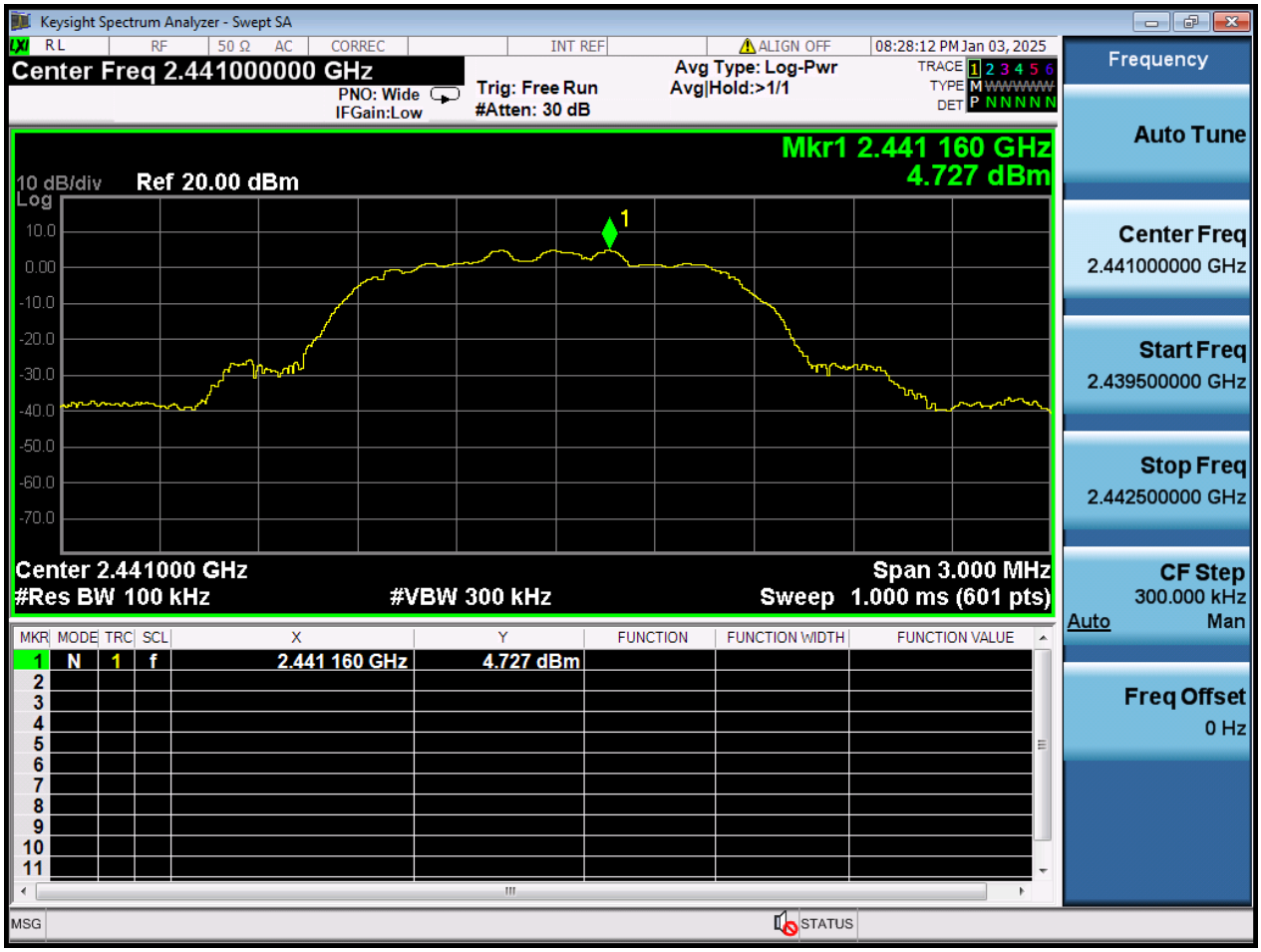


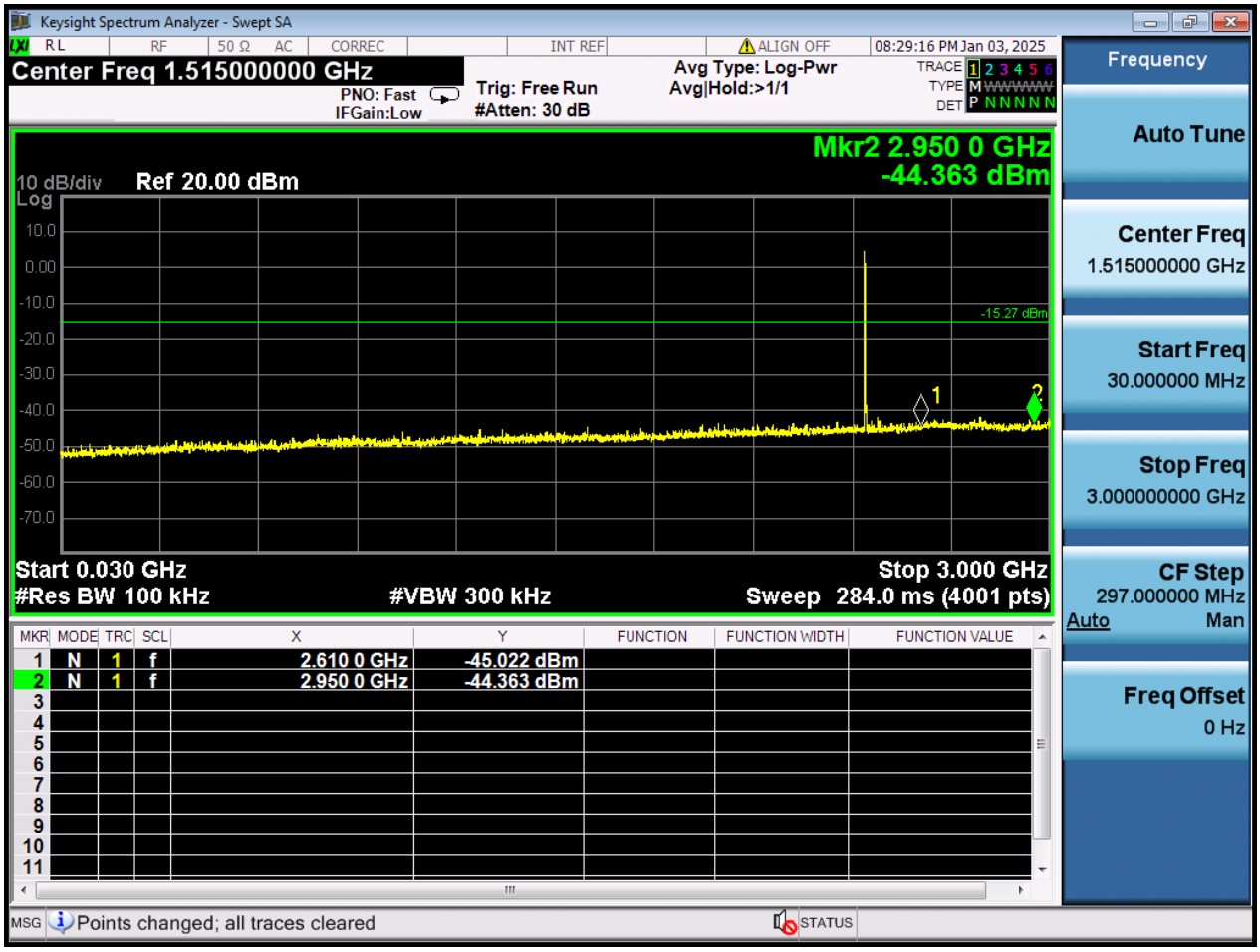

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
05:41:51 PM Nov 05, 2024
Center Freq 1.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr2 2.950 0 GHz
-51.697 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-15.79 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 284.0 ms (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.610 0 GHz -50.825 dBm
2 N 1 f 2.950 0 GHz -51.697 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

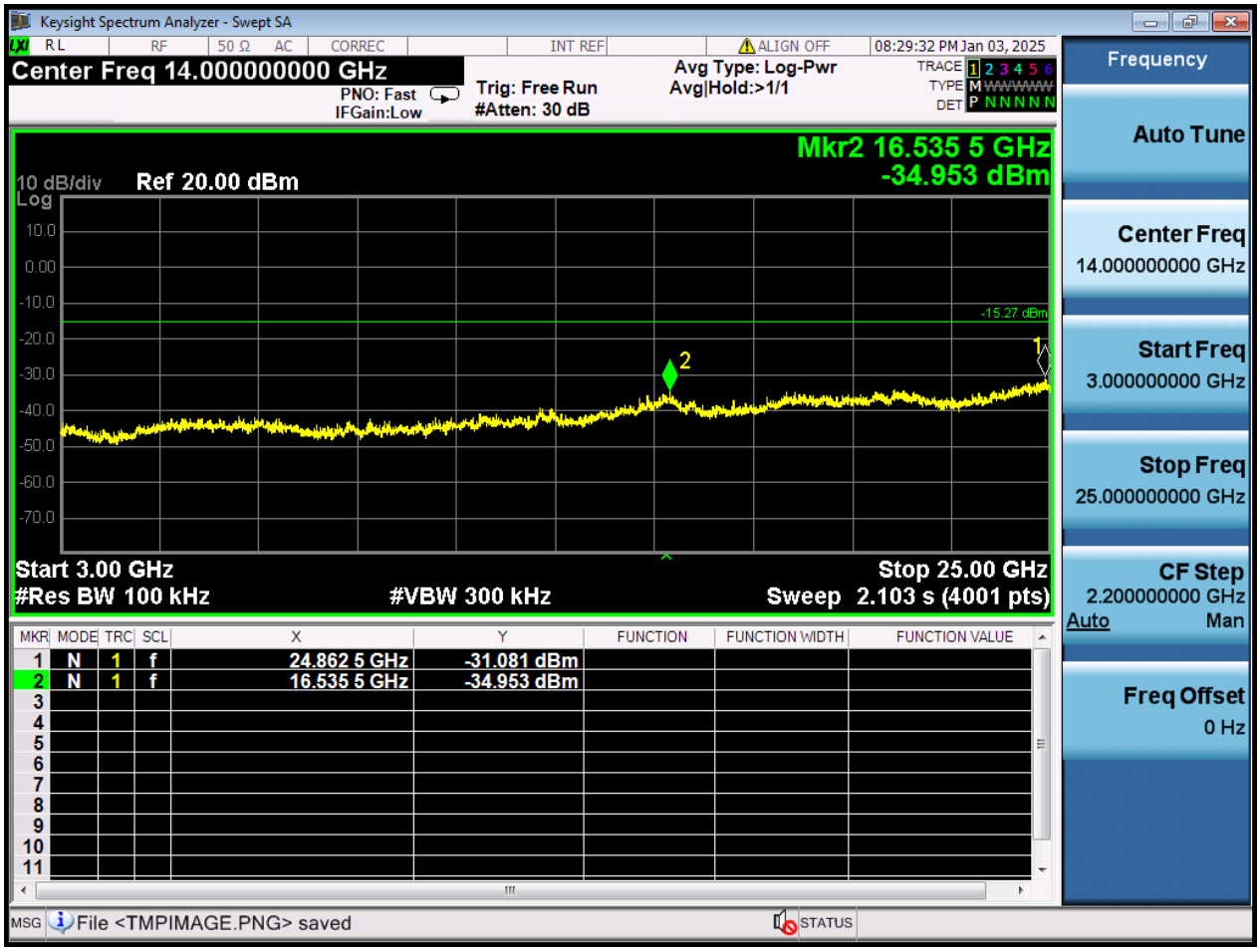

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
05:42:07 PM Nov 05, 2024
Center Freq 14.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr2 16.420 0 GHz
-39.355 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-15.79 dBm
Start 3.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.103 s (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 24.466 5 GHz -36.130 dBm
2 N 1 f 16.420 0 GHz -39.355 dBm
3
4
5
6
7
8
9
10
11
Frequency
Auto Tune
Center Freq
14.000000000 GHz
Start Freq
3.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
2.200000000 GHz
Auto Man
Freq Offset
0 Hz
MSG
File <TMPIMAGE.PNG> saved
STATUS

3.2. A.6-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2950 | -44.363 |
| 16403.5 | -34.953 |

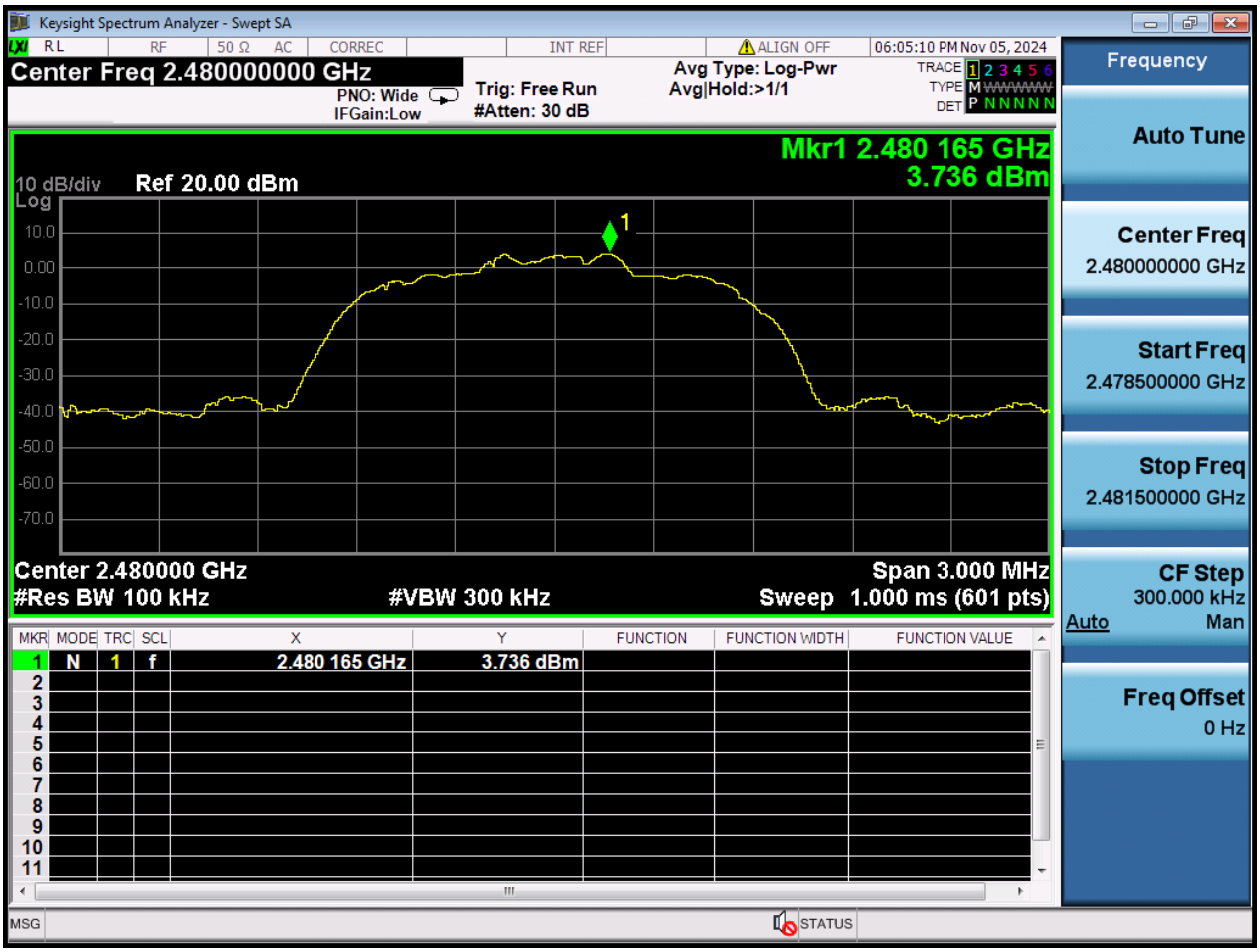


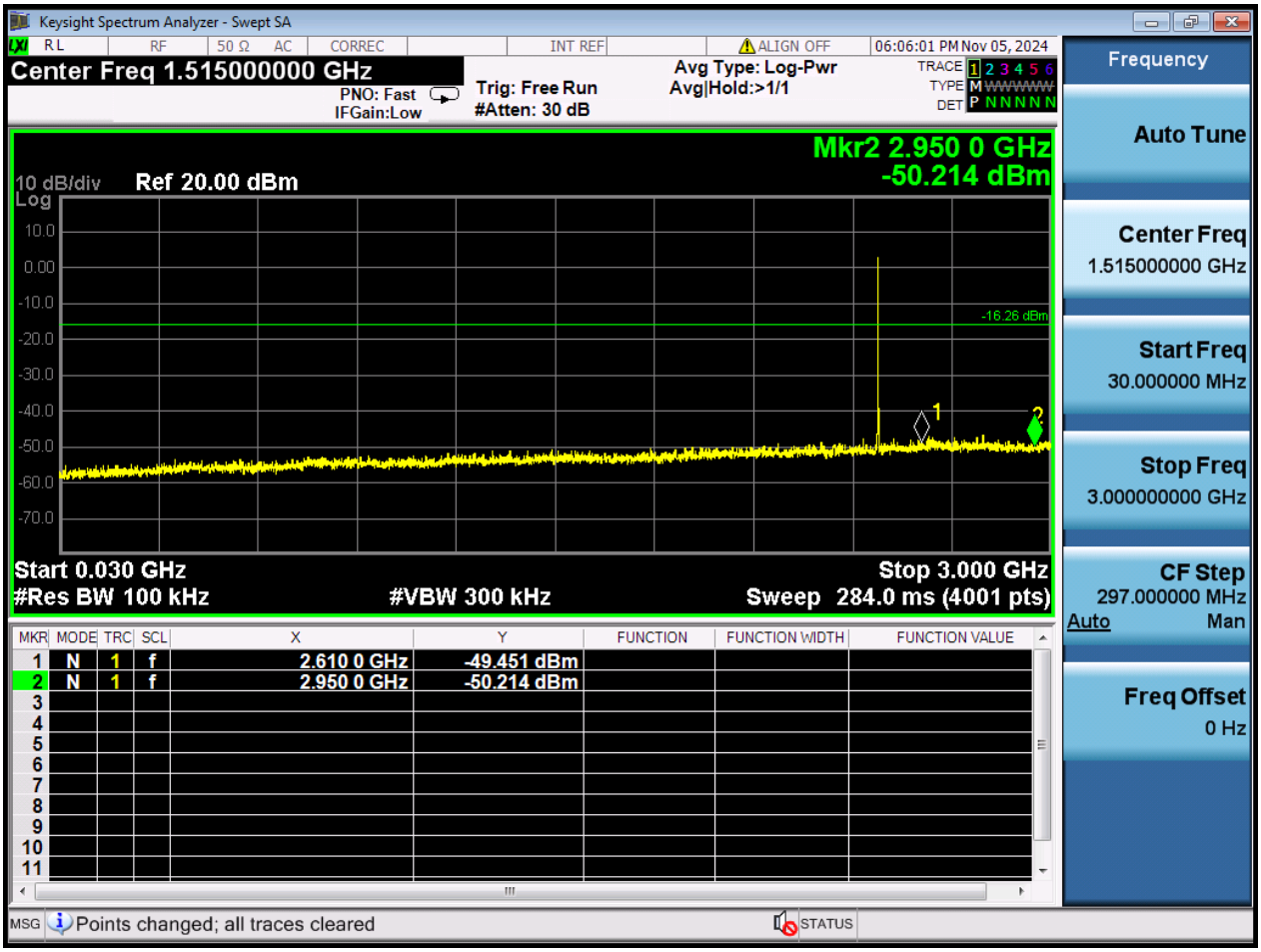

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
08:29:16 PM Jan 03, 2025
Center Freq 1.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Mkr2 2.950 0 GHz
-44.363 dBm
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-15.27 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 284.0 ms (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.610 0 GHz -45.022 dBm
2 N 1 f 2.950 0 GHz -44.363 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

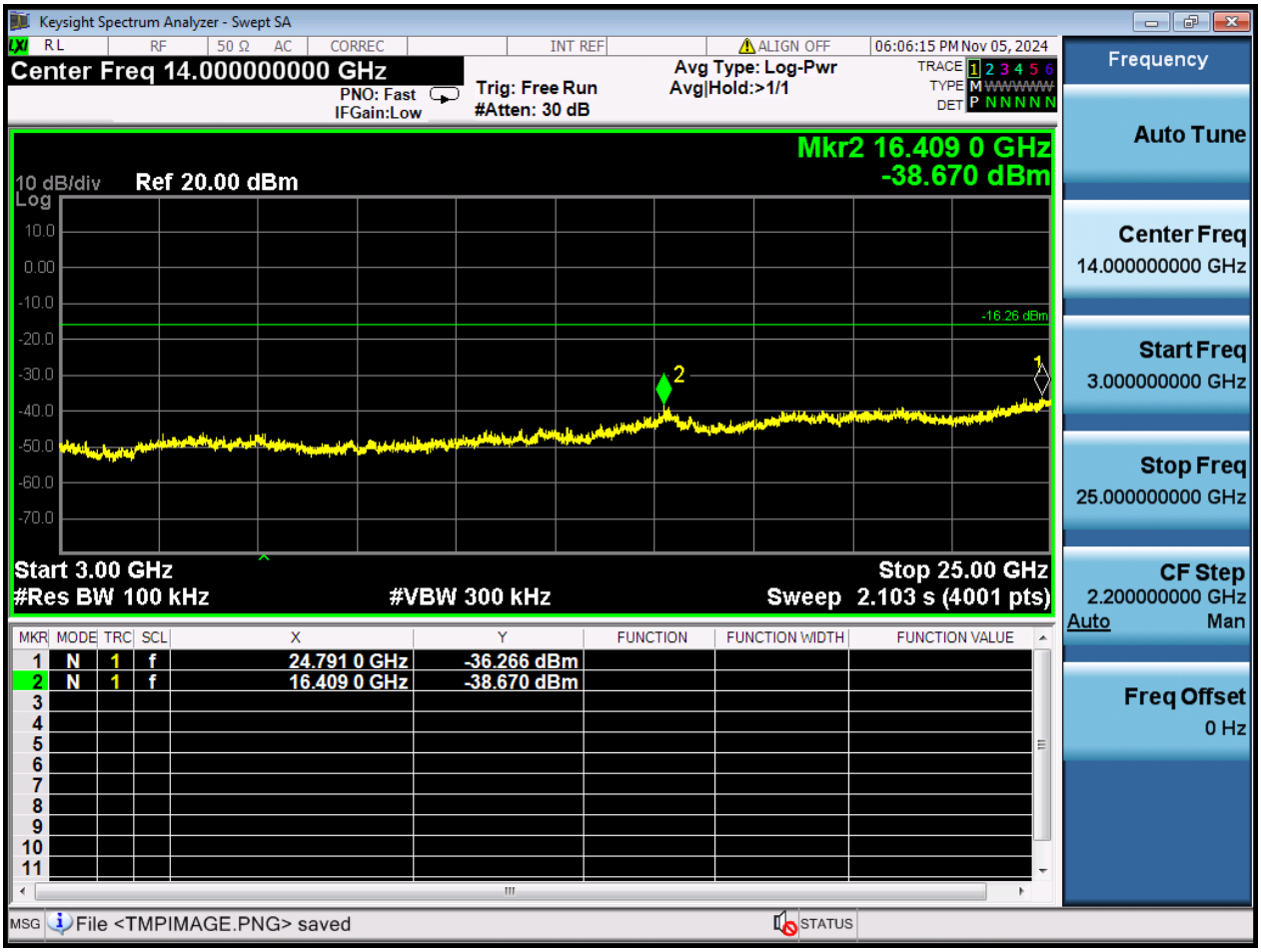

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
08:29:32 PM Jan 03, 2025
Center Freq 14.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Mkr2 16.535 5 GHz
-34.953 dBm
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-15.27 dBm
Start 3.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.103 s (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 24.862 5 GHz -31.081 dBm
2 N 1 f 16.535 5 GHz -34.953 dBm
Frequency
Auto Tune
Center Freq
14.000000000 GHz
Start Freq
3.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
2.200000000 GHz
Auto Man
Freq Offset
0 Hz
MSG
File <TMPIMAGE.PNG> saved
STATUS

3.3. A.6-CONDUCTED SPURIOUS EMISSIONS(NTNV)

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2950 | -50.214 |
| 16409 | -38.67 |



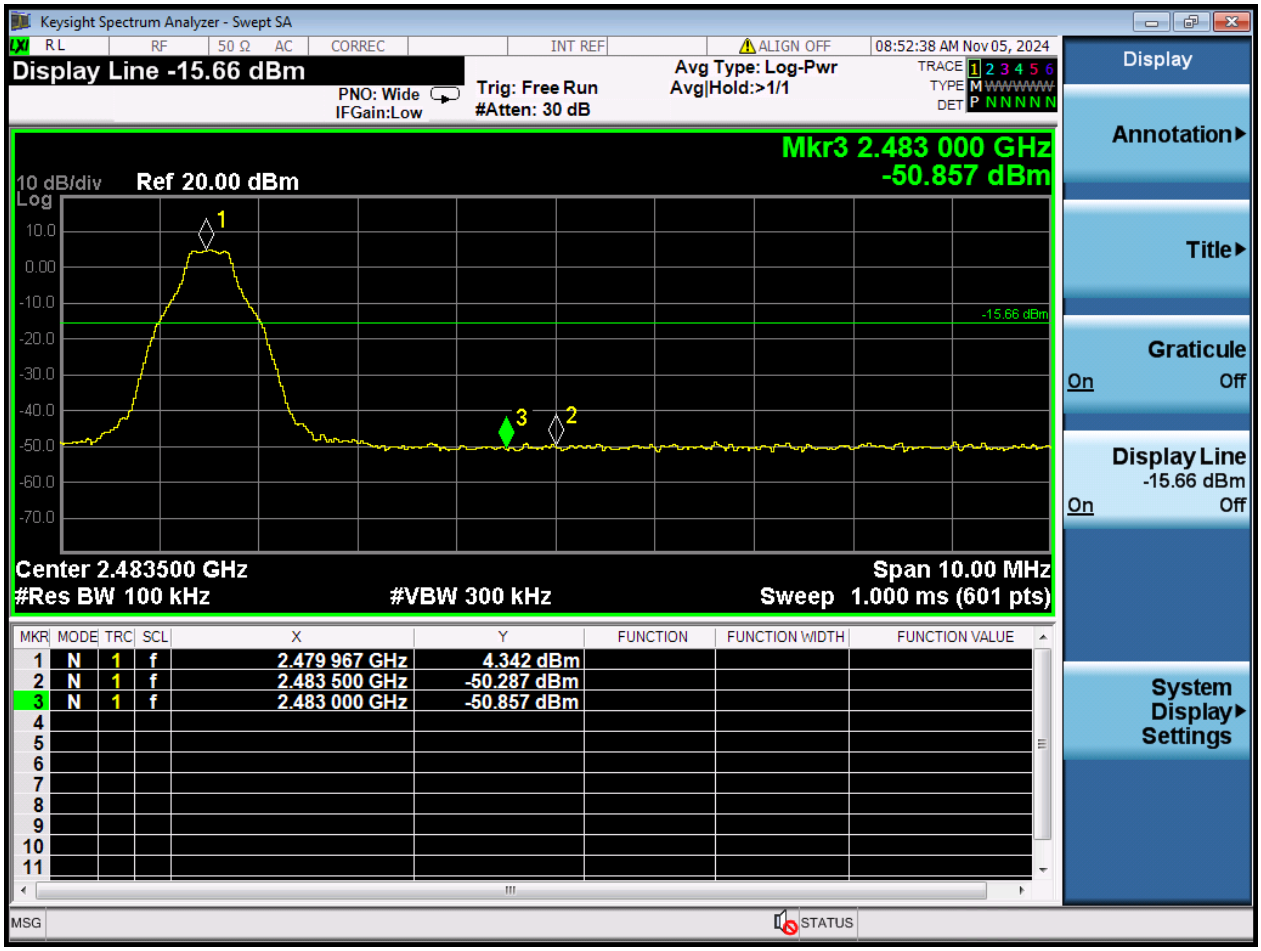

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN OFF
06:06:01 PM Nov 05, 2024
Center Freq 1.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr2 2.950 0 GHz
-50.214 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-16.26 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 284.0 ms (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.610 0 GHz -49.451 dBm
2 N 1 f 2.950 0 GHz -50.214 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
06:06:15 PM Nov 05, 2024
Center Freq 14.000000000 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 16.409 0 GHz
-38.670 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
-16.26 dBm
Start 3.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.103 s (4001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 24.791 0 GHz -36.266 dBm
2 N 1 f 16.409 0 GHz -38.670 dBm
3
4
5
6
7
8
9
10
11
Frequency
Auto Tune
Center Freq
14.000000000 GHz
Start Freq
3.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
2.200000000 GHz
Auto Man
Freq Offset
0 Hz
MSG
File <TMPIMAGE.PNG> saved
STATUS

ANNEX A. BANDEDGE(H)--CSE

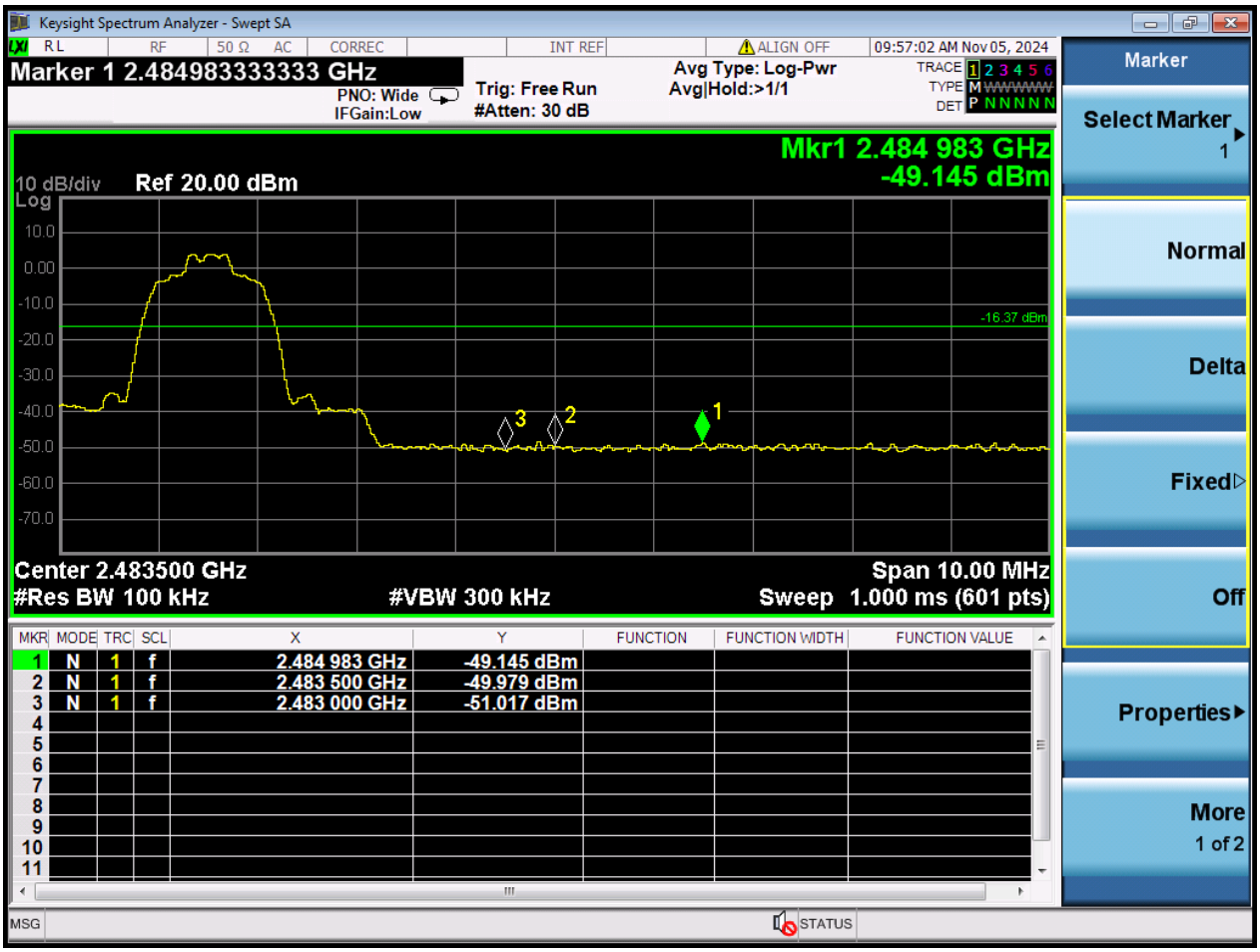
1. BLUETOOTH FOR CLASSIC

1.1. A.6.1-BANDEDGE(H)--CSE(NTNV) -1-DH5



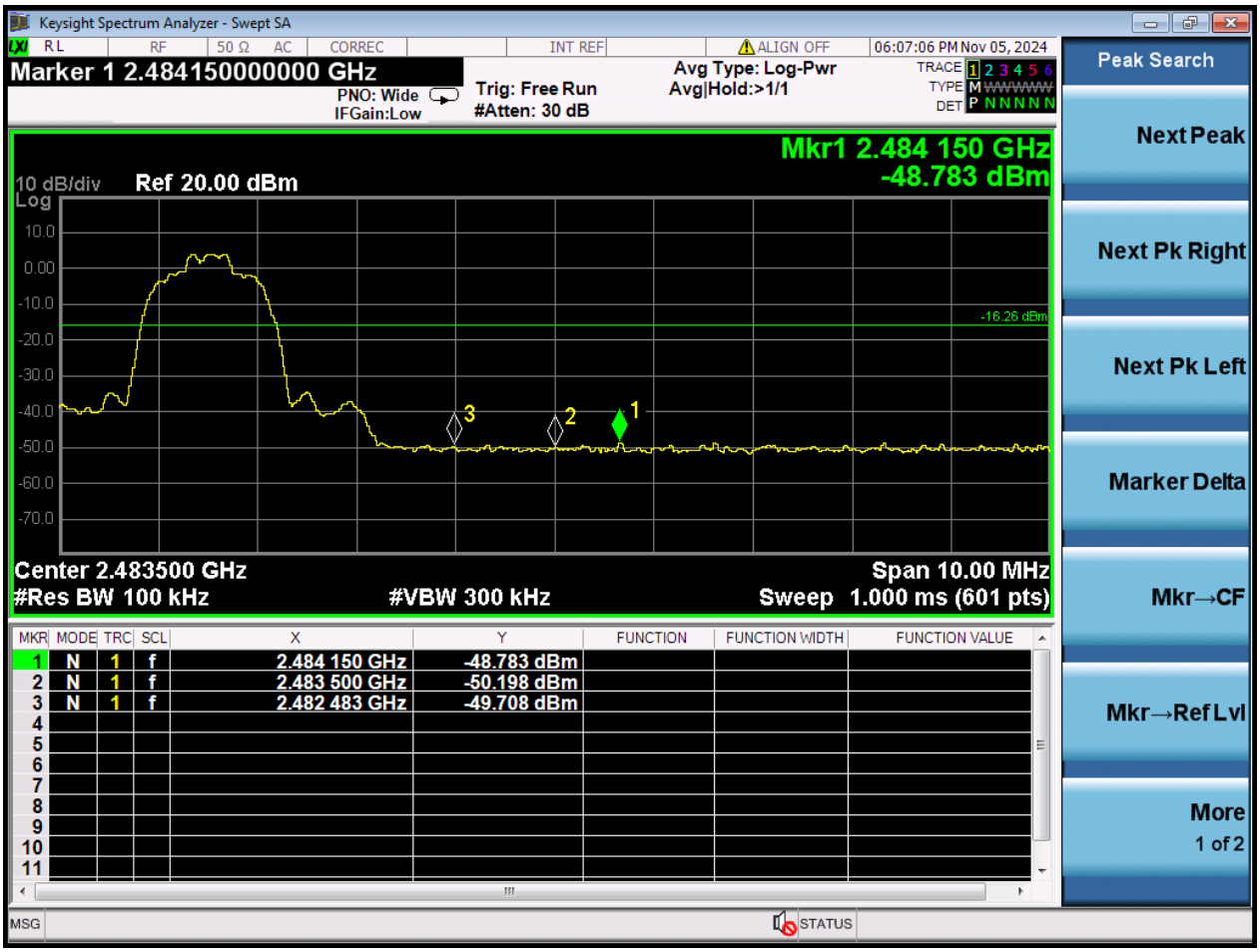
1.2. A.6.1-BANDEDGE(H)--CSE(NTNV) -2-DH5

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2483 | -51.017 |



1.3. A.6.1-BANDEDGE(H)--CSE(NTNV) -3-DH5

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2482.483333 | -49.708 |

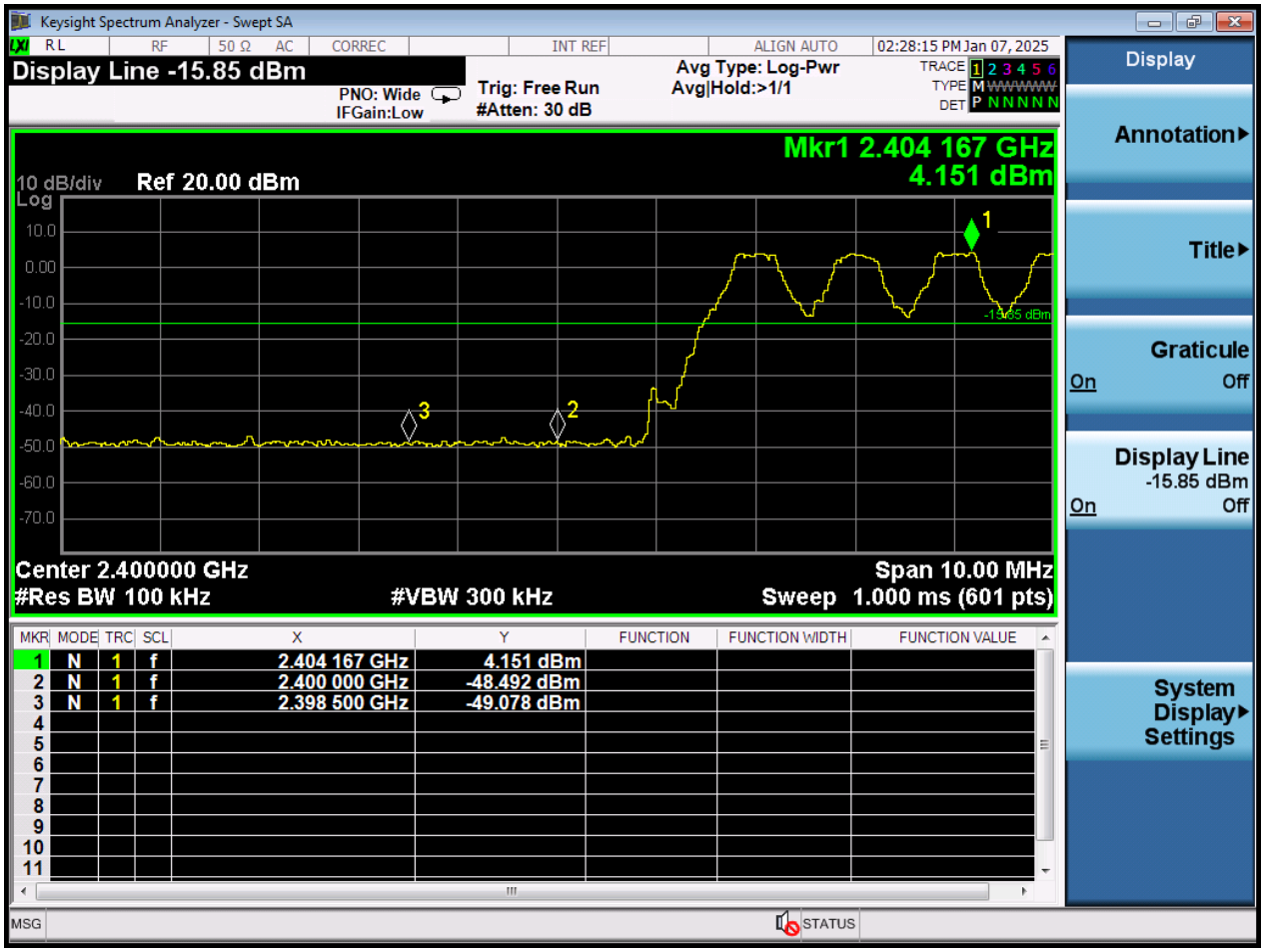


## ANNEX A. BANDEDGE(HOPPING)--CSE

### 1. BLUETOOTH FOR CLASSIC_HOPPING

### 1.1. A.6.1-BANDEDGE(HOPPING)--CSE(NTNV) -1-DH5

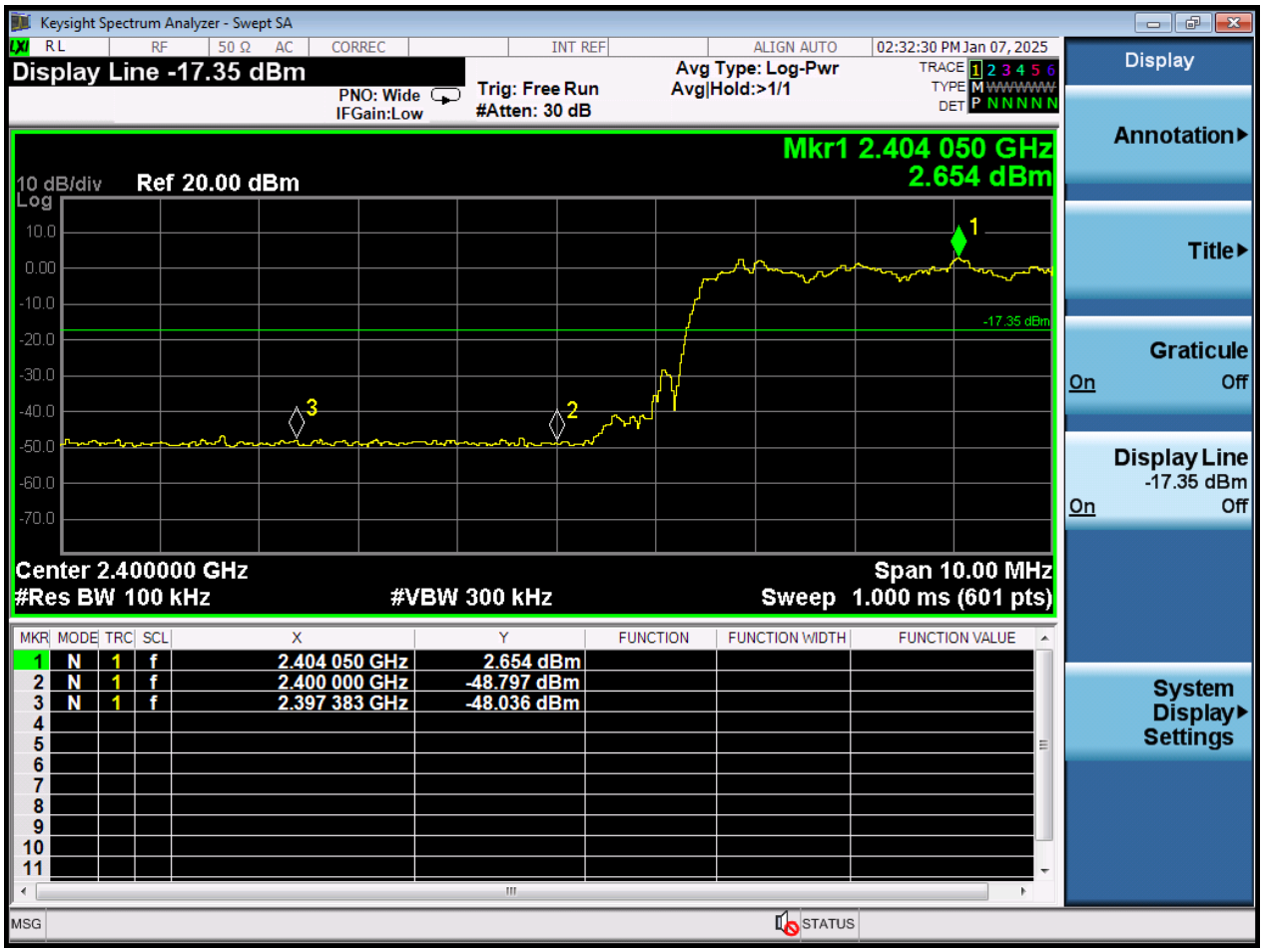
| Frequency(MHz) | Level(dBm) |
|---|---|
| 2400.000 | -48.492 |
| 2483.500 | -49.043 |

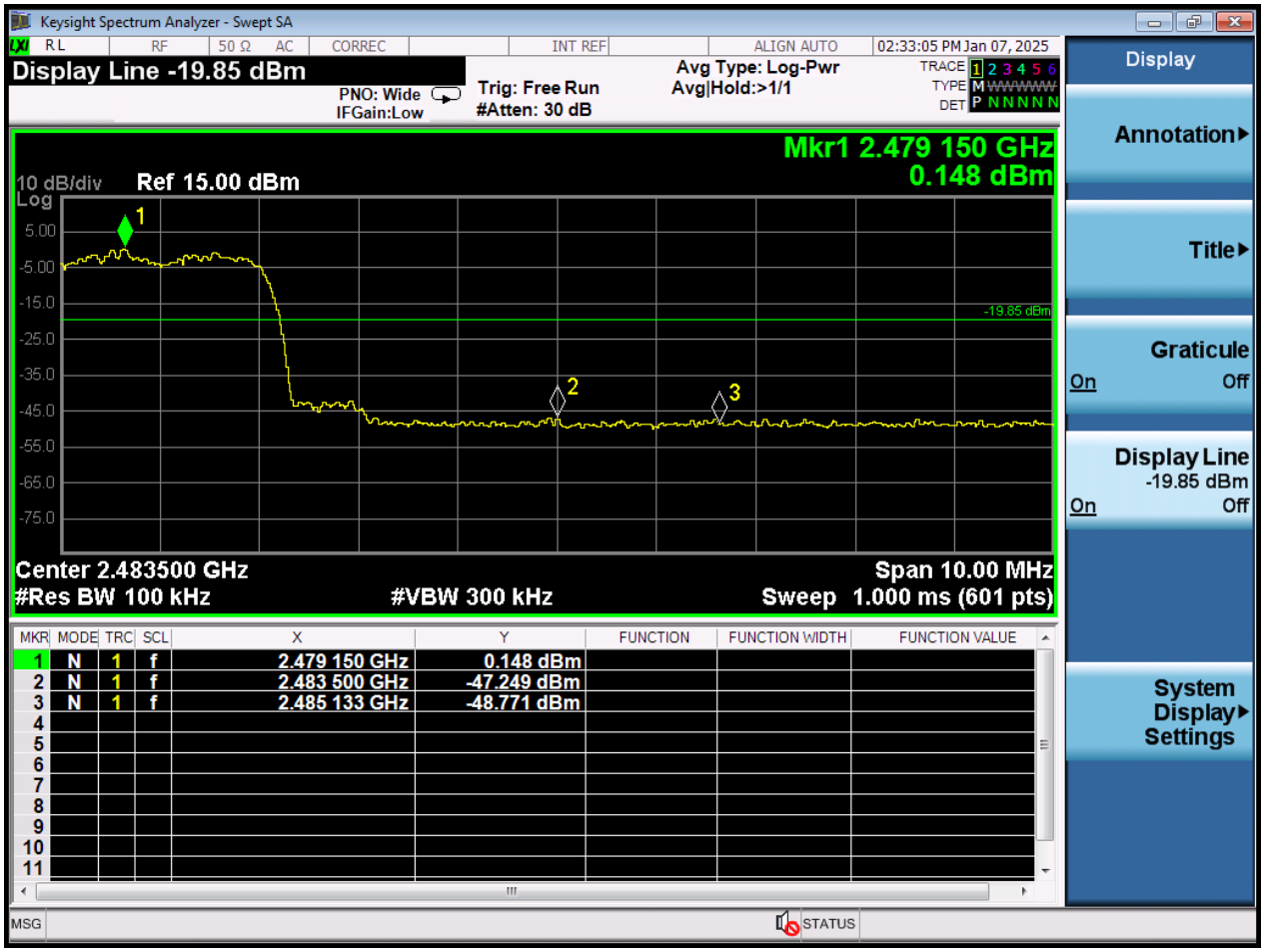


Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN AUTO
02:28:43 PM Jan 07, 2025
Display Line -17.66 dBm
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr1 2.479 983 GHz
2.463 dBm
10 dB/div
Ref 15.00 dBm
Log
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-17.66 dBm
Center 2.483500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10.00 MHz
Sweep 1.000 ms (601 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.479 983 GHz 2.463 dBm
2 N 1 f 2.483 500 GHz -49.043 dBm
3 N 1 f 2.485 433 GHz -49.694 dBm
4
5
6
7
8
9
10
11
Display
Annotation
Title
Graticule
On Off
Display Line
-17.66 dBm
On Off
System Display Settings
MSG
STATUS

1.2. A.6.1-BANDEDGE(HOPPING)--CSE(NTNV) -2-DH5

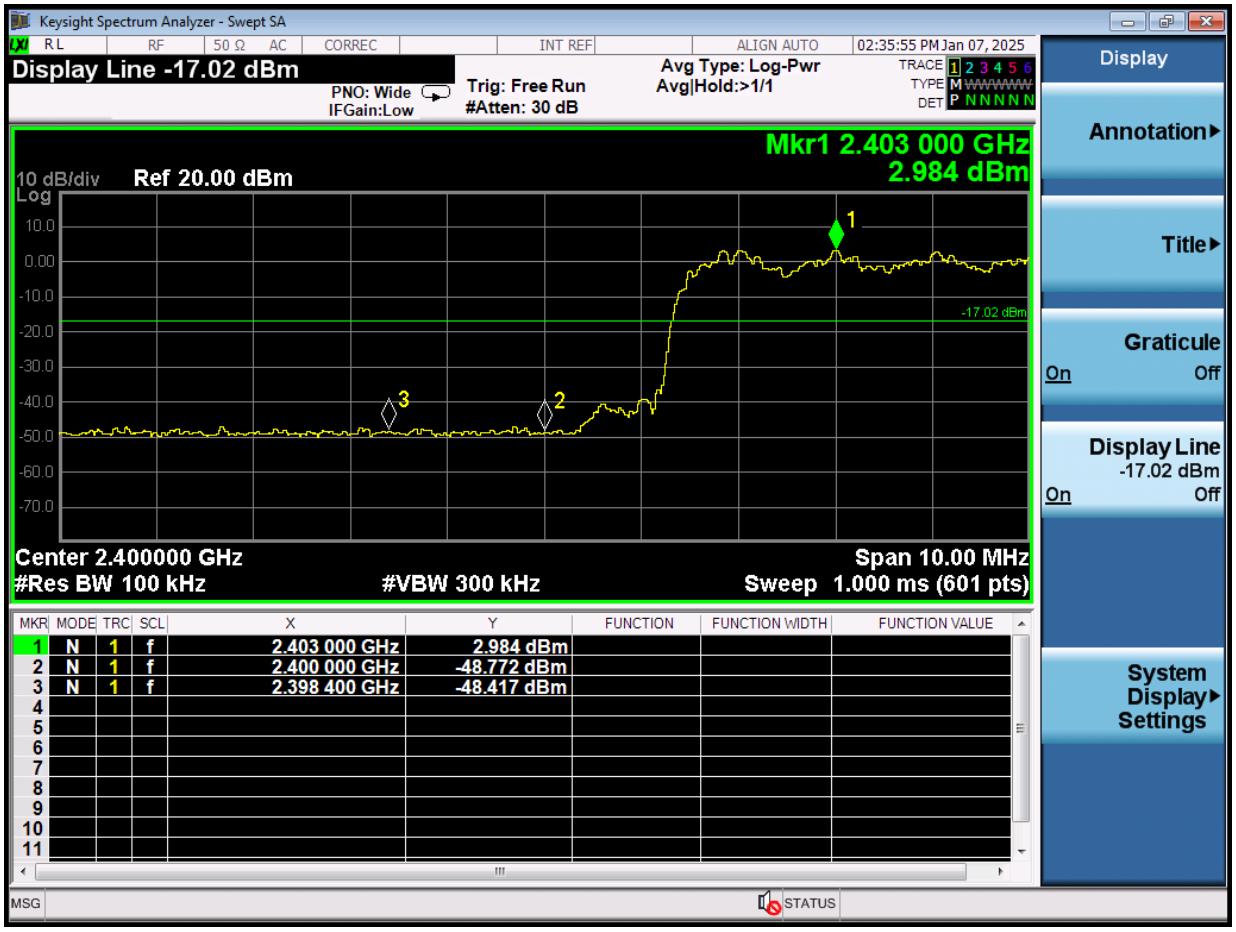
| Frequency(MHz) | Level(dBm) |
|---|---|
| 2400.000 | -48.797 |
| 2483.500 | -47.249 |

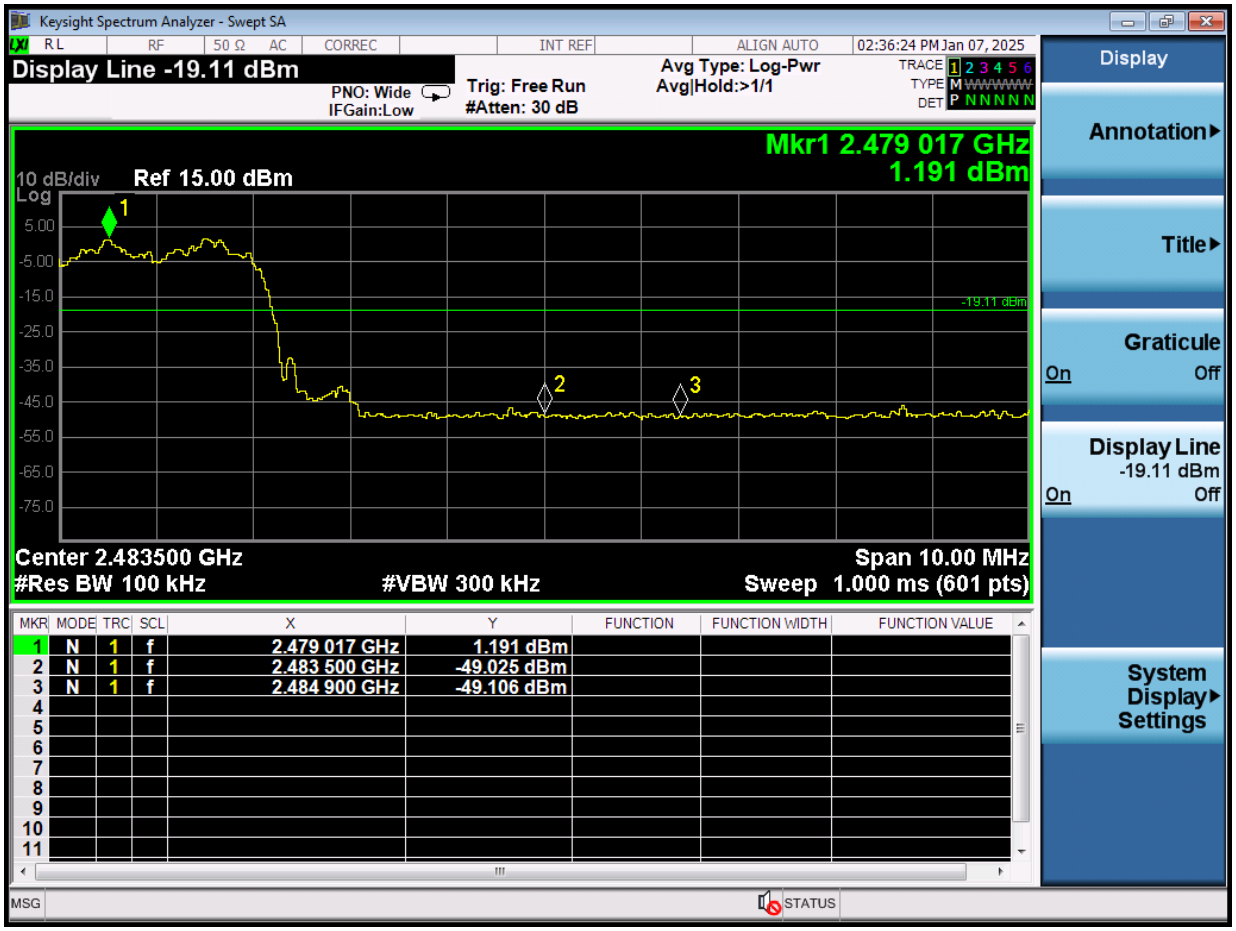



Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
INT REF
ALIGN AUTO
02:33:05 PM Jan 07, 2025
Display Line -19.85 dBm
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr1 2.479 150 GHz
0.148 dBm
10 dB/div
Ref 15.00 dBm
Log
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-19.85 dBm
Center 2.483500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10.00 MHz
Sweep 1.000 ms (601 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.479 150 GHz 0.148 dBm
2 N 1 f 2.483 500 GHz -47.249 dBm
3 N 1 f 2.485 133 GHz -48.771 dBm
4
5
6
7
8
9
10
11
Display
Annotation
Title
Graticule
On Off
Display Line
-19.85 dBm
On Off
System Display Settings
MSG
STATUS

1.3. A.6.1-BANDEDGE(HOPPING)--CSE(NTNV) -3-DH5

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2400.000 | -48.772 |
| 2483.500 | -49.025 |



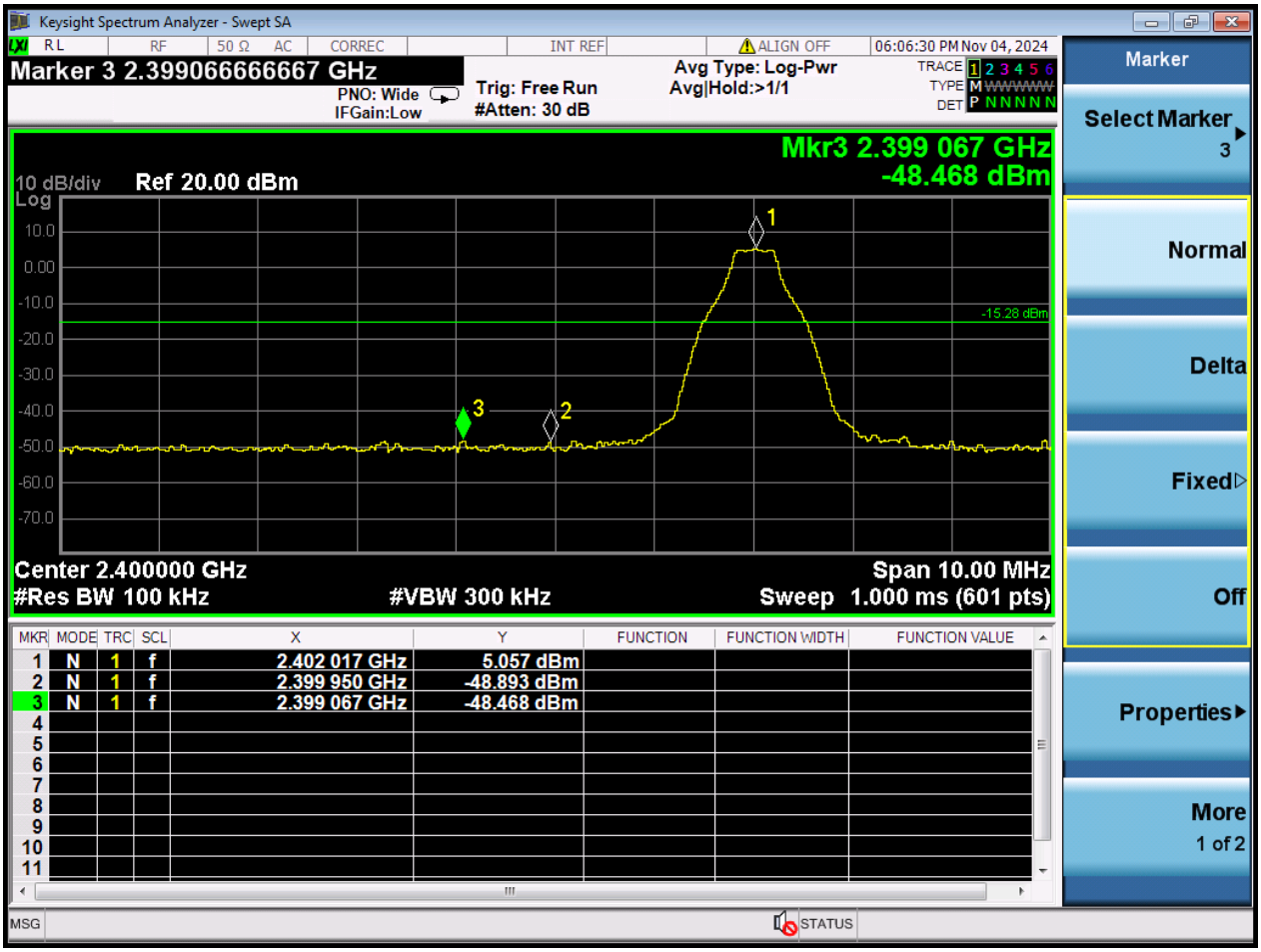

Keysight Spectrum Analyzer - Swept SA
R L
RF
50 Ω AC
CORREC
INT REF
ALIGN AUTO
02:36:24 PM Jan 07, 2025
Display Line -19.11 dBm
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Mkr1 2.479 017 GHz
1.191 dBm
10 dB/div
Ref 15.00 dBm
Log
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-19.11 dBm
Center 2.483500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10.00 MHz
Sweep 1.000 ms (601 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.479 017 GHz 1.191 dBm
2 N 1 f 2.483 500 GHz -49.025 dBm
3 N 1 f 2.484 900 GHz -49.106 dBm
Display
Annotation
Title
Graticule
On Off
Display Line
-19.11 dBm
On Off
System Display Settings
MSG
STATUS

ANNEX A. BANDEDGE(L)--CSE

1. BLUETOOTH FOR CLASSIC

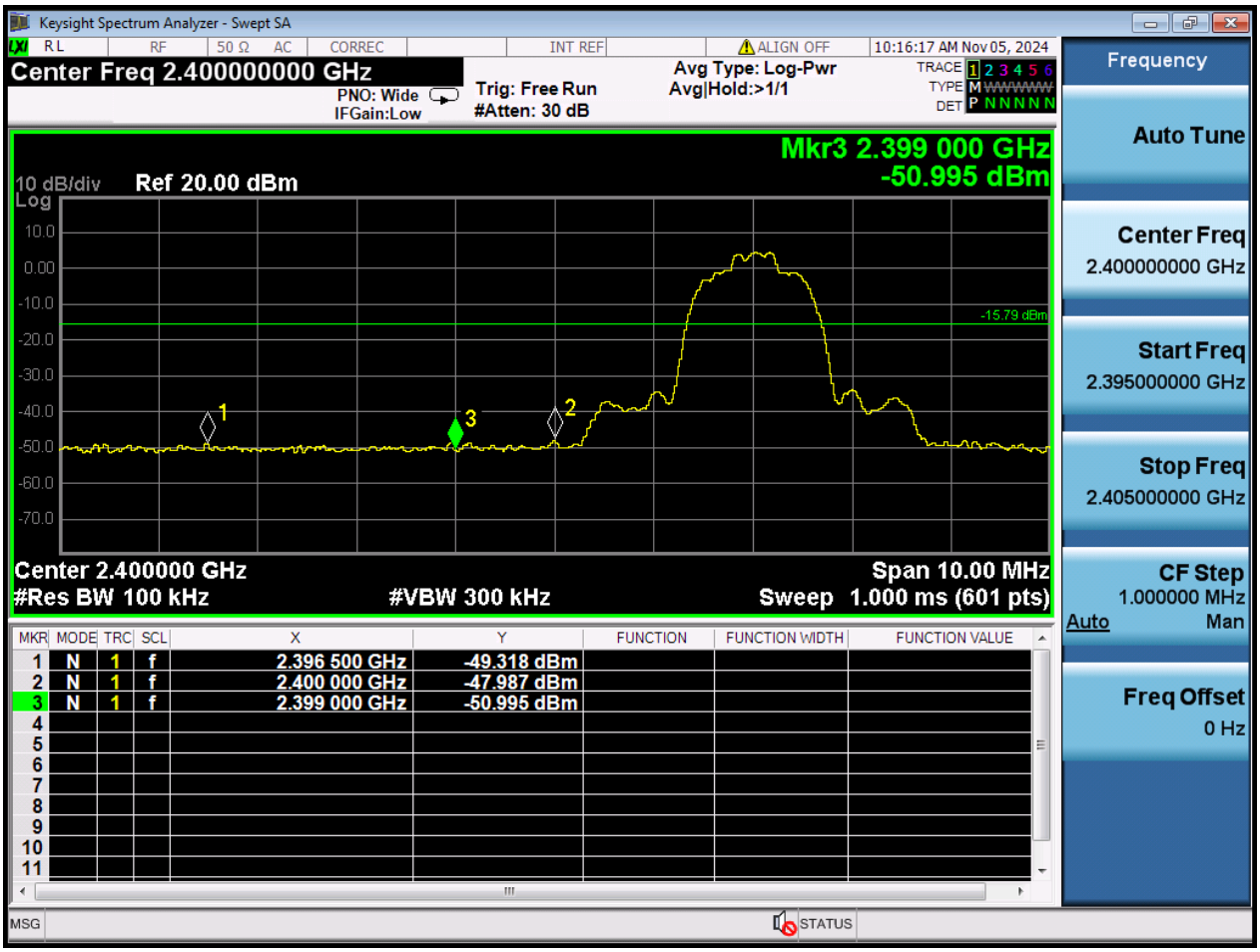
1.1. A.6.1-BANDEDGE(L)--CSE(NTNV) -1-DH5

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2399.066667 | -48.468 |



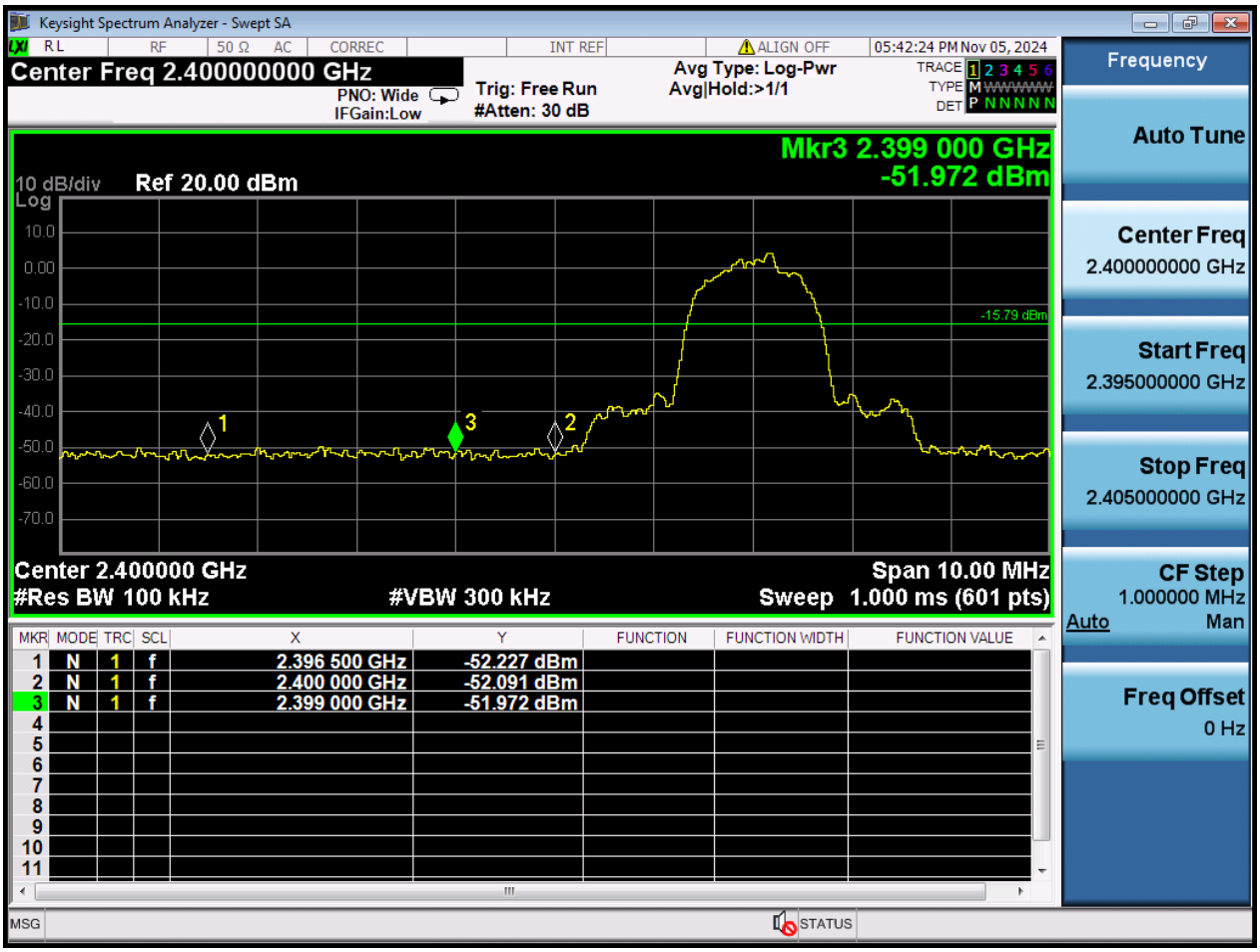
1.2. A.6.1-BANDEDGE(L)--CSE(NTNV) -2-DH5

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2399 | -50.995 |



1.3. A.6.1-BANDEDGE(L)--CSE(NTNV) -3-DH5

| Frequency(MHz) | Level(dBm) |
|---|---|
| 2399 | -51.972 |

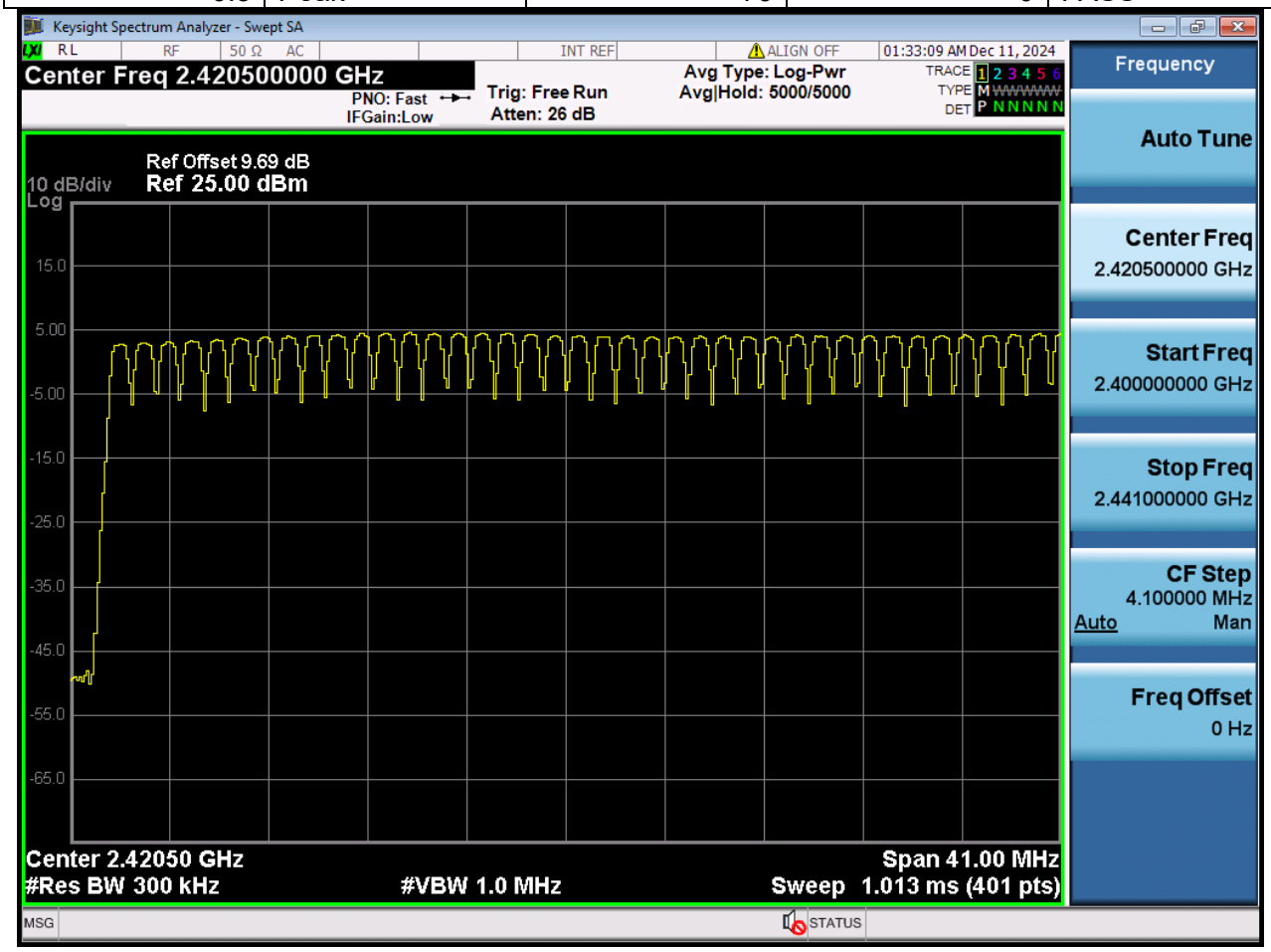


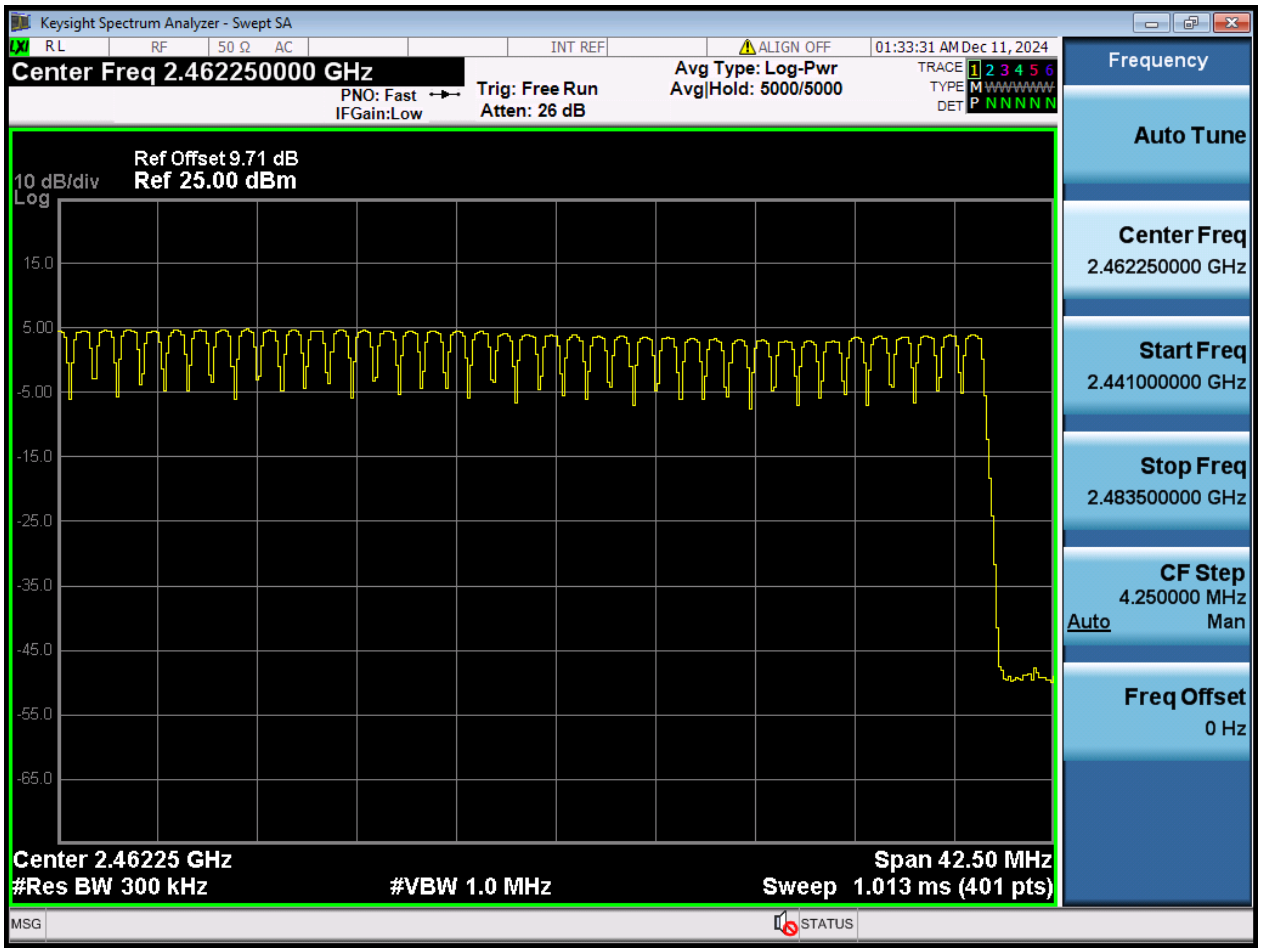
# ANNEX A. NUMBER OF HOPPING FREQUENCY

1. BLUETOOTH FOR CLASSIC_HOPPING

1.1. A.1-NUMBER OF HOPPING FREQUENCY(NTNV)-1-DH5

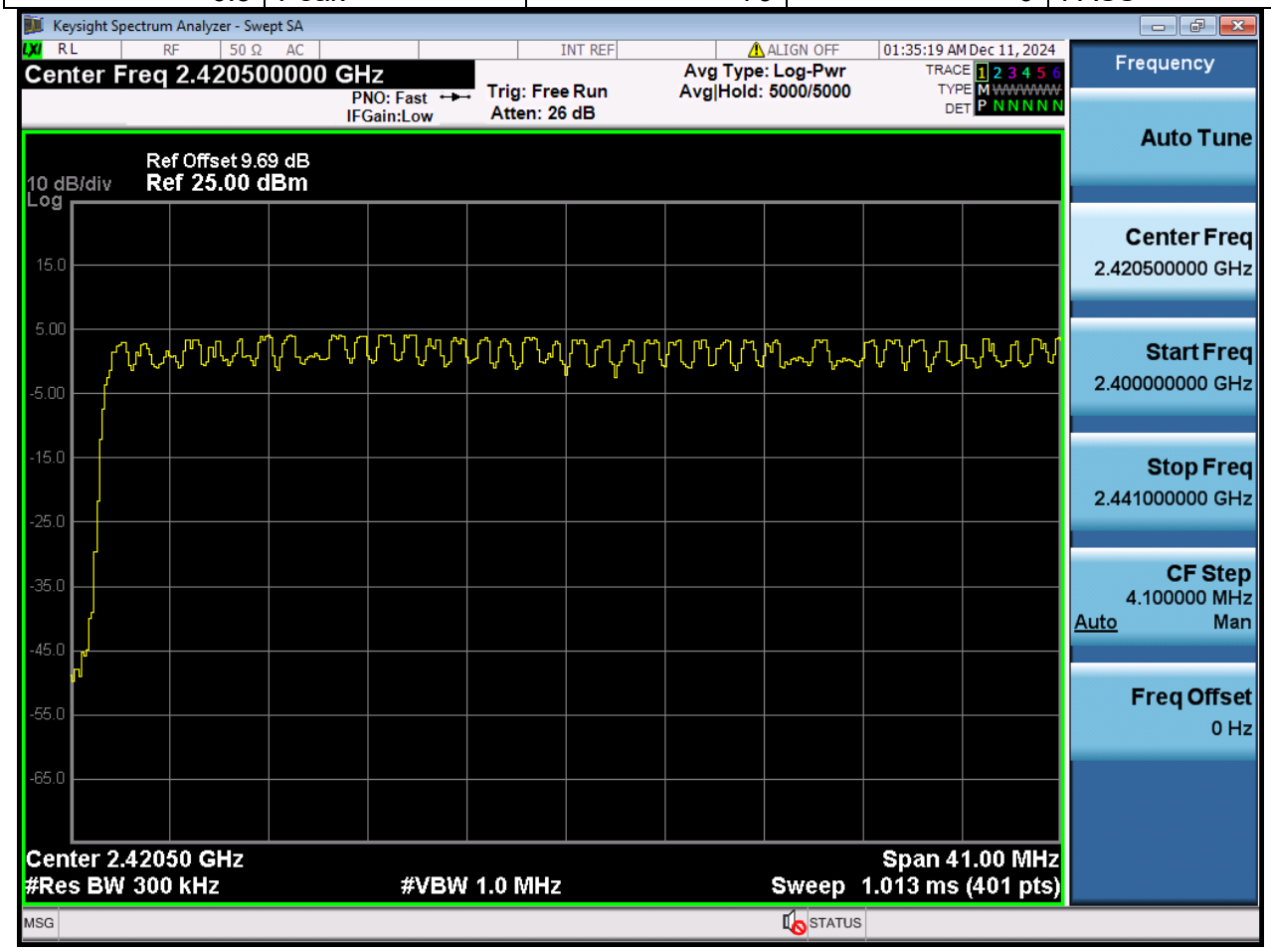
| RBW (MHz) | Detector | Num of Hopping Freq | Limit (dB) | Verdict |
|---|---|---|---|---|
| 0.3 | Peak | 79 | 0 | PASS |

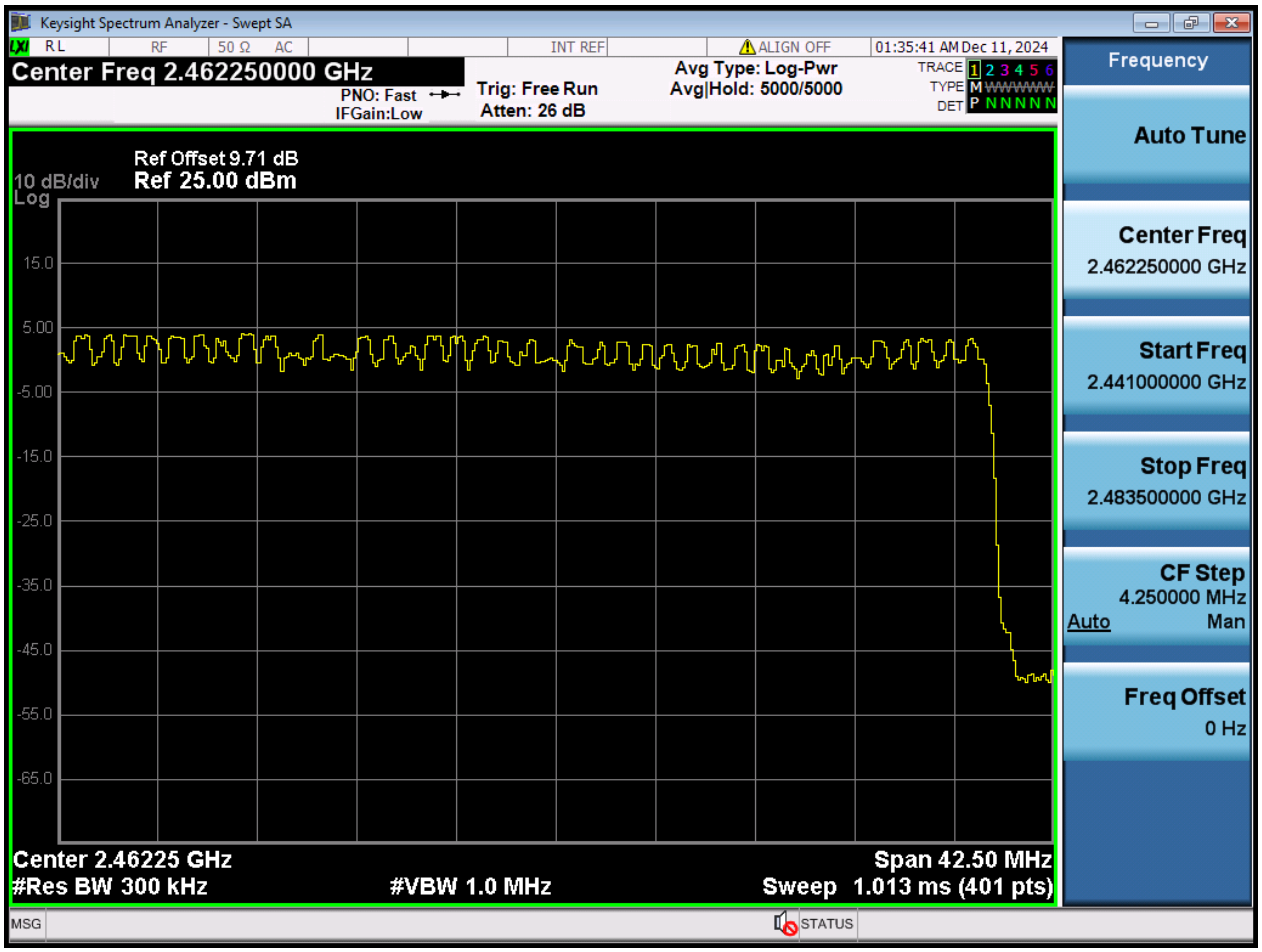



Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
INT REF
ALIGN OFF
01:33:31 AM Dec 11, 2024
Center Freq 2.462250000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 26 dB
Avg Type: Log-Pwr
Avg|Hold: 5000/5000
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Ref Offset 9.71 dB
10 dB/div
Ref 25.00 dBm
Log
15.0
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
Center 2.46225 GHz
#Res BW 300 kHz
#VBW 1.0 MHz
Span 42.50 MHz
Sweep 1.013 ms (401 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.462250000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.483500000 GHz
CF Step
4.250000 MHz
Auto
Man
Freq Offset
0 Hz

1.2. A.1-NUMBER OF HOPPING FREQUENCY(NTNV)-2-DH5

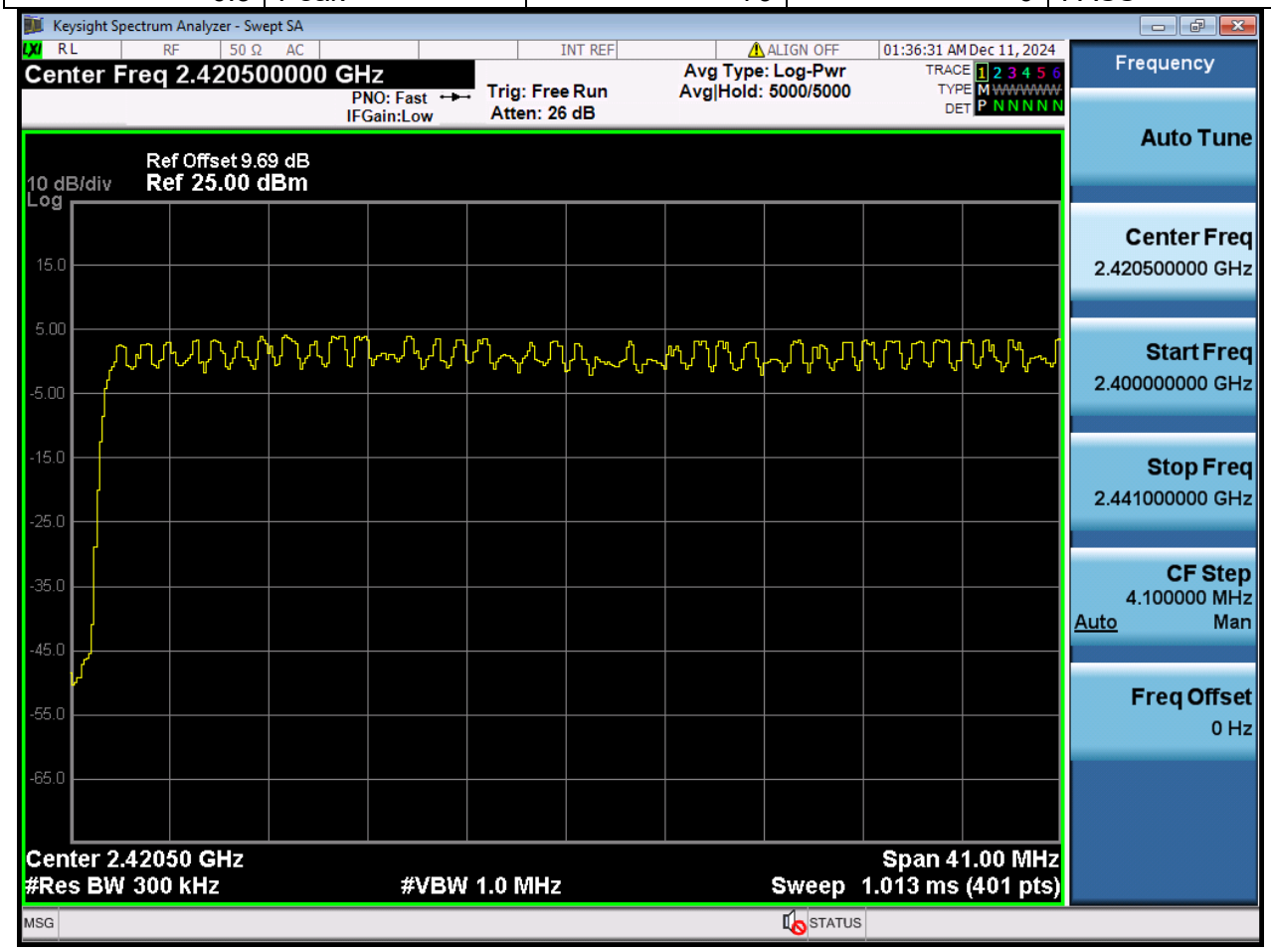
| RBW (MHz) | Detector | Num of Hopping Freq | Limit (dB) | Verdict |
|---|---|---|---|---|
| 0.3 | Peak | 79 | 0 | PASS |

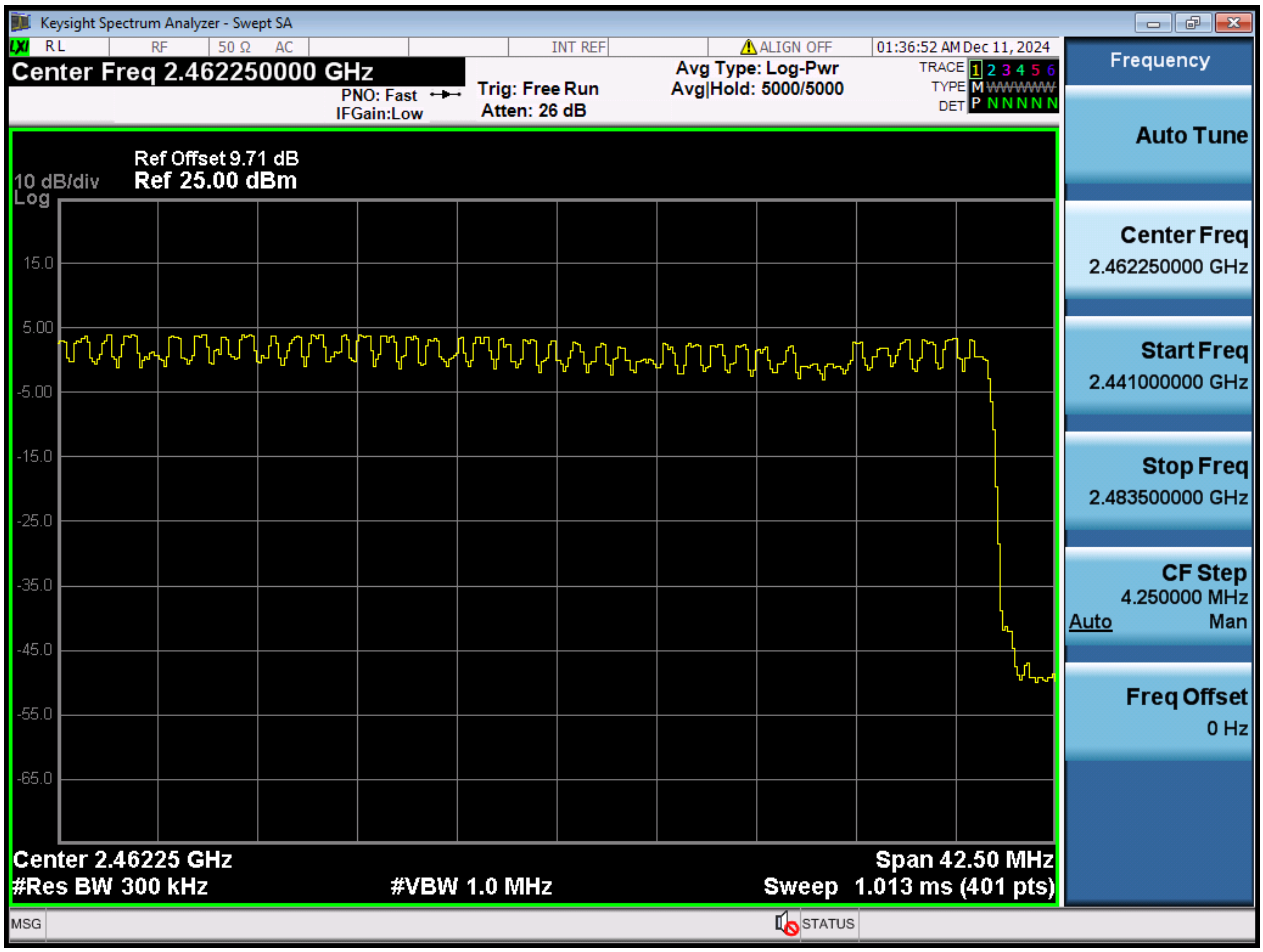



Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
INT REF
ALIGN OFF
01:35:41 AM Dec 11, 2024
Center Freq 2.462250000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 26 dB
Avg Type: Log-Pwr
Avg|Hold: 5000/5000
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Ref Offset 9.71 dB
10 dB/div
Log
Ref 25.00 dBm
15.0
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
Center 2.46225 GHz
#Res BW 300 kHz
#VBW 1.0 MHz
Span 42.50 MHz
Sweep 1.013 ms (401 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.462250000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.483500000 GHz
CF Step
4.250000 MHz
Auto
Man
Freq Offset
0 Hz

1.3. A.1-NUMBER OF HOPPING FREQUENCY(NTNV)-3-DH5

| RBW (MHz) | Detector | Num of Hopping Freq | Limit (dB) | Verdict |
|---|---|---|---|---|
| 0.3 | Peak | 79 | 0 | PASS |



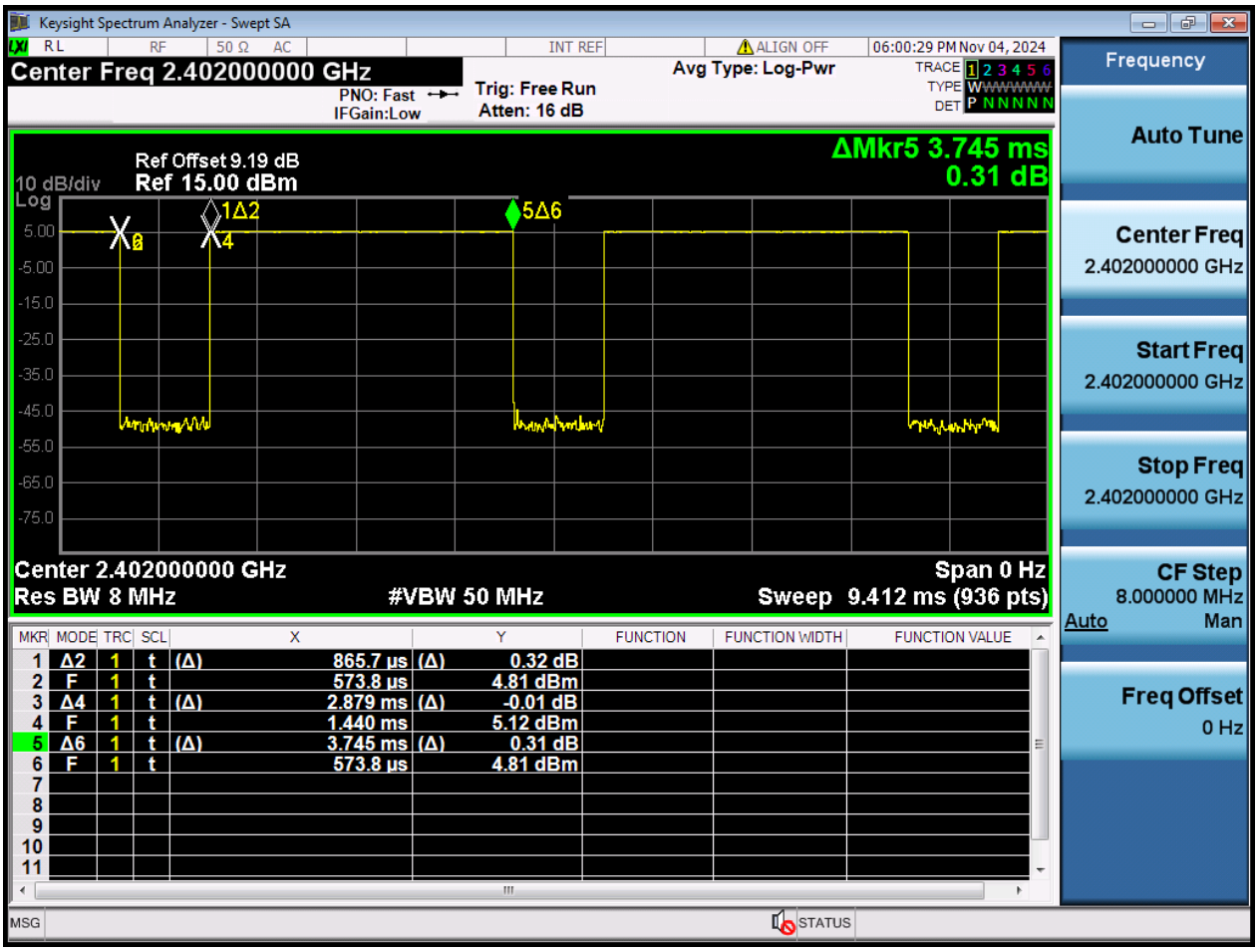

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
INT REF
ALIGN OFF
01:36:52 AM Dec 11, 2024
Center Freq 2.462250000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 26 dB
Avg Type: Log-Pwr
Avg|Hold: 5000/5000
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Ref Offset 9.71 dB
10 dB/div
Ref 25.00 dBm
Log
15.0
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
Center 2.46225 GHz
#Res BW 300 kHz
#VBW 1.0 MHz
Span 42.50 MHz
Sweep 1.013 ms (401 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.462250000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.483500000 GHz
CF Step
4.250000 MHz
Auto
Man
Freq Offset
0 Hz

# ANNEX A. DUTY CYCLE

## 1. BLUETOOTH FOR CLASSIC-1-DH5

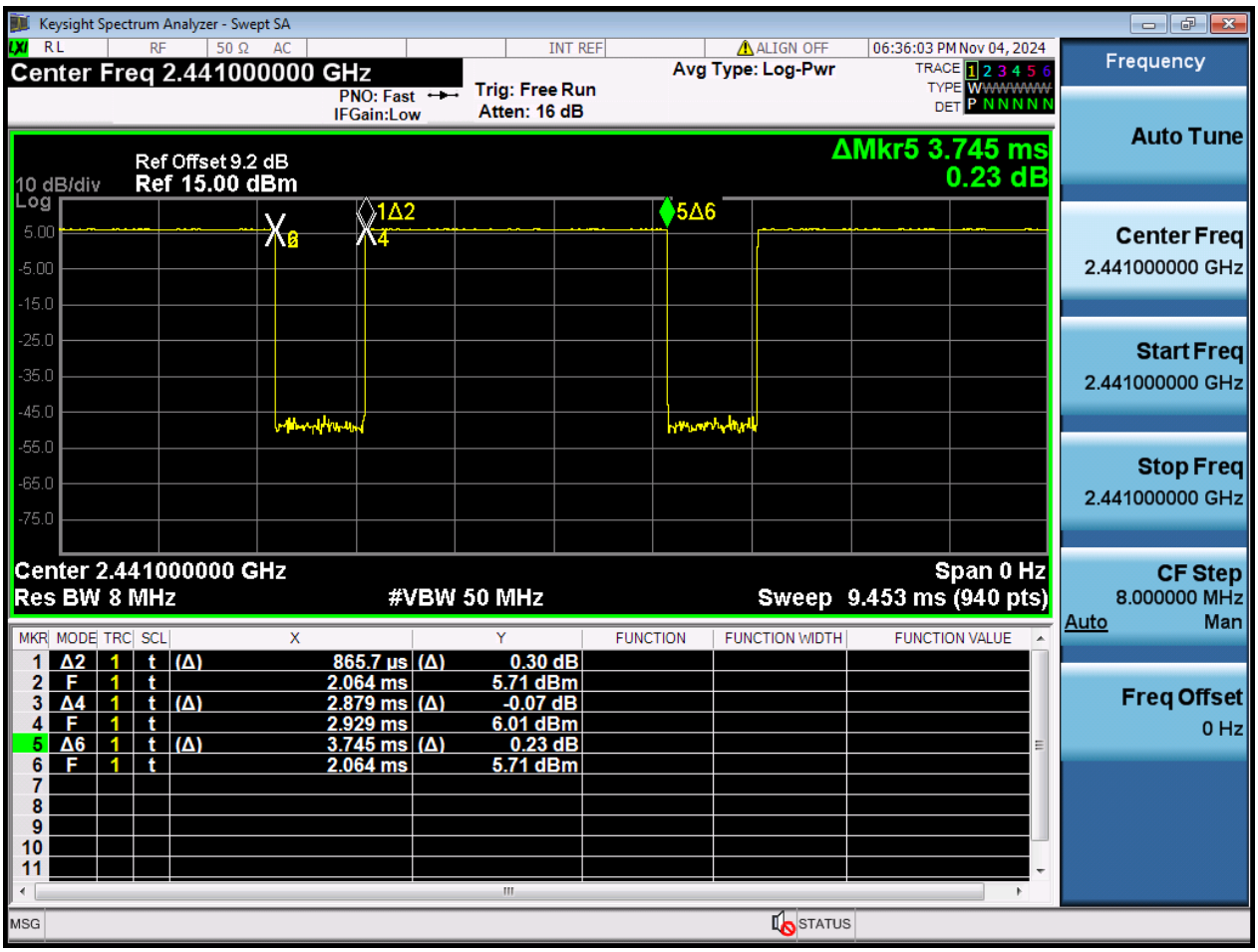
### 1.1. DUTY CYCLE(NTNV)

| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2402 | 8 | Peak | 0.002879 | 0.000866 | 0.003745 | 0.7688 | 0.1 | Pass |



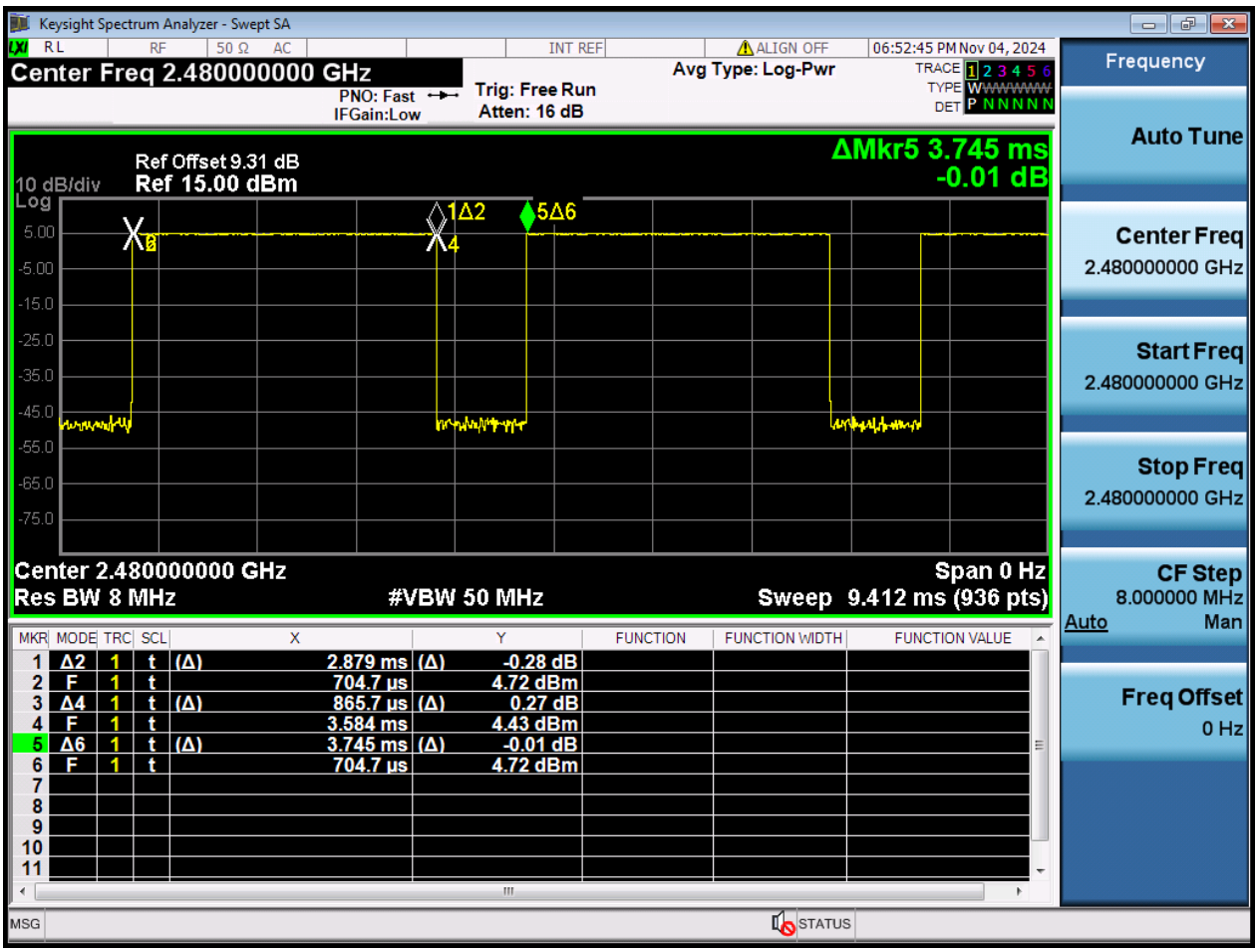
1.2. DUTY CYCLE(NTNV)

| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2441 | 8 | Peak | 0.002879 | 0.000866 | 0.003745 | 0.7688 | 0.1 | Pass |



1.3. DUTY CYCLE(NTNV)

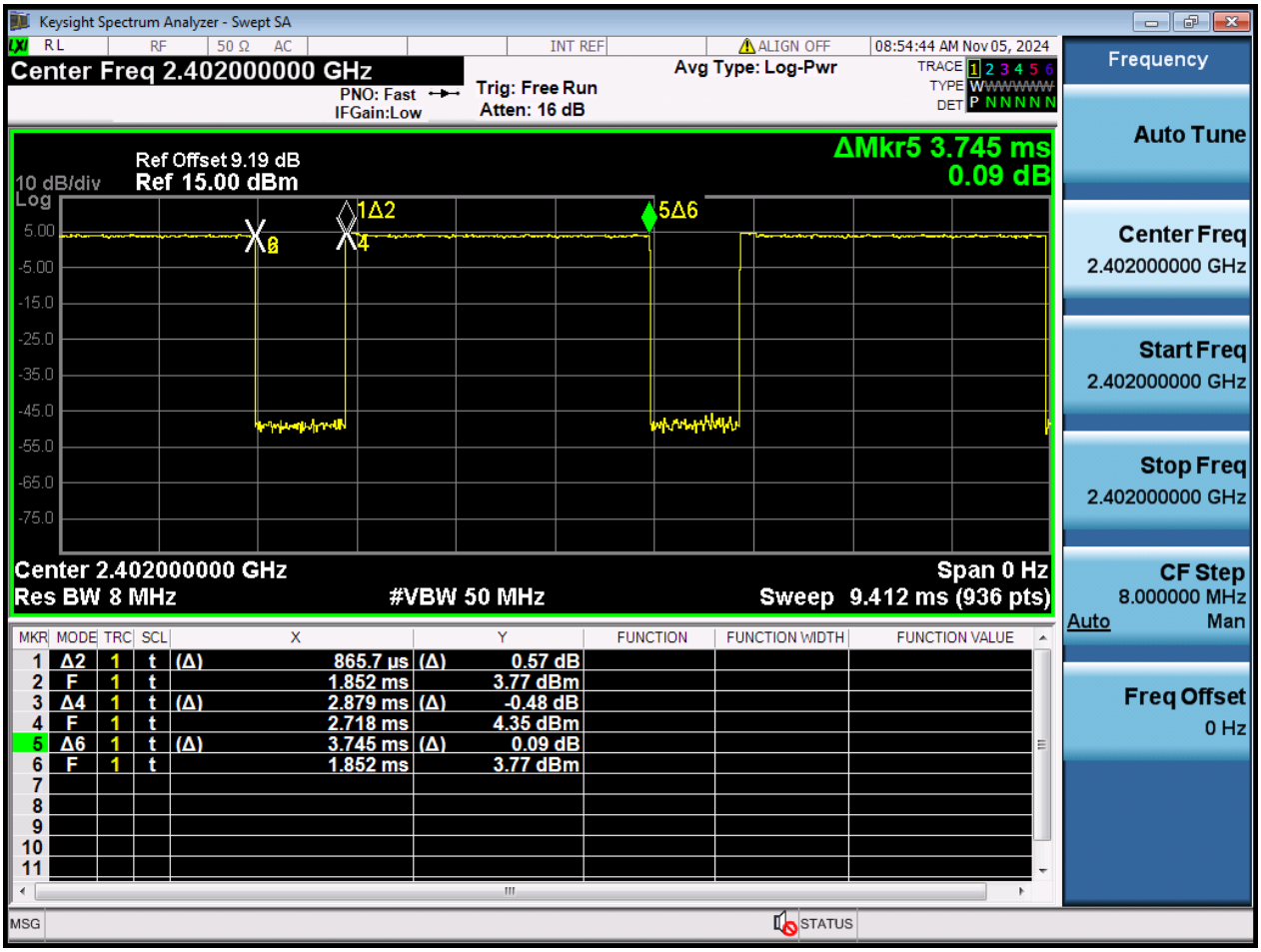
| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2480 | 8 | Peak | 0.002879 | 0.000866 | 0.003745 | 0.7688 | 0.1 | Pass |



2. BLUETOOTH FOR CLASSIC-2-DH5

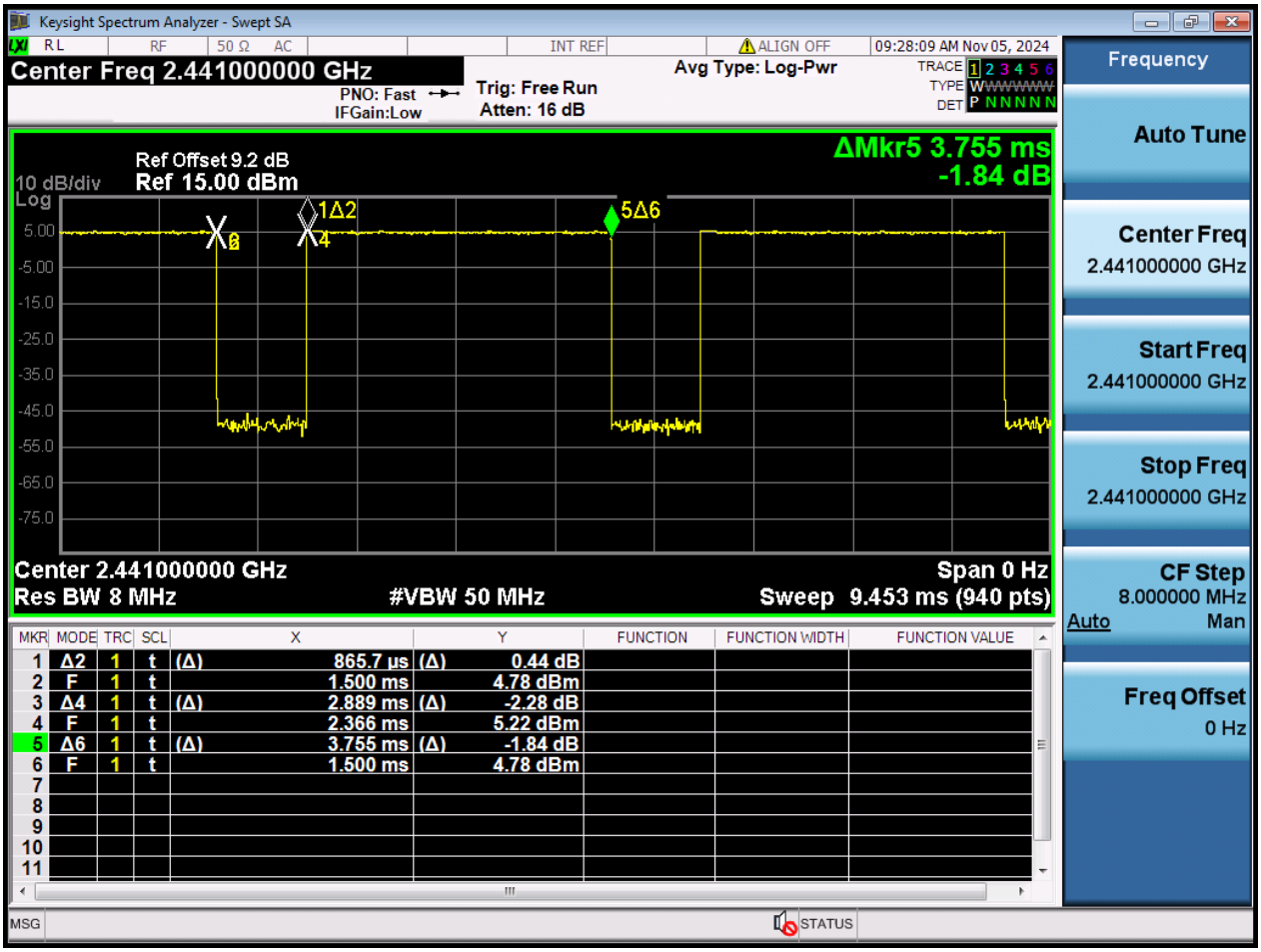
2.1. DUTY CYCLE(NTNV)

| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2402 | 8 | Peak | 0.002879 | 0.000866 | 0.003745 | 0.7688 | 0.1 | Pass |



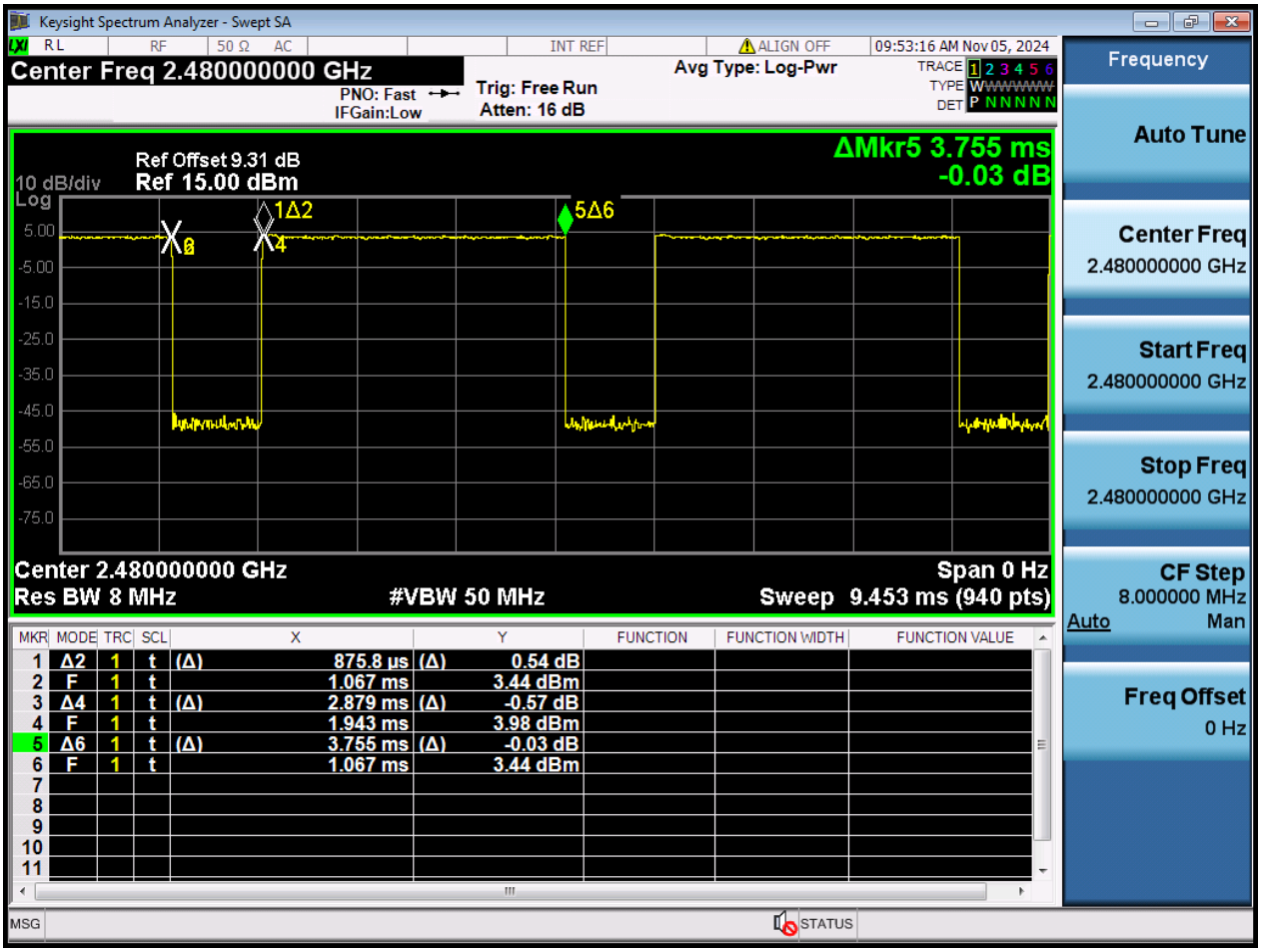
2.2. DUTY CYCLE(NTNV)

| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2441 | 8 | Peak | 0.002889 | 0.000866 | 0.003755 | 0.7694 | 0.1 | Pass |



2.3. DUTY CYCLE(NTNV)

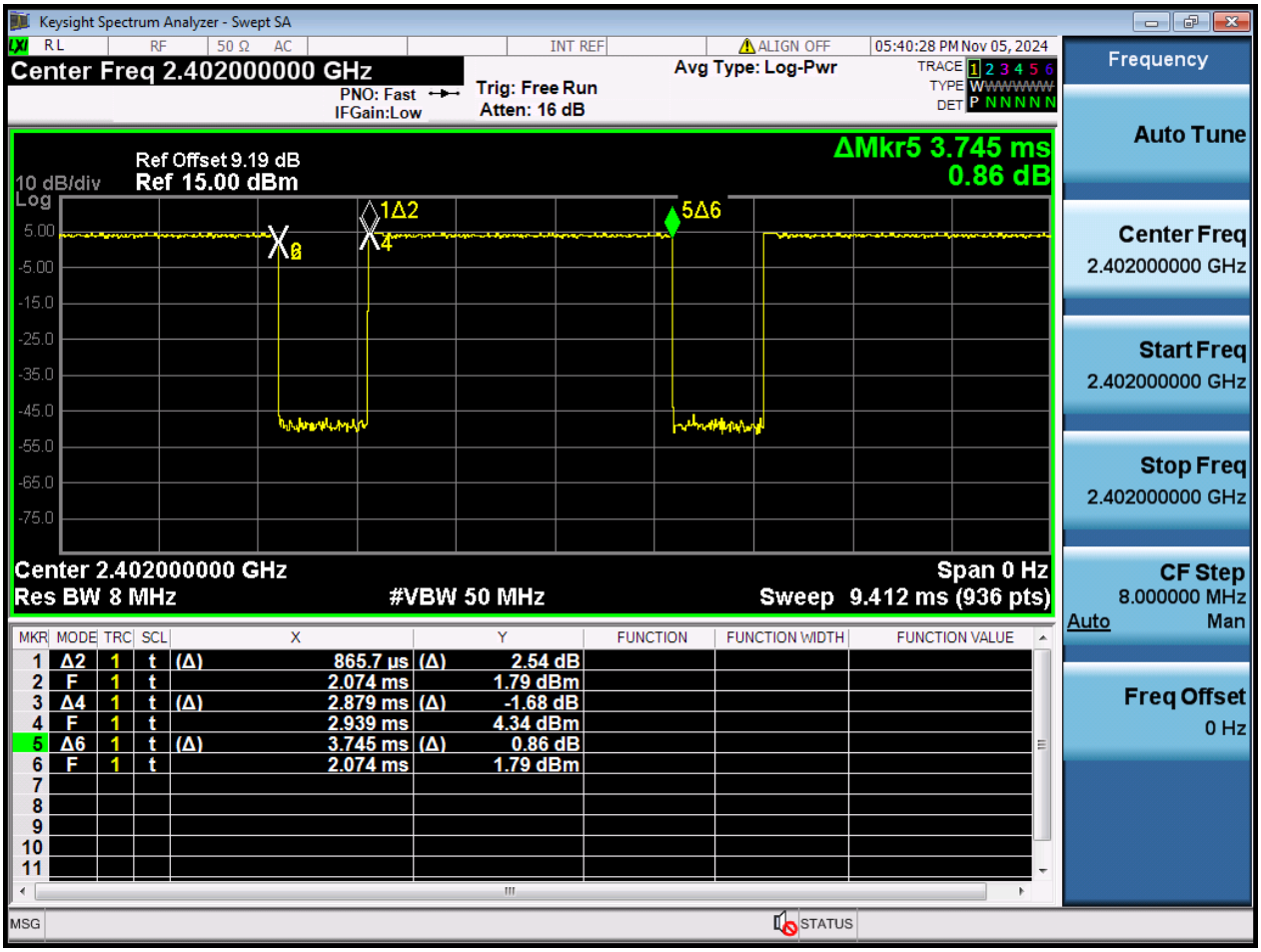
| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2480 | 8 | Peak | 0.002879 | 0.000876 | 0.003755 | 0.7668 | 0.1 | Pass |



3. BLUETOOTH FOR CLASSIC-3-DH5

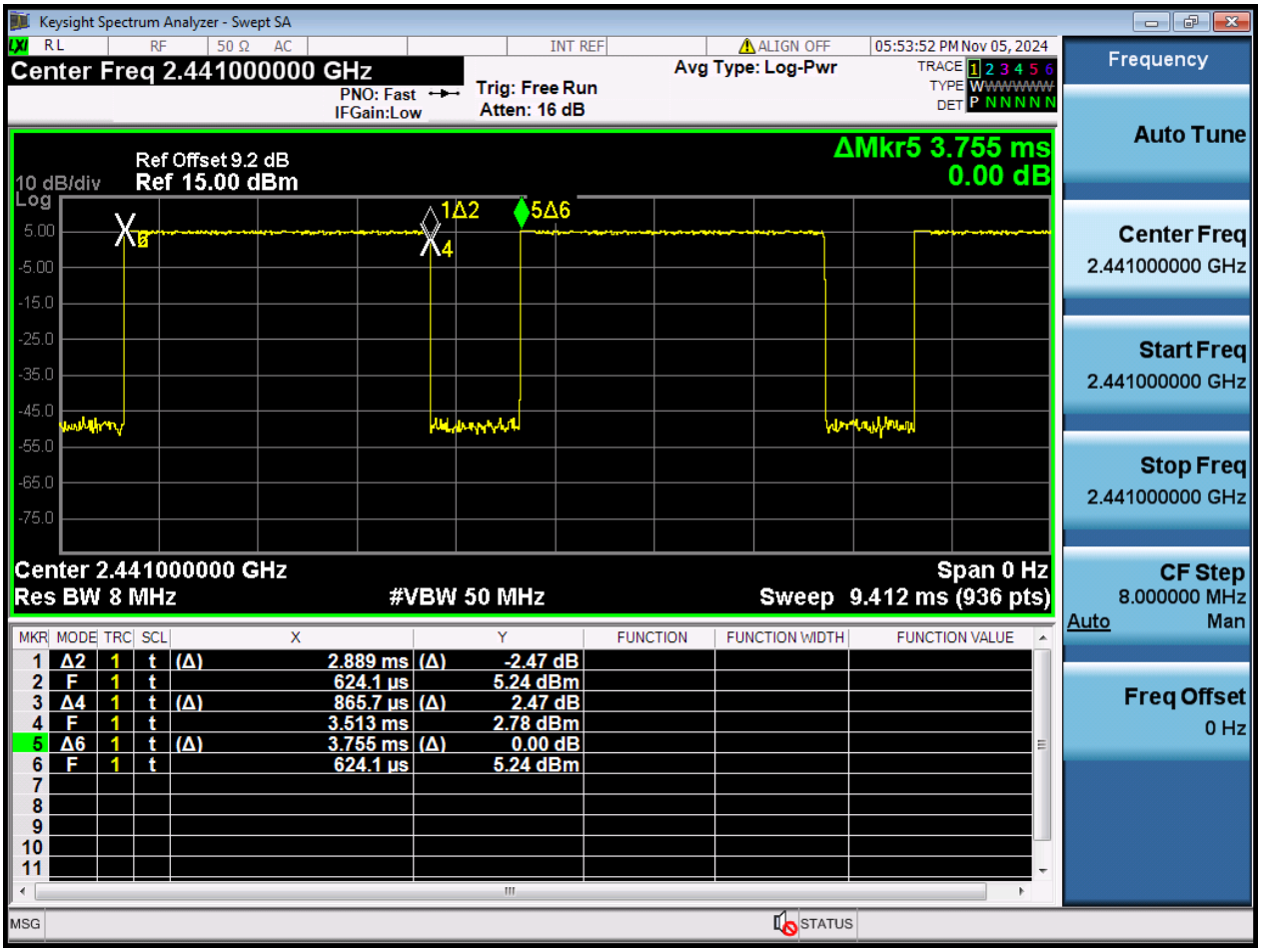
3.1. DUTY CYCLE(NTNV)

| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2402 | 8 | Peak | 0.002879 | 0.000866 | 0.003745 | 0.7688 | 0.1 | Pass |



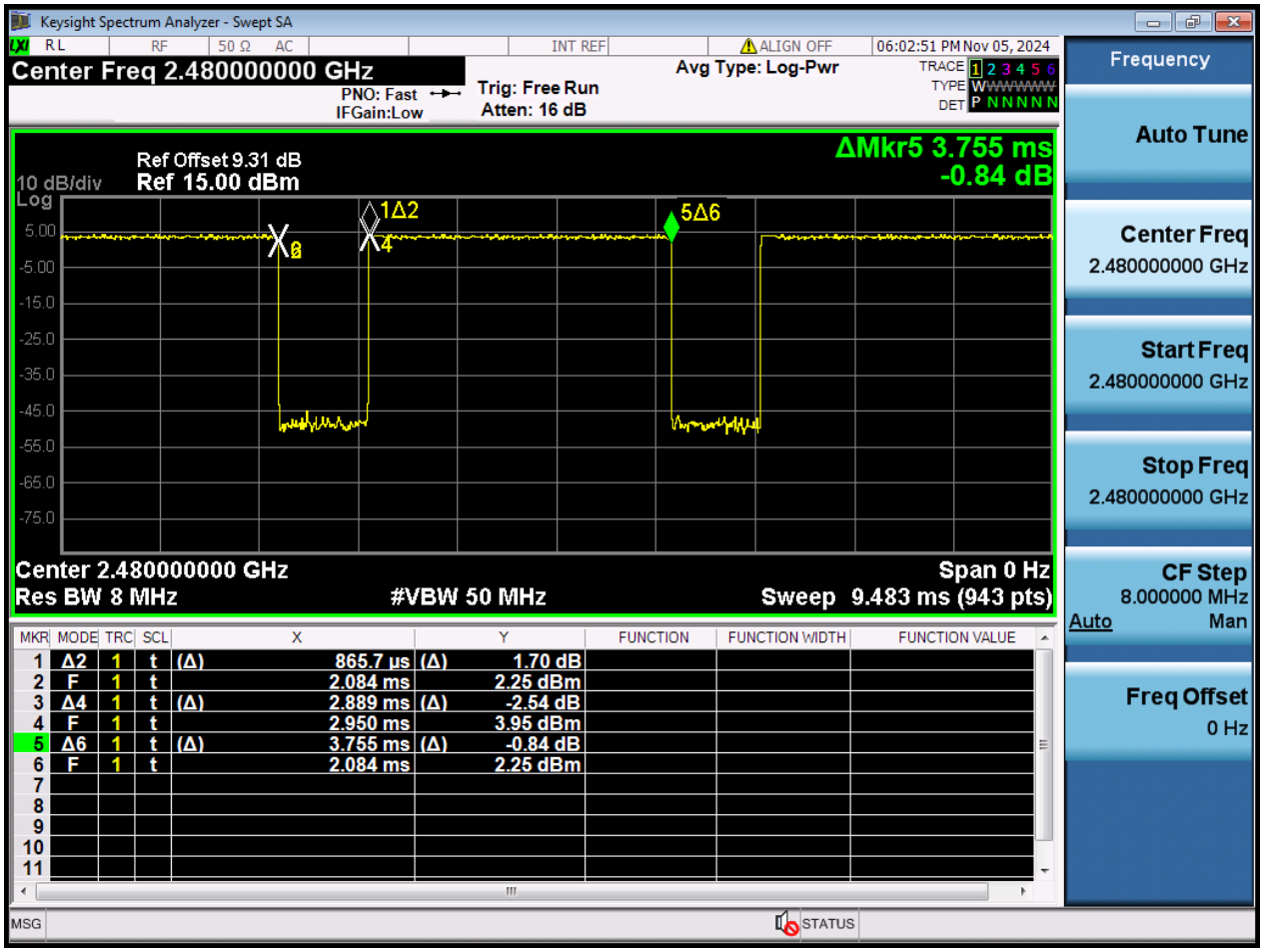
3.2. DUTY CYCLE(NTNV)

| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2441 | 8 | Peak | 0.002889 | 0.000866 | 0.003755 | 0.7694 | 0.1 | Pass |



3.3. DUTY CYCLE(NTNV)

| Center Frequency(MHz) | RBW (MHz) | Detector | Tx On (s) | Tx Off (s) | Period (s) | Duty Cycle | Limit | Verdict |
|---|---|---|---|---|---|---|---|---|
| 2480 | 8 | Peak | 0.002889 | 0.000866 | 0.003755 | 0.7694 | 0.1 | Pass |



# APPENDIX II - MEASUREMENT PHOTOS

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

※※※※※END OF THE REPORT※※※※※