

| TEST REPORT                                                                                                                                                                                                        |                                                                                      |                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------|
| Report Number..... :                                                                                                                                                                                               | 90836-22-72-22-PP001                                                                 |                  |
| Date of issue .....                                                                                                                                                                                                | 2022-09-27                                                                           |                  |
| Tested by (+signature) .....                                                                                                                                                                                       | Duke                                                                                 | <i>Duke Chen</i> |
| Approved by (+signature).... :                                                                                                                                                                                     | Jason                                                                                | <i>Jason gao</i> |
| Testing Laboratory name..... :                                                                                                                                                                                     | SLG-CPC Testlaboratory Co., Ltd.                                                     |                  |
| Address .....                                                                                                                                                                                                      | No. 11, Wu Song Road, Dongcheng District, Dongguan, Guangdong Province, China 523117 |                  |
| Applicant's name .....                                                                                                                                                                                             | Dongguan Laiken Electronics Co., Ltd.                                                |                  |
| Address .....                                                                                                                                                                                                      | 3rd Floor, NO.25 , Liuhua Road, Dongcheng Street, Dongguan Guangdong                 |                  |
| Manufacturer's name .....                                                                                                                                                                                          | Dongguan Laiken Electronics Co., Ltd.                                                |                  |
| Address .....                                                                                                                                                                                                      | 3rd Floor, NO.25 , Liuhua Road, Dongcheng Street, Dongguan Guangdong                 |                  |
| Factory's name .....                                                                                                                                                                                               | Dongguan Laiken Electronics Co., Ltd.                                                |                  |
| Address .....                                                                                                                                                                                                      | 3rd Floor, NO.25 , Liuhua Road, Dongcheng Street, Dongguan Guangdong                 |                  |
| Standard(s)..... :                                                                                                                                                                                                 | FCC 47 CFR Part 15, Subpart C                                                        |                  |
| Test item description..... :                                                                                                                                                                                       | Wireless headphones                                                                  |                  |
| Trade Mark..... :                                                                                                                                                                                                  | N/A                                                                                  |                  |
| Model/Type reference..... :                                                                                                                                                                                        | B-X6, B-X8, B-X10, B-E2, B-E7, B-C5, B-C6, B-C12                                     |                  |
| FCC ID .....                                                                                                                                                                                                       | 2A8MQB-X6                                                                            |                  |
| Date of receipt of test item .. :                                                                                                                                                                                  | 2022-09-01                                                                           |                  |
| Date (s) of performance of test..... :                                                                                                                                                                             | 2022-09-02 to 2022-09-26                                                             |                  |
| Summary of Test Results..... :                                                                                                                                                                                     | Pass                                                                                 |                  |
| The Summary of Test Results based on a technical opinion belongs to the standard(s).                                                                                                                               |                                                                                      |                  |
| <b>General disclaimer:</b><br>This report shall not be reproduced except in full, without the written approval of SLG-CPC Testlaboratory Co., Ltd. The test results in the report only apply to the tested sample. |                                                                                      |                  |

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Modified Information

| Version | Report No.           | Revision Data | Summary          |
|---------|----------------------|---------------|------------------|
| Ver.1.0 | 90836-22-72-22-PP001 | 2022-09-27    | Original Version |
|         |                      |               |                  |

## 1 EUT TECHNICAL DESCRIPTION

| Characteristics               | Description                                                                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Product                       | Wireless headphones                                                                                                                               |
| Model Number                  | B-X6, B-X8, B-X10, B-E2, B-E7, B-C5, B-C6, B-C12<br>All models are identical except for the model name.<br>All tests were performed on model B-X6 |
| Device Type                   | Bluetooth V5.1                                                                                                                                    |
| Data Rate                     | 1Mbps for BT V5.1 GFSK modulation<br>2Mbps for BT V5.1 pi/4-DQPSK modulation                                                                      |
| Modulation:                   | GFSK modulation for BT V5.1 (1Mbps)<br>pi/4-DQPSK modulation for BT V5.1 (2Mbps)                                                                  |
| Operating Frequency Range(s): | 2402-2480MHz                                                                                                                                      |
| Number of Channels:           | 79 channels                                                                                                                                       |
| Transmit Power Max:           | -7.03 dBm                                                                                                                                         |
| Antenna Type                  | PCB Antenna                                                                                                                                       |
| Antenna Gain                  | -0.58 dBi                                                                                                                                         |
| Power supply                  | <input checked="" type="checkbox"/> DC supply:<br>DC 3.7 by battery 500mAh                                                                        |
| Temperature Range:            | -20°C ~ +55°C                                                                                                                                     |

**Note:** for more details, please refer to the User's manual of the EUT.

## 2 SUMMARY OF TEST RESULT

| FCC Part Clause                                                                                                                                                                                                                                                                                                               | Test Parameter                         | Verdict | Remark |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---------|--------|
| 15.247(a)(1)                                                                                                                                                                                                                                                                                                                  | 20 dB Bandwidth                        | PASS    |        |
| 15.247(a)(1)                                                                                                                                                                                                                                                                                                                  | Carrier Frequency Separation           | PASS    |        |
| 15.247(a)(1)                                                                                                                                                                                                                                                                                                                  | Number of Hopping Frequencies          | PASS    |        |
| 15.247(a)(1)                                                                                                                                                                                                                                                                                                                  | Average Time of Occupancy (Dwell Time) | PASS    |        |
| 15.247(b)(1)                                                                                                                                                                                                                                                                                                                  | Maximum Peak Conducted Output Power    | PASS    |        |
| 15.247(c)                                                                                                                                                                                                                                                                                                                     | Conducted Spurious Emissions           | PASS    |        |
| 15.247(d)<br>15.209                                                                                                                                                                                                                                                                                                           | Radiated Spurious Emissions            | PASS    |        |
| 15.207                                                                                                                                                                                                                                                                                                                        | Conducted Emission                     | N/A     |        |
| 15.203                                                                                                                                                                                                                                                                                                                        | Antenna Application                    | PASS    |        |
| 15.247 (a)<br>(1)/g/h                                                                                                                                                                                                                                                                                                         | Frequency Hopping System               | PASS    |        |
| NOTE1: N/A (Not Applicable)<br>NOTE2: According to FCC KDB 558074 D01 15.247 Meas Guidance v05r02, the report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits. |                                        |         |        |

### RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2A8MQB-X6 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

### 3 TEST METHODOLOGY

#### 3.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 15, Subpart C

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

#### 3.2 MEASUREMENT EQUIPMENT USED

| Equipment                           | Model           | Manufacturer | S/N              | Last Cal.  | DUE Cal. |
|-------------------------------------|-----------------|--------------|------------------|------------|----------|
| <b>RF Connected Test</b>            |                 |              |                  |            |          |
| Vector Signal Generator             | Rohde & Schwarz | SMBV100B(6G) | 101166           | 2022/06/29 | 1 year   |
| Analog Signal Generator             | Rohde & Schwarz | SMB100A(40G) | 181333           | 2022/06/29 | 1 year   |
| Signal Analyzer                     | Rohde & Schwarz | FSV40        | 101527           | 2022/04/19 | 1 year   |
| Power Analyzer                      | Rohde & Schwarz | OSP-B157W8   | N/A              | 2022/06/29 | 1 year   |
| Wideband Radio Communication Tester | R&S             | CMW270       | 101985           | 2022/07/05 | 1 year   |
| Wideband Radio Communication Tester | Rohde & Schwarz | CMW500       | 166898           | 2022/07/14 | 1 year   |
| Temperature&Humidity test chamber   | ESPEC           | VC 4018      | /                | 2022/03/23 | 1 year   |
| <b>Radiated Emission Test</b>       |                 |              |                  |            |          |
| EMI Test Receiver                   | KEYSIGHT        | N9010A       | MY56070465       | 2021/12/10 | 1 year   |
| EMI Test Receiver                   | Rohde & Schwarz | FSV40        | 101511           | 2022/04/19 | 1 year   |
| Bilog Antenna                       | Schwarzbeck     | VULB 9163    | 01335            | 2020/04/28 | 3 year   |
| Power Amplifier                     | EMEC            | EM330        | 060676           | 2021/12/10 | 3 year   |
| Cable                               | Tuyue           | F4309        | L-400-NmNm-12000 | 2021/12/10 | 1 year   |
| Horn Antenna                        | Schwarzbeck     | BBHA9120D    | 1779             | 2022/04/21 | 3 year   |
| Horn Antenna                        | Schwarzbeck     | BBHA9170     | 00954            | 2022/09/13 | 3 year   |
| Power Amplifier                     | Rohde & Schwarz | SCU-18F      | 180118           | 2022/04/21 | 3 year   |
| Active Loop Antenna                 | ETS LINDGREN    | 6512         | 41623            | 2022/04/23 | 3 year   |
| Test Software                       | Farad           | EZ-EMC       | Ver.CPC-3A1      | /          | /        |
| <b>Conducted Emission Test</b>      |                 |              |                  |            |          |
| LISN                                | Schwarzbeck     | NSLK 8127    | 8127-892         | 2022/03/19 | 1 year   |
| LISN                                | Schwarzbeck     | NSLK 8127    | 8127-437         | 2022/08/26 | 1 year   |
| EMI Test Receiver                   | R&S             | ESR3         | 102124           | 2021/12/10 | 1 year   |
| Pulse Limiter                       | R&S             | ESH3-Z2      | 357.8810.52      | 2021/12/10 | 1 year   |
| Test Software                       | Farad           | EZ-EMC       | Ver.CPC-3A1      | /          | /        |

### 3.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (1Mbps for Bluetooth V5.1 GFSK modulation; 2Mbps for Bluetooth V5.1 pi/4-DQPSK modulation) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for Bluetooth V5.1

| Channel                                                             | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------------------------------------------------------------------|-----------------|---------|-----------------|---------|-----------------|
| 0                                                                   | 2402            | 39      | 2441            | ...     | ...             |
| 1                                                                   | 2403            | 40      | 2442            | 76      | 2478            |
| 2                                                                   | 2404            | 41      | 2443            | 77      | 2479            |
| ...                                                                 | ...             | ...     | ...             | 78      | 2480            |
| Note: $f_c = 2402\text{MHz} + (k-1) \times 1\text{MHz}$ $k=1$ to 79 |                 |         |                 |         |                 |

Test Frequency and channel for Bluetooth V5.1

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 0                | 2402            | 39               | 2441            | 78                | 2480            |

## 4 FACILITIES AND ACCREDITATIONS

### 4.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No. 11, Wu Song Road, Dongcheng District, Dongguan, Guangdong Province, China 523117

The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.10 and CISPR Publication 32.

### 4.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab.

:

Accredited by ISED, October 04 2021

CAB identifier: CN0126

Company Number: 27767

Accredited by A2LA, October 04 2021

The Certificate Registration Number is 6325.01

Name of Firm

:

SLG-CPC Testlaboratory Co., Ltd.

Site Location

:

No. 11, Wu Song Road, Dongcheng District, Dongguan,  
Guangdong Province, China 523117

## 5 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

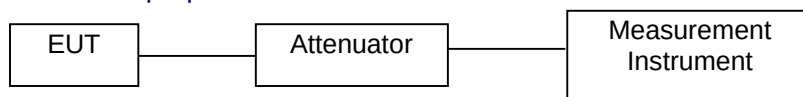
| Parameter                      | Uncertainty            |
|--------------------------------|------------------------|
| Radio Frequency                | $\pm 1 \times 10^{-5}$ |
| Maximum Peak Output Power Test | $\pm 1.0\%$            |
| Conducted Emissions Test       | $\pm 3.08\text{dB}$    |
| Radiated Emission Test         | $\pm 4.60\text{dB}$    |
| Power Density                  | $\pm 0.9\%$            |
| Occupied Bandwidth Test        | $\pm 2.3\%$            |
| Band Edge Test                 | $\pm 1.2\%$            |
| Antenna Port Emission          | $\pm 3\text{dB}$       |
| Temperature                    | $\pm 3.2\%$            |
| Humidity                       | $\pm 2.5\%$            |

Measurement Uncertainty for a level of Confidence of 95%

## 6 SETUP OF EQUIPMENT UNDER TEST

### 6.1 RADIO FREQUENCY TEST SETUP 1

The Bluetooth V5.1 component's antenna port(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



### 6.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 32.

Below 30MHz:

The EUT is placed on a turntable 0.8meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the the specified distance from the EUT.

Above 30MHz:

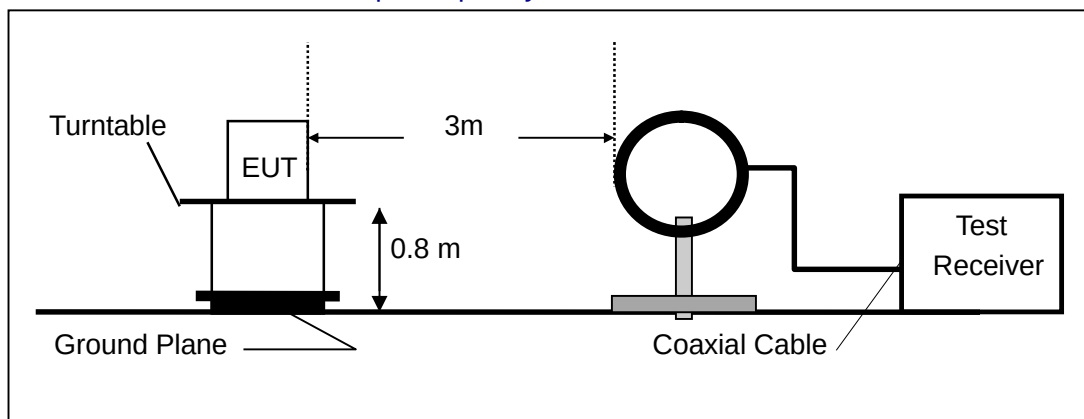
The EUT is placed on a turntable 0.8meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz:

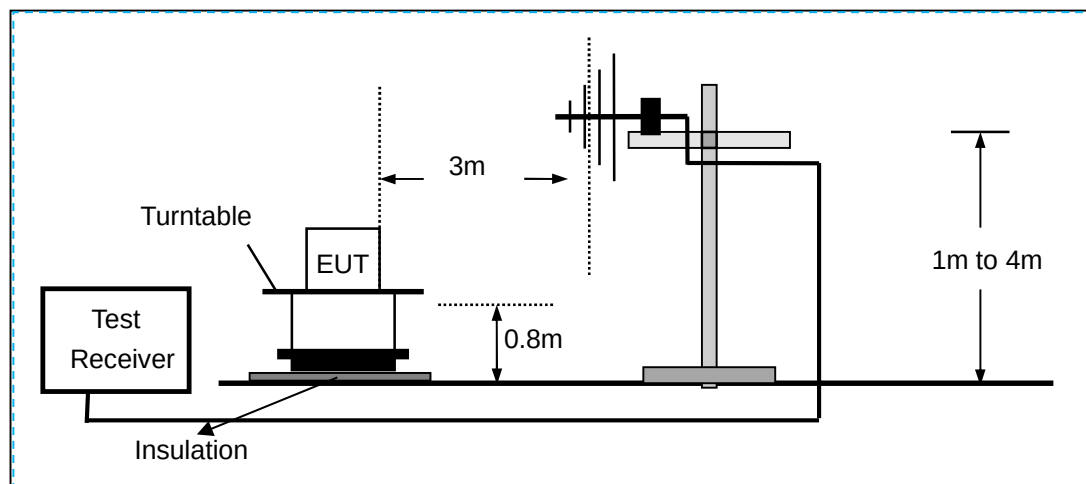
(Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.)

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

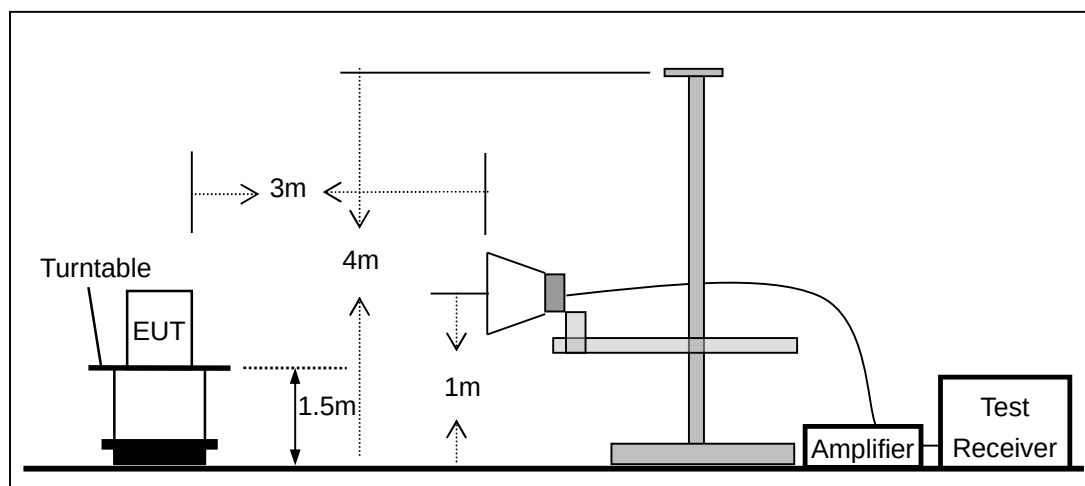
#### (a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

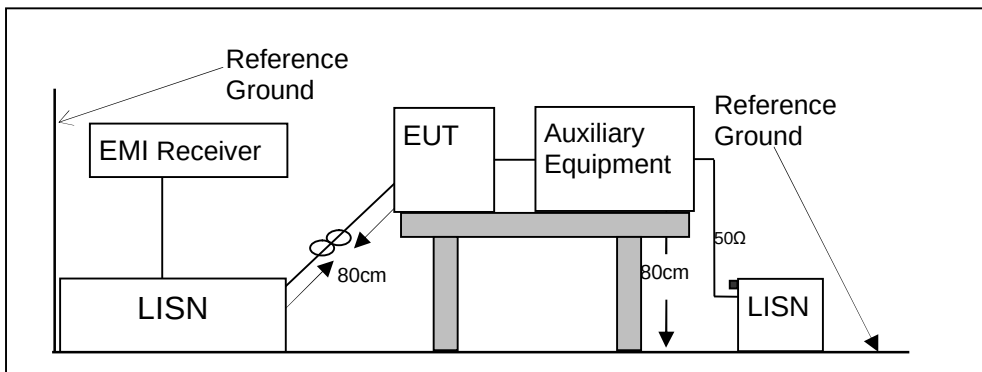


### 6.3 CONDUCTED EMISSION TEST SETUP

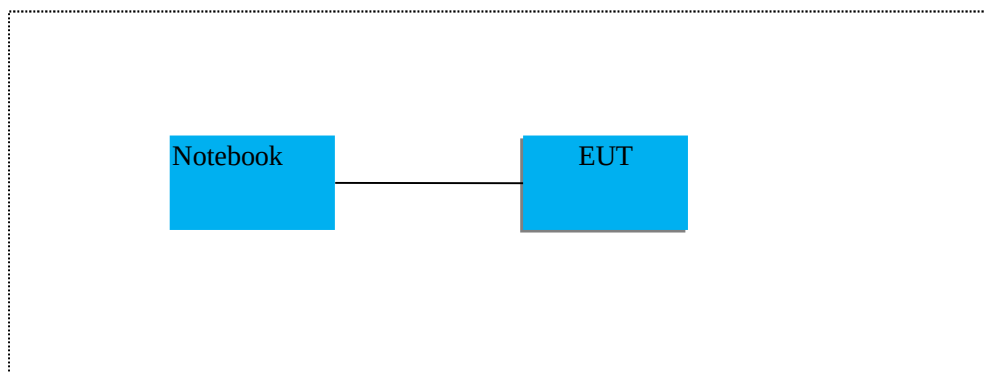
The mains cable of the EUT (Perfect Share Mini) must be connected to LISN. The LISN shall be placed 0.8m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.8m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



#### 6.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



#### 6.5 SUPPORT EQUIPMENT

| EUT Cable List and Details |            |                     |                        |
|----------------------------|------------|---------------------|------------------------|
| Cable Description          | Length (m) | Shielded/Unshielded | With / Without Ferrite |
|                            |            |                     |                        |
|                            |            |                     |                        |

| Auxiliary Cable List and Details |            |                     |                        |
|----------------------------------|------------|---------------------|------------------------|
| Cable Description                | Length (m) | Shielded/Unshielded | With / Without Ferrite |
|                                  |            |                     |                        |
|                                  |            |                     |                        |

| Auxiliary Equipment List and Details |              |              |               |
|--------------------------------------|--------------|--------------|---------------|
| Description                          | Manufacturer | Model        | Serial Number |
| Notebook                             | Lenovo       | MPNXB1505007 | MP1XHYV7      |
| Adapter                              | HUAWEI       | HW-200675CD1 | /             |

**Notes:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

## 7 TEST REQUIREMENTS

### 7.1 20DB BANDWIDTH

#### 7.1.1 Applicable Standard

According to FCC Part 15.247(a)(1) and KDB 558074 D01 15.247 MEAS GUIDANCE v05r02

#### 7.1.2 Conformance Limit

No limit requirement.

#### 7.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

#### 7.1.4 Test Procedure

The EUT was operating in Bluetooth V5.1 mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 30 kHz.

Set the video bandwidth (VBW) =100 kHz.

Set Span= approximately 2 to 3 times the 20 dB bandwidth

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the markerdelta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

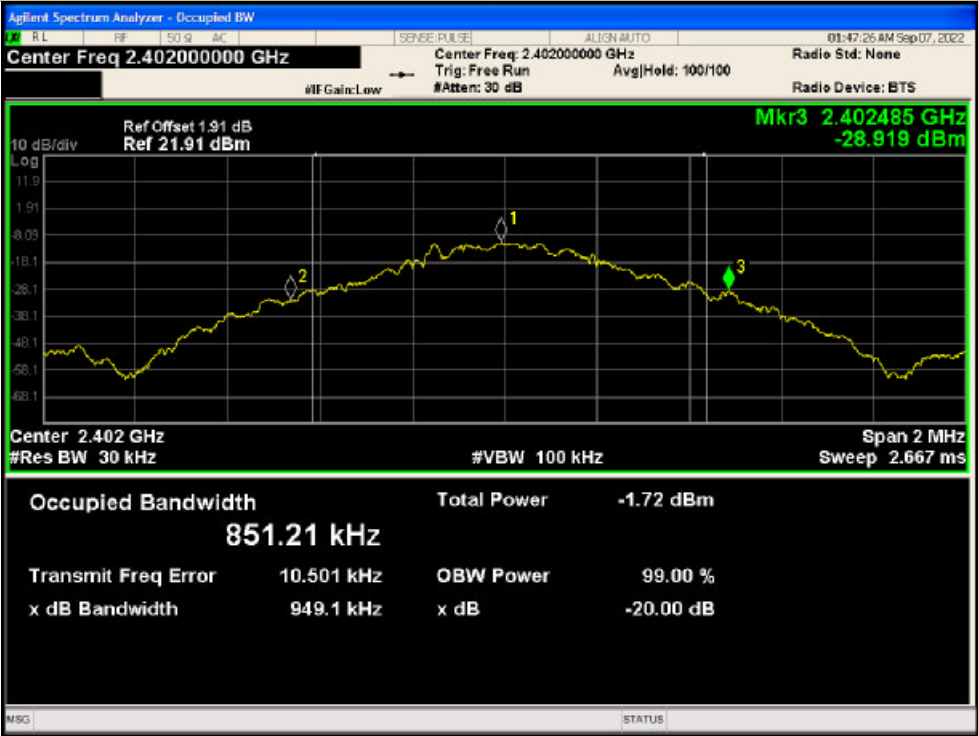
Measure and record the results in the test report.

### Test Results

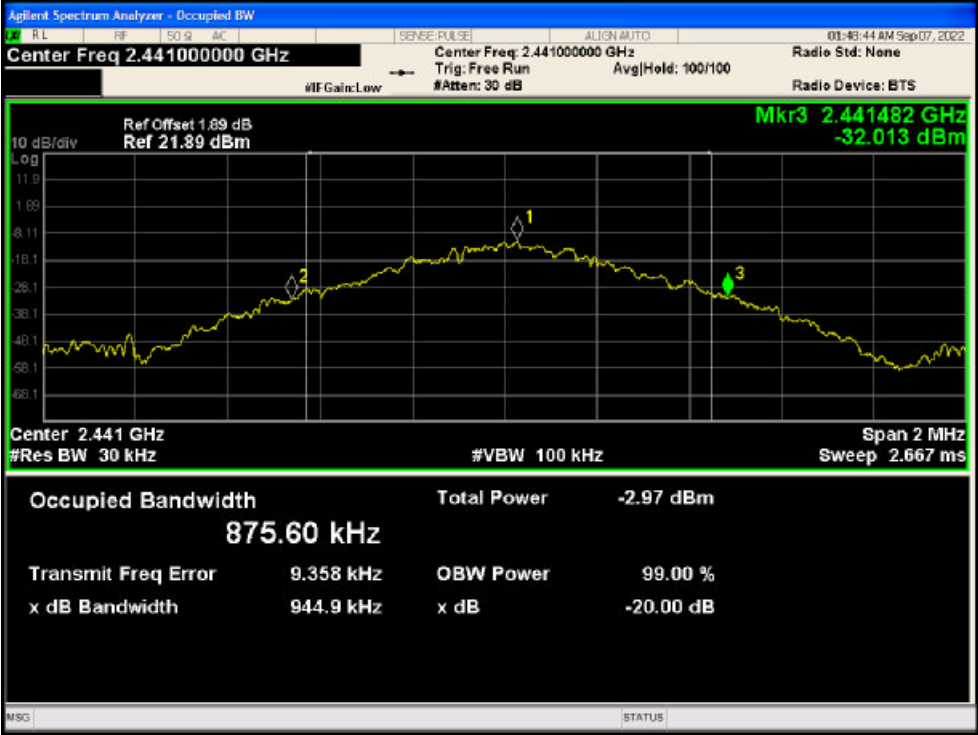
|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 54%       |
| ATM Pressure:      | 1011 mbar |

| Modulation Mode            | Channel Number | Channel Frequency (MHz) | Measurement Bandwidth (MHz) | Limit (MHz) | Verdict |
|----------------------------|----------------|-------------------------|-----------------------------|-------------|---------|
| GFSK                       | 00             | 2402                    | 0.949                       | N/A         | PASS    |
|                            | 39             | 2441                    | 0.945                       | N/A         | PASS    |
|                            | 78             | 2480                    | 0.949                       | N/A         | PASS    |
| pi/4-DQPSK                 | 00             | 2402                    | 1.298                       | N/A         | PASS    |
|                            | 39             | 2441                    | 1.315                       | N/A         | PASS    |
|                            | 78             | 2480                    | 1.281                       | N/A         | PASS    |
| Note: N/A (Not Applicable) |                |                         |                             |             |         |

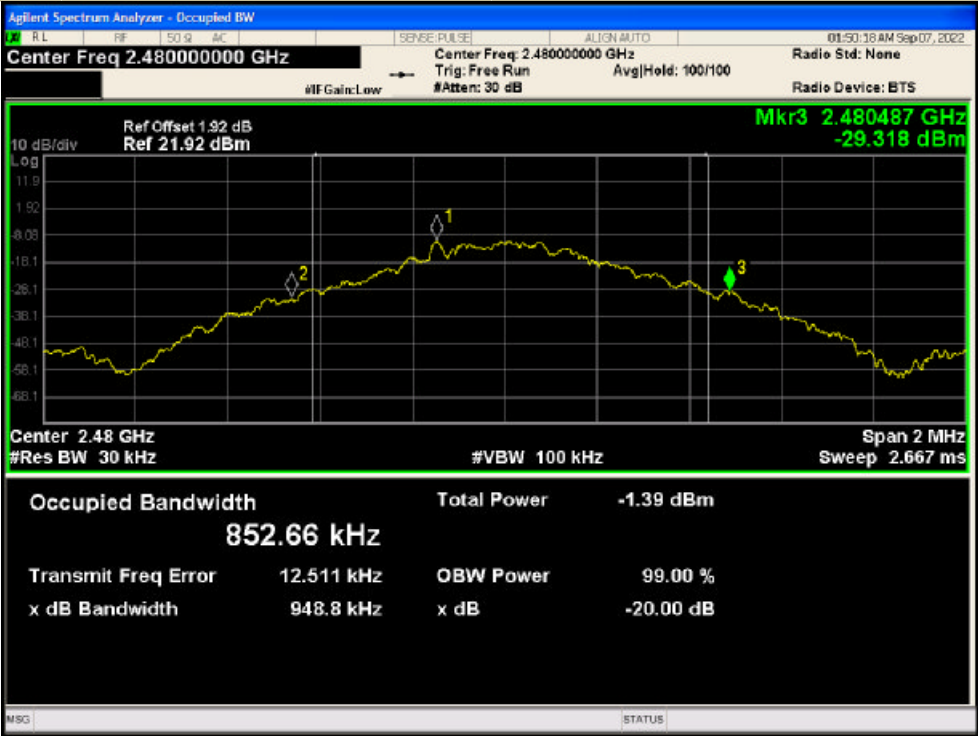
|            |                    |                 |
|------------|--------------------|-----------------|
| Test Model | 20dB Bandwidth     |                 |
|            | Bluetooth V5.1     |                 |
|            | Channel 0: 2402MHz | GFSK Modulation |



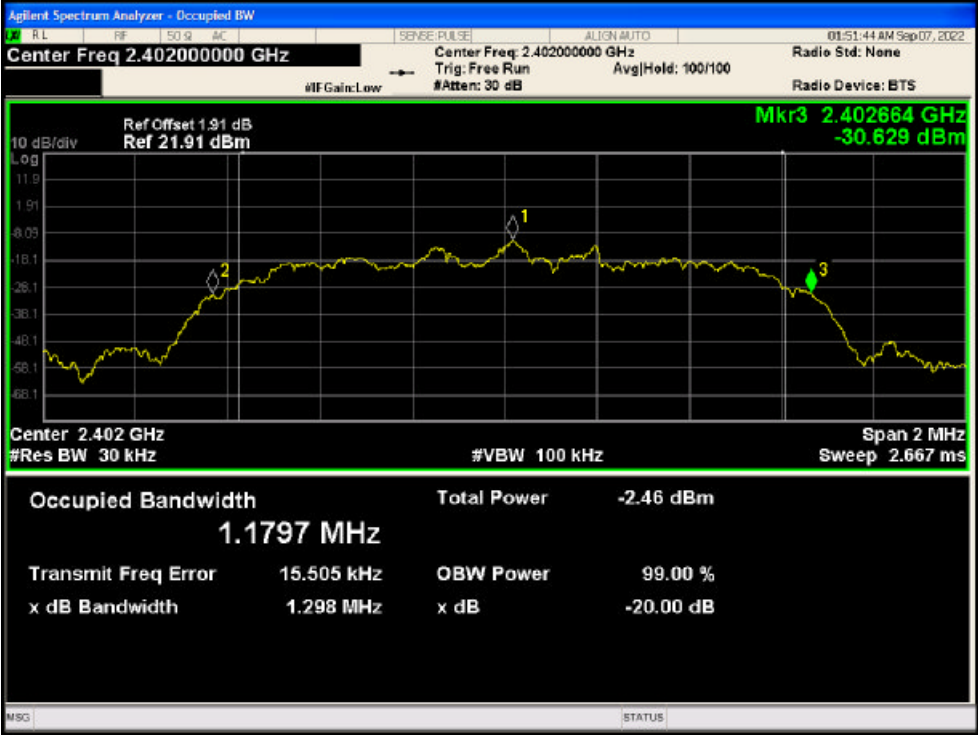
|            |                     |                 |
|------------|---------------------|-----------------|
| Test Model | 20dB Bandwidth      |                 |
|            | Bluetooth V5.1      |                 |
|            | Channel 39: 2441MHz | GFSK Modulation |



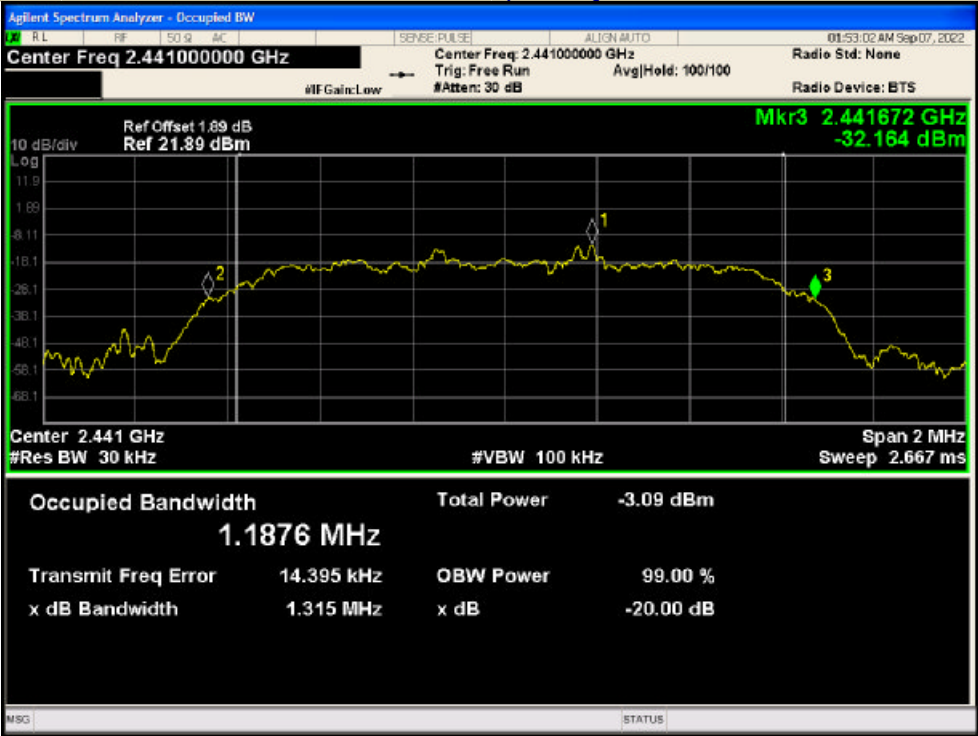
|            |                     |                 |
|------------|---------------------|-----------------|
| Test Model | 20dB Bandwidth      |                 |
|            | Bluetooth V5.1      |                 |
|            | Channel 78: 2480MHz | GFSK Modulation |



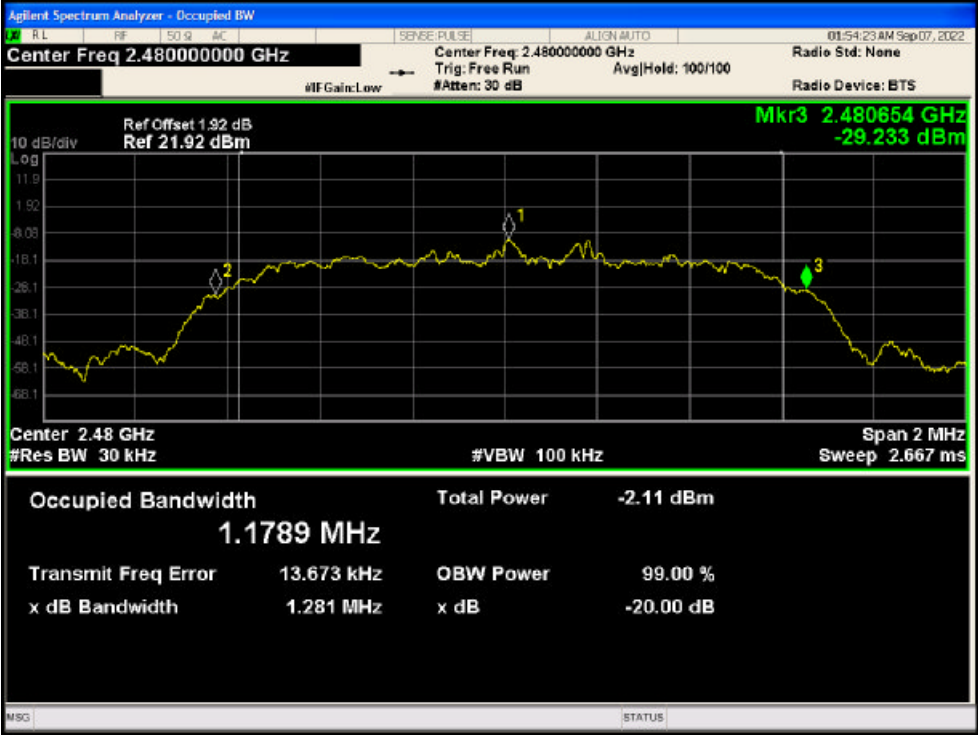
|            |                    |                       |
|------------|--------------------|-----------------------|
| Test Model | 20dB Bandwidth     |                       |
|            | Bluetooth V5.1     |                       |
|            | Channel 0: 2402MHz | pi/4-DQPSK Modulation |



|            |                     |                       |
|------------|---------------------|-----------------------|
| Test Model | 20dB Bandwidth      |                       |
|            | Bluetooth V5.1      |                       |
|            | Channel 39: 2441MHz | pi/4-DQPSK Modulation |



|            |                     |                       |
|------------|---------------------|-----------------------|
| Test Model | 20dB Bandwidth      |                       |
|            | Bluetooth V5.1      |                       |
|            | Channel 78: 2480MHz | pi/4-DQPSK Modulation |



## 7.2 CARRIER FREQUENCY SEPARATION

### 7.2.1 Applicable Standard

According to FCC Part 15.247(a)(1) and KDB 558074 D01 15.247 MEAS GUIDANCE v05r02

### 7.2.2 Conformance Limit

Frequency hopping systems operating in the 2400-2483.5MHz band shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

In case of an output power less than 125mW, the frequency hopping system may have channels separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

### 7.2.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

### 7.2.4 Test Procedure

■ According to FCC Part 15.247(a)(1)

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Set the RBW = 30kHz. Set VBW = 100kHz.

Set the span = wide enough to capture the peaks of two adjacent channels

Set Sweep time = auto couple.

Set Detector = peak. Set Trace mode = max hold.

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

### Test Results

|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 54%       |
| ATM Pressure:      | 1011 mbar |

| Modulation Mode                    | Channel Number | Channel Frequency (MHz) | Measurement Bandwidth (kHz) | Limit (kHz) | Verdict |
|------------------------------------|----------------|-------------------------|-----------------------------|-------------|---------|
| GFSK                               | 0              | 2402                    | 998                         | >632        | PASS    |
|                                    | 39             | 2441                    | 1008                        | >630        | PASS    |
|                                    | 78             | 2480                    | 1003                        | >632        | PASS    |
| pi/4-DQPSK                         | 0              | 2402                    | 1001                        | >865        | PASS    |
|                                    | 39             | 2441                    | 996                         | >876        | PASS    |
|                                    | 78             | 2480                    | 1164                        | >854        | PASS    |
| Note: Limit = 20dB bandwidth * 2/3 |                |                         |                             |             |         |

|            |                              |                 |
|------------|------------------------------|-----------------|
| Test Model | Carrier Frequency Separation |                 |
|            | Bluetooth V5.1               |                 |
|            | Channel 0: 2402MHz           | GFSK Modulation |



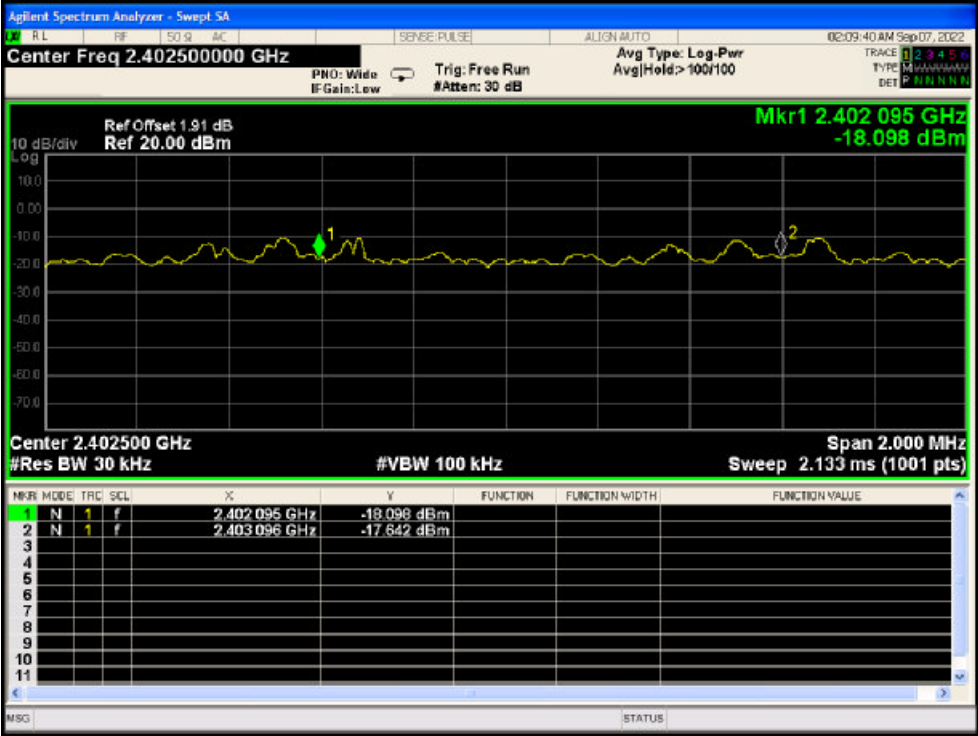
|            |                              |                 |
|------------|------------------------------|-----------------|
| Test Model | Carrier Frequency Separation |                 |
|            | Bluetooth V5.1               |                 |
|            | Channel 39: 2441MHz          | GFSK Modulation |



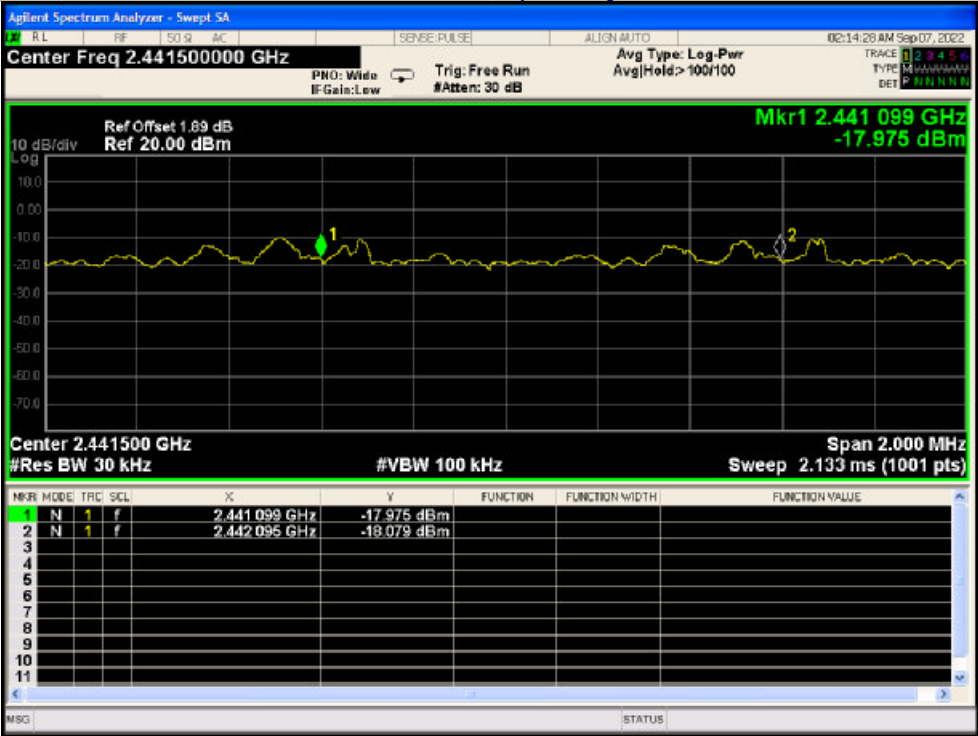
|            |                              |                 |  |
|------------|------------------------------|-----------------|--|
| Test Model | Carrier Frequency Separation |                 |  |
|            | Bluetooth V5.1               |                 |  |
|            | Channel 78: 2480MHz          | GFSK Modulation |  |



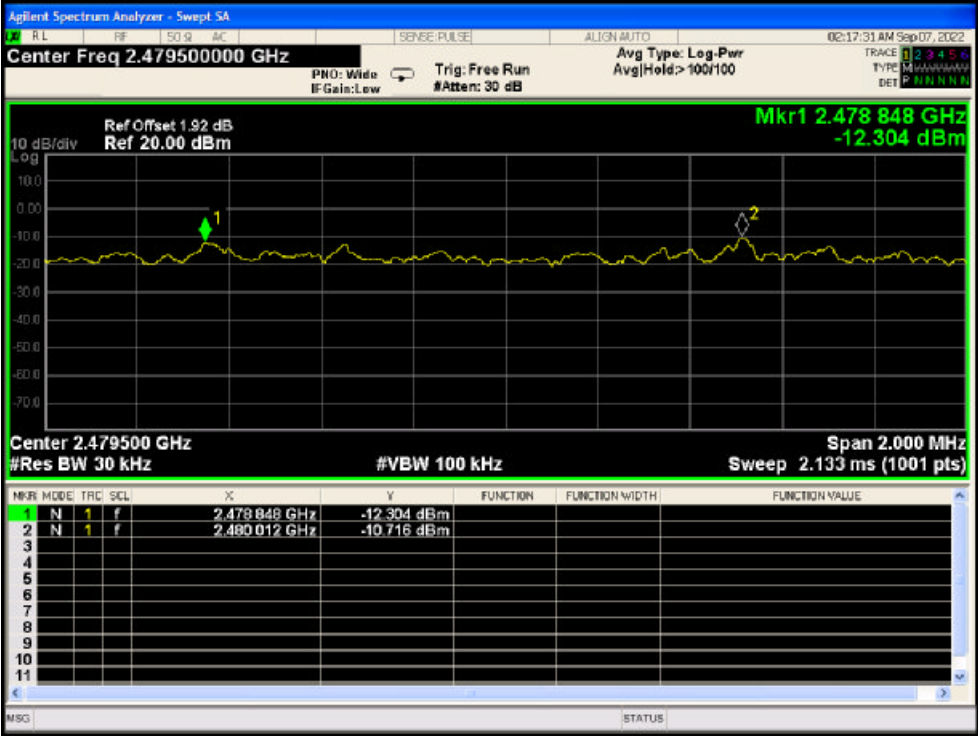
|            |                              |                       |  |
|------------|------------------------------|-----------------------|--|
| Test Model | Carrier Frequency Separation |                       |  |
|            | Bluetooth V5.1               |                       |  |
|            | Channel 0: 2402MHz           | pi/4-DQPSK Modulation |  |



|            |                              |                       |  |
|------------|------------------------------|-----------------------|--|
| Test Model | Carrier Frequency Separation |                       |  |
|            | Bluetooth V5.1               |                       |  |
|            | Channel 39: 2441MHz          | pi/4-DQPSK Modulation |  |



|            |                              |                       |  |
|------------|------------------------------|-----------------------|--|
| Test Model | Carrier Frequency Separation |                       |  |
|            | Bluetooth V5.1               |                       |  |
|            | Channel 78: 2480MHz          | pi/4-DQPSK Modulation |  |



### 7.3 NUMBER OF HOPPING FREQUENCIES

#### 7.3.1 Applicable Standard

According to FCC Part 15.247(a)(1) (iii) and KDB 558074 D01 15.247 MEAS GUIDANCE v05r02

#### 7.3.2 Conformance Limit

Frequency hopping systems operating in the 2400-2483.5MHz band shall use at least 15 channels.

#### 7.3.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

#### 7.3.4 Test Procedure

- According to FCC Part 15.247(a)(1)(iii)

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = the frequency band of operation (2400-2483.5MHz)

RBW  $\geq$  100KHz

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

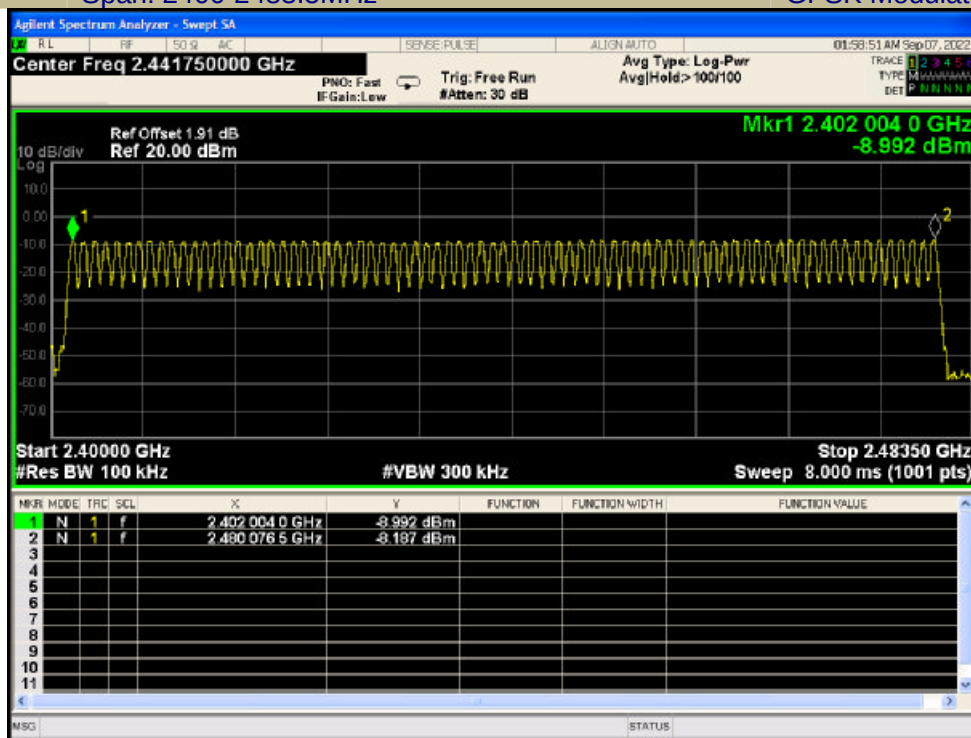
Allow the trace to stabilize. It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies.

#### Test Results

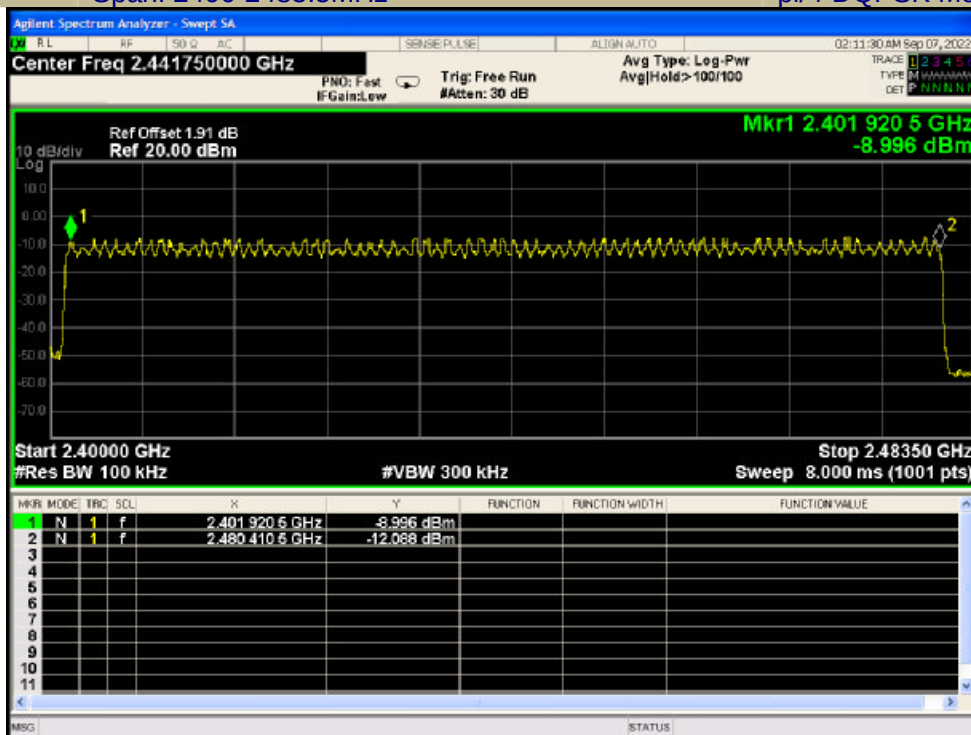
|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 54%       |
| ATM Pressure:      | 1011 mbar |

| Modulation Mode | Hopping Channel Frequency Range | Quantity of Hopping Channel | Quantity of Hopping Channel limit |
|-----------------|---------------------------------|-----------------------------|-----------------------------------|
| GFSK            | 2402-2480                       | 79                          | >15                               |
| pi/4-DQPSK      | 2402-2480                       | 79                          | >15                               |

|            |                               |
|------------|-------------------------------|
| Test Model | Number Of Hopping Frequencies |
|            | Bluetooth V5.1                |
|            | Span: 2400-2483.5MHz          |
|            | GFSK Modulation               |



|            |                               |
|------------|-------------------------------|
| Test Model | Number Of Hopping Frequencies |
|            | Bluetooth V5.1                |
|            | Span: 2400-2483.5MHz          |
|            | pi/4-DQPSK Modulation         |



## 7.4 AVERAGE TIME OF OCCUPANCY (DWELL TIME)

### 7.4.1 Applicable Standard

According to FCC Part 15.247(a)(1)(iii) and KDB 558074 D01 15.247 MEAS GUIDANCE v05r02

### 7.4.2 Conformance Limit

For frequency hopping systems operating in the 2400-2483.5MHz band, the average time of occupancy on any channel shall not be greater than 0.4s within a period of 0.4s multiplied by the number of hopping channels employed.

### 7.4.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

### 7.4.4 Test Procedure

■ According to FCC Part 15.247(a)(1)(iii)

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel

RBW = 1 MHz

VBW  $\geq$  RBW

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

Trace = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section.

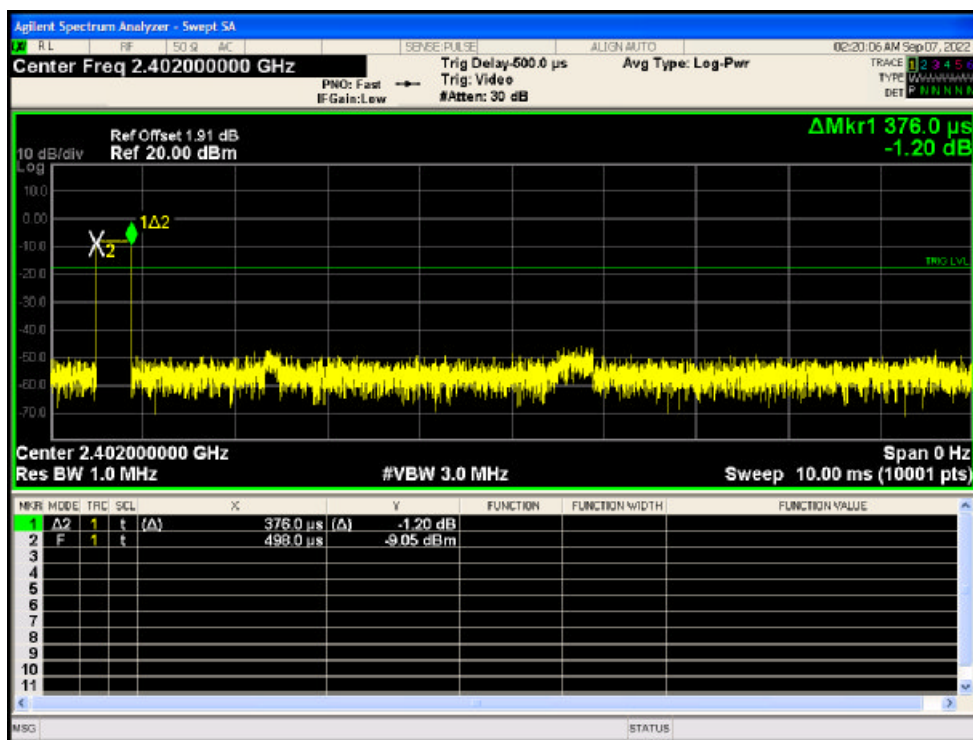
### 7.4.5 Test Results

|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 54%       |
| ATM Pressure:      | 1011 mbar |

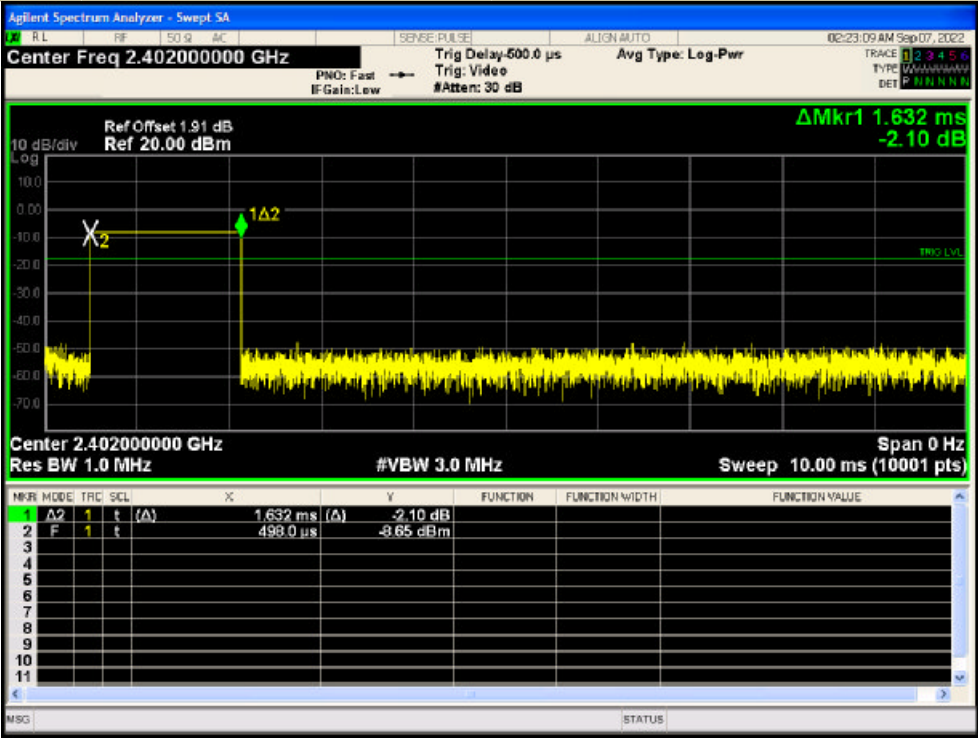
Bluetooth (GFSK, pi/4-DQPSK) mode have been tested, and the worst result(GFSK) was report as below:

| Modulation Mode                                                                                                         | Channel Number | Packet type | Pulse width (ms) | Dwell Time (ms) | Limit (ms) | Verdict |
|-------------------------------------------------------------------------------------------------------------------------|----------------|-------------|------------------|-----------------|------------|---------|
| GFSK                                                                                                                    | 0              | DH1         | 0.376            | 120,320         | <400       | PASS    |
|                                                                                                                         | 0              | DH3         | 1.632            | 261,120         | <400       | PASS    |
|                                                                                                                         | 0              | DH5         | 2.880            | 307,200         | <400       | PASS    |
| Note: Dwell Time(DH1)=PW*(1600/2/79)*31.6<br>Dwell Time(DH3)=PW*(1600/4/79)*31.6<br>Dwell Time(DH5)=PW*(1600/6/79)*31.6 |                |             |                  |                 |            |         |

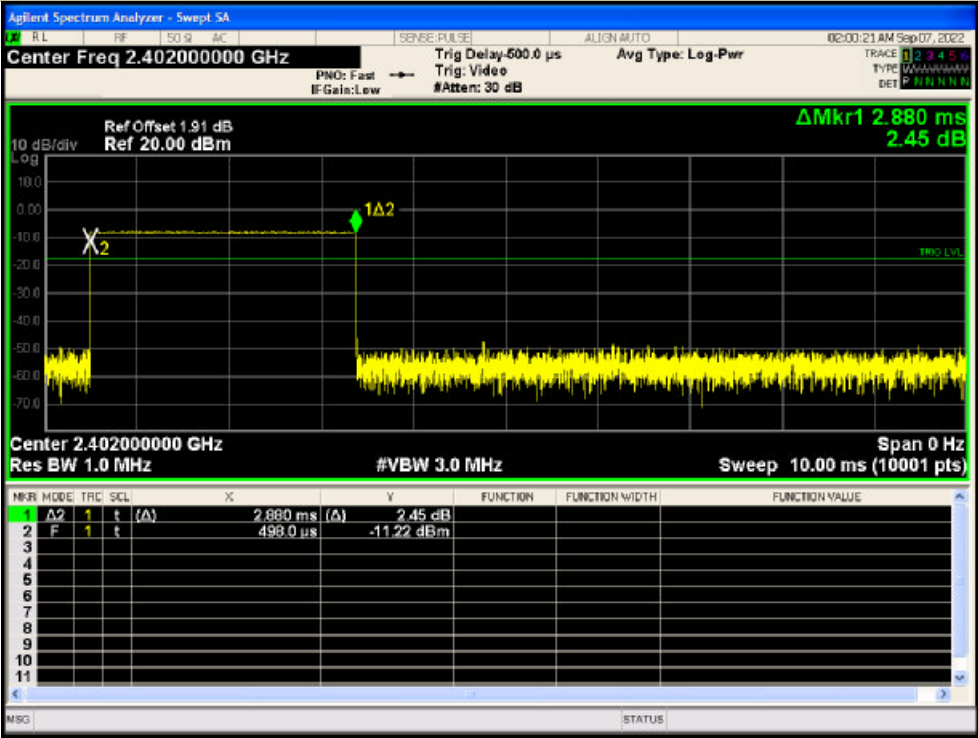
|            |                                        |          |
|------------|----------------------------------------|----------|
| Test Model | Average Time Of Occupancy (Dwell Time) |          |
|            | Bluetooth V5.1                         |          |
|            | CH 0: 2402MHz                          | GFSK DH1 |



|            |                                        |          |
|------------|----------------------------------------|----------|
| Test Model | Average Time Of Occupancy (Dwell Time) |          |
|            | Bluetooth V5.1                         |          |
|            | CH 0: 2402MHz                          | GFSK DH3 |



|            |                                        |          |
|------------|----------------------------------------|----------|
| Test Model | Average Time Of Occupancy (Dwell Time) |          |
|            | Bluetooth V5.1                         |          |
|            | CH 0: 2402MHz                          | GFSK DH5 |



## 7.5 MAXIMUM PEAK CONDUCTED OUTPUT POWER

### 7.5.1 Applicable Standard

According to FCC Part 15.247(b)(1) and KDB 558074 D01 15.247 MEAS GUIDANCE v05r02

### 7.5.2 Conformance Limit

The max For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

### 7.5.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

### 7.5.4 Test Procedure

■ According to FCC Part 15.247(b)(1)

As an alternative to a peak power measurement, compliance with the limit can be based on a measurement of the maximum conducted output power.

Use the following spectrum analyzer settings:

Set Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

Set RBW > the 20 dB bandwidth of the emission being measured

Set VBW  $\geq$  RBW

Set Sweep = auto

Set Detector function = peak

Set Trace = max hold

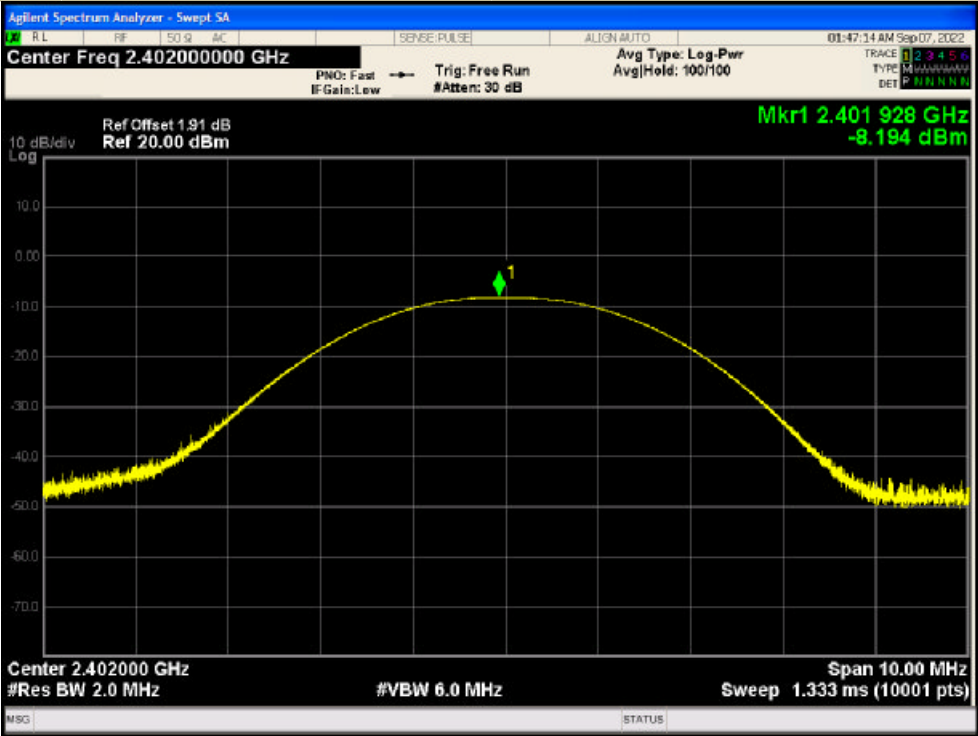
Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission to determine the peak amplitude level.

## Test Results

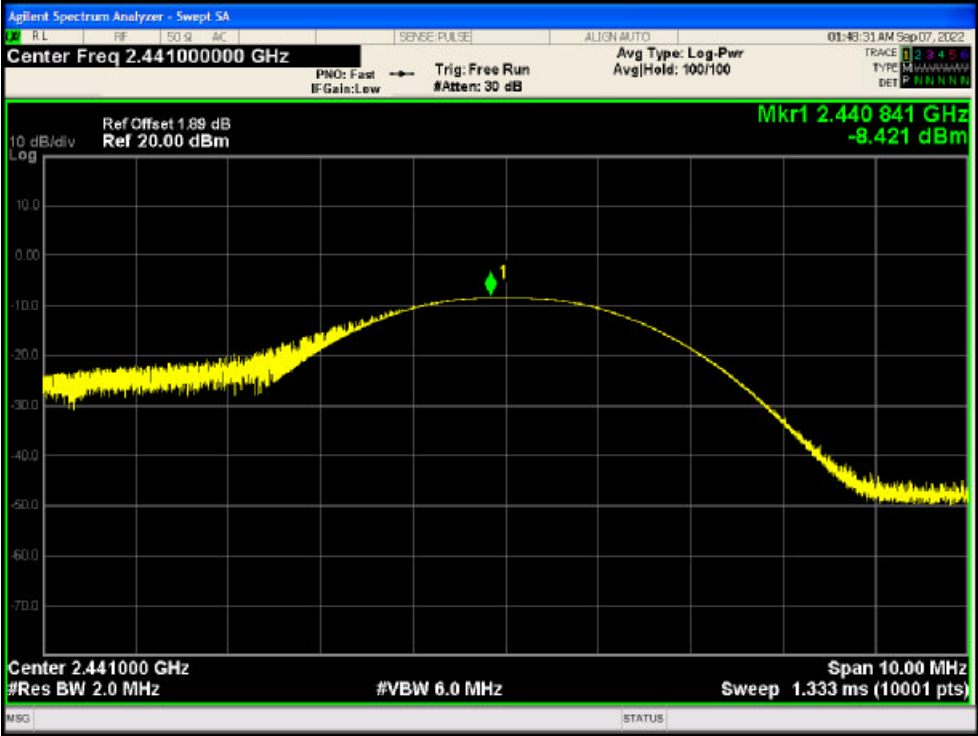
|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 54%       |
| ATM Pressure:      | 1011 mbar |

| Operation Mode | Channel Number | Channel Frequency (MHz) | Measurement Level (dBm) | Limit (dBm) | Verdict |
|----------------|----------------|-------------------------|-------------------------|-------------|---------|
| GFSK           | 0              | 2402                    | -8.19                   | 21          | PASS    |
|                | 39             | 2441                    | -8.42                   | 21          | PASS    |
|                | 78             | 2480                    | -7.85                   | 21          | PASS    |
| pi/4-DQPSK     | 0              | 2402                    | -7.38                   | 21          | PASS    |
|                | 39             | 2441                    | -7.53                   | 21          | PASS    |
|                | 78             | 2480                    | -7.03                   | 21          | PASS    |
| Note: N/A      |                |                         |                         |             |         |

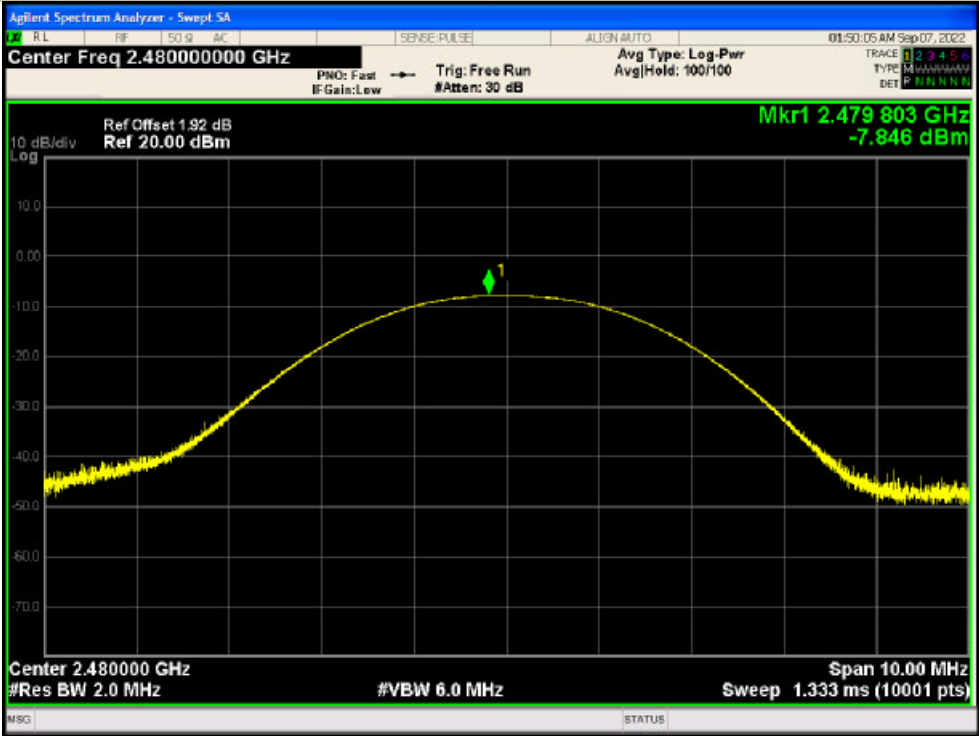
|            |                                     |      |  |
|------------|-------------------------------------|------|--|
| Test Model | Maximum Peak Conducted Output Power |      |  |
|            | Bluetooth V5.1                      |      |  |
|            | Channel 0: 2402MHz                  | GFSK |  |



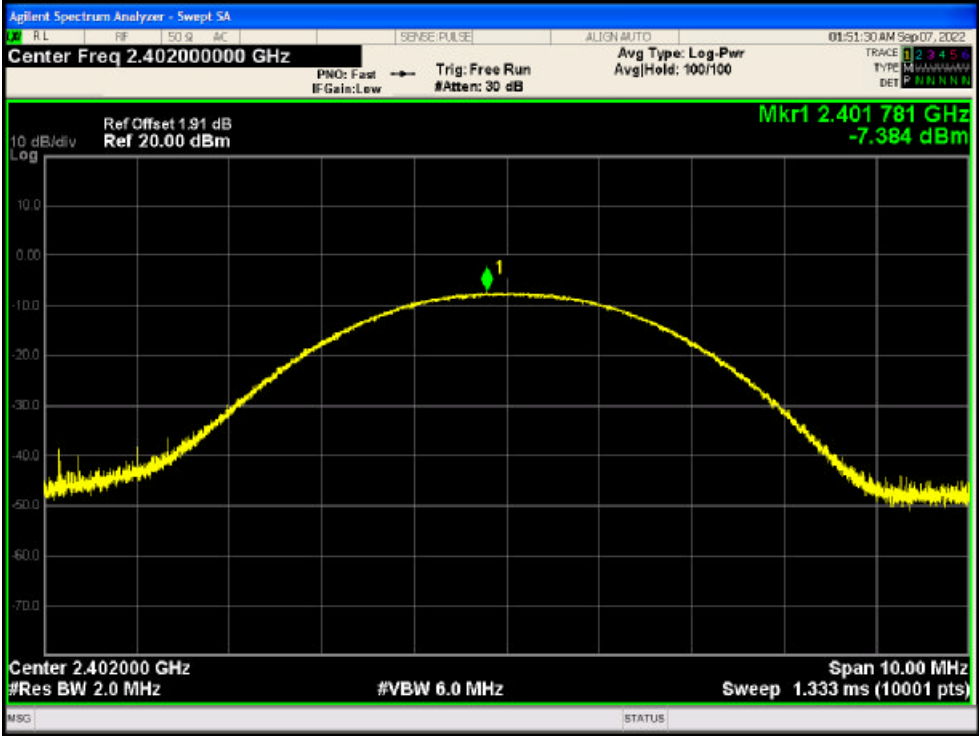
|            |                                     |      |  |
|------------|-------------------------------------|------|--|
| Test Model | Maximum Peak Conducted Output Power |      |  |
|            | Bluetooth V5.1                      |      |  |
|            | Channel 39: 2441MHz                 | GFSK |  |



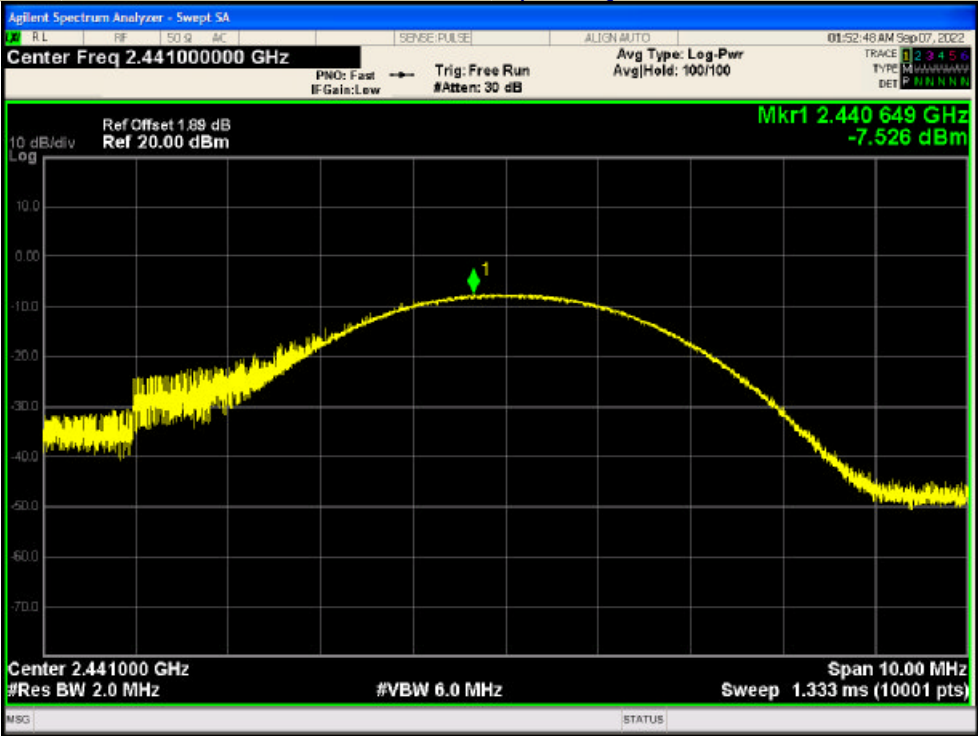
|            |                                     |      |  |
|------------|-------------------------------------|------|--|
| Test Model | Maximum Peak Conducted Output Power |      |  |
|            | Bluetooth V5.1                      |      |  |
|            | Channel 78: 2480MHz                 | GFSK |  |



|            |                                     |            |  |
|------------|-------------------------------------|------------|--|
| Test Model | Maximum Peak Conducted Output Power |            |  |
|            | Bluetooth V5.1                      |            |  |
|            | Channel 0: 2402MHz                  | pi/4-DQPSK |  |



|            |                                     |            |  |
|------------|-------------------------------------|------------|--|
| Test Model | Maximum Peak Conducted Output Power |            |  |
|            | Bluetooth V5.1                      |            |  |
|            | Channel 39: 2441MHz                 | pi/4-DQPSK |  |



|            |                                     |            |  |
|------------|-------------------------------------|------------|--|
| Test Model | Maximum Peak Conducted Output Power |            |  |
|            | Bluetooth V5.1                      |            |  |
|            | Channel 78: 2480MHz                 | pi/4-DQPSK |  |

