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# Ningbo EverFlourish Smart Technology Corp., Ltd.

# RF TEST REPORT

**Report Type:**
FCC Part 15.247 & ISED RSS-247 RF report

**Model:**
EV100D-40W, EV100D-48W

**REPORT NUMBER:**
230402142SHA-002

**ISSUE DATE:**
June 9, 2023

**DOCUMENT CONTROL NUMBER:**
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**TEST REPORT**

Report no.: 230402142SHA-002

| | |
|---|---|
| **APPLICANT:** | Ningbo EverFlourish Smart Technology Corp., Ltd.<br>77 Wuxiang East Road, Yinzhou, Ningbo, Zhejiang, 31511 China |
| **MANUFACTURER:** | Ningbo EverFlourish Smart Technology Corp., Ltd.<br>77 Wuxiang East Road, Yinzhou, Ningbo, Zhejiang, 31511 China |
| **Factory:** | Ningbo EverFlourish Smart Technology Corp., Ltd.<br>77 Wuxiang East Road, Yinzhou, Ningbo, Zhejiang, 31511 China |
| **FCC ID:** | VBA-EFEV100D |
| **IC:** | 7098A-EFEV100D |

**SUMMARY:**

The equipment complies with the requirements according to the following standard(s) or Specification:

**47CFR Part 15 (2020):** Radio Frequency Devices (Subpart C)

**ANSI C63.10 (2013):** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

**RSS-247 Issue 2 (February 2017):** Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

**RSS-Gen Issue 5 (March 2019) Amendment1:** General Requirements for Compliance of Radio Apparatus

| **PREPARED BY:** | **REVIEWED BY:** |
|---|---|
| Project Engineer<br>Sky Yang | Reviewer<br>Eric Li |

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**TEST REPORT**

# Content

# Revision History

| Report No. | Version | Description | Issued Date |
|---|---|---|---|
| 230402142SHA-002 | Rev. 01 | Initial issue of report | June 9, 2023 |
| | | | |
| | | | |

TEST REPORT

# Measurement result summary

| TEST ITEM | FCC REFERENCE | IC REFERENCE | RESULT |
|---|---|---|---|
| Minimum 6dB Bandwidth | 15.247(a)(2) | RSS-247 Issue 2 Clause 5.2 | Pass |
| Maximum conducted output power and e.i.r.p. | 15.247(b)(3) | RSS-247 Issue 2 Clause 5.4 | Pass |
| Power spectrum density | 15.247(e) | RSS-247 Issue 2 Clause 5.2 | Pass |
| Emission outside the frequency band | 15.247(d) | RSS-247 Issue 2 Clause 5.5 | Pass |
| Radiated Emissions in restricted frequency bands | 15.247(d), 15.205&15.209 | RSS-Gen Issue 5 Clause 8.9&8.10 | Pass |
| Power line conducted emission | 15.207(a) | RSS-Gen Issue 5 Clause 8.8 | Pass |
| Occupied bandwidth | - | RSS-Gen Issue 5 Clause 6.6 | Tested |
| Antenna requirement | 15.203 | - | Pass |

Notes:
1: NA =Not Applicable
2: Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.
3: Additions, Deviations and Exclusions from Standards: None.

TEST REPORT

# 1 GENERAL INFORMATION

## 1.1 Description of Equipment Under Test (EUT)

| | |
|---|---|
| Product name: | Electric Vehicle Supply Equipment |
| Type/Model: | EV100D-40W, EV100D-48W |
| Description of EUT: | The EUT is an electric vehicle supply equipment with WIFI function. Two models are same except the maximum output power. We test EX100D-48W as representative and list the results in this report. |
| Rating: | EV100D-40W: 240VAC, 60Hz, 40A Max, 9.6kW Max<br>EV100D-48W: 240VAC, 60Hz, 48A Max, 11.5kW Max |
| Category of EUT: | Class B |
| EUT type: | ☒ Table top ☐ Floor standing |
| Software Version: | / |
| Hardware Version: | / |
| Sample Identification No.: | 0230420-41 |
| Sample received date: | April 21, 2023 |
| Date of test: | April 24, 2023 ~ May 25, 2023 |

## 1.2 Technical Specification

| | |
|---|---|
| Frequency Band: | 2400MHz ~ 2483.5MHz |
| Support Standards: | Bluetooth LE 4.2 |
| Type of Modulation: | GFSK |
| Channel Number: | 40 |
| Data Rate: | 1Mbps |
| Channel Separation: | 2MHz |
| Antenna Information: | 1.59dBi, Brass Antenna |

## 1.3 Description of Test Facility

| | |
|---|---|
| Name: | Intertek Testing Services Shanghai |
| Address: | Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China |
| Telephone: | 86 21 61278200 |
| Telefax: | 86 21 54262353 |

| | |
|---|---|
| The test facility is recognized, certified, or accredited by these organizations: | CNAS Accreditation Lab<br>Registration No. CNAS L0139 |
| | FCC Accredited Lab<br>Designation Number: CN0175 |
| | IC Registration Lab<br>CAB identifier.: CN0014 |
| | VCCI Registration Lab<br>Member No.: 3598 (Registration No.: R-14243, G-10845, C-14723, T-12252) |
| | A2LA Accreditation Lab<br>Certificate Number: 3309.02 |

# 2 TEST SPECIFICATIONS

## 2.1 Standards or specification

47CFR Part 15 (2020)
ANSI C63.10 (2013)
RSS-247 Issue 2 (February 2017)
RSS-Gen Issue 5 (April 2019) Amendment1
KDB 558074 (v05or02)

## 2.2 Mode of operation during the test

The lowest, middle and highest channel were tested as representatives.

| Frequency Band (MHz) | | | | 2400 ~ 2483.5 | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| **0** | **2402** | 10 | 2422 | 20 | 2442 | 30 | 2462 |
| 1 | 2404 | 11 | 2424 | 21 | 2444 | 31 | 2464 |
| 2 | 2406 | 12 | 2426 | 22 | 2446 | 32 | 2466 |
| 3 | 2408 | 13 | 2428 | 23 | 2448 | 33 | 2468 |
| 4 | 2410 | 14 | 2430 | 24 | 2450 | 34 | 2470 |
| 5 | 2412 | 15 | 2432 | 25 | 2452 | 35 | 2472 |
| 6 | 2414 | 16 | 2434 | 26 | 2454 | 36 | 2474 |
| 7 | 2416 | 17 | 2436 | 27 | 2456 | 37 | 2476 |
| 8 | 2418 | 18 | 2438 | 28 | 2458 | 38 | 2478 |
| 9 | 2420 | **19** | **2440** | 29 | 2460 | **39** | **2480** |

**Data rate VS Power:**

The test setting software is offered by the applicant. The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases.

| **Test software and Power Setting parameter** | | | |
|---|---|---|---|
| Test Software | EspRFTestTool V2.8 | | |
| Working Mode | BLE | | |
| Test Channel | 2402MHz | 2440MHz | 2480MHz |

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied.

Radiated test mode: EUT transmitted signal with antenna;

Conducted test mode: EUT transmitted signal from RF port connected to SPA directly;

## 2.3 Test software list

| Test Items | Software | Manufacturer | Version |
|---|---|---|---|
| Conducted emission | SKET Auto EMC Test Software | Keleto | V3.0 |
| Radiated emission | SKET Auto EMC Test Software | Keleto | V3.0 |

## 2.4 Test peripherals list

| Item No. | Name | Band and Model | Description |
|---|---|---|---|
| 1 | Laptop computer | HP ProBook 6470b | 100-240V AC, 50/60Hz |
| | | | |

## 2.5 Test environment condition:

| Test items | Temperature | Humidity |
|---|---|---|
| Minimum 6dB Bandwidth | 23°C | 52% RH |
| Maximum conducted output power and e.i.r.p. | | |
| Power spectrum density | | |
| Emission outside the frequency band | | |
| Occupied bandwidth | | |
| Radiated Emissions in restricted frequency bands | 22°C | 53% RH |
| Power line conducted emission | 22°C | 55% RH |

## 2.6 Instrument list

| Conducted Emission | | | | | |
|---|---|---|---|---|---|
| Used | Equipment | Manufacturer | Type | Internal no. | Due date |
| ☒ | Test Receiver | R&S | ESCS 30 | EC 2107 | 2023-07-18 |
| ☒ | A.M.N. | R&S | ESH2-Z5 | EC 3119 | 2023-11-09 |
| ☒ | Shielded room | Zhongyu | - | EC 2838 | 2024-01-11 |
| Radiated Emission | | | | | |
| Used | Equipment | Manufacturer | Type | Internal no. | Due date |
| ☒ | Test Receiver | R&S | ESIB 26 | EC 3045 | 2023-07-18 |
| ☒ | Bilog Antenna | TESEQ | CBL 6112B | EC 6411 | 2023-08-23 |
| ☒ | Pre-amplifier | Tonscend | tap01018050 | EC 6432-1 | 2023-12-07 |
| ☒ | Horn antenna | Tonscend | bha9120d | EC 6432-2 | 2024-02-15 |
| ☒ | Horn antenna | TOYO | HAP18-26W | EC 4792-3 | 2023-07-29 |
| ☒ | Semi-anechoic chamber | Albatross project | - | EC 3048 | 2023-07-08 |
| RF test | | | | | |
| Used | Equipment | Manufacturer | Type | Internal no. | Due date |
| ☒ | PXA Signal Analyzer | Keysight | N9030A | EC 5338 | 2024-03-05 |
| ☒ | Spectrum Analyzer | Keysight | N9030B | EC 6078 | 2024-06-03 |
| ☒ | Test Receiver | R&S | ESCI 7 | EC 4501 | 2024-03-05 |
| ☒ | Signal generator | Agilent | N5182A | EC 6172 | 2023-08-09 |
| ☒ | Signal generator | Agilent | N5181A | EC 6171 | 2023-08-09 |
| Additional instrument | | | | | |
| Used | Equipment | Manufacturer | Type | Internal no. | Due date |
| ☒ | Therom-Hygrograph | ZJ1-2A | S.M.I.F. | EC 3783 | 2024-03-24 |
| ☒ | Therom-Hygrograph | ZJ1-2A | S.M.I.F. | EC 5199 | 2024-03-13 |
| ☒ | Pressure meter | YM3 | Shanghai Mengde | EC 4620 | 2023-09-13 |

## 2.7 Measurement uncertainty

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

| Test item | Measurement uncertainty |
|---|---|
| Maximum peak output power | ± 0.74dB |
| Power spectrum density | ± 0.74dB |
| Radiated Emissions in restricted frequency bands below 1GHz | ± 4.90dB |
| Radiated Emissions in restricted frequency bands above 1GHz | ± 5.02dB |
| Emission outside the frequency band | ± 2.89dB |
| Power line conducted emission | ± 3.19dB |
| Minimum 6dB Bandwidth | $\pm 0.84 \times 10^{-7}$ |
| Occupied bandwidth | $\pm 0.84 \times 10^{-7}$ |

# 3 Minimum 6dB bandwidth

**Test result: Pass**

## 3.1 Limit

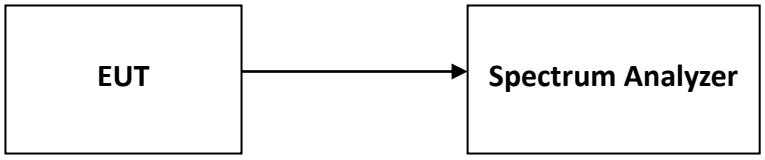
For systems using digital modulation techniques that may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 kHz.

## 3.2 Measurement Procedure

The minimum 6dB bandwidth is measured using the Spectrum Analyzer according to DTS test procedure of "558074 D01 15.247 Meas Guidance v05r02" (clause 8.2) for compliance requirements.

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

## 3.3 Test Configuration




## 3.4 Test Results of Minimum 6dB bandwidth

Please refer to Appendix A

# 4 Maximum conducted output power and e.i.r.p.

**Test result: Pass**

## 4.1 Limit

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 W. (The e.i.r.p. shall not exceed 4 W)

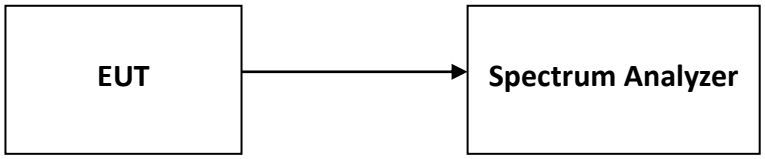
If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 30dBm and 30+ (6 –antenna gain-beam forming gain).

## 4.2 Measurement Procedure

The EUT was tested according to DTS test procedure of “558074 D01 15.247 Meas Guidance v05r02” (clause 8.3.1) for compliance requirements.

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ 3 × RBW.
c) Set span ≥ 3 x RBW
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

## 4.3 Test Configuration




## 4.4 Test Results of Maximum conducted output power

Please refer to Appendix A

# 5 Power spectrum density

**Test result:** **Pass**

## 5.1 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

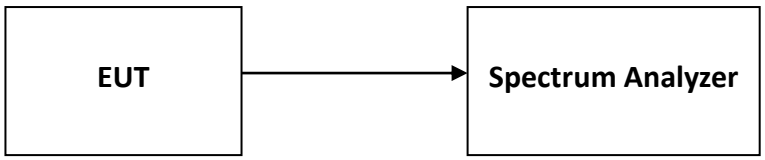
If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 8dBm/MHz and 8+ (6 –antenna gain-beam forming gain).

## 5.2 Measurement Procedure

The power output was tested according to DTS test procedure of “558074 D01 15.247 Meas Guidance v05r02” (clause 8.4) for compliance requirements.

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3 × RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

## 5.3 Test Configuration




## 5.4 Test Results of Power spectrum density

Please refer to Appendix A

# 6 Emission outside the frequency band

**Test result:** **Pass**

## 6.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

## 6.2 Measurement Procedure

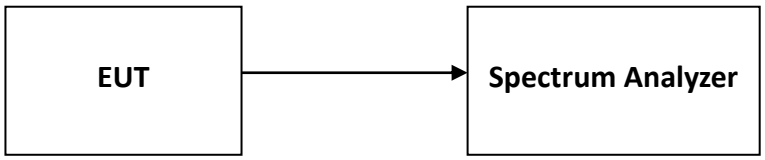
The EUT was tested according to DTS test procedure of "558074 D01 15.247 Meas Guidance v05r02" (clause 8.5) for compliance requirements.

**Reference level measurement**
Establish a reference level by using the following procedure:
a) Set instrument center frequency to DTS channel center frequency.
b) Set the span to ≥ 1.5 times the DTS bandwidth.
c) Set the RBW = 100 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum PSD level.

**Emission level measurement**
a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ 3 x RBW.
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.

## 6.3 Test Configuration




## 6.4 The results of Emission outside the frequency band

Please refer to Appendix A

# 7 Radiated Emissions in restricted frequency bands

**Test result:** **Pass**

## 7.1 Limit

The radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified showed as below:

| Frequencies (MHz) | Field Strength (microvolts/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 |

## 7.2 Measurement Procedure

**For Radiated emission below 30MHz:**

a) The EUT was placed on the top of a rotating table 0.1 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c) Both X and Y axes of the antenna are set to make the measurement.
d) For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e) The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

**For Radiated emission above 30MHz:**

a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for

above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c) The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

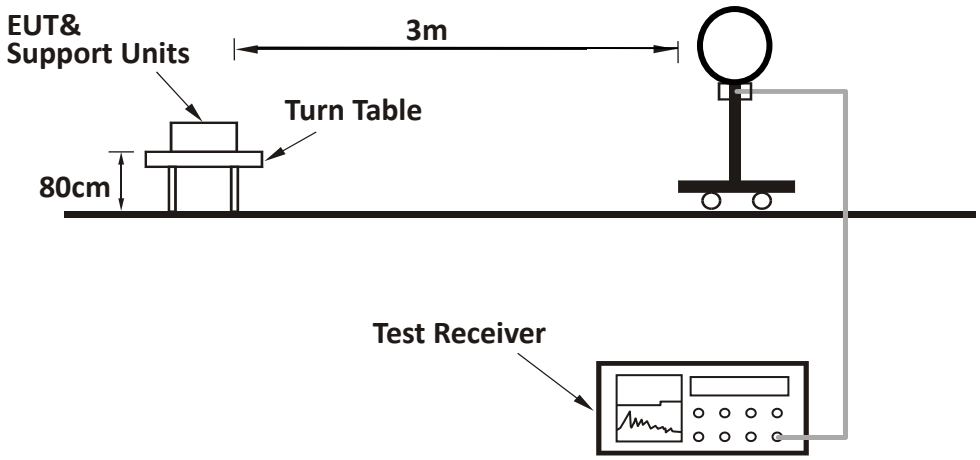
f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

**Note:**

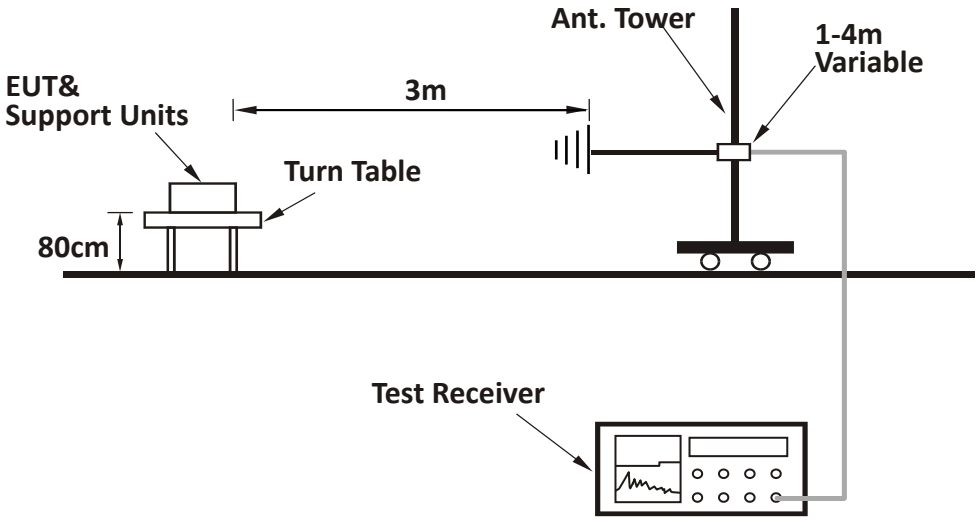
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 3 x RBW (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported

## 7.3 Test Configuration

**For Radiated emission below 30MHz:**




**For Radiated emission 30MHz to 1GHz:**



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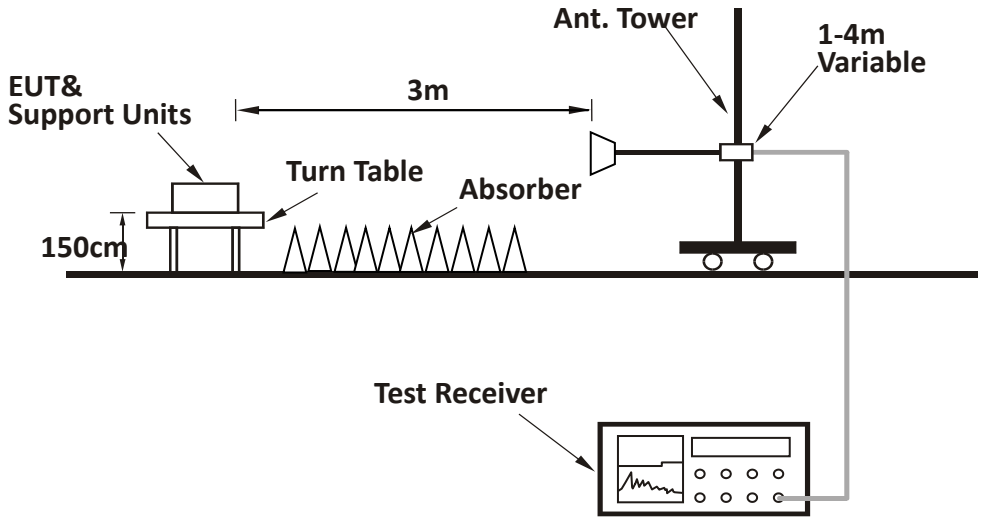
**For Radiated emission above 1GHz:**

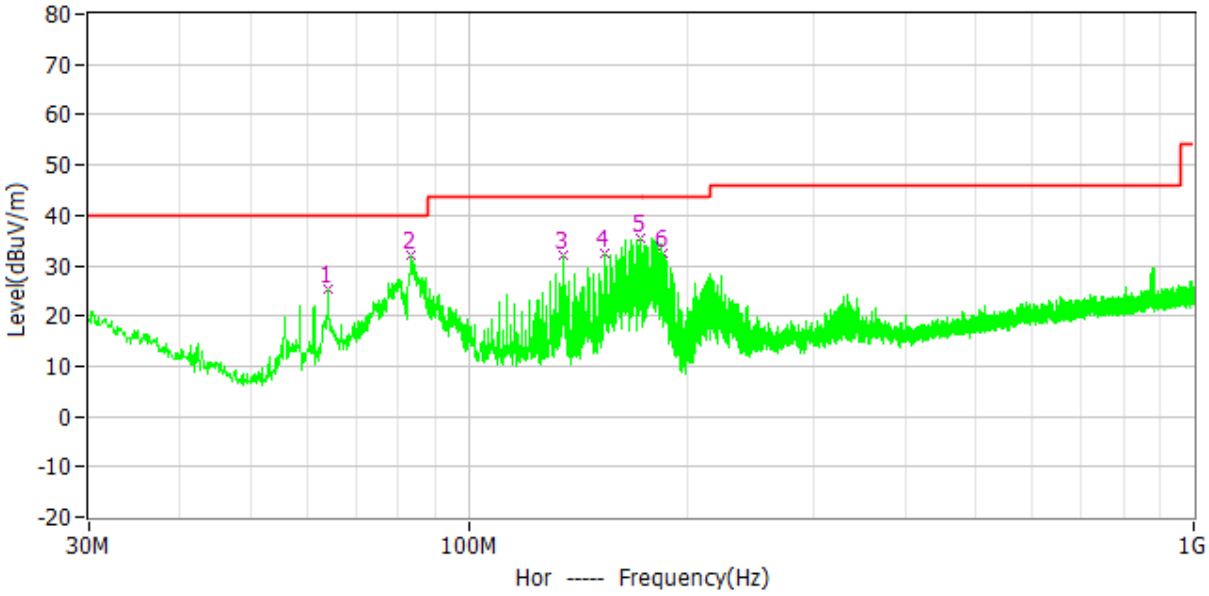


## 7.4 Test Results of Radiated Emissions

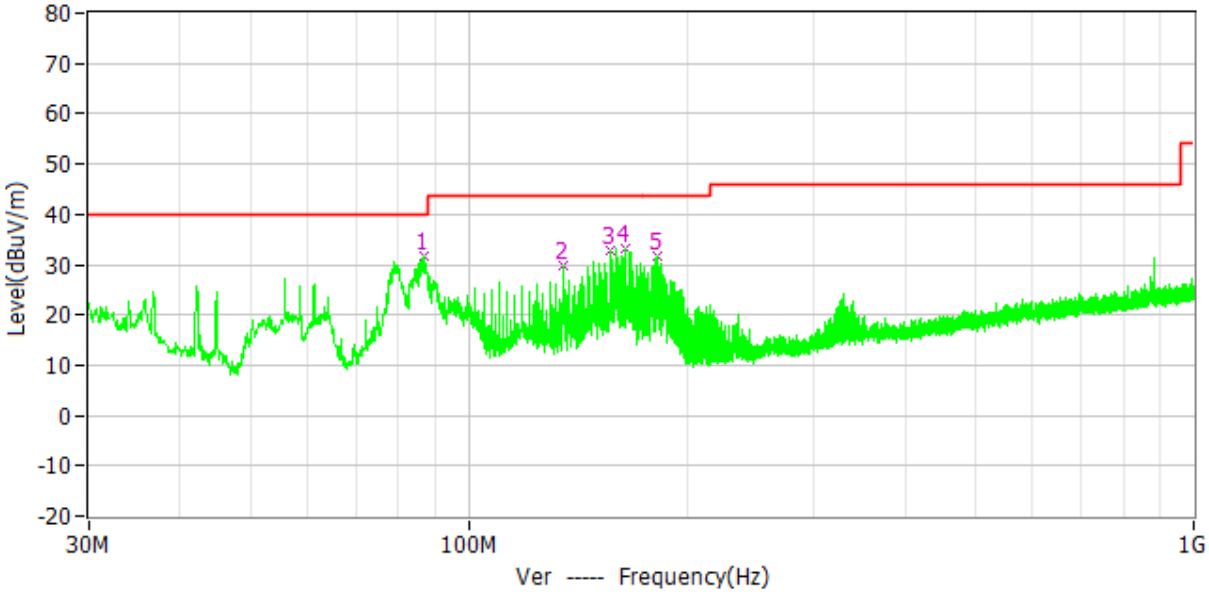
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

The worst waveform from 30MHz to 1000MHz is listed as below:

Horizontal




Vertical



**TEST REPORT**

Teat Data:

| Antenna | Frequency (MHz) | Limit (dBuV/m) | Level (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|
| H | 64.04 | 40.0 | 25.2 | 14.8 | PK |
| | 83.35 | 40.0 | 31.9 | 8.1 | PK |
| | 134.95 | 43.5 | 32.0 | 11.5 | PK |
| | 154.06 | 43.5 | 32.3 | 11.2 | PK |
| | 173.17 | 43.5 | 35.5 | 8.0 | PK |
| | 185.39 | 43.5 | 32.5 | 11.0 | PK |
| V | 86.74 | 40.0 | 31.5 | 8.5 | PK |
| | 134.95 | 43.5 | 29.9 | 13.6 | PK |
| | 156.77 | 43.5 | 32.8 | 10.7 | PK |
| | 165.02 | 43.5 | 33.3 | 10.2 | PK |
| | 182.67 | 43.5 | 31.5 | 12.0 | PK |

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
2. Level = Original Receiver Reading + Correct Factor
3. Margin = Limit - Level
4. If the PK Level is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV,
Limit = 40.00dBuV/m.
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Level = 10dBuV + 0.20dB/m = 10.20dBuV/m;
Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

**Test result above 1GHz:**

The emission was conducted from 1GHz to 25GHz

| CH | Antenna | Frequency (MHz) | Measured Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|
| L | H | 2390.00 | 53.9 | 74.0 | 20.1 | PK |
| | H | 2390.00 | 42.0 | 54.0 | 12.0 | AV |
| | V | 2390.00 | 53.3 | 74.0 | 20.7 | PK |
| | V | 2390.00 | 40.4 | 54.0 | 13.6 | AV |
| | H | 4804.00 | 50.5 | 74.0 | 23.5 | PK |
| | V | 4804.00 | 48.8 | 74.0 | 25.2 | PK |
| M | H | 4880.00 | 50.8 | 74.0 | 23.2 | PK |
| | V | 4880.00 | 49.4 | 74.0 | 24.6 | PK |
| H | H | 2483.50 | 54.8 | 74.0 | 19.2 | PK |
| | H | 2483.50 | 42.7 | 54.0 | 11.3 | AV |
| | V | 2483.50 | 53.2 | 74.0 | 20.8 | PK |
| | V | 2483.50 | 41.3 | 54.0 | 12.7 | AV |
| | H | 4960.00 | 49.6 | 74.0 | 24.4 | PK |
| | V | 4960.00 | 49.7 | 74.0 | 24.3 | PK |

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = Limit - Measured Level
4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV,
Limit = 40.00dBuV/m.
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Measured Level = 10dBuV + 0.20dB/m = 10.20dBuV/m;
Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

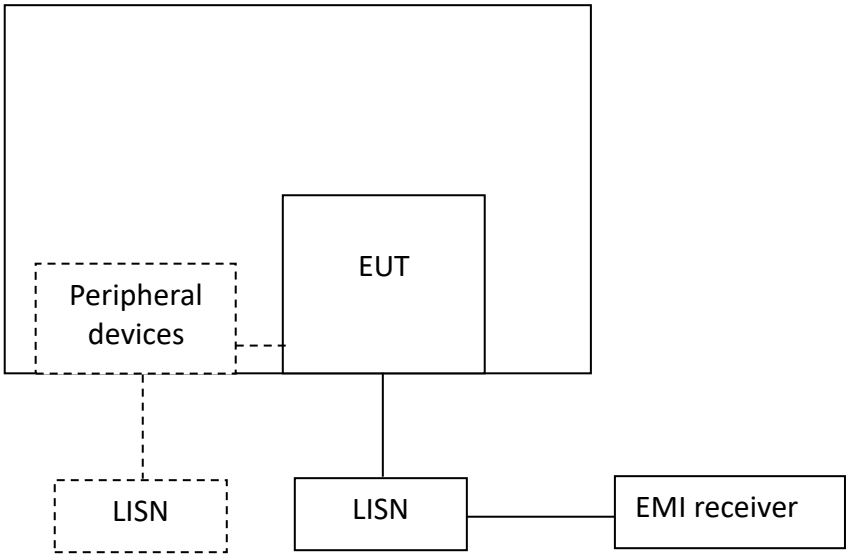
# 8 Power line conducted emission

**Test result:** **Pass**

## 8.1 Limit

| Frequency of Emission (MHz) | Conducted Limit (dBuV) | |
|---|---|---|
| | QP | AV |
| 0.15-0.5 | 66 to 56* | 56 to 46 * |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |
| * Decreases with the logarithm of the frequency. | | |

## 8.2 Test Configuration



## 8.3 Measurement Procedure

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

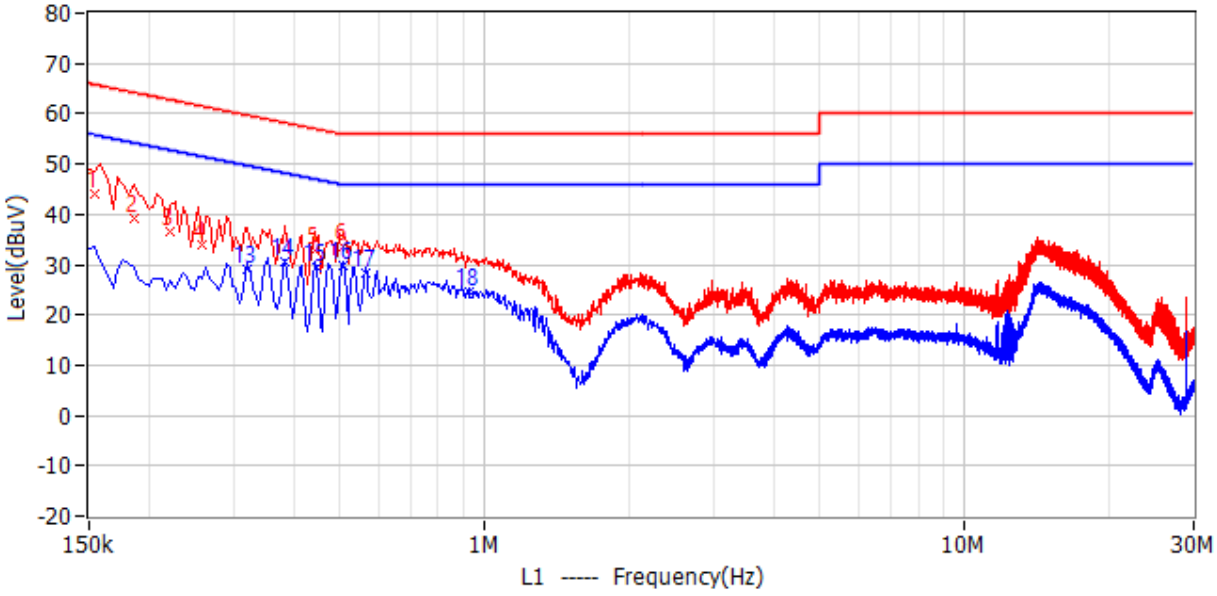
Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

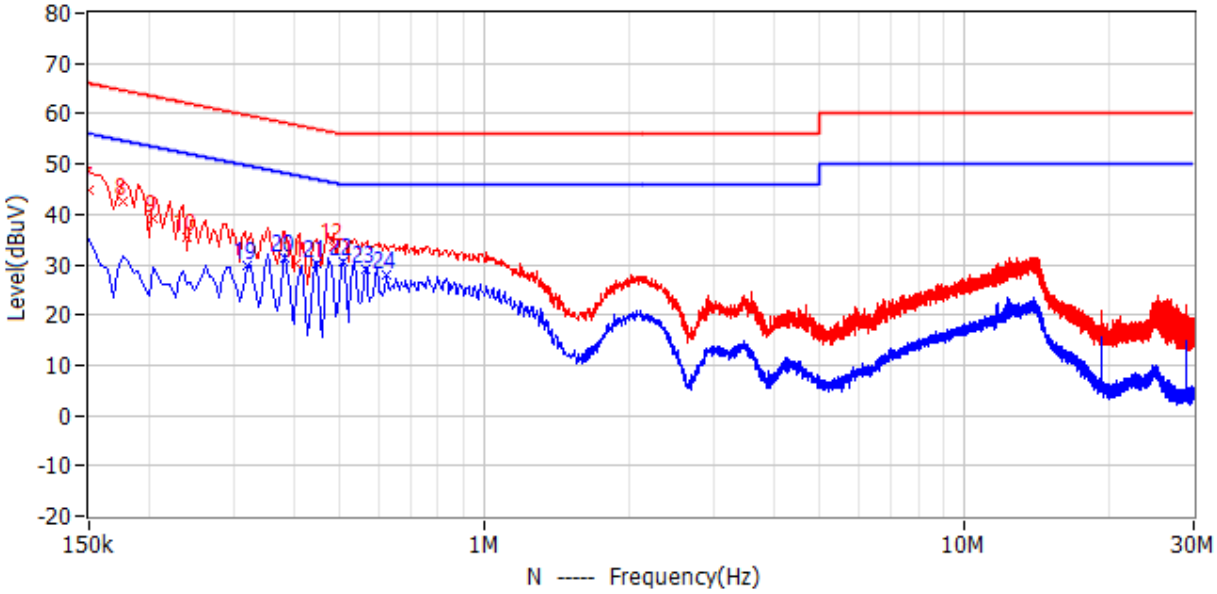
## 8.4 Test Results of Power line conducted emission

**Test Voltage: 240VAC/60Hz**
**Test Curve:**

L Line




N Line



**TEST REPORT**

**Test Data:**

| No. | Frequency | Limit dBuV | Level dBuV | Delta dB | Detector | Phase |
|---|---|---|---|---|---|---|
| 1 | 154.500kHz | 65.8 | 43.9 | -21.9 | QP | L1 |
| 2 | 186.000kHz | 64.2 | 39.3 | -24.9 | QP | L1 |
| 3 | 222.000kHz | 62.7 | 36.7 | -26.0 | QP | L1 |
| 4 | 258.000kHz | 61.5 | 34.1 | -27.4 | QP | L1 |
| 5 | 442.500kHz | 57.0 | 32.8 | -24.2 | QP | L1 |
| 6 | 505.500kHz | 56.0 | 33.5 | -22.5 | QP | L1 |
| 7 | 150.000kHz | 66.0 | 44.8 | -21.2 | QP | N |
| 8 | 177.000kHz | 64.6 | 42.5 | -22.1 | QP | N |
| 9 | 204.000kHz | 63.4 | 39.2 | -24.2 | QP | N |
| 10 | 240.000kHz | 62.1 | 35.5 | -26.6 | QP | N |
| 11 | 406.500kHz | 57.7 | 30.2 | -27.5 | QP | N |
| 12 | 483.000kHz | 56.3 | 33.7 | -22.6 | QP | N |
| 13 | 321.000kHz | 49.7 | 29.1 | -20.6 | CAV | L1 |
| 14 | 384.000kHz | 48.2 | 30.7 | -17.5 | CAV | L1 |
| 15 | 447.000kHz | 46.9 | 29.3 | -17.6 | CAV | L1 |
| 16 | 505.500kHz | 46.0 | 30.0 | -16.0 | CAV | L1 |
| 17 | 564.000kHz | 46.0 | 28.4 | -17.6 | CAV | L1 |
| 18 | 928.500kHz | 46.0 | 24.6 | -21.4 | CAV | L1 |
| 19 | 321.000kHz | 49.7 | 29.7 | -20.0 | CAV | N |
| 20 | 384.000kHz | 48.2 | 31.4 | -16.8 | CAV | N |
| 21 | 447.000kHz | 46.9 | 30.2 | -16.7 | CAV | N |
| 22 | 505.500kHz | 46.0 | 30.6 | -15.4 | CAV | N |
| 23 | 564.000kHz | 46.0 | 29.2 | -16.8 | CAV | N |
| 24 | 627.000kHz | 46.0 | 28.1 | -17.9 | CAV | N |

Remark: 1. Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
2. Level = Original Receiver Reading + Correct Factor
3. Delta = Level - Limit
4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV,
Limit = 40.00dBuV/m.
Then Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Level = 10dBuV + 0.20dB/m = 10.20dBuV/m;
Delta = 10.20dBuV/m - 40.00dBuV/m = -29.80dB.

# 9 Occupied Bandwidth

**Test result:** **Tested**

## 9.1 Limit

None

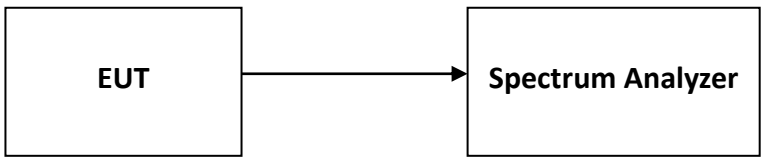
## 9.2 Measurement Procedure

The occupied bandwidth per RSS-Gen was measured using the Spectrum Analyzer.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

## 9.3 Test Configuration




## 9.4 The results of Occupied Bandwidth

Please refer to Appendix A

# 10 Antenna requirement

**Requirement:**
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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

**Result:**
EUT uses permanently attached antenna to the intentional radiator, so it can comply with the provisions of this section.

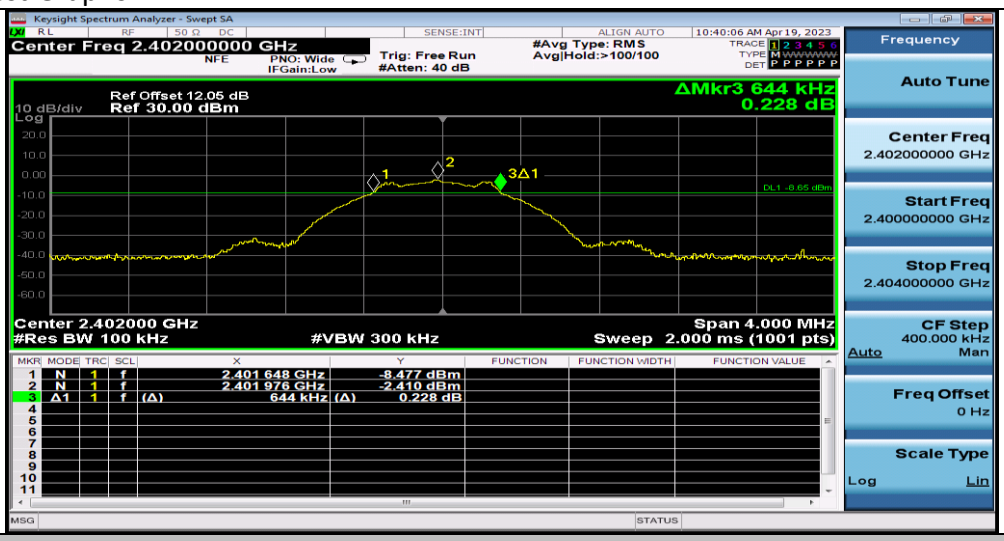
# Appendix A: Test results

## DTS Bandwidth

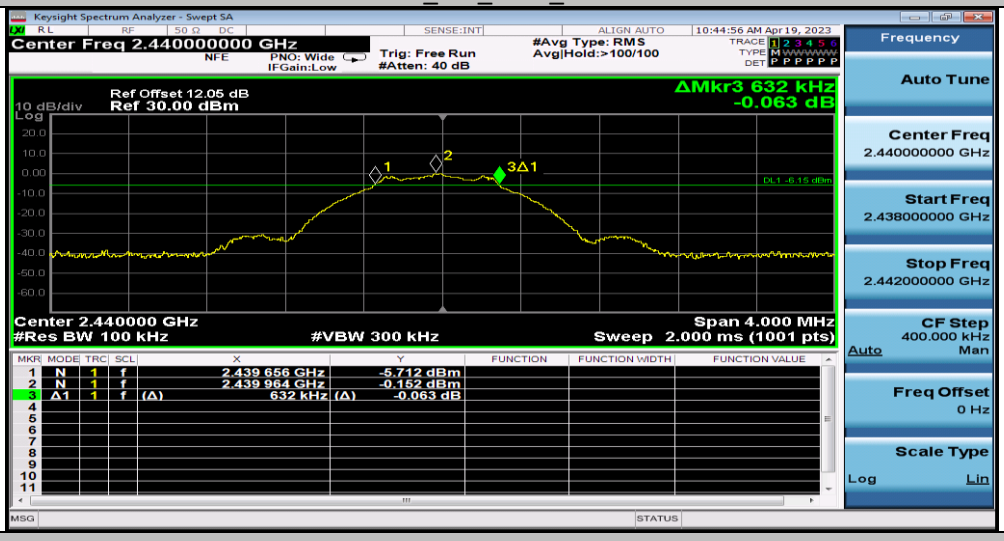
Test Result

| Test Mode | Antenna | Frequency [MHz] | DTS BW [MHz] | FL [MHz] | FH [MHz] | Limit [MHz] | Verdict |
|---|---|---|---|---|---|---|---|
| BLE_1M | Ant1 | 2402 | 0.644 | 2401.648 | 2402.292 | 0.5 | PASS |
| | | 2440 | 0.632 | 2439.656 | 2440.288 | 0.5 | PASS |
| | | 2480 | 0.644 | 2479.648 | 2480.292 | 0.5 | PASS |

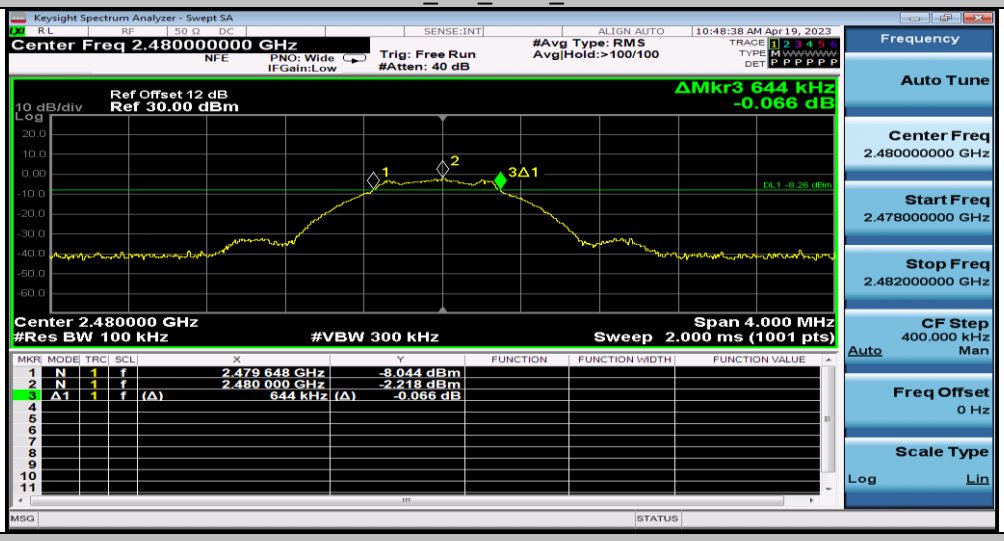
Test Graphs




BLE_1M_Ant1_2402




BLE_1M_Ant1_2440




BLE_1M_Ant1_2480

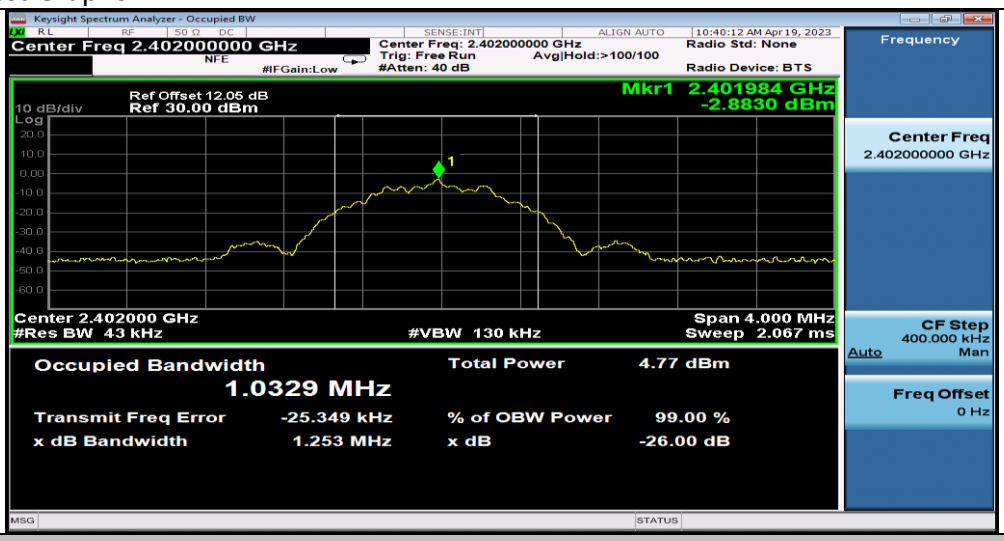
## Occupied Channel Bandwidth

Test Result

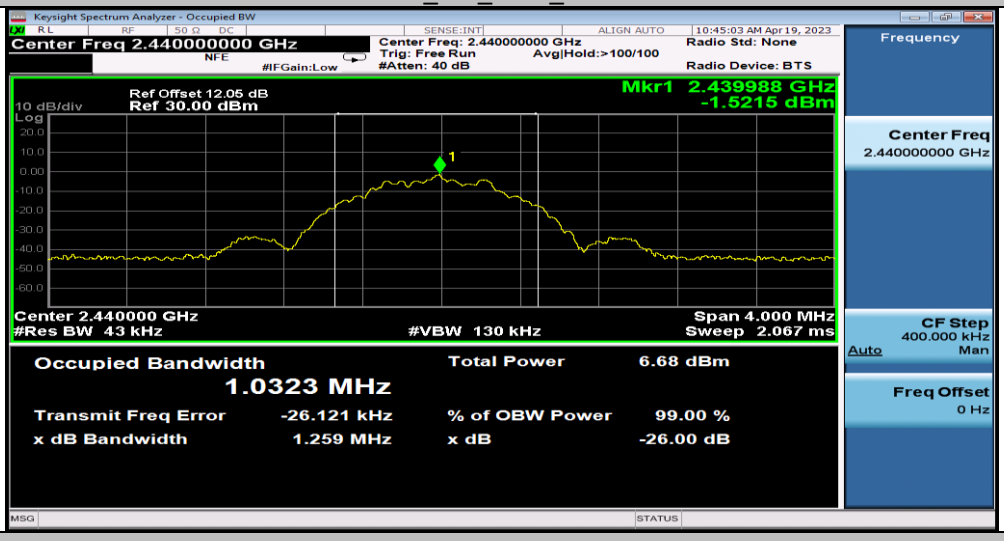
| Test Mode | Antenna | Frequency [MHz] | OCB [MHz] | Limit [MHz] | Verdict |
|---|---|---|---|---|---|
| BLE_1M | Ant1 | 2402 | 1.0324 | --- | --- |
| | | 2440 | 1.0324 | --- | --- |
| | | 2480 | 1.0313 | --- | --- |

**TEST REPORT**

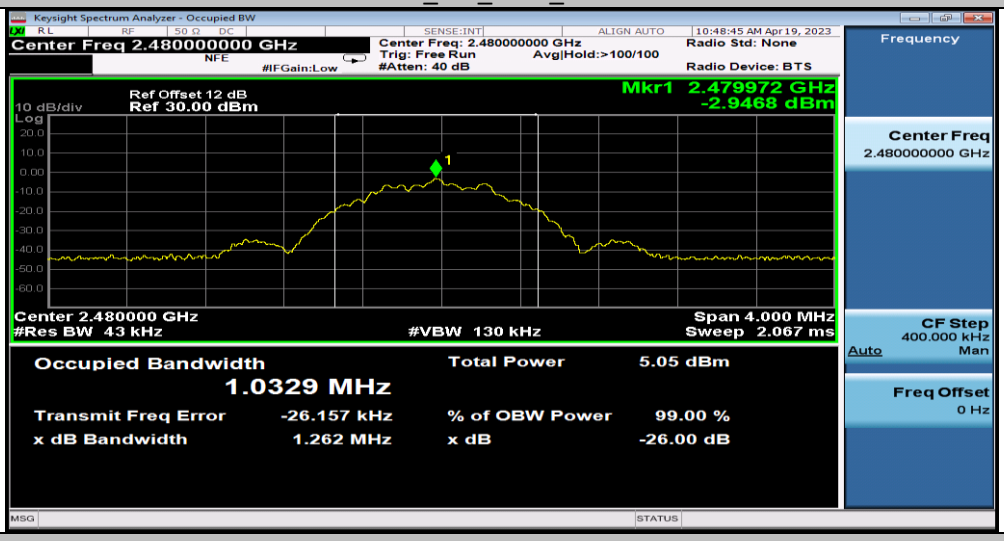
Test Graphs




BLE_1M_Ant1_2402




BLE_1M_Ant1_2440



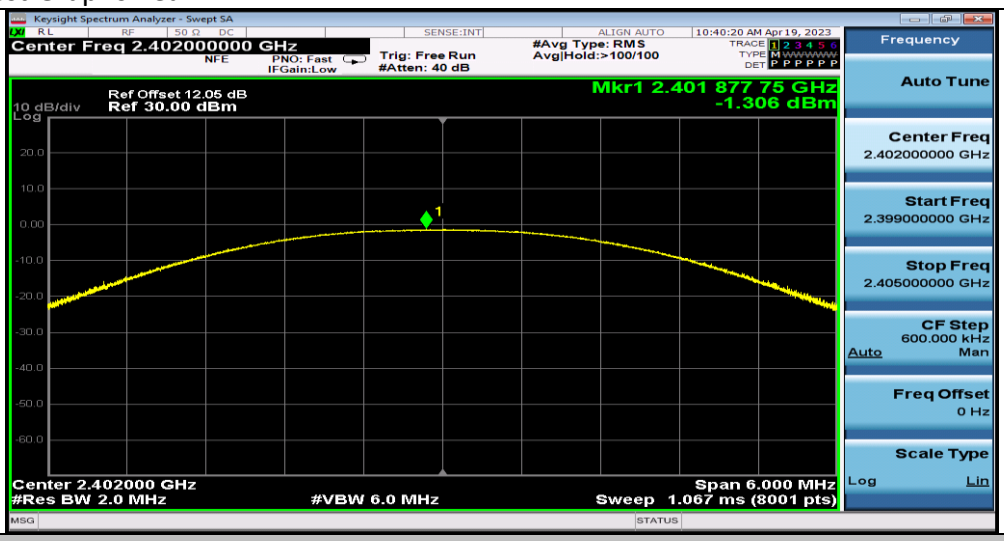

BLE_1M_Ant1_2480

## Maximum conducted output power

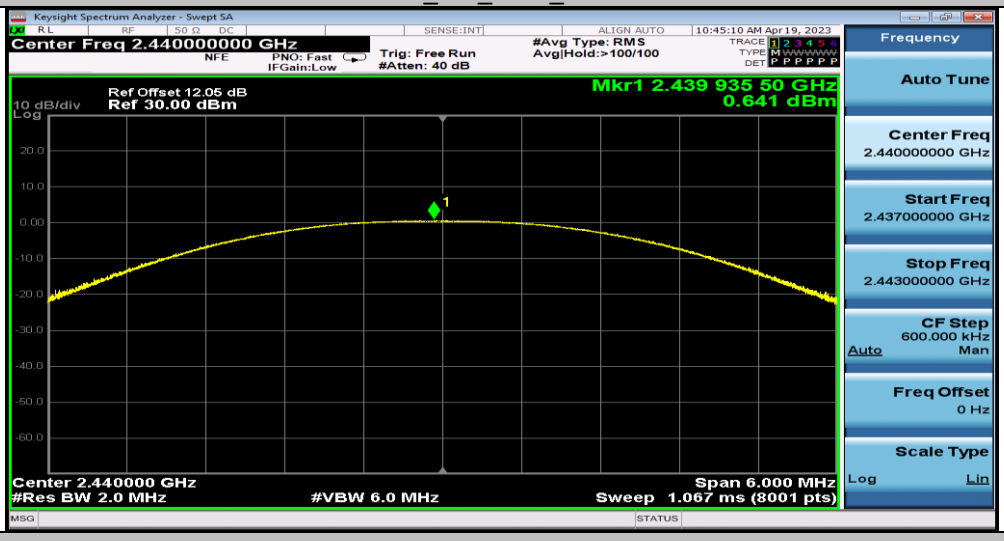
Test Result Peak

| Test Mode | Antenna | Frequency [MHz] | Conducted Powert [dBm] | Conducted Limit[dBm] | EIRP [dBm] | EIRP Limit[dBm] | Verdict |
|---|---|---|---|---|---|---|---|
| BLE_1M | Ant1 | 2402 | -1.31 | ≤30 | 0.28 | ≤36 | PASS |
| | | 2440 | 0.64 | ≤30 | 2.23 | ≤36 | PASS |
| | | 2480 | -0.83 | ≤30 | 0.76 | ≤36 | PASS |

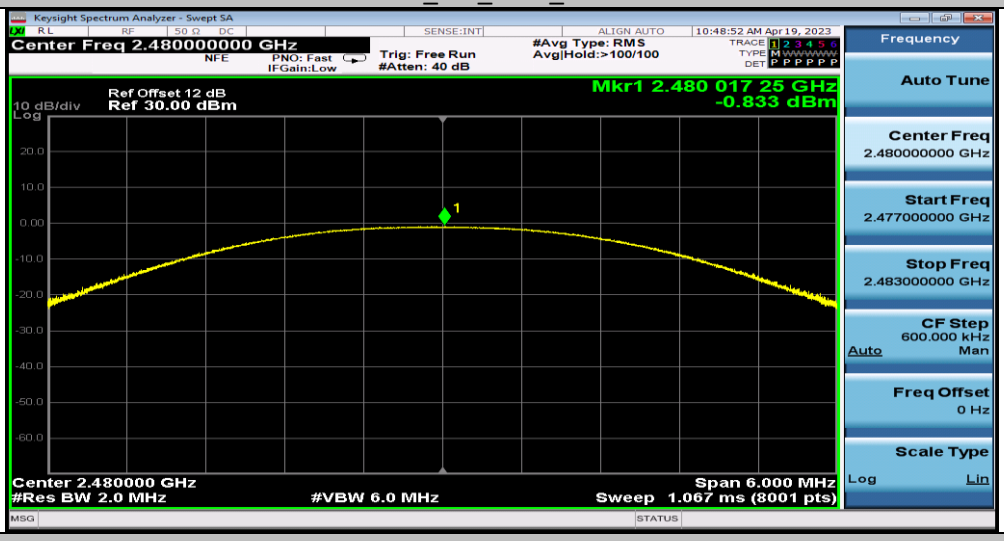
Test Graphs Peak




BLE_1M_Ant1_2402




BLE_1M_Ant1_2440



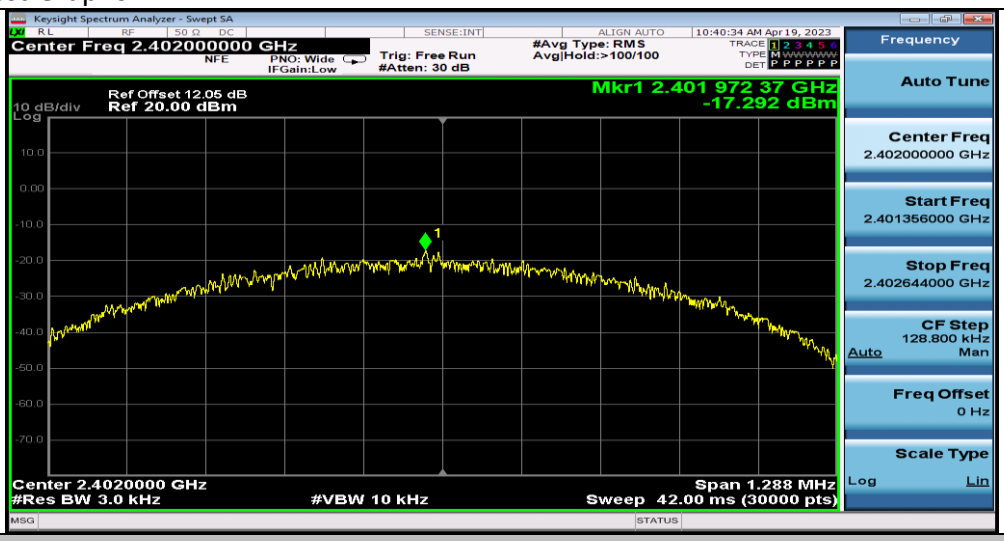

BLE_1M_Ant1_2480

## Maximum power spectral density

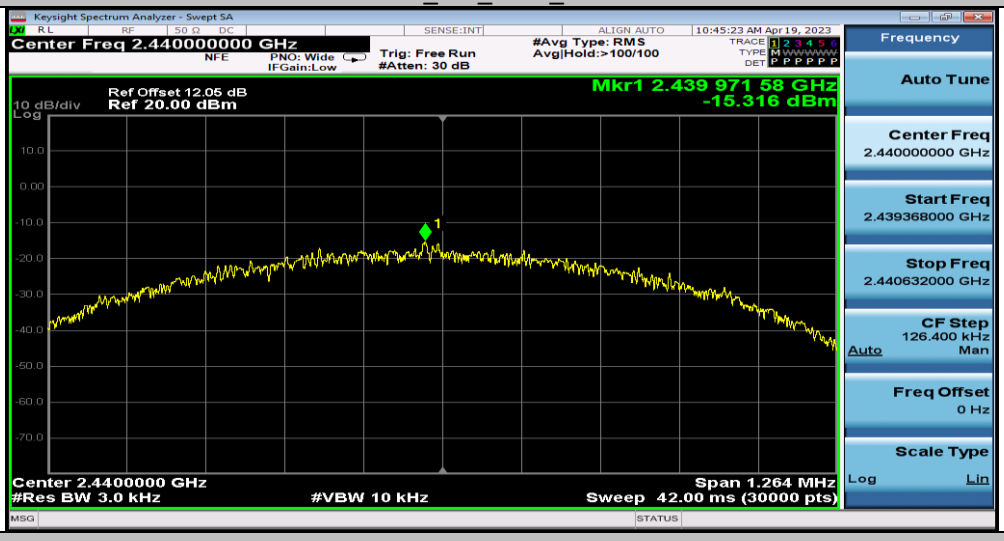
Test Result

| Test Mode | Antenna | Frequency [MHz] | Result [dBm/3kHz] | Limit [dBm/3kHz] | Verdict |
|---|---|---|---|---|---|
| BLE_1M | Ant1 | 2402 | -17.29 | ≤8.00 | PASS |
| | | 2440 | -15.32 | ≤8.00 | PASS |
| | | 2480 | -16.27 | ≤8.00 | PASS |

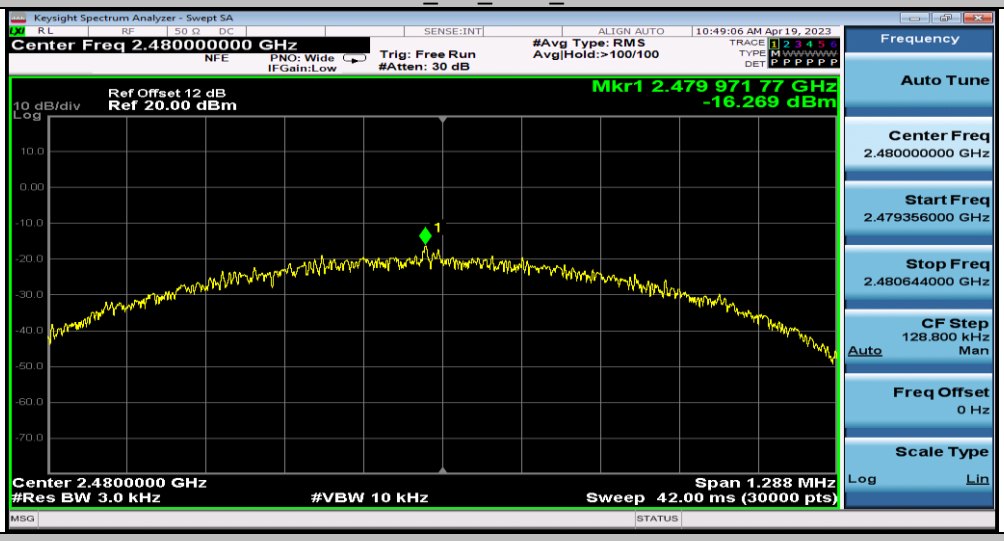
Test Graphs




BLE_1M_Ant1_2402




BLE_1M_Ant1_2440



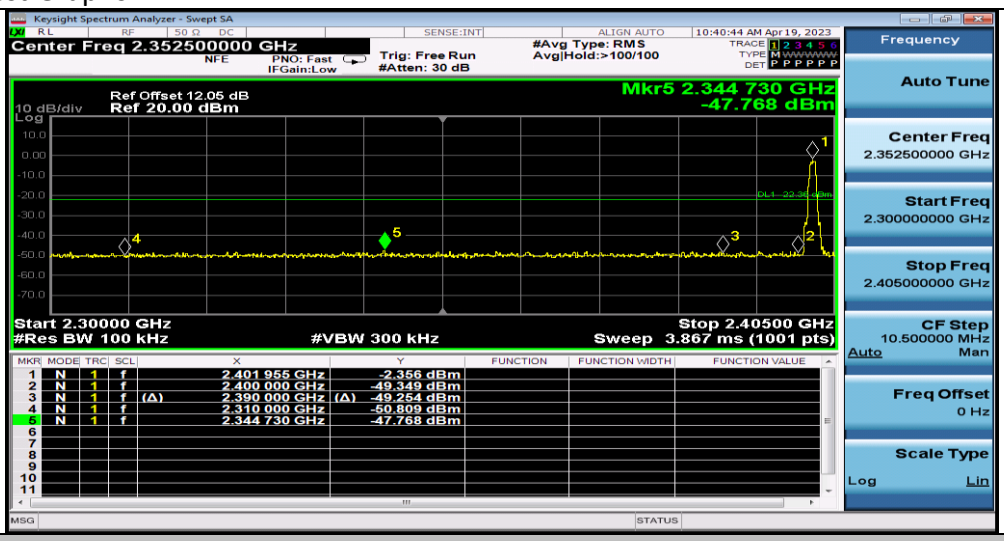

BLE_1M_Ant1_2480

## Band edge measurements

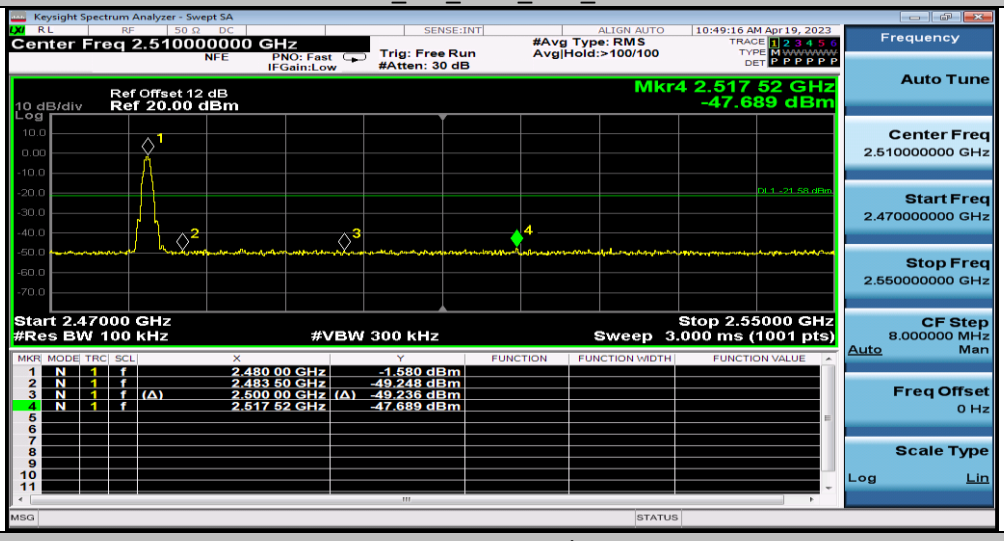
Test Result

| Test Mode | Antenna | Ch Name | Frequency [MHz] | RefLevel [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|---|
| BLE_1M | Ant1 | Low | 2402 | -2.36 | -47.77 | ≤-22.36 | PASS |
| | | High | 2480 | -1.58 | -47.69 | ≤-21.58 | PASS |

Test Graphs




BLE_1M_Ant1_Low_2402




BLE_1M_Ant1_High_2480

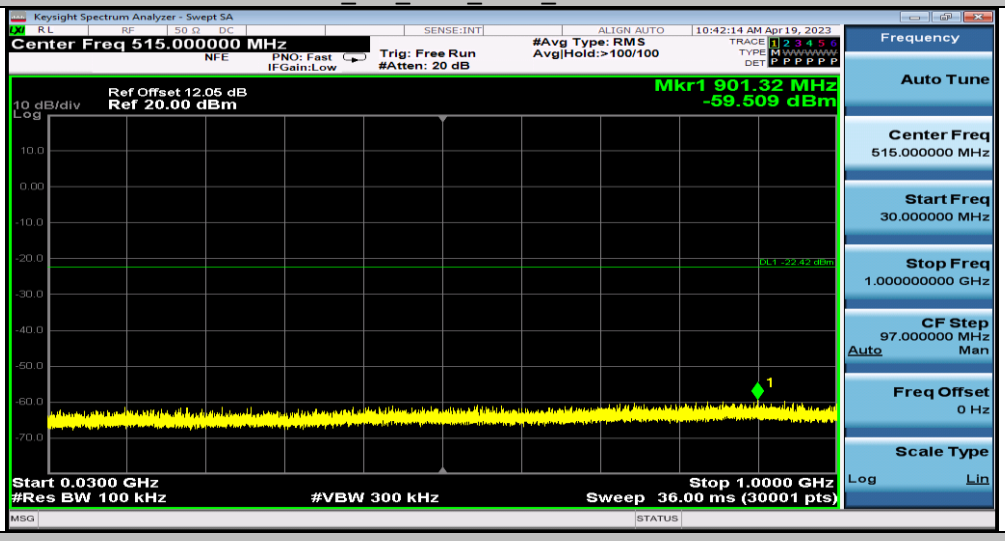
## Conducted Spurious Emission

Test Result

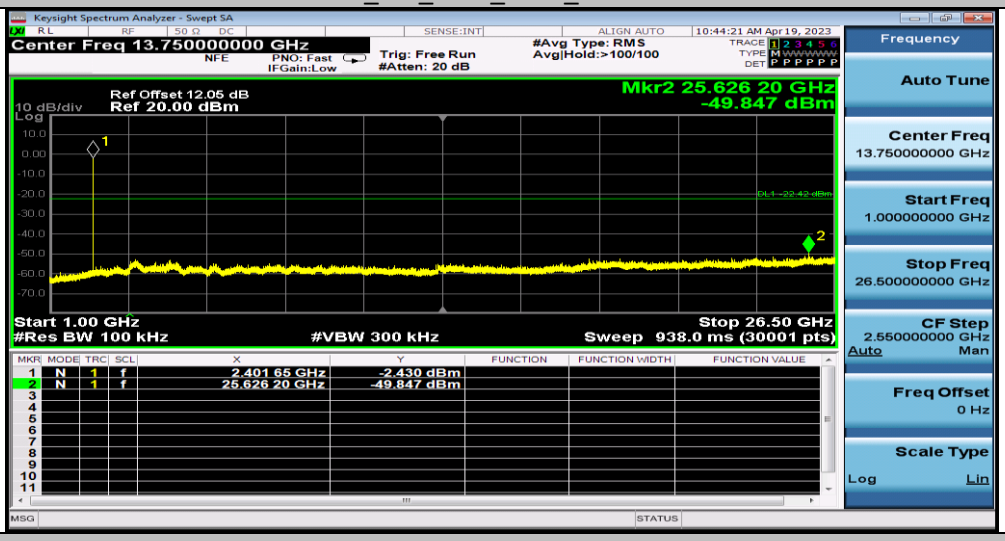
| Test Mode | Antenna | Frequency [MHz] | FreqRange [MHz] | RefLevel [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|---|
| BLE_1M | Ant1 | 2402 | Reference | -2.42 | -2.42 | --- | PASS |
| | | | 30~1000 | -2.42 | -59.51 | ≤-22.42 | PASS |
| | | | 1000~26500 | -2.42 | -49.85 | ≤-22.42 | PASS |
| | | 2440 | Reference | -0.76 | -0.76 | --- | PASS |
| | | | 30~1000 | -0.76 | -57.97 | ≤-20.76 | PASS |
| | | | 1000~26500 | -0.76 | -50.79 | ≤-20.76 | PASS |
| | | 2480 | Reference | -2.18 | -2.18 | --- | PASS |
| | | | 30~1000 | -2.18 | -59.34 | ≤-22.18 | PASS |
| | | | 1000~26500 | -2.18 | -51.34 | ≤-22.18 | PASS |

Test Graphs

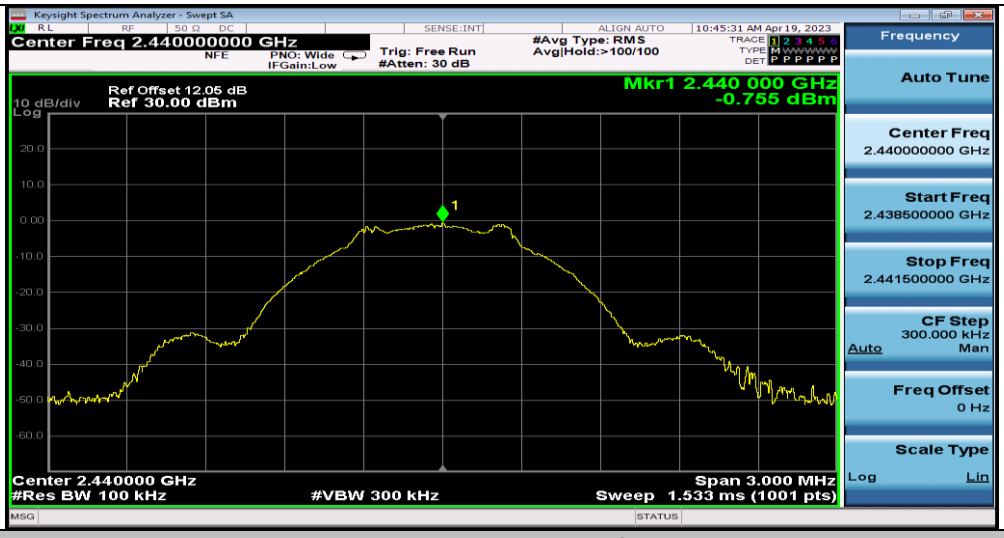

BLE_1M_Ant1_2402_0~Reference



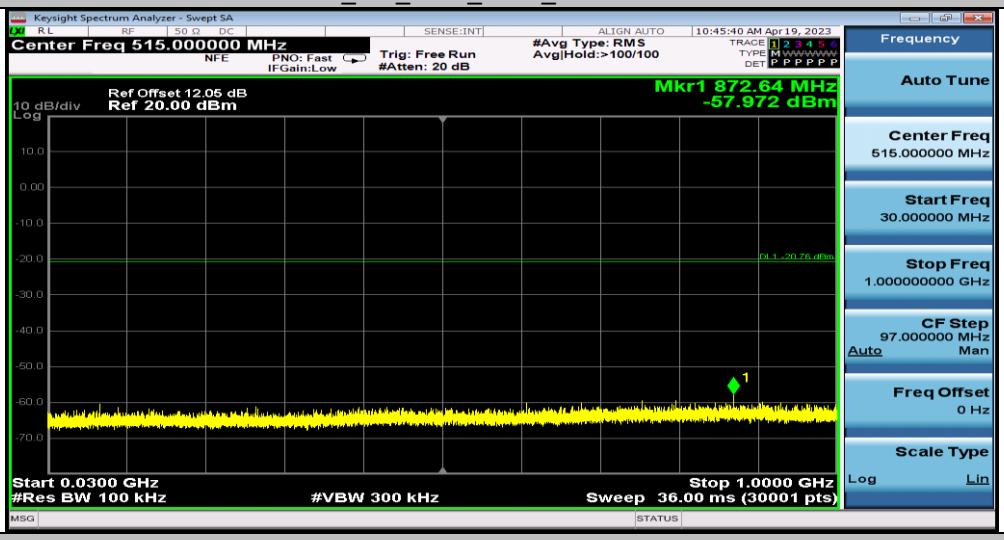

BLE_1M_Ant1_2402_30~1000



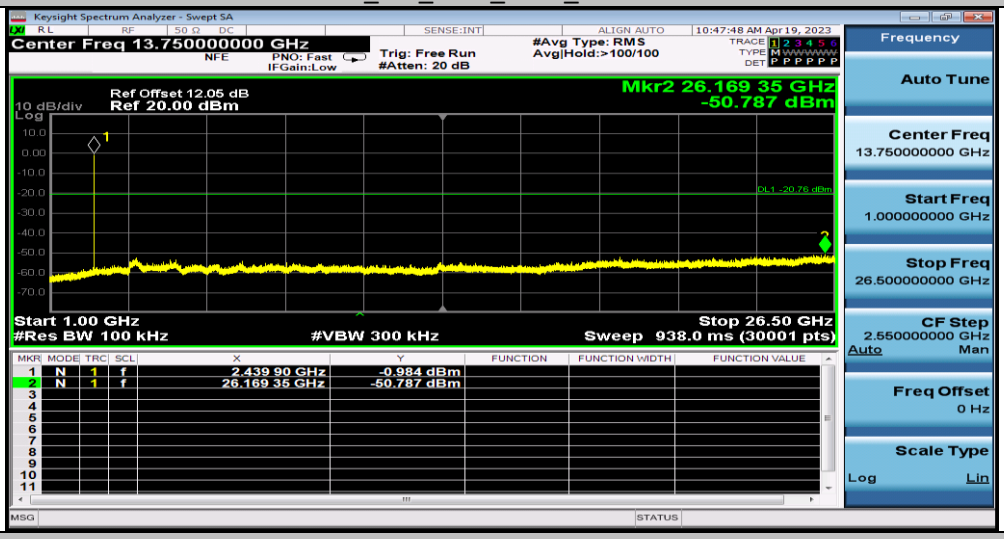

BLE_1M_Ant1_2402_1000~26500




BLE_1M_Ant1_2440_0~Reference

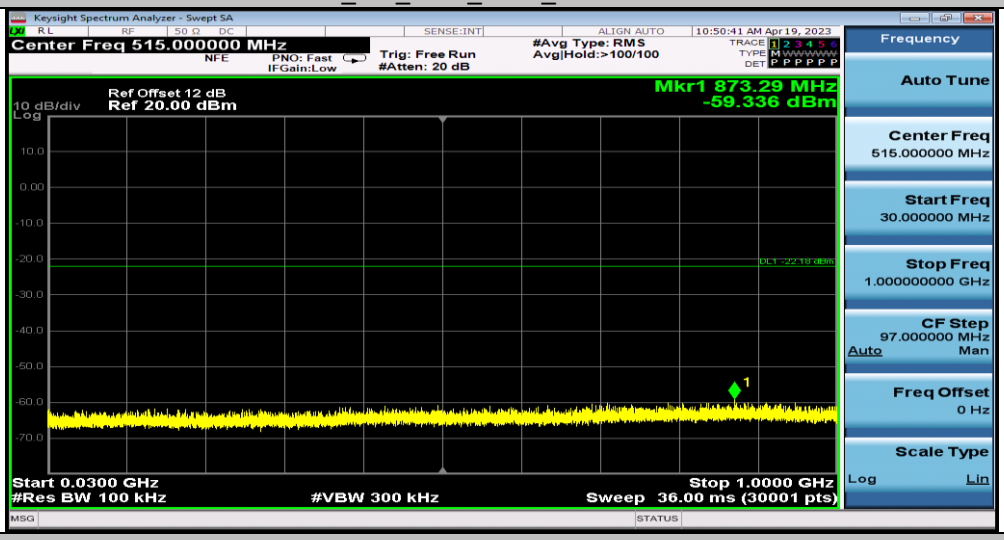



BLE_1M_Ant1_2440_30~1000

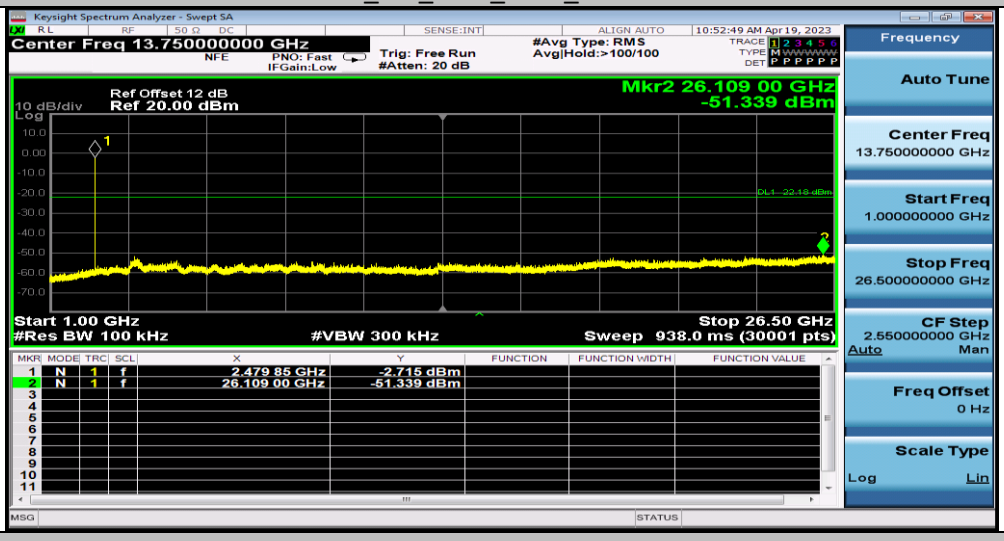



BLE_1M_Ant1_2440_1000~26500


BLE_1M_Ant1_2480_0~Reference




BLE_1M_Ant1_2480_30~1000




BLE_1M_Ant1_2480_1000~26500

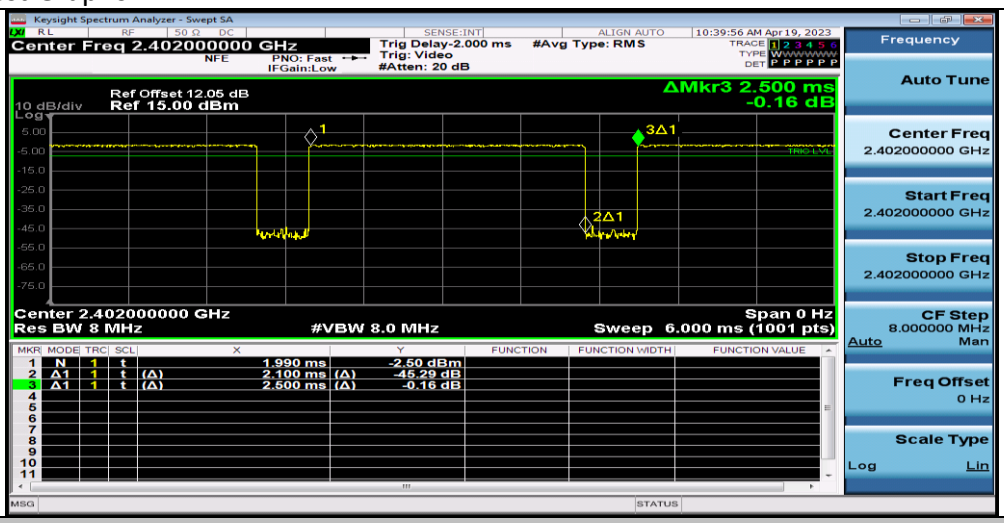
## Duty Cycle

Test Result

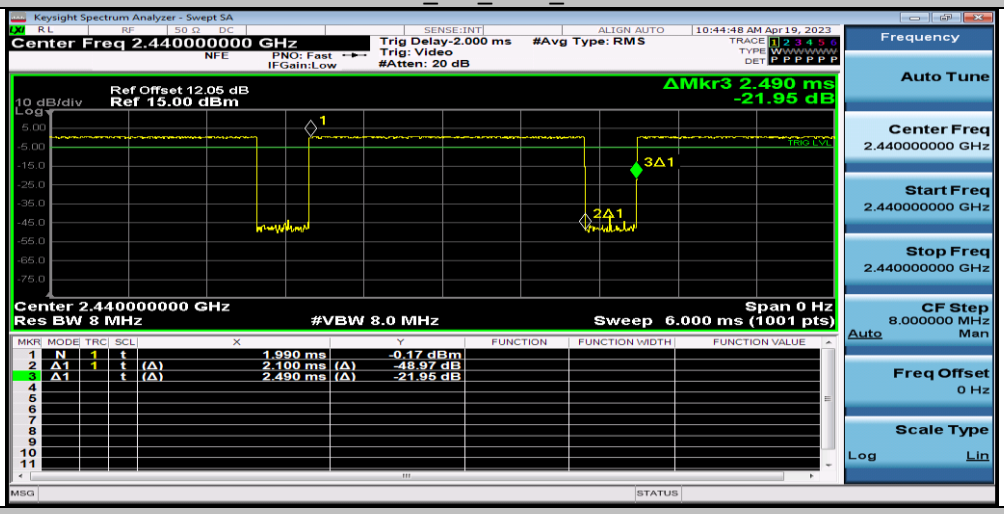
| Test Mode | Antenna | Frequency [MHz] | ON Time [ms] | Period [ms] | Duty Cycle [%] | Duty Cycle Factor[dB] |
|---|---|---|---|---|---|---|
| BLE_1M | Ant1 | 2402 | 2.10 | 2.50 | 84.00 | 0.76 |
| | | 2440 | 2.10 | 2.49 | 84.34 | 0.74 |
| | | 2480 | 2.09 | 2.49 | 83.94 | 0.76 |

**TEST REPORT**

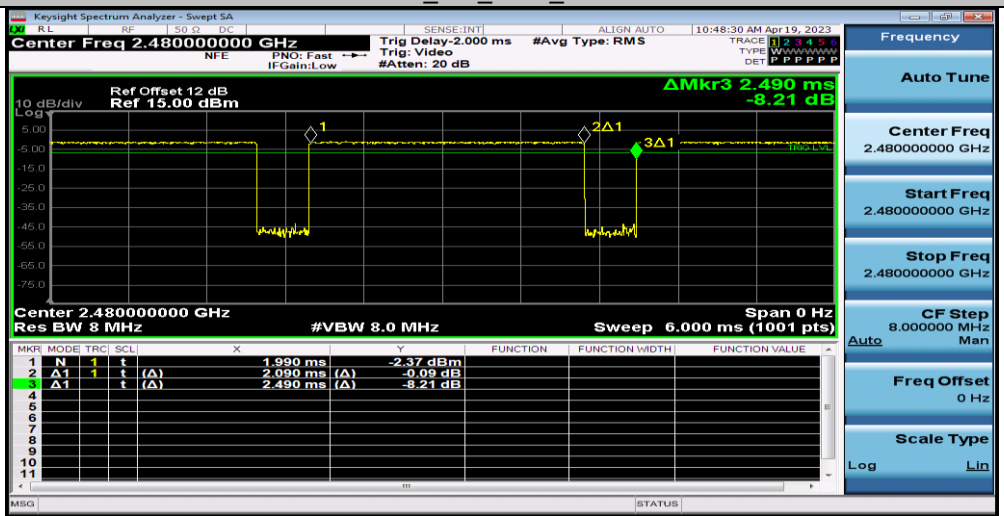
Test Graphs




BLE_1M_Ant1_2402




BLE_1M_Ant1_2440




BLE_1M_Ant1_2480

********** END **********