



经续检验

SLG-CPC Testlaboratory

| TEST REPORT | | |
|--|--|---|
| Report Number | 90836-25-72-25-PP001 | |
| Date of issue | 2025-09-09 | |
| Prepared by (+signature) | Susan |  |
| Approved by (+signature) | Jason |  |
| Testing Laboratory name | SLG-CPC Testlaboratory Co., Ltd. | |
| Address | No. 11, Wu Song Road, Dongcheng District Dongguan, Guangdong Province, 523117, People's Republic of China | |
| Applicant's name..... | Shenzhen Putuo Technology Co., Ltd | |
| Address | 3rd Floor, Building 9, Jiatiangang Industrial Zone, Huangtian, Hangcheng Street, Baoan District, Shenzhen, China | |
| Manufacturer's name | Shenzhen Putuo Technology Co., Ltd | |
| Address | 3rd Floor, Building 9, Jiatiangang Industrial Zone, Huangtian, Hangcheng Street, Baoan District, Shenzhen, China | |
| Factory's name | Shenzhen Putuo Technology Co., Ltd | |
| Address | 3rd Floor, Building 9, Jiatiangang Industrial Zone, Huangtian, Hangcheng Street, Baoan District, Shenzhen, China | |
| Standard(s)..... | FCC 47 CFR Part 15, Subpart C | |
| Test item description | WIRELESS MOUSE | |
| Trade Mark | / | |
| Model/Type reference | XSD-33, XSD-41, XSD-53, XSD-72 | |
| FCC ID..... | 2BGX5-PT | |
| Date of receipt of test item ...: | 2025-09-02 | |
| Date (s) of performance of test | 2025-09-03 to 2025-09-08 | |
| Summary of Test Results | Pass | |
| The Summary of Test Results based on a technical opinion belongs to the standard(s). | | |
| General disclaimer: 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. | | |

TABLE OF CONTENTS

| | | |
|----------|---|-----------|
| 1 | EUT TECHNICAL DESCRIPTION | 4 |
| 2 | SUMMARY OF TEST RESULT..... | 5 |
| 3 | TEST METHODOLOGY | 6 |
| 3.1 | GENERAL DESCRIPTION OF APPLIED STANDARDS..... | 6 |
| 3.2 | MEASUREMENT EQUIPMENT USED | 6 |
| 3.3 | DESCRIPTION OF TEST MODES | 7 |
| 4 | FACILITIES AND ACCREDITATIONS | 8 |
| 4.1 | FACILITIES..... | 8 |
| 4.2 | LABORATORY ACCREDITATIONS AND LISTINGS | 8 |
| 5 | TEST SYSTEM UNCERTAINTY | 9 |
| 6 | SETUP OF EQUIPMENT UNDER TEST | 10 |
| 6.1 | RADIO FREQUENCY TEST SETUP 1 | 10 |
| 6.2 | RADIO FREQUENCY TEST SETUP 2 | 10 |
| 6.3 | CONDUCTED EMISSION TEST SETUP | 12 |
| 6.4 | SUPPORT EQUIPMENT | 13 |
| 7 | TEST REQUIREMENTS..... | 14 |
| 7.1 | BANDWIDTH TEST | 14 |
| 7.2 | RADIATED SPURIOUS EMISSION | 17 |
| 7.3 | BAND EDGES REQUIREMENT | 24 |
| 7.4 | CONDUCTED EMISSIONS TEST | 26 |
| 7.5 | ANTENNA APPLICATION..... | 27 |

Modified Information

| Report No. | Revision Data | Summary |
|----------------------|---------------|------------------|
| 90836-25-72-25-PP001 | 2025-09-09 | Original Version |
| | | |

1 EUT TECHNICAL DESCRIPTION

| | |
|---------------------|--|
| Product: | WIRELESS MOUSE |
| Model Number: | XSD-33, XSD-41, XSD-53, XSD-72 (All modules are based on the same design principle and PCB. The different models are just to distinguish enclosure and switch, Here we choose XSD-72 as the test EUT) |
| Power supply: | <input checked="" type="checkbox"/> : DC 1.5V for one AA battery <input type="checkbox"/> : Adapter information |
| Modulation: | GFSK |
| Frequency Range: | 2402MHz~2479MHz |
| Number of Channels: | 16 channels |
| Antenna Gain: | 2.08 dBi |
| Antenna: | PCB Antenna |
| Temperature Range: | 0°C ~ +40°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 |
|--|----------------------------|---------|--------|
| 15.207 | Conducted Emission | N/A | |
| 15.209 | Radiated Emission | PASS | |
| 15.249 | Radiated Spurious Emission | PASS | |
| 15.249 | Band edge test | PASS | |
| 15.215 | 20dB Bandwidth | PASS | |
| 15.203 | Antenna Requirement | PASS | |
| NOTE1: N/A (Not Applicable) NOTE2: 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: 2BGX5-PT filing to comply with Section 15.249 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

3.2 MEASUREMENT EQUIPMENT USED

| Equipment | Manufacturer | Model | S/N | Last Cal. | DUE Cal. |
|-------------------------------------|-----------------|--------------|------------------|------------|----------|
| RF Connected Test | | | | | |
| Vector Signal Generator | Rohde & Schwarz | SMBV100B(6G) | 101166 | 2025/04/16 | 1 year |
| Analog Signal Generator | Rohde & Schwarz | SMB100A(40G) | 181333 | 2025/06/18 | 1 year |
| Signal Analyzer | Rohde & Schwarz | FSV40 | 101527 | 2025/03/26 | 1 year |
| Power Analyzer | Rohde & Schwarz | OSP-B157W8 | N/A | 2025/04/16 | 1 year |
| Wideband Radio Communication Tester | R&S | CMW270 | 101985 | 2025/04/18 | 1 year |
| Wideband Radio Communication Tester | Rohde & Schwarz | CMW500 | 166898 | 2025/04/14 | 1 year |
| Temperature&Humidity test chamber | ESPEC | VC 4018 | / | 2025/03/26 | 1 year |
| Radiated Emission Test | | | | | |
| EMI Test Receiver | KEYSIGHT | N9010A | MY56070465 | 2024/12/03 | 1 year |
| EMI Test Receiver | Rohde & Schwarz | FSV40 | 101511 | 2025/01/10 | 1 year |
| Bilog Antenna | Schwarzbeck | VULB 9163 | 01335 | 2023/04/21 | 3 year |
| Broadband Antenna | Schwarzbeck | 9162 | 139 | 2025/03/01 | 3 year |
| Power Amplifier | EMEC | EM330 | 060676 | 2025/03/11 | 3 year |
| Cable | Tuyue | F4309 | L-400-NmNm-12000 | 2024/12/03 | 2 year |
| Horn Antenna | Schwarzbeck | BBHA9120D | 1779 | 2025/03/28 | 3 year |
| Horn Antenna | Schwarzbeck | BBHA9170 | 00954 | 2025/08/15 | 3 year |
| Power Amplifier | Rohde & Schwarz | SCU08F2 | 08400019 | 2025/03/24 | 3 year |
| Power Amplifier | Rohde & Schwarz | SCU-18F | 180118 | 2025/03/24 | 3 year |
| Power Amplifier | Rohde & Schwarz | SCU40A | 100499 | 2023/06/21 | 3 year |
| Active Loop Antenna | ETS LINDGREN | 6512 | 41623 | 2025/03/19 | 3 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.

The EUT has been tested under its typical operating condition so those modulation and channel 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

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 0 | 2402 | 6 | 2428 | 12 | 2468 |
| 1 | 2408 | 7 | 2437 | 13 | 2474 |
| 2 | 2417 | 8 | 2446 | 14 | 2478 |
| 3 | 2419 | 9 | 2456 | 15 | 2479 |
| 4 | 2421 | 10 | 2460 | | |
| 5 | 2423 | 11 | 2451 | | |
| | | | | | |

Test Frequency and Channel list:

| Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) |
|-------------|-----------------|-------------|-----------------|-------------|-----------------|
| 0 | 2402 | 7 | 2437 | 15 | 2479 |

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, 523117, People's Republic of China

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 31 2023 CAB identifier: CN0126 Company Number: 27767 Accredited by A2LA, October 31 2023 The Certificate Registration Number is 6325.01 Accredited by FCC Designation Number: CN1287 Test Firm Registration Number: 394054 |
| Name of Firm | : SLG-CPC Testlaboratory Co., Ltd. |
| Site Location | : No. 11, Wu Song Road, Dongcheng District Dongguan, Guangdong Province, 523117, People's Republic of China |

5 TEST SYSTEM UNCERTAINTY

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

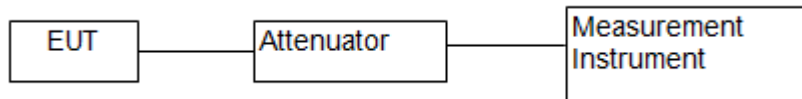
| Parameter | Uncertainty |
|--------------------------------|------------------------|
| Radio Frequency | $\pm 1 \times 10^{-5}$ |
| Maximum Peak Output Power Test | $\pm 1.0\%$ |
| Conducted Emissions Test | 3.68dB |
| Radiated Emission Test | 3.46dB (Below 30MHz) |
| | 4.80dB (Below 1GHz) |
| | 3.28dB (Above 1GHz) |
| Occupied Bandwidth Test | $\pm 0.9\%$ |
| Band Edge Test | $\pm 2.3\%$ |
| All emission, radiated | $\pm 1.2\%$ |
| 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 EUT wireless component's antenna ports(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 0.8 meters 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 specified distance from the EUT.

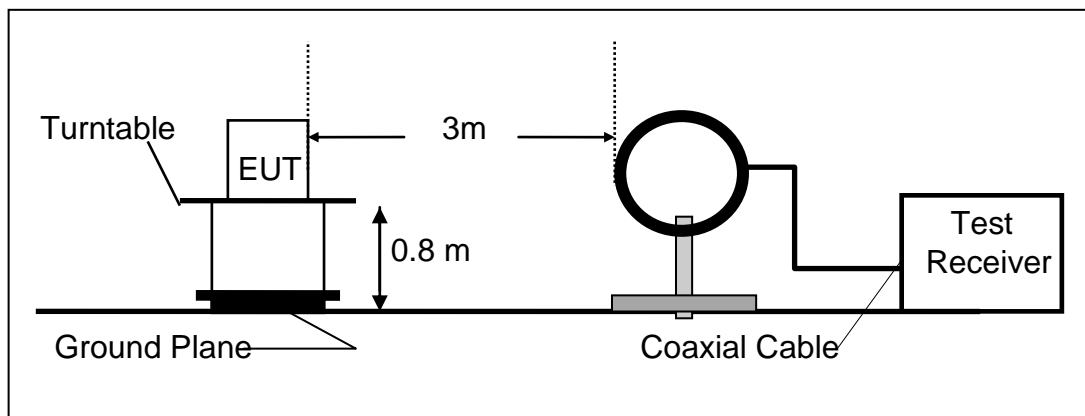
30MHz-1GHz:

The EUT is placed on a turntable 0.8 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).

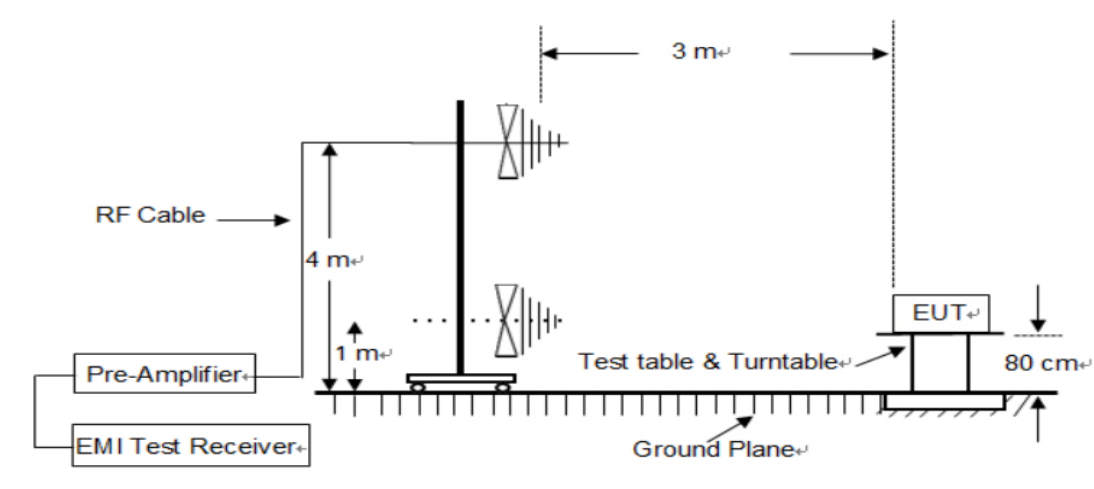
Above 1GHz:

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).

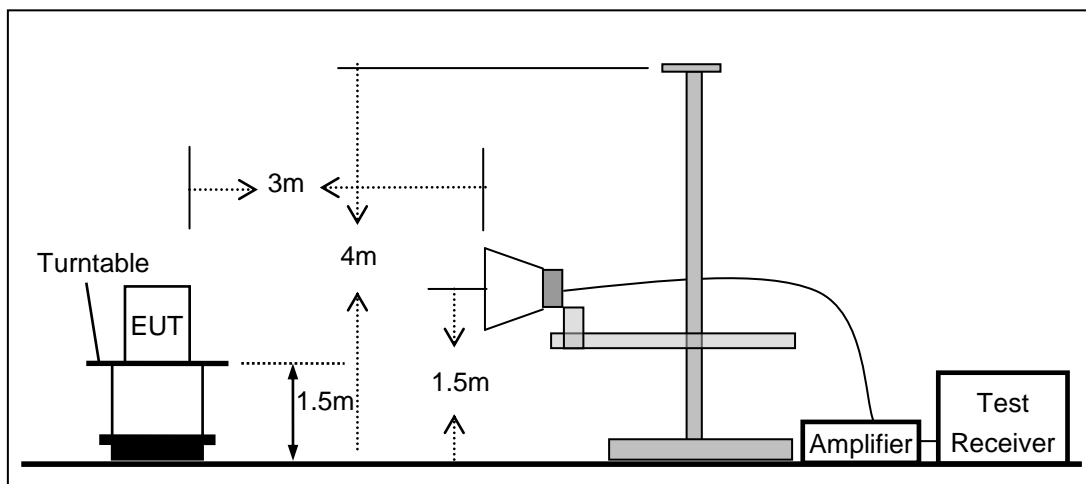
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



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

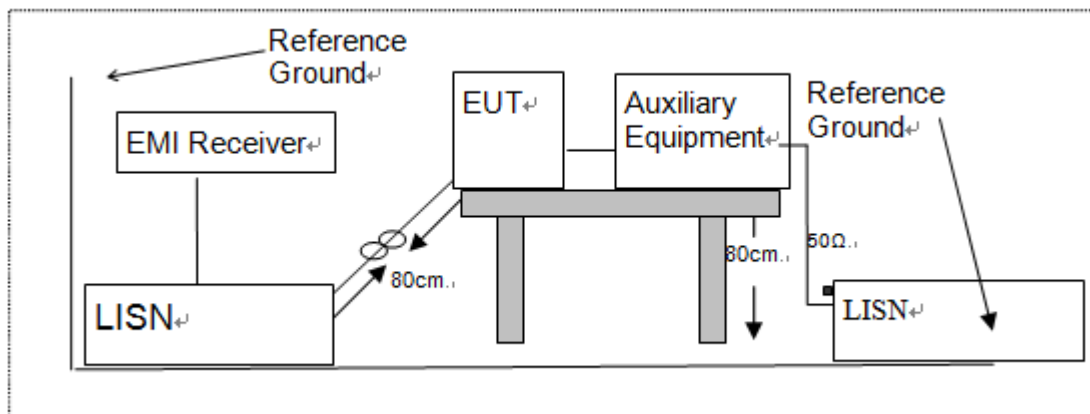


6.3 CONDUCTED EMISSION TEST SETUP

The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m 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 0.1 m.

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 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 |
| | | | |
| | | | |

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.
- 3) Unless otherwise denoted as EUT in 『Remark』 column , device(s) used in tested system is a support equipment

7 TEST REQUIREMENTS

7.1 BANDWIDTH TEST

7.1.1 Applicable Standard

According to FCC Part 15.215

7.1.2 Conformance Limit

N/A

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 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 \geq 1% ~ 5% of the 20 dB bandwidth

Set the video bandwidth (VBW) \geq RBW.

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

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

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 20 dB relative to the maximum level measured in the fundamental emission.

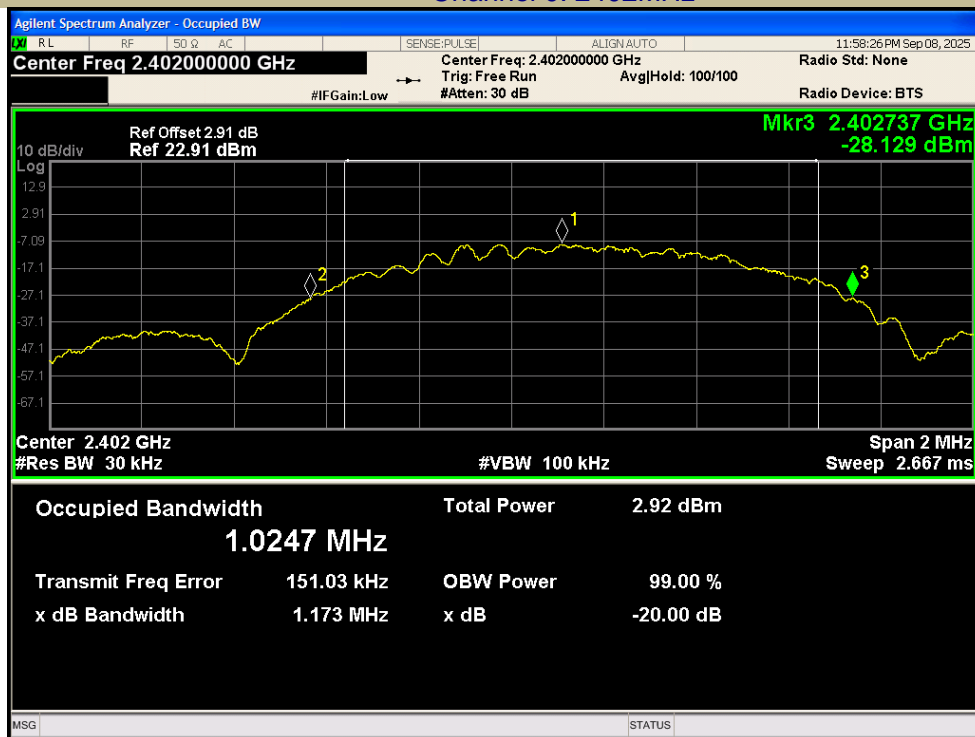
Measure and record the results in the test report.

Test Results

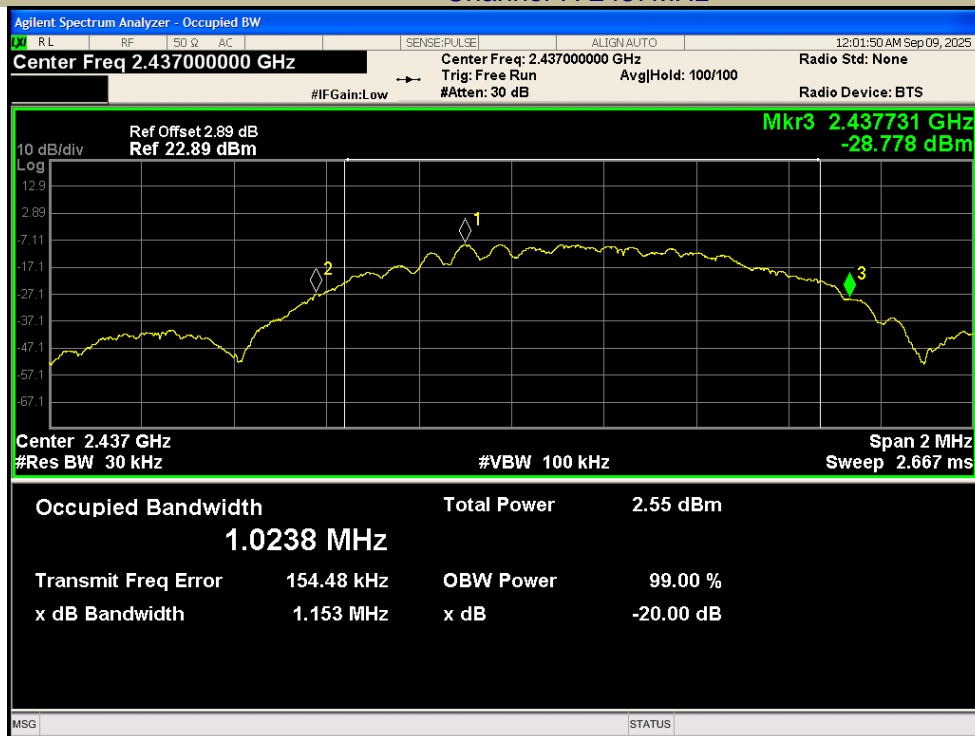
| | |
|--------------------|-----------|
| Temperature: | 24° C |
| Relative Humidity: | 51% |
| ATM Pressure: | 1011 mbar |

| Operation Mode | Channel Number | Channel Frequency (MHz) | 20db Measurement Bandwidth (MHz) | Limit (kHz) | Verdict |
|----------------------------|----------------|-------------------------|----------------------------------|-------------|---------|
| GFSK | 0 | 2402 | 1.173 | N/A | PASS |
| GFSK | 7 | 2437 | 1.153 | N/A | PASS |
| GFSK | 15 | 2479 | 1.153 | N/A | PASS |
| Note: N/A (Not Applicable) | | | | | |

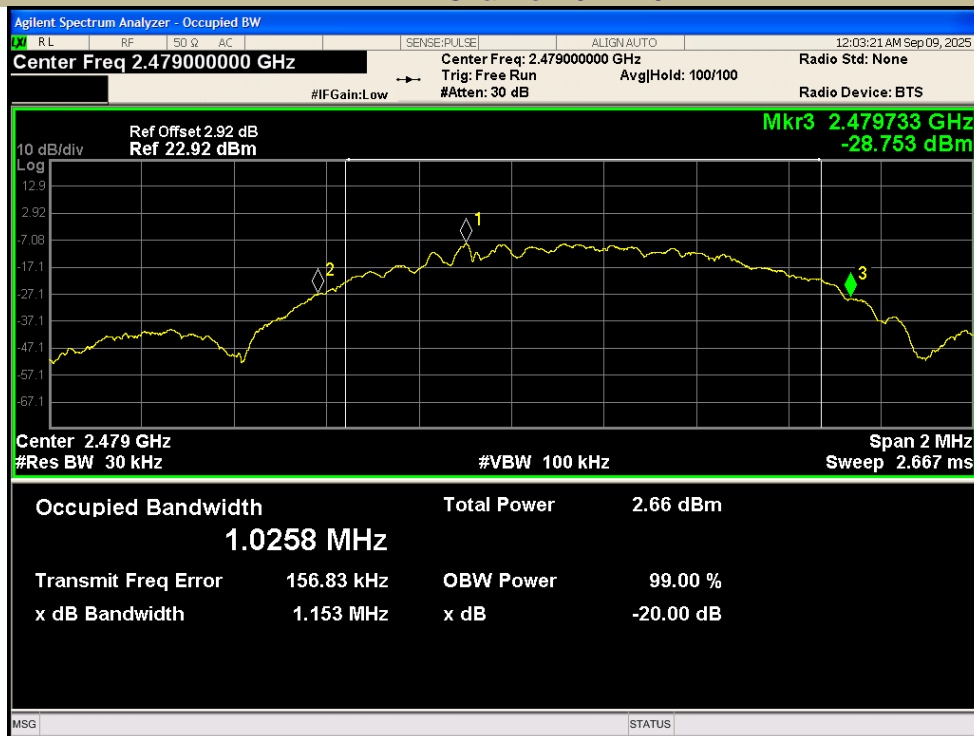
Test Model

Occupied Bandwidth
GFSK
Channel 0: 2402MHz

Test Model

Occupied Bandwidth
GFSK
Channel 7: 2437MHz

Test Model

Occupied Bandwidth
GFSK
Channel 79: 2479MHz

7.2 RADIATED SPURIOUS EMISSION

7.2.1 Applicable Standard

According to FCC Part 15.249 and 15.209

7.2.2 Conformance Limit

According to FCC Part 15.249: radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

According to FCC Part 15.205, Restricted bands

| MHz | MHz | MHz | GHz |
|-------------------|---------------------|---------------|-------------|
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| 10.495-0.505 | 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 | 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 | (2) |
| 13.36-13.41 | | | |

According to FCC Part 15.205, the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

| Restricted Frequency(MHz) | Field Strength (μV/m) | Field Strength (dBμV/m) | Measurement Distance |
|---------------------------|-----------------------|-------------------------|----------------------|
| 0.009-0.490 | 2400/F(KHz) | 20 log (uV/m) | 300 |
| 0.490-1.705 | 24000/F(KHz) | 20 log (uV/m) | 30 |
| 1.705-30 | 30 | 29.5 | 30 |
| 30-88 | 100 | 40 | 3 |
| 88-216 | 150 | 43.5 | 3 |
| 216-960 | 200 | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

Remark :1. Emission level in dBuV/m=20 log (uV/m)

2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

3. Distance extrapolation factor =40log(Specific distance/ test distance)(dB);

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

for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] =10*lg(100 [kHz]/narrower RBW [kHz]). , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

Field strength of fundamental and Field strength of harmonics Limit:

| Fundamental frequency | Field strength of fundamental (millivolts/meter) | Field strength of harmonics (microvolts/meter) |
|-----------------------|--|--|
| 902-928 MHz | 50(94 dBV/m) | 500(54 dBV/m) |
| 2400-2483.5 MHz | 50(94 dBV/m) | 500(54 dBV/m) |
| 5725-5875 MHz | 50(94 dBV/m) | 500(54 dBV/m) |
| 24.0-24.25 GHz | 250(108 dBV/m) | 2500(68 dBV/m) |

As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation

7.2.3 Test Configuration

Test according to clause 6.2 radio frequency test setup 2

7.2.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz (1GHz to 25GHz), 100 kHz for $f < 1$ GHz (30MHz to 1GHz)

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{dwell time}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Repeat above procedures until all frequency measured was complete.

7.2.5 Test Results

| | |
|--------------------|-----------|
| Temperature: | 21° C |
| Relative Humidity: | 54% |
| ATM Pressure: | 1011 mbar |

■ Spurious Emission below 30MHz (9KHz to 30MHz)

| Freq. (MHz) | Ant.Pol. | Emission Level(dBuV/m) | | Limit 3m(dBuV/m) | | Over(dB) | |
|----------------|----------|---------------------------|----|------------------|----|----------|----|
| | H/V | PK | AV | PK | AV | PK | AV |
| -- | -- | -- | -- | -- | -- | -- | -- |

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible

limit has no need to be reported.

Distance extrapolation factor = $40\log(\text{Specific distance}/\text{test distance})$ (dB);

Limit line = Specific limits(dBuV) + distance extrapolation factor

■ Field Strength of the fundamental signal

| Operation Mode: The worst case GFSK | | | | | | | | | | |
|-------------------------------------|------------------|-------------------------|-------|----------------|----------------------------|-------|----------------------|----|----------------|--------|
| Freq (MHz) | Ant.Pol (H/V) | Reading Level (dBuV) | | Factor (dB) | Emission Level (dBuV/m) | | Limit 3m (dBuV/m) | | Margin (dB) | |
| | | PK | AV | | PK | AV | PK | AV | PK | AV |
| 2402 | V | 65.92 | 51.74 | 13.75 | 79.67 | 65.49 | 114 | 94 | -34.33 | -28.51 |
| 2402 | H | 68.26 | 44.31 | 13.75 | 82.01 | 58.06 | 114 | 94 | -31.99 | -35.94 |
| --- | | | | | | | | | | |
| 2437 | V | 63.39 | 42.20 | 13.75 | 77.14 | 55.95 | 114 | 94 | -36.86 | -38.05 |
| 2437 | H | 62.12 | 42.02 | 13.75 | 75.87 | 55.77 | 114 | 94 | -38.13 | -38.23 |
| --- | | | | | | | | | | |
| 2479 | V | 65.88 | 45.36 | 13.75 | 79.63 | 59.11 | 114 | 94 | -34.37 | -34.89 |
| 2479 | H | 69.64 | 47.36 | 13.75 | 83.39 | 61.11 | 114 | 94 | -30.61 | -32.89 |

Note: (1) Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain

(2) Emission Level = Reading Level + Factor

■ Spurious Emission Above 1GHz (1GHz to 25GHz)

Test mode: TX (The worst case GFSK)

Test mode: GFSK Frequency: Channel 0: 2402MHz

| Freq. (MHz) | Ant.Pol. | Emission Level(dBuV/m) | | Limit 3m(dBuV/m) | | Over(dB) | |
|----------------|----------|---------------------------|-------|------------------|-------|----------|--------|
| | H/V | PK | AV | PK | AV | PK | AV |
| 4804.54 | V | 49.89 | 44.34 | 74.00 | 54.00 | -24.11 | -9.66 |
| 7206.40 | V | 54.21 | 41.07 | 74.00 | 54.00 | -19.79 | -12.93 |
| 9608.79 | V | 59.02 | 36.10 | 74.00 | 54.00 | -14.98 | -17.90 |
| 4804.92 | H | 53.77 | 37.00 | 74.00 | 54.00 | -20.23 | -17.00 |
| 7206.91 | H | 56.56 | 35.06 | 74.00 | 54.00 | -17.44 | -18.94 |
| 9608.41 | H | 59.49 | 36.84 | 74.00 | 54.00 | -14.51 | -17.16 |

Test mode: GFSK Frequency: Channel 16: 2437MHz

| Freq. (MHz) | Ant.Pol. | Emission Level(dBuV/m) | | Limit 3m(dBuV/m) | | Over(dB) | |
|----------------|----------|---------------------------|-------|------------------|-------|----------|--------|
| | H/V | PK | AV | PK | AV | PK | AV |
| 4874.99 | V | 47.10 | 44.68 | 74.00 | 54.00 | -26.90 | -9.32 |
| 7311.64 | V | 45.26 | 37.30 | 74.00 | 54.00 | -28.74 | -16.70 |
| 9748.67 | V | 49.23 | 40.20 | 74.00 | 54.00 | -24.77 | -13.80 |
| 4874.75 | H | 51.95 | 37.31 | 74.00 | 54.00 | -22.05 | -16.69 |
| 7311.23 | H | 49.56 | 40.78 | 74.00 | 54.00 | -24.44 | -13.22 |
| 9748.77 | H | 56.31 | 41.51 | 74.00 | 54.00 | -17.69 | -12.49 |

Test mode: GFSK Frequency: Channel 31: 2479MHz

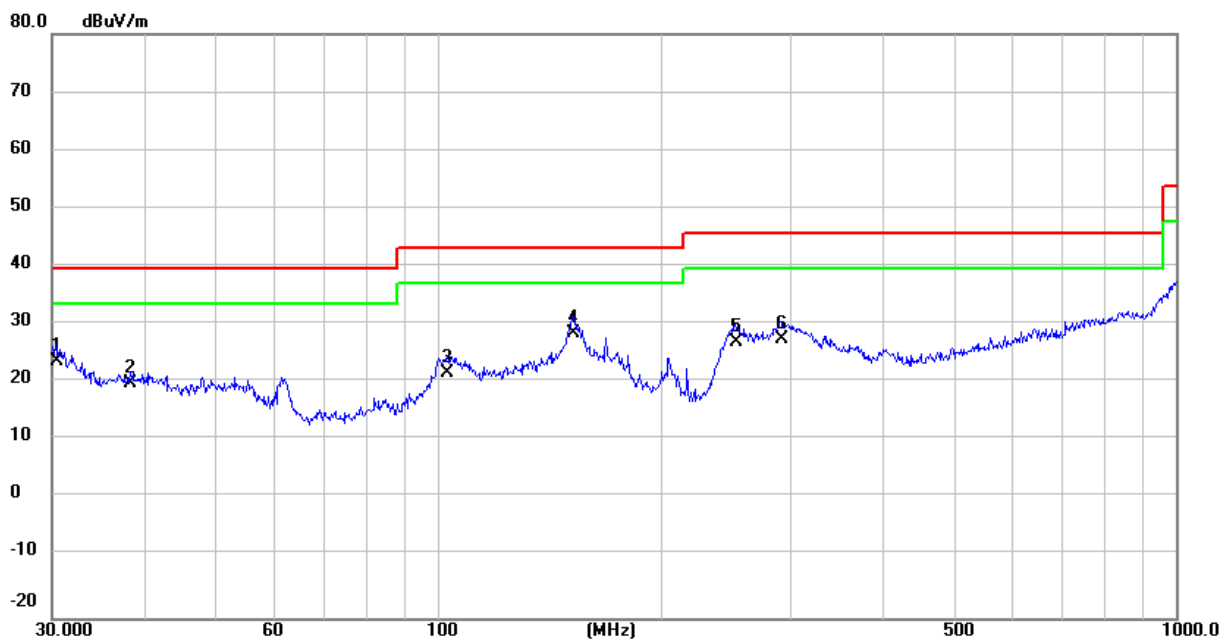
| Freq. (MHz) | Ant.Pol. | Emission Level(dBuV/m) | | Limit 3m(dBuV/m) | | Over(dB) | |
|----------------|----------|---------------------------|-------|------------------|-------|----------|--------|
| | H/V | PK | AV | PK | AV | PK | AV |
| 4958.43 | V | 50.41 | 37.07 | 74.00 | 54.00 | -23.59 | -16.93 |
| 7437.41 | V | 47.22 | 35.75 | 74.00 | 54.00 | -26.78 | -18.25 |
| 9916.80 | V | 46.31 | 40.73 | 74.00 | 54.00 | -27.69 | -13.27 |
| 4958.37 | H | 56.81 | 36.56 | 74.00 | 54.00 | -17.19 | -17.44 |
| 7437.46 | H | 47.17 | 35.85 | 74.00 | 54.00 | -26.83 | -18.15 |
| 9916.42 | H | 56.56 | 43.11 | 74.00 | 54.00 | -17.44 | -10.89 |

- Note:** (1) All Readings are Peak Value (VBW=3MHz) and Average Value(VBW=10Hz).
 (2) Emission Level= Reading Level+Correct Factor +Cable Loss.
 (3) Correct Factor= Antenna Factor -Amp Factor +Cable Loss

■ Spurious Emission below 1GHz (30MHz to 1GHz)

All modes have been tested, and the worst result (GFSK, 2402MHz) recorded was report as below:

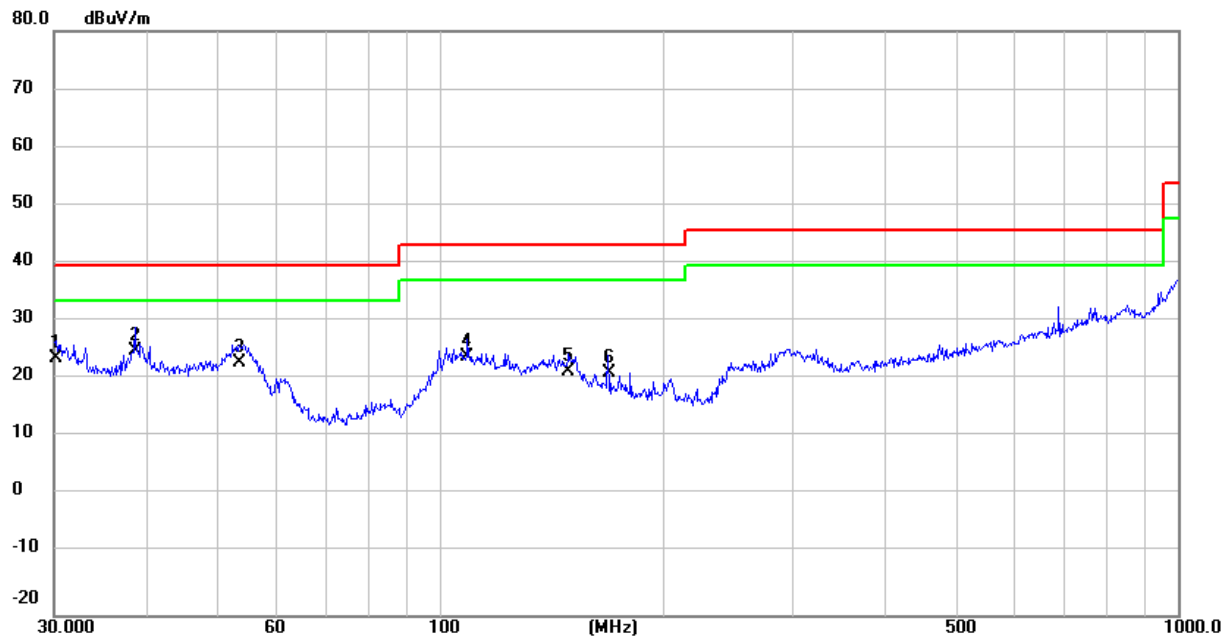
| | | | |
|---------------|------------|---------------|------------------------|
| Polarization: | Horizontal | Test Voltage: | DC 1.5V for AA battery |
|---------------|------------|---------------|------------------------|



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|
| 1 | 30.3173 | 20.97 | 3.03 | 24.00 | 40.00 | -16.00 | QP |
| 2 | 38.3462 | 22.32 | -2.05 | 20.27 | 40.00 | -19.73 | QP |
| 3 | 103.0800 | 26.72 | -4.60 | 22.12 | 43.50 | -21.38 | QP |
| 4 | 152.6641 | 32.62 | -3.74 | 28.88 | 43.50 | -14.62 | QP |
| 5 | 252.9482 | 30.39 | -3.10 | 27.29 | 46.00 | -18.71 | QP |
| 6 | 291.0360 | 28.89 | -1.04 | 27.85 | 46.00 | -18.15 | QP |

Remark: Emission Level=Reading+ Correct Factor + Reading Level

| | | | |
|---------------|------------|---------------|------------------------|
| Polarization: | Horizontal | Test Voltage: | DC 1.5V for AA battery |
|---------------|------------|---------------|------------------------|



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|
| 1 | 30.2111 | 20.99 | 3.14 | 24.13 | 40.00 | -15.87 | QP |
| 2 | 38.6160 | 27.39 | -2.03 | 25.36 | 40.00 | -14.64 | QP |
| 3 | 53.5052 | 30.63 | -7.22 | 23.41 | 40.00 | -16.59 | QP |
| 4 | 109.0286 | 28.66 | -4.23 | 24.43 | 43.50 | -19.07 | QP |
| 5 | 149.4857 | 25.22 | -3.42 | 21.80 | 43.50 | -21.70 | QP |
| 6 | 169.0054 | 26.72 | -5.18 | 21.54 | 43.50 | -21.96 | QP |

Remark: Emission Level=Reading+ Correct Factor + Reading Level

7.3 BAND EDGES REQUIREMENT

7.3.1 Applicable Standard

According to FCC Part 15.249(d)

7.3.2 Test Configuration

Test according to clause 6.2 radio frequency test setup 2

7.3.3 Test Procedure

Follow the guidelines in ANSI C63.10: Clause 6.10

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports(if EUT with antenna diversity architecture). The lowest, middle and highest channels were selected for the final test as listed below.

7.3.4 Test Results

| | |
|--------------------|-----------|
| Temperature: | 24° C |
| Relative Humidity: | 53% |
| ATM Pressure: | 1011 mbar |

■ BAND EDGES REQUIREMENT DATA

| Low Channel: 2402MHz | | | | | | | |
|----------------------|--------------|-----------------------|-------------------|-----------------------|-------------------|----------|--------|
| Frequency (MHz) | Polarity H/V | PK(dBuV/m) (VBW=3MHz) | Limit 3m (dBuV/m) | AV(dBuV/m) (VBW=10Hz) | Limit 3m (dBuV/m) | Over(dB) | |
| | | | | | | PK | AVG |
| 2310.0000 | H | 50.34 | 74.00 | 30.01 | 54.00 | -23.66 | -23.99 |
| 2390.0000 | H | 44.75 | 74.00 | 24.92 | 54.00 | -29.25 | -29.08 |
| 2400.0000 | H | 52.44 | 74.00 | 27.54 | 54.00 | -21.56 | -26.46 |
| 2310.0000 | V | 47.34 | 74.00 | 30.76 | 54.00 | -26.66 | -23.24 |
| 2390.0000 | V | 50.34 | 74.00 | 30.01 | 54.00 | -23.66 | -23.99 |
| 2400.0000 | V | 44.75 | 74.00 | 24.92 | 54.00 | -29.25 | -29.08 |

| High Channel: 2479MHz | | | | | | | |
|-----------------------|--------------|-----------------------|-------------------|-----------------------|-------------------|----------|--------|
| Frequency (MHz) | Polarity H/V | PK(dBuV/m) (VBW=3MHz) | Limit 3m (dBuV/m) | AV(dBuV/m) (VBW=10Hz) | Limit 3m (dBuV/m) | Over(dB) | |
| | | | | | | PK | PK |
| 2483.5000 | H | 43.77 | 74.00 | 32.14 | 54.00 | -30.23 | -21.86 |
| 2500.0000 | H | 57.93 | 74.00 | 28.21 | 54.00 | -16.07 | -25.79 |
| 2500.0000 | V | 48.49 | 74.00 | 32.39 | 54.00 | -25.51 | -21.61 |
| 2483.5000 | V | 43.44 | 74.00 | 34.50 | 54.00 | -30.56 | -19.50 |

7.4 CONDUCTED EMISSIONS TEST

7.4.1 Applicable Standard

According to FCC Part 15.207(a)

7.4.2 Conformance Limit

| Frequency(MHz) | Conducted Emission Limit | |
|----------------|--------------------------|---------|
| | Quasi-peak | Average |
| 0.15-0.5 | 66-56 | 56-46 |
| 0.5-5.0 | 56 | 46 |
| 5.0-30.0 | 60 | 50 |

Note: 1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Remark: Test results were obtained from the following equation:

Measurement (dBμV) = LISN Factor (dB) + Cable Loss (dB) + Reading (dBμV)

Over (dB) = Measurement (dBμV) - Limit (dBμV)

7.4.3 Test Configuration

Test according to clause 6.3 conducted emission test setup

7.4.4 Test Procedure

The EUT was placed on a table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Repeat above procedures until all frequency measured were complete.

7.4.5 Test Results

Not Applicable for DC product.

7.5 ANTENNA APPLICATION

7.5.1 Antenna Requirement

| Standard | Requirement |
|---------------------|---|
| FCC CRF Part 15.203 | <p>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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.</p> |

For intentional device, according to FCC 47 CFR Section 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.

7.5.2 Result

PASS.

The EUT has 1 antennas: an PCB Antenna for 2402-2479MHz, antenna has a gain of 2.08 dBi;

Note: ☒ Antenna use a permanently attached antenna which is not replaceable.
☐ Not using a standard antenna jack or electrical connector for antenna replacement
☐ The antenna has to be professionally installed (please provide method of installation)

which in accordance to section 15.203, please refer to the internal photos.

-----The end-----

声 明 Statement

1. 本报告无授权批准人签字及盖章无效;

This report is invalid without the signature and seal of the authorized approver.

2. 未经许可本报告不得部分复制;

This report shall not be copied partly without authorization.

3. 本报告的检测结果仅对送测样品有效, 委托方对样品的代表性和资料的真实性负责;

The test results or observations are applicable only to tested sample. Client shall be responsible for representativeness of the sample and authenticity of the material.

4. 本检测报告中检测项目标注有特殊符号则该项目不在资质认定范围内, 仅作为客户委托、科研、教学或内部质量控制等目的使用;

The observations or tests with special mark fall outside the scope of accreditation, and are only used for purpose of commission, research, training, internal quality control etc.

5. 本检测报告以实测值进行符合性判定, 未考虑不确定度所带来的风险, 本实验室不承担相关责任, 特别约定、标准或规范中有明确规定的除外;

The test results or observations are provided in accordance with measured value, without taking risks caused by uncertainty into account. Without explicit stipulation in special agreements, standards or regulations, SLG-CPC shall not assume any responsibility.

6. 对本检测报告若有异议, 请于收到报告之日起 20 日内提出;

Objections shall be raised within 20 days from the date receiving the report.