# RF TEST REPORT

**For**

## JOYYEN LIGHTING& ELECTRICAL CO.,LTD
## Product Name: 2.4G Remote Control
## Test Model(s).: RC-2.4G-01

| | | |
|---|---|---|
| **Report Reference No.** | : | **POCE240307002RF001** |
| **FCC ID** | : | **2BFKH-RC24G01** |
| **Applicant's Name** | : | JOYYEN LIGHTING& ELECTRICAL CO.,LTD |
| **Address** | : | Rm 1702-3, 4 Building, Kangsheng Chuangfu Center, No. 17, Chashan Town, Dongguan City |
| **Testing Laboratory** | : | Shenzhen POCE Technology Co., Ltd. |
| **Address** | : | 101-102 Building H5 & 1/F., Building H, Hongfa Science & Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, Guangdong, China |
| **Test Specification Standard** | : | **47 CFR Part 15.249 & ANSI C63.10-2013** |
| **Date of Receipt** | : | March 7, 2024 |
| **Date of Test** | : | March 7, 2024 to March 22, 2024 |
| **Data of Issue** | : | March 22, 2024 |
| **Result** | : | **Pass** |

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# Revision History Of Report

| Version | Description | REPORT No. | Issue Date |
|---|---|---|---|
| V1.0 | Original | POCE240307002RF001 | March 22, 2024 |
| | | | |
| | | | |
| | | | |
| | | | |

**NOTE1:**

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

| Compiled by: | Supervised by: | Approved by: |
|---|---|---|
| Keren Huang | Stone Yin | Tom Chen |
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# 1 TEST SUMMARY

## 1.1 Test Standards

The tests were performed according to following standards:

**47 CFR Part 15.249:** Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHZ, and 24.0-24.25 GHz

## 1.2 Summary of Test Result

| Item | Method | Requirement | Result |
|---|---|---|---|
| Antenna requirement | / | 47 CFR Part 15.203 | Pass |
| Occupied Bandwidth | ANSI C63.10-2013, section 6.9.2 | 47 CFR 15.215(c) | Pass |
| Field strength of fundamental | ANSI C63.10-2013 section 6.6 | 47 CFR 15.249(a)<br>47 CFR 15.249(b)(1) | Pass |
| Band edge emissions (Radiated) | ANSI C63.10-2013 section 6.6.4 | 47 CFR 15.249(d) | Pass |
| Emissions in frequency bands (below 1GHz) | ANSI C63.10-2013 section 6.5 | 47 CFR 15.249(a)<br>47 CFR 15.249(d)<br>47 CFR 15.249(e) | Pass |
| Emissions in frequency bands (above 1GHz) | ANSI C63.10-2013 section 6.6 | 47 CFR 15.249(a)<br>47 CFR 15.249(d)<br>47 CFR 15.249(e) | Pass |

Note: 1.N/A -this device(EUT) is not applicable to this testing item
2. RF-conducted test results including cable loss.

# 2 GENERAL INFORMATION

## 2.1 Client Information

**Applicant's Name** : JOYYEN LIGHTING& ELECTRICAL CO.,LTD
**Address** : Rm 1702-3, 4 Building, Kangsheng Chuangfu Center, No. 17, Chashan Town, Dongguan City

**Manufacturer** : JOYYEN LIGHTING& ELECTRICAL CO.,LTD
**Address** : Rm 1702-3, 4 Building, Kangsheng Chuangfu Center, No. 17, Chashan Town, Dongguan City

## 2.2 Description of Device (EUT)

| | |
|---|---|
| Product Name: | 2.4G Remote Control |
| Model/Type reference: | RC-2.4G-01 |
| Trade Mark: | N/A |
| Product Description: | 2.4G Remote Control |
| Power Supply: | DC3.0V from 2*AAA battery |
| Operation Frequency: | 2426MHz |
| Number of Channels: | 1 |
| Modulation Type: | GFSK |
| Antenna Type: | PCB ANT |
| Antenna Gain: | 0dBi |
| Hardware Version: | 2.4G-12J-X |
| Software Version: | N/A |

| **Operation Frequency each of channel** | |
|---|---|
| Channel | Frequency |
| 1 | 2426MHz |

Note:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| **Test channel** | **Frequency (MHz)** |
|---|---|
| Channel | 2426MHz |

## 2.3 Description of Test Modes

| **No** | **Title** | **Description** |
|---|---|---|
| TM1 | TX-GFSK | Keep the EUT in continuously transmitting mode with GFSK modulation. |
| | ☐Special software is used.<br>☐Through engineering command into the engineering mode.<br>engineering command: *#*#3646633#*#*<br>☒Other method: press the keys | |

## 2.4 Description of Support Units

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

| Item | Description | Manufacturer | Model No. | Remark | Certification |
|---|---|---|---|---|---|
| 1 | -- | -- | -- | -- | -- |
| 2 | | | | | |

## 2.5 Equipments Used During The Test

| Occupied Bandwidth | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No** | **Inventory No** | **Cal Date** | **Cal Due Date** |
| RF Test Software | TACHOY | RTS-01 | V2.0.0.0 | / | / |
| Power divider | MIDEWEST | PWD-2533 | SMA-79 | 2023-05-11 | 2026-05-10 |
| DC power | HP | 66311B | 38444359 | / | / |
| RF Sensor Unit | TACHOY | TR1029-2 | 000001 | / | / |
| Signal generator | Keysight | N5182A | MY50143455 | 2023-11-09 | 2024-11-08 |
| Spectrum Analyzer | Keysight | N9020A | MY53420323 | 2023-12-12 | 2024-12-11 |

| Field strength of fundamental<br>Band edge emissions (Radiated)<br>Emissions in frequency bands (below 1GHz)<br>Emissions in frequency bands (above 1GHz) | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No** | **Inventory No** | **Cal Date** | **Cal Due Date** |
| EMI Test software | Farad | EZ -EMC | V1.1.42 | / | / |
| Positioning Controller | / | MF-7802 | / | / | / |
| High Pass filter | ZHINAN | OQHPF1-M1.5-18G-224 | 6210075 | / | / |
| Amplifier(18-40G) | COM-POWER | AH-1840 | 10100008-1 | 2022-04-05 | 2025-04-04 |
| Horn antenna | COM-POWER | AH-1840 (18-40G) | 10100008 | 2023-04-05 | 2025-04-04 |
| Loop antenna | ZHINAN | ZN30900C | ZN30900C | 2021-07-05 | 2024-07-04 |
| Cable(LF)#2 | Schwarzbeck | / | / | 2024-02-19 | 2025-02-18 |
| Cable(LF)#1 | Schwarzbeck | / | / | 2024-02-19 | 2025-02-18 |
| Cable(HF)#2 | Schwarzbeck | AK9515E | 96250 | 2024-02-19 | 2025-02-18 |
| Cable(HF)#1 | Schwarzbeck | SYV-50-3-1 | / | 2024-02-19 | 2025-02-18 |
| Power amplifier(LF) | Schwarzbeck | BBV9743 | 9743-151 | 2023-06-13 | 2024-06-12 |
| Power amplifier(HF) | Schwarzbeck | BBV9718 | 9718-282 | 2023-06-13 | 2024-06-12 |
| Spectrum Analyzer | R&S | FSP30 | 1321.3008K40-101729-jR | 2023-06-14 | 2024-06-13 |
| Horn Antenna | Sunol Sciences | DRH-118 | A091114 | 2023-05-13 | 2025-05-12 |
| Broadband Antenna | Sunol Sciences | JB6 Antenna | A090414 | 2023-05-21 | 2025-05-20 |
| Test Receiver | R&S | ESCI | 102109 | 2023-06-13 | 2024-06-12 |

## 2.6 Statement Of The Measurement Uncertainty

| **Test Item** | **Measurement Uncertainty** |
|---|---|
| Occupied Bandwidth | ±3.63% |
| Radiated Emission (Above 1GHz) | ±5.46dB |
| Radiated Emission (Below 1GHz) | ±5.79dB |
| Note: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. | |

## 2.7 Identification of Testing Laboratory

| | |
|---|---|
| Company Name: | Shenzhen POCE Technology Co., Ltd. |
| Address: | 101-102 Building H5 & 1/F., Building H, Hongfa Science & Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, Guangdong, China |
| Phone Number: | +86-13267178997 |
| Fax Number: | 86-755-29113252 |

Identification of the Responsible Testing Location

| | |
|---|---|
| Company Name: | Shenzhen POCE Technology Co., Ltd. |
| Address: | 101-102 Building H5 & 1/F., Building H, Hongfa Science & Technology Park, |

| | |
|---|---|
| | Tangtou, Shiyan, Bao'an District, Shenzhen, Guangdong, China |
| Phone Number: | +86-13267178997 |
| Fax Number: | 86-755-29113252 |
| FCC Registration Number: | 0032847402 |
| Designation Number: | CN1342 |
| Test Firm Registration No.: | 778666 |
| A2LA Certificate Number: | 6270.01 |

## 2.8 Announcement

(1) The test report reference to the report template version v0.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) This document may not be altered or revised in any way unless done so by POCE and all revisions are duly noted in the revisions section.

(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

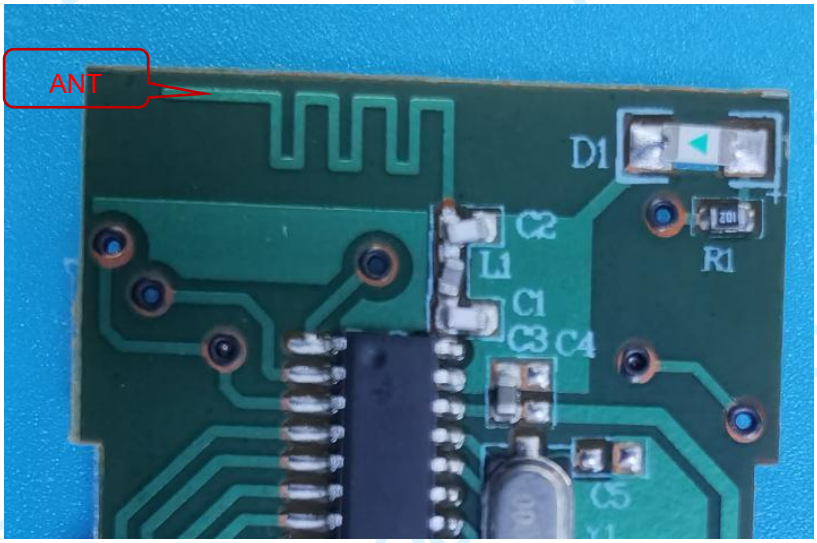
(6) We hereby declare that the laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant. the laboratory is not responsible for the accuracy of the information provided by the client. When the information provided by the customer may affect the effectiveness of the results, the responsibility lies with the customer, and the laboratory does not assume any responsibility.

# 3 Evaluation Results (Evaluation)

## 3.1 Antenna requirement

| | |
|---|---|
| Test Requirement: | Refer to 47 CFR Part 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. 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. |

### 3.1.1 Conclusion:



# 4 Radio Spectrum Matter Test Results (RF)

## 4.1 Occupied Bandwidth

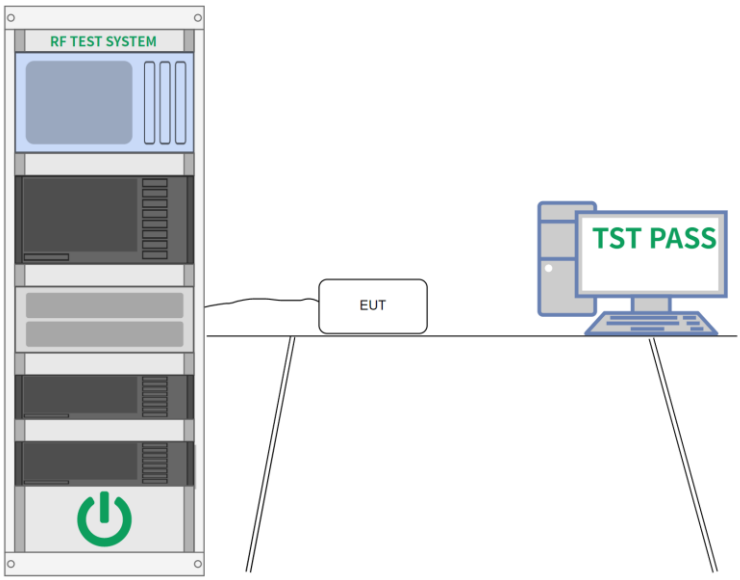
| | |
|---|---|
| Test Requirement: | 47 CFR 15.215(c) |
| Test Limit: | Refer to 47 CFR 15.215(c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. |
| Test Method: | ANSI C63.10-2013, section 6.9.2 |
| Procedure: | a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.<br>b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.<br>c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.<br>d) Steps a) through c) might require iteration to adjust within the specified tolerances.<br>e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.<br>f) Set detection mode to peak and trace mode to max hold.<br>g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).<br>h) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.<br>i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).<br>j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "-xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the "-xx dB down amplitude" determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.<br>k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s). |

### 4.1.1 E.U.T. Operation:

| |
|---|
| Operating Environment: |

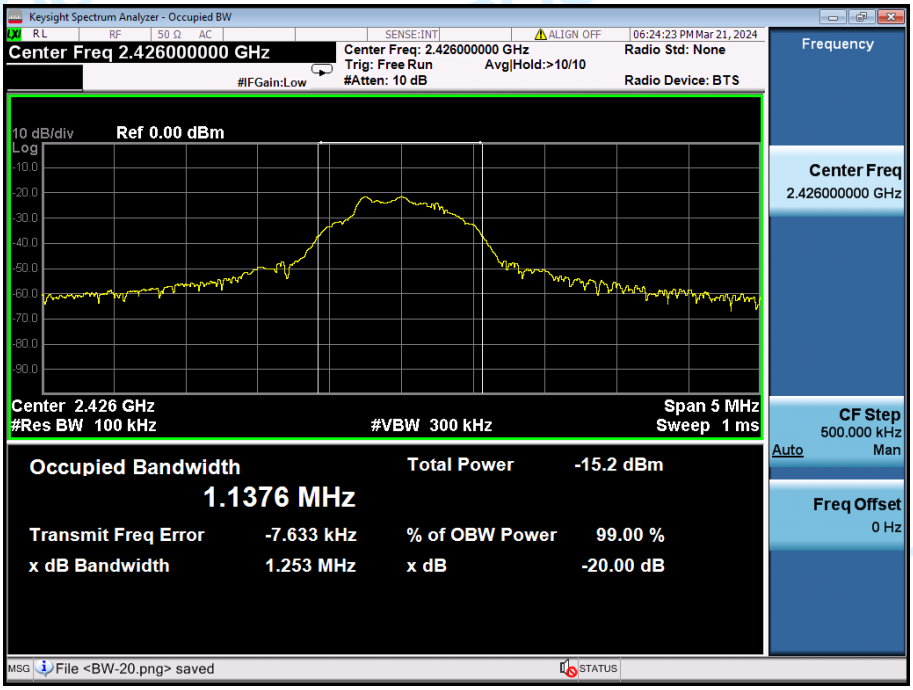
| Temperature: | 22.3 °C | Humidity: | 49.6 % | Atmospheric Pressure: | 102 kPa |
|---|---|---|---|---|---|
| Pretest mode: | TM1 | | | | |
| Final test mode: | TM1 | | | | |

### 4.1.2 Test Setup Diagram:




### 4.1.3 Test Data:

| Condition | Antenna | Modulation | Frequency (MHz) | 20dB Bandwidth (MHz) | 99% Bandwidth (MHz) | Limit(dBm) | Result |
|---|---|---|---|---|---|---|---|
| NVNT | ANT1 | GFSK | 2426.00 | 1.253 | 1.1376 | / | Pass |



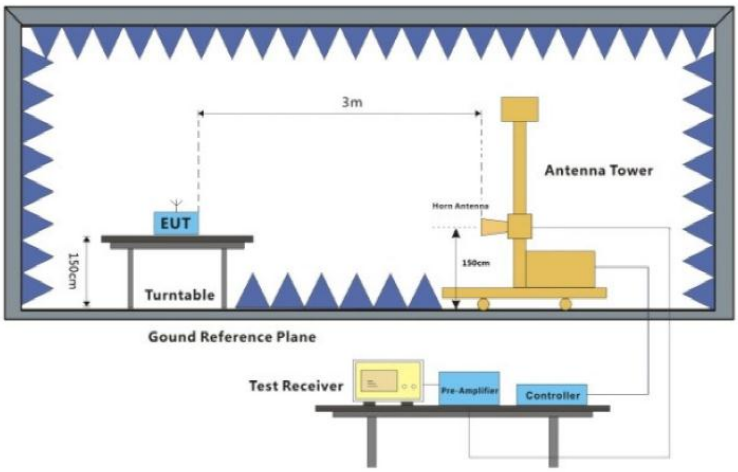
## 4.2 Field strength of fundamental

| | |
|---|---|
| Test Requirement: | Except as provided in paragraph (b)of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:<br><br>Fundamental frequency / Field strength of fundamental (millivolts/meter) / Field strength of harmonics (microvolts/meter)<br>902-928 MHz / 50 / 500<br>2400-2483.5 MHz / 50 / 500<br>5725-5875 MHz / 50 / 500<br>24.0-24.25 GHz / 250 / 2500<br><br>The field strength of emissions in this band shall not exceed 2500 millivolts/meter. |
| Test Method: | ANSI C63.10-2013 section 6.6 |
| Procedure: | ANSI C63.10-2013 section 6.6 |

### 4.2.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 22.3 °C | Humidity: | 49.6 % | Atmospheric Pressure: | 102 kPa |
| Pretest mode: | TM1 | | | | |
| Final test mode: | TM1 | | | | |

### 4.2.2 Test Setup Diagram:



### 4.2.3 Test Data:

| Frequency | Emission Level | Limits | Margin | Detector | Polarization |
|---|---|---|---|---|---|
| (MHz) | (dBuV/m) | (dBuV/m) | (dBuV/m) | (PK/AV) | (H/V) |
| 2426 | 76.64 | 114.00 | -37.36 | PK | H |
| 2426 | 68.20 | 94.00 | -25.80 | AV | H |
| 2426 | 77.10 | 114.00 | -36.90 | PK | V |
| 2426 | 69.51 | 94.00 | -24.49 | AV | V |

Note: Margin = Emission Level – Limit; For fundamental frequency, RBW>20dB BW, VBW>=3XRBW

## 4.3 Band edge emissions (Radiated)

| | |
|---|---|
| Test Requirement: | Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation. |
| Test Limit: | Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation. |

| Frequency (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 |

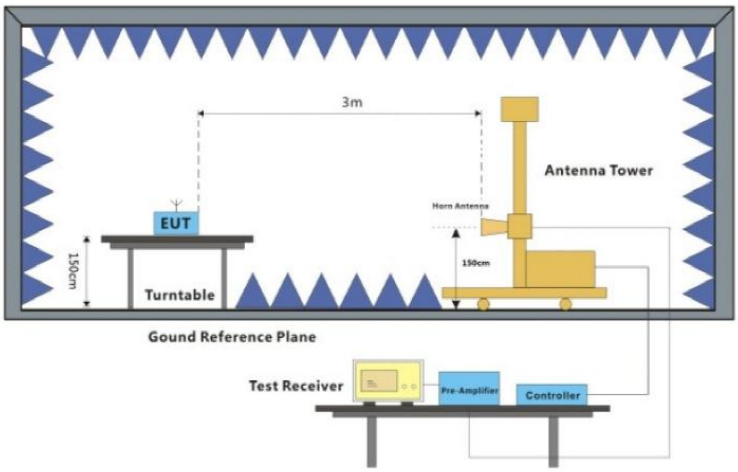
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

| | |
|---|---|
| Test Method: | ANSI C63.10-2013 section 6.6.4 |
| Procedure: | ANSI C63.10-2013 section 6.6.4 |

### 4.3.1 E.U.T. Operation:

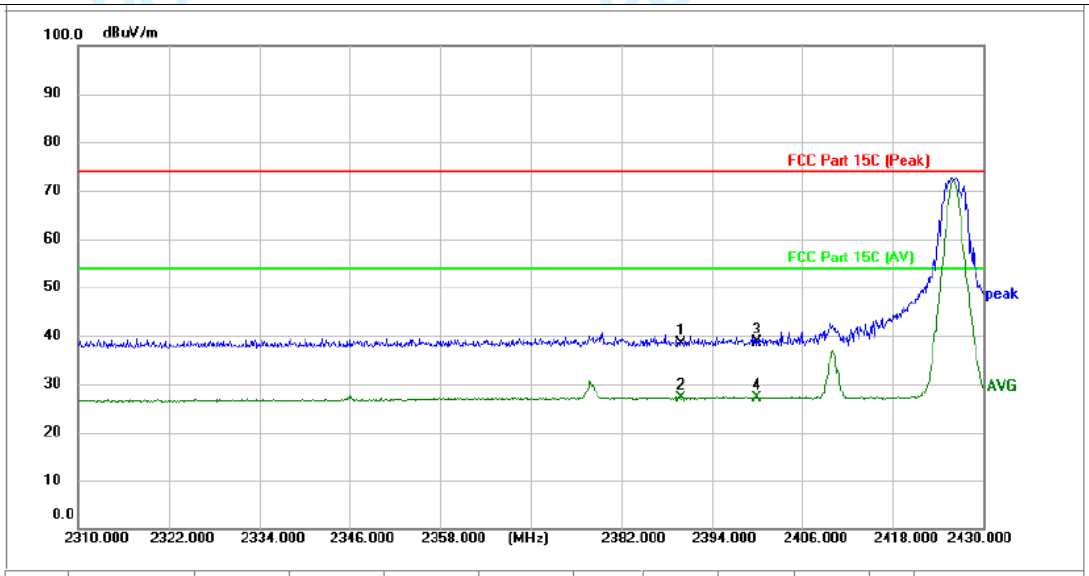
| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 22.3 °C | Humidity: | 49.6 % | Atmospheric Pressure: | 102 kPa |
| Pretest mode: | TM1 | | | | |
| Final test mode: | TM1 | | | | |

### 4.3.2 Test Setup Diagram:



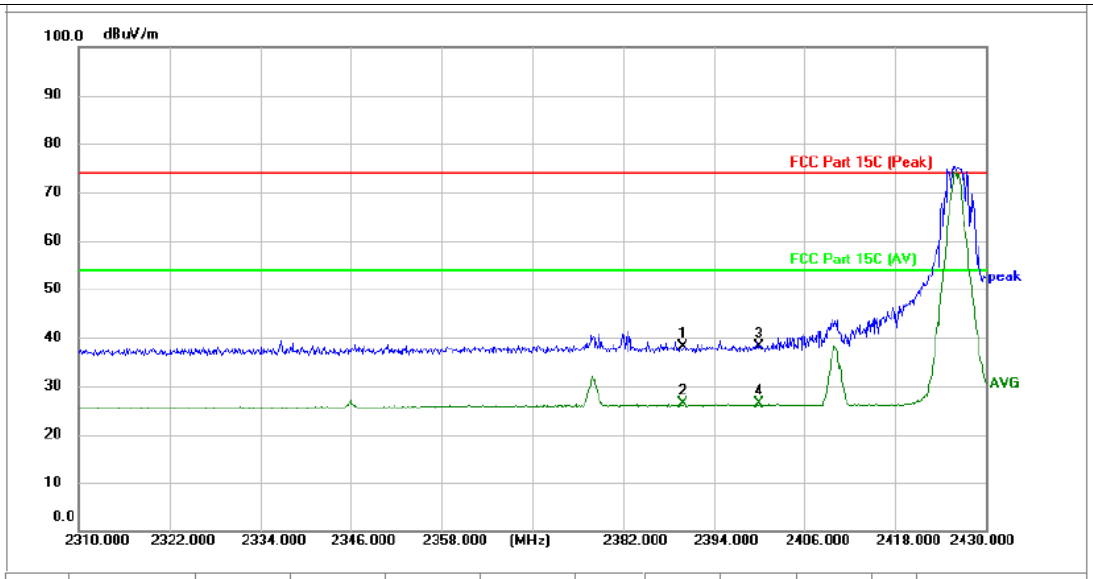
### 4.3.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2.4G/ Left



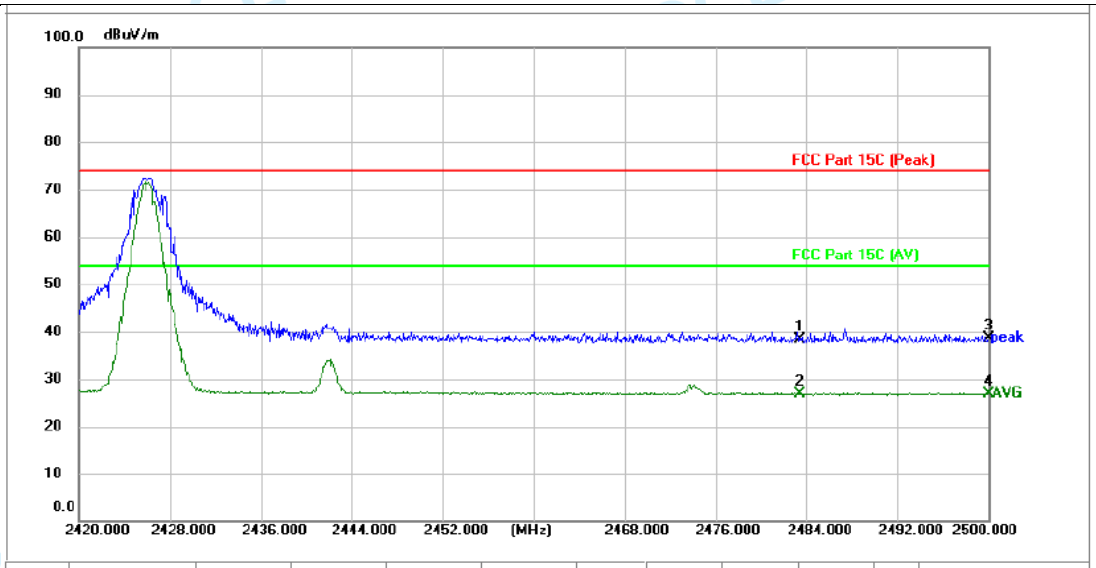

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2390.000 | 45.19 | -6.72 | 38.47 | 74.00 | -35.53 | peak | | | P | |
| 2 * | 2390.000 | 33.89 | -6.72 | 27.17 | 54.00 | -26.83 | AVG | | | P | |
| 3 | 2400.000 | 45.25 | -6.69 | 38.56 | 74.00 | -35.44 | peak | | | P | |
| 4 | 2400.000 | 33.79 | -6.69 | 27.10 | 54.00 | -26.90 | AVG | | | P | |

TM1 / Polarization: Vertical / Band: 2.4G/ Left



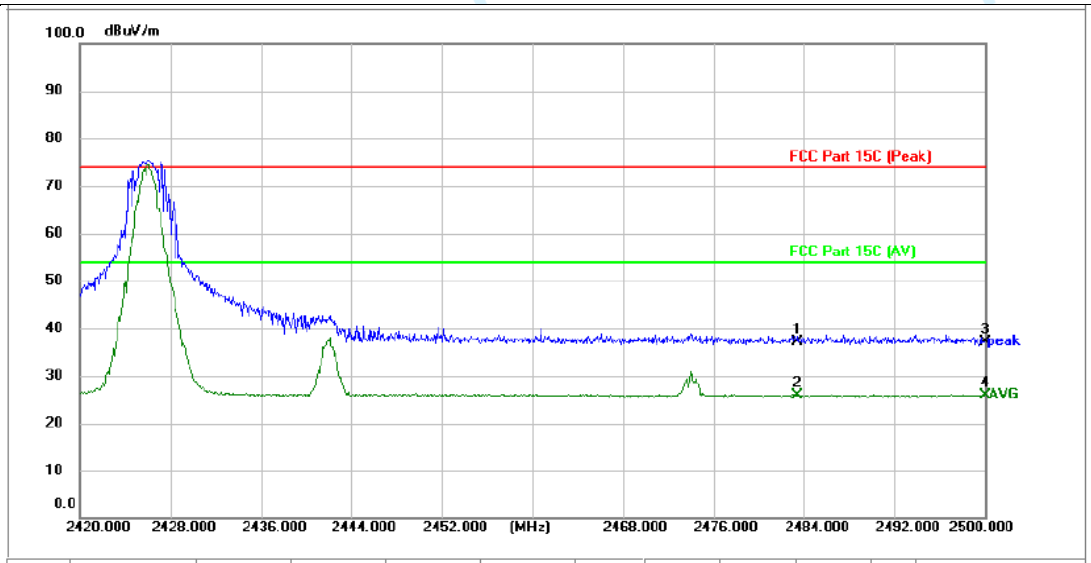

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2390.000 | 46.16 | -7.91 | 38.25 | 74.00 | -35.75 | peak | | | P | |
| 2 * | 2390.000 | 34.20 | -7.91 | 26.29 | 54.00 | -27.71 | AVG | | | P | |
| 3 | 2400.000 | 46.02 | -7.87 | 38.15 | 74.00 | -35.85 | peak | | | P | |
| 4 | 2400.000 | 34.16 | -7.87 | 26.29 | 54.00 | -27.71 | AVG | | | P | |

TM1 / Polarization: Horizontal / Band: 2.4G/Right




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 44.76 | -6.47 | 38.29 | 74.00 | -35.71 | peak | | | P | |
| 2 * | 2483.500 | 33.41 | -6.47 | 26.94 | 54.00 | -27.06 | AVG | | | P | |
| 3 | 2500.000 | 45.10 | -6.43 | 38.67 | 74.00 | -35.33 | peak | | | P | |
| 4 | 2500.000 | 33.34 | -6.43 | 26.91 | 54.00 | -27.09 | AVG | | | P | |

TM1 / Polarization: Vertical / Band: 2.4G/ Right




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 44.63 | -7.54 | 37.09 | 74.00 | -36.91 | peak | | | P | |
| 2 | 2483.500 | 33.38 | -7.54 | 25.84 | 54.00 | -28.16 | AVG | | | P | |
| 3 | 2500.000 | 44.72 | -7.48 | 37.24 | 74.00 | -36.76 | peak | | | P | |
| 4 * | 2500.000 | 33.38 | -7.48 | 25.90 | 54.00 | -28.10 | AVG | | | P | |

Remark:

Mesurement Level = Reading + Correct Factor, Margin= Mesurement Level - Limit

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

## 4.4 Emissions in frequency bands (below 1GHz)

| | |
|---|---|
| Test Requirement: | 47 CFR 15.249(a)<br>47 CFR 15.249(d)<br>47 CFR 15.249(e) |
| Test Limit: | Except as provided in paragraph (b)of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following: |

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

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

| Frequency (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 |

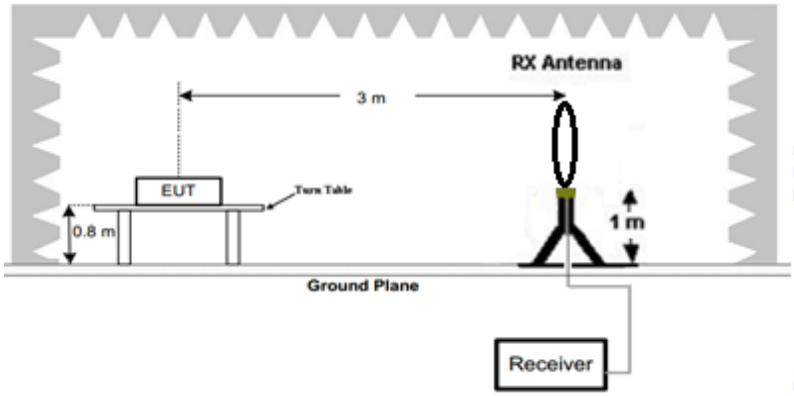
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
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. For point-to-point operation under paragraph (b)of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

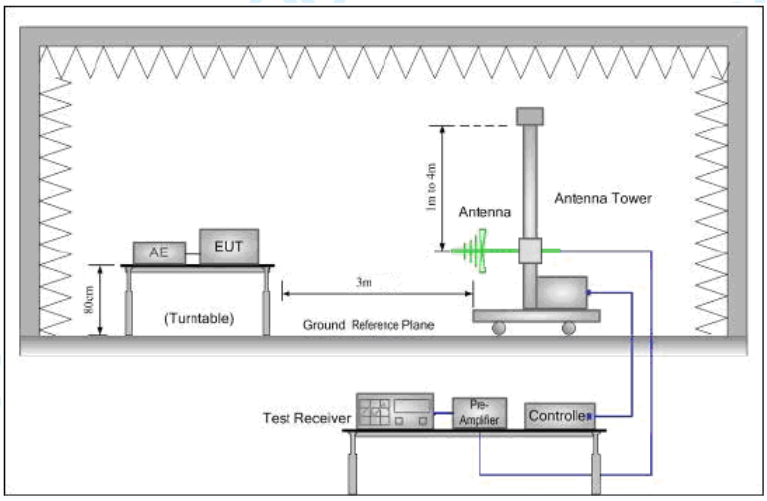
| | |
|---|---|
| Test Method: | ANSI C63.10-2013 section 6.5 |
| Procedure: | ANSI C63.10-2013 section 6.5 |

### 4.4.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 22.3 °C | Humidity: | 49.6 % | Atmospheric Pressure: | 102 kPa |
| Pretest mode: | TM1 | | | | |
| Final test mode: | TM1 | | | | |

### 4.4.2 Test Setup Diagram:



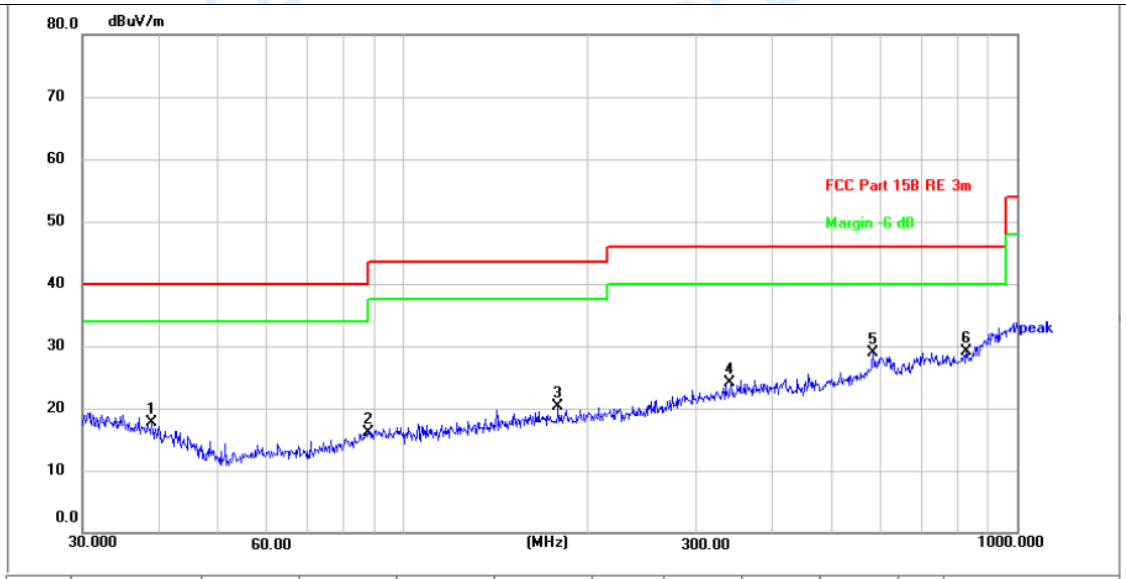

### 4.4.3 Test Data:

Between 9KHz – 30MHz

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

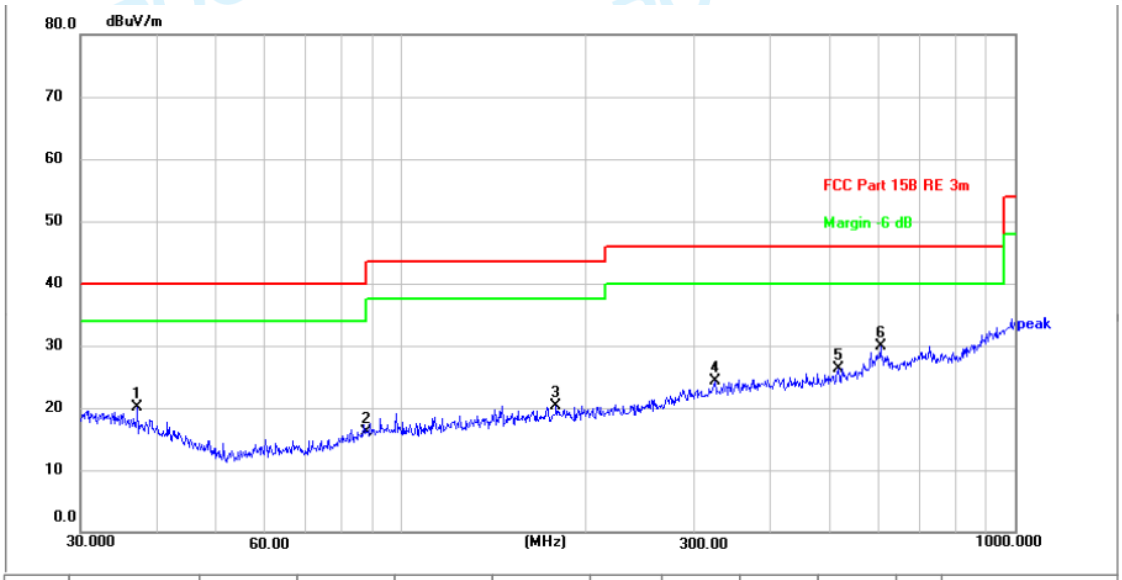
Between 30MHz—1000MHz:

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 3 / CH: M




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 38.8878 | 22.87 | -5.26 | 17.61 | 40.00 | -22.39 | QP | | | P | |
| 2 | 87.7246 | 22.41 | -6.36 | 16.05 | 40.00 | -23.95 | QP | | | P | |
| 3 | 178.7584 | 23.54 | -3.14 | 20.40 | 43.50 | -23.10 | QP | | | P | |
| 4 | 341.9786 | 23.55 | 0.63 | 24.18 | 46.00 | -21.82 | QP | | | P | |
| 5 | 582.7424 | 24.50 | 4.33 | 28.83 | 46.00 | -17.17 | QP | | | P | |
| 6 * | 827.4934 | 23.48 | 5.53 | 29.01 | 46.00 | -16.99 | QP | | | P | |

TM1 / Polarization: Vertical / Band: 2.4G / BW: 3 / CH: M




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 37.1550 | 24.92 | -4.79 | 20.13 | 40.00 | -19.87 | QP | 100 | | P | |
| 2 | 87.7248 | 22.41 | -6.36 | 16.05 | 40.00 | -23.95 | QP | 100 | | P | |
| 3 | 178.7584 | 23.54 | -3.14 | 20.40 | 43.50 | -23.10 | QP | 100 | | P | |
| 4 | 324.4561 | 24.02 | 0.33 | 24.35 | 46.00 | -21.65 | QP | 100 | | P | |
| 5 | 515.4374 | 24.28 | 2.11 | 26.39 | 46.00 | -19.61 | QP | 100 | | P | |
| 6 * | 603.5392 | 24.78 | 5.12 | 29.90 | 46.00 | -16.10 | QP | 100 | | P | |

Remark: Margin= Measurement Level - Limit
Measurement Level=Test reading + correction factor
Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

## 4.5 Emissions in frequency bands (above 1GHz)

| | |
|---|---|
| Test Requirement: | 47 CFR 15.249(a)<br>47 CFR 15.249(d)<br>47 CFR 15.249(e) |
| Test Limit: | Except as provided in paragraph (b)of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following: |

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

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

| Frequency (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 |

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

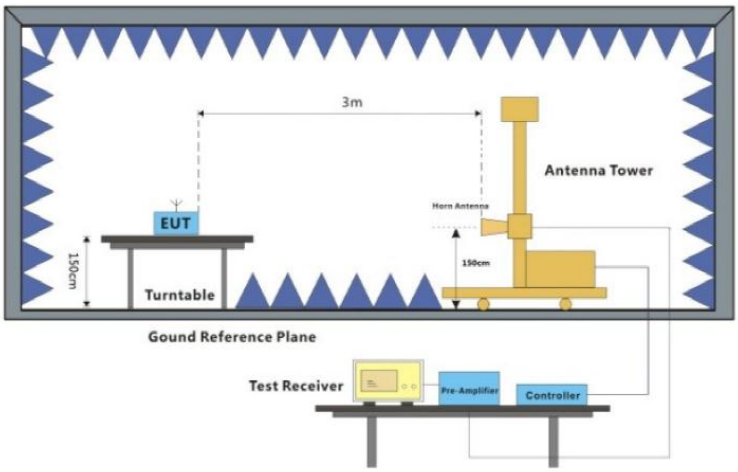
As shown in § 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a)and (b)of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b)of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

| | |
|---|---|
| Test Method: | ANSI C63.10-2013 section 6.6 |
| Procedure: | ANSI C63.10-2013 section 6.6 |

### 4.5.1 E.U.T. Operation:

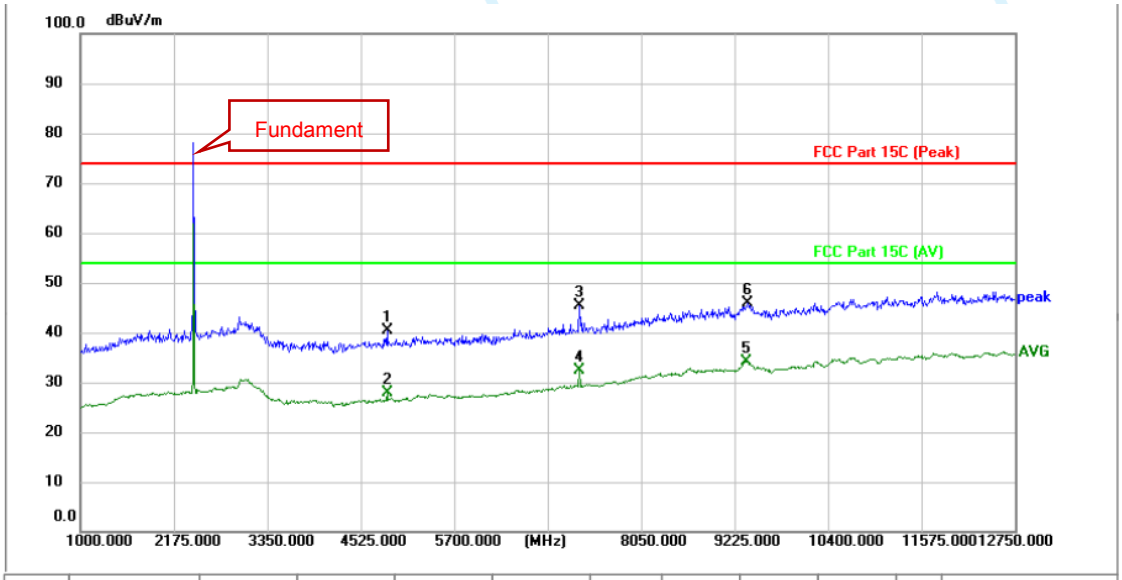
| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 22.3 °C | Humidity: | 49.6 % | Atmospheric Pressure: | 102 kPa |
| Pretest mode: | TM1 | | | | |
| Final test mode: | TM1 | | | | |

### 4.5.2 Test Setup Diagram:



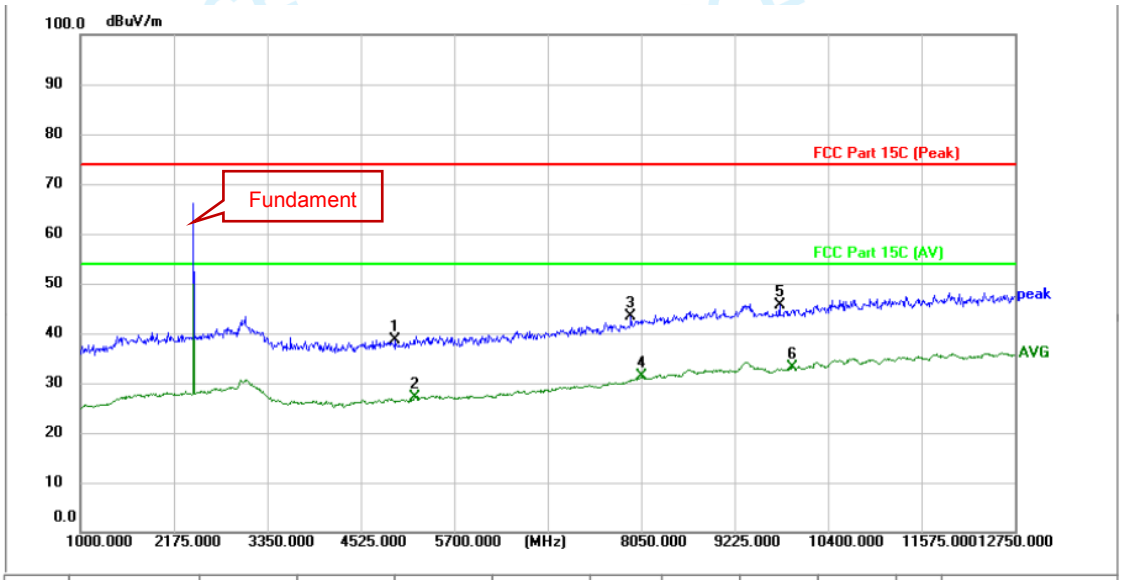

### 4.5.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2.4G




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4854.000 | 41.08 | -0.73 | 40.35 | 74.00 | -33.65 | peak | 150 | | P | |
| 2 | 4854.000 | 28.61 | -0.73 | 27.88 | 54.00 | -26.12 | AVG | 150 | | P | |
| 3 | 7274.500 | 41.10 | 4.24 | 45.34 | 74.00 | -28.66 | peak | 150 | | P | |
| 4 | 7274.500 | 28.18 | 4.24 | 32.42 | 54.00 | -21.58 | AVG | 150 | | P | |
| 5 * | 9377.750 | 26.13 | 8.07 | 34.20 | 54.00 | -19.80 | AVG | 150 | | P | |
| 6 | 9389.500 | 37.90 | 8.08 | 45.98 | 74.00 | -28.02 | peak | 150 | | P | |

TM1 / Polarization: Vertical / Band: 2.4G




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4959.750 | 38.33 | 0.23 | 38.56 | 74.00 | -35.44 | peak | | | P | |
| 2 | 5206.500 | 26.63 | 0.50 | 27.13 | 54.00 | -26.87 | AVG | | | P | |
| 3 | 7920.750 | 37.48 | 5.79 | 43.27 | 74.00 | -30.73 | peak | | | P | |
| 4 | 8061.750 | 25.29 | 6.08 | 31.37 | 54.00 | -22.63 | AVG | | | P | |
| 5 | 9789.000 | 37.42 | 8.14 | 45.56 | 74.00 | -28.44 | peak | | | P | |
| 6 * | 9953.500 | 24.91 | 8.26 | 33.17 | 54.00 | -20.83 | AVG | | | P | |

Remark: 1.Test from 1GHz to 25GHz ，no emission found above 12.75GHz，only report worse case

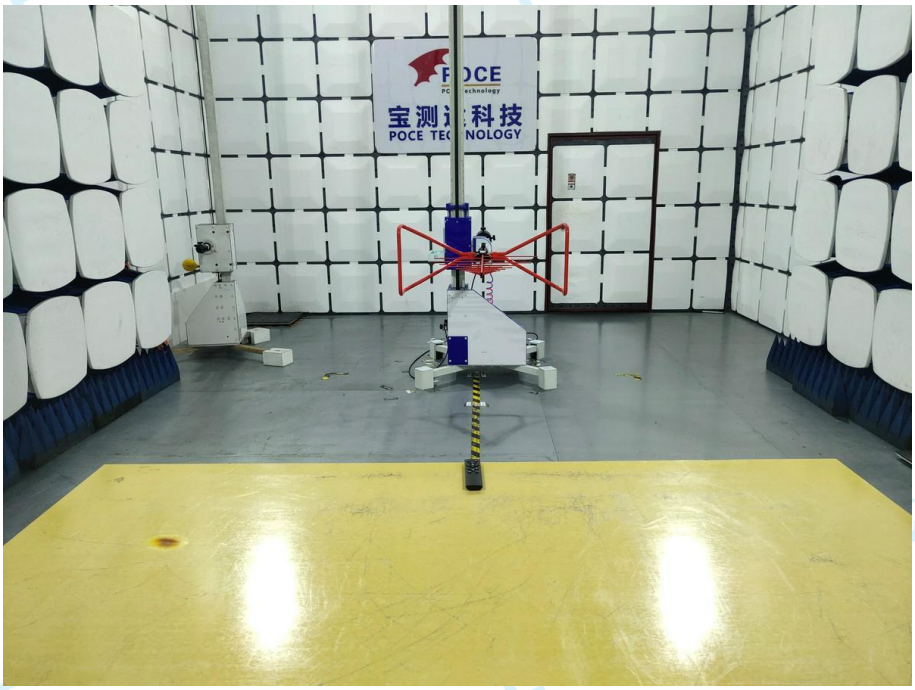
Margin= Measurement Level - Limit

Measurement Level=Test reading + correction factor

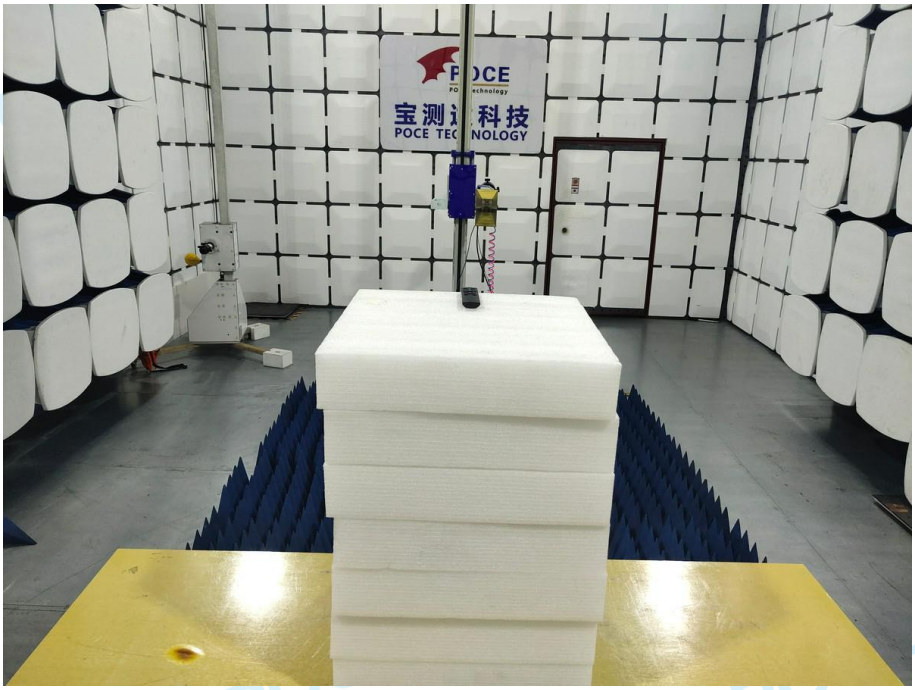
Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

# 5 TEST SETUP PHOTOS

**Emissions in frequency bands (below 1GHz)**




**Emissions in frequency bands (above 1GHz)**



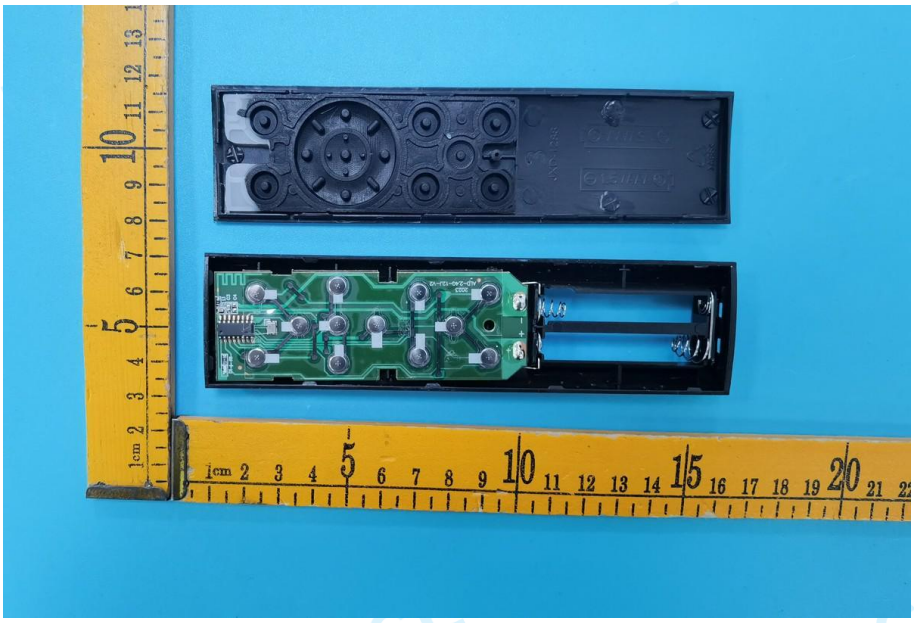
# 6 PHOTOS OF THE EUT

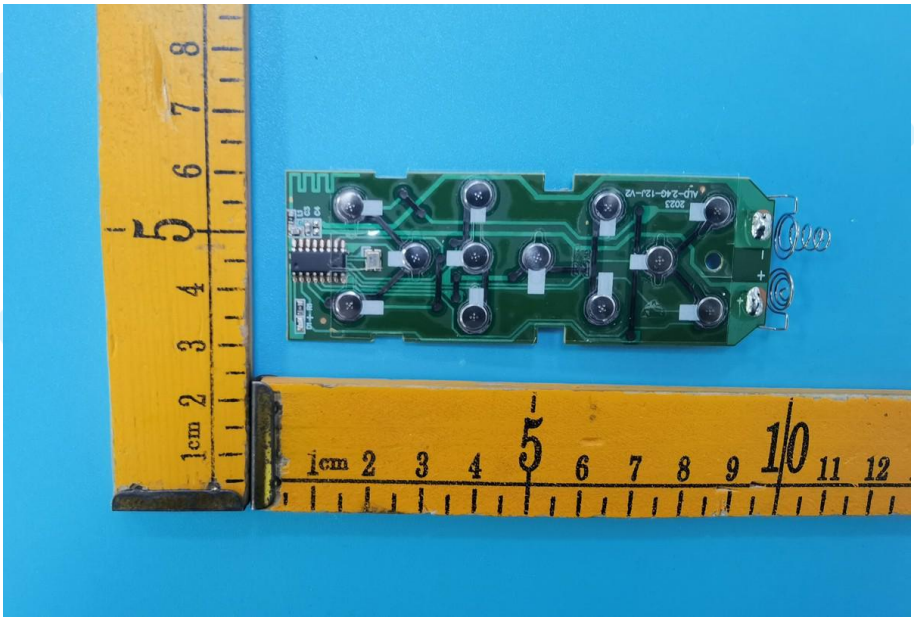
**External**

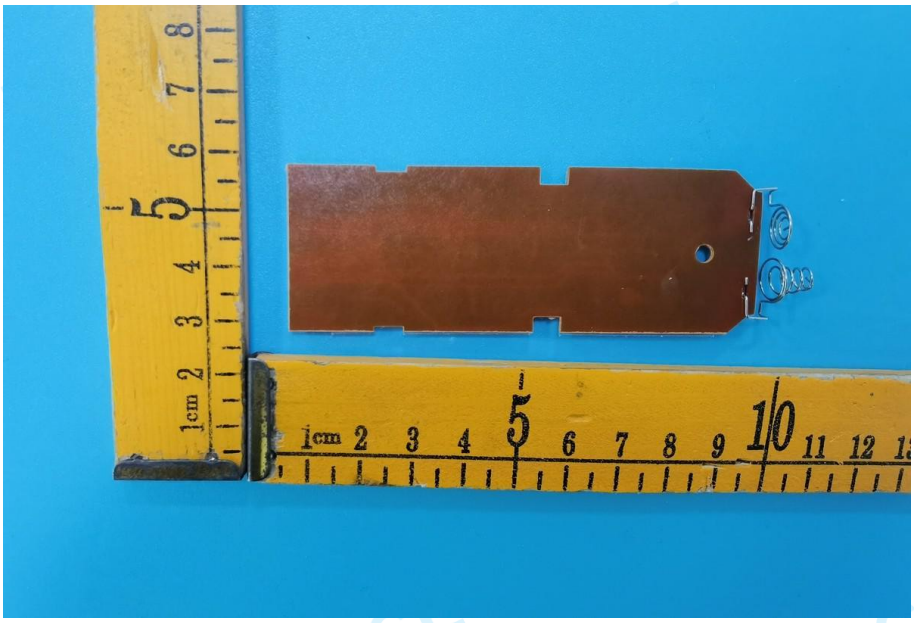
1cm 2 3 4 5 6 7 8

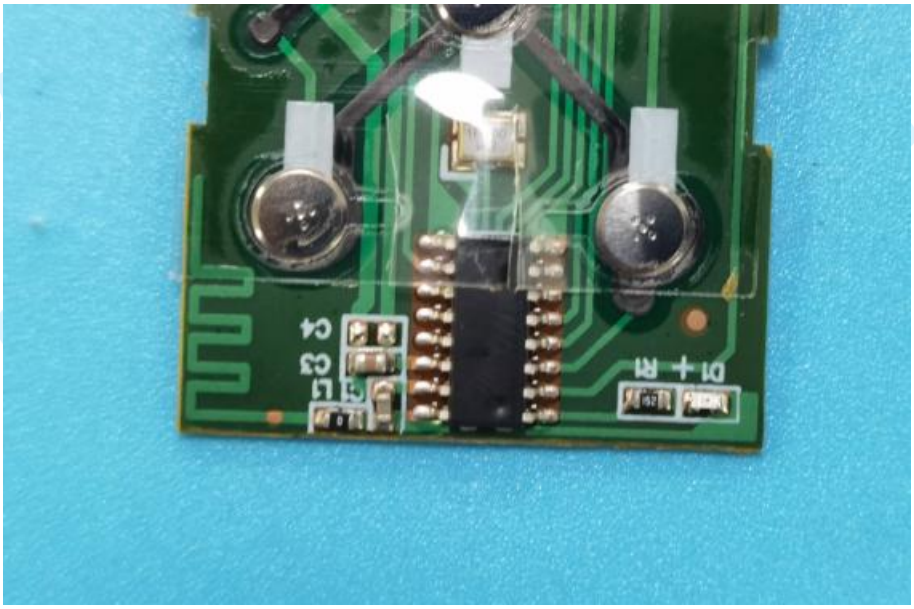
1cm 2 3 4 5 6 7 8 9 10 11 12 13 14

| Internal |
| --- |
| |









********** End of Report **********