# FCC TEST REPORT
# FCC ID: 2AOPF-433-3

| | | |
|---|---|---|
| Product | : | RF Remote Control used for Christmas trees, wreaths or garlands |
| Model Name | : | 433-3 |
| Brand | : | N/A |
| Report No. | : | NCT24008090E-FC01 |

## Prepared for

Terry Electronics Technology Company Limited

2/F, Building D, Dingfeng Technology Park, Shuitian Community, Shiyan Town,Baoan District,Shenzhen,Guangdong

## Prepared by

Shenzhen NCT Testing Technology Co., Ltd.

A101&2F B2, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan District, Shenzhen, People's Republic of China

TEL: 400-8868-419

FAX: 86-755-27790922

## 1.TEST RESULT CERTIFICATION

| | | |
|---|---|---|
| Applicant's name | : | Terry Electronics Technology Company Limited |
| Address | : | 2/F, Building D, Dingfeng Technology Park, Shuitian Community, Shiyan Town,Baoan District,Shenzhen,Guangdong |
| Manufacture's name | : | SHENZHEN XINDAJING ELECTRONICS CO., LTD |
| Address | : | 2F, Xingyongfeng industrial park, NO.49 Yangtaishan road,Liguang community,Shiyan street,Baoan District,Shenzhen |
| Product | : | RF Remote Control used for Christmas trees, wreaths or garlands |
| Model | : | 433-3 |
| Standards | : | FCC CFR47 Part 15 Section 15.231 |
| Test procedure | : | ANSI C63.10:2013 |
| Test Date | : | Jan. 10, 2024 to Jan. 22, 2024 |
| Date of Issue | : | Jan. 26, 2024 |
| Test Result | : | Pass |

This device described above has been tested by NCT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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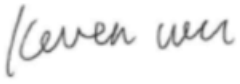
Test Engineer:



Keven Wu / Engineer

Technical Manager:

Henry Wang / Manager

# Contents

**Page**

# 2 Test Summary

| Test Items | Test Requirement | Result |
|---|---|---|
| Conducted Emissions | 15.207 | N/A |
| Transmission Cease Time | 15.231(a) | PASS |
| Radiated Emission | 15.209<br>15.205(a) | PASS |
| Periodic Operation | 15.35(c) | PASS |
| Outside of Band Emission | 15.231(b)<br>15.205<br>15.209 | PASS |
| 20dB Bandwidth | 15:215(c) | PASS |
| Antenna Requirement | 15.203 | PASS |
| Remark:<br>N/A: Not Applicable | | |

# 3 General Information

## 3.1 General Description of E.U.T.

Product Name : RF Remote Control used for Christmas trees, wreaths or garlands

Model Name : 433-3

Operation Frequency: : 433.88MHz

Antenna installation: : PCB Antenna

Antenna Gain: : 0 dBi

Type of Modulation : ASK

The lowest oscillator : 433.88MHz

Power supply : Li-ion Battery : DC 3V

## 3.2 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

| Modulation | Test mode | Low channel | Middle channel | High channel |
|---|---|---|---|---|
| GFSK | continuously Transmitting | 433.88MHz | \ | \ |

## 3.3 Test Site

Site Description

| | | |
|---|---|---|
| EMC Lab. | : | Accredited by CNAS, 2022-09-27 |
| | | The certificate is valid until 2028.01.07 |
| | | The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2017) |
| | | The Certificate Registration Number is L8251 |
| | | Designation Number: CN1347 |
| | | Test Firm Registration Number: 894804 |
| | | Accredited by A2LA, June 14, 2023 |
| | | The Certificate Registration Number is 6837.01 |
| | | Accredited by Industry Canada, November 09, 2018 |
| | | The Conformity Assessment Body Identifier is CN0150 |
| | | Company Number: 30806 |
| Name of Firm | : | Shenzhen NCT Testing Technology Co., Ltd. |
| Site Location | : | A101&2F B2, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan District, Shenzhen, People’s Republic of China |

# 4 Equipment During Test

## 4.1 Equipments List

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Last calibration | Calibration Interval |
|---|---|---|---|---|---|---|
| 1 | EMI Test Receiver | Rohde & Schwarz | ESCI7 | 101671 | Aug. 17,2023 | 1 Year |
| 2 | EMC Analyzer (9k~26.5GHz) | Agilent | E4407B | MY45109572 | Aug.22, 2023 | 1 year |
| 3 | Trilog Broadband Antenna | SCHWARZBECK | VULB9160 | 9160-3355 | Aug. 17,2023 | 1 Year |
| 4 | Amplifier | SCHWARZBECK | BBV 9475 | 9745-0013 | Aug. 17,2023 | 1 Year |
| 5 | Horn Antenna | SCHWARZBECK | BBHA9120D | 9120D-1246 | Aug. 17,2023 | 1 Year |
| 6 | Coaxial Cable(below 1GHz) | LARGE | CALB1 | - | Aug. 17,2023 | 1 Year |
| 7 | Coaxial Cable(above 1GHz) | LARGE | CALB2 | - | Aug. 17,2023 | 1 Year |
| 8 | Loop Antenna | Schwarzbeck | FMZB 1519 | 012 | Aug. 17,2023 | 1 Year |
| 9 | Test S/W | Tonscend | JS32-RE/4.0.0.0 | / | / | / |

## 4.2 Measurement Uncertainty

| **Parameter** | **Uncertainty** |
|---|---|
| RF output power, conducted | ±1.0dB |
| Power Spectral Density, conducted | ±2.2dB |
| Radio Frequency | ± 1 x $10^{-6}$ |
| Bandwidth | ± 1.5 x $10^{-6}$ |
| Time | ±2% |
| Duty Cycle | ±2% |
| Temperature | ±1°C |
| Humidity | ±5% |
| DC and low frequency voltages | ±3% |
| Conducted Emissions (150kHz~30MHz) | ±3.64dB |
| Radiated Emission(9kHz~30MHz) | ±3.15dB |
| Radiated Emission(30MHz~1GHz) | ±5.03dB |
| Radiated Emission(1GHz~25GHz) | ±4.74dB |

# 5 Conducted Emission

| | | |
|---|---|---|
| Test Requirement: | : | FCC CFR 47 Part 15 Section 15.207 |
| Test Method | : | ANSI C63.10: 2013 |
| Test Result | : | PASS |
| Frequency Range | : | 150kHz to 30MHz |
| Class/Severity | : | Class B |

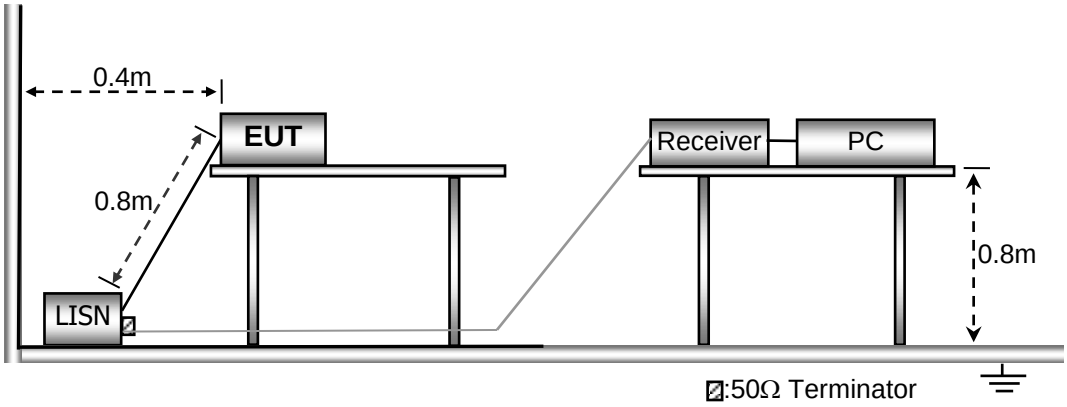
## 5.1 E.U.T. Operation

Operating Environment **:**

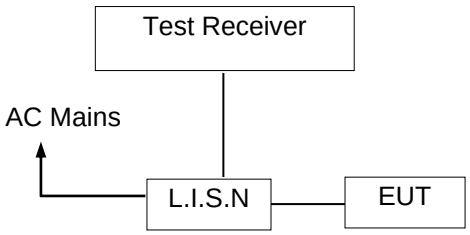
| | | |
|---|---|---|
| Temperature | : | 23.9 °C |
| Humidity | : | 51.4 % RH |
| Atmospheric Pressure | : | 101.21kPa |

## 5.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



## 5.3 Test SET-UP (Block Diagram of Configuration)




## 5.4 Measurement Procedure

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

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

3. Repeat above procedures until all frequency measured was complete.

## 5.5 Conducted Emission Limit

**Conducted Emission**

| Frequency(MHz) | 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.

## 5.6 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

## 5.7 Conducted Emission Test Result

**N/A**

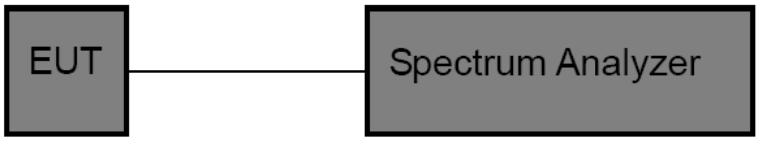
Note: Powered by non-rechargeable lithium cell.

# 6 Periodic Operation

The duty cycle was determined by the following equation:

To calculate the actual field intensity, the duty cycle correction factor in decibel is needed for later use and can be obtained from following conversion

## 6.1 Test Setup




Duty Cycle(%)=Total On interval in a complete pulse train/ Length of a complete pulse train * %

Duty Cycle Correction Factor (dB)=20 * $Log_{10}$(Duty Cycle(%))

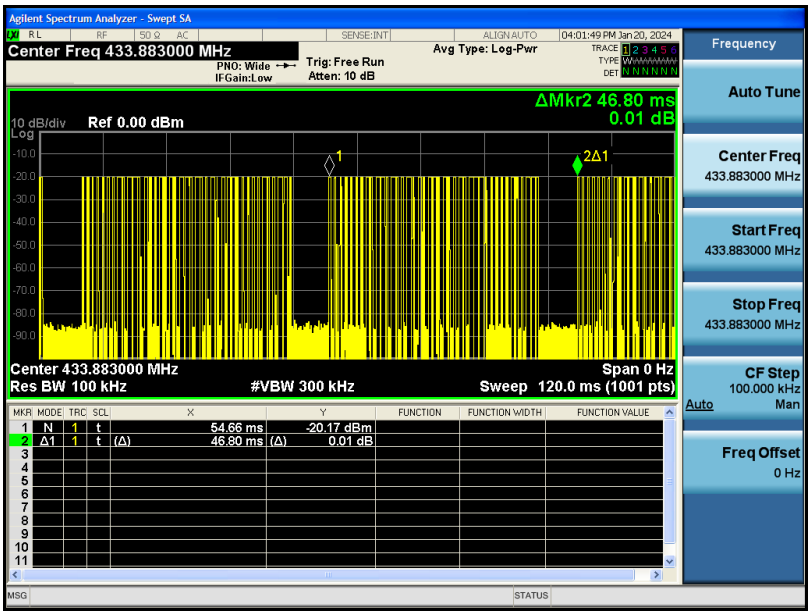
| | |
|---|---|
| Total transmission time(ms) | 0.67*14+0.325*21=16.205 |
| Length of a complete transmission period(ms) | 46.80 |
| Duty Cycle(%) | 34.63 |
| Duty Cycle Correction Factor(dB) | -9.21 |

Refer to the duty cycle plot (as below), This device meets the FCC requirement.

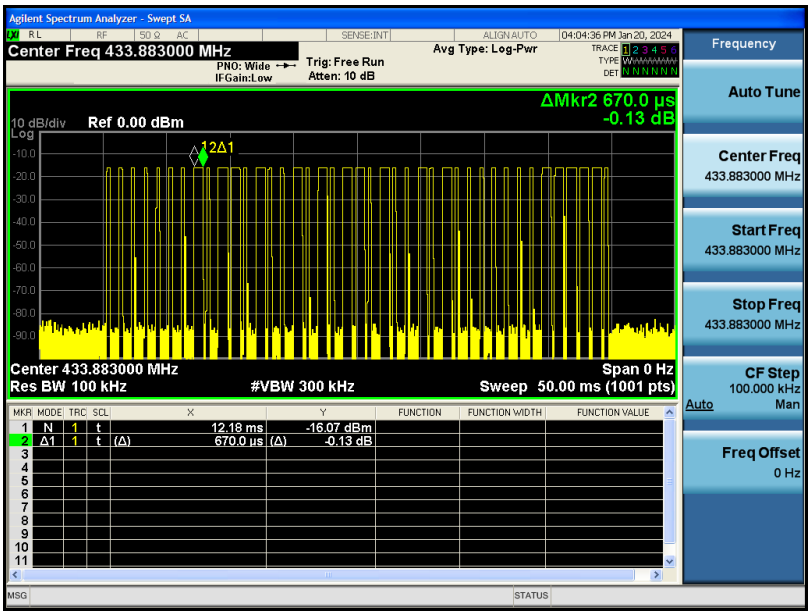
Length of a complete pulse train:

Remark: FCC part15.35(c) required that a complete pulse train is more than 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

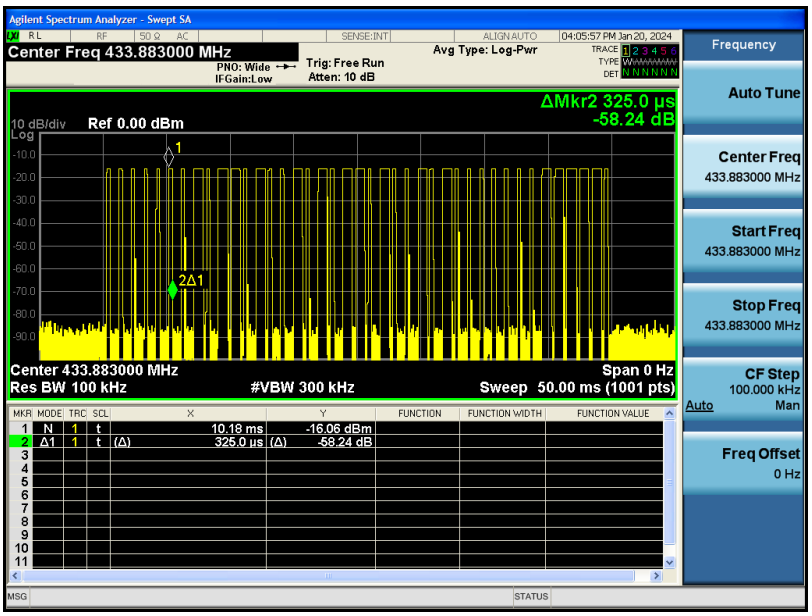
Tp


Agilent Spectrum Analyzer - Swept SA
Center Freq 433.883000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
04:01:49 PM Jan 20, 2024
ΔMkr2 46.80 ms
0.01 dB
10 dB/div
Log
Ref 0.00 dBm
Center 433.883000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 120.0 ms (1001 pts)
1 N 1 t 54.66 ms -20.17 dBm
2 Δ1 1 t (Δ) 46.80 ms (Δ) 0.01 dB
Frequency
Auto Tune
Center Freq
433.883000 MHz
Start Freq
433.883000 MHz
Stop Freq
433.883000 MHz
CF Step
100.000 kHz
Auto
Man
Freq Offset
0 Hz

Pulse 1

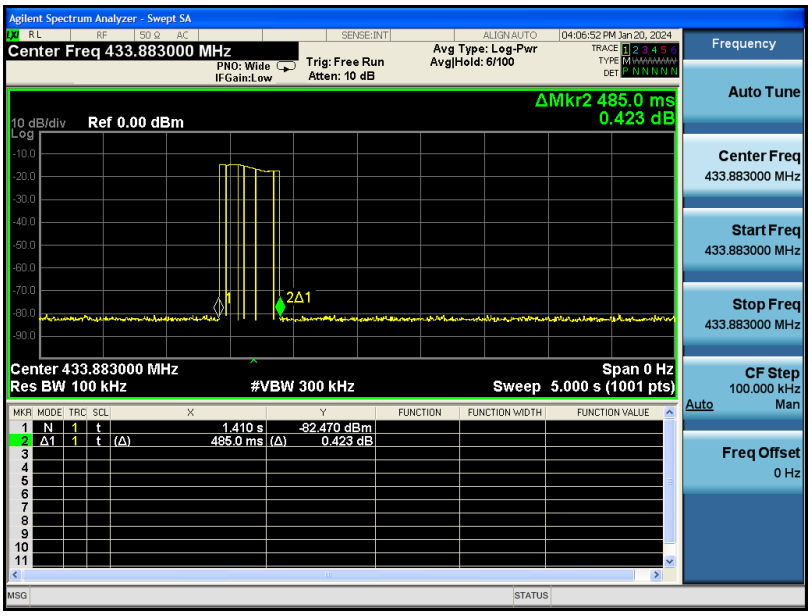



Pulse 2



FCC Part15.231 (a) (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(2)A transmitter activated automatically shall cease transmission within 5 seconds after activation.



# 7 Radiated Spurious Emissions

Test Requirement: : FCC CFR47 Part 15 Section 15.231 & 15.207 &15.205

Test Method: : ANSI C63.10:2013

Test Result: : PASS

Measurement Distance: : 3m

Limit: : See the follow table

| Frequency (MHz) | Field Strength | | Field Strength Limit at 3m Measurement Dist | |
|---|---|---|---|---|
| | uV/m | Distance (m) | uV/m | dBuV/m |
| 0.009 ~ 0.490 | 2400/F(kHz) | 300 | 10000 * 2400/F(kHz) | $20\log^{(2400/F(kHz))} + 80$ |
| 0.490 ~ 1.705 | 24000/F(kHz) | 30 | 100 * 24000/F(kHz) | $20\log^{(24000/F(kHz))} + 40$ |
| 1.705 ~ 30 | 30 | 30 | 100 * 30 | $20\log^{(30)} + 40$ |
| 30 ~ 88 | 100 | 3 | 100 | $20\log^{(100)}$ |
| 88 ~ 216 | 150 | 3 | 150 | $20\log^{(150)}$ |
| 216 ~ 960 | 200 | 3 | 200 | $20\log^{(200)}$ |
| Above 960 | 500 | 3 | 500 | $20\log^{(500)}$ |

In addition to the provisions of § 15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

| Fundamental frequency (MHz) | Field strength of fundamental (microvolts/meter) | Field strength of spurious emissions (microvolts/meter) |
|---|---|---|
| 40.66-40.70 | 2,250 | 225 |
| 70-130 | 1,250 | 125 |
| 130-174 | 1,250 to 3,750 | 125 to 375 |
| 174-260 | 3,750 | 375 |
| 260-470 | 3,750 to 12,500 | 375 to 1250 |
| Above 470 | 12,500 | 1,250 |

**Note:** Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, µV/m at 3 meters = 56.81818(F) - 6136.3636; for the band 260-470 MHz, µV/m at 3 meters = 41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

## 7.1 EUT Operation

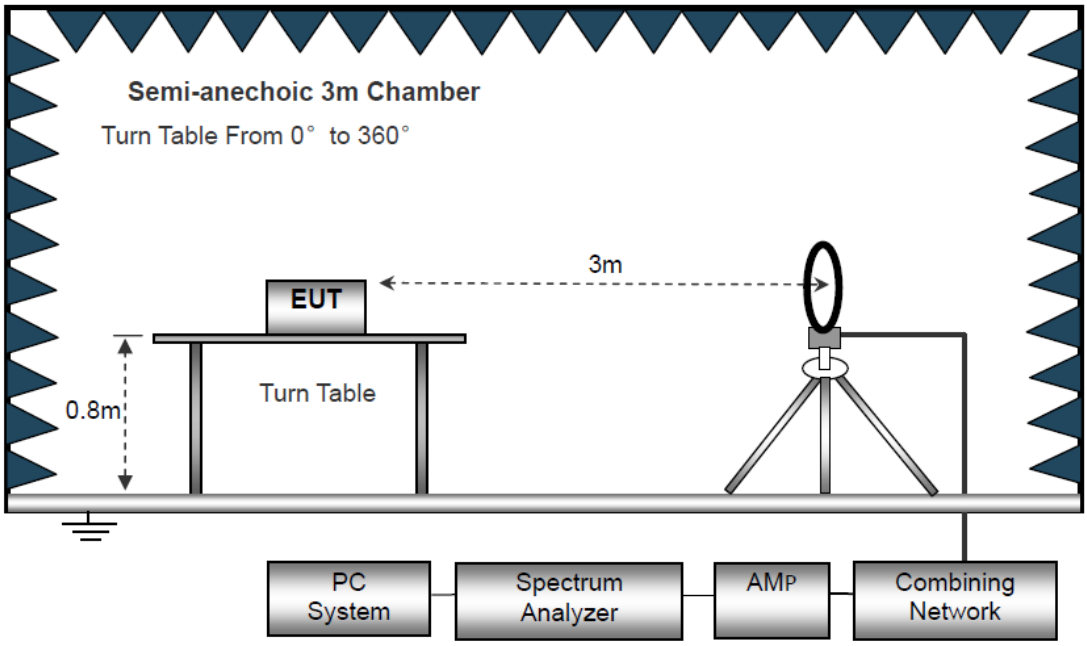
Operating Environment :

| | | |
|---|---|---|
| Temperature: | : | 23.5 °C |
| Humidity: | : | 51.1 % RH |
| Atmospheric Pressure: | : | 101.2kPa |
| EUT Operation : | : | Refer to section 3.3 |

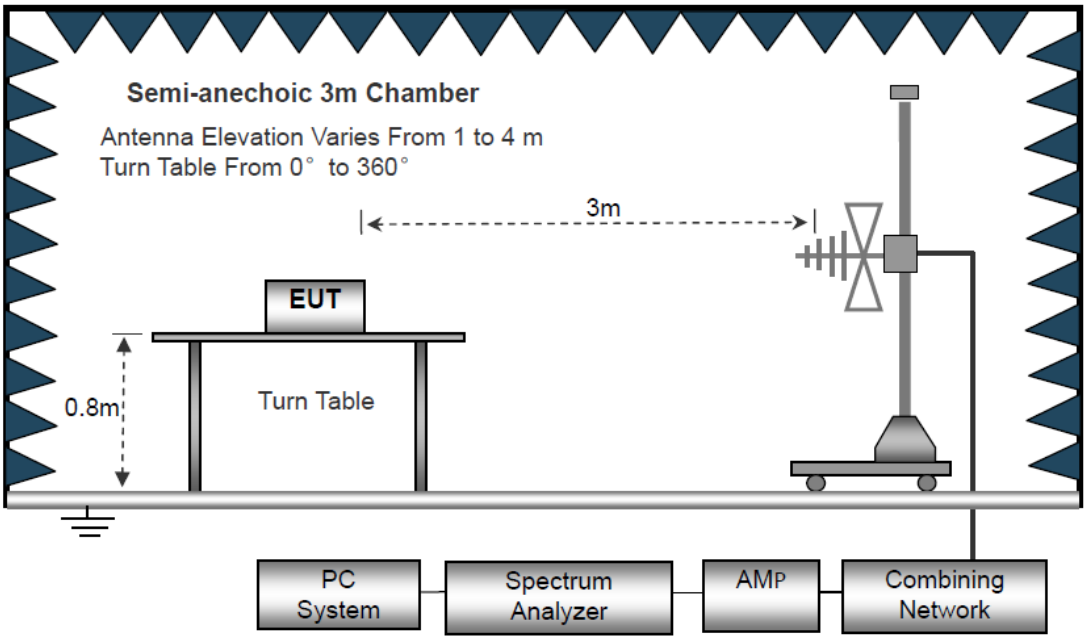
## 7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

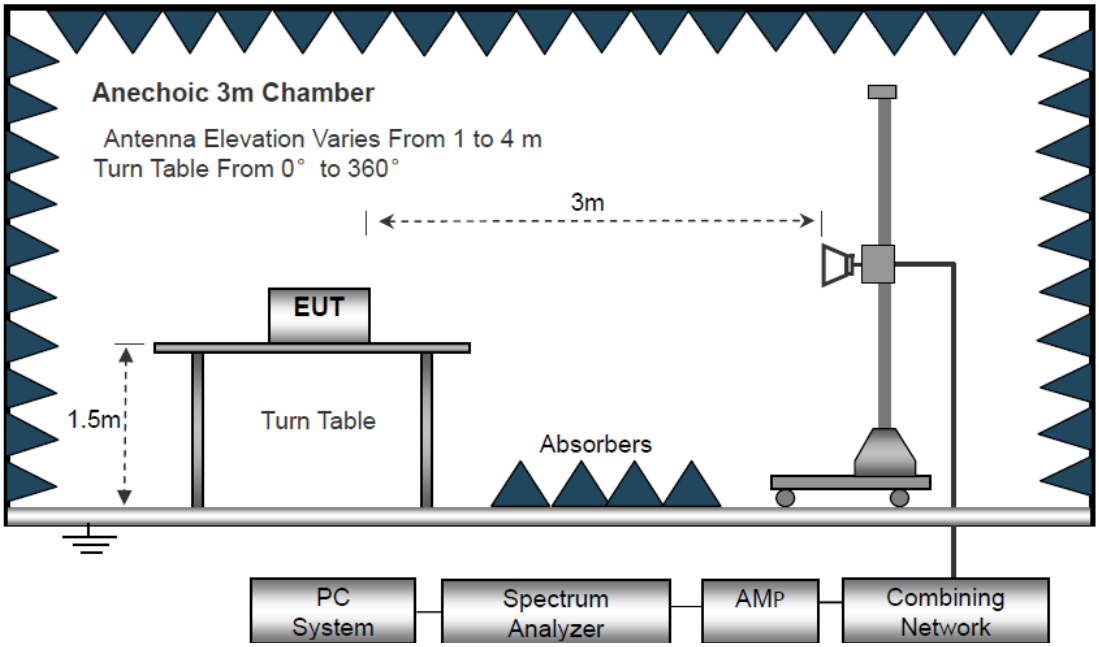
The test setup for emission measurement below 30MHz




The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz




## 7.3 Spectrum Analyzer Setup

Below 30MHz

| | | |
|---|---|---|
| IF Bandwidth | | 10kHz |
| Resolution Bandwidth | | 10kHz |
| Video Bandwidth | | 10kHz |

30MHz ~ 1GHz

| | | |
|---|---|---|
| Detector | : | PK |
| Resolution Bandwidth | : | 100kHz |
| Video Bandwidth | : | 300kHz |
| Detector | : | QP |
| Resolution Bandwidth | : | 120kHz |
| Video Bandwidth | : | 300kHz |

Above 1GHz

| | | |
|---|---|---|
| Detector | : | PK |
| Resolution Bandwidth | : | 1MHz |
| Video Bandwidth | : | 3MHz |
| Detector | : | AV |
| Resolution Bandwidth | : | 1MHz |
| Video Bandwidth | : | 10Hz |

## 7.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m or 1.5m above ground plane.

2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

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

5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

6. Repeat above procedures until the measurements for all frequencies are complete.

7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

8. The test above 1GHz must be use the fully anechoic room, and the test below 1GHz use the half anechoic room

## 7.5 Summary of Test Results

**Test Frequency: Below 30MHz**

The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

**Test Frequency: 30MHz ~ 5GHz**

All applicable test modes have been tested with TX mode(433.88MHz)

**Test Result of Fundamental Emission:**

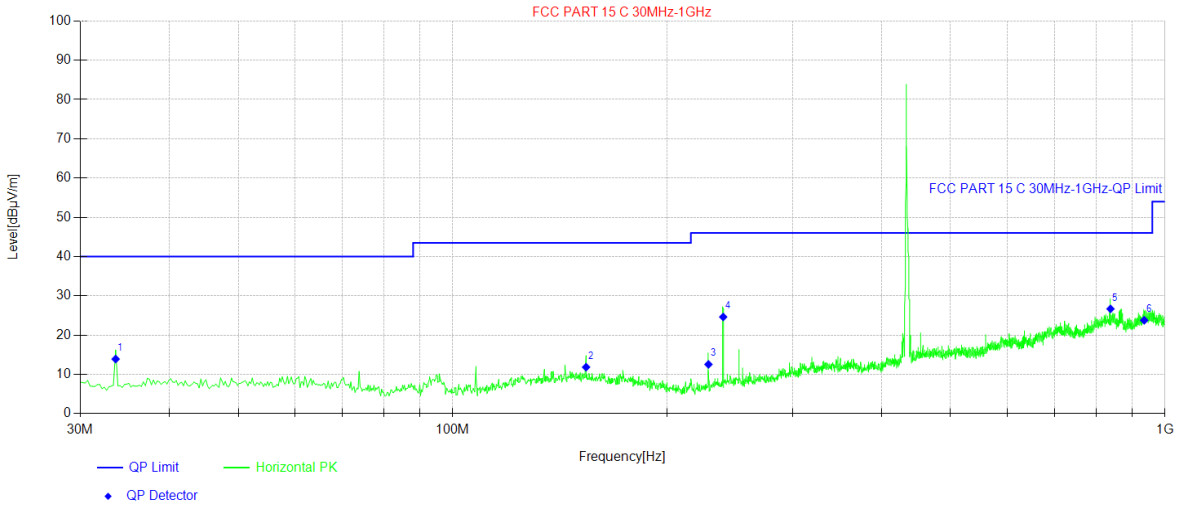
| Frequency (MHz) | Reading (dBuV) | Factor (dB) | Peak Value (dBµV/m) | PDCF | Average value (dBuV/m) | Average Limit (dBµV/m) | Margin Limit (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 433.88 | 97.1 | 12.32 | 84.78 | -9.21 | 75.57 | 80.8 | 5.23 | H |
| 433.88 | 96.89 | 12.32 | 84.57 | -9.21 | 75.36 | 80.8 | 5.44 | V |

Note: PDCF is the abbreviation of duty cycle factor，DCF= 20 log(Duty cycle).

**Test Result of Spurious Emissions:**

**Blow 1GHz:**

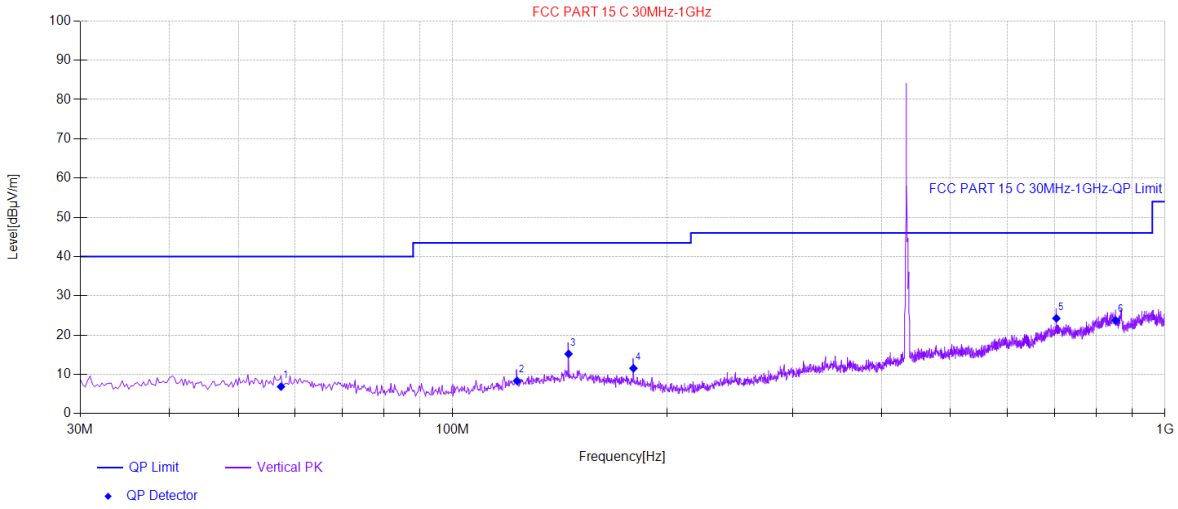
Antenna Polarization: Horizontal




| Final Data List[QP] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | QP Reading [dBµV/m] | Factor [dB] | QP Value [dBµV/m] | QP Limit [dBµV/m] | QP Margin [dB] | Polarity | Verdict |
| 1 | 33.64 | 32.18 | -18.27 | 13.91 | 40.00 | 26.09 | Horizontal | PASS |
| 2 | 153.92 | 28.29 | -16.44 | 11.85 | 43.50 | 31.65 | Horizontal | PASS |
| 3 | 228.61 | 30.78 | -18.23 | 12.55 | 46.00 | 33.45 | Horizontal | PASS |
| 4 | 239.76 | 42.12 | -17.49 | 24.63 | 46.00 | 21.37 | Horizontal | PASS |
| 5 | 838.50 | 29.67 | -2.99 | 26.68 | 46.00 | 19.32 | Horizontal | PASS |
| 6 | 935.01 | 26.18 | -2.40 | 23.78 | 46.00 | 22.22 | Horizontal | PASS |

Remark:Emission Level=Reading+Cable Loss+ANT Factor-AMP Factor

Antenna Polarization: Vertical




| Final Data List[QP] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | QP Reading [dBµV/m] | Factor [dB] | QP Value [dBµV/m] | QP Limit [dBµV/m] | QP Margin [dB] | Polarity | Verdict |
| 1 | 57.40 | 24.66 | -17.78 | 6.88 | 40.00 | 33.12 | Vertical | PASS |
| 2 | 123.12 | 26.07 | -17.71 | 8.36 | 43.50 | 35.14 | Vertical | PASS |
| 3 | 145.43 | 31.48 | -16.26 | 15.22 | 43.50 | 28.28 | Vertical | PASS |
| 4 | 179.38 | 29.03 | -17.48 | 11.55 | 43.50 | 31.95 | Vertical | PASS |
| 5 | 703.91 | 30.21 | -5.92 | 24.29 | 46.00 | 21.71 | Vertical | PASS |
| 6 | 852.56 | 26.34 | -2.60 | 23.74 | 46.00 | 22.26 | Vertical | PASS |

Remark:Emission Level=Reading+Cable Loss+ANT Factor-AMP Factor

**Above 1GHz:**

| NO. | Freq. [MHz] | Reading [dBμV] | Factor [dB] | PDCF | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Result | Polarity | Detector |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1301.64 | 52.09 | -11.6 | / | 40.49 | 74 | 33.51 | PASS | H | PK |
| 2 | 1735.52 | 55.25 | -7.98 | / | 47.27 | 74 | 26.73 | PASS | H | PK |
| 3 | 2169.40 | 52.87 | -6.99 | / | 45.88 | 74 | 28.12 | PASS | H | PK |
| 4 | 2603.28 | 55.65 | -4.31 | / | 51.34 | 74 | 22.66 | PASS | H | PK |
| 5 | 3037.16 | 51.30 | -3.5 | / | 47.8 | 74 | 26.2 | PASS | H | PK |
| 6 | 3471.04 | 51.36 | -0.38 | / | 50.98 | 74 | 23.02 | PASS | H | PK |
| 7 | 1301.64 | 57.94 | -11.6 | / | 46.34 | 74 | 27.66 | PASS | V | PK |
| 8 | 1735.52 | 55.29 | -7.98 | / | 47.31 | 74 | 26.69 | PASS | V | PK |
| 9 | 2169.40 | 54.86 | -6.99 | / | 47.87 | 74 | 26.13 | PASS | V | PK |
| 10 | 2603.28 | 51.51 | -4.07 | / | 47.44 | 74 | 26.56 | PASS | V | PK |
| 11 | 3037.16 | 49.84 | -1.91 | / | 47.93 | 74 | 26.07 | PASS | V | PK |
| 12 | 3471.04 | 49.84 | 1.25 | / | 51.09 | 74 | 22.91 | PASS | V | PK |

| NO. | Freq. [MHz] | Reading [dBμV] | Factor [dB] | PDCF | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Result | Polarity | Detector |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1301.64 | 52.09 | -11.6 | -9.21 | 31.28 | 54 | 22.72 | PASS | H | AV |
| 2 | 1735.52 | 55.25 | -7.98 | -9.21 | 38.06 | 54 | 15.94 | PASS | H | AV |
| 3 | 2169.40 | 52.87 | -6.99 | -9.21 | 36.67 | 54 | 17.33 | PASS | H | AV |
| 4 | 2603.28 | 55.65 | -4.31 | -9.21 | 42.13 | 54 | 11.87 | PASS | H | AV |
| 5 | 3037.16 | 51.3 | -3.5 | -9.21 | 38.59 | 54 | 15.41 | PASS | H | AV |
| 6 | 3471.04 | 51.36 | -0.38 | -9.21 | 41.77 | 54 | 12.23 | PASS | H | AV |
| 7 | 1301.64 | 57.94 | -11.6 | -9.21 | 37.13 | 54 | 16.87 | PASS | V | AV |
| 8 | 1735.52 | 55.29 | -7.98 | -9.21 | 38.10 | 54 | 15.9 | PASS | V | AV |
| 9 | 2169.40 | 54.86 | -6.99 | -9.21 | 38.66 | 54 | 15.34 | PASS | V | AV |
| 10 | 2603.28 | 51.51 | -4.07 | -9.21 | 38.23 | 54 | 15.77 | PASS | V | AV |
| 11 | 3037.16 | 49.84 | -1.91 | -9.21 | 38.72 | 54 | 15.28 | PASS | V | AV |
| 12 | 3471.04 | 49.84 | 1.25 | -9.21 | 41.88 | 54 | 12.12 | PASS | V | AV |

Remark:

1.The field strength is calculated by adding the Antenna Factor, Cable Factor and Preamplifier.

The formula is as follows is as follows:

Final Test Level =Receiver Reading +Correct Factor

# 8 20dB Bandwidth Measurement

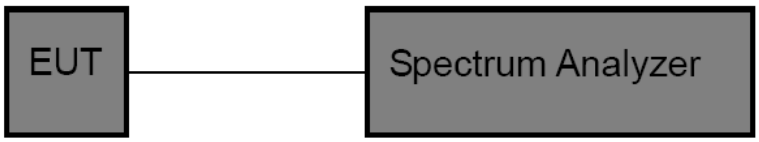
| | | |
|---|---|---|
| Test Requirement | : | FCC Part15.231(c) |
| Test Method | : | FCC Part15.231(c) |
| Test Mode | : | Refer to section 3.3 |
| Limit | : | The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. |

## 8.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer: RBW = 3 kHz, VBW = 10kHz,

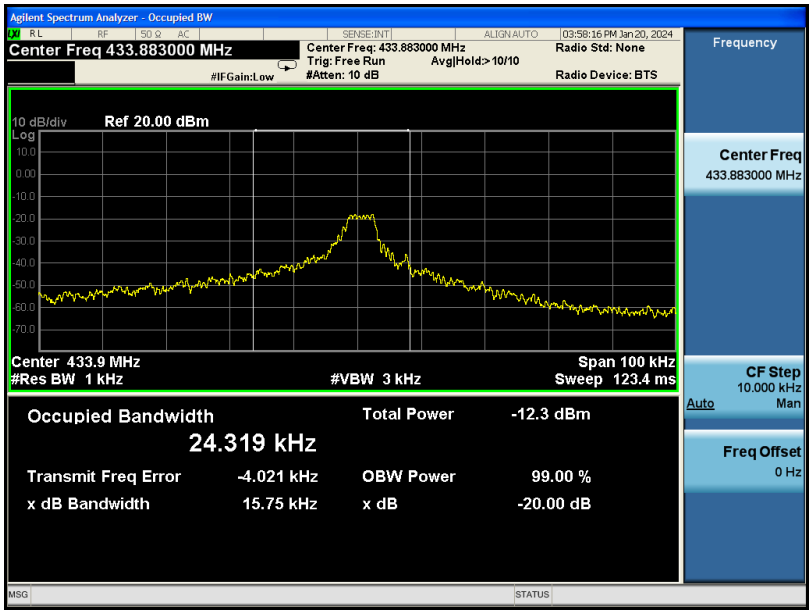
## 8.2 Test Setup



## 8.3 Test Result

| Test Frequency (MHz) | Bandwidth (kHz) | Limit (kHz) | Result |
|---|---|---|---|
| 433.88 | 15.75 | 1084.80 | pass |

Test plots

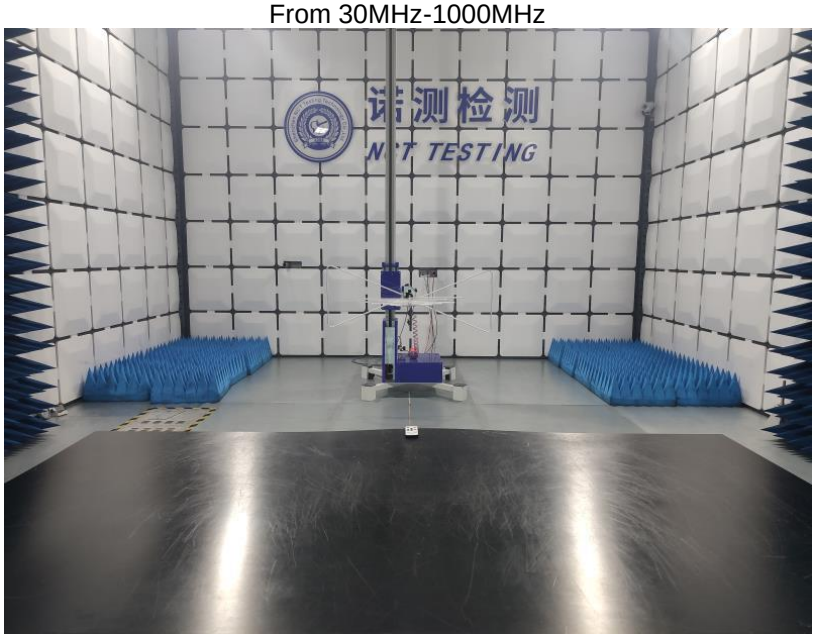


# 9 Antenna Requirement

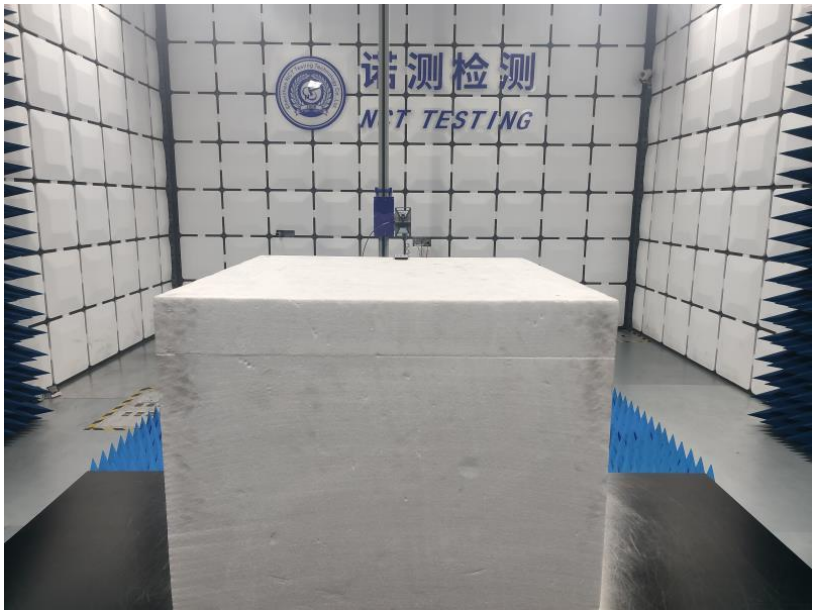
According to the FCC part15.203, a transmitter can only be sold or operated with antennas with which it was approved. This product has an  PCB Antenna which meet the requirement of this section.

# 10 Test Setup

Radiated Spurious Emissions
From 30MHz-1000MHz



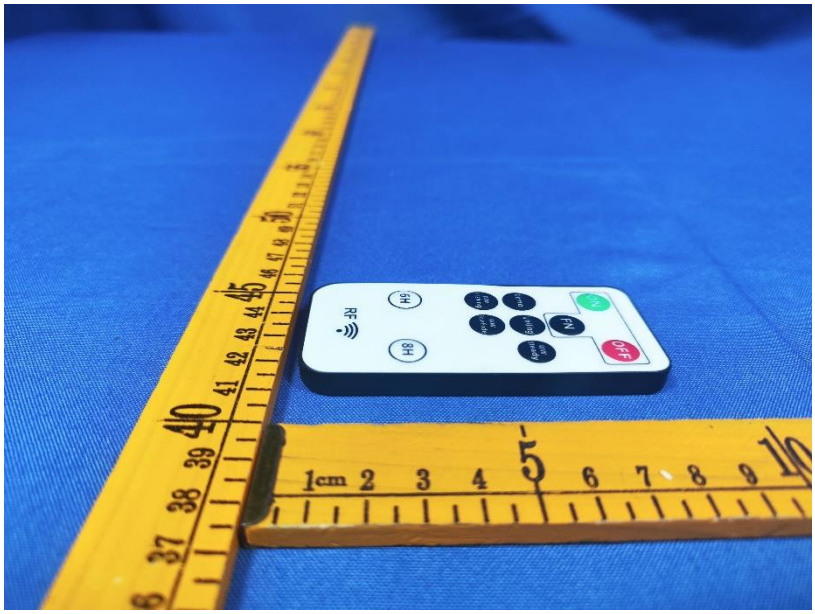

Above 1GHz



# 11 EUT Photos

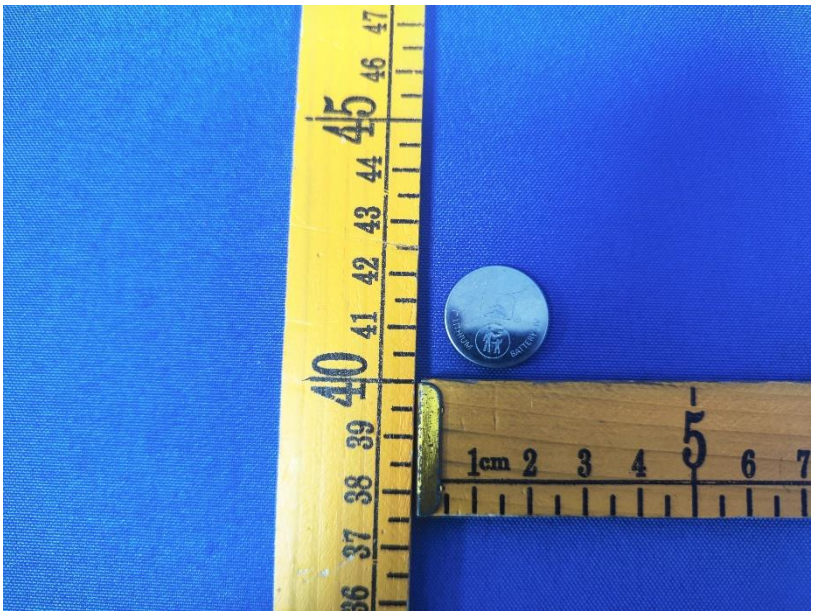


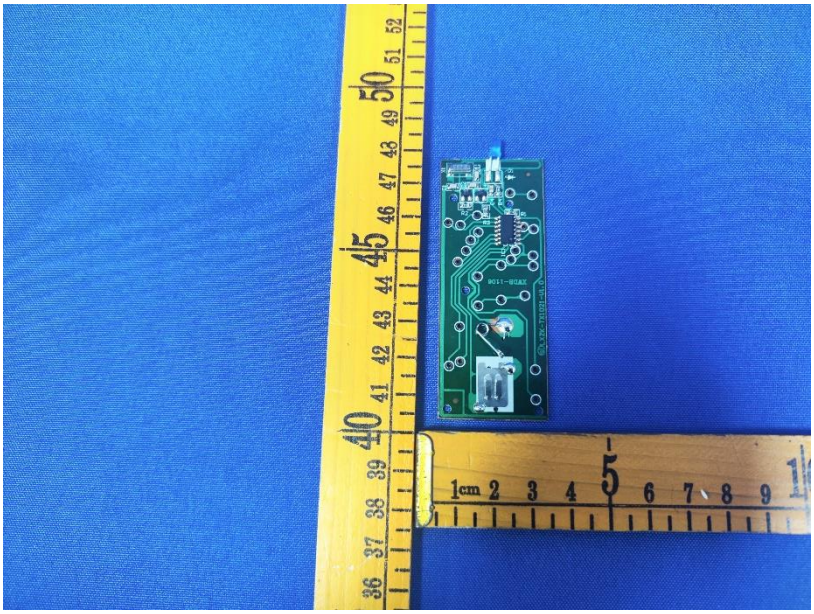
FN
6H
8H
RF
1cm 2 3 4 5 6 7

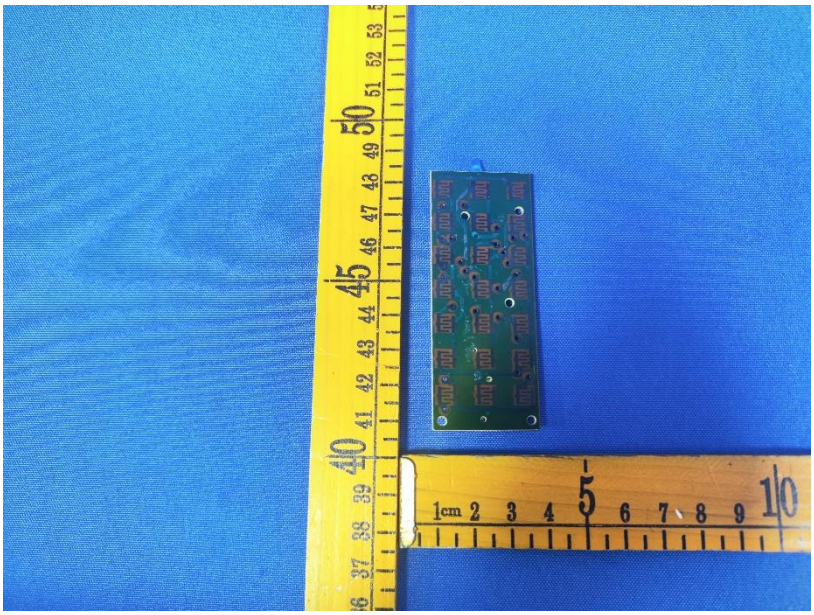

RF
1cm 2 3 4 5 6 7 8 9

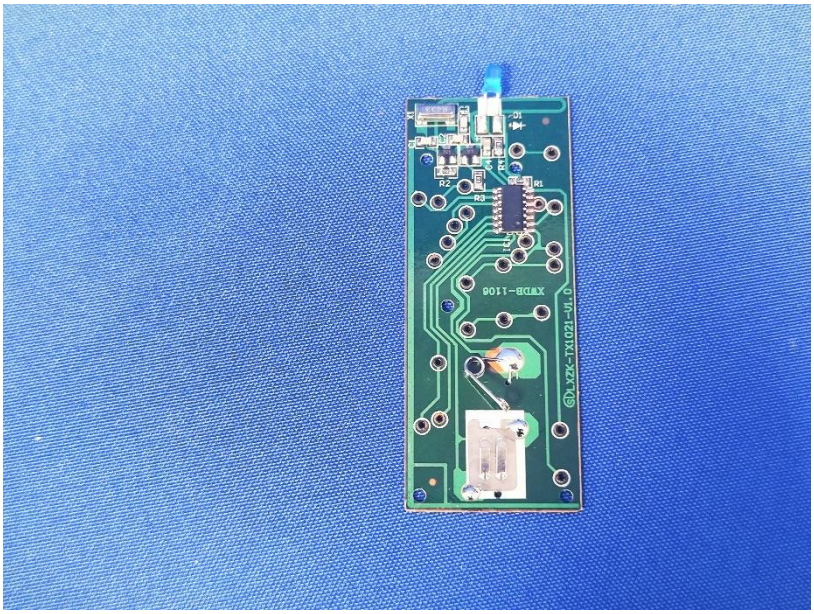

FN
OFF
ON
1cm 2 3 4 5 6 7

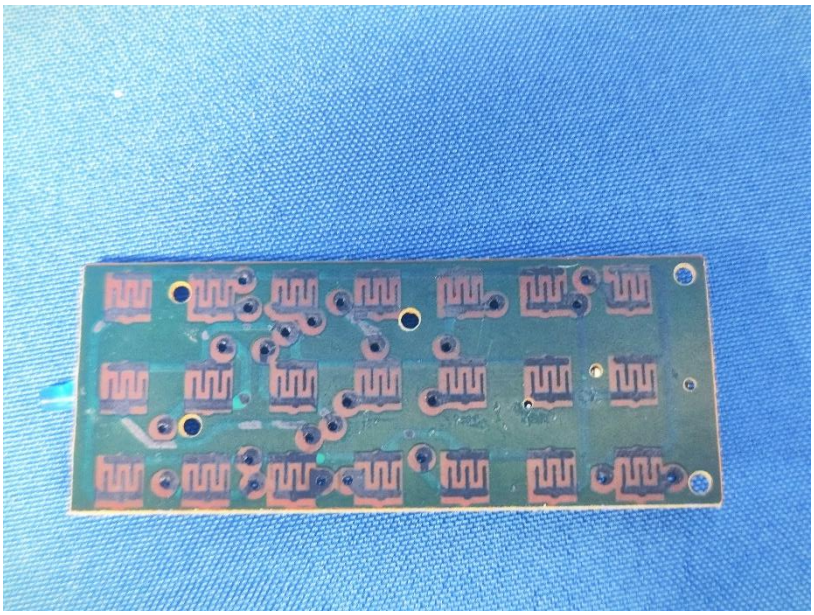

OFF
FN
RF
1cm 2 3 4 5 6 7 8 9 10






1cm 2 3 4 5 6 7 8 9 10





********THE END REPORT********