# TEST REPORT

| | | |
|---|---|---|
| **Reference No.**..... | : | WTN16S0448493E |
| **FCC ID**..... | : | 2AFOYL434FCNN |
| **Applicant**..... | : | Le Shi Zhi Xin Electronic Technology（Tian jin） Limited |
| **Address**..... | : | 201-427 2F B1 District, Anime building,No.126 Anime Middle Road, Eco-city Tianjin, China |
| **Manufacturer** ..... | : | Goertek.Inc |
| **Address**..... | : | West of Weian Road, North of Yingqian Street, High-tech Industrial Development Zone, Weifang, Shandong Province, China., ShenZhen, China |
| **Product Name**..... | : | LED TV |
| **Model No**..... | : | L434FCNN |
| **Brand**..... | | LeEco |
| **Standards**..... | : | FCC CFR47 Part 15 Section 15.249: 2015 |
| **Date of Receipt sample**..... | : | Apr. 15, 2016 |
| **Date of Test**..... | : | Apr. 16 – May. 31, 2016 |
| **Date of Issue**..... | : | Jun. 01, 2016 |
| **Test Result**..... | : | Pass |

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.


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Tested by:

Zero Zhou / Test Engineer

Approved by:

Philo Zhong / Manager

# 2 Test Summary

| Test Items | Test Requirement | Result |
|---|---|---|
| Conducted Emissions | 15.207 | PASS |
| Radiated Emission | 15.249(a)<br>15.209<br>15.205(a) | PASS |
| Periodic Operation | 15.35(c) | PASS |
| Outside of Band Emission | 15.249<br>15.205<br>15.209 | PASS |
| 20dB Bandwidth | 15:215(c) | PASS |
| Antenna Requirement | 15.203 | PASS |

# 3 Contents

# 4 General Information

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

| | |
|---|---|
| Product Name: | LED TV |
| Model No.: | L434FCNN |
| Model Description: | N/A |
| Operation Frequency: | IEEE 802.11b/g/n(HT20):2412MHz ~ 2462MHz<br>IEEE 802.11n(HT40):2422MHz~2452MHz<br>IEEE 802.11a/ n(HT20/40)/ac(HT20/40/80): 5150MHz to 5250MHz<br>IEEE 802.11a/ n(HT20/40)/ac(HT20/40/80): 5725MHz to 5850MHz<br>BT: 2402-2480MHz<br>SRD: 2403-2480MHz |
| The Lowest Oscillator: | 32.768KHz |
| Antenna Gain: | ANT 0<br>2.4GHz WIFI:3.2 dBi<br>5.2GHz WIFI:4.1 dBi<br>5.8GHz WIFI:4.0 dBi<br>ANT 1<br>2.4GHz WIFI:3.2 dBi<br>5.2GHz WIFI:3.3 dBi<br>5.8GHz WIFI:3.4 dBi<br>ANT 2<br>2.4GHz BT:3.2 dBi<br>ANT 3<br>2.4GHz SRD:3.1 dBi |
| Type of modulation: | IEEE 802.11b DSSS(CCK/QPSK/BPSK)<br>IEEE 802.11g OFDM(BPSK/QPSK/16QAM/64QAM)<br>IEEE 802.11n OFDM(BPSK/QPSK/16QAM/64QAM)<br>IEEE for 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM)<br>IEEE for 802.11n : OFDM(BPSK/QPSK/16QAM/64QAM)<br>IEEE for 802.11ac : OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)<br>BT: GFSK,PI/4-DQPSK,8DPSK<br>SRD: GFSK |
| Number of transmitter chains: | WIFI:2*2 (MIMO)<br>BT: 1<br>SRD: 1 |

The device supports MIMO 2*2, and the MIMO works with STBC(Space-Time Block Coding).The antenna is omnidirectional, does not support any directional gain in any modes.

TX power for MIMO rate, the wifi chip has a power/rate table that controls TX power from chipout, it's preset in nvram, FW don't need to calculate it again when MIMO rate is fixed. Of course the real radiation power is also related to antenna efficient.

Two transmitter signals are not correlated with each other.

## 4.2 Details of E.U.T.

Technical Data : AC 120V~60Hz, 73W

## 4.3 Channel List

| Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) |
|---|---|---|---|---|---|---|---|
| 1 | 2403 | 2 | 2408 | 3 | 2413 | 4 | 2418 |
| 5 | 2423 | 6 | 2428 | 7 | 2433 | 8 | 2440 |
| 9 | 2445 | 10 | 2450 | 11 | 2455 | 12 | 2460 |
| 13 | 2465 | 14 | 2470 | 15 | 2475 | 16 | 2480 |

## 4.4 Test Mode

Test Mode Description:

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Transmitting duty cycle is no less 98%.

The software is installed in operation system, named “RFTestTool.apk” ,Version 1,date 20160518.

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

| Test mode | channel |
|---|---|
| Transmitting | 2403MHz |
| Transmitting | 2440MHz |
| Transmitting | 2480MHz |

## 4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **IC – Registration No.: 7760A-1**

  Waltek Services (Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration 7760A-1, Oct. 15, 2015.

- **FCC Test Site 1#– Registration No.: 880581**

  Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, April 29, 2014.

- **FCC Test Site 2#– Registration No.: 328995**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 328995, December 3, 2014

# 5 Equipment Used during Test

## 5.1 Equipments List

| Conducted Emissions at Mains Terminals Disturbance Voltage(1#) | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Calibration Date** | **Calibration Due Date** |
| 1 | EMI Test Receiver | R&S | ESCI | 100947 | 2015.09.14 | 2016.09.13 |
| 2 | LISN | R&S | ENV216 | 100115 | 2015.09.14 | 2016.09.13 |
| 3 | Cable | Top | TYPE16(3.5M) | - | 2015.09.14 | 2016.09.13 |
| **Conducted Emissions at Mains Terminals Disturbance Voltage(2#)** | | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Calibration Date** | **Calibration Due Date** |
| 1 | EMI Test Receiver | R&S | ESCI | 101155 | 2015.09.14 | 2016.09.13 |
| 2 | LISN | SCHWARZBECK | NSLK 8128 | 8128-289 | 2015.09.14 | 2016.09.13 |
| 3 | Limiter | York | MTS-IMP-136 | 261115-001-0024 | 2015.09.14 | 2016.09.13 |
| 4 | Cable | **Laplace** | RF300 | - | 2015.09.14 | 2016.09.13 |
| **3m Semi-anechoic Chamber for Radiation(1#)** | | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Calibration Date** | **Calibration Due Date** |
| 1 | Spectrum Analyzer | R&S | FSP | 100091 | 2015.09.14 | 2016.09.13 |
| 2 | Amplifier | Agilent | 8447D | 2944A10178 | 2015.09.14 | 2016.09.13 |
| 3 | Active Loop Antenna | Beijing Dazhi | ZN30900A | 0703 | 2015.09.14 | 2016.09.13 |
| 4 | Trilog Broadband Antenna | SCHWARZBECK | VULB9163 | 336 | 2015.09.14 | 2016.09.13 |
| 5 | Coaxial Cable (below 1GHz) | Top | TYPE16(13M) | - | 2015.09.14 | 2016.09.13 |
| 6 | Broad-band Horn Antenna | SCHWARZBECK | BBHA 9120 D | 667 | 2015.09.14 | 2016.09.13 |
| 7 | Broadband Preamplifier | COMPLIANCE DIRECTION | PAP-1G18 | 2004 | 2015.09.14 | 2016.09.13 |
| 8 | Coaxial Cable (above 1GHz) | Top | 1GHz-25GHz | EW02014-7 | 2015.09.14 | 2016.09.13 |
| **3m Semi-anechoic Chamber for Radiation(2#)** | | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Calibration Date** | **Calibration Due Date** |
| 1 | Test Receiver | R&S | ESCI | 101296 | 2016.03.23 | 2017.03.22 |
| 2 | Trilog Broadband Antenna | SCHWARZBECK | VULB9160 | 9160-3325 | 2016.03.23 | 2017.03.22 |
| 3 | Amplifier | ANRITSU | MH648A | M43381 | 2016.03.23 | 2017.03.22 |
| 4 | Cable | HUBER+SUHNER | CBL2 | 525178 | 2016.03.23 | 2017.03.22 |

## 5.2 Description of Support Units

| Equipment | Manufacturer | Model No. | Series No. |
|---|---|---|---|
| / | / | / | / |

## 5.3 Measurement Uncertainty

| Parameter | Uncertainty |
|---|---|
| Radio Frequency | ± 1 x $10^{-6}$ |
| RF Power | ± 1.0 dB |
| RF Power Density | ± 2.2 dB |
| Radiated Spurious Emissions test | ± 5.03 dB<br>(Bilog antenna 30M~1000MHz) |
| | ± 5.47 dB<br>(Horn antenna 1000M~25000MHz) |

## 5.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

# 6 Conducted Emission

| | |
|---|---|
| Test Requirement: | FCC CFR 47 Part 15 Section 15.207 |
| Test Method: | ANSI C63.10:2009 |
| Test Result: | PASS |
| Frequency Range: | 150kHz to 30MHz |
| Class/Severity: | Class B |
| Limit: | 66-56 dBμV between 0.15MHz & 0.5MHz |
| | 56 dBμV between 0.5MHz & 5MHz |
| | 60 dBμV between 5MHz & 30MHz |
| Detector: | Peak for pre-scan (9kHz Resolution Bandwidth) |

## 6.1 E.U.T. Operation

Operating Environment **:**

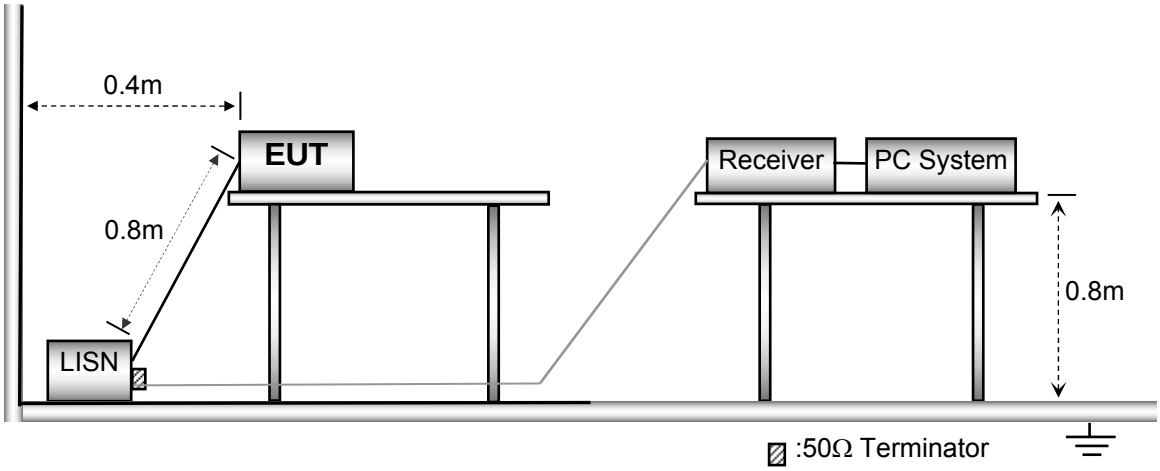
| | |
|---|---|
| Temperature: | 25.5 °C |
| Humidity: | 51 % RH |
| Atmospheric Pressure: | 101.2kPa |

EUT Operation **:**

The test was performed in transmitting mode, the test data were shown in the report.

## 6.2 EUT Setup

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

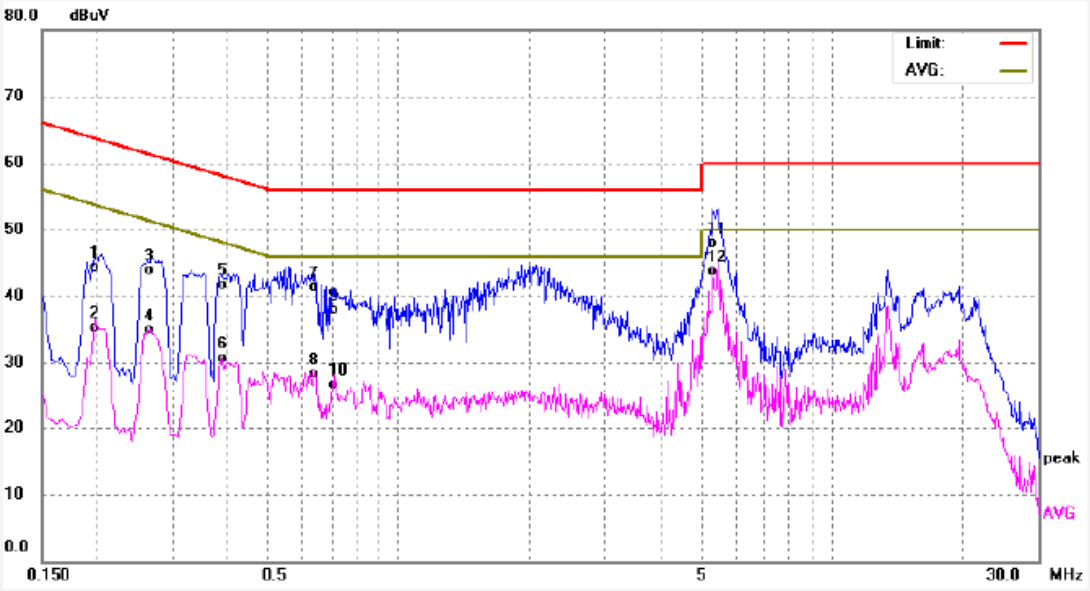



## 6.3 Measurement Description

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.

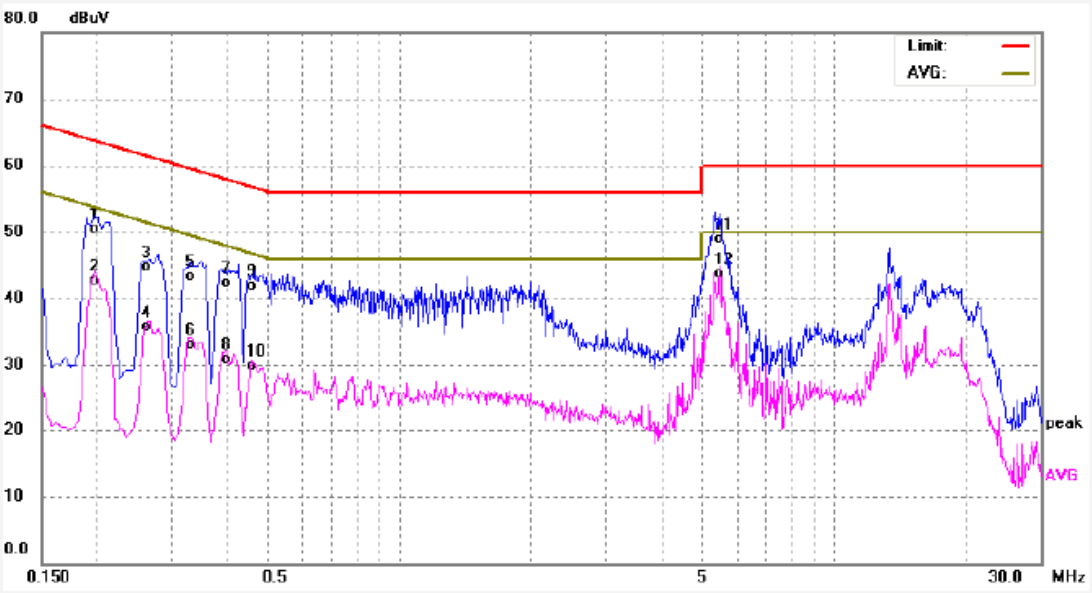
## 6.4 Conducted Emission Test Result

Live line:




| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit dBuV | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.1980 | 34.10 | 10.26 | 44.36 | 63.69 | -19.33 | QP | |
| 2 | 0.1980 | 24.96 | 10.26 | 35.22 | 53.69 | -18.47 | AVG | |
| 3 | 0.2660 | 33.65 | 10.27 | 43.92 | 61.24 | -17.32 | QP | |
| 4 | 0.2660 | 24.60 | 10.27 | 34.87 | 51.24 | -16.37 | AVG | |
| 5 | 0.3899 | 31.42 | 10.27 | 41.69 | 58.06 | -16.37 | QP | |
| 6 | 0.3899 | 20.37 | 10.27 | 30.64 | 48.06 | -17.42 | AVG | |
| 7 | 0.6419 | 31.03 | 10.33 | 41.36 | 56.00 | -14.64 | QP | |
| 8 | 0.6419 | 17.90 | 10.33 | 28.23 | 46.00 | -17.77 | AVG | |
| 9 | 0.7060 | 27.48 | 10.36 | 37.84 | 56.00 | -18.16 | QP | |
| 10 | 0.7060 | 16.40 | 10.36 | 26.76 | 46.00 | -19.24 | AVG | |
| 11 | 5.3179 | 37.43 | 10.55 | 47.98 | 60.00 | -12.02 | QP | |
| 12 | 5.3179 | 33.14 | 10.55 | 43.69 | 50.00 | -6.31 | AVG | |

Neutral line:




| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit dBuV | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.1980 | 40.27 | 10.26 | 50.53 | 63.69 | -13.16 | QP | |
| 2 | 0.1980 | 32.44 | 10.26 | 42.70 | 53.69 | -10.99 | AVG | |
| 3 | 0.2620 | 34.48 | 10.26 | 44.74 | 61.36 | -16.62 | QP | |
| 4 | 0.2620 | 25.50 | 10.26 | 35.76 | 51.36 | -15.60 | AVG | |
| 5 | 0.3300 | 33.06 | 10.29 | 43.35 | 59.45 | -16.10 | QP | |
| 6 | 0.3300 | 22.72 | 10.29 | 33.01 | 49.45 | -16.44 | AVG | |
| 7 | 0.3980 | 32.13 | 10.27 | 42.40 | 57.89 | -15.49 | QP | |
| 8 | 0.3980 | 20.56 | 10.27 | 30.83 | 47.89 | -17.06 | AVG | |
| 9 | 0.4580 | 31.67 | 10.26 | 41.93 | 56.73 | -14.80 | QP | |
| 10 | 0.4580 | 19.65 | 10.26 | 29.91 | 46.73 | -16.82 | AVG | |
| 11 | 5.4500 | 38.26 | 10.56 | 48.82 | 60.00 | -11.18 | QP | |
| 12 | 5.4500 | 33.21 | 10.56 | 43.77 | 50.00 | -6.23 | AVG | |

# 7 Radiation Emission Test

Test Requirement: FCC Part15 Paragraph 15.249

Test Method: ANSI 63.10: 2009

Measurement Distance: 3m

Test Result: PASS

15.249(a)Limit:

| Fundamental frequency | Field strength of fundamental | | Field strength of harmonics | |
|---|---|---|---|---|
| | mV/m | dBuV/m | uV/m | dBuV/m |
| 902-928 MHz | 50 | 94 | 500 | 54 |
| 2400-2483.5 MHz | 50 | 94 | 500 | 54 |
| 5725-5875 MHz | 50 | 94 | 500 | 54 |
| 24.0-24.25 GHz | 250 | 108 | 2500 | 68 |

15.209 Limit:

| Frequency (MHz) | Field Strength | | Field Strength Limit at 3m Measurement Distance | |
|---|---|---|---|---|
| | 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 | $20\log^{(500)}$ |

**Note**: RF Voltage(dBuV)=20 $\log_{10}$ RF Voltage(uV)

## 7.1 EUT Operation

Operating Environment **:**

Temperature: 23.5 °C

Humidity: 51.1 % RH

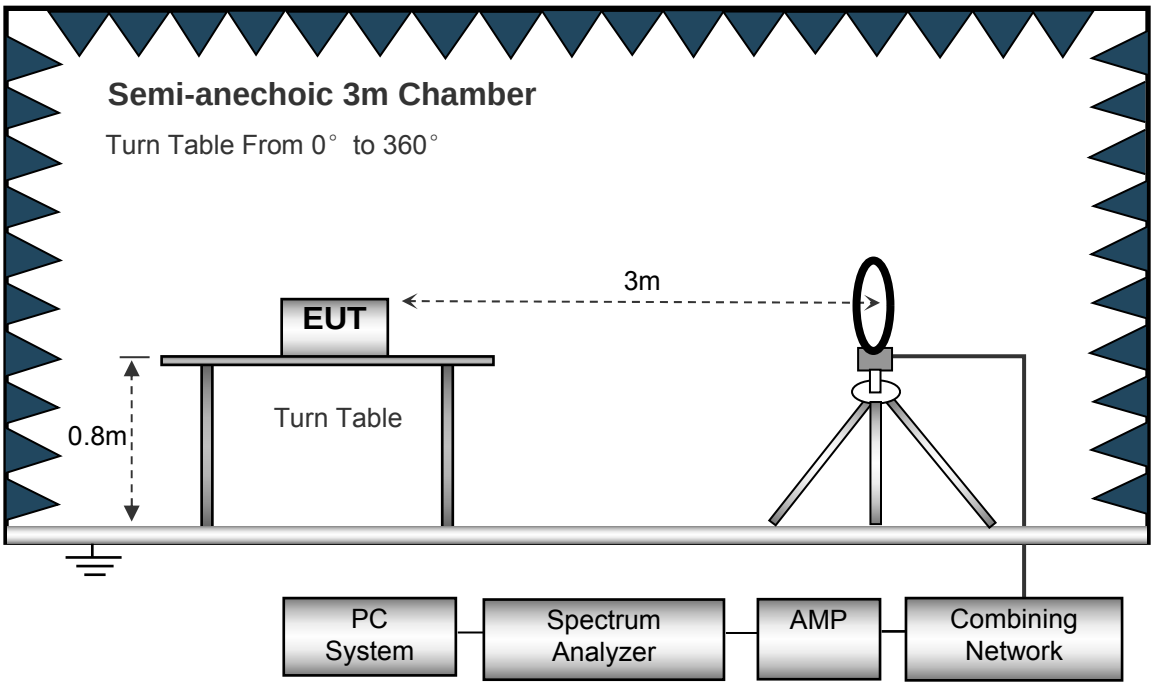
Atmospheric Pressure: 101.2kPa

EUT Operation **:**

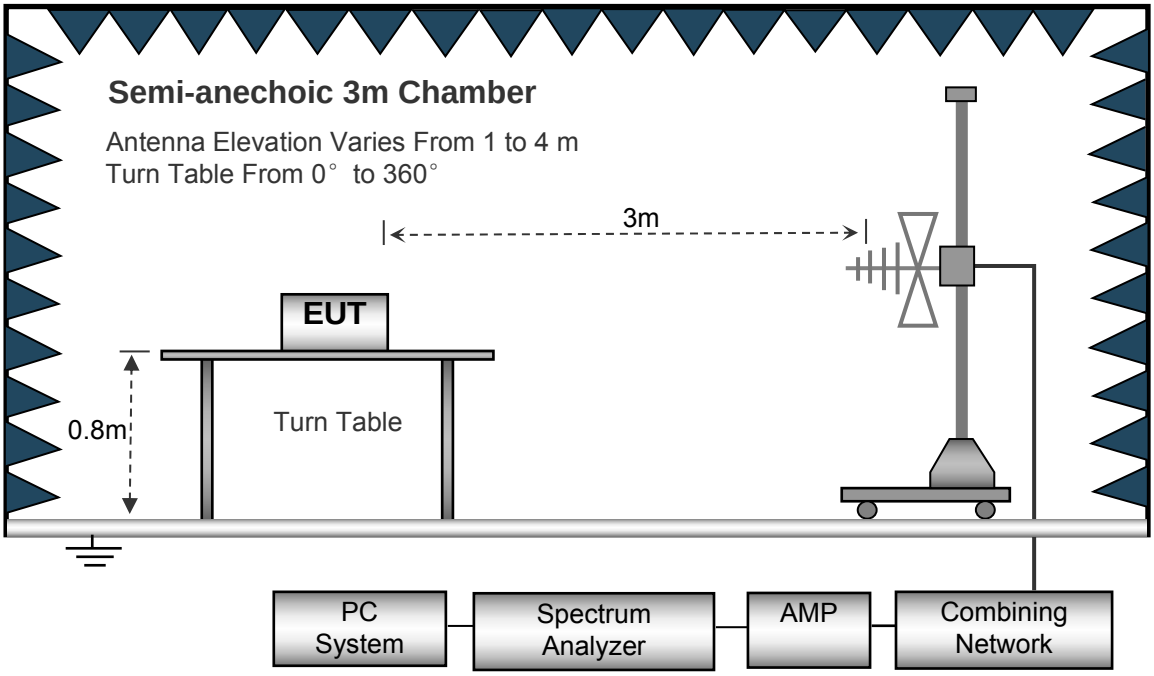
The test was performed in transmitting mode, the test data were shown in the report.

## 7.2 Test Setup

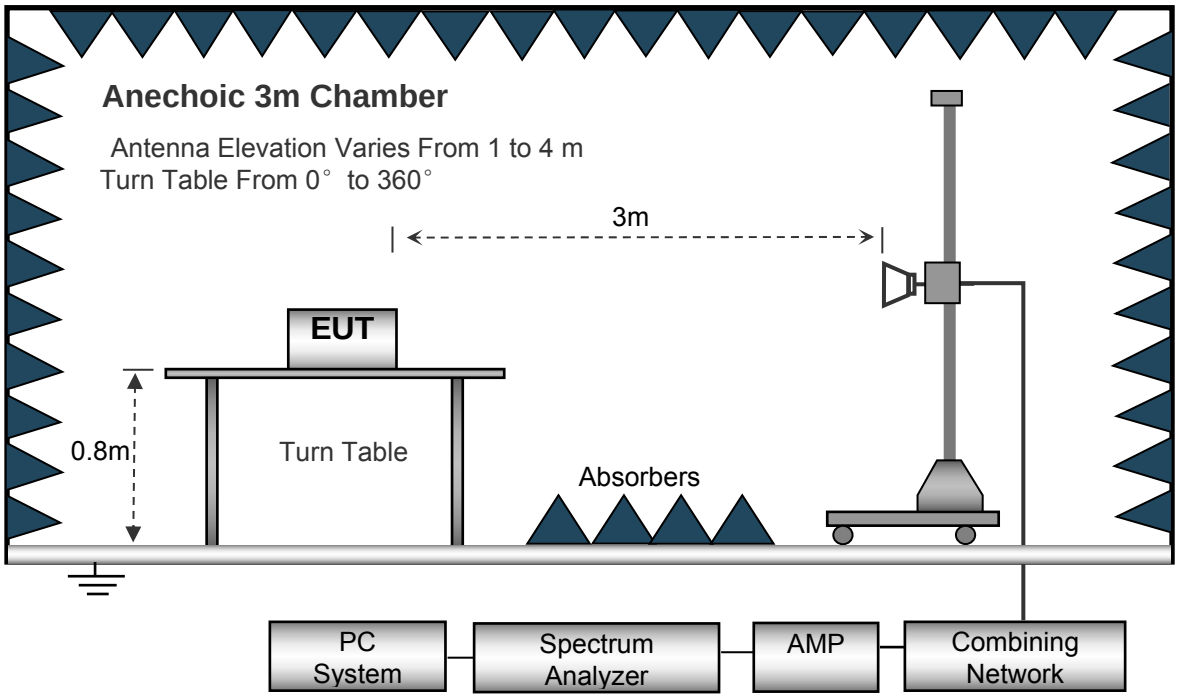
The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI 63.10: 2009.
The test setup for emission measurement below 30MHz.




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



The test setup for emission measurement above 1 GHz.




## 7.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed..... Auto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz

Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed..... Auto
Detector..... PK
Resolution Bandwidth.....100kHz
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed..... Auto
Detector .....PK
Resolution Bandwidth.....1MHz
Video Bandwidth..... 3MHz
Detector .....Ave.
Resolution Bandwidth.....1MHz
Video Bandwidth..... 10Hz

## 7.4 Test Procedure

1. The EUT is placed on a turntable, which is 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.

## 7.5 Test Result

**Test Frequency: 32.768kHz~30MHz**

| Frequency (MHz) | Measurement results | Detector | Correct factor | Extrapolation factor | Measurement results (calculated) | Limits | Margin |
|---|---|---|---|---|---|---|---|
| | dBμV @3m | PK/QP | dB/m | dB | dBμV/m @30m | dBμV/m @30m | dB |
| 26.980 | 26.24 | QP | 19.90 | 40.00 | 6.14 | 29.54 | -23.40 |

**Test Frequency: 30MHz ~ 18GHz**

Test Mode: Low Channel

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.231/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB/m) | (dBμV/m) | (dBμV/m) | (dB) |
| 302.56 | 39.21 | QP | 140 | 1.9 | V | -11.40 | 27.81 | 40.00 | -12.19 |
| *2403.00 | 69.54 | PK | 174 | 1.1 | H | -13.08 | 56.46 | 114.00 | -57.54 |
| *2403.00 | 64.31 | PK | 69 | 1.7 | V | -13.08 | 51.23 | 114.00 | -62.77 |
| 4806.00 | 45.65 | PK | 352 | 1.4 | H | 0.09 | 45.74 | 94.00 | -48.26 |
| 4806.00 | 48.12 | PK | 57 | 1.3 | V | 0.09 | 48.21 | 94.00 | -45.79 |
| 7209.00 | 46.55 | PK | 97 | 1.0 | H | 3.01 | 49.56 | 94.00 | -44.44 |
| 7209.00 | 45.37 | PK | 258 | 1.8 | V | 3.01 | 48.38 | 94.00 | -45.62 |

* Fundamental Frequency

| Frequency | PK | Turn table Angle | RX Antenna | | Duty cycle Factor | AV | FCC Part 15.231/209/205 | |
|---|---|---|---|---|---|---|---|---|
| | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV/m) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| *2403.00 | 56.46 | 174 | 1.1 | H | -38.50 | 17.96 | 94.00 | -76.04 |
| *2403.00 | 51.23 | 69 | 1.7 | V | -38.50 | 12.73 | 94.00 | -81.27 |
| 4806.00 | 45.74 | 352 | 1.4 | H | -38.50 | 7.24 | 74.00 | -66.76 |
| 4806.00 | 48.21 | 57 | 1.3 | V | -38.50 | 9.71 | 74.00 | -64.29 |
| 7209.00 | 49.56 | 97 | 1.0 | H | -38.50 | 11.06 | 74.00 | -62.94 |
| 7209.00 | 48.38 | 258 | 1.8 | V | -38.50 | 9.88 | 74.00 | -64.12 |

* Fundamental Frequency

Test Mode: Middle Channel

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.231/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB/m) | (dBμV/m) | (dBμV/m) | (dB) |
| 302.56 | 38.27 | QP | 103 | 1.1 | V | -11.40 | 26.87 | 40.00 | -13.13 |
| *2440.00 | 70.12 | PK | 331 | 1.0 | H | -13.08 | 57.04 | 114.00 | -56.96 |
| *2440.00 | 66.89 | PK | 229 | 1.0 | V | -13.08 | 53.81 | 114.00 | -60.19 |
| 4880.00 | 44.29 | PK | 343 | 2.0 | H | 0.09 | 44.38 | 94.00 | -49.62 |
| 4880.00 | 49.31 | PK | 300 | 1.4 | V | 0.09 | 49.40 | 94.00 | -44.60 |
| 7320.00 | 47.58 | PK | 318 | 1.8 | H | 3.01 | 50.59 | 94.00 | -43.41 |
| 7320.00 | 45.12 | PK | 84 | 1.0 | V | 3.01 | 48.13 | 94.00 | -45.87 |

* Fundamental Frequency

| Frequency | PK | Turn table Angle | RX Antenna | | Duty cycle Factor | AV | FCC Part 15.231/209/205 | |
|---|---|---|---|---|---|---|---|---|
| | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV/m) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| *2440.00 | 57.04 | 331 | 1.0 | H | -38.50 | 18.54 | 94.00 | -75.46 |
| *2440.00 | 53.81 | 229 | 1.0 | V | -38.50 | 15.31 | 94.00 | -78.69 |
| 4880.00 | 44.38 | 343 | 2.0 | H | -38.50 | 5.88 | 74.00 | -68.12 |
| 4880.00 | 49.40 | 300 | 1.4 | V | -38.50 | 10.90 | 74.00 | -63.10 |
| 7320.00 | 50.59 | 318 | 1.8 | H | -38.50 | 12.09 | 74.00 | -61.91 |
| 7320.00 | 48.13 | 84 | 1.0 | V | -38.50 | 9.63 | 74.00 | -64.37 |

* Fundamental Frequency

Test Mode: High Channel

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.231/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB/m) | (dBμV/m) | (dBμV/m) | (dB) |
| 302.56 | 39.51 | QP | 244 | 1.9 | V | -11.40 | 28.11 | 40.00 | -11.89 |
| *2480.00 | 71.23 | PK | 349 | 1.4 | H | -13.08 | 58.15 | 114.00 | -55.85 |
| *2480.00 | 67.38 | PK | 170 | 1.5 | V | -13.08 | 54.30 | 114.00 | -59.70 |
| 4960.00 | 45.69 | PK | 149 | 1.0 | H | 0.09 | 45.78 | 94.00 | -48.22 |
| 4960.00 | 50.21 | PK | 328 | 1.2 | V | 0.09 | 50.30 | 94.00 | -43.70 |
| 7440.00 | 48.33 | PK | 95 | 1.7 | H | 3.01 | 51.34 | 94.00 | -42.66 |
| 7440.00 | 46.29 | PK | 113 | 1.8 | V | 3.01 | 49.30 | 94.00 | -44.70 |

* Fundamental Frequency

| Frequency | PK | Turn table Angle | RX Antenna | | Duty cycle Factor | AV | FCC Part 15.231/209/205 | |
|---|---|---|---|---|---|---|---|---|
| | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV/m) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| *2480.00 | 58.15 | 349 | 1.4 | H | -38.50 | 19.65 | 94.00 | -74.35 |
| *2480.00 | 54.30 | 170 | 1.5 | V | -38.50 | 15.80 | 94.00 | -78.20 |
| 4960.00 | 45.78 | 149 | 1.0 | H | -38.50 | 7.28 | 74.00 | -66.72 |
| 4960.00 | 50.30 | 328 | 1.2 | V | -38.50 | 11.80 | 74.00 | -62.20 |
| 7440.00 | 51.34 | 95 | 1.7 | H | -38.50 | 12.84 | 74.00 | -61.16 |
| 7440.00 | 49.30 | 113 | 1.8 | V | -38.50 | 10.80 | 74.00 | -63.20 |

* Fundamental Frequency

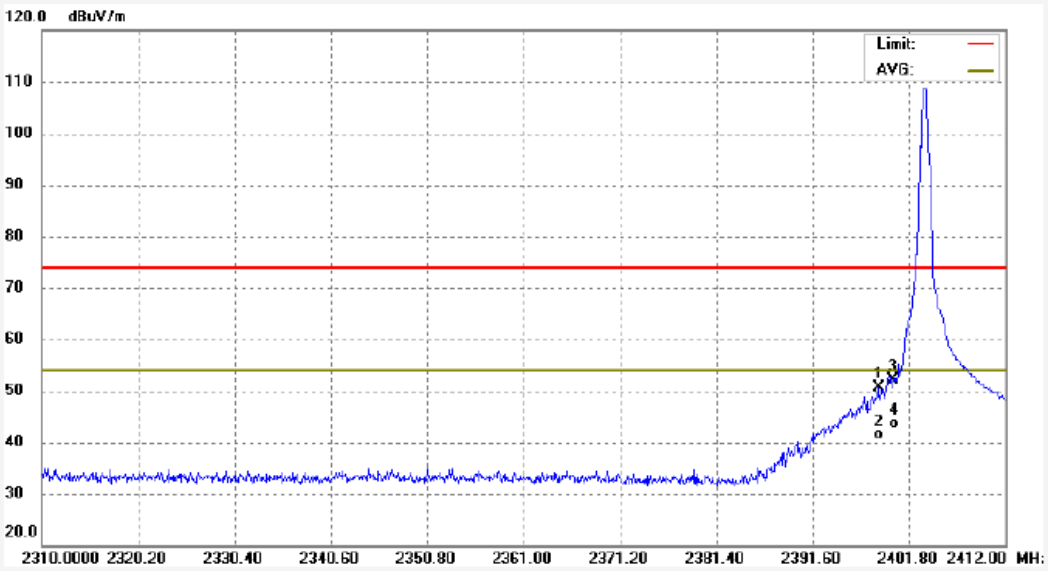
Test Frequency :From 18GHz to 25GHz

The measurements were more than 20 dB below the limit and not reported.

Outside of Band Emissions

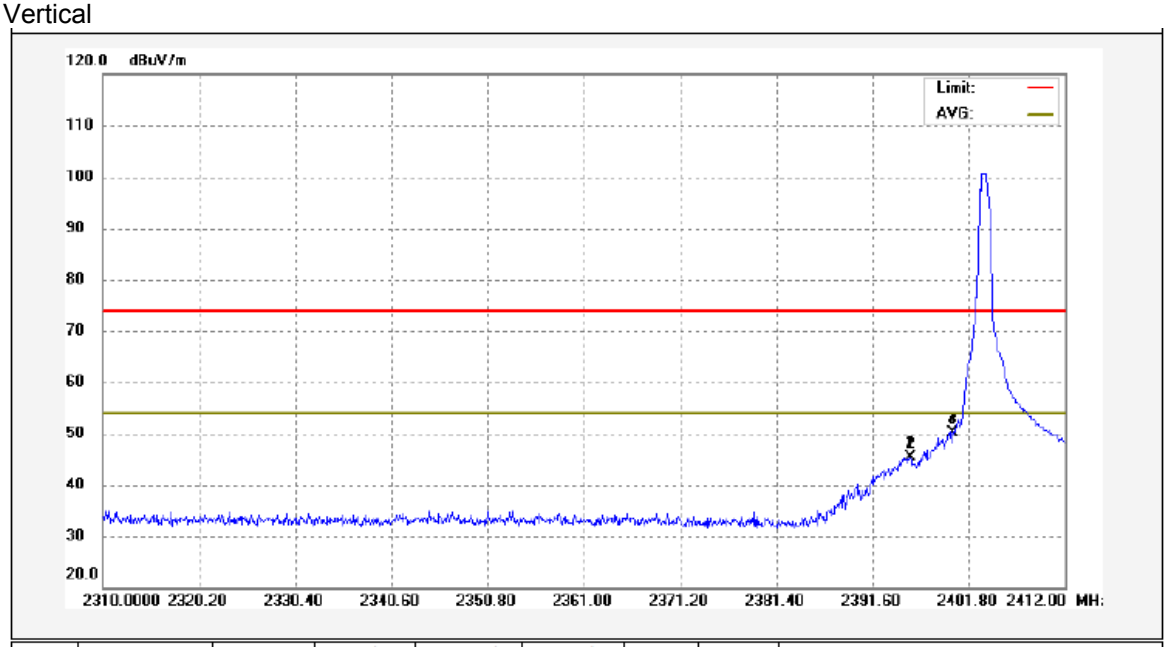
Left band- 2403MHz transmitting

Horizontal




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 2398.536 | 65.78 | -15.24 | 50.54 | 74.00 | -23.46 | peak | |
| 2 | 2398.536 | 56.53 | -15.24 | 41.29 | 54.00 | -12.71 | AVG | |
| 3 | 2400.000 | 67.30 | -15.24 | 52.06 | 74.00 | -21.94 | peak | |
| 4 | 2400.000 | 58.90 | -15.24 | 43.66 | 54.00 | -10.34 | AVG | |

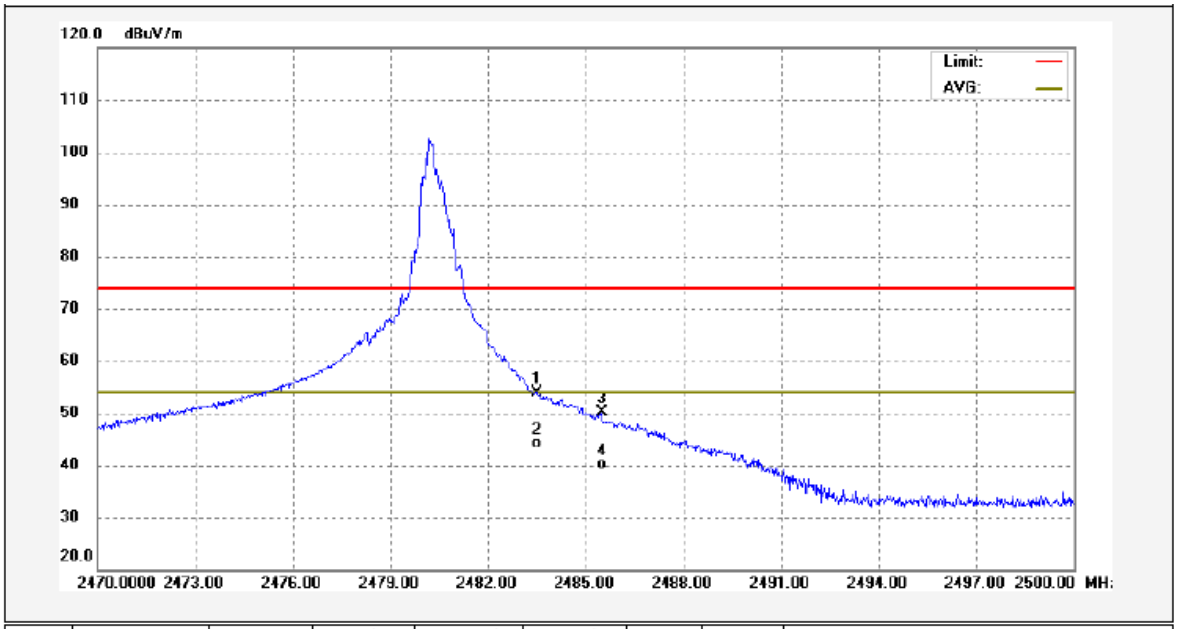
Vertical




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 2395.578 | 60.61 | -15.23 | 45.38 | 74.00 | -28.62 | peak | |
| 2 | 2395.578 | 60.61 | -15.23 | 45.38 | 74.00 | -28.62 | peak | |
| 3 | 2400.000 | 65.30 | -15.24 | 50.06 | 74.00 | -23.94 | peak | |
| 4 | 2400.000 | 65.30 | -15.24 | 50.06 | 74.00 | -23.94 | peak | |

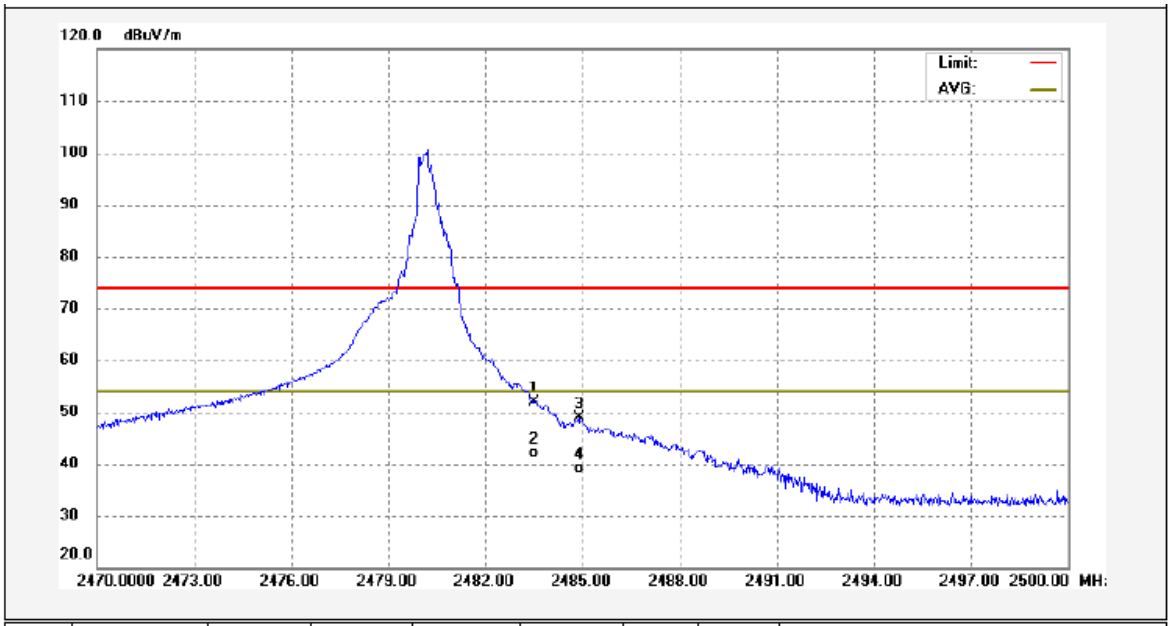
Right band-2480MHz transmitting

Horizontal




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 69.27 | -15.39 | 53.88 | 74.00 | -20.12 | peak | |
| 2 | 2483.500 | 59.51 | -15.39 | 44.12 | 54.00 | -9.88 | AVG | |
| 3 | 2485.480 | 65.60 | -15.40 | 50.20 | 74.00 | -23.80 | peak | |
| 4 | 2485.480 | 55.62 | -15.40 | 40.22 | 54.00 | -13.78 | AVG | |

Vertical




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 67.27 | -15.39 | 51.88 | 74.00 | -22.12 | peak | |
| 2 | 2483.500 | 57.58 | -15.39 | 42.19 | 54.00 | -11.81 | AVG | |
| 3 | 2484.880 | 64.18 | -15.39 | 48.79 | 74.00 | -25.21 | peak | |
| 4 | 2484.880 | 54.54 | -15.39 | 39.15 | 54.00 | -14.85 | AVG | |

# 8 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

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

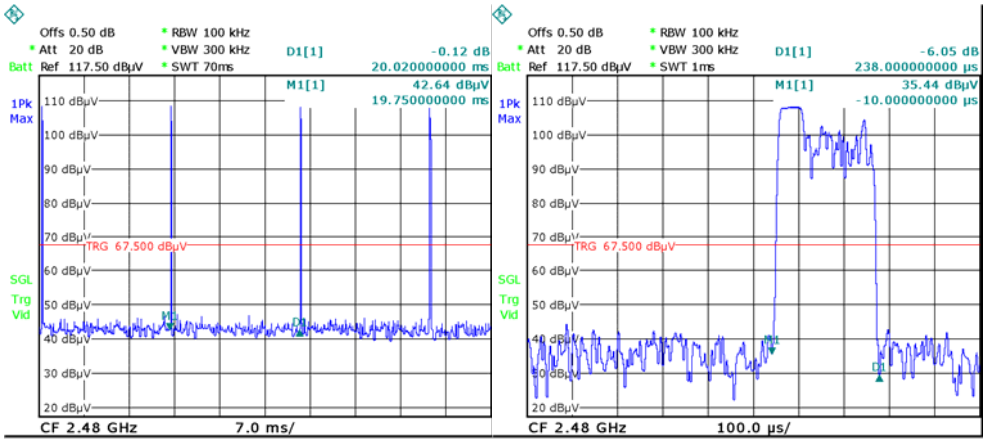
Duty Cycle Correction Factor(dB)=20 * $Log_{10}$(Duty Cycle(%))

| | |
|---|---|
| Total transmission time(ms) | 0.238 |
| Length of a complete transmission period(ms) | 20.02 |
| Duty Cycle(%) | 1.19 |
| Duty Cycle Correction Factor(dB) | -38.50 |

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.



# 9 20 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.215(c)

Test Method: ANSI C63.10:2013

Test Mode: Transmitting

## 9.1 Test Procedure

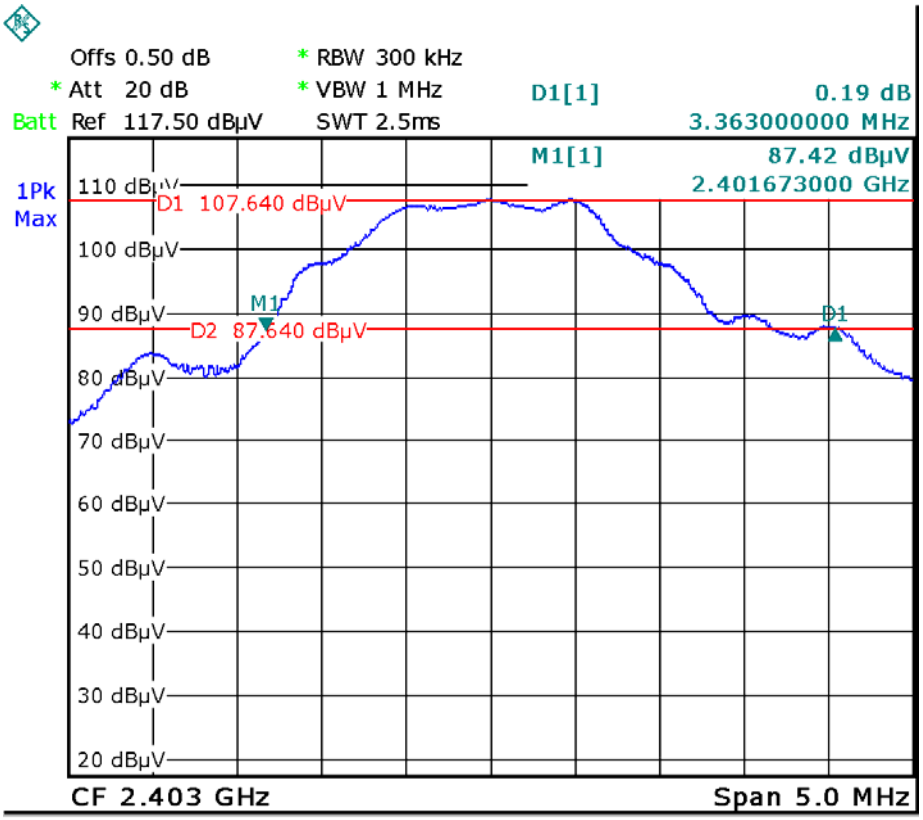
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 30kHz, VBW = 100kHz

## 9.2 Test Result

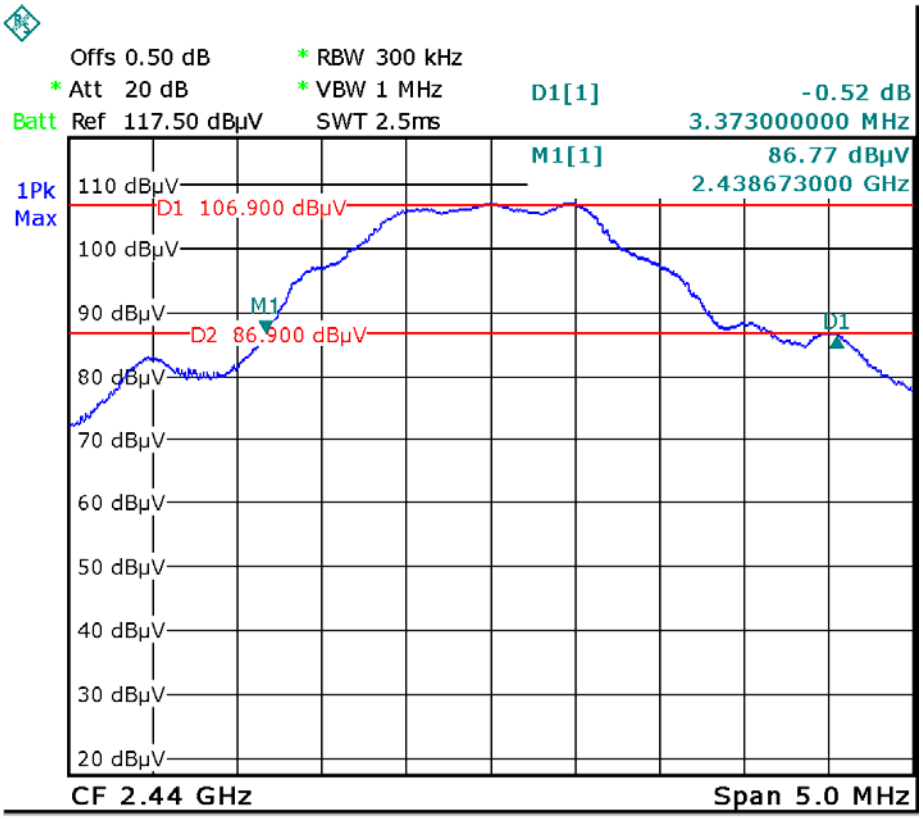
| Test Channel | Bandwidth |
|---|---|
| 2403MHz | 2401.7MHz |
| 2440MHz | 2438.7MHz |
| 2480MHz | 2478.4MHz |

Test plots

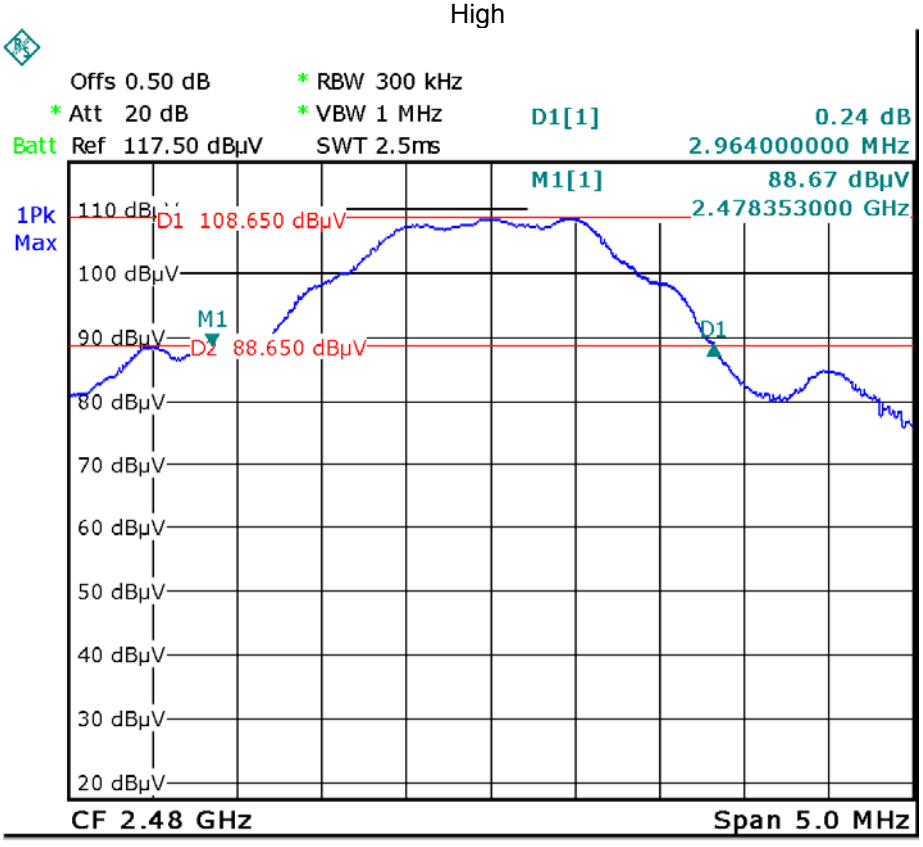
Low



Middle


Offs 0.50 dB
* RBW 300 kHz
* Att 20 dB
* VBW 1 MHz
D1[1]
-0.52 dB
Batt Ref 117.50 dBµV
SWT 2.5ms
3.373000000 MHz
M1[1]
86.77 dBµV
2.438673000 GHz
1Pk
Max
110 dBµV
D1 106.900 dBµV
100 dBµV
90 dBµV
M1
D2 86.900 dBµV
D1
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
20 dBµV
CF 2.44 GHz
Span 5.0 MHz

High


Offs 0.50 dB
* RBW 300 kHz
* Att 20 dB
* VBW 1 MHz
D1[1]
0.24 dB
Batt Ref 117.50 dBµV
SWT 2.5ms
2.964000000 MHz
M1[1]
88.67 dBµV
2.478353000 GHz
1Pk
Max
110 dBµV
D1 108.650 dBµV
100 dBµV
M1
90 dBµV
D2 88.650 dBµV
D1
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
20 dBµV
CF 2.48 GHz
Span 5.0 MHz

# 10 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. 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.

This device uses of an antenna that uses a unique coupling to the intentional radiator. Antenna connector complied with the requirement.

======End of Report======