



TEST REPORT

Report No.: **GTI20190660F-1**

FCC ID.....: **2AKIT-AS013**

IC.....: **22635-AS013**

Applicant.....: **Lumi United Technology Co., Ltd**

Address.....: 8th Floor, JinQi Wisdom Valley, Liuxian Ave, Taoyuan Residential District, Nanshan District, Shenzhen, China

Manufacturer.....: Lumi United Technology Co., Ltd

Address.....: 8th Floor, JinQi Wisdom Valley, Liuxian Ave, Taoyuan Residential District, Nanshan District, Shenzhen, China

Product Name.....: **Weather Sensor T1**

Trade Mark.....: AQara

Model/Type reference.....: WS-S01

Listed Model(s): WSDCGQ12LM,WSDCGQ12LM-G0

Standard.....: **FCC CFR Title 47 Part 15 Subpart C Section 15.247**
RSS-247 Issue 2
RSS-Gen Issue 5

Date of receipt of test sample...: Apr. 16, 2019

Date of testing.....: Apr. 17, 2019 to Apr. 27, 2019

Date of issue.....: Aug. 14, 2019

Result.....: **PASS**

Compiled by:
(Printed name+signature) Zaki Zhang *Zaki Zhang*

Supervised by:
(Printed name+signature) Eric Zhang *Eric Zhang*

Approved by:
(Printed name+signature) Walter Chen *Walter Chen*

Testing Laboratory Name..... **CTC Laboratories, Inc.**

Address..... 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

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1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.

[RSS 247 Issue 2](#): Standard Specifications for Frequency Hopping Systems (FHSs) and Digital Transmission Systems (DTSs) Operating in the Bands 902-928MHz, 2400-2483.5MHz and 5725-5850MHz.

[RSS-Gen](#): General Requirements for Compliance of Radio Apparatus.

[ANSI C63.10-2013](#): American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report version

| Revised No. | Date of issue | Description |
|-------------|---------------|-------------|
| 01 | Aug. 14, 2019 | Original |
| | | |
| | | |
| | | |



1.3. Test Description

| FCC Part 15 Subpart C(15.247)/ RSS-247 Issue 2/ RSS-Gen Issue 5 | | | | |
|--|--------------------------|-----------------|--------|---------------|
| Test Item | Standard Section | | Result | Test Engineer |
| | FCC | IC | | |
| Antenna Requirement | 15.203 | / | Pass | Zaki Zhang |
| Conducted Emission | 15.207(a) | RSS-GEN 8.8 | N/A | N/A |
| Band-Edge & Unwanted Emissions into Restricted Frequency | 15.205&15.247(d) | RSS-GEN 8.9 | Pass | Zaki Zhang |
| 6dB Bandwidth | 15.247(a)(2) | RSS 247 5.2 (1) | Pass | Zaki Zhang |
| Conducted Max Output Power | 15.247(b)(3) | RSS 247 5.4 (4) | Pass | Zaki Zhang |
| Power Spectral Density | 15.247(e) | RSS 247 5.2 (2) | Pass | Zaki Zhang |
| Transmitter Radiated Spurious & Unwanted Emissions into Restricted Frequency | 15.205, 15.209&15.247(d) | RSS 247 5.5 | Pass | Zaki Zhang |

Note: "N/A" is not applicable.

The measurement uncertainty is not included in the test result.



1.4. Test Facility

Address of the report laboratory

CTC Laboratories, Inc.

Add: 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Laboratory accreditation

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

CNAS-Lab Code: L5365

CTC Laboratories, Inc. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025:2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 4340.01

CTC Laboratories, Inc. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Registration No.: CN0029

The 3m alternate test site of CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: CN0029 on Dec, 2018.

FCC-Registration No.:CN1208

CTC Laboratories, Inc. 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. RegistrationCN1208, Sep 07, 2017

1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the CTC Laboratories, Inc. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Below is the best measurement capability for CTC Laboratories, Inc.

CTC Laboratories, Inc.

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| Test Items | Measurement Uncertainty | Notes |
|---|-------------------------|-------|
| Transmitter power conducted | 0.42 dB | (1) |
| Transmitter power Radiated | 2.14 dB | (1) |
| Conducted spurious emissions 9kHz~40GHz | 1.60 dB | (1) |
| Radiated spurious emissions 9kHz~40GHz | 2.20 dB | (1) |
| Conducted Emissions 9kHz~30MHz | 3.20 dB | (1) |
| Radiated Emissions 30~1000MHz | 4.70 dB | (1) |
| Radiated Emissions 1~18GHz | 5.00 dB | (1) |
| Radiated Emissions 18~40GHz | 5.54 dB | (1) |
| Occupied Bandwidth | ----- | (1) |

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

1.6. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

| | |
|--------------------|---------|
| Temperature: | 25°C |
| Relative Humidity: | 55 % |
| Air Pressure: | 989 kPa |



2. GENERAL INFORMATION

2.1. Client Information

| | |
|---------------|--|
| Applicant: | Lumi United Technology Co., Ltd |
| Address: | 8th Floor, JinQi Wisdom Valley, Liuxian Ave, Taoyuan Residential District, Nanshan District, Shenzhen, China |
| Manufacturer: | Lumi United Technology Co., Ltd |
| Address: | 8th Floor, JinQi Wisdom Valley, Liuxian Ave, Taoyuan Residential District, Nanshan District, Shenzhen, China |

2.2. General Description of EUT

| | |
|------------------------|--|
| Product Name: | Weather Sensor T1 |
| Marketing Name: | AQara |
| Model/Type reference: | WS-S01 |
| Listed Model(s): | WSDCGQ12LM,WSDCGQ12LM-G0 |
| Model Difference: | All these models are identical in the same PCB, layout and electrical circuit, only named differently for marketing purpose. |
| Power supply: | 3Vdc from button battery |
| Hardware version: | V1.0.1 |
| Software version: | V1.0.1 |
| Zigbee | |
| Operation frequency: | 2405MHz~2480MHz |
| Modulation Type: | O-QPSK |
| Max Peak Output Power: | 10.35dBm |
| Channel number: | 16 |
| Channel separation: | 5MHz |
| Antenna type: | PCB Antenna |
| Antenna gain: | 2dBi |



2.3. Operation state

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. Zigbee 16 channels are provided to the EUT. Channels 11/18/26 were selected for testing.

Operation Frequency List:

| Channel | Frequency (MHz) | Test software power Settings |
|-----------|-----------------|------------------------------|
| 11 | 2405 | 10 |
| 12 | 2410 | |
| ⋮ | ⋮ | |
| 17 | 2435 | |
| 18 | 2440 | 10 |
| 19 | 2445 | |
| ⋮ | ⋮ | |
| 25 | 2475 | |
| 26 | 2480 | 0 |

Note: The display in grey were the channel selected for testing.

Test mode

| |
|--|
| For RF test items: |
| The software test program was provided and enabled to make EUT continuous transmit (duty cycle>98%). |
| For AC power line conducted emissions: |
| The EUT was set to connect with the Zigbee instrument under large package sizes transmission. |
| For Radiated spurious emissions test item: |
| The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report. |



2.4. Measurement Instruments List

| Tonscend JS0806-2 Test system | | | | | | |
|-------------------------------|-------------------------------------|-----------------|-----------|------------|-----------------|------------------|
| Item | Test Equipment | Manufacturer | Model No. | Serial No. | Calibrated Date | Calibrated until |
| 1 | Spectrum Analyzer | Rohde & Schwarz | FSU26 | 100105 | Dec. 27, 2018 | Dec. 28, 2019 |
| 2 | Spectrum Analyzer | Rohde & Schwarz | FUV40-N | 101331 | Jun. 21, 2018 | Jun. 22, 2019 |
| 3 | MXG Vector Signal Generator | Agilent | N5182A | MY47420864 | Dec. 27, 2018 | Dec. 28, 2019 |
| 4 | Signal Generator | Agilent | E8257D | MY46521908 | Dec. 27, 2018 | Dec. 28, 2019 |
| 5 | Power Sensor | Agilent | U2021XA | MY5365004 | Dec. 27, 2018 | Dec. 28, 2019 |
| 6 | Power Sensor | Agilent | U2021XA | MY5365006 | Dec. 27, 2018 | Dec. 28, 2019 |
| 7 | Simultaneous Sampling DAQ | Agilent | U2531A | TW54493510 | Dec. 27, 2018 | Dec. 28, 2019 |
| 8 | Climate Chamber | TABAI | PR-4G | A8708055 | Dec. 27, 2018 | Dec. 28, 2019 |
| 9 | Wideband Radio Communication Tester | Rohde & Schwarz | CMW500 | 116410 | Dec. 27, 2018 | Dec. 28, 2019 |
| 10 | Climate Chamber | ESPEC | MT3065 | / | Dec. 27, 2018 | Dec. 28, 2019 |
| 11 | 300328 v2.1.1 test system | TONSCEND | v2.6 | / | / | / |

| Conducted Emission | | | | | | |
|--------------------|-------------------|--------------|-----------|------------|-----------------|------------------|
| Item | Test Equipment | Manufacturer | Model No. | Serial No. | Calibrated Date | Calibrated until |
| 1 | LISN | R&S | ENV216 | 101112 | Dec. 27, 2018 | Dec. 28, 2019 |
| 2 | LISN | R&S | ENV216 | 101113 | Dec. 27, 2018 | Dec. 28, 2019 |
| 3 | EMI Test Receiver | R&S | ESCI | 100920 | Dec. 27, 2018 | Dec. 28, 2019 |
| 4 | ISN CAT6 | Schwarzbeck | NTFM 8158 | 8158-0046 | Dec. 27, 2018 | Dec. 28, 2019 |

| Radiated Emission | | | | | | |
|-------------------|-------------------------|-----------------|-------------|------------|-----------------|------------------|
| Item | Test Equipment | Manufacturer | Model No. | Serial No. | Calibrated Date | Calibrated until |
| 1 | EMI Test Receiver | Rohde & Schwarz | ESCI | 100658 | Dec. 27, 2018 | Dec. 28, 2019 |
| 2 | High pass filter | micro-tranics | HPM50111 | 142 | Dec. 27, 2018 | Dec. 28, 2019 |
| 3 | Log-Bicon Antenna | Schwarzbeck | CBL6141A | 4180 | Dec. 27, 2018 | Dec. 28, 2019 |
| 4 | Ultra-Broadband Antenna | Schwarzbeck | BBHA9170 | 25841 | Dec. 27, 2018 | Dec. 28, 2019 |
| 5 | Loop Antenna | LAPLAC | RF300 | 9138 | Dec. 27, 2018 | Dec. 28, 2019 |
| 6 | Spectrum Analyzer | Rohde & Schwarz | FSU26 | 100105 | Dec. 27, 2018 | Dec. 28, 2019 |
| 7 | Horn Antenna | Schwarzbeck | BBHA 9120D | 647 | Dec. 27, 2018 | Dec. 28, 2019 |
| 8 | Pre-Amplifier | HP | 8447D | 1937A03050 | Dec. 27, 2018 | Dec. 28, 2019 |
| 9 | Pre-Amplifier | EMCI | EMC051835 | 980075 | Dec. 27, 2018 | Dec. 28, 2019 |
| 10 | Antenna Mast | UC | UC3000 | N/A | N/A | N/A |
| 11 | Turn Table | UC | UC3000 | N/A | N/A | N/A |
| 12 | Cable Below 1GHz | Schwarzbeck | AK9515E | 33155 | Dec. 27, 2018 | Dec. 28, 2019 |
| 13 | Cable Above 1GHz | Hubersuhner | SUCOFLEX102 | DA1580 | Dec. 27, 2018 | Dec. 28, 2019 |
| 14 | Splitter | Mini-Circuit | ZAPD-4 | 400059 | Dec. 27, 2018 | Dec. 28, 2019 |
| 15 | RF Connection Cable | HUBER+SUHNER | RE-7-FL | N/A | Dec. 27, 2018 | Dec. 28, 2019 |
| 16 | RF Connection | Chengdu | --- | --- | Dec. 27, 2018 | Dec. 28, 2019 |

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| | | | | | | |
|----|------------------|------------------------------|-----------------|-------|---------------|---------------|
| | Cable | E-Microwave | | | | |
| 17 | High pass filter | Compliance Direction systems | BSU-6 | 34202 | Dec. 27, 2018 | Dec. 28, 2019 |
| 18 | Attenuator | Chengdu E-Microwave | EMCAXX-10R NZ-3 | --- | Dec. 27, 2018 | Dec. 28, 2019 |

Note: 1. The cable loss has calculated in test result which connection between each test instruments.

3. TEST ITEM AND RESULTS

3.1. Conducted Emission

Limit

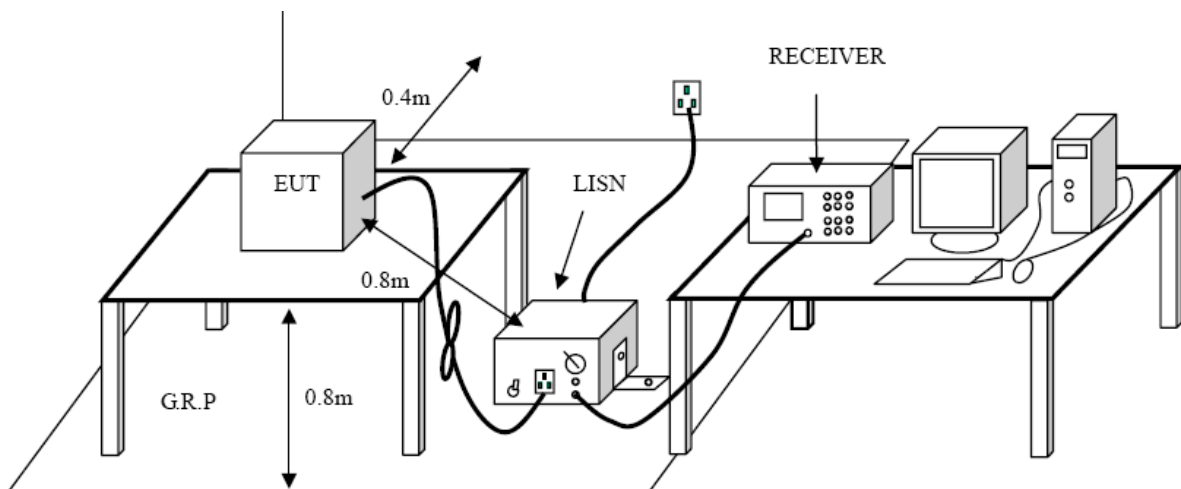
Conducted Emission Test Limit

| Frequency | Maximum RF Line Voltage (dB μ V) | |
|---------------|--------------------------------------|---------------|
| | Quasi-peak Level | Average Level |
| 150kHz~500kHz | 66 ~ 56 * | 56 ~ 46 * |
| 500kHz~5MHz | 56 | 46 |
| 5MHz~30MHz | 60 | 50 |

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Configuration



Test Procedure

1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
7. During the above scans, the emissions were maximized by cable manipulation.



Test Mode:

Please refer to the clause 2.3.

Test Results

Not applicable.

3.2. Radiated Emission

Limit

Radiated Emission Limits (9 kHz~1000 MHz)

| Frequency (MHz) | Field Strength (microvolt/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 |

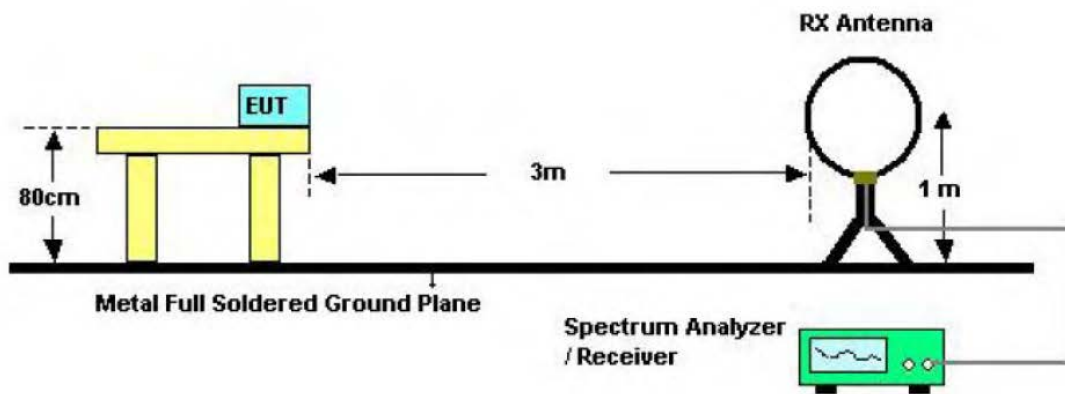
Radiated Emission Limit (Above 1000MHz)

| Frequency (MHz) | Distance Meters(at 3m) | |
|-----------------|------------------------|---------|
| | Peak | Average |
| Above 1000 | 74 | 54 |

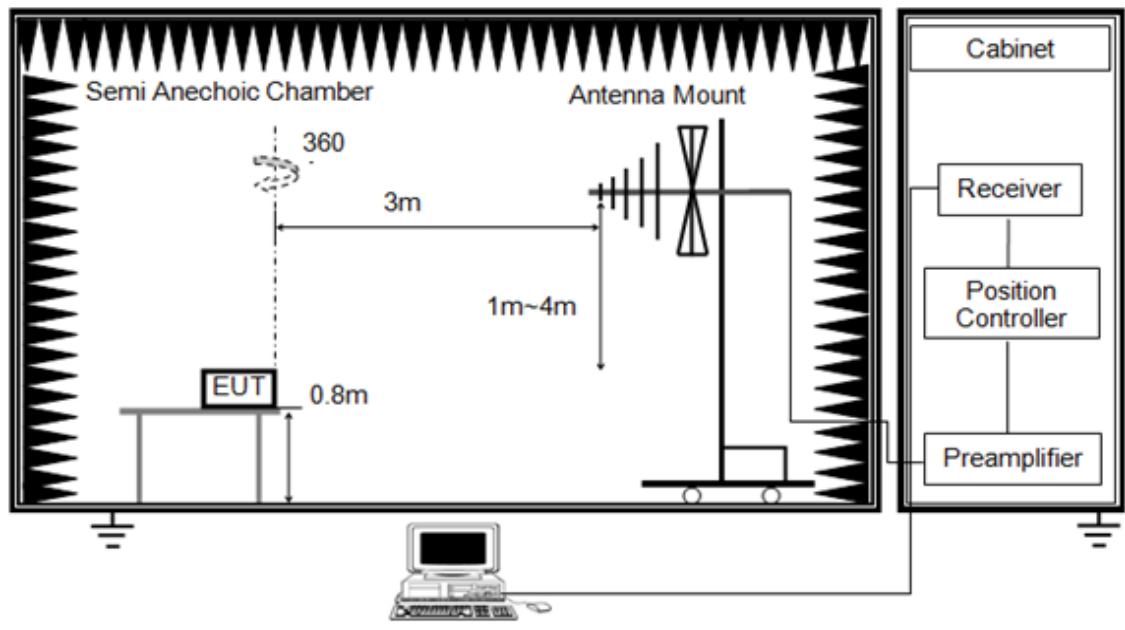
Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBuV/m)=20log Emission Level (uV/m).

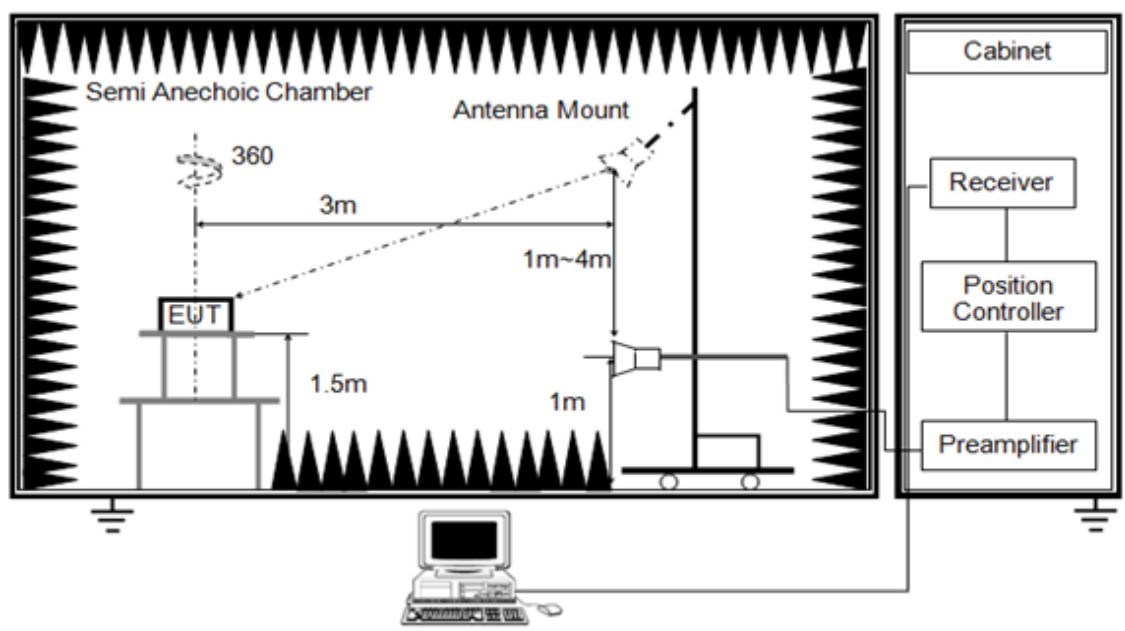
Test Configuration



Below 30MHz Test Setup



Below 1000MHz Test Setup



Above 1GHz Test Setup



Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Below 1 GHz:
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
 - (3) From 1 GHz to 10th harmonic:
RBW=1MHz, VBW=3MHz Peak detector for Peak value.
RBW=1MHz, VBW=3MHz RMS detector for Average value.

Test Mode

Please refer to the clause 2.3.

Test Result

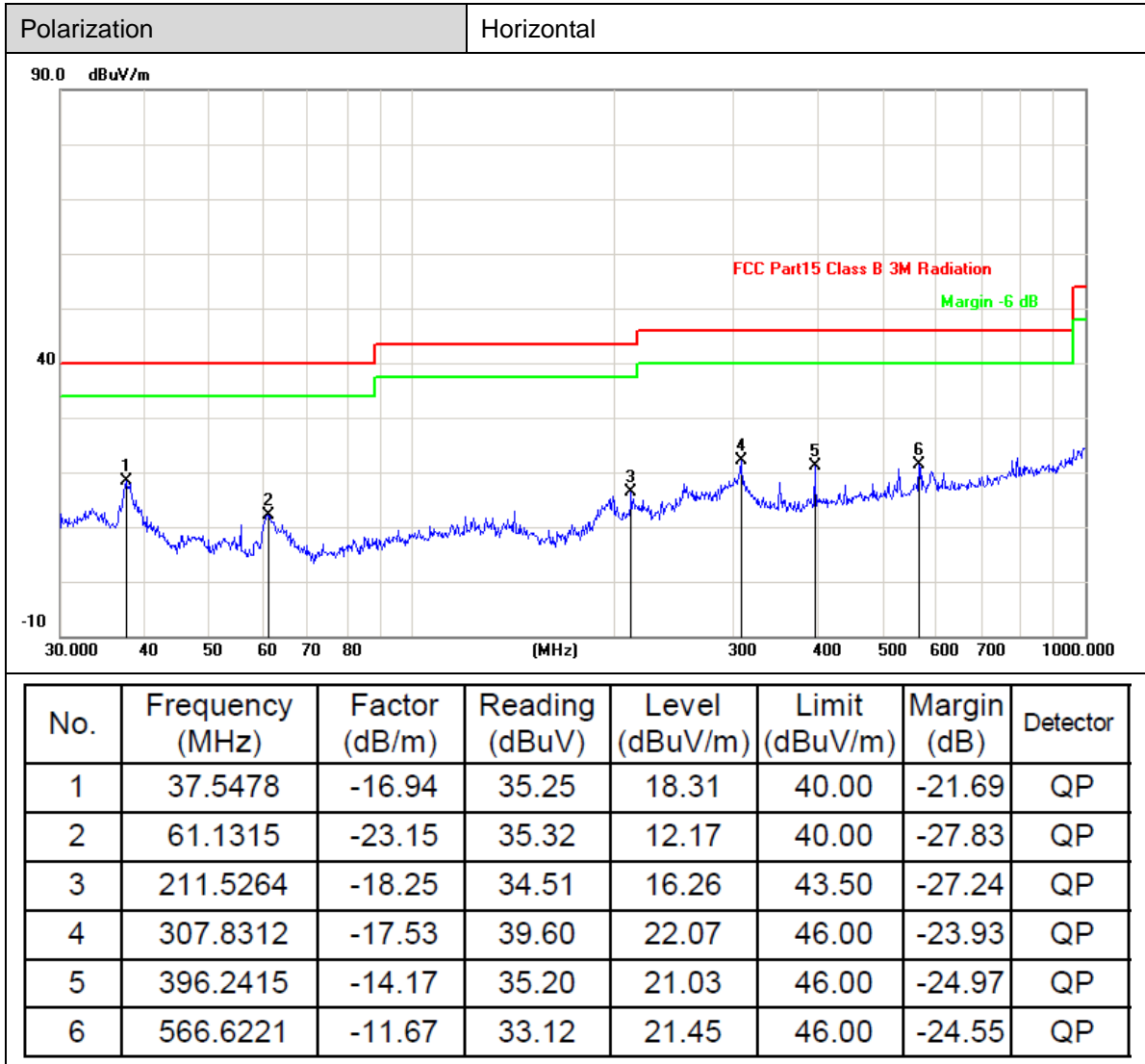
9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

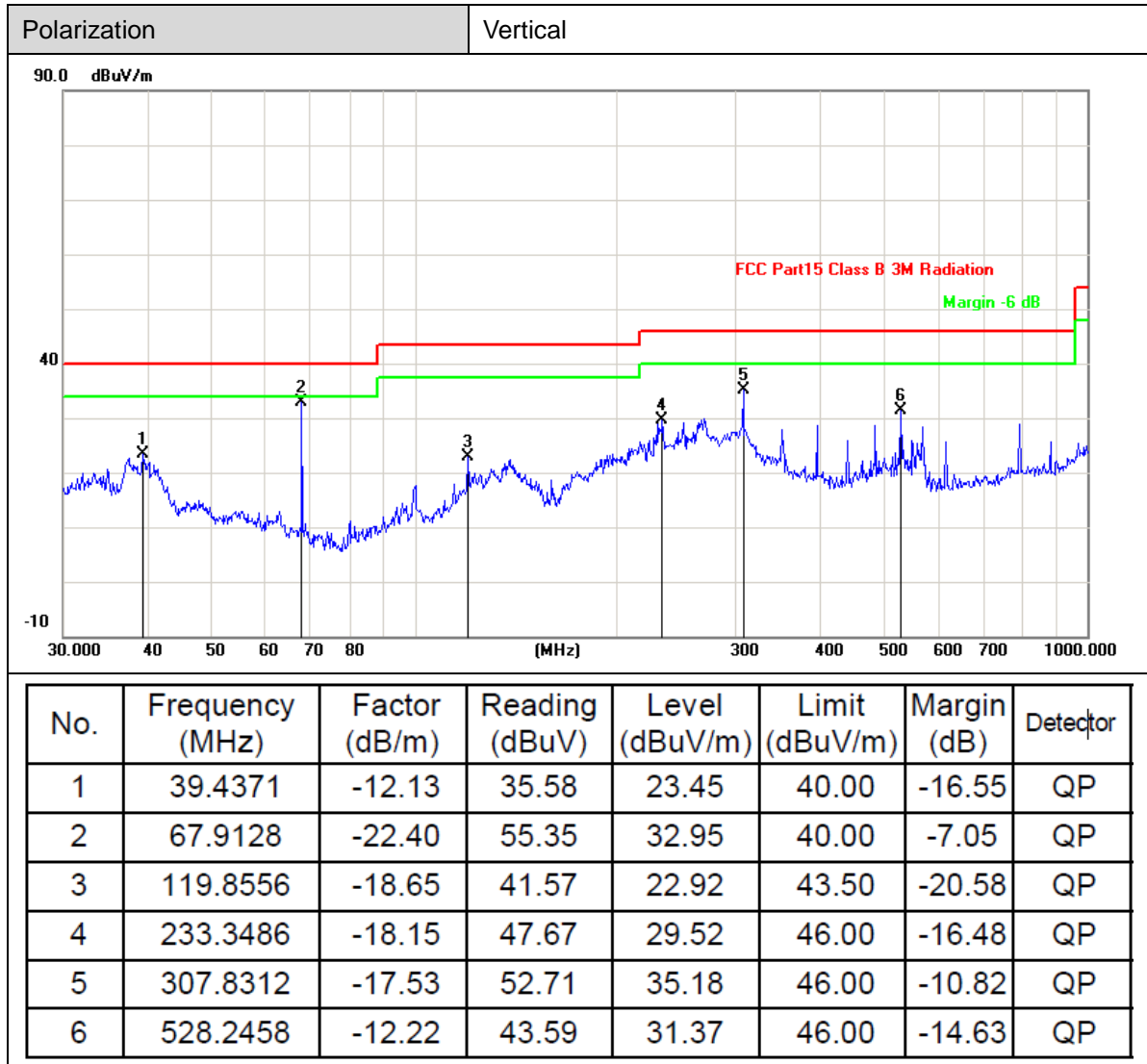


30MHz-1GHz



Remark:

1. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2. Margin value = Level -Limit value



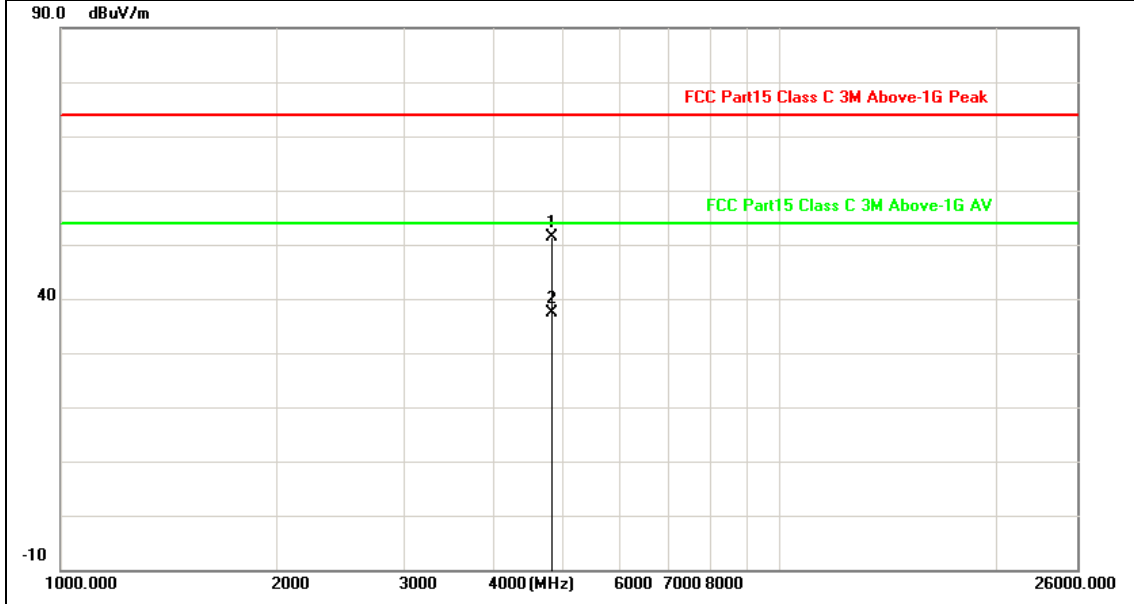
Remark:

1. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2. Margin value = Level -Limit value



Above 1G

| | |
|------------|--|
| Ant. Pol. | Horizontal |
| Test Mode: | TX Zigbee Mode 2405MHz |
| Remark: | No report for the emission which more than 10 dB below the prescribed limit. |



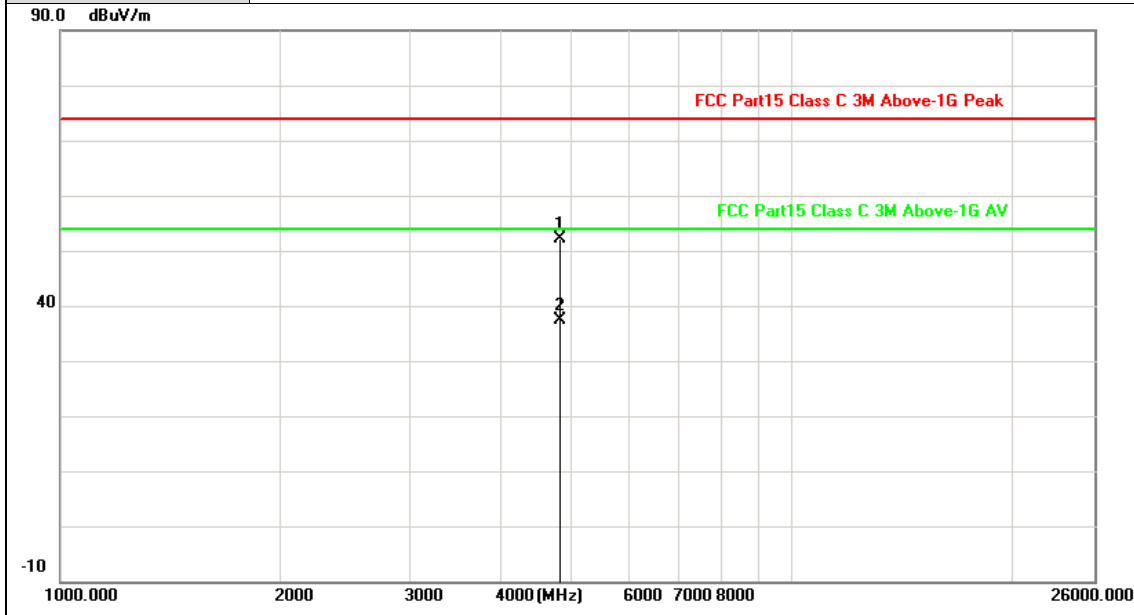
| No. | Frequency (MHz) | Factor (dB/m) | Reading (dBuV) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|---------------|----------------|----------------|----------------|-------------|----------|
| 1 | 4809.091 | 1.37 | 49.94 | 51.31 | 74.00 | -22.69 | peak |
| 2 | 4811.479 | 1.37 | 35.94 | 37.31 | 54.00 | -16.69 | AVG |

Remark:

- 1. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
- 2. Margin value = Level -Limit value



| | |
|-------------------|--|
| Ant. Pol. | Vertical |
| Test Mode: | TX Zigbee Mode 2405MHz |
| Remark: | No report for the emission which more than 10 dB below the prescribed limit. |



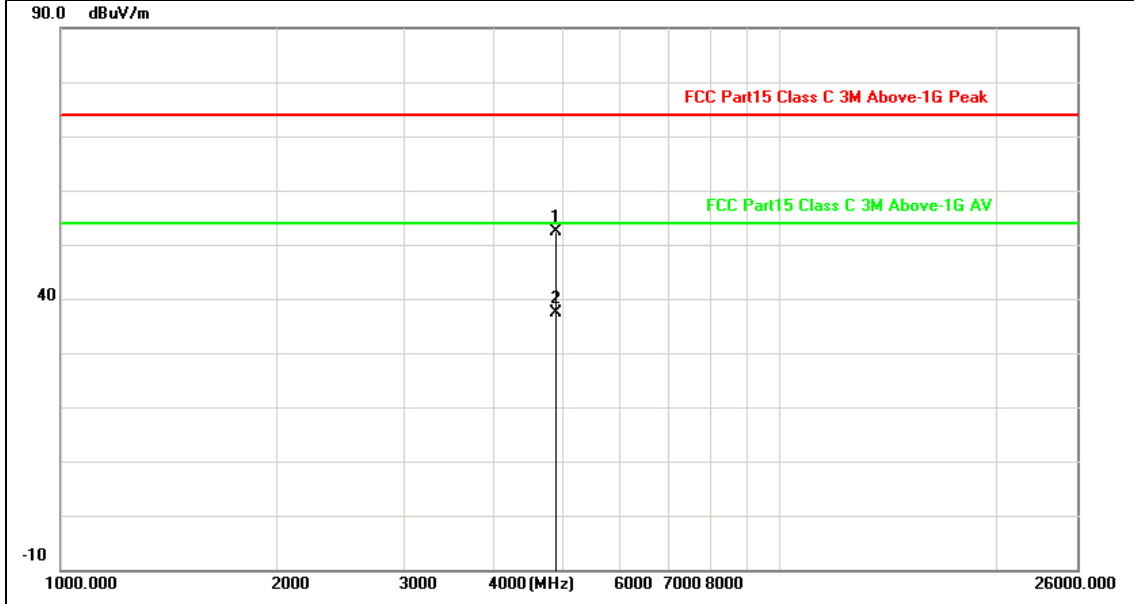
| No. | Frequency (MHz) | Factor (dB/m) | Reading (dBuV) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----|-----------------|---------------|----------------|----------------|----------------|-------------|
| 1 | 4809.720 | 1.37 | 50.70 | 52.07 | 74.00 | -21.93 |
| 2 | 4809.225 | 1.37 | 35.94 | 37.31 | 54.00 | -16.69 |

Remark:

1. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2. Margin value = Level -Limit value



| | |
|-------------------|--|
| Ant. Pol. | Horizontal |
| Test Mode: | TX Zigbee Mode 2440MHz |
| Remark: | No report for the emission which more than 10 dB below the prescribed limit. |



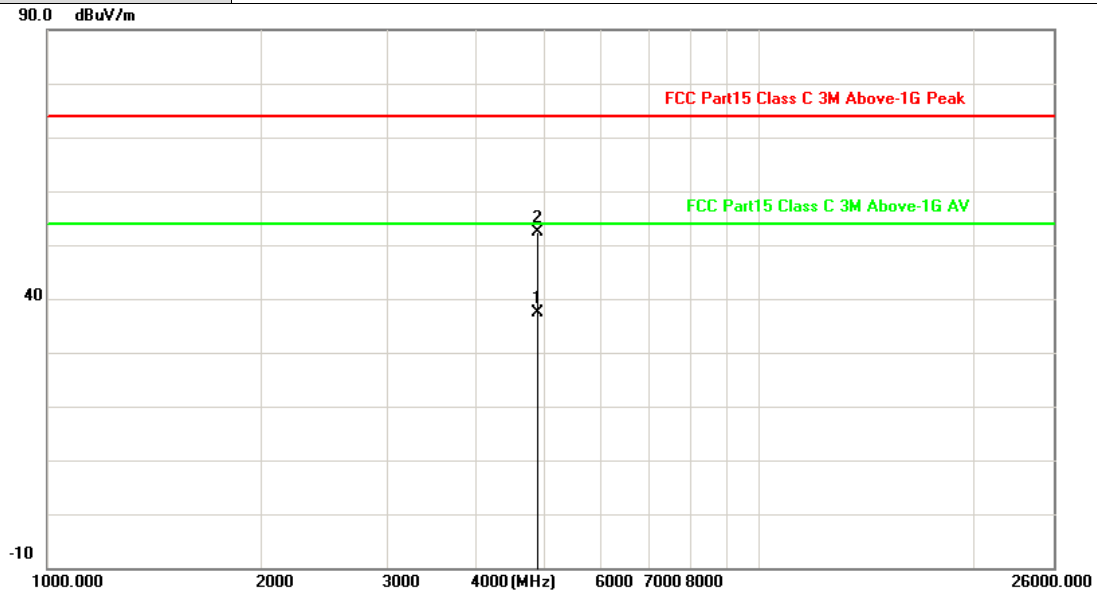
| No. | Frequency (MHz) | Factor (dB/m) | Reading (dBuV) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|---------------|----------------|----------------|----------------|-------------|----------|
| 1 | 4878.773 | 1.56 | 50.77 | 52.33 | 74.00 | -21.67 | peak |
| 2 | 4880.288 | 1.56 | 35.91 | 37.47 | 54.00 | -16.53 | AVG |

Remark:

- Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
- Margin value = Level -Limit value



| | |
|-------------------|--|
| Ant. Pol. | Vertical |
| Test Mode: | TX Zigbee Mode 2440MHz |
| Remark: | No report for the emission which more than 10 dB below the prescribed limit. |



| No. | Frequency (MHz) | Factor (dB/m) | Reading (dBuV) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|---------------|----------------|----------------|----------------|-------------|----------|
| 1 | 4880.755 | 1.56 | 35.91 | 37.47 | 54.00 | -16.53 | AVG |
| 2 | 4881.755 | 1.56 | 50.72 | 52.28 | 74.00 | -21.72 | peak |

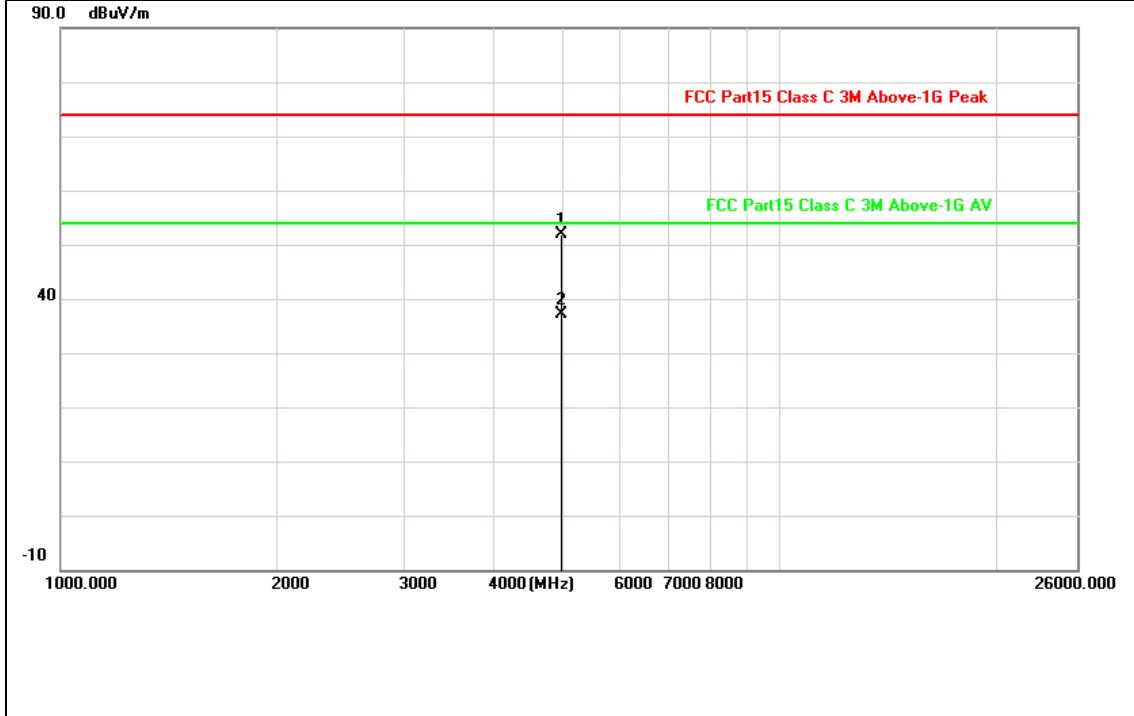
Remark:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor

2. Margin value = Level - Limit value



| | |
|-------------------|--|
| Ant. Pol. | Horizontal |
| Test Mode: | TX Zigbee Mode 2480MHz |
| Remark: | No report for the emission which more than 10 dB below the prescribed limit. |



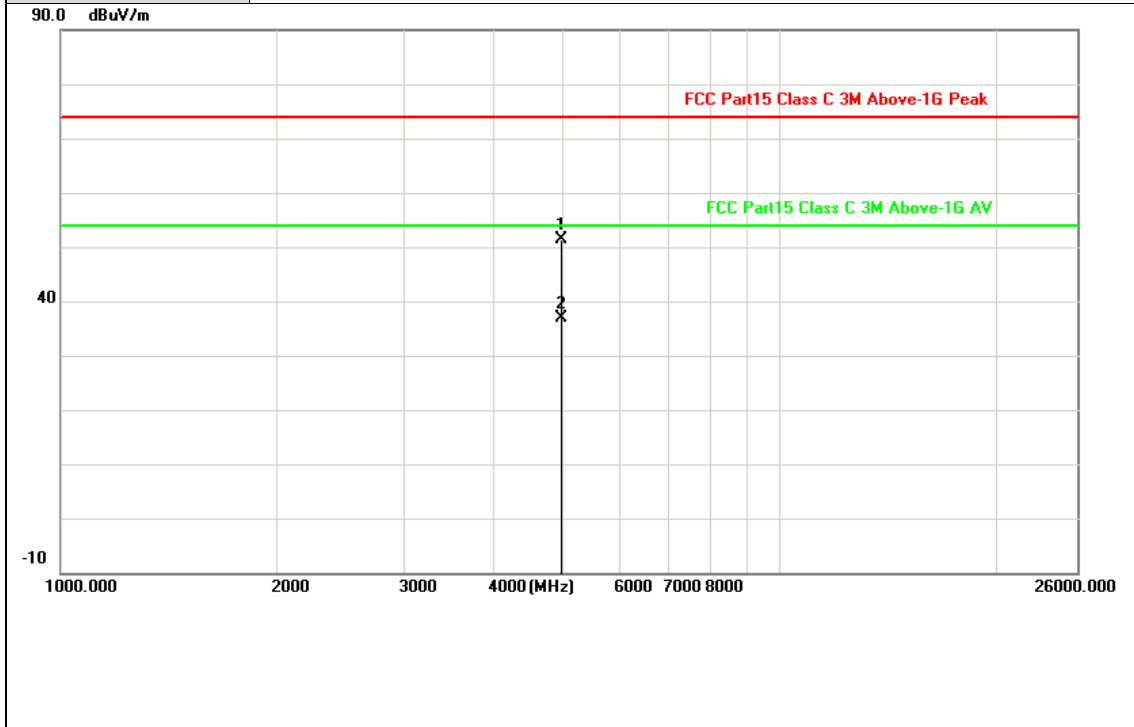
| No. | Frequency (MHz) | Factor (dB/m) | Reading (dBuV) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|---------------|----------------|----------------|----------------|-------------|----------|
| 1 | 4958.785 | 1.78 | 50.10 | 51.88 | 74.00 | -22.12 | peak |
| 2 | 4958.857 | 1.78 | 35.34 | 37.12 | 54.00 | -16.88 | AVG |

Remark:

- Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
- Margin value = Level -Limit value



| | |
|-------------------|--|
| Ant. Pol. | Vertical |
| Test Mode: | TX Zigbee Mode 2480MHz |
| Remark: | No report for the emission which more than 10 dB below the prescribed limit. |



| No. | Frequency (MHz) | Factor (dB/m) | Reading (dBuV) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|---------------|----------------|----------------|----------------|-------------|----------|
| 1 | 4957.905 | 1.78 | 49.68 | 51.46 | 74.00 | -22.54 | peak |
| 2 | 4961.375 | 1.78 | 35.17 | 36.95 | 54.00 | -17.05 | AVG |

Remark:

- Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
- Margin value = Level -Limit value

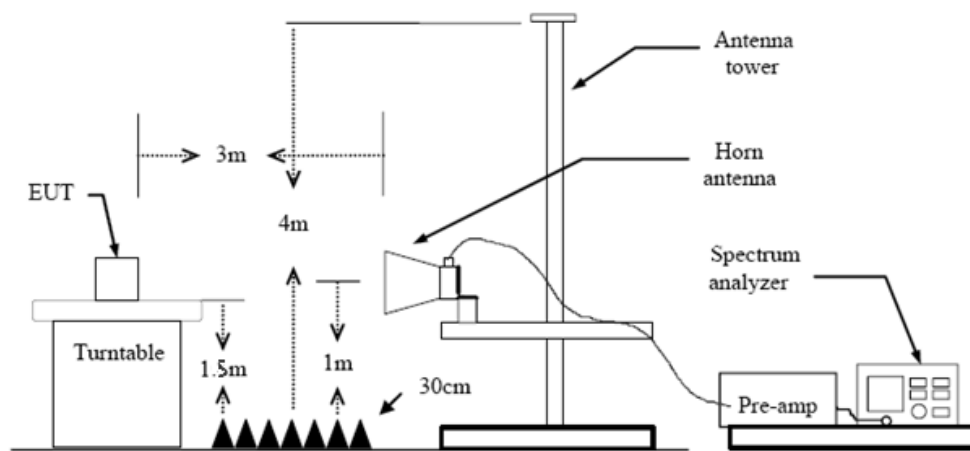
3.3. Band Edge Emissions

Limit

| Restricted Frequency Band (MHz) | (dBuV/m)(at 3m) | |
|---------------------------------|-----------------|---------|
| | Peak | Average |
| 2310 ~2390 | 74 | 54 |
| 2483.5 ~2500 | 74 | 54 |

Note: All restriction bands have been tested, only the worst case is reported.

Test Configuration



Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:
 RBW=1MHz, VBW=3MHz PEAK detector for Peak value.
 RBW=1MHz, VBW=10Hz with PEAK Detector for Average Value.

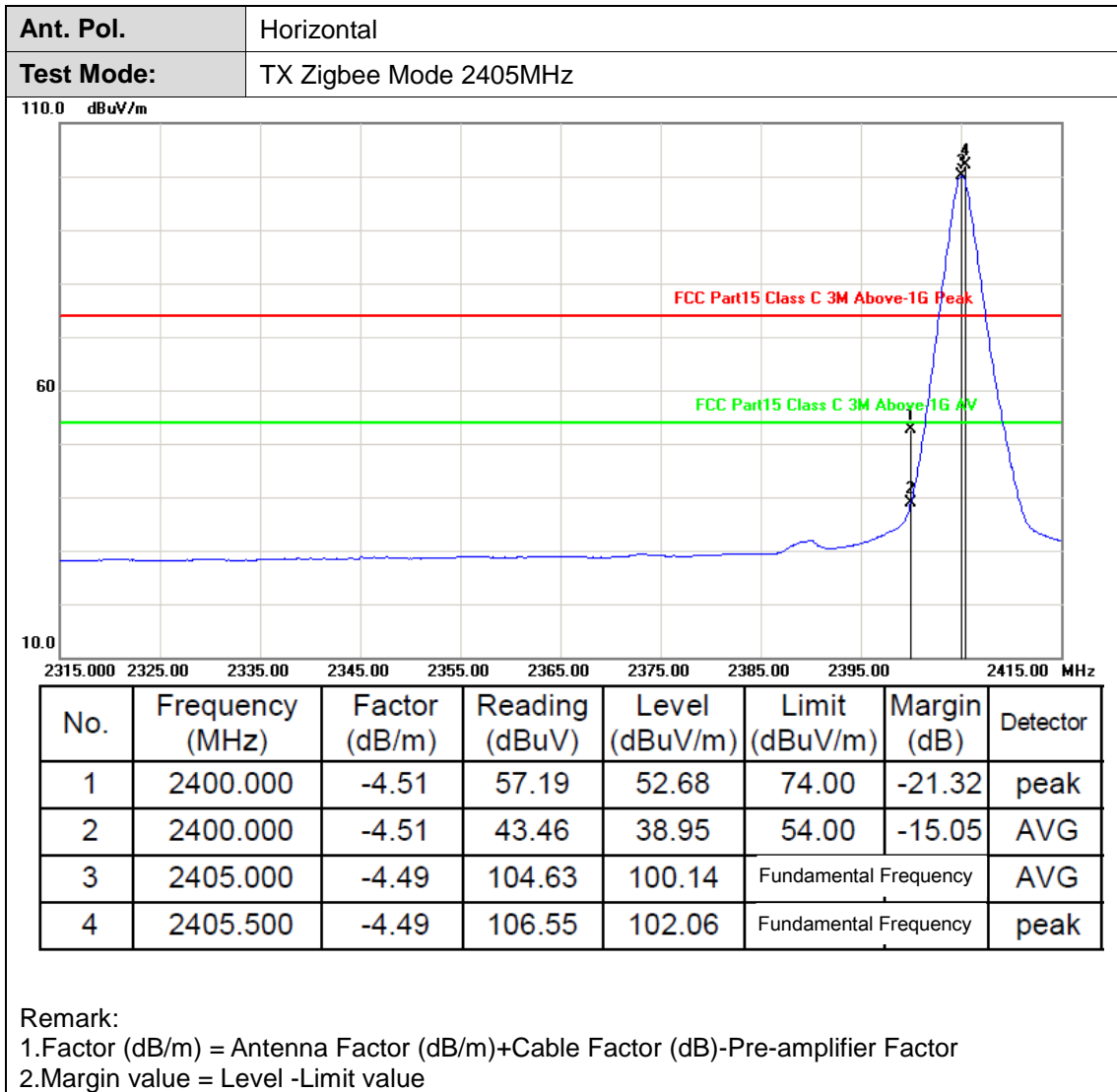
Test Mode

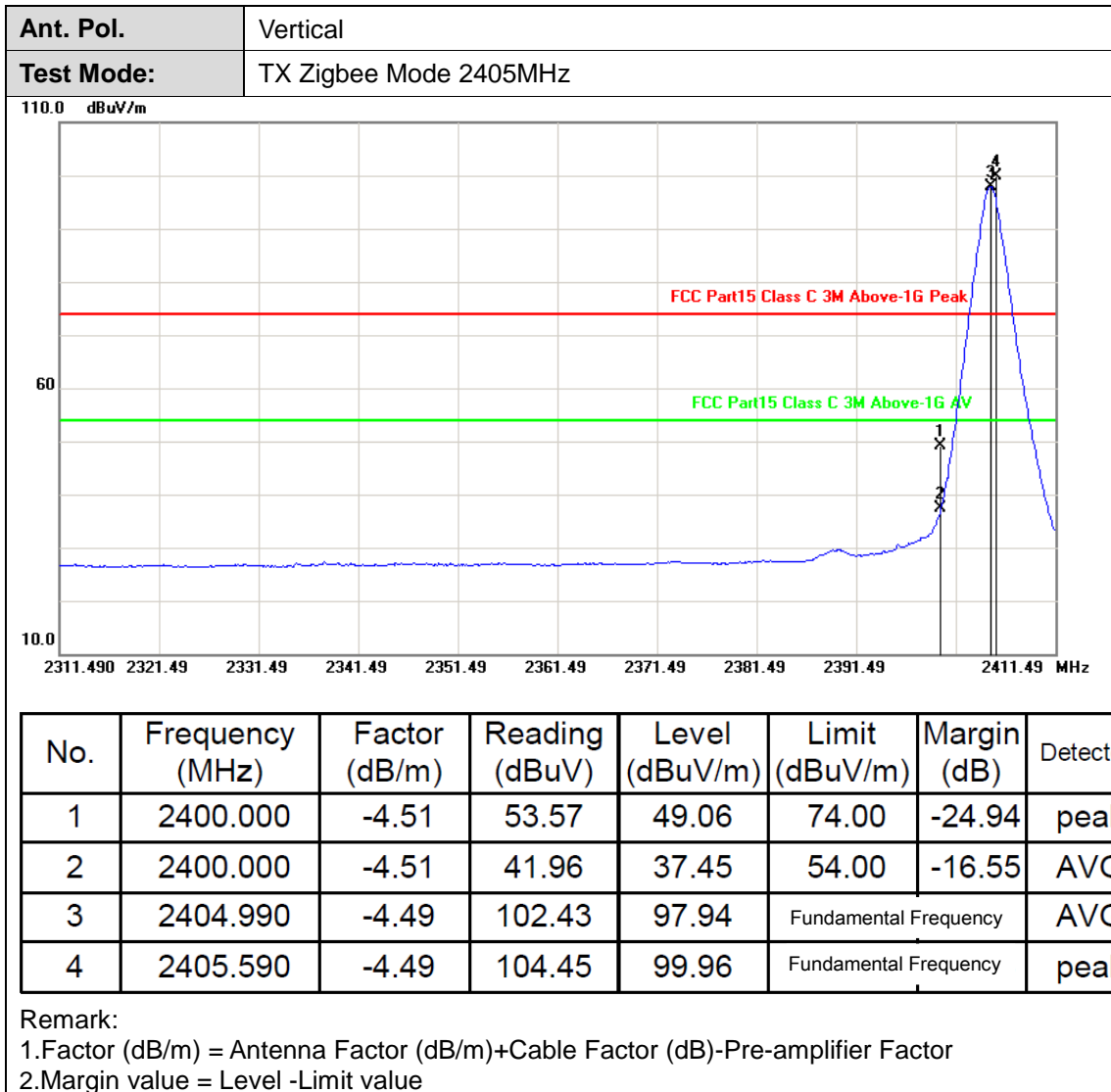
Please refer to the clause 2.3.

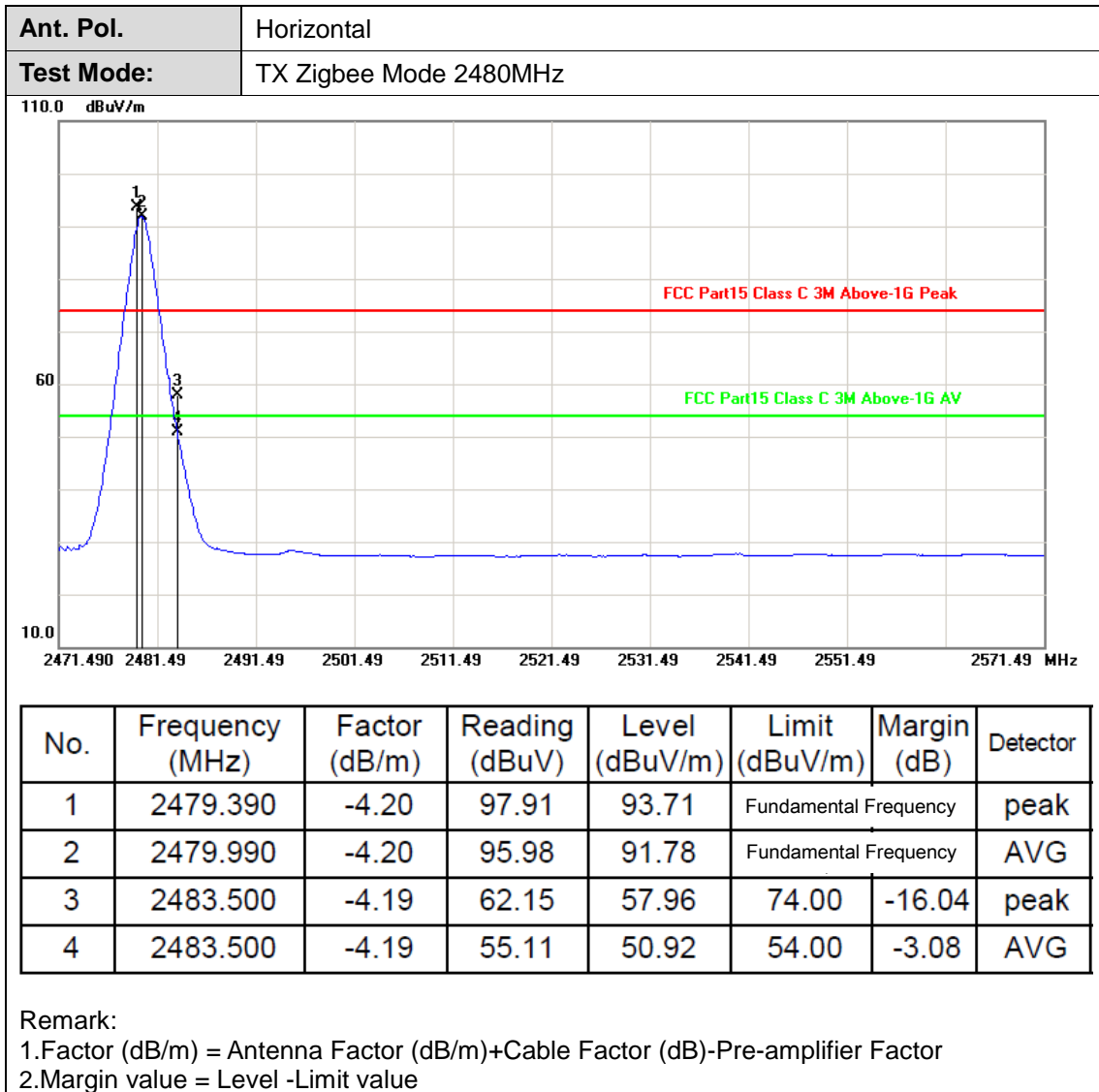
Test Results

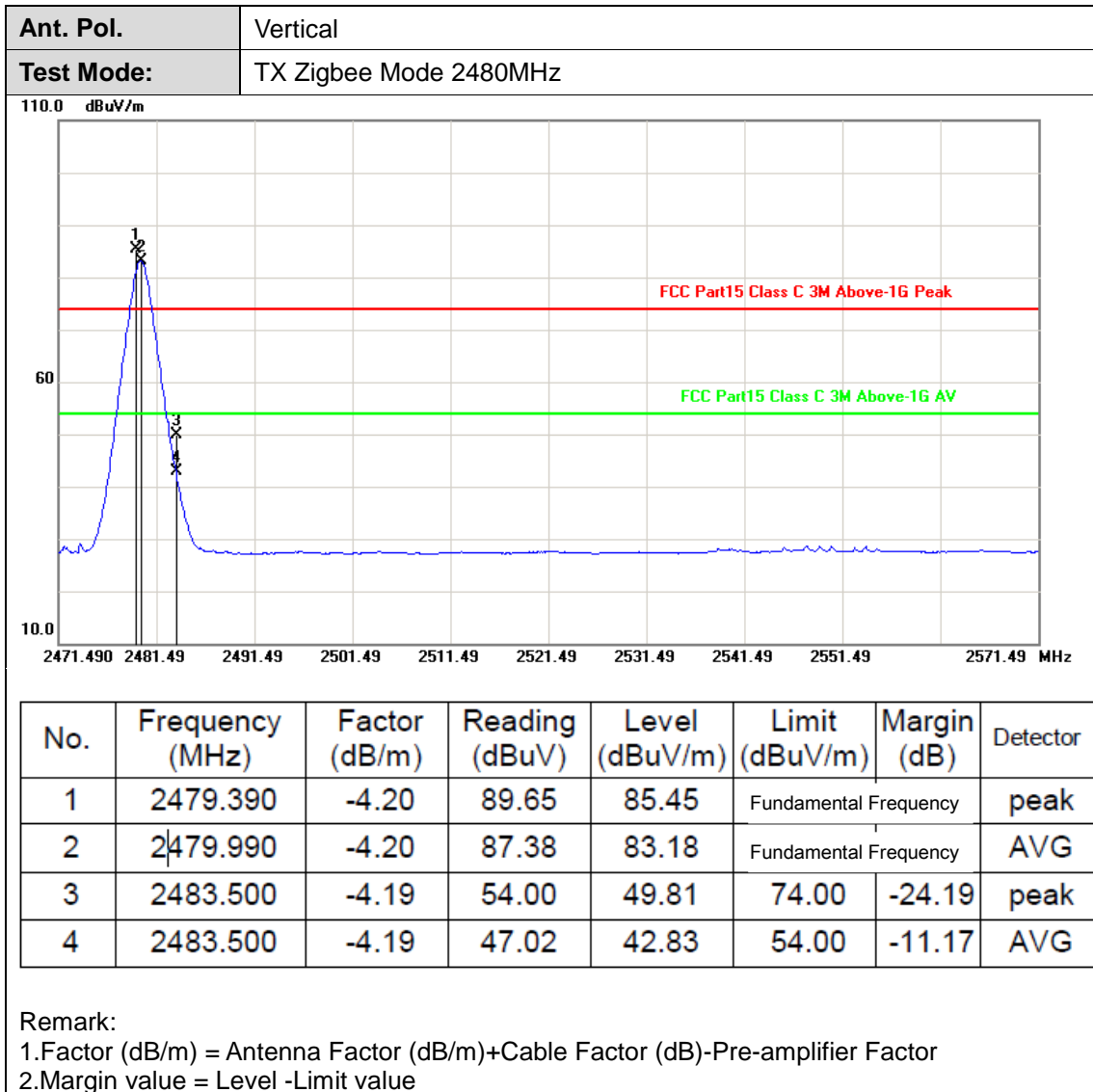


(1) Radiation Test



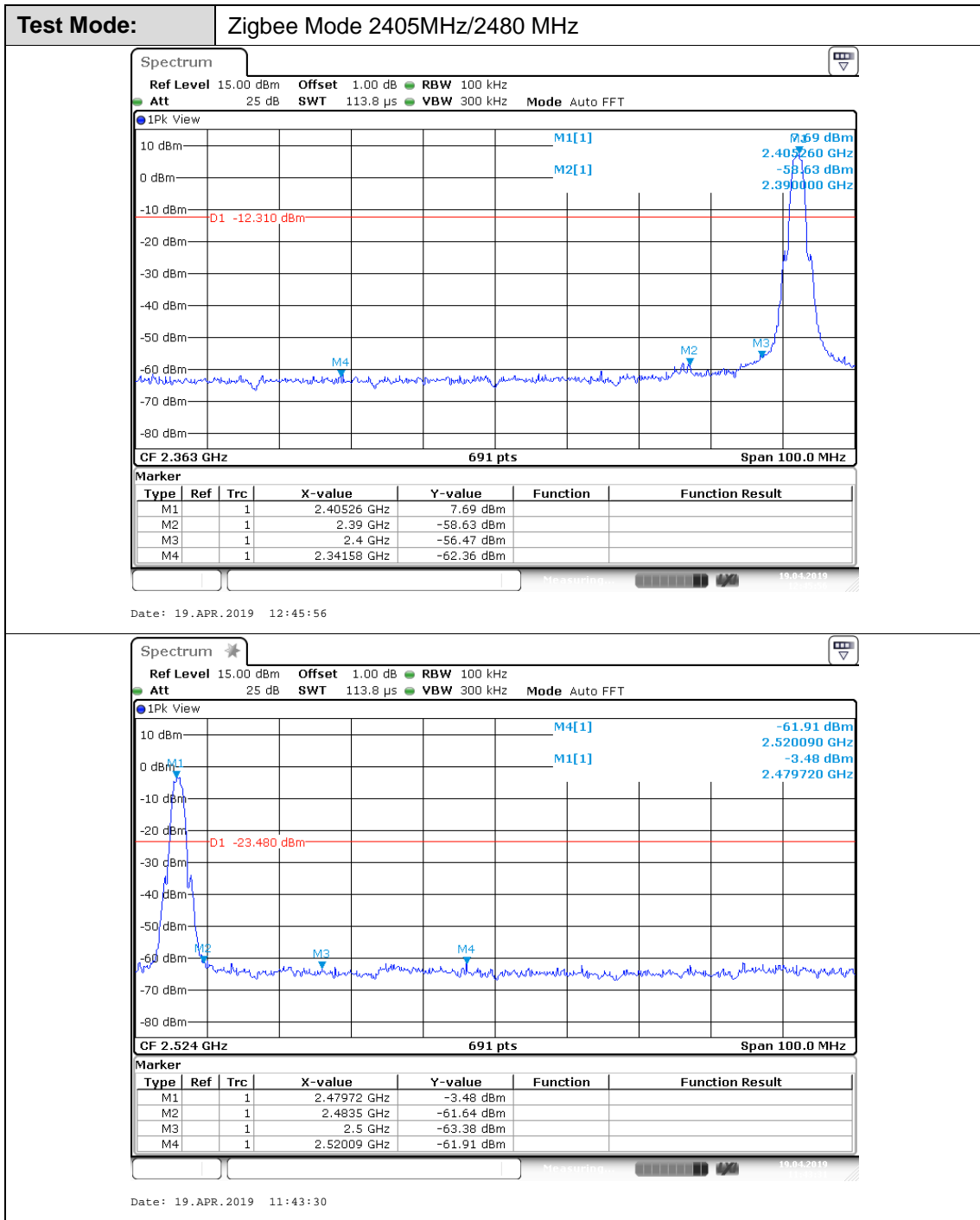








(2) Conducted Test



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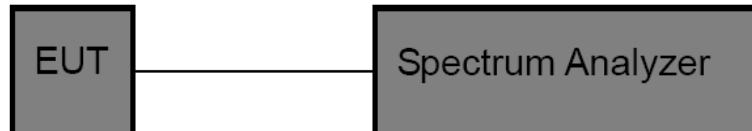
For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : yz.cncaic.cn

3.4. Bandwidth

Limit

| Test Item | Limit | Frequency Range(MHz) |
|-----------|-----------------------------------|----------------------|
| Bandwidth | ≥ 500 KHz (6dB bandwidth) | 2400~2483.5 |

Test Configuration



Test Procedure

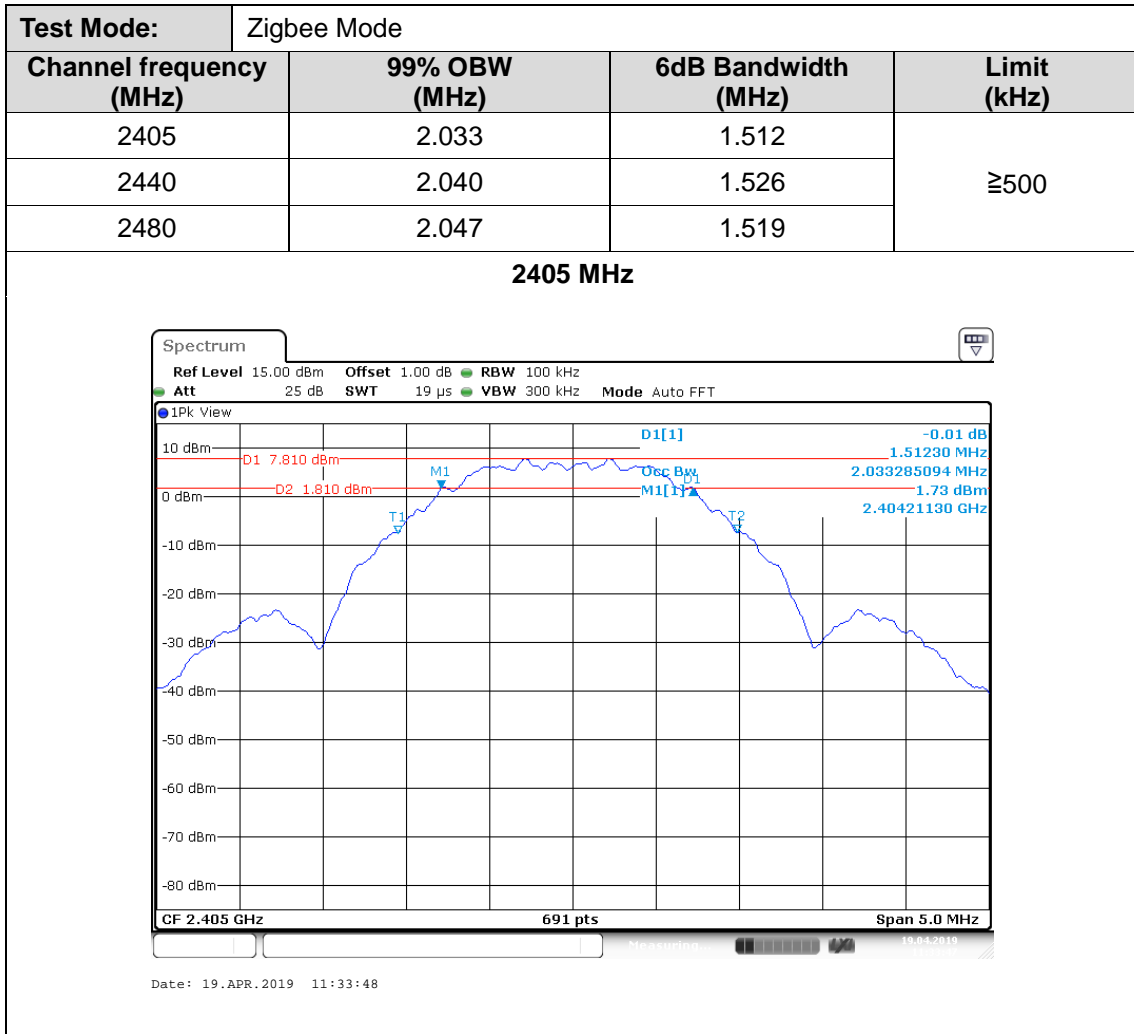
1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
Set RBW = 100 kHz.
Set the video bandwidth (VBW) ≥ 3 RBW.
Detector = Peak.
Trace mode = Max hold.
Sweep = Auto couple.

NOTE: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

Test Mode

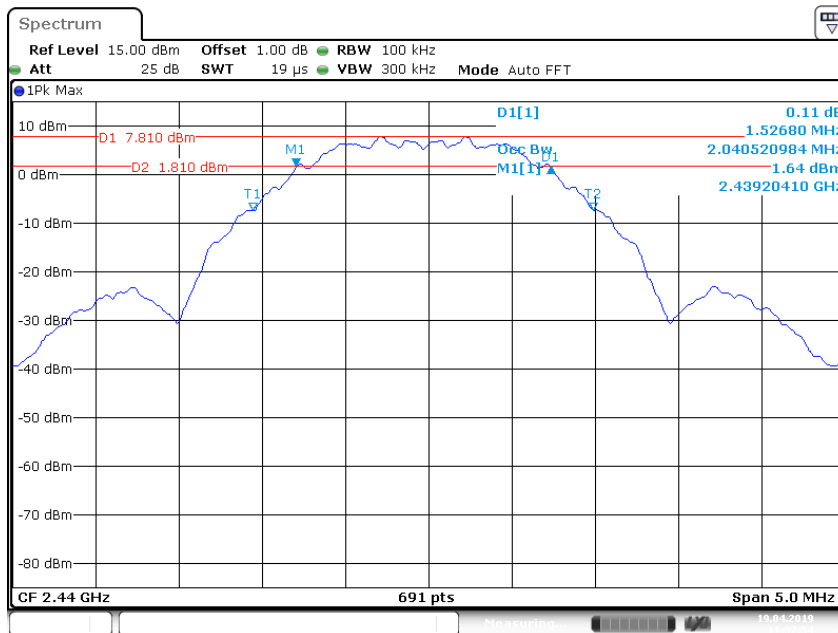
Please refer to the clause 2.3.

Test Results



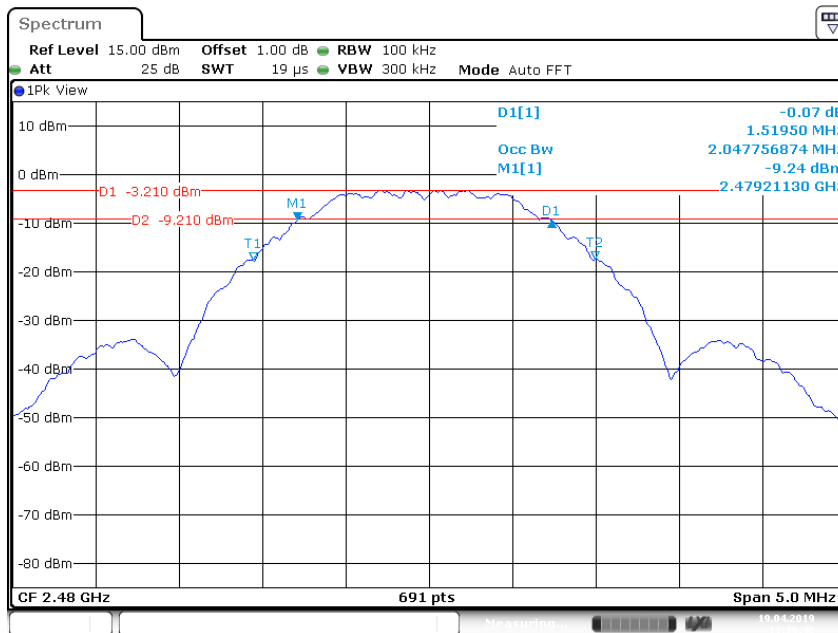


2440 MHz



Date: 19. APR. 2019 11:37:54

2480 MHz



Date: 19. APR. 2019 11:39:40

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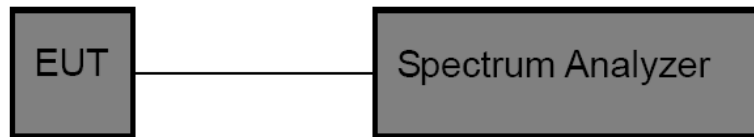
For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : yz.cncaic.cn

3.5. Peak Output Power

Limit

| | Test Item | Limit | Frequency Range(MHz) |
|---|--------------------------------|-----------------|----------------------|
| CFR 47 FCC 15.247(b)(3) ISED RSS-247 5.4 | Maximum conducted output power | 1 Watt or 30dBm | 2400~2483.5 |
| ISED RSS-247 5.4 | EIRP | 4 Watt or 36dBm | 2400~2483.5 |

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
 Peak Detector: $RBW \geq DTS$ Bandwidth, $VBW \geq 3 * RBW$.
 Sweep time=Auto.
 Detector= Peak.
 Trace mode= Maxhold.
 Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

Test Mode

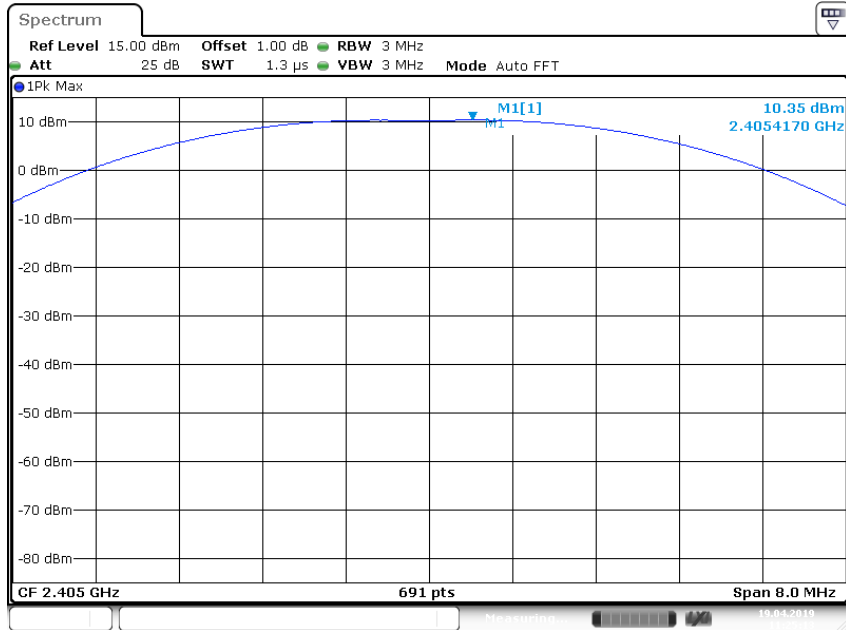
Please refer to the clause 2.3

Test Result

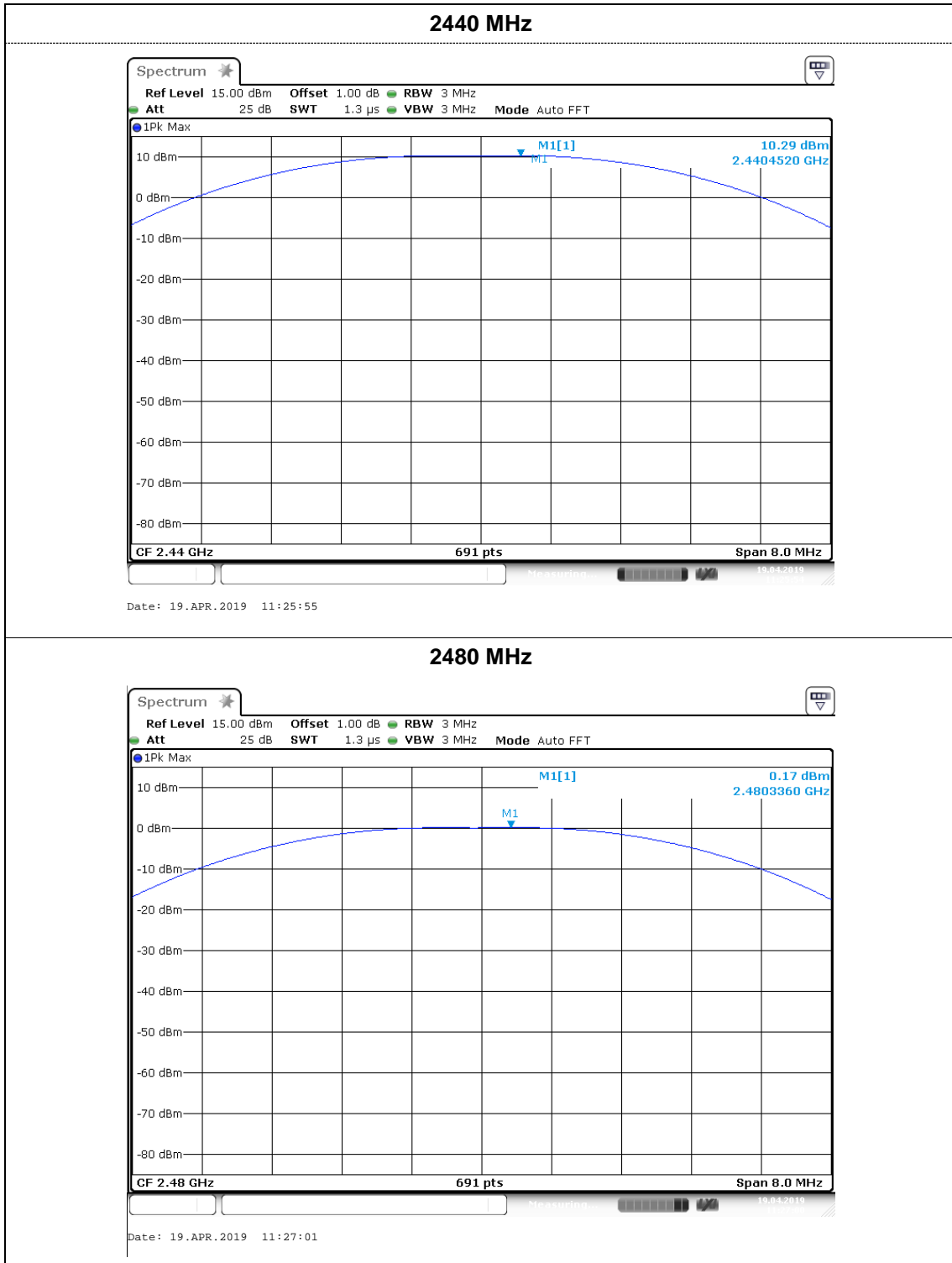


| Test Mode: | Zigbee Mode | |
|-------------------------|--------------------------------------|-----------|
| Channel frequency (MHz) | Maximum conducted output power (dBm) | EIRP(dBm) |
| 2405 | 10.35 | 12.35 |
| 2440 | 10.29 | 12.29 |
| 2480 | 0.17 | 2.17 |

2405 MHz



Date: 19.APR.2019 11:25:13



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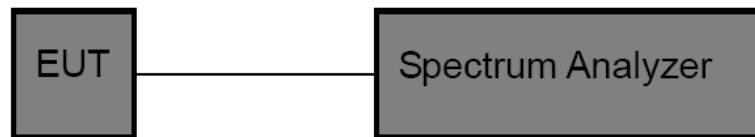
For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : yz.cncaic.cn

3.6. Power Spectral Density

Limit

| FCC Part 15 Subpart C(15.247) | | |
|-------------------------------|--------------------|----------------------|
| Test Item | Limit | Frequency Range(MHz) |
| Power Spectral Density | 8dBm(in any 3 kHz) | 2400~2483.5 |

Test Configuration



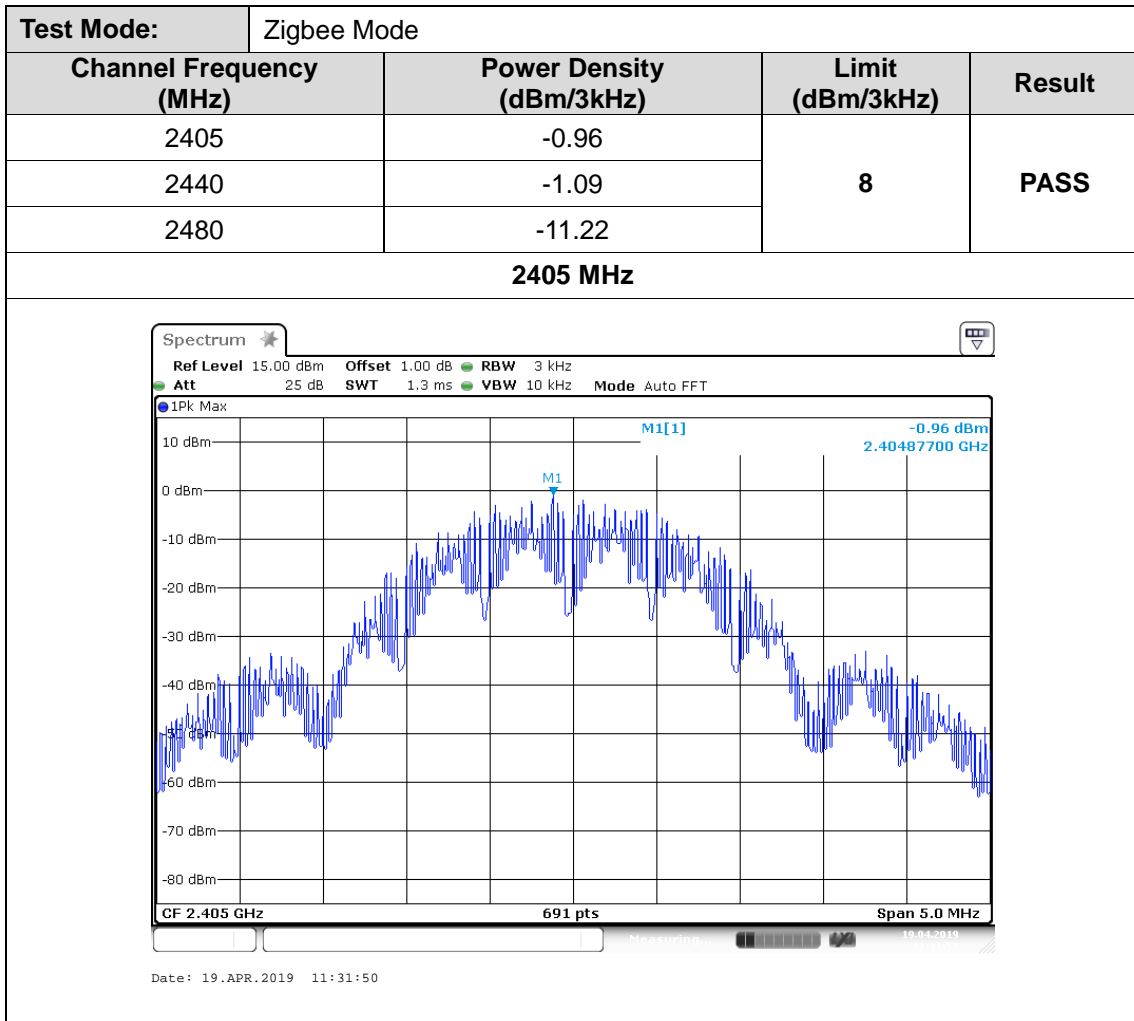
Test Procedure

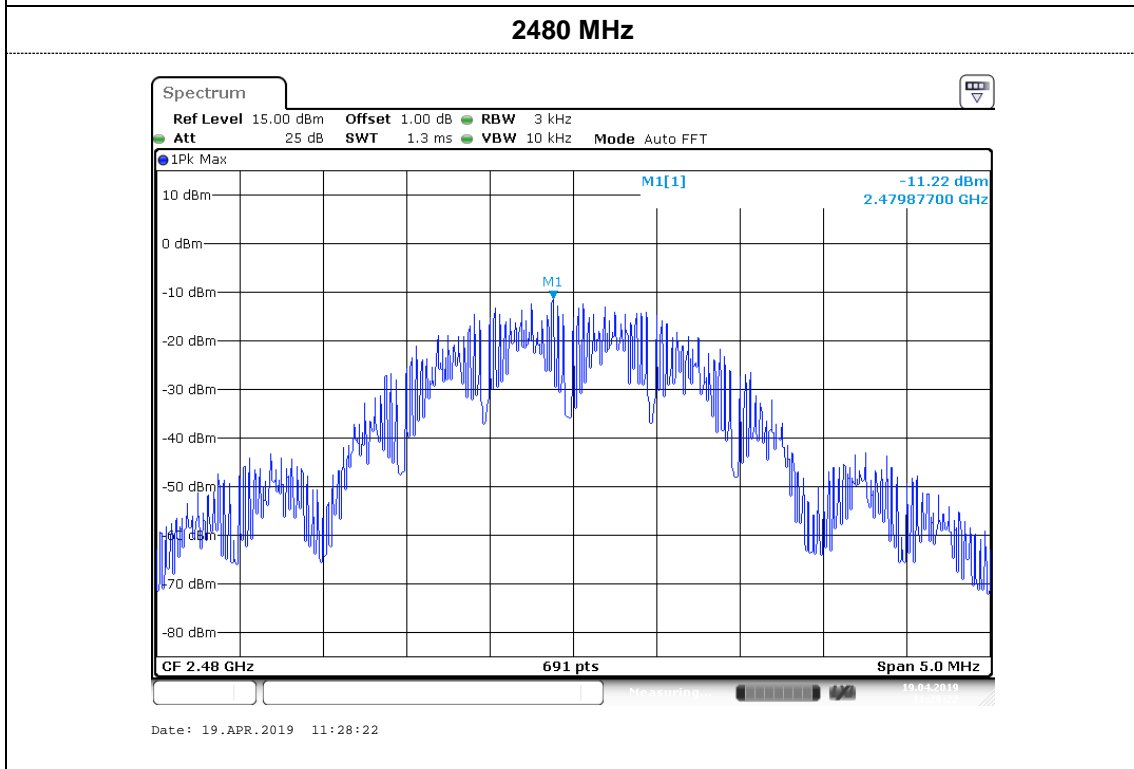
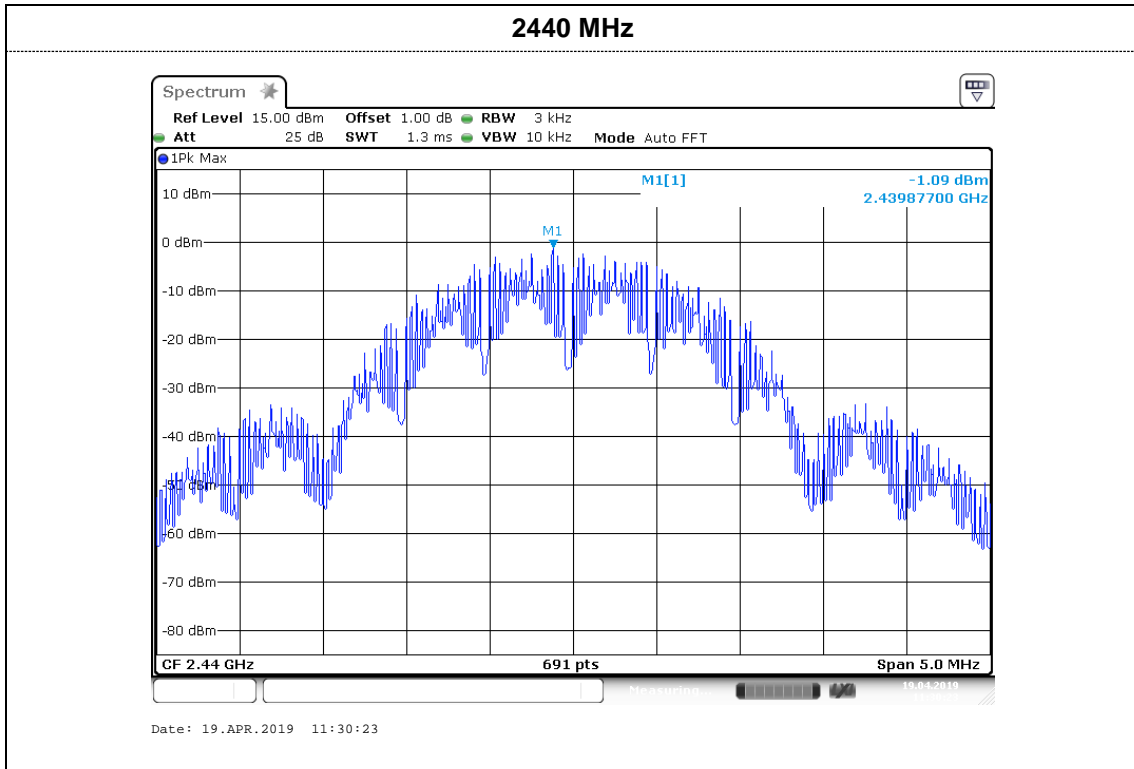
1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v04.
3. Spectrum Setting:
 - Set analyser center frequency to DTS channel center frequency.
 - Set the span to 1.5 times the DTS bandwidth.
 - Set the RBW to: 3 kHz
 - Set the VBW to: 10 kHz
 - Detector: peak
 - Sweep time: autoAllow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

Test Mode

Please refer to the clause 2.3

Test Result





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3.7. Antenna requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C 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. The use of a permanently attached antenna or of antenna that uses a unique coupling to the intentional radiator, 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.

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

Test Result

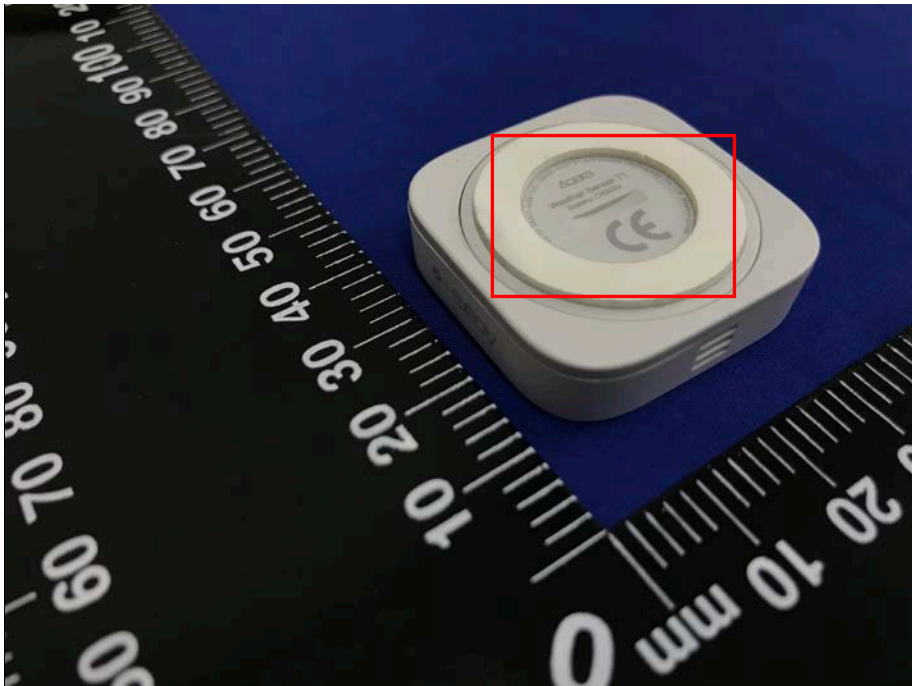
The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.

4. LABEL AND LABEL LOCATION

Label

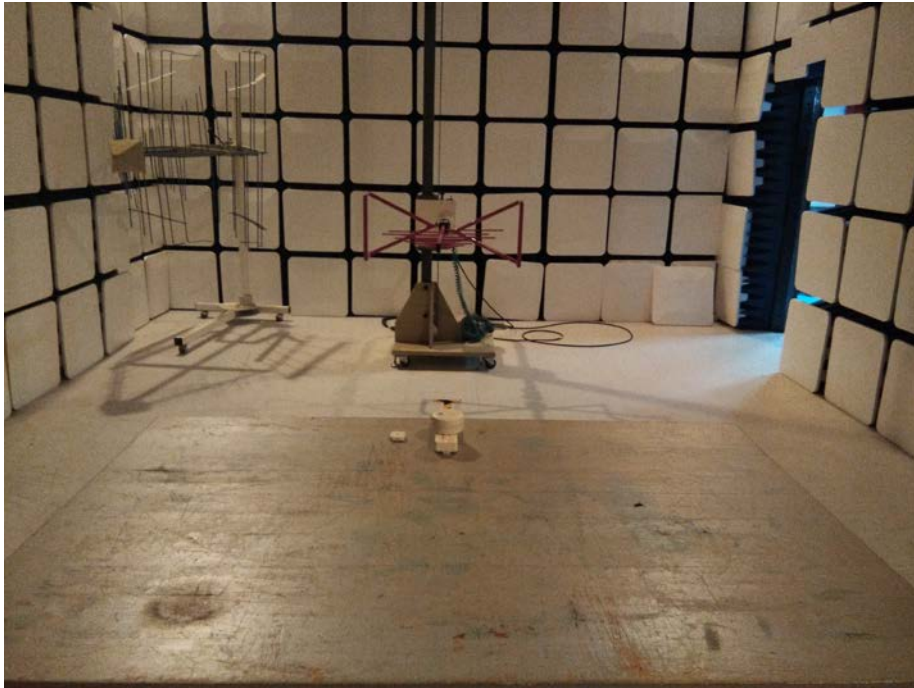


Label Location

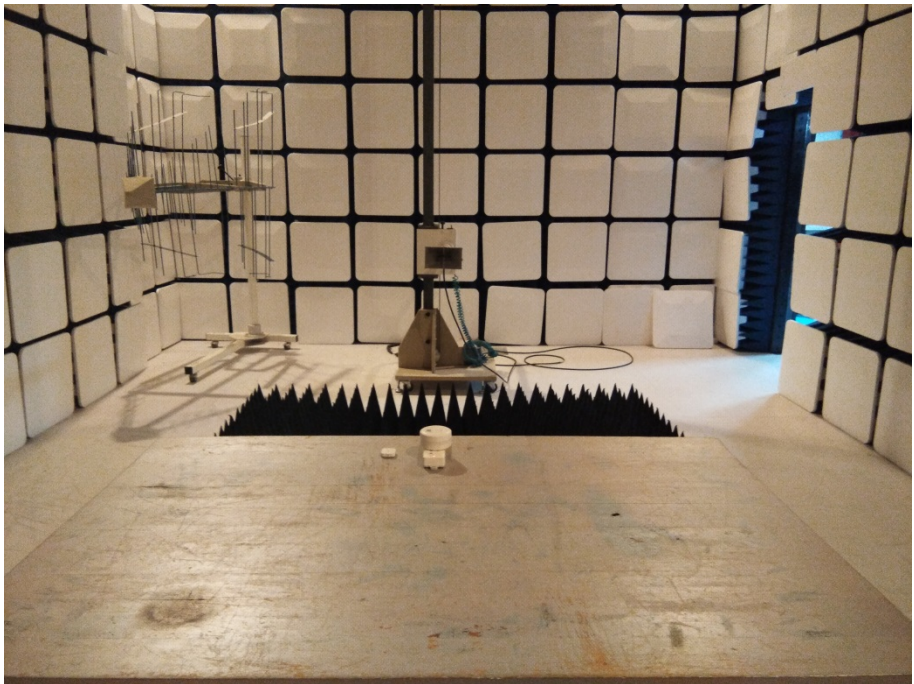


5.EUT TEST PHOTOS

Radiated Emission

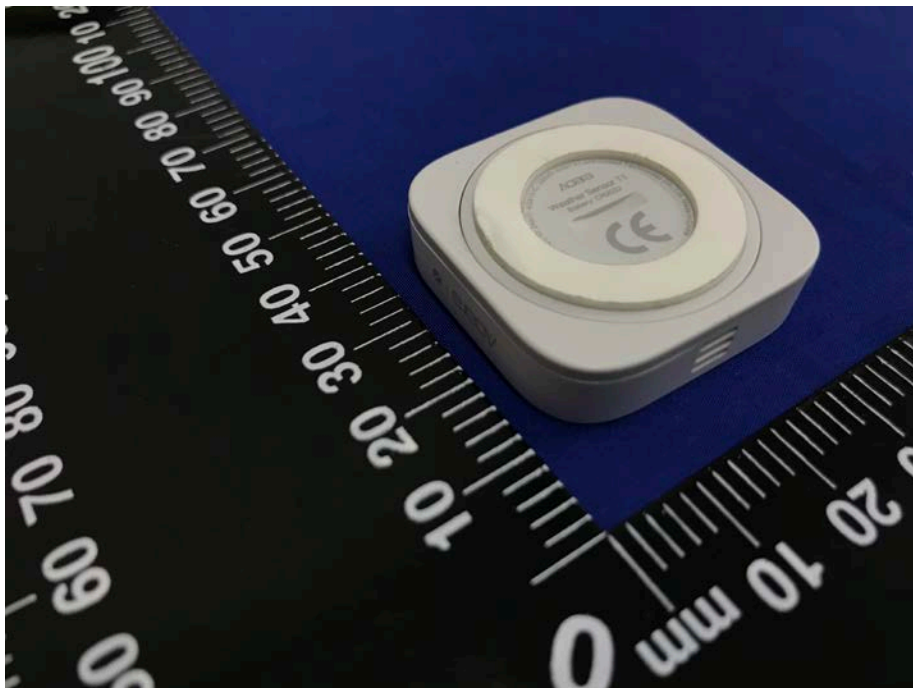


Below 1G

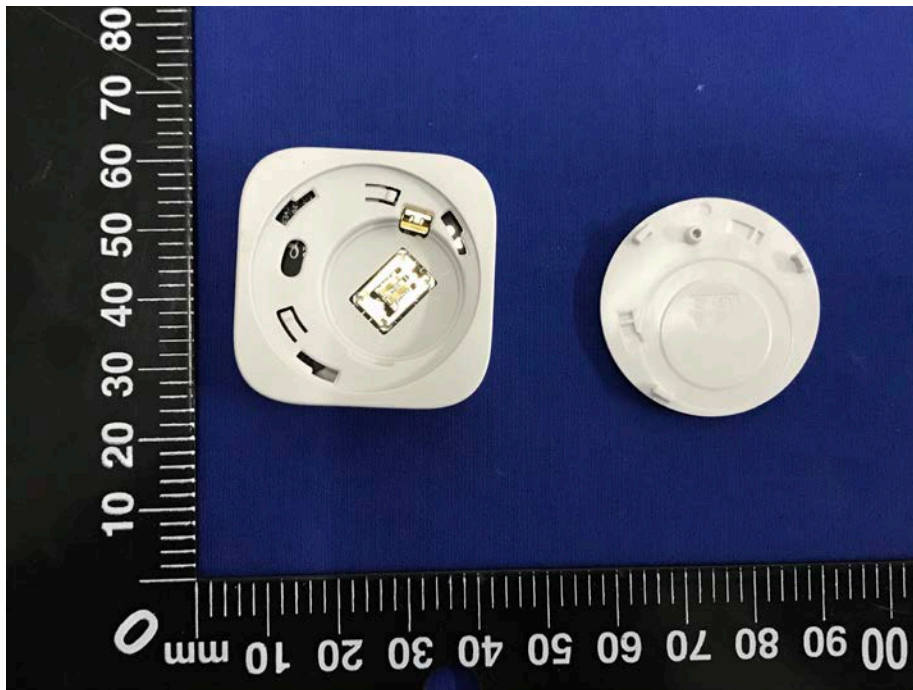
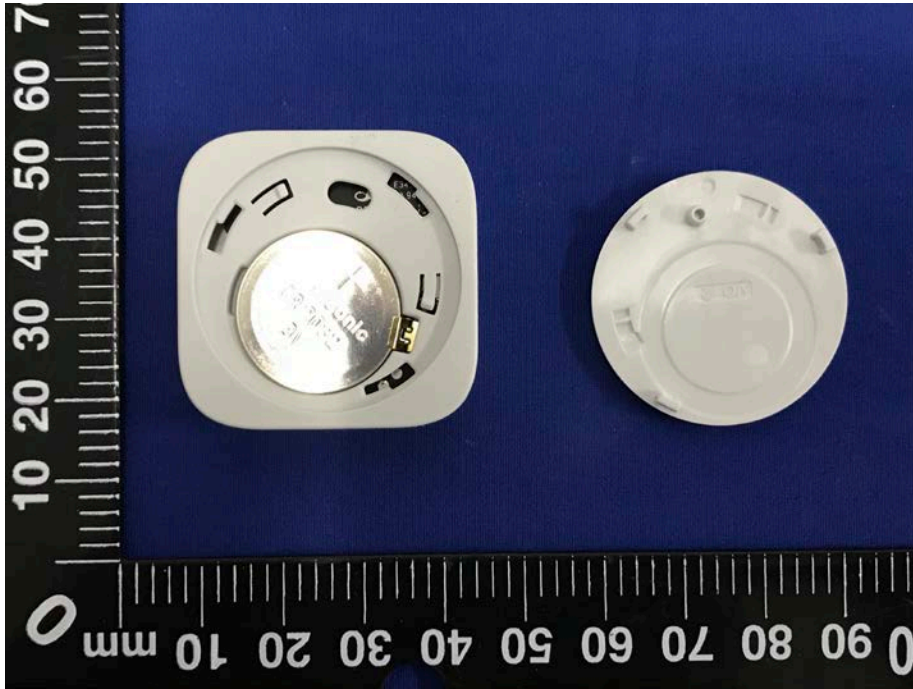


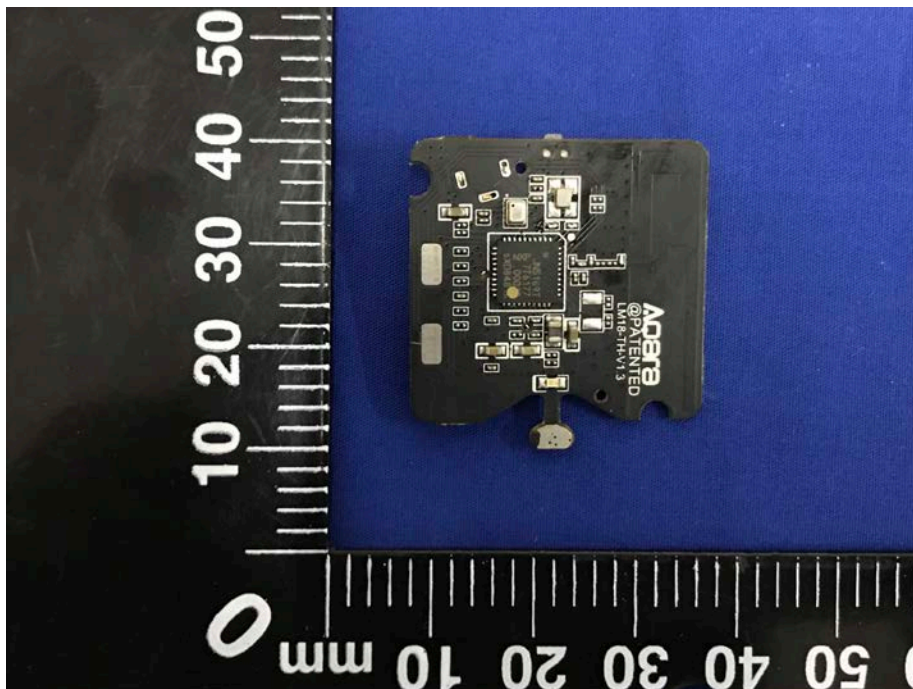
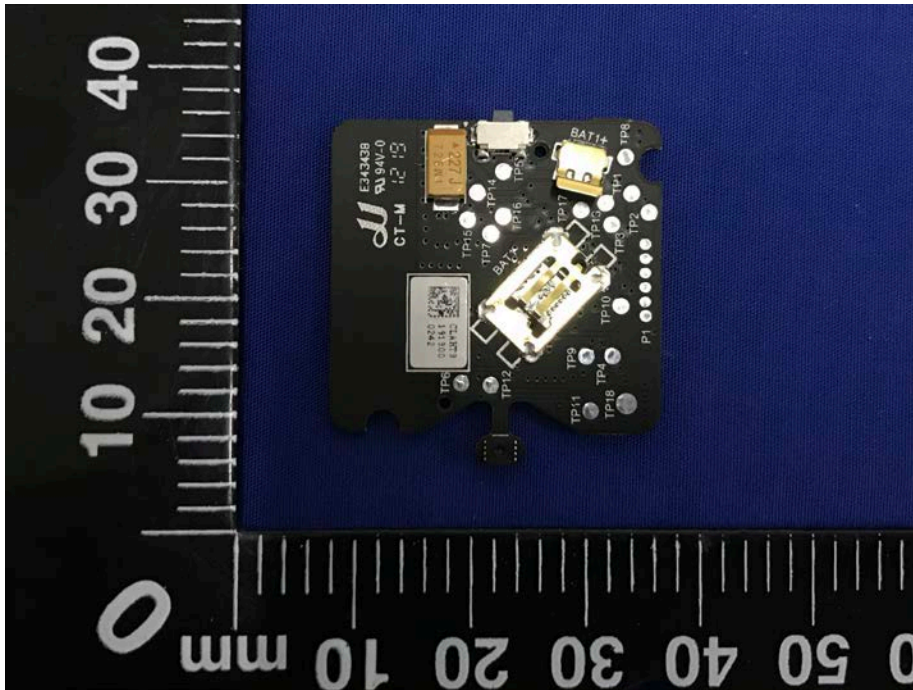
6. PHOTOGRAPHS OF EUT CONSTRUCTIONAL

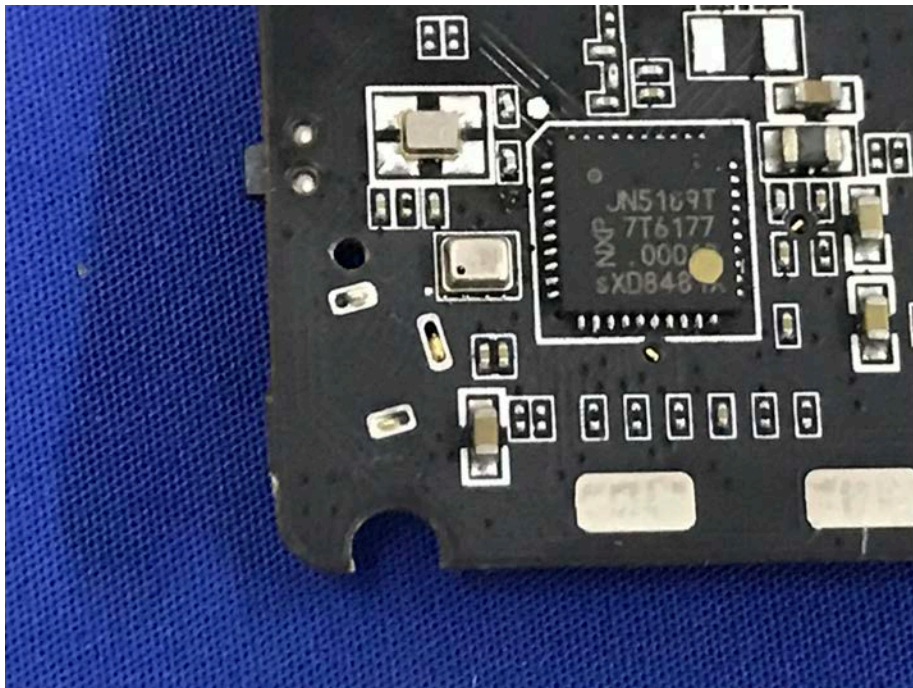
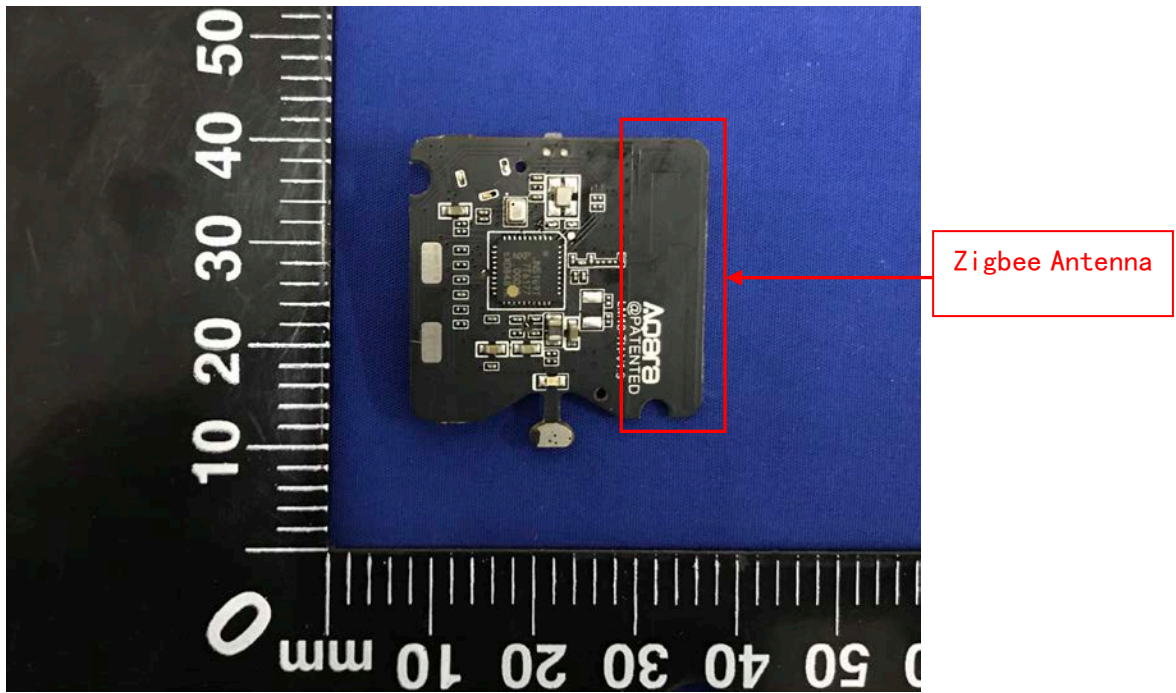
External Photographs



Internal Photographs







*****THE END*****