

Japan Radio Law TEST REPORT

SHENZHEN MTC LUX CO., LTD.

Smart LED Ceiling Light

Model No.: WMCDCM47-040T126UT-08F; WMCDCM47-40

Prepared for : SHENZHEN MTC LUX CO., LTD.

A15, 11/F, Building F, West Sea Pearl Garden, Xitaoyuan  
Road South, Nanhai Avenue, Nantou Street, Nanshan  
District, Shenzhen City, Guangdong Province, P.R.China

Prepared by : Audix Technology (Shenzhen) Co., Ltd.

No. 6, Kefeng Road, Science & Technology Park,  
Nanshan District , Shenzhen, Guangdong, China

Tel: (0755) 26639496

Fax: (0755) 26632877



Report Number : ACS-P19151  
Date of Test : Oct.18,2019  
Date of Report : Nov.06,2019

## TABLE OF CONTENTS

| DESCRIPTION                                                                             | Page |
|-----------------------------------------------------------------------------------------|------|
| TEST REPORT VERIFICATION .....                                                          | 3    |
| 1. SUMMARY OF MEASUREMENTS AND RESULTS .....                                            | 5    |
| 1.1. Summary of test result .....                                                       | 5    |
| 2. GENERAL INFORMATION .....                                                            | 6    |
| 2.1. Description of Equipment Under Test .....                                          | 6    |
| 2.2. Feature of Equipment Under Test .....                                              | 7    |
| 2.3. Block Diagram of Test Setup .....                                                  | 8    |
| 2.4. Test Information .....                                                             | 9    |
| 2.5. Test Equipments .....                                                              | 10   |
| 2.6. Description of Test Facility .....                                                 | 11   |
| 2.7. Measurement Uncertainty (95% confidence levels, $k=2$ ) .....                      | 11   |
| 3. MEASUREMENTS OF TRANSMITTER PARAMETERS .....                                         | 12   |
| 3.1. Antenna Power .....                                                                | 12   |
| 3.2. Frequency Tolerance .....                                                          | 14   |
| 3.3. Occupied Bandwidth and Spread-spectrum Bandwidth / Spread Factor Measurement ..... | 15   |
| 3.4. Transmitter Spurious Emissions (Conducted) .....                                   | 16   |
| 3.5. Carrier sense function .....                                                       | 17   |
| 4. MEASUREMENTS OF RECEIVER PARAMETERS .....                                            | 18   |
| 4.1. Secondary Radiated Emissions (Conducted) .....                                     | 18   |
| 5. MEASUREMENT OF OTHER PARAMETERS .....                                                | 19   |
| 5.1. Interference Prevention Function .....                                             | 19   |
| 5.2. Construction Protection .....                                                      | 20   |

Appendix A. Setup Photographs

Appendix B. Test Results

Appendix C. Test Plots

Appendix D. Photographs of EUT

# TEST REPORT VERIFICATION

Applicant : SHENZHEN MTC LUX CO., LTD.  
 Product : Smart LED Ceiling Light  
 Model No. : WMCDCM47-Q49T126JLT-08F-WMCDCM47-40  
 Test Voltage : AC 100V/50Hz

## Measurement Standards Used:

註用規則第2条第1項第19号に掲げる無線設備 別表第四十三  
 2.4GHz 帯高周波小電力データ通信システム(2.400~2.483.5MHz)

The device described above is tested by AUDIX Technology Corporation. The measurement results were contained in this test report and AUDIX Technology Corporation was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with Article 49.20 and the relevant Articles in Ordinance Regulating Radio Equipment, and the device has been measured in accordance with the test method given in MIC notice No.88 Appendix No.43, or surpasses or is equal to the test method.

This report applies to above tested sample only and shall not be reproduced in part without written approval of AUDIX Technology Corporation.

Date of Test : Oct.18,2019 Report of date: Nov.06,2019

Prepared by : *Brave Zhang* Reviewed by : *Sunny Lu* / Deputy Manager  
 Brave Zhang / Assistant Sunny Lu / Deputy Manager



Approved & Authorized Signer: *David Jia*  
 David Jia / Manager

# REPORT REVISION HISTORY

| Edition No. | Revision                | Issue Data  | Report No. |
|-------------|-------------------------|-------------|------------|
| Rev.01      | Initial issue of report | Nov.06,2019 | ACS-P19151 |

## 1. SUMMARY OF MEASUREMENTS AND RESULTS

### 1.1. Summary of test result

| CLAUSE                                                                                                      | TEST PARAMETER                            | RESULTS             |
|-------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------------|
| Transmitter Parameters                                                                                      |                                           |                     |
| 3.2 (2)                                                                                                     | Antenna Power                             | PASS                |
| 3.2 (3)                                                                                                     | Tolerances for Antenna Power              | PASS                |
| 3.2 (4)                                                                                                     | Frequency Tolerance                       | PASS                |
| 3.2 (5)                                                                                                     | Transmission Rate                         | N/A                 |
| 3.2 (6)                                                                                                     | Spurious Emissions                        | PASS                |
| 3.2 (7)                                                                                                     | Occupied Frequency Bandwidth              | PASS                |
| 3.2 (8)                                                                                                     | Spread-spectrum Bandwidth / Spread Factor | PASS                |
| 3.2 (9)                                                                                                     | Number of Carriers                        | N/A                 |
| 3.2 (10)                                                                                                    | Dwell Time                                | N/A                 |
| Receiver Parameters                                                                                         |                                           |                     |
| 3.3 (1)                                                                                                     | Secondary Radiated Emissions              | PASS                |
| Other Parameters                                                                                            |                                           |                     |
| 3.4.1                                                                                                       | Interference Prevention Function          | Pass                |
| 3.4.2                                                                                                       | Construction Protection                   | Pass                |
| 3.4.3                                                                                                       | Carrier sense function                    | N/A <sup>Note</sup> |
| Note : Only Applicable for OFDM and OBW $\geq 38\text{MHz}$ .<br>N/A is an abbreviation for Not Applicable. |                                           |                     |

## 2. GENERAL INFORMATION

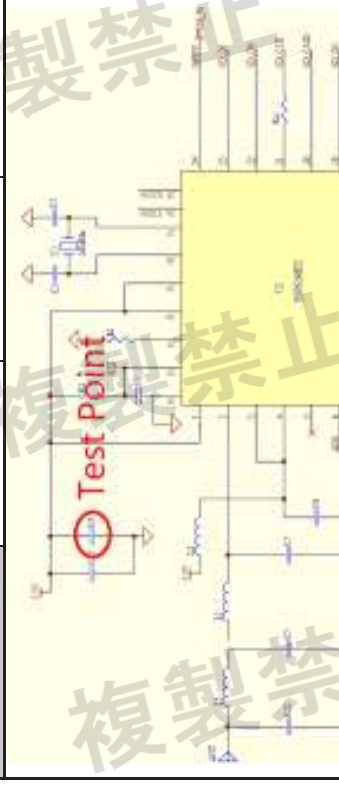
### 2.1. Description of Equipment Under Test

|                   |                                                                                                                                                                  |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant         | SHENZHEN MTC LUX CO., LTD.                                                                                                                                       |
| Applicant Address | A15, 11/F, Building F, West Sea Pearl Garden, Xitaoyuan Road South, Nantou Avenue, Nantou Street, Nanshan District, Shenzhen City, Guangdong Province, P.R.China |
| Product           | Smart LED Ceiling Light                                                                                                                                          |
| Model No.         | WMCDCM47-040T126UT-08F; WMCDCM47-40                                                                                                                              |
| Test Model        | Only the model name is different.                                                                                                                                |
| Rating Power      | WMCDCM47-040T126UT-08F                                                                                                                                           |
| Sample Type       | 40W                                                                                                                                                              |
| Date of Receipt   | Prototype production                                                                                                                                             |
| Date of Test      | Oct.14,2019                                                                                                                                                      |
|                   | Oct.18,2019                                                                                                                                                      |

## 2.2. Feature of Equipment Under Test

| Product Feature & Specification           |                                                                                                               |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Product                                   | Smart LED Ceiling Light                                                                                       |
| Model No.                                 | WMCDCM47-040T126UT-08F; WMCDCM47-40                                                                           |
| Power Source                              | <input checked="" type="checkbox"/> Commercial Power                                                          |
|                                           | AC 90 ~ 110V, 580mA                                                                                           |
|                                           | <input type="checkbox"/> External Power Source                                                                |
|                                           | DC 3.3V                                                                                                       |
|                                           | <input type="checkbox"/> Lithium battery                                                                      |
|                                           | DC V                                                                                                          |
|                                           | <input type="checkbox"/> UM battery                                                                           |
|                                           | DC V                                                                                                          |
| WLAN                                      |                                                                                                               |
| WLAN Support Category/<br>Frequency Range | <input checked="" type="checkbox"/> Article 2-1-19 /2400MHz ~ 2483.5MHz                                       |
|                                           | <input type="checkbox"/> Article 2-1-19-3 /5150MHz ~ 5250MHz                                                  |
|                                           | <input type="checkbox"/> Article 2-1-19-3 /5250MHz ~ 5350MHz                                                  |
|                                           | <input type="checkbox"/> Article 2-1-19-3-2 /5470MHz ~ 5725MHz                                                |
| Type of Modulation                        | <input checked="" type="checkbox"/> Direct Spreading (DS)                                                     |
|                                           | <input checked="" type="checkbox"/> Orthogonal frequency-division multiplexing (OFDM)                         |
|                                           | <input type="checkbox"/> Frequency Hopping (FH)                                                               |
| RF Technology                             | <input type="checkbox"/> 802.11a <input checked="" type="checkbox"/> 802.11b <input type="checkbox"/> 802.11g |
|                                           | <input checked="" type="checkbox"/> 802.11n-HT20 <input type="checkbox"/> 802.11ac-VHT20                      |
|                                           | <input type="checkbox"/> 802.11n-HT40 <input type="checkbox"/> 802.11ac-VHT40                                 |
|                                           | <input type="checkbox"/> 802.11ac-VHT80                                                                       |
|                                           | <input type="checkbox"/> 802.11ac-VHT160                                                                      |
| Antenna Information                       | Antenna Type: PIFA Antenna                                                                                    |
|                                           | 2.4GHz Peak Gain: 3.23dBi                                                                                     |

|                   |      |        |         |
|-------------------|------|--------|---------|
| Operating Voltage | 100V | 90.00V | 110.00V |
| Measuring Voltage | 3.3V | 3.29V  | 3.31V   |
| Tolerance         | -    | -0.30% | 0.30%   |



**NOTE:** When EUT be operated at  $\pm 10\%$  from the normal supply voltage, the supply voltage of RF part was varied within  $\pm 1\%$ . All test cases were done under the normal supply voltage

## 2.3. Block Diagram of Test Setup



(EUT: Smart LED Ceiling Light)

## 2.4. Test Information

A special test software was used to control EUT work in Continuous TX mode, and select test channel, mode and data rate.

| Tested mode, channel, and data rate information |                                |             |                    |
|-------------------------------------------------|--------------------------------|-------------|--------------------|
| Mode                                            | data rate (Mbps)<br>(see Note) | Channel     | Frequency<br>(MHz) |
| IEEE 802.11b                                    | 1                              | Low :CH1    | 2412               |
|                                                 | 1                              | Middle: CH7 | 2442               |
|                                                 | 1                              | High: CH13  | 2472               |
| IEEE 802.11g                                    | 6                              | Low :CH1    | 2412               |
|                                                 | 6                              | Middle: CH7 | 2442               |
|                                                 | 6                              | High: CH13  | 2472               |
| IEEE 802.11n HT20                               | 6.5                            | Low :CH1    | 2412               |
|                                                 | 6.5                            | Middle: CH7 | 2442               |
|                                                 | 6.5                            | High: CH13  | 2472               |

Note: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.

Remark: This device(model:WMCD47-040T126UT-08F; WMCD47-40) and the model WMCD47-032T108UT-08F; WMCD47-32 use same Wi-Fi Module (model: TYWE3L), so this test report (Report number ACS-P19151) and test report (Report number ACS-P19150) of model WMCD47-032T108UT-08F; WMCD47-32 use the same test data.

## 2.5. Test Equipments

| Item | Equipment           | Manufacturer  | Model No.     | Serial No. | Calibration Date | Calibration Body | Cal Method (Note) |
|------|---------------------|---------------|---------------|------------|------------------|------------------|-------------------|
| 1.   | PXA Signal Analyzer | Agilent       | N9030A        | MY51380221 | Jun.30,19        | CCIC             | c)                |
| 2.   | Attenuator          | Agilent       | 8491B         | MY39269201 | Oct.13,19        | CCIC             | c)                |
| 3.   | RF Cable            | Mini-Circuits | CBL-1M-SMS M+ | No.4       | Oct.13,19        | CCIC             | d)                |
| 4.   | Power meter         | Agilent       | 436A          | 2016A07891 | Oct.13,19        | CCIC             | c)                |
| 5.   | Power Sensor        | Agilent       | 8482B         | MY41090514 | Oct.13,19        | CCIC             | c)                |
| 6.   | Signal Generator    | HP            | 83732B        | US34490501 | Apr.13,19        | LISAI            | c)                |

## Note: Calibration Method

a): Calibration conducted by the National Institute of Information and Communications Technology ~ NICT ~ or a designated calibration agency under Article 102-18 paragraph (1) ~ TELEC Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc ~.

b): Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) ~ Japan Calibration Service System ~

c): Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1) ~ TELEC Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc ~.

d): Calibration conducted by using other equipment that listed above from a) to c)

## 2.6. Description of Test Facility

Site Description  
Name of Firm

: Audix Technology (Shenzhen) Co., Ltd.  
No. 6, Kefeng Road, Science & Technology  
Park, Nanshan District, Shenzhen,  
Guangdong, China

RF Anechoic Chamber

: Dimensions are:  
[L]10m × [W]5.5m × [H]5m

EMC Lab.

: Certificated by FCC, USA  
Designation No.: CN5022  
Valid Date: Mar. 31, 2020

Certificated by DAkkS, Germany  
Registration No: D-PL-12151-01-00  
Valid Date: Dec.07, 2021

Accredited by NVLAP, USA  
NVLAP Code: 200372-0  
Valid Date: Mar.31, 2020

Certificated by TAF, Taiwan  
Registration No: 1418  
Valid Date: Nov.08, 2020

## 2.7. Measurement Uncertainty (95% confidence levels, k=2)

| Test Item                                                        | Uncertainty          |
|------------------------------------------------------------------|----------------------|
| Uncertainty for Radiated Spurious<br>Emission test in RF chamber | 3.7dB(30MHz-1000MHz) |
| Uncertainty for Conduction Spurious<br>emission test             | 3.3dB(1GHz-26.5GHz)  |
| Uncertainty for Output power test                                | 2.0dB                |
| Uncertainty for Power density test                               | 0.8dB                |
| Uncertainty for Frequency range test                             | 2.0dB                |
| Uncertainty for Bandwidth test                                   | $7 \times 10^{-3}$   |
| Uncertainty for DC power test                                    | 83 kHz               |
| Uncertainty for test site temperature and<br>humidity            | 0.1 %                |
|                                                                  | 0.6 °C               |
|                                                                  | 3%                   |

## 3. MEASUREMENTS OF TRANSMITTER PARAMETERS

## 3.1. Antenna Power

## 3.1.1. Limit

| Item                  | Limits                                                                                                              |
|-----------------------|---------------------------------------------------------------------------------------------------------------------|
| Antenna Power Density | $\leq 10\text{mW/MHz}$ when $\text{OBW} \leq 26\text{MHz}$<br>(OFDM_DS from 2400~2483.5MHz)                         |
|                       | $\leq 5\text{mW/MHz}$ when $26\text{MHz} < \text{OBW} \leq 38\text{MHz}$<br>(OFDM_DS from 2400~2483.5MHz)           |
| Antenna Power Error   | $\leq 10\text{mW}$ (Other from 2400~2483.5MHz)<br>+20%,-80% (Base on manufacturer declare antenna power<br>density) |

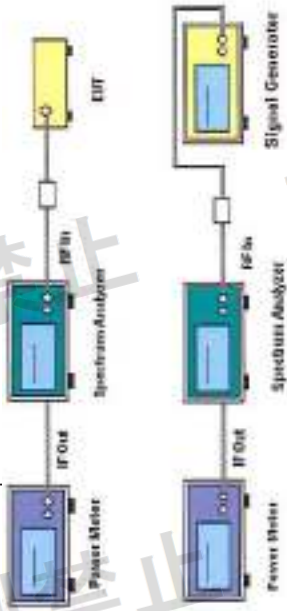
## 3.1.2. Measuring Instruments

See list of measuring instruments of the 2.5 section.

## 3.1.3. Test Procedures

1. A power meter is connected on the IF output port of the spectrum analyzer.
2. Adjust the spectrum analyzer to have the center frequency the same with the measured carrier.  
RBW=VBW=1MHz. detector mode is positive peak. Turn off the averaging function and use zero span.
3. The calibrating signal power shall be reduced to 0 dBm and is shall be verified that the power meter reading also reduces by 10 dB.
4. Connect the equipment to be measured. Using the following settings of the spectrum analyzer in combination with "max hold" function, fine the frequency of highest power output in the power envelope: center frequency equal to operating frequency; RBW & VBW: 1 MHz; detector mode: positive peak; averaging : off; span: 3 times the spectrum width; amplitude: adjust for middle of the instrument's range. The frequency found shall be recorded.
5. Set the center frequency of the spectrum analyzer to the found frequency and switch to zero span. The power meter indicates the measured power density "E".
6. Remove the EUT and put the replacing standard signal generator (SSG). Set the standard signal generator (SSG) at same frequency and transmit on, then set SSG output power at  $P_t$  to give the equivalent output level of "E".
7. Calculate antenna power density by the formula  $PD=P_t + 10^4 \log(1/X)$ .  
x: The duty cycle of the EUT in continuously transmitting mode  
 $P_t$ : Output power of the SSG
8. Antenna power Error is definition that actual measure antenna power tolerance between +20% to -80% power range that base on manufacturer declare the conducted power density.

### 3.1.4. Test Setup



### 3.1.5. Test Results

Please refer to Appendix B and C.

### 3.2. Frequency Tolerance

#### 3.2.1. Limit

| Item                | Limits              |
|---------------------|---------------------|
| Frequency Tolerance | $\leq 50\text{ppm}$ |

#### 3.2.2. Measuring Instruments

See list of measuring instruments of the 2.5 section.

#### 3.2.3. Test Procedure

| <input checked="" type="checkbox"/> WLAN 2.4GHz                                                                                                                                                                                                                                                                                                                 | <input type="checkbox"/> WLAN 2.4GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| a. Frequency accuracy of instrument shall be less than 10% of limits tolerance (5ppm).<br>b. Setting of SA is following as: RBW: 10kHz / VBW: 10kHz.<br>c. The frequency tolerance test case is directly measured using spectrum analyzer. Then the frequency error formula is $(f_c - f)/f \times 10^{-6}$ ppm and the limit is less than $\pm 50\text{ppm}$ . | a. Let the DUT transmit at Low/Mid/High channel with wave.<br>b. Setting of SA is following as: RBW: 100kHz/ VBW: 100kHz.<br>c. Use the peak search function of the SA get the peak point.<br>d. Down 10dB from the max peak point get the display level.<br>e. The display level cross with the trace at Lowest Frequency $f_a$ and Highest Frequency $f_b$ .<br>f. Get the test Result $F_c = (f_a + f_b)/2$ . error formula is $(f_c - f)/f \times 10^{-6}$ ppm and the limit is less than $\pm 50\text{ppm}$ . |

#### 3.2.4. Test Setup

See clause 2.3 for block diagram of test setup.

#### 3.2.5. Test Results

Please refer to Appendix B and C.

### 3.3. Occupied Bandwidth and Spread-spectrum Bandwidth / Spread Factor Measurement

#### 3.3.1. Limit

| Item                | Limits                                                                                                                                    |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Occupied Bandwidth  | DS $\leq 26\text{MHz}$ ; Others $\leq 26\text{MHz}$<br>OFDM (For BW=20MHz) $\leq 38\text{MHz}$<br>OFDM (For BW=40MHz) $\leq 38\text{MHz}$ |
| Spreading Bandwidth | DS, OFDM, FH, FH+DS, FH+OFDM $\leq 500\text{kHz}$                                                                                         |

#### 3.3.2. Measuring Instruments

See list of measuring instruments of the 2.5 section.

#### 3.3.3. Test Procedure

- Setting of SA is following as: RBW: 100kHz / VBW: 300kHz  
Sweep mode: Continuous sweep  
Detect mode: Positive peak  
Trace mode: Max hold.
- EUT have transmitted each modulation signal and fixed channelize (For DSSS or OFDM Device).
- SA set to 99% of occupied bandwidth to measure occupied bandwidth. The limit is less than 26MHz (For DSSS Device) or 38MHz (For OFDM Device).
- SA set to 90% of occupied bandwidth to measure Spread Spectrum Bandwidth and must greater than 500kHz.
- Spread Spectrum Factor = Spread Spectrum Bandwidth / modulation rate of EUT.
- Spread Spectrum Factor (2400MHz)  $\leq f \leq 2483.5\text{MHz}$  limit should be 5 or more. CH14 is 2484MHz, so it is Spread Spectrum Factor should be 10 or more.

#### 3.3.4. Test Setup

See clause 2.3 for block diagram of test setup.

#### 3.3.5. Test Results

Please refer to Appendix B and C.

### 3.4. Transmitter Spurious Emissions (Conducted)

#### 3.4.1. Limit

| Item                 | Limits                                                                                                    |
|----------------------|-----------------------------------------------------------------------------------------------------------|
| Tx Spurious Emission | $\leq 2.5\mu\text{W}$ (2387MHz $> f$ ; 2496.5MHz $< f$ )                                                  |
|                      | $\leq 25\mu\text{W}$<br>(2387MHz $\leq f < 2400\text{MHz}$ ) and (2483.5MHz $< f \leq 2496.5\text{MHz}$ ) |
|                      | For Channel 14                                                                                            |
|                      | Transmitter Operating Below 2458MHz: 2.5 $\mu\text{W}$ or less (-26dBm)                                   |
|                      | Transmitter Operating Between 2458 to 2471MHz: 25 $\mu\text{W}$ or less (-16dBm)                          |
|                      | Transmitter Operating 2497 through 2510: 25 $\mu\text{W}$ or less (-16dBm)                                |
|                      | Transmitter Operating Above 2510: 2.5 $\mu\text{W}$ or less (-26dBm)                                      |

#### 3.4.2. Measuring Instruments

See list of measuring instruments of the 2.5 section.

#### 3.4.3. Test Procedures

- EUT have transmitted the maximum power and fixed channelize.
- Setting of SA is following as: RBW: 1MHz / VBW: 1MHz, Sweep time : Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold.
- Setting of SA is following as: start frequency 30MHz and stop frequency 2387MHz Then to mark peak reading Value + cable loss shall be less than 2.5 $\mu\text{W}$ .
- SA adjusted to start frequency 2387MHz and stop frequency 2400MHz. Then to mark peak reading Value + cable loss shall be less than 25 $\mu\text{W}$ .
- SA adjusted to start frequency 2483.5MHz and stop frequency 2496.5MHz. Then to mark peak reading Value + cable loss shall be less than 25 $\mu\text{W}$ .
- SA adjusted to start frequency 2500MHz and stop frequency 13000MHz. Then to mark peak reading Value + cable loss shall be less than 25 $\mu\text{W}$ .
- If the Result\_ Value is over the requirement, take total sum of 1MHz band centered at the spur frequency like ACLP measurement as Result\_ Value.

#### 3.4.4. Test Setup

See clause 2.3 for block diagram of test setup.

#### 3.4.5. Test Results of Conducted Spurious Emissions – TX Operating

Please refer to Appendix B and C.

## 3.5. Carrier sense function

## 3.5.1. Limit

The radio equipment connected to telecommunication circuit equipment shall be equipped with a device which detects emissions radiated from another radio station and prevents interference, or a device which prevents interference by operation on a receive signal and a signal for diffusion for signal level detection.

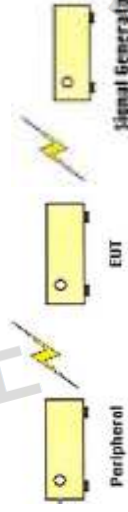
## 3.5.2. Measuring Instruments

| No. | Description      | Manufacturer | Model     | Serial Number | Approved type                                           |
|-----|------------------|--------------|-----------|---------------|---------------------------------------------------------|
| 1   | Wireless Router  | TP-LINK      | Archer C9 | 2158161000011 | <input checked="" type="checkbox"/> TBL ID: D16-0002018 |
| 2   | Signal Generator | Agilent      | N5181A    | MY49061013    | ---                                                     |

## 3.5.3. Test Procedures

1. Control the wireless Router work at OFDM and OBW $\geq$ 38MHz Mode by software.
2. Link EUT with Wireless Router Via Wireless. Let EUT work in normal transmitting mode.
3. Set the signal generator at same frequency channel with a proper signal level output to act as interference signal.
4. Monitor the signal transmission between EUT and wireless Router, when interference signal presents, the EUT would stop transmitting once it detects interference signal over their, then it pass. Otherwise the Result is fail.

## 3.5.4. Test Setup



Peripheral: Wireless Router

3.5.5. Test result  
[None]

Note: Carrier sense function only applicable for OFDM and OBW $\geq$ 38MHz Mode, this device does not support OBW $\geq$ 38MHz Mode.

## 4. MEASUREMENTS OF RECEIVER PARAMETERS

## 4.1. Secondary Radiated Emissions (Conducted)

## 4.1.1. Limit

| Item                 | Limits                                                                       |
|----------------------|------------------------------------------------------------------------------|
| Rx Spurious Emission | $\leq 4\text{nW}(f < 1\text{GHz})$<br>$\leq 20\text{nW}(1\text{GHz} \leq f)$ |

## 4.1.2. Measuring Instruments

See list of measuring instruments of 2.5 section.

## 4.1.3. Test Procedures

1. EUT have the continuous reception mode and fixed only one channelize.
2. SA set RBW: 100KHz and VBW: 100KHz. Then adjust to start frequency 30MHz and stop frequency 1000MHz. Search to mark peak reading value + cable loss shall be less than 4nW.
3. SA set RBW: 1MHz and VBW: 1MHz. Then adjust to start frequency 1000MHz and stop frequency 13000MHz. Search to mark peak reading value + cable loss shall be less than 20nW.
4. If power level of lower emissions are more than 1/10 of limit (0.4nW for  $f < 1\text{GHz}$ , 2nW for  $f \geq 1\text{GHz}$ ), all those are to be indicated in the 2nd and 3rd lines. If others are 1/10 or less more of the limit, no necessary to be indicated.

## 4.1.4. Test Setup

See clause 2.3 for block diagram of test setup.

## 4.1.5. Test Results of Conducted Spurious Emissions – RX Operating

Please refer to Appendix B and C.

## 5. MEASUREMENT OF OTHER PARAMETERS

### 5.1. Interference Prevention Function

#### 5.1.1. Limit

| Item           | Limits  |
|----------------|---------|
| Identification | ≥48bits |

#### 5.1.2. Measuring Instruments

| No. | Description     | ACS No. | Manufacturer | Model    | Serial Number    | Approved type                                                                            |
|-----|-----------------|---------|--------------|----------|------------------|------------------------------------------------------------------------------------------|
| 1.  | Wireless Router | ---     | D-Link       | DI-624+A | NI624+AC<br>EUA1 | <input checked="" type="checkbox"/> FCC ID: KA2DI524<br><input type="checkbox"/> BSMI ID |

#### 5.1.3. Test Procedures

- In the case that the EUT has the function of automatically transmitting the identification code:
  - Transmit the predetermined identification codes form EUT.
  - Check the transmitted identification codes with the demodulator.
- In the case of receiving the identification code:
  - Transmit the predetermined identification codes form the counterpart.
  - Check if communication is normal.
  - Transmit the signals other than predetermined ID codes form the counterpart.
  - check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

#### 5.1.4. Test Results

TX: The transmitting mode of EUT is on normal operating, the interference prevention function is okay.

RX: The receiving mode of EUT is on normal operating, the interference prevention function is okay.

The ID Code of this WiFi device is 2c:f4:32:69:60:d9 as below list :

2c:f4:32:69:60:d9

### 5.2. Construction Protection

#### 5.2.1. Limit

The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

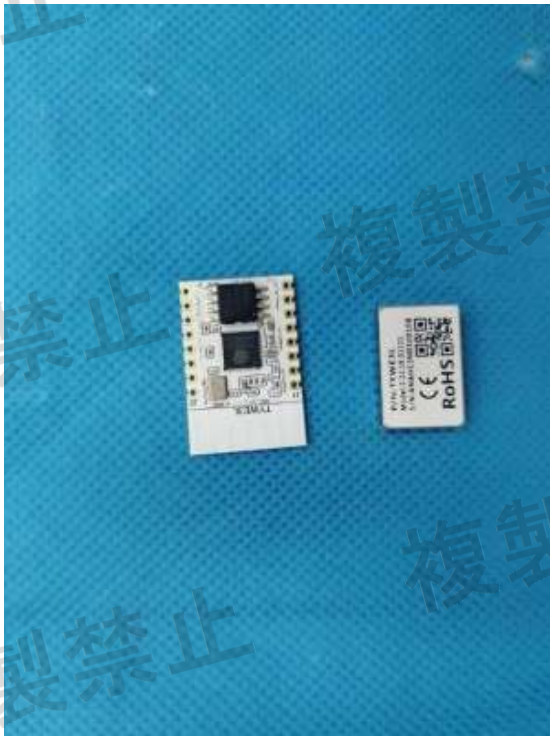
#### 5.2.2. Confirmation Method

|                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Sealed with special screws.                                                                                    |
| <input type="checkbox"/> Plastic chassis is being welded using ultrasonic waves.                                                        |
| <input type="checkbox"/> Chassis is glued using a special adhesive.                                                                     |
| <input type="checkbox"/> Metal covers are spot-fused.                                                                                   |
| <input type="checkbox"/> Cover is specially interlocked.                                                                                |
| <input checked="" type="checkbox"/> RF and Modulation components are covered with shielding case and this shielding case is soldered.   |
| <input type="checkbox"/> RF modulation parts and ID-ROM be welded using the BGA Method.                                                 |
| <input type="checkbox"/> Shield case is welded at RF and modulation parts and ID-ROM is glued at its lead with a special adhesive.      |
| <input type="checkbox"/> Shield case is welded at RF and modulation parts, and ID-ROM is glued with a non-transparent laminating agent. |
| <input type="checkbox"/> Other:                                                                                                         |

#### 5.2.3. The Photos of Construction Protection



Appendix A. Setup Photographs



## Appendix B Test Results

### B.1 Antenna Power

| EUT: Smart LED Ceiling Light      |      |                           |                  |                                   |
|-----------------------------------|------|---------------------------|------------------|-----------------------------------|
| M/N: WMCDCM47-040T126UT-08F       |      |                           |                  |                                   |
| Date: 2019-10-18                  |      | Test Site: RF Site        |                  | Temperature: 23.4±0.6 °C          |
| Tested by: Allen                  |      | Humidity: 52.8±3.0%       |                  | Pressure: 103.2±1.0 kpa           |
| Test Mode                         | CH   | Antenna Power<br>(mW/MHz) | Tolerance<br>(%) | Limit<br>(mW/MHz)                 |
| 11b                               | CH1  | 2.9631                    | -1.23            | 10 or less Tolerance<br>-80%~+20% |
|                                   | CH7  | 2.9998                    | -0.01            |                                   |
|                                   | CH13 | 2.6682                    | -11.06           |                                   |
| 11g                               | CH1  | 1.0906                    | -9.12            | 10 or less Tolerance<br>-80%~+20% |
|                                   | CH7  | 1.1190                    | -6.75            |                                   |
|                                   | CH13 | 0.84457                   | -29.62           |                                   |
| 11n<br>HT20                       | CH1  | 1.1178                    | -6.85            | 10 or less Tolerance<br>-80%~+20% |
|                                   | CH7  | 1.0466                    | -12.78           |                                   |
|                                   | CH13 | 0.78508                   | -34.58           |                                   |
| Rated Power: 11b : 3mW/MHz        |      |                           |                  |                                   |
| Rated Power: 11g : 1.2mW/MHz      |      |                           |                  |                                   |
| Rated Power: 11n HT20 : 1.2mW/MHz |      |                           |                  |                                   |
| Conclusion: PASS                  |      |                           |                  |                                   |

**B.2 Frequency Tolerance**

| EUT: Smart LED Ceiling Light |                         |                          |                        |              |             |
|------------------------------|-------------------------|--------------------------|------------------------|--------------|-------------|
| M/N: WMCDCM47-040T126UT-08F  |                         |                          |                        |              |             |
| Date: 2019-10-18             | Pressure: 103.1±1.0 kpa | Humidity: 53.1±3.0%      |                        |              |             |
| Tested by: Allen             | Test Site: RF site      | Temperature: 23.0±0.6 °C |                        |              |             |
| Test Mode                    | CH                      | Reading (MHz)            | Target Frequency (MHz) | Result (ppm) | Limit (ppm) |
| TX                           | CH1                     | 2411.9450                | 2412                   | -22.8027     | ±50         |
|                              | CH7                     | 2441.9445                | 2442                   | -22.7273     | ±50         |
|                              | CH13                    | 2471.9440                | 2472                   | -22.6537     | ±50         |
| Conclusion: Pass             |                         |                          |                        |              |             |

**B.3 Occupied Bandwidth and Spread-spectrum Bandwidth / Spread Factor Measurement**

| (99% BW)                     |                         |                          |             |  |
|------------------------------|-------------------------|--------------------------|-------------|--|
| EUT: Smart LED Ceiling Light |                         |                          |             |  |
| M/N: WMCDCM47-040T126UT-08F  |                         |                          |             |  |
| Date: 2019-10-18             | Pressure: 101.6±1.0 kpa | Humidity: 50.8±3.0%      |             |  |
| Tested by: Allen             | Test Site: RF Site      | Temperature: 23.5±0.6 °C |             |  |
| Test Mode                    | CH                      | 99% bandwidth (MHz)      | Limit (MHz) |  |
| 11b                          | CH1                     | 10.434                   | ≤26         |  |
|                              | CH7                     | 10.468                   | ≤26         |  |
|                              | CH13                    | 10.381                   | ≤26         |  |
| 11g                          | CH1                     | 16.316                   | ≤38         |  |
|                              | CH7                     | 16.290                   | ≤38         |  |
|                              | CH13                    | 16.317                   | ≤38         |  |
| 11n<br>HT20                  | CH1                     | 17.226                   | ≤38         |  |
|                              | CH7                     | 17.321                   | ≤38         |  |
|                              | CH13                    | 17.296                   | ≤38         |  |
| Conclusion : PASS            |                         |                          |             |  |

(90% BW)

|                              |                         |                          |  |
|------------------------------|-------------------------|--------------------------|--|
| EUT: Smart LED Ceiling Light |                         |                          |  |
| M/N: WMCDCM47-040T126UT-08F  |                         |                          |  |
| Date: 2019-10-18             | Pressure: 101.6±1.0 kpa | Humidity: 50.8±3.0%      |  |
| Tested by: Allen             | Test Site: RF Site      | Temperature: 23.5±0.6 °C |  |

| Test Mode        | CH   | 90% Spread bandwidth (MHz) | Limit (KHz) |
|------------------|------|----------------------------|-------------|
| 11b              | CH1  | 7.9138                     | ≥500        |
|                  | CH7  | 7.7635                     | ≥500        |
|                  | CH13 | 7.7743                     | ≥500        |
| Conclusion: PASS |      |                            |             |

Spread Spectrum Factor

| Test Mode        | CH   | 90% bandwidth (MHz) | Symbol Rate(Mbps) | Spread Spectrum Factor | Limit |
|------------------|------|---------------------|-------------------|------------------------|-------|
| 11b              | CH1  | 7.9138              | 1.375             | 5.7555                 | ≥5    |
|                  | CH7  | 7.7635              |                   | 5.6462                 | ≥5    |
|                  | CH13 | 7.7743              |                   | 5.6540                 | ≥5    |
| Conclusion: PASS |      |                     |                   |                        |       |

## B.4 Transmitter Spurious Emissions (Conducted)

|                              |                         |                          |  |
|------------------------------|-------------------------|--------------------------|--|
| EUT: Smart LED Ceiling Light |                         |                          |  |
| M/N: WMCDCM47-040T126UT-08F  |                         |                          |  |
| Date: 2019-10-18             | Pressure: 101.6±1.0 kpa | Humidity: 50.8±3.0%      |  |
| Tested by: Allen             | Test Site: RF Site      | Temperature: 23.5±0.6 °C |  |

| Test Mode                  | 11b/CH1,CH7,CH13 |         | Remarks |
|----------------------------|------------------|---------|---------|
| Test Frequency (MHz)       | 2412             | 2442    | 2472    |
| 30~1000MHz (dBm/MHz)       | -50.847          | -50.200 | -50.656 |
| 1000~2387MHz (dBm/MHz)     | -46.620          | -46.688 | -47.036 |
| 2387~2400MHz (dBm/MHz)     | -38.912          | -46.370 | -46.419 |
| 2483.5~2496.5MHz (dBm/MHz) | -47.630          | -46.012 | -38.391 |
| 2496.5~13000MHz (dBm/MHz)  | -46.044          | -45.929 | -46.850 |

| Test Mode                  | 11g/CH1,CH7,CH13 |         | Remarks |
|----------------------------|------------------|---------|---------|
| Test Frequency (MHz)       | 2412             | 2442    | 2472    |
| 30~1000MHz (dBm/MHz)       | -50.454          | -50.671 | -50.645 |
| 1000~2387MHz (dBm/MHz)     | -34.655          | -46.887 | -46.381 |
| 2387~2400MHz (dBm/MHz)     | -39.765          | -45.975 | -46.691 |
| 2483.5~2496.5MHz (dBm/MHz) | -47.396          | -46.145 | -43.472 |
| 2496.5~13000MHz (dBm/MHz)  | -46.380          | -47.968 | -45.593 |

| Test Mode                  | 11n HT20/CH1,CH7,CH13 |         | Remarks |
|----------------------------|-----------------------|---------|---------|
| Test Frequency (MHz)       | 2412                  | 2442    | 2472    |
| 30~1000MHz (dBm/MHz)       | -50.954               | -51.168 | -50.611 |
| 1000~2387MHz (dBm/MHz)     | -33.055               | -46.851 | -47.468 |
| 2387~2400MHz (dBm/MHz)     | -40.815               | -41.596 | -46.360 |
| 2483.5~2496.5MHz (dBm/MHz) | -47.252               | -45.774 | -24.045 |
| 2496.5~13000MHz (dBm/MHz)  | -46.410               | -46.850 | -46.620 |

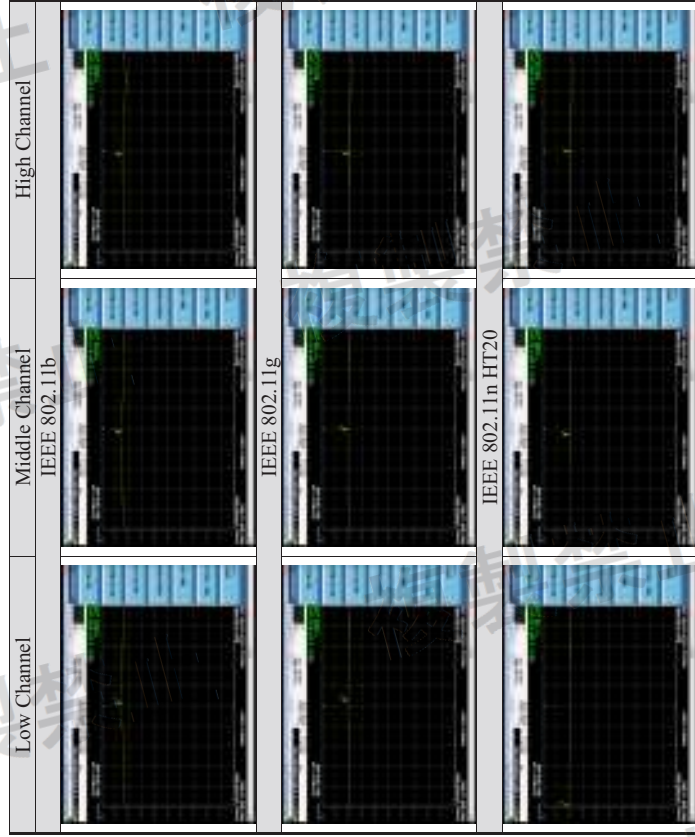
Conclusion: PASS

### B.5 Secondary Radiated Emissions (Conducted)

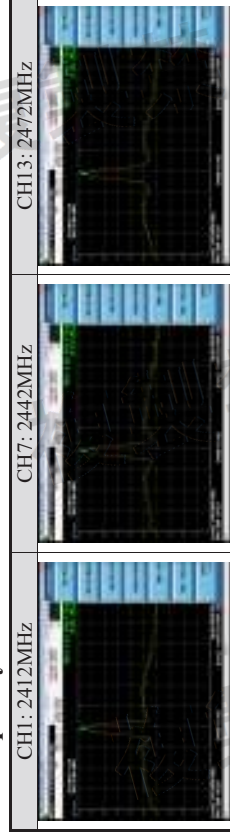
| EUT: Smart LED Ceiling Light     |                         |         |                          |
|----------------------------------|-------------------------|---------|--------------------------|
| M/N: WMCDCM47-040T126UT-08F      |                         |         |                          |
| Date: 2019-10-18                 | Pressure: 101.6±1.0 kpa |         | Humidity: 50.8±3.0%      |
| Tested by: Allen                 | Test Site: RF Site      |         | Temperature: 23.5±0.6 °C |
| Test Mode                        | 11b/CH1,CH7,CH13        |         | Remarks                  |
| Test Frequency (MHz)             | 2412                    | 2442    | 2472                     |
| 30~1000MHz (dBm/100kHz)          | -79.710                 | -80.669 | -80.274                  |
| 1000~13000MHz (dBm/MHz)          | -68.089                 | -68.190 | -68.121                  |
| Limit $\leq 4nW$ (-54dBm/100kHz) |                         |         |                          |
| Limit $\leq 20n W$ (-47dBm/MHz)  |                         |         |                          |
| Test Mode                        | 11g/CH1,CH7,CH13        |         | Remarks                  |
| Test Frequency (MHz)             | 2412                    | 2442    | 2472                     |
| 30~1000MHz (dBm/100kHz)          | -80.549                 | -79.758 | -81.076                  |
| 1000~13000MHz (dBm/MHz)          | -68.356                 | -68.470 | -67.792                  |
| Limit $\leq 4nW$ (-54dBm/100kHz) |                         |         |                          |
| Limit $\leq 20n W$ (-47dBm/MHz)  |                         |         |                          |
| Test Mode                        | 11n HT20/CH1,CH7,CH13   |         | Remarks                  |
| Test Frequency (MHz)             | 2412                    | 2442    | 2472                     |
| 30~1000MHz (dBm/100kHz)          | -81.114                 | -80.928 | -80.810                  |
| 1000~13000MHz (dBm/MHz)          | -67.709                 | -67.674 | -67.678                  |
| Limit $\leq 4nW$ (-54dBm/100kHz) |                         |         |                          |
| Limit $\leq 20n W$ (-47dBm/MHz)  |                         |         |                          |
| Conclusion: PASS                 |                         |         |                          |

## Appendix C Test Plots

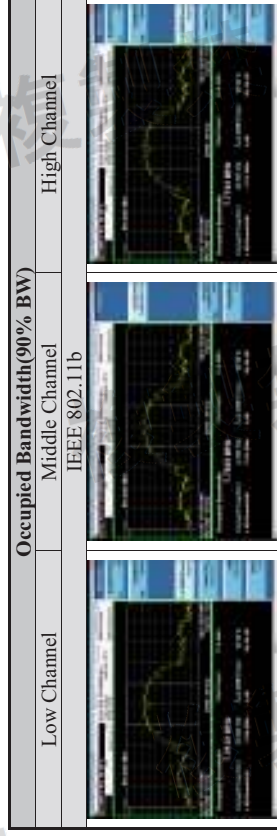
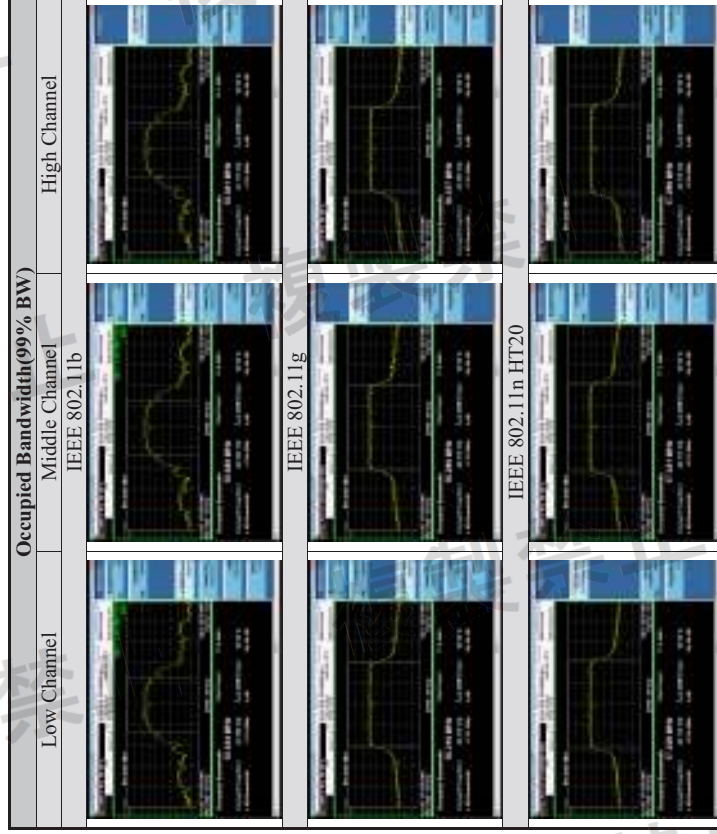
C.1 Antenna Power



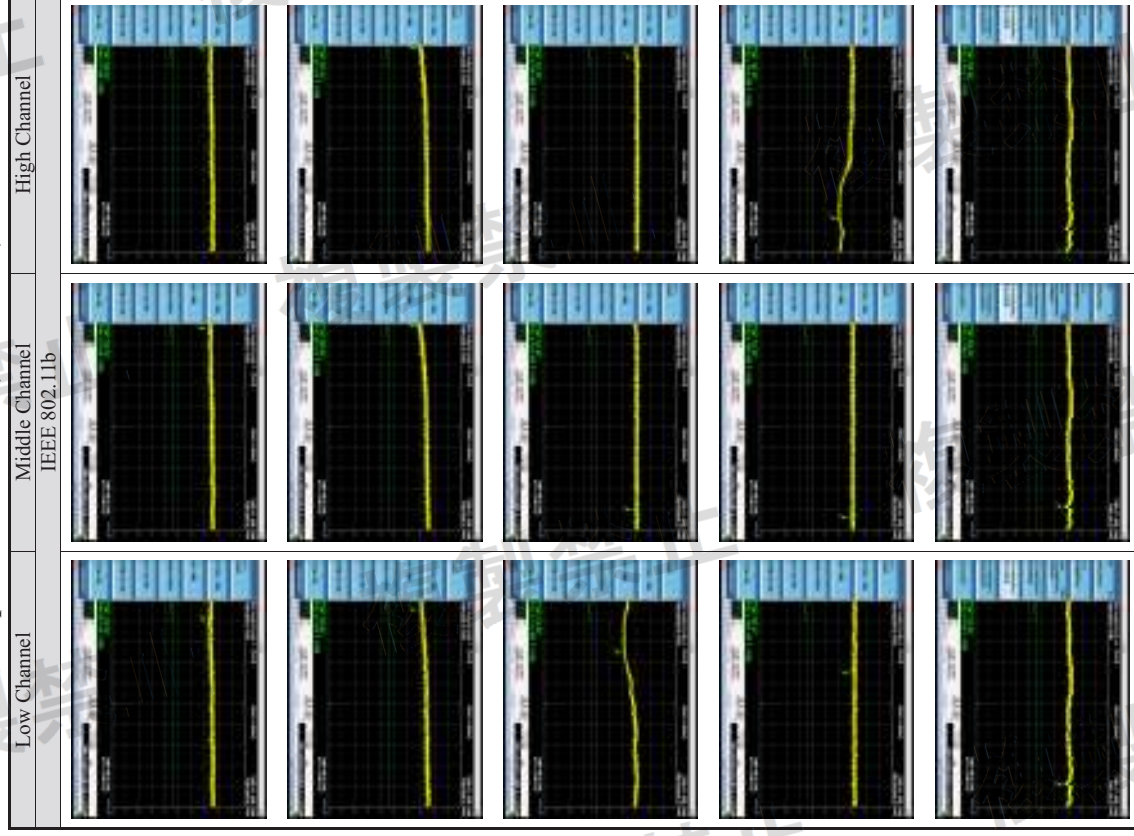
C.2 Frequency Tolerance



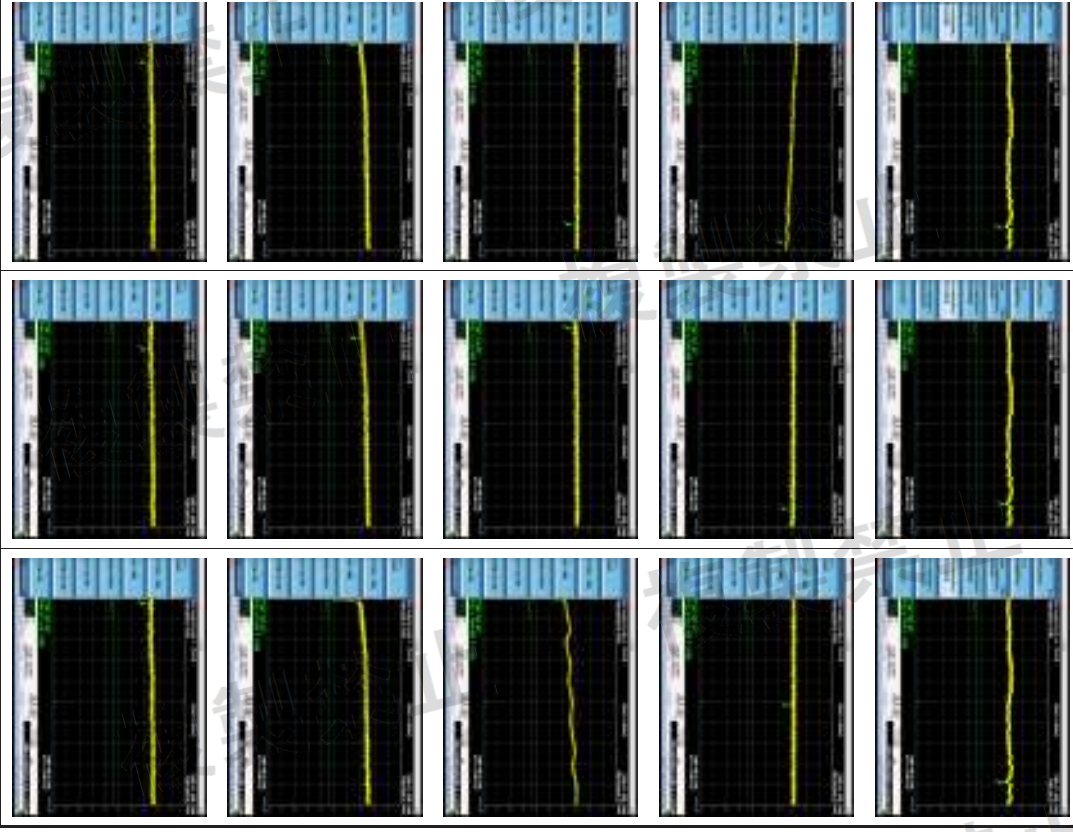
### C.3 Occupied Bandwidth and Spread-spectrum Bandwidth / Spread Factor Measurement



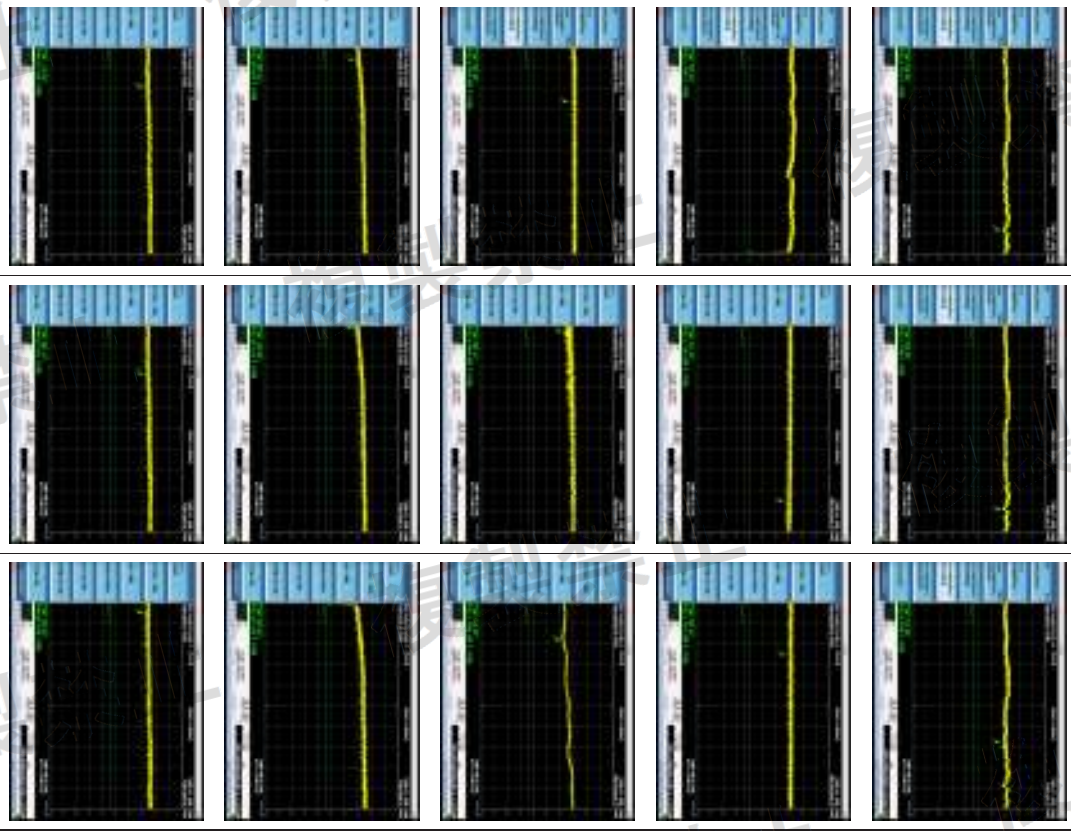
### C.4 Transmitter Spurious Emissions (Conducted)



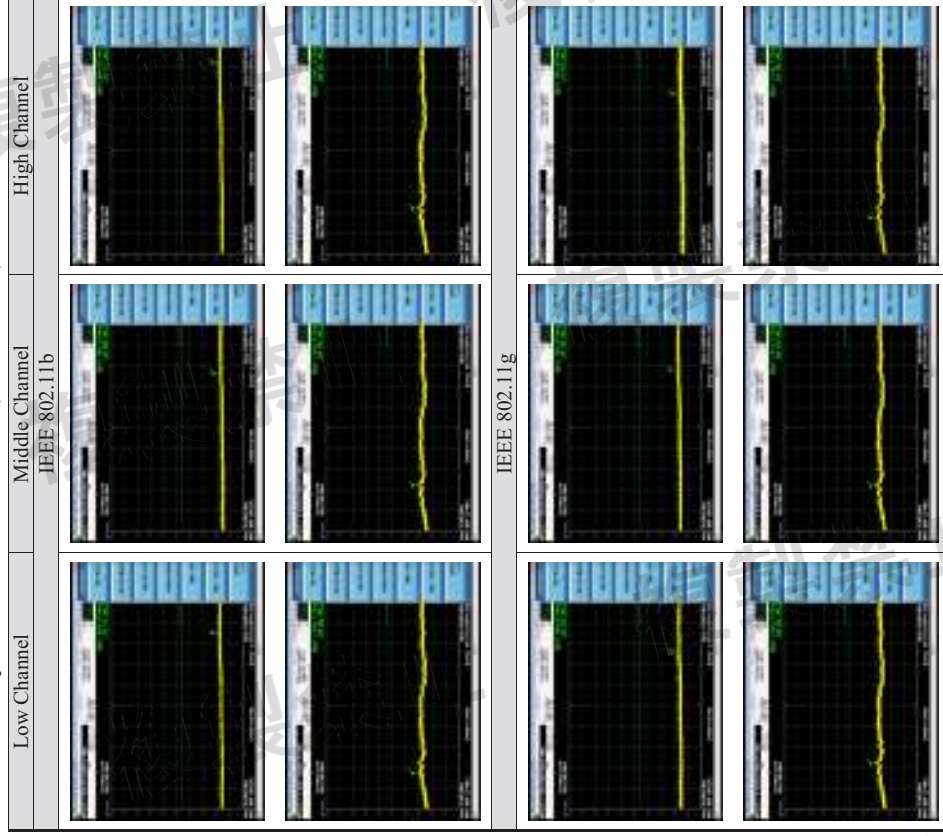
### IEEE 802.11g



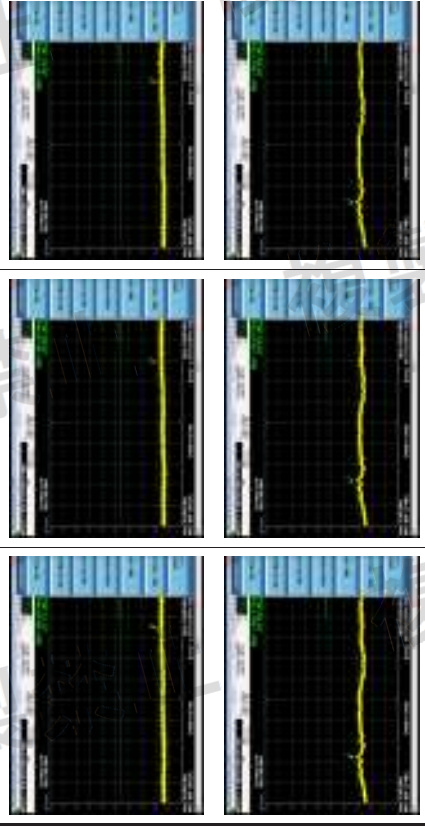
IEEE 802.11n HT20



C.5 Secondary Radiated Emissions (Conducted)



IEEE 802.11n HT20



## Appendix D. Photographs of EUT

Figure 1  
General Appearance of the EUT



Figure 2  
General Appearance of the EUT



Figure 3  
Inside of the EUT



Figure 4  
Inside of the EUT



Figure 5  
Inside of the EUT



Figure 6  
Inside of the EUT



Figure 7  
Inside of the EUT

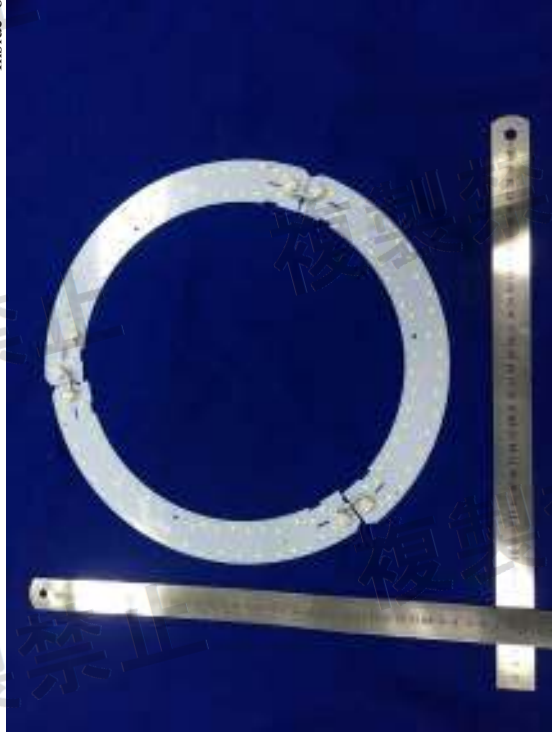


Figure 8  
Inside of the EUT

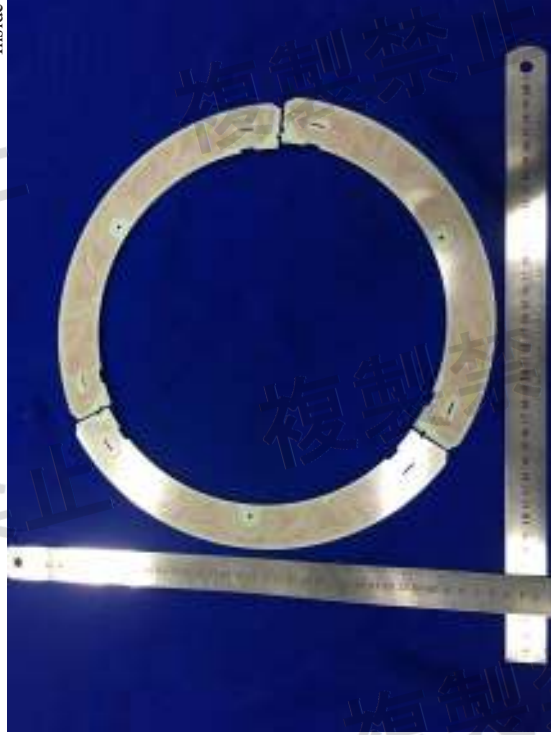


Figure 9  
Inside of the EUT



Figure 10  
Inside of the EUT



Figure 11  
Inside of the EUT



Figure 12  
Inside of the EUT



Figure 13  
Inside of the EUT

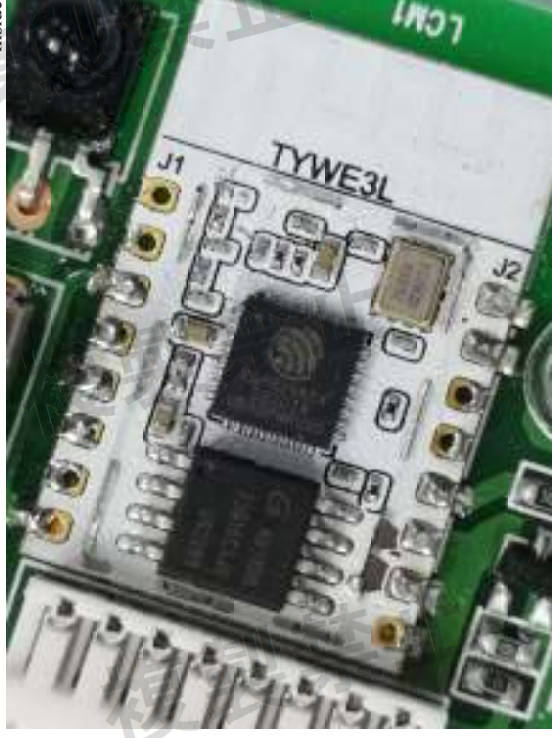


Figure 14  
Inside of the EUT



Figure 15  
Inside of the EUT

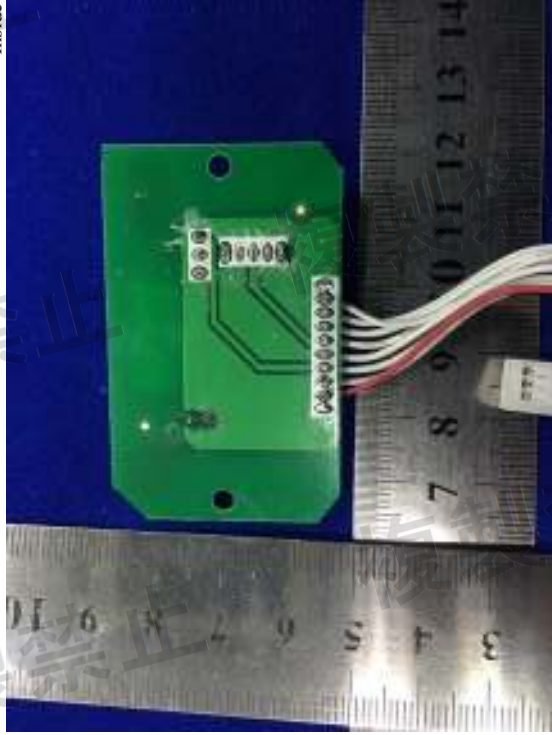


Figure 16  
Inside of the EUT



Figure 17  
Inside of the EUT

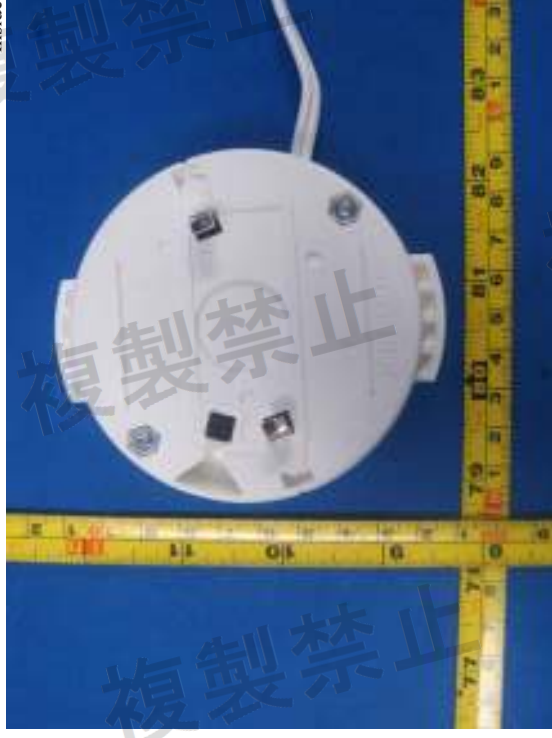


Figure 18  
Inside of the EUT

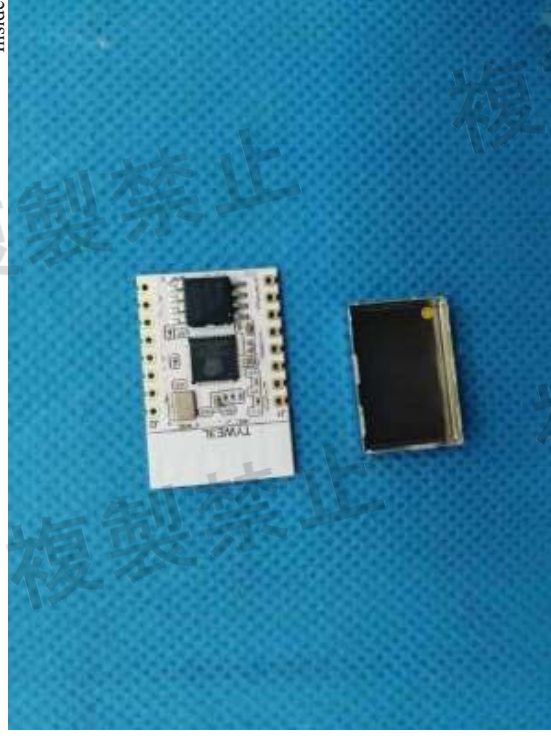


Figure 19  
Inside of the EUT

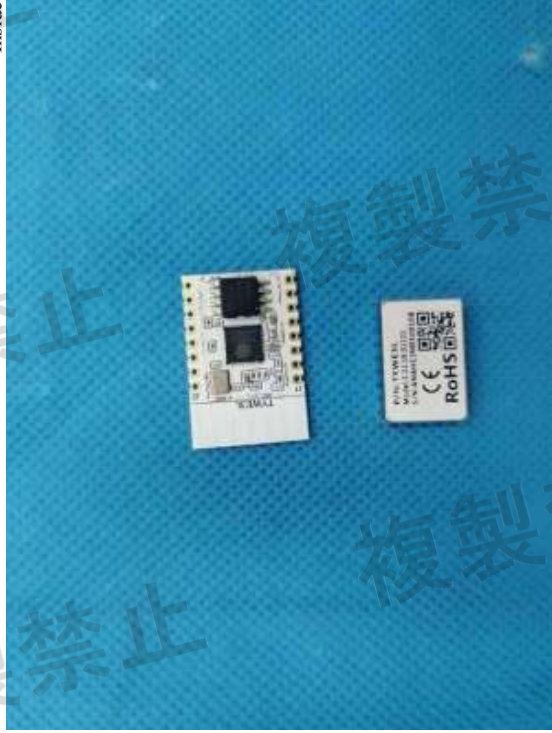


Figure 20  
Inside of the EUT



Figure 21  
Inside of the EUT



THE END