




TEST REPORT

Report No. : **CHTEW20040114** Report Verification : 

Project No...... : **SHT1910069302EW**

FCC ID..... : **2AJ9T-ZL400**

Applicant's name..... : **ZKTECO CO., LTD.**

Address..... : No.26,Pingshan 188 Industry zone,Tangxia Town,Dongguan City,Guangdong Province,China 523728

Manufacturer..... : ZKTECO CO., LTD.

Address..... : No.26,Pingshan 188 Industry zone,Tangxia Town,Dongguan City,Guangdong Province,China 523728

Test item description : **Wireless Hotel Lock**

Trade Mark : ZKTECO

Model/Type reference..... : ZL400

Listed Model(s) : -

Standard : **FCC CFR Title 47 Part 15 Subpart C Section 15.249**


Date of receipt of test sample..... : Nov.04, 2019

Date of testing..... : Nov.04, 2019- Apr.15, 2020

Date of issue..... : Apr.16, 2020

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

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Approved by
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Testing Laboratory Name : **Shenzhen Huatongwei International Inspection Co., Ltd.**

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The test report merely correspond to the test sample.

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1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

[FCC Rules Part 15.249](#): Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz.

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

1.2. Report version information

| Revision No. | Date of issue | Description |
|--------------|---------------|-------------|
| N/A | 2020-04-16 | Original |
| | | |
| | | |
| | | |
| | | |

2 . TEST DESCRIPTION

| Report clause | Test Item | Standard Requirement | Result | Test Engineer |
|---------------|--|------------------------|--------|-----------------|
| 5.1 | Antenna Requirement | 15.203 | PASS | N/A |
| 5.2 | AC Conducted Emission | 15.207 | N/A | N/A |
| 5.3 | 20dB Bandwidth | 15.215/15.249 | PASS | Jiongsheng Feng |
| 5.4 | Field strength of the Fundamental signal | 15.249(a) | PASS | Jiongsheng Feng |
| 5.5 | Radiated Band Edge Emission | 15.249(a)15.205/15.209 | PASS | Pan Xie |
| 5.6 | Radiated Spurious Emission | 15.249(d)15.205/15.209 | PASS | Pan Xie |

Note:

- The measurement uncertainty is not included in the test result.

3. SUMMARY

3.1. Client Information

| | |
|---------------|---|
| Applicant: | ZKTECO CO., LTD. |
| Address: | No.26,Pingshan 188 Industry zone,Tangxia Town,Dongguan City,Guangdong Province,China 523728 |
| Manufacturer: | ZKTECO CO., LTD. |
| Address: | No.26,Pingshan 188 Industry zone,Tangxia Town,Dongguan City,Guangdong Province,China 523728 |

3.2. Product Description

| | |
|----------------------|--------------------------|
| Name of EUT: | Wireless Hotel Lock |
| Trade Mark: | ZKTECO |
| Model No.: | ZL400 |
| Listed Model(s): | - |
| Power supply: | DC 6V by 1.5*4AA battery |
| Adapter information: | - |
| Hardware Version: | V1.02 |
| Software Version: | V1.03 |

3.3. Radio Specification Description

| | |
|----------------------|------------------|
| Operation frequency: | 2405~2480MHz |
| Channel number: | 16 |
| Modulation Type: | GFSK |
| Antenna type: | Monopole antenna |
| Antenna gain: | 2dBi |

3.4. Testing Laboratory Information

| | | |
|---------------------|--|----------------------|
| Laboratory Name | Shenzhen Huatongwei International Inspection Co., Ltd. | |
| Laboratory Location | 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China | |
| Qualifications | Type | Accreditation Number |
| | CNAS | L1225 |
| | A2LA | 3902.01 |
| | FCC | 762235 |
| | Canada | 5377A |

4. TEST CONFIGURATION

4.1. Test frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channel which were tested. the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the below gray bottom.

| Channel | Frequency (MHz) |
|-----------------|-----------------|
| CH _L | 2405 |
| CH _M | 2440 |
| CH _H | 2480 |

4.2. Test mode

| |
|--|
| For RF test items |
| The engineering test program was provided and enabled to make EUT continuous transmit. |
| For Radiated spurious emissions test item: |
| The EUT in each of three orthogonal axis emissions had been tested ,but only the worst case (X axis) data recorded in the report. During all testing, the product is powered by new batterys. |

4.3. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

| Whether support unit is used? | | | | | |
|-------------------------------|------------|------------|-----------|--------|------------|
| ✓ No | | | | | |
| Item | Equipement | Trade Name | Model No. | FCC ID | Power cord |
| 1 | | | | | |
| 2 | | | | | |

4.4. Testing environmental condition

| Type | Requirement | Actual |
|--------------------|--------------|----------|
| Temperature: | 15~35°C | 25°C |
| Relative Humidity: | 25~75% | 50% |
| Air Pressure: | 860~1060mbar | 1000mbar |

4.5. Measurement uncertainty

| Test Item | Measurement Uncertainty |
|--------------------------------------|-------------------------|
| AC Conducted Emission (150kHz~30MHz) | 3.02 dB |
| Radiated Emission (30MHz~1000MHz) | 4.90 dB |
| Radiated Emissions (1GHz~25GHz) | 4.96 dB |
| Peak Output Power | 0.51 dB |
| Power Spectral Density | 0.51 dB |
| Conducted Spurious Emission | 0.51 dB |
| 6dB Bandwidth | 70 Hz |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.6. Equipment Used during the Test

| ● Conducted Emission | | | | | | | |
|----------------------|---------------------|--------------------|---------------|-----------------|---------------|---------------------------|---------------------------|
| Used | Test Equipment | Manufacturer | Equipment No. | Model No. | Serial No. | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
| ● | Shielded Room | Albatross projects | HTWE0114 | N/A | N/A | 2018/09/28 | 2023/09/27 |
| ● | EMI Test Receiver | R&S | HTWE0111 | ESCI | 101247 | 2019/10/26 | 2020/10/25 |
| ● | Artificial Mains | SCHWARZBECK | HTWE0113 | NNLK 8121 | 573 | 2019/10/23 | 2020/10/22 |
| ● | Pulse Limiter | R&S | HTWE0033 | ESH3-Z2 | 100499 | 2019/10/23 | 2020/10/22 |
| ● | RF Connection Cable | HUBER+SUHNER | HTWE0113-02 | ENVIROFLE X_142 | EF-NM-BNCM-2M | 2019/10/23 | 2020/10/22 |
| ● | Test Software | R&S | N/A | ES-K1 | N/A | N/A | N/A |

| ● Radiated emission-6th test site | | | | | | | |
|-----------------------------------|-------------------------|--------------------|---------------|--------------|------------|---------------------------|---------------------------|
| Used | Test Equipment | Manufacturer | Equipment No. | Model No. | Serial No. | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
| ● | Semi-Anechoic Chamber | Albatross projects | HTWE0127 | SAC-3m-02 | C11121 | 2018/09/30 | 2021/09/29 |
| ● | EMI Test Receiver | R&S | HTWE0099 | ESCI | 100900 | 2019/10/26 | 2020/10/25 |
| ● | Loop Antenna | R&S | HTWE0170 | HFH2-Z2 | 100020 | 2018/04/02 | 2021/04/01 |
| ● | Ultra-Broadband Antenna | SCHWARZBECK | HTWE0119 | VULB9163 | 546 | 2020/04/05 | 2023/04/04 |
| ● | Pre-Amplifier | SCHWARZBECK | HTWE0295 | BBV 9742 | N/A | 2019/11/14 | 2020/11/13 |
| ● | RF Connection Cable | HUBER+SUHNER | HTWE0062-01 | N/A | N/A | 2019/08/21 | 2020/08/20 |
| ● | RF Connection Cable | HUBER+SUHNER | HTWE0062-02 | SUCOFLEX 104 | 501184/4 | 2019/05/27 | 2020/05/26 |
| ● | Test Software | R&S | N/A | ES-K1 | N/A | N/A | N/A |

| ● Radiated emission-7th test site | | | | | | | |
|-----------------------------------|-------------------------|--------------------|---------------|-------------------|-------------|---------------------------|---------------------------|
| Used | Test Equipment | Manufacturer | Equipment No. | Model No. | Serial No. | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
| ● | Semi-Anechoic Chamber | Albatross projects | HTWE0122 | SAC-3m-01 | N/A | 2018/09/27 | 2021/09/26 |
| ● | Spectrum Analyzer | R&S | HTWE0098 | FSP40 | 100597 | 2019/10/26 | 2020/10/25 |
| ● | Horn Antenna | SCHWARZBECK | HTWE0126 | 9120D | 1011 | 2020/04/01 | 2023/03/31 |
| ● | Horn Antenna | SCHWARZBECK | HTWE0103 | BBHA9170 | 25841 | 2018/10/11 | 2021/10/10 |
| ● | Broadband Horn Antenna | SCHWARZBECK | HTWE0103 | BBHA9170 | BBHA9170472 | 2018/10/11 | 2021/10/10 |
| ● | Pre-amplifier | CD | HTWE0071 | PAP-0102 | 12004 | 2019/11/14 | 2020/11/13 |
| ● | Broadband Pre-amplifier | SCHWARZBECK | HTWE0201 | BBV 9718 | 9718-248 | 2019/05/23 | 2020/05/22 |
| ● | RF Connection Cable | HUBER+SUHNER | HTWE0120-01 | 6m 18GHz S Serisa | N/A | 2019/05/10 | 2020/05/09 |
| ● | RF Connection Cable | HUBER+SUHNER | HTWE0120-02 | 6m 3GHz RG Serisa | N/A | 2019/05/10 | 2020/05/09 |
| ● | RF Connection Cable | HUBER+SUHNER | HTWE0120-03 | 6m 3GHz RG Serisa | N/A | 2019/05/10 | 2020/05/09 |
| ● | RF Connection Cable | HUBER+SUHNER | HTWE0120-04 | 6m 3GHz RG Serisa | N/A | 2019/05/10 | 2020/05/09 |
| ● | RF Connection Cable | HUBER+SUHNER | HTWE0121-01 | 6m 18GHz S Serisa | N/A | 2019/05/10 | 2020/05/09 |
| ● | Test Software | Audix | N/A | E3 | N/A | N/A | N/A |

| ● RF Conducted Method | | | | | | |
|-----------------------|------------------------------|--------------|-----------|------------|------------------------------|------------------------------|
| Used | Test Equipment | Manufacturer | Model No. | Serial No. | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
| ● | Signal and spectrum Analyzer | R&S | FSV40 | 100048 | 2019/10/26 | 2020/10/25 |
| ● | Spectrum Analyzer | Agilent | N9020A | MY50510187 | 2019/10/26 | 2020/10/25 |
| ○ | Radio communication tester | R&S | CMW500 | 137688-Lv | 2019/10/26 | 2020/10/25 |

5. TEST CONDITIONS AND RESULTS

5.1. Antenna requirement

Requirement

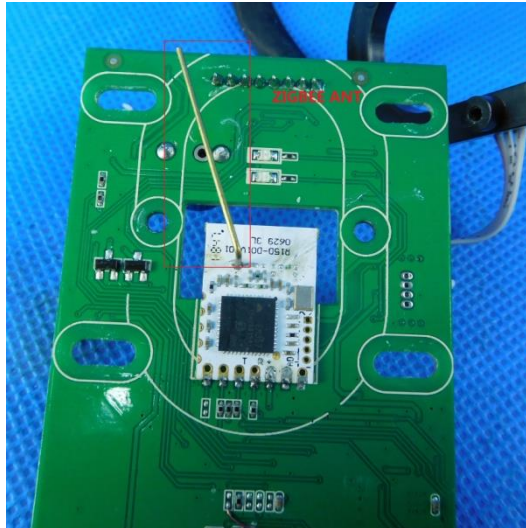
FCC CFR Title 47 Part 15 Subpart C Section 15.203:

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 an 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.

TEST RESULTS

Passed **Not Applicable**

The antenna type is a monopole antenna, the directional gain of the antenna less than 6 dBi, please refer to the below antenna photo.



5.2. AC Conducted Emissions

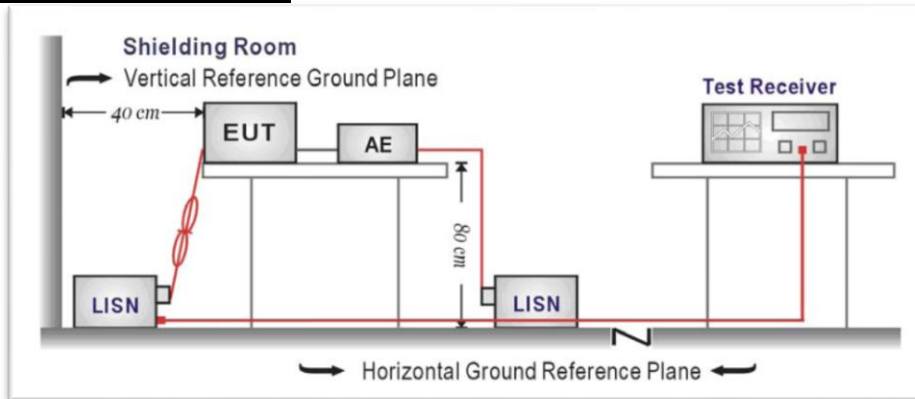
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207:

| Frequency range (MHz) | Limit (dBuV) | |
|-----------------------|--------------|-----------|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10:2013
2. The EUT was placed on a plat form of nominal size, 1 m by 1.5 m, raised 10 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 10 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50ohm / 50uH coupling impedance for the measuring equipment.
4. 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)
5. 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.
6. 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.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST MODE:

Please refer to the clause 4.2

TEST RESULTS

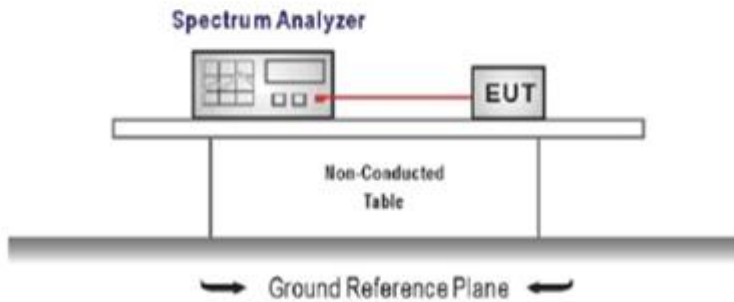
Passed Not Applicable

5.3. 20 dB bandwidth

Limit

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).
 Center Frequency = channel center frequency
 Span= approximately 2 to 3 times the 20 dB bandwidth
 RBW = 100 kHz, VBW ≥ 3 × RBW
 Sweep time= auto couple
 Detector = Peak
 Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission, and record the pertinent measurements.

TEST MODE:

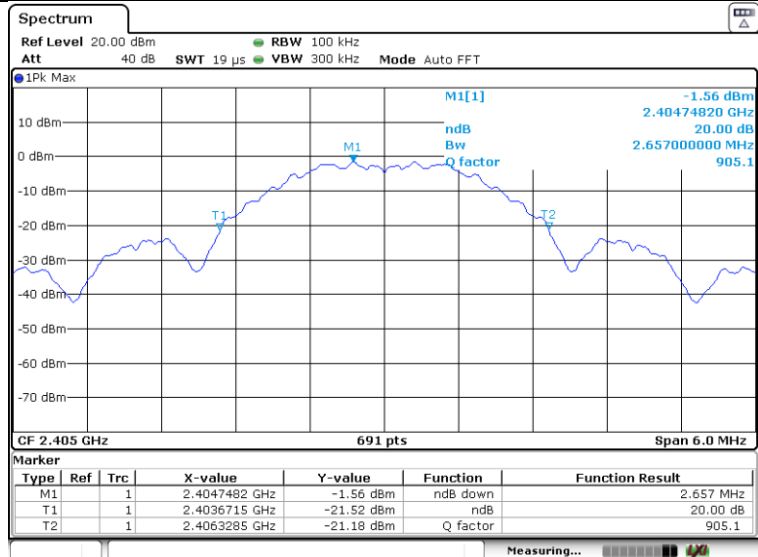
Please refer to the clause 4.2

TEST RESULTS

Passed **Not Applicable**

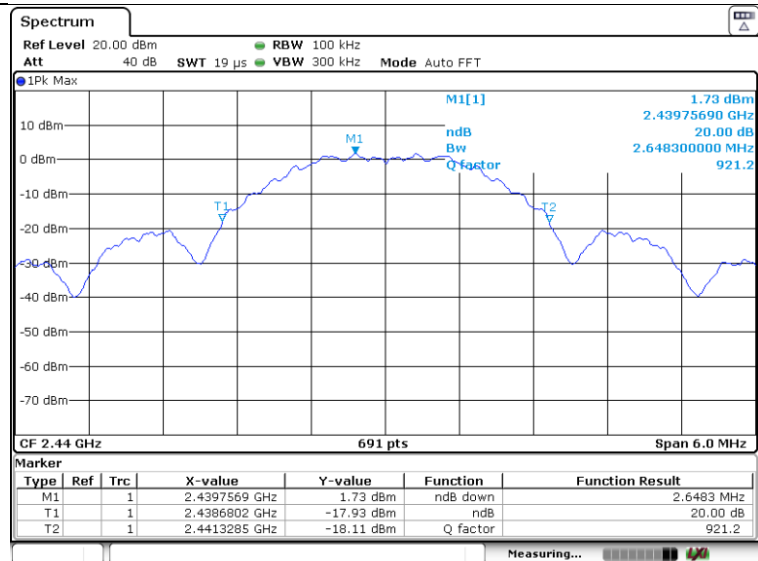
| Test Channel | 20dB Bandwidth (MHz) | Limit (MHz) | Result |
|-----------------|----------------------|-------------|--------|
| CH _L | 2.6570 | - | Pass |
| CH _M | 2.6483 | - | Pass |
| CH _H | 2.6570 | - | Pass |

CH_L



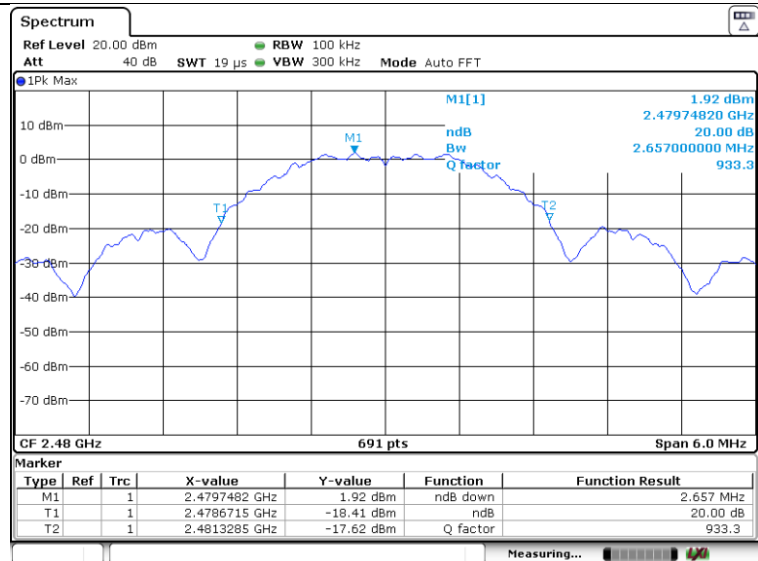
Date: 15/4PR2020 09:33:05

CH_M



Date: 15/4PR2020 09:34:27

CH_H



Date: 15/4PR2020 09:36:11

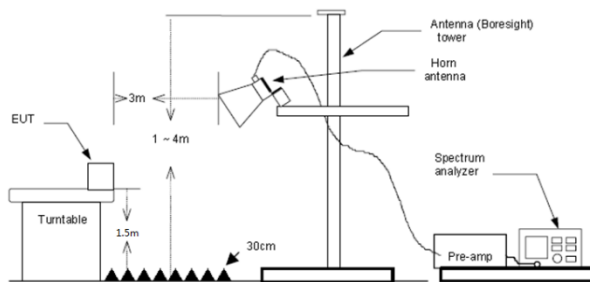
5.4. Radiated field strength of the fundamental signal

LIMIT

| Fundamental frequency | Field strength of fundamental (millivolts/meter) | Field strength of harmonics (microvolts/meter) |
|-----------------------|--|--|
| 902-928 MHz | 50 (94dBuV/m @3m) | 500 (54dBuV/m @3m) |
| 2400-2483.5 MHz | 50 (94dBuV/m @3m) | 500 (54dBuV/m @3m) |
| 5725-5875 MHz | 50 (94dBuV/m @3m) | 500 (54dBuV/m @3m) |
| 24.0-24.25 GHz | 250 (108dBuV/m @3m) | 2500 (68dBuV/m @3m) |

Frequencies above 1000 MHz, the field strength limits are based on average limits

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. Use the following spectrum analyzer settings:
 RBW=3MHz, VBW=3MHz Peak detector for Peak value.
 RBW=3MHz, VBW=3MHz RMS detector for Average value.

TEST MODE:

Please refer to the clause 4.2

TEST RESULTS

Passed Not Applicable

Note:

- 1) Level= Reading + Factor; Factor =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Margin = Limit – Level

CH_L

Suspected Data List

| NO. | Freq. [MHz] | Reading [dBμV/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Polarity | Detector |
|-----|-------------|------------------|-------------|----------------|----------------|-------------|------------|----------|
| 1 | 2404.408 | 38.47 | 45.10 | 83.57 | 114.00 | 30.43 | Horizontal | PK |
| 2 | 2404.408 | 36.47 | 45.10 | 81.57 | 94.00 | 12.43 | Horizontal | AV |

Suspected Data List

| NO. | Freq. [MHz] | Reading [dBμV/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Polarity | Detector |
|-----|-------------|------------------|-------------|----------------|----------------|-------------|----------|----------|
| 1 | 2404.451 | 38.12 | 45.10 | 83.22 | 114.00 | 30.78 | Vertical | PK |
| 2 | 2404.451 | 36.09 | 45.10 | 81.19 | 94.00 | 12.81 | Vertical | AV |

CH_M

Suspected Data List

| NO. | Freq. [MHz] | Reading [dBμV/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Polarity | Detector |
|-----|-------------|------------------|-------------|----------------|----------------|-------------|------------|----------|
| 1 | 2440.491 | 42.66 | 45.48 | 88.14 | 94.00 | 5.86 | Horizontal | AV |
| 2 | 2440.493 | 44.69 | 45.48 | 90.17 | 114.00 | 23.83 | Horizontal | PK |

Suspected Data List

| NO. | Freq. [MHz] | Reading [dBμV/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Polarity | Detector |
|-----|-------------|------------------|-------------|----------------|----------------|-------------|----------|----------|
| 1 | 2440.501 | 40.21 | 45.48 | 85.69 | 94.00 | 8.31 | Vertical | AV |
| 2 | 2440.603 | 42.68 | 45.48 | 88.16 | 114.00 | 25.84 | Vertical | PK |

CH_H

Suspected Data List

| NO. | Freq. [MHz] | Reading [dBμV/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Polarity | Detector |
|-----|-------------|------------------|-------------|----------------|----------------|-------------|------------|----------|
| 1 | 2480.506 | 50.78 | 45.90 | 96.68 | 114.00 | 17.32 | Horizontal | PK |
| 2 | 2480.506 | 46.78 | 45.90 | 92.68 | 94.00 | 1.32 | Horizontal | AV |

Suspected Data List

| NO. | Freq. [MHz] | Reading [dBμV/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Polarity | Detector |
|-----|-------------|------------------|-------------|----------------|----------------|-------------|----------|----------|
| 1 | 2480.516 | 43.87 | 45.90 | 89.77 | 114.00 | 24.23 | Vertical | PK |
| 2 | 2480.591 | 41.33 | 45.90 | 87.23 | 94.00 | 6.77 | Vertical | AV |

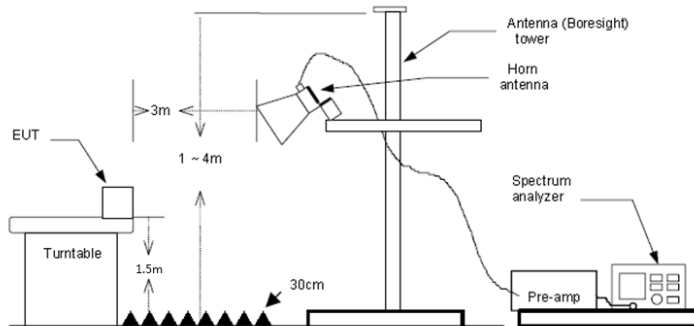
5.5. Radiated Band edge Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 .
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 on radiated measurement.
5. Use the following spectrum analyzer settings:
 - a) Span shall be wide enough to fully capture the emission being measured
 - b) Set RBW=100kHz for <1GHz, VBW=3*RBW, Sweep time=auto, Detector=peak, Trace=max hold
 - c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

For average measurement:

 - VBW=10Hz, When duty cycle is no less than 98 percent
 - VBW≥1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting .

TEST MODE:

Please refer to the clause 4.2

TEST RESULT

Passed Not Applicable

Note:

- 3) Level= Reading + Factor; Factor =Antenna Factor+ Cable Loss- Preamp Factor
- 4) Margin = Limit – Level
- 5) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m).

CHL

| Suspected Data List | | | | | | | | |
|---------------------|-------------|------------------------|-------------|----------------------|----------------------|-------------|------------|----------|
| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
| 1 | 2310.000 | 38.98 | -2.34 | 36.64 | 74.00 | 37.36 | Horizontal | PK |
| 2 | 2390.012 | 38.64 | -2.41 | 36.23 | 74.00 | 37.77 | Horizontal | PK |

| Suspected Data List | | | | | | | | |
|---------------------|-------------|------------------------|-------------|----------------------|----------------------|-------------|------------|----------|
| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
| 1 | 2310.000 | 32.62 | -2.34 | 30.28 | 54.00 | 23.72 | Horizontal | AV |
| 2 | 2390.010 | 32.36 | -2.41 | 29.95 | 54.00 | 24.05 | Horizontal | AV |

| Suspected Data List | | | | | | | | |
|---------------------|-------------|------------------------|-------------|----------------------|----------------------|-------------|----------|----------|
| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
| 1 | 2310.000 | 38.54 | -2.34 | 36.20 | 74.00 | 37.80 | Vertical | PK |
| 2 | 2390.012 | 39.61 | -2.41 | 37.20 | 74.00 | 36.80 | Vertical | PK |

| Suspected Data List | | | | | | | | |
|---------------------|-------------|------------------------|-------------|----------------------|----------------------|-------------|----------|----------|
| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
| 1 | 2310.000 | 32.71 | -2.34 | 30.37 | 54.00 | 23.63 | Vertical | AV |
| 2 | 2390.010 | 32.25 | -2.41 | 29.84 | 54.00 | 24.16 | Vertical | AV |

| Suspected Data List | | | | | | | | |
|---------------------|-------------|------------------------|-------------|----------------------|----------------------|-------------|------------|----------|
| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
| 3 | 2400.090 | 22.31 | 35.46 | 57.77 | 74.00 | 16.23 | Horizontal | PK |
| 3 | 2400.090 | 11.93 | 35.46 | 47.39 | 54.00 | 6.61 | Horizontal | AV |

| Suspected Data List | | | | | | | | |
|---------------------|-------------|------------------------|-------------|----------------------|----------------------|-------------|----------|----------|
| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
| 3 | 2400.090 | 23.30 | 35.46 | 58.76 | 74.00 | 15.24 | Vertical | PK |
| 3 | 2400.090 | 11.87 | 35.46 | 47.33 | 54.00 | 6.67 | Vertical | AV |

CHH

Suspected Data List

| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
|-----|-------------|------------------------|-------------|----------------------|----------------------|-------------|------------|----------|
| 1 | 2483.500 | 52.48 | -2.15 | 50.33 | 74.00 | 23.67 | Horizontal | PK |
| 2 | 2500.000 | 49.34 | -2.10 | 47.24 | 74.00 | 26.76 | Horizontal | PK |

Suspected Data List

| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
|-----|-------------|------------------------|-------------|----------------------|----------------------|-------------|------------|----------|
| 1 | 2483.500 | 40.51 | -2.15 | 38.36 | 54.00 | 15.64 | Horizontal | AV |
| 2 | 2500.000 | 42.48 | -2.10 | 40.38 | 54.00 | 13.62 | Horizontal | AV |

Suspected Data List

| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
|-----|-------------|------------------------|-------------|----------------------|----------------------|-------------|----------|----------|
| 1 | 2483.500 | 58.85 | -2.15 | 56.70 | 74.00 | 17.30 | Vertical | PK |
| 2 | 2500.000 | 59.26 | -2.10 | 57.16 | 74.00 | 16.84 | Vertical | PK |

Suspected Data List

| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
|-----|-------------|------------------------|-------------|----------------------|----------------------|-------------|----------|----------|
| 1 | 2483.500 | 49.58 | -2.15 | 47.43 | 54.00 | 6.57 | Vertical | AV |
| 2 | 2500.000 | 42.19 | -2.10 | 40.09 | 54.00 | 13.91 | Vertical | AV |

5.6. Radiated Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

| Frequency | Limit (dBuV/m) | Value |
|----------------------|-------------------|------------|
| 0.009 MHz ~0.49 MHz | 2400/F(kHz) @300m | Quasi-peak |
| 0.49 MHz ~ 1.705 MHz | 24000/F(kHz) @30m | Quasi-peak |
| 1.705 MHz ~30 MHz | 30 @30m | Quasi-peak |

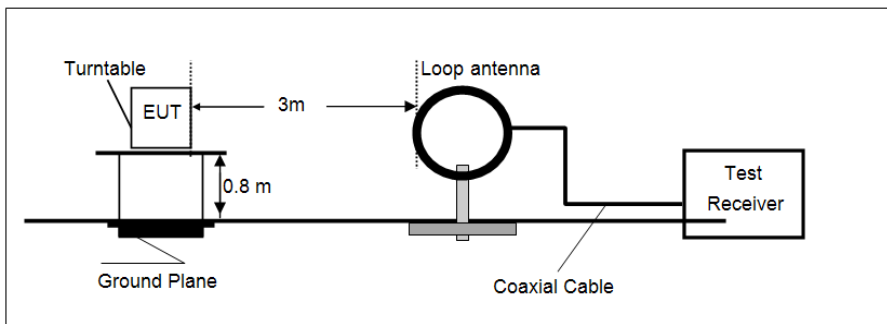
Note: Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3)= Limit dBuV/m @300m +80,

Limit dBuV/m @3m = Limit dBuV/m @30m +40*log(30/3)= Limit dBuV/m @30m + 40.

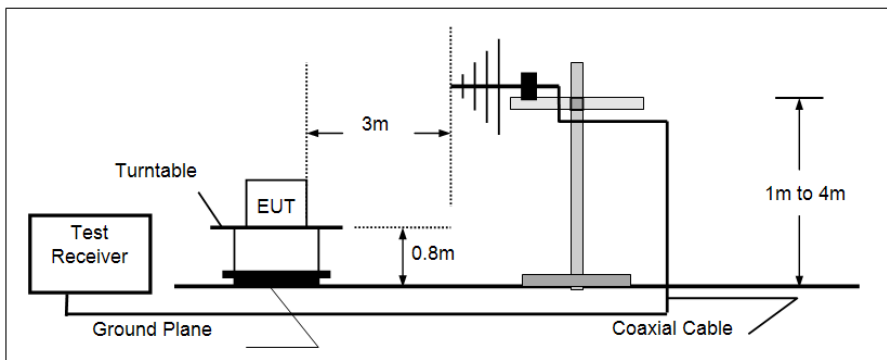
| Frequency | Limit (dBuV/m @3m) | Value |
|---------------|--------------------|------------|
| 30MHz~88MHz | 40.00 | Quasi-peak |
| 88MHz~216MHz | 43.50 | Quasi-peak |
| 216MHz~960MHz | 46.00 | Quasi-peak |
| 960MHz~1GHz | 54.00 | Quasi-peak |
| Above 1GHz | 54.00 | Average |
| | 74.00 | Peak |

TEST CONFIGURATION

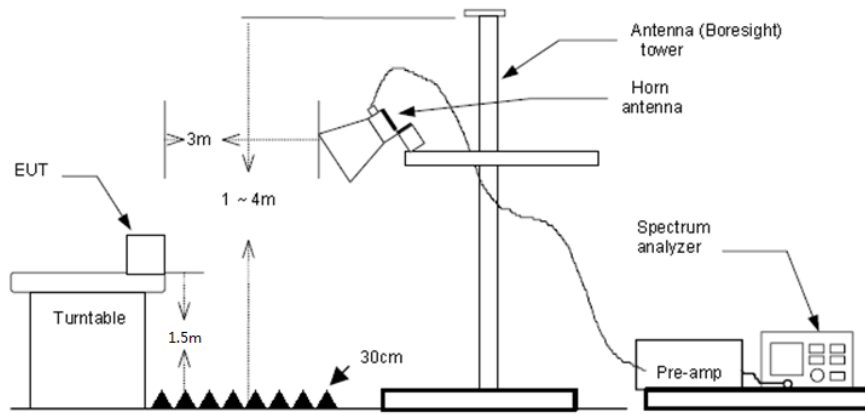
- 9 kHz ~ 30 MHz



- 30 MHz ~ 1 GHz



- Above 1 GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 .
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) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement
 - For average measurement:
 - VBW=10Hz, When duty cycle is no less than 98 percent

VBW \geq 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting.

TEST MODE:

Please refer to the clause 4.2

TEST RESULT

Passed **Not Applicable**

Note:

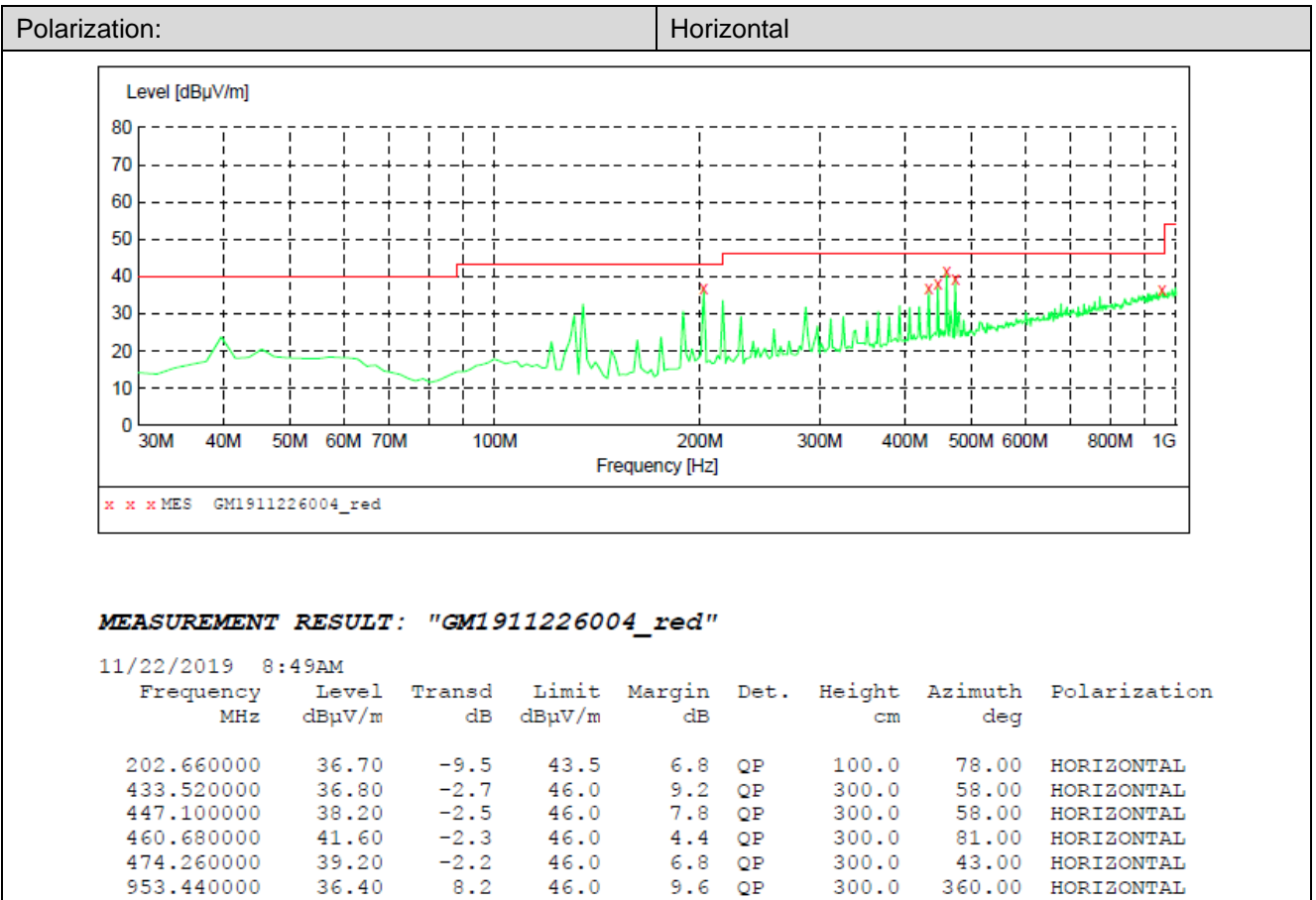
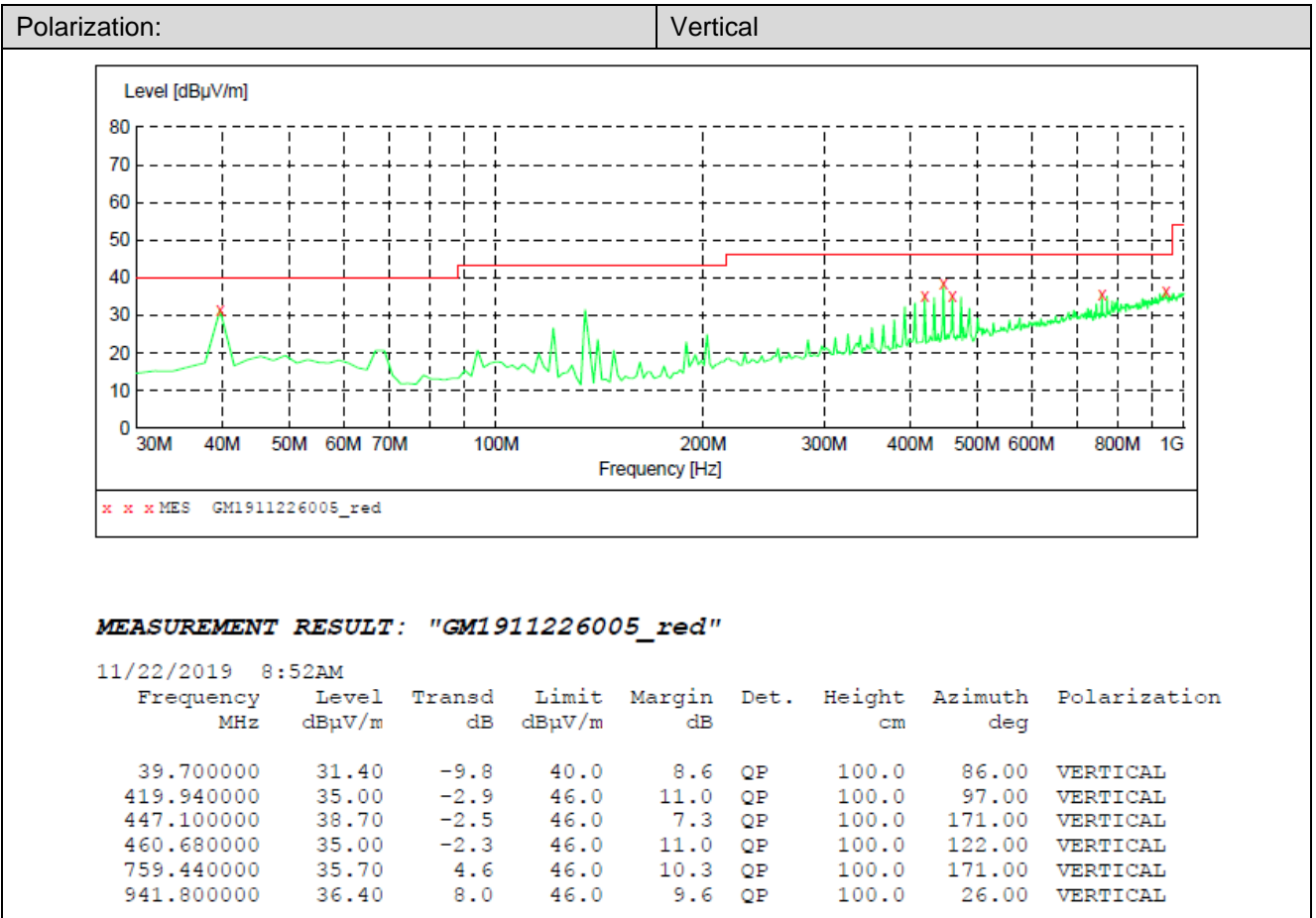
- 1) Level= Reading + Factor/Transd; Factor/Transd =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Margin = Limit – Level
- 3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m) for above 1GHz.

TEST DATA FOR 9 kHz ~ 30 MHz

The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

TEST DATA FOR 30 MHz ~ 1000 MHz

Have pre-scan all test channel, found CH_H which it was worst case, so only show the worst case's data on this report.



TEST DATA FOR 1 GHz ~ 25 GHz**CH_L**

| Suspected Data List | | | | | | | | |
|----------------------------|-------------|------------------------|-------------|----------------------|----------------------|-------------|------------|----------|
| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
| 1 | 1353.968 | 35.16 | -5.58 | 29.58 | 74.00 | 44.42 | Horizontal | PK |
| 2 | 3188.437 | 33.30 | 0.78 | 34.08 | 74.00 | 39.92 | Horizontal | PK |
| 3 | 4811.406 | 41.43 | 7.06 | 48.49 | 74.00 | 25.51 | Horizontal | PK |
| 4 | 7217.218 | 33.22 | 15.00 | 48.22 | 74.00 | 25.78 | Horizontal | PK |

| Suspected Data List | | | | | | | | |
|----------------------------|-------------|------------------------|-------------|----------------------|----------------------|-------------|----------|----------|
| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
| 1 | 1220.312 | 35.55 | -5.78 | 29.77 | 74.00 | 44.23 | Vertical | PK |
| 2 | 3097.375 | 32.35 | 0.31 | 32.66 | 74.00 | 41.34 | Vertical | PK |
| 3 | 4811.406 | 32.77 | 7.06 | 39.83 | 74.00 | 34.17 | Vertical | PK |
| 4 | 6713.437 | 30.24 | 13.43 | 43.67 | 74.00 | 30.33 | Vertical | PK |

CH_M

| Suspected Data List | | | | | | | | |
|----------------------------|-------------|------------------------|-------------|----------------------|----------------------|-------------|------------|----------|
| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
| 1 | 1243.812 | 34.90 | -5.72 | 29.18 | 74.00 | 44.82 | Horizontal | PK |
| 2 | 3216.343 | 32.29 | 0.65 | 32.94 | 74.00 | 41.06 | Horizontal | PK |
| 3 | 4878.968 | 42.71 | 7.15 | 49.86 | 74.00 | 24.14 | Horizontal | PK |
| 4 | 7321.500 | 34.28 | 15.12 | 49.40 | 74.00 | 24.60 | Horizontal | PK |

| Suspected Data List | | | | | | | | |
|----------------------------|-------------|------------------------|-------------|----------------------|----------------------|-------------|----------|----------|
| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
| 1 | 1210.031 | 35.12 | -5.80 | 29.32 | 74.00 | 44.68 | Vertical | PK |
| 2 | 3163.468 | 32.29 | 0.65 | 32.94 | 74.00 | 41.06 | Vertical | PK |
| 3 | 4880.437 | 36.79 | 7.15 | 43.94 | 74.00 | 30.06 | Vertical | PK |
| 4 | 6086.281 | 32.11 | 10.68 | 42.79 | 74.00 | 31.21 | Vertical | PK |

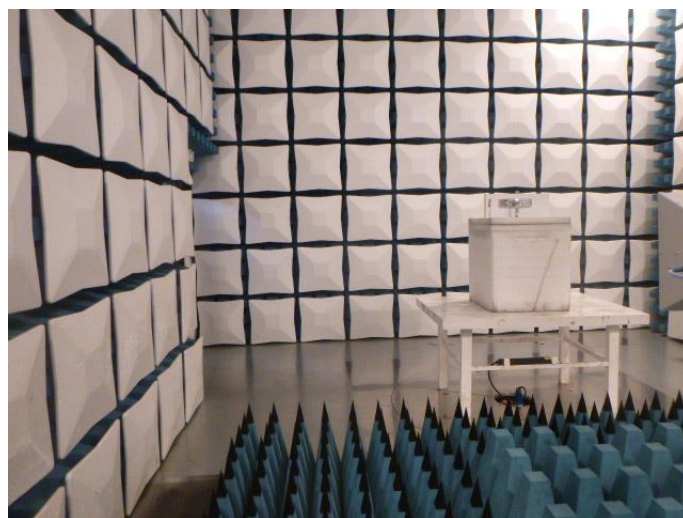
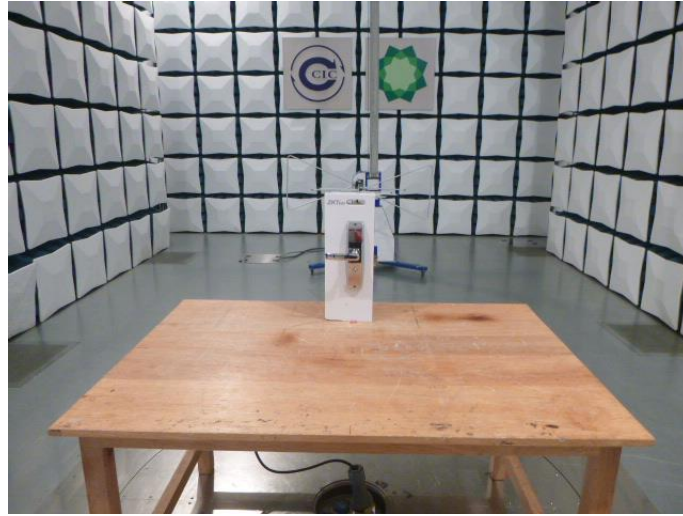
CH_H

| Suspected Data List | | | | | | | | |
|----------------------------|-------------|------------------------|-------------|----------------------|----------------------|-------------|------------|----------|
| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
| 1 | 1163.031 | 35.38 | -6.22 | 29.16 | 74.00 | 44.84 | Horizontal | PK |
| 2 | 3068.000 | 32.58 | 0.18 | 32.76 | 74.00 | 41.24 | Horizontal | PK |
| 3 | 4961.218 | 43.86 | 7.59 | 51.45 | 74.00 | 22.55 | Horizontal | PK |
| 4 | 7439.000 | 35.61 | 15.39 | 51.00 | 74.00 | 23.00 | Horizontal | PK |

| Suspected Data List | | | | | | | | |
|----------------------------|-------------|------------------------|-------------|----------------------|----------------------|-------------|----------|----------|
| NO. | Freq. [MHz] | Reading [dB μ V/m] | Factor [dB] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Polarity | Detector |
| 1 | 1270.250 | 34.48 | -5.65 | 28.83 | 74.00 | 45.17 | Vertical | PK |
| 2 | 3151.718 | 31.72 | 0.59 | 32.31 | 74.00 | 41.69 | Vertical | PK |
| 3 | 4961.218 | 37.80 | 7.59 | 45.39 | 74.00 | 28.61 | Vertical | PK |
| 4 | 7439.000 | 31.45 | 15.39 | 46.84 | 74.00 | 27.16 | Vertical | PK |

6. TEST SETUP PHOTOS OF THE EUT

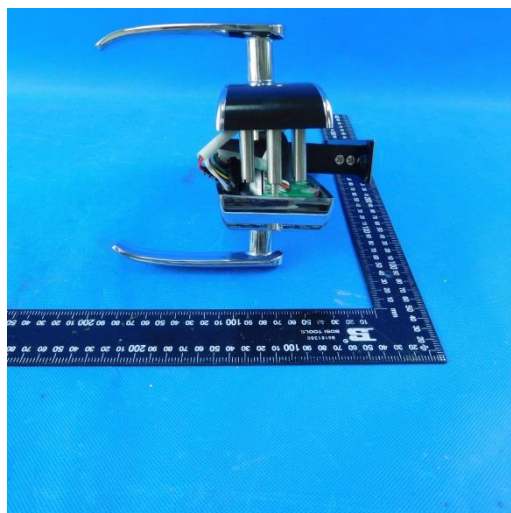
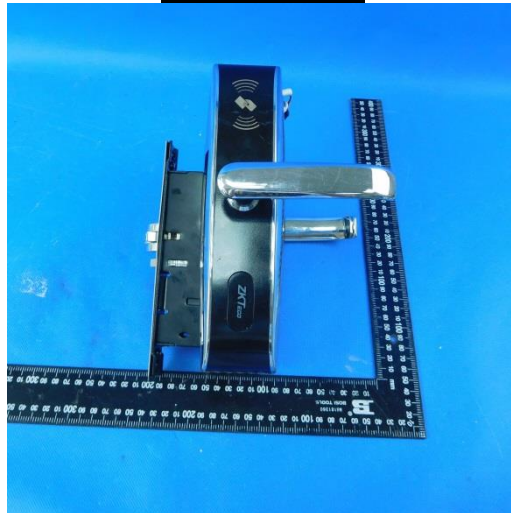
Radiated Emissions

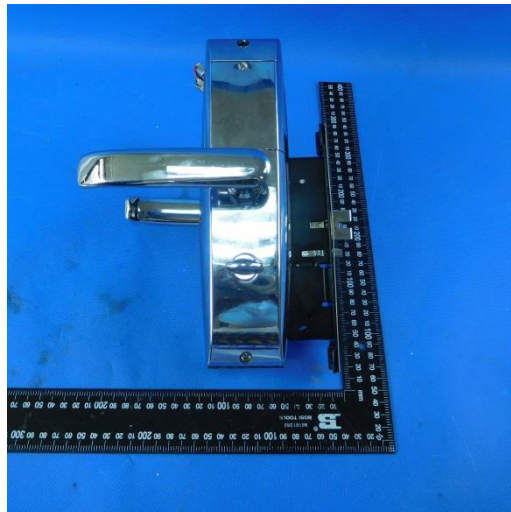
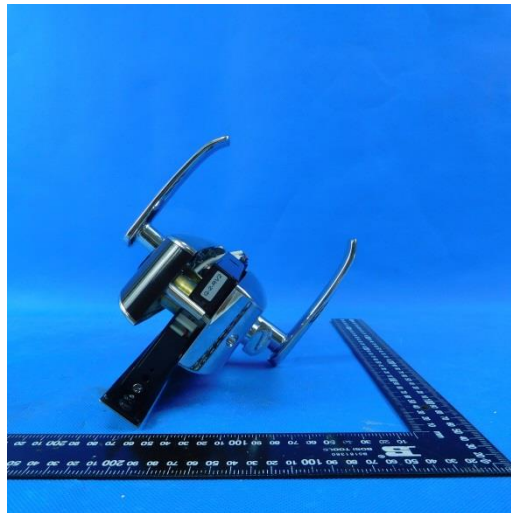
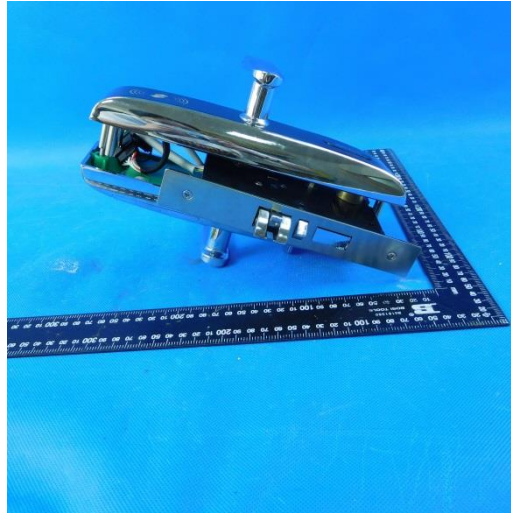


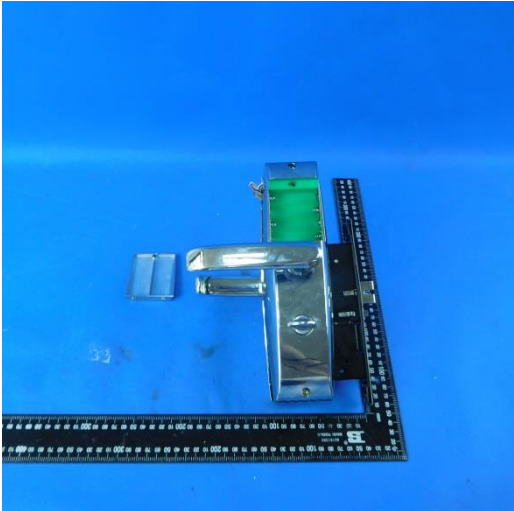


7. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

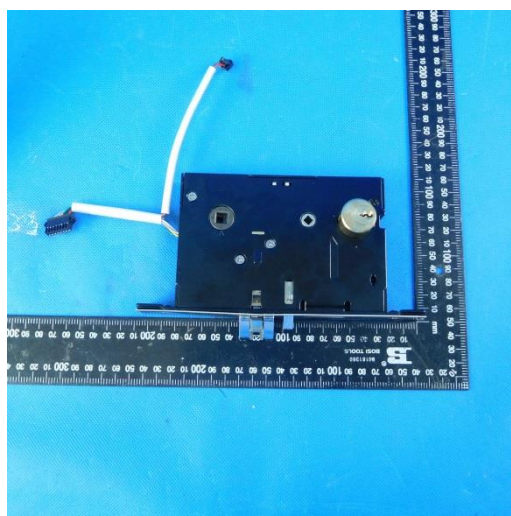
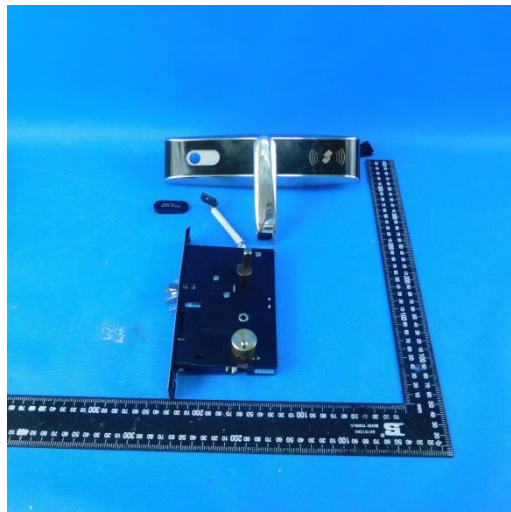
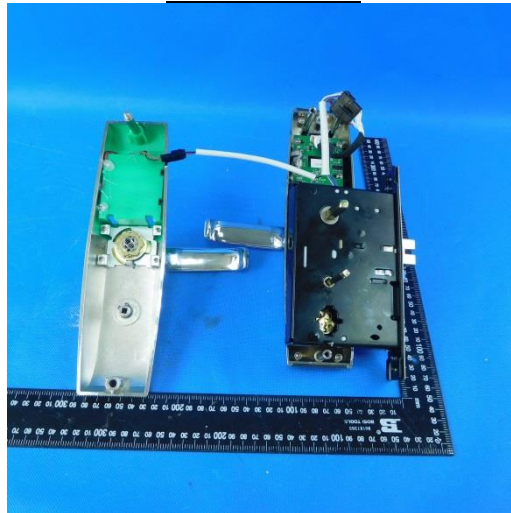
External Photos

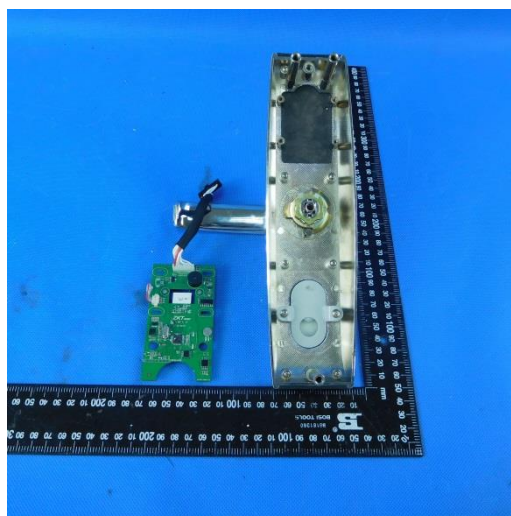
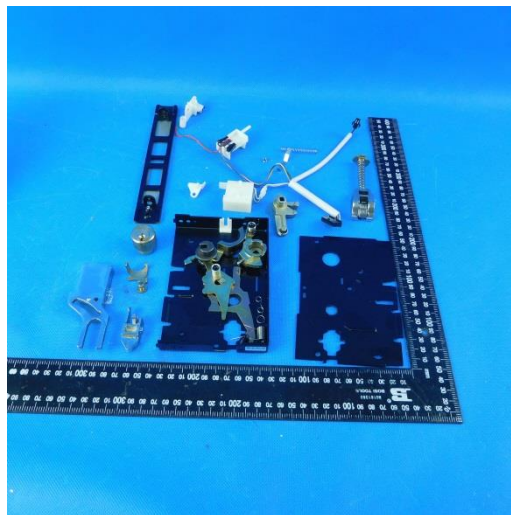
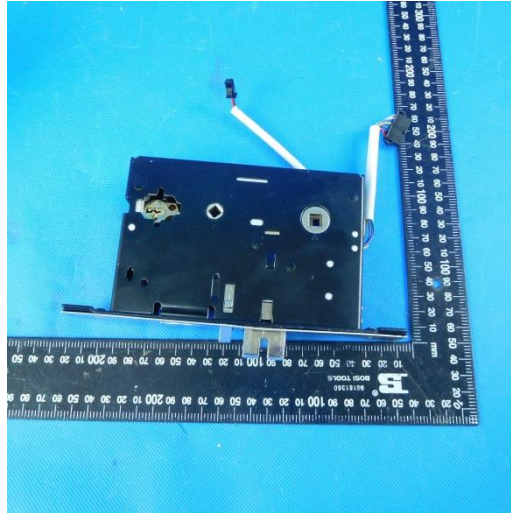


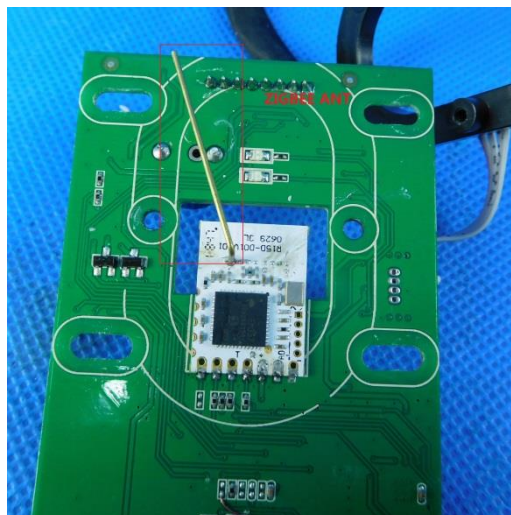
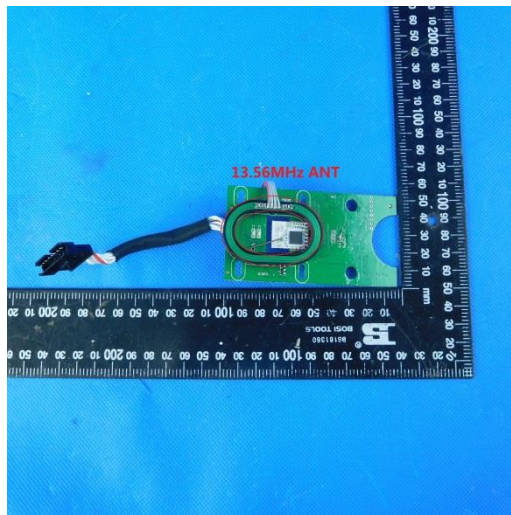


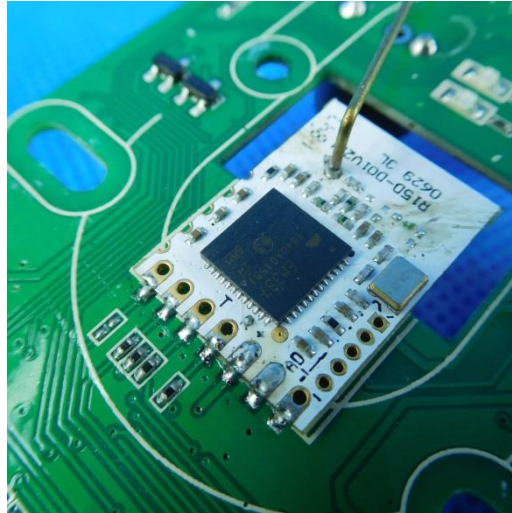


Internal Photos









-----End of Report-----