

# TEST REPORT

For RF

**Report No.** .....: **CHEW22060107** **Report verification:**   
**Project No.** .....: **SHT2205024705EW**  
**FCC ID** .....: **2AJ9T-20805**  
**Applicant's name** .....: **ZKTECO CO., LTD.**  
**Address** .....: No.32, Pingshan Industrial Avenue, Tangxia Town, Dongguan City, Guangdong Province, China 523728  
**Product Name** .....: **Smart Access Control Terminal**  
**Trade Mark** .....: -  
**Model No.** .....: ProFace X(DS)  
**Listed Model(s)** .....: ProFace X(CH/DS)  
**Standard** .....: **FCC CFR Title 47 Part 15 Subpart C Section 15.225**  
**Date of receipt of test sample** .....: May 13, 2022  
**Date of testing** .....: May 13, 2022- Jun.15, 2022  
**Date of issue** .....: Jun.16, 2022  
**Result** .....: **PASS**

**Compiled by**  
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*Echo Wei*

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*Kiki Kong*

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*Hans Hu*

**Testing Laboratory Name** .....: **Shenzhen Huatongwei International Inspection Co., Ltd.**  
**Address** .....: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

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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 15.225](#): Operation within the band 13.110-14.010 MHz.

[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          | 2022-06-16    | Original    |
|              |               |             |
|              |               |             |
|              |               |             |
|              |               |             |

## 2. TEST DESCRIPTION

| Report clause | Test Items                                             | Standard Requirement | Result | Test Engineer |
|---------------|--------------------------------------------------------|----------------------|--------|---------------|
| 5.1           | Antenna requirement                                    | 15.203               | PASS   | Yifan Wang    |
| 5.2           | AC Power Conducted Emissions                           | 15.207               | PASS   | Hongtao Meng  |
| 5.3           | Field Strength of the Fundamental and Mask Measurement | 15.225(a)(b)(c)      | PASS   | Yifan Wang    |
| 5.4           | 20dB Bandwidth                                         | 15.215               | PASS   | Yifan Wang    |
| 5.5           | Radiated Spurious Emission                             | 15.225(d)&15.209     | PASS   | Dongyang Wu   |
| 5.6           | Frequency Stability                                    | 15.225(e)            | PASS   | Yifan Wang    |

Note: The measurement uncertainty is not included in the test result.

### 3. SUMMARY

#### 3.1. Client Information

|               |                                                                                             |
|---------------|---------------------------------------------------------------------------------------------|
| Applicant:    | ZKTECO CO., LTD.                                                                            |
| Address:      | No.32,Pingshan Industrial Avenue,Tangxia Town,Dongguan City,Guangdong Province,China 523728 |
| Manufacturer: | ZKTECO CO., LTD.                                                                            |
| Address:      | No.32,Pingshan Industrial Avenue,Tangxia Town,Dongguan City,Guangdong Province,China 523728 |

#### 3.2. Product Description

| Main unit information:      |                                                                                                    |
|-----------------------------|----------------------------------------------------------------------------------------------------|
| Product Name:               | Smart Access Control Terminal                                                                      |
| Trade Mark:                 | -                                                                                                  |
| Model No.:                  | ProFace X(DS)                                                                                      |
| Listed Model(s):            | ProFace X(CH/DS)                                                                                   |
| Power supply:               | AC 120V                                                                                            |
| Hardware version:           | V1.4                                                                                               |
| Software version:           | V1.1.2                                                                                             |
| Accessory unit information: |                                                                                                    |
| Adapter information:        | Model: ADS-40SI-12-3 12036E<br>Input: 100-240Va.c.,50/60Hz 1.0A max<br>Output:12.0Vd.c.,3.0A 36.0W |

#### 3.3. Radio Specification Description

|                      |          |
|----------------------|----------|
| Modulation:          | ASK      |
| Operation frequency: | 13.56MHz |
| Channel number:      | 1        |

### 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                                                            |                      |
| Connect information: | Phone: 86-755-26715499<br>E-mail: <a href="mailto:cs@szhtw.com.cn">cs@szhtw.com.cn</a><br><a href="http://www.szhtw.com.cn">http://www.szhtw.com.cn</a> |                      |
| Qualifications       | Type                                                                                                                                                    | Accreditation Number |
|                      | FCC                                                                                                                                                     | 762235               |

## 4. TEST CONFIGURATION

### 4.1. Test mode

|                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| For RF test items                                                                                                                                                                                                           |
| The engineering test program was provided and enabled to make EUT continuous transmit.                                                                                                                                      |
| For AC power line conducted emissions:                                                                                                                                                                                      |
| The engineering test program was provided and enabled to make EUT continuous transmit.                                                                                                                                      |
| For Radiated spurious emissions test item:                                                                                                                                                                                  |
| The engineering test program was provided and enabled to make EUT continuous transmit.<br>The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data Recorded in the report. |

### 4.2. Test sample information

| Test item              | HTW sample no.  |
|------------------------|-----------------|
| RF Radiated test items | YPHT22050247002 |
| EMI test items         | YPHT22050247001 |

Note:

RF Radiated test items: Field Strength of the Fundamental and Mask Measurement, 20dB Bandwidth, Radiated Spurious Emission, Frequency Stability

EMI test items : AC Power Conducted Emissions

### 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. |
| 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. Statement of the measurement uncertainty

| Test Items                    | Measurement Uncertainty           |
|-------------------------------|-----------------------------------|
| AC Power Conducted Emissions  | 3.00 dB                           |
| Radiated emissions below 1GHz | 4.36 dB                           |
| Radiated emissions above 1GHz | 5.10 dB                           |
| Occupied Bandwidth            | 70Hz for <1GHz<br>130Hz for >1GHz |

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

#### 4.6. Equipments 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        | 2021/09/14                | 2022/09/13                |
| ●                    | Artificial Mains    | SCHWARZBECK        | HTWE0113      | NNLK 8121      | 573           | 2021/09/17                | 2022/09/16                |
| ●                    | Pulse Limiter       | R&S                | HTWE0193      | ESH3-Z2        | 101447        | 2021/09/16                | 2022/09/15                |
| ●                    | RF Connection Cable | HUBER+SUHNER       | HTWE0113-02   | ENVIROFLEX 142 | EF-NM-BNCM-2M | 2021/09/17                | 2022/09/16                |
| ●                    | 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                | 2022/09/29                |
| ●                                 | EMI Test Receiver       | R&S                | HTWE0099      | ESCI        | 100900     | 2021/09/14                | 2022/09/13                |
| ●                                 | Loop Antenna            | R&S                | HTWE0170      | HFH2-Z2     | 100020     | 2021/04/06                | 2024/04/05                |
| ●                                 | Ultra-Broadband Antenna | SCHWARZBECK        | HTWE0123      | VULB9163    | 538        | 2021/04/06                | 2024/04/05                |
| ●                                 | Pre-Amplifier           | SCHWARZBECK        | HTWE0295      | BBV 9742    | N/A        | 2021/11/05                | 2022/11/04                |
| ●                                 | RF Connection Cable     | HUBER+SUHNER       | HTWE0062-01   | N/A         | N/A        | 2022/02/25                | 2023/02/24                |
| ●                                 | RF Connection Cable     | HUBER+SUHNER       | HTWE0062-02   | SUCOFLEX104 | 501184/4   | 2022/02/25                | 2023/02/24                |
| ●                                 | 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         | C11121      | 2018/09/27                | 2022/09/26                |
| ●                                 | Spectrum Analyzer       | R&S                | HTWE0098      | FSP40             | 100597      | 2021/09/13                | 2022/09/12                |
| ●                                 | Horn Antenna            | SCHWARZBECK        | HTWE0126      | 9120D             | 1011        | 2020/04/01                | 2023/03/31                |
| ●                                 | Broadband Horn Antenna  | SCHWARZBECK        | HTWE0103      | BBHA9170          | BBHA9170472 | 2020/04/27                | 2023/04/26                |
| ●                                 | Pre-amplifier           | CD                 | HTWE0071      | PAP-0102          | 12004       | 2021/11/05                | 2022/11/04                |
| ●                                 | Broadband Pre-amplifier | SCHWARZBECK        | HTWE0201      | BBV 9718          | 9718-248    | 2022/02/28                | 2023/02/27                |
| ●                                 | RF Connection Cable     | HUBER+SUHNER       | HTWE0120-01   | 6m 18GHz S Serisa | N/A         | 2022/02/25                | 2023/02/24                |
| ●                                 | RF Connection Cable     | HUBER+SUHNER       | HTWE0120-02   | 6m 3GHz RG Serisa | N/A         | 2022/02/25                | 2023/02/24                |
| ●                                 | RF Connection Cable     | HUBER+SUHNER       | HTWE0119-05   | 6m 3GHz RG Serisa | N/A         | 2022/02/25                | 2023/02/24                |
| ●                                 | RF Connection Cable     | HUBER+SUHNER       | HTWE0120-04   | 6m 3GHz RG Serisa | N/A         | 2022/02/25                | 2023/02/24                |
| ●                                 | 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<br>(YY-MM-DD) | Next Cal. Date<br>(YY-MM-DD) |
| ●                     | Signal and spectrum Analyzer | R&S          | FSV40     | 100048     | 2021/09/13                   | 2022/09/12                   |
| ●                     | Spectrum Analyzer            | Agilent      | N9020A    | MY50510187 | 2021/09/13                   | 2022/09/12                   |
| ●                     | Power Meter                  | Anritsu      | ML249A    | N/A        | 2021/09/13                   | 2022/09/12                   |
| ○                     | Radio communication tester   | R&S          | CMW500    | 137688-Lv  | 2021/09/13                   | 2022/09/12                   |

## 5. TEST CONDITIONS AND RESULTS

### 5.1. Antenna requirement

#### Requirement

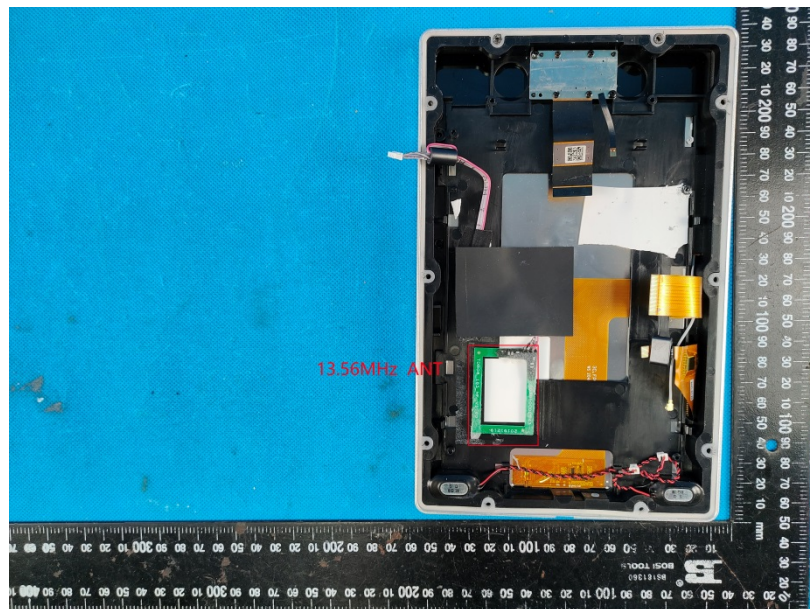
##### **FCC CFR Title 47 Part 15 Subpart C Section 15.203:**

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 RESULT

☒ Passed ☐ Not Applicable

The antenna type is a PCB antenna, please refer to the below antenna photo.



## 5.2. AC Power Conducted Emissions

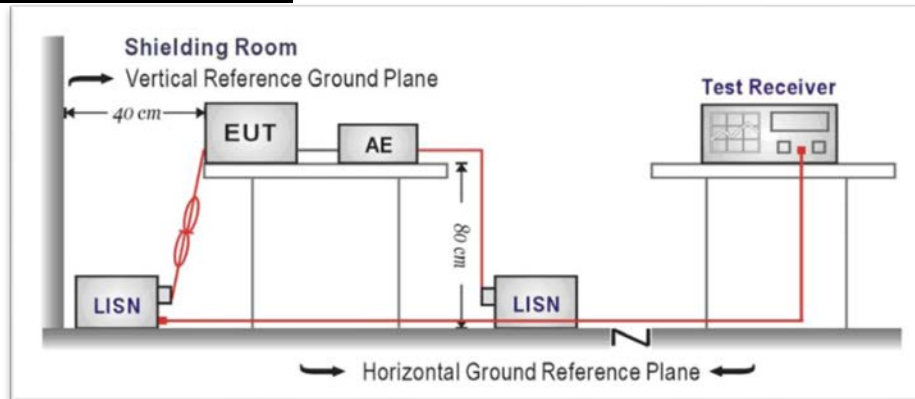
### LIMIT

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
2. The EUT was placed on a plat form of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line 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:

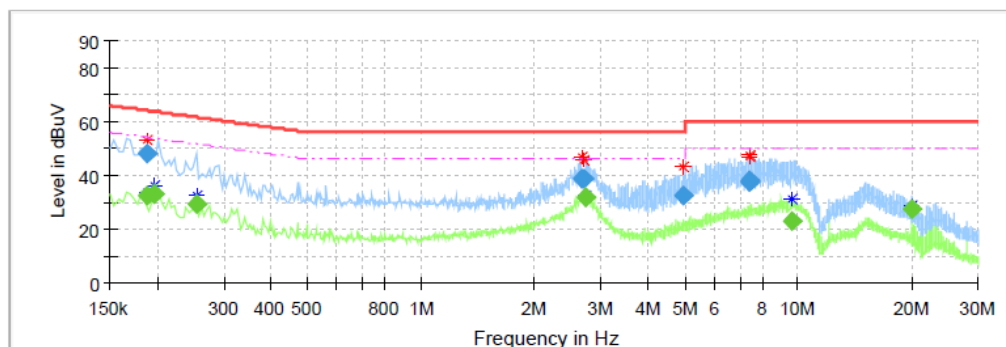
Please refer to the clause 4.1

### TEST RESULTS

☒ Passed ☐ Not Applicable

Test Line:

L

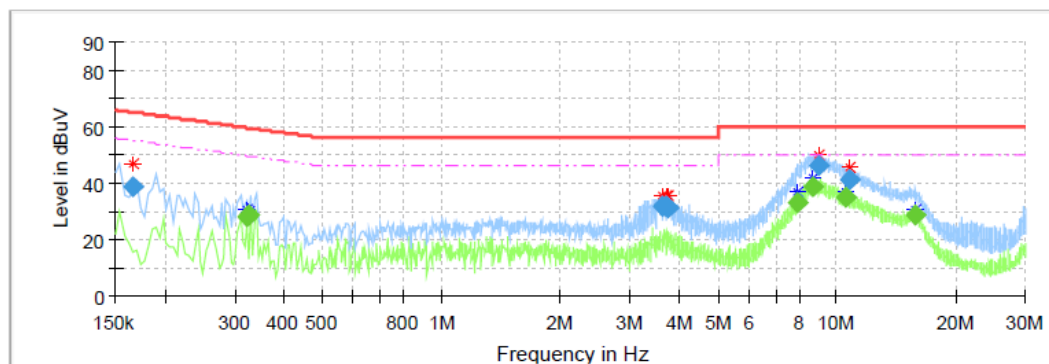


### Final Result

| Frequency (MHz) | QuasiPeak (dBuV) | CAverage (dBuV) | Limit (dBuV) | Margin (dB) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|------|------------|
| 0.187500        | ---              | 32.64           | 54.15        | 21.50       | L1   | 10.1       |
| 0.187500        | 47.95            | ---             | 64.15        | 16.20       | L1   | 10.1       |
| 0.195500        | ---              | 32.92           | 53.80        | 20.88       | L1   | 10.1       |
| 0.255500        | ---              | 29.19           | 51.58        | 22.39       | L1   | 10.1       |
| 2.659500        | 38.64            | ---             | 56.00        | 17.36       | L1   | 10.2       |
| 2.707500        | 38.84            | ---             | 56.00        | 17.16       | L1   | 10.2       |
| 2.719500        | ---              | 31.63           | 46.00        | 14.37       | L1   | 10.2       |
| 4.971500        | 32.38            | ---             | 56.00        | 23.62       | L1   | 10.3       |
| 7.468500        | 38.04            | ---             | 60.00        | 21.96       | L1   | 10.4       |
| 7.471500        | 37.72            | ---             | 60.00        | 22.28       | L1   | 10.4       |
| 9.583500        | ---              | 22.84           | 50.00        | 27.16       | L1   | 10.5       |
| 20.003500       | ---              | 27.50           | 50.00        | 22.50       | L1   | 10.8       |

Test Line:

N



### Final Result

| Frequency (MHz) | QuasiPeak (dBuV) | CAverage (dBuV) | Limit (dBuV) | Margin (dB) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|------|------------|
| 0.166000        | 38.75            | ---             | 65.16        | 26.41       | N    | 10.1       |
| 0.323500        | ---              | 27.94           | 49.62        | 21.68       | N    | 10.1       |
| 0.327500        | ---              | 28.83           | 49.51        | 20.68       | N    | 10.1       |
| 3.619500        | 31.97            | ---             | 56.00        | 24.03       | N    | 10.2       |
| 3.691500        | 32.04            | ---             | 56.00        | 23.96       | N    | 10.2       |
| 3.759500        | 30.96            | ---             | 56.00        | 25.04       | N    | 10.2       |
| 7.932500        | ---              | 33.43           | 50.00        | 16.57       | N    | 10.3       |
| 8.695500        | ---              | 38.80           | 50.00        | 11.20       | N    | 10.3       |
| 9.043500        | 46.12            | ---             | 60.00        | 13.88       | N    | 10.3       |
| 10.487500       | ---              | 34.92           | 50.00        | 15.08       | N    | 10.2       |
| 10.759500       | 41.24            | ---             | 60.00        | 18.76       | N    | 10.3       |
| 15.735500       | ---              | 28.93           | 50.00        | 21.07       | N    | 10.6       |

### 5.3. Field Strength of the Fundamental and Mask Measurement

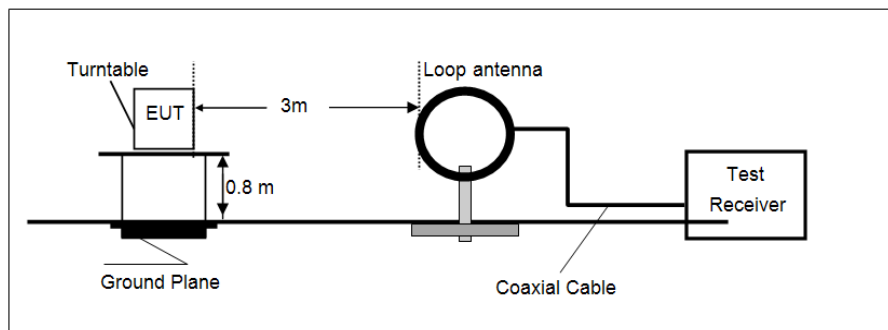
#### LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.225(a)(b)(c)

| Fundamental frequency(MHz)  | Field strength of fundamental (uV/m @30m) | Field strength of fundamental (dBuV/m @3m) |
|-----------------------------|-------------------------------------------|--------------------------------------------|
| 13.553-13.567               | 15848                                     | 124.0                                      |
| 13.410-13.553&13.567-13.710 | 334                                       | 90.5                                       |
| 13.110-13.410&13.710-14.010 | 106                                       | 80.5                                       |

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

#### TEST CONFIGURATION



#### TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 requirements.
2. The EUT is placed on a turn table which is 0.8 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.

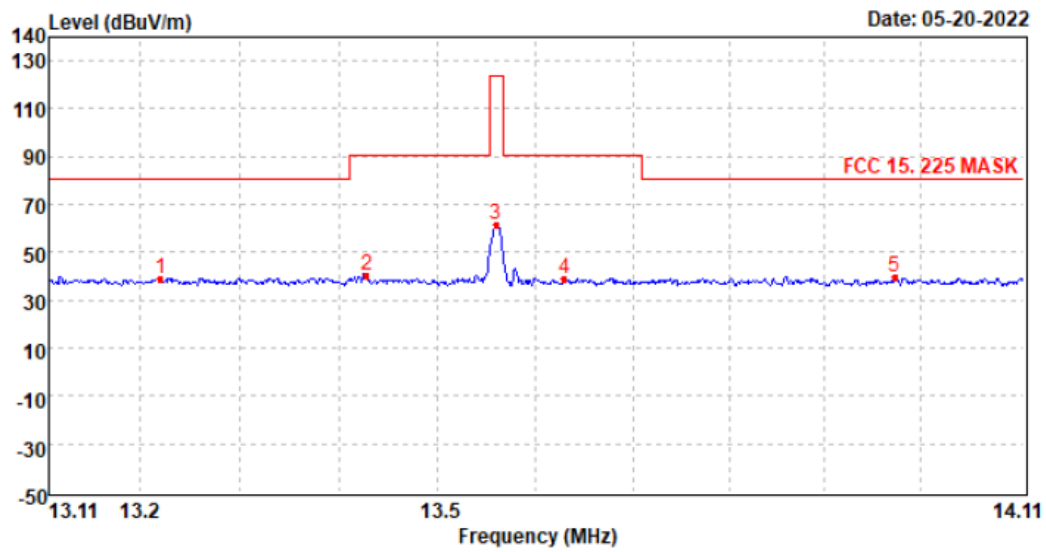
#### TEST MODE:

Please refer to the clause 4.1

#### TEST RESULTS

☒ Passed ☐ Not Applicable

## Field Strength of The Fundamental and Mask



| Mark | Frequency<br>MHz | Reading<br>dBuV/m | Antenna<br>dB | Cable<br>dB | Preamp<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>limit | Remark |
|------|------------------|-------------------|---------------|-------------|--------------|-----------------|-----------------|---------------|--------|
| 1    | 13.22            | 12.41             | 20.18         | 6.68        | 0.00         | 39.27           | 80.50           | -41.23        | Peak   |
| 2    | 13.43            | 13.51             | 20.10         | 6.66        | 0.00         | 40.27           | 90.50           | -50.23        | Peak   |
| 3    | 13.56            | 34.89             | 20.05         | 6.65        | 0.00         | 61.59           | 124.00          | -62.41        | Peak   |
| 4    | 13.63            | 12.49             | 20.02         | 6.65        | 0.00         | 39.16           | 90.50           | -51.34        | Peak   |
| 5    | 13.97            | 13.24             | 19.88         | 6.63        | 0.00         | 39.75           | 80.50           | -40.75        | Peak   |

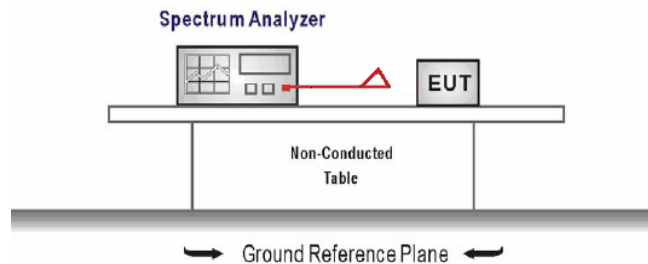
## 5.4. 20dB Bandwidth

### Limit

#### FCC CFR Title 47 Part 15 Subpart C Section 15.215

Intentional radiators must be designed to ensure that the 20dB emission bandwidth in the specific band 13.553~13.567MHz.

### TEST CONFIGURATION



### TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:  
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel  
RBW  $\geq$  1% of the 20 dB bandwidth, VBW  $\geq$  RBW  
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

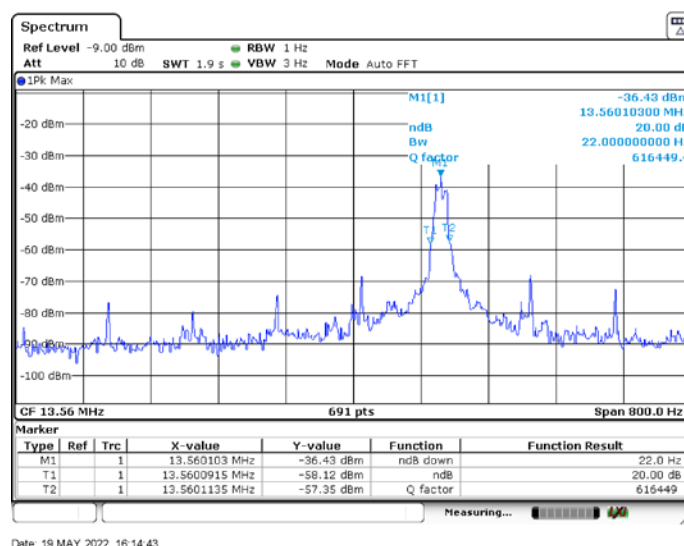
### TEST MODE:

Please refer to the clause 4.1

### TEST RESULTS

☒ Passed ☐ Not Applicable

| Frequency | Measurement data (MHz) | Limit (MHz) | Result |
|-----------|------------------------|-------------|--------|
| $f_L$     | 13.5600915             | >13.553     | PASS   |
| $f_H$     | 13.5601135             | <13.567     | PASS   |



Date: 19 MAY 2022 16:14:43

## 5.5. Radiated Spurious Emission

### LIMIT

#### FCC CFR Title 47 Part 15 Subpart C Section 15.209&15.225(d)

Limit for frequency below 30MHz:

| Frequency   | Limit (uV/m) | Measurement Distance(m) | Remark     |
|-------------|--------------|-------------------------|------------|
| 0.009~0.490 | 2400/F(kHz)  | 300                     | Quasi-peak |
| 0.490~1.705 | 24000/F(kHz) | 30                      | Quasi-peak |
| 1.705~30.0  | 30           | 30                      | Quasi-peak |

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

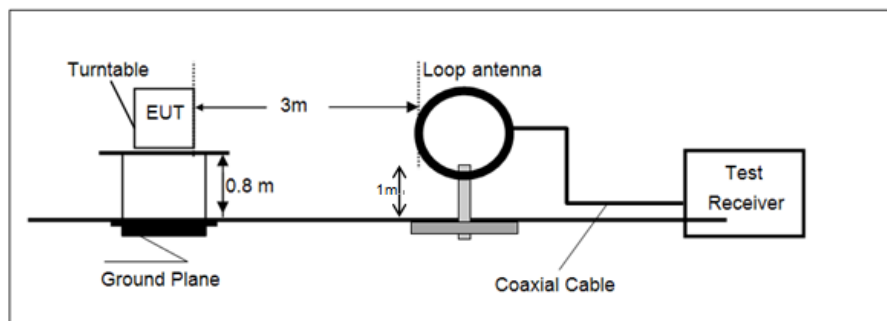
Limit dBuV/m @3m = Limit dBuV/m @30m +40\*log(30/3)= Limit dBuV/m @30m + 40.

Limit for frequency above 30MHz:

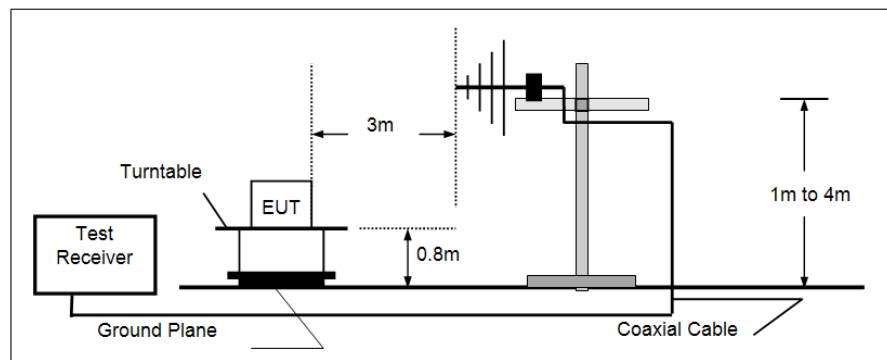
| Frequency     | Limit (dBuV/m@3m) | Remark     |
|---------------|-------------------|------------|
| 30MHz~88MHz   | 40.00             | Quasi-peak |
| 88MHz~216MHz  | 43.50             | Quasi-peak |
| 216MHz~960MHz | 46.00             | Quasi-peak |
| 960MHz-1GHz   | 54.00             | Quasi-peak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

### TEST CONFIGURATION

- 9 kHz ~ 30 MHz



- 30 MHz ~ 1 GHz



**TEST PROCEDURE**

1. The EUT was setup and tested according to ANSI C63.10 requirements.
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 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 30MHz:  
RBW=10 kHz, VBW=30 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
  - (3) 30MHz to 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.

**TEST MODE:**

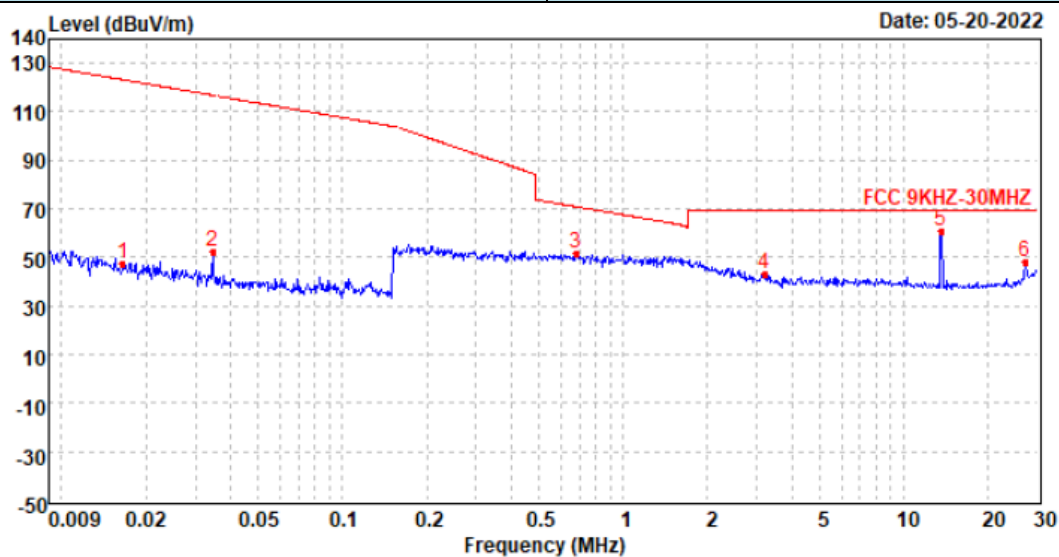
Please refer to the clause 4.1

**TEST RESULTS**

☒ **Passed**                      ☐ **Not Applicable**

Test frequency range:

Below 30MHz



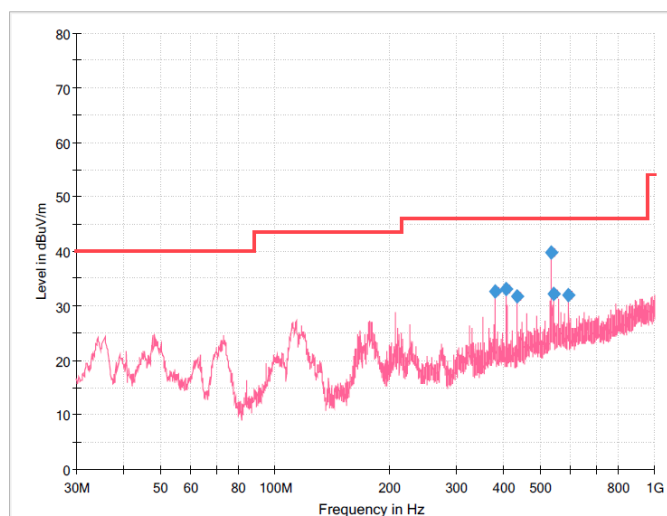
| Mark | Frequency<br>MHz | Reading<br>dBuV/m | Antenna<br>dB | Cable<br>dB | Preamp<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>limit | Remark |
|------|------------------|-------------------|---------------|-------------|--------------|-----------------|-----------------|---------------|--------|
| 1    | 0.02             | 18.01             | 22.35         | 7.21        | 0.00         | 47.57           | 123.22          | -75.65        | Peak   |
| 2    | 0.03             | 22.96             | 22.34         | 7.21        | 0.00         | 52.51           | 116.84          | -64.33        | Peak   |
| 3    | 0.68             | 22.18             | 22.20         | 7.20        | 0.00         | 51.58           | 70.96           | -19.38        | Peak   |
| 4    | 3.19             | 13.56             | 22.20         | 7.18        | 0.00         | 42.94           | 69.54           | -26.60        | Peak   |
| 5    | 13.62            | 34.22             | 20.02         | 6.65        | 0.00         | 60.89           | 69.54           | -8.65         | Peak   |
| 6    | 27.13            | 17.44             | 24.04         | 6.76        | 0.00         | 48.24           | 69.54           | -21.30        | Peak   |

Test frequency range:

30MHz~1000MHz

Polarization:

Vertical



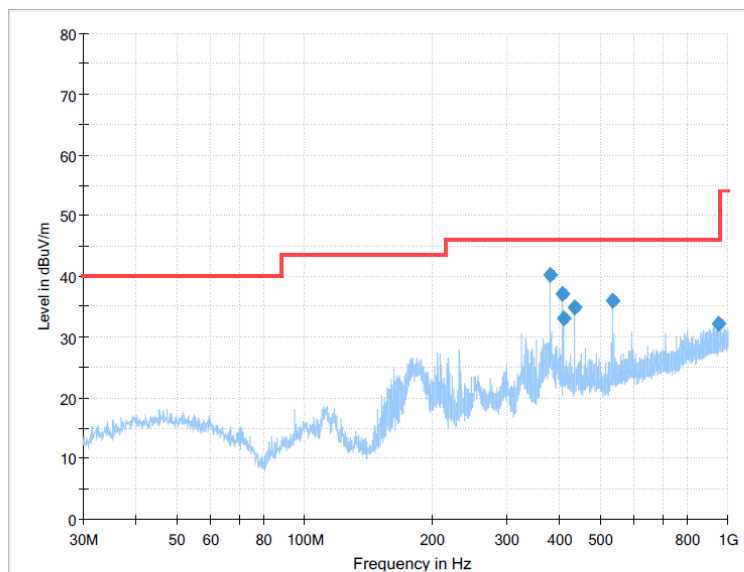
Serif;

**Final Result**

| Frequency (MHz) | MaxPeak (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 379.685000      | 32.60            | 46.00          | 13.40       | 100.0       | V   | 0.0           | -5.0         |
| 406.845000      | 32.99            | 46.00          | 13.01       | 100.0       | V   | 0.0           | -4.2         |
| 433.883750      | 31.70            | 46.00          | 14.30       | 100.0       | V   | 0.0           | -3.6         |
| 534.036250      | 39.80            | 46.00          | 6.20        | 100.0       | V   | 62.0          | -0.9         |
| 542.402500      | 32.22            | 46.00          | 13.78       | 100.0       | V   | 62.0          | -0.6         |
| 593.812500      | 31.85            | 46.00          | 14.15       | 100.0       | V   | 252.0         | 0.6          |

Polarization:

Horizontal



Serif;

**Final Result**

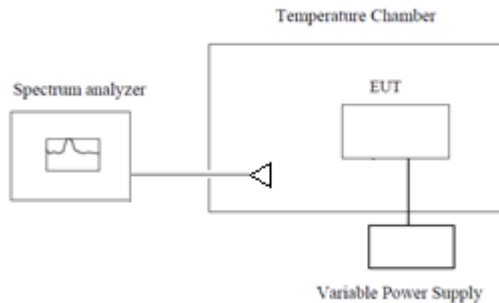
| Frequency (MHz) | MaxPeak (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 379.685000      | 40.20            | 46.00          | 5.80        | 100.0       | H   | 85.0          | -5.0         |
| 406.845000      | 37.03            | 46.00          | 8.97        | 100.0       | H   | 62.0          | -4.2         |
| 408.421250      | 33.16            | 46.00          | 12.84       | 100.0       | H   | 73.0          | -4.2         |
| 433.883750      | 34.92            | 46.00          | 11.08       | 100.0       | H   | 73.0          | -3.6         |
| 534.036250      | 35.99            | 46.00          | 10.01       | 100.0       | H   | 250.0         | -0.9         |
| 946.407500      | 32.07            | 46.00          | 13.93       | 100.0       | H   | 291.0         | 7.2          |

## 5.6. Frequency Stability

### LIMIT

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### TEST CONFIGURATION



### TEST PROCEDURE

1. The equipment under test was connected to an external power supply.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT  $25^{\circ}\text{C}$  operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to  $-20^{\circ}\text{C}$ . After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with  $10^{\circ}\text{C}$  increased per stage until the highest temperature of  $+50^{\circ}\text{C}$  reached.

### TEST MODE:

Please refer to the clause 4.1

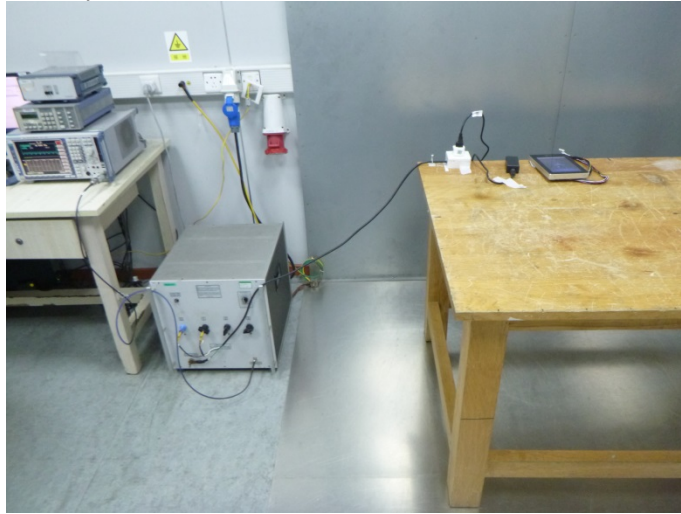
### TEST RESULTS

☒ Passed ☐ Not Applicable

| Test Enviroment |                 | Frequency Reading(MHz) | Frequency Error(%) | Limit  | Result Voltage |
|-----------------|-----------------|------------------------|--------------------|--------|----------------|
| Voltage         | Temperature(°C) |                        |                    |        |                |
| AC 120V         | -20             | 13.56000               | 0.0000             | ±0.01% | AC 120V        |
|                 | -10             | 13.56005               | 0.0004             | ±0.01% | Pass           |
|                 | 0               | 13.56010               | 0.0007             | ±0.01% | Pass           |
|                 | 10              | 13.56002               | 0.0001             | ±0.01% | Pass           |
|                 | 20              | 13.56004               | 0.0003             | ±0.01% | Pass           |
|                 | 30              | 13.56009               | 0.0007             | ±0.01% | Pass           |
|                 | 40              | 13.56007               | 0.0005             | ±0.01% | Pass           |
|                 | 50              | 13.56003               | 0.0002             | ±0.01% | Pass           |
| AC 132V         | 20              | 13.56002               | 0.0001             | ±0.01% | AC 132V        |
| AC 108V         | 20              | 13.56011               | 0.0008             | ±0.01% | AC 108V        |

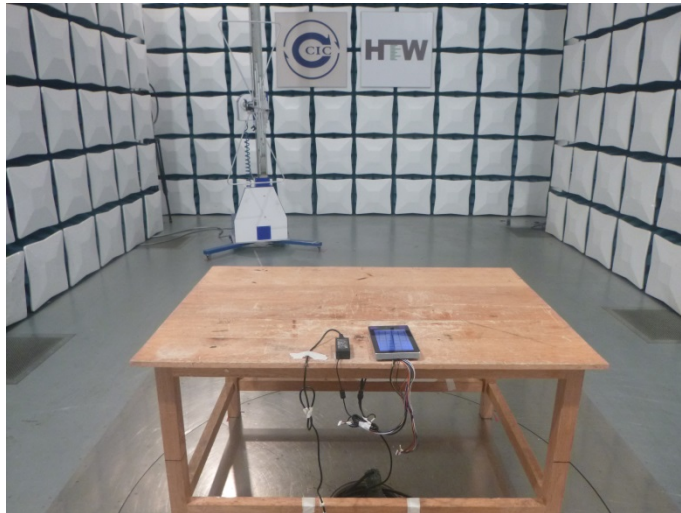
## 6. TEST SETUP PHOTOS

Conducted Emissions (AC Mains)



Radiated Emissions





## **7. EXTERNAL AND INTERNAL PHOTOS OF THE EUT**

Reference to the test report No. CHTEW22060106

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