

## FCC TEST REPORT

For

NINGBO DOOYA MECHANIC & ELECTRONIC TECHNOLOGY CO., LTD.

Quiet Tubular Motor

Model No.: DM45F/S-15/32,DM45EQ/S-10/21

FCC ID:VYY-DM45F-S

Prepared for : Ningbo Dooya Mechanic & Electronic Technology Co., Ltd.  
Address : Loutuo Industrial Area, Zhenhai, Ningbo, Zhejiang, China

Prepared by : SHENZHEN EMTEK CO., LTD  
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Report Number : ES151110015E  
Date of Test : November 10, 2015 to November 19, 2015  
Date of Report : November 20, 2015

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## TEST REPORT DESCRIPTION

Applicant : Ningbo Dooya Mechanic & Electronic Technology Co., Ltd.  
Manufacturer : Loutuo Industrial Area, Zhenhai, Ningbo, Zhejiang, China  
Trade Mark : N/A  
EUT : Quiet Tubular Motor  
Model No. : DM45F/S-15/32, DM45EQ/S-10/21  
Input Voltage : AC 120V/60Hz

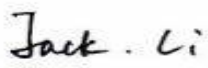
Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart B Class B & FCC / ANSI C63.4-2014

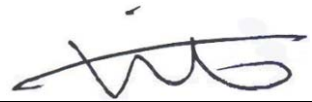
The device described above is tested by SHENZHEN EMTEK CO., LTD. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and SHENZHEN EMTEK CO., LTD. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of SHENZHEN EMTEK CO., LTD.

Date of Test : November 10, 2015 to November 19, 2015

Prepared by :   
Jack Li/Editor

Reviewer :   
Joe Xia/Supervisor

Approved & Authorized Signer :   
Lisa Wang/Manager

### Modified History

| Version | Report No.   | Revision date | Summary         |
|---------|--------------|---------------|-----------------|
| Ver.1.0 | ES151110015E | \             | Original Report |

## 1. SUMMARY OF TEST RESULT

| <b>Emission</b>                                  |                                                   |         |
|--------------------------------------------------|---------------------------------------------------|---------|
| Description of test item                         | Standard & Limits                                 | Results |
| Conducted disturbance at mains terminals         | FCC Part15, Subpart B, Class B<br>ANSI C63.4-2014 | Pass    |
| Radiated Disturbance                             | FCC Part15, Subpart B, Class B<br>ANSI C63.4-2014 | Pass    |
| Note: N/A is an abbreviation for Not Applicable. |                                                   |         |

## 2. GENERAL INFORMATION

### 2.1. Description of Device (EUT)

EUT : Quiet Tubular Motor

Model Number : DM45F/S-15/32,DM45EQ/S-10/21 (Note: The models of DM45EQ/S-10/21 and DM45F/S-15/32 are identical and have same structures. The only difference is the tooth pitch of reduction gear.. We prepared model DM45F/S-15/32 for test)

Test Voltage : AC 120V/60Hz

Applicant : Ningbo Dooya Mechanic & Electronic Technology Co., Ltd.

Address : Loutuo Industrial Area, Zhenhai, Ningbo, Zhejiang,China

Manufacturer : Ningbo Dooya Mechanic & Electronic Technology Co., Ltd.

Address : Loutuo Industrial Area, Zhenhai, Ningbo, Zhejiang,China

Date of receiver : November 10, 2015

Date of Test : November 10, 2015 to November 19, 2015

### 2.2. Description of Test Facility

Site Description  
EMC Lab. : Accredited by CNAS, 2013.10.29  
The certificate is valid until 2016.10.28  
The Laboratory has been assessed and proved to be in compliance with CNAS/CL01:2006(identical to ISO/IEC17025: 2005)  
The Certificate Registration Number is L2291

Accredited by TUV Rheinland Shenzhen 2010.5.25  
The Laboratory has been assessed according to the requirements ISO/IEC 17025

Accredited by FCC, April 17, 2014  
The Certificate Registration Number is 406365.

Accredited by Industry Canada, March 5, 2010  
The Certificate Registration Number is 4480A-2.

Name of Firm : SHENZHEN EMTEK CO., LTD  
Site Location : Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

### 2.3. Support Device

| Item | Equipment | Mfr/Brand | Model/Type No. | Input | Output | Note |
|------|-----------|-----------|----------------|-------|--------|------|
| 1.   | N/A       | N/A       | N/A            | N/A   | N/A    | N/A  |

## 2.4. Measurement Uncertainty

Conducted Emission Uncertainty : 2.8dB

Radiated Emission Uncertainty : 3.3dB (3m Chamber)

### 3. MEASURING DEVICE AND TEST EQUIPMENT

#### 3.1. For Power Line Conducted Emission

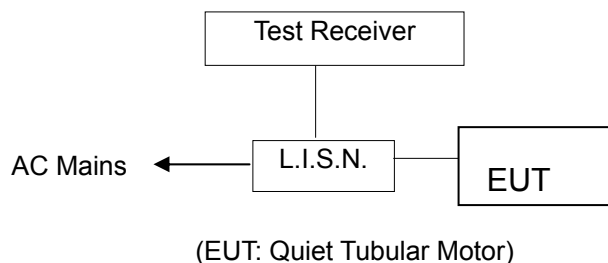
| Item | Equipment          | Manufacturer    | Model No. | Serial No.       | Last Cal.  | Cal. Interval |
|------|--------------------|-----------------|-----------|------------------|------------|---------------|
| 1.   | Test Receiver      | Rohde & Schwarz | ESCS30    | 101108           | 05/16/2015 | 1 Year        |
| 2.   | L.I.S.N.           | Rohde & Schwarz | ENV216    | 101193           | 05/16/2015 | 1 Year        |
| 3.   | L.I.S.N.           | Schwarzbeck     | NNLK8129  | 8126-462         | 05/16/2015 | 1 Year        |
| 4.   | 50Ω Coaxial Switch | Anritsu         | MP59B     | 2611115-001-0033 | 05/16/2015 | 1 Year        |
| 5.   | Pulse Limiter      | Rohde & Schwarz | ESH3-Z2   | 38400            | 05/16/2015 | 1 Year        |

#### 3.2. For Radiated Emission Measurement

| Item | Equipment         | Manufacturer    | Model No. | Serial No.   | Last Cal.  | Cal. Interval |
|------|-------------------|-----------------|-----------|--------------|------------|---------------|
| 1.   | EMI Test Receiver | Rohde & Schwarz | ESU       | 1302.6005.26 | 05/16/2015 | 1 Year        |
| 2.   | Pre-Amplifier     | HP              | 8447D     | 2944A07999   | 05/16/2015 | 1 Year        |
| 3.   | Pre-Amplifier     | A.H.            | PAM-0126  | 1415261      | 05/16/2015 | 1 Year        |
| 4.   | Bilog Antenna     | Schwarzbeck     | VULB9163  | 142          | 05/16/2015 | 1 Year        |
| 5.   | Loop Antenna      | Schwarzbeck     | FMZB 1519 | 1519-012     | 05/16/2015 | 1 Year        |
| 6.   | Horn Antenna      | Schwarzbeck     | BBHA 9170 | BBHA9170399  | 05/16/2015 | 1 Year        |
| 7.   | Horn Antenna      | Schwarzbeck     | BBHA 9120 | D143         | 05/16/2015 | 1 Year        |
| 8.   | Cable             | Schwarzbeck     | AK9513    | ACRX1        | 05/16/2015 | 1 Year        |
| 9.   | Cable             | Rosenberger     | N/A       | FP2RX2       | 05/16/2015 | 1 Year        |
| 10.  | Cable             | Schwarzbeck     | AK9513    | CRPX1        | 05/16/2015 | 1 Year        |
| 11.  | Cable             | Schwarzbeck     | AK9513    | CRRX2        | 05/16/2015 | 1 Year        |

## 4. POWER LINE CONDUCTED EMISSION MEASUREMENT

### 4.1. Block Diagram of Test Setup



### 4.2. Measuring Standard

FCC Part15, Subpart B, Class B, ANSI C63.4-2014

### 4.3. Power Line Conducted Emission Limits (Class B)

| Frequency<br>(MHz) | Limit (dB $\mu$ V) |               |
|--------------------|--------------------|---------------|
|                    | Quasi-peak Level   | Average Level |
| 0.15 ~ 0.50        | 66.0 ~ 56.0 *      | 56.0 ~ 46.0 * |
| 0.50 ~ 5.00        | 56.0               | 46.0          |
| 5.00 ~ 30.00       | 60.0               | 50.0          |

NOTE1-The lower limit shall apply at the transition frequencies.  
NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

### 4.4. EUT Configuration on Measurement

The following equipments are installed on Conducted Emission Measurement to meet FCC requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

EUT : Quiet Tubular Motor  
Model Number : DM45F/S-15/32

### 4.5. Operating Condition of EUT

4.5.1. Turn on the power.

4.5.2. After that, let the EUT work in test mode (Receiving) and measure it.

#### 4.6. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the FCC regulations during conducted emission measurement.

The bandwidth of the test receiver (R&S ESU) is set at 9KHz in 150KHz~30MHz and 200Hz in 9KHz~150KHz.

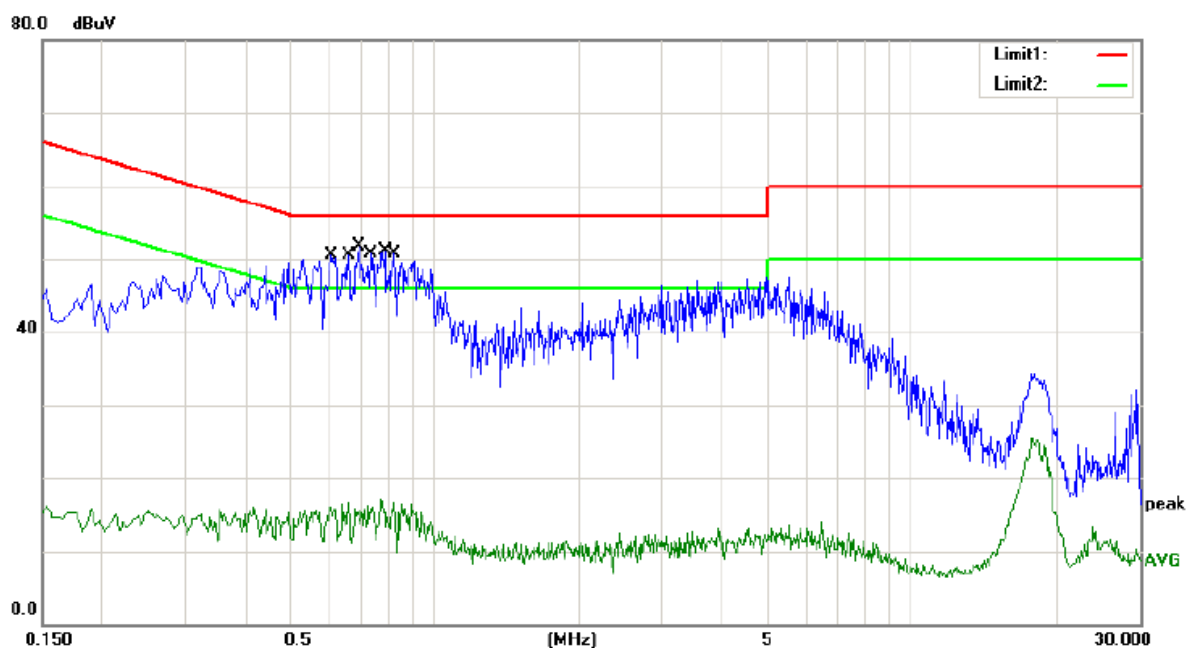
The frequency range from 150kHz to 30MHz is investigated

#### 4.7. Measurement Results

**PASS.**

Please refer to the following pages.

## Test Data:



Site site #1

Phase: **N**

Temperature: 22

Limit: (CE)FCC PART 15 class B\_QP

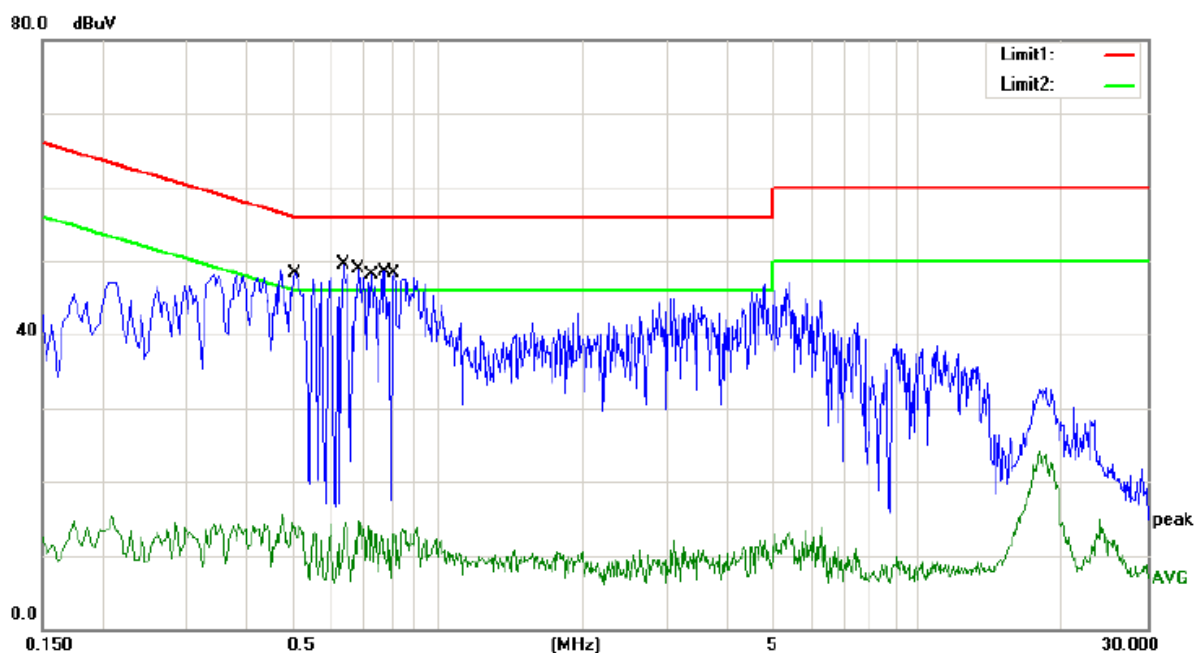
Power: AC 120V/60Hz

Humidity: 50 %

Mode: Receiving

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.6060       | 29.10                    | 11.00                   | 40.10                    | 56.00         | -15.90     | QP       |         |
| 2   |     | 0.6060       | 5.10                     | 11.00                   | 16.10                    | 46.00         | -29.90     | AVG      |         |
| 3   |     | 0.6580       | 30.30                    | 11.00                   | 41.30                    | 56.00         | -14.70     | QP       |         |
| 4   |     | 0.6580       | 5.70                     | 11.00                   | 16.70                    | 46.00         | -29.30     | AVG      |         |
| 5   |     | 0.6900       | 30.20                    | 11.00                   | 41.20                    | 56.00         | -14.80     | QP       |         |
| 6   |     | 0.6900       | 3.60                     | 11.00                   | 14.60                    | 46.00         | -31.40     | AVG      |         |
| 7   |     | 0.7340       | 29.70                    | 11.00                   | 40.70                    | 56.00         | -15.30     | QP       |         |
| 8   |     | 0.7340       | 4.80                     | 11.00                   | 15.80                    | 46.00         | -30.20     | AVG      |         |
| 9   |     | 0.7860       | 29.60                    | 11.00                   | 40.60                    | 56.00         | -15.40     | QP       |         |
| 10  |     | 0.7860       | 2.20                     | 11.00                   | 13.20                    | 46.00         | -32.80     | AVG      |         |
| 11  | *   | 0.8180       | 31.50                    | 11.00                   | 42.50                    | 56.00         | -13.50     | QP       |         |
| 12  |     | 0.8180       | 4.70                     | 11.00                   | 15.70                    | 46.00         | -30.30     | AVG      |         |



Site site #1

Phase: **L1**

Temperature: 22

Limit: (CE)FCC PART 15 class B\_QP

Power: AC 120V/60Hz

Humidity: 50 %

Mode: Receiving

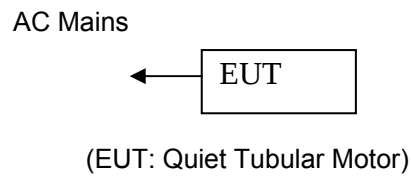
Note:

| No. Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|---------|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1       | 0.5060       | 25.10                    | 11.00                   | 36.10                    | 56.00         | -19.90     | QP       |         |
| 2       | 0.5060       | 2.10                     | 11.00                   | 13.10                    | 46.00         | -32.90     | AVG      |         |
| 3 *     | 0.6340       | 28.50                    | 11.00                   | 39.50                    | 56.00         | -16.50     | QP       |         |
| 4       | 0.6340       | 2.20                     | 11.00                   | 13.20                    | 46.00         | -32.80     | AVG      |         |
| 5       | 0.6860       | 26.90                    | 11.00                   | 37.90                    | 56.00         | -18.10     | QP       |         |
| 6       | 0.6860       | 3.60                     | 11.00                   | 14.60                    | 46.00         | -31.40     | AVG      |         |
| 7       | 0.7300       | 25.70                    | 11.00                   | 36.70                    | 56.00         | -19.30     | QP       |         |
| 8       | 0.7300       | 2.20                     | 11.00                   | 13.20                    | 46.00         | -32.80     | AVG      |         |
| 9       | 0.7780       | 26.50                    | 11.00                   | 37.50                    | 56.00         | -18.50     | QP       |         |
| 10      | 0.7780       | -0.40                    | 11.00                   | 10.60                    | 46.00         | -35.40     | AVG      |         |
| 11      | 0.8140       | 24.80                    | 11.00                   | 35.80                    | 56.00         | -20.20     | QP       |         |
| 12      | 0.8140       | 0.90                     | 11.00                   | 11.90                    | 46.00         | -34.10     | AVG      |         |

## 5. RADIATED EMISSION MEASUREMENT

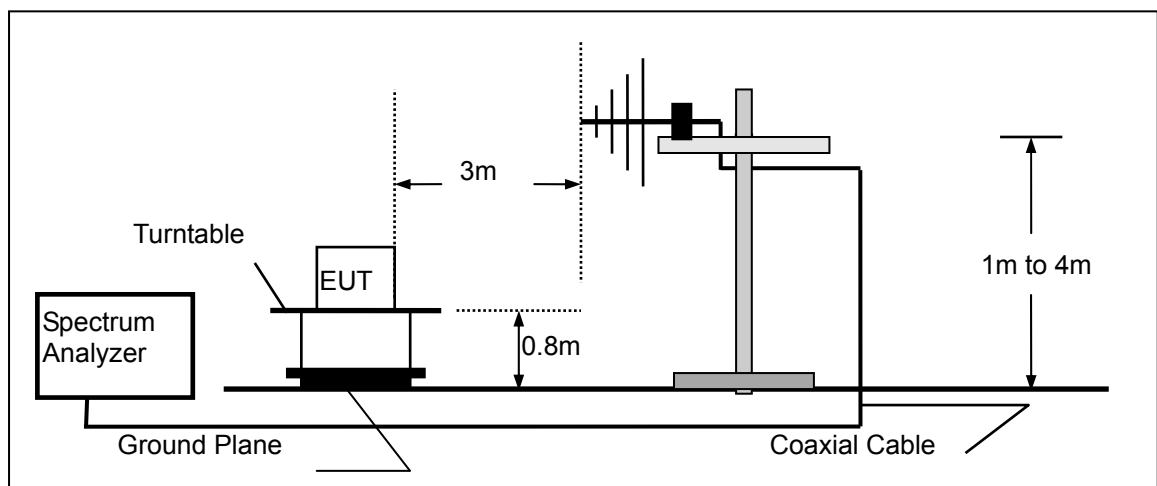
### 5.1. Block Diagram of Test

5.1.1. Block diagram of connection between the EUT and simulators.

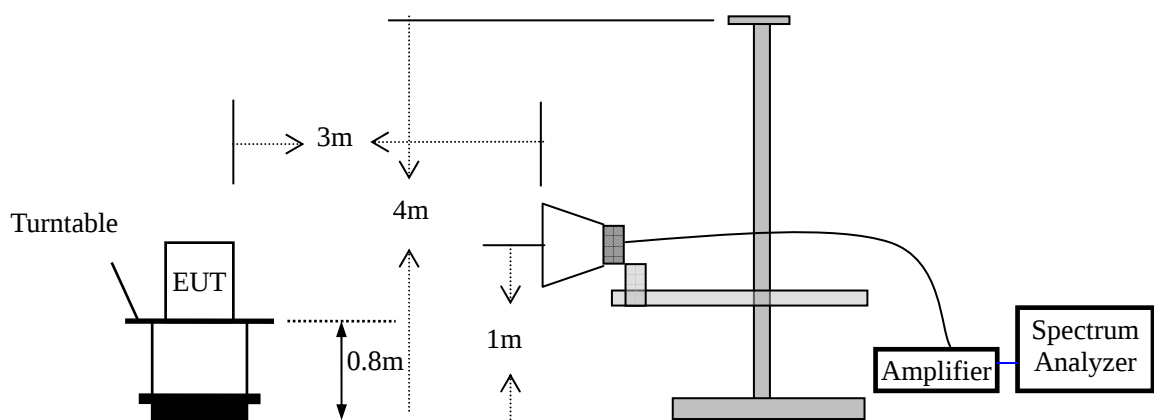


5.1.2. Block diagram of test setup (In chamber)

Below 1GHz



Above 1GHz



## 5.2. Measuring Standard

FCC Part15, Subpart B, Class B ANSI C63.4-2014

## 5.3. Radiated Emission Limits (class B)

| FREQUENCY<br>MHz | DISTANCE<br>Meters | FIELD STRENGTHS LIMIT |                                   |
|------------------|--------------------|-----------------------|-----------------------------------|
|                  |                    | $\mu\text{V/m}$       | $\text{dB}(\mu\text{V})/\text{m}$ |
| 30 ~ 88          | 3                  | 100                   | 40.0                              |
| 88 ~ 216         | 3                  | 150                   | 43.5                              |
| 216 ~ 960        | 3                  | 200                   | 46.0                              |
| 960 ~ 1000       | 3                  | 500                   | 54.0                              |

Remark: (1) Emission level  $(\text{dB})\mu\text{V} = 20 \log$  Emission level  $\mu\text{V/m}$

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

## 5.4. EUT Configuration on Test

The FCC Class B regulations test method must be used to find the maximum emission during radiated emission measurement.

## 5.5. Operating Condition of EUT

5.5.1. Turn on the power.

5.5.2. After that, let the EUT work in test mode (Receiving) and measure it.

## 5.6. Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on an antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) and horn antenna are used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on test.

The frequency range from 30MHz to 1000MHz was pre-scanned with a peak detector (RBW=100kHz, VBW=300kHz) and all final readings of measurement from Test Receiver are Quasi-Peak values (Quasi Peak detector used with a bandwidth of 120 kHz).

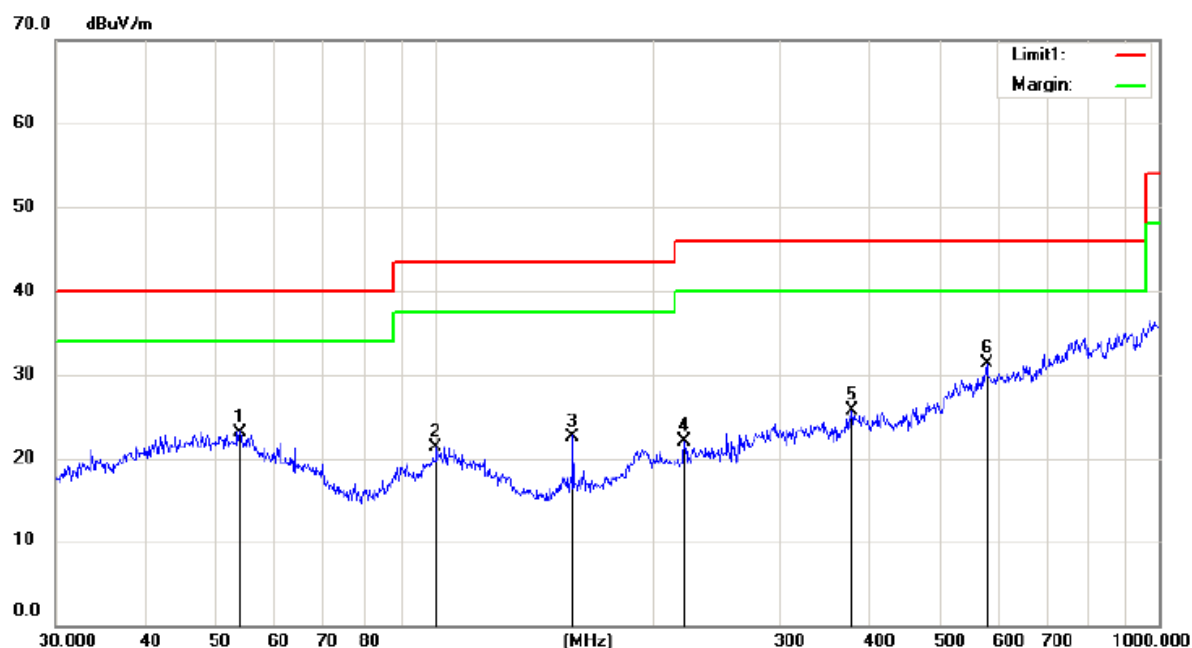
The frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

## 5.7. Measuring Results

**PASS.**

Please refer to the following pages.

## Below 1000MHz (30M-1GHz)



Site site #1

Polarization: **Horizontal**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

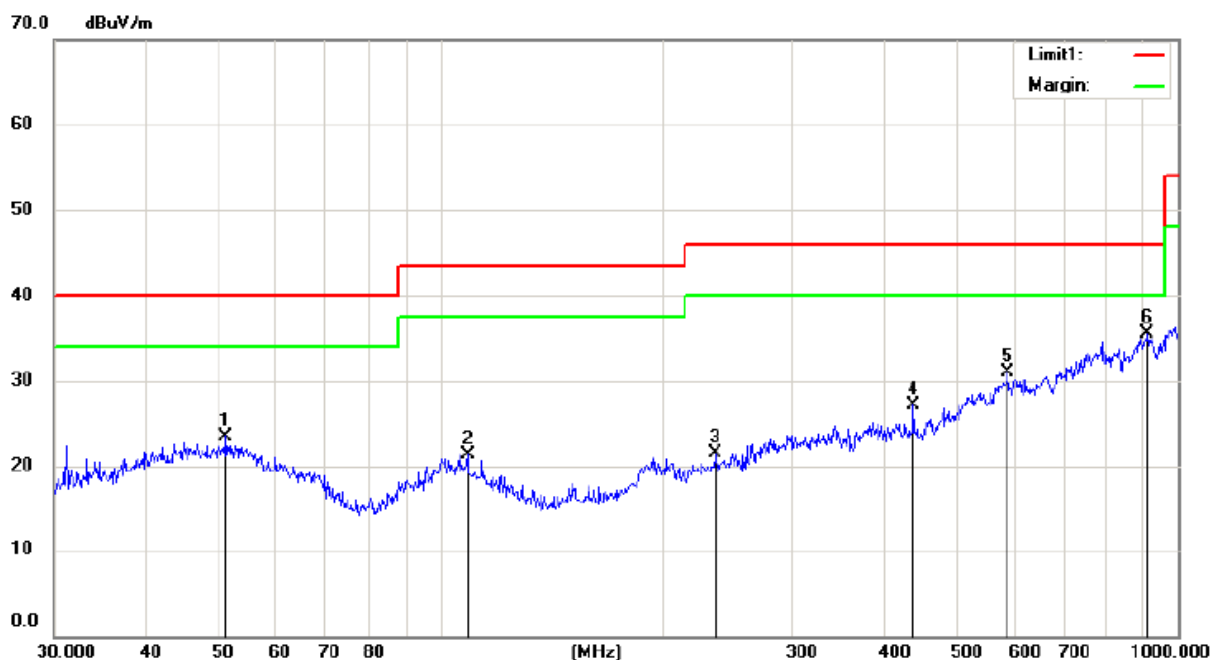
Power: AC 120V/60Hz

Humidity: 52 %

Mode:Receiving

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|---------|
| 1   |     | 53.8817      | 8.55                     | 14.65                   | 23.20                      | 40.00           | -16.80     | QP                      |                 |         |
| 2   |     | 100.5806     | 8.27                     | 13.23                   | 21.50                      | 43.50           | -22.00     | QP                      |                 |         |
| 3   |     | 155.3643     | 14.06                    | 8.64                    | 22.70                      | 43.50           | -20.80     | QP                      |                 |         |
| 4   |     | 221.3921     | 9.87                     | 12.23                   | 22.10                      | 46.00           | -23.90     | QP                      |                 |         |
| 5   |     | 377.2590     | 8.74                     | 17.06                   | 25.80                      | 46.00           | -20.20     | QP                      |                 |         |
| 6   | *   | 578.6700     | 9.40                     | 22.00                   | 31.40                      | 46.00           | -14.60     | QP                      |                 |         |



Site site #1

Polarization: **Vertical**

Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation

Power: AC 120V/60Hz

Humidity: 52 %

Mode:Receiving

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m       | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 51.3005  | 8.86          | 14.74          | 23.60        | 40.00  | -16.40 | QP             |              |         |
| 2   |     | 109.0286 | 9.05          | 12.45          | 21.50        | 43.50  | -22.00 | QP             |              |         |
| 3   |     | 236.6447 | 8.74          | 12.86          | 21.60        | 46.00  | -24.40 | QP             |              |         |
| 4   |     | 438.6554 | 10.05         | 17.25          | 27.30        | 46.00  | -18.70 | QP             |              |         |
| 5   |     | 588.9050 | 9.42          | 21.58          | 31.00        | 46.00  | -15.00 | QP             |              |         |
| 6   | *   | 909.6666 | 9.30          | 26.30          | 35.60        | 46.00  | -10.40 | QP             |              |         |

## Above 1000MHz:

Test Date : 11/19/2015      Temperature : 23 °C  
 Test Result: PASS      Humidity : 52 %  
 Test By: KK

| Mode: Receiving |                   |                        |       |                  |       |            |        |
|-----------------|-------------------|------------------------|-------|------------------|-------|------------|--------|
| Freq.<br>(MHz)  | Ant.Pol.<br>(H/V) | Emission Level(dBuV/m) |       | Limit 3m(dBuV/m) |       | Margin(dB) |        |
|                 |                   | PK                     | AV    | PK               | AV    | PK         | AV     |
| 4595.000        | V                 | 51.06                  | 36.00 | 74.00            | 54.00 | -22.94     | -18.00 |
| 4885.000        | V                 | 50.49                  | 35.40 | 74.00            | 54.00 | -23.51     | -18.60 |
| 5085.000        | V                 | 51.51                  | 36.50 | 74.00            | 54.00 | -22.49     | -17.50 |
| 5295.000        | V                 | 51.66                  | 36.60 | 74.00            | 54.00 | -22.34     | -17.40 |
| 5620.000        | V                 | 52.08                  | 37.00 | 74.00            | 54.00 | -21.92     | -17.00 |
| 5850.000        | V                 | 53.06                  | 38.00 | 74.00            | 54.00 | -20.94     | -16.00 |
| 4540.000        | H                 | 51.40                  | 36.40 | 74.00            | 54.00 | -22.6      | -17.60 |
| 4735.000        | H                 | 49.97                  | 34.90 | 74.00            | 54.00 | -24.03     | -19.10 |
| 5035.000        | H                 | 51.31                  | 36.30 | 74.00            | 54.00 | -22.69     | -17.70 |
| 5180.000        | H                 | 51.33                  | 36.30 | 74.00            | 54.00 | -22.67     | -17.70 |
| 5490.000        | H                 | 52.22                  | 37.20 | 74.00            | 54.00 | -21.78     | -16.80 |
| 5690.000        | H                 | 52.44                  | 37.40 | 74.00            | 54.00 | -21.56     | -16.60 |

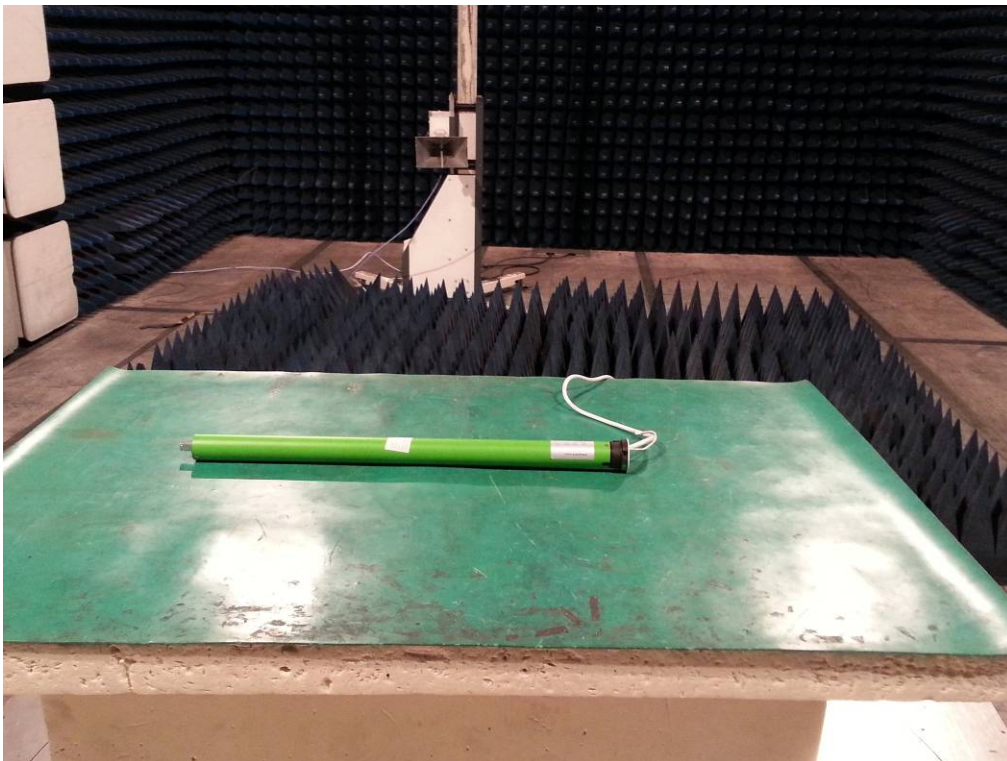
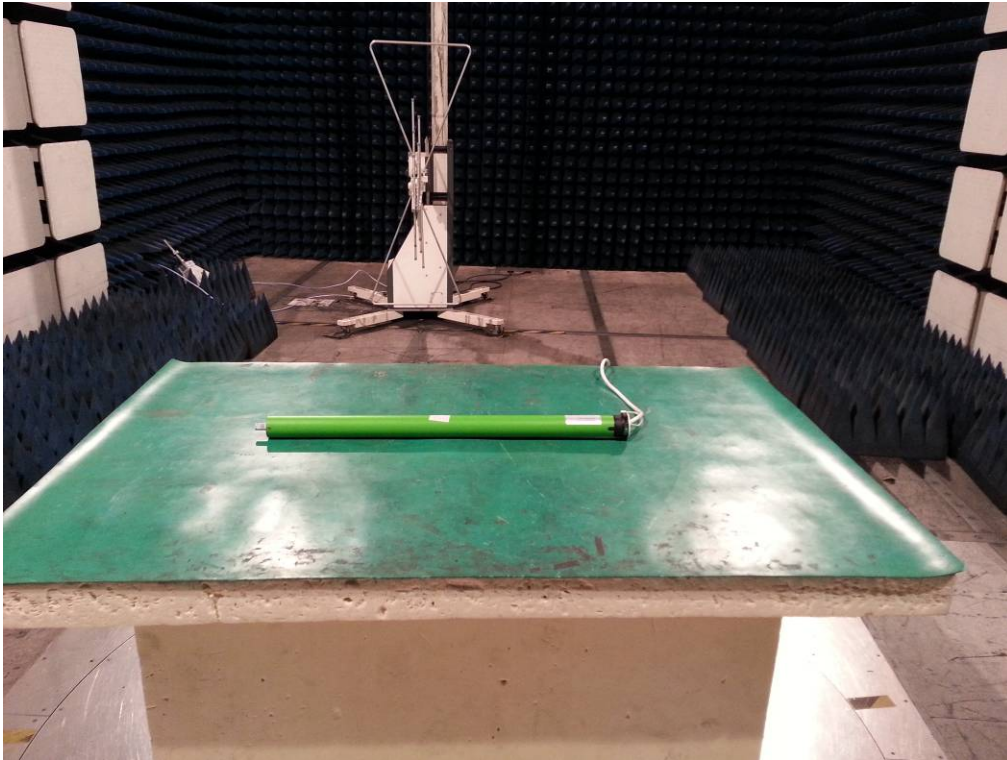
---The End---

## 6.PHOTOGRAPH OF TEST

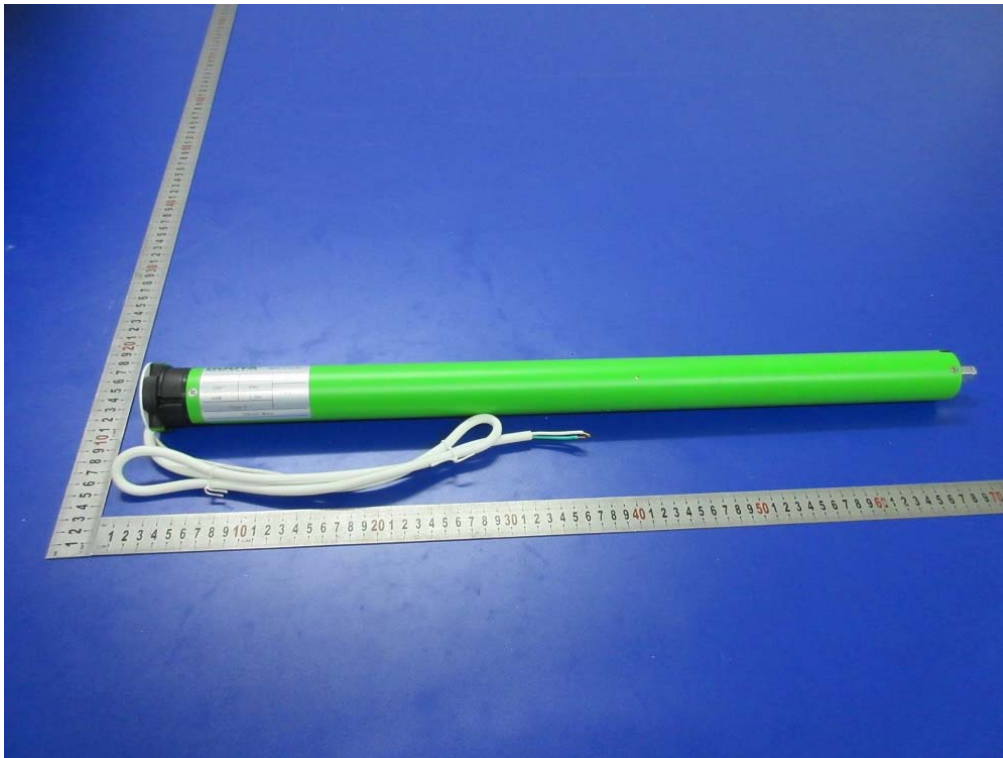
### 6.1Photo of Conducted Emission Measurement



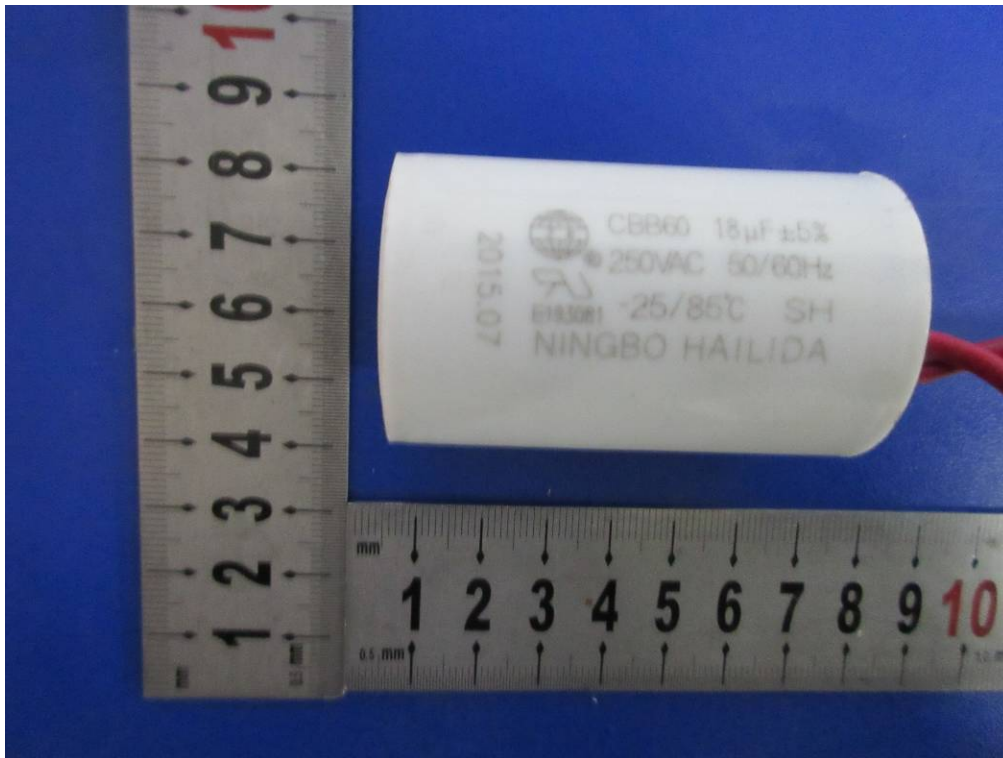
## 6.2 Photo of Radiation Emission Measurement

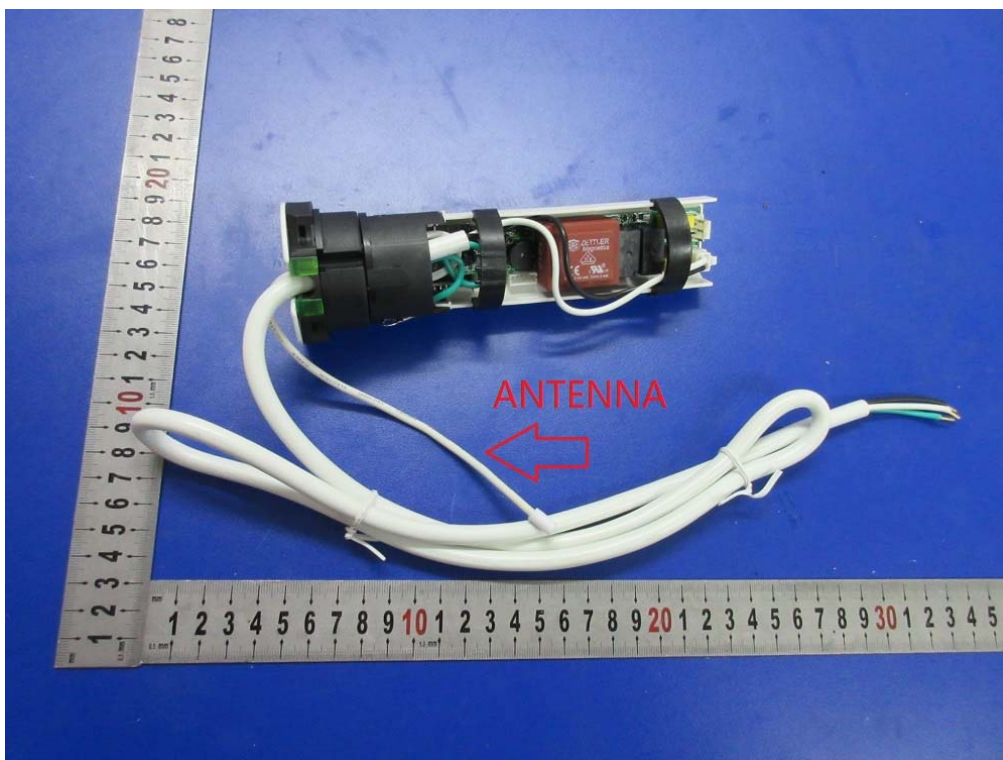
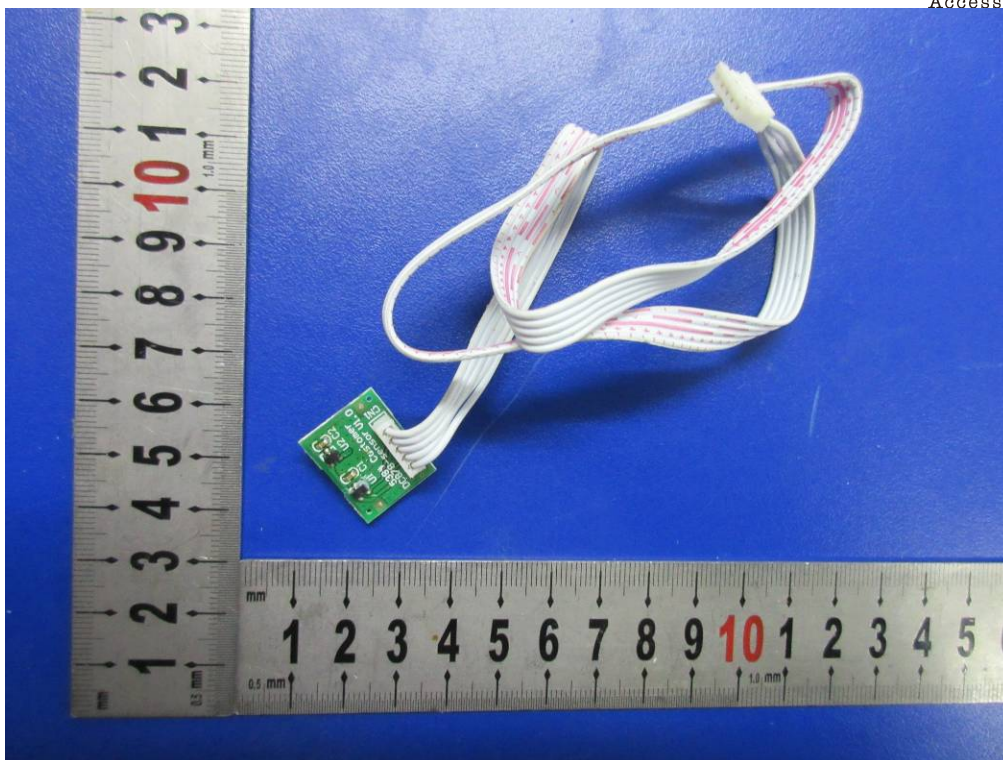


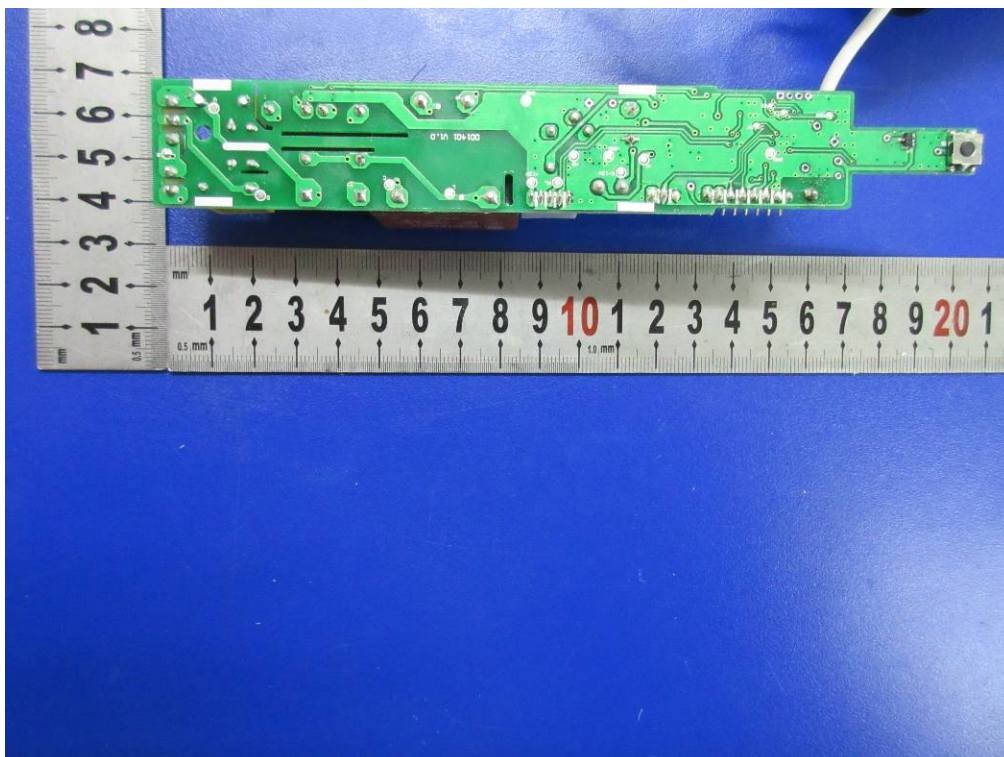
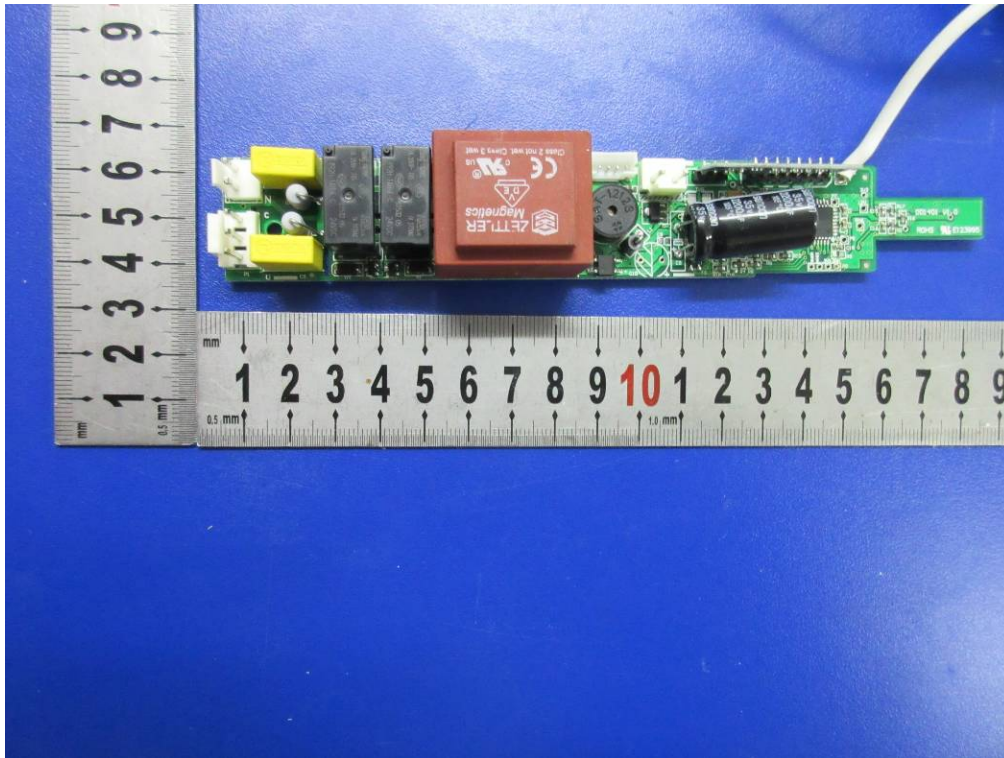
# APPENDIX I (Photos of EUT)











---The End---