

FCC TEST REPORT

For

NINGBO DOOYA MECHANIC & ELECTRONIC TECHNOLOGY CO., LTD.

DC Tubular motor

Model No.: DM28LEQ/S-2/28

FCC ID:VYY-DM28LEQ-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 : ES151102002E
Date of Test : October 30, 2015 to November 16, 2015
Date of Report : November 17, 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 : DC Tubular motor
Model No. : DM28LEQ/S-2/28
Input Voltage : DC 12V

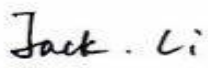
Measurement Procedure Used:


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 : October 30, 2015 to November 11, 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	ES151102002E	\	Original Report

1. SUMMARY OF TEST RESULT

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

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT : DC Tubular motor

Model Number : DM28LEQ/S-2/28

Test Voltage : DC 12V (Support Device/AC/DC ADAPTOR: 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 : October 30, 2015

Date of Test : October 30, 2015 to November 11, 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.	AC /DC ADAPTOR	N/A	XVE-1200100	AC 120V 50/60Hz	DC 12V1A	

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

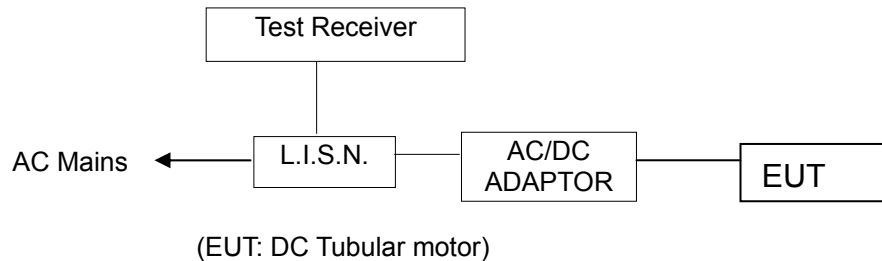
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCS30	101108	05/16/2015	1 Year
2.	L.I.S.N.	Rohde & Schwarz	ENV216	101193	05/16/2015	1 Year
3.	L.I.S.N.	Schwarzbeck	NNLK8129	8126-462	05/16/2015	1 Year
4.	50Ω Coaxial Switch	Anritsu	MP59B	2611115-001-0033	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 (MHz)	Limit (dB μ 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 : DC Tubular motor
Model Number : DM28LEQ/S-2/28

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.

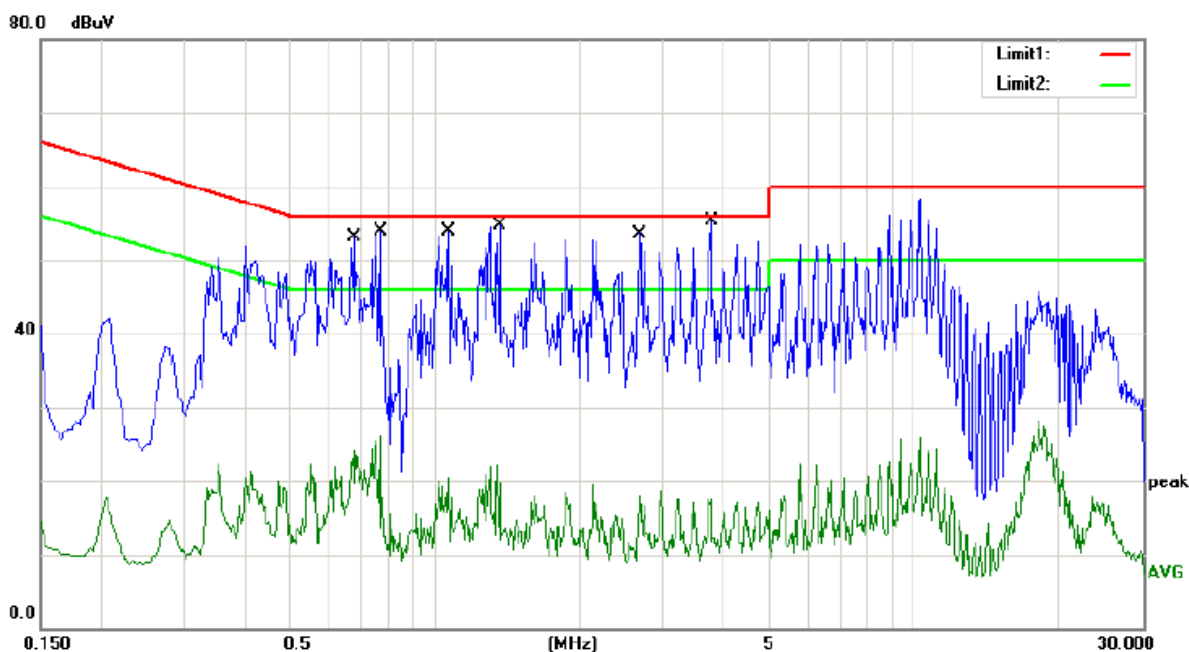
The frequency range from 150kHz to 30MHz is investigated

4.7. Measurement Results

PASS.

Please refer to the following pages.

Test Data:



Site site #1

Phase: **L1**

Temperature: 22

Limit: (CE)FCC PART 15 class B_QP

Power: AC 120V/60Hz

Humidity: 50 %

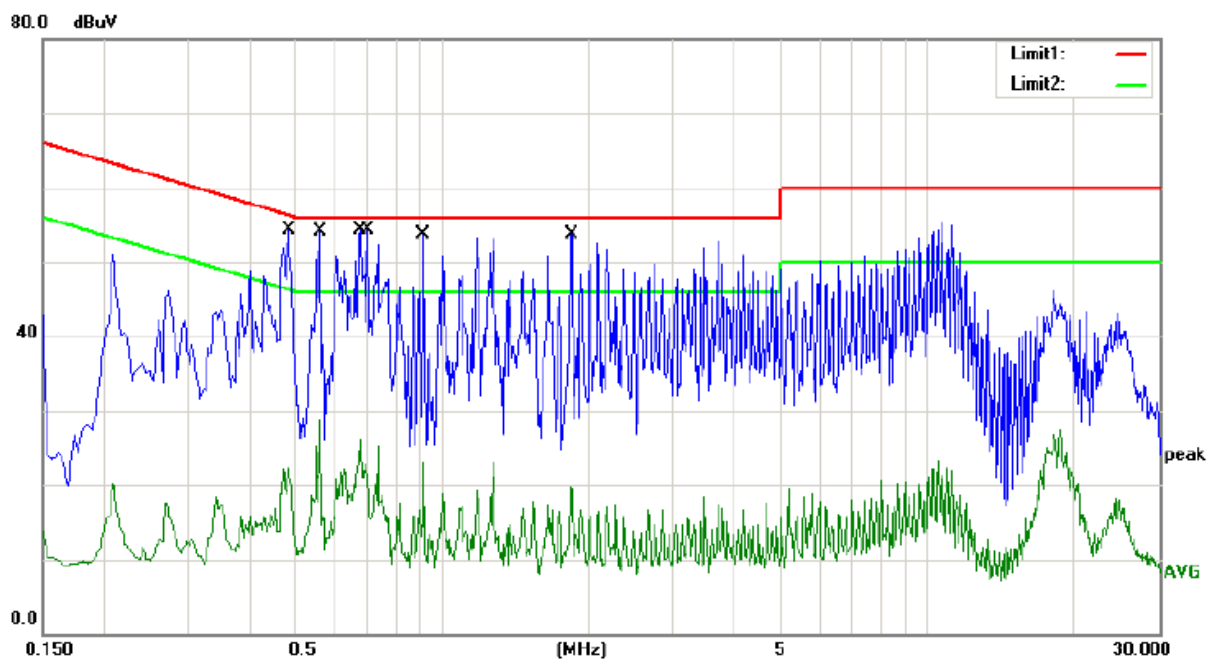
EUT: DC Tubular motor

M/N: DM28LEQ/S-2/28

Mode: Receiving

Note:

No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.6780	38.10	11.00	49.10	56.00	-6.90	QP	
2	0.6820	8.60	11.00	19.60	46.00	-26.40	AVG	
3	0.7700	38.90	11.00	49.90	56.00	-6.10	QP	
4	0.7740	2.70	11.00	13.70	46.00	-32.30	AVG	
5	1.0700	38.80	11.00	49.80	56.00	-6.20	QP	
6	1.0700	9.50	11.00	20.50	46.00	-25.50	AVG	
7	1.3660	39.70	11.00	50.70	56.00	-5.30	QP	
8	1.3700	1.10	11.00	12.10	46.00	-33.90	AVG	
9	2.6740	38.60	11.00	49.60	56.00	-6.40	QP	
10	2.6740	7.10	11.00	18.10	46.00	-27.90	AVG	
11 *	3.7700	40.30	11.00	51.30	56.00	-4.70	QP	
12	3.7980	0.90	11.00	11.90	46.00	-34.10	AVG	



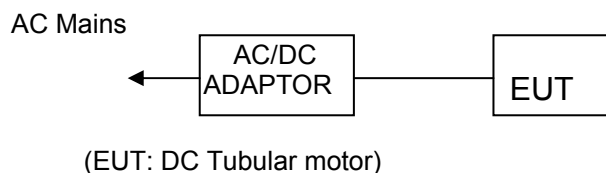
Site site #1 Phase: **N** Temperature: 22
 Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 50 %
 EUT: DC Tubular motor
 M/N: DM28LEQ/S-2/28
 Mode: Receiving
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.4820	39.20	11.00	50.20	56.30	-6.10	QP	
2		0.4860	10.00	11.00	21.00	46.24	-25.24	AVG	
3		0.5620	39.00	11.00	50.00	56.00	-6.00	QP	
4		0.5620	17.70	11.00	28.70	46.00	-17.30	AVG	
5	*	0.6780	39.30	11.00	50.30	56.00	-5.70	QP	
6		0.6820	14.50	11.00	25.50	46.00	-20.50	AVG	
7		0.7020	39.20	11.00	50.20	56.00	-5.80	QP	
8		0.7020	10.50	11.00	21.50	46.00	-24.50	AVG	
9		0.9140	38.60	11.00	49.60	56.00	-6.40	QP	
10		0.9140	12.10	11.00	23.10	46.00	-22.90	AVG	
11		1.8500	38.70	11.00	49.70	56.00	-6.30	QP	
12		1.8500	8.40	11.00	19.40	46.00	-26.60	AVG	

5. RADIATED EMISSION MEASUREMENT

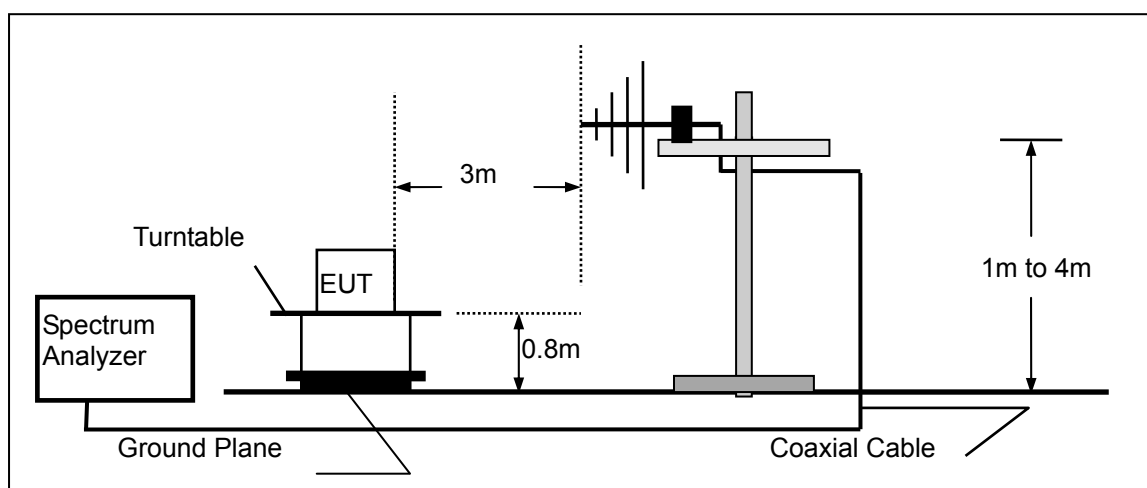
5.1. Block Diagram of Test

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

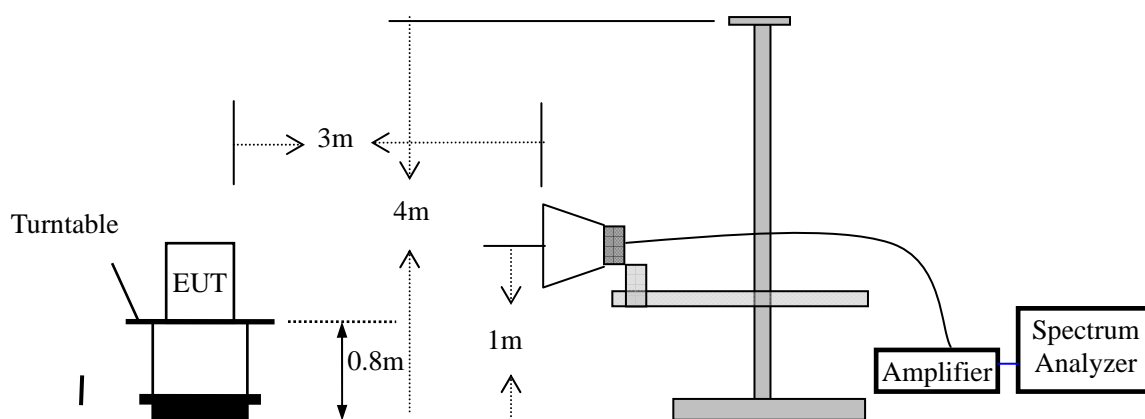


5.1.2. Block diagram of test setup (In chamber)

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)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3
Above 1GHz	74 dBuV/m (PEAK) 54 dBuV/m (AVERAGE)	

Remark: (1) Emission level (dB) μ V = 20 log Emission level μ 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).

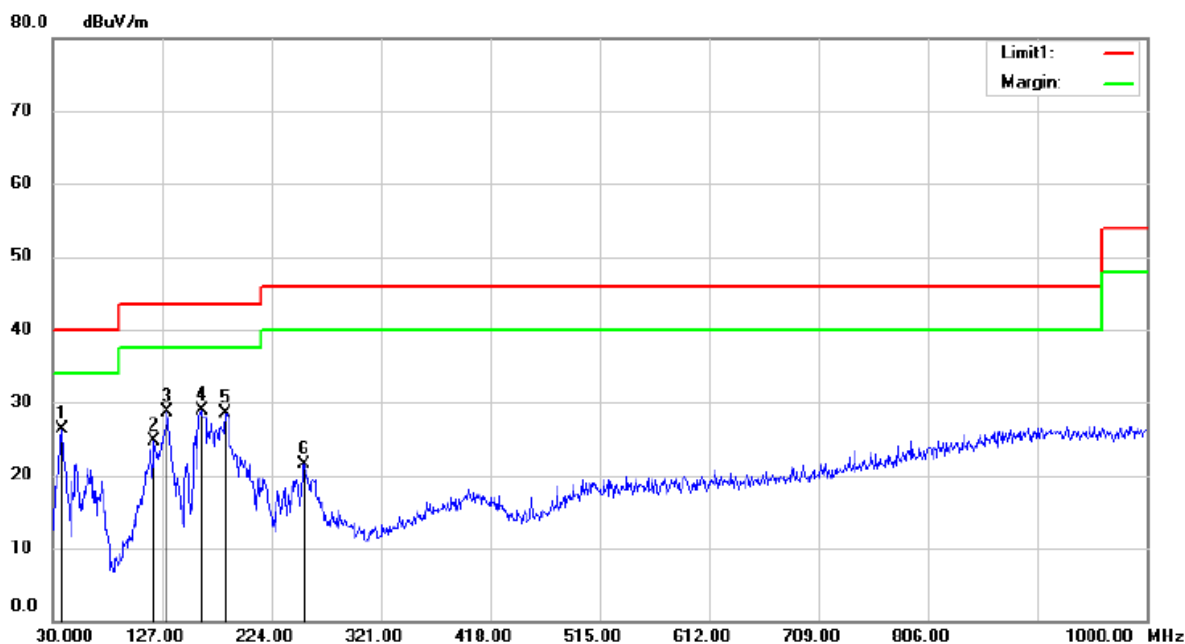
The frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

5.7. Measuring Results

PASS.

Please refer to the following pages.

Below 1000MHz (30M-1GHz)



Site 3m Chamber #3

Polarization: **Horizontal**

Temperature: 24 C

Limit: (RE)FCC PART 15 CLASS B

Power: AC 120V/60Hz

Humidity: 53 %

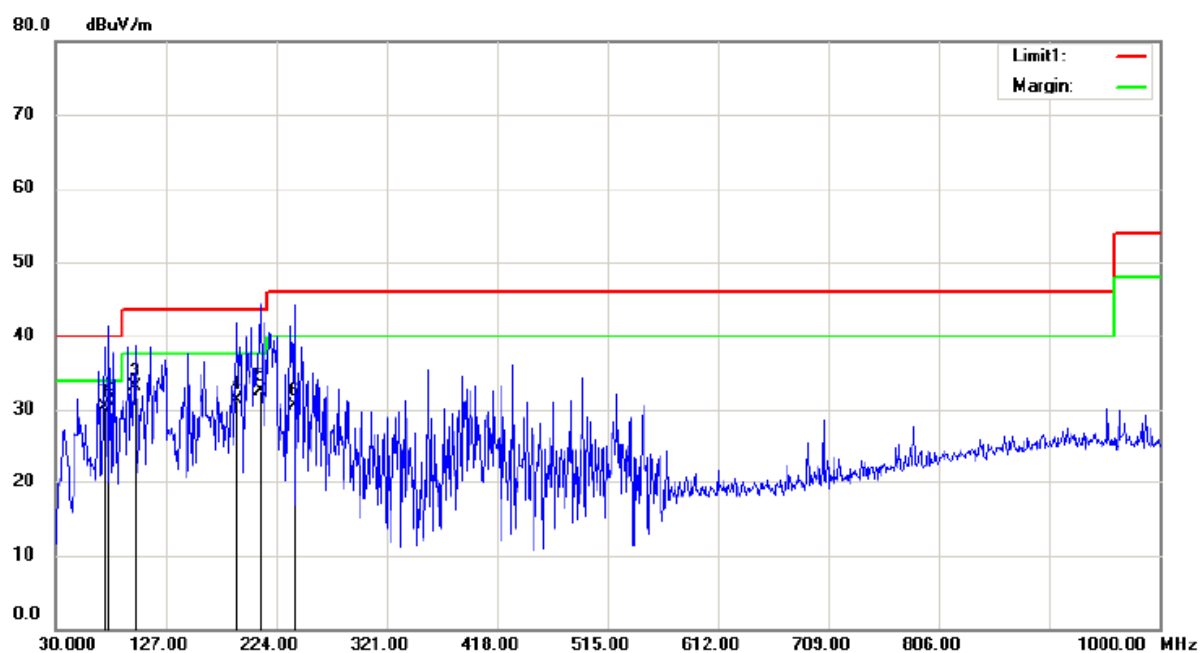
EUT: DC Tubular motor

M/N: DM28LEQ/S-2/28

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	*	37.7600	40.12	-13.72	26.40	40.00	-13.60	QP		
2		120.2100	41.05	-16.36	24.69	43.50	-18.81	QP		
3		131.8500	46.01	-17.36	28.65	43.50	-14.85	QP		
4		161.9200	47.85	-18.86	28.99	43.50	-14.51	QP		
5		183.2600	47.00	-18.41	28.59	43.50	-14.91	QP		
6		253.1000	34.62	-13.16	21.46	46.00	-24.54	QP		



Site site #1 Polarization: **Horizontal** Temperature: 24 C
 Limit: (RE)FCC PART 15 CLASS B Power: AC 120V/60Hz Humidity: 53 %
 EUT: DC Tubular motor
 M/N: DM28LEQ/S-2/28
 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		72.6800	49.35	-19.05	30.30	40.00	-9.70	QP		
2	*	77.5300	50.66	-19.46	31.20	40.00	-8.80	QP		
3		100.8100	47.22	-14.02	33.20	43.50	-10.30	QP		
4		190.0500	48.68	-17.28	31.40	43.50	-12.10	QP		
5		210.4200	48.88	-16.38	32.50	43.50	-11.00	QP		
6		239.5200	44.39	-13.89	30.50	46.00	-15.50	QP		

Above 1000MHz:

Test Date : 11/16/2015
 Test Result: PASS
 Test By: KK

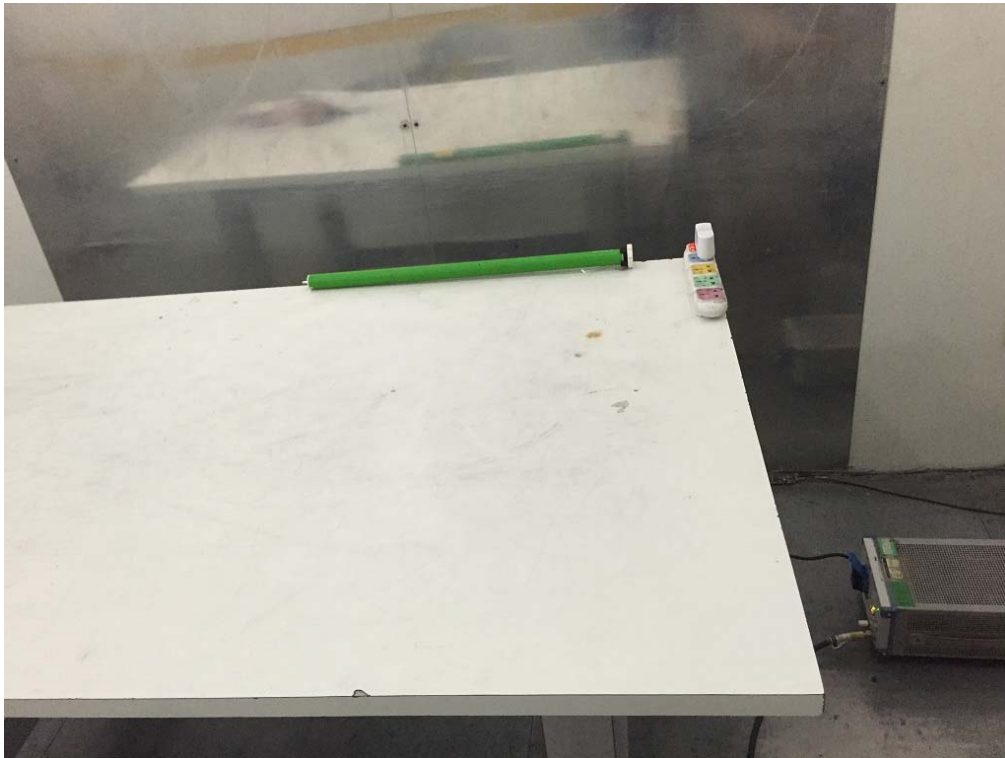
Temperature : 23 °C
 Humidity : 52 %

Mode: Receiving							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
1528.500	V	39.72	25.20	74.00	54.00	-36.08	-28.80
1871.500	V	38.99	26.50	74.00	54.00	-35.01	-27.50
1997.500	V	38.99	27.30	74.00	54.00	-35.01	-26.70
2463.000	V	40.51	29.60	74.00	54.00	-33.49	-24.40
2879.500	V	40.15	30.20	74.00	54.00	-33.85	-23.80
3460.500	V	39.94	28.60	74.00	54.00	-34.06	-25.40
1262.500	H	38.38	28.60	74.00	54.00	-35.62	-25.40
1780.500	H	38.90	29.10	74.00	54.00	-35.10	-24.90
2463.000	H	44.13	34.30	74.00	54.00	-29.87	-19.70
2865.500	H	39.83	29.80	74.00	54.00	-34.17	-24.20
3495.500	H	40.98	31.00	74.00	54.00	-33.02	-23.00
4017.000	H	40.65	30.45	74.00	54.00	-33.35	-23.55

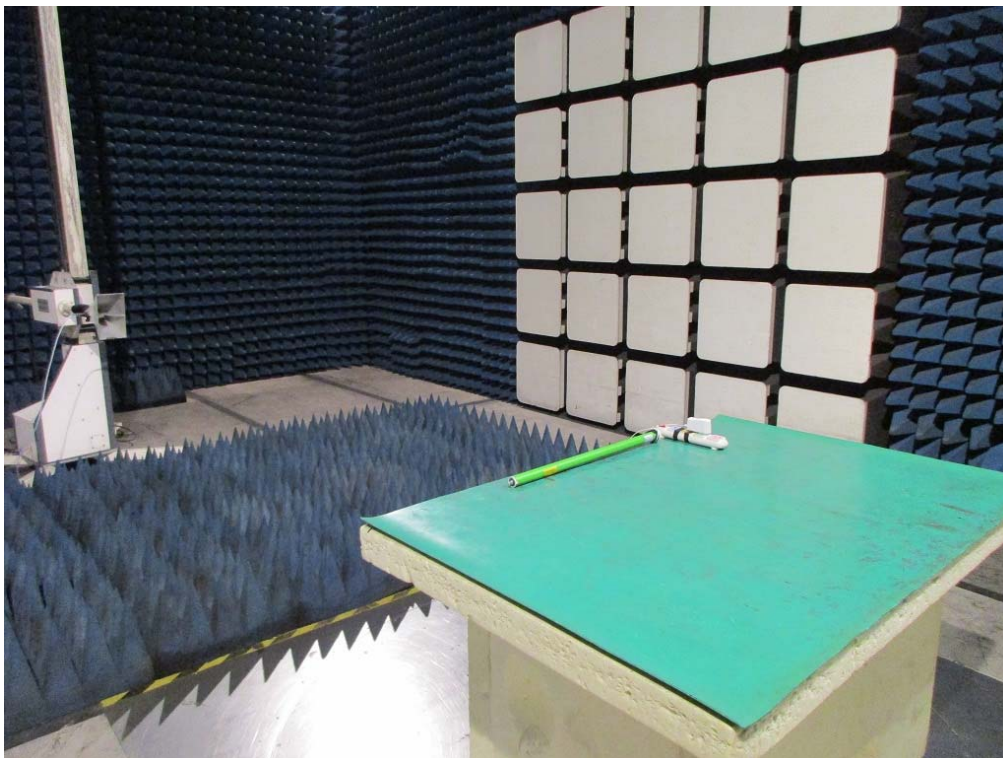
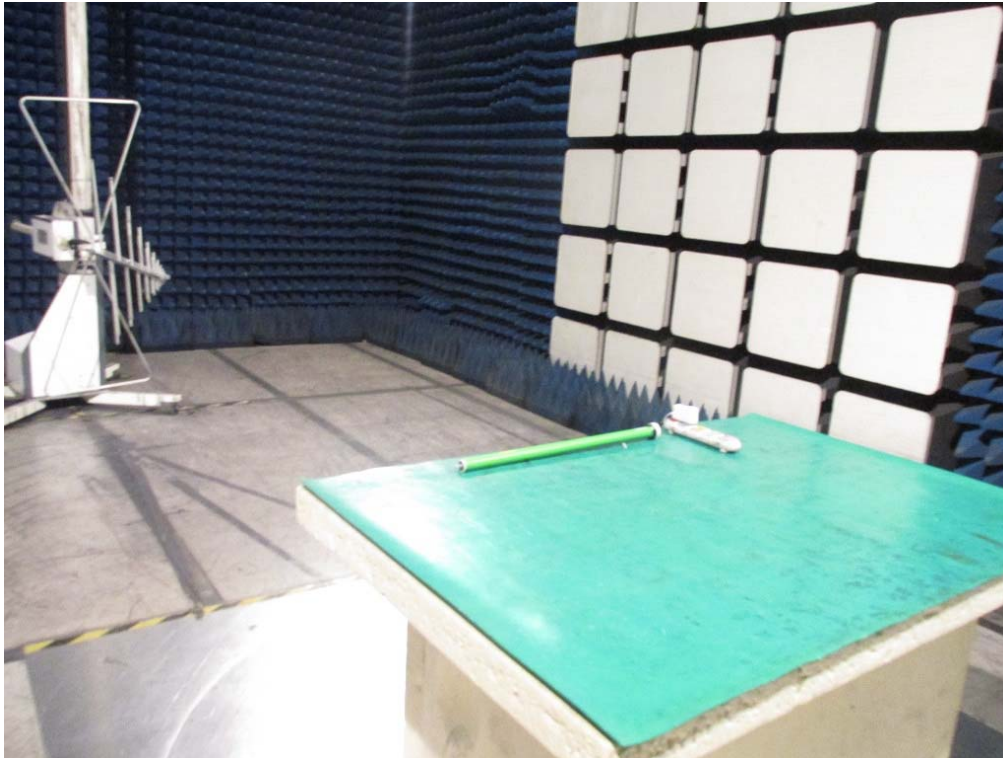
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6.PHOTOGRAPH OF TEST

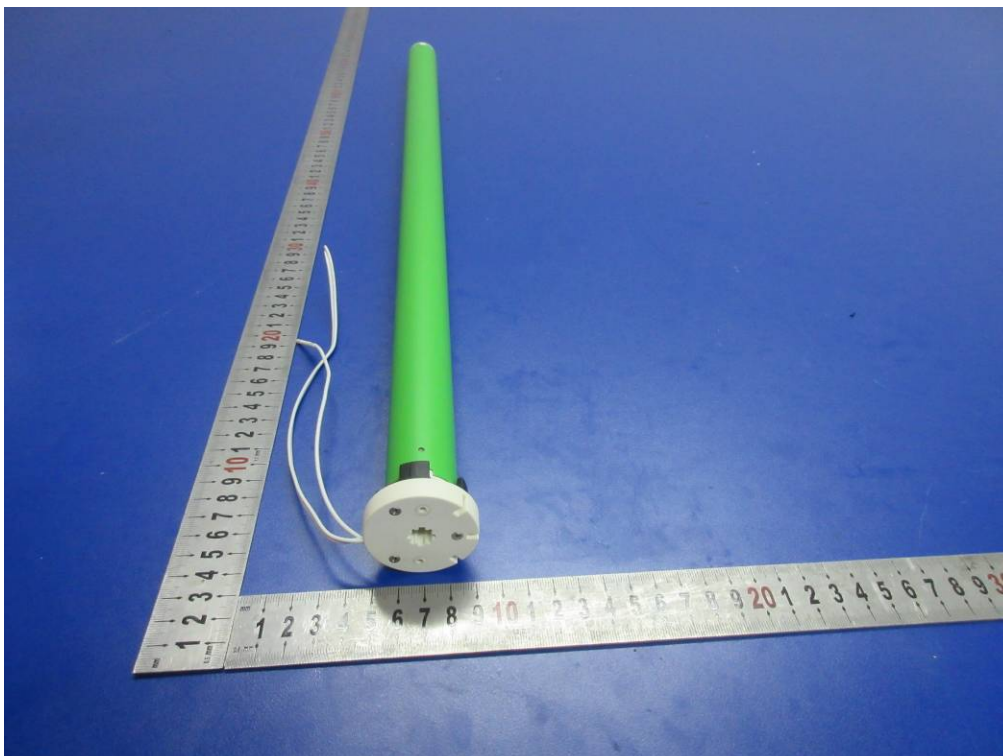
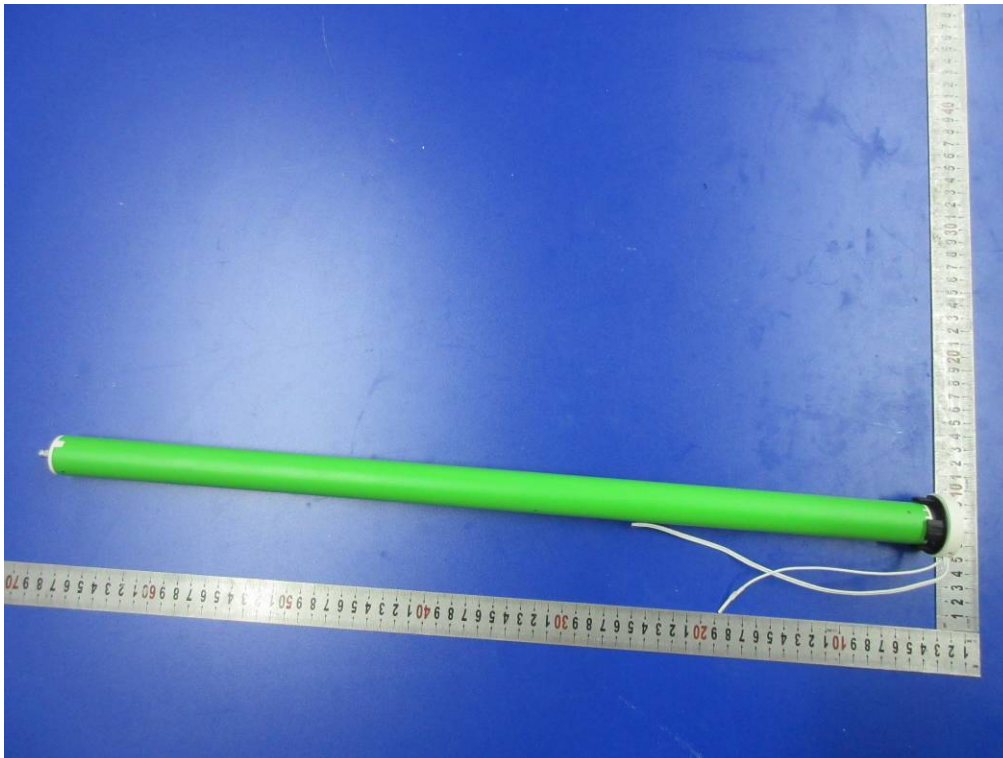
6.1Photo of Conducted Emission Measurement

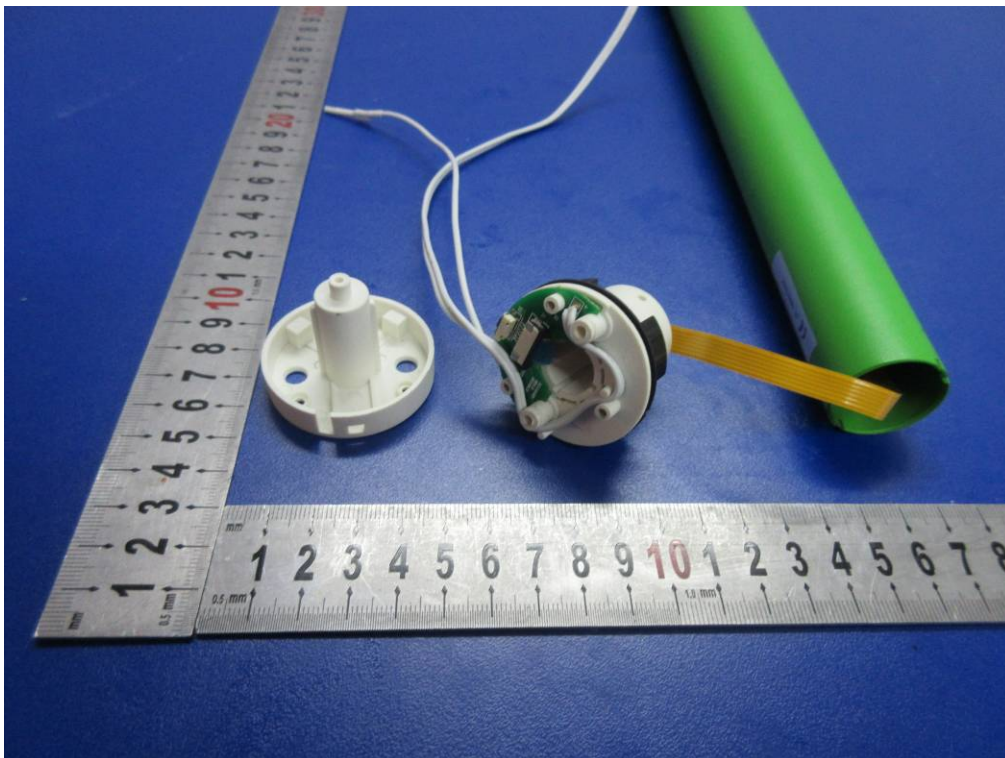
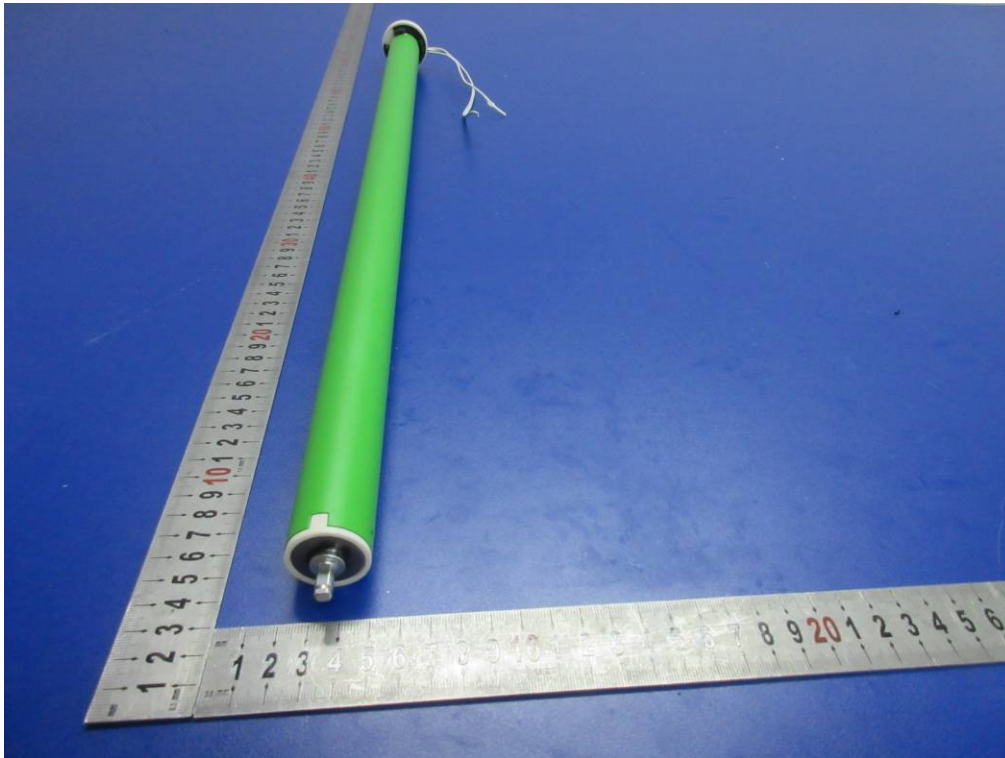


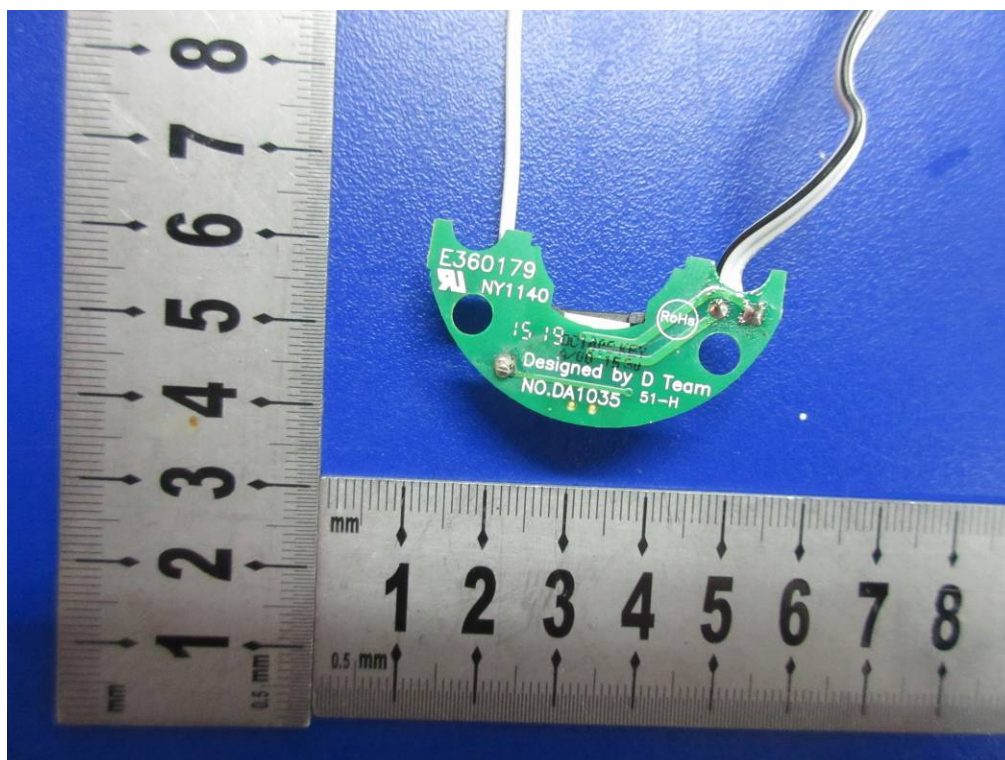
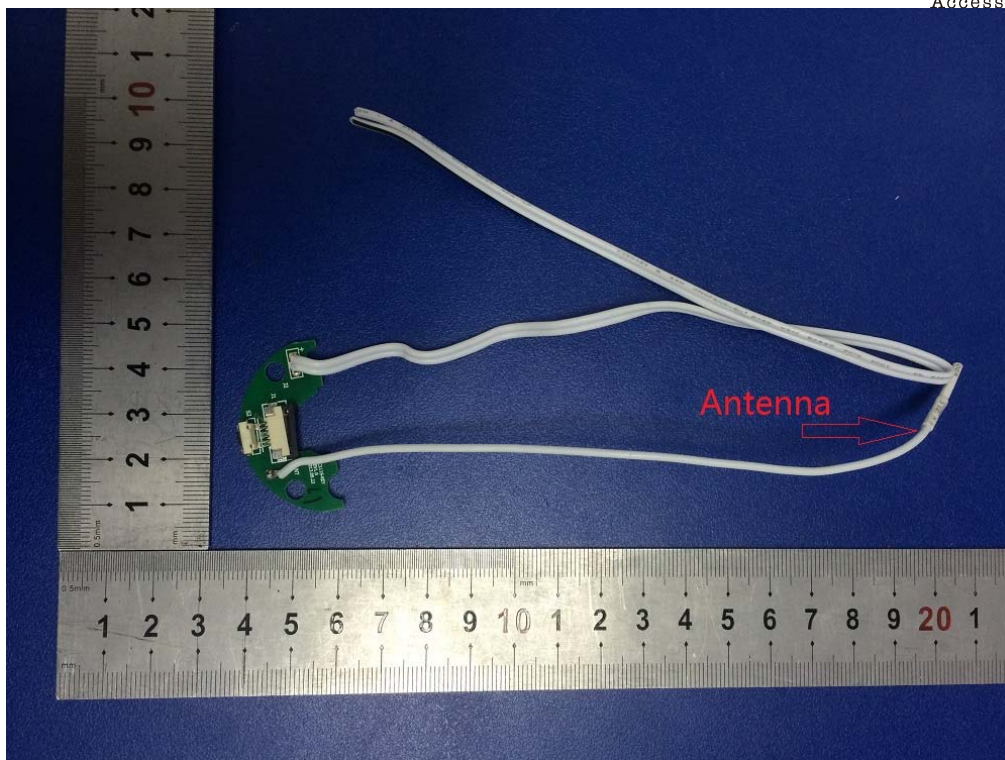
6.2 Photo of Radiation Emission Measurement



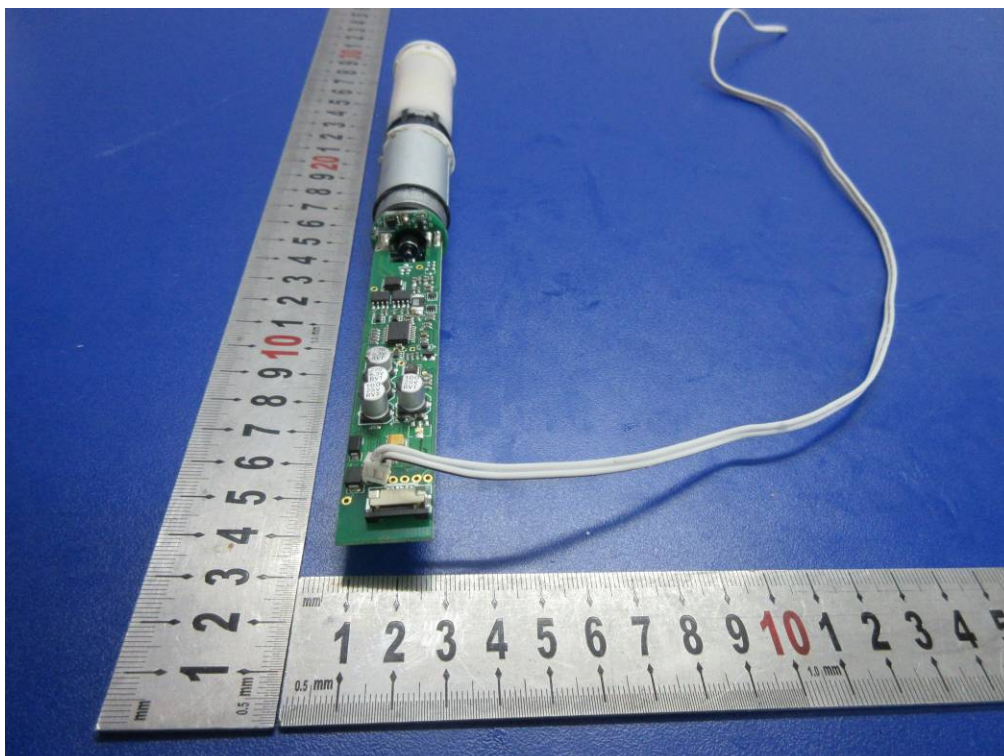
APPENDIX I (Photos of EUT)

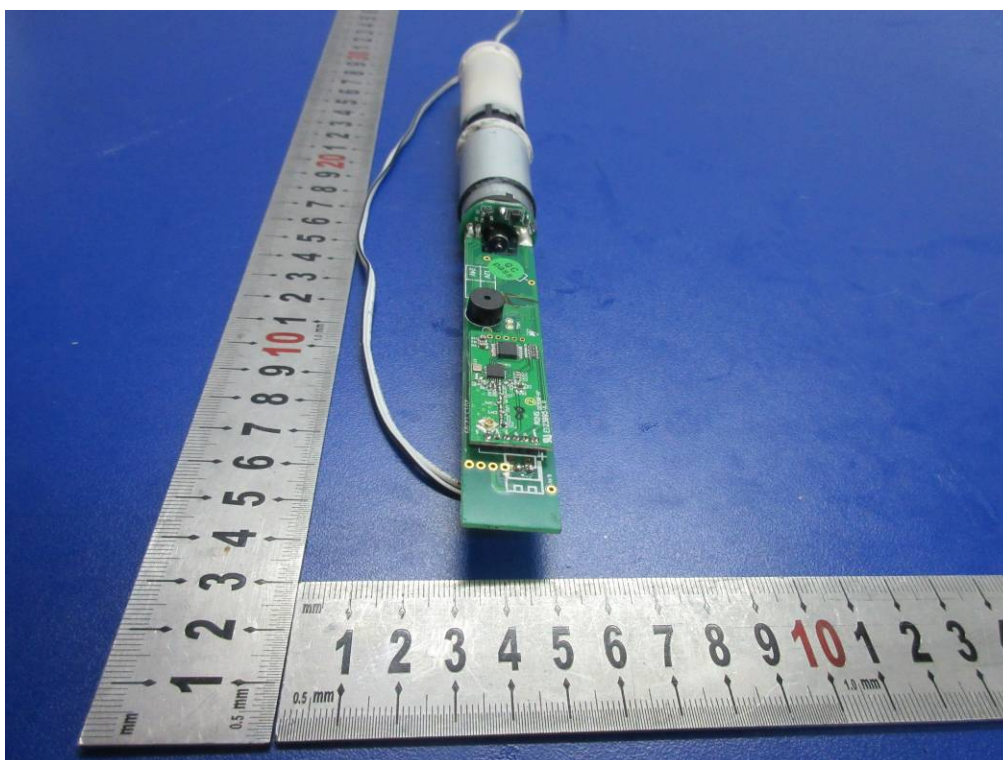












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