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Report No.: GZEM100700117901  
Page: 1 of 46

## TEST REPORT

Application No.:	GZEM1007001179HS
Applicant:	HoMedics Group Ltd
<b>Equipment Under Test (EUT):</b>	
EUT Name:	FOOT AND CALF MASSAGER
Item No.:	FC-200H-EU, FC-200H-GB ♣
♣	Please refer to section 3 of this report for details
P.O. No.:	PC0000405
Standards:	EN 55014-1:2006+A1:2009, EN 55014-2:1997+A1:2001+A2:2008, EN 61000-3-2:2006+A2:2009, EN 61000-3-3:2008.
Date of Receipt:	2010-07-19
Date of Test:	2010-07-21 to 2010-07-29
Date of Issue:	2010-08-11
Test Result :	Pass*

\* In the configuration tested, the EUT complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives.

  
2010. August.

**Stephen Guo**  
Manager



The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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## 2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2010-08-11		Original

Authorized for issue by:				
Tested By		 <hr/> <b>(Crystal Wang) / Project Engineer</b>		2010-07-21 to 2010-07-29 <hr/> <b>Date</b>
Prepared By		 <hr/> <b>(Millie Li) / Clerk</b>		2010-08-05 <hr/> <b>Date</b>
Checked By		 <hr/> <b>(Michael Huang) / Reviewer</b>		2010-08-11 <hr/> <b>Date</b>

### 3 Test Summary

<b>Electromagnetic Interference (EMI)</b>				
<b>Test</b>	<b>Test Requirement</b>	<b>Test Method</b>	<b>Class / Severity</b>	<b>Result</b>
Conducted Emission on AC, 150kHz to 30MHz	EN 55014-1: 2006+A1:2009	EN 55014-1: 2006+A1:2009	Table 1 Columns 2&3	PASS
Radiated Emission (30MHz to 1GHz)	EN 55014-1: 2006 + A1:2009	CISPR 16-2-3:2006	Table 3	PASS
Harmonic Emission on AC, 100Hz to 2kHz	EN 61000-3-2: 2006+A2:2009	N/A	Class A	N/A
Flicker Emission on AC	EN 61000-3-3:2008	EN 61000-3-3:2008	Clause 5 of EN 61000-3-3	PASS
<b>Electromagnetic Susceptibility(EMS)</b>				
<b>Test</b>	<b>Test Requirement</b>	<b>Test Method</b>	<b>Class / Severity</b>	<b>Result</b>
ESD	EN 55014-2:1997 +A1:2001+A2:2008	EN 61000-4-2: 2009	Contact ±4 kV Air ±8 kV	PASS
Electrical Fast Transients (EFT) on AC	EN 55014-2:1997 +A1:2001+A2:2008	EN 61000-4-4 : 2004	AC ± 0.5kV & ± 1.0kV	PASS
Surge Immunity on AC	EN 55014-2:1997 +A1:2001+A2:2008	EN 61000-4-5: 2006	±1kV D.M.†	PASS
Injected Currents on AC, 150kHz to 230MHz	EN 55014-2:1997 +A1:2001+A2:2008	EN 61000-4-6: 2009	3Vrms (emf), 80%, 1kHz Amp. Mod.	PASS
Voltage Dips and Interruptions on AC	EN 55014-2:1997 +A1:2001+A2:2008	EN 61000-4-11: 2004	0 % UT* for 0.5per 40 % UT* for 10per 70 % UT* for 25per	PASS
<b>Remark :</b>				
* $U_T$ is the nominal supply voltage				
† D.M. – Differential Mode				
N/A : Not applicable, please refer to Section 7.3 of this report for details.				
♣Item No.: FC-200H-EU, FC-200H-GB				
According to the confirmation from the applicant, since the electrical circuit design, layout, components used and internal wiring were identical for the above items, only difference being the item No. and outer decoration.				
Therefore only one item FC-200H-EU was tested in this report.				

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## 5 General Information

### 5.1 Client Information

Applicant: HoMedics Group Ltd  
Address of Applicant: HoMedics House, Somerhill Business Park, Five Oak Green Road, Tonbridge, Kent TN11 0GP England

### 5.2 General Description of E.U.T.

EUT Name: FOOT AND CALF MASSAGER  
Item No.: FC-200H-EU, FC-200H-GB  
P.O. No.: PC0000405

### 5.3 Details of E.U.T.

Power Supply: AC 220-240V 50 Hz  
Power Cable: 1.8m x 2 pins unscreened cable.

### 5.4 Description of Support Units

The EUT has been tested as an independent unit.

### 5.5 Deviation from Standards

N/A

### 5.6 Abnormalities from Standard Conditions

N/A

### 5.7 Monitoring of EUT for All Immunity Test

Audio: N/A  
Visual: Monitored the light and movement of the EUT.

### 5.8 Test Location

All tests were performed at:  
SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory,  
198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District,  
Guangzhou, China 510663  
Tel: +86 20 82155555 Fax: +86 20 82075059  
No tests were sub-contracted.



## 6 Equipment Used during Test

Conducted Emission						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
					(YYYY-MM-DD)	(YYYY-MM-DD)
EMC0306	Shielding Room	Zhong Yu	8 x 3 x 3.8 m <sup>3</sup>	N/A	N/A	N/A
EMC0102	LISN	Schaffner Chase	MNZ050D/1	1421	2009-11-24	2010-11-24
EMC0506	EMI Test Receiver	Rohde & Schwarz	ESCS30	100085	2009-11-24	2010-11-24
EMC0107	Coaxial Cable	SGS	2m	N/A	2009-11-25	2010-11-25
EMC0106	Voltage Probe	SGS	N/A	N/A	N/A	N/A
EMC0120	8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	20550	2010-01-25	2011-01-25
EMC0121	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	20549	2010-01-25	2011-01-25
EMC0122	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	20548	2010-01-25	2011-01-25

RE in Chamber						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
					(YYYY-MM-DD)	(YYYY-MM-DD)
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	N/A	N/A
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2010-01-25	2011-01-25
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	10036	2010-06-02	2011-06-02
N/A	EMI Test Software	Audix	E3	N/A	N/A	N/A
EMC0514	Coaxial cable	SGS	N/A	N/A	2009-12-09	2010-12-09
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2009-12-20	2010-12-20
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2009-12-20	2010-12-20
EMC0517	Horn Antenna	Rohde & Schwarz	HF906	100095	2009-09-15	2010-09-15
EMC0040	Spectrum Analyzer	Rohde & Schwarz	FSP30	100324	2009-12-05	2010-12-05
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2010-01-25	2011-01-25
EMC0049	Amplifier	Agilent	8447D	2944A10862	2010-04-21	2011-04-21
EMC0075	310N Amplifier	Sonama	310N	272683	2009-10-26	2010-10-26
EMC0523	Active Loop Antenna	EMCO	6502	42963	2009-11-17	2010-11-17
EMC0530	10m Semi-Anechoic Chamber	ETS	N/A	N/A	2010-05-17	2011-05-17



Harmonics / Flicker test						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
					(YYYY-MM-DD)	(YYYY-MM-DD)
EMC0608	AC Power Source	California	50001iX	56627	2010-01-25	2011-01-25
EMC0607	Power Analyzer	California	PAXS-1	72400	2010-01-25	2011-01-25

Electrostatic Discharge						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
					(YYYY-MM-DD)	(YYYY-MM-DD)
EMC0809	ESD Simulator	EM Test AG	Dito	V0735102864	2009-10-28	2010-10-28
EMC0804	ESD Ground Plane	SGS	3m x 3m	N/A	N/A	N/A
EMC0077	Temperature, & Humidity	Shanghai Meteorological Instrument factory Co., Ltd.	ZJ1-2B	709151	2009-11-26	2010-11-26

EFT, Surge, Voltage dips and Interruption						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
					(YYYY-MM-DD)	(YYYY-MM-DD)
EMC1010	EMC Immunity Test System	Thermo KeyTek	Pro-Plus	501276	2009-11-24	2010-11-24
EMC2012	Power-Electronics Measurement System	Tektronix	TDS 744A	N/A	2010-06-22	2011-06-22





Conducted Immunity						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
					(YYYY-MM-DD)	(YYYY-MM-DD)
EMC1101	Signal Generator	Rohde & Schwarz	SMY01	825675/016	2009-11-24	2010-11-24
EMC1102	Amplifier 0.15-230MHz	Ophirrf	GRF5048	1003	2010-01-25	2011-01-25
EMC1103	Power Meter	Rohde & Schwarz	NRVS	825770/079	2010-07-06	2011-07-06
EMC0071	URV5-Z2 Insert. Unit	R&S	URV5-Z2	100309	2009-11-02	2010-11-02
EMC1105	Dual Directional coupler	Werlatone Inc.	C1795	6635	2009-11-24	2010-11-24
EMC0908	Oscilloscope Type 485	Tektronix	485	B144408	2009-11-11	2010-11-11
EMC1108	CDN M3	Schaffner Chase	CDN-M3-16	9866	2009-11-24	2010-11-24
EMC1107	CDN M2	Schaffner Chase	CDN-M2-16	9863	2009-11-24	2010-11-24
EMC1120	Immunity S/W Ver 4.31	Schaffner Chase	CIS9942	WHHPKB	N/A	N/A
EMC1116	Current Probe	Schaffner Chase	CIP9136	1155	2009-11-24	2010-11-24
EMC1117	Current Probe	Schaffner Chase	CSP8445	18	2009-11-24	2010-11-24

General used equipment						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
					(YYYY-MM-DD)	(YYYY-MM-DD)
EMC0006	DMM	Fluke	73	70681569	2009-12-16	2010-12-16
EMC0007	DMM	Fluke	73	70671122	2009-12-16	2010-12-16

## 7 Electromagnetic Interference Test Results

### 7.1 Conducted Emissions on Mains Terminals, 150 kHz to 30MHz

Test Requirement: EN 55014-1  
 Test Method: EN 55014-1  
 Test Date: 2010-07-21  
 Test voltage: 230V AC 50 Hz  
 Frequency Range: 150KHz to 30MHz  
 Detector: Quasi-Peak and Average at frequency with maximum peak (9kHz resolution bandwidth)

Limit:

Frequency range MHz	At mains terminals dB (µV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	59 to 46
0.50 to 5	56	46
5 to 30	60	50

Note1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 30 MHz.  
 Note2: The lower limit is applicable at the transition frequency.

#### 7.1.1 E.U.T. Operation

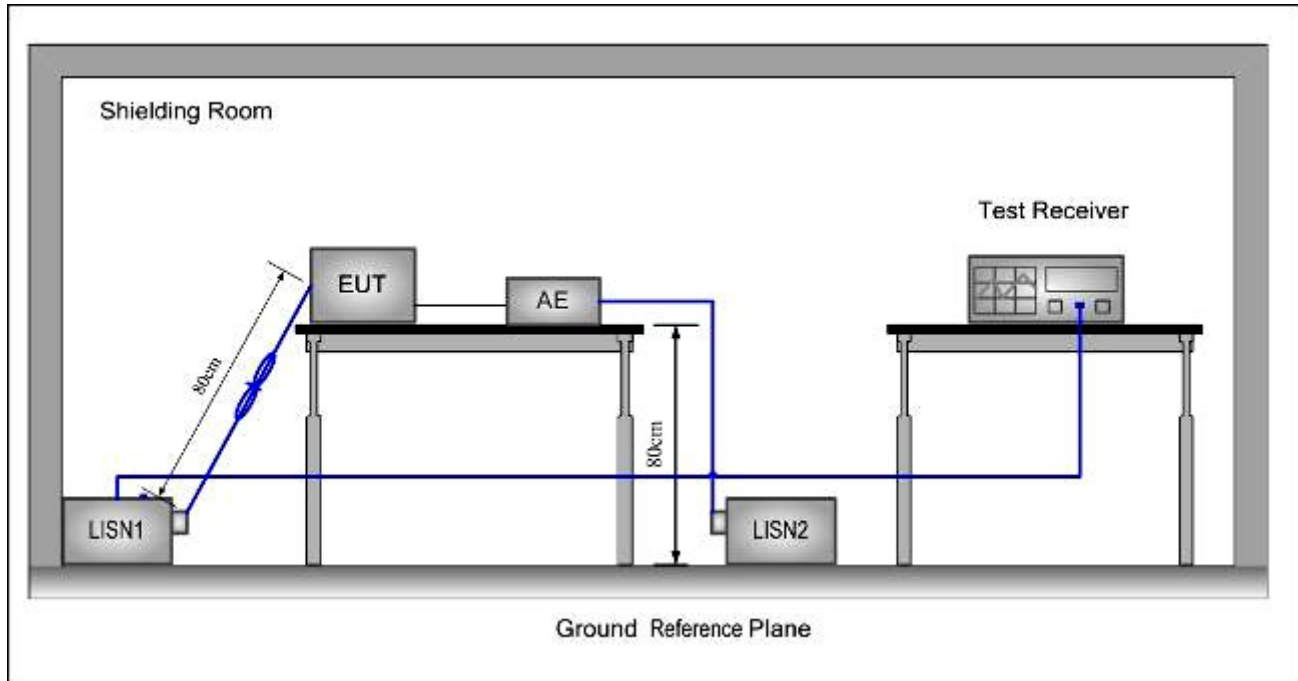
Operating Environment:

Temperature: 22.0 °C Humidity: 50 % RH Atmospheric Pressure: 1029 mbar

EUT Operation: A pre-test was performed on the EUT in motor running mode with heating both in foot and calf parts, motor running mode both in foot and calf parts, motor running mode with heating in foot parts, motor running mode in foot parts, motor running mode with heating in calf parts & motor running mode in calf parts in order to find the worst case. Test the EUT in motor running mode with heating both in foot and calf parts for the compliance test as the worst case was found.

A pre-test at 160KHz shall be made over a range of 0.9 to 1.1 times the rated voltage in order to check the level of disturbance varies considerably with the supply voltage, compliance test at 230V AC as no worse case was found.

## 7.1.2 Test Setup and Procedure



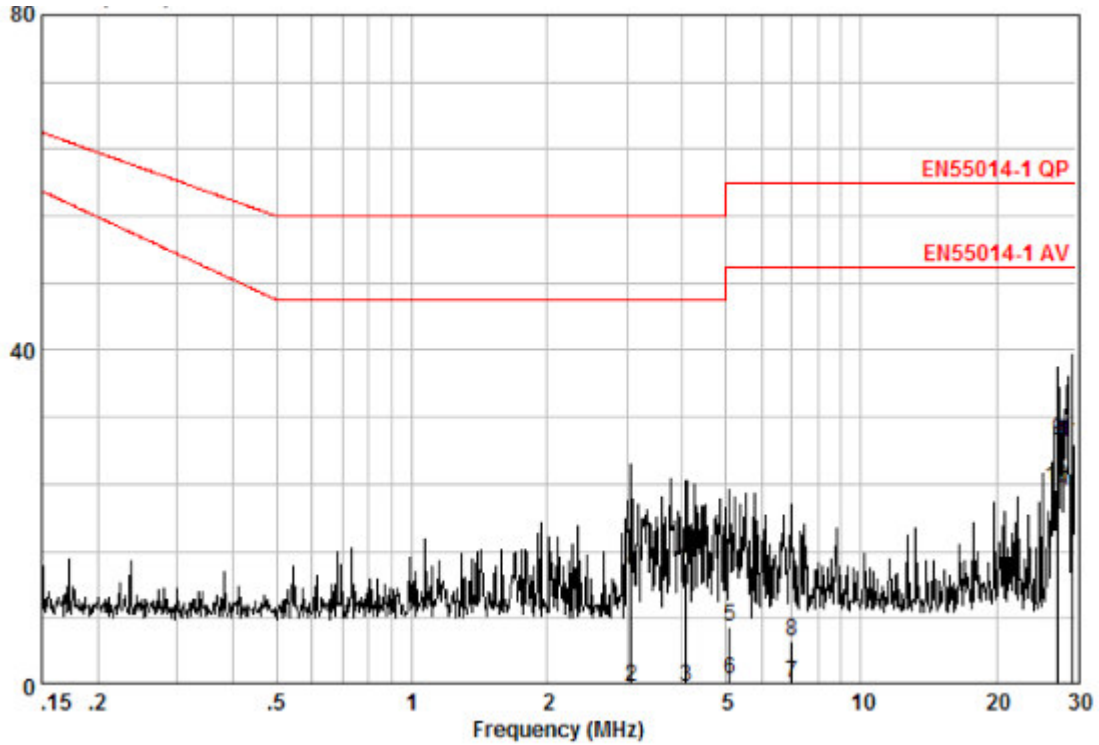
1. The mains terminal disturbance voltage was measured with the EUT in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a  $50\Omega/50\mu\text{H} + 5\Omega$  linear impedance. The power cables of all other units of the EUT was connected to a second LISN, which was bonded to the ground reference plane in the same way as the LISN for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN and the EUT. The mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m. All other units of the EUT and associated equipment was at least 0,8 m from the LISN.

### 7.1.3 Measurement Data

Live Line:

Peak Scan:

Level (dBμV)



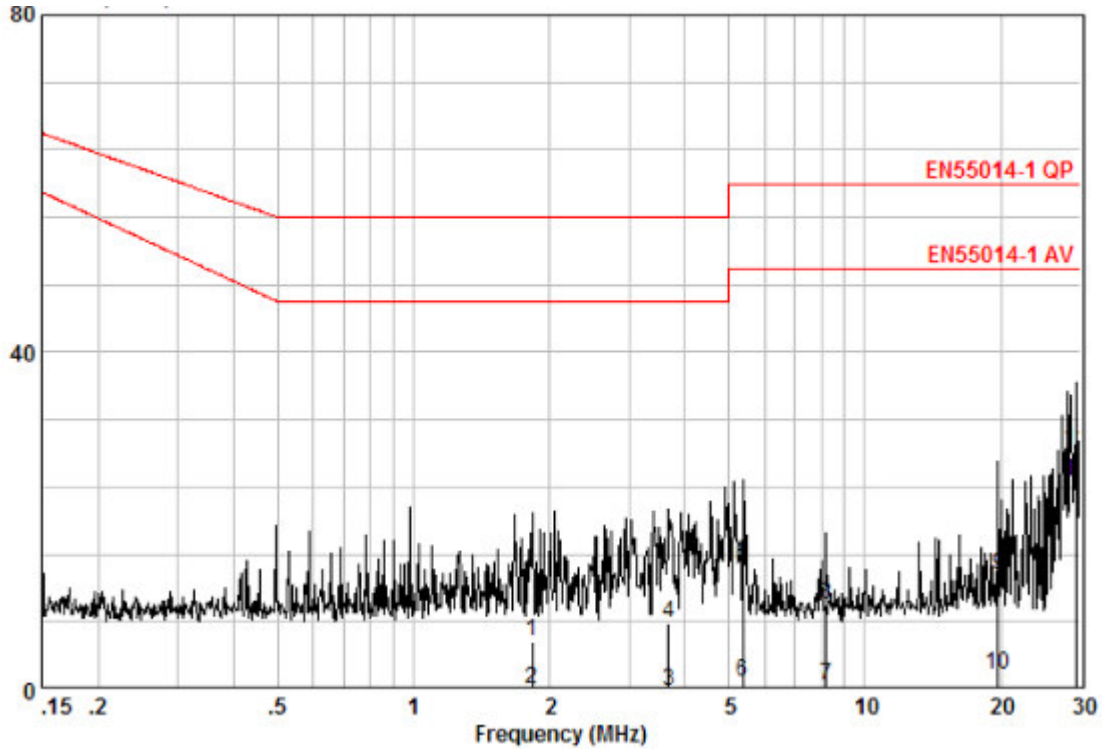
Quasi-peak and Average measurement:

Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
MHz	dBμV	dB	dB	dBμV	dBμV	dB	
3.074	12.68	0.05	0.15	12.88	56.00	-43.12	QP
3.074	-0.40	0.05	0.15	-0.20	46.00	-46.20	AVERAGE
4.070	-0.48	0.06	0.17	-0.25	46.00	-46.25	AVERAGE
4.070	14.40	0.06	0.17	14.63	56.00	-41.37	QP
5.085	6.66	0.08	0.19	6.93	60.00	-53.07	QP
5.085	0.44	0.08	0.19	0.71	50.00	-49.29	AVERAGE
6.988	-0.11	0.09	0.26	0.24	50.00	-49.76	AVERAGE
6.988	4.92	0.09	0.26	5.27	60.00	-54.73	QP
27.406	28.28	0.20	0.71	29.19	60.00	-30.81	QP
27.406	22.66	0.20	0.71	23.57	50.00	-26.43	AVERAGE
29.487	27.94	0.20	0.79	28.93	60.00	-31.07	QP
29.487	22.15	0.20	0.79	23.14	50.00	-26.86	AVERAGE

Neutral Line

Peak Scan:

Level (dBµV)



Quasi-peak and Average measurement:

Freq MHz	Read Level dBµV	Cable Loss dB	LISN Factor dB	Level dBµV	Limit Line dBµV	Over Limit dB	Remark
1.829	5.50	0.03	0.11	5.64	56.00	-50.36	QP
1.829	-0.04	0.03	0.11	0.10	46.00	-45.90	AVERAGE
3.681	-0.48	0.06	0.16	-0.26	46.00	-46.26	AVERAGE
3.681	7.72	0.06	0.16	7.94	56.00	-48.06	QP
5.362	14.22	0.08	0.20	14.50	60.00	-45.50	QP
5.362	0.57	0.08	0.20	0.85	50.00	-49.15	AVERAGE
8.192	0.03	0.09	0.32	0.44	50.00	-49.56	AVERAGE
8.192	9.66	0.09	0.32	10.07	60.00	-49.93	QP
19.740	12.32	0.20	1.02	13.54	60.00	-46.46	QP
19.740	0.51	0.20	1.02	1.73	50.00	-48.27	AVERAGE
29.481	27.18	0.20	0.96	28.34	60.00	-31.66	QP
29.481	23.45	0.20	0.96	24.61	50.00	-25.39	AVERAGE

Level = Read Level + LISN Factor + Cable Loss.



## 7.2 Radiated Emissions, 30 MHz to 1 GHz

Test Requirement: EN 55014-1  
Test Method: CISPR 16-2-3, semi-anechoic chamber  
Test Date: 2010-07-22 (initial test)  
2010-07-29 (retest)  
Test voltage: 230V AC 50 Hz  
Frequency Range: 30 MHz to 1GHz  
Measurement Distance: 3 m  
Detector: Peak for pre-scan (120 kHz resolution bandwidth)  
Quasi-Peak for final test (120 kHz resolution bandwidth)

Limit:

Frequency range	Quasi-peak limits
MHz	dB ( $\mu$ V/m)
30 to 230	40
230 to 1000	47

At transitional frequencies the lower limit applies.

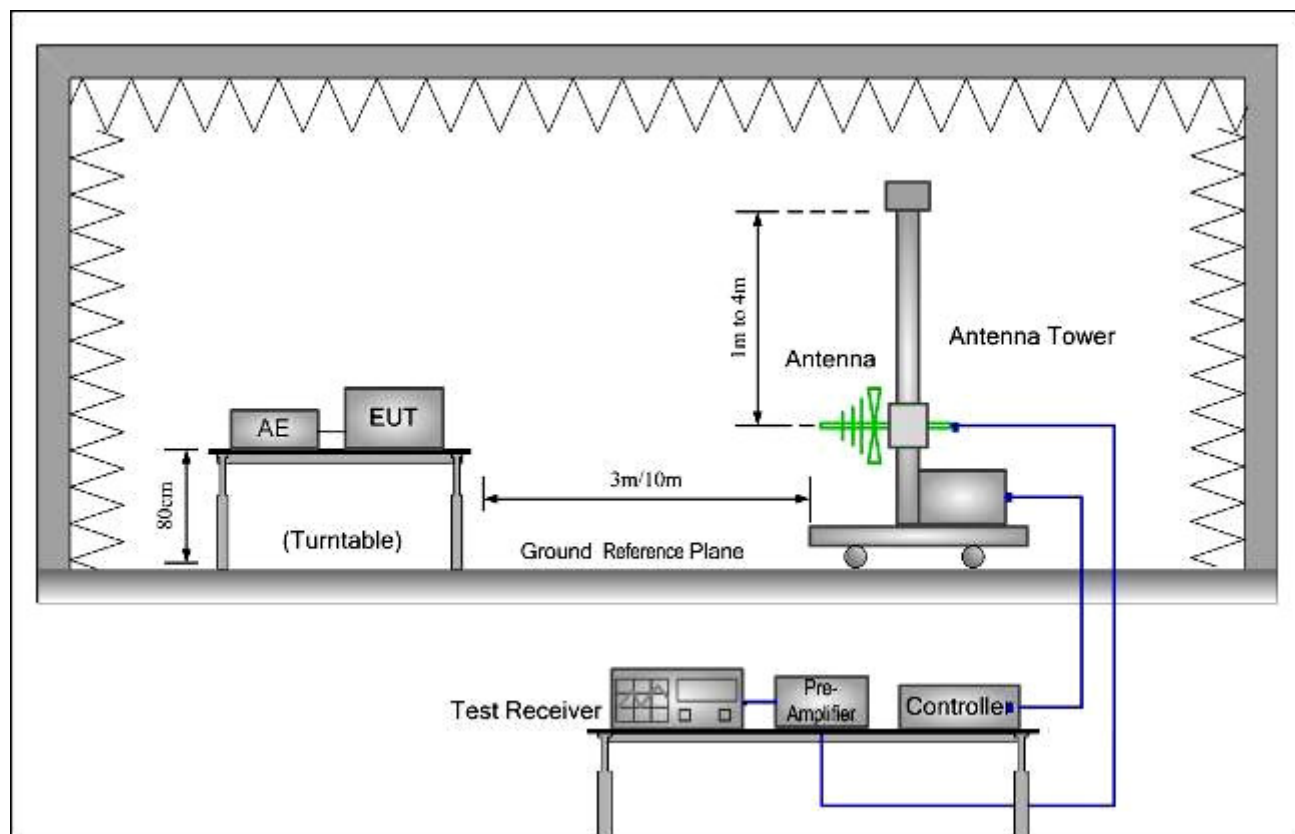
### 7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 26.0 °C Humidity: 59% RH Atmospheric Pressure: 1009 mbar

EUT Operation: A pre-test was performed on the EUT in motor running mode with heating both in foot and calf parts, motor running mode both in foot and calf parts, motor running mode with heating in foot parts, motor running mode in foot parts, motor running mode with heating in calf parts & motor running mode in calf parts in order to find the worst case. Test the EUT in motor running mode with heating both in foot and calf parts for the compliance test as the worst case was found.

## 7.2.2 Test Setup and Procedure



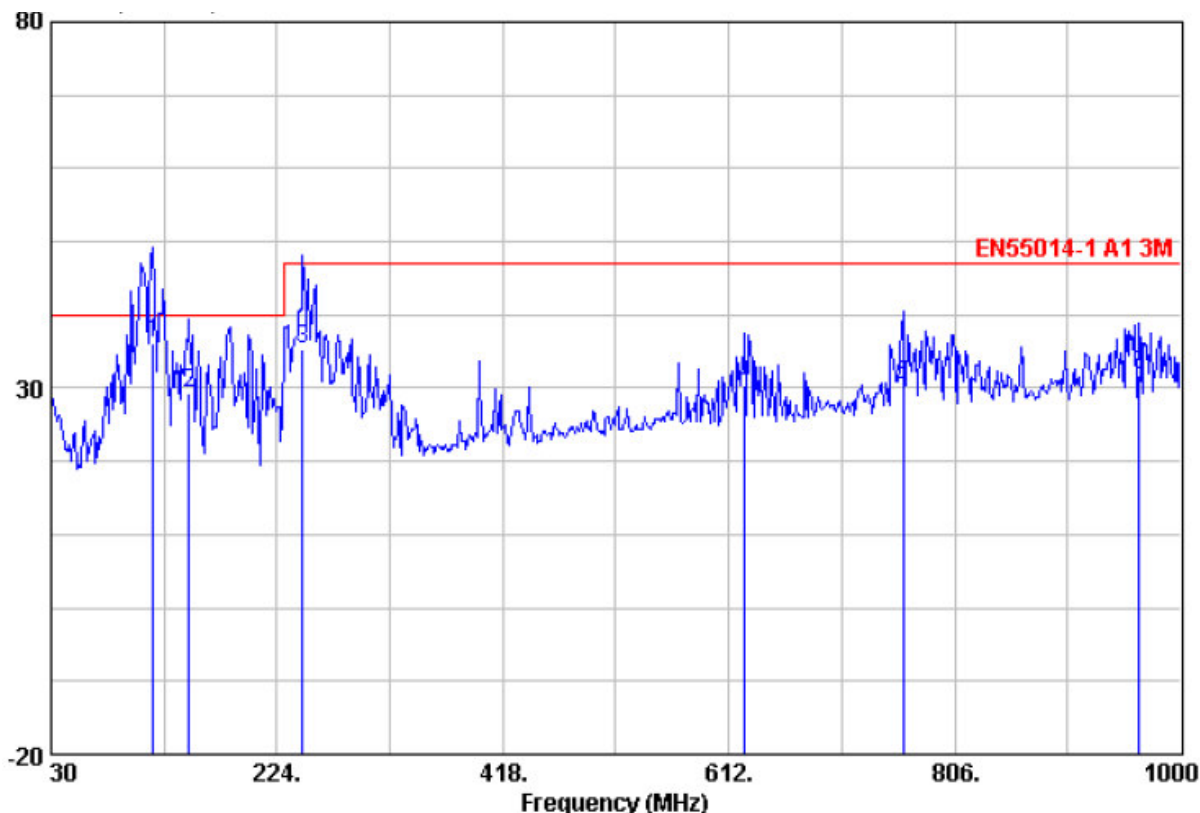
1. The radiated emissions test was conducted in a semi-anechoic chamber.
2. The EUT was connected to AC power source through a mains power outlet which was bonded to the ground reference plane; The mains cables shall drape to the ground reference plane.
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emission spectrum signature data plots of the EUT.
5. The frequencies of maximum emission were determined in the final radiated emissions measurement, the physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

### 7.2.3 Measurement Data

Vertical:

Peak scan

Level (dB $\mu$ V/m)

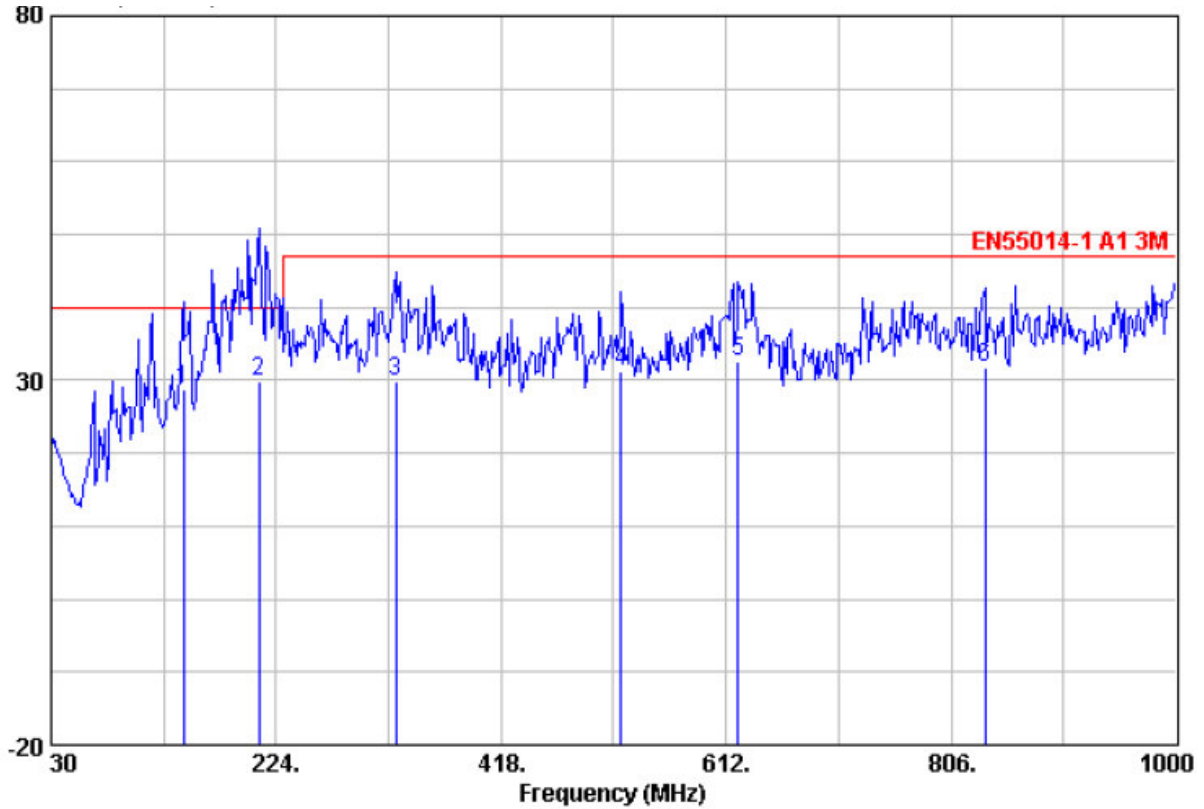


Quasi-peak measurement

Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamplifier Factor	Level	Limit Line	Over Limit	Remark
MHz	dB $\mu$ V	dB/m	dB	dB	dB $\mu$ V/m	dB $\mu$ V/m	dB	
117.460	50.60	12.24	0.90	27.58	36.16	40.00	-3.84	QP
148.340	44.36	11.28	1.10	27.43	29.31	40.00	-10.69	QP
246.310	48.79	12.18	1.40	27.15	35.22	47.00	-11.78	QP
625.580	37.81	18.55	2.30	28.24	30.42	47.00	-16.58	QP
761.380	35.82	19.81	2.50	27.73	30.40	47.00	-16.60	QP
964.110	35.27	20.66	2.70	26.87	31.76	47.00	-15.24	QP



Horizontal:  
 Peak scan  
 Level (dBμV/m)



Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
144.460	43.68	11.45	1.00	27.45	28.68	40.00	-11.32	QP
209.200	44.70	10.95	1.30	27.22	29.73	40.00	-10.27	QP
326.820	41.54	14.00	1.60	27.28	29.86	47.00	-17.14	QP
521.790	40.19	17.14	2.00	28.12	31.21	47.00	-15.79	QP
622.670	39.86	18.57	2.30	28.26	32.48	47.00	-14.52	QP
835.100	36.21	20.30	2.50	27.30	31.71	47.00	-15.29	QP

**Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor.**

### 7.3 Harmonics Test Result

Test Requirement: EN 61000-3-2  
Test Method: N/A: See Remark Below  
Frequency Range: 100 Hz to 2 kHz

There is no need for Harmonics test to be performed on this product (rated power is less than 75 W) in accordance with EN 61000-3-2.

For further details, please refer to Clause 7, Note 1 of EN 61000-3-2 which states:

“For the following categories of equipment limits are not specified in this edition of the standard.

Note 1: Equipment with a rated power of 75 W or less, other than lighting equipment.”

## 7.4 Flicker Test Result

Test Requirement:	EN 61000-3-3
Test Method:	EN 61000-3-3
Test Date:	2010-07-22
Test voltage	230V AC 50 Hz
Measurement Time:	10 mins
Class / Severity:	Clause 5 of EN 61000-3-3

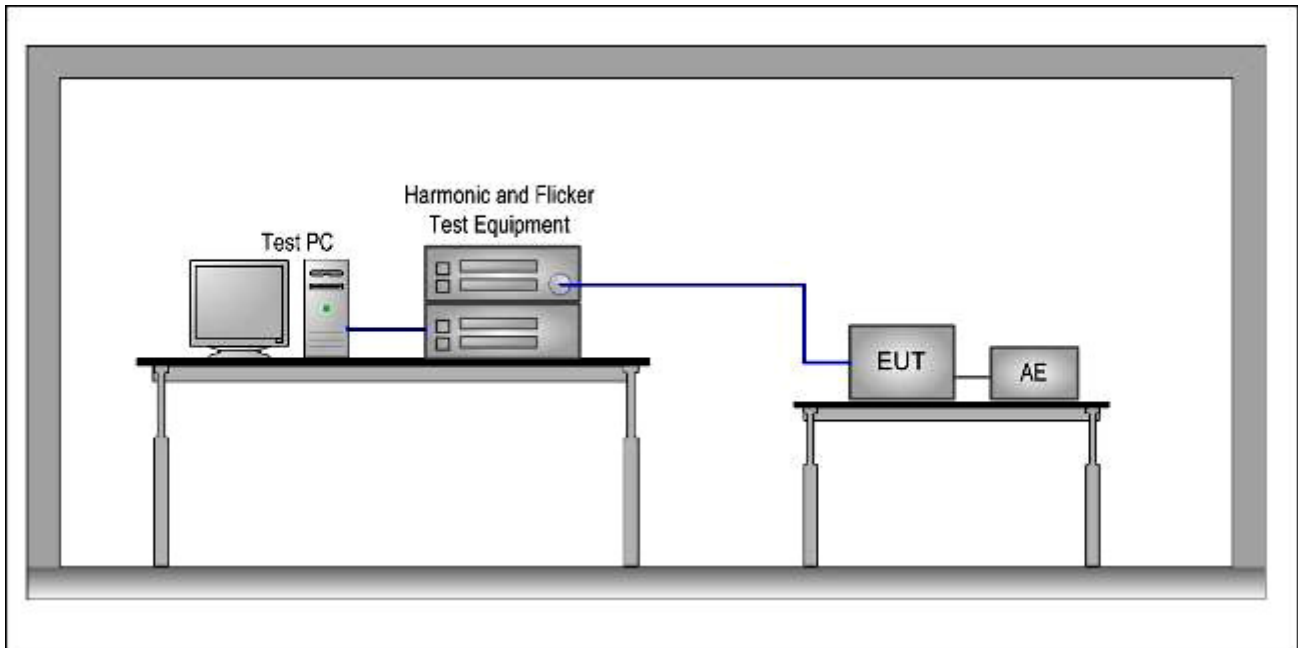
### 7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 23.0 °C      Humidity: 50 % RH      Atmospheric Pressure: 1006 mbar

EUT Operation: A pre-test was performed on the EUT in motor running mode with heating both in foot and calf parts, motor running mode both in foot and calf parts, motor running mode with heating in foot parts, motor running mode in foot parts, motor running mode with heating in calf parts & motor running mode in calf parts in order to find the worst case. Test the EUT in motor running mode with heating both in foot and calf parts for the compliance test as the worst case was found.

## 7.4.2 Test Setup and Procedure



1. The test supply voltage (open-circuit voltage) was the rated voltage of the EUT. The test voltage was maintained within  $\pm 2\%$  of the nominal value. The frequency was  $50\text{ Hz} \pm 0.5\%$ .
2. The voltage fluctuations and flicker were measured at the supply terminals of the EUT.
3. The observation period,  $T_p$ , for the assessment of flicker values by flicker measurement, flicker simulation, or analytical method was:
  - for  $P_{st}$ ,  $T_p = 10\text{ min}$ ;
  - for  $Plt$ ,  $T_p = 2\text{ h}$ .

The observation period included that part of the whole operation cycle in which the EUT produces the most unfavorable sequence of voltage changes.

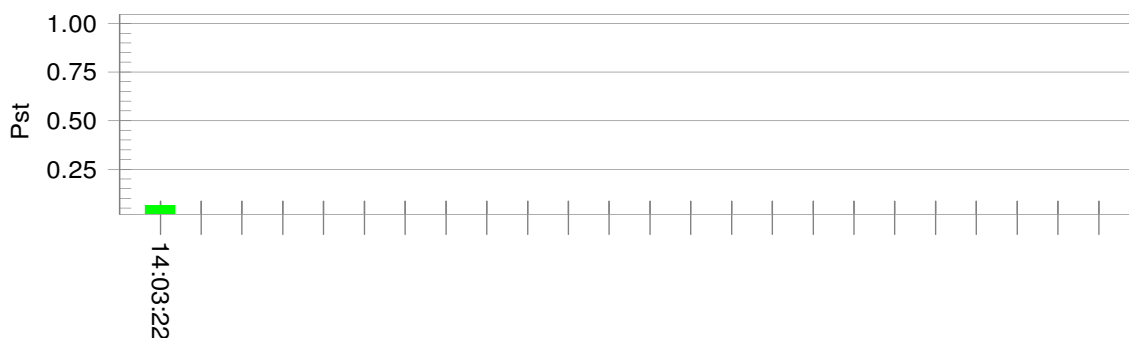
### 7.4.3 Measurement Data

#### Flicker Test Summary

Test Result: Pass Status: Test Completed

#### Pst<sub>t</sub> and limit line

#### European Limits



#### Parameter values recorded during the test:

<b>Vrms at the end of test (Volt):</b>	<b>230.06</b>			
<b>Highest dt (%):</b>	<b>0.00</b>	<b>Test limit (%):</b>	<b>3.30</b>	<b>Pass</b>
<b>Time(mS) &gt; dt:</b>	<b>0.0</b>	<b>Test limit (mS):</b>	<b>500.0</b>	<b>Pass</b>
<b>Highest dc (%):</b>	<b>0.00</b>	<b>Test limit (%):</b>	<b>3.30</b>	<b>Pass</b>
<b>Highest dmax (%):</b>	<b>0.00</b>	<b>Test limit (%):</b>	<b>4.00</b>	<b>Pass</b>
<b>Highest Pst (10 min. period):</b>	<b>0.064</b>	<b>Test limit:</b>	<b>1.000</b>	<b>Pass</b>

## 8 Electromagnetic Susceptibility Test Results

### 8.1 Performance Criteria Description in Clause 6 of EN 55014-2

<b>Criterion A:</b>	The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.
<b>Criterion B:</b>	The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation and from what the user may reasonably expect from the apparatus if used as intended.
<b>Criterion C:</b>	Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

## 8.2 ESD

Test Requirement:	EN 55014-2	
Test Method:	EN 61000-4-2	
Criterion Required:	B	
Test Date:	2010-07-22	
Test voltage	230V AC 50 Hz	
Discharge Impedance:	330 Ω / 150 pF	
Discharge Voltage:	Air Discharge:	8 kV
	Contact Discharge:	4 kV
	VCP / HCP:	4 kV
Polarity:	Positive & Negative	
Number of Discharge:	Minimum 10 times at each test point	
Discharge Mode:	Single Discharge	
Discharge Period:	1 second minimum	

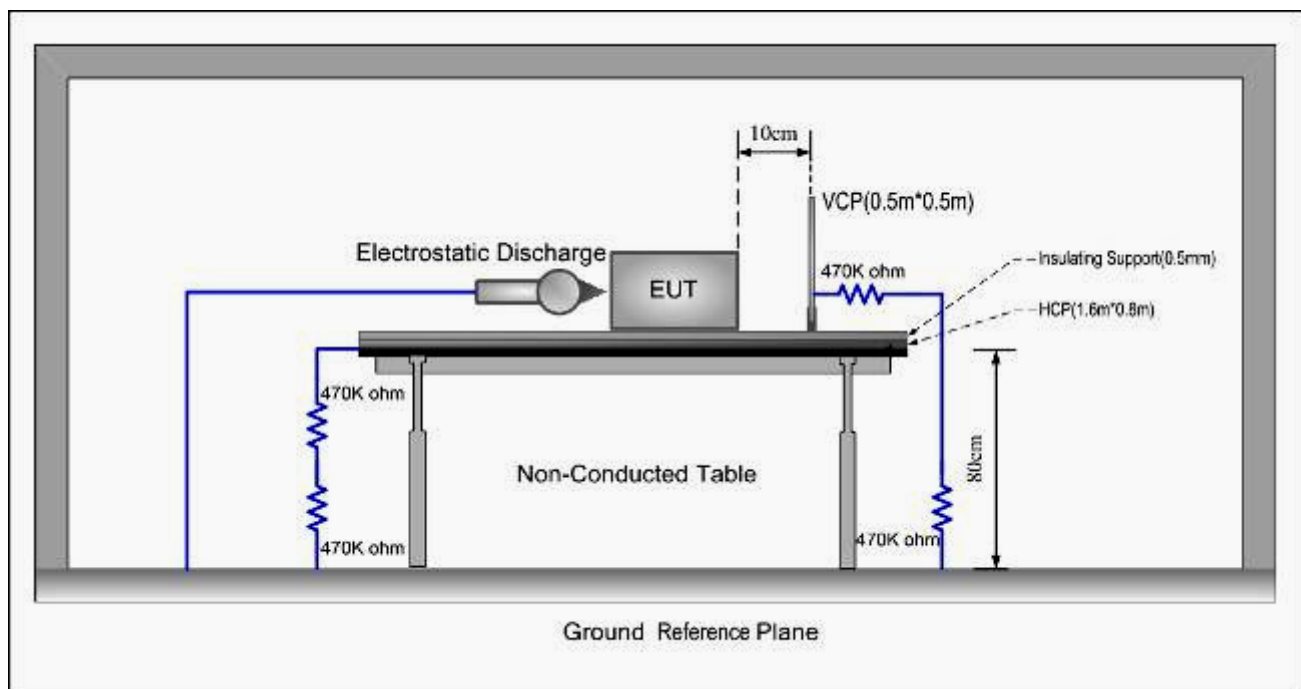
### 8.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24.0 °C      Humidity: 52% RH      Atmospheric Pressure: 1008 mbar

EUT Operation: Test the EUT in motor running mode with heating both in foot and calf parts, motor running mode both in foot and calf parts, motor running mode with heating in foot parts, motor running mode in foot parts, motor running mode with heating in calf parts, motor running mode in calf parts & idle mode.

### 8.2.2 Test Setup and Procedure



1. Contact discharge was applied only to conductive surfaces of the EUT. Air discharge was applied only to non-conducted surfaces of the EUT.
2. The EUT was put on a 0.8m high wooden table for table-top equipment or 0.1m high for floor standing equipment standing on the ground reference plane (GRP).
3. A horizontal coupling plane(HCP) 1.6m by 0.8m in size was placed on the table, and the EUT with its cables were isolated from the HCP by an insulating support thick than 0.5mm. The VCP 0.5m by 0.5m in size while HCP were constructed from the same material type and thickness as that of the GRP, and connected to the GRP via a 470kΩ resistor at each end. The distance between EUT and any of the other metallic surface excepted the GRP, HCP and VCP was greater than 1m.
4. During the contact discharges, the tip of the discharge electrode was touch the EUT before the discharge switch is operated. During the air discharges, the round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT.
5. After each discharge, the ESD generator was removed from the EUT, the generator is then retriggered for a new single discharge. For ungrounded product, a discharge cable with two resistances were used after each discharge to remove remnant electrostatic voltage. 10 times of each polarity single discharge were applied to HCP and VCP.

### 8.2.3 Test Results

#### Direct Application Test Results

- Observations:            Test Point:
1. All insulated enclosure & seams.
  2. All accessible metal parts of the enclosure.

Direct Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
8	+/-	1	N/A	A
4	+/-	2	A	N/A

#### Indirect Application Test Results

- Observations:            Test Point:
1. All sides.

Indirect Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling	Vertical Coupling
4	+/-	1	N/A	A

#### Results:

- A: No degradation in the performance of the EUT was observed.  
 N/A: Not applicable (floor mounted EUT or not requested by Standard)



### 8.3 Electrical Fast Transients (EFT)

Test Requirement:	EN 55014-2
Test Method:	EN 61000-4-4
Criterion Required:	B
Test Date:	2010-07-22
Test voltage	230V AC, 50Hz
Test Level:	0.5, 1.0kV on AC
Polarity:	Positive & Negative
Repetition Frequency:	5kHz
Burst Duration:	300ms
Test Duration:	2 minute per level & polarity

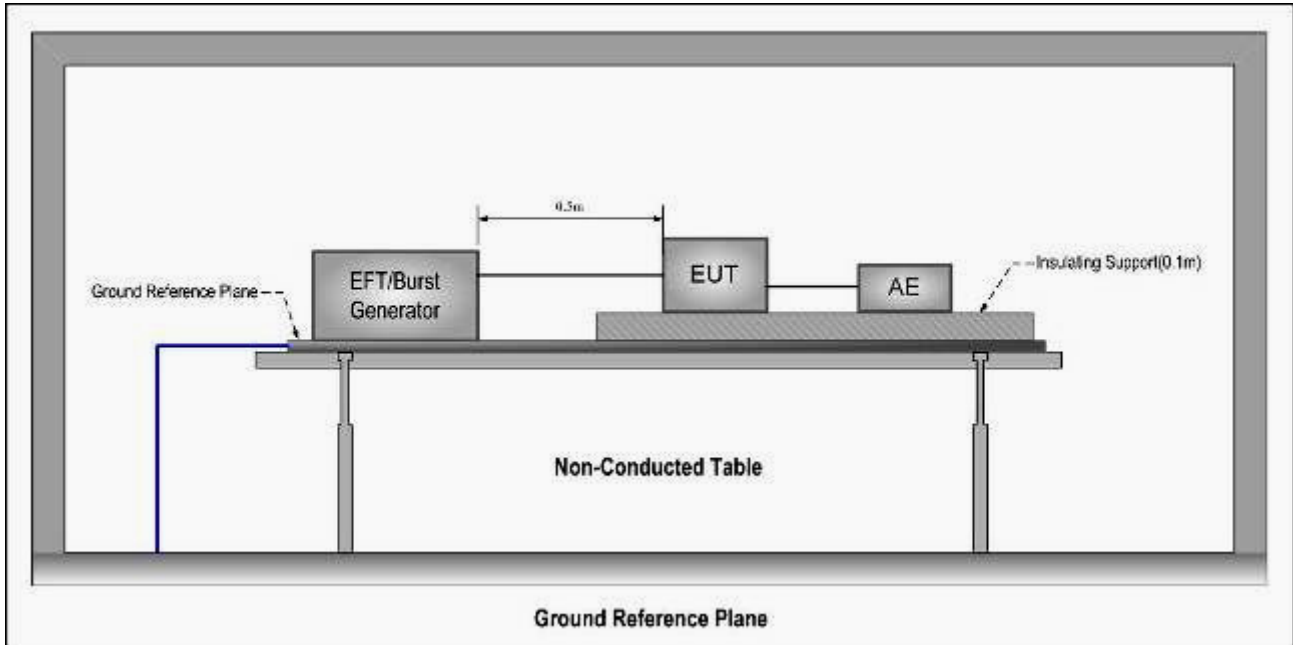
#### 8.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23.0 °C      Humidity: 50 % RH      Atmospheric Pressure: 1005 mbar

EUT Operation: Test the EUT in motor running mode with heating both in foot and calf parts, motor running mode both in foot and calf parts, motor running mode with heating in foot parts, motor running mode in foot parts, motor running mode with heating in calf parts, motor running mode in calf parts & idle mode.

### 8.3.2 Test Setup and Procedure



1. The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
2. The GRP shall project beyond the EUT and the clamp by at least 0.1m on all sides. The distance between the EUT and any other of the metallic surface except the GRP was greater than 0.5m. All cables to the EUT were placed on the insulating support 0.1m above GRP. Cables not subject to EFT were routed as far as possible from cable under test to minimize the coupling between the cables.
3. The length of signal and power cable between the EUT and EFT generator was 0.5m. If the cable is a non-detachable supply cable more than 0.5m, the excess length of this cable shall be folded to avoid a flat coil and situated at a distance of 0.1m above the GRP.

The EUT was conducted the below specified level voltage test for line to neutral or line to neutral to earth (for clamp coupling is for the signal line), 120 seconds duration. If the equipment contains identical ports, only one was tested; multiconductor cables, such as a 50-pair telecommunication cable, was tested as a single cable. Cables did not be split or divided into groups of conductors for this test; interface ports, which were intended by the manufacturer to be connected to data cables not longer than 3 m, did not be tested.

### 8.3.3 Test Results On AC Supply

Lead under Test	Level (±kV)	Coupling Direct/Clamp	EUT operating mode	Observations (Performance Criterion)
Live + Neutral	± 0.5, 1.0	Direct	All modes	(A)

A: No loss of function.

## 8.4 Surge

Test Requirement:	EN 55014-2
Test Method:	EN 61000-4-5
Criterion Required:	B
Test Date:	2010-07-22
Test voltage	230V AC, 50Hz
Test Level:	±1kV Live to Neutral
Polarity:	Positive & Negative
Generator source impedance:	2Ω
Trigger Mode:	Internal
No. of surges:	5 positive at 90°, 5 negative at 270°.

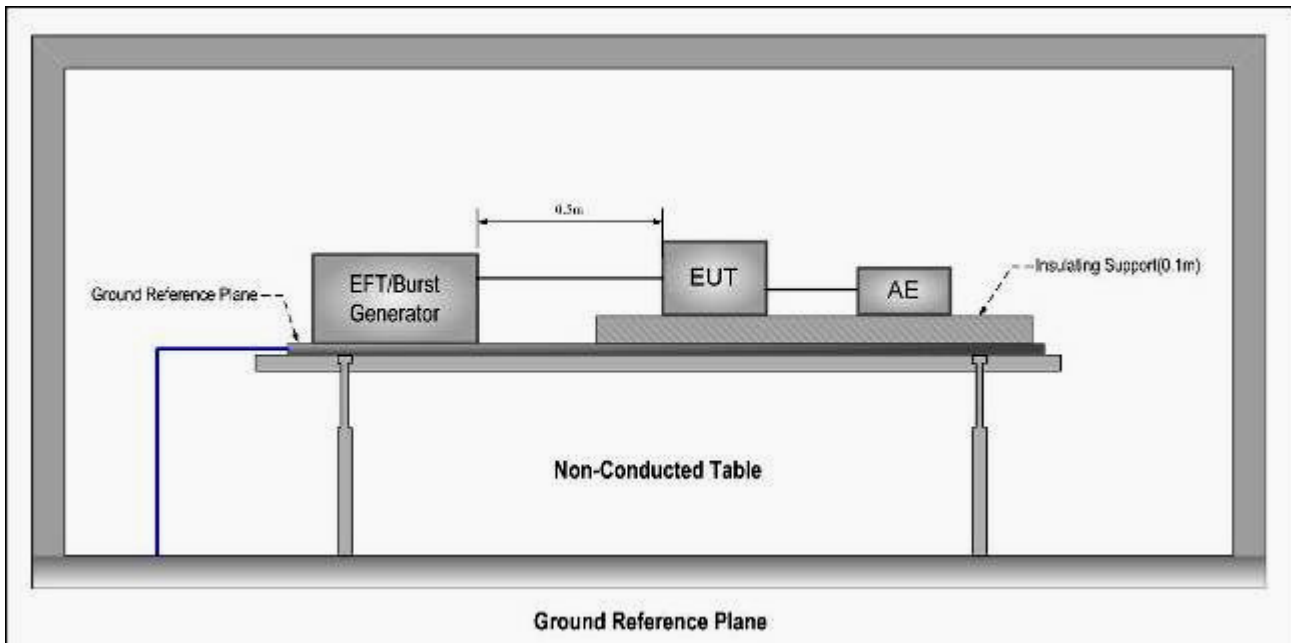
### 8.4.1 E.U.T. Operation

Operating Environment:

Temperature: 23.0 °C      Humidity: 50 % RH      Atmospheric Pressure: 1002 mbar

EUT Operation: Test the EUT in motor running mode with heating both in foot and calf parts, motor running mode both in foot and calf parts, motor running mode with heating in foot parts, motor running mode in foot parts, motor running mode with heating in calf parts, motor running mode in calf parts & idle mode.

### 8.4.2 Test Setup and Procedure



1. The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0,1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
2. The 1,2/50  $\mu$ s surge was to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks were required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines and to provide sufficient decoupling impedance to the surge wave so that the specified wave may be applied on the lines under test.
3. The power cord between the EUT and the coupling/decoupling network do not exceed 2m in length. The interconnection line between the EUT and the coupling/ decoupling network shall not exceed 2 m in length.
4. The EUT was conducted 1kV test voltage for line to line and line to neutral and conducted 2kV test voltage for line to earth and neutral to earth, five positive pulses and five negative pulses each at 0°, 90°, 180° and 270° for AC power ports and five positive pulses and five negative surge pulses for DC power ports. The test levels were applied on the EUT with a 2 $\Omega$  generator source impedance for power supply terminals and 40 $\Omega$  output impedance for interconnection lines. The tests were done at repetition rate 1 per minute.

### 8.4.3 Test Results:

Pulse No	Line-Line	Level (kV)	Surge Interval	Phase (deg)	Observation (Performance Criterion)
1-5	L-N	+1	60s	90°	No Loss of Function (A)
6-10	L-N	-1	60s	270°	(A)

## 8.5 Conducted Immunity 0.15MHz to 230MHz

Test Requirement:	EN 55014-2
Test Method:	EN 61000-4-6
Criterion Required:	A
Test Date:	2010-07-22
Test voltage	230V AC 50Hz
Frequency Range:	0.15MHz to 230MHz
Test level:	3V rms on AC Ports (unmodulated emf into 150 Ω)
Modulation:	80%, 1kHz Amplitude Modulation

### 8.5.1 E.U.T. Operation

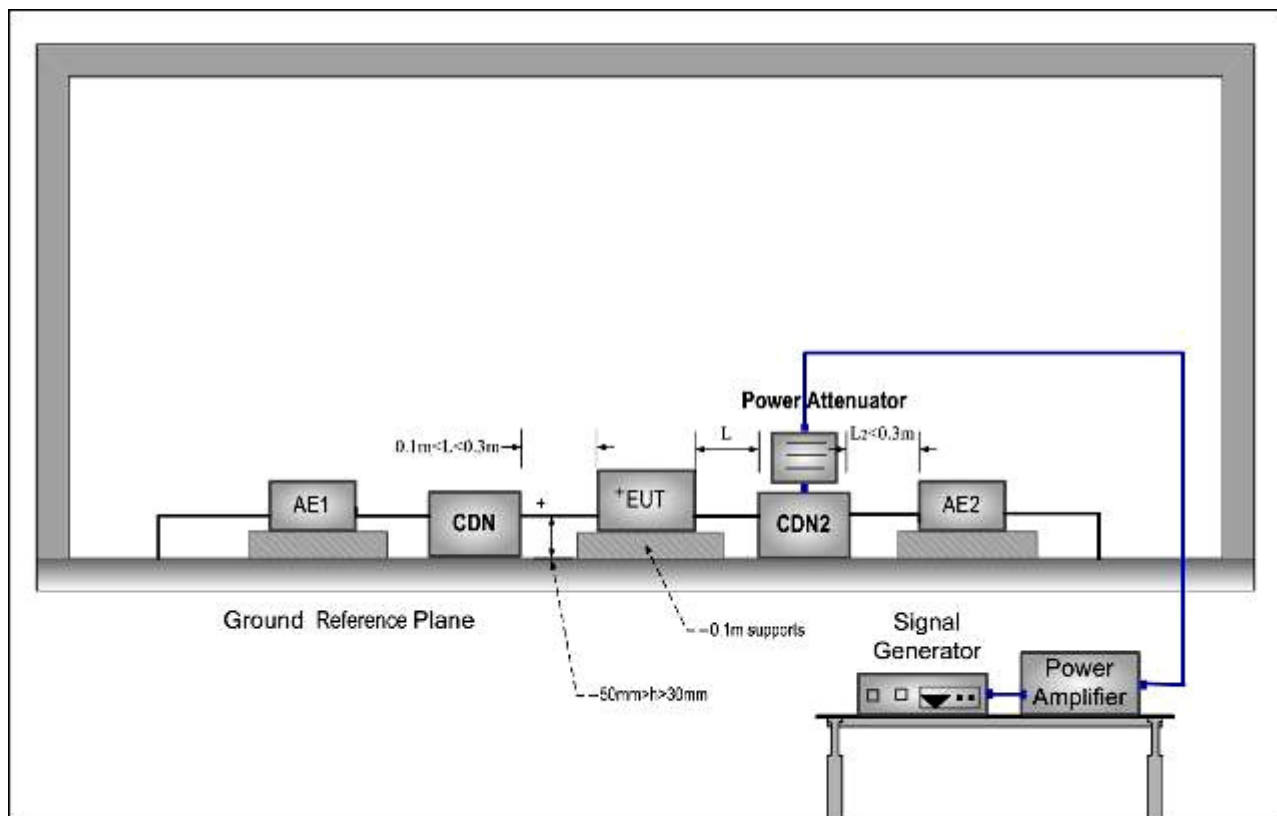
Operating Environment:

Temperature: 21.0 °C      Humidity: 57 % RH      Atmospheric Pressure: 1009 mbar

EUT Operation: Test the EUT in motor running mode with heating both in foot and calf parts, motor running mode both in foot and calf parts, motor running mode with heating in foot parts, motor running mode in foot parts, motor running mode with heating in calf parts, motor running mode in calf parts & idle mode.

### 8.5.2 Test Setup and Procedure

For AC port



1. The EUT was placed on an insulating support of 0.1m height above a ground reference Plane, arranged and connected to satisfy its functional requirement. All cables exiting the EUT was supported at a height of at least 30 mm above the ground reference plane.
2. The coupling and decoupling devices were required, they were located between 0,1 m and 0,3 m from the EUT. This distance was to be measured horizontally from the projection of the EUT on to the ground reference plane to the coupling and decoupling device.
3. Each AE, used with clamp injection, shall be placed on an insulating support 0,1 m above the ground reference plane. A decoupling network shall be installed on each cable between the EUT and AE except the cable under test. All cables connected to each AE, other than those being connected to the EUT, shall be provided with decoupling networks. The decoupling networks connected to each AE (except those on cables between the EUT and AE) shall be applied no further than 0,3 m from the AE. The cable(s) between the AE and the decoupling network (s) or in between the AE and the injection clamp shall not be bundled nor wrapped and shall be kept between 30 mm and 50 mm above the ground reference plane
4. The frequency range was swept from 150 kHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80 % amplitude modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or to change coupling devices as necessary. Where the frequency was swept incrementally, the step size do not exceed 1 % of the preceding frequency value. The dwell time of the amplitude modulated carrier at each frequency was not less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5 s.

### 8.5.3 Test Results:

Frequency	Line	Test Level	Modulation	Step Size	Dwell Time	Observation (Performance Criterion)
150 kHz to 230 MHz	2 Wires AC Supply Cable	3 Vrms	80 %, 1 kHz Amp. Mod.	1%	1s	No Loss of Function (A)

## 8.6 Voltage Dips and Interruptions

Test Requirement:	EN 55014-2
Test Method:	EN 61000-4-11
Criterion Required:	C
Test Date:	2010-07-22
Test voltage	Refer to $U_T$
Test Level:	0% of $U_T$ (Supply Voltage) for 0.5 Periods 40 % of $U_T$ (Supply Voltage) for 10 Periods 70 % of $U_T$ (Supply Voltage) for 25 Periods
No. of Dips / Interruptions:	3 per Level

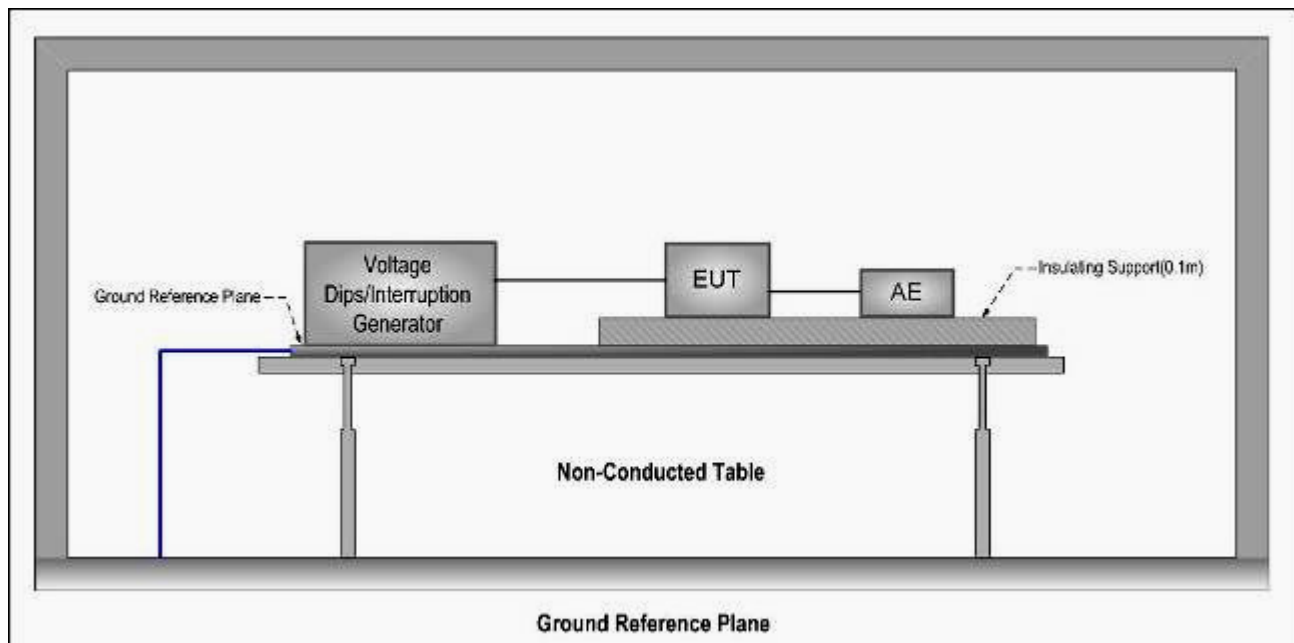
### 8.6.1 E.U.T. Operation

Operating Environment:

Temperature: 23.0 °C      Humidity: 50 % RH      Atmospheric Pressure: 1005 mbar

EUT Operation: Test the EUT in motor running mode with heating both in foot and calf parts, motor running mode both in foot and calf parts, motor running mode with heating in foot parts, motor running mode in foot parts, motor running mode with heating in calf parts, motor running mode in calf parts & idle mode.

### 8.6.2 Test Setup and Procedure



1. The EUT was placed on a ground reference plane(GRP) insulated by an insulating support 0,1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
2. The test was performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer.
3. The EUT was tested for each selected combination of test level and duration with a sequence of three dips /interruptions with intervals of 10 s minimum. Each representative mode of operation was tested.
4. For EUT with more than one power cord, each power cord was tested individually.

### 8.6.3 Test Results

$U_{T=}$  230V AC

Test Level % $U_T$	Phase	Duration of drop out in Periods	No of drop out	Time between drop out	Observations (Performance Criterion)
0	0°	0.5	3	10s	No Loss of Function (A)
40	0°	10	3	10s	No Loss of Function (A)
70	0°	25	3	10s	(C)

Remark:

$U_{T=}$  the nominal supply voltage

C: During test the EUT stopped working, it could recover by operator after test.

**Performance C is within the acceptable criterion for Voltage Dips and Interruption test.**



## 9 Photographs

### 9.1 Conducted Emissions on Mains Terminals Test Setup



## 9.2 Radiated Emission Test Setup



### 9.3 Flicker Test Setup



### 9.4 ESD Test Setup



## 9.5 EFT, Surge, Voltage Dip and Interruptions Test Setup

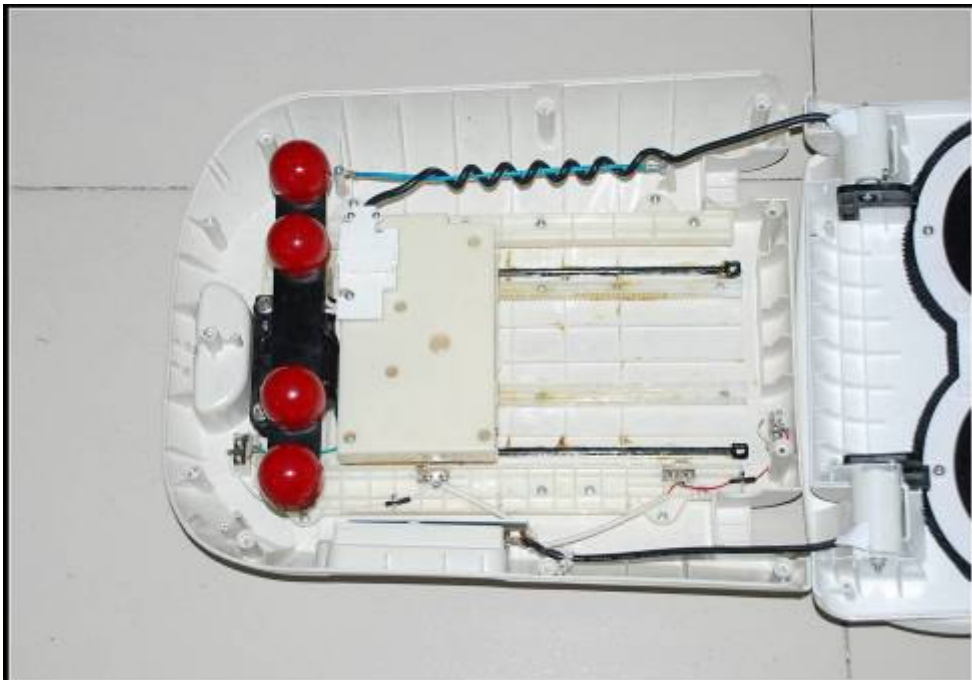
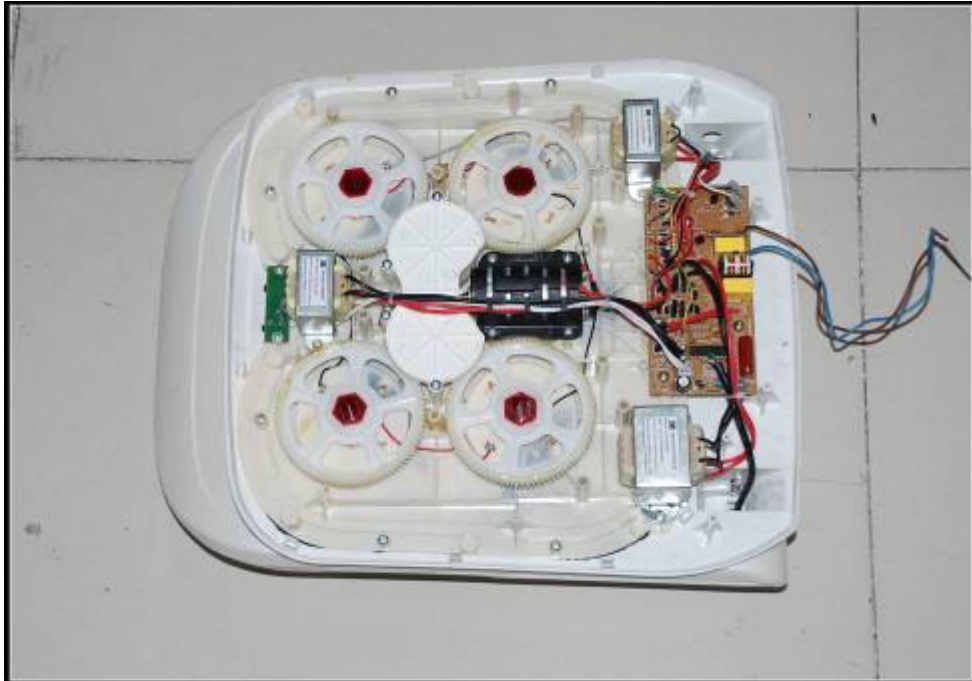


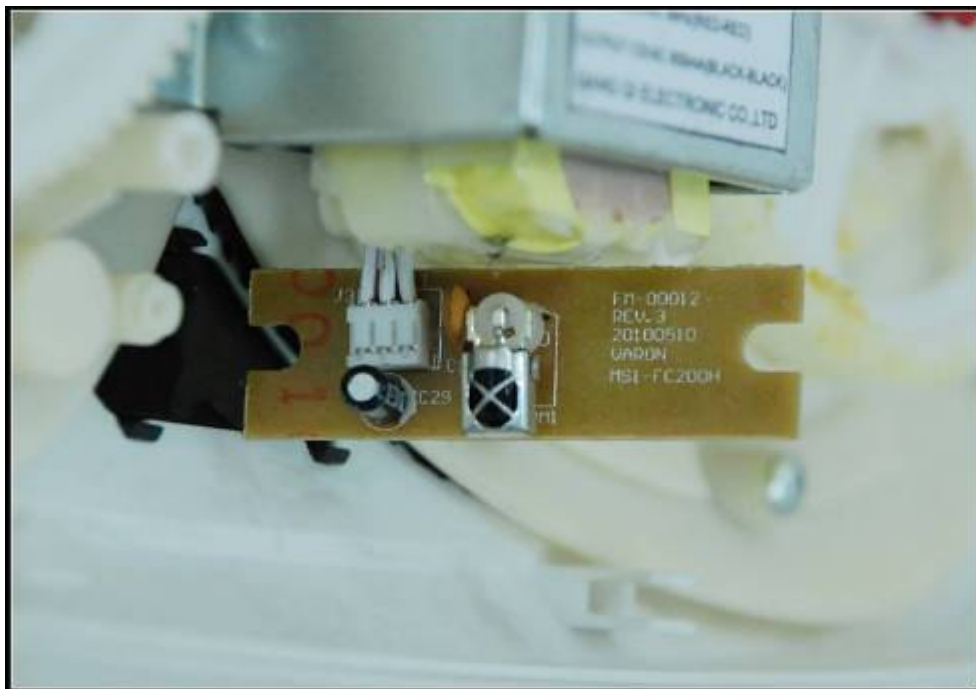
## 9.6 Conducted Immunity Test Setup



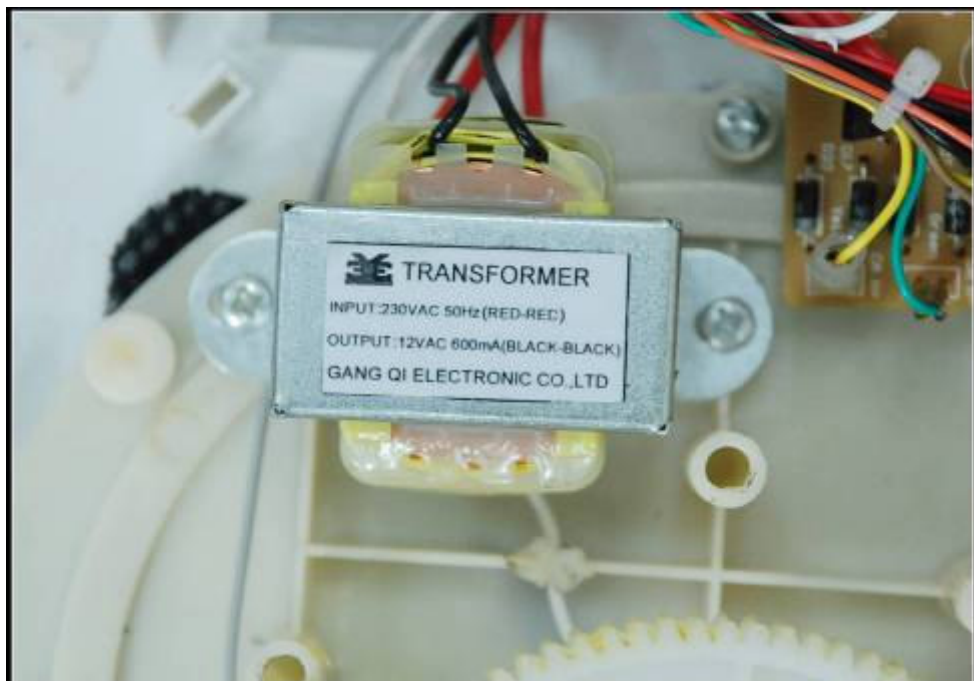
## 9.7 EUT Constructional Details

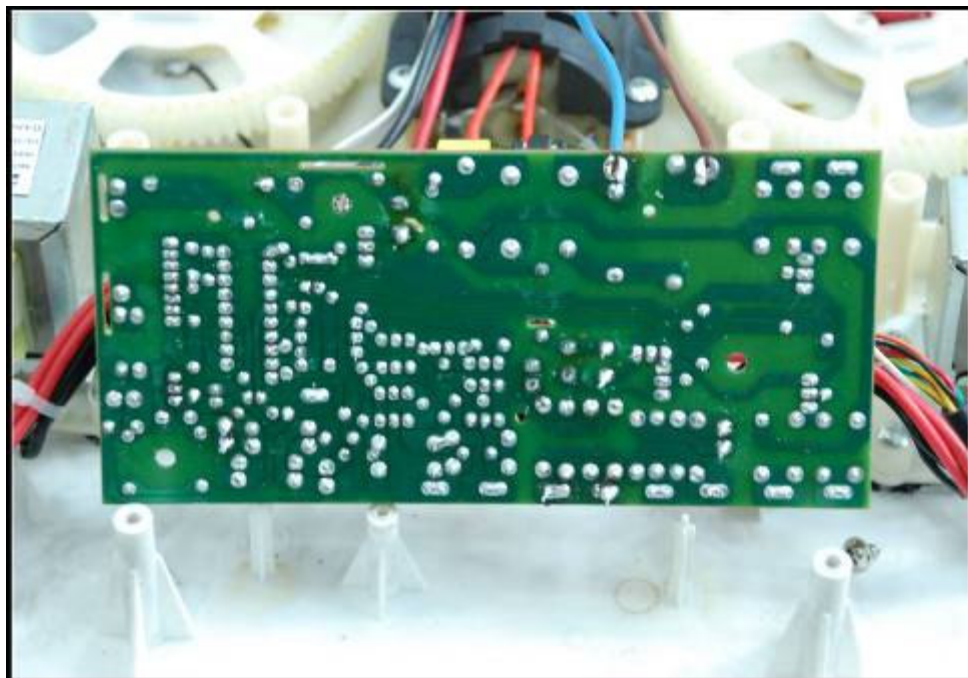
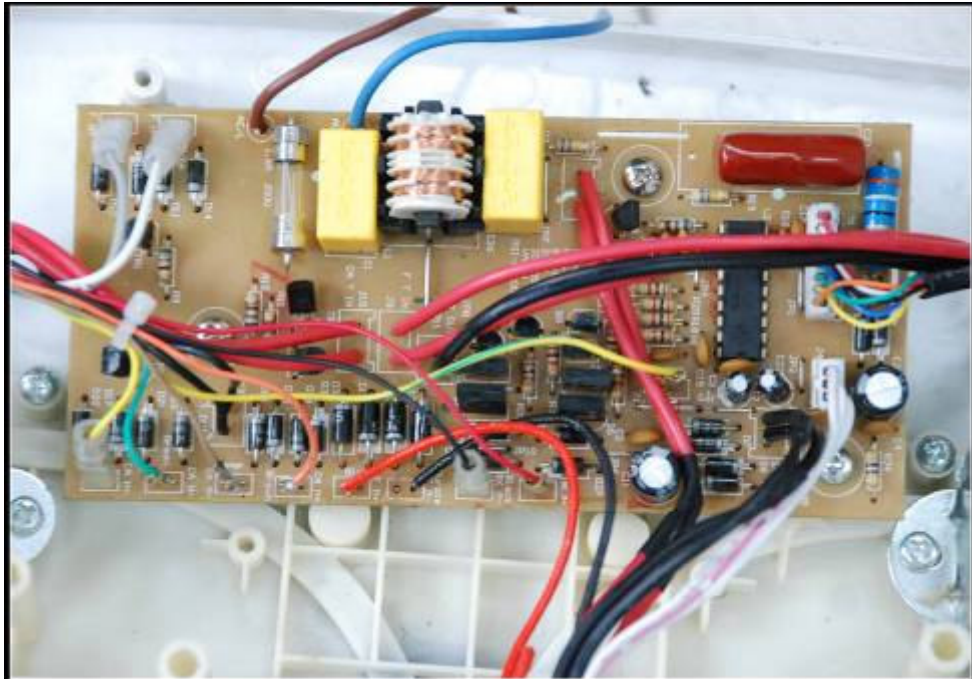


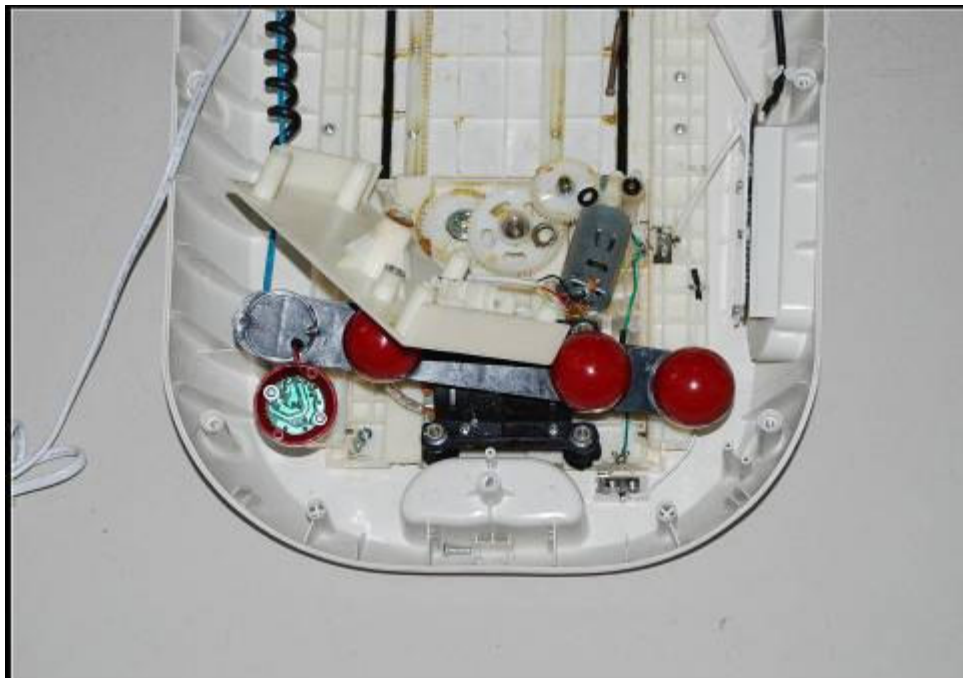
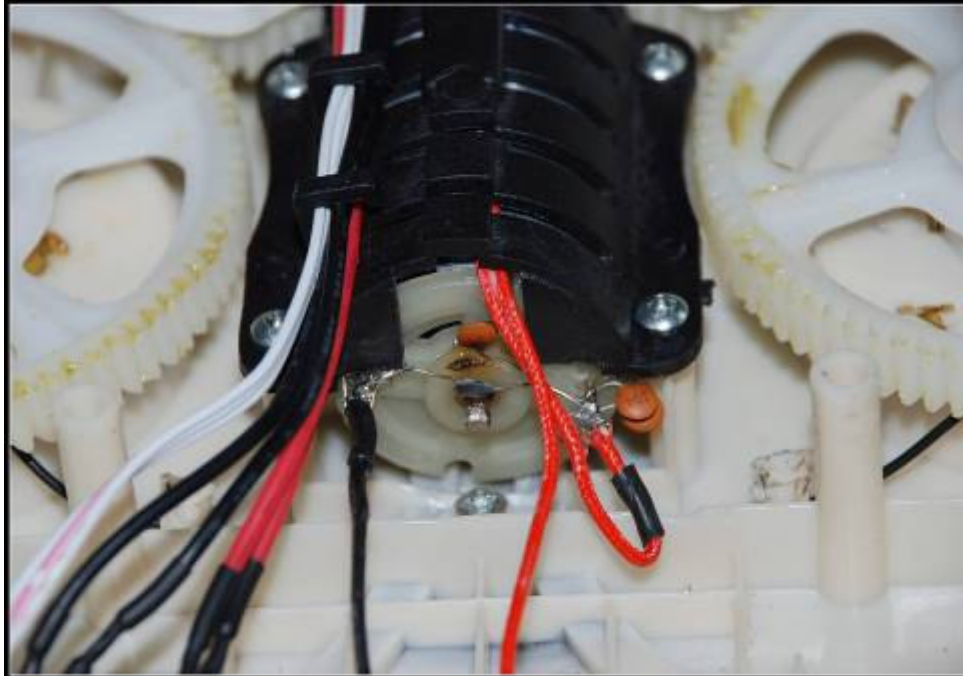


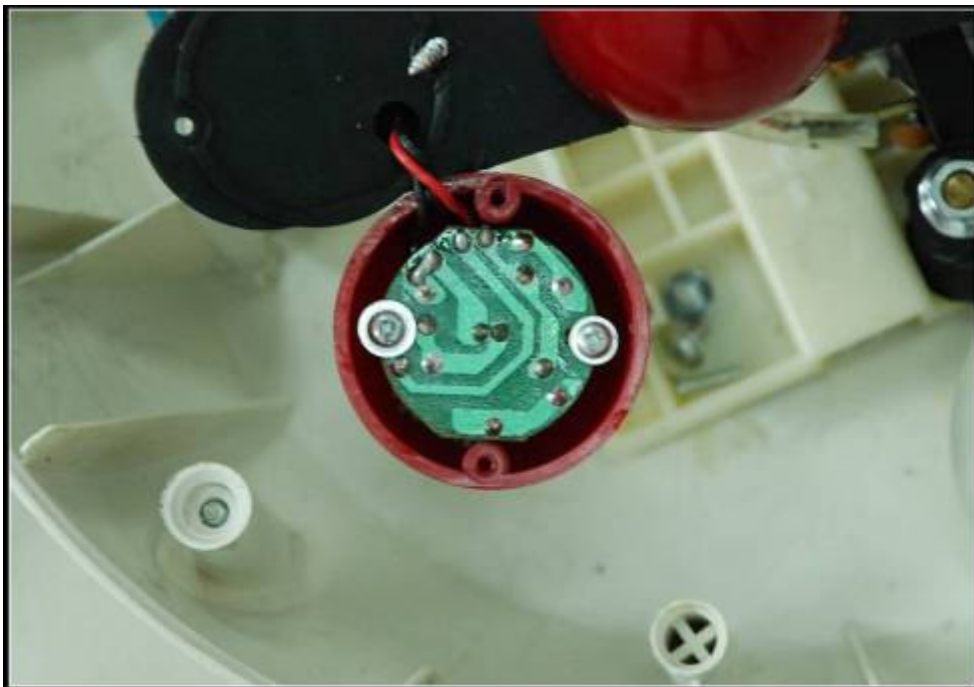
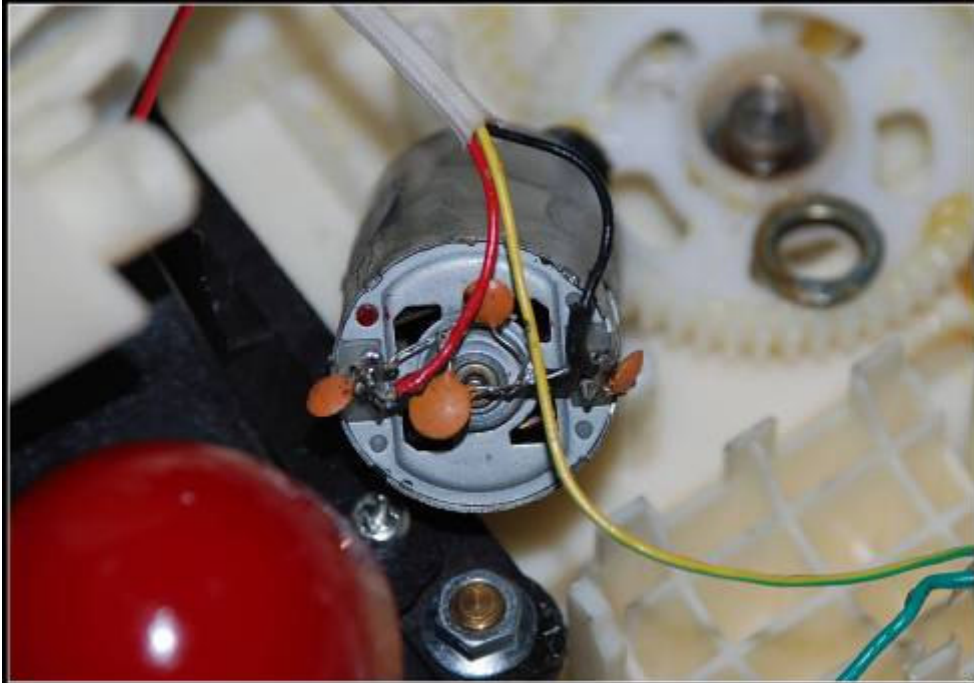


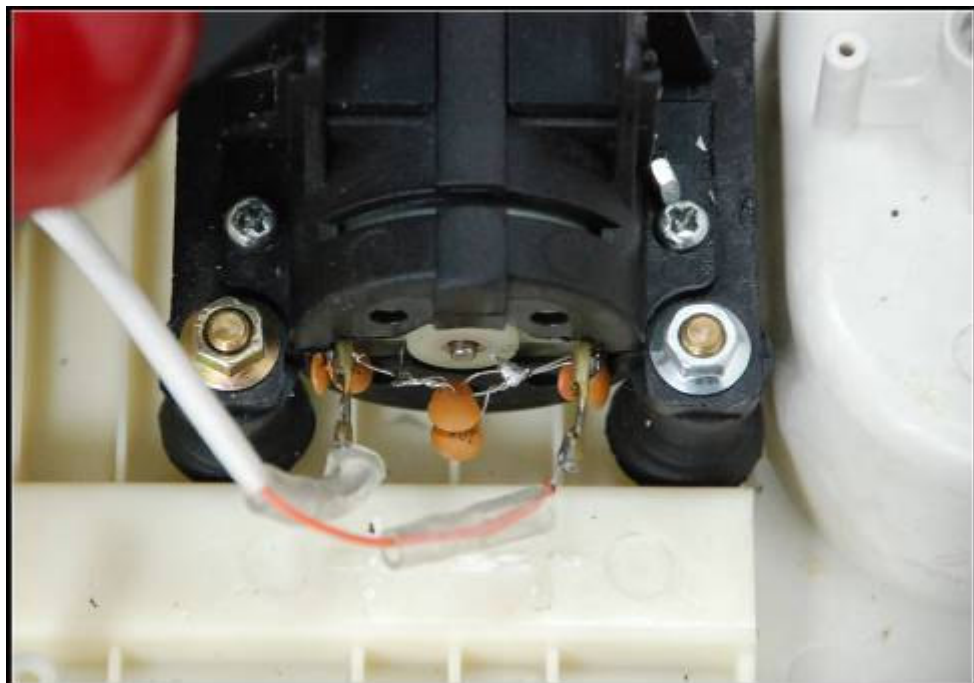
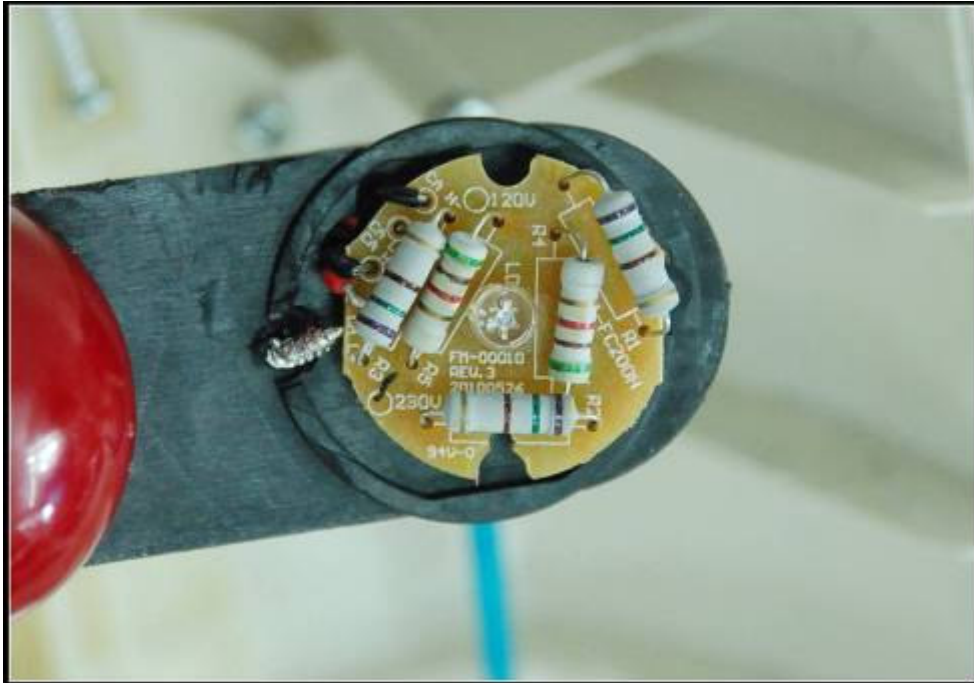


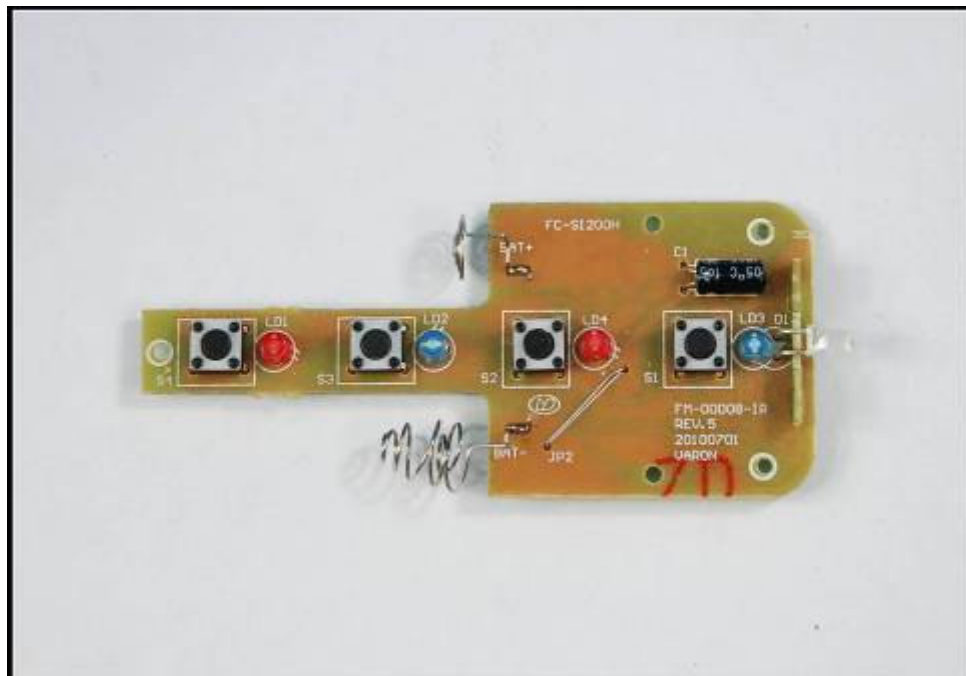
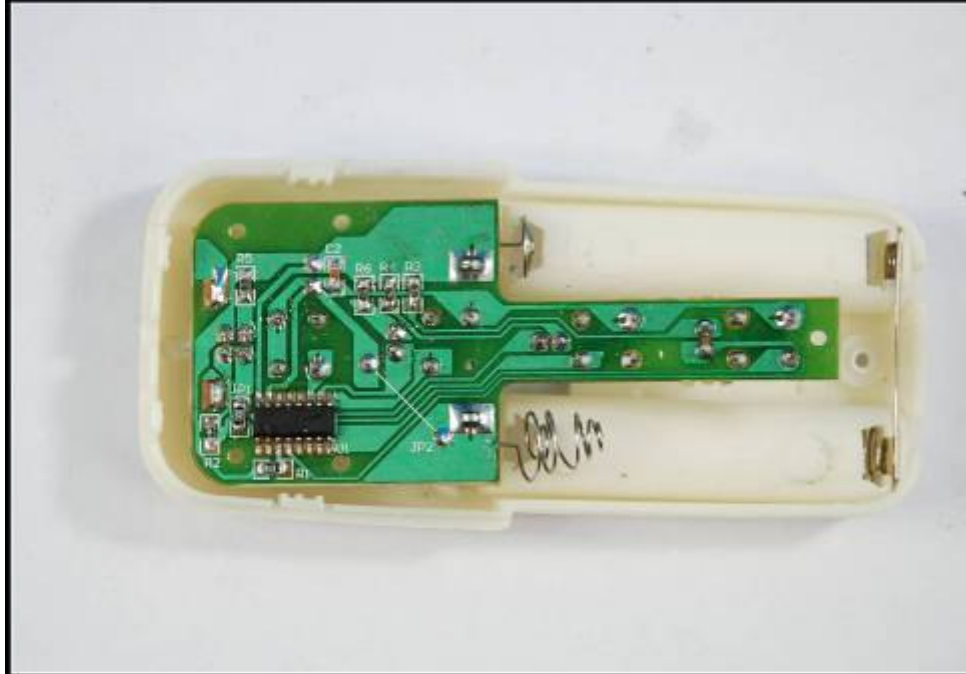












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