SGS-CSTC Standards Technical Services Co., Ltd.

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TEST REPORT

Application No:	GZEM1207002870HS
Applicant:	HoMedics Group Ltd
Product Name:	Shiatsu Foot Massager
Product Description:	Massager appliance
Model No:	FM-TS9-EU, FM-TS9-GB ♣
P.O. No.:	PC0001082
♣	Please refer to section 3 of this report which indicates which model was tested and which is electric identical.
Standards:	EN 55014-1:2006+A1:2009+A2:2011, BS EN 55014-1:2006+A1:2009+A2:2011, EN 55014-2:1997+A1:2001+A2:2008, BS EN 55014-2:1997+A1:2001+A2:2008, EN 61000-3-2:2006+A1:2009+A2:2009, BS EN 61000-3-2:2006+A1:2009+A2:2009, EN 61000-3-3:2008, BS EN 61000-3-3:2008.
Date of Receipt:	2012-07-20
Date of Test:	2012-07-25 to 2012-07-29
Date of Issue:	2012-08-02
Test Result:	**Pass***

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

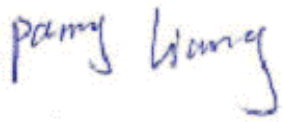
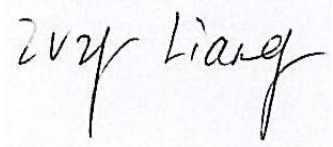
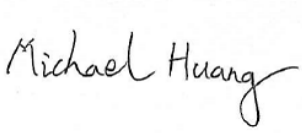
The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives.

CE

Richard Li
Manager

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2012-08-02		Original

Authorized for issue by:				
Tested By		 **(Panny Liang) / Project Engineer**		2012-07-25 to 2012-07-29 **Date**
Prepared By		 **(Ivy Liang) / Clerk**		2012-08-01 **Date**
Checked By		 **(Michael Huang) / Reviewer**		2012-08-02 **Date**

3 Test Summary

Electromagnetic Interference (EMI)				
Test	**Test Requirement**	**Test Method**	**Class / Severity**	**Result**
Conducted Emission on AC (150k to 30MHz)	EN 55014-1:2006 +A1:2009+A2:2011	EN 55014-1:2006 +A1:2009+A2:2011	Table 1 Columns 2&3	PASS
	BS EN 55014-1:2006 +A1:2009+A2:2011	BS EN 55014-1:2006 +A1:2009+A2:2011		
Disturbance Power (30MHz to 300MHz)	EN 55014-1:2006 +A1:2009+A2:2011	EN 55014-1:2006 +A1:2009+A2:2011	Table 2a, Table 2b Columns 2&3 ♀	PASS
	BS EN 55014-1:2006 +A1:2009+A2:2011	BS EN 55014-1:2006 +A1:2009+A2:2011		
Harmonic Emission on AC	EN 61000-3-2:2006 +A1:2009+A2:2009	EN 61000-3-2:2006 +A1:2009+A2:2009	Class A	PASS **
	BS EN 61000-3-2:2006 +A1:2009+A2:2009	BS EN 61000-3-2:2006 +A1:2009+A2:2009		
Flicker Emission on AC	EN 61000-3-3:2008	EN 61000-3-3:2008	Clause 5 of EN 61000-3-3	PASS
	BS EN 61000-3-3:2008	BS EN 61000-3-3:2008	Clause 5 of BS EN 61000-3-3	
Electromagnetic Susceptibility(EMS)				
Test	**Test Requirement**	**Test Method**	**Class / Severity**	**Result**
Electrostatic Discharge (ESD)	EN 55014-2:1997 +A1:2001+A2:2008	EN 61000-4-2:2009	Contact ±4 kV Air ±8 kV	PASS
	BS EN 55014-2:1997 +A1:2001+A2:2008	BS EN 61000-4-2:2009		
Electrical Fast Transients (EFT) on AC	EN 55014-2:1997 +A1:2001+A2:2008	EN 61000-4-4:2004 +A1:2010	AC ± 0.5kV & ± 1.0kV	PASS
	BS EN 55014-2:1997 +A1:2001+A2:2008	BS EN 61000-4-4:2004 +A1:2010		
Surge Immunity on AC	EN 55014-2:1997 +A1:2001+A2:2008	EN 61000-4-5:2006	±1kV D.M.†	PASS
	BS EN 55014-2:1997 +A1:2001+A2:2008	BS EN 61000-4-5:2006		
Injected Currents on AC (150kHz to 230MHz)	EN 55014-2:1997 +A1:2001+A2:2008	EN 61000-4-6:2009	3V r.m.s (emf), 80% 1kHz Amp. Mod.	PASS
	BS EN 55014-2:1997 +A1:2001+A2:2008	BS EN 61000-4-6:2009		
Voltage Dips and Interruptions on AC	EN 55014-2:1997 +A1:2001+A2:2008	EN 61000-4-11:2004	0 % U_T* for 0.5per 40 % U_T* for 10per 70 % U_T* for 25per	PASS
	BS EN 55014-2:1997 +A1:2001+A2:2008	BS EN 61000-4-11:2004		

Remark :
* U_T is the nominal supply voltage.
† D.M. – Differential Mode.
♀ Disturbance Power test is applied to the EUT only since: 1) All the measurement result are lower than the applicable limits (Table 2a) minus the corresponding margin (Table 2b); or the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector. 2) No clock frequency or oscillator frequency of the EUT is more than or equal to 30 MHz. Please refer to section 7.2 of this test report for more details. **: Please refer to Section 7.3 of this report for details.
Model No.: **FM-TS9-EU**, FM-TS9-GB According to the declaration of the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference being the plug. “-GB” is with CE/BS plug while “-EU” is with CE/GS plug. Therefore only one model **FM-TS9-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.

Product Name:	Shiatsu Foot Massager
Product Description:	Massager appliance
Model No:	FM-TS9-EU

5.3 Details of E.U.T.

Rated Supply (Voltage):	AC 220-240V, 50/60Hz
Power Cable:	2 wires 1.8m unscreened AC mains cable.

5.4 Description of Support Units

The EUT has been tested as an independent unit.

5.5 Deviation from Standards

None.

5.6 General Test Climate During Testing

Temperature: 15-30 °C Humidity: 30-70 %RH Atmospheric Pressure: 860-1060 mbar

5.7 Abnormalities from Standard Conditions

None.

5.8 Monitoring of EUT for All Immunity Test

Audio:	N/A
Visual:	Motor running and LED of the EUT.

5.9 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.

5.10 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

  SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

- **ACMA**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

  Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

- **FCC (Registration No.: 282399)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

- **Industry Canada (Registration No.: 4620B-1)**

  The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

- **VCCI (Registration No.: R-2460, C-2584, G-449 and T-1179)**

  The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460, C-2584， G-449 and T-1179 respectively.

- **CBTL (Lab Code: TL129)**

  SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01:2006-10 and Rules of procedure IECEE 02:2006-10, and the relevant IECEE CB-Scheme Operational documents.

6 Equipment Used during Test

Conducted Emission						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
EMC0306	Shielding Room	Zhong Yu	8 x 3 x 3.8 m^3	N/A	N/A	N/A
EMC0118	Two-line v-netwok	R&S	ENV216	100359	2012-08-29	1Y
EMC0102	LISN	SCHAFFNER CHASE	MN2050D/1	1421	2012-11-23	1Y
EMC2046	Artificial Mains Network (LISN)	AFJ Instruments	LT32C	S.N.32031120150	2013-03-12	1Y
EMC0506	EMI Test Receiver	Rohde & Schwarz	ESCS30	100085	2012-11-24	1Y
EMC0107	Coaxial Cable	SGS	2m	N/A	2013-07-10	1Y
EMC0106	Voltage Probe	SGS	N/A	N/A	N/A	1Y
EMC0120	8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	20550	2012-11-11	1Y
EMC0121	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	20549	2012-11-11	1Y
EMC0122	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	20548	2012-11-11	1Y
EMC2047	CDN	Elektronik-Feinmechanik	L-801:AF2	2793	2014-11-11	3Y
EMC2048	CDN	Elektronik-Feinmechanik	L-801:M2/M3	2738	2014-11-11	3Y
EMC167	Conical metal housing	SGS-EMC	N/A	N/A	2013-02-16	1Y

Disturbance Power						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
EMC0306	Shielding Room	Zhong Yu	8 x 3 x 3.8 m^3	N/A	N/A	N/A
EMC2040	Absorbing Clamp	Beijing Dazhe Co. Ltd.	ZN23201	N/A	2013-03-12	1Y
EMC0303	7m Coaxial Cable	SGS	7m	N/A	2012-11-01	1Y
EMC0506	EMI Test Receiver	Rohde & Schwarz	ESCS30	100085	2012-08-29	1Y
EMC0305	Slide Bar Controller	HD-GmbH	HD50	050/490	N/A	N/A
EMC0103	Slide Bar RP	HD-GmbH	KMS560	560/392	N/A	N/A

Harmonics / Flicker test						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
EMC0608	AC Power Source	California	50001iX	56627	2013-03-12	1Y
EMC0607	Power Analyzer	California	PACS	72400	2013-03-12	1Y

Electrostatic Discharge						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
EMC0809	ESD Simulator	EM Test AG	Dito	V0735102864	2012-10-20	1Y
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	2012-11-26	1Y

EFT, Surge, Voltage dips and Interruption						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
EMC2059	Modular Impulse Surge Generator	EMC PARTNER	MIG0603EN	259	2013-06-13	1Y
EMC2060	High speed signal Surge CDN	EMC PARTNER	CDN-UTP	CDN-UTP0089	2013-05-15	1Y
EMC1010	EMC Immunity Test System	Thermo KeyTek	Pro-Plus	501276	2013-03-12	1Y
EMC2012	Power-Electronics Measurement System	Tektronix	TDS 744A	N/A	2013-03-12	1Y

Conducted Immunity						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
EMC1101	Signal Generator	Rohde & Schwarz	SMY01	825675/016	2012-11-25	1Y
EMC1102	Amplifier 0.15-230MHz	Ophirrf	GRF5048	1003	2012-11-11	1Y
EMC1103	Power Meter	Rohde & Schwarz	NRVS	825770/079	2013-03-12	1Y
EMC0071	URV5-Z2 Insert. Unit	R&S	URV5-Z2	100309	2013-03-12	1Y
EMC1105	Dual Directional coupler	Werlatone Inc.	C1795	6635	2012-11-24	1Y
EMC2012	Oscilloscope	Tektronix	TDS 744A	N/A	2013-03-12	1Y
EMC1108	CDN M3	Schaffner Chase	CDN-M3-16	9866	2012-11-11	1Y
EMC1107	CDN M2	Schaffner Chase	CDN-M2-16	9863	2012-11-11	1Y
EMC1116	Current Probe	Schaffner Chase	CIP9136	1155	2012-11-11	1Y
EMC1117	Current Probe	Schaffner Chase	CSP8445	18	2012-11-11	1Y

General used equipment						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
EMC0006	DMM	Fluke	73	70681569	2012-11-14	1Y
EMC0007	DMM	Fluke	73	70671122	2012-11-14	1Y

7 Electromagnetic Interference Test Results

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

Test Requirement: EN 55014-1, BS EN 55014-1

Test Method: EN 55014-1, BS EN 55014-1

Test Date: 2012-07-29

Test voltage: AC 230V 50Hz

Frequency Range: 150KHz to 30MHz

Detector: Peak for pre-scan

Quasi-Peak or（and）Average for final measurement

Limit:

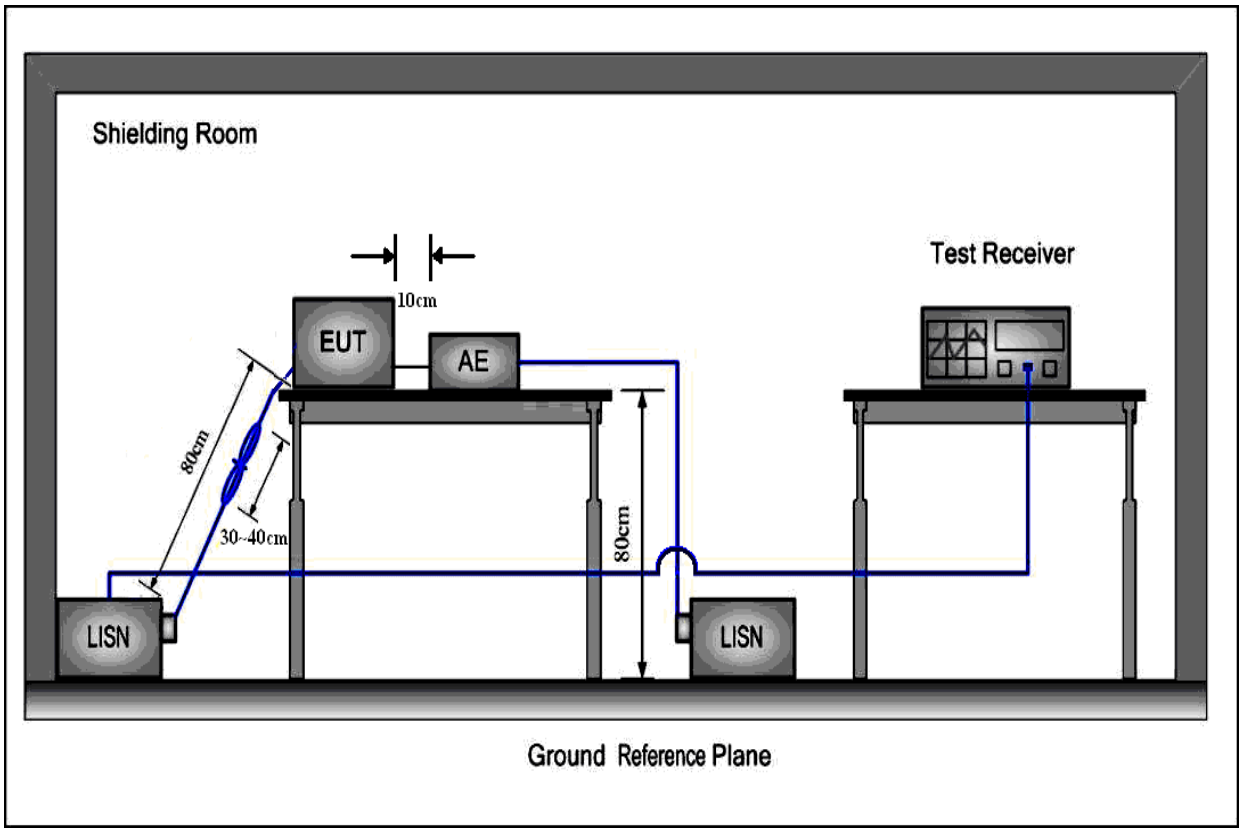
Frequency range MHz	**At mains terminals** dB (μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	59 to 46
0.50 to 5	56	46
5 to 30	60	50
Note1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz. Note2: The lower limit is applicable at the transition frequency.		

7.1.1 E.U.T. Operation

EUT Operation: Test the EUT in on mode, keep the motor running.

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 AC 230V 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 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were 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 0.4m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN was placed 0.8m from the boundary of the unit under test and bonded to a ground reference plane for LISN 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 were at least 0.8m from the LISN.

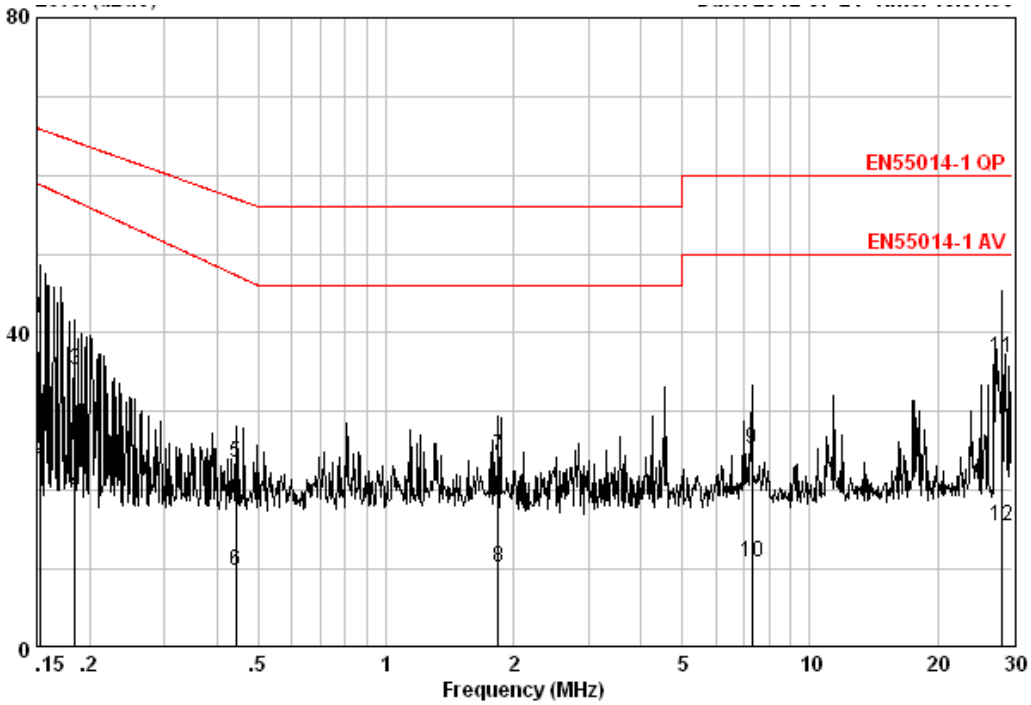
7.1.3 Measurement Data

EN 55014-1

Live Line:

Peak Scan:

Level (dBμV)



Quasi-peak and Average measurement:

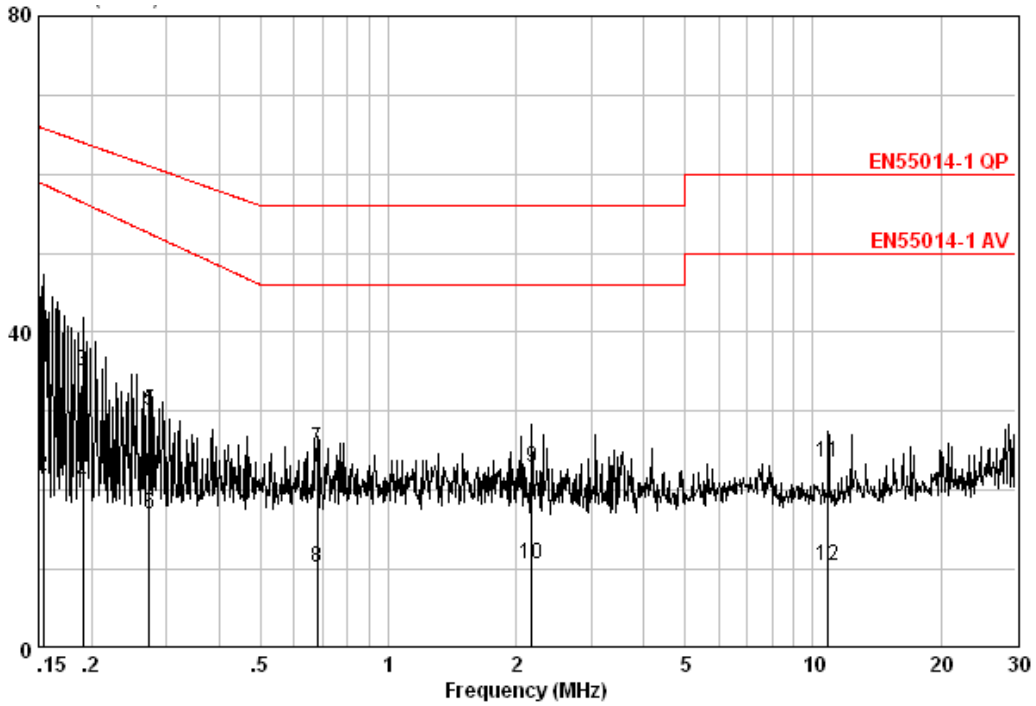
Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.152	32.17	0.06	9.63	41.86	65.87	-24.00	QP
0.152	14.29	0.06	9.63	23.98	58.83	-34.84	AVERAGE
0.184	25.65	0.11	9.63	35.39	64.28	-28.90	QP
0.184	9.91	0.11	9.63	19.65	56.77	-37.12	AVERAGE
0.442	13.94	0.04	9.63	23.61	57.02	-33.41	QP
0.442	0.14	0.04	9.63	9.81	47.33	-37.51	AVERAGE
1.839	14.76	0.06	9.64	24.46	56.00	-31.54	QP
1.839	0.50	0.06	9.64	10.20	46.00	-35.80	AVERAGE
7.290	15.24	0.15	9.82	25.21	60.00	-34.79	QP
7.290	0.94	0.15	9.82	10.91	50.00	-39.09	AVERAGE
28.452	25.71	0.37	10.67	36.74	60.00	-23.26	QP
28.452	4.42	0.37	10.67	15.45	50.00	-34.55	AVERAGE

Level = Read Level + LISN Factor + Cable Loss.

Neutral Line

Peak Scan:

Level (dBµV)



Quasi-peak and Average measurement:

Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.154	29.43	0.07	9.66	39.15	65.78	-26.63	QP
0.154	12.17	0.07	9.66	21.89	58.71	-36.82	AVERAGE
0.190	25.38	0.12	9.64	35.14	64.02	-28.88	QP
0.190	11.16	0.12	9.64	20.92	56.43	-35.51	AVERAGE
0.273	20.44	0.09	9.64	30.17	61.03	-30.86	QP
0.273	7.20	0.09	9.64	16.93	52.54	-35.61	AVERAGE
0.679	15.51	0.04	9.68	25.23	56.00	-30.77	QP
0.679	0.48	0.04	9.68	10.20	46.00	-35.80	AVERAGE
2.178	13.13	0.07	9.70	22.91	56.00	-33.09	QP
2.178	0.80	0.07	9.70	10.58	46.00	-35.42	AVERAGE
10.847	13.29	0.18	10.03	23.50	60.00	-36.50	QP
10.847	0.20	0.18	10.03	10.41	50.00	-39.59	AVERAGE

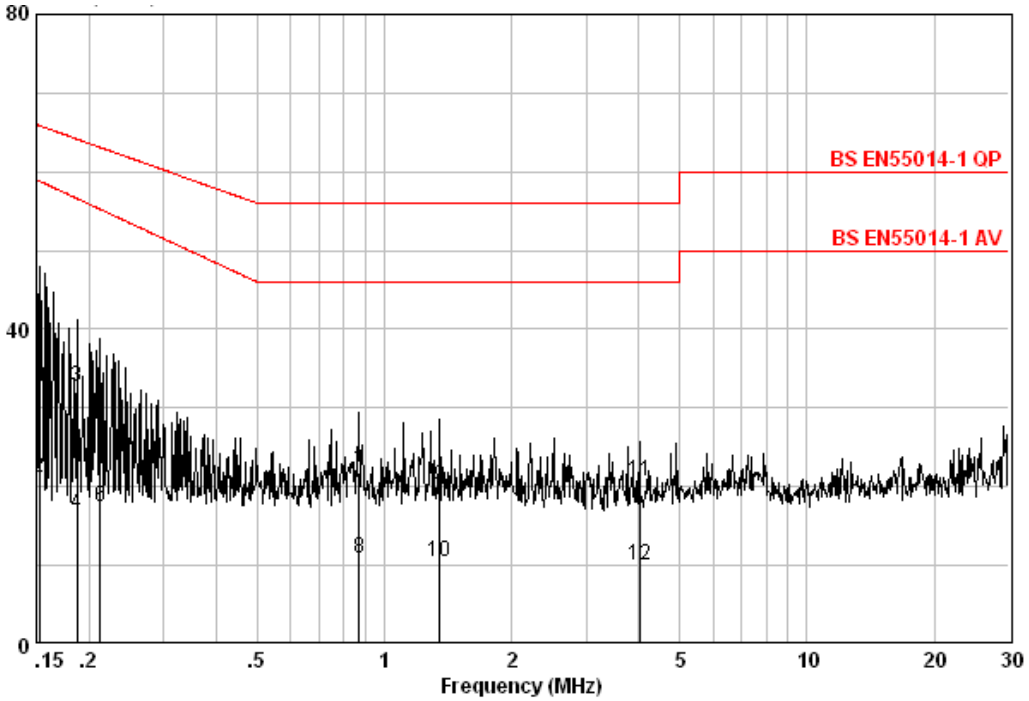
Level = Read Level + LISN Factor + Cable Loss.

BS EN 55014-1

Live Line:

Peak Scan:

Level (dBµV)



Quasi-peak and Average measurement:

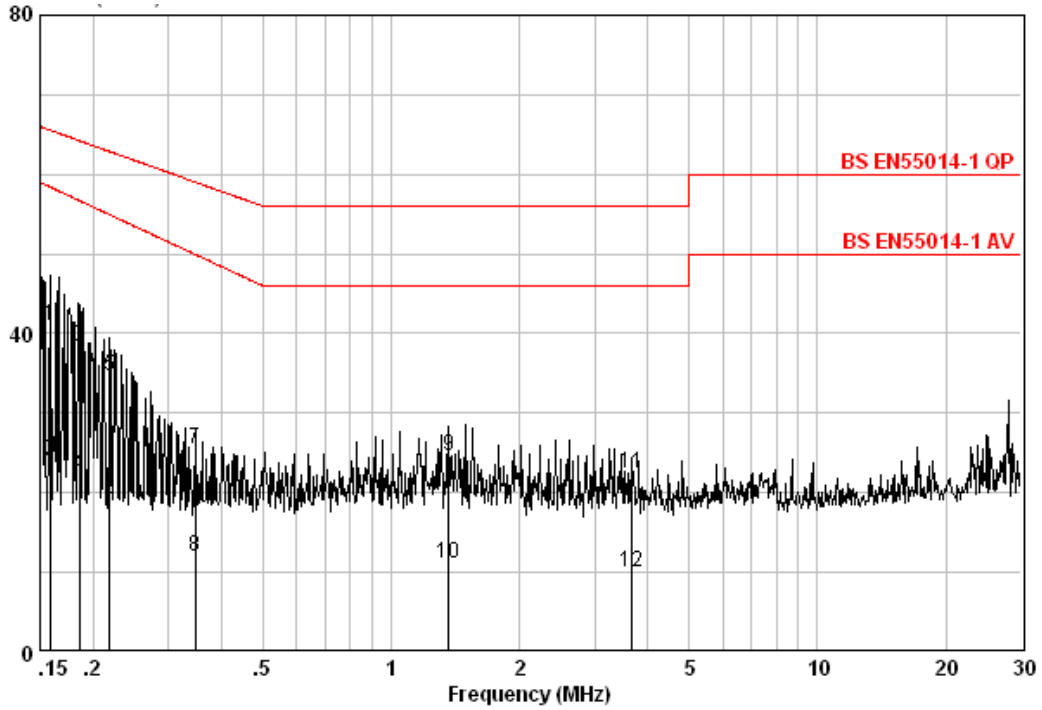
Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.152	32.21	0.06	9.63	41.90	65.87	-23.96	QP
0.152	11.47	0.06	9.63	21.16	58.83	-37.66	AVERAGE
0.187	22.89	0.11	9.62	32.63	64.15	-31.52	QP
0.187	6.88	0.11	9.62	16.62	56.60	-39.98	AVERAGE
0.213	20.77	0.12	9.62	30.51	63.10	-32.58	QP
0.213	7.79	0.12	9.62	17.53	55.22	-37.69	AVERAGE
0.871	12.15	0.05	9.64	21.84	56.00	-34.16	QP
0.871	1.10	0.05	9.64	10.79	46.00	-35.21	AVERAGE
1.352	10.38	0.04	9.62	20.04	56.00	-35.96	QP
1.352	0.89	0.04	9.62	10.55	46.00	-35.45	AVERAGE
4.006	10.81	0.14	9.73	20.68	56.00	-35.32	QP
4.006	0.07	0.14	9.73	9.94	46.00	-36.06	AVERAGE

Level = Read Level + LISN Factor + Cable Loss.

Neutral Line

Peak Scan:

Level (dBµV)



Quasi-peak and Average measurement:

Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.158	31.33	0.07	9.65	41.05	65.56	-24.51	QP
0.158	14.27	0.07	9.65	23.99	58.43	-34.43	AVERAGE
0.185	28.54	0.11	9.64	38.29	64.24	-25.95	QP
0.185	12.38	0.11	9.64	22.13	56.71	-34.58	AVERAGE
0.219	24.94	0.12	9.64	34.70	62.88	-28.18	QP
0.219	9.35	0.12	9.64	19.11	54.94	-35.83	AVERAGE
0.346	15.82	0.06	9.63	25.51	59.05	-33.54	QP
0.346	2.32	0.06	9.63	12.01	49.96	-37.95	AVERAGE
1.367	14.96	0.04	9.70	24.70	56.00	-31.30	QP
1.367	1.40	0.04	9.70	11.14	46.00	-34.86	AVERAGE
3.681	12.48	0.13	9.74	22.36	56.00	-33.64	QP
3.681	0.21	0.13	9.74	10.09	46.00	-35.91	AVERAGE

Level = Read Level + LISN Factor + Cable Loss.

7.2 Disturbance Power Test, 30MHz to 300MHz

Test Requirement: EN 55014-1, BS EN 55014-1

Test Method: EN 55014-1, BS EN 55014-1

Test Date: 2012-07-29

Test voltage: AC 230V 50Hz

Frequency Range: 30MHz to 300MHz

Detector: Peak for pre-scan

Quasi-Peak and Average at frequency with maximum peak (120kHz resolution bandwidth)

Limit:

Table 2a, Columns 2&3 for household and similar appliances

Disturbance power limits for the frequency range 30 MHz to 300 MHz

Frequency range MHz	**At mains terminals** (dB (pW))	
	Quasi-peak	Average
30 to 300	45 to 55	35 to 45
Note1: The limit increases linearly with the frequency in the range 30 MHz to 300 MHz.		

Table 2b, Columns 2&3 for household and similar appliances

Margin when performing disturbance power measurement in the frequency range 30 MHz to 300 MHz

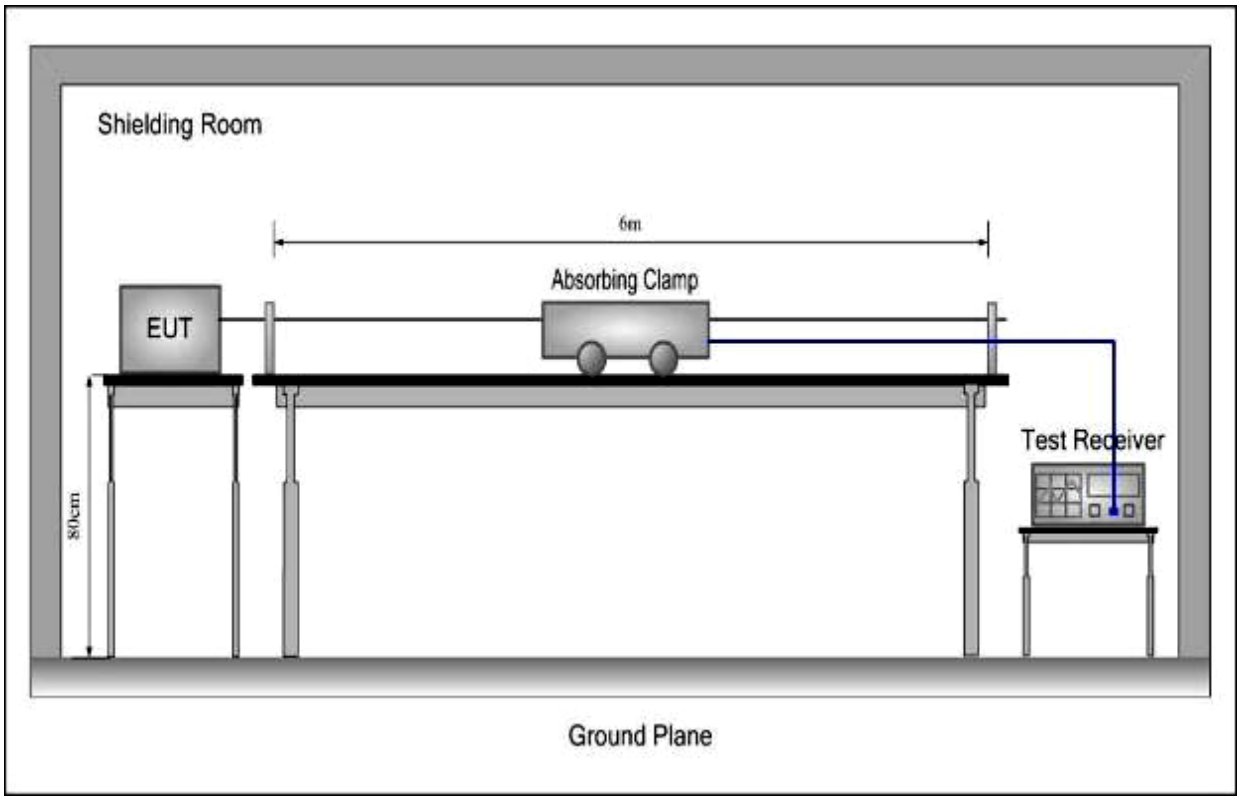
Frequency range MHz	**Margin** (dB)	
	Quasi-peak	Average
200 to 300	0 to 10 dB	--
NOTE 1: Appliances are deemed to comply in the frequency range from 300 MHz to 1 000 MHz if both of the following conditions (1) and 2)) are fulfilled: 1) All the measurement result are lower than the applicable limits (Table 2a) minus the corresponding margin (Table 2b); or the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector. 2) No clock frequency or oscillator frequency of the EUT is more than or equal to 30 MHz. NOTE 2: The measured result at a particular frequency shall be less than the relevant limit minus the corresponding margin (at that frequency).		

7.2.1 E.U.T. Operation

EUT Operation: Test the EUT in on mode, keep the motor running.

A pre-test at 50MHz 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 AC 230V as no worse case was found.

7.2.2 Test Setup



1. The disturbance power was measured with the EUT in a shielded room.
2. The distance between the clamp test set-up (the appliance, the lead to be measured and the absorbing clamp) and any other conductive objects (including persons, walls and ceiling, but excluding the floor) shall be at least 0,8 m. The appliance to be tested shall be placed on a non-metallic support table parallel to the floor. The height of the table shall be 0,1 m ± 0,025 m for appliances primarily intended to be positioned on the floor in normal use, and 0,8 m ± 0,05 m for other appliances.
3. Auxiliary leads normally extendible by the user, for instance with a loose end or leads fitted with a (by the user) easily replaceable plug or socket on one or both ends, shall in accordance with 6.2.3 be extended to a length of about 6 m. Any plug or socket which will not pass through the absorbing clamp due to its size shall be removed (see 6.2.3).
4. If the auxiliary lead is permanently fixed to the appliance and to the auxiliary apparatus and:
   – is shorter than 0.25 m, measurement are not to be made on these leads.
   – is longer than 0.25 m but shorter than twice the length of the absorbing clamp, it shall be extended to twice the length of the absorbing clamp.
   – is longer than twice the length of the absorbing clamp, measurements shall be made using the original lead.
5. The absorbing clamp was moved along the lead to obtain maximum disturbance.

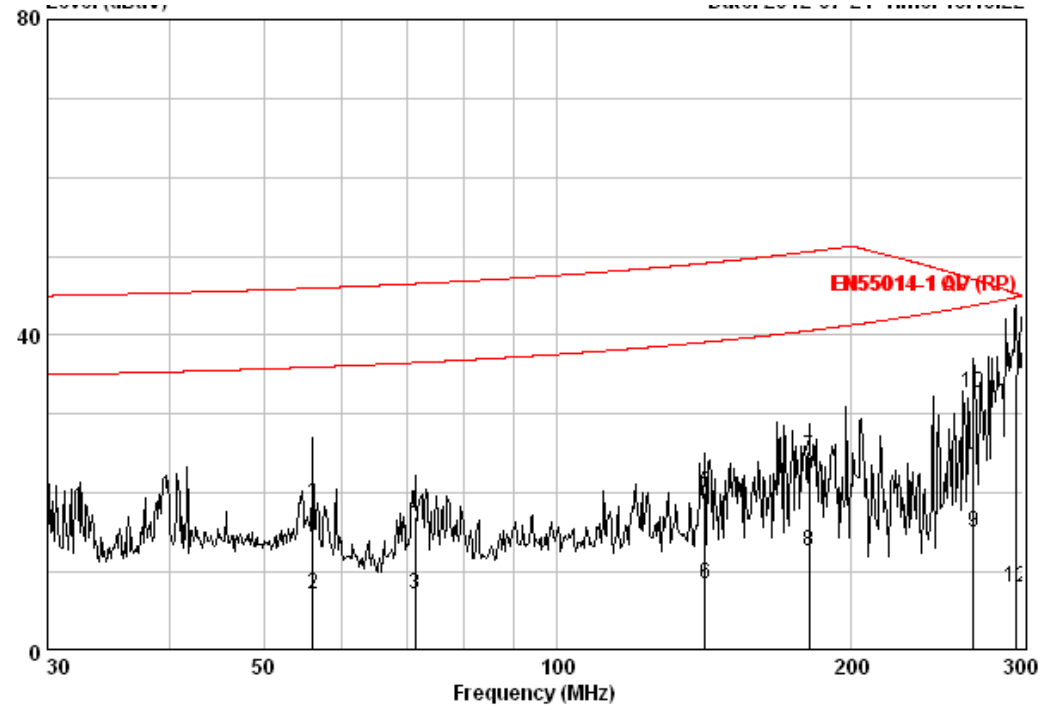
7.2.3 Measurement Data

EN 55014-1

AC Mains:

Peak Scan:

Level (dBpW)



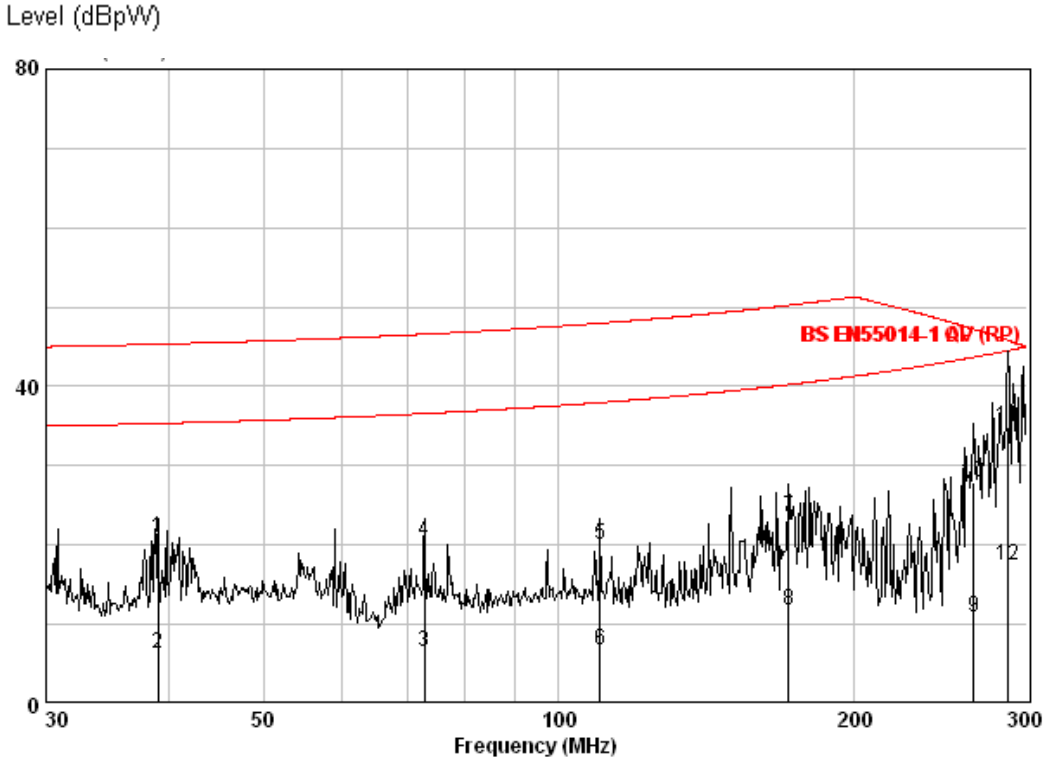
Quasi-peak and Average measurement:

Freq	Read Level	Trans.	RF Switch Loss	Level	Limit Line	Over Limit	Detector
MHz	(dBµV)	dB	dB	(dBpW)	(dBpW)	dB	
56.120	15.28	3.40	0.00	18.68	45.97	-27.29	QP
56.120	3.82	3.40	0.00	7.22	35.97	-28.74	AVERAGE
71.470	4.28	2.92	0.00	7.20	36.54	-29.34	AVERAGE
71.470	14.09	2.92	0.00	17.01	46.54	-29.53	QP
141.619	16.52	3.60	0.00	20.12	49.14	-29.02	QP
141.619	4.80	3.60	0.00	8.40	39.13	-30.73	AVERAGE
181.185	21.76	2.90	0.00	24.66	50.60	-25.94	QP
181.185	9.70	2.90	0.00	12.60	40.60	-28.00	AVERAGE
266.760	11.45	3.56	0.00	15.01	43.77	-28.76	AVERAGE
266.760	29.03	3.56	0.00	32.59	47.09	-14.50	QP
295.203	31.33	3.70	0.00	35.03	45.30	-10.27	QP
295.203	4.41	3.70	0.00	8.11	44.82	-36.71	AVERAGE

BS EN 55014-1

AC Mains:

Peak Scan:



Quasi-peak and Average measurement:

Freq	Read Level	Trans.	RF Switch Loss	Level	Limit Line	Over Limit	Detector
MHz	(dBµV)	dB	dB	(dBpW)	(dBpW)	dB	
39.005	17.78	3.18	0.00	20.96	45.33	-24.38	QP
39.005	3.23	3.18	0.00	6.41	35.33	-28.93	AVERAGE
72.966	3.52	3.04	0.00	6.56	36.59	-30.03	AVERAGE
72.966	17.39	3.04	0.00	20.43	46.59	-26.16	QP
110.185	16.20	3.79	0.00	19.99	47.97	-27.98	QP
110.185	3.06	3.79	0.00	6.85	37.97	-31.12	AVERAGE
171.444	20.47	3.11	0.00	23.58	50.24	-26.66	QP
171.444	8.72	3.11	0.00	11.83	40.24	-28.41	AVERAGE
264.924	7.29	3.60	0.00	10.89	43.70	-32.81	AVERAGE
264.924	24.29	3.60	0.00	27.89	47.21	-19.32	QP
287.158	31.32	3.51	0.00	34.83	45.81	-10.97	QP
287.158	13.84	3.51	0.00	17.35	44.52	-27.17	AVERAGE

7.3 Harmonics Test Result

Test Requirement:	EN 61000-3-2, BS EN 61000-3-2
Test Method:	See Remark Below
Frequency Range:	100 Hz to 2 kHz

Remark：
Since the EUT was belong to exception of clause 7 and Annex C, according to EN 61000-3-2, BS EN 61000-3-2 figure 1, it was deemed to conform to the requirements of this standard without further testing.

"7 Harmonic current limits
The procedure for applying the limits and assessing the results is shown in Figure 1.
For the following categories of equipment, limits are not specified in this standard:
NOTE 1 Limits may be defined in a future amendment or revision of the standard.
– equipment with a rated power of 75 W or less, other than lighting equipment;
NOTE 2 This value may be reduced from 75 W to 50 W in the future, subject to approval by National Committees at that time.
– professional equipment with a total rated power greater than 1 kW;
– symmetrically controlled heating elements with a rated power less than or equal to 200 W.
– independent dimmers for incandescent lamps with a rated power less than or equal to 1 kW.
NOTE 3 See also C.5.3."
and
No limit applies for all LED lighting equipments with active input power ≤25 W except Discharge lighting equipment (refer to 7.3 b）)

Please read clause 7 & Annex C of this standard for reference.

7.4 Flicker Test Result

Test Requirement:	EN 61000-3-3, BS EN 61000-3-3
Test Method:	EN 61000-3-3, BS EN 61000-3-3
Test Date:	2012-07-27
Test voltage:	AC 230V 50Hz
Measurement Time:	10 mins
Class / Severity:	Clause 5 of EN 61000-3-3, BS EN 61000-3-3

7.4.1 E.U.T. Operation

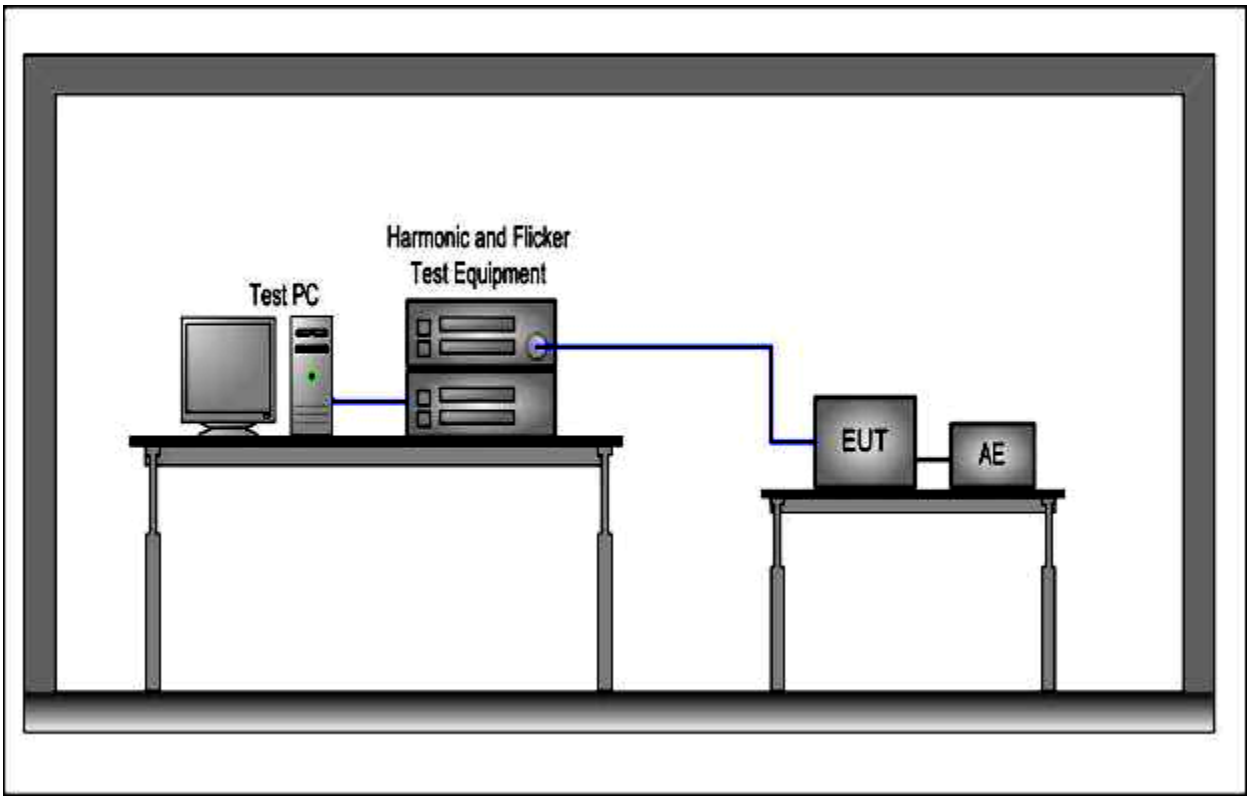
EUT Operation: Test the EUT in on mode, keep the motor running.

Note: "Pst and Plt requirements shall not be applied to voltage changes caused by manual switching. The limits shall not be applied to voltage changes associated with emergency switching or emergency interruptions."

Please also refer to Annex A (Application of limits and type test conditions) for details in EN 61000-3-3, BS EN 61000-3-3

--No limits shall apply to lamps.
--Incandescent lamp luminaires with ratings less than or equal to 1 000 W and discharge lamp luminaires with ratings less than or equal to 600 W, are deemed to comply with the dmax limits in this standard and are not required to be tested.
--Ballasts are deemed to be part of luminaires and are not required to be tested.

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 ±2 % of the nominal value. The frequency was 50 Hz ±0.5 %.
2. The voltage fluctuations and flicker were measured at the supply terminals of the EUT.
3. The observation period, Tp, for the assessment of flicker values by flicker measurement, flicker simulation, or analytical method was:

   — for Pst, Tp = 10 min.

   — for Plt, Tp = 2 h.

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

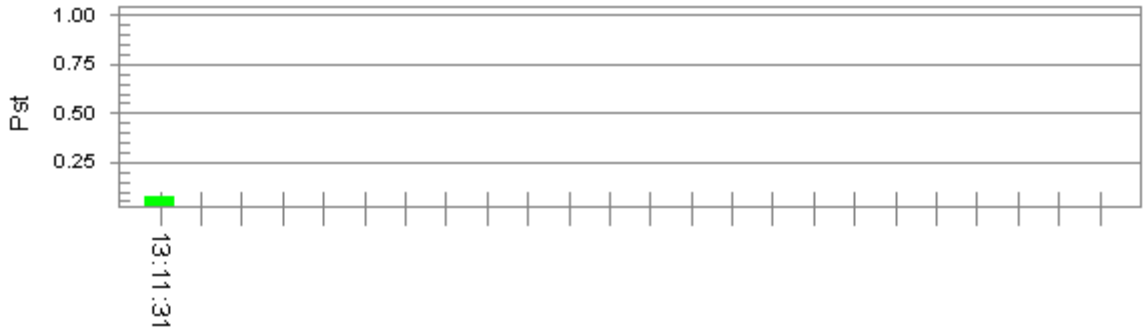
7.4.3 Measurement Data

For EN 61000-3-3

Flicker Test Summary per EN 61000-3-3 (Run time)

Test Result: Pass **Status: Test Completed**

Pst and limit line **European Limits**



Parameter values recorded during the test:

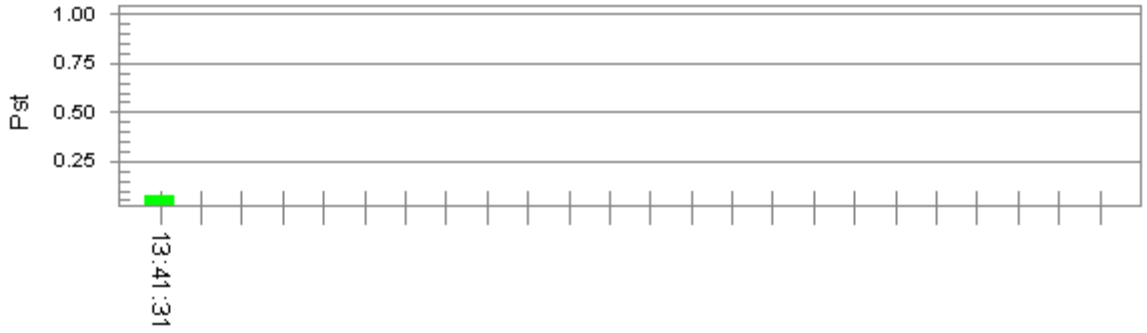
Vrms at the end of test (Volt):	**229.83**			
Highest dt (%):	**0.13**	**Test limit (%):**	**3.30**	**Pass**
Time(mS) > dt:	**0.00**	**Test limit (mS):**	**500.0**	**Pass**
Highest dc (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Highest dmax (%):	**0.00**	**Test limit (%):**	**4.00**	**Pass**
Highest Pst (10 min. period):	**0.051**	**Test limit:**	**1.000**	**Pass**

For BS EN 61000-3-3

Flicker Test Summary per BS EN 61000-3-3 (Run time)

Test Result: Pass **Status: Test Completed**

Pst and limit line **European Limits**



Parameter values recorded during the test:

Vrms at the end of test (Volt):	**229.90**			
Highest dt (%):	**0.10**	**Test limit (%):**	**3.30**	**Pass**
Time(mS) > dt:	**0.00**	**Test limit (mS):**	**500.0**	**Pass**
Highest dc (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Highest dmax (%):	**0.00**	**Test limit (%):**	**4.00**	**Pass**
Highest Pst (10 min. period):	**0.043**	**Test limit:**	**1.000**	**Pass**

8 Electromagnetic Susceptibility Test Results

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

Criterion A:	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.
Criterion 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.
Criterion C:	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, BS EN 55014-2	
Test Method:	EN 61000-4-2, BS EN 61000-4-2	
Criterion Required:	B	
Test Date:	2012-07-25	
Test voltage:	AC 230V 50Hz	
Discharge Impedance:	330 Ω / 150 pF	
Discharge Voltage:	Air Discharge:	8 kV
	Contact Discharge:	4 kV
	VCP:	4 kV
Polarity:	Positive & Negative	
Number of Discharge:	Minimum 10 times at each test point	
Discharge Mode:	Single Discharge	
Discharge Period:	1 second minimum	

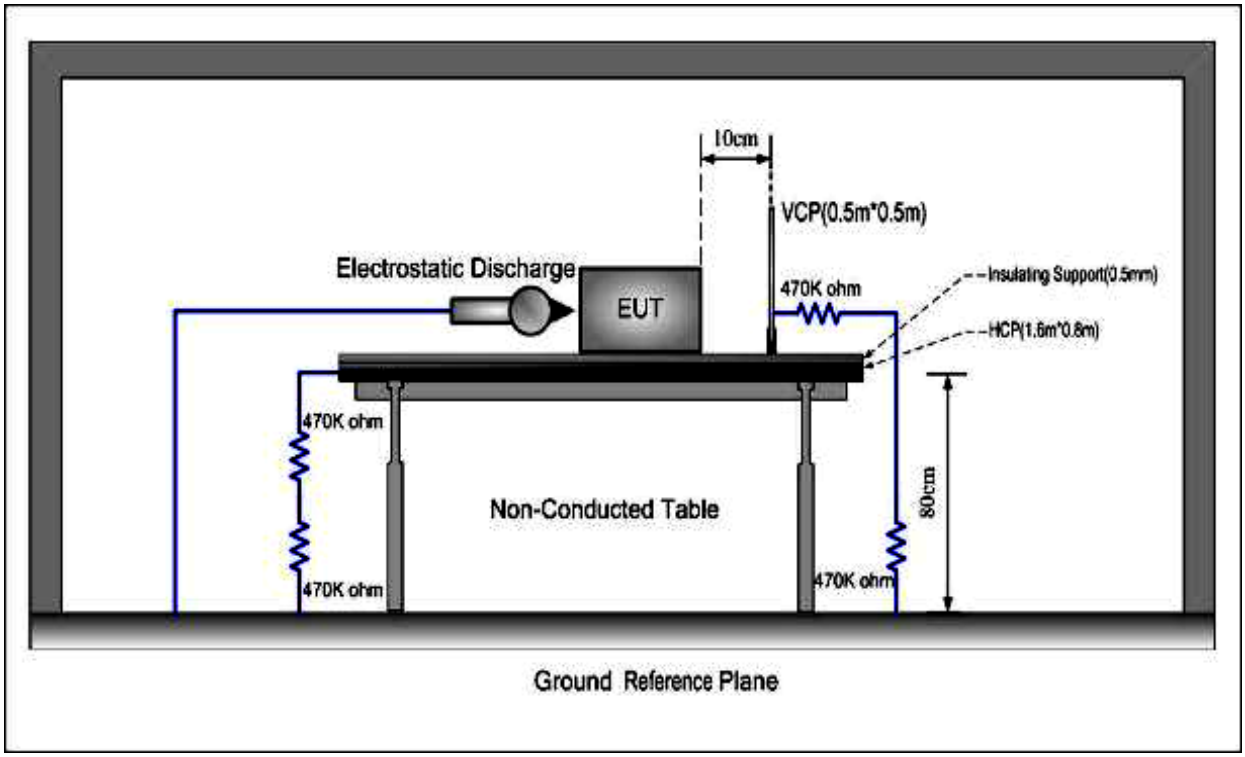
8.2.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 57 % RH Atmospheric Pressure: 1007 mbar

EUT Operation: Test the EUT in on mode keep the motor running and 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 surfaces except the GRP, HCP and VCP was greater than 1m.
4. During the contact discharges, the tip of the discharge electrode touched 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 was 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	N/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).

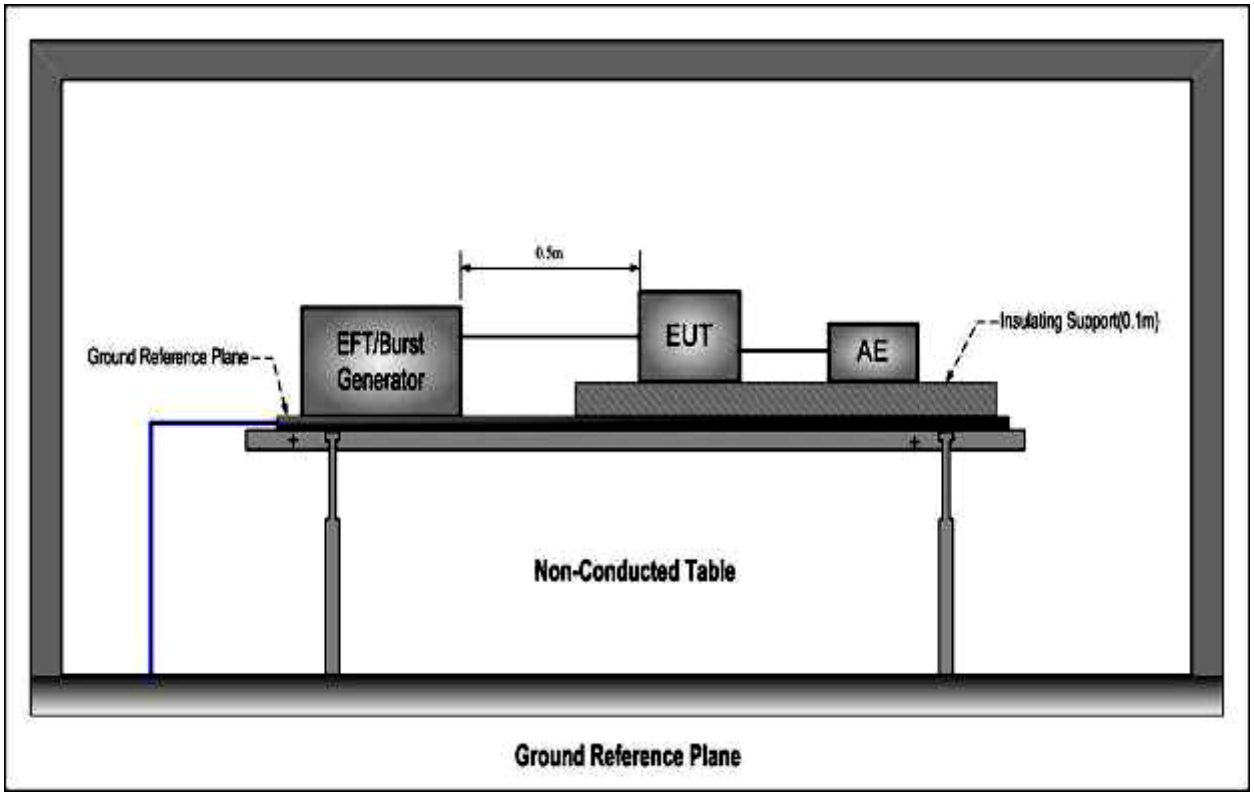
8.3 Electrical Fast Transients (EFT)

Test Requirement:	EN 55014-2, BS EN 55014-2
Test Method:	EN 61000-4-4, BS EN 61000-4-4
Criterion Required:	B
Test Date:	2012-07-26
Test voltage:	AC 230V 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

EUT Operation: Test the EUT in on mode keep the motor running and 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 0.1m 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 was placed on the insulation support 0.1m above GRP. Cables not subject to EFT was 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.
4. The EUT was conducted the below specified test voltages for line and neutral or line, neutral and earth simultaneously (for signal line with capacitive coupling clamp), 120 seconds duration. If the equipment contains identical ports, only one was tested; multiconduct or 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 3m, 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.

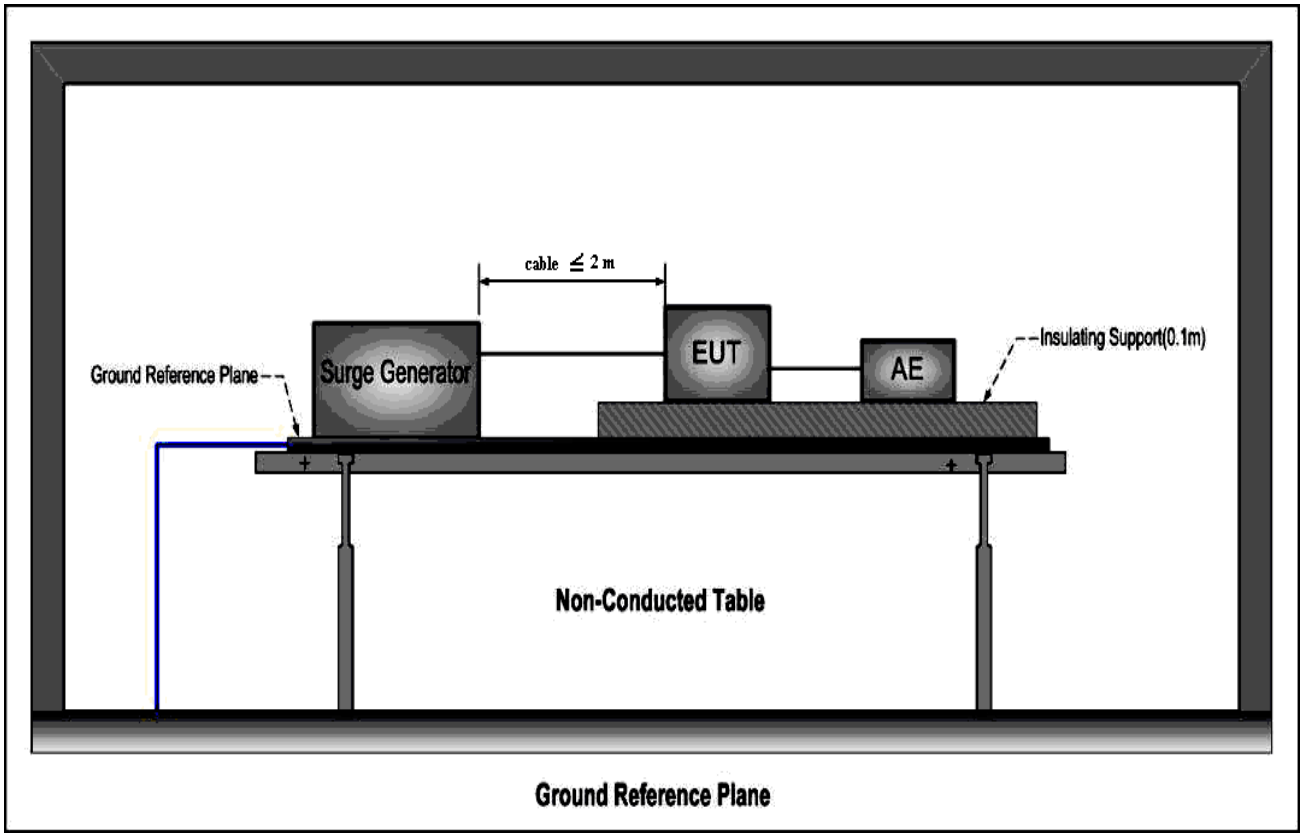
8.4 Surge

Test Requirement:	EN 55014-2, BS EN 55014-2
Test Method:	EN 61000-4-5, BS EN 61000-4-5
Criterion Required:	B
Test Date:	2012-07-26
Test voltage:	AC 230V 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

EUT Operation: Test the EUT in on mode keep the motor running and 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 0.1m 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 μs 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 2m in length.
4. The EUT was conducted the below specified test voltages for line to line and line to neutral and line to earth and neutral to earth, five positive pulses at 90° and five negative pulses 270° for a.c. power ports and five positive pulses and five negative surge pulses for d.c. power ports. The test levels were applied on the EUT with a 2Ω generator source impedance for power supply terminals and 40Ω 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

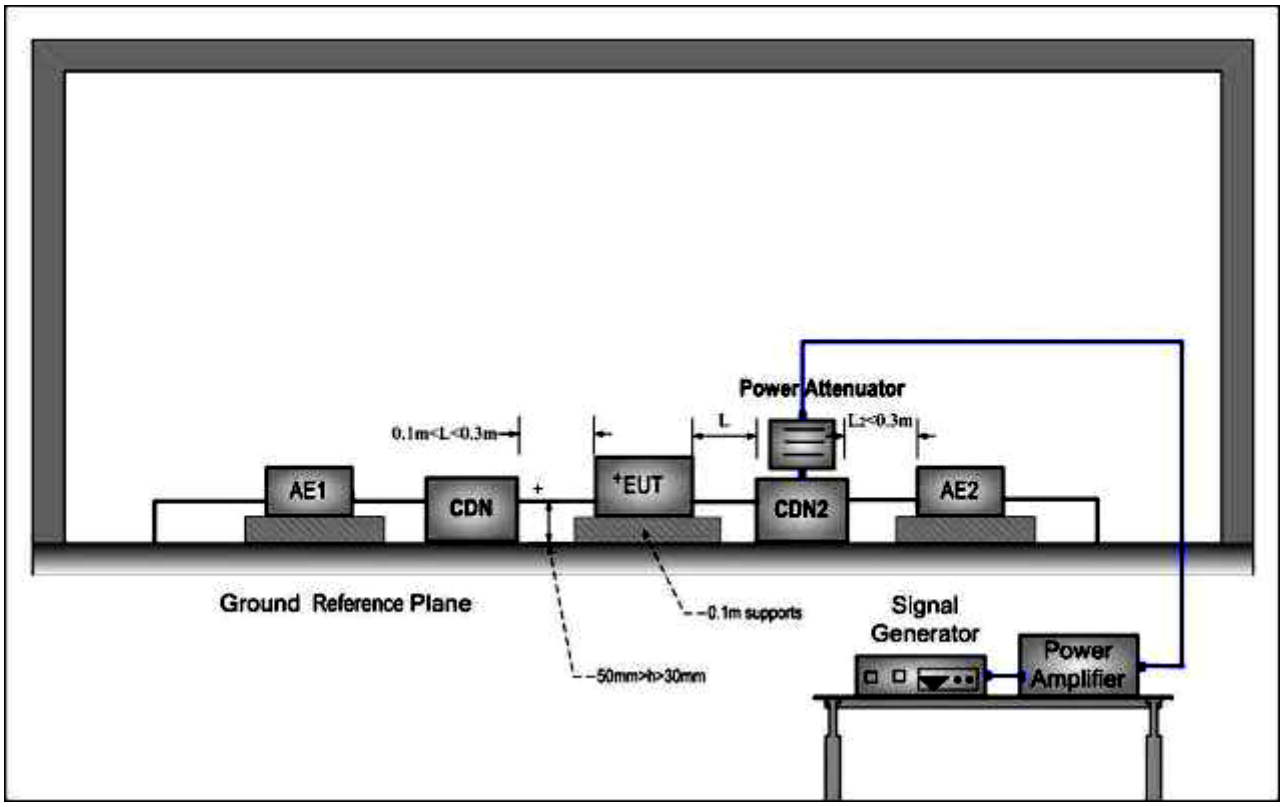
Test Requirement:	EN 55014-2, BS EN 55014-2
Test Method:	EN 61000-4-6, BS EN 61000-4-6
Criterion Required:	A
Test Date:	2012-07-27
Test voltage:	AC 230V 50Hz
Frequency Range:	0.15MHz to 230MHz
Test level:	3V r.m.s on AC Ports (unmodulated emf into 150 Ω)
Modulation:	80%, 1kHz Amplitude Modulation

8.5.1 E.U.T. Operation

EUT Operation: Test the EUT in on mode keep the motor running and 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 0.1m and 0.3m 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 0.1m 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 0.3m 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 230 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	3V r.m.s	80%, 1 kHz Amp. Mod.	1%	1s	No Loss of Function (A)

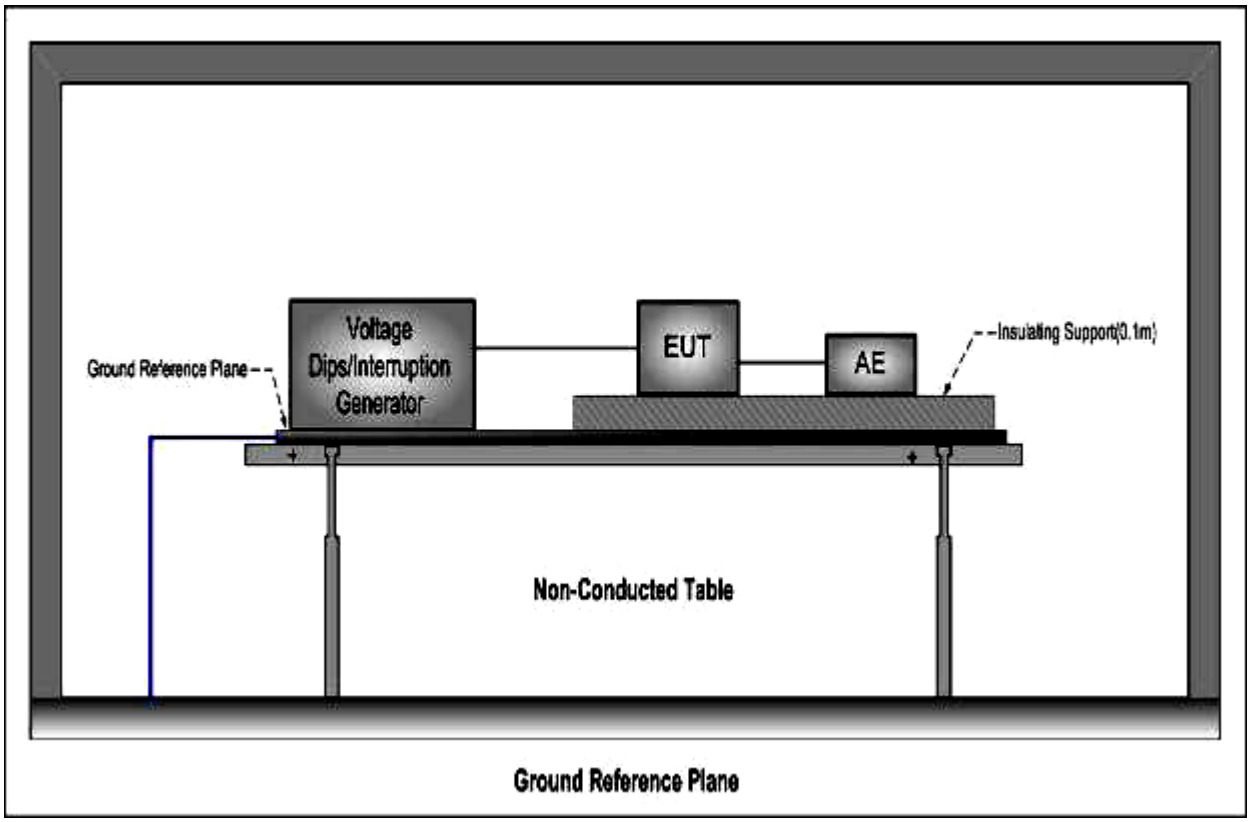
8.6 Voltage Dips and Interruptions

Test Requirement:	EN 55014-2, BS EN 55014-2
Test Method:	EN 61000-4-11, BS EN 61000-4-11
Criterion Required:	C
Test Date:	2012-07-26
Test voltage:	AC 230V 50Hz
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

EUT Operation: Test the EUT in on mode keep the motor running and 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 0.1m 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

$U_{T=}$ AC 230V 50Hz

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	(B)
70	0°	25	3	10s	(B)

Remark:

$U_{T=}$ The nominal supply voltage.

B: During test the EUT stopped working, after test it can recover by itself.

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

9 Photographs

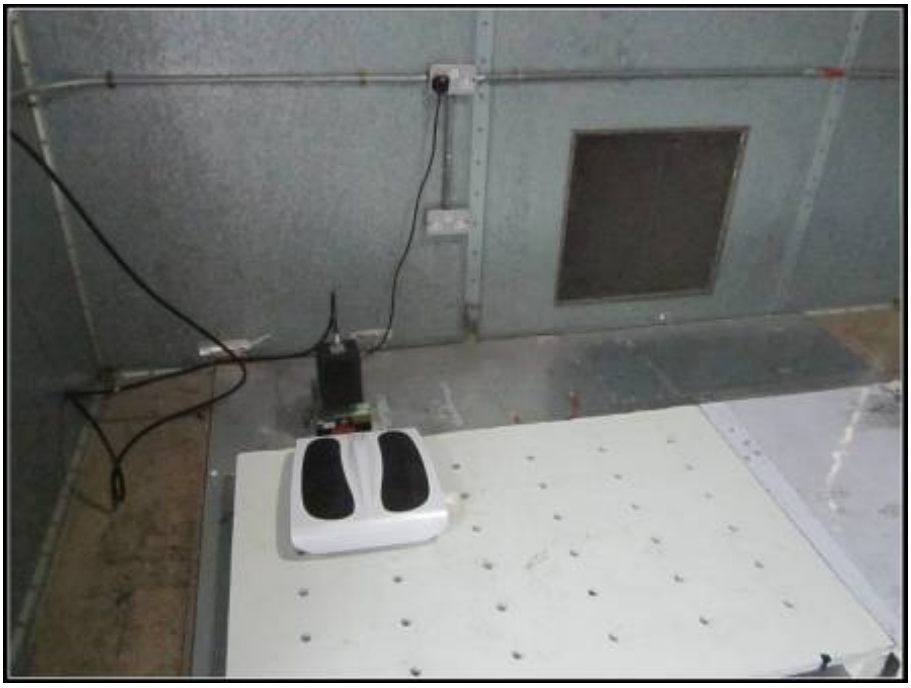
9.1 Conducted Emissions on Mains Terminals Test Setup

9.2 Disturbance Power Test Setup

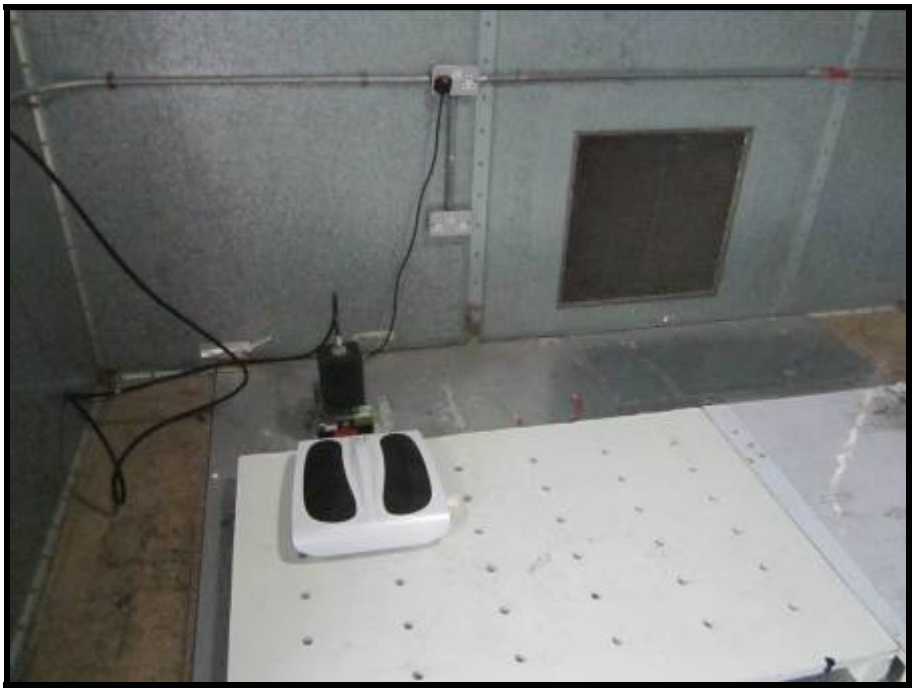
9.3 Flicker Test Setup

9.4 ESD Test Setup

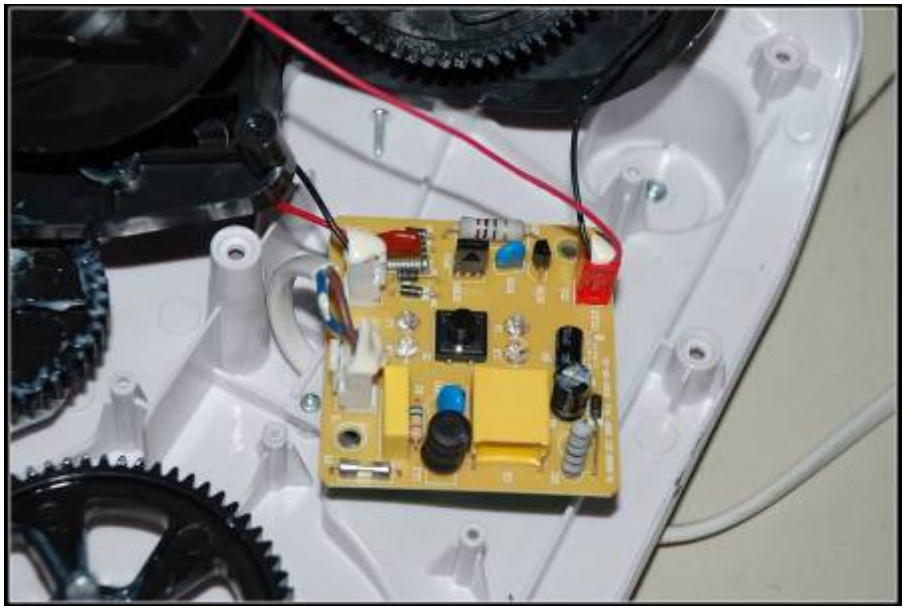
9.5 EFT, Surge, Voltage Dip and Interruptions Test Setup

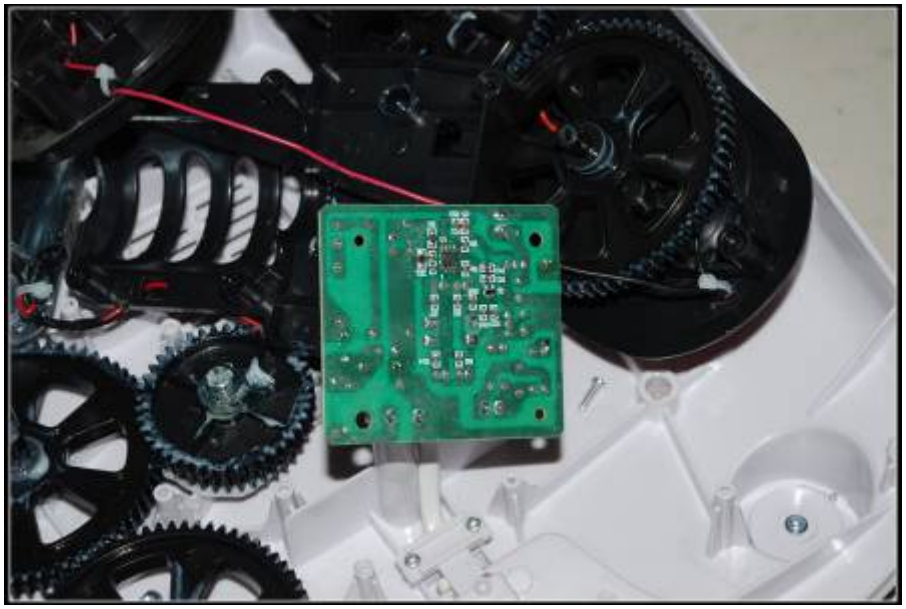


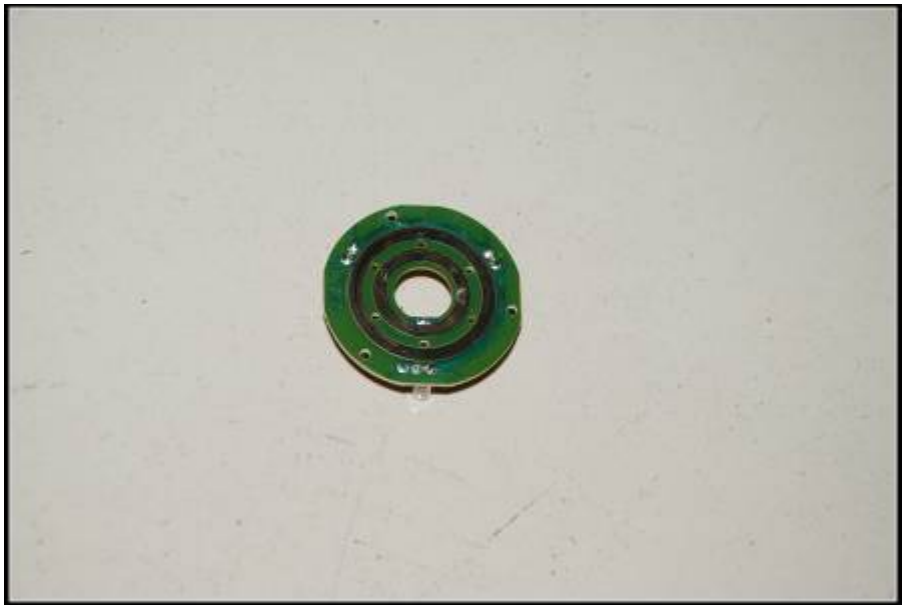
9.6 Conducted Immunity Test Setup

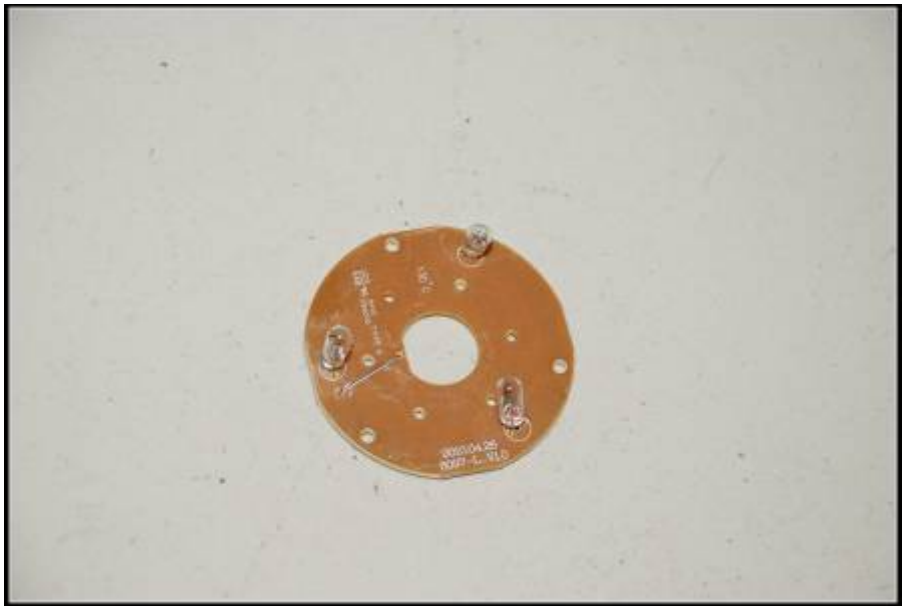


9.7 EUT Constructional Details









--End of Report--