EMC TEST REPORT

Application No:	UC2011187701-E
Applicant:	ANHUI HONYI INTERNATIONAL CORP.
Address of Applicant:	B-2106 BUSINESS BLDG,WOYE GARDEN GANQUAN Road, SHUSHAN DISTRICT HEFEI, ANHUI, 230088, CN
Product Name:	Fill-O-Meter
Product Description:	Controller
Model No:	KL14694
Series Model No.:	KL14694, KL20503 ,KL20510
Standards:	EN 55014-1:2017, EN 55014-2:2015, EN IEC 61000-3-2:2019, EN 61000-3-3:2013+A1:2019.
Date of Receipt:	2020-11-16
Date of Test:	2020-11-17 to 2020-11-28
Date of Issue:	2020-11-29
Test Result:	**Pass***

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

For and on behalf of
Foshan UC Testing Lab.

Test By:

Dennis Zhong
Project Manager

Approval By:

Aaron Zhou
Lab Manager

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

1 Test Summary

Electromagnetic Interference (EMI)				
Test	**Test Requirement**	**Test Method**	**Class / Severity**	**Result**
Conducted Emission on AC (150kHz to 30MHz)	EN 55014-1:2017	EN 55014-1:2017	Table 1 Columns 2&3	PASS
Disturbance Power (30MHz to 300MHz)	EN 55014-1:2017	EN 55014-1:2017	Table 2a, Table 2b Columns 2&3 ♀	PASS
Harmonic Emission on AC	EN IEC 61000-3-2:2019	EN IEC 61000-3-2:2019	Class A	PASS
Flicker Emission on AC	EN 61000-3-3:2013+ A1 :2019	EN 61000-3-3:2013+ A1 :2019	Clause 5 of EN 61000-3-3	PASS
Electromagnetic Susceptibility(EMS)				
Test	**Test Requirement**	**Test Method**	**Class / Severity**	**Result**
Electrostatic Discharge (ESD)	EN 55014-2:2015	EN 61000-4-2:2009	Contact ±4 kV Air ±8 kV	PASS
Electrical Fast Transients (EFT) on AC	EN 55014-2:2015	EN 61000-4-4:2012	AC ± 0.5kV & ± 1.0kV	PASS
Surge Immunity on AC	EN 55014-2:2015	EN 61000-4-5:2014	±1kV D.M.†	PASS
Injected Currents on AC (150kHz to 230MHz)	EN 55014-2:2015	EN 61000-4-6:2014	3V r.m.s (emf), 80% 1kHz Amp. Mod.	PASS
Voltage Dips and Interruptions on AC	EN 55014-2:2015	EN 61000-4-11:2004	0 % U_T* for 0.5per 40 % U_T* for 10per 70 % U_T* for 25per	PASS

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 3.2 of this test report for more details.

**：Please refer to Section 3.3 of this report for details.

2 Contents

3 General Information

3.1 Client Information

Applicant:	ANHUI HONYI INTERNATIONAL CORP.
Address of Applicant:	B-2106 BUSINESS BLDG,WOYE GARDEN GANQUAN Road, SHUSHAN DISTRICT HEFEI, ANHUI, 230088, CN
Manufacturer:	ANHUI HONYI INTERNATIONAL CORP.
Address of Manufacturer:	B-2106 BUSINESS BLDG,WOYE GARDEN GANQUAN Road, SHUSHAN DISTRICT HEFEI, ANHUI, 230088, CN

3.2 General Description of E.U.T.

Product Name:	Fill-O-Meter
Product Description:	Controller
Test Model No.:	KL14694
Series Model No.:	KL14694, KL20503, KL20510
Adapter Rating:	Input:100–240V~, 50/60Hz ; Output: 24V d.c., 1500mA
EUT Rating:	24V d.c., 1500mA
Remark:	All models are same circuit, only different model name. Model KL14694 was subject to full test

3.3 Details of E.U.T.

Power Supply:	230V~, 50Hz

3.4 Description of Support Units

The EUT has been tested as an independent unit.

3.5 Deviation from Standards

N/A

3.6 Abnormalities from Standard Conditions

N/A

3.7 Monitoring of EUT for All Immunity Test

Running

3.8 Test Location

All tests were performed at:

Guangdong Electronic & Electrical Products Inspection and Supervision Institute.(CGEL)

No.45, Shayongnan Street, Sanyuanli, Guangzhou, Guangdong, China

3.9 Test Facility

USA	FCC Listed Lab No. 597719
China	CNAS NO.L0307

4 Equipment Used during Test

Equipment	Manufacturer	Model No.	calibration date	calibration date
EMI Test Receiver	R&S	ESCI	2020-03-30	2021-03-30
EMI Test Receiver	R&S	ESPI	2020-03-30	2021-03-30
Amplifier	HP	8447D	2020-03-30	2021-03-30
Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	2020-03-30	2021-03-30
Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	2020-03-30	2021-03-30
Power Clamp	SCHWARZBECK	MDS-21	2020-03-30	2021-03-30
Positioning Controller	C&C	CC-C-1F	N/A	N/A
Electrostatic Discharge Simulator	TESEQ	NSG437	2020-03-30	2021-03-30
Fast Transient Burst Generator	SCHAFFNER	MODULA6150	2020-03-30	2021-03-30
Fast Transient Noise Simulator	Noiseken	FNS-105AX	2020-03-30	2021-03-30
Capacitive Coupling Clamp	TESEQ	CDN8014	2020-03-30	2021-03-30
High Field Bucolical Antenna	ELECTRO-METRICS	EM-6913	2020-03-30	2021-03-30
Log Periodic Antenna	ELECTRO-METRICS	EM-6950	2020-03-30	2021-03-30
Remote Active Vertical Antenna	ELECTRO-METRIS	EM-6892	2020-02-02	2021-02-02
TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	2020-02-02	2021-02-02
Horn Antenna	SCHWARZBECK	BBHA9120A	2020-02-02	2021-02-02
Toe Line Single Phase Module	SCHWARZBECK	NSLK8128	2020-02-02	2021-02-02
10dB attenuator	SCHWARZBECK	MTAIMP-136	2020-02-02	2021-02-02
Electric Bridge	Zentech	100 LCR METER	N/A	N/A
RF Current Probe	FCC	F-33-4	2020-10-08	2021-10-08
SIGNAL GENERATOR	HP	8647A	2020-10-08	2021-10-08
MICROWAVE AMPLIFIER	HP	8349B	2020-10-08	2021-10-08
Triple-Loop Antenna	EVERFINE	LLA-2	2020-10-08	2021-10-08

5 Electromagnetic Interference Test Results

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

Test Requirement: EN 55014-1

Test Method: EN 55014-1

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.		

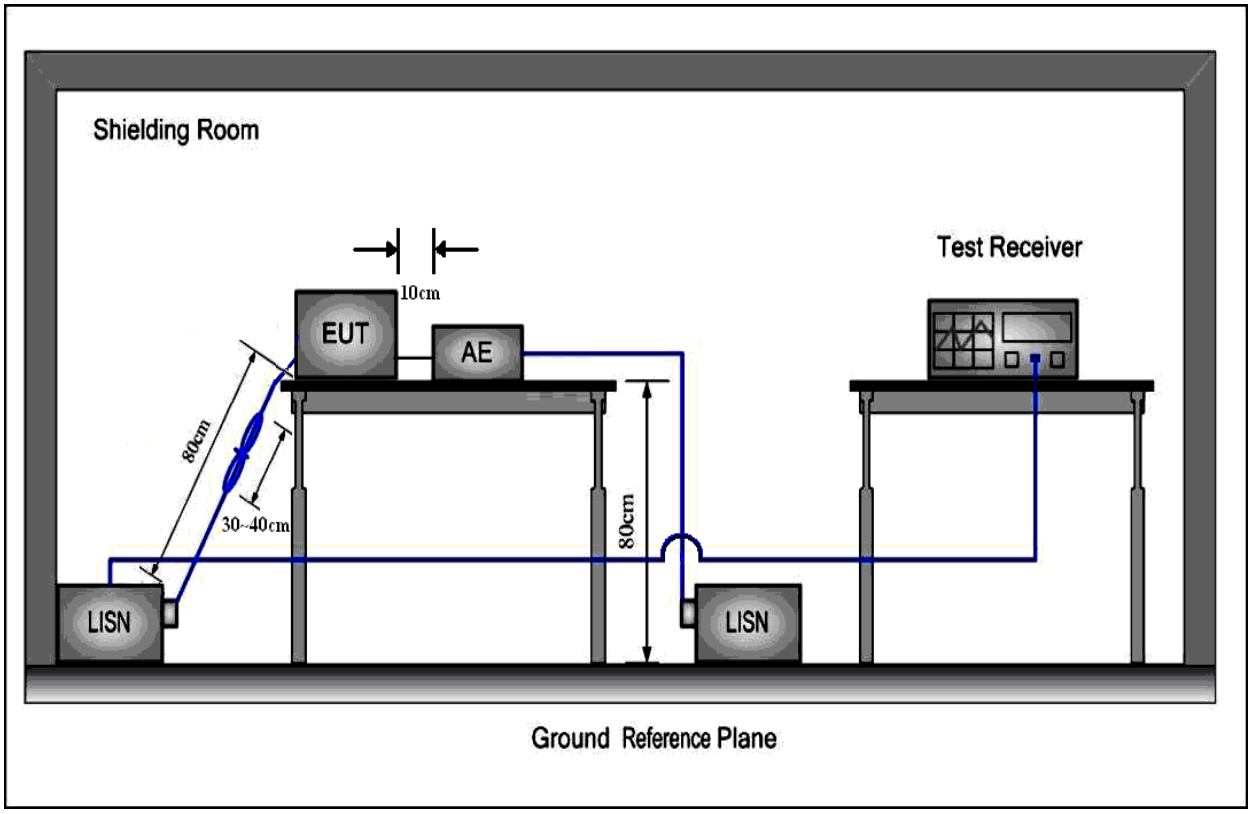
5.1.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 52% RH Atmospheric Pressure: 1008 mbar

EUT Operation: Test the EUT in motor running mode.
A pre-test was performed on the EUT in mode in order to find the worst case.
Test the EUT in mode 1 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 AC 230V as no worse case was found.

5.1.2 Test Setup and Procedure



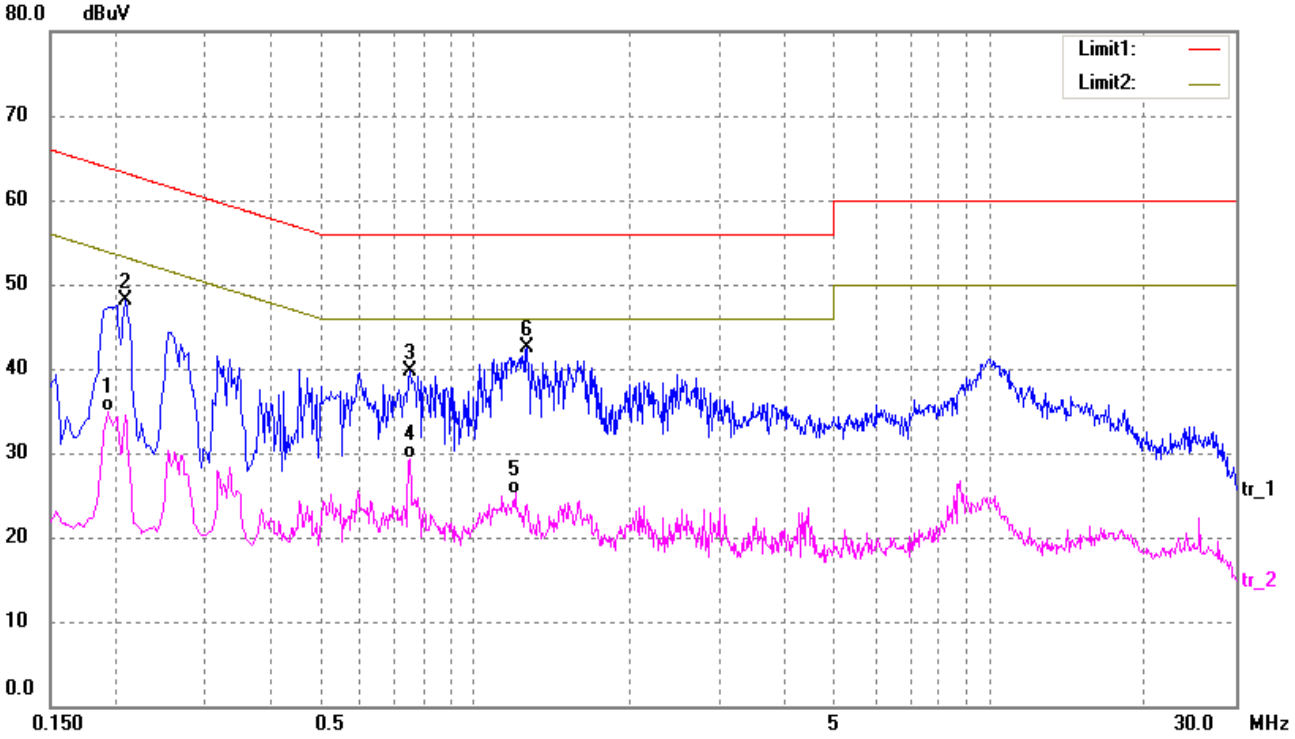
1. The mains terminal disturbance voltage was measured with the EUT in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to 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.

5.1.3 Measurement Data

Live Line:

Peak Scan:

Level (dBμV)



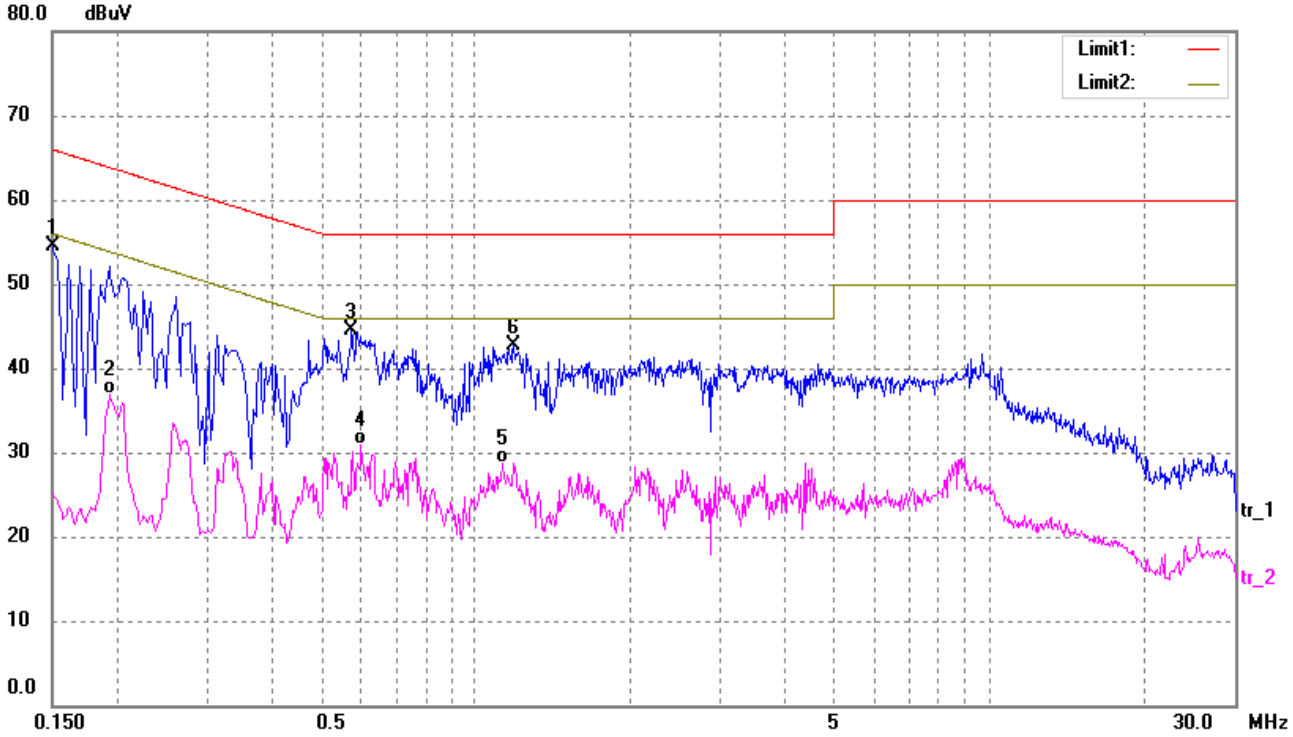
Quasi-peak and Average measurement:

No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.1940	25.44	9.50	34.94	53.86	-18.92	AVG
2	0.2100	38.54	9.50	48.04	63.21	-15.17	peak
3	0.7500	29.94	9.75	39.69	56.00	-16.31	peak
4	0.7500	19.49	9.75	29.24	46.00	-16.76	AVG
5	1.1980	15.20	10.00	25.20	46.00	-20.80	AVG
6*	1.2660	32.50	10.00	42.50	56.00	-13.50	peak

Neutral Line

Peak Scan:

Level (dBµV)



Quasi-peak and Average measurement:

No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.1500	45.07	9.50	54.57	66.00	-11.43	peak
2	0.1940	27.41	9.50	36.91	53.86	-16.95	AVG
3	0.5740	34.94	9.57	44.51	56.00	-11.49	peak
4	0.5980	21.38	9.60	30.98	46.00	-15.02	AVG
5	1.1260	18.77	10.00	28.77	46.00	-17.23	AVG
6	1.1900	32.75	10.00	42.75	56.00	-13.25	peak

Level = Read Level + LISN Factor + Cable Loss.

5.2 Disturbance Power Test, 30MHz to 300MHz

Test Requirement:	EN 55014-1
Test Method:	EN 55014-1
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).

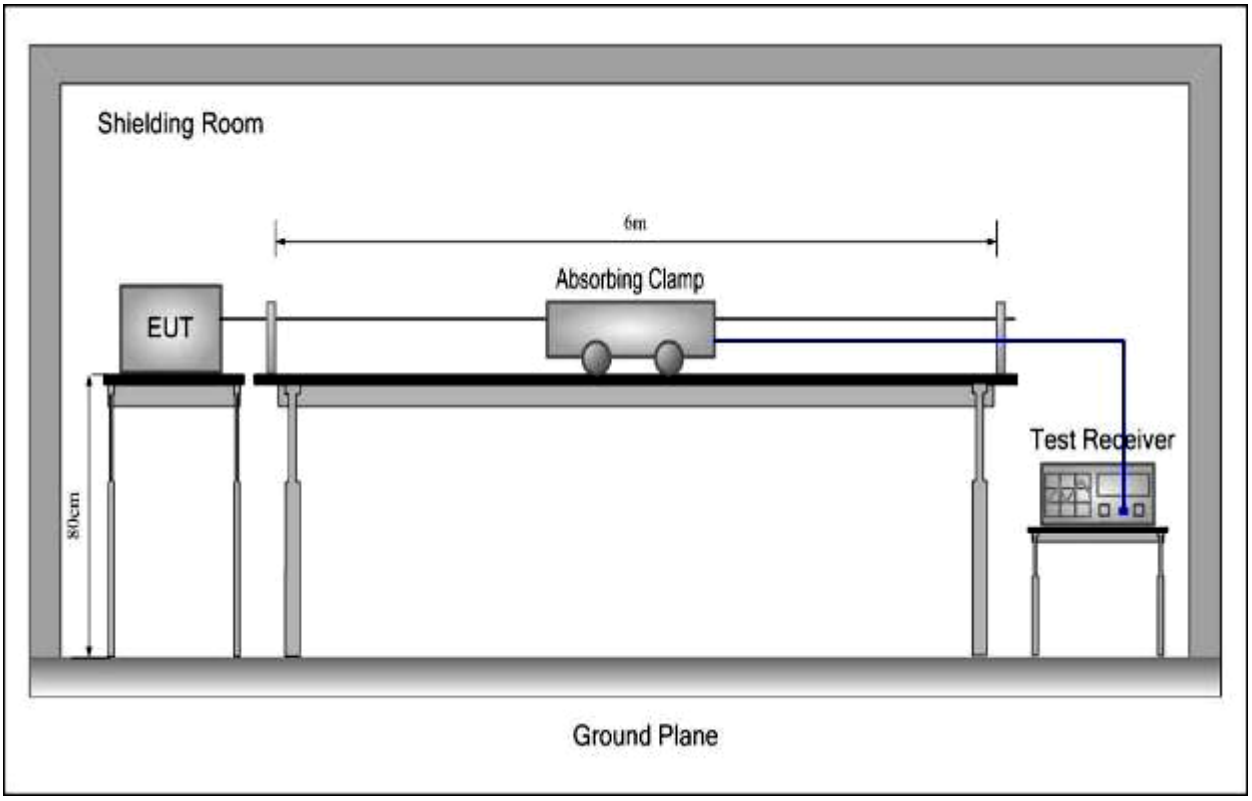
5.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 52% RH Atmospheric Pressure: 1015 mbar

EUT Operation: Test the EUT in motor running mode..
Test the EUT in mode for the compliance test as the worst case was found.
A pre-test at 30MHz 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.

5.2.2 Test Setup

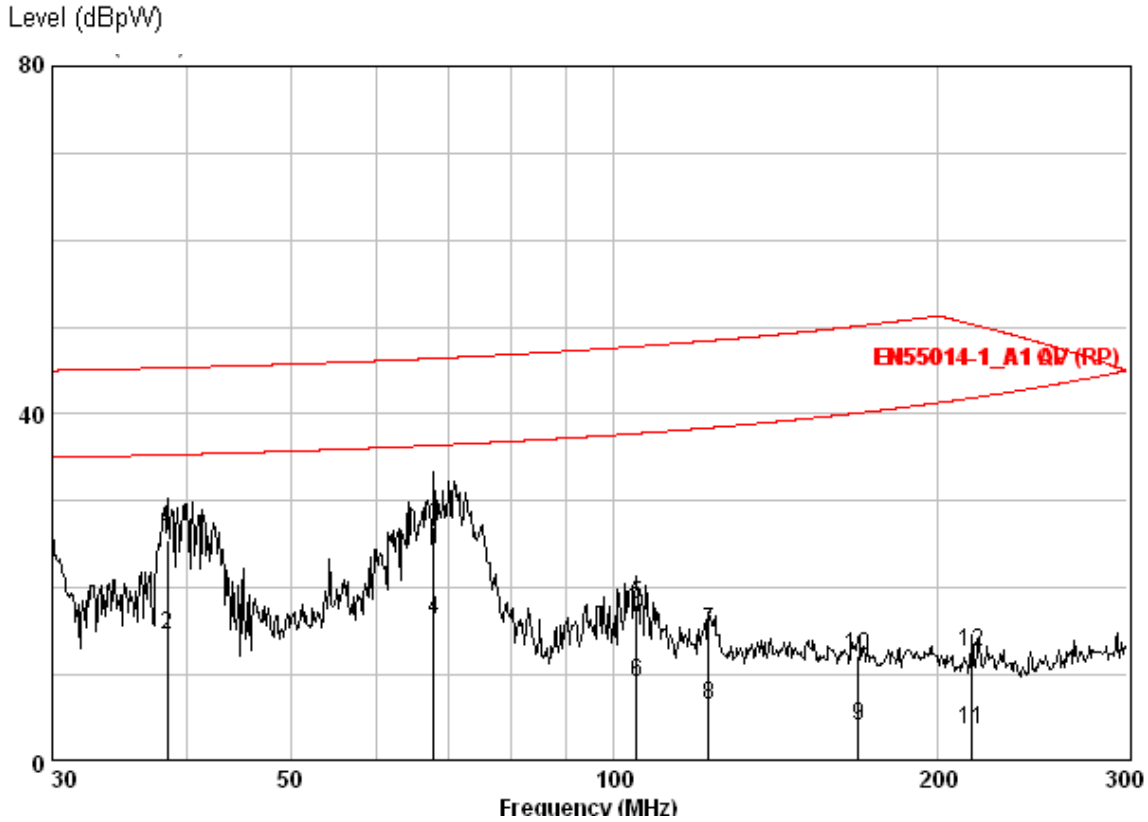


1. The disturbance power was measured with the EUT in a shielded room.
2. The distance between the clamp test set-up (the appliance, the lead to be measured and the absorbing clamp) and any other conductive objects (including persons, walls and ceiling, but excluding the floor) shall be at least 0,8 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.

5.2.3 Measurement Data

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	
38.381	22.56	2.97	0.00	25.53	45.31	-19.78	QP
38.381	11.72	2.97	0.00	14.69	35.31	-20.62	AVERAGE
67.939	25.12	1.87	0.00	26.99	46.41	-19.42	QP
67.939	14.46	1.87	0.00	16.33	36.41	-20.08	AVERAGE
104.984	14.13	4.00	0.00	18.13	47.78	-29.65	QP
104.984	5.26	4.00	0.00	9.26	37.78	-28.52	AVERAGE
122.496	11.68	3.45	0.00	15.13	48.43	-33.30	QP
122.496	3.07	3.45	0.00	6.52	38.43	-31.91	AVERAGE
168.702	0.95	3.22	0.00	4.17	40.14	-35.96	AVERAGE
168.702	9.05	3.22	0.00	12.27	50.14	-37.87	QP
215.338	0.83	2.92	0.00	3.75	41.86	-38.11	AVERAGE
215.338	9.82	2.92	0.00	12.74	50.33	-37.59	QP

5.3 Harmonics Test Result

Test Requirement:	EN IEC 61000-3-2
Test Method:	EN IEC 61000-3-2
Test voltage	230V AC, 50 Hz
Frequency Range	100Hz to 2kHz
Measurement Time:	3 mins
Class / Severity:	Class A

5.3.1 E.U.T. Operation

Operating Environment:

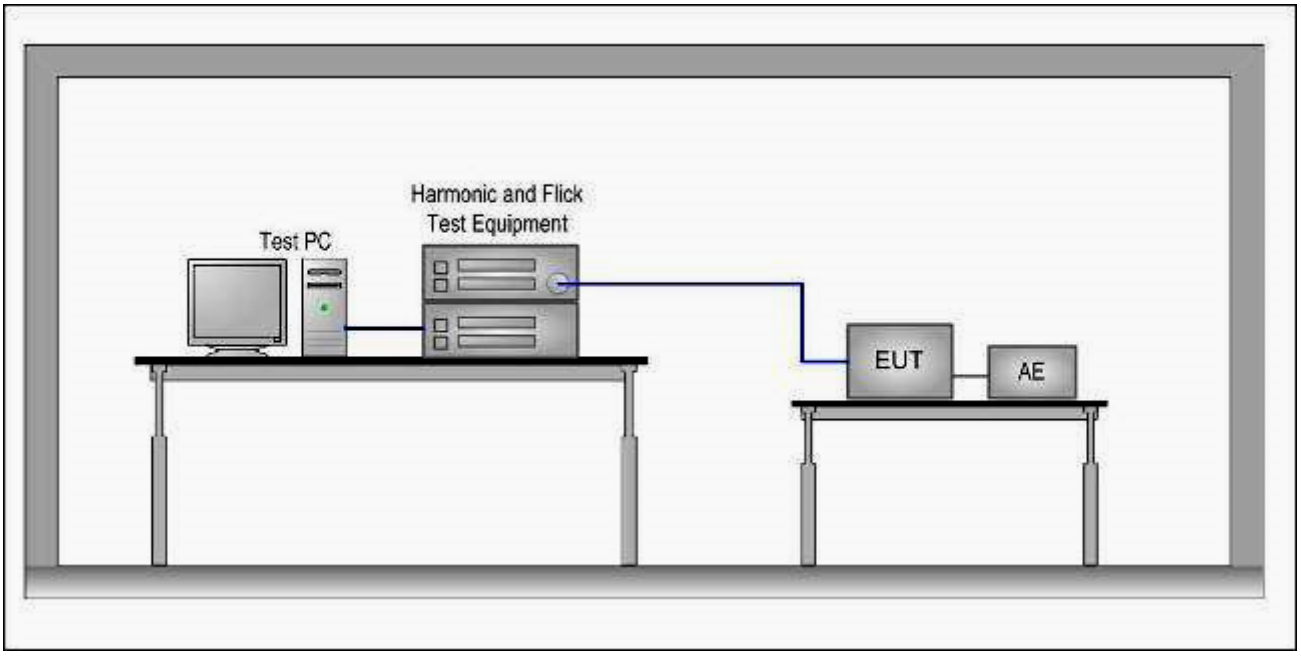
Temperature: 22.0 °C Humidity: 53 % RH Atmospheric Pressure: 1005 mbar

EUT Operation: For items

A pre-test was performed on the EUT in motor running mode with 1 & 2 speed in order to find the worse case.

Test the EUT in motor running mode with 2 speed for the compliance test as the worse case was found.

5.3.2 Test Setup and Procedure



1. The EUT was tested with the equipment configured to its rated current.
2. The measurements were carried out under steady conditions. When a piece of EUT is brought into operation or is taken out of operation, manually or automatically, harmonic currents and power are not taken into account at first 10s following the switching event. EUT shall not be in standby mode for more than 10% of any observation period.
3. Harmonics of the fundamental current were measured using a digital power meter with an analogue output and frequency analyser which was integrated in the harmonic & flicker test system.
4. For each harmonic order, measure the 1,5 s smoothed r.m.s. harmonic current in each DFT time window and calculate the arithmetic average of the measured values from the DFT time windows, over the entire observation period. Each harmonic order, all 1.5 s smoothed r.m.s. harmonic current values and the average values for the individual harmonic currents, taken over the entire test observation period shall be less than or equal to the applicable limits.

5.3.3 Measurement Data

The EUT power less than 50W no test.

5.4 Flicker Test Result

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

5.4.1 E.U.T. Operation

Operating Environment:

Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1005 mbar

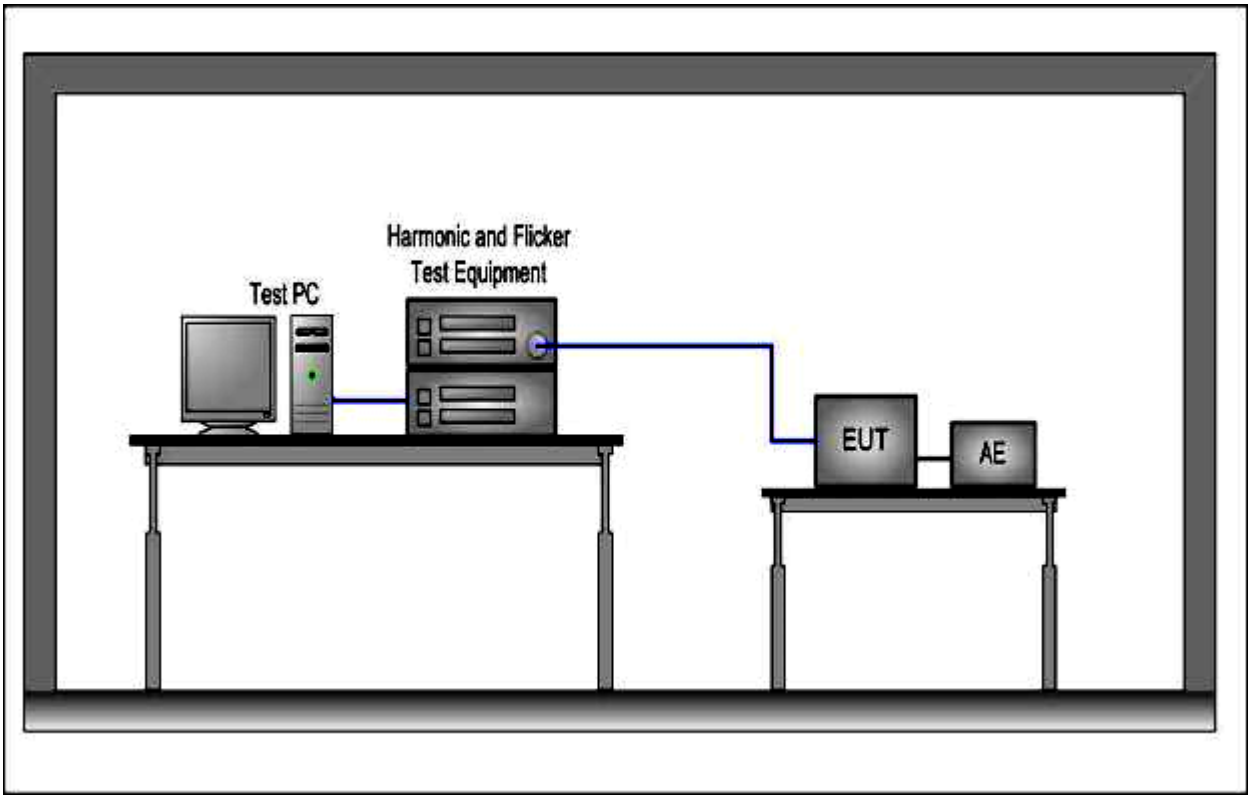
EUT Operation: Test the EUT in motor running mode.A pre-test was performed on the EUT in order to find the worst case.

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.

--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.

5.4.2 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.

5.4.3 Measurement Data

Flicker Test Summary per EN61000-3-3 (Run time)

Test Result: Pass Status: Test Completed

Psti and limit line **European Limits**

Parameter values recorded during the test:

Vrms at the end of test (Volt):	**229.73**			
Highest dt (%):	**0.00**	**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):	**0.364**	**Test limit:**	**1.000**	**Pass**

6 Electromagnetic Susceptibility Test Results

6.1 Performance Criteria Description in Clause 6 of 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.

6.2 ESD

Test Requirement:	EN 55014-2	
Test Method:	EN 61000-4-2	
Criterion Required:	B	
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	

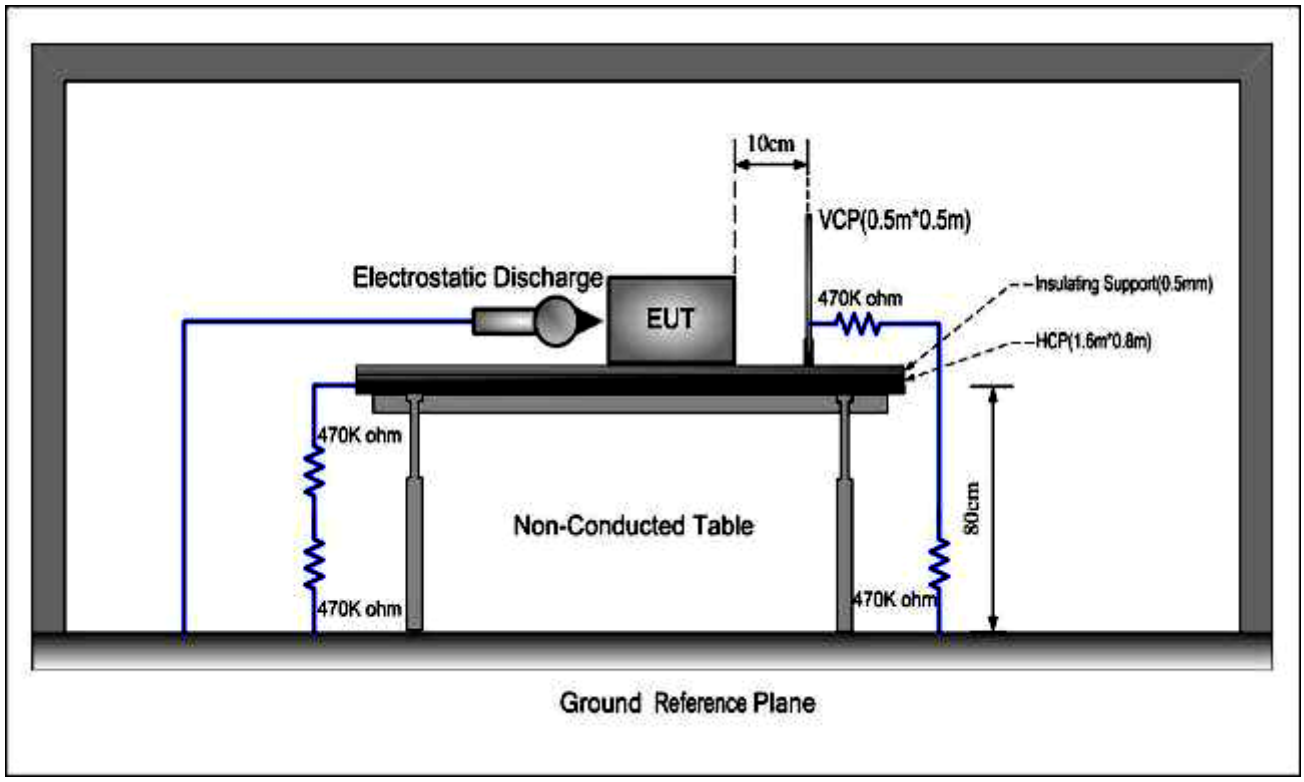
6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 53 % RH Atmospheric Pressure: 1006 mbar

EUT Operation: Test the EUT in motor running mode.

6.2.2 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.

6.2.3 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).

6.3 Electrical Fast Transients (EFT)

Test Requirement:	EN 55014-2
Test Method:	EN 61000-4-4
Criterion Required:	B
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

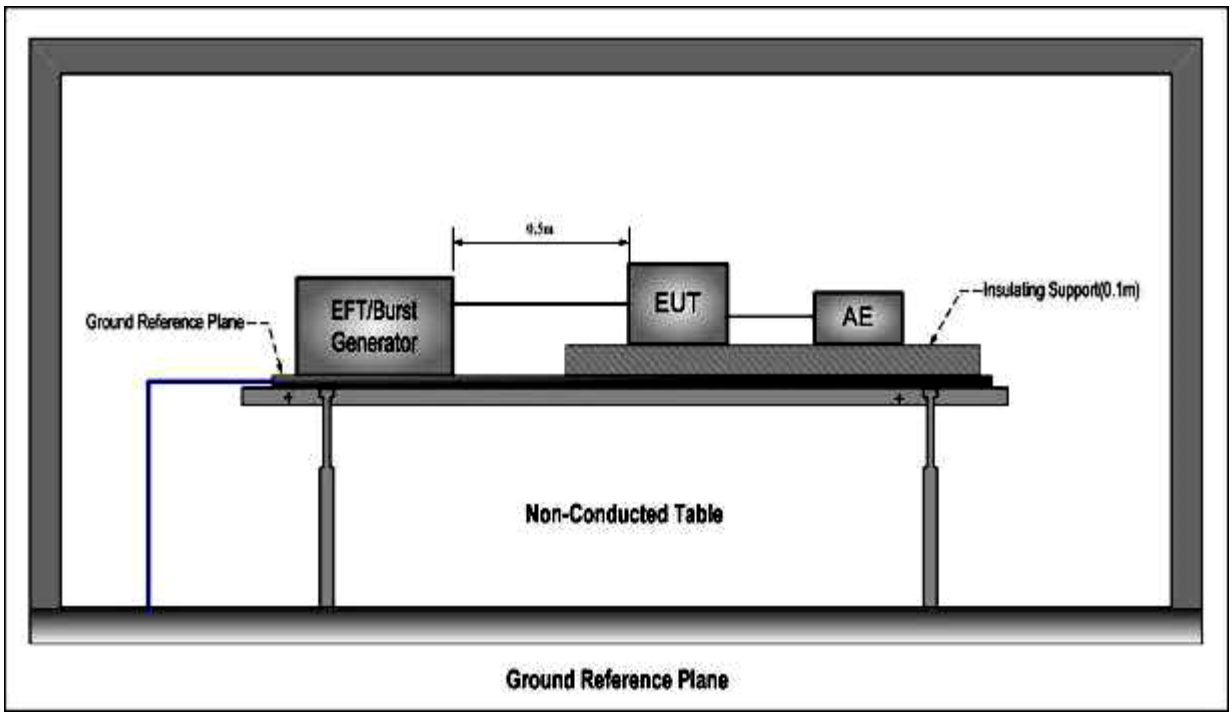
6.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 52 % RH Atmospheric Pressure: 1008 mbar

EUT Operation: Test the EUT in motor running mode.

6.3.2 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 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.
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.

6.3.3 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.

6.4 Surge

Test Requirement:	EN 55014-2
Test Method:	EN 61000-4-5
Criterion Required:	B
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°.

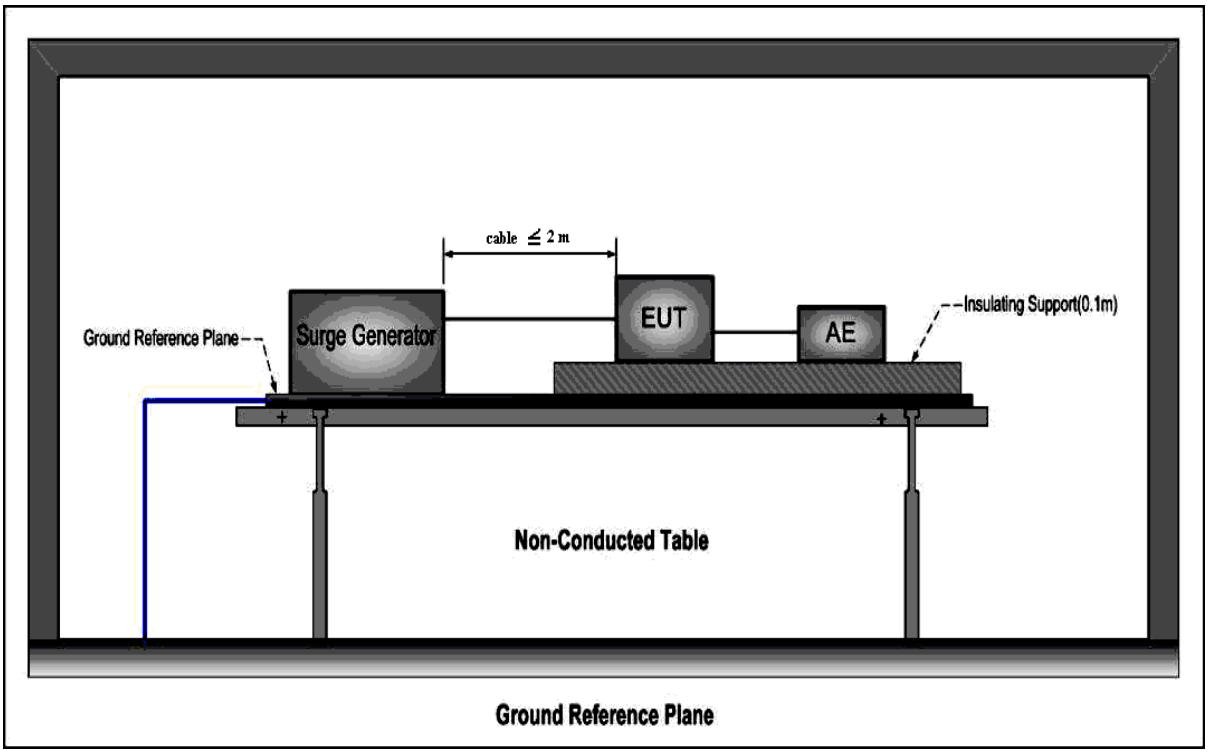
6.4.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 52 % RH Atmospheric Pressure: 1008 mbar

EUT Operation: Test the EUT in motor running mode.

6.4.2 Test Setup and Procedure



1. he 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.

6.4.3 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)

6.5 Conducted Immunity 0.15MHz to 230MHz

Test Requirement:	EN 55014-2
Test Method:	EN 61000-4-6
Criterion Required:	A
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

6.5.1 E.U.T. Operation

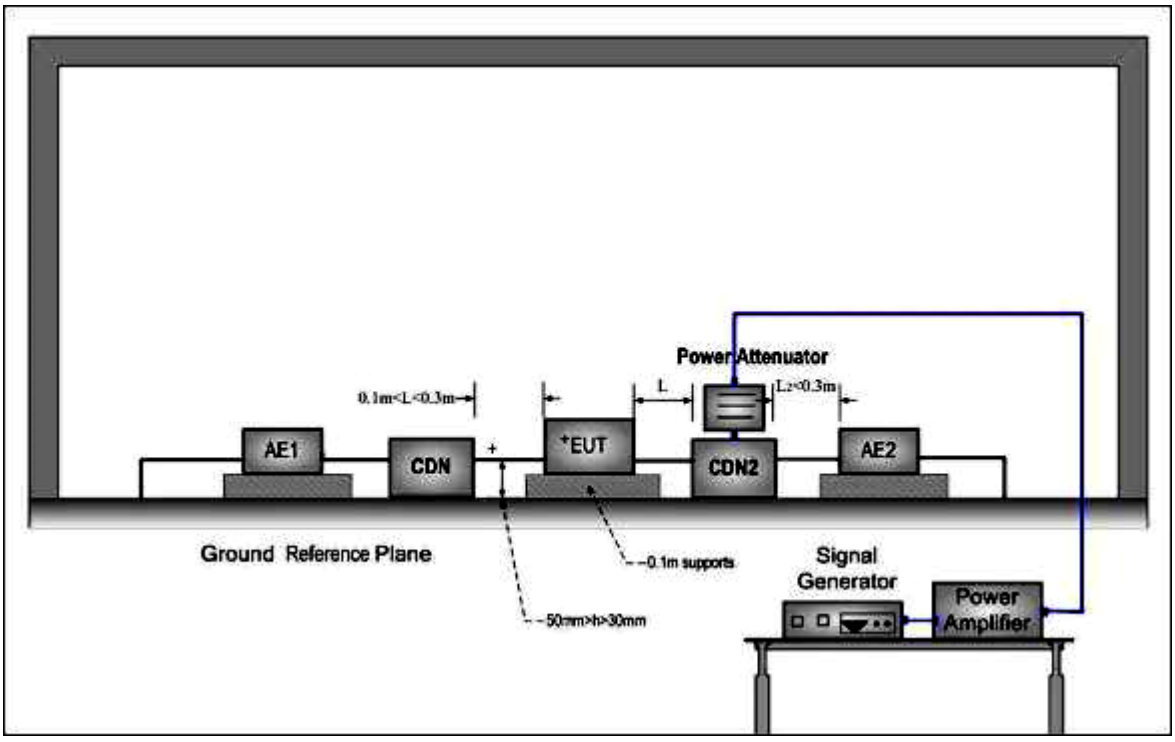
Operating Environment:

Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1005 mbar

EUT Operation: Test the EUT in motor running mode.

6.5.2 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.

6.5.3 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)

6.6 Voltage Dips and Interruptions

Test Requirement:	EN 55014-2
Test Method:	EN 61000-4-11
Criterion Required:	C
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

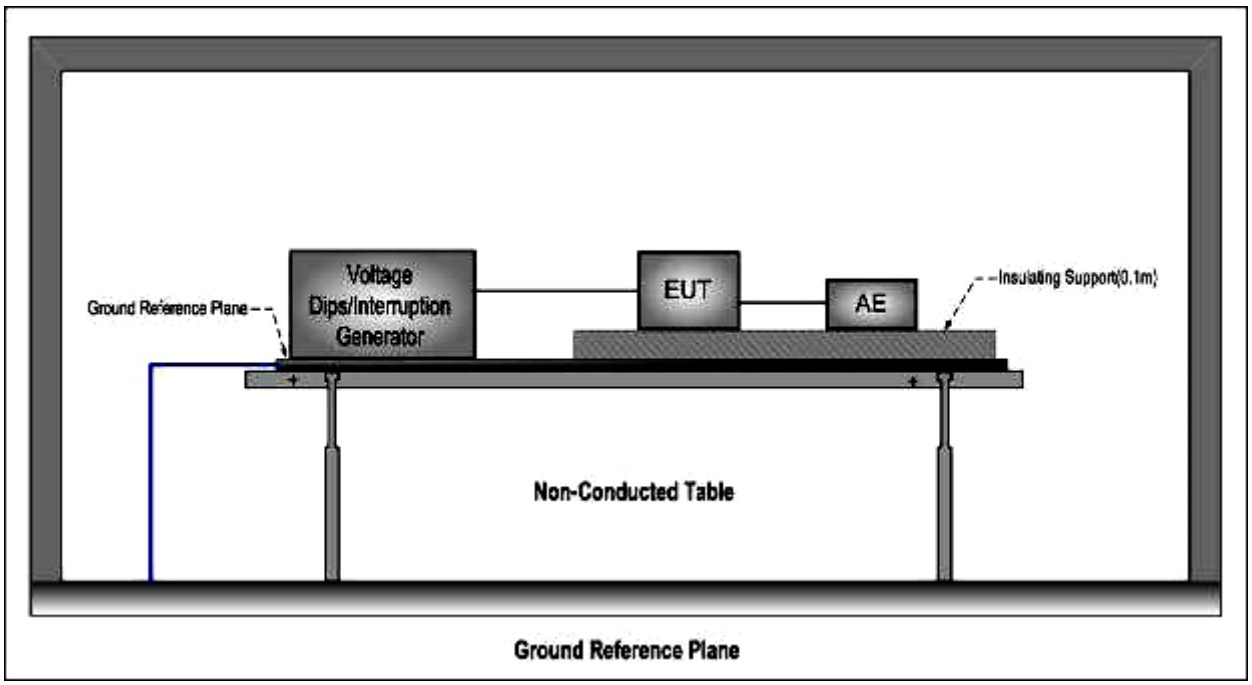
6.6.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 52 % RH Atmospheric Pressure: 1008 mbar

EUT Operation: Test the EUT in motor running mode.

6.6.2 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.

6.6.3 Test Results

$\mathbf{U_{T=}}$ 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	(A)
70	0°	25	3	10s	(B)

Remark:

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

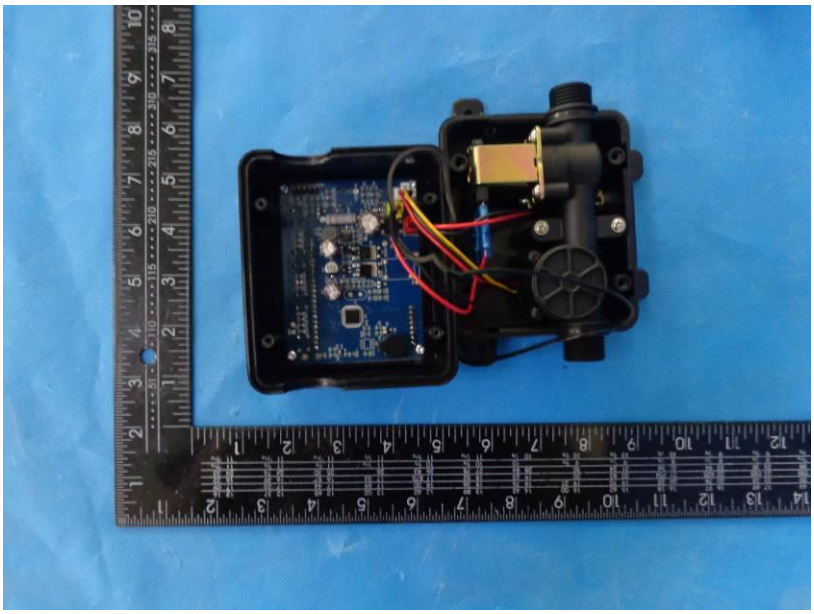
B: During test there some flick of the EUT, it could recover automatically after test.

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

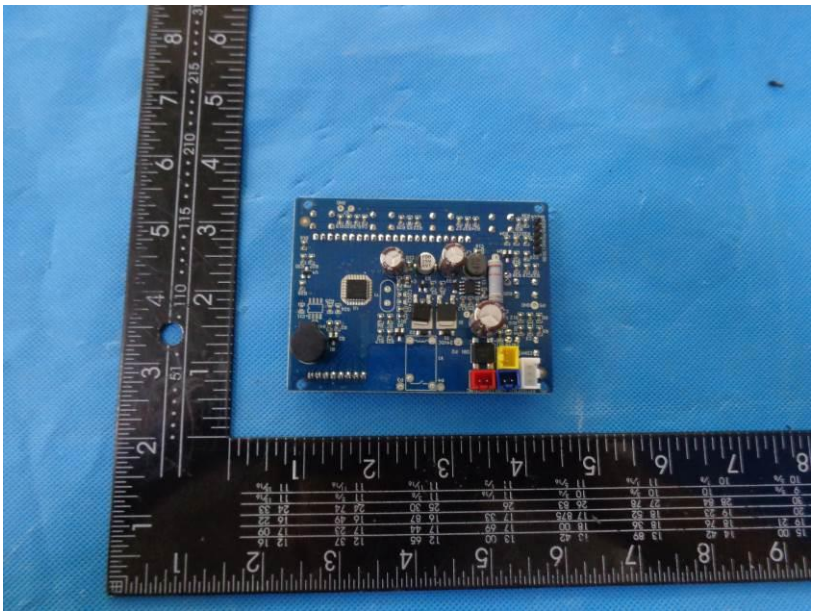
6.7 EUT Constructional Details

Pic 1

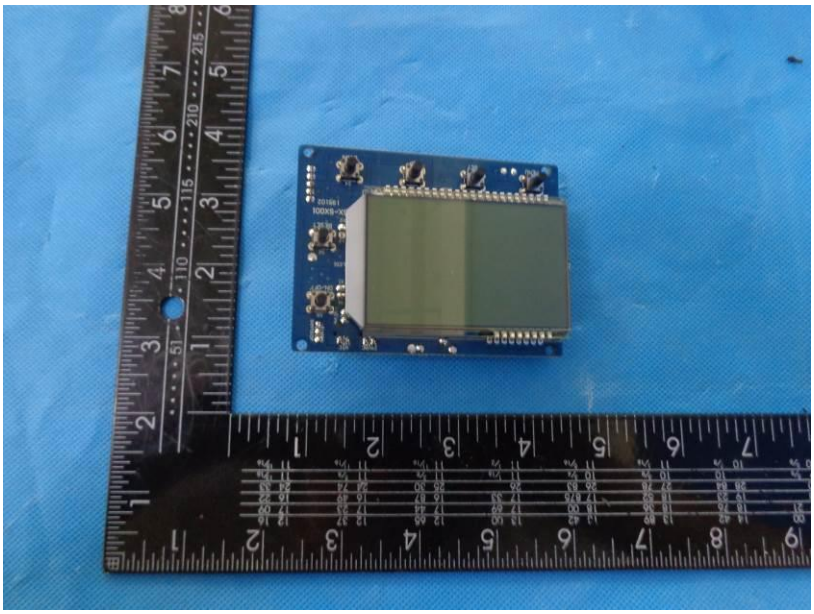
Pic 2



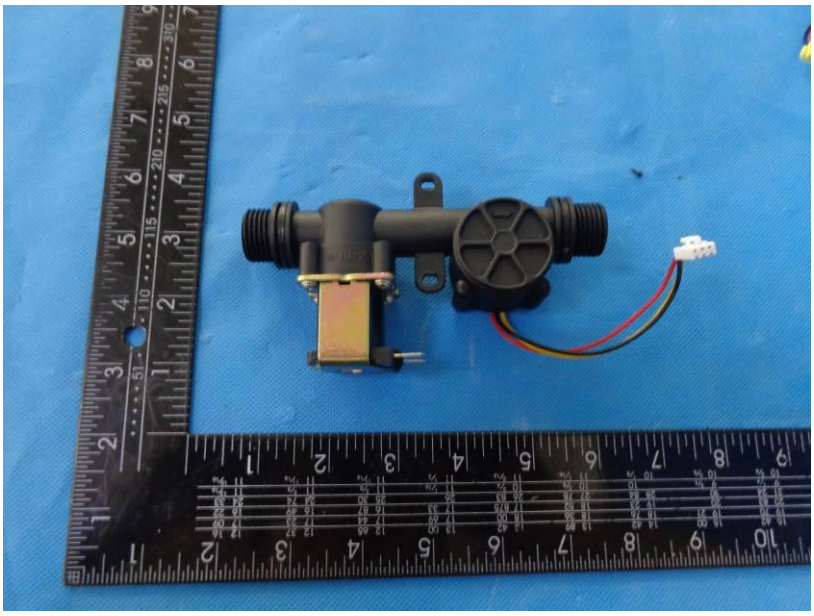
Pic 3



Pic 4



Pic 5



Pic 6

--End of Report--