

# Test Report

Applicant: XIAMEN COMFORT SCIENCE & TECHNOLOGY GROUP CO., LTD.

Product Name: Massage Chair

Brand Name: N/A

Model No.: EC-628K, OG7598P, EC-628P

Date of Receipt : Nov.24, 2019

Date of Test: Nov.25-26, 2019

Date of Report: Nov.27, 2019

Prepared by: Shenzhen Most Technology Service Co., Ltd.

**The EMC testing has been performed on the submitted samples and found in compliance with the council EMC directive 2014/30/EU.**

Shenzhen Most Technology Service Co., Ltd.  
No.5, 2nd Langshan Road, North District, Hi-tech Industry Park,  
Nanshan, Shenzhen, Guangdong, China  
Phone: 86-755-86026850  
Fax: 86-755-26013350  
[http:// www.szmost.com](http://www.szmost.com)


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APPENDIX I	(2 pages)
APPENDIX II	(1 page)

## TEST REPORT DECLARATION

Report Number	MTEN19111948	
Applicant	XIAMEN COMFORT SCIENCE & TECHNOLOGY GROUP CO., LTD.	
	(5/F) NO.168, QIANPU ROAD, SIMING DISTRICT, XIAMEN, CHINA	
Manufacturer	XIAMEN COMFORT SCIENCE & TECHNOLOGY GROUP CO., LTD.	
	(5/F) NO.168, QIANPU ROAD, SIMING DISTRICT, XIAMEN, CHINA	
Product	Product Name	Massage Chair
	Model No.	EC-628K
	Power Supply	AC220-240V, 50-60Hz
Test Result	The EUT was found compliant with the requirement(s) of the standards.	
Standard	EN 55014-1:2017, EN IEC 61000-6-1:2019, EN 61000-3-3:2013, EN 55014-2:2015(IEC 61000-4-2:2008, IEC 61000-4-4:2012, IEC 61000-4-5:2014+A1:2017, IEC 61000-4-6:2013, IEC 61000-4-11:2004+A1:2017)	
<p><b>*Note</b></p> <p>The above device has been tested by Shenzhen Most Technology Service Co., Ltd. To determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test record, data evaluation &amp; Equipment Under Test (EUT) configurations represented are contained in this test report and Shenzhen Most Technology Service Co., Ltd. Is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the requirement of the above standards.</p> <p>This report applies to above tested sample only. This report shall not be reproduced except in full, without written approval of Shenzhen Most Technology Service Co., Ltd., this document may be altered or revised by Shenzhen Most Technology Service Co., Ltd., personal only, and shall be noted in the revision of the document.</p>		
Prepared by	<i>Lili Lu</i>	
	Lili Lu(Engineer)	
Reviewed by	<i>Sunny</i> 	
	Sunny Deng(Engineer)	
Approved by	<i>Yvette Zhou</i>	
	Yvette Zhou(Manager)	

# 1. GENERAL INFORMATION

## 1.1. Description of Device (EUT)

Description	:	Massage Chair
Model Number	:	EC-628K, OG7598P,EC-628P
Remark	:	Uses EC-628K does all tests

## 1.2. Operational Mode(s) of EUT

Order Number	:	Test Mode(s)
1	:	Running

## 1.3. Test Voltage(s) of EUT

Order Number	:	Test Voltage(s)
1	:	AC 230V/50Hz

## 2. DESCRIPTION OF TEST STANDARD

The intention of this publication is to establish uniform requirements for the radio disturbance level of the equipment contained in the scope, to fix limits of disturbance, to describe methods of measurement and to standardize operating conditions and interpretation of results.

The following referenced standard are indispensable for the application of this report.

Referenced Description below:

EN 55014-1:2017

Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus -- Part 1: Emission.

EN IEC 61000-6-1:2019

Limits for harmonic current emissions (equipment input current  $\leq 16$  A per phase).

EN 61000-3-3:2013

Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current  $\leq 16$  A per phase and not subject to conditional connection.

EN 55014-2:2015

Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus -- Part 2: Immunity - Product family standard

### 3. LABORATORY INFORMATION

#### 3.1. Laboratory Name

Shenzhen Most Technology Service Co., Ltd.

#### 3.2. Location

No.5, 2<sup>nd</sup> Langshan Road, North District, Hi-tech Industrial Park, Nanshan, Shenzhen, Guangdong, China

#### 3.3. Test facility

- 3m Anechoic Chamber : Nov. 28, 2012 File on Federal Communication Commission  
Registration Number:490827
  
- Shielding Room : Nov. 28, 2012 File on Federal Communication Commission  
Registration Number:490827
  
- EMC Lab. : Accredited by TUV Rheinland Shenzhen  
Audit Report: UA 50149851  
Mar. 12, 2009  
  
 Accredited by Industry Canada  
 Registration Number: 7103A-1  
 Oct. 22, 2012  
  
 Accredited by TIMCO  
 Registration Number: Q1460  
 March 28, 2010

#### 3.4. Measurement Uncertainty

No.	Item	Uncertainty
1.	Uncertainty for Conducted Disturbance Test	1.25dB
2.	Uncertainty for Power Clamp Test	1.15dB
3.	Uncertainty for Radiated Disturbance Test	3.15dB

#### 4. SUMMARY OF TEST RESULTS

<b>EMISSION</b>			
<b>Test Item</b>	<b>Standard</b>	<b>Limits</b>	<b>Results</b>
Conducted disturbance at mains terminals	EN 55014-1:2017	Class B	PASS
Radiated disturbance	EN 55014-1:2017	Class B	N/A
Disturbance power test	EN 55014-1:2017	Class B	PASS
Harmonic current emissions	EN IEC 61000-6-1:2019	---	PASS
Voltage fluctuations & flicker	EN 61000-3-3:2013	---	PASS
Clicks	EN 55014-1:2017	---	PASS
<b>IMMUNITY (EN 55014-2:2015)</b>			
<b>Test Item</b>	<b>Basic Standard</b>	<b>Performance Criteria</b>	<b>Results</b>
Electrostatic discharge (ESD)	IEC 61000-4-2:2008	B	PASS
Radio-frequency, Continuous radiated disturbance	IEC 61000-4-3:2006+A1:2007+A2:2010	A	N/A
Electrical fast transient (EFT)	IEC 61000-4-4:2012	B	PASS
Surge (Input a.c. power ports)	IEC 61000-4-5:2014+A1:2017 IEC 61000-4-6:2013	B	PASS
Radio-frequency, Continuous conducted disturbance		A	PASS
Voltage dips, 60% reduction	IEC 61000-4-11:2004+A1:2017	C	PASS
Voltage dips, 30% reduction	IEC 61000-4-11:2004+A1:2017	C	PASS
Voltage interruptions	IEC 61000-4-11:2004+A1:2017	C	PASS
N/A is an abbreviation for Not Applicable.			

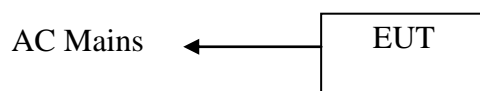
Because the electronic control circuitry of EUT with no Oscillator frequency higher than 15MHz, and is power by mains only, According to EN 55014-2 section 4, the EUT may be defined as category II. Radiation immunity (IEC 61000-4-3) need no test.



## 5. BLOCK DIAGRAM OF TEST SETUP

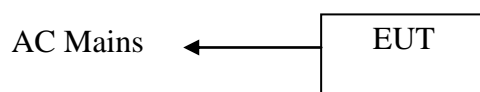
The equipments are installed test to meet EN 55014-1 requirement and operating in a manner which tends to maximize its emission characteristics in a normal application. EUT was tested in normal configuration (Please See following Block diagrams)

### 5.1. Block Diagram of connection between EUT and simulation-EMI



(EUT: Massage Chair )

### 5.2. Block Diagram of connection between EUT and simulation-EMS



(EUT: Massage Chair )

## 6. TEST INSTRUMENT USED

### 6.1. For Conducted Disturbance at Mains Terminals Emission Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	100492	Mar. 09, 19	1 Year
2.	L.I.S.N.	Rohde & Schwarz	ENV216	100093	Mar. 09, 19	1 Year
3.	Coaxial Switch	Anritsu Corp	MP59B	6200283933	Mar. 09, 19	1 Year
4.	Terminator	Hubersuhner	50Ω	No.1	Mar. 09, 19	1 Year
5.	RF Cable	SchwarzBeck	N/A	No.1	Mar. 09, 19	1 Year

### 6.2. For Power Clamp Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	100492	Mar. 09, 19	1 Year
2.	Absorbing Clamp	Luthi	MDS21	3635	Mar. 09, 19	1 Year
3.	Coaxial Switch	Anritsu Corp	MP59B	6200283933	Mar. 09, 19	1 Year

### 6.3. For Radiation Test (In Anechoic Chamber)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESPI	101202	Mar. 09, 19	1 Year
2.	Bilog Antenna	Sunol	JB3	A121206	Mar. 09, 19	1 Year
3.	Cable	Resenberger	N/A	NO.1	Mar. 09, 19	1 Year
4.	Cable	SchwarzBeck	N/A	NO.2	Mar. 09, 19	1 Year
5.	Cable	SchwarzBeck	N/A	NO.3	Mar. 09, 19	1 Year
6.	DC Power Filter	DuoJi	DL2×30B	N/A	N/A	N/A
7.	Single Phase Power Line Filter	DuoJi	FNF 202B30	N/A	N/A	N/A
8.	3 Phase Power Line Filter	DuoJi	FNF 402B30	N/A	N/A	N/A

### 6.4. For Harmonic / Flicker Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	AC Power Source	Kikusui	AC40MA	LM003232	Mar. 09, 19	1 Year
2.	Test Analyzer	Kikusui	KHA1000	LM003720	Mar. 09, 19	1 Year
3.	Line Impedance Network	Kikusui	LN40MA-PCR-L	LM002352	Mar. 09, 19	1 Year

### 6.5. For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	Zhongsheng	ESD-203AX	023K14538	Mar. 09, 19	1 Year

### 6.6. For Electrical Fast Transient/Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMCPRO System	EM Test	UCS-500-M4	V0648102026	Mar. 09, 19	1 Year

### 6.7. For Surge Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMCPRO System	EM Test	UCS-500-M4	V0648102026	Mar. 09, 19	1 Year

### 6.8. For Injected Currents Susceptibility Test

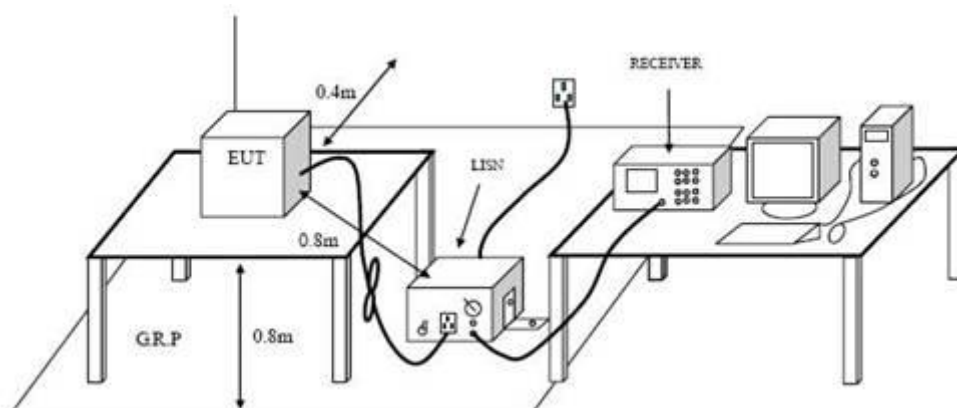
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	IFR	2032	203002/100	Mar. 09, 19	1 Year
2.	Amplifier	A&R	150W1000	301584	NCR	NCR
3.	CDN	FCC	FCC-801-M2-25	47	Mar. 09, 19	1 Year
4.	CDN	FCC	FCC-801-M3-25	107	Mar. 10, 19	1 Year
5.	EM Injection Clamp	FCC	F-203I-23mm	403	Mar. 10, 19	1 Year
6.	RF Cable	MIYAZAKI	N/A	No.1/No.2	Mar. 10, 19	1 Year

### 6.9. For Voltage Dips and Interruptions Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMCPRO System	EM Test	UCS-500-M4	V0648102026	Mar. 09, 19	1 Year

## 7. CONDUCTED DISTURBANCE AT MAINS TERMINALS TEST

### 7.1. Configuration of Test System



### 7.2. Test Standard

EN 55014-1:2017

### 7.3. Power Line Conducted Disturbance at Mains Terminals Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level Db( $\mu$ V)	Average Level Db( $\mu$ V)
150kHz ~ 500kHz	66 ~ 56*	59 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. \* Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

### 7.4. Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. #1). This provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to EN 55014-1 on Conducted Disturbance at Mains Terminals test.

The bandwidth of test receiver is set at 9 kHz.

The frequency range from 150kHz to 30MHz is checked. The test result are reported on Section 7.5.

## 7.5. Conducted Disturbance at Mains Terminals Test Results

7.5.1. Test Results: **PASS**

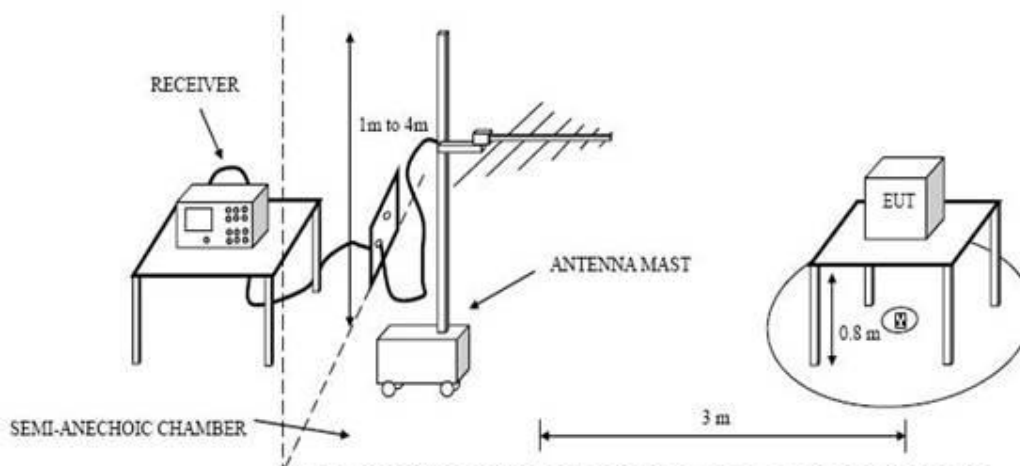
7.5.2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

7.5.3. Emission Level= Correct Factor + Reading Level.

7.5.4. The test data and the scanning waveform are attached within Appendix I.

## 8. RADIATED DISTURBANCE TEST

### 8.1. Configuration of Test System



### 8.2. Test Standard

EN 55014-1:2017

### 8.3. Radiated Disturbance Limit

All emanations from devices or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMITS (dB $\mu$ V/m)
30 ~ 230	3	40
230 ~ 1000	3	47

Note: 1. The lower limit shall apply at the transition frequencies.

2. Distance refers to the distance in meters between the test antenna and the closed point of any part of the EUT.

### 8.4. Test Procedure

The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 10m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to EN 55014-1 on Radiated Disturbance test.

The bandwidth setting on the test receiver is 120 kHz.

The frequency range from 30MHz to 1000MHz is checked. The test result are reported on Section 7.5.

## 8.5. Radiated Disturbance Test Results

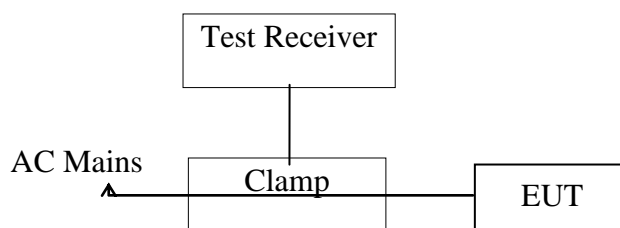
8.5.1. Test Results: **N/A**

8.5.2. Emission Level = Correct Factor + Reading Level.

8.5.3. All readings are Quasi-Peak values.

## 9. DISTURBANCE POWER TEST

### 9.1. Configuration of Test System



### 9.2. Test Standard

EN 55014-1:2017

### 9.3. Radiated Disturbance Limit

All emanations from devices or system including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	Interference Power Limits (dBpW)	
	Quasi-peak Value	Average Value
30 ~ 300	45 Increasing Linearly with Frequency to 55	35 Increasing Linearly with Frequency to 45

### 9.4. Test Procedure

The EUT is placed on the table which is high 0.8m by insulating support and away from other metallic surface at least 0.4m. It is connected to the power mains through an extension cord of 6m minimums. The absorber clamp was clamps the cord and moves from the far end to EUT to measure the disturbing energy emitted from the cord.

The bandwidth of the Test Receiver is set at 120kHz.

The frequency range from 30MHz to 300MHz is checked. The test result are reported on Section 8.5.



## 9.5. Radiated Disturbance Test Results

9.5.1. Test Results: **PASS**

9.5.2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

9.5.3. Emission Level = Correct Factor + Reading Level.

9.5.4. All readings are Quasi-Peak values.

9.5.5. The test data and the scanning waveform are attached within Appendix II.

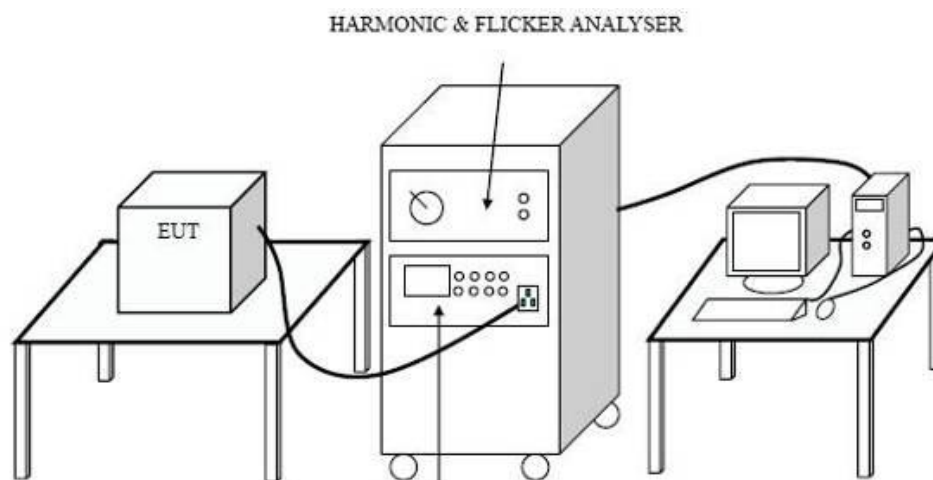
## 10. CLICKS

The EUT which fulfil the following condition:

- the click rate is no more than 5;
- none of the caused clicks has a duration longer than 20 ms,
- 90% of the caused clicks have a duration less than 10 ms (measured duration time is 0.4ms), was deemed to comply with the limits.

# 11.HARMONIC CURRENT TEST

## 11.1. Configuration of Test System



## 11.2.Test Standard

EN IEC 61000-6-1:2019

## 11.3.Test Limits

For Class A equipment, the harmonics of the input current shall not exceed the values given in below:

Harmonic order n	Maximum permissible Harmonic current A
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
$15 \leq n \leq 39$	$0.15 \frac{15}{n}$
Even harmonics	
2	1.08
4	0.43
6	0.30
$8 \leq n \leq 40$	$0.23 \frac{8}{n}$

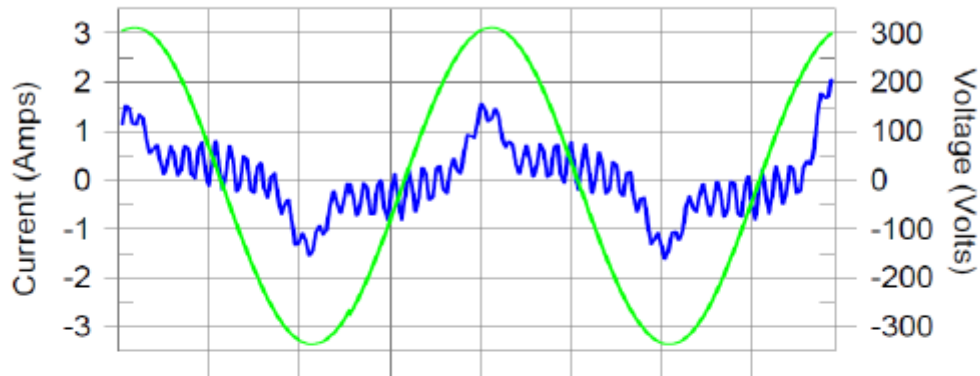
## 11.4.Test Results

11.4.1.Test Results: **PASS**

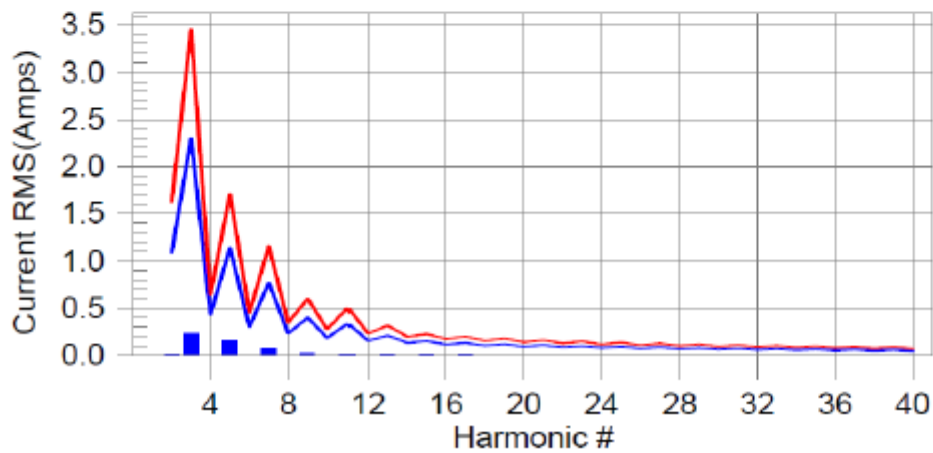
11.4.2.All test data on the following pages.

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line      European Limits



Test result: Pass Worst harmonics H5-9.3% of 150% limit, H5-13.2% of 100% limit

Highest parameter values during test:

V <sub>RMS</sub> (Volts):	229.89	Frequency(Hz):	50.00
I <sub>Peak</sub> (Amps):	2.343	I <sub>RMS</sub> (Amps):	0.744
I <sub>Fund</sub> (Amps):	0.569	Crest Factor:	3.441
Power (Watts):	125.4	Power Factor:	0.795

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.007	1.080	0.7	0.013	1.620	0.8	Pass
3	0.232	2.300	10.1	0.261	3.450	7.6	Pass
4	0.004	0.430	N/A	0.009	0.645	N/A	Pass
5	0.151	1.140	13.2	0.158	1.710	9.3	Pass
6	0.002	0.300	N/A	0.004	0.450	N/A	Pass
7	0.072	0.770	9.3	0.082	1.155	7.1	Pass
8	0.001	0.230	N/A	0.003	0.345	N/A	Pass
9	0.017	0.400	4.3	0.031	0.600	5.1	Pass
10	0.001	0.184	N/A	0.003	0.276	N/A	Pass
11	0.009	0.330	2.7	0.013	0.495	2.6	Pass
12	0.001	0.153	N/A	0.001	0.230	N/A	Pass
13	0.012	0.210	5.6	0.016	0.315	5.2	Pass
14	0.001	0.131	N/A	0.001	0.197	N/A	Pass
15	0.009	0.150	6.0	0.012	0.225	5.5	Pass
16	0.001	0.115	N/A	0.001	0.173	N/A	Pass
17	0.005	0.132	4.0	0.008	0.198	4.0	Pass
18	0.001	0.102	N/A	0.001	0.153	N/A	Pass
19	0.003	0.118	N/A	0.004	0.178	N/A	Pass
20	0.001	0.092	N/A	0.001	0.138	N/A	Pass
21	0.004	0.107	N/A	0.006	0.161	N/A	Pass
22	0.001	0.084	N/A	0.001	0.125	N/A	Pass
23	0.004	0.098	N/A	0.005	0.147	N/A	Pass
24	0.001	0.077	N/A	0.001	0.115	N/A	Pass
25	0.003	0.090	N/A	0.003	0.135	N/A	Pass
26	0.001	0.071	N/A	0.001	0.107	N/A	Pass
27	0.002	0.083	N/A	0.003	0.125	N/A	Pass
28	0.001	0.066	N/A	0.001	0.099	N/A	Pass
29	0.002	0.078	N/A	0.003	0.116	N/A	Pass
30	0.001	0.061	N/A	0.001	0.092	N/A	Pass
31	0.002	0.073	N/A	0.002	0.109	N/A	Pass
32	0.001	0.058	N/A	0.001	0.086	N/A	Pass
33	0.001	0.068	N/A	0.002	0.102	N/A	Pass
34	0.001	0.054	N/A	0.001	0.081	N/A	Pass
35	0.001	0.064	N/A	0.002	0.096	N/A	Pass
36	0.001	0.051	N/A	0.001	0.077	N/A	Pass
37	0.001	0.061	N/A	0.002	0.091	N/A	Pass
38	0.001	0.048	N/A	0.001	0.073	N/A	Pass
39	0.001	0.058	N/A	0.002	0.087	N/A	Pass
40	0.001	0.046	N/A	0.001	0.069	N/A	Pass

## 12. VOLTAGE FLUCTUATIONS & FLICKER TEST

### 12.1. Configuration of Test System

Same as Section 10.1.

### 12.2. Test Standard

EN 61000-3-3:2013

### 12.3. Test Limits

The limits shall be applicable to voltage fluctuations and flicker at the supply terminals of the equipment under test, the following limits apply:

the value of  $P_{st}$  shall not be greater than 1.0;

the value of  $P_{lt}$  shall not be greater than 0.65;

the value of  $d(t)$  during a voltage change shall not exceed 3.3% for more than 500ms;

the relative steady-state voltage change,  $dc$ , shall not exceed 3.3%;

the maximum relative voltage change  $d_{max}$ , shall not exceed

a) 4% without additional conditions;

b) 6% for equipment which is:

Switched manually, or

Switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

c) 7% for equipment which is

Attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or

switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

### 12.4. Test Results

12.4.1. Test Results: **PASS**

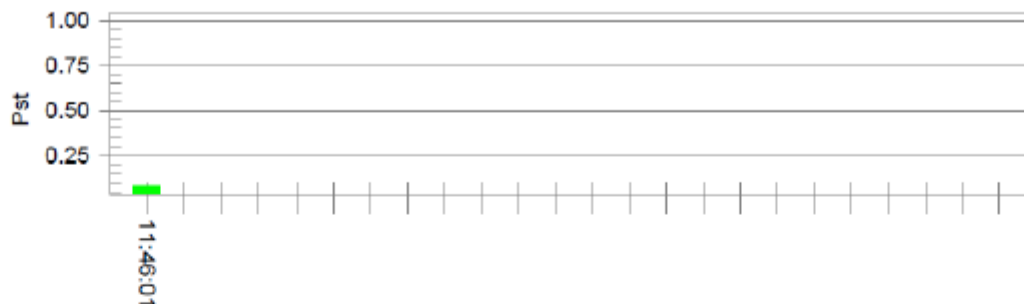
12.4.2. All test data on the following pages.

Test Result: Pass

Status: Test Completed

**Pst<sub>i</sub> and limit line**

**European Limits**



**Plt and limit line**



**Parameter values recorded during the test:**

Vrms at the end of test (Volt):	229.11		
T-max (mS):	0	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):	0.083	Test limit:	1.000 Pass
Highest Plt (2 hr. period):	0.036	Test limit:	0.650 Pass

## 13. IMMUNITY PERFORMANCE CRITERIA

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance level by its manufacturer or the requestor of the test, or the agreed between the manufacturer and the purchaser of the product.

Definition related to the performance level:

Based on the used product standard

Based on the declaration of the manufacturer, requestor or purchaser

Criterion A:

The apparatus shall continue to operate as intended during the test and 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. 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. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed, however. No change of actual operation 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 form the apparatus the apparatus if used as intended.

Criterion C:

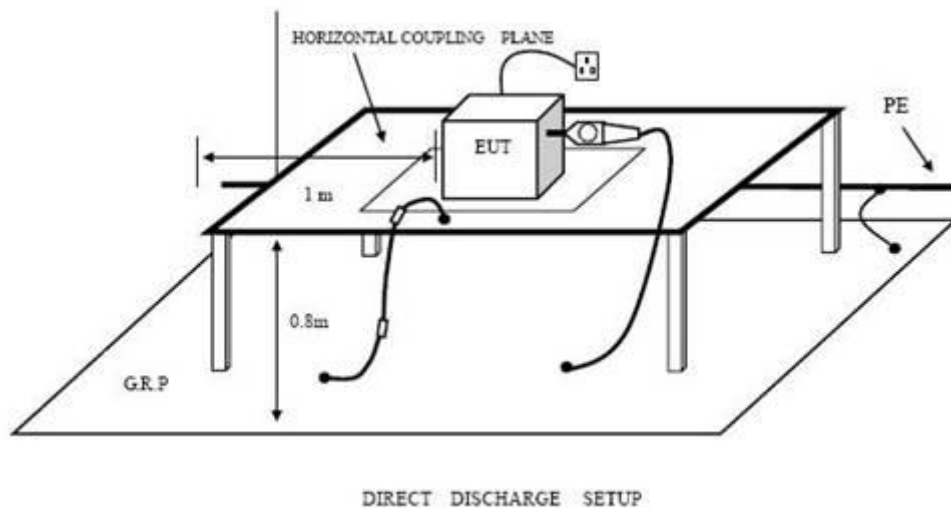
Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.



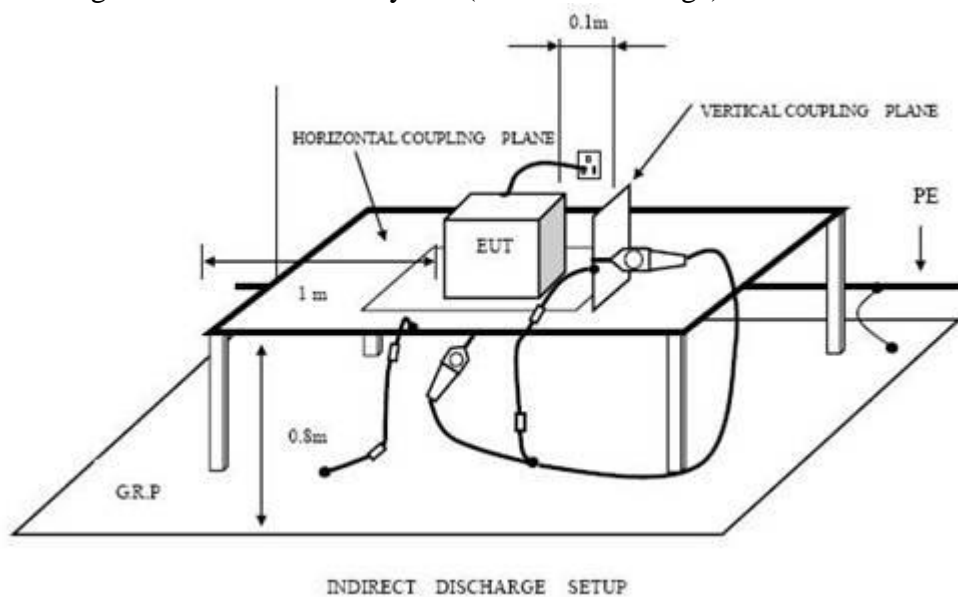
## 14.ELECTROSTATIC DISCHARGE IMMUNITY TEST

### 14.1.Configuration of Test System

#### 14.1.1. Configuration of ESD Test System(Direct Discharge)



#### 14.1.2.Configuration of ESD Test System(Indirect Discharge)



### 14.2.Test Standard

EN 55014-2:2015(IEC 61000-4-2:2008)  
 (Severity Level 3 for Air Discharge at 8KV,  
 Severity Level 2 for Contact Discharge at 4KV)

### 14.3. Severity Levels and Performance Criterion

#### 14.3.1. Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	2	2
2.	4	4
3.	6	8
4.	8	15
X	Special	Special

#### 14.3.2. Performance criterion : **B**

### 14.4. Test Procedure

#### 14.4.1. Air Discharge:

The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and repeated 20 times for each pre-selected test point. This procedure was repeated until all the air discharge completed

#### 14.4.2. Contact Discharge:

All the procedure was same as Section 13.4.1. except that the generator was re-triggered for a new single discharge for each pre-selected test point. The tip of the discharge electrode was touch the EUT before the discharge switch was operated.

#### 14.4.3. Indirect discharge for horizontal coupling plane

At least 20 single discharges were applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

#### 14.4.4. Indirect discharge for vertical coupling plane

At least 20 single discharge were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

### 14.5. Test Results

#### 14.5.1. Test Results: **PASS**

#### 14.5.2. Test data on the following pages.

# Electrostatic Discharge Test Results

Shenzhen Most Technology Service Co., Ltd.

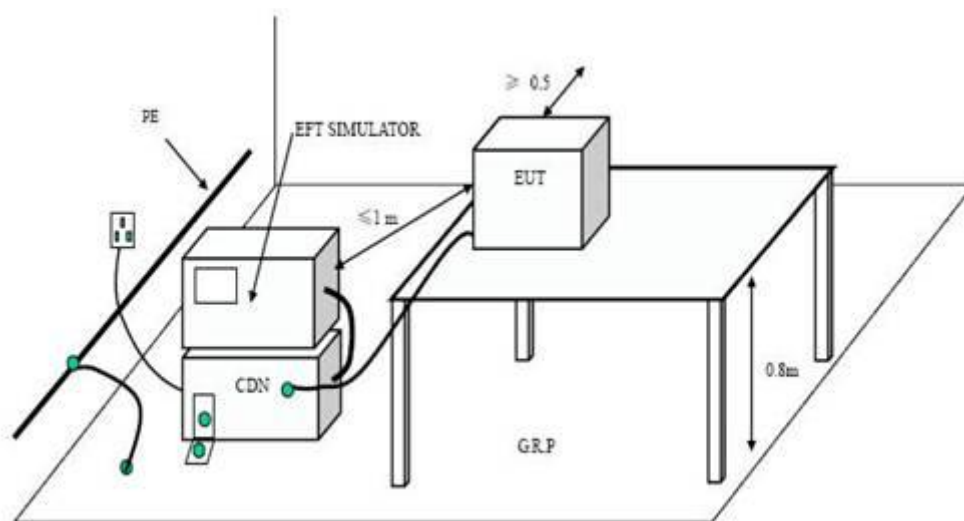
Test Voltage :	1	Test Date:	Nov.25,2019
Test Mode :	1	Criterion :	B
Temperature:	23 °C	Humidity:	56 %
<p><i>Air Discharge: ±8KV # For Air Discharge each Point Positive 10 times and negative 10 times discharge.</i></p> <p><i>Contact Discharge: ±4KV # For Contact Discharge each point positive 10 times and negative 10 times discharge</i></p>			
<i>Test Results Description</i>			
<b>Location</b>	<b>Kind</b> A-Air Discharge C-Contact Discharge		<b>Result</b>
Gaps	A		PASS
Switch	A		PASS
Keys	A		PASS
Port	C		PASS
Screen	A		PASS
Screw	C		PASS
HCP	C		PASS
VCP of Front	C		PASS
VCP of Rear	C		PASS
VCP of Left	C		PASS
VCP of Right	C		PASS
Remark :			

Discharge was considered on Contact and Air and Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).

Reviewer :  \_\_\_\_\_

# 15.ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

## 15.1.Configuration of Test System



## 15.2.Test Standard

EN 55014-2:2015 (IEC 61000-4-4:2012)  
(Severity Level 2 at 1KV)

## 15.3.Severity Levels and Performance Criterion

### 15.3.1.Severity level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal lines and control lines
1.	0.5 KV	0.25 KV
2.	1 KV	0.5 KV
3.	2 KV	1 KV
4.	4 KV	2 KV
X	Special	Special

### 15.3.2.Performance criterion : **B**

## 15.4. Test Procedure

The EUT and its simulators were placed on a the ground reference plane and were insulated from it by an wood support  $0.1\text{m} \pm 0.01\text{m}$  thick. The ground reference plane was  $1\text{m} \times 1\text{m}$  metallic sheet with  $0.65\text{mm}$  minimum thickness. This reference ground plane was project beyond the EUT by at least  $0.1\text{m}$  on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than  $0.5\text{m}$ . All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.

### 15.4.1. For input and AC power ports:

The EUT was connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both positive transients and negative transients of test voltage was applied during compliance test and the duration of the test can't less than 2mins.

### 15.4.2. For signal lines and control lines ports:

It's not I/O ports,  
It's unnecessary to test.

### 15.4.3. For DC input and DC output power ports:

It's not I/O ports,  
It's unnecessary to test.

## 15.5. Test Results

### 15.5.1. Test Results: **PASS**

### 15.5.2. Test data on the following pages.

# Electrical Fast Transient/Burst Test Results

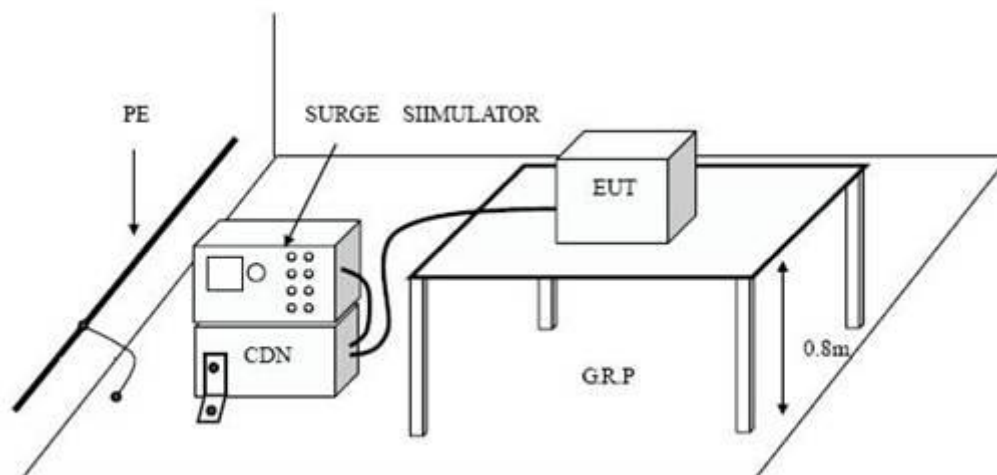
Shenzhen Most Technology Service Co., Ltd.

<i>Test Voltage</i> :	1	<i>Test Date:</i>	Nov.25,2019						
<i>Test Mode</i> :	1	<i>Criterion</i> :	B						
<i>Temperature:</i>	24 °C	<i>Humidity:</i>	55%						
<i>Test Results Description</i>									
<i>Inject Line</i>	<i>Voltage KV</i>	<i>Inject Time(s)</i>	<i>Inject Method</i>	<i>Results</i>	<i>Inject Line</i>	<i>Voltage KV</i>	<i>Inject Time(s)</i>	<i>Inject Method</i>	<i>Results</i>
L	±1	120	Direct	PASS					
N	±1	120	Direct	PASS					
L+N	±1	120	Direct	PASS					
PE	±1	120	Direct	PASS					
L+PE	±1	120	Direct	PASS					
N+PE	±1	120	Direct	PASS					
<i>Remark:</i>									

Reviewer :  \_\_\_\_\_

## 16.SURGE TEST

### 16.1.Configuration of Test System



### 16.2.Test Standard

EN 55014-2:2015 (IEC 61000-4-5:2014+A1:2017)  
 (Severity Level : Line to Line was Level 2 at 1KV  
 Line to PE was Level 3 at 2KV )

### 16.3.Severity Levels and Performance Criterion

#### 16.3.1.Severity level

Severity Level	Open-Circuit Test Voltage KV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

#### 16.3.2.Performance criterion : **B**

## 16.4. Test Procedure

16.4.1. Set up the EUT and test generator as shown on Section 15.1.

16.4.2. For line to line coupling mode, provide a 1KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points, and for active line / neutral line to ground are same except test level is 2KV.

16.4.3. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are applied during test.

16.4.4. Different phase angles are done individually.

16.4.5. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

## 16.5. Test Results

16.5.1. Test Results: **PASS**

16.5.2. Test data on the following pages.



## Surge Immunity Test Results

Shenzhen Most Technology Service Co., Ltd.

<i>Test Voltage</i> :	1	<i>Test Date:</i>	Nov.25,2019
<i>Test Mode</i> :	1	<i>Criterion</i>	B
<i>Temperature:</i>	24 °C	<i>Humidity:</i>	55 %

*Test Results Description*

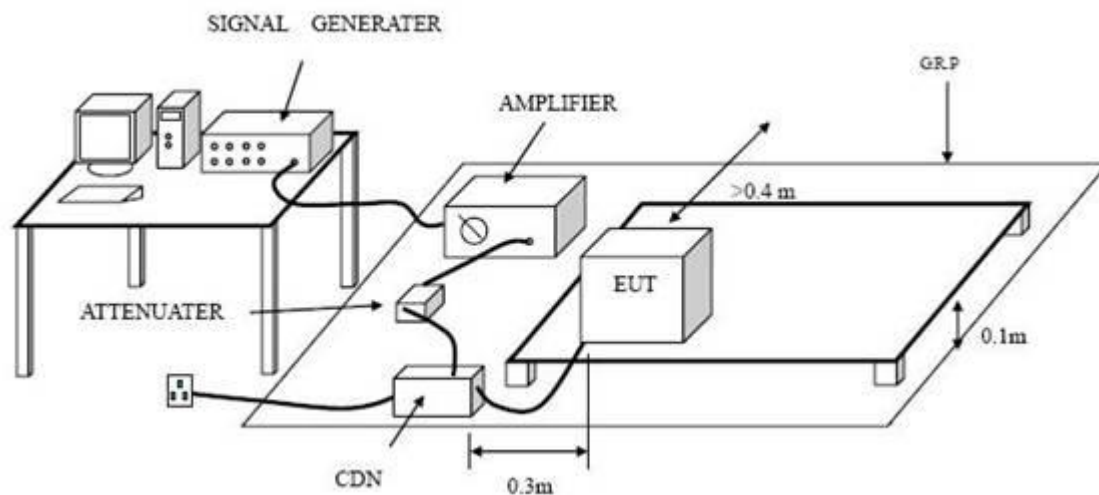
Location	Polarity	Phase Angle	No of Pulse	Pulse Voltage (KV)	Result
<i>L-N</i>	+	90	5	1.0	<i>PASS</i>
	-	270	5	1.0	<i>PASS</i>
<i>L-PE</i>	+	90	5	2.0	<i>PASS</i>
	-	270	5	2.0	<i>PASS</i>
<i>N-PE</i>	+	90	5	2.0	<i>PASS</i>
	-	270	5	2.0	<i>PASS</i>
<i>L+N-PE</i>	+	90	5	2.0	<i>PASS</i>
	-	270	5	2.0	<i>PASS</i>

*Remark:*

Reviewer :  \_\_\_\_\_

## 17. INJECTED CURRENTS SUSCEPTIBILITY TEST

### 17.1. Configuration of Test System



### 17.2. Test Standard

EN 55014-2:2015 (IEC61000-4-6:2013)

(Severity Level 2 at 3V (r.m.s.) and frequency is from 0.15MHz to 230MHz)

### 17.3. Severity Levels and Performance Criterion

#### 17.3.1. Severity level

Level	Voltage Level (e.m.f.) V
1.	1
2.	3
3.	10
X	Special

#### 17.3.2. Performance criterion: **A**

## 17.4. Test Procedure

- 17.4.1. Set up the EUT, CDN and test generators as shown on Section 16.1.
- 17.4.2. Let the EUT work in test mode and test it.
- 17.4.3. The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 17.4.4. The disturbance signal described below is injected to EUT through CDN.
- 17.4.5. The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 17.4.6. The frequency range is swept from 0.150MHz to 230MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
- 17.4.7. The rate of sweep shall not exceed  $1.5 \cdot 10^{-3}$  decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 17.4.8. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

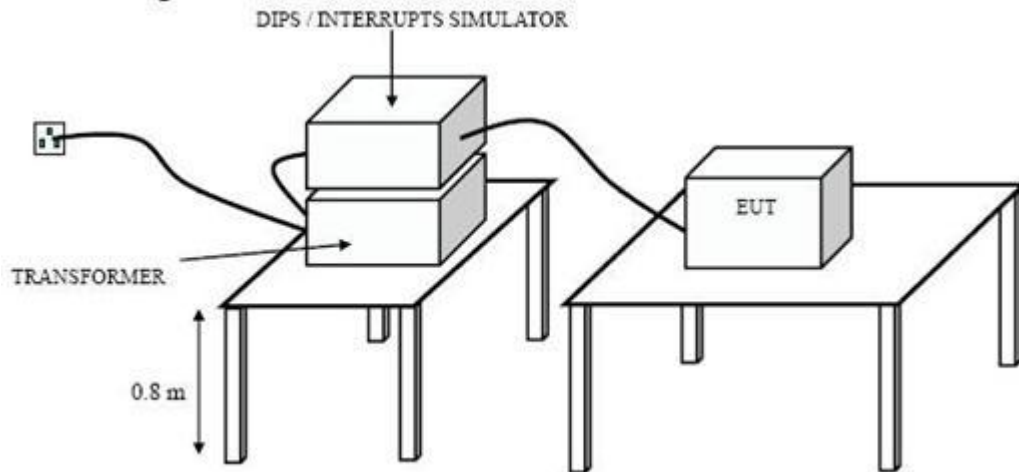
## 17.5. Test Results

- 17.5.1. Test Results: **PASS**
- 17.5.2. Test data on the following pages.



## 18. VOLTAGE DIPS AND INTERRUPTIONS TEST

### 18.1. Configuration of Test System



### 18.2. Test Standard

EN 55014-2:2015(IEC 61000-4-11:2004+A1:2017)

(Severity level: 0% 0.5 period  
70% 25 periods  
40% 10 periods )

### 18.3. Severity Levels and Performance Criterion

#### 18.3.1. Severity level

Test Level %U <sub>T</sub>	Voltage dip and short interruptions %U <sub>T</sub>	Performance Criterion	Duration (in period)
0	100	C	0.5
40	60	C	10
70	30	C	25

#### 18.3.2. Performance criterion : C

## 18.4. Test Procedure

18.4.1. Set up the EUT and test generator as shown on section 17.1.

18.4.2. The interruptions is introduced at selected phase angles with specified duration there is a 3mins minimum interval between each test event.

18.4.3. After each test a full functional check is performed before the next test.

18.4.4. Repeat procedures 2 & 3 for voltage dips only the test level and duration is changed.

18.4.5. Record any degradation of performance.

## 18.5. Test Results

18.5.1. Test Results: **PASS**

18.5.2. Test data on the following pages.

## Voltage Dips And Interruptions Test Results

Shenzhen Most Technology Service Co., Ltd.

<i>Test Voltage</i> : 1	<i>Test Date:</i> Nov.25,2019
<i>Test Mode</i> : 1	<i>Criterion</i> C
<i>Temperature:</i> 24 °C	<i>Humidity:</i> 55 %

### Test Results Description

<i>Test Level</i> % $U_T$	<i>Voltage Dips &amp; Short Interruptions</i> % $U_T$	<i>Duration</i> (in period)	<i>Phase Angle</i>	<i>Criterion</i>	<i>Result</i>
0	100	0.5P	$0 \sim 360^\circ$	C	PASS
70	30	25P	$0 \sim 360^\circ$	C	PASS
40	60	10P	$0 \sim 360^\circ$	C	PASS

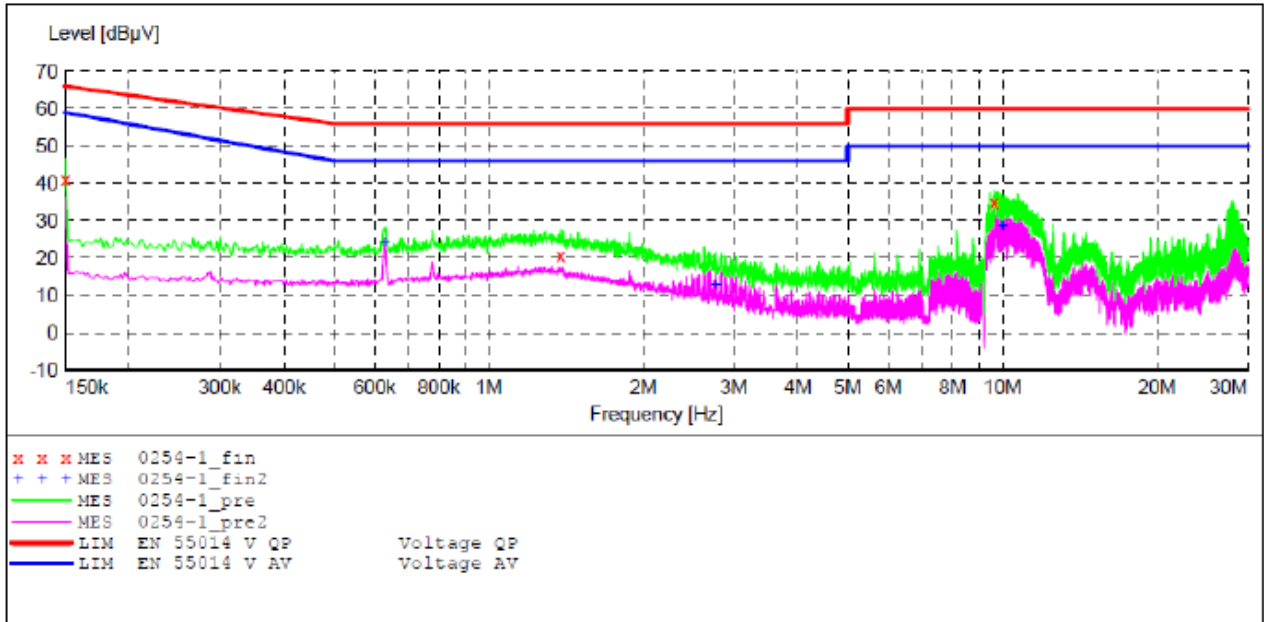
*Remark:*  $U_T$  is the rated voltage for the equipment.

Reviewer :  \_\_\_\_\_

# **APPENDIX I**



EUT:	Massage Chair	M/N:	EC-628K
Mode:	Running	Phase:	L
Test by:	Leo	Power:	AC 230V/50Hz
Temperature: / Humidity	28.0°C/66.0%	Test date:	2019-11-25



**MEASUREMENT RESULT: "0254-1\_fin"**

2018-3-5 17:11

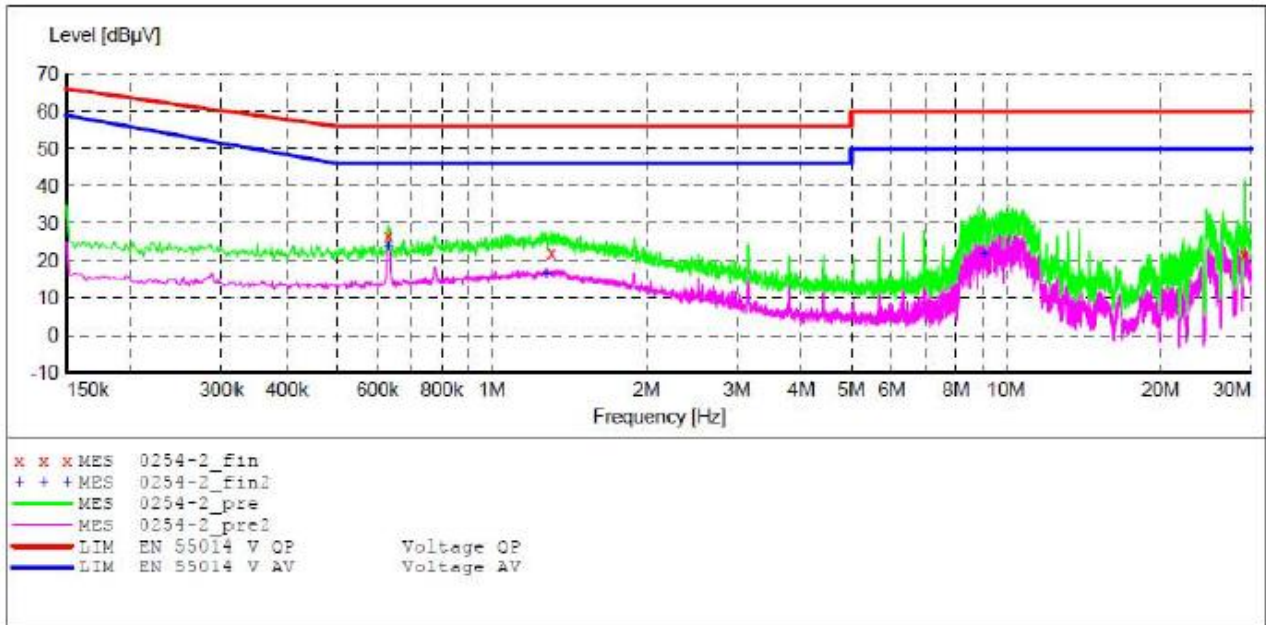
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	40.90	10.8	66	25.1	QP	L1	GND
1.380000	20.80	11.2	56	35.2	QP	L1	GND
9.645000	34.90	11.6	60	25.1	QP	L1	GND

**MEASUREMENT RESULT: "0254-1\_fin2"**

2018-3-5 17:11

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.628000	24.40	11.0	46	21.6	AV	L1	GND
2.765000	13.00	11.3	46	33.0	AV	L1	GND
9.980000	28.40	11.6	50	21.6	AV	L1	GND

EUT:	Massage Chair	M/N:	EC-628K
Mode:	Running	Phase:	N
Test by:	Leo	Power:	AC 230V/50Hz
Temperature: / Humidity	28.0°C/66.0%	Test date:	2019-11-25



**MEASUREMENT RESULT: "0254-2\_fin"**

2018-3-5 17:13

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.630000	26.70	11.0	56	29.3	QP	N	GND
1.306000	22.00	11.2	56	34.0	QP	N	GND
29.150000	21.70	11.8	60	38.3	QP	N	GND

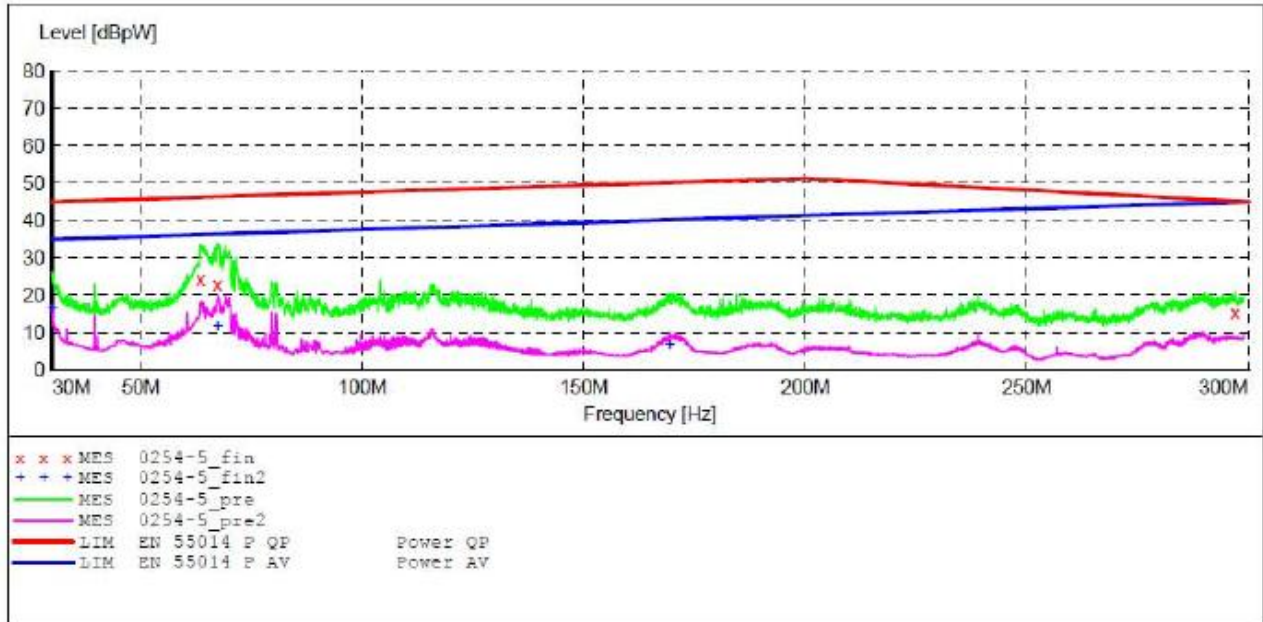
**MEASUREMENT RESULT: "0254-2\_fin2"**

2018-3-5 17:13

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.630000	23.90	11.0	46	22.1	AV	N	GND
1.278000	16.60	11.2	46	29.4	AV	N	GND
9.060000	21.70	11.6	50	28.3	AV	N	GND

# **APPENDIX II**

EUT:	Massage Chair	M/N:	EC-628K
Mode:	Running	Note:	AC Line
Test by:	Leo	Power:	AC 230V/50Hz
Temperature: / Humidity	28.0°C/66.0%	Test date:	2019-11-25



**MEASUREMENT RESULT: "0254-5\_fin"**

2018-3-5 17:44

Frequency MHz	Level dBpW	Transd dB	Limit dBpW	Margin dB	Det.	Position cm
63.480000	24.30	7.1	46	21.9	QP	0.0
67.260000	23.00	7.0	46	23.4	QP	0.0
297.120000	15.40	6.0	45	29.8	QP	0.0

**MEASUREMENT RESULT: "0254-5\_fin2"**

2018-3-5 17:44

Frequency MHz	Level dBpW	Transd dB	Limit dBpW	Margin dB	Det.	Position cm
30.000000	16.40	9.0	35	18.6	AV	0.0
67.440000	11.70	7.0	36	24.7	AV	0.0
169.380000	6.90	6.2	40	33.3	AV	0.0