

EMC TEST REPORT



Page 1 of 45

Report No NSL-160714010204-R

Applicant Wuxi Sans Electronic Co., Ltd
Industrial WuYi, DongGang Town, Wuxi City, Jiangsu Province, China

Product Li-ion Battery Charger
SSLC109V55

Specification EN 55014-1: 2006 +A1: 2009 +A2: 2011
EN 55014-2: 1997 +A1: 2001 +A2: 2008
EN 61000-3-2: 2006 +A1: 2009 +A2: 2009
EN 61000-3-3: 2013

Results Complies with the requirements of the above specification

Authorized by

A handwritten signature in black ink, appearing to read 'Robert Song'.

Robert Song



Issue Date

16 July, 2014

Laboratory

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All applicable tests according to the above specified standard, See clauses tested of the test report. Test results are valid only for the tested samples. This report shall not be reproduced, except in full, without the written approval of the NEW-STANDARD laboratory.

Form No.: RF-55014-A

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Report No.: NSL-160714010204-R

TEST REPORT

Electromagnetic compatibility requirements for
household appliances, electric tools and similar apparatus-
emission and immunity

Report:

Report No. : NSL-160714010204-R

Tested by
(Printed name and signature) : Jack Liu



.....

Approved by
(Printed name and signature) : Robert Song



.....

Date of issue : 16 July, 2014

Total number of pages : 45

Client:

Applicant name : Wuxi Sans Electronic Co., Ltd

Address : Industrial WuYi, DongGang Town, Wuxi City, Jiangsu Province, China

Manufacturer name : Same as applicant

Address : --

Factory name : Same as applicant

Address : --

Testing Laboratory:

Name : SUZHOU NEW-STANDARD LABORATORY CO LTD

Address : NO. 199, JINFENG ROAD, SUZHOU, 215011 P. R. CHINA

Testing location : NO. 1168, WUZHONG ROAD, SUZHOU, P. R. CHINA


Test specification:

Standard : EN 55014-1: 2006 +A1: 2009 +A2: 2011
EN 55014-2: 1997 +A1: 2001 +A2: 2008
EN 61000-3-2: 2006 +A1: 2009 +A2: 2009
EN 61000-3-3: 2013

Non-standard test method : --

Test Item:

Product/Description : Li-ion Battery Charger

Trade Mark : 

Model/Type reference : SSLC109V55

Ratings : Input: 100-240 V ~, 47-63 Hz, 2.0 A MAX
Output: 54.6 VDC, 2.0 A

Copy of marking plate



Report No.: NSL-160714010204-R

Test item particulars:

Class of equipment : Class I
 Test voltage : AC 230 V, 50 Hz
 Working condition : On mode

Possible test case verdicts:

- test case does not apply to the test object : N (Not applicable)
 - test object does meet the requirement : P (Pass)
 - test object does not meet the requirement : F (Fail)

Testing:

Date of receipt of test item : 01 July, 2014
 Date(s) of performance of tests : 01 July, 2014 to 16 July, 2014

Environmental condition:

Ambient temperature (°C) : 22-25
 Relative humidity (%) : 35-45
 Atmospheric pressure (kPa) : 102.1-102.9

General remarks:

“EUT” refer to equipment (sample) under test.
 “CDN” refer to coupling and decoupling network.
 “LISN” refer to line impedance stabilization network.
 Throughout this report a point is used as the decimal separator.

When determining of test conclusion, measurement uncertainty of test has been considered. The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of $k=2$. See below details.

Conducted Emission uncertainty (9-150 kHz): 3.6 dB
 Conducted Emission uncertainty (0.15-30 MHz): 3.5 dB
 Radiated Emission uncertainty (30-1000 MHz): 4.0 dB

General product information

This Li-ion Battery Charger is for household and indoor use. It's designed for charging Li-ion rechargeable battery only.

Report No.: NSL-160714010204-R

SUMMARY OF TESTING

| NO. | TEST(S) | STANDARD(S) | RESULT | |
|---------|---------------------------------------|---|---|---|
| 5 | EMISSION TEST | EN 55014-1: 2006 +A1: 2009 +A2: 2011 | P | |
| 5-1 | MAINS TERMINALS DISTURBANCE VOLTAGE | | P | |
| 5-2 | DISTURBANCE POWER | | P | |
| 5-3 | DISCONTINUOUS DISTURBANCE | | N | |
| 5-4 | RADIATED EMISSION | | N | |
| 5-5 | HARMONIC CURRENT | EN 61000-3-2: 2006 +A1: 2009 +A2: 2009 | P | |
| 5-6 | VOLTAGE FLUCTUATION AND FLICKER | EN 61000-3-3: 2013 | P | |
| 6 | IMMUNITY TEST | EN 55014-2: 1997 +A1: 2001 +A2: 2008 | P | |
| 6-1 | ELECTROSTATIC DISCHARGE | | EN 61000-4-2: 2009 | P |
| 6-2 | RADIO-FREQUENCY ELECTROMAGNETIC FIELD | | EN 61000-4-3: 2006 +A1: 2008 +A2: 2010 | N |
| 6-3 | ELECTRICAL FAST TRANSIENT | | EN 61000-4-4: 2012 | P |
| 6-4 | SURGE | | EN 61000-4-5: 2006 | P |
| 6-5 | INJECTED CURRENT | | EN 61000-4-6: 2014 | P |
| 6-6 | VOLTAGE DIPS AND SHORT INTERRUPTION | EN 61000-4-11: 2004 | P | |
| Remarks | | | | |

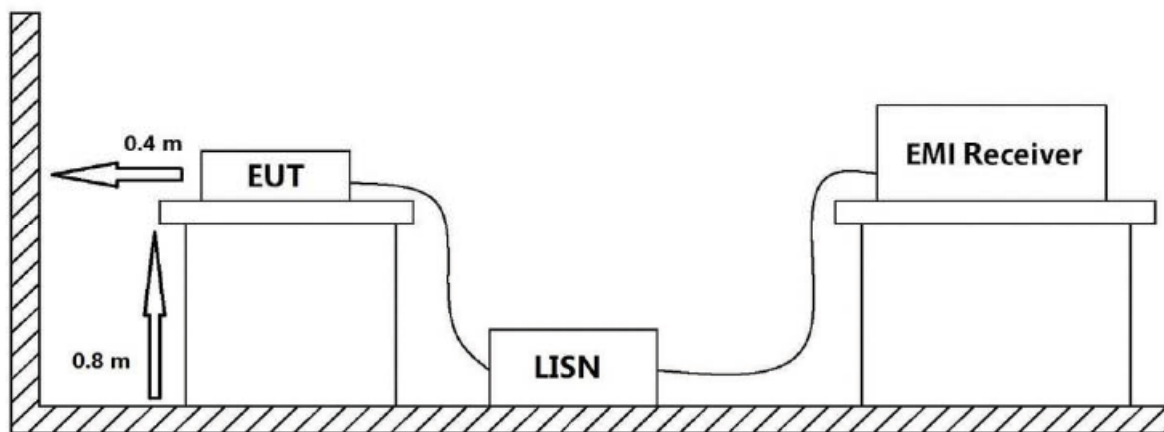
EMISSION TEST

5-1 MAINS TERMINALS DISTURBANCE VOLTAGE

5-1-1 TEST PROCEDURE

1. The EUT was placed on a non-conductive table which was 0.8 m above the ground plane. The rear of the EUT was 0.4 m from the vertical coupling plane and connected to the main power through a line impedance stabilization network (LISN). This set up provided 50 ohm / 50 μ H coupling impedance for the measuring equipment.
2. The conducted emissions were measured between the line phase and ground, and between the neutral phase and ground using an EMI Receiver.
3. The frequency range from 150 kHz to 30 MHz is checked.

5-1-2 TEST SETUP



5-1-3 MEASUREMENT LIMITS

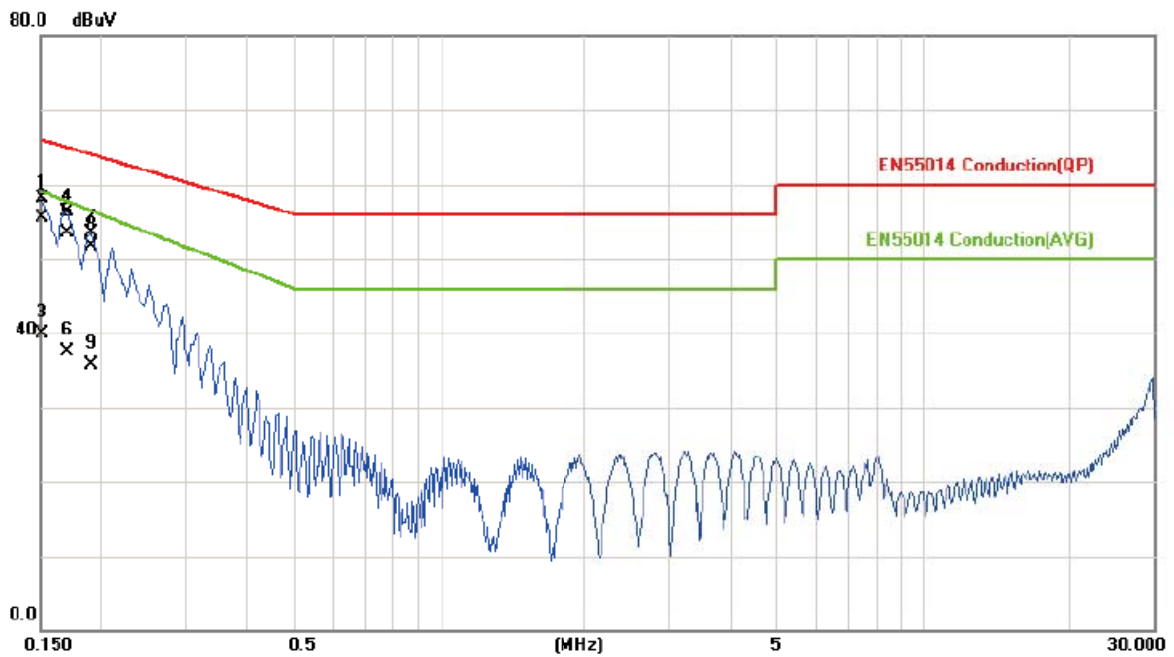
| Frequency (MHz) | Limits dB(μ V) | |
|-----------------|---------------------|----------|
| | Quasi-Peak | Average* |
| 0.15-0.5 | 66-56 | 59-46 |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

* If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

EMISSION TEST
5-1 MAINS TERMINALS DISTURBANCE VOLTAGE

5-1-4 TEST RESULTS

Phase: Line

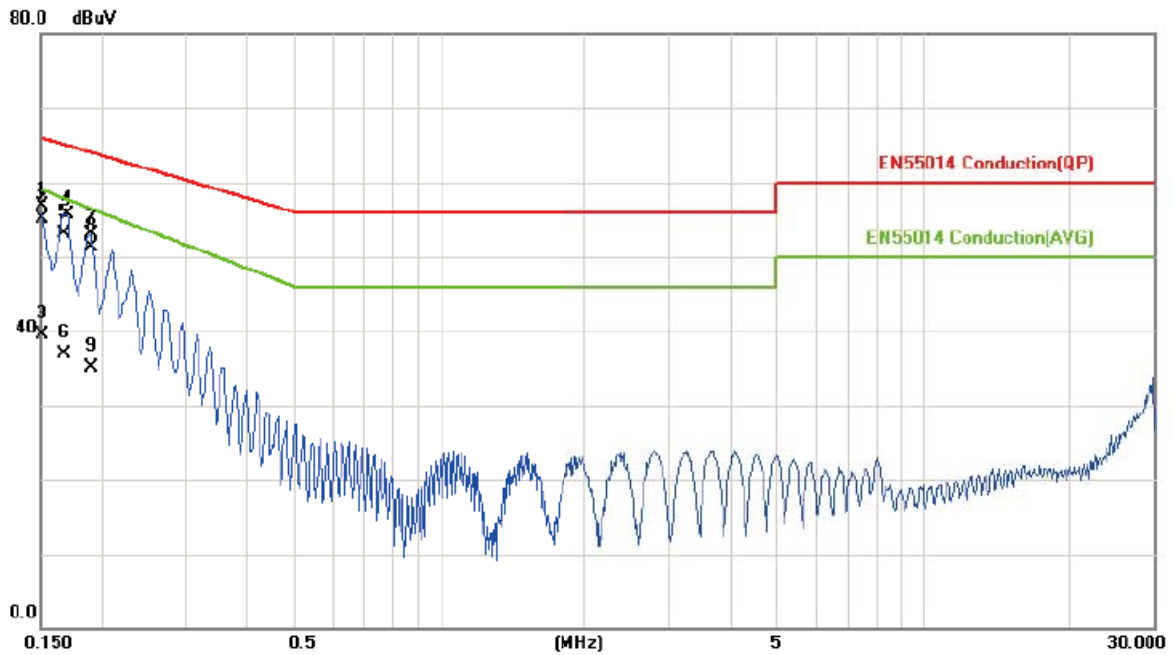


| Freq. (MHz) | Terminal L/N | Measured(dBuV) | | Limits(dBuV) | | Margin(dB) | Note |
|----------------|-----------------|----------------|---------|--------------|---------|------------|------|
| | | QP-Mode | AV-Mode | QP-Mode | AV-Mode | | |
| 0.15 | L | 55.51 | 39.95 | 66.00 | 59.00 | -7.96 | PEAK |
| 0.17 | L | 53.57 | 37.55 | 64.96 | 57.65 | -8.68 | PEAK |
| 0.19 | L | 51.68 | 35.61 | 64.04 | 56.45 | -10.54 | PEAK |

EMISSION TEST 5-1 MAINS TERMINALS DISTURBANCE VOLTAGE

5-1-4 TEST RESULTS

Phase: Neutral



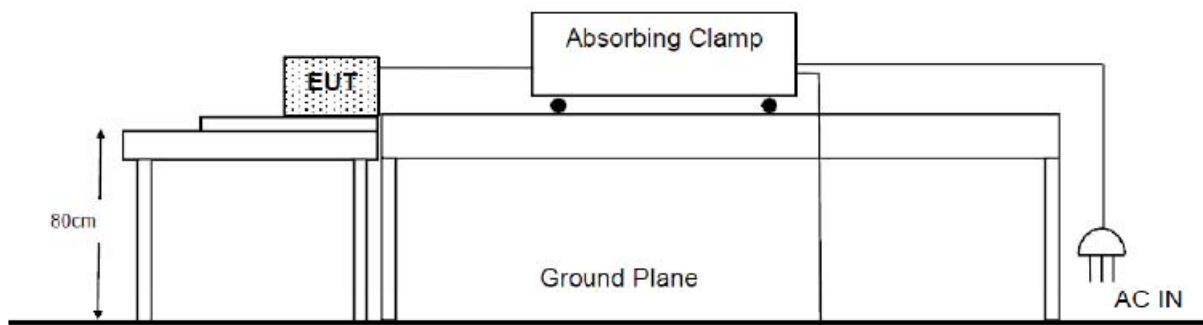
| Freq. (MHz) | Terminal L/N | Measured(dBuV) | | Limits(dBuV) | | Margin(dB) | Note |
|----------------|-----------------|----------------|---------|--------------|---------|------------|------|
| | | QP-Mode | AV-Mode | QP-Mode | AV-Mode | | |
| 0.15 | N | 55.14 | 39.57 | 66.00 | 59.00 | -9.03 | PEAK |
| 0.17 | N | 53.13 | 36.92 | 64.96 | 57.65 | -9.30 | PEAK |
| 0.19 | N | 51.23 | 35.10 | 64.04 | 56.45 | -10.94 | PEAK |

EMISSION TEST 5-2 DISTURBANCE POWER

5-2-1 TEST PROCEDURE

1. The EUT was placed on a non-conductive table which was 0.8 m above the ground plane. The straight portion of main lead would put on 6 m long testing bench, if main lead is shorter than 6 m it should be extended.
2. The absorbing clamp is positioned for maximum indication at each test frequency range from 30 MHz to 300 MHz, that means is clamp moved along the main lead until the maximum emission value is found.
3. The test result of the worst-case condition was recorded.

5-2-2 TEST SETUP



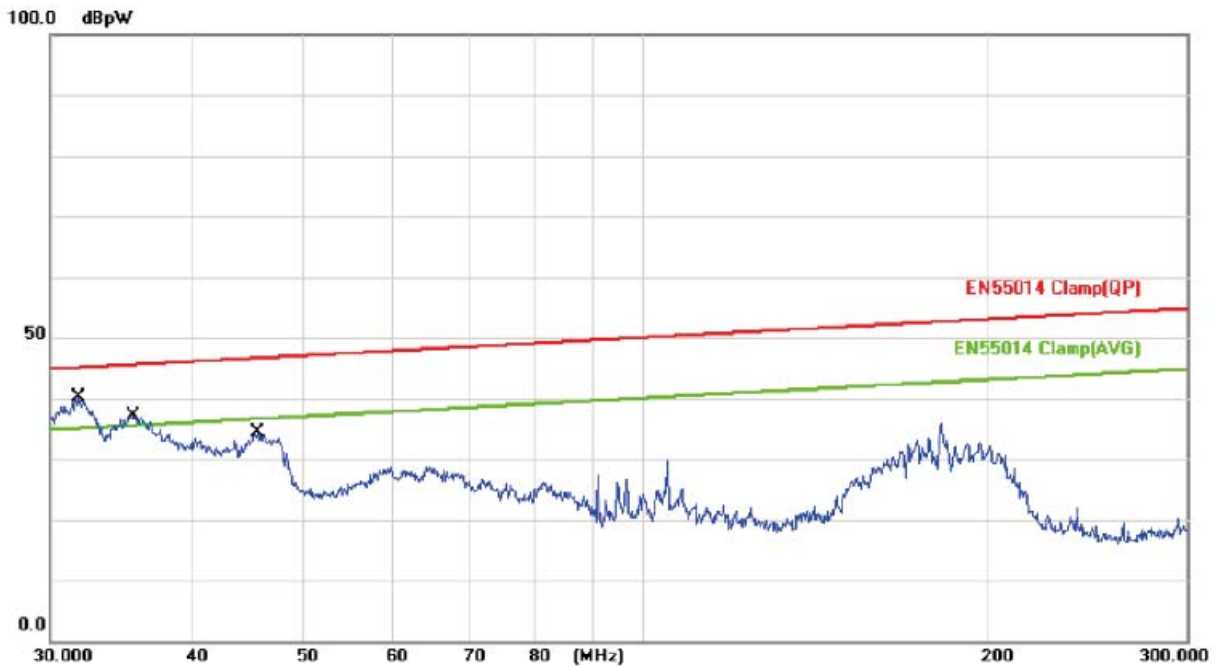
5-2-3 MEASUREMENT LIMITS

| Household and similar appliances | | |
|----------------------------------|-----------------------|---------------------------------|
| 1 | 2 | 3 |
| Frequency (MHz) | dB (pW) Quasi-peak | dB (pW) Average ^a |
| 30-300 | 45-55 | 35-45 |

^a If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

EMISSION TEST 5-2 DISTURBANCE POWER

5-2-4 TEST RESULTS



| No. | Frequency (MHz) | Factor (dB) | Reading (dBuV) | Level (dBpW) | Limit (dBpW) | Margin (dB) | Detector | P/F | Remark |
|-----|-----------------|-------------|----------------|--------------|--------------|-------------|----------|-----|--------|
| 1 | 31.8000 | 8.19 | 29.11 | 37.30 | 45.07 | -7.77 | QP | P | |
| 2 | 31.8000 | 8.19 | 27.11 | 31.50 | 35.07 | -3.57 | AVG | P | |
| 3 | 35.5600 | 7.66 | 26.04 | 33.70 | 45.21 | -11.51 | QP | P | |
| 4 | 35.5600 | 7.66 | 23.94 | 31.60 | 35.21 | -3.61 | AVG | P | |
| 5 | 45.7200 | 3.73 | 26.87 | 30.60 | 45.58 | -14.98 | QP | P | |
| 6 | 45.7200 | 3.73 | 23.87 | 27.60 | 35.58 | -7.98 | AVG | P | |

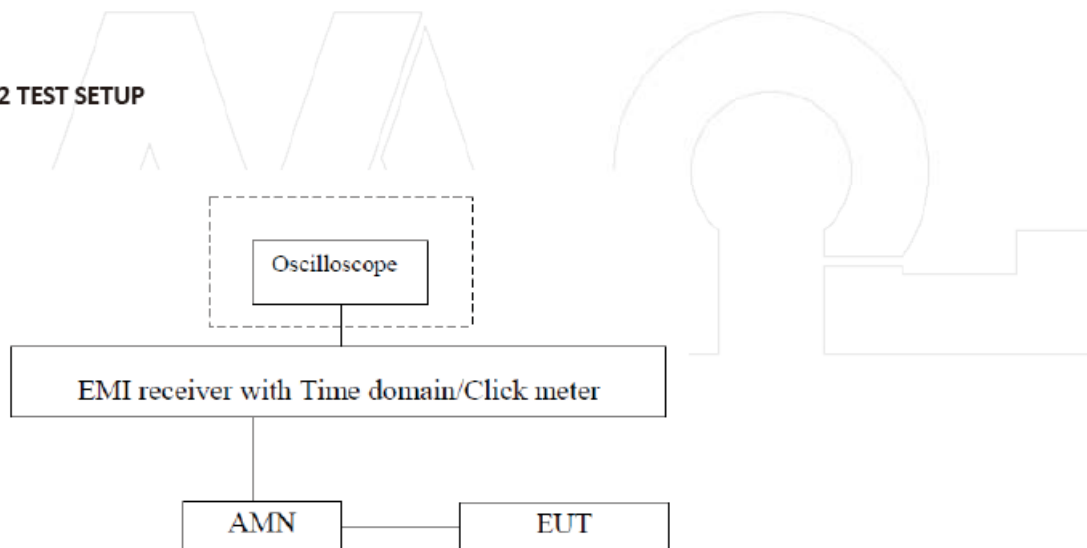
EMISSION TEST

5-3 DISCONTINUOUS DISTURBANCE

5-3-1 TEST PROCEDURE

1. The EUT was placed on a non-conductive table which was 0.8 m above the ground plane at a semi-anechoic chamber.
2. The EUT to be measured is connected to an artificial mains network for the frequency range 150 kHz to 30 MHz. The test receiver is connected to the artificial mains network and an oscilloscope is connected to the RF output of the test receiver. The cut off frequency of the oscilloscope shall be not lower than the IF of the test receiver.
3. Set the program to let the EUT to produce 40 clicks or, where relevant, 40 switching operations. When, 120 min. after the beginning of the test, 40 clicks have not been produced, the test is stopped at the end of the programme in progress.
4. For frequency range 148.5 kHz to 500 kHz, using 150 kHz to determine click rate N; and frequency range 500 kHz to 30 MHz, using 500 kHz to determine click rate N.
5. The frequency points 150 kHz, 500 kHz, 1.4 MHz, 30 MHz was checked.

5-3-2 TEST SETUP



5-3-3 MEASUREMENT LIMITS

| Frequency (MHz) | Limits dB(μV) | |
|-----------------|---------------|----------|
| | Quasi-Peak | Average* |
| 0.15-0.5 | 66-56 | 59-46 |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

* If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

EMISSION TEST
5-3 DISCONTINUOUS DISTURBANCE

5-3-4 TEST RESULTS

Remark: EUT is a household battery charger, the test does not apply.

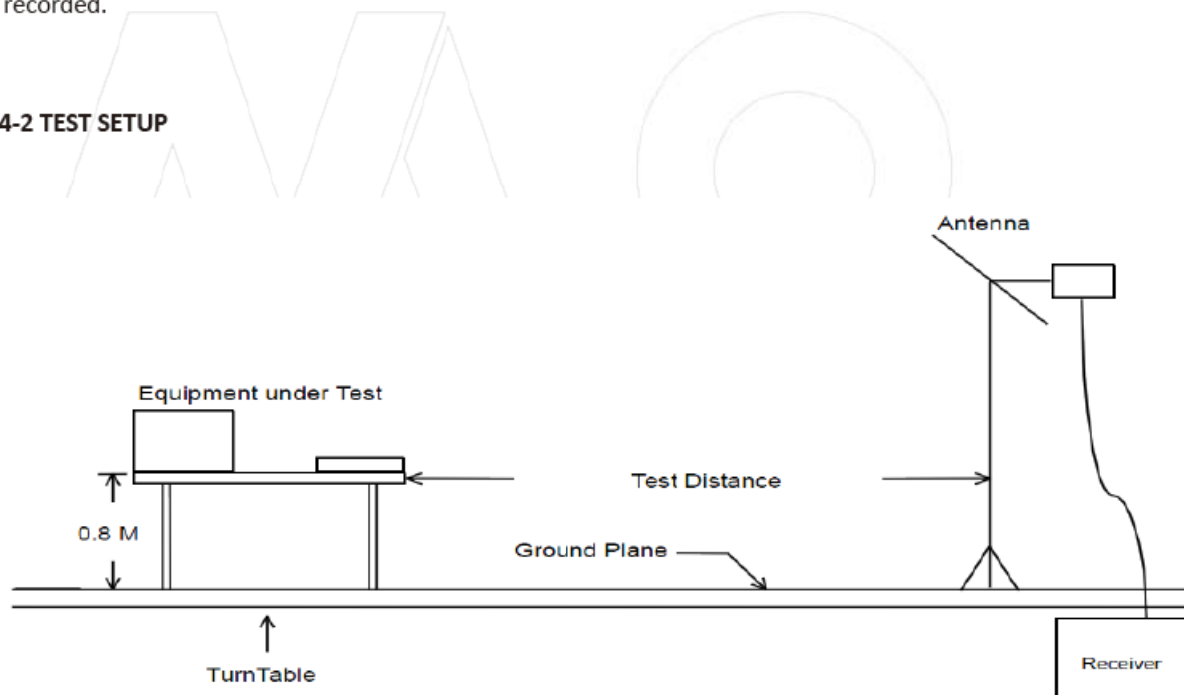


EMISSION TEST 5-4 RADIATED EMISSION

5-4-1 TEST PROCEDURE

1. The EUT was placed on a non-conductive table which was 0.8 m above the ground plane at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna is a broadband antenna, and its height is varied from 1 to 4 m above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to the heights from 1 to 4 m and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The frequency spectrum from 30 MHz to 1000 MHz was scanned and maximum emission levels at each frequency recorded.

5-4-2 TEST SETUP



5-4-3 MEASUREMENT LIMITS

| Frequency (MHz) | Quasi-peak limits dB($\mu\text{V}/\text{m}$) ^a |
|-----------------|---|
| 30-230 | 42 to 35 ^b |
| 230-1000 | 42 ^b |

Remark:

^a At the transition frequency, the lower limit applies.

^b is 3 meters measurement limit.

**EMISSION TEST
5-4 RADIATED EMISSION**

5-4-4 TEST RESULTS

Remark: EUT is a household battery charger, the test does not apply.

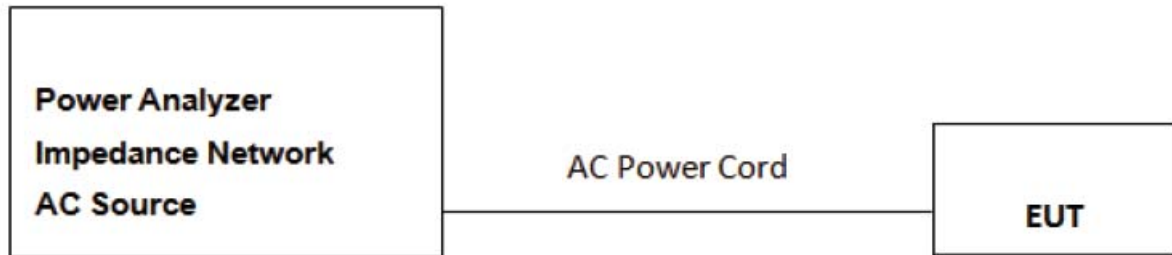


EMISSION TEST 5-5 HARMONIC CURRENT

5-5-1 TEST PROCEDURE

1. The EUT was placed on a non-conductive table which was 0.8 m above the ground plane and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
2. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.

5-5-2 TEST SETUP



5-5-3 MEASUREMENT LIMITS

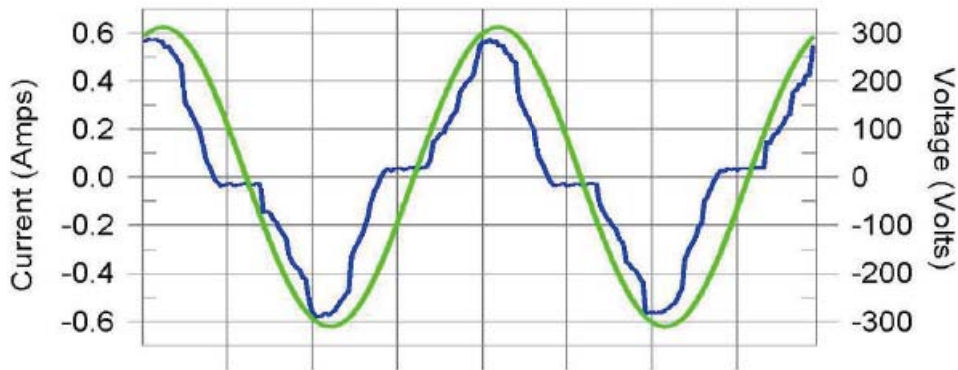
| Harmonic order (n) | Maximum permissible harmonic current Class A |
|-----------------------|---|
| Odd harmonics | |
| 3 | 2.30 |
| 5 | 1.14 |
| 7 | 0.77 |
| 9 | 0.40 |
| 11 | 0.33 |
| 13 | 0.21 |
| $15 \leq n \leq 39$ | $0.15 \frac{15}{n}$ |
| Even harmonics | |
| 2 | 1.08 |
| 4 | 0.43 |
| 6 | 0.30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

EMISSION TEST 5-5 HARMONIC CURRENT

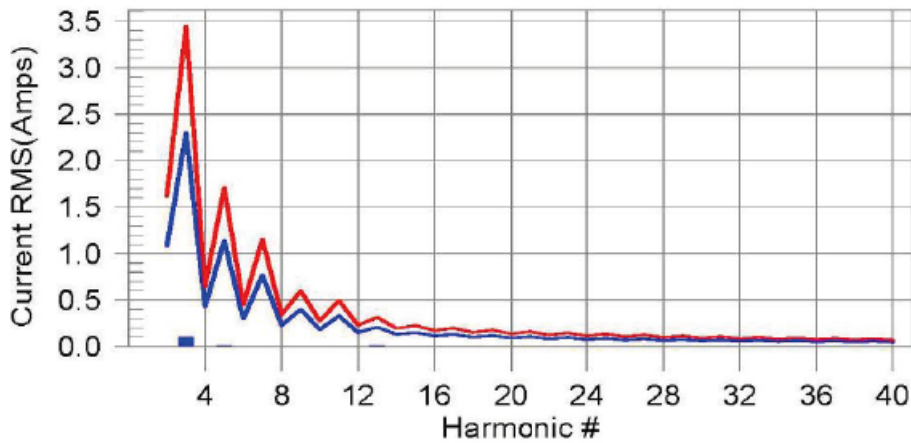
5-5-4 TEST RESULTS

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line European Limits



Test result: Pass Worst harmonic was #21 with 7.13% of the limit.

EMISSION TEST 5-5 HARMONIC CURRENT

5-5-4 TEST RESULTS

Test Result: Pass Source qualification: Normal

THC(A): 0.10 I-THD(%): 35.18 POHC(A): 0.008 POHC Limit(A): 0.251

Highest parameter values during test:

| | |
|-----------------------|----------------------|
| V_RMS (Volts): 220.29 | Frequency(Hz): 50.00 |
| I_Peak (Amps): 0.603 | I_RMS (Amps): 0.325 |
| I_Fund (Amps): 0.300 | Crest Factor: 1.908 |
| Power (Watts): 64.7 | Power Factor: 0.925 |

| Harm# | Harms(avg) | 100%Limit | %of Limit | Harms(max) | 150%Limit | %of Limit | Status |
|-------|------------|-----------|-----------|------------|-----------|-----------|--------|
| 2 | 0.001 | 1.080 | 0.1 | 0.001 | 1.620 | 0.06 | Pass |
| 3 | 0.101 | 2.300 | 4.4 | 0.102 | 3.450 | 2.97 | Pass |
| 4 | 0.001 | 0.430 | 0.1 | 0.001 | 0.645 | 0.11 | Pass |
| 5 | 0.015 | 1.140 | 1.4 | 0.016 | 1.710 | 0.91 | Pass |
| 6 | 0.000 | 0.300 | 0.1 | 0.000 | 0.450 | 0.08 | Pass |
| 7 | 0.006 | 0.770 | 0.8 | 0.006 | 1.155 | 0.56 | Pass |
| 8 | 0.000 | 0.230 | 0.1 | 0.000 | 0.345 | 0.08 | Pass |
| 9 | 0.002 | 0.400 | 0.6 | 0.003 | 0.600 | 0.45 | Pass |
| 10 | 0.000 | 0.184 | 0.1 | 0.000 | 0.276 | 0.11 | Pass |
| 11 | 0.004 | 0.330 | 1.1 | 0.004 | 0.495 | 0.78 | Pass |
| 12 | 0.000 | 0.153 | 0.1 | 0.000 | 0.230 | 0.12 | Pass |
| 13 | 0.011 | 0.210 | 5.1 | 0.011 | 0.315 | 3.46 | Pass |
| 14 | 0.000 | 0.131 | 0.1 | 0.000 | 0.197 | 0.13 | Pass |
| 15 | 0.007 | 0.150 | 5.0 | 0.008 | 0.225 | 3.40 | Pass |
| 16 | 0.000 | 0.115 | 0.1 | 0.000 | 0.173 | 0.13 | Pass |
| 17 | 0.002 | 0.132 | 1.4 | 0.003 | 0.199 | 1.26 | Pass |
| 18 | 0.000 | 0.102 | 0.2 | 0.000 | 0.153 | 0.17 | Pass |
| 19 | 0.003 | 0.118 | 2.8 | 0.004 | 0.178 | 2.08 | Pass |
| 20 | 0.000 | 0.092 | 0.2 | 0.000 | 0.138 | 0.19 | Pass |
| 21 | 0.008 | 0.107 | 7.1 | 0.008 | 0.161 | 4.82 | Pass |
| 22 | 0.000 | 0.084 | 0.2 | 0.000 | 0.125 | 0.20 | Pass |
| 23 | 0.002 | 0.098 | 1.7 | 0.002 | 0.147 | 1.21 | Pass |
| 24 | 0.000 | 0.077 | 0.2 | 0.000 | 0.115 | 0.17 | Pass |
| 25 | 0.002 | 0.090 | 2.2 | 0.002 | 0.135 | 1.59 | Pass |
| 26 | 0.000 | 0.071 | 0.3 | 0.000 | 0.106 | 0.23 | Pass |
| 27 | 0.001 | 0.083 | 1.7 | 0.002 | 0.125 | 1.30 | Pass |
| 28 | 0.000 | 0.066 | 0.7 | 0.001 | 0.099 | 0.54 | Pass |
| 29 | 0.003 | 0.078 | 4.5 | 0.004 | 0.116 | 3.30 | Pass |
| 30 | 0.000 | 0.061 | 0.4 | 0.000 | 0.092 | 0.35 | Pass |
| 31 | 0.003 | 0.073 | 4.1 | 0.003 | 0.109 | 2.88 | Pass |
| 32 | 0.000 | 0.058 | 0.8 | 0.001 | 0.086 | 0.60 | Pass |
| 33 | 0.003 | 0.068 | 4.1 | 0.003 | 0.102 | 3.08 | Pass |
| 34 | 0.000 | 0.054 | 0.4 | 0.000 | 0.081 | 0.33 | Pass |
| 35 | 0.002 | 0.064 | 3.3 | 0.003 | 0.096 | 2.76 | Pass |
| 36 | 0.000 | 0.051 | 0.3 | 0.000 | 0.077 | 0.32 | Pass |
| 37 | 0.004 | 0.061 | 7.4 | 0.005 | 0.091 | 5.06 | Pass |
| 38 | 0.000 | 0.048 | 0.4 | 0.000 | 0.073 | 0.36 | Pass |
| 39 | 0.001 | 0.058 | 1.3 | 0.001 | 0.087 | 1.09 | Pass |
| 40 | 0.000 | 0.046 | 0.4 | 0.000 | 0.069 | 0.37 | Pass |

EMISSION TEST 5-5 HARMONIC CURRENT

5-5-4 TEST RESULTS

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

| | |
|------------------------|----------------------|
| Voltage (Vrms): 220.29 | Frequency(Hz): 50.00 |
| I_Peak (Amps): 0.603 | I_RMS (Amps): 0.325 |
| I_Fund (Amps): 0.300 | Crest Factor: 1.908 |
| Power (Watts): 64.7 | Power Factor: 0.925 |

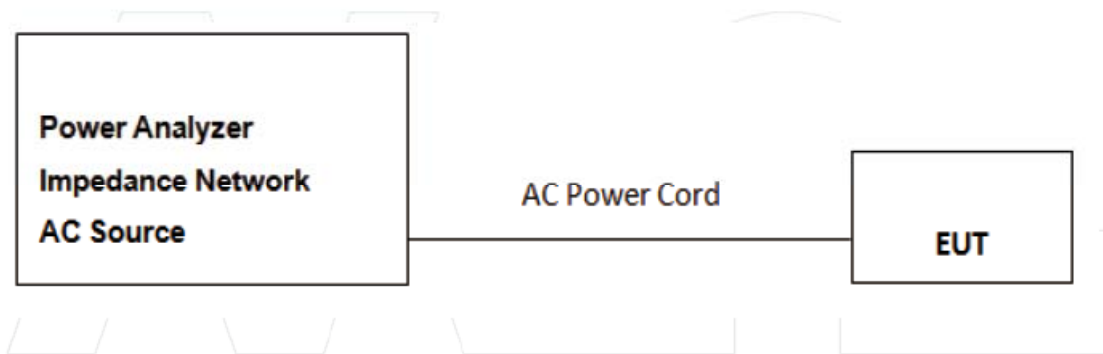
| Harm# | Harmonics V-rms | Limit V-rms | % of Limit | Status |
|-------|-----------------|-------------|------------|--------|
| 2 | 0.063 | 0.441 | 14.19 | OK |
| 3 | 0.480 | 1.982 | 24.22 | OK |
| 4 | 0.098 | 0.440 | 22.17 | OK |
| 5 | 0.032 | 0.881 | 3.58 | OK |
| 6 | 0.065 | 0.441 | 14.74 | OK |
| 7 | 0.063 | 0.661 | 9.59 | OK |
| 8 | 0.026 | 0.441 | 5.90 | OK |
| 9 | 0.064 | 0.440 | 14.56 | OK |
| 10 | 0.016 | 0.440 | 3.72 | OK |
| 11 | 0.026 | 0.220 | 12.01 | OK |
| 12 | 0.012 | 0.220 | 5.26 | OK |
| 13 | 0.021 | 0.220 | 9.42 | OK |
| 14 | 0.007 | 0.220 | 3.35 | OK |
| 15 | 0.014 | 0.220 | 6.39 | OK |
| 16 | 0.011 | 0.220 | 5.14 | OK |
| 17 | 0.005 | 0.220 | 2.13 | OK |
| 18 | 0.011 | 0.220 | 4.82 | OK |
| 19 | 0.009 | 0.220 | 4.14 | OK |
| 20 | 0.012 | 0.220 | 5.47 | OK |
| 21 | 0.012 | 0.220 | 5.26 | OK |
| 22 | 0.004 | 0.220 | 1.85 | OK |
| 23 | 0.005 | 0.220 | 2.24 | OK |
| 24 | 0.004 | 0.220 | 1.79 | OK |
| 25 | 0.005 | 0.220 | 2.37 | OK |
| 26 | 0.004 | 0.220 | 2.01 | OK |
| 27 | 0.005 | 0.220 | 2.28 | OK |
| 28 | 0.004 | 0.220 | 1.88 | OK |
| 29 | 0.006 | 0.220 | 2.75 | OK |
| 30 | 0.003 | 0.220 | 1.37 | OK |
| 31 | 0.006 | 0.220 | 2.62 | OK |
| 32 | 0.003 | 0.220 | 1.38 | OK |
| 33 | 0.007 | 0.220 | 3.17 | OK |
| 34 | 0.003 | 0.220 | 1.37 | OK |
| 35 | 0.005 | 0.220 | 2.28 | OK |
| 36 | 0.003 | 0.220 | 1.40 | OK |
| 37 | 0.010 | 0.220 | 4.35 | OK |
| 38 | 0.003 | 0.220 | 1.28 | OK |
| 39 | 0.006 | 0.220 | 2.78 | OK |
| 40 | 0.009 | 0.220 | 4.16 | OK |

EMISSION TEST 5-6 VOLTAGE FLUCTUATION AND FLICKER

5-6-1 TEST PROCEDURE

1. The EUT was placed on a non-conductive table which was 0.8 m above the ground plane. The EUT was set in series with the power analyzer through an impedance network for the measurement of flicker voltage.
2. The supply voltage and frequency setting on the programmable AC source was programmed as the rated voltage and frequency of the EUT.
3. During the flick measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

5-6-2 TEST SETUP



5-6-3 MEASUREMENT LIMITS

| Test item | Limit |
|---|-------|
| Relative voltage change characteristic dt (%) | 3.3 |
| Maximum relative voltage change dmax (%) | 4 |
| Relative Voltage change dc (%) | 3.3 |
| Short term flicker Pst | 1 |
| Long term flicker Plt | 0.65 |

EMISSION TEST
5-6 VOLTAGE FLUCTUATION AND FLICKER

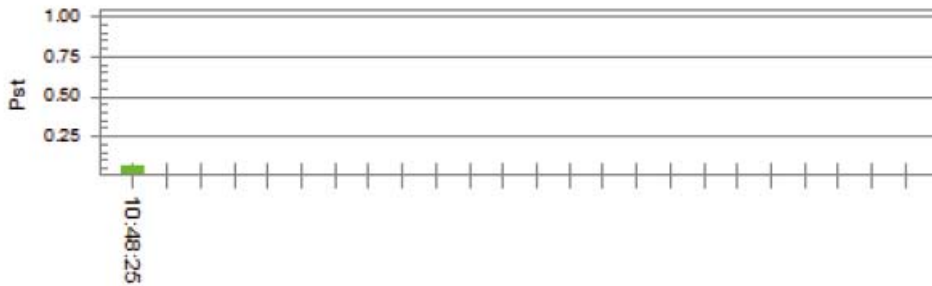
5-6-4 TEST RESULTS

Test Result: Pass

Status: Test Completed

Pst and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

| | | | |
|---------------------------------|--------|-------------------|------------|
| Vrms at the end of test (Volt): | 229.97 | | |
| Highest dt (%): | 0.00 | Test limit (%): | 3.30 Pass |
| Time(m S) > dt: | 0.0 | Test limit (m S): | 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): | 0.064 | Test limit: | 1.000 Pass |
| Highest Plt (2 hr. period): | 0.028 | Test limit: | 0.650 Pass |

IMMUNITY TEST

6-1 ELECTROSTATIC DISCHARGE

6-1-1 ELECTROSTATIC DISCHARGE

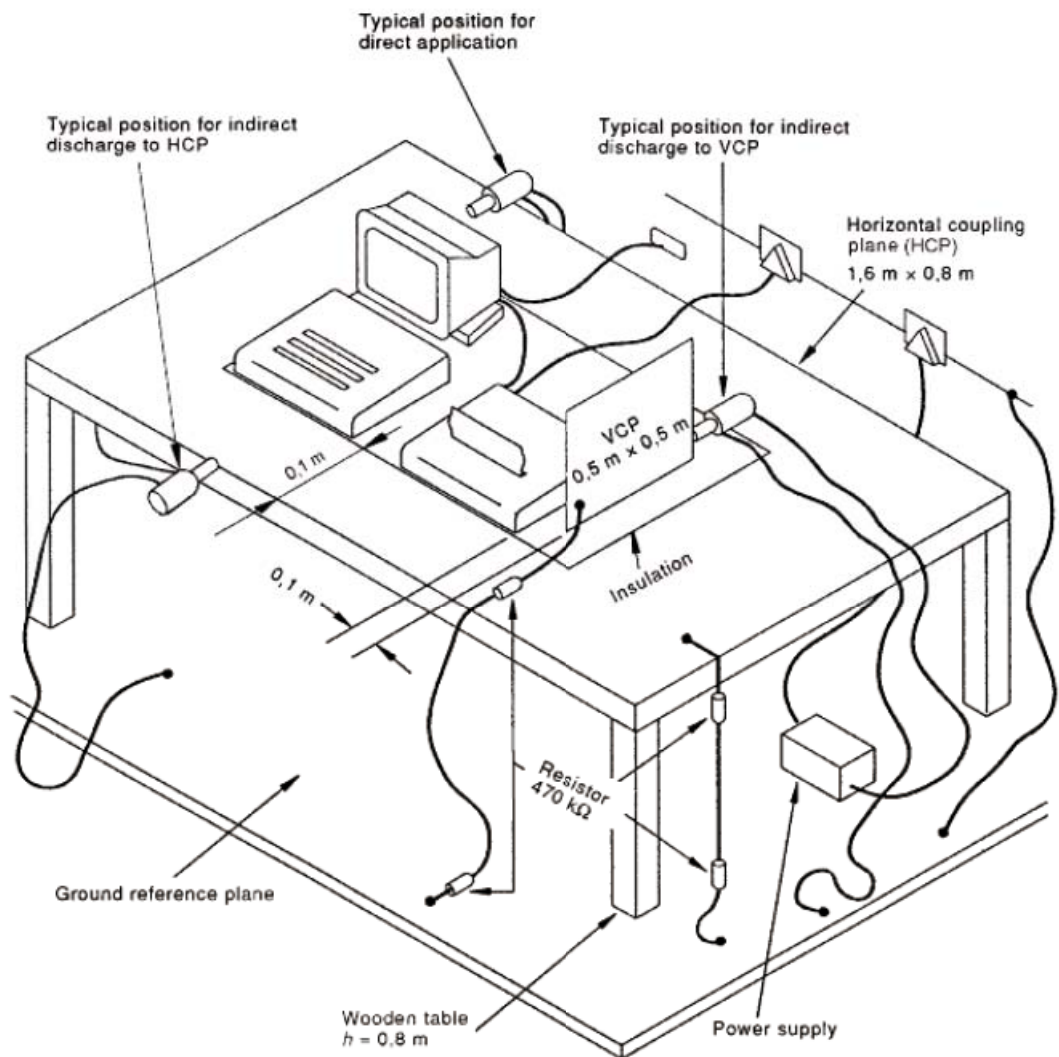
TEST PROCEDURE

1. The EUT was placed on a conductive surfaces table which was 0.8 m above the ground plane.
2. During the test, it was performed with single discharges. for the single discharge time between successive single discharges was at least 1 second. the EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. one of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. the remaining three test points shall each receive at least 50 direct contact discharges.
3. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. test shall be performed at a maximum repetition rate of one discharge per second.
4. Vertical coupling plane (VCP):
The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the discharge electrode touching the coupling plane. the four faces of the EUT will be performed with electrostatic discharge.
5. Horizontal coupling plane (HCP):
The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the discharge electrode touching the coupling plane. the four faces of the EUT will be performed with electrostatic discharge.
6. Air discharges at insulation surfaces of the EUT. It was at least ten single discharges with positive and negative at the same selected point.

IMMUNITY TEST

6-1 ELECTROSTATIC DISCHARGE

6-1-2 TEST SETUP



IEC 063/98

6-1-3 MEASUREMENT LIMITS (PERFORMANCE CRITERIA)

Criterion A:

The apparatus shall continue to operate as intended during the test.

Criterion B:

The apparatus shall continue to operate as intended after the test.

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.

IMMUNITY TEST
6-1 ELECTROSTATIC DISCHARGE

6-1-4 TEST RESULTS

Criterion B

| Location | Air discharge (kV) | | | | Contact discharge (kV) | | | |
|-------------------|--------------------|----|----|-----|------------------------|----|----|----|
| | ±2 | ±4 | ±8 | ±15 | ±2 | ±4 | ±6 | ±8 |
| HCP(front) | -- | -- | P | -- | -- | P | -- | -- |
| HCP(rear) | -- | -- | P | -- | -- | P | -- | -- |
| HCP(left) | -- | -- | P | -- | -- | P | -- | -- |
| HCP(right) | -- | -- | P | -- | -- | P | -- | -- |
| VCP(front) | -- | -- | P | -- | -- | P | -- | -- |
| VCP(rear) | -- | -- | P | -- | -- | P | -- | -- |
| VCP(left) | -- | -- | P | -- | -- | P | -- | -- |
| VCP(right) | -- | -- | P | -- | -- | P | -- | -- |
| Plastic enclosure | -- | -- | P | -- | -- | P | -- | -- |
| Output terminal | -- | -- | P | -- | -- | P | -- | -- |

Remark:

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

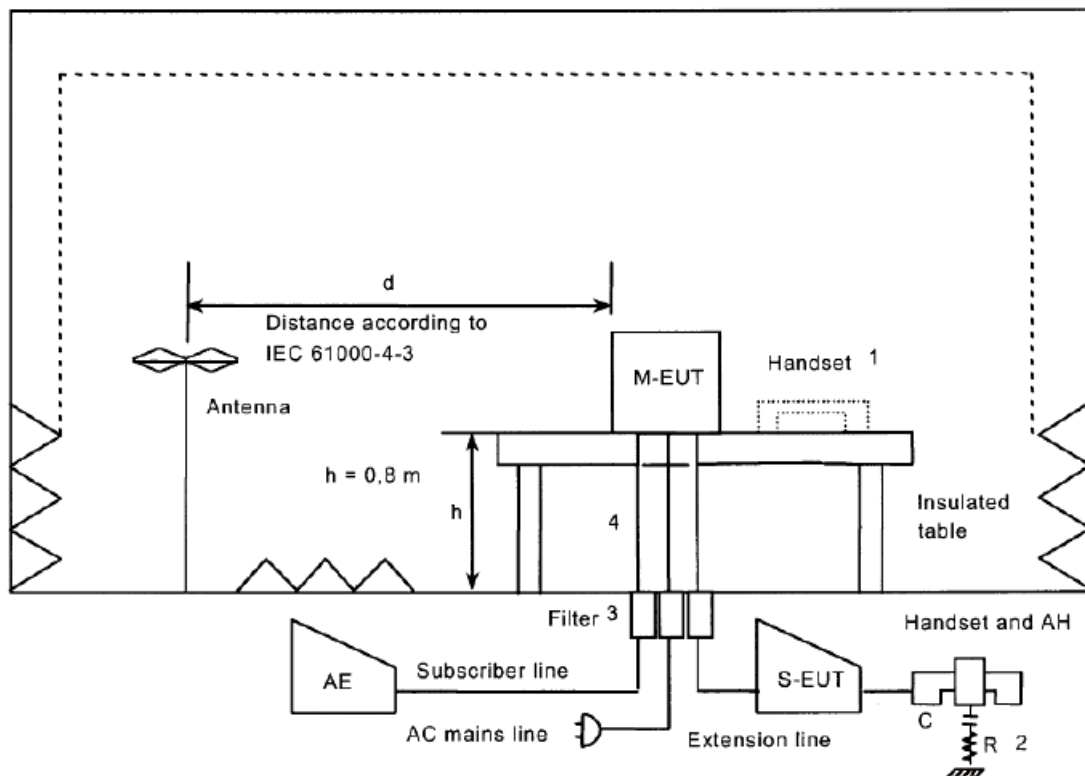
IMMUNITY TEST

6-2 RADIO-FREQUENCY ELECTROMAGNETIC FIELD

6-2-1 TEST PROCEDURE

1. The equipment to be tested is placed in the center of the enclosure on a non-conductive table which was 0.8 m above the ground plane. The equipment is then connected to power and signal leads according to pertinent installation instructions.
2. The antenna which is enabling the complete frequency range of 80-1000 MHz is placed 3m away from the equipment. The required field strength is determined by placing the field strength meter on top of or directly alongside the equipment under test and monitoring the field strength meter via a remote field strength indicator outside the enclosure while adjusting the continuous-wave to the applicable antennae.
3. The test is normally performed with the generating antenna facing each of four sides of the EUT. The polarization of the field generated by the broadband antenna necessitates testing each position twice, once with the antenna positioned vertically and again with the antenna positioned horizontally.
4. At each of the above conditions, the frequency range is swept 80-1000 MHz, pausing to adjust the R.F. signal level or to switch oscillators and antenna. The rate of sweep is in the order of 1.5×10^{-3} decades/s. The sensitive frequencies or frequencies of dominant interest may be discretely analyzed.
5. The field strength level was 3V/m.

6-2-2 TEST SETUP



IMMUNITY TEST
6-2 RADIO-FREQUENCY ELECTROMAGNETIC FIELD

6-2-3 MEASUREMENT LIMITS (PERFORMANCE CRITERIA)

Criterion A:

The apparatus shall continue to operate as intended during the test.

Criterion B:

The apparatus shall continue to operate as intended after the test.

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.



IMMUNITY TEST
6-2 RADIO-FREQUENCY ELECTROMAGNETIC FIELD

6-2-4 TEST RESULTS

Remark: EUT is a household battery charger, the test does not apply.



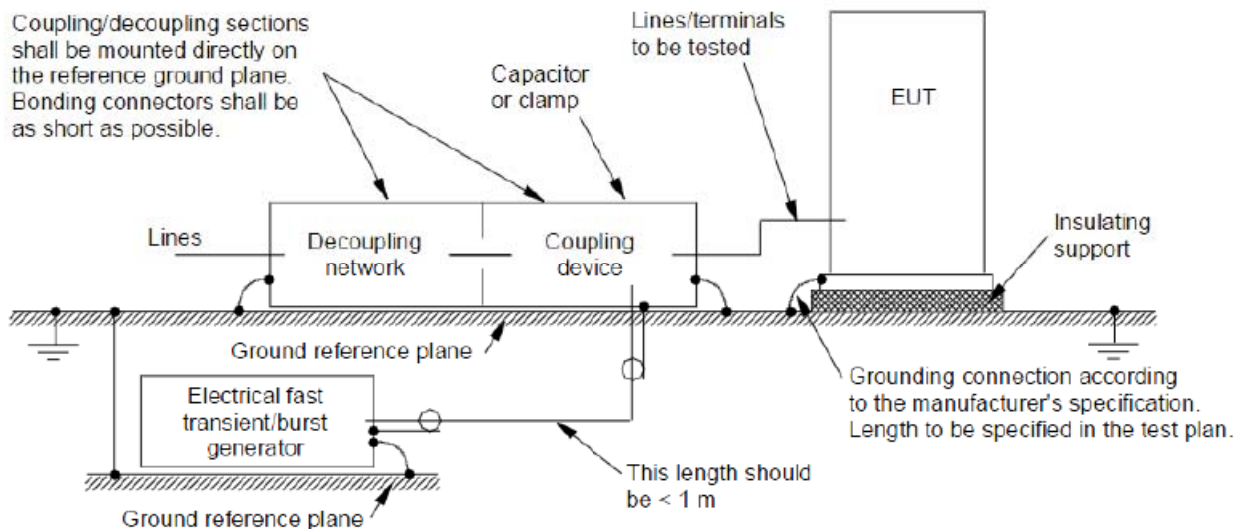
IMMUNITY TEST

6-3 ELECTRICAL FAST TRANSIENT

6-3-1 TEST PROCEDURE

1. The EUT was placed on a non-conductive table which was 0.8 m above the ground plane. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.
2. The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 minutes.

6-3-2 TEST SETUP



6-3-3 MEASUREMENT LIMITS (PERFORMANCE CRITERIA)

Criterion A:

The apparatus shall continue to operate as intended during the test.

Criterion B:

The apparatus shall continue to operate as intended after the test.

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.

IMMUNITY TEST
6-3 ELECTRICAL FAST TRANSIENT

6-3-4 TEST RESULTS

Criterion B

| Location | Test level (kV) | Rise time/hold time (ns) | Repetition frequency (kHz) | P/F |
|---------------------|-----------------|--------------------------|----------------------------|-----|
| Line | ±1 | 5/50 | 5 | P |
| Neutral | ±1 | 5/50 | 5 | P |
| Line + Neutral | ±1 | 5/50 | 5 | P |
| PE | ±1 | 5/50 | 5 | P |
| Line + PE | ±1 | 5/50 | 5 | P |
| Neutral + PE | ±1 | 5/50 | 5 | P |
| Line + Neutral + PE | ±1 | 5/50 | 5 | P |
| Signal Line | -- | -- | -- | N |
| DC Line | -- | -- | -- | N |

Remark:

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

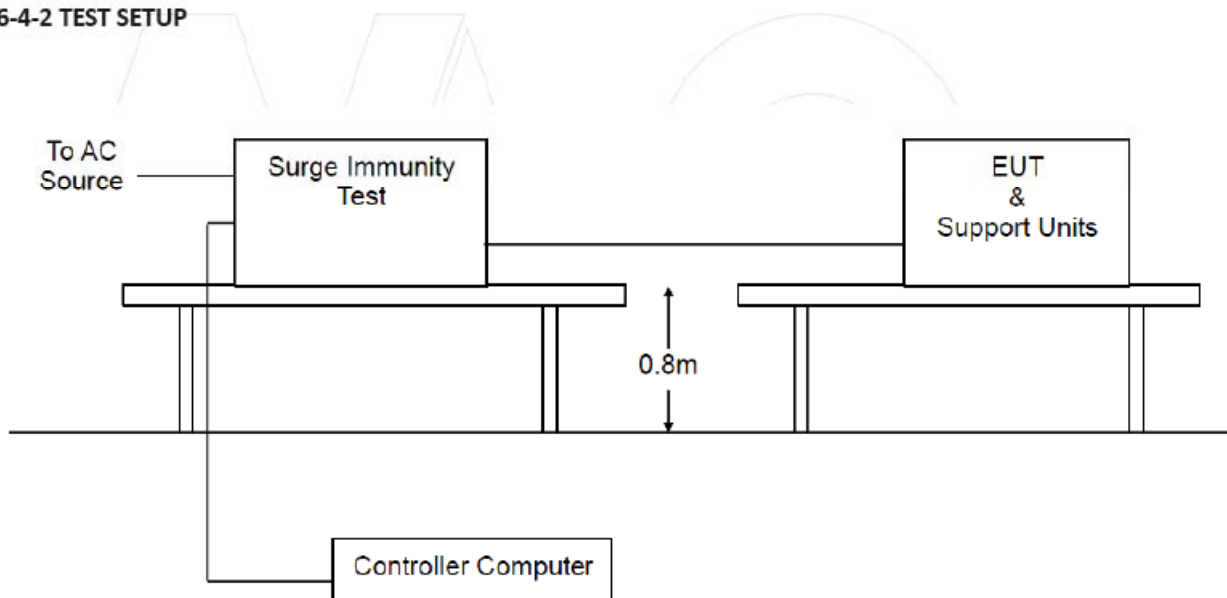
IMMUNITY TEST

6-4 SURGE

6-4-1 TEST PROCEDURE

1. The EUT and the auxiliary equipment were placed on a table of 0.8m above the metal ground plane. The size of ground plane is greater than 1x1 m and project beyond the EUT by at least 0.1 m on all sides. The ground plane is connected to the protective earth. The length of power cord between the coupling device and the EUT was less than 2 m (provided by the manufacturer).
2. The EUT was connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise was applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).
3. The surges were applied line to line and line(s) to earth. When testing line to earth the test voltage was applied successively between each of the lines and earth. Steps up to the test level specified increased the test voltage. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulse.

6-4-2 TEST SETUP



6-4-3 MEASUREMENT LIMITS (PERFORMANCE CRITERIA)

Criterion A:

The apparatus shall continue to operate as intended during the test.

Criterion B:

The apparatus shall continue to operate as intended after the test.

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.

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**IMMUNITY TEST
6-4 SURGE****6-4-4 TEST RESULTS**

Criterion B

| Location | Test level (kV) | Wave-shape data (μs) | P/F |
|----------------|-----------------|----------------------|-----|
| Line - Neutral | 1 | 1.2/50 | P |
| Line - PE | 2 | 1.2/50 | P |
| Neutral - PE | 2 | 1.2/50 | P |

Remark:

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

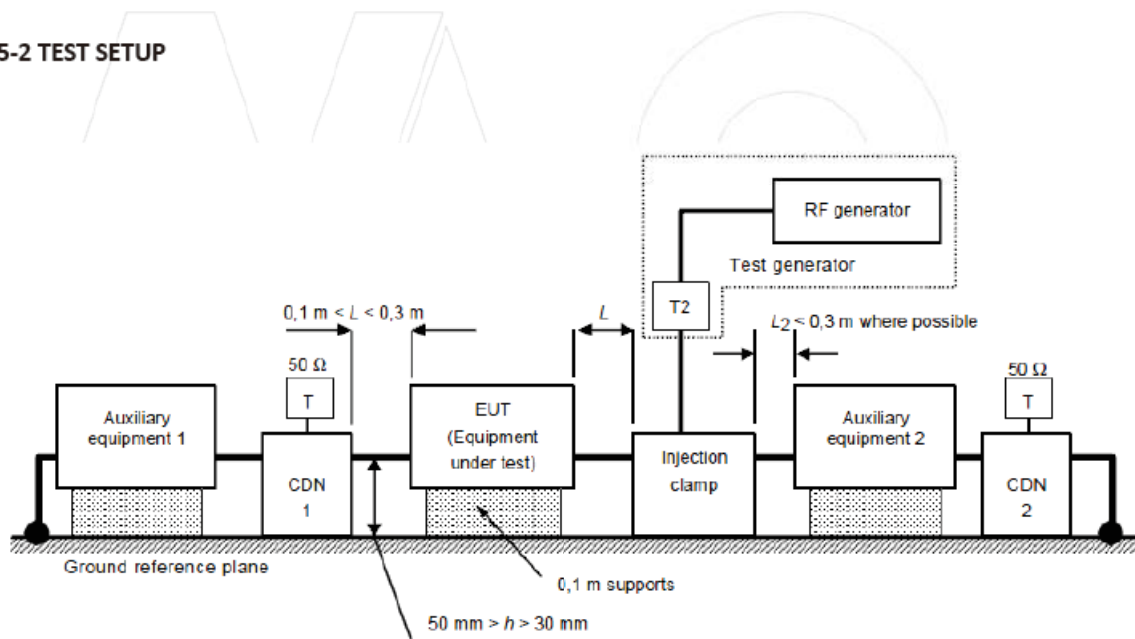


IMMUNITY TEST 6-5 INJECTED CURRENT

6-5-1 TEST PROCEDURE

1. The EUT was placed on an insulating support of 0.1 m height above a ground plane. All cables exiting the EUT was supported at a height of 30 mm above the ground reference plane.
2. The EUT was connected to the power mains through a coupling and decoupling networks (CDN).
3. The CDN was located 0.3 m from the EUT as indicated in the diagram above.
4. The test was performed with the test generator connected to each of the CDN in turn while the other non-excited RF input ports of the coupling devices were terminated by a 50 Ω terminator.
5. The frequency range is swept from 150 kHz to 80 MHz using 3 V signal level, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave. The rate of sweep shall not exceed 1.5×10^{-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.

6-5-2 TEST SETUP



6-5-3 MEASUREMENT LIMITS (PERFORMANCE CRITERIA)

Criterion A:

The apparatus shall continue to operate as intended during the test.

Criterion B:

The apparatus shall continue to operate as intended after the test.

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.

**IMMUNITY TEST
6-5 INJECTED CURRENT**

6-5-4 TEST RESULTS

Criterion A

| Location | Frequency range (MHz) | Test level (Vrms) | P/F |
|---------------|-----------------------|-------------------|-----|
| AC input port | 0.15 - 80 | 3 | P |

Remark:

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

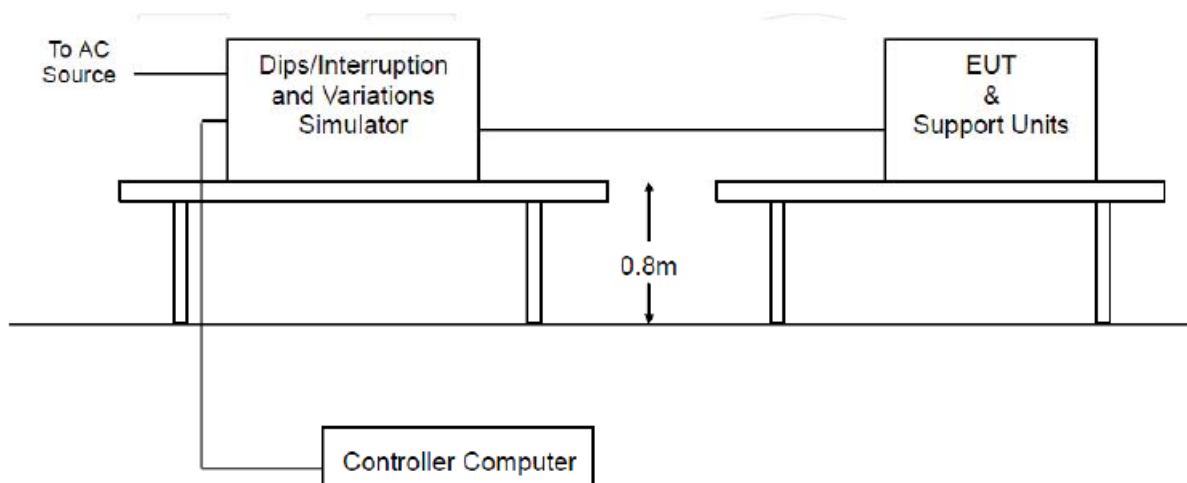


IMMUNITY TEST 6-6 VOLTAGE DIPS AND SHORT INTERRUPTION

6-6-1 TEST PROCEDURE

1. The power cord was used as supplied by the manufacturer. The EUT was connected to the line output of the voltage dips and Interruption generator.
2. The EUT was tested for 30% voltage dip of supplied voltage with duration of 200 ms, 100% voltage dip of supplied voltage and duration 10 ms. Both of the dip tests were carried out for a sequence of three voltage dips with intervals of 10 seconds.
3. Voltage reductions occur at 0 degree crossover point of the voltage waveform. The performance of the EUT was checked after the voltage dip or interruption.

6-6-2 TEST SETUP



6-6-3 MEASUREMENT LIMITS (PERFORMANCE CRITERIA)

Criterion A:

The apparatus shall continue to operate as intended during the test.

Criterion B:

The apparatus shall continue to operate as intended after the test.

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.

IMMUNITY TEST
6-6 VOLTAGE DIPS AND SHORT INTERRUPTION

6-6-4 TEST RESULTS

Criterion C

| Test level (%)UT | Frequency (Hz) | Reduction (%)UT | Number of periods | P/F |
|------------------|----------------|-----------------|-------------------|-----|
| 0 | 47 | 100 | 0.5 | P |
| | 63 | 100 | 0.5 | P |
| 40 | 47 | 60 | 10 | P |
| | 63 | 60 | 12 | P |
| 70 | 47 | 30 | 25 | P |
| | 63 | 30 | 30 | P |

Remark:

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

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ANNEX 1
TEST EQUIPMENT LIST

| Equipment Name | Manufacturer | Model No. | Cal. Date |
|-------------------------|--------------------|-----------|------------|
| EMI Test Receiver | ROHDE & SCHWARZ | ESCI | 2014-06-01 |
| EMI Test Receiver | ROHDE & SCHWARZ | ESU8 | 2014-06-01 |
| LISN | ROHDE & SCHWARZ | ESH3-z5 | 2014-05-28 |
| LISN | ROHDE & SCHWARZ | ESH3-z6 | 2014-05-28 |
| LISN | ROHDE & SCHWARZ | ENV26 | 2014-05-28 |
| Pulse Limiter | ROHDE & SCHWARZ | ESH3-z2 | 2014-05-28 |
| Voltage Probe | Schwarzbeck | TK9146 | 2014-06-01 |
| Broadband Test Antenna | Schwarzbeck | VULB9163 | 2014-06-01 |
| Horn Antenna | ROHDE & SCHWARZ | HF906 | 2014-05-28 |
| Bilog Antenna | Schwarzbeck | VULB9163 | 2014-06-01 |
| Compliance Test System | CI | 5001ix | 2014-05-28 |
| EMC Test System | KeyTek | ECAT | 2014-05-28 |
| ESD Generator | Teseq | NSG437 | 2014-05-28 |
| Signal Generator | ROHDE & SCHWARZ | SML02 | 2014-05-28 |
| Power Amplifier | Amplifier Research | 150W1000 | 2014-05-28 |
| Power Amplifier | Amplifier Research | 75A250M | 2014-05-28 |
| Field Monitor | Amplifier Research | FM5004 | 2014-06-01 |
| Shield Room | Nanbo Tech | Site 1 | 2014-05-28 |
| Anechoic Chamber | Albatross | SAC-3 | 2014-05-28 |
| Anechoic Chamber | Albatross | H-249 | 2014-05-28 |
| CDN | EM Test | M2/M3 | 2014-06-01 |
| Ultra compact Simulator | EM Test | UCS500N5 | 2014-06-01 |
| Capacitive Clamp | EM Test | HFK | 2014-06-01 |
| EM Injection Clamp | FCC | F-203I | 2014-06-01 |
| Absorbing Clamp | ROHDE & SCHWARZ | MDS21 | 2014-06-01 |
| Magnetic Field Tester | HAEFELY | MAG100 | 2014-06-01 |
| Power Source | iDRC | CIF-3000A | 2014-06-01 |

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ANNEX 2
LIST OF CRITICAL COMPONENTS

| Object/part No. | Manufacturer/ trademark | Type/model(s) | Technical data | Remark(s) |
|------------------------|--------------------------------------|-------------------|----------------|-----------|
| X-capacitor (CX1) | Various | Various | 0.1 uF | -- |
| X-capacitor (CX2) | Various | Various | 0.33 uF | -- |
| Y-capacitor (CY1, CY2) | Various | Various | Max. 4700 pF | -- |
| Y-capacitor (CY3, CY4) | Various | Various | Max. 2200 pF | -- |
| Transformer (T1) | Wuxi Zhongtong Electronics Co., Ltd. | SSB109V55-ER35-CE | -- | -- |
| Line chock (FL1) | Wuxi Zhongtong Electronics Co., Ltd. | SSL-03 | -- | -- |
| Line chock (FL2) | Wuxi Zhongtong Electronics Co., Ltd. | SSL-01 | -- | -- |



**ANNEX 3
PHOTOGRAPHS OF THE TEST SETUP**

No. 1

- Test No. 5-1
- Test No. 5-2
- Test No. 5-3
- Test No. 5-4
- Test No. 5-5
- Test No. 5-6
- Test No. 6-1
- Test No. 6-2
- Test No. 6-3
- Test No. 6-4
- Test No. 6-5
- Test No. 6-6
- Other:



No. 2

- Test No. 5-1
- Test No. 5-2
- Test No. 5-3
- Test No. 5-4
- Test No. 5-5
- Test No. 5-6
- Test No. 6-1
- Test No. 6-2
- Test No. 6-3
- Test No. 6-4
- Test No. 6-5
- Test No. 6-6
- Other:



**ANNEX 3
PHOTOGRAPHS OF THE TEST SETUP**

No. 3

- Test No. 5-1
- Test No. 5-2
- Test No. 5-3
- Test No. 5-4
- Test No. 5-5
- Test No. 5-6
- Test No. 6-1
- Test No. 6-2
- Test No. 6-3
- Test No. 6-4
- Test No. 6-5
- Test No. 6-6
- Other:



No. 4

- Test No. 5-1
- Test No. 5-2
- Test No. 5-3
- Test No. 5-4
- Test No. 5-5
- Test No. 5-6
- Test No. 6-1
- Test No. 6-2
- Test No. 6-3
- Test No. 6-4
- Test No. 6-5
- Test No. 6-6
- Other:



**ANNEX 3
PHOTOGRAPHS OF THE TEST SETUP**

No. 5

- Test No. 5-1
- Test No. 5-2
- Test No. 5-3
- Test No. 5-4
- Test No. 5-5
- Test No. 5-6
- Test No. 6-1
- Test No. 6-2
- Test No. 6-3
- Test No. 6-4
- Test No. 6-5
- Test No. 6-6
- Other:



No. 6

- Test No. 5-1
- Test No. 5-2
- Test No. 5-3
- Test No. 5-4
- Test No. 5-5
- Test No. 5-6
- Test No. 6-1
- Test No. 6-2
- Test No. 6-3
- Test No. 6-4
- Test No. 6-5
- Test No. 6-6
- Other:



**ANNEX 4
PHOTOGRAPHS OF EUT**

No. 1

- General
- Appearance
- Label
- Internal
- PCB board
- Transformer
- Motor
- Other:



No. 2

- General
- Appearance
- Label
- Internal
- PCB board
- Transformer
- Motor
- Other:



**ANNEX 4
PHOTOGRAPHS OF EUT**

No. 3

- General
- Appearance
- Label
- Internal
- PCB board
- Transformer
- Motor
- Other:



No. 4

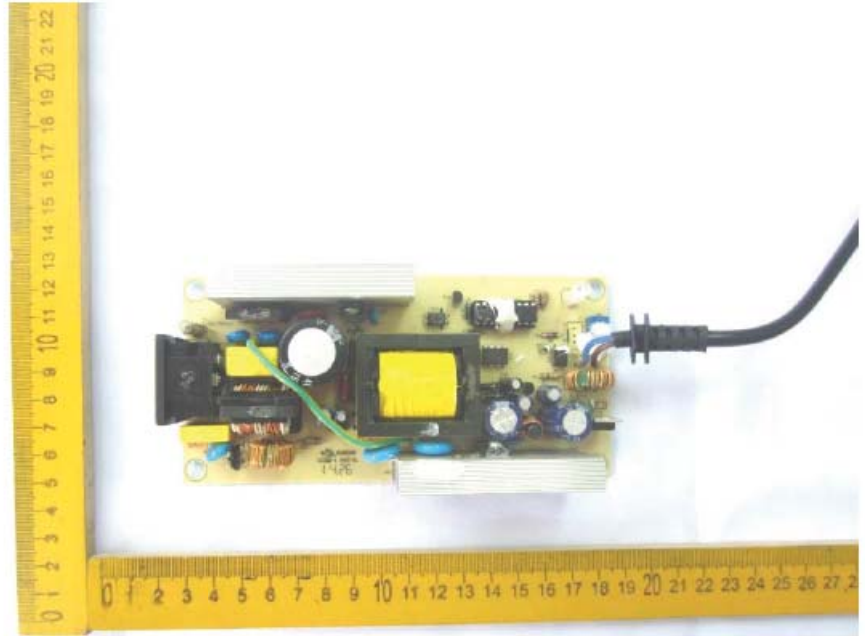
- General
- Appearance
- Label
- Internal
- PCB board
- Transformer
- Motor
- Other:



**ANNEX 4
PHOTOGRAPHS OF EUT**

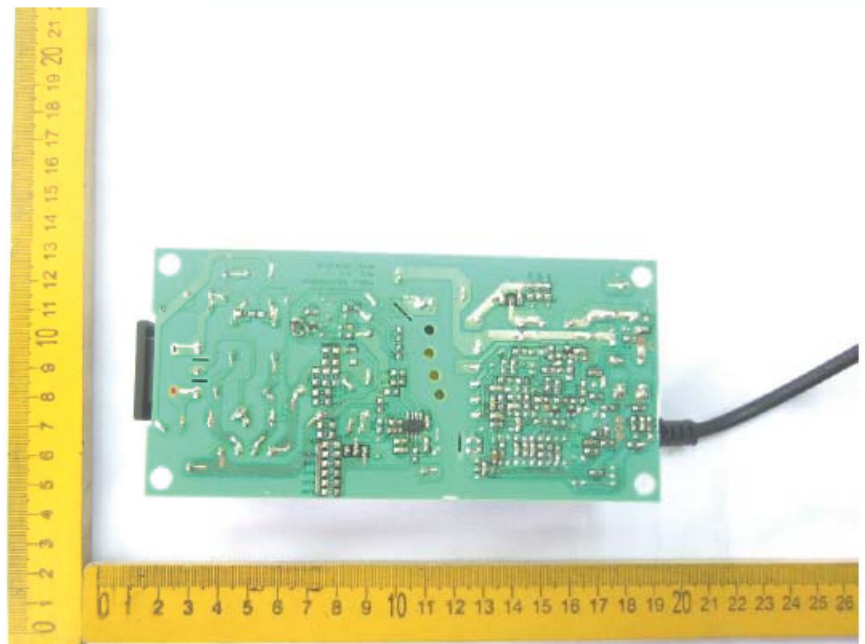
No. 5

- General
- Appearance
- Label
- Internal
- PCB board
- Transformer
- Motor
- Other:



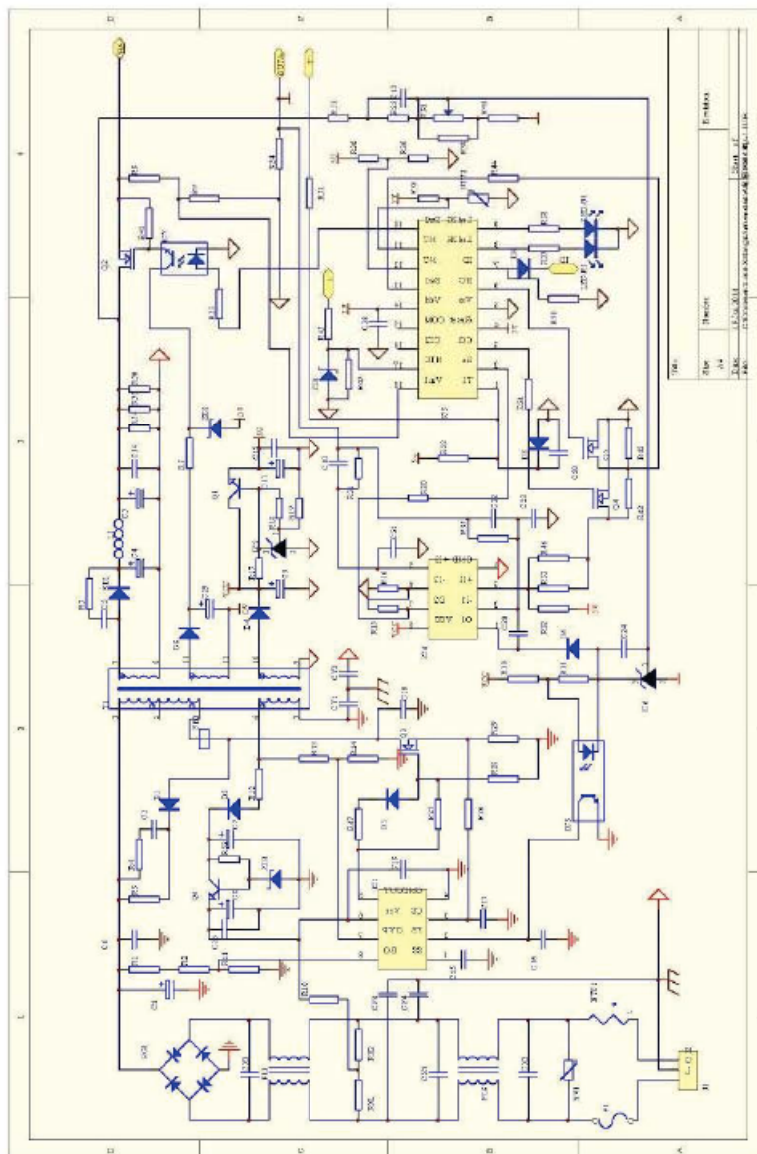
No. 6

- General
- Appearance
- Label
- Internal
- PCB board
- Transformer
- Motor
- Other:



ANNEX 5 TECHNICAL DOCUMENTS

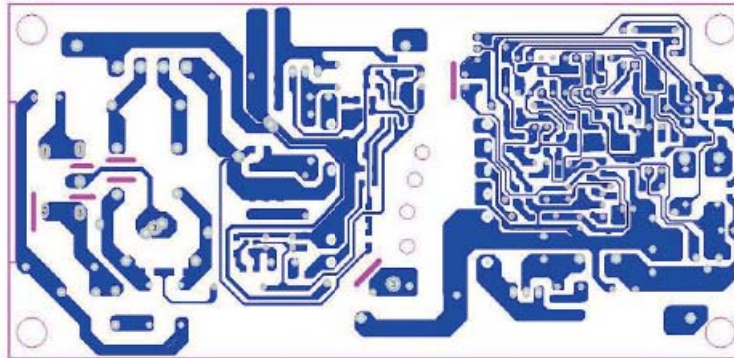
Schematic diagram



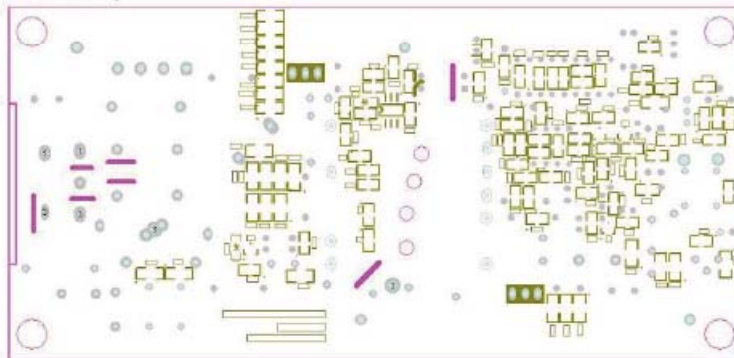
ANNEX 5 TECHNICAL DOCUMENTS

Layout diagram

Bottom



Bottom overlay



Top overlay

