



**BUREAU
VERITAS**

Test Report No.: CE150814N031



Test Lab
Cert 2951.01

TEST REPORT

Applicant	Hung Kay Industrial Co., Ltd
Address	Room 2509-2510 Mega Trade Centre, 1 Mei Wan Street, Tsuen Wan, Hong Kong

Manufacturer or Supplier	DongGuan Sun Hung Kin Electrical Co., Ltd	
Address	Wong Dong Industry Park, Fung Kong Town, Dongguan city, Guangdong Province, P.R. China	
Product	Switching adaptor	
Brand Name	Hung Kay	
Model	HKP12-2400500dV, HKP12-0402300dV, HKP12-0751600dV, HKP12-1201000dV, HKP12-0402000dV, HKP12-1000800dV, HKP12-2400300dV	
Additional Model & Model Difference	HKP12-xxxxxyydz Series, See items 2.1	
Date of tests	Aug. 14, 2015 ~ Jan. 25, 2016	

The submitted sample of the above equipment has been tested for according to following European Directive - Electromagnetic directive 2004/108/EC and the tests have been carried out according to the requirements of the following standards:

- EN 55013:2013
- EN 61000-3-2:2014
- EN 61000-3-3:2013
- EN 55020:2007 + A11:2011

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Tested by Jerry fu Project Engineer / EMC Department	Approved by Madison Luo Supervisor / EMC Department
	Date: Jan. 25, 2016

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**BUREAU
VERITAS**

Test Report No.: CE150814N031

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
CE150814N031	Original release	Jan. 25, 2016



1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EMISSION			
Standard	Test Type	Result	Remarks
EN 55013:2013	Mains Terminal Disturbance Voltage Test	PASS	Minimum passing margin is -3.84dB at 0.41953MHz
	Disturbance Power emissions test	PASS	Minimum passing margin is -4.31dB at 37.81250MHz
EN 61000-3-2:2014	Harmonic current emissions	PASS	Meets the requirements.
EN 61000-3-3:2013	Voltage fluctuations & flicker	PASS	Meets the requirements.

IMMUNITY (EN 55020:2007+A11:2011)			
Standard	Test Type	Result	Remarks
IEC 61000-4-2:2008 ED. 2.0	Electrostatic discharge immunity test	PASS	Meets the requirements of Standard's Performance Criterion A
IEC 61000-4-4:2012 ED. 3.0	Electrical fast transient / burst immunity test	PASS	Meets the requirements of Standard's Performance Criterion A



1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Mains Terminal Disturbance Voltage Test	0.15MHz ~ 30MHz	+ /-2.70 dB
Disturbance Power emissions test	30MHz ~ 300MHz	+ /-3.91 dB

“This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.”



2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT OF EUT	Switching Power Supply
MODEL NO.	HKP12-2400500dV, HKP12-0402300dV, HKP12-0751600dV, HKP12-1201000dV, HKP12-0402000dV, HKP12-1000800dV, HKP12-2400300dV
ADDITIONAL MODELS	HKP12-xxxxxyyydz Series
POWER SUPPLY	AC 100-240V 50/60Hz
DATA CABLE SUPPLIED	AC Line: Unshielded, Non-Detachable, 1.8m

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
3. Please refer to the EUT photo document (Reference No.: 150814N031) for detailed product photo.



4. Model List:

Model No. (HKP12-xxxxxyydz)	Input Voltage (VAC)	Input Current (A)	Output Voltage (V)	EF-20 Output Current (mA)	EE-16 Output Current (mA)
HKP12-xxxxxyydz	100~240	0.3	3.0-4.0	0-2300	0-2000
HKP12-xxxxxyydz	100~240	0.3	4.1-5.0	0-2000	0-1500
HKP12-xxxxxyydz	100~240	0.3	5.1-6.0	0-1800	0-1200
HKP12-xxxxxyydz	100~240	0.3	6.1-6.5	0-1600	0-1200
HKP12-xxxxxyydz	100~240	0.3	6.6-7.5	0-1600	0-1000
HKP12-xxxxxyydz	100~240	0.3	7.6-8.0	0-1500	0-0800
HKP12-xxxxxyydz	100~240	0.3	8.1-8.5	0-1400	0-0800
HKP12-xxxxxyydz	100~240	0.3	8.6-9.2	0-1300	0-0800
HKP12-xxxxxyydz	100~240	0.3	9.3-10	0-1200	0-0800
HKP12-xxxxxyydz	100~240	0.3	10.1-10.5	0-1100	0-0600
HKP12-xxxxxyydz	100~240	0.3	10.6-10.9	0-1100	0-0600
HKP12-xxxxxyydz	100~240	0.3	11.0-12.0	0-1000	0-0600
HKP12-xxxxxyydz	100~240	0.3	12.1-12.6	0-950	0-0500
HKP12-xxxxxyydz	100~240	0.3	12.7-13.3	0-900	0-0500
HKP12-xxxxxyydz	100~240	0.3	13.4-14.1	0-850	0-0500
HKP12-xxxxxyydz	100~240	0.3	14.2-15.0	0-800	0-0500
HKP12-xxxxxyydz	100~240	0.3	15.1-16.0	0-750	0-0500
HKP12-xxxxxyydz	100~240	0.3	16.1-17.1	0-700	0-0400
HKP12-xxxxxyydz	100~240	0.3	17.2-18.4	0-650	0-0400
HKP12-xxxxxyydz	100~240	0.3	18.5-20.0	0-600	0-0400
HKP12-xxxxxyydz	100~240	0.3	20.1-21.8	0-550	0-0300
HKP12-xxxxxyydz	100~240	0.3	21.9-24	0-500	0-0300

The "xxx" is 3 digits number from '030' to '240' which represents the output voltage from 3.0Vdc to 24.0Vdc, For example '240' means rate output voltage range 24Vdc. The difference between the adjacent models is 0.1V.

The "yyyy" is 4 digits number from '0050' to '2300' which represents output current from 50mA to 2300mA, For example 1000 means rated output current range 1000mA.

The letter "z" can be replaced by one letter in "V", "B "or "A", as follows:

"V" denotes direct plug-in type provided European plug (EU) plug

"B" denotes direct plug-in type provided British plug (UK) plug

"A" denotes direct plug-in type provided Australia plug (AU) plug

The used of transformers

The transformer have to size EE16 and EF20, EE16 type transformer will be used in products which output is not more than 8W. EF20 type trans-former will be used in products which output power is not more than 12W; and each transformer has two type bobbin for used, the pin type and flight line type for secondary.



2.2 DESCRIPTION OF TEST MODES

The EUT was tested under the following modes the final worst mode was marked in boldface and recorded in this report.

◆ MAINS TERMINAL DISTURBANCE VOLTAGE TEST

Test Mode	Test Model
Full Load	HKP12-2400500dV
Full Load	HKP12-1000800dV
Full Load	HKP12-0402000dV
Full Load	HKP12-2400300dV
Full Load	HKP12-1201000dV
Full Load	HKP12-0402300dV
Full Load	HKP12-0751600dV
Half Load	HKP12-2400500dV
No Load	HKP12-2400500dV

◆ DISTURBANCE POWER EMISSIONS TEST

Test Mode	Test Model	Test Line
Full Load	HKP12-0402000dV	AC Line DC Line
Full Load	HKP12-2400300dV	
Full Load	HKP12-1000800dV	
Full Load	HKP12-1201000dV	
Full Load	HKP12-0402300dV	
Full Load	HKP12-0751600dV	
Full Load	HKP12-2400500dV	

◆ HARMONIC, FLICKERED, ESD AND EFT TESTS

Test Mode
Full load



2.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to the specifications of the manufacturers, the EUT must comply with the requirements of the following standards:

EN 55013:2013

EN 61000-3-2:2014

EN 61000-3-3:2013

EN 55020:2007+A11:2011

IEC 61000-4-2:2008 ED. 2.0

IEC 61000-4-4:2012 ED. 3.0

The EUT is without tuner function and therefore the test items 20-S were not tested.

All applicable tests have been performed and recorded as per the above standards.

2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit without any other necessary accessories or support units.



3 EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 LIMITS OF MAINS TERMINAL DISTURBANCE VOLTAGE MEASUREMENT

TEST STANDARD: EN 55013

EQUIPMENT TYPE	FREQUENCY RANGE	LIMITS	
	(MHz)	(dB (uV))	
Television and sound receivers and associated equipment	0.15 to 0.5 0.5 to 5 5 to 30	Quasi-peak	Average
		66 to 56*	56 to 46*
		56	46
		60	50

* Decreasing linearly with the logarithm of the frequency.

- Note:**
1. If the limits for the average are met when using the quasi-peak detector, then the limits for the measurements with the average detector are considered to be met.
 2. The higher value measured with and without the aerial input outer conductor screen connected to earth is considered.
 3. Television receivers with teletext facilities should be tested in teletext mode with teletext picture.

3.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCS30	100340	May 11,15	May 10,16
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	April 25,15	April 24,16
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100317	April 25,15	April 24,16
Voltage probe	SCHWARZBECK	TK 9421	TK 9421-176	Jan. 08,16	Jan. 07,17
Test software	ADT	ADT_Cond_V7.3.7	N/A	N/A	N/A

- NOTE:**
1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
 2. The test was performed at Shielded Room 553.



3.1.3 TEST PROCEDURE

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20dB) were not recorded.

- NOTE:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. Margin value = Emission level - Limit value
 4. Correction factor = Insertion loss + Cable loss
 5. Emission Level = Correction Factor + Reading Value.

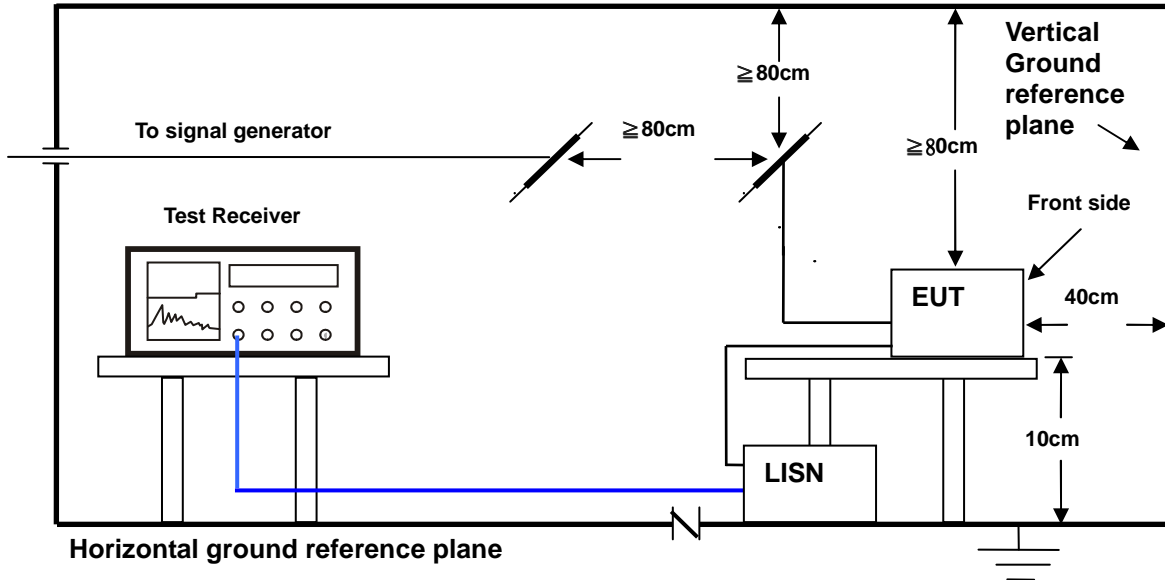
3.1.4 DEVIATION FROM TEST STANDARD

No deviation.



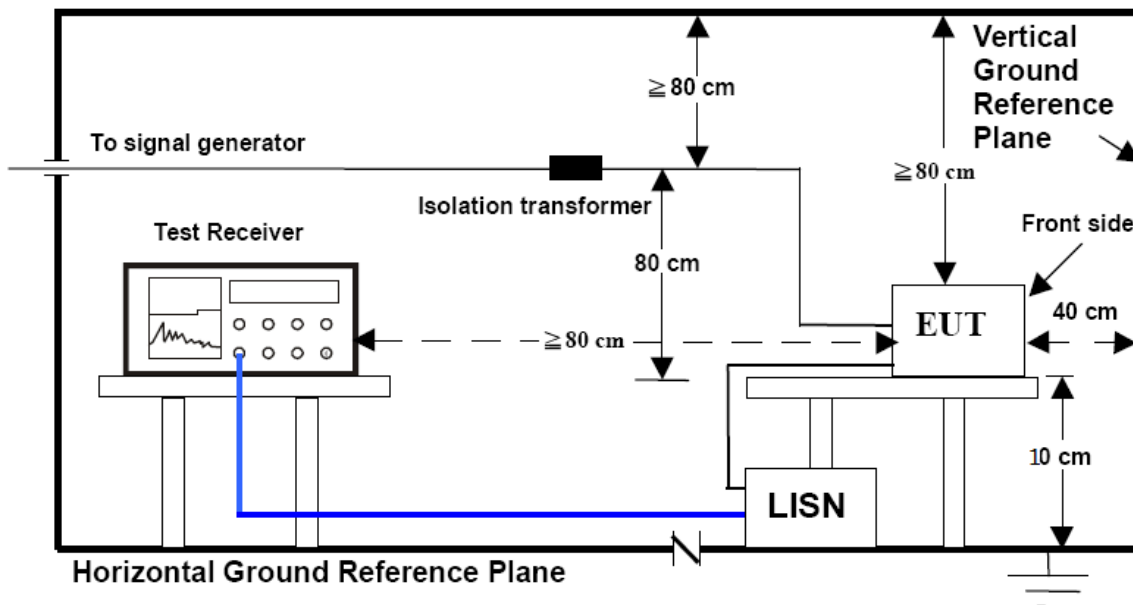
3.1.5 TEST SETUP

<For Analog signal in>



Note: Support units were connected to second LISN.

<For Digital signal in>



Note: Support units were connected to second LISN.

3.1.6 EUT OPERATING CONDITIONS

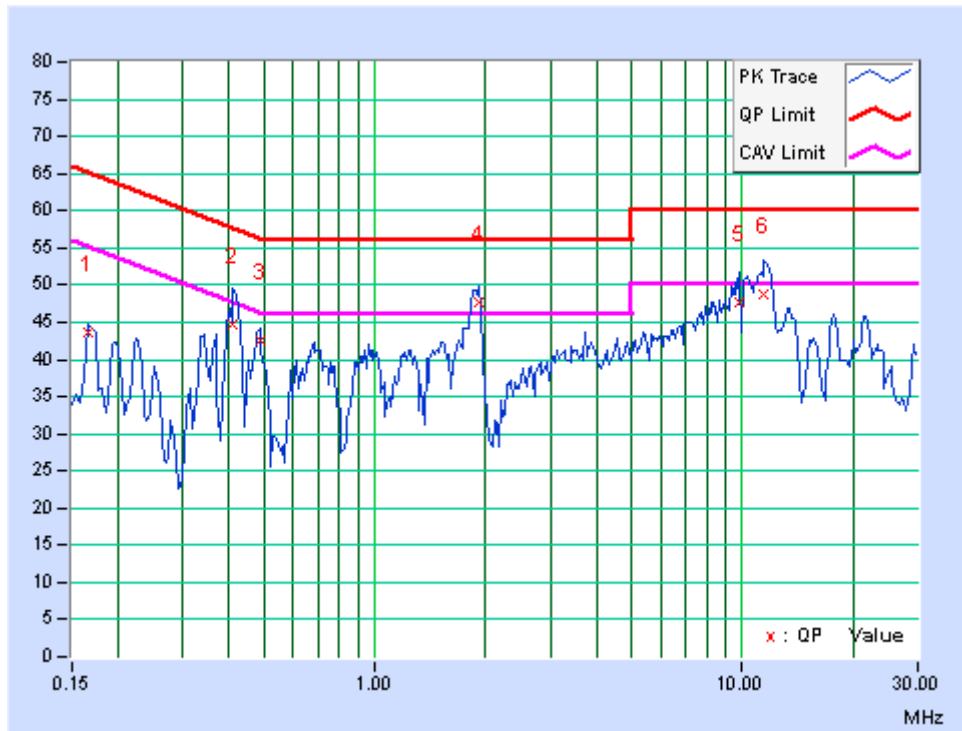
- a. Turned on the power of all equipment.
- b. EUT was operated according to the type description in manufacturer's specifications or the User's Manual.



3.1.7 TEST RESULTS

TEST MODE		Full load								
TEST VOLTAGE		AC 230V 50Hz				6dB BANDWIDTH		9 kHz		
ENVIRONMENTAL CONDITIONS		25 deg. C, 57% RH				TESTED BY: David				
PHASE OF POWER: LINE (L)										
No.	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.16562	9.75	33.87	31.72	43.62	41.47	65.18	55.18	-21.56
2	0.41172	9.79	34.95	28.94	44.74	38.73	57.61	47.61	-12.88	-8.89
3	0.48594	9.81	32.84	25.85	42.65	35.66	56.24	46.24	-13.59	-10.58
4	1.92969	9.82	37.78	29.34	47.60	39.16	56.00	46.00	-8.40	-6.84
5	9.83984	10.06	37.51	27.53	47.57	37.59	60.00	50.00	-12.43	-12.41
6	11.46094	10.10	38.76	29.85	48.86	39.95	60.00	50.00	-11.14	-10.05

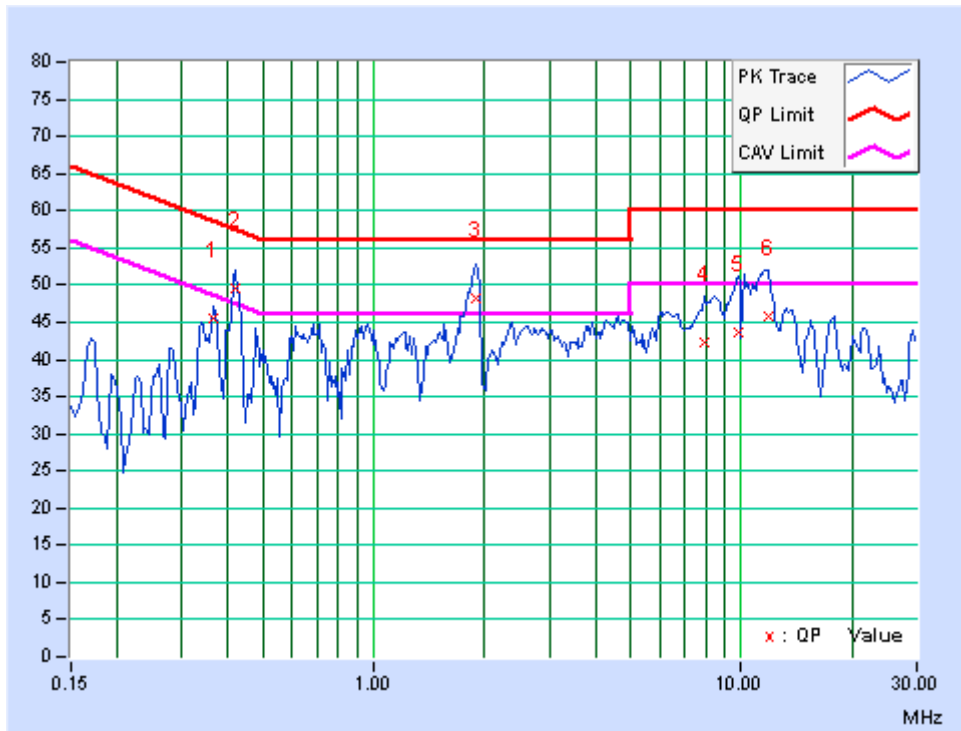
REMARKS: The emission levels of other frequencies were very low against the limit.





TEST MODE		Full load								
TEST VOLTAGE		AC 230V 50Hz				6dB BANDWIDTH		9 kHz		
ENVIRONMENTAL CONDITIONS		25 deg. C, 57% RH				TESTED BY: David				
PHASE OF POWER: NEUTRAL (N)										
No.	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.36484	9.49	36.11	30.87	45.60	40.36	58.62	48.62	-13.01
2	0.41953	9.50	40.11	34.11	49.61	43.61	57.46	47.46	-7.84	-3.84
3	1.90625	9.55	38.59	28.79	48.14	38.34	56.00	46.00	-7.86	-7.66
4	7.90625	9.73	32.52	24.64	42.25	34.37	60.00	50.00	-17.75	-15.63
5	9.83984	9.79	33.90	25.13	43.69	34.92	60.00	50.00	-16.31	-15.08
6	11.78125	9.85	35.88	27.14	45.73	36.99	60.00	50.00	-14.27	-13.01

REMARKS: The emission levels of other frequencies were very low against the limit.





3.2 DISTURBANCE POWER EMISSIONS MEASUREMENT

3.2.1 LIMITS OF DISTURBANCE POWER EMISSIONS MEASUREMENT

TEST STANDARD: EN 55013

EQUIPMENT TYPE	FREQUENCY RANGE(MHz)	LIMITS dB (pW)	
		Quasi-peak	Average
Associated equipment (video recorder excluded)	30 to 300	45 to 55*	35 to 45*

* Increasing linearly with frequency.

3.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCS30	100199	May 11,15	May 10,16
Absorbing Clamp	Rohde&Schwarz	MDS-21	100084	Apr. 10,15	Apr. 09,16
Test software	ADT	ADT_Clamp_V7.3.7	N/A	N/A	N/A

- NOTE:** 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed at Shielded Room 843.



3.2.3 TEST PROCEDURE

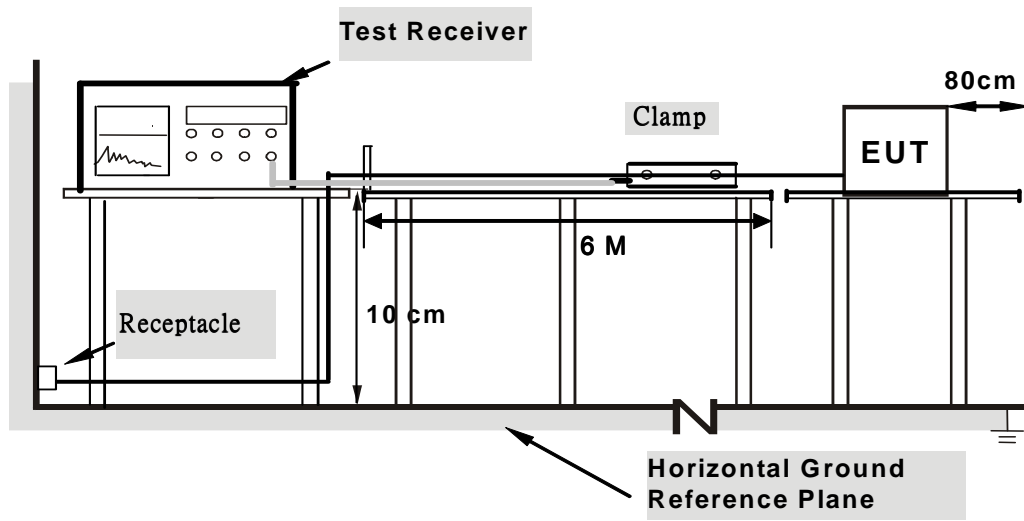
- a. The EUT was placed on a non-metallic table at least 0.1m from other metallic objects.
- b. The clamp was placed around the lead so as to measure a quantity proportional to the disturbance power on the lead.
- c. The absorbing clamp is positioned for maximum indication at each test frequency, the clamp shall be moved along the lead until the maximum value is found .
- d. The straight portion of the lead to be measured on should therefore be about 6m long , this being equal to $\lambda_{\max}/2 + 0.6\text{m}$.
- e. If the original lead of the appliance is shorter than the necessary length it shall be extended or replaced by a similar lead.
- f. Any plug or socket which will not pass through the absorbing clamp due to its size shall be removed.
- g. For each suspected emission, the EUT was arranged to its worst case and then the clamp was moved to lengths from 0 meter to 6 meters to find the maximum reading.
- h. The test-receiver system was set to quasi-peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is from 30MHz – 300MHz.

3.2.4 DEVIATION FROM TEST STANDARD

No deviation.



3.2.5 TEST SETUP



3.2.6 EUT OPERATING CONDITIONS

Same as item 3.1.6.



3.2.7 TEST RESULTS

TEST MODE	Full load; AC Line	FREQUENCY RANGE	30-300MHz
TEST VOLTAGE	AC 230V/50Hz	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak/ Average, 120kHz
ENVIRONMENTAL CONDITIONS	23 deg. C, 53% RH	TESTED BY: Wang Xue	

NO.	Freq. (MHz)	Corr. Factor (dB)	Reading Value (dBpW)		Emission Level (dBpW)		Limit (dBpW)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	31.62500	10.33	31.16	18.84	41.49	29.17	45.06	35.06	-3.57	-5.89
2	37.81250	11.03	28.90	19.95	39.93	30.98	45.29	35.29	-5.36	-4.31
3	70.25000	9.54	23.03	13.64	32.57	23.18	46.49	36.49	-13.93	-13.32
4	78.18750	7.53	24.07	13.15	31.60	20.68	46.78	36.78	-15.18	-16.10
5	114.68750	7.98	23.09	11.19	31.07	19.17	48.14	38.14	-17.07	-18.97
6	125.50000	8.23	24.15	15.86	32.38	24.09	48.54	38.54	-16.16	-14.45

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.





3.3 HARMONICS CURRENT MEASUREMENT

3.3.1 LIMITS OF HARMONICS CURRENT MEASUREMENT

TEST STANDARD: EN 61000-3-2

Limits for Class A equipment	
Harmonics Order n	Max. permissible harmonics current A
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15<=n<=39	0.15x15/n
Even harmonics	
2	1.08
4	0.43
6	0.30
8<=n<=40	0.23x8/n

Limits for Class D equipment		
Harmonics Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd Harmonics only		
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
13	0.30	0.21
15<=n<=39	3.85/n	0.15x15/n

- NOTE:** 1. Class A and Class D are classified according to section 5 of EN 61000-3-2.
2. According to section 7 of EN 61000-3-2, the above limits for all equipment except for lighting equipment are for all applications having an active power Input > 75 W and no limits apply for equipment with an active power Input up to and including 75 W.

3.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
5kVA AC Power Source	California Instruments	5001ix-400	55194	April 8, 15	April 7, 16
Harmonic/Flicker Test System	California Instruments	PACS-1	72134	April 8, 15	April 7, 16
Test Software	California Instruments	CTS 3.0-V3.2.0.35	N/A	N/A	N/A

- NOTE:** 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in EMS Room 2.



3.3.3 TEST PROCEDURE

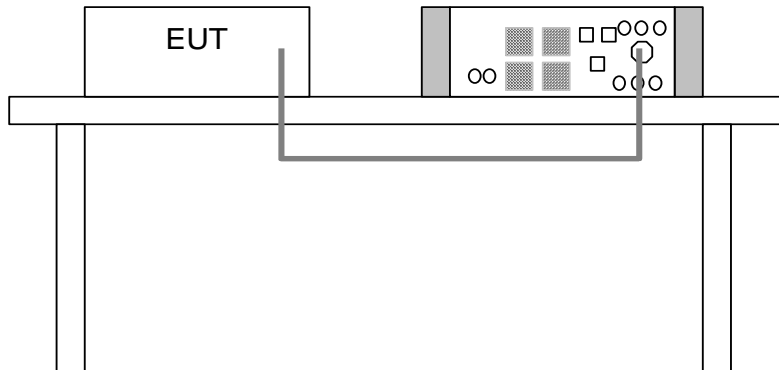
- a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- b. The classification of EUT is according to section 5 of EN 61000-3-2.
The EUT is classified as follows:
 - Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.
 - Class B: Portable tools.; Arc welding equipment which is not professional equipment
 - Class C: Lighting equipment.
 - Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors and television receivers.
- c. 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 time necessary for the EUT to be exercised.

3.3.4 DEVIATION FROM TEST STANDARD

No deviation.



3.3.5 TEST SETUP



3.3.6 EUT OPERATING CONDITIONS

Same as item 3.1.6.

3.3.7 TEST RESULTS

The limits are not specified for equipment with a rated power of 75W or less (other than lighting equipment). The EUT is not required to meet this test item as its power consumption is lower than 75W.

For further details, please refer to Clause 7 of EN 61000-3-2:2014.



3.4 VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

3.4.1 LIMITS OF VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

TEST STANDARD: EN 61000-3-3

TEST ITEM	LIMIT	NOTE
P_{st}	1.0	P_{st} means short-term flicker indicator.
P_{lt}	0.65	P_{lt} means long-term flicker indicator.
$T_{d(t)}$ (ms)	500	$T_{d(t)}$ means maximum time that $d(t)$ exceeds 3.3%.
d_{max} (%)	4	d_{max} means maximum relative voltage change.
dc (%)	3.3	dc means relative steady-state voltage change

3.4.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
5kVA AC Power Source	California Instruments	5001ix-400	55194	April 8, 15	April 7, 16
Harmonic/Flicker Test System	California Instruments	PACS-1	72134	April 8, 15	April 7, 16
Test Software	California Instruments	CTS 3.0-V3.2.0.35	N/A	N/A	N/A

NOTE: 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
 2. The test was performed in EMS Room 2.

3.4.3 TEST PROCEDURE

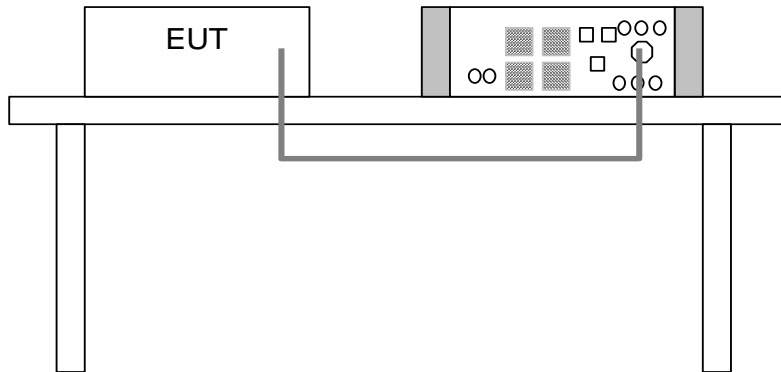
- a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
- b. During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.



3.4.4 DEVIATION FROM TEST STANDARD

No deviation.

3.4.5 TEST SETUP



3.4.6 EUT OPERATING CONDITIONS

Same as item 3.1.6.



3.4.7 TEST RESULTS

TEST MODE	Full load		
FUNDAMENTAL VOLTAGE/AMPERE	230.05Vrms	OBSERVATION PERIOD (Tp)	10 mins
ENVIRONMENTAL CONDITIONS	26 deg. C, 57% RH	TESTED BY: Sook	

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARKS
P_{st}	0.064	1.0	Pass
P_{lt}	/	0.65	/
$T_{d(t)}$ (ms)	0	500	Pass
d_{max} (%)	0	4	Pass
dc (%)	0	3.3	Pass

- NOTE:**
- (1) P_{st} means short-term flicker indicator.
 - (2) P_{lt} means long-term flicker indicator.
 - (3) $T_{d(t)}$ means maximum time that $d(t)$ exceeds 3.3%
 - (4) d_{max} means maximum relative voltage change.
 - (5) dc means relative steady-state voltage change.



4 IMMUNITY TEST

4.1 GENERAL DESCRIPTION

Product Standard:	EN 55020:2007+A11:2011	
Basic Standard, Specification, and Performance Criteria:	IEC 61000-4-2	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	IEC 61000-4-4	Electrical Fast Transient/Burst - EFT, Power line: 1kV, Tr/Th: 5/50 ns, 5kHz repetition frequency Performance Criterion B

4.2 GENERAL PERFORMANCE CRITERIA DESCRIPTION

CRITERION A	<p>The equipment shall continue to operate as intended during the test.</p> <p>No change of actual operating state (for eg. Change of channel) is allowed as a result of the application of the test. Multifunction equipment shall for each function meet the relevant requirements. Evaluation is carried out for audio and video functions. The equipment is supposed to operate as intended if the criteria of “Evaluation of audio quality” and/or “Evaluation of picture quality” are fulfilled.</p>
CRITERION B	<p>The equipment shall continue to operate as intended after the test. No loss of function is allowed after the test when the apparatus is used as intended, but failures which are recovered automatically, but which cause temporary delay in processing, are permissible. No change of actual operating state for example change of channel or stored data and settings is allowed as a result of the application of the test. During the test, degradation of performance is allowed.</p>

4.3 EUT OPERATING CONDITION

Same as item 3.1.6.



4.4 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

4.4.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge: 8 kV (Direct) Contact Discharge: 4 kV (Indirect & Direct)
Polarity:	Positive / Negative
Number of Discharge:	20 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1-second

4.4.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
ESD Generator	TESEQ	NSG 437	279	Mar. 26, 15	Mar. 25, 16
Test Software	TESEQ	V03.03	N/A	N/A	N/A
ESD Generator	EM TEST	Dito	V1211112265	Aug. 08,15	Aug. 07,16
Test Software	EM TEST	V 2.31	N/A	N/A	N/A

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in ESD Room.

4.4.3 TEST PROCEDURE

The basic test procedure was in accordance with IEC 61000-4-2:

- a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- c. The time interval between two successive single discharges was at least 1 second.
- d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.
- e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.

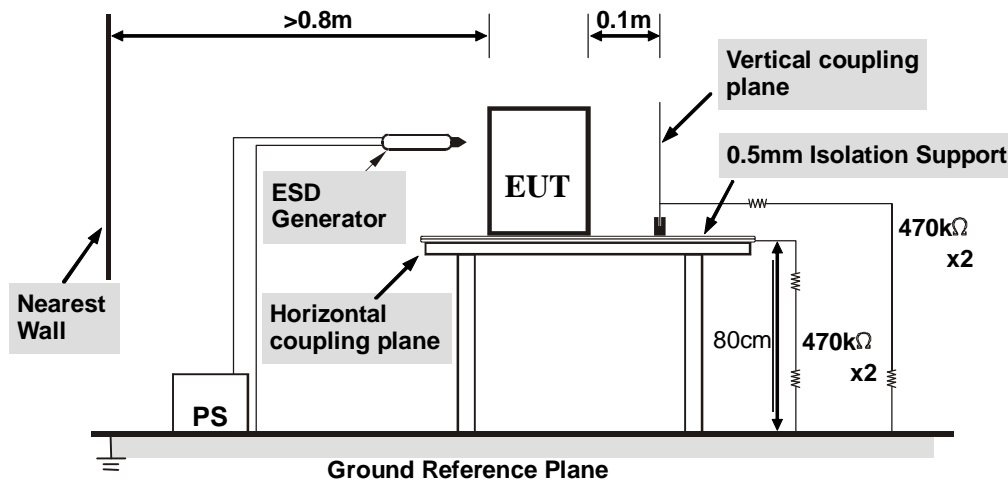


- g. At least ten single discharges (in the most sensitive polarity) were applied to the **Horizontal Coupling Plane** at points on each side of the EUT. The ESD generator was positioned horizontally at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP**.
- h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **Vertical Coupling Plane** in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



NOTE:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940kΩ total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.



4.4.6 TEST RESULTS

TEST MODE	See section 2.2	TEST VOLTAGE	AC 230V 50Hz
ENVIRONMENTAL CONDITIONS	23.5deg. C, 44.5% RH, 101.5kPa	TESTED BY: Paul Liang	

Direct Discharge Application				
Test Level (kV)	Polarity	Test Point	Test Result of Contact Discharge	Test Result of Air Discharge
4	+/-	All metal parts	A	N/A
8	+/-	All non-metal parts	N/A	A

Indirect Discharge Application				
Discharge Level (kV)	Polarity	Test Point	Test Result of HCP	Test Result of VCP
4	+/-	HCP	A	N/A
4	+/-	VCP	N/A	A

NOTE: A: There was no change compared with initial operation during the test..



4.5 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)

4.5.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-4
Test Voltage:	Power Line – 1 kV Signal-Line – N/A
Polarity:	Positive & Negative
Impulse Frequency:	100 kHz : only for single lines of xDSL equipment 5 kHz : other
Impulse Waveshape :	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	1 min.

4.5.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EFT Tester	HAEFELY	PEFT4010	150546	May 11,15	May 10,16
EFT Coupling Clamp	HAEFELY	IP4A	150407	May 11,15	May 10,16
Test Software	HAEFELY	SWPE4010 1.22	N/A	N/A	N/A

- NOTE:** 1. The test was performed in EMS Room 1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

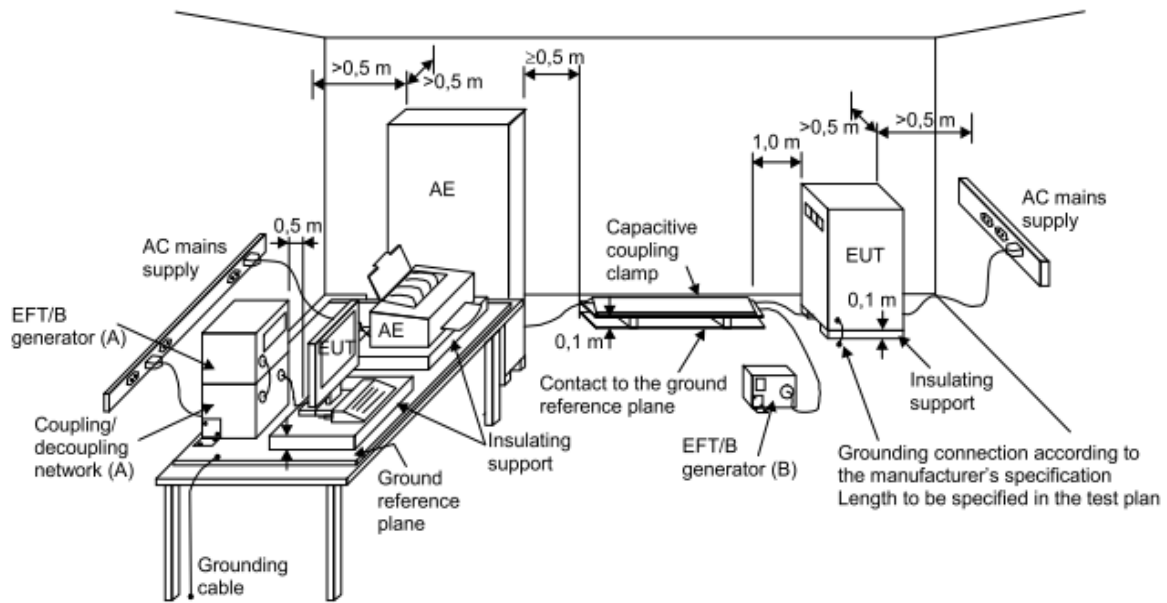
4.5.3 TEST PROCEDURE

- Both positive and negative polarity discharges were applied.
- The distance between any coupling devices and the EUT should be (0.5 – 0/+0.1) m for table-top equipment testing, and (1.0 ± 0.1) m for floor standing equipment.
- The duration time of each test sequential was 1 minutes.
- The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP



IEC 645/12

NOTE:

- (A) location for supply line coupling
- (B) location for signal lines coupling

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



4.5.6 TEST RESULTS

TEST MODE	See section 2.2	TEST VOLTAGE	AC 230V 50Hz
ENVIRONMENTAL CONDITIONS	26.3deg. C, 57.4% RH	TESTED BY: Sook	

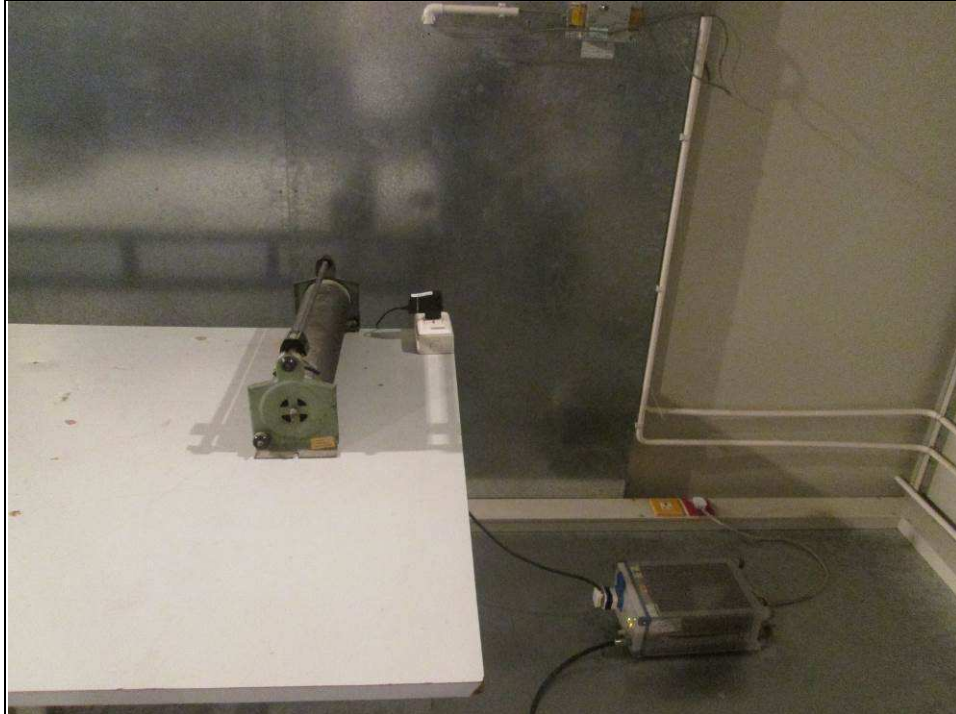
Pulse Voltage	1 kV		kV		kV		kV	
Pulse Polarity	+	-	+	-	+	-	+	-
L	A	A	/	/	/	/	/	/
N	A	A	/	/	/	/	/	/
L+N	A	A	/	/	/	/	/	/

NOTE: A: There was no change compared with initial operation during the test.

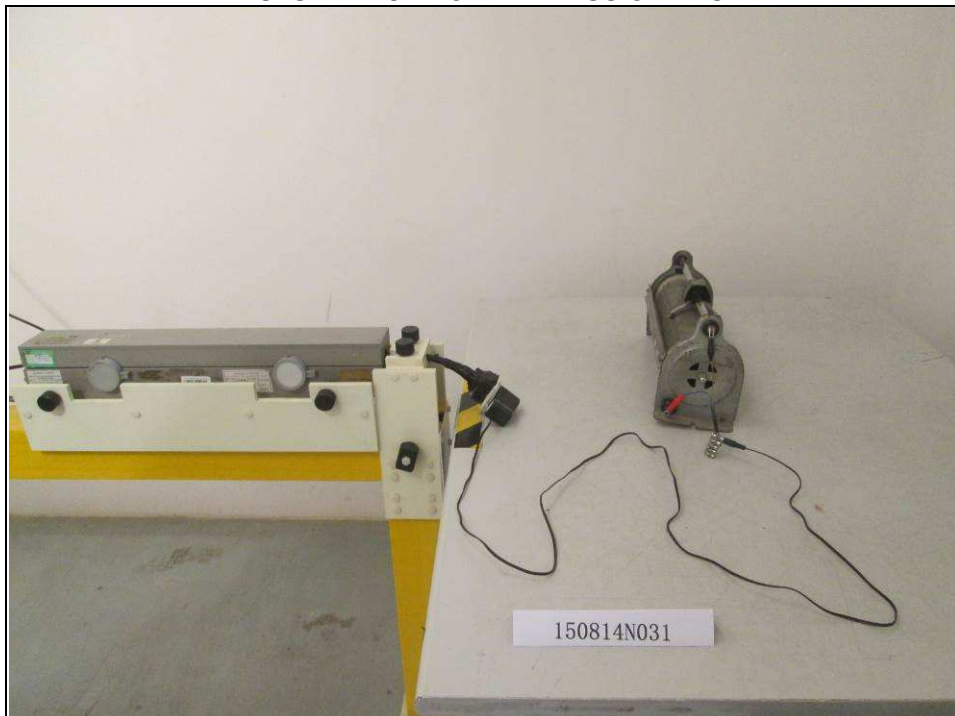


5 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST



DISTURBANCE POWER EMISSION TEST





**BUREAU
VERITAS**

Test Report No.: CE150814N031

HARMONICS EMISSION TEST & VOLTAGE FLUCTUATIONS AND FLICKER TEST



ESD TEST





**BUREAU
VERITAS**

Test Report No.: CE150814N031

EFT TEST





Test Report No.: CE150814N031

6 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications were made to the EUT by the lab during the test.