

# CERTIFICATE OF CONFORMITY



**Applicant:** Cho-Liang Thermal Tech Co.,Ltd  
**Address:** 5F.-3, No.14, Ln. 609, Sec. 5, Chongxin Rd., Sanchong Dist.,  
New Taipei City 241  
**Product:** Notebook Stand  
**Brand Name:** N/A  
**Model No.:** NB620(CNR-NS8)  
**Test Report No.:** LTE12091701

The submitted sample of the above product has been tested for CE marking according to following European Directive and standards:

- Electromagnetic Compatibility Directive 2004/108/EC

**Standards:** EN 55022: 2006+A1: 2007, Class B;

EN 55024: 1998+A1: 2001+A2: 2003;

EN 61000-3-2: 2006+A1:2009+A2:2009; EN 61000-3-3: 2008

The referred test report(s) show that the product complies with standard(s) recognized as giving presumption of compliance with the essential requirements in the specified European Directive. This verification does not imply assessment of the production of the product. The CE marking may be affixed if all relevant and effective European Directives with CE are applicable.




Jim Gao  
Manager  
Sep. 20, 2012

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<b>LiTest Technology Service Co., Ltd</b>	MingYing Building, FuKang Road(42), HouJie Town, DongGuan City, GuangDong Province, China	Tel: +86-769-82272566/7 Fax: +86-769-82272565 Web: www.Litest.cn
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## TEST REPORT



Applicant	Cho-Liang Thermal Tech Co.,Ltd
Address	5F.-3, No.14, Ln. 609, Sec. 5, Chongxin Rd., Sanchong Dist., New Taipei City 241
Manufacturer or Supplier	Fly Alpine Electron Co.,Ltd
Address	Gongting Managent Zone, Longxi Town,Boluo County, Huizhou City, Guangdong Province, P.R.China

Product	Notebook Stand	
Brand Name	N/A	
Model	NB620(CNR-NS8)	
Additional Model & Model Difference	N/A	
Date of tests	Sep. 18-20, 2012	

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 55022: 2006+A1: 2007, Class B
- ☒ EN 55024: 1998+A1: 2001+A2: 2003
- ☒ EN 61000-3-2: 2006+A1:2009+A2:2009
- ☒ EN 61000-3-3: 2008

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

Reviewed by Penny Li Engineer / EMC Department	Approved by Jim Gao Manager / LiTest
  Date: Sep. 20, 2012	  Date: Sep. 20, 2012

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us.

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## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EMISSION			
Standard	Test Type	Result	Remarks
EN 55022: 2006+A1:2007, Class B	Conducted Test	PASS	Meets Limits Minimum passing margin is –11.29 dB at 0.20 MHz
	Radiated Test	PASS	Meets Limits Minimum passing margin is –5.93 dB at 34.85 MHz
EN 61000-3-2: 2006+A1:2009+A2:2009	Harmonic current emissions	PASS	Meets the requirements.
EN 61000-3-3: 2008	Voltage fluctuations & flicker	PASS	Meets the requirements.

IMMUNITY (EN55024: 1998+A1: 2001+A2: 2003)			
Standard	Test Type	Result	Remarks
IEC 61000-4-2: 2008	Electrostatic discharge immunity test	PASS	Electrostatic Discharge – ESD: 8kV Air discharge, 4kV Contact discharge, Performance Criterion B
IEC 61000-4-3: 2010	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Radio-Frequency Electromagnetic Field Susceptibility Test – RS 80-1000 MHz, 3V/m, 80%AM(1kHz), Performance Criterion A
IEC 61000-4-4: 2004 +A1:2010	Electrical fast transient / burst immunity test.	PASS	Electrical Fast Transient/Burst - EFT AC mains: 1kV, Performance Criterion B
IEC 61000-4-5: 2005	Surge immunity test	PASS	Surge Immunity Test: 1.2/50 us AC mains: 1 kV, Performance Criterion B

IEC 61000-4-6: 2008	Immunity to conducted disturbances, induced by radio-frequency fields	PASS	Conducted Radio Frequency Disturbances Test – CS: 0.15-80 MHz, 3Vrms, 80% AM, 1kHz, Performance Criterion A
IEC 61000-4-8: 2009	Power frequency magnetic field immunity test.	PASS	Power Frequency Magnetic Field Test, 50 Hz, 1A/m, Performance Criterion A
IEC 61000-4-11:2004	Voltage dips, short interruptions and voltage variations immunity tests	PASS	Meets the requirements of Voltage Dips: Ut:230Vac 50HZ i) 100% residual - Performance Criterion B ii) 30% residual – Performance Criterion C iii) 100% residual – Performance Criterion C

## 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.

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

MEASUREMENT	UNCERTAINTY
Conducted emissions	1.99dB
Radiated emissions	4.76dB

## 2 GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Notebook Stand
<b>MODEL NO.</b>	NB620(CNR-NS8)
<b>POWER SUPPLY</b>	Input: DC 5V 0.5A (from Notebook input 230Vac 50Hz)
<b>DATA CABLE SUPPLIED</b>	USB line, Power mains

### 2.2 DESCRIPTION OF TEST MODES

The EUT was chosen for emission test with on load

Test Item	Description of Test Mode		
	Test Mode	Model No.	Test Condition
Conducted Emission	On	NB620(CNR-NS8)	load
Radiated Emission	On	NB620(CNR-NS8)	load

The EUT with worst emission was selected and the test data were recorded in the test report.

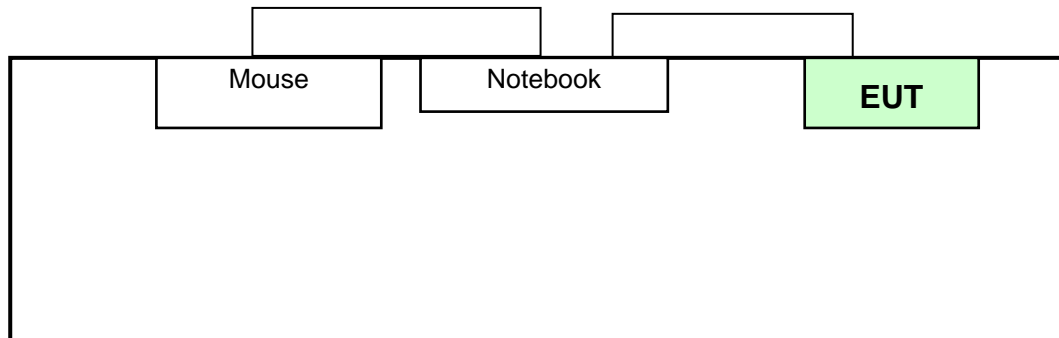
The worst mode was selected for Flicks and other immunity test items.

### 2.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

#### 2.3.1 FOR EMISSION TEST

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	--	--	--	N/A
2	Mouse	--	--	--	N/A

**TEST CONFIGURATION****EMI+EMS**



### 3 EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

###### TEST STANDARD: EN 55022

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

- NOTE:**
- (1) The lower limit shall apply at the transition frequencies.
  - (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
  - (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

##### 3.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Jul. 7,12	Jul. 6,13
Artificial Mains Network	Rohde&Schwarz	ENV216	101315	Jul. 7,12	Jul. 6,13
Artificial Mains Network (AUX)	Rohde&Schwarz	ENV216	101314	Jul. 7,12	Jul. 6,13
RF Cable	FUJIKURA	3D-2W	944 Cable	Jul. 7,12	Jul. 6,13

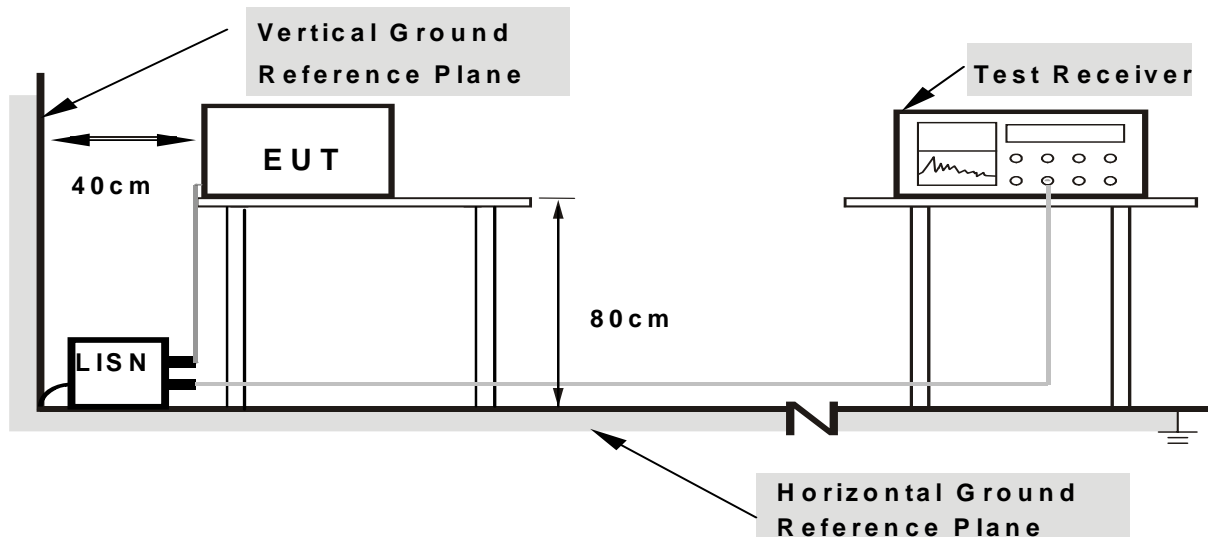
##### 3.1.3 TEST PROCEDURE

- 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 artificial mains network (AMN). Other support units were connected to the power mains through another AMN. The two AMNs 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.

### 3.1.4 DEVIATION FROM TEST STANDARD

No deviation

### 3.1.5 TEST SETUP



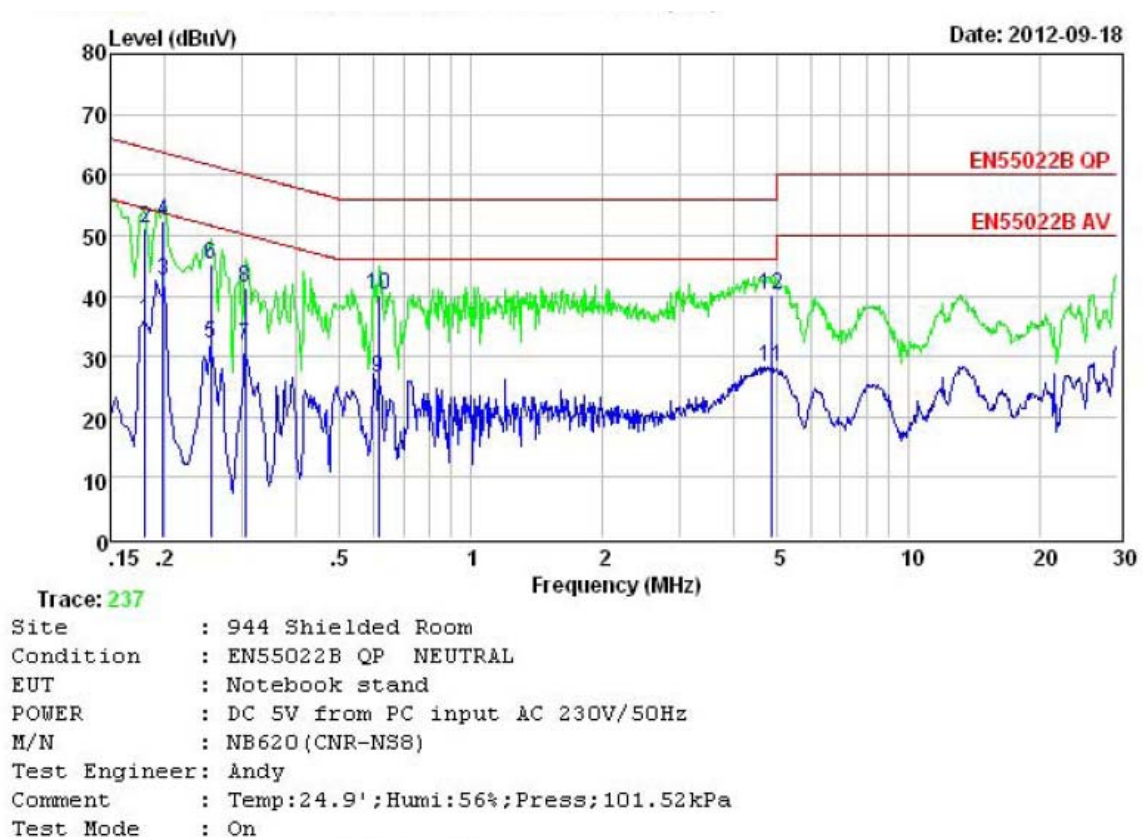
**Note:** 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

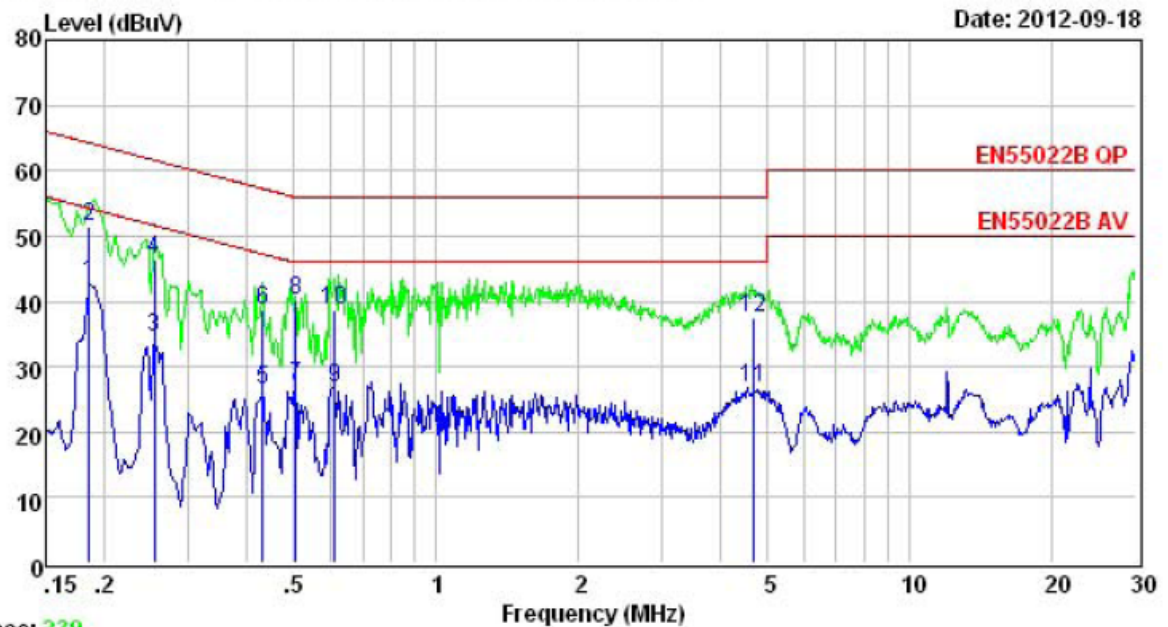
### 3.1.6 EUT OPERATING CONDITIONS

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

### 3.1.7 TEST RESULTS



	Freq	Level	Limit	Over	Remark
	MHz	dBuV	dBuV	dB	
1	0.18	35.86	54.50	-18.64	Average
2	0.18	51.01	64.50	-13.49	QP
3	0.20	42.42	53.71	-11.29	Average
4	0.20	52.41	63.71	-11.30	QP
5	0.25	32.26	51.60	-19.34	Average
6	0.25	45.18	61.60	-16.42	QP
7	0.31	31.77	50.10	-18.33	Average
8	0.31	41.35	60.10	-18.75	QP
9	0.61	26.34	46.00	-19.66	Average
10	0.61	40.25	56.00	-15.75	QP
11	4.87	28.34	46.00	-17.66	Average
12	4.87	40.16	56.00	-15.84	QP



Trace: 239

Site : 944 Shielded Room  
 Condition : EN55022B QP LINE  
 EUT : Notebook stand  
 POWER : DC 5V from PC input AC 230V/50Hz  
 M/N : NB620 (CNR-NS8)  
 Test Engineer: Andy  
 Comment : Temp:24.9';Humi:56%;Press:101.52kPa  
 Test Mode : On

	Freq	Level	Limit	Over	Remark
	MHz	dBuV	Line	Limit	
			dBuV	dB	
1	0.19	42.84	54.24	-11.40	Average
2	0.19	51.35	64.24	-12.89	QP
3	0.25	34.57	51.60	-17.03	Average
4	0.25	46.53	61.60	-15.07	QP
5	0.43	26.37	47.24	-20.87	Average
6	0.43	38.67	57.24	-18.57	QP
7	0.50	27.12	46.00	-18.88	Average
8	0.50	40.11	56.00	-15.89	QP
9	0.61	26.69	46.00	-19.31	Average
10	0.61	38.65	56.00	-17.35	QP
11	4.70	26.69	46.00	-19.31	Average
12	4.70	37.55	56.00	-18.45	QP

## 3.2 RADIATED EMISSION MEASUREMENT

### 3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

**TEST STANDARD: EN 55022**  
**FOR FREQUENCY BELOW 1000 MHz**

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 10m)
	dBuV/m	dBuV/m
30 – 230	40	30
230 – 1000	47	37

**FOR FREQUENCY ABOVE 1000 MHz**

FREQUENCY (GHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
1 to 3	76	56	70	50
3 to 6	80	60	74	54

**NOTE:** (1) The lower limit shall apply at the transition frequencies.  
(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).  
(3) All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	Up to 5 times of the highest frequency or 6 GHz, whichever is less

### 3.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Jul. 7,12	Jul. 6,13
Bilog Antenna	ETS-LINDGREN	3142D	00135452	Jun. 28,12	Jun. 27,13
Spectrum Analyzer	Agilent	E4411B	MY4511304	Sept. 9,12	Sept. 8,13
3m Semi-anechoic Chamber	ETS-LINDGREN	966	KW01	Aug.28,12	Aug.27,13
Signal Amplifier	SONOMA	310	187303	Jul. 7,12	Jul. 6,13
RF Cable	IMRO	IMRO-400	966 Cable 1#	Jul. 7,12	Jul. 6,13
MULTI-DEVICE Controller	ETS-LINDGREN	2090	126913	N/A	N/A
Antenna Holder	ETS-LINDGREN	2070B	00109601	N/A	N/A

### 3.2.3 TEST PROCEDURE

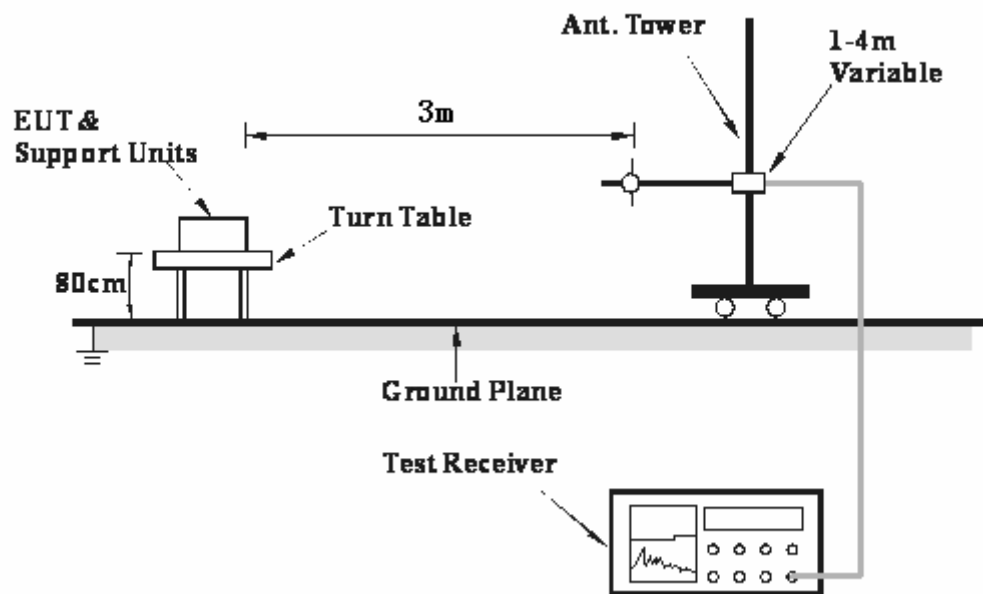
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10-meter Semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna is varied from one meter to four meters 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.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

**NOTE:** The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

### 3.2.4 DEVIATION FROM TEST STANDARD

No deviation

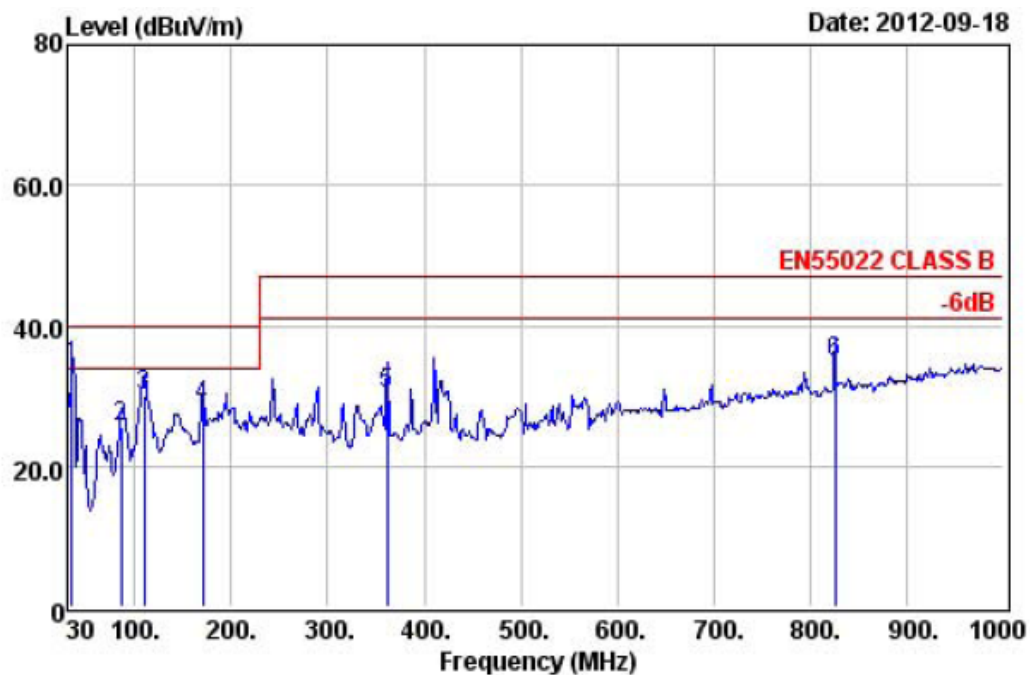
### 3.2.5 TEST SETUP



### 3.2.6 EUT OPERATING CONDITIONS

Same as item 3.1.6

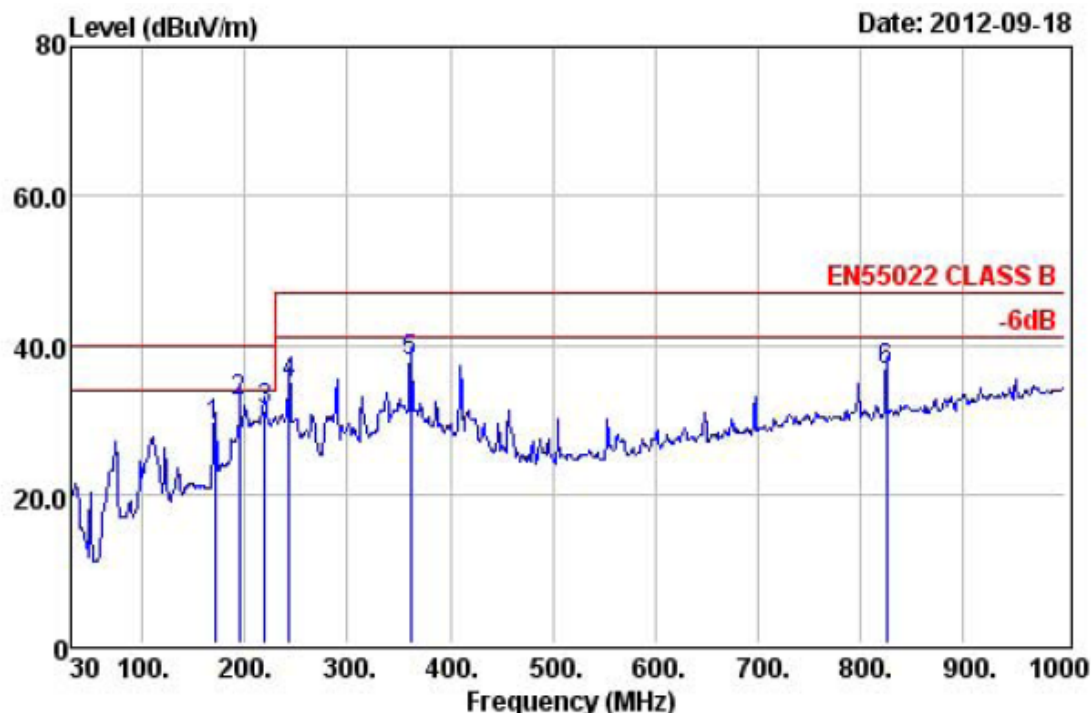
## 3.2.7 TEST RESULTS



Site : 966 Chamber  
 Condition: EN55022 CLASS B 3m 3142D VERTICAL  
 EUT : Notebook stand  
 M/N : NB620 (CNR-NS8)  
 Power : DC 5V from PC input AC 230V/50Hz  
 Test By : Andy  
 Comment : Temp:24.8'C Humi:56% Press:101.52kPa  
 Test Mode: On

: Ant high:1.0m;Table angle:127'								
	Preamp	Read	Cable	Antenna		Limit	Over	
Freq	Factor	Level	Loss	Factor	Level	Line	Limit	
MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dBuV/m	dB
1 !	34.85	31.38	49.00	0.51	15.94	34.07	40.00	-5.93
2	86.26	31.35	47.38	0.89	8.69	25.61	40.00	-14.39
3	109.54	31.31	50.99	1.03	9.31	30.02	40.00	-9.98
4	170.65	31.19	48.35	1.33	10.12	28.61	40.00	-11.39
5	361.74	30.61	42.58	2.18	16.12	30.27	47.00	-16.73
6	825.40	30.47	37.55	4.50	23.10	34.68	47.00	-12.32





Site : 966 Chamber  
 Condition: EN55022 CLASS B 3m 3142D HORIZONTAL  
 EUT : Notebook stand  
 M/N : NB620 (CNR-NS8)  
 Power : DC 5V from PC input AC 230V/50Hz  
 Test By : Andy  
 Comment : Temp:24.8'C Humi:56% Press:101.52kPa  
 Test Mode: On

: Ant high:2.4m;Table angle:253'

	Preamp	Read	Cable	Antenna		Limit	Over
Freq	Factor	Level	Loss	Factor	Level	Line	Limit
MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB
1	170.65	31.19	48.81	1.33	10.12	29.07	40.00 -10.93
2	194.90	31.11	51.40	1.45	10.54	32.28	40.00 -7.72
3	219.15	30.99	48.66	1.56	11.92	31.15	40.00 -8.85
4	243.40	30.95	51.46	1.66	12.72	34.89	47.00 -12.11
5	361.74	30.61	49.97	2.18	16.12	37.66	47.00 -9.34
6	825.40	30.47	39.35	4.50	23.10	36.48	47.00 -10.52

### 3.3 HARMONICS CURRENT MEASUREMENT

#### 3.3.1 LIMITS OF HARMONICS CURRENT MEASUREMENT

##### TEST STANDARD: EN 61000-3-2

Limits for Class A equipment		Limits for Class D equipment		
Harmonics Order n	Max. permissible harmonics current A	Harmonics Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd harmonics		Odd Harmonics only		
3	2.30	3	3.4	2.30
5	1.14	5	1.9	1.14
7	0.77	7	1.0	0.77
9	0.40	9	0.5	0.40
11	0.33	11	0.35	0.33
13	0.21	13	0.30	0.21
15<=n<=39	0.15x15/n	15<=n<=39	3.85/n	0.15x15/n
Even harmonics				
2	1.08			
4	0.43			
6	0.30			
8<=n<=40	0.23x8/n			

**NOTE:** 1. Class A and Class D are classified according to section 5 of EN 61000-3-2:2006.

2. According to section 7 of EN 61000-3-2: 2006+A1:2009, the above limits for all equipment except for lighting equipment are for all applications having an active input power > 75 W and no limits apply for equipment with an active input power 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	5001lx+CTS-400	60138	Jul. 7,12	Jul. 6,13
Harmonic/Flicker Test System	California Instruments	PACS-1	72847	Jul. 7,12	Jul. 6,13

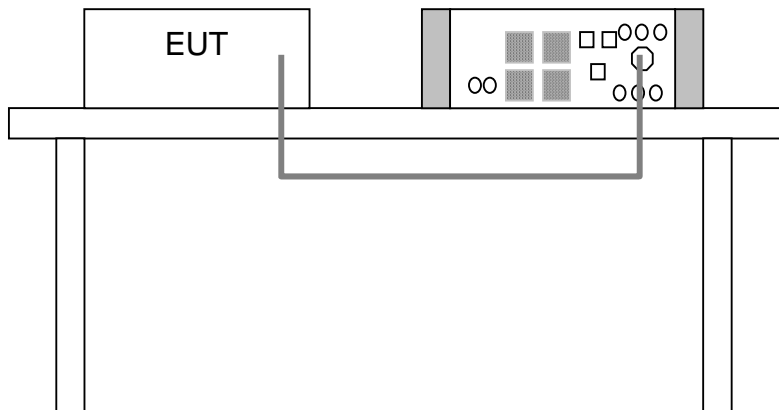
### 3.3.3 TEST PROCEDURE

- 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: 2006+A1:2009. 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

Connected notebook to USB output port of EUT to make EUT have maximum power consumption.

### 3.3.7 TEST RESULTS

**NOTE:** There is no need for Harmonics test to be performed on this product (rated power is less than 75W) in accordance with EN 61000-3-2:2006+A1:2009+A2:2009

For further details, please refer to Clause 7 of EN 61000-3-2:2006+A1:2009+A2:2009 which states:

“For the following categories of equipment, limits are not specified in this edition of the standard: - equipment with a rated power of 75W or less, other than lighting equipment.”

### 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.
$d(t)$ (%)	3.3	$d(t)$ means maximum time that not exceeds 500 ms.
$d_{max}$ (%)	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+CTS-400	60138	Jul. 7,12	Jul. 6,13
Harmonic/Flicker Test System	California Instruments	PACS-1	72847	Jul. 7,12	Jul. 6,13

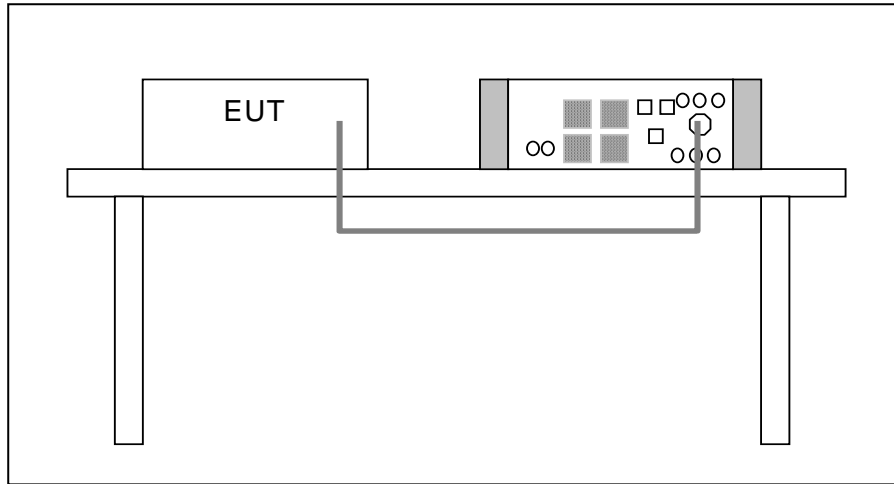
#### 3.4.3 TEST PROCEDURE

- 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.
- 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.

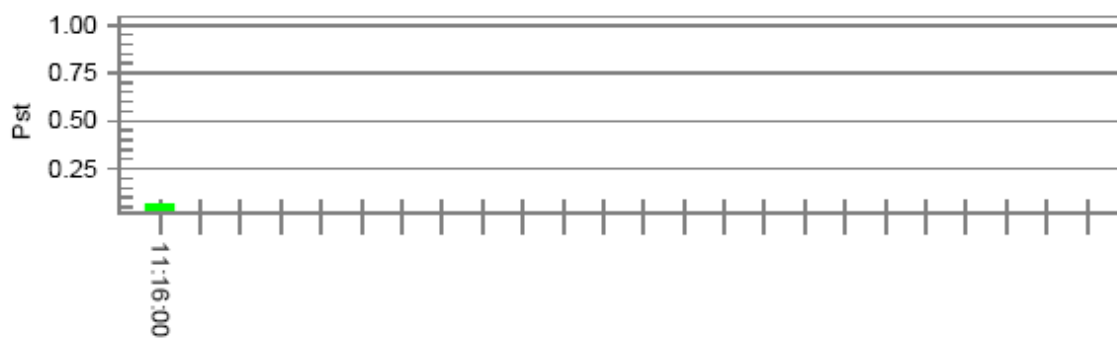
### 3.4.7 TEST RESULTS

Test Result: Pass

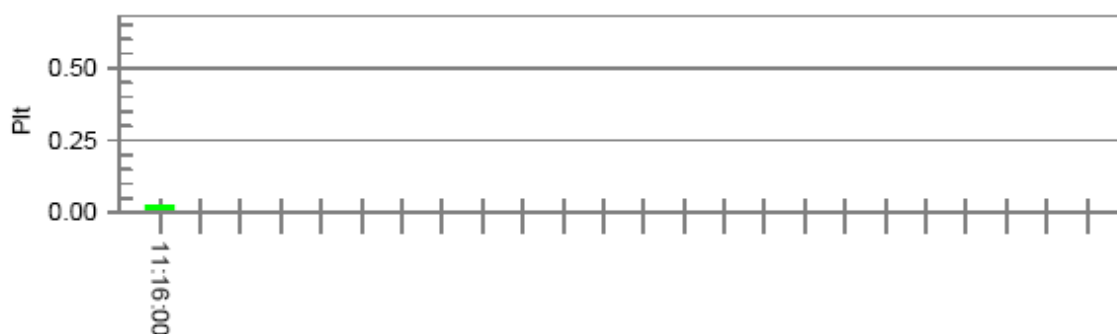
Status: Test Completed

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):	230.95		
Highest dt (%):	0.00	Test limit (%):	3.30 Pass
Time(mS) > dt:	0.0	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):	0.064	Test limit:	1.000 Pass
Highest Plt (2 hr. period):	0.028	Test limit:	0.650 Pass

## 4. IMMUNITY TEST

### 4.1. GENERAL DESCRIPTION

<b>Product Standard:</b>	<b>EN 55024: 1998+A1: 2001+A2: 2003</b>	
<b>Basic Standard, specification requirement, and Performance Criteria:</b>	IEC 61000-4-2	Electrostatic Discharge – ESD: 8kV Air discharge, 4kV Contact discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-1000 MHz, 3V/m, 80% AM (1kHz), Performance Criterion A
	IEC 61000-4-4	Electrical Fast Transient/Burst - EFT AC mains: 1kV, Performance Criterion B
	IEC 61000-4-5	Surge Immunity Test: 1.2/50 us Open Circuit Voltage Performance Criterion B
	IEC 61000-4-6	Conducted Radio Frequency Disturbances Test – CS: 0.15-80 MHz, 3Vrms, 80% AM, 1kHz, Performance Criterion A
	IEC 61000-4-8	Power Frequency Magnetic Field Test, 50 Hz, 1A/m, Performance Criterion A
	IEC 61000-4-11	Voltage Dips: 100% reduction -0.5 period, Performance Criterion B 30% reduction – 25 period, Performance Criterion C Voltage Interruptions: 100% reduction – 250 period, Performance Criterion C



## 4.2. GENERAL PERFORMANCE CRITERIA DESCRIPTION

According to Clause 7.1 of EN 55024: 1998+A1: 2001 +A2: 2003 standard, the following describes the general performance criteria.

<b>CRITERION A</b>	The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. 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 by what the user may reasonably expect from the equipment if used as intended.
<b>CRITERION B</b>	<p>After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomenon below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.</p> <p>During the test, degradation of performance is allowed. However, no change of operating state if stored data is allowed to persist after the test. 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 by what the user may reasonably expect from the equipment if used as intended.</p>
<b>CRITERION C</b>	<p>Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.</p> <p>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

## 4.3. EUT OPERATING CONDITION

Same as item 3.1.6.

#### 4.4. ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

##### 4.4.1. TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-2
<b>Discharge Impedance:</b>	330 ohm / 150 pF
<b>Discharge Voltage:</b>	Air Discharge : 8 kV (Direct) Contact Discharge : 4 kV (Indirect)
<b>Polarity:</b>	Positive & Negative
<b>Number of Discharge:</b>	≥10(Air discharge for single polarity discharge) ≥25 (Contact discharge for single polarity discharge)
<b>Discharge Mode:</b>	Single Discharge
<b>Discharge Period:</b>	1 second minimum

##### 4.4.2. TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
ESD Generator	TESEQ	NSG437	433	Jul. 11,12	Jul. 10,13

##### 4.4.3. TEST PROCEDURE

The discharges shall be applied in two ways:

- a. Contact discharges to the conductive surfaces and coupling planes:

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. 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.

b. Air discharges at slots and apertures and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

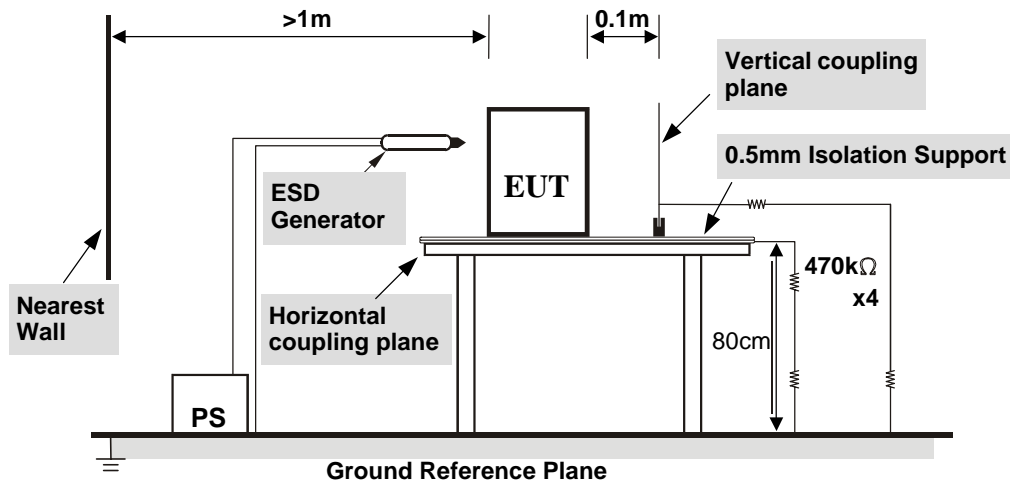
The basic test procedure was in accordance with IEC 61000-4-2:

- 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 vertically 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

<b>TEST MODE</b>	on	<b>INPUT</b>	DC 5V from Notebook input 230Vac 50Hz
<b>ENVIRONMENTAL CONDITIONS</b>	23.6deg. C, 56% RH,	<b>TESTED BY:</b> Andy	

TEST RESULTS OF DIRECT APPLICATION					
Discharge Level (kV)	Polarity	Test Point	Contact Discharge	Air Discharge	Performance Criterion
4, 8	+/-	1, 4	N/A	Note	B

**Description of test point:**

1. Switch Port    2. USB Port    3. Screw    4. Slot

TEST RESULTS OF INDIRECT APPLICATION					
Discharge Level (kV)	Polarity	Test Point	Horizontal Coupling Plane	Vertical Coupling Plane	Performance Criterion
2, 4, 8	+/-	1 ~ 4	Note	Note	B

**Description of test point:**

1. Left side  
2. Right side  
3. Front side  
4. Rear side

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

## 4.5. RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)

### 4.5.1. TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-3
<b>Frequency Range:</b>	80 MHz - 1000 MHz
<b>Field Strength:</b>	3 V/m
<b>Modulation:</b>	1kHz Sine Wave, 80%, AM Modulation
<b>Frequency Step:</b>	1 % of fundamental
<b>Polarity of Antenna:</b>	Horizontal and Vertical
<b>Antenna Height:</b>	1.5m
<b>Dwell Time:</b>	3 seconds

### 4.5.2. TEST INSTRUMENTS

**NOTE:** The test was performed at STC (Dongguan) Company Ltd.

### 4.5.3. TEST PROCEDURE

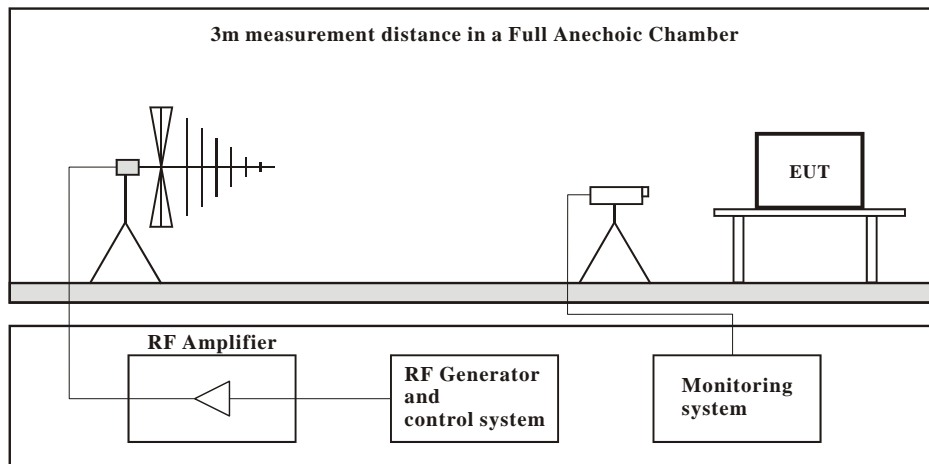
The test procedure was in accordance with IEC 61000-4-3

- The testing was performed in a fully-anechoic chamber.
- The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz sinewave.
- The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5s.
- The field strength level was 3V/m.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

### 4.5.4. DEVIATION FROM TEST STANDARD

No deviation

## 4.5.5. TEST SETUP



### NOTE:

#### TABLETOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

#### FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

#### 4.5.6. TEST RESULTS

<b>TEST MODE</b>	on	<b>INPUT</b>	DC 5V from Notebook input 230Vac 50Hz
<b>ENVIRONMENTAL CONDITIONS</b>	23deg. C, 56% RH,	<b>TESTED BY:</b> Andy	

Frequency (MHz)	Polarity	Azimuth	Field Strength (V/m)	Observation	Performance Criterion
80 – 1000	V&H	0	3	Note	A
80 – 1000	V&H	90	3		
80 – 1000	V&H	180	3		
80 – 1000	V&H	270	3		

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



## 4.6. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)

### 4.6.1. TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-4
<b>Test Voltage:</b>	AC Mains: 1KV Signal/Control Line : N/A
<b>Polarity:</b>	Positive/Negative
<b>Impulse Frequency:</b>	5 kHz
<b>Impulse Waveshape :</b>	5/50 ns
<b>Burst Duration:</b>	15 ms
<b>Burst Period:</b>	300 ms
<b>Test Duration:</b>	1 min.

### 4.6.2. TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EFT Tester	EMtest	EFT500N5	V1105108698	Jul. 7,12	Jul.6,13
EFT Coupling Clamp	EMtest	HFK	0211-168	Jul. 7,12	Jul. 6,13

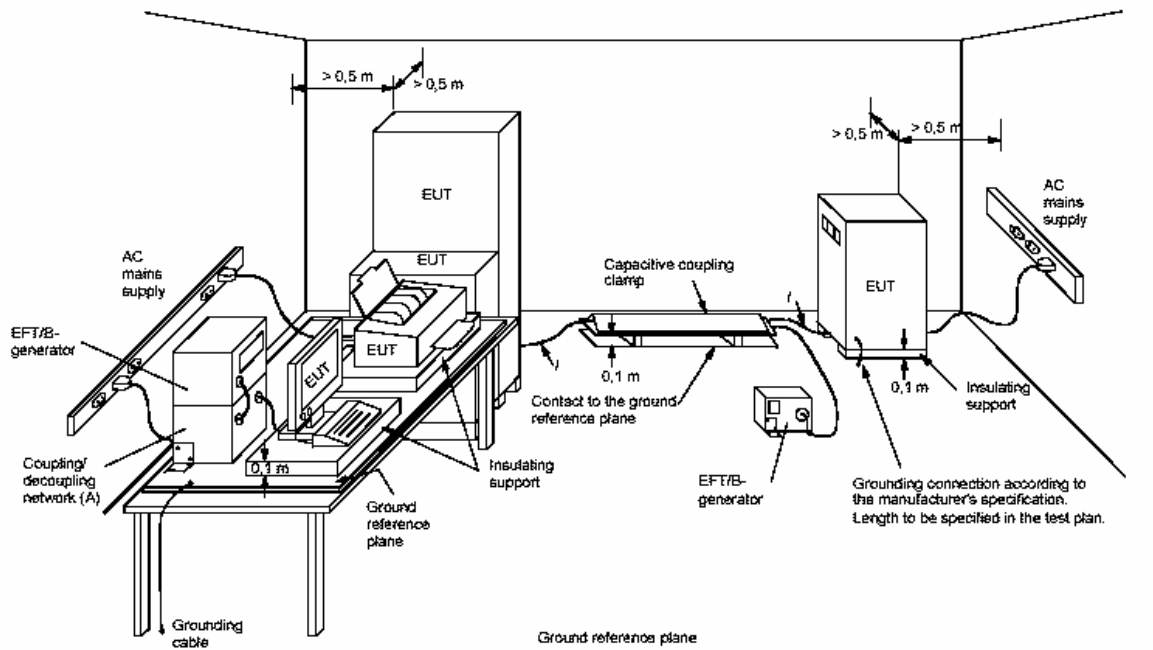
### 4.6.3. TEST PROCEDURE

- Both positive and negative polarity discharges were applied.
- The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 0.5 meter  $\pm$  0.05 meter.
- The duration time of each test sequential was 1 minute.
- The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.

### 4.6.4. DEVIATION FROM TEST STANDARD

No deviation

## 4.6.5. TEST SETUP



### **NOTE:** **TABLETOP EQUIPMENT**

The configuration consisted of a wooden table standing on the Ground Reference Plane and should be located 0.1m +/- 0.01m above the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

### **FLOOR STANDING EQUIPMENT**

The EUT installed in a representative system as described in section 7 of IEC 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

#### 4.6.6. TEST RESULTS

<b>TEST MODE</b>	on	<b>INPUT</b>	DC 5V from Notebook input 230Vac 50Hz
<b>ENVIRONMENTAL CONDITIONS</b>	25.6deg. C, 56% RH	<b>TESTED BY:</b> Andy	

Test Point	Polarity	Test Level (kV)	Observation	Performance Criterion
L	+/-	1	Note	B
N	+/-	1	Note	B
L-N	+/-	1	Note	B

## 4.7. SURGE IMMUNITY TEST

### 4.7.1. TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-5
<b>Wave-Shape:</b>	Combination Wave 1.2/50 us Open Circuit Voltage
<b>Test Voltage:</b>	1KV, 2KV
<b>Surge Input/Output:</b>	L-N,L-PE, N-PE
<b>Generator Source</b>	2 ohm between networks
<b>Impedance:</b>	12 ohm between network and ground
<b>Polarity:</b>	Positive/Negative
<b>Phase Angle:</b>	0° /90°/180°/270°
<b>Pulse Repetition Rate:</b>	60 sec.
<b>Number of Tests:</b>	5 positive and 5 negative at selected points

### 4.7.2. TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Surge Tester	EMtest	UCS500N7	V1105108699	Feb. 9,12	Feb. 9,13

### 4.7.3. TEST PROCEDURE

a. For EUT power supply:

The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

b. For test applied to unshielded unsymmetrically operated interconnection lines of EUT:

The surge is applied to the lines via the capacitive coupling. The coupling / decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

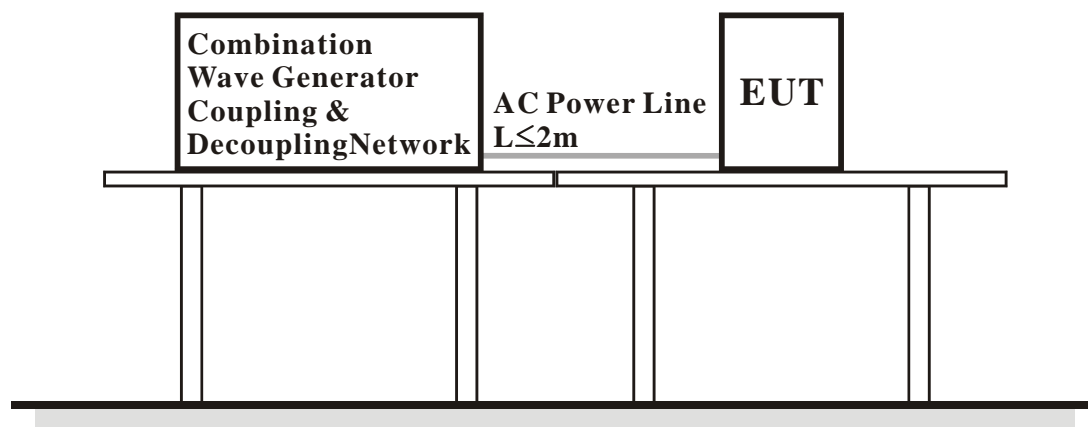
c. For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT:

The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

#### 4.7.4. DEVIATION FROM TEST STANDARD

No deviation

#### 4.7.5. TEST SETUP



#### 4.7.6. TEST RESULTS

<b>TEST MODE</b>	on	<b>INPUT</b>	DC 5V from Notebook input 230Vac 50Hz
<b>ENVIRONMENTAL CONDITIONS</b>	25.6deg. C, 54% RH,	<b>TESTED BY:</b> Andy	

<b>VOLTAGE (kV)</b>	<b>TEST POINT</b>	<b>POLARITY</b>	<b>OBSERVATION</b>	<b>PERFORMANCE CRITERION</b>
1	L-N	+/-	Note	B
2	L-PE	+/-	Note	B
2	N-PE	+/-	Note	B

## 4.8. IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS (CS)

### 4.8.1. TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-6
<b>Frequency Range:</b>	0.15 MHz - 80 MHz
<b>Field Strength:</b>	3 V <sub>r.m.s</sub>
<b>Modulation:</b>	1kHz Sine Wave, 80%, AM Modulation
<b>Frequency Step:</b>	1 % of fundamental
<b>Coupled Cable:</b>	Power mains
<b>Coupling Device:</b>	CDN

### 4.8.2. TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
C/S Test System	FRANKONIA	CIT-10/75	126B1164	Jul. 7,12	Jul. 6,13
CDN	Luthi	L-801 M2/M3	2789	Jul. 7,12	Jul. 6,13
Electromagnetic Injection Clamp	Luthi	EM101	36041	Jul. 7,12	Jul. 6,13

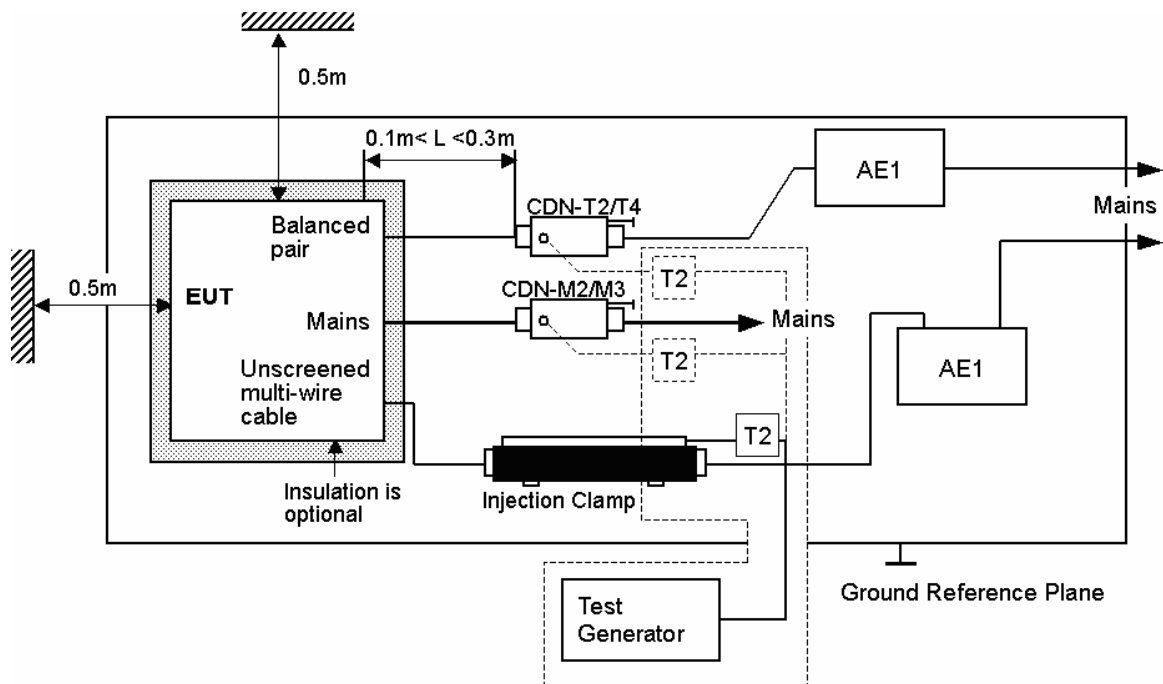
### 4.8.3. TEST PROCEDURE

- The EUT shall be tested within its intended operating and climatic conditions.
- An artificial hand was placed on the hand-held accessory and connected to the ground reference plane.
- The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.
- The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value.
- The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5 s. The sensitive frequencies (e.g. clock frequencies) shall be analyzed separately.
- Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

#### 4.8.4. DEVIATION FROM TEST STANDARD

No deviation

#### 4.8.5. TEST SETUP



NOTE: The EUT clearance from any metallic obstacles shall be at least 0.5m.  
All non-excited input ports of the CDNs shall be terminated by  $50\Omega$  loads.

#### NOTE:

##### FLOOR-STANDING EQUIPMENT

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

#### 4.8.6. TEST RESULTS

<b>TEST MODE</b>	on	<b>INPUT</b>	DC 5V from Notebook input 230Vac 50Hz
<b>ENVIRONMENTAL CONDITIONS</b>	25.6deg. C, 54% RH,	<b>TESTED BY:</b> Andy	

<b>FREQUENCY (MHz)</b>	<b>FIELD STRENGTH (V<sub>r.m.s.</sub>)</b>	<b>CABLE</b>	<b>INJECTION METHOD</b>	<b>OBSER- VATION</b>	<b>PERFORMANCE CRITERION</b>
0.15 – 80	3	AC mains	CDN	Note	A



## 4.9. POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

### 4.9.1. TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-8
<b>Frequency Range:</b>	50Hz
<b>Field Strength:</b>	1 A/m
<b>Observation Time:</b>	1 minute
<b>Inductance Coil:</b>	Rectangular type, 1mx1m

### 4.9.2. TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Magnetic Field Tester	EVERFINE	EMS61000-8K	YG100376N1 1080002	Jan.18,12	Jan. 18,13

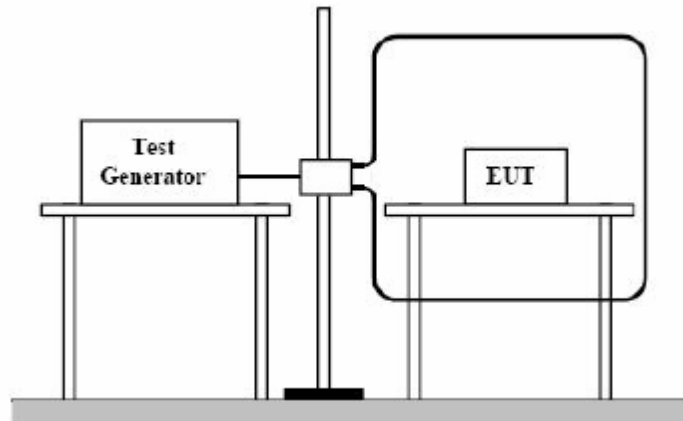
### 4.9.3. TEST PROCEDURE

- The equipment is configured and connected to satisfy its functional requirements.
- The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

### 4.9.4. DEVIATION FROM TEST STANDARD

No deviation

#### 4.9.5. TEST SETUP



**NOTE:**

TABLETOP EQUIPMENT

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

FLOOR-STANDING EQUIPMENT

The equipment shall be subjected to the test magnetic field by using induction coils of suitable dimensions. The test shall be repeated by moving and shifting the induction coils, in order to test the whole volume of the EUT for each orthogonal direction. The test shall be repeated with the coil shifted to different positions along the side of the EUT, in steps corresponding to 50 % of the shortest side of the coil. The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

#### 4.9.6. TEST RESULTS

<b>TEST MODE</b>	on	<b>INPUT</b>	DC 5V from Notebook input 230Vac 50Hz
<b>ENVIRONMENTAL CONDITIONS</b>	25.6deg. C, 54% RH,	<b>TESTED BY:</b> Andy	

<b>DIRECTION</b>	<b>FIELD STRENGTH (A/m)</b>	<b>OBSERVATION</b>	<b>PERFORMANCE CRITERION</b>
X - Axis	1	Note	A
Y - Axis	1	Note	A
Z - Axis	1	Note	A

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

## **4.10. VOLTAGE DIP/SHORT INTERRUPTIONS/VOLTAGE VARIATIONS (DIP) IMMUNITY TEST**

### **4.10.1. TEST SPECIFICATION**

<b>Basic Standard:</b>	IEC 61000-4-11
<b>Test Duration Time:</b>	Minimum three test events in sequence
<b>Interval between Event:</b>	Minimum ten seconds
<b>Phase Angle:</b>	0°/180°
<b>Test Cycle:</b>	3 times

### **4.10.2. TEST INSTRUMENTS**

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Dips Tester	EVERFINE	EMS61000-11K	YG100319N11 040005	Jan.18,12	Jan. 18,13

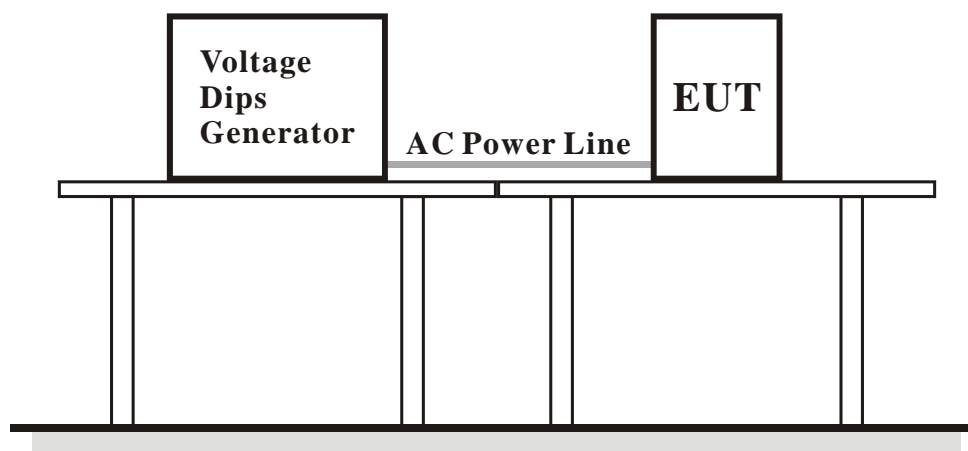
### **4.10.3. TEST PROCEDURE**

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

### **4.10.4. DEVIATION FROM TEST STANDARD**

No deviation

#### 4.10.5. TEST SETUP



#### 4.10.6. TEST RESULTS

<b>TEST MODE</b>	on	<b>INPUT</b>	DC 5V from Notebook input 230Vac 50Hz
<b>ENVIRONMENTAL CONDITIONS</b>	25.6deg. C, 54% RH,	<b>TESTED BY:</b> Andy	

Input Power for testing: 230Vac, 50Hz			
<b>VOLTAGE % REDUCTION</b>	<b>PERIOD</b>	<b>OBSERVATION</b>	<b>PERFORMANCE CRITERION</b>
100	0.5	Note (1)	B
30	25	Note (1)	C
100	250	Note (2)	C

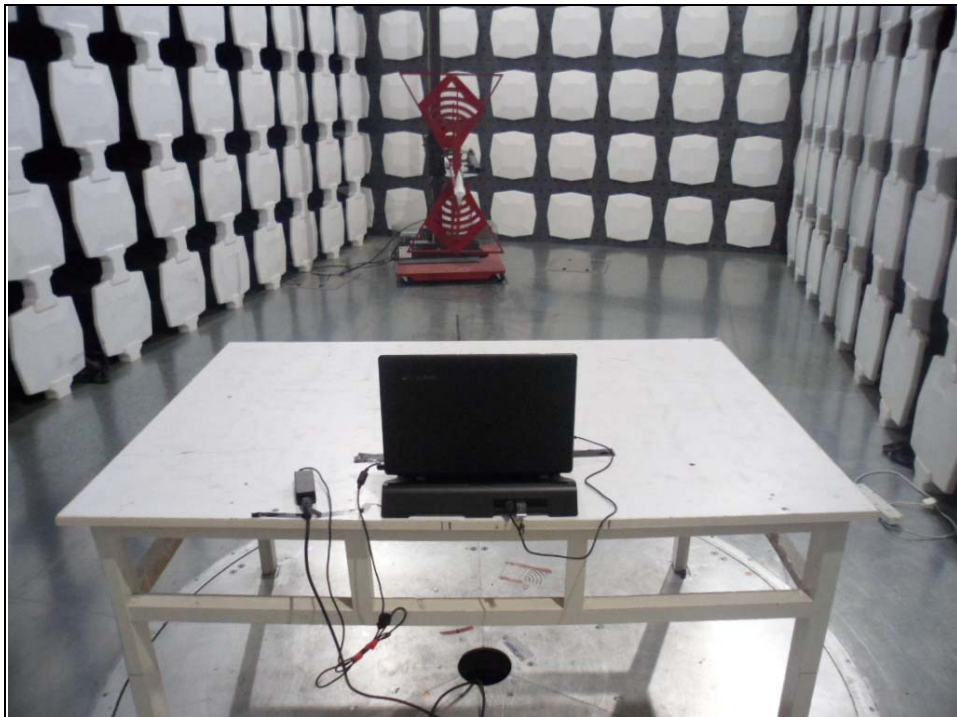
**NOTE:** (1) There was no change compared with the initial operation during the test.  
(2) The EUT reset.

## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST



RADIATED EMISSION TEST



## ESD TEST



## EFT TEST





## CS TEST



## SURGE TEST





**POWER-FREQUENCY MAGNETIC FIELDS TEST****VOLTAGE DIPS AND INTERRUPTIONS TEST**

## VOLTAGE FLICKER TEST



## PHOTOGRAPHS OF THE EUT



