

# EMC TEST REPORT

according to

**European Standard EN 55022:2006/A1:2007 Class B,  
EN 61000-3-2:2006, EN 61000-3-3:2008,  
EN 55024:1998/A1:2001/A2:2003  
(IEC 61000-4-2:2008, IEC 61000-4-3:2008,  
IEC 61000-4-4:2004, IEC 61000-4-5:2005,  
IEC 61000-4-6:2008, IEC 61000-4-8:2009,  
IEC 61000-4-11:2004) and  
AS/NZS CISPR22: 2006 Class B**

Equipment : Gamepad

Model No. : G-U0002, G-U0001

Applicant : LOGITECH FAR EAST LTD.  
#2 Creation Rd. 4, Science-Based Ind. Park  
Hsinchu Taiwan, R.O.C.

- The test result refers exclusively to the test presented test model / sample.
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***SPORTON International Inc.***

6F, No. 106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

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**History of this test report**

Original Report Issue Date: May 10, 2010

Report No. : EC042834

No additional attachment.

Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

## CERTIFICATE OF COMPLIANCE

according to

**European Standard EN 55022:2006/A1:2007 Class B,  
EN 61000-3-2:2006, EN 61000-3-3:2008,  
EN 55024:1998/A1:2001/A2:2003  
(IEC 61000-4-2:2008, IEC 61000-4-3:2008,  
IEC 61000-4-4:2004, IEC 61000-4-5:2005,  
IEC 61000-4-6:2008, IEC 61000-4-8:2009,  
IEC 61000-4-11:2004) and  
AS/NZS CISPR22: 2006 Class B**

Equipment : Gamepad

Model No. : G-U0002, G-U0001

Applicant : LOGITECH FAR EAST LTD.  
#2 Creation Rd. 4, Science-Based Ind. Park  
Hsinchu Taiwan, R.O.C.

**I HEREBY CERTIFY THAT:**

The measurements shown in this test report were made in accordance with the procedures given in EUROPEAN COUNCIL DIRECTIVE 2004/108/EC. The equipment was *passed* the test performed according to European Standard EN 55022:2006/A1:2007 Class B, EN 61000-3-2:2006, EN 61000-3-3:2008, EN 55024:1998/A1:2001/A2:2003

(IEC 61000-4-2:2008, IEC 61000-4-3:2008, IEC 61000-4-4:2004, IEC 61000-4-5:2005, IEC 61000-4-6:2008, IEC 61000-4-8:2009, IEC 61000-4-11:2004) and AS/NZS CISPR22: 2006

The test was carried out on May 06, 2010 at SPORTON International Inc. LAB.

  
Castries Huang

**SPORTON International Inc.**

6F, No. 106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

## 1. General Description of Equipment under Test

### 1.1 Applicant

**LOGITECH FAR EAST LTD.**

#2 Creation Rd. 4, Science-Based Ind. Park Hsinchu Taiwan, R.O.C.

### 1.2 Manufacturer

Same as 1.1.

### 1.3 Basic Description of Equipment under Test

Equipment : Gamepad  
Model No. : G-U0002, G-U0001  
Trade Name : Logitech  
Power Supply Type : From Host System  
USB Cable : Shielded, 181cm

### 1.4 Feature of Equipment under Test

The model names are listed in the following table.

Model Name	Type	Description
G-U0002	EUT 1	EUT 1 has vibration apparatus.
G-U0001	EUT 2	EUT 2 hasn't vibration apparatus.

Please refer to user manual.

## 2. Test Configuration of Equipment under Test

### 2.1 Test Manner

- a. During testing, the interface cables and equipment positions were varied according to European Standard EN 55022.
- b. There are two types of EUT, only EUT 1 was tested and recorded in this report.  
Mode 1: EUT 1 (Model No.: G-U0002) has vibration apparatus  
Mode 2: EUT 2 (Model No.: G-U0001) hasn't vibration apparatus
- c. The complete test system included DELL Personal Computer, DELL LCD Monitor, iCooky Keyboard, iCooky Mouse, ACEEX Modem, EPSON Printer and EUT for EMI test.
- d. The complete test system included DELL Notebook and EUT for EMS test.
- e. Frequency range investigated: conduction 150 kHz to 30 MHz, radiation 30 MHz to 1,000 MHz.

### 2.2 Description of Test System

#### < EMI >

##### Support Unit 1. – Personal Computer (DELL)

FCC ID	: N/A
Model No.	: OPTIPLEX 780
Serial No.	: PC-H
Data Cable	: Non-Shielded
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

##### Support Unit 2. -- LCD Monitor (DELL)

FCC ID	: E144096
Model No.	: 2709WB
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: LM-D

##### Support Unit 3 – Keyboard (iCooky)

FCC ID	: N/A
Model No.	: SK068
Power Cord	: Non-Shielded
Serial No.	: KB-A
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

**Support Unit 4. -- Mouse (iCooky)**

FCC ID : N/A  
Model No. : AMS0706W  
Serial No. : MO-A  
Data Cable : Shielded, 1.8m  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

**Support Unit 5 –Modem (ACEEX)**

FCC ID : IFAXDM1414  
Model No. : DM1414  
Power Supply Type : Linear  
Power Cord : Non-Shielded  
Data Cable : Shielded,1.8m  
Serial No. : MD-A

**Support Unit 6 – Printer (EPSON)**

FCC ID : N/A  
Model No. : LQ-300+  
Power Supply Type : Linear  
Power Cord : Non-Shielded  
Data Cable : Shielded,1.8m  
Serial No. : PR-A  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

**< EMS >****Support Unit 1. -- Notebook (DELL)**

FCC ID : E2K4965AGNM  
Model No. : 1200  
Power Supply Type : Switching  
Power Cord : Non-Shielded  
Serial No. : NB-M



### 3. Test Software

**<EMI>**

An executive program, EMCTEST.EXE under WIN XP, which generates a complete line of continuously repeating " H " pattern was used as the test software.

- a. Turn on the power of all equipment.
- b. The PC sends " H " messages to the monitor, and the monitor displays " H " patterns on the screen.
- c. The PC sends " H " messages to the printer, then the printer prints them on the paper.
- d. The PC sends " H " messages to the modem.
- e. Repeat the steps from b to d.

At the same time, the following program was executed:

Executed " XBOX 360 " to display the data transmission sent from EUT.

**<EMS>**

During the test, the following program under WIN XP was executed:

Executed " XBOX 360 " to display the data transmission sent from EUT.

## 4. General Information of Test

### 4.1 Test Facility

#### <EMI>

Test Site Location : No.8, Lane 724, Bo-ai St., Jhubei City,  
Hsinchu County 302, Taiwan, R.O.C.  
TEL : 886-3-656-9065  
FAX : 886-3-656-9085

Test Site No. : Conduction : CO01-CB; Radiation : 10CH01-CB

#### <EMS>

Test Site Location : No.8, Lane 724, Bo-ai St., Jhubei City,  
Hsinchu County 302, Taiwan, R.O.C.  
TEL : 886-3-656-9065  
FAX : 886-3-656-9085

### 4.2 Test Voltage

230V / 50Hz

### 4.3 Standard for Methods of Measurement

EMI Test (conduction and radiation) : European Standard EN 55022 Class B and  
AS/NZS CISPR22 Class B

Harmonics Test : European Standard EN 61000-3-2

Voltage Fluctuations Test : European Standard EN 61000-3-3

EMS Test : European Standard EN 55024  
(ESD: IEC 61000-4-2, RS: IEC 61000-4-3, EFT: IEC 61000-4-4, SURGE: IEC 61000-4-5,  
CS: IEC 61000-4-6, Power Frequency Magnetic Field: IEC 61000-4-8, DIPS: IEC 61000-4-11)

### 4.4 Test in Compliance with

EMI Test (conduction and radiation) : European Standard EN 55022 Class B and  
AS/NZS CISPR22 Class B

Harmonics Test : European Standard EN 61000-3-2

Voltage Fluctuations Test : European Standard EN 61000-3-3

EMS Test : European Standard EN 55024  
(ESD: IEC 61000-4-2, RS: IEC 61000-4-3, EFT: IEC 61000-4-4, SURGE: IEC 61000-4-5,  
CS: IEC 61000-4-6, Power Frequency Magnetic Field: IEC 61000-4-8, DIPS: IEC 61000-4-11)

#### **4.5 Frequency Range Investigated**

- a. Conducted emission test: from 150 kHz to 30 MHz
- b. Radiated emission test: from 30 MHz to 1,000 MHz
- c. Radio frequency electromagnetic field immunity test: 80-1000 MHz.

#### **4.6 Test Distance**

- a. The test distance of radiated emission test from antenna to EUT is 10 m (from 30MHz~1000MHz).
- b. The test distance of radio frequency electromagnetic field immunity test from antenna to EUT is 3 m.

## 5. Test of Conducted Powerline

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 kHz and return leads of the EUT according to the methods defined in European Standard EN 55022 Clause 9. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 5.3. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position producing maximum conducted emissions.

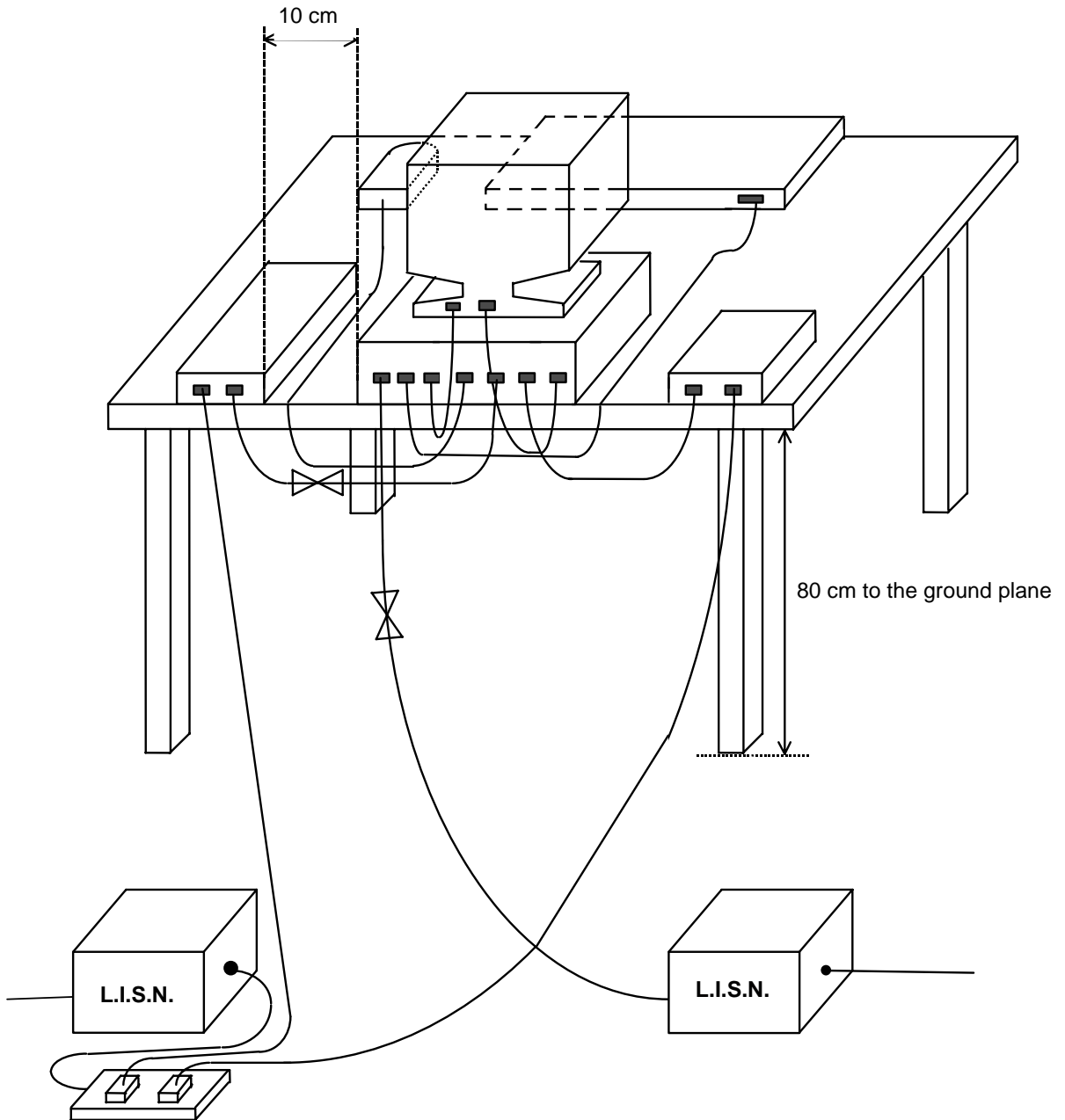
### 5.1 Description of Major Test Instruments

● Test Receiver	(R&S ESCS 30)
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9kHz

### 5.2 Test Procedures

- a. The EUT was placed on a desk 0.8 meters height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. Connect Telecommunication port to ISN (Impedance Stabilization Network).
- d. All the support units are connect to the other LISN.
- e. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- f. The CISPR states that a 50 ohm, 50 microhenry LISN should be used.
- g. Both sides of AC line were checked for maximum conducted interference.
- h. The frequency range from 150 kHz to 30 MHz was searched.
- i. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

### 5.3 Typical Test Setup Layout of Conducted Powerline

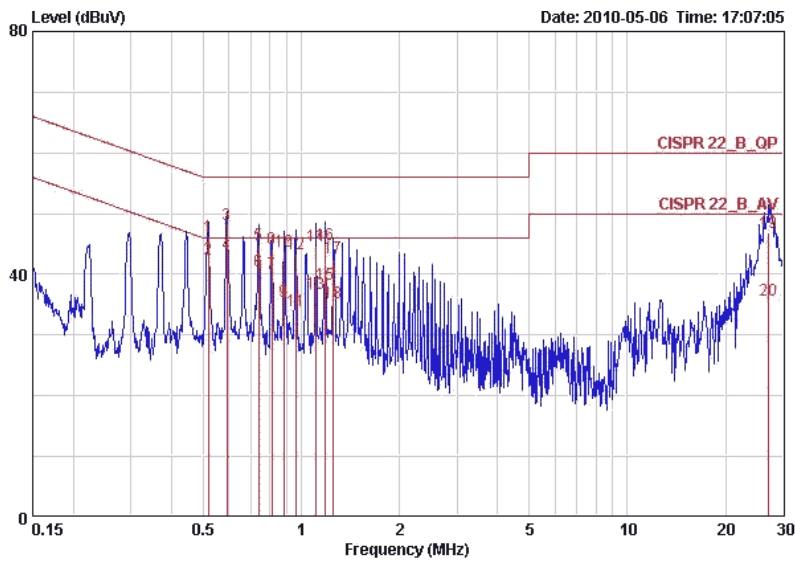


### 5.4 Test Result of AC Powerline Conducted Emission

- Test Mode: Mode 1
- Frequency Range of Test: from 0.15 MHz to 30 MHz
- Temperature: 23 °C
- Relative Humidity: 56 %
- Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- All emissions not reported here are more than 10 dB below the prescribed limit.

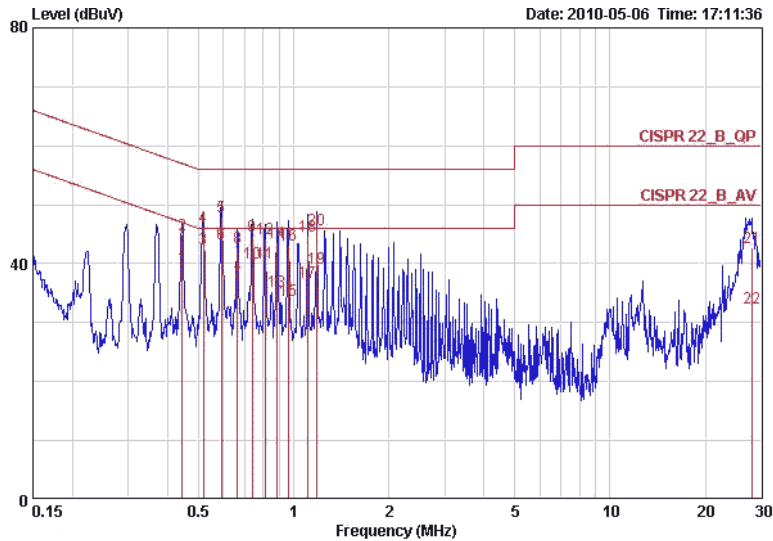
■ The test was passed at the minimum margin that marked by a frame in the following table

Line



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.51824	46.21	-9.79	56.00	45.98	0.03	0.20	QP
2	0.51824	42.52	-3.48	46.00	42.29	0.03	0.20	AVERAGE
3	0.59164	48.10	-7.90	56.00	47.87	0.03	0.20	QP
4	0.59164	43.36	-2.64	46.00	43.13	0.03	0.20	AVERAGE
5	0.73910	44.84	-11.16	56.00	44.61	0.03	0.20	QP
6	0.73910	40.48	-5.52	46.00	40.25	0.03	0.20	AVERAGE
7	0.81306	40.14	-5.86	46.00	39.91	0.03	0.20	AVERAGE
8	0.81306	44.24	-11.76	56.00	44.01	0.03	0.20	QP
9	0.88499	35.47	-10.53	46.00	35.24	0.03	0.20	AVERAGE
10	0.88499	43.72	-12.28	56.00	43.49	0.03	0.20	QP
11	0.96008	34.07	-11.93	46.00	33.84	0.03	0.20	AVERAGE
12	0.96008	43.29	-12.71	56.00	43.06	0.03	0.20	QP
13	1.109	36.84	-9.16	46.00	36.63	0.03	0.18	AVERAGE
14	1.109	44.64	-11.36	56.00	44.43	0.03	0.18	QP
15	1.184	38.33	-7.67	46.00	38.14	0.03	0.16	AVERAGE
16	1.184	44.93	-11.07	56.00	44.74	0.03	0.16	QP
17	1.255	42.76	-13.24	56.00	42.58	0.04	0.14	QP
18	1.255	35.24	-10.76	46.00	35.06	0.04	0.14	AVERAGE
19	27.127	46.77	-13.23	60.00	44.91	1.26	0.60	QP
20	27.127	35.85	-14.15	50.00	33.99	1.26	0.60	AVERAGE

**Neutral**



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.44363	39.39	-7.60	46.99	39.12	0.07	0.20	AVERAGE
2	0.44363	44.80	-12.19	56.99	44.53	0.07	0.20	QP
3	0.51824	42.56	-3.44	46.00	42.29	0.07	0.20	AVERAGE
4	0.51824	46.19	-9.81	56.00	45.92	0.07	0.20	QP
5	0.59044	48.06	-7.94	56.00	47.79	0.07	0.20	QP
6 @	0.59044	43.31	-2.69	46.00	43.04	0.07	0.20	AVERAGE
7	0.66478	36.74	-9.26	46.00	36.47	0.07	0.20	AVERAGE
8	0.66478	42.82	-13.18	56.00	42.55	0.07	0.20	QP
9	0.73982	44.60	-11.40	56.00	44.33	0.07	0.20	QP
10	0.73982	40.16	-5.84	46.00	39.89	0.07	0.20	AVERAGE
11	0.81306	40.10	-5.90	46.00	39.83	0.07	0.20	AVERAGE
12	0.81306	44.21	-11.79	56.00	43.94	0.07	0.20	QP
13	0.88499	35.33	-10.67	46.00	35.06	0.07	0.20	AVERAGE
14	0.88499	43.62	-12.38	56.00	43.35	0.07	0.20	QP
15	0.95938	33.82	-12.18	46.00	33.55	0.07	0.20	AVERAGE
16	0.95938	43.17	-12.83	56.00	42.90	0.07	0.20	QP
17	1.108	36.77	-9.23	46.00	36.52	0.07	0.18	AVERAGE
18	1.108	44.60	-11.40	56.00	44.35	0.07	0.18	QP
19	1.182	39.23	-6.77	46.00	38.99	0.07	0.16	AVERAGE
20	1.182	45.79	-10.21	56.00	45.55	0.07	0.16	QP
21	28.003	42.68	-17.32	60.00	40.72	1.36	0.60	QP
22	28.003	32.57	-17.43	50.00	30.61	1.36	0.60	AVERAGE

Test Engineer : Peter Wu  
Peter Wu

### 5.5 Photographs of Conducted Powerline Test Configuration

- The photographs show the configuration that generates the maximum emission.

Test Mode: Mode 1

FRONT VIEW



REAR VIEW





SIDE VIEW



## 6. Test of Radiated Emission

Radiated emissions from 30 MHz to 1,000 MHz were measured with a bandwidth of 120 kHz for 30MHz~1GHz according to the methods defines in European Standard EN 55022, Clause 10. The EUT was placed on a nonmetallic stand, 0.8 meter above the ground plane, as shown in section 6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

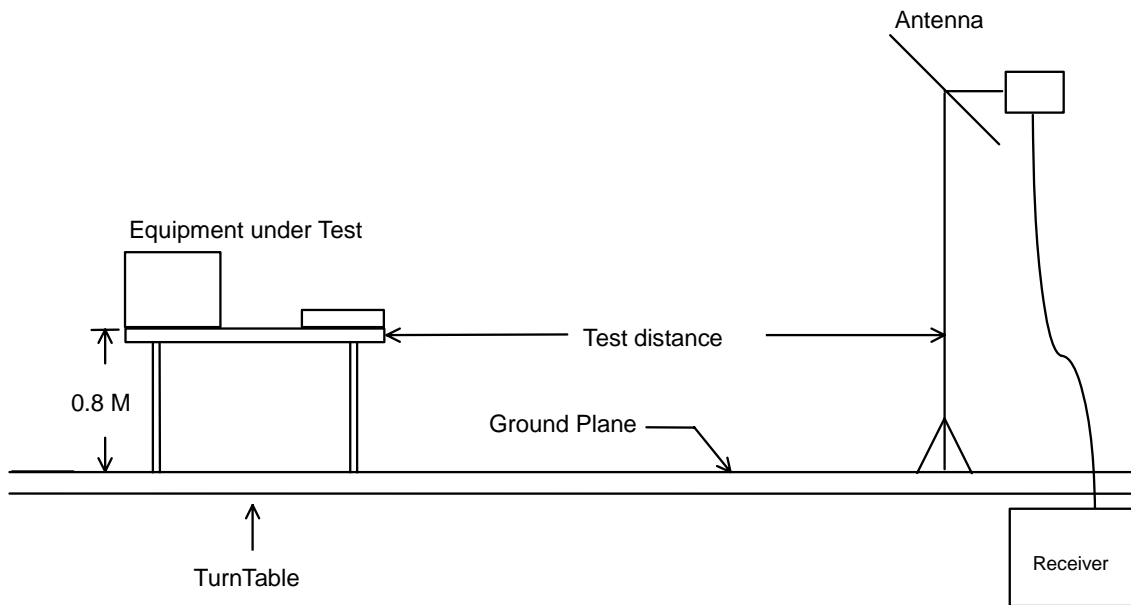
### 6.1 Description of Major Test Instruments

- Amplifier (Agilent 8447D)
  - RF Gain 25 dB
  - Signal Input 9 KHz to 1.3 GHz
  
- Spectrum Analyzer (R&S FSP40)
  - Attenuation 10 dB
  - Start Frequency 30 MHz
  - Stop Frequency 1000 MHz
  - Resolution Bandwidth 120 KHz
  - Signal Input 9 KHz to 40 GHz
  
- Test Receiver (R&S ESCI)
  - Attenuation 10 dB
  - Start Frequency 30 MHz
  - Stop Frequency 1000 MHz
  - Resolution Bandwidth 120 KHz
  - Signal Input 9kHz to 3 GHz

## 6.2 Test Procedures

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3/10 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.

### 6.3 Typical Test Setup Layout of Radiated Emission

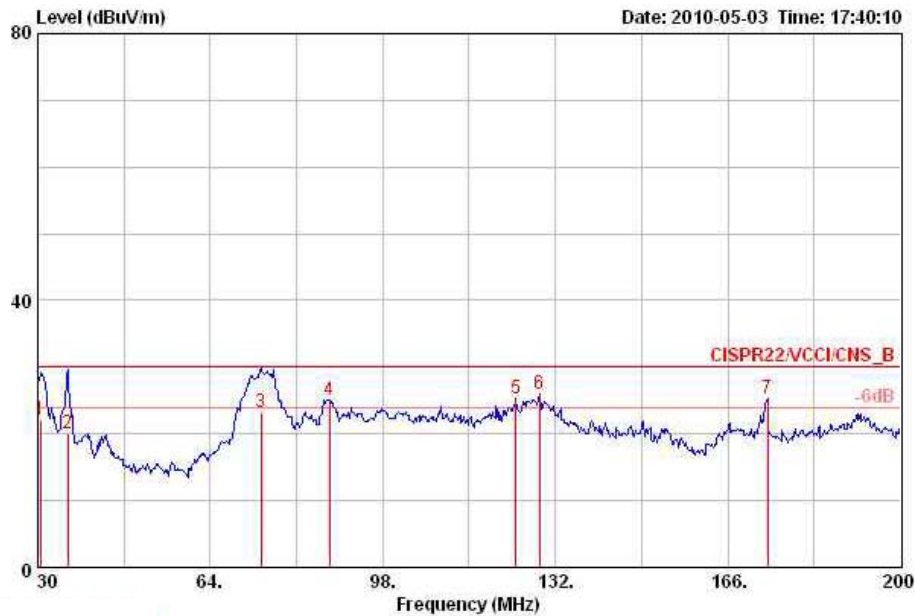


### 6.4 Test Result of Radiated Emission

- Test Mode: Mode 1
- Frequency Range of Test : from 30 MHz to 1,000 MHz
- Test Distance: 10m
- Temperature: 24 °C
- Relative Humidity: 56 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

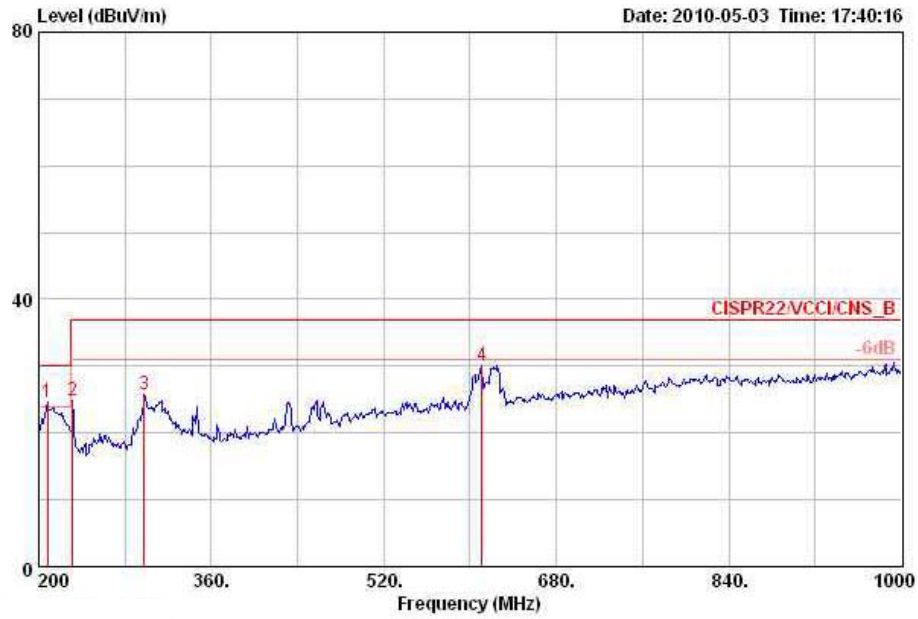
**The test was passed at the minimum margin that marked by the frame in the following test record**

Vertical



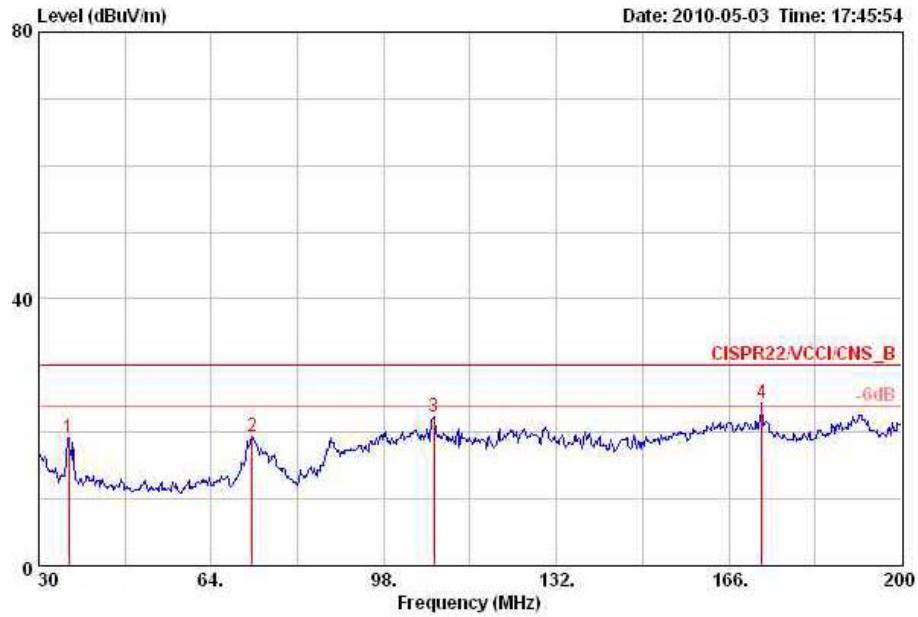
	Freq	Level	Over Limit	Limit Line	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		deg	cm	
1	30.510	22.17	-7.83	30.00	35.42	1.74	28.45	13.46	QP	26	100	VERTICAL
2	35.950	20.13	-9.87	30.00	34.99	1.90	28.50	11.74	QP	53	100	VERTICAL
3	74.030	23.29	-6.71	30.00	39.72	2.78	28.17	8.97	QP	4	100	VERTICAL
4 !	87.460	25.17	-4.83	30.00	40.97	3.01	28.02	9.22	Peak	0	400	VERTICAL
5 !	124.180	25.24	-4.76	30.00	38.53	3.61	27.84	10.95	Peak	0	400	VERTICAL
6 B	128.940	25.87	-4.13	30.00	38.85	3.68	27.76	11.11	Peak	0	400	VERTICAL
7 !	173.820	25.37	-4.63	30.00	35.42	4.29	27.52	13.19	Peak	0	400	VERTICAL

**Vertical**



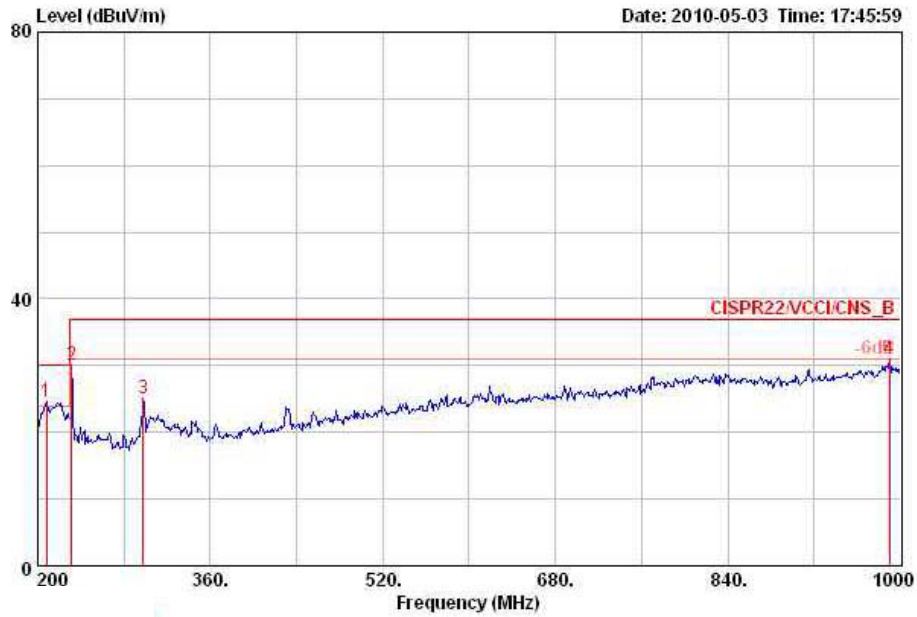
	Freq	Level	Over Limit	Limit Line	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		deg	cm	
1 !	208.000	24.56	-5.44	30.00	33.35	3.13	27.30	15.39	Peak	0	400	VERTICAL
2	231.200	24.89	-12.11	37.00	34.98	3.29	27.24	13.86	Peak	0	400	VERTICAL
3	297.600	25.67	-11.33	37.00	36.20	3.71	27.24	13.00	Peak	0	400	VERTICAL
4	611.200	30.20	-6.80	37.00	33.50	5.38	28.27	19.58	Peak	0	400	VERTICAL

**Horizontal**



	Freq	Level	Over Limit	Limit Line	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		deg	cm	
1	35.950	19.20	-10.80	30.00	34.06	1.90	28.50	11.74	Peak	0	100	HORIZONTAL
2	71.990	19.43	-10.57	30.00	35.89	2.73	28.20	9.01	Peak	0	100	HORIZONTAL
3	107.860	22.25	-7.75	30.00	36.70	3.36	27.93	10.12	Peak	0	100	HORIZONTAL
4	172.460	24.36	-5.64	30.00	34.58	4.26	27.54	13.06	Peak	0	100	HORIZONTAL

**Horizontal**



	Freq	Level	Over Limit	Limit Line	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		deg	cm	
1	208.000	24.53	-5.47	30.00	33.31	3.13	27.30	15.39	Peak	0	100	HORIZONTAL
2	231.200	30.14	-6.86	37.00	40.23	3.29	27.24	13.86	Peak	0	100	HORIZONTAL
3	297.600	25.09	-11.91	37.00	35.62	3.71	27.24	13.00	Peak	0	100	HORIZONTAL
4	989.600	30.99	-6.01	37.00	28.13	6.82	26.60	22.64	Peak	0	100	HORIZONTAL

Test Engineer : Beck Wu  
Beck Wu



### 6.5 Photographs of Radiated Emission Test Configuration

- The photographs show the configuration that generates the maximum emission.

Test Mode: Mode 1

FRONT VIEW



REAR VIEW



## 7. Harmonics Test

### 7.1 Standard

- Standard : EN 61000-3-2:2006

### 7.2 Test Procedure

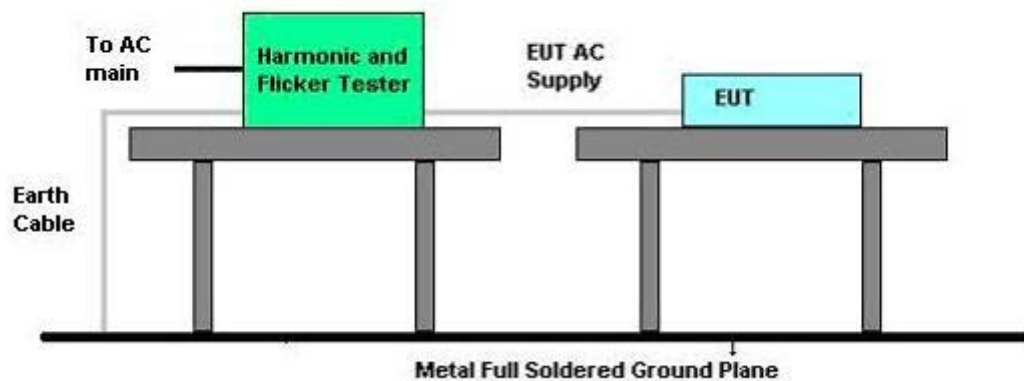
The measured values of the harmonics components of the input current, including line current and neutral current, shall be compared with the limits given in Clause 7 of EN 61000-3-2.

Note: Active input power under 75W, no limit apply, declare compliance.

### 7.3 Test Equipment Settings

- Line Voltage : 230 V
- Line Frequency : 50 Hz
- Device Class : D
- Current Measurement Range : High
- Measurement Delay : 10.0 seconds
- Test Duration : 10.00 minutes
- Class determination Pre-test Duration : 10.00 seconds

### 7.4 Test Setup



**7.5 Test Result of Harmonics Test**

7.5.1 Test Data of Harmonics

- Test Mode : Mode 1
- FINAL TEST RESULT : N/L
- Temperature : 23 °C
- Relative Humidity : 47% RH
- Test Date : May 04, 2010

Test Result: N/L Source qualification: Distorted  
 THC(A): 0.00 I-THD(%): 0.00 POHC(A): 0.000 POHC Limit(A): 0.000  
 Highest parameter values during test:  
 V\_RMS (Volts): 231.23 Frequency(Hz): 50.00  
 I\_Peak (Amps): 1.436 I\_RMS (Amps): 0.292  
 I\_Fund (Amps): 0.100 Crest Factor: 6.472  
 Power (Watts): 28.6 Power Factor: 0.424

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.011						
3	0.086	0.097	0.0	0.096	0.146	0.00	N/L
4	0.010						
5	0.082	0.054	0.0	0.092	0.082	0.00	N/L
6	0.010						
7	0.077	0.029	0.0	0.085	0.043	0.00	N/L
8	0.009						
9	0.071	0.014	0.0	0.078	0.021	0.00	N/L
10	0.007						
11	0.063	0.010	0.0	0.069	0.015	0.00	N/L
12	0.006						
13	0.055	0.009	0.0	0.059	0.013	0.00	N/L
14	0.005						
15	0.046	0.007	0.0	0.049	0.011	0.00	N/L
16	0.003						
17	0.038	0.007	0.0	0.040	0.010	0.00	N/L
18	0.002						
19	0.030	0.006	0.0	0.030	0.009	0.00	N/L
20	0.001						
21	0.022	0.005	0.0	0.022	0.008	0.00	N/L
22	0.000						
23	0.015	0.005	0.0	0.016	0.005	0.00	N/L
24	0.001						
25	0.010	0.004	0.0	0.010	0.005	0.00	N/L
26	0.001						
27	0.006	0.004	0.0	0.006	0.005	0.00	N/L
28	0.001						
29	0.004	0.004	0.0	0.005	0.006	0.00	N/L
30	0.001						
31	0.005	0.004	0.0	0.005	0.005	0.00	N/L
32	0.001						
33	0.005	0.003	0.0	0.006	0.005	0.00	N/L
34	0.001						
35	0.005	0.003	0.0	0.006	0.005	0.00	N/L
36	0.001						
37	0.005	0.003	0.0	0.005	0.004	0.00	N/L
38	0.001						
39	0.004	0.003	0.0	0.004	0.004	0.00	N/L
40	0.001						

Note: The EUT power level is below 75.0 Watts and therefore has no defined limits

Test Engineer : Cloud Peng.  
 Cloud Peng

7.5.2 Test Data of Harmonics

- Test Mode : Mode 2
- FINAL TEST RESULT : **N/L**
- Temperature : 23 °C
- Relative Humidity : 47% RH
- Test Date : May 04, 2010

Test Result: N/L Source qualification: Distorted  
 THC(A): 0.00 I-THD(%): 0.00 POHC(A): 0.000 POHC Limit(A): 0.000  
 Highest parameter values during test:  
 V\_RMS (Volts): 231.23 Frequency(Hz): 50.00  
 I\_Peak (Amps): 1.449 I\_RMS (Amps): 0.298  
 I\_Fund (Amps): 0.100 Crest Factor: 6.269  
 Power (Watts): 29.7 Power Factor: 0.430

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.011						
3	0.086	0.101	0.0	0.095	0.151	0.00	N/L
4	0.010						
5	0.082	0.056	0.0	0.091	0.085	0.00	N/L
6	0.010						
7	0.077	0.030	0.0	0.085	0.044	0.00	N/L
8	0.009						
9	0.071	0.015	0.0	0.077	0.022	0.00	N/L
10	0.007						
11	0.063	0.010	0.0	0.068	0.016	0.00	N/L
12	0.006						
13	0.055	0.009	0.0	0.059	0.013	0.00	N/L
14	0.005						
15	0.046	0.008	0.0	0.049	0.011	0.00	N/L
16	0.004						
17	0.038	0.007	0.0	0.040	0.010	0.00	N/L
18	0.002						
19	0.030	0.006	0.0	0.031	0.009	0.00	N/L
20	0.001						
21	0.022	0.005	0.0	0.022	0.008	0.00	N/L
22	0.001						
23	0.015	0.005	0.0	0.016	0.007	0.00	N/L
24	0.001						
25	0.010	0.005	0.0	0.010	0.007	0.00	N/L
26	0.001						
27	0.006	0.004	0.0	0.006	0.006	0.00	N/L
28	0.001						
29	0.004	0.004	0.0	0.005	0.006	0.00	N/L
30	0.001						
31	0.005	0.004	0.0	0.005	0.006	0.00	N/L
32	0.001						
33	0.005	0.003	0.0	0.006	0.005	0.00	N/L
34	0.001						
35	0.005	0.003	0.0	0.006	0.005	0.00	N/L
36	0.001						
37	0.005	0.003	0.0	0.005	0.005	0.00	N/L
38	0.001						
39	0.004	0.003	0.0	0.004	0.004	0.00	N/L
40	0.001						

Note: The EUT power level is below 75.0 Watts and therefore has no defined limits

Test Engineer : Cloud Peng.  
 Cloud Peng

## 8. Voltage Fluctuations Test

### 8.1 Standard

- Product Standard : EN 61000-3-3:1995/A1:2001/A2:2005

### 8.2 Test Procedure

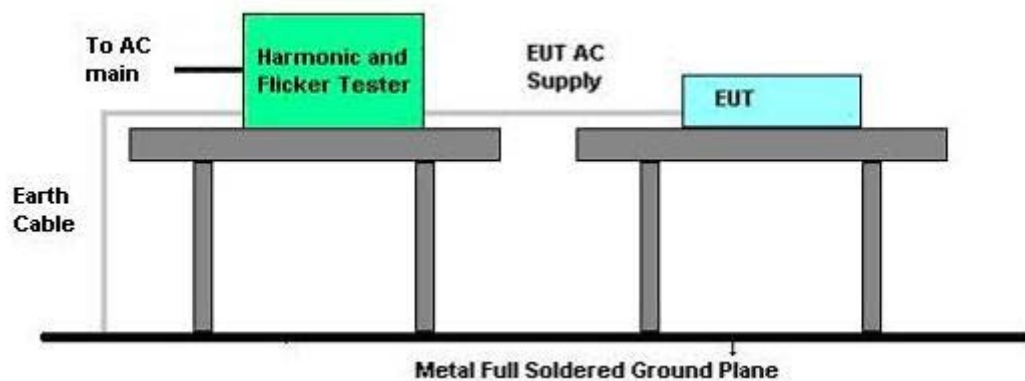
The equipment shall be tested under the conditions of **Clause 5**.

The total impedance of the test circuit, excluding the appliance under test, but including the internal impedance of the supply source, shall be equal to the reference impedance. The stability and tolerance of the reference impedance shall be adequate to ensure that the overall accuracy of  $\pm 8\%$  is achieved during the whole assessment procedure.

### 8.3 Test Equipment Settings

- Line Voltage: 230 V
- Line Frequency: 50 Hz
- Measurement Delay: 10.0 seconds
- Pst Integration Time: 10 minutes
- Pst Integration Periods: 1
- Test Duration: 00:10:00 minutes

### 8.4 Test Setup



### 8.5 Test Result of Voltage Fluctuation and Flicker Test

#### 8.5.1 Test Data of Voltage Fluctuation and Flicker

- Test Mode : Mode 1
- FINAL TEST RESULT : **PASS**
- Temperature : 23 °C
- Relative Humidity : 47 % RH
- Test Date : May 04, 2010

Vrms at the end of test (Volt):	231.15			
Highest dt (%):	0.34	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 (%):	-0.19	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.160	Test limit:	1.000	Pass

Test completed, Result: PASSED

Test Engineer : Cloud Peng.  
Cloud Peng

8.5.2 Test Data of Voltage Fluctuation and Flicker

- Test Mode : Mode 2
- FINAL TEST RESULT : **PASS**
- Temperature : 23 °C
- Relative Humidity : 47 % RH
- Test Date : May 04, 2010

Vrms at the end of test (Volt):	231.35			
Highest dt (%):	0.32	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 (%):	0.21	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.160	Test limit:	1.000	Pass

Test completed, Result: PASSED

Test Engineer : Cloud Peng.  
Cloud Peng

**8.6 Photographs of Harmonics Test, Voltage Fluctuation and Flicker Test**

FRONT VIEW



REAR VIEW

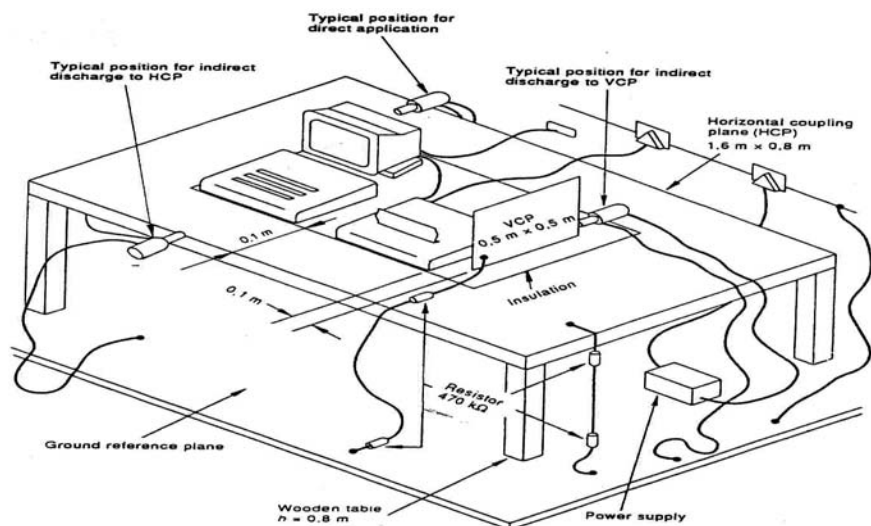




## 9. Electrostatic Discharge Immunity Test (ESD)

- Final Test Result : **PASS**
- Pass Performance Criteria : B
- Required Performance Criteria : B
- Basic Standard : IEC 61000-4-2:2008
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : X for air discharge,  
: 4 for contact discharge
- Tested voltage :  $\pm 2 / \pm 4 / \pm 8 / \pm 10 / \pm 12$  for air discharge,  
:  $\pm 2 / \pm 4 / \pm 6 / \pm 8$  for contact discharge
- Temperature : 24 °C
- Relative Humidity : 42 %
- Atmospheric Pressure : 98.6 kPa
- Test Date : Apr. 22, 2010
- Test Mode : Mode 1 ~ Mode 2
- Observation : During the test at contact discharge  $\pm 8\text{KV} / \pm 10\text{KV} / \pm 12\text{KV}$  on USB port. The data transmission was disconnected. After the test, the equipment continued to operate as intended without operator intervention.

### 9.1 Test Setup



The test setup consists of the test generator, EUT and auxiliary instrumentation necessary to perform DIRECT and INDIRECT application of discharges to the EUT as applicable, in the follow manner:

- a. CONTACT DISCHARGE to the conductive surfaces and to coupling plane;
- b. AIR DISCHARGE at insulating surfaces.

The preferred test method is that of type tests performed in laboratories and the only accepted method of demonstrating conformance with this standard. The EUT was arranged as closely as possible to arrangement in final installed conditions.

## **9.2 Test Setup for Tests Performed in Laboratory**

A ground reference plane was provided on the floor of the test site. It was a metallic sheet (copper or aluminum) of 0.25 mm, minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. In the SPORTON EMC LAB., we provided 1 mm thickness aluminum ground reference plane or 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 1 m x 1 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system.

The EUT was arranged and connected according to its functional requirements. A distance of 1m minimum was provided between the EUT and the wall of the lab. and any other metallic structure. In cases where this length exceeds the length necessary to apply the discharges to the selected points, the excess length shall, where possible, be placed non-inductively off the ground reference plane and shall not come closer than 0.2m to other conductive parts in the test setup.

Where the EUT is installed on a metal table, the table was connected to the reference plane via a cable with a 470k ohm resister located at each end, to prevent a build-up of charge. The test setup was consist a wooden table, 0.8m high, standing on the ground reference plane. A HCP, 1.6 m x 0.8 m, was placed on the table. The EUT and cables was isolated from the HCP by an insulating support 0.5 mm thick. The VCP size, 0.5 m x 0.5 m.

### 9.3 ESD Test Procedure

- a. In the case of air discharge testing the climatic conditions shall be within the following ranges:
  - ambient temperature: 15°C to 35°C;
  - relative humidity : 30% to 60%;
  - atmospheric pressure : 86 kPa (860 mbar) to 106 kPa (1060 mbar).
- b. Test programs and software shall be chosen so as to exercise all normal modes of operation of the EUT.

The use of special exercising software is encouraged, but permitted only where it can be shown that the EUT is being comprehensively exercised.
- c. The test voltage shall be increased from the minimum to the selected test severity level, in order to determine any threshold of failure. The final severity level should not exceed the product specification value in order to avoid damage to the equipment.
- d. The test shall be performed with both air discharge and contact discharge. On preselected points at least 10 single discharges (in the most sensitive polarity) shall be applied on air discharge. On preselected points at least 25 single discharges (in the most sensitive polarity) shall be applied on contact discharge.
- e. For the time interval between successive single discharges an initial value of one second is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.
- f. In the case of contact discharges, the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.
- g. In the case of painted surface covering a conducting substrate, the following procedure shall be adopted:
  - If the coating is not declared to be an insulating coating by the equipment manufacturer, then the pointed tip of the generator shall penetrate the coating so as to make contact with the conducting substrate.
  - Coating declared as insulating by the manufacturer shall only be submitted to the air discharge.
  - The contact discharge test shall not be applied to such surfaces.
- h. In the case of air discharges, the round discharge tip of the discharge electrode shall be approached as fast as possible (without causing mechanical damage) to touch the EUT . After each discharge, the ESD generator (discharge electrode) shall be removed from the EUT. The generator is then retriggered for a new single discharge. This procedure shall be repeated until the discharges are completed. In the case of an air discharge test, the discharge switch, which is used for contact discharge, shall be closed.

## 9.4 Test Severity Levels

### 9.4.1 Contact Discharge

Level	Test Voltage (kV) of Contact discharge
1	±2
2	±4
3	±6
4	±8
X	Specified

Remark : "X" is an open level.

### 9.4.2 Air Discharge

Level	Test Voltage (kV) of Air Discharge
1	±2
2	±4
3	±8
4	±15
X	Specified

Remark : "X" is an open level.

**9.5 Test Points**

9.5.1 Test Result of Air Discharge

Test Point	Voltage	Tested No.
Case / bracket	$\pm 2 / \pm 4 / \pm 8 / \pm 10 / \pm 12$ KV	BY 10
LED	$\pm 2 / \pm 4 / \pm 8 / \pm 10 / \pm 12$ KV	BY 10
USB PORT	$\pm 2 / \pm 4 / \pm 8 / \pm 10 / \pm 12$ KV	BY 10
Control button	$\pm 2 / \pm 4 / \pm 8 / \pm 10 / \pm 12$ KV	BY 10

9.5.2 Test Result of Contact Discharge

Test Point	Voltage	Tested No.
HCP (At Front)	$\pm 2 / \pm 4 / \pm 6 / \pm 8$ kV	BY 25
HCP (At Left)	$\pm 2 / \pm 4 / \pm 6 / \pm 8$ kV	BY 25
HCP (At Right)	$\pm 2 / \pm 4 / \pm 6 / \pm 8$ kV	BY 25
HCP (At Rear)	$\pm 2 / \pm 4 / \pm 6 / \pm 8$ kV	BY 25
VCP (At Front)	$\pm 2 / \pm 4 / \pm 6 / \pm 8$ kV	BY 25
VCP (At Left)	$\pm 2 / \pm 4 / \pm 6 / \pm 8$ kV	BY 25
VCP (At Right)	$\pm 2 / \pm 4 / \pm 6 / \pm 8$ kV	BY 25
VCP (At Rear)	$\pm 2 / \pm 4 / \pm 6 / \pm 8$ kV	BY 25
Screw	$\pm 2 / \pm 4 / \pm 6 / \pm 8$ kV	BY 25

Test Engineer : Cloud Peng.  
 Cloud Peng

**9.6 Photographs of Electrostatic Discharge Immunity Test**

FRONT VIEW



REAR VIEW



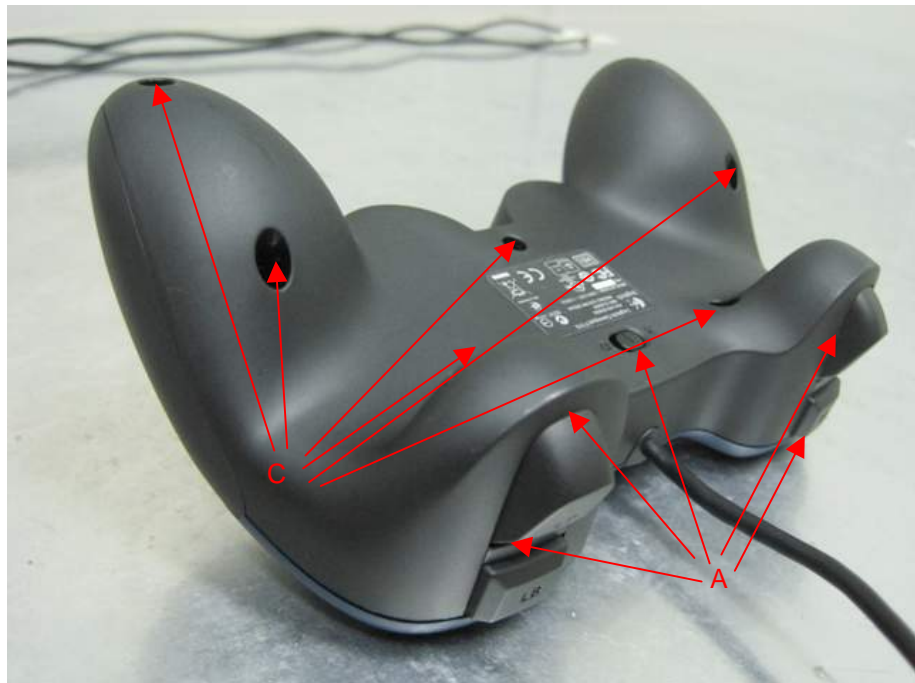
**Photographs of Electrostatic Discharge Immunity Test / Test Mode: Mode 1**

**Description : Electronics Discharge (ESD) of Test Point**

Description:  
"A" means  
Air Discharge  
  
"C" means  
Contact Discharge



Description:  
"A" means  
Air Discharge  
  
"C" means  
Contact Discharge



**Description : Electronics Discharge (ESD) of Test Point**

Description:  
"A" means  
Air Discharge  
  
"C" means  
Contact Discharge



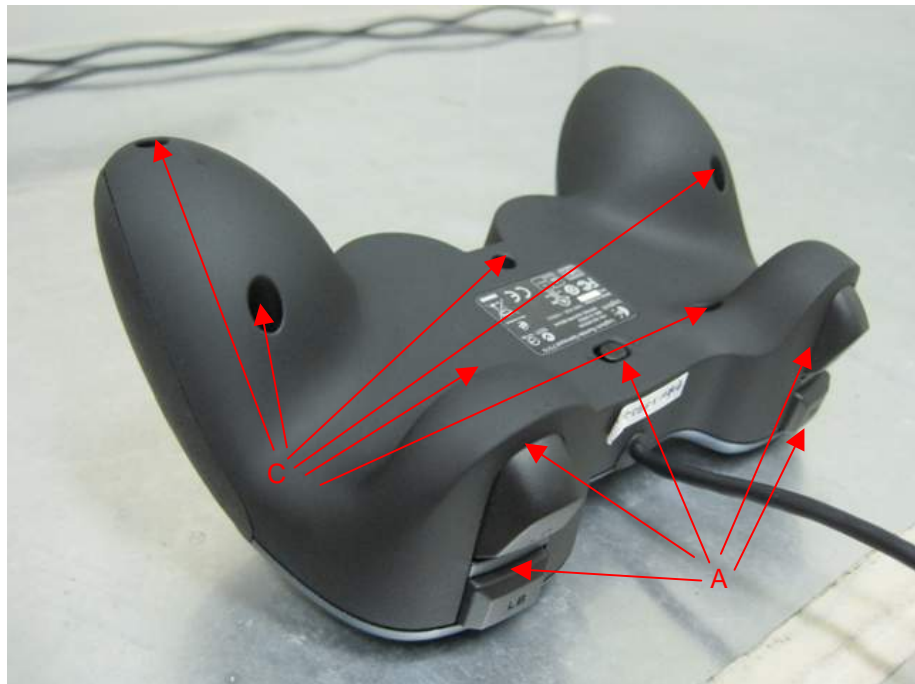


**Photographs of Electrostatic Discharge Immunity Test / Test Mode: Mode 2**  
**Description : Electronics Discharge (ESD) of Test Point**

Description:  
"A" means  
Air Discharge  
  
"C" means  
Contact Discharge



Description:  
"A" means  
Air Discharge  
  
"C" means  
Contact Discharge



**Description : Electronics Discharge (ESD) of Test Point**

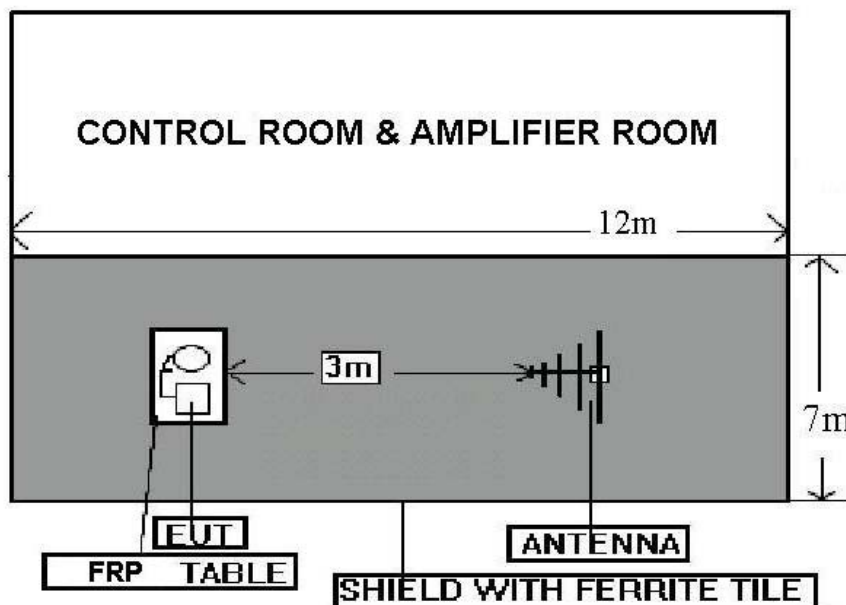
Description:  
"A" means  
Air Discharge  
  
"C" means  
Contact Discharge



## 10. Radio Frequency Electromagnetic Field Immunity Test (RS)

- Final Test Result : **PASS**
- Pass Performance Criteria : A
- Required Performance Criteria : A
- Basic Standard : IEC 61000-4-3:2008
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : 2
- Frequency Range : 80-1000 MHz
- Field Strength : 3 V/m (unmodulated, r.m.s) 80% AM (1 kHz)
- Temperature : 23 °C
- Relative Humidity : 56 %
- Atmospheric Pressure : 98.6 kPa
- Test Date : Apr. 22, 2010
- Test Mode : Mode 1 ~ Mode 2
- Observation : Normal

### 10.1 Test Setup



**Note:** The SPORTON 12m x 7m x 7m Fully Anechoic chamber is compliance with the sixteen points uniform field requirement as stated in IEC 61000-4-3 Section 6.2.

The procedure defined in this part requires the generation of electromagnetic fields within which the test sample is placed and its operation observed. To generate fields that are useful for simulation of actual (field) conditions may require significant antenna drive power and the resultant high field strength levels.

**10.2 Test Procedure**

- a. The equipment to be tested is placed in the center of the enclosure on a wooden table. The equipment is then connected to power and signal leads according to pertinent installation instructions.
- b. The bilog 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(s) 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.
- c. 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 (bilog) antenna necessitates testing each position twice, once with the antenna positioned vertically and again with the antenna positioned horizontally.
- d. 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  $1.5 \times 10^{-3}$  decades/s. The sensitive frequencies or frequencies of dominant interest may be discretely analyzed.

**10.3 Test Severity Levels**

Frequency Band : 80-1000 MHz

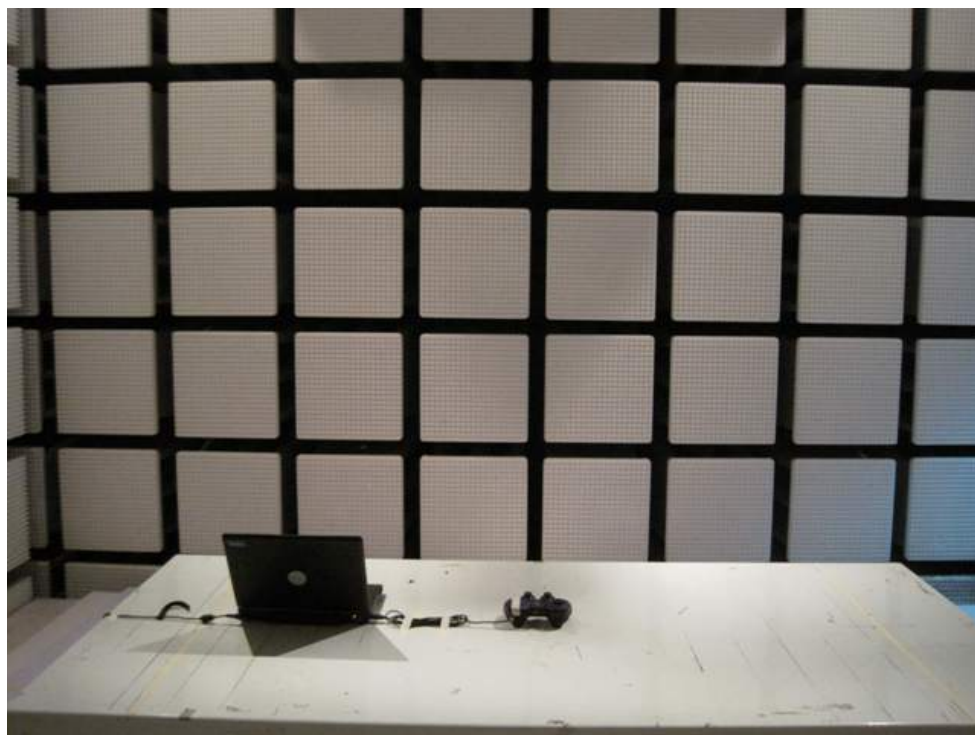
Level	Test field strength (V/m)
1	1
2	3
3	10
X	Specified

Remark : "X" is an open class.

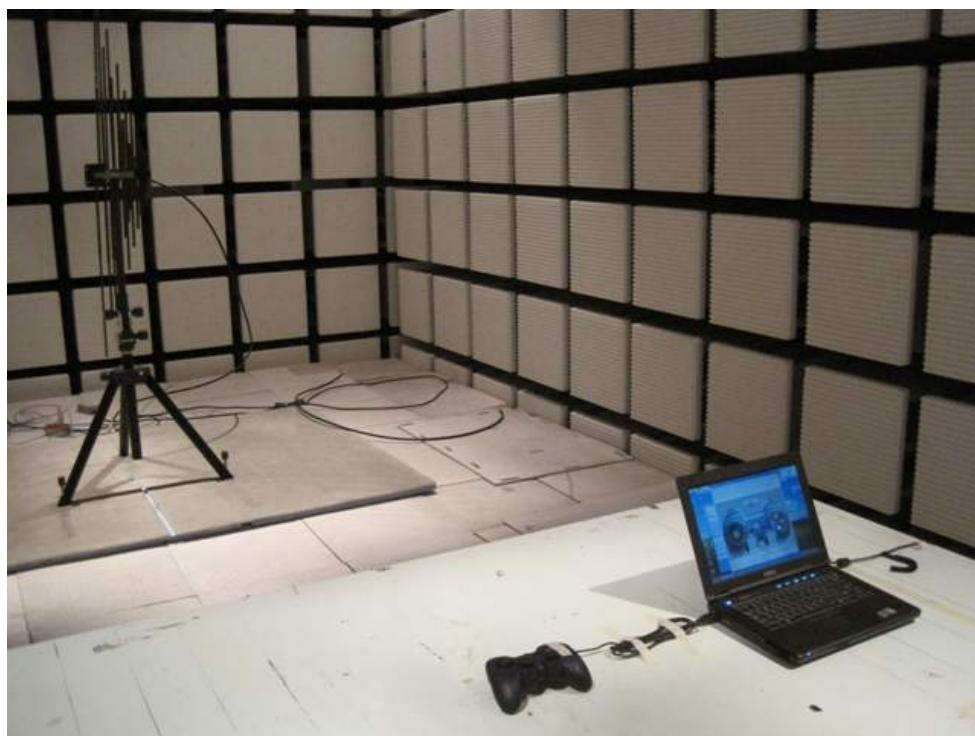
Test Engineer : Cloud Peng.  
 Cloud Peng

### 10.4 Photographs of Radio Frequency Electromagnetic Field Immunity Test

FRONT VIEW



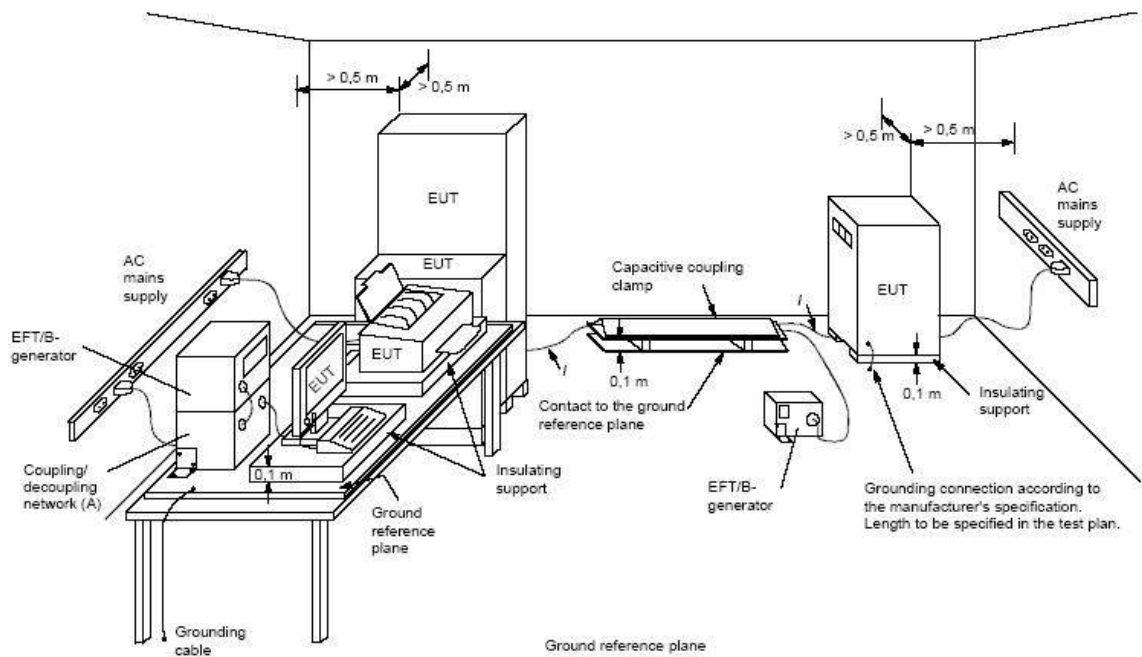
REAR VIEW



## 11. Electrical Fast Transient/Burst Immunity Test (EFT/BURST)

- Final Test Result : **PASS**
- Pass Performance Criteria : A
- Required Performance Criteria : B
- Basic Standard : IEC 61000-4-4:2004
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : on Input power ports – 2
- Test Voltage : on Input power ports –  $\pm 0.5 / \pm 1.0$  KV
- Temperature : 23 °C
- Relative Humidity : 47 %
- Atmospheric Pressure : 98.6 kPa
- Test Date : Apr. 22, 2010
- Test Mode : Mode 1 ~ Mode 2
- Observation : Normal

### 11.1 Test Setup



The EUT was placed on a ground reference plane and was insulated from it by an insulating support about 0.1m thick. If the EUT is table-top equipment, it was located approximately 0.8m above the GRP. The GRP was a metallic sheet (copper or aluminum) of 0.25 mm, minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. It shall project beyond the EUT by at least 0.1m on all sides and connected to the protective earth. In the SPORTON EMC LAB. We provided 1 mm thickness aluminum ground reference plane or 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 1 m x 1 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system. The EUT was arranged and connected according to

its functional requirements. The minimum distance between the EUT and other conductive structures, except the GRP. Beneath the EUT, was more than 0.5 m. Using the coupling clamp, the minimum distance between the coupling plates and all other conductive structures, except the GRP. Beneath the EUT, was more than 0.5 m. The length of the signal and power lines between the coupling device and the EUT was 1m or less.

## 11.2 Test on Power Line

- a. The EFT/B-generator was located on the GRP.. The length from the EFT/B-generator to the EUT as not exceed 1 m.
- b. The EFT/B-generator provides the ability to apply the test voltage in a non-symmetrical condition to the power supply input terminals of the EUT.

## 11.3 Test on Communication Lines

- a. The coupling clamp is composed of a clamp unit for housing the cable (length more than 3 m), and was placed on the GRP..
- b. The coupling clamp provides the ability of coupling the fast transient/bursts to the cable under test.

## 11.4 Test Procedure

- a. In order to minimize the effect of environmental parameters on test results, the climatic conditions when test is carrying out shall comply with the following requirements:
  - ambient temperature: 15°C to 35°C;
  - relative humidity : 45% to 75%;
  - atmospheric pressure : 86 kPa (860 mbar) to 106 kPa (1060 mbar).
- b. In order to minimize the effect of environmental parameters on test results, the electromagnetic environment of the laboratory shall not influence the test results.
- c. The variety and diversity of equipment and systems to be tested make it difficult to establish general criteria for the evaluation of the effects of fast transients/bursts on equipment and systems.
- d. The test results may be classified on the basic of the operating conditions and the functional specification of the equipment under test, according to the following performance criteria :
  - Normal performance within the specification limits.
  - Temporary degradation or loss of function or performance which is self-recoverable.
  - Temporary degradation or loss of function or performance which requires operator intervention or system reset.
  - Degradation or loss of function which is not recoverable due to damage of equipment (components).

**11.5 Test Severity Levels**

The following test severity levels are recommended for the fast transient/burst test :

Open circuit output test voltage $\pm 10\%$		
Level	On Input power ports	On signal port and telecommunication ports
1	0.5 kV	0.25 kV
2	1.0 kV	0.50 kV
3	2.0 kV	1.00 kV
4	4.0 kV	2.00 kV
X	Specified	Specified

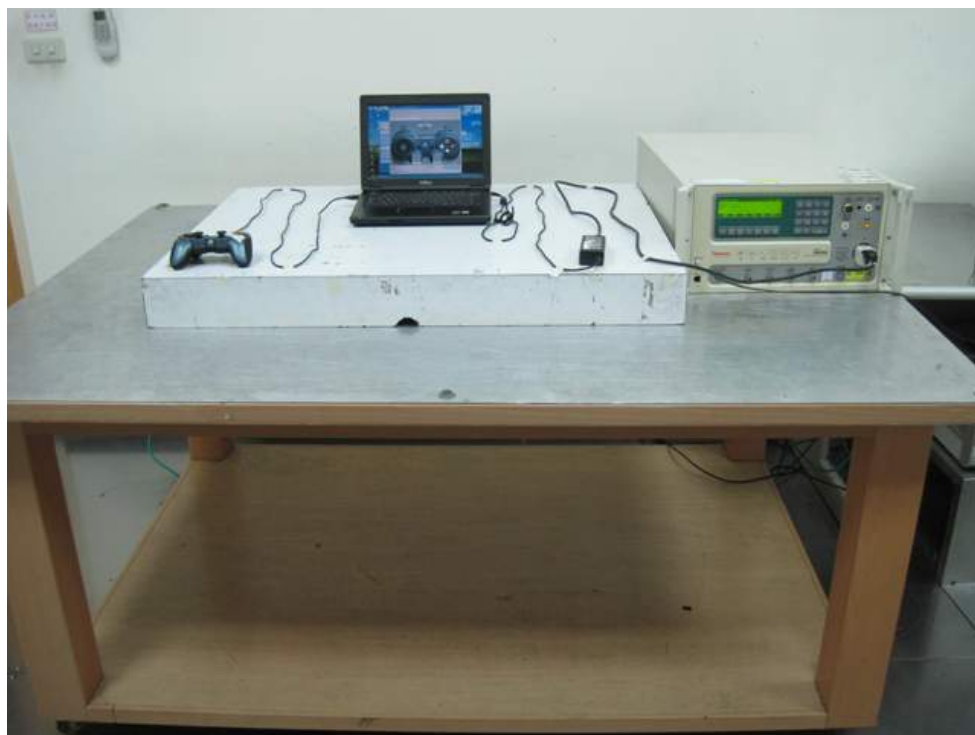
Remark : " X " is an open level. The level is subject to negotiation between the user and the manufacturer or is specified by the manufacturer.

Test Engineer : Cloud Peng.  
 Cloud Peng

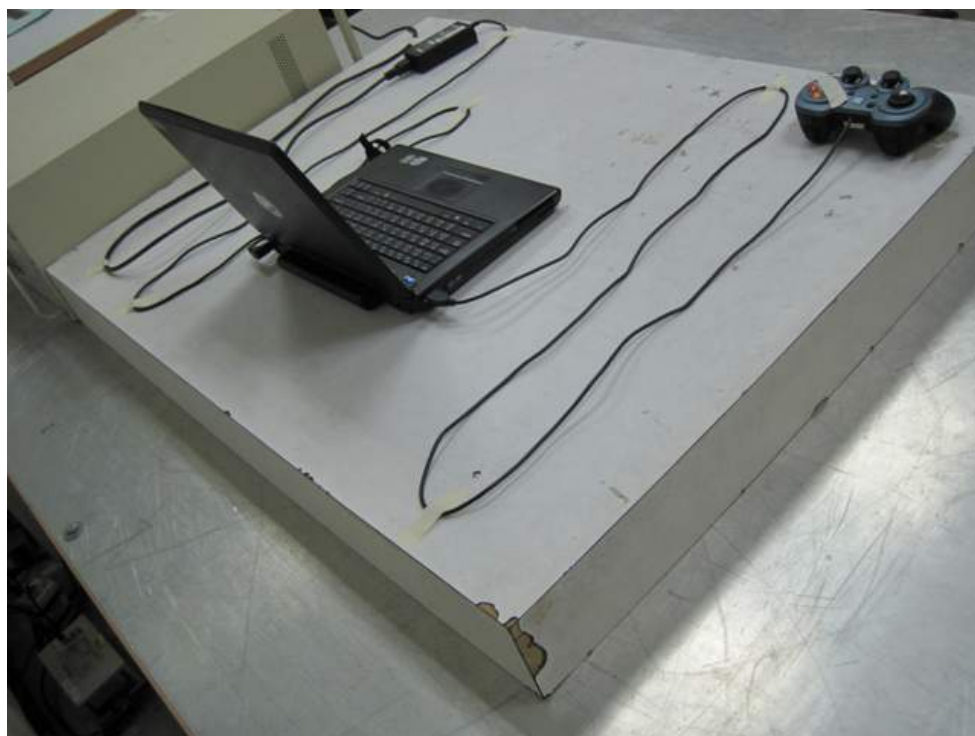


**11.6 Photographs of Electrical Fast Transient/Burst Immunity Test**

FRONT VIEW



REAR VIEW



## 12. Surge Immunity Test

- Final Test Result : **PASS**
- Pass performance Criteria : A
- Required Performance Criteria : B
- Basic Standard : IEC 61000-4-5:2005
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Surge Wave Form (Tr/Th) : 1, 2/50 ( 8/20 )  $\mu$ s
- Level : on Input AC Power Port – 3
- Test Voltage : on Input AC Power Port –  $\pm 1.0 / \pm 2.0$ KV
- Temperature : 23 °C
- Relative Humidity : 47 %
- Atmospheric Pressure : 98.6 kPa
- Test Date : Apr. 22, 2010
- Test Mode : Mode 1 ~ Mode 2
- Observation : Normal

### 12.1 Test Record

#### 12.1.1 Input AC power port:

Voltage ( kV )	Test Location	Polarity	Phase Angle				Test Result
			0°	90°	180°	270°	
1 kV	L - N	+	A	A	A	A	<b><u>PASS</u></b>
		-	A	A	A	A	<b><u>PASS</u></b>
2 kV	L - PE	+	A	A	A	A	<b><u>PASS</u></b>
		-	A	A	A	A	<b><u>PASS</u></b>
	N - PE	+	A	A	A	A	<b><u>PASS</u></b>
		-	A	A	A	A	<b><u>PASS</u></b>

# Remark : PE = Earth reference

## 12.2 Test Level

Level	Open-circuit test voltage, $\pm 10\%$ , kV
1	0.5
2	1.0
3	2.0
4	4.0
x	Specified

NOTE - x is an open class.  
This level can be specified in the product specification.

## 12.3 Test Procedure

a. Climatic conditions

The climatic conditions shall comply with the following requirements :

- ambient temperature : 15 °C to 35 °C
- relative humidity : 10 % to 75 %
- atmospheric pressure : 86 kPa to 106 kPa ( 860 mbar to 1060 mbar )

b. Electromagnetic conditions

The electromagnetic environment of the laboratory shall not influence the test results.

c. The test shall be performed according the test plan that shall specify the test set-up with

- generator and other equipment utilized;
- test level ( voltage/current );
- generator source impedance;
- internal or external generator trigger;
- number of tests : at least five positive and five negative at the selected points;
- repetition rate : maximum 1/min.
- inputs and outputs to be tested;
- representative operating conditions of the EUT;
- sequence of application of the surge to the circuit;
- phase angle in the case of a.c. power supply;
- actual installation conditions, for example :
  - AC : neutral earthed,
  - DC : ( + ) or ( - ) earthed to simulated the actual earthing conditions.

d. If not otherwise specified the surges have to be applied synchronized to the voltage phase at the zero-crossing and the peak value of the a.c. voltage wave ( positive and negative ).

e. The surges have to be applied line to line and line(s) and earth. When testing line to earth, the test voltage has to be applied successively between each of the lines and earth, if there is no other specification.

- f. The test procedure shall also consider the non-linear current-voltage characteristics of the equipment under test. Therefore the test voltage has to be increased by steps up to the test level specified in the product standard or test plan.
- g. All lower levels including the selected test level shall be satisfied. For testing the secondary protection, the output voltage of the generator shall be increased up to the worstcase voltage breakdown level ( let-through level ) of the primary protection.
- h. If the actual operating signal sources are not available, they may be simulated. Under no circumstances may the test level exceed the product specification. The test shall be carried out according to the test plan.
- i. To find all critical points of the duty cycle of the equipment, a sufficient number of positive and negative test pulses shall be applied. For acceptance test a previously unstressed equipment shall be used to the protection devices shall be replaced.

## 12.4 Operating Condition

Full system

Test Engineer : Cloud Peng.  
Cloud Peng

### 12.5 Photographs of Surge Immunity Test

FRONT VIEW



REAR VIEW



### 13. Conducted Disturbances Induced by Radio-Frequency Field Immunity Test ( CS )

- Final Test Result : **PASS**
- Pass Performance Criteria : A
- Required Performance Criteria : A
- Basic Standard : IEC 61000-4-6:2008
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : 2
- Test Voltage : 3 V (unmodulated, r.m.s) 80% AM (1 kHz)
- Frequency Range : 0.15 MHz to 80 MHz
- Dwell Time : 2.9 seconds
- Frequency Step Size : 1 %
- Test Port : on AC Power
- Coupling mode : CDN-M2+M3 for AC power ports
- Temperature : 23 °C
- Relative Humidity : 47 %
- Atmospheric Pressure : 98.6 kPa
- Test Date : Apr. 22, 2010
- Test Mode : Mode 1 ~ Mode 2
- Observation : Normal

#### 13.1 Test Level

Level	Voltage Level ( EMF )
1	1 V rms
2	3 V rms
3	10 V rms
x	Specified
NOTE - x is an open class. This level can be specified in the product specification.	

#### 13.2 Operating Condition

Full system

### 13.3 Test Procedure

- a. The EUT shall be operated within its intended climatic conditions. The temperature and relative humidity should be recorded.
- b. This test method test can be performed without using a sell shielded enclosure. This is because the disturbance levels applied and the geometry of the setups are not likely to radiated a high amount of energy, especially at the lower frequencies. If under certain circumstances the radiated energy is too high, a shielded enclosure has to be used.
- c. 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.
- d. The frequency range is swept from 150 kHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1kHz sinewave, pausing to adjust the RF-signal level or to switch coupling devices as necessary. The rate of sweep shall no exceed  $1.5 \times 10^{-3}$  decades/s. Where the frequency is swept incrementally, the step size shall no exceed 1% of the start and thereafter 1% of the preceding frequency value.
- e. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies e.g. clock frequency(ies) and harmonics or frequencies of dominant interest shall be analyzed separately.
- f. In cases of dispute, the test procedure using a step size not exceeding 1% of the start and thereafter 1% of preceding frequency value shall take precedence.
- g. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.
- h. The use of special exercising programs is recommended.
- i. Testing shall be performed according to a Test Plan, which shall be included in the test report.
- j. It may be necessary to carry out some investigatory testing in order to establish some aspects of the test plan.

Test Engineer : Cloud Peng.  
Cloud Peng

### 13.4 Photographs of CS Tests

FRONT VIEW



REAR VIEW





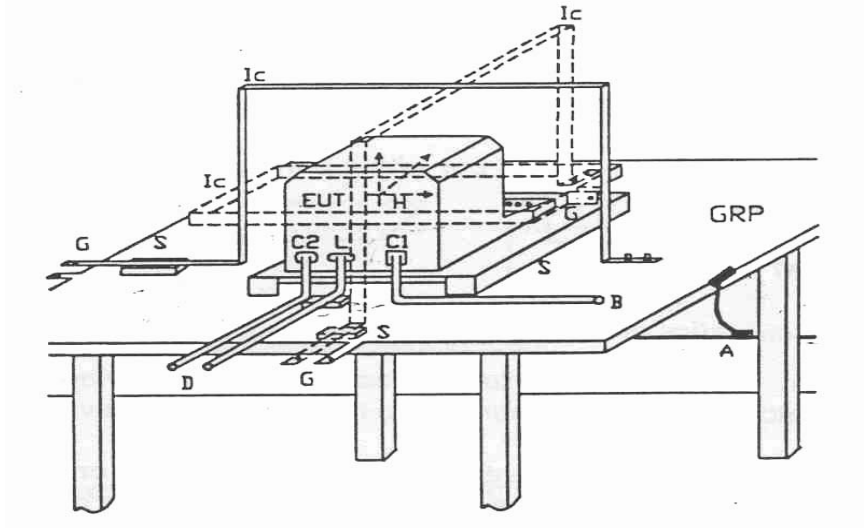
## 14. Power Frequency Magnetic Field Immunity Tests

- FINAL TEST RESULT : **PASS**
- Pass Performance Criteria : A
- Required Performance Criteria : A
- Basic Standard : IEC 61000-4-8:2009
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Temperature : 23°C
- Relative Humidity : 47%
- Atmospheric Pressure : 98.6 kPa
- Test Date : Apr. 22, 2010
- Test Mode : Mode 1 ~ Mode 2
- Observation : Normal Link

### 14.1 Test Record

Power Frequency Magnetic Field	Testing duration	Coil Orientation	Results
50Hz, 1A/m	1.0 Min	X-axis	Pass
50Hz, 1A/m	1.0 Min	Y-axis	Pass
50Hz, 1A/m	1.0 Min	Z-axis	Pass

**14.2 Test Setup**



- |                            |                                 |
|----------------------------|---------------------------------|
| GRP : Ground plane         | C1 : Power supply circuit       |
| A : Safety earth           | C2 : Signal circuit             |
| S : Insulating support     | L : Communication line          |
| EUT : Equipment under test | B : To power supply source      |
| Lc : Induction coil        | D : To signal source, simulator |
| E : Earth terminal         | G : To the test generator       |

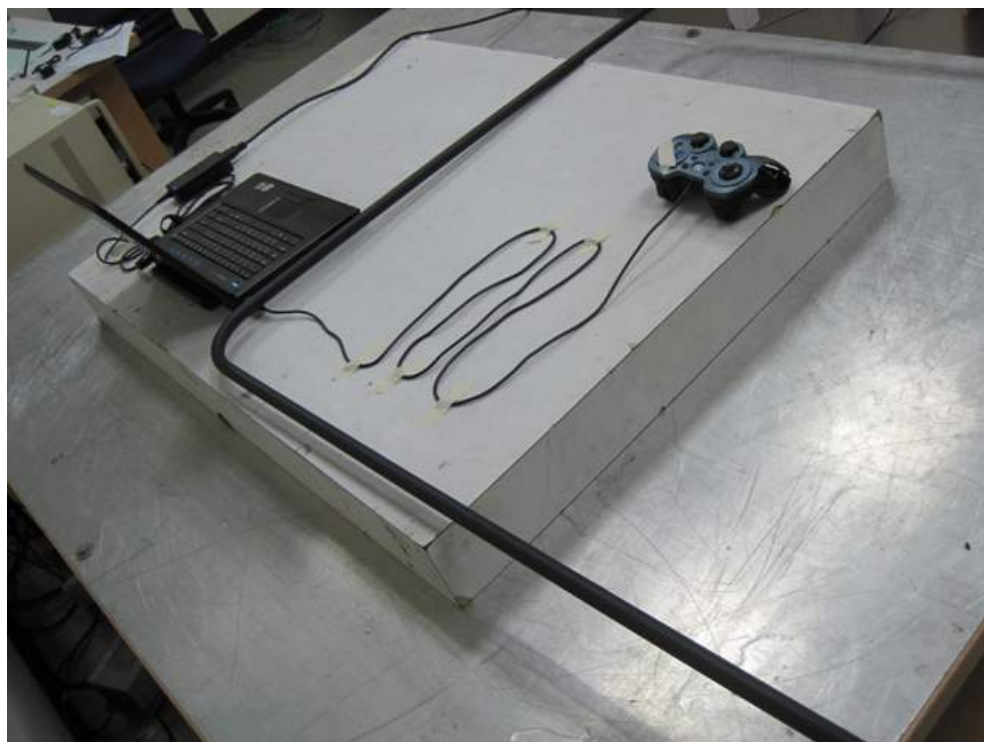
Test Engineer : Cloud Peng.  
Cloud Peng

### 14.3 Photographs of Power Frequency Magnetic Field Immunity Tests

FRONT VIEW



REAR VIEW



## 15. Voltage Dips and Voltage Interruptions Immunity Tests

- Final Test Result : **PASS**
- Pass Performance Criteria : A for voltage interruption, A for voltage dips
- Required Performance Criteria : C for voltage interruption, C/B for voltage dips
- Basic Standard : IEC 61000-4-11:2004
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Test Port : on Input power ports
- Temperature : 23 °C
- Relative Humidity : 47 %
- Atmospheric Pressure : 98.6 kPa
- Test Mode : Mode 1 ~ Mode 2
- Test Date : Apr. 22, 2010

### 15.1 Test Record of Voltage Interruption

Voltage ( V )	Phase Angle		% Reduction	Duration (Periods)	Observation
	0 °	180 °			
100/230/240V	A	A	>95%	250	Normal

### 15.2 Test Record of Voltage Dips

Voltage ( V )	Phase Angle		% Reduction	Duration (Periods)	Observation
	0 °	180 °			
100/230/240V	A	A	30	25	Normal
100/230/240V	A	A	>95 %	0.5	Normal

### 15.3 Testing Requirement and Procedure

The test was based on IEC 61000-4-11:2004

### 15.4 Test Conditions

1. Source voltage and frequency: 100/230/240V / 50Hz, Single phase.
2. Test of interval: 10 sec.
3. Level and duration: Sequency of 3 dips/interrupts.
4. Voltage rise (and fall) time: 1 ~ 5  $\mu$ s.

### 15.5 Operating Condition

Full system

Test Engineer : Cloud Peng.  
Cloud Peng

**15.6 Photographs of Voltage Dips and Voltage Interruptions Immunity Tests**

FRONT VIEW



REAR VIEW



## 16. List of Measuring Equipment Used

<EMI>

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100377	9kHz ~ 2.75GHz	Jul. 20, 2009	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Apr. 24, 2010	Conduction (CO01-CB)
V- LISN	Schwarzbeck	NSLK 8127	8127-478	9K ~ 30MHz	Oct. 30, 2009	Conduction (CO01-CB)
PULSE LIMITER	R&S	ESH3-Z2	100430	9K~30MHz	Jan. 04, 2010	Conduction (CO01-CB)
10m Semi Anechoic Chamber	TDK	SAC-10M	10CH01-CB	30MHz~1GHz 10m, 3m	Nov. 16, 2009	Radiation (10CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10783	9KHz ~ 1.3GHz	Nov. 06, 2009	Radiation (10CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10784	9KHz ~ 1.3GHz	Nov. 06, 2009	Radiation (10CH01-CB)
Biconical Antenna	Schwarzbeck	VHBB 9124	324	30MHz ~ 200MHz	Nov. 16, 2009	Radiation (10CH01-CB)
Log Antenna	Schwarzbeck	VUSLP 9111	247	200MHz ~ 1GHz	Nov. 16, 2009	Radiation (10CH01-CB)
EMI Test Receiver	R&S	ESCI	100186	9KHZ ~ 3GHz	Mar. 09, 2010	Radiation (10CH01-CB)
Spectrum Analyzer	R&S	FSP40	100142	9KHz ~ 40GHz	Jan. 21, 2010	Radiation (10CH01-CB)

※ Calibration Interval of instruments listed above is one year.

**<EMS>**

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Harmonic & Flicker tester	Schaffner	CCN 1000-1	72471	-	Nov. 20, 2009	Harmonics, Flicker
ESD Generator	TESEQ QG	NSG 437	314	Air: 0 KV ~ 30 KV, Contact: 0 KV ~ 30KV	Jan. 18, 2010	ESD
Integrated Measurement System	R&S	IMS	100002	9KHz ~ 3GHz	Nov. 27, 2009	RS
Average Power Sensor	R&S	NRP-Z91	100151	9KHz ~ 6GHz	Nov. 27, 2009	RS
Electric Field Sensor	ETS-Lindgren	HI-6005	00075211	100KHz ~ 5GHz, 0.5 ~ 800V/M	Nov. 27, 2009	RS
RF Power Amplifier	AR	30S1G3	0323046	1GHz ~ 3GHz, 30W	Nov. 27, 2009	RS
RF Power Amplifier	AR	250W1000A	0323202	80MHz ~ 1GHz, 250W	Nov. 27, 2009	RS
Log-Periodic Antenna	AR	AT1080	0323130	80MHz ~ 1GHz	NCR	RS
Horn Antenna	AR	AT4002A	0323305	0.8GHz ~ 5GHz	NCR	RS
Dual Directional Couplers	AR	DC 7144A	0322883	0.8GHz ~ 4.2GHz	Nov. 27, 2009	RS
Dual Directional Couplers	AR	DC 6180A	0322837	80MHz ~ 1GHz	Nov. 27, 2009	RS
EFT Generator	KEYTEK	EMC Pro	0408325	0 KV ~ 4.4 KV	Aug. 18, 2009	EFT
SURGE Generator	KEYTEK	EMC Pro	0408325	1.2*50us, 6.6KV; 10*700us, 6.6KV	Aug. 18, 2009	SURGE
Conducted Immunity Test System	SCHAFFNER	NSG2070	1091	100KHz ~ 250MHz, FM 1KHZ 80%	Mar. 03, 2010	CS
Coupling and Decoupling Network	FRANKONIA	CDN M2+M3	A3011047	150kHz~230MHz	Mar. 09, 2010	CS



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
PQF Generator	KEYTEK	EMCPro	0408325	230VA/50Hz/60Hz 0%Open/5S, 0%Short/5S, 40%0.10S, 70%/0.01S	Jun. 02, 2009	DIP
Magnetic field Immunity Loop	KEYTEK	F-1000-4-8/9/10-L-1A M	4017	30A//CONTINUOUS, 100A/2Hrs, 230A/30SEC	Nov. 19, 2009	Magnetic

※ Calibration Interval of instruments listed above is one year.

※ NCR means Non-Calibration required.

## APPENDIX A. Photographs of EUT

EUT 1

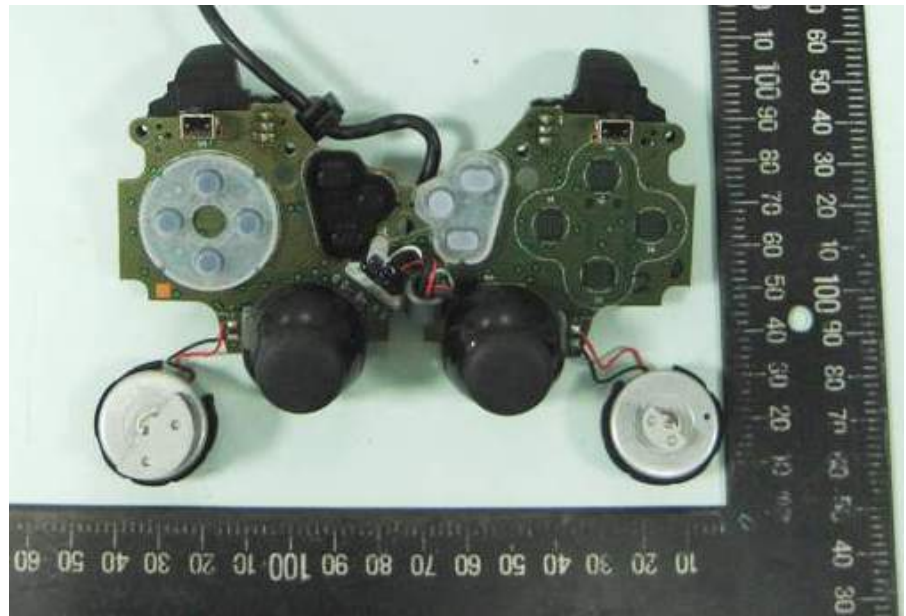
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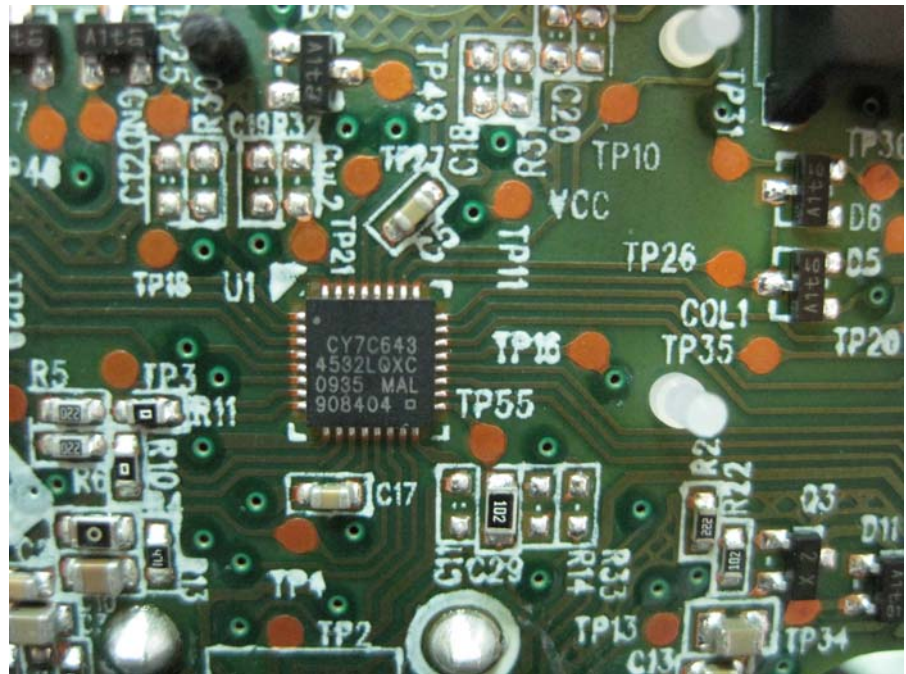












EUT 2  
Model No.: G-U0001











