



# Declaration of Conformity



**Type of equipment:** NETWORK CONTROLLER  
**Brand Name /Trade Mark:** SAMSUNG  
**Type designation /model:** SPC-2000  
**Applicant:** SAMSUNG TECHWIN CO., LTD.

**In accordance with the following Directives:**

2004/108/EC The Electromagnetic Compatibility Directive

Including amendments by the CE Marking Directive 93/68/EEC

**The following harmonized European standards or technical specifications have been applied:**

EN 55022:2010	Limits and methods of measurement of radio disturbance characteristics of information technology equipment
EN 55024:2010	Information technology equipment – Immunity characteristics - Limits and Methods of measurement
EN 61000-4-2:2009	Electrostatic discharge immunity test
EN 61000-4-3:2006+A1:2008	Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4:2004+A1:2010	Electrical fast transient/burst immunity test
EN 61000-4-5:2006	Surge immunity test
EN 61000-4-6:2009	Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-11:2004	Voltage dips, short interruptions and voltage variations immunity tests

**The CE Marking on the products and/or their packaging signifies that SAMSUNG TECHWIN CO., LTD. holds the reference technical file available to the European Union authorities.**

**Place and date of issue:** #42 Seongju-Dong, Changwon-Shi, Kyungsangnam-Do, Korea / April 13, 2012

**Authorized Signatory:** Name : Jei Soon, Kang  
Title : Principal Research Engineer

Signature :

## EMC TEST REPORT

**Test report No:** EMC-CE-3090  
**Type of Equipment:** NETWORK CONTROLLER  
**Model Name:** SPC-2000  
**Applicant:** Samsung Techwin Co., Ltd.  
#42 Seongju-Dong, Changwon-Shi,  
Kyungsangnam-Do, Korea  
**Manufacturer:** ROTAC Co.,Ltd  
#73-11, GEUMSA-DONG, GEUMJEONG-GU,  
BUSAN, KOREA  
**Test standards:** EN 55022:2010, Class A  
EN 55024:2010  
**Testing Laboratory:** EMC Compliance Ltd.  
**Test result:** Complied

This product complies with the requirements of the EMC Directive 2004/108/ EC.  
The results in this report apply only to the sample tested.  
This test report shall not be reproduced, except in full, without the written approval of  
EMC compliance Laboratory.

Date of receipt: 2012. 04. 11

Date of testing: 2012. 04. 09 ~ 04. 11

Issued date: 2012. 04. 13

**Tested by:**   
SUNG, KI-MUN

**Approved by:**   
YEOM, HAN-SEOK

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## 1. Applicant information

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Kyungsangnam-Do, Korea  
**Telephone:** +82-70-7147-8361  
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**E-mail:** js2002.kang@samsung.com  
**Contact name:** **Kang Jei Soon**

**Manufacturer:** ROTAC Co.,Ltd  
**Address:** #73-11, GEUMSA-DONG,  
GEUMJEONG-GU, BUSAN, KOREA

## 2. Laboratory information

### Address

#### **EMC compliance Ltd.**

480-5 Sin-dong, Yeongtong-gu, Suwon-city, Gyeonggi-do, 443-390, Korea

Telephone Number: 82 31 336 9919

Facsimile Number: 82 31 336 4767

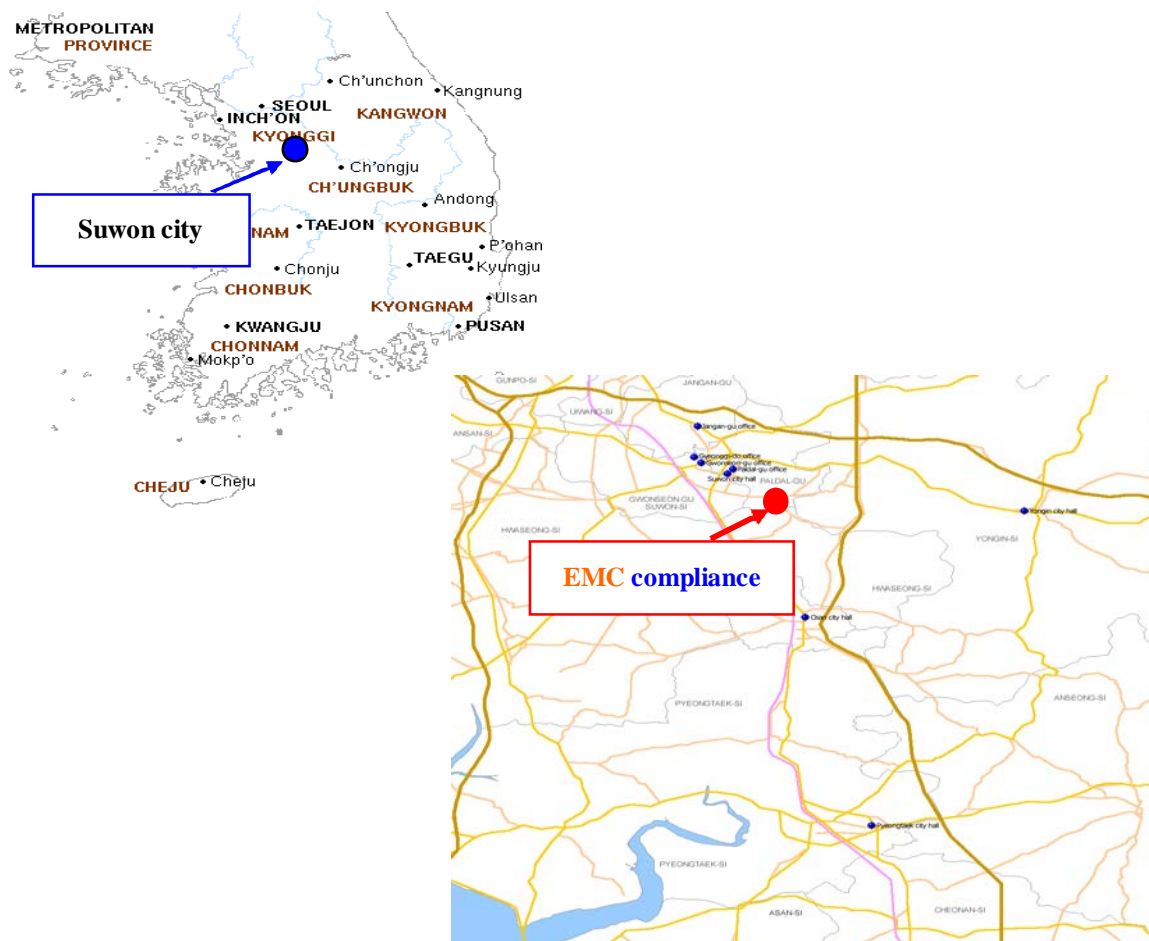
FCC CAB.: KR0040

VCCI Registration No. : R-3327, G-198, C-3706, T-1849

Industry Canada Registration No. : 8035A

KOLAS NO.: 231

### **SITE MAP**



### 3. Test system configuration

#### 3.1 Operation environment

	Temperature	Humidity	Pressure
Chamber(10 m)	: 23 °C	34 % R.H.	-
Shielded room(CE)	: 23 °C	32 % R.H.	-
Shielded room(ESD)	: 23 °C	40 % R.H.	100.1 kPa

#### Test site

These testing items were performed following locations;

Test item	Test site
Conducted Emission	Shielded Room
Radiated Emission	10 m Chamber
Harmonics current	Immunity area
Voltage fluctuations and flickers	Immunity area
Electrostatic discharge	Shielded Room
Radiated RF immunity	Fully anechoic chamber (3 m)
Electric Fast Transient/BURST	Shielded Room
Surge	Shielded Room
Conducted RF immunity	Shielded Room
Magnetic field immunity	Shielded Room
Voltage dip/interruption	Shielded Room
Mains supply voltage variations	Shielded Room

### 3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.

The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability. Based on CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

Conducted emission measurement : ( $k = 2$ , 95 % )		
Shielded Room (CE#1)	9 kHz ~ 150 kHz: $\pm 3.77$ [dB] 150 kHz ~ 30 MHz: $\pm 3.35$ [dB]	
Shielded Room (CE#2)	9 kHz ~ 150 kHz: $\pm 3.95$ [dB] 150 kHz ~ 30 MHz: $\pm 3.55$ [dB]	
Shielded Room (CE#3)	9 kHz ~ 150 kHz: $\pm 3.88$ [dB] 150 kHz ~ 30 MHz: $\pm 3.50$ [dB]	
Radiated Emission measurement : ( $k = 2$ , 95 % )		
10 m Chamber (#F4)	30 MHz ~ 300 MHz	3 m: + 4.29 [dB], - 4.31 [dB] 10 m: + 4.28 [dB], - 4.30 [dB]
	300 MHz ~ 1 000 MHz	3 m: + 4.57 [dB], - 4.57 [dB] 10 m: + 4.42 [dB], - 4.44 [dB]
	1 GHz ~ 6 GHz	3 m: + 5.94 [dB], - 5.95 [dB]
10 m Chamber (#F2)	30 MHz ~ 300 MHz	3 m: + 4.28 [dB], - 4.30 [dB] 10 m: + 4.27 [dB], - 4.28 [dB]
	300 MHz ~ 1 000 MHz	3 m: + 4.56 [dB], - 4.57 [dB] 10 m: + 4.41 [dB], - 4.43 [dB]
	1 GHz ~ 6 GHz	3 m: + 5.94 [dB], - 5.95 [dB]
Radio Frequency Electromagnetic Fields : ( $k = 2$ , 95 % )		
$\pm 1.82$ [dB]		
Disturbance power Electromagnetic Fields: ( $k = 2$ , 95 % )		
$\pm 3.73$ [dB]		

## 4. Description of E.U.T.

### 4.1 General information

SPC-2000	
PTZ Control	Joystick (3-axis twist zoom)
Interface	USB 2.0, DirectX
Voltage	5V DC, 32mA (USB)
Operating Temperature	-25°C ~ +70°C (-13°F ~ +158°F)
Operating Humidity	10% ~ 70%
Dimensions (WxHxD)	157.0 x 127.0 x 168.0mm (6.18" x 5" x 6.61")
Weight	440g (0.97 lb)

### 4.2 Product description

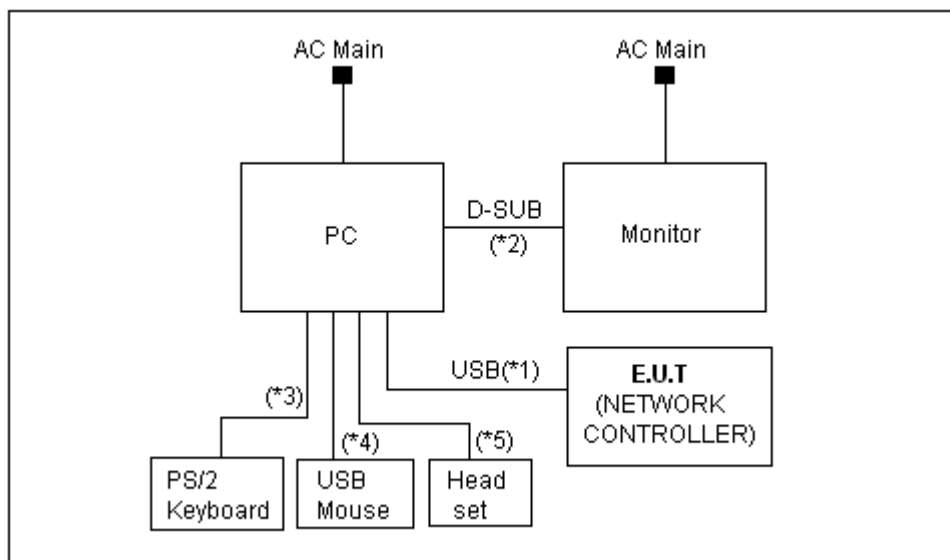
Type of product	NETWORK CONTROLLER
Model name (Basic)	SPC-2000
Model name (Variant)	N/A
Difference	-
Trade name	-
Serial no	Engineering Sample
Testing voltage	230 V, 50 Hz
Product rating	DC 5 V
Internal clock frequency	100 MHz
Note	-



### 4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
PC	DB-P55	251K97CP200055H	SAMSUNG
Monitor	CB19WS	-	SAMSUNG
PS/2 Keyboard	SDM8400P	8M004617	SAMSUNG
USB Mouse	M-UV69a	HCA51201590	LG
Headset	MP-422	-	MANIAPC

### 4.4 Test configuration



Note	Start		End		Cable		
	Name	I/O port	Name	I/O port	Length (m)	Spec.	Cable
1	<b>EUT (NETWORK CONTROLLER)</b>	USB	PC	USB	2.0	Shield	-
2	PC	D-SUB	Monitor	D-SUB	1.5	Shield	-
3		PS/2	PS/2 Keyboard	PS/2	2.0	Non-Shield	-
4		USB	USB Mouse	USB	2.0	Shield	-
5		Audio,MIC	Headset	Audio,MIC	2.0	Non-Shield	-

## 4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
1	EUT Control test mode.

## 5. Summary of test results

### 5.1 Modification to the E.U.T.

None

### 5.2 Summary of EMI emission test results

Applied	Test items	Test method	Result
<input checked="" type="checkbox"/>	Conducted Emission	EN 55022:2010	Complied
<input checked="" type="checkbox"/>	Radiated Emission	EN 55022:2010	Complied
<input type="checkbox"/>	Harmonics current	EN 61000-3-2:2006+A2:2009	N/A
<input type="checkbox"/>	Voltage fluctuations and flickers	EN 61000-3-3:2008	N/A

### 5.3 Summary of immunity test results

Applied	Test items	Test method	Result
<input checked="" type="checkbox"/>	Electrostatic discharge	EN 61000-4-2:2009	Complied
<input checked="" type="checkbox"/>	Radiated RF immunity	EN 61000-4-3:2006+A1:2008	Complied
<input checked="" type="checkbox"/>	Electric Fast Transient/BURST	EN 61000-4-4:2004+A1:2010	Complied
<input checked="" type="checkbox"/>	Surge	EN 61000-4-5:2006	Complied
<input checked="" type="checkbox"/>	Conducted RF immunity	EN 61000-4-6:2009	Complied
<input type="checkbox"/>	Magnetic field immunity	EN 61000-4-8:2010	N/A
<input checked="" type="checkbox"/>	Voltage dip/interruption	EN 61000-4-11:2004	Complied

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## 5.4 Performance criteria

**Performance criterion A:** 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.

**Performance criterion B:** 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 phenomena below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or 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.

**Performance criterion C:** Loss of function is allowed, provided the function is self-recoverable or can be restored by the operating of the controls by the user In accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

## 6. Test results

### 6.1 Conducted Emission

Test specification	EN 55022:2010, Class A		
Testing voltage	230 V, 50 Hz		
Test facility	Shielded room (CE#3)		
Date	2012. 04. 09		
Temperature (°C)	23 °C	Humidity (% R.H.)	32 % R.H.
Remarks	Complied		

#### 6.1.1 Limits of conducted emission measurement

AC main

Frequency [MHz]	Class A (dB(μV))		Class B (dB(μV))	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	79	66	66 ~ 56 *	56 ~ 46*
0.5 ~ 5	73	60	56	46
5 ~ 30	73	60	60	50

\*The limit decreases linearly with the logarithm of frequency.

Telecommunication

Frequency [MHz]	Class A Voltage Limits (dB(μV))		Current Limits (dB(μA))	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15 ~ 0.5	97 to 87	84 to 74	53 to 43	40 to 30
0.5 ~ 30	87	74	43	30
Frequency [MHz]	Class B Limits (dB(μV))		Current Limits (dB(μA))	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15 ~ 0.5	84 to 74	74 to 64	40 to 30	30 to 20
0.5 ~ 30	74	64	30	20

\* The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz

\* The current and voltage disturbance limits are derived for use with an impedance stabilization Network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is  $20 \log_{10} 150/I = 44$  dB).

### 6.1.2 Measurement procedure

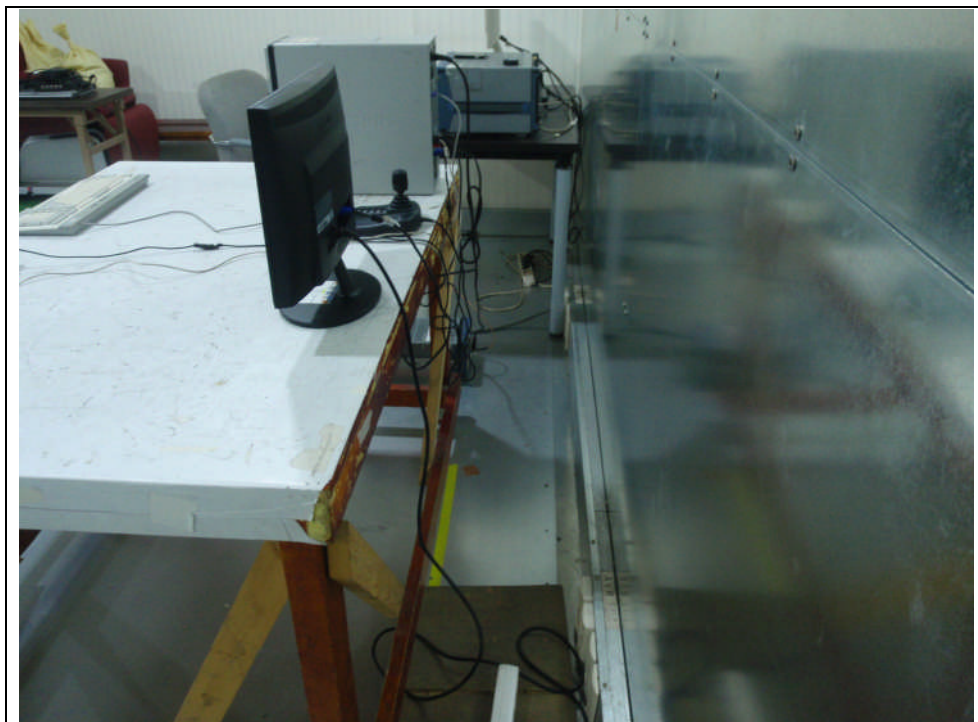
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground plane. The LISN power was filtered. Each EUT power lead, except ground (safety) lead was individually connected through a LISN to input power source. EUT signal cables that hung closer than 0.4 m to the Horizontal metal ground 0.3 m ~ 0.4 m long. The power cord was bundles in the center. All peripheral equipment was powered from a sub LISN. The LISN and ISN were positioned 0.8 m from the EUT. Peak and Average detection were used in preliminary testing and Quasi-peak and Average detections were used at final measurement. Both lines of power cord, hot and neutral, were measured.

### 6.1.3 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESHS10	843276/003	R&S	2012.06.14	<input checked="" type="checkbox"/>
LISN	ESH3-Z5	100267	R&S	2012.07.08	<input checked="" type="checkbox"/>
LISN	ENV216	101358	R&S	2012.10.26	<input checked="" type="checkbox"/>
ISN	T800	24314	TESEQ	2012.12.12	<input type="checkbox"/>
8-WIRE ISN	NTFM 8158 CAT5	CAT5-8158-0028	SCHWARZBECK	2013.04.06	<input type="checkbox"/>
8-WIRE ISN	NTFM 8158 CAT3	CAT3-8158-0020	SCHWARZBECK	2013.04.06	<input type="checkbox"/>
ISN	ENY81	101545	R&S	2012.09.01	<input type="checkbox"/>

#### 6.1.4 Photographs of test setup

\* AC Main



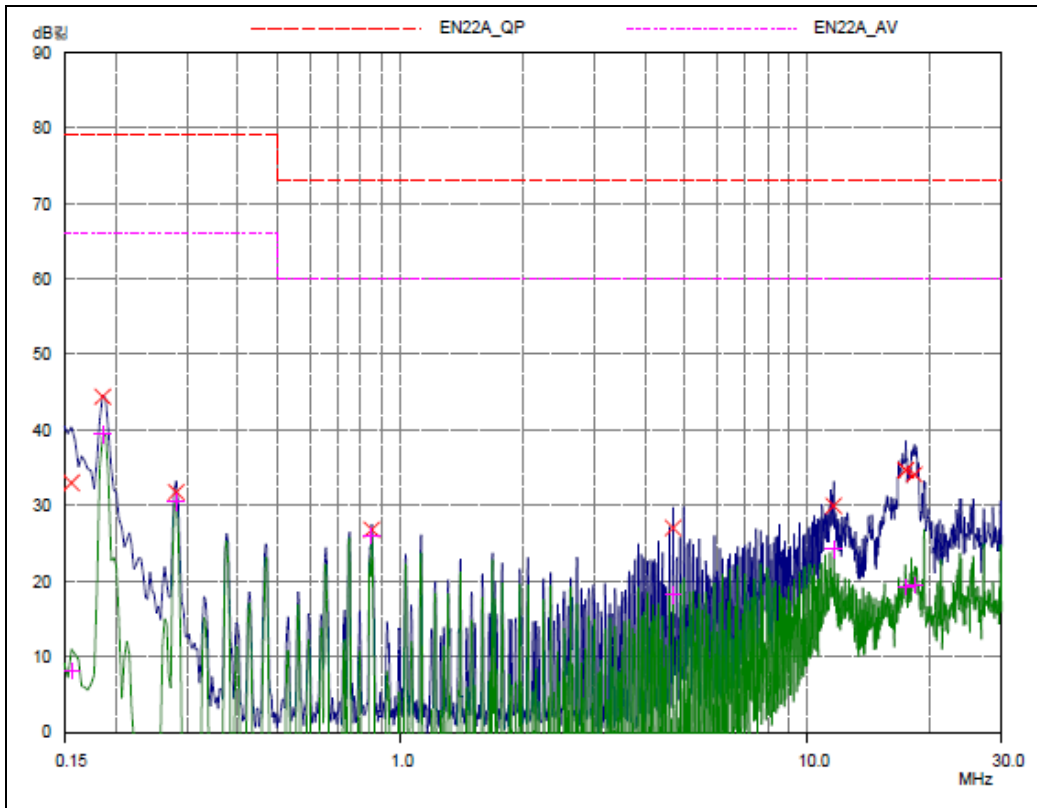
### 6.1.5 Conducted emission measurement result

\*AC Main

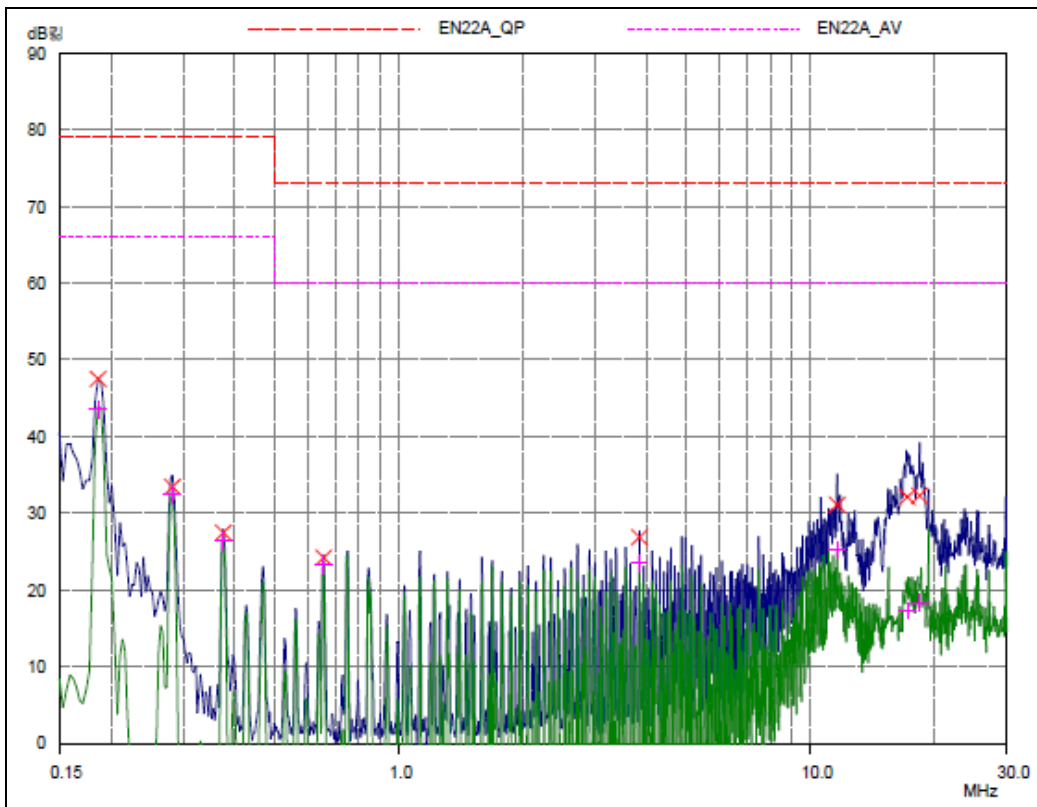
Frequency [MHz]	Correction Factor		Line	Quasi-peak				Average			
	LISN	Cable		Limit [dB( $\mu$ V)]	Reading [dB( $\mu$ V)]	Result [dB( $\mu$ V)]	Margin [dB]	Limit [dB( $\mu$ V)]	Reading [dB( $\mu$ V)]	Result [dB( $\mu$ V)]	Margin [dB]
0.156	0.07	0.05	H	79.00	32.99	33.11	45.89	66.00	8.12	8.24	57.76
0.186	0.08	0.05	H		44.38	44.51	34.49		39.43	39.56	26.44
0.186	0.07	0.05	N		47.51	47.63	31.37		43.50	43.62	22.38
0.282	0.07	0.05	N		33.41	33.53	45.47		32.37	32.49	33.51
0.375	0.07	0.05	N		27.43	27.55	51.45		26.40	26.52	39.48
4.680	0.13	0.09	H	73.00	27.03	27.25	45.75	60.00	18.11	18.33	41.67
11.610	0.34	0.13	N		31.09	31.56	41.44		25.22	25.69	34.31
17.200	0.46	0.15	N		32.07	32.68	40.32		17.20	17.81	42.19
17.430	0.55	0.15	H		34.67	35.37	37.63		19.23	19.93	40.07
18.320	0.63	0.16	H		34.07	34.86	38.14		19.46	20.25	39.75
18.390	0.52	0.16	N		32.27	32.95	40.05		18.35	19.03	40.97



[Hot-Line]



[Neutral-Line]



## 6.2 Radiated Emission

Test specification	EN 55022:2010, Class A		
Testing voltage	230 V, 50 Hz		
Test facility	10 m Chamber (#F4)		
Test distance	10 m		
Date	2012. 04. 09		
Temperature (°C)	23 °C	Humidity (% R.H.)	34 % R.H.
Remarks	Complied		

### 6.2.1 Limits of radiated emission measurement

Limits below 1 GHz

Frequency [MHz]	Class A (dB( $\mu$ V/m)) @ 10 m	Class B (dB( $\mu$ V/m)) @ 10 m
30 ~ 230	40	30
230 ~ 1 000	47	37

Limits above 1 GHz

Frequency [GHz]	Class A @ 3 m		Class B @ 3 m	
	Average limit (dB( $\mu$ V/m))	Peak limit (dB( $\mu$ V/m))	Average limit (dB( $\mu$ V/m))	Peak limit (dB( $\mu$ V/m))
1 ~ 3	56	76	50	70
3 ~ 6	60	80	54	74

Note - The lower limit applies at the transition frequency.

### 6.2.2 Measurement procedure

The test was done at a 10 m chamber with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane.

Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

### 6.2.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
Test Receiver	ESCI	100001	R&S	2012.07.11	<input checked="" type="checkbox"/>
Bi-Log Antenna	VULB 9168	375	SCHWARZBECK	2013.09.21	<input checked="" type="checkbox"/>
Amplifier	310N	284608	SONOMA INSTRUMENT	2012.07.11	<input checked="" type="checkbox"/>
3 dB Attenuator	8491A	16861	HP	2012.07.11	<input checked="" type="checkbox"/>
Antenna Mast	AM4.0	079/3440509	MATURO	-	<input checked="" type="checkbox"/>
Turn Table	CO2000-SOFT	-	MATURO	-	<input checked="" type="checkbox"/>
Horn ANT	3115	00086706	ETS	2013.11.21	<input type="checkbox"/>
Amplifier	8449B	3008A01802	AGILENT	2012.05.11	<input type="checkbox"/>
Spectrum Analyzer	FSP7	100289	R&S	2012.12.19	<input type="checkbox"/>

### 6.2.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

$$\text{Result} = \text{M.R} + \text{C.F}(\text{A.F} + \text{C.L} + 3 \text{ dB Att} - \text{A.G})$$

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

A.G = Amplifier Gain

3 dB Att = 3 dB Attenuator

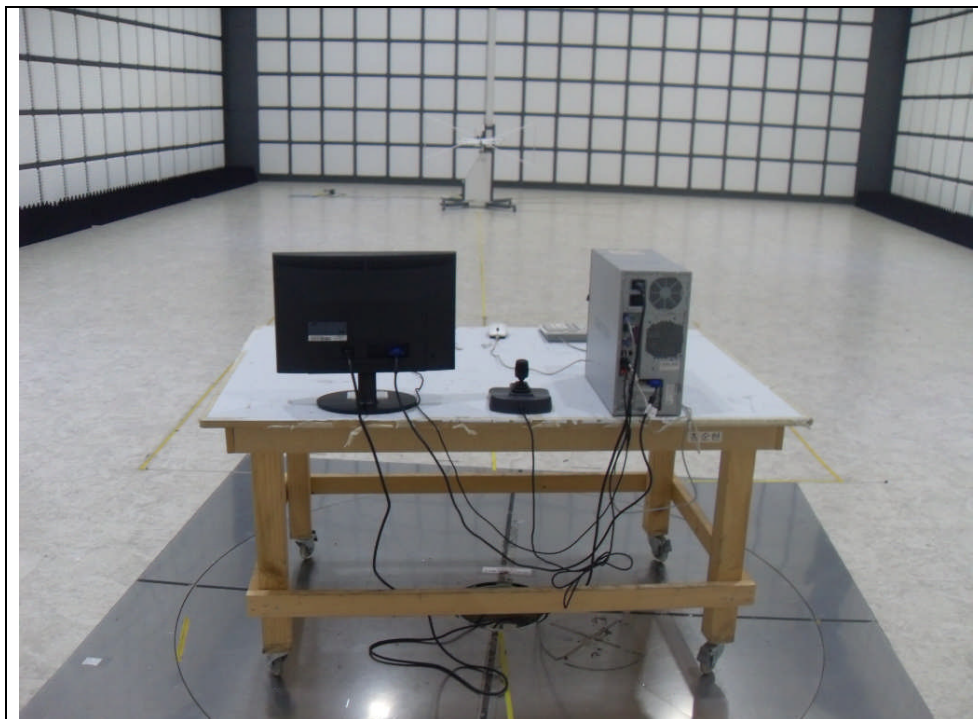
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is

$$30 + 12 + 5 + 3 - 35 = 15 \text{ dB}(\mu\text{V/m})$$

## 6.2.5 Photographs of test setup

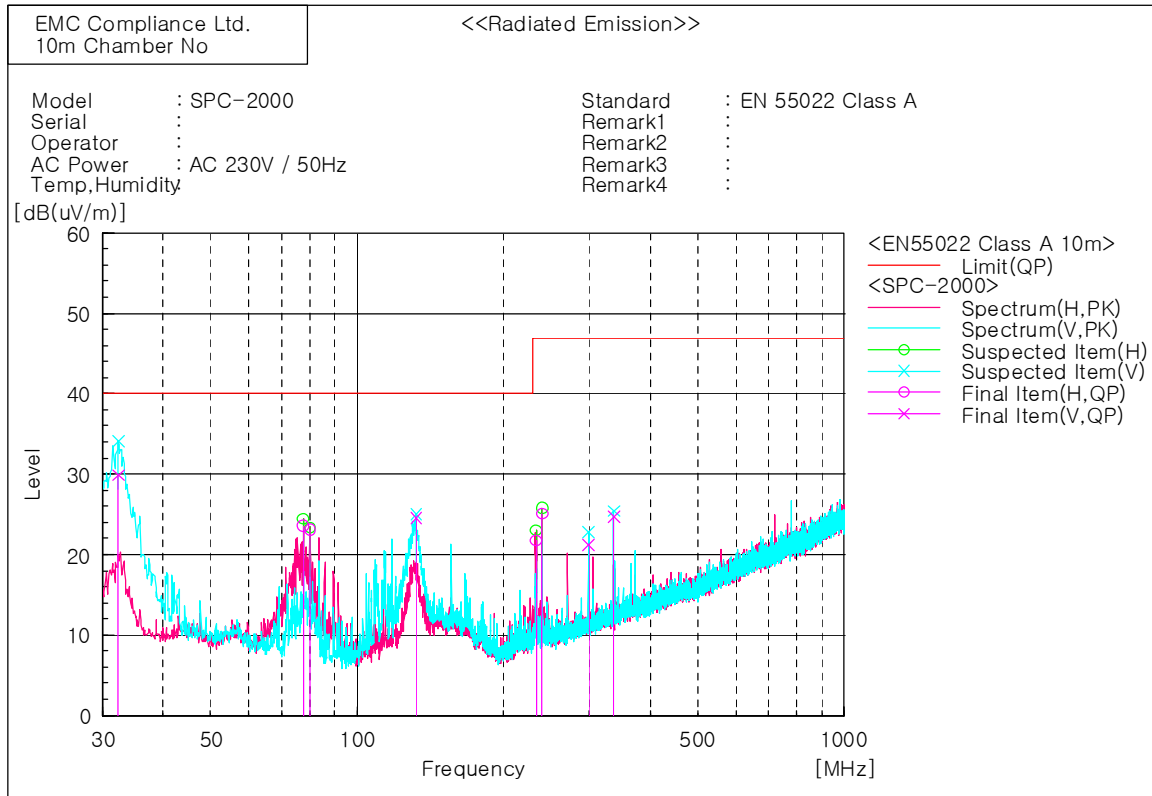
\* 30 MHz ~ 1 GHz



### 6.2.6 Radiated emission measurement result

#### \* Graph and Data

\* 30 MHz ~ 1 GHz



### 6.3 Electrostatic Discharge

Test specification	EN 61000-4-2:2009, Criteria : B				
Test level	<input type="checkbox"/> Contact: $\pm 2$ kV, $\pm 4$ kV <input checked="" type="checkbox"/> Air: $\pm 2$ kV, $\pm 4$ kV, $\pm 8$ kV <input checked="" type="checkbox"/> HCP: $\pm 2$ kV, $\pm 4$ kV <input checked="" type="checkbox"/> VCP: $\pm 2$ kV, $\pm 4$ kV				
Discharge impedance	330 $\Omega$ / 150 pF				
Number of discharge (Each polarity)	<input type="checkbox"/> Contact: 25 <input checked="" type="checkbox"/> Air: 10 <input checked="" type="checkbox"/> HCP / VCP: 25				
Interval between discharges	1 s				
Testing voltage	230 V, 50 Hz				
Test facility	Shielded room				
Date	2012. 04. 10				
Temperature(°C)	23 °C	Humidity (% R.H.)	40 % R.H.	Pressure (kPa)	100.1 kPa
Remarks	Complied - A: There was no change of operation status during above testing.				

#### 6.3.1 Measurement procedure

A ground reference plane was located on the floor, and connected to earth via a low Impedance connection. The return cable of the ESD generator was connected to the reference plane.

In case of floor standing equipment, EUT was placed on the reference plane on 0.1 m of insulating Support. In case of table top equipment, EUT was placed on a wooden table 0.8 m above the reference grounded floor. A horizontal coupling plane (HCP) was placed on the table, and Connected to the reference plane via a 470 k $\Omega$  resistor located in each end (0.5 mm insulating support between EUT and HCP). In both cases a vertical coupling plane(VCP) OF 0.5 X 0.5 m was located 0.1 m from the EUT's sides. The VCP was connected to the reference plane in the same matter as the HCP.



### 6.3.2 Used equipments



Equipment	Model No.	Serial No.	Makers	Next Cal. Date	Used
ESD Tester	NSG 437	182	TESEQ	2012.05.23	<input checked="" type="checkbox"/>
HCP	-	-	-	-	<input checked="" type="checkbox"/>
VCP	-	-	-	-	<input checked="" type="checkbox"/>

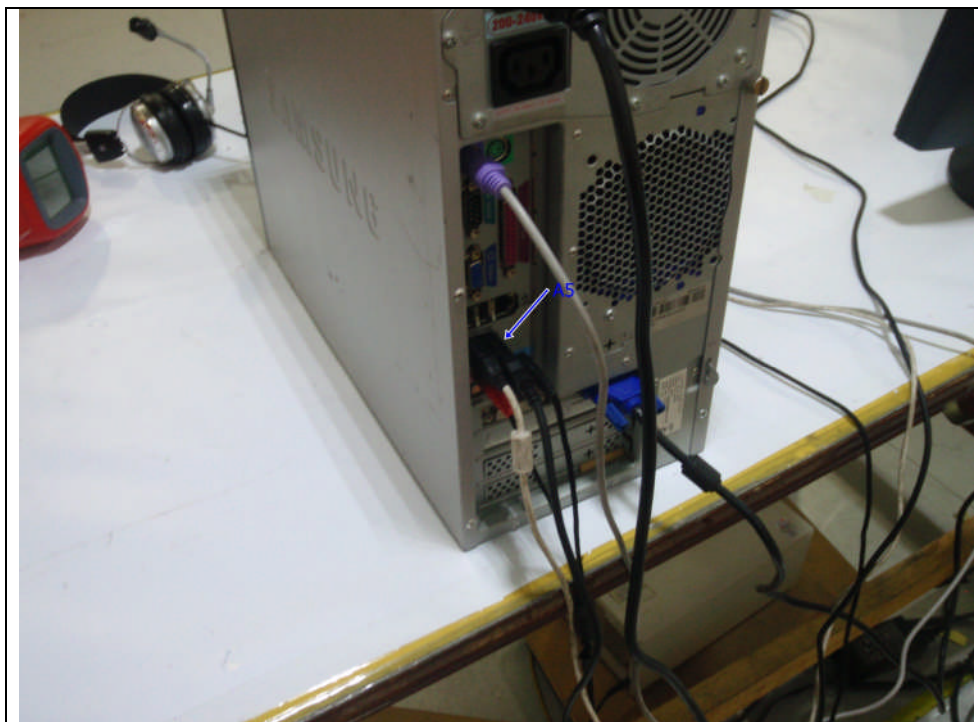
### 6.3.3 Photographs of test setup



### 6.3.4 Measurement result

#### Electrostatic Discharge (Test Point)

Air discharge	
Contact discharge	





**HCP/VCP discharge**

Location(EUT)	Applied level (±)	Result (Criterion)
HCP (All 4 sides)	± 2 kV, ± 4 kV	A
VCP (All 4 sides)	± 2 kV, ± 4 kV	A

**Contact discharge**

Location(EUT)	Applied level (±)	Result (Criterion)
-	-	-

**Air discharge**

Location(EUT)	Applied level (±)	Result (Criterion)
A1 Case	± 2 kV, ± 4 kV, ± 8 kV	A
A2 Button	± 2 kV, ± 4 kV, ± 8 kV	A
A3 Joystick	± 2 kV, ± 4 kV, ± 8 kV	A
A4 USB Port	± 2 kV, ± 4 kV, ± 8 kV	A

## 6.4 Radio Frequency Electromagnetic Fields

Test specification	EN 61000-4-3:2006+A1:2008, Criteria : A				
Tested frequency	80 MHz ~ 1 GHz				
Test level & Modulation	3 V/m, 80 % Amplitude Modulation (1 kHz)				
Frequency Step	log 1 % step				
Dwell time	3 s				
Distance	3 m from EUT to tip of antenna				
Testing Voltage	230 V, 50 Hz				
Test facility	Fully anechoic chamber (3 m)				
Date	2012. 04. 10				
Temperature(°C)	23 °C	Humidity (% R.H.)	41 % R.H.	Pressure (kPa)	100.1 kPa
Remarks	Complied - A: There was no change of operation status during above testing.				

### 6.4.1 Measurement procedure

The test was performed at 3 m full anechoic chamber.

For floor standing equipment, the EUT was standing on the floor.

For tabletop equipment, the EUT was located on a wooden table 0.8 m above the floor.

The EUT was tested all sides, horizontal and vertical polarization.

#### 6.4.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Power meter	PM2002	302852	AR	2012.04.11	<input checked="" type="checkbox"/>
Power sensor	PH2000	303224	AR	2012.04.11	<input checked="" type="checkbox"/>
Power sensor	PH2000	303222	AR	2012.04.11	<input checked="" type="checkbox"/>
Directional coupler	DC6180	303976	AR	2012.04.11	<input checked="" type="checkbox"/>
Signal generator	E4421B	GB40052295	AGILENT	2012.10.12	<input checked="" type="checkbox"/>
Amplifier	150W1000M2	303843	AR	2012.04.11	<input type="checkbox"/>
Amplifier	BBA100	100996-1	R&S	2013.02.07	<input checked="" type="checkbox"/>
Broadband Ant.	LPDA-0803	130269	ETS	-	<input checked="" type="checkbox"/>
Fiber Optic Modem	HI-4413P	-	ETS- LINDGREM	-	<input checked="" type="checkbox"/>
Antenna master	-	-	ETS	-	<input checked="" type="checkbox"/>

#### 6.4.3 Photographs of test setup



6.4.4 Measurement result

Location(EUT)	Antenna polarization	Result (Criterion)
Front side	Horizontal	A
	Vertical	A
Rear side	Horizontal	A
	Vertical	A
Left side	Horizontal	A
	Vertical	A
Right side	Horizontal	A
	Vertical	A

## 6.5 Electric Fast Transient/BURST

Test specification	EN 61000-4-4:2004+A1:2010, Criteria : B				
Coupling	<input checked="" type="checkbox"/> AC main <input type="checkbox"/> Signal: Clamp <input type="checkbox"/> Telecommunication: Clamp				
Test level	<input checked="" type="checkbox"/> AC main: $\pm 1$ kV Peak <input type="checkbox"/> Signal: $\pm 0.5$ kV Peak <input type="checkbox"/> Telecommunication: $\pm 0.5$ kV Peak				
Repetition frequency	5 kHz, Tr/Th = 5 / 50 ns				
Coupling time	60 s				
Testing Voltage	230 V, 50 Hz				
Test facility	Shielded room				
Date	2012. 04. 11				
Temperature(°C)	22 °C	Humidity (% R.H.)	39 % R.H.	Pressure (kPa)	100.0 kPa
Remarks	Complied - A: There was no change of operation status during above testing.				

### 6.5.1 Measurement procedure

A ground reference plane was located on the floor.

EFT generator was connected to reference ground plane via low impedance connection.

For floor standing equipment, EUT was placed on a 0.1 m wooden table.

For tabletop equipment, EUT was placed on a 0.1 m above the ground reference plane.

Test generator and coupling/decoupling network was placed on, and bounded to, the ground reference plane. When using the coupling clamp, the minimum distance between the coupling plates and all other conductive surfaces, except the ground reference plane beneath the coupling clamp, Shall be 0.5 m.

### 6.5.2 Used equipments

Equipment	Model No.	Serial No.	Makers	Next Cal. date	Used
Generator	UCS 500 M6	0701-03	EM TEST	2012.06.14	<input checked="" type="checkbox"/>
Capacitive Coupling Clamp	-	-	EM TEST	-	<input type="checkbox"/>

### 6.5.3 Photographs of test setup



### 6.5.4 Measurement result

\* AC main

EFT coupling point	(+)	(-)	Result (Criterion)
L+N+PE	+ 1 kV	- 1 kV	A

\* Signal

EFT coupling point	(+)	(-)	Result (Criterion)
-	-	-	-

\* Telecommunication

EFT coupling point	(+)	(-)	Result (Criterion)
-	-	-	-

## 6.6 Surge

Test specification	EN 61000-4-5:2006, Criteria : B				
Coupling	<input checked="" type="checkbox"/> AC main: Direct <input type="checkbox"/> Signal: Direct / CDN				
Test level	<input checked="" type="checkbox"/> AC main: <input checked="" type="checkbox"/> Differential mode: ± 0.5 kV, ± 1 kV <input checked="" type="checkbox"/> Common mode: ± 0.5 kV, ± 1 kV, ± 2 kV <input type="checkbox"/> Signal: ± 0.5 kV, ± 1 kV				
Coupling Impedance	<input checked="" type="checkbox"/> Differential mode: 18 $\mu$ F <input type="checkbox"/> 40 $\Omega$		<input checked="" type="checkbox"/> Common mode: 10 $\Omega$ + 9 $\mu$ F <input type="checkbox"/> Direct		
Surge pulse shape	Tr/Th = 1.2 / 50 $\mu$ s				
Angles	0°, 90°, 180°, 270°				
Number of surge	5				
Coupling time	1 min				
Testing Voltage	230 V, 50 Hz				
Test facility	Shielded room				
Date	2012. 04. 11				
Temperature(°C)	22 °C	Humidity (% R.H.)	39 % R.H.	Pressure (kPa)	100.0 kPa
Remarks	Complied - A: There was no change of operation status during above testing.				

### 6.6.1 Measurement procedure

A ground reference plane was located on the floor. SURGE generator was connected to reference ground plane via low impedance connection. For floor standing equipment & table top equipment, EUT was placed on a wooden table.

### 6.6.2 Used equipments

Equipment	Model No.	Serial No.	Makers	Next Cal. date	Used
Generator	UCS 500 M6	0701-03	EM TEST	2012.06.14	<input checked="" type="checkbox"/>
CDN	CNV 508 S1	0302-01	EM TEST	-	<input type="checkbox"/>

### 6.6.3 Photographs of test setup



### 6.6.4 Measurement result

\* AC main

Coupling point	(+)	(-)	Result (Criterion)
L+N	+ 0.5 kV, + 1 kV	- 0.5 kV, - 1 kV	A
L+PE	+ 0.5 kV, + 1 kV, + 2 kV	- 0.5 kV, - 1 kV, - 2 kV	A
N+PE	+ 0.5 kV, + 1 kV, + 2 kV	- 0.5 kV, - 1 kV, - 2 kV	A

\* Signal

Coupling point	(+)	(-)	Result (Criterion)
-	-	-	-



## 6.7 Conducted Immunity

Test specification	EN 61000-4-6:2009, Criteria : A				
Tested frequency	0.15 MHz ~ 80 MHz				
Test level & Modulation	3 V, 80 % Amplitude Modulation (1 kHz)				
Frequency Step	log 1 % step				
Coupling method	<input checked="" type="checkbox"/> AC main: CDN(M3) <input type="checkbox"/> Signal: Clamp <input type="checkbox"/> Telecommunication: Clamp				
Testing Voltage	230 V, 50 Hz				
Test facility	Shielded room				
Date	2012. 04. 11				
Temperature(°C)	22 °C	Humidity (% R.H)	39 % R.H	Pressure(kPa)	100.0 kPa
Remarks	Complied - A: There was no change of operation status during above testing.				

### 6.7.1 Measurement procedure

A ground reference plane was located on the floor.

The test was performed on a ground reference plane on a 0.1 m wooden table. This test were Performed using CDN for mains, clamp for signal and injection probe. The frequency range was swept from 0.15 MHz to 80 MHz. This frequency range was Modulated with 1 kHz sine wave at 80 %.

The signal generators provided the modulated frequency at a 1 % step size.

The power and all network cable, I/O cables longer than 3 m length were tested.

### 6.7.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
CS generator	NSG 2070	1054	Schaffner	2013.03.23	<input checked="" type="checkbox"/>
CDN	M016	16674	Schaffner	2013.03.22	<input checked="" type="checkbox"/>
CDN	CDN M2/M3N	0111-04	EM TEST	2013.02.07	<input checked="" type="checkbox"/>
Attenuator	INA2070-1	2054	Schaffner	2013.03.22	<input checked="" type="checkbox"/>
EM Clamp	KEMZ 801	17643	Schaffner	2012.04.25	<input type="checkbox"/>
Current probe	MD720	W1345167/M6/ 0068	Schaffner	-	<input type="checkbox"/>

### 6.7.3 Photographs of test setup



### 6.7.4 Measurement result

\* AC main

Coupling point	Coupling method	Result (Criterion)
Power	CDN(M3)	A

\* Signal

Coupling point	Coupling method	Result (Criterion)
-	-	-

\* Telecommunication

Coupling point	Coupling method	Result (Criterion)
-	-	-

## 6.8 Dips and Interruptions

Test specification	EN 61000-4-11:2004 , Criterion: B or C				
Number of dips	3 T				
Duration	10 s				
Phase	Zero crossing (0 °, 180 ° )				
Testing Voltage	230 V , 50 Hz				
Test facility	Shielded room				
Test Date	2012. 04. 11				
Temperature (°C)	22 °C	Humidity (% R.H)	39 % R.H	Pressure (kPa)	100.0 kPa
Remarks	Complied				

### 6.8.1 Measurement procedure

The dips/interruption test is only applicable to AC mains.

The dips/interruptions were applied at zero crossing.

### 6.8.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Generator	UCS 500 M6	0701-03	EM TEST	2012.06.14	<input checked="" type="checkbox"/>

### 6.8.3 Photographs of test setup



### 6.8.4 Measurement result

\* 230 V , 50 Hz

Test Level (%UT)	Dip/Int. (%UT)	Duration /Period	Angle (°)	Count number	Result
0 %	100 %	0.5 Period	0 / 180	3T	A
70 %	30 %	25 Period	0	3T	A
0 %	100 %	250 Period	0	3T	C

**Comment:**

- A: There was no change of operation status during above testing. (0.5 Period, 25 Period)
- C: The power of PC & EUT is off during the interruption test. After the test,

When PC is rebooting, the EUT is also getting back to normal operation (250 Period)

## 7. E.U.T. photographs

### Front View



### Rear View





Left View



Right View



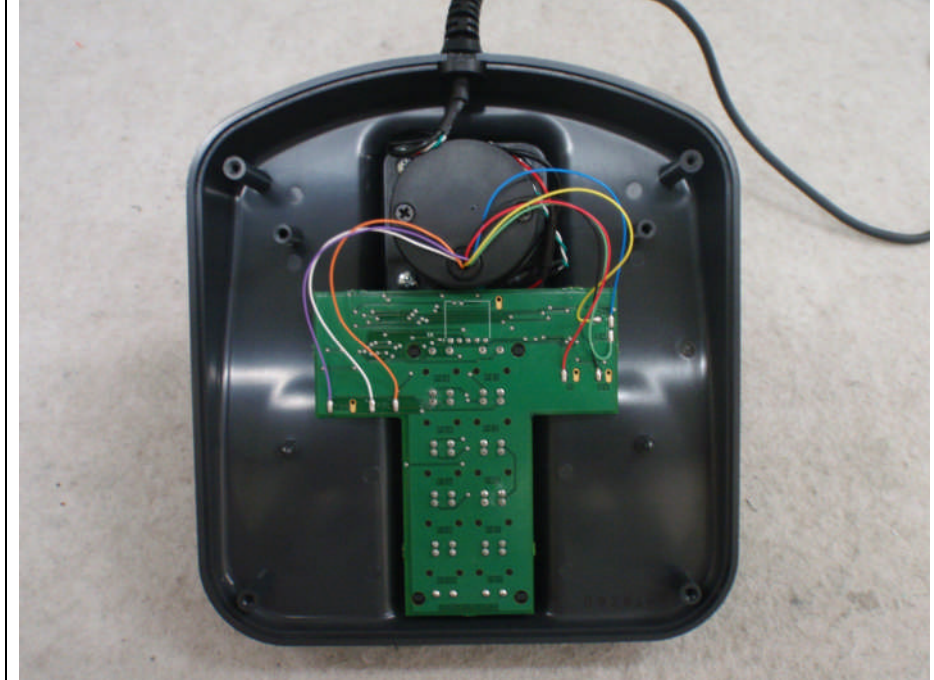
Top View



Bottom View



Inside





Main Board

