



DECLARATION OF CONFORMITY

Manufacturer's Name: Korea Heating Co., Ltd.

Manufacturer's Address: #975-89, Janglim-Dong, Saha-Gu, Busan, Korea (Zip Code : 604-040)

Declares that the product:

Product Name: Hot-Film

Model Number: KH-500

Product Options: All

Conforms to the following Product Specifications:

Emissions: EN55014-1:2000, +A1:2001, +A2:2002

Immunity: EN55014-2:1997, +A1:2001

Low Voltage Directive EN60335-1:2002 +A11/+A12
EN60335-45:2002

Supplementary Information:

The product herewith complies with the requirements of the EMC Directive 2004/108/EC.

Country: _____

Signature: _____

Date: _____

Name/Position: _____

European Contact (for regulatory topics only):

CE CONFORMANCE VERIFICATION

NOT TRANSFERABLE

CE CONFORMANCE VERIFICATION hereby issued to the named Applicant and is VALID ONLY for the equipment identified hereon for use under the rules and regulations listed below:

Applicant's Name: Korea Heating Co., Ltd.
Applicant's Address: #975-89, Janglim-Dong, Saha-Gu, Busan, Korea
(Zip Code : 604-040)
Manufacturer's Name: Same as above
Manufacturer's Address: Same as above
Product Description: Hot-Film
Model Number: KH-500
Serial Number: Prototype
Applicable Regulation: EC Council Directive 2004/108/EC
EN55014-1:2000, +A1:2001, +A2:2002
EN55014-2:1997, +A1:2001

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s) as described in the attached test report.

TESTED and CERTIFIED by:

Korea Standard Quality Laboratories

KSQ Bldg., #23-123,

Daebang-Dong, Dongjak-Gu,

Seoul 156-807, KOREA

Tel: +822-827-0005 Fax: +822-824-5642

Date: October 07, 2008

Report Number KSQ-CE081005

Authorized Signature:


Sung Goo Kim / President

Report Number : KSQ-CE081005

CE CONFORMANCE TEST REPORT EMC DIRECTIVE 2004/108/EC

EN55014-1:2000, +A1:2001, +A2:2002, EN55014-2:1997, +A1:2001

for

Korea Heating Co., Ltd.

#975-89, Janglim-Dong, Saha-Gu, Busan, Korea (Zip Code : 604-040)

on the

**Hot-Film
KH-500**

Issued Date : October 07, 2008
Report Number : KSQ-CE081005

Prepared By:

Test Date: October 03, 2008

Test Engineer: Jae Ju, Lee

Printed Name

Signature

Compliance Engineer: Young Cheon, Kim

Printed Name

Signature



Korea Standard Quality Laboratories

Testing Laboratories for EMC and Safety Compliance

#102, Jangduk-Dong, Hwasung-City, Gyeonggi-Do, KOREA

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1. General Information

1.1 Introduction

The EMC Test Report for CE Declaration of Conformity is prepared on behalf of named applicant in accordance with the EMC Directive (2004/108/EC) of the European Economic Community. The test results reported in this document relate only to the item that was tested.

All measurements contained in this report were conducted in accordance with

CISPR14-1/EN55014-1:2000, +A1:2001, +A2:2002 Publication Electromagnetic compatibility –

Requirements for household appliances, electric tools and similar apparatus. The instrumentation utilized for the measurements conforms with CISPR16 Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. Calibration checks are performed yearly on the instruments by a local calibration laboratories.

All radiated emission, conducted emission and immunity measurements required by the EMC Directive were performed manually at Korea Standard Quality Laboratories (hereinafter called KSQ), #102, Jangduk-Dong, Hwasung-City, Gyeonggi-Do, KOREA. The radiated emission measurements performed on 10 meter, Open Area Test Site, test range maintained by KSQ. Complete ANSI63.4 description and site attenuation measurement data records are maintained at the test facility and have been placed on file with the Federal Communications Commission. The power line conducted emission and immunity measurements were performed in a shielded enclosure and/or semi-anechoic chamber also located at the same facility. The KSQ EMC test facilities in Hwasung-City are designated testing laboratory according to ISO/IEC 17025 by Radio Research Laboratory (RRL), Ministry of Information and Communication.

1.2 Product Description for Equipment Under Test (EUT)

GlobalCentury Co., Ltd.'s .Hot-Film, Model No: KH-500, or the "EUT" as referred to turn on the power of requirements and let the EUT work in test mode(max load) and test it.

Main Specifications of EUT are:

- Rate voltage : AC 220V 50Hz / 60Hz
- Product Size : 980(width) × 780(length) × 15(height) (in mm)
- Weight : 1.90kg

EMC TEST REPORT



Report Number : KSQ-CE081005

1.3 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
Hot-Film	KH-500	none	Korea Heating Co., Ltd.	EUT

1.4 Internal Components

Description	Model Number	Serial Number	Manufacturer	Remarks
N/A	N/A	N/A	N/A	N/A

1.5 External I/O Cabling

Description	Length (m)	Port/From	Port/To	Remarks
N/A	N/A	N/A	N/A	N/A

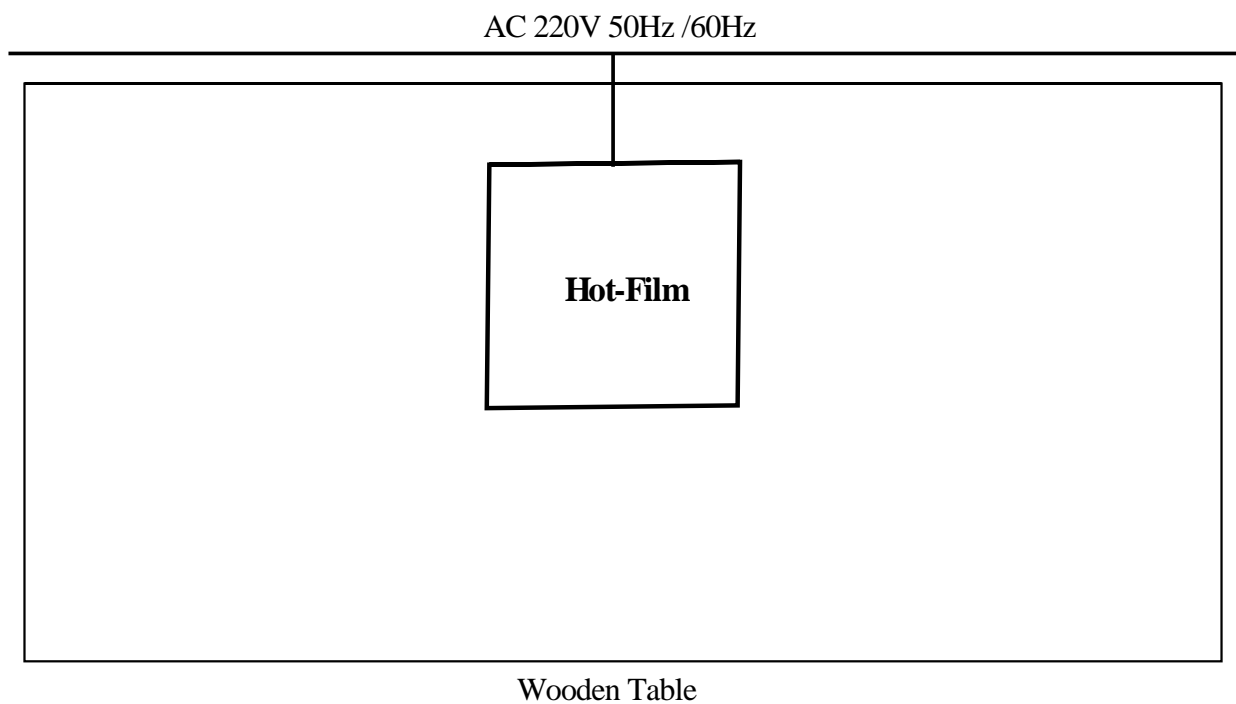
1.6 Special Accessories

As shown in section 1.8, all interface cables used for compliance testing are unshielded as normally supplied or by use respective component manufacturers.

1.7 EUT Modifications

No modifications were made to the EUT in order to achieve and maintain compliance to the standards described in this report.

1.8 Configuration of Test System

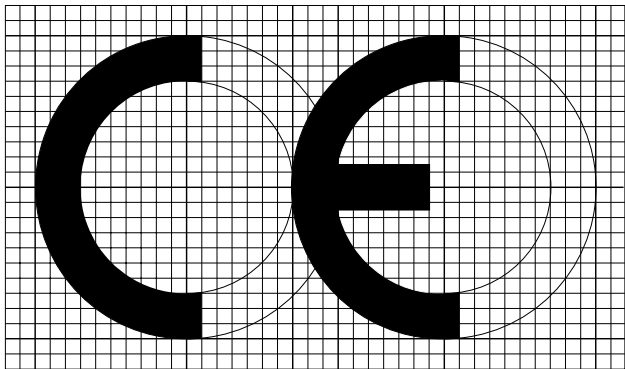


2. Product Labelling Requirements

2.1 CE Mark

The CE Conformity Marking must consist of the initials "CE" in the stylized font and proportional to the dimensional requirements shown in following figure. Regardless of its size, the symbol must retain the specified proportionality.

The Various components of the CE Marking must have substantially the same vertical dimensions, and shall not be less than 5mm in height.



Radius of Outer Circle	100units
Radius of Inner Circle	70units
Stroke Width	30units
Length of Bar	85units
Axis to Axis	170units
Minimum Height	5.0mm

3. Applicable Regulations

3.1 Emission

EN55014-1:2000, +A1:2001, +A2:20002/CISPR14-1 are the applicable regulations that apply to Electromagnetic compatibility Requirements for household appliances, electric tools and similar apparatus Part 1:Emission. The intention of these standards, is to establish uniform requirements for the radio disturbance level of the equipment contained in the scope, to fix limits of disturbance, to describe method of measurement and to standardize operation conditions and interpretation of the results.

EN61000-3-2:1995 A1, A2:2006 and EN61000-3-3:1995+A1:2001 +A2:2005 is applicable to electrical and electronic equipment having an input current up to and including 16A per phase, and intended to be connected to public low-voltage distribution systems. The standard specifies limits of voltage fluctuations and maximum permissible values of harmonics components of the input current.

EN55014-1:2000, +A1:2001, +A2:20002/CISPR14-1 defines Electromagnetic compatibility as follows:

- a. It includes such equipment as: household electrical appliances, electric tools, regulating controls using semiconductor devices, motor-driven electro-medical apparatus, electric/electronic toys, automatic dispensing machines as well as cine or slide projectors.
- b. Excluded from the scope of this standard are: apparatus for which all emission requirements in the radio frequency range are explicitly formulated in other IEC or CISPR standards;

3.2 Immunity

EN55014-2:1997, +A1:2001 is the Electromagnetic compatibility –Requirements for household appliances, electric tools and similar apparatus –Part 2: Immunity – Product family standard. Immunity requires the following as specific performance criteria:

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

No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. 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 from what the user may reasonably expect from the apparatus if used as intended.

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

No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is

used as intended. During the test, degradation of performance is allowed, however. No change of actual operating state or stored data is allowed. 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 from what the user may reasonably expect from the apparatus if used as intended.

- C: Temporary loss of function is allowed, provided the function is selfrecoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

Testing was performed using procedures and criteria contained in EN61000-4-2:1995; +A1:1998, EN61000-4-3:1996, EN61000-4-4:1995, EN61000-4-5:1995, EN61000-4-6:1996, EN61000-4-11:1994

4. Test Performed

4.1 Powerline Conducted Emission Measurements (EN55014-1:2000, +A1:2001, +A2:2002)

4.1.1 Test Description

The power line conducted emission measurements were performed in a shielded enclosure, using the setup in accordance with ANSI C63.4/CISPR Pub 14-1 conducted emission measurement procedure.

4.1.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
EMI TEST Receiver	LIG NEX1	LSA-265	L7098003	12, 2008
LISN1	Electro Metrics	ANS-25/2	2535	09, 2008
LISN2	Kyoritsu	KNW-407	8-1010-14	09, 2008

4.1.3 Test Environments

Ambient Temperatures : 15~35℃

Relative Humidity : 40~60%

4.1.4 Test Limits

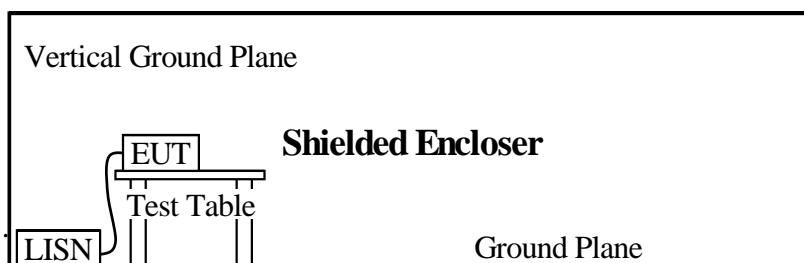
Frequency (MHz)	EN55014-1:2000, +A1:2001, +A2:2002			
	At mains terminals (dBuV)		At load terminals and additional terminals (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.50	66.0 to 56.0	56.0 to 46.0	80.0	70.0
0.50 to 5.00	56.0	46.0	74.0	64.0
5.00 to 30.00	60.0	50.0	74.0	64.0

4.1.5 Test Procedure

The conducted emission levels were measured on each current-carrying line with the EMI TEST Receiver operating in the CISPR quasi-peak mode (or peak mode if applicable). The receiver's 6dB bandwidth was set to 9kHz. The initial step in collecting conducted data is a EMI TEST Receiver peak scan of the measurement range. If the conducted emission exceed the average limit with the instrument set to the quasi-peak mode, the measurements are made in the average mode. The emission Receiver was scanned from 150kHz to 30MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded. Quasi-peak readings are distinguished with a "QP".

The conducted emission test was performed with the EUT exercise program loaded, and the emissions were scanned between 150kHz to 30MHz on the HOT side and NEUTRAL side, herein referred to as H and N, respectively

4.1.6 Test Configuration



4.1.7 Test Results

According to the data in section 4.1.8, the EUT complied with the EN55014-1:2000, +A1:2001, +A2:2002 standards, and had the worst margin reading of:

8.9dB at 0.57MHz in the HOT side and 9.0dB at 0.65MHz in the NEUTRAL side.

EUT is take the test max normal load operation conditions

4.1.8 Test Data

Line Conducted Emission				EN55014-1:2000, +A1:2001, +A2:2002 At mains terminals		
Frequency (MHz)	Amplitude (dBuV)	Phase Hot/Neutral	Detector QP/AV/PK	Applicable Limit		Quasi-peak Margin (dB)
				Quasi-peak (dBuV)	Average (dBuV)	
0.18	37.11	N	QP	64.5	54.48	27.4
0.19	41.18	H	QP	64.0	54.03	22.8
0.28	31.91	N	QP	60.8	50.81	28.9
0.38	38.12	H	QP	58.3	48.27	20.2
0.44	44.42	H	QP	57.1	47.06	12.7
0.47	42.45	N	QP	56.5	46.51	14.1
0.57	47.09	H	QP	56.0	46.0	8.9
0.65	47.01	N	QP	56.0	46.0	9.0
1.03	46.60	H	QP	56.0	46.0	9.4
1.32	45.71	N	QP	56.0	46.0	10.3
2.92	44.07	N	QP	56.0	46.0	11.9
3.92	41.94	H	QP	56.0	46.0	14.1
5.58	38.04	H	QP	60.0	50.0	22.0
5.66	37.75	N	QP	60.0	50.0	22.3
10.46	36.93	N	QP	60.0	50.0	23.1
10.52	37.37	H	QP	60.0	50.0	22.6
19.33	36.31	N	QP	60.0	50.0	23.7
19.54	35.07	H	QP	60.0	50.0	24.9

PK = Peak; QP = Quasi-peak; AV = Average

Temperature: 25 °C Humidity: 44 % Test Date: October 03, 2008 Tested by: Jae Ju, Lee

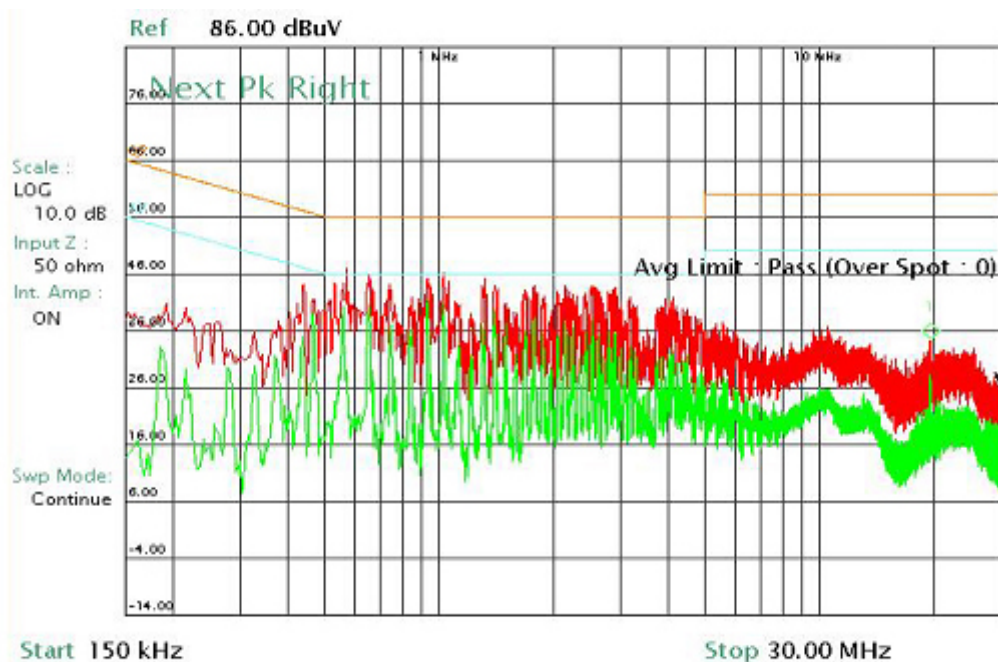
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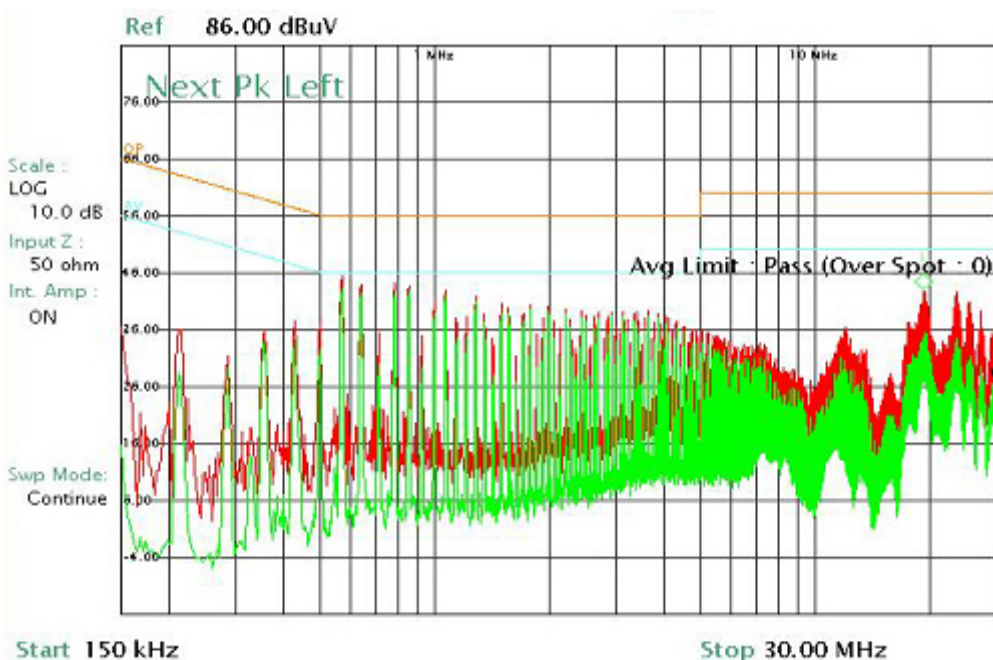
Report Number : KSQ-CE081005

4.1.9 Plots of Test Data

Polarization: HOT



Polarization: NEUTRAL



4.2 Radiated Emission Measurements (EN55014-1:2000, +A1:2001, +A2:2002)

4.2.1 Test Description

The radiated emission measurements were performed on the Open Area Test Site, using the setup in accordance with EN55014-1:2000, +A1:2001, +A2:2002 radiated emission measurement procedure.

4.2.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
EMI TEST Receiver	LIG NEX1	LSA-265	L7098003	12, 2008
Biconical Antenna	Electro Metrics	BIA-30S	164	04, 2010
Log Periodic Antenna	Electro Metrics	LPA-30	387	01, 2010

4.2.3 Test Environments

Ambient Temperatures : 15~35°C

Relative Humidity : 40~60%

4.2.4 Test Limits

Frequency (MHz)	EN55014-1:2000, +A1:2001, +A2:2002
30 to 230	30.0
230 to 1000	37.0

4.2.5 Test Procedure

Before final measurements of radiated emission were made on the OATS, the EUT was scanned in semi-anechoic chamber in order to determine its emission spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emission in amplitude, direction and frequency. This process was repeated during final radiated emission measurements on the OATS range, at each frequency, in order to ensure that maximum emissions amplitudes were attained.

The radiated emission test was performed with EUT exercise program loaded, and the emissions were scanned between 30 to 1000MHz using the spectrum analyzer. The EMI TEST Receiver's 6dB bandwidth was set to 120kHz, and the receiver was operated in the CISPR quasi-peak detection mode.

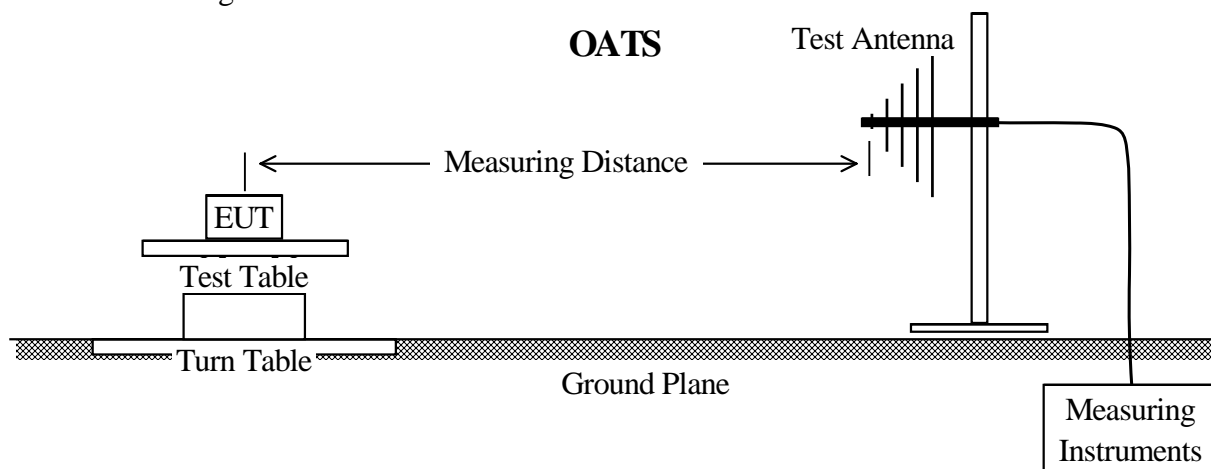
Measurements were taken using both HORIZONTAL and VERTICAL antenna polarization, herein referred to as H and V, respectively.

4.2.6 Field Strength Calculation

The Field Strength (FS) is calculated by adding the Antenna Factor (AF) and Cable Factor (CF) from the Measured Reading (MR). The basic equation with a sample calculation is as follows:

$$FS(dBuV/m) = MR(dBuV) + [AF(dB/m) + CF(dB)]$$

4.2.7 Test Configuration



4.2.8 Test Results

N/A

Radiated disturbance requirements in this standard are restricted to toys.

4.2.9 Test Data

Indicated		Antenna		Correction Factor		Corrected Amplitude	EN55014-1:2000, +A1:2001, +A2:2002		
Frequency (MHz)	Amplitude (dBuV/m)	Polar. (H/V)	Height (m)	Ant. (dB)	Cable (dB)	(dBuV/m)	Applicable Limit		Margin (dB)
							(dBuV/m)	(uV/m)	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Temperature:

Humidity:

Test Date:

Tested by:

4.3 Disturbance power test

4.3.1 Test Description

The disturbance power test measurements were performed in a shielded enclosure, using the setup in accordance with EN55014-1:2000, +A1:2001, +A2:2002 disturbance power test procedure.

4.3.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
EMI TEST Receiver	LIG NEX1	LSA-265	L7098003	12, 2008
Absorbing Clamp	Rohde & Schwarz	MDS-21	100017	09, 2008

4.3.3 Test Environments

Ambient Temperatures : 15~35°C

Relative Humidity : 40~60%

4.3.4 Test Limits

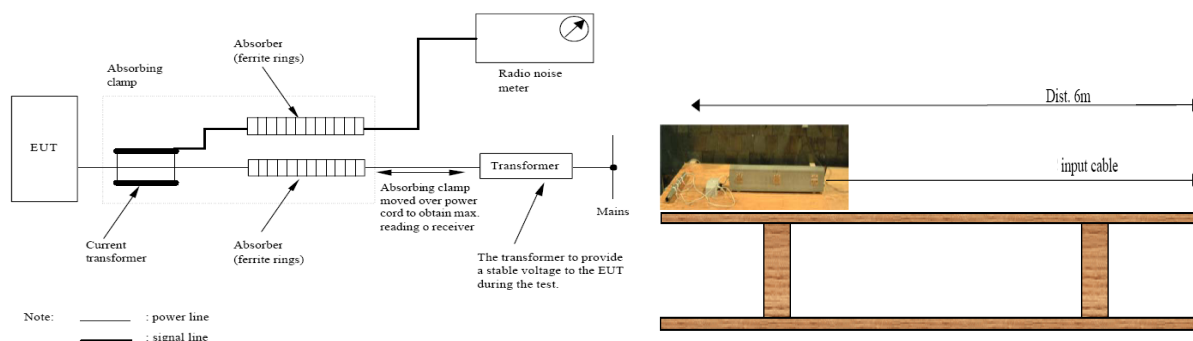
1	Household and similar appliances		Tools					
	2	3	4	5	6	7	8	9
Frequency range			Rated motor power not exceeding 700 W		Rated motor power above 700 W and not exceeding 1 000 W		Rated motor power above 1 000 W	
(MHz)	dB (pw) Quasi-peak	dB (pw) Average*	dB (pw) Quasi-peak	dB (pw) Average*	dB (pw) Quasi-peak	dB (pw) Average*	dB (pw) Quasi-peak	dB (pw) Average*
30 to 300	Increasing linearly with the frequency from :							
	45 to 55	35 to 45	45 to 55	35 to 45	49 to 59	39 to 49	55 to 65	45 to 55
* if the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.								

4.3.5 Test Procedure

The EUT is placed on the ground and away from other metallic surface at least 0.4m. It is connected to power mains through an extension cord of 6m min. The absorber clamp clamps the cord and moves from the far end to the EUT to measure the disturbing energy emitted the cord.

The bandwidth of the test receiver(R&S ESCS30) is set at 120KHz

4.3.6 Test Configuration



4.3.7 Test Results

According to the data in section 4.3.8, the EUT complied with the EN55014-1:2000, +A1:2001, +A2:2002 standards, and had the worst margin reading of: 10.2dB at 46.8MHz in the power line

EUT is take the test max normal load operation conditions

4.3.8 Test Data

Disturbance power test			EN55014-1:2000, +A1:2001, +A2:2002 At mains terminals		
Frequency (MHz)	Amplitude (dBuV)	Detector QP/AV/PK	Applicable Limit		Quasi-peak Margin (dB)
			Quasi-peak (dBuV)	Average (dBuV)	
46.8	35.2	QP	45.4	35.4	10.2
78.8	36.1	QP	46.4	36.4	10.3
98.5	36.2	QP	46.8	36.8	10.6
108.4	34.6	QP	47.4	37.4	12.8
134.6	36.4	QP	48.2	38.2	11.8
150.8	37.5	QP	49.2	39.2	11.7
165.7	35.3	QP	49.8	39.8	14.5
190.7	37.4	QP	50.6	40.6	13.2
202.7	34.2	QP	51.2	41.2	17.0
229.0	36.2	QP	52	42.0	15.8
251.6	35.1	QP	52.8	42.8	17.7
286.2	34.6	QP	53.4	43.4	18.8

PK = Peak; QP = Quasi-peak; AV = Average

Temperature: 25 °C Humidity: 44 % Test Date: October 03, 2008 Tested by: Jae Ju, Lee

4.4 Electrostatic Discharge Immunity Measurements (EN61000-4-2:1995; +A1:1998)

4.4.1 Test Description

IEC Publications EN61000-4-2:1995; +A1:1998, Electromagnetic Compatibility Part 4: Testing and Measurement Techniques Section 2: Electrostatic Discharge Immunity Test, was the guiding document for this test.

4.4.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
EMC Simulator	Schaffner-Chase	Best EMC V2.3	199930-013SC	09, 2008
ESD Gun	Schaffner-Chase	Best ESD	642	09, 2008

4.4.3 Test Environment

Ambient Temperatures :	15~35℃
Relative Humidity :	40~60%
Atmospheric Pressure :	860~1060mbar

4.4.4 Test Levels

Discharge Impedance :	330Ω ±10% / 150pF ±10%
Type of Discharge :	Direct - <input type="checkbox"/> Air Discharge(2/4/8 kV) <input type="checkbox"/> Contact Discharge(2/4 kV) Indirect - <input checked="" type="checkbox"/> HCP Discharge(2kV, 4kV) <input checked="" type="checkbox"/> VCP Discharge(2kV, 4kV)
Polarity of Output Voltage :	Positive and Negative
Discharge Repetition Rate :	1/sec
Number of Discharges :	more than 10 times
Performance Criteria :	B

4.4.5 Test Procedure

Contact discharge is the preferred test method. 20 discharges (10 with positive and 10 with negative polarity) shall be applied on each accessible metal part of the enclosure. In case of a non-conductive enclosure, discharges shall be applied on the horizontal or vertical coupling planes as specified in IEC 61000-4-2. Air discharges shall be used where contact discharges cannot be applied. Tests with other (lower) voltages than those given in table 4.4.4 are not required.

The test was conducted in the following order: Air Discharge, Direct Contact Discharge. The electrostatic discharge test levels were set and discharges for the different test modes were set appropriately. The electrostatic discharge is applied to the conductive surface of the EUT, and along all seams and control surfaces on the EUT. When a discharge occurs and an error is caused, the type of error, discharge level and location is recorded.

4.4.6 Test Results

There are no any problem during this test.

According to the data in section 4.4.7, the EUT complied with the EN61000-4-2:1995; +A1:1998 standards, and detailed test results are found in the following test data. Direct discharge is not exist to air and contact discharge point.

There is not exist Direct Discharge point. It was not tested Direct Discharge.
It was tested Indirect Discharge.

4.4.7 Test Data

Indirect Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Criteria	Results	
1	VCP	Contact discharge	B	A	-
2	HCP	Contact discharge	B	A	-

Direct Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Criteria	Results	
1	-	-	-	-	-
2	-	-	-	-	-
3	-	-	-	-	-
-	-	-	-	-	-

Performance Results

- A: Normal performance within the specification limits.
- B: Temporary degradation or loss of function or performance which is self-recoverable.
- C: Temporary degradation or loss of function or performance which requires operator intervention or system reset.
- D: Degradation or loss of function which is not recoverable due to damage or equipment.

Temperature: 25 °C Humidity: 44 % Test Date: October 03, 2008 Tested by: Jae Ju, Lee

4.5 Radiated RF-Electromagnetic Fields Immunity Measurements (EN61000-4-3:1996)

4.5.1 Test Description

IEC Publication EN61000-4-3:1996, Electromagnetic Compatibility Part 4: Testing and Measurement Techniques Section 3: Radiated Radio Frequency Electromagnetic Fields Immunity Test, was the guiding document for this test.

4.5.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
Signal Generator	IFR Limited	2023A	202301/794	09, 2008
Power Amplifier	IFR Limited	CBA9413A	4008	09, 2008
RF Switch	IFR Limited	HF-Schaltfeld	15098	09, 2008
RF Power Amplifier	Ophir Amplifiers	GRF5048	1010	09, 2008
RF Power Meter	Boonton	4232A	33601	09, 2008
Power Sensor	Boonton	51011-EMC	30696	09, 2008
Electric Field Probe	Wandel & Goltermann	EMC-20	U-0014	09, 2008
Electric Field Sensor	Wandel & Goltermann	TYP-8	S-0039	09, 2008
Bilog Antenna	Schaffner-Chase	CBL6140A	1163	05, 2010

4.5.3 Test Environments

Ambient Temperatures :	15~35℃
Relative Humidity :	40~60%
Atmospheric Pressure :	860~1060mbar

4.5.4 Test Levels

Frequency Range :	80MHz to 1000MHz
Field Strength :	3V/m
Amplitude Modulation :	80% AM in depth by a 1kHz sine wave
Distance of ANT-EUT :	3 meters
Antenna Polarity :	Horizontal and Vertical
Frequency Step :	1%
Performance Criteria :	B

4.5.5 Test Procedures

The EUT is set into operation and was monitored for variations in performance. The test signal start frequency (80MHz) and stop frequency (1000MHz) were set, including the field strength at 3V/m, 80% AM modulated through immunity test software. The software maintains the necessary field strength through the frequency range, with the transmitting antenna horizontally polarized. If an error is detected, the field is reduced until the error is not repeatable, the field is then manually increased until the error begins to occur. This threshold level, the frequency and the error created are noted before continuing. The test is then repeated with vertical polarization, using the same test configuration for all four sides.

4.5.6 Test Results

According to the data in section 4.5.7, the EUT complied with the EN61000-4-3:1996 standards, and detailed test results are found in the following test data and EUT is take the test max normal load operation conditions

4.5.7 Test Data

No.	Test Point	Performance Criteria	Performance Results		Remarks
			Horizontal	Vertical	
1	Front	B	A	A	-
2	Rear	B	A	A	-
3	Right Side	B	A	A	-
4	Left Side	B	A	A	-

Performance Results

- A: Normal performance within the specification limits.
- B: Temporary degradation or loss of function or performance which is self-recoverable.
- C: Temporary degradation or loss of function or performance which requires operator intervention or system reset.
- D: Degradation or loss of function which is not recoverable due to damage or equipment.

Temperature: 25 °C Humidity: 44 % Test Date: October 03, 2008 Tested by: Jae Ju, Lee

4.6 Electrical Fast Transients/Burst Immunity Measurements (EN61000-4-4:1995)

4.6.1 Test Description

IEC Publication EN61000-4-4:1995, Electromagnetic Compatibility Part 4: Testing and Measurement Techniques Section 4: Electrical Fast Transient/Burst Immunity Test, was the guiding document for this test.

4.6.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
EMC Simulator	Schaffner-Chase	Best EMC V2.3	199930-013SC	09, 2008
Coupling Clamp	Schaffner-Chase	CDN125	806	09, 2008

4.6.3 Test Environments

Ambient Temperatures :	15~35℃
Relative Humidity :	40~60%
Atmospheric Pressure :	860~1060mbar

4.6.4 Test Levels

Open Circuit Output Test Voltage :	<input checked="" type="checkbox"/> Power Supply; $\pm 0.5/1/2\text{kV}$ <input type="checkbox"/> Protective Earth(PE) ports; $\pm 0.5/1/2\text{kV}$ <input type="checkbox"/> I/O Signal, Data and Control ports: $0.25/0.5/1\text{kV}$
Repetition Frequency of the Impulses :	5kHz
Polarity :	Positive and Negative
Rise Time of One Pulse :	5ns $\pm 30\%$
Impulse Duration :	50ns $\pm 30\%$
Burst Duration :	15ms $\pm 20\%$
Burst Period :	300ms $\pm 20\%$
Performance Criteria :	B

4.6.5 Test Procedure

The EUT was connected to the test equipment, and monitored for performance. The test level was set and the test signal was applied for 120 seconds. A test signal of $\pm 0.5\text{kV}$ was Coupled to Line and Ground, Neutral and Ground, Line plus Neutral and Ground, and Protective Earth and Ground. When an error occurs, the test level is reduced until the error recovers and then increased until the threshold level is reached. This threshold and the error conditions were noted. This procedure was then repeated for the other coupling modes.

4.6.6 Test Results

There are no any problem during this test.

According to the data in section 4.6.7, the EUT complied with the EN61000-4-4:1995 standards, and detailed test results are found in the following test data. EUT is take the test max normal load operation conditions

4.6.7 Test Data

On AC Power port(Common mode) ports

No.	Test Point	Performance Criteria	Performance Results		Remarks
			+Burst	-Burst	
1	L1	B	A	A	-
2	L2	B	A	A	-
3	L1-L2	B	A	A	-
4	-	-	-	-	-
5	-	-	-	-	-
6	-	-	-	-	-
7	-	-	-	-	-

On I/O Signal, Data and Control ports

No.	Test Point	Performance Criteria	Performance Results		Remarks
			+Burst	-Burst	
1	N/A	N/A	N/A	N/A	-
2	N/A	N/A	N/A	N/A	-

Performance Results

A: Normal performance within the specification limits.

B: Temporary degradation or loss of function or performance which is self-recoverable.

C: Temporary degradation or loss of function or performance which requires operator intervention or system reset.

D: Degradation or loss of function which is not recoverable due to damage or equipment.

Temperature: 25 °C Humidity: 44 % Test Date: October 03, 2008 Tested by: Jae Ju, Lee

4.7 Surge Immunity Measurements (EN61000-4-5:1995)

4.7.1 Test Description

IEC Publication EN61000-4-5:1995, Electromagnetic Compatibility Part 4: Testing and Measurement Techniques Section 5: Surge Immunity Test, was the guiding document for this test.

4.7.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
EMC Simulator	Schaffner-Chase	Best EMC V2.3	199930-013SC	09, 2008
Coupling Network	Schaffner-Chase	CDN117	262	09, 2008

4.7.3 Test Environments

Ambient Temperatures :	15~35°C
Relative Humidity :	40~60%
Atmospheric Pressure :	860~1060mbar

4.7.4 Test Levels

Open Circuit Test Voltage :	<input checked="" type="checkbox"/> AC Power; $\pm 0.5/1\text{kV}$ line-to-line, <input type="checkbox"/> AC POWER, $\pm 0.5/1/2\text{kV}$ line-to-ground <input type="checkbox"/> DC Power; $\pm 0.5\text{kV}$ line-to-ground <input type="checkbox"/> Data and Control Line; $\pm 1.0\text{kV}$ line-to-ground
Open Circuit Voltage Waveform :	1.2/50 microsecond
Short Circuit Current Waveform :	8/20 microsecond
Number of Tests :	5 positive and 5 negative
Repetition Rate :	1/min
Performance Criteria :	B

4.7.5 Test Procedure

The surges have to be applied line to line and line(s) and ground. In case of testing line to ground the test voltage has to be applied successively between each of the lines and ground, if there is no other specification. All lower levels including the selected test level must be satisfied. For testing the secondary protection the output voltage of the generator must be increased up to the worst case voltage break down level of the primary protection.

4.7.6 Test Results

There are no any problem during this test.

According to the data in section 4.7.7, the EUT complied with the EN61000-4-5:1995 standards, and detailed test results are found in the following test data.

4.7.7 Test Data

On Power Supply, Protective Earth(PE) ports

No.	Test Point	Performance Criteria	Performance Results		Remarks
			+Surge	-Surge	
1	L1-L2	B	A	A	-
2	-	-	-	-	-
3	-	-	-	-	-

On I/O Signal, Data and Control ports

No.	Test Point	Performance Criteria	Performance Results		Remarks
			+Surge	-Surge	
1	N/A	N/A	N/A	N/A	-
2	N/A	N/A	N/A	N/A	-

Performance Results

A: Normal performance within the specification limits.

B: Temporary degradation or loss of function or performance which is self-recoverable.

C: Temporary degradation or loss of function or performance which requires operator intervention or system reset.

D: Degradation or loss of function which is not recoverable due to damage or equipment.

Temperature: 25 °C Humidity: 44 % Test Date: October 03, 2008 Tested by: Jae Ju, Lee

4.8 Conducted Disturbances Induced by Radio Frequency Fields (EN60001-4-6)

4.8.1 Test Descriptions

IEC Publication EN61000-4-6:1996, Electromagnetic Compatibility Part 4: Testing and Measurement Techniques Section 6: Immunity to Conducted Disturbances Induced by Radio Frequency Fields, was the guiding document for this test.

4.8.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
Signal Generator	IFR Limited	2023A	202301/794	09, 2008
Power Amplifier	IFR Limited	CBA9413A	4008	09, 2008
RF Switch	IFR Limited	HF-Schaltfeld	15098	09, 2008
RF Power Amplifier	Ophir Amplifiers	GRF5048	1010	09, 2008
RF Power Meter	Boonton	4232A	33601	09, 2008
Power Sensor	Boonton	51011-EMC	30696	09, 2008
CDN	M3	Schaffner-Chase	14419	09, 2008
CDN	M216	Schaffner-Chase	16401	09, 2008
ISN	T400	Schaffner-Chase	16847	09, 2008
ISN	T200	Schaffner-Chase	19059	09, 2008
EM Clamp	KEMZ801	Schaffner-Chase	14302	10, 2008

4.8.3 Test Environments

Ambient Temperatures :	15~35°C
Relative Humidity :	40~60%
Atmospheric Pressure :	860~1060mbar

4.8.4 Test Levels

Port	AC Power Port
Frequency Range :	150kHz to 230MHz, 150kHz to 80MHz
Voltage Level :	3V
Amplitude Modulation :	80% AM in depth by a 1kHz sine wave
Frequency Step :	1%
Performance Criteria :	B

4.8.5 Test Procedure

The test was 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-ohms load resistor. The frequency range is swept from 150kHz to 80MHz and from 150kHz to 230MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave, pausing to adjust the RF-signal level or to switch coupling device as necessary.

4.8.6 Test Results

According to the data in section 4.8.7, the EUT complied with the EN61000-4-6:1996 standards, and detailed test results are found in the following test data and EUT is take the test max normal load operation conditions

4.8.7 Test Data

AC Power Supply ports

No.	Test Point	Performance		Remarks
		Criteria	Results	
1	L1-L2	B	A	-
2	N/A	B	N/A	-

On I/O Signal, Data and Control ports

No.	Test Point	Performance		Remarks
		Criteria	Results	
1	N/A	B	N/A	-
2	N/A	B	N/A	-

Performance Results

- A: Normal performance within the specification limits.
- B: Temporary degradation or loss of function or performance which is self-recoverable.
- C: Temporary degradation or loss of function or performance which requires operator intervention or system reset.
- D: Degradation or loss of function which is not recoverable due to damage or equipment.

Temperature: 25 °C Humidity: 44 % Test Date: October 03, 2008 Tested by: Jae Ju, Lee

4.9 Voltage Dips and Short Interruptions Immunity Measurements (EN61000-4-11:1994)

4.9.1 Test Descriptions

IEC Publication EN61000-4-11:1994, Electromagnetic Compatibility Part 4: Testing and Measurement Techniques Section 11: Voltage Dips, Short Interruptions and Voltage Variations Immunity Test, was the guiding document for this test.

4.9.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
EMC Simulator	Schaffner-Chase	Best EMC V2.3	199930-013SC	09, 2008

4.9.3 Test Environments

Ambient Temperatures :	15~35°C
Relative Humidity :	40~60%
Atmospheric Pressure :	860~1060mbar

4.9.4 Test Levels

Overshoot/Undershoot of Actual Voltage :	Less than $\pm 5\%$ of the change in voltage
Voltage Rise and Fall Time :	Between 1 and 5 microseconds
Test Voltage :	220V a.c
Test Frequency	50Hz
Frequency Deviation of Test Voltage :	Less than $\pm 2\%$ of rated frequency
Number of Tests :	3 times
Test Intervals :	10 sec
Performance Criteria :	According to the Test data in section 5.5.7

4.9.5 Test Procedure

For each test any degradation of performance were recorded. The monitoring equipment should be capable of displaying the status of the operational mode of the EUT during and after the tests. After each group of tests a full functional check were performed.

4.9.6 Test Results

There are no any problem during this test.

According to the data in section 4.9.7, the EUT complied with the EN61000-4-11:1994 standards, and detailed test results are found in the following test data and EUT is take the test max normal load operation conditions

4.9.7 Test Data

Voltage Dips

No.	Depth	Duration	Performance		Remarks
			Criteria	Results	
1	<60%	200ms	A	A	-
2	<30%	1000ms	A	A	-

Short Interruptions

No.	Depth	Duration	Performance		Remarks
			Criteria	Results	
1	100%	10ms	C	C	-

Performance Results

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

No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. 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 from what the user may reasonably expect from the apparatus if used as intended.

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

No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however. No change of actual operating state or stored data is allowed. 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 from what the user may reasonably expect from the apparatus if used as intended.

C: Temporary loss of function is allowed, provided the function is selfrecoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

Temperature: 25 °C Humidity: 44 % Test Date: October 03, 2008 Tested by: Jae Ju, Lee

4.10 Harmonics / Voltage Fluctuations Measurements (EN61000-3-2:2005.11 / EN61000-3-3:2005.10)

4.10.1 Test Description

EN61000-3-2:1995 A1, A2:2006 and EN61000-3-3:1995+A1:2001 +A2:2005 is applicable to electrical and electronic equipment having an input current up to and including 16A per phase, and intended to be connected to public low-voltage distribution systems. The standard was created to provide limits on the disturbing effect that equipment has on the AC supply. EN61000-3-2:1995 A1, A2:2006 defines limits on the magnitude of the 2nd to the 40th current harmonic created by equipment. EN61000-3-3:1995+A1:2001 +A2:2005 defines limits on the level of voltage fluctuations produced by equipment per Generic Emission Standard EN61000-6-3

4.10.2 Test Environments

Ambient Temperatures :	15~35°C
Relative Humidity :	40~60%
Atmospheric Pressure :	860~1060mbar

4.10.3 Test Procedures

The EUT was installed and placed on a non-conductive table and was connected to the AC power source, 220VAC, via the measuring equipment with its attached AC power cord. All other equipment or peripherals included in the test, and having a separate power supply, are connected to the outlet, supplying 220VAC, 50Hz. A typical configuration is defined in the specification ANSI 63.4 or CISPR22. This ensures the repeatability of the test.

Measuring equipment uncertainty :

Harmonics	± 0.2%
Voltage fluctuation	± 5%

4.10.4 Test Results

There are no any problem during this test.

According to the data in section 5.6.5 and 5.6.6, the EUT complied with the EN61000-3-2:1995 A1, A2:2006 and EN61000-3-3:1995+A1:2001 +A2:2005 standards, and detailed test results are found in the following test data and EUT is take the test max normal load operation conditions

Report Number : KSQ-CE081005

4.10.5 Test Data - Harmonic

N/A

Report Number : KSQ-CE081005

Test Data - Harmonics (continued)

N/A

Report Number : KSQ-CE081005

Test Data - Harmonics (continued)

N/A

Report Number : KSQ-CE081005

4.10.6 Test Data - Voltage Fluctuations

N/A

4.11 Discontinuous disturbance (CLICKS) (EN55014-1:2000, +A1:2001, +A2:2002)

4.11.1 Test Description

Switching operations in thermostatically controlled appliances, automatic programme controlled machines and other electrically controlled or operated appliances generate discontinuous disturbance. The subjective effect of discontinuous disturbance varies with repetition rate and amplitude in audio and video presentation. Therefore distinction is made between various kinds of discontinuous disturbance.

4.11.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
EMI TEST Receiver	LIG NEX1	LSA-265	L7098003	12, 2008
LISN1	Electro Metrics	ANS-25/2	2535	09, 2008
LISN2	Kyoritsu	KNW-407	8-1010-14	09, 2008

4.11.3 Test Environments

Ambient Temperatures : 15~35°C

Relative Humidity : 40~60%

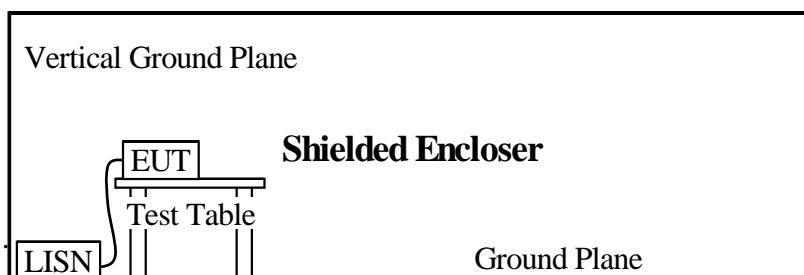
4.11.4 Test Limits

Frequency (MHz)	EN55014-1:2000, +A1:2001, +A2:2002(Quasi-Peak dB μ V)
0.15 to 0.50	66 to 56
0.5 to 5.0	56
5 to 30	60

4.11.5 Test Procedure

A disturbance, the amplitude of which exceeds the quasi-peak limit of continuous disturbance, the duration of which is not longer than 200 ms and which is separated from a subsequent disturbance by at least 200 ms. The durations are determined from the signal which exceeds the i.f. reference level of the measuring receiver. A click may contain a number of impulses; in which case the relevant time is that from the beginning of the first to the end of the last impulse.

4.11.6 Test Configuration



Limit L for household appliances and equipment causing similar disturbances and regulating controls incorporating semiconductor devices at mains terminals

4.11.7 Test Results

There are no any problem during this test.

According to the data in section 4.11.8, the EUT complied with the EN55014-1:2000, +A1:2001, +A2:2002 standards, and The appliance has a program which stops automatically; therefore the observation time is defined and contains more than 40 clicks. If less than 25% of the clicks exceeds the limit the product complies with the limits

Switching operation : One opening or one closing of a switch or contact.

4.11.8 Test Data

Clicks Factor =							
Observation Time =		min					
Line	Freq. MHz	Limit	Total	Click Rate	Relaxation	Relaxed	Permitted
		dBuV	Clicks n	$N=(n*f)/T$	dB	Limit dBuV	Clicks (25%)
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N	Relaxation (dB)
$N < 0.2$	44
$0.2 \leq N < 30$	$20\text{Log}(30/N)$
$N > 30$	0

Temperature:

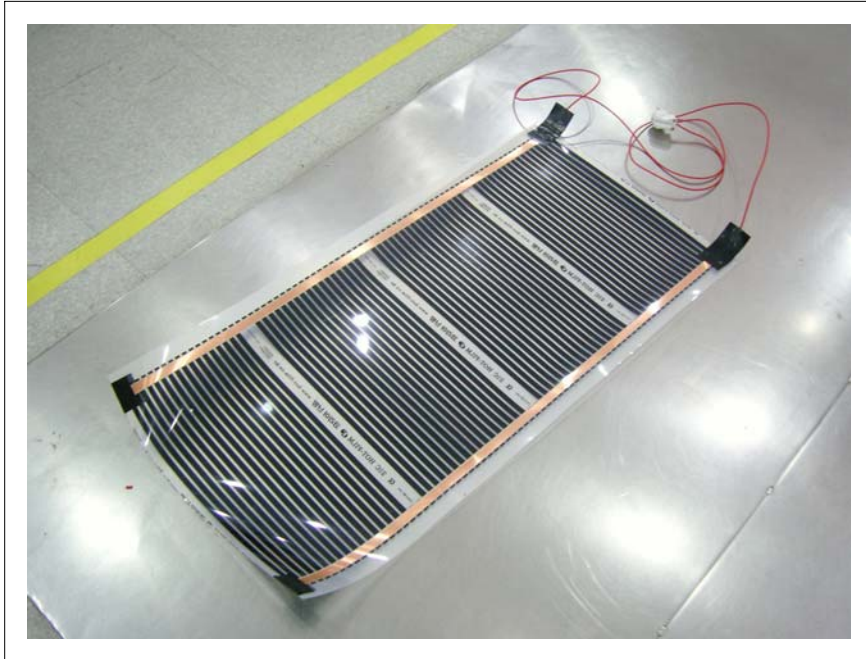
Humidity:

Test Date:

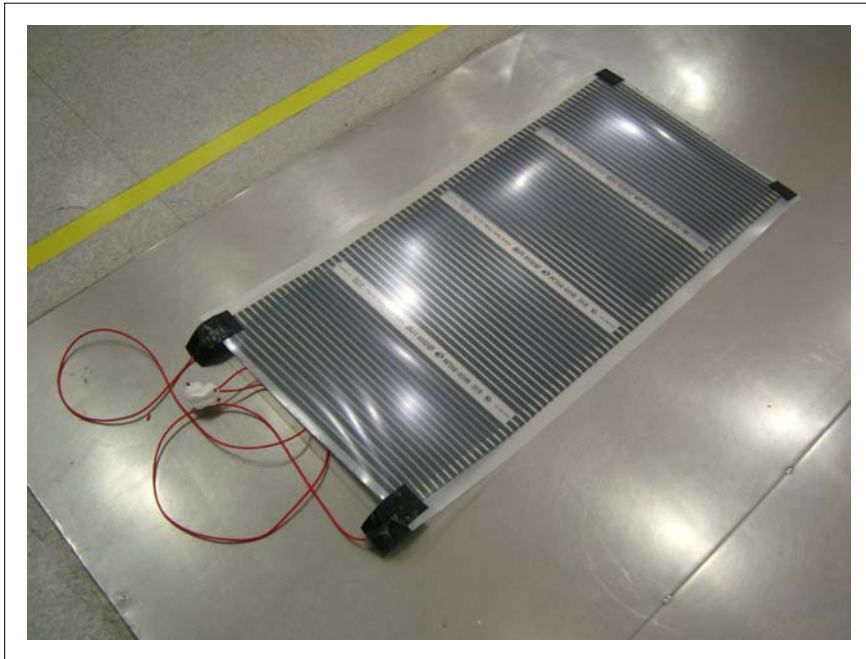
Tested by:

5. External Photographs

5.1EUT: Front View



5.2EUT: Rear View



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6.3EUT: Label View



Appendix A - Schematics/Block Diagram

Please see attached document(s).

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Appendix B - User's Manual

Please see attached document(s).