

EMC TEST REPORT

Test report no.: EMC-CE-1208

Type of equipment: DIGITAL COLOR CAMERA

Model Name: SCC-C4335

Variant Model: SCC-C4335P, SCC-C4235, SCC-C4235P
SCC-C4233, SCC-C4233P, SCC-C4333,
SCC-C4333P

Applicant: SAMSUNG ELECTRONICS CO.,LTD

Manufacturer: Tianjin Samsung Electronics Co.,Ltd

Test standards: EN 55022:1998+A1:2000+A2:2003, Class A
EN 55024:1998+A1:2001+A2:2003
EN55013:2001+A1:2003
EN55020:2002+A1:2003

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.
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Approval of EMC compliance Laboratory.

Date of test: 2007. 10. 25 ~ 10. 29

Date of Issue: 2007. 10. 30

Tested by: Y. J. Park

PARK, YONG-JIN

Approved by: 

YOO.SUNG-YUNG

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1. Client information

Applicant: SAMSUNG ELECTRONICS CO.,LTD

Address: 416, Maetan3-dong, Yeongtong-gu,
Suwon-si, Gyeonggi-do, Korea

Telephone number: +82-31-277-3695

Contact person: KANG JE SOON

Manufacturer: Tianjin Samsung Electronics Co.,Ltd

Address: 300457 CHINA TIANJIN NO 12.
FOURTH AVENUE, TEDA, TIANJIN CHINA

Telephone number: +82-31-277-3695

2. Laboratory information

Address

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Telephone Number : 82 31 336 9919

Facsimile Number : 82 31 336 4767

CBTL Testing Laboratory

FCC Filing No.: 793334

FCC CAB.: KR0040

VCCI Registration No. : C-1713, R-1606, T-258

KOLAS NO.: 231

SITE MAP



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3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
OATS	20 °C	52 %	-
Shielded room	21 °C	51%	-
Immunity area	21 °C	50 %	998 hPa

Test site

These testing items were performed following locations;

Shielded Room : Conducted Emission

OATS (10m) : Radiated Emission

Immunity area : ESD, RS, EFT/ Burst, SURGE, CS

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 NIS 80, 81, the measurement uncertainty level with a 95% confidence level was applied.

3.3 Sample calculation

Conducted Emission

The field strength is calculated by adding the LISN factor, cable loss from the measured reading.

The sample calculation is as follows :

$$FS = MR + LF + CL$$

MR = Meter Reading

LF = LISN Factor

CL = Cable Loss

If MR is 30dB, LISN Factor 1dB, CL 1dB

The result (MR) is

$$30 + 1 + 1 = 32\text{dBuV}$$

4. Description of E.U.T.

4.1 Product description

Applicant:	SAMSUNG ELECTRONICS CO.,LTD
Address:	416, Maetan3-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea
Manufacturer:	Tianjin Samsung Electronics Co.,Ltd
Address:	300457 CHINA TIANJIN NO 12. FOURTH AVENUE, TEDA, TIANJIN CHINA
Type of equipment:	DIGITAL COLOR CAMERA
Basic Model:	SCC-C4335
Variant Model:	SCC-C4335P, SCC-C4235, SCC-C4235P SCC-C4233, SCC-C4233P, SCC-C4333, SCC-C4333P
The difference between basic model and variant model:	BUYER MODEL NAME
Serial number:	-
Testing voltage	DC 12V
Rating:	DC 12V

4.2 Peripherals

Description	Model / Part #	Serial number	Manufacturer
Monitor	CX714MP-A	N495H4KXB00713H	SAMSUNG

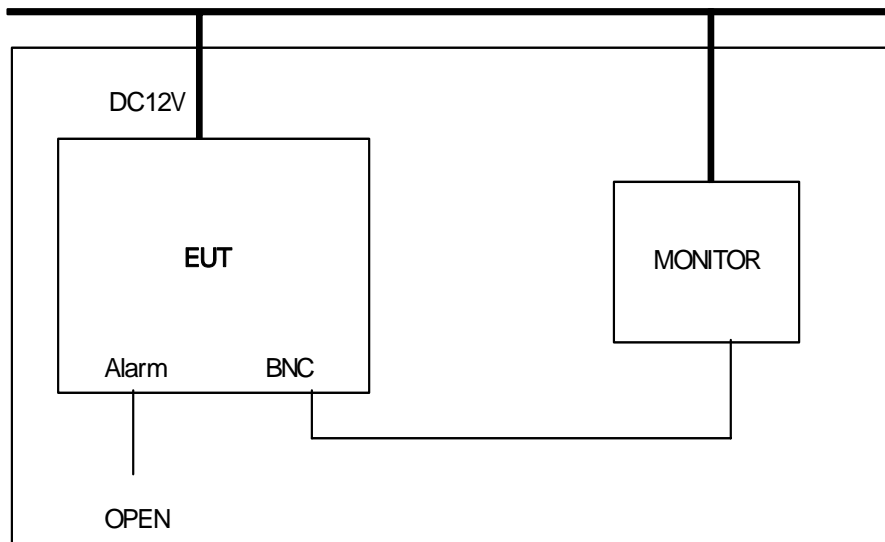
4.3 Operating conditions

- Display mode test.

4.4 Used cables

Start		END		Cable Spec.	
Name	I/O Port	Name	I/O Port	Length	Shield
EUT	BNC cable	Monitor	BNC cable	3.0	Shield
	Alarm (RJ-45)	-	Alarm (RJ-45)	3.0	Non-Shield

4.5 EUT test configuration



5. Summary of test results

5.1 Modification to the E.U.T.

None

5.2 Standards & results

The following standards have been applied:

EN 55022:1998+A1:2000+A2:2003

Information technology equipment – Radio disturbance characteristics - Limits and methods of measurement

Test items	Result
Conducted emission	Pass
Radiated emission	Pass

EN 50130-4:1995+A1:1998+A2:2003

Alarm systems – part 4: Electromagnetic compatibility – Product Family standard: Immunity requirements for components of fire, intruder and social alarm systems

Test items	Test methods	Result
Electrostatic discharge	EN 61000-4-2:1995+A1:1998+A2:2001	Pass
Electromagnetic field	EN 61000-4-3:1995+A1:1998+A2:2001	Pass
Electric fast transients	EN 61000-4-4:1995+A1:2001	Pass
Surge	EN 61000-4-5:1995+A1:2001	Pass
Conducted Immunity	EN 61000-4-6:1995+A1:2001	Pass

5.3 Performance criteria

The variety and the diversity of the apparatus within the scope of this document makes it difficult to define precise criteria for the evaluation of the immunity test results.

If as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe then the apparatus shall be deemed to have failed the test.

A functional description and a definition of performance criteria, during or as a consequence of the EMC testing, shall be provided by the manufacturer and noted in the test report, based on the following criteria:

Electrostatic discharge

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of the discharge is permissible, providing that there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

Radiated electromagnetic fields

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in output, which could be interpreted by associated equipment as a change, and no such flickering of indicators occurs at a field strength of 3V/m.

For components of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at 10V/m, providing.

- (a) there is no permanent damage or change to the EUT(e.g. no corruption of memory
or Changes to programmable settings etc.)
- (b) at 3V/m, any deterioration of the picture is so minor that the system could still be used; and
- (c) there is no observable deterioration of the picture at 1V/m.

Fast transient burst / Slow high energy voltage surge

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of the discharge is permissible, providing that there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

Conducted disturbances induced by electromagnetic field

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of the discharge is permissible, providing that there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change, and no such flickering of indicators occurs at $U = 130\text{dBuV}$.

For components of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at $U = 140\text{dBuV}$, providing:

- (a) there is no permanent damage or change to the EUT (e.g.no corruption of memory or changes to programmable settings etc.):
- (b) at $U = 130\text{ dBuV}$, any deterioration of the picture is so minor that system could still be used, and;
- (c) there is no observable deterioration of the picture at $U = 120\text{dBuV}$.

6. Test results

6.1 Conducted Emission

6.1.1 Measurement procedure

Mains

The measurements were performed in a shielded room.

EUT was 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. Each EUT power lead, except ground (safety) lead, was individually connected through a LISN to input power source. Both lines of power cord, hot and neutral, were measured.

6.1.2 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESHS30	844827/001	R&S	08.08.07	<input checked="" type="checkbox"/>
LISN	ESH3-Z5	846128/024	R&S	08.07.30	<input checked="" type="checkbox"/>
LISN	L3-32	0120J20305	PMM	-	<input checked="" type="checkbox"/>

6.1.3 Measurement uncertainty

Conducted emission measurement : (k=2, 95%)

9kHz-150 kHz : ±3.281 [dB]

150kHz-30 MHz : ±2.977 [dB]

6.1.4 Test data

Frequency [MHz]	Correction Factor		Line	Quasi-peak			Average		
	LISN	Cable		Limit	Reading	Result	Limit	Reading	Result
				[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.198	0.25	0.3	N	79.00	47.34	47.89	66.00	45.42	45.97
0.252	0.25	0.3	N	73.00	45.86	46.41	60.00	44.33	44.88
0.330	0.22	0.2	N	79.00	52.48	52.90	66.00	51.69	52.11
0.393	0.26	0.3	H	79.00	43.67	44.23	66.00	42.69	43.25
0.396	0.19	0.3	N	79.00	45.96	46.45	66.00	44.71	45.20
0.459	0.19	0.3	N	79.00	47.30	47.79	66.00	45.84	46.33
1.248	0.27	0.3	H	73.00	45.73	46.30	60.00	43.42	43.99
1.248	0.18	0.3	N	73.00	45.17	45.65	60.00	42.49	42.97
1.314	0.18	0.3	N	73.00	44.94	45.42	60.00	42.18	42.66
6.380	0.34	0.4	N	73.00	43.26	44.00	60.00	39.73	40.47

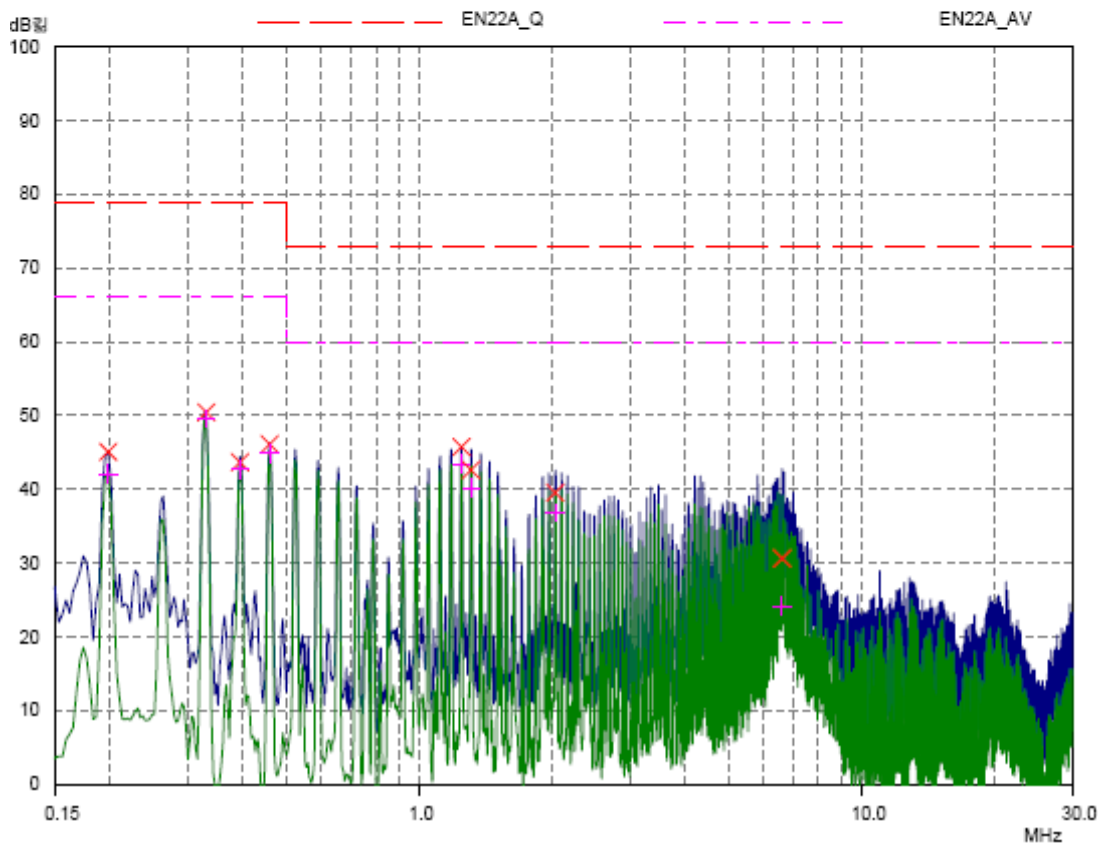
- Note. QP = Quasi-Peak, AV= Average
- Loss = LISN Loss + Cable Loss
- Measurement time : 1 s

EUT: SCC-C4335
 Manuf:
 Op Cond: H
 Operator:
 Test Spec: EN55022 Class A Conducted Emission
 Comment:

Result File: 035h.dat : SCC-C4335 H

Scan Settings			(2 Ranges)		Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB	
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB	

Final Measurement: Detectors: X QP / + AV
 Meas Time: 1sec
 Peaks: 8
 Acc Margin: 25 dB



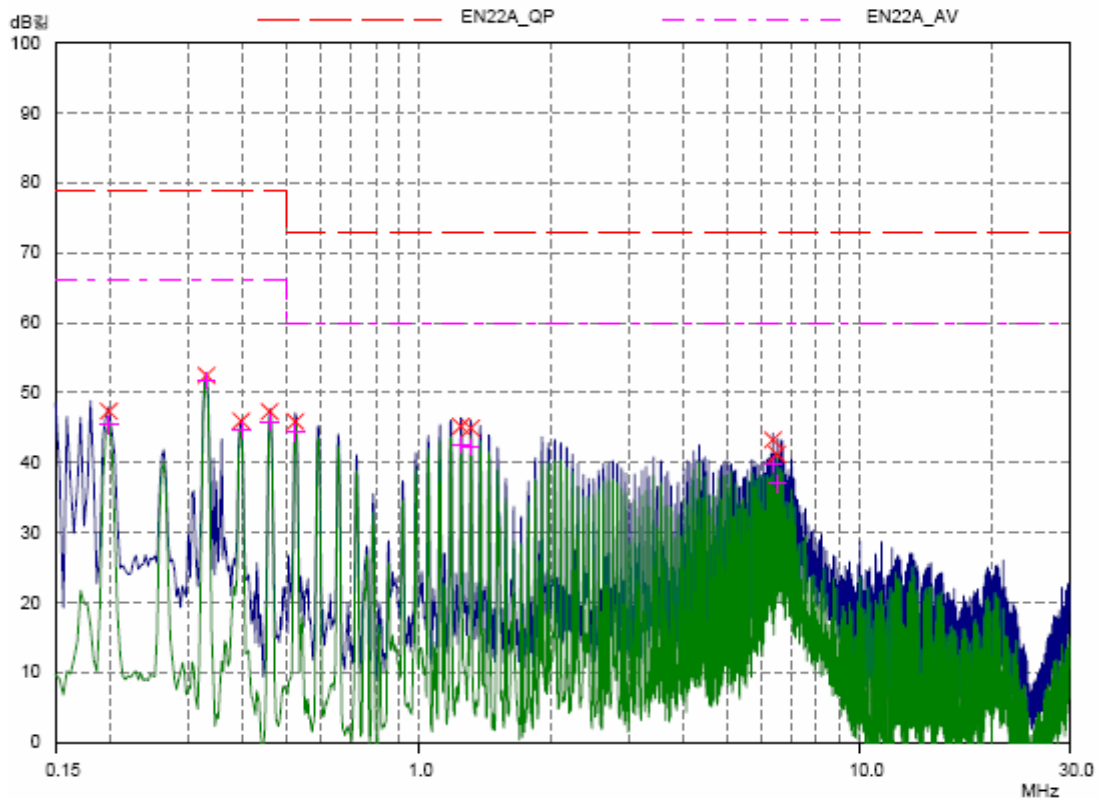
EUT: SCC-C4335
 Manuf:
 Op Cond: N
 Operator:
 Test Spec: EN55022 Class A Conducted Emission
 Comment:

Result File: 035n.dat : SCC-C4335 N

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Final Measurement: Detectors: X QP / + AV
 Meas Time: 1sec
 Peaks: 8
 Acc Margin: 25 dB



6.1.5 Result

Minimum limit margin is 13.89 dB at 0.330 MHz.

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6.2 Radiated emission

6.2.1 Measurement procedure

A pretest was performed at 3m distance in a semi-anechoic chamber for searching correct frequency. The final test was done at a 10m open area test site with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3m to 0.4m long and were hanged at a 0.4m 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.

6.2.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next cal. date	Used
Test receiver	ESCI	100001	R&S	07.10.31	<input checked="" type="checkbox"/>
TRILOG SUPER BROADBAND ANT	VULB 9160	3228	Schwarzbeck Mess-Electronik	08.02.12	<input checked="" type="checkbox"/>
Antenna Mast	A109	N/A	DEAIL	-	<input checked="" type="checkbox"/>
Turn Table	TS14	N/A	DEAIL	-	<input checked="" type="checkbox"/>
10m OATS	-	-	EMC Compliance	-	<input checked="" type="checkbox"/>

6.2.3 Measurement uncertainty

Radiated Emission measurement : (k=2, 95%)
 30-300 MHz ; 3 m: ± 3.721 [dB], 10 m: $+3.721, -3.707$ [dB]
 300-1000 MHz ; 3 m: ± 3.818 [dB], 10 m: ± 3.802 [dB]

6.2.4 Test data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	angle	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
					Antenna	Cable			
255.36	21.0	h	3.6	264	11.65	3.18	47.0	35.85	11.15
312.13	17.9	h	3.4	219	13.33	3.49	47.0	34.72	12.28
354.69	15.1	h	3.8	241	14.40	3.76	47.0	33.29	13.71
368.86	15.2	h	3.0	256	14.74	3.81	47.0	33.78	13.22
383.06	16.7	h	3.3	198	15.10	3.87	47.0	35.70	11.30
766.09	5.7	h	1.8	207	22.20	5.85	47.0	33.73	13.27

* Receiving Antenna Mode : *Horizontal, Vertical*

* 10 m OATS

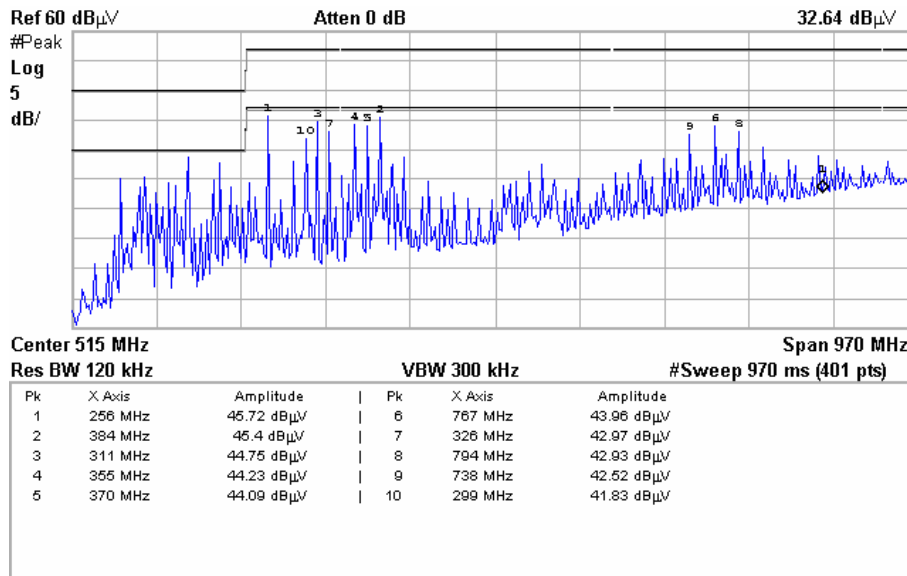
* Note : Reading = Test Receiver meter,

P= Polarization → H = Horizontal, V = Vertical

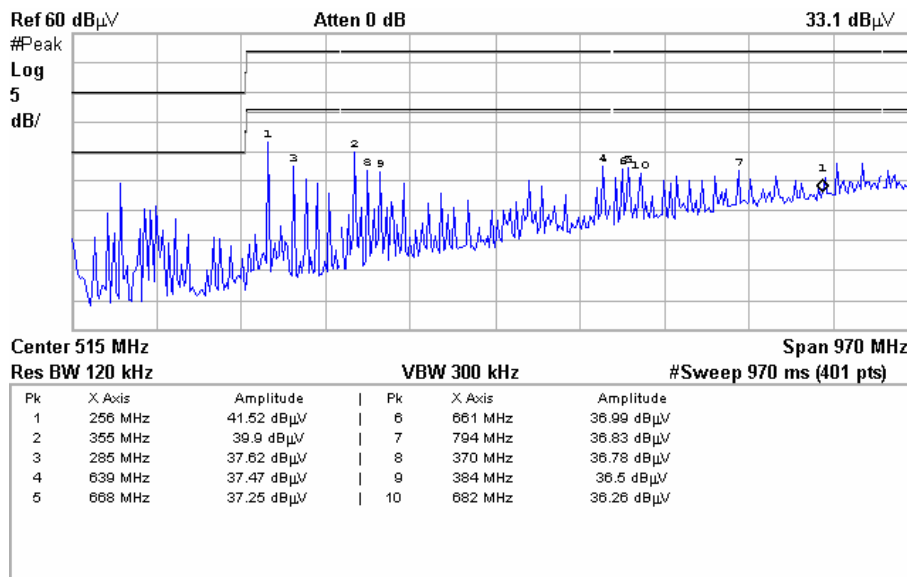
Result = Field Strength (Antenna factor + Cable factor + Reading)

***3m Chamber Prescan Data**

-Horizontal



-Vertical



6.2.5. Result

Minimum limit margin is 11.15 dB at 255.36 MHz.

6.3 Electrostatic Discharge

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 0.8m above the reference grounded floor. A horizontal coupling plane(HCP) was placed on the table, and Connected to the reference plane via a 470kΩ resistor located in each end (0.5mm insulating support between EUT and HCP).

In both cases a vertical coupling plane(VCP) OF 0.5 X 0.5m was located 10cm 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	ESS-100L	5099C02066	NOISE KEN	08.06.19	<input checked="" type="checkbox"/>
HCP	-	-	-	-	<input checked="" type="checkbox"/>
VCP	-	-	-	-	<input checked="" type="checkbox"/>

6.3.3 Test Data

Test Specification : EN 61000-4-2

Required Criterion: B

Kind of Discharges

- Contact Discharge
- Air Discharge
- HCP
- VCP

Discharge Voltages

- Contact Discharge : $\pm 2, 4, 6$ kV
- Air Discharge : $\pm 2, 4, 8$ kV

Discharge Impedance

- 330 Ω /150pF 2K Ω /330pF

Number Of Discharge

- Number of discharges per point, for each voltage and polarity
: 10 (Interval between discharges : ≥ 1 s)

Test point (Please refer to attached photograph.)

- Contact Discharge : EUT case, BNC cable
- Air Discharge : Screw, Alarm port

Test Results

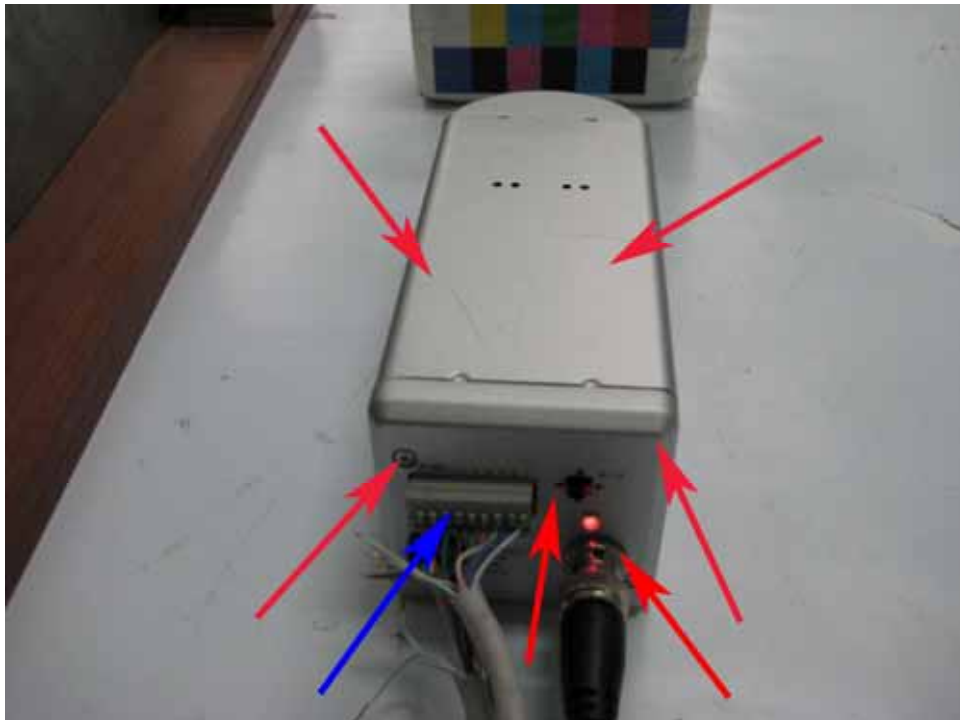
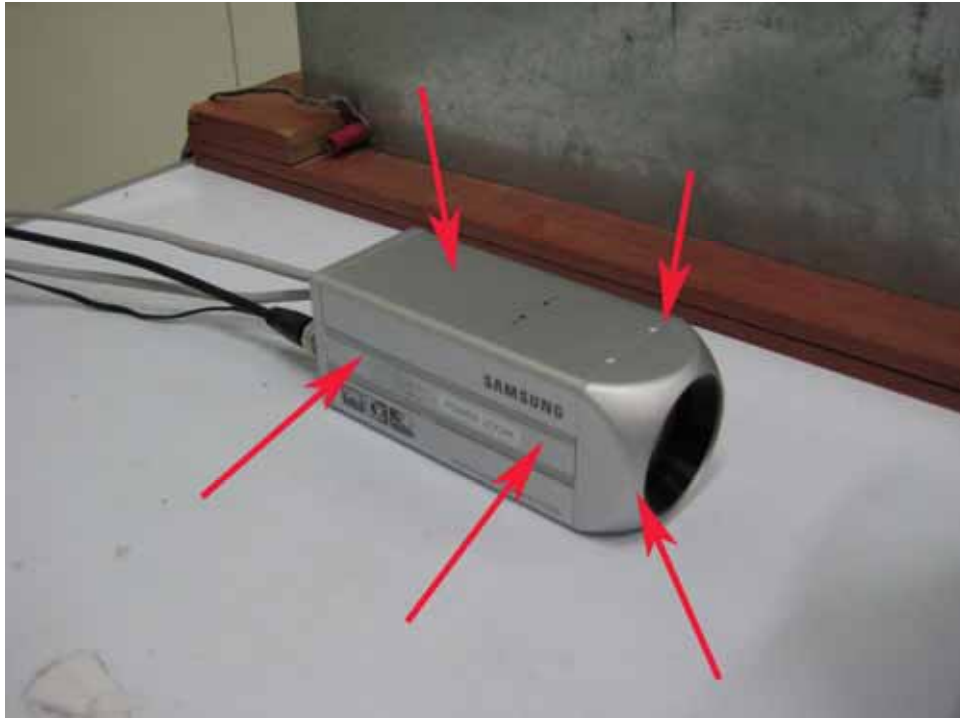
- Complied Not complied

Comment :

- There was no change of operation status during above testing.

Electrostatic Discharge

Air discharge	→
Contact discharge	→



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6.4 Radio Frequency Electromagnetic Fields

6.4.1 Measurement procedure

The test was performed at 3m 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 0.8m 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	08.05.03	<input checked="" type="checkbox"/>
Field monitor	SI-300	-	TDK	-	<input checked="" type="checkbox"/>
Power sensor (with adapter)	PH2000	303224	AR	08.05.03	<input checked="" type="checkbox"/>
Power sensor (with adapter)	PH2000	303222	AR	08.05.03	<input checked="" type="checkbox"/>
Directional coupler	DC6180	303976	AR	08.05.03	<input checked="" type="checkbox"/>
Amplifier	150W1000M2	303843	AR	08.05.03	<input checked="" type="checkbox"/>
Amplifier	60S1G3M2	320444	AR	08.04.21	<input checked="" type="checkbox"/>
Signal generator	E4421B	GB40052295	AGILENT	08.10.25	<input checked="" type="checkbox"/>
BiconiLog Ant.	LPDA-0803	130269	ETS	08.03.17	<input checked="" type="checkbox"/>
Directional Coupler	DC7144M1	320279	AR	08.01.18	<input checked="" type="checkbox"/>

6.4.3 Measurement uncertainty

Radio Frequency Electromagnetic Fields : ± 1.0556 [dB](k=2, 95%)

6.4.4 Test Data

Test Specification : EN 61000-4-3

Required Criterion: A

Frequency Range

80MHz – 2GHz 900MHz 26MHz - 500MHz

Test level

1V/m 3V/m 10V/m

Modulation

AM : 1kHz, 80%
 PM : 1Hz (0.5 s ON : 0.5 s OFF)

Frequency step

log 1% step log 3% step log 5% step

Dwell Time

3 s 2 s 1 s

Test point

Front
 Rear
 Left
 Right

Test Results

Complied Not complied

Comment :

- There was no change of operation status during above testing.

6.5 Electric Fast Transient/BURST

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 0.8 m wooden table.

For tabletop equipment, EUT was placed on a wooden table(0.8m) above the reference plane.

6.5.2 Used equipments

Equipment	Model No.	Serial No.	Makers	Next Cal. date	Used
EFT/B Tester	UCS 500 M6	V0545100858	EM TEST	08.01.03	<input checked="" type="checkbox"/>
Capacitive coupling clamp	-	-	EM TEST	-	<input type="checkbox"/>

6.6.3 Test Data

Test Specification : EN 61000-4-4

Required Criterion: B

Coupling

Power Signal Lines Telecommunication line

Test level

Power : ± 0.25 kV, ± 0.5 kV, ± 1 kV

Signal Lines : ± 0.25 kV, ± 0.5 kV, ± 1 kV

Tel. line :

Test mode

- DC Power : DC 12V

- Signal line : Alarm cable, BNC cable

Burst frequency : 5 kHz, 5/50 ns

Coupling Time : > 60 s

Test Results

Complied Not complied

Comment :

- There was no change of operation status during above testing.

6.6 Surge

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, EUT was placed on a 0.8 m wooden table.

For tabletop equipment, EUT was placed on a wooden table(0.8m) above the reference plane.

6.6.2 Used equipments

Equipment	Model No.	Serial No.	Makers	Next Cal. date	Used
Surge Generator	UCS 500 M6	V0545100858	EM TEST	08.01.03	<input checked="" type="checkbox"/>
CDN	CNV 508 S2	0402-01	EM TEST	-	<input type="checkbox"/>

6.6.3 Test Data

Test Specification : EN 61000-4-5

Required Criterion: B

Coupling

Power Signal Line Telecommunication line

Test level

Power : $\pm 0.5\text{kV}, \pm 1\text{kV}$

Signal Line : $\pm 0.5\text{kV}, \pm 1\text{kV}$

Tel. line :

Test mode

- DC Power : DC 12V

-Signal Line : Alarm Cable, BNC Cable

Coupling Impedance

$40\Omega+0.5\mu\text{F}$ 40Ω $10\Omega+9\mu\text{F}$ $18\mu\text{F}$

Coupling Time : > 5 min

Number of Surge : 5

Angle : 0, 90, 180, 270

Test Results

Complied Not complied

Comment :

- During the test, EUT appeared Dot. After this test, EUT was operated normally. (0.5kV, 1kV : Main, signal)

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6.7 Conducted Immunity

6.7.1 Measurement procedure

A ground reference plane was located on the floor.

For tabletop equipment, the test was performed on a ground reference plane on a 0.8m wooden table.

The EUT was isolated 0.1 m isolating support.

The ground plane was connected to floor reference ground plane via low impedance connection.

6.7.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
CS generator	NSG 2070	1054	Schaffner	2008.05.03	<input checked="" type="checkbox"/>
CDN	M016	16674	Schaffner	2008.04.10	<input checked="" type="checkbox"/>
Attenuator	INA2070-1	2054	Schaffner	-	<input checked="" type="checkbox"/>

6.7.3 Test Data

Test Specification : EN 61000-4-6

Required Criterion: A

Frequency Range

150 KHz - 100MHz 150 KHz - 230MHz 150 KHz - 500MHz

Test point: DC Power, Alarm cable, BNC cable

Coupling

Power : CDN
 Signal : CLAMP
 Tel. line :

Test level

1V 3V 10V

Modulation

AM : 1kHz, 80%
 PM : 1Hz (0.5 s ON : 0.5 s OFF)

Frequency step

log 1% step log 3% step log 5% step

Dwell Time

3 s 2 s 1 s

Test Results

Complied Not complied

Comment :

- During the test, EUT appeared flickering. After this test, EUT was operated normally. (3V, 10V : Main)

EMC Compliance Ltd.

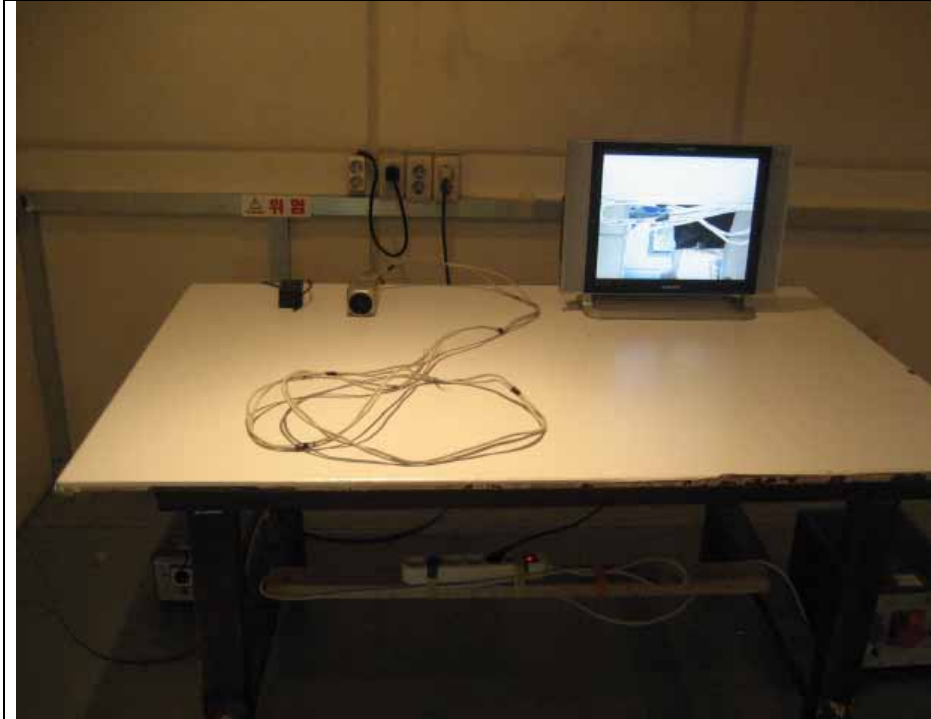
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7. Test photographs

Conducted emission



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Radiated Emission



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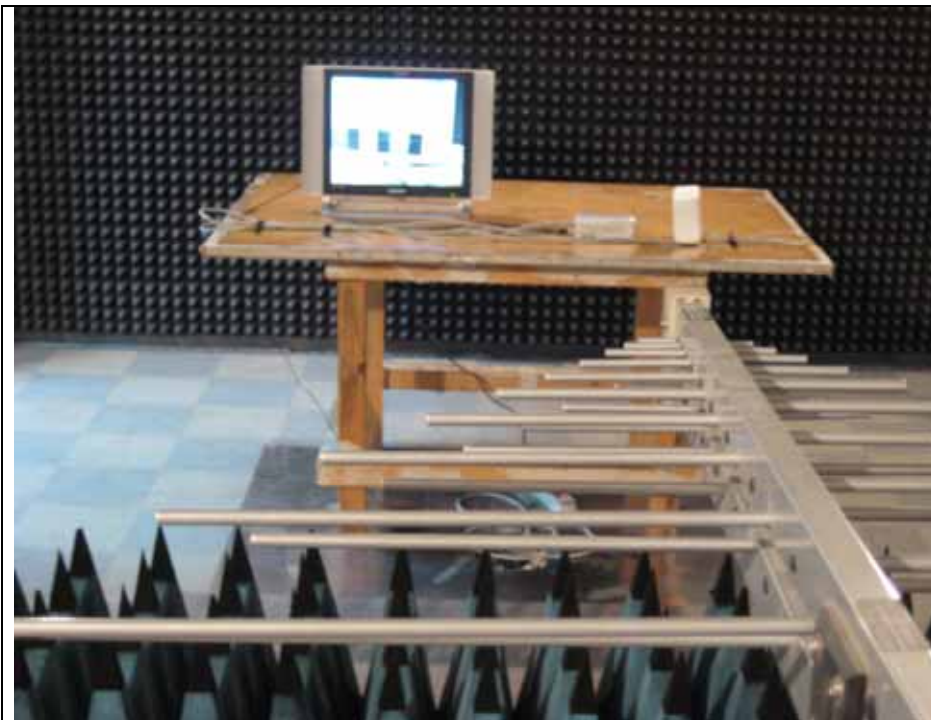
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Electrostatic Discharge



Radio Frequency Electromagnetic Fields



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Electric Fast Transient



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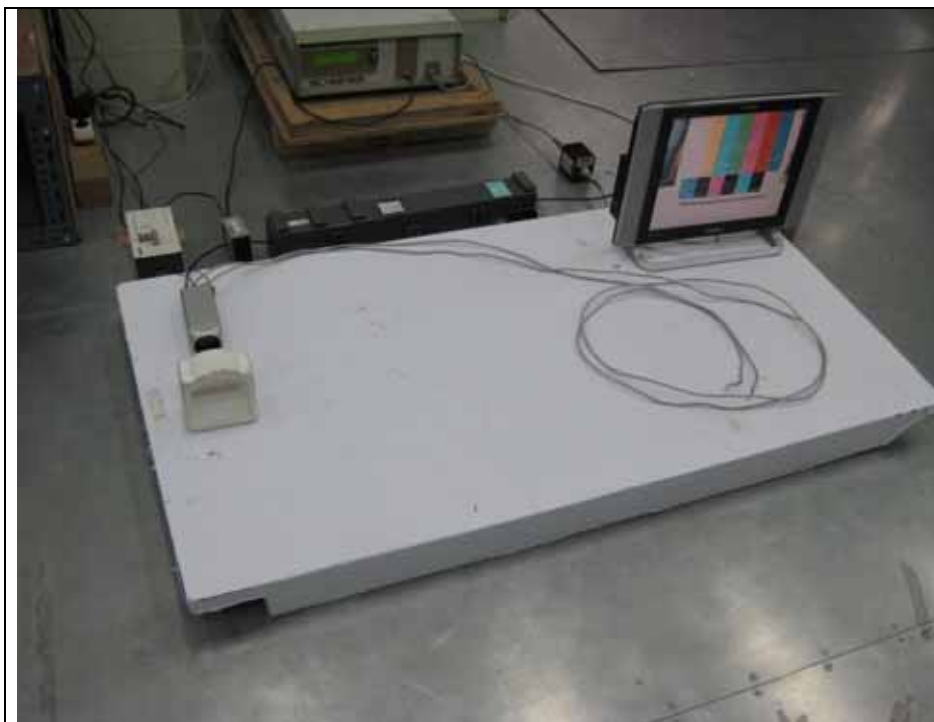
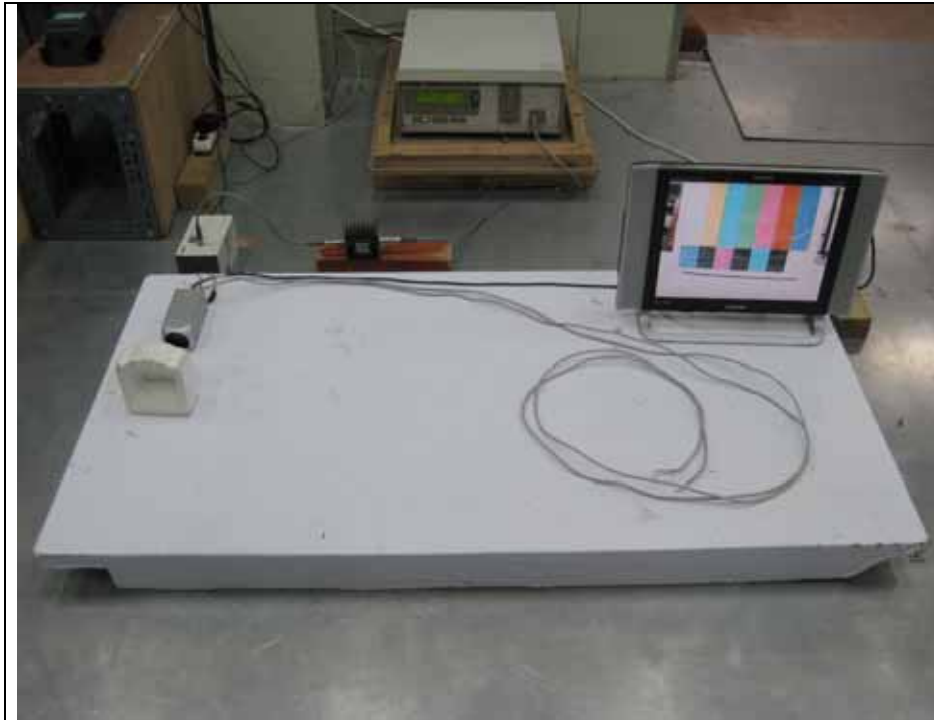
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Surge



Conducted Immunity



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8. E.U.T. photographs

Front



Rear



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Inside



CCD Board



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Lens Board



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DSP Board



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Function Board



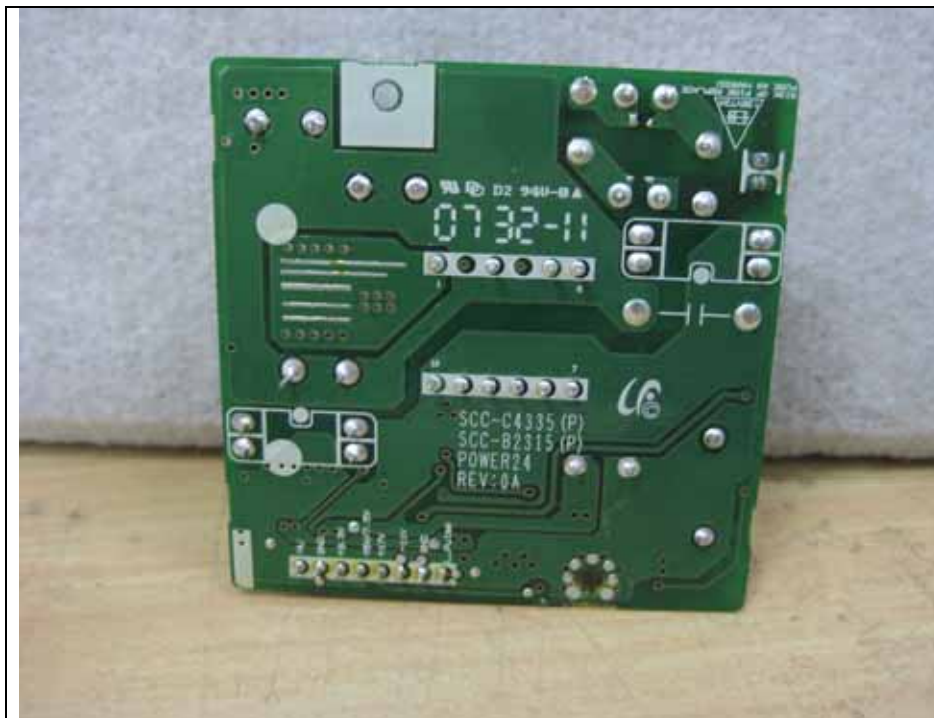
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Power Board



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Rear Board



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