

EMC TEST REPORT

Test report no.: EMC-CE-1029

Type of equipment: DIGITAL VIDEO RECORDER

Model Name: SHR-5042P

Variant Model: SHR-5040P

Applicant: Samsung Electronics Co., Ltd

Manufacturer: Tianjin Samsung Electronics Co.,Ltd

Test standards: EN 55022:1998+A1+A2:2003, CLASS A
EN 50130-4:1995+A1+A2:2003
EN 61000-3-2:2000
EN 61000-3-3:1995+A1:2001

Testing Laboratory: EMC Compliance Ltd.

Test result: Complied

This product complies with the requirements of the EMC Directive 89/336/EEC. 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 test: 2007. 03. 13 ~ 03. 19

Date of Issue: 2007. 03. 20

Tested by: _____

SHIN, YONG-KEUN

Approved by: _____

CHUNG, MIN-SEOK

EMC Compliance Ltd.

82-1 JEIL-RI, YANGJI-MYUN, YONGIN-CITY, KYUNGGI-DO, 449-825 KOREA

TEL: 82 31 336 9919 FAX : 82 31 336 4767

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1. Client information

Applicant: Samsung Electronics Co., Ltd
Address: 416, Maetan-dong, Youngtong-gu, Suwon city,
Kyunggi-do, Korea
Telephone Number: +82- 31-277-3695
Contact Person: KAND JAE SOON

Manufacturer: Tianjin Samsung Electronics Co.,Ltd
Address: 300457 CHINA TIANJIN NO 12. FOURTH TEDA,
TIANJIN CHINA

2. Laboratory information

Address

EMC compliance Ltd.

82-1, JEIL-RI, YANGJI-MYUN, YONGIN-CITY, KYUNGGI-DO, KOREA

Telephone Number : 82 31 336 9919

Facsimile Number : 82 31 336 4767

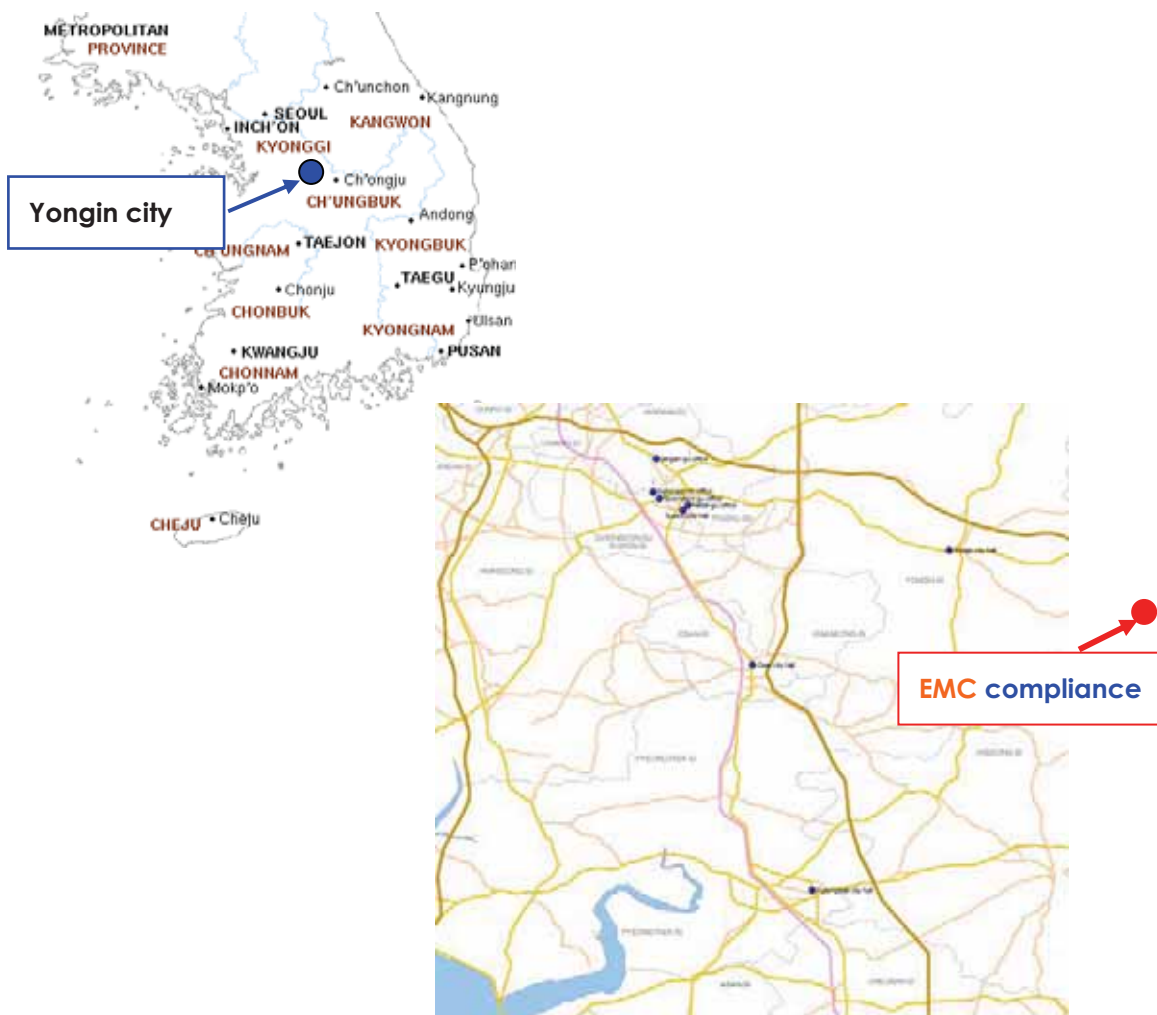
CBTL Testing Laboratory

FCC Filing No.: 793334

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

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SITE MAP



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3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
OATS	: 10 °C	48 %	1009 hPa
Shielded room	: 20 °C	42 %	1011 hPa
Immunity area	: 19 °C	34 %	1006 hPa

Test site

These testing items were performed following locations;

Shielded Room	: Conducted Emission, ESD
OATS (10m)	: Radiated Emission
Immunity area	: RS, EFT/ Burst, SURGE, CS, Magnetic, Dip, Harmonics, Flicker

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 follow:

$$FS = MR + LF + CL$$

MR = Meter Reading

LF = LISN Factor

CL = Cable Loss

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

The result (MR) is

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

Radiated emission

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:

$$FS = MR + AF + CL + AT -AG$$

MR = Meter Reading

AF = Antenna Factor

CL = Cable Loss

AP = Antenna Pad

AG=Amplifier Gain

If MR is 30dB, AF 12dB, CL 5dB, AP 10dB, AG 35dB

The result (MR) is

$$30 + 12 + 5 + 10 -35 = 22\text{dBuV/m}$$

4. Description of EUT

4.1 Product description

Applicant:	Samsung Electronics Co., Ltd
Address:	416, Maetan-dong, Youngtong-gu, Suwon city, Kyunggi-do, Korea
Manufacturer:	Tianjin Samsung Electronics Co.,Ltd
Address:	300457 CHINA TIANJIN NO 12. FOURTH TEDA, TIANJIN CHINA
Type of equipment:	DIGITAL VIDEO RECORDER
Basic Model:	SHR-5042P
Variant Model:	SHR-5040P
The difference between basic model and variant model:	Buyer model name
Serial number:	N/A
Rating:	Adaptor input: 100-240Vac, 50/60Hz, 59W Output: DC 12V, 4A

4.2 Peripherals

Description	Model / Part #	Serial number	Manufacturer
CAMERA	260X	-	KOCOM
MONITOR	RB19NS	N434H4JX31771F	SAMSUNG
USB DRIVE	X-TICK	-	LG
USB MOUSE	M-UV69a	HCA51201590	LG

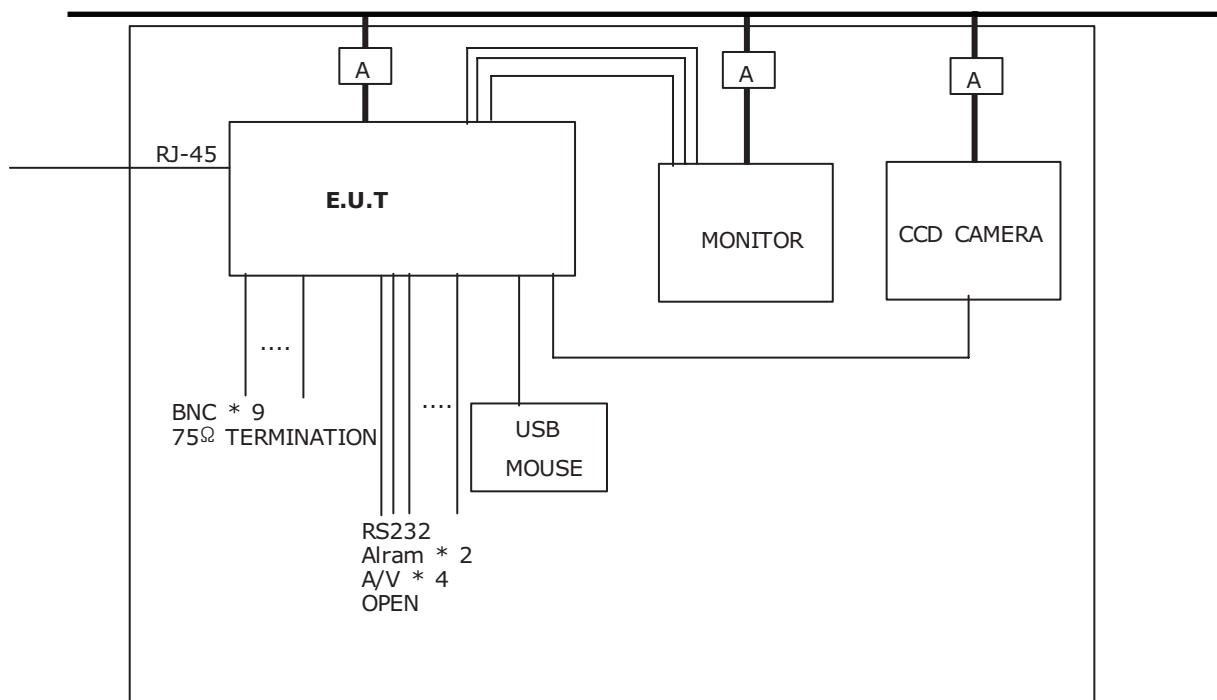
4.3 Operating conditions

- DVR RECORDING(Read/Write, USB DRIVE, HDD) MODE

4.4 Used cables

Start		END		Cable Spec.	
Name	I/O Port	Name	I/O Port	Length	Shield
EUT	RS-232	Open	-	1.8	Shielded
	Alarm * 2	Open	-	3.0	Unshielded
	BNC * 9	75 Ω Termination	-	3.0	Shielded
	A/V * 4	Open	-	1.8	Shielded
	A/V	Monitor	A/V	1.8	Shielded
	S-Video	Monitor	S-Video	2.8	Shielded
	D-SUB	Monitor	D-SUB	1.8	Shielded
	BNC	Camera	BNC	3.0	Shielded
	RJ45	External LAN	-	3.0	Unshielded

4.5 E.U.T. 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+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+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+A2:2001	Pass
Electromagnetic field	EN 61000-4-3:1995+A1+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
Magnetic field immunity	EN 61000-4-8:1993	Pass
Voltage dip/interruption	EN 61000-4-11:1994+A1:2001	Pass

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EN 61000-3-2: 2000

*Electromagnetic compatibility (EMC) – Part 3-2: Limits –
Limits for harmonic-current emissions
(equipment input current up to including 16A per phase)*

Test items	Test methods	Result
Harmonics	EN 61000-3-2: 2000	Pass

EN 61000-3-3: 1995+A1 : 2001

*Electromagnetic compatibility (EMC) – Part 3-3: Limits –
Limitation of voltage fluctuations and flicker in public low-voltage supply systems, for equipment with
rated current $\leq 16A$ per phase and not subject to conditional connection*

Test items	Test method	Result
Flicker	EN 61000-3-3: 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	ESHS10	843276/003	R&S	07.05.09	<input checked="" type="checkbox"/>
L.I.S.N.	ESH3-Z5	100267	R&S	07.06.17	<input checked="" type="checkbox"/>
	L2-16A	0000J10705	PMM	-	<input type="checkbox"/>
Test site	Shield room	-	-	-	<input checked="" type="checkbox"/>

6.1.3 Measurement uncertainty

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

9kHz-150 kHz : ±3.263 [dB]

150kHz-30 MHz : ±2.966 [dB]

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6.1.4 Test data

Frequency [MHz]	Correction		Line	Quasi-peak			Average		
	Factor			Limit	Reading	Result	Limit	Reading	Result
	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.156	0.28	0.2	N	79.00	57.88	58.36	66.00	53.24	53.72
0.207	0.12	0.3	N		51.23	51.65		43.53	43.95
0.261	0.12	0.3	N		44.02	44.44		36.84	37.26
0.312	0.13	0.1	N		35.89	36.12		25.78	26.01
0.360	0.13	0.1	N		39.28	39.51		28.52	28.75
0.417	0.15	0.1	N		40.80	41.05		32.78	33.03
0.732	0.16	0.1	N	73.00	35.62	35.88	60.00	26.29	26.55
1.884	0.20	0.1	N		32.65	32.95		23.55	23.85
3.760	0.26	0.2	N		34.97	35.43		27.52	27.98
5.280	0.29	0.3	H		33.37	33.96		25.71	26.30
11.990	0.46	0.2	N		34.64	35.30		28.38	29.04
23.970	1.10	0.1	N		34.76	35.96		23.93	25.13

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

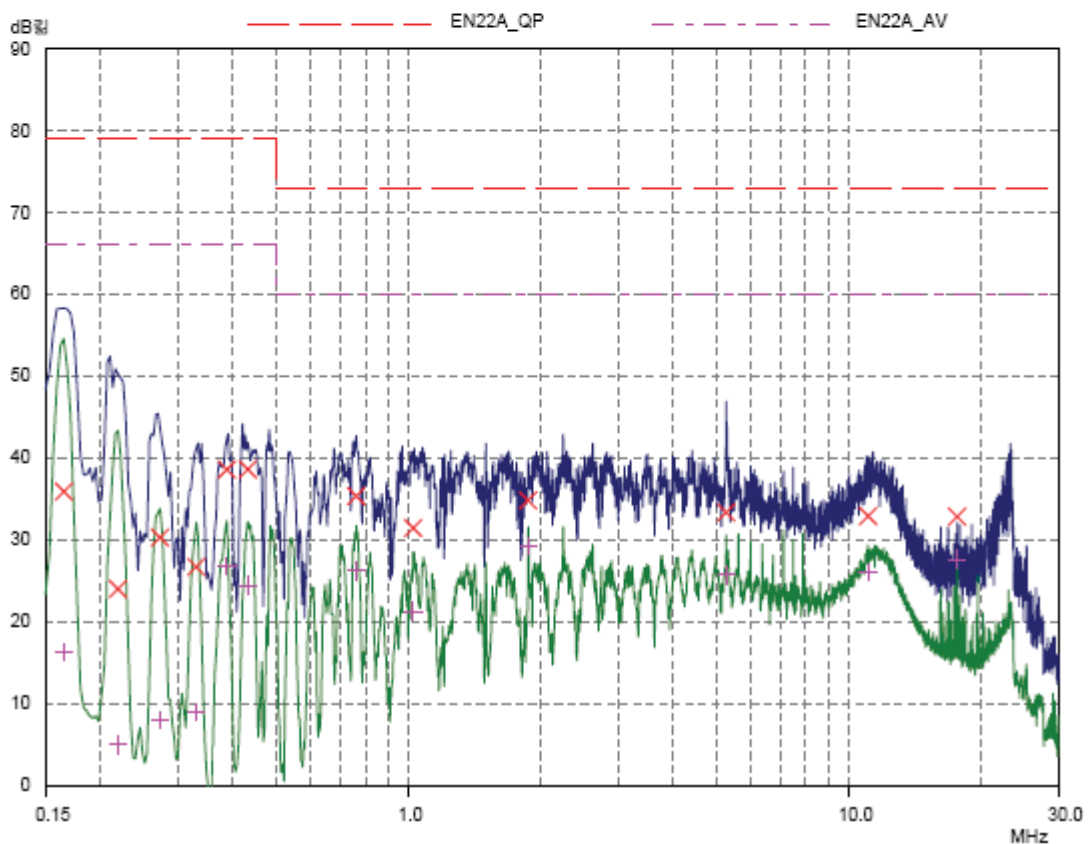
EUT: samsung DVR
 Manuf:
 Op Cond: H
 Operator:
 Test Spec: EN55022 Class A Conducted Emission
 Comment:

Result File: dvral_h.dat : SAMSUNG DVR_PAL_H

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

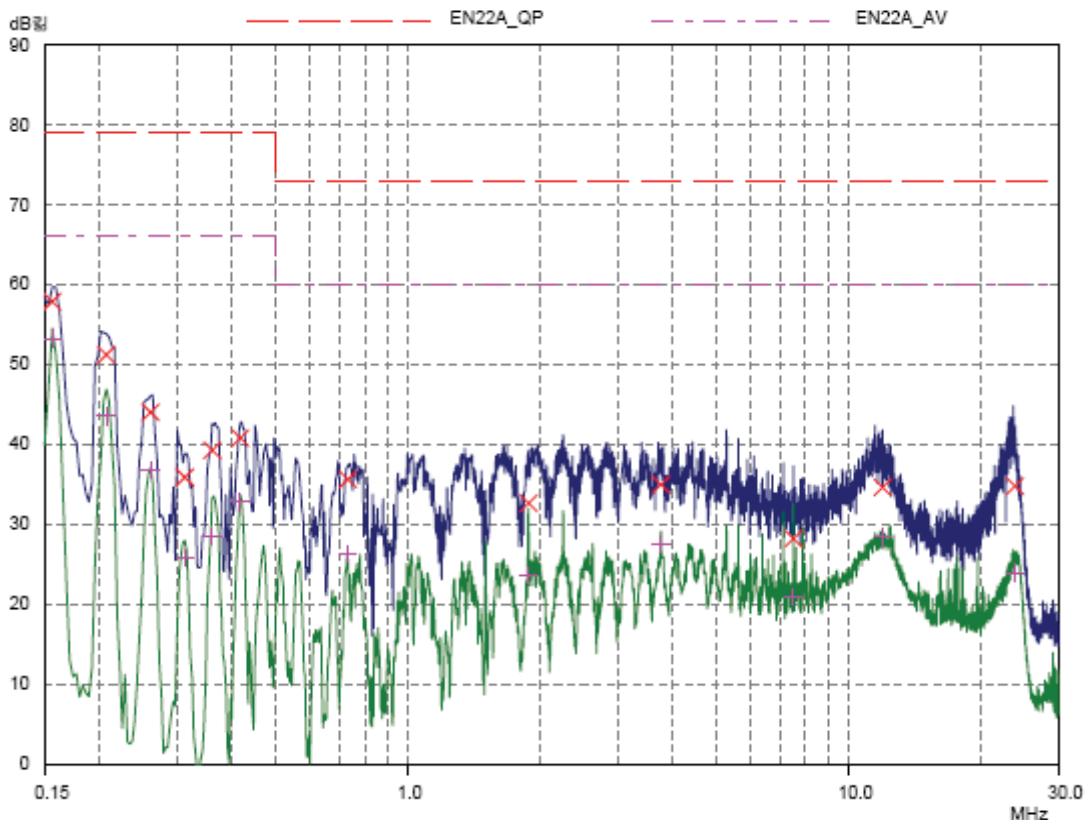


EUT: samsung DVR
 Manuf:
 Op Cond: n
 Operator:
 Test Spec: EN55022 Class A Conducted Emission
 Comment:

Result File: dvrpal_n.dat : SAMSUNG DVR_PAL_N

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



6.1.5 Result

Minimum limit margin is 12.280 dB at 0.156 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	2007.10.31	<input checked="" type="checkbox"/>
TRILOG SUPER BROADBAND ANT	V9160	3138	Schwarzbeck Mess-Electronik	2007.10.31	<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: +3.706, -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			
*RW MODE									
33.98	16.4	V	1.0	194	11.28	1.03	40.0	28.71	11.29
75.06	21.9	V	1.0	259	8.76	1.54	40.0	32.20	7.80
125.77	9.0	V	1.0	291	11.69	2.00	40.0	22.69	17.31
192.33	12.9	H	3.7	86	9.85	2.32	40.0	25.06	14.94
208.25	15.6	H	4.0	288	9.38	2.45	40.0	27.43	12.57
216.01	16.7	H	4.0	314	9.76	2.50	40.0	28.96	11.04
323.77	21.5	H	4.0	275	13.43	2.99	47.0	37.93	9.07
404.92	20.1	H	4.0	286	15.26	3.42	47.0	38.79	8.21
593.94	13.2	V	1.7	287	19.38	4.18	47.0	36.77	10.23
649.88	13.8	V	1.0	75	20.09	4.54	47.0	38.43	8.57
692.83	14.7	V	1.5	88	20.60	4.73	47.0	40.03	6.97
702.25	13.6	V	1.0	192	20.74	4.78	47.0	39.12	7.88
*HDD MODE									
102.33	18.7	V	1.0	241	9.55	1.80	40.0	30.05	9.95
297.14	20.7	H	4.0	297	12.83	2.90	47.0	36.43	10.57
406.47	19.5	H	4.0	311	15.32	3.43	47.0	38.25	8.75
691.84	15.0	V	1.0	94	20.58	4.73	47.0	40.31	6.69
721.08	14.6	H	2.7	284	21.23	4.85	47.0	40.69	6.31

* 10 m OATS

* Note : Reading = Test Receiver meter,

P = Polarization → POL H = Horizontal, POL V = Vertical

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

6.2.5. Result

Minimum limit margin is 6.31 dB at 721.08 MHz. (HDD MODE)

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 470k Ω 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	PESD 1600	H 011 309	HAEFELY	2007.11.13	<input checked="" type="checkbox"/>
HCP	-	-	-	-	<input checked="" type="checkbox"/>
VCP	-	-	-	-	<input checked="" type="checkbox"/>

6.3.3 Test Data

Test Specification : EN61000-4-2

Kind of Discharges

- Contact Discharge (Direct Discharge)
- Air Discharge
- HCP / VCP (Indirect Discharge)

Discharge Voltages

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

Discharge Impedance

- 330 Ω /150 pF
- 2K Ω /330 pF

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 : Case(Rear), Screw, D-SUB(VGA) port, A/V(Audio) port, Video port, RS-232 port, USB port(Rear), RJ45 port, Power port, S-Video port, Button
- Air Discharge : USB port(Front), Case(Front), LED, Alarm port

Test Results

- Complied
- Not complied

Comment :

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

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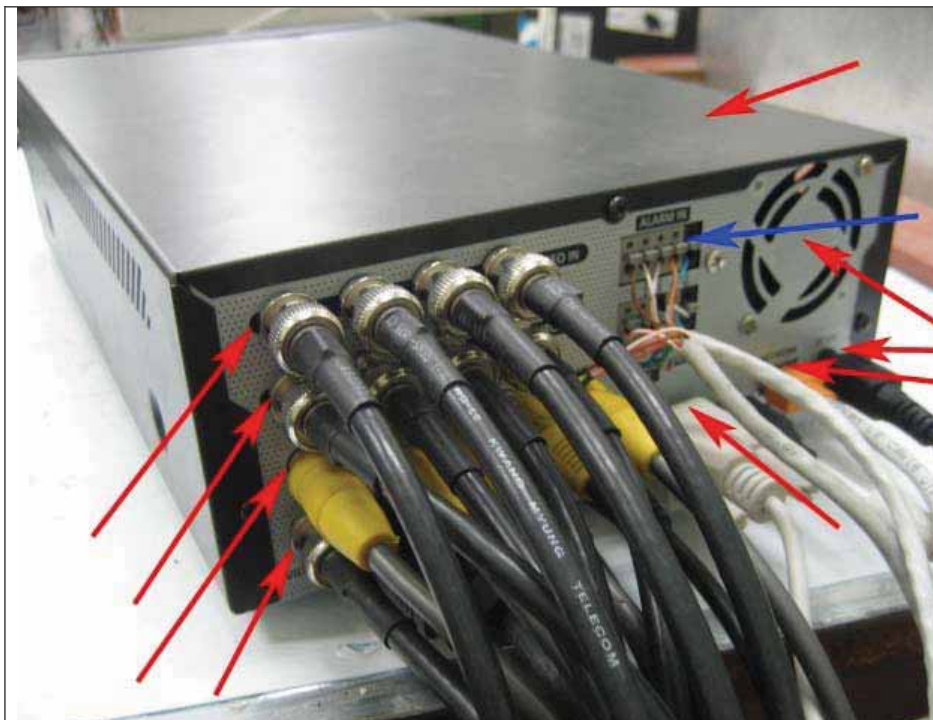
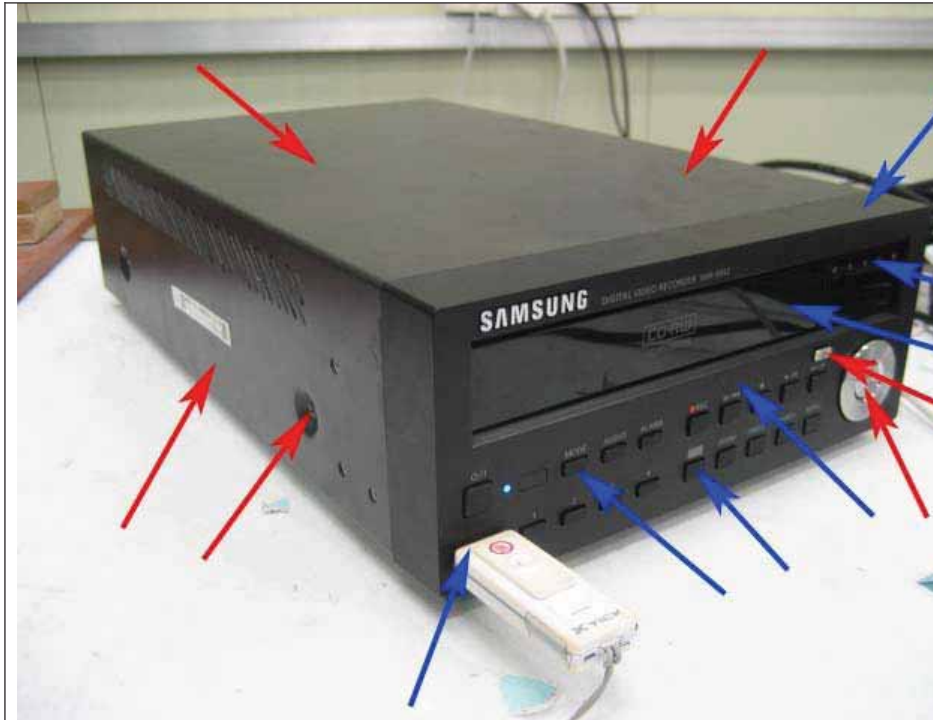
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Electrostatic Discharge (Test Point)

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.

The field uniformity was calibrated for 1V/m, 3V/m, 10V/m.

6.4.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Power meter	PM2002	302852	AR	07.05.03	<input checked="" type="checkbox"/>
Field monitor	SI-300	-	TDK	07.06.16	<input checked="" type="checkbox"/>
Power sensor (with adapter)	PH2000	303224	AR	07.05.03	<input checked="" type="checkbox"/>
Power sensor (with adapter)	PH2000	303222	AR	07.05.03	<input checked="" type="checkbox"/>
Isotropic probe	FP5000	AR	303057	07.04.14	<input checked="" type="checkbox"/>
Directional coupler	DC6180	303976	AR	07.05.03	<input checked="" type="checkbox"/>
Amplifier	150W1000M2	303843	AR	07.05.03	<input checked="" type="checkbox"/>
Signal generator	E4421B	GB40052295	AGILENT	07.10.10	<input checked="" type="checkbox"/>
BiconiLog Ant.	3142B	1786	EMCO	07.04.21	<input checked="" type="checkbox"/>
BiconiLog Ant.	LPDA-0803	130269	ETS	-	<input checked="" type="checkbox"/>
Directional Coupler	DC7144M1	320279	AR	08.01.18	<input checked="" type="checkbox"/>
Amplifier	60S1G3M2	320444	AR	07.04.21	<input checked="" type="checkbox"/>

6.4.3 Measurement uncertainty

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

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6.4.4 Test Data

Test Specification : EN 61000-4-3

Frequency Range

80MHz - 2000MHz 900 MHz \pm 5MHz 26MHz - 500MHz

Test level

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

Modulation

AM : 1kHz, 80%
 PM : 1Hz (0.5s 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	N/A	N/A	EM TEST	-	<input checked="" type="checkbox"/>

6.5.3 Test Data

Test Specification : EN 61000-4-4

Coupling

Power Signal Lines Telecommunication line

Test level

Power : ± 0.5 kV & ± 1 kV & ± 2 kV

Signal Line : ± 0.25 kV & ± 0.5 kV & ± 1 kV

Tel. line :

Test mode

- Power : L1, L2, PE, L1+L2, L1+PE, L2+PE, L1+L2+PE

-Signal Line : BNC cable, Alarm cable, RJ-45 cable

Burst frequency : 5 kHz, 5/50 ns

Coupling Time : > 120 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"/>
Coupling Clamp	CNV 508 S2	1001-10	EM TEST	-	<input checked="" type="checkbox"/>

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.

For floor standing equipment, EUT was placed on a 0.8 m wooden table.

This test were Performed using CDN for mains, clamp for signal.
and injection probe.

6.7.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
CS Generator	NSG 2070	1054	Schaffner	07.05.03	<input checked="" type="checkbox"/>
CDN	M016	16674	Schaffner	07.04.12	<input checked="" type="checkbox"/>
EM Clamp	KEMZ 801	17643	Schaffner	-	<input checked="" type="checkbox"/>

6.7.3 Test Data

Test Specification : EN 61000-4-6

Frequency Range

150 kHz - 100MHz 150 kHz - 230MHz 150 kHz - 500MHz

Test point: Power, Signal line (BNC cable, Alarm cable, RJ-45 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 :

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

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6.8 Magnetic field immunity

6.8.1 Measurement procedure

The test was performed on a ground reference plane (GRP) on a 0.8m wooden table. The EUT was isolated 10 cm isolating support.

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

The test generator was placed 3m distance from the induction coil. The generator was connected reference ground plane.

Preliminary verification of equipment performances was carried out prior to applying the test magnetic field.

The field was applied to the EUT horizontal, vertical polarization.

6.8.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Magnetic coil	MS 100	V0545100858	EM TEST	08.01.03	<input checked="" type="checkbox"/>
Current transformer	MC 2630	113-97	EM TEST	07.12.08	<input checked="" type="checkbox"/>
Ultra compact simulator	UCS 500 M6	0701-03	EM TEST	07.05.03	<input checked="" type="checkbox"/>

6.8.3 Test data

Test specifications

Test specification : EN 61000-4-8

Test level

1A/m

3A/m

10A/m

30A/m

Test time

Continue

10 min

3 min

1min

Polarity

H

V

Test Results

Complied

Not complied

Comment :

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

6.9 Dips and Interruptions

6.9.1 Measurement procedure

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

The dips/interruptions were applied at zero crossing.

6.9.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
dips/interruption Tester	UCS 500 M6	V0545100858	EM TEST	08.01.03	<input checked="" type="checkbox"/>

6.9.3 Test data

Test specification : EN 61000-4-11

Test data

-240Vac-

Test Level (%UT)	Dip/Int. (%UT)	Duration /Period	Phase (°)	Count number	Result
0 %	100 %	0.5/1/5 Period	0/180	3T	Pass
40 %	60 %	0.5/1/5/10 Period	0/180	3T	Pass

Test results

Complied Not complied

Comment :

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

-100Vac-

Test Level (%UT)	Dip/Int. (%UT)	Duration /Period	Phase (°)	Count number	Result
0 %	100 %	0.5/1/5 Period	0/180	3T	Pass
40 %	60 %	0.5/1/5/10 Period	0/180	3T	Pass

Test results

Complied Not complied

Comment :

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

6.10 Harmonics

6.10.1 Measurement procedure

The equipment is supplied in series with shunt(s) Rm or current transformer(s) from a source having the same nominal voltage and frequency as the rated supply voltage and frequency of the equipment. Measurements shall be made under normal load, or conditions for adequate heat discharge, and under normal operating conditions.

User's operation controls or automatic programmers shall be set to produce the maximum harmonic component, for each successive harmonic component in turn. For the purpose of harmonic current limitation, equipment is classified as follows :

Class A : Equipment not specified in one of the three other Classes shall be considered as Class A equipment.

- Balanced three-phase equipment;
- Household appliances excluding equipment identified as Class D;
- Tools excluding portable tools;
- Dimmers for incandescent lamps;
- Audio equipment.

Class B : Portable tools; Arc welding equipment which is not professional equipment.

Class C : Lighting equipment.

Class D : Equipment having a specified power according to 6.2.2 less than or equal to 600 w, of the following types:

- Personal computers and personal computer monitors;
- Television receivers.

6.10.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Harmonics/Flicker meter	5001x-CTS-400-413	54984	C.I.	07.05.03	<input checked="" type="checkbox"/>
Test site	Immunity area	-	-	-	<input checked="" type="checkbox"/>

6.10.3 Test data

- Refer to attached test data

Test results

Complied Not complied

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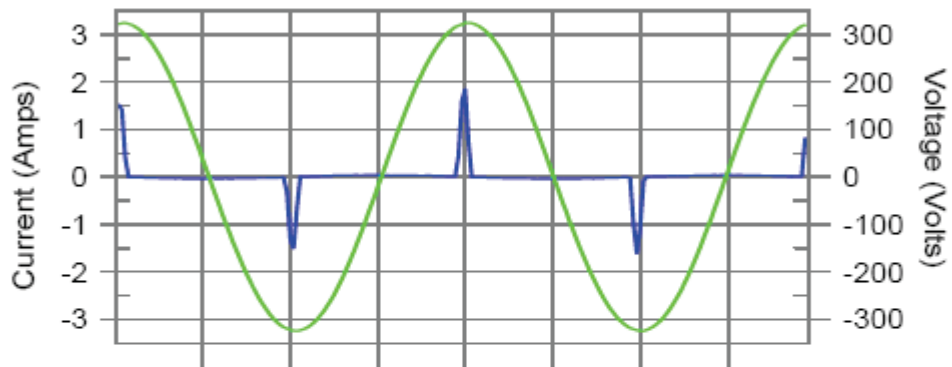
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Harmonics – Class-A per A-14(Run time)

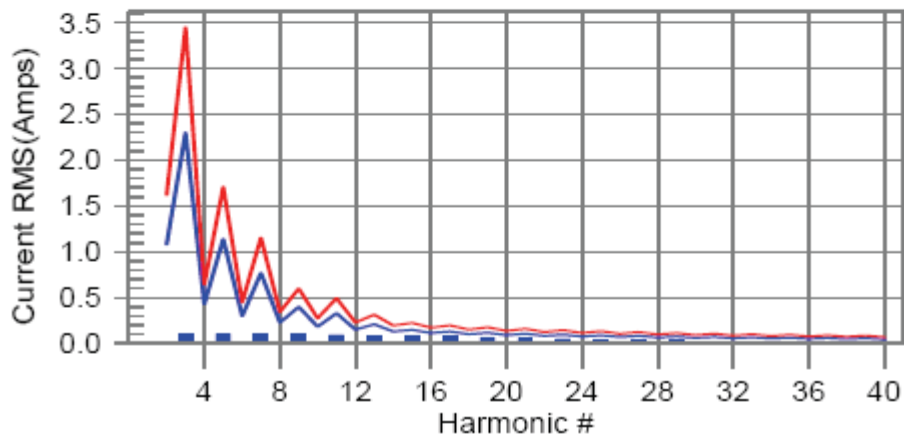
EUT: SCR-5042
 Test category: Class-A per A-14 (European limits)
 Test date: 2007-03-17
 Test duration (min): 2.5
 Comment: SEC
 Customer:
 Tested by:
 Test Margin: 100
 Start time: 오후 5:34:13
 End time: 오후 5:36:54
 Data file name: H-000532.cts_data

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line European Limits



Test result: Pass Worst harmonic was #19 with 36.23% of the limit.

Current Test Result Summary (Run time)

EUT: SCR-5042
 Test category: Class-A per A-14 (European limits)
 Test date: 2007-03-17
 Test duration (min): 2.5
 Comment: SEC
 Customer:

Tested by:
 Test Margin: 100
 Start time: 오후 5:34:13
 End time: 오후 5:36:54
 Data file name: H-000532.cts_data

Test Result: Pass
 Source qualification: Normal
 THC(A): 0.29 I-THD(pk%): 260.12 POHC(A): 0.099 POHC Limit(A): 0.251
 Highest parameter values during test:

V_RMS (Volts): 229.57	Frequency(Hz): 50.00
I_Peak (Amps): 1.914	I_RMS (Amps): 0.325
I_Fund (Amps): 0.119	Crest Factor: 6.162
Power (Watts): 26	Power Factor: 0.355

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.002	1.080	0.2	0.003	1.620	0.17	Pass
3	0.106	2.300	4.6	0.108	3.450	3.13	Pass
4	0.002	0.430	0.5	0.003	0.645	0.45	Pass
5	0.103	1.140	9.0	0.105	1.710	6.16	Pass
6	0.002	0.300	0.8	0.003	0.450	0.65	Pass
7	0.100	0.770	13.0	0.102	1.155	8.83	Pass
8	0.002	0.230	1.0	0.003	0.345	0.88	Pass
9	0.095	0.400	23.8	0.097	0.600	16.24	Pass
10	0.002	0.184	1.3	0.003	0.276	1.11	Pass
11	0.090	0.330	27.3	0.092	0.495	18.60	Pass
12	0.003	0.153	1.7	0.003	0.230	1.38	Pass
13	0.084	0.210	40.1	0.086	0.315	27.29	Pass
14	0.003	0.131	1.9	0.003	0.197	1.58	Pass
15	0.078	0.150	51.7	0.079	0.225	35.21	Pass
16	0.003	0.115	2.2	0.003	0.173	1.79	Pass
17	0.071	0.132	53.4	0.072	0.199	36.17	Pass
18	0.002	0.102	2.4	0.003	0.153	1.99	Pass
19	0.063	0.118	53.4	0.064	0.178	36.23	Pass
20	0.002	0.092	2.6	0.003	0.138	2.11	Pass
21	0.056	0.107	52.0	0.057	0.161	35.28	Pass
22	0.002	0.084	2.8	0.003	0.125	2.23	Pass
23	0.048	0.098	49.4	0.049	0.147	33.45	Pass
24	0.002	0.077	2.9	0.003	0.115	2.28	Pass
25	0.041	0.090	45.5	0.042	0.135	30.87	Pass
26	0.002	0.071	2.9	0.002	0.106	2.30	Pass
27	0.034	0.083	40.8	0.035	0.125	27.68	Pass
28	0.002	0.066	2.9	0.002	0.099	2.23	Pass
29	0.027	0.078	35.2	0.028	0.116	24.06	Pass
30	0.002	0.061	2.8	0.002	0.092	2.21	Pass
31	0.021	0.073	29.3	0.022	0.109	19.99	Pass
32	0.002	0.058	2.7	0.002	0.086	2.13	Pass
33	0.016	0.068	23.2	0.016	0.102	15.92	Pass
34	0.001	0.054	2.7	0.002	0.081	2.11	Pass
35	0.011	0.064	17.1	0.011	0.096	11.86	Pass
36	0.001	0.051	2.6	0.002	0.077	2.08	Pass
37	0.007	0.061	11.3	0.007	0.091	7.87	Pass
38	0.001	0.048	2.6	0.001	0.073	2.04	Pass
39	0.003	0.058	5.9	0.004	0.087	4.25	Pass
40	0.001	0.046	2.6	0.001	0.069	2.04	Pass

Voltage Source Verification Data (Run time)

EUT: SCR-5042
 Test category: Class-A per A-14 (European limits)
 Test date: 2007-03-17
 Test duration (min): 2.5
 Comment: SEC
 Customer:

Tested by:
 Test Margin: 100
 Start time: 오후 5:34:13
 End time: 오후 5:36:54

Data file name: H-000532.cts_data

Test Result: Pass

Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms): 229.57
 I_{Peak} (Amps): 1.914
 I_{Fund} (Amps): 0.119
 Power (Watts): 26

Frequency(Hz): 50.00
 I_{RMS} (Amps): 0.325
 Crest Factor: 6.162
 Power Factor: 0.355

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.100	0.459	21.67	OK
3	0.608	2.066	29.44	OK
4	0.042	0.459	9.08	OK
5	0.011	0.918	1.23	OK
6	0.021	0.459	4.61	OK
7	0.044	0.689	6.35	OK
8	0.024	0.459	5.29	OK
9	0.059	0.459	12.79	OK
10	0.006	0.459	1.21	OK
11	0.061	0.230	26.47	OK
12	0.030	0.230	13.23	OK
13	0.075	0.230	32.62	OK
14	0.004	0.230	1.95	OK
15	0.070	0.230	30.36	OK
16	0.021	0.230	9.18	OK
17	0.066	0.230	28.74	OK
18	0.011	0.230	4.75	OK
19	0.072	0.230	31.52	OK
20	0.009	0.230	4.13	OK
21	0.061	0.230	26.74	OK
22	0.008	0.230	3.27	OK
23	0.063	0.230	27.38	OK
24	0.009	0.230	3.74	OK
25	0.054	0.230	23.71	OK
26	0.019	0.230	8.41	OK
27	0.052	0.230	22.73	OK
28	0.005	0.230	2.16	OK
29	0.038	0.230	16.35	OK
30	0.020	0.230	8.66	OK
31	0.036	0.230	15.68	OK
32	0.006	0.230	2.42	OK
33	0.026	0.230	11.18	OK
34	0.011	0.230	4.81	OK
35	0.023	0.230	10.00	OK
36	0.005	0.230	2.21	OK
37	0.010	0.230	4.44	OK
38	0.006	0.230	2.47	OK
39	0.008	0.230	3.58	OK
40	0.008	0.230	3.59	OK

6.11 Flicker

6.11.1 Measurement procedure

EUT was connected to the power analyzer system.

Measurement was performed to obtain the desired flicker parameters.

The measuring time depends on which parameters are to be measured.

P_{It} = 2 h

P_{st} = 10 min

Controls and automatic programs shall be set to produce the most unfavorable sequence of voltage changes, using only those combinations of controls and programs are mentioned by the manufacturer in the instruction manual.

6.11.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Harmonics/Flicker meter	5001x-CTS-400-413	54984	C.I.	07.05.03	<input checked="" type="checkbox"/>
Test site	Immunity area	-	-	-	<input checked="" type="checkbox"/>

6.11.3 Test data

- Refer to attached test data

Test results

Complied

Not complied

Flicker Test Summary per EN/IEC61000-3-3 (Run time)

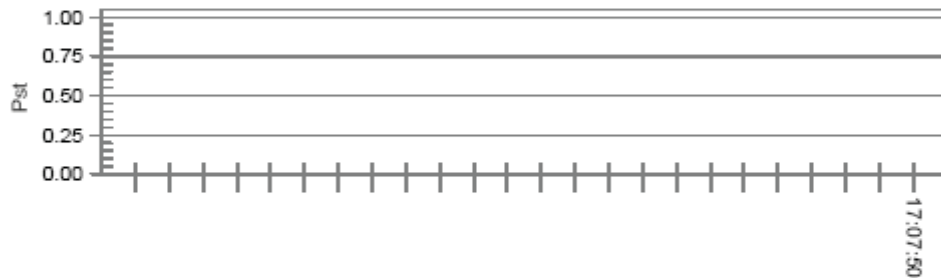
EUT: SCR-5042	Tested by:
Test category: All parameters (European limits)	Test Margin: 100
Test date: 2007-03-17	Start time: 오후 4:57:38
Test duration (min): 10	End time: 오후 5:07:51
Comment: 삼성전자주	Data file name: F-000531.cts_data
Customer:	

Test Result: Pass

Status: Test Completed

Pst, and limit line

European Limits


Time is too short for PIt plot

Parameter values recorded during the test:

Vrms at the end of test (Volt):	229.46		
Highest dt (%):	0.00	Test limit (%):	3.30 Pass
Time(mS) > dt:	0.0	Test limit (mS):	500.0 Pass
Highest dc (%):	0.00	Test limit (%):	3.30 Pass
Highest dmax (%):	0.00	Test limit (%):	4.00 Pass
Highest Pst (10 min. period):	0.001	Test limit:	1.000 Pass
Highest PIt (2 hr. period):	0.001	Test limit:	0.650 Pass

7. Test photographs

Conducted emission



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Radiated Emission



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Electrostatic Discharge



Radio Frequency Electromagnetic Fields



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Electric Fast Transient



Surge



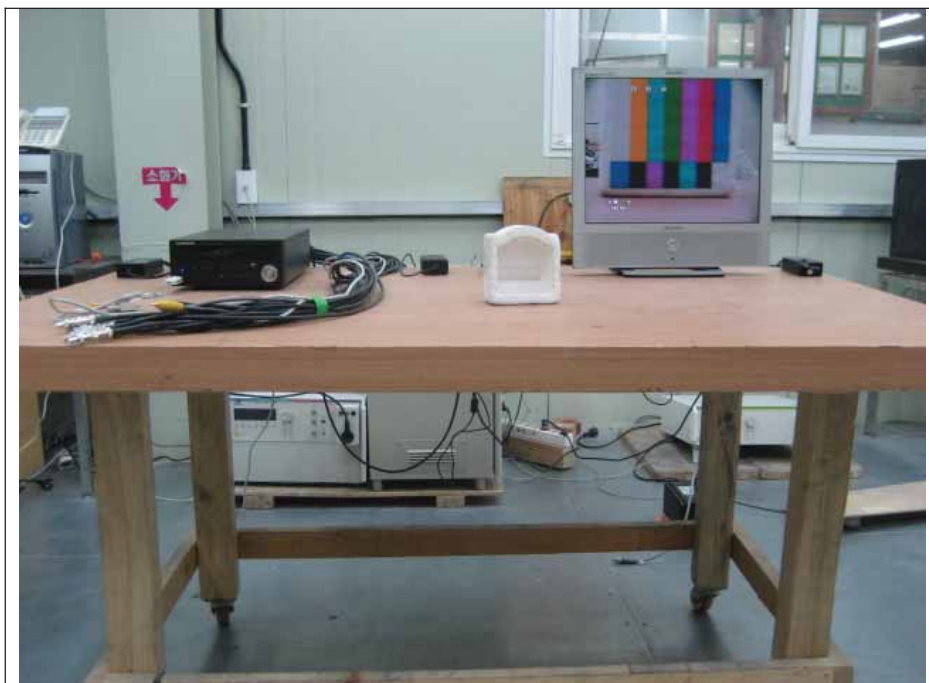
Conducted Immunity



Magnetic field immunity



Dip/Interruptions



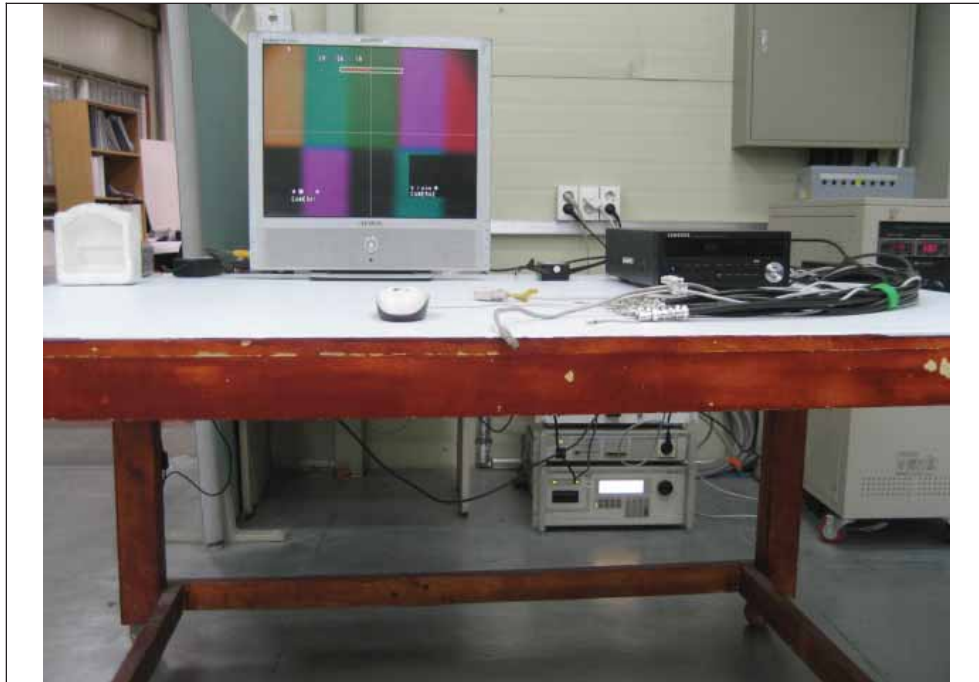
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Harmonics & Flicker



8. E.U.T. photographs

Front View



Rear View



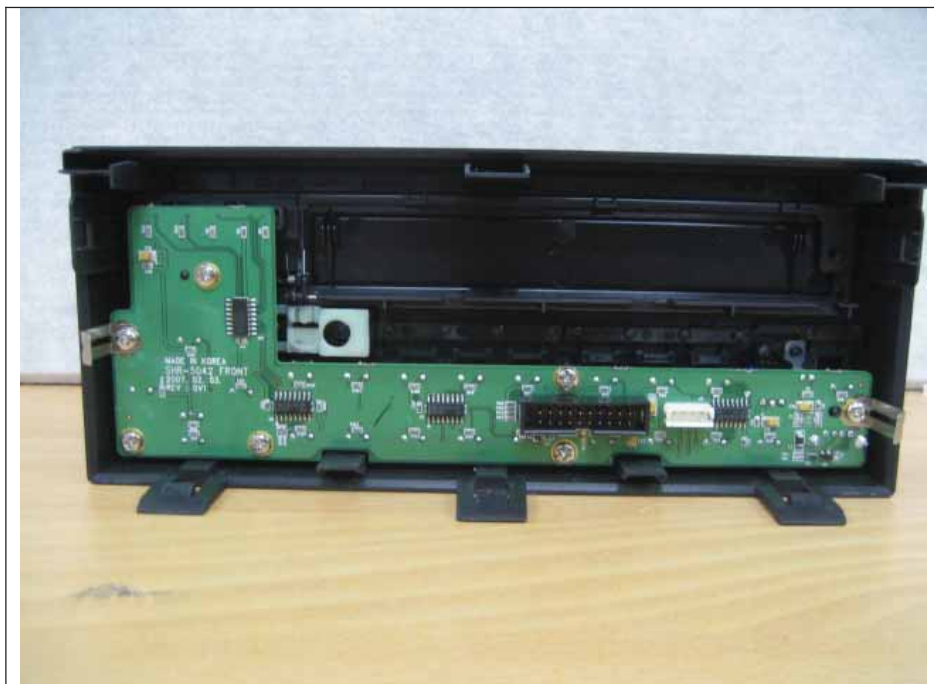
EMC Compliance Ltd.

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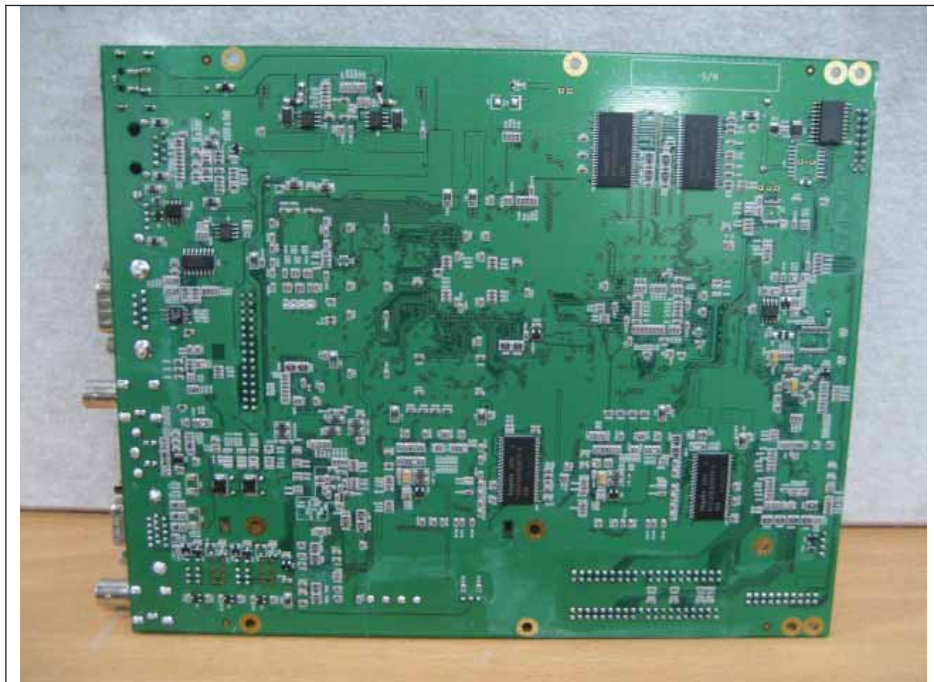
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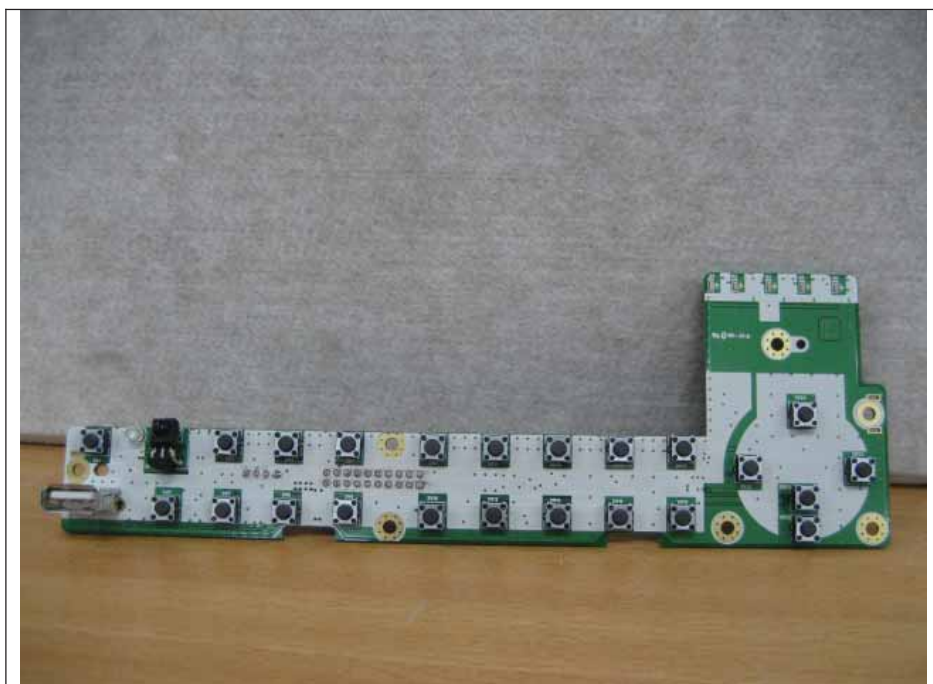
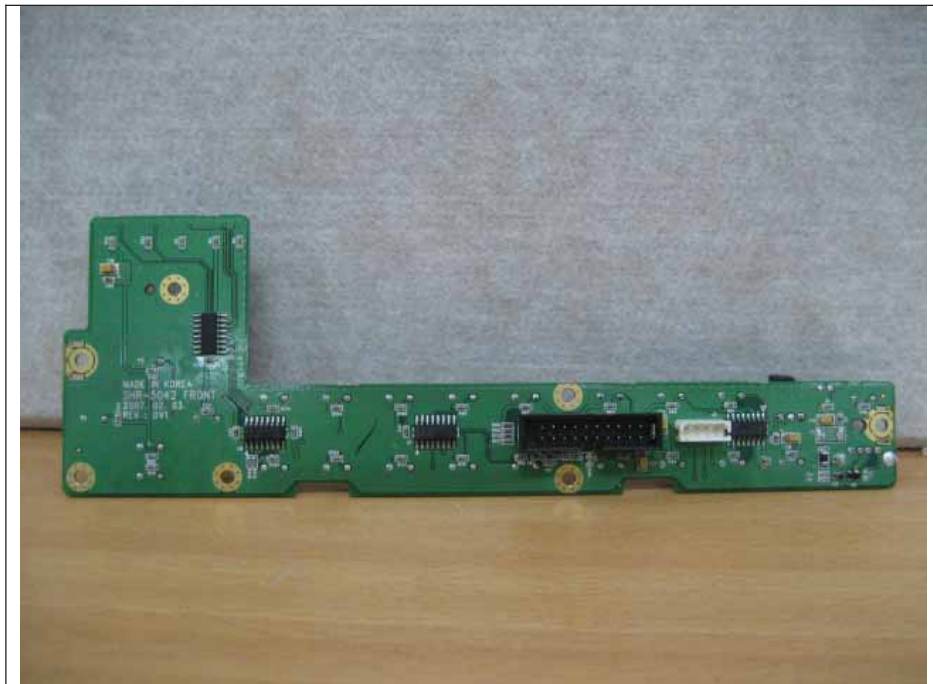
Inside



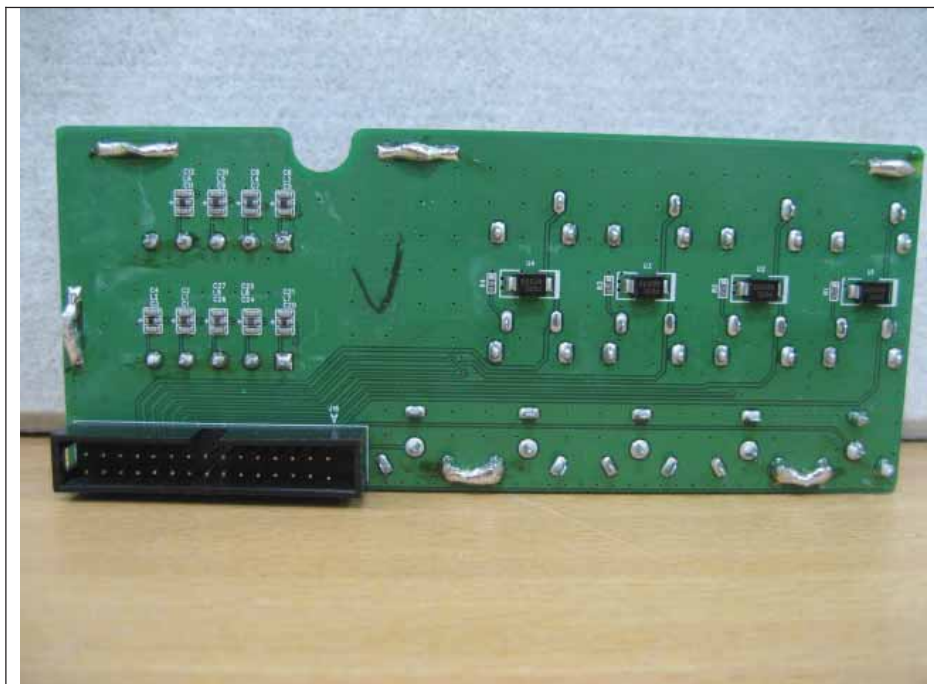
Main Board



Button Board



Port Board



HDD



ODD



Adaptor



AV Cable



BNC Cable



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D-SUB Cable



RJ-45 Cable



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RS232 Cable



S-VIDEO Cable



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