

EMC TEST REPORT

Test report no.: EMC-CE-0679

Type of equipment: Digital Video Recorder

Model Name: SHR-2080P,SHR-2082P

Test Rating: 230Vac, 50Hz

Applicant: SAMSUNG ELECTRONICS CO., LTD

Manufacturer#1: SAMSUNG ELECTRONICS CO., LTD

Manufacturer#2: Tianjin Samsung Electronics Co., Ltd.

Test standards: EN 61000-6-4: 2001 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: 2005. 12. 09-13


Date of Issue: 2005. 12. 19

Tested by:



KIM, DONG-MIN

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 : +82-31-277-3709
Facsimile Number: +82-31-277-4008
Contact person: Kim Jong Uk

Manufacturer#1: SAMSUNG ELECTRONICS CO., LTD
Address: 416, Maetan-dong, Youngtong-gu, Suwon city
Kyunggi-do, Korea
Telephone Number : +82-31-277-3709
Facsimile Number: +82-31-277-4008
Contact person: Kim Jong Uk

Manufacturer#2: Tianjin Samsung Electronics Co., Ltd.
Address: No.12, Fourth Avenue, TEDA, Tianjin, 300457,
China

2. Laboratory information

Address

EMC compliance Ltd.

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

Telephone Number : 82 31 336 9919

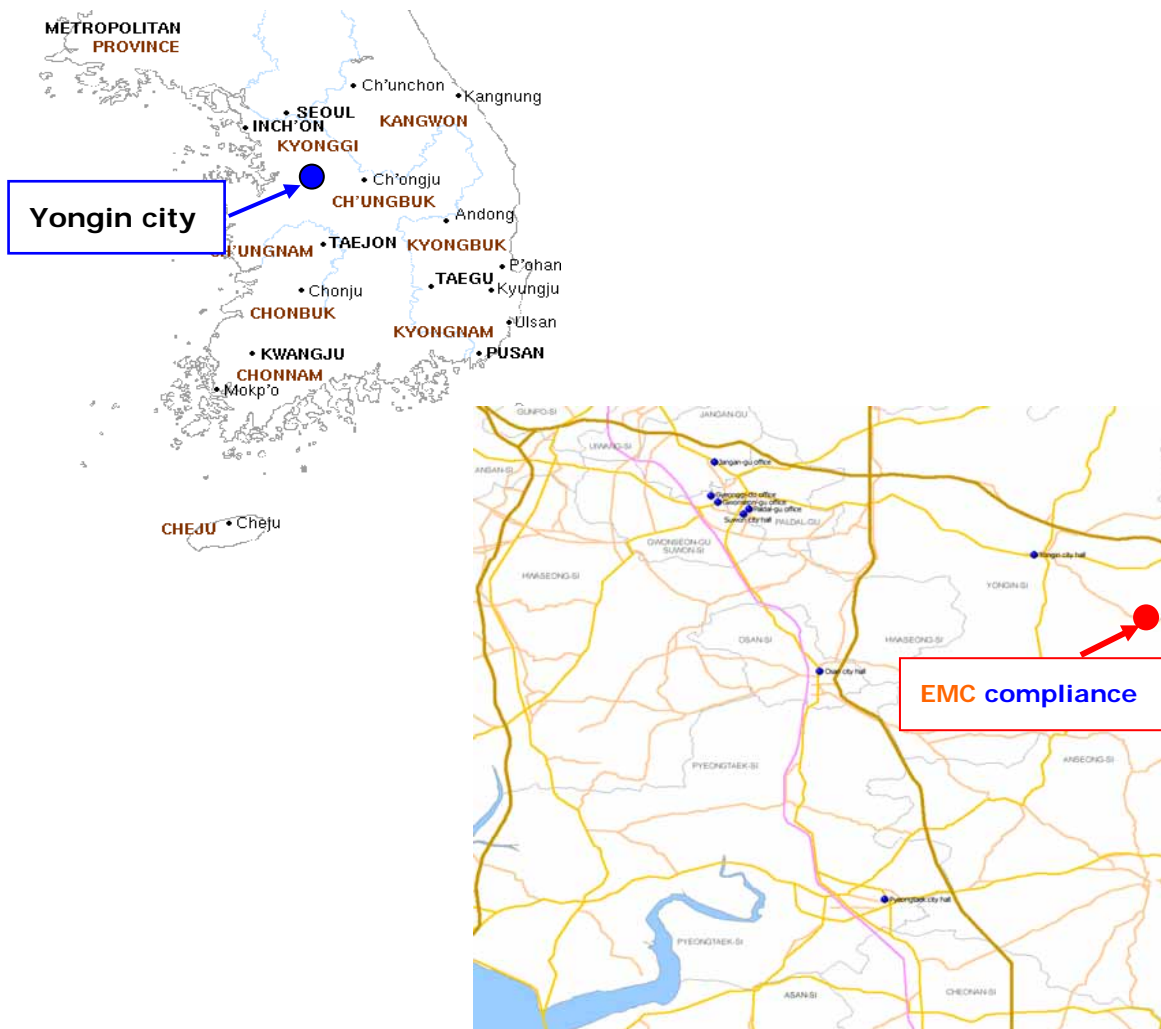
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VCCI Registration No. : C-1713, R-1606

KOLAS NO.: 231

SITE MAP



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3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
OATS	16 °C	32 %	1009 hPa
Shielded room	26 °C	38 %	1010 hPa
Immunity area	25 °C	35 %	1019 hPa

Test site

These testing items were performed following locations;

OATS (10m)	: Radiated Emission
Shielded Room	: Conducted Emission, ESD
Immunity area	: RS, EFT/ Burst, SURGE, CS, Dips, 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 follows :

$$FS = MR + LF + CL$$

MR = Meter Reading

LF = LISN Factor

CL = Cable Loss

If MR is 30dB, LISN Factor 2dB, CL 1dB

The result (MR) is

$$30 + 2 + 1 = 33\text{dBuV}$$

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 follows :

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

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 / Manufacturer#1:	SAMSUNG ELECTRONICS CO., LTD
Address:	416, Maetan-dong, Youngtong-gu, Suwon city, Kyunggi-do, Korea
Manufacturer#2 :	Tianjin Samsung Electronics Co., Ltd.
Address:	No.12, Fourth Avenue, TEDA, Tianjin, 300457, China
Type of equipment:	Digital Video Recorder
Basic Model:	SHR-2080P
Serial number:	N/A
Rating:	AC 100-230V~ 50/60Hz, 4-2A

4.2 Peripherals

Description	Model / Part #	Serial number	Manufacture
MONITOR	CX714MP-A	N495H4KXB00713H	SAMSUNG
CCTV CAMERA	DIGITAL COLOR CCD CAMERA	KCC-41	KOCOM
USB MOUSE	M-UV69a	HCA51201556	LG

4.3 Operating conditions

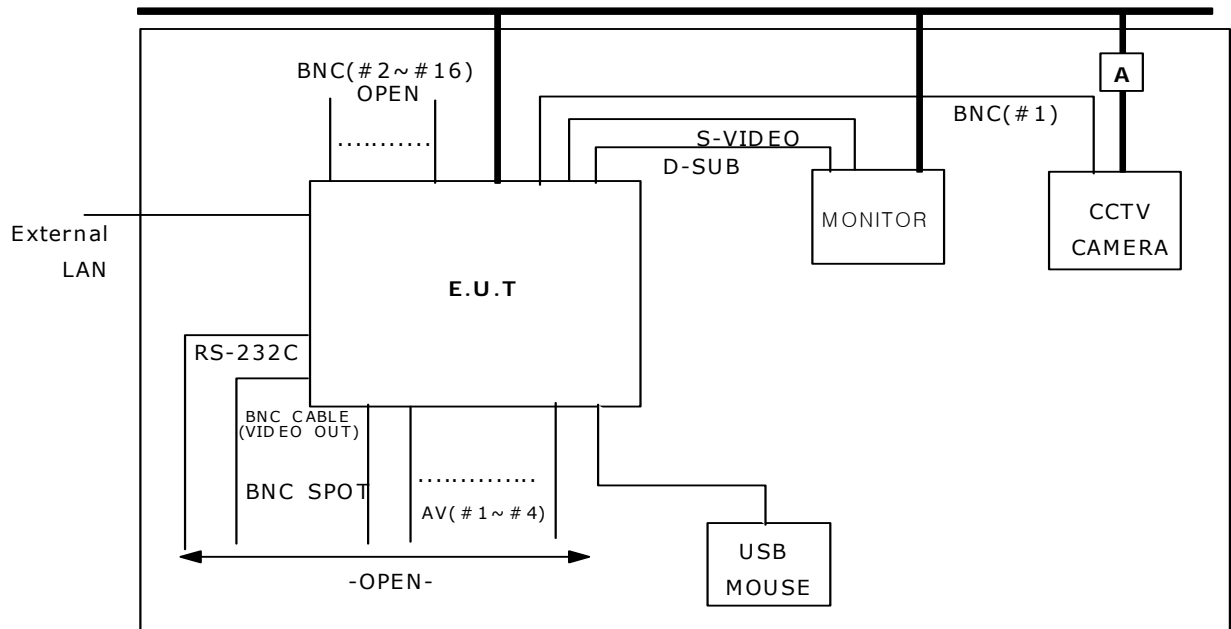
Operating :

-Recording mode

4.4 Used cables

Start		END		Cable Spec.	
Name	I/O Port	Name	I/O Port	Length	Shield
EUT	BNC#1	CCTV CAMERA	BNC#1	3.0	Shield
	BNC#2~16	OPEN	-	1.5	Shield
	BNC (Video out)	OPEN	-	1.5	Shield
	BNC(SPOT)	OPEN	-	1.5	Shield
	AV#1~4	OPEN	-	1.2	Shield
	AV (Audio out)	OPEN	-	1.2	Shield
	D-SUB	MONITOR	D-SUB	1.2	Shield
	S-VIDEO	MONITOR	S-VIDEO	1.5	Shield
	RJ-45	ROUTER	RJ-45	3.0	Unshield
	RS-232C	OPEN	-	1.5	Shield
	ALRAM#1	OPEN	-	3.0	Unshield
	ALRAM#2	OPEN	-	1.5	Unshield

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:

EN61000-6-4:2001

Electromagnetic compatibility(EMC)-Part6-4:Generic standards- Emission standard for Industrial environments.

Test items	Test method	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	Pass
Electromagnetic field	EN 61000-4-3:1995	Pass
Electric fast transients	EN 61000-4-4:1995	Pass
Surge	EN 61000-4-5:1995	Pass
Conducted immunity	EN 61000-4-6:1996	Pass
Voltage dip/interruption	EN 61000-4-11:1994	Pass

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 method	Result
Harmonics	EN 61000-3-2: 2000	Pass

EMC Compliance Ltd.

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

Performance criterion A: The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B: After the test, The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.

If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as untended.

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

6. Test results

6.1 Conducted Emission

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	100269	R&S	06.06.17	<input checked="" type="checkbox"/>
L.I.S.N.	ESH3-Z5	100269	R&S	06.06.17	<input checked="" type="checkbox"/>
	L2-32	0120J20305	PMM	05.12.27	<input checked="" type="checkbox"/>
Test site	Shield room	-	-	-	<input checked="" type="checkbox"/>

6.1.3 Measurement uncertainty

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

9kHz-150 kHz : ±3.47 [dB]

150kHz-30 MHz : ±3.01 [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]
0.189	0.12	0.1	N	79.00	40.12	40.34	66.00	39.24	39.46
0.192	0.09	0.1	H		39.03	39.22		38.00	38.19
0.255	0.09	0.1	H		33.05	33.24		30.17	30.36
0.321	0.10	0.1	H		39.73	39.93		34.26	34.46
0.381	0.13	0.1	N		40.10	40.33		32.14	32.37
0.450	0.10	0.1	H		38.69	38.89		23.81	24.01
0.507	0.13	0.1	N	73.00	44.67	44.90	60.00	31.71	31.94
0.633	0.13	0.1	N		36.64	36.87		24.72	24.95
12.010	0.83	0.2	N		36.88	37.91		34.08	35.11
17.810	1.08	0.2	N		36.80	38.08		23.12	24.40
18.110	1.07	0.2	H		36.36	37.63		25.04	26.31
23.130	1.16	0.2	N		39.45	40.81		37.91	39.27

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

6.1.5 Result

Minimum limit margin is 20.73 dB at 23.130 MHz.

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 0.1m 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	ESVD	841729/010	R&S	06.05.23	<input checked="" type="checkbox"/>
TRILOG Super Broadband Ant	VULB 9160	9160-3149	SCHWARZBECK Mess-Elektronik	06.10.10	<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: ±3.69 [dB], 10 m: ±3.67 [dB]

300-1000 MHz ; 3 m: ±4.01 [dB], 10 m: ±3.41 [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			
70.48	10.5	V	1.2	342	9.66	1.10	40.0	21.26	18.74
100.30	13.0	H	4.0	115	9.42	1.40	40.0	23.82	16.18
161.03	14.7	H	4.0	209	12.72	2.10	40.0	29.52	10.48
180.06	15.2	H	3.6	61	11.15	2.10	40.0	28.45	11.55
200.06	11.9	V	1.1	48	9.14	2.30	40.0	23.34	16.66
225.14	10.3	V	1.6	276	10.20	2.50	40.0	23.00	17.00
375.00	20.0	H	2.6	90	14.56	3.60	47.0	38.16	8.84
575.36	11.2	H	2.1	150	18.89	4.90	47.0	34.99	12.01
675.00	9.1	V	1.5	43	20.35	5.60	47.0	35.05	11.95
692.02	9.6	V	2.6	254	20.56	5.90	47.0	36.06	10.94
825.01	7.2	H	1.0	100	22.40	6.60	47.0	36.20	10.80
920.01	1.5	V	1.7	168	23.20	7.10	47.0	31.80	15.20

* 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 8.84 dB at 375.00 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 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	PESD1600	H011309	HAEFELY	2006.08.12	<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 : $\pm 2, 4, 6\text{kV}$
- Air Discharge : $\pm 2, 4, 8\text{kV}$

Discharge Impedance

- $330\ \Omega/150\ \text{pF}$ $2\text{K}\Omega/330\ \text{pF}$

Number Of Discharge

- Number of discharges per point, for each voltage and polarity
: 10 (Interval between discharges : $\geq 1\text{s}$)

Test point (Please refer to attached photograph.)

- Contact Discharge : EUT Case, Screw, Control Switch(Ground), BNC Port
AV Port, RS-232C Port, D-SUB Port
- Air Discharge : Control Switch (Button), EUT Front LED, S-Video Port
RJ-45 Port, USB Port, Alarm Port

Test Results

- Complied Not complied

Comment :

- There was no change of operation status during above testing.
(Control Switch (Button), EUT Front LED, S-Video Port, RJ-45 Port, USB Port
Alarm Port, EUT Case, Screw, BNC Port, AV Port, RS-232C Port, D-SUB Port)
- During the test, EUT was appeared dot. After this test, EUT was operated normally. (Control Switch (Ground))

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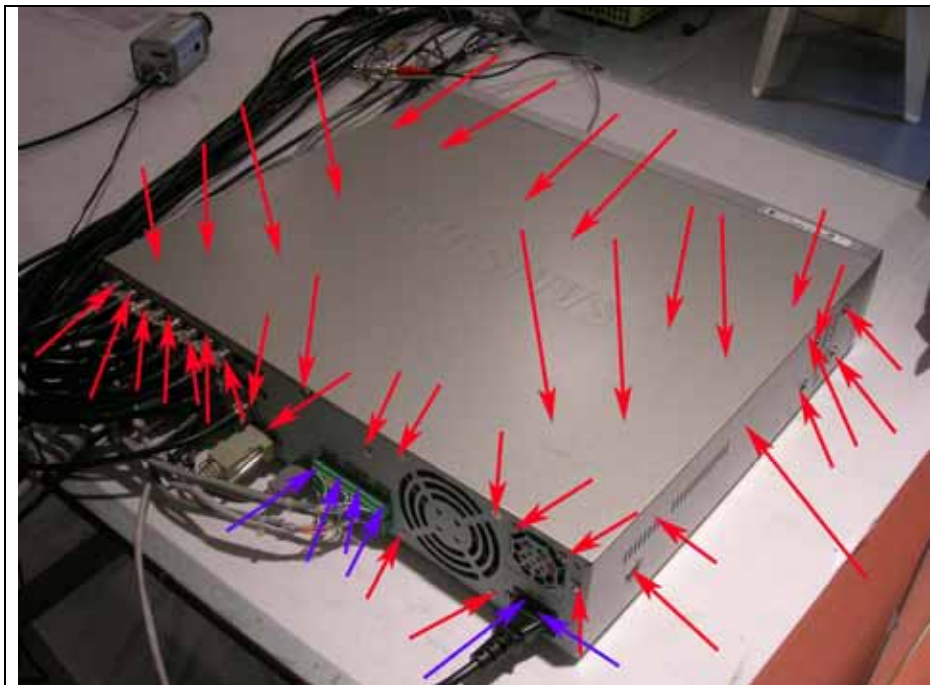
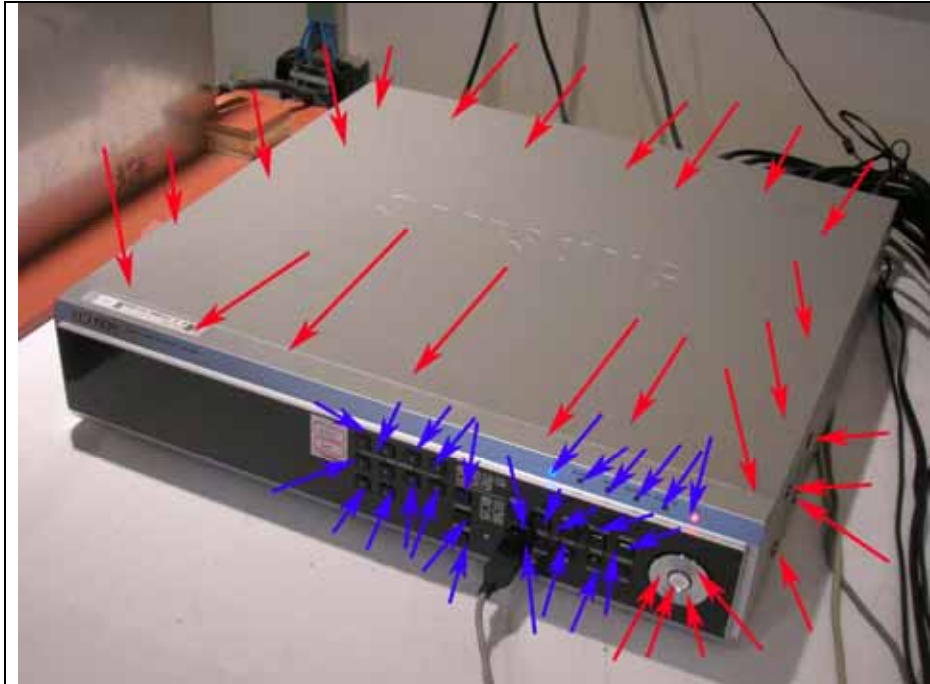
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Electrostatic Discharge (Test Point)

Air discharge	→
Contact discharge	→



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	06.05.03	<input checked="" type="checkbox"/>
Field monitor	FM5004	303078	AR	07.12.09	<input checked="" type="checkbox"/>
Power sensor (with adapter)	PH2000	303224	AR	06.05.03	<input checked="" type="checkbox"/>
Power sensor (with adapter)	PH2000	303222	AR	06.05.03	<input checked="" type="checkbox"/>
Isotropic probe	FP5000	303057	AR	07.12.09	<input checked="" type="checkbox"/>
Directional coupler	DC6180	303976	AR	06.05.03	<input checked="" type="checkbox"/>
Amplifier	150W1000M2	303843	AR	06.05.03	<input checked="" type="checkbox"/>
Signal generator	2023A	202304/2578	IFR	06.05.03	<input checked="" type="checkbox"/>
Function generator	33120A	US36018826	HP	07.05.03	<input checked="" type="checkbox"/>
BiconiLog Ant.	3142B	1786	EMCO	06.05.15	<input checked="" type="checkbox"/>

6.4.3 Measurement uncertainty

Radio Frequency Electromagnetic Fields : ± 1.89 [dB] (k=2, 95%)

6.4.4 Test Data

Test Specification : EN 61000-4-3

Frequency Range

80MHz - 1000MHz 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 0.1 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	0701-03	EM TEST	06.05.03	<input checked="" type="checkbox"/>
	RWG500 M6	0701-08	EM TEST	06.05.08	<input type="checkbox"/>
	TSS500 M4	0402-01	EM TEST	06.05.03	<input 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
 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, RJ-45 NET cable, Alarm 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.
(L1, L2, PE)
-During the test, EUT was appeared dot. After this test, EUT was operated normally. (± 1 kV & ± 2 kV: L1-L2, L1-PE, L2-PE, L1-L2-PE/ ± 0.5 kV & ± 1 kV: BNC Cable, RJ-45 NET cable, Alarm cable)

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 0.1 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	0701-03	EM TEST	06.05.03	<input checked="" type="checkbox"/>
	RWG500 M6	0701-08	EM TEST	06.05.08	<input type="checkbox"/>
	TSS500 M4	0402-01	EM TEST	06.05.03	<input type="checkbox"/>
Coupling Clamp	CNV 508 S2	1001-10	EM TEST	06.05.16	<input checked="" type="checkbox"/>

6.6.3 Test Data

Test Specification : EN 61000-4-5

Coupling

Power Signal Line Telecommunication line

Test level

Power : ± 0.5 kV & ± 1 kV & ± 2 kV

Signal Line : ± 0.5 kV & ± 1 kV

Tel. line :

Test mode

- Power : L-N, L-PE, N-PE

- Signal Line : BNC cable

Coupling Impedance

40Ω+0.5μF 40Ω 10Ω+9μF 18μF

Coupling Time : > 5 s

Number of Surge : 20

Angle : 0,45,90,135,180, 225, 270, 315

Test Results

Complied Not complied

Comment :

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

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 0.1 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	06.05.03	<input checked="" type="checkbox"/>
CDN	M016	16674	Schaffner	06.04.08	<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, BNC cable, RJ-45 NET cable, Alarm 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.

6.8 Dips and Interruptions

6.8.1 Measurement procedure

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

The dips/interruptions were applied at zero crossing.

6.8.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
dips/interruption Tester	UCS 500 M6	0701-03	EM TEST	06.05.03	<input checked="" type="checkbox"/>
	RWG500 M6	0701-08	EM TEST	06.05.08	<input type="checkbox"/>
	TSS500 M4	0402-01	EM TEST	06.05.03	<input type="checkbox"/>

6.8.3 Test data

Test specification : EN 61000-4-11

Test data

-230Vac-

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

Test results Complied Not complied**Comment :**

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

6.9 Harmonics

6.9.1 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.

6.9.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Harmonics/Flicker meter	5001x-CTS-400-413	54984	C.I.	06.05.03	<input checked="" type="checkbox"/>
Test site	Immunity area	-	-	-	<input checked="" type="checkbox"/>

6.9.3 Test data

- Refer to attached test data

Test results

Complied Not complied

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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6.10 Flicker

6.10.1 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.

$$P_{It} = 2 \text{ h}$$

$$P_{st} = 10 \text{ min}$$

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.

6.10.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Harmonics/Flicker meter	5001x-CTS-400-413	54984	C.I.	06.05.03	<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

7. Test photographs

Conducted emission



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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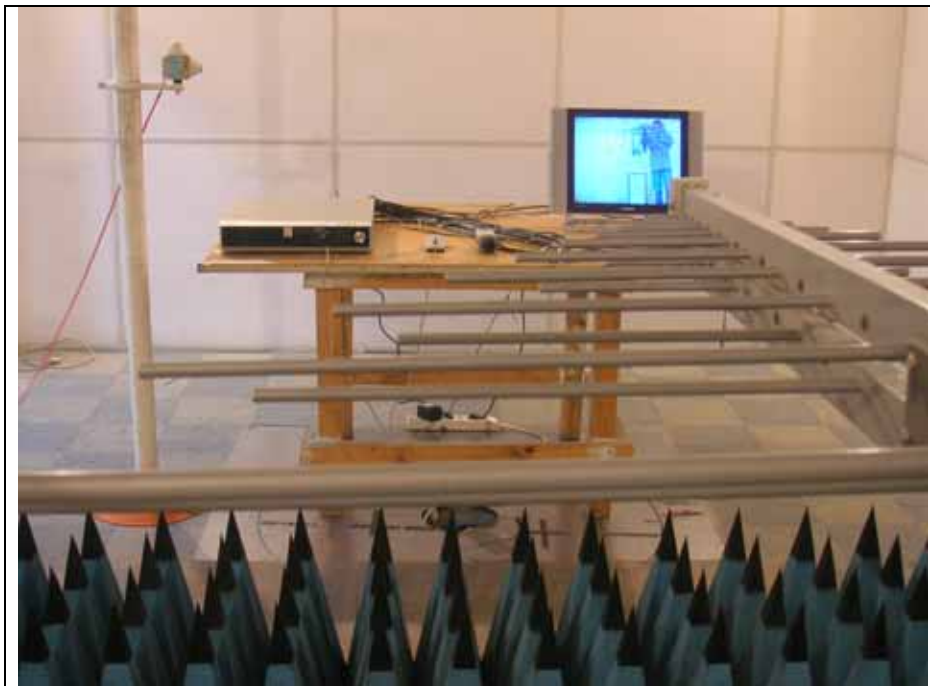
Radiated Emission



Electrostatic Discharge



Radio Frequency Electromagnetic Fields



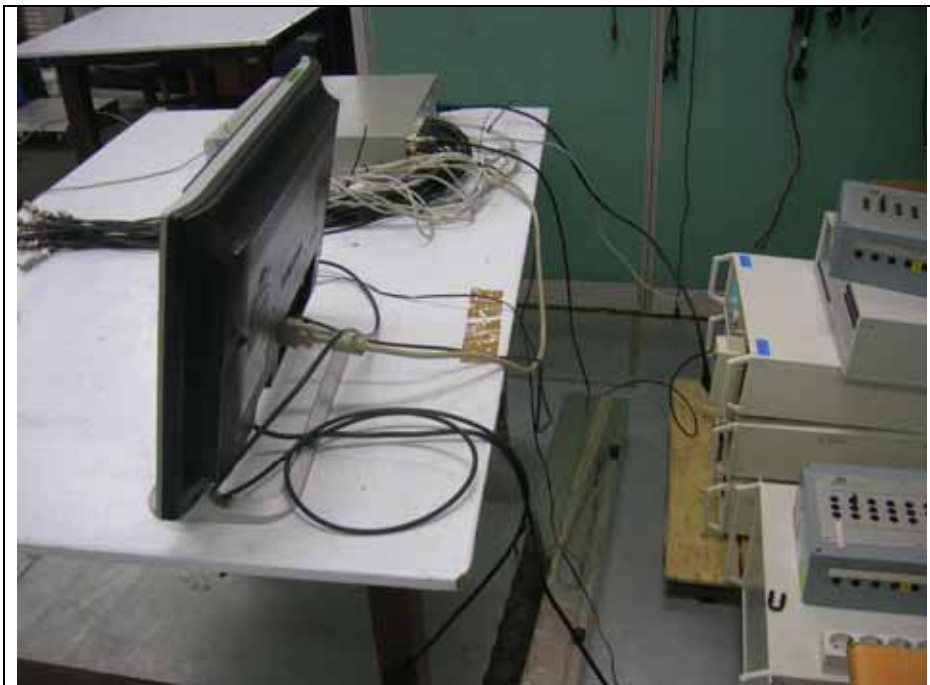
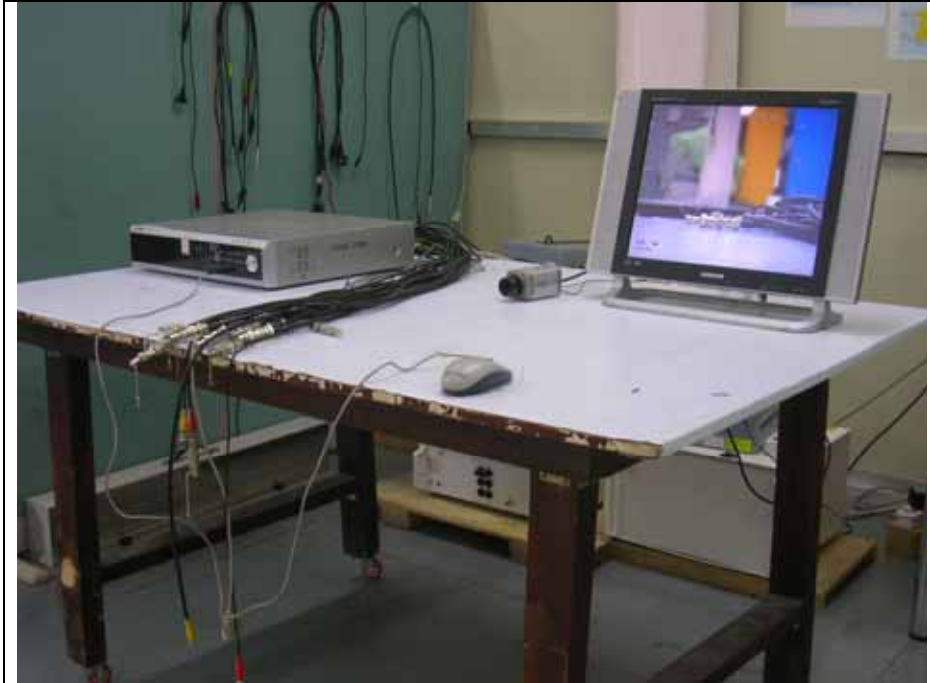
EMC Compliance Ltd.

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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Electric Fast Transient



EMC Compliance Ltd.

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

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Surge



EMC Compliance Ltd.

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

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Conducted Immunity



Dip & Interruptions



Harmonic/Flicker



EMC Compliance Ltd.

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8. E.U.T. photographs

Front View



Rear View



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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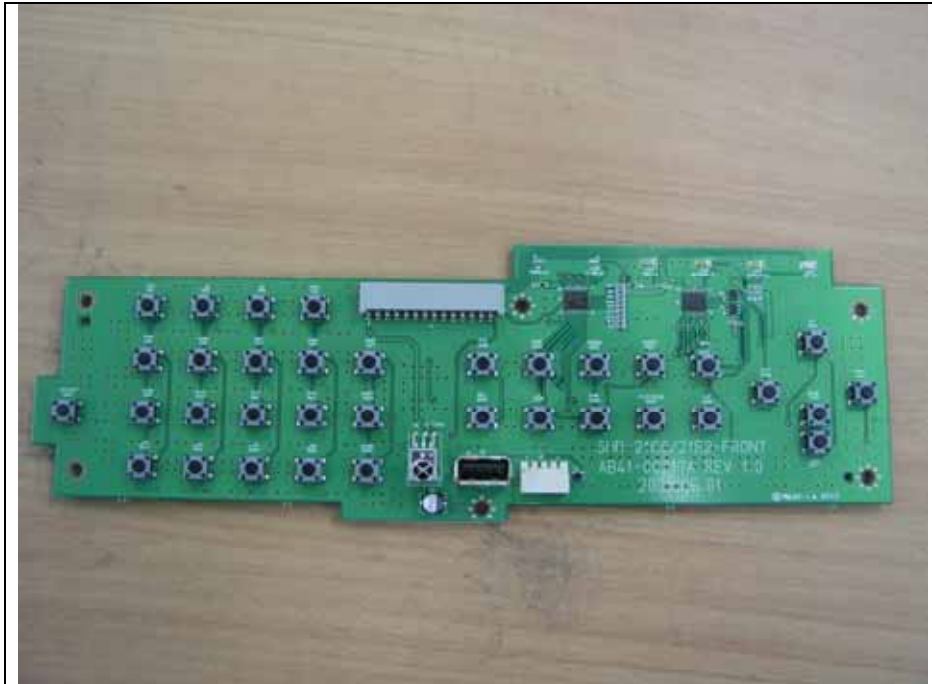
Inside



Main Board

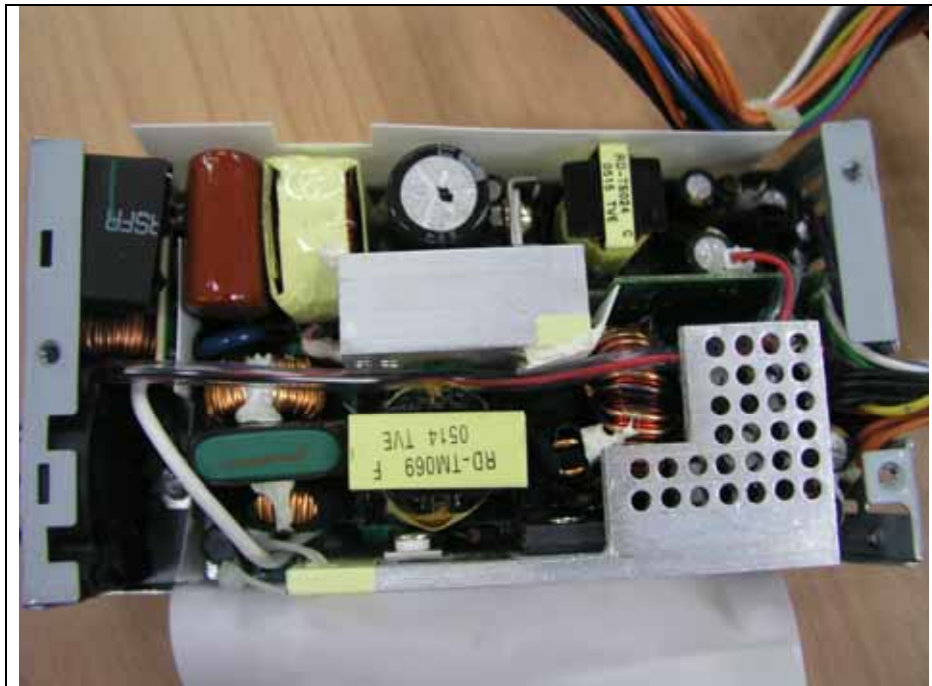


Switch Board

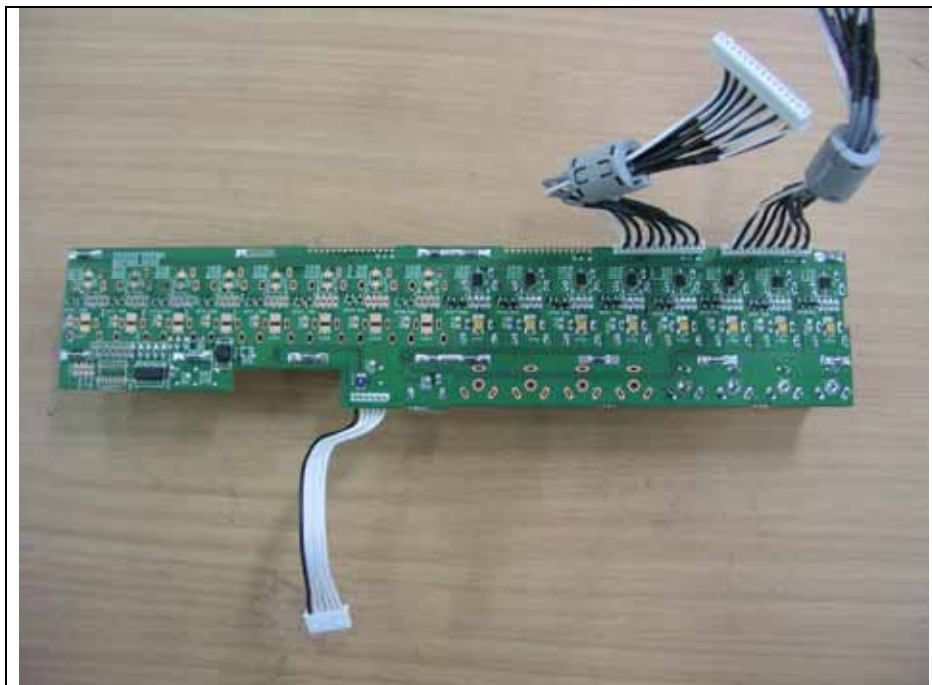


SMPS





Rear Board



HDD



9. Appendix

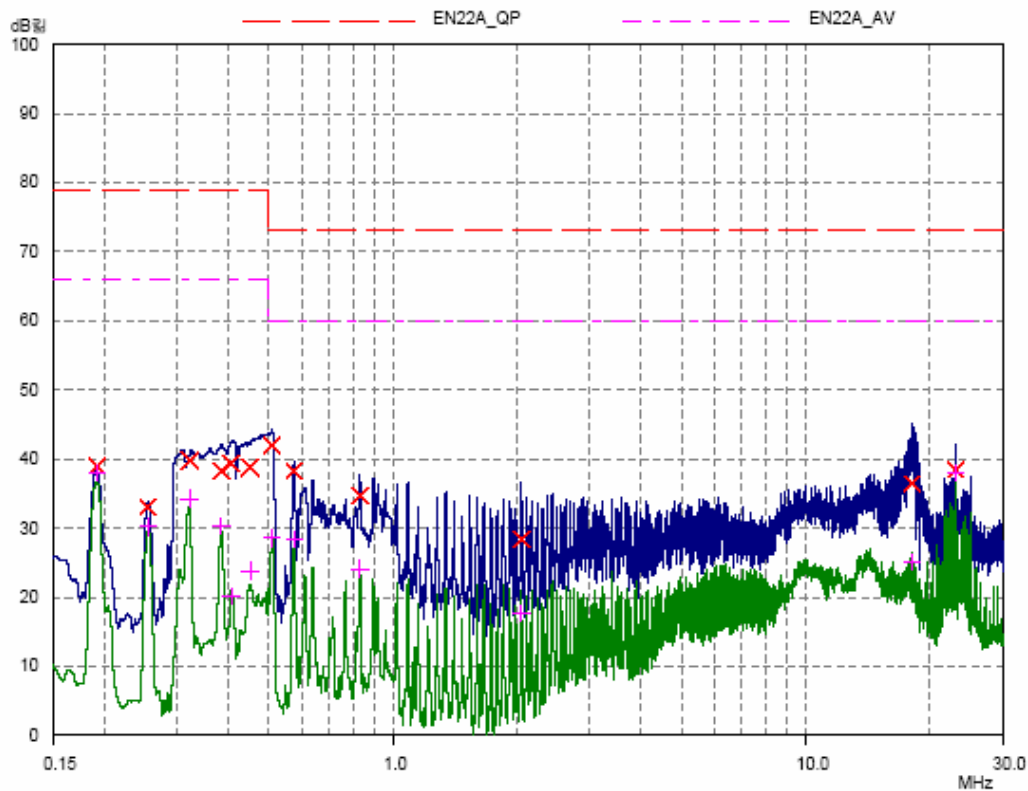
Conducted Emission test graph

EUT: DVR_SHR-2080
 Manuf: SAMSUNG ELECTRONIC
 Op Cond: H
 Operator:
 Test Spec: EN22 Class A Conducted Emission
 Comment:

Result File: 0512018h.dat : SAMSUNG_DVR_SHR-2080_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



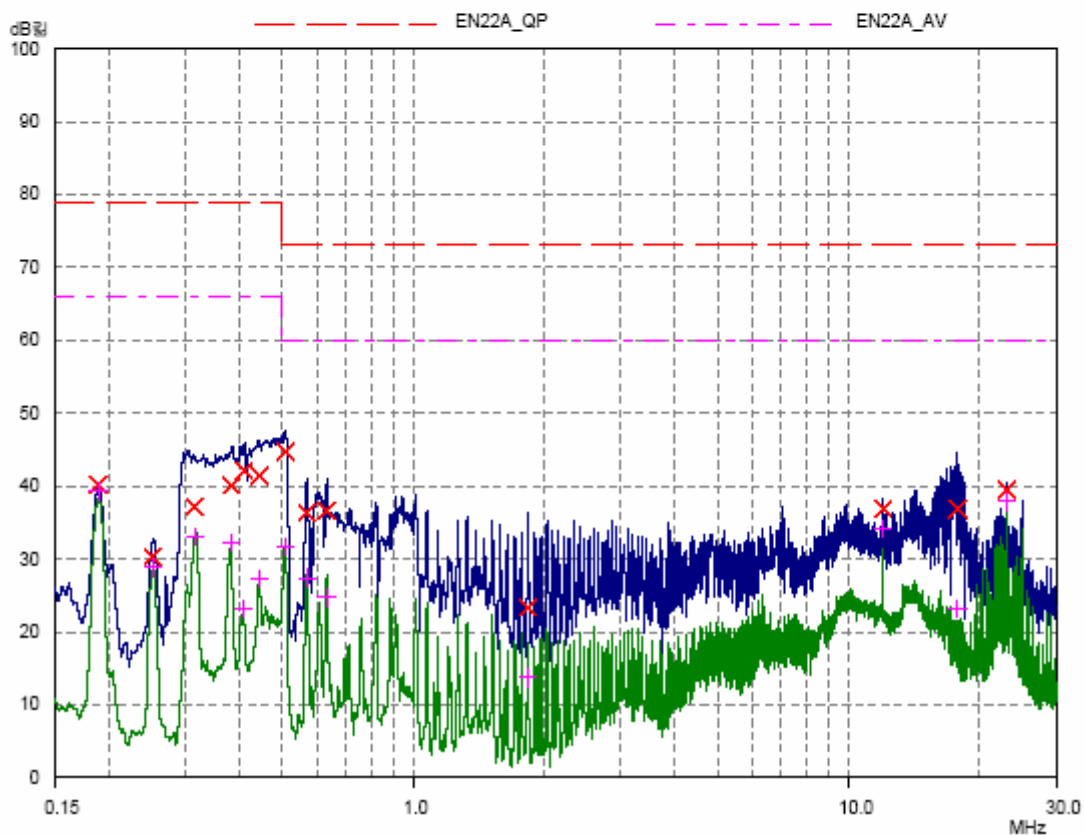
EUT: DVR
 Manuf: SAMSUNG ELECTRONIC
 Op Cond: N
 Operator:
 Test Spec: EN22 Class A Conducted Emission
 Comment:

Result File: 0512018n.dat : SAMSUNG_DVR_SHR-2080_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



Harmonics test graph

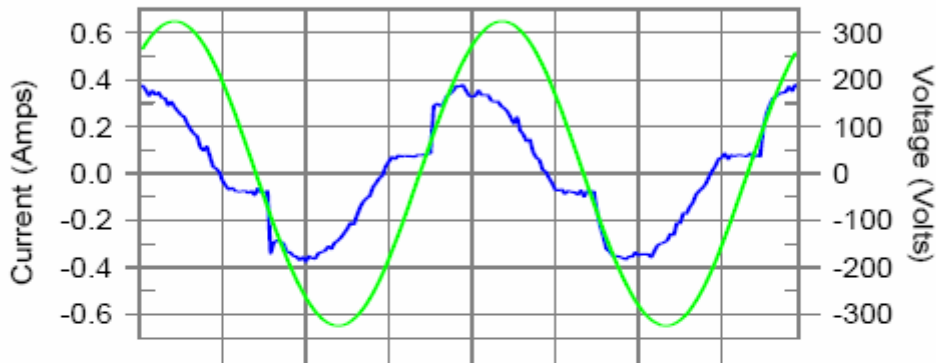
Harmonics – Class-A per A-14(Run time)

EUT: DVR_SHR - 2080
 Test category: Class-A per A-14 (European limits)
 Test date: 2005-12-12
 Test duration (min): 2.5
 Comment:
 Customer: 삼성전자

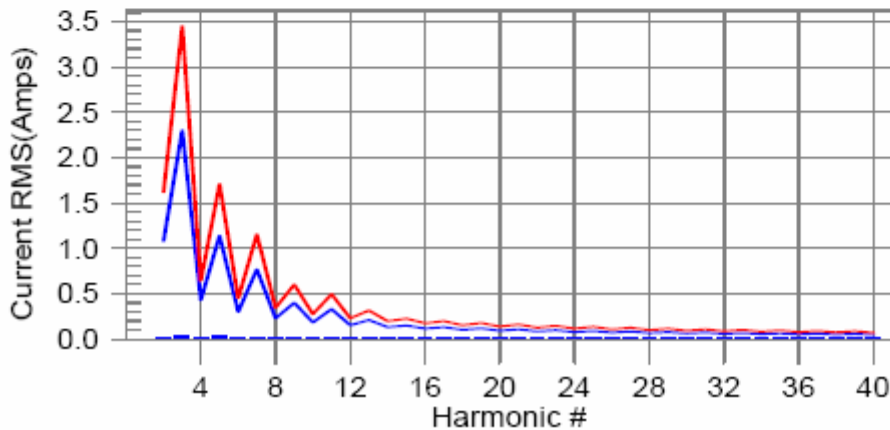
Tested by:
 Test Margin: 100
 Start time: 오후 1:42:58
 End time: 오후 1:45:34
 Data file name: H-000446.cts_data

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line European Limits



Test result: Pass Worst harmonic was #39 with 3.32% of the limit.

Current Test Result Summary (Run time)

EUT: Smart Terminal
 Test category: Class-A per A-14 (European limits)
 Test date: 2005-12-12
 Test duration (min): 2.5
 Comment:
 Customer:

Tested by:
 Test Margin: 100
 Start time: 오후 1:42:58
 End time: 오후 1:45:34

Data file name: H-000446.cts_data

Test Result: Pass
 Source qualification: Normal
 THC(A): 0.05 I-THD(pk%): 21.39 POHC(A): 0.009 POHC Limit(A): 0.251
 Highest parameter values during test:
 V_RMS (Volts): 229.48
 I_Peak (Amps): 0.404
 I_Fund (Amps): 0.232
 Power (Watts): 45
 Frequency(Hz): 50.00
 I_RMS (Amps): 0.238
 Crest Factor: 1.712
 Power Factor: 0.831

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.000	1.080	0.0	0.000	1.620	0.02	Pass
3	0.036	2.300	1.6	0.037	3.450	1.06	Pass
4	0.000	0.430	0.0	0.000	0.645	0.03	Pass
5	0.025	1.140	2.2	0.025	1.710	1.47	Pass
6	0.000	0.300	0.1	0.000	0.450	0.09	Pass
7	0.014	0.770	1.8	0.014	1.155	1.23	Pass
8	0.000	0.230	0.0	0.000	0.345	0.04	Pass
9	0.007	0.400	1.8	0.007	0.600	1.20	Pass
10	0.000	0.184	0.0	0.000	0.276	0.05	Pass
11	0.005	0.330	1.6	0.006	0.495	1.12	Pass
12	0.000	0.153	0.1	0.000	0.230	0.12	Pass
13	0.006	0.210	3.1	0.007	0.315	2.10	Pass
14	0.000	0.131	0.1	0.000	0.197	0.09	Pass
15	0.005	0.150	3.3	0.005	0.225	2.22	Pass
16	0.000	0.115	0.1	0.000	0.173	0.09	Pass
17	0.004	0.132	2.7	0.004	0.199	1.82	Pass
18	0.000	0.102	0.3	0.000	0.153	0.27	Pass
19	0.003	0.118	2.9	0.004	0.178	2.02	Pass
20	0.000	0.092	0.2	0.000	0.138	0.17	Pass
21	0.004	0.107	4.0	0.004	0.161	2.72	Pass
22	0.000	0.084	0.3	0.000	0.125	0.24	Pass
23	0.003	0.098	3.1	0.003	0.147	2.16	Pass
24	0.000	0.077	0.3	0.000	0.115	0.29	Pass
25	0.003	0.090	3.5	0.003	0.135	2.43	Pass
26	0.000	0.071	0.3	0.000	0.106	0.23	Pass
27	0.003	0.083	3.5	0.003	0.125	2.45	Pass
28	0.000	0.066	0.3	0.000	0.099	0.25	Pass
29	0.003	0.078	3.7	0.003	0.116	2.58	Pass
30	0.000	0.061	0.3	0.000	0.092	0.35	Pass
31	0.003	0.073	3.8	0.003	0.109	2.61	Pass
32	0.000	0.058	0.3	0.000	0.086	0.25	Pass
33	0.003	0.068	4.0	0.003	0.102	2.81	Pass
34	0.000	0.054	0.2	0.000	0.081	0.22	Pass
35	0.002	0.064	3.0	0.002	0.096	2.10	Pass
36	0.000	0.051	0.3	0.000	0.077	0.25	Pass
37	0.003	0.061	4.5	0.003	0.091	3.15	Pass
38	0.000	0.048	0.4	0.000	0.073	0.33	Pass
39	0.003	0.058	4.8	0.003	0.087	3.32	Pass
40	0.000	0.046	0.4	0.000	0.069	0.32	Pass

Voltage Source Verification Data (Run time)

EUT: Smart Terminal
 Test category: Class-A per A-14 (European limits)
 Test date: 2005-12-12 Start time: 오후 1:42:58
 Test duration (min): 2.5 Data file name: H-000446.cts_data
 Comment:
 Customer:

Tested by:
 Test Margin: 100
 End time: 오후 1:45:34

Test Result: Pass

Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms): 229.48	Frequency(Hz): 50.00
I_Peak (Amps): 0.404	I_RMS (Amps): 0.238
I_Fund (Amps): 0.232	Crest Factor: 1.712
Power (Watts): 45	Power Factor: 0.831

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.098	0.459	21.40	OK
3	0.593	2.065	28.71	OK
4	0.020	0.459	4.46	OK
5	0.033	0.918	3.57	OK
6	0.021	0.459	4.53	OK
7	0.016	0.688	2.32	OK
8	0.019	0.459	4.19	OK
9	0.021	0.459	4.50	OK
10	0.008	0.459	1.82	OK
11	0.015	0.229	6.72	OK
12	0.016	0.229	6.77	OK
13	0.029	0.229	12.53	OK
14	0.011	0.229	4.81	OK
15	0.004	0.229	1.61	OK
16	0.009	0.229	3.98	OK
17	0.015	0.229	6.33	OK
18	0.027	0.229	11.64	OK
19	0.009	0.229	3.87	OK
20	0.007	0.229	2.86	OK
21	0.006	0.229	2.83	OK
22	0.018	0.229	7.77	OK
23	0.005	0.229	2.08	OK
24	0.015	0.229	6.44	OK
25	0.006	0.229	2.79	OK
26	0.011	0.229	4.75	OK
27	0.008	0.229	3.45	OK
28	0.007	0.229	3.22	OK
29	0.011	0.229	4.67	OK
30	0.013	0.229	5.67	OK
31	0.013	0.229	5.50	OK
32	0.010	0.229	4.56	OK
33	0.007	0.229	3.14	OK
34	0.004	0.229	1.70	OK
35	0.007	0.229	3.19	OK
36	0.007	0.229	3.26	OK
37	0.008	0.229	3.42	OK
38	0.006	0.229	2.52	OK
39	0.010	0.229	4.36	OK
40	0.005	0.229	2.00	OK

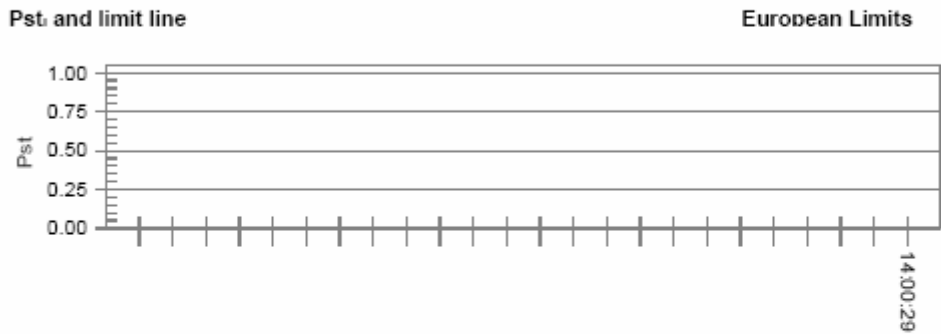
Flicker test graph

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

EUT: DVR_SHR-2080
 Test category: All parameters (European limits)
 Test date: 2005-12-12
 Test duration (min): 10
 Comment:
 Customer: SAMSUNG ELECTRONIC

Tested by:
 Test Margin: 100
 Start time: 오후 1:50:22
 End time: 오후 2:00:31
 Data file name: F-000448.cts_data

Test Result: Pass Status: Test Completed



Time is too short for Plt plot

Parameter values recorded during the test:

Vrms at the end of test (Volt):	229.34	Test limit (%):	3.30	Pass
Highest dt (%):	0.00	Test limit (mS):	500.0	Pass
Time(mS) > dt:	0.0	Test limit (%):	3.30	Pass
Highest dc (%):	0.00	Test limit (%):	4.00	Pass
Highest dmax (%):	0.00	Test limit:	1.000	Pass
Highest Pst (10 min. period):	0.001	Test limit:	0.650	Pass
Highest Plt (2 hr. period):	0.001			