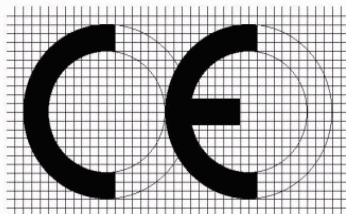


EU Declaration of Conformity (EMC)

Type of equipment: DIGITAL VIDEO RECORDER
Model Name: SHR-6164P(N)
Variant Model Name: SHR-6163P(N), SHR-6160P(N), SHR-6162P(N),
SHR-6080P(N), SHR-6082P(N)
Applicant: SAMSUNG ELECTRONICS Co., Ltd.
Address: 416 Maetan3-Dong, Yeongtong-Gu,
Suwon-City, Gyeonggi-Do, Korea, 443-742
Manufacturer: TIANJIN SAMSUNG ELECTRONICS CO., LTD.
Address: 300457 TSEC No.12 FOURTH AVENUE, TEDA,
TIANJIN, CHINA

We hereby declare, that all major safety requirements, concerning to CE Mark Directive (93/68/EEC) Electromagnetic Compatibility Directives (2004/108/EC, 92/31/EEC) are fulfilled, as laid out in the guideline set down by the member states of the EEC Commission.

This declaration is valid for all samples that are part of this declaration, which are manufactured according to the production charts appendix.



The standards relevant for the evaluation of EMC requirements are as follows :

EN 55022:2006, EN 50130-4:1995+A1+1998+A2:2003

EN 61000-3-2:2006, EN 61000-3-3/A2:2005

1. Certificate of conformity / Test report issued by:

EMC : EMC Compliance Laboratory

Report No : EMC-CE-1633

2. Technical documentation kept at: SAMSUNG ELECTRONICS Co., Ltd.

which will be made available upon request.

SAMSUNG ELECTRONICS Co., Ltd.

416 Maetan3-Dong, Yeongtong-Gu,
Suwon-City, Gyeonggi-Do, Korea, 443-742

(place and date of issue)

(name and signature of authorized person)

EMC TEST REPORT

Test report No: EMC-CE-1633
Type of Equipment : DIGITAL VIDEO RECORDER
Model Name: SHR-6164P(N)
Variant Model Name: SHR-6163P(N), SHR-6160P(N), SHR-6162P(N),
SHR-6080P(N), SHR-6082P(N)
Applicant: SAMSUNG ELECTRONICS Co., Ltd.
416 Maetan3-Dong, Yeongtong-Gu,
Suwon-City, Gyeonggi-Do, Korea, 443-742
Manufacturer: TIANJIN SAMSUNG ELECTRONICS CO., LTD.
300457 TSEC No.12 FOURTH AVENUE, TEDA,
TIANJIN, CHINA

Test standards :

EN 55022:2006, Class A, EN 50130-4:1995+A1:1998+A2:2003
EN 61000-3-2:2006, EN 61000-3-3/A2:2005

Testing Laboratory: EMC Compliance Ltd.

Test result : Complied

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

The results in this report apply only to the sample tested.

This test report shall not be reproduced except in full, without the written approval of EMC compliance Laboratory.

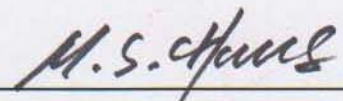
Date of receipt: 2009. 03. 04

Date of testing: 2009. 03. 05 ~ 03. 10

Issued date: 2009. 03. 11

Tested by: 

SUNG, GI-MUN

Approved by: 

CHUNG, MIN-SEOK

EMC Compliance Ltd.

82-1 Jeil-ri, Yangji-myun, Churingu, Yongin-city, Kyunggi-do 449-825, Korea
TEL: 82 31 336 9919 FAX : 82 31 336 4767

This test report shall not be reproduced except in full, Without the written approval.

Contents

1. Applicant information	3
2. Laboratory information	4
3. Test system configuration	5
3.1 Operation environment	5
3.2 Measurement Uncertainty	6
4. Description of E.U.T.....	7
4.1 General information	7
4.2 Product description.....	7
4.3 Auxiliary equipments.....	7
4.4 Test configuration.....	8
4.5 Operating conditions.....	8
5. Summary of test results.....	10
5.1 Modification to the E.U.T.	10
5.2 Summary of EMI emission test results	10
5.3 Summary of immunity test results	10
5.4 Performance criteria	11
6. Test results.....	13
6.1 Conducted Emission.....	13
6.2 Radiated Emission.....	22
6.3 Harmonics.....	27
6.4 Flicker	32
6.5 Electrostatic Discharge test result	35
6.6 Radio Frequency Electromagnetic Fields.....	39
6.7 Electric Fast Transient/BURST	42
6.8 Surge.....	45
6.9 Conducted Immunity.....	48
6.10 Dips and Interruptions.....	51
6.11 Mains supply voltage variations	54
7. E.U.T. photographs.....	55

1. Applicant information

Applicant: SAMSUNG ELECTRONICS Co., Ltd.
Address: 416 Maetan3-Dong, Yeongtong-Gu,
Suwon-City, Gyeonggi-Do, Korea, 443-742
Telephone: +82- 31-277-2641
Fax: +82- 31-277-2784
E-mail: js2002.kang@samsung.com
Contact name: **Kang Je Soon**

Manufacturer: TIANJIN SAMSUNG ELECTRONICS CO., LTD.
Address: 300457 TSEC No.12 FOURTH AVENUE,
TEDA, TIANJIN, CHINA

2. Laboratory information

Address

EMC compliance Ltd.

82-1 Jeil-ri, Yangji-myun, Churingu, Yongin-city, Kyunggi-do 449-825, Korea

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-2710, T-258

Industry Canada Registration No. : 8035A

KOLAS NO.: 231

SITE MAP



EMC Compliance Ltd.

82-1 Jeil-ri, Yangji-myun, Churingu, Yongin-city, Kyunggi-do 449-825, Korea

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

This test report shall not be reproduced except in full, Without the written approval.

3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
OATS	10 °C	64 % R.H.	-
Shielded room	19 °C	33 % R.H.	-
Immunity area	19 °C	34 % R.H.	100.9 kPa

Test site

These testing items were performed following locations;

Shielded Room : Conducted Emission
OATS (10 m) : Radiated Emission (#4)
Anechoic chamber (3 m): RS
Immunity area : ESD, EFT/Burst, Surge, CS,
Dip/Interruption, variation,
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 CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

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

9 kHz ~ 150 kHz: ± 3.052 [dB μ V]

150 kHz ~ 30 MHz: ± 2.532 [dB μ V]

Radiated Emission measurement: ($k = 2$, 95 %)

30 ~ 300 MHz: 3 m: ± 3.53 [dB μ V/m], 10 m: ± 3.52 [dB μ V/m]

300 ~ 1000 MHz: 3 m: ± 3.70 [dB μ V/m], 10 m: ± 3.69 [dB μ V/m]

Radio Frequency Electromagnetic Fields: ($k = 2$, 95 %)

± 1.0234 [dB μ V/m]

4. Description of E.U.T.

4.1 General information

- SHR-6164P(N) is a DIGITAL VIDEO RECORDER.

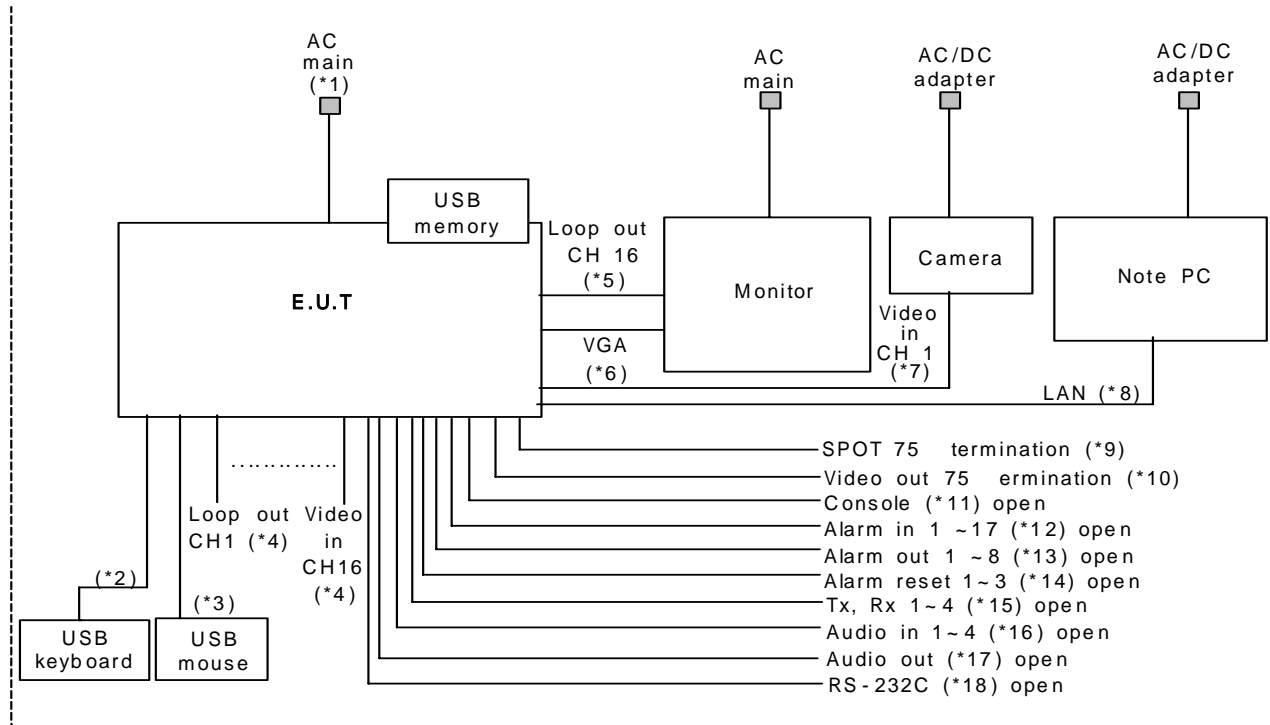
4.2 Product description

Type of product:	DIGITAL VIDEO RECORDER
Model name (Basic):	SHR-6164P(N)
Model name (Variant):	SHR-6163P(N), SHR-6160P(N), SHR-6162P(N), SHR-6080P(N), SHR-6082P(N)
Difference:	Marketing model name
Serial no:	-
Trade name :	-
Testing Voltage:	230 V , 50 Hz
Product rating:	100 ~ 240 V , 50 / 60 Hz
Note :	This test was done with SHR-6164P(N)

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Monitor	CX911MW	N732H11L900530W	SAMSUNG
Camera	260X	-	KOCOM
Note PC	C1320	413610861945	FUJITSU
USB keyboard	SKG-2100UB	K2UBTAKQ502941X	SAMSUNG
USB mouse	SMH-210UB	M2UBAKQ335314D	SAMSUNG
USB memory	U40	-	IOCELL

4.4 Test configuration



Note	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1		Power	AC main	Power	1.8	Non- Shield
2		USB	USB keyboard	USB	2.0	Shield
3		USB	USB mouse	USB	2.0	Shield
4	EUT	Loop out CH 1 (BNC)	Loop	Video in CH 16 (BNC)	2.0	Shield
5		Loop out CH 16 (BNC)	Monitor	Loop out CH 16 (BNC)	3.0	Shield
6		VGA	Monitor	VGA	1.6	Shield
7		Video in CH 1 (BNC)	Camera	Video in CH 1 (BNC)	3.0	Shield
8		LAN (RJ-45)	Note PC	LAN (RJ-45)	3.0	Non- Shield

9		SPOT (BNC)	75 termination	SPOT (BNC)	3.0	Shield
10		Video out (BNC)	75 termination	Video out (BNC)	3.0	Shield
11		Console	Open	-	1.8	Non- Shield
12		Alarm in 1~17	Open	-	3.0	Non- Shield
13		Alarm out 1~8	Open	-	3.0	Non- Shield
14		Alarm reset 1~3	Open	-	3.0	Non- Shield
15		Tx, Rx 1 ~ 4	Open	-	3.0	Non- Shield
16		Audio in 1 ~ 4	Open	-	1.4	Shield
17		Audio out	Open	-	1.4	Shield
18		RS-232C	Open	-	1.7	Shield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
1	Recording mode.
2	web viewer mode.

5. Summary of test results

5.1 Modification to the E.U.T.

None

5.2 Summary of EMI emission test results

Application	Test method	Test result
Conducted emission - AC main port - Telecommunication	EN 55022:2006, Class A	Complied
Radiated emission	EN 55022:2006, Class A	Complied
Harmonics current	EN 61000-3-2:2006	Complied
Voltage fluctuations and flickers	EN 61000-3-3/A2:2005	Complied

5.3 Summary of immunity test results

Items	Application	Test method	Test result
Electrostatic discharge	Enclosure	EN 61000-4-2:1995+A1+A2:2001	Complied
Radiated RF immunity	Enclosure	EN 61000-4-3:1995+A1:2002	Complied
Fast transient	AC main Signal Telecommunication	EN 61000-4-4:1995+A1+A2:2004	Complied
Surge	AC main Signal	EN 61000-4-5:1995+A1:2001	Complied
Conducted RF immunity	AC main Signal Telecommunication	EN 61000-4-6:1996+A1:2001	Complied
Voltage dip/interruption	AC main	EN 61000-4-11:2004	Complied

5.4 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 by the manufacture 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 discharge is permissible, providing 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 application of discharge is permissible, providing which could be interpreted by associated equipment as a change, and no such Flickering of indicators occurs at a field strength of 3 V/m. For components of CCTV systems, where the picture is allowed at 10 V/m, providing.

- (a) there is no permanent damage or change to EUT (e.g. no corruption of memory or changes to programmable setting etc.)
- (b) at 3 V/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 1 V/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 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

Conducted RF immunity

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

Flickering of an indicator during the application of 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 oeuvres at $U = 130 \text{ dB}\mu\text{V}$.

For component of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at $U = 140 \text{ dB}\mu\text{V}$, 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 $U = 130 \text{ dB}\mu\text{V}$, any deterioration of the picture is so minor that the system could still be used; and
- (c) there in no observable deterioration of the picture at $U = 120 \text{ dB}\mu\text{V}$.

Voltage dip/interruption / Voltage variation

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 outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test, after the conditioning.

6. Test results

6.1 Conducted Emission

Test specification	EN 55022:2006 Section 5, Class A		
Test mode	Recording and web viewer mode.		
Date:	2009. 03. 05		
Power supply	230 V, 50 Hz		
Test facility	Shielded room (CE#2)		
Temperature (°C)	19 °C	Humidity (% R.H.)	33 % R.H.
Remarks	Complied Minimum limit margin is 29.18 dB at 29.440 MHz. (Quasi-peak) Telecommunication Minimum limit margin is 33.63 dB at 22.205 MHz. (Average)		

6.1.1 Limits of conducted emission measurement

- AC main

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

*The limit decreases linearly with the logarithm of frequency.

- Telecommunication

Frequency [MHz]	Class A Voltage Limits (dB μ V)		Current Limits (dBuA)	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15 ~ 0.5	97 to 87	84 to 74	53 to 43	40 to 30
0.5 ~ 30	87	74	43	30

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

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

6.1.2 Measurement procedure

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

6.1.3 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESHS30	844827/011	R&S	09.08.19	<input checked="" type="checkbox"/>
LISN	ESH3-Z5	846125/024	R&S	09.08.06	<input checked="" type="checkbox"/>
LISN	L3-32	0120J20305	PMM	-	<input checked="" type="checkbox"/>
ISN	T800	24314	TESEQ	09.06.05	<input checked="" type="checkbox"/>

6.1.4 Photographs of test setup





6.1.5 Conducted emission measurement result

Frequency [MHz]	Correction Factor		Line	Quasi-peak			Average		
	LISN	Cable		Limit	Reading	Result	Limit	Reading	Result
				[dB μ V]	[dB μ V]	[dB μ V]	[dB μ V]	[dB μ V]	[dB μ V]
0.177	0.09	0.2	H	79.00	31.68	31.97	66.00	22.16	22.45
0.207	0.07	0.2	N		39.68	39.95		33.16	33.43
0.210	0.09	0.2	H		43.25	43.54		35.15	35.44
0.315	0.09	0.5	H		22.36	22.95		14.58	15.17
0.420	0.08	0.4	N		19.79	20.27		14.33	14.81
0.735	0.09	0.4	N	73.00	21.41	21.90	60.00	17.75	18.24
2.859	0.18	0.6	H		34.04	34.82		27.00	27.78
2.901	0.16	0.6	N		34.15	34.91		26.56	27.32
23.138	0.74	0.9	N		41.34	42.98		24.58	26.22
28.610	0.72	0.7	N		36.81	38.23		21.97	23.39
29.440	1.06	0.7	H		42.06	43.82		25.32	27.08

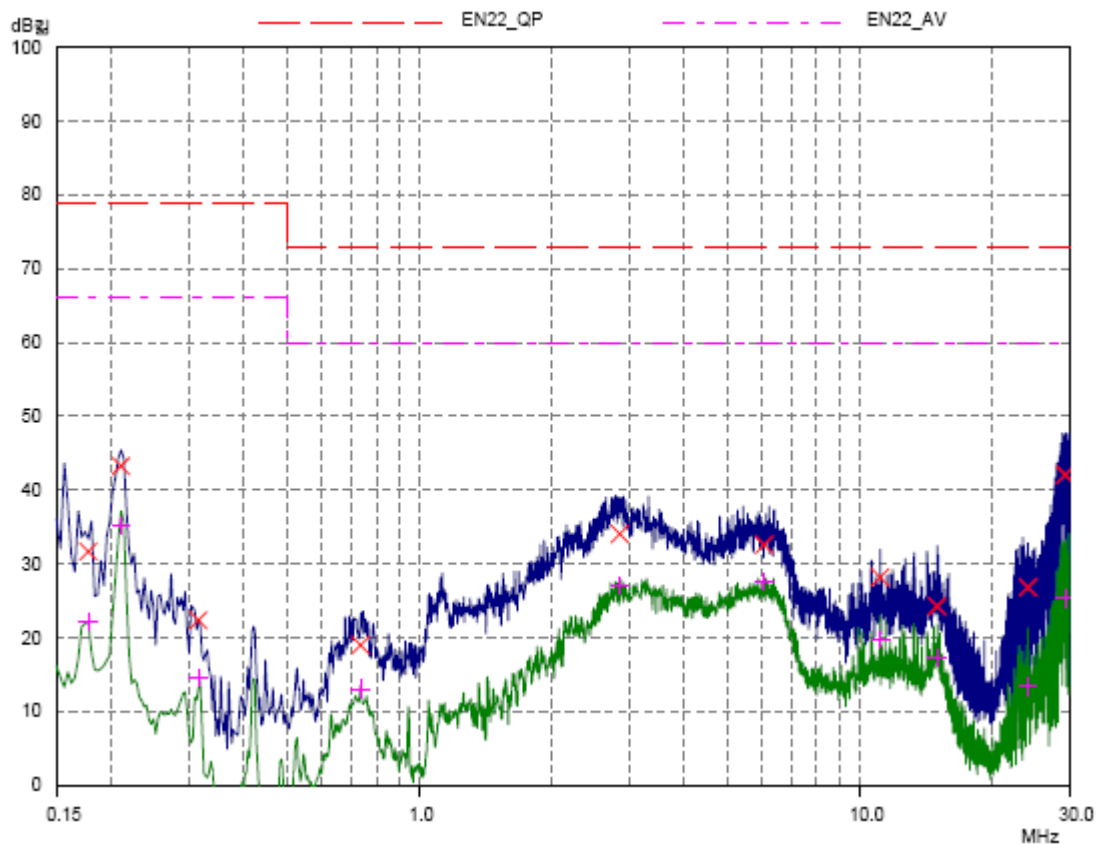
EUT: SHR-6164
 Manuf: SAMSUNG
 Op Cond: H
 Operator:
 Test Spec: EN55022 Class A Conducted Emission
 Comment:

Result File: 03029_h.dat : SAMSUNG_DIGITAL VIDEO RECORDER_SHR-6164

Scan Settings (2 Ranges)

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

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



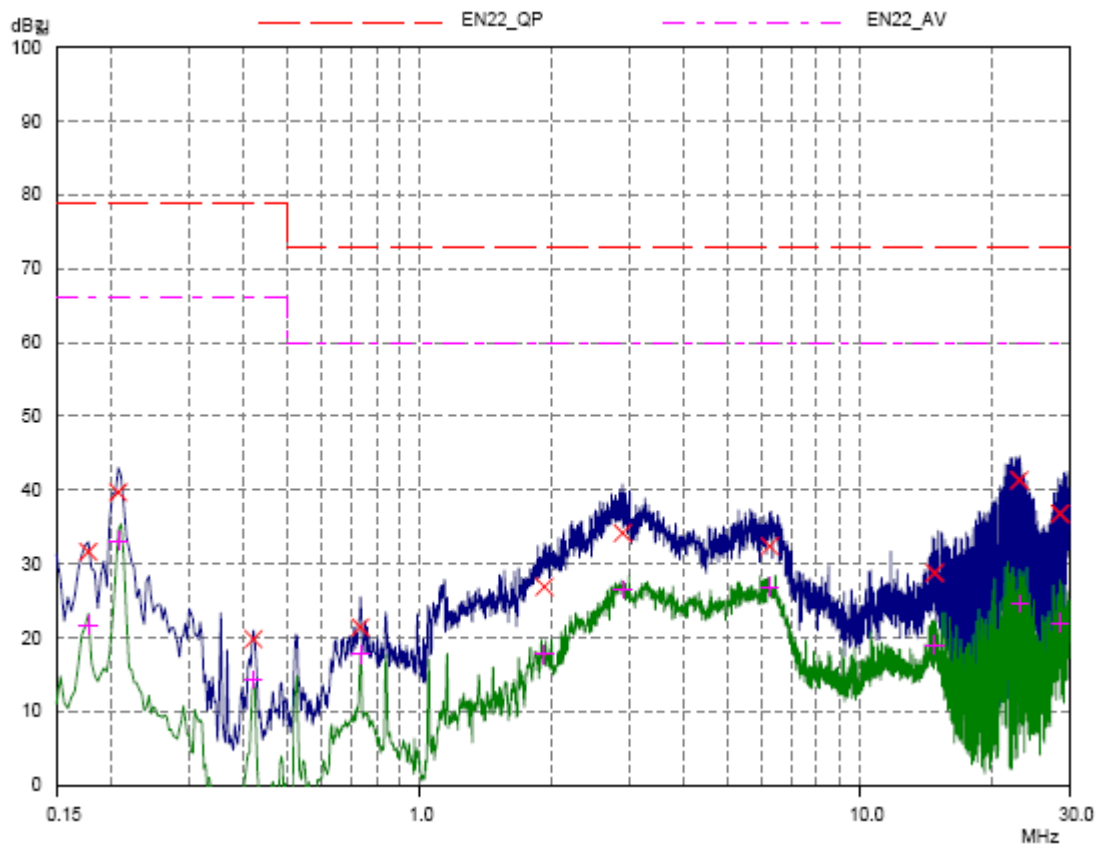
EUT: SHR-8164
Manuf: SAMSUNG
Op Cond: N
Operator:
Test Spec: EN55022 Class A Conducted Emission
Comment:

Result File: 03020_n.dat : SAMSUNG_DIGITAL VIDEO RECORDER_SHR-8164

Scan Settings (2 Ranges)

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

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



*** Telecommunication port**

*** LCL 65 dB (LAN Port)**

Frequency [MHz]	Correction	Quasi-peak			Average		
	Factor	Limit	Reading	Result	Limit	Reading	Result
	Cable	[dB μ V]	[dB μ V]	[dB μ V]	[dB μ V]	[dB μ V]	[dB μ V]
0.255	0.07	92.59	37.46	37.53	79.59	31.47	31.54
0.738	0.07	87.00	36.47	36.54	74.00	30.41	30.48
6.715	0.07		38.36	38.43		31.64	31.71
13.390	0.09		43.06	43.15		36.98	37.07
22.205	0.07		47.57	47.64		40.30	40.37

• Note. QP = Quasi-Peak, AV= Average.

EUT: SHR-8164
 Manuf: SAMSUNG
 Op Cond:
 Operator:
 Test Spec: EN55022 Class A Conducted Emission
 Comment: Telecommunication port.

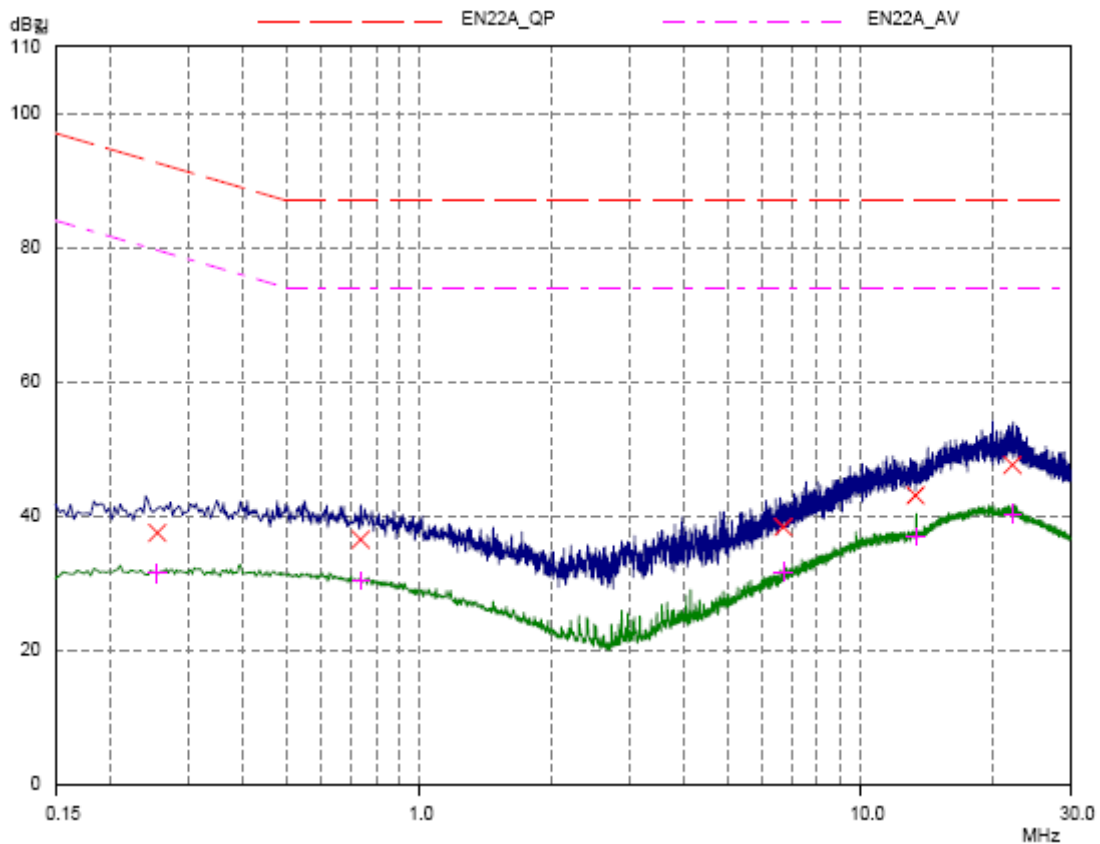
Result File: 03029_t.dat : SAMSUNG_DIGITAL VIDEO RECORDER_SHR-8164

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	5kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB	

Transducer	No.	Start	Stop	Name
	1	10kHz	30MHz	T800

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



6.2 Radiated Emission

Test specification	EN 55022:2006 Sections 6, Class A		
Test mode	Recording and web viewer mode.		
Date	2009. 03. 06		
Power supply	230 V , 50 Hz		
Test facility	Semi-anechoic chamber #4 10 m OATS		
Temperature (°C)	10 °C	Humidity (% R.H.)	64 % R.H.
Remarks	Complied Minimum limit margin is 6.80 dB at 297.00 MHz.		

6.2.1 Limits of radiated emission measurement

Frequency [MHz]	Class A (dB μ V/m) @10 m	Class B (dB μ V/m) @10 m
30 ~ 230	40	30
230 ~ 1000	47	37
Above 1000 MHz		

6.2.2 Measurement procedure

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

Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.

The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

6.2.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next cal. date	Used
Test Receiver	ESCI	100001	R&S	09.08.18	<input checked="" type="checkbox"/>
TRILOG SUPER BROADBAND ANT	VULB9160	3228	Schwarz beck	10.02.21	<input checked="" type="checkbox"/>
Antenna Mast	A109	N/A	DAEIL	-	<input checked="" type="checkbox"/>
Turn Table	TS25	N/A	DAEIL	-	<input checked="" type="checkbox"/>
AMPLIFIER	310N	284608	SONOMA INSTRUMENT	09.12.09	<input checked="" type="checkbox"/>
3 dB Attenuator	8491A	16861	HP	10.01.09	<input checked="" type="checkbox"/>
10 m OATS	-	-	EMC Compliance	-	<input checked="" type="checkbox"/>

6.2.4 Sample calculation

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

The sample calculation is as follow:

$$FS = MR + AF + CL + AP + 3 \text{ dB Att} - AG$$

MR = Meter Reading

AF = Antenna Factor

CL = Cable Loss

AP = Antenna Pad

AG= Amplifier Gain

3 dB Att = 3 dB Attenuator

If MR is 30 dB, AF 12 dB, CL 5 dB, AP 10 dB, 3 dB, AG 35 dB

The result (MR) is

$$30 + 12 + 5 + 10 + 3 - 35 = 25 \text{ dB}\mu\text{V/m}$$

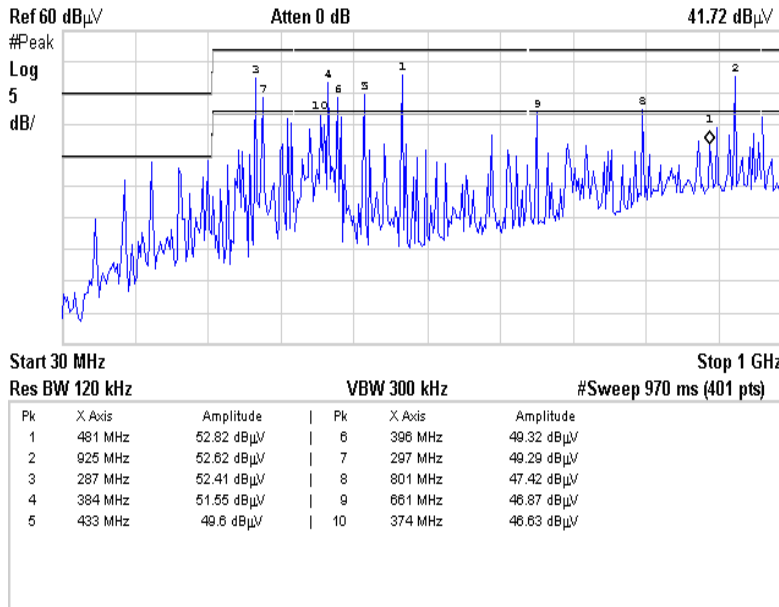
6.2.5 Photographs of test setup



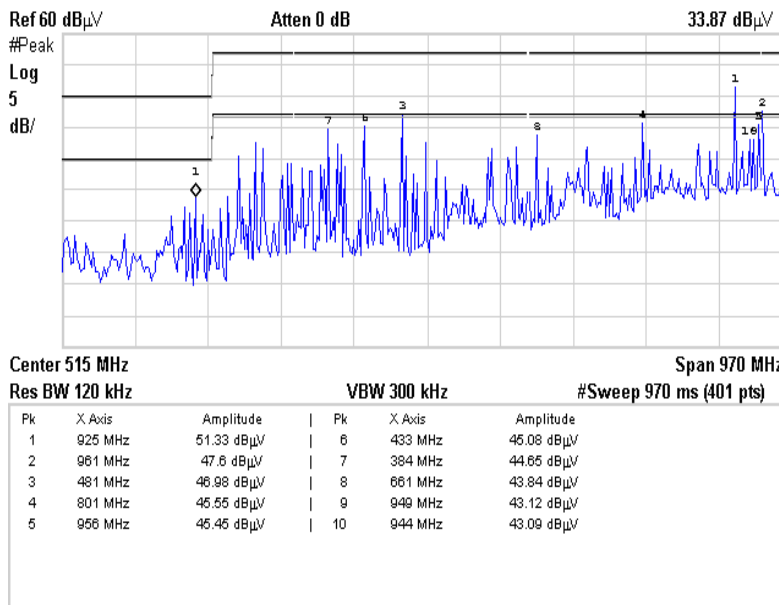
6.2.6 Radiated emission measurement result

***3 m Semi-anechoic chamber Pre-scan Data (#4)**

-Horizontal



-Vertical



***10 m OATS measurement data**

Frequency [MHz]	Reading [dB μ V/m]	Pol.	Height [m]	angle	Att [3dB]	Correction Factor			Limits [dB μ V/m]	Result [dB μ V/m]	Margin [dB]
						Amp Gain	Antenna	Cable			
216.01	41.8	H	3.9	163	3	32.60	11.53	3.93	40.0	27.66	12.34
288.00	47.1	H	3.9	285	3	32.60	13.65	4.55	47.0	35.70	11.30
297.00	51.2	H	3.1	213	3	32.60	13.94	4.66	47.0	40.20	6.80
384.00	46.9	H	2.9	120	3	32.74	15.52	5.48	47.0	38.16	8.84
432.00	47.3	H	3.3	286	3	32.80	16.27	5.90	47.0	39.67	7.33
480.00	45.3	H	4.0	253	3	32.80	16.98	6.38	47.0	38.86	8.14
660.00	34.9	V	3.2	29	3	33.00	19.65	7.63	47.0	32.18	14.82
923.99	34.3	H	1.3	226	3	32.07	22.38	9.34	47.0	36.95	10.06

* Note: Reading = Test Receiver value.

6.3 Harmonics

Test specification	EN 61000-3-2:2006				
Test mode	Recording and web viewer mode.				
Date	2009. 03. 19				
Power supply	230 V , 50 Hz				
Test facility	Immunity area				
Temperature(°C)	19 °C	Humidity (% R.H.)	27 % R.H.	Pressure (kPa)	100.6 kPa
Remarks	Complied				

6.3.1 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.

6.3.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Harmonics/Flicker meter	5001x-CTS -400-413	54984	C.I.	09.05.13	<input checked="" type="checkbox"/>

6.3.3 Photographs of test setup



6.3.4 Measurement result

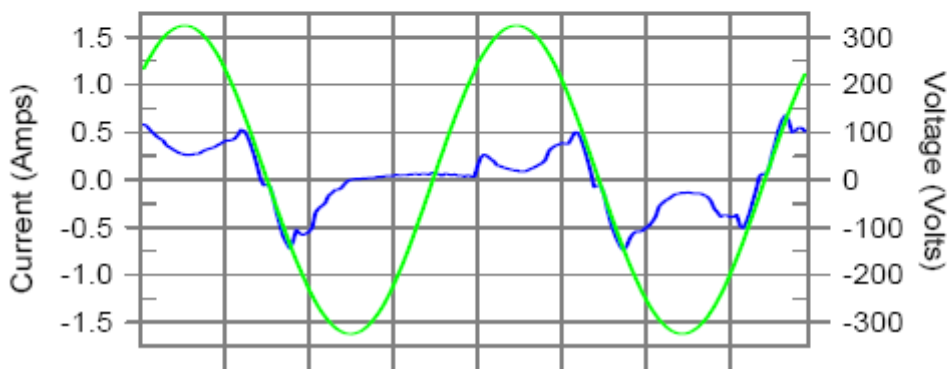
Harmonics – Class-A per Ed. 3.0 (2005-11)(Run time) incl. inter-harmonics

EUT: SHR-6164
Test category: Class-A per Ed. 3.0 (2005-11) (European limits)
Test date: 2009-03-09
Test duration (min): 2.5
Customer: SAMSUNG

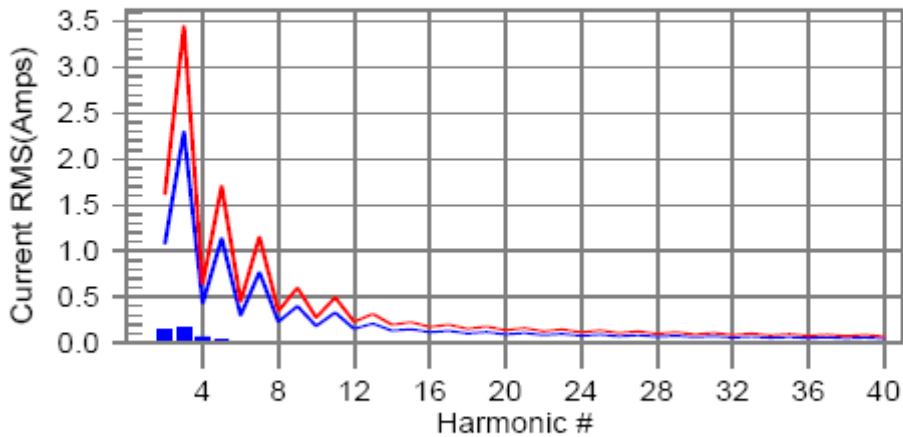
Tested by: EMC Compliance
Test Margin: 100
Start time: 오후 4:57:24
End time: 오후 5:00:14
Data file name: H-000243.cts_data

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line European Limits



Test result: Pass Worst harmonic was #4 with 14.81% of the limit.

6.4 Flicker

Test specification	EN 61000-3-3/A2:2005				
Test mode	Recording and web viewer mode.				
Date	2009. 03. 09				
Power supply	230 V, 50 Hz				
Test facility	Immunity area				
Temperature(°C)	19 °C	Humidity (% R.H.)	27 % R.H.	Pressure (kPa)	100.6 kPa
Remarks	Complied				

6.4.1 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.

6.4.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Harmonics/Flicker meter	5001x-CTS-400-413	54984	C.I.	09.05.13	<input checked="" type="checkbox"/>

6.4.3 Photographs of test setup



6.4.4 Measurement result

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

EUT: SHR-6162
 Test category: All parameters (European limits)
 Test date: 2009-03-09
 Test duration (min): 10
 Customer: SAMSUNG

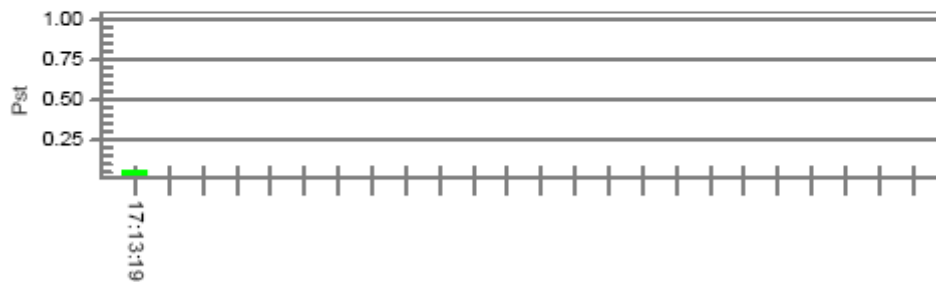
Tested by: EMC Compliance
 Test Margin: 100
 Start time: 오후 5:02:59
 End time: 오후 5:13:20
 Data file name: F-000244.cts_data

Test Result: Pass

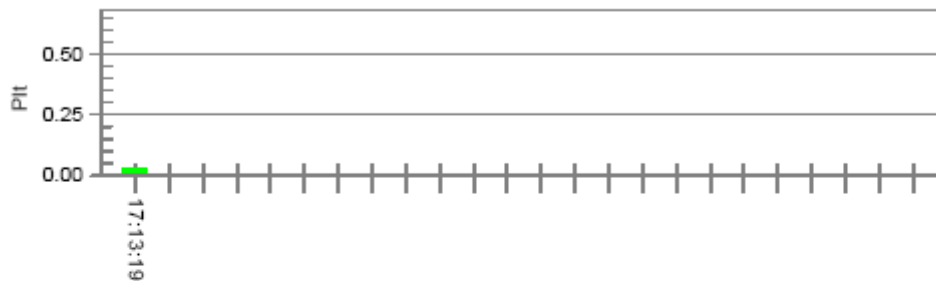
Status: Test Completed

Pst, and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt):	229.34		
Highest dt (%):	-0.17	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 (%):	0.11	Test limit (%):	4.00 Pass
Highest Pst (10 min. period):	0.064	Test limit:	1.000 Pass
Highest Plt (2 hr. period):	0.028	Test limit:	0.650 Pass

6.5 Electrostatic Discharge test result

Test specification	EN 61000-4-2:2001				
Test level	Contact: ± 2, 4, 6 kV Air: ± 2, 4, 8 kV HCP / VCP: ± 2, 4, 6 kV				
Discharge impedance	330 / 150 pF				
Date	2009. 03. 06				
Power supply	230 V, 50 Hz				
Number of discharge	10				
Interval between discharges	: ≥ 1 s				
Temperature(°C)	19 °C	Humidity (% R.H.)	34 % R.H.	Pressure (kPa)	100.9 kPa
Remarks	Complied - There was no change of operation status during above testing.				

6.5.1 Measurement procedure

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

6.5.2 Used equipments

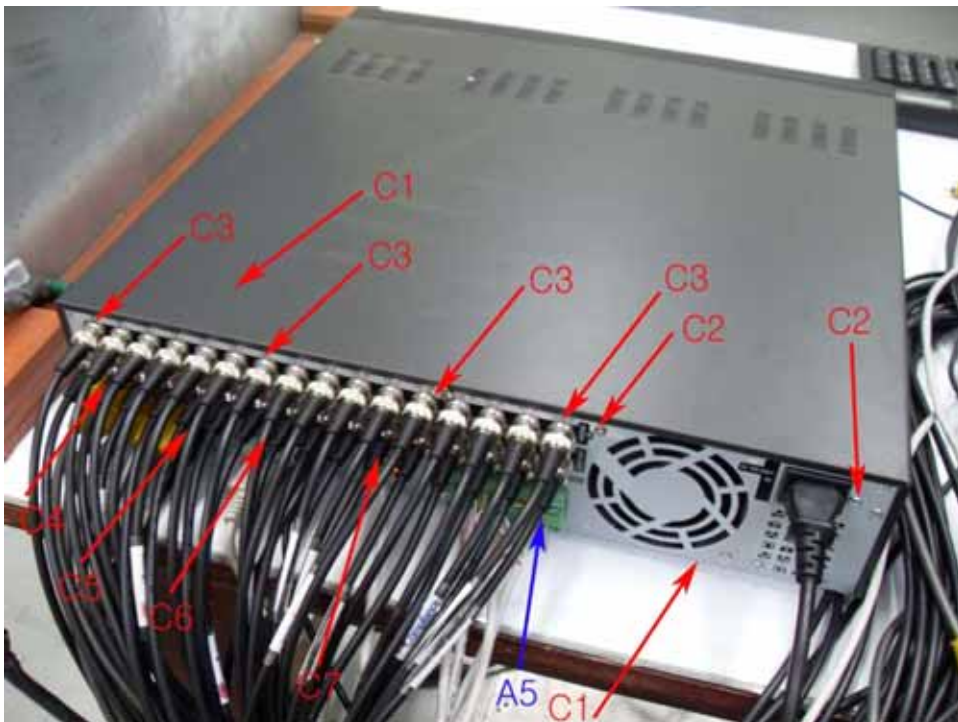
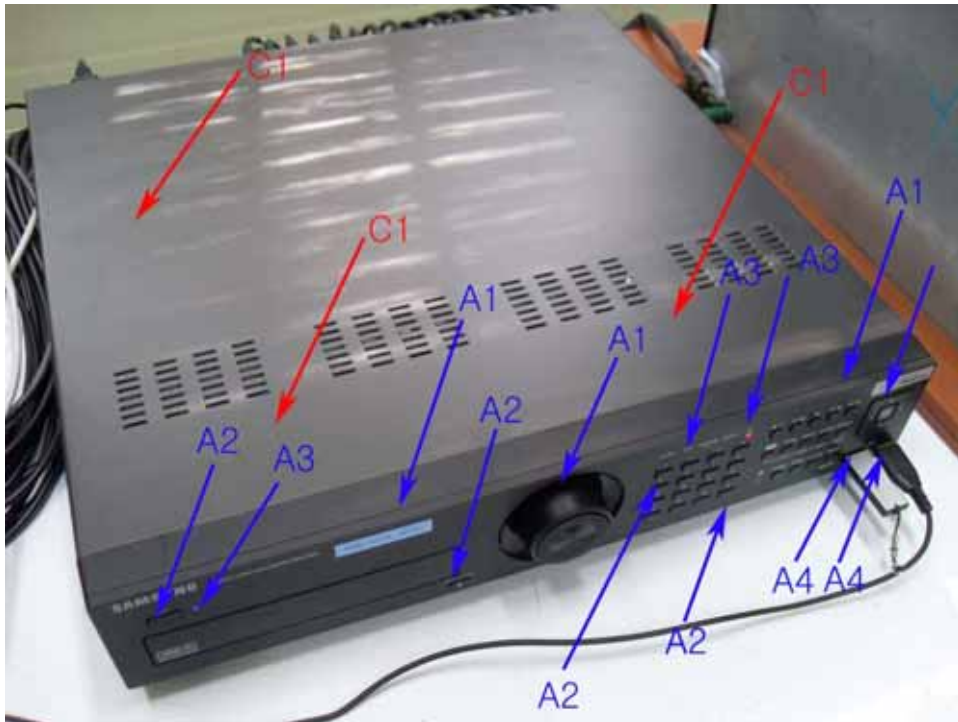
Equipment	Model No.	Serial No.	Makers	Next Cal. Date	Used
ESD Tester	NSG 437	182	TESEQ	09.05.20	<input checked="" type="checkbox"/>
HCP	-	-	-	-	<input checked="" type="checkbox"/>
VCP	-	-	-	-	<input checked="" type="checkbox"/>

6.5.3 Photographs of test setup



6.5.4 Measurement result
Electrostatic Discharge (Test Point)

Air discharge	→
Contact discharge	→



Contact discharge

Location(EUT)		Applied level (\pm)	Result
C1	Case	$\pm 2, 4, 6$ kV	Complied
C2	Screw	$\pm 2, 4, 6$ kV	Complied
C3	BNC port	$\pm 2, 4, 6$ kV	Complied
C4	Audio port	$\pm 2, 4, 6$ kV	Complied
C5	VGA port	$\pm 2, 4, 6$ kV	Complied
C6	RS-232C port	$\pm 2, 4, 6$ kV	Complied
C7	LAN port	$\pm 2, 4, 6$ kV	Complied
	HCP (All 4 sides)	$\pm 2, 4, 6$ kV	Complied
	VCP (All 4 sides)	$\pm 2, 4, 6$ kV	Complied

Air discharge

Location(EUT)		Applied level (\pm)	Result
A1	Case	$\pm 2, 4, 8$ kV	Complied
A2	Button	$\pm 2, 4, 8$ kV	Complied
A3	LED	$\pm 2, 4, 8$ kV	Complied
A4	USB port	$\pm 2, 4, 8$ kV	Complied
A5	Alarm port	$\pm 2, 4, 8$ kV	Complied

6.6 Radio Frequency Electromagnetic Fields

Test specification	EN 61000-4-3:2002				
Tested frequency	80 MHz ~ 2000 MHz log 1 % step				
Test level & Modulation	1, 3, 10 V/m, 80 % Amplitude Modulation (1 kHz) 1, 3, 10 V/m, Pulse Modulation (1 Hz (0.5 s ON: 0.5 s OFF))				
Distance	3 m from EUT to tip of antenna				
Dwell time	3 s				
Step size	log 1 % step				
Power supply	230 V, 50 Hz				
Date	2009. 03. 09				
Temperature(°C)	18 °C	Humidity (% R.H.)	26 % R.H.	Pressure(kPa)	100.5 kPa
Remarks	Complied - There was no change of operation status during above testing. (1 V/m, 3 V/m) - During the test, some of flickering phenomenon happened. After this test, EUT was operated normally.(10 V/m)				

6.6.1 Measurement procedure

The test was performed at 3 m full anechoic chamber. For floor standing equipment, the EUT was standing on the floor. For tabletop equipment, the EUT was located on a wooden table 0.8 m above the floor. The EUT was tested all sides, horizontal and vertical polarization. The field uniformity was calibrated for 1 V/m, 3 V/m, 10 V/m.

6.6.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Power meter	PM2002	302852	AR	09.05.08	<input checked="" type="checkbox"/>
Power sensor (with adapter)	PH2000	303224	AR	09.05.08	<input checked="" type="checkbox"/>
Power sensor (with adapter)	PH2000	303222	AR	09.05.08	<input checked="" type="checkbox"/>
Directional coupler	DC6180	303976	AR	09.05.08	<input checked="" type="checkbox"/>
Signal generator	E4421B	GB40052295	AGILENT	09.10.24	<input checked="" type="checkbox"/>

Amplifier	150W1000M2	303843	AR	09.04.11	☒
Directional Coupler	DC7144M1	320279	AR	10.02.20	☒
Amplifier	60S1G3M2	320444	AR	09.04.11	☒
BiconiLog Ant.	LPDA-0803	130269	ETS	-	☒
BiconiLog Antenna	3142B	1786	EMCO	-	☒
Field monitor	SI-300	-	TDK	-	☒
Controller	HD 100	-	Deisel	-	☒
Turn table	DS 412S	-	Deisel	-	☒
Antenna mast	MA 220	-	Deisel	-	☒

6.6.3 Photographs of test setup



6.6.4 Measurement result

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

6.7 Electric Fast Transient/BURST

Test specification	EN 61000-4-4:2004				
Coupling	AC main Signal: clamp Telecommunication: clamp				
Test level	AC Power: ± 2 kV Peak Signal: ± 1 kV Peak Telecommunication: ± 1 kV Peak				
Repetition frequency	5 kHz, Tr/Th = 5 / 50 ns				
Coupling time	60 s				
Power supply	230 V, 50 Hz				
2008.09.24	2009. 03. 06				
Temperature(°C)	18 °C	Humidity (% R.H.)	27 % R.H.	Pressure(kPa)	100.7 kPa
Remarks	Complied - There was no change of operation status during above testing.				

6.7.1 Measurement procedure

A ground reference plane was located on the floor. EFT generator was connected to reference ground plane via low impedance connection. For floor standing equipment, EUT was placed on a 0.1 m wooden table. For tabletop equipment, EUT was placed on a 0.1 m above the ground reference plane. Test generator and coupling/decoupling network was placed on, and bounded to, the ground reference plane.

When using the coupling clamp, the minimum distance between the coupling plates and all other conductive surfaces, except the ground reference plane beneath the coupling clamp, Shall be 0.5 m.

6.7.2 Used equipments

Equipment	Model No.	Serial No.	Makers	Next Cal. date	Used
Generator	UCS 500 M6	V0545100858	EM TEST	10.01.21	<input checked="" type="checkbox"/>
Capacitive Coupling Clamp	-	-	EM TEST	-	<input checked="" type="checkbox"/>

6.7.3 Photographs of test setup



6.7.4 Measurement result

AC main

EFT coupling point	(+)	(-)	Result
Live	+ 2 kV	- 2 kV	Complied
Neutral	+ 2 kV	- 2 kV	Complied
PE	+ 2 kV	- 2 kV	Complied
Live + Neutral	+ 2 kV	- 2 kV	Complied
Live + PE	+ 2 kV	- 2 kV	Complied
Neutral + PE	+ 2 kV	- 2 kV	Complied
Live + Neutral + PE	+ 2 kV	- 2 kV	Complied

Signal

EFT coupling point	(+)	(-)	Result
Alarm in/out	+ 1 kV	- 1 kV	Complied
BNC	+ 1 kV	- 1 kV	Complied
Tx, Rx	+ 1 kV	- 1 kV	Complied

Telecommunication

EFT coupling point	(+)	(-)	Result
LAN	+ 1 kV	- 1 kV	Complied

6.8 Surge

Test specification	EN 61000-4-5 :2001				
Coupling	AC main Signal: Direct, CDN				
Test level	AC main Differential mode: 0.5, 1 kV Common mode: 0.5, 1, 2 kV Signal: 0.5, 1 kV				
Surge pulse shape	Tr/Th = 1.2 / 50 μ s				
Coupling Impedance	Differential mode: 18 μ F Common mode: 10 + 9 μ F BNC: Direct (2) Alarm in/out, Tx, Rx: 40				
Angles	0 °, 90 °, 180 °, 270 °				
Number of surge & Coupling time	1 min				
Power supply	230 V, 50 Hz				
Date	2009. 03. 10				
Temperature(°C)	20 °C	Humidity (% R.H)	27 % R.H	Pressure(kPa)	100.8 kPa
Remarks	Complied - There was no change of operation status during above testing.				

6.8.1 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 0.8 m above the reference plane.

6.8.2 Used equipments

Equipment	Model No.	Serial No.	Makers	Next Cal. date	Used
Generator	UCS 500M6	0701-03	EM TEST	09.06.03	<input checked="" type="checkbox"/>
CDN	CNV 508 S1	0302-01	EM TEST	-	<input checked="" type="checkbox"/>

6.8.3 Photographs of test setup



6.8.4 Measurement result

AC main

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

Signal

Coupling point	(+)	(-)	Result
Alarm in/out	+ 0.5, 1 kV	- 0.5, 1 kV	Complied
BNC	+ 0.5, 1 kV	- 0.5, 1 kV	Complied
Tx, Rx	+ 0.5, 1 kV	- 0.5, 1 kV	Complied

6.9 Conducted Immunity

Test specification	EN 61000-4-6:2001				
Tested frequency	150 kHz ~ 100 MHz log 1 % step				
Test level & Modulation	1, 3, 10 V, 80 % Amplitude Modulation (1 kHz) 1, 3, 10 V, Pulse Modulation (1 Hz (0.5 s ON: 0.5 s OFF))				
Coupling method	AC main : M3 Signal : clamp Telecommunication: clamp				
Power supply	230 V, 50 Hz				
Date	2009. 03. 09				
Temperature(°C)	18 °C	Humidity (% R.H)	25 % R.H	Pressure(kPa)	100.5 kPa
Remarks	Complied - There was no change of operation status during above testing. (1 V, 3 V) - During the test, some of flickering phenomenon happened. After this test, EUT was operated normally.(10 V)				

6.9.1 Measurement procedure

A ground reference plane was located on the floor.

The test was performed on a ground reference plane on a 0.8 m wooden table.

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

The frequency range was swept from 150 kHz to 100 MHz. This frequency range was Modulated with 1 kHz sine wave at 80 %.

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

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

6.9.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
CS generator	NSG 2070	1054	Schaffner	09.05.19	<input checked="" type="checkbox"/>
CDN	M016	16674	Schaffner	09.04.11	<input checked="" type="checkbox"/>
Attenuator	INA2070-1	2054	Schaffner	09.03.24	<input checked="" type="checkbox"/>
EM Clamp	KEMZ 801	17643	Schaffner	09.04.01	<input checked="" type="checkbox"/>
RF Absorbing Clamp	KEMA 801	17899	Schaffner	-	<input type="checkbox"/>
Current probe	MD720	W1345167/M6/0068	Schaffner	-	<input checked="" type="checkbox"/>

6.9.3 Photographs of test setup





6.9.4 Measurement result

Coupling point	Coupling method	Result
Power	CDN (M3)	Complied
Alarm in/out	clamp	Complied
BNC	clamp	Complied
Tx, Rx	clamp	Complied

6.10 Dips and Interruptions

Test specification	EN 61000-4-11:2004				
Number of dips	3 T				
Duration	60 s				
Phase	Zero crossing (0 °, 180 °)				
Power supply	100 V, 50 Hz / 240 V, 50 Hz				
Date	2009. 03. 10				
Temperature (°C)	20 °C	Humidity (% R.H)	27 % R.H	Pressure (kPa)	100.8 kPa
Remarks	Complied				

6.10.1 Measurement procedure

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

The dips/interruptions were applied at zero crossing.

6.10.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
dips/interruption generator	UCS 500M6	0701-03	EM TEST	09.06.03	<input checked="" type="checkbox"/>

6.10.3 Photographs of test setup



6.10.4 Measurement result

- 240 V, 50 Hz

Test Level (%UT)	Dip/Int. (%UT)	Duration /Period	Angle (°)	Count number
0 %	100 %	0.5, 1, 5 Period	0 / 180	3T
40 %	60 %	0.5, 1, 5, 10 Period	0	3T
70 %	30 %	0.5, 1, 5, 10 Period	0	3T

Comment:

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

- 100 V, 50 Hz

Test Level (%UT)	Dip/Int. (%UT)	Duration /Period	Angle (°)	Count number
0 %	100 %	0.5, 1, 5 Period	0 / 180	3T
40 %	60 %	0.5, 1, 5, 10 Period	0	3T
70 %	30 %	0.5, 1, 5, 10 Period	0	3T

Comment:

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

6.11 Mains supply voltage variations

Test specification	EN 50130-4:2003				
Tested Voltage	$U_{nom} + 10 \%$, $U_{nom} - 15 \%$				
Power supply	100 V, 50 Hz / 240 V, 50 Hz				
Date	2009. 03. 10				
Temperature (°C)	20 °C	Humidity (% R.H)	27 % R.H	Pressure (kPa)	100.8 kPa
Remarks	Complied				

6.11.1 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
dips/interruption generator	UCS 500M6	0701-03	EM TEST	09.06.03	<input checked="" type="checkbox"/>

6.11.2 Measurement result

Tested voltage: 240 V, 50 Hz

Supply voltage		Result
+ 10 %	264 V	Complied
- 15 %	204 V	Complied

Tested voltage: 100 V, 50 Hz

Supply voltage		Result
+ 10 %	110 V	Complied
- 15 %	85 V	Complied

7. E.U.T. photographs

Front View



Rear View



Left View



Right View



Top View



Bottom View



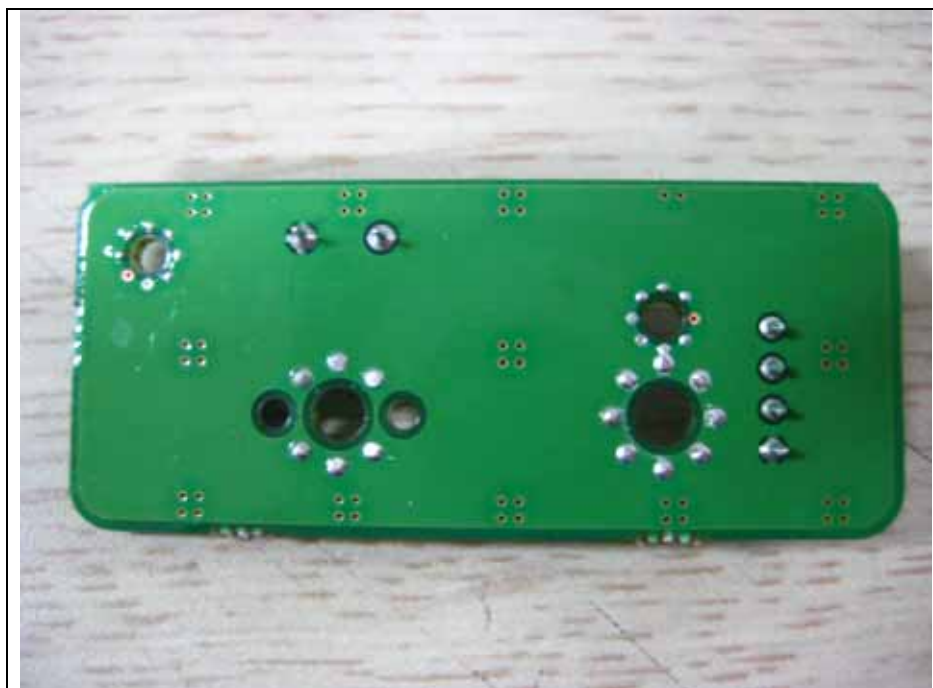
Inside



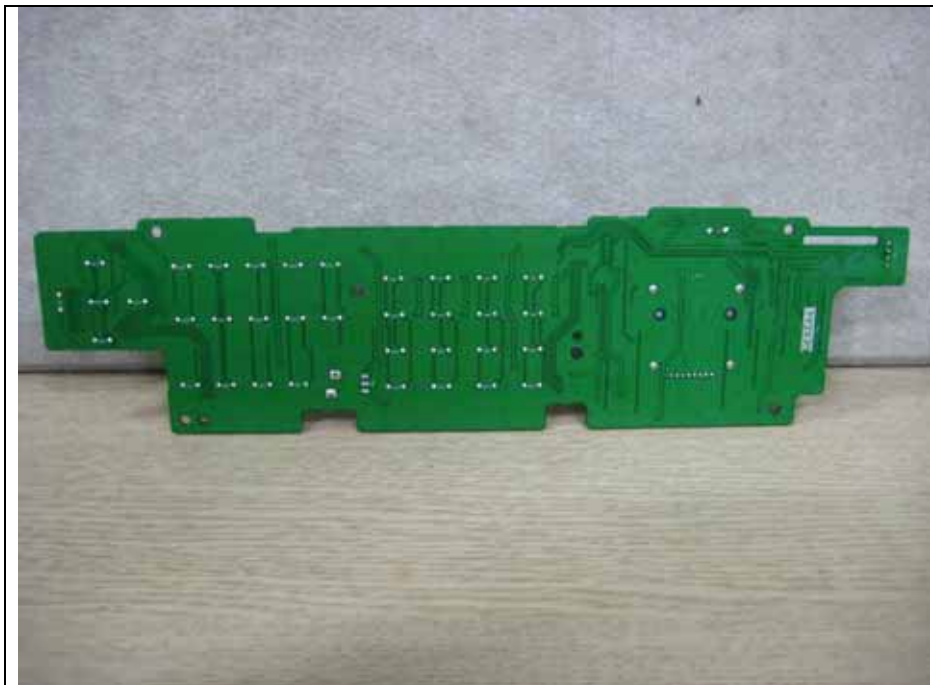
Main Board



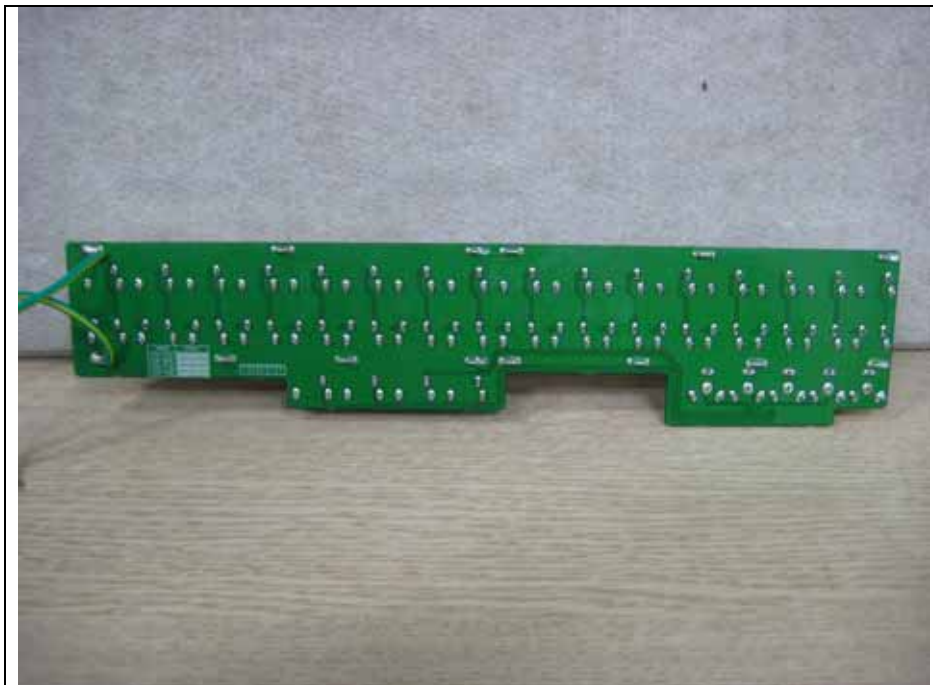
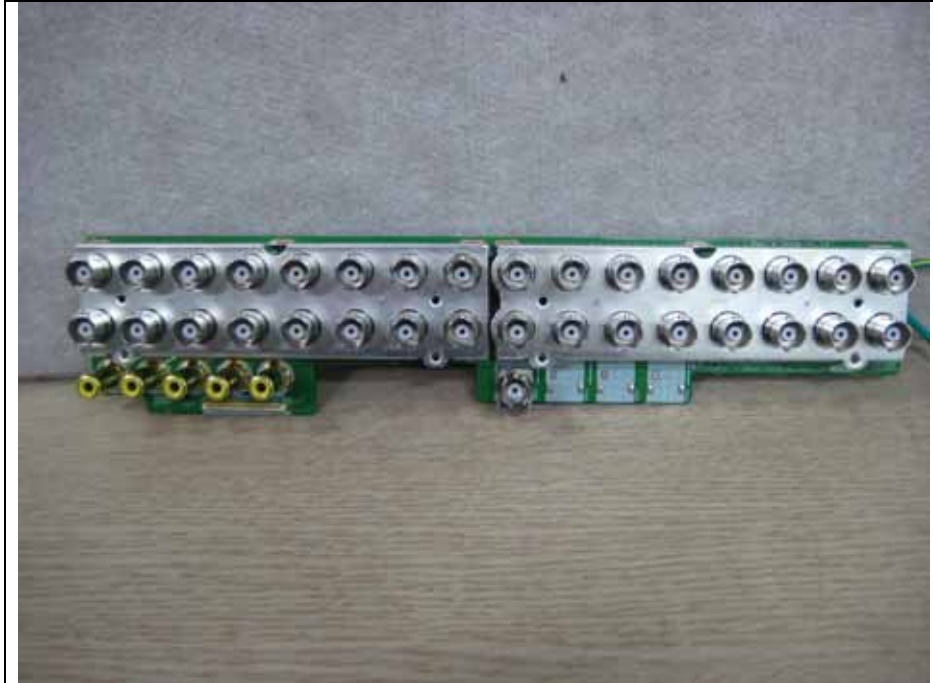
Power Board



Front Board



Rear Board



HDD





ODD



SMPS



