EU Declaration of Conformity (EMC)

Type of equipment:	**DIGITAL VIDEO RECORDER**
Model Name:	**SHR-8162**
Variant Model Name:	**SHR-8082, SHR-7082, SHR-7162, SHR-8080, SHR-8160, SHR-7080, SHR-7160**
Applicant:	**SAMSUNG ELECTRONICS CO., LTD.**
Address:	**416, Maetan3-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea**
Manufacturer:	**TIANJIN FENGGUANG ELECTRONICS CO., LTD.**
Address:	**No.10-1 FUSHENG ROAD, ZHONGBEI INDUSTRY DISTRICT, XIQING DISTRICT, 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-1518

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-si, Gyeonggi-do, Korea

(place and date of issue)

(name and signature of authorized person)

EMC TEST REPORT

Test report No:	**EMC-CE-1518**
Type of Equipment :	**DIGITAL VIDEO RECORDER**
Model Name:	**SHR-8162**
Variant Model Name:	**SHR-8082, SHR-7082, SHR-7162, SHR-8080, SHR-8160, SHR-7080, SHR-7160**
Applicant:	**SAMSUNG ELECTRONICS CO., LTD. 416, Maetan3-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea**
Manufacturer:	**TIANJIN FENGGUANG ELECTRONICS CO., LTD. No.10-1 FUSHENG ROAD, ZHONGBEI INDUSTRY DISTRICT, XIQING DISTRICT, 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.

Receipt date: 2008. 10. 20
Date of testing: 2008. 10. 20 ~ 10. 29
Issued date: 2008. 11. 05

Tested by: SUNG, GI-MUN

Approved by: CHUNG, MIN-SEOK

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1. Applicant information

Applicant:	SAMSUNG ELECTRONICS CO., LTD.
Address:	416, Maetan3-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea
Telephone:	+82-31-277-3695
E-mail:	js2002.kang@samsung.com
Contact name:	**Kang Je Soon**

Manufacturer:	TIANJIN FENGGUANG ELECTRONICS CO., LTD.
Address:	No.10-1 FUSHENG ROAD, ZHONGBEI INDUSTRY DISTRICT, XIQING DISTRICT, 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

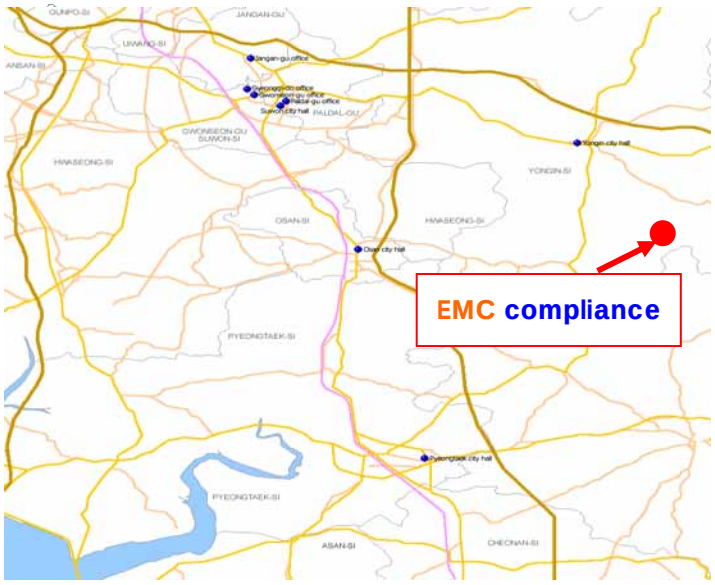
FCC Filing No.: 793334

FCC CAB.: KR0040

VCCI Registration No. : C-1713, R-2710, T-258

KOLAS NO.: 231

SITE MAP



3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
OATS :	8 °C	50 %	-
Shielded room :	22 °C	53 %	-
Immunity area :	23 °C	48 %	998 hPa

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,
Harmonics, Flicker, Voltage variation

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 [dBuV]
150 kHz ~ 30 MHz : ± 2.532 [dBuV]

Radiated Emission measurement :(k = 2, 95 %)
30 ~ 300 MHz : 3 m: ± 3.53 [dBuV/m], 10 m: ± 3.52 [dBuV/m]
300 ~ 1000 MHz :3 m: ± 3.70 [dBuV/m], 10 m: ± 3.69 [dBuV/m]

Radio Frequency Electromagnetic Fields :(k = 2, 95 %)
± 1.0234 [dBuV/m]

4. Description of E.U.T.

4.1 General information

- SHR-8162P is a digital video recorder.

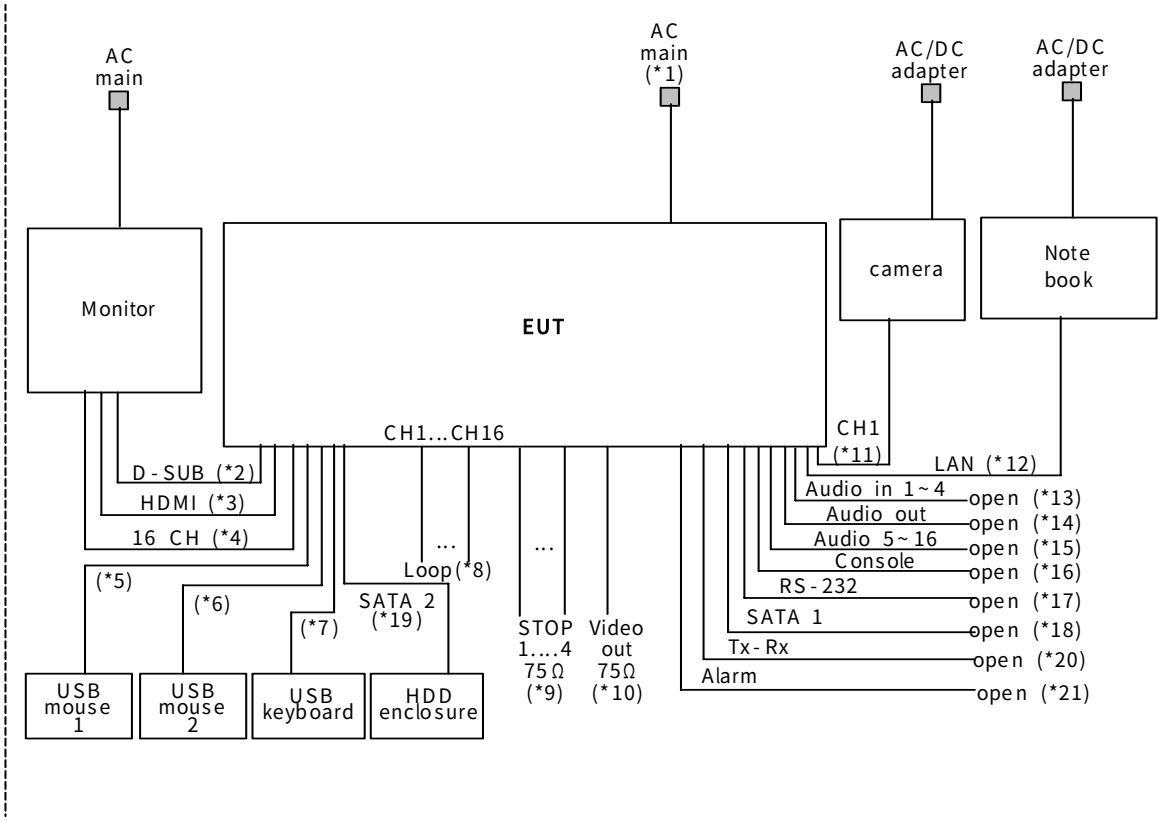
4.2 Product description

Type of product:	DIGITAL VIDEO RECORDER
Model name (Basic):	SHR-8162P
Model name (Variant):	SHR-8082P, SHR-7082P, SHR-7162P, SHR-8080P, SHR-8160P, SHR-7080P, SHR-7160P
Difference:	Buyer model names
Serial no:	-
Trade name :	-
Testing Voltage:	230 Vac, 50 Hz
Product rating:	100 ~ 240 Vac, 4 ~ 1.5 A, 50 / 60 Hz
Note :	This test was done with SHR-8162P.

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Monitor	3008WFPt	7735432490POB	DELL
Camera	260X	-	KOCOM
Notebook	E8210	482678041377	FUJITSU
USB mouse 1	SMH-2104B	M2UBTAKQ335303N	SAMSUNG
USB mouse 2	SMH-210UB	M2UBAKQ335310Z	SAMSUNG
USB keyboard	SK-8115	-	DELL
HDD enclosure	FKL-GP3	-	Calmee

4.4 Test configuration



Type	Description	Connection (To)	Spec.	Length(m)	Note *
Power	AC main	EUT	Non-Shield	1.5	1
Signal	D-SUB cable	Monitor	Shield	1.6	2
Signal	HDMI cable	Monitor	Shield	2.0	3
BNC	CH16 cable	Monitor	Shield	3.0	4
Signal	USB cable 1	USB mouse 1	Shield	1.9	5
	USB cable 2	USB mouse 2	Shield	1.9	6
	USB cable 3	USB keyboard	Shield	2.0	7
BNC	CH1~CH16 cable	Loop	Shield	1.5	8
Signal	STOP cable 1~4	75 Ω termination	Shield	3.0	9
BNC	Video out cable	75 Ω termination	Shield	3.0	10
	CH1 cable	Camera	Shield	3.0	11

Signal	LAN cable	Notebook	Shield	3.0	12
	Audio in cable 1~4	Open	Shield	1.4	13
	Audio out cable	Open	Shield	1.4	14
	Audio cable 5~16	Open	Shield	2.0	15
	Console cable	Open	Non-Shield	1.2	16
	RS-232 cable	Open	Shield	1.6	17
	SATA cable 1	Open	Shield	1.0	18
	SATA cable 2	HDD enclosure	Shield	1.0	19
	Tx-Rx cable	Open	Non-Shield	3.0	20
	Alarm cable	Open	Non-Shield	3.0	21

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
1	Recording mode
2	Web monitoring mode using notebook pc.

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 - LAN port	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
Magnetic field immunity	Enclosure	EN 61000-4-8:1994+A1:2001	N/A
Voltage dip/interruption	AC main	EN 61000-4-11:2004	Complied
Voltage variation	AC main	EN 50130-4:2003	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 a change, and no such flickering of indicators oeuvres at U = 130 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 BuV, 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 dBuV, 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 dBuV.

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 DBuv.

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 dBuV, providing:

(d) there is no permanent damage or change to the EUT (e.g. no corruption of memory or changes to programmable settings etc.):

(e) at U = 130 dBuV, any deterioration of the picture is so minor that the system could still be used; and

(f) there in no observable deterioration of the picture at U + 120 dBuV.

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 perishable, 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 Section 5, Class A		
Test mode	REC & web viewer mode		
Date:	2008. 10. 20		
Power supply	230 V, 50 Hz		
Test facility	Shielded room (CE#2)		
Temperature (°C)	22 °C	Humidity (%)	53 %
Remarks	Complied Minimum limit margin is 19.17 dB at 0.207 MHz. (Average) Telecommunication Minimum limit margin is 33.06 dB at 19.595 MHz (Average)		

6.1.1 Limits of conducted emission measurement

- AC main

Frequency [MHz]	Class A (dBuV)		Class B (dBuV)	
	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 (dBuV)		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).

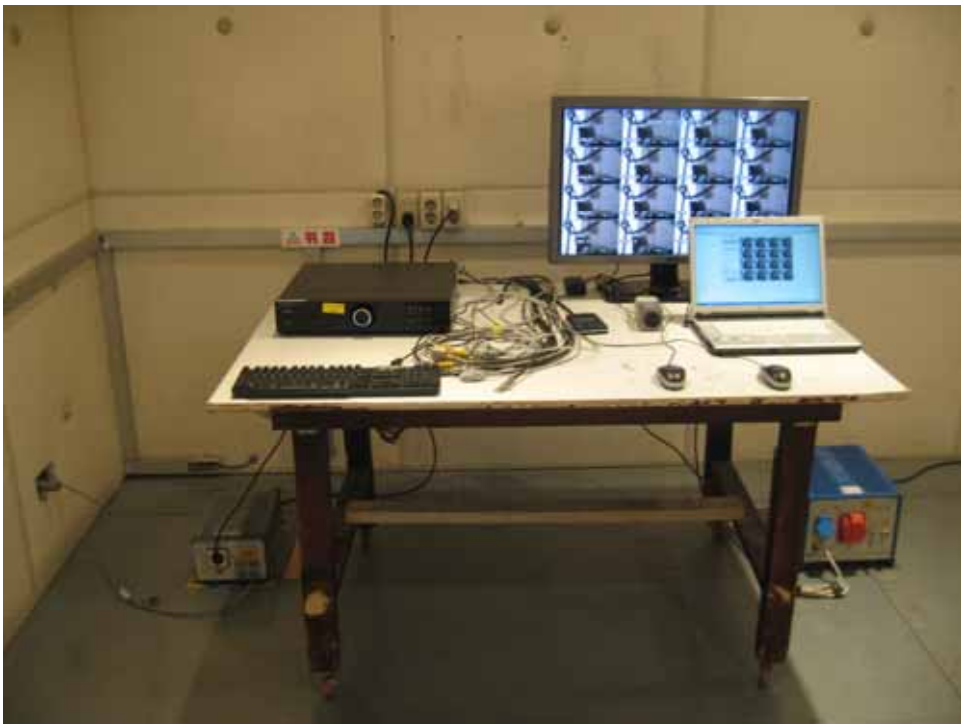
6.1.2 Measurement procedure

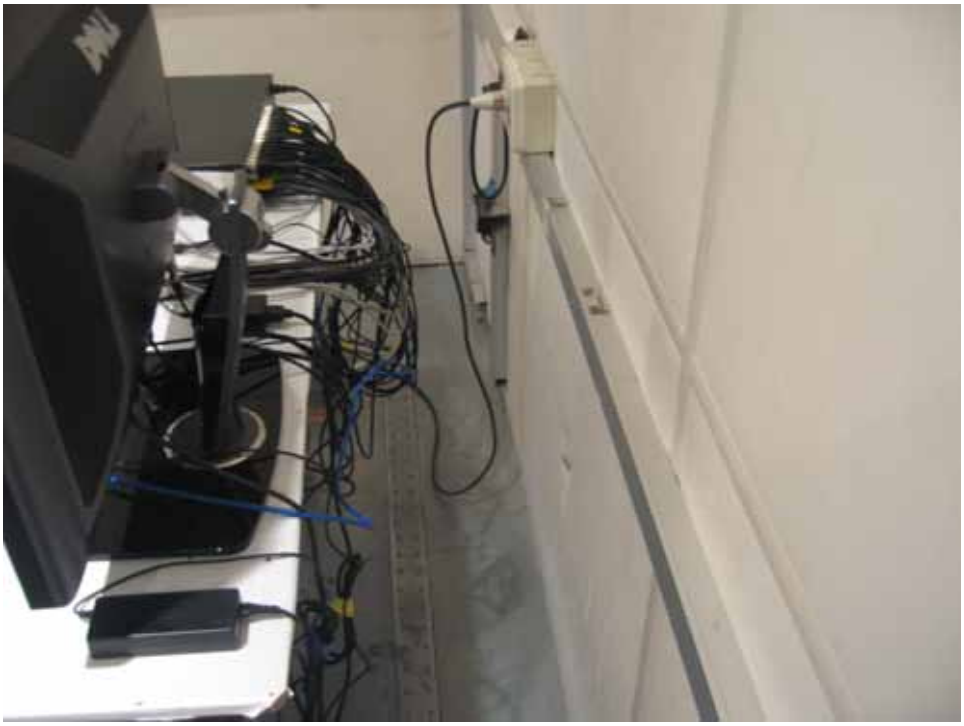
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground 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 ~ 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	☒
LISN	ESH3-Z5	846125/024	R&S	09.08.06	☒
LISN	L3-32	0120J20305	PMM	-	☒
4WIRE ISN	T800	24314	TESEQ	09.06.05	☒

6.1.4 Photographs of test setup





Telecommunication

6.1.5 Conducted emission measurement result

Frequency	Correction Factor		Line	Quasi-peak			Average		
				Limit	Reading	Result	Limit	Reading	Result
[MHz]	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.150	0.09	0.4	H	79.00	45.26	45.75	66.00	33.53	34.02
0.171	0.07	0.4	N		41.04	41.51		30.08	30.55
0.207	0.09	0.4	H		55.16	55.65		46.34	46.83
0.312	0.09	0.5	H		34.37	34.96		26.77	27.36
0.417	0.10	0.5	H		23.22	23.82		16.27	16.87
2.601	0.16	0.6	N	73.00	24.39	25.15	60.00	13.47	14.23
5.210	0.25	0.5	H		20.85	21.60		16.30	17.05
11.150	0.39	0.5	N		31.90	32.79		25.74	26.63
14.800	0.77	0.6	H		31.58	32.95		28.67	30.04
19.920	0.67	0.6	N		42.58	43.85		28.81	30.08
20.010	0.93	0.6	H		38.75	40.28		23.13	24.66

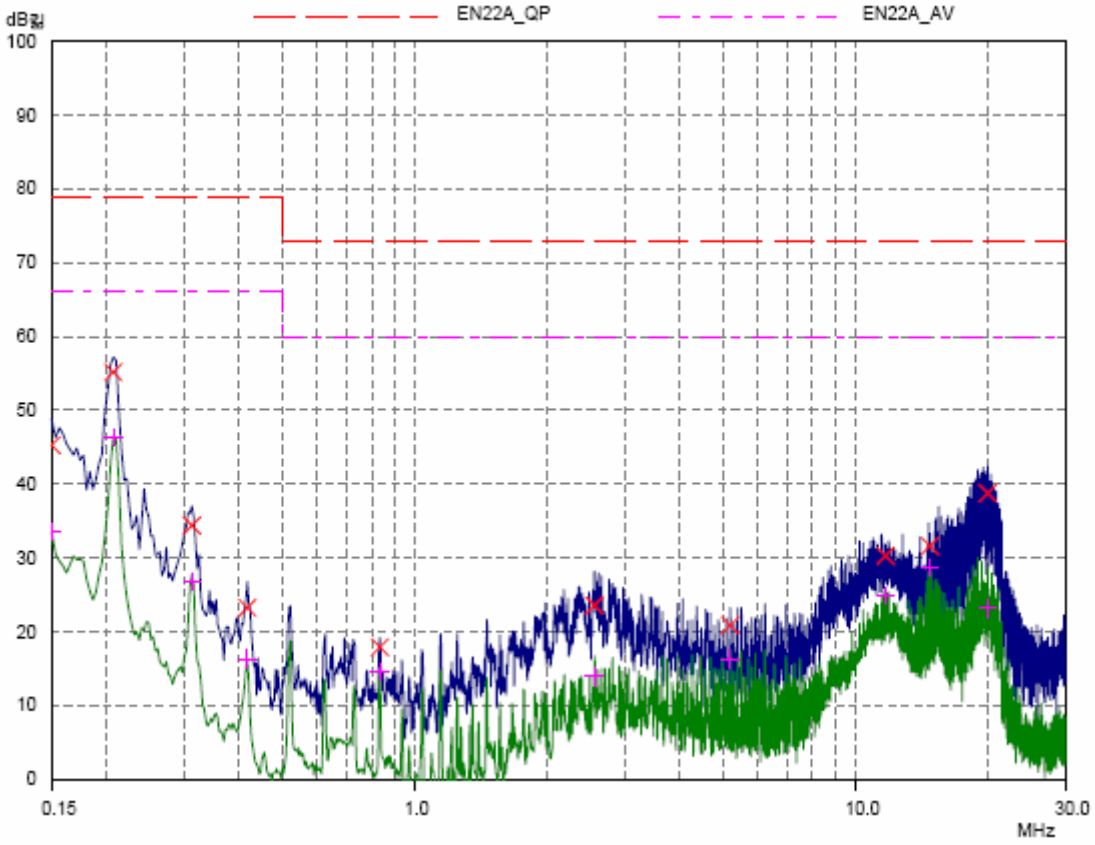
EUT: SHR-8162
Manuf: SUMSUNG
Op Cond: H
Operator:
Test Spec: EN22 Class A Conducted Emission
Comment:

Result File: 10075_h.dat : SUMSUNG_SHR-8162_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	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



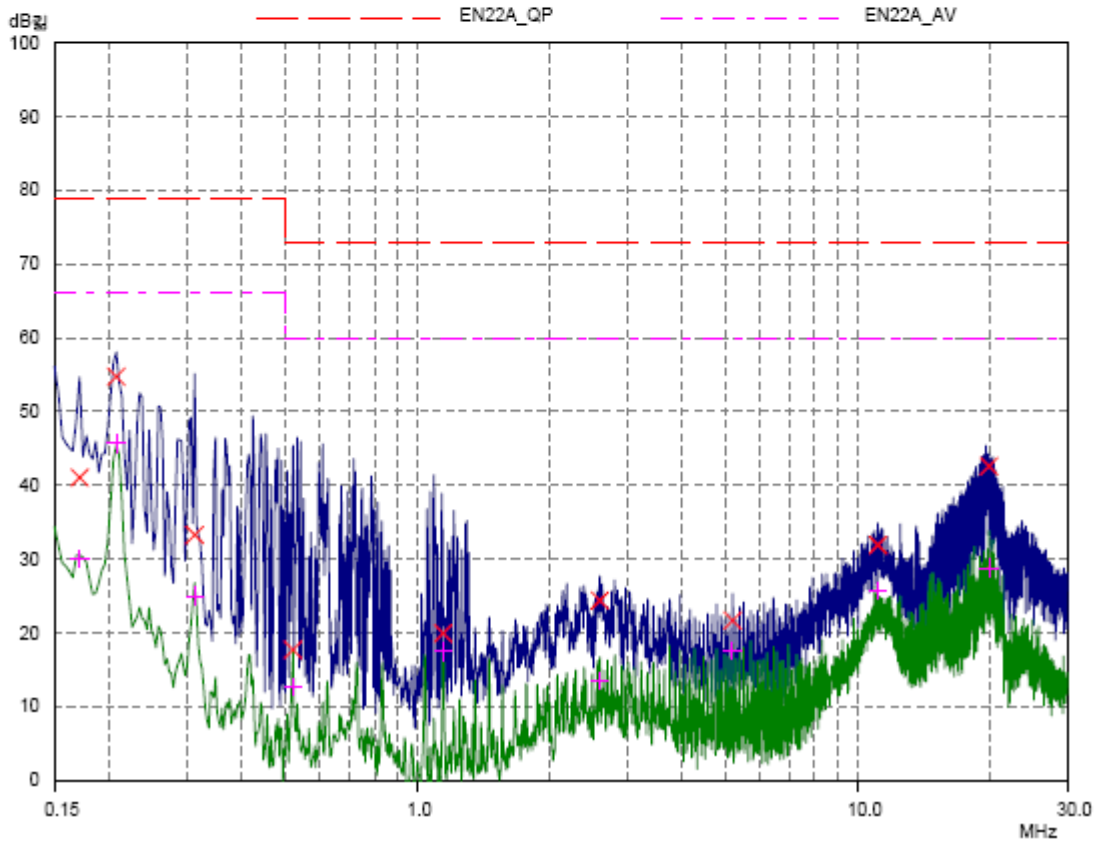
EUT: SHR-8162
Manuf: SUMSUNG
Op Cond: N
Operator:
Test Spec: EN22 Class A Conducted Emission
Comment:

Result File: 10075_n.dat : SUMSUNG_SHR-8162_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	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 65dB (LAN Port)**

Frequency	Correction Factor	Quasi-peak			Average		
		Limit	Reading	Result	Limit	Reading	Result
[MHz]	Cable	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.393	0.4	89.00	40.90	41.30	76.00	35.60	36.00
19.595	0.4	87.00	49.40	49.80	74.00	40.54	40.94

• Note. QP = Quasi-Peak, AV= Average.

EUT: SHR-8162
Manuf: SAMSUNG
Op Cond: TEL
Operator:
Test Spec: EN55022 telecommunication ports
Comment: Telecommunication port.

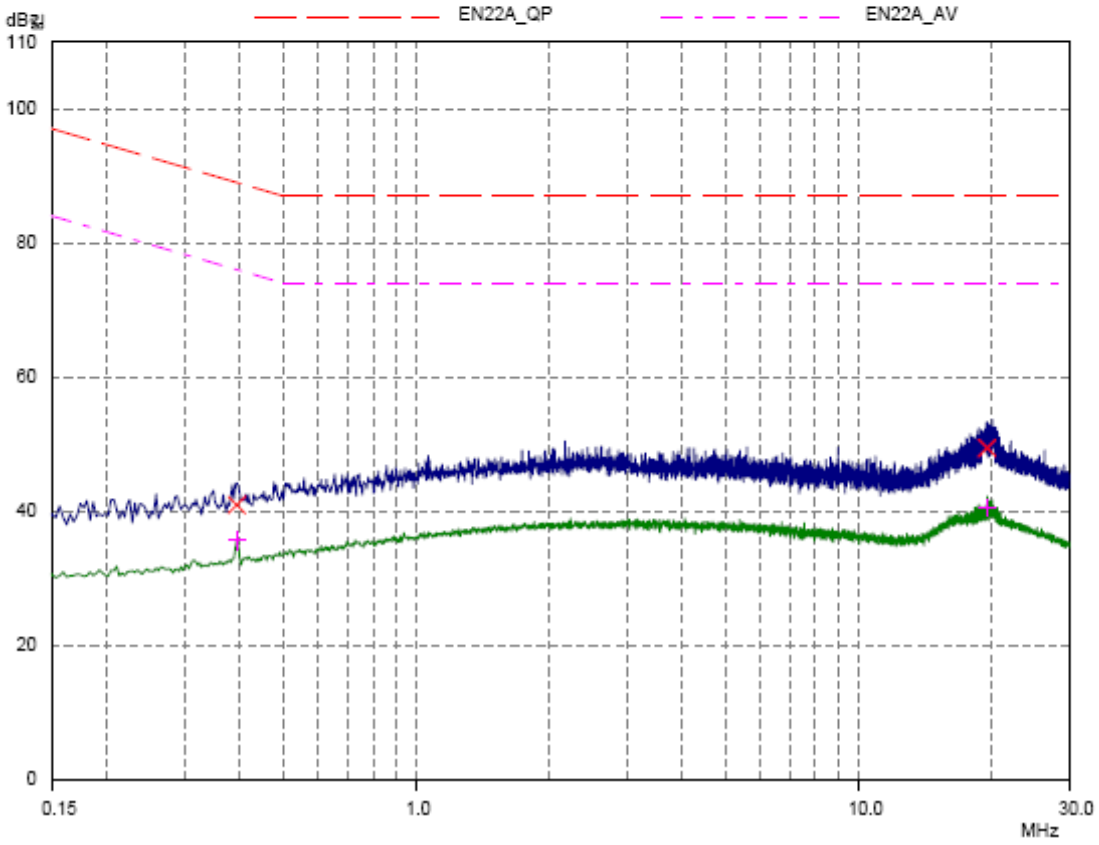
Result File: 10075_t.dat : SAMSUNG_SHR-8162_TEL(RJ-45)

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 Sections 5, Class A		
Test mode	REC & web viewer mode		
Date	2008. 10. 27		
Power supply	230 V, 50 Hz		
Test facility	Semi-anechoic chamber # 4, 10m OATS		
Temperature (°C)	8 °C	Humidity (%)	50 %
Remarks	Complied Minimum limit margin is 2.26 dB at 375.02 MHz.		

6.2.1 Limits of radiated emission measurement

Frequency [MHz]	Class A (dBuV/m) @ 10 m	Class B (dBuV/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	☒
TRILOG SUPER BROADBAND ANT	VULB9160	3228	Schwarz beck	10.02.21	☒
Antenna Mast	A109	N/A	DAEIL	-	☒
Turn Table	TS25	N/A	DAEIL	-	☒
10m OATS	-	-	EMC Compliance	-	☒

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 + AT - AG

MR = Meter Reading

AF = Antenna Factor

CL = Cable Loss

AP = Antenna Pad

AG= Amplifier Gain

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

The result (MR) is

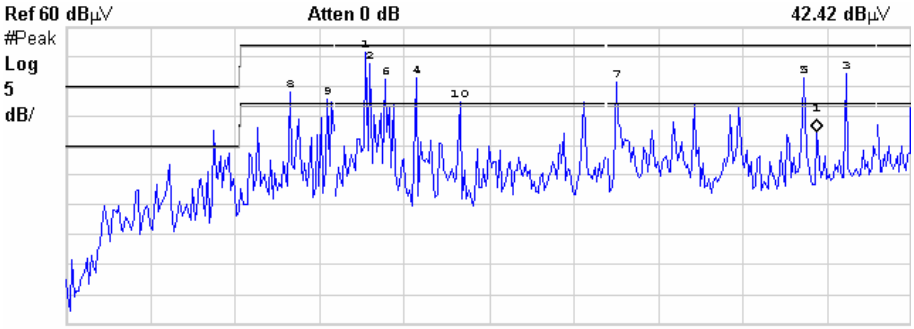
30 + 12 + 5 + 10 – 35 = 22 dBuV/m

6.2.5 Photographs of test setup

6.2.6 Radiated emission measurement result

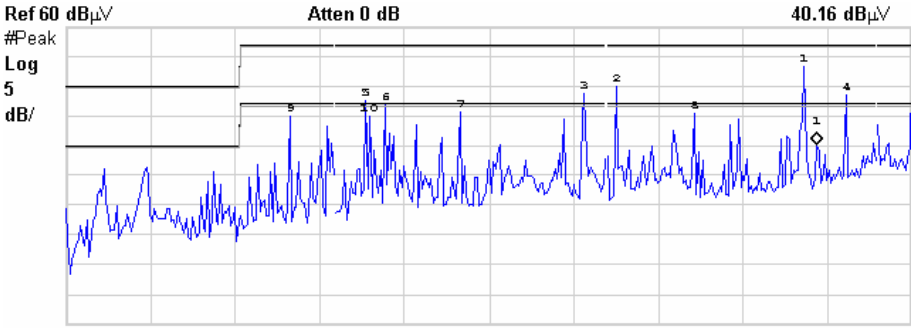
***3 m Semi-anechoic chamber Pre-scan Data (#4)**

-Horizontal



Pk	X Axis	Amplitude	Pk	X Axis	Amplitude
1	374 MHz	55.61 dBµV	6	396 MHz	51.17 dBµV
2	379 MHz	53.88 dBµV	7	661 MHz	50.76 dBµV
3	925 MHz	52.16 dBµV	8	287 MHz	49.02 dBµV
4	433 MHz	51.48 dBµV	9	331 MHz	47.72 dBµV
5	876 MHz	51.47 dBµV	10	481 MHz	47.44 dBµV

-Vertical



Pk	X Axis	Amplitude	Pk	X Axis	Amplitude
1	876 MHz	53.31 dBµV	6	396 MHz	46.92 dBµV
2	661 MHz	50.04 dBµV	7	481 MHz	45.75 dBµV
3	624 MHz	48.64 dBµV	8	750 MHz	45.32 dBµV
4	925 MHz	48.55 dBµV	9	287 MHz	45.03 dBµV
5	374 MHz	47.64 dBµV	10	379 MHz	44.89 dBµV

***10 m OATS measurement data**

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	angle	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
					Antenna	Cable			
125.01	10.8	H	4.0	338	11.71	2.91	40.0	25.42	14.58
150.00	11.0	H	4.0	192	13.18	3.14	40.0	27.32	12.68
192.00	10.3	V	1.0	283	11.10	3.64	40.0	25.04	14.96
375.02	24.1	H	3.2	203	15.37	5.27	47.0	44.74	2.26
378.01	21.3	H	3.3	119	15.42	5.30	47.0	42.02	4.98
432.02	18.2	H	4.0	164	16.27	5.74	47.0	40.21	6.79
659.98	13.7	H	4.0	339	19.65	7.30	47.0	40.64	6.36
923.99	7.1	H	3.6	123	22.38	9.05	47.0	38.53	8.47

* Note : Reading = Test Receiver value,

6.3 Harmonics

Test specification	EN 61000-3-2:2006				
Test mode	REC & web viewer mode				
Date	2008. 10. 27				
Power supply	230 V, 50 Hz				
Test facility	Immunity area				
Temperature(°C)	22 °C	Humidity (%)	49 %	Pressure (mb)	999 mb
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	☒

6.3.3 Photographs of test setup

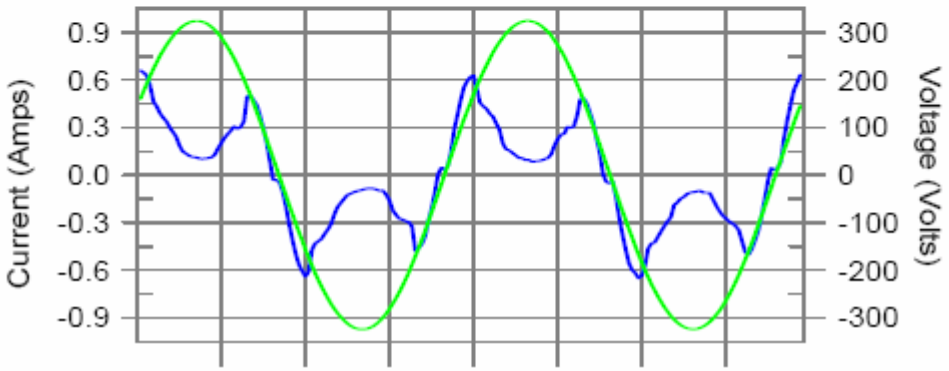
6.3.4 Measurement result

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

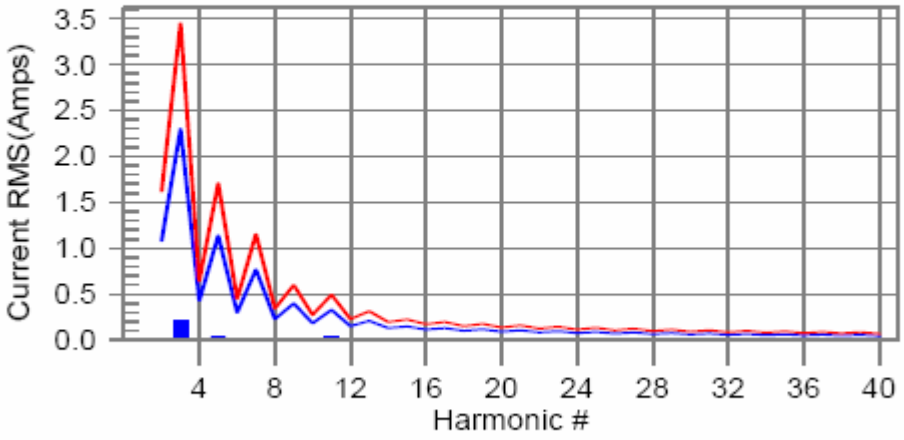
EUT: SHR-8162 Tested by: Test Operator
Test category: Class-A per Ed. 3.0 (2005-11) (European limits) Test Margin: 100
Test date: 2008-10-27 Start time: 오후 4:40:42 End time: 오후 4:43:32
Test duration (min): 2.5 Data file name: H-000033.cts_data
Comment: Comments
Customer: SAMSUNG

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line European Limits



Test result: Pass Worst harmonic was #3 with 9.09% of the limit.

Current Test Result Summary (Run time)

EUT: SHR-8162 Tested by: Test Operator
Test category: Class-A per Ed. 3.0 (2005-11) (European limits) Test Margin: 100
Test date: 2008-10-27 Start time: 오후 4:40:42 End time: 오후 4:43:32
Test duration (min): 2.5 Data file name: H-000033.cts_data
Comment: Comments
Customer: SAMSUNG

Test Result: Pass Source qualification: Normal
THC(A): 0.22 I-THD(%): 91.40 POHC(A): 0.011 POHC Limit(A): 0.251
Highest parameter values during test:

V_RMS (Volts):	229.67	Frequency(Hz):	50.00
I_Peak (Amps):	0.678	I_RMS (Amps):	0.336
I_Fund (Amps):	0.242	Crest Factor:	2.082
Power (Watts):	55.6	Power Factor:	0.727

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.007	1.080	0.6	0.010	1.620	0.61	Pass
3	0.209	2.300	9.1	0.211	3.450	6.12	Pass
4	0.003	0.430	0.7	0.005	0.645	0.71	Pass
5	0.044	1.140	3.9	0.045	1.710	2.62	Pass
6	0.002	0.300	0.7	0.003	0.450	0.70	Pass
7	0.009	0.770	1.2	0.010	1.155	0.87	Pass
8	0.002	0.230	1.0	0.003	0.345	0.92	Pass
9	0.022	0.400	5.5	0.023	0.600	3.77	Pass
10	0.003	0.184	1.7	0.004	0.276	1.31	Pass
11	0.029	0.330	8.9	0.030	0.495	6.07	Pass
12	0.003	0.153	2.2	0.004	0.230	1.80	Pass
13	0.009	0.210	4.1	0.009	0.315	2.91	Pass
14	0.004	0.131	2.8	0.004	0.197	2.18	Pass
15	0.005	0.150	3.6	0.006	0.225	2.53	Pass
16	0.002	0.115	1.9	0.003	0.173	1.50	Pass
17	0.005	0.132	4.0	0.006	0.199	2.79	Pass
18	0.002	0.102	1.8	0.002	0.153	1.56	Pass
19	0.009	0.118	7.5	0.009	0.178	5.07	Pass
20	0.001	0.092	1.0	0.001	0.138	0.92	Pass
21	0.008	0.107	7.2	0.008	0.161	4.91	Pass
22	0.002	0.084	2.0	0.002	0.125	1.51	Pass
23	0.004	0.098	4.2	0.004	0.147	2.96	Pass
24	0.002	0.077	2.6	0.002	0.115	1.96	Pass
25	0.003	0.090	3.7	0.004	0.135	2.62	Pass
26	0.002	0.071	2.7	0.002	0.106	2.03	Pass
27	0.002	0.083	2.3	0.002	0.125	1.76	Pass
28	0.002	0.066	3.0	0.002	0.099	2.23	Pass
29	0.003	0.078	4.3	0.004	0.116	3.04	Pass
30	0.001	0.061	2.3	0.002	0.092	1.76	Pass
31	0.002	0.073	3.1	0.002	0.109	2.29	Pass
32	0.001	0.058	2.5	0.002	0.086	1.88	Pass
33	0.001	0.068	2.0	0.002	0.102	1.54	Pass
34	0.001	0.054	1.7	0.001	0.081	1.47	Pass
35	0.002	0.064	3.2	0.002	0.096	2.30	Pass
36	0.001	0.051	2.1	0.001	0.077	1.64	Pass
37	0.002	0.061	2.6	0.002	0.091	1.96	Pass
38	0.001	0.048	2.6	0.001	0.073	1.98	Pass
39	0.001	0.058	1.7	0.001	0.087	1.36	Pass
40	0.001	0.046	2.3	0.001	0.069	1.79	Pass

Voltage Source Verification Data (Run time)

EUT: SHR-8162 Tested by: Test Operator
Test category: Class-A per Ed. 3.0 (2005-11) (European limits) Test Margin: 100
Test date: 2008-10-27 Start time: 오후 4:40:42 End time: 오후 4:43:32
Test duration (min): 2.5 Data file name: H-000033.cts_data
Comment: Comments
Customer: SAMSUNG

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	229.67	Frequency(Hz):	50.00
I_Peak (Amps):	0.678	I_RMS (Amps):	0.336
I_Fund (Amps):	0.242	Crest Factor:	2.082
Power (Watts):	55.6	Power Factor:	0.727

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.106	0.459	23.07	OK
3	0.559	2.067	27.02	OK
4	0.022	0.459	4.78	OK
5	0.027	0.919	2.98	OK
6	0.022	0.459	4.84	OK
7	0.017	0.689	2.53	OK
8	0.015	0.459	3.22	OK
9	0.018	0.459	3.97	OK
10	0.009	0.459	1.93	OK
11	0.018	0.230	7.63	OK
12	0.017	0.230	7.32	OK
13	0.028	0.230	12.37	OK
14	0.009	0.230	3.87	OK
15	0.009	0.230	4.06	OK
16	0.022	0.230	9.44	OK
17	0.012	0.230	5.37	OK
18	0.013	0.230	5.52	OK
19	0.016	0.230	6.94	OK
20	0.015	0.230	6.37	OK
21	0.008	0.230	3.59	OK
22	0.008	0.230	3.69	OK
23	0.007	0.230	2.96	OK
24	0.008	0.230	3.53	OK
25	0.004	0.230	1.81	OK
26	0.010	0.230	4.35	OK
27	0.012	0.230	5.05	OK
28	0.015	0.230	6.54	OK
29	0.009	0.230	3.81	OK
30	0.009	0.230	4.08	OK
31	0.009	0.230	3.86	OK
32	0.015	0.230	6.73	OK
33	0.007	0.230	3.13	OK
34	0.004	0.230	1.95	OK
35	0.006	0.230	2.61	OK
36	0.008	0.230	3.34	OK
37	0.004	0.230	1.94	OK
38	0.008	0.230	3.35	OK
39	0.010	0.230	4.42	OK
40	0.005	0.230	2.26	OK

6.4 Flicker

Test specification	EN 61000-3-3/A2:2005				
Test mode	REC & web viewer mode				
Date	2008. 10. 27				
Power supply	230 V, 50 Hz				
Test facility	Immunity area				
Temperature(°C)	22 °C	Humidity (%)	49 %	Pressure (mb)	999 mb
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_{lt} = 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.

6.4.2 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	☒

6.4.3 Photographs of test setup

6.4.4 Measurement result

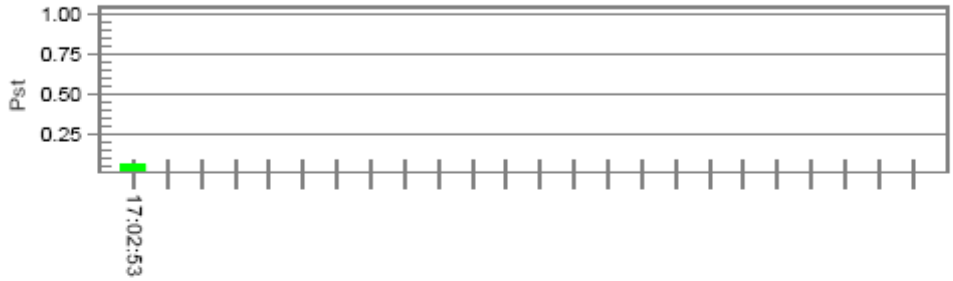
Flicker Test Summary per EN/IEC61000-3-3 (Run time)

EUT: SHR-8162
Test category: All parameters (European limits)
Test date: 2008-10-27
Test duration (min): 10
Comment: Comments
Customer: SAMSUNG

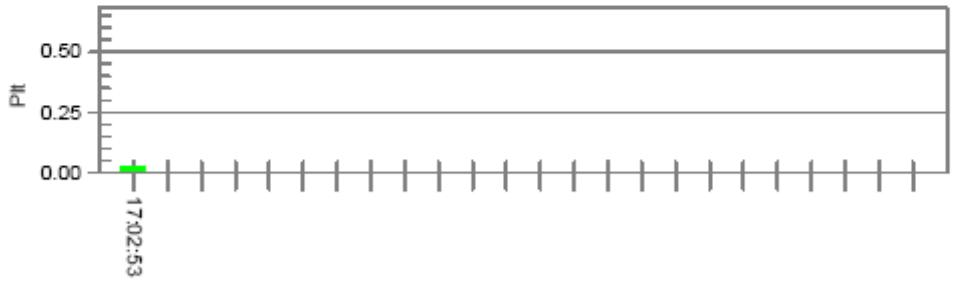
Tested by: Test Operator
Test Margin: 100
Start time: 오후 4:52:33
End time: 오후 5:02:54
Data file name: F-000034.cts_data

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):	229.51			
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 (%):	-0.10	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 Ω / 150 pF				
Date	2008. 10. 28				
Power supply	230 V, 50 Hz				
Number of discharge	10				
Interval between discharges	: ≥ 1 s				
Temperature(°C)	23 °C	Humidity (%)	48 %	Pressure (mb)	998 mb
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 10 cm 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

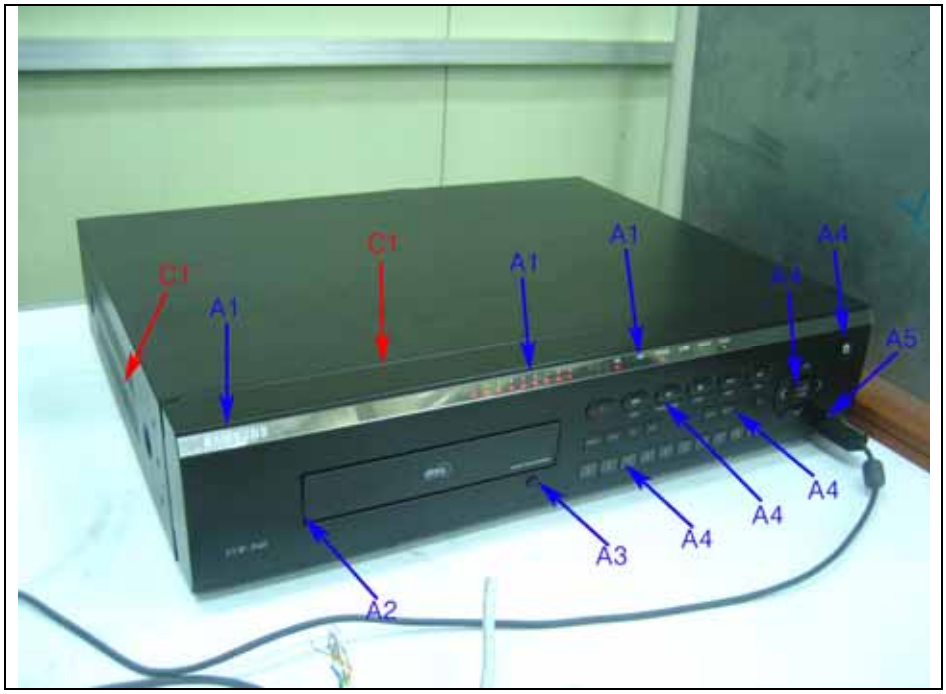
Equipment	Model No.	Serial No.	Makers	Next Cal. Date	Used
ESD Tester	PESD 1600	H011 309	HAEFELY	08.12.24	☒
HCP	-	-	-	-	☒
VCP	-	-	-	-	☒

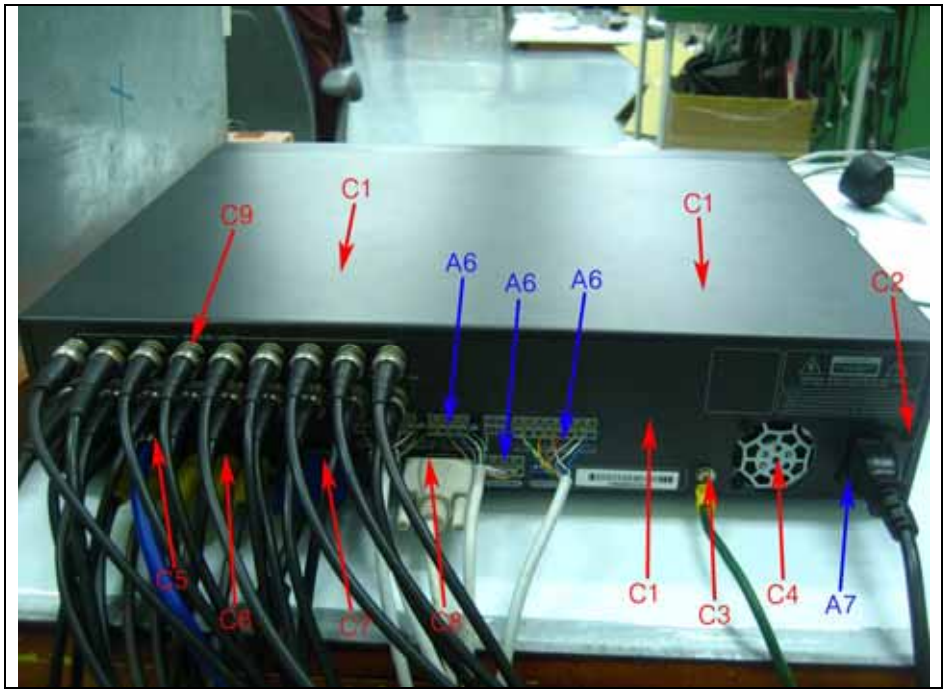
6.5.2 Photographs of test setup

6.5.4 Measurement result

Electrostatic Discharge (Test Point)

Air discharge →
Contact discharge →





Contact discharge

Location(EUT)		Applied level (±)	Result
C1	Case (metal)	± 2, 4, 6 kV	Complied
C2	Screw	± 2, 4, 6 kV	Complied
C3	BNC port	± 2, 4, 6 kV	Complied
C4	D-SUB port	± 2, 4, 6 kV	Complied
C5	Console port	± 2, 4, 6 kV	Complied
C6	HDMI port	± 2, 4, 6 kV	Complied
C7	Audio 5 ~ 16 port	± 2, 4, 6 kV	Complied
C8	LAN port	± 2, 4, 6 kV	Complied
C9	Audio port	± 2, 4, 6 kV	Complied
C10	RS-232C port	± 2, 4, 6 kV	Complied
	HCP (All 4 sides)	± 2, 4, 6 kV	Complied
	VCP (All 4 sides)	± 2, 4, 6 kV	Complied

Air discharge

Location(EUT)		Applied level (±)	Result
A1	Case (not matal)	± 2, 4, 8 kV	Complied
A2	Button	± 2, 4, 8 kV	Complied
A3	LED	± 2, 4, 8 kV	Complied
A4	USB port	± 2, 4, 8 kV	Complied
A5	Alarm port	± 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	3m from EUT to tip of antenna				
Dwell time	3 s				
Step size	log 1 % step				
Power supply	230 V, 50 Hz				
Date	2008. 10. 27				
Temperature(°C)	21 °C	Humidity (%)	46 %	Pressure (mb)	997 mb
Remarks	Complied - There was no change of operation status during above testing.				

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.

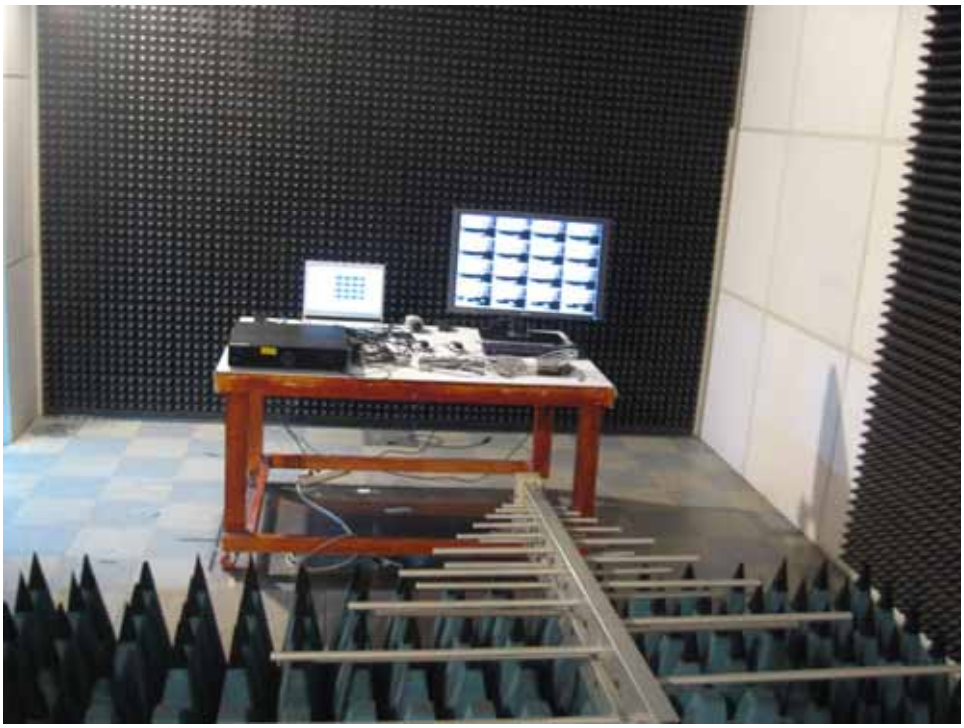
The field uniformity was calibrated for 1 V/m, 3 V/m, 10 V/m.

6.6.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Power meter	PM2002	302852	AR	09.05.08	☒
Power sensor (with adapter)	PH2000	303224	AR	09.05.08	☒
Power sensor (with adapter)	PH2000	303222	AR	09.05.08	☒
Directional coupler	DC6180	303976	AR	09.05.08	☒
Signal generator	E4421B	GB40052295	AGILENT	09.10.25	☒
Amplifier	150W1000M2	303843	AR	09.04.11	☒
Directional Coupler	DC7144M1	320279	AR	09.02.19	☒

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				
Date	2008.10. 27				
Temperature(°C)	20 °C	Humidity (%)	45 %	Pressure (mb)	996 mb
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 0.8 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 500M6	0701-03	EM TEST	09.06.03	☒
Capacitive Coupling Clamp	-	-	EM TEST	-	☒

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
BNC cable	+ 1 KV	- 1 KV	Complied
Tx-Rx cable	+ 1 KV	- 1 KV	Complied
Alarm cable	+ 1 KV	- 1 KV	Complied

Telecommunication

EFT coupling point	(+)	(-)	Result
LAN cable	+ 1 KV	- 1 KV	Complied

6.8 Surge

Test specification	EN 61000-4-5 :2001				
Coupling	AC main Signal: clamp				
Test level	AC main Differential mode : 0.5, 1 kV Common mode : 0.5, 1, 2 kV Signal line: 0.5, 1 kV				
Surge pulse shape	Tr/Th = 1.2 / 50 uS				
Coupling Impedance	Differential mode: 18 μF Common mode: 10 Ω + 9 μF BNC: Direct Tx-Rx, Alram : 40 Ω				
Angles	0 °, 90 °, 180 °, 270 °				
Number of surge & Coupling time	5 T / 1 min				
Power supply	230 V, 50 Hz				
Date	2008. 10. 29				
Temperature(°C)	22 °C	Humidity (%)	50 %	Pressure (mb)	1000 mb
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 0.8 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
Surge generator	UCS 500 M6	V0545100858	EM TEST	09.01.07	☒
CDN	CNV 508 S1	0302-01	EM TEST	-	☒

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
BNC cable	+ 0.5, 1 kV	- 0.5, 1 kV	Complied
Tx-Rx cable	+ 0.5, 1 kV	- 0.5, 1 kV	Complied
Alarm cable	+ 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/m, 80 % Amplitude Modulation (1 kHz) 1, 3, 10 V/m, 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				
Step size	log 1 % step				
Date	2008. 10. 28				
Temperature(°C)	23 °C	Humidity (%)	48 %	Pressure (mb)	998 mb
Remarks	Complied - There was no change of operation status during above testing.(1V,3V)				

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 0.1 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 in length were tested.

6.9.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
CS generator	CWS 500 C S1	V0635101750	EM TEST	09.10.13	☒
CDN	CDN M2/M3	0906-12	EM TEST	09.10.13	☒
Attenuator	73-6-34	MU918	MCE/WEINSCHEL	09.03.24	☒
EM Clamp	KEMZ 801	17643	Schaffner	09.04.01	☒
EM Clamp	KEMA 801	17899	Scahffner	-	☐
Current probe	MD720	W1345167/M6/0068	Schaffner	-	☐

6.9.3 Photographs of test setup

6.9.4 Measurement result

Coupling point	Coupling method	Result
Power	CDN(M3)	Complied
BNC cable	Clamp	Complied
Tx-Rx cable	Clamp	Complied
Alarm cable	Clamp	Complied
LAN cable	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 Vac / 240 Vac				
Date	2008. 10. 29				
Temperature (°C)	22 °C	Humidity (%)	49 %	Pressure (mb)	1000 mb
Remarks	Complied - There was no change of operation status during above testing.				

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	V0545100858	EM TEST	09.01.07	☒

6.10.3 Photographs of test setup

6.10.4 Measurement result

- 240 V

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

Comment:

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

- 100 V

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

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 Vac / 240 Vac				
Date	2008. 10. 29				
Temperature(°C)	22 °C	Humidity (%)	49 %	Pressure (mb)	1000 mb
Remarks	Complied - There was no change of operation status during above testing.				

6.11.1 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
Generator	UCS 500 M6	V0545100858	EM TEST	09.01.07	☒

6.11.2 Measurement result

Tested voltage: 240 V

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

Tested voltage: 100 V

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

7. E.U.T. photographs

Front View

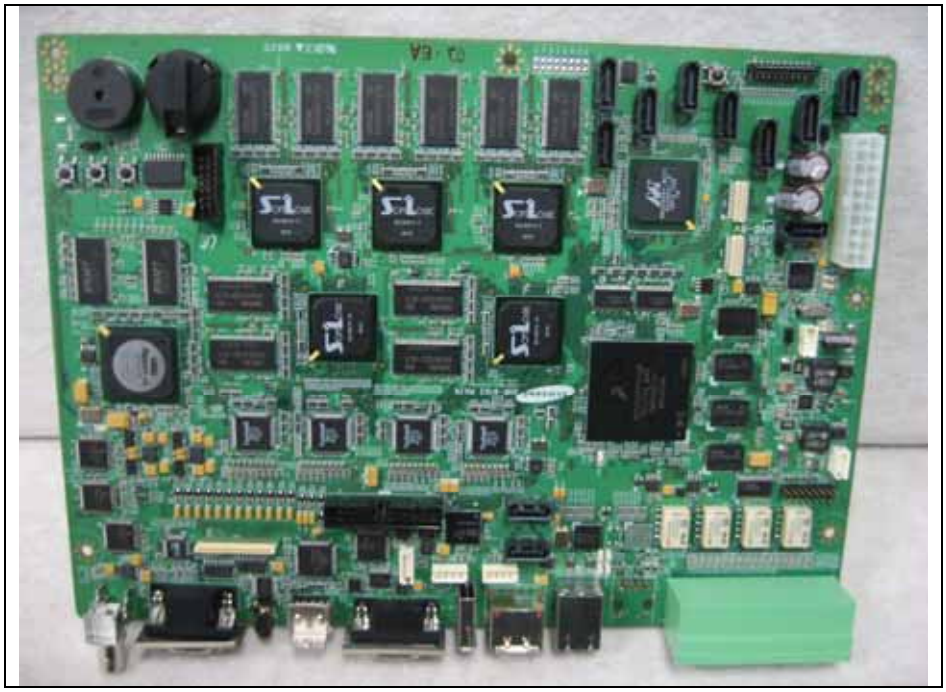
Rear View

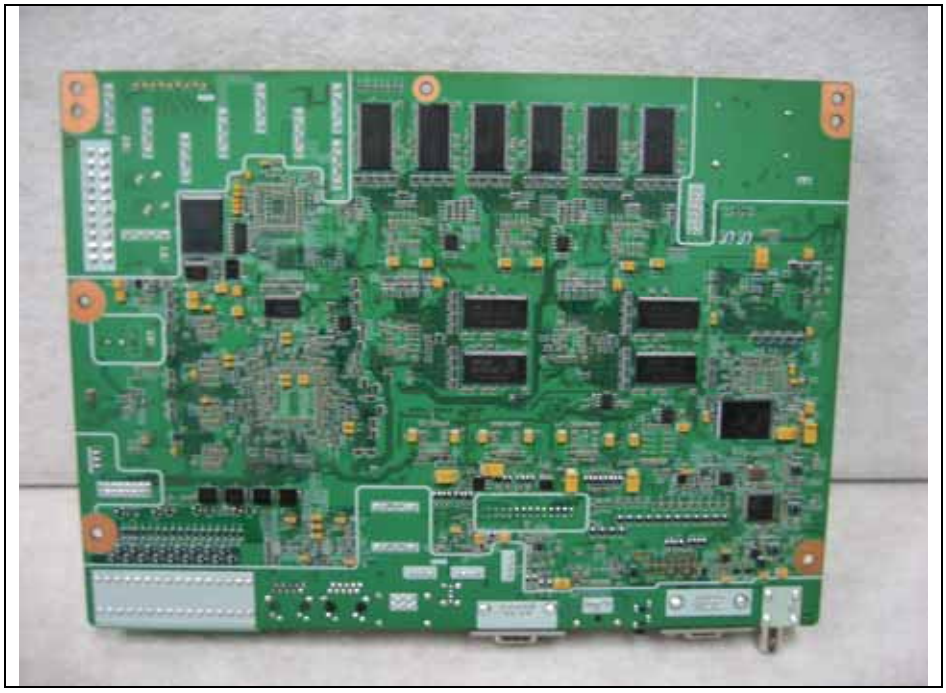
Left View

Right View

Inside

Main Board



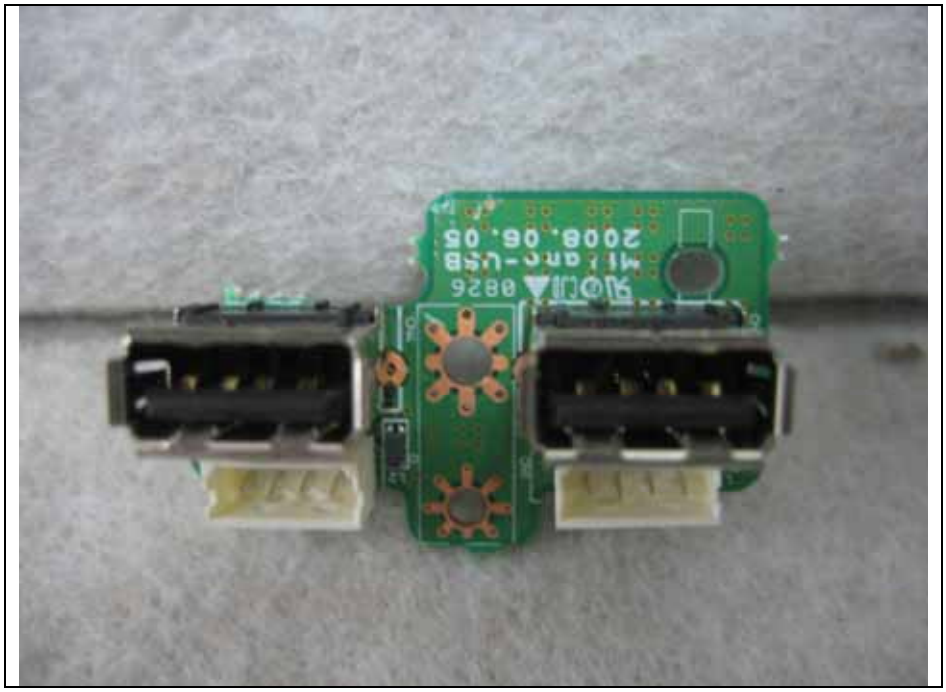


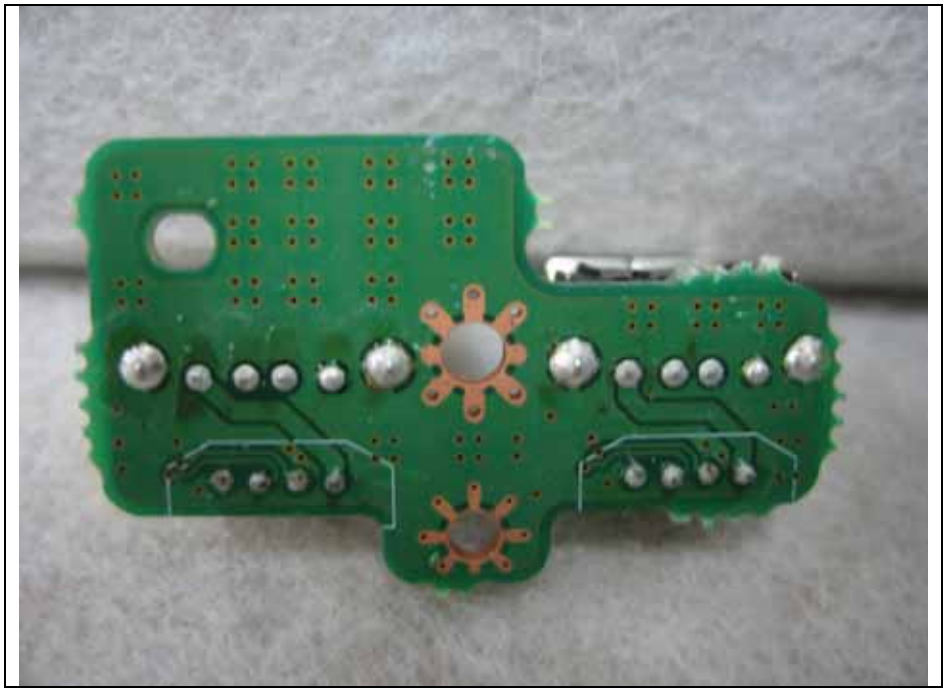
SMPS

HDD

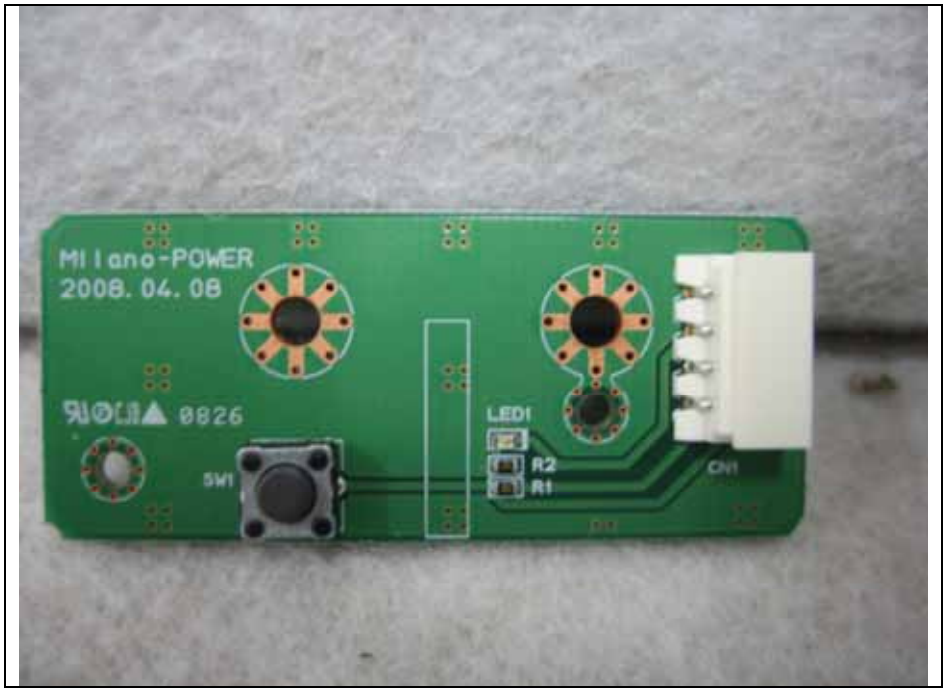
ODD

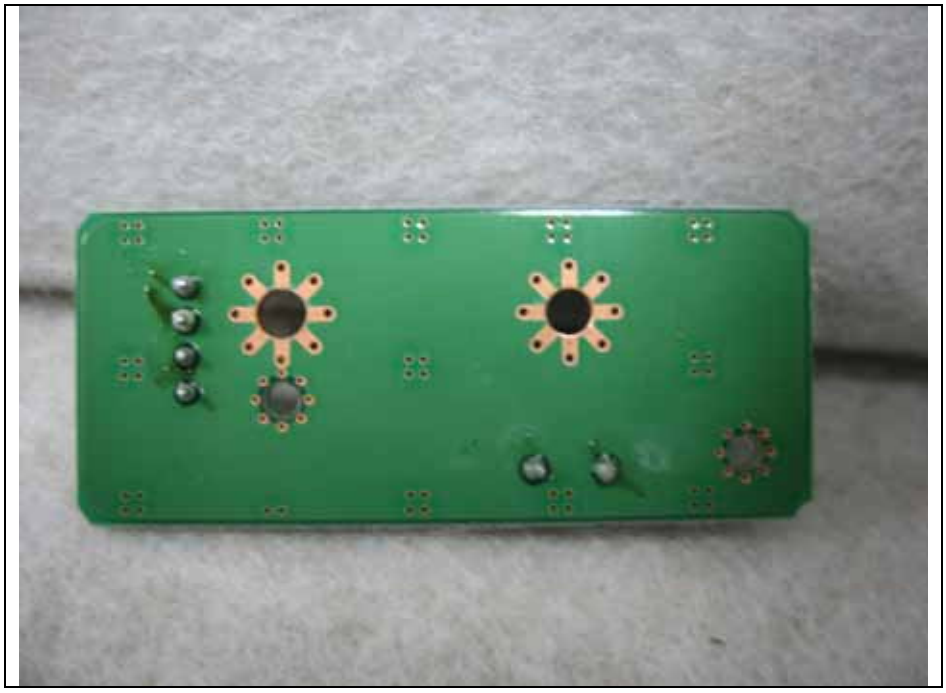
Port Board



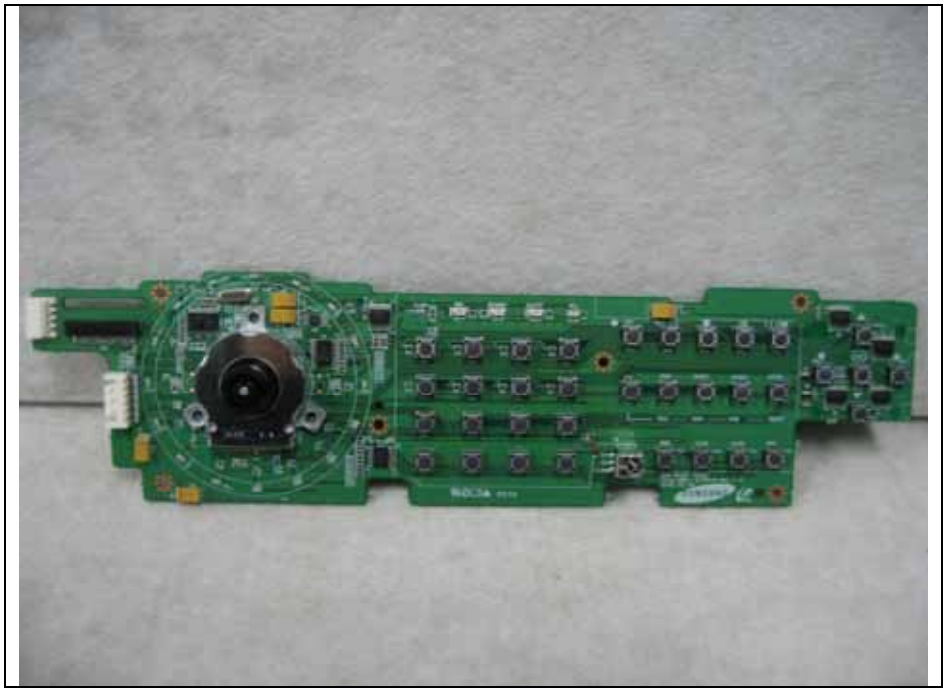


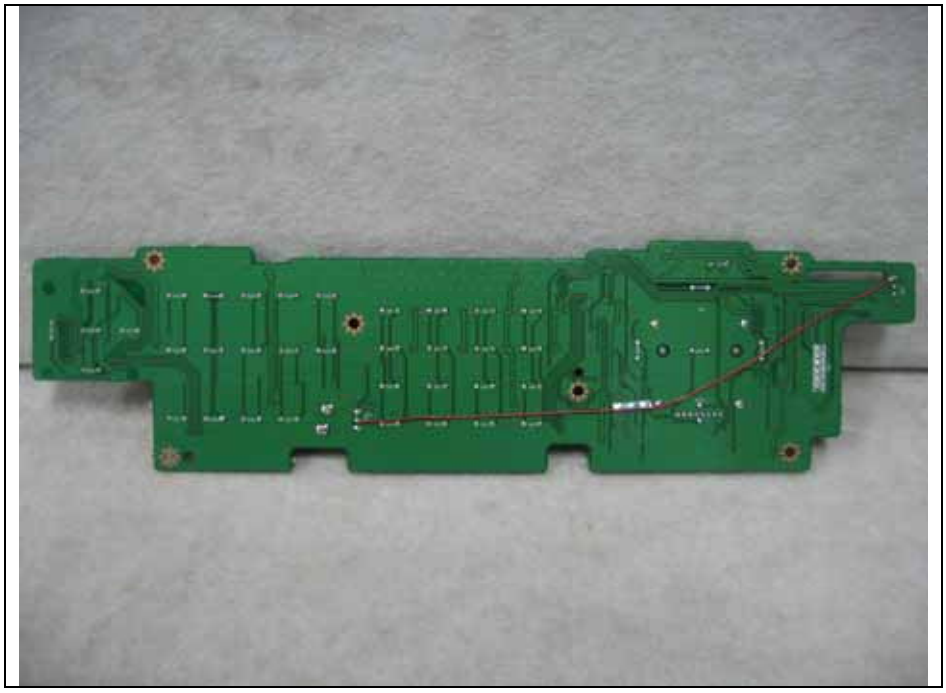
Power Switch Board



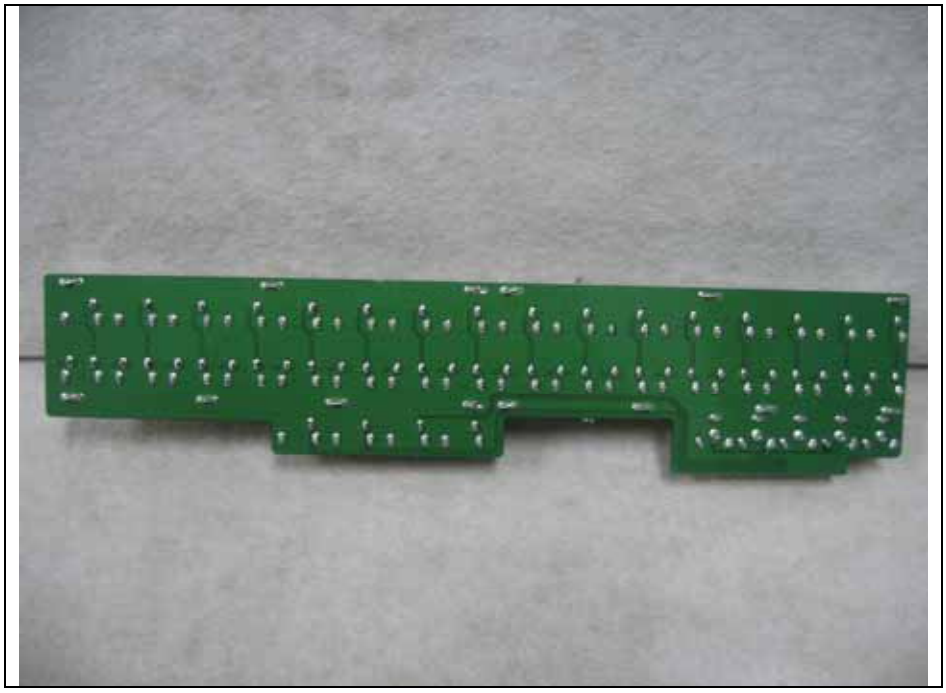


Button Board





BNC Board



D-SUB Cable

RS-232C Cable

HDMI Cable

BNC Cable

E-SATA Cable

Console Cable