

CERTIFICATE of EMC Compliance

Type of equipment: DIGITAL VIDEO RECORDER

Basic Model Name: SHR-8162N

**Variant Model Name: SHR-8082N, SHR-7082N, SHR-7162N,
SHR-8080N, SHR-8160N, SHR-7080N, SHR-7160N**

Report No: EMC-FCC-0792

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**

Date of Issue : November 05 , 2008

Test required : FCC part 15 subpart B, Class A

ANSI C63.4 – 2003

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.

The results of testing in this report apply to the product / system which was tested only.

Test Laboratory

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



Min-Seok Chung / Manager

EMI TEST REPORT

Test report No. : EMC- FCC- 0792
Type of Equipment : DIGITAL VIDEO RECORDER
Model Name: SHR-8162N
Variant Model Name : SHR-8082N, SHR-7082N, SHR-7162N, SHR-8080N,
SHR-8160N, SHR-7080N, SHR-7160N
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 : FCC part 15 subpart B, Class A

Test Procedure and Items

- AC Power Line Conducted Emissions Measurement: ANSI C63.4-2003
- Radiated Emissions Measurement : ANSI C63.4-2003

Testing Laboratory : EMC Compliance Ltd.

Test result : Complied

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.


The results of testing in this report apply to the product/system which was tested only.


Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Receipt date: 2008. 10. 20

Date of testing: 2008. 10. 20 ~ 10. 27

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



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

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3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
OATS	8 °C	50 %	-
Shielded room	22 °C	53 %	-

Test site

These testing items were performed following locations;

Shielded Room : Conducted Emission
OATS (10 m) : Radiated Emission (#4)

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]

4. Description of E.U.T.

4.1 General information

- SHR-8162N is a digital video recorder.

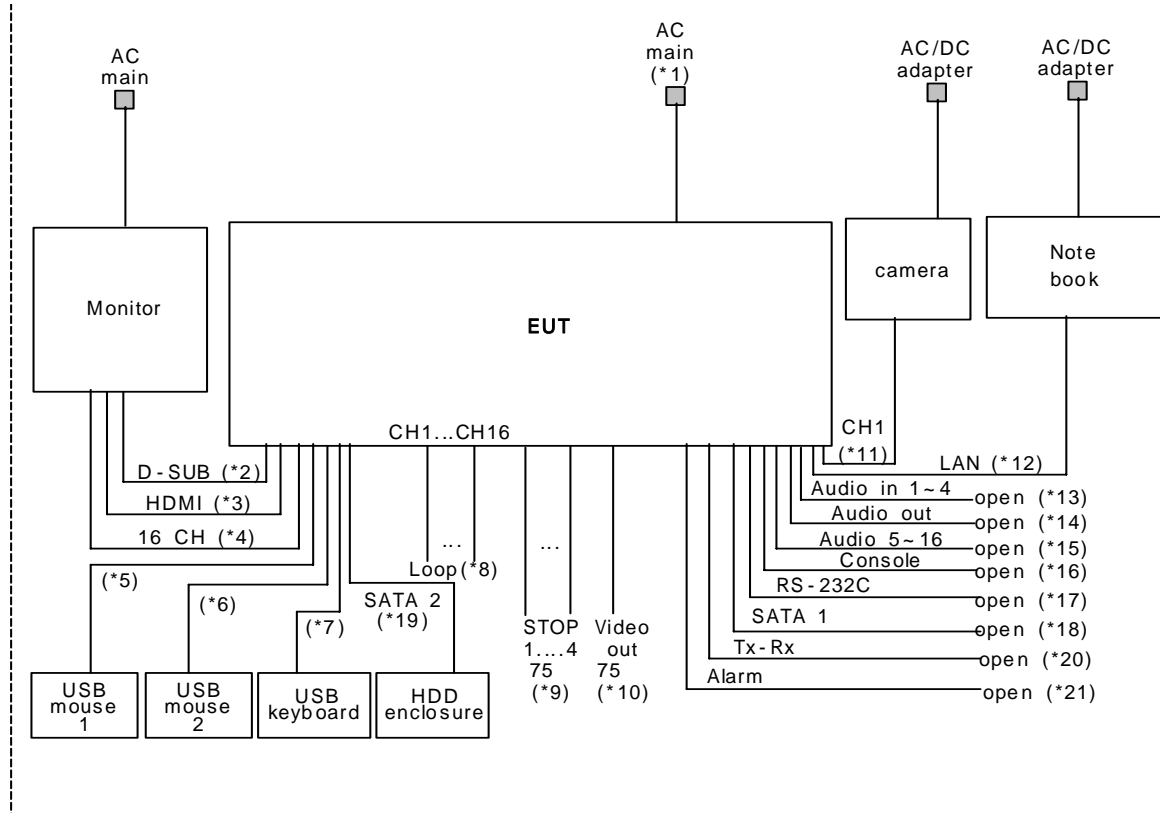
4.2 Product description

Type of product:	DIGITAL VIDEO RECORDER
Model name (Basic):	SHR-8162N
Model name (Variant):	SHR-8082N, SHR-7082N, SHR-7162N, SHR-8080N, SHR-8160N, SHR-7080N, SHR-7160N
Difference:	Buyer model names
Serial no:	-
Trade name :	-
Testing Voltage:	120 Vac, 60 Hz
Product rating:	100 ~ 240 Vac, 4 ~ 1.5 A, 50 / 60 Hz
Note :	This test was done with SHR-8162N.

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Monitor	3008WFPt	7735432490POB	DELL
Camera	KCC-41	C0802220852	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.

This test was done at worst case.

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

FCC Part 15 Subpart B (Class A)

ANSI C63.4 – 2003

Application	Test method	Test result
Conducted emission - AC main	ANSI C63.4 – 2003	Complied
Radiated emission	ANSI C63.4 – 2003	Complied

6. Test results

6.1 Conducted Emission

Test specification	FCC Part 15, Section 15.107, Class A		
Test mode	REC & web viewer mode		
Date:	2008. 10. 20		
Test facility	Shielded room (CE#2)		
Power supply	120 V, 60 Hz		
Temperature (°C)	22 °C	Humidity (%)	53 %
Remarks	Complied Minimum limit margin is 19.79 dB at 0.207 MHz. (Average)		

6.1.1 Limits of conducted emission measurement

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.

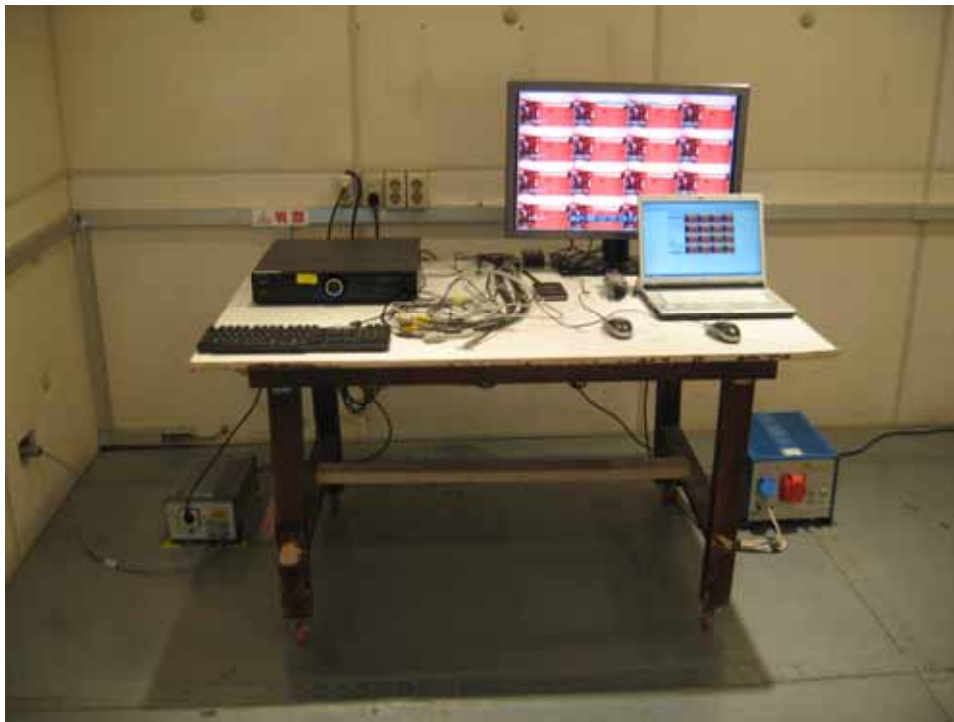
6.2.2 Measurement procedure

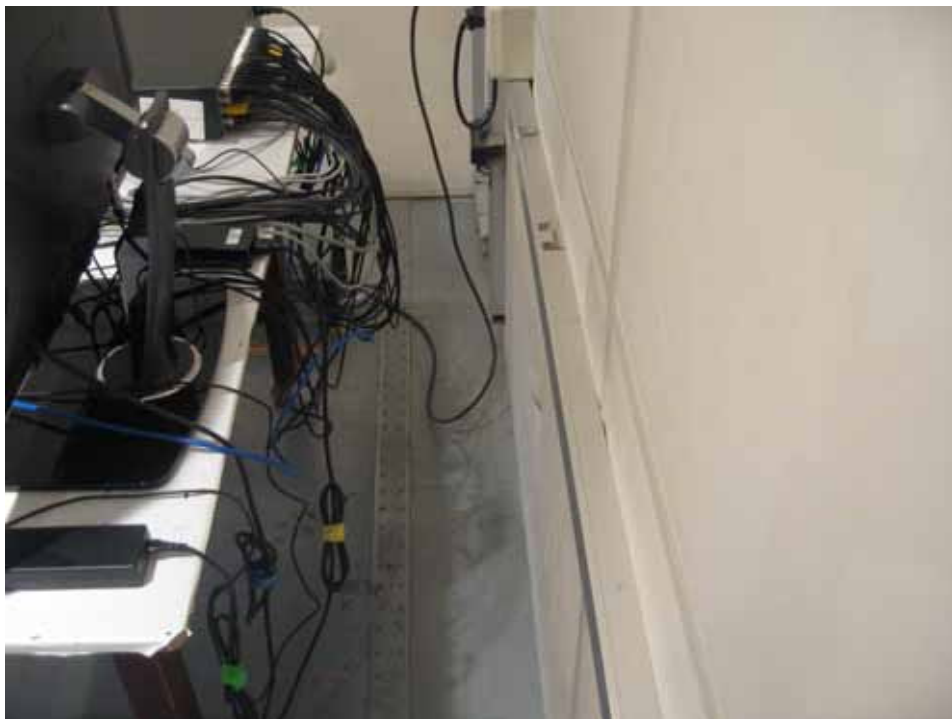
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground 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	<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"/>

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 [dBuV]	Reading [dBuV]	Result [dBuV]	Limit [dBuV]	Reading [dBuV]	Result [dBuV]
0.150	0.07	0.4	N	79.00	49.90	50.37	66.00	34.75	35.22
0.207	0.09	0.4	H		54.72	55.21		45.72	46.21
0.312	0.09	0.5	H		33.52	34.11		24.76	25.35
0.414	0.10	0.5	H		20.39	20.99		13.12	13.72
4.440	0.22	0.5	H	73.00	30.54	31.26	60.00	28.78	29.50
10.470	0.44	0.6	H		29.11	30.15		21.59	22.63
10.840	0.39	0.5	N		28.44	29.33		21.91	22.80
15.310	0.77	0.6	H		35.05	36.42		29.85	31.22
19.370	0.65	0.6	N		44.78	46.03		34.74	35.99
20.000	0.93	0.6	H		39.68	41.21		27.63	29.16

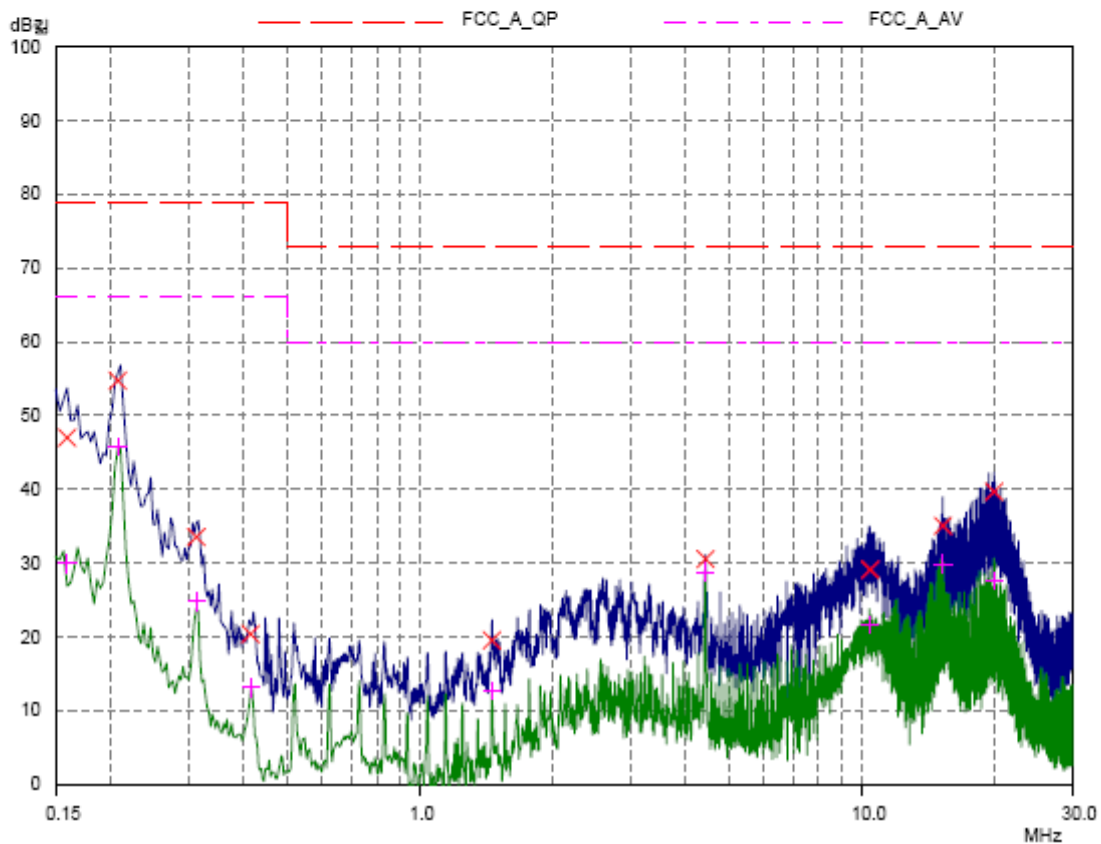
EUT: SHR-8162
 Manuf: SAMSUNG
 Op Cond: H
 Operator:
 Test Spec: FCC Class A Conducted Emission
 Comment:

Result File: 10018_h.dat : SAMSUNG_SHR-8162

Scan Settings (2 Ranges)

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

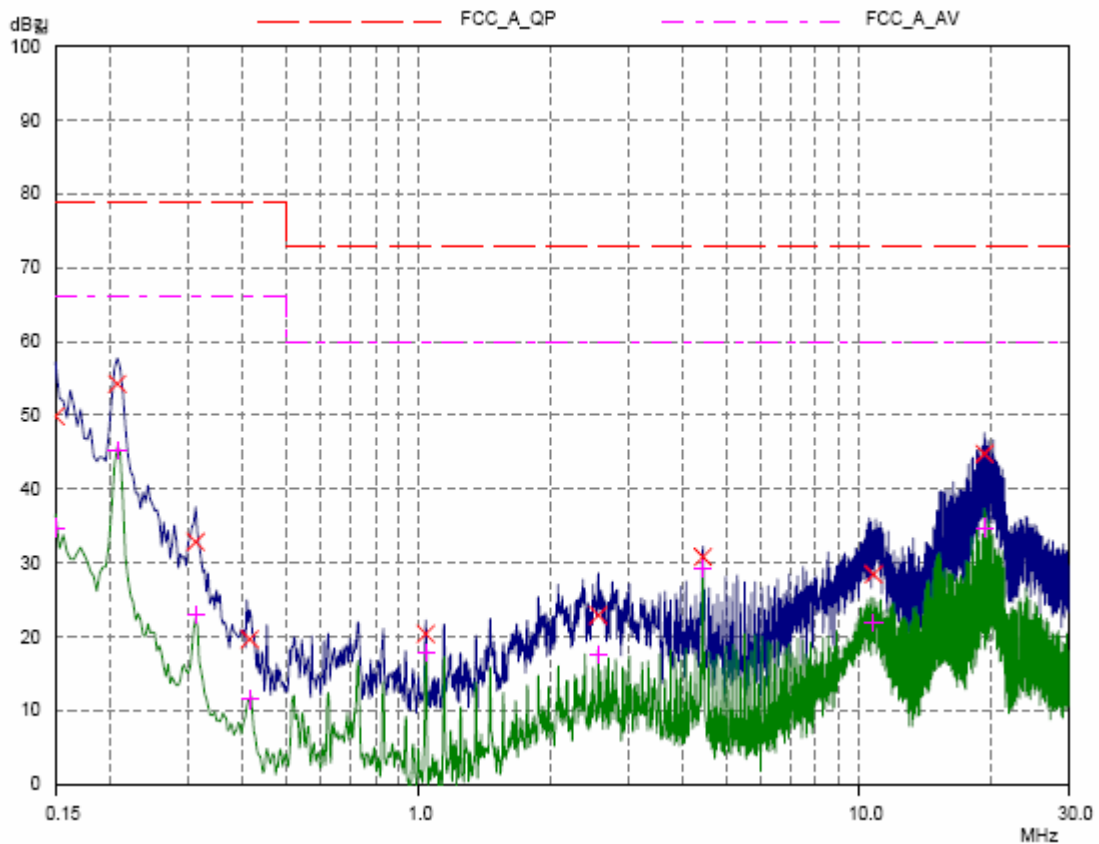
Final Measurement: Detectors: X QP / + AV
 Meas Time: 1sec
 Peaks: 8
 Acc Margin: 25 dB



EUT: SHR-8162
 Manuf: SAMSUNG
 Op Cond: N
 Operator:
 Test Spec: FCC Class A Conducted Emission
 Comment:
 Result File: 10018_n.dat : SAMSUNG_SHR-8162

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

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



6.2 Radiated Emission

Test specification	FCC Part 15, Section 15.109, Class A		
Test mode	REC & web viewer mode		
Date:	2008. 10. 27		
Power supply	120 V, 60 Hz		
Test facility	Semi-anechoic chamber # 4, 10 m OATS		
Temperature (°C)	8 °C	Humidity (%)	50 %
Remarks	Complied Minimum limit margin is 2.26 dB at 375.01 MHz.		

6.2.1 Limits of radiated emission measurement

Frequency [MHz]	Class A (dBuV/m) @ 10 m	Class B (dBuV/m) @ 3 m
30 ~ 88	39	40
88 ~ 216	43.5	43.5
216 ~ 960	46.4	46
Above 960	49.5	54

* Note - Alternative standard: CISPR, Pub. 22 *

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"/>
10m 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:

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

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

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

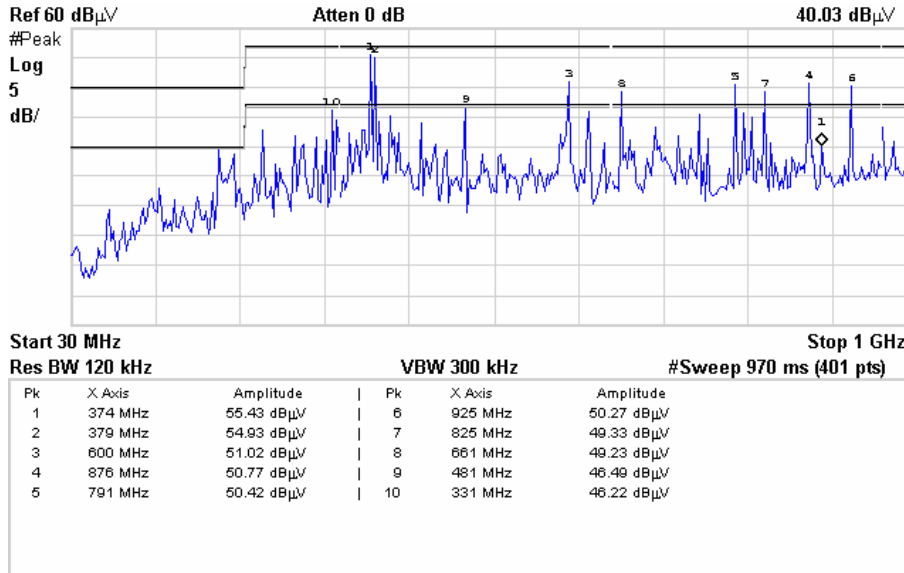
6.2.5 Photographs of test setup



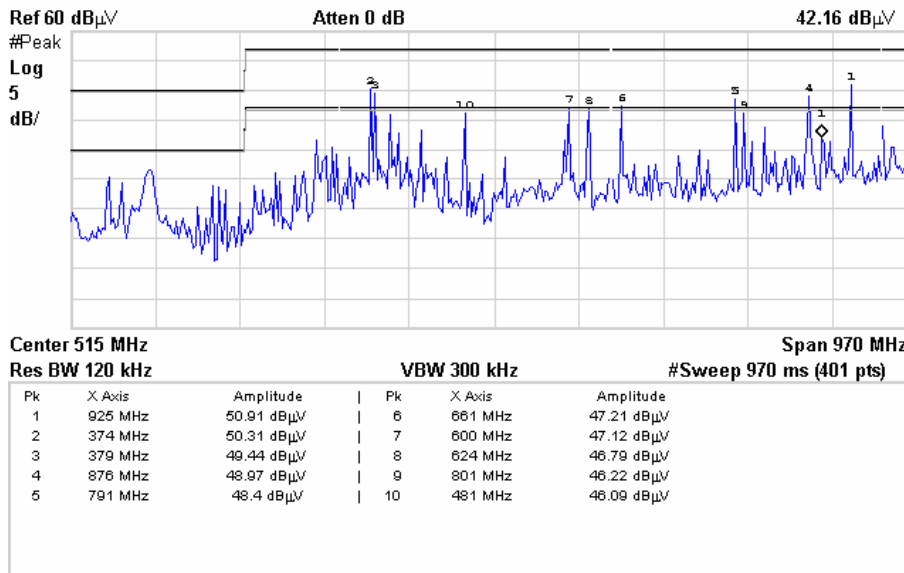
6.2.6 Radiated emission measurement result

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

-Horizontal



-Vertical



***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			
74.63	14.4	V	1.0	104	8.91	2.19	39.0	25.50	13.50
148.74	9.2	V	1.2	134	13.12	3.13	43.5	25.45	18.05
287.99	18.4	H	3.2	110	13.65	4.55	46.4	36.60	9.80
330.01	20.0	H	4.0	201	14.59	4.95	46.4	39.54	6.86
375.01	23.5	H	3.3	199	15.37	5.27	46.4	44.14	2.26
377.99	21.0	H	4.0	203	15.40	5.29	46.4	41.69	4.71
660.00	16.8	V	1.5	121	19.65	7.30	46.4	43.76	2.64

* Note: Reading = Test Receiver value.

7. E.U.T. photographs

Front View



Rear View



Left View



Right View



Inside



Main Board



SMPS





HDD



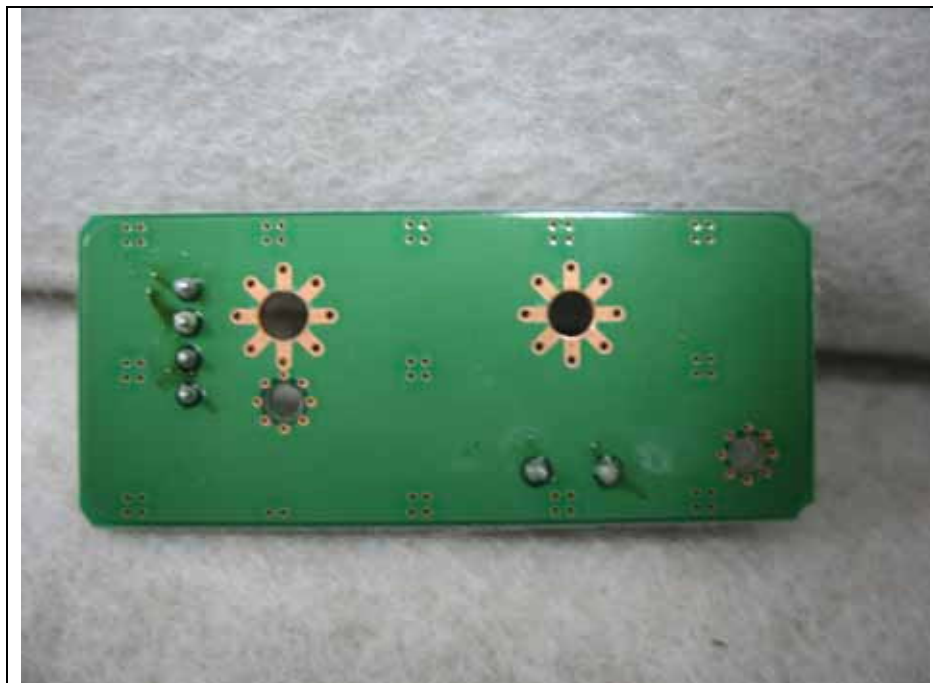
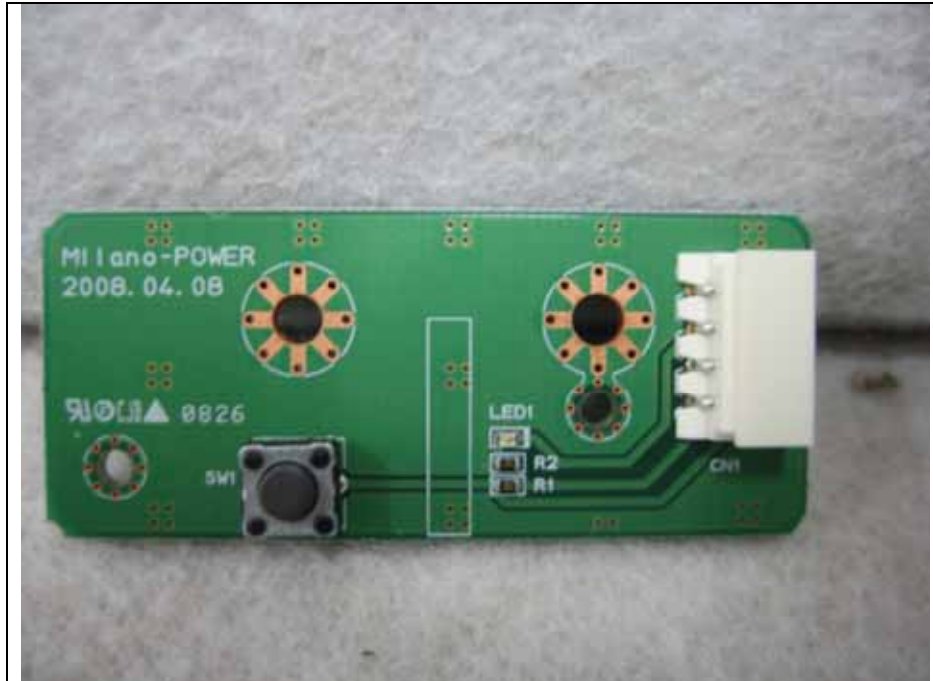


ODD

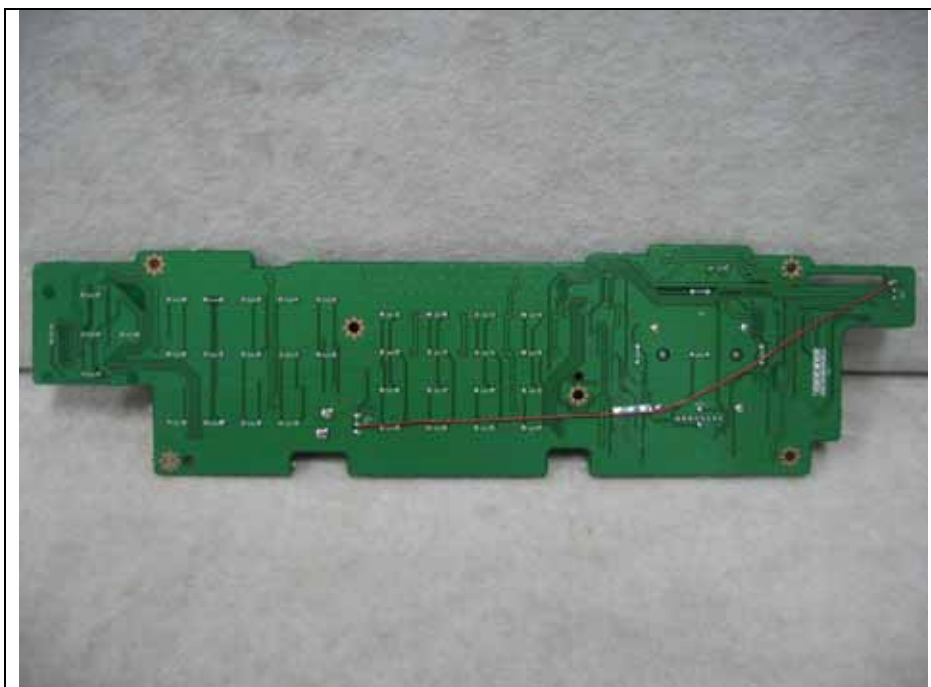




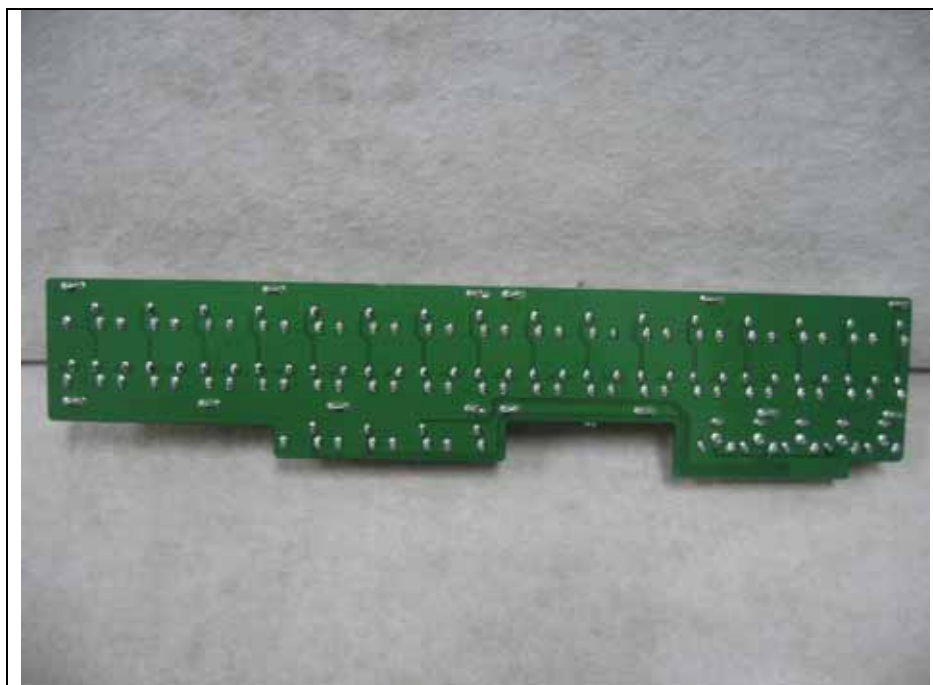
Power Switch Board



Button Board



BNC Board



D-SUB Cable



RS-232C Cable



HDMI Cable



BNC Cable



SATA Cable



Console Cable

