

CERTIFICATE of EMC Compliance

Report No: EMC-FCC-1215
Type of equipment: DVR
Model Name: SRD-1652DN
Variant Model Name: SRD-852DN
Applicant: Samsung Techwin Co., Ltd.
Address: #42, Seongju-Dong, Changwon-Shi,
Kyeongsangnam-Do, Korea
Manufacturer#1 : Samsung Techwin Co., Ltd.
Address: #42, Seongju-Dong, Changwon-Shi,
Kyeongsangnam-Do, Korea
Manufacturer#2 : TIANJIN SAMSUNG TECHWIN
OPTO-ELECTRONIC CO., LTD
Address: No.11 Weiliu Road. Micro-Electronic Industrial
Park Jingang Road Tianjin 300385, China
Test standards : FCC part 15 subpart B, Class A
Classification : Verification

The above equipment was tested by EMC compliance Testing Laboratory for with the requirements of FCC Rules and Regulations. The results of testing in this report apply to the product / system which was tested only.

These results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations.

Laboratory

EMC compliance Ltd.
480-5 Sin-dong, Yeongtong-gu,
Suwon-city, Gyeonggi-do, 443-390, Korea

Tel : 82 31 336 9919
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Yeom, Han-Seok / Manager

EMI TEST REPORT

Test report No.: EMC-FCC-1215
Type of Equipment: DVR
Model Name: SRD-1652DN
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Applicant: Samsung Techwin Co., Ltd.
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OPTO-ELECTRONIC CO., LTD
No.11 Weiliu Road. Micro-Electronic Industrial
Park Jingang Road Tianjin 300385, China
Test standards: FCC part 15 subpart B, Class A
Test Procedure and Items
- AC Power Line Conducted Emissions Measurement: ANSI C63.4-2009
- Radiated Emissions Measurement : ANSI C63.4-2009
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.

These results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations.

Date of receipt: 2011. 01. 18

Date of testing: 2011. 01. 19

Issued date: 2011. 02. 01

Tested by:

KIM, IN-HO

Approved by:

YEOM, HAN-SEOK

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	8
4.3 Auxiliary equipments.....	8
4.4 Test configuration	9
4.5 Operating conditions.....	10
5. Summary of test results.....	11
5.1 Modification to the E.U.T.	11
5.2 Summary of EMI emission test results	11
6. Test results	12
6.1 Conducted Emission	12
6.2 Radiated Emission	18
7. E.U.T. photographs.....	24

1. Applicant information

Applicant: Samsung Techwin Co., Ltd.
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Manufacturer#1: Samsung Techwin Co., Ltd.
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E-mail: js2002.kang@samsung.com
Contact name: **Kang Jei Soon**

Manufacturer#2: TIANJIN SAMSUNG TECHWIN OPTO-ELECTRONIC CO., LTD
Address: No.11 Weiliu Road. Micro-Electronic Industrial
Park Jingang Road Tianjin 300385, China

2. Laboratory information

Address

EMC compliance Ltd.

480-5 Sin-dong, Yeongtong-gu, Suwon-city, Gyeonggi-do, 443-390, Korea

Telephone Number: 82 31 336 9919

Facsimile Number: 82 31 336 4767

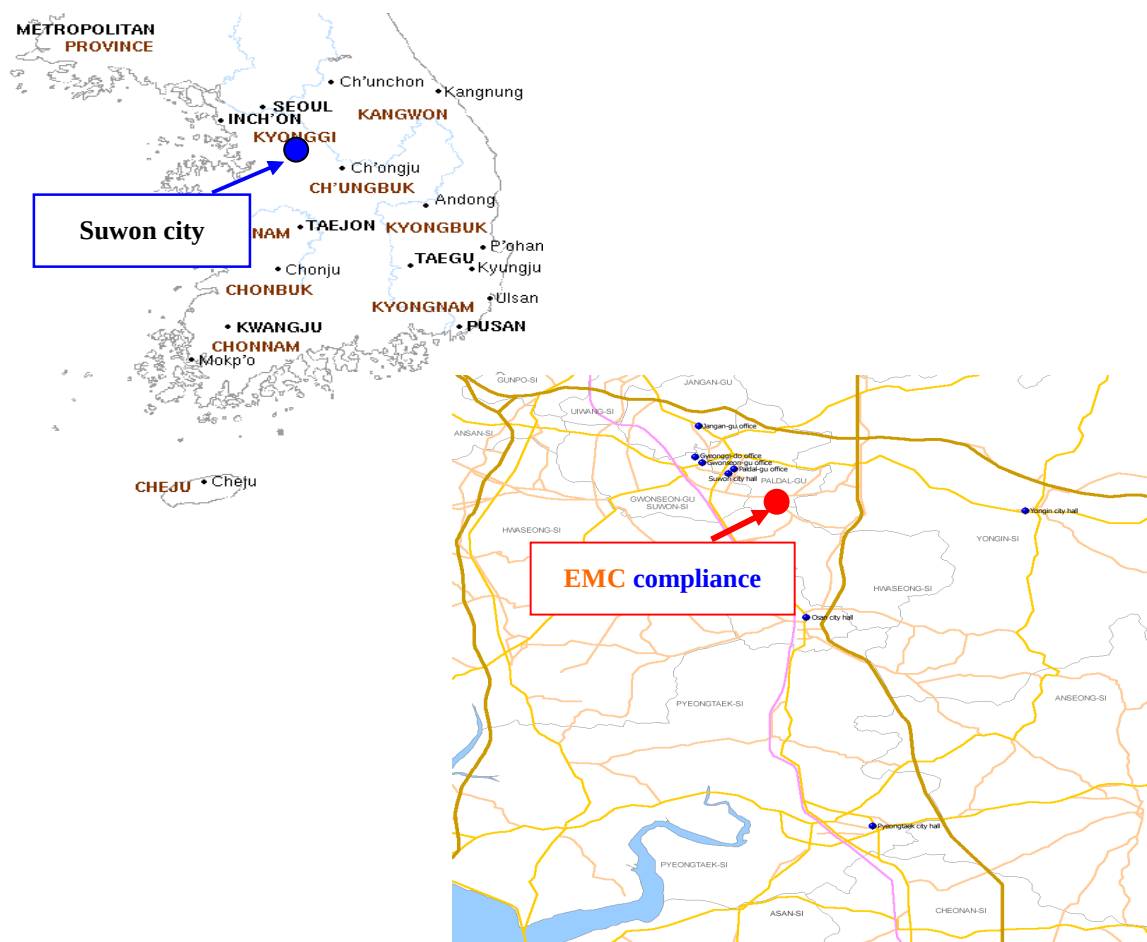
FCC CAB.: KR0040

VCCI Registration No. : R-3327, G-198, C-3706, T-1849

Industry Canada Registration No. : 8035A

KOLAS NO.: 231

SITE MAP



3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
Chamber(10 m)	: 18 °C	21 % R.H.	-
Shielded room(CE)	: 17 °C	23 % R.H.	-

Test site

These testing items were performed following locations;

Shielded Room : Conducted Emission
Chamber (10 m) : Radiated Emission (Test distance: 10 m, 3 m)

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: ± 3.77 [dB]

150 kHz ~ 30 MHz: ± 3.35 [dB]

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

30 MHz ~ 300 MHz: 3 m: ± 4.3 [dB]

10 m: ± 4.3 [dB]

300 MHz ~ 1 000 MHz: 3 m: ± 4.4 [dB]

10 m: ± 4.3 [dB]

4. Description of E.U.T.

4.1 General information

Model		SRD-1652DN	SRD-852DN
image			
Video	Inputs	16 composite video 0.5-1 Vpp	8 composite video 0.5-1 Vpp
	Resolution	704x480 NTSC, 704x576 PAL	704x480 NTSC, 704x576 PAL
Live	Frame rate	480fps NTSC, 400fps PAL	240fps NTSC, 200fps PAL
	Resolution	704x480 NTSC, 704x576 PAL	704x480 NTSC, 704x576 PAL
	Multi Screen display	1/4/6/8/9/13/16/PIP	1/4/6/8/9/13/PIP
Performance			
OS	Embedded	Linux	Linux
Recording	Compression	H.264	H.264
	Record Rate	NTSC: Up to 120fps @ 704x480 PAL: Up to 100fps @ 704x576	NTSC: Up to 60fps @ 704x480 PAL: Up to 50fps @ 704x576
		NTSC: Up to 240fps @ 704x240 PAL: Up to 200fps @ 704x288	NTSC: Up to 120fps @ 704x240 PAL: Up to 100fps @ 704x288
		NTSC: Up to 480fps @ 352x240 PAL: Up to 400fps @ 352x288	NTSC: Up to 240fps @ 352x240 PAL: Up to 200fps @ 352x288
	Mode	NTSC: - Manual - Schedule (Continuous/Event) - Event(Pre/Post) - Time lapse (0.9/1.9/3.8/7.5/15/30 fps)	NTSC: - Manual - Schedule (Continuous/Event) - Event(Pre/Post) - Time lapse (0.9/1.9/3.8/7.5/15/30 fps)
		PAL: - Manual - Schedule (Continuous/Event) - Event(Pre/Post) - Time lapse	PAL: - Manual - Schedule (Continuous/Event) - Event(Pre/Post) - Time lapse

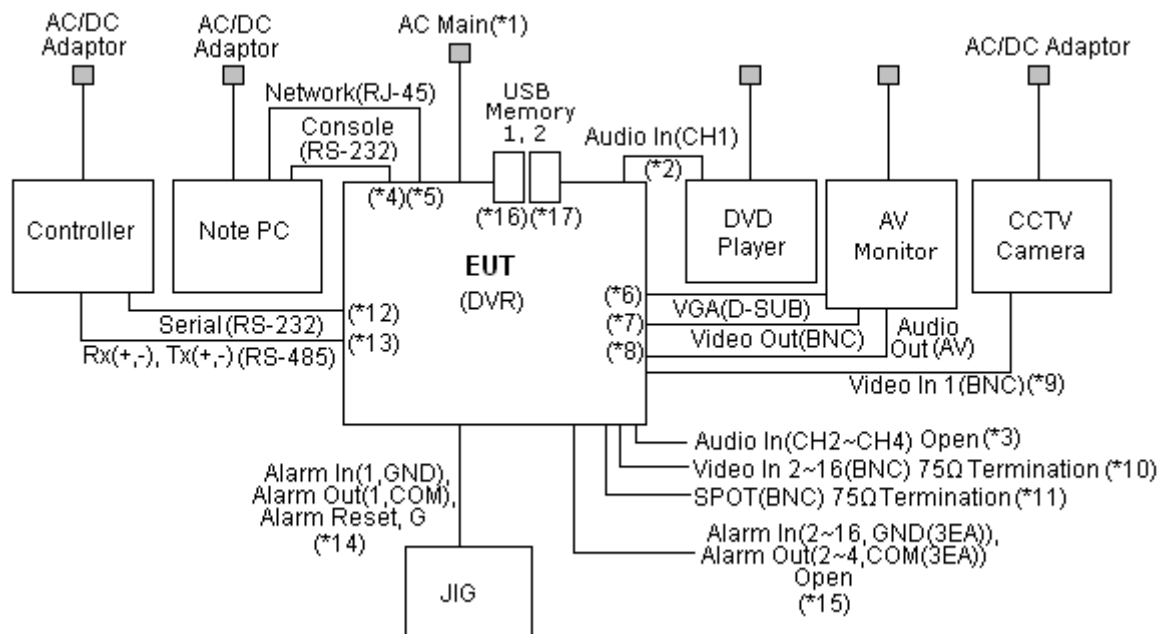
4.2 Product description

Type of product	DVR
Model name (Basic)	SRD-1652DN
Model name (Variant)	SRD-852DN
Difference	The number of Decoder IC. SRD-1652DN: 4 EA / SRD-852DN: 2 EA
Serial no	Engineering Sample
Testing voltage	120 V , 60 Hz
Product rating	AC 100 - 240 V , 50 / 60 Hz
Internal clock ferquence	667 MHz
Note	This test was done with SRD-1652DN.

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Note PC	C1410	473680121639	FUJITSU
AV Monitor	DO19WS	N732HIIL900528X	SAMSUNG
DVD Player	DVP-NS76H	2000914	SONY
CCTV Camera	SDC-435P	C08C6V3Z245129	SAMSUNGTECHWIN
Controller	SCC-2000	-	SAMSUNG
JIG	-	-	-
USB Memory 1(8 GB)	CS2-U40	-	IOCELL
USB Memory 2(2 GB)	IMAT	-	imation

4.4 Test configuration



Note *	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT (DVR)	Power	AC Main	Power	1.5	Non-Shield
2		Audio In(CH1)	DVD Player	Audio Out	1.6	Shield
3		Audio In(CH2~CH4)	Open	-	1.6	Shield
4		Console(RS-232)	NotePC	Serial(RS-232)	1.5	Shield
5		Network(RJ-45)	Note PC	Network(RJ-45)	3.0	Non-Shield
6		VGA(D-SUB)	AV Monitor	VGA(D-SUB)	1.8	Shield
7		Video Out(BNC)	AV Monitor	Video In	3.0	Shield
8		Audio Out(AV)	AV Monitor	Audio In	1.6	Shield
9		Video In 1(BNC)	CCTV Camera	Video Out	3.0	Shield
10		Video In 2~16(BNC)	75ΩTermination	-	1.5	Shield
11		SPOT(BNC)	75ΩTermination	-	1.5	Shield
12		Serial(RS-232)	Controller	Serial(RS-232)	1.8	Shield
13		Rx(+,-), Tx(+,-) (RS-485)	Controller	Rx(+,-), Tx(+,-) (RS-485)	3.0	Non-Shield
14		Alarm In(1,GND), Alarm Out(1,COM), Alarm Reset, G	JIG	Alarm In(1,G), Alarm Out(1,COM), Alarm Reset, G	3.0	Non-Shield
15		Alarm In (2~16, GND(3EA)), Alarm Out (2~4,COM(3EA))	Open	-	3.0	Non-Shield
16		USB	USB Memory 1	USB	Direct	-
17		USB	USB Memory 2	USB	Direct	-

4.5 Operating conditions

The EUT was configured as normal intended use.

This test was done at worst case.

Test mode	Normal operating
1	Web view test mode
	REC test mode
	Controller operating test mode (RS-232, RS-485 port)
	JIG operating test mode (Alarm port)

5. Summary of test results

In the above configuration tested, The EUT complied with the requirement of the specification

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 – 2009

Application	Test method	Test result
Conducted emission - AC main port	ANSI C63.4 – 2009	Complied
Radiated emission	ANSI C63.4 – 2009	Complied

6. Test results

6.1 Conducted Emission

Test specification	FCC Part 15, Section 15.107(b), Class A		
Test mode	Operating mode.		
Date	2011. 01. 19		
Testing voltage	120 V, 60 Hz		
Temperature(°C)	17 °C	Humidity (% R.H.)	23 % R.H.
Remarks	Complied Minimum limit margin is 21.77 dB at 9.610 MHz. (Average)		

6.1.1 Limits of conducted emission measurement

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.

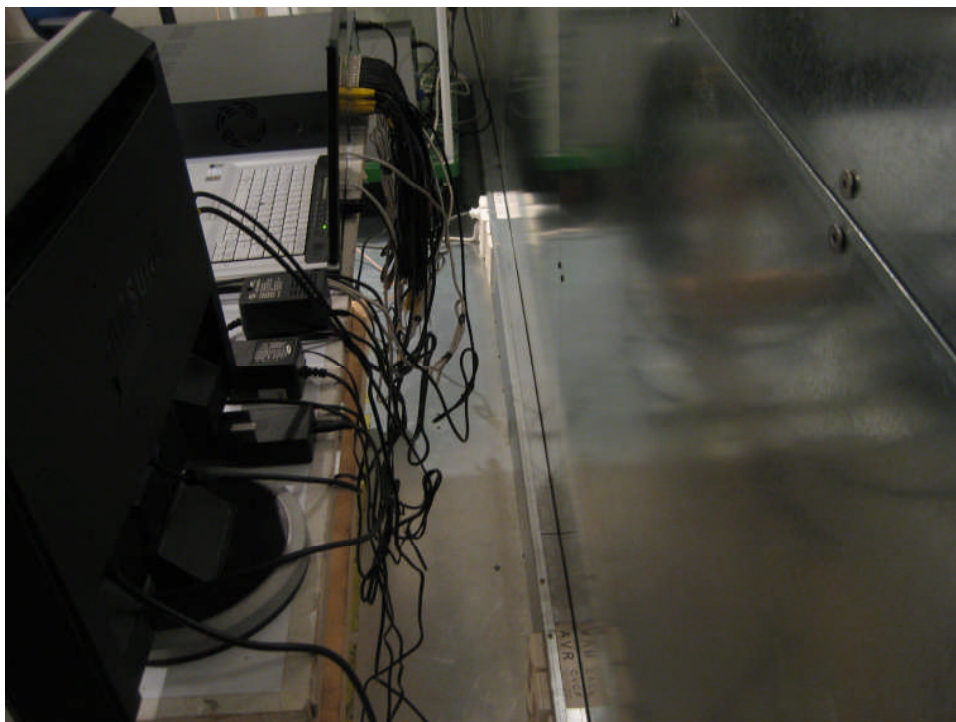
6.1.2 Measurement procedure

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.

6.1.3 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESHS10	843276/003	R&S	11.06.11	☒
LISN	ESH3-Z5	100267	R&S	11.07.05	☒
LISN	L2-16A	0000J10705	PMM	-	☒

6.1.4 Photographs of test setup



6.1.5 Conducted emission measurement result

Frequency [MHz]	Correction Factor		Line	Quasi-peak			Average		
				Limit	Reading	Result	Limit	Reading	Result
	LISN	Cable		[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]
0.153	0.07	0.03	H	79.00	40.71	40.81	66.00	14.77	14.87
0.156	0.08	0.03	N		39.96	40.07		14.22	14.33
0.213	0.08	0.02	H		41.52	41.62		34.03	34.13
0.321	0.08	0.03	H		25.44	25.55		18.73	18.84
0.426	0.07	0.03	H		22.60	22.70		16.82	16.92
6.560	0.23	0.09	H	73.00	36.03	36.35	60.00	27.66	27.98
9.610	0.35	0.10	H		40.63	41.08		37.78	38.23
12.000	0.40	0.11	H		36.57	37.08		34.99	35.50
17.495	0.46	0.12	N		39.40	39.98		21.14	21.72
18.120	0.63	0.11	H		41.70	42.44		28.14	28.88
26.470	0.94	0.13	N		40.25	41.32		19.31	20.38

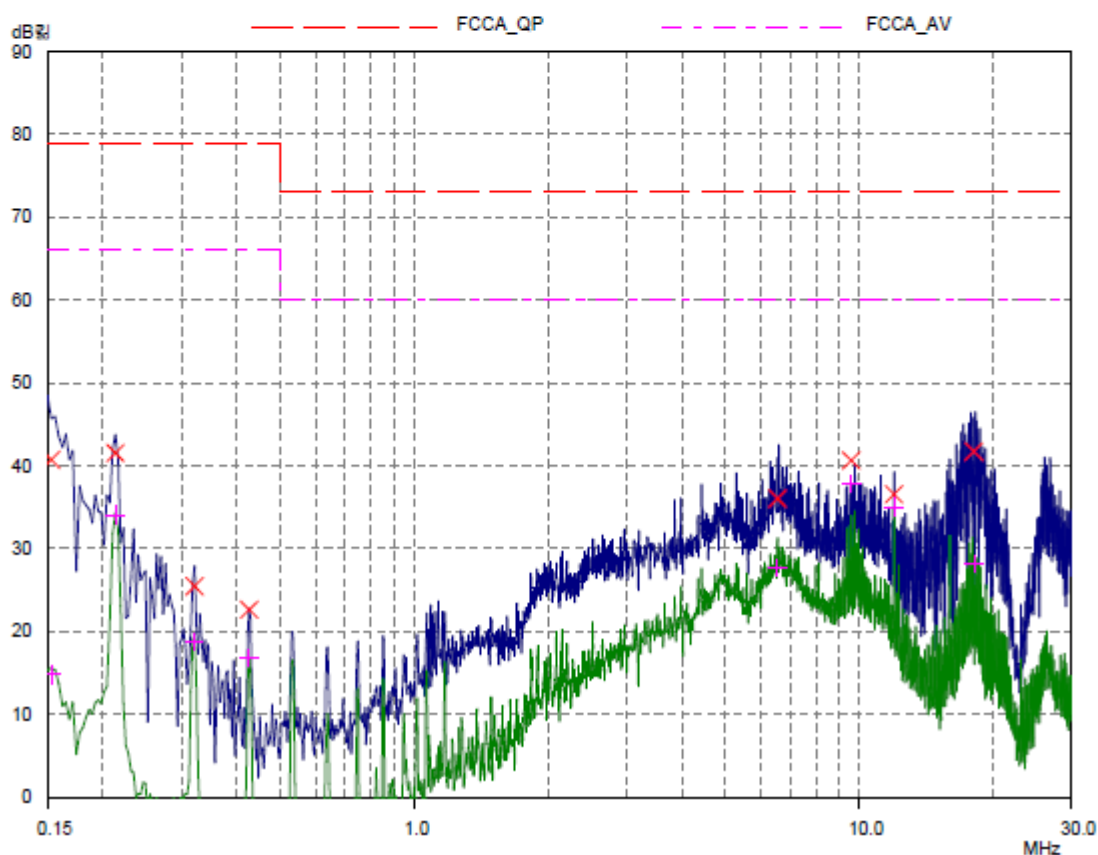
EUT: SRD-1652DN
Manuf:
Op Cond: H
Operator:
Test Spec: FCC Class A Conducted Emission
Comment:

Result File: h.dat : SMASUNG TECHWIN

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



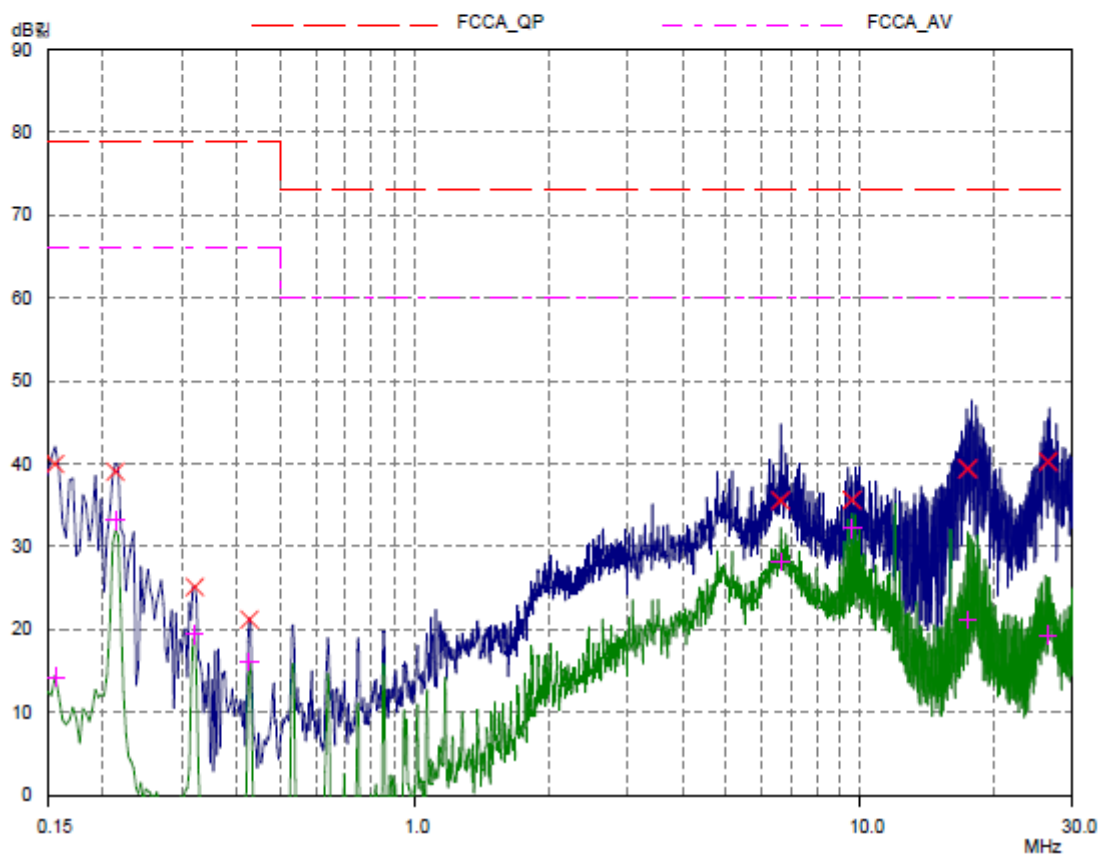
EUT: SRD-1652DN
Manuf:
Op Cond: N
Operator:
Test Spec: FCC Class A Conducted Emission
Comment:

Result File: n.dat : SMASUNG TECHWIN

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



6.2 Radiated Emission

Test specification	FCC Part 15, Section 15.109(g), Class A		
Test mode	Operating mode.		
Date	2011. 01. 19		
Testing voltage	120 V , 60 Hz		
Test facility	10 m Chamber (Test distance: 10 m, 3 m)		
Temperature (°C)	18 °C	Humidity (% R.H.)	21 % R.H.
Remarks	Complied 30 MHz ~ 1 GHz Minimum limit margin is 7.6 dB at 726.002 MHz. Minimum limit margin is 7.6 dB at 858.012 MHz. 1 GHz ~ 4 GHz Minimum limit margin is 12.9 dB at 1385.991 MHz. (Average)		

6.2.1 Limits of radiated emission measurement

Frequency [MHz]	Class A (dB(μV/m)) @ 10 m	Class B (dB(μV/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

The test was done at a 10 m, 3 m distance at 10 m chamber 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	11.08.17	☒
Bi-Log Antenna	VULB 9168	375	SCHWARZBECK	11.11.30	☒
Amplifier	310N	284608	SONOMA INSTRUMENT	11.07.08	☒
3 dB Attenuator	8491A	16861	HP	12.01.13	☒
Antenna Mast	AM4.0	079/3440509	MATURO	-	☒
Turn Table	CO2000-SOFT	-	MATURO	-	☒
Horn ANT	3115	00086706	ETS	11.12.22	☒
Amplifier	8449B	3008A02343	AGILENT	11.12.01	☒
Spectrum Analyzer	FSP7	100289	R&S	11.12.17	☒

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:

$$\text{Result} = \text{M.R} + \text{C.F}(\text{A.F} + \text{C.L} + 3 \text{ dB Att} - \text{A.G})$$

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

A.G= Amplifier Gain

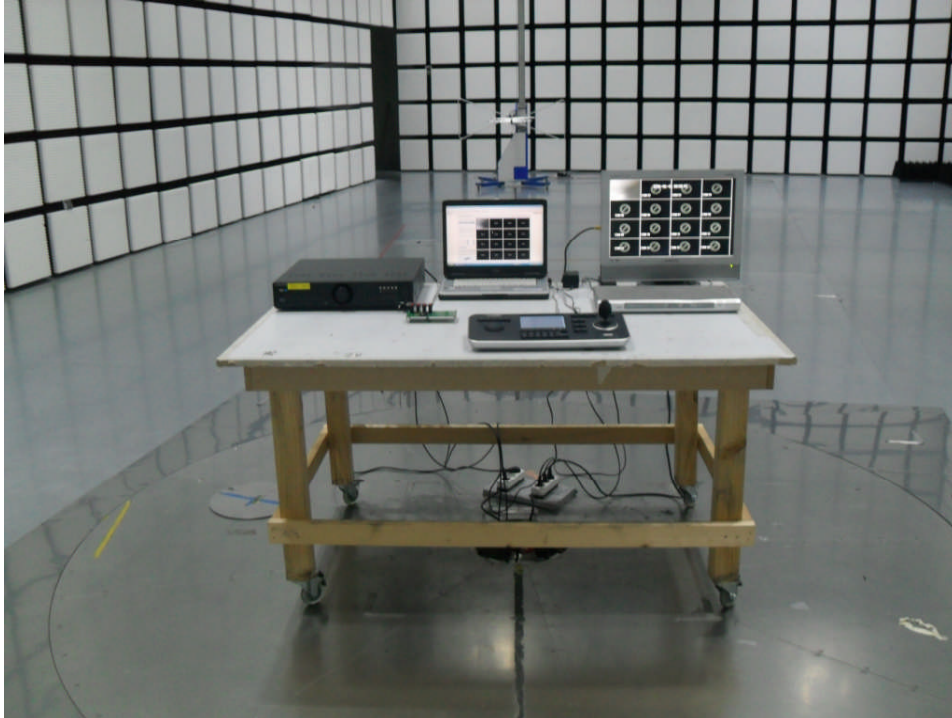
3 dB Att = 3 dB Attenuator

If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

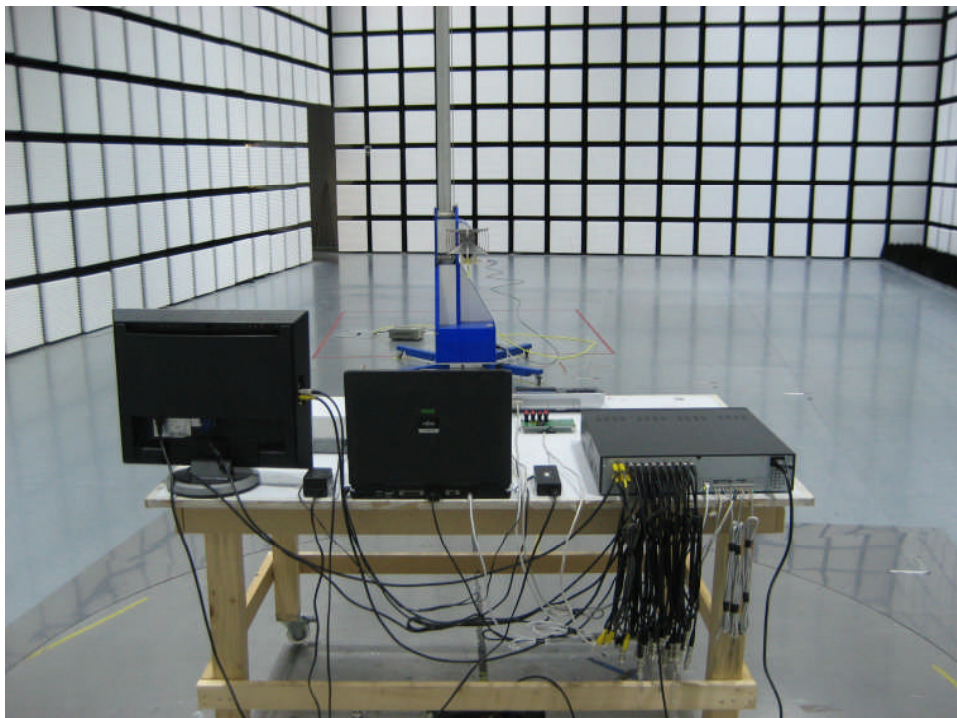
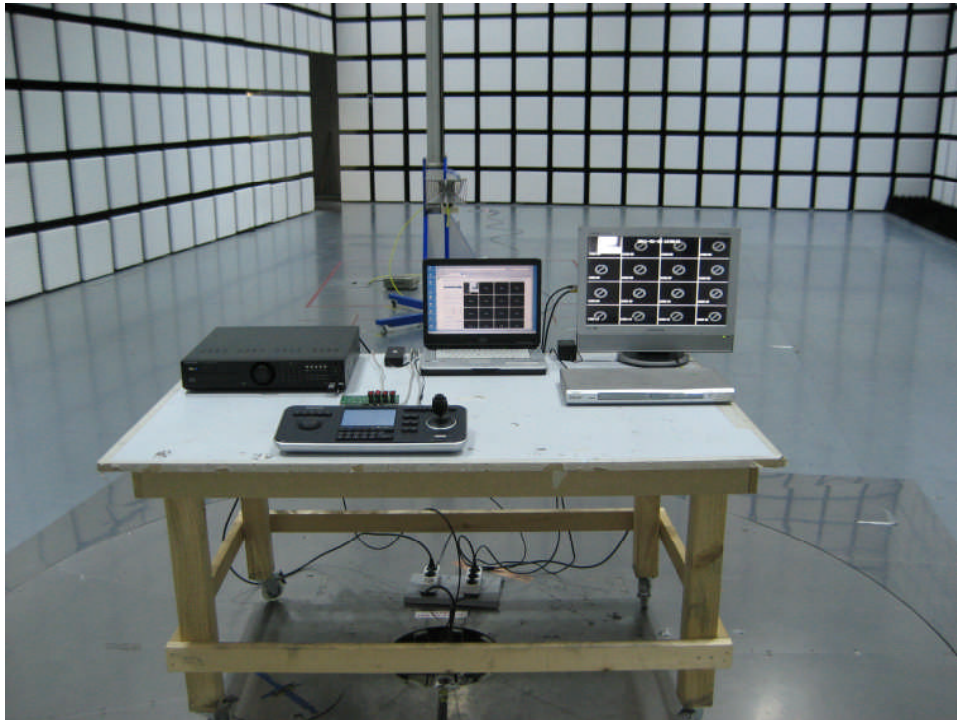
The result is $30 + 12 + 5 + 3 - 35 = 15 \text{ dB}(\mu\text{V/m})$

6.2.5 Photographs of test setup

* 30 MHz ~ 1 GHz



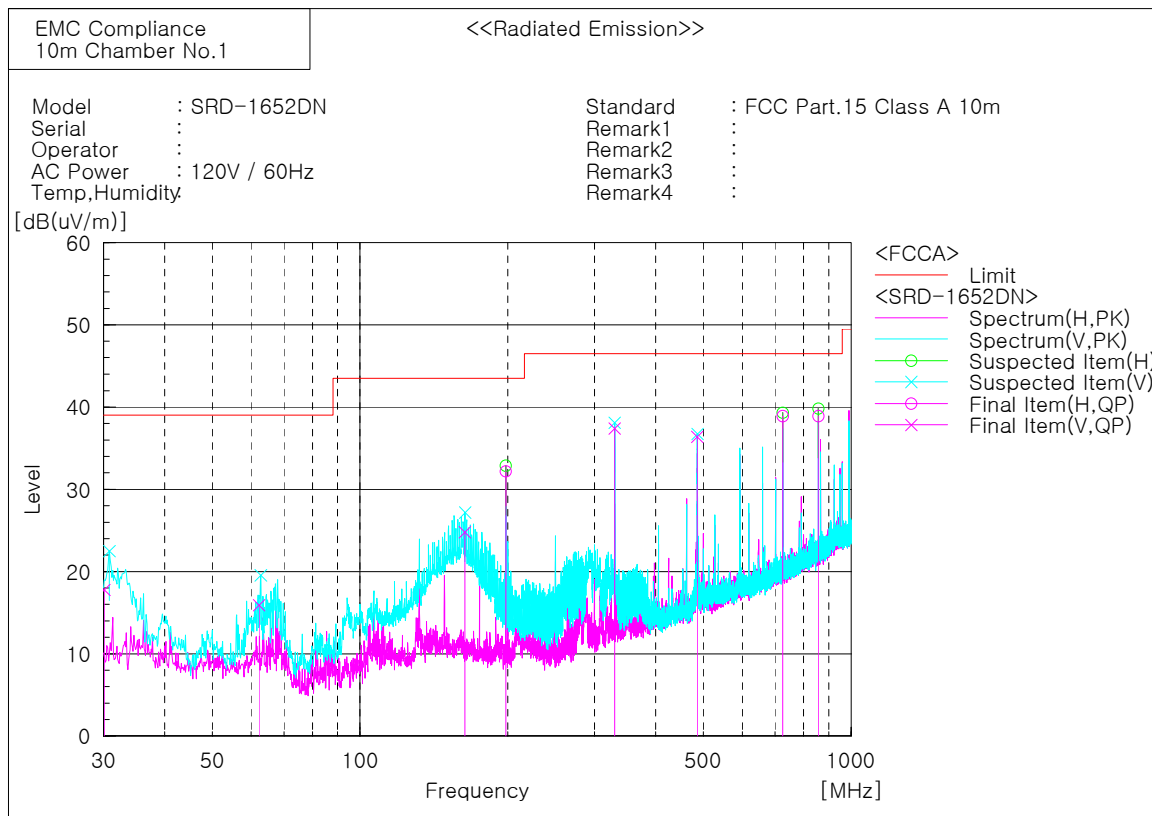
* 1 GHz ~ 4 GHz



6.2.6 Radiated emission measurement result

* Graph and Data

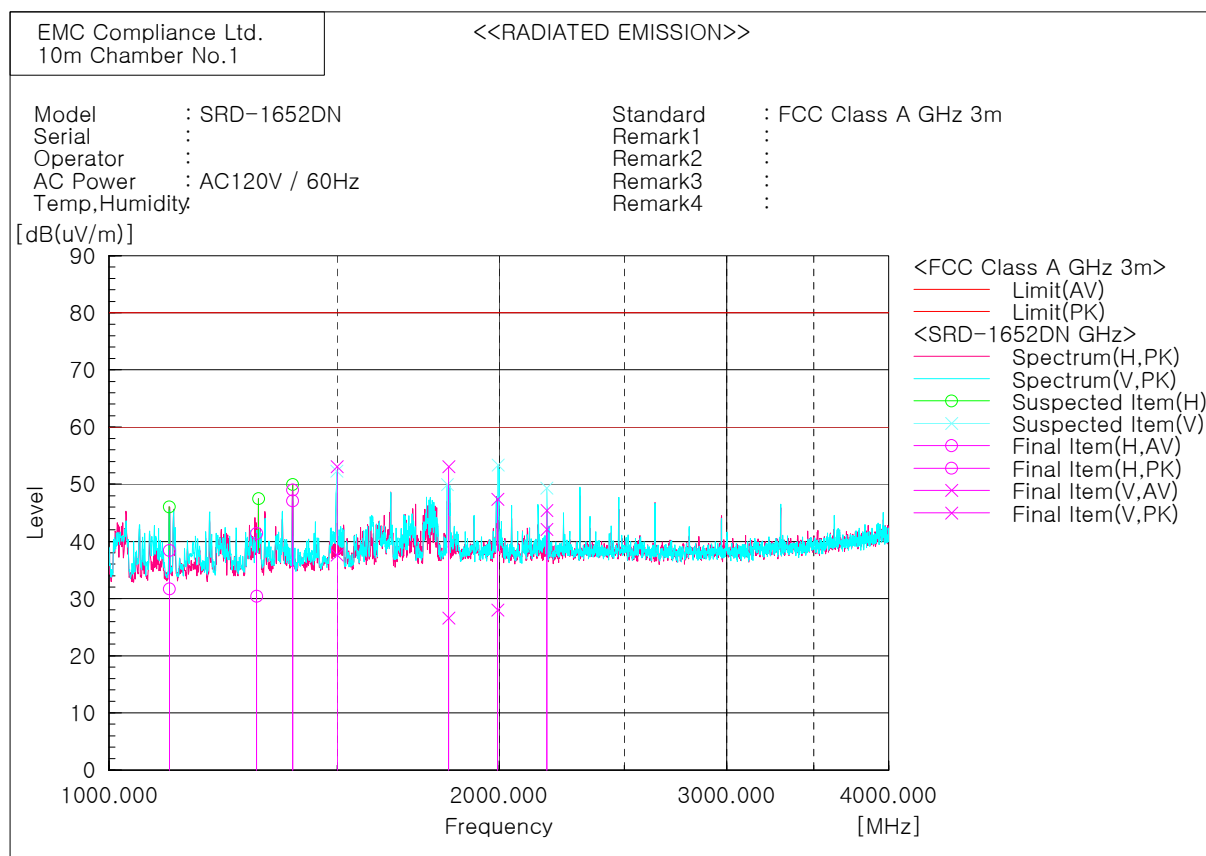
* 30 MHz ~ 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	30.125	V	35.6	-17.8	17.8	39.0	21.2	100.0	12.5
2	62.250	V	34.2	-18.3	15.9	39.0	23.1	202.0	61.4
3	163.260	V	40.1	-15.3	24.8	43.5	18.7	100.0	274.2
4	198.002	H	51.2	-19.0	32.2	43.5	11.3	400.0	245.4
5	330.016	V	51.1	-13.7	37.4	46.5	9.1	100.0	30.5
6	486.003	V	46.1	-9.7	36.4	46.5	10.1	100.0	7.7
7	726.002	H	43.8	-4.9	38.9	46.5	7.6	400.0	197.2
8	858.012	H	41.5	-2.6	38.9	46.5	7.6	400.0	76.5

* 1 GHz ~ 4 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	c.f [dB(1/m)]	Result AV [dB(uV/m)]	Result PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [deg]
1	1113.768	H	45.5	52.2	-13.8	31.7	38.4	60.0	80.0	28.3	41.6	100.0	140.2
2	1300.060	H	42.6	53.6	-12.2	30.4	41.4	60.0	80.0	29.6	38.6	100.0	117.7
3	1385.991	H	58.4	60.3	-11.3	47.1	49.0	60.0	80.0	12.9	31.0	100.0	150.9
4	1500.000	V	48.3	63.8	-10.7	37.6	53.1	60.0	80.0	22.4	26.9	199.0	325.7
5	1828.950	V	35.3	61.8	-8.7	26.6	53.1	60.0	80.0	33.4	26.9	199.0	348.0
6	1995.506	V	36.5	55.9	-8.5	28.0	47.4	60.0	80.0	32.0	32.6	100.0	38.5
7	2178.008	V	50.1	53.4	-8.0	42.1	45.4	60.0	80.0	17.9	34.6	100.0	339.4

7. E.U.T. photographs

Front View



Rear View



Left View



Right View



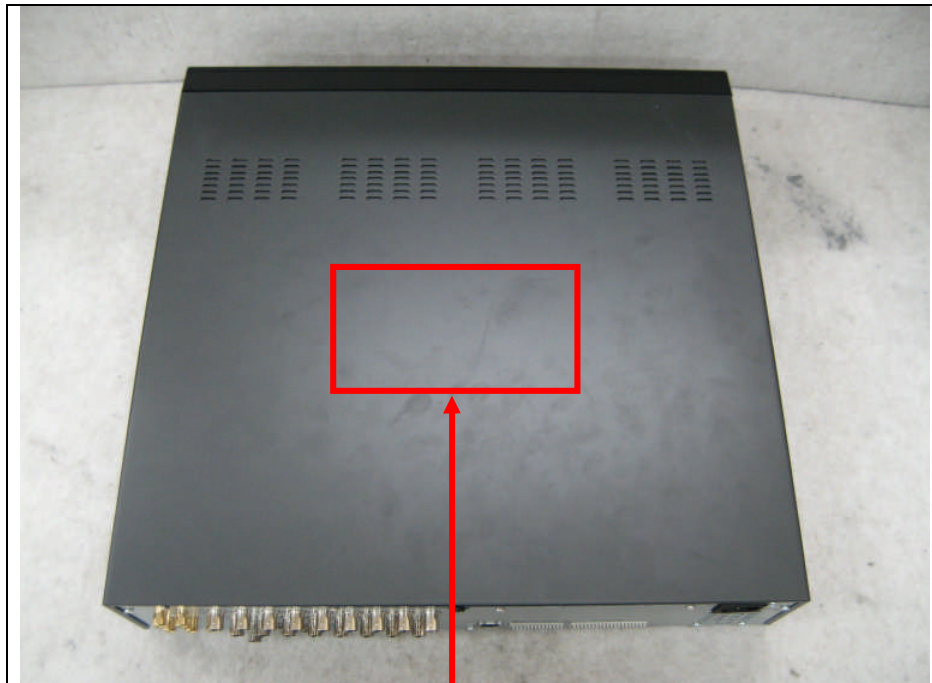
Top View



Bottom View



Label



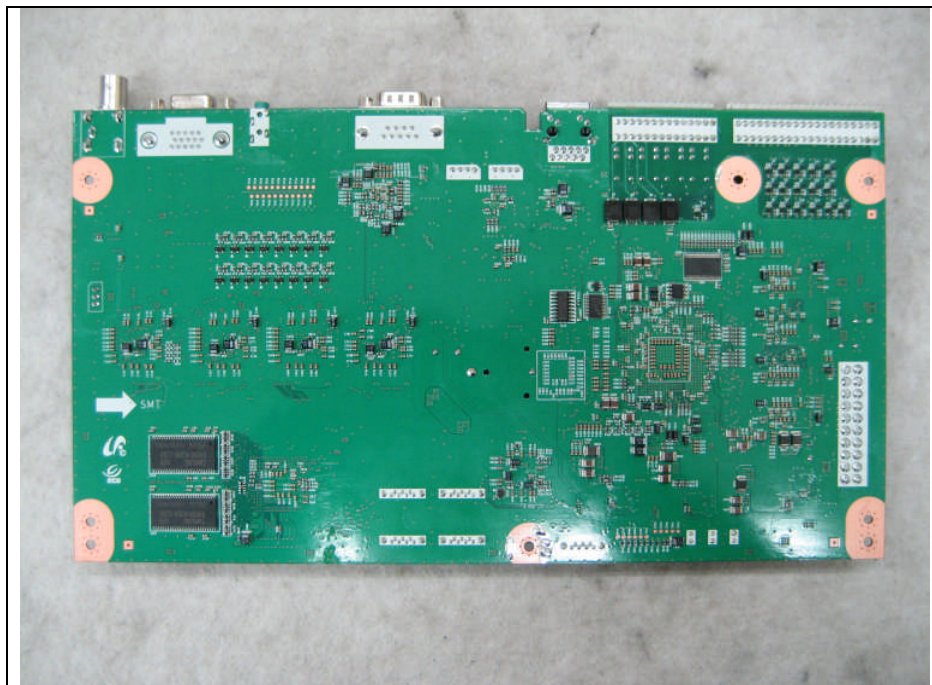
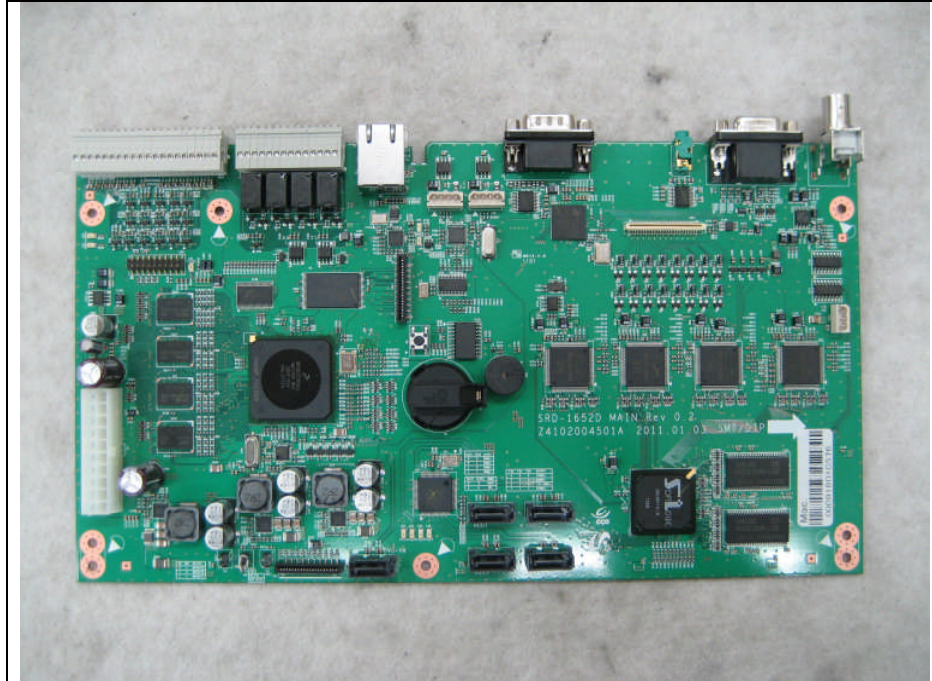
FCC Label Location

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

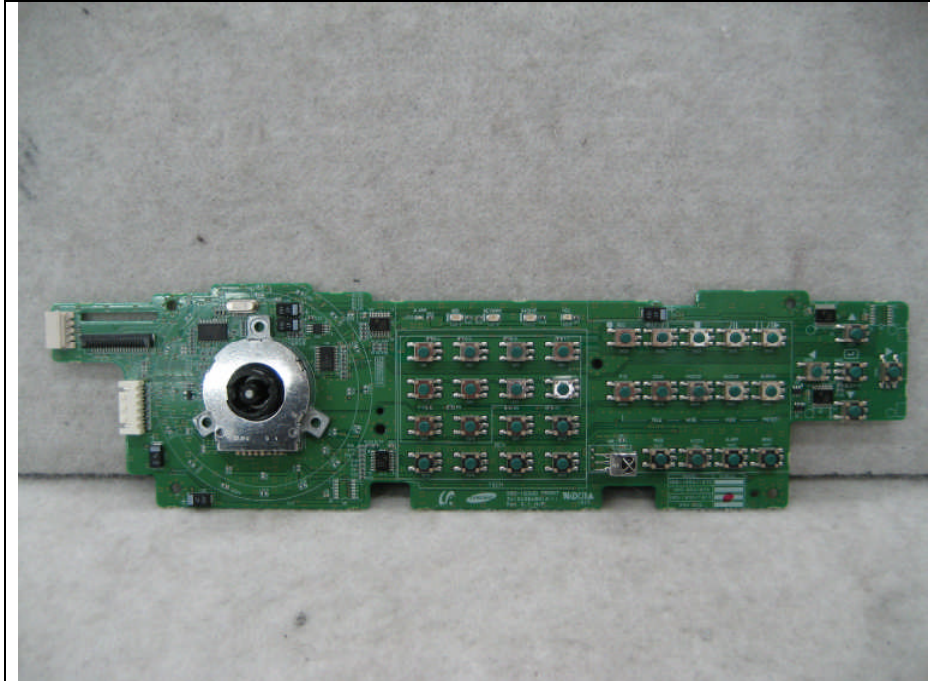
Inside



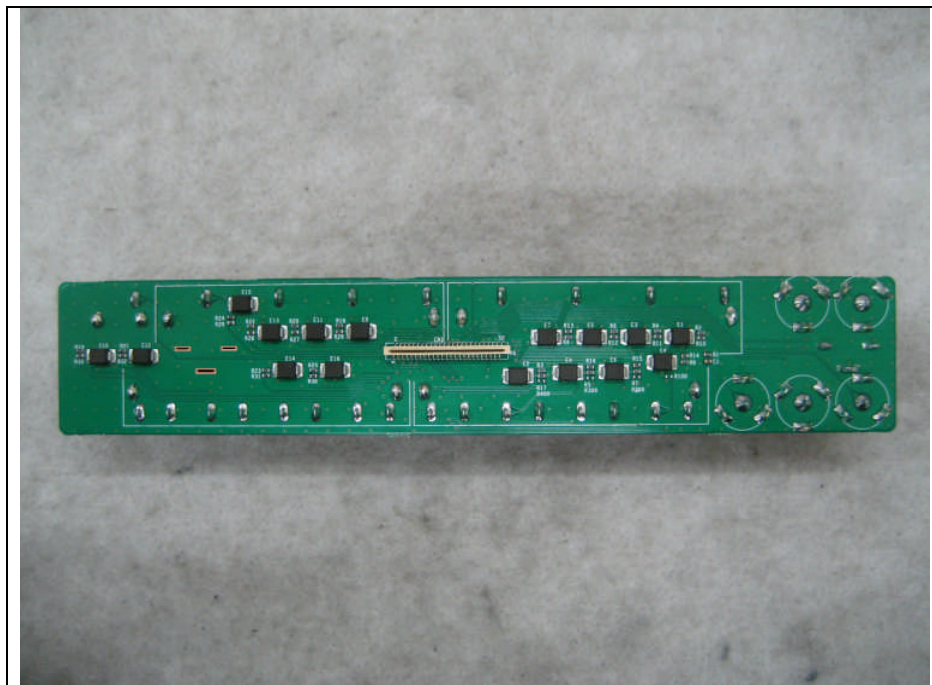
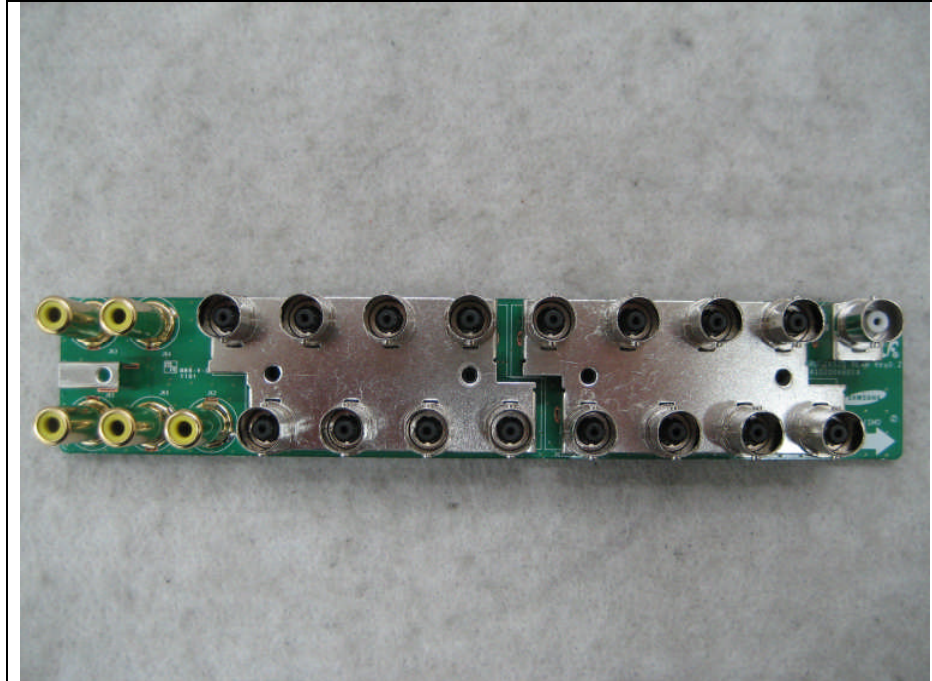
Main Board



Front Board



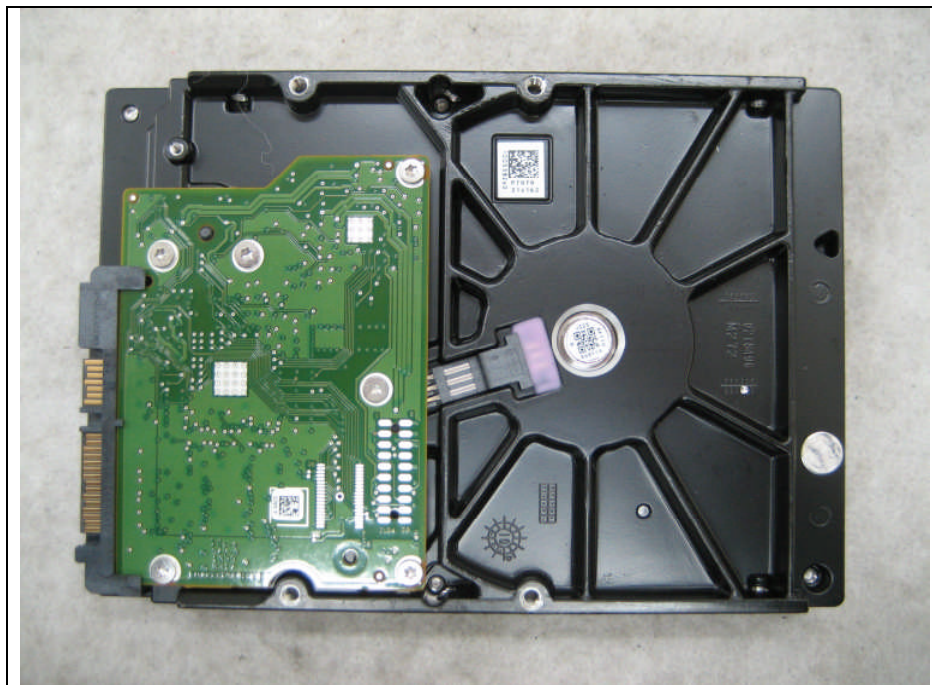
Rear Board



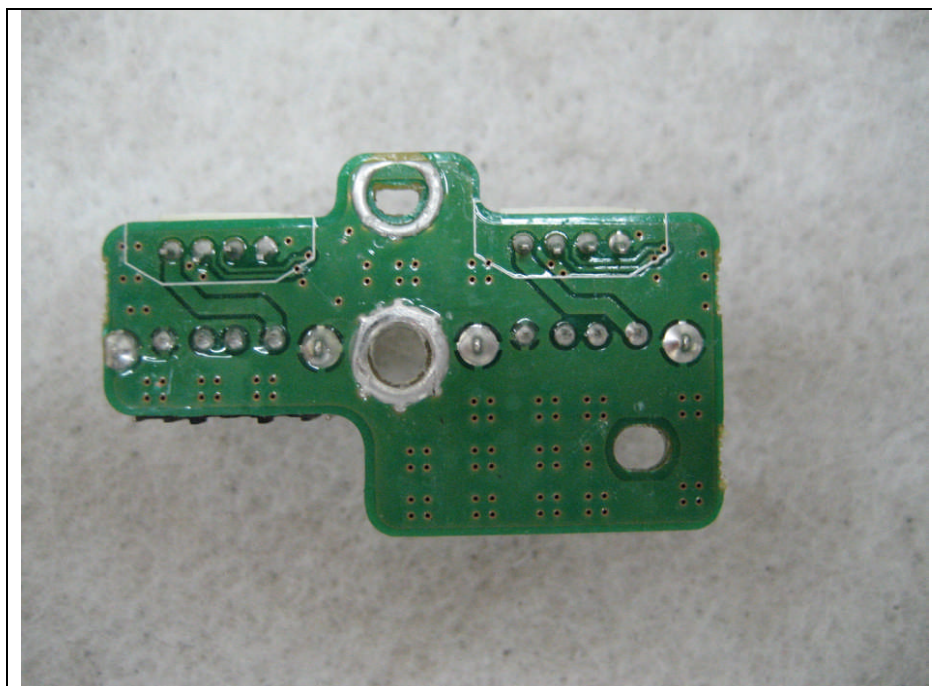
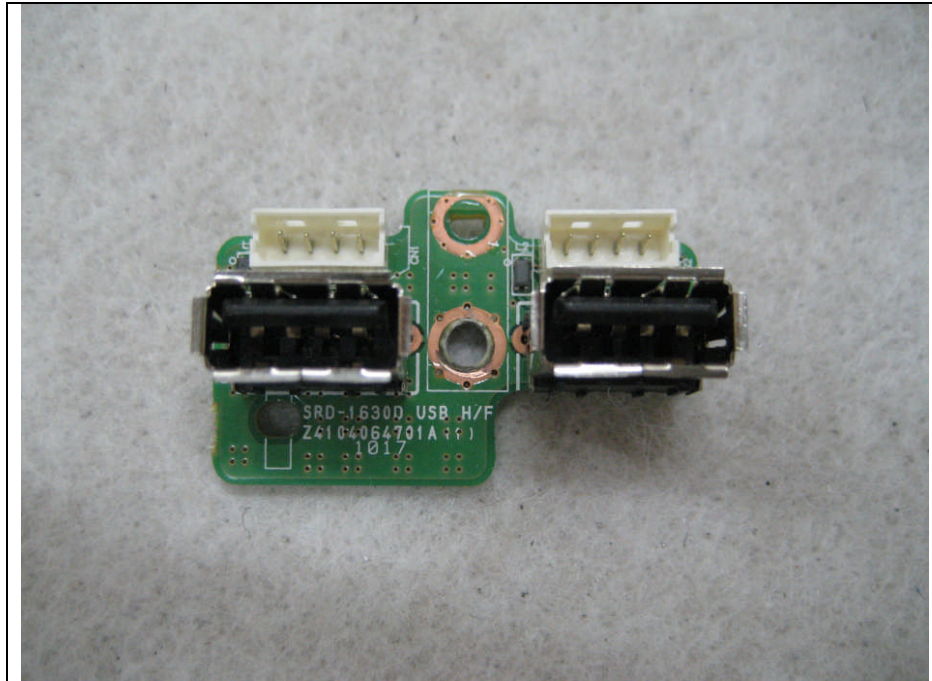
DVD



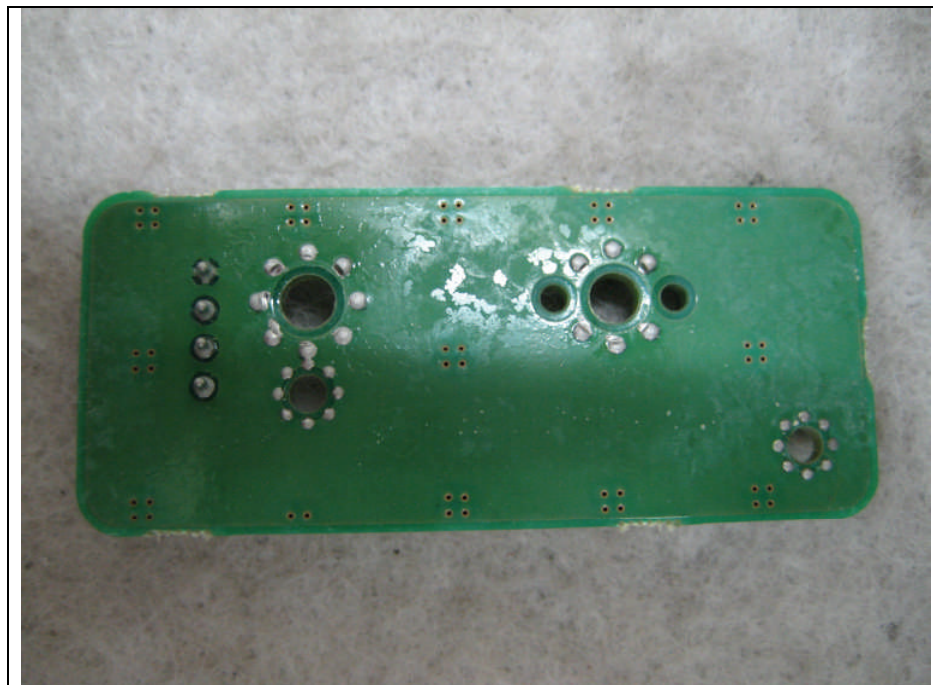
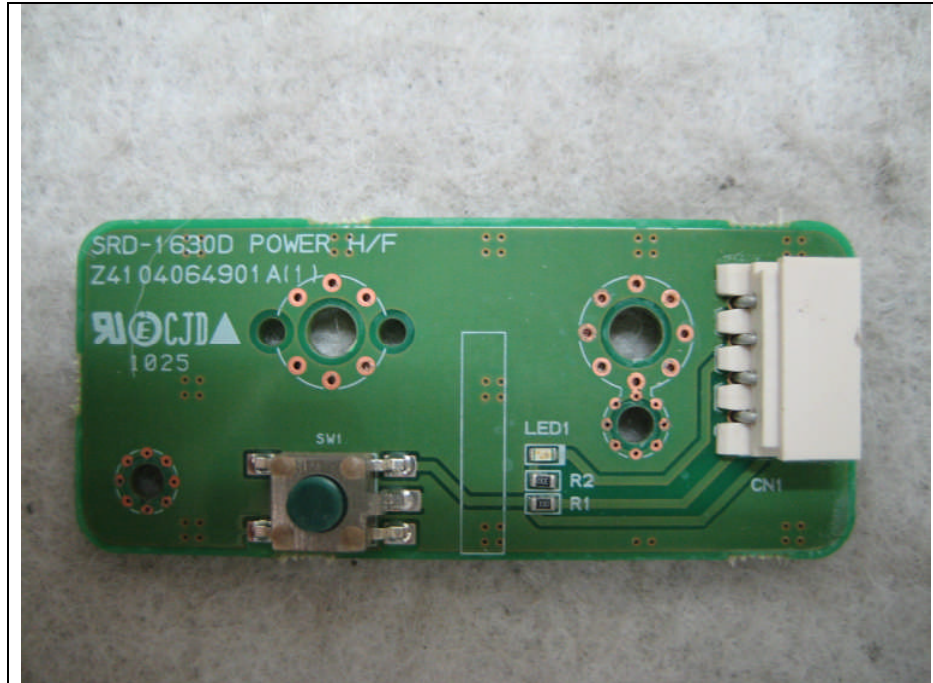
HDD (500 GB)



USB Board



Power Button Board



Power

