

CERTIFICATE of EMC Compliance

Report No: EMC-FCC-1489
Type of equipment: DIGITYAL VIDEO RECORDER
Model Name: SRD-442N
Applicant: Samsung Techwin Co., Ltd.
#42 Seongju-Dong, Changwon-Shi,
Kyungsangnam-Do, Korea
Manufacturer#1: Samsung Techwin Co., Ltd.
#42 Seongju-Dong, Changwon-Shi,
Kyungsangnam-Do, Korea
Manufacturer#2: TIANJIN SAMSUNG TECHWIN
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
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.



Yeom, Han-Seok/ Manager

Laboratory

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EMI TEST REPORT

Test report No.: EMC-FCC-1489
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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: 2012. 01. 17

Date of testing: 2012. 02. 15

Issued date: 2012. 02. 20

Tested by:


JUNG, YOUNG-JUN

Approved by:


YEOM, HAN-SEOK

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1. Applicant information

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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

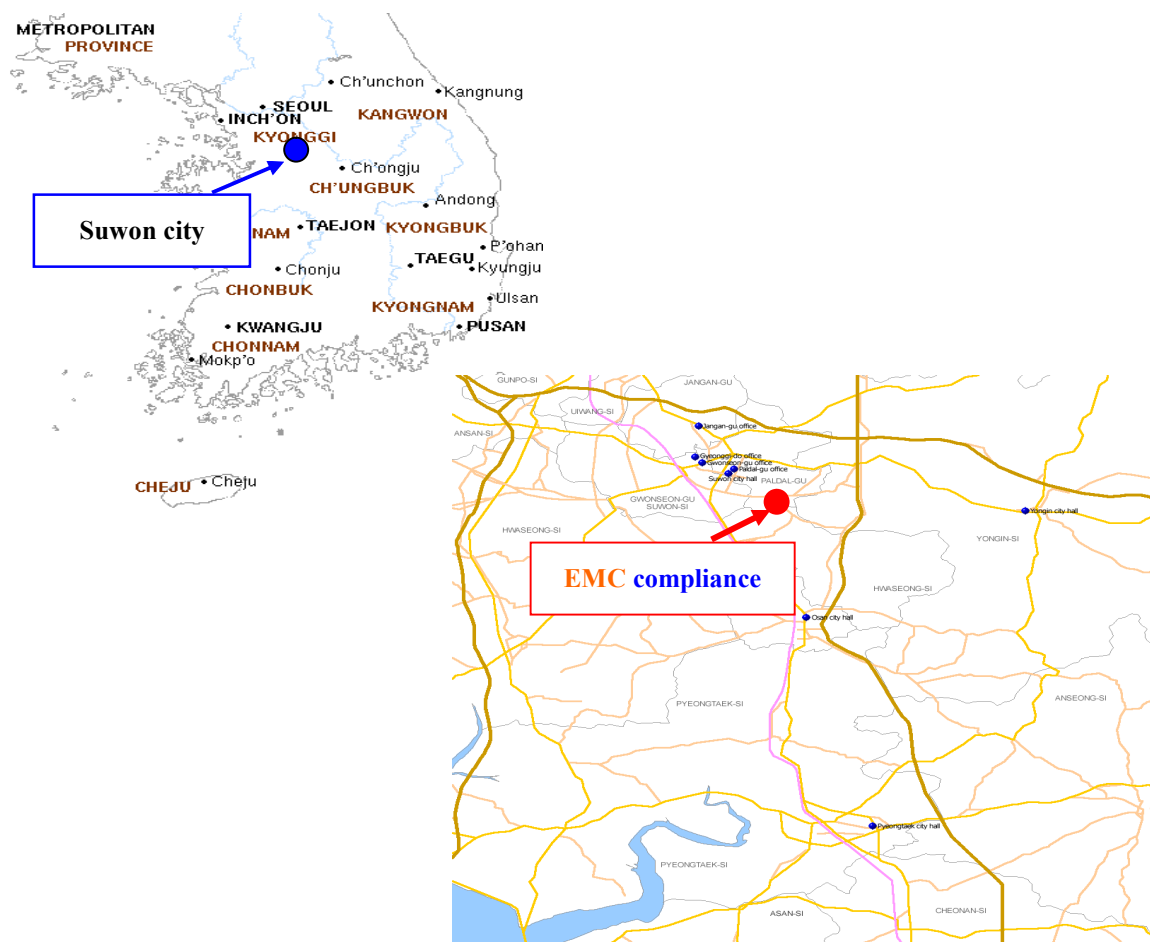
FCC CAB.: KR0040

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)	: 20 °C	10 % R.H.	-
Shielded room(CE)	: 20 °C	13 % R.H.	-

Test site

These testing items were performed following locations;

Test item	Test site
Conducted Emission	Shielded Room
Radiated Emission	10 m Chamber

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 %)		
Shielded Room (CE#1)	9 kHz ~ 150 kHz: ± 3.77 [dB] 150 kHz ~ 30 MHz: ± 3.35 [dB]	
Shielded Room (CE#2)	9 kHz ~ 150 kHz: ± 3.95 [dB] 150 kHz ~ 30 MHz: ± 3.55 [dB]	
Shielded Room (CE#3)	9 kHz ~ 150 kHz: ± 3.88 [dB] 150 kHz ~ 30 MHz: ± 3.50 [dB]	
Radiated Emission measurement : ($k = 2$, 95 %)		
10 m Chamber (#F4)	30 MHz ~ 300 MHz	3 m: + 4.29 [dB], - 4.31 [dB] 10 m: + 4.28 [dB], - 4.30 [dB]
	300 MHz ~ 1 000 MHz	3 m: + 4.57 [dB], - 4.57 [dB] 10 m: + 4.42 [dB], - 4.44 [dB]
	1 GHz ~ 6 GHz	3 m: + 5.94 [dB], - 5.95 [dB]
	6 GHz ~ 18 GHz	3 m: + 5.49 [dB], - 5.16 [dB]
10 m Chamber (#F2)	30 MHz ~ 300 MHz	3 m: + 4.28 [dB], - 4.30 [dB] 10 m: + 4.27 [dB], - 4.28 [dB]
	300 MHz ~ 1 000 MHz	3 m: + 4.56 [dB], - 4.57 [dB] 10 m: + 4.41 [dB], - 4.43 [dB]
	1 GHz ~ 6 GHz	3 m: + 5.94 [dB], - 5.95 [dB]
	6 GHz ~ 18 GHz	3 m: + 5.49 [dB], - 5.16 [dB]

4. Description of E.U.T.

4.1 General information

Video	Inputs	4 composite video 0.5~1 Vpp, 75 ohm
	Resolution	704x480 NTSC, 704x576 PAL
Live	Frame rate	120fps NTSC, 100fps PAL
	Resolution	704x480 NTSC, 704x576 PAL
	Multi Screen display	1/4/SEQUENCE/PIP
Display	LCD	4.3 Inch Built-In (감압식), 1 Touch (Click), 1초이상 Touch (Double Click)
Performance		
Operating System	Embedded	Linux
Recording	Compression	H.264
	Record Rate	NTSC: Up to 30fps @ 704x480 / PAL: Up to 25fps @ 704x576 NTSC: Up to 60fps @ 704x240 / PAL: Up to 50fps @ 704x288 NTSC: Up to 120fps @ 352x240 / PAL: Up to 100fps @ 352x288
	Mode	NTSC: Manual, Schedule (Continuous/Event), Event(Pre/Post) PAL: Manual, Schedule (Continuous/Event), Event(Pre/Post)
	Overwrite modes	Continuous
	Pre-alarm	Up to 5 sec.
	Post-Alarm	Up to 6 hour. (5, 10, 20, 30 sec, 1, 3, 5, 10, 20 min, 1, 2, 3, 4, 5, 6 hour)
Search & Playback	Search mode	Date/time, Event, Back up, Motion
	Playback function	Fast Forward/Backward (x2, x4, x8, x16, x32, x64) * Backward Play with I-frame Only, Slow Forward/Backward (x1/2, x1/4, x1/8) Step Forward/Backward (x2, x4, x8, x16, x32, x64) * Backward Play with I-frame Only
Network (IPv4)	Transmission speed	100/120fps
	Bandwidth	Up to (4)Mbps, Unlimited(4M)/2/1.5/1 Mbps/800/600/500/400/300/200/100/50 kbps
	Bandwidth control	Automatic
	Stream	CIF (H.264)
	Remote users Maximum	4 Persons (Search up to (2), Live Unicast/Live Multicast available)
	Protocol support	TCP/IP, DHCP, PPPoE, SMTP, NTP, HTTP, DDNS, RTP, RTSP
Smart phone	Monitoring	Webviewer, CMS(Smart viewer, Net-I)
	Smart Phone	Android, I-phone (iPad included)
	Protocol support	RTSP, HTTP, CGI
	Transmission speed	CIF Max 15fps(Single Channel)/ CIF Max 2fps(Quad Channel)
	Remote users Maximum	Live(1)
Storage	Internal HDD	Up to 2 SATA HDDs
	External HDD/DVD Writer	Not Support
	DVD Writer (Back-up)	Not Support
	USB (Back-up)	2 USB Ports
	File Format (Back-up)	BU(DVR Player), EXE(Include Player)
Security	Password Protection	1 Admin, 10 Group, 10 User per 1 Group
	Data Authentication	Watermark
Interface		
Monitors	VGA	1 VGA (1024x768) * Main Composite Selectable
	HDMI	Not Support
	Main Composite	1 BNC (1 Vp-p, 75 ohm) * Main Composite Selectable
	Spot Composite	* Main Composite Selectable
	Loop Outputs	Not Support
Audio	Inputs/Output	1 line in / 1 line out
	Compression	G.711 ULAW(8KHz, 16Bit)
Alarm	Sampling rate	8KHz
	Inputs/Outputs	Terminal 4 inputs (NO/NC) / Terminal 1 relay outputs (NO/NC), Rating : 24VDC/1A, 125V AC/0.5A
Connections	Remote notification	Notification via e-mail
	Ethernet	1 RJ45 10/100 Base-T
General	Serial interface	RS-485(Half) for PTZ, System Keyboard * Support for POS Interface (VSI-Pro)
	USB	USB 2.0, 2 ports (Front/Rear)
	e-SATA	Not Support
	Application Support	Mouse(Not Include), Remote Controller
	Protocol support	Samsung-E/ Samsung-T/ Pelco-D/ Pelco-p/Panasonic/ Phillips/ AD/ DIAMOND/ ERNA/ GE/ VCL
General		
Electrical	Input Voltage/Current	DC12V Adaptor, 4A, 100~240VAC, 50~60Hz, 48watt
	Power consumption	Max.36 W (with 1x HDD)
Environmental	Operating Temperature/Humidity	+0°C to +40°C (+32°F to +104°F)/ 20%RH to 85%RH
Mechanical	Dimension (W x H x D)	215 x 88 x 354mm
	Weight (With hard disks)	Approx. 3 kg
	Rack mount kit	Not Support
Lauguage		Korean, Japanese, Chinese, English, French, German, Spanish, Italian, Russian, Polish, Czech, Turkish, Netherlands, Portuguese, Swedish, Danish, Thailandais, Rumania, Serbia, Croatia, Hungary, Greek (22

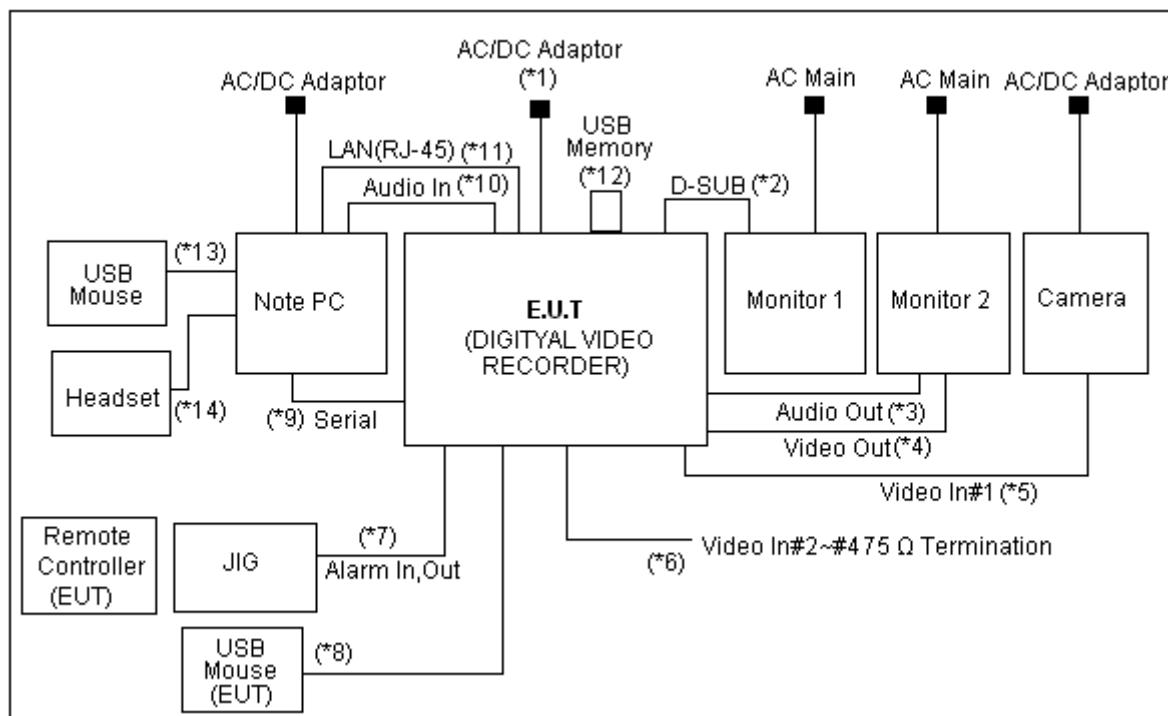
4.2 Product description

Type of product	DIGITYAL VIDEO RECORDER
Model name (Basic)	SRD-442N
Model name (Variant)	N/A
Difference	-
Trade name	-
Serial no	Engineering Sample
Testing voltage	120 V , 60 Hz
Product rating	AC/DC Adaptor (model name: ADP-4812) Input: AC 100 - 240 V , 50 / 60 Hz, 1.2 A Output: DC 12 V , 4 A
Internal clock frequency	400 MHz
Note	AC/DC adaptor was provided by the manufacturer.

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Monitor 1	GH19PS	N865HVTP900897M	SAMSUNG
Monitor 2	PM24KO	YER8HVDBA00057E	SAMSUNG
Note PC	PSLQ0K-02N005	2A046497Q	TOSHIBA
USB Mouse	1088	8165906050943	Microsoft
Headset	SHS-250V	-	SAMSUNG
Camera	SNZ-5200	-	SAMSUNG Techwin
USB Memory(1GB)	-	888120418	-
JIG	-	-	-

4.4 Test configuration



Note	Start		End		Cable	
*	Name	I/O port	Name	I/O port	Length(m)	Spec.
1	EUT (DIGITAL VIDEO RECORDER)	Power	AC/DC Adaptor	Power	1.0	Non-Shield
2		D-SUB	Monitor 1	D-SUB	1.6	Shield
3		Audio Out	Monitor 2	Audio In	3.0	Shield
4		Video Out	Monitor 2	Video In	3.0	Shield
5		Video In#1	Camera	Video Out	3.0	Shield
6		Video In#2~#4	75 Ω Termination	-	3.0	Shield
7		Alarm In,Out	JIG	Alarm In,Out	3.0	Non-Shield
8		USB	USB Mouse(EUT)	USB	1.6	Shield
9		Serial	Note PC	USB	1.4	Shield
10		Audio In	Note PC	Audio Out	3.0	Shield
11		LAN(RJ-45)	Note PC	LAN(RJ-45)	3.0	Non-Shield
12		USB	USB Memory	USB	Direct	-
13	Note PC	USB	USB Mouse	USB	1.8	Shield
14		Speaker	Headset	Speaker	2.0	Non-Shield

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 viewer test mode.
	Monitoring test mode.
	1 kHz MP3 Play Test mode. (Program: Window Media Player)
	Alarm operating mode.
	REC Test Mode.

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

Applied	Test items	Test method	Result
☒	Conducted Emission	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		
Testing voltage	120 V, 60 Hz		
Test facility	Shielded room (CE#1)		
Date	2012. 02. 15		
Temperature (°C)	20 °C	Humidity (% R.H.)	13 % R.H.
Remarks	Complied		

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	ESHS30	828765/009	R&S	2012.10.28	☒
LISN	ENV216	101358	R&S	2012.10.26	☒
LISN	L2-16A	0000J10705	PMM	-	☒
ISN	T800	24314	TESEQ	2012.12.12	☒

6.1.4 Photographs of test setup

* AC Main

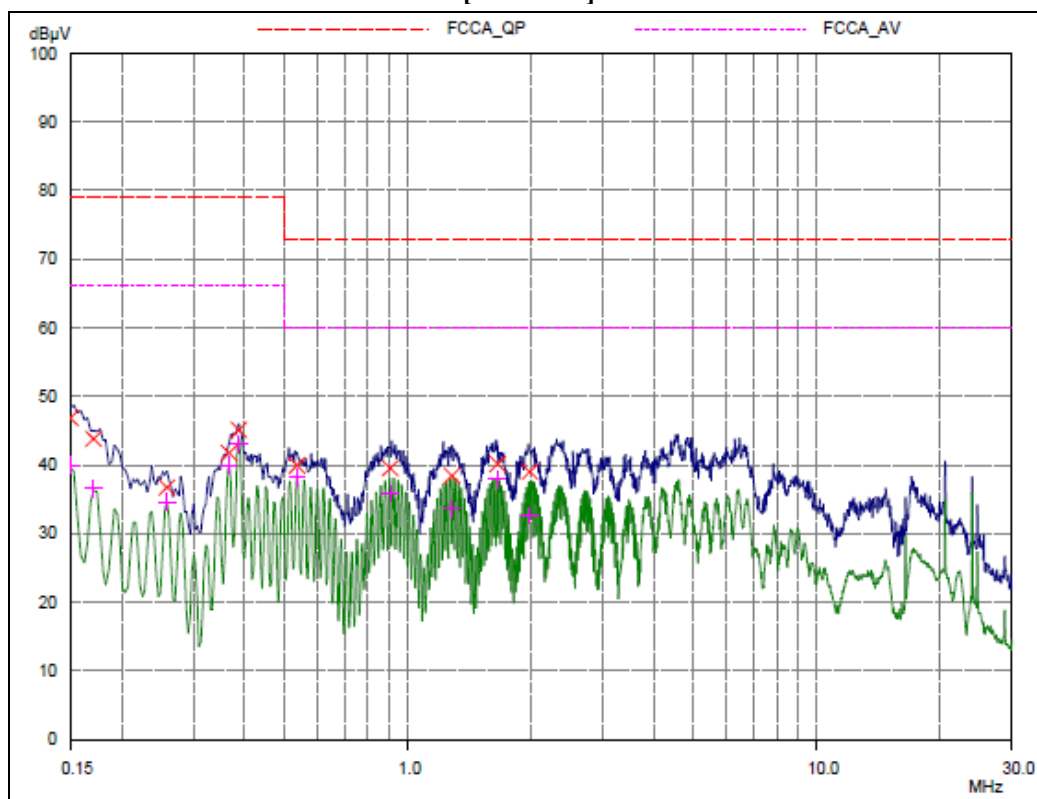


6.1.5 Conducted emission measurement result

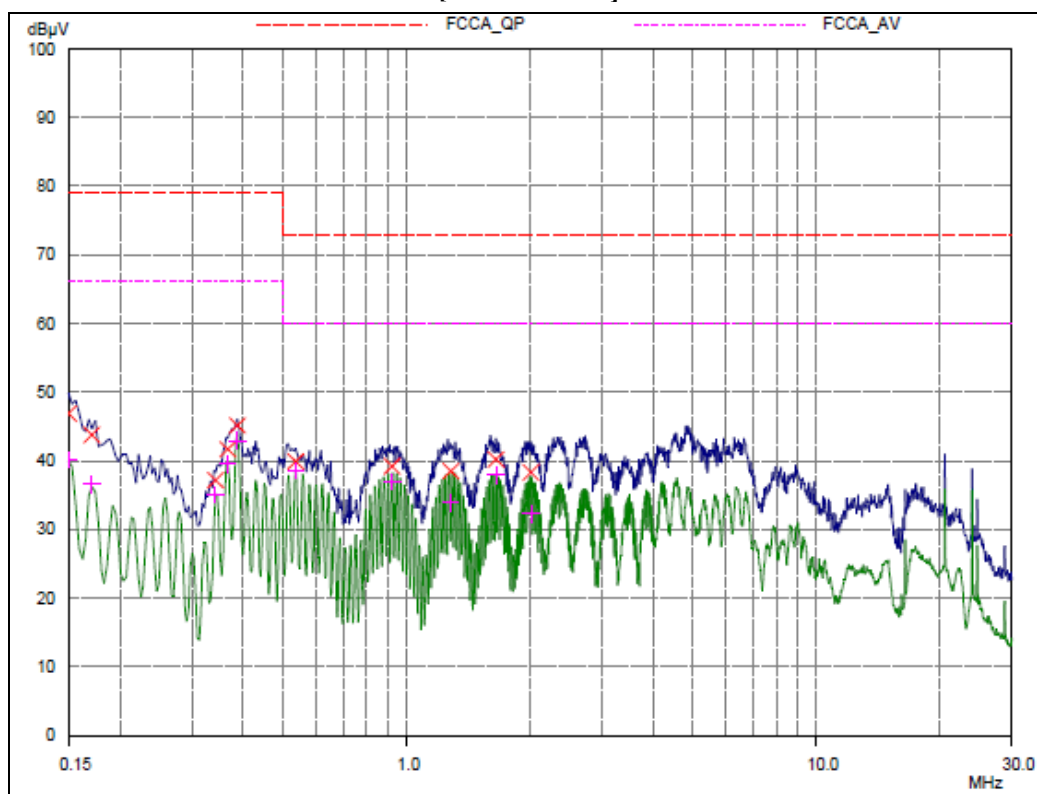
* AC Main

Frequency	Correction Factor		Line	Quasi-peak				Average			
				Limit	Reading	Result	Margin	Limit	Reading	Result	Margin
[MHz]	LISN	Cable		[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]
0.150	9.82	0.03	N	79.00	37.03	46.88	32.12	66.00	30.34	40.19	25.81
0.171	9.82	0.03	H		33.96	43.81	35.19		26.69	36.54	29.46
0.258	9.90	0.03	H		26.78	36.71	42.29		24.66	34.59	31.41
0.342	9.92	0.03	N		27.22	37.17	41.83		25.07	35.02	30.98
0.366	9.93	0.03	H		31.78	41.74	37.26		30.05	40.01	25.99
0.387	9.94	0.03	N		35.17	45.14	33.86		33.01	42.98	23.02
0.537	9.97	0.03	H	73.00	29.95	39.95	33.05	60.00	28.23	38.23	21.77
0.906	9.80	0.04	H		29.72	39.56	33.44		26.08	35.92	24.08
0.921	9.80	0.04	N		29.38	39.22	33.78		27.15	36.99	23.01
1.653	9.65	0.05	N		30.53	40.23	32.77		28.27	37.97	22.03
1.656	9.66	0.05	H		30.47	40.18	32.82		28.18	37.89	22.11
1.992	9.66	0.05	H		29.34	39.05	33.95		22.96	32.67	27.33

[Hot-Line]



[Neutral-Line]



6.2 Radiated Emission

Test specification	FCC Part 15, Section 15.109(g), Class A		
Testing voltage	120 V, 60 Hz		
Test facility	10 m Chamber (#F2)		
Test distance	10 m, 3 m		
Date	2012. 02. 15		
Temperature (°C)	20 °C	Humidity (% R.H.)	10 % R.H.
Remarks	Complied		

6.2.1 Limits of radiated emission measurement

Frequency [MHz]	Class A (dB(μ V/m)) @ 10 m	Class B (dB(μ V/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 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	100710	R&S	2012.11.28	☒
Bi-Log Antenna	VULB 9168	9168-440	SCHWARZBECK	2013.10.04	☒
Amplifier	310N	293004	SONOMA INSTRUMENT	2012.11.28	☒
3 dB Attenuator	8491A	27444	HP	2012.11.28	☒
Antenna Mast	MA4000-EP	303	Innco Systems	-	☒
Turn Table	DT2000S-1t	079	Innco Systems	-	☒
Horn ANT	3115	00086706	ETS	2013.11.21	☒
Amplifier	8449B	3008A01802	AGILENT	2012.05.11	☒
Spectrum Analyzer	FSP7	100289	R&S	2012.12.19	☒

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

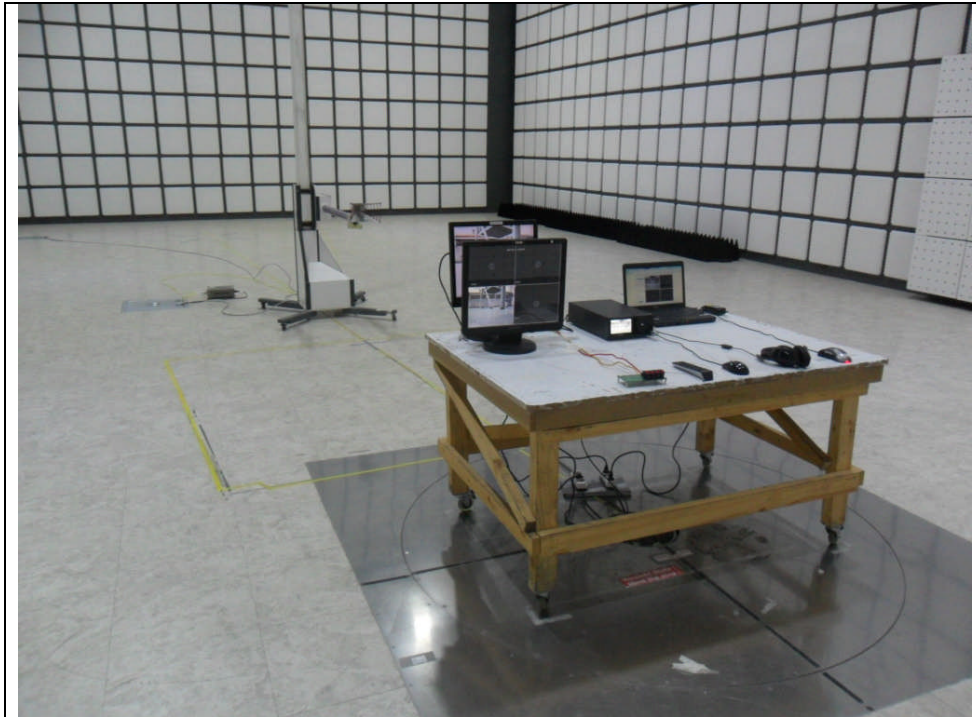
The result is $30 + 12 + 5 + 3 - 35 = 15 \text{ dB}(\mu\text{V/m})$

6.2.5 Photographs of test setup

* 30 MHz ~ 1 GHz



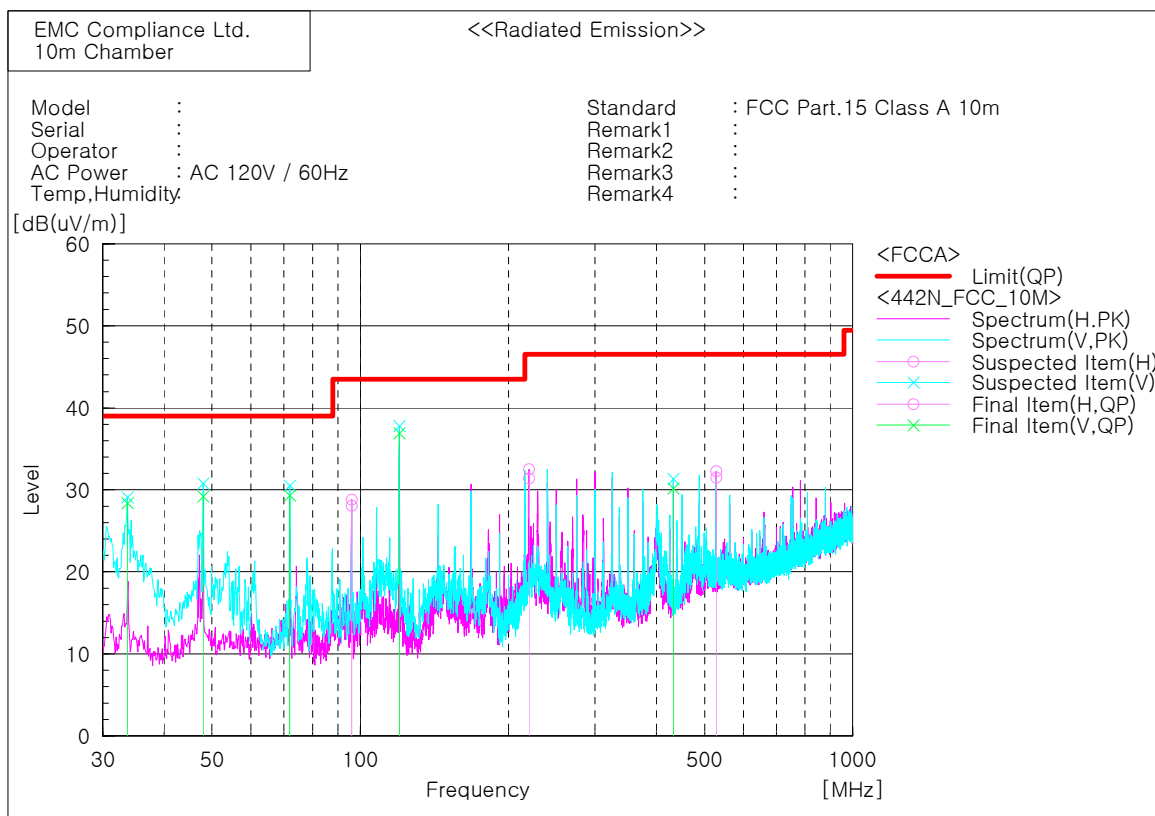
* 1 GHz ~ 5 GHz



6.2.6 Radiated emission measurement result

* Graph and Data

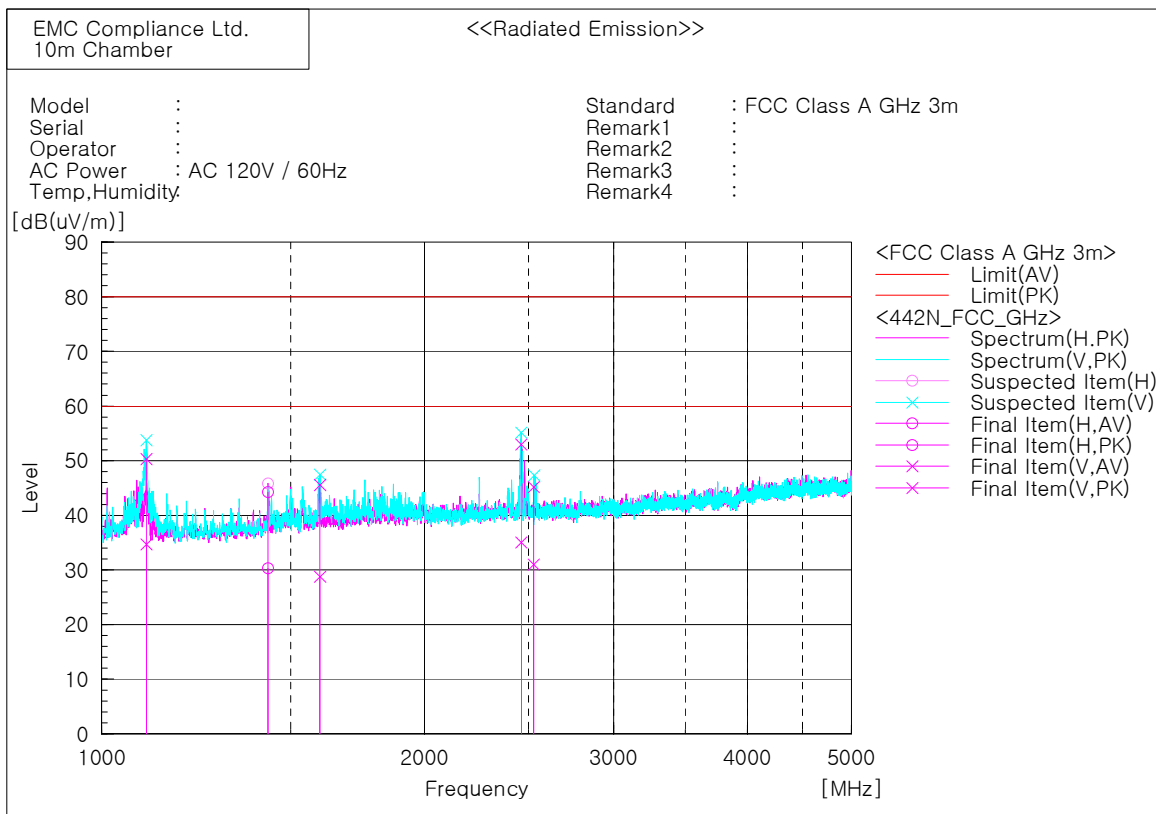
* 30 MHz ~ 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit QP [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	33.638	V	44.1	-15.7	28.4	39.0	10.6	100.0	79.7	
2	47.945	V	43.6	-14.4	29.2	39.0	9.8	100.0	49.8	
3	71.953	V	45.8	-16.5	29.3	39.0	9.7	100.0	69.3	
4	95.960	H	47.5	-19.4	28.1	43.5	15.4	400.0	329.8	
5	119.968	V	53.3	-16.4	36.9	43.5	6.6	100.0	120.2	
6	219.999	H	47.7	-16.3	31.4	46.5	15.1	400.0	271.7	
7	431.944	V	39.8	-9.6	30.2	46.5	16.3	100.0	139.6	
8	528.095	H	38.7	-7.2	31.5	46.5	15.0	400.0	49.4	

* 1 GHz ~ 5 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading AV [dB(μV)]	Reading PK [dB(μV)]	c.f [dB(1/m)]	Result AV [dB(μV/m)]	Result PK [dB(μV/m)]	Limit AV [dB(μV/m)]	Limit PK [dB(μV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [deg]	Remark
1	1100.784	V	46.2	61.8	-11.5	34.7	50.3	60.0	80.0	25.3	29.7	100.0	339.1	
2	1429.501	H	38.9	52.9	-8.6	30.3	44.3	60.0	80.0	29.7	35.7	100.0	32.7	
3	1598.044	V	36.1	52.9	-7.3	28.8	45.6	60.0	80.0	31.2	34.4	100.0	267.2	
4	2461.021	V	38.6	56.5	-3.5	35.1	53.0	60.0	80.0	24.9	27.0	100.0	318.1	
5	2528.499	V	34.4	48.6	-3.4	31.0	45.2	60.0	80.0	29.0	34.8	100.0	339.1	

7. E.U.T. photographs

Whole



*** Main**

Front View



Rear View



Left View



Right View



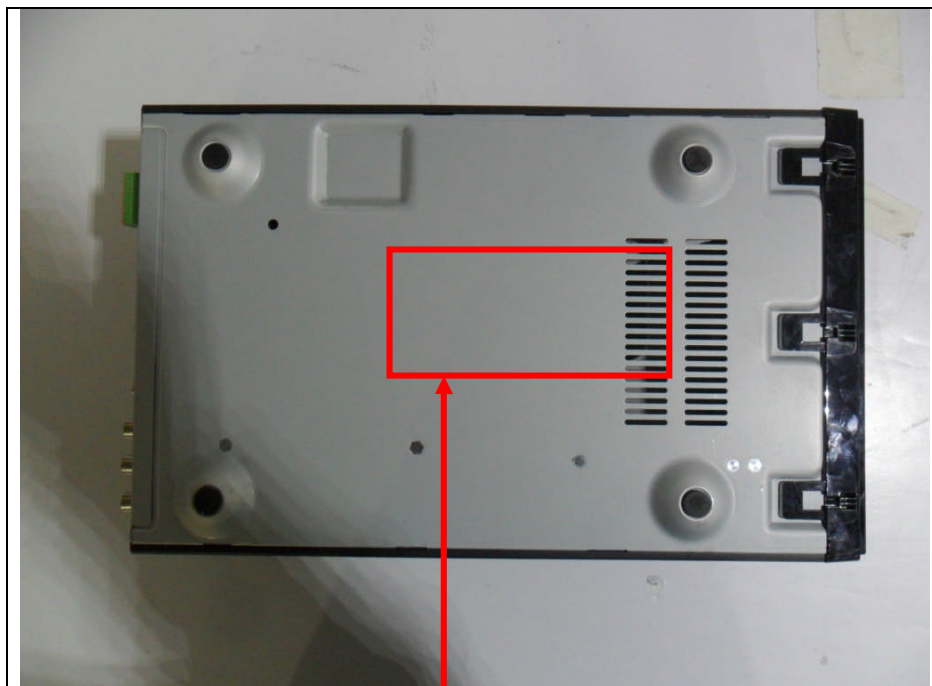
Top View



Bottom View



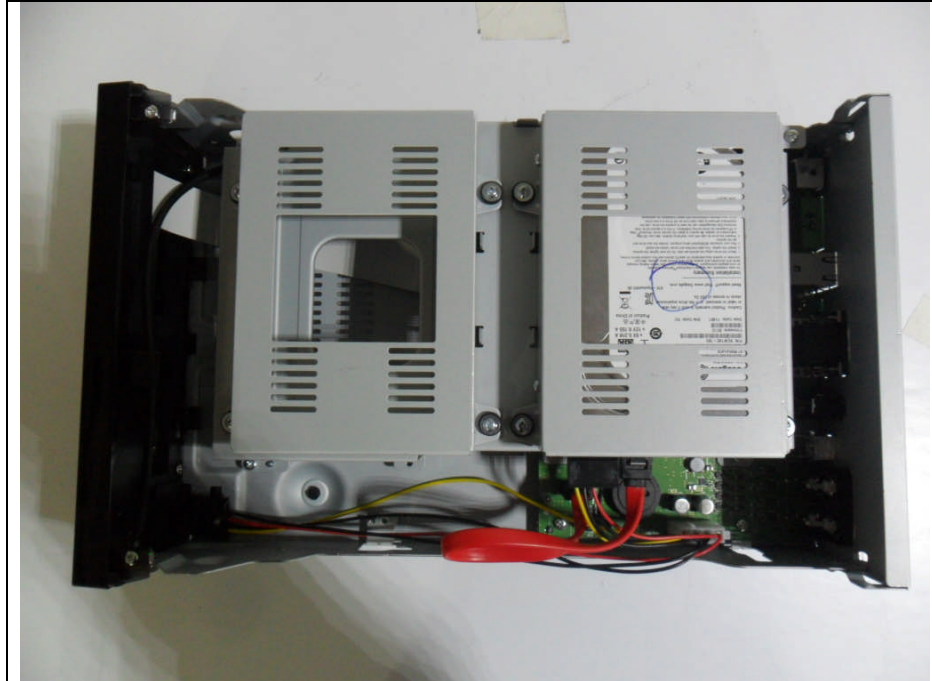
Label



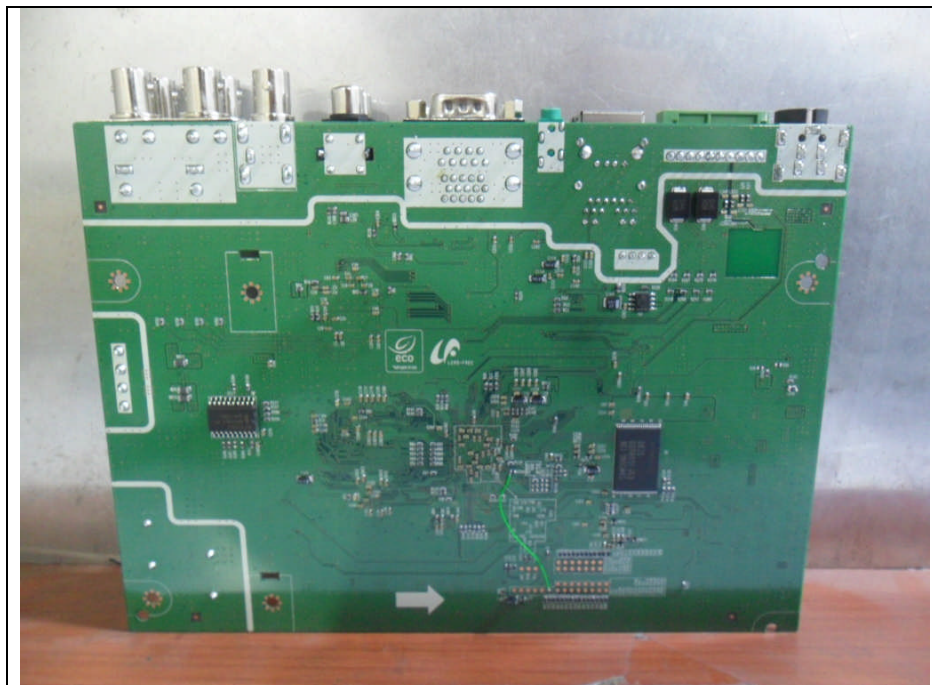
FCC Label Location

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

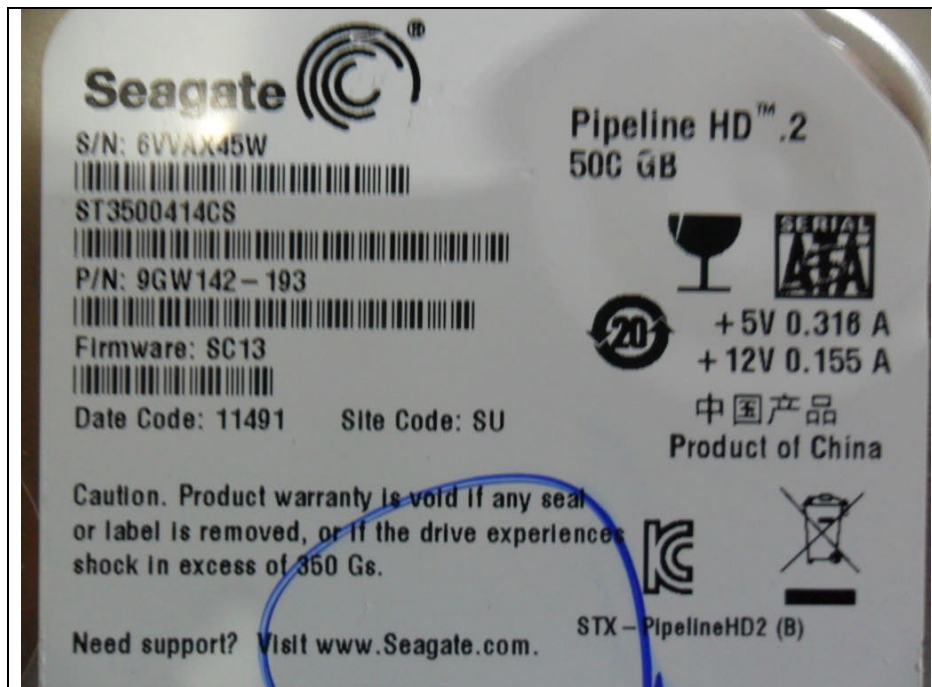


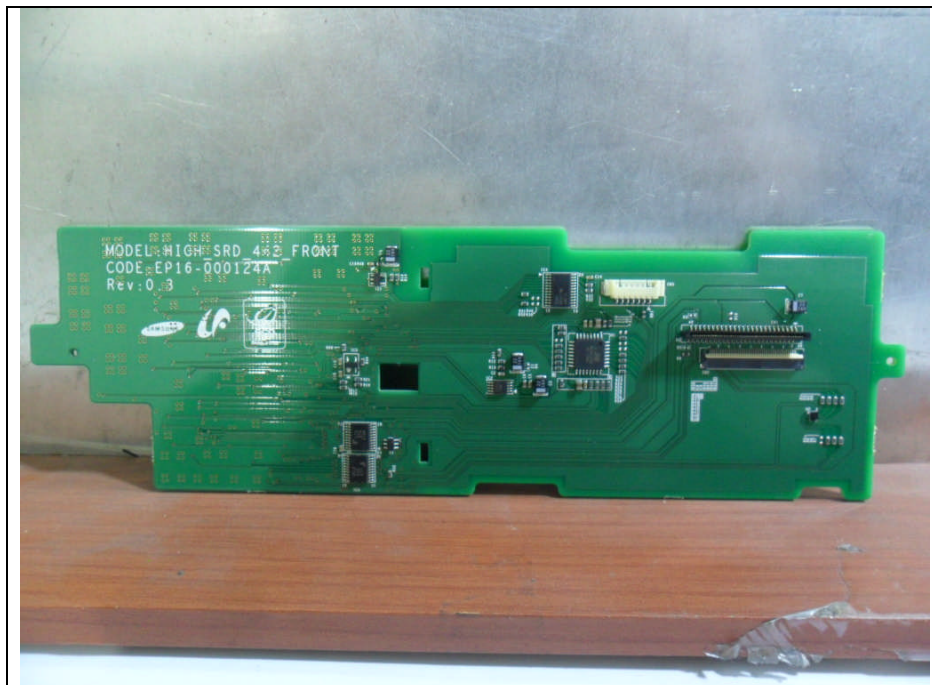
Main Board



HDD(500GB)





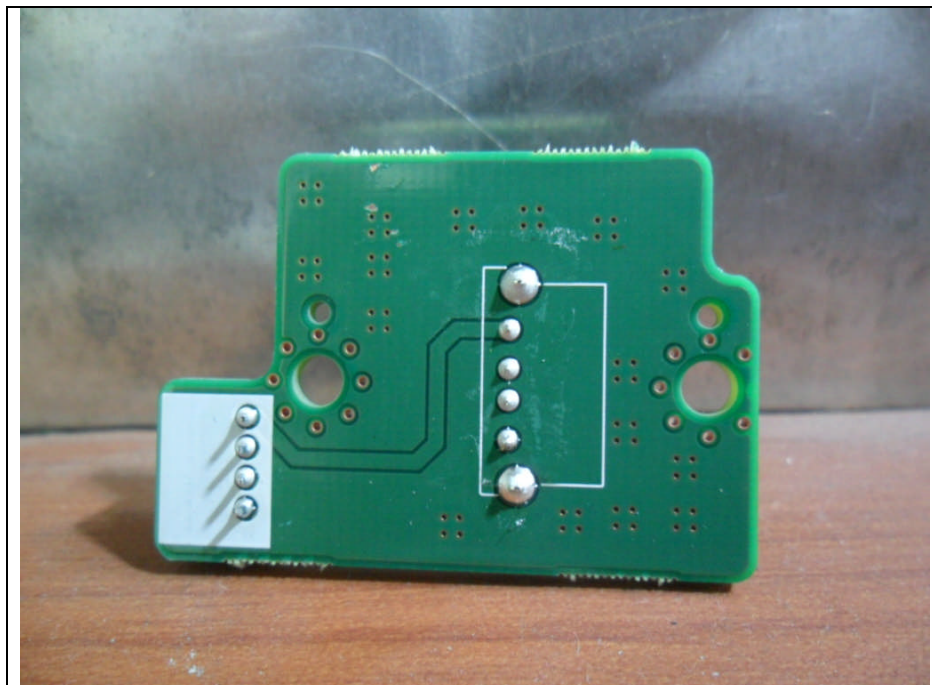


LCD





USB Board



Adaptor



*** USB Mouse**

Front View



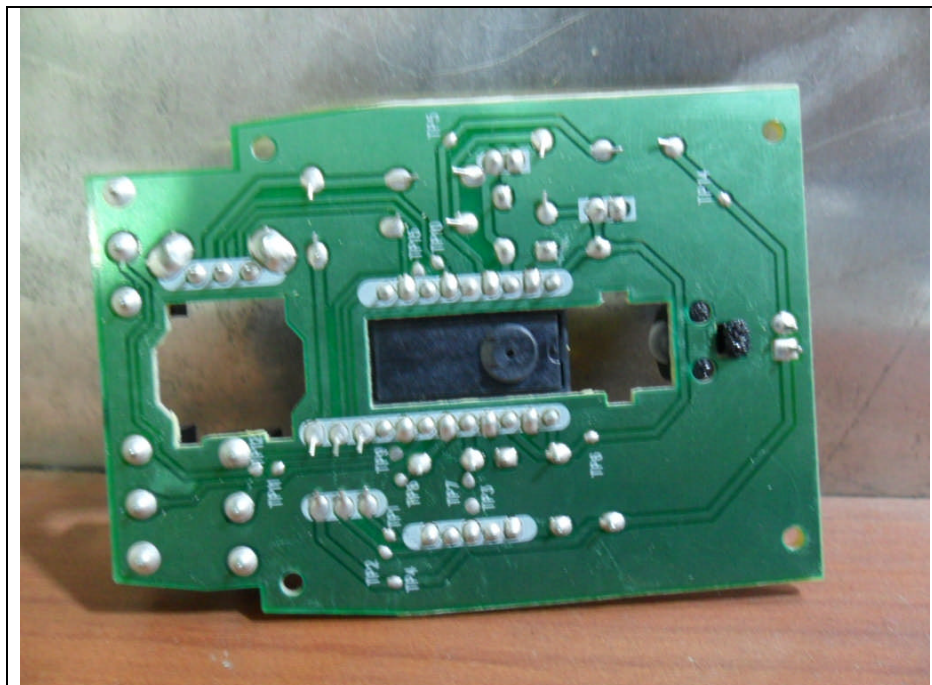
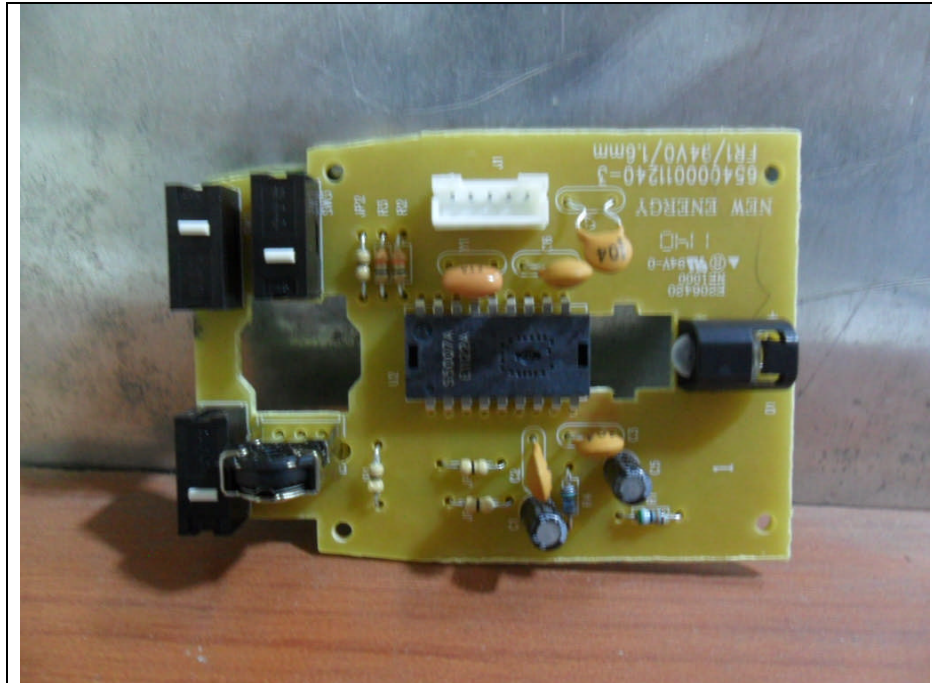
Rear View



Inside



Main Board



*** Remote Controller**

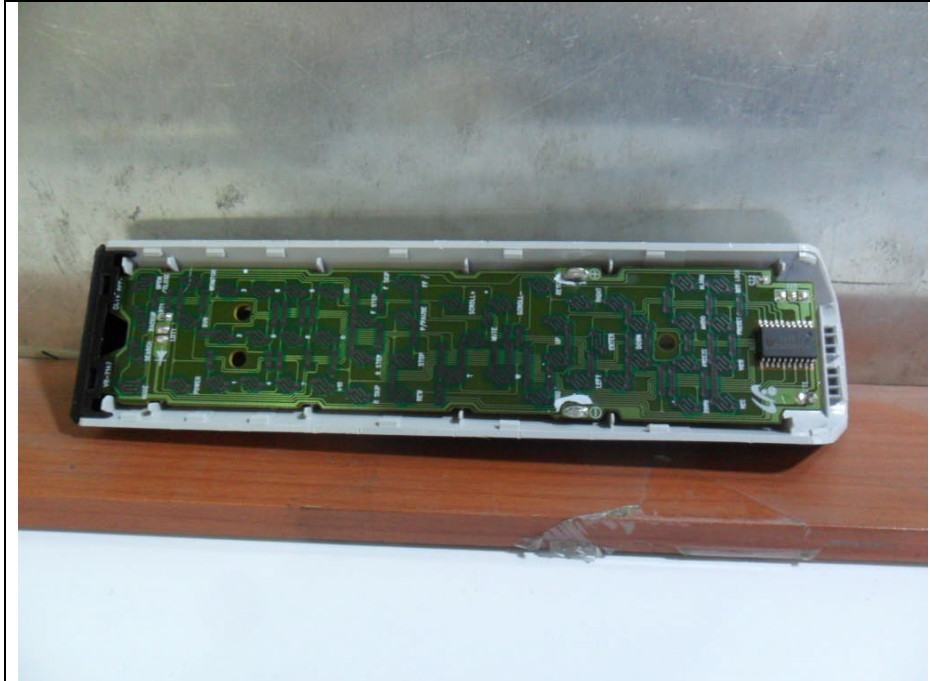
Front View



Rear View



Inside



Main Board

