

CERTIFICATE of EMC Compliance

Report No : EMC-FCC-2248
Type of equipment : Digital Video Recorder
Model Name : SRD-1656DN
Applicant : Samsung Techwin Co., Ltd.
84, Jeongdong-ro, Seongsan-gu,
Changwon-si, Gyeongsangnam-do, Korea
Manufacturer#1 : Samsung Techwin Co., Ltd.
84, Jeongdong-ro, Seongsan-gu,
Changwon-si, Gyeongsangnam-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.

Laboratory

EMC compliance Ltd.
65, Sinwon-ro, Yeongtong-gu, Suwon-si,
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Yeom, Han-Seok/ Manager

EMI TEST REPORT

Test report No : EMC-FCC-2248
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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
Classification : Verification
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: 2014. 03. 04

Date of testing: 2014. 03. 17 ~ 03. 19

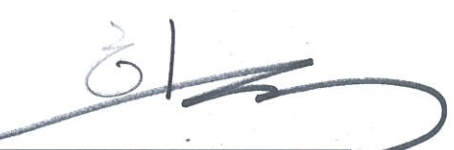
Issued date: 2014. 03. 21

Tested by:



KIM, JIN-WON

Approved by:



YEOM, HAN-SEOK

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1. Applicant information

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Manufacturer#2: TIANJIN SAMSUNG TECHWIN OPTO-ELECTRONIC CO., LTD
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2. Laboratory information

Address

EMC compliance Ltd.

65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-390, Korea

Telephone Number: 82 31 336 9919

Facsimile Number: 82 505 299 8311

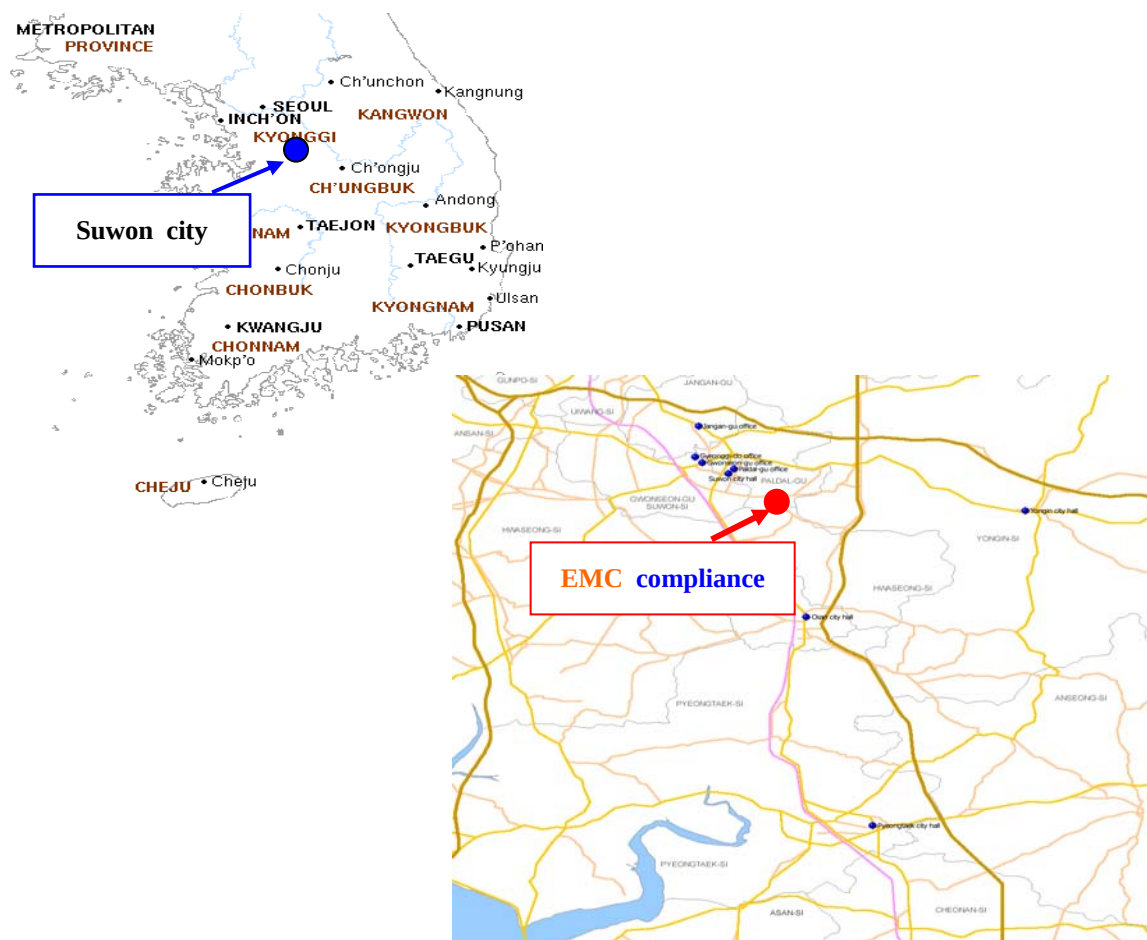
FCC CAB.: KR0040

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)	: 20.3 °C	29.8 % R.H.	-
Shielded room(CE)	: 21.9 °C	21.3 % 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 (C.L: Approx 95 %, k = 2)		
Shielded Room (CE#1)	9 kHz ~ 150 kHz: ± 3.82 dB 150 kHz ~ 30 MHz: ± 3.43 dB	
Shielded Room (CE#2)	9 kHz ~ 150 kHz: ± 3.82 dB 150 kHz ~ 30 MHz: ± 3.43 dB	
Shielded Room (CE#3)	9 kHz ~ 150 kHz: ± 4.00 dB 150 kHz ~ 30 MHz: ± 3.63 dB	
Radiated Emission measurement (C.L: Approx 95 %, k = 2)		
10 m Chamber (#F4)	30 MHz ~ 300 MHz	3 m: + 4.56 dB, - 4.58 dB 10 m: + 4.56 dB, - 4.56 dB
	300 MHz ~ 1 000 MHz	3 m: + 4.84 dB, - 4.85 dB 10 m: + 4.71 dB, - 4.72 dB
	1 GHz ~ 6 GHz	3 m: + 6.19 dB, - 6.20 dB
	6 GHz ~ 18 GHz	3 m: + 6.41 dB, - 6.53 dB
10 m Chamber (#F2)	30 MHz ~ 300 MHz	3 m: + 4.86 dB, - 4.88 dB 10 m: + 4.86 dB, - 4.86 dB
	300 MHz ~ 1 000 MHz	3 m: + 4.98 dB, - 4.99 dB 10 m: + 4.85 dB, - 4.87 dB
	1 GHz ~ 6 GHz	3 m: + 6.19 dB, - 6.20 dB
	6 GHz ~ 18 GHz	3 m: + 6.41 dB, - 6.53 dB

4. Description of E.U.T.

4.1 General information

SRD-1656D		
Video	Inputs	16 composite video 0.5~1 Vpp, 75 ohm automatic termination
	Resolution	1280x480 NTSC, 1280x576 PAL / 720x480 NTSC, 720x576 PAL
Live	Frame rate	480fps NTSC, 400fps PAL
	Resolution	1280x480 NTSC, 1280x576 PAL, 704x480 NTSC, 704x576 PAL
	Multi Screen display	1/4/7/9/13/16/16A/PIP/Sequence
Performance		
Operating System	Embedded	Linux
Recording	Compression	H.264
	Record Rate	NTSC: Up to 120fps @ 1280x480 / PAL: Up to 100fps @ 1280x576
		NTSC: Up to 120fps @ 704x480 / PAL: Up to 100fps @ 704x576
		NTSC: Up to 240fps @ 704x240 / PAL: Up to 200fps @ 704x288
		NTSC: Up to 480fps @ 352x240 / PAL: Up to 400fps @ 352x288
	Mode	NTSC: Manual, Schedule (Continuous/Event), Event(Pre/Post), Time lapse (1~30 fps)
	Event	PAL: Manual, Schedule (Continuous/Event), Event(Pre/Post), Time lapse (1~25 fps)
	Overwrite modes	Video Loss, Motion(Level 1~10), Alarm, Tampering(Level 1~3)
	Pre-alarm	Continuous
	Post-Alarm	Up to 30 sec (5,10,20,30 Sec)
	Search mode	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, Pos, Motion (* All Search Included Preview Function)
	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) * Backward Play with I-frame Only Step Forward/Backward
Network (IPv4)	Transmission speed	Option 1) 1280H/4CIF/2CIF/CIF(120/120/240/480fps NTSC, 100/100/200/400fps PAL)
	Bandwidth	Option 2) 4CIF/2CIF/CIF(120/240/480fps NTSC, 100/200/400fps PAL)
	Bandwidth control	Up to 32Mbps
	Stream	Selectable
	Remote users Maximum	H.264(4CIF/2CIF/CIF Selectable)
	Protocol support	Search(3)/Live Unicast(10)/Live Multicast(20)
	Monitoring	TCP/IP,DHCP,PPPoE,SMTP,NTP,HTTP,DDNS,RTP,RTSP,SNMP
	Smart phone	Smart viewer,Web viewer, SSM(CMS)
Smart phone	Platform	Android, iOS
	Protocol support	RTP,RTSP,HTTP,CGI,HTTPS
Storage	Remote users Maximum	Live(4), Search(1)
	Internal HDD	Up to 4 SATA HDDs
	External (e-SATA Interface)	Up to 2 expansion bay (* Model: SVS-5R/5E)
	DVD Writer (Back-up)	YES
	USB (Back-up)	2 USB Ports
Security	File Format (Back-up)	BU(DVR Player), EXE(Include Player), AVI
	Password Protection	1 Admin, 10 Group, 10 User per 1 Group
	Data Authentication	Watermark
Interface		
Monitors	VGA	1 VGA (1280x720, 1280x1024, 1920x1080)
	HDMI	1 HDMI (1280x720, 1280x1024, 1920x1080)
	Main Composite	N/A
	Spot(Composite)	Digital Spot (2CH) * Included OSD On Screen, Multi mode Support(1CH)
	Loop Outputs	16CH
Audio	Inputs/Output	16CH line in (Built in 4CH, Option : Audio Extension Cable)/ 1CH line out
	Compression	G.711
	Sampling rate	8KHz
Alarm	Inputs/Outputs	Terminal 16 Inputs (NO/NC) / Terminal 4 relay Outputs (NO/NC), Rating : 30V DC/2A, 250V AC/0.25A
	Remote notification	Notification via e-mail
Connections	Ethernet	1 RJ45 10/100/1000 Base-T
	Serial interface	RS-232/RS-485(Full Duplex) for PTZ, Samsung System Keyboard
	USB	USB 2.0, 2 ports
	e-SATA	2 External SATA ports
	Application Support	Mouse, Remote Controller
	Protocol support	Samsung-E/Samsung-T/Pelco-D/Pelco-p/Panasonic/ Phillips/ AD/ DIAMOND/ ERNA/ KALATEL/ VCL PTZ Control via Coaxial Cable (Samsung CCVC, Pelco-C (Coaxitron))
General		
Electrical	Input Voltage/Current	100 to 240 VAC ±10%; 50/60 Hz, Autoranging
	Power consumption	Max. 60 W (with 1x HDD)
Environmental	Operating Temperature/Humidity	+0°C to +40°C (+32°F to +104°F) / 20% to 85% RH
Mechanical	Dimension (W x H x D)	W440 x H88 x D384.8(17.32" x 3.46" x 15.15")
	Weight (With hard disks)	6.81 kg (15.01 lb)
	Rack mount kit	2 EA
Language		English, French, German, Spanish, Italian, Russian, Polish, Czech, Turkish, Netherlands
		Portuguese, Swedish, Danish, Rumania, Serbia, Croatia, Hungary, Greek, Finnish, Norwegian, Korean, Japanese, Chinese(Traditional), Thai, Taiwanese(25 Language)

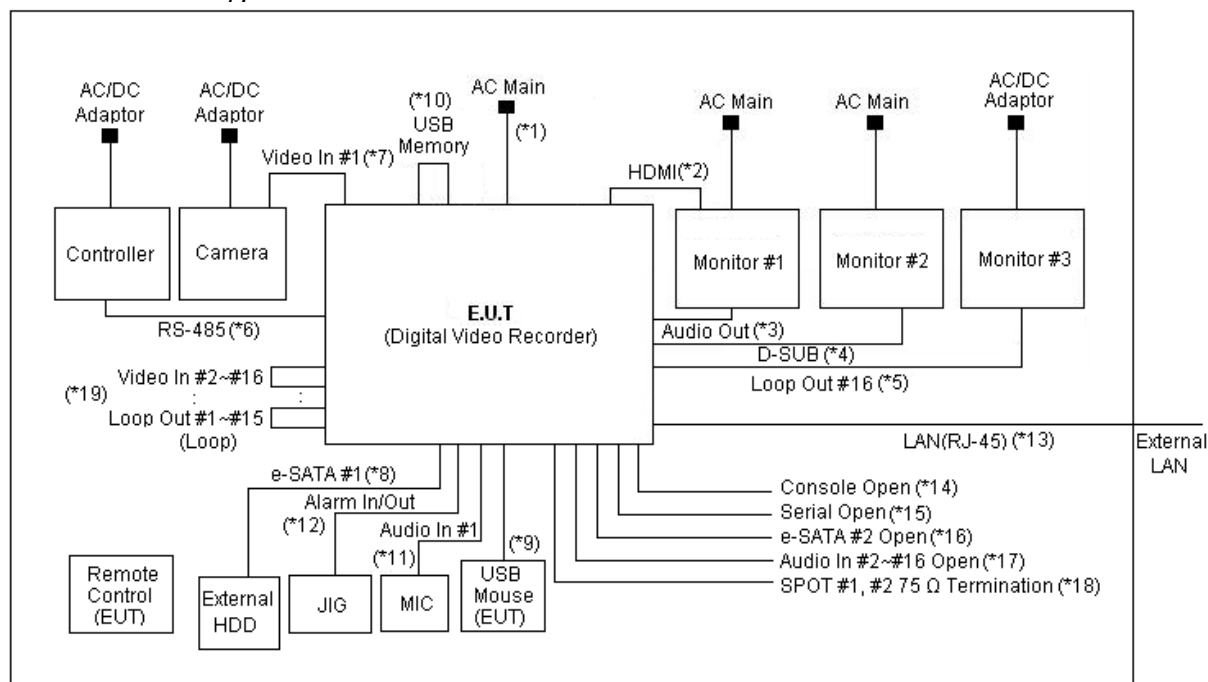
4.2 Product description

Type of product	Digital Video Recorder
Model name (Basic)	SRD-1656DN
Model name (Variant)	-
Difference	-
Trade name	-
Serial no	Engineering Sample
Testing voltage	120 V , 60 Hz
Product rating	100 - 240 V , 50/60 Hz
Internal clock frequency	Above 108 MHz
Note	-

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Monitor #1	PM24KO	ZQ9XH1HBA01776V	SAMSUNG
Monitor #2	LT24B350	ZWP0HMCD10771M	SAMSUNG
Monitor #3	SMT-2231P	YDQ03VDBB02500H	SAMSUNG
Controller	SCC-1000	EW089028913	SAMSUNG
Camera	SCB-6000	C6PW6V3B80115Y	SAMSUNG
External HDD	SP10	-	-
USB Memory(8GB)	JFV33	-	TRANSCEND
MIC	-	-	-
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 Main	Power	1.5	Non-Shield
2		HDMI	Monitor #1	HDMI	1.0	Shield
3		Audio Out	Monitor #1	Audio In	3.0	Shield
4		D-SUB	Monitor #2	D-SUB	1.5	Shield
5		Loop Out #16	Monitor #3	Loop In	3.0	Shield
6		RS-485	Controller	RS-485	3.0	Non-Shield
7		Video In #1	Camera	Video Out	3.0	Shield
8		e-SATA #1	External HDD	e-SATA #1	1.0	Non-Shield
9		USB	USB Mouse (EUT)	USB	1.0	Shield
10		USB	USB Memory	USB	Direct	-
11		Audio In #1	MIC	Audio Out	3.0	Shield
12		Alarm In/Out	JIG	Alarm In/Out	3.0	Non-Shield
13		LAN(RJ-45)	External LAN	LAN(RJ-45)	3.0	Non-Shield
14		Console	Open	-	1.0	Non-Shield
15		Serial	Open	-	1.0	Shield
16		e-SATA #2	Open	-	0.5	Non-Shield
17		Audio In #2~#16	Open	-	3.0	Shield
18		SPOT #1, #2	75 Ω Termination	-	3.0	Shield
19		Video In #2~#16	Loop	Loop Out #1~#15	1.0	Shield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
1	Monitoring test.
	Ping test.
	Alarm In/Out test.
	Audio In/Out test.
	Controller Test.

5. Summary of test results

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

5.1 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	2014. 03. 19		
Temperature (°C)	21.9 °C	Humidity (% R.H.)	21.3 % 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

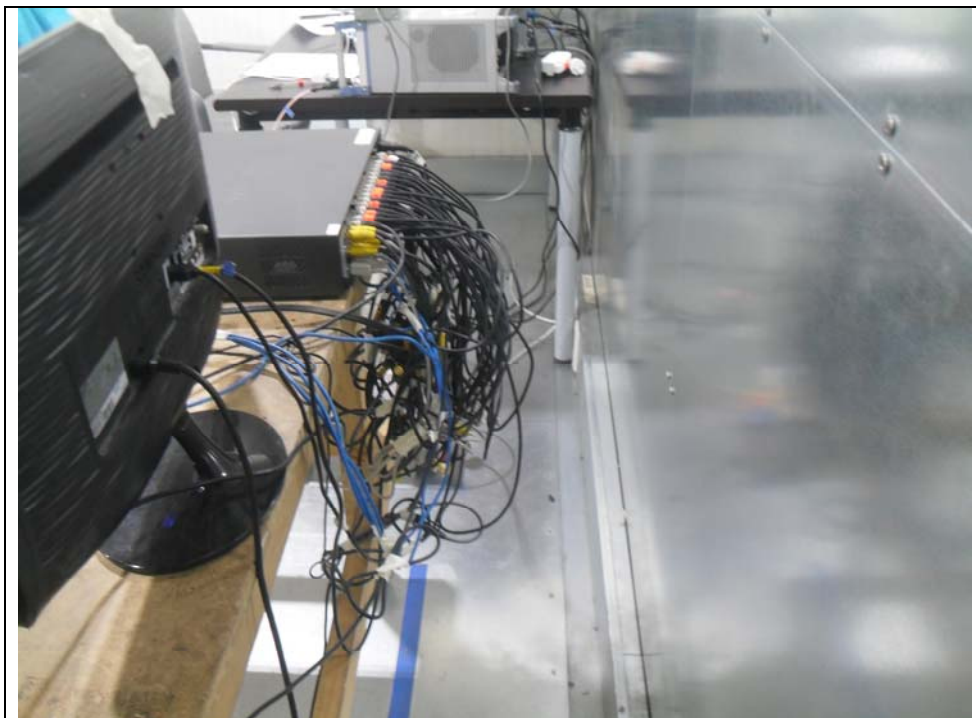
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground 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	ESCI7	100732	R&S	2015.01.27	☐
Test Receiver	ESCI	100001	R&S	2014.07.25	☒
Test Receiver	ESCI	100710	R&S	2014.10.28	☐
LISN	ENV216	101358	R&S	2014.10.04	☒
LISN	ESH3-Z5	100267	R&S	2014.07.08	☒

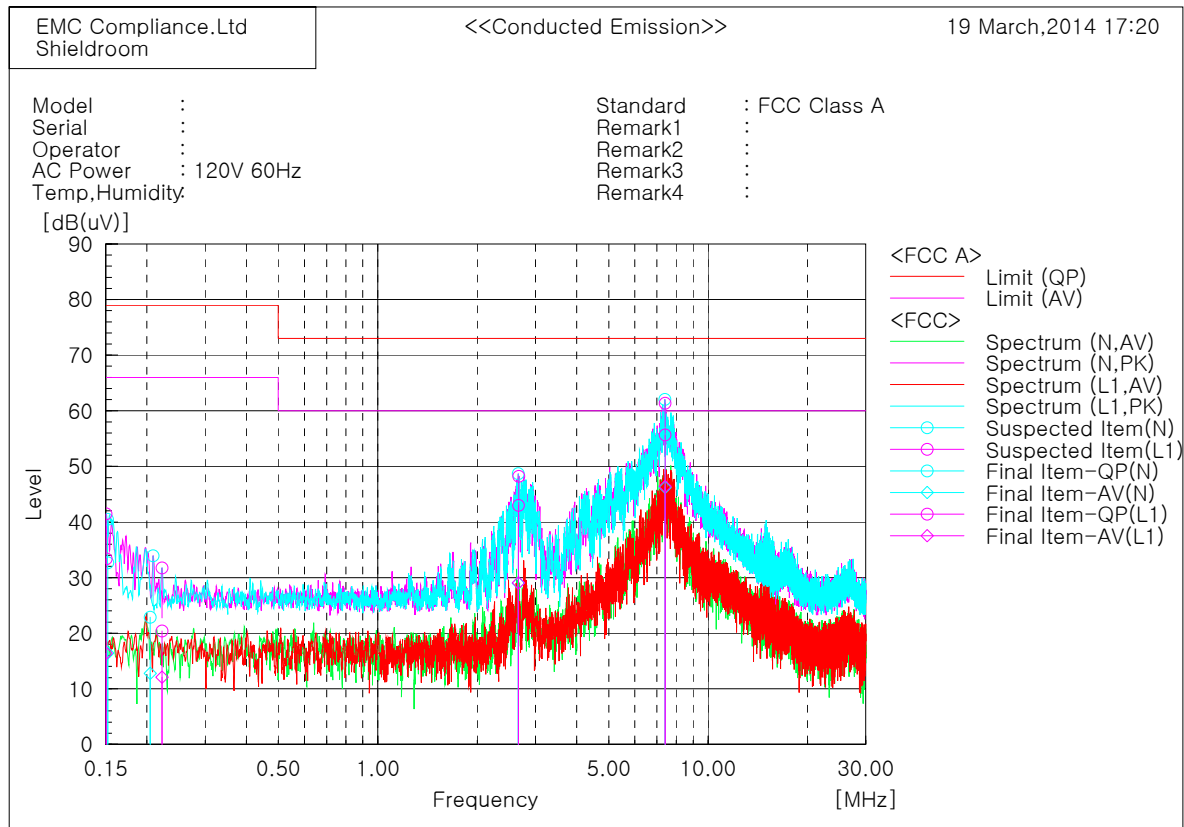
6.1.4 Photographs of test setup

* AC Main



6.1.5 Conducted emission measurement result

* AC Main (SRD-1656DN)



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.15228	22.6	6.3	10.1	32.7	16.4	79.0	66.0	46.3	49.6
2	0.20445	12.8	2.7	10.1	22.9	12.8	79.0	66.0	56.1	53.2
3	2.66369	32.8	19.1	9.9	42.7	29.0	73.0	60.0	30.3	31.0
4	7.40256	46.0	36.4	9.8	55.8	46.2	73.0	60.0	17.2	13.8

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.15053	23.3	6.3	10.1	33.4	16.4	79.0	66.0	45.6	49.6
2	0.2223	10.3	2.0	10.1	20.4	12.1	79.0	66.0	58.6	53.9
3	2.66483	33.1	19.2	9.9	43.0	29.1	73.0	60.0	30.0	30.9
4	7.40487	45.9	36.6	9.8	55.7	46.4	73.0	60.0	17.3	13.6

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	2014. 03. 17		
Temperature (°C)	20.3 °C	Humidity (% R.H.)	29.8 % 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	ESCI7	100732	R&S	2015.01.27	☒
Test Receiver	ESCI	100001	R&S	2014.07.25	☐
Test Receiver	ESCI	100710	R&S	2014.10.28	☐
Bi-Log Antenna	VULB 9168	440	SCHWARZBECK	2015.10.16	☒
Amplifier	310N	293004	SONOMA INSTRUMENT	2014.10.31	☒
3 dB Attenuator	8491B	22981	HP	2014.03.19	☒
Antenna Mast	MA4000-EP	303	Innco Systems	-	☒
Turn Table	DT2000S-1t	079	Innco Systems	-	☒
Amplifier	8449B	3008A02343	AGILENT	2014.10.31	☒
Horn ANT	3115	00086706	ETS	2014.09.05	☒
Spectrum Analyzer	FSP7	100289	R&S	2014.11.25	☐

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



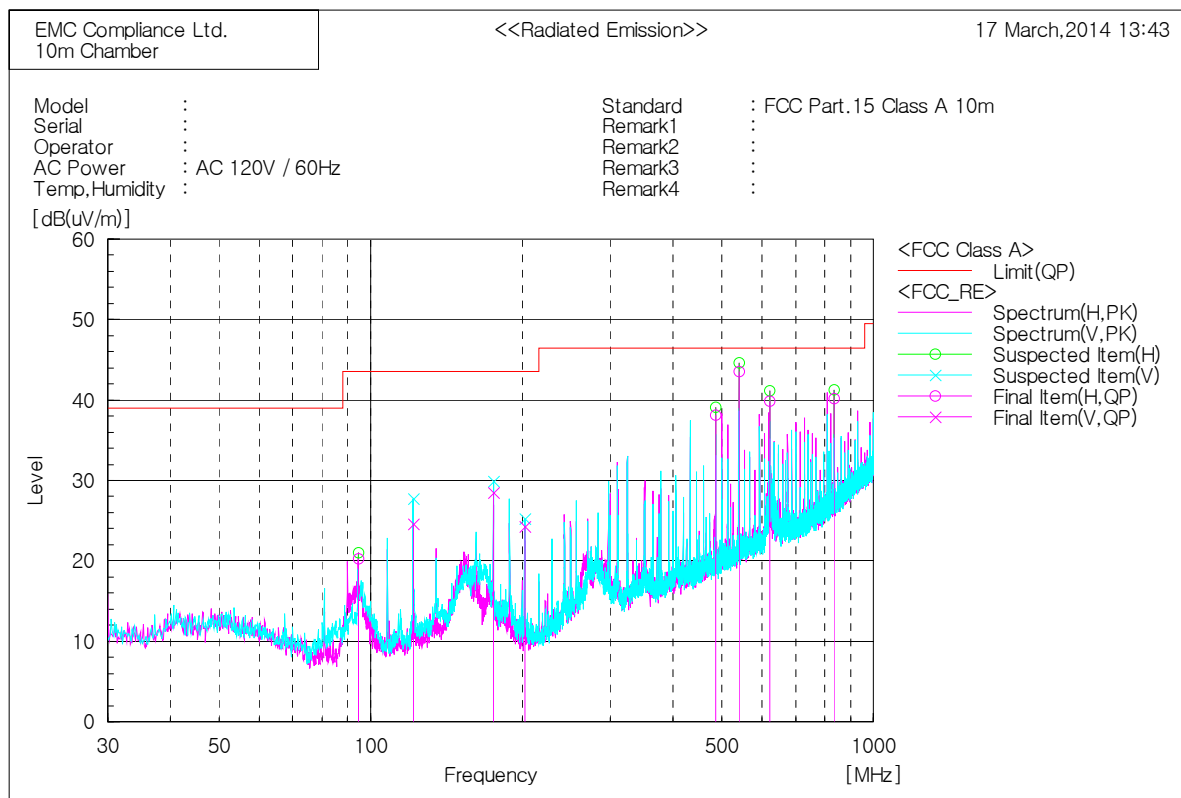
* 1 GHz ~ 6 GHz



6.2.6 Radiated emission measurement result

* Graph and Data

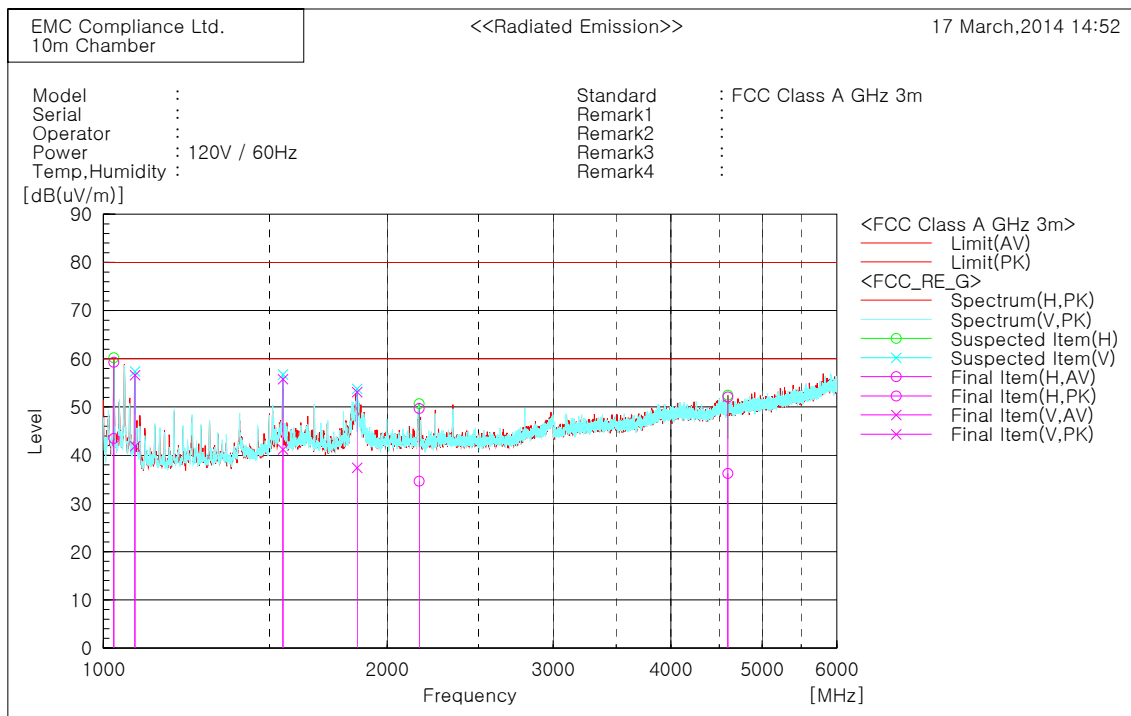
* 30 MHz ~ 1 GHz (SRD-1656DN)



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]
1	94.505	H	38.3	-18.1	20.2	43.5	23.3	400.0	76.8
2	121.544	V	39.8	-15.2	24.6	43.5	18.9	100.0	21.5
3	175.500	V	41.6	-13.1	28.5	43.5	15.0	100.0	322.9
4	202.418	V	39.1	-14.8	24.3	43.5	19.2	100.0	3.3
5	486.021	H	43.0	-4.9	38.1	46.5	8.4	199.0	349.0
6	539.978	H	46.9	-3.4	43.5	46.5	3.0	199.0	156.2
7	621.094	H	41.4	-1.5	39.9	46.5	6.6	199.0	186.4
8	837.040	H	37.6	2.6	40.2	46.5	6.3	100.0	154.3

* 1 GHz ~ 6 GHz (SRD-1656DN)



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	1025.625	H	49.3	65.1	-5.8	43.5	59.3	60.0	80.0	16.5	20.7	100.0	127.9
2	1080.000	V	47.4	62.1	-5.5	41.9	56.6	60.0	80.0	18.1	23.4	100.0	189.2
3	1550.625	V	42.8	57.4	-1.6	41.2	55.8	60.0	80.0	18.8	24.2	100.0	136.6
4	1858.750	V	37.2	52.9	0.2	37.4	53.1	60.0	80.0	22.6	26.9	100.0	208.8
5	2162.500	H	33.8	48.9	0.8	34.6	49.7	60.0	80.0	25.4	30.3	100.0	340.4
6	4597.500	H	26.0	41.9	10.2	36.2	52.1	60.0	80.0	23.8	27.9	100.0	144.5

Front View



Left View



Right View



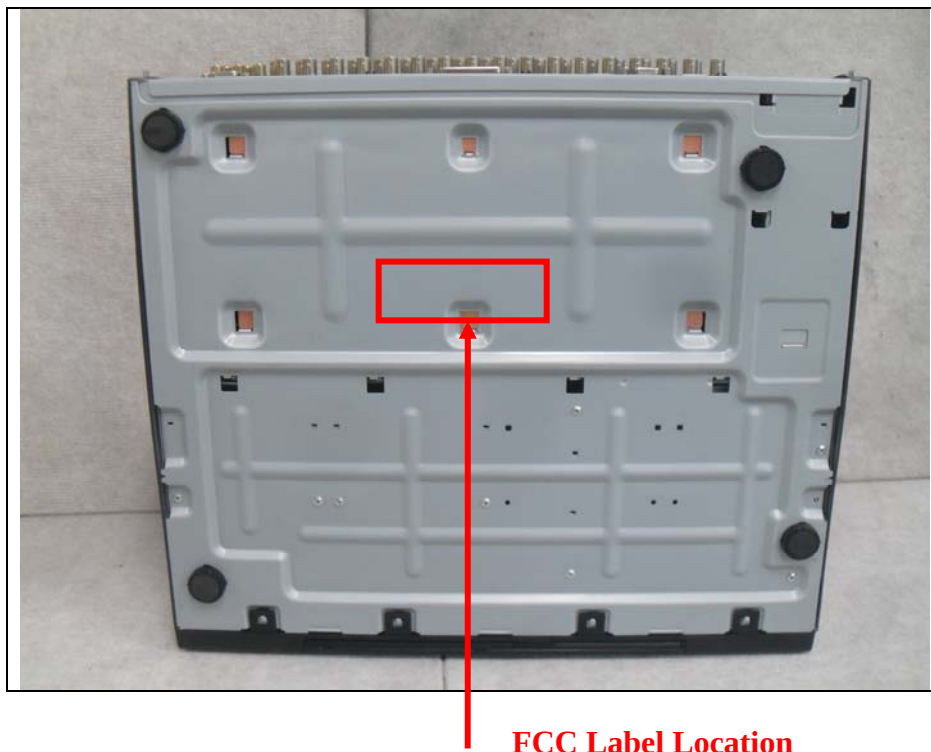
Top View



Bottom View

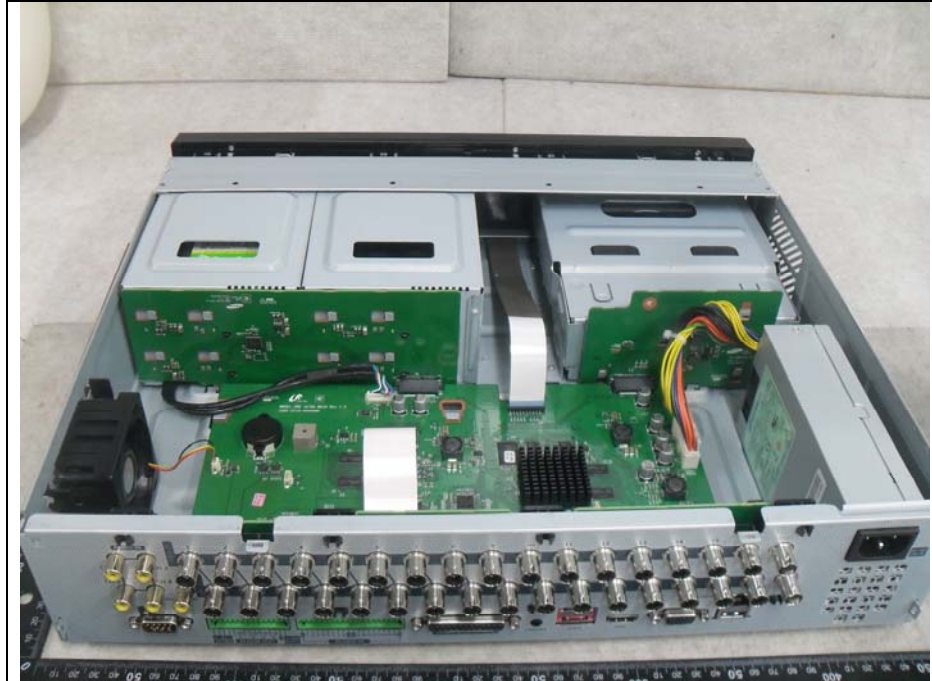


Label

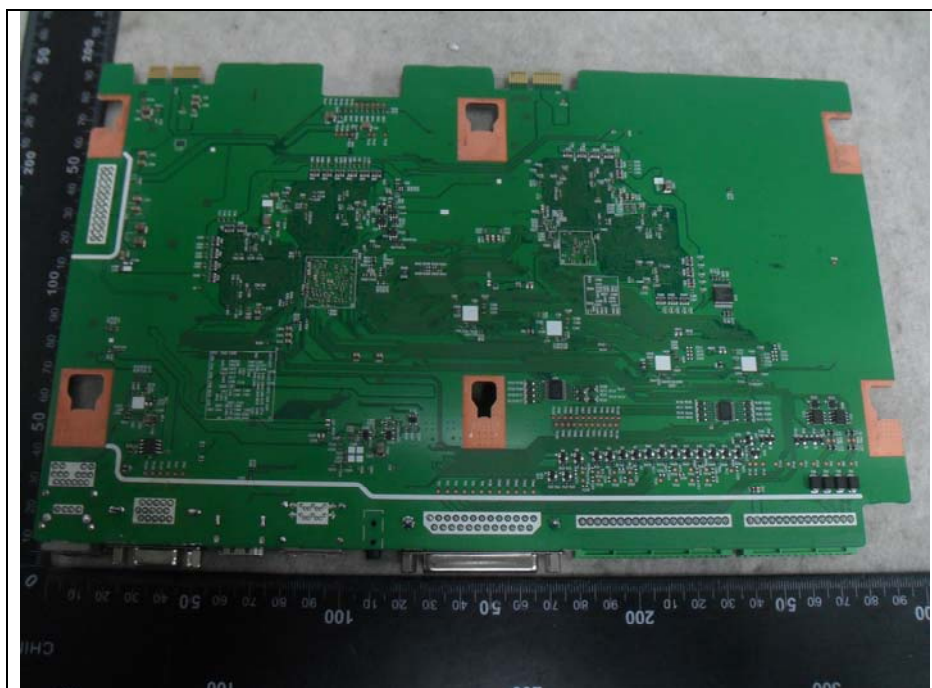


This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

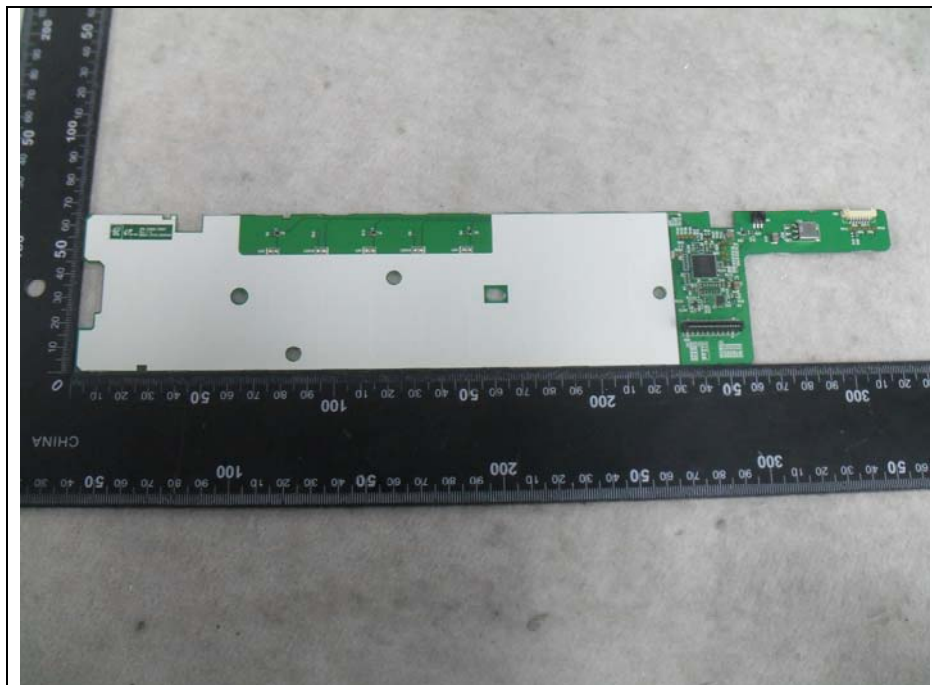
Inside



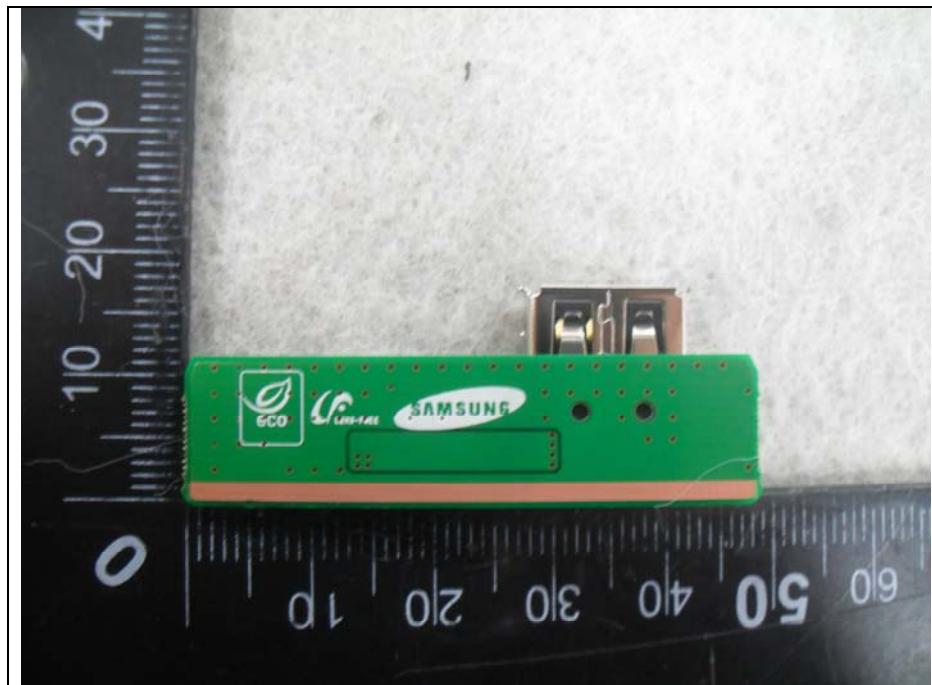
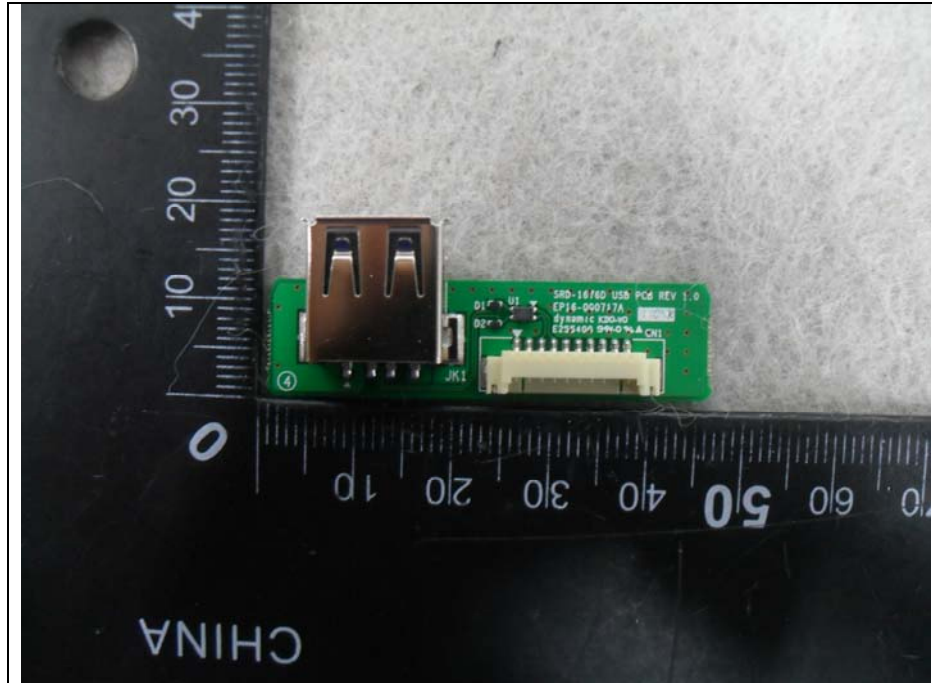
Main Board



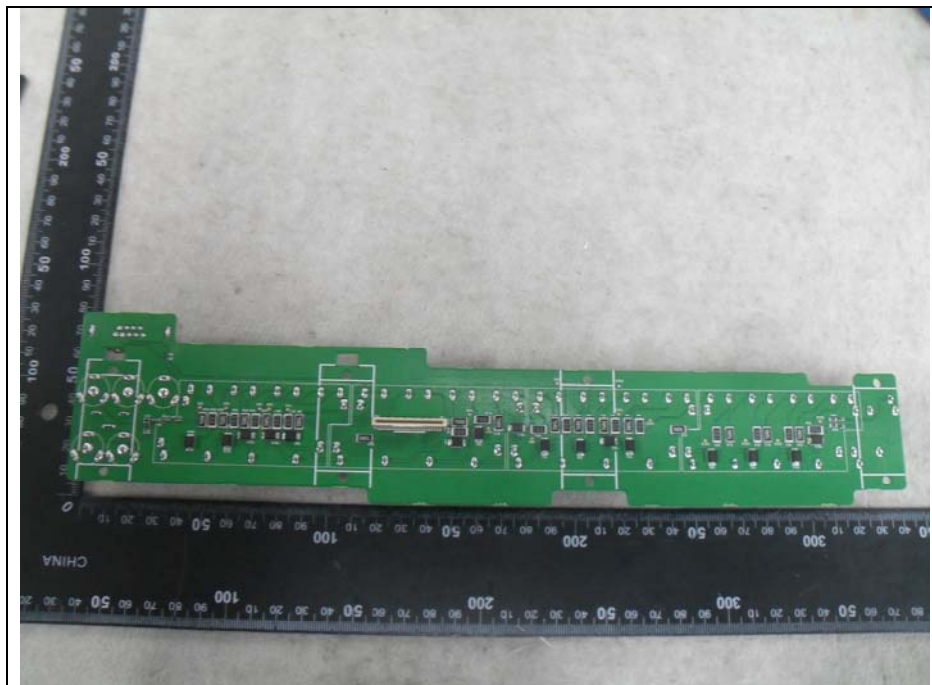
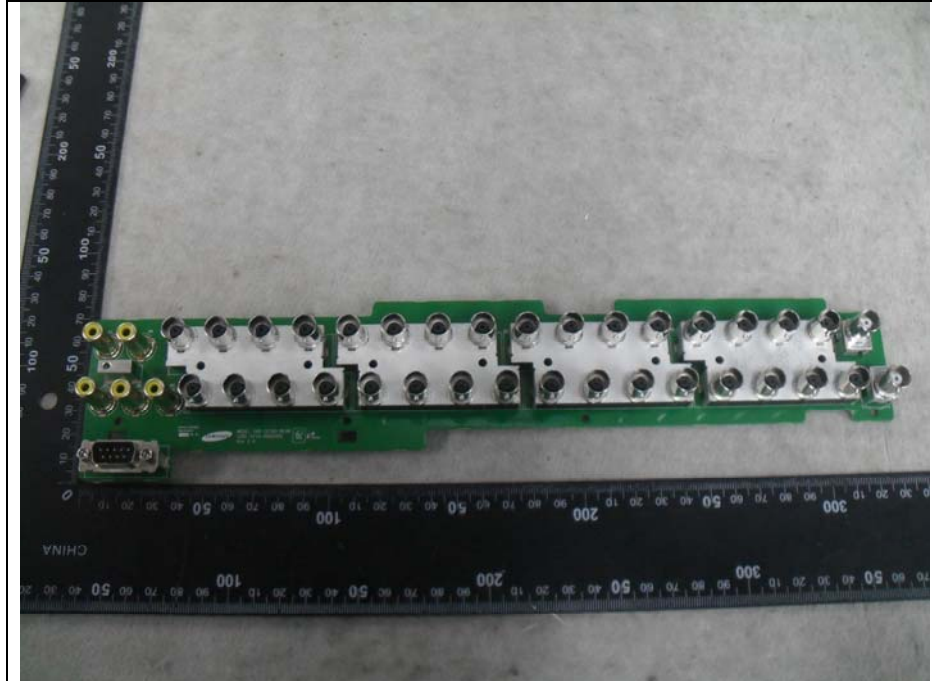
SUB Board



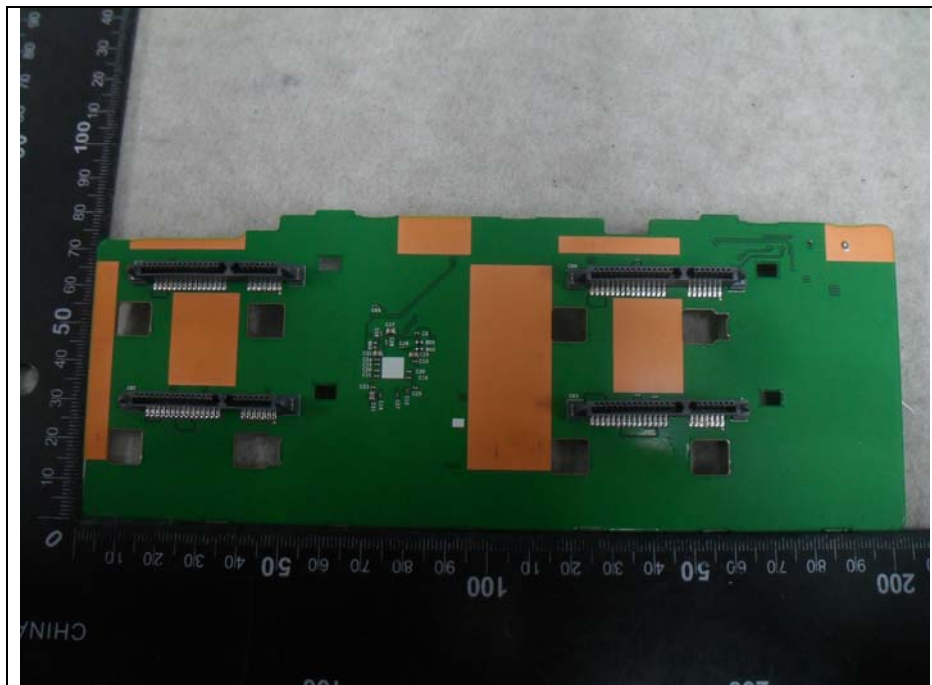
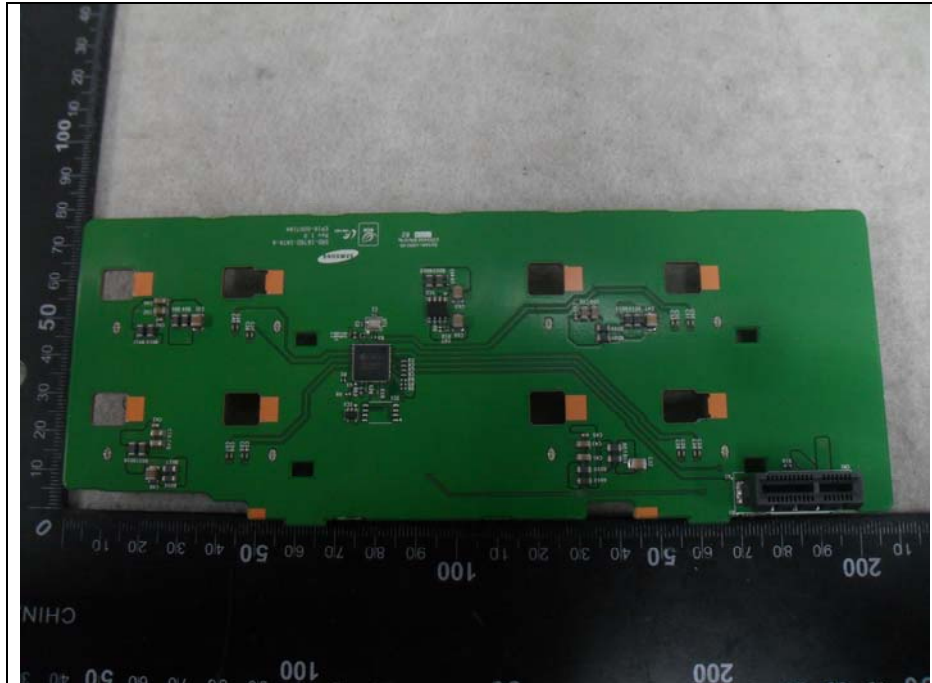
USB Board



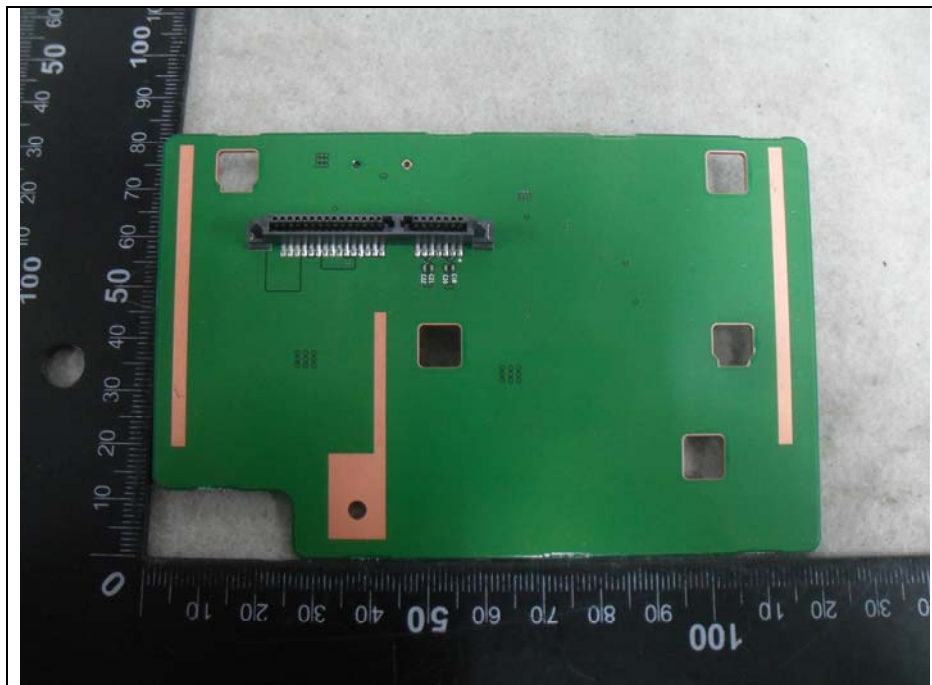
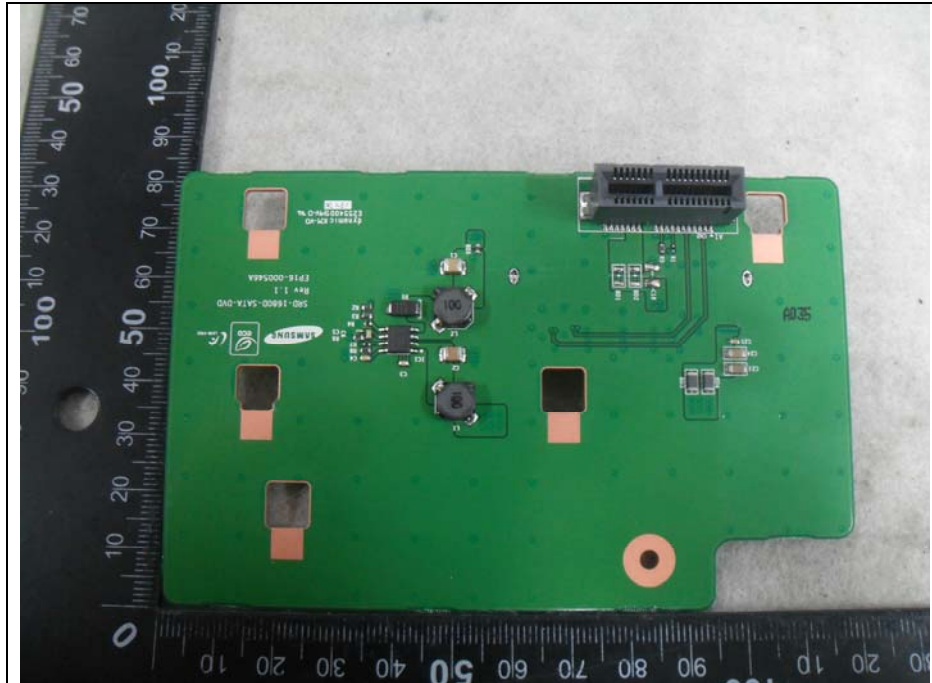
Port Board



SATA Board



SATA DVD Board



HDD (1TB)





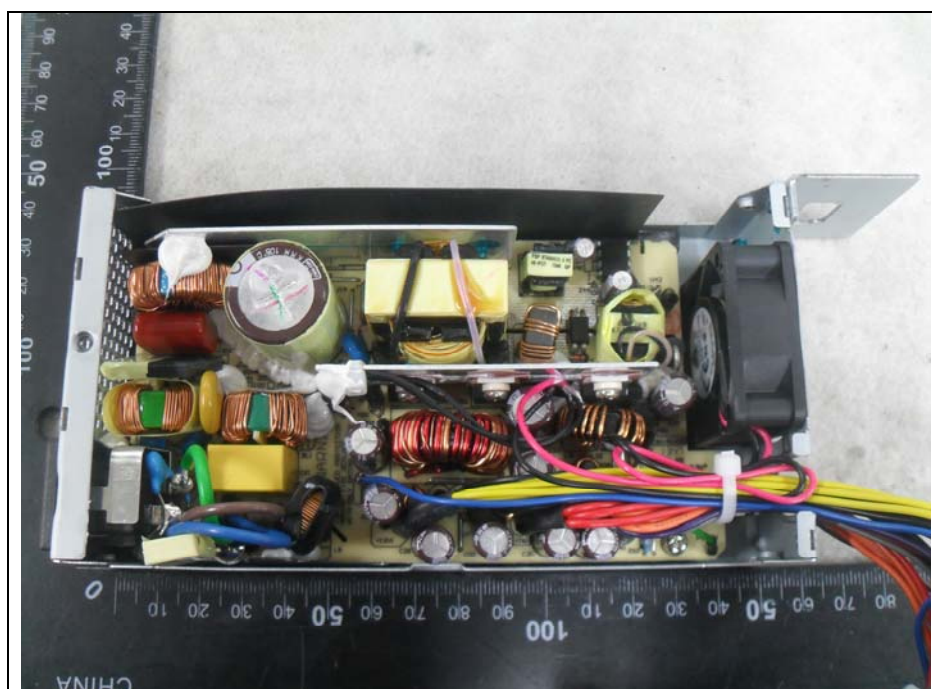
ODD

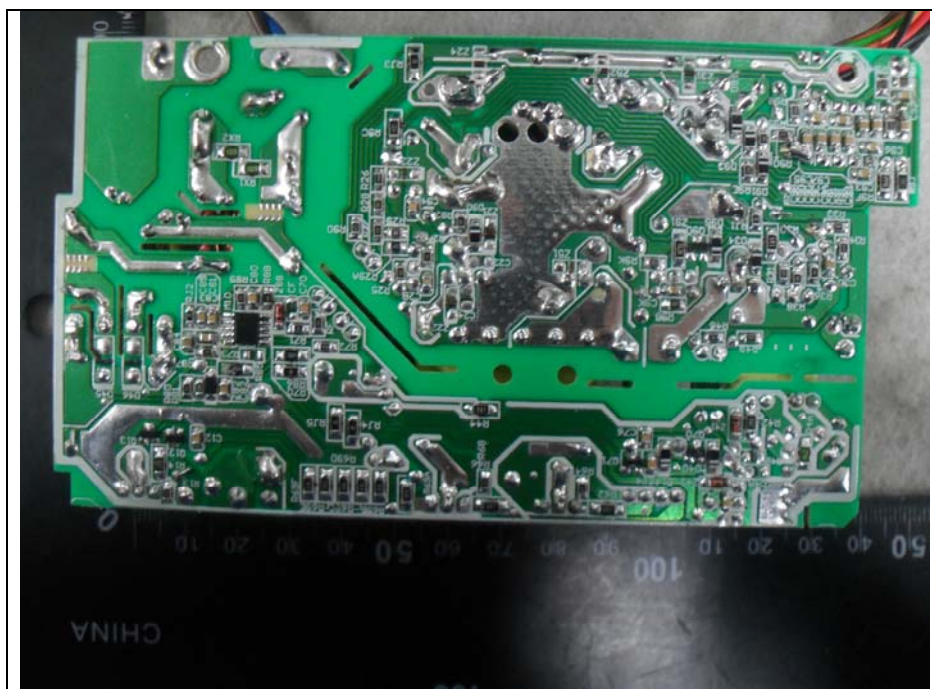
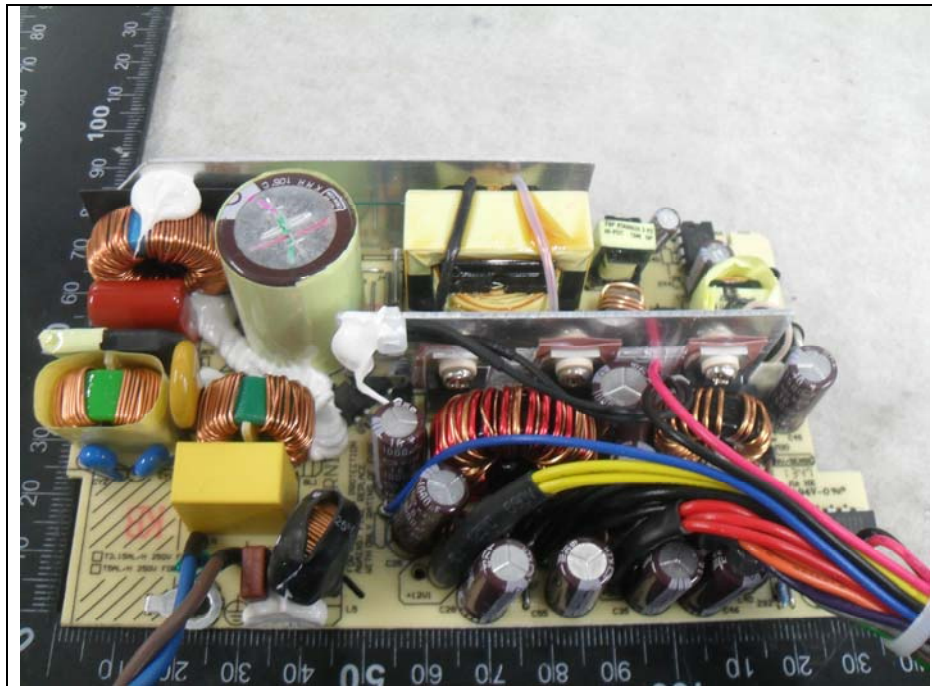




Power







USB Mouse





Remote Control



