

EMC TEST REPORT

Test report No : EMC-VCCI-0323
Type of Equipment : Network Video Recorder
Model Name : SRN-4000N
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 : VCCI V-3 / 2012.04, Class A
Testing Laboratory : EMC Compliance Ltd.
Test result : Complied

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

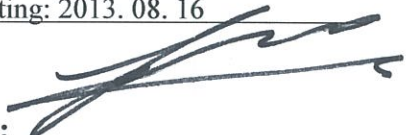
The results of testing in this report apply to the product/system which was tested only.

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

Date of receipt: 2013. 08. 16

Date of testing: 2013. 08. 16

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Tested by: 
JUNG, YOUNG-JUN

Approved by: 
YEOM, HAN-SEOK

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1. Applicant information

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Contact name: **Kang Jei Soon**

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: 82 505 299 8311

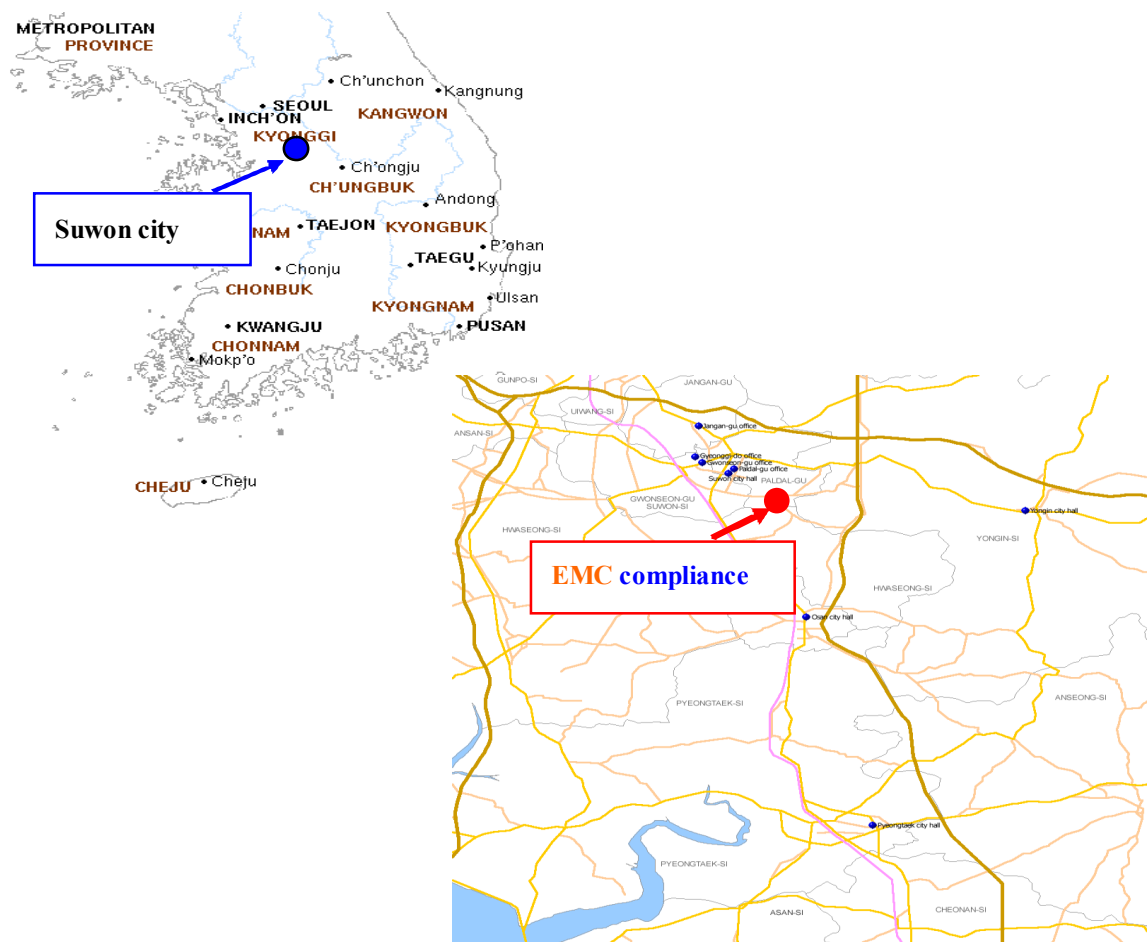
FCC CAB.: KR0040

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)	: 24 °C	38 % R.H.	-
Shielded room(CE)	: 25 °C	46 % 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

Display		
Network Camera	Inputs	Max. 64CH
	Resolution	CIF ~ 5MP
	Protocols	Onvif(Samsung, Axis, Sony, Panasonic, Vivotek), Samsung(SVNP)
Live	Local Display	HDMI/VGA
	Multi-Channel Display	[Local Monitor] 1 / 4 / 9 / 16 / Auto Sequence (4 page view) [Web] 1 / 4 / 9 / 16 / 32 / 64 / Auto Sequence
Performance		
Operating System	Embedded	Linux
Record	Compression	H.264, MPEG-4, MJPEG
	Recording Bandwidth	400Mbps(2MP 64camera real-time recording)
	Resolution	CIF ~ 5MP
	Type	Normal, Scheduled, Event (Pre/Post)
	Event Trigger	- Alarm Input(8) - Video Loss - Camera Event(Sensor, MD, Video Analytics) - Internal VA(upto 16ch selectable, Advanced MD, Object Classification(People, Car, Anything, Color(TBD)))
	Event Action	e-Mail, PTZ Preset, Alarm Out, Buzzer, Monitor Out
Search & Play	Playback Bandwidth	100Mbps(16ch simultaneously)
	Mode	Date & Time(Calendar)/Event Log list
	Simultaneous playback	16 channels(Local Monitor) 64 ch(Web, CMS)
	Resolution	CIF ~ 5MP
	Playback Control	Fast Forward/Fast Backward, Move one step up/Move one step down
Storage	Built-In	N/A
	Extended	12 (Hot Swap)
	External(DAS)	N/A
	External(NAS)	NAS(iSCSI) : vesaRaid 1840i
	RAID	RAID-5/6
Backup	File backup(Via Web)	BU/Exe(GUI), JPG, AVI(Network)
	Function	Single channel Play, Date-Time/Title display
Sensor	I/O	8/4 (NO/NC Selectable)
Audio	Input	64 channels (network)
	Compression	G.711, G.726
	Audio Communication	2-Way
Network		
Interface		RJ-45, Gigabit Ethernet x4
Protocol		TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTSP, NTP, HTTP, DHCP, PPPoE, SMTP, ICMP, IGMP, ARP, DNS, DDNS, uPnP, ONVIF, HTTPS, SNMP, ONVIF
DDNS		Samsung iPolis DDNS
Transmission Bandwidth		MAX 400Mbps, Unlimited/2/1.5/1 Mbps,800/600/500/400/300/ 200/100/50kbps
Max Remote Users		Search(3) / Live unicast(10) / Live multicast(20)
IP Version		IPv4/v6
Security		User access Log IP Filtering 802.1x Encryption
Web Viewer	Language	English, French, German, Spanish, Italian, Chinese, Korean, Russian, Japanese, Swedish, Danish, Portuguese, Czech, Polish, Turkish, Rumanian, Serbian, Dutch, Croatian, Hungarian, Greek, Finnish, Norwegian
	OS	Supported OS : Window XP(service pack 2 or above), Vista, 7, 8, Mac OS X(10.4.8 or above) , 64bit
	Web Browser	MS IE 7.x, 8.x, 9.x, Google Chrome, Safari, Firefox 2.x, 3.x
Viewer Software	Type	SSM., Webviewer, Smart Viewer
	CMS Support	Support SDK/CGI

Functions		
Camera Setup	Register	Auto, Manual
	Setup Items	- IP Address, Add Profile Edit, Bitrate, Compression, GOP, Quality - Video Setup(MD, VA, ABF, Brightness/Contrast, Flip/Mirror, IRIS, WDR, D&N, SSNR, Shutter)
PTZ	Control	Via Webviewer
	Preset	256 Presets
Smart phone	Support Model	I-Phone, Android
	Control	Live(4ch) / Playback(1ch)
Indicator/Interface		
Front	Indicator	HDD Action LED 12EA, RAID Status LED 3EA
	Switch	PWR Switch 1EA Key-Lock 1EA
Connectors	VGA	1 EA
	HDMI	1 EA
	Audio	Out(1EA, RCA, Line)
	DVD	N/A
	Serial	N/A
	Ethernet	RJ-45(4EA, GbE) w/ LINK/ACT LED
	Alarm	In(8EA, Terminal Block) Out(4EA, Terminal Block)
	USB	2EA
	Reset	Switch(1EA)
	Power Cord	2x AC Inlet
System		
Log	Log List	Max. 20000 (System Log, Event Log each)
Environmental		
Operating Temperature / Humidity		+0°C to +40°C
Humidity		20% ~ 85%
Electrical		
Power		100 to 240 VAC ±10%; 50/60 Hz, 4~1.5A(Dual SMPS)
Power Consumption		TBD
Mechanical		
Color / Material		Black / Metal
Dimension (WxHxD)		W440.0 x H132.0 x D426.8 mm (3U)
Weight		TBD
Standards		
Regulation		R82(France), EN-50132
Approvals	Safety	UL,KC
	EMC	CE, FCC, KCC, CCC, Gost-R

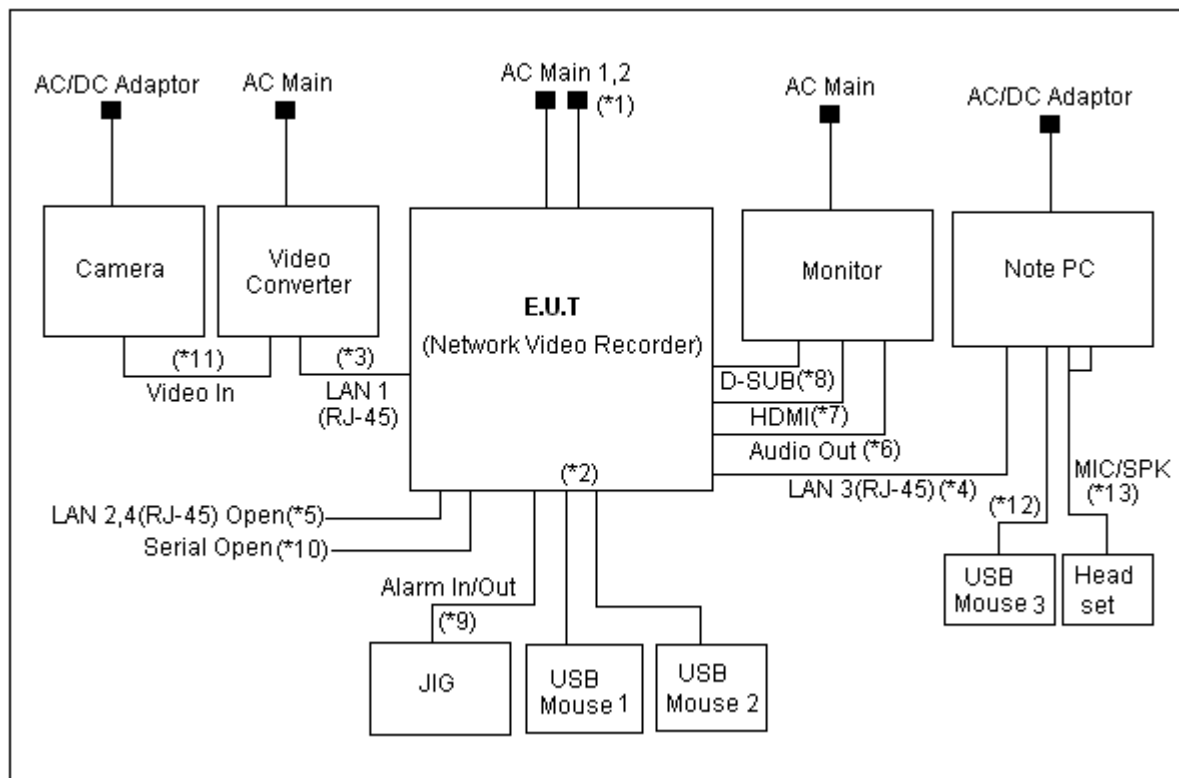
4.2 Product description

Type of product	Network Video Recorder
Model name (Basic)	SRN-4000N
Model name (Variant)	-
Difference	-
Trade name	-
Serial no	Engineering Sample
Testing voltage	100 V , 50 Hz
Product rating	AC 100 - 240 V , 50 / 60 Hz
Internal clock frequency	Above 108 Mhz
Note	-

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Note PC	Xnote	-	LG
Monitor	CF23MS	NC07H1KZ602039A	SAMSUNG
USB Mouse 1	1088	8165900106545	Microsoft
USB Mouse 2	1088	8165906051226	Microsoft
USB Mouse 3	1088	8165906050941	Microsoft
Headset	SHS-250V	-	SAMSUNG
JIG	-	-	-
Camera	SCO-2370	-	Samsung Techwin
Video Converter	IPE-1600R	-	Samsung Techwin

4.4 Test configuration



Note	Start		End		Cable	
*	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT (Network Video Recorder)	Power 1,2	AC Main 1,2	Power 1,2	1.4	Non-Shield
2		USB 1,2	USB Mouse 1,2	USB 1,2	1.8	Shield
3		LAN 1(RJ-45)	Video Converter	LAN(RJ-45)	3.0	Non-Shield
4		LAN 3(RJ-45)	Note PC	LAN(RJ-45)	3.0	Non-Shield
5		LAN 2,4(RJ-45)	Open	-	3.0	Non-Shield
6		Audio Out	Monitor	Audio In	3.0	Shield
7		HDMI	Monitor	HDMI	1.6	Shield
8		D-SUB	Monitor	D-SUB	1.4	Shield
9		Alarm In/Out	JIG	Alarm In/Out	3.0	Non-Shield
10		Serial	Open	-	1.4	Non-Shield
11	Video Converter	Video In	Camera	Video Out	2.0	Shield
12	Note PC	USB	USB Mouse 3	USB	1.8	Shield
13		MIC/SPK	Headset	MIC/SPK	2.0	Non-Shield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
HDMI Mode, D-SUB Mode	Web viewer camera monitoring test.
	Ping test.
	Alarm test. (Used JIG)

5. Summary of test results

5.1 Summary of EMI emission test results

Applied	Test items	Test method	Result
☒	Conducted Emission	VCCI V-3 / 2012.04, Class A	Complied
☒	Radiated Emission	VCCI V-3 / 2012.04, Class A	Complied

6. Test results

6.1 Conducted Emission

Test specification	VCCI V-3 / 2012.04, Class A		
Testing voltage	100 V, 50 Hz		
Test facility	Shielded room (CE#1)		
Date	2013. 08.16		
Temperature (°C)	25 °C	Humidity (% R.H.)	46 % R.H.
Remarks	Complied		

6.1.1 Limits of conducted emission measurement

☒ AC main

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.

☒ Telecommunication

Frequency [MHz]	Class A Voltage Limits (dB(μ V))		Current Limits (dB(μ A))	
	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
Frequency [MHz]	Class B Limits (dB(μ V))		Current Limits (dB(μ A))	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15 ~ 0.5	84 to 74	74 to 64	40 to 30	30 to 20
0.5 ~ 30	74	64	30	20

* 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

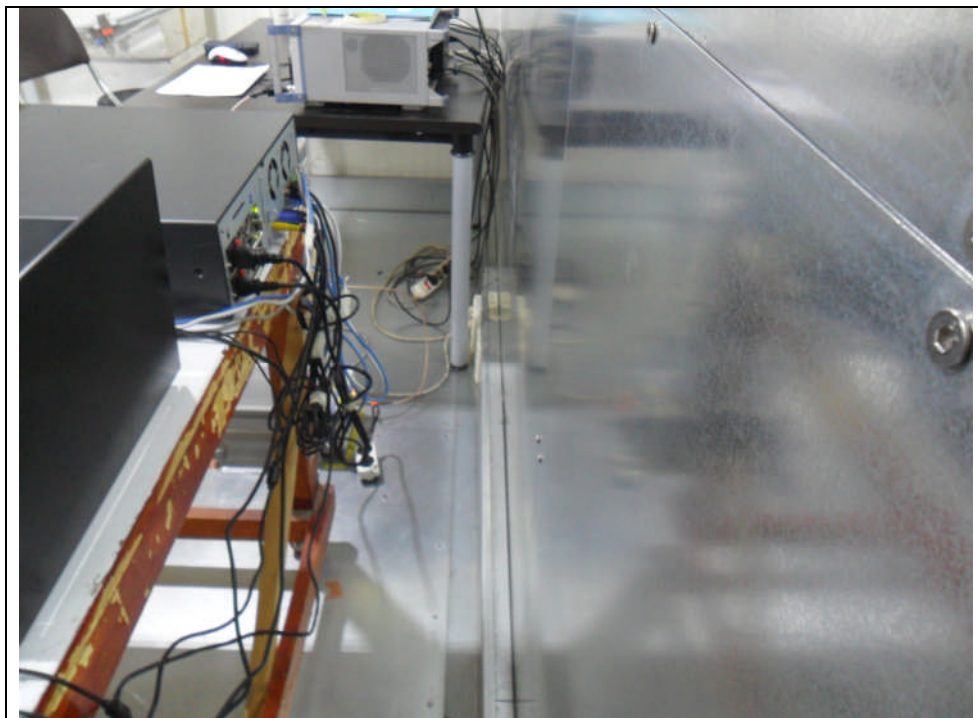
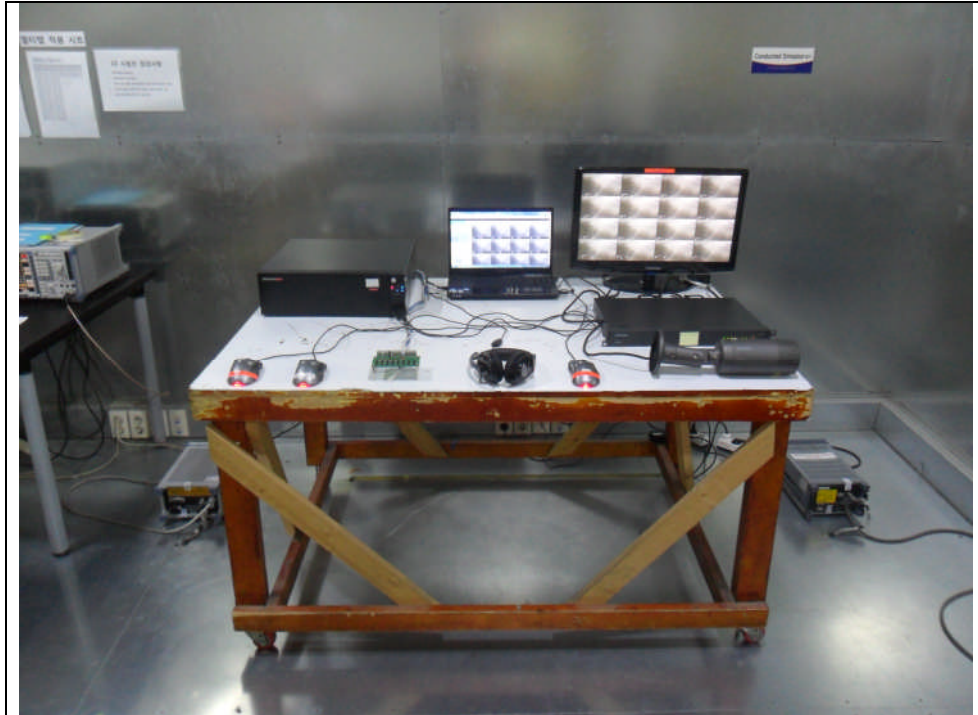
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground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

6.1.3 Used equipments

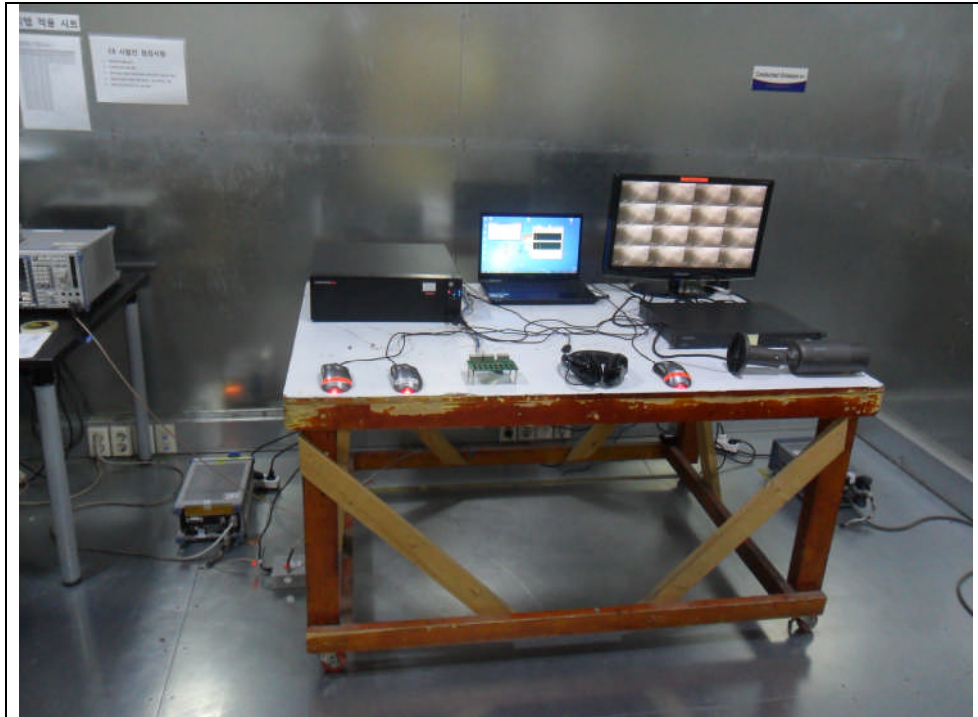
Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESHS30	828765/009	R&S	2013.10.22	☐
Test Receiver	ESCI7	100732	R&S	2014.02.18	☐
Test Receiver	ESCI	100001	R&S	2014.07.25	☐
Test Receiver	ESCI	100710	R&S	2013.11.06	☒
LISN	ENV216	101358	R&S	2013.10.22	☒
LISN	ESH3-Z5	100267	R&S	2014.07.08	☒
8-WIRE ISN	NTFM 8158 CAT5	CAT5-8158-0048	SCHWARZBECK	2013.10.30	☒
8-WIRE ISN	NTFM 8158 CAT3	CAT3-8158-0033	SCHWARZBECK	2013.10.30	☒
ISN	ST08	24342	TESEQ	2014.06.21	☐
ISN	ENY81	101545	R&S	2013.08.29	☐

6.1.4 Photographs of test setup

* AC Main

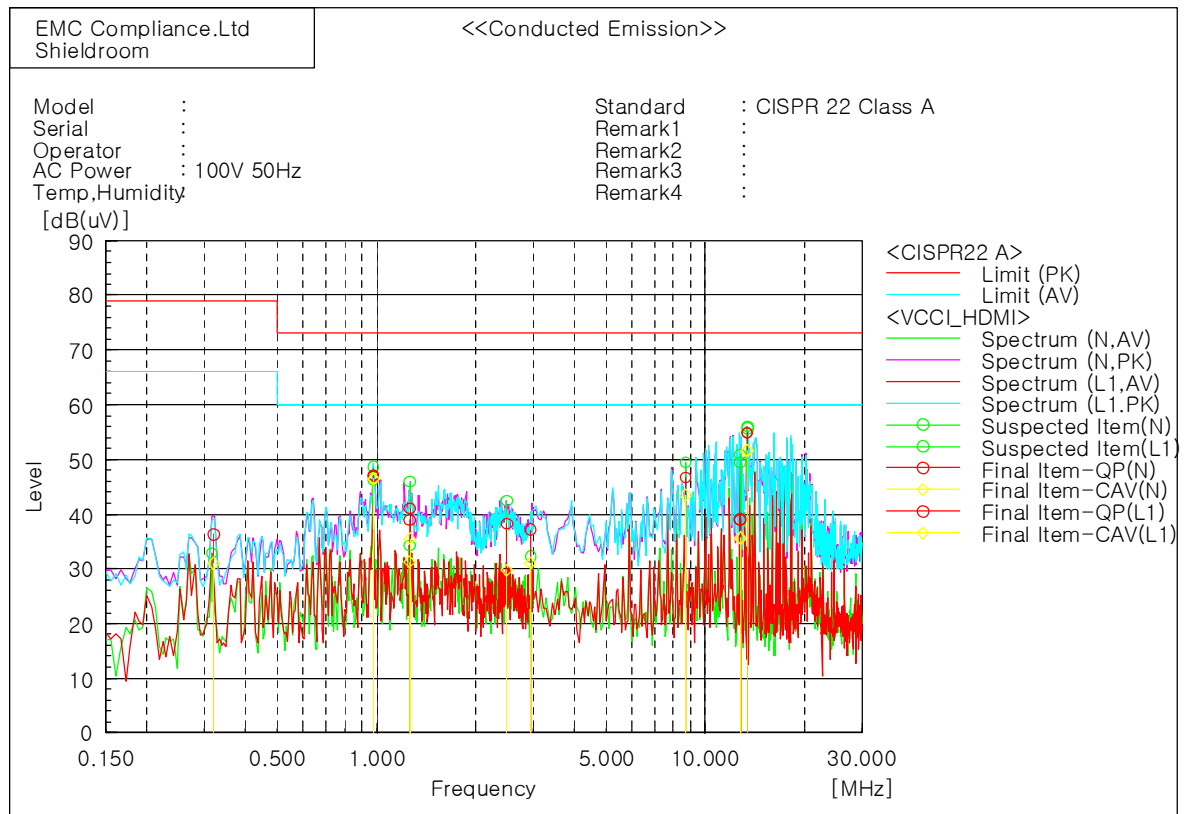


* Telecommunication



6.1.5 Conducted emission measurement result

* AC Main _HDMI Mode (SRN-4000N)



Final Result

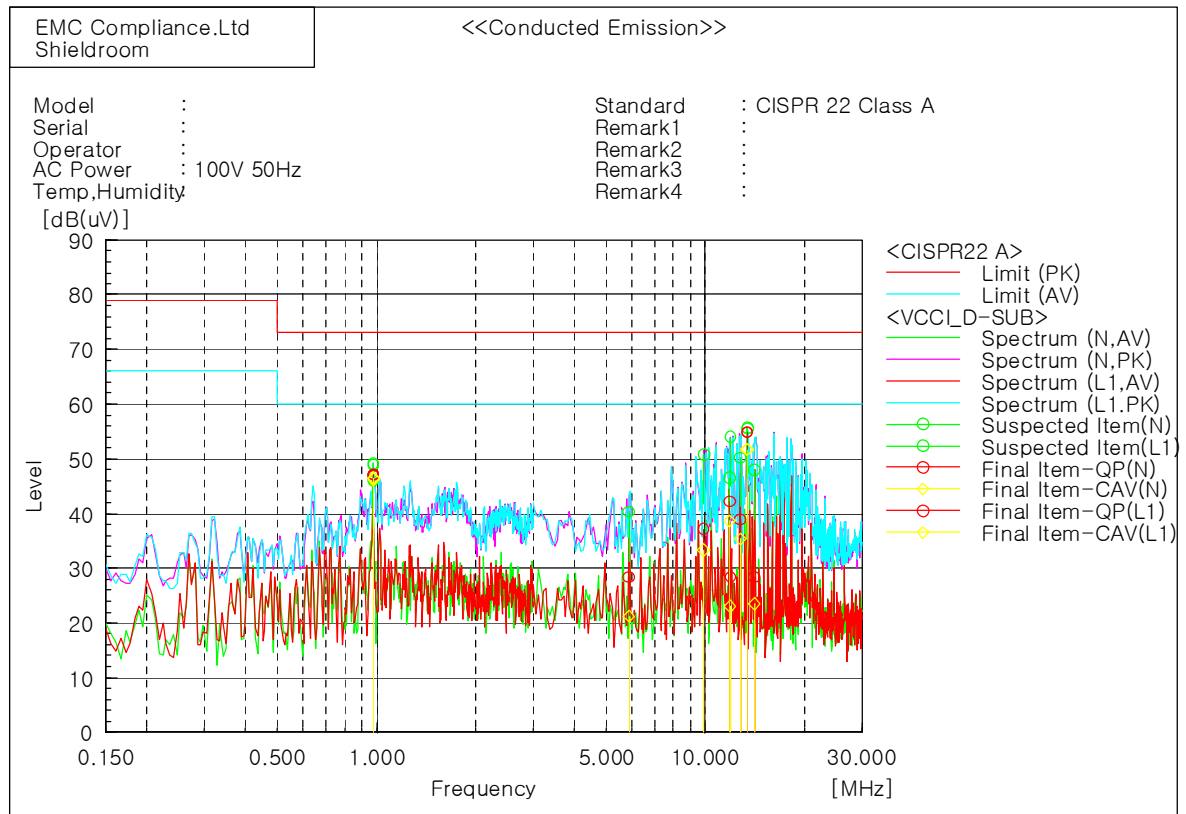
--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading CAV [dB(μV)]	c. f [dB]	Result QP [dB(μV)]	Result CAV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin CAV [dB]
1	0.98068	37.4	36.9	9.7	47.1	46.6	73.0	60.0	25.9	13.4
2	0.98188	37.2	36.6	9.7	46.9	46.3	73.0	60.0	26.1	13.7
3	2.4901	28.6	20.1	9.6	38.2	29.7	73.0	60.0	34.8	30.3
4	2.9462	27.6	21.5	9.6	37.2	31.1	73.0	60.0	35.8	28.9
5	12.77734	29.1	25.6	9.8	38.9	35.4	73.0	60.0	34.1	24.6
6	13.41972	45.0	41.8	9.8	54.8	51.6	73.0	60.0	18.2	8.4

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading CAV [dB(μV)]	c. f [dB]	Result QP [dB(μV)]	Result CAV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin CAV [dB]
1	0.31976	26.3	21.1	9.9	36.2	31.0	79.0	66.0	42.8	35.0
2	1.26266	29.3	21.8	9.6	38.9	31.4	73.0	60.0	34.1	28.6
3	1.26716	31.5	25.8	9.6	41.1	35.4	73.0	60.0	31.9	24.6
4	8.71928	37.0	33.8	9.7	46.7	43.5	73.0	60.0	26.3	16.5
5	12.77806	29.3	25.8	9.8	39.1	35.6	73.0	60.0	33.9	24.4
6	13.41876	45.0	41.8	9.8	54.8	51.6	73.0	60.0	18.2	8.4

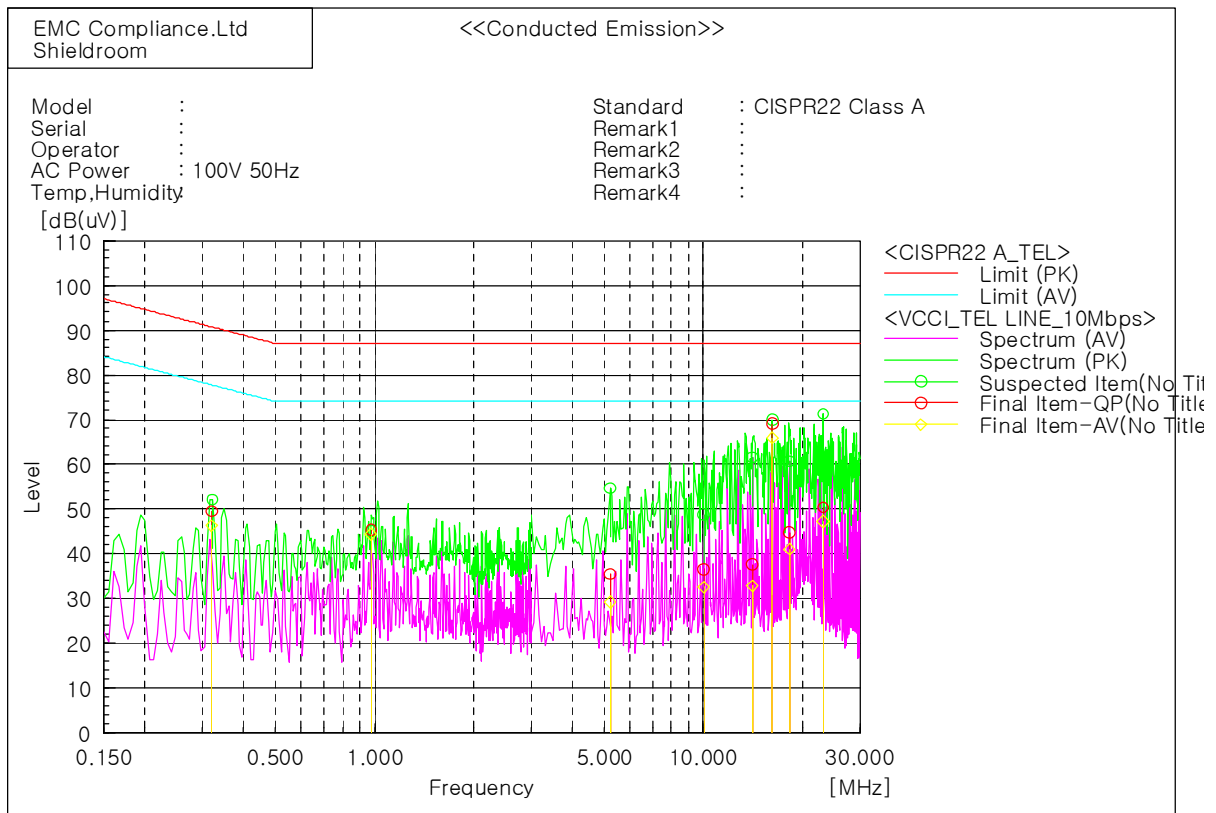
* AC Main_D-SUB Mode (SRN-4000N)



Final Result

--- N Phase ---										
No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result CAV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin CAV [dB]
1	0.98004	37.4	36.8	9.7	47.1	46.5	73.0	60.0	25.9	13.5
2	0.98216	37.1	36.5	9.7	46.8	46.2	73.0	60.0	26.2	13.8
3	5.8615	18.5	11.4	9.8	28.3	21.2	73.0	60.0	44.7	38.8
4	11.90588	18.8	13.3	9.7	28.5	23.0	73.0	60.0	44.5	37.0
5	12.77716	29.0	25.6	9.8	38.8	35.4	73.0	60.0	34.2	24.6
6	13.41926	45.1	41.9	9.8	54.9	51.7	73.0	60.0	18.1	8.3
--- L1 Phase ---										
No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result CAV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin CAV [dB]
1	0.9801	37.4	36.8	9.7	47.1	46.5	73.0	60.0	25.9	13.5
2	0.9801	37.3	36.7	9.7	47.0	46.4	73.0	60.0	26.0	13.6
3	9.9075	27.6	23.7	9.6	37.2	33.3	73.0	60.0	35.8	26.7
4	11.86088	32.5	28.9	9.7	42.2	38.6	73.0	60.0	30.8	21.4
5	13.41918	45.0	41.8	9.8	54.8	51.6	73.0	60.0	18.2	8.4
6	14.12148	18.6	13.7	9.8	28.4	23.5	73.0	60.0	44.6	36.5

* AC Main_LAN Port (LCL 55 dB)_10 Mbps (SRN-4000N)

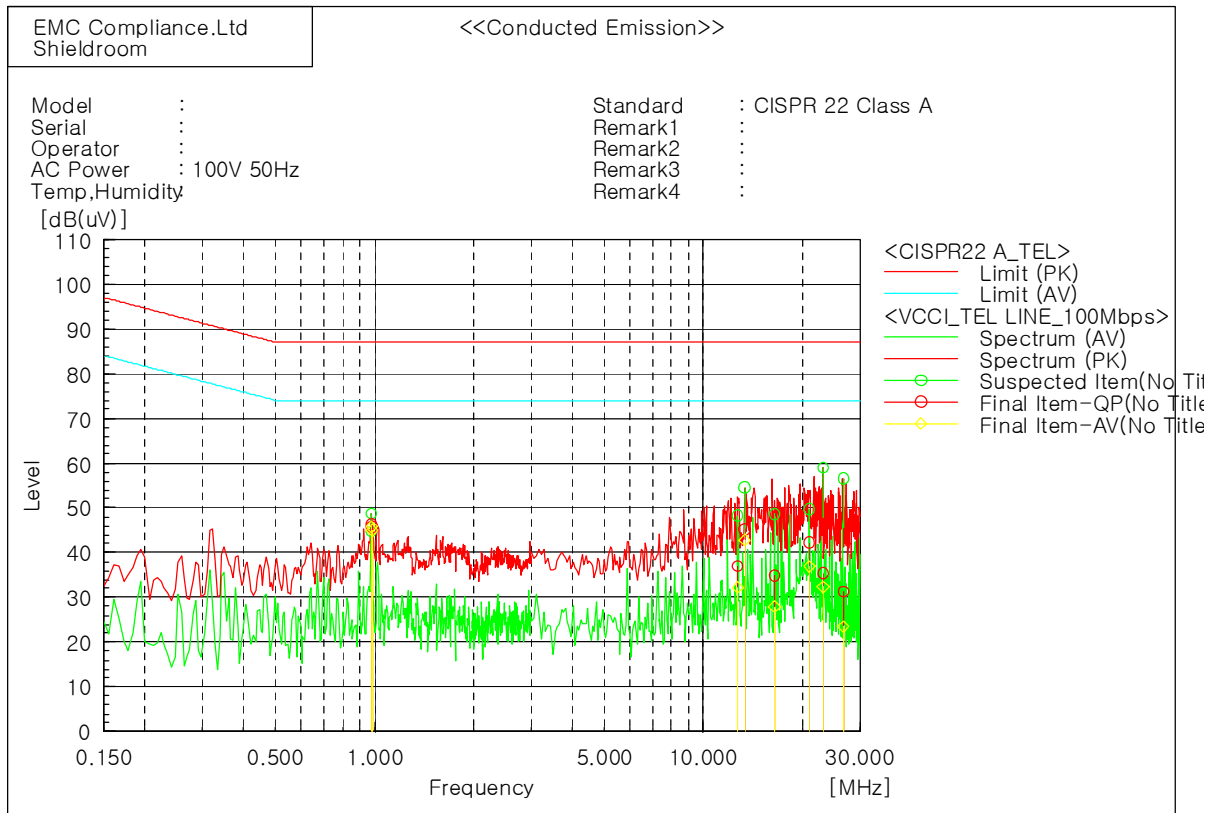


Final Result

--- ISN-CAT3 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result CAV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin CAV [dB]
1	0.32006	39.4	36.2	10.1	49.5	46.3	90.7	77.7	41.2	31.4
2	0.97874	35.6	34.5	9.8	45.4	44.3	87.0	74.0	41.6	29.7
3	5.20968	25.6	19.3	9.8	35.4	29.1	87.0	74.0	51.6	44.9
4	10.025	26.9	23.0	9.6	36.5	32.6	87.0	74.0	50.5	41.4
5	14.12176	27.9	23.0	9.7	37.6	32.7	87.0	74.0	49.4	41.3
6	16.22798	59.4	56.2	9.7	69.1	65.9	87.0	74.0	17.9	8.1
7	18.27726	35.1	31.3	9.7	44.8	41.0	87.0	74.0	42.2	33.0
8	23.137	40.6	37.4	9.7	50.3	47.1	87.0	74.0	36.7	26.9

* AC Main_LAN Port (LCL 65 dB)_100 Mbps (SRN-4000N)



Final Result

--- ISN-CAT5 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result CAV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin CAV [dB]
1	0.98032	36.6	36.0	9.7	46.3	45.7	87.0	74.0	40.7	28.3
2	0.98286	36.0	35.3	9.7	45.7	45.0	87.0	74.0	41.3	29.0
3	12.7201	27.2	22.5	9.7	36.9	32.2	87.0	74.0	50.1	41.8
4	13.36328	35.4	32.9	9.8	45.2	42.7	87.0	74.0	41.8	31.3
5	16.44838	25.1	18.1	9.8	34.9	27.9	87.0	74.0	52.1	46.1
6	21.03192	32.4	27.2	9.8	42.2	37.0	87.0	74.0	44.8	37.0
7	23.13792	25.7	22.6	9.8	35.5	32.4	87.0	74.0	51.5	41.6
8	26.64714	21.5	13.6	9.8	31.3	23.4	87.0	74.0	55.7	50.6

6.2 Radiated Emission

Test specification	VCCI V-3 / 2012.04, Class A		
Testing voltage	100 V, 50 Hz		
Test facility	10 m Chamber (#F2)		
Test distance	10 m, 3 m		
Date	2013. 08. 16		
Temperature (°C)	24 °C	Humidity (% R.H.)	38 % R.H.
Remarks	Complied		

6.2.1 Limits of radiated emission measurement

☒ Limits below 1 GHz

Frequency [MHz]	Class A (dB(μV/m)) @10 m	Class B (dB(μV/m)) @10 m
30 ~ 230	40	30
230 ~ 1000	47	37

☒ Limits above 1 GHz

Frequency [GHz]	Class A @ 3 m		Class B @ 3 m	
	Average limit (dB(μV/m))	Peak limit (dB(μV/m))	Average limit (dB(μV/m))	Peak limit (dB(μV/m))
1 ~ 3	56	76	50	70
3 ~ 6	60	80	54	74

Note - The lower limit applies at the transition frequency.

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	2014.02.18	☐
Test Receiver	ESCI	100001	R&S	2014.07.25	☐
Test Receiver	ESCI	100710	R&S	2013.11.06	☒
Bi-Log Antenna	VULB 9168	440	SCHWARZBECK	2013.10.04	☒
Amplifier	310N	293004	SONOMA INSTRUMENT	2013.11.06	☒
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	2013.11.06	☒
Horn ANT	3115	00155772	ETS	2015.03.20	☒
Spectrum Analyzer	FSP7	100289	R&S	2013.12.14	☒

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

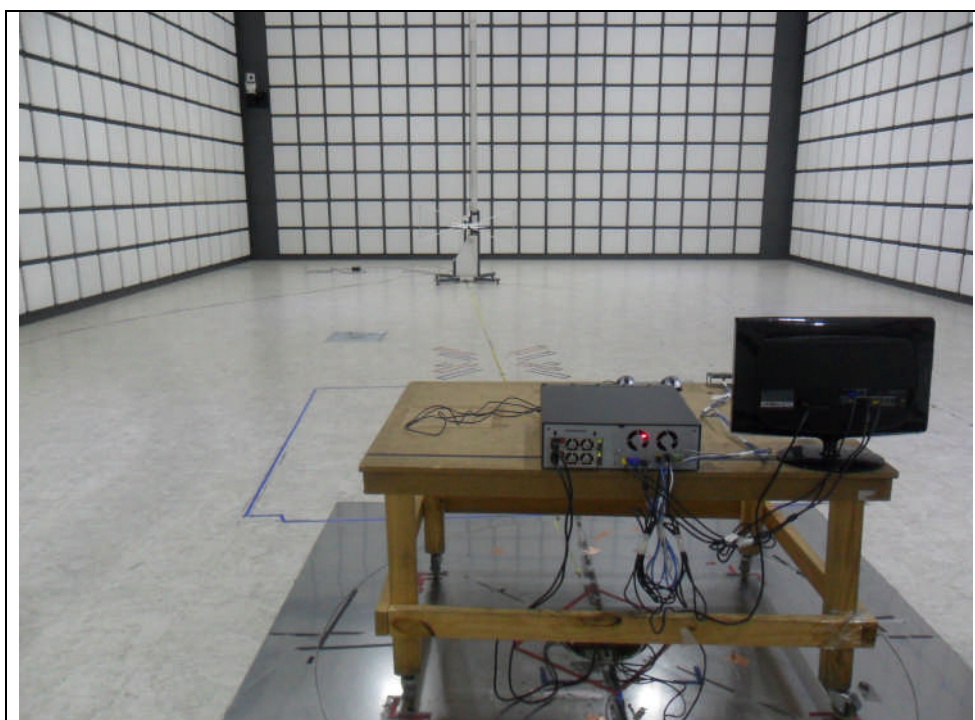
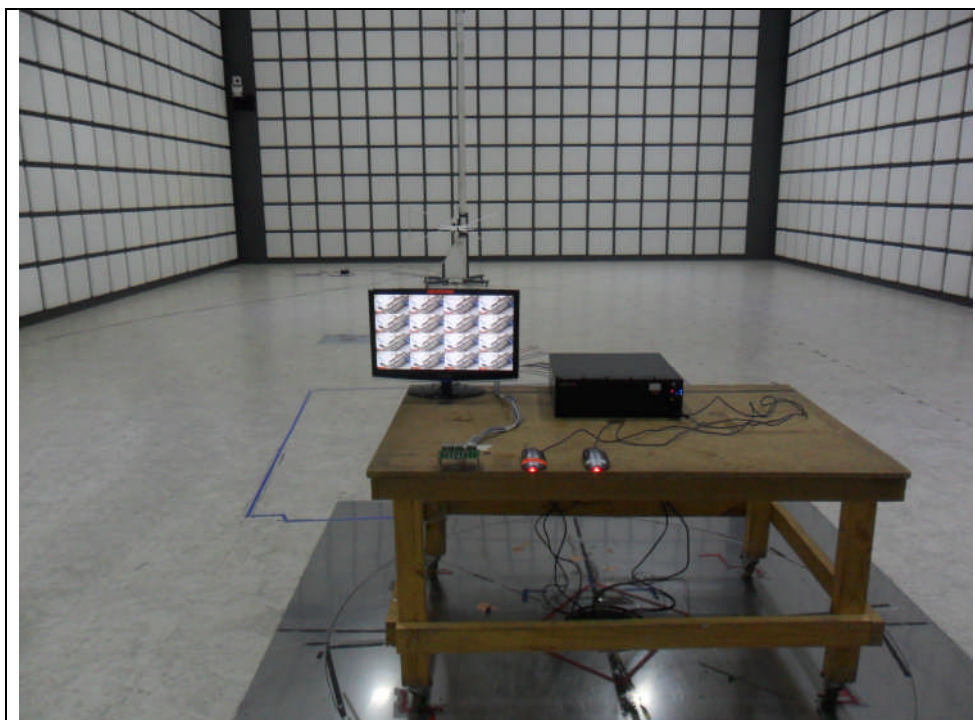
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is

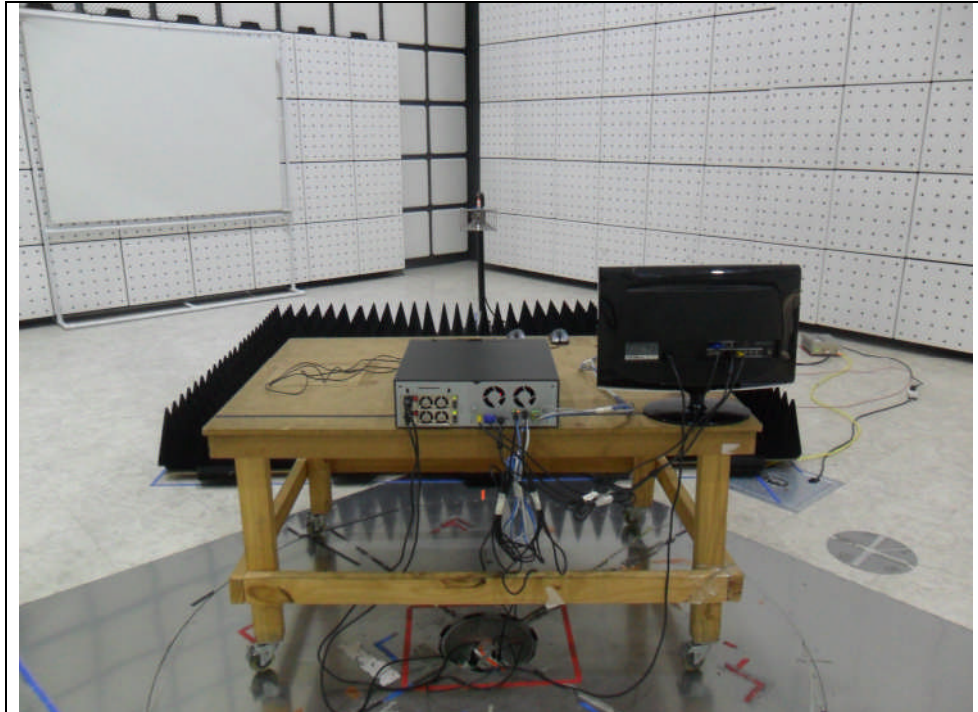
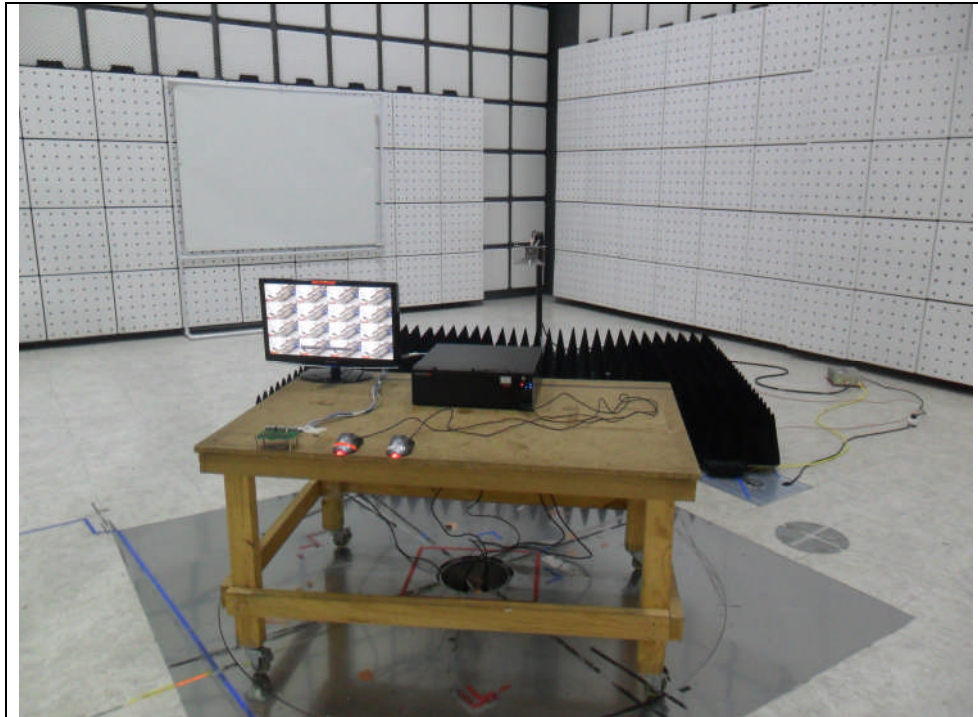
$$30 + 12 + 5 + 3 - 35 = 15 \text{ dB}(\mu\text{V/m})$$

6.2.5 Photographs of test setup

* 30 MHz ~ 1 GHz



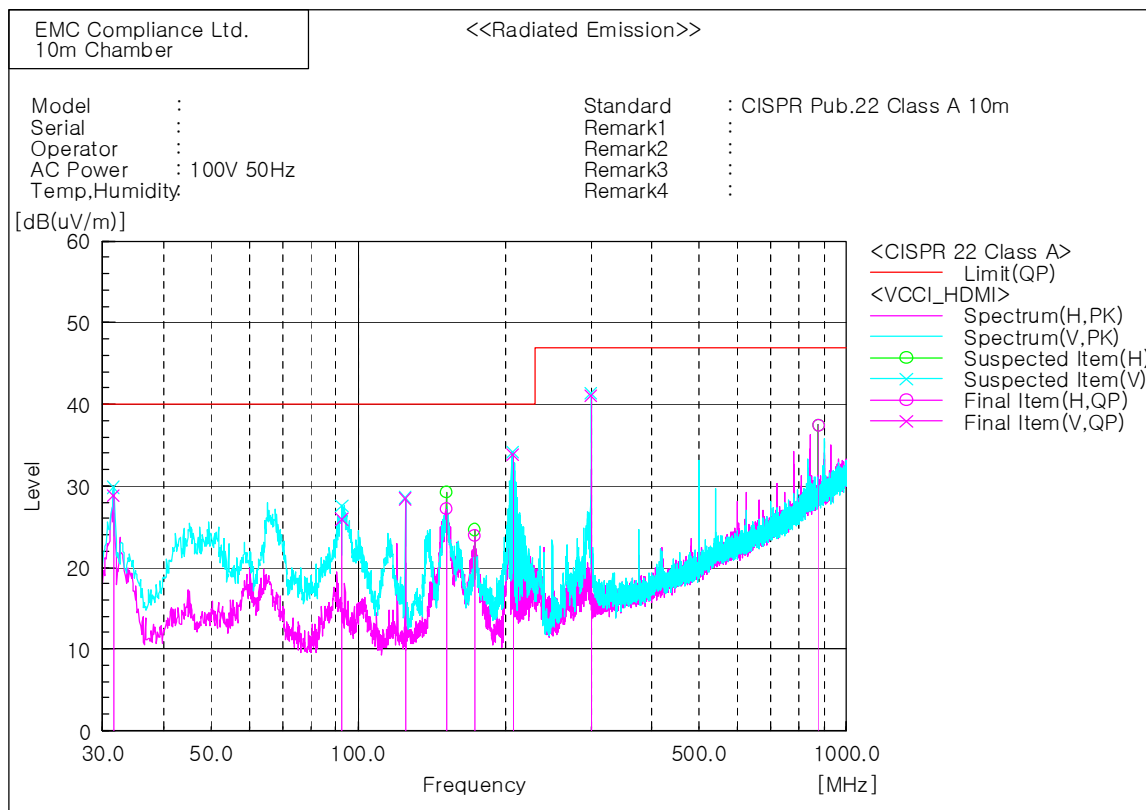
* 1 GHz ~ 6 GHz



6.2.6 Radiated emission measurement result

* Graph and Data

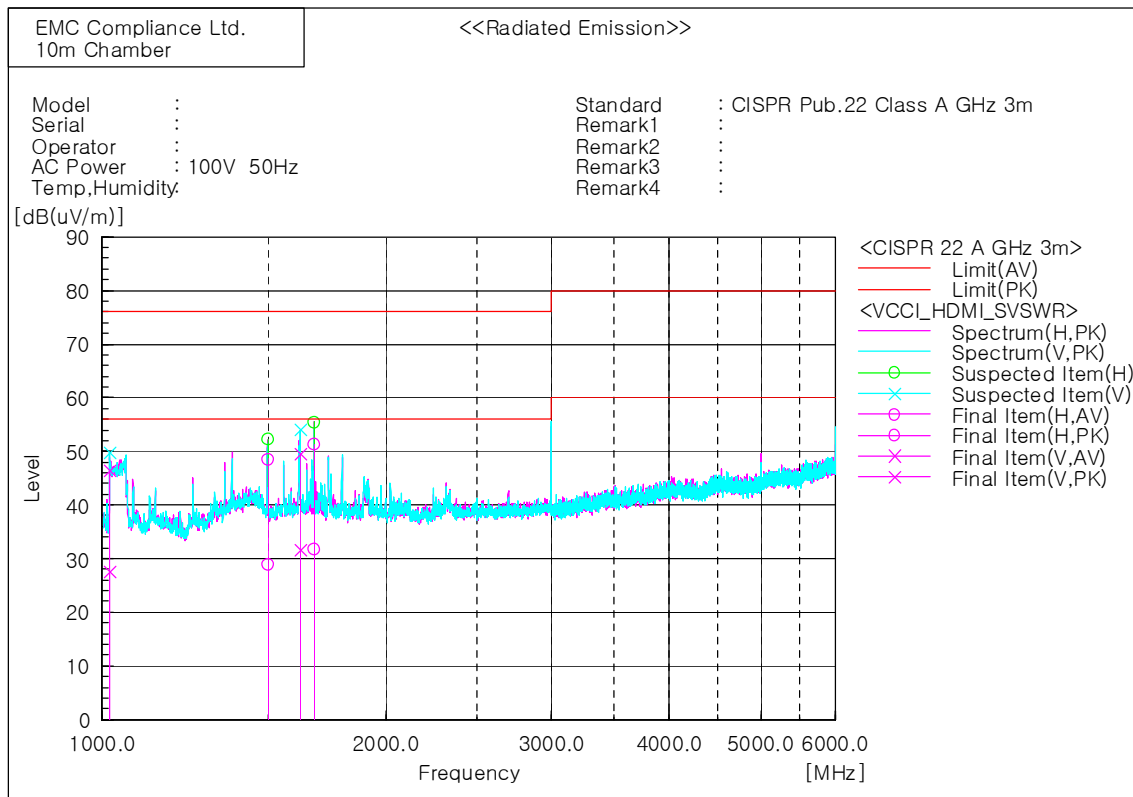
* 30 MHz ~ 1 GHz_HDMI Mode (SRN-4000N)



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]	Remark
1	31.576	V	43.9	-15.1	28.8	40.0	11.2	400.0	312.4	
2	92.565	V	44.2	-18.3	25.9	40.0	14.1	100.0	280.3	
3	124.939	V	42.6	-14.2	28.4	40.0	11.6	100.0	251.8	
4	151.614	H	39.6	-12.4	27.2	40.0	12.8	400.0	205.1	
5	173.318	H	36.6	-12.7	23.9	40.0	16.1	400.0	139.2	
6	207.510	V	48.4	-14.6	33.8	40.0	6.2	100.0	357.3	
7	300.024	V	51.5	-10.4	41.1	47.0	5.9	100.0	20.9	
8	875.112	H	33.7	3.7	37.4	47.0	9.6	100.0	175.1	

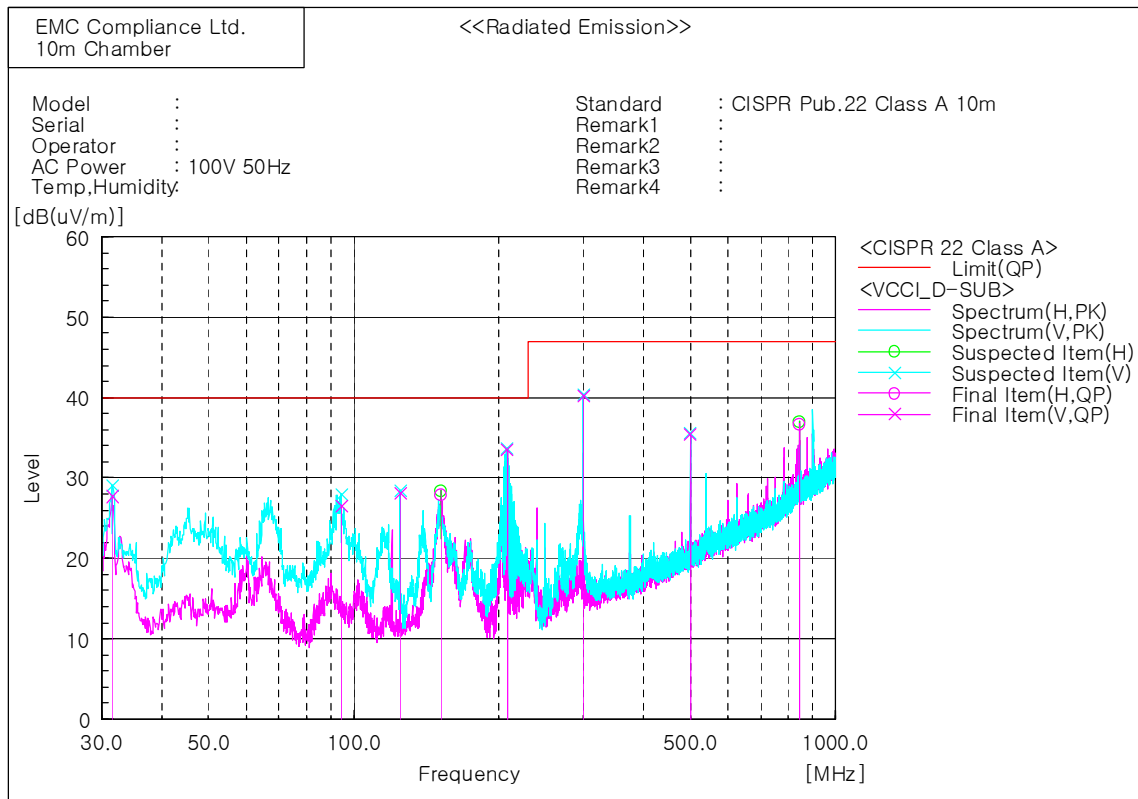
* 1 GHz ~ 6 GHz_HDMI Mode (SRN-4000N)



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	1019.375	V	36.4	55.2	-8.9	27.5	46.3	56.0	76.0	28.5	29.7	100.0	359.3	
2	1500.000	H	33.5	53.1	-4.5	29.0	48.6	56.0	76.0	27.0	27.4	100.0	38.6	
3	1625.000	V	34.8	52.7	-3.3	31.5	49.4	56.0	76.0	24.5	26.6	100.0	12.0	
4	1680.000	H	35.1	54.6	-3.3	31.8	51.3	56.0	76.0	24.2	24.7	100.0	146.7	

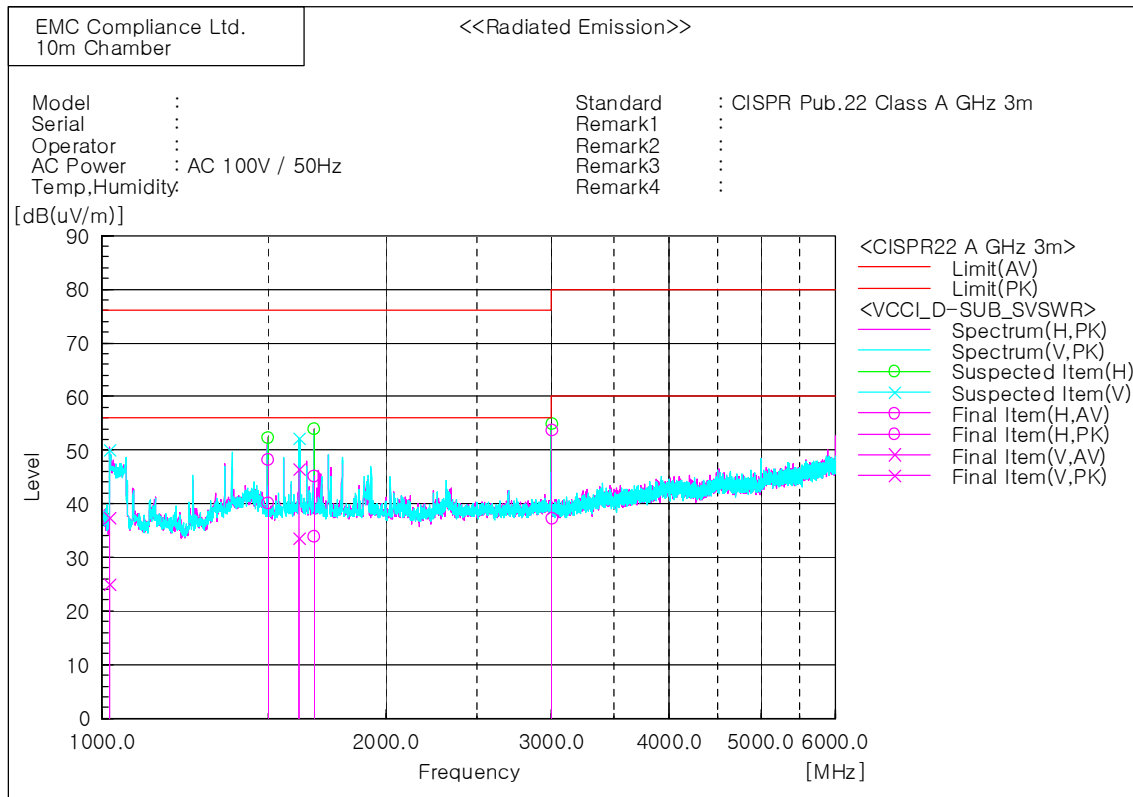
* 30 MHz ~ 1 GHz_D-SUB Mode (SRN-4000N)



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	31.576	V	42.8	-15.1	27.7	40.0	12.3	400.0	144.3	
2	94.384	V	44.7	-18.2	26.5	40.0	13.5	100.0	247.8	
3	124.939	V	42.3	-14.2	28.1	40.0	11.9	100.0	229.8	
4	151.978	H	40.2	-12.3	27.9	40.0	12.1	400.0	212.4	
5	208.238	V	48.0	-14.5	33.5	40.0	6.5	100.0	14.1	
6	300.024	V	50.6	-10.4	40.2	47.0	6.8	100.0	34.4	
7	499.965	V	39.9	-4.5	35.4	47.0	11.6	100.0	142.6	
8	841.648	H	33.7	3.0	36.7	47.0	10.3	100.0	260.1	

* 1 GHz ~ 6 GHz _D-SUB Mode (SRN-4000N)



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]	Remark
1	1019.375	V	33.9	46.1	-8.9	25.0	37.2	56.0	76.0	31.0	38.8	100.0	50.2	
2	1500.000	H	44.7	52.7	-4.5	40.2	48.2	56.0	76.0	15.8	27.8	100.0	37.8	
3	1619.375	V	36.8	49.8	-3.3	33.5	46.5	56.0	76.0	22.5	29.5	100.0	191.4	
4	1680.625	H	37.2	48.5	-3.3	33.9	45.2	56.0	76.0	22.1	30.8	100.0	158.0	
5	2999.375	H	36.3	52.7	1.0	37.3	53.7	56.0	76.0	18.7	22.3	100.0	158.0	

7. E.U.T. photographs

Front View



Rear View



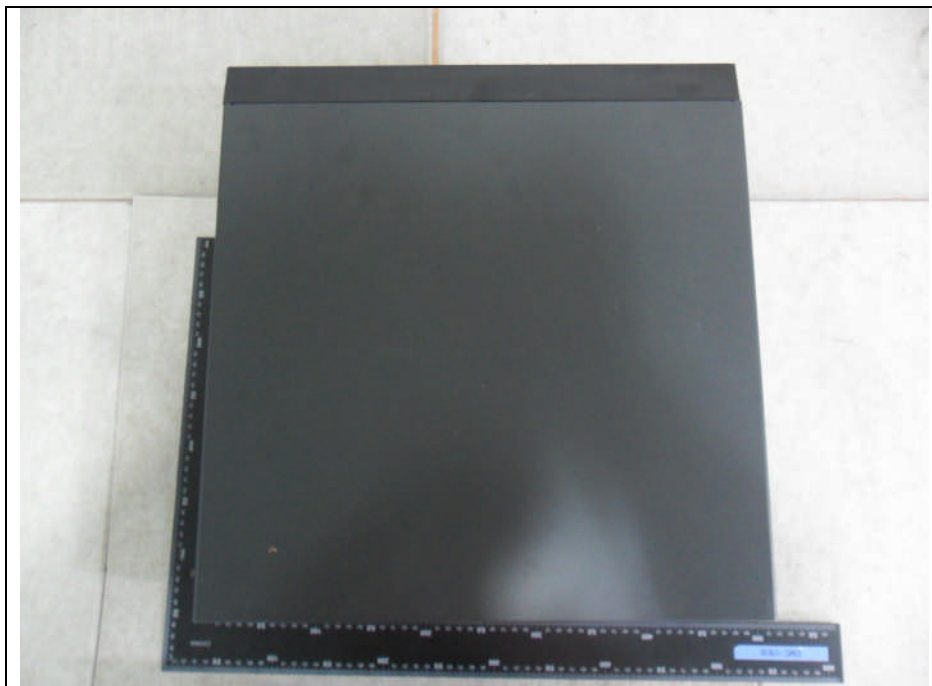
Left View



Right View



Top View



Bottom View



Port

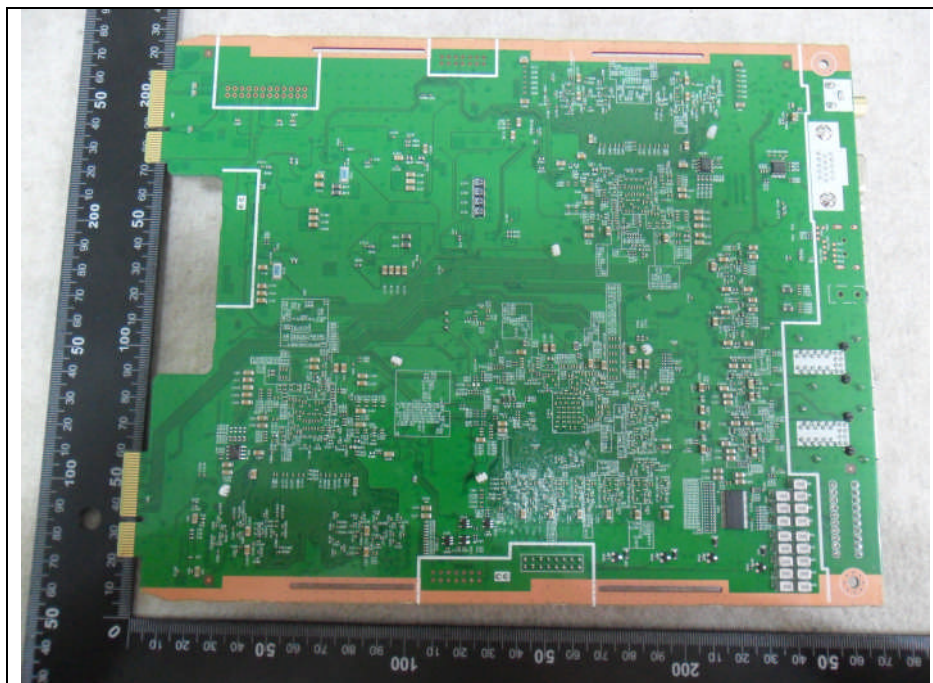




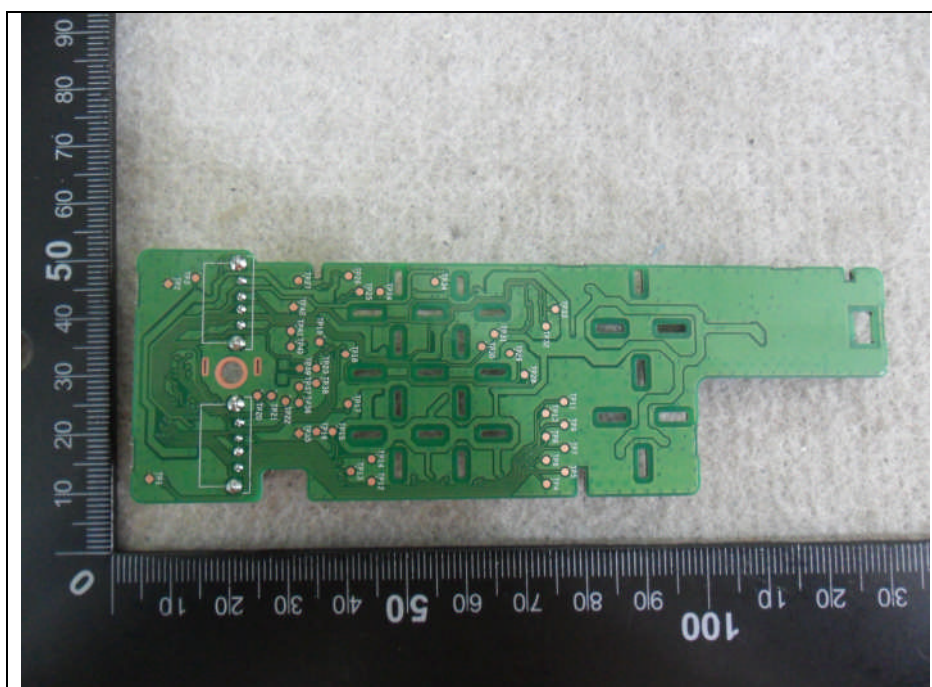
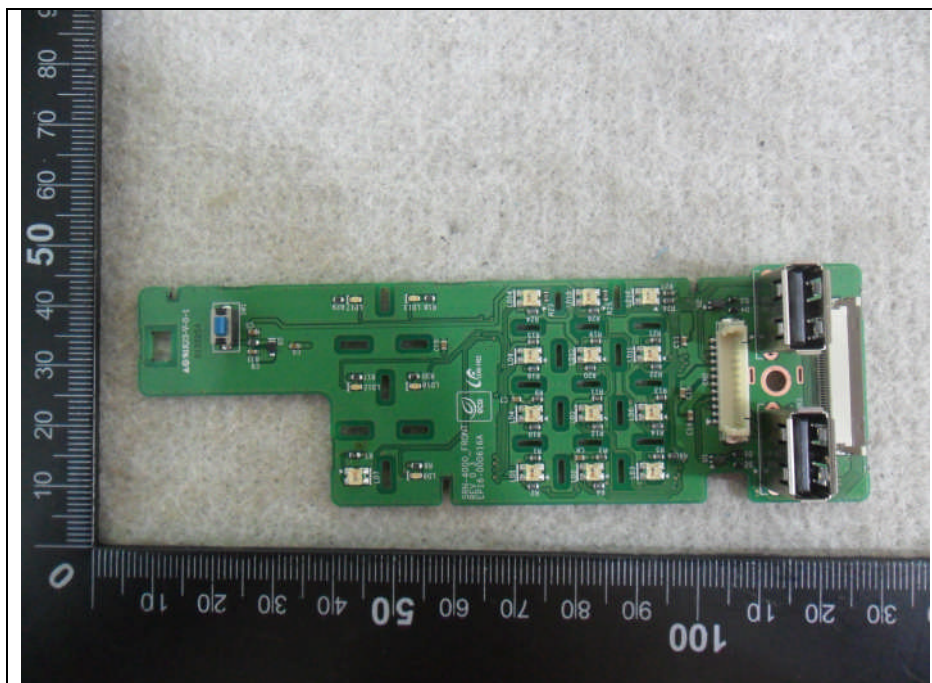
Inside



Main Board



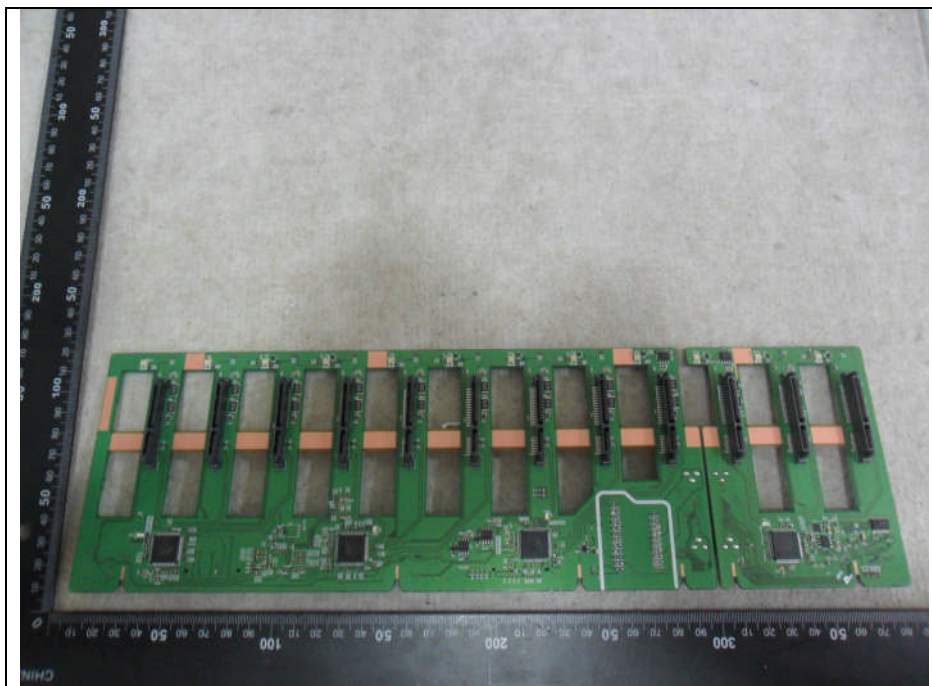
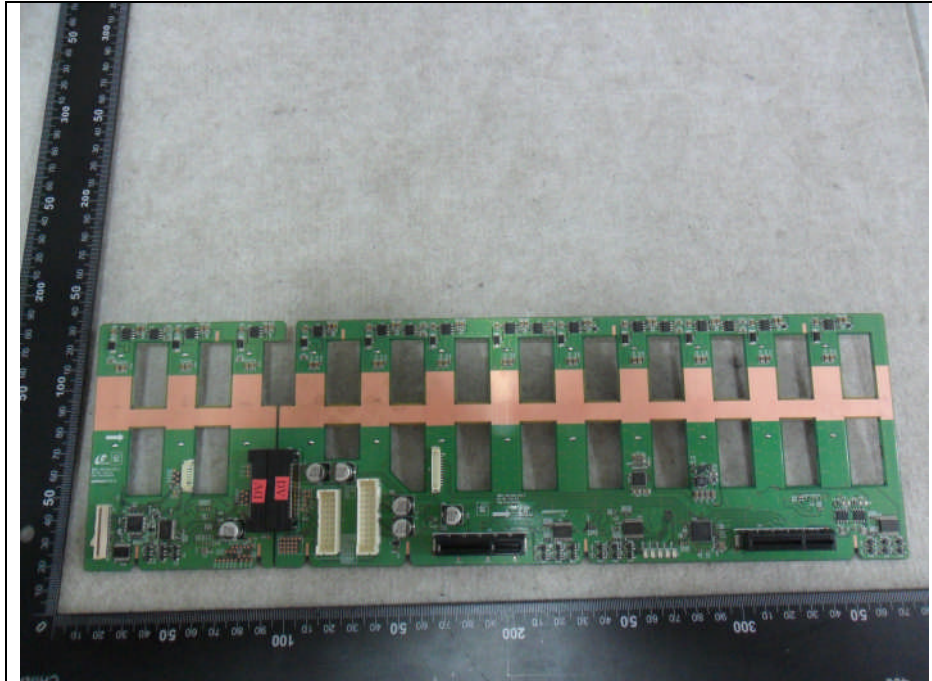
Front Board



HDD (1000 GB*12EA)



Terminal Board



Power*2EA



