

EMC TEST REPORT

Test report No : EMC-VCCI-0387
Type of Equipment : Network Camera
Model Name : SNV-5084RN
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 : VCCI V-3 / 2013.04, 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.

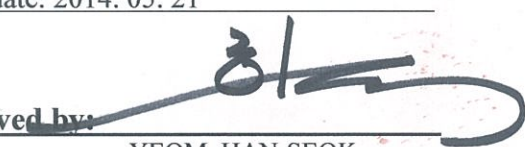
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Tested by: 

BEAK, JEONG-SOO

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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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.

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

Telephone Number: 82 31 336 9919

Facsimile Number: 82 505 299 8311

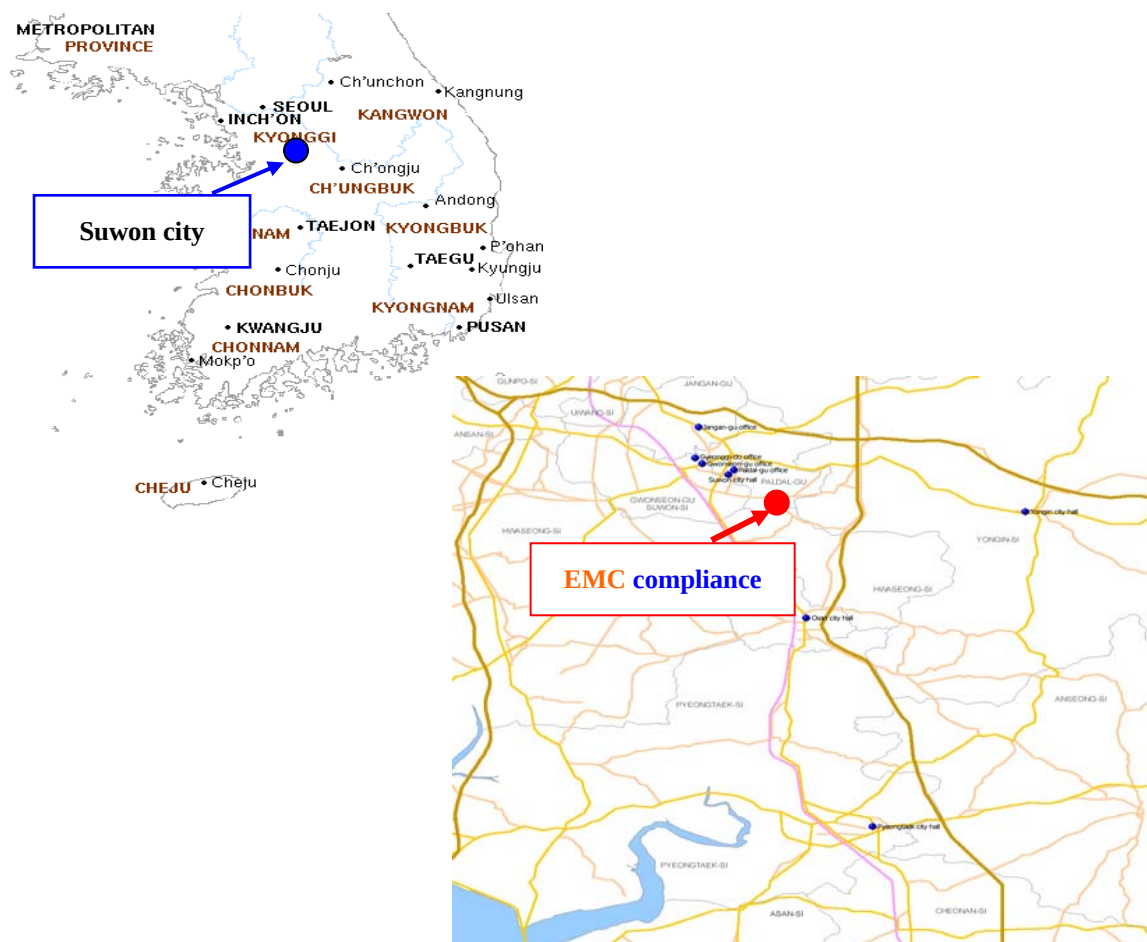
FCC CAB.: KR0040

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)	: 21.4 °C	41.2 % R.H.	-
Shielded room(CE)	: 22.0 °C	46.8 % 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

Video	
Imaging Device	1/3" PS Exmor 1.37M CMOS (IMX238)
Total Pixels	1,312(H) x 1,069(V)
Effective Pixels	1,305(H) x 1,049(V)
Scanning System	Progressive
Min. Illumination	Color : 0.05 Lux (1/30sec, F1.2, 50IRE), 0.0008Lux (2sec, 50IRE) B/W : 0 Lux(IR LED on)
S / N Ratio	50dB
Video Out	CVBS : 1.0 Vp-p / 75Ω composite, 704x480(N), 704x576(P), for installation - DIP connector type
Lens	
Focal Length (Zoom Ratio)	3~8.5mm (2.8X) Motorized Vari-focal
Max. Aperture Ratio	F1.2
Angular Field of View	H: 93.4°(Wide)~33.1°(Tele), V: 73.8°(Wide)~26.5°(Tele)
Min. Object Distance	0.5m
Focus Control	Simple Focus (Motorized V/F) / Manual - Remote control via network (Manual, Simple Focus)
Lens Type	DC Auto Iris, P-Iris
Mount Type	Board-in type
Pan / Tilt / Rotate	
Pan Range	0 ° ~ +354 °
Tilt Range	0 ° ~ +67 °
Rotate Range	0 ° ~ +355 °
Operational	
IR LED	12 ea
Viewable Length	15m
Camera Title	Off / On (Displayed up to 45 characters)
Day & Night	Auto (ICR) / Color / B/W / External / Schedule
Backlight Compensation	Off / BLC
Wide Dynamic Range	130dB ↑
Contrast Enhancement	SSDR (Samsung Super Dynamic Range) (Off / On)
Digital Noise Reduction	SSNRIII (2D+3D Noise Filter) (Off / On)
Defog	Auto/Manual/Off
Digital Image Stabilization	Off / On
Motion Detection	Off / On (4ea 4 Points Polygonal zones)
Privacy Masking	Off / On (32 Zones with 4 Points of Polygonal)
Gain Control	Off / Low / Middle / High
White Balance	ATW / AWC / Manual / Indoor / Outdoor
Electronic Shutter Speed	Minimum / Maximum / Anti flicker
Flip / Mirror	Off / On
Intelligent Video Analytics	Tampering, Virtual Line, Enter/Exit, Appear / Disappear, Audio Detection, Face Detection
Alarm I/O	Input 1ea / Output 1ea
Audio In	Selectable (Mic IN/Line IN), Max output level: 1 Vrms Supply voltage: 2.5VDC(4mA), Input impedance: approx. 2K Ohm
Audio out	Line out (3.5mm stereo mini jack)
Alarm Triggers	Motion detection, Tempering, Audio Detection, Face Detecton, Video Analytics, Network Disconnection, Alarm Input
Alarm events	File upload via FTP and E-Mail Notification via E-Mail, TCP local storage(microSD/SDHC/SDXC) recording at Network disconnected & Event (Alarm Triggers) External output

Network	
Ethernet	RJ-45 (10/100BASE-T)
Video Compression Format	H.264(MPEG-4 Part 10/AVC), Motion JPEG
Resolution	1280x1024, 1280x720P(HD), 1024x768, 800x600, 640x480, 320x240
Max. Framerate	H.264 : Max 60fps at all resolutions Motion JPEG : 1280x1024 / 1280x720 / 1024x768 : Max. 15 fps 800x600 / 640x480 / 320x240 : Max. 30fps
Smart Codec	-
Video Quality Adjustment	H.264 : Compression Level, Target Bitrate Level Control MJPEG : Quality Level Control
Bitrate Control Method	H.264 : CBR or VBR M-JPEG : VBR
Streaming Capability	Multiple Streaming (Up to 10 Profiles)
Audio Compression Format	G.711 u-law /G.726 Selectable G.726 (ADPCM) 8KHz, G.711 8KHz G.726 : 16Kbps, 24Kbps, 32Kbps, 40Kbps
Audio Communication	Bi-directional
IP	IPv4, IPv6
Protocol	TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP,RTSP, NTP, HTTP, HTTPS, SSL, DHCP, PPPoE, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, PIM-SM, UPnP, Bonjour
Security	HTTPS(SSL) Login Authentication Digest Login Authentication IP Address Filtering User access Log 802.1X Authentication
Streaming Method	Unicast / Multicast
Max. User Access	15 users at Unicast Mode
Memory Slot	micro SD/SDHC/SDXC - motion Images recorded in the SD/SDHC/SDXC memory card can be downloaded.
Application Programming Interface	ONVIF Profile S HTTP API v2.0 SVNP 1.2
Webpage Language	English, French, German, Spanish, Italian, Chinese, Korean, Russian, Japanese, Swedish, Danish, Portuguese, Turkish, Polish, Czech, Rumanian, Serbian, Dutch, Croatia, Hungary, Greek, Finnish, Norwegian
Web Viewer	Supported OS : Windows XP / VISTA / 7 / 8, MAC OS X 10.7 Supported Browser : Microsoft Internet Explorer (Ver. 7~10), Mozilla Firefox (Ver. 9~19), Google Chrome (Ver. 15~25), Apple Safari (Ver. 6.0.2(Mac OS X 10.8, 10.7 Only), 5.1.7) * Mac OS X Only
Central Management Software	SmartViewer 4.0
Environmental	
Operating Temperature / Humidity	-40°C to +55°C(-40°F ~ +131°F) / Less than 90% RH * Start up should be done at above -35°C
Storage Temperature / Humidity	-30°C ~ +60°C (-22°F ~ +140°F) / Less than 90% RH
Ingress Protection	IP66 Grade
Vandal Resistance	IK10
Electrical	
Input Voltage / Current	AC24V, DC12V, PoE(IEEE802.3af)
Power Consumption	Max. 10.5W (Heater Off) Max. 12.95W (Heater On)
Mechanical	
Color / Material	Ivory / Aluminum
Dimension (WxHxD)	160 x H118.5
Weight	960g

4.2 Product description

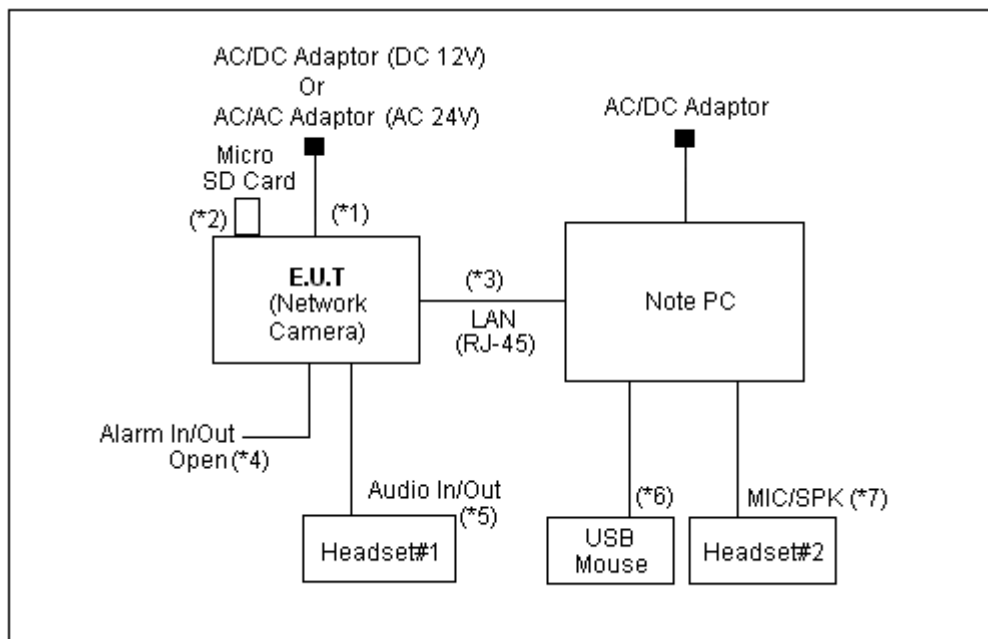
Type of product	Network Camera
Model name (Basic)	SNV-5084RN
Model name (Variant)	-
Difference	-
Trade name	-
Serial no	Engineering Sample
Testing voltage	DC 12 V , AC 24 V , PoE
Product rating	DC 12 V , AC 24 V , PoE
Internal clock frequency	Above 108 Mhz
Note	* AC/DC adaptor was not provided by the manufacturer. * AC/AC adaptor was not provided by the manufacturer. * PoE Switch was not provided by the manufacturer.

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Note PC	NT271B5E	JGFE919DB00025Z	SAMSUNG
USB Mouse	M-BZ96C	DZL-M-BZ96C	FUJITSU
Headset#1	SHS-250V	-	SAMSUNG
Headset#2	SHS-250V	-	SAMSUNG
Micro SD Card(4GB)	-	-	LG
AC/DC Adaptor (DC 12V)	DAD12050DKA	-	Samsung Techwin
AC/AC Adaptor (AC 24V)	DRL-241500AC	-	Dream Electronics
PoE Switch	FS110P	2HK1283T50C33	NETGEAR

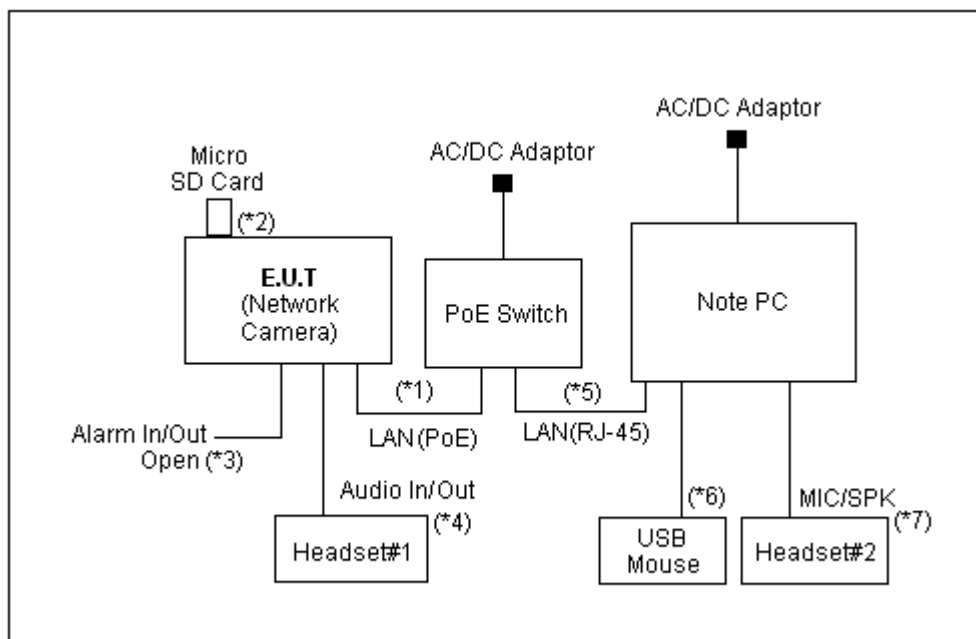
4.4 Test configuration

#1- DC 12V, #2- AC 24V



Note *	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT (Network Camera)	Power	AC/DC Adaptor Or AC/AC Adaptor	Power	2.0	Non-Shield
2		Micro SD	Micro SD Card	Micro SD	Direct	-
3		LAN(RJ-45)	Note PC	LAN(RJ-45)	3.0	Non-Shield
4		Alarm In/Out	Open	-	3.0	Non-Shield
5		Audio In/Out	Headset#1	Audio In/Out	2.0	Non-Shield
6	Note PC	USB	USB Mouse	USB	1.8	Shield
7		MIC/SPK	Headset#2	MIC/SPK	2.0	Non-Shield

#3- PoE



* Power supplied from PoE Switch

Note *	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT (Network Camera)	LAN(PoE)	PoE Switch	LAN(PoE)	3.0	Non-Shield
2		Micro SD	Micro SD Card	Micro SD	Direct	-
3		Alarm In/Out	Open	-	3.0	Non-Shield
4		Audio In/Out	Headset#1	Audio In/Out	2.0	Non-Shield
5	Note PC	LAN(RJ-45)	PoE Switch	LAN(RJ-45)	1.0	Non-Shield
6		USB	USB Mouse	USB	1.8	Shield
7		MIC/SPK	Headset#2	MIC/SPK	2.0	Non-Shield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
1	Web Viewer Monitoring Test.
	Alarm Test.
	Ping Test.

* Note: 3 types of powers are available for the product, that are DC 12 V, AC 24 V, PoE.

Therefore, tests were performed for 3 different types of powers.

5. Summary of test results

5.1 Summary of EMI emission test results

Applied	Test items	Test method	Result
☒	Conducted Emission	VCCI V-3 / 2013.04, Class A	Complied
☒	Radiated Emission	VCCI V-3 / 2013.04, Class A	Complied

6. Test results

6.1 Conducted Emission

Test specification	VCCI V-3 / 2013.04, Class A		
Testing voltage	DC 12 V, AC 24 V, PoE		
Test facility	Shielded room (CE#1)		
Date	2014. 05. 13		
Temperature (°C)	22.0 °C	Humidity (% R.H.)	46.8 % 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.

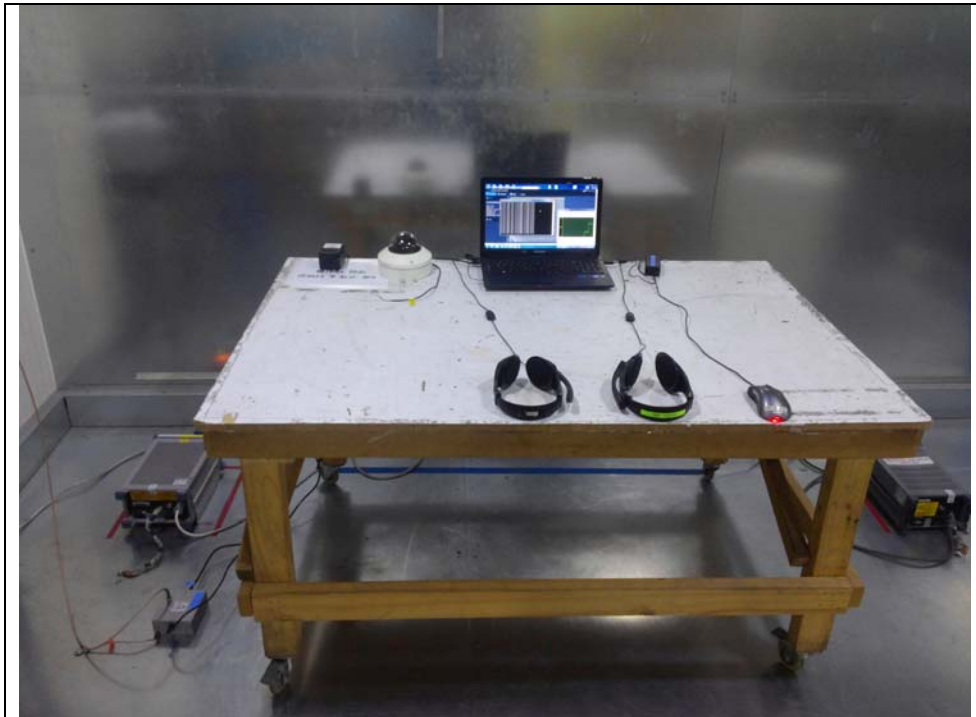
6.1.3 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	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	☒
8-WIRE ISN	NTFM 8158 CAT5	CAT5-8158-0071	SCHWARZBECK	2015.02.25	☒
8-WIRE ISN	NTFM 8158 CAT3	CAT3-8158-0020	SCHWARZBECK	2015.03.07	☐
ISN	ST08	24342	TESEQ	2014.06.21	☐

6.1.4 Photographs of test setup

* Telecommunication

#1- DC 12V, #2- AC 24V



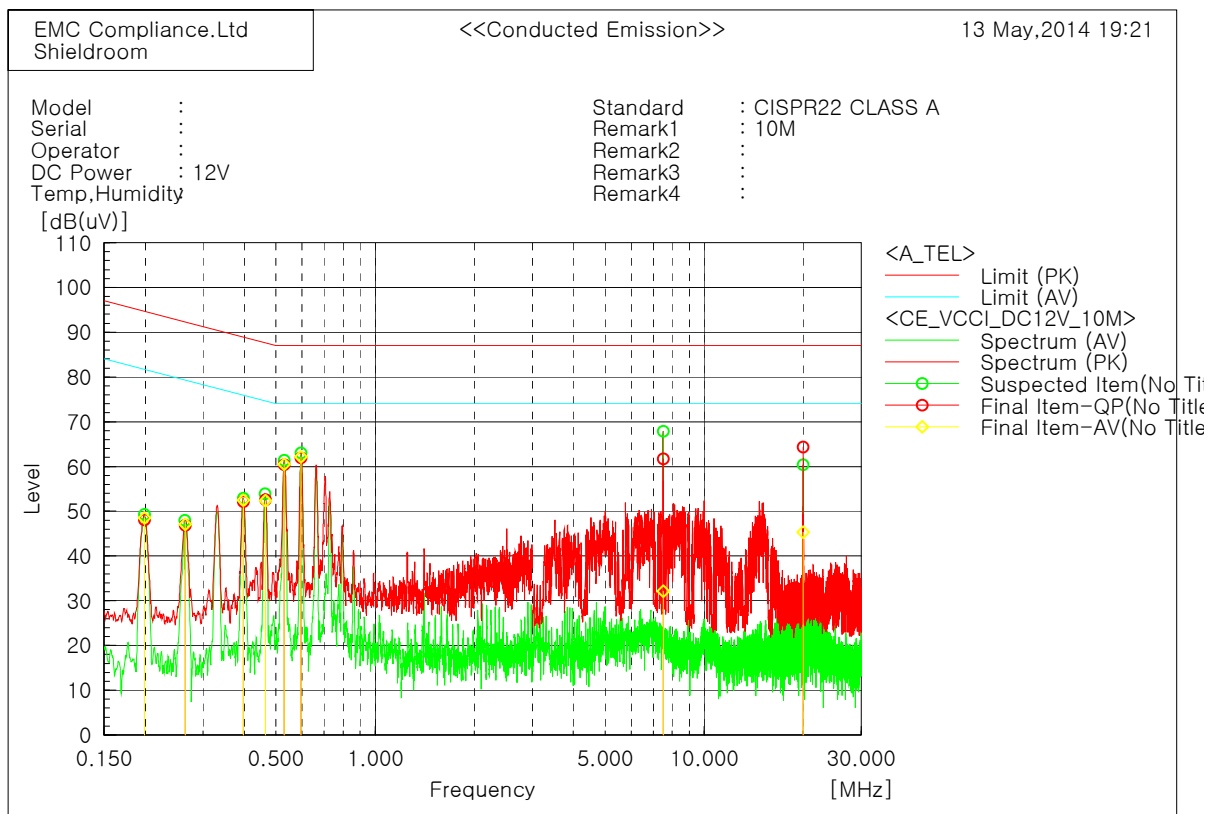
#3-PoE



6.1.5 Conducted emission measurement result

* Telecommunication port

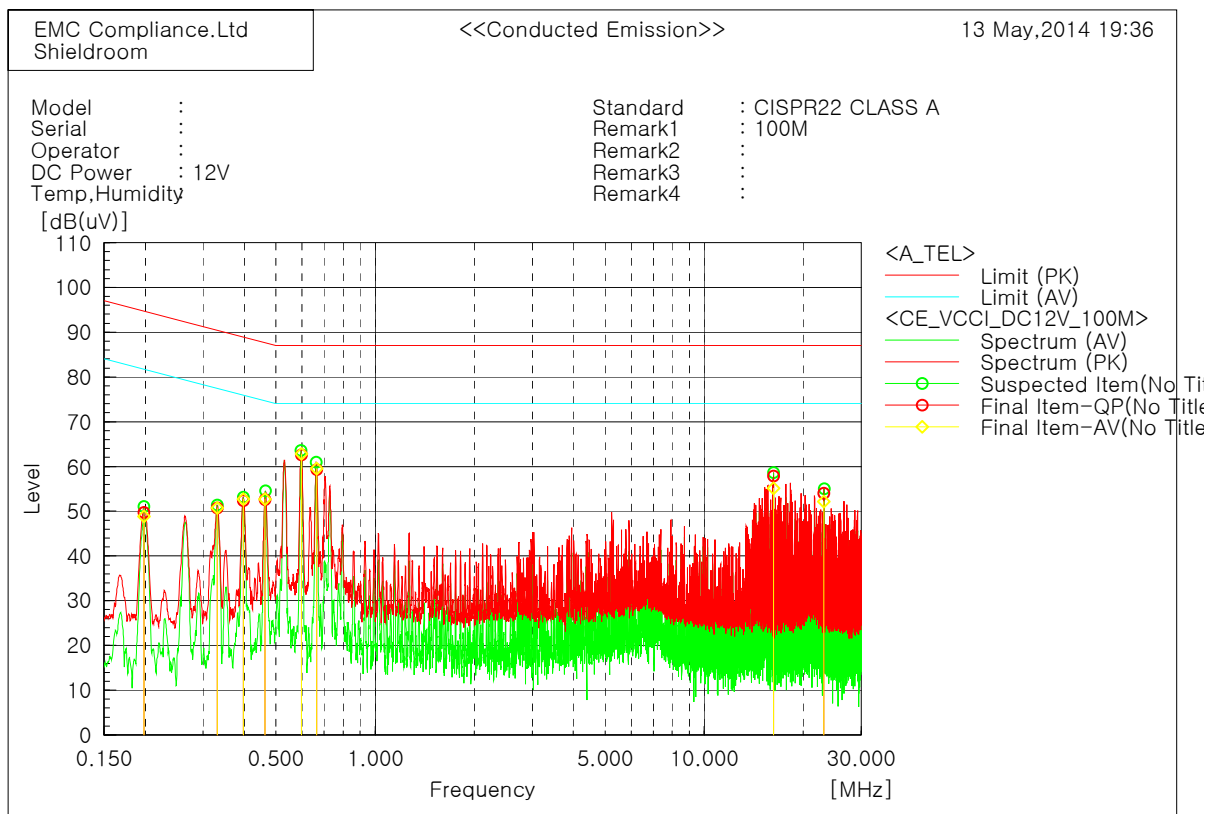
LAN Port (LCL 65 dB)_10 Mbps (SNV-5084RN)_#1- DC 12V



Final Result

--- ISN-CAT5 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	0.19874	38.4	38.8	9.7	48.1	48.5	94.7	81.7	46.6	33.2
2	0.26442	37.2	37.4	9.7	46.9	47.1	92.3	79.3	45.4	32.2
3	0.39741	42.7	43.0	9.5	52.2	52.5	88.9	75.9	36.7	23.4
4	0.46358	43.1	42.9	9.5	52.6	52.4	87.6	74.6	35.0	22.2
5	0.52918	50.9	51.0	9.5	60.4	60.5	87.0	74.0	26.6	13.5
6	0.59474	52.4	52.6	9.5	61.9	62.1	87.0	74.0	25.1	11.9
7	7.4999	52.3	22.7	9.4	61.7	32.1	87.0	74.0	25.3	41.9
8	20.0002	54.8	35.9	9.5	64.3	45.4	87.0	74.0	22.7	28.6

LAN Port (LCL 65 dB)_100 Mbps (SNV-5084RN)_#1- DC 12V

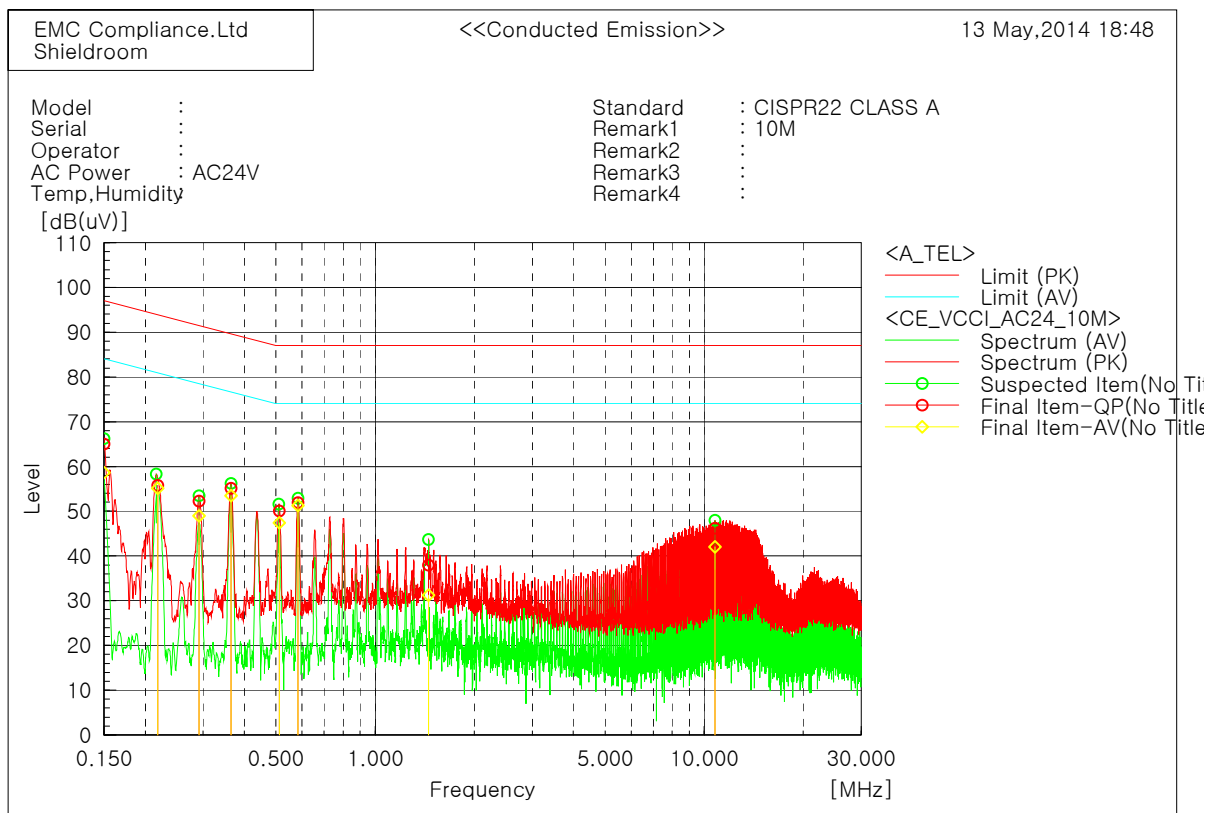


Final Result

--- ISN-CAT5 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	0.19834	40.0	39.1	9.7	49.7	48.8	94.7	81.7	45.0	32.9
2	0.33086	41.1	41.1	9.6	50.7	50.7	90.4	77.4	39.7	26.7
3	0.39763	42.9	43.2	9.5	52.4	52.7	88.9	75.9	36.5	23.2
4	0.4635	43.0	43.2	9.5	52.5	52.7	87.6	74.6	35.1	21.9
5	0.5963	53.1	53.3	9.5	62.6	62.8	87.0	74.0	24.4	11.2
6	0.66324	49.8	50.0	9.5	59.3	59.5	87.0	74.0	27.7	14.5
7	16.22823	48.4	45.7	9.4	57.8	55.1	87.0	74.0	29.2	18.9
8	23.12893	44.4	42.5	9.6	54.0	52.1	87.0	74.0	33.0	21.9

LAN Port (LCL 65 dB)_10 Mbps (SNV-5084RN)_#2- AC 24V

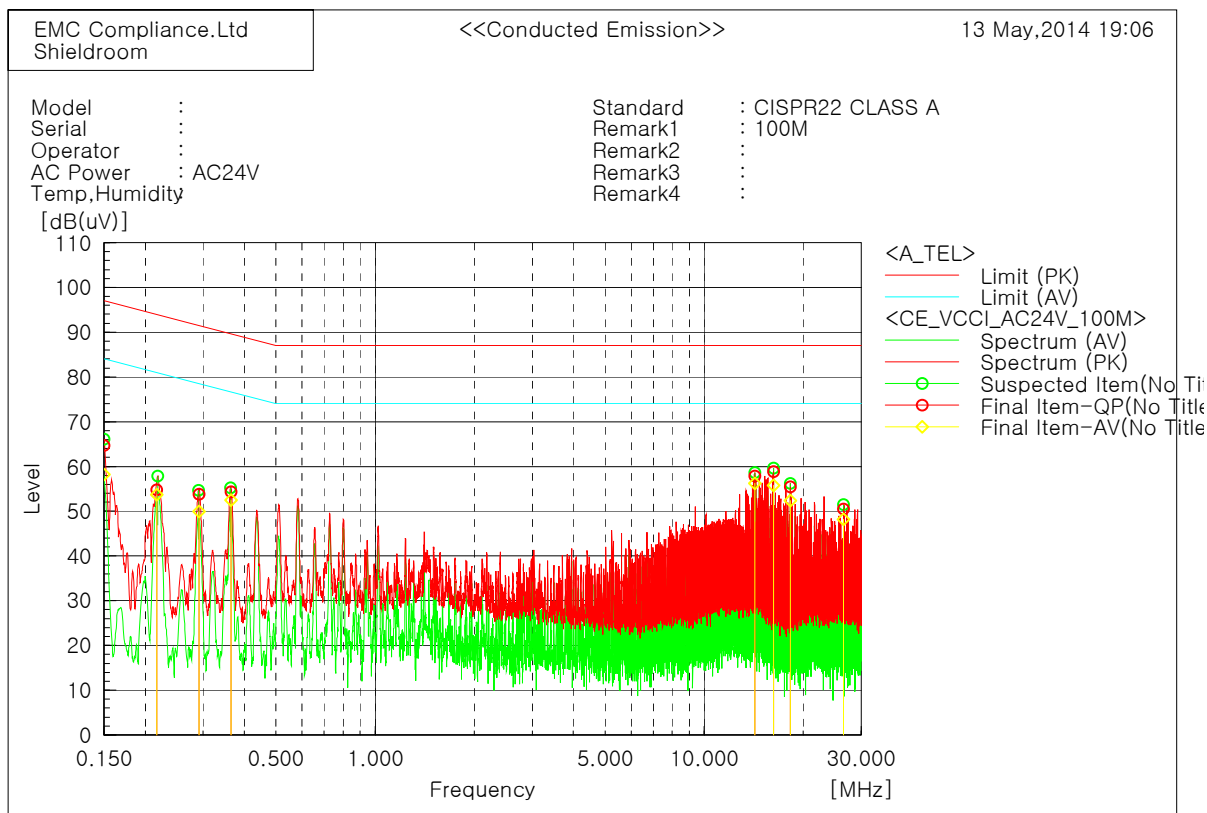


Final Result

--- ISN-CAT5 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	0.15009	55.2	48.9	9.8	65.0	58.7	97.0	84.0	32.0	25.3
2	0.21868	46.1	45.4	9.7	55.8	55.1	93.9	80.9	38.1	25.8
3	0.29183	42.7	39.4	9.6	52.3	49.0	91.5	78.5	39.2	29.5
4	0.36467	45.6	43.9	9.5	55.1	53.4	89.6	76.6	34.5	23.2
5	0.51072	40.5	37.9	9.5	50.0	47.4	87.0	74.0	37.0	26.6
6	0.58329	42.4	41.7	9.5	51.9	51.2	87.0	74.0	35.1	22.8
7	1.45302	28.6	21.9	9.4	38.0	31.3	87.0	74.0	49.0	42.7
8	10.78038	36.9	32.6	9.4	46.3	42.0	87.0	74.0	40.7	32.0

LAN Port (LCL 65 dB)_100 Mbps (SNV-5084RN)_#2- AC 24V

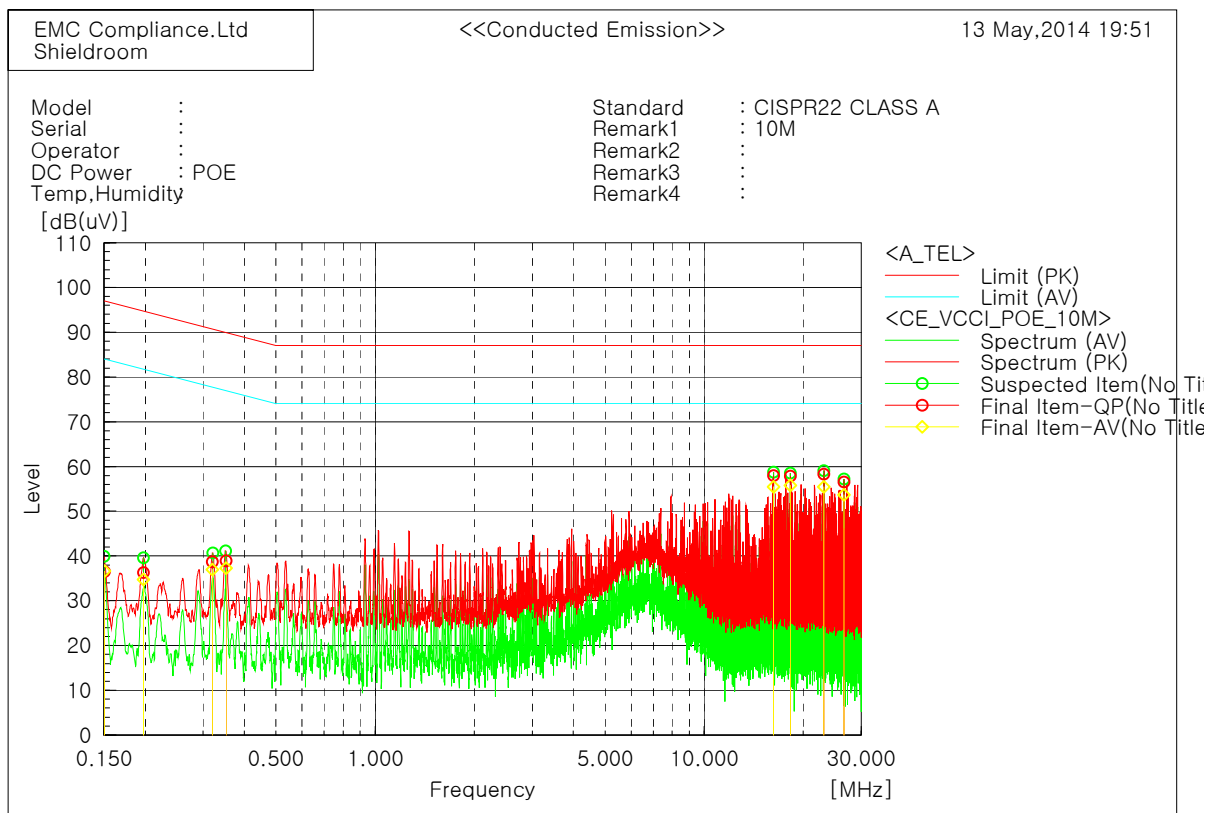


Final Result

--- ISN-CAT5 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	0.15023	54.9	48.4	9.8	64.7	58.2	97.0	84.0	32.3	25.8
2	0.2168	45.1	44.0	9.7	54.8	53.7	93.9	80.9	39.1	27.2
3	0.29128	44.2	40.3	9.6	53.8	49.9	91.5	78.5	37.7	28.6
4	0.36445	44.8	42.9	9.5	54.3	52.4	89.6	76.6	35.3	24.2
5	14.27405	48.4	46.8	9.4	57.8	56.2	87.0	74.0	29.2	17.8
6	16.22858	49.5	46.3	9.4	58.9	55.7	87.0	74.0	28.1	18.3
7	18.24368	45.9	42.9	9.5	55.4	52.4	87.0	74.0	31.6	21.6
8	26.48763	40.9	38.6	9.6	50.5	48.2	87.0	74.0	36.5	25.8

LAN Port (LCL 65 dB)_10 Mbps (SNV-5084RN)_#3- PoE

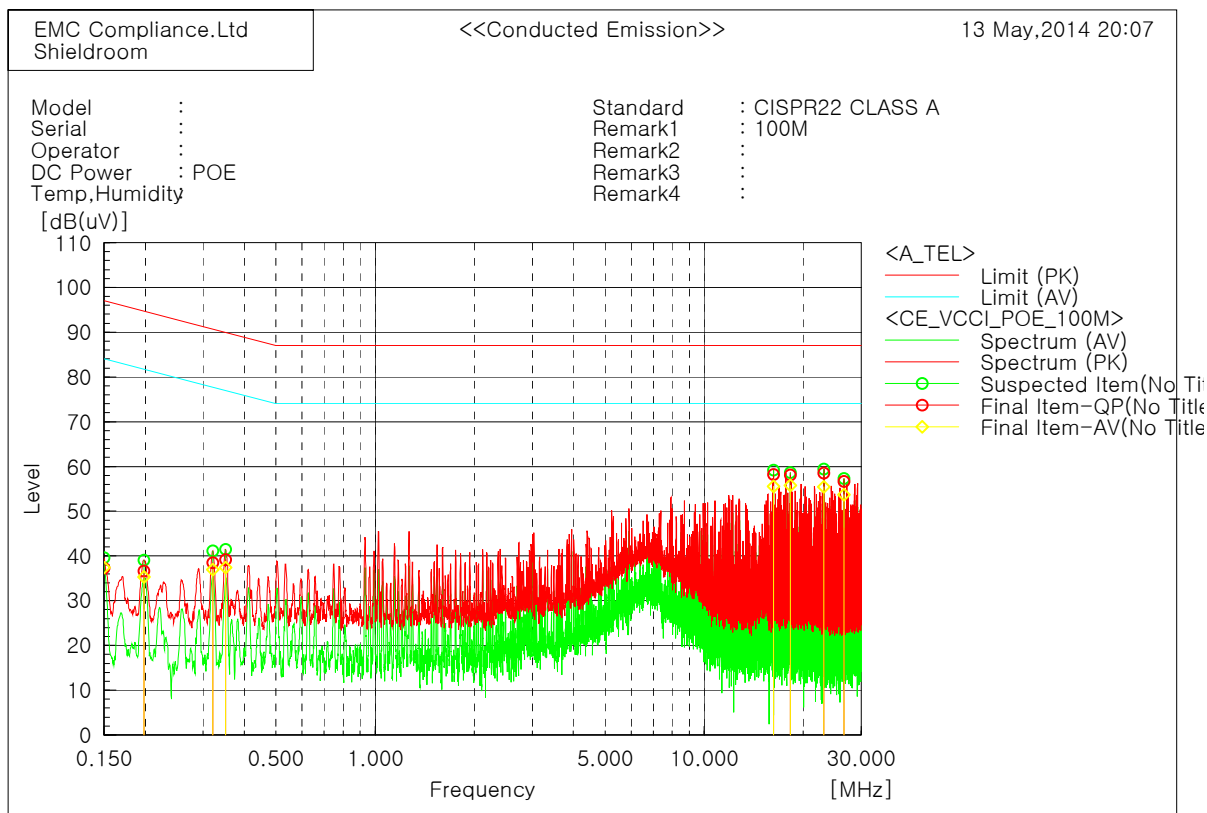


Final Result

--- ISN-CAT5 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	0.15042	26.7	26.8	9.8	36.5	36.6	97.0	84.0	60.5	47.4
2	0.19741	26.6	25.1	9.7	36.3	34.8	94.7	81.7	58.4	46.9
3	0.32005	29.1	27.4	9.6	38.7	37.0	90.7	77.7	52.0	40.7
4	0.35187	29.3	27.7	9.6	38.9	37.3	89.9	76.9	51.0	39.6
5	16.22819	48.6	46.1	9.4	58.0	55.5	87.0	74.0	29.0	18.5
6	18.24308	48.4	46.3	9.5	57.9	55.8	87.0	74.0	29.1	18.2
7	23.1288	48.7	45.8	9.6	58.3	55.4	87.0	74.0	28.7	18.6
8	26.60969	47.0	44.1	9.6	56.6	53.7	87.0	74.0	30.4	20.3

LAN Port (LCL 65 dB)_100 Mbps (SNV-5084RN)_#3- PoE



Final Result

--- ISN-CAT5 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	0.15007	27.5	27.6	9.8	37.3	37.4	97.0	84.0	59.7	46.6
2	0.19857	26.9	25.6	9.7	36.6	35.3	94.7	81.7	58.1	46.4
3	0.32135	29.0	27.3	9.6	38.6	36.9	90.7	77.7	52.1	40.8
4	0.35133	29.6	27.8	9.6	39.2	37.4	89.9	76.9	50.7	39.5
5	16.22776	48.8	46.1	9.4	58.2	55.5	87.0	74.0	28.8	18.5
6	18.24325	48.6	46.3	9.5	58.1	55.8	87.0	74.0	28.9	18.2
7	23.12902	48.9	45.9	9.6	58.5	55.5	87.0	74.0	28.5	18.5
8	26.60926	47.1	44.1	9.6	56.7	53.7	87.0	74.0	30.3	20.3

6.2 Radiated Emission

Test specification	VCCI V-3 / 2013.04, Class A		
Testing voltage	DC 12 V, AC 24 V, PoE		
Test facility	10 m Chamber (#F2)		
Test distance	10 m, 3 m		
Date	2014. 05. 15 ~ 05. 16		
Temperature (°C)	21.4 °C	Humidity (% R.H.)	41.2 % 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	2015.01.27	☐
Test Receiver	ESCI	100001	R&S	2014.07.25	☐
Test Receiver	ESCI	100710	R&S	2014.10.28	☐
Test Receiver	ESR	101078	R&S	2015.02.24	☒
Bi-Log Antenna	VULB 9168	440	SCHWARZBECK	2015.10.16	☒
Amplifier	310N	293004	SONOMA INSTRUMENT	2014.10.31	☒
3 dB Attenuator	8491B	22981	HP	2015.03.04	☒
Antenna Mast	MA4000-EP	303	Innco Systems	-	☒
Turn Table	DT2000S-1t	079	Innco Systems	-	☒
Amplifier	8449B	3008A02343	AGILENT	2014.10.31	☒
Horn ANT	3115	00155772	ETS	2015.02.26	☒
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

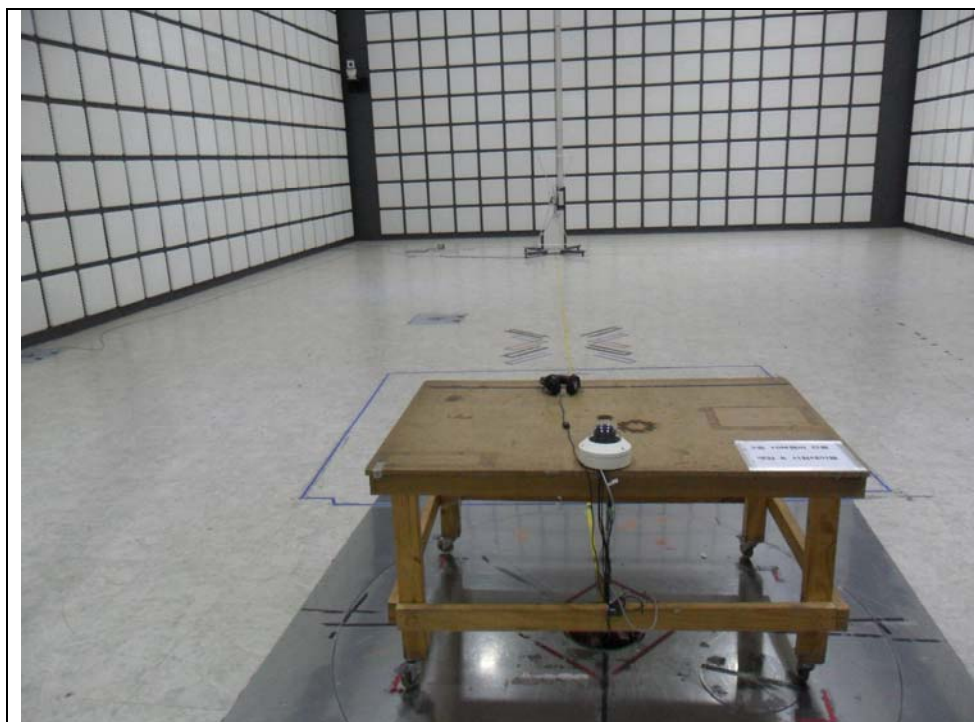
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is

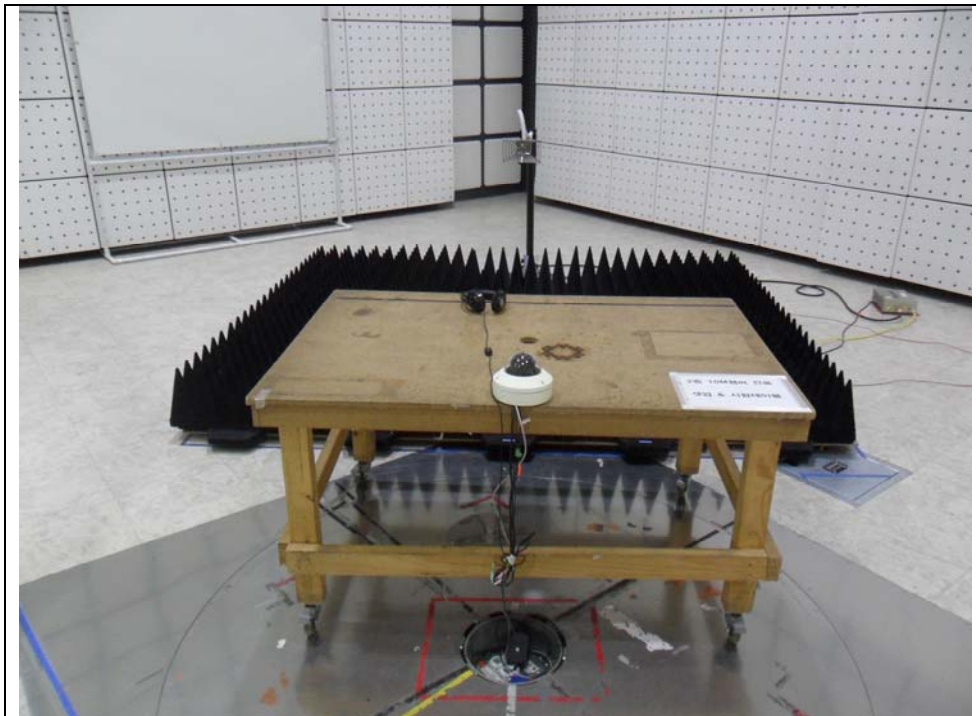
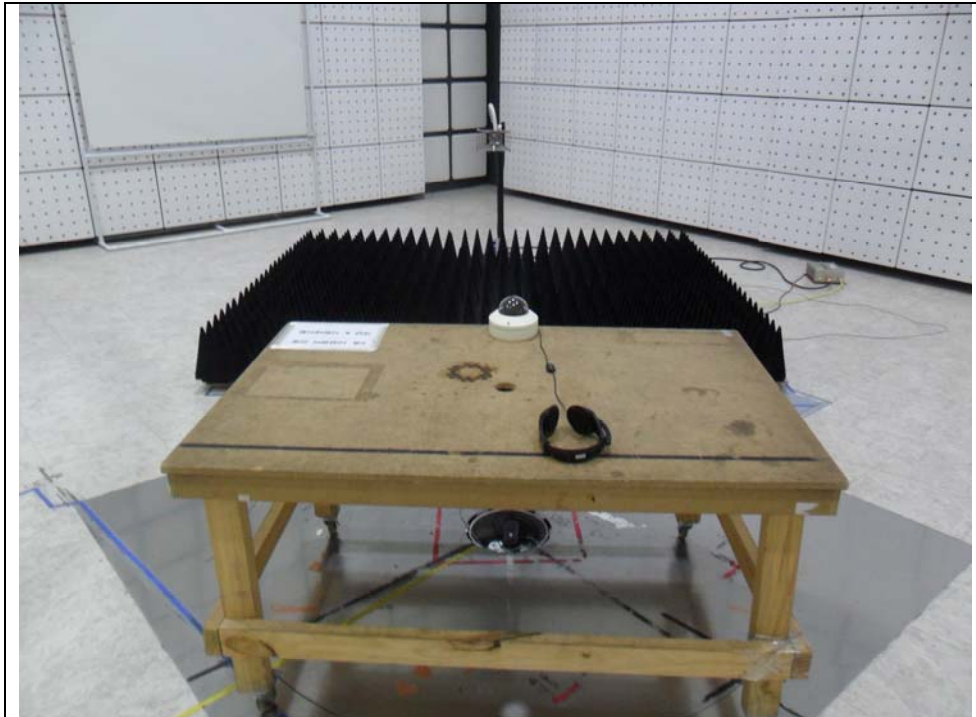
$$30 + 12 + 5 + 3 - 35 = 15 \text{ dB}(\mu\text{V/m})$$

6.2.5 Photographs of test setup

* 30 MHz ~ 1 GHz (#1- DC 12V, #2- AC 24V, #3-PoE)



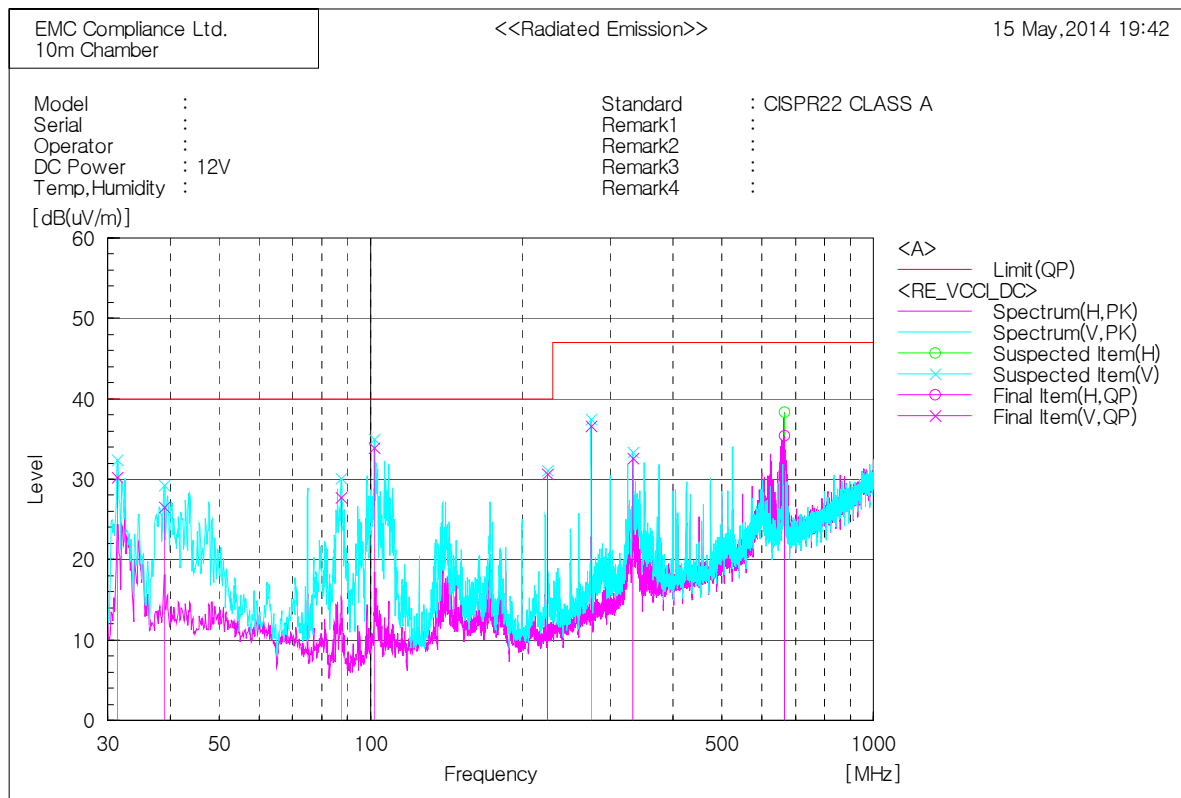
* 1 GHz ~ 6 GHz (#1- DC 12V, #2- AC 24V, #3-PoE)



6.2.6 Radiated emission measurement result

* Graph and Data

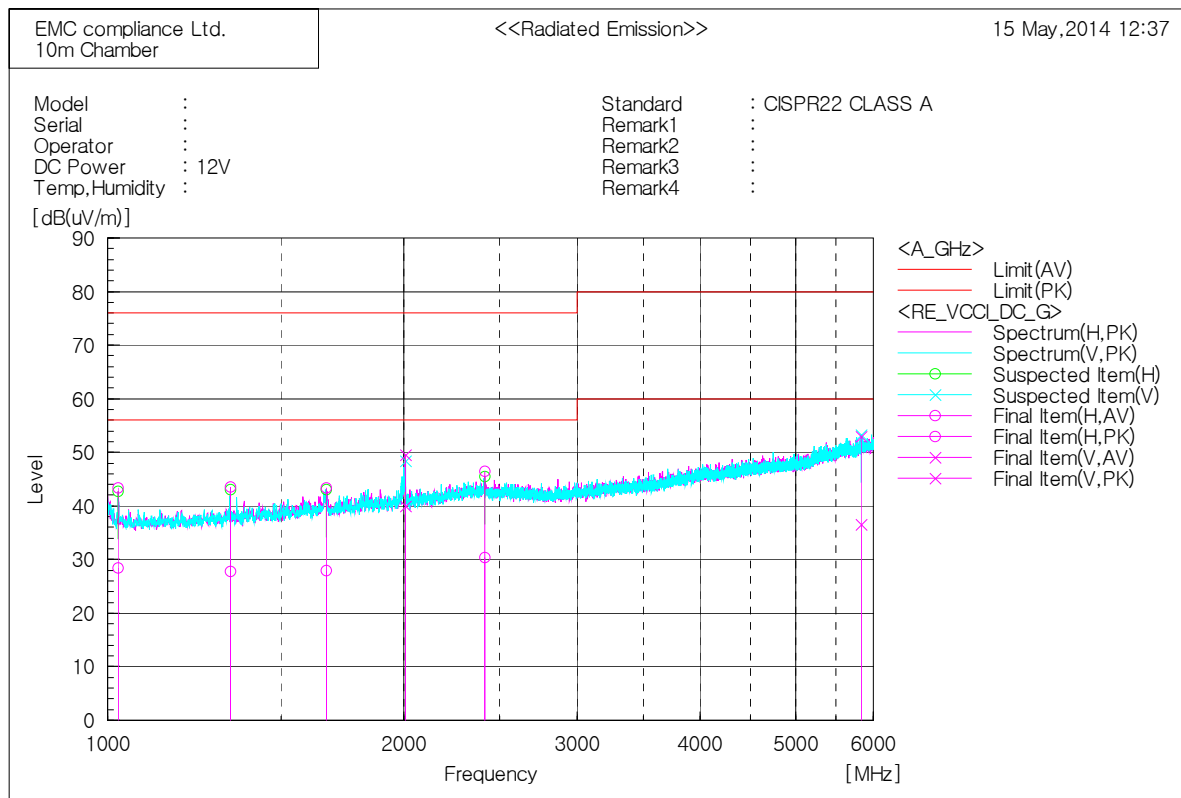
* 30 MHz ~ 1 GHz (SNV-5084RN)_#1- DC 12V



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	31.334	V	45.2	-15.0	30.2	40.0	9.8	400.0	142.7
2	38.851	V	40.6	-14.1	26.5	40.0	13.5	400.0	294.8
3	87.473	V	46.1	-18.4	27.7	40.0	12.3	100.0	139.1
4	101.780	V	51.2	-17.3	33.9	40.0	6.1	100.0	136.1
5	224.970	V	44.5	-13.9	30.6	40.0	9.4	100.0	68.0
6	274.925	V	47.8	-11.2	36.6	47.0	10.4	100.0	152.7
7	333.004	V	42.0	-9.4	32.6	47.0	14.4	100.0	45.4
8	666.078	H	36.5	-1.1	35.4	47.0	11.6	100.0	274.9

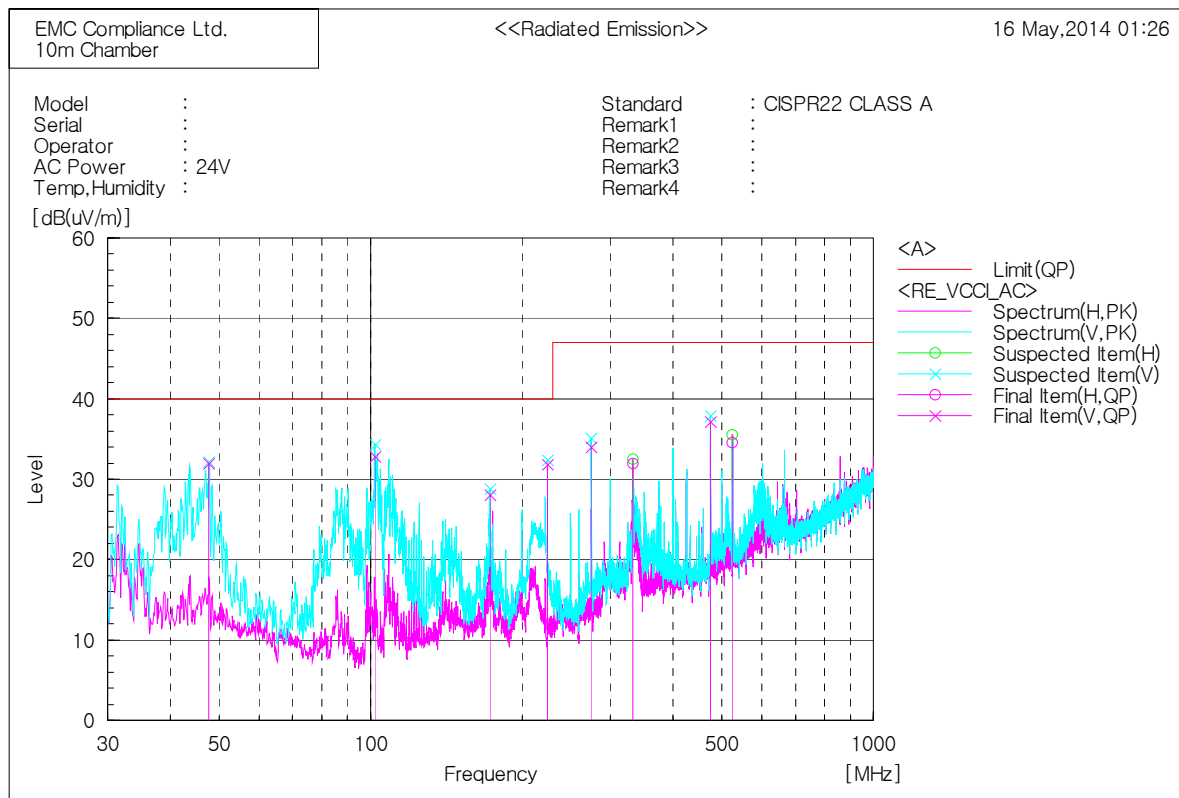
* 1 GHz ~ 6 GHz (SNV-5084RN)_#1- DC 12V



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]
1	1025.000	H	35.2	50.2	-6.8	28.4	43.4	56.0	76.0	27.6	32.6	100.0	122.7
2	1331.875	H	32.6	48.4	-4.9	27.7	43.5	56.0	76.0	28.3	32.5	100.0	358.0
3	1668.750	H	30.7	46.1	-2.7	28.0	43.4	56.0	76.0	28.0	32.6	100.0	341.2
4	2006.250	V	40.6	50.3	-0.7	39.9	49.6	56.0	76.0	16.1	26.4	100.0	163.5
5	2415.625	H	28.9	45.1	1.4	30.3	46.5	56.0	76.0	25.7	29.5	100.0	72.7
6	5826.250	V	25.6	42.0	11.0	36.6	53.0	60.0	80.0	23.4	27.0	100.0	8.4

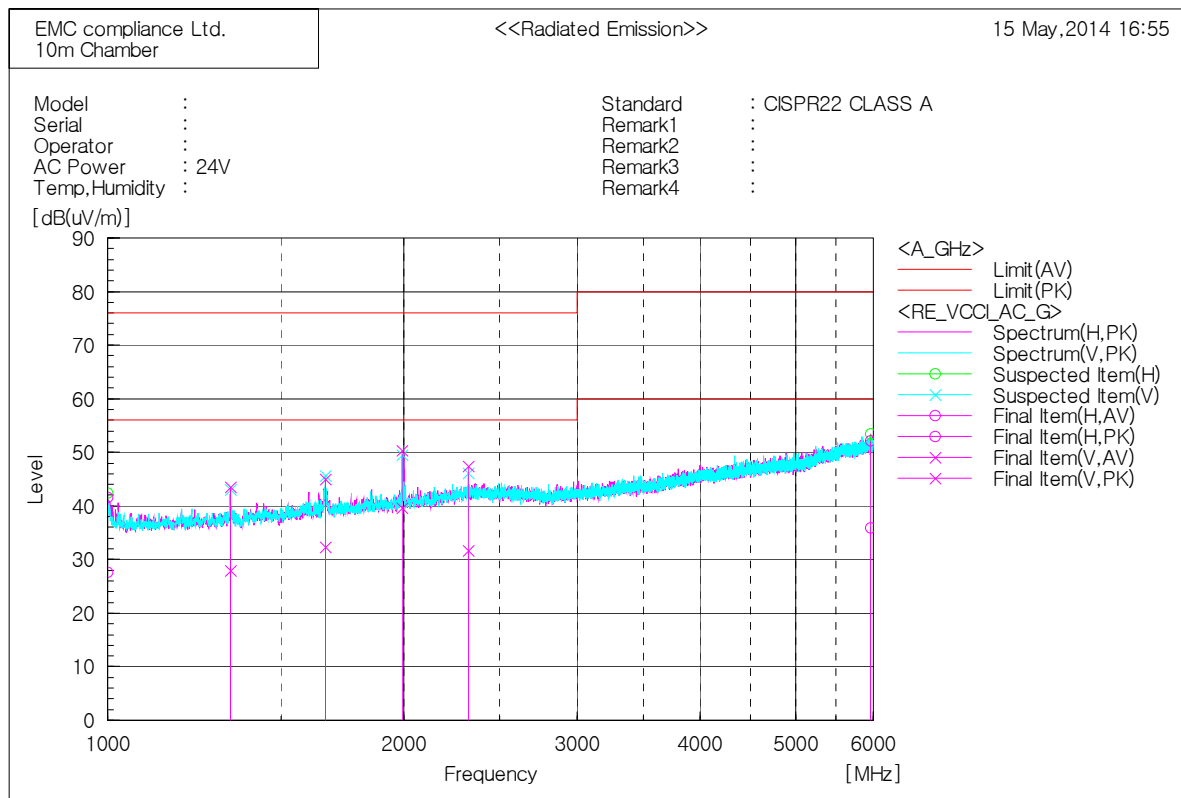
* 30 MHz ~ 1 GHz (SNV-5084RN)_#2- AC 24V



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	47.703	V	45.2	-13.3	31.9	40.0	8.1	100.0	6.9
2	101.901	V	50.1	-17.3	32.8	40.0	7.2	100.0	293.6
3	172.711	V	41.2	-13.2	28.0	40.0	12.0	100.0	266.5
4	224.970	V	45.7	-13.9	31.8	40.0	8.2	100.0	343.4
5	274.925	V	45.2	-11.2	34.0	47.0	13.0	100.0	145.7
6	333.004	H	41.4	-9.4	32.0	47.0	15.0	400.0	128.1
7	474.987	V	42.6	-5.4	37.2	47.0	9.8	100.0	195.5
8	524.943	H	38.7	-4.1	34.6	47.0	12.4	100.0	156.6

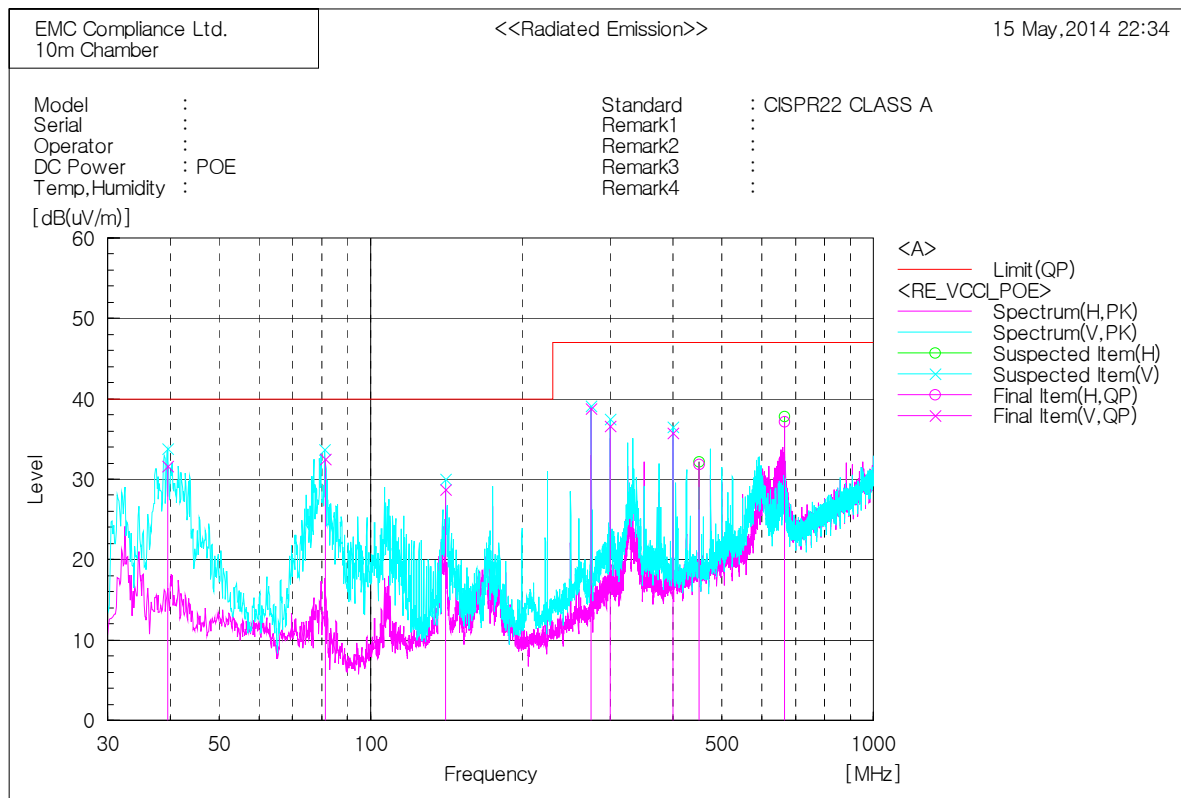
* 1 GHz ~ 6 GHz (SNV-5084RN)_#2- AC 24V



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]
1	1000.000	H	34.6	48.6	-7.0	27.6	41.6	56.0	76.0	28.4	34.4	100.0	62.6
2	1332.500	V	32.8	48.4	-4.9	27.9	43.5	56.0	76.0	28.1	32.5	100.0	156.4
3	1665.625	V	35.1	47.8	-2.8	32.3	45.0	56.0	76.0	23.7	31.0	100.0	1.9
4	1992.500	V	40.4	51.2	-0.8	39.6	50.4	56.0	76.0	16.4	25.6	100.0	203.2
5	2325.625	V	30.6	46.4	1.0	31.6	47.4	56.0	76.0	24.4	28.6	100.0	93.1
6	5961.250	H	24.3	40.6	11.6	35.9	52.2	60.0	80.0	24.1	27.8	100.0	357.5

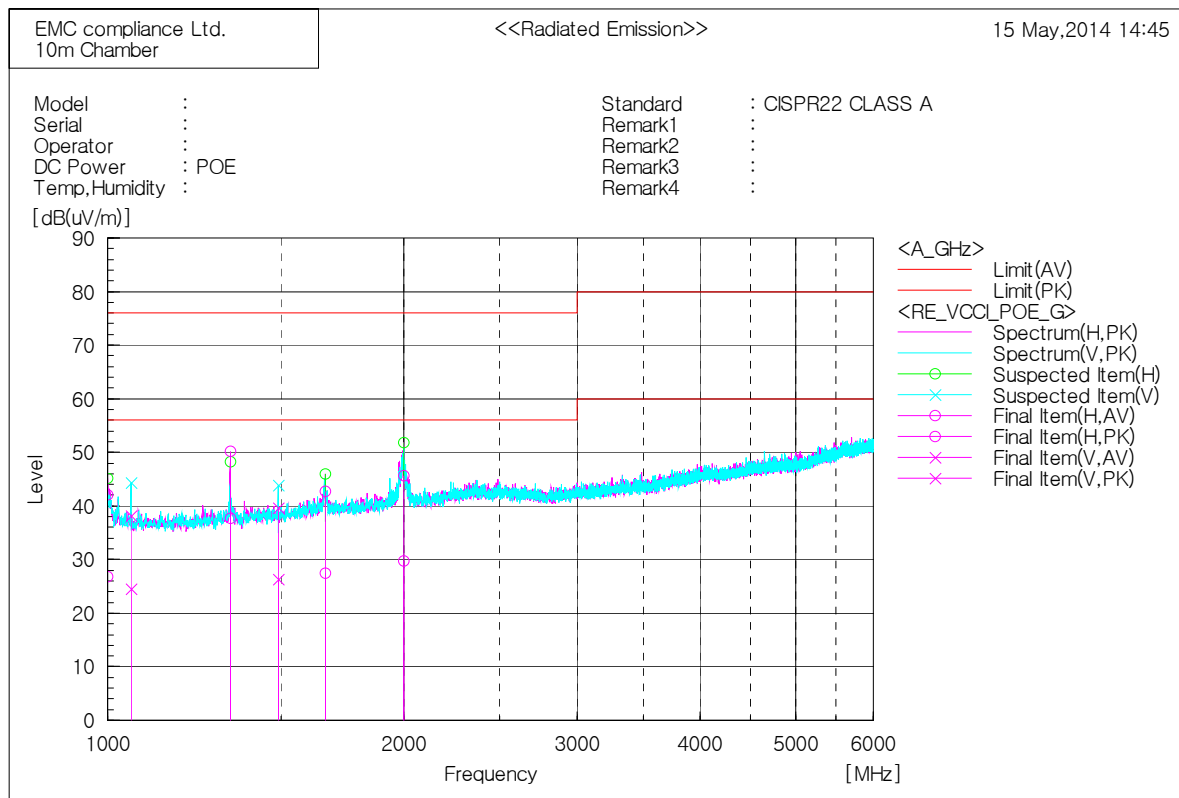
* 30 MHz ~ 1 GHz (SNV-5084RN)_#3- PoE



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	39.458	V	45.6	-14.0	31.6	40.0	8.4	400.0	140.3
2	81.168	V	50.1	-17.6	32.5	40.0	7.5	100.0	23.3
3	141.186	V	42.2	-13.5	28.7	40.0	11.3	100.0	111.1
4	274.925	V	50.0	-11.2	38.8	47.0	8.2	100.0	225.9
5	300.024	V	47.0	-10.4	36.6	47.0	10.4	100.0	4.0
6	399.934	V	43.0	-7.3	35.7	47.0	11.3	400.0	147.9
7	450.010	H	37.8	-6.0	31.8	47.0	15.2	400.0	40.7
8	666.078	H	38.3	-1.1	37.2	47.0	9.8	100.0	149.9

* 1 GHz ~ 6 GHz (SNV-5084RN)_#3- PoE



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]
1	1000.625	H	33.8	49.1	-7.0	26.8	42.1	56.0	76.0	29.2	33.9	100.0	116.1
2	1055.625	V	31.2	44.8	-6.6	24.6	38.2	56.0	76.0	31.4	37.8	100.0	143.4
3	1331.875	H	42.6	55.1	-4.9	37.7	50.2	56.0	76.0	18.3	25.8	100.0	352.2
4	1490.625	V	43.5	30.2	-3.9	39.6	26.3	56.0	76.0	16.4	49.7	100.0	342.6
5	1664.375	H	30.2	45.5	-2.8	27.4	42.7	56.0	76.0	28.6	33.3	100.0	17.4
6	2001.250	H	30.5	46.5	-0.8	29.7	45.7	56.0	76.0	26.3	30.3	100.0	197.5

7. E.U.T. photographs

Front View



Rear View



Left View



Right View



Top View



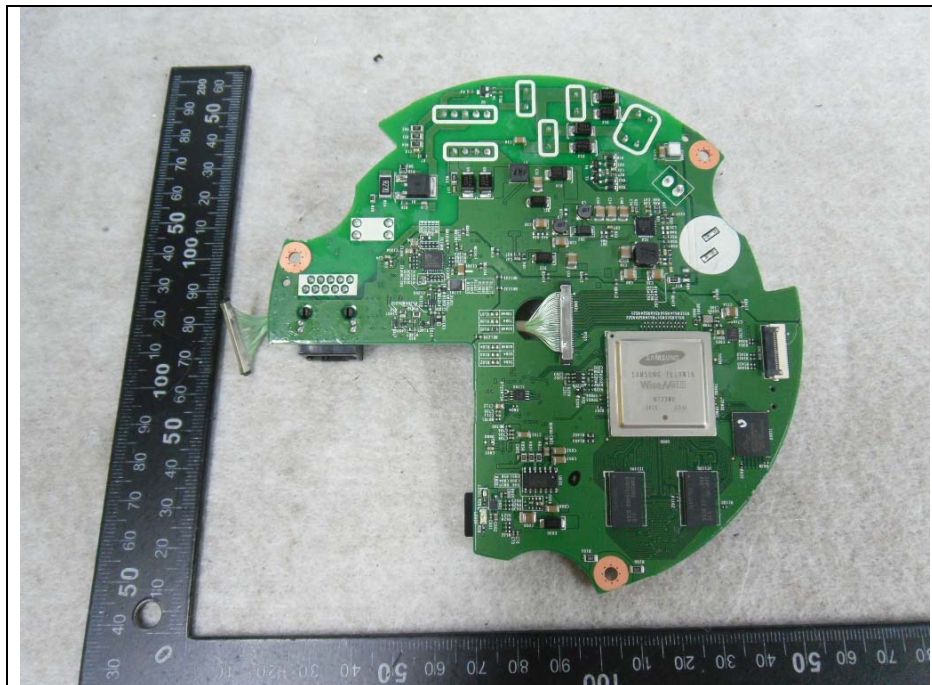
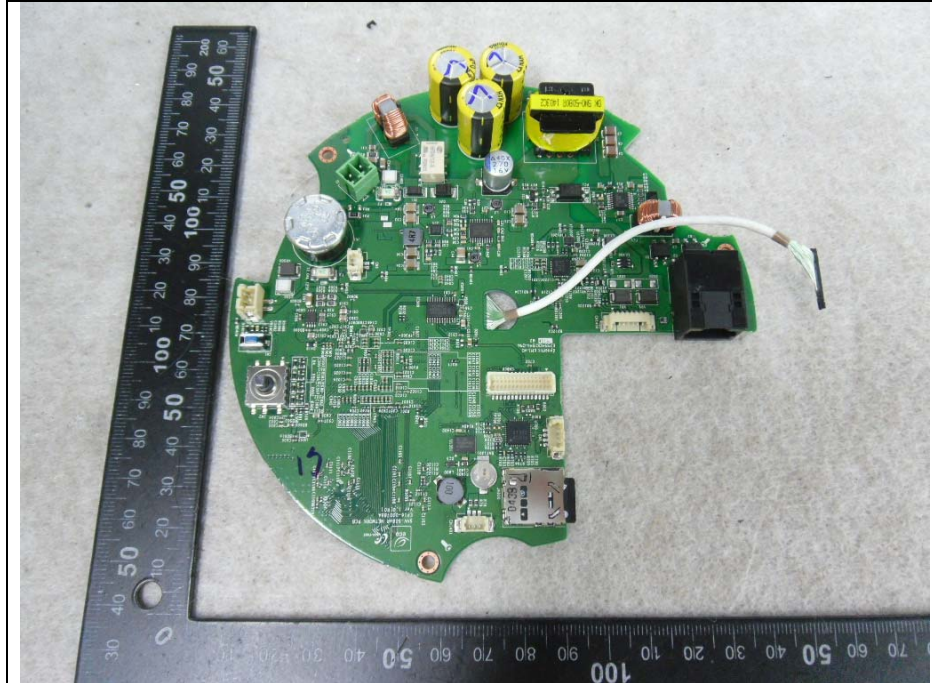
Bottom View



Inside



Main Board



LED Board

