

TESTING CERTIFICATE

EMC Compliance Ltd.

65, Sinwon-ro, Yeongtong-gu,
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Certificate No.: EMC-K-E0126

Page(1) / (40) Pages

**1. Applicant**

Name: Samsung Techwin Co., Ltd.
Address: 84, Jeongdong-ro, Seongsan-gu, Changwon-si,
Gyeongsangnam-do, Korea
Date of Receipt: October 07, 2014

2. Manufacturer

Name#1: Samsung Techwin Co., Ltd.
Name#2: TIANJIN SAMSUNG TECHWIN
OPTO-ELECTRONIC CO., LTD

3. Use of Report:

Completed report

4. Test Sample:

Network Camera, SNP-6321HP

5. Date of Test:

October 17 ~ 20, 2014

6. Test method used:

AS/NZS CISPR 22:2009+A1:2010, Class A

7. Testing Environment:

Temperature: $(21.8 \pm 1.7) ^\circ\text{C}$,
Relative Humidity: $(38.55 \pm 11.45) \% \text{ R.H.}$

8. Test Results:

Refer to page 14 ~ page 30
(Measurement uncertainty: Refer to page 6)

This result shown in this report refer only to the sample(s) tested unless otherwise stated.

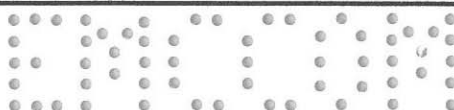
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EMC Compliance Laboratory.

Affirmation	Tested by	Technical Manager
	 Name: JUNG, YONG-JUN	 Name: YEOM, HAN-SEOK

The above test certificate is the accredited test results by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2014.10.24
EMC Compliance Ltd.

Accredited by KOLAS, Republic of KOREA



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1. Applicant information

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Manufacturer#2: TIANJIN SAMSUNG TECHWIN OPTO-ELECTRONIC CO., LTD
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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 70 5008 1021

Facsimile Number: 82 505 299 8311

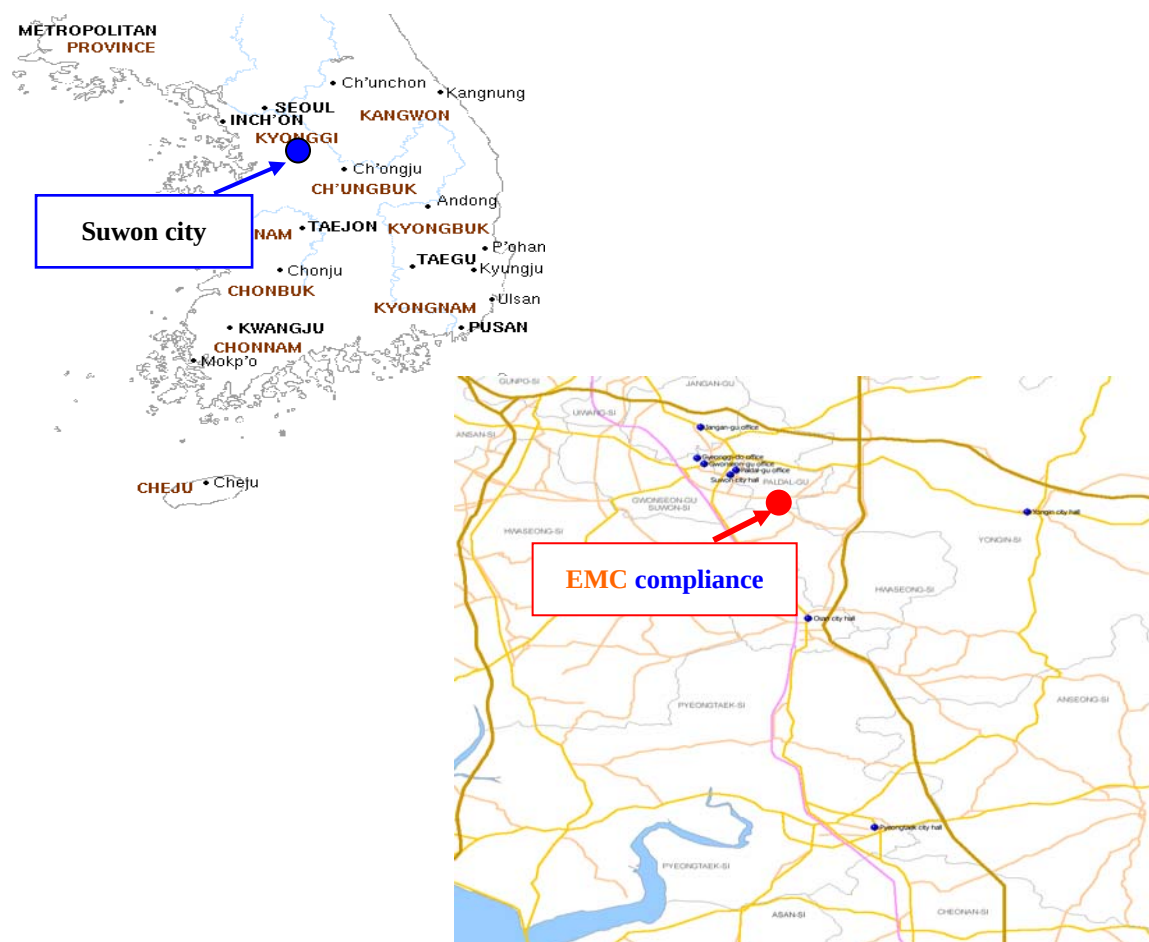
FCC CAB.: KR0040

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)	: 20.1 ~ 21.7 °C	30.7 ~ 50.0 % R.H.	-
Shielded room(CE)	: 23.5 °C	27.1 % 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	± 3.75 dB
	150 kHz ~ 30 MHz	± 3.36 dB
Shielded Room (CE#2)	9 kHz ~ 150 kHz	± 3.79 dB
	150 kHz ~ 30 MHz	± 3.42 dB
Radiated Emission measurement (C.L: Approx 95 %, k = 2)		
10 m Chamber (#F4)	30 MHz ~ 300 MHz	3 m: + 4.87 dB, - 4.99 dB 10 m: + 4.86 dB, - 4.98 dB
	300 MHz ~ 1 000 MHz	3 m: + 5.04 dB, - 5.14 dB 10 m: + 4.91 dB, - 5.02 dB
	1 GHz ~ 6 GHz	3 m: + 6.03 dB, - 6.06 dB
10 m Chamber (#F2)	30 MHz ~ 300 MHz	3 m: + 4.94 dB, - 5.06 dB 10 m: + 4.93 dB, - 5.05 dB
	300 MHz ~ 1 000 MHz	3 m: + 4.97 dB, - 5.08 dB 10 m: + 4.84 dB, - 4.96 dB
	1 GHz ~ 6 GHz	3 m: + 6.03 dB, - 6.05 dB
Radio Frequency Electromagnetic Fields (C.L: Approx 95 %, k = 2)		
± 1.82 dB		
Disturbance power Electromagnetic Fields (C.L: Approx 95 %, k = 2)		
± 3.30 dB		

4. Description of E.U.T.

4.1 General information

Spec.	SNP-6321	SNP-6321H
	DV	
Video		
Imaging Device	1/2.8" Progressive Scan CMOS	
Total Pixels	1952(H) x 1236(V), 2.41M	
Effective Pixels	1944(H) x 1224(V), 2.38M	
Scanning System	Progressive	
Min. Illumination	Color : 0.3 Lux (1/30sec, F1.6, 50IRE, AGC High모드) B/W : 0.03 Lux (1/30sec, F1.6, 50IRE AGC High모드) Color : 0.15 Lux (1/30sec, F1.6, 30IRE)	
S / N Ratio	50dB	
Video Out	CVBS : 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P), for installation	
Lens		
Focal Length (Zoom Ratio)	4.44~142.6mm(Optical 32X)	
Max. Aperture Ratio	1.6 (Wide) ~ 4.4 (Tele)	
Angular Field of View	H : 62.8°(Wide) ~ 2.23°(Tele) /	
Min. Object Distance	Wide 1.5m ,Tele 2m	Wide 1.5m ,Tele1.9m
Focus Control	Auto / Manual / One Push	
Lens Type	DC Auto Iris	
Mount Type	Board-in type	
Pan / Tilt / Rotate		
Pan Range	360° Endless	
Pan Speed	Preset : 700°/sec, Manual : 0.024°/sec ~120°/sec	
Tilt Range	210°(-15° ~195°)	
Tilt Speed	Preset : 700°/sec, Manual : 0.024°/sec ~120°/sec	
Sequence	Preset (255 ea), Swing, Group (6 ea), Trace, Tour (1 ea), Auto Run, Schedule	
Preset Accuracy	±0.2°	
Azimuth	Yes (East/West/South/North)	
Operational		
Camera Title	Off / On (Displayed up to 45 characters)	
Day & Night	Auto (ICR) / Color / B/W	
Backlight Compensation	Off / BLC	
Wide Dynamic Range	120dB ↑	
Contrast Enhancement	SSDR (Samsung Super Dynamic Range) (Off / On)	
Digital Noise Reduction	SSNRIII (2D+3D Noise Filter) (Off / On)	
Digital Image Stabilization	Off / On	
Defog	Auto/Manual/Off	
Motion Detection	Off / On (4ea Rectangle zone)	
Privacy Masking	Off / On (32 Zones of Rectangle zone) with Zoom Thresold Mosaic option	
Gain Control	Off / Low / Middle / High	
White Balance	ATW / AWC / Manual / Indoor / Outdoor / Mercury	
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (2 ~ 1/12,000sec)	
Digital Zoom	16x area zoom funtion support digital zoom 2x	
Flip / Mirror	Off / On	
Intelligent Video Analytics	Tampering, Virtual Line, Enter/Exit, Appear / Disappear, Audio Detection, Face Detection	
Serial Interface	RS-485 - Samsung-T/E, Pelco-D/P, Sungjin, Panasonic, Bosch, AD, GE, Vicon, Honeywell	
Alarm I/O	Input 4ea / Output 2ea (Relay)	
Alarm Triggers	Motion detection, Tampering, Audio Detection, Face Detecton	
Alarm events	File upload via FTP and E-Mail Notification via E-Mail, TCP and HTTP local storage(SD/SDHC/SDXC) or NAS recording at Network disconnected & Event (Alarm Triggers) External output	
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)	

Network		
Ethernet	RJ-45 (10/100BASE-T)	
Video Compression Format	H.264 (MPEG-4 Part 10/AVC), Motion JPEG	
Resolution	1920x1080 / 1280x1024 / 1280x960 / 1280x720 / 1024x768 / 800x600 / 800x450 / 720x576 / 640x480 / 640x360 / 320x240 / 320x180	
Max. Framerate	H.264 : Max 60fps at all resolutions Motion JPEG : 1920x1080 / 1280x1024 / 1280x960 / 1280x720 / 1024x768 : Max. 15 fps 800x600/800x450/720x576/640x480/640x360/320x240/320x180 : Max. 30fps	
Smart Codec	0	
Video Quality Adjustment	H.264 : Compression Level, Target Bitrate Level Control MJPEG : Quality Level Control	
Bitrate Control Method	H.264 : CBR or VBR, Motion 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	
Edge Storage	SD/SDHC/SDXC slot for supporting memory card - motion Images recorded in the SD/SDHC/SDXC memory card can be downloaded. Instant Recording to the local PC NAS(Network Attached Storage)	
Application Programming Int	ONVIF Profile S SUNAPI (HTTP API) 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.8~11), 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, SSM	
Environmental		
Operating Temperature / Humidity	-10°C ~ +55°C(+14°F ~ +131°F) / Less than 90% RH	AC24V : -50°C ~ +55°C (-58°F ~ +131°F) / Less than 90% RH PoE+ : -30°C ~ +55°C (-22°F ~ +131°F) / Less than 90% RH
Storage Temperature / Humidity	-30°C ~ +60°C (-22°F ~ +140°F) / Less than 90% RH	-60°C ~ +60°C (-76°F ~ +140°F) / Less than 90% RH
Ingress Protection	-	IP66
Vandal Resistance	IK10 (with SHP-3701H : using IK10 accessory housing)	IK10
Electrical		
Input Voltage / Current	AC24V±10%,PoE+(IEEE802.3at,Class3)	
Power Consumption	20W MAX	25W Max(DC Heater On), 65W Max(AC24V & DC Heater On)
Mechanical		
Color / Material	Ivory / Plastic + Metal	
Dimension (WxHxD)	Ø152.0 x H218.0 mm	Ø220.0 x H293.6 mm
Weight	1.8kg	3.2kg

4.2 Product description

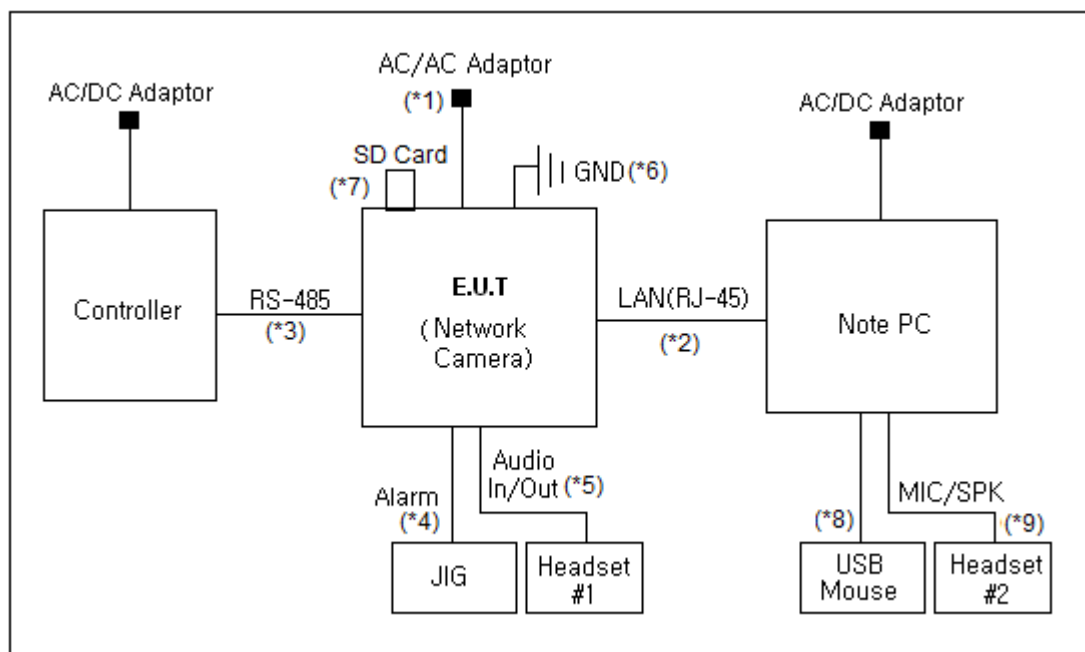
Type of product	Network Camera
Model name (Basic)	SNP-6321HP
Model name (Variant)	SNP-L6233HP
Difference	Buyer model name.
Trade name	-
Serial no	Engineering Sample
Testing voltage	AC 24 V, PoE
Product rating	AC 24 V, PoE
Internal clock frequency	Above 108 MHz
Note	* AC/AC Adaptor was not provided by the manufacturer. * PoE Switch was not provided by the manufacturer.

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Note PC	NT271B5E	JGFE91DF600046D	SAMSUNG
USB Mouse	1088	8165906051010	Microsoft
Headset #1	ES-303	-	inkel
Headset #2	SHS-250V	-	SAMSUNG
Controller	WTX-1300		Wonwoo
JIG	-	-	-
SD Card(2GB)	-	-	-
AC/AC Adaptor (AC 24 V)	DLA24300SKA	-	Dream Electronics
PoE Switch	-	-	-

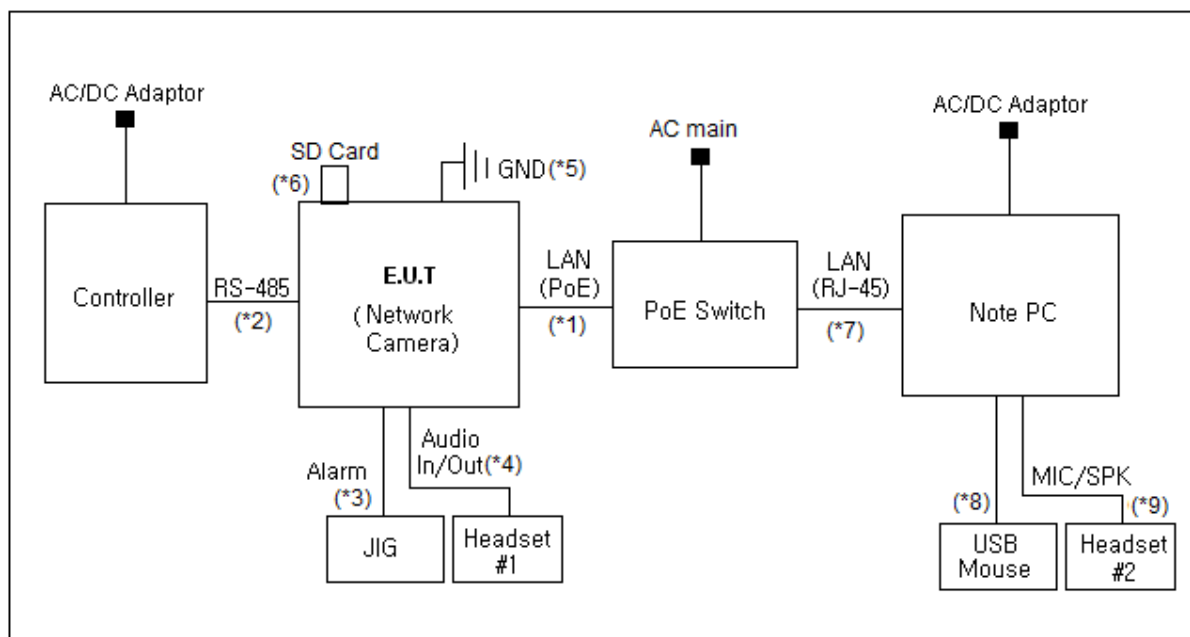
4.4 Test configuration

#1- AC 24V



Note *	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT (Network Camera)	Power	AC/AC Adaptor	Power	1.6	Non-Shield
2		LAN(RJ-45)	Note PC	LAN(RJ-45)	3.0	Non-Shield
3		RS-485	Controller	RS-485	3.0	Non-Shield
4		Alarm	JIG	Alarm	3.0	Non-Shield
5		Audio In/Out	Headset #1	Audio In/Out	3.0	Non-Shield
6		GND	GND	GND	2.0	Non-Shield
7		SD Card	SD Card	SD Card	Direct	-
8	Note PC	USB	USB Mouse	USB	1.8	Shield
9		MIC/SPK	Headset #2	MIC/SPK	2.0	Non-Shield

#2- 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		RS-485	Controller	RS-485	3.0	Non-Shield
3		Alarm	JIG	Alarm	3.0	Non-Shield
4		Audio In/Out	Headset #1	Audio In/Out	3.0	Non-Shield
5		GND	GND	GND	2.0	Non-Shield
6		SD Card	SD Card	SD Card	Direct	-
7	Note PC	LAN(RJ-45)	PoE Switch	LAN(RJ-45)	3.0	Non-Shield
8		USB	USB Mouse	USB	1.8	Shield
9		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.
	Ping Test.
	Audio In/Out Test.
	Alarm Test.
	Control Test.
	SD Card recording Test.

* Note: 2 types of powers are available for the product, that are AC 24 V , PoE.

Therefore, tests were performed for 2 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	AS/NZS CISPR 22:2009+A1:2010, Class A	14 Page ~ 20 Page
☒	Radiated Emission	AS/NZS CISPR 22:2009+A1:2010, Class A	21 Page ~ 30 Page

6. Test results

6.1 Conducted Emission

Test specification	AS/NZS CISPR 22:2009+A1:2010, Class A		
Testing voltage	AC 24 V, PoE		
Test facility	Shielded room (CE#1)		
Date	2014. 10. 16		
Temperature (°C)	23.5 °C	Humidity (% R.H.)	27.1 % R.H.
Remarks	Complied		

6.1.1 Limits of conducted emission measurement

☐ AC main

Frequency MHz	Class A $\text{dB}\mu\text{V}$		Class B $\text{dB}\mu\text{V}$	
	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 $\text{dB}\mu\text{V}$		Current Limits $\text{dB}\mu\text{A}$	
	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 $\text{dB}\mu\text{V}$		Current Limits $\text{dB}\mu\text{A}$	
	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 $20 \log_{10} 150/I = 44 \text{ dB}$).

6.1.2 Measurement procedure

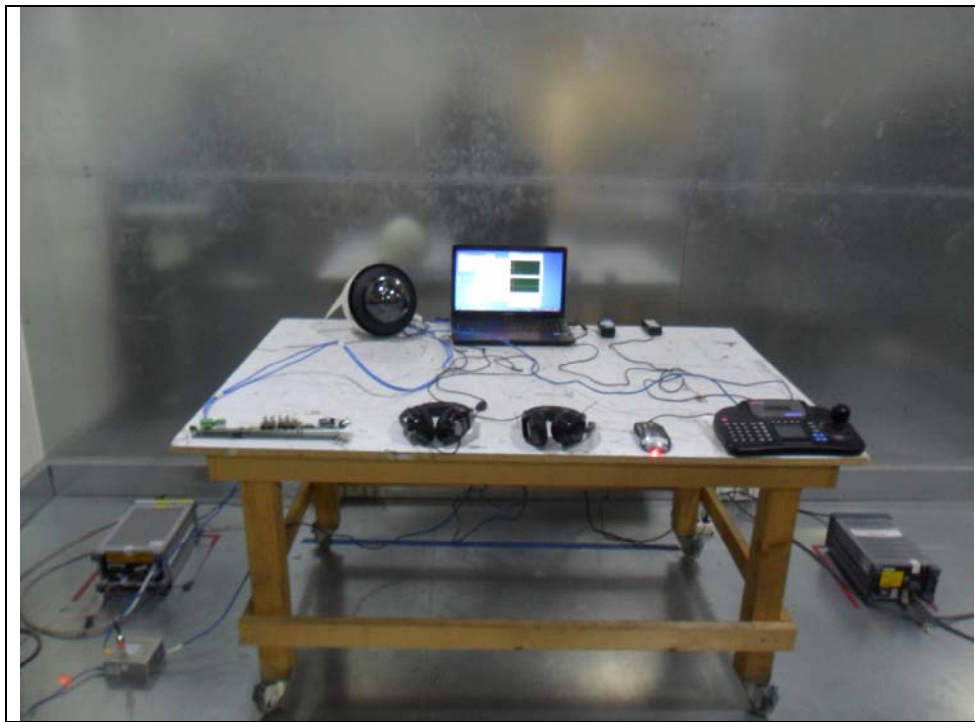
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground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

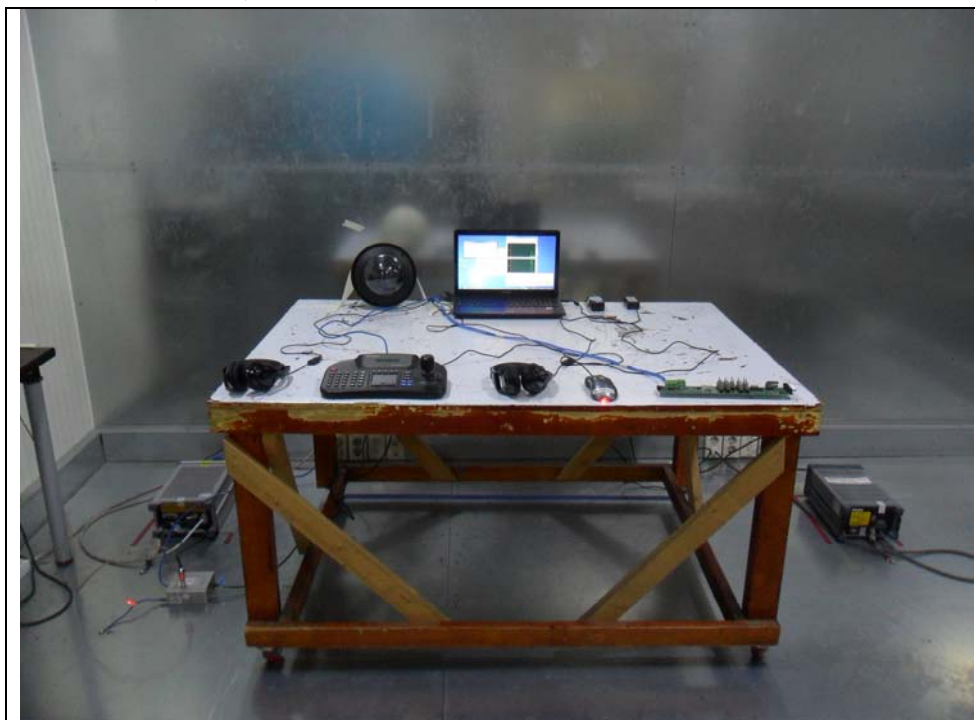
Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESCI7	100732	R&S	2015.01.27	☐
Test Receiver	ESCI	100001	R&S	2015.07.14	☒
Test Receiver	ESCI	100710	R&S	2015.10.13	☐
TWO-LINE V-NETWORK	ENV216	101358	R&S	2015.10.02	☒
TWO-LINE V-NETWORK	ESH3-Z5	100267	R&S	2015.06.24	☒
8-WIRE ISN	NTFM 8158 CAT5	CAT5-8158-0028	SCHWARZBECK	2015.03.07	☒
8-WIRE ISN	NTFM 8158 CAT3	CAT3-8158-0020	SCHWARZBECK	2015.03.07	☐

6.1.4 Photographs of test setup

* Telecommunication(#1-AC 24V)



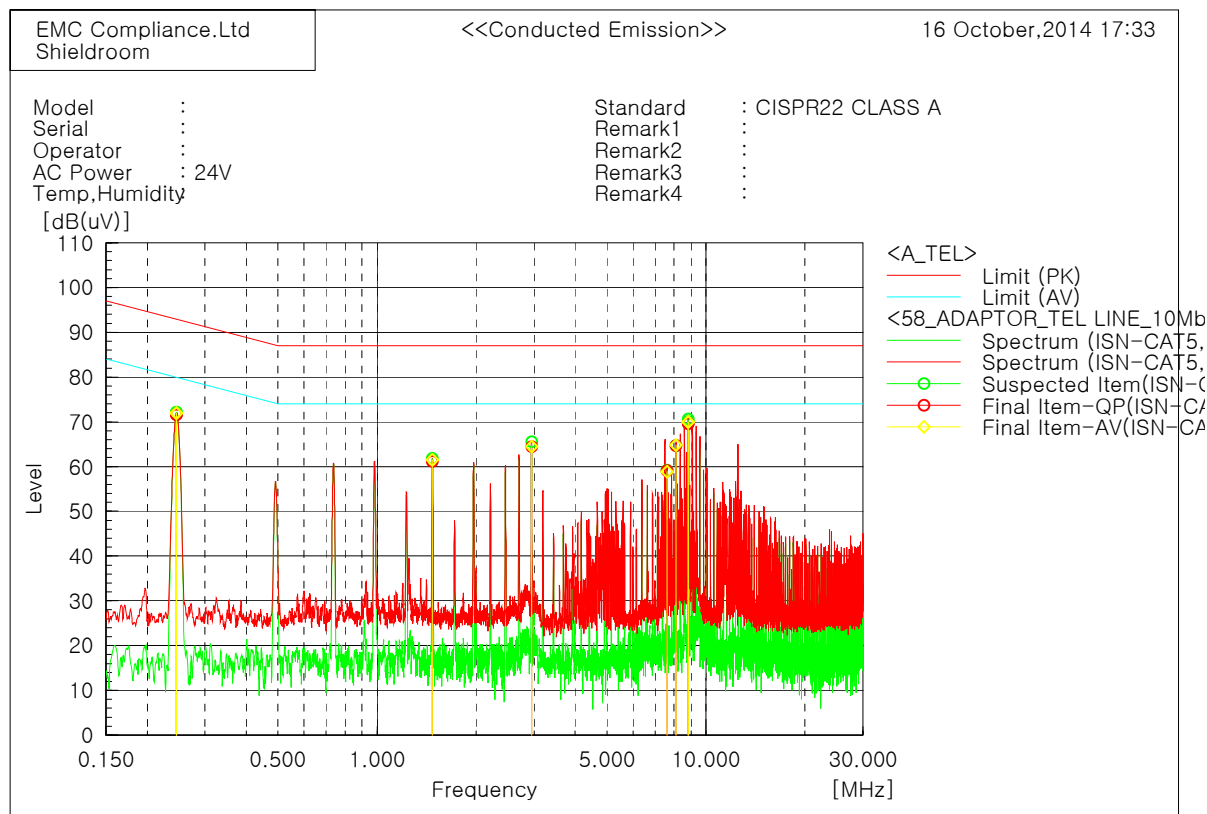
* Telecommunication(#2-PoE)



6.1.5 Conducted emission measurement result

* Telecommunication port

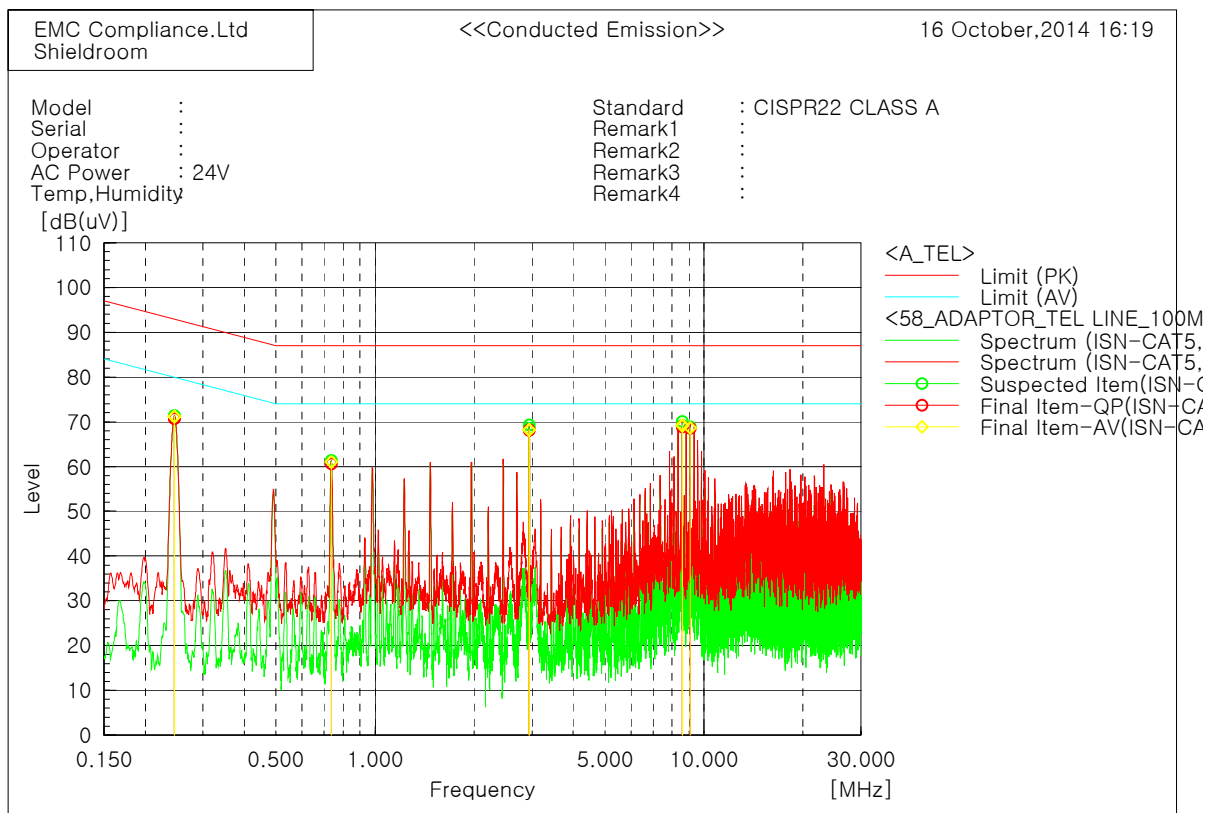
LCL 65 dB (LAN Port)_10 Mbps (SNP-6321HP)_#1-AC 24V



Final Result

--- ISN-CAT5 Phase ---											
No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV	
	[MHz]	[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]	
1	0.24576	61.7	62.0	9.9	71.6	71.9	92.9	79.9	21.3	8.0	
2	0.24578	61.7	62.0	9.9	71.6	71.9	92.9	79.9	21.3	8.0	
3	1.47425	51.4	51.8	9.7	61.1	61.5	87.0	74.0	25.9	12.5	
4	2.94839	54.8	54.7	9.7	64.5	64.4	87.0	74.0	22.5	9.6	
5	7.61678	49.5	49.3	9.6	59.1	58.9	87.0	74.0	27.9	15.1	
6	8.10763	55.1	55.2	9.6	64.7	64.8	87.0	74.0	22.3	9.2	
7	8.84481	60.0	60.3	9.6	69.6	69.9	87.0	74.0	17.4	4.1	
8	8.84496	60.0	60.3	9.6	69.6	69.9	87.0	74.0	17.4	4.1	

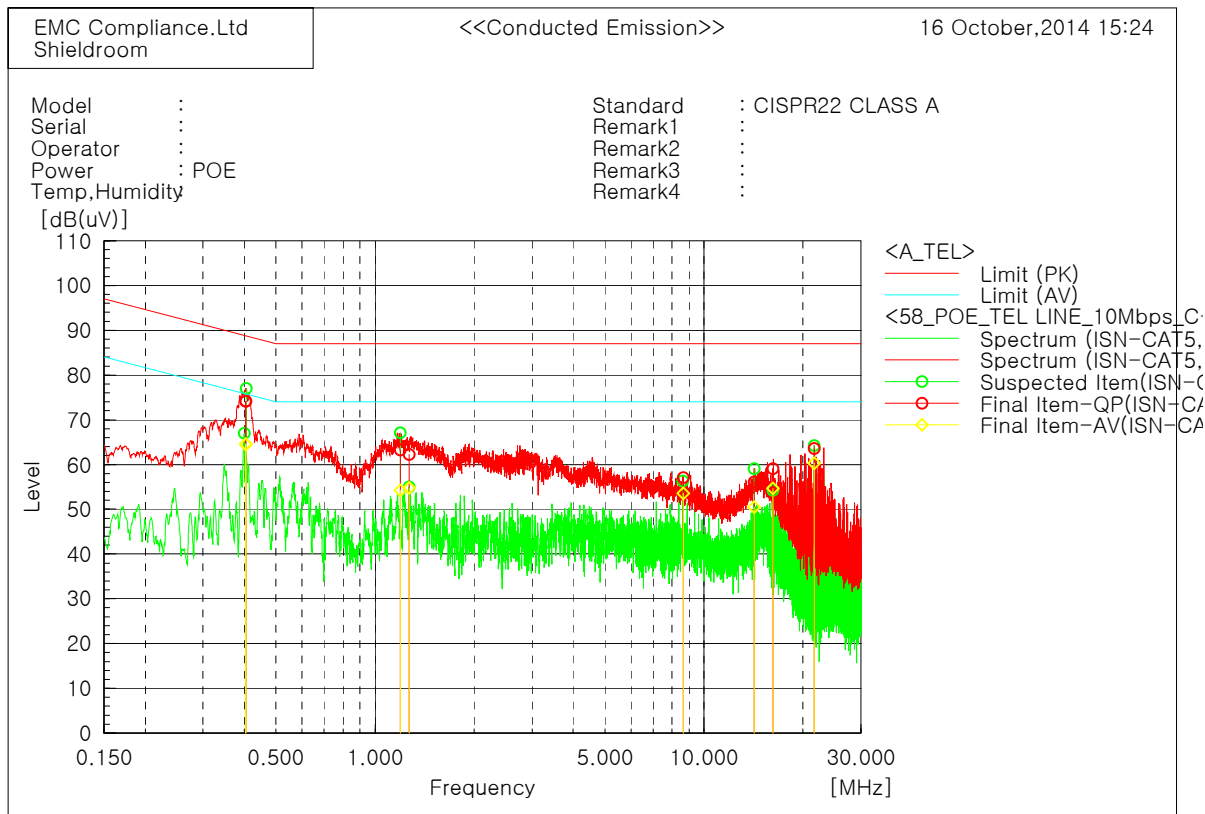
LCL 65 dB (LAN Port)_100 Mbps (SNP-6321HP)_#1-AC 24V



Final Result

--- ISN-CAT5 Phase ---											
No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV	
	[MHz]	[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]	
1	0.24546	60.9	61.2	9.9	70.8	71.1	92.9	79.9	22.1	8.8	
2	0.2455	60.9	61.2	9.9	70.8	71.1	92.9	79.9	22.1	8.8	
3	0.736	50.9	51.3	9.7	60.6	61.0	87.0	74.0	26.4	13.0	
4	2.94446	58.4	58.5	9.7	68.1	68.2	87.0	74.0	18.9	5.8	
5	2.94494	58.5	58.5	9.7	68.2	68.2	87.0	74.0	18.8	5.8	
6	8.59047	59.4	59.7	9.6	69.0	69.3	87.0	74.0	18.0	4.7	
7	8.59086	59.3	59.5	9.6	68.9	69.1	87.0	74.0	18.1	4.9	
8	9.08162	58.9	59.0	9.6	68.5	68.6	87.0	74.0	18.5	5.4	

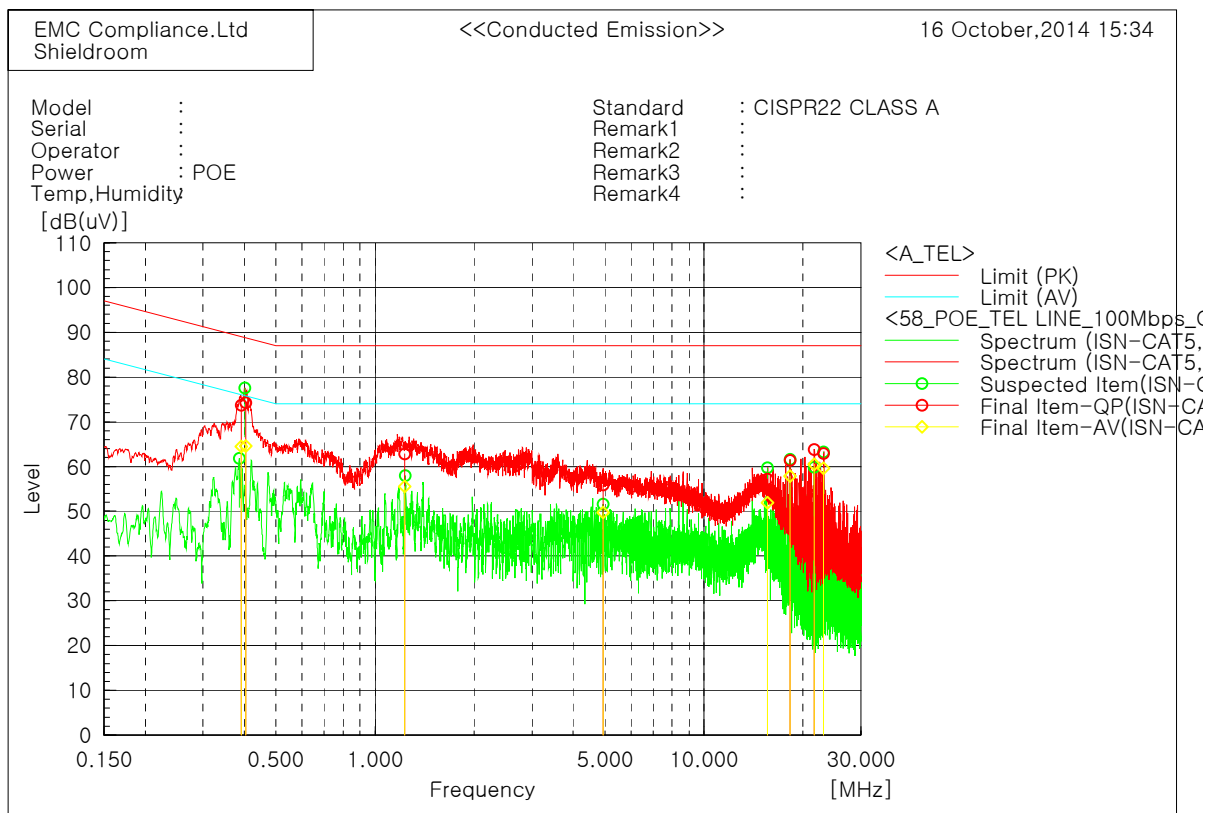
LCL 65 dB (LAN Port)_10 Mbps (SNP-6321HP)_#2-PoE



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	0.40405	64.6	55.0	9.5	74.1	64.5	88.8	75.8	14.7	11.3
2	0.4045	64.7	55.0	9.5	74.2	64.5	88.8	75.8	14.6	11.3
3	1.19375	53.8	44.8	9.4	63.2	54.2	87.0	74.0	23.8	19.8
4	1.26852	52.9	45.4	9.4	62.3	54.8	87.0	74.0	24.7	19.2
5	8.63597	47.7	44.1	9.4	57.1	53.5	87.0	74.0	29.9	20.5
6	14.21409	46.6	40.9	9.5	56.1	50.4	87.0	74.0	30.9	23.6
7	16.16747	49.5	45.2	9.5	59.0	54.7	87.0	74.0	28.0	19.3
8	21.66354	54.0	50.6	9.6	63.6	60.2	87.0	74.0	23.4	13.8

LCL 65 dB (LAN Port)_100 Mbps (SNP-6321HP)_#2-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	0.39157	64.2	55.0	9.5	73.7	64.5	89.0	76.0	15.3	11.5
2	0.40416	64.7	55.0	9.5	74.2	64.5	88.8	75.8	14.6	11.3
3	1.23247	53.4	46.2	9.4	62.8	55.6	87.0	74.0	24.2	18.4
4	4.93698	46.5	40.3	9.4	55.9	49.7	87.0	74.0	31.1	24.3
5	15.61621	47.7	42.4	9.5	57.2	51.9	87.0	74.0	29.8	22.1
6	18.24371	51.9	48.3	9.5	61.4	57.8	87.0	74.0	25.6	16.2
7	21.66301	54.2	50.9	9.6	63.8	60.5	87.0	74.0	23.2	13.5
8	23.12865	53.4	50.0	9.6	63.0	59.6	87.0	74.0	24.0	14.4

6.2 Radiated Emission

Test specification	AS/NZS CISPR 22:2009+A1:2010, Class A		
Testing voltage	AC 24 V, PoE		
Test facility	10 m Chamber (#F2, #F4)		
Test distance	10 m, 3 m		
Date	2014. 10. 17 ~ 10. 20		
Temperature (°C)	20.1 ~ 21.7 °C	Humidity (% R.H.)	30.7 ~ 50.0 % R.H.
Remarks	Complied		

6.2.1 Limits of radiated emission measurement

☒ Limits below 1 GHz

Frequency MHz	Class A dB μ V/m @ 10 m	Class B dB μ V/m @ 10 m
30 ~ 230	40	30
230 ~ 1 000	47	37

☒ Limits above 1 GHz

Frequency MHz	Class A @ 3 m		Class B @ 3 m	
	Average limit dB μ V/m	Peak limit dB μ V/m	Average limit dB μ V/m	Peak limit dB μ V/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

* 30 MHz ~ 1 GHz

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
Test Receiver	ESR	101078	R&S	2015.02.24	☒
Bi-Log Antenna	VULB 9168	440	SCHWARZBECK	2016.08.28	☒
Amplifier	310N	284608	SONOMA INSTRUMENT	2015.04.16	☒
3 dB Attenuator	8491B	22981	HP	2015.03.04	☒
Antenna Mast	MA4000-EP	303	Innco Systems	-	☒
Turn Table	DT2000S-1t	079	Innco Systems	-	☒

* 1 GHz ~ 6 GHz

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
Test Receiver	ESCI7	100732	R&S	2015.01.27	☒
Antenna Mast	AM4.0	079/3440509	MATURO	-	☒
Turn Table	CO2000-SOFT	-	MATURO	-	☒
Preamplifier	8449B	3008A01802	AGILENT	2015.08.05	☒
Horn ANT	3115	00086706	ETS	2015.09.01	☒

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

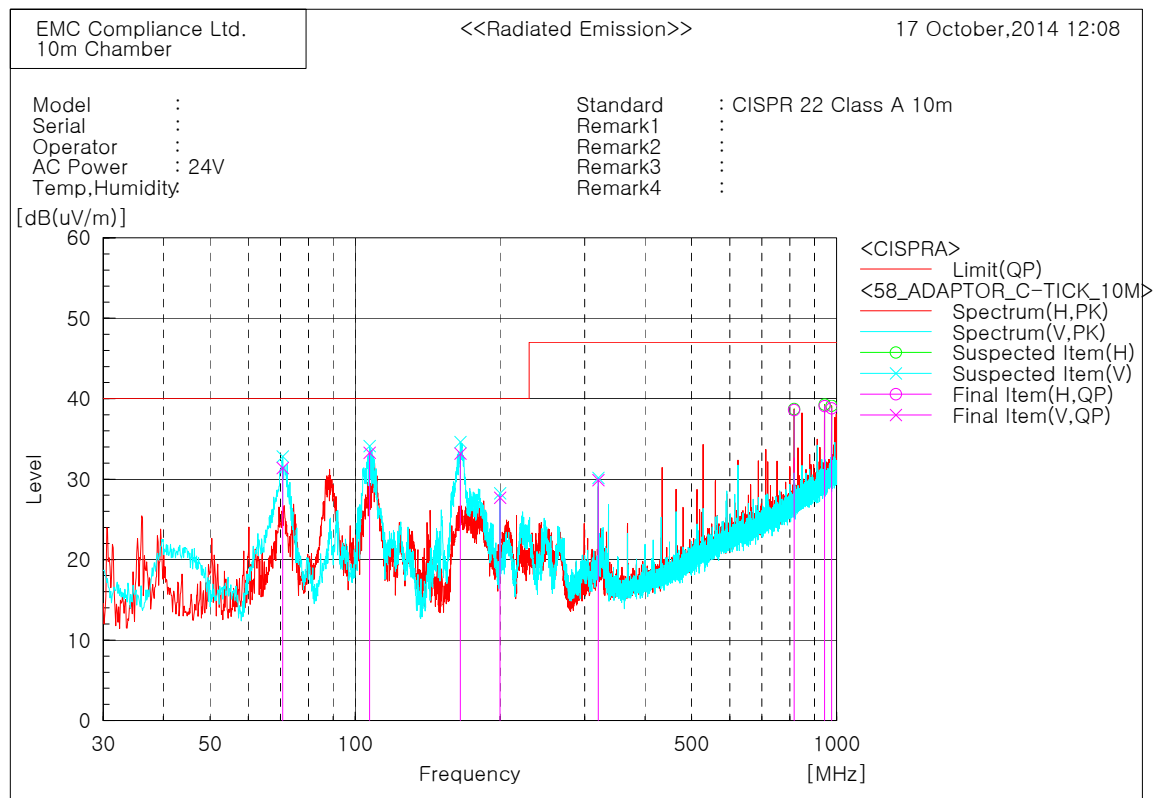
The result is

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

6.2.6 Radiated emission measurement result

* Graph and Data

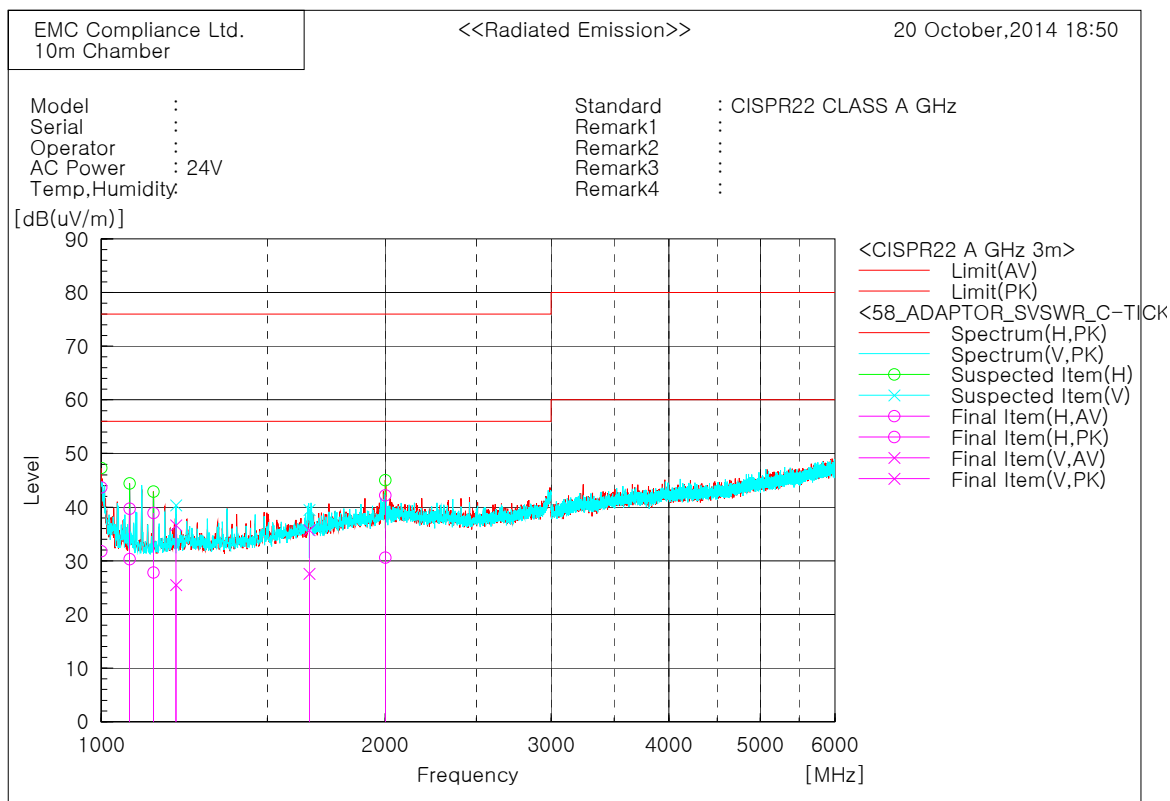
* 30 MHz ~ 1 GHz (SNP-6321HP)_#1- AC 24V



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	70.740	V	46.1	-14.7	31.4	40.0	8.6	100.0	32.4
2	107.115	V	49.2	-15.9	33.3	40.0	6.7	100.0	290.2
3	165.558	V	45.2	-12.0	33.2	40.0	6.8	100.0	171.2
4	199.993	V	42.3	-14.6	27.7	40.0	12.3	100.0	24.8
5	320.030	V	39.4	-9.5	29.9	47.0	17.1	100.0	2.3
6	816.064	H	35.9	2.7	38.6	47.0	8.4	100.0	259.6
7	944.104	H	33.8	5.3	39.1	47.0	7.9	100.0	136.0
8	976.114	H	32.9	5.9	38.8	47.0	8.2	100.0	143.6

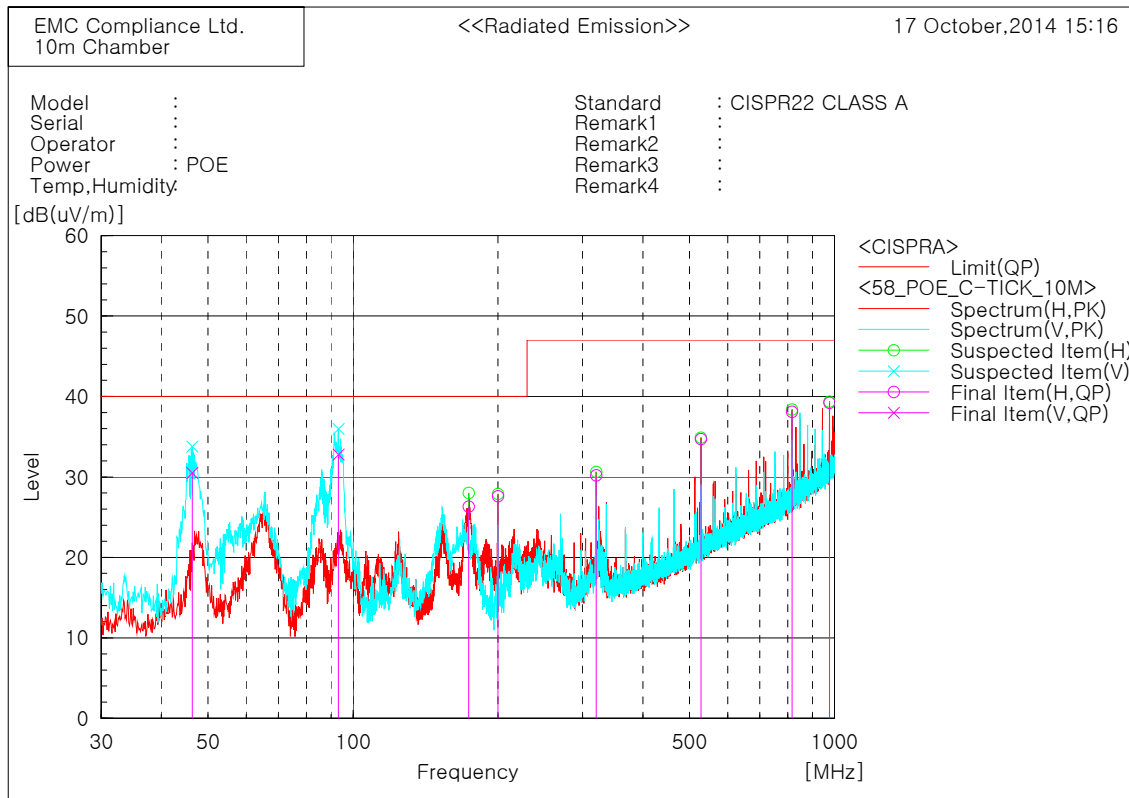
* 1 GHz ~ 6 GHz (SNP-6321HP)_#1- AC 24V



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	1000.000	H	42.5	54.4	-10.7	31.8	43.7	56.0	76.0	24.2	32.3	100.0	179.3
2	1071.875	H	40.7	50.1	-10.4	30.3	39.7	56.0	76.0	25.7	36.3	100.0	168.0
3	1135.625	H	37.8	48.9	-10.0	27.8	38.9	56.0	76.0	28.2	37.1	100.0	208.1
4	1200.000	V	35.2	46.3	-9.7	25.5	36.6	56.0	76.0	30.5	39.4	100.0	230.1
5	1661.875	V	33.4	41.5	-5.8	27.6	35.7	56.0	76.0	28.4	40.3	100.0	158.7
6	2001.250	H	33.6	45.2	-3.0	30.6	42.2	56.0	76.0	25.4	33.8	100.0	168.0

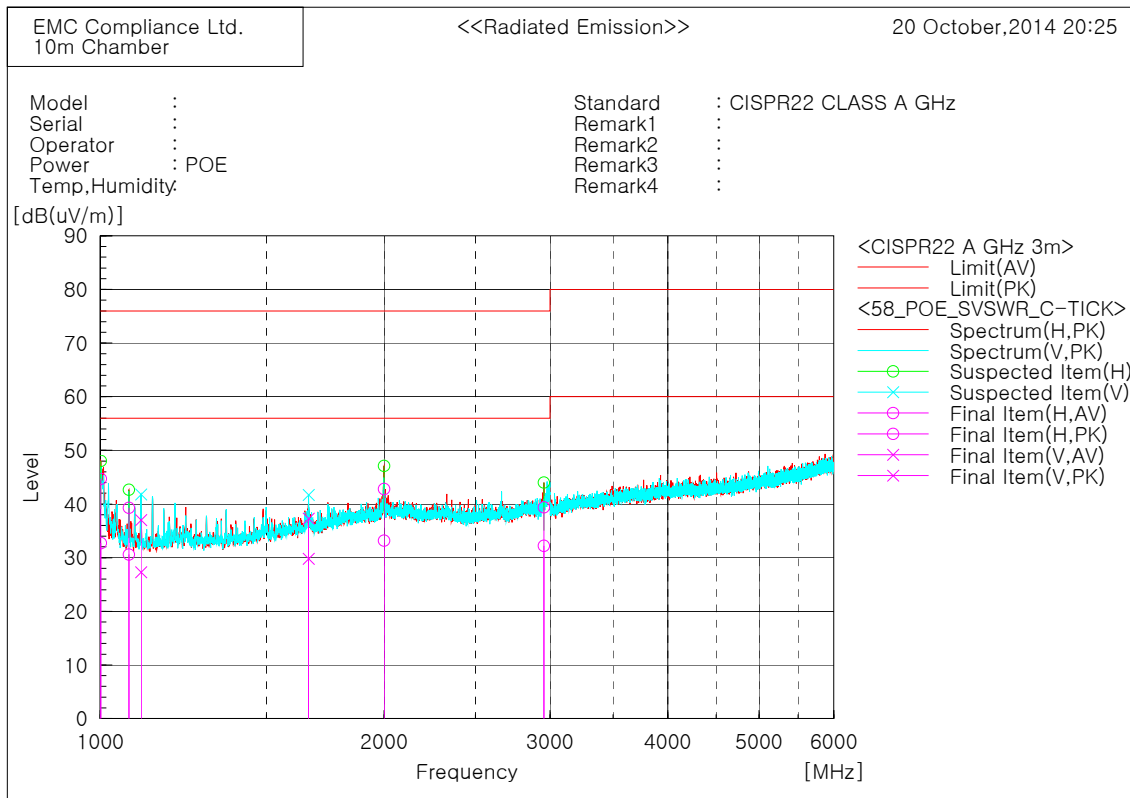
* 30 MHz ~ 1 GHz (SNP-6321HP)_#2- PoE



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	46.369	V	43.7	-13.2	30.5	40.0	9.5	100.0	315.1
2	93.293	V	50.8	-18.0	32.8	40.0	7.2	100.0	155.2
3	173.924	H	38.9	-12.6	26.3	40.0	13.7	400.0	165.7
4	199.993	H	42.2	-14.6	27.6	40.0	12.4	400.0	238.1
5	320.030	H	39.7	-9.5	30.2	47.0	16.8	400.0	102.3
6	527.974	H	38.1	-3.4	34.7	47.0	12.3	100.0	338.9
7	816.064	H	35.4	2.7	38.1	47.0	8.9	100.0	213.8
8	976.114	H	33.3	5.9	39.2	47.0	7.8	100.0	141.4

* 1 GHz ~ 6 GHz (SNP-6321HP)_#2- PoE

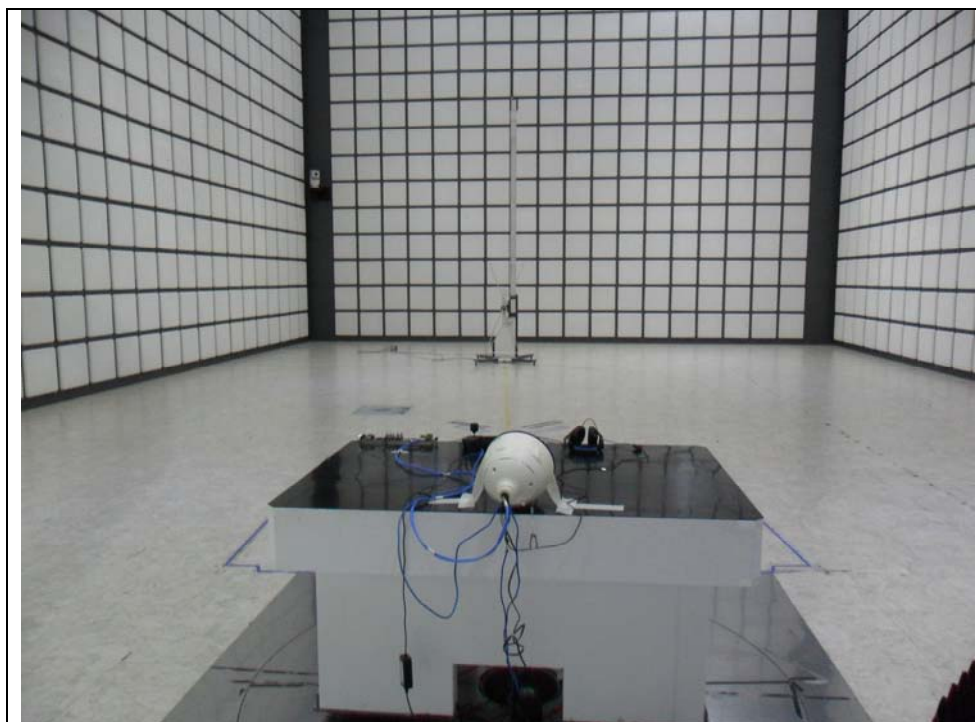
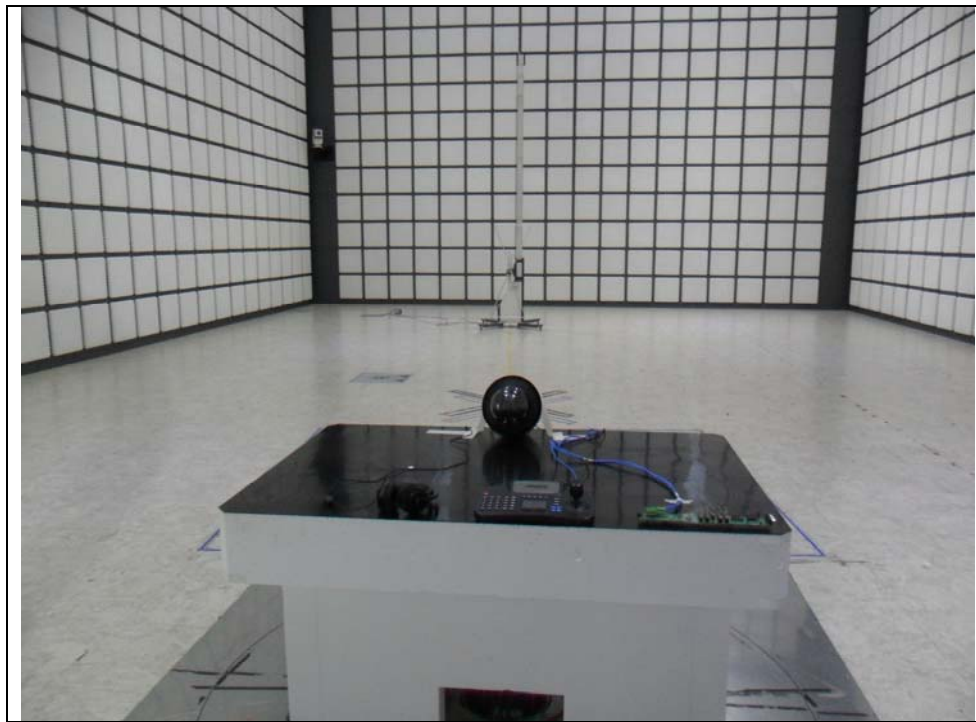


Final Result

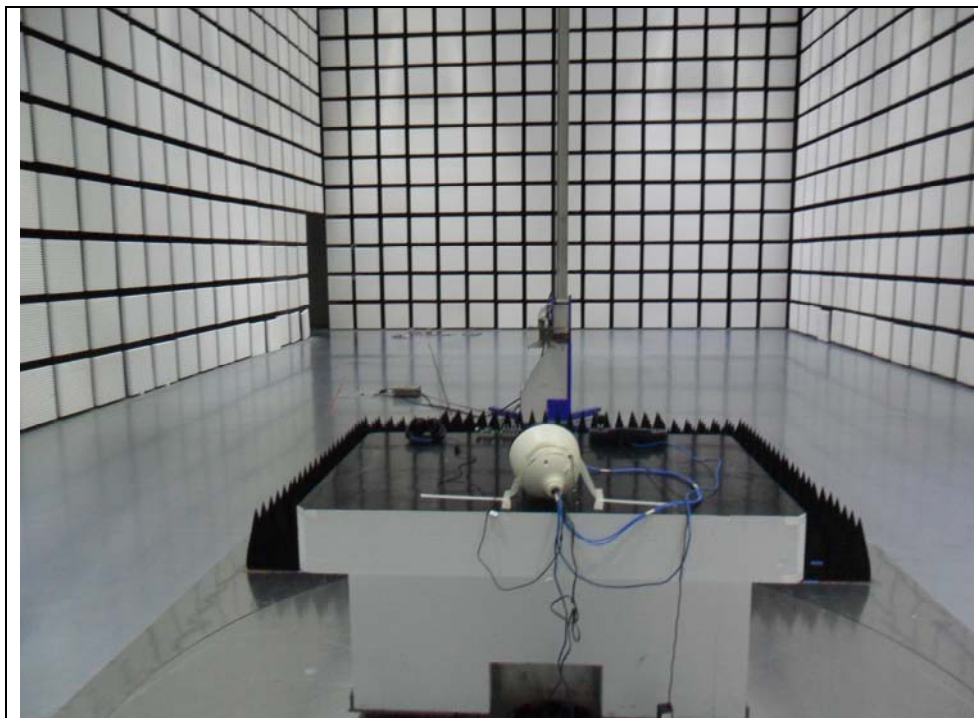
No.	Frequency [MHz]	(P)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	c.f [dB(1/m)]	Result AV [dB(uV/m)]	Result PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [deg]
1	1001.250	H	43.4	55.4	-10.7	32.7	44.7	56.0	76.0	23.3	31.3	100.0	349.4
2	1072.500	H	41.0	49.7	-10.4	30.6	39.3	56.0	76.0	25.4	36.7	100.0	337.3
3	1104.375	V	37.5	47.2	-10.2	27.3	37.0	56.0	76.0	28.7	39.0	100.0	11.3
4	1663.125	V	35.6	43.1	-5.8	29.8	37.3	56.0	76.0	26.2	38.7	100.0	342.9
5	1999.375	H	36.2	45.8	-3.0	33.2	42.8	56.0	76.0	22.8	33.2	100.0	324.4
6	2955.000	H	33.8	41.0	-1.6	32.2	39.4	56.0	76.0	23.8	36.6	100.0	72.4

6.2.5 Photographs of test setup

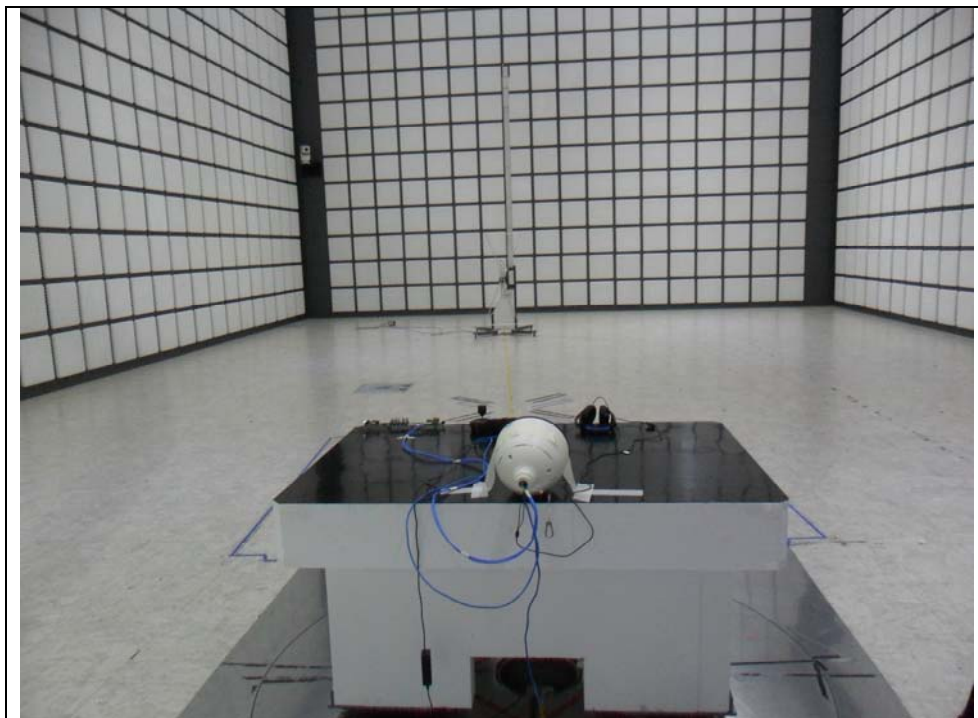
* 30 MHz ~ 1 GHz (#1-AC 24V)



* 1 GHz ~ 6 GHz (#1- AC 24V)



* 30 MHz ~ 1 GHz (#2-PoE)



* 1 GHz ~ 6 GHz (#2-PoE)



7. E.U.T. photographs

Front View



Rear View



Left View



Right View



Top View



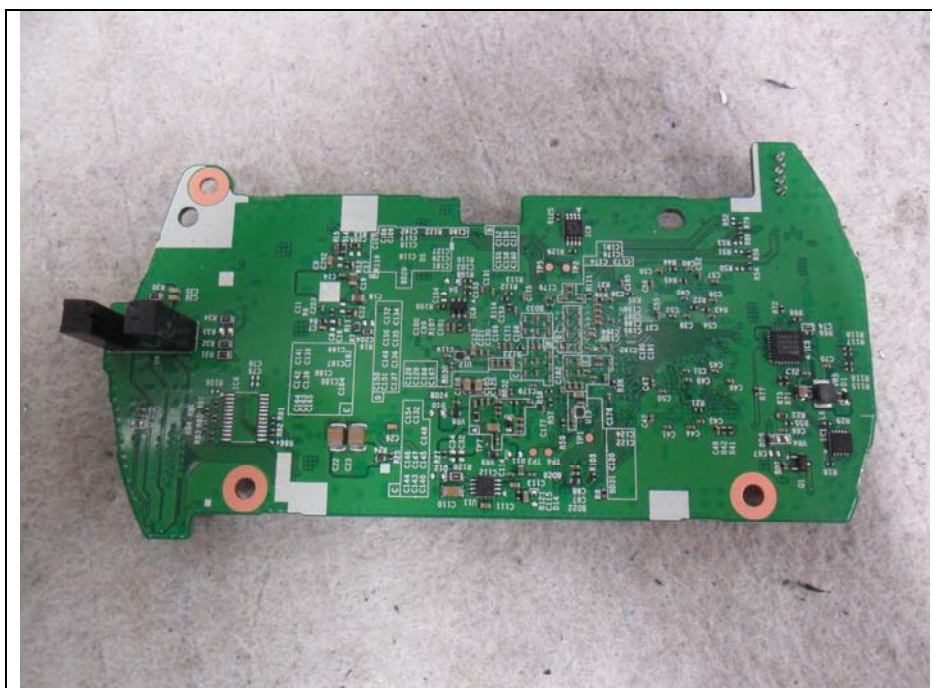
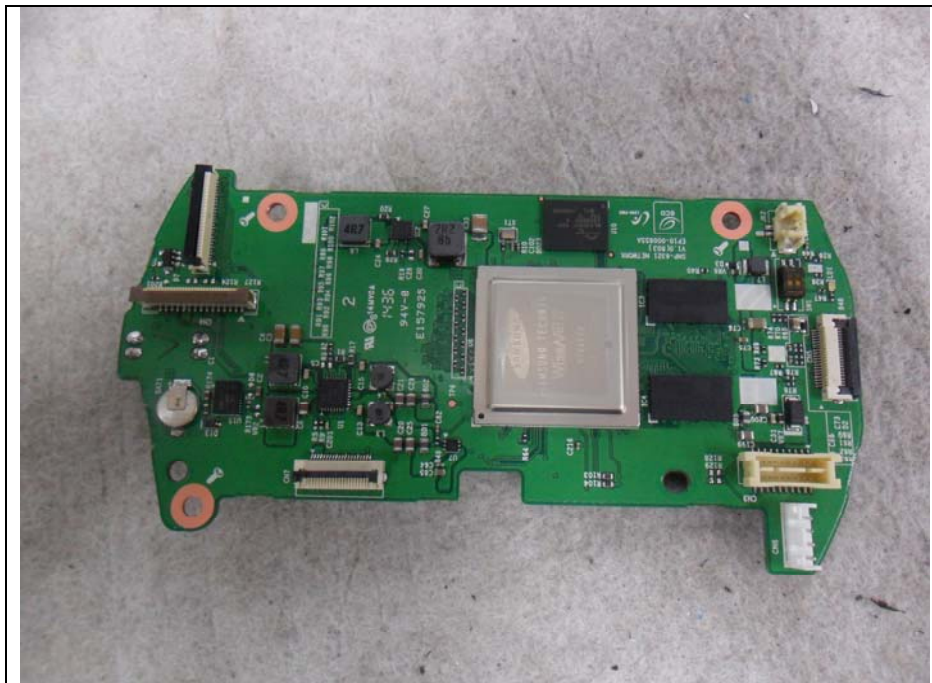
Bottom View



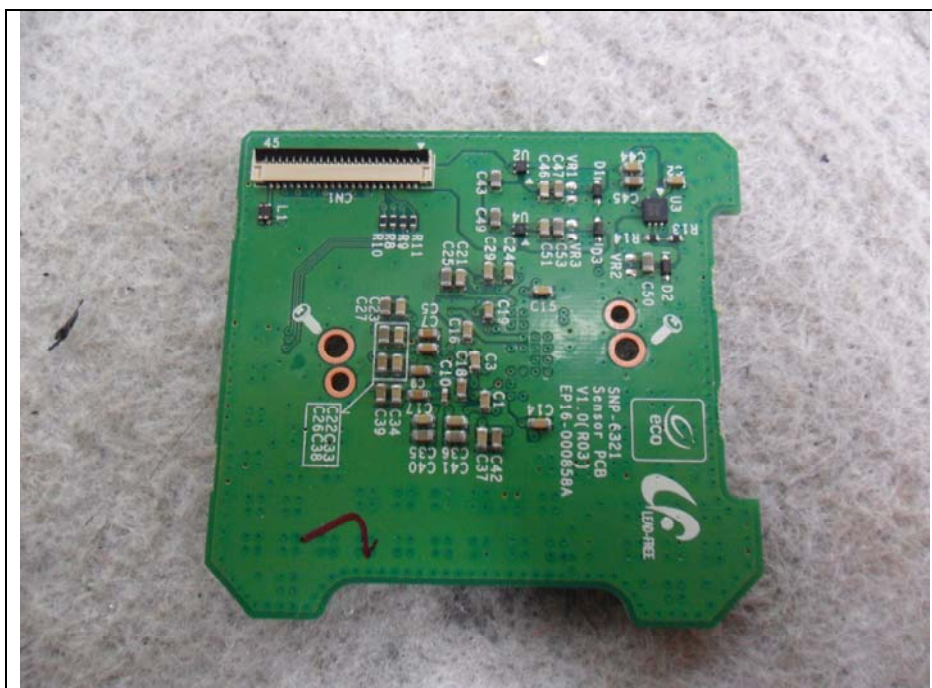
Inside



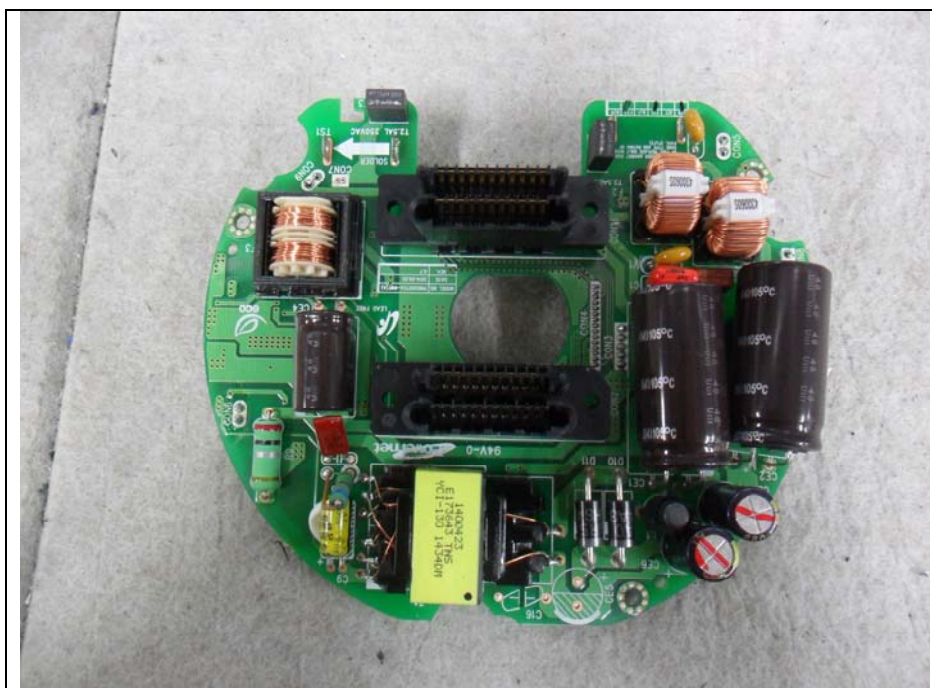
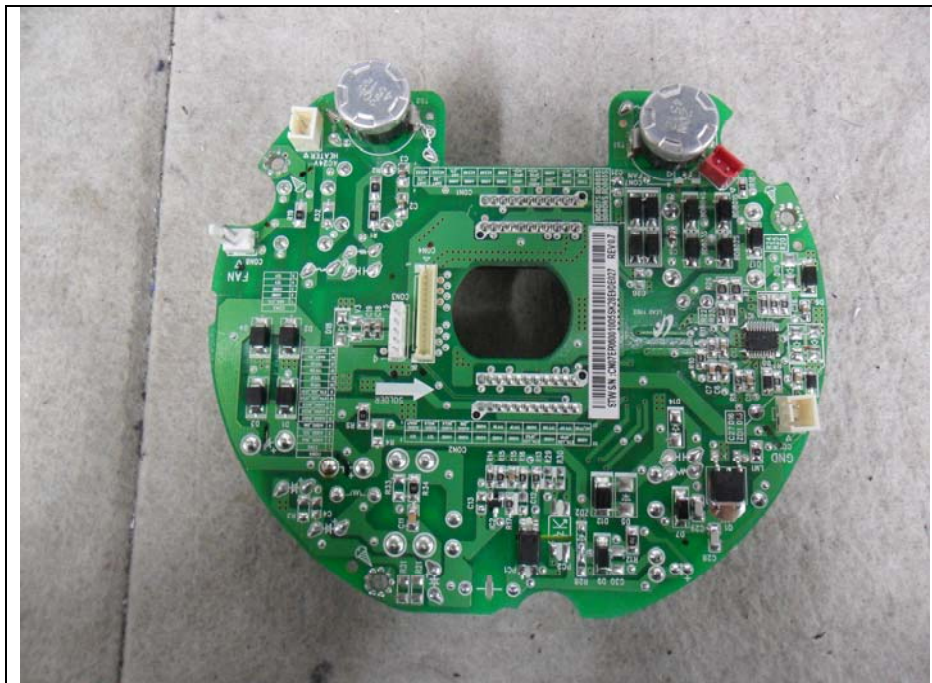
Main Board



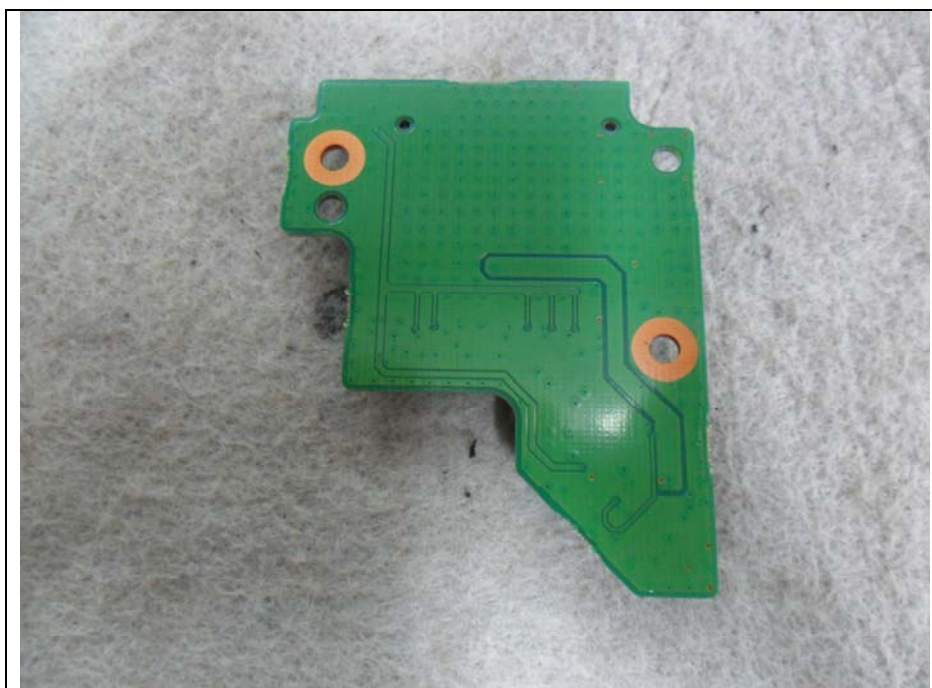
CCD Board



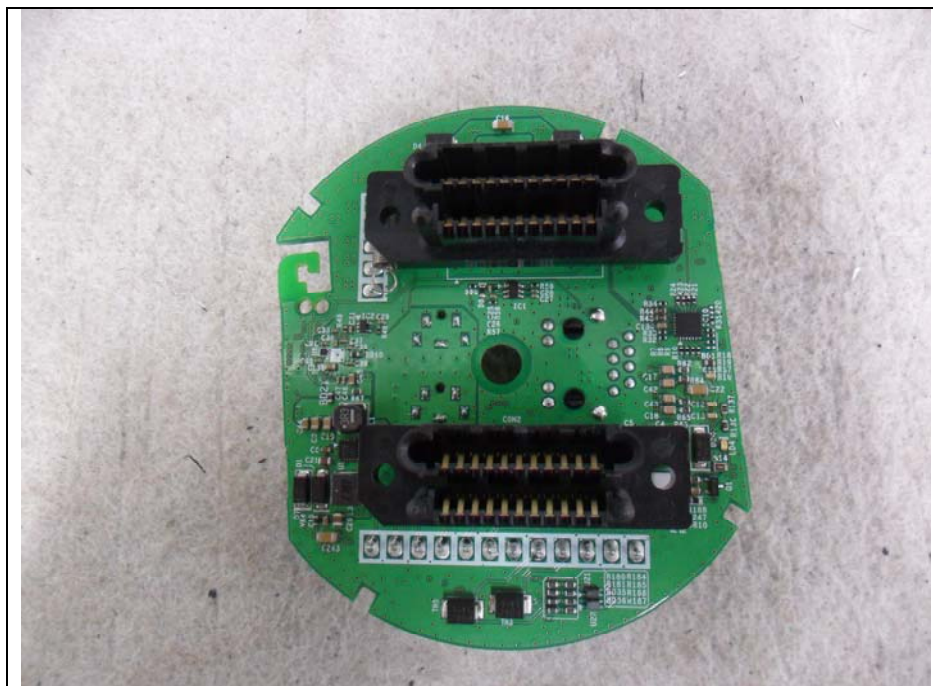
SUB Board #1



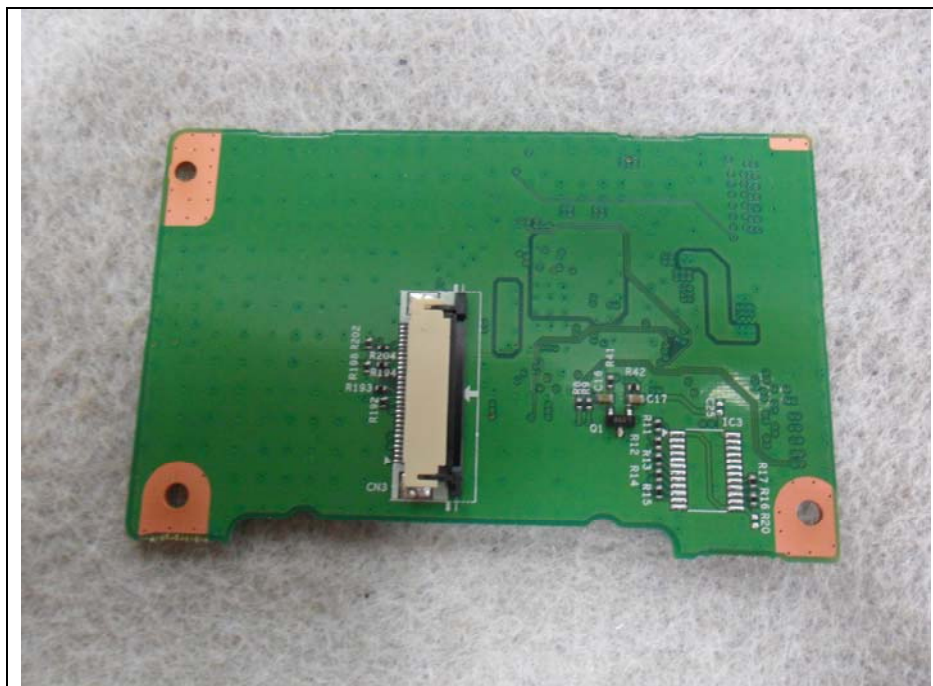
SUB Board #2



Interface Board



Drive Board



TILT Board

