

EMC TEST REPORT

Test report No : EMC-VCCI-E0421
Type of Equipment : Network Camera
Model Name : SNP-5321N
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.

Date of receipt: 2015. 01. 26

Date of testing: 2015. 01. 31 ~ 02. 02

Issued date: 2015. 02. 09

Tested by:


LYU, JUNG-GIL

Approved by:


BEAK, JEONG-SOO

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1. Applicant information

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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 70 5008 1021

Facsimile Number: 82 505 299 8311

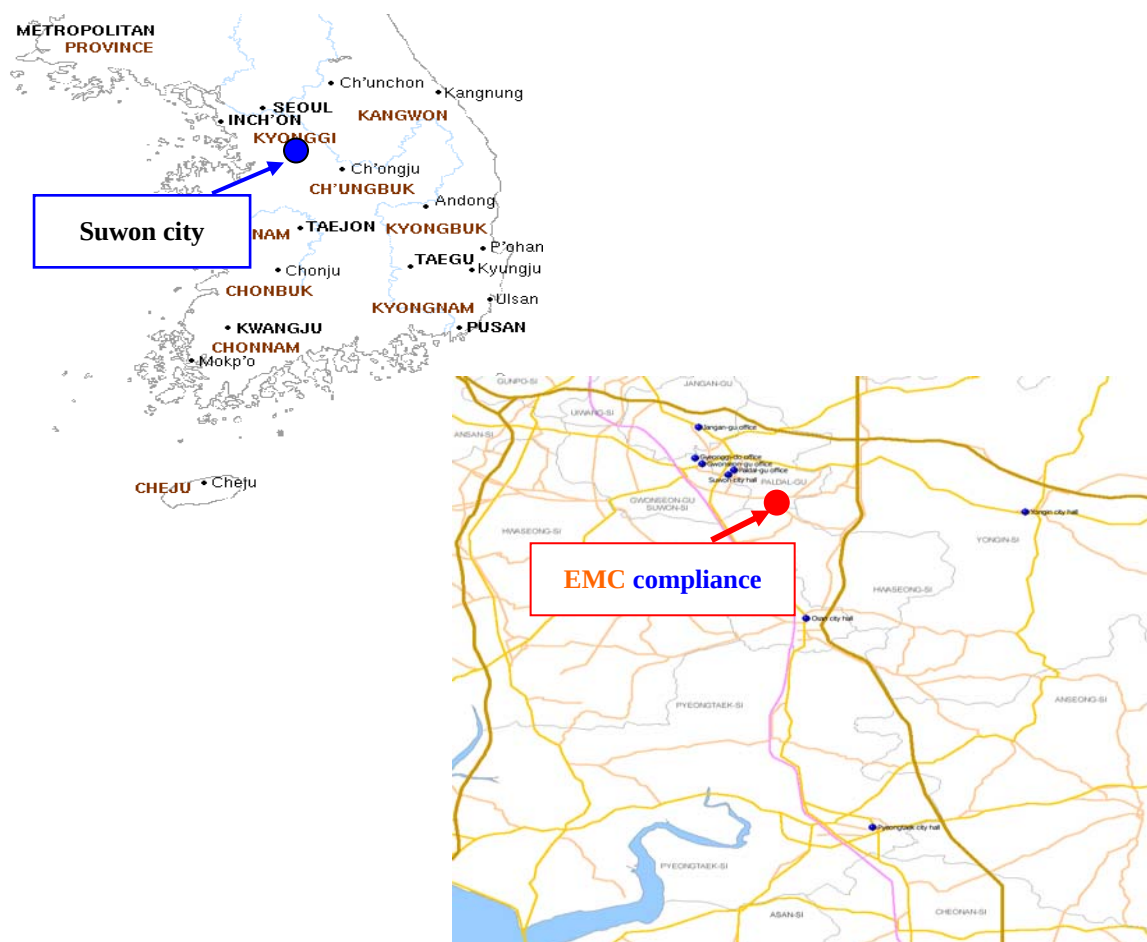
FCC Site Designation No: KR0040, FCC Site Registration No: 687132

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)	: 20.6 °C	18.4 % R.H.	-
Shielded room(CE)	: 22.7 °C	14.8 % 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	± 3.75 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: + 5.20 dB, - 5.31 dB 10 m: + 5.19 dB, - 5.30 dB
	300 MHz ~ 1 000 MHz	3 m: + 6.56 dB, - 6.65 dB 10 m: + 6.45 dB, - 6.64 dB
	1 GHz ~ 6 GHz	3 m: + 6.70 dB, - 6.81 dB
10 m Chamber (#F2)	30 MHz ~ 300 MHz	3 m: + 5.21 dB, - 5.32 dB 10 m: + 5.20 dB, - 5.31 dB
	300 MHz ~ 1 000 MHz	3 m: + 5.82 dB, - 5.91 dB 10 m: + 5.69 dB, - 5.91 dB
	1 GHz ~ 6 GHz	3 m: + 6.28 dB, - 6.30 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

Video	SNP-5321	SNP-5321H
Imaging Device	1/3" Progressive Scan CMOS	
Total Pixels	1,312(H) x 1,069(V), 1.40M	
Effective Pixels	1,305(H) x 1,049(V), 1.37M	
Scanning System	Progressive	
Min. Illumination	Color : 0.2 Lux (1/30sec, F1.6, 50IRE, AGC High), 0.005 Lux (2sec, F1.6, 50IRE, AGC High) B/W : 0.02 Lux (1/30sec, F1.6, 50IRE AGC High), 0.0005 Lux(2sec, F1.6, 50IRE, AGC High) Color : 0.1 Lux (1/30sec, F1.6, 30IRE), 0.0025 Lux (2sec, F1.6, 30IRE) B/W : 0.01 Lux (1/30sec, F1.6, 30IRE), 0.00025 Lux (2sec, F1.6, 30IRE)	
S / N Ratio	50dB	
Video Out	CVBS : 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P), for installation	
Lens	SNP-5321	SNP-5321H
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) / V : 36.80°(Wide) ~ 1.26°(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 (E/W/S/N/NE/NW/SE/SW)	
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	SSNR III (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 Threshold 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	
Image Rotation	Flip : On/Off Mirror : On/Off	
Intelligent Video Analytics	Tampering, Virtual Line, Enter/Exit, Appear / Disappear, Audio Detection, Face Detection	
Serial Interface	RS-485 - Samsung-T/E, Pelco-D/P, Panasonic, Bosch, AD, GE, Vicon, Honeywell	
Alarm I/O	Input 4ea / Output 2ea (Relay)	
Alarm Triggers	Motion detection, Tampering, Audio Detection, Face Detecton Video Analytics, Alarm Input, Network Disconnection	
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) Supply voltage: 2.5VDC(4mA), Input impedance: approx. 2K Ohm	
Audio out	Line out (3.5mm mono jack), Max output level: 1 Vrms	

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	O	
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. NAS(Network Attached Storage)	
Application Programming In	ONVIF Profile S SUNAPI (HTTP API) SVNP 1.2 Samsung Camera Application Platform	
Webpage Language	English, French, German, Spanish, Italian, Chinese, 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 Softwa	SmartViewer, SSM	
Environmental	SNP-5321	SNP-5321H
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	-30°C ~ +60°C (-22°F ~ +140°F) / Less than 90% RH
Ingress Protection	-	IP66
Vandal Resistance	SHP-3701H : IK10 housing	IK10
Electrical	SNP-5321	SNP-5321H
Input Voltage / Current	AC24V±10%, PoE+(IEEE802.3at, Class4)	
Power Consumption	20W MAX	PoE+ : 25W Max (AC24V HEATER OFF & PoE HEATER ON), AC 24V : 65W Max (AC24V HEATER ON & PoE HEATER ON)
Mechanical	SNP-5321	SNP-5321H
Color / Material	Ivory / Plastic + Metal	
Dimension (WxHxD)	Ø152.0 x H218.0 mm	Ø223.4 x H293.6 mm
Weight	1.8kg	3.2kg

4.2 Product description

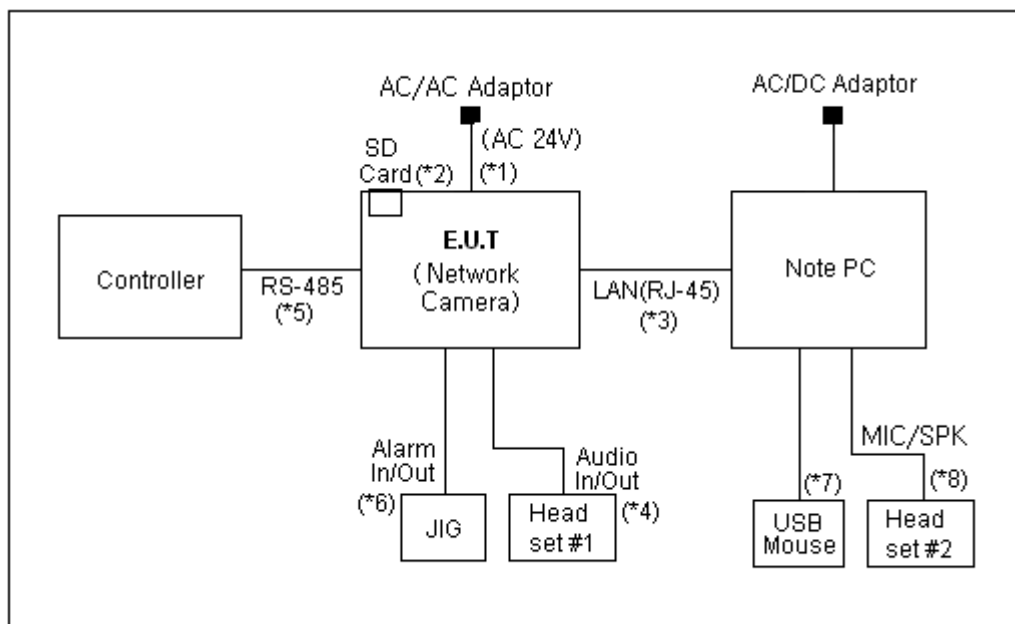
Type of product	Network Camera
Model name (Basic)	SNP-5321N
Model name (Variant)	-
Difference	-
Trade name	-
Serial no	-
Testing voltage	AC 24 V , PoE
Product rating	AC 24 V , PoE
Internal clock frequency	500 MHz
Note	* AC/AC Adaptor was not provided by the manufacturer. * PoE Switch was not provided by the manufacturer.

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Note PC	PSLQ0K-02N005	2A047151Q	TOSHIBA
USB Mouse	1088	8165906050950	Microsoft
Headset #1	SHS-250V	-	SAMSUNG
Headset #2	SHS-250V	-	SAMSUNG
Controller	SCC-1000	EW089028913	SAMSUNG
JIG	-	-	-
SD Card	-	-	-
PoE Switch	FS108P	1DL20C3L00542	NETGEAR
AC/AC Adaptor (AC 24 V)	DLA24300SKA	-	Dream Electronics

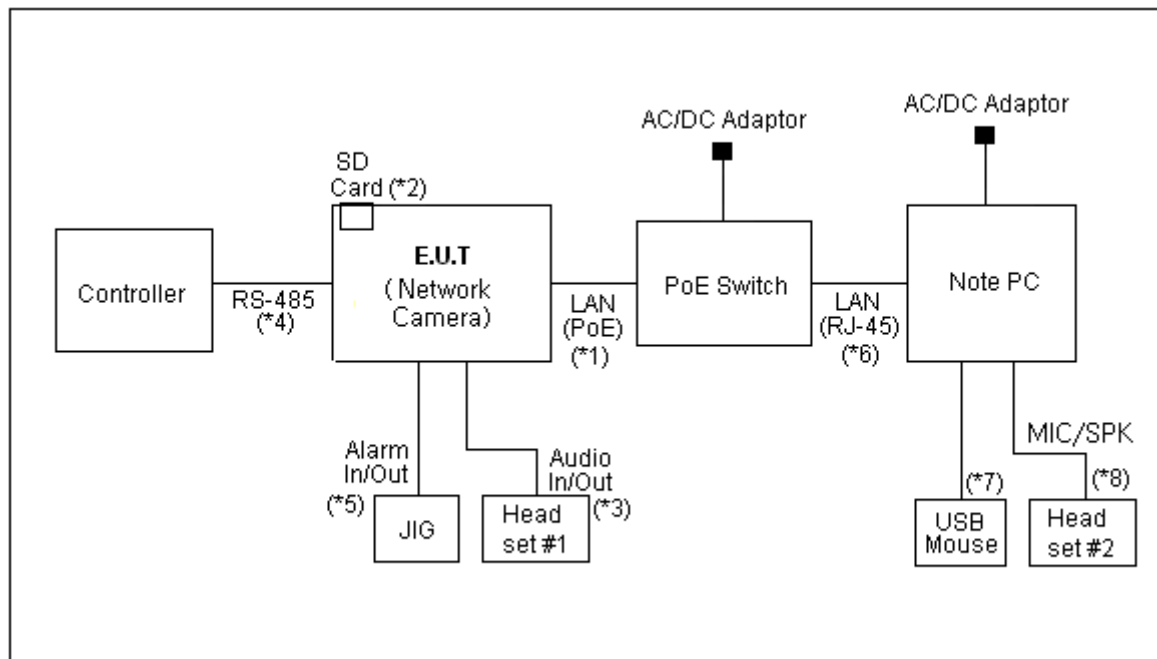
4.4 Test configuration

#1- AC 24 V



Note *	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT (Network Camera)	Power	AC/AC Adaptor	Power	1.5	Non-Shield
2		SD Card	SD Card	SD Card	Direct	-
3		LAN(RJ-45)	Note PC	LAN(RJ-45)	3.0	Non-Shield
4		Audio In/Out	Headset #1	Audio In/Out	3.0	Non-Shield
5		RS-485	Controller	RS-485	3.0	Non-Shield
6		Alarm In/Out	JIG	Alarm In/Out	3.0	Non-Shield
7	Note PC	USB	USB Mouse	USB	1.6	Shield
8		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)	1.5	Non-Shield
2		SD Card	SD Card	SD Card	Direct	-
3		Audio In/Out	Headset #1	Audio In/Out	3.0	Non-Shield
4		RS-485	Controller	RS-485	3.0	Non-Shield
5		Alarm In/Out	JIG	Alarm In/Out	3.0	Non-Shield
6	Note PC	LAN(RJ-45)	PoE Switch	LAN(RJ-45)	3.0	Non-Shield
7		USB	USB Mouse	USB	1.6	Shield
8		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.
	Alarm In/Out test.
	Audio In/Out test.
	RS-485 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	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	AC 24 V, PoE		
Test facility	Shielded room (CE#1)		
Date	2015. 02. 02		
Temperature (°C)	22.7 °C	Humidity (% R.H.)	14.8 % 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.

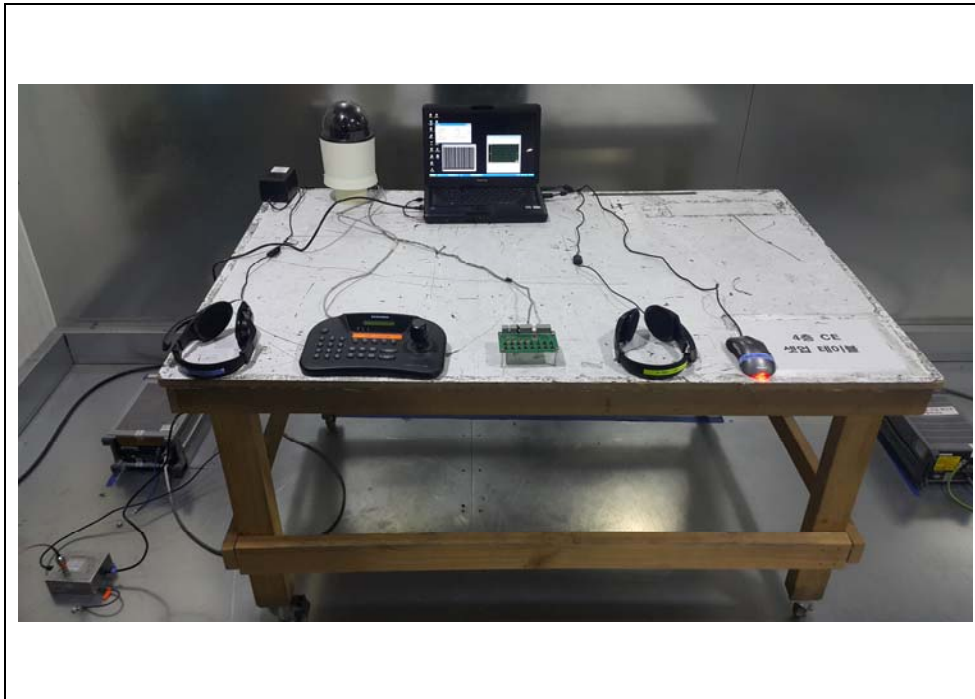
6.1.3 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESCI7	100732	R&S	2016.01.20	☐
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



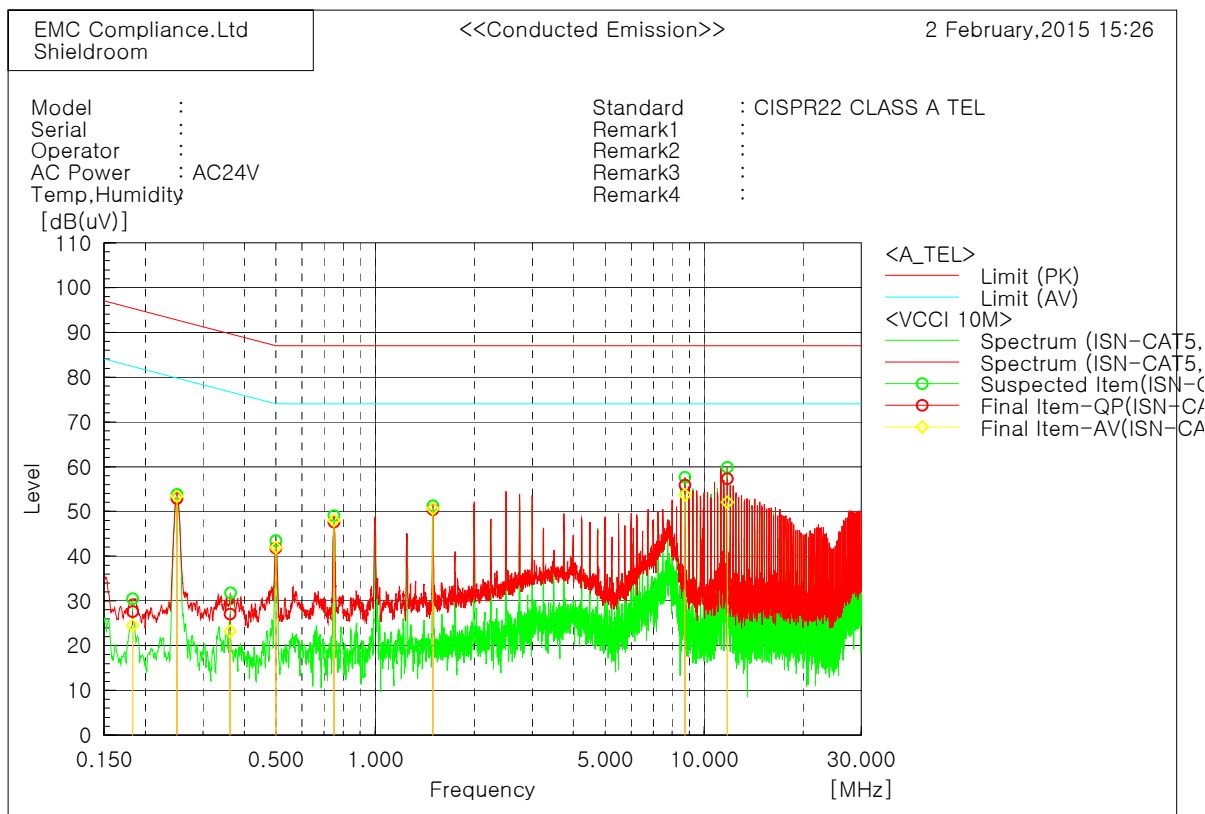
#2- PoE



6.1.5 Conducted emission measurement result

* Telecommunication port

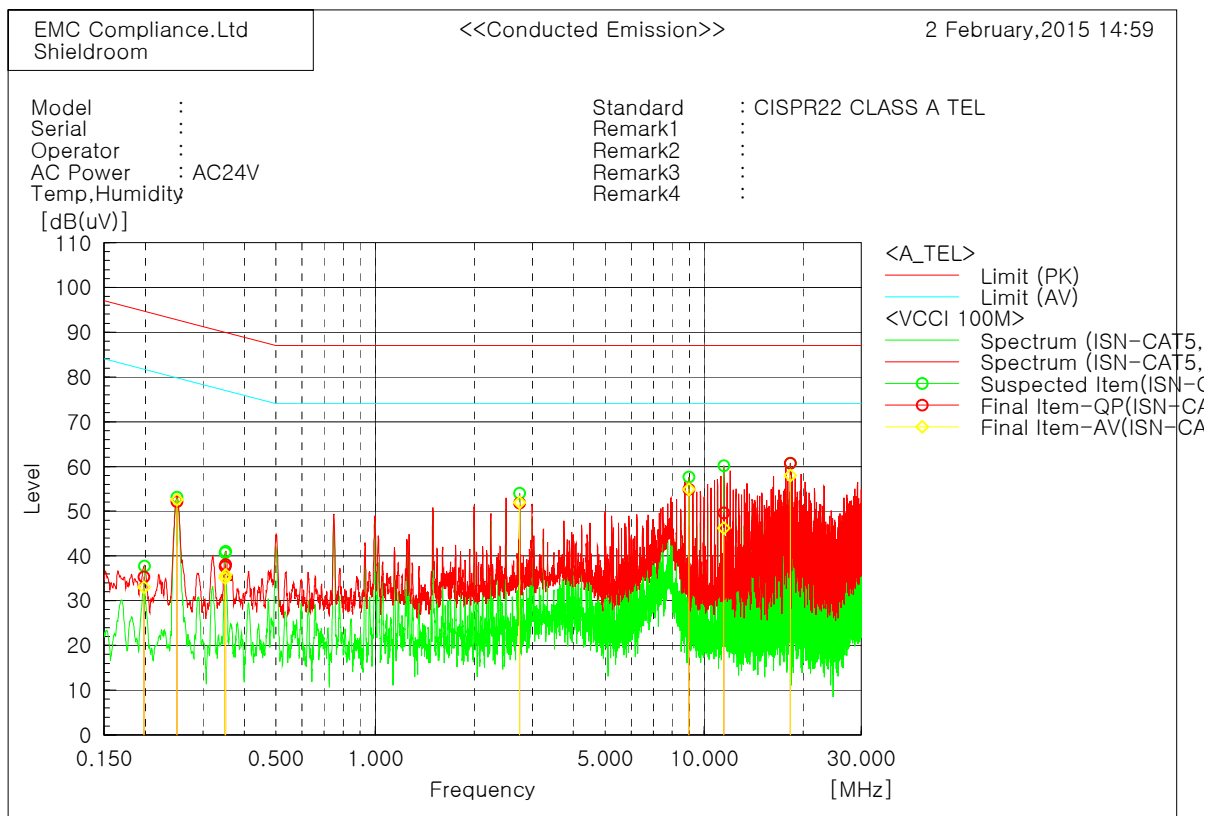
LAN Port (LCL 65 dB)_10 Mbps (SNP-5321N)_#1- AC 24V



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]	Remark
1	0.18316	17.5	14.4	10.1	27.6	24.5	95.3	82.3	67.7	57.8	
2	0.24953	43.1	43.4	9.9	53.0	53.3	92.8	79.8	39.8	26.5	
3	0.36285	17.2	13.4	9.8	27.0	23.2	89.7	76.7	62.7	53.5	
4	0.49963	31.9	32.1	9.8	41.7	41.9	87.0	74.0	45.3	32.1	
5	0.74942	37.9	38.2	9.7	47.6	47.9	87.0	74.0	39.4	26.1	
6	1.49899	40.7	40.9	9.7	50.4	50.6	87.0	74.0	36.6	23.4	
7	8.74358	46.3	44.1	9.6	55.9	53.7	87.0	74.0	31.1	20.3	
8	11.74281	47.7	42.4	9.6	57.3	52.0	87.0	74.0	29.7	22.0	

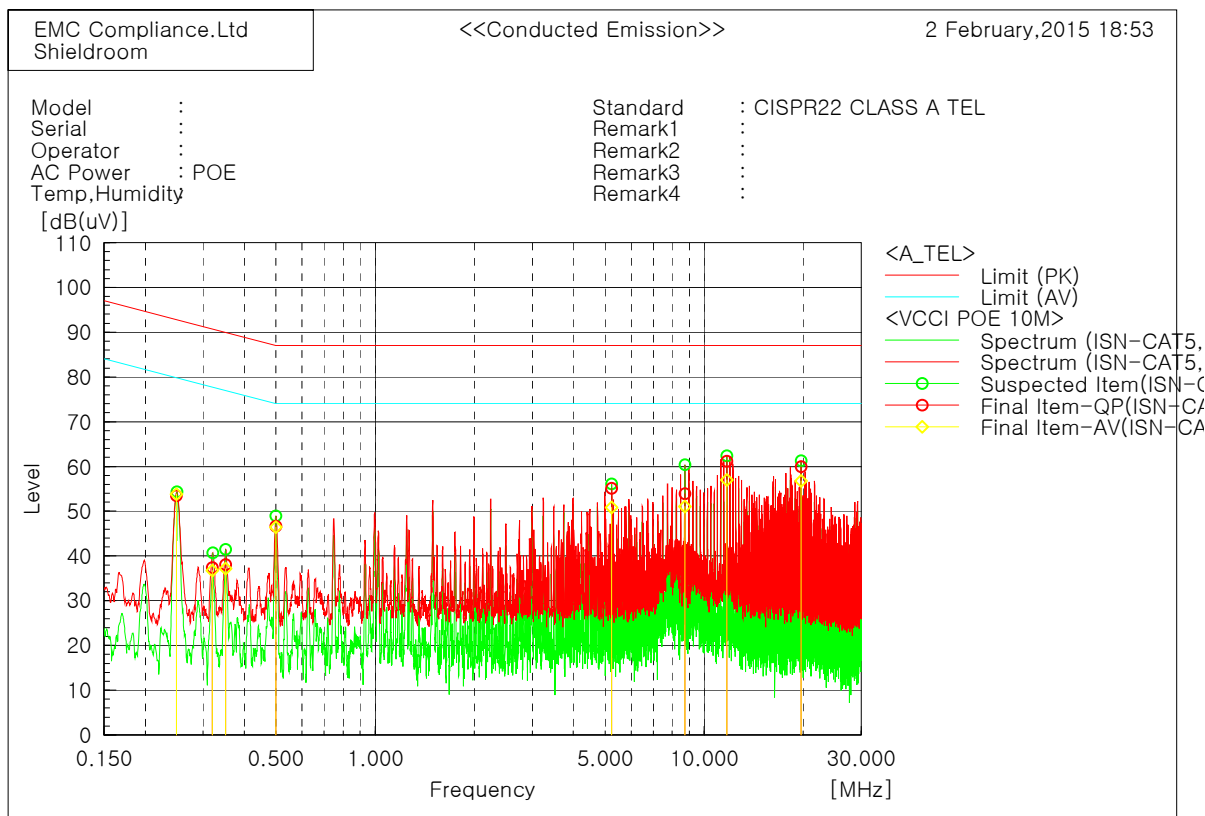
LAN Port (LCL 65 dB)_100 Mbps (SNP-5321N)_#1- AC 24V



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]	Remark
1	0.19822	25.3	23.0	10.0	35.3	33.0	94.7	81.7	59.4	48.7	
2	0.24971	42.3	42.6	9.9	52.2	52.5	92.8	79.8	40.6	27.3	
3	0.35076	28.2	25.8	9.9	38.1	35.7	89.9	76.9	51.8	41.2	
4	0.35017	27.7	25.2	9.9	37.6	35.1	90.0	77.0	52.4	41.9	
5	2.74758	42.2	42.3	9.6	51.8	51.9	87.0	74.0	35.2	22.1	
6	8.99099	45.3	45.3	9.6	54.9	54.9	87.0	74.0	32.1	19.1	
7	11.48791	40.0	36.6	9.6	49.6	46.2	87.0	74.0	37.4	27.8	
8	18.24341	51.1	48.3	9.7	60.8	58.0	87.0	74.0	26.2	16.0	

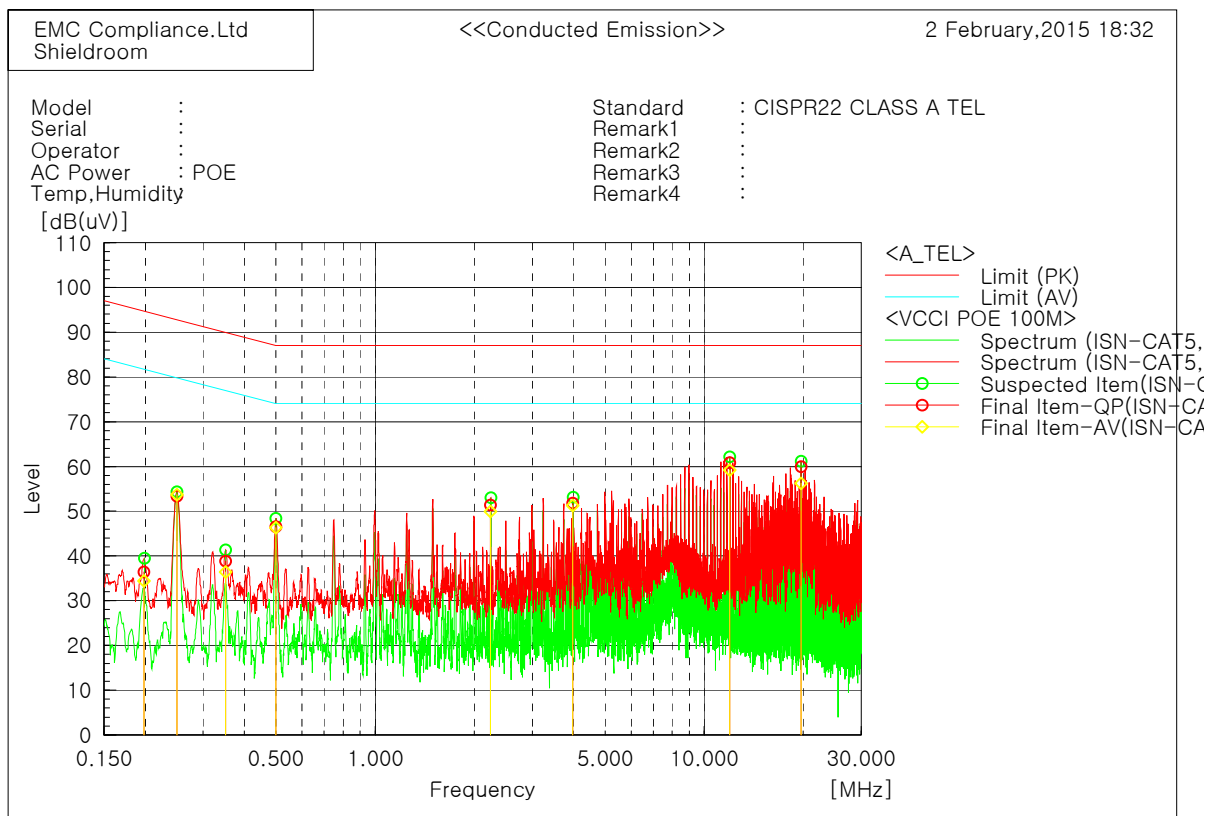
LAN Port (LCL 65 dB)_10 Mbps (SNP-5321N)_# 2- PoE



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]	Remark
1	0.24922	43.5	43.9	9.9	53.4	53.8	92.8	79.8	39.4	26.0	
2	0.31965	27.5	26.9	9.9	37.4	36.8	90.7	77.7	53.3	40.9	
3	0.35132	28.1	27.3	9.9	38.0	37.2	89.9	76.9	51.9	39.7	
4	0.49945	36.8	36.7	9.8	46.6	46.5	87.0	74.0	40.4	27.5	
5	5.23671	45.5	41.3	9.6	55.1	50.9	87.0	74.0	31.9	23.1	
6	8.73338	44.3	41.5	9.6	53.9	51.1	87.0	74.0	33.1	22.9	
7	11.7251	51.6	47.4	9.6	61.2	57.0	87.0	74.0	25.8	17.0	
8	19.70945	50.3	47.1	9.7	60.0	56.8	87.0	74.0	27.0	17.2	

LAN Port (LCL 65 dB)_100 Mbps (SNP-5321N)_# 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]	Remark
1	0.19809	26.4	24.4	10.0	36.4	34.4	94.7	81.7	58.3	47.3	
2	0.24988	43.4	43.8	9.9	53.3	53.7	92.8	79.8	39.5	26.1	
3	0.35121	29.0	26.5	9.9	38.9	36.4	89.9	76.9	51.0	40.5	
4	0.49954	36.8	36.5	9.8	46.6	46.3	87.0	74.0	40.4	27.7	
5	2.24501	41.8	40.4	9.6	51.4	50.0	87.0	74.0	35.6	24.0	
6	3.99046	42.1	41.5	9.7	51.8	51.2	87.0	74.0	35.2	22.8	
7	11.97302	51.2	49.6	9.6	60.8	59.2	87.0	74.0	26.2	14.8	
8	19.70927	50.2	46.5	9.7	59.9	56.2	87.0	74.0	27.1	17.8	

6.2 Radiated Emission

Test specification	VCCI V-3 / 2013.04, Class A		
Testing voltage	AC 24 V, PoE		
Test facility	10 m Chamber (#F2)		
Test distance	10 m, 3 m		
Date	2015. 01. 31		
Temperature (°C)	21.3 °C	Humidity (% R.H.)	17.3 % 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	2016.01.20	☒
Test Receiver	ESCI	100001	R&S	2015.07.14	☐
Test Receiver	ESCI	100710	R&S	2015.10.13	☐
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	-	☒
Preamplifier	8449B	3008A02343	AGILENT	2015.10.13	☒
Horn ANT	3115	00086706	ETS	2015.09.01	☒
Spectrum Analyzer	E4407B	US39010142	AGILENT	2015.10.13	☐

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

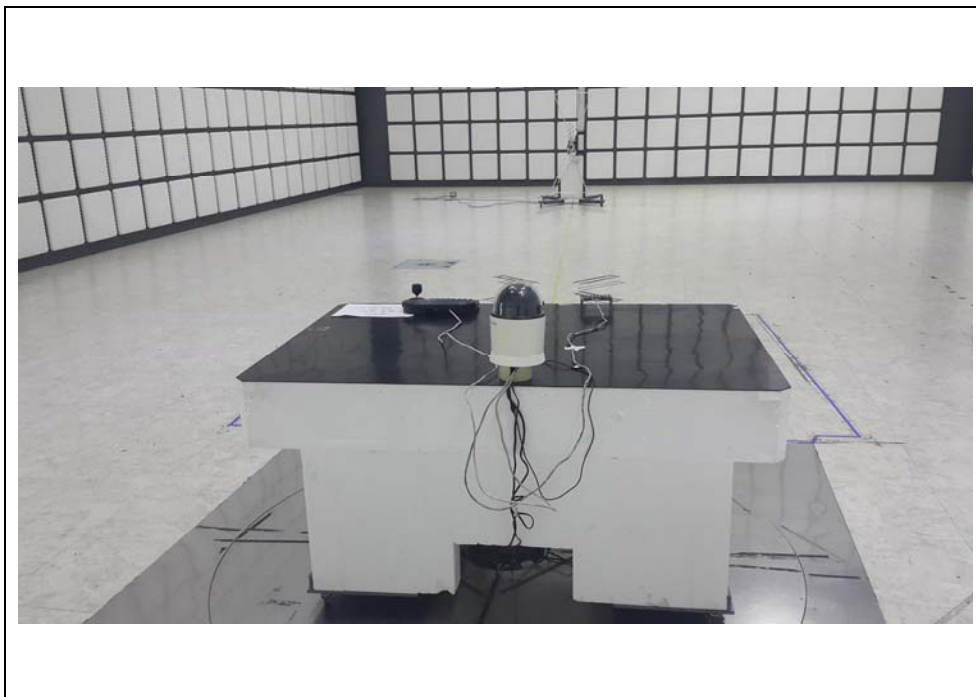
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is

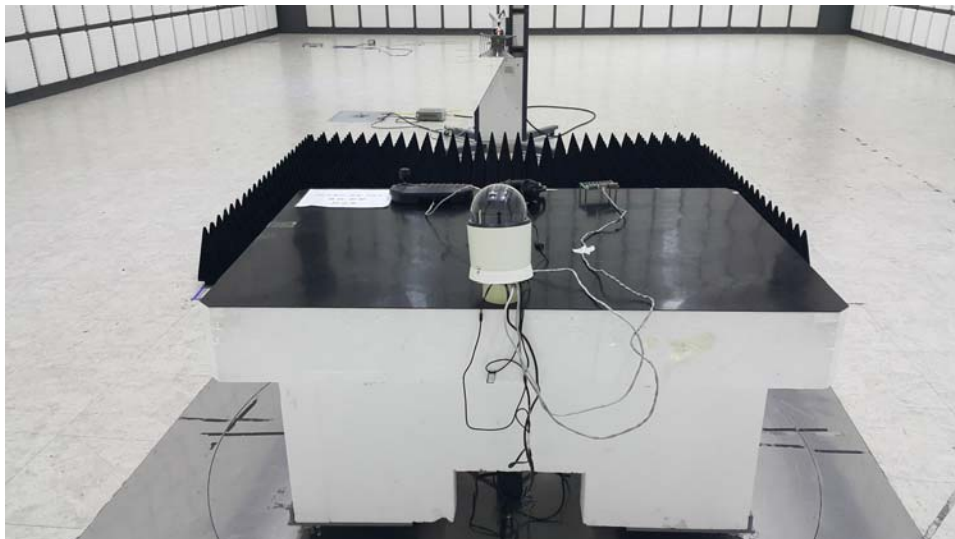
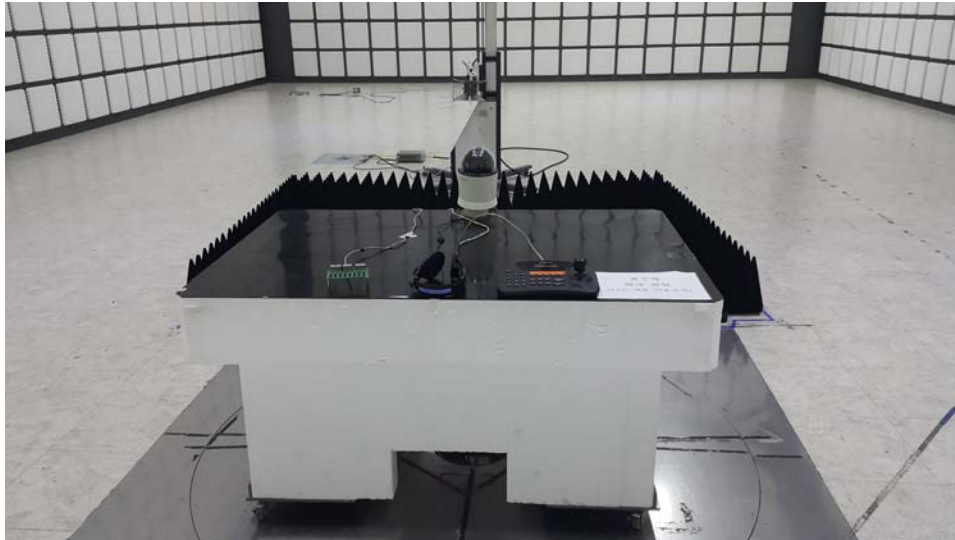
$$30 + 12 + 5 + 3 - 35 = 15 \text{ dB}(\mu\text{V/m})$$

6.2.5 Photographs of test setup

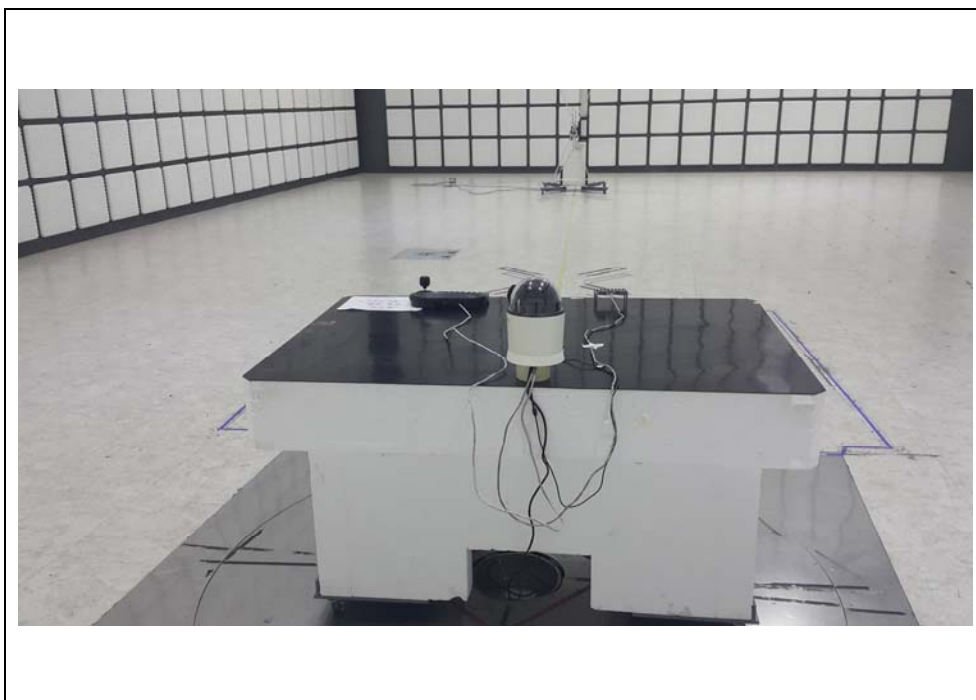
* 30 MHz ~ 1 GHz (#1- AC 24V)



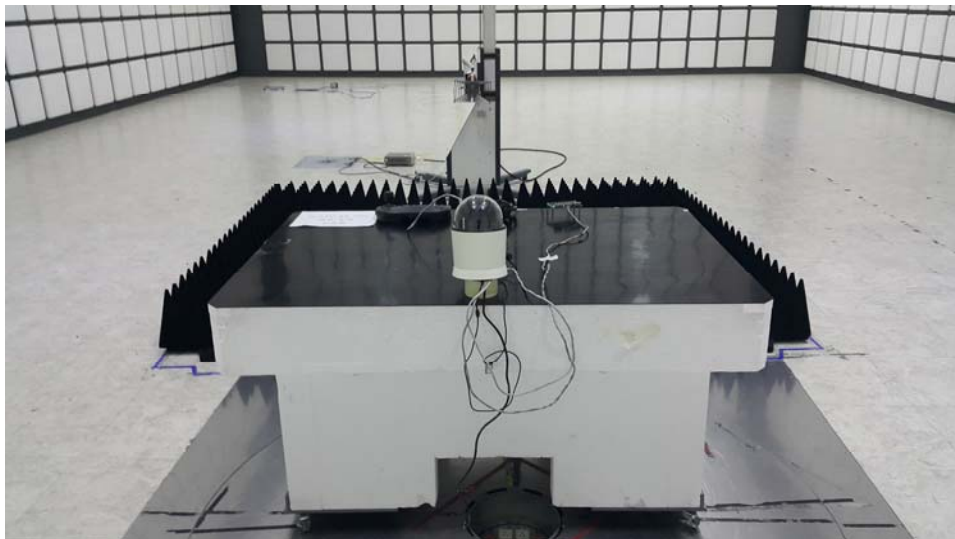
* 1 GHz ~ 6 GHz (#1- AC 24V)



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



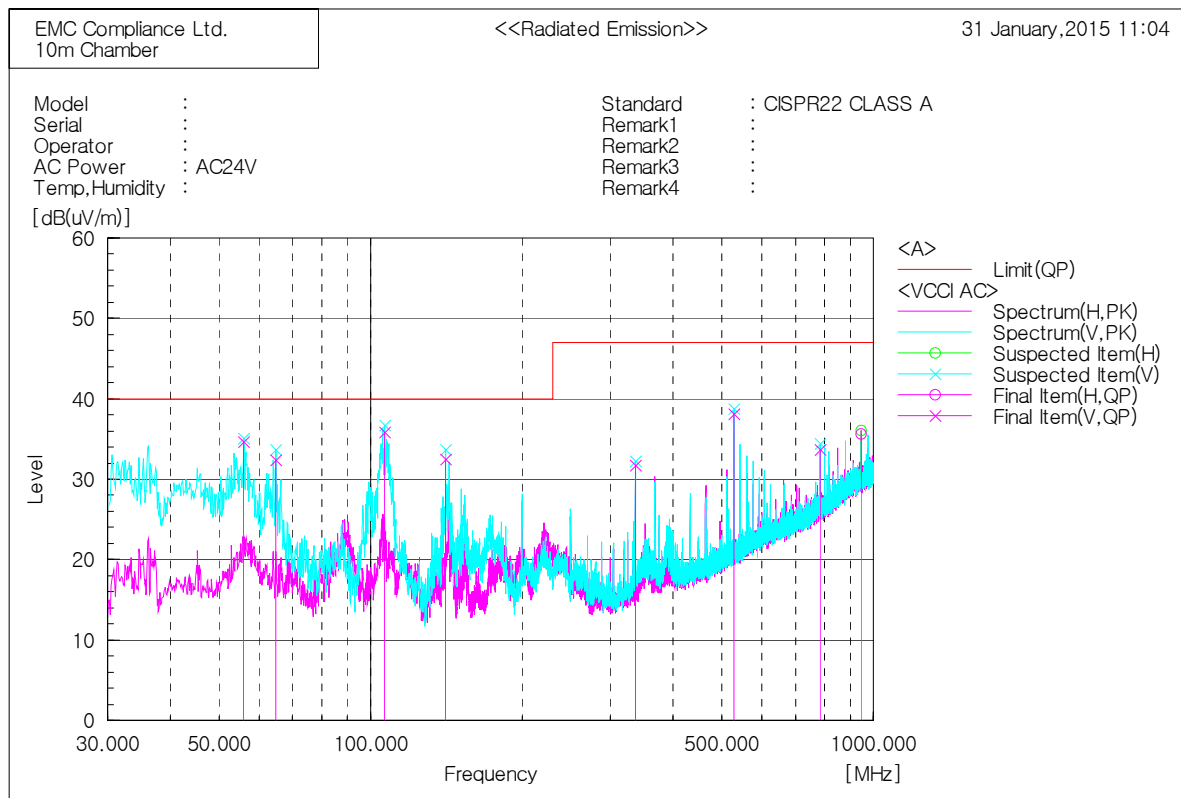
* 1 GHz ~ 6 GHz (#2- PoE)



6.2.6 Radiated emission measurement result

* Graph and Data

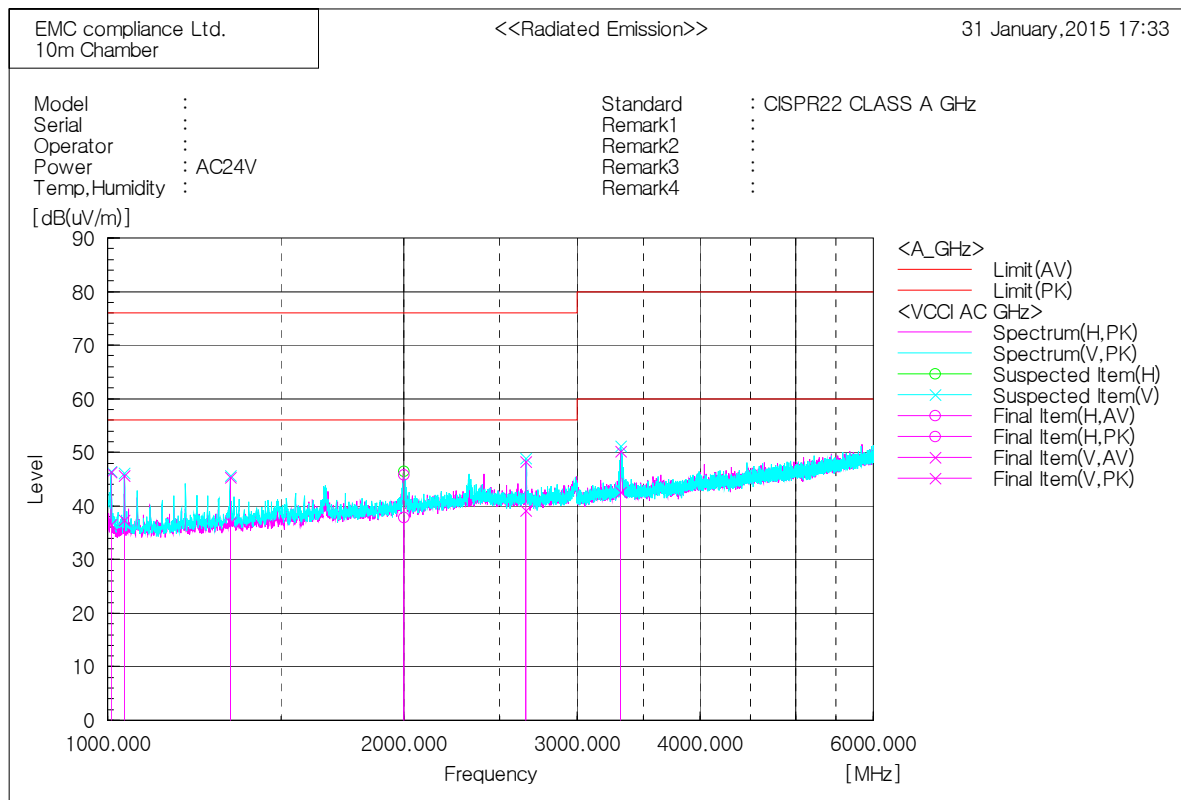
* 30 MHz ~ 1 GHz (SNP-5321N) _#1- AC 24V



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	55.948	V	47.8	-13.1	34.7	40.0	5.3	100.0	252.8
2	64.799	V	46.1	-13.7	32.4	40.0	7.6	200.0	335.6
3	106.751	V	51.6	-15.8	35.8	40.0	4.2	400.0	197.6
4	141.186	V	44.8	-12.3	32.5	40.0	7.5	100.0	3.6
5	336.035	V	40.5	-8.8	31.7	47.0	15.3	400.0	223.3
6	528.095	V	41.3	-3.2	38.1	47.0	8.9	400.0	218.7
7	784.054	V	31.5	2.2	33.7	47.0	13.3	300.0	31.8
8	944.104	H	30.1	5.5	35.6	47.0	11.4	100.0	339.4

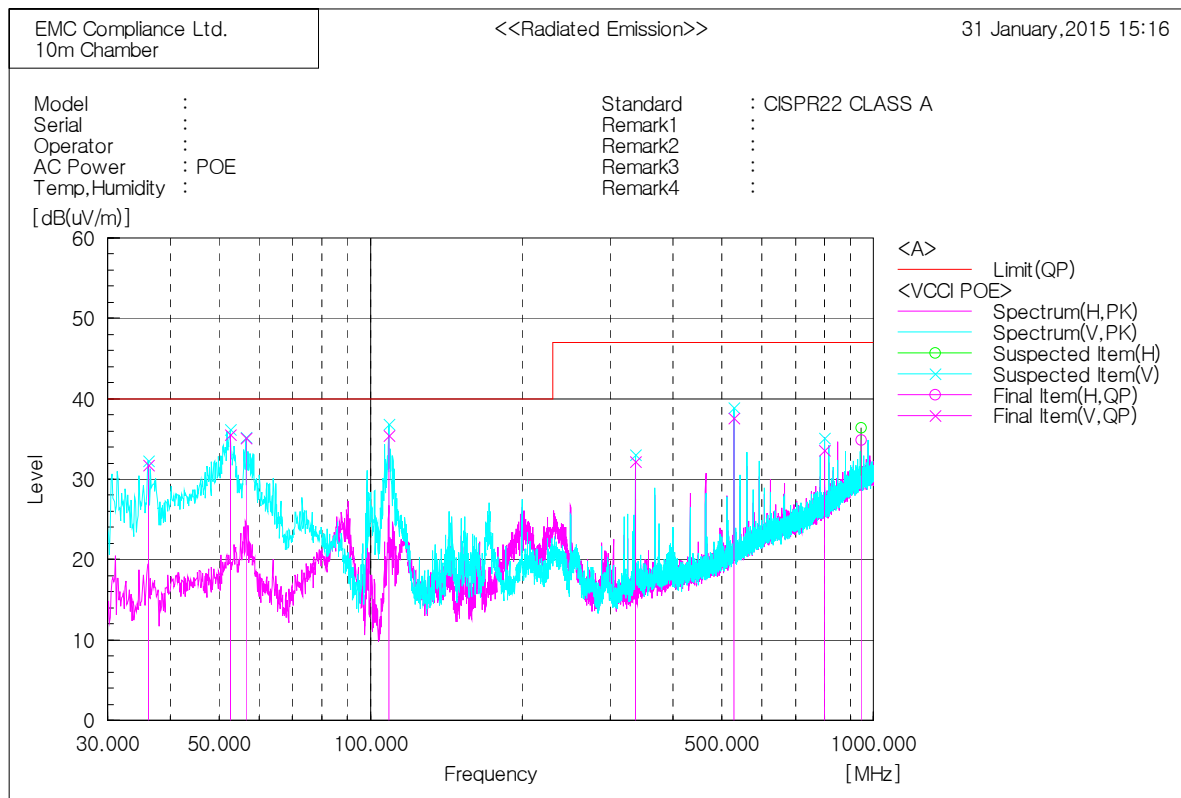
* 1 GHz ~ 6 GHz (SNP-5321N) _#1- AC 24V



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	1008.125	V	44.3	54.0	-7.7	36.6	46.3	56.0	76.0	19.4	29.7	100.0	59.8
2	1040.000	V	44.8	53.2	-7.5	37.3	45.7	56.0	76.0	18.7	30.3	100.0	44.7
3	1331.875	V	42.6	51.1	-5.7	36.9	45.4	56.0	76.0	19.1	30.6	100.0	356.0
4	1998.125	H	39.8	47.8	-2.0	37.8	45.8	56.0	76.0	18.2	30.2	100.0	300.7
5	2662.500	V	39.2	48.2	0.0	39.2	48.2	56.0	76.0	16.8	27.8	100.0	162.3
6	3325.000	V	41.0	48.6	1.6	42.6	50.2	60.0	80.0	17.4	29.8	100.0	351.9

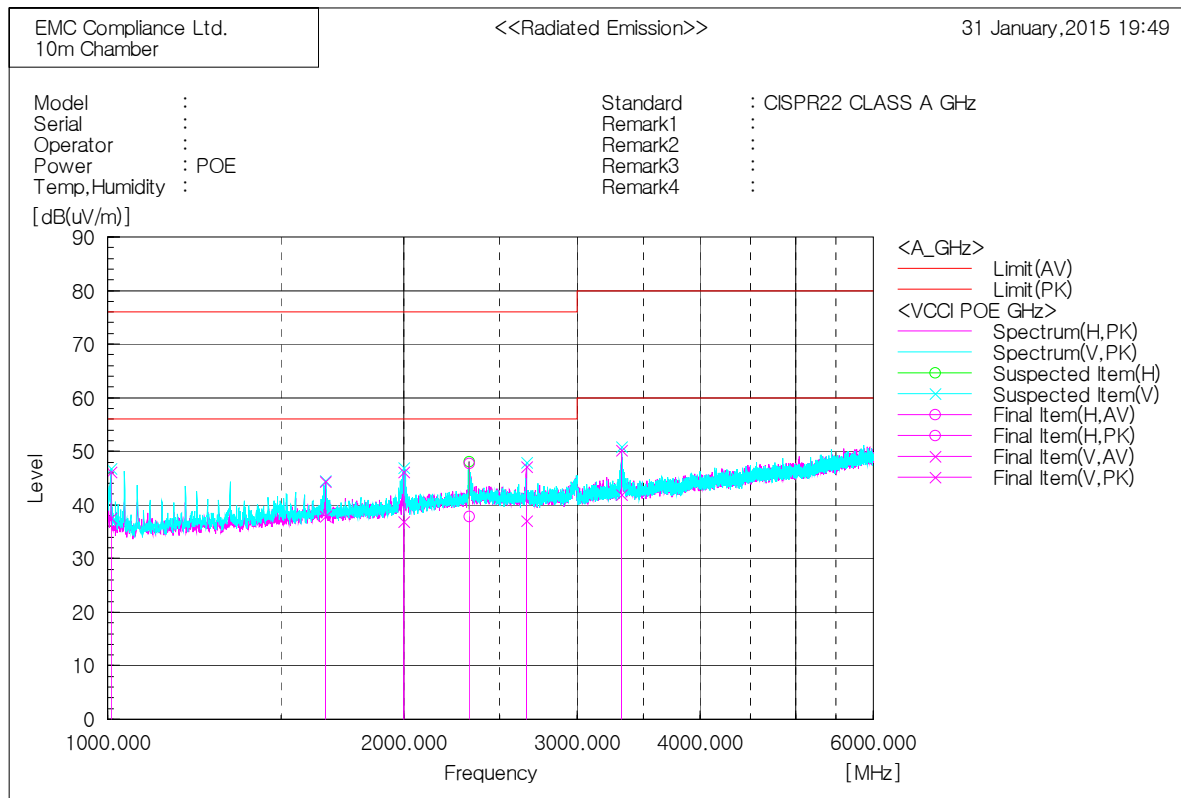
* 30 MHz ~ 1 GHz (SNP-5321N)_#2- PoE



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	36.184	V	45.8	-14.1	31.7	40.0	8.3	100.0	204.0
2	52.553	V	48.4	-12.9	35.5	40.0	4.5	100.0	343.0
3	56.554	V	48.2	-13.1	35.1	40.0	4.9	200.0	332.4
4	108.813	V	50.9	-15.5	35.4	40.0	4.6	100.0	241.8
5	336.035	V	41.0	-8.8	32.2	47.0	14.8	100.0	196.4
6	528.095	V	40.8	-3.2	37.6	47.0	9.4	400.0	316.7
7	800.059	V	31.0	2.6	33.6	47.0	13.4	300.0	31.6
8	944.104	H	29.4	5.5	34.9	47.0	12.1	400.0	353.4

* 1 GHz ~ 6 GHz (SNP-5321N)_#2- 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	1008.125	V	45.3	53.9	-7.7	37.6	46.2	56.0	76.0	18.4	29.8	100.0	12.0
2	1666.250	V	41.5	48.1	-3.7	37.8	44.4	56.0	76.0	18.2	31.6	100.0	42.0
3	1998.125	V	38.8	48.1	-2.0	36.8	46.1	56.0	76.0	19.2	29.9	100.0	31.5
4	2330.000	H	38.1	48.1	-0.3	37.8	47.8	56.0	76.0	18.2	28.2	100.0	58.2
5	2663.750	V	37.1	47.1	0.0	37.1	47.1	56.0	76.0	18.9	28.9	100.0	90.5
6	3328.125	V	40.3	48.6	1.6	41.9	50.2	60.0	80.0	18.1	29.8	100.0	300.4

7. E.U.T. photographs

Front View



Rear View



Left View



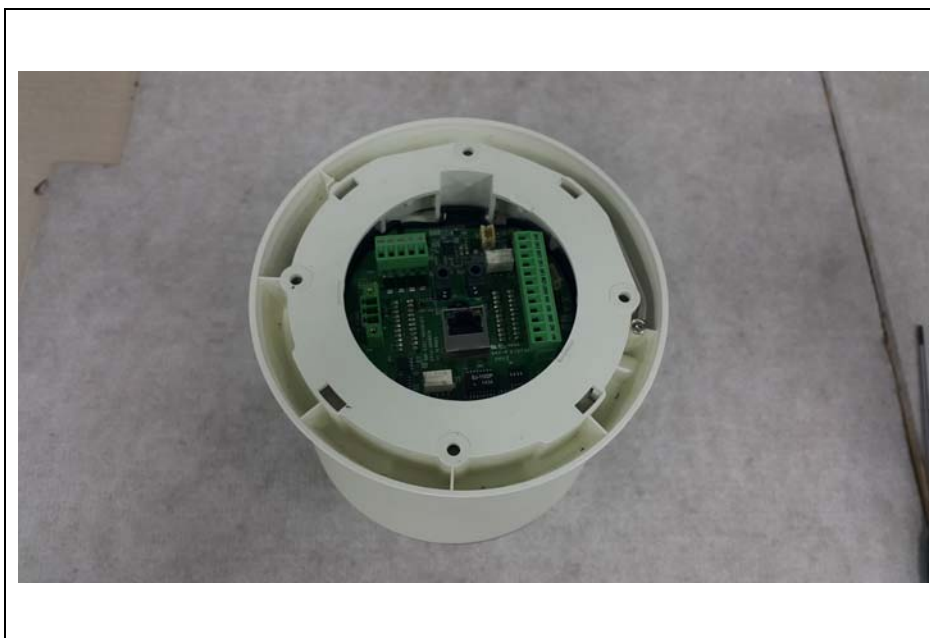
Right View



Top View



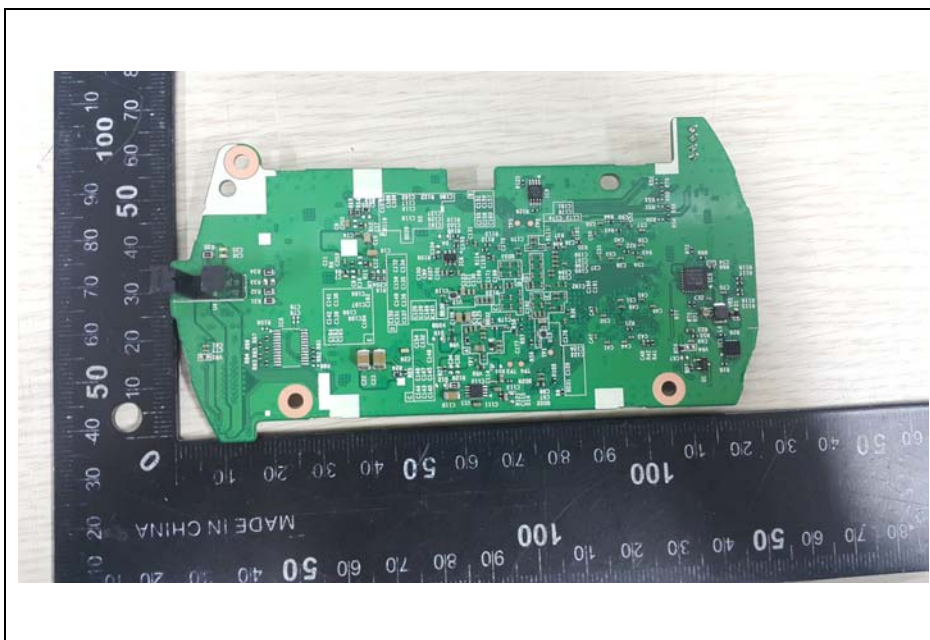
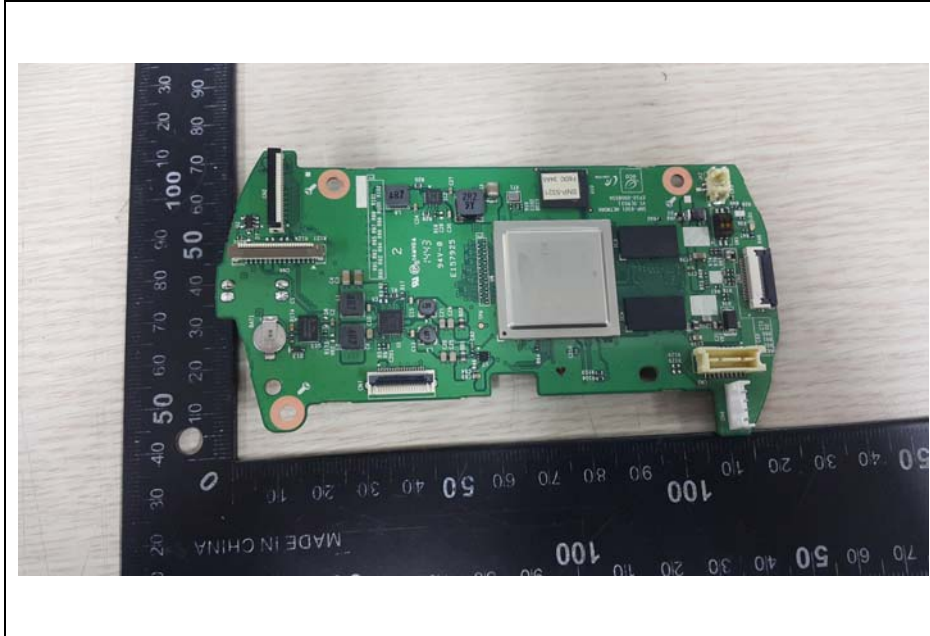
Bottom View



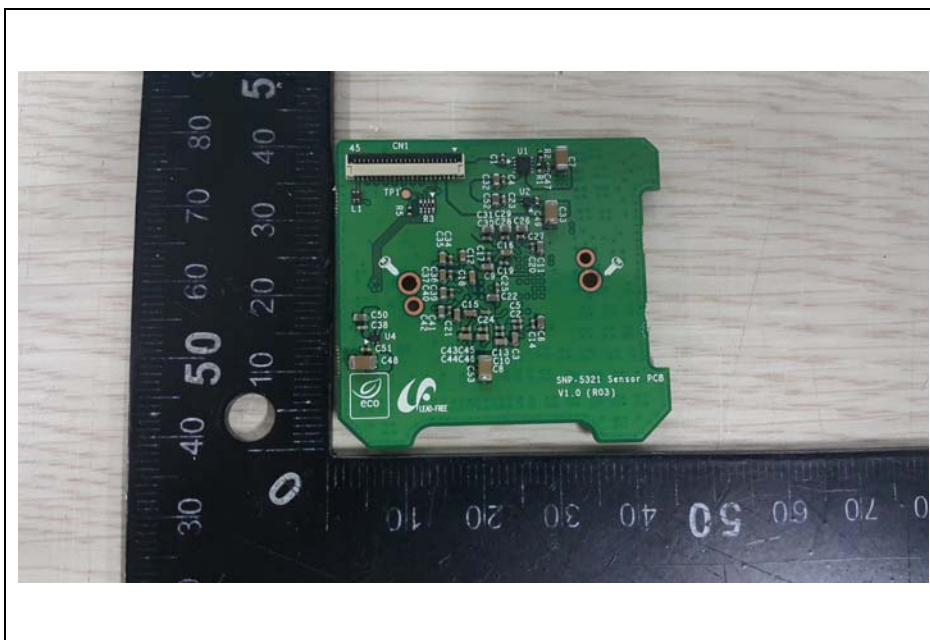
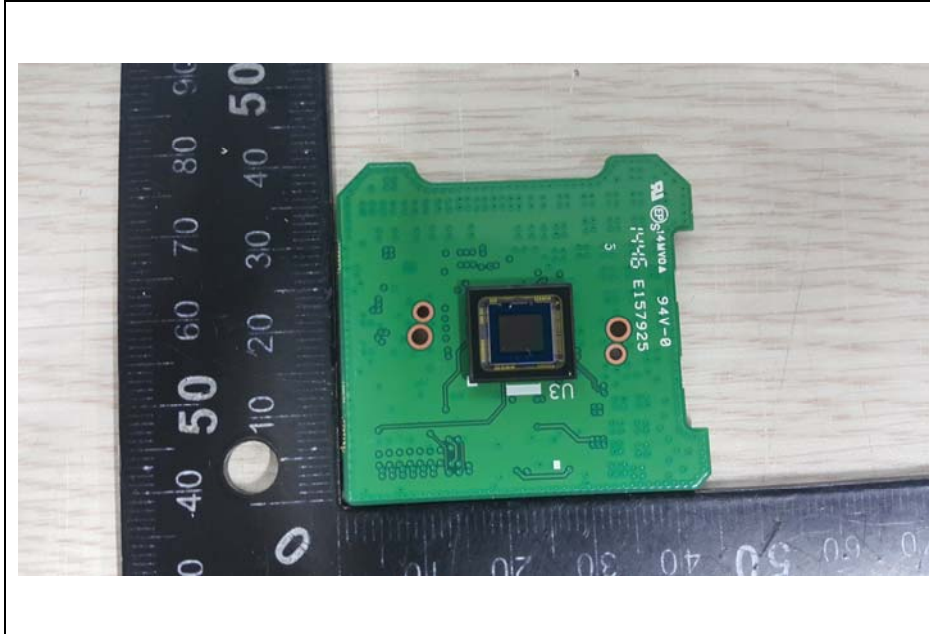
Inside



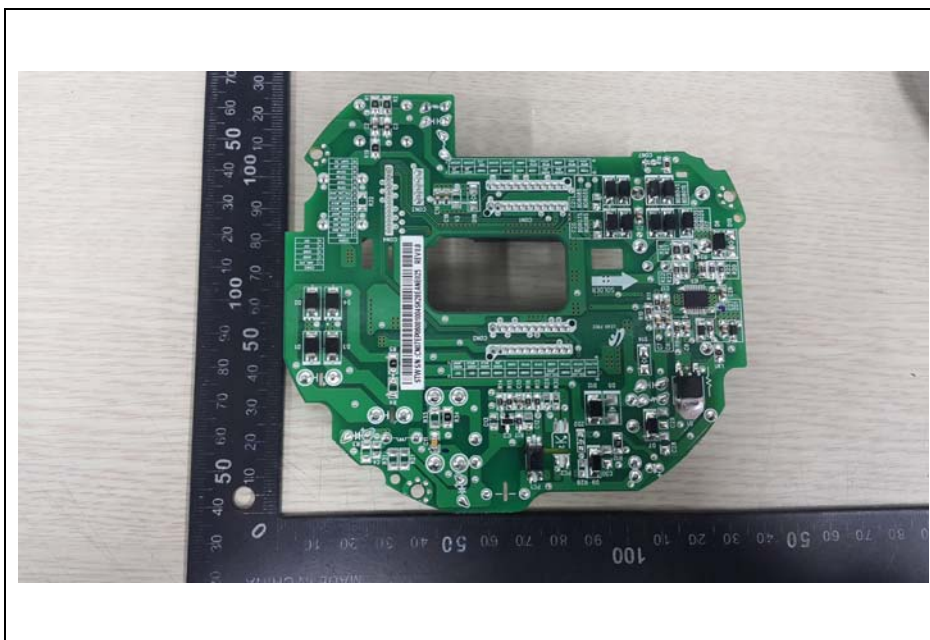
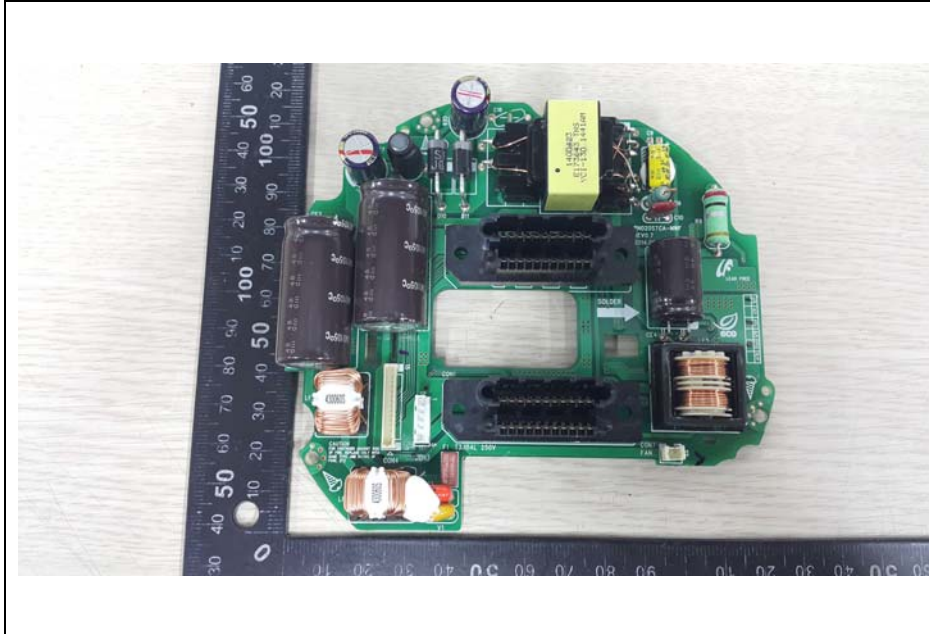
Main Board



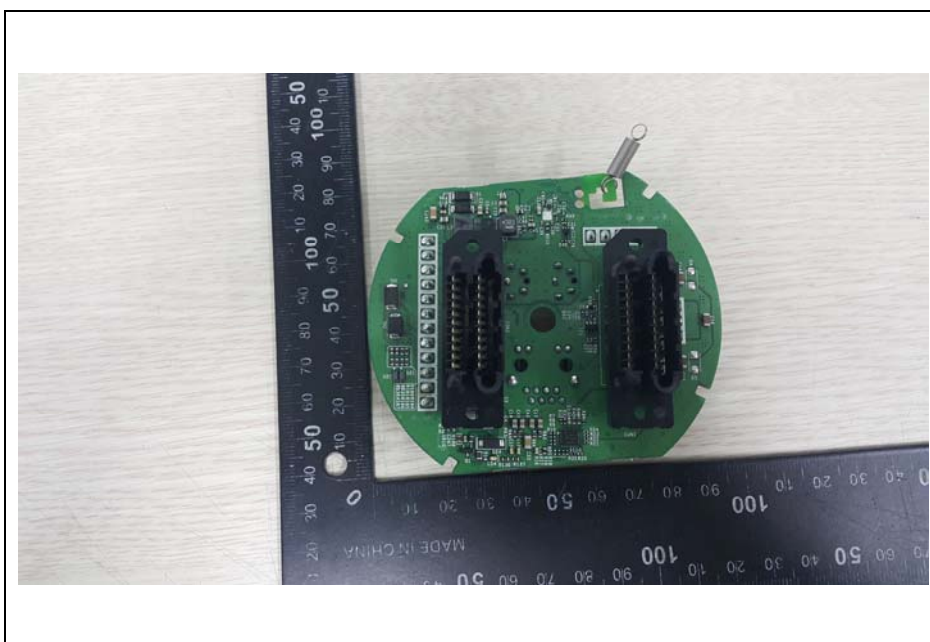
CCD Board



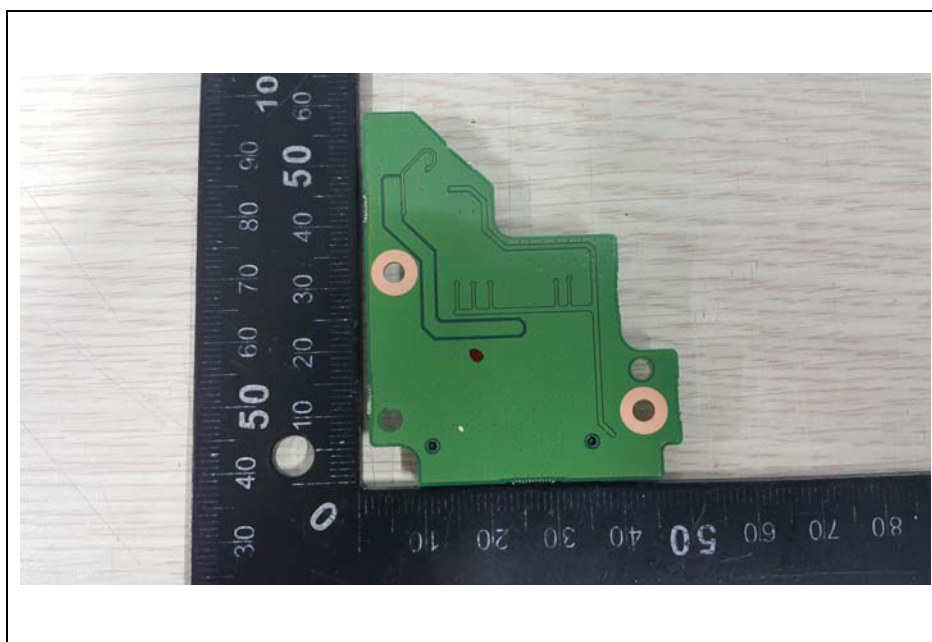
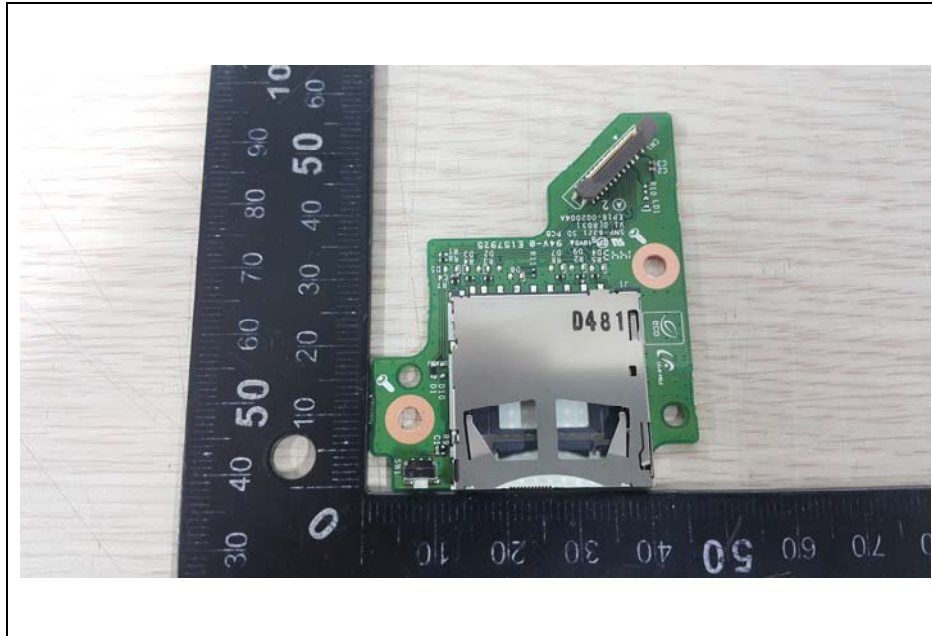
Power Board



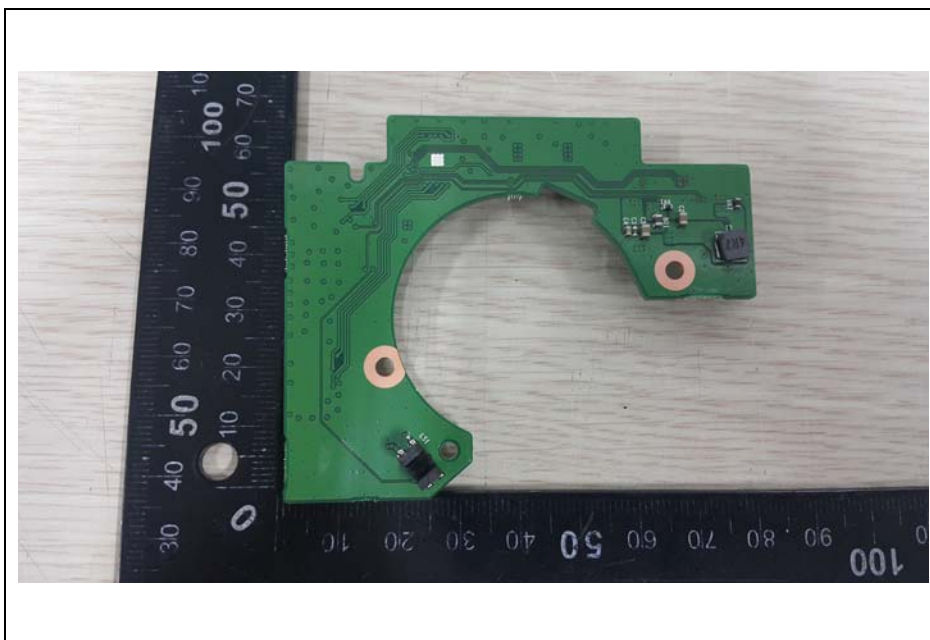
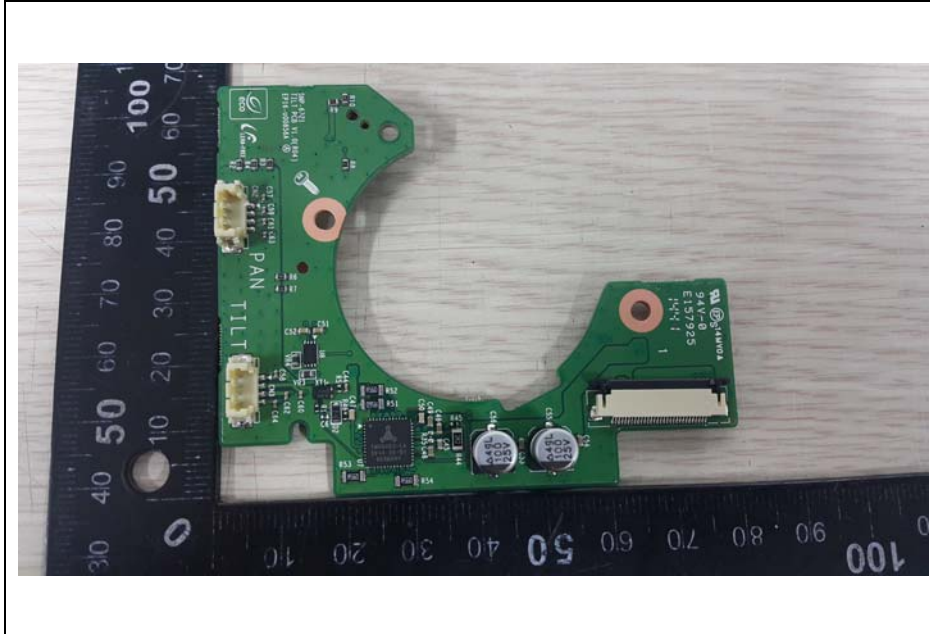
SUB Board #1



SUB Board #2



SUB Board #3



SUB Board #4

