

TESTING CERTIFICATE

EMC Compliance Ltd.

65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do,
443-390, Korea
TEL: 82 31 336 9919
FAX: 82 505 299 8311

Certificate No.: EMC-CE-4576

Page(1) / (38) Pages



1. Applicant

Name: Samsung Techwin Co., Ltd.
Address: 84, Jeongdong-ro, Seongsan-gu, Changwon-si,
Gyeongsangnam-do, Korea
Date of Receipt: January 15, 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, SND-7084RP

5. Date of Test:

February 06, 2014

6. Test method used:

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

7. Testing Environment:

Temperature: $(19.45 \pm 2.65) ^\circ\text{C}$,
Relative Humidity: $(20.2 \pm 2.7) \% \text{ R.H.}$

8. Test Results:

Refer to page 15 ~ page 31
(Measurement uncertainty: Refer to page 6)

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

This Test Report cannot be reproduced, except in full, without the written approval of
EMC Compliance Laboratory.

Affirmation	Tested by  Name: PARK, GUN-SU	Technical Manager  Name: YEOM, HAN-SEOK
-------------	--	---

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

2014.02.12

EMC Compliance Ltd.

Accredited by KOLAS, Republic of KOREA



Contents

1. Applicant information	3
2. Laboratory information	4
3. Test system configuration.....	5
3.1 Operation environment	5
3.2 Measurement Uncertainty.....	6
4. Description of E.U.T.	7
4.1 General information.....	7
4.2 Product description	10
4.3 Auxiliary equipments.....	10
4.4 Test configuration	11
4.5 Operating conditions.....	13
5. Summary of test results.....	14
5.1 Summary of EMI emission test results.....	14
6. Test results	15
6.1 Conducted Emission.....	15
6.2 Radiated Emission	22
7. E.U.T. photographs.....	32

1. Applicant information

Applicant: Samsung Techwin Co., Ltd.
Address: 84, Jeongdong-ro, Seongsan-gu, Changwon-si,
Gyeongsangnam-do, Korea
Telephone: +82-70-7147-8361
Fax: +82-31-277-2784
E-mail: js2002.kang@samsung.com
Contact name: **Kang Jei Soon**

Manufacturer#1: Samsung Techwin Co., Ltd.
Address: 84, Jeongdong-ro, Seongsan-gu, Changwon-si,
Gyeongsangnam-do, Korea
Telephone: +82-70-7147-8361
Fax: +82-31-277-2784
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.

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

Telephone Number: 82 31 336 9919

Facsimile Number: 82 505 299 8311

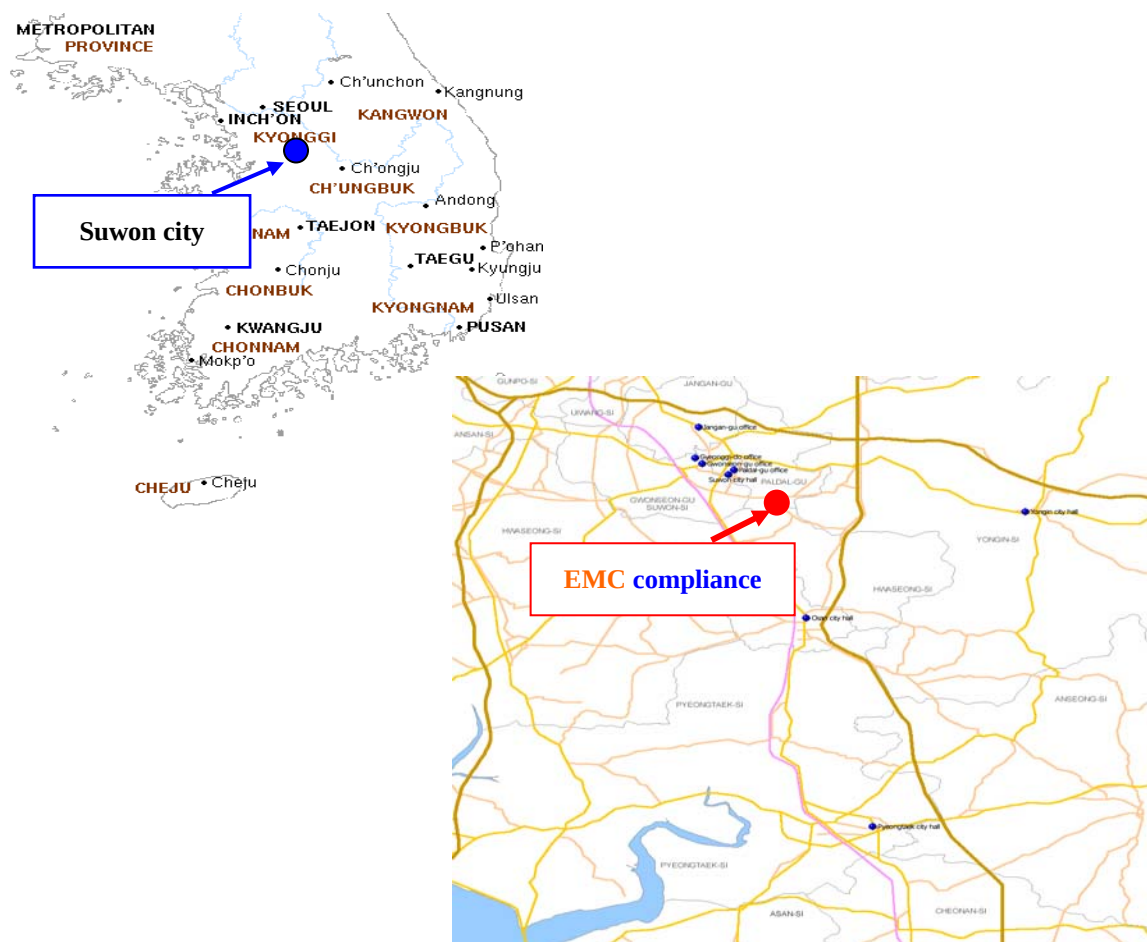
FCC CAB.: KR0040

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)	: 16.8 °C	22.9 % R.H.	-
Shielded room(CE)	: 22.1 °C	17.5 % 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
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

4. Description of E.U.T.

4.1 General information

Video	
Imaging Device	1/2.8" PS Exmor 3.20M CMOS (IMX124)
Total Pixels	2,065(H) X 1,565(V)
Effective Pixels	2,065(H) X 1,553(V)
Scanning System	Progressive
Min. Illumination	Color : 0.1 Lux (F1.2, 50IRE), 0.01Lux (Sens-up 60x, 50IRE) B/W : 0 Lux(IR LED on)
S / N Ratio	50dB
Video Out	CVBS : 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P), for installation - connector type
Lens	
Focal Length (Zoom Ratio)	3 ~ 8.5mm (2.8x) Motorized Varifocal
Max. Aperture Ratio	F1.2
Angular Field of View	H : 100.12°(Wide) ~ 35.38°(Tele) / V : 73.76°(Wide) ~ 26.58°(Tele)
Min. Object Distance	0.5m(1.64ft)
Focus Control	Simple Focus (Motorized V/F) / Manual - Remote control via network (Manual, Simple Focus)
Lens Type	DC Auto Iris
Mount Type	Board-in type
Pan / Tilt / Rotate	
Pan Range	0 ° ~ +355 °
Tilt Range	0 ° ~ +67 °
Rotate Range	0 ° ~ +355 °
Operational	
IR LED	12ea
Viewable Length	25m(82.02ft)
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	Max. 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 (4 zones with 4 points Polygon)
Privacy Masking	Off / On (32 zones with 4 points of polygon)
Sens-up (Frame Integration)	-
Gain Control	Off / Low / Middle / High
White Balance	ATW / AWC / Manual / Indoor / Outdoor
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (1 ~ 1/12,000sec)
Digital PTZ	-
Flip / Mirror	Off / On
Intelligent Video Analytics	Tampering, Virtual Line, Enter/Exit, Appear / Disappear, Audio Detection, Face Detection with Metadata
Alarm I/O	Input 1ea / Output 1ea
Alarm Triggers	Motion detection, Tampering Detection, Audio Detection, Face Detector, Video Loss, Video Analytics, Alarm Input
Alarm events	File upload via FTP and E-Mail Notification via E-Mail, TCP and HTTP local storage(SD/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	2048x1536 / 1920x1080 / 1600x1200 / 1280x1024 / 1280x960 / 1280x720 / 1024x768 / 800x600 / 800x450 / 640x480 / 640x360 / 320x240 / 320x180
Max. Framerate	H.264 : 3M Mode Max 30fps@2048x1536 / 1920x1080 / 1600x1200 / 1280x1024 / 1280x960 / 1280x720 / 1024x768 / 800x600 / 800x450 / 640x480 / 640x360 / 320x240 / 320x180 2M Mode Max 60fps @1920x1080 / 1600x1200 / 1280x1024 / 1280x960 / 1280x720 / 1024x768 / 800x600 / 800x450 / 640x480 / 640x360 / 320x240 / 320x180 MJPEG : Max 10fps@2048x 1536 / 1920x1080 / 1600x1200 / 1280x1024 / 1280x960 / 1280x720 / 1024x768 Max 30fps@ 800x600 / 800x450 / 640x480 / 640x360 / 320x240 / 320x180
Smart Codec	Built-in Area-Based : SEA Face detection Mode
Video Quality Adjustment	H.264 : Compression Level, Target Bitrate Level Control MJPEG : Quality Level Control
Bitrate Control Method	H.264 : CBR or VBR, MJPEG : VBR
Streaming Capability	Multiple Streaming (Up to 10 Profiles)
Audio I/O	Mic(Line)-in/Built-in Mic Selectable via UI, Line-out (Mono, 1Vrms) 2.5VDC(4mA) powered 2K Ohm
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 SDX/SDHC/SD memory card can be downloaded.
Application Programming Interface	ONVIF Profile S SUNAPI(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, Croatian, Hungarian, Greek, Norwegian, Finnish
Web Viewer	Supported OS : Windows XP / VISTA / 7 / 8, MAC OS X 10.7 Supported Browser : Microsoft Internet Explorer (Ver. 10, 9, 8, 7), Mozilla Firefox (Ver. 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9), Google Chrome (Ver. 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15), 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.x

Environmental	
Operating Temperature / Humidity	-10°C ~ +55°C(+14°F ~ +131°F) / Less than 90% RH
Storage Temperature / Humidity	-30°C ~ +60°C (-22°F ~ +140°F) / Less than 90% RH
Electrical	
Input Voltage / Current	DC 12V, PoE (IEEE802.3af class 3)
Power Consumption	Max. 10.0W (DC 12V)
	Max. 11.0W (PoE)
Mechanical	
Color / Material	IVORY / Aluminum
Dimension (WxHxD)	Ø132.1 x 107.6mm (Ø5.2" x 4.24")
Weight	1000g (2.20 lb)

4.2 Product description

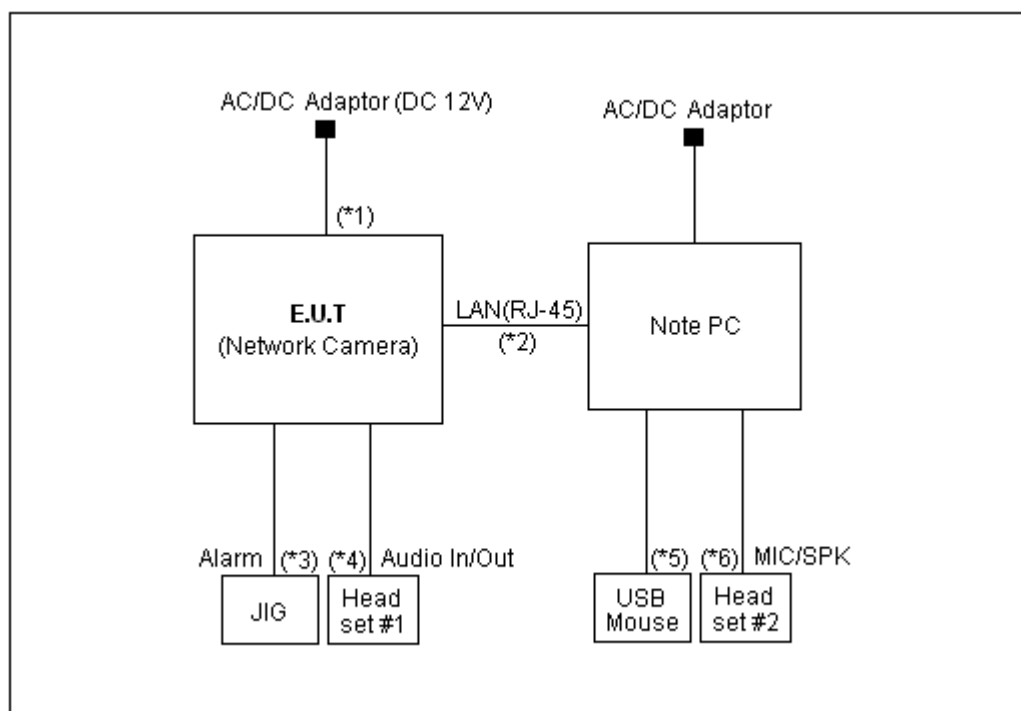
Type of product	Network Camera
Model name (Basic)	SND-7084RP
Model name (Variant)	-
Difference	-
Trade name	-
Serial no	Engineering Sample
Testing voltage	DC 12 V , PoE
Product rating	DC 12 V , PoE
Internal clock frequency	Above 108 MHz
Note	* AC/DC adaptor was not provided by the manufacturer. * PoE Switch was not provided by the manufacturer.

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Note PC	C1321	472680432038	FUJITSU
USB Mouse	1088	8165906051248	Microsoft
Headset #1	SHS-250V	-	SAMSUNG
Headset #2	SHS-250V	-	SAMSUNG
JIG	-	-	-
AC/DC Adaptor (DC 12V)	ADS-30S1-12-2	-	-
PoE Switch	FS108P	1DL20C3N00544	NETGEAR

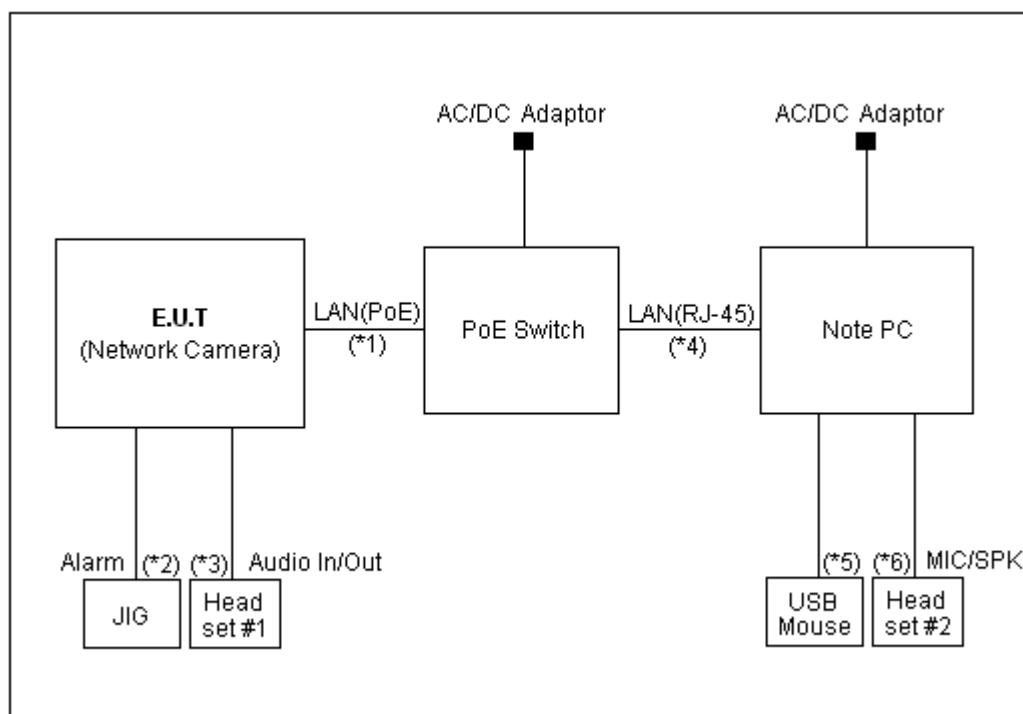
4.4 Test configuration

#1- DC 12V



Note *	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT (Network Camera)	Power	AC/DC Adaptor	Power	1.2	Non-Shield
2		LAN(RJ-45)	Note PC	LAN(RJ-45)	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	Note PC	USB	USB Mouse	USB	1.8	Shield
6		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		Alarm	JIG	Alarm	3.0	Non-Shield
3		Audio In/Out	Headset #1	Audio In/Out	3.0	Non-Shield
4	Note PC	LAN(RJ-45)	PoE Switch	LAN(RJ-45)	3.0	Non-Shield
5		USB	USB Mouse	USB	1.8	Shield
6		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	Alarm test.
	Audio In/Out test.
	Web view monitoring test.
	Ping test.

* Note: 3 types of powers are available for the product, that are DC 12 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	AS/NZS CISPR 22:2009, Class A	15 Page ~ 21 Page
☒	Radiated Emission	AS/NZS CISPR 22:2009, Class A	22 Page ~ 31 Page

6. Test results

6.1 Conducted Emission

Test specification	AS/NZS CISPR 22:2009, Class A		
Testing voltage	DC 12 V, PoE		
Test facility	Shielded room (CE#2)		
Date	2014. 02. 06		
Temperature (°C)	22.1 °C	Humidity (% R.H.)	17.5 % 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.

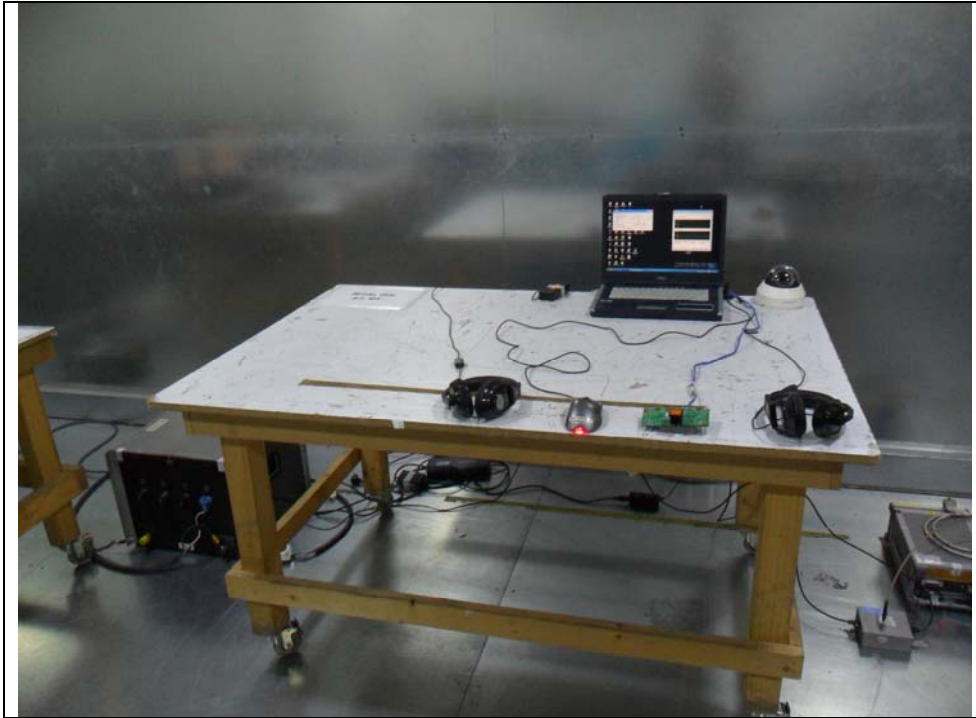
6.1.3 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESCI7	100732	R&S	2015.01.27	☐
Test Receiver	ESCI	100001	R&S	2014.07.25	☒
Test Receiver	ESCI	100710	R&S	2014.10.28	☐
LISN	ENV216	101352	R&S	2015.01.02	☐
LISN	NNLK8121	8121-472	SCHWARZBECK	2014.07.08	☒
8-WIRE ISN	NTFM 8158 CAT5	CAT5-8158-0071	SCHWARZBECK	2014.04.02	☒
8-WIRE ISN	NTFM 8158 CAT3	CAT3-8158-0020	SCHWARZBECK	2014.04.13	☐
ISN	ST08	24342	TESEQ	2014.06.21	☐
ISN	ENY81	101545	R&S	2014.08.29	☐

6.1.4 Photographs of test setup

* Telecommunication

#1- DC 12V



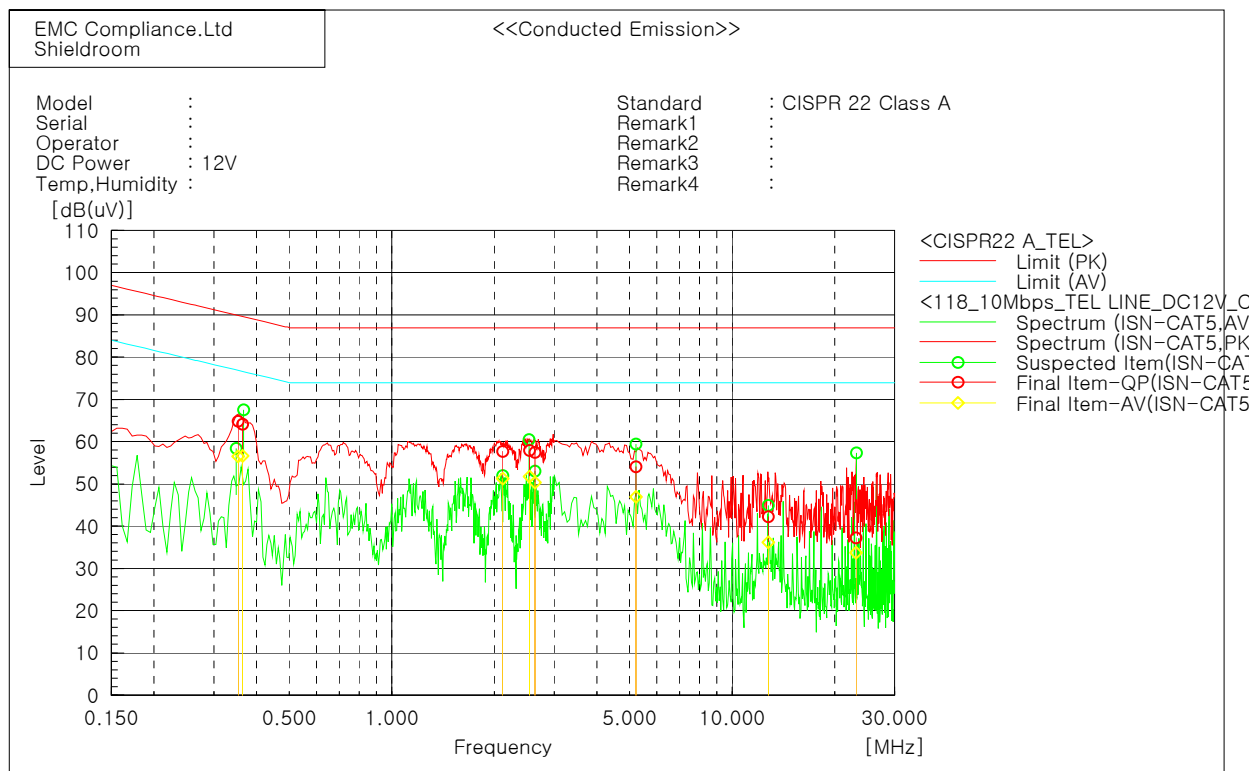
#2-PoE



6.1.5 Conducted emission measurement result

* Telecommunication port (SND-7084RP)

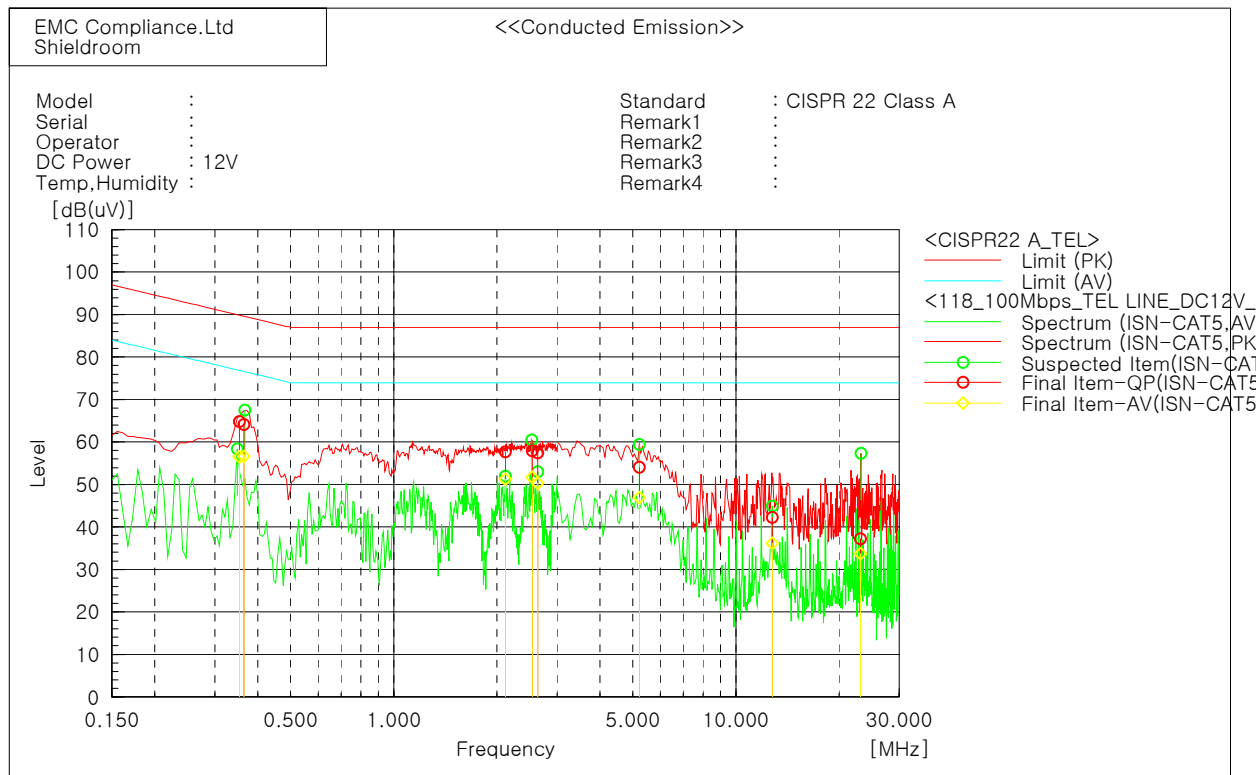
LAN Port (LCL 65 dB)_10 Mbps_#1- DC 12V



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	0.35386	55.2	47.0	9.6	64.8	56.6	89.9	76.9	25.1	20.3
2	0.36408	54.6	47.1	9.6	64.2	56.7	89.6	76.6	25.4	19.9
3	2.12056	48.2	41.8	9.5	57.7	51.3	87.0	74.0	29.3	22.7
4	2.53536	48.6	42.3	9.4	58.0	51.7	87.0	74.0	29.0	22.3
5	2.6316	48.1	40.9	9.4	57.5	50.3	87.0	74.0	29.5	23.7
6	5.21394	44.6	37.5	9.4	54.0	46.9	87.0	74.0	33.0	27.1
7	12.77594	32.7	26.6	9.5	42.2	36.1	87.0	74.0	44.8	37.9
8	23.13706	27.7	24.2	9.5	37.2	33.7	87.0	74.0	49.8	40.3

LAN Port (LCL 65 dB)_100 Mbps_#1- DC 12V

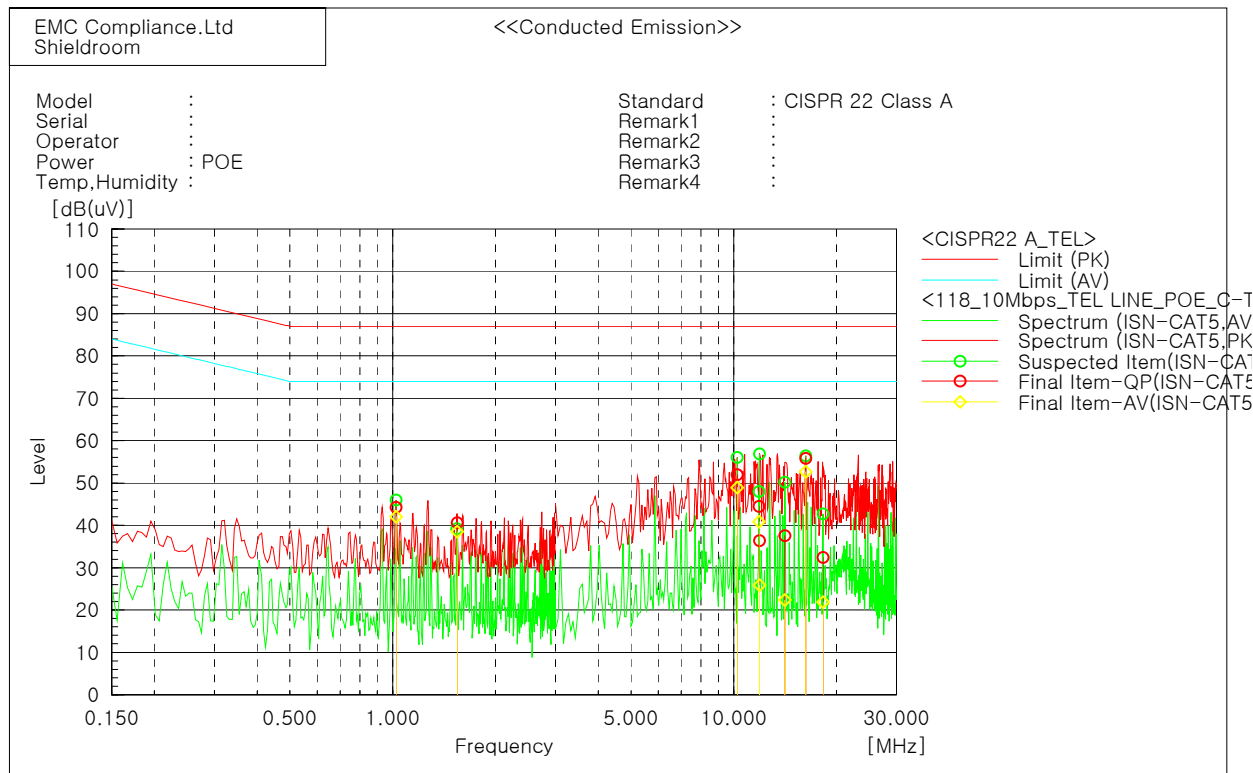


Final Result

--- 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	0.35386	55.2	47.0	9.6	64.8	56.6	89.9	76.9	25.1	20.3
2	0.36408	54.6	47.1	9.6	64.2	56.7	89.6	76.6	25.4	19.9
3	2.12056	48.2	41.8	9.5	57.7	51.3	87.0	74.0	29.3	22.7
4	2.53536	48.6	42.3	9.4	58.0	51.7	87.0	74.0	29.0	22.3
5	2.6316	48.1	40.9	9.4	57.5	50.3	87.0	74.0	29.5	23.7
6	5.21394	44.6	37.5	9.4	54.0	46.9	87.0	74.0	33.0	27.1
7	12.77594	32.7	26.6	9.5	42.2	36.1	87.0	74.0	44.8	37.9
8	23.13706	27.7	24.2	9.5	37.2	33.7	87.0	74.0	49.8	40.3

LAN Port (LCL 65 dB)_10 Mbps_#2- PoE

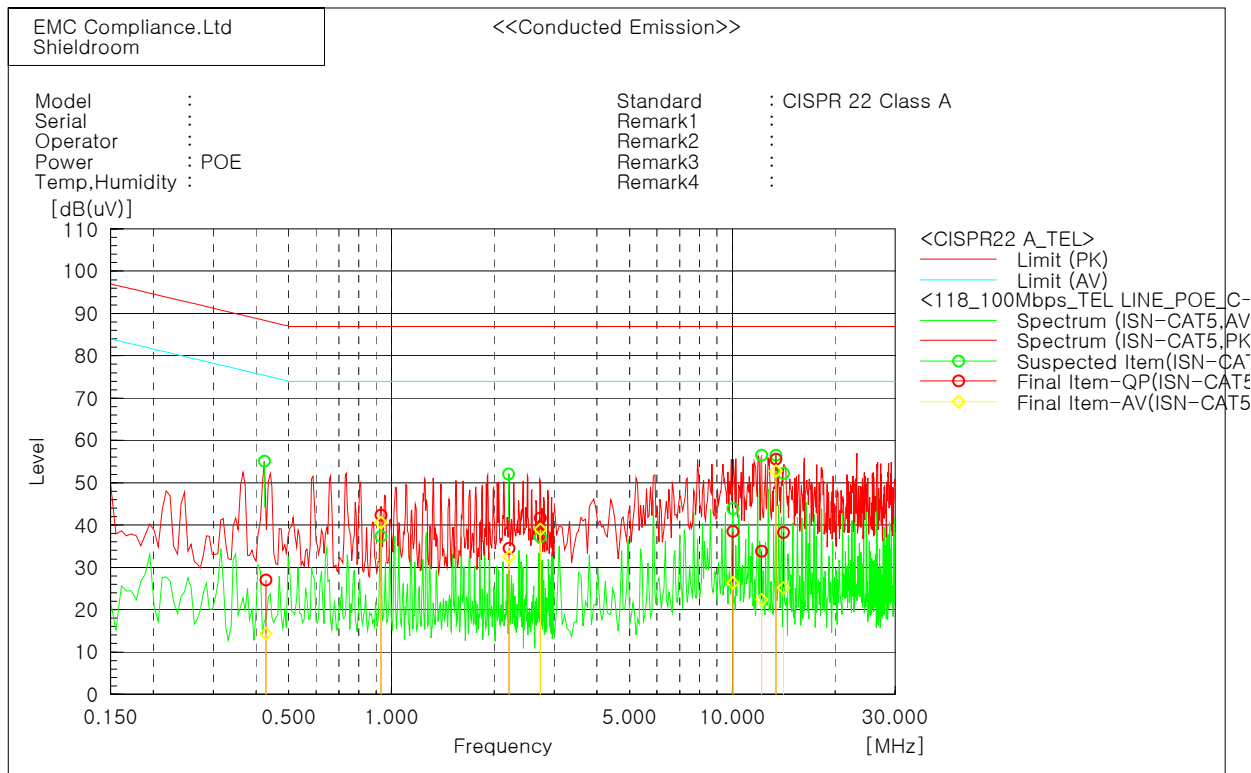


Final Result

--- 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	1.0235	34.7	32.5	9.5	44.2	42.0	87.0	74.0	42.8	32.0
2	1.54294	31.2	29.0	9.5	40.7	38.5	87.0	74.0	46.3	35.5
3	10.24098	42.5	39.4	9.5	52.0	48.9	87.0	74.0	35.0	25.1
4	11.86018	34.9	31.3	9.5	44.4	40.8	87.0	74.0	42.6	33.2
5	11.91436	26.9	16.4	9.5	36.4	25.9	87.0	74.0	50.6	48.1
6	14.1288	28.1	12.9	9.5	37.6	22.4	87.0	74.0	49.4	51.6
7	16.22894	46.4	43.2	9.5	55.9	52.7	87.0	74.0	31.1	21.3
8	18.2828	22.9	12.3	9.5	32.4	21.8	87.0	74.0	54.6	52.2

LAN Port (LCL 65 dB)_100 Mbps _#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	0.42804	17.4	4.7	9.6	27.0	14.3	88.3	75.3	61.3	61.0
2	0.93224	32.8	31.1	9.5	42.3	40.6	87.0	74.0	44.7	33.4
3	2.21196	25.1	23.0	9.4	34.5	32.4	87.0	74.0	52.5	41.6
4	2.73242	32.3	29.6	9.4	41.7	39.0	87.0	74.0	45.3	35.0
5	10.02054	29.0	16.9	9.5	38.5	26.4	87.0	74.0	48.5	47.6
6	12.17628	24.3	12.8	9.5	33.8	22.3	87.0	74.0	53.2	51.7
7	13.41964	46.1	43.2	9.5	55.6	52.7	87.0	74.0	31.4	21.3
8	14.1192	28.8	15.6	9.5	38.3	25.1	87.0	74.0	48.7	48.9

6.2 Radiated Emission

Test specification	AS/NZS CISPR 22:2009, Class A		
Testing voltage	DC 12 V, PoE		
Test facility	10 m Chamber (#F2)		
Test distance	10 m, 3 m		
Date	2014. 02. 06		
Temperature (°C)	16.8 °C	Humidity (% R.H.)	22.9 % 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

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	2014.10.17	☐
Bi-Log Antenna	VULB 9168	440	SCHWARZBECK	2015.10.16	☒
Amplifier	310N	293004	SONOMA INSTRUMENT	2014.10.31	☒
3 dB Attenuator	8491B	22981	HP	2014.03.19	☒
Antenna Mast	MA4000-EP	303	Innco Systems	-	☒
Turn Table	DT2000S-1t	079	Innco Systems	-	☒
Amplifier	8449B	3008A02343	AGILENT	2014.10.31	☒
Horn ANT	3115	00086706	ETS	2014.09.05	☒
Spectrum Analyzer	FSP7	100289	R&S	2014.11.25	☐

6.2.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

$$\text{Result} = \text{M.R} + \text{C.F}(\text{A.F} + \text{C.L} + 3 \text{ dB Att} - \text{A.G})$$

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

A.G= Amplifier Gain

3 dB Att = 3 dB Attenuator

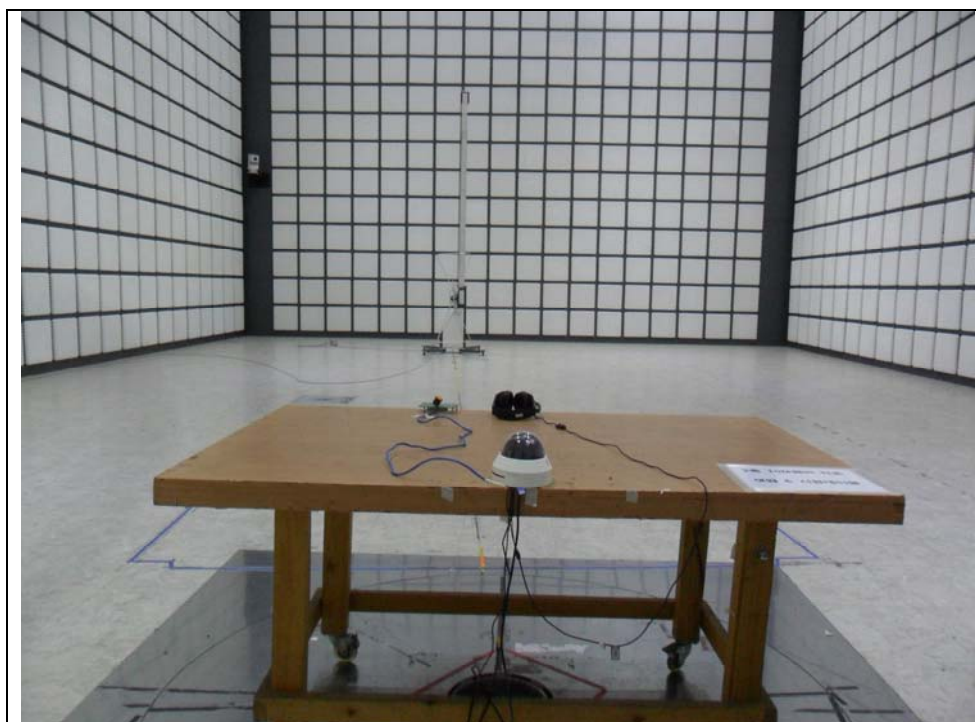
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is

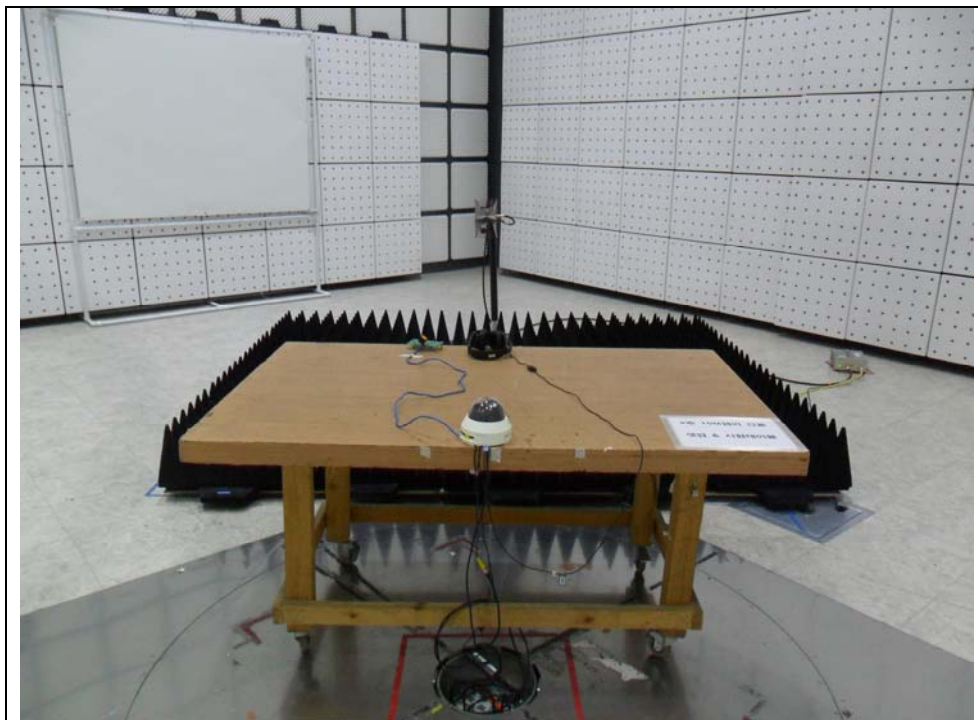
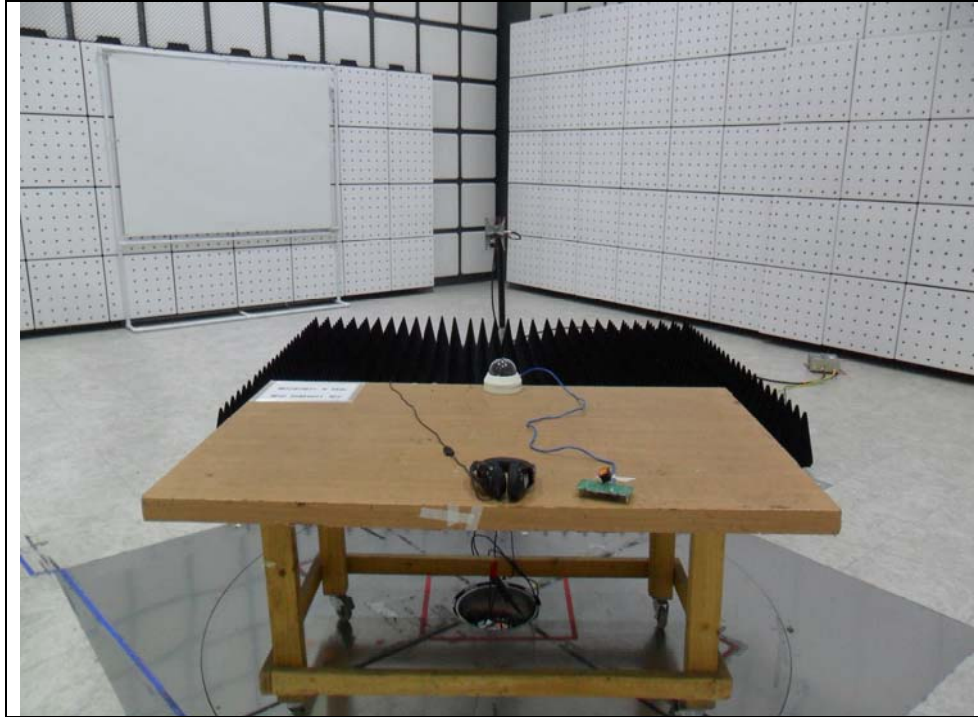
$$30 + 12 + 5 + 3 - 35 = 15 \text{ dB}\mu\text{V/m}$$

6.2.5 Photographs of test setup

* 30 MHz ~ 1 GHz (#1- DC 12V)



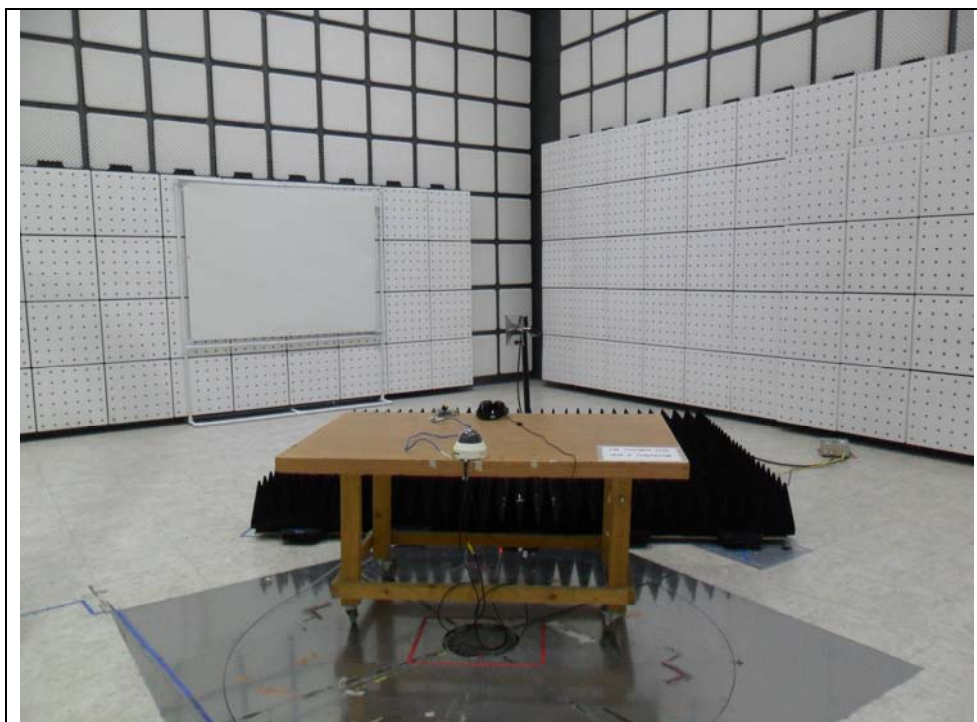
* 1 GHz ~ 6 GHz (#1- DC 12V)



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



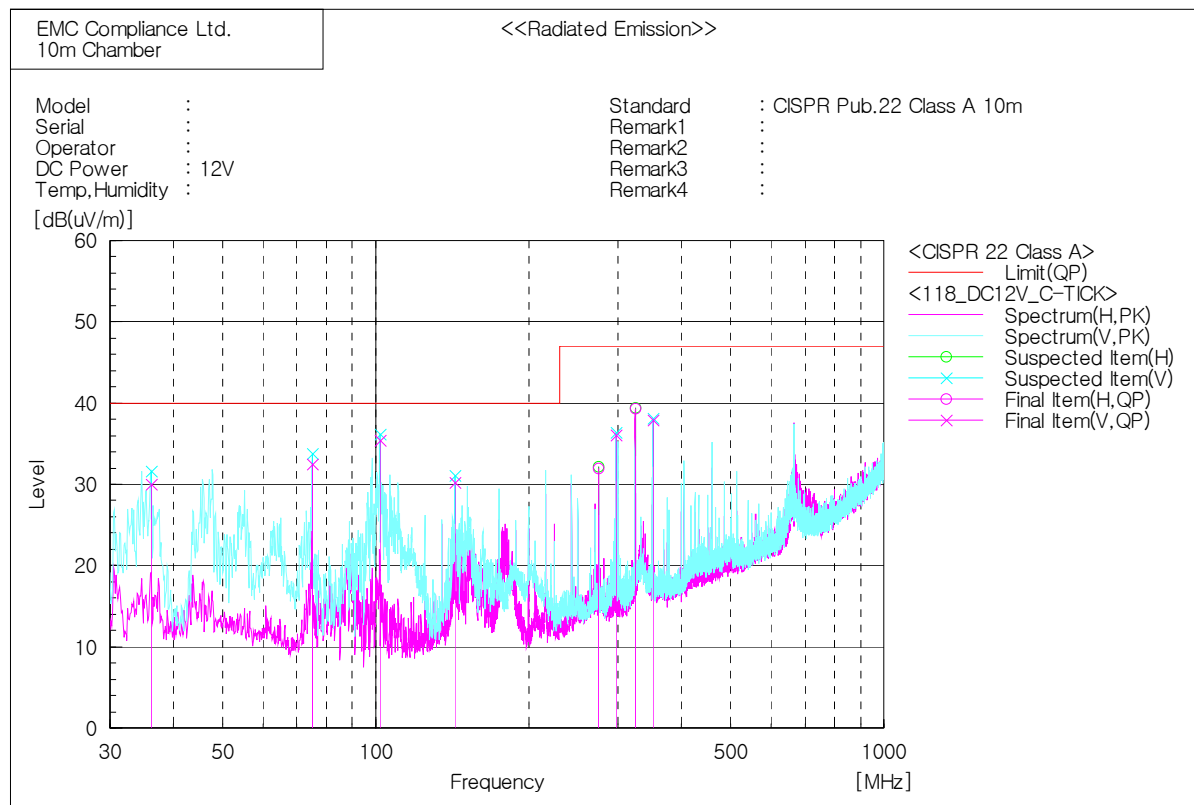
* 1 GHz ~ 6 GHz (#2-PoE)



6.2.6 Radiated emission measurement result

* Graph and Data

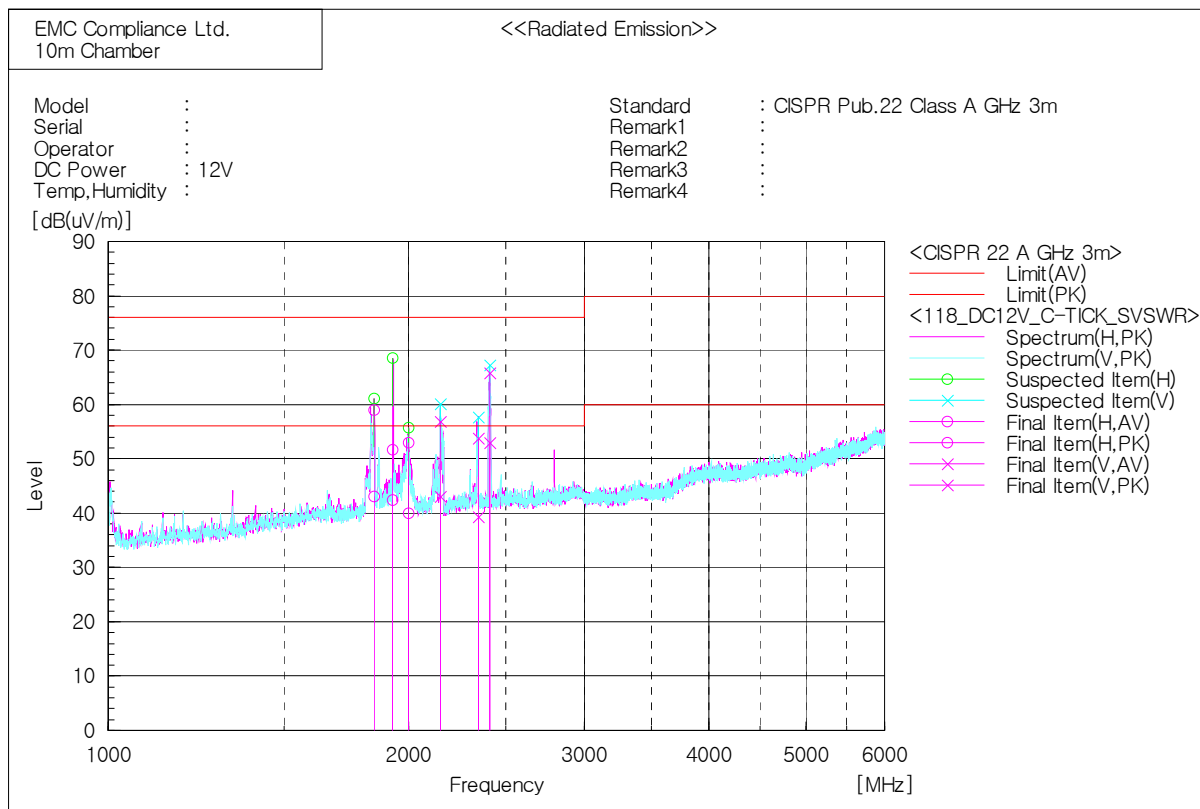
* 30 MHz ~ 1 GHz (SND-7084RP) _#1- DC 12V



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	36.184	V	44.5	-14.5	30.0	40.0	10.0	400.0	150.7
2	74.984	V	49.1	-16.6	32.5	40.0	7.5	100.0	64.0
3	101.901	V	52.6	-17.2	35.4	40.0	4.6	100.0	357.4
4	143.248	V	43.4	-13.2	30.2	40.0	9.8	100.0	101.9
5	275.046	H	43.0	-11.0	32.0	47.0	15.0	400.0	94.7
6	296.993	V	46.5	-10.4	36.1	47.0	10.9	100.0	168.5
7	324.031	H	48.8	-9.5	39.3	47.0	7.7	400.0	241.3
8	350.949	V	46.5	-8.6	37.9	47.0	9.1	100.0	248.6

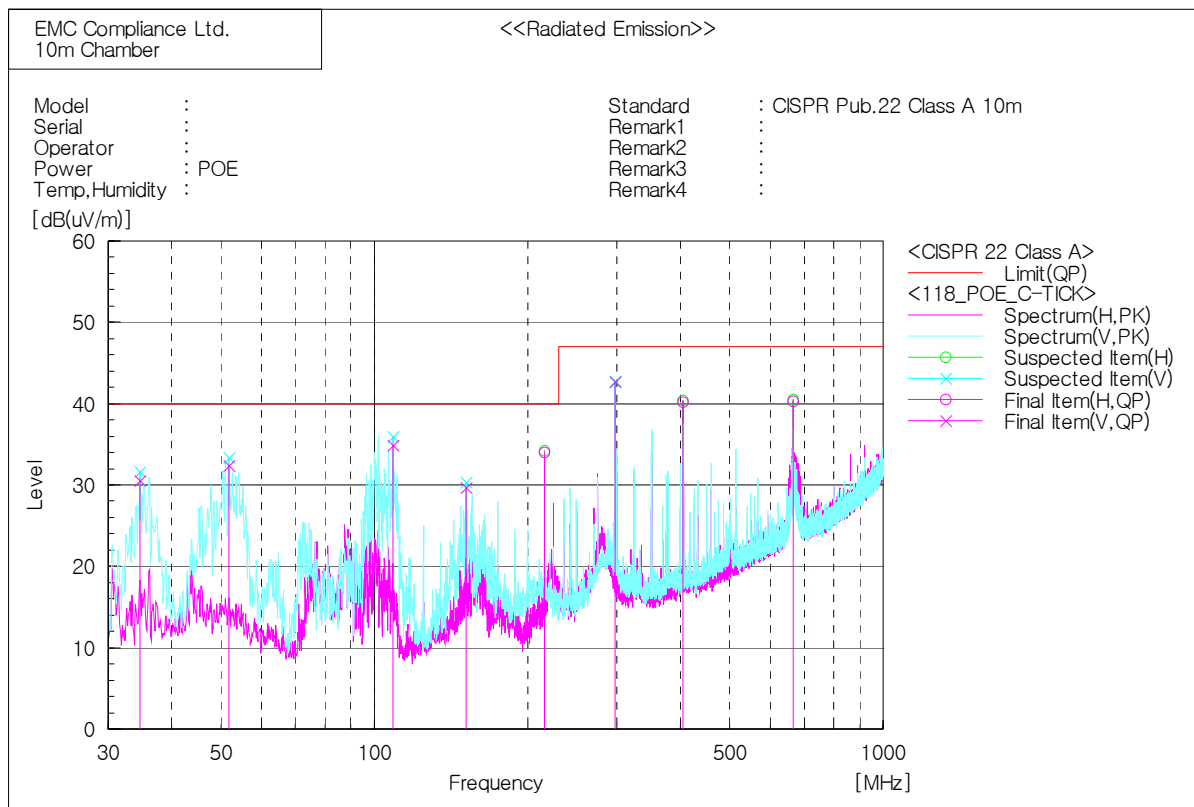
* 1 GHz ~ 6 GHz (SND-7084RP) _#1- DC 12V



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	1848.750	H	42.5	58.5	0.5	43.0	59.0	56.0	76.0	13.0	17.0	100.0	43.3
2	1929.375	H	41.5	50.8	0.9	42.4	51.7	56.0	76.0	13.6	24.3	100.0	228.0
3	1999.375	H	38.7	51.6	1.3	40.0	52.9	56.0	76.0	16.0	23.1	100.0	141.8
4	2153.125	V	41.3	55.1	1.8	43.1	56.9	56.0	76.0	12.9	19.1	100.0	319.0
5	2348.750	V	36.8	51.2	2.5	39.3	53.7	56.0	76.0	16.7	22.3	100.0	133.1
6	2410.625	V	50.4	63.2	2.6	53.0	65.8	56.0	76.0	3.0	10.2	100.0	101.4

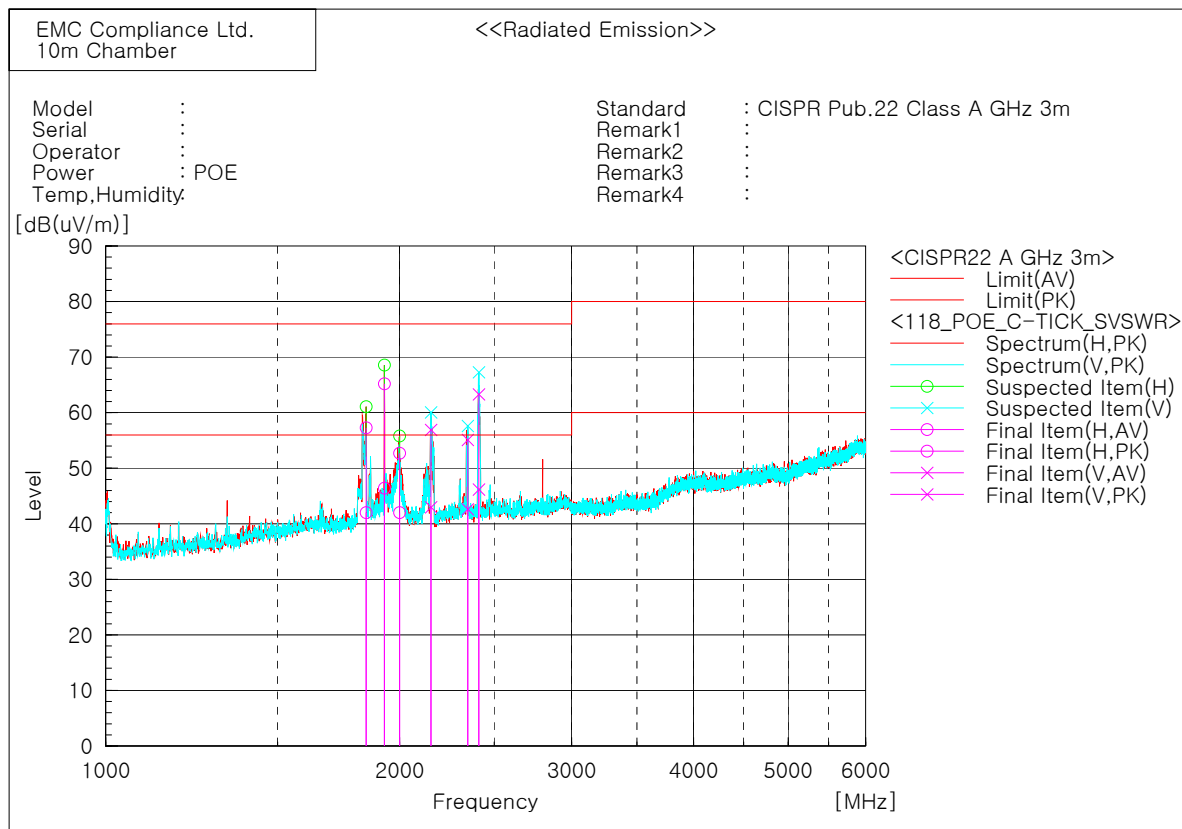
* 30 MHz ~ 1 GHz (SND-7084RP) _#2- PoE



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	34.608	V	45.2	-14.7	30.5	40.0	9.5	400.0	350.0
2	51.825	V	45.6	-13.2	32.4	40.0	7.6	100.0	58.5
3	108.813	V	51.3	-16.4	34.9	40.0	5.1	100.0	342.7
4	151.493	V	42.7	-13.0	29.7	40.0	10.3	100.0	99.4
5	215.998	H	48.2	-14.2	34.0	40.0	6.0	400.0	118.6
6	296.993	V	53.1	-10.4	42.7	47.0	4.3	100.0	339.7
7	405.026	H	47.2	-7.0	40.2	47.0	6.8	400.0	262.1
8	666.078	H	41.2	-0.9	40.3	47.0	6.7	400.0	41.3

* 1 GHz ~ 6 GHz (SND-7084RP) _#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	1848.750	H	41.5	56.8	0.5	42.0	57.3	56.0	76.0	14.0	18.7	100.0	43.3
2	1929.375	H	45.5	64.3	0.9	46.4	65.2	56.0	76.0	9.6	10.8	100.0	228.0
3	1999.375	H	40.7	51.4	1.3	42.0	52.7	56.0	76.0	14.0	23.3	100.0	141.8
4	2153.125	V	41.2	55.1	1.8	43.0	56.9	56.0	76.0	13.0	19.1	100.0	319.0
5	2348.750	V	40.1	52.6	2.5	42.6	55.1	56.0	76.0	13.4	20.9	100.0	133.1
6	2410.625	V	43.6	60.7	2.6	46.2	63.3	56.0	76.0	9.8	12.7	100.0	101.4

7. E.U.T. photographs

Front View



Rear View



Left View



Right View



Top View



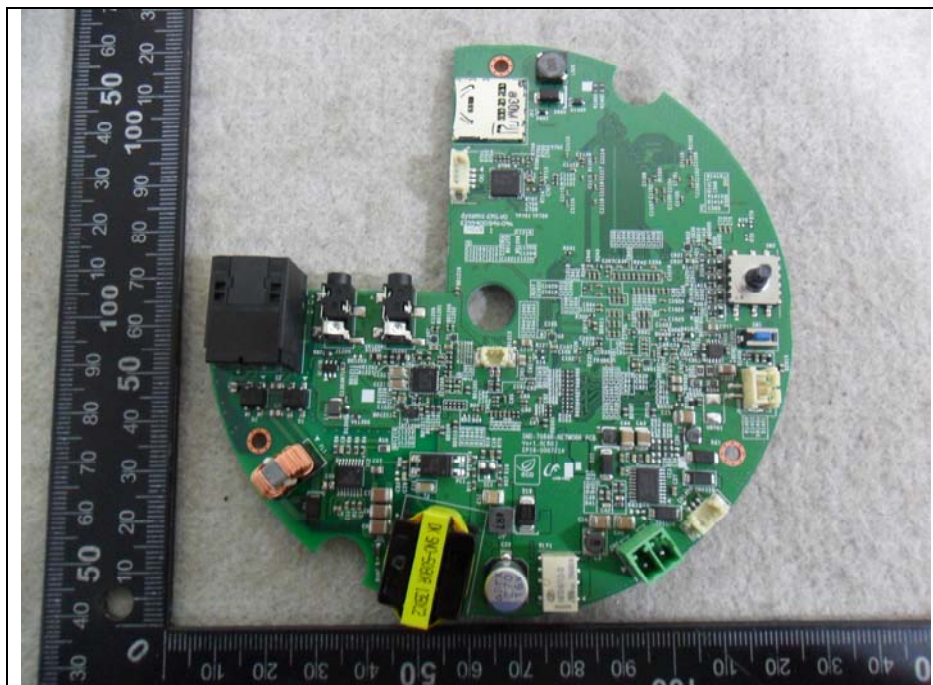
Bottom View



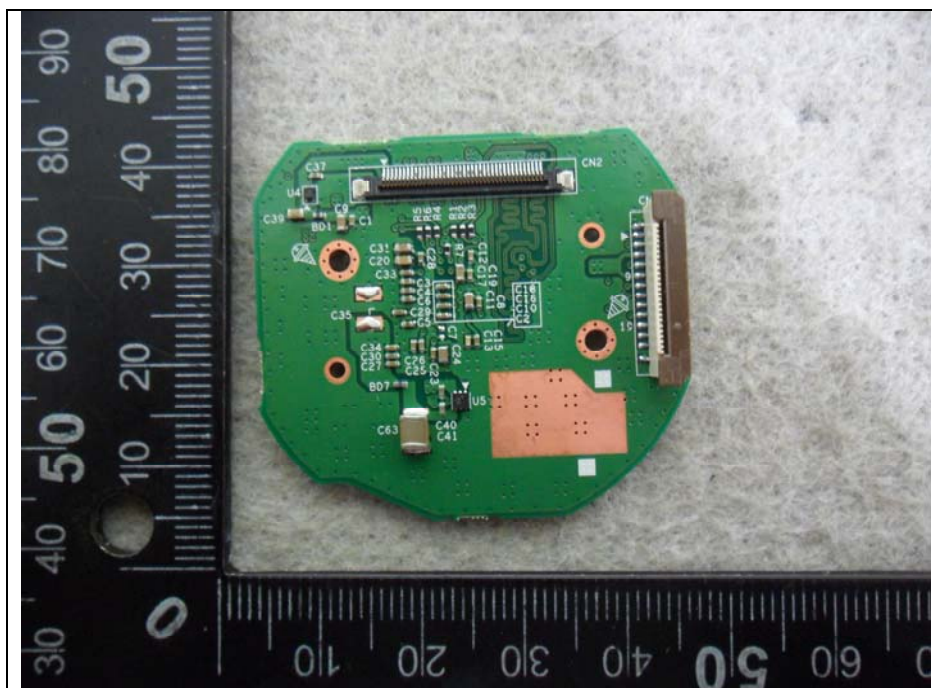
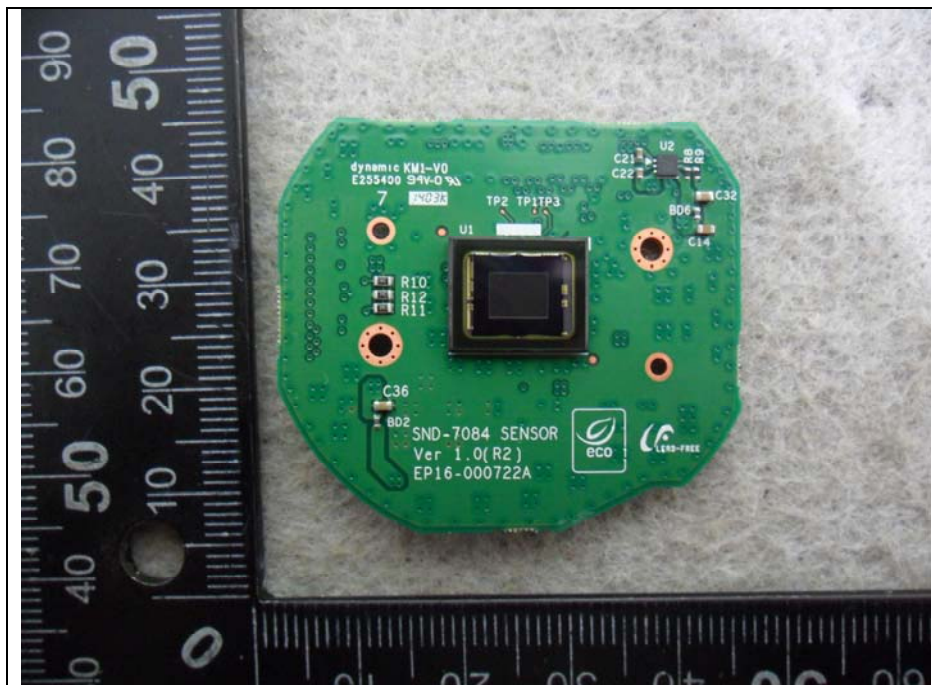
Inside



Main Board



CCD Board



IR Board

