

TESTING CERTIFICATE

EMC Compliance Ltd.

480-5 Sin-dong, Yeongtong-gu,
Suwon-city, Gyeonggi-do,
443-390, Korea
TEL: 82 31 336 9919
FAX: 82 505 299 8311

Certificate No.: EMC-CE-4165

Page(1) / (30) Pages

**1. Applicant**

Name: Samsung Techwin Co., Ltd.
Address: #42 Seongju-Dong, Changwon-Shi,
Kyungsangnam-Do, Korea
Date of Receipt: May 15, 2013

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, SNO-6011RP

5. Date of Test:

July 01 ~ 02, 2013

6. Test method used:

AS/NZS CISPR 22:2009, Class A

7. Testing Environment:

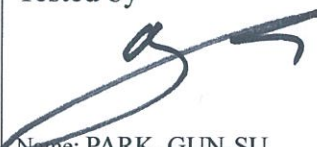
Temperature: (24.0) °C,
Relative Humidity: (38.0 ~ 41.0) % R.H.

8. Test Results:

Refer to page 13 ~ page 23
(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  Name: PARK, GUN-SU	Technical Manager  Name: BEAK, JEONG-SOO
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The above test certificate is the accredited test results by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2013. 07. 12

EMC Compliance Ltd.

Accredited by KOLAS, Republic of KOREA

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1. Applicant information

Applicant: Samsung Techwin Co., Ltd.
Address: #42 Seongju-Dong, Changwon-Shi,
Kyungsangnam-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: #42 Seongju-Dong, Changwon-Shi,
Kyungsangnam-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.

480-5 Sin-dong, Yeongtong-gu, Suwon-city, Gyeonggi-do, 443-390, Korea

Telephone Number: 82 31 336 9919

Facsimile Number: 82 505 299 8311

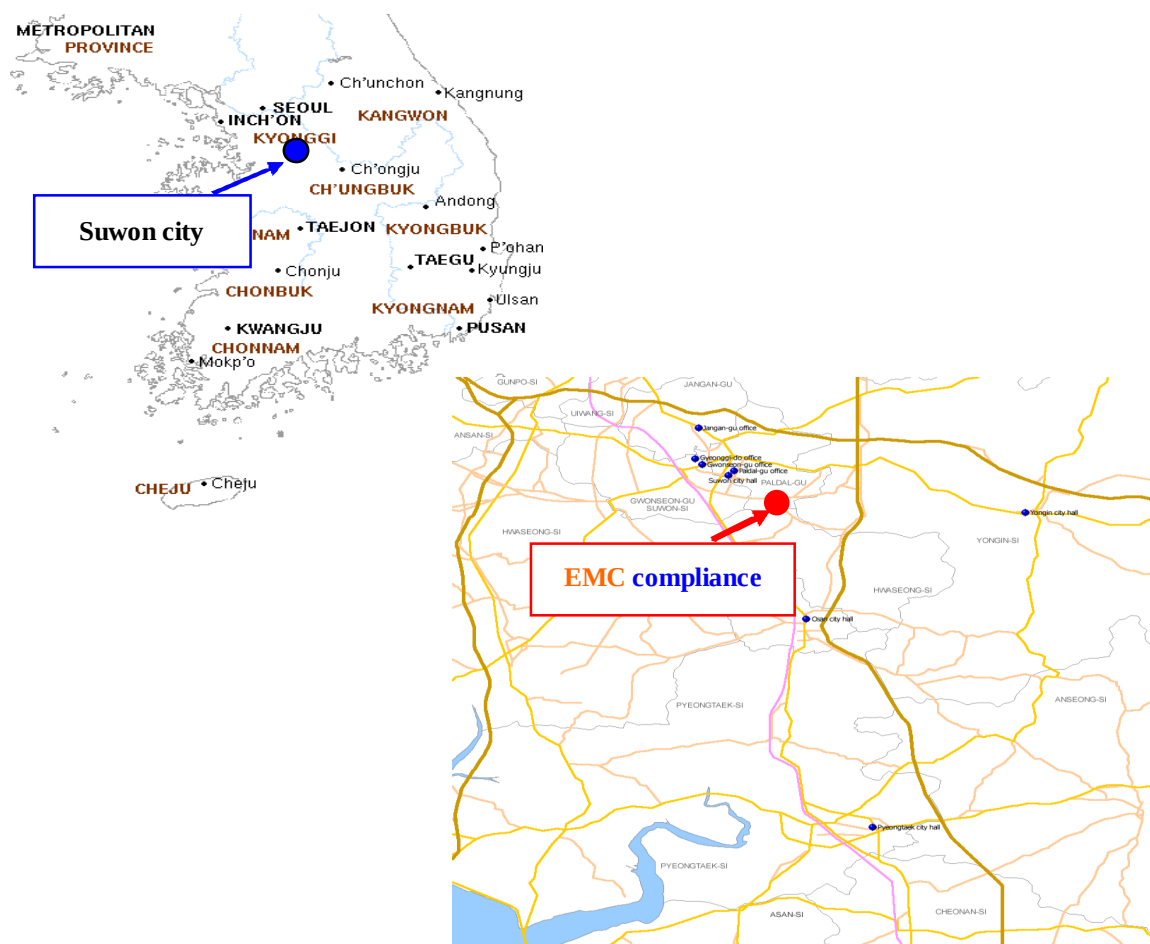
FCC CAB.: KR0040

VCCI Registration No. : R-3327, G-198, C-3706, T-1849

Industry Canada Registration No.: 8035A

KOLAS NO.: 231

SITE MAP



3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
Chamber(10 m)	: 24 °C	41 % R.H.	-
Shielded room(CE)	: 24 °C	38 % 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 Exmore 2.38M CMOS (IMX136)
Total Pixels	1952(H) x 1236(V)
Effective Pixels	1944(H) x 1224(V)
Scanning System	Progressive
Min. Illumination	Color : 0.3 Lux (F2.0, 50IRE), 0.03 Lux (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)
Lens	
Focal Length (Zoom Ratio)	3.8mm Fixed
Max. Aperture Ratio	F2.0
Angular Field of View	H: 84.5°, V: 45.8°, D: 98.8°
Min. Object Distance	0.5m
Focus Control	Manual
Lens Type	-
Mount Type	Board-in type
Operational	
Viewable Length	15m
Camera Title	Off / On (Displayed up to 45 characters)
Day & Night	Auto (ICR) / Color / B/W
Backlight Compensation	Off / BLC
Wide Dynamic Range	WDR 15fps 100dB
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 (32ea Polygonal zones)
Gain Control	Off / Low / Middle / High
White Balance	ATW / AWC / Manual / Indoor / Outdoor
Electronic Shutter Speed	Auto / A.FLK / Manual (1/30 ~ 12,000sec)
Digital PTZ	-
Flip / Mirror	Off / On
Intelligent Video Analytics	Tampering, Virtual Line, Enter/Exit, Appear / Disappear, Face Detection, with Metadata
Alarm I/O	Input 1ea
RS-485 Protocol	-

Alarm Triggers	Motion detection, Face Detecton, Tampering Detection, Video Analytics, Alarm Input
Alarm events	File upload via FTP and E-Mail Notification via E-Mail, TCP and HTTP
Network	
Ethernet	RJ-45 (10/100BASE-T)
Video Compression Format	H.264(MPEG-4 Part 10/AVC), Motion JPEG
Resolution	1920x1080 /1600x1200/ 1280x1024 /1280x960 / 1280x720 / 1024x768 / 800x600 / 800x450 / 640x480 / 640x360 / 320x240 / 320x180
Max. Framerate	H.264 : Max 30fps at all resolutions Motion JPEG : 1920x1080 /1600x1200/ 1280x1024 /1280x960 / 1280x720 / 1024x768 : Max. 15 fps 800x600 / 800x450 / 640x480 / 640x360 / 320x240 /
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 I/O	-
Audio Compression Format	-
Audio Communication	-
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.
Memory Card	Micro SD(4G)
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, MAC OS X 10.7 or Higher Supported Browser : Internet Explorer 7.0 or Higher, Firefox 9.0 or Higher, Chrome 15.0 or Higher, Safari 5.1 or Higher
Central Management Software	SmartViewer 4.0
Environmental	
Operating Temperature / Humidity	-10°C ~ +55°C / Less than 90% RH
Storage Temperature / Humidity	-30°C ~ +60°C (-22°F ~ +140°F) / Less than 90% RH
Ingress Protection	IP66 Grade (Waterproof)
Vandal Resistance	-
Electrical	
Input Voltage / Current	PoE(IEEE802.3af)
Power Consumption	Max 8.5W
Mechanical	
Color / Material	Dark Gray / Plastic
Dimension (WxHxD)	68.4X262.2
Weight	330g

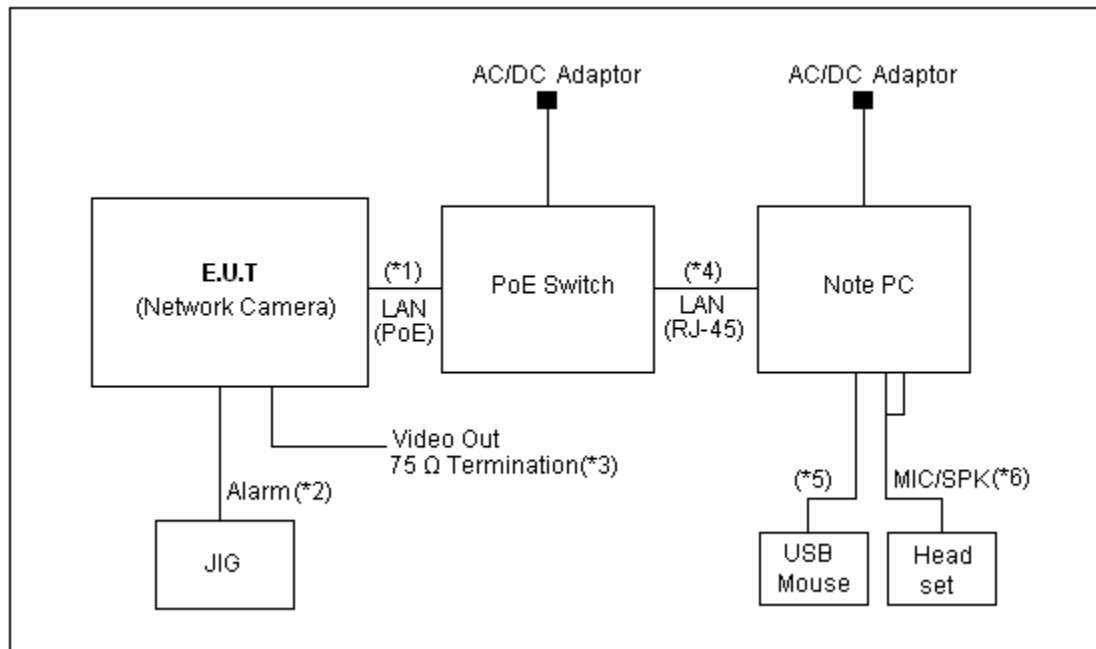
4.2 Product description

Type of product	Network Camera
Model name (Basic)	SNO-6011RP
Model name (Variant)	-
Difference	-
Trade name	-
Serial no	Engineering Sample
Testing voltage	PoE
Product rating	PoE
Internal clock frequency	Above 108 MHz
Note	* PoE Switch was not provided by the manufacturer.

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Note PC	Satellite L730	3B134626W	TOSHIBA
USB Mouse	1088	8165906051240	Microsoft
Headset	SHS-250V	-	SAMSUNG
JIG	-	-	-
PoE Switch	FS108P	1DL2093R00C1C	NETGEAR

4.4 Test configuration



* 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		Video Out	75 Ω Termination	-	1.0	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	MIC/SPK	2.0	Non-Shield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
1	Camera monitoring test. (Web viewer)

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	13 Page ~ 17 Page
☒	Radiated Emission	AS/NZS CISPR 22:2009, Class A	18 Page ~ 23 Page

6. Test results

6.1 Conducted Emission

Test specification	AS/NZS CISPR 22:2009, Class A		
Testing voltage	PoE		
Test facility	Shielded room (CE#2)		
Date	2013. 07. 02		
Temperature (°C)	24 °C	Humidity (% R.H.)	38 % 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

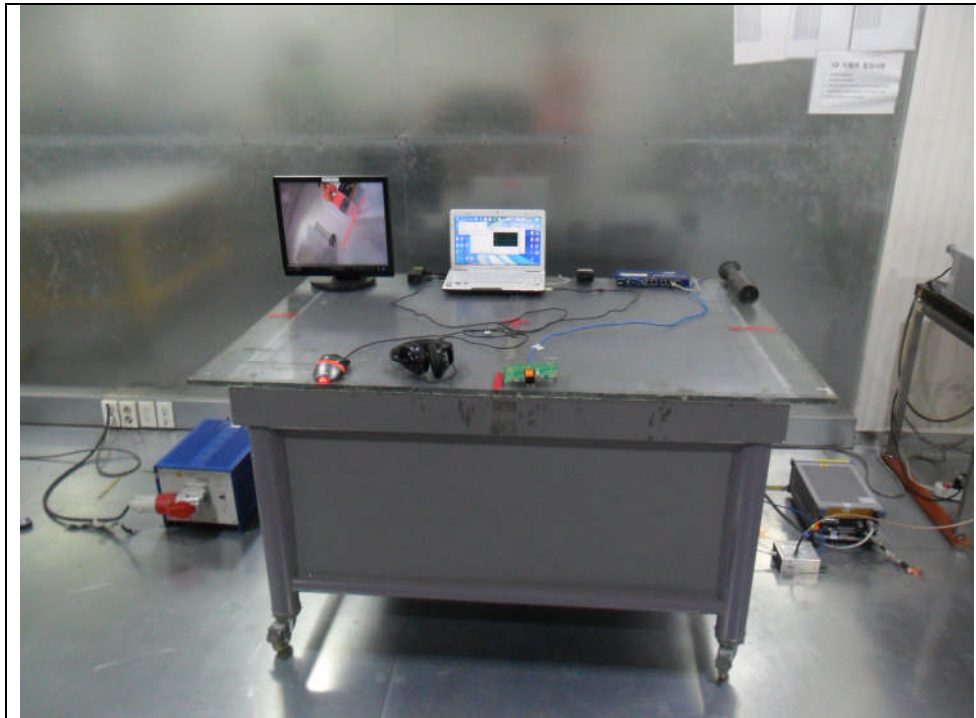
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground 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	ESHS30	844827/011	R&S	2013.08.06	☐
Test Receiver	ESCI7	100732	R&S	2014.02.18	☐
Test Receiver	ESCI	100001	R&S	2013.07.10	☒
Test Receiver	ESCI	100710	R&S	2013.11.06	☐
LISN	ENV216	101352	R&S	2014.01.07	☐
LISN	L3-32	0120J20305	PMM	-	☒
8-WIRE ISN	NTFM 8158 CAT5	CAT5-8158-0048	SCHWARZBECK	2013.10.30	☒
8-WIRE ISN	NTFM 8158 CAT3	CAT3-8158-0033	SCHWARZBECK	2013.10.30	☒
ISN	ST08	24342	TESEQ	2014.06.21	☐
ISN	ENY81	101545	R&S	2013.08.29	☐

6.1.4 Photographs of test setup

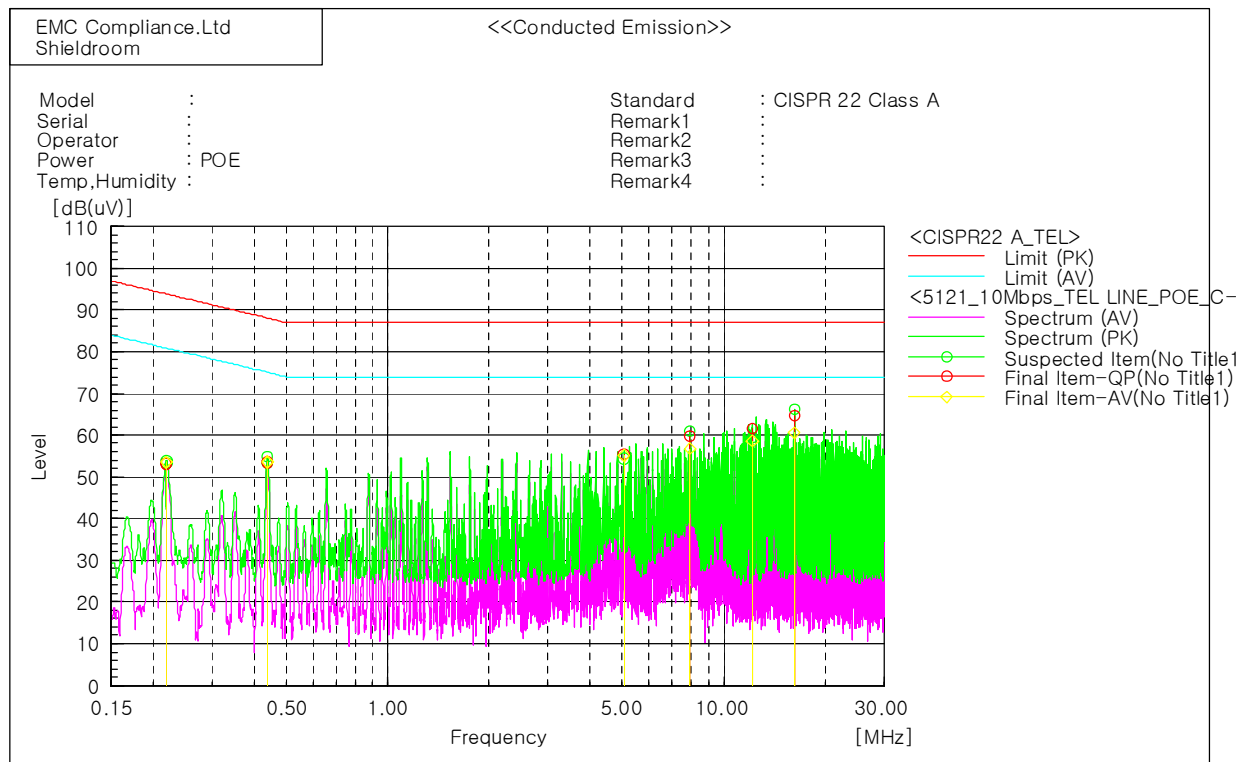
* Telecommunication



6.1.5 Conducted emission measurement result

* Telecommunication port

LAN Port (LCL 55 dB)_10 Mbps (SNO-6011RP)

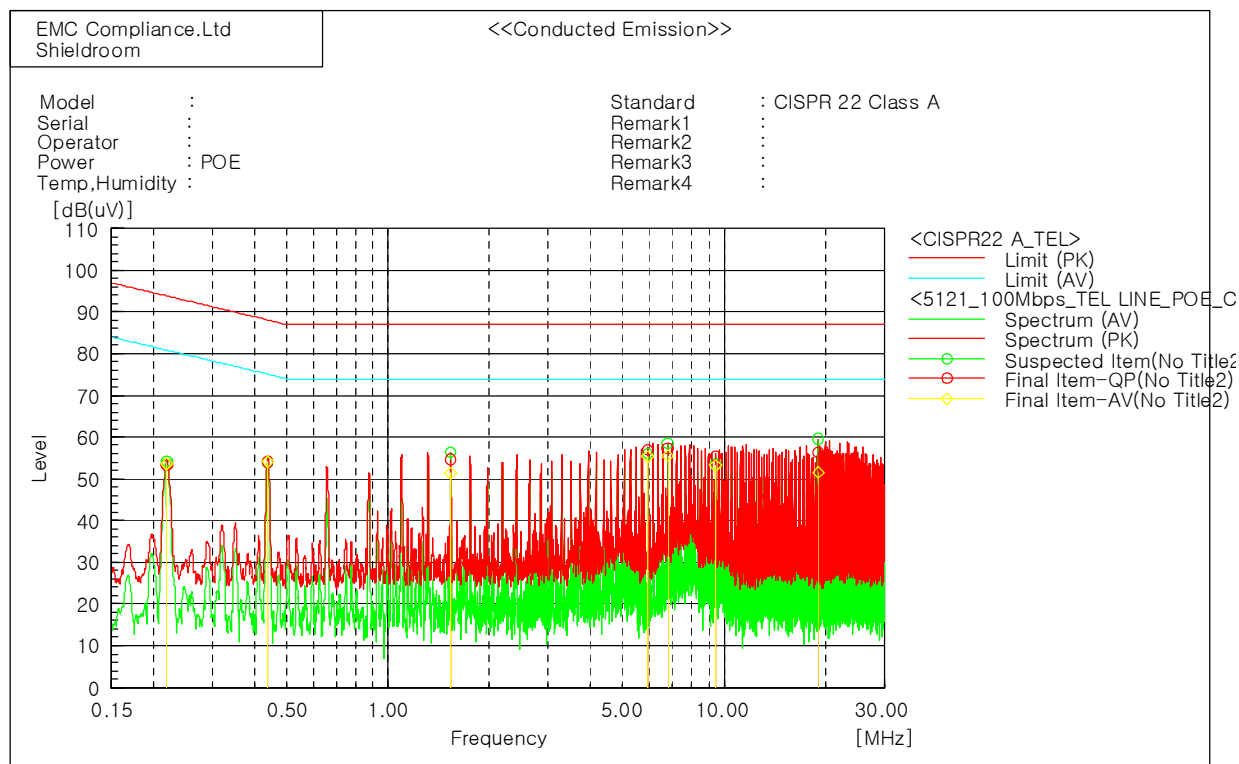


Final Result

--- ISN-CAT3 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	0.2191	42.8	43.2	10.3	53.1	53.5	93.9	80.9	40.8	27.4
2	0.21935	42.8	43.2	10.3	53.1	53.5	93.8	80.8	40.7	27.3
3	0.43871	43.4	43.5	10.1	53.5	53.6	88.1	75.1	34.6	21.5
4	0.43901	43.4	43.4	10.1	53.5	53.5	88.1	75.1	34.6	21.6
5	5.04386	45.7	45.4	9.7	55.4	55.1	87.0	74.0	31.6	18.9
6	7.92352	50.1	47.1	9.7	59.8	56.8	87.0	74.0	27.2	17.2
7	12.1977	52.0	49.0	9.6	61.6	58.6	87.0	74.0	25.4	15.4
8	16.22842	55.1	51.0	9.6	64.7	60.6	87.0	74.0	22.3	13.4

LAN Port (LCL 65 dB)_100 Mbps (SNO-6011RP)



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	0.2188	43.1	43.4	10.2	53.3	53.6	93.9	80.9	40.6	27.3
2	0.21984	43.1	43.4	10.2	53.3	53.6	93.8	80.8	40.5	27.2
3	0.43847	44.0	44.1	10.0	54.0	54.1	88.1	75.1	34.1	21.0
4	1.53493	44.9	41.6	9.8	54.7	51.4	87.0	74.0	32.3	22.6
5	5.92096	47.3	45.7	9.7	57.0	55.4	87.0	74.0	30.0	18.6
6	6.79904	47.6	45.8	9.7	57.3	55.5	87.0	74.0	29.7	18.5
7	9.42995	45.7	43.6	9.7	55.4	53.3	87.0	74.0	31.6	20.7
8	19.08068	46.6	41.8	9.7	56.3	51.5	87.0	74.0	30.7	22.5

6.2 Radiated Emission

Test specification	AS/NZS CISPR 22:2009, Class A		
Testing voltage	PoE		
Test facility	10 m Chamber (#F2)		
Test distance	10 m, 3 m		
Date	2013. 07. 01		
Temperature (°C)	24 °C	Humidity (% R.H.)	41 % 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	2014.02.18	☒
Test Receiver	ESCI	100001	R&S	2013.07.10	☐
Test Receiver	ESCI	100710	R&S	2013.11.06	☐
Bi-Log Antenna	VULB 9168	440	SCHWARZBECK	2013.10.04	☒
Amplifier	310N	293004	SONOMA INSTRUMENT	2013.11.06	☒
3 dB Attenuator	8491B	22981	HP	2014.03.19	☒
Antenna Mast	MA4000-EP	303	Innco Systems	-	☒
Turn Table	DT2000S-1t	079	Innco Systems	-	☒
Amplifier	8449B	3008A02343	AGILENT	2013.11.06	☒
Horn ANT	3115	00086706	ETS	2013.11.21	☒
Spectrum Analyzer	FSP7	100289	R&S	2013.12.14	☐

6.2.4 Sample calculation

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

The sample calculation is as follow:

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

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

A.G= Amplifier Gain

3 dB Att = 3 dB Attenuator

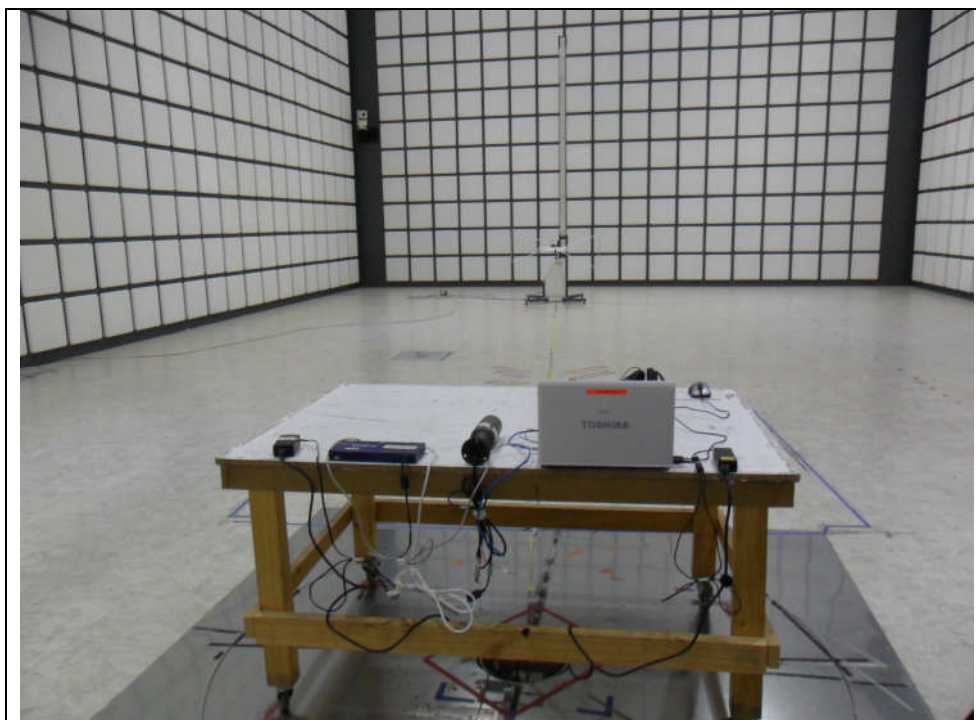
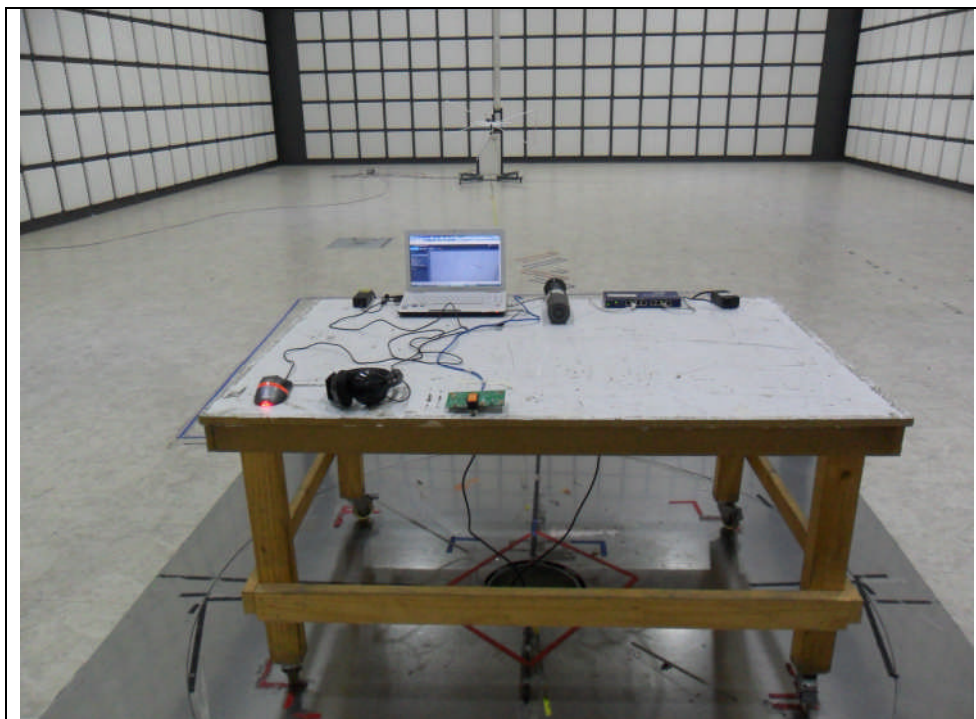
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is

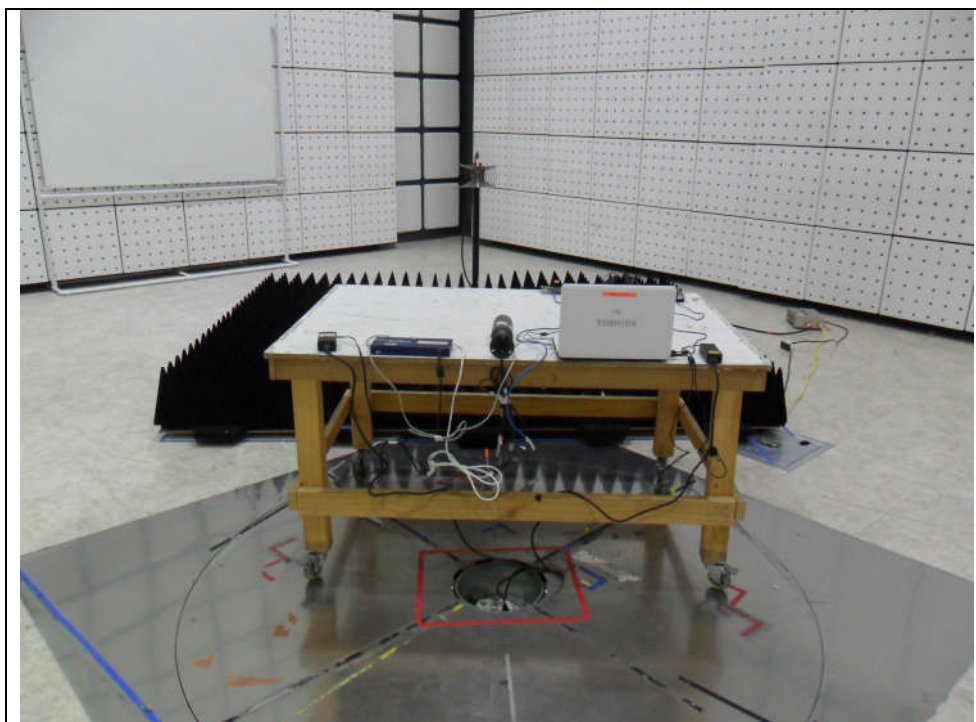
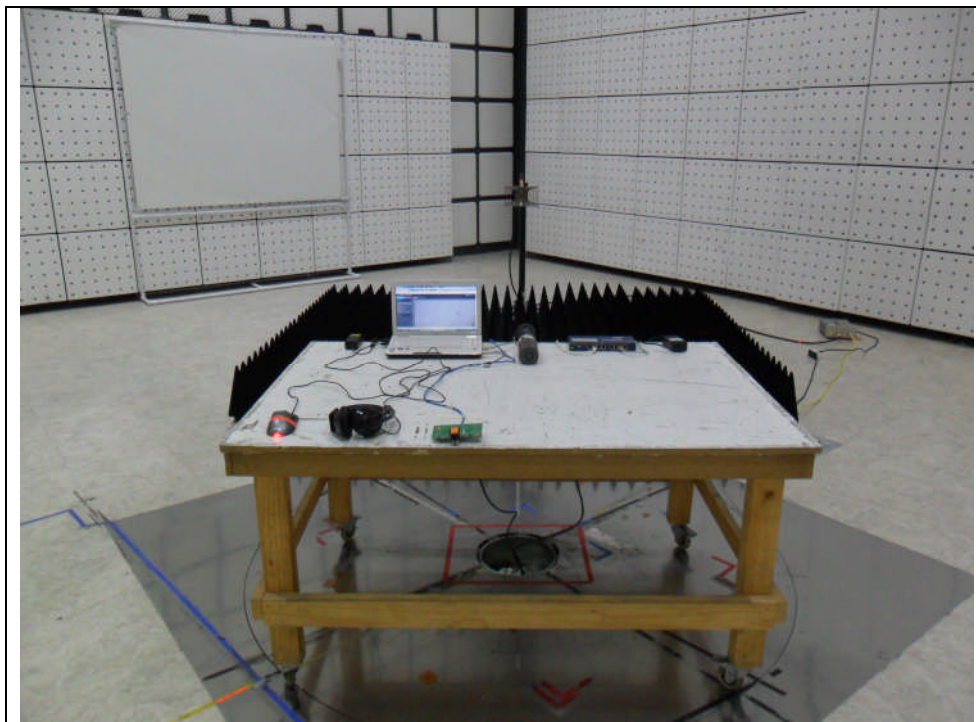
$$30 + 12 + 5 + 3 - 35 = 15 \text{ dB}\mu\text{V/m}$$

6.2.5 Photographs of test setup

* 30 MHz ~ 1 GHz



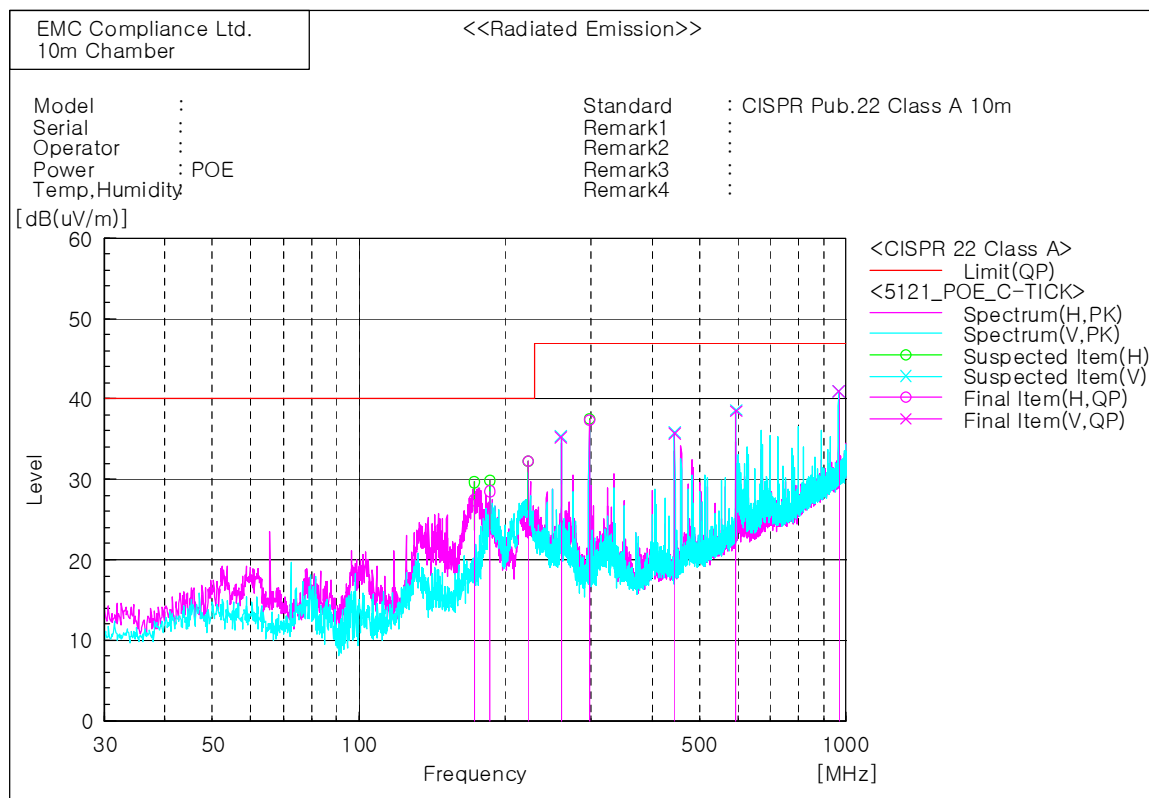
* 1 GHz ~ 6 GHz



6.2.6 Radiated emission measurement result

* Graph and Data

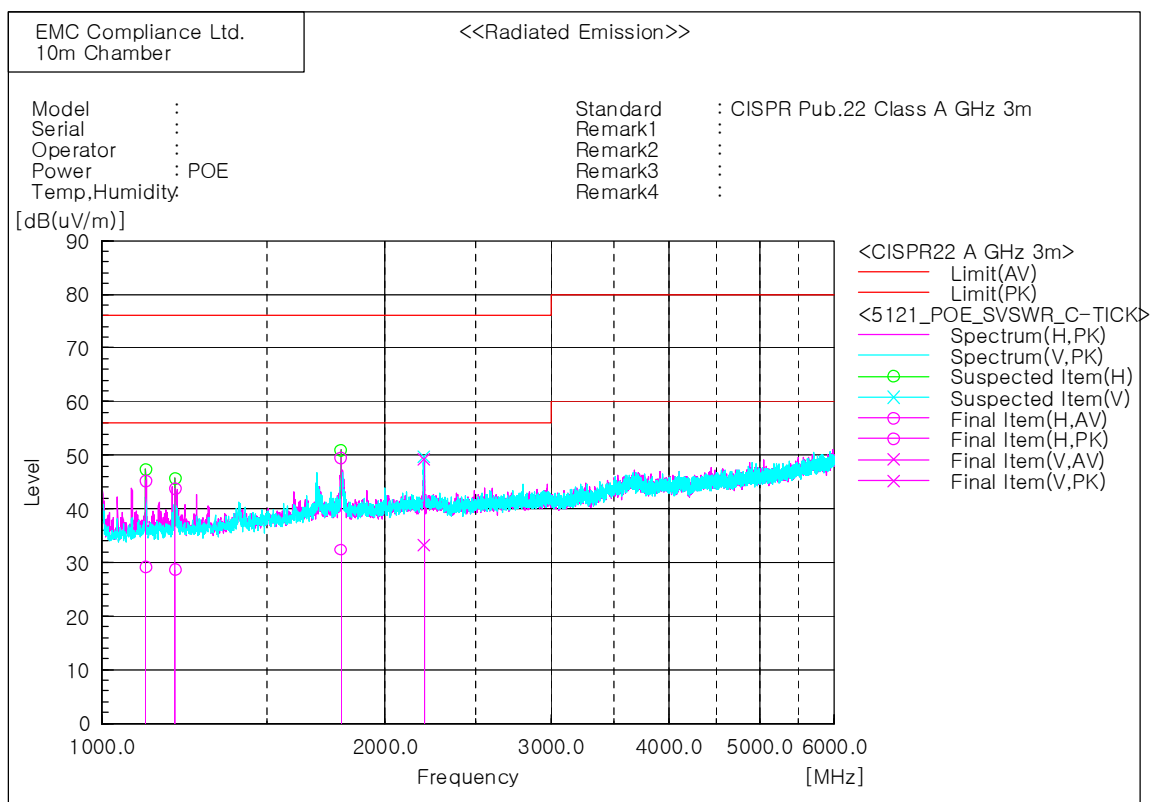
* 30 MHz ~ 1 GHz (SNO-6011RP)



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c. f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	172.590	H	40.1	-12.7	27.4	40.0	12.6	100.0	25.3	
2	185.685	H	42.5	-14.0	28.5	40.0	11.5	100.0	293.5	
3	222.666	H	46.2	-13.9	32.3	40.0	7.7	100.0	49.3	
4	259.890	V	47.2	-12.0	35.2	47.0	11.8	400.0	177.9	
5	296.993	H	47.8	-10.5	37.3	47.0	9.7	100.0	245.5	
6	445.524	V	41.7	-6.0	35.7	47.0	11.3	100.0	92.5	
7	594.055	V	40.4	-1.9	38.5	47.0	8.5	100.0	110.5	
8	965.322	V	35.4	5.5	40.9	47.0	6.1	100.0	84.9	

* 1 GHz ~ 6 GHz (SNO-6011RP)



Final Result

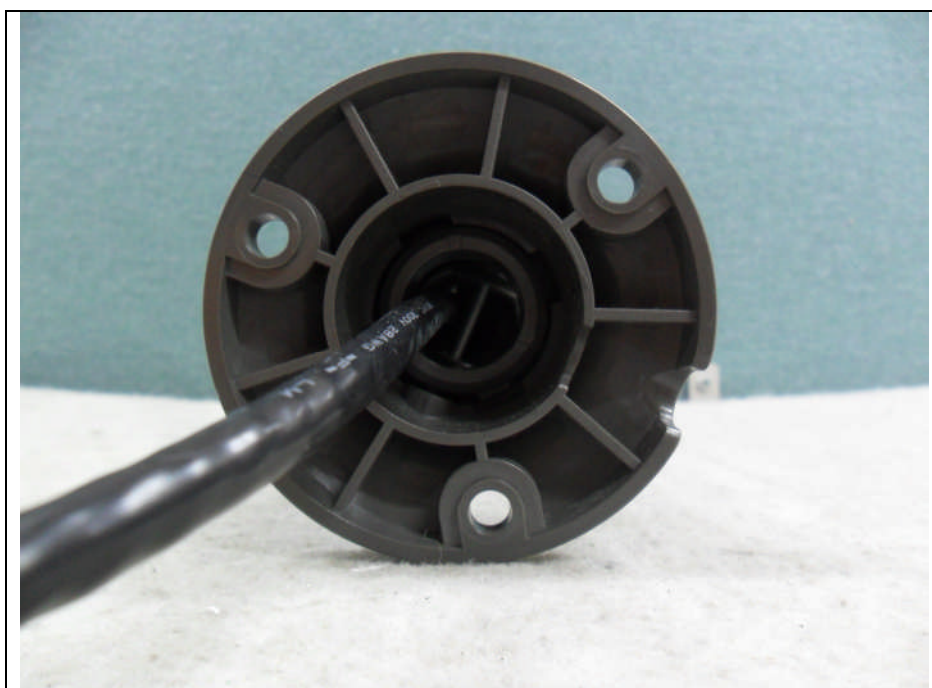
No.	Frequency [MHz]	(P)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	c.f [dB(1/m)]	Result AV [dB(uV/m)]	Result PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [deg]
1	1113.750	H	37.5	53.6	-8.4	29.1	45.2	56.0	76.0	26.9	30.8	100.0	325.1
2	1197.500	H	36.2	51.4	-7.6	28.6	43.8	56.0	76.0	27.4	32.2	100.0	341.6
3	1795.625	H	35.7	52.8	-3.3	32.4	49.5	56.0	76.0	23.6	26.5	100.0	181.2
4	2200.000	V	34.8	50.9	-1.6	33.2	49.3	56.0	76.0	22.8	26.7	100.0	53.1

7. E.U.T. photographs

Front View



Rear View



Left View



Right View



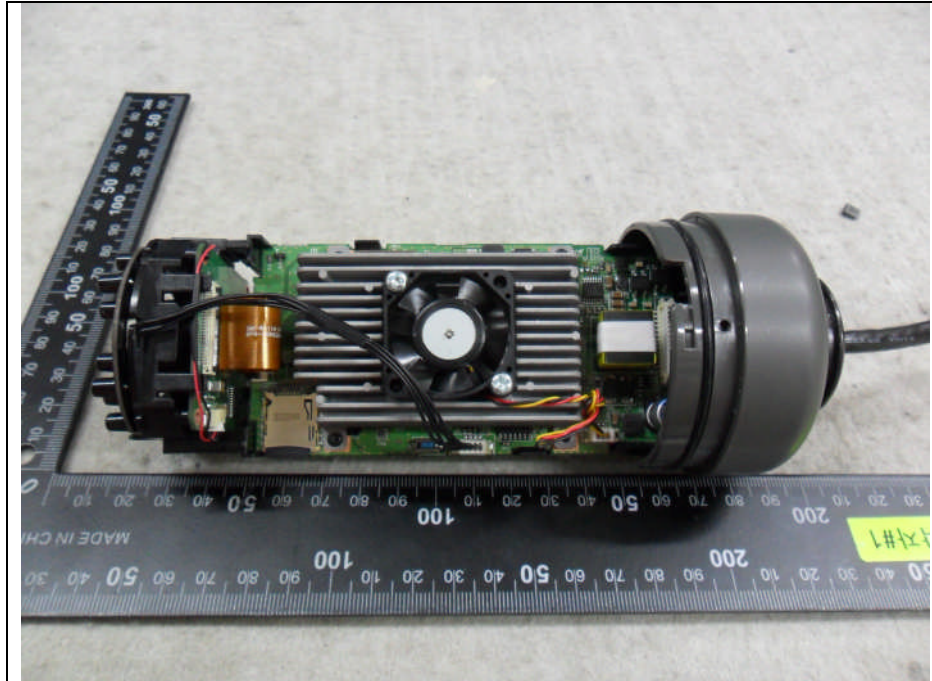
Top View



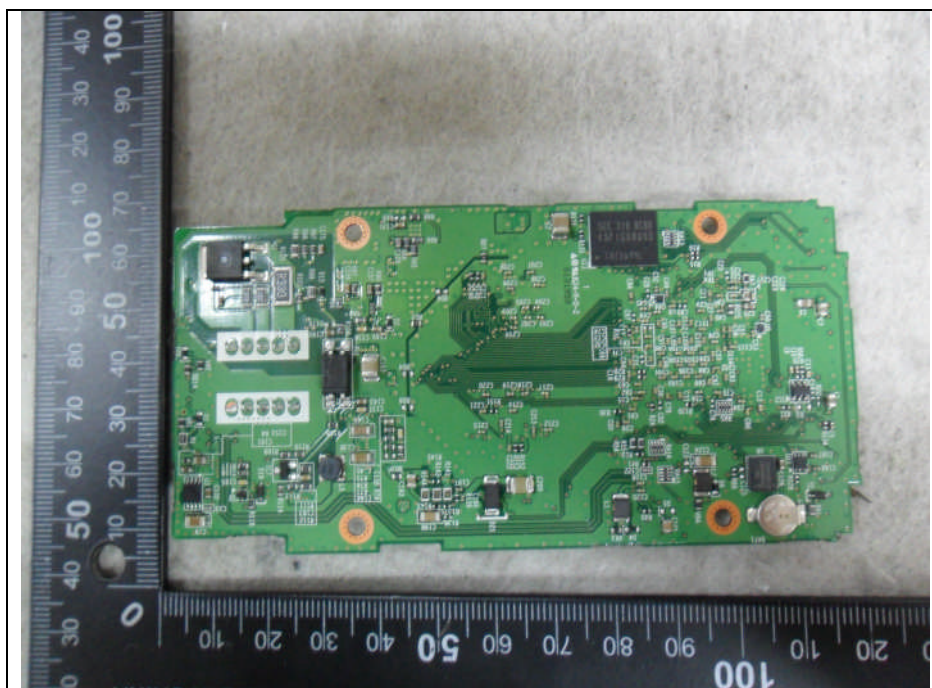
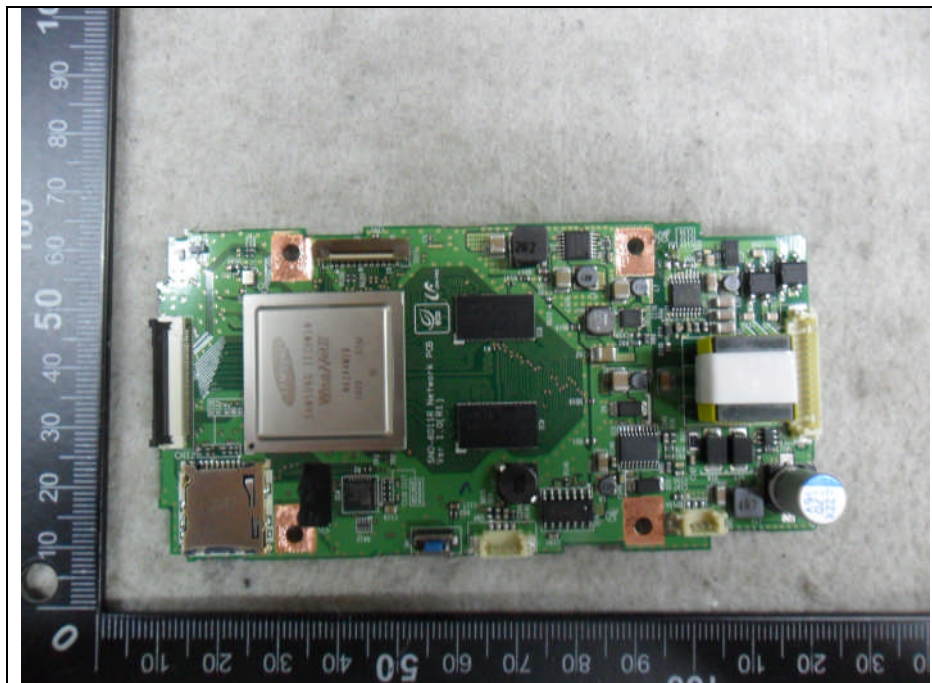
Bottom View



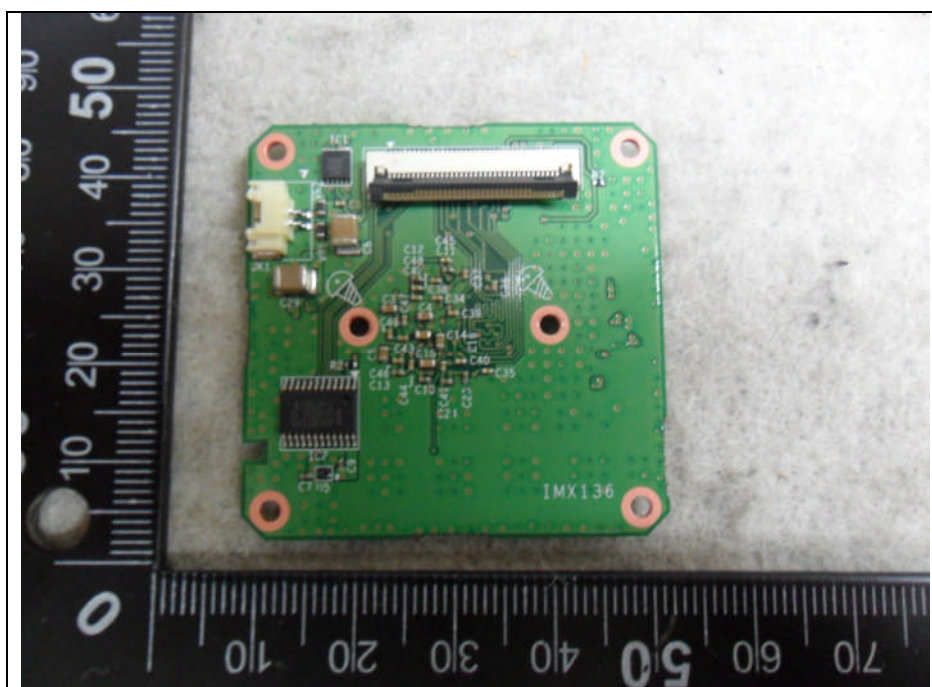
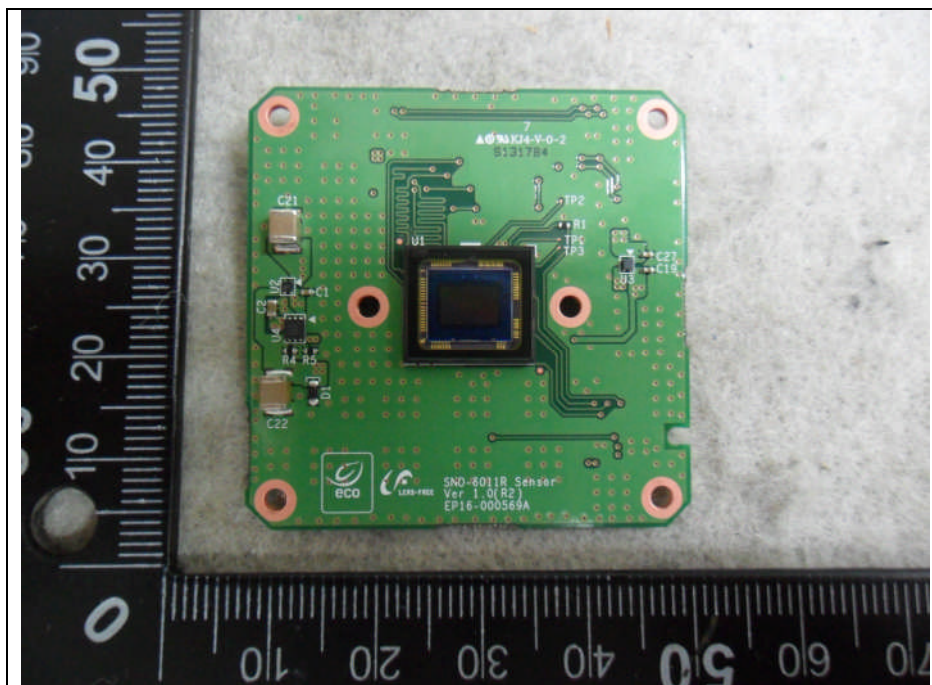
Inside



Main Board



CCD Board



LED Board

