

EMC TEST REPORT

Test report No : EMC-VCCI-0304
Type of Equipment : Network Camera
Model Name : SND-6011RN
Applicant : Samsung Techwin Co., Ltd.
#42 Seongju-Dong, Changwon-Shi,
Kyungsangnam-Do, Korea
Manufacturer#1 : Samsung Techwin Co., Ltd.
#42 Seongju-Dong, Changwon-Shi,
Kyungsangnam-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 / 2012.04, 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: 2013. 05. 15

Date of testing: 2013. 07. 01 ~ 07. 02

Issued date: 2013. 07. 12

Tested by:

JUNG, YOUNG-JUN

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
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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

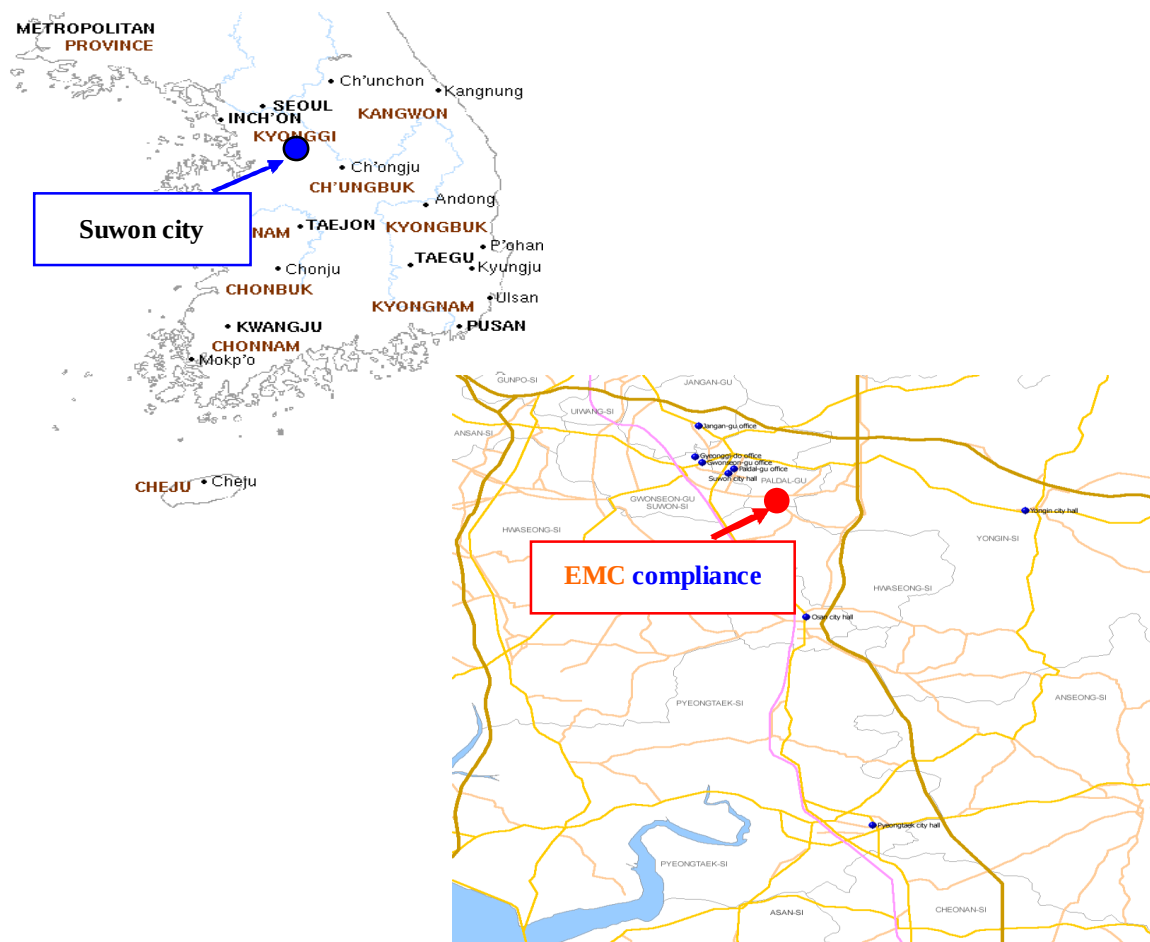
FCC CAB.: KR0040

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
	6 GHz ~ 18 GHz	3 m: + 6.41 dB, - 6.53 dB
10 m Chamber (#F2)	30 MHz ~ 300 MHz	3 m: + 4.86 dB, - 4.88 dB 10 m: + 4.86 dB, - 4.86 dB
	300 MHz ~ 1 000 MHz	3 m: + 4.98 dB, - 4.99 dB 10 m: + 4.85 dB, - 4.87 dB
	1 GHz ~ 6 GHz	3 m: + 6.19 dB, - 6.20 dB
	6 GHz ~ 18 GHz	3 m: + 6.41 dB, - 6.53 dB

4. Description of E.U.T.

4.1 General information

Video	
Imaging Device	1/2.8" 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
Pan / Tilt / Rotate	
Pan Range	
Tilt Range	
Rotate Range	
Operational	
Viewable Length	10m
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 / 320x180 : Max. 30fps
Smart Codec	-
Video Quality Adjustment	H.264 : Compression Level, Target Bitrate Level Control MJPEG : Quality Level Control
Bitrate Control Method	H.264 : CBR or VBR M-JPEG : VBR
Streaming Capability	Multiple Streaming (Up to 10 Profiles)
Audio 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, SVP 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	-
Vandal Resistance	-
Electrical	
Input Voltage / Current	PoE(IEEE802.3af)
Power Consumption	Max 8.0W
Mechanical	
Color / Material	Ivory / Plastic
Dimension (WxHxD)	120*102
Weight	380g

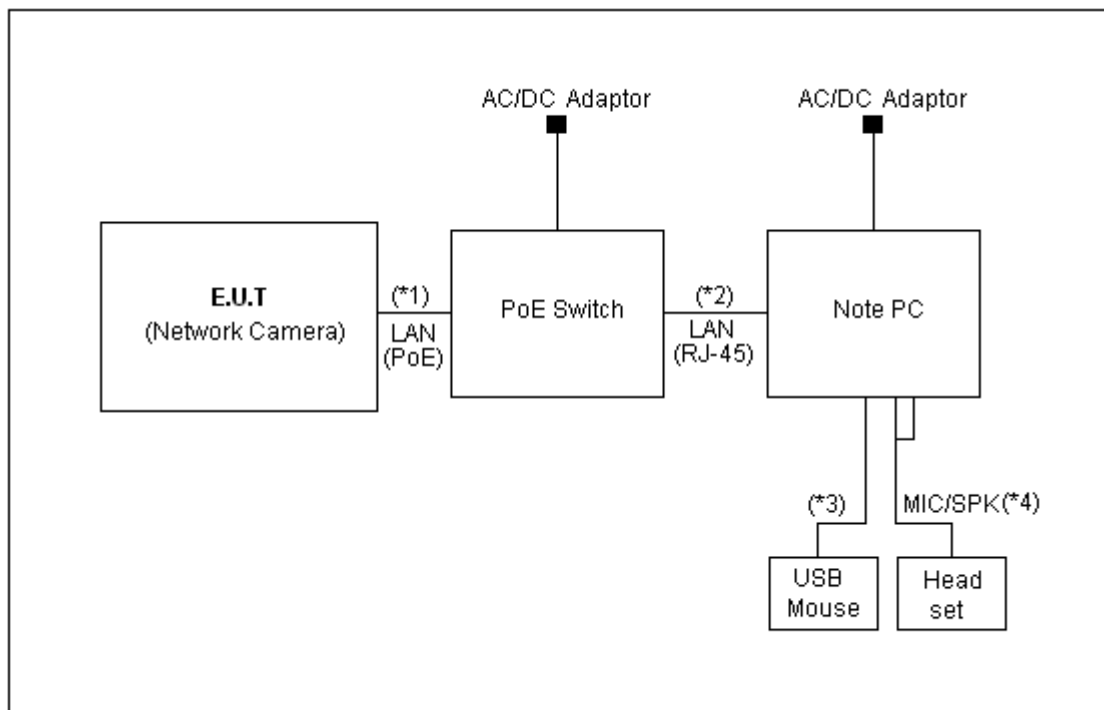
4.2 Product description

Type of product	Network Camera
Model name (Basic)	SND-6011RN
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
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	Note PC	LAN(RJ-45)	PoE Switch	LAN(RJ-45)	3.0	Non-Shield
3		USB	USB Mouse	USB	1.8	Shield
4		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	VCCI V-3 / 2012.04, Class A	Complied
☒	Radiated Emission	VCCI V-3 / 2012.04, Class A	Complied

6. Test results

6.1 Conducted Emission

Test specification	VCCI V-3 / 2012.04, 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 (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

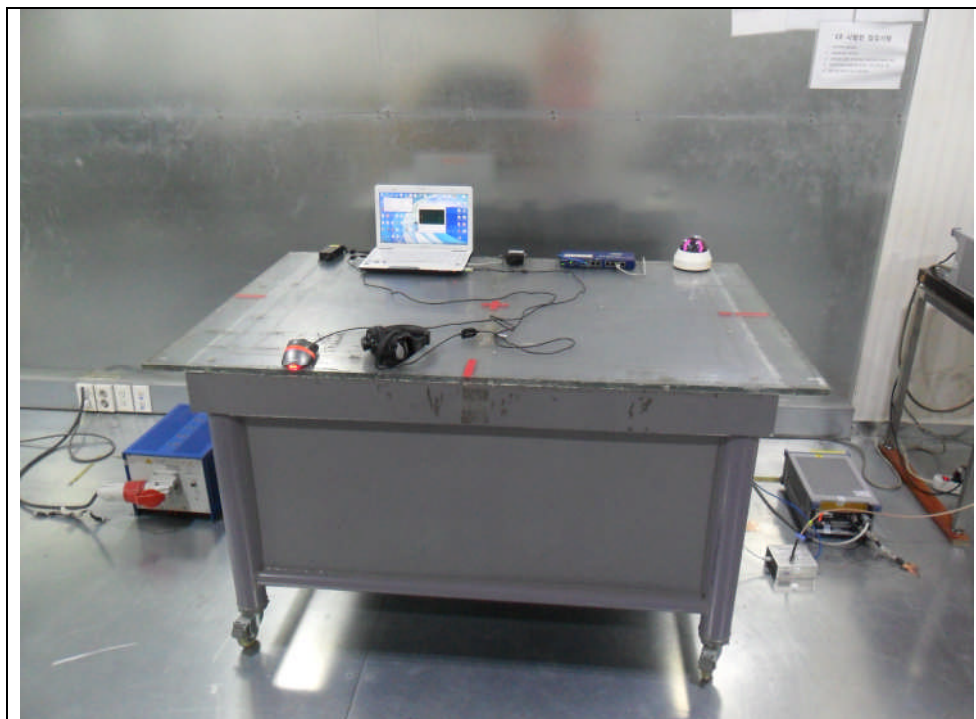
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground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

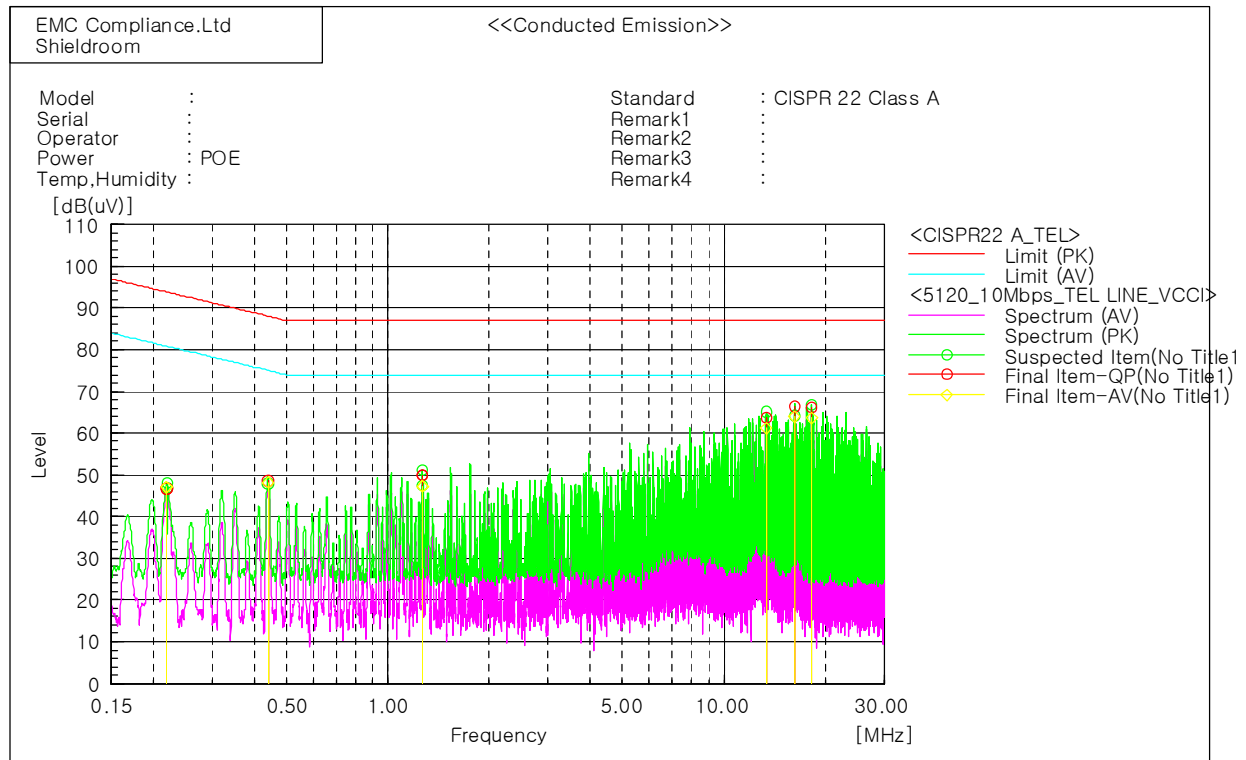
* Telecommunication



6.1.5 Conducted emission measurement result

* Telecommunication port

LAN Port (LCL 55 dB)_10 Mbps (SND-6011RN)

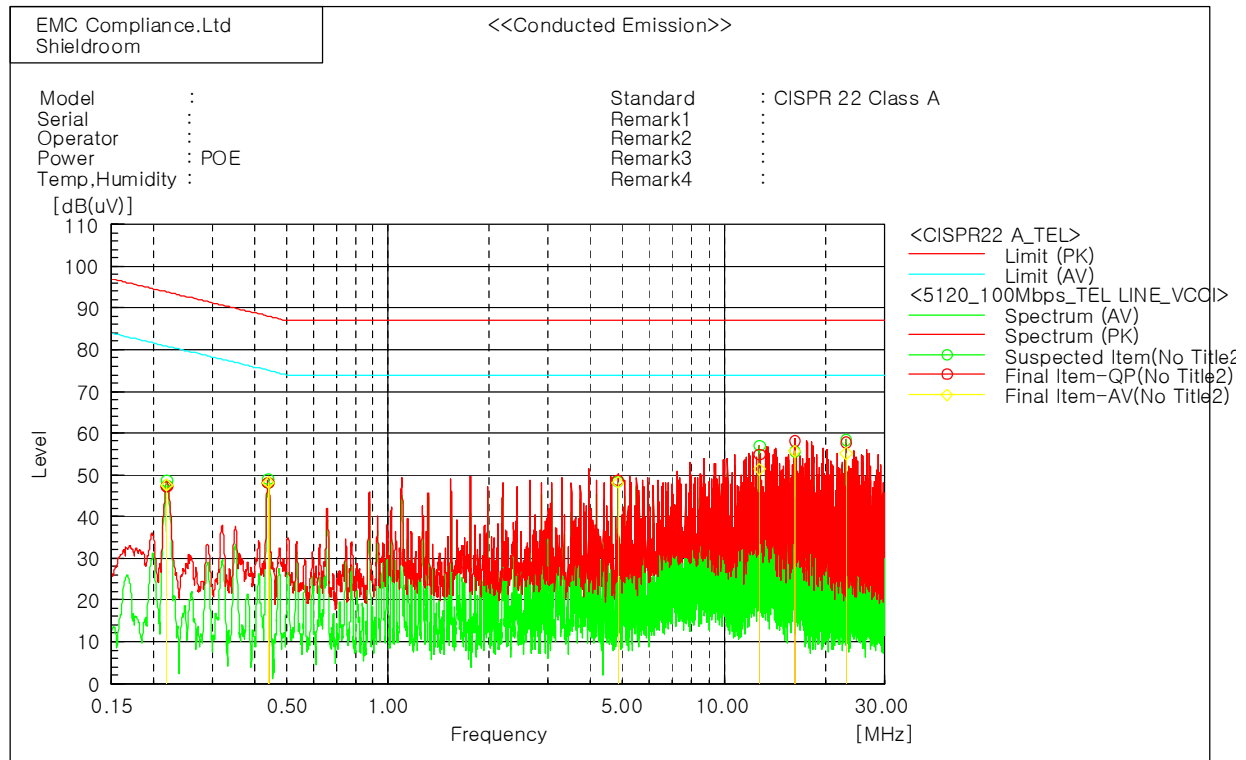


Final Result

--- ISN-CAT3 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	0.21957	36.4	36.8	10.3	46.7	47.1	93.8	80.8	47.1	33.7
2	0.22004	36.4	36.8	10.3	46.7	47.1	93.8	80.8	47.1	33.7
3	0.43997	38.5	38.1	10.1	48.6	48.2	88.1	75.1	39.5	26.9
4	1.26726	40.0	37.3	9.9	49.9	47.2	87.0	74.0	37.1	26.8
5	1.26714	40.0	37.3	9.9	49.9	47.2	87.0	74.0	37.1	26.8
6	13.35772	54.1	51.6	9.6	63.7	61.2	87.0	74.0	23.3	12.8
7	16.22828	56.8	54.4	9.6	66.4	64.0	87.0	74.0	20.6	10.0
8	18.24308	56.5	54.0	9.6	66.1	63.6	87.0	74.0	20.9	10.4

LAN Port (LCL 65 dB)_100 Mbps (SND-6011RN)



Final Result

--- ISN-CAT5 Phase ---											
No.	Frequency	Reading	Reading	c.f	Result	Result	Limit	Limit	Margin	Margin	
	[MHz]	QP	CAV		QP	CAV	QP	AV	QP	CAV	
		[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]	
1	0.21937	37.0	37.3	10.2	47.2	47.5	93.8	80.8	46.6	33.3	
2	0.22001	37.0	37.3	10.2	47.2	47.5	93.8	80.8	46.6	33.3	
3	0.43985	38.1	38.2	10.0	48.1	48.2	88.1	75.1	40.0	26.9	
4	0.43959	38.1	38.3	10.0	48.1	48.3	88.1	75.1	40.0	26.8	
5	4.83485	39.0	38.4	9.7	48.7	48.1	87.0	74.0	38.3	25.9	
6	12.74676	45.1	41.6	9.7	54.8	51.3	87.0	74.0	32.2	22.7	
7	16.22793	48.4	46.0	9.7	58.1	55.7	87.0	74.0	28.9	18.3	
8	23.1284	48.0	45.4	9.7	57.7	55.1	87.0	74.0	29.3	18.9	

6.2 Radiated Emission

Test specification	VCCI V-3 / 2012.04, 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(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	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

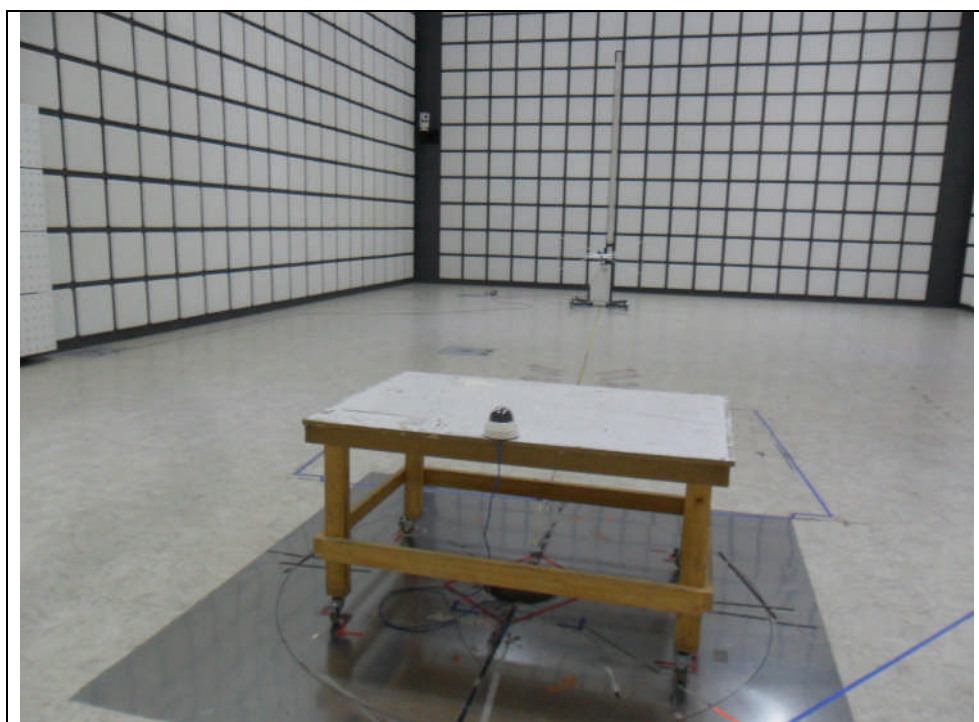
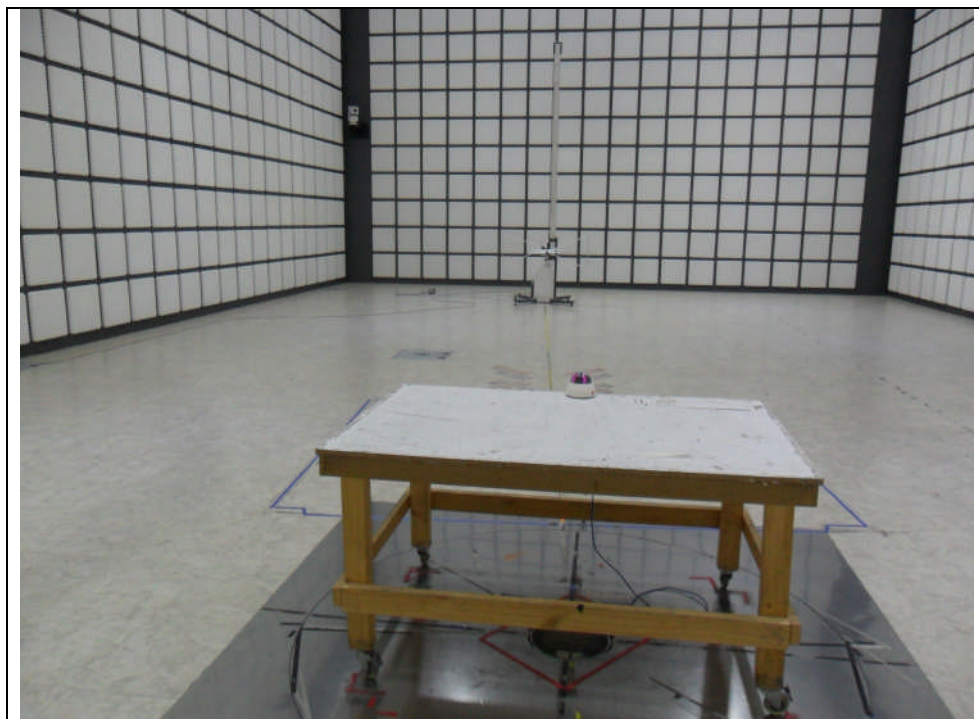
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is

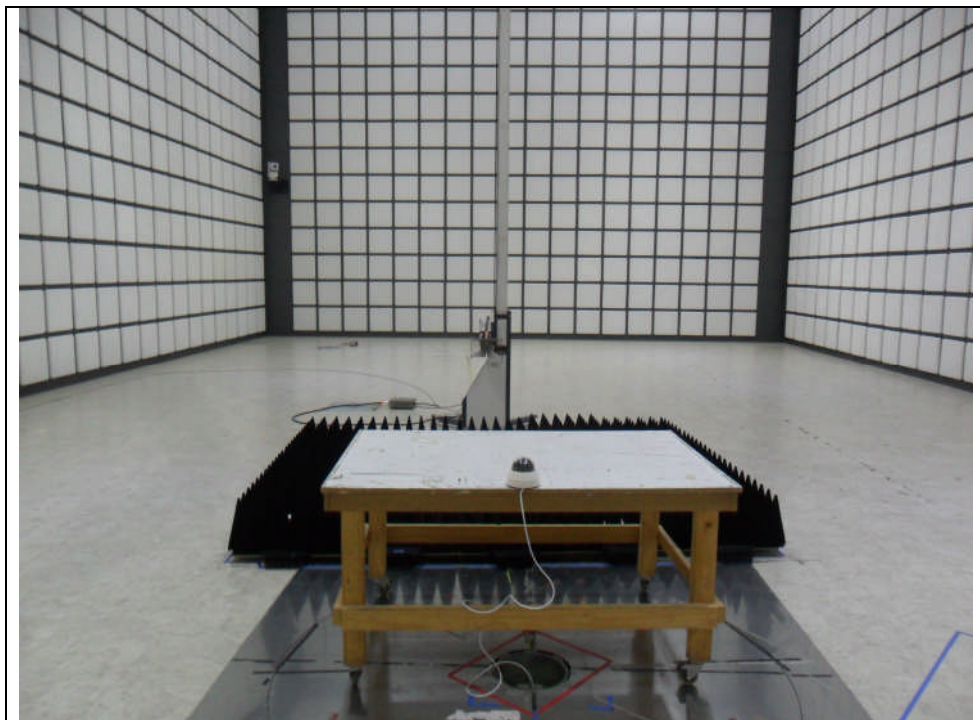
$$30 + 12 + 5 + 3 - 35 = 15 \text{ dB}(\mu\text{V/m})$$

6.2.5 Photographs of test setup

* 30 MHz ~ 1 GHz



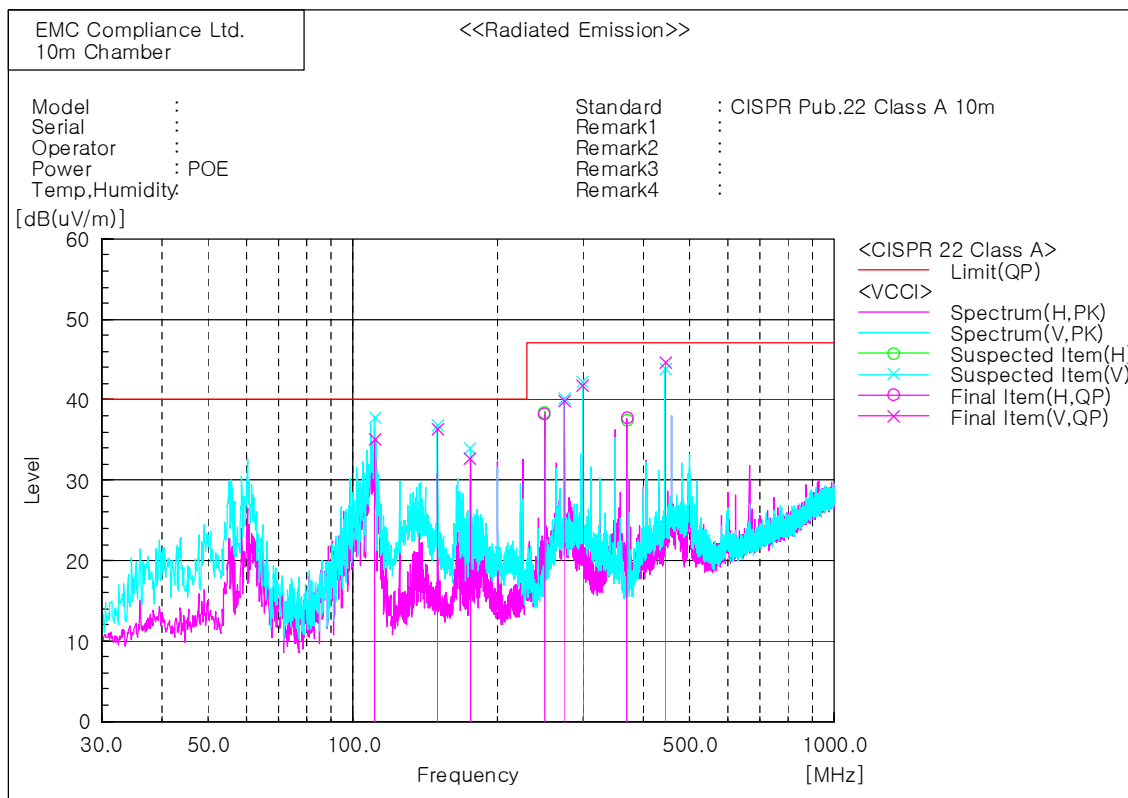
* 1 GHz ~ 6 GHz



6.2.6 Radiated emission measurement result

* Graph and Data

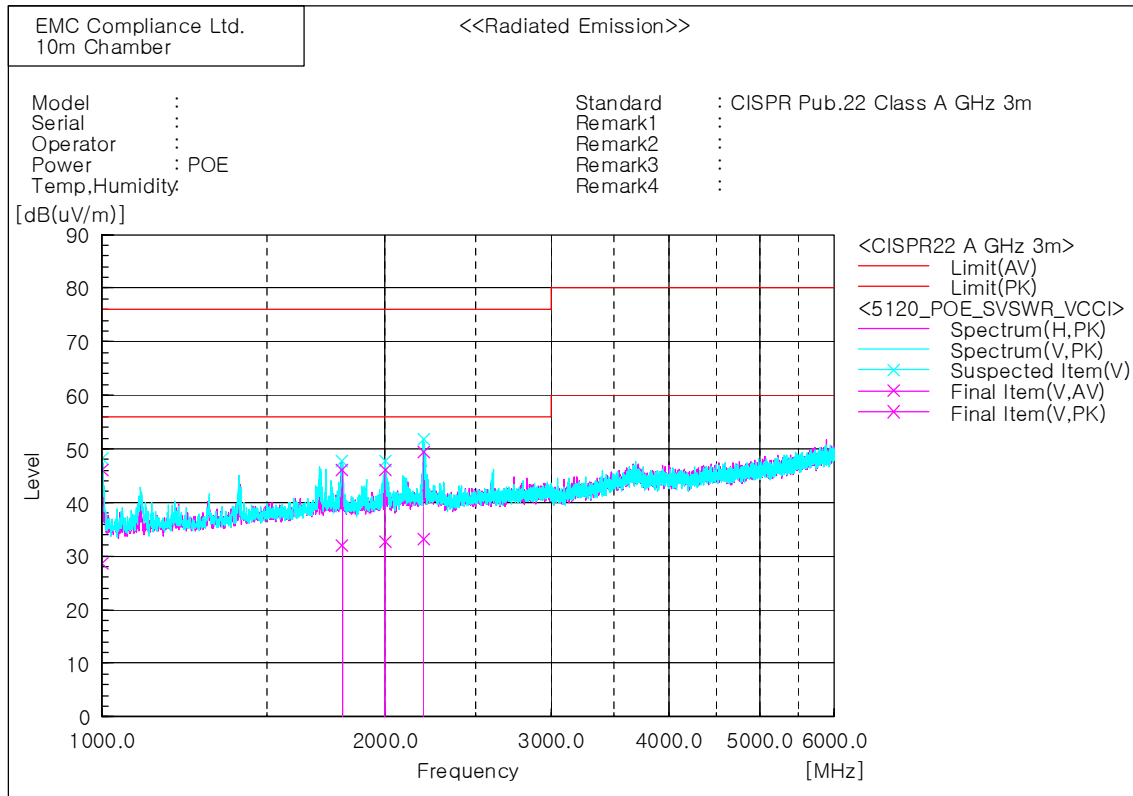
* 30 MHz ~ 1 GHz (SND-6011RN)



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	110.770	V	51.8	-16.8	35.0	40.0	5.0	100.0	130.5
2	150.000	V	49.7	-13.4	36.3	40.0	3.7	100.0	246.4
3	175.015	V	47.6	-14.9	32.7	40.0	7.3	100.0	285.0
4	249.947	H	53.0	-14.8	38.2	47.0	8.8	400.0	113.5
5	275.046	V	53.6	-13.7	39.9	47.0	7.1	100.0	170.7
6	300.024	V	54.6	-12.9	41.7	47.0	5.3	100.0	229.7
7	371.319	H	48.5	-10.8	37.7	47.0	9.3	299.0	164.9
8	445.500	V	53.1	-8.5	44.6	47.0	2.4	100.0	16.1

* 1 GHz ~ 6 GHz (SND-6011RN)



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	V	38.1	55.4	-9.4	28.7	46.0	56.0	76.0	27.3	30.0	100.0	259.6
2	1799.375	V	35.2	49.5	-3.3	31.9	46.2	56.0	76.0	24.1	29.8	100.0	193.6
3	2000.000	V	35.3	48.7	-2.5	32.8	46.2	56.0	76.0	23.2	29.8	100.0	34.7
4	2198.125	V	34.7	51.1	-1.6	33.1	49.5	56.0	76.0	22.9	26.5	100.0	297.1

7. E.U.T. photographs

Front View



Rear View



Left View



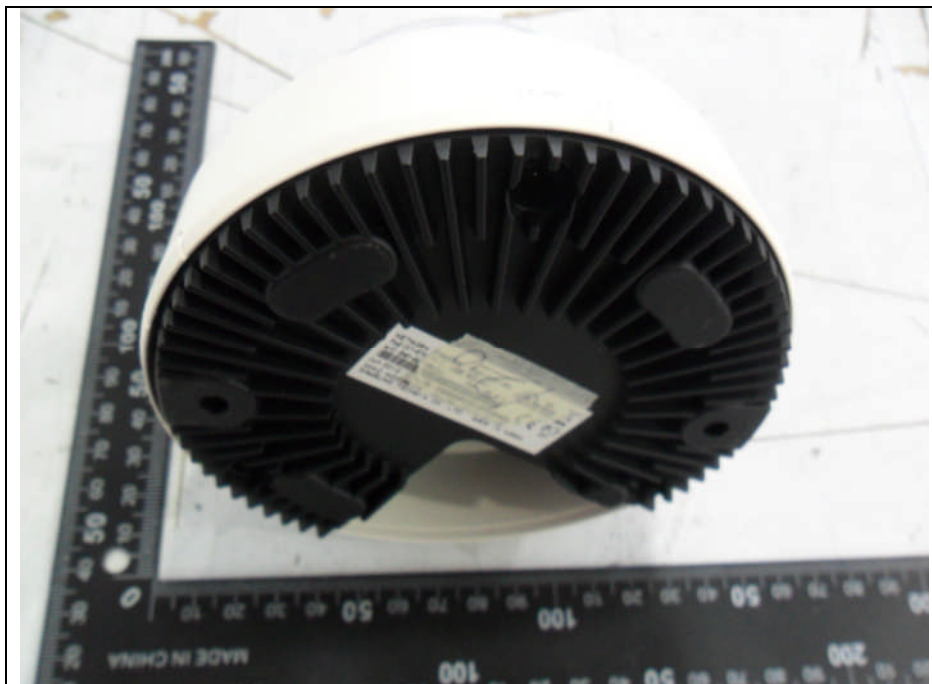
Right View



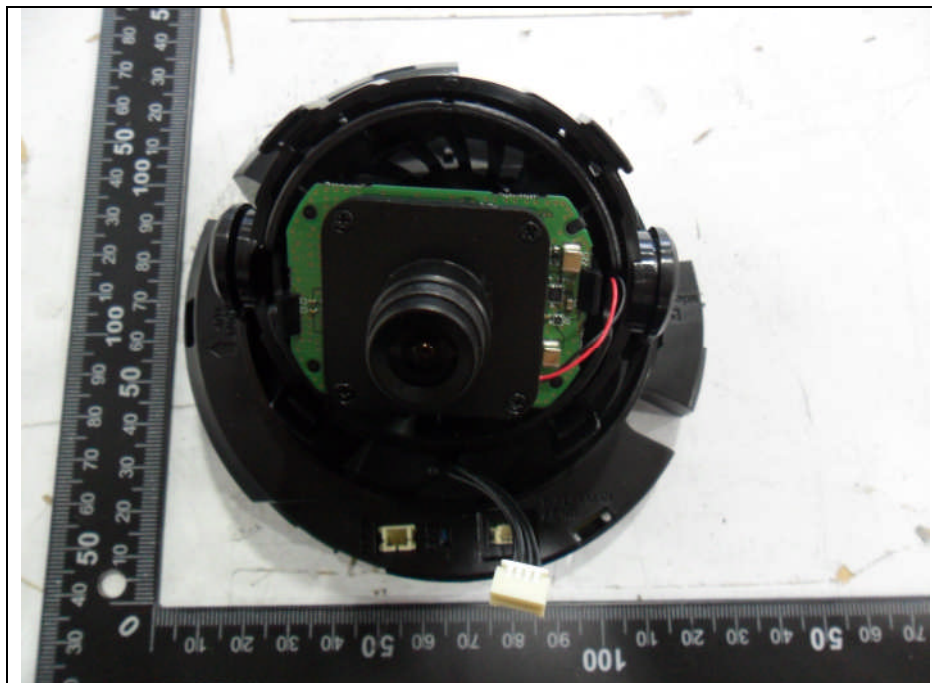
Top View



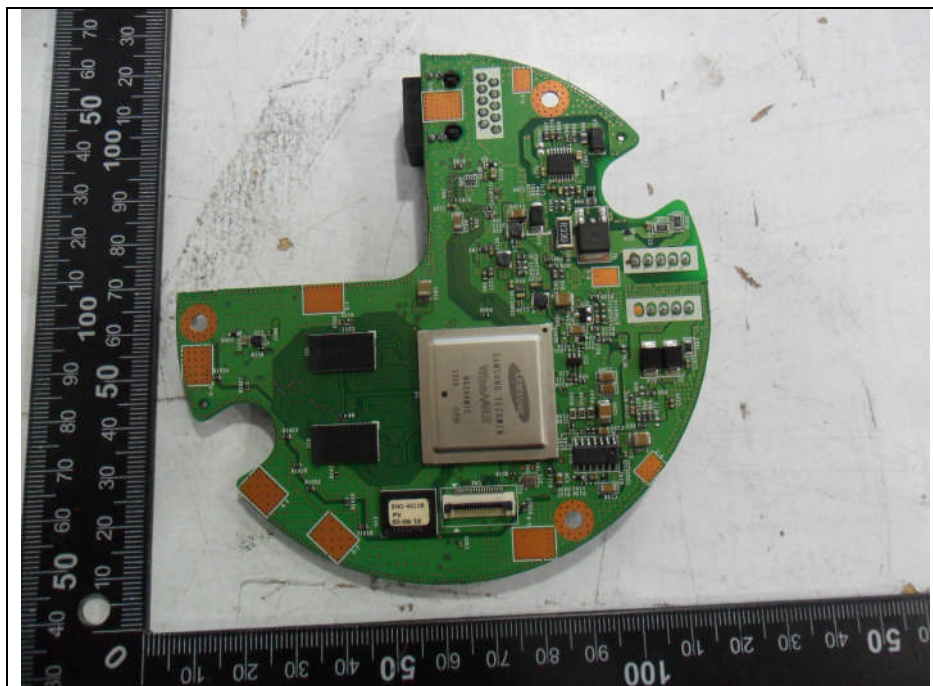
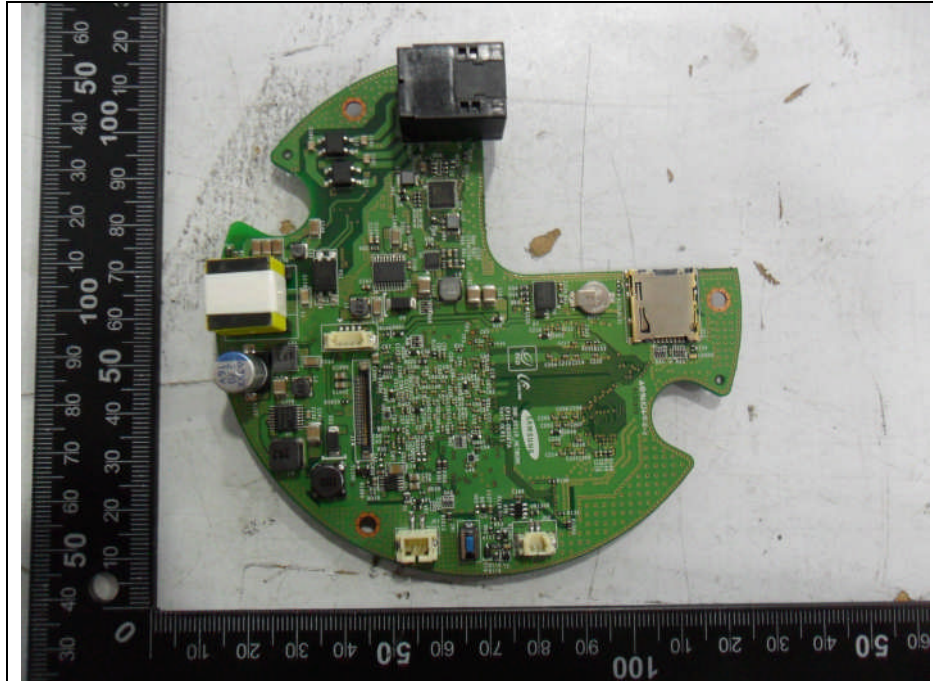
Bottom View



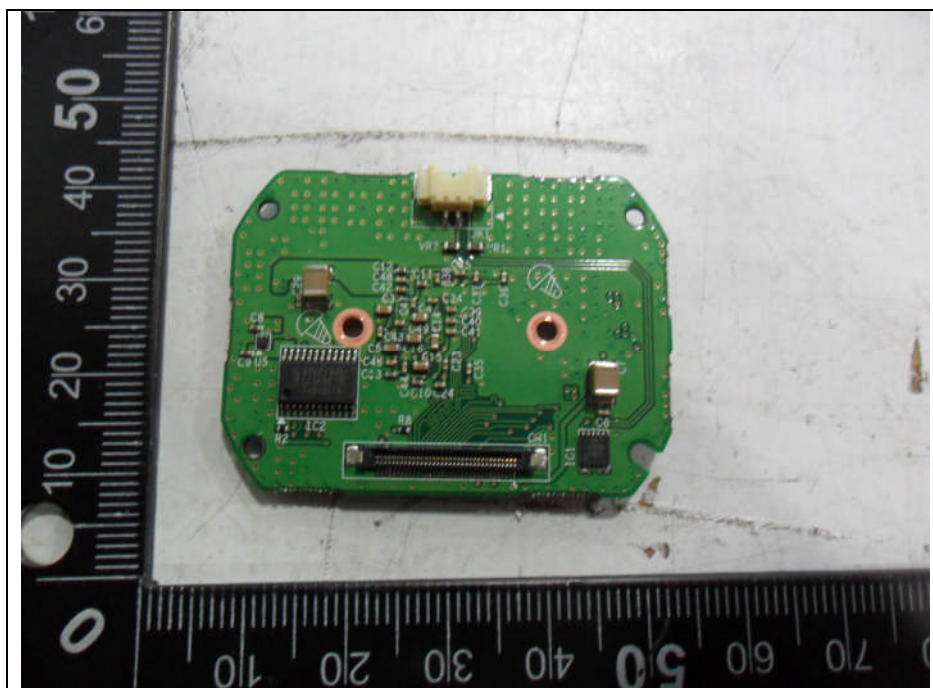
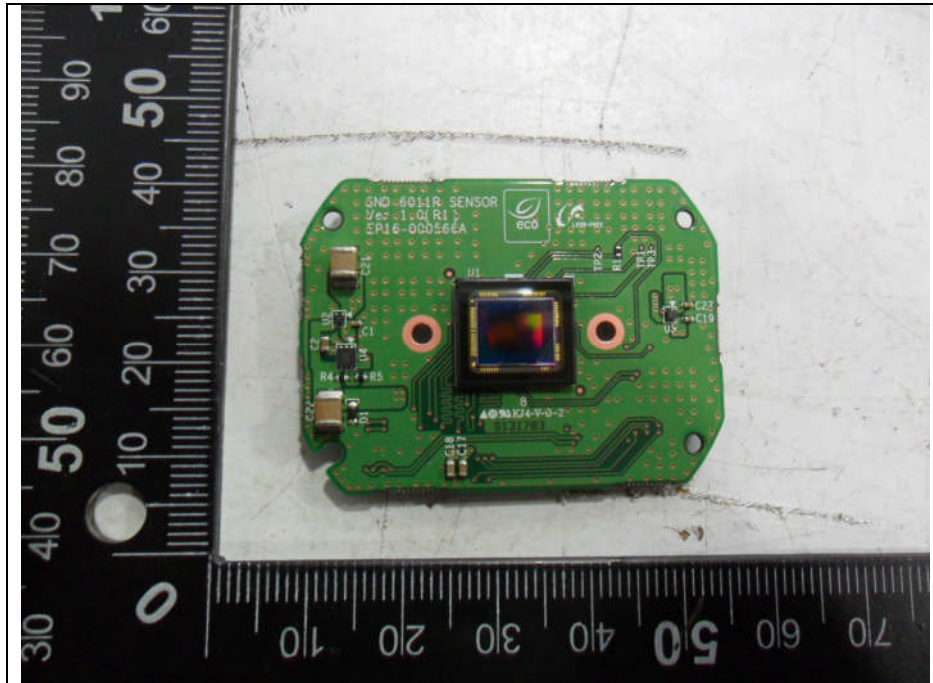
Inside



Main Board



CCD Board



LED Board

