



# Declaration of Conformity



**Type of equipment:** Network Camera  
**Brand Name /Trade Mark:** SAMSUNG  
**Type designation /model:** SND-6011RP  
**Applicant:** SAMSUNG TECHWIN CO., LTD.

**In accordance with the following Directives:**

2004/108/EC The Electromagnetic Compatibility Directive  
Including amendments by the CE Marking Directive 93/68/EEC

2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (recast)

**The following harmonized European standards or technical specifications have been applied:**

EN 55022:2010	Limits and methods of measurement of radio disturbance characteristics of information technology equipment
EN 50581:2012	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
EN 50130-4:2011	Product family standard: Immunity requirements for components of fire, intruder and social alarm systems
EN 61000-4-2:2009	Electrostatic discharge immunity test
EN 61000-4-3:2006+A2:2010	Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4:2004+A1:2010	Electrical fast transient/burst immunity test
EN 61000-4-6:2009	Immunity to conducted disturbances, induced by radio-frequency fields

**The CE Marking on the products and/or their packaging signifies that SAMSUNG TECHWIN CO., LTD. holds the reference technical file available to the European Union authorities.**

**Place and date of issue:** #42 Seongju-Dong, Changwon-Shi, Kyungsangnam-Do, Korea / July 12, 2013

**Authorized Signatory:** Name : Jei Soon, Kang  
Title : Principal Research Engineer

Signature :

## EMC TEST REPORT

**Test report No** : EMC-CE-4162  
**Type of Equipment** : Network Camera  
**Model Name** : SND-6011RP  
**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** : EN 55022:2010, Class A  
EN 50130-4:2011  
**Testing Laboratory** : EMC Compliance Ltd.  
**Test result** : Complied

This product complies with the requirements of the EMC Directive 2004/108/ EC.  
The results in this report apply only to the sample tested.  
This test report shall not be reproduced, except in full, without the written approval of  
EMC compliance Laboratory.

Date of receipt: 2013. 05. 15

Date of testing: 2013. 07. 01 ~ 07. 04

Issued date: 2013. 07. 12

**Tested by:**   
JUNG, YOUNG-JUN

**Approved by:**   
BEAK, JEONG-SOO

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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

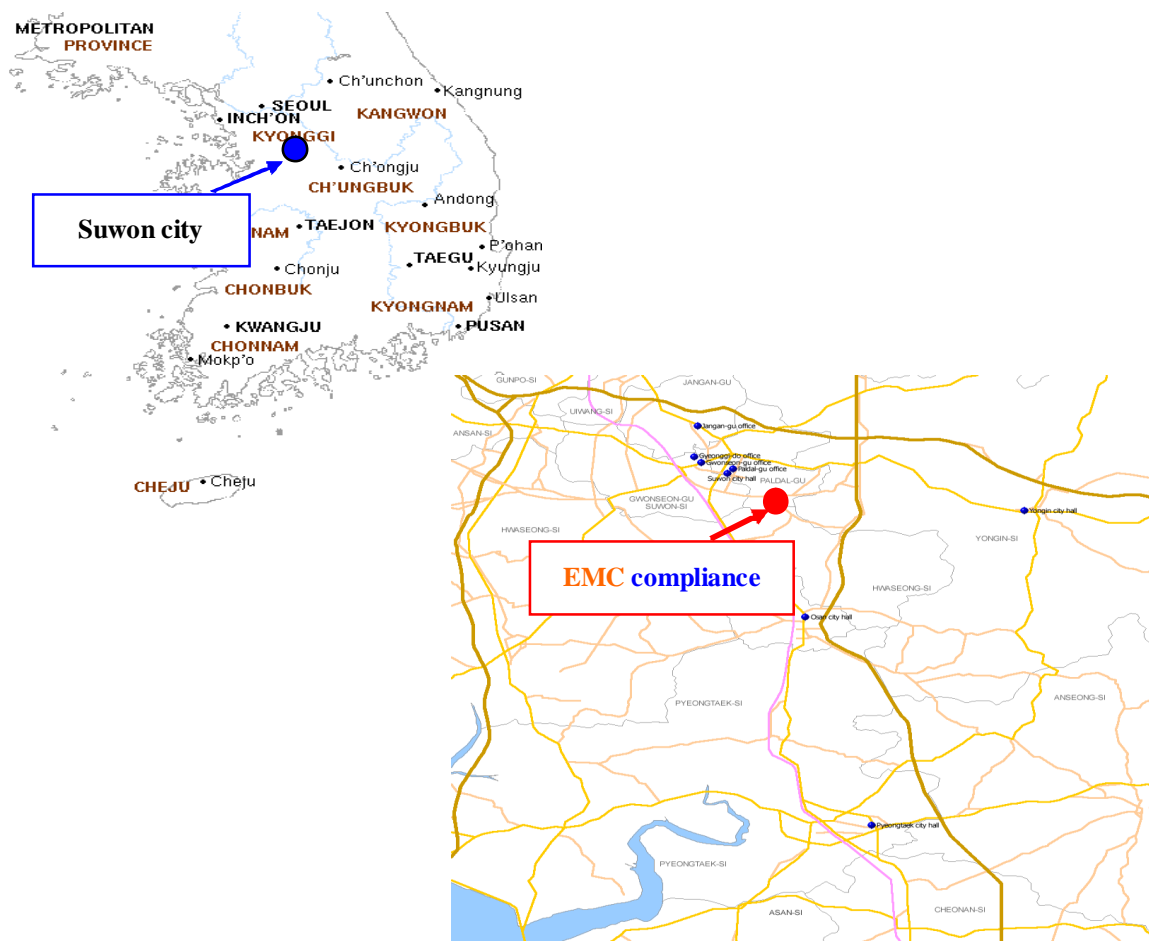
FCC CAB.: KR0040

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.	-
Shielded room(ESD)	: 25 °C	40 % R.H.	99.2 kPa

#### Test site

These testing items were performed following locations;

Test item	Test site
Conducted Emission	Shielded Room
Radiated Emission	10 m Chamber
Harmonics current	Immunity area
Voltage fluctuations and flickers	Immunity area
Electrostatic discharge	Shielded Room
Radiated RF immunity	Fully anechoic chamber (3 m)
Electric Fast Transient/BURST	Shielded Room
Surge	Shielded Room
Conducted RF immunity	Shielded Room
Voltage dip/interruption	Shielded Room
Mains supply voltage variations	Shielded Room

### 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
Radio Frequency Electromagnetic Fields (C.L: Approx 95 %, k = 2)		
± 1.82 dB		
Disturbance power Electromagnetic Fields (C.L: Approx 95 %, k = 2)		
± 3.73 dB		

## 4. Description of E.U.T.

### 4.1 General information

<b>Video</b>	
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)
<b>Lens</b>	
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
<b>Pan / Tilt / Rotate</b>	
Pan Range	
Tilt Range	
Rotate Range	
<b>Operational</b>	
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



<b>Network</b>	
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, 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
<b>Environmental</b>	
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	-
<b>Electrical</b>	
Input Voltage / Current	PoE(IEEE802.3af)
Power Consumption	Max 8.0W
<b>Mechanical</b>	
Color / Material	Ivory / Plastic
Dimension (WxHxD)	120*102
Weight	380g

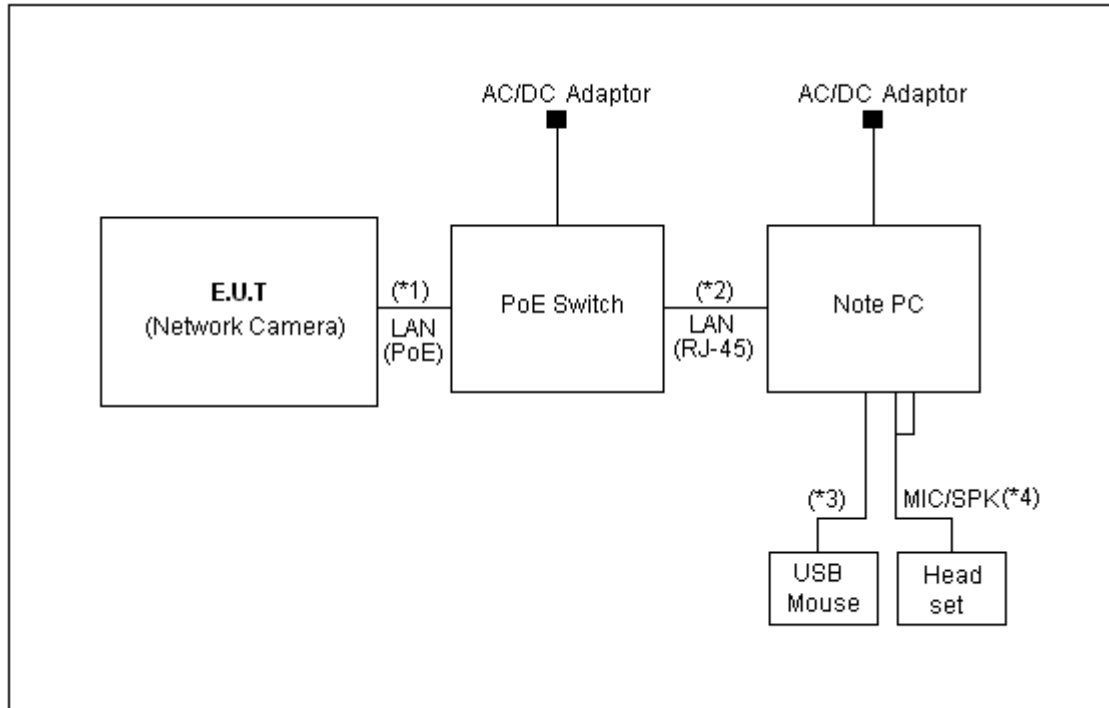
## 4.2 Product description

Type of product	Network Camera
Model name (Basic)	SND-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
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.	Cable
1	<b>EUT</b> (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
<input checked="" type="checkbox"/>	Conducted Emission	EN 55022:2010	Complied
<input checked="" type="checkbox"/>	Radiated Emission	EN 55022:2010	Complied
<input type="checkbox"/>	Harmonics current	EN 61000-3-2:2006+A2:2009	N/A
<input type="checkbox"/>	Voltage fluctuations and flickers	EN 61000-3-3:2008	N/A

### 5.2 Summary of immunity test results

Applied	Test items	Test method	Result
<b>* EN 50130-4:2011</b>			
<input checked="" type="checkbox"/>	Electrostatic discharge	EN 61000-4-2:2009	Complied
<input checked="" type="checkbox"/>	Radiated RF immunity	EN 61000-4-3:2006+A2:2010	Complied
<input checked="" type="checkbox"/>	Electric Fast Transient/BURST	EN 61000-4-4:2004+A1:2010	Complied
<input type="checkbox"/>	Surge	EN 61000-4-5:2006	N/A
<input checked="" type="checkbox"/>	Conducted RF immunity	EN 61000-4-6:2009	Complied
<input type="checkbox"/>	Voltage dip/interruption	EN 61000-4-11:2004	N/A
<input type="checkbox"/>	Mains supply voltage variations	EN 50130-4:2011	N/A

### 5.3 Performance criteria

The variety and the diversity of the apparatus within the scope of this document makes it difficult to define precise criteria for the evaluation of the immunity test results.

If as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe then the apparatus shall be deemed to have failed the test.

A functional description and a definition of performance by the manufacture and noted in the test report, based on the following criteria:

#### **Electrostatic discharge**

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing which could be interpreted by associated equipment as a change,

#### **Radiated electromagnetic fields**

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing which could be interpreted by associated equipment as a change, and no such

Flickering of indicators occurs at a field strength of 3 V/m. For components of CCTV systems, where the picture is allowed at 10 V/m, providing.

- (a) there is no permanent damage or change to EUT  
(e.g. no corruption of memory or changes to programmable setting etc.)
- (b) at 3 V/m, any deterioration of the picture is so minor that the system could still be used; and
- (c) there is no observable deterioration of the picture at 1 V/m.

#### **Fast transient burst / slow high energy voltage surge**

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing

That there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as

---

### **Conducted RF immunity**

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing

That there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change,

and no such flickering of indicators occurs at  $U = 130 \text{ dB}\mu\text{V}$ .

For component of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at  $U = 140 \text{ dB}\mu\text{V}$ , providing:

- (a) there is no permanent damage or change to the EUT  
(e.g. no corruption of memory or changes to programmable settings etc.)
- (b) at  $U = 130 \text{ dB}\mu\text{V}$ , any deterioration of the picture is so minor that the system could still be used; and
- (c) there is no observable deterioration of the picture at  $U = 120 \text{ dB}\mu\text{V}$ .

### **Voltage dip/interruption / Voltage variation**

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test, after the conditioning.

## 6. Test results

### 6.1 Conducted Emission

Test specification	EN 55022:2010, 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(μV))		Class B (dB(μV))	
	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(μV))		Current Limits (dB(μA))	
	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(μV))		Current Limits (dB(μA))	
	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.

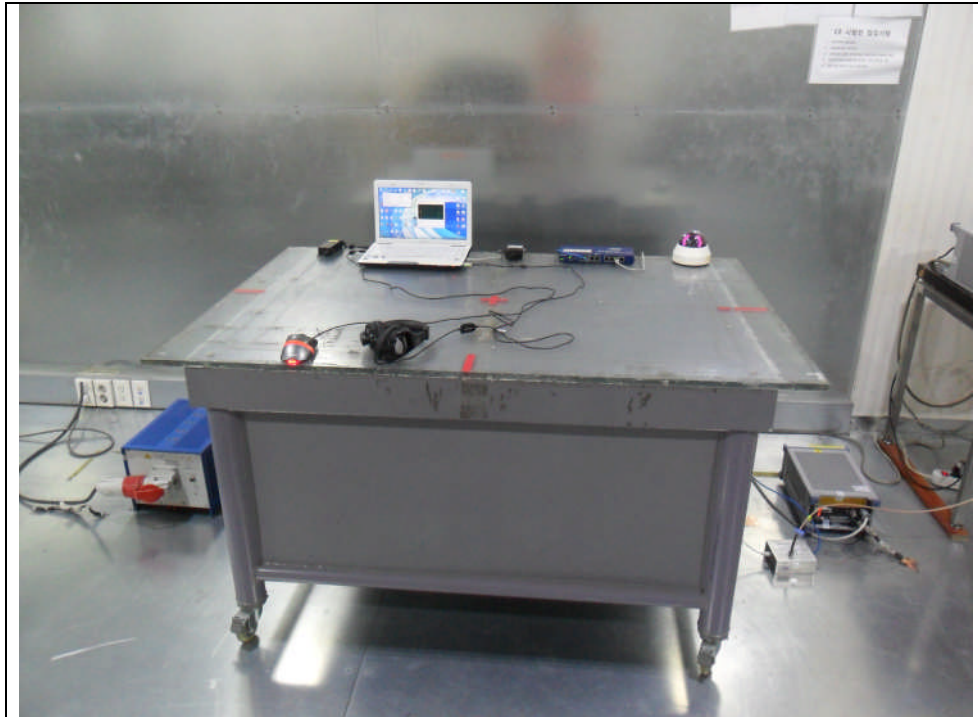
### 6.1.3 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESHS30	844827/011	R&S	2013.08.06	<input type="checkbox"/>
Test Receiver	ESCI7	100732	R&S	2014.02.18	<input type="checkbox"/>
Test Receiver	ESCI	100001	R&S	2013.07.10	<input checked="" type="checkbox"/>
Test Receiver	ESCI	100710	R&S	2013.11.06	<input type="checkbox"/>
LISN	ENV216	101352	R&S	2014.01.07	<input type="checkbox"/>
LISN	L3-32	0120J20305	PMM	-	<input checked="" type="checkbox"/>
8-WIRE ISN	NTFM 8158 CAT5	CAT5-8158-0048	SCHWARZBECK	2013.10.30	<input checked="" type="checkbox"/>
8-WIRE ISN	NTFM 8158 CAT3	CAT3-8158-0033	SCHWARZBECK	2013.10.30	<input checked="" type="checkbox"/>
ISN	ST08	24342	TESEQ	2014.06.21	<input type="checkbox"/>
ISN	ENY81	101545	R&S	2013.08.29	<input type="checkbox"/>



#### 6.1.4 Photographs of test setup

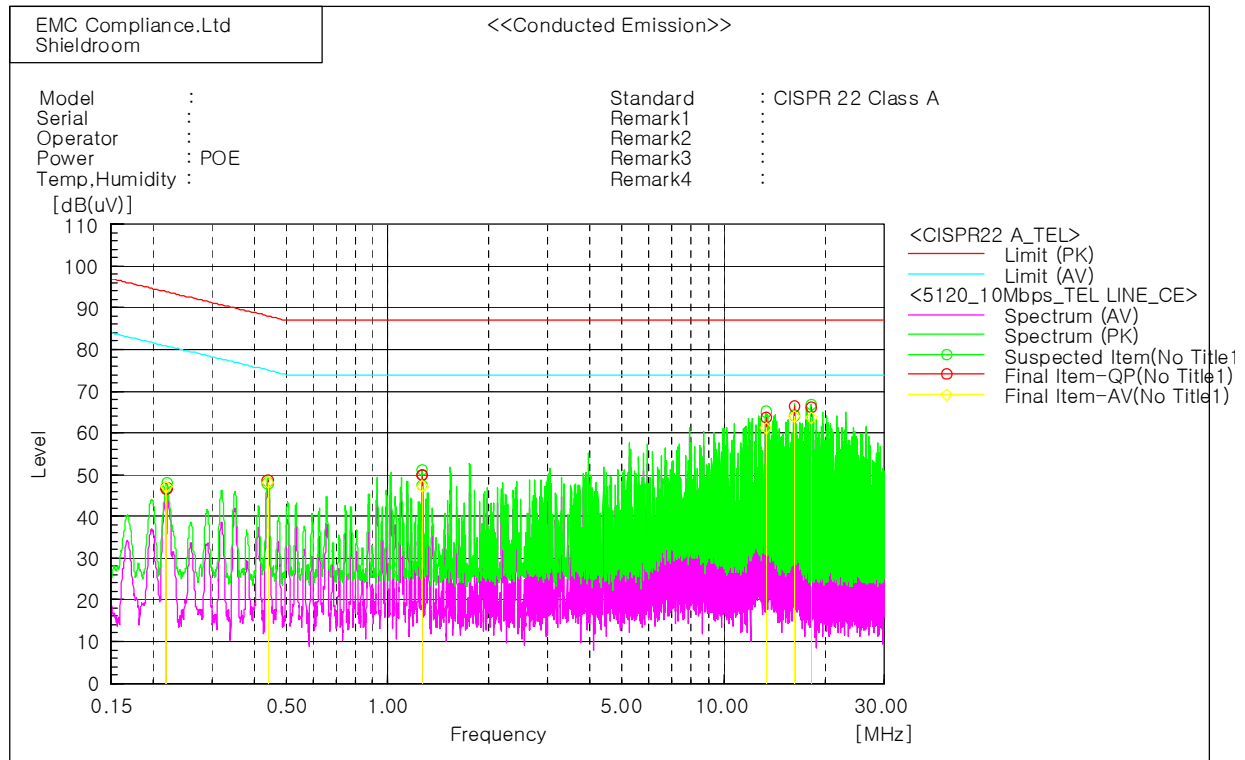
\* Telecommunication



### 6.1.5 Conducted emission measurement result

\* Telecommunication port

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

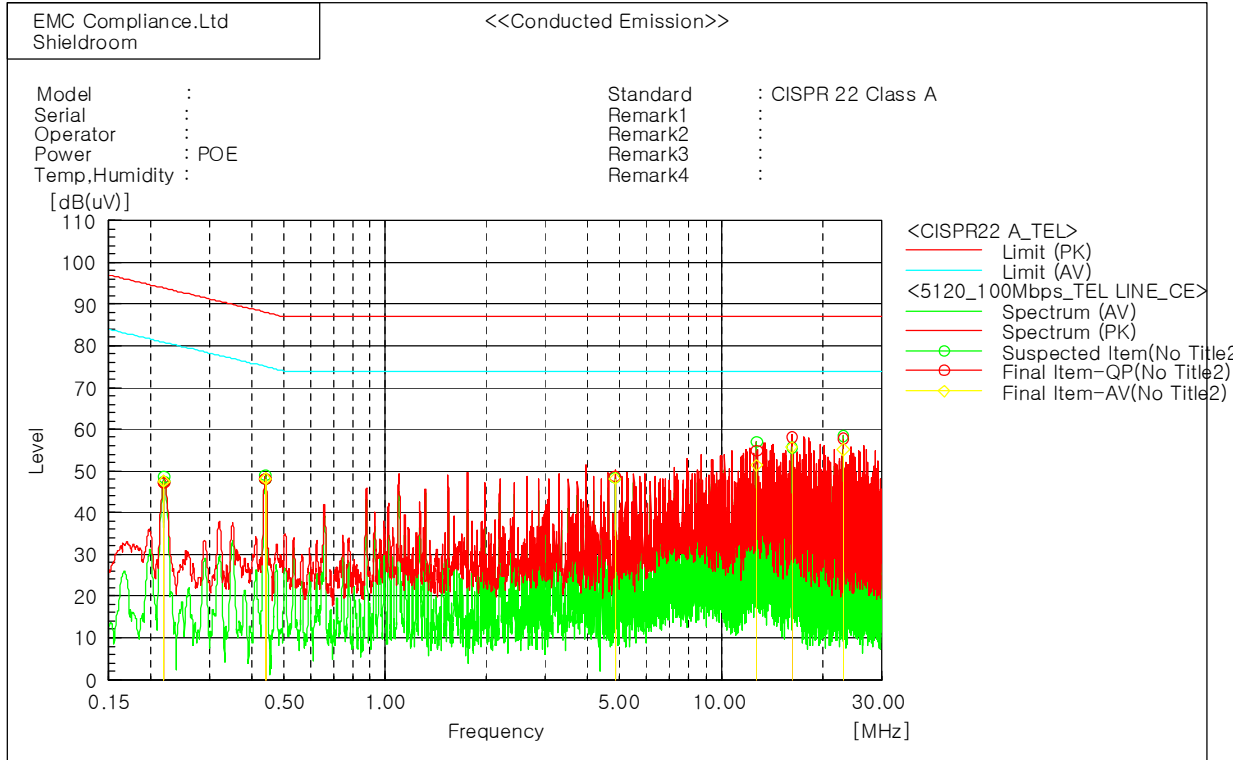


Final Result

--- 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	0.21957	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-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	0.21937	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	EN 55022:2010, 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( $\mu$ V/m)) @ 10 m	Class B (dB( $\mu$ V/m)) @ 10 m
30 ~ 230	40	30
230 ~ 1 000	47	37

Limits above 1 GHz

Frequency [GHz]	Class A @ 3 m		Class B @ 3 m	
	Average limit (dB( $\mu$ V/m))	Peak limit (dB( $\mu$ V/m))	Average limit (dB( $\mu$ V/m))	Peak limit (dB( $\mu$ 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	<input checked="" type="checkbox"/>
Test Receiver	ESCI	100001	R&S	2013.07.10	<input type="checkbox"/>
Test Receiver	ESCI	100710	R&S	2013.11.06	<input type="checkbox"/>
Bi-Log Antenna	VULB 9168	440	SCHWARZBECK	2013.10.04	<input checked="" type="checkbox"/>
Amplifier	310N	293004	SONOMA INSTRUMENT	2013.11.06	<input checked="" type="checkbox"/>
3 dB Attenuator	8491B	22981	HP	2014.03.19	<input checked="" type="checkbox"/>
Antenna Mast	MA4000-EP	303	Innco Systems	-	<input checked="" type="checkbox"/>
Turn Table	DT2000S-1t	079	Innco Systems	-	<input checked="" type="checkbox"/>
Amplifier	8449B	3008A02343	AGILENT	2013.11.06	<input checked="" type="checkbox"/>
Horn ANT	3115	00086706	ETS	2013.11.21	<input checked="" type="checkbox"/>

### 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

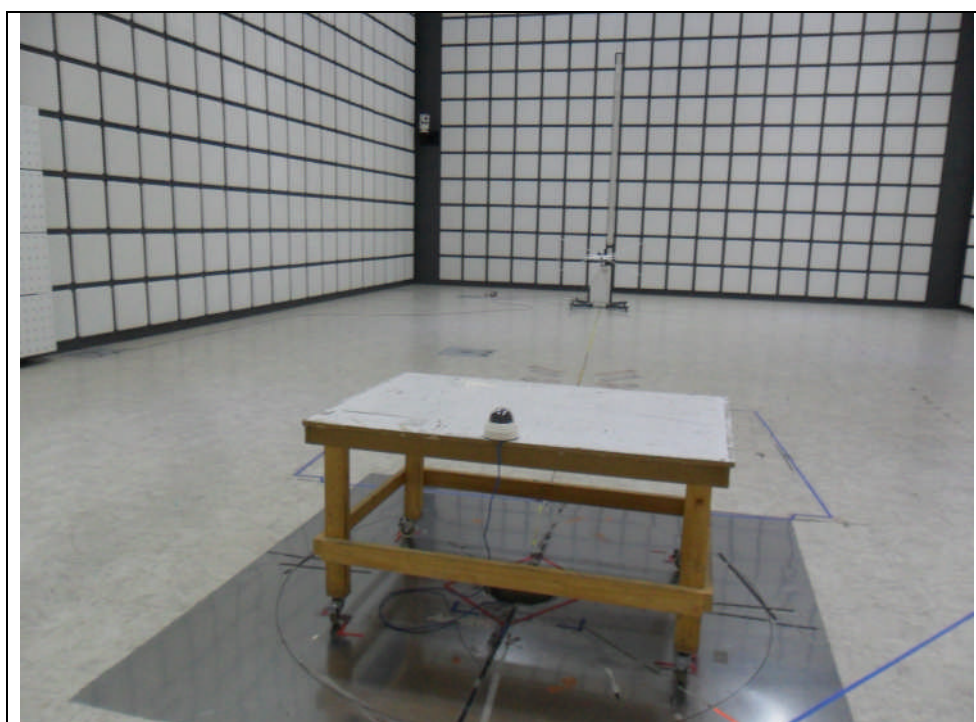
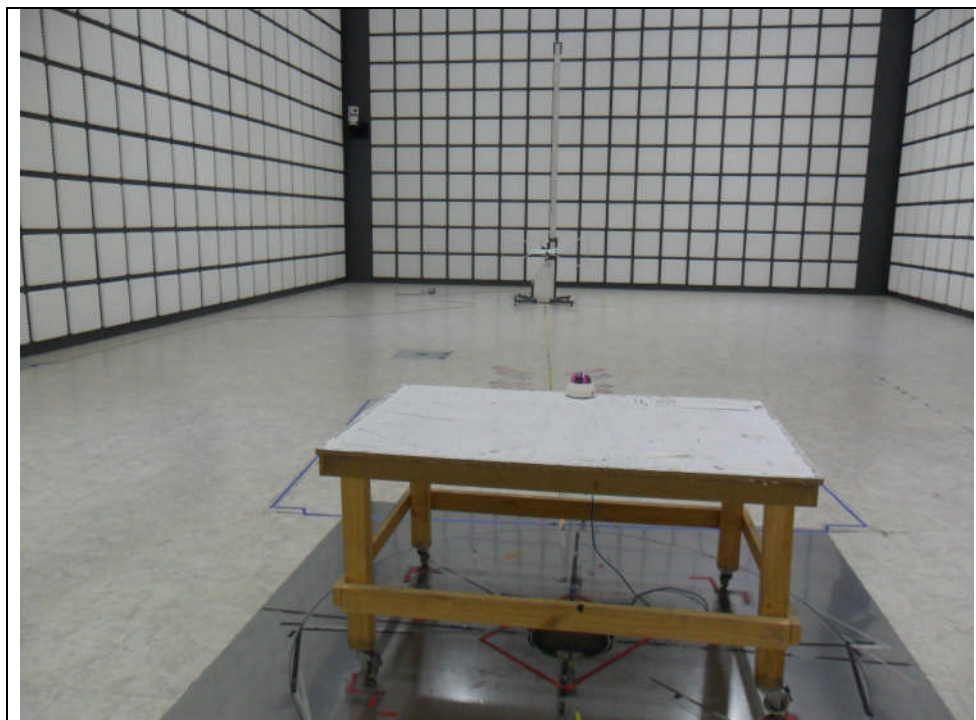
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is

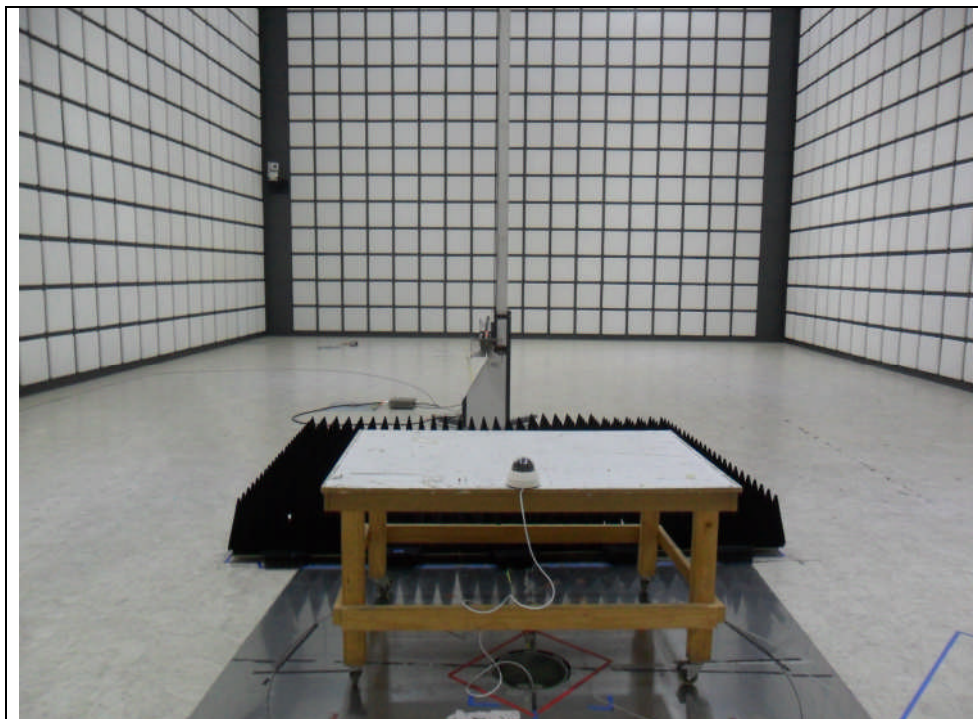
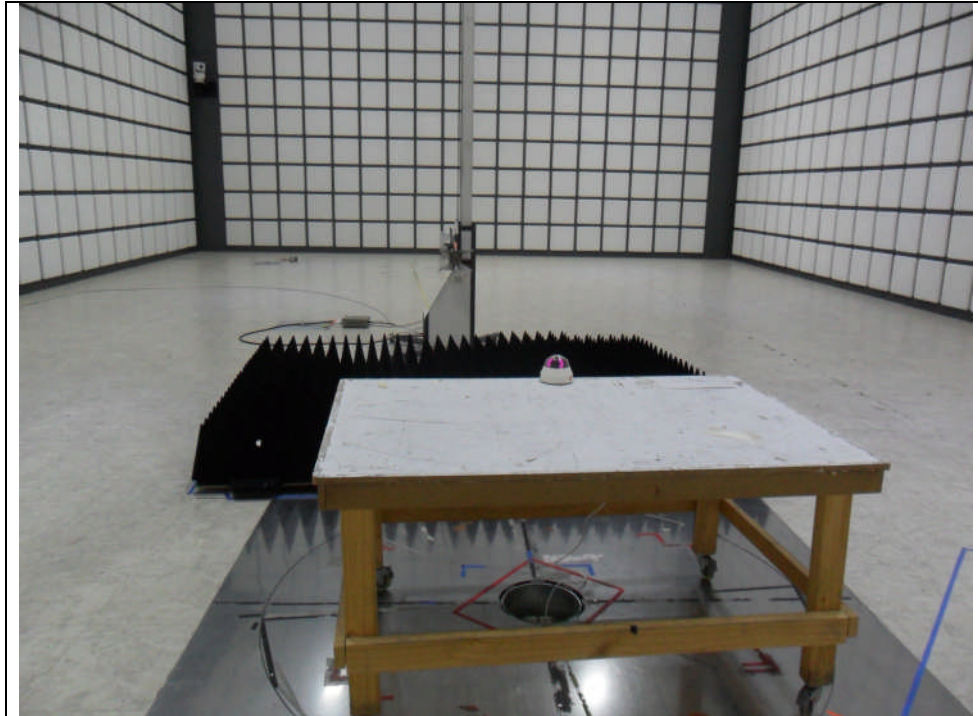
$$30 + 12 + 5 + 3 - 35 = 15 \text{ dB}(\mu\text{V/m})$$

### 6.2.5 Photographs of test setup

\* 30 MHz ~ 1 GHz



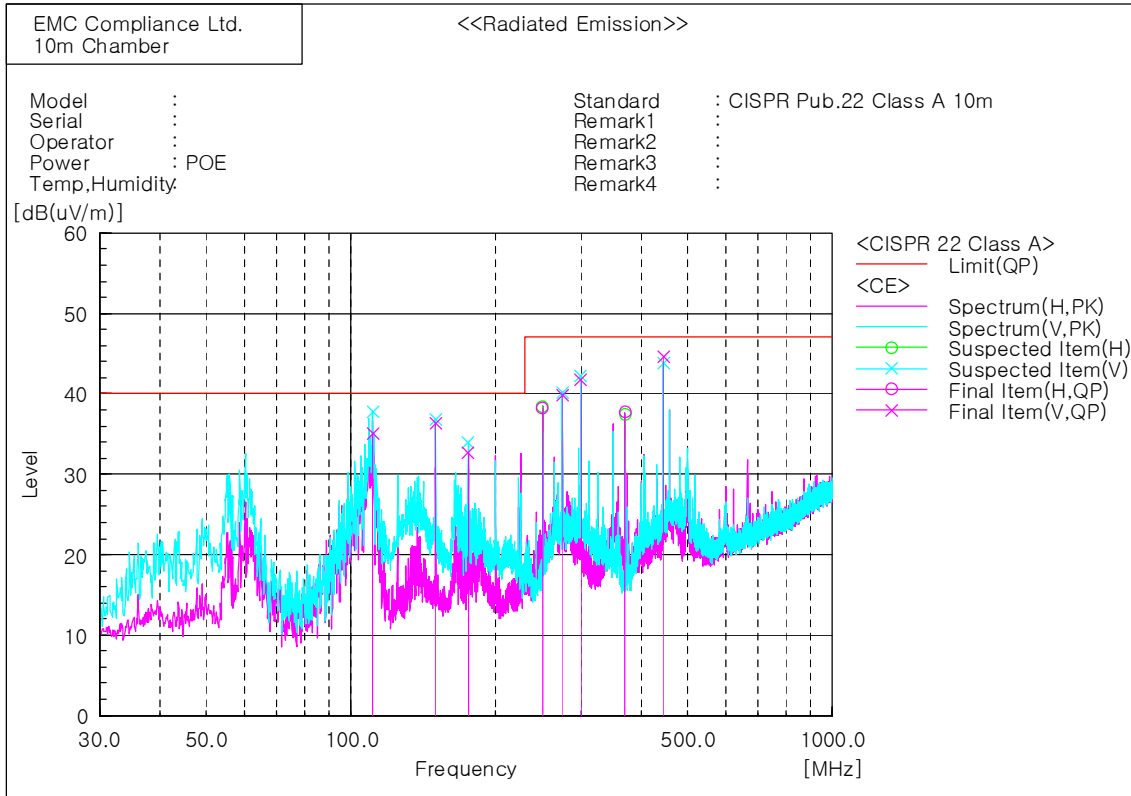
\* 1 GHz ~ 6 GHz



6.2.6 Radiated emission measurement result

\* Graph and Data

\* 30 MHz ~ 1 GHz (SND-6011RP)

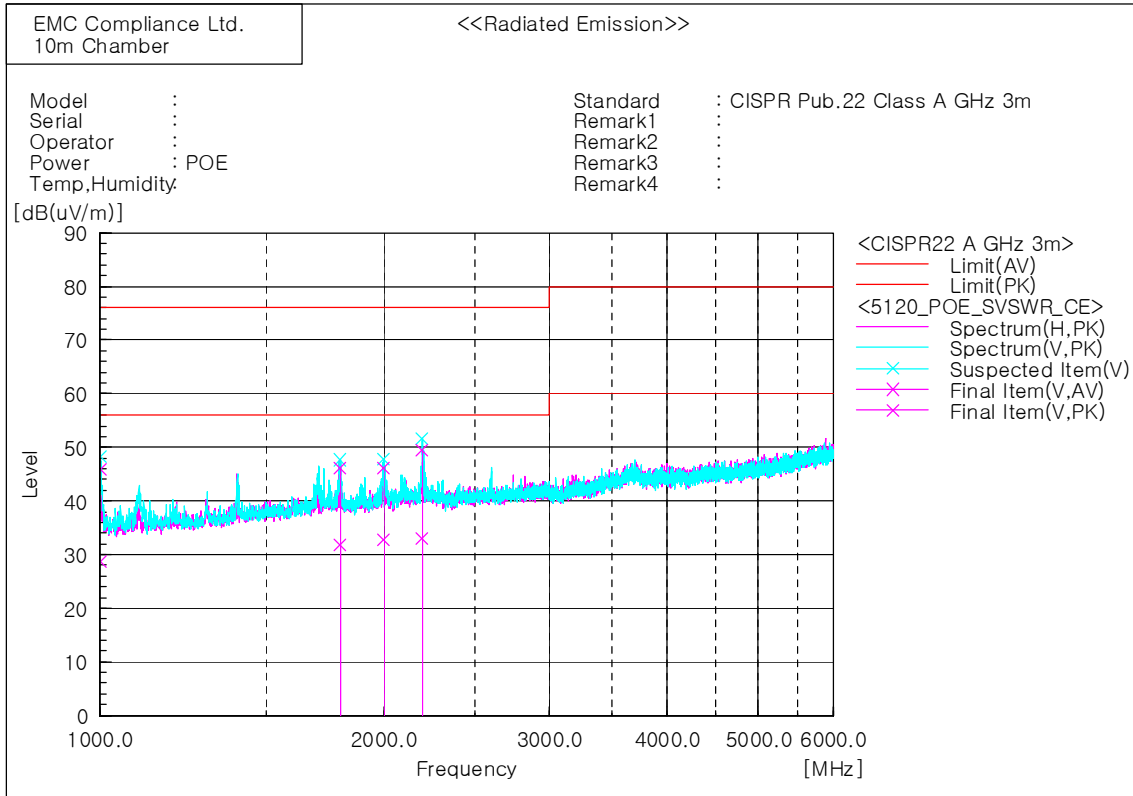


Final Result

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]
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-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	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

### 6.3 Electrostatic Discharge

Test specification	EN 61000-4-2:2009				
Test level	<input type="checkbox"/> Contact: $\pm 6$ kV <input checked="" type="checkbox"/> Air: $\pm 2$ kV, $\pm 4$ kV, $\pm 8$ kV <input type="checkbox"/> HCP: $\pm 2$ kV, $\pm 4$ kV, $\pm 6$ kV <input checked="" type="checkbox"/> VCP: $\pm 2$ kV, $\pm 4$ kV, $\pm 6$ kV				
Discharge impedance	330 $\Omega$ / 150 pF				
Number of discharge (Each polarity)	<input type="checkbox"/> Contact: 10 <input checked="" type="checkbox"/> Air: 10 <input checked="" type="checkbox"/> HCP / VCP: 10				
Interval between discharges	1 s				
Testing voltage	PoE				
Test facility	Shielded room				
Date	2013. 07. 04				
Temperature( $^{\circ}$ C)	25 $^{\circ}$ C	Humidity (% R.H.)	40 % R.H.	Pressure (kPa)	99.2 kPa
Remarks	Complied - There was no change of operation status during above testing.				

#### 6.3.1 Measurement procedure

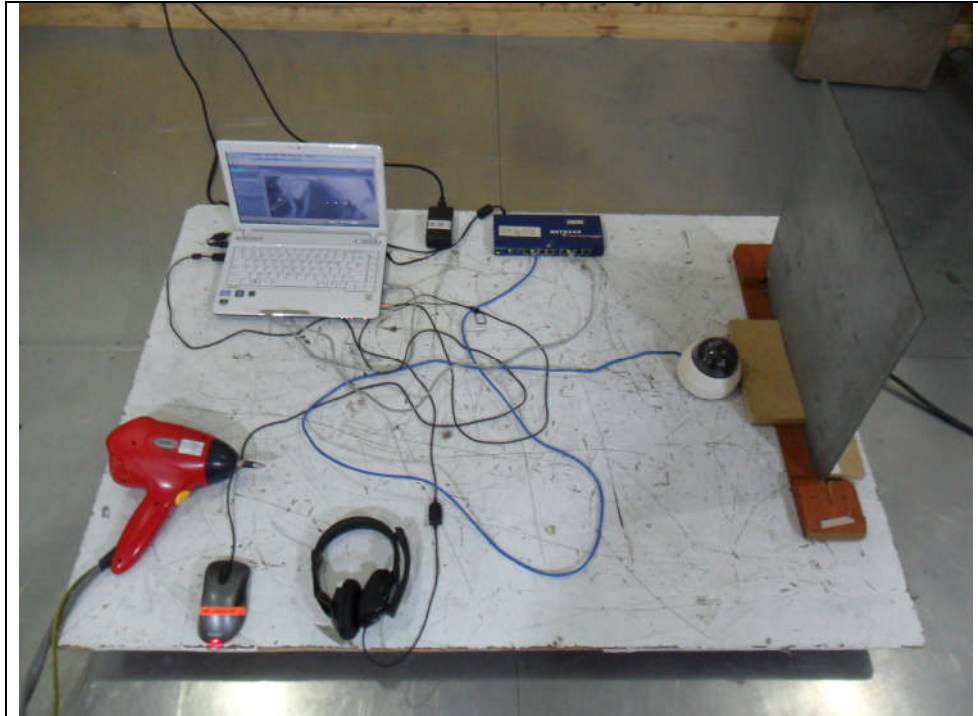
A ground reference plane was located on the floor, and connected to earth via a low Impedance connection. The return cable of the ESD generator was connected to the reference plane.

In case of floor standing equipment, EUT was placed on the reference plane on 0.1 m of insulating Support. In case of table top equipment, EUT was placed on a wooden table 0.8 m above the reference grounded floor. A horizontal coupling plane (HCP) was placed on the table, and Connected to the reference plane via a 470 k $\Omega$  resistor located in each end (0.5 mm insulating support between EUT and HCP). In both cases a vertical coupling plane(VCP) OF 0.5 X 0.5 m was located 0.1 m from the EUT's sides. The VCP was connected to the reference plane in the same matter as the HCP.

#### 6.3.2 Used equipments



Equipment	Model No.	Serial No.	Makers	Next Cal. Date	Used
ESD Tester	PESD 1600	H011 309	HAEFELY	2013.07.18	<input type="checkbox"/>
ESD Tester	NSG 437	182	TESEQ	2014.05.21	<input checked="" type="checkbox"/>
HCP	-	-	-	-	<input type="checkbox"/>
VCP	-	-	-	-	<input checked="" type="checkbox"/>

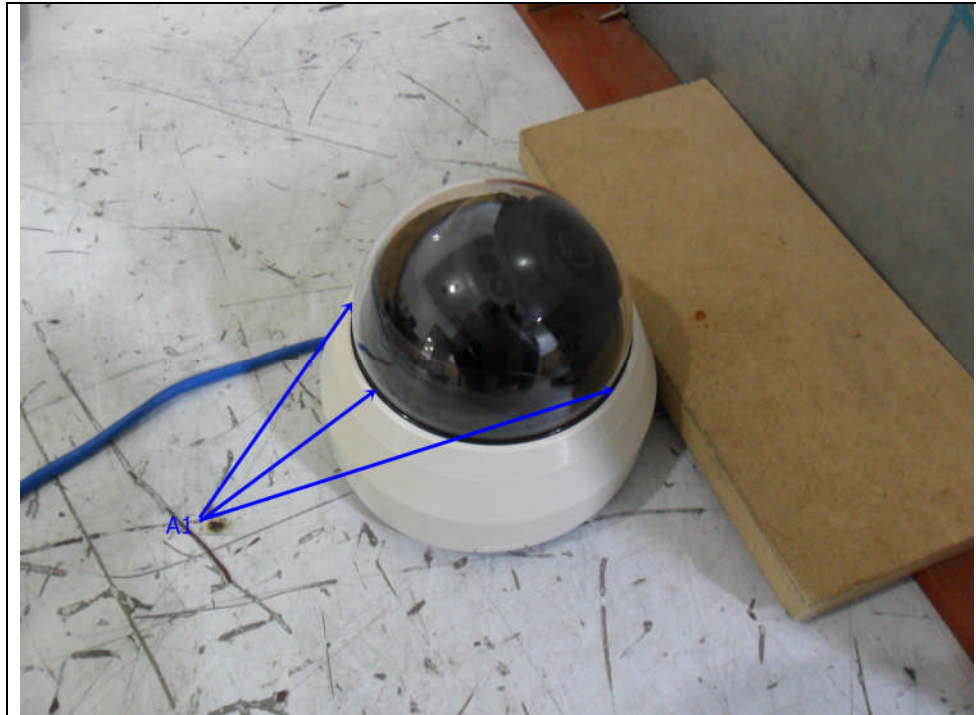
### 6.3.3 Photographs of test setup



6.3.4 Measurement result

Electrostatic Discharge (Test Point)

<b>Air discharge</b>	
<b>Contact discharge</b>	



**HCP/VCP discharge**

Location(EUT)	Applied level (±)	Result
HCP (All 4 sides)	-	-
VCP (All 4 sides)	± 2 kV, ± 4 kV, ± 6 kV	Complied

**Contact discharge**

Location(EUT)	Applied level (±)	Result
-	-	-

**Air discharge**

Location(EUT)	Applied level (±)	Result
A1	Enclosure(Case) ± 2 kV, ± 4 kV, ± 8 kV	Complied

## 6.4 Radio Frequency Electromagnetic Fields

Test specification	EN 61000-4-3:2006+A2:2010				
Tested frequency	80 MHz ~ 1 GHz, 1 GHz ~ 2.7 GHz				
Test level & Modulation	1 V/m, 3 V/m, 10 V/m, 80 % Amplitude Modulation (1 kHz) 1 V/m, 3 V/m, 10 V/m, Pulse Modulation (1 Hz (0.5 s ON: 0.5 s OFF))				
Frequency Step	log 1 % step				
Dwell time	3 s				
Distance	3 m from EUT to tip of antenna				
Testing Voltage	PoE				
Test facility	Fully anechoic chamber (3 m)				
Date	2013. 07. 03				
Temperature(°C)	26 °C	Humidity (% R.H.)	40 % R.H.	Pressure (kPa)	99.1 kPa
Remarks	<p>Complied (1 V/m, 3 V/m) - There was no change of operation status during above testing.</p> <p>(10 V/m)_ 89.84 MHz ~ 112.6 MHz, 118.78 MHz ~ 131.5 MHz - During the test, some packet was lost but link was alive. After the test, EUT is getting back to normal operation. - During the test, the video happens to be disconnected, After the test, EUT is getting back to normal operation.</p>				

### 6.4.1 Measurement procedure

The test was performed at 3 m full anechoic chamber.

For floor standing equipment, the EUT was standing on the floor.

For tabletop equipment, the EUT was located on a wooden table 0.8 m above the floor.

The EUT was tested all sides, horizontal and vertical polarization.

#### 6.4.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Power meter	PM2002	302852	AR	2014.04.05	☒
Power sensor	PH2000	303224	AR	2014.04.05	☒
Power sensor	PH2000	311217	AR	2014.04.05	☒
Directional coupler	DC6180	303976	AR	2014.04.08	☒
Directional coupler	DC7144M1	320279	AR	2014.02.07	☒
Signal generator	E4421B	GB40052295	AGILENT	2013.10.11	☒
Amplifier	BBA100	100996-1	R&S	2014.02.12	☒
Amplifier	60S1G3M2	320444	AR	2014.04.09	☒
Broadband Ant.	LPDA-0803	130269	ETS	-	☒
Fiber Optic Modem	HI-4413P	-	ETS- LINDGREM	-	☒
Antenna master	-	-	ETS	-	☒

#### 6.4.3 Photographs of test setup



6.4.4 Measurement result

Location(EUT)	Antenna polarization	Result
Front side	Horizontal	Complied
	Vertical	Complied
Rear side	Horizontal	Complied
	Vertical	Complied
Left side	Horizontal	Complied
	Vertical	Complied
Right side	Horizontal	Complied
	Vertical	Complied

## 6.5 Electric Fast Transient/BURST

Test specification	EN 61000-4-4:2004+A1:2010				
Coupling	<input type="checkbox"/> DC 12 V, AC 24 V <input type="checkbox"/> Signal: Clamp <input checked="" type="checkbox"/> Telecommunication: Clamp				
Test level	<input type="checkbox"/> DC 12 V, AC 24 V: $\pm 1$ kV Peak <input type="checkbox"/> Signal: $\pm 1$ kV Peak <input checked="" type="checkbox"/> Telecommunication: $\pm 1$ kV Peak				
Repetition frequency	100 kHz, Tr/Th = 5 / 50 ns				
Coupling time	60 s				
Testing Voltage	PoE				
Test facility	Shielded room				
Date	2013. 07. 04				
Temperature(°C)	23 °C	Humidity (% R.H.)	46 % R.H.	Pressure (kPa)	99.2 kPa
Remarks	Complied - There was no change of operation status during above testing.				

### 6.5.1 Measurement procedure

A ground reference plane was located on the floor.

EFT generator was connected to reference ground plane via low impedance connection.

For floor standing equipment, EUT was placed on a 0.1 m wooden table.

For tabletop equipment, EUT was placed on a 0.1 m above the ground reference plane.

Test generator and coupling/decoupling network was placed on, and bounded to, the ground reference plane. When using the coupling clamp, the minimum distance between the coupling plates and all other conductive surfaces, except the ground reference plane beneath the coupling clamp, shall be 0.5 m.

### 6.5.2 Used equipments

Equipment	Model No.	Serial No.	Makers	Next Cal. date	Used
Ultra compact simulator	UCS 500 M6	V0545100858	EM TEST	2014.01.31	<input checked="" type="checkbox"/>
Ultra compact simulator	UCS 500 M6	0701-03	EM TEST	2014.06.21	<input type="checkbox"/>
Capacitive Coupling Clamp	-	-	EM TEST	-	<input checked="" type="checkbox"/>



### 6.5.3 Photographs of test setup



### 6.5.4 Measurement result

\* AC/DC Line

EFT coupling point	(+)	(-)	Result
-	-	-	-

\* Signal

EFT coupling point	(+)	(-)	Result
-	-	-	-

\* Telecommunication

EFT coupling point	(+)	(-)	Result
LAN(PoE)	+ 1 kV	- 1 kV	Complied

## 6.6 Conducted Immunity

Test specification	EN 61000-4-6:2009				
Tested frequency	0.15 MHz ~ 100 MHz				
Test level & Modulation	1 V, 3 V, 10 V, 80 % Amplitude Modulation (1 kHz) 1 V, 3 V, 10 V, Pulse Modulation (1 Hz (0.5 s ON: 0.5 s OFF))				
Frequency Step	log 1 % step				
Coupling method	<input type="checkbox"/> DC 12 V, AC 24 V : CDN(M2) <input type="checkbox"/> Signal: Clamp <input checked="" type="checkbox"/> Telecommunication: CDN(T8-RJ45)				
Testing Voltage	PoE				
Test facility	Shielded room				
Date	2013. 07. 03				
Temperature(°C)	24 °C	Humidity (% R.H.)	43 % R.H.	Pressure (kPa)	99.1 kPa
Remarks	Complied (1 V, 3 V) - There was no change of operation status during above testing.  (10 V)_ 59.390 MHz ~ 66.198 MHz, 84.321 MHz ~ 100.00 MHz - During the test, some packet was lost but link was alive. After the test, EUT is getting back to normal operation. - During the test, the video happens to be disconnected, After the test, EUT is getting back to normal operation.				

### 6.6.1 Measurement procedure

A ground reference plane was located on the floor.

The test was performed on a ground reference plane on a 0.1 m wooden table. This test were Performed using CDN for mains, clamp for signal and injection probe. The frequency range was swept from 0.15 MHz to 100 MHz. This frequency range was Modulated with 1 kHz sine wave at 80 %.

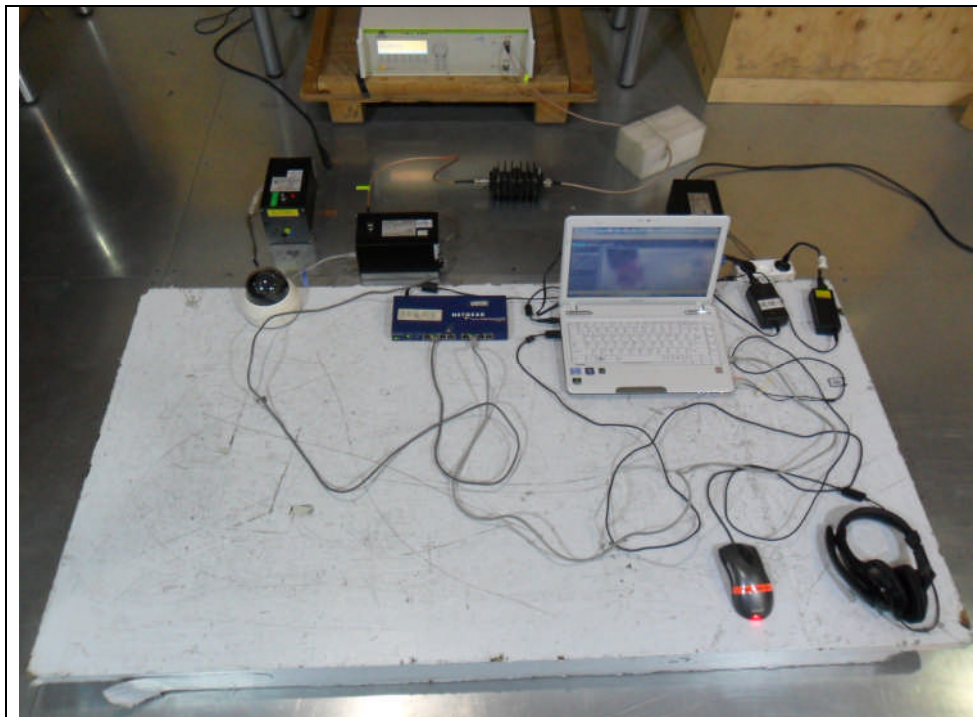
The signal generators provided the modulated frequency at a 1 % step size.

The power and all network cable, I/O cables longer than 3 m length were tested.

### 6.6.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
CS generator	CWS 500	V0635101750	EM TEST	2014.01.17	<input checked="" type="checkbox"/>
CDN	CDN L-801 M2/M3	2936	EM TEST	2014.02.06	<input type="checkbox"/>
CDN	CDN M2/M3	0906-12	EM TEST	2013.10.11	<input checked="" type="checkbox"/>
Attenuator	73-6-34	MU918	MCE/WEINSCHEL	2013.10.11	<input checked="" type="checkbox"/>
EM Clamp	KEMZ 801	17643	Schaffner	2014.04.17	<input type="checkbox"/>
CDN	CDN S1/75	0410-28	EM TEST	2014.05.13	<input type="checkbox"/>
CDN	CDN-T8-RJ45	0113-22	EM TEST	2014.02.22	<input checked="" type="checkbox"/>

### 6.6.3 Photographs of test setup



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#### 6.6.4 Measurement result

\* AC/DC Line

Coupling point	Coupling method	Result
-	-	-

\* Signal

Coupling point	Coupling method	Result
-	-	-

\* Telecommunication

Coupling point	Coupling method	Result
LAN(PoE)	CDN(T8-RJ45)	Complied

## 7. E.U.T. photographs

### Front View



### Rear View



Left View



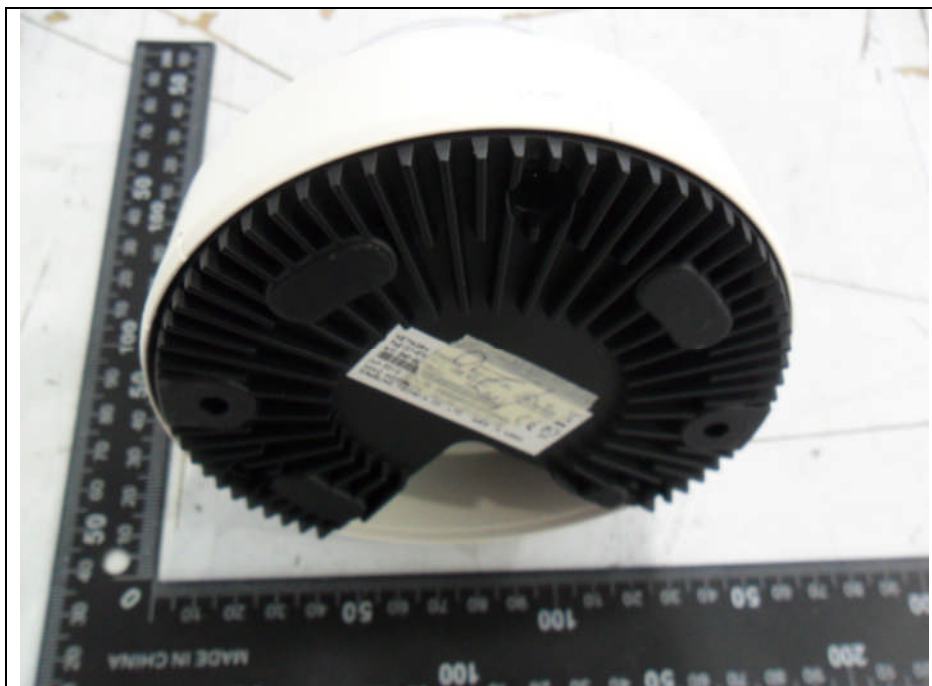
Right View



Top View



Bottom View

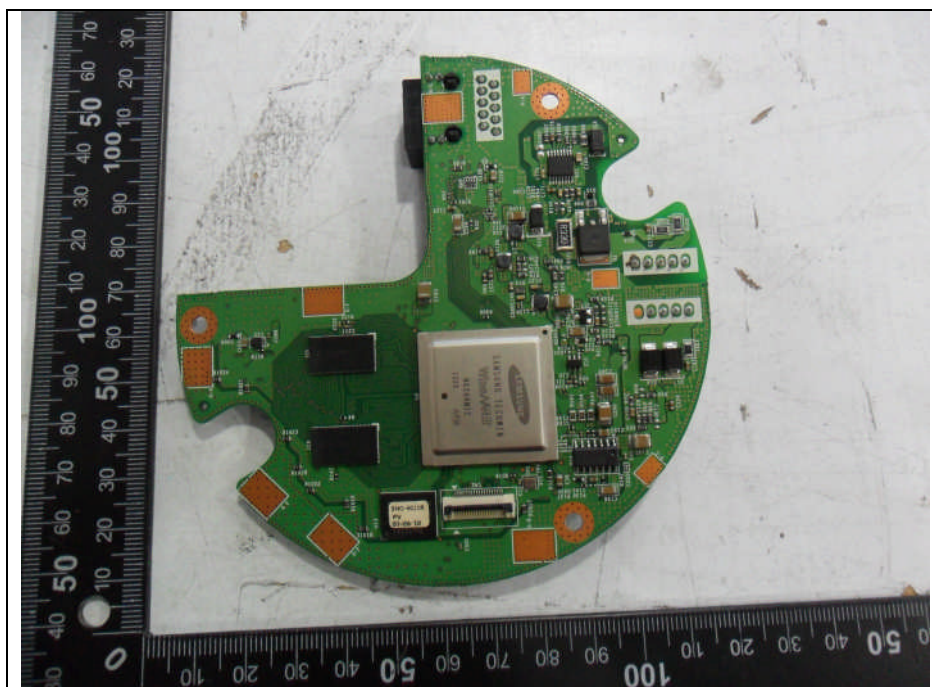
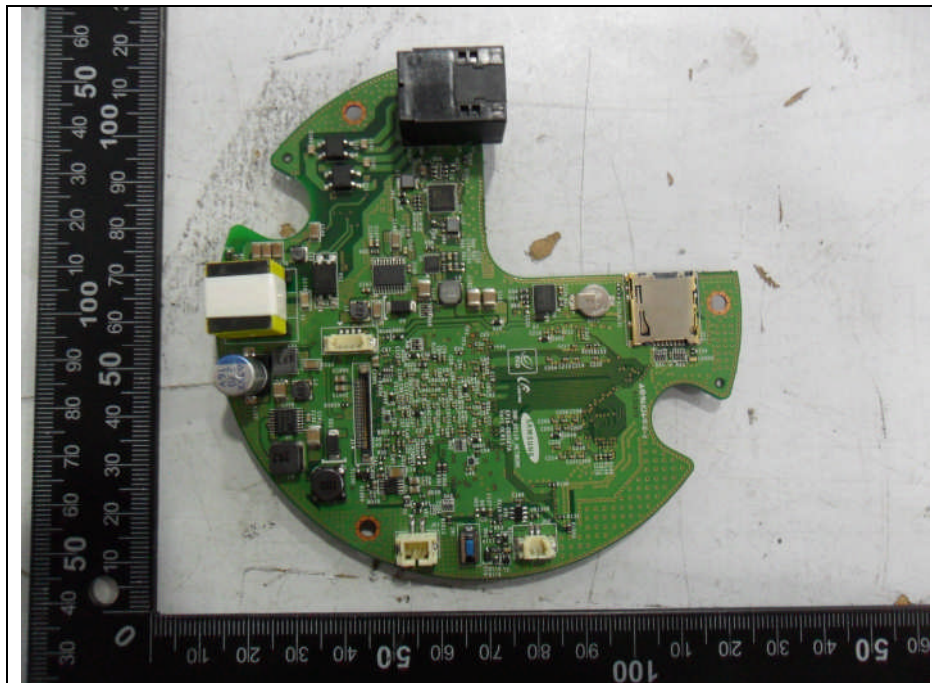


Inside

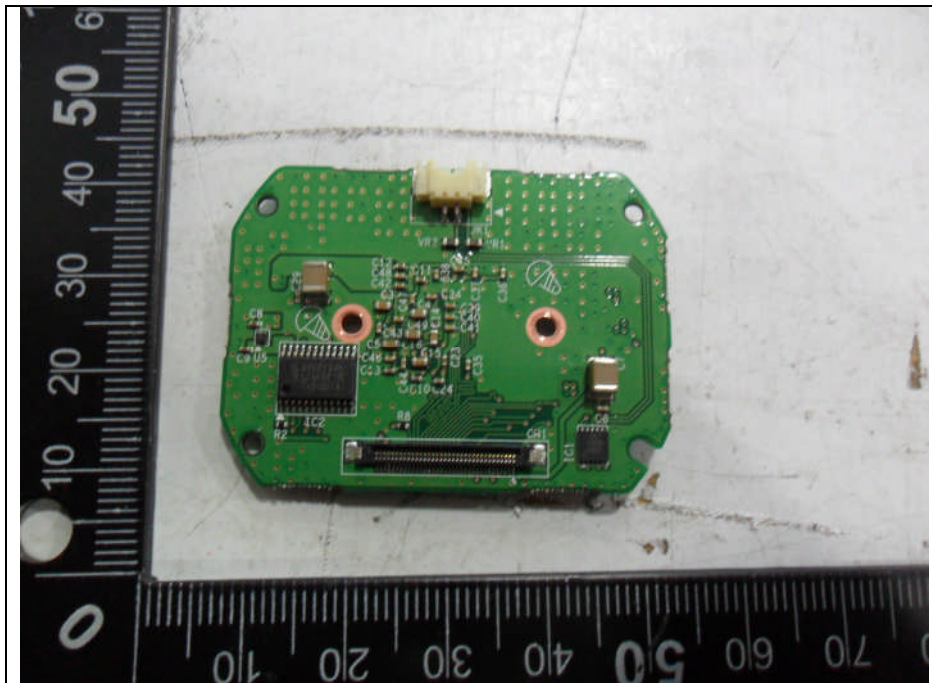
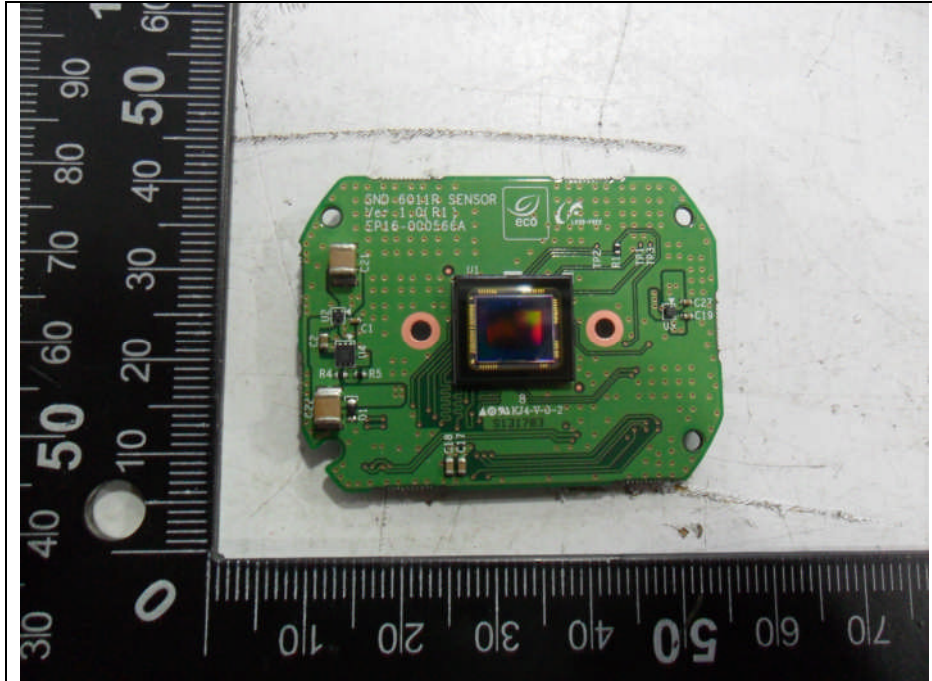




Main Board



CCD Board



LED Board

