

EMC TEST REPORT

Test report No : EMC-CE-4972
Type of Equipment : Network Camera
Model Name : SNF-8010VMP
Applicant : Samsung Techwin Co., Ltd.
84, Jeongdong-ro, Seongsan-gu, Changwon-si,
Gyeongsangnam-do, Korea
Manufacturer #1 : Samsung Techwin Co., Ltd.
84, Jeongdong-ro, Seongsan-gu, Changwon-si,
Gyeongsangnam-do, Korea
Manufacturer#2 : TIANJIN SAMSUNG TECHWIN
OPTO-ELECTRONIC CO., LTD
No.11 Weiliu Road. Micro-Electronic Industrial
Park Jingang Road Tianjin 300385, China
Test standards : EN 55011:2009+A1 :2010
EN 50121-3-2:2006
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: 2014. 05. 19

Date of testing: 2014. 05. 25 ~ 05. 31

Issued date: 2014. 06. 23

Tested by:

LYU, JUNG-GIL

Approved by:

YEOM, HAN-SEOK

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	12
4.3 Auxiliary equipments	12
4.4 Test configuration	13
4.5 Operating conditions	15
5. Summary of test results	15
5.1 Summary of EMI emission test results	16
5.2 Summary of immunity test results	16
5.3 Performance criteria	17
6. Test results	18
6.1 Conducted Emission	18
6.2 Radiated Emission	22
6.3 Electrostatic Discharge	28
6.4 Radio Frequency Electromagnetic Fields	33
6.5 Electric Fast Transient/BURST	38
6.6 Surge	41
6.7 Conducted Immunity	45
7. E.U.T. photographs	48

1. Applicant information

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2. Laboratory information

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EMC compliance Ltd.

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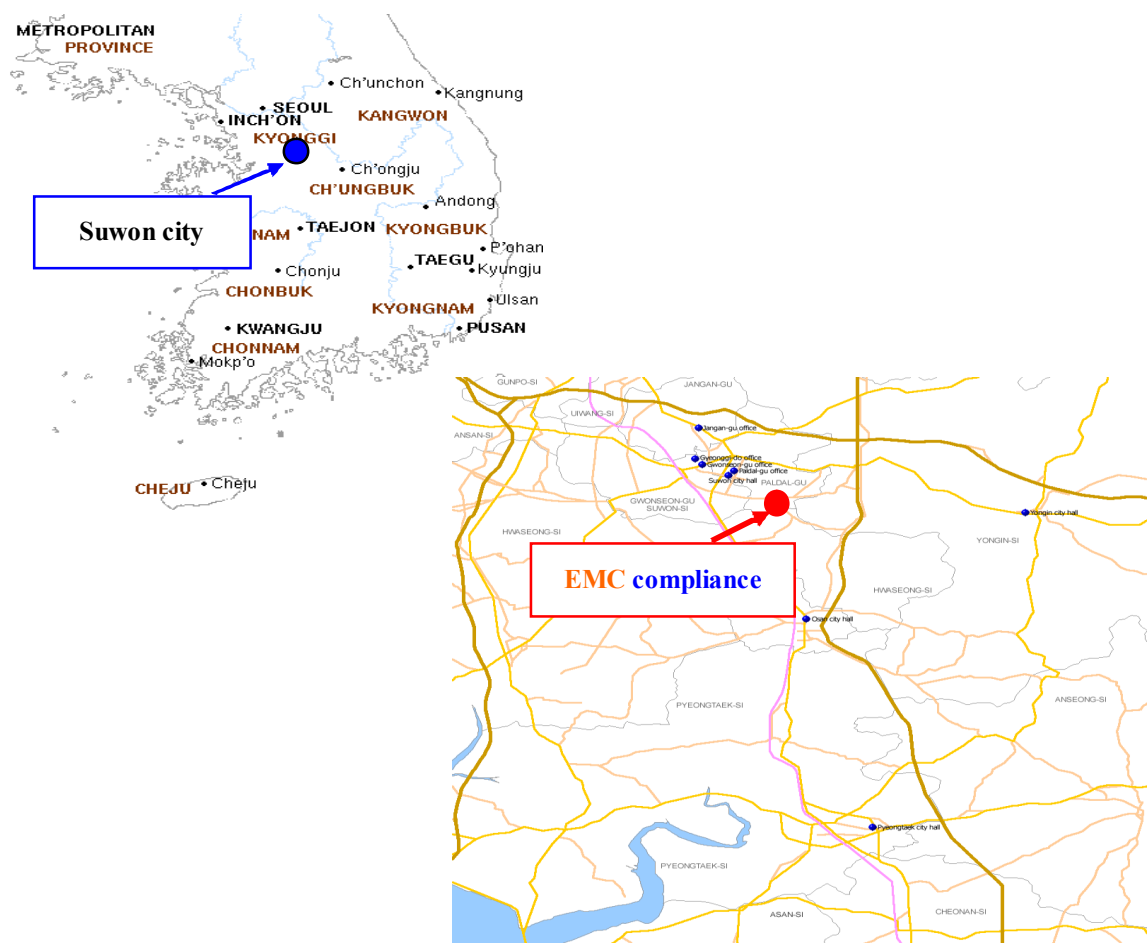
FCC CAB.: KR0040

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)	: 23.6 °C	41.6 % R.H.	-
Shielded room(CE)	: 24.7 °C	44.3 % R.H.	-
Shielded room(ESD)	: 25.5 °C	43.2 % R.H.	100.7 kPa

Test site

These testing items were performed following locations;

Test item	Test site
Conducted Emission	Shielded Room
Radiated Emission	10 m Chamber
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

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

Items		Description		
		SNF-8010	SNF-8010V	SNF-8010VM
Video	Imaging Device	1/1.8" 6M PS CMOS		
	Total Pixels	6M		
	Effective Pixels	5.3M(2560 x 2048)		
	Scanning System	Progressive		
	Min. Illumination	Color : 0.9 Lux (1/30sec, F2.5, 50IRE) Color : 0.015 Lux (2sec, F2.5, 30IRE) B/W : 0.09 Lux (1/30sec, F2.5, 50IRE) B/W : 0.0015 Lux (2sec, F2.5, 30IRE)		
	Video Out	CVBS : 1.0 Vp-p / 75Ω composite		
Lens	Focal Length (Zoom Ratio)	1.14mm(Fixed)		
	Max. Aperture Ratio	F2.5		
	Angular Field of View	H : 187°, V : 187°, D : 187°		
	Min. Object Distance	0.3M ~ Infinity		
	Focus Control	Manual		
	Lens Type	Fixed Lens		
	Mount Type	Board Type (M12)		
Operational	Camera Title	Displayed up to 45 characters		
	Day & Night	True D&N		
	Backlight Compensation	BLC		
	Wide Dynamic Range	60dB↑		
	Digital Noise Reduction	SSNR (2D+3D Noise Filter)		

Items	Description		
	SNF-8010	SNF-8010V	SNF-8010VM
Operational	Motion Detection	Off / On (4 ea)	
	Privacy Masking	Off / On (32ea)	
	Gain Control	Off / Low / Middle / High	
	White Balance	ATW / AWC / Manual / Indoor / Outdoor / Mercury	
	Electronic Shutter Speed	2 ~ 1/12,000 sec	
	Digital Zoom	16x, Digital PTZ(Preset, Group)	
	Flip / Mirror	Off / On	
	Intelligent Video Analytics	Tampering, Audio Detection, Face Detection * Coming : Heat map('14.Nov), People counting ('14.Nov)	
	Alarm I/O	Input 1ea / Output 1ea	
	Audio In	Built in Mic., External MIC	External MIC
	Audio out	Line out (3.5mm stereo mini jack)	
	Alarm Triggers	Motion detection, Tampering, Audio Detection, Alarm Input, Network Disconnection	
	Alarm events	File upload via FTP and E-Mail Notification via E-Mail, TCP and HTTP local storage(SD/SDHC/SDXC) recording at Network disconnected & Event (Alarm Triggers) External output	
	View Composition	Camera Side: 360 view, Single Panorama, Double Panorama, Quad view, Single Rectangle, [360 + 3Rectangle, Single Panorama + 2Rectangle] : Coming '14. Nov CMS Side: 360 view, Single Panorama, Double Panorama, Quad view, Single Rectangle, 360 + 3Rectangle, Single Panorama + 2Rectangle	

Items		Description		
		SNF-8010	SNF-8010V	SNF-8010VM
Network	Ethernet	RJ-45 (10/100BASE-T) : Female Type		M12 Connector Type
	Video Compression Format	H.264 (MPEG-4 Part 10/AVC), Motion JPEG		
	Resolution	Fisheye (Original)	<5.3M Original> 2560x2048, 1920x1080, 1600x1200 1280x1024, 1280x960, 1280x720 1024x768, 800x600, 720x480 640x480, 320x240	
		Double Panorama Singla Panorama Quad Single rectangle	1. Single Rectangle 800x600, 640x480, 320x240 2. Quad View 1600x1200, 1280x960, 1024x768, 800x600, 640x480, 320x240 3. Double Panorama 2048x1536, 1600x1200, 1280x960, 1024x768, 800x600, 640x480, 320x240 4. Single Panaroma 2048x768, 1600x600, 1280x480, 1024x384, 800x300, 640x240, 320x120 5. 360 view + 3 Rectangle : Coming '14.Nov 1600x1200, 1280x960, 1024x768, 800x600, 640x480, 320x240 6. Single Panorama + 2 Rectangle : Coming '14.Nov 1600x1200, 1280x960, 1024x768, 800x600, 640x480, 320x240	
	Smart Codec	Support		
	Max. Framerate	H.264 : Max 20fps at all resolutions MJPEG : 10fps for all resolution		
	Video Quality Adjustment	H.264 : Compression Level, Target Bitrate Level Control MJPEG : Quality Level Control		

Items	Description		
	SNF-8010	SNF-8010V	SNF-8010VM
Network	Bitrate Control Method	H.264 : CBR or VBR MJPEG : VBR	
	Streaming Capability	Multiple Streaming (Up to 10 Profiles)	
	Audio Compression Format	G.711 μ -law /G.726 Selectable G.726 (ADPCM) 8KHz, G.711 8KHz G.726 : 16Kbps, 24Kbps, 32Kbps, 40Kbps AAC (16KHz/48KHz) (Coming '14. Sep)	
	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 SD/SDHC/SDXC memory card can be downloaded. NAS	
	Application Programming Interface	ONVIF Profile S SUNAPI (Samsung Protocol) SVNP 1.2	

Items		Description		
		SNF-8010	SNF-8010V	SNF-8010VM
Network	Webpage Language	English, French, German, Spanish, Italian, Chinese, Korean, Russian, Japanese, Swedish, Danish, Portuguese, Czech, Polish, Turkish, Rumanian, Serbian, Dutch, Croatian, Hungarian, Greek, Norway, Finland		
	Web Viewer	Supported OS : Windows XP / VISTA / 7 / 8, MAC OS X 10.7 Supported Browser : Microsoft Internet Explorer (Ver. 8~11) Mozilla Firefox (Ver. 9~19) Google Chrome (Ver. 15~25) Apple Safari (Ver. 6.0.2(Mac OS X 10.8, 10.7 only), 5.1.7) * Mac OS X only		
	Central Management Software	Use Samsung Techwin Viewer (SSM, Smart Viewer, iPolis Mobile Viewer)		
Environmental	Operating Temperature / Humidity	Indoor : -25℃ ~ +55℃(+14ℱ ~ +131ℱ) / Less than 90% RH TBD Outdoor: -25℃ ~ +55℃(+14ℱ ~ +131ℱ) / Less than 90% RH TBD * Start up should be done at above -10℃		
	Storage Temperature / Humidity	Indoor : -30℃ ~ +60℃(-22ℱ ~ +140ℱ) / Less than 90% RH Outdoor: -30℃ ~ +60℃(-22ℱ ~ +140ℱ) / Less than 90% RH		
	Ingress Protection	-	IP66	
	Vandal Resistance	-	IK10	
	Standard Certification	UL, CE, FCC, RoHS, Gost, KC	EN-61373, EN-50155	
Electrical	Input Voltage / Current	DC12V±10%,PoE(IEEE802.3af,Class3)		
	Power Consumption	TBD		
Mechanical	Color / Material	IVORY/Aluminum		
	Dimension (Ø x H)	Ø145.9 x H49.6mm	Ø145.9 x H62.4mm	
	Weight	TBD		

4.2 Product description

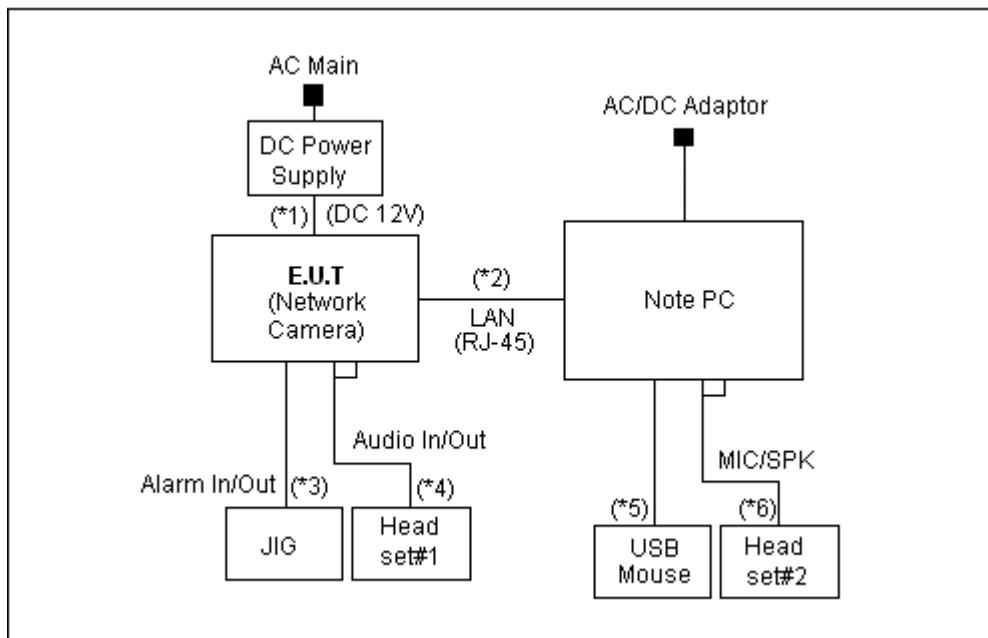
Type of product	Network Camera
Model name (Basic)	SNF-8010VMP
Model name (Variant)	-
Difference	-
Trade name	-
Serial no	Engineering Sample
Testing voltage	DC 12 V, PoE
Product rating	DC 12 V, PoE
Internal clock frequency	Above 108 MHz
Note	* PoE Switch was not provided by the manufacturer.

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Note PC	PSLQ0K-02N005	3A045920Q	TOSHIBA
USB Mouse	1088	8165906051224	Microsoft
Headset #1	SHS-250V	-	SAMSUNG
Headset #2	SHS-250V	-	SAMSUNG
JIG	-	-	-
DC Power Supply	E3632A	KR01009281	Agilent
PoE Switch	FS109P	2HK1283V50C35	NETGEAR

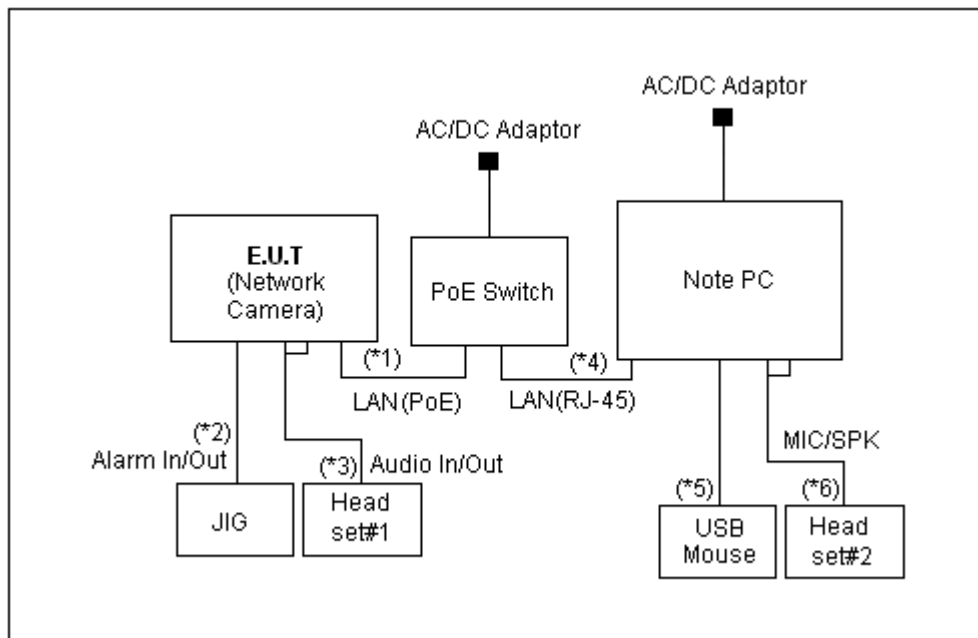
4.4 Test configuration

#1- DC 12V



Note *	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.Cable
1	EUT (Network Camera)	Power	DC Power Supply	Power	1.5	Non-Shield
2		LAN(RJ-45)	Note PC	LAN(RJ-45)	3.0	Non-Shield
3		Audio In/Out	Headset 1	Audio In/Out	3.0	Non-Shield
4		Alarm In/Out	JIG	Alarm 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.Cable
1	EUT (Network Camera)	LAN(PoE)	PoE Switch	LAN(PoE)	3.0	Non-Shield
2		Audio In/Out	Headset 1	Audio In/Out	3.0	Non-Shield
3		Alarm In/Out	JIG	Alarm 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	Web Viewer Monitoring Test.
	Ping Test.
	Audio In/Out Test.
	Alarm In/Out Test.

* Note: 2 types of powers are available for the product, that are DC 12 V, PoE.

Therefore, tests were performed for 2 different types of powers.

5. Summary of test results

5.1 Summary of EMI emission test results

Applied	Test items	Test method	Result
☒	Conducted Emission	EN 55011:2009+A1:2010	Complied
☒	Radiated Emission	EN 55011:2009+A1:2010	Complied

5.2 Summary of immunity test results

Applied	Test items	Test method	Result
☒	Electrostatic discharge	EN 61000-4-2:2009	Complied
☒	Radiated RF immunity	EN 61000-4-3:2006+A2:2010	Complied
☒	Electric Fast Transient/BURST	EN 61000-4-4:2012	Complied
☒	Surge	EN 61000-4-5:2006	Complied
☒	Conducted RF immunity	EN 61000-4-6:2009	Complied

5.3 Performance criteria

The performance criteria were based on the following guidelines:

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

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

A functional description and a definition of performance criteria, during or as a consequence of the EMC testing shall be provided by manufacturer and noted in the test report, based on the following criteria:

Performance criterion A: The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

* Though the noise appeared on the display during the testing, it is judged criterion A if there is no problem to distinguish the things. This is the criterion set by the manufacturer.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level of the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C: Temporary loss of function as allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

6. Test results

6.1 Conducted Emission

Test specification	EN 55011:2009+A1:2010		
Testing voltage	DC 12 V		
Test facility	Shielded room (CE#1)		
Date	2014. 05. 28		
Temperature (°C)	24.7 °C	Humidity (% R.H.)	44.3 % R.H.
Remarks	Complied		

6.1.1 Limits of conducted emission measurement

Frequency	Quasi-peak (dB(μ V))
150 kHz – 500 kHz	99 dB(μ V)
500 kHz – 30 MHz	93 dB(μ V)

6.1.2 Measurement procedure

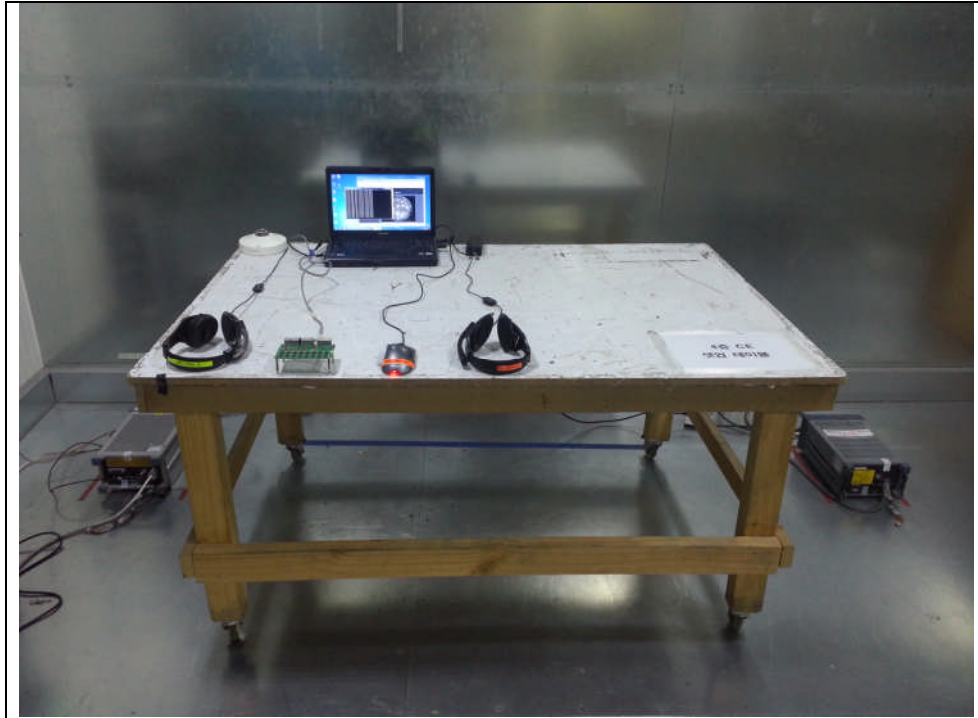
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground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

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	101358	R&S	2014.10.04	☒
LISN	ESH3-Z5	100267	R&S	2014.07.08	☒

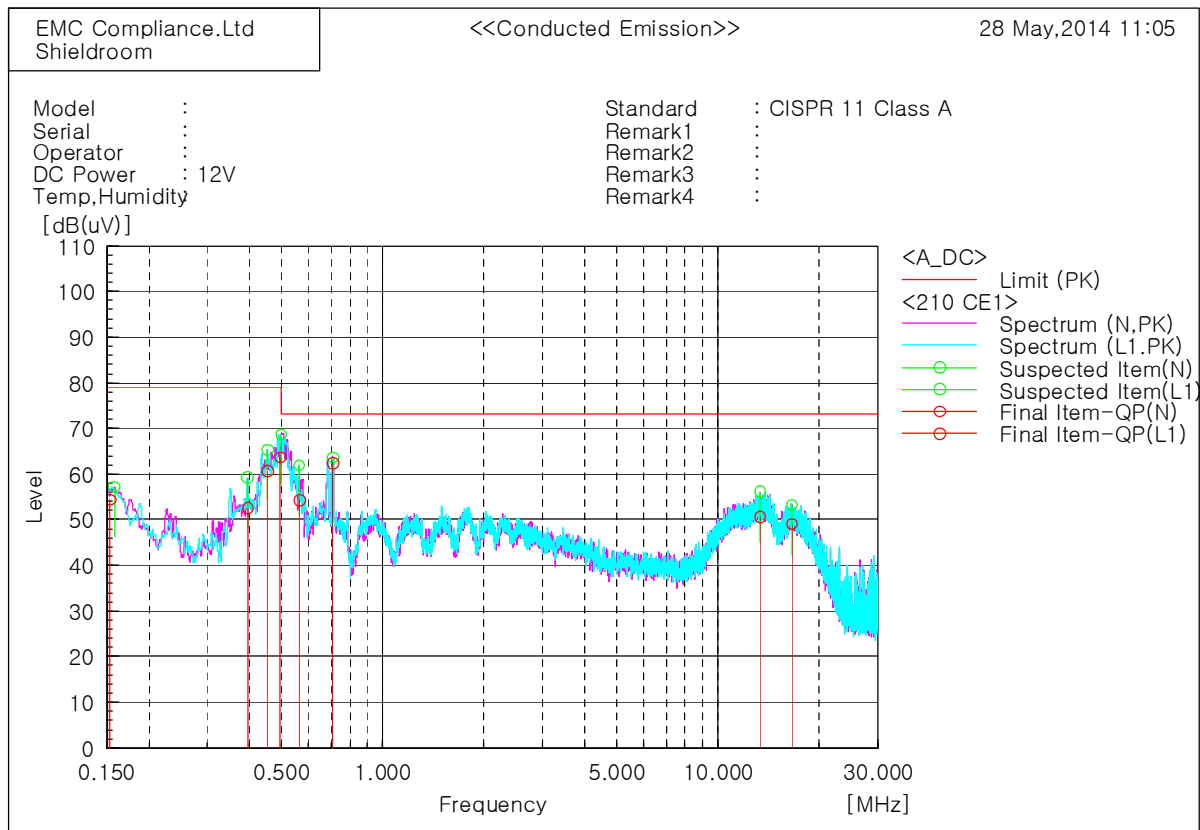
6.1.4 Photographs of test setup

#1- DC 12V



6.1.5 Conducted emission measurement result

#1- DC 12V (SNF-8010VMP)



Final Result

--- N Phase ---

No.	Frequency	Reading QP	c.f	Result QP	Limit QP	Margin QP
	[MHz]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB]
1	0.15349	44.4	10.0	54.4	79.0	24.6
2	16.6546	39.2	9.9	49.1	73.0	23.9

--- L1 Phase ---

No.	Frequency	Reading QP	c.f	Result QP	Limit QP	Margin QP
	[MHz]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB]
1	0.39671	42.3	10.1	52.4	79.0	26.6
2	0.45288	50.5	10.1	60.6	79.0	18.4
3	0.495	53.4	10.1	63.5	79.0	15.5
4	0.56487	44.3	10.0	54.3	73.0	18.7
5	0.70887	52.4	10.0	62.4	73.0	10.6
6	13.37993	40.8	9.8	50.6	73.0	22.4

6.2 Radiated Emission

Test specification	EN 55011:2009+A1:2010		
Testing voltage	DC 12 V , PoE		
Test facility	10 m Chamber (#F4)		
Test distance	10 m		
Date	2014. 05. 25		
Temperature (°C)	23.6 °C	Humidity (% R.H.)	41.6 % R.H.
Remarks	Complied		

6.2.1 Limits of radiated emission measurement

Frequency	Quasi-peak (dB(μ V/m))
30 MHz ~ 230 MHz	40 (dB(μ V/m))
230 MHz ~ 1 GHz	47 (dB(μ V/m))

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	2015.02.24	☐
Bi-Log Antenna	VULB 9168	375	SCHWARZBECK	2015.10.16	☒
Amplifier	310	186280	SONOMA INSTRUMENT	2015.01.27	☒
3 dB Attenuator	8491A	16861	HP	2014.07.08	☒
Antenna Mast	AM4.0	079/3440509	MATURO	-	☒
Turn Table	CO2000-SOFT	-	MATURO	-	☒

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

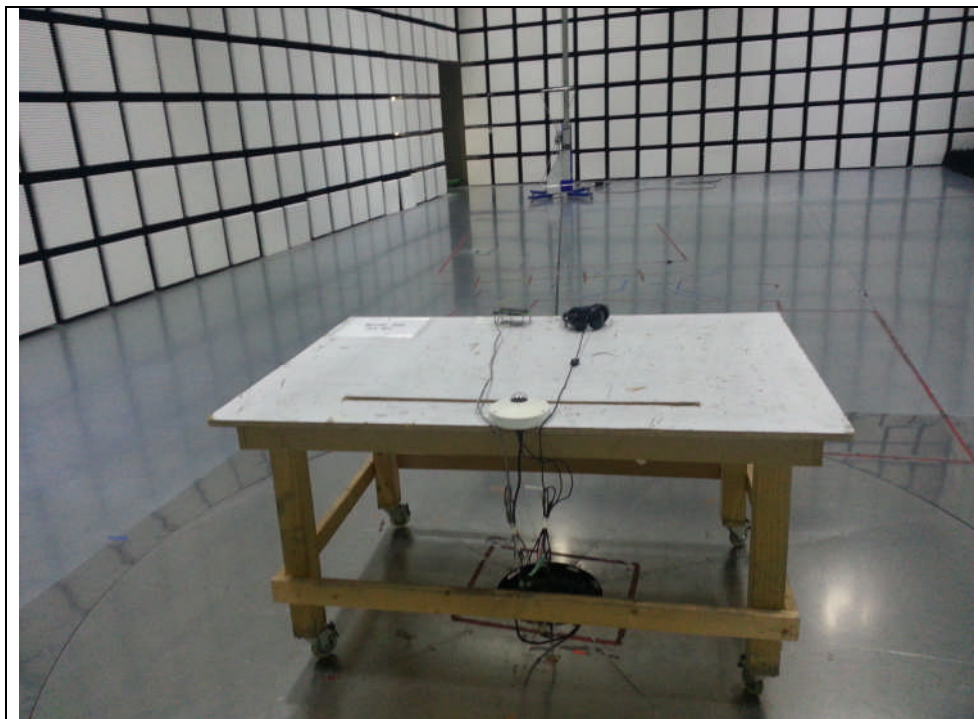
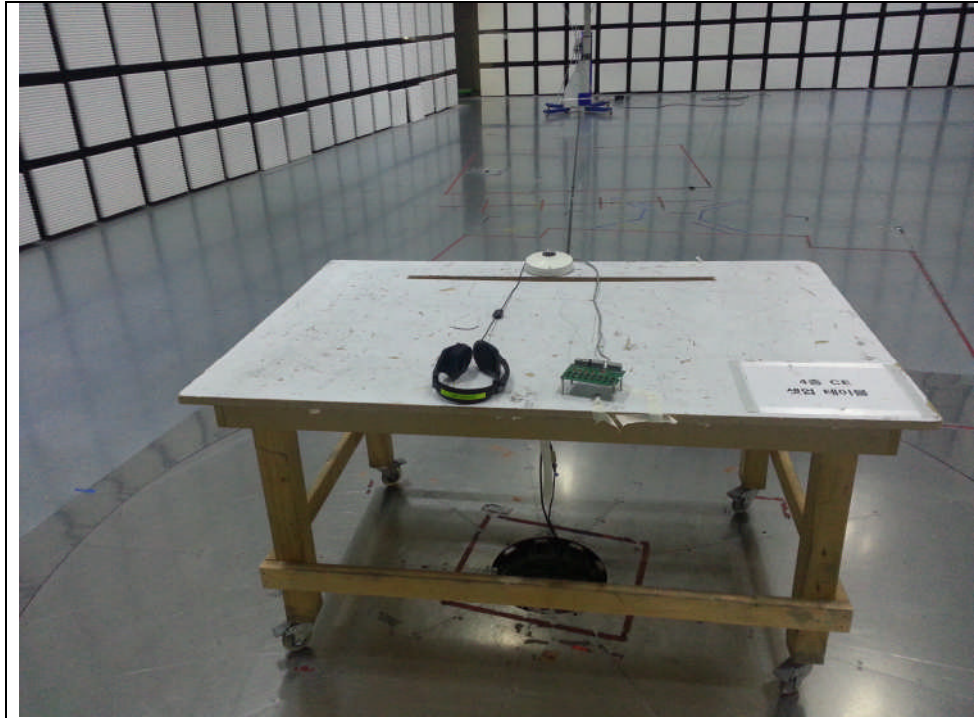
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is

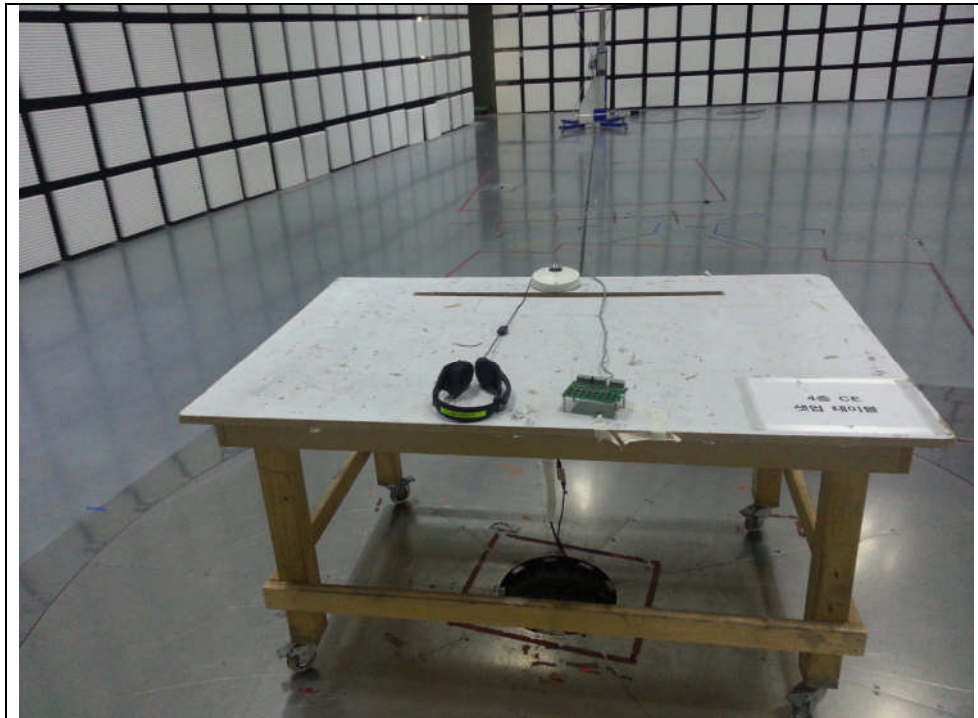
$$30 + 12 + 5 + 3 - 35 = 15 \text{ dB}(\mu\text{V/m})$$

6.2.5 Photographs of test setup

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



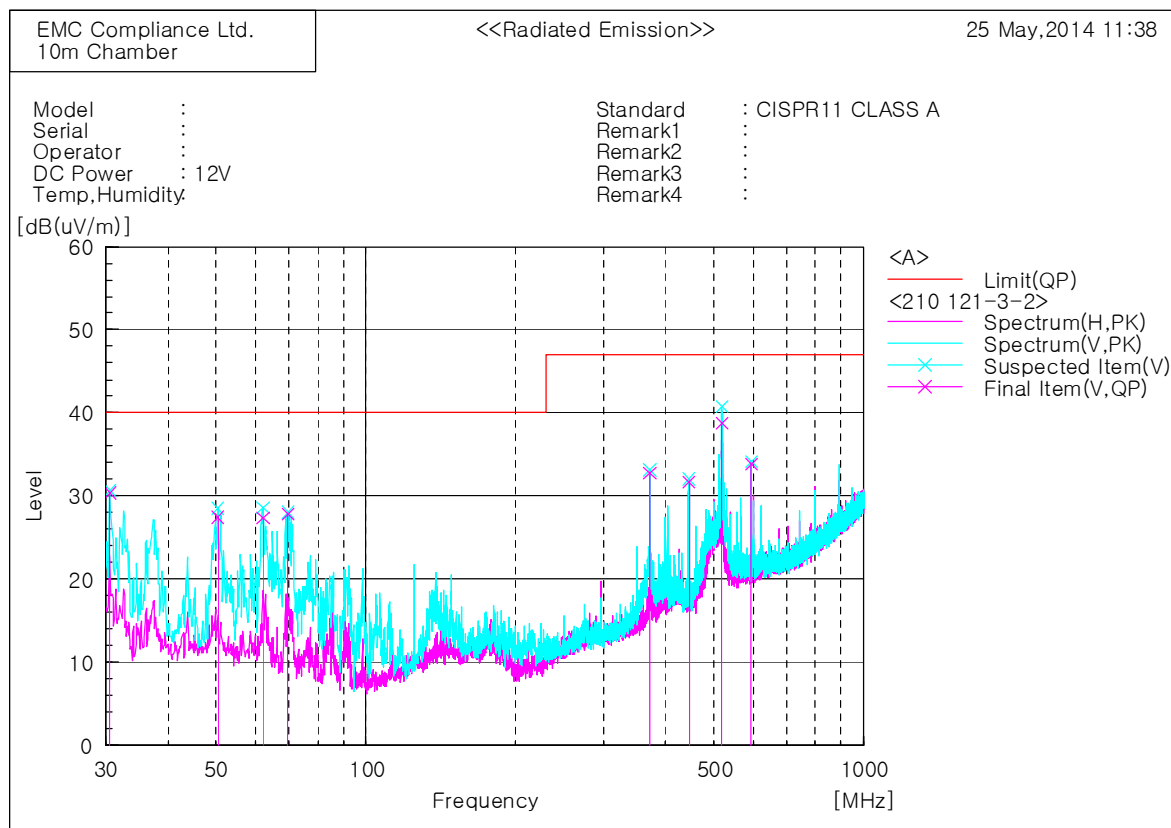
* 30 MHz ~ 1 GHz (#2- PoE)



6.2.6 Radiated emission measurement result

* Graph and Data

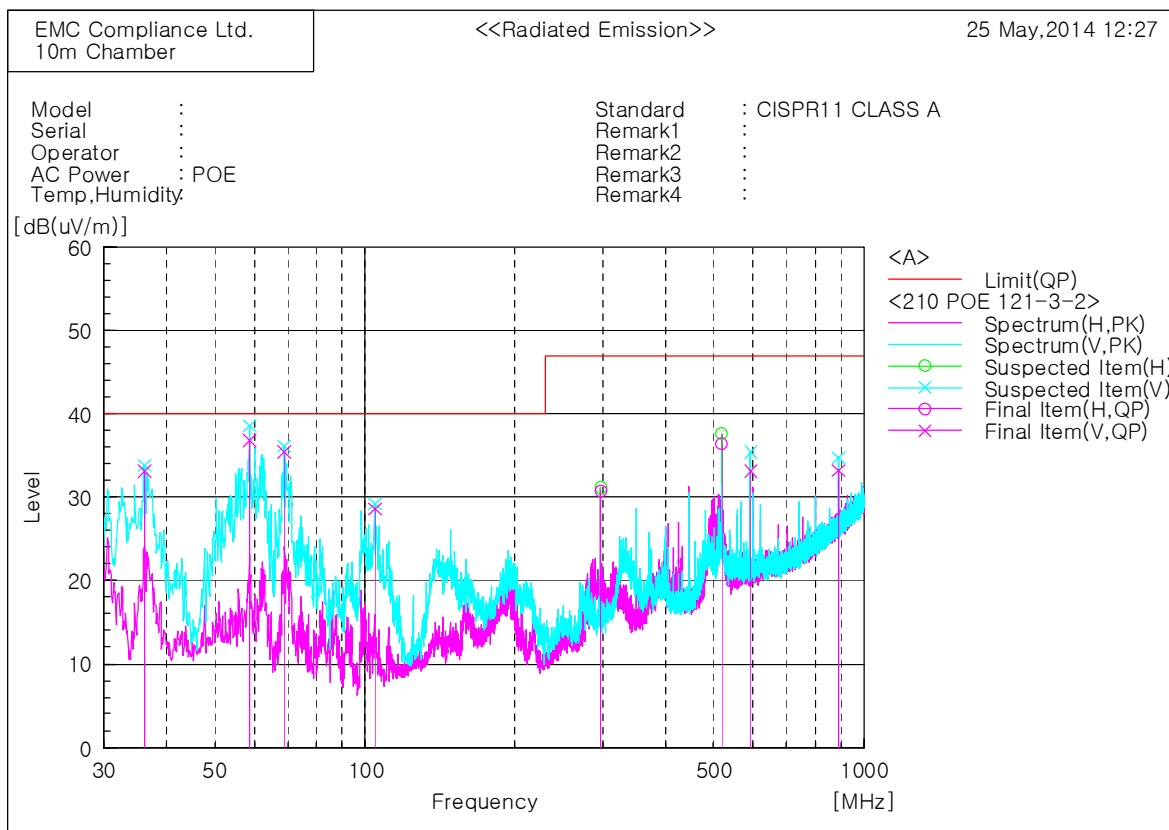
* 30 MHz ~ 1 GHz (SNF-8010VMP) _#1- DC 12V



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	30.606	V	46.4	-16.0	30.4	40.0	9.6	199.0	0.2
2	50.370	V	41.8	-14.3	27.5	40.0	12.5	100.0	108.5
3	62.010	V	43.1	-15.7	27.4	40.0	12.6	100.0	149.7
4	69.649	V	44.7	-16.8	27.9	40.0	12.1	199.0	197.3
5	371.319	V	42.8	-10.0	32.8	47.0	14.2	100.0	281.8
6	445.524	V	39.8	-8.1	31.7	47.0	15.3	100.0	301.7
7	519.729	V	45.3	-6.5	38.8	47.0	8.2	100.0	190.9
8	593.934	V	38.4	-4.6	33.8	47.0	13.2	299.0	181.6

* 30 MHz ~ 1 GHz (SNF-8010VMP) _#2- PoE



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit QP [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	36.184	V	48.5	-15.4	33.1	40.0	6.9	302.0	18.6
2	58.736	V	51.9	-15.1	36.8	40.0	3.2	100.0	141.8
3	68.921	V	52.1	-16.7	35.4	40.0	4.6	201.0	114.5
4	104.690	V	46.8	-18.2	28.6	40.0	11.4	100.0	119.0
5	296.993	H	43.0	-12.2	30.8	47.0	16.2	400.0	146.0
6	519.729	H	42.9	-6.5	36.4	47.0	10.6	198.0	279.3
7	594.055	V	37.7	-4.6	33.1	47.0	13.9	201.0	167.5
8	890.996	V	32.3	0.9	33.2	47.0	13.8	302.0	5.8

6.3 Electrostatic Discharge

Test specification	EN 61000-4-2:2009, Criteria: B				
Test level	☒ Contact: ± 6 kV ☒ Air: ± 2 kV, ± 4 kV, ± 8 kV ☒ HCP: ± 2 kV, ± 4 kV, ± 6 kV ☒ VCP: ± 2 kV, ± 4 kV, ± 6 kV				
Discharge impedance	330 Ω / 150 pF				
Number of discharge (Each polarity)	☒ Contact: 10 ☒ Air: 10 ☒ HCP / VCP: 10				
Interval between discharges	1 s				
Testing voltage	DC 12 V, PoE				
Test facility	Shielded room				
Date	2014. 05. 26				
Temperature(°C)	25.5 °C	Humidity (% R.H.)	43.2 % R.H.	Pressure (kPa)	100.7 kPa
Remarks	Complied - A: 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 Ω 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	2014.07.15	☐
ESD Tester	NSG 437	182	TESEQ	2015.04.09	☒
HCP	-	-	-	-	☒
VCP	-	-	-	-	☒

6.3.3 Photographs of test setup

#1- DC 12V



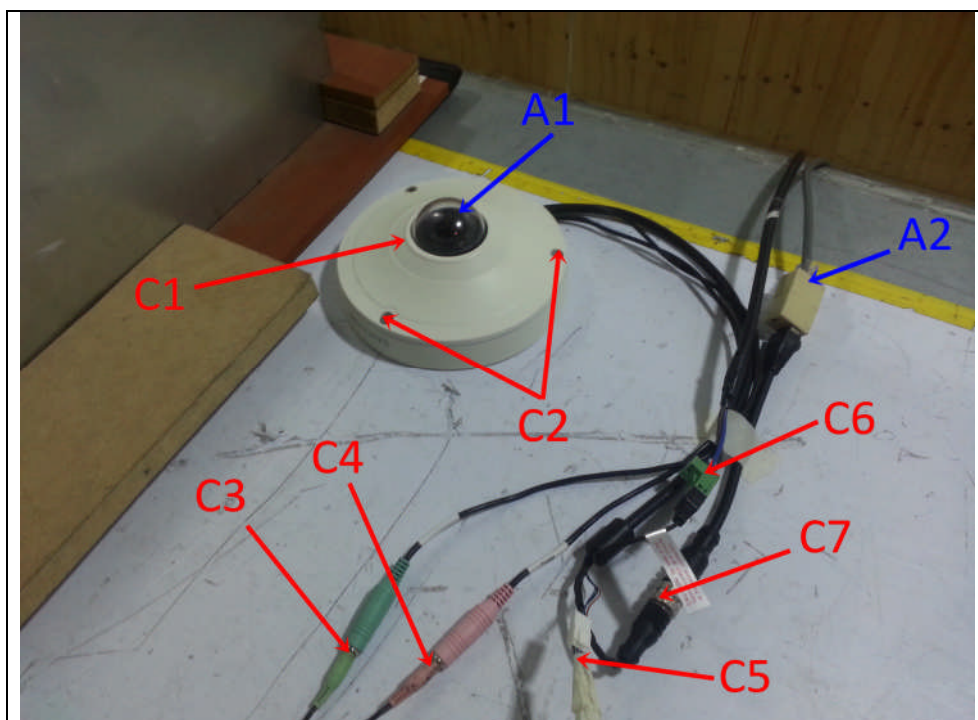
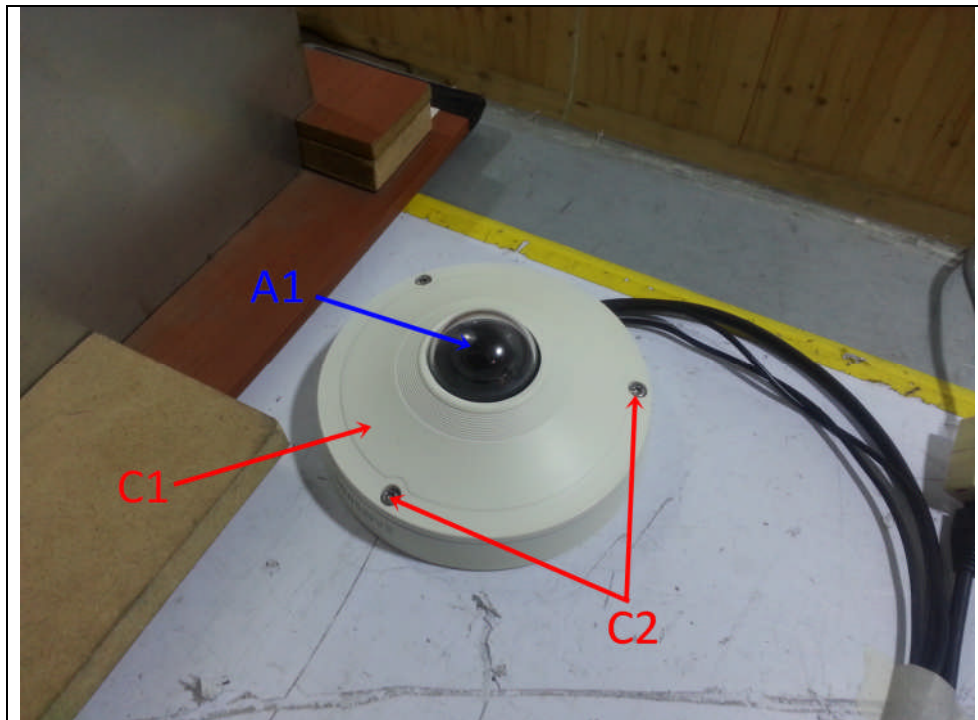
#2- PoE



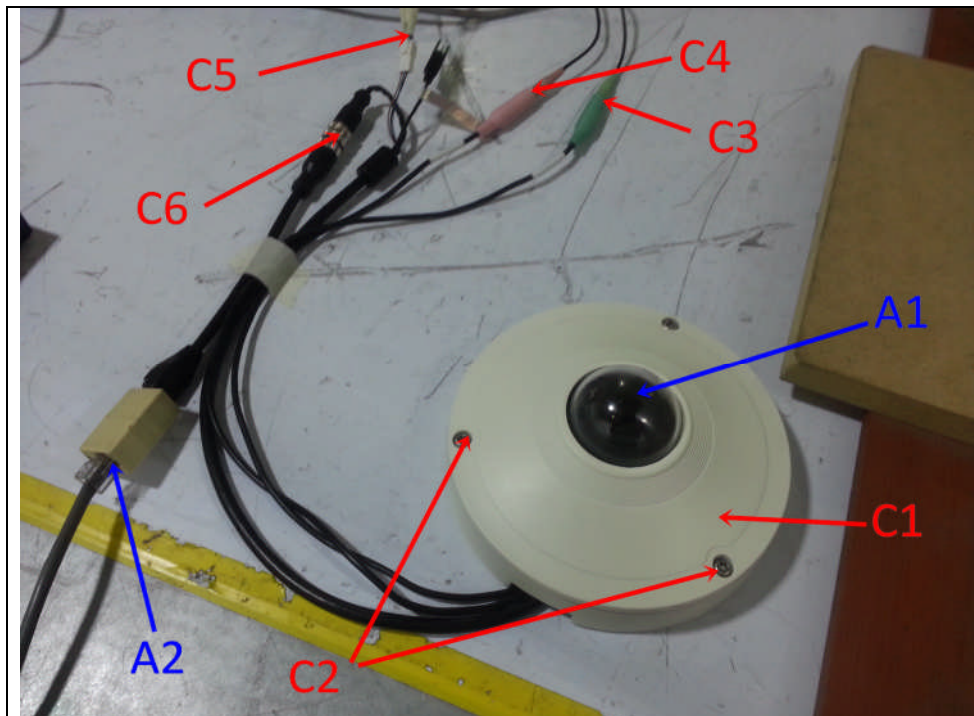
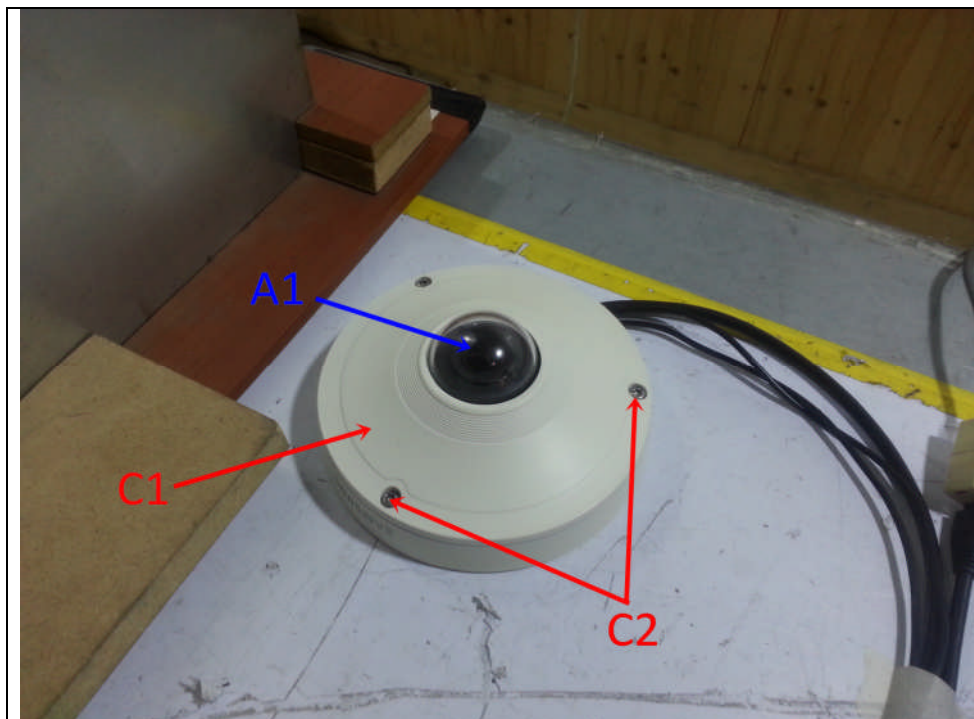
6.3.4 Measurement result
Electrostatic Discharge (Test Point)

Air discharge	
Contact discharge	

#1- DC 12V



#2- PoE



(#1- DC 12V, #2- PoE)

HCP/VCP discharge

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

Contact discharge

Location(EUT)	Applied level (±)	Result (Criteria)
C1 Enclosure(Case)	± 6 kV	A
C2 Screw	± 6 kV	A
C3 Audio In Port	± 6 kV	A
C4 Audio Out Port	± 6 kV	A
C5 Alarm In/Out Port	± 6 kV	A
C6 Power Port	± 6 kV	A
C7 LAN(RJ-45) Port	± 6 kV	A

Air discharge

Location(EUT)	Applied level (±)	Result (Criteria)
A1 Lens	± 2 kV, ± 4 kV, ± 8 kV	A
A2 LAN(RJ-45) Port	± 2 kV, ± 4 kV, ± 8 kV	A

6.4 Radio Frequency Electromagnetic Fields

Test specification	EN 61000-4-3:2006+A2:2010, Criteria: A				
Tested frequency	800 MHz ~ 1 GHz, 80 MHz ~ 1 GHz, 1.4 GHz ~ 2.1 GHz, 2.1 GHz ~ 2.5 GHz				
Test level & Modulation	800 MHz ~ 1 GHz: 20 V/m, 80 % Amplitude Modulation (1 kHz) 80 MHz ~ 1 GHz: 20 V/m, 80 % Amplitude Modulation (1 kHz) 1.4 GHz ~ 2.1 GHz: 10 V/m, 80 % Amplitude Modulation (1 kHz) 2.1 GHz ~ 2.5 GHz: 5 V/m, 80 % Amplitude Modulation (1 kHz)				
Frequency Step	log 1 % step				
Dwell time	3 s				
Distance	3 m from EUT to tip of antenna				
Testing voltage	DC 12 V, PoE				
Test facility	Fully anechoic chamber (3 m) (1.4 GHz ~ 2.1 GHz, 2.1 GHz ~ 2.5 GHz) DIGITAL EMC Lab (800 MHz ~ 1 GHz, 80 MHz ~ 1 GHz)				
Date	2014. 05. 31				
Temperature(°C)	25.3 °C	Humidity (% R.H.)	48.4 % R.H.	Pressure (kPa)	100.6 kPa
Remarks	Complied - A: The manufacturer allow to appear some rolling bar phenomenon.				

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

* (5 V/m, 10 V/m)

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Power meter	PM2002	302852	AR	2015.02.07	☒
Power sensor	PH2000	303224	AR	2015.02.07	☒
Power sensor	PH2000	311217	AR	2015.02.07	☒
Directional coupler	DC6180	303976	AR	2015.02.06	☒
Signal generator	E4421B	GB40052295	AGILENT	2015.02.06	☒
Broadband Amplifier	BBA100	100996-1	R&S	2015.02.06	☒
Log Periodic Dipole Antenna	LPDA-0803	-	ETS	-	☒
Antenna master	-	-	ETS	-	☒

* (20 V/m)

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Signal generator	SML03	100647	R&S	2015.02.28	☒
Power meter	NRVD	100403	R&S	2015.02.30	☒
Antenna	VULP 9118E	754	SCHWARZBECK	-	☒
Power Amplifier	MT200	1102	PRANA	-	☒

6.4.3 Photographs of test setup

#1- DC 12 V (5 V/m, 10 V/m)



#1- DC 12 V (20 V/m)



#2- PoE (5 V/m, 10 V/m)



#2- PoE (20 V/m)



6.4.4 Measurement result

(#1- DC 12V, #2- PoE)

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

6.5 Electric Fast Transient/BURST

Test specification	EN 61000-4-4:2012, Criteria: A				
Coupling	☒ DC 12 V ☒ Signal: Clamp ☒ Telecommunication: Clamp				
Test level	☒ DC 12 V : ± 2 kV Peak ☒ Signal: ± 2 kV Peak ☒ Telecommunication: ± 2 kV Peak				
Repetition frequency	5 kHz, Tr/Th = 5 / 50 ns				
Coupling time	60 s				
Testing Voltage	DC 12 V, PoE				
Test facility	Shielded room				
Date	2014. 05. 27				
Temperature(°C)	26.8 °C	Humidity (% R.H.)	30.9 % R.H.	Pressure (kPa)	100.5 kPa
Remarks	Complied - A: 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	UCS500N	V1238113636	EM TEST	2015.02.22	☒
Ultra compact simulator	UCS500M	0701-03	EM TEST	2015.06.03	☐
Capacitive Coupling Clamp	-	0001	EM TEST	2015.02.04	☒
Capacitive Coupling Clamp	HFK	P1411132494	EM TEST	2015.04.21	☐

6.5.3 Photographs of test setup

#1- DC 12V



#2- PoE



6.5.4 Measurement result

* DC Line (#1- DC 12V)

EFT coupling point	(+)	(-)	Result (Criteria)
DC 12 V	+ 2 kV	- 2 kV	A

* Signal (#1- DC 12V, #2- PoE)

EFT coupling point	(+)	(-)	Result (Criteria)
Audio In/Out	+ 2 kV	- 2 kV	A
Alarm In/Out	+ 2 kV	- 2 kV	A

* Telecommunication (#1- DC 12V, #2- PoE)

EFT coupling point	(+)	(-)	Result (Criteria)
LAN(RJ-45)	+ 2 kV	- 2 kV	A

6.6 Surge

Test specification	EN 61000-4-5:2006, Criteria: B				
Coupling	☒ DC 12 V : CDN ☒ Signal: CDN				
Test level	☒ DC 12 V : ± 1 kV ☒ Signal: ± 1 kV				
Coupling Impedance	☐ Differential mode: $18 \mu\text{F}$ ☐ Common mode: $10 \Omega + 9 \mu\text{F}$ ☒ $42 \Omega + 0.5 \mu\text{F}$ ☐ Direct				
Surge pulse shape	Tr/Th = 1.2 / 50 μs				
Number of surge	5				
Coupling time	1 min				
Testing Voltage	DC 12 V, PoE				
Test facility	Shielded room				
Date	2014. 05. 27				
Temperature(°C)	26.8 °C	Humidity (% R.H.)	30.9 % R.H.	Pressure (kPa)	100.5 kPa
Remarks	Complied -A: There was no change of operation status during above testing.				

6.6.1 Measurement procedure

A ground reference plane was located on the floor. SURGE generator was connected to reference ground plane via low impedance connection. For floor standing equipment & table top equipment, EUT was placed on a wooden table.

6.6.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Ultra compact simulator	UCS500N	V1238113636	EM TEST	2015.02.22	☒
Ultra compact simulator	UCS500M	0701-03	EM TEST	2015.06.03	☐
CDN	CNV 508 N1	V1108108861	EM TEST	2014.11.26	☒

6.6.3 Photographs of test setup

#1- DC 12V



#2- PoE



6.6.4 Measurement result

* DC Line (#1- DC 12V)

Coupling point	(+)	(-)	Result (Criteria)
DC 12 V	+ 1 kV	- 1 kV	A

* Signal (#1- DC 12V, #2- PoE)

Coupling point	(+)	(-)	Result (Criteria)
Audio In/Out	+ 1 kV	- 1 kV	A
Alarm In/Out	+ 1 kV	- 1 kV	A

6.7 Conducted Immunity

Test specification	EN 61000-4-6:2009, Criteria : A				
Tested frequency	0.15 MHz ~ 80 MHz				
Test level & Modulation	10 V, 80 % Amplitude Modulation (1 kHz)				
Frequency Step	log 1 % step				
Dwell time	3 s				
Coupling method	☒ DC 12 V : CDN(M2) ☒ Signal: Clamp ☒ Telecommunication: CDN(T8-RJ45)				
Testing Voltage	DC 12 V, PoE				
Test facility	Shielded room				
Date	2014. 05. 26				
Temperature(°C)	25.5 °C	Humidity (% R.H)	43.2 % R.H	Pressure(kPa)	100.7 kPa
Remarks	Complied -A: The manufacturer allow to appear some rolling bar phenomenon.				

6.7.1 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.

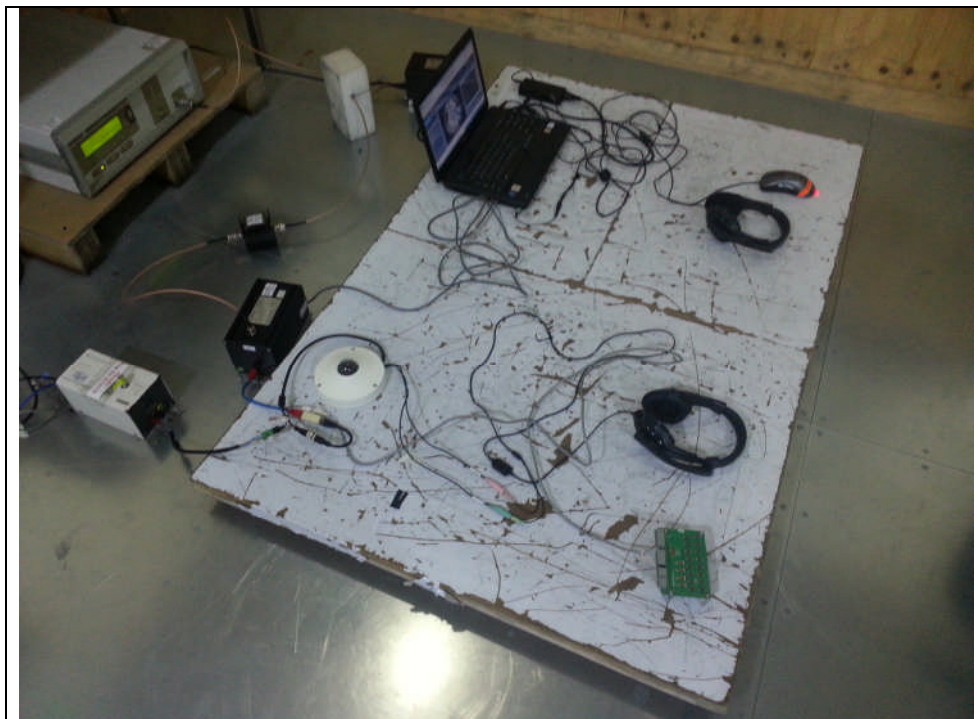
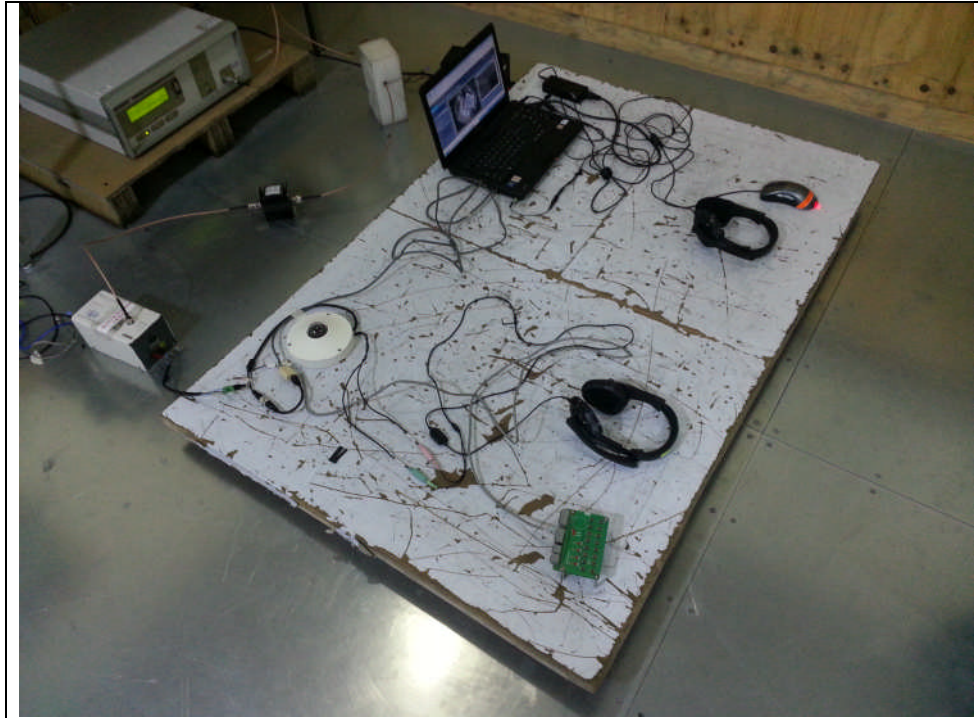
The power and all network cable, I/O cables longer than 3 m length were tested.

6.7.2 Used equipments

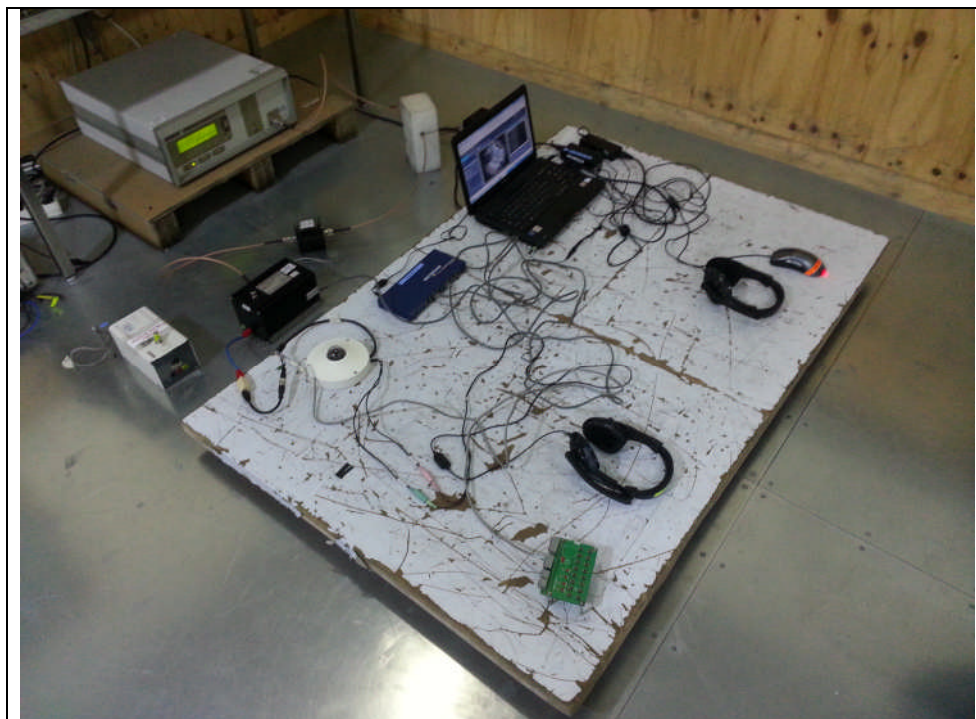
Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
CS generator	NSG 2070	1054	Schaffner	2015.03.07	☒
CDN	M016	16674	Schaffner	2015.03.07	☒
CDN	CDN M2/M3N	0111-04	EM TEST	2015.01.29	☒
Attenuator	INA2070-1	2054	Schaffner	2015.03.04	☒
EM Clamp	KEMZ 801	17643	Schaffner	2015.05.08	☒
CDN	CDN S1/75	0410-28	EM TEST	2015.04.16	☐
CDN	CDN-T8-RJ45	0113-22	EM TEST	2015.01.29	☒

6.7.3 Photographs of test setup

#1- DC 12V



#2- PoE



6.7.4 Measurement result

* DC Line (#1- DC 12V)

Coupling point	Coupling method	Result (Criteria)
DC 12 V	CDN(M2)	A

* Signal (#1- DC 12V, #2- PoE)

Coupling point	Coupling method	Result (Criteria)
Audio In/Out	Clamp	A
Alarm In/Out	Clamp	A

* Telecommunication (#1- DC 12V, #2- PoE)

Coupling point	Coupling method	Result (Criteria)
LAN(RJ-45)	CDN(T8-RJ45)	A

7. E.U.T. photographs

Front View



Rear View



Left View



Right View



Top View



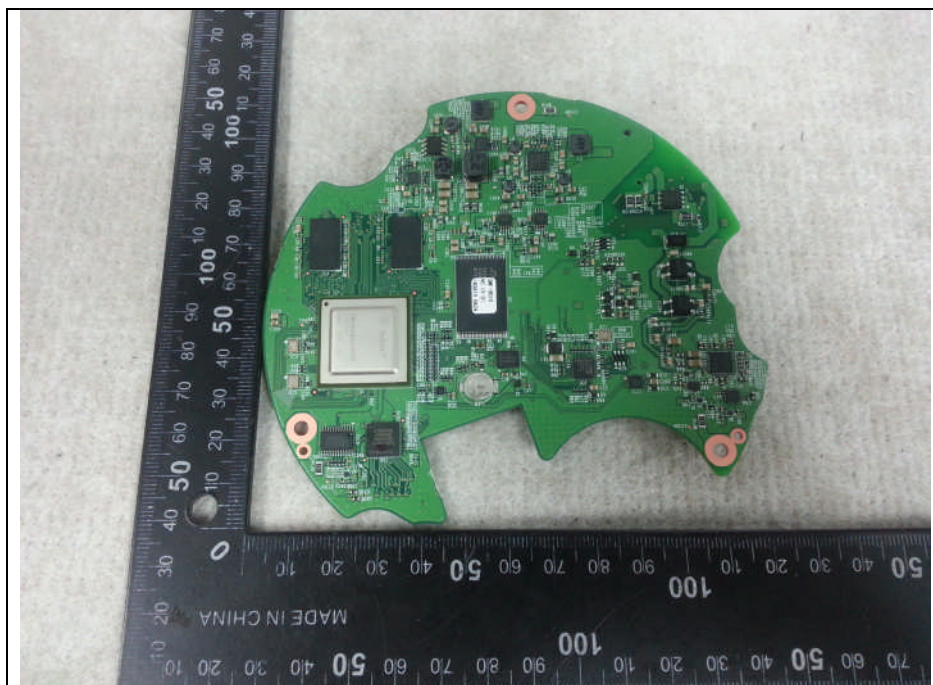
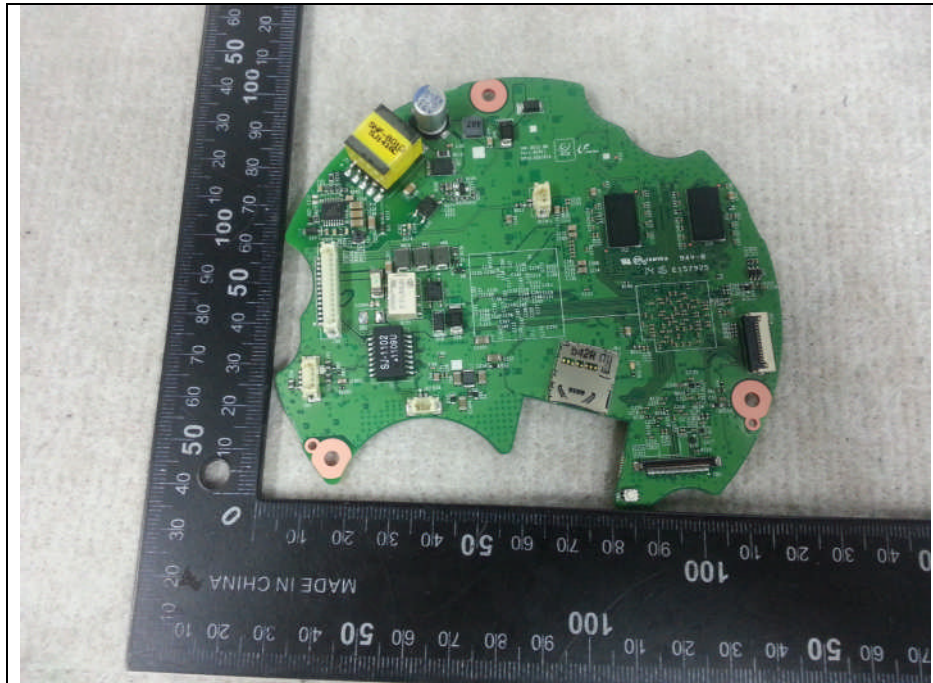
Bottom View



Inside



Main Board



Lens Board

