



EMC TEST REPORT For CE

Test Report No. : KES-E1-16T0181-R2

Date of Issue : May. 15, 2019

Product name : NETWORK CAMERA
7

Model/Type No. : PNO-9080R

Variant Model : -

Applicant : Hanwha Techwin Co., Ltd.

Applicant Address : 6, Pangyo-ro 319 Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13488, KOREA

Manufacturer : 1. Hanwha Techwin (Tianjin) Co.,Ltd.
2. HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.
3. D-TECH CO.,LTD.

Manufacturer Address : 1. No.11 Weiliu Rd, Micro-Electronic Industrial Park, TEDA, Tianjin,
300385, People's Republic of China
2. Lot O-2, Que Vo Industrial Zone extended area,
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam
3. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi-do,
Korea (Suwon Industrial Complex)

Date of Receipt : Apr. 14, 2016

Test date : Apr. 20, 2016 – Apr. 27, 2016

Test Results : ☒ In Compliance ☐ Not in Compliance

Tested by

Dae Hyun, Kim
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

This test report is not related to KOLAS.

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Apr. 28, 2016	KES-E1-16T0181	Issued
Aug. 07, 2017	KES-E1-16T0181-R1	Re-issue due to manufacturer change
May. 15, 2019	KES-E1-16T0181-R2	Re-issue due to manufacturer change

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1.0 General Product Description

Main Specifications of E.U.T are:

	PNO-9080R (DVT)
Video	
Imaging Device	1/1.7" 12.4M CMOS
Total Pixels	4,168(H) x 3,062(V)
Effective Pixels	4,072(H) x 3,046(V)
Scanning System	Progressive Scan
Min. Illumination	Color : 0.3 Lux(1/30sec, F1.6, 30IRE), 0.01 Lux(2sec, F1.6, 30IRE) 0 Lux (IR LED On)
S / N Ratio	50dB
Video Out	CVBS : 1.0 Vp-p / 75Ω composite, 704x480(N), 704x576(P), for installation - DIP connector type
Lens	
Focal Length (Zoom Ratio)	4.5 ~ 10mm (2.2x) Motorized Varifocal
Max. Aperture Ratio	F1.6
Angular Field of View	[4096 x 2160] H : 100.3° (Wide) - 45.6° (Tele) / V : 49.7° (Wide) - 24.0° (Tele) [3840 x 2160] H : 92.9° (Wide) - 42.6° (Tele) / V : 49.7° (Wide) - 24.0° (Tele)
Min. Object Distance	0.5m(1.64ft)
Focus Control	Simple Focus (Motorized V/F) / Manual - Remote control via network (Manual, Simple Focus)
Lens Type	P-Iris mode
Mount Type	Board-in type
LDC (Lens Distortion Correction)	Off/On
Operational	
IR LED	4 EA
Viewable Length	30m
Camera Title	Off / On (Displayed up to 45 characters) - W/V : English/Numeric/Special Characters - China : English/Numeric/Special/Chinese Characters - Common : Multi-line (Max 6), Color (Gray/Green/Red/Blue/Black/White), Transparency, Auto Scale by Resolution
Day & Night	Auto (ICR) / Color / B/W / External / Schedule
Backlight Compensation	Off / BLC / WDR
Wide Dynamic Range	120dB
Contrast Enhancement	SSDR (Samsung Super Dynamic Range) (Off / On)
Digital Noise Reduction	SSNR (2D+3D Noise Filter) (Off / On)
Digital Image Stabilization	-
Defog	Auto/Manual/Off
Motion Detection	Off / On (8ea, Polygonal)
Privacy Masking	Off / On (16ea , Polygonal with 4 Lines Only) - Color : Gray, Green, Red, Blue, Black, White
Gain Control	Off / Low / Middle / High
White Balance	ATW / AWC / Manual / Indoor / Outdoor (included Mercury & Sodium)
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (2 ~ 1/12,000sec)
Rotate Image	Flip : On/Off Mirror : On/Off Halfway : 90° / 270°
Intelligent Video Analytics	Tampering (Scene Change), Virtual Line, Enter/Exit, Appear / Disappear, Audio Detection, Defocus Detection, Digital Auto Tracking - with Metadata
Alarm I/O	Input 1ea / Output 1ea
Remote Control Interface	-
Alarm Triggers	Alarm Input, Motion Detection, Video Analytics, Audio Detection, Network Disconnect
Alarm events	• File upload via FTP, E-Mail • Notification via E-Mail • local storage (SD/SDHC/SDXC) or NAS recording at Event Triggers • External output
Audio In	Selectable (Mic IN/Line IN), Supply voltage: 2.5VDC(4mA), Input impedance: approx. 2K Ohm
Audio out	Line out (3.5mm stereo mini jack), Max output level: 1 Vrms



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Network	
Ethernet	RJ-45 (10/100/1000BASE-T)
Video Compression Format	H.265/H.264 (MPEG-4 Part 10/AVC) : Main/Baseline/High Motion JPEG
Resolution	4096x2160 / 3840x2160 / 2592x1944 / 2592x1464 / 1920x1080 / 1600x1200 / 1280x1024 / 1280x960 / 1280x720 / 1024x768 / 800x600 / 800x450 / 720x576 / 720x480 / 640x480 / 320x240
Max. Framerate	H.265/H.264 : 3840x2160 @ 30Fps Max. 30fps at all resolutions(8 Mega Mode under) Motion JPEG 4096 X 3000 : 2 fps 4096 X 2160 : 2 fps 3840 X 2160 : 2 fps 2592 X 1944 : 2 fps 2592 X 1464 : 2 fps 1920 X 1080 : 4 fps 1600 X 1200 : 4 fps 1280 X 1024 : 5 fps 1280 X 960 : 5 fps 1280 X 720 : 5 fps 1024 X 768 : 15 fps 800 X 600 : 15 fps 800 X 450 : 15 fps 720 X 576 : 15 fps 720 X 480 : 15 fps 640 X 480 : 15 fps 640 X 360 : 15 fps 320 X 240 : 15 fps
Smart Codec	Manual Mode (area-based : 5EA)
Video Quality Adjustment	H.264/H.265 : Target Bitrate Level Control MJPEG : Target Bitrate Level Control
Bitrate Control Method	H.264/H.265 : CBR or VBR, Motion JPEG : VBR
Streaming Capability	Multiple Streaming (Up to 10 Profiles)
Audio Compression Format	G.711 u-law / G.726 Selectable G.726 (ADPCM) 8KHz, G.711 8KHz G.726 : 16Kbps, 24Kbps, 32Kbps, 40Kbps AAC-LC : 48Kbps at 16KHz
Audio Communication	Bi-directional (2-Way)
IP	IPv4, IPv6
Protocol	TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP, RTSP, NTP, HTTP, HTTPS, SSL/TLS, 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 (EAP-TLS, EAP-LEAP)
Streaming Method	Unicast / Multicast
Max. User Access	20 users at Unicast Mode
Edge Storage	SD/SDHC/SDXC (up to 128Gb) - motion Images recorded in the SD/SDHC/SDXC memory card can be downloaded. - camera can detect automatically when the memory is connected - memory status display (normal/error/active/formatting/lock) NAS(Network Attached Storage) Local PC for Instant Recording(plug-in viewer only)
Application Programming Interface	ONVIF Profile S/G SUNAPI(HTTP API) SVNP SAMSUNG TECHWIN Open Platform
Webpage Language	English, French, German, Spanish, Italian, Chinese, Russian, Japanese, Swedish, Danish, Portuguese, Turkish, Polish, Czech, Rumanian, Serbian, Dutch, Croatia, Hungary, Greek
Web Viewer	Supported OS: Windows 7, 8, 10, Mac OS X 10.8, 10.9, 10.10, 10.11 Non-plugin Webviewer Supported Browser: Google Chrome 47, MS Edge 20 Support Codec Video : H.264, MJPEG (MAX 1M 15FPS) Audio : G.711 Plug-in Webviewer Supported Browser : MS Explore 11 : Mozilla Firefox 43 . Apple Safari 9 + Mac OS X only
Central Management Software	SmartViewer, SSM
Pixel Counter	support (plug-in viewer only)
Environmental	
Operating Temperature / Humidity	-40°C ~ +55°C (-40°F ~ +131°F) / Less than 90% RH * Start up should be done at above -35°C
Storage Temperature / Humidity	-40°C ~ +60°C (-40°F ~ +140°F) / Less than 90% RH
Ingress Protection	IP66
Vandal Resistance	IK10
Electrical	
Input Voltage / Current	24V AC, 12V DC, PoE(IEEE802.3af class3)
Power Consumption	- Heater On DC 12V : Max 11.55W PoE : Max 12.95W AC 24V : 14.08W - Heater Off DC 12V : Max 10.45W PoE : Max 11.77W AC 24V : 12.43W
Mechanical	
Color / Material	DARK GRAY / ALUMINIUM
Dimension (WxHxD)	Korea : W82.4 x H90.0 x D312.6 (with bracket) Export : W82.4 x H87.0 x D348.3 (with bracket/Backbox) Common : W82.4 x H87.0 x D178.0 (without bracket)
Weight	Korea : 1180g Export : 1420g

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1.1 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

Voltage ☐ 220 Vac ☐ 230 Vac ☐ 240 Vac ☒ PoE ☒ 12 Vdc

Frequency ☐ 50 Hz ☐ 60 Hz ☐ Hz

1.2 Variant Model Differences

Not applicable

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
NETWORK CAMERA	PNO-9080R	-	Hanwha Techwin (Tianjin) Co.,Ltd.	E.U.T

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
PoE Adapter	PD-3001GC	PD-6082G300	PowerDsine	-
Notebook	NT-R410Y	Z9YJ93CS300631H	Samsung Electronics co., Ltd.	-
Notebook Adapter	AD-6019	-	LI SHIN INTERNATIONAL ENTERPRISE CORP.	-
Speaker	BR10000A CUVE	SN128458795701	BEIJING EDIFIER HI-TECH GROUP.	-
Microphone	CMK-303	-	CAMAC	-
Alarm Jig	-	-	-	-
Mobile Phone	SHV-E210L	R33D713KA3F	Samsung Electronics co., Ltd.	-

1.6 External I/O Cabling

- DC 12 V Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA (E.U.T)	RJ-45	Notebook	RJ-45	3.0	U
	Audio In	MicroPhone	Audio Out	1.3	U
	Audio Out	Speaker	Audio In	1.4	U
	Alarm	Alarm Jig	Alarm	3.0	U
Notebook	3.5 mm	Mobile Phone	3.5 mm	0.4	U

- PoE Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA (E.U.T)	RJ-45(PoE)	PoE Adapter	RJ-45(PoE)	3.0	U
PoE Adapter	RJ-45(LAN)	Notebook	RJ-45(LAN)	0.3	U
NETWORK CAMERA (E.U.T)	Audio In	MicroPhone	Audio Out	1.3	U
	Audio Out	Speaker	Audio In	1.4	U
	Alarm	Alarm Jig	Alarm	3.0	U
Notebook	3.5 mm	Mobile Phone	3.5 mm	0.4	U

* Unshielded=U, Shielded=S

1.7 E.U.T Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

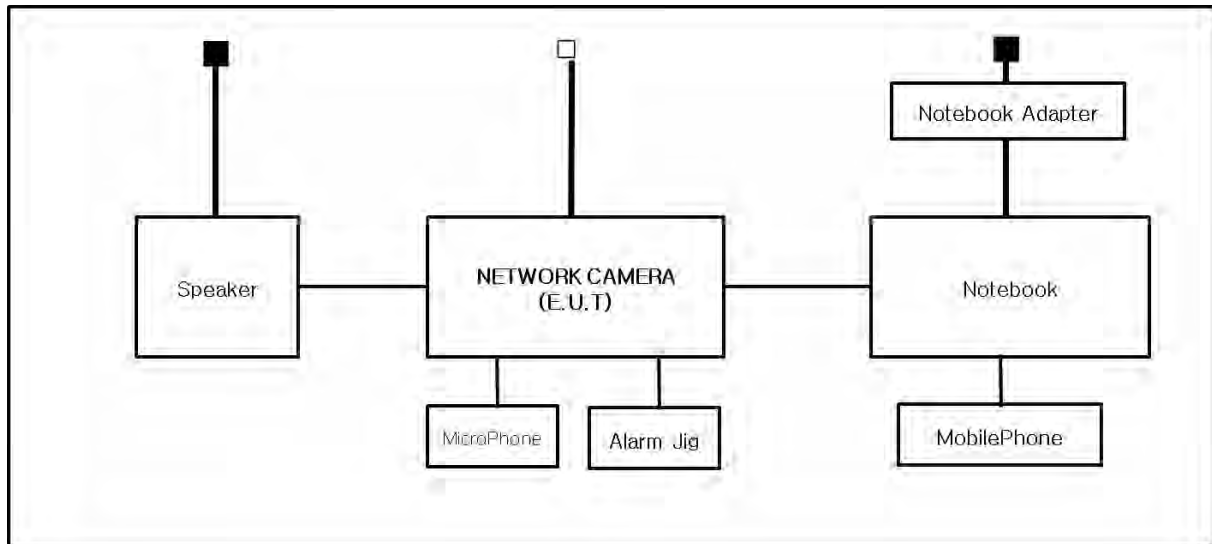
Test mode	Normal operating
OP	MONITORING Network ping test

- Input power condition during the measurements was 12 V (dc) , PoE

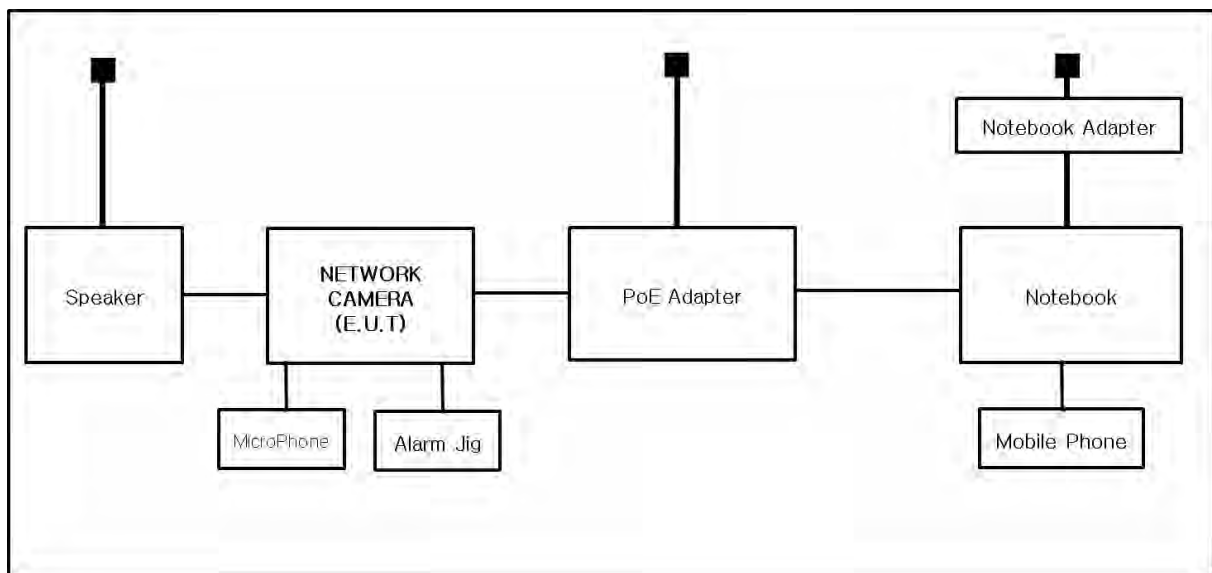
1.8 Configuration

■ AC Main
 □ DC Main

- DC 12 V Mode



- PoE Mode



1.9 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less.

1.10 Test Facility

The measurement facility is located at 473-21 Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4:2014 and CISPR 16-1-4:2012

1.11 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Anechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
International	KOLAS	EMI (3 m & 10 m Semi-Anechoic Chamber , and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KT489
USA	FCC	3 m & 10 m Semi-Anechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Anechoic Chamber and Conducted test site	 23298-1
JAPAN	VCCI	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	 R-4308, C-4798, T-2311, G-914
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Anechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 17 07 01633 001



2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ EMC – Directive 2014 / 30 / EU

☐ EN 61000-6-3:2011

☐ EN 61000-6-1:2007

☐ EN 61000-6-4:2007 +A1:2011

☐ EN 61000-6-2:2005

☐ EN 55011:2007 +A1:2010

☐ Group 1
☐ Class A

☐ Group 2
☐ Class B

☐ EN 55014-1:2006 +A2:2011

☐ EN 55014-2:1997 +A2:2008

☐ EN 55015:2013

☒ EN 55032:2012/AC:2013

☒ Class A

☐ Class B

☐ EN 55024:2010

☒ EN 50130-4:2011 +A1:2014

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013

☐ VCCI V-3 / 2013.04

☐ Class A

☐ Class B

☐ AS / NZS CISPR22:2009 +A1:2010

☐ Class A

☐ Class B

☐ 47 CFR Part 15, Subpart B / ANSI C63.4-2009

☐ Class A

☐ Class B

☐ IC Regulation ICES-003 : 2012
/ ANSI C63.4-2014

☐ Class A

☐ Class B

☐ CISPR 22:2009 +A1:2010

☐ Class A

☐ Class B



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☐ R&TTE – Directive 1999 / 5 / EC

☐ EN 301 489-1 V1.9.2

- ☐ Equipment for fixed use
- ☐ Equipment for vehicular use
- ☐ Equipment for portable use

☐ EN 301 489-3 V1.6.1

☐ EN 301 489-17 V2.2.1

☐ EN 60945:2002

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2.1 Conducted Emissions at Mains Power Ports

Test Date

N/A

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☐	EMI Test Receiver	ESR3	R&S	101783	05, 06, 2016
☐	LISN	ENV216	R&S	101137	02, 04, 2017
☐	LISN	ENV216	R&S	101786	05, 06, 2016
☐	Electro wave Shieldroom	-	SEMITEC	-	-

Test Conditions

Temperature: °C

Relative Humidity: %

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☐ PASS
☐ NOT PASS
☒ NOT APPLICABLE

Remarks

Because the E.U.T power is 12 V (dc) power and PoE, limits are not specified

2.2 Conducted Emissions at Telecommunication Ports

Test Date
Apr. 26, 2016

Test Location
Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test Receiver	ESR3	R&S	101783	05, 06, 2016
☒	LISN	ENV216	R&S	101137	02, 04, 2017
☒	LISN	ENV216	R&S	101786	05, 06, 2016
☒	8-Wire ISN CAT3	CAT3 8158	Schwarzbeck Mess	8158-0019	04, 01, 2017
☒	8-Wire ISN CAT5	CAT5 8158	Schwarzbeck Mess	8158-0030	04, 01, 2017
☒	8-Wire ISN CAT6	NTFM 8158	Schwarzbeck Mess	8158-0029	08, 14, 2016
☒	Electro wave Shieldroom	-	SEMITEC	-	-

Test Conditions

Temperature: 24.7 °C
Relative Humidity: 36.6 %

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Apr. 25, 2016

Test Location

☐ Open Area Test Site #1

☒ Open Area Test Site #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test Receiver	ESR3	R&S	101781	05, 06, 2016
☒	Trilog-Broadband Antenna	VULB 9163	SCHWARZBECK	9168-713	05, 15, 2017
☒	Open Area Test Site	-	KES	-	-
☒	Antenna Mast	-	DAEIL EMC	-	-
☒	Turn Table	-	DAEIL EMC	-	-

Test Conditions

Temperature: 23.6 °C

Relative Humidity: 28.0 %

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

☒ PASS

☐ NOT PASS

☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Apr. 27, 2016

Test Location

Semi Anchoic Chamber #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test Receiver	ESU26	R&S	100551	04, 18, 2017
☒	Broadband Coaxial Preamplifier	BBV 9718	Schwarzbeck Mess - Elektronik	9718-246	10, 23, 2016
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 07, 2017
☒	Semi Anchoic Chamber #2	-	SEMITEC	-	-
☒	Antenna Mast	-	AUDIX	-	-
☒	Turn Table	-	AUDIX	-	-

Test Conditions

Temperature: 22.5 °C

Relative Humidity: 33.0 %

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.5 Harmonic Current Emissions

Test Date

N/A

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☐	AC Source	ACS 500 N	EM TEST	V1024106760	08, 13, 2016
☐	Digital Power Analyzer	DPA 500 N	EM TEST	V1024106759	08, 13, 2016

Test Conditions

Temperature: °C

Relative Humidity: %

Classification of Equipment for Harmonic Current Emissions

- ☐ Class A
- ☐ Class B
- ☐ Class C(Below 25 W)
- ☐ Class C(Above 25 W)
- ☐ Class D

Test Results

The requirements are:

- ☐ PASS
- ☐ NOT PASS
- ☒ NOT APPLICABLE

Remarks

Because the E.U.T power is less than 75 W, limits are not specified.



2.6 Voltage Fluctuations and Flicker

Test Date

N/A

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☐	AC Source	ACS 500 N	EM test	V1024106760	08, 13, 2016
☐	Digital Power Analyzer	DPA 500 N	EM test	V1024106759	08, 13, 2016

Test Conditions

Temperature:

°C

Relative Humidity:

%

Test Results

The requirements are:

☐ PASS

☐ NOT PASS

☒ NOT APPLICABLE

Remarks

Because the E.U.T power is 12 V (dc) power and PoE.

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

EN 50130-4:2011 +A1:2014 Alarm systems-Part 4: Electromagnetic compatibility Product family standard: Immunity requirements for components of fire, intruder and social alarm systems

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 that is no residual change in the EUT or any change in outputs, 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 a change.

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 oeuvres 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 in 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.

3.1 Electrostatic Discharge

Reference Standard
EN 61000-4-2:2009

Test Date
Apr. 22, 2016

Test Location
EMS-ESD: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS05X4620	02, 24, 2017
☒	HCP	-	Noise Ken	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: 22,0 °C
Relative Humidity: 44,2 %
Atmospheric Pressure: 99,1 kPa

Test Specifications

Discharge Factor: ≥ 1 s

Discharge Impedance: 330 ohm / 150 pF

Kind of Discharge: Air, Contact (direct and indirect)

Polarity: Positive and Negative

Number of Discharge: 10 at all locations for Air discharge
10 at all locations for Contact discharge

Discharge Voltage:	Contact ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	Air ☒ 2 kV ☒ 4 kV ☐ 6 kV ☒ 8 kV ☐ 15 kV	HCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	VCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV
--------------------	---	---	---	---

Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

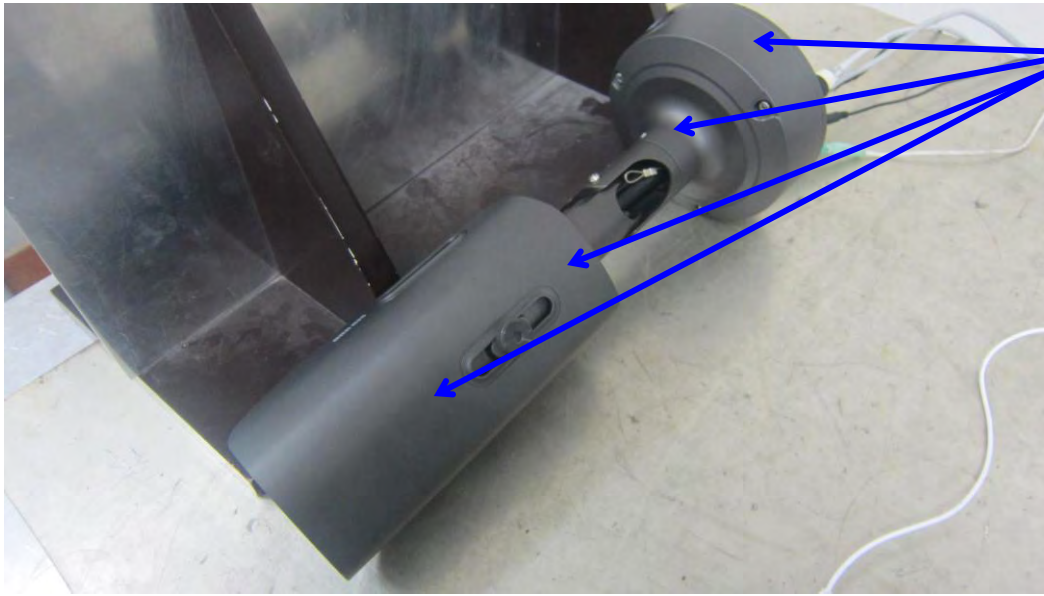
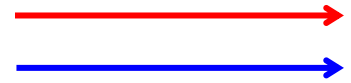
Required Performance Criteria: ☒ Complied

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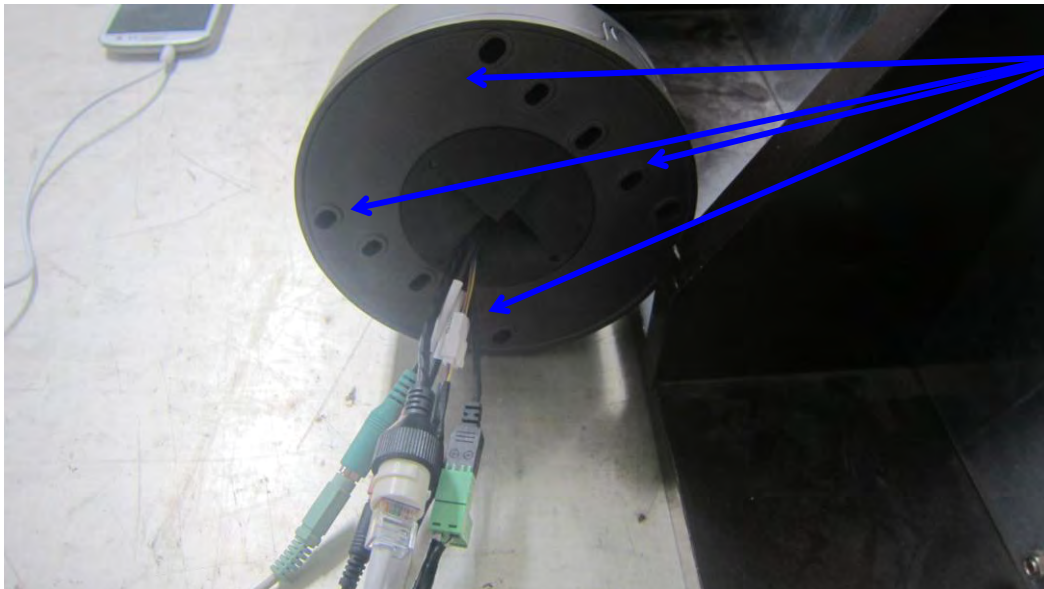
Location of Discharge:

- DC 12V Mode

Air
Contact



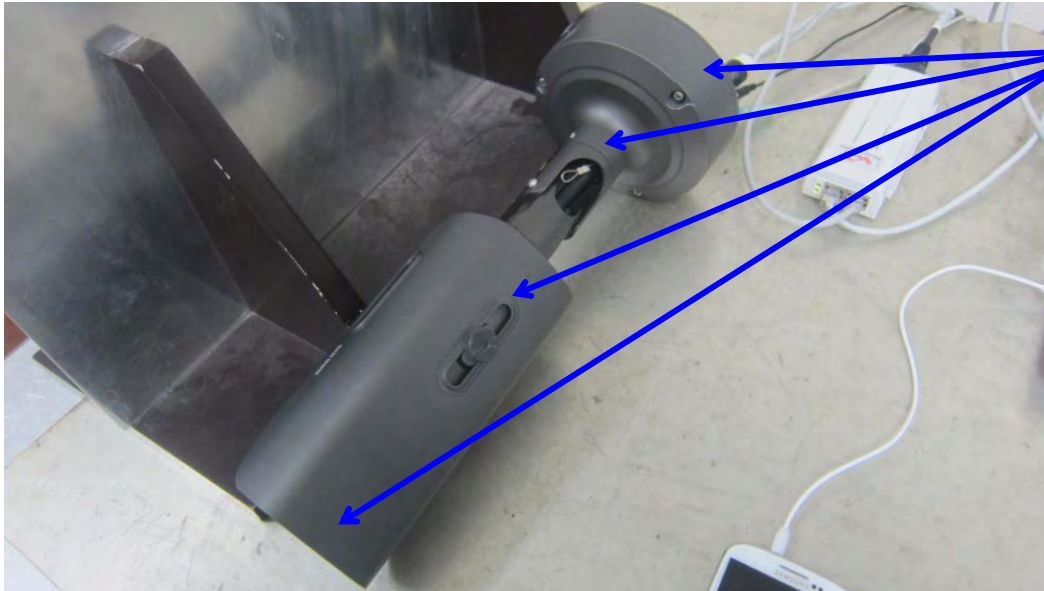
1. Contact



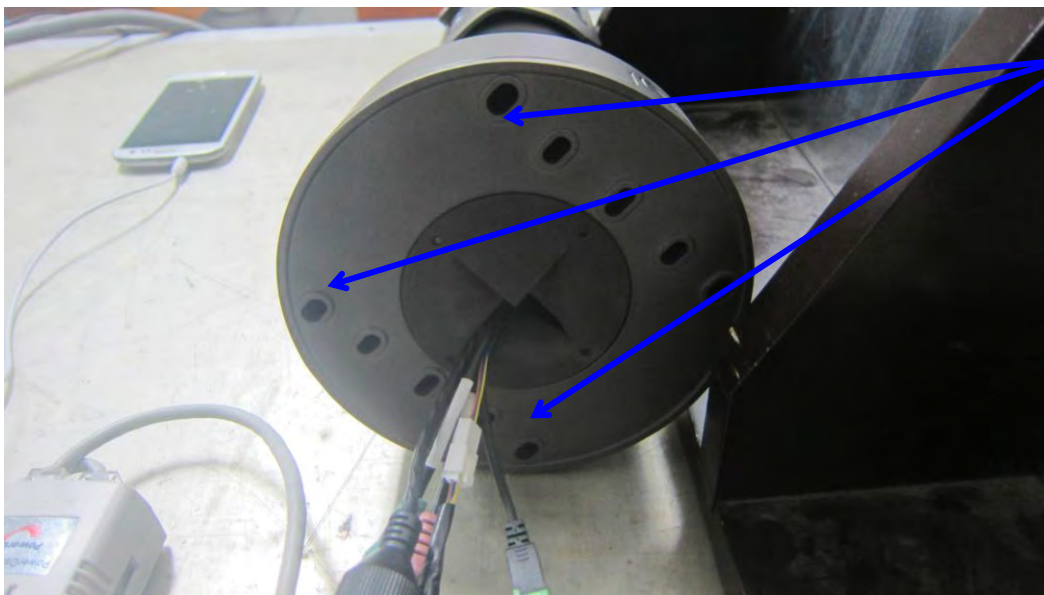
2. Contact

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- PoE Mode



1. Contact



2. Contact

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Test Data**- DC 12V Mode****Indirect Discharge**

No.	Test Point	Discharge Method	Performance	Remarks
			Observation	
1	HCP Contact	Contact Discharge	Complied	-
2	VCP Contact	Contact Discharge	Complied	-

Direct Discharge

No.	Test Point	Discharge Method	Performance	Remarks
			Observation	
1	Enclosure side	Contact Discharge	Complied	-
2	Enclosure the back side	Contact Discharge	Complied	-

- PoE Mode**Indirect Discharge**

No.	Test Point	Discharge Method	Performance	Remarks
			Observation	
1	HCP Contact	Contact Discharge	Complied	-
2	VCP Contact	Contact Discharge	Complied	-

Direct Discharge

No.	Test Point	Discharge Method	Performance	Remarks
			Observation	
1	Enclosure side	Contact Discharge	Complied	-
2	Enclosure the back side	Contact Discharge	Complied	-

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

- ☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.



3.2 Radiated Electric Field Immunity

Reference Standard

EN 61000-4-3:2006 +A2:2010

Test Date

Apr. 26, 2016

Test Location

EMS-RS: ☐ Semi Anchoic Chamber #1

☒ Semi Anchoic Chamber #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	SIGNAL GENERATOR	SMB 100A	R&S	108252	08, 13, 2016
☒	BROADBAND AMPLIFIER	BBA100	R&S	101239	08, 13, 2016
☒	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 13, 2016
☒	POWER METER	NRP2	R&S	103475	08, 13, 2016
☒	AVG POWER SENSOR	NRP-Z91	R&S	102526	08, 13, 2016
☒	AVG POWER SENSOR	NRP-Z91	R&S	102527	08, 13, 2016
☒	Stacked Log.-Per.Antenna	STLP 9128 D	Schwarzbeck	9128D038	-
☒	DIRECTIONAL COUPLER	KYDC-D1070-DX40	(주)광역텔레콤	KY150001	09, 25, 2016
☒	Semi Anchoic Chamber #2		SEMITEC	-	-

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Test Conditions

Temperature: 24,7 °C
Relative Humidity: 36,6 %
Atmospheric Pressure: 100,0 kPa

Test Specifications

Antenna Polarization: Horizontal & vertical unless indicated otherwise

Antenna Distance: ☒ 3 m

Field Strength: ☐ 1 V/m ☐ 3 V/m
☒ 10 V/m

Frequency Range: ☐ 80 MHz to 1 GHz ☐ 1,4 GHz to 2,7 GHz
☒ 80 MHz to 2,7 GHz

Modulation: ☒ AM, 80 %, 1 kHz sine wave
☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step: ☒ 1 % stepDwell Time: ☒ 1 s ☐ 3 s# of Sides Radiated: ☒ 4Required Performance Criteria: ☒ Complied**Test Data**

- DC 12V Mode

Side Exposed	Observation	
	Horizontal	Vertical
Front	Complied	Complied
Right	Complied	Complied
Back	Complied	Complied
Left	Complied	Complied

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- PoE Mode

Side Exposed	Observation	
	Horizontal	Vertical
Front	Complied	Complied
Right	Complied	Complied
Back	Complied	Complied
Left	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

- ☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.

3.3 Electrical Fast Transients / Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Apr. 05, 2016

Test Location

EMS-EFT: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Ultra Compact Simulator	UCS 500 N5	EM TEST	V0936105120	07, 14, 2016
☒	Capacitive Coupling Clamp	HFK	EM TEST	070925	07, 14, 2016
☒	MotorVariac	MV2616	EM TEST	V0936105123	07, 14, 2016

Test Conditions

Temperature: 22,8 °C
Relative Humidity: 37,3 %
Atmospheric Pressure: 100,2 kPa

Test Specifications

Pulse Amplitude & Polarity: (Power Lines)	☒ ± 1.0 kV ☐ ± 4.0 kV	☐ ± 2.0 kV
Pulse Amplitude & Polarity: (Signal Lines)	☐ ± 0.5 kV ☐ ± 2.0 kV	☒ ± 1.0 kV
Burst Period:	☒ 300 ms	☐ 2 s
Repetition Rate:	☐ 5 kHz	☒ 100 kHz
Duration of Test Voltage:	☒ ≥ 1 min	
Required Performance Criteria:	☒ Complied	



Test Data

- DC 12V Mode

☐ Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	OBSERVATIONS	
	(+) Burst (kV)	(-) Burst (kV)
-	-	-

☒ Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	OBSERVATIONS	
	(+) Burst (kV)	(-) Burst (kV)
L – N	Complied	Complied

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	OBSERVATIONS	
	(+) Burst (kV)	(-) Burst (kV)
RJ-45	Complied	Complied
Alarm	Complied	Complied

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- PoE Mode☐ Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	OBSERVATIONS	
	(+) Burst (kV)	(-) Burst (kV)
-	-	-

☐ Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	OBSERVATIONS	
	(+) Burst (kV)	(-) Burst (kV)
-	-	-

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	OBSERVATIONS	
	(+) Burst (kV)	(-) Burst (kV)
RJ-45(PoE)	Complied	Complied
Alarm	Complied	Complied

Note: "Blank" = Not performed

Observations:

A – No degradation of function

B – Distortion/Error of function (self-recoverable)

C – Loss of function

Test Results☒ PASS Required Performance Criteria☐ NOT PASS Required Performance Criteria**Remarks**

PASS Required Performance Criteria.

3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

Test Date

Apr. 20, 2016

Test Location

EMS-Surge: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Ultra Compact Simulator	UCS 500 N5	EM TEST	V0936105120	07, 14, 2016
☒	MotorVariac	MV2616	EM TEST	V0936105123	07, 14, 2016
☒	CDN	CNV 508T5	EM TEST	P1530162238	01, 25, 2017

Test Conditions

Temperature: 22,8 °C
Relative Humidity: 37,3 %
Atmospheric Pressure: 100,2 kPa

Test Specifications

Power Lines

Source Impedance: 12 ohm for common mode and 2 ohm for differential mode

Surge Amplitude :

Common Mode

☐ (0,5 / 1,0 / 2,0) kV

Differential Mode

☐ (0,5 / 1,0) kV

Signal lines

☐ (0,5 / 1,0) kV

Number of Surges:

☐ 5 surges per angle

Angle:

☐ 0°, 90°, 180°, 270° (input a.c. power port)

Polarity:

☐ Positive & Negative

Repetition Rate:

☐ 1 surge per min ☐ 1 surge per 30 sec.

Required Performance Criteria: ☐ Complied

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Signal Lines

Source Impedance:

42 ohm for common mode

Surge Amplitude:

Common Mode☒ (0,5 / 1,0) kV

Number of Surges:

☒ 5 Surges

Polarity:

☒ Positive & Negative

Repetition Rate:

☐ 1 surge per min☒ 1 surge per 30 sec.Required Performance Criteria: ☒ Complied**Test Data****- DC 12V Mode**☐ Line to Line – Differential Mode

Mode of Application	OBSERVATIONS	
	(+) Surge (kV)	(-) Surge (kV)
-	-	-

☐ Line to Earth – Common Mode

Mode of Application	OBSERVATIONS	
	(+) Surge (kV)	(-) Surge (kV)
-	-	-

Signal Lines☒ Line to Earth – Common Mode

Mode of Application	OBSERVATIONS	
	(+) Surge (kV)	(-) Surge (kV)
RJ-45	Complied	Complied
Alarm	Complied	Complied

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- PoE Mode☐ Line to Line – Differential Mode

Mode of Application	OBSERVATIONS	
	(+) Surge (kV)	(-) Surge (kV)
-	-	-

☐ Line to Earth – Common Mode

Mode of Application	OBSERVATIONS	
	(+) Surge (kV)	(-) Surge (kV)
-	-	-

Signal Lines☒ Line to Earth – Common Mode

Mode of Application	OBSERVATIONS	
	(+) Surge (kV)	(-) Surge (kV)
RJ-45(PoE)	Complied	Complied
Alarm	Complied	Complied

Note: "Blank" = Not performed

Observations:

A – No degradation of function

B – Distortion/Error of function (self-recoverable)

C – Loss of function

Test Results☒ PASS Required Performance Criteria☐ NOT PASS Required Performance Criteria**Remarks**

PASS Required Performance Criteria.

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3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2009

Test Date

Apr. 07, 2016

Test Location

EMS-CS: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Continuous Wave Generator	CWS 500N1	EM TEST	V0936105119	09, 25, 2016
☒	6dB Attenuator	ATT6	EM TEST	1208-34	08, 13, 2016
☒	CDN	CDN-M2/M3N	EM TEST	0909-06	08, 13, 2016
☐	CDN	CDN-T2-RJ11	EM TEST	0909-07	08, 13, 2016
☐	CDN	CDN-T4	EM TEST	0909-08	08, 13, 2016
☐	CDN	CDN-T8RJ45	EM TEST	0909-09	08, 13, 2016
☐	CDN	CDN-AF2	EM TEST	0909-10	08, 13, 2016
☐	CDN	CDN-AF4	EM TEST	0909-11	08, 13, 2016
☒	EM Injection Clamp	EM 101	Liithi	35943	02, 04, 2017

Test Conditions

Temperature: 21,4 °C

Relative Humidity: 57,1 %

Atmospheric Pressure: 98,9 kPa



Test Specifications

Frequency range:

☒ 150 kHz to 100 MHz
☐ 150 kHz to 230 MHz

☐ 10 kHz to 30 MHz
☐ 10 kHz to 100 MHz

Voltage Level:

☐ 1 Vrms
☒ 10 Vrms

☐ 3 Vrms

Modulation:

☒ AM, 80 %, 1 kHz sine wave
☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step:

☒ 1 % step

Dwell Time:

☒ 1 s ☐ 3 s

Required Performance Criteria: ☒ Complied

Test Data

- DC 12V Mode

☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observation
-	CDN (☐ M2, ☐ M3)	-

☒ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observation
L - N	CDN (☒ M2, ☐ M3)	Complied

☒ Signal ports and telecommunication ports

Mode of Application	OBSERVATIONS	
	(+) Surge (kV)	(-) Surge (kV)
RJ-45	Complied	Complied
Alarm	Complied	Complied

- PoE Mode

☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observation
-	CDN (☐ M2, ☐ M3)	-

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observation
-	CDN (☐ M2, ☐ M3)	-

☒ Signal ports and telecommunication ports

Mode of Application	OBSERVATIONS	
	(+) Surge (kV)	(-) Surge (kV)
RJ-45(PoE)	Complied	Complied
Alarm	Complied	Complied

Notes: CDN = Coupling Decoupling Network
EMC = Electro Magnetic Clamp
"blank" = Not performed

Observations:

A – No degradation of function
B – Distortion/Error of function (self-recoverable)
C – Loss of function

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.



3.6 Voltage Dips and Short Interruptions

Reference Standard
EN 61000-4-6:2009

Test Date
N/A

Test Location
EMS-Voltage dip: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☐	Ultra Compact Simulator	UCS 500 N5	EM TEST	V0936105120	07, 14, 2016
☐	MotorVariac	MV2616	EM TEST	V0936105123	07, 14, 2016

Test Conditions

Temperature: °C
Relative Humidity: %
Atmospheric Pressure: kPa



Test Specifications & Observations/Remarks

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
☐ 20 % dip	☐ 250 /10	_____
☐ 30 % dip	☐ 25 /10	_____
☐ 60 % dip	☐ 10 /10	_____
☐ 100 % dip	☐ 250 /10	_____

- Voltage variations

☐ Unom + 10 %	☐ 253 V (ac)	_____
☐ Unom - 15 %	☐ 195.5 V (ac)	_____

Observations:

- A – No response observed from E.U.T
- B – Unit shuts down then automatically restarts when full voltage is restored.
- C – Unit shuts down then manually restarts when full voltage is restored or Loss of function.

Test Results

- ☐ PASS Required Performance Criteria
- ☐ NOT PASS Required Performance Criteria
- ☒ NOT APPLICABLE

Remarks

Because the E.U.T power is 12 V (dc) power and PoE.



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APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

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[NEUTRAL]

N/A

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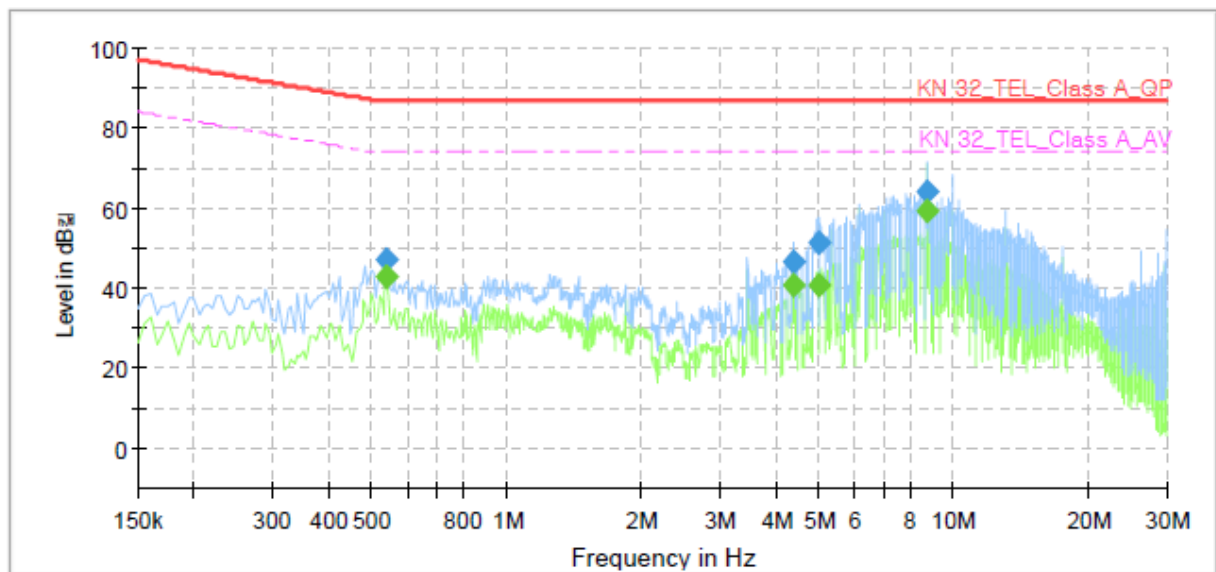
Conducted Emissions at Telecommunication Ports

- DC 12V Mode

[10 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	PNO-9080RP
Mode	# DC 12 V 10 Mbps
Operator Name:	KES



Final Result

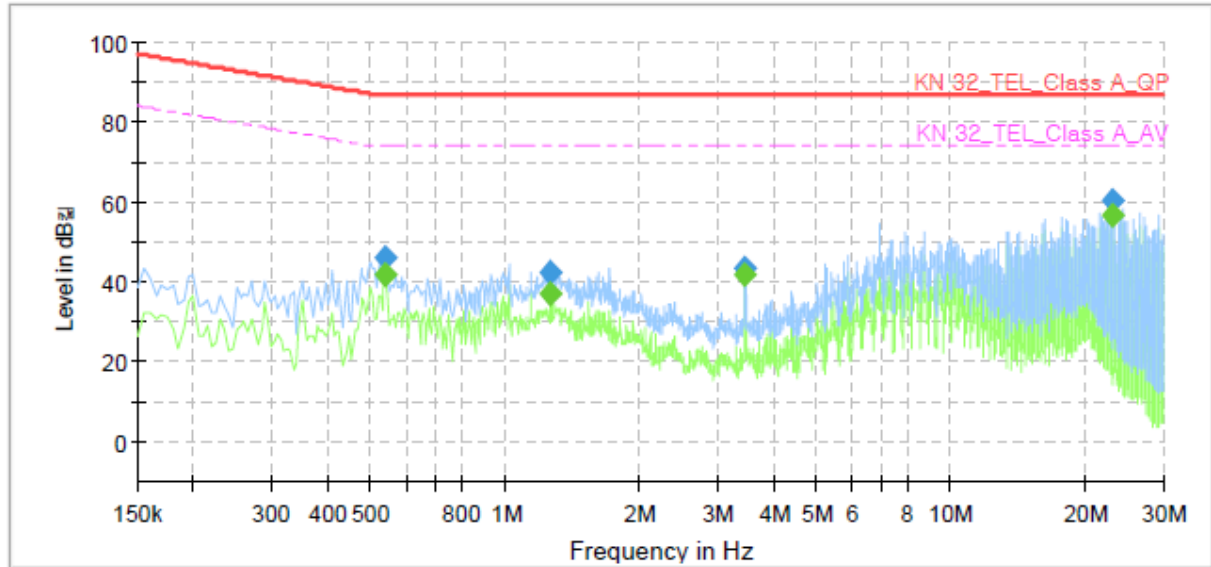
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.540000	---	43.05	74.00	30.95	1000.0	9.000	Single Line	9.9
0.540000	46.97	---	87.00	40.03	1000.0	9.000	Single Line	9.9
4.400000	---	40.99	74.00	33.01	1000.0	9.000	Single Line	9.8
4.400000	46.50	---	87.00	40.50	1000.0	9.000	Single Line	9.8
4.975000	---	40.53	74.00	33.47	1000.0	9.000	Single Line	9.9
4.975000	51.37	---	87.00	35.63	1000.0	9.000	Single Line	9.9
8.750000	---	59.31	74.00	14.69	1000.0	9.000	Single Line	10.0
8.750000	64.30	---	87.00	22.70	1000.0	9.000	Single Line	10.0

[100 Mbps]

Common Information

Test Description:
Model No.:
Mode
Operator Name:

Telecommunication Emission
PNO-9080RP
DC 12 V 100 Mbps
KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.540000	---	41.66	74.00	32.34	1000.0	9.000	Single Line	9.5
0.540000	45.82	---	87.00	41.18	1000.0	9.000	Single Line	9.5
1.265000	---	37.25	74.00	36.75	1000.0	9.000	Single Line	9.3
1.265000	42.48	---	87.00	44.52	1000.0	9.000	Single Line	9.3
3.460000	---	41.61	74.00	32.39	1000.0	9.000	Single Line	9.3
3.460000	43.46	---	87.00	43.54	1000.0	9.000	Single Line	9.3
23.130000	---	56.66	74.00	17.34	1000.0	9.000	Single Line	9.5
23.130000	60.14	---	87.00	26.86	1000.0	9.000	Single Line	9.5



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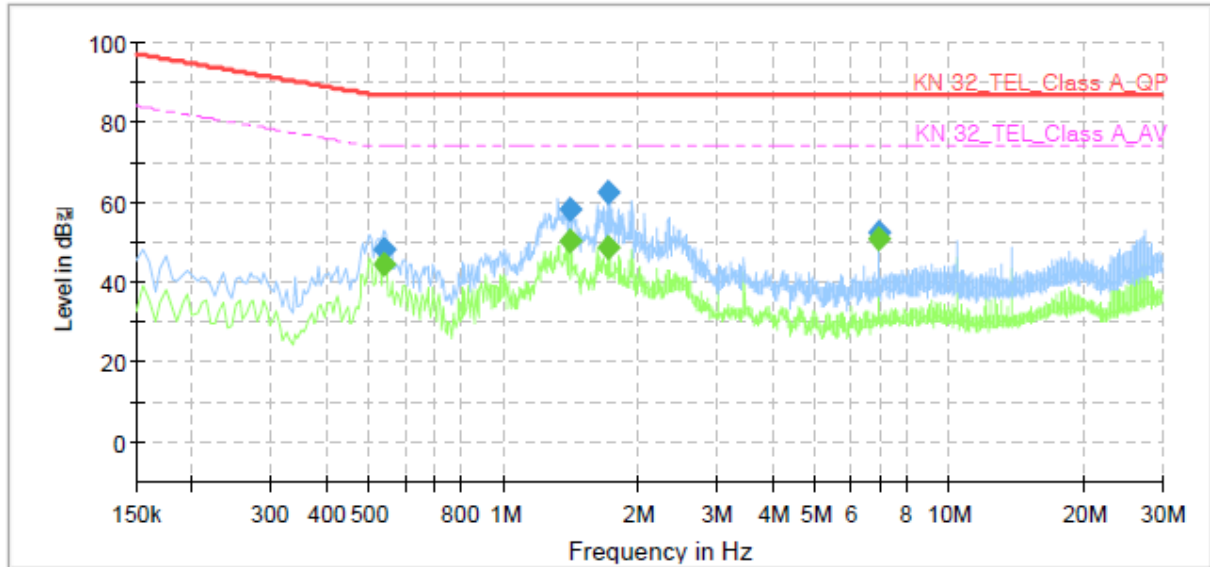
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[1 000 Mbps]

Common Information

Test Description:
Model No.:
Mode
Operator Name:

Telecommunication Emission
PNO-9080RP
DC 12 V 1 000 Mbps
KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.540000	---	44.69	74.00	29.31	1000.0	9.000	Single Line	9.3
0.540000	48.34	---	87.00	38.66	1000.0	9.000	Single Line	9.3
1.405000	---	50.13	74.00	23.87	1000.0	9.000	Single Line	9.2
1.405000	58.35	---	87.00	28.65	1000.0	9.000	Single Line	9.2
1.715000	---	48.94	74.00	25.06	1000.0	9.000	Single Line	9.2
1.715000	62.49	---	87.00	24.51	1000.0	9.000	Single Line	9.2
6.925000	---	50.65	74.00	23.35	1000.0	9.000	Single Line	9.3
6.925000	52.50	---	87.00	34.50	1000.0	9.000	Single Line	9.3

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Test report No.:

KES-E1-16T0181-R2

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- PoE Mode

[10 Mbps]

Common Information

Test Description:

Model No.:

Mode

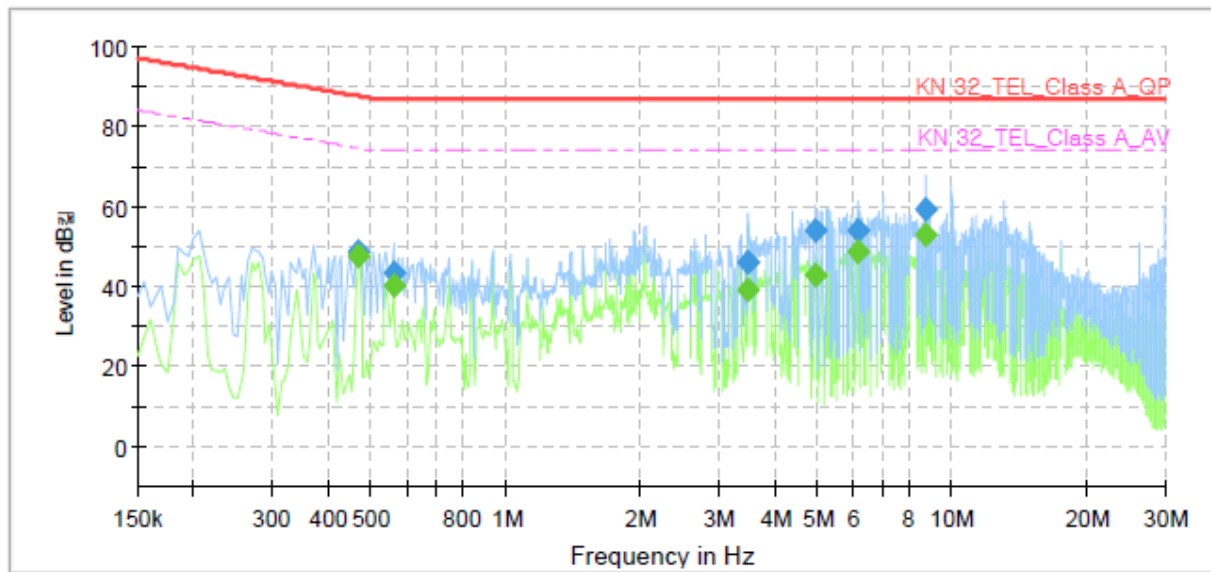
Operator Name:

Telecommunication Emission

PNO-9080RP

PoE 10 Mbps

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.465000	---	47.81	74.60	26.79	1000.0	9.000	Single Line	10.0
0.465000	48.76	---	87.60	38.84	1000.0	9.000	Single Line	10.0
0.560000	---	40.12	74.00	33.88	1000.0	9.000	Single Line	9.9
0.560000	43.17	---	87.00	43.83	1000.0	9.000	Single Line	9.9
3.505000	---	39.29	74.00	34.71	1000.0	9.000	Single Line	9.8
3.505000	46.28	---	87.00	40.72	1000.0	9.000	Single Line	9.8
4.970000	---	42.90	74.00	31.10	1000.0	9.000	Single Line	9.9
4.970000	53.88	---	87.00	33.12	1000.0	9.000	Single Line	9.9
6.140000	---	48.52	74.00	25.48	1000.0	9.000	Single Line	9.9
6.140000	53.88	---	87.00	33.12	1000.0	9.000	Single Line	9.9
8.750000	---	53.19	74.00	20.81	1000.0	9.000	Single Line	10.0
8.750000	59.39	---	87.00	27.61	1000.0	9.000	Single Line	10.0

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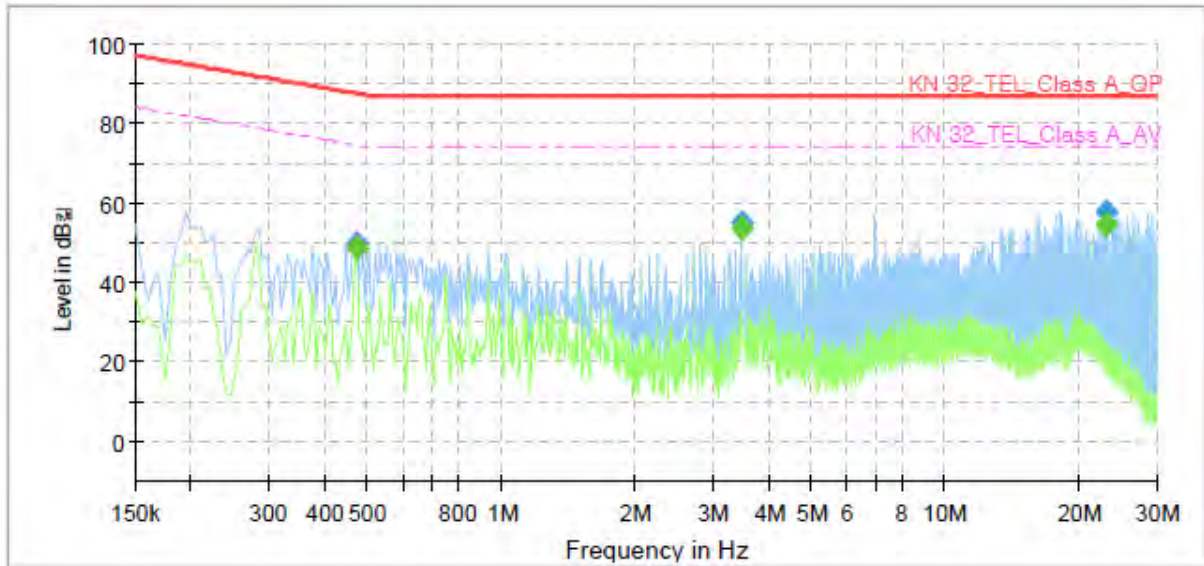
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[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	PNO-9080RP
Mode	# PoE 100 Mbps
Operator Name:	KES



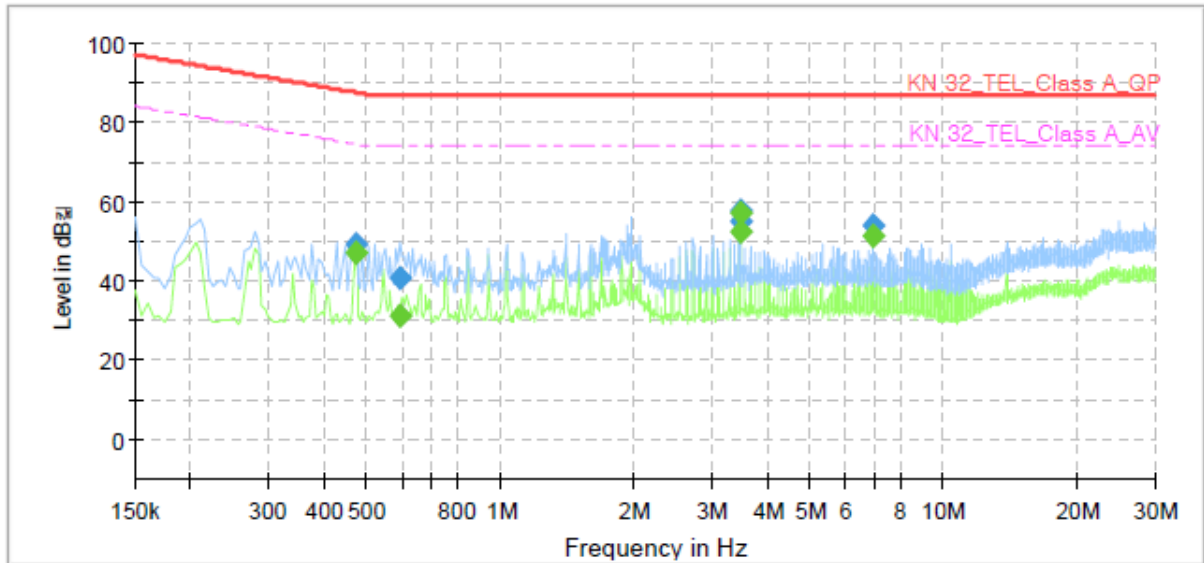
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.470000	—	48.44	74.51	26.07	1000.0	9.000	Single Line	9.5
0.470000	49.96	—	87.51	37.55	1000.0	9.000	Single Line	9.5
3.485000	—	53.24	74.00	20.76	1000.0	9.000	Single Line	9.3
3.485000	55.24	—	87.00	31.76	1000.0	9.000	Single Line	9.3
23.130000	—	54.47	74.00	19.53	1000.0	9.000	Single Line	9.5
23.130000	57.88	—	87.00	29.12	1000.0	9.000	Single Line	9.5

[1 000 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	PNO-9080RP
Mode	# PoE 1 000 Mbps
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.470000	---	47.24	74.51	27.27	1000.0	9.000	Single Line	9.4
0.470000	49.19	---	87.51	38.32	1000.0	9.000	Single Line	9.4
0.595000	---	31.40	74.00	42.60	1000.0	9.000	Single Line	9.3
0.595000	40.54	---	87.00	46.46	1000.0	9.000	Single Line	9.3
3.470000	---	57.32	74.00	16.68	1000.0	9.000	Single Line	9.2
3.470000	57.69	---	87.00	29.31	1000.0	9.000	Single Line	9.2
3.475000	---	52.59	74.00	21.41	1000.0	9.000	Single Line	9.2
3.475000	54.95	---	87.00	32.05	1000.0	9.000	Single Line	9.2
6.945000	---	51.51	74.00	22.49	1000.0	9.000	Single Line	9.3
6.945000	54.00	---	87.00	33.00	1000.0	9.000	Single Line	9.3

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**Radiated Electric Field Emissions(Below 1 GHz)****- DC 12V Mode**

Frequency	Amplitude	ANT	ANT. Height	Correction Factor		Corrected Amplitude	Applicable Limit	Margin
[MHz]	[dB μ V]	Polar. (H/V)	[m]	ANT. [dB/m]	Cable [dB]	[dB μ V/m]	[dB μ V/m]	[dB]
155.02	11.02	V	1.00	8.38	2.80	22.20	40.00	17.80
216.18	10.58	H	4.00	11.66	3.44	25.68	40.00	14.32
221.96	8.50	H	4.00	11.79	3.50	23.79	40.00	16.21
360.54	10.29	H	3.90	14.78	4.74	29.81	47.00	17.19
451.02	12.94	V	1.00	16.41	5.40	34.75	47.00	12.25
503.99	12.03	V	1.70	17.19	5.77	34.99	47.00	12.01

* H : Horizontal, V : Vertical

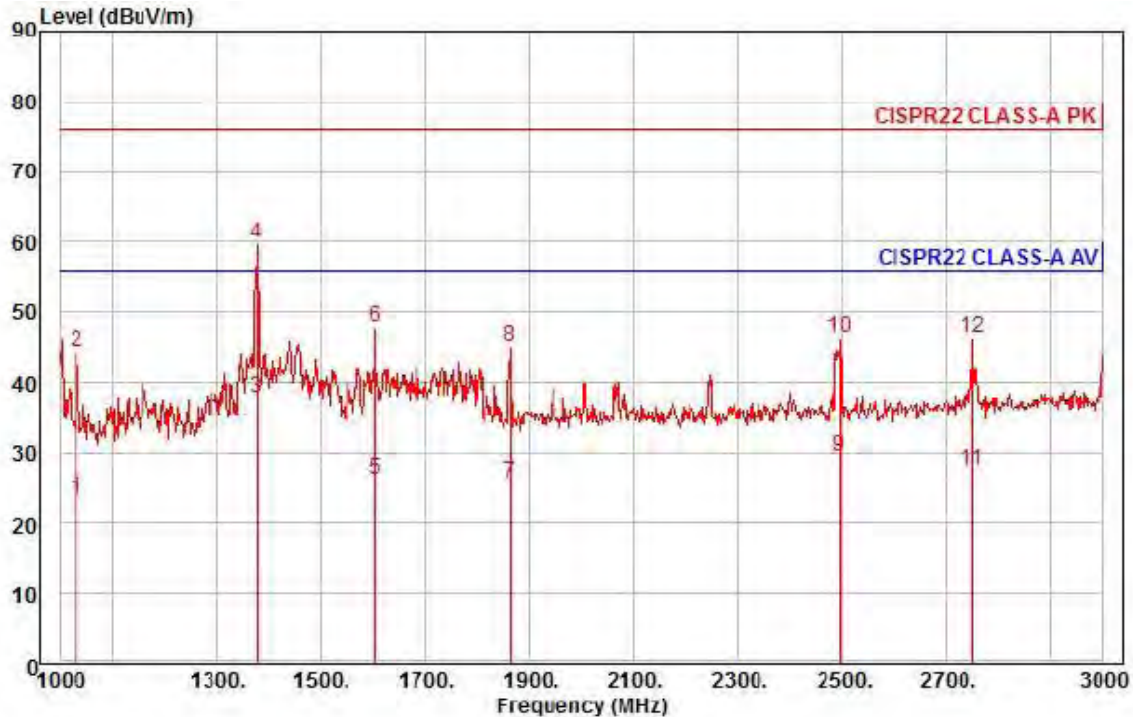
- PoE Mode

Frequency	Amplitude	ANT	ANT. Height	Correction Factor		Corrected Amplitude	Applicable Limit	Margin
[MHz]	[dB μ V]	Polar. (H/V)	[m]	ANT. [dB/m]	Cable [dB]	[dB μ V/m]	[dB μ V/m]	[dB]
56.02	14.42	V	1.00	13.19	1.55	29.16	40.00	10.84
63.75	16.95	V	1.00	11.56	1.67	30.18	40.00	9.82
70.58	18.04	V	1.10	9.53	1.77	29.34	40.00	10.66
152.06	14.80	H	4.00	8.27	2.78	25.85	40.00	14.15
215.99	15.87	H	3.90	11.65	3.44	30.96	40.00	9.04
222.01	10.97	H	4.00	11.79	3.50	26.26	40.00	13.74
503.96	12.14	V	1.70	17.19	5.77	35.10	47.00	11.90

* H : Horizontal, V : Vertical

Radiated Electric Field Emissions(Above 1 GHz)

- DC 12V Mode



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project : NETWORK CAMERA
Model : PNO-9080RP
Mode : # DC 12 V
Memo : 1 ~ 3 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1030.00	33.00	24.03	6.60	40.11	200	56.00	-32.48	horizontal	Average
2	1030.00	53.97	24.03	6.60	40.11	200	76.00	-31.51	horizontal	Peak
3 av	1376.00	44.65	25.40	7.60	39.94	197	56.00	-18.29	horizontal	Average
4 pp	1376.00	66.88	25.40	7.60	39.94	197	76.00	-16.06	horizontal	Peak
5	1604.00	31.58	26.31	8.26	39.82	4	56.00	-29.67	horizontal	Average
6	1604.00	53.01	26.31	8.26	39.82	4	76.00	-28.24	horizontal	Peak
7	1864.00	29.09	27.34	8.98	39.70	88	56.00	-30.29	horizontal	Average
8	1864.00	48.38	27.34	8.98	39.70	88	76.00	-31.00	horizontal	Peak
9	2496.00	30.03	29.10	10.11	39.92	154	56.00	-26.68	horizontal	Average
10	2496.00	47.00	29.10	10.11	39.92	154	76.00	-29.71	horizontal	Peak
11	2750.00	27.15	29.72	10.63	40.06	191	56.00	-28.56	horizontal	Average
12	2750.00	46.02	29.72	10.63	40.06	191	76.00	-29.69	horizontal	Peak

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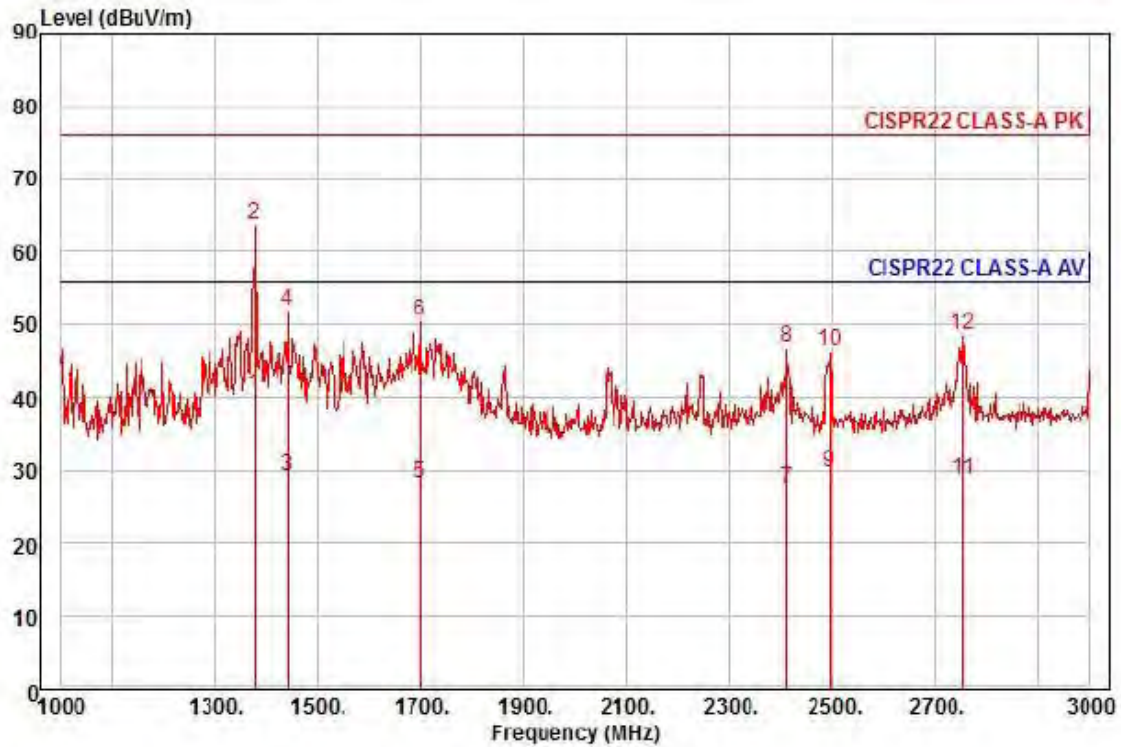
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Test report No.:

KES-E1-16T0181-R2

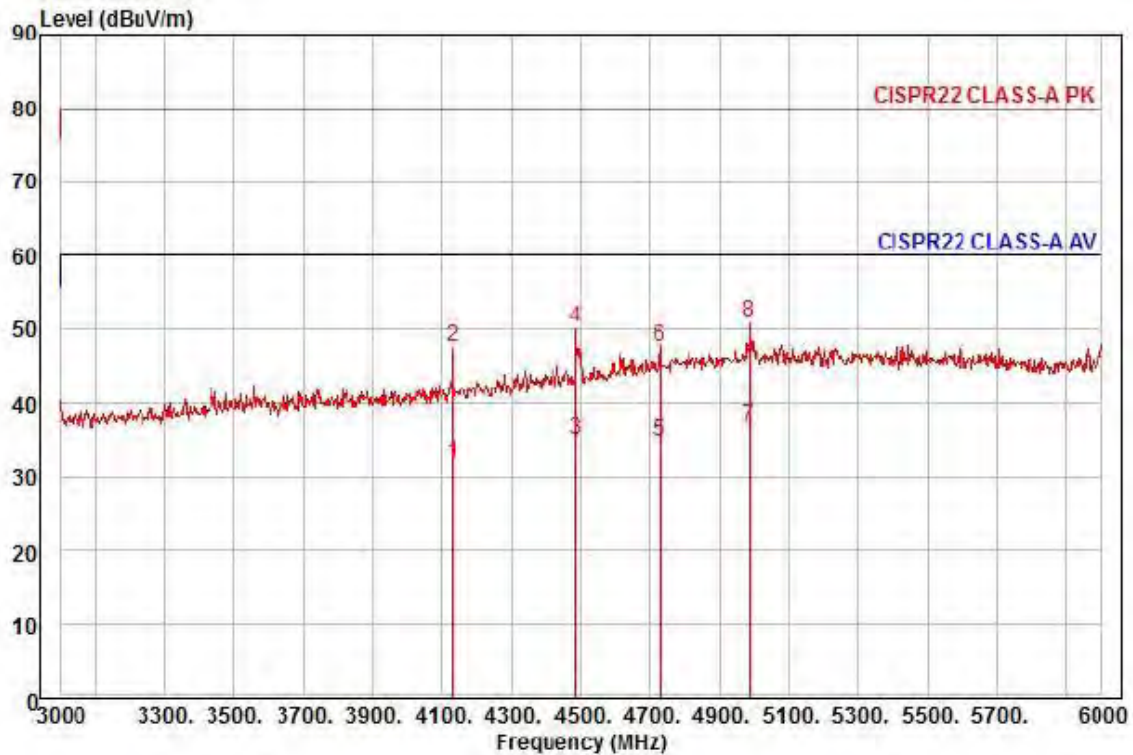
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Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project : NETWORK CAMERA
Model : PNO-9080RP
Mode : # DC 12 V
Memo : 1 ~ 3 GHz

		Read Freq	Ant Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
		MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	av	1376.00	47.39	25.40	7.60	39.94	290	56.00	-15.55	vertical	Average
2	pp	1376.00	70.64	25.40	7.60	39.94	290	76.00	-12.30	vertical	Peak
3		1442.00	35.62	25.66	7.79	39.90	262	56.00	-26.83	vertical	Average
4		1442.00	58.49	25.66	7.79	39.90	262	76.00	-23.96	vertical	Peak
5		1700.00	32.88	26.69	8.52	39.78	3	56.00	-27.69	vertical	Average
6		1700.00	55.12	26.69	8.52	39.78	3	76.00	-25.45	vertical	Peak
7		2412.00	28.52	28.89	9.98	39.87	117	56.00	-28.48	vertical	Average
8		2412.00	47.80	28.89	9.98	39.87	117	76.00	-29.20	vertical	Peak
9		2496.00	30.39	29.10	10.11	39.92	195	56.00	-26.32	vertical	Average
10		2496.00	47.05	29.10	10.11	39.92	195	76.00	-29.66	vertical	Peak
11		2756.00	28.32	29.73	10.64	40.07	273	56.00	-27.38	vertical	Average
12		2756.00	48.22	29.73	10.64	40.07	273	76.00	-27.48	vertical	Peak

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Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project : NETWORK CAMERA
Model : PNO-9080RP
Mode : # DC 12 V
Memo : 3 ~ 6 GHz

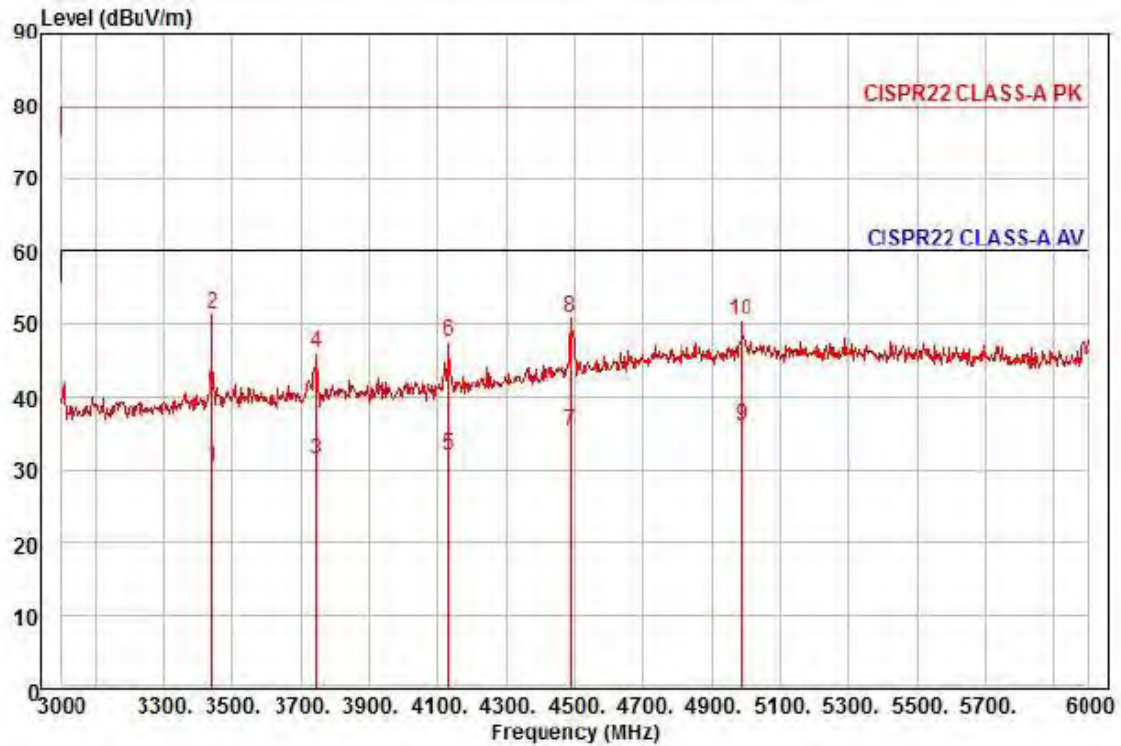
		Read	Ant	Cable	Preamp	TPos	Limit	Over		
	Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	4131.00	25.85	32.76	13.75	40.41	210	60.00	-28.05	horizontal	Average
2	4131.00	41.39	32.76	13.75	40.41	210	80.00	-32.51	horizontal	Peak
3	4485.00	26.32	34.78	14.40	40.41	347	60.00	-24.91	horizontal	Average
4	4485.00	41.45	34.78	14.40	40.41	347	80.00	-29.78	horizontal	Peak
5	4728.00	24.20	36.17	14.84	40.41	36	60.00	-25.20	horizontal	Average
6	4728.00	37.01	36.17	14.84	40.41	36	80.00	-32.39	horizontal	Peak
7 pp	4983.00	24.20	37.62	15.30	40.41	360	60.00	-23.29	horizontal	Average
8 pk	4983.00	38.56	37.62	15.30	40.41	360	80.00	-28.93	horizontal	Peak



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Test report No.:
KES-E1-16T0181-R2
Page (50) of (81)



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project : NETWORK CAMERA
Model : PNO-9080RP
Mode : # DC 12 V
Memo : 3 ~ 6 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamplifier Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3441.00	27.25	31.07	12.36	40.30	339	60.00	-29.62	vertical	Average
2 pk	3441.00	48.26	31.07	12.36	40.30	339	80.00	-28.61	vertical	Peak
3	3744.00	27.17	31.58	13.00	40.36	295	60.00	-28.61	vertical	Average
4	3744.00	41.99	31.58	13.00	40.36	295	80.00	-33.79	vertical	Peak
5	4131.00	26.01	32.76	13.75	40.41	115	60.00	-27.89	vertical	Average
6	4131.00	41.43	32.76	13.75	40.41	115	80.00	-32.47	vertical	Peak
7	4488.00	26.48	34.80	14.41	40.41	39	60.00	-24.72	vertical	Average
8	4488.00	42.16	34.80	14.41	40.41	39	80.00	-29.04	vertical	Peak
9 pp	4986.00	23.56	37.64	15.30	40.41	185	60.00	-23.91	vertical	Average
10	4986.00	38.03	37.64	15.30	40.41	185	80.00	-29.44	vertical	Peak

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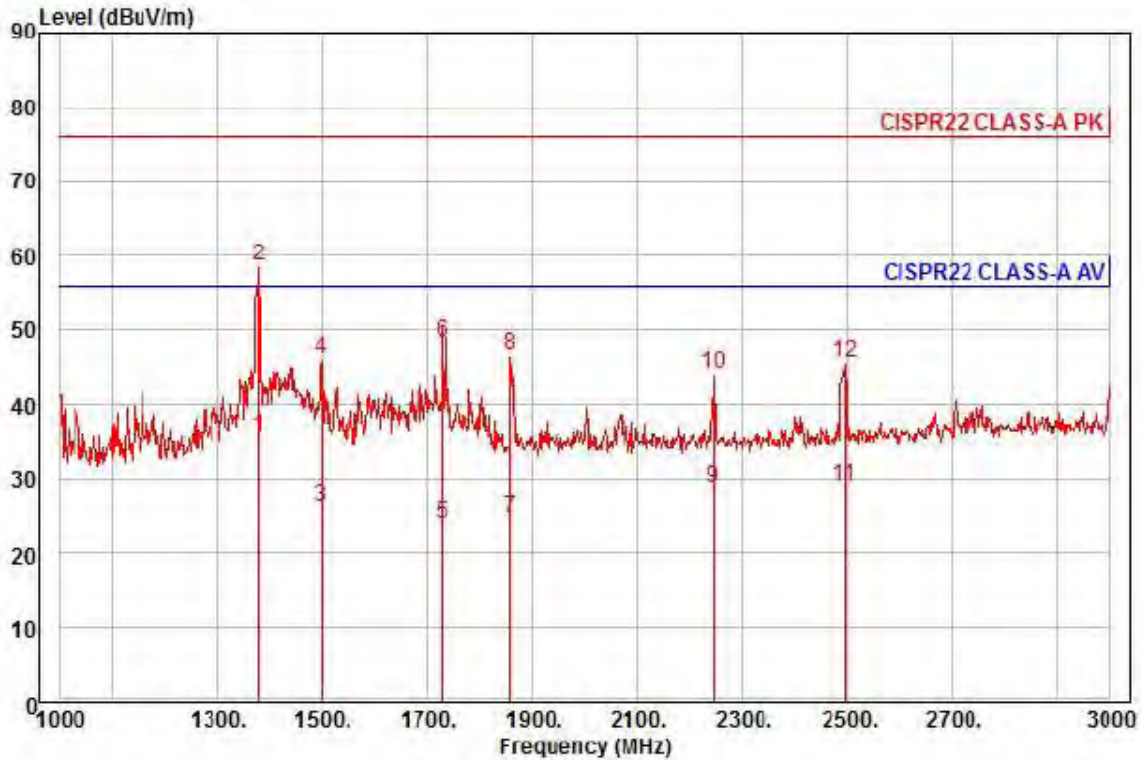


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Test report No.:
KES-E1-16T0181-R2
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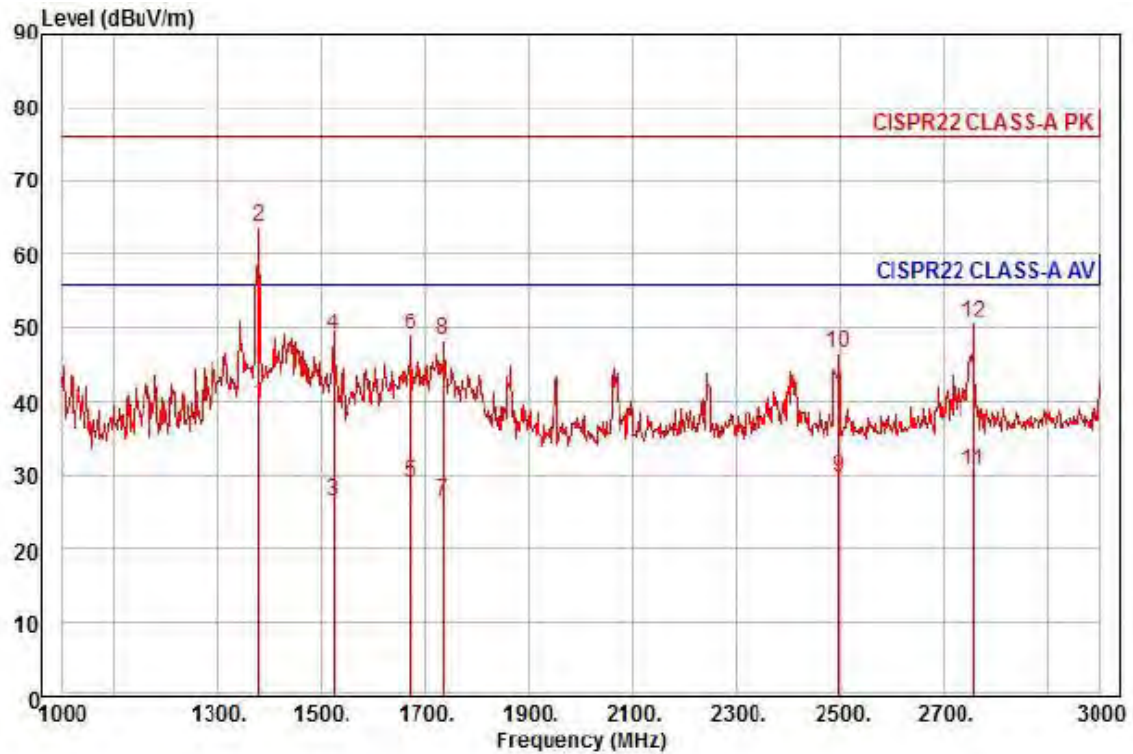
- PoE Mode



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project : NETWORK CAMERA
Model : PNO-9080RP
Mode : # PoE
Memo : 1 ~ 3 GHz

		Read	Ant	Cable	Preamp	TPos	Limit	Over		
	Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	av	1378.00	42.39	25.41	7.61	39.93	228	56.00	-20.52	horizontal Average
2	pp	1378.00	65.42	25.41	7.61	39.93	228	76.00	-17.49	horizontal Peak
3		1498.00	32.26	25.89	7.95	39.88	231	56.00	-29.78	horizontal Average
4		1498.00	52.11	25.89	7.95	39.88	231	76.00	-29.93	horizontal Peak
5		1730.00	28.41	26.81	8.61	39.76	297	56.00	-31.93	horizontal Average
6		1730.00	52.76	26.81	8.61	39.76	297	76.00	-27.58	horizontal Peak
7		1858.00	28.18	27.32	8.96	39.70	197	56.00	-31.24	horizontal Average
8		1858.00	49.90	27.32	8.96	39.70	197	76.00	-29.52	horizontal Peak
9		2246.00	30.24	28.48	9.73	39.77	11	56.00	-27.32	horizontal Average
10		2246.00	45.77	28.48	9.73	39.77	11	76.00	-31.79	horizontal Peak
11		2496.00	29.56	29.10	10.11	39.92	223	56.00	-27.15	horizontal Average
12		2496.00	46.31	29.10	10.11	39.92	223	76.00	-30.40	horizontal Peak

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Site : chamber

Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) vertical

: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto

Project : NETWORK CAMERA

Model : PNO-9080RP

Mode : # PoE

Memo : 1 ~ 3 GHz

		Read	Ant	Cable	Preamp	TPos	Limit	Over			
	Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark	
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB			
1	av	1378.00	46.67	25.41	7.61	39.93	288	56.00	-16.24	vertical	Average
2	pp	1378.00	70.70	25.41	7.61	39.93	288	76.00	-12.21	vertical	Peak
3		1522.00	32.29	25.98	8.02	39.86	152	56.00	-29.57	vertical	Average
4		1522.00	55.02	25.98	8.02	39.86	152	76.00	-26.84	vertical	Peak
5		1670.00	33.70	26.57	8.44	39.79	293	56.00	-27.08	vertical	Average
6		1670.00	53.74	26.57	8.44	39.79	293	76.00	-27.04	vertical	Peak
7		1734.00	30.91	26.82	8.62	39.76	142	56.00	-29.41	vertical	Average
8		1734.00	52.65	26.82	8.62	39.76	142	76.00	-27.67	vertical	Peak
9		2498.00	30.37	29.10	10.11	39.92	190	56.00	-26.34	vertical	Average
10		2498.00	47.21	29.10	10.11	39.92	190	76.00	-29.50	vertical	Peak
11		2758.00	30.45	29.74	10.65	40.07	127	56.00	-25.23	vertical	Average
12		2758.00	50.47	29.74	10.65	40.07	127	76.00	-25.21	vertical	Peak

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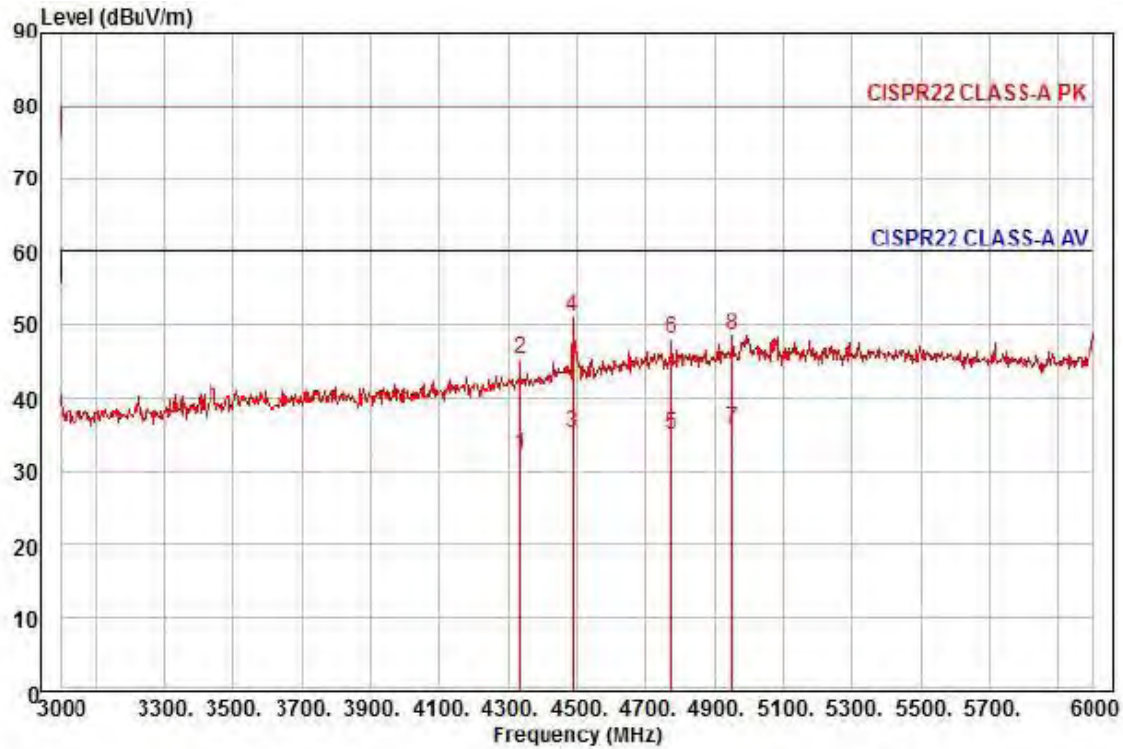
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Test report No.:

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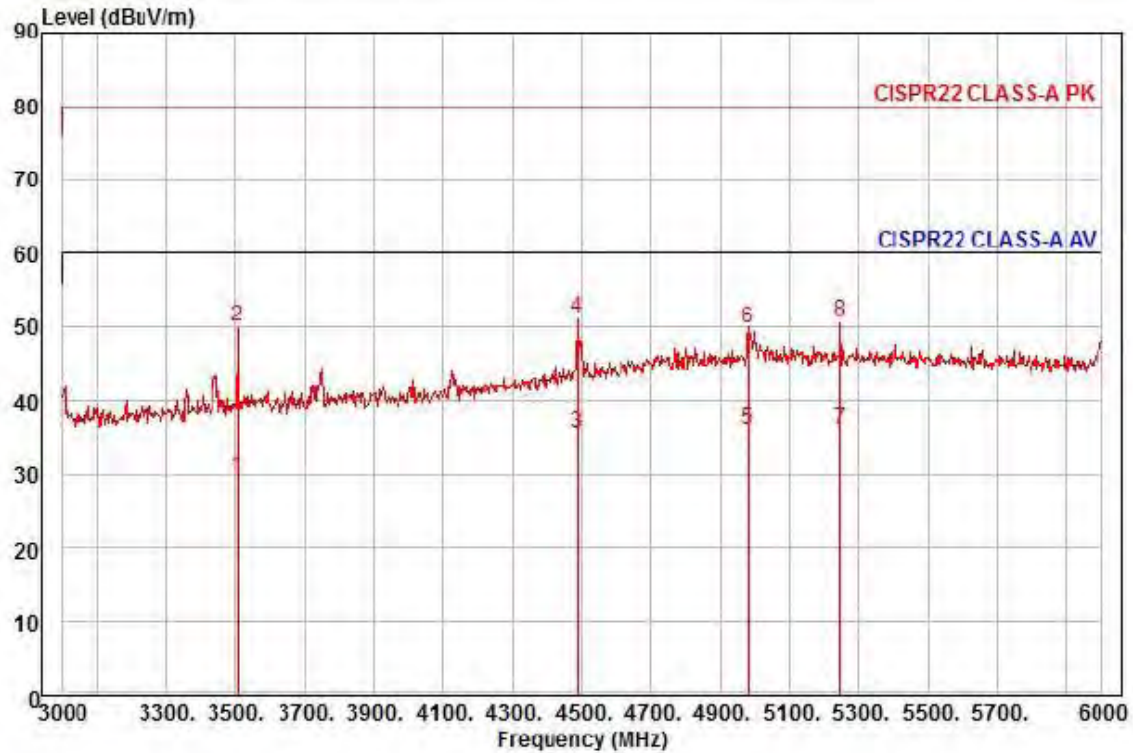
Page (53) of (81)



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project : NETWORK CAMERA
Model : PNO-9080RP
Mode : # PoE
Memo : 3 ~ 6 GHz

		Read	Ant	Cable	Preamp	TPos	Limit	Over		
	Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	4335.00	24.71	33.92	14.13	40.41	77	60.00	-27.65	horizontal	Average
2	4335.00	37.66	33.92	14.13	40.41	77	80.00	-34.70	horizontal	Peak
3	4488.00	26.55	34.80	14.41	40.41	345	60.00	-24.65	horizontal	Average
4 pk	4488.00	42.56	34.80	14.41	40.41	345	80.00	-28.64	horizontal	Peak
5	4773.00	24.10	36.42	14.92	40.41	120	60.00	-24.97	horizontal	Average
6	4773.00	37.19	36.42	14.92	40.41	120	80.00	-31.88	horizontal	Peak
7 pp	4950.00	23.47	37.43	15.24	40.41	255	60.00	-24.27	horizontal	Average
8	4950.00	36.27	37.43	15.24	40.41	255	80.00	-31.47	horizontal	Peak

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Site : chamber

Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) vertical

: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto

Project : NETWORK CAMERA

Model : PNO-9080RP

Mode : # PoE

Memo : 3 ~ 6 GHz

	Read	Ant	Cable	Preamp	TPos	Limit	Over		
Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3507.00	25.99	31.18	12.52	40.31	146	60.00	-30.62	vertical
2	3507.00	46.59	31.18	12.52	40.31	146	80.00	-30.02	vertical
3	4488.00	26.85	34.80	14.41	40.41	276	60.00	-24.35	vertical
4 pk	4488.00	42.50	34.80	14.41	40.41	276	80.00	-28.70	vertical
5	4980.00	23.64	37.61	15.29	40.41	113	60.00	-23.87	vertical
6	4980.00	37.35	37.61	15.29	40.41	113	80.00	-30.16	vertical
7 pp	5247.00	23.70	37.22	15.62	40.38	283	60.00	-23.84	vertical
8	5247.00	38.18	37.22	15.62	40.38	283	80.00	-29.36	vertical

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Harmonic Current Emissions and Voltage Fluctuations and Flicker

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	N/A			
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
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19				
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33				
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36				
37				
38				
39				
40				

**KES Co., Ltd.**

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Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	N/A			
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
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26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

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Test Data - Voltage Fluctuations

Maximum Flicker results

	EUT values	Limit	Result
Pst	N/A		
Plt			
dc [%]			
dmax [%]			
Tmax [s]			



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Test report No.:
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Test Setup Photos and Configuration

Conducted Voltage Emissions

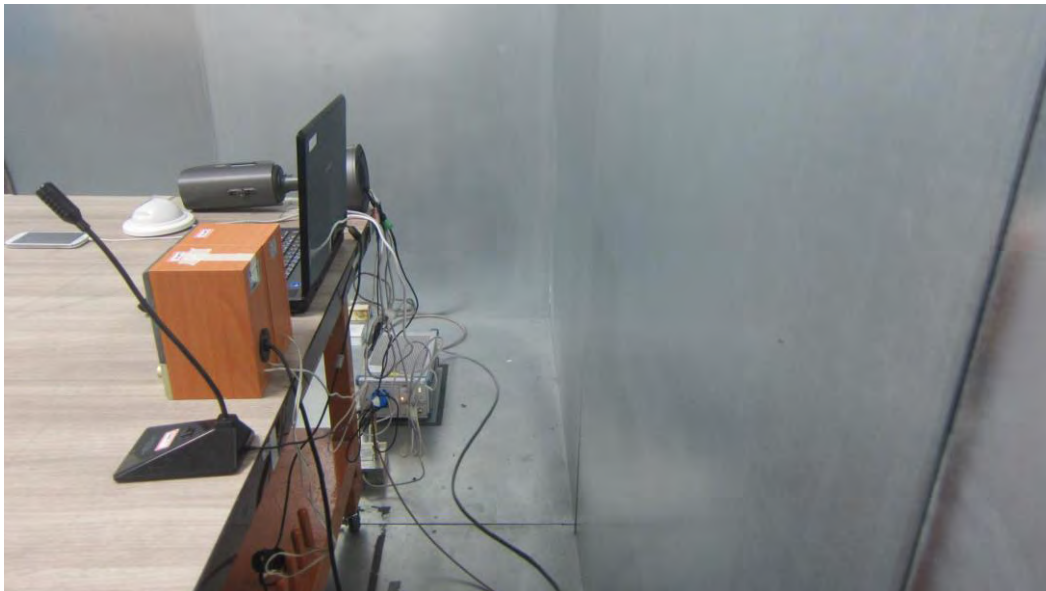
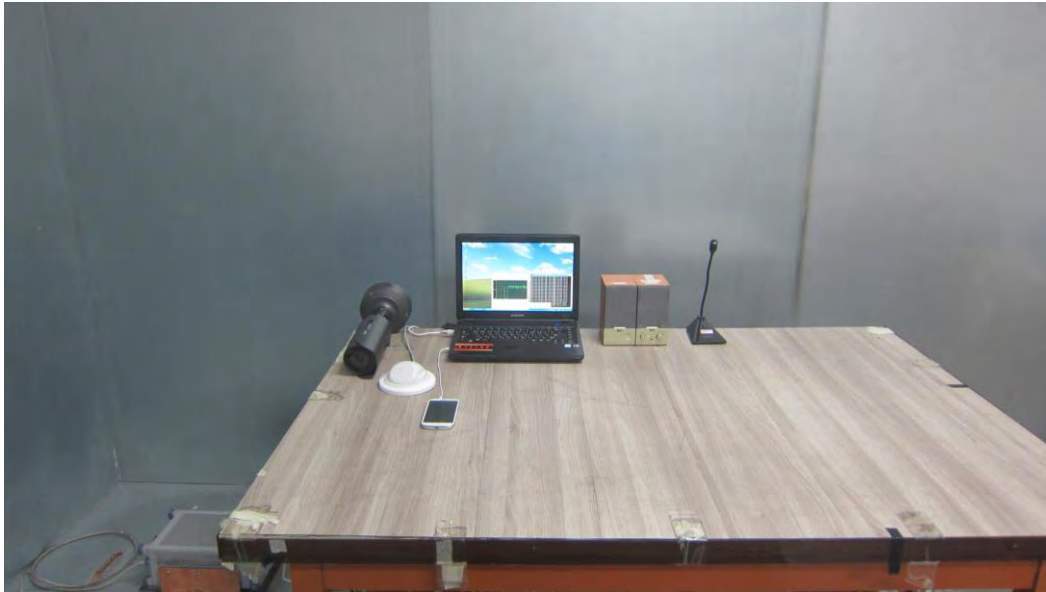
N/A

N/A

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Conducted Telecommunication Emissions

- DC 12V Mode



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- PoE Mode



Radiated Electric Field Emissions(Below 1 GHz)

- DC 12V Mode



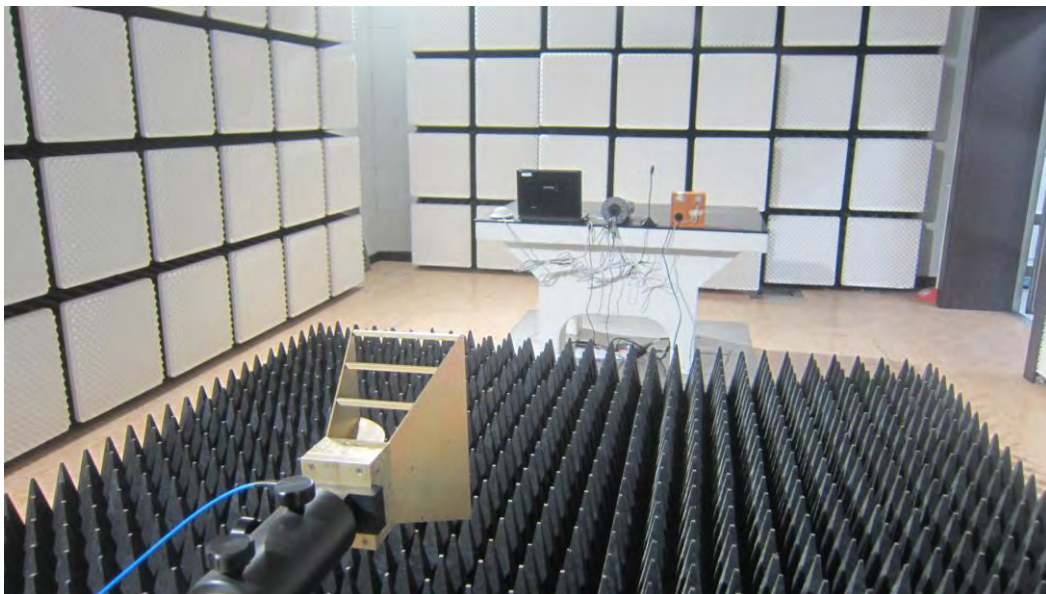
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- PoE Mode



Radiated Electric Field Emissions(Above 1 GHz)

- DC 12V Mode



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- PoE Mode



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Harmonic Current Emissions and Voltage Fluctuations and Flicker

N/A

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Electrostatic Discharge

- DC 12V Mode



- PoE Mode



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Radiated Electric Field Immunity

- DC 12V Mode



- PoE Mode



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Electrical Fast Transients / Bursts

- DC 12V Mode



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- PoE Mode



Surge Transients

- DC 12V Mode



- PoE Mode



Conducted Disturbance

- DC 12V Mode



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- PoE Mode





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Voltage Dips and Short Interruptions

N/A

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EUT External Photographs

(Top)



(Bottom)



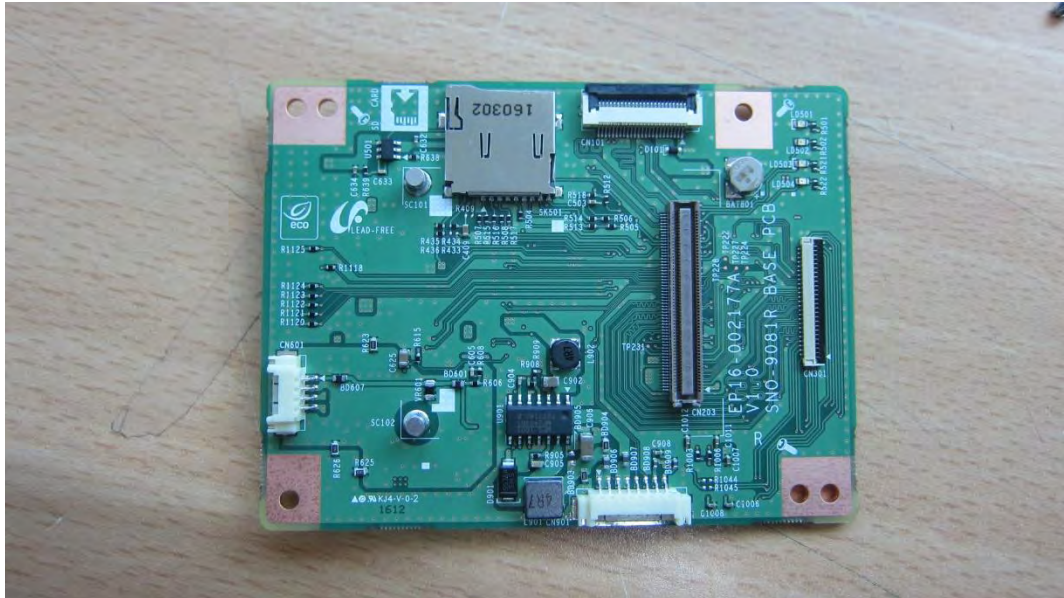
EUT Internal Photographs

(Internal View)

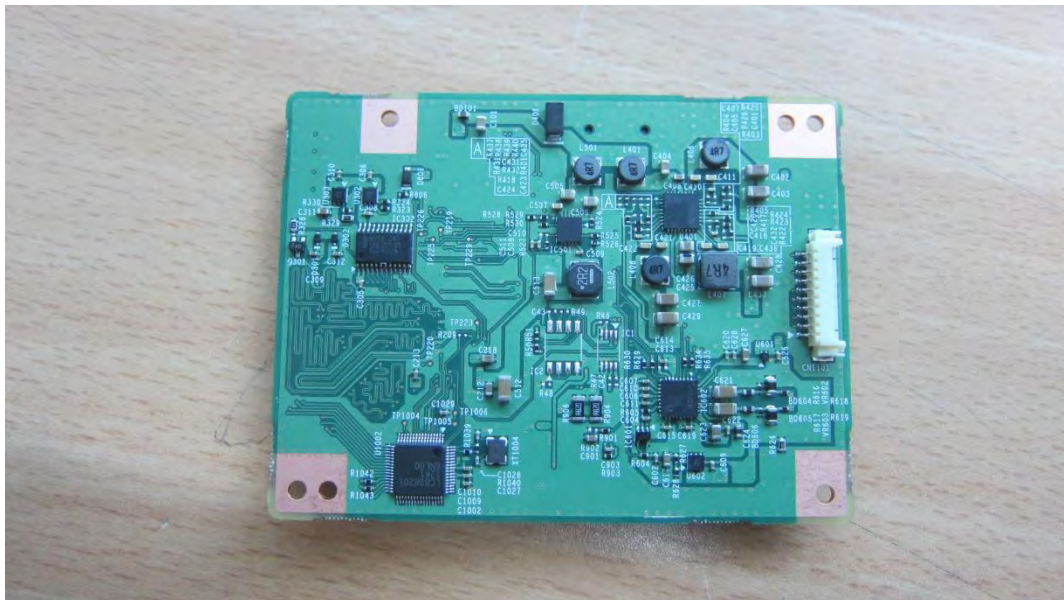


Main Board EUT Internal View – Main Board

(Top)



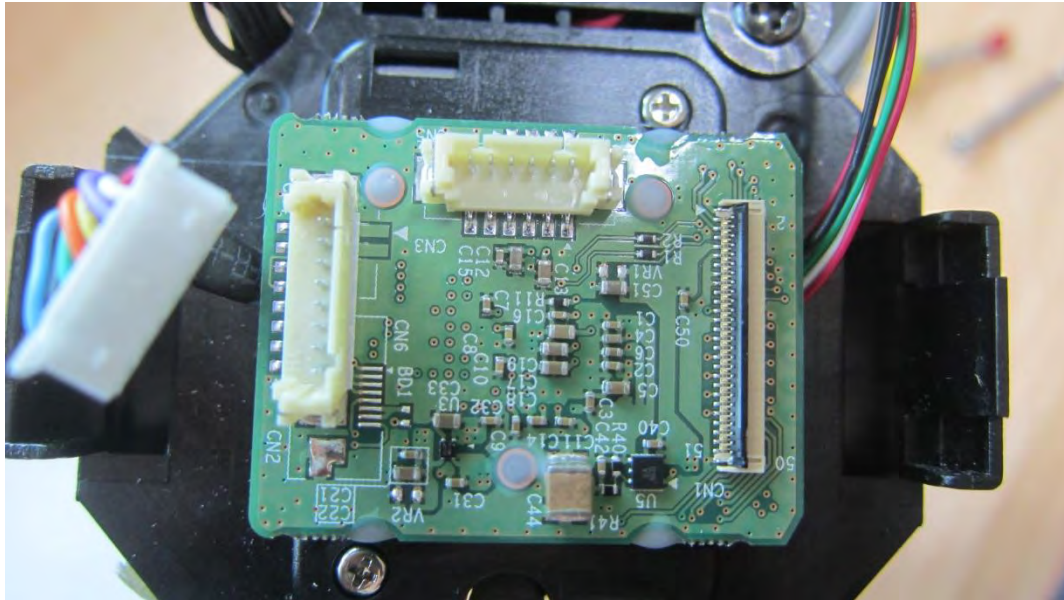
(Bottom)



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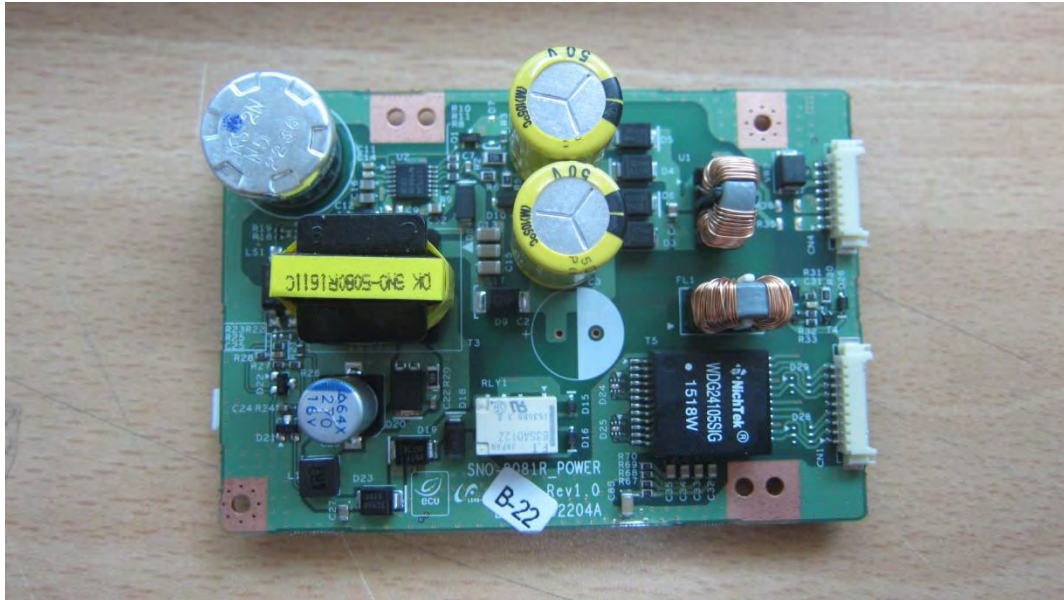
Main Board EUT Internal View – Sub Board 1

(Top)

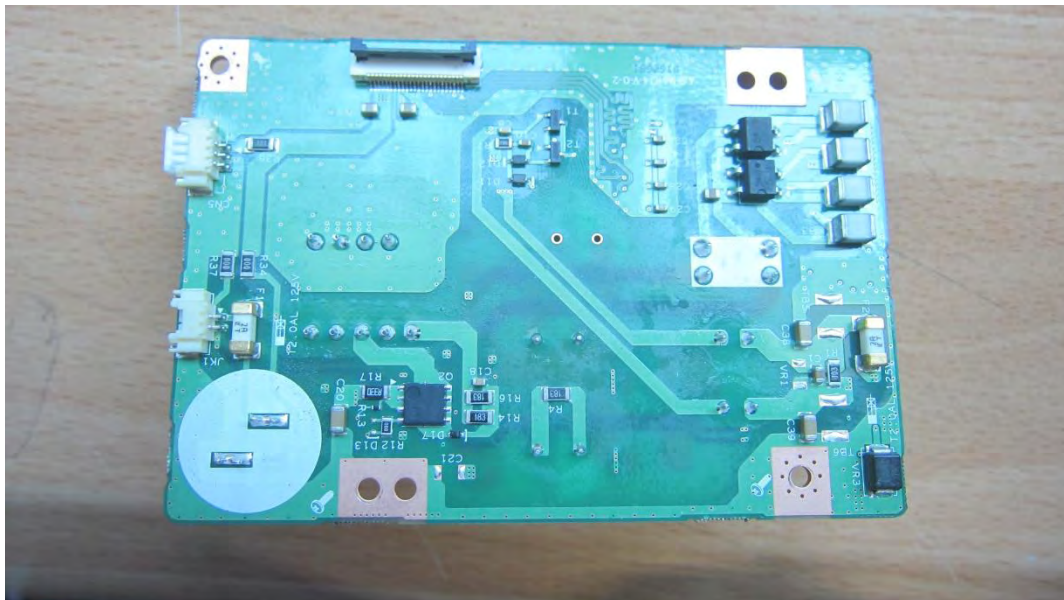


Main Board EUT Internal View – Sub Board 2

(Top)



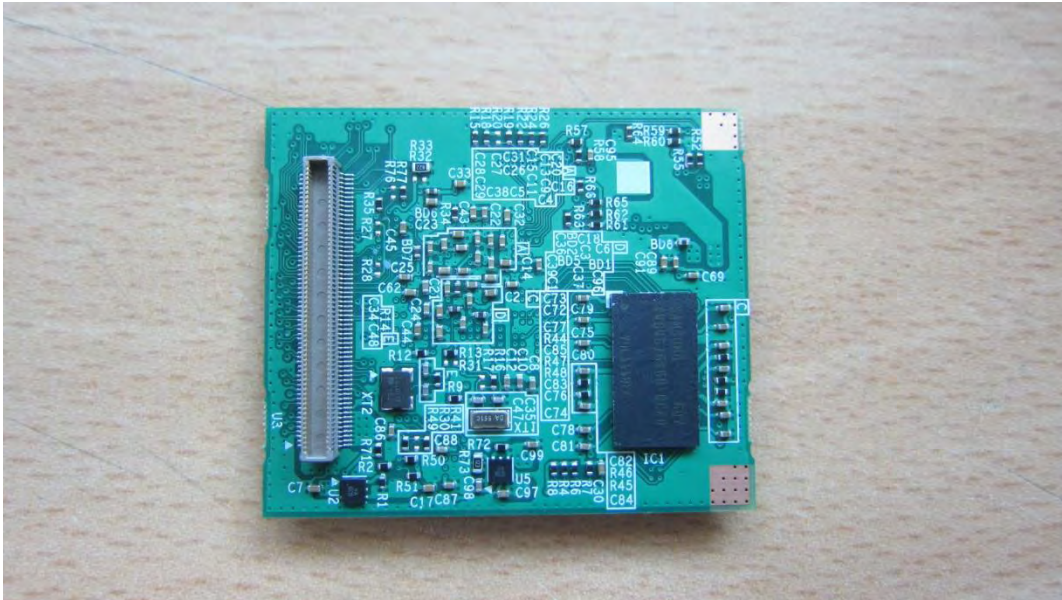
(Bottom)



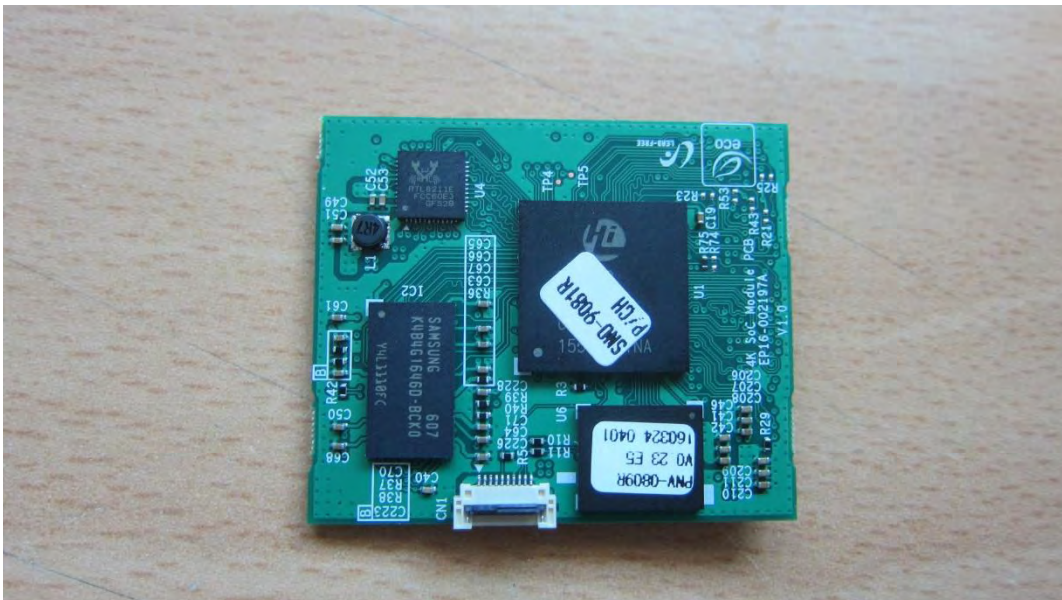
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Main Board EUT Internal View – Sub Board 3

(Top)



(Bottom)



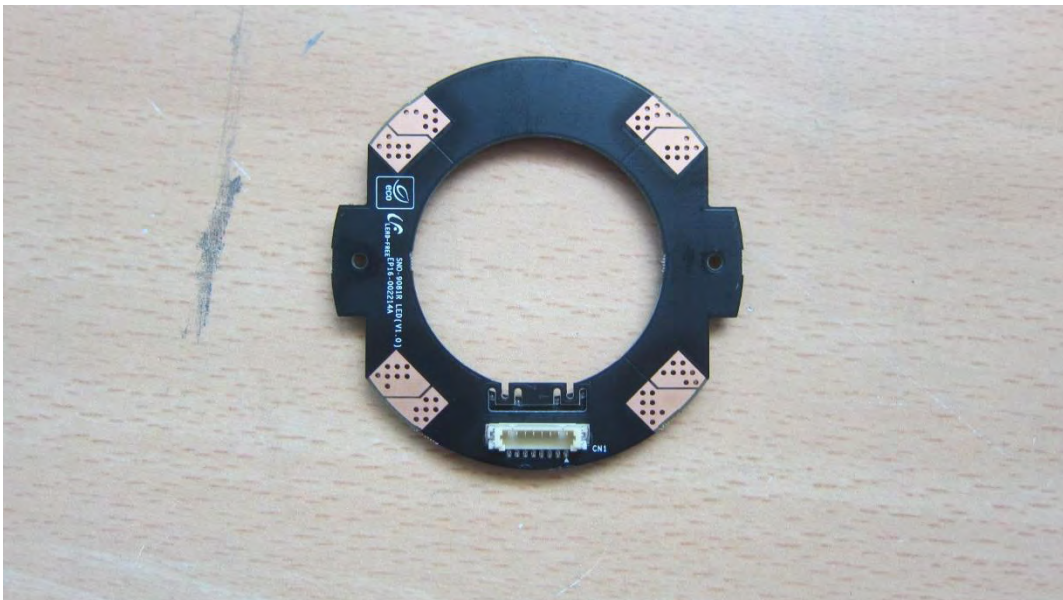
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Main Board EUT Internal View – IR Board

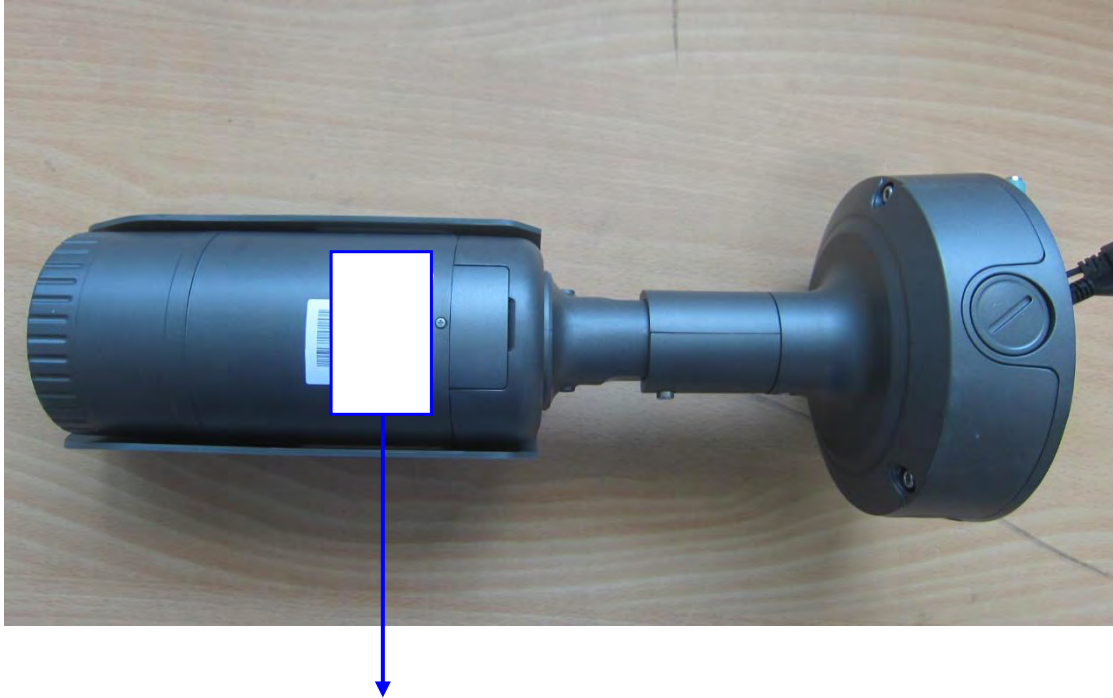
(Top)



(Bottom)



Label and Location



NETWORK CAMERA

Model No : PNO-9080R

Manufacturer : Hanwha Techwin (Tianjin) Co.,Ltd.

Made in of China