



EMC TEST REPORT For CE

Test Report No. : KES-E1-16T0489-R2

Date of Issue : May. 15, 2019

Product name : NETWORK CAMERA

Model/Type No. : PNM-9020V

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 : Sep, 13, 2016

Test date : Sep, 21, 2016 – Sep. 23, 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.

**KES Co., Ltd.**

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Sep. 26, 2016	KES-E1-16T0489	Issued
Aug. 07, 2017	KES-E1-16T0489-R1	Re-issue due to manufacturer change
May. 15, 2019	KES-E1-16T0489-R2	Re-issue due to regulations update

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1.0 General Product Description

Main Specifications of E.U.T are:

Video	
Imaging Device	8M(2M x 4)
Total Pixels	TBD
Effective Pixels	TBD
Scanning System	Progressive
Min. Illumination	Color : 0.1Lux ↓
S / N Ratio	N/A
Video Out	N/A
Lens	
Focal Length (Zoom Ratio)	3.6mm Fixed
Max. Aperture Ratio	TBD
Angular Field of View	[Total 4sensor] H : 180°, V : TBD [Per sensor] H : 50° ↑ V : TBD
Min. Object Distance	0.5m(1.64ft)
Focus Control	Manual
Lens Type	-
Mount Type	Board-in type
Pan / Tilt / Rotate	
Pan Range	0° ~ +355°
Tilt Range	0° ~ +73°
Rotate Range	N/A
Operational	
IR LED	N/A
Viewable Length	N/A
Camera Title	Off / On (Displayed up to 45 characters) - W/W : English/Numeric/Special Characters - Korea : English/Numeric/Special/Korean Characters - China : English/Numeric/Special/Chinese Characters - Common : Multi-line (Max 6), Color (Grey/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	SSNRⅢ (2D+3D Noise Filter) (Off / On)
Defog	Auto/Manual/Off
LDC	Off/On
Motion Detection	Off / On(8ea, Polygonal)
Privacy Masking	Off / On (16ea, Polygonal with 4Lines 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
Rotate Image	Flip : On/Off Mirror : On/Off Hallway : N/A
Digital PTZ	Support
Flip / Mirror	Off / On
Intelligent Video Analytics	Tampering, Virtual Line, Enter/Exit, Appear / Disappear, Audio Detection, Face Detection Defocus Detection, Digital Auto Tracking, Heat map
Alarm I/O	Input 1ea / Output 1ea

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Audio In	Line IN Supply voltage: 2.5VDC(4mA), Input impedance: approx. 2K Ohm
Audio out	Line out (3.5mm stereo mini jack)
Alarm Triggers	Tampering(Scene Change), Heat Map Virtual Line, Enter/Exit, Appear / Disappear, Audio Detection,Defocus Detection,Digital Auto Tracking - with Metadata
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
Network	
Ethernet	RJ-45(1000BASE-T), Plug-in type
Video Compression Format	H.265/H.264 (MPEG-4 Part 10/AVC) : Main/Baseline/High Motion JPEG
Resolution	[Panorama] Onboard stitch 4096 x 1843 [4:3] 1600x1200, 1280x960, 1024x768, 800x600, 720 x 576, 720 x 480 640x480, 480x360, 320x240 [16:9] 1920x1080, 1280x720, 800x450, 640x360
Max. Framerate	H.265/H.264 : Max. 30fps at all resolutions Motion JPEG : Max. 15fps at all resolutions
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

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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	Non-plugin Webviewer
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 ~ +80°C (-40°F ~ +140°F) / Less than 90% RH
Fan / Heater	On/Off via webvier
Ingress Protection	IP66
Vandal Resistance	IK10
Electrical	
Input Voltage / Current	PoE+(IEEE802.3at)
Power Consumption	Max 25.5W(PoE+/DC, Heater On)
Mechanical	
Color / Material	Ivory / Aluminum
Dimension (WxHxD)	Ø188 x H146mm
Weight	1426g

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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 ☒ 12 Vdc ☒ PoE

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	PNM-9020V	-	Hanwha Techwin (Tianjin) Co., Ltd.	E.U.T

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	NT63025J	JK9091EF400142M	Samsung Electronics Co., Ltd.	-
Notebook Adapter	A13-040N2A	CN60BA4400313AD 0N843KO2OO	Chicony Power Technology (suzhou)Co., Ltd.	-
PoE Adapter	3001GC	-	PowerDsine	-

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(LAN)	Notebook	RJ-45(LAN)	4.0	U

* Unshielded=U, Shielded=S

■ 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)	4.0	U
PoE Adapter	RJ-45(LAN)	Notebook	RJ-45(LAN)	0.8	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:

E.U.T Test operating S/W		
Name	Version	Manufacture Company
WebViewer	5.8	Hanwha Techwin Co., Ltd.

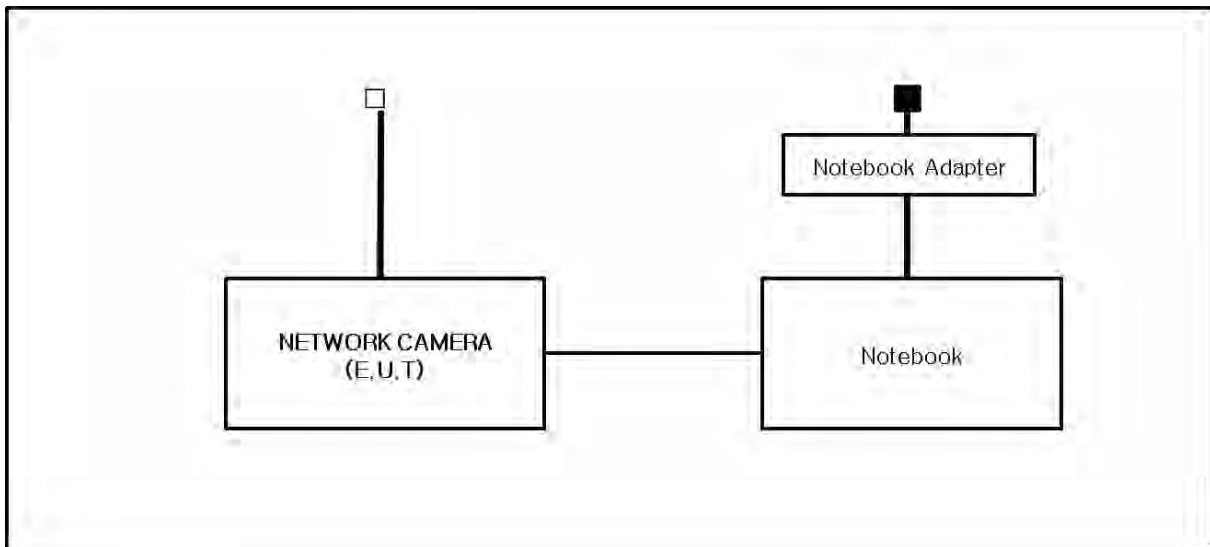
Test mode	Normal operating
DC 12 V	E.U.T Monitoring
PoE	E.U.T Monitoring

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

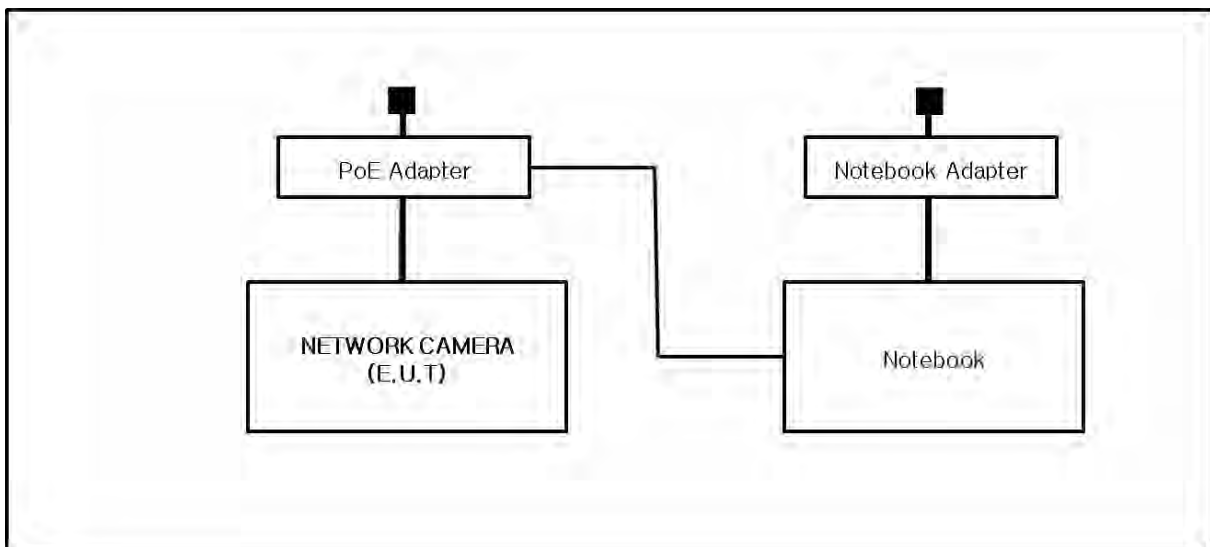
1.8 Configuration

■ 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 61547:2009

☒ EN 55032:2012/AC:2013

☒ Class A

☐ Class B

☐ EN 55024:2010 +A1:2015

☒ EN 50130-4:2011 +A1:2014

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



-
- | | | |
|---|----------------------------------|----------------------------------|
| <input type="checkbox"/> VCCI V-3 / 2015.04 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> AS/NZS CISPR22:2009 +A1:2010 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> 47 CFR Part 15, Subpart B | | |
| <input type="checkbox"/> CISPR 22:2009 +A1:2010 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2009 | | |
| <input type="checkbox"/> IC Regulation ICES-003 : 2016 | | |
| <input type="checkbox"/> CAN/CSA CISPR 22-10 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2014 | | |
|
<input type="checkbox"/> RE- Directive 2014/53/EU | | |
|
<input type="checkbox"/> EN 301 489-1 V1.9.2 | | |
| <input type="checkbox"/> Equipment for fixed use | | |
| <input type="checkbox"/> Equipment for vehicular use | | |
| <input type="checkbox"/> Equipment for portable use | | |
|
<input type="checkbox"/> EN 301 489-3 V1.6.1 | | |
|
<input type="checkbox"/> EN 301 489-17 V2.2.1 | | |
|
<input type="checkbox"/> EN 60945:2002 | | |

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
<input type="checkbox"/>	EMI Test Receiver	ESR7	R & S	101190	08, 08, 2017
<input type="checkbox"/>	LISN	ENV216	R & S	101787	01, 14, 2017
<input type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	05, 02, 2017
<input type="checkbox"/>	Electro wave Shieldroom	-	AONE SHIELD	-	-
<input type="checkbox"/>	EMI Test S/W	EMC32	R&S	9.12.00	-

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

N/A :

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

Sep, 22, 2016

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test Receiver	ESR3	R&S	101783	05, 03, 2017
<input checked="" type="checkbox"/>	LISN	ENV216	R&S	101137	02, 04, 2017
<input checked="" type="checkbox"/>	LISN	ENV216	R&S	101786	05, 02, 2017
<input checked="" type="checkbox"/>	8-Wire ISN CAT3	CAT3 8158	Schwarzbeck Mess	8158-0019	04, 01, 2017
<input checked="" type="checkbox"/>	8-Wire ISN CAT5	CAT5 8158	Schwarzbeck Mess	8158-0030	04, 01, 2017
<input checked="" type="checkbox"/>	8-Wire ISN CAT6	NTFM 8158	Schwarzbeck Mess	8158-0029	08, 11, 2017
<input checked="" type="checkbox"/>	Electro wave Shieldroom	-	SEMITEC	-	-
<input checked="" type="checkbox"/>	EMI Test S/W	EMC32	R&S	9.12.00	-

Test Conditions

Temperature: 21,6 °C

Relative Humidity: 43,5 %

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

Sep, 22, 2016

Test Location

☐ Open Area Test Site #1

☒ Open Area Test Site #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI TEST Receiver	ESR3	R&S	101781	05, 03, 2017
<input checked="" type="checkbox"/>	Trilog-Broadband ANT	VULB 9163	Schwarzbeck	9163-713	05, 15, 2017
<input checked="" type="checkbox"/>	Open Area Test Site	-	KES	-	-
<input checked="" type="checkbox"/>	Antenna Mast	-	DAEIL EMC	-	-
<input checked="" type="checkbox"/>	Turn Table	-	DAEIL EMC	-	-
<input checked="" type="checkbox"/>	EMI Test S/W	-	-	-	-

Test Conditions

Temperature: 18,5 °C

Relative Humidity: 47,0 %

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

Sep, 23, 2016

Test Location

Semi Anchoic Chamber #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test Receiver	ESU26	R&S	100552	04, 24, 2017
<input checked="" type="checkbox"/>	Broadband Coaxial Preamplifier	BBV 9718	Schwarzbeck Mess - Elektronik	9718-246	10, 23, 2016
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 07, 2017
<input checked="" type="checkbox"/>	Semi Anchoic Chamber #2	-	SEMITEC	-	-
<input checked="" type="checkbox"/>	Antenna Mast	-	AUDIX	-	-
<input checked="" type="checkbox"/>	Turn Table	-	AUDIX	-	-
<input checked="" type="checkbox"/>	EMI Test S/W	e3	AUDIX	8.083b	-

Test Conditions

Temperature: 21,7 °C

Relative Humidity: 46,8 %

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
<input type="checkbox"/>	AC Source	ACS 500 N	EM TEST	V1024106760	08, 08, 2017
<input type="checkbox"/>	Digital Power Analyzer	DPA 500 N	EM TEST	V1024106759	08, 08, 2017
<input type="checkbox"/>	EMI Test S/W	dpa.control	EM TEST AG	5.4.8.0	-

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

N/A : 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
<input type="checkbox"/>	AC Source	ACS 500 N	EM test	V1024106760	08, 08, 2017
<input type="checkbox"/>	Digital Power Analyzer	DPA 500 N	EM test	V1024106759	08, 08, 2017
<input type="checkbox"/>	EMI Test S/W	dpa.control	EM TEST AG	5.4.8.0	-

Test Conditions

Temperature: °C

Relative Humidity: %

Test Results

The requirements are:

- ☐ PASS
☐ NOT PASS
☒ NOT APPLICABLE

Remarks

N/A : Because the E.U.T power is 12 v (dc) power and 24 v (ac), limit are not specified.

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

Sep, 21, 2016

Test Location

EMS-ESD: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	10, 23, 2016
<input checked="" type="checkbox"/>	HCP	-	KES	-	-
<input checked="" type="checkbox"/>	VCP	-	KES	-	-
<input checked="" type="checkbox"/>	EMS Test S/W	-	-	-	-

Test Conditions

Temperature: 23,8 °C
Relative Humidity: 52,4 %
Atmospheric Pressure: 98,9 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 <input type="checkbox"/> 2 kV <input type="checkbox"/> 4 kV <input checked="" type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	Air <input checked="" type="checkbox"/> 2 kV <input checked="" type="checkbox"/> 4 kV <input type="checkbox"/> 6 kV <input checked="" type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	HCP <input type="checkbox"/> 2 kV <input type="checkbox"/> 4 kV <input checked="" type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	VCP <input type="checkbox"/> 2 kV <input type="checkbox"/> 4 kV <input checked="" type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV
--------------------	---	---	---	---

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

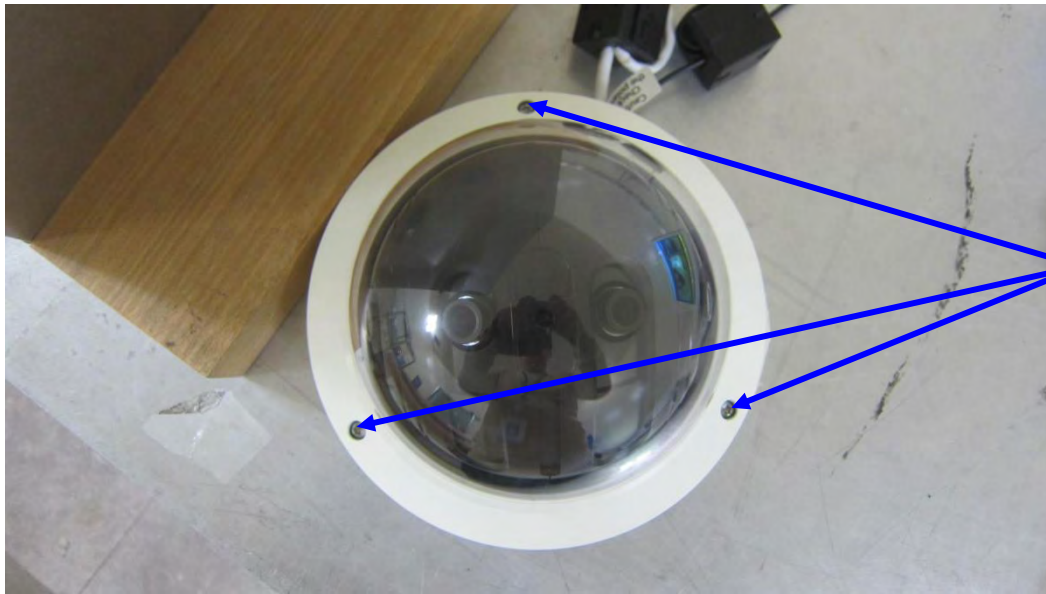
Required Performance Criteria: ☒ Complied

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Location of Discharge:

■ DC 12 V Mode

Air
Contact



1



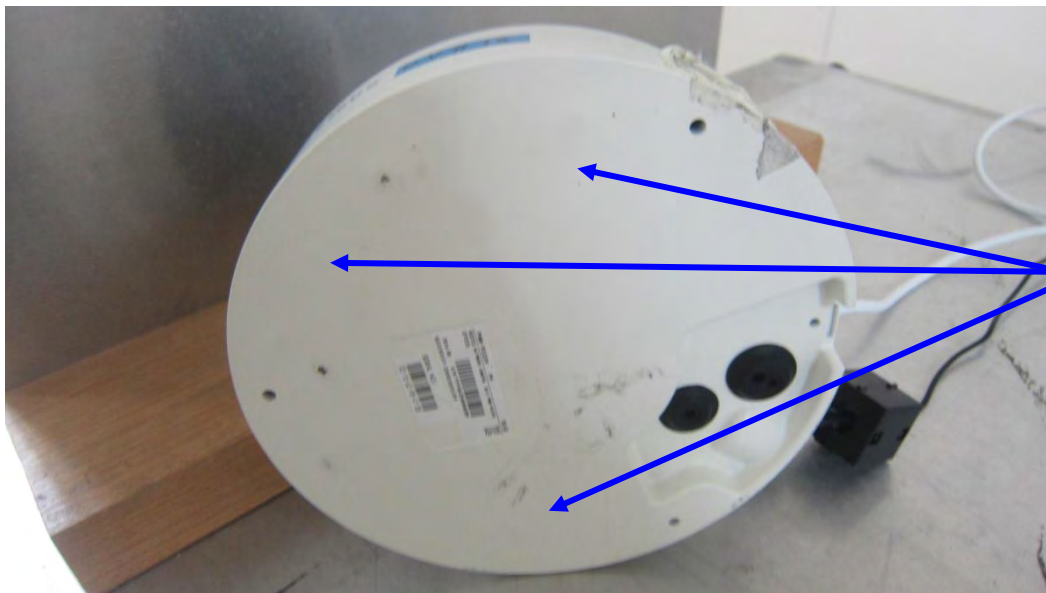
2

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■ PoE Mode



1



2

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**Test Data**

■ DC 12 V Mode

Indirect Discharge

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

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	E.U.T Screw	Contact Discharge	Complied	-
2	E.U.T Enclosure	Contact Discharge	Complied	-

■ PoE Mode

Indirect Discharge

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

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	E.U.T Screw	Contact Discharge	Complied	-
2	E.U.T Enclosure	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

Sep, 23, 2016

Test Location

EMS-RS: ☐ Semi Anchoic Chamber #1 ☒ Semi Anchoic Chamber #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	08, 08, 2017
<input checked="" type="checkbox"/>	BROADBAND AMPLIFIER	BBA100	Rohde & Schwarz	101239	08, 08, 2017
<input checked="" type="checkbox"/>	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 08, 2017
<input checked="" type="checkbox"/>	POWER METER	NRP2	Rohde & Schwarz	103475	08, 08, 2017
<input checked="" type="checkbox"/>	AVG POWER SENSOR	NRP-Z91	Rohde & Schwarz	102526	08, 08, 2017
<input checked="" type="checkbox"/>	AVG POWER SENSOR	NRP-Z91	Rohde & Schwarz	102527	08, 08, 2017
<input checked="" type="checkbox"/>	Stacked Log.-Per.Antenna	STLP 9128 D	Schwarzbeck	9128D038	-
<input checked="" type="checkbox"/>	DIRECTIONAL COUPLER	KYDC-D1070-DX40	Kytelecom Co., Ltd.	KY150001	08, 08, 2017
<input checked="" type="checkbox"/>	Semi Anchoic Chamber #2	-	SEMITEC	-	-
<input checked="" type="checkbox"/>	EMS Test S/W	EMC32	R&S	9.12.00	-

Test Conditions

Temperature: 21,7 °C
Relative Humidity: 46,8 %
Atmospheric Pressure: 99,7 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 % step

Dwell Time: ☐ 1 s ☒ 3 s

of Sides Radiated: ☒ 4

Required Performance Criteria: ☒ Complied

Test Data

■ DC 12 V Mode

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

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■ PoE Mode

Side Exposed	Observations	
	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

Sep, 21, 2016

Test Location

EMS-EFT: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	Transient Test System	TRA3000F-S-D-V	EMC PARTNER AG	1524	03, 25, 2017
<input checked="" type="checkbox"/>	MotorVariac	VAR-EXT1000	EMC PARTNER AG	1507	03, 25, 2017
<input checked="" type="checkbox"/>	Capacitive Coupling Clamp	CN-EFT1000	EMC PARTNER AG	1528	03, 25, 2017
<input checked="" type="checkbox"/>	EMS Test S/W	-	-	-	-

Test Conditions

Temperature: 23,8 °C
Relative Humidity: 52,4 %
Atmospheric Pressure: 98,9 kPa

Test Specifications

Pulse Amplitude & Polarity:
(AC Power Lines) ☐ ± 1.0 kV ☐ ± 2.0 kV
☐ ± 4.0 kV

Pulse Amplitude & Polarity:
(Other supply / Signal Lines) ☐ ± 0.5 kV ☒ ± 1.0 kV
☐ ± 2.0 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 12 V 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)
L1 – L2	Complied	Complied

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
RJ-45(LAN)	Complied	Complied

■ 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

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.

3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

Test Date

Sep, 21, 2016

Test Location

EMS-Surge: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	Ultra Compact Simulator	UCS 500 N5	EM TEST	V0936105120	06, 27, 2017
<input checked="" type="checkbox"/>	Motor Variac	MV2616	EM TEST	V0936105123	06, 27, 2017
<input checked="" type="checkbox"/>	CDN	CNV 508T5	EM TEST	P1549168422	04, 27, 2017
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST AG	5.0.9.0	-

Test Conditions

Temperature: 22,5 °C
Relative Humidity: 49,2 %
Atmospheric Pressure: 99,9 kPa

Test Specifications

AC 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

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

Other supply / 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 12 V 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)
L1 - PE	Complied	Complied
L2 - PE	Complied	Complied

Signal Lines
☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
RJ-45 (LAN)	Complied	Complied

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Test report No.:

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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

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.

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3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Sep, 22, 2016

Test Location

EMS-CS: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	Continuous Wave Generator	CWS 500N1	EM TEST	P1251106910	03, 25, 2017
<input checked="" type="checkbox"/>	6 dB Attenuator	ATT6/75	EM TEST	1202-35	03, 25, 2017
<input checked="" type="checkbox"/>	CDN	CDN-M2/M3N	EM TEST	0213-10	03, 25, 2017
<input checked="" type="checkbox"/>	EM Injection Clamp	EM 101	Liithi	36152	03, 29, 2017
<input checked="" type="checkbox"/>	EMS Test S/W	icd.control	EM TEST AG	5.2.5	-

Test Conditions

Temperature: 23,8 °C
Relative Humidity: 52,3 %
Atmospheric Pressure: 98,3 kPa

Test Specifications

Frequency range: ☒ 150 kHz to 100 MHz ☐ 10 kHz to 30 MHz
☐ 150 kHz to 230 MHz ☐ 10 kHz to 100 MHz

Voltage Level: ☐ 1 Vrms ☐ 3 Vrms
☒ 10 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 12 V Mode

☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	CDN (<input type="checkbox"/> M2, <input type="checkbox"/> M3)	-

☒ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L1 – L2	CDN (<input checked="" type="checkbox"/> M2, <input type="checkbox"/> M3)	Complied

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45 (LAN)	EM Injection Clamp	Complied

■ PoE Mode

☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	CDN (<input type="checkbox"/> M2, <input type="checkbox"/> M3)	-

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	CDN (<input type="checkbox"/> M2, <input type="checkbox"/> M3)	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45 (PoE)	EM Injection Clamp	Complied

Notes: CDN = Coupling Decoupling Network
"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.



3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004

Test Date

N/A

Test Location

EMS-Voltage dip: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input type="checkbox"/>	Transient Test System	TRA3000F-S-D-V	EMC PARTNER AG	1524	03, 25, 2017
<input type="checkbox"/>	MotorVariac	VAR-EXT1000	EMC PARTNER AG	1507	03, 25, 2017
<input type="checkbox"/>	EMS Test S/W	N/A	N/A	N/A	-

Test Conditions

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



Test Specifications & Observations/Remarks

(Test Voltage : AC 230 V, 50 Hz)

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
<input type="checkbox"/> 20 % dip	<input type="checkbox"/> 250 /5000	_____
<input type="checkbox"/> 30 % dip	<input type="checkbox"/> 25 /500	_____
<input type="checkbox"/> 60 % dip	<input type="checkbox"/> 10 /200	_____
<input type="checkbox"/> 100 % dip	<input type="checkbox"/> 250 /5000	_____

- Voltage variations

<input type="checkbox"/> Unom + 10 %	<input type="checkbox"/> 253 V (ac)	_____
<input type="checkbox"/> Unom - 15 %	<input type="checkbox"/> 195.5 V (ac)	_____

Observations:

Complied – No degradation of function

Test Results

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

Remarks

N/A : Because the E.U.T power is 12 v (dc) and PoE, power limits are not specified



APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

N/A

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

Corr. : Correction values (LISN FACTOR+ Cable Loss)



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[NEUTRAL]

N/A

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

Corr. : Correction values (LISN FACTOR+ Cable Loss)

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Conducted Emissions at Telecommunication Ports

■ DC 12V Mode

[10 Mbps]

Common Information

Test Description:

Telecommunication Emission

Model No.:

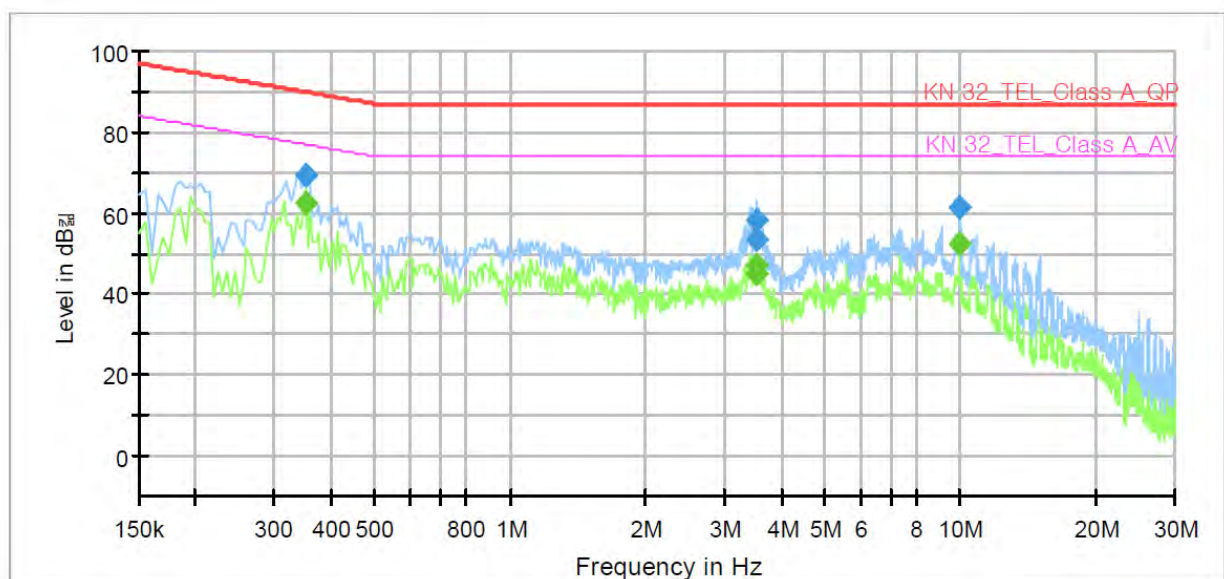
PNM-9020VP

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)
0.350000	---	62.29	76.96	14.67	1000.0	9.000	Single Line	10.1
0.350000	69.44	---	89.96	20.52	1000.0	9.000	Single Line	10.1
3.520000	---	45.25	74.00	28.75	1000.0	9.000	Single Line	10.1
3.520000	53.57	---	87.00	33.43	1000.0	9.000	Single Line	10.1
3.535000	---	47.09	74.00	26.91	1000.0	9.000	Single Line	10.1
3.535000	58.46	---	87.00	28.54	1000.0	9.000	Single Line	10.1
10.000000	---	52.30	74.00	21.70	1000.0	9.000	Single Line	10.0
10.000000	61.38	---	87.00	25.62	1000.0	9.000	Single Line	10.0

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

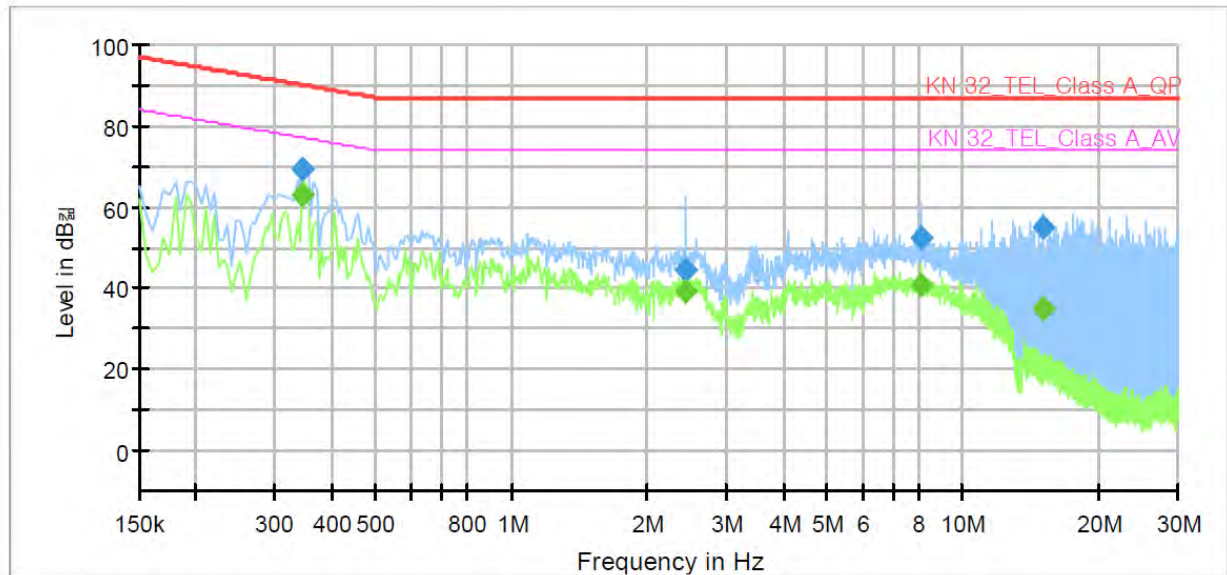
Reading Value : Not shown in the table.

Corr. : Correction values (ISN FACTOR+ Cable Loss)

[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: PNM-9020VP
Mode: DC 12 V_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)
0.345000	---	63.18	77.08	13.90	1000.0	9.000	Single Line	9.6
0.345000	69.45	---	90.08	20.63	1000.0	9.000	Single Line	9.6
2.435000	---	38.99	74.00	35.01	1000.0	9.000	Single Line	9.6
2.435000	44.66	---	87.00	42.34	1000.0	9.000	Single Line	9.6
8.120000	---	41.00	74.00	33.00	1000.0	9.000	Single Line	9.6
8.120000	52.65	---	87.00	34.35	1000.0	9.000	Single Line	9.6
15.020000	---	35.01	74.00	38.99	1000.0	9.000	Single Line	9.5
15.020000	55.23	---	87.00	31.77	1000.0	9.000	Single Line	9.5

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

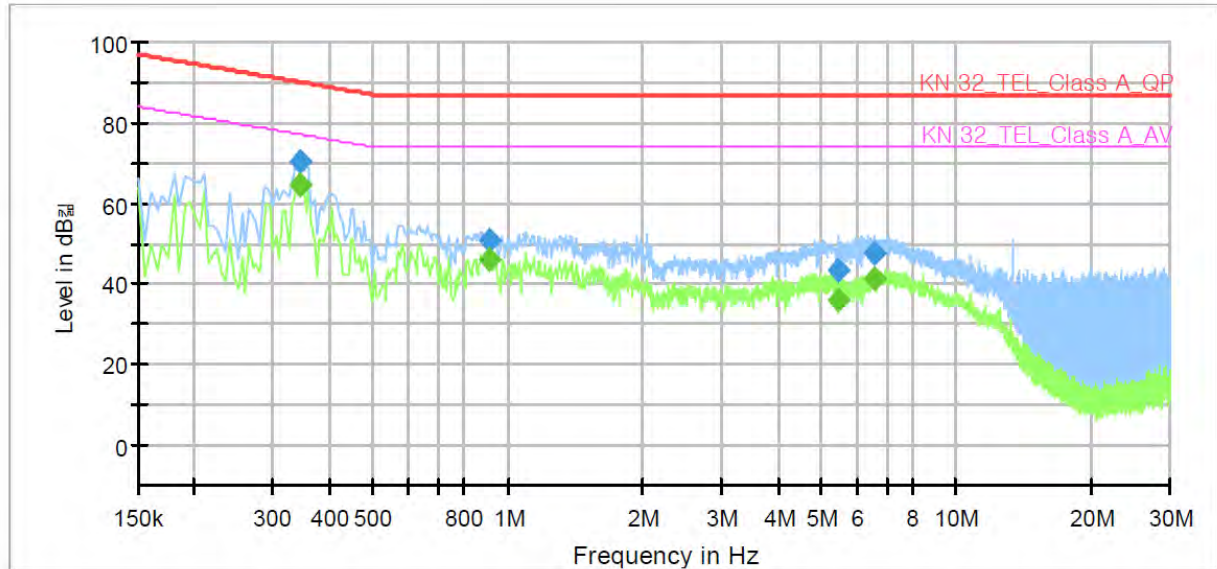
Reading Value : Not shown in the table.

Corr. : Correction values (ISN FACTOR+ Cable Loss)

[1 000 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: PNM-9020VP
Mode: DC 12 V_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)
0.345000	---	64.61	77.08	12.47	1000.0	9.000	Single Line	9.5
0.345000	70.24	---	90.08	19.84	1000.0	9.000	Single Line	9.5
0.905000	---	46.08	74.00	27.92	1000.0	9.000	Single Line	9.5
0.905000	51.03	---	87.00	35.97	1000.0	9.000	Single Line	9.5
5.445000	---	36.16	74.00	37.84	1000.0	9.000	Single Line	9.5
5.445000	43.18	---	87.00	43.82	1000.0	9.000	Single Line	9.5
6.570000	---	41.49	74.00	32.51	1000.0	9.000	Single Line	9.5
6.570000	47.56	---	87.00	39.44	1000.0	9.000	Single Line	9.5

◆ Calculation

QuasiPeak [dBuV] / CAverage [dBuV] = Reading Value [dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

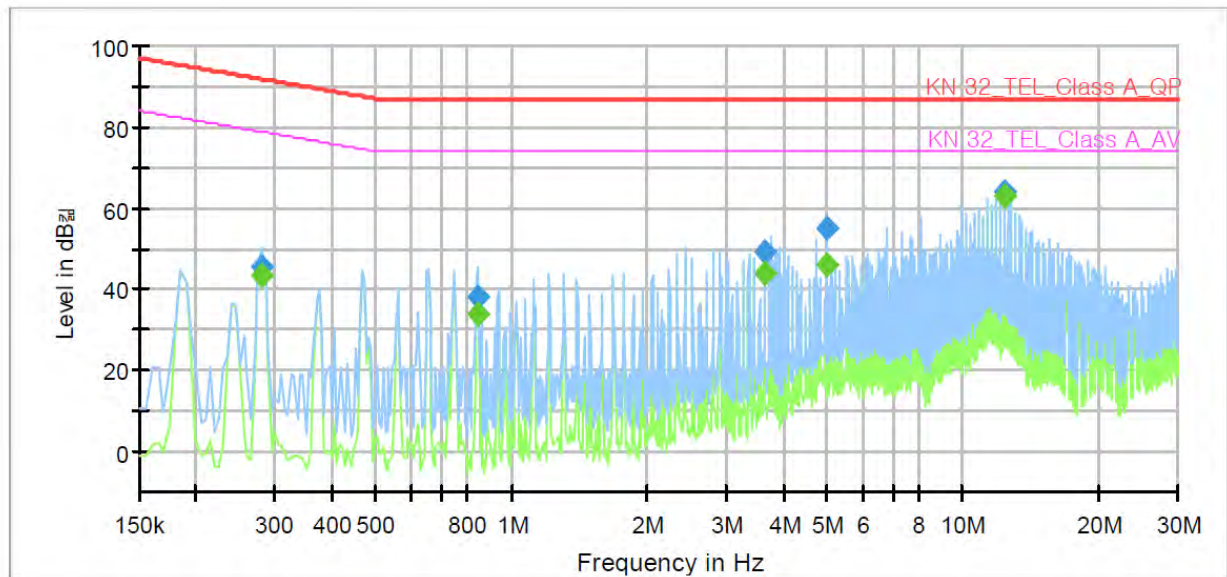
Reading Value : Not shown in the table.

Corr. : Correction values (ISN FACTOR+ Cable Loss)

■ PoE Mode
[10 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	PNM-9020VP
Mode	PoE_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)
0.280000	---	43.33	78.82	35.49	1000.0	9.000	Single Line	10.1
0.280000	45.44	---	91.82	46.38	1000.0	9.000	Single Line	10.1
0.840000	---	33.93	74.00	40.07	1000.0	9.000	Single Line	10.1
0.840000	38.10	---	87.00	48.90	1000.0	9.000	Single Line	10.1
3.640000	---	43.72	74.00	30.28	1000.0	9.000	Single Line	10.1
3.640000	49.04	---	87.00	37.96	1000.0	9.000	Single Line	10.1
4.980000	---	46.05	74.00	27.95	1000.0	9.000	Single Line	10.1
4.980000	55.09	---	87.00	31.91	1000.0	9.000	Single Line	10.1
12.350000	---	63.16	74.00	10.84	1000.0	9.000	Single Line	10.0
12.350000	63.84	---	87.00	23.16	1000.0	9.000	Single Line	10.0

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

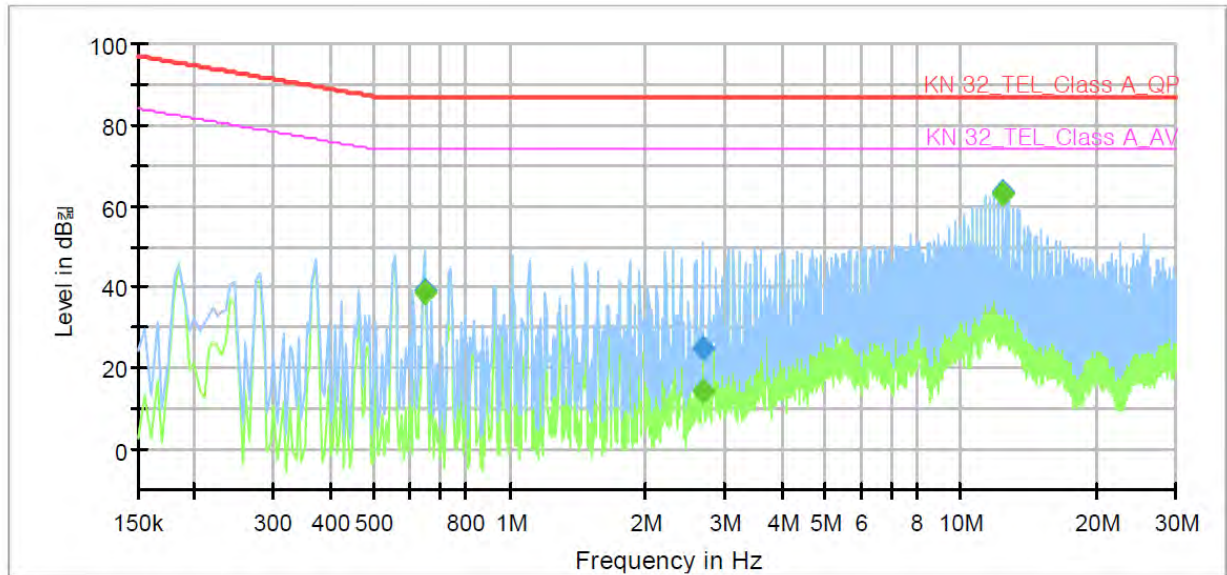
Reading Value : Not shown in the table.

Corr. : Correction values (ISN FACTOR+ Cable Loss)

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	PNM-9020VP
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)
0.645000	---	38.70	74.00	35.30	1000.0	9.000	Single Line	9.6
0.645000	38.92	---	87.00	48.08	1000.0	9.000	Single Line	9.6
2.675000	---	14.22	74.00	59.78	1000.0	9.000	Single Line	9.6
2.675000	24.87	---	87.00	62.13	1000.0	9.000	Single Line	9.6
12.350000	---	63.15	74.00	10.85	1000.0	9.000	Single Line	9.5
12.350000	63.25	---	87.00	23.75	1000.0	9.000	Single Line	9.5

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

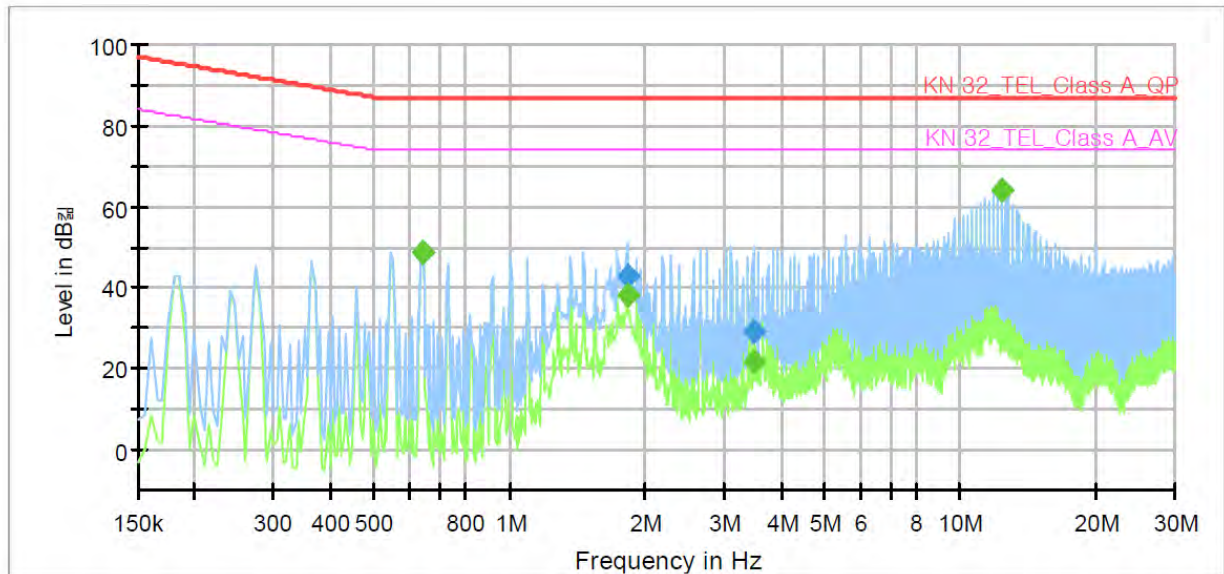
Reading Value : Not shown in the table.

Corr. : Correction values (ISN FACTOR+ Cable Loss)

[1 000 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	PNM-9020VP
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)
0.640000	---	48.92	74.00	25.08	1000.0	9.000	Single Line	9.5
0.640000	48.91	---	87.00	38.09	1000.0	9.000	Single Line	9.5
1.825000	---	37.98	74.00	36.02	1000.0	9.000	Single Line	9.5
1.825000	42.89	---	87.00	44.11	1000.0	9.000	Single Line	9.5
3.470000	---	21.49	74.00	52.51	1000.0	9.000	Single Line	9.5
3.470000	28.88	---	87.00	58.12	1000.0	9.000	Single Line	9.5
12.350000	---	64.15	74.00	9.85	1000.0	9.000	Single Line	9.4
12.350000	64.22	---	87.00	22.78	1000.0	9.000	Single Line	9.4

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

Corr. : Correction values (ISN FACTOR+ Cable Loss)

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]
186.04	11.73	V	1.00	9.98	3.97	25.68	40.00	14.32
259.80	20.81	H	4.00	12.60	4.80	38.21	47.00	8.79
300.51	20.79	H	4.00	13.39	5.16	39.34	47.00	7.66
500.10	17.11	H	2.80	17.10	7.01	41.22	47.00	5.78
599.98	14.46	H	3.10	19.30	7.83	41.59	47.00	5.41
750.65	11.40	V	1.00	20.26	9.04	40.70	47.00	6.30

* H : Horizontal, V : Vertical

◆ Calculation

Corrected Amplitude [dB μ V] = Amplitude[dBuV] + Correction Factor [dB]

Corrected Amplitude : The Final Value, Amplitude : Reading Value,

Correction Factor : ANT FACTOR + Cable loss

■ 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]
111.39	13.14	V	1.00	10.50	3.04	26.68	40.00	13.32
360.57	13.52	H	4.00	14.79	5.75	34.06	47.00	12.94
375.18	11.24	H	4.00	15.12	5.91	32.27	47.00	14.73
500.10	16.98	H	2.90	17.10	7.01	41.09	47.00	5.91
599.98	16.28	H	3.40	19.30	7.83	43.41	47.00	3.59
700.06	12.70	V	1.50	19.70	8.52	40.92	47.00	6.08

* H : Horizontal, V : Vertical

◆ Calculation

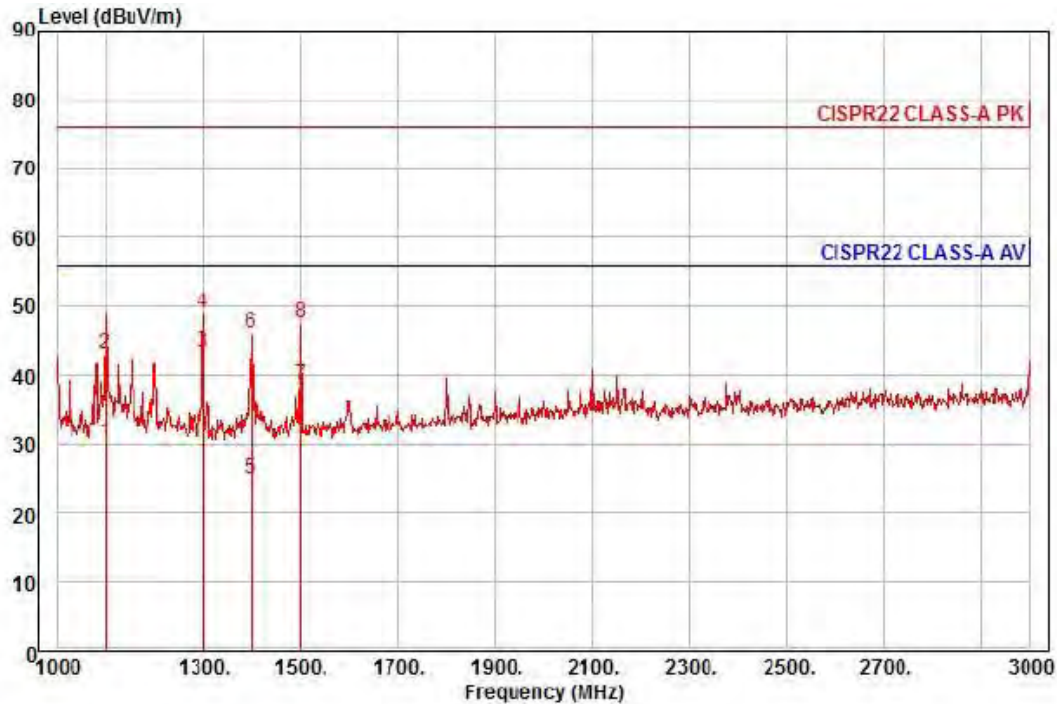
Corrected Amplitude [dB μ V] = Amplitude[dBuV] + Correction Factor [dB]

Corrected Amplitude : The Final Value, Amplitude : Reading Value,

Correction Factor : ANT FACTOR + Cable loss

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 : PNM-9020VP
Mode : DC 12 V
Memo : 1 ~ 3 GHz

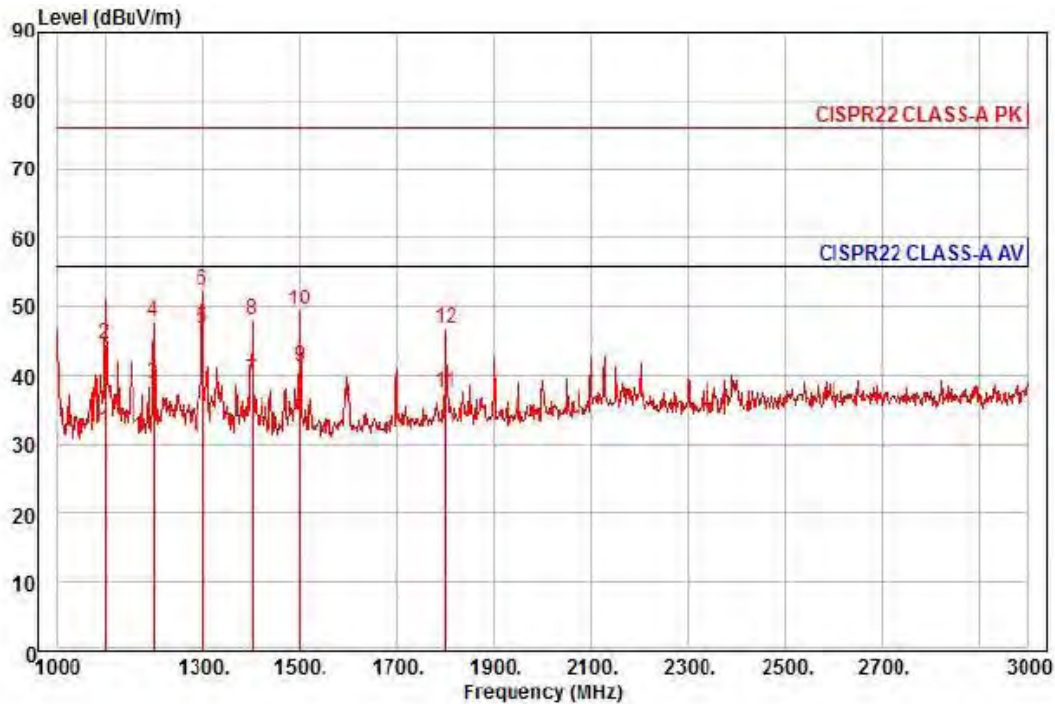
	Read	Ant	Cable	Preamp	TPos	Limit	Over		
Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1098.00	39.18	24.30	6.80	40.07	146	56.00	-25.79	horizontal Average
2	1098.00	52.16	24.30	6.80	40.07	146	76.00	-32.81	horizontal Peak
3 pp	1300.00	50.79	25.10	7.43	39.97	129	56.00	-12.65	horizontal Average
4 pk	1300.00	56.39	25.10	7.43	39.97	129	76.00	-27.05	horizontal Peak
5	1398.00	31.81	25.49	7.72	39.92	112	56.00	-30.90	horizontal Average
6	1398.00	52.73	25.49	7.72	39.92	112	76.00	-29.98	horizontal Peak
7	1500.00	44.43	25.90	8.02	39.88	21	56.00	-17.53	horizontal Average
8	1500.00	53.42	25.90	8.02	39.88	21	76.00	-28.54	horizontal Peak

◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

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The authenticity of the test report, contact shchoi@kes.co.kr



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 : PNM-9020VP
Mode : DC 12 V
Memo : 1 ~ 3 GHz

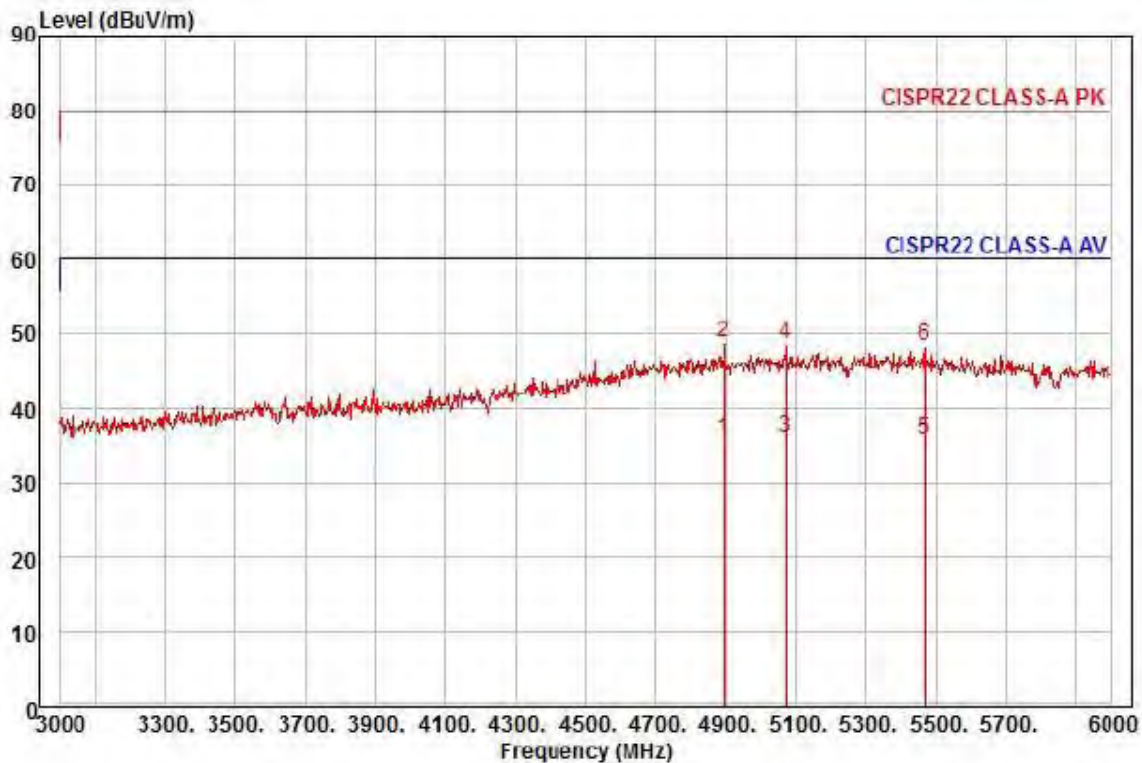
	Read	Ant	Cable	Preamp	TPos	Limit	Over		
Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1098.00	41.10	24.30	6.80	40.07	26	56.00	-23.87	vertical
2	1098.00	53.64	24.30	6.80	40.07	26	76.00	-31.33	vertical
3	1200.00	46.89	24.70	7.14	40.02	143	56.00	-17.29	vertical
4	1200.00	56.06	24.70	7.14	40.02	143	76.00	-28.12	vertical
5 pp	1300.00	54.36	25.10	7.43	39.97	8	56.00	-9.08	vertical
6 pk	1300.00	59.93	25.10	7.43	39.97	8	76.00	-23.51	vertical
7	1400.00	46.13	25.50	7.72	39.92	85	56.00	-16.57	vertical
8	1400.00	54.76	25.50	7.72	39.92	85	76.00	-27.94	vertical
9	1500.00	47.32	25.90	8.02	39.88	59	56.00	-14.64	vertical
10	1500.00	55.57	25.90	8.02	39.88	59	76.00	-26.39	vertical
11	1800.00	41.27	27.09	8.83	39.73	46	56.00	-18.54	vertical
12	1800.00	50.56	27.09	8.83	39.73	46	76.00	-29.25	vertical

◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

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The authenticity of the test report, contact shchoi@kes.co.kr



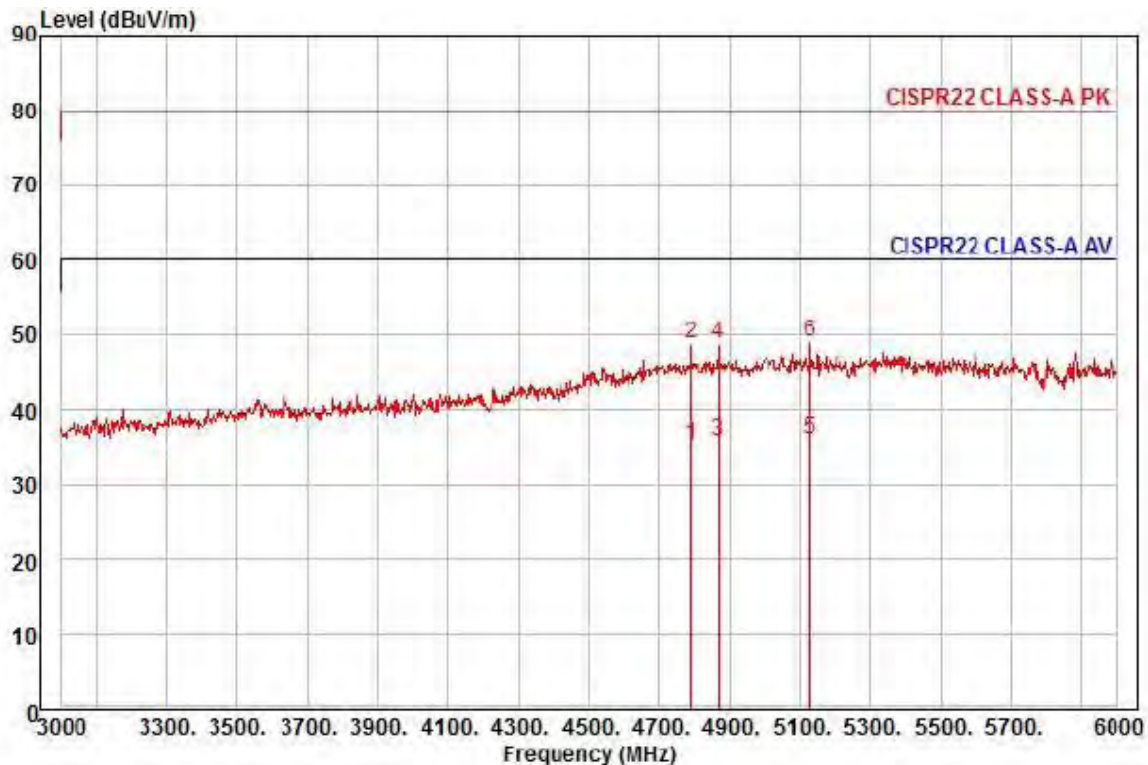
Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project : NETWORK CAMERA
Model : PNM-9020VP
Mode : DC 12 V
Memo : 3 ~ 6 GHz

	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	4896.00	23.99	37.13	15.20	40.41	141	60.00	-24.09	horizontal	Average
2 pk	4896.00	37.00	37.13	15.20	40.41	141	80.00	-31.08	horizontal	Peak
3 pp	5073.00	23.34	37.57	15.46	40.40	204	60.00	-24.03	horizontal	Average
4	5073.00	36.03	37.57	15.46	40.40	204	80.00	-31.34	horizontal	Peak
5	5469.00	23.31	36.77	16.14	40.34	149	60.00	-24.12	horizontal	Average
6	5469.00	35.82	36.77	16.14	40.34	149	80.00	-31.61	horizontal	Peak

◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor



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 : PNM-9020VP

Mode : DC 12 V

Memo : 3 ~ 6 GHz

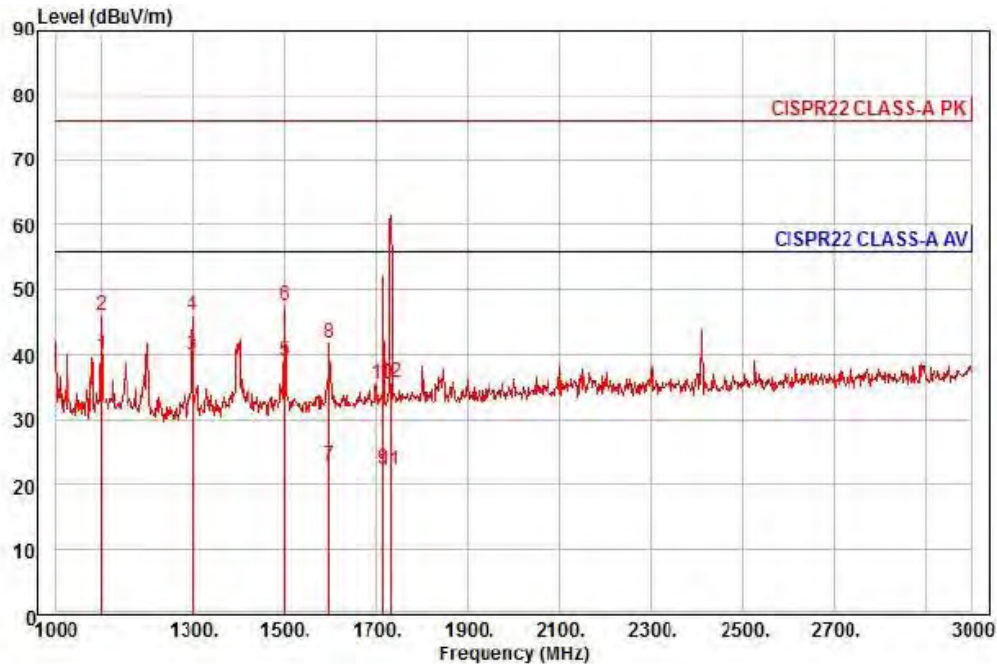
	Read	Ant	Cable	Preamp	TPos	Limit	Over		
Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	4788.00	24.18	36.51	15.07	40.41	138	60.00	-24.65	vertical
2	4788.00	37.52	36.51	15.07	40.41	138	80.00	-31.31	vertical
3	4869.00	24.14	36.97	15.17	40.41	1	60.00	-24.13	vertical
4	4869.00	37.06	36.97	15.17	40.41	1	80.00	-31.21	vertical
5 pp	5127.00	23.34	37.46	15.57	40.39	70	60.00	-24.02	vertical
6 pk	5127.00	36.53	37.46	15.57	40.39	70	80.00	-30.83	vertical

◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

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 : PNM-9020VP

Mode : PoE

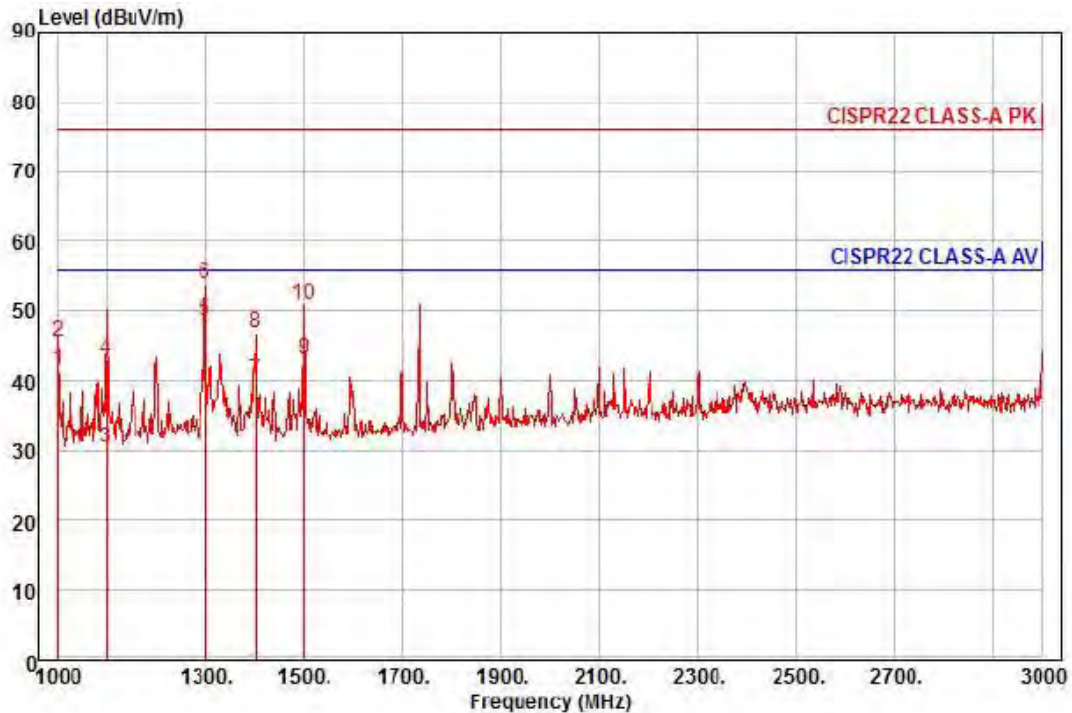
Memo : 1 ~ 3 GHz

	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 pp	1100.00	48.84	24.31	6.81	40.07	132	56.00	-16.11	horizontal	Average
2	1100.00	54.94	24.31	6.81	40.07	132	76.00	-30.01	horizontal	Peak
3	1300.00	47.33	25.10	7.43	39.97	331	56.00	-16.11	horizontal	Average
4	1300.00	53.57	25.10	7.43	39.97	331	76.00	-29.87	horizontal	Peak
5	1500.00	44.99	25.90	8.02	39.88	7	56.00	-16.97	horizontal	Average
6 pk	1500.00	53.52	25.90	8.02	39.88	7	76.00	-28.44	horizontal	Peak
7	1598.00	28.41	26.28	8.31	39.83	247	56.00	-32.83	horizontal	Average
8	1598.00	47.26	26.28	8.31	39.83	247	76.00	-33.98	horizontal	Peak
9	1716.00	26.86	26.75	8.61	39.77	16	56.00	-33.55	horizontal	Average
10	1716.00	39.90	26.75	8.61	39.77	16	76.00	-40.51	horizontal	Peak
11	1732.00	26.72	26.82	8.65	39.76	221	56.00	-33.57	horizontal	Average
12	1732.00	40.14	26.82	8.65	39.76	221	76.00	-40.15	horizontal	Peak

Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor



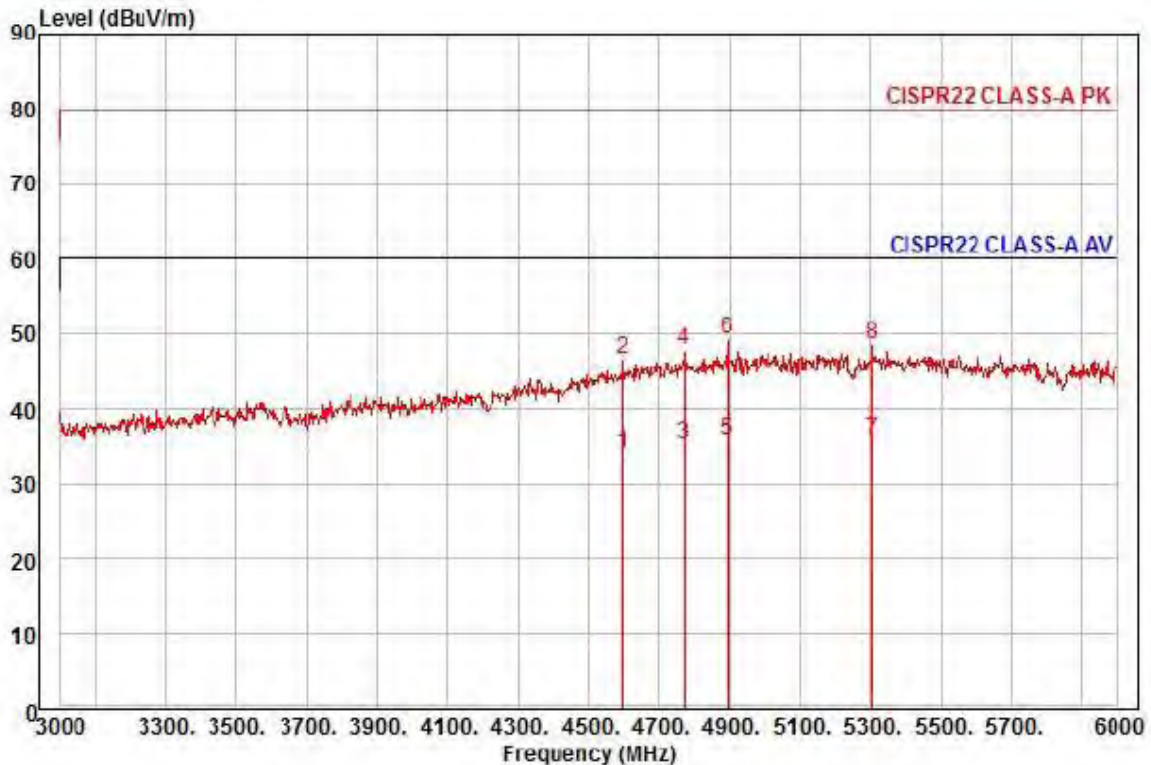
Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project : NETWORK CAMERA
Model : PNM-9020VP
Mode : PoE
Memo : 1 ~ 3 GHz

	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	1000.00	51.34	23.91	6.48	40.12	170	56.00	-14.39	vertical	Average
2	1000.00	55.26	23.91	6.48	40.12	170	76.00	-30.47	vertical	Peak
3	1098.00	39.46	24.30	6.80	40.07	19	56.00	-25.51	vertical	Average
4	1098.00	52.15	24.30	6.80	40.07	19	76.00	-32.82	vertical	Peak
5 pp	1300.00	55.88	25.10	7.43	39.97	359	56.00	-7.56	vertical	Average
6 pk	1300.00	61.48	25.10	7.43	39.97	359	76.00	-21.96	vertical	Peak
7	1400.00	46.96	25.50	7.72	39.92	59	56.00	-15.74	vertical	Average
8	1400.00	53.63	25.50	7.72	39.92	59	76.00	-29.07	vertical	Peak
9	1500.00	49.20	25.90	8.02	39.88	42	56.00	-12.76	vertical	Average
10	1500.00	56.89	25.90	8.02	39.88	42	76.00	-25.07	vertical	Peak
11	1734.00	0.00	26.82	8.66	39.76	359	76.00	-80.28	vertical	Peak

◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) horizontal
: RBW:1000.000kHz VBN:1000.000kHz SWT:Auto
Project : NETWORK CAMERA
Model : PNM-9020VP
Mode : PoE
Memo : 3 ~ 6 GHz

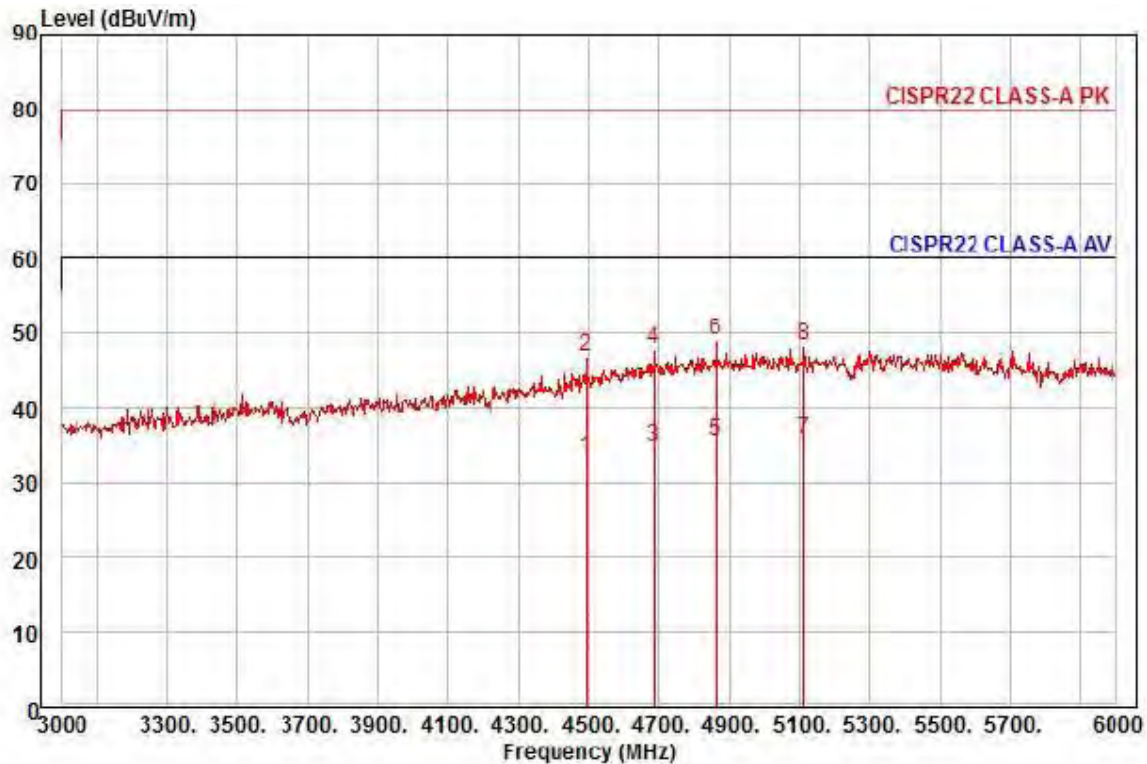
	Read	Ant	Cable	Preamp	TPos	Limit	Over		
Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	4596.00	24.50	35.41	14.65	40.41	159	60.00	-25.85	horizontal Average
2	4596.00	36.91	35.41	14.65	40.41	159	80.00	-33.44	horizontal Peak
3	4770.00	24.22	36.41	15.03	40.41	215	60.00	-24.75	horizontal Average
4	4770.00	36.88	36.41	15.03	40.41	215	80.00	-32.09	horizontal Peak
5	4896.00	23.91	37.13	15.20	40.41	317	60.00	-24.17	horizontal Average
6 pk	4896.00	37.31	37.13	15.20	40.41	317	80.00	-30.77	horizontal Peak
7 pp	5304.00	23.22	37.11	15.88	40.37	262	60.00	-24.16	horizontal Average
8	5304.00	36.06	37.11	15.88	40.37	262	80.00	-31.32	horizontal Peak

◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

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The authenticity of the test report, contact shchoi@kes.co.kr



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 : PNM-9020VP
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	4494.00	24.54	34.83	14.45	40.41	255	60.00	-26.59	vertical	Average
2	4494.00	37.86	34.83	14.45	40.41	255	80.00	-33.27	vertical	Peak
3	4686.00	24.44	35.93	14.85	40.41	130	60.00	-25.19	vertical	Average
4	4686.00	37.37	35.93	14.85	40.41	130	80.00	-32.26	vertical	Peak
5	4863.00	23.87	36.94	15.17	40.41	115	60.00	-24.43	vertical	Average
6 pk	4863.00	37.27	36.94	15.17	40.41	115	80.00	-31.03	vertical	Peak
7 pp	5112.00	23.11	37.49	15.54	40.39	260	60.00	-24.25	vertical	Average
8	5112.00	35.75	37.49	15.54	40.39	260	80.00	-31.61	vertical	Peak

◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor



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				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
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31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

**KES Co., Ltd.**

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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:
KES-E1-16T0489-R2
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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				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

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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 Setup Photos and Configuration

Conducted Voltage Emissions

N/A

N/A

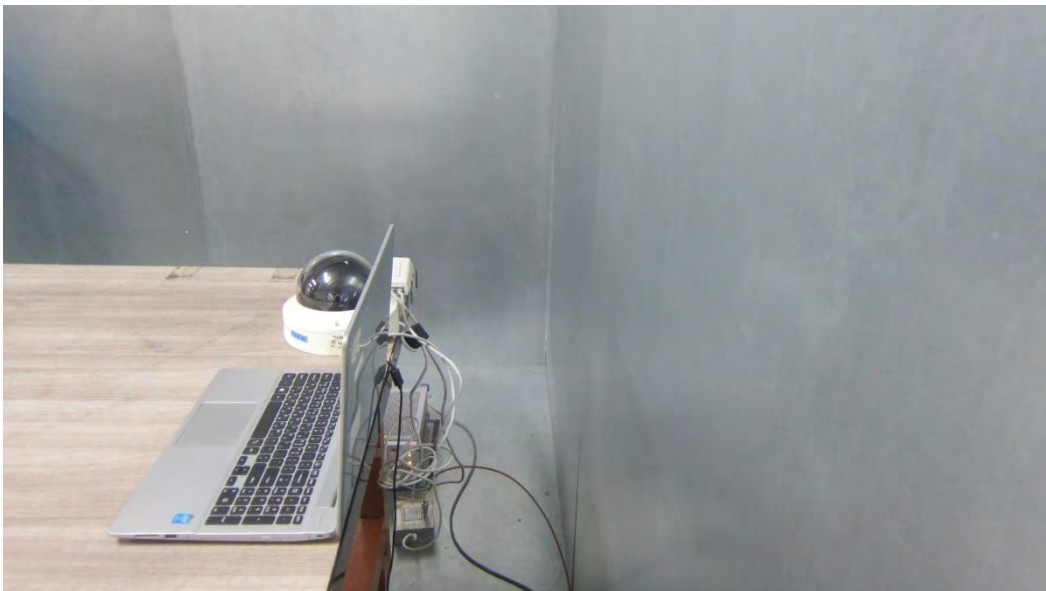
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Conducted Telecommunication Emissions

■ DC 12 V Mode



■ PoE Mode



Radiated Electric Field Emissions(Below 1 GHz)

■ DC 12 V Mode



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■ PoE Mode



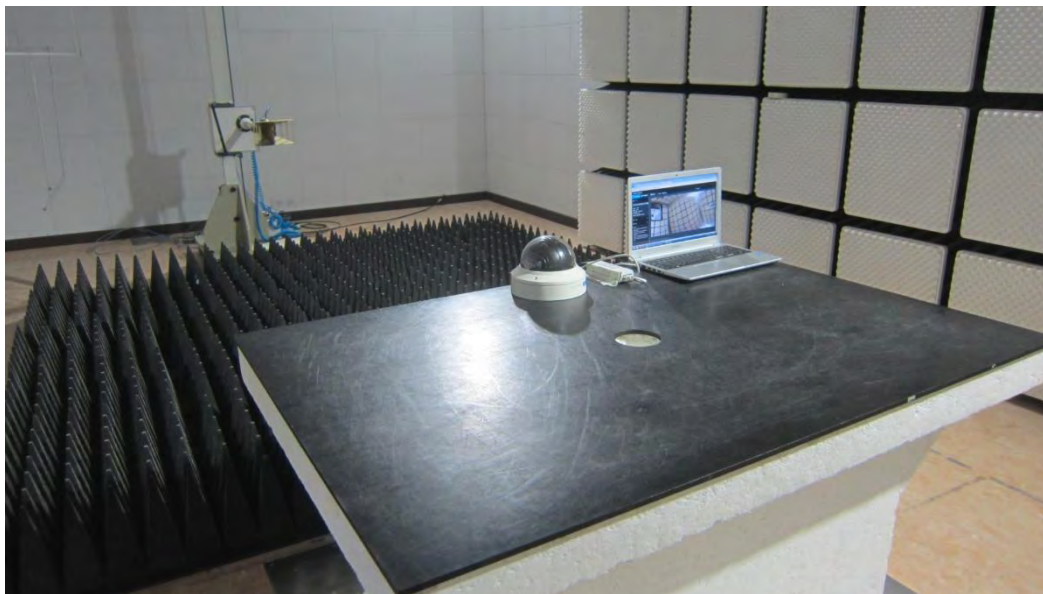
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Radiated Electric Field Emissions(Above 1 GHz)

■ DC 12 V Mode



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■ PoE Mode

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Harmonic Current Emissions and Voltage Fluctuations and Flicker

N/A

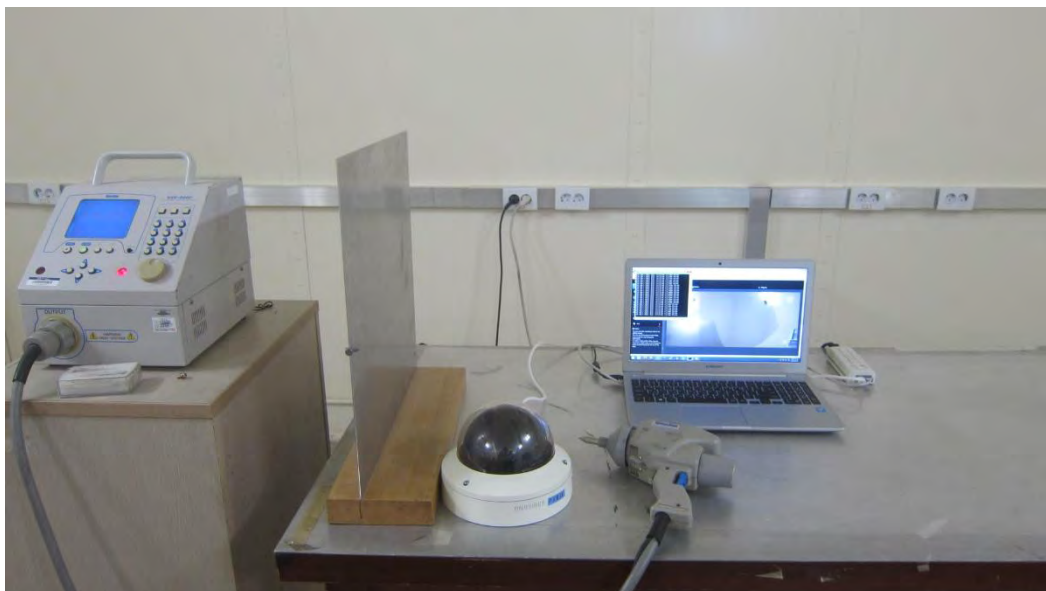
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Electrostatic Discharge

■ DC 12 V Mode



■ PoE Mode



Radiated Electric Field Immunity

■ DC 12V Mode



■ PoE Mode



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Electrical Fast Transients/Bursts

■ DC 12 V Mode



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■ PoE Mode

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Surge Transients

■ DC 12 V Mode



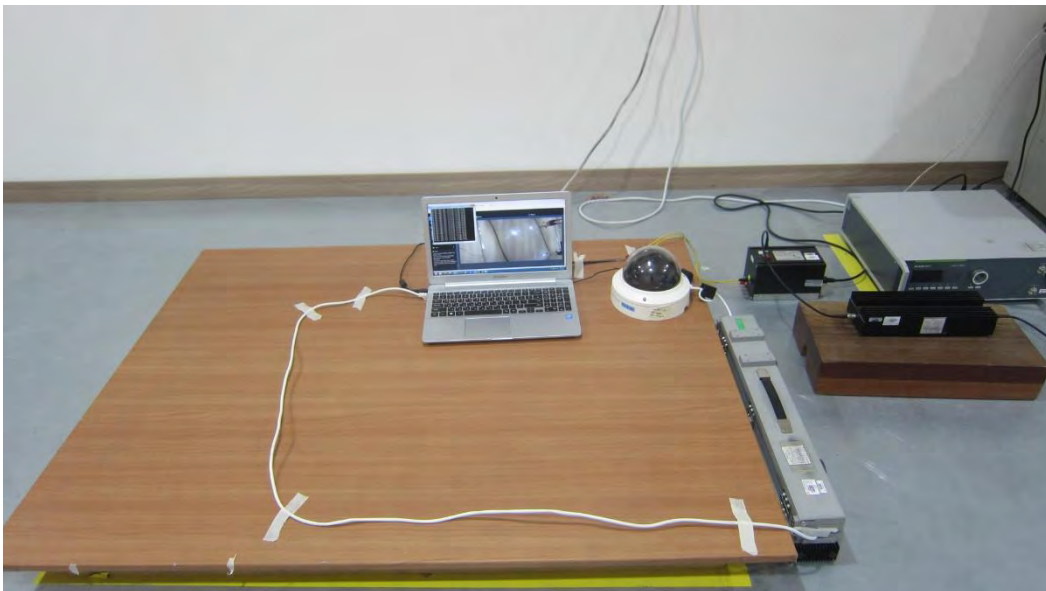
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■ PoE Mode



Conducted Disturbance

■ DC 12 V 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)

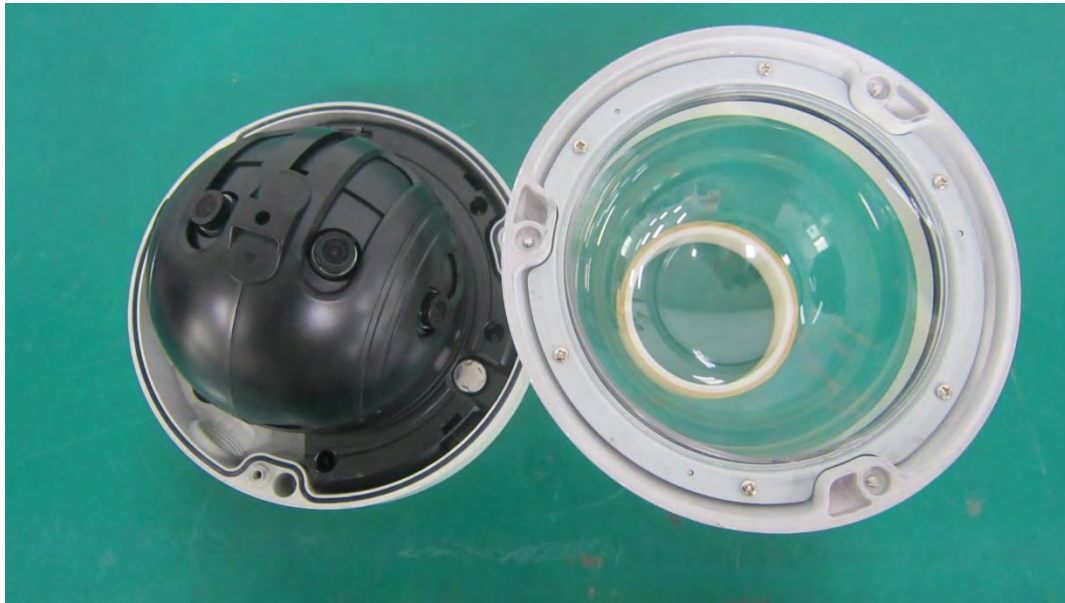


(Bottom)



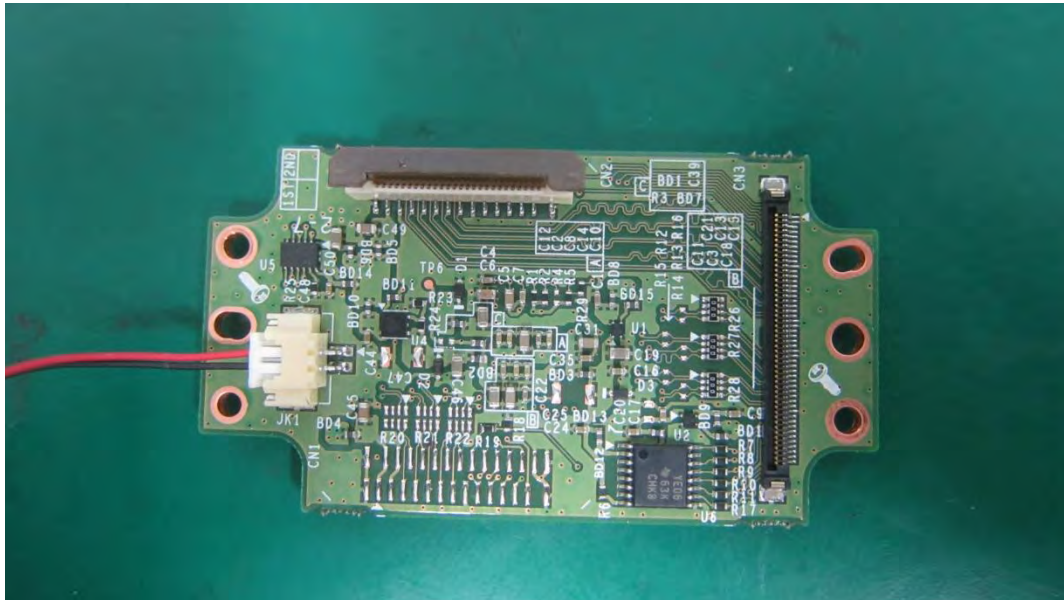
EUT Internal Photographs

(Internal View)

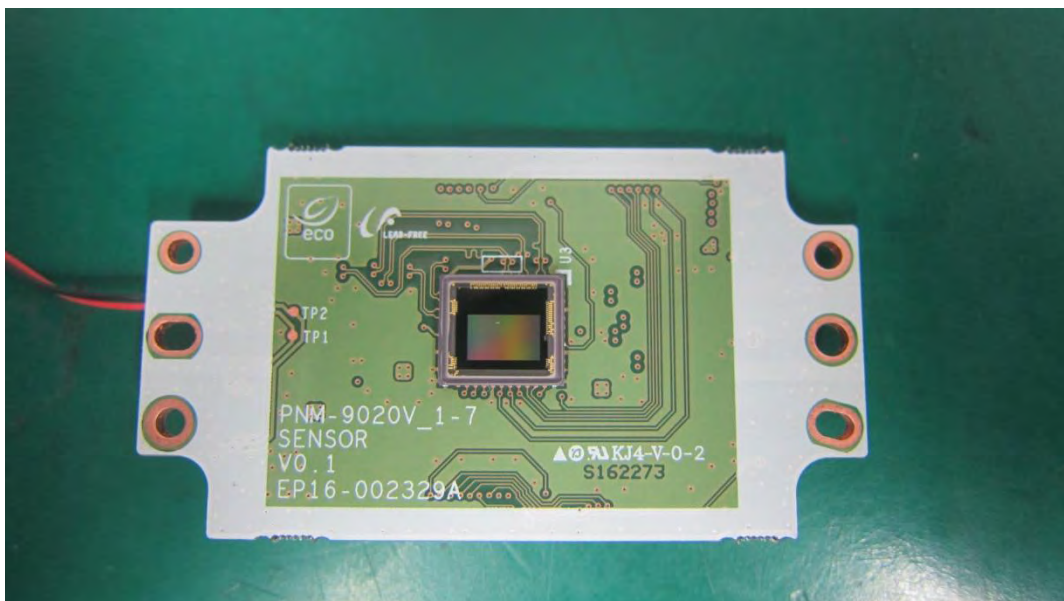


EUT Internal View – Lens board

(Top)



(Bottom)



EUT Internal View – Sub Board 1

(Top)

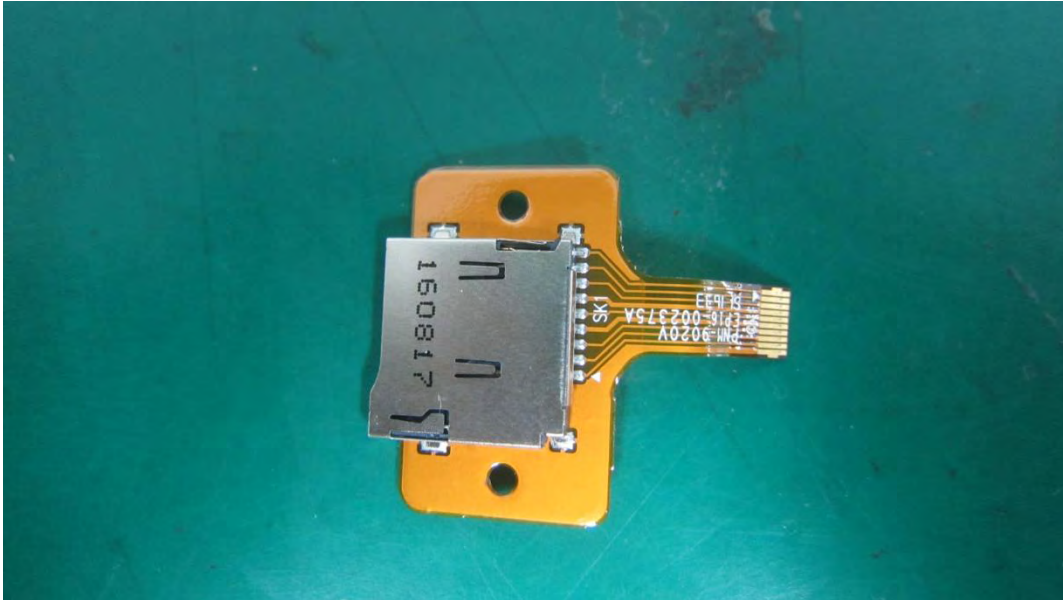


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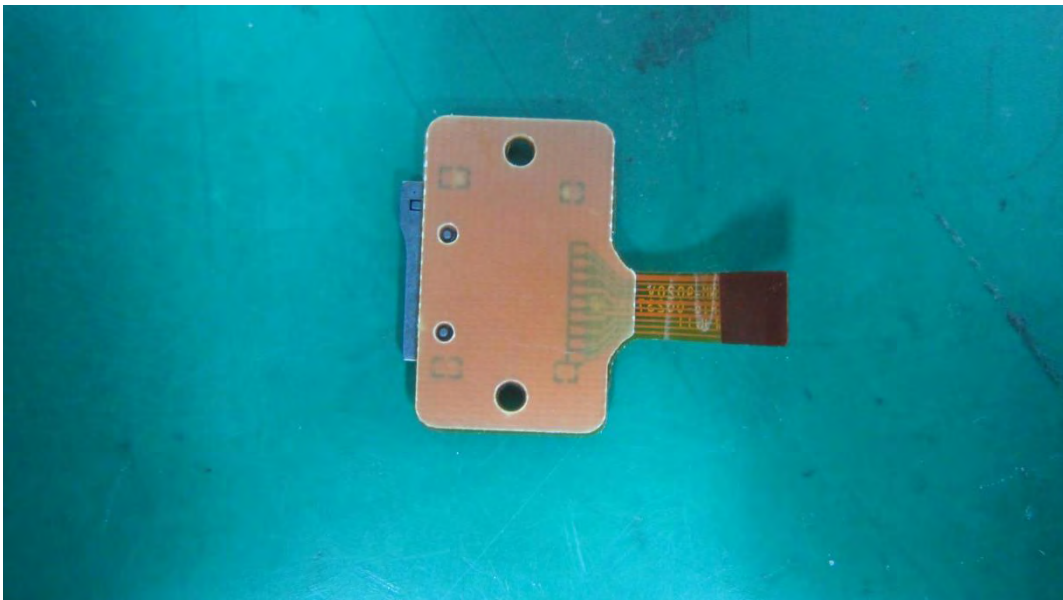


EUT Internal View – Sub Board 2

(Top)

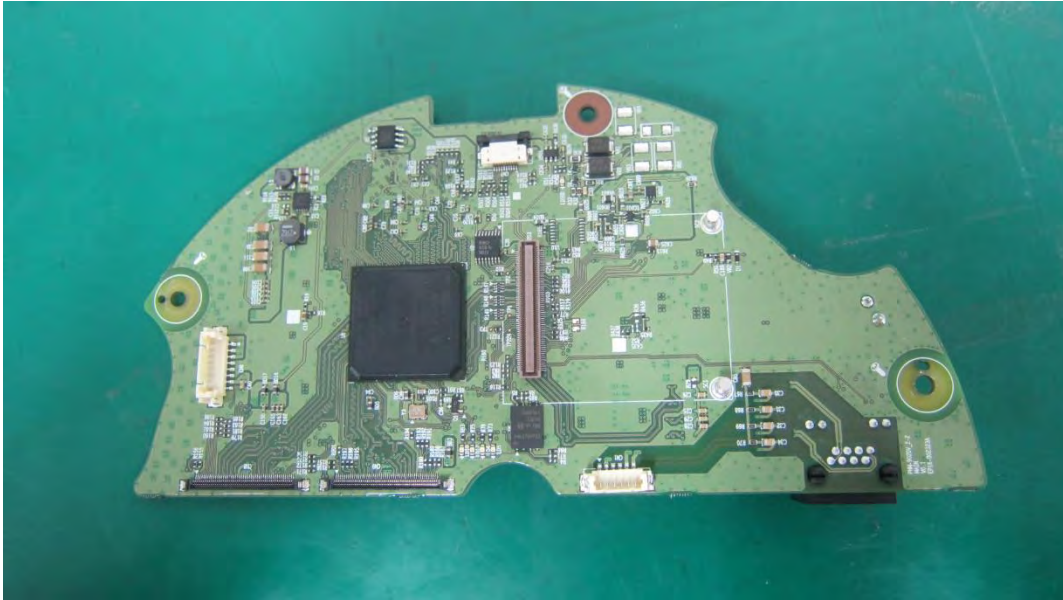


(Bottom)

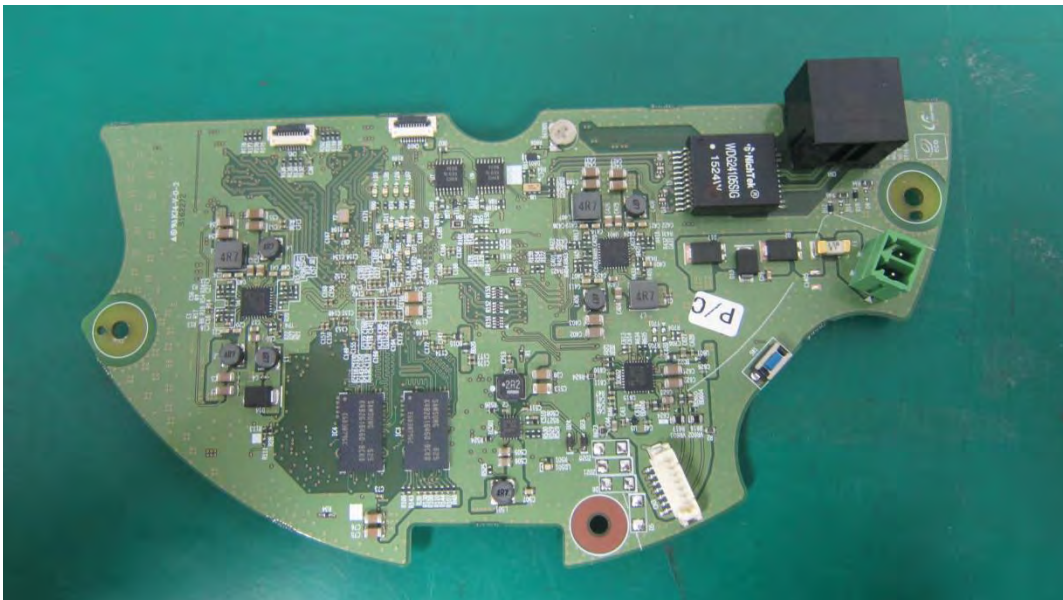


EUT Internal View – Sub Board 3

(Top)



(Bottom)



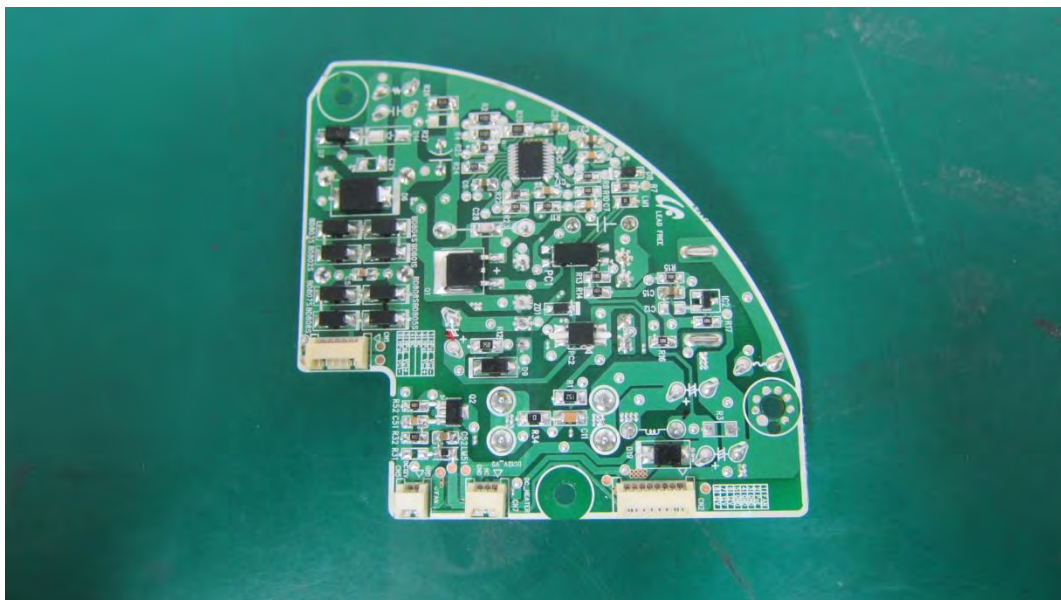
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EUT Internal View – Sub Board 4

(Top)



(Bottom)



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Label and Location



CCTV CAMERA

Model No : PNM-9020V

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

Made in of China

