



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-E1-16T0300-R1

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EMC TEST REPORT For CE

Test Report No. : KES-E1-16T0300-R1

Date of Issue : Mar. 06, 2019

Product name : NETWORK CAMERA

Model/Type No. : PNF-9010RVM

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 : Jun. 15, 2016

Test date : Jun. 25, 2016 – Jul. 02, 2016 / Mar. 05, 2019

Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Dae Hyun, Kim
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Jul. 05, 2016	KES-E1-16T0300	Issued
Mar. 06, 2019	KES-E1-16T0300-R1	Reissue due to Radiated Electric Field Emissions(Above 1 GHz) retest. Modify the Model name, Manufacturer and address.

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1.0 General Product Description

Main Specifications of E.U.T are:

PNF-9010RVM	
Video	
Imaging Device	1/1.7"
Total Pixels	4168x3062
Effective Pixels	2992x2992
Scanning System	Progressive
Min. Illumination	Color : 0.7Lux(F2.8, 30IRE) B/W : 0 Lux (IR LED On)
S / N Ratio	50dB
Video Out	CVBS : 1.0Vpp DIP connector type
Lens	
Focal Length (Zoom Ratio)	1.98mm
Max. Aperture Ratio	F2.8
Angular Field of View	H : 180° / V : 180° / D : 180°
Min. Object Distance	0.3m ~ Infinity
Focus Control	ABF
Lens Type	Fixed Lens
Mount Type	Board Type (M12)
Operational	
Viewable Length	15m
Camera Title	Off / On (Displayed up to 20 characters per line) - W/W : English/Numeric/Special Characters - China : English/Numeric/Special/Chinese Characters - Common : Multi-line (Max 5), Color (Grey/Green/Red/Blue/Black/White), Transparency, Auto Scale by Resolution
Day & Night	True D&N
Backlight Compensation	BLC / WDR
Wide Dynamic Range	120dB
Contrast Enhancement	SSDR (Samsung Super Dynamic Range) (Off / On)
Digital Noise Reduction	DNR(2D+3D Noise Filter), Function Name : SSNR
Digital Image Stabilization	Not support
Defog	Support
Motion Detection	Off / On (8ea Polygonal zones)
Privacy Masking	Off / On (16ea Polygonal zones)
People counting	In/Out counting support (overhead), Statistic report support
Heatmap	Color histogram, Statistic report support
Gain Control	Off / Low / Middle / High
White Balance	ATW / AWC / Manual / Indoor / Outdoor (included Mercury)
Electronic Shutter Speed	2 ~ 1/12,000 sec
Digital Zoom	16x, Digital PTZ(Preset, Group)
Flip / Mirror	Off / On
Intelligent Video Analytics	Tampering(Scene Change), People counting, Heatmap, Virtual Line, Enter/Exit, Appear / Disappear, Audio Detection
Alarm I/O	Input 1ea / Output 1ea
Audio In	Line in/out Built-in Mic
Audio out	Line out
Alarm Triggers	Motion detection, Tampering, Audio Detection, Alarm input, Network-Disconnection, Defocus detection
Alarm events	File upload via FTP and E-Mail Notification via E-Mail, TCP and HTTP local storage(SD/SDHC/SDXC) or NAS recording at Event (Alarm Triggers) External output
View Composition	<Camera Side> 360 source view 180° Panorama 360° Panorama Double Panorama 360+4 PTZ view 180+4 PTZ view Quad PTZ view View 1/2/3/4 360+8 PTZ view

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Network		
Ethernet		M12 cable
Video Compression Format		H.265 / H.264 (MPEG-4 Part 10/AVC), Motion JPEG
Resolution	Original View	Max 12MP TBD
	Dewarped View	Max 9M
Max. Frame Rate	H.265	12M 20fps, 9M 25fps
	H.264	12M 20fps, 9M 25fps
	MJPEG	Max 15fps at all resolutions
Smart Codec		WiseStream
Video Quality Adjustment		H.264/H.265 : Target Bitrate Level Control MJPEG : Quality 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
IP		IPv4, IPv6
Protocol		TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP, RTSP, NTP, HTTP, HTTPS, SSL, DHCP, PPPoE, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, PIM-SM, UPnP, Bonjour, SIP
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		micro SD/SDHC/SDXC (128GB) - motion Images recorded in the SDX/SDHC/SD memory card can be downloaded. NAS(Network Attached Storage) Local PC
Application Programming Interface		ONVIF Profile S/G SUNAPI(HTTP API) v2.0 Samsung techwin open platform
Webpage Language		English, French, German, Spanish, Italian, Chinese, Korean, Russian, Japanese, Swedish, Portuguese, Turkish, Polish, Czech, Dutch, 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		SSM, Smart Viewer
Pixel counter		support (plug-in viewer only)
Environmental		
Operating Temperature / Humidity		SNF-9010RVM : -40°C ~ +55°C(+14°F ~ +131°F) / Less than 90% RH TBD * Startup should be done at above -20°C
Storage Temperature / Humidity		-30°C ~ +60°C (-22°F ~ +140°F) / Less than 90% RH
Ingress Protection		IP66
Vandal Resistance		IK10
Standard Certification		SNV-L6014RM과 동일
Electrical		
Input Voltage / Current		DC12V±10%, PoE(IEEE802.3af, Class3)
Power Consumption		DC12V: TBD, PoE: TBD
Mechanical		
Color / Material		Ivory/Metal
Dimension (WxHxD)		TBD
Weight		TBD

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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	PNF-9010RVM	-	Hanwha Techwin (Tianjin) Co.,Ltd.	E.U.T

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
AC/DC Adapter	2ACB022F	-	Channel Well Technology	
PoE Adapter	RP-PEG048I	-	REPOTEC	KES-E1-16T0300
Notebook	HP ProBook 4430s	CNU2084CVW	HP	
Notebook Adapter	Series PPP00H	F12921201063695	CHICONY POWER TECHNOLOGY (SUZHOU) CO.,LTD,	
Monitor	SMT-2232	C95V67VF900038B	Weihai Daewoo Electronics Co., Ltd.	
Speaker	BR10000A CUVE	SN128458950887	BEIJING EDIFIER HI-TECH GROUP.	
Alarm Jig	-	-	-	
Mobile Phone	A1688	-	Apple	KES-E1-16T0300
Mobile Phone	A1429	-	Apple	KES-E1-16T0300-R1
PoE Adaper	POE 36U-1AT-R	P90215791A1	PHIHONG	KES-E1-16T0300-R1

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)	3.0	U
	BNC	Monitor	BNC	4.0	S
	Audio In	Mobile Phone	Audio Out	1.7	U
	Audio Out	Speaker	Audio In	1.6	U
	Alarm	Alarm Jig	Alarm	3.0	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)	3.5	U
PoE Adapter	RJ-45(LAN)	Notebook	RJ-45(LAN)	1.7	U
NETWORK CAMERA (E.U.T)	BNC	Monitor	BNC	4.0	S
	Audio In	Mobile Phone	Audio Out	1.7	U
	Audio Out	Speaker	Audio In	1.6	U
	Alarm	Alarm Jig	Alarm	3.0	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:

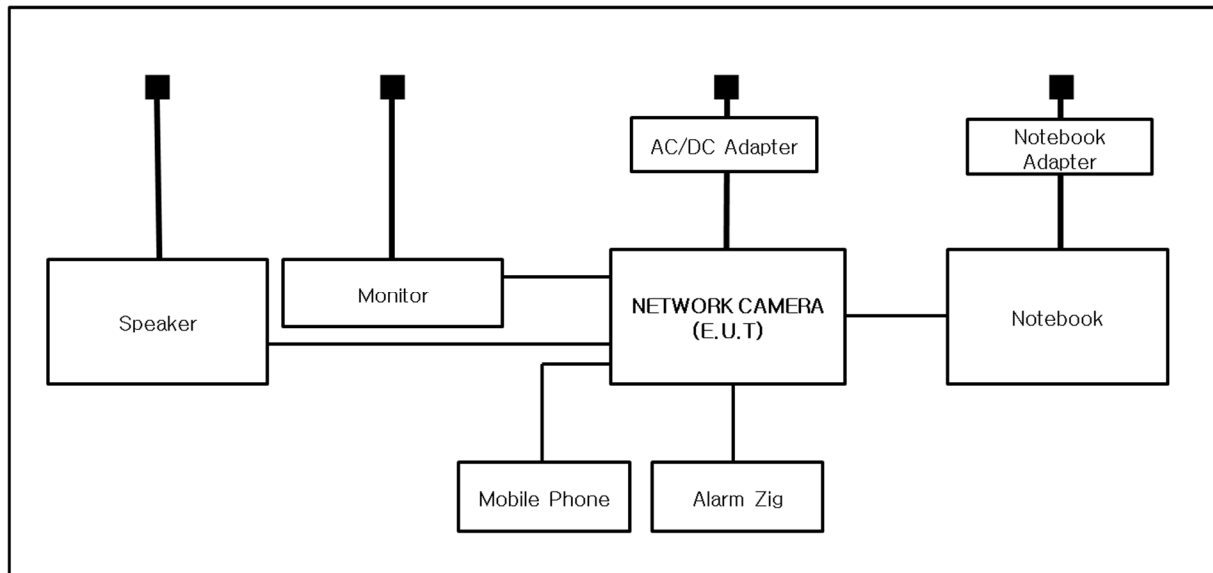
Test mode	Normal operating
OP	MONITORING PING TEST

-PoE Mode : Input power condition during measurements was PoE

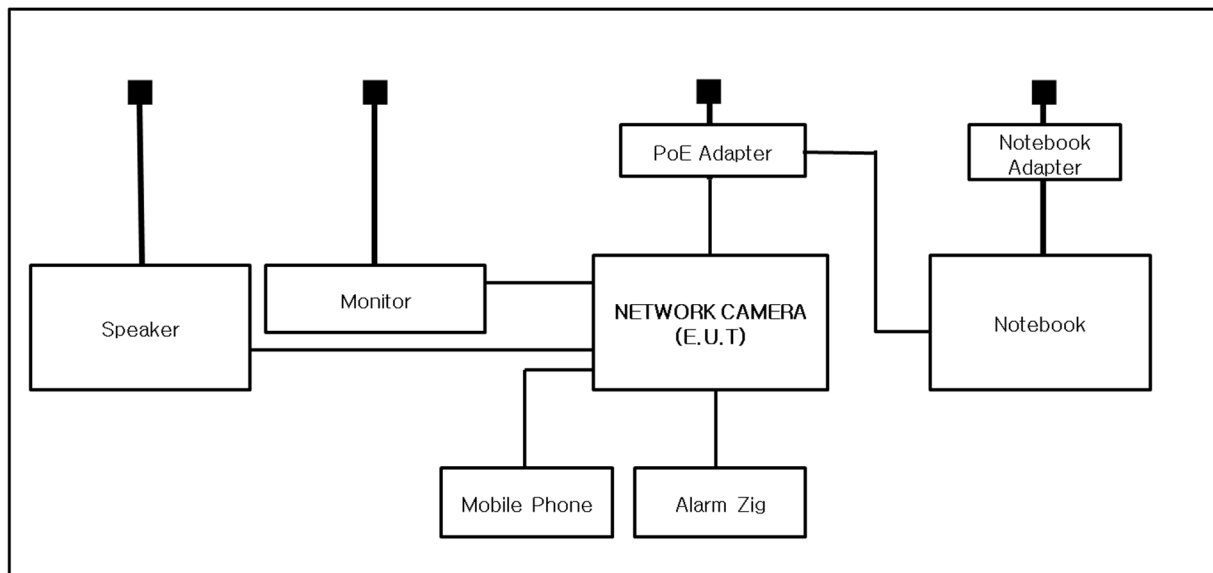
1.8 Configuration

■ 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-Aechoic 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-Aechoic Chamber , and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KT489
USA	FCC	3 m & 10 m Semi-Aechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Aechoic 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-Aechoic 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 55022:2010

☐ Class A

☐ Class B

☐ EN 55024:2010

☐ EN 50130-4:2011 +A1:2014

☒ EN 50121-3-2:2016

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



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- | | | |
|---|----------------------------------|----------------------------------|
| ☐ VCCI V-3 / 2015.04 | ☐ Class A | ☐ Class B |
| ☐ AS/NZS CISPR22:2009 +A1:2010 | ☐ Class A | ☐ Class B |
| ☐ 47 CFR Part 15, Subpart B | | |
| ☐ CISPR 22:2009 +A1:2010 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2009 | | |
| ☐ IC Regulation ICES-003 : 2016 | | |
| ☐ CAN/CSA CISPR 22-10 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2014 | | |
|
 | | |
| ☐ RE- Directive 2014/53/EU | | |
| ☐ 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

Jun. 29, 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, 03, 2017
☒	LISN	ENV216	R&S	101137	02, 04, 2017
☒	LISN	ENV216	R&S	101786	05, 02, 2017
☒	Electro wave Shieldroom	-	SEMITEC	-	-

Test Conditions

Temperature: 23,9 °C

Relative Humidity: 49,4 %

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

RemarksSee Appendix A for test data.

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2.2 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Jun. 30, 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, 03, 2017
☒	Trilog-Broadband Antenna	VULB 9163	SCHWARZBECK	9163-713	05, 15, 2017
☒	Open Area Test Site	-	KES	-	-
☒	Antenna Mast	-	DAEIL EMC	-	-
☒	Turn Table	-	DAEIL EMC	-	-

Test Conditions

Temperature: 30,1 °C

Relative Humidity: 54,0 %

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

RemarksSee Appendix A for test data.

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2.3 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Mar. 05, 2019

Test Location

SEMI ANECHOIC CHAMBER #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESR7	R & S	101190	08, 06, 2019
☒	PREAMPLIFIER	8449B	AGILENT	3008A01967	05, 31, 2019
☐	ATTENUATOR	8491A	HP	35496	03, 21, 2019
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 02, 2019

Test Conditions

Temperature: 22,1 °C
Relative Humidity: 42,3 % R.H.

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

RemarksSee Appendix A for test data.

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2.4 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.

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2.5 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 PoE power, limits are not specified.

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3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

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

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

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

Performance criterion A: The apparatus shall continue to operate as intended during and after the test.

No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

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

Performance criterion B: The apparatus shall continue to operate as intended after the test.

No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

No change of actual operating state or stored data is allowed. If the minimum performance level of the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

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

3.1 Electrostatic Discharge

Reference Standard

EN 61000-4-2:2009

Test Date

Jun. 27, 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: 24,9 °C
Relative Humidity: 42,1 %
Atmospheric Pressure: 99,0 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
25 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: ☒ B

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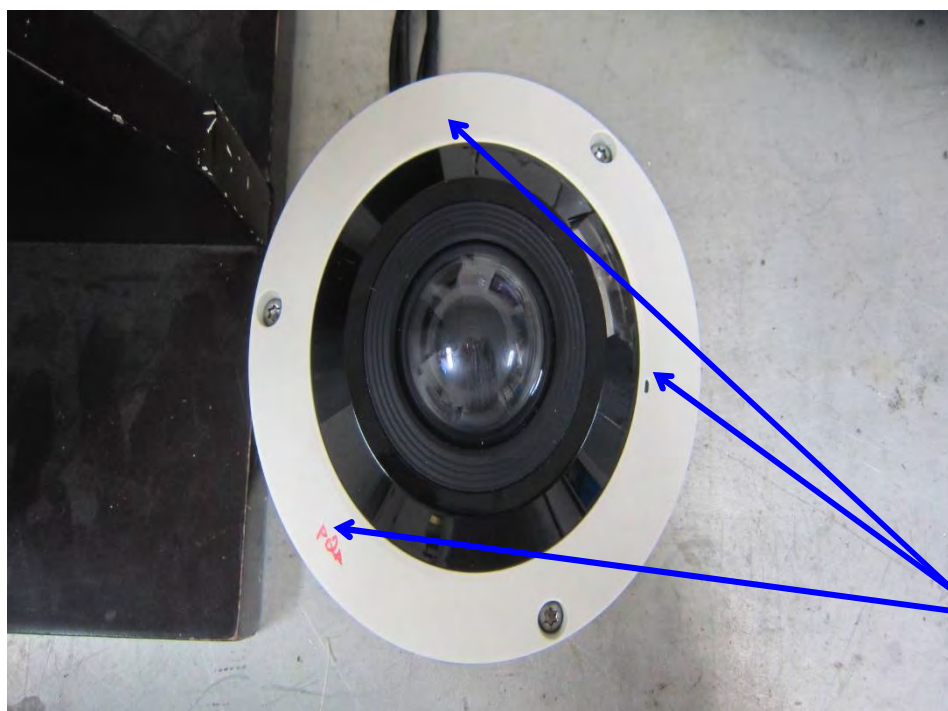
Location of Discharge:

- DC 12 V, PoE Mode

Air
Contact

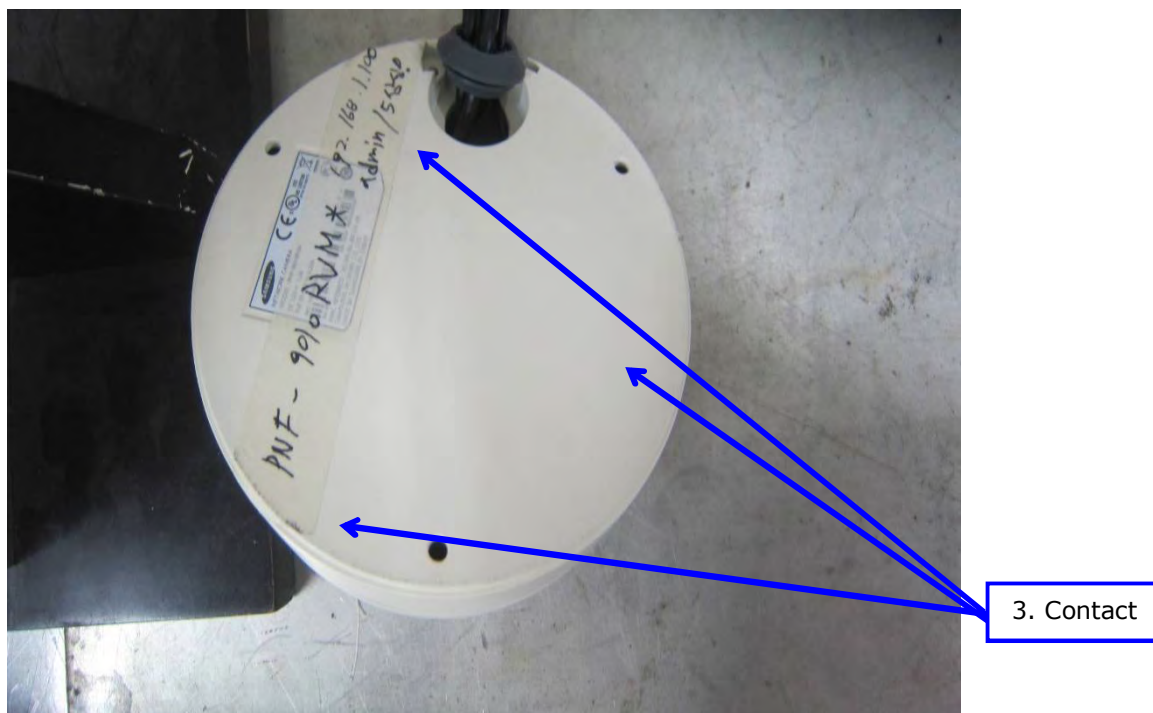


1. Contact



2. Contact

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

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

Direct Discharge

No.	Test Point	Discharge Method	Observation	Remarks
1	Enclosure 1	Contact Discharge	A	-
2	Screw	Contact Discharge	A	-
3	Enclosure 2	Contact Discharge	A	-

- PoE Mode**Indirect Discharge**

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

Direct Discharge

No.	Test Point	Discharge Method	Observation	Remarks
1	Enclosure 1	Contact Discharge	A	-
2	Screw	Contact Discharge	A	-
3	Enclosure 2	Contact Discharge	A	-

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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3.2 Radiated Electric Field Immunity

Reference Standard

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

Test Date (Dt&C Co., Ltd.)

Jul. 04, 2016

Test Location (Dt&C Co., Ltd.)EMS-RS: ☒ DIGITAL EMC Lab**Test Equipment (Dt&C Co., Ltd.)**

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Signal generator	SML03	R&S	100647	02.24.2017
☒	Power meter	NRVD	R&S	100403	02.24.2017
☒	Antenna	VULP 9118E	SCHWARZBECK	754	-
☒	Power Amplifier	MT200	PRANA	1102	-

Test Conditions (Dt&C Co., Ltd.)

Temperature: 22,4 °C
Relative Humidity: 48,1 %
Atmospheric Pressure: 100,0 kPa

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Test Specifications

Antenna Polarization: Horizontal & vertical unless indicated otherwise

Antenna Distance: ☒ 3 m

Field Strength: ☒ 3 V/m ☒ 5 V/m
☒ 10 V/m ☒ 20 V/m

Frequency Range: ☒ 80 MHz to 800 MHz ☒ 800 MHz to 1 GHz
☒ 1,4 GHz to 2,0 GHz ☒ 2,0 GHz to 2,7 GHz
☒ 5,1 GHz to 6,0 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: ☒ A

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Test Data (Dt&C Co., Ltd.)

- DC 12 V Mode

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

- PoE Mode

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

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
☐ NOT APPLICABLE

Remarks

PASS Required Performance Criteria.

3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Jun. 29, 2016

Test Location

EMS-EFT: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Transient Test System	TRA3000F-S-D-V	EMC PARTNER AG	1524	03, 25, 2017
☒	MotorVariac	VAR-EXT1000	EMC PARTNER AG	1507	03, 25, 2017
☒	Capacitive Coupling Clamp	CN-EFT1000	EMC PARTNER AG	1528	03, 25, 2017

Test Conditions

Temperature: 24,5 °C
Relative Humidity: 48,4 %
Atmospheric Pressure: 99,2 kPa

Test Specifications

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

Pulse Amplitude & Polarity:
(Signal Lines) ☐ ± 0.5 kV ☐ ± 1.0 kV
☒ ± 2.0 kV

Burst Period: ☒ 300 ms ☐ 2 s

Repetition Rate: ☒ 5 klz ☐ 100 klz

Duration of Test Voltage: ☒ ≥ 1 min

Required Performance Criteria: ☒ A

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Test Data

- DC 12 V Mode

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

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

☐ 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 (LAN)	A	A
BNC	A	A
Alarm	A	A

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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)	A	A
BNC	A	A
Alarm	A	A

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

Jul. 01, 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	06, 27, 2017
☒	Motor Variac	MV2616	EM TEST	V0936105123	06, 27, 2017
☒	CDN	CNV 508N1	EM TEST	P1551168979	04, 27, 2017
☐	CDN	CNV 508T5	EM TEST	P1549168422	04, 27, 2017

Test Conditions

Temperature: 23,7 °C
Relative Humidity: 53,4 %
Atmospheric Pressure: 99,7 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: ☒ B

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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: ☒ B

Test Data

- DC 12 V Mode

☒ Line to Line – Differential Mode

Mode of Application	OBSERVATIONS	
	(+) Surge (kV)	(-) Surge (kV)
L - N	A	A

☐ 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 (LAN)	A	A
BNC	A	A
Alarm	A	A

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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)	A	A
BNC	A	A
Alarm	A	A

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 61000-4-6:2014

Test Date

Jun. 25, 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: 24,2 °C
Relative Humidity: 45,5 %
Atmospheric Pressure: 98,3 kPa

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Test Specifications

Frequency range:

☒ 150 kHz to 80 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: ☒ A**Test Data**

- DC 12 V Mode

☒ Input a.c. power ports

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

☐ Input d.c. power ports

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

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observation
RJ-45 (LAN)	EM Injection Clamp	A
BNC	EM Injection Clamp	A
Alarm	EM Injection Clamp	A

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- 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

Coupling Location (Line Stressed)	Coupling Method	Observation
RJ-45 (PoE)	EM Injection Clamp	A
BNC	EM Injection Clamp	A
Alarm	EM Injection Clamp	A

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.

APPENDIX A – TEST DATA

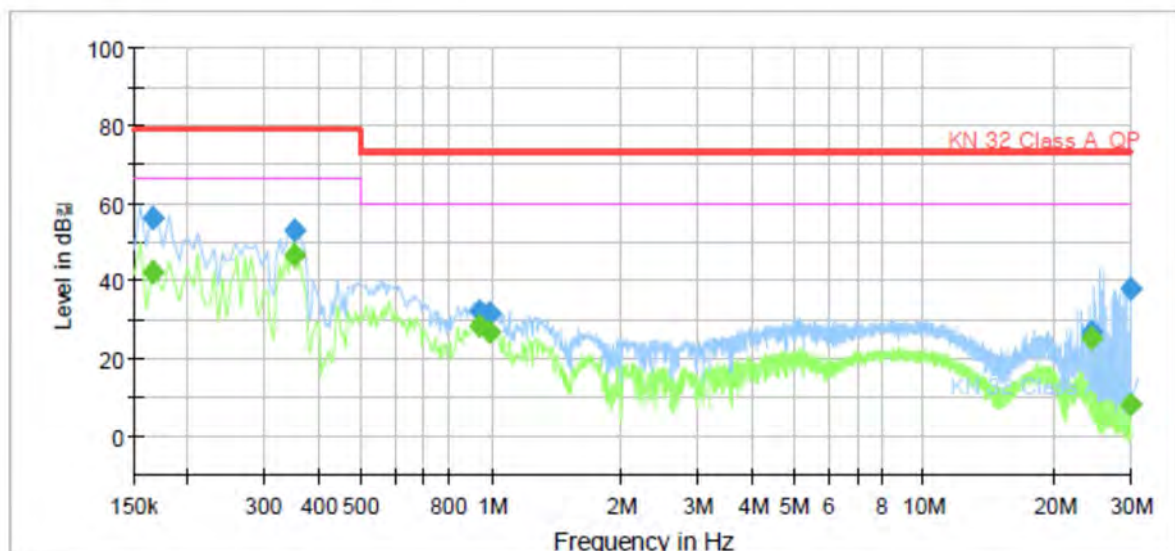
Conducted Emissions at Mains Power Ports

- DC 12 V Mode

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	PNF-9010RVMP
Mode	DC 12 V
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.165000	---	42.37	66.00	23.63	1000.0	9.000	L1	9.7
0.165000	55.97	---	79.00	23.03	1000.0	9.000	L1	9.7
0.350000	---	46.82	66.00	19.18	1000.0	9.000	L1	9.7
0.350000	52.98	---	79.00	26.02	1000.0	9.000	L1	9.7
0.935000	---	28.41	60.00	31.59	1000.0	9.000	L1	9.7
0.935000	32.57	---	73.00	40.43	1000.0	9.000	L1	9.7
0.995000	---	27.16	60.00	32.84	1000.0	9.000	L1	9.7
0.995000	31.75	---	73.00	41.25	1000.0	9.000	L1	9.7
24.350000	---	25.65	60.00	34.35	1000.0	9.000	L1	10.2
24.350000	26.94	---	73.00	46.06	1000.0	9.000	L1	10.2
29.985000	---	8.51	60.00	51.49	1000.0	9.000	L1	10.3
29.985000	38.16	---	73.00	34.84	1000.0	9.000	L1	10.3

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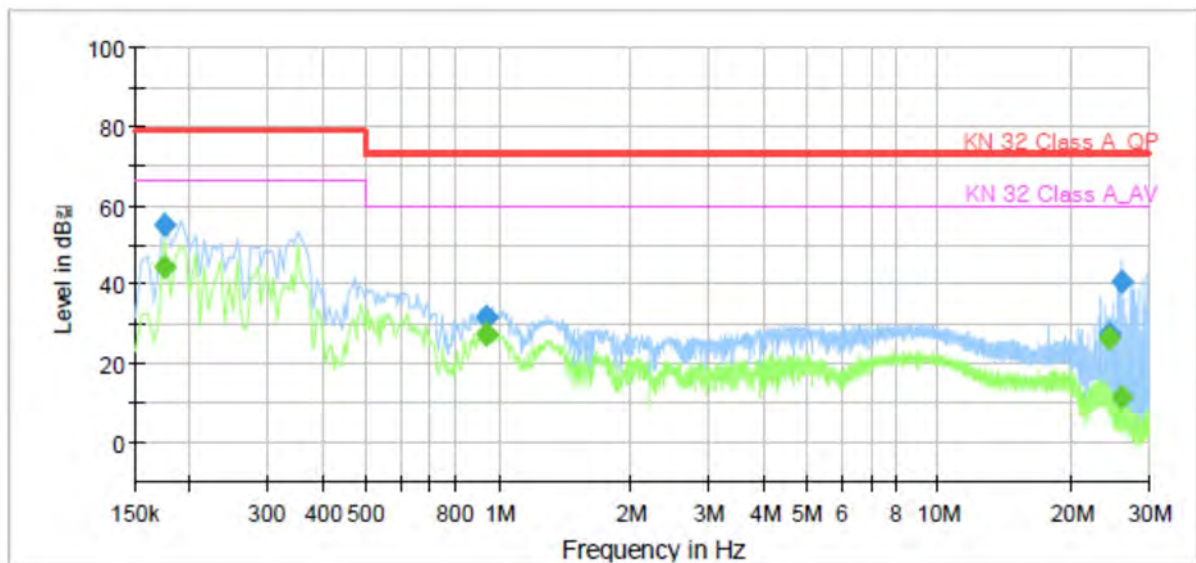
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[NEUTRAL]

Common Information

Test Description: Conducted Emission
Model No.: PNF-9010RVMP
Mode: DC 12 V
Operator Name: KES



Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.175000	---	44.59	66.00	21.41	1000.0	9.000	N	9.6
0.175000	55.18	---	79.00	23.82	1000.0	9.000	N	9.6
0.940000	---	27.51	60.00	32.49	1000.0	9.000	N	9.7
0.940000	31.78	---	73.00	41.22	1000.0	9.000	N	9.7
0.945000	---	27.37	60.00	32.63	1000.0	9.000	N	9.7
0.945000	31.99	---	73.00	41.01	1000.0	9.000	N	9.7
24.350000	---	26.58	60.00	33.42	1000.0	9.000	N	10.2
24.350000	27.78	---	73.00	45.22	1000.0	9.000	N	10.2
26.015000	---	11.70	60.00	48.30	1000.0	9.000	N	10.3
26.015000	40.68	---	73.00	32.32	1000.0	9.000	N	10.3

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Radiated Electric Field Emissions(Below 1 GHz)

- DC 12 V 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]
155.03	19.20	V	1.00	8.38	2.80	30.38	40.00	9.62
275.36	17.63	H	4.00	12.90	4.01	34.54	47.00	12.46
360.70	20.67	H	4.00	14.79	4.74	40.20	47.00	6.80
450.82	14.72	H	3.40	16.41	5.40	36.53	47.00	10.47
504.01	18.21	H	3.00	17.19	5.77	41.17	47.00	5.83
648.69	14.70	H	2.90	19.49	6.77	40.96	47.00	6.04

* 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]
50.23	12.31	V	1.00	13.92	1.46	27.69	40.00	12.31
62.00	11.42	V	1.00	12.09	1.64	25.15	40.00	14.85
360.64	20.27	V	1.00	14.79	4.74	39.80	47.00	7.20
400.49	14.98	H	3.90	15.71	5.04	35.73	47.00	11.27
504.01	18.85	H	3.00	17.19	5.77	41.81	47.00	5.19
648.80	14.61	H	3.80	19.50	6.77	40.88	47.00	6.12
675.09	13.52	H	2.60	19.60	7.02	40.14	47.00	6.86
725.37	12.26	H	1.90	19.98	7.35	39.59	47.00	7.41

* H : Horizontal, V : Vertical

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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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www.kes.co.kr

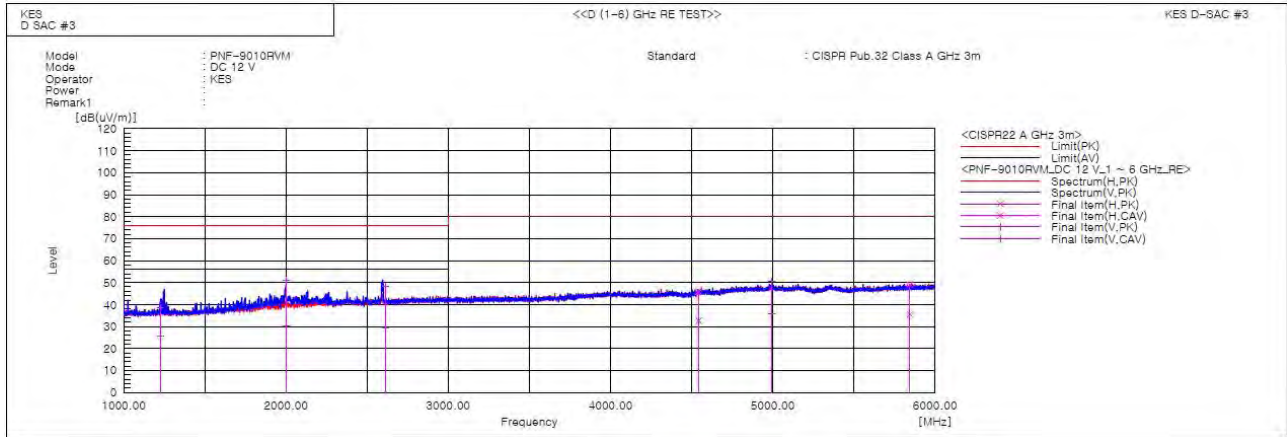
Report No.:

KES-E1-16T0300-R1

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Radiated Electric Field Emissions(Above 1 GHz)

- DC 12 V Mode



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1224.975	V	45.7	33.0	-7.1	38.6	25.9	76.0	56.0	37.4	30.1	100.0	197.2	
2	1998.530	V	53.2	32.2	-2.1	51.1	30.1	76.0	56.0	24.9	25.9	100.0	14.4	
3	2609.897	V	48.0	29.1	0.2	48.2	29.3	76.0	56.0	27.8	26.7	100.0	355.3	
4	4543.384	H	40.1	26.8	5.9	46.0	32.7	80.0	60.0	34.0	27.3	100.0	45.1	
5	4994.531	V	42.0	27.4	8.5	50.5	35.9	80.0	60.0	29.5	24.1	100.0	81.8	
6	5845.067	H	40.1	26.5	9.1	49.2	35.6	80.0	60.0	30.8	24.4	100.0	359.5	

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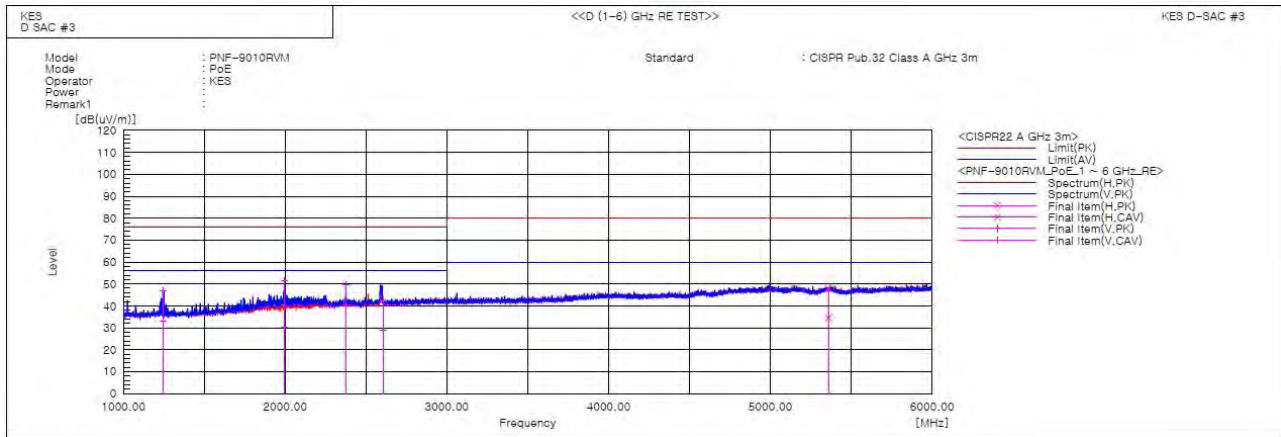
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- PoE Mode



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1246.031	V	54.0	40.0	-7.0	47.0	33.0	76.0	56.0	29.0	23.0	100.0	224.0	
2	1992.870	V	53.6	32.4	-2.1	51.5	30.3	76.0	56.0	24.5	25.7	100.0	8.7	
3	2375.790	V	50.0	40.6	-0.4	49.6	40.2	76.0	56.0	26.4	15.8	100.0	294.0	
4	2606.387	V	42.0	28.5	0.2	42.2	28.7	76.0	56.0	33.8	27.3	100.0	59.5	
5	5360.002	H	39.6	26.4	8.2	47.8	34.6	80.0	60.0	32.2	25.4	100.0	116.1	

◆ Calculation

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

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

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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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27				
28				
29				
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31				
32				
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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 - 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				
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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



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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



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Radiated Electric Field Immunity (Dt&C Co., Ltd.)

- DC 12 V Mode



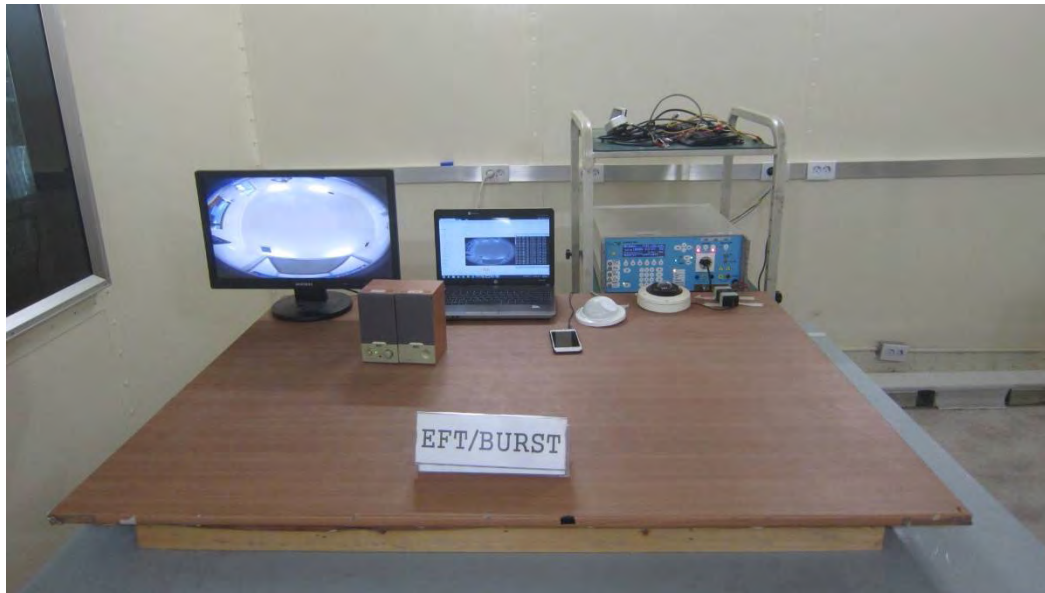
- PoE Mode



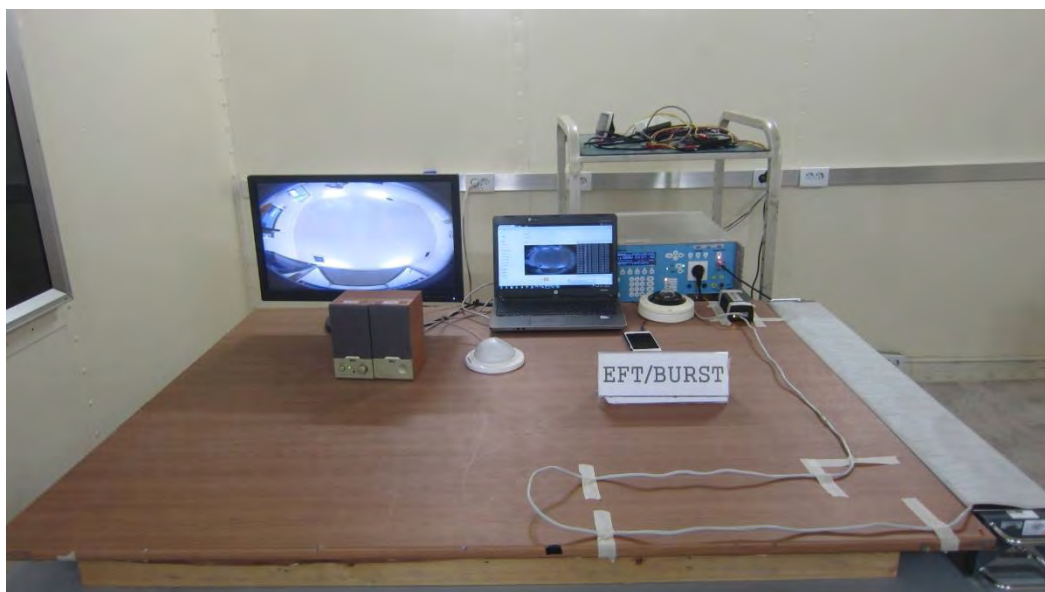
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Electrical Fast Transients/Bursts

- DC 12 V Mode



- PoE Mode



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Surge Transients

- DC 12 V Mode



- PoE Mode



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Conducted Disturbance

- DC 12 V Mode



- PoE Mode



EUT External Photographs

(Top)



(Bottom)



EUT Internal Photographs

(Internal View)



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EUT Internal View – Main Board

(Top)



(Bottom)



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EUT Internal View – lens Board

(Top)



(Bottom)



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EUT Internal View – Sub Board

(Top)



(Bottom)



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EUT Internal View – IR Board

(Top)



(Bottom)



Label and Location

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

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