



EMC TEST REPORT For CE

Test Report No. : KES-EM-20T0027
Date of Issue : Jan. 16, 2020
Product name : Network Camera
Model/Type No. : TNB-9000
Variant Model : -
Applicant : Hanwha Techwin Co., Ltd.
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, Republic of 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 : Dec. 26, 2019
Test date : Jan. 08, 2020 ~ Jan. 10, 2020
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Jung Jun Soo
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

This test report is not related to KS Q ISO/IEC 17025 and KOLAS.



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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Jan. 16, 2020	KES-EM-20T0027	Issued

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1.0 General Product Description

Main Specifications of EUT are:

Video	
Imaging Device	43.3mm Full-frame CMOS
Effective Pixels	7680(H)x4320(V)
NETD	None
Pixel Size	None
Min. Illumination	Color : 0.015Lux(F1.4, 1/30sec) B/W : 0.0015Lux(F1.4, 1/30sec)
Video Out	HDMI: 1080p@30fps
Lens	
Focal Length (Zoom Ratio)	None
Max. Aperture Ratio	None
Angular Field of View	Canon 24mm f1.4L, Auto-Iris (EF 24mm f/1.4 II USM) : Horizontal field of view: 8K 57.4° Canon 35mm f1.4L, Auto-Iris (EF 35mm f/1.4 II USM) : Horizontal field of view: 8K 42.6° Canon 50mm f1.4, Auto-Iris (EF 50mm f/1.4 USM) : Horizontal field of view: 8K 30.9° Canon 85mm f1.2L, Auto-Iris (EF 85mm f/1.2L II USM) : Horizontal field of view: 8K 19.1° Canon 100mm f2.0, Auto-Iris (EF 100mm f/2 USM) : Horizontal field of view: 8K 16.0° Canon 70-200mm f2.8L, Auto-Iris, Vari Focal (EF 70-200mm f/2.8L USM) : Horizontal field of view: 8K 22.8° ~ 8.0° <i>* When using Canon 70-200mm f2.8L, Auto-Iris, Vari Focal (EF 70-200mm f/2.8L USM) mount lens, housing accessory components must be used.</i>
Min. Object Distance	None
Focus Control	Autofocus
Lens Type	Canon EF mount Lens
Mount Type	Canon EF mount
Optional Lens	Canon 24mm f1.4L, Auto-Iris (EF 24mm f/1.4 II USM) Canon 35mm f1.4L, Auto-Iris (EF 35mm f/1.4 II USM) Canon 50mm f1.4, Auto-Iris (EF 50mm f/1.4 USM) Canon 85mm f1.2L, Auto-Iris (EF 85mm f/1.2L II USM) Canon 100mm f2.0, Auto-Iris (EF 100mm f/2 USM) Canon 70-200mm f2.8L, Auto-Iris, Vari Focal (EF 70-200mm f/2.8L USM)
Pan / Tilt / Rotate	
Pan / Tilt / Rotate Range	None
Pan Range	None
Pan Speed	None
Tilt Range	None
Tilt Speed	None
Rotate Range	None
Sequence	None
Preset Accuracy	None
Azimuth	None
Auto Tracking	None
Operational	
IR Viewable Length	None
Camera Title	Displayed up to 75 characters
Day & Night	Auto(ICR)
Backlight Compensation	BLC, DWDR
Wide Dynamic Range	None
Digital Noise Reduction	SSNRV
Digital Image Stabilization	None
Defog	None
Motion Detection	8ea, 8point polygonal zones (in 8K resolution only)
Privacy Masking	6ea, Rectangular - Color: Grey/Green/Red/Blue/Black/White
Gain Control	Low / Middle / High
White Balance	ATW / AWC / Manual / Indoor / Outdoor
LDC	None
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (1/5 ~ 1/12,000sec)
Digital PTZ	Support
Video Rotation	None

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Analytics	- Classified object type : Person/Face/Vehicle/License plate with attributes, BestShot per object - Analytics events based on AI engine : object detection, Directional detection, Enter/Exit, Loitering, Virtual line - Analytics events : Defocus detection, Motion detection, Appear/Disappear, Tampering, Audio detection, Sound classification
Business Intelligence	None
Serial Interface	RS-485(Samsung-T, Pelco-D/P)
Alarm I/O	Input 1ea / Output 1ea
Alarm Triggers	Analytics, Network disconnect, Alarm input
Alarm Events	File upload via FTP and e-mail Notification via e-mail SD/SDHC/SDXC or NAS recording at event triggers Alarm output Handover
Audio In	Selectable(mic in/line in) Supply voltage: 2.5VDC(4mA), Input impedance: 2K Ohm
Audio Out	Line out, Max.output level: 1Vrms
IR Illuminator (Optional)	None
Wiper	None
Coaxial Protocol	None
Video Transmission Distance	None
Radiometry	
Temperature detect range	None
Temperature accuracy	None
Temperature detection	None
Additional	None
Network	
Ethernet	RJ-45(10/100/1000 BASE-T), SFP slot(100/1000Mbps)
Video Compression	H.265/H.264: Main/High, MJPEG
Resolution	7680x4320, 7360x4128, 6016x3384, 6016x4008, 5472x3648, 4768x3184, 4608x2592, 3840x2160, 1920x1080, 1280x1024, 1280x960, 1280x720, 1024x768, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360
Max. Framerate	H.265/H.264: 8K @ Max. 15fps (Mode 0) : Available in Dec. 2019 H.265/H.264: 24MP @ Max. 20fps (Mode 1) : Available in Mar. 2020 H.265/H.264: 15MP @ Max. 30fps (Mode 2) : Available in Mar. 2020 H.265/H.264: 4K @ Max. 60fps (Mode 3) : Available in Mar. 2020
Smart Codec	WiseStreamII
Video Quality Adjustment	H.264/H.265: Target bitrate level control MJPEG: Target bitrate level control
Bitrate Control	H.264/H.265: CBR or VBR MJPEG: VBR
Streaming	Unicast(10 users) / Multicast Multiple streaming(Up to 3 profiles)
Audio Compression	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
Protocol	IPv4, IPv6, TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP,RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, UPnP, Bonjour, LLDP
Security	HTTPS(SSL) Login Authentication Digest Login Authentication IP Address Filtering User access log 802.1X Authentication(EAP-TLS, EAP-LEAP) Device Certificate(Hanwha Techwin Root CA)
Edge Storage	Micro SD/SDHC/SDXC 1slot 256MB
Application Programming Interface	ONVIF Profile S/G/T SUNAPI(HTTP API)
Webpage Language	English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Swedish,, Portuguese, Czech, Polish, Turkish, Dutch, Hungarian, Greek
Web Viewer	Supported OS: Windows 8.1, 10, Mac OS X 10.10, 10.11, 10.12 Recommended Browser: Google Chrome Supported Browser: MS Explore11, MS Edge, Mozilla Firefox(Window 64bit only), Apple Safari(Mac OS X only)
Memory	4096MB RAM, 512MB Flash

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Environmental	
Operating Temperature / Humidity	0°C ~ +45°C(32°F ~ +122°F) / Less than 90% RH
Storage Temperature / Humidity	-40°C ~ +65°C(-40°F ~ +149°F) / Less than 90% RH
Certification	EMC EN 50130-4, EN 55032 Class A, EN 61000-6-3, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, FCC Part 15 Subpart B Class A, IC ICES-003 Class A, Safety UL 60950-1
Electrical	
Input Voltage	HPoE(IEEE802.3bt, Class5), 12VDC
Power Consumption	PoE: Max 30W, typical 20W 12VDC: Max 26W, typical 18W
Mechanical	
Color / Material	Black / Aluminum
RAL Code	None
Product dimensions / weight	120(W)x118.1(H)x179(D)mm, 2.1Kg(4.55 lb)
Package dimensions / weight	250(W)x250(D)x323(H)mm, 3.8Kg(8.38 lb)
Conduit hole	None
Hanging mount(Dome)	
Skin cover(Dome)	
Weather cap(Dome)	
Power module	
Backbox	

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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 ☒ 230 Vac ☐ 100 Vac ☐ 24 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	TNB-9000	-	HANWHA TECHWIN (TIANJIN) CO., LTD	EUT
PoE Adapter	PT-PSE109GBRO-AH	PT1941220063	Dongguan PROCET Network Technology Co.,Ltd	EUT

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1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	P95G001	8KM8HT2	Wistron Infocom (Chengdu) Company Limited	-
Notebook Adapter	LA65NS2-01	-	LITE-ON TECHNOLOGY(CHANG ZHOU)CO.,LTD.	-
Controller	SPC-1010	C50E67WG10100F	SamSung Techwin Co.,Ltd.	-
Controller Adapter	RS-AB1000	-	Dongguan Jinhua Sheng Power Technology Co.,Ltd.	-
Speaker	BR1000A Cuve Black 2	-	DONGGUAN EDIFIER TECHNOLOGY Co., Ltd	-
MIC	MP1000	-	-	-
Alarm	SIP-1201DD D0	-	SAMSUNG TECHWIN CO., LTD.	-
Button Alarm	-	-	-	-
iPod	A1367	C3TDG2JGDCP9	APPLE .Inc	-
Micro SD Card	-	-	SanDisk	8 GB
Monitor	27UK850	805NTGYCH455	LG Electronics Inc.	-
Monitor Adapter	A16-140P1A	ZJ5CS64929301C304	LG Electronics Inc.	-

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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 (EUT)	Micro HDMI	Monitor	HDMI	1.0	S
	NETWORK	Notebook	RJ-45	30	S
	RS-485	Controller	RS-485	3.0	U
	Audio Out	Speaker	3.5 mm	1.4	U
	Audio In	MIC	XLR	1.4	U
	Alarm Out	Alarm	Alarm In	3.0	U
	Alarm In	Button Alarm	Alarm Out	3.0	U
	SLOT	Micro SD Card	SLOT	-	-
Notebook	3.5 mm	iPod	3.5 mm	1.0	U

* Unshielded=U, Shielded=S

■ PoE Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
Network Camera (EUT)	Micro HDMI	Monitor	HDMI	1.0	S
	NETWORK	PoE Adapter	RJ-45	30	S
	RS-485	Controller	RS-485	3.0	U
	Audio Out	Speaker	3.5 mm	1.4	U
	Audio In	MIC	XLR	1.4	U
	Alarm Out	Alarm	Alarm In	3.0	U
	Alarm In	Button Alarm	Alarm Out	3.0	U
	SLOT	Micro SD Card	SLOT	-	-
Notebook	3.5 mm	iPod	3.5 mm	1.0	U
	RJ-45	PoE Adapter	RJ-45	30	S

* Unshielded=U, Shielded=S

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1.7 EUT Operating Mode(s)

Test Mode	operating
DC 12 V, PoE	Monitoring EUT Using Web Viewer, Ping Test

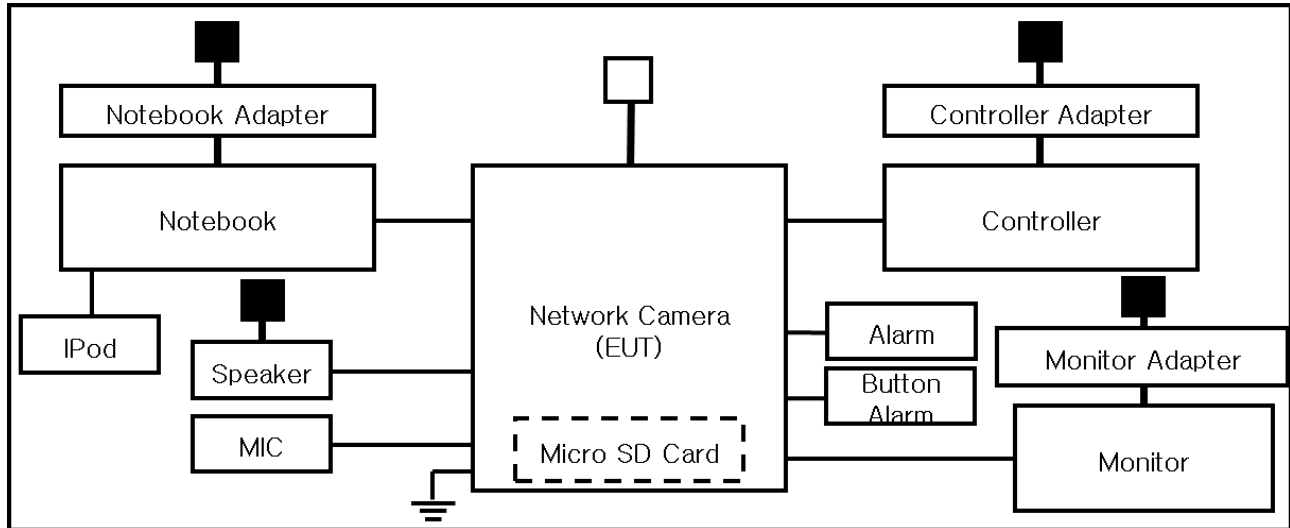
EUT Test operating S/W		
Name	Version	Manufacture Company
Web Viewer	-	-

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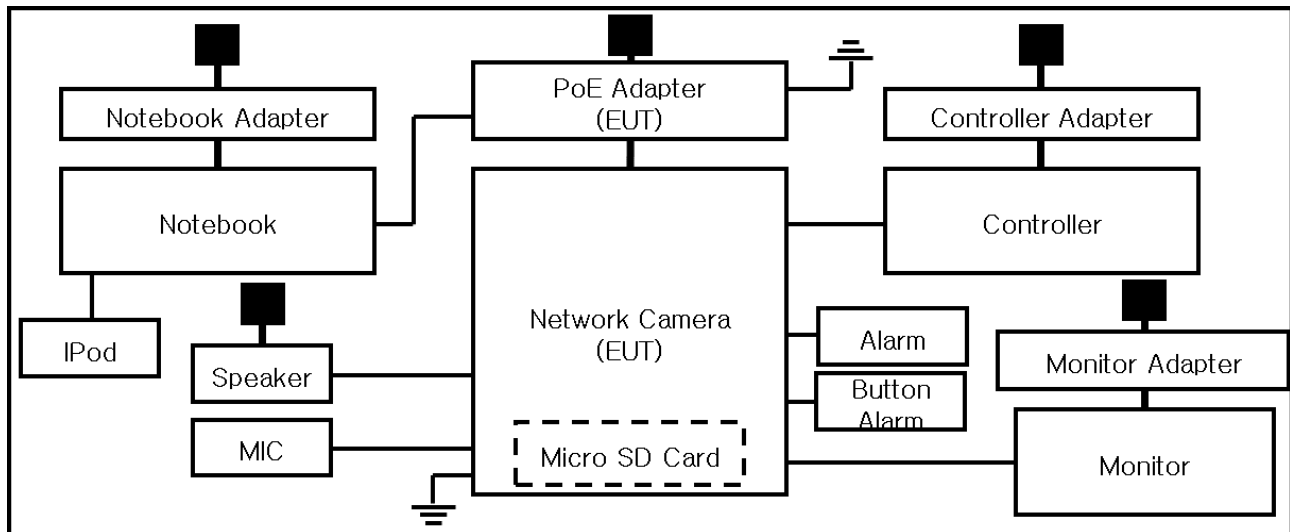
1.8 Configuration

■ AC Main
 □ DC Main

■ DC 12 V Mode



■ PoE Mode



1.9 Remarks when standards applied

USB and SFP ports are for administrators and is excluded from the test.







1.10 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.

1.11 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

1.12 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-20056, C-20036, T-20040, G-20057
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 001633 0003

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

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

☐ EN 61326-1:2013



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- | | | |
|---|----------------------------------|----------------------------------|
| <input type="checkbox"/> VCCI-CISPR 32:2016 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> AS/NZS CISPR32:2015 | <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 C63.4-2014 | | |
| <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 | | |

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2.1 Conducted Emissions at Mains Power Ports

Test Date

Jan. 08, 2020

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101783	04, 22, 2020
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101786	01, 25, 2020
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101137	01, 25, 2020
<input type="checkbox"/>	LISN	NNBM8124	SCHWARZBECK	8124-1002	08, 06 2020

Test Conditions

Temperature: 25,8 °C
Relative Humidity: 48,4 % R.H.

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.

2.2 Conducted Emissions at Telecommunication Ports

Test Date

Jan. 08, 2020

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101783	04, 22, 2020
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101786	01, 25, 2020
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101137	01, 25, 2020
<input type="checkbox"/>	8-WIRE ISN CAT3	CAT3 8158	SCHWARZBECK	8158-0019	03, 19, 2020
<input type="checkbox"/>	8-WIRE ISN CAT5	CAT5 8158	SCHWARZBECK	8158-0030	03, 19, 2020
<input type="checkbox"/>	8-WIRE ISN CAT6	NTFM 8158	SCHWARZBECK	8158-0029	08, 13, 2020
<input checked="" type="checkbox"/>	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	05, 09, 2020

Test Conditions

Temperature: 25,8 °C
Relative Humidity: 48,4 % R.H.

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

Jan. 08, 2020

Test Location

☐ OPEN AREA TEST SITE #2 ☒ SEMI ANECHOIC CHAMBER #4(10m)

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	R & S	100551	04, 09, 2020
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	11, 25, 2020
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 29, 2020
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	32173	03, 11, 2020

Test Conditions

Temperature: 24,6 °C
Relative Humidity: 47,2 % R.H.

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

Jan. 08, 2020

Test Location

SEMI ANECHOIC CHAMBER #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR7	R & S	101190	08, 06, 2020
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	AGILENT	3008A01967	05, 27, 2020
<input type="checkbox"/>	ATTENUATOR	8491A	HP	35496	03, 11, 2020
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 12, 2020

Test Conditions

Temperature: 25,2 °C
Relative Humidity: 45,3 % 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

Remarks

See Appendix A for test data.



2.5 Harmonic Current Emissions

Test Date

Jan. 08, 2020

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	net.control	EM TEST	2.1.4	-
<input checked="" type="checkbox"/>	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	04, 09, 2020
<input checked="" type="checkbox"/>	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 19,6 °C
Relative Humidity: 45,2 % R.H.

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

See Appendix A for test data.



2.6 Voltage Fluctuations and Flicker

Test Date

Jan. 08, 2020

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	net.control	EM TEST	2.1.4	-
<input checked="" type="checkbox"/>	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	04, 09, 2020
<input checked="" type="checkbox"/>	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 19,6 °C
Relative Humidity: 45,2 % R.H.

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

EN 50130-4:2011 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

Jan. 09, 2020

Test Location

EMS-ESD: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	ESD SIMULATOR	ESS-2000	Noise Ken	ESS05X4620	02, 22, 2022
<input checked="" type="checkbox"/>	HCP	-	KES	-	-
<input checked="" type="checkbox"/>	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: 25,7 °C
Relative Humidity: 49,0 % R.H.
Atmospheric Pressure: 100,3 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
--------------------	---	---	---	---

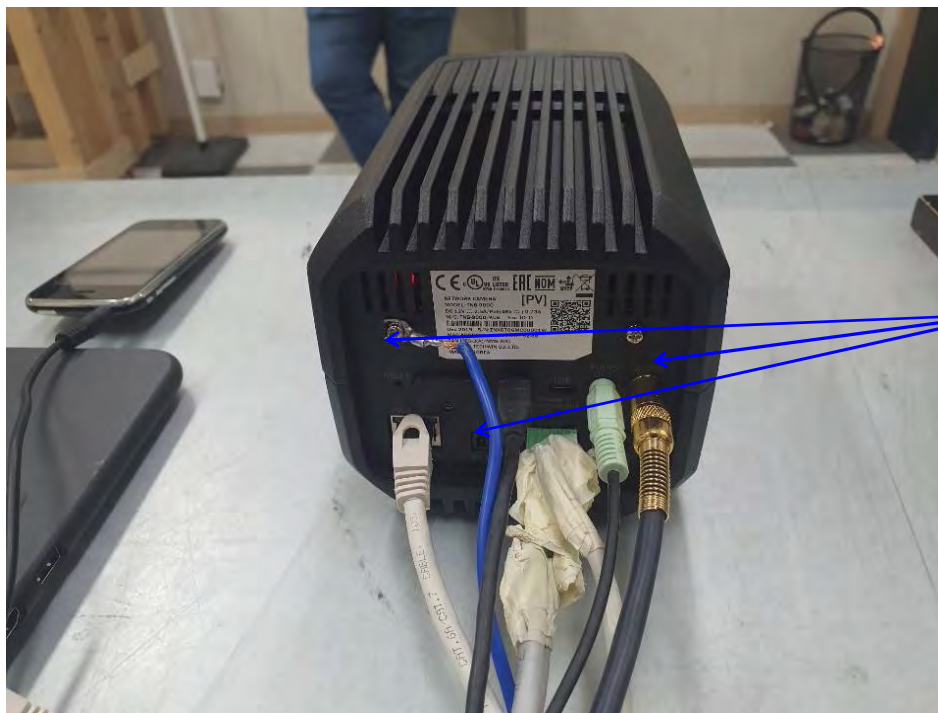
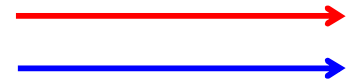
Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

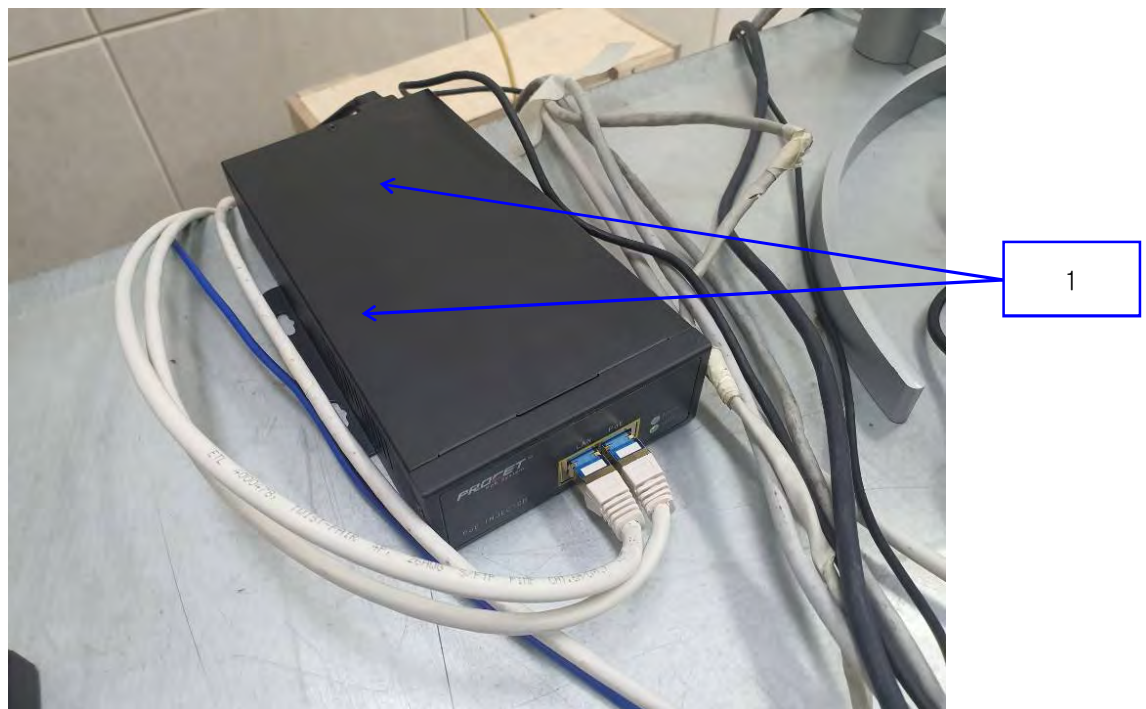
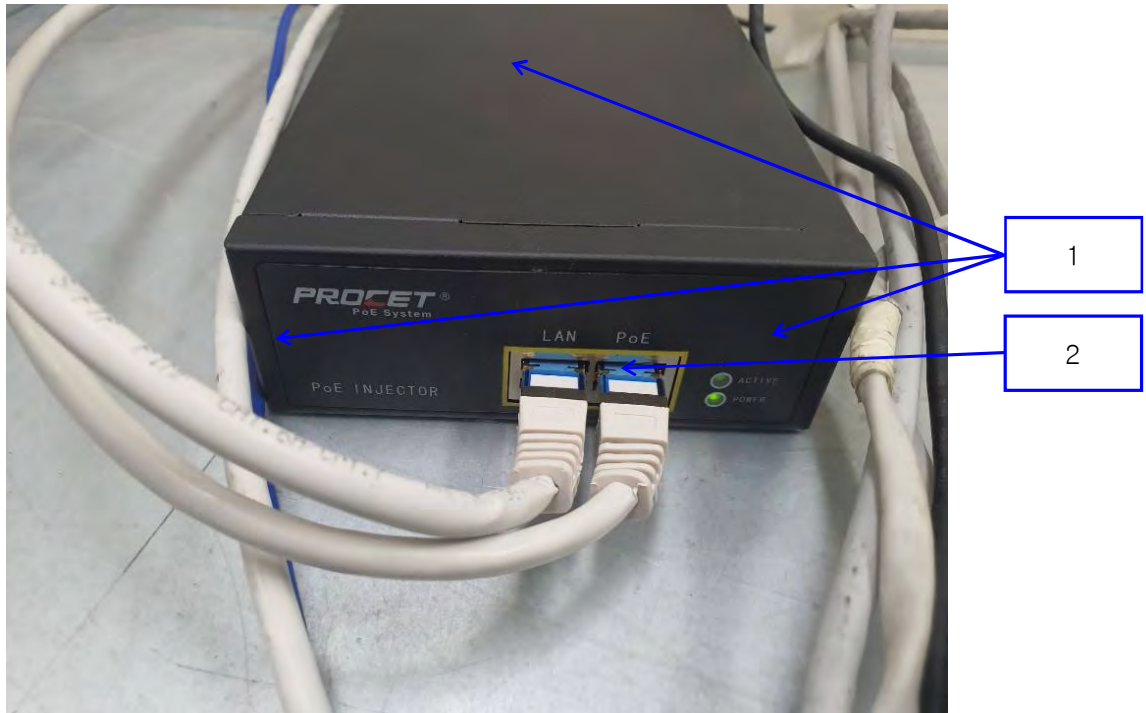
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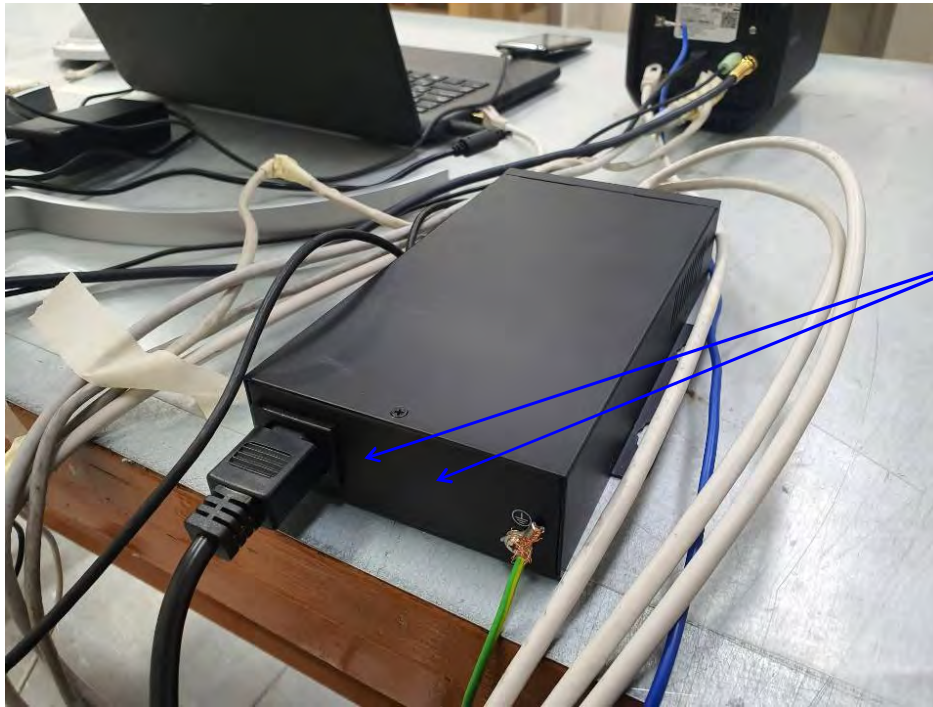
Location of Discharge:

Air
Contact



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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	Enclosure	Contact Discharge	Complied	-
2	Port around	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	Enclosure	Contact Discharge	Complied	-
2	Port around	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

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3.2 Radiated Electric Field Immunity

Reference Standard

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

Test Date

Jan. 10, 2020

Test Location

EMS-RS: ☐ SEMI ANECHOIC CHAMBER #2 ☒ SEMI ANECHOIC CHAMBER #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	EMC32	R & S	10.10.02	-
<input checked="" type="checkbox"/>	SIGNAL GENERATOR	SMB 100A	R & S	177586	08, 06, 2020
<input checked="" type="checkbox"/>	BROADBAND AMPLIFIER	BBA100	R & S	101239	08, 06, 2020
<input checked="" type="checkbox"/>	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 06, 2020
<input checked="" type="checkbox"/>	POWER METER	NRP2	R & S	103475	08, 06, 2020
<input checked="" type="checkbox"/>	AVG POWER SENSOR	NRP-Z91	R & S	102526	08, 06, 2020
<input checked="" type="checkbox"/>	AVG POWER SENSOR	NRP-Z91	R & S	102527	08, 06, 2020
<input checked="" type="checkbox"/>	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
<input checked="" type="checkbox"/>	DIRECTIONAL COUPLER	KYDC-D1070-DX40	KY TELECOM	KY150001	08, 06, 2020
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 12, 2020

Test Conditions

Temperature: 23,6 °C
Relative Humidity: 46,2 % R.H.
Atmospheric Pressure: 100,6 kPa



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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

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Test Data**■ DC 12 V Mode**

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

■ 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

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3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Jan. 09, 2020

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.7	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2020
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2020
<input checked="" type="checkbox"/>	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 27, 2020

Test Conditions

Temperature: 25,7 °C
Relative Humidity: 49,0 % R.H.
Atmospheric Pressure: 100,3 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 klz ☒ 100 klz

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)
L	-	-
N	-	-
PE	-	-
L – N	-	-
L – PE	-	-
N – PE	-	-
L – N – PE	-	-

☒ 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(Notebook)	Complied	Complied
Alarm In	Complied	Complied
Alarm Out	Complied	Complied
RS-485	Complied	Complied

■ PoE Mode

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

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

☐ 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(Notebook)	Complied	Complied
RJ-45(PoE Adapter)	Complied	Complied
Alarm In	Complied	Complied
Alarm Out	Complied	Complied
RS-485	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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3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

Test Date

Jan. 09, 2020

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.7	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2020
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2020
<input checked="" type="checkbox"/>	CDN	CNV 508N1	EM TEST	P1610176296	11, 27, 2020

Test Conditions

Temperature: 25,7 °C
Relative Humidity: 49,0 % R.H.
Atmospheric Pressure: 100,3 kPa

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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

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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(Notebook)	Complied	Complied
Alarm In	Complied	Complied
Alarm Out	Complied	Complied
RS-485	Complied	Complied

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■ PoE Mode☒ Line to Line – Differential Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L – N – PE	Complied	Complied

☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L - PE	Complied	Complied
N - PE	Complied	Complied

Signal Lines☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
RJ-45(Notebook)	Complied	Complied
RJ-45(PoE Adapter)	Complied	Complied
RJ-45(Camera)	Complied	Complied
Alarm In	Complied	Complied
Alarm Out	Complied	Complied
RS-485	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria

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3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Jan. 10, 2020

Test Location

EMS-CS: Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	icd.control	EM TEST	5.3.11	-
<input checked="" type="checkbox"/>	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	11, 25, 2020
<input checked="" type="checkbox"/>	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 25, 2020
<input checked="" type="checkbox"/>	CDN	CDN M016	TESEQ	43694	11, 25, 2020
<input type="checkbox"/>	CDN	CDN M016	TESEQ	43697	11, 25, 2020
<input checked="" type="checkbox"/>	CDN	CDN ST08A	TESEQ	43886	11, 25, 2020
<input checked="" type="checkbox"/>	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 26, 2020

Test Conditions

Temperature: 26,0 °C
Relative Humidity: 49,8 % R.H.
Atmospheric Pressure: 100,3 kPa

Test Specifications

Frequency range: ☒ 150 kHz to 100 MHz ☐ 150 kHz to 80 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

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Test Data**■ DC 12 V Mode**☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	-	-

☒ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L1 - L2	CDN	Complied

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45(Notebook)	CDN	Complied
RS-485	Clamp	Complied
Alarm In	Clamp	Complied
Alarm Out	Clamp	Complied

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■ PoE Mode☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L - N - PE	CDN	Complied

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	-	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45(Notebook)	CDN	Complied
RJ-45(PoE Adapter)	CDN	Complied
RS-485	Clamp	Complied
Alarm In	Clamp	Complied
Alarm Out	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

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3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004

Test Date

Jan. 09, 2020

Test Location

EMS-Voltage dip: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.7	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2020
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2020

Test Conditions

Temperature: 25,7 °C
Relative Humidity: 49,0 % R.H.
Atmospheric Pressure: 100,3 kPa

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Test Specifications & Observations/Remarks

- Voltage Dips and Short Interruptions

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
<input checked="" type="checkbox"/> 20 % dip	<input checked="" type="checkbox"/> 250 / 5 000	<u>Complied</u>
<input checked="" type="checkbox"/> 30 % dip	<input checked="" type="checkbox"/> 25 / 500	<u>Complied</u>
<input checked="" type="checkbox"/> 60 % dip	<input checked="" type="checkbox"/> 10 / 200	<u>Complied</u>
<input checked="" type="checkbox"/> 100 % dip	<input checked="" type="checkbox"/> 250 / 5 000	<u>Complied</u>

- Voltage variations

<input checked="" type="checkbox"/> Unom + 10 %	<input checked="" type="checkbox"/> 253.0 V (ac)	<u>Complied</u>
<input checked="" type="checkbox"/> Unom - 15 %	<input checked="" type="checkbox"/> 195.5 V (ac)	<u>Complied</u>

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria



APPENDIX A – TEST DATA

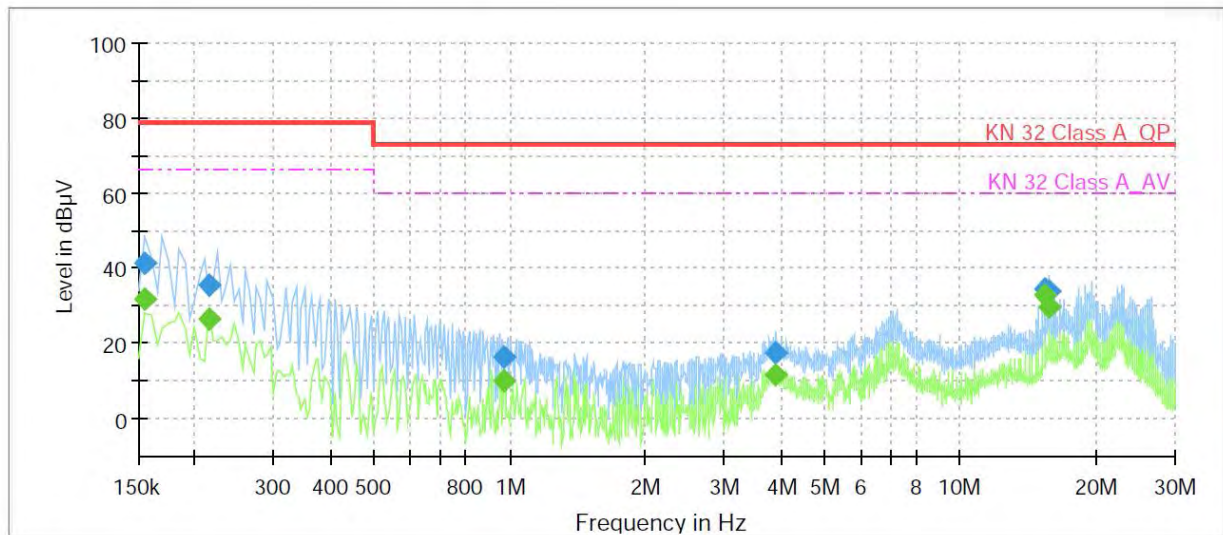
Conducted Emissions at Mains Power Ports

■ PoE Mode

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	TNB-9000
Mode	L1
Operator Name:	KES



Final Result

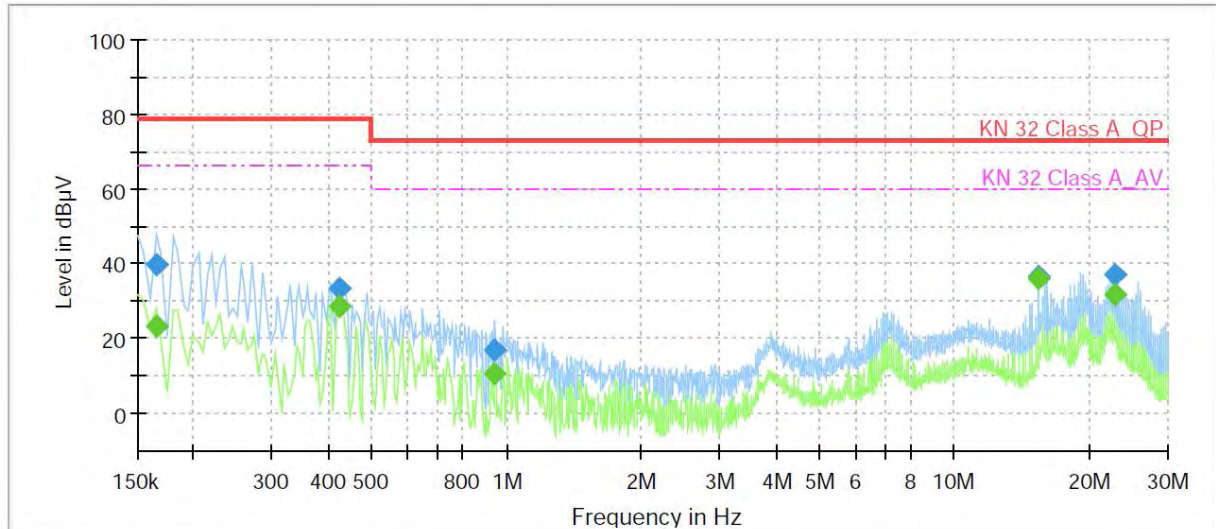
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	31.90	66.00	34.10	1000.0	9.000	L1	9.9
0.155000	41.10	---	79.00	37.90	1000.0	9.000	L1	9.9
0.215000	---	26.44	66.00	39.56	1000.0	9.000	L1	10.0
0.215000	35.39	---	79.00	43.61	1000.0	9.000	L1	10.0
0.975000	---	9.94	60.00	50.06	1000.0	9.000	L1	11.4
0.975000	16.19	---	73.00	56.81	1000.0	9.000	L1	11.4
3.910000	---	11.77	60.00	48.23	1000.0	9.000	L1	10.1
3.910000	17.50	---	73.00	55.50	1000.0	9.000	L1	10.1
15.440000	---	33.06	60.00	26.94	1000.0	9.000	L1	10.6
15.440000	34.32	---	73.00	38.68	1000.0	9.000	L1	10.6
15.685000	---	29.60	60.00	30.40	1000.0	9.000	L1	10.6
15.685000	34.15	---	73.00	38.85	1000.0	9.000	L1	10.6

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[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	TNB-9000
Mode	N
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	---	23.58	66.00	42.42	1000.0	9.000	N	9.9
0.165000	39.90	---	79.00	39.10	1000.0	9.000	N	9.9
0.425000	---	28.69	66.00	37.31	1000.0	9.000	N	10.8
0.425000	33.57	---	79.00	45.43	1000.0	9.000	N	10.8
0.945000	---	10.53	60.00	49.47	1000.0	9.000	N	11.4
0.945000	16.92	---	73.00	56.08	1000.0	9.000	N	11.4
15.440000	---	35.93	60.00	24.07	1000.0	9.000	N	10.6
15.440000	36.66	---	73.00	36.34	1000.0	9.000	N	10.6
22.795000	---	31.78	60.00	28.22	1000.0	9.000	N	10.9
22.795000	36.92	---	73.00	36.08	1000.0	9.000	N	10.9

◆ 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 + Pulse Limiter FACTOR))

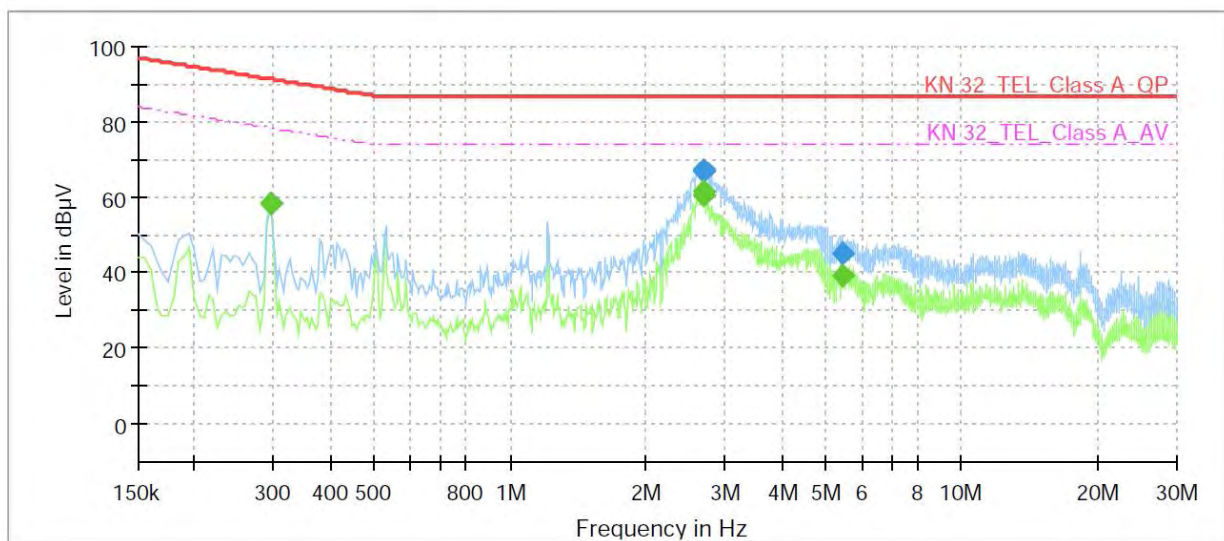
Conducted Emissions at Telecommunication Ports

■ DC 12 V Mode_RJ-45(Notebook)

[1 000 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNB-9000
Mode	1000 Mbps
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.295000	---	58.05	78.38	20.33	1000.0	9.000	Single Line	10.2
0.295000	58.19	---	91.38	33.19	1000.0	9.000	Single Line	10.2
2.680000	---	60.21	74.00	13.79	1000.0	9.000	Single Line	10.1
2.680000	66.62	---	87.00	20.38	1000.0	9.000	Single Line	10.1
2.685000	---	61.20	74.00	12.80	1000.0	9.000	Single Line	10.1
2.685000	67.35	---	87.00	19.65	1000.0	9.000	Single Line	10.1
5.445000	---	39.36	74.00	34.64	1000.0	9.000	Single Line	10.1
5.445000	45.04	---	87.00	41.96	1000.0	9.000	Single Line	10.1



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■ PoE Mode_RJ-45(PoE Adapter)

[1 000 Mbps]

Common Information

Test Description:

Model No.:

Mode

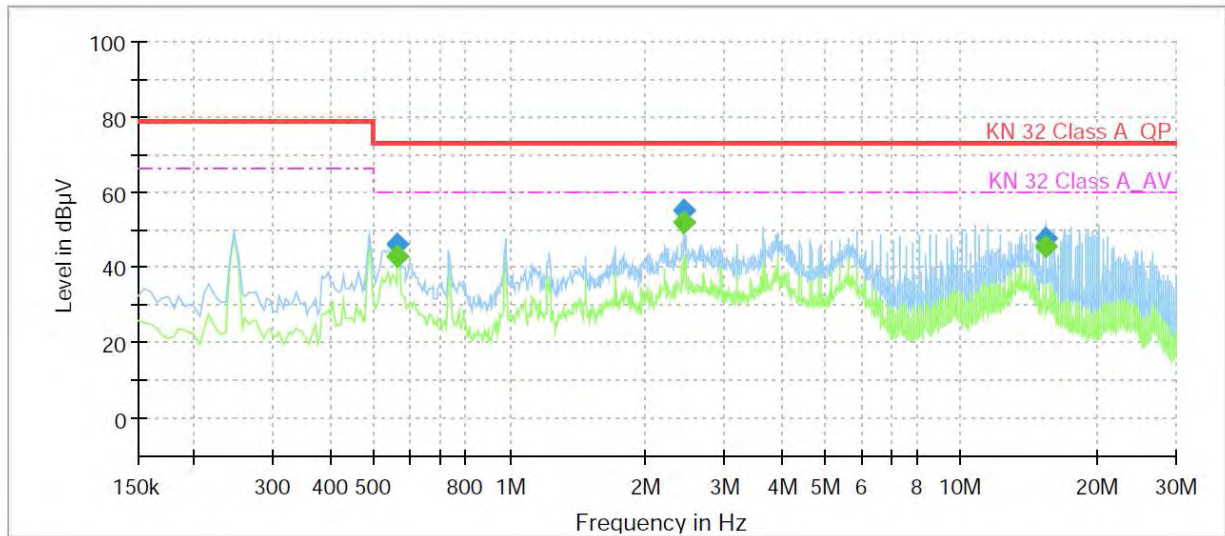
Operator Name:

Conducted Emission

TNB-9000

1000 Mbps

KES



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.565000	---	42.63	60.00	17.37	1000.0	9.000	N	11.1
0.565000	46.18	---	73.00	26.82	1000.0	9.000	N	11.1
2.435000	---	51.89	60.00	8.11	1000.0	9.000	N	10.0
2.435000	55.20	---	73.00	17.80	1000.0	9.000	N	10.0
15.440000	---	45.51	60.00	14.49	1000.0	9.000	N	10.6
15.440000	47.49	---	73.00	25.51	1000.0	9.000	N	10.6

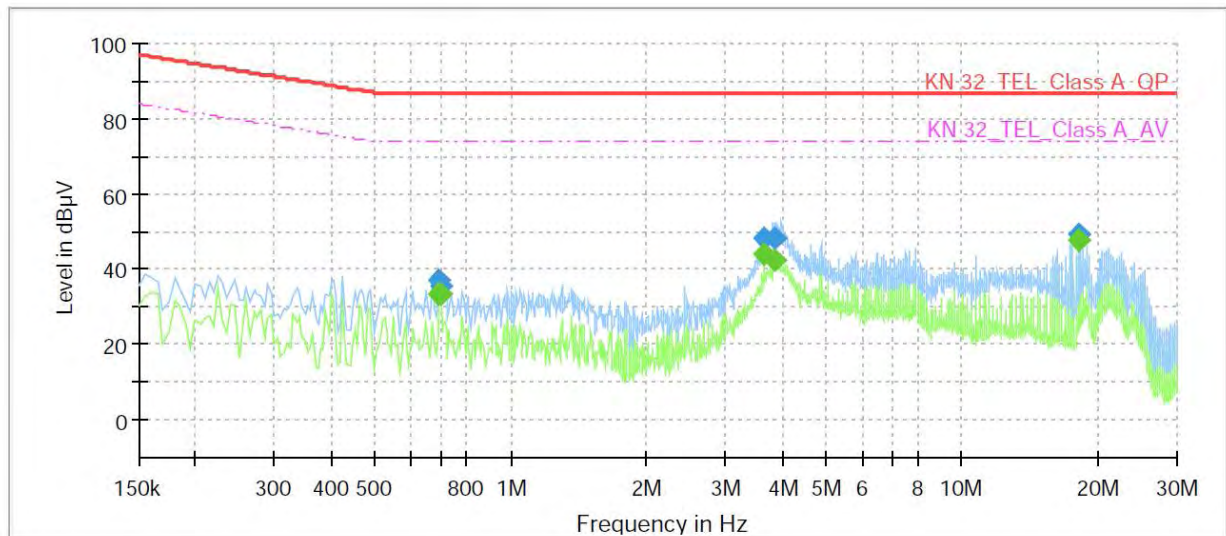
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■ PoE Mode_RJ-45(Notebook)

[1 000 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNB-9000
Mode	LAN 1000 Mbps
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.695000	---	33.15	74.00	40.85	1000.0	9.000	Single Line	11.3
0.695000	37.11	---	87.00	49.89	1000.0	9.000	Single Line	11.3
0.700000	---	33.39	74.00	40.61	1000.0	9.000	Single Line	11.3
0.700000	35.41	---	87.00	51.59	1000.0	9.000	Single Line	11.3
3.650000	---	43.83	74.00	30.17	1000.0	9.000	Single Line	10.1
3.650000	48.32	---	87.00	38.68	1000.0	9.000	Single Line	10.1
3.865000	---	42.47	74.00	31.53	1000.0	9.000	Single Line	10.0
3.865000	48.36	---	87.00	38.64	1000.0	9.000	Single Line	10.0
18.145000	---	47.88	74.00	26.12	1000.0	9.000	Single Line	10.7
18.145000	49.09	---	87.00	37.91	1000.0	9.000	Single Line	10.7

◆ 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 + Pulse Limiter FACTOR))



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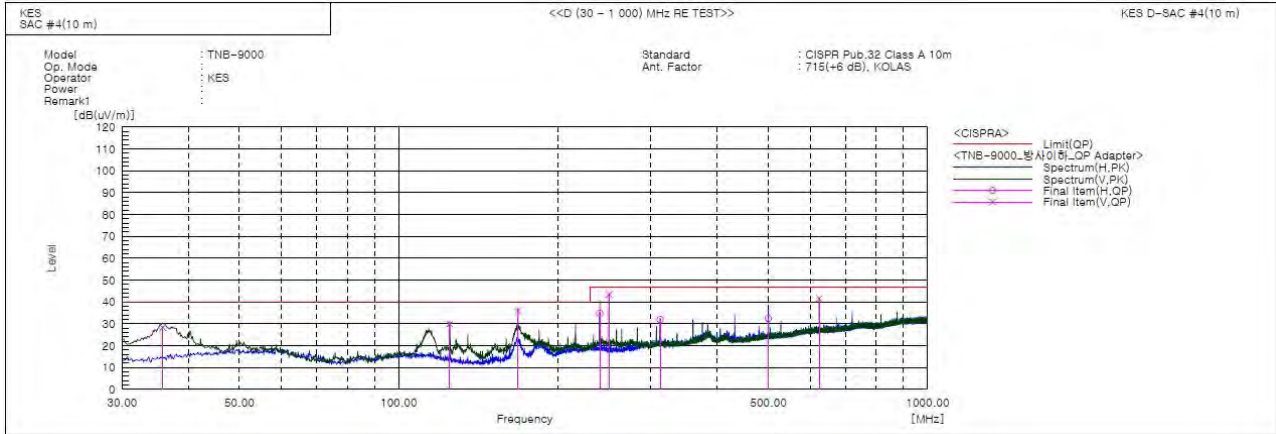
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Radiated Electric Field Emissions(Below 1 GHz)

■ DC 12 V Mode



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	35.820	V	53.0	-24.7	28.3	40.0	11.7	100.0	258.0	
2	124.939	V	54.6	-24.7	29.9	40.0	10.1	100.0	346.0	
3	167.983	V	60.3	-24.5	35.8	40.0	4.2	111.0	6.0	
4	240.005	H	54.9	-20.1	34.8	47.0	12.2	400.0	105.0	
5	249.948	V	63.4	-20.0	43.4	47.0	3.6	100.0	155.0	
6	312.028	H	50.0	-18.0	32.0	47.0	15.0	400.0	284.0	
7	499.965	H	45.2	-12.7	32.5	47.0	14.5	400.0	340.0	
8	624.004	V	51.1	-9.5	41.6	47.0	5.4	310.0	11.0	

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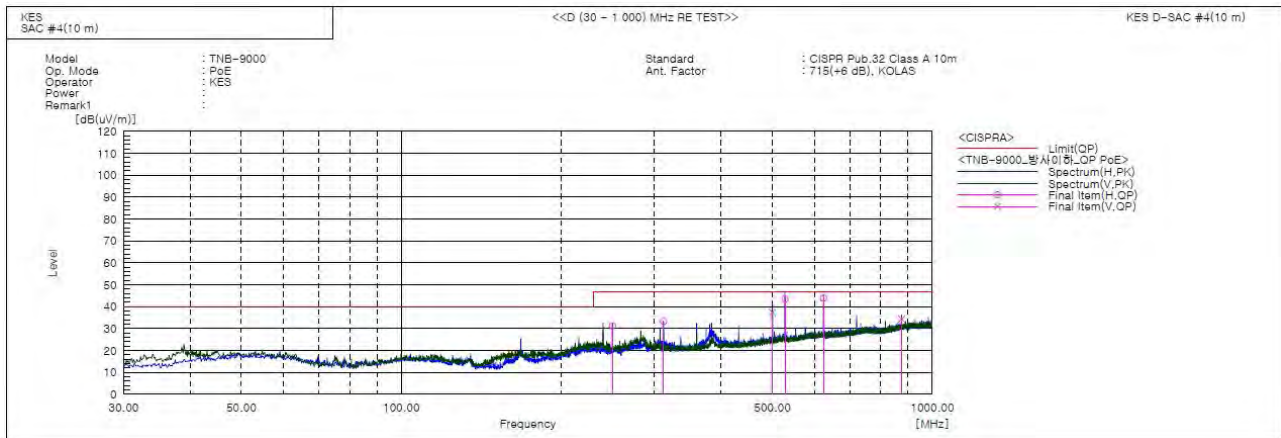


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PoE Mode



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	249.948	H	51.3	-20.0	31.3	47.0	15.7	400.0	210.0	
2	311.906	H	51.3	-18.0	33.3	47.0	13.7	255.0	90.0	
3	499.965	V	50.1	-12.7	37.4	47.0	9.6	100.0	22.0	
4	527.974	H	55.8	-12.3	43.5	47.0	3.5	221.0	102.0	
5	624.004	H	53.4	-9.5	43.9	47.0	3.1	280.0	246.0	
6	874.991	V	40.3	-6.0	34.3	47.0	12.7	121.0	138.0	

◆ Calculation – SEMI ANECHOIC CHAMBER #4(10 m)

Result(QP) [dB(μV/m)] = (Reading(QP)[dB(μV)] + c.f[dB(1/m)])

Margin(QP)[dB] = Limit[dB(μV/m)] - Result(QP) [dB(μV/m)]

Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value



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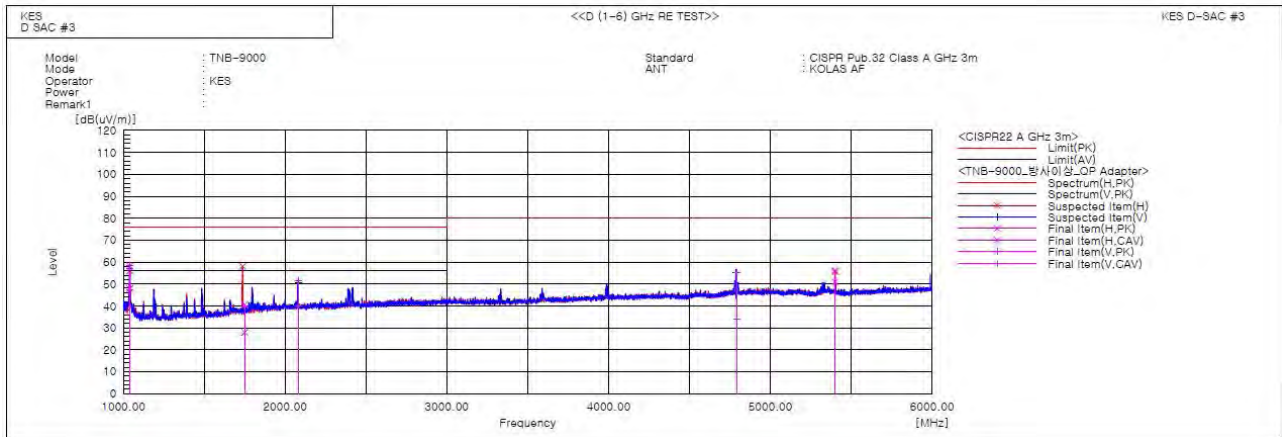
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Radiated Electric Field Emissions(Above 1 GHz)

■ 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	1039.300	H	67.5	57.2	-9.3	58.2	47.9	76.0	56.0	17.8	8.1	100.0	85.3	
2	1039.340	V	67.6	56.6	-9.3	58.3	47.3	76.0	56.0	17.7	8.7	100.0	199.4	
3	1749.727	H	44.6	31.9	-4.0	40.6	27.9	76.0	56.0	35.4	28.1	100.0	148.4	
4	2078.930	V	53.0	41.4	-1.6	51.4	39.8	76.0	56.0	24.6	16.2	100.0	54.1	
5	4792.269	V	47.5	26.7	7.5	55.0	34.2	80.0	60.0	25.0	25.8	100.0	161.3	
6	5400.260	H	48.3	43.0	7.9	56.2	50.9	80.0	60.0	23.8	9.1	100.0	2.7	

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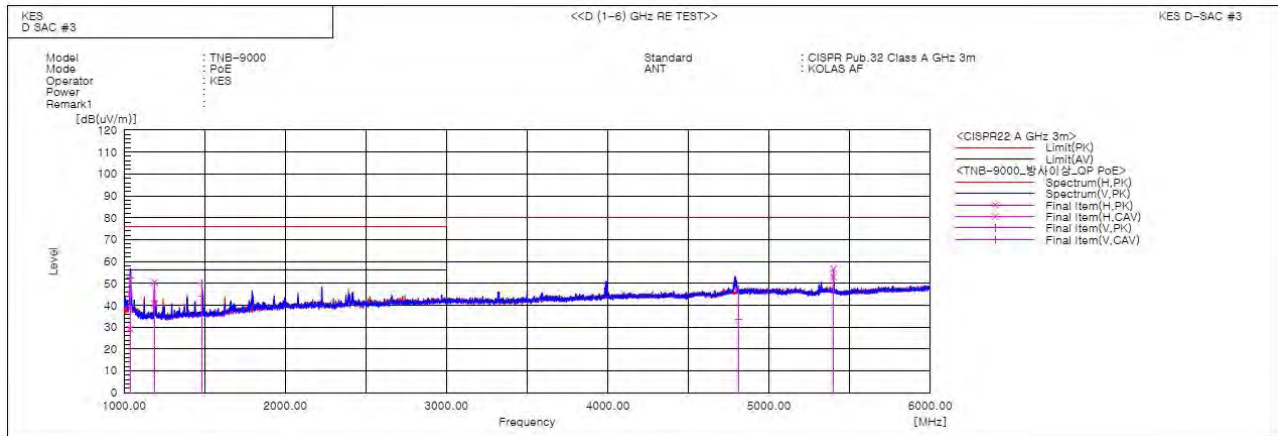


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PoE Mode



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Result CAV [dB(μV/m)]	Limit PK [dB(μV/m)]	Limit AV [dB(μV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1040.220	V	61.9	48.6	-9.3	52.6	39.3	76.0	56.0	23.4	16.7	100.0	351.9	
2	1036.750	H	54.4	38.5	-9.3	45.1	29.2	76.0	56.0	30.9	26.8	100.0	355.2	
3	1188.100	H	59.1	49.2	-8.6	50.5	40.6	76.0	56.0	25.5	15.4	100.0	91.0	
4	1484.920	V	56.6	50.9	-6.6	50.0	44.3	76.0	56.0	26.0	11.7	100.0	16.1	
5	4810.206	V	39.9	26.0	7.6	47.5	33.6	80.0	60.0	32.5	26.4	100.0	160.6	
6	5399.900	H	48.7	44.9	7.9	56.6	52.8	80.0	60.0	23.4	7.2	100.0	4.3	

Calculation

Result(PK/CAV) [dB(μV/m)] = (Reading(PK/CAV)[dB(μV)] + c.f[dB(1/m)])

Margin(PK/CAV)[dB] = Limit[dB(μV/m)] - Result(PK/CAV) [dB(μV/m)]

Reading(PK/CAV) : Reading value, Result(PK/CAV) : Reading value + Factor value

Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value

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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	0.087			
2	0.003	0.266	1.080	n/a
3	0.078	3.375	2.300	PASS
4	0.005	1.084	0.430	n/a
5	0.075	6.565	1.140	PASS
6	0.004	1.232	0.300	n/a
7	0.071	9.243	0.770	PASS
8	0.004	1.554	0.230	n/a
9	0.066	16.505	0.400	PASS
10	0.004	2.324	0.184	n/a
11	0.060	18.298	0.330	PASS
12	0.003	2.255	0.153	n/a
13	0.054	25.824	0.210	PASS
14	0.003	2.008	0.131	n/a
15	0.048	31.709	0.150	PASS
16	0.002	1.967	0.115	n/a
17	0.041	30.728	0.132	PASS
18	0.002	2.074	0.102	n/a
19	0.033	28.244	0.118	PASS
20	0.002	1.862	0.092	n/a
21	0.027	16.547	0.161	PASS
22	0.001	1.533	0.084	n/a
23	0.021	14.091	0.147	PASS
24	0.001	1.472	0.077	n/a
25	0.015	11.234	0.135	PASS
26	0.001	1.301	0.071	n/a
27	0.010	8.241	0.125	PASS
28	0.001	1.432	0.066	n/a
29	0.006	5.512	0.116	PASS
30	0.001	1.470	0.061	n/a
31	0.003	3.141	0.109	n/a
32	0.001	1.419	0.058	n/a
33	0.002	1.908	0.102	n/a
34	0.001	1.495	0.054	n/a
35	0.003	2.625	0.096	n/a
36	0.001	1.377	0.051	n/a
37	0.003	3.587	0.091	n/a
38	0.001	1.502	0.048	n/a
39	0.004	4.130	0.087	n/a
40	0.001	1.465	0.046	n/a

Note: 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.

* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.

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www.kes.co.kr

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Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.087			
2	0.004	0.240	1.620	n/a
3	0.078	2.265	3.450	PASS
4	0.006	0.906	0.645	PASS
5	0.075	4.405	1.710	PASS
6	0.005	1.036	0.450	n/a
7	0.072	6.206	1.155	PASS
8	0.004	1.299	0.345	n/a
9	0.066	11.074	0.600	PASS
10	0.005	1.911	0.276	PASS
11	0.061	12.276	0.495	PASS
12	0.004	1.873	0.230	n/a
13	0.055	17.340	0.315	PASS
14	0.003	1.695	0.197	n/a
15	0.048	21.315	0.225	PASS
16	0.003	1.677	0.173	n/a
17	0.041	20.662	0.199	PASS
18	0.003	1.753	0.153	n/a
19	0.034	19.004	0.178	PASS
20	0.002	1.559	0.138	n/a
21	0.027	16.696	0.161	PASS
22	0.002	1.276	0.125	n/a
23	0.021	14.269	0.147	PASS
24	0.001	1.192	0.115	n/a
25	0.015	11.396	0.135	PASS
26	0.001	1.079	0.106	n/a
27	0.011	8.427	0.125	PASS
28	0.001	1.162	0.099	n/a
29	0.007	5.719	0.116	PASS
30	0.001	1.180	0.092	n/a
31	0.004	3.393	0.109	n/a
32	0.001	1.144	0.086	n/a
33	0.002	2.078	0.102	n/a
34	0.001	1.188	0.081	n/a
35	0.003	2.781	0.096	n/a
36	0.001	1.063	0.077	n/a
37	0.004	3.944	0.091	n/a
38	0.001	1.182	0.073	n/a
39	0.004	4.410	0.087	n/a
40	0.001	1.141	0.069	n/a

Note: 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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KES-EM-20T0027
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Test Data - Voltage Fluctuations

Maximum Flicker results

Flicker Measurements					
	Plt	Max Pst	Max Dc	Max Dmax	Max Tmax
Line 1:	0.028	0.028	0	< 0.2	0
Limits:	0.65	1	3.3	4	0.5
Results:	PASS	PASS	PASS	PASS	PASS

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Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports



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Conducted Emissions at Telecommunication Ports



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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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Harmonic Current Emissions and Voltage Fluctuations and Flicker

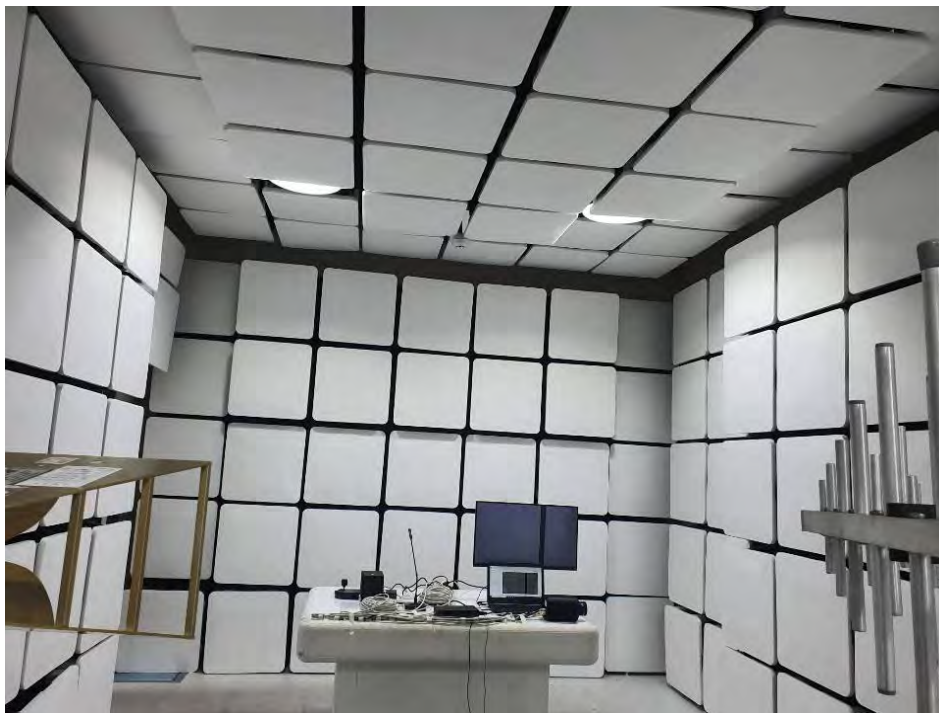


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Electrostatic Discharge



Radiated Electric Field Immunity



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Electrical Fast Transients/Bursts



Surge Transients



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Conducted Disturbance



Voltage Dips and Short Interruptions



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EUT External Photographs

(Top)



(Bottom)



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EUT Internal Photographs

(Internal View)



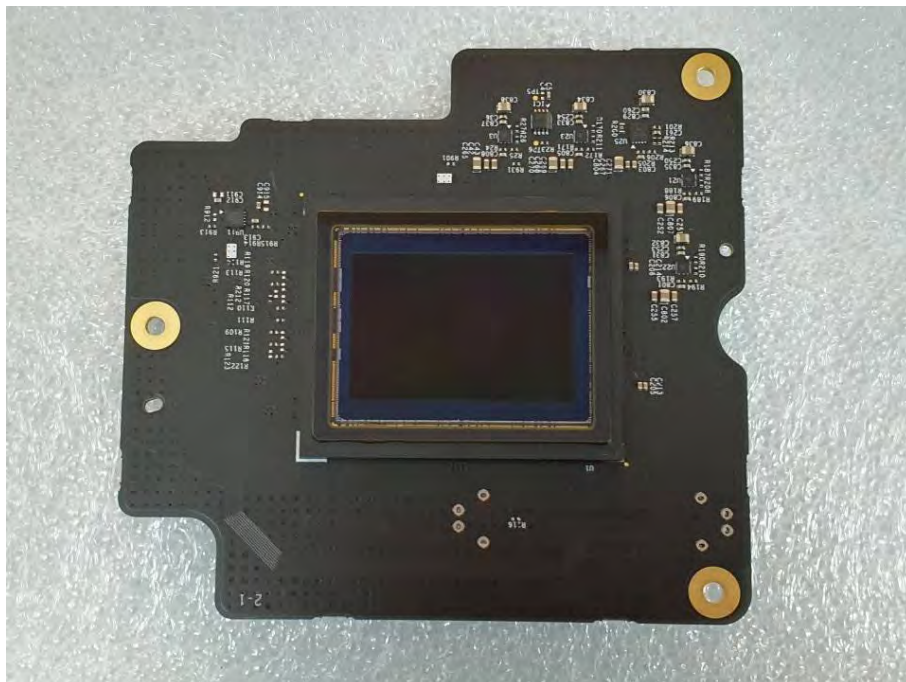
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EUT Internal View – Board 1

(Top)



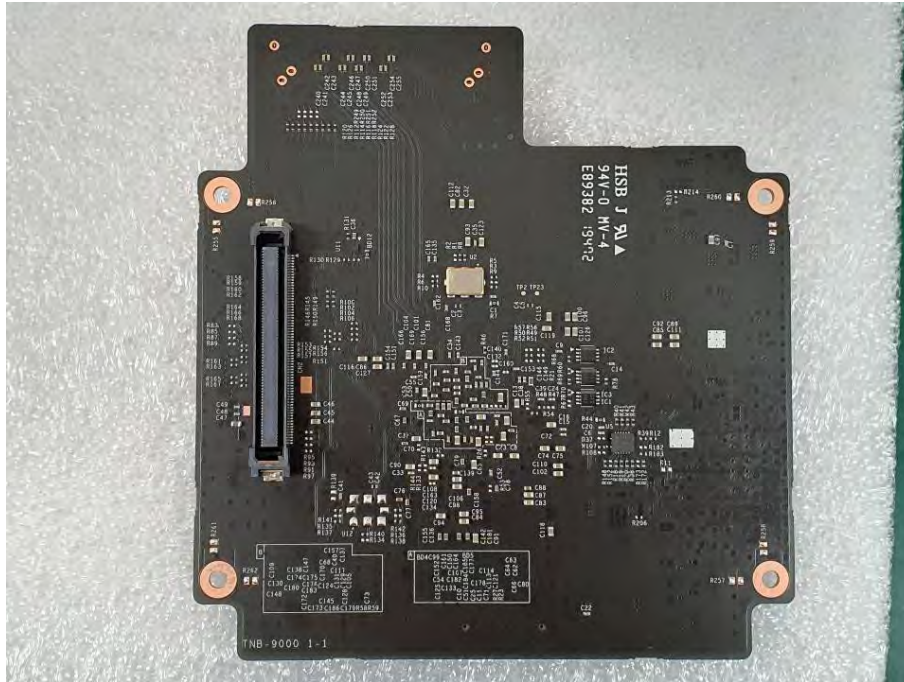
(Bottom)



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EUT Internal View – Board 2

(Top)



(Bottom)



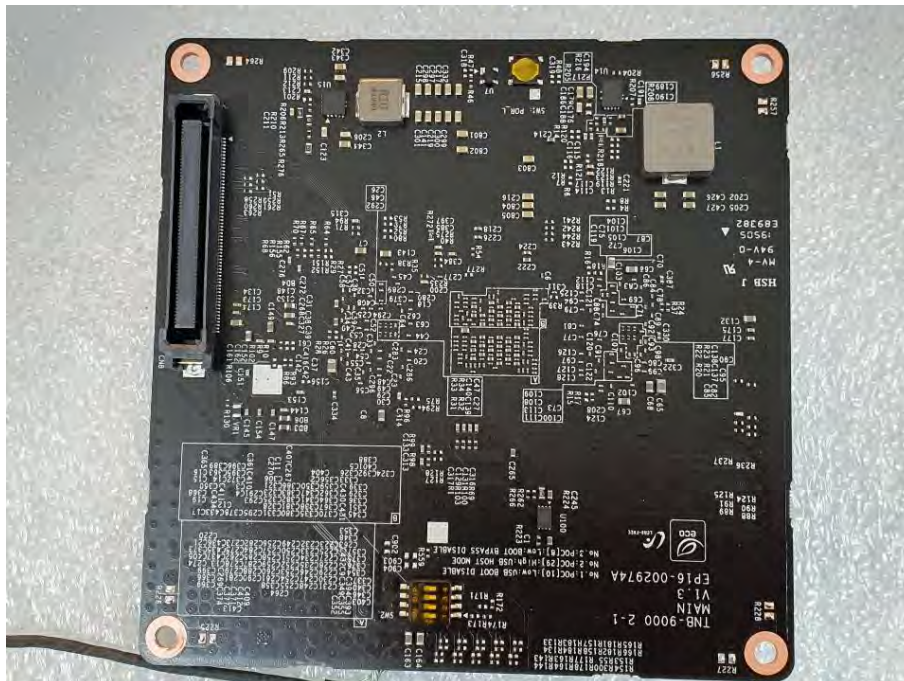
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EUT Internal View – Board 3

(Top)



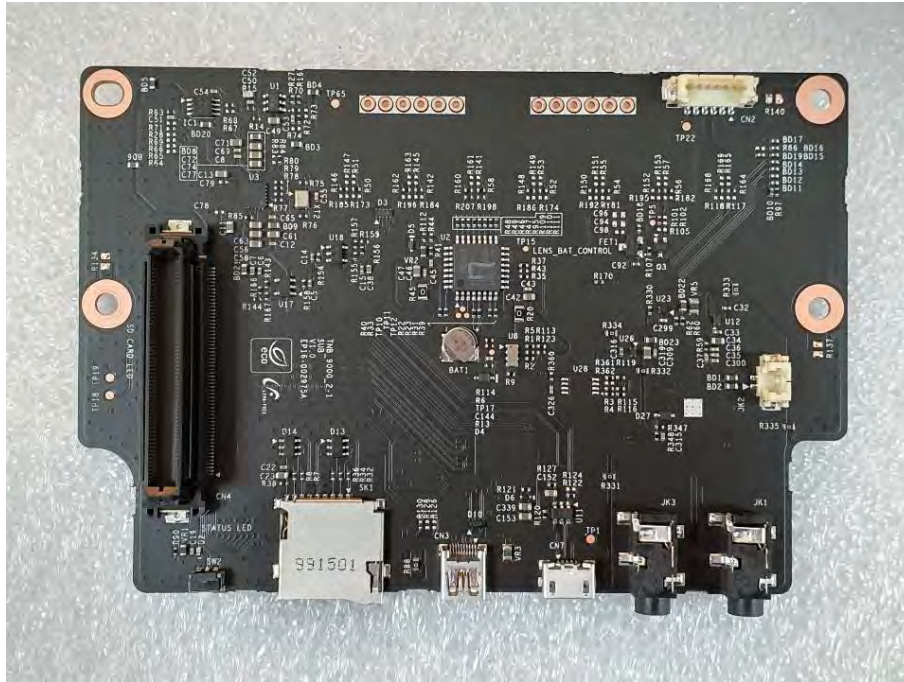
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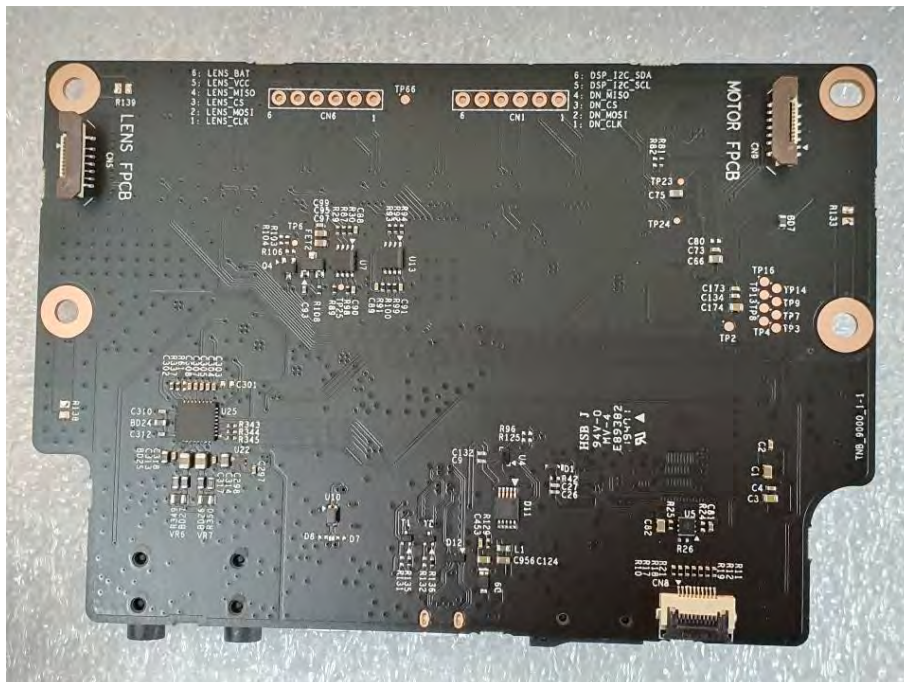
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EUT Internal View – Board 4

(Top)



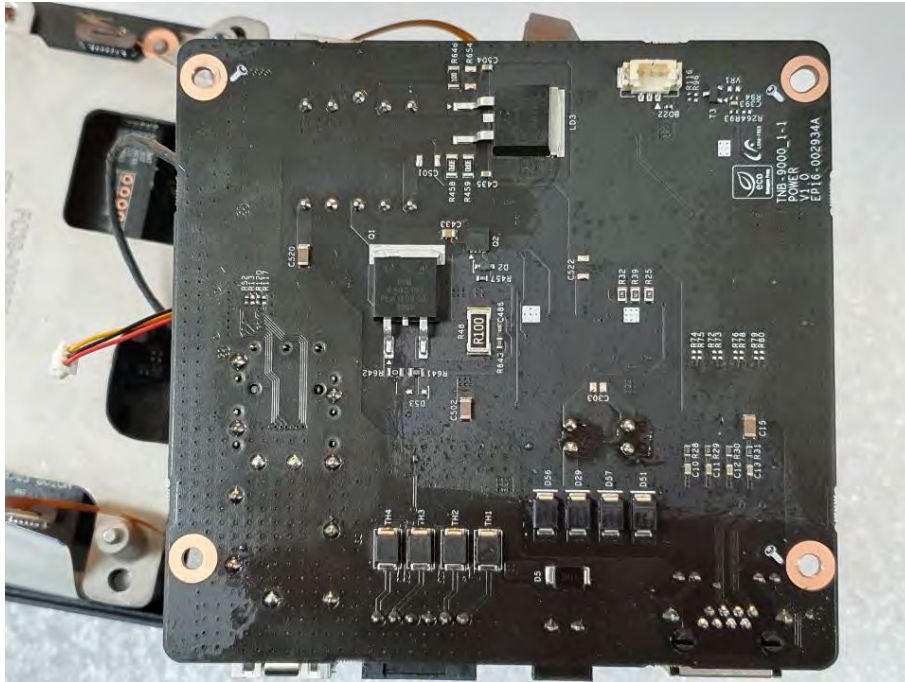
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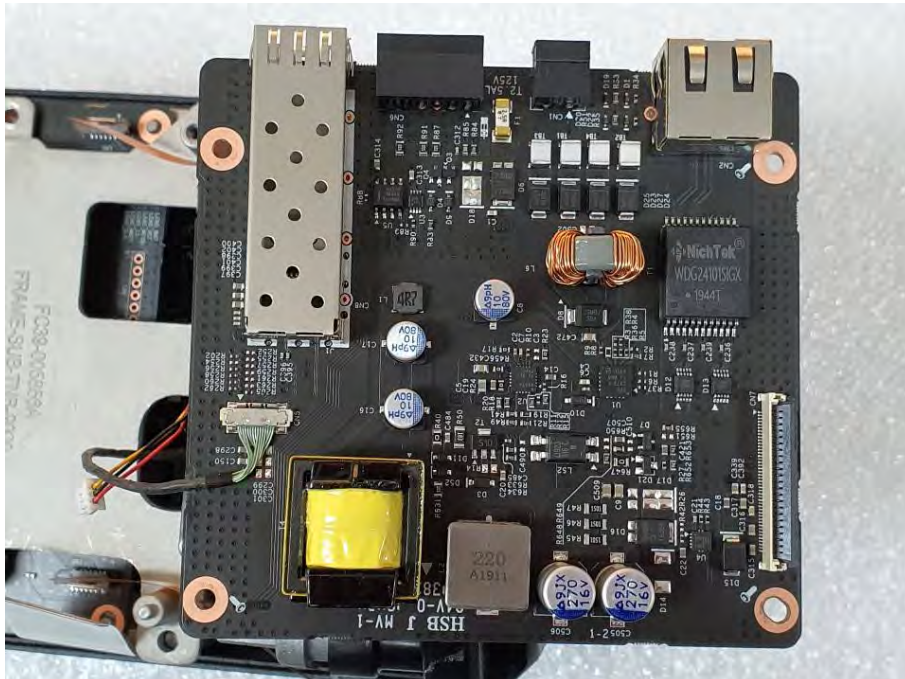
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EUT Internal View – Board 5

(Top)

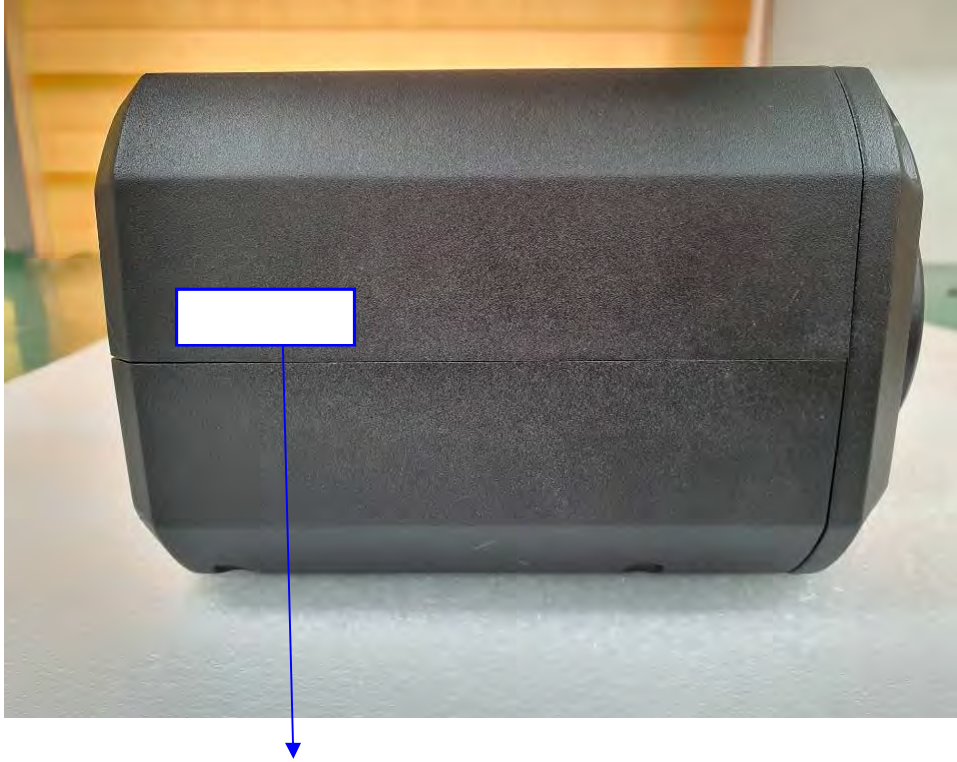


(Bottom)



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Label and Location



Network Camera

Model No : TNB-9000

Manufacturer : HANWHA TECHWIN (TIANJIN) CO.,LTD.

Made in China

