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Report No.:
KES-EM-23T0253
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EMC TEST REPORT

Test Report No. : KES-EM-23T0253
Date of Issue : Mar. 17, 2023
Product name : Network Camera
Model/Type No. : TNV-C7013RC
Variant Model : -
Applicant : Hanwha Vision Co., Ltd
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, Republic of Korea
Manufacturer : 1. HANWHA VISION VIETNAM COMPANY LIMITED
2. D-TECH CO.,LTD.
Manufacturer Address : 1. Lot O-2, Que Vo Industrial Zone extended area,
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam
2. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi- do,
Korea (Suwon Industrial Complex)
Date of Receipt : Feb. 21, 2023
Test date : Mar. 03, 2023 ~ Mar. 10, 2023
Test Results : ☒ In Compliance ☐ Not in Compliance

Tested by

Dae Soo, Kim
EMC Test Engineer

Reviewed by

Seong Min, Choi
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
Mar. 17, 2023	KES-EM-23T0253	Issued

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1.0 General Product Description

Main Specifications of EUT are:

Video		Radiometry	
Imaging Device	1/1.8" progressive CMOS	Temperature Detect Range	None
Resolution	2048x1536, 1920x1080, 1600x1200, 1280x1024, 1280x960, 1280x720, 1024x768, 800x600, 800x480, 720x576, 720x480, 640x480, 640x360, 320x240	Temperature Accuracy	None
Max. Frame Rate	H.265/H.264: Max. 30fps/25fps(50Hz/50Hz) MJPEG: Max. 30fps(30MP Max. 5fps)	Temperature Detection	None
NETD	None	Additional	None
Pixel Size	None	Network	
Min. Illumination	Color: 0.04Lux(F2.0, 1/30sec, 30IRE) BW: 0.04Lux(F2.0, 1/30sec, 30IRE), 0Lux(IR LED on)	Ethernet	Metal shielded RJ-45(10/100BASE-T)
Video Out	None	Video Compression	H.265/H.264: Main/Baseline/High, MJPEG 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
Video Transmission Distance	None	Audio Compression	Smart Codec: Manual(Sea area), WiseStreamII, WiseStreamIII(Based on AI engine)
Lens		Video Quality Adjustment	H.264/H.265: Target bitrate level control MJPEG: Target bitrate level control
Focal Length (Zoom Ratio)	2.39mm fixed focal	Bitrate Control	H.264/H.265: CBR or VBR MJPEG: VBR
Max. Aperture Ratio	F2.0	Streaming	Unicast(20 users) / Multicast Multiple streaming(Up to 10 profiles, 3 virtual channel support)
Angular Field of View	H: 128°, V: 100°	Protocol	IPv4, IPv6, TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTSP, RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, CoS, UPnP, Bonjour, LLDP, CDP, SRTP(TCP, UDP Unicast), MQTT
Min. Object Distance	0.5m(1.64ft)	SIP support (VoIP, Peer-to-peer, SIP/P	None
Focus Control	Fixed		TPM 2.0(FIPS 140-2 level 2) HTTPS(SSL) Login Authentication Digest Login Authentication IP Address Filtering User access log 802.1X Authentication(EAP-TLS, EAP-LEAP, EAP-PEAP MSCHAPv2) Device Certificate(Hamwa Techwin Root CA, pre-installed) Secure by default certificate Secure OS/Boot/Storage, Verify firmware forgery
Lens Type	None		ONVIF Profile S/G/I/M SUNAPI(HTTP API) Wisenet open platform
Mount Type	None	General	
Optional Lens	None	Webpage Language	None
Pan / Tilt / Rotate		Web Viewer	None
Pan / Tilt / Rotate Range	None	Edge Storage	Micro SD/SDHC/SDXC 1slot 1TB
Pan Range	None	Memory	4096MB RAM, 512MB Flash
Pan Speed	None	Environmental & Electrical	
Tilt Range	None	Operating Temperature / Humidity	-10°C ~ +55°C (14°F ~ +131°F) 0~95% RH(non-condensing) Humidity control /w AIR vent
Tilt Speed	None	Storage Temperature / Humidity	-50°C ~ +60°C(-58°F ~ +140°F) / 0~90% RH
Rotate Range	None	Certification	IP66, IP6K9K, IK10+
Sequence	None	Input Voltage	PoE(IEEE802.3af, Class3)
Preset Accuracy	None	Power Consumption	PoE: Max 12.95W, typical 9.7W DC : Max 12.7W, typical 9.0W
Operational		Mechanical	
Camera Title	Displayed up to 85 characters	Color / Material	White / Aluminum
Direction Indicator	None	RAL Code	RAL9003
Day & Night	Auto(ICR)	Product Dimensions / Weight	198.3(W)x104.8(H)x198.6(D)(mm)(7.8"x4.13"x7.82"), 1.935g (4.27lb)
Backlight Compensation	BLC, HLC, WDR, SSDR	Compatible Conduit hole / Gangbox	None
Wide Dynamic Range	extremeWDR (120dB)	Hanging Mount (Dome)	None
Digital Noise Reduction	WiseNRII(Based on AI engine), SSNRV	Skin Cover	None
Digital Image Stabilization	Support	Skin Cover (Dome)	SPG-VANT13W
Defog	Support	Weather Cap (Dome)	None
Motion Detection	Bea, Bpoint polygonal zones	Power Module	None
Privacy Masking	32ea, 4point Quadrangle zones - Color: Gray/Green/Red/Blue/Black/White - Mosaic	Backbox	None
Gain Control	Off / Max Gain / Manual	Certifications & Standards	
White Balance	ATW / Narrow ATW / AWC / Manual / Indoor / Outdoor	Network	None
IRDC	None	FCC 47 CFR 15 Subpart B Class A ICES-3(A)/NMB-3(A) CE/UKCA	
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (2~1/12,000sec) Prefer shutter control(Based on AI engine)	EMC	- EN 55032 Class A, EN 50130-4, EN 61000-3-2, EN 61000-3-3 VCCI C/SPR 32 Class A RCM AS/NZS CISPR 32 Class A KS C 9832 Class A, KS C 9835
Digital PTZ	Support(Preset, Group)	Safety	UL 62368-1, CAN/CSA C22.2 NO. 62368-1 IEC/EN 62471
Video Rotation	Flip, Mirror, Halfway view(90°/270°)	Environment	IEC/EN 63000 IEC/EN 60529 IP66, ISO 20653 IP6K9K, IEC/EN 62262 IK10+
Classified object type	Person/Face/Vehicle/license plate	Video	None
Support DetectionShot	Analytics events based on AI engine - Object detection, Virtual line(Crossing/Direction), Virtual area(Loitering/Intrusion/Enter/Exit) Analytics events - Defocus detection, Motion detection, Tampering, Audio detection, Sound classification, Virtual area(Appear/Disappear), Clothes color detection(Orange/Black/Red, @400lux)	DORI (EN62676-4 standard)	
Business Intelligence	None	Detect (25PPM/ 8PPF)	35.1m(115.16ft)
Serial Interface	None	Observe (63PPM/ 19PPF)	14m(45.93ft)
Alarm I/O	2 configurable I/O ports * Support Alarm via optional SPM-4210 I/O box	Recognize (125PPM/ 38PPF)	7.0m(22.97ft)
Alarm Triggers	Analytics, Network disconnect, Alarm input, App event, Time schedule, MQTT	Identify (250PPM/ 76PPF)	3.5m(11.48ft)
When alarm trigger occurred	- File upload(image): e-mail/FTP - Notification: e-mail - Recording: SD/SDHC/SDXC or NAS recording at event triggers	LPR/ANPR/MMCR	
Alarm Events	- Alarm output - Handover: PTZ preset, send message by HTTP/HTTPS/TCP - Audio clip playback - MQTT: publication	Speed Description	None
Audio Streaming	None	Speed limit	None
Audio In	Selectable(mic in/line in), Built-in MIC Supply voltage: 2.5VDC(4mA), Input impedance: 2K Ohm * Support Audio via optional SPM-4210 I/O box	Min. Forward Distance	None
Audio Out	Line out, Max. output level: 1Vrms	Max. Forward Distance	None
IR Viewable Length	Wise IR 15m(49.21ft)	Max. Horizontal Angle	None
IR Illuminator (Optional)	None	Max. Vertical Angle	None
IR Radiation angle	None	Horizontal Offset	None
IR LED	None	Camera Height	None
IR Wavelength	None	Lane Coverage	None
IR Operation	None	Vehicle Recognition	None
Water Removal	None	Available Countries	None
Auto Tracking	None	Wisenet Road AI LPR/ANPR/MMCR	
Coaxial Protocol	None	Solution	None
Color Palettes	None	Speed Description	None
		Lane Coverage	None
		Speed limit	None
		Min. Forward Distance	None
		Max. Forward Distance	None
		Max. Horizontal Angle	None
		Max. Vertical Angle	None
		Horizontal Offset	None
		Camera Height	None
		Vehicle Recognition	None
		Available Countries	None

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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.

☒ AC 230 V, 50 Hz ☒ PoE

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	TNV-C7013RC	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
AC / DC ADAPTOR	KPL-048F-VI	-	I.T.E POWER SUPPLY	-
PoE SWITCH	POE29U-1AT(PL)	3115156G00001 3	Phihong Technology Co., Ltd.	-
LAPTOP	Latitude 5300	8C47BE45C060	DELL INC.	-
LAPTOP ADAPTOR	HA65NM130	-	Chicony Power Technology(Suzhou)Co., Ltd.	-
HEADSET	K550	-	Britz®	-
BUTTON ALARM	-	-	-	-
ALARM	-	-	-	-
SMART PHONE	SM-N920	-	SAMSUNG	-
Micro SD card	-	-	SanDisk	-

1.6 External I/O Cabling

■ DC Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
Network Camera (EUT)	DC JACK	AC / DC ADAPTOR	DC JACK	1.2	U
	RJ-45	LAPTOP	RJ-45	3.1	U
	MIC	HEADSET	MIC	1.8	U
	SPEAKER		SPEAKER	1.7	U
	ALARM IN	BUTTON ALARM	ALARM OUT	3.1	U
	ALARM OUT	ALARM	ALARM IN	3.1	U
	Micro SD Slot	Micro SD card	Micro SD Slot	-	-

* Unshielded=U, Shielded=S

■ PoE Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
Network Camera (EUT)	RJ-45 (PoE)	PoE SWITCH	RJ-45 (PoE)	3.1	U
	MIC	HEADSET	MIC	1.8	U
	SPEAKER		SPEAKER	3.0	U
	ALARM IN	BUTTON ALARM	ALARM OUT	3.1	U
	ALARM OUT	ALARM	ALARM IN	3.1	U
	Micro SD Slot	Micro SD card	Micro SD Slot	-	-

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

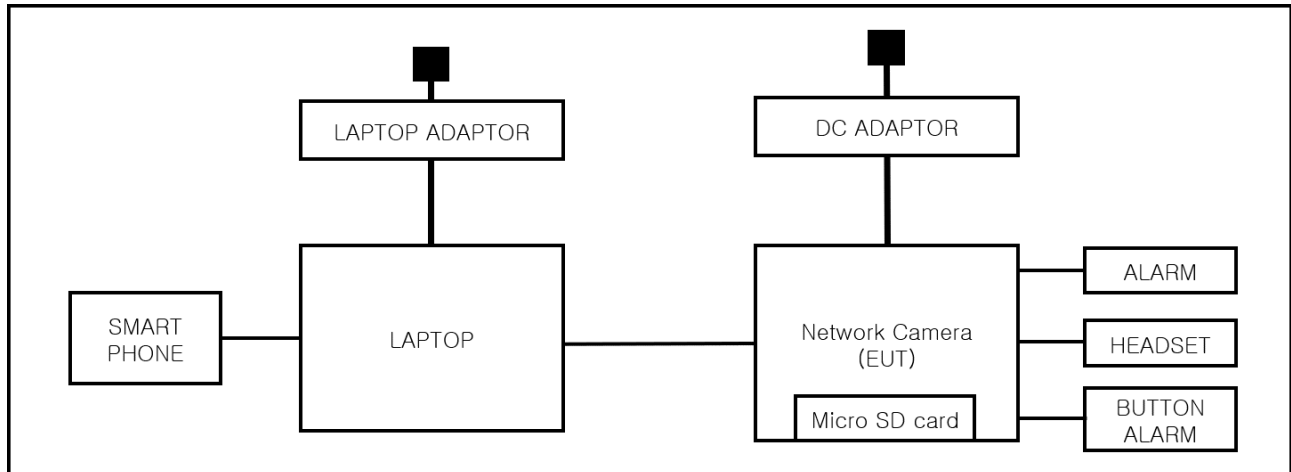
Test Mode	operating
Operation	1. Network ping test on the EUT and laptop. 2. Check if the image is output normally through the laptop's WEB VIEWER. 3. Run 1KHz Tone on the smartphone connected to the peripheral laptop to verify that it is output to the headset normally. 4. After the test, check if the micro SD card recorded properly.

EUT Test operating S/W		
Name	Version	Manufacture Company
Web Viewer	-	Hanwha Vision Co., Ltd

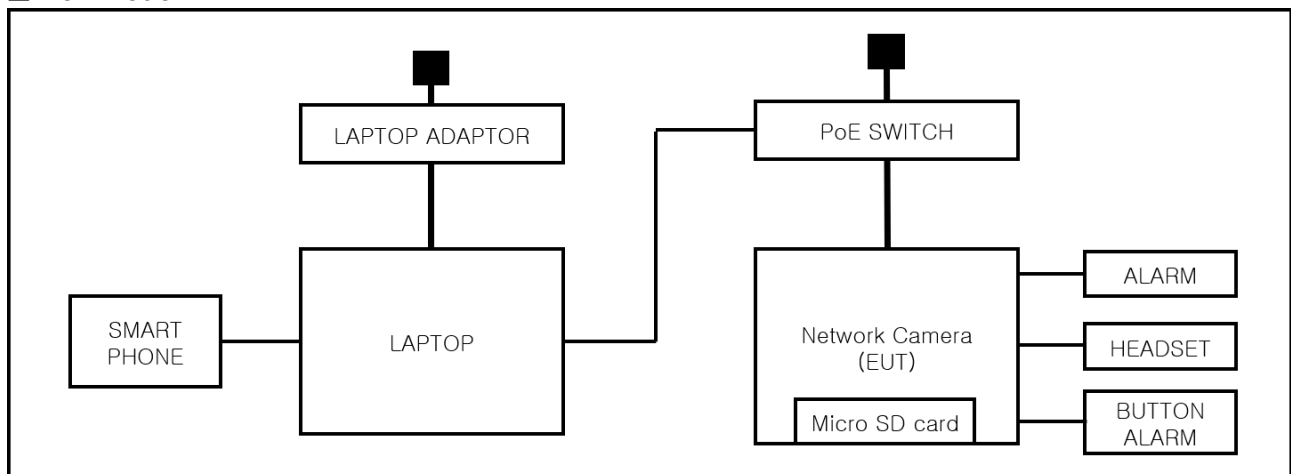
1.8 Configuration

■ AC Main
 □ DC Main

■ DC Mode



■ PoE Mode



1.9 Remarks when standards applied

N/A

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, Republic of. The sites are constructed in conformance with the requirements of ANSI C63.4a-2017 and CISPR 16-1-4:2019

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Anechoic Chamber 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 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
JAPAN	VCCI	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)	 C-20136, T-20137, R-20181, G-20176
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 001633 0004

2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ EMC – Directive 2014/30/EU

☒ EN 55032:2015/A11:2020

☒ Class A

☐ Class B

☒ EN 50130-4:2011

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

☒ EMC – Regulations 2016

☒ EN 55032:2015/A11:2020

☒ Class A

☐ Class B

☒ EN 50130-4:2011

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

2.1 Conducted Emissions at Mains Power Ports

Test Date
Mar. 06, 2023Test Location
Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101783	11, 11, 2023
☒	LISN	ENV216	R & S	101787	11, 10, 2023
☒	LISN	ESH2-Z5	R & S	100450	11, 10, 2023
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 10, 2023

Test Conditions

Temperature: (24,2 ± 0,0) °C
Relative Humidity: (43,2 ± 0,1) % R.H.Frequency Range of Measurement
150 kHz to 30 MHzInstrument Settings
IF Band Width: 9 kHzTest Results
The requirements are:☒ PASS
☐ NOT PASS
☐ NOT APPLICABLERemarks
See Appendix A for test data.

2.2 Conducted Emissions at Telecommunication Ports

Test Date
Mar. 06, 2023

Test Location
Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101783	11, 11, 2023
☒	LISN	ENV216	R & S	101787	11, 10, 2023
☒	LISN	ESH2-Z5	R & S	100450	11, 10, 2023
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 10, 2023
☒	8-WIRE ISN CAT3,5	ENY81	R & S	100174	11, 22, 2023
☐	CDN	CDNS502A	TESEQ	40431	11, 10, 2023

Test Conditions

Temperature: (24,2 ± 0,1) °C
Relative Humidity: (43,2 ± 0,1) % 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.
- For Ethernet interfaces, measurements are required at the highest data rate supported by the interface.

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2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date
Mar. 03, 2023

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

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	ESU26	R & S	100551	03, 31, 2023
☒	AMPLIFIER	SCU 01	R & S	100603	11, 10, 2023
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 17, 2024
☒	ATTENUATOR	8491A	HP	32173	03, 03, 2024

Test Conditions

Temperature: (23,9 ± 0,0) °C
Relative Humidity: (43,1 ± 0,1) % 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.

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2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date
Mar. 05, 2023Test Location
SEMI ANECHOIC CHAMBER #4(10m)

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	ESU26	R & S	100551	03, 31, 2023
☒	PREAMPLIFIER	8449B	AGILENT	3008A01742	11, 07, 2023
☒	ATTENUATOR	8491A	HP	35496	03, 03, 2024
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	11, 08, 2023

Test Conditions

Temperature: (23,5 ± 0,1) °C
Relative Humidity: (43,2 ± 0,1) % 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.
- The Average of the test data is the cispr average result.

2.5 Harmonic Current Emissions

Test Date
Mar. 03, 2023Test Location
Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	net.control	EM TEST	2.1.4	-
☒	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	04, 06, 2023
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: (23,5 ± 0,1) °C
Relative Humidity: (44,2 ± 0,1) % 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.

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2.6 Voltage Fluctuations and Flicker

Test Date
Mar. 03, 2023

Test Location
Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	net.control	EM TEST	2.1.4	-
☒	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	04, 06, 2023
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: (23,5 ± 0,2) °C
Relative Humidity: (44,2 ± 0,2) % 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

Mar. 06, 2023

Test Location

EMS-ESD: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	01, 31, 2024
☒	HCP	-	KES	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: (23,9 ± 0,0) °C

Relative Humidity: (43,4 ± 0,0) % R.H.

Atmospheric Pressure: (100,5 ± 0,0) 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
10 at all locations for Contact discharge

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

Notes: HCP: Horizontal coupling plane

VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

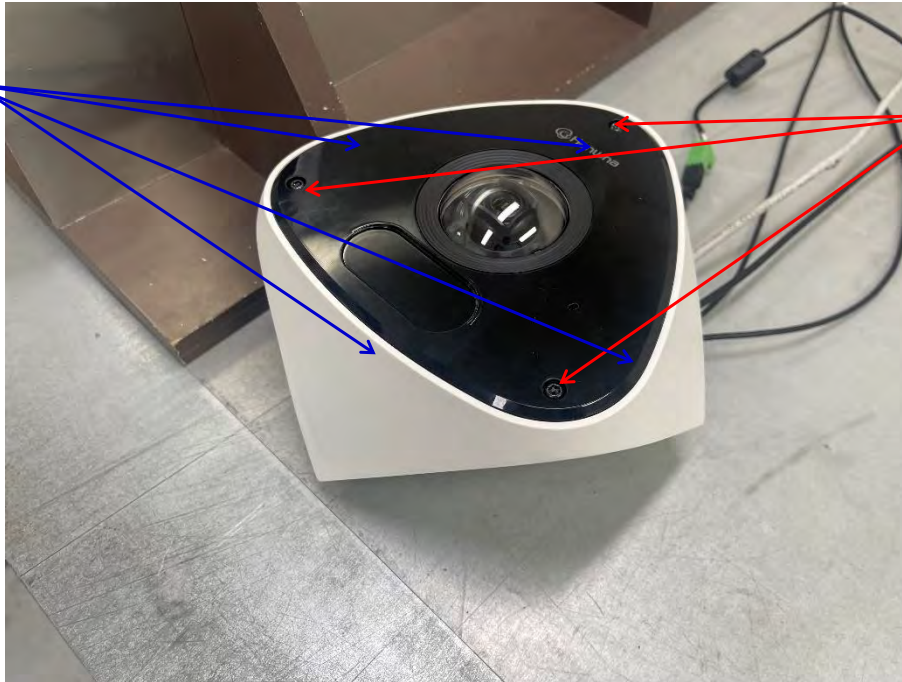
Location of Discharge:

■ DC Mode

Air
Contact



1



2

3

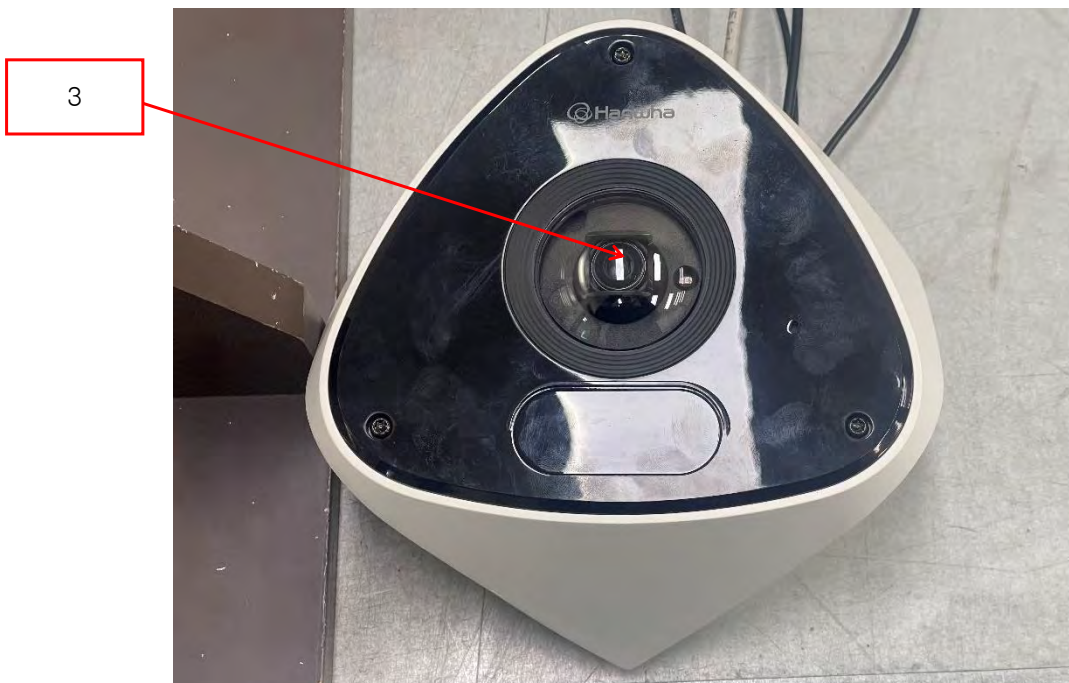
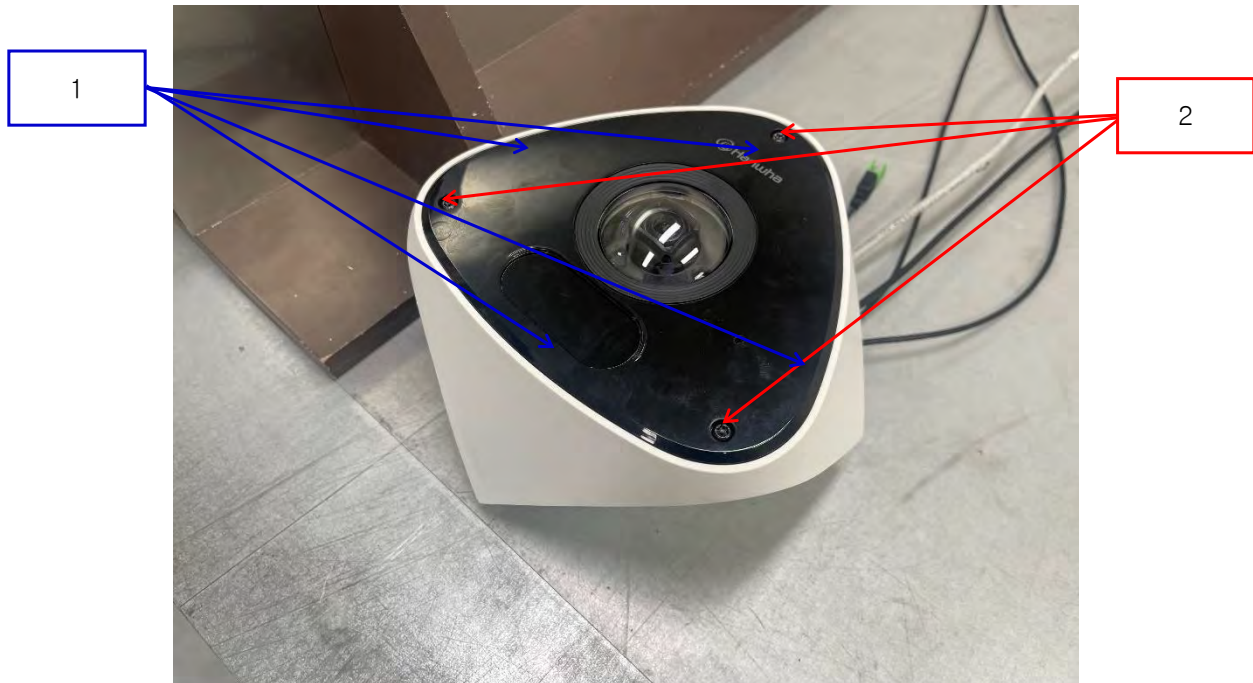


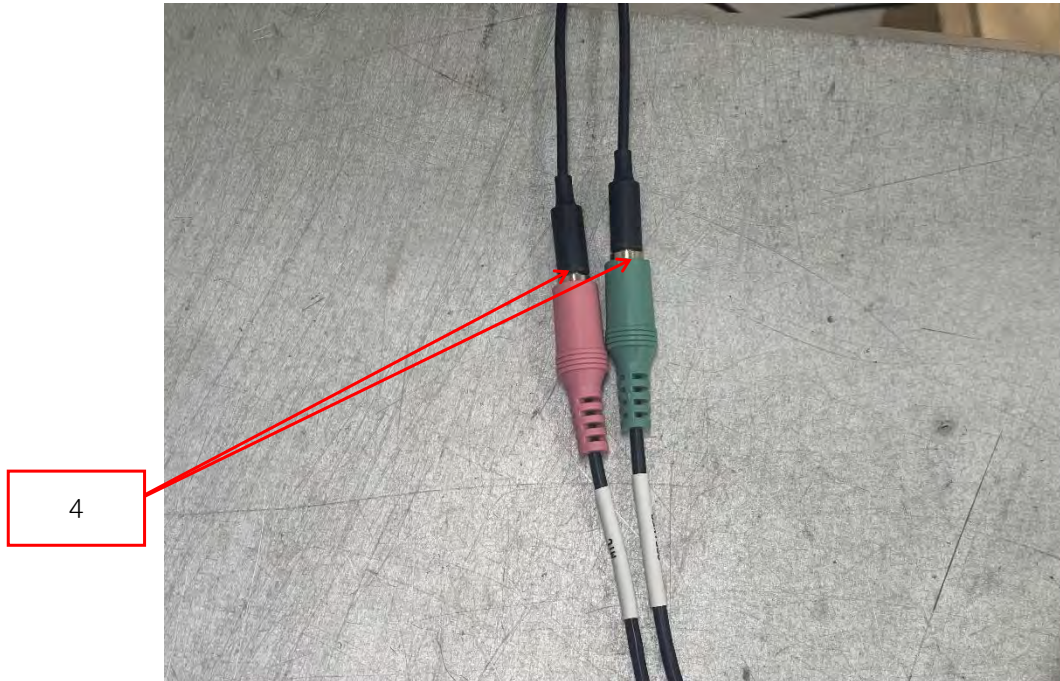
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4

■ PoE Mode





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Test Data**■ DC Mode**

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	Air Discharge	Complied	-
2	Screw	Contact Discharge	Complied	-
3	Lens	Air Discharge	Complied	-
4	Port	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	Air Discharge	Complied	-
2	Screw	Contact Discharge	Complied	-
3	Lens	Air Discharge	Complied	-
4	Port	Contact Discharge	Complied	-

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

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

RemarksPASS Required Performance Criteria

3.2 Radiated Electric Field Immunity

Reference Standard
EN IEC 61000-4-3:2020

Test Date
Mar. 09, 2023

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

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	EMC32	R & S	10.10.02	-
☒	SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	08, 01, 2023
☒	HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-
☒	POWER METER	E4419B	Agilent	GB40203000	03, 31, 2023
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY52170007	04, 04, 2023
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY41498669	04, 04, 2023
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM, INC	781	03, 06, 2024

Test Conditions

Temperature: (24,2 ± 0,2) °C
Relative Humidity: (43,0 ± 0,2) % R.H.
Atmospheric Pressure: (100,8 ± 0,0) 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 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

RemarksPASS Required Performance Criteria

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3.3 Electrical Fast Transients / Bursts

Reference Standard
EN 61000-4-4:2012

Test Date
Mar. 06, 2023

Test Location
EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 28, 2023
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 29, 2023
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 28, 2023

Test Conditions

Temperature: (23,9 ± 0,1) °C
Relative Humidity: (43,4 ± 0,1) % R.H.
Atmospheric Pressure: (100,9 ± 0,0) kPa

Test Specifications

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

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

Burst Period: ☒ 300 ms ☐ 2 s

Repetition Rate: ☐ 5 kHz ☒ 100 kHz

Duration of Test Voltage: ☒ ≥ 1 min

Required Performance Criteria: ☒ Complied

Test Data

■ DC 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	Complied	Complied
ALARM IN	Complied	Complied
ALARM OUT	Complied	Complied

☒ PoE Mode

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

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

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
RJ-45	Complied	Complied
Alarm	Complied	Complied
ALARM OUT	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria

3.4 Surge Transients

Reference Standard
EN 61000-4-5:2014/A1:2017Test Date
Mar. 06, 2023Test Location
EMS-Surge: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 28, 2023
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 29, 2023
☒	CDN	CNV 508N1	EM TEST	P1610176296	11, 29, 2023

Test Conditions

Temperature: (23,9 ± 0,2) °C
Relative Humidity: (43,4 ± 0,2) % R.H.
Atmospheric Pressure: (100,5 ± 0,0) 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

Test Data
☒ DC Mode

☒ Line to Line – Differential Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L – N	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	Coupling Method	Observations	
		(+) Surge (kV)	(-) Surge (kV)
RJ-45	CDN	Complied	Complied
	LINE	Complied	Complied

☒ 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	Coupling Method	Observations	
		(+) Surge (kV)	(-) Surge (kV)
RJ-45	CDN	Complied	Complied
	LINE	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria

3.5 Conducted Disturbance

Reference Standard
EN 61000-4-6:2014Test Date
Mar. 05, 2023Test Location
EMS-CS: Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	icd.control	EM TEST	5.3.12	-
☒	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	11, 10, 2023
☒	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 10, 2023
☒	CDN	CDN M016	TESEQ	43694	11, 10, 2023
☒	CDN	CDN M016	TESEQ	43697	11, 10, 2023
☒	CDN	CDN T8RJ45	EM TEST	0909-09	08, 01, 2023
☒	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 14, 2023

Test Conditions

Temperature: (24,3 ± 0,2) °C
Relative Humidity: (43,2 ± 0,2) % R.H.
Atmospheric Pressure: (100,5 ± 0,0) kPa



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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 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	CDN	Complied
Alarm	Clamp	Complied
ALARM OUT	Clamp	Complied

■ PoE 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
-	-	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45	CDN	Complied
Alarm	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

3.6 Voltage Dips and Short Interruptions

Reference Standard
EN IEC 61000-4-11:2020Test Date
Mar. 06, 2023Test Location
EMS-Voltage dip: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 29, 2023
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 29, 2023

Test Conditions

Temperature: (23,9 ± 0,0) °C
Relative Humidity: (43,4 ± 0,0) % R.H.
Atmospheric Pressure: (100,5 ± 0,0) kPa



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Test Specifications & Observations/Remarks

■ DC Mode

- Voltage Dips and Short Interruptions

Test Level	Duration [in period/ms (50 Hz)]	Results
☒ 20 % dip	☒ 250 / 5 000	<u>Complied</u>
☒ 30 % dip	☒ 25 / 500	<u>Complied</u>
☒ 60 % dip	☒ 10 / 200	<u>Complied</u>
☒ 100 % dip	☒ 250 / 5 000	<u>Degradation</u>

- Voltage variations

☒ Unom + 10 %	☒ 253.0 V (ac)	<u>Complied</u>
☒ Unom - 15 %	☒ 195.5 V (ac)	<u>Complied</u>

Observations:

Complied – No degradation of function

Degradation - See "Remarks "

Test Results

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

Remarks

During the test(100%, 250cycle), EUT was turned off but after the test, it was recovered by no operator's intervention.

APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

■ DC Mode

[HOT]

Common Information

Test Description:

Model No.:

Phase:

Mode:

Operator Name:

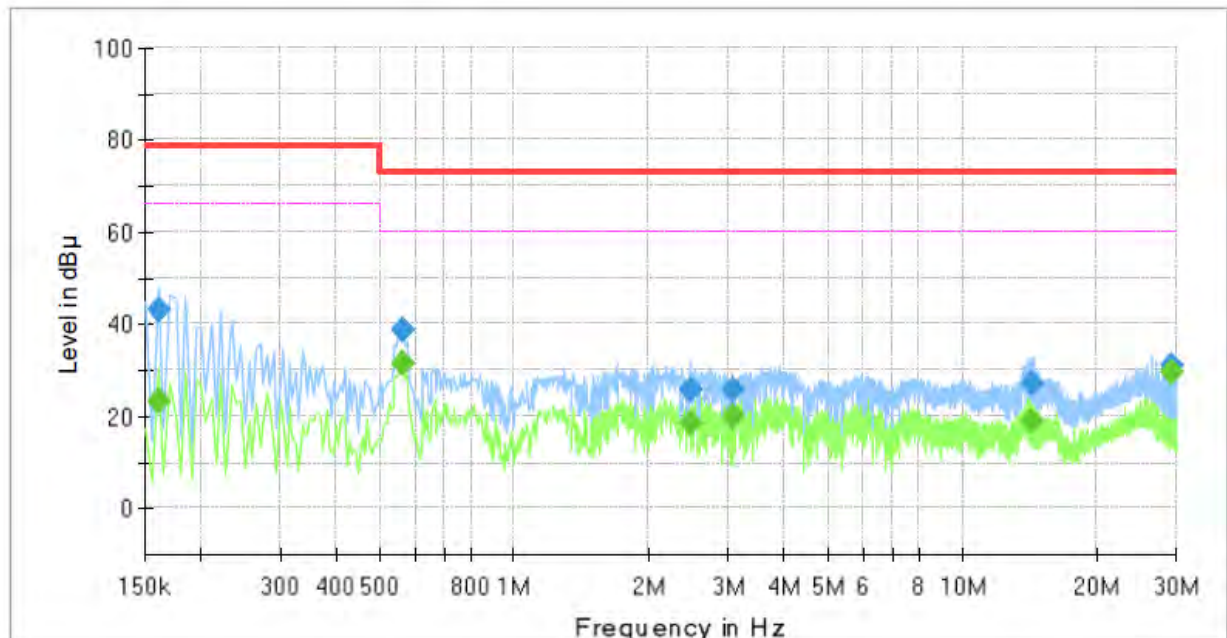
Conducted Emission

TNV-C7013RC

H

DC

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.160000	---	23.46	66.00	42.54	1000.0	9.000	L1	19.5
0.160000	42.84	---	79.00	36.16	1000.0	9.000	L1	19.5
0.560000	---	31.62	60.00	28.38	1000.0	9.000	L1	19.8
0.560000	38.56	---	73.00	34.44	1000.0	9.000	L1	19.8
2.465000	---	18.44	60.00	41.56	1000.0	9.000	L1	20.2
2.465000	25.81	---	73.00	47.19	1000.0	9.000	L1	20.2
3.060000	---	19.90	60.00	40.10	1000.0	9.000	L1	20.2
3.060000	25.75	---	73.00	47.25	1000.0	9.000	L1	20.2
14.370000	---	18.74	60.00	41.26	1000.0	9.000	L1	19.9
14.370000	27.15	---	73.00	45.85	1000.0	9.000	L1	19.9
29.235000	---	29.35	60.00	30.65	1000.0	9.000	L1	20.4
29.235000	30.81	---	73.00	42.19	1000.0	9.000	L1	20.4

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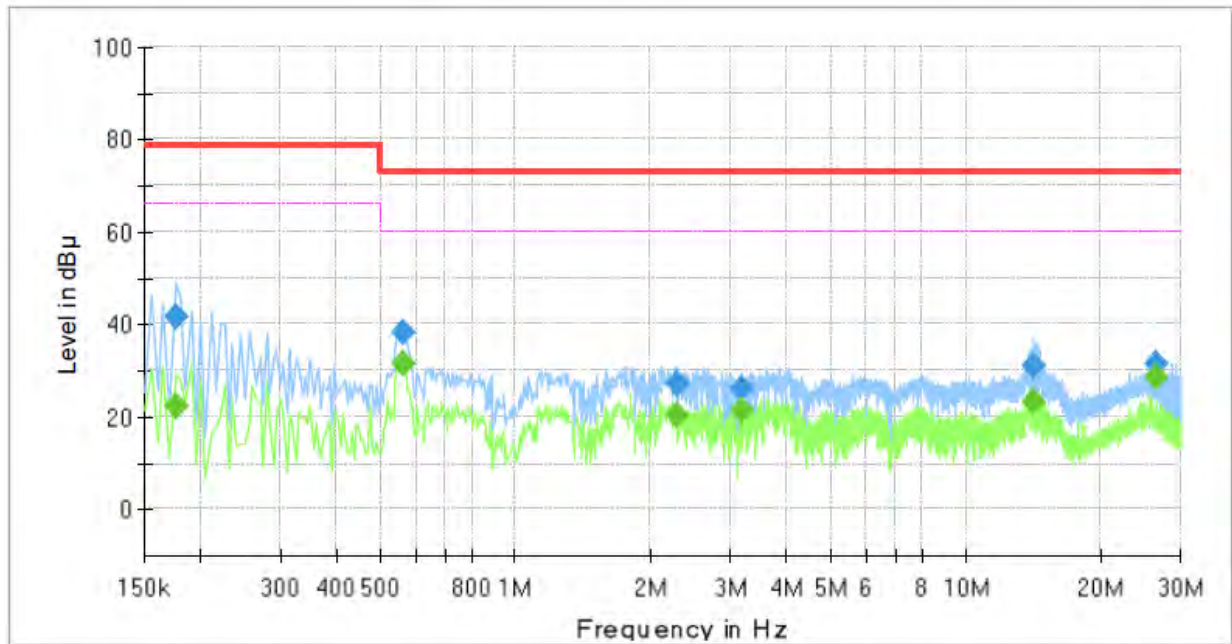
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[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	TNV-C7013RC
Phase:	N
Mode:	DC
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	---	22.49	66.00	43.51	1000.0	9.000	N	19.5
0.175000	41.55	---	79.00	37.45	1000.0	9.000	N	19.5
0.565000	---	31.62	60.00	28.38	1000.0	9.000	N	19.8
0.565000	38.38	---	73.00	34.62	1000.0	9.000	N	19.8
2.285000	---	20.22	60.00	39.78	1000.0	9.000	N	20.3
2.285000	27.10	---	73.00	45.90	1000.0	9.000	N	20.3
3.170000	---	21.22	60.00	38.78	1000.0	9.000	N	20.1
3.170000	26.21	---	73.00	46.79	1000.0	9.000	N	20.1
14.110000	---	23.27	60.00	36.73	1000.0	9.000	N	19.9
14.110000	30.92	---	73.00	42.08	1000.0	9.000	N	19.9
26.610000	---	28.83	60.00	31.17	1000.0	9.000	N	20.4
26.610000	31.53	---	73.00	41.47	1000.0	9.000	N	20.4

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

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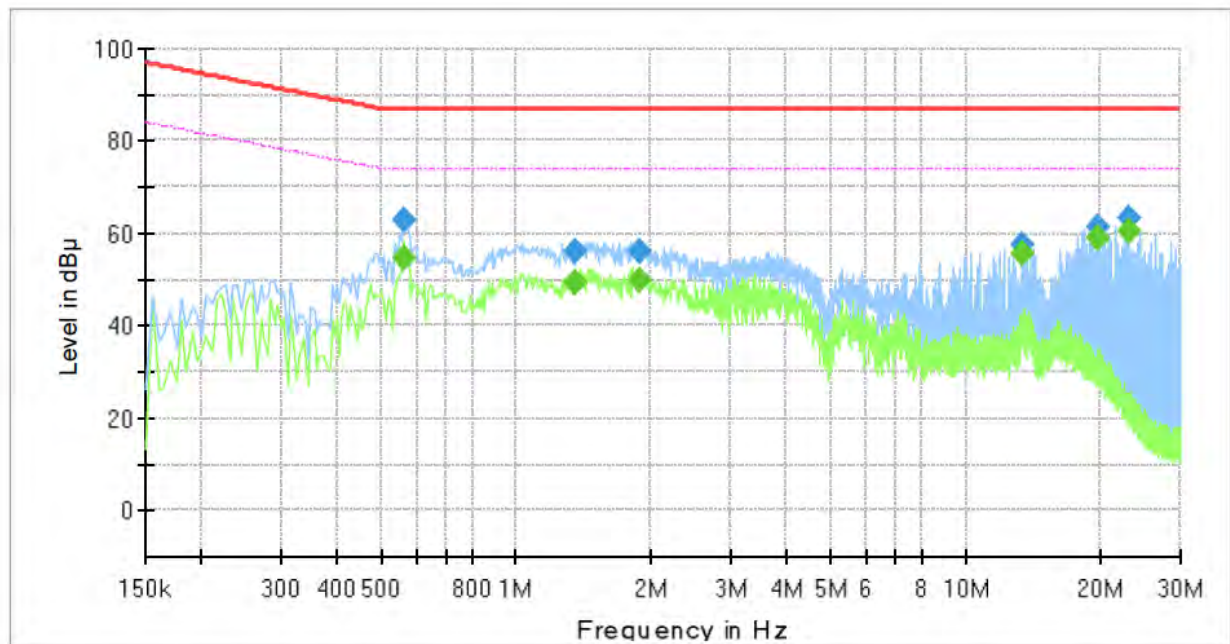
Conducted Emissions at Telecommunication Ports

■ DC Mode

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNV-C7013RC
Mode :	DC
Speed :	100 Mbps
Operator Name:	KES



Final Result

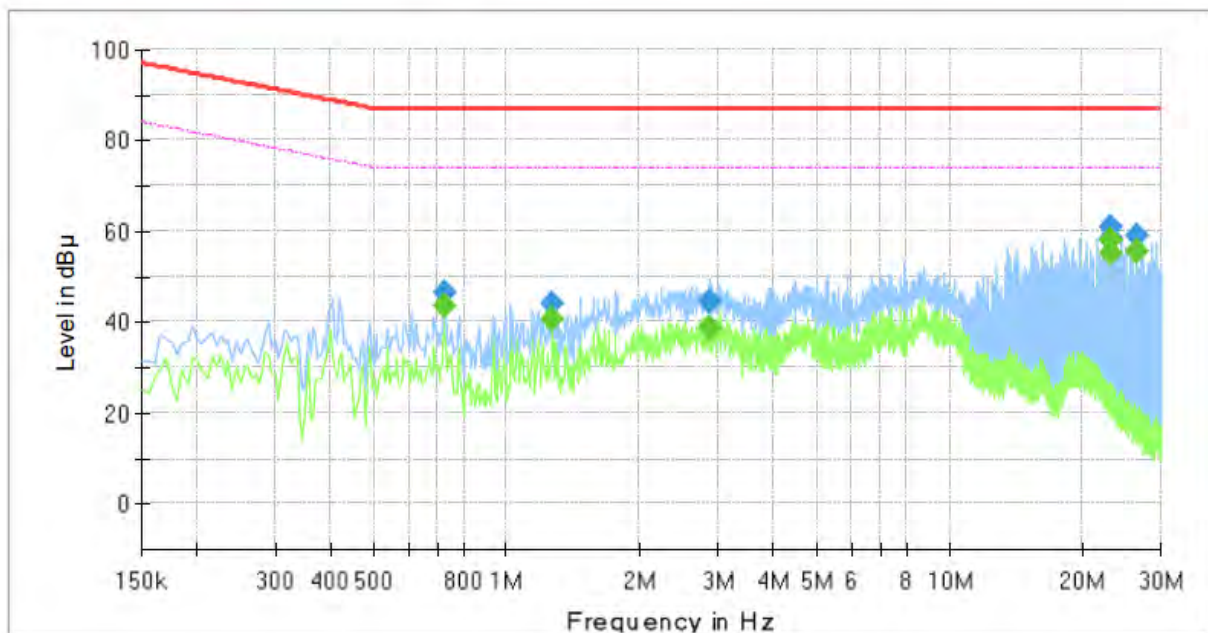
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.560000	62.90	---	87.00	24.10	1000.0	9.000	Single Line	19.8
0.560000	---	54.83	74.00	19.17	1000.0	9.000	Single Line	19.8
1.350000	56.28	---	87.00	30.72	1000.0	9.000	Single Line	20.1
1.350000	---	49.44	74.00	24.56	1000.0	9.000	Single Line	20.1
1.885000	55.96	---	87.00	31.04	1000.0	9.000	Single Line	20.1
1.885000	---	49.88	74.00	24.12	1000.0	9.000	Single Line	20.1
13.420000	57.64	---	87.00	29.36	1000.0	9.000	Single Line	19.7
13.420000	---	55.57	74.00	18.43	1000.0	9.000	Single Line	19.7
19.710000	61.58	---	87.00	25.42	1000.0	9.000	Single Line	20.0
19.710000	---	59.12	74.00	14.88	1000.0	9.000	Single Line	20.0
23.130000	63.24	---	87.00	23.76	1000.0	9.000	Single Line	20.1
23.130000	---	60.45	74.00	13.55	1000.0	9.000	Single Line	20.1

■ PoE Mode

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNV-C7013RC
Mode :	PoE
Speed :	100 Mbps
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.720000	46.48	---	87.00	40.52	1000.0	9.000	Single Line	19.9
0.720000	---	43.74	74.00	30.26	1000.0	9.000	Single Line	19.9
1.265000	44.23	---	87.00	42.77	1000.0	9.000	Single Line	20.1
1.265000	---	40.70	74.00	33.30	1000.0	9.000	Single Line	20.1
2.885000	44.57	---	87.00	42.43	1000.0	9.000	Single Line	20.0
2.885000	---	38.87	74.00	35.13	1000.0	9.000	Single Line	20.0
23.125000	58.39	---	87.00	28.61	1000.0	9.000	Single Line	20.1
23.125000	---	55.09	74.00	18.91	1000.0	9.000	Single Line	20.1
23.130000	61.02	---	87.00	25.98	1000.0	9.000	Single Line	20.1
23.130000	---	57.80	74.00	16.20	1000.0	9.000	Single Line	20.1
26.610000	---	55.75	74.00	18.25	1000.0	9.000	Single Line	20.4
26.610000	58.95	---	87.00	28.05	1000.0	9.000	Single Line	20.4

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

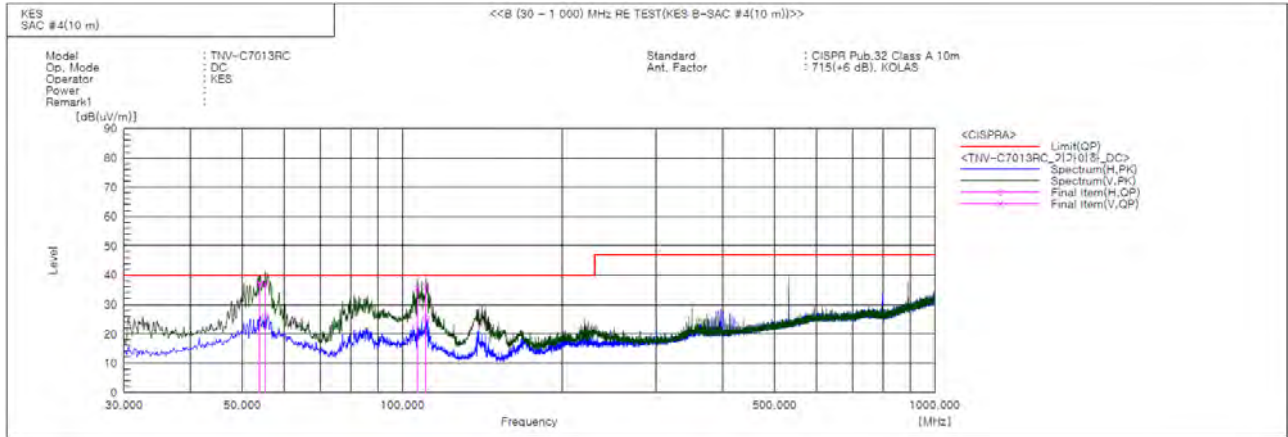
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Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode



Final Result

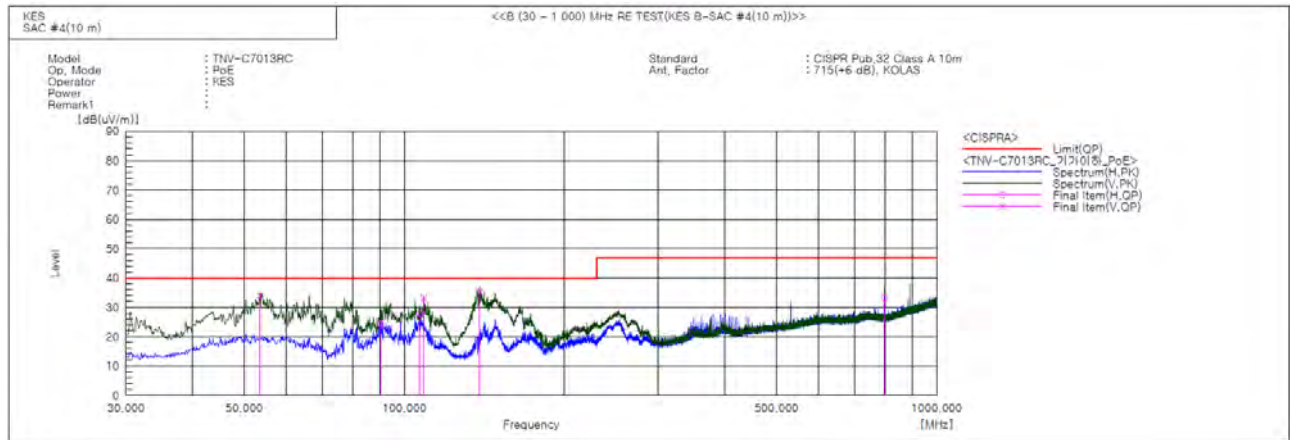
No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	53.886	V	57.7	-20.8	36.9	40.0	3.1	145.0	126.0	
2	55.220	V	57.7	-21.0	36.7	40.0	3.3	112.0	97.0	
3	55.220	H	47.1	-21.0	26.1	40.0	13.9	394.0	104.0	
4	106.630	V	58.2	-22.6	35.6	40.0	4.4	171.0	253.0	
5	110.753	V	59.0	-23.0	36.0	40.0	4.0	106.0	245.0	
6	110.753	H	48.3	-23.0	25.3	40.0	14.7	348.0	127.0	

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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	53.523	V	54.7	-20.8	33.9	40.0	6.1	166.0	275.0	
2	90.261	H	48.4	-24.1	24.3	40.0	15.7	391.0	19.0	
3	106.630	H	50.4	-22.6	27.8	40.0	12.2	369.0	94.0	
4	108.691	V	55.9	-22.8	33.1	40.0	6.9	115.0	247.0	
5	138.398	V	60.8	-25.4	35.4	40.0	4.6	104.0	142.0	
6	797.998	H	40.7	-7.4	33.3	47.0	13.7	317.0	157.0	

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

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

Margin(QP)[dB] = Limit[dB(μ V/m)] - Result(QP) [dB(μ V/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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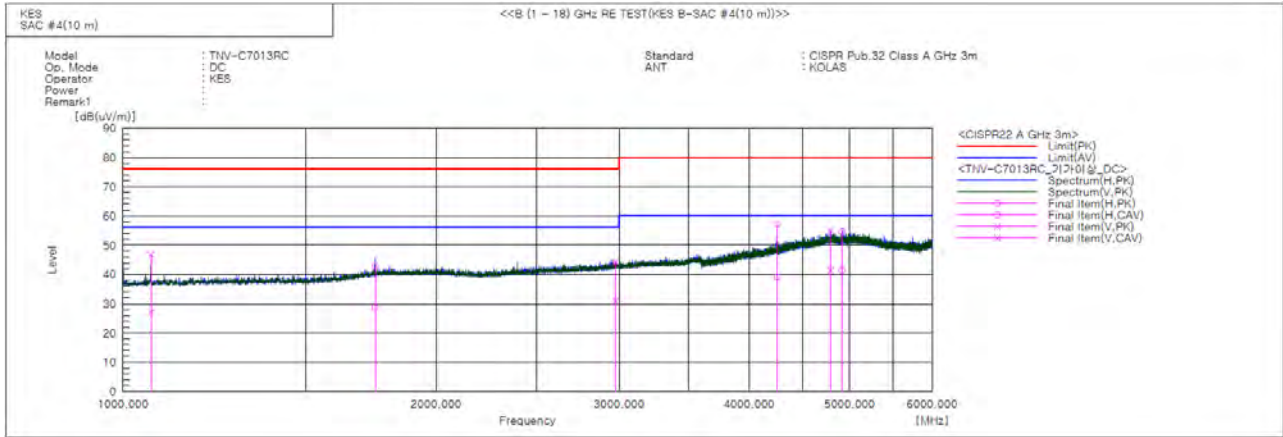
Report No.:

KES-EM-23T0253

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Radiated Electric Field Emissions(Above 1 GHz)

■ DC 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	1063.969	V	50.9	31.1	-4.0	46.9	27.1	76.0	56.0	29.1	28.9	100.0	25.0	
2	1748.125	H	41.6	27.5	1.2	42.8	28.7	76.0	56.0	33.2	27.3	100.0	147.0	
3	2976.250	V	39.1	25.7	5.3	44.4	31.0	76.0	56.0	31.6	25.0	100.0	163.0	
4	4255.457	H	43.3	25.2	13.9	57.2	39.1	80.0	60.0	22.8	20.9	100.0	349.0	
5	4792.113	V	37.2	23.6	17.8	55.0	41.4	80.0	60.0	25.0	18.6	100.0	0.0	
6	4914.306	H	36.6	23.4	18.1	54.7	41.5	80.0	60.0	25.3	18.5	100.0	157.0	

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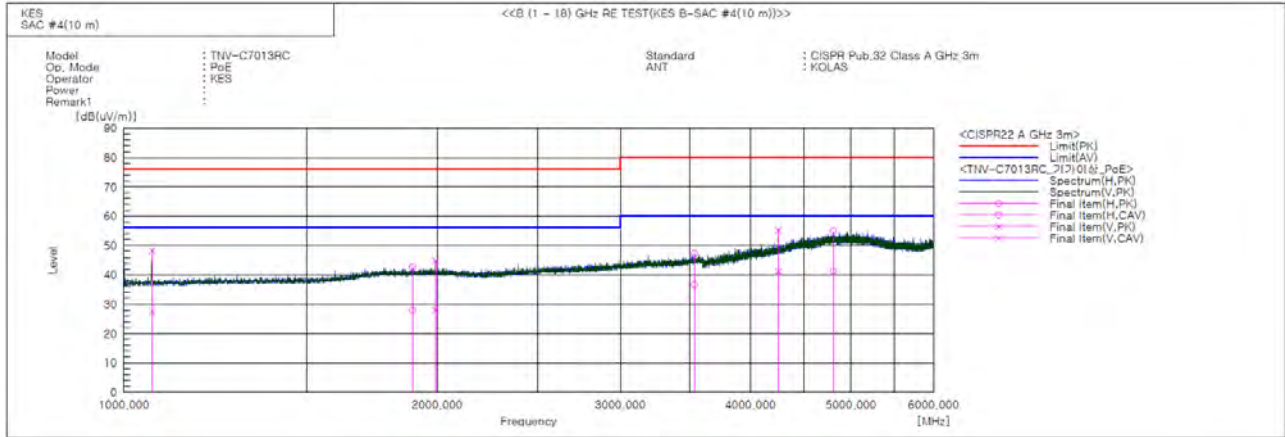


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KES-EM-23T0253
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■ PoE Mode



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	1063.963	V	52.3	31.5	-4.0	48.3	27.5	76.0	56.0	27.7	28.5	100.0	28.0	
2	1893.772	H	40.8	26.1	1.8	42.6	27.9	76.0	56.0	33.4	28.1	100.0	114.0	
3	1992.561	V	42.8	26.0	2.1	44.9	28.1	76.0	56.0	31.1	27.9	100.0	264.0	
4	3534.375	H	39.0	28.3	8.3	47.3	36.6	80.0	60.0	32.7	23.4	100.0	265.0	
5	4255.625	V	41.4	27.2	13.9	55.3	41.1	80.0	60.0	24.7	18.9	100.0	79.0	
6	4806.250	H	37.2	23.6	17.8	55.0	41.4	80.0	60.0	25.0	18.6	100.0	253.0	

◆ Calculation

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

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

■ DC Mode

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.045			
2	0.005	0.422	1.080	n/a
3	0.036	1.587	2.300	PASS
4	0.004	0.900	0.430	n/a
5	0.036	3.125	1.140	PASS
6	0.005	1.827	0.300	PASS
7	0.035	4.546	0.770	PASS
8	0.004	1.785	0.230	n/a
9	0.035	8.686	0.400	PASS
10	0.004	1.923	0.184	n/a
11	0.034	10.262	0.330	PASS
12	0.004	2.409	0.153	n/a
13	0.033	15.496	0.210	PASS
14	0.004	2.904	0.131	n/a
15	0.031	20.741	0.150	PASS
16	0.004	3.210	0.115	n/a
17	0.030	22.411	0.132	PASS
18	0.004	3.514	0.102	n/a
19	0.028	23.856	0.118	PASS
20	0.003	3.548	0.092	n/a
21	0.026	16.375	0.161	PASS
22	0.003	3.879	0.084	n/a
23	0.025	16.912	0.147	PASS
24	0.003	4.054	0.077	n/a
25	0.023	17.155	0.135	PASS
26	0.003	3.958	0.071	n/a
27	0.021	17.026	0.125	PASS
28	0.003	4.313	0.066	n/a
29	0.020	16.895	0.116	PASS
30	0.003	4.108	0.061	n/a
31	0.018	16.228	0.109	PASS
32	0.002	4.025	0.058	n/a
33	0.016	15.494	0.102	PASS
34	0.002	4.160	0.054	n/a
35	0.014	14.798	0.096	PASS
36	0.002	3.623	0.051	n/a
37	0.012	13.516	0.091	PASS
38	0.002	3.748	0.048	n/a
39	0.011	12.509	0.087	PASS
40	0.002	3.346	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.



Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.045			
2	0.006	0.349	1.620	PASS
3	0.037	1.071	3.450	PASS
4	0.005	0.750	0.645	n/a
5	0.036	2.112	1.710	PASS
6	0.007	1.483	0.450	PASS
7	0.035	3.072	1.155	PASS
8	0.005	1.501	0.345	PASS
9	0.035	5.863	0.600	PASS
10	0.004	1.609	0.276	n/a
11	0.034	6.929	0.495	PASS
12	0.005	2.018	0.230	n/a
13	0.033	10.463	0.315	PASS
14	0.005	2.403	0.197	n/a
15	0.032	14.027	0.225	PASS
16	0.005	2.685	0.173	n/a
17	0.030	15.136	0.199	PASS
18	0.004	2.923	0.153	n/a
19	0.029	16.105	0.178	PASS
20	0.004	2.986	0.138	n/a
21	0.027	16.590	0.161	PASS
22	0.004	3.178	0.125	n/a
23	0.025	17.105	0.147	PASS
24	0.004	3.357	0.115	n/a
25	0.023	17.337	0.135	PASS
26	0.004	3.359	0.106	n/a
27	0.022	17.204	0.125	PASS
28	0.004	3.612	0.099	n/a
29	0.020	17.077	0.116	PASS
30	0.003	3.488	0.092	n/a
31	0.018	16.407	0.109	PASS
32	0.003	3.275	0.086	n/a
33	0.016	15.671	0.102	PASS
34	0.003	3.445	0.081	n/a
35	0.014	14.954	0.096	PASS
36	0.002	2.980	0.077	n/a
37	0.012	13.661	0.091	PASS
38	0.002	3.067	0.073	n/a
39	0.011	12.693	0.087	PASS
40	0.002	2.799	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.

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

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Report No.:
KES-EM-23T0253
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Test Data - Voltage Fluctuations

Maximum Flicker results

■ DC Mode

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

■ DC Mode



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Conducted Emissions at Telecommunication Ports

■ DC Mode



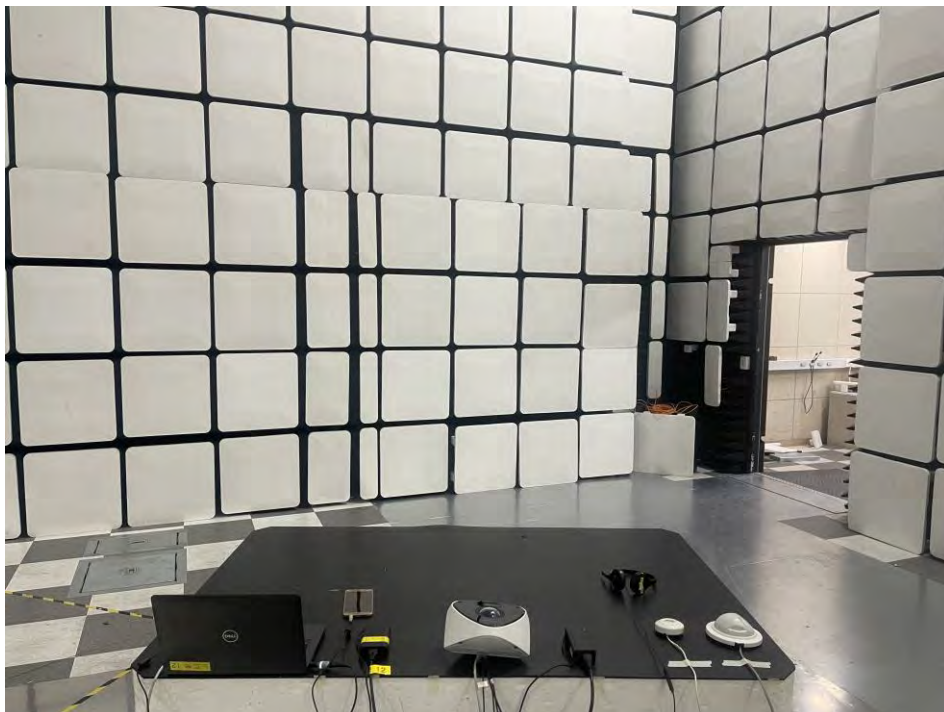
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■ PoE Mode



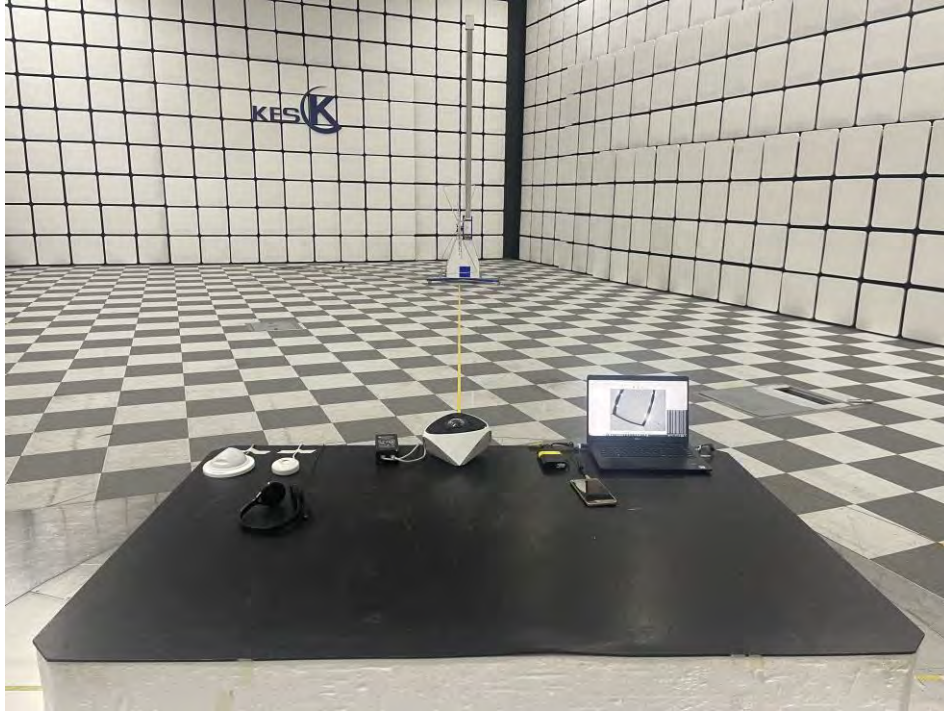
Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode



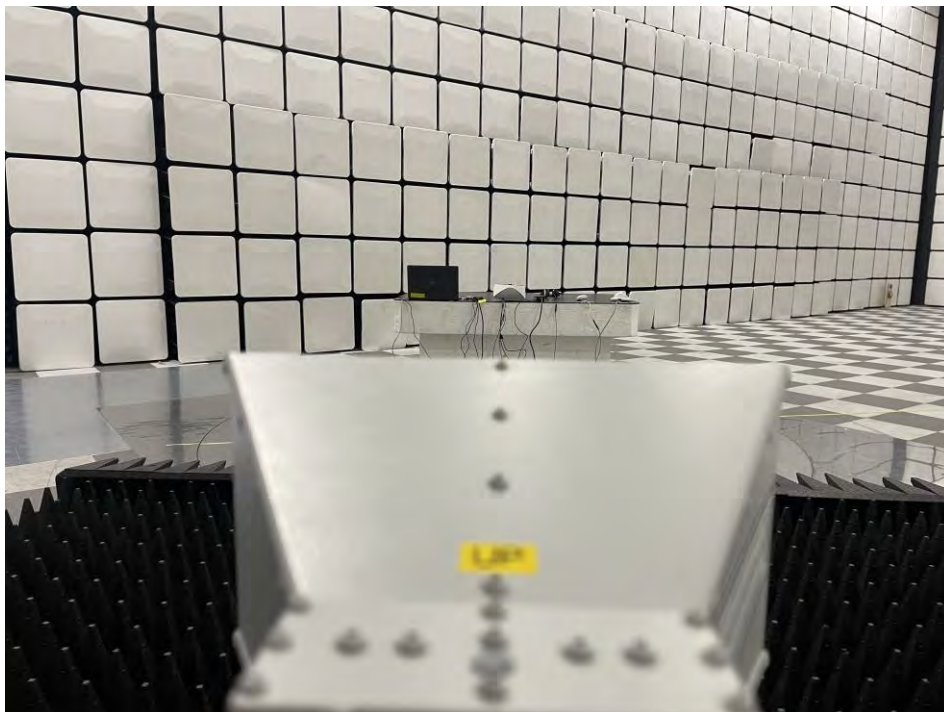
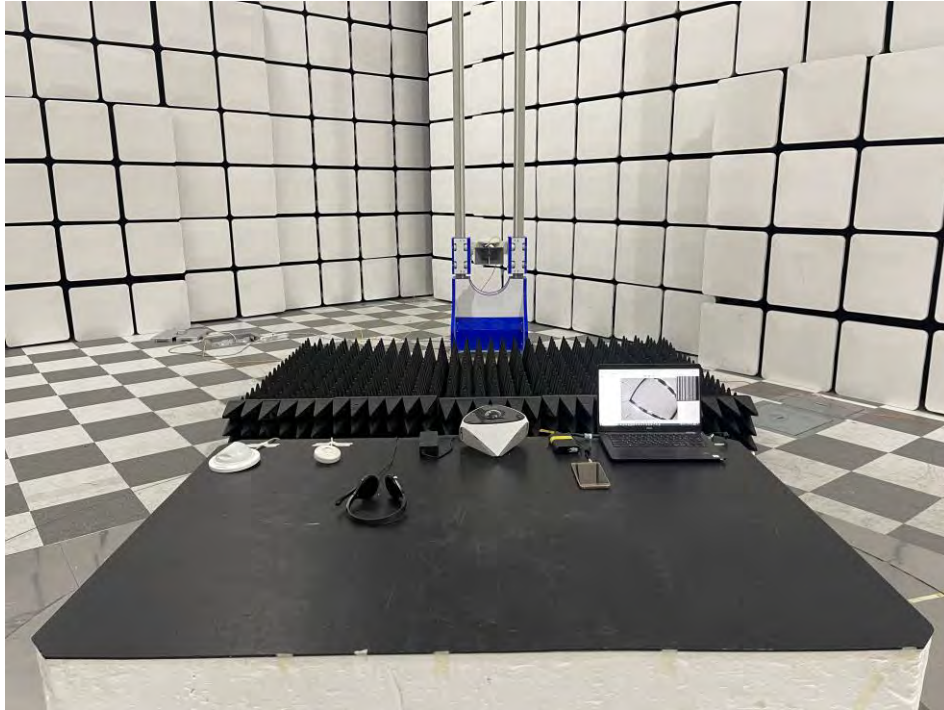
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■ PoE Mode



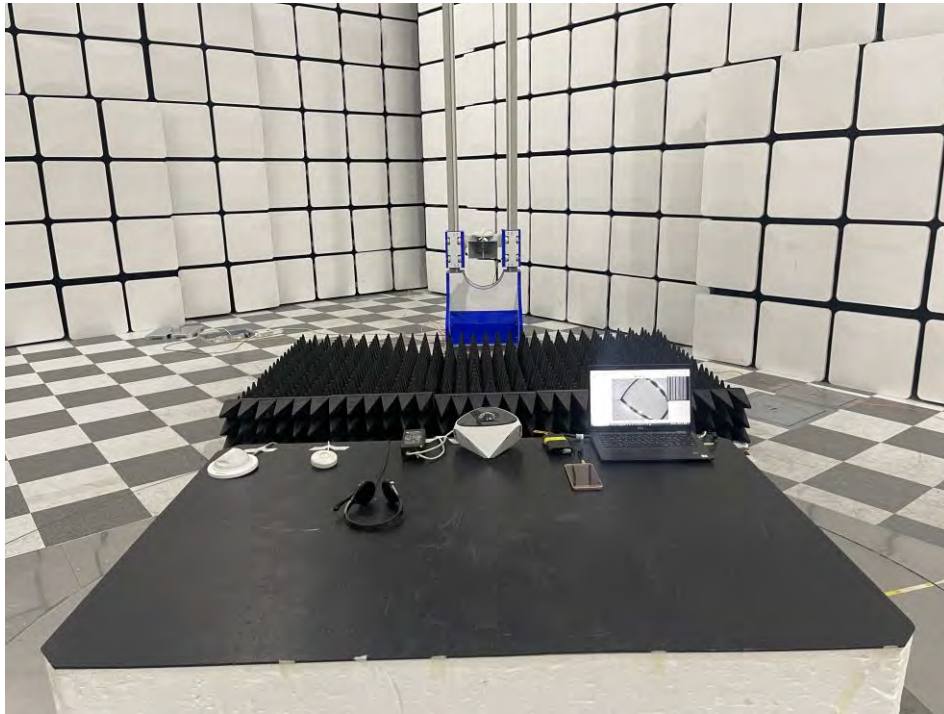
Radiated Electric Field Emissions(Above 1 GHz)

■ DC Mode



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■ PoE Mode



Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ DC Mode



Electrostatic Discharge

■ DC Mode



■ PoE Mode



Radiated Electric Field Immunity

■ DC Mode



■ PoE Mode



Electrical Fast Transients/Bursts

■ DC Mode



■ PoE Mode



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Surge Transients

■ DC Mode



■ PoE Mode



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Conducted Disturbance

■ DC Mode



■ PoE Mode



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Voltage Dips and Short Interruptions

■ DC Mode



EUT External Photographs

(Top)



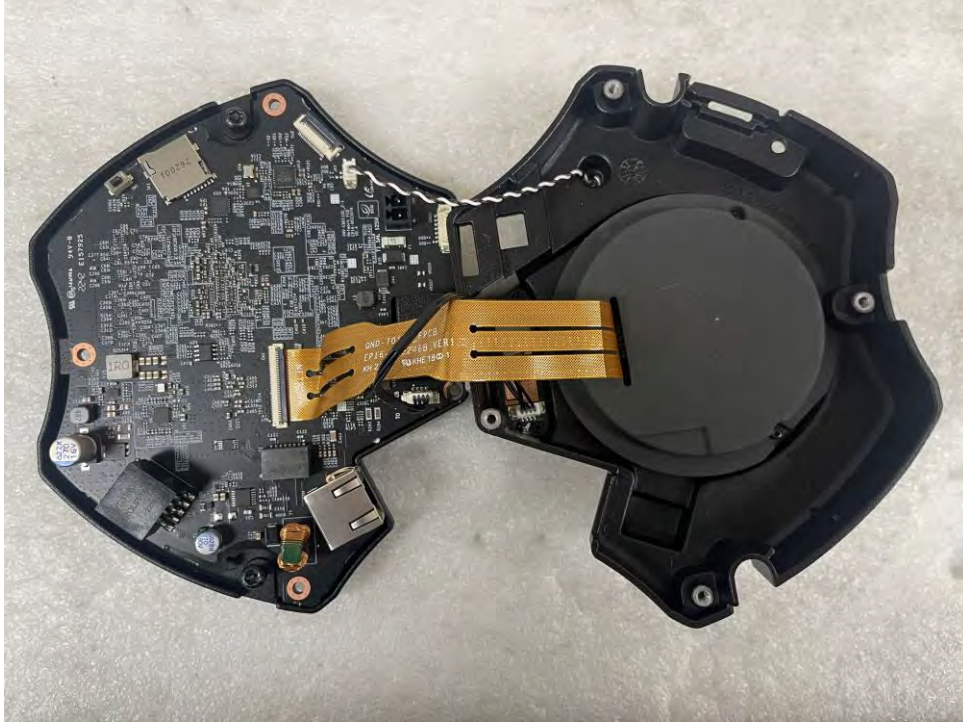
(Bottom)



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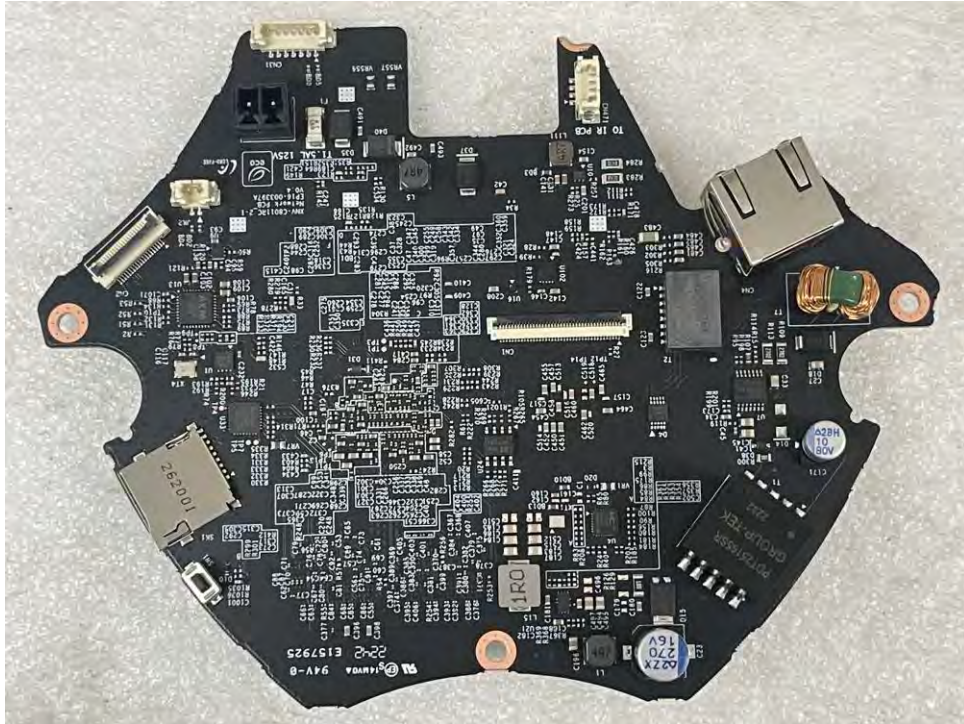
EUT Internal Photographs

(Internal View)

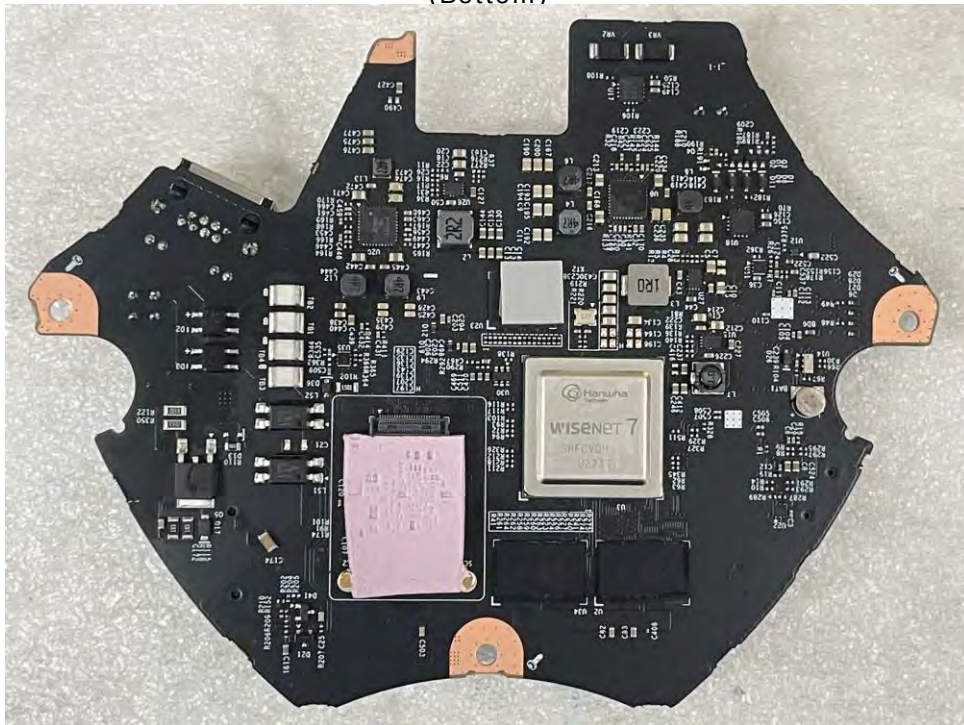


EUT Internal View – Board 1

(Top)



(Bottom)



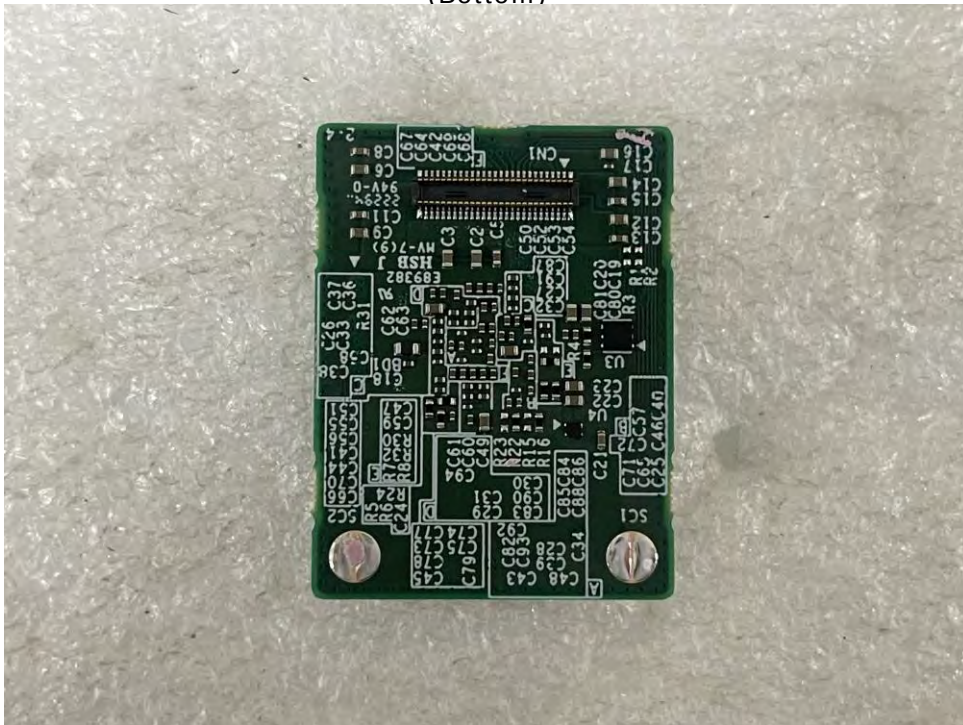
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EUT Internal View – Board 2

(Top)



(Bottom)



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EUT Internal View – Board 3

(Top)



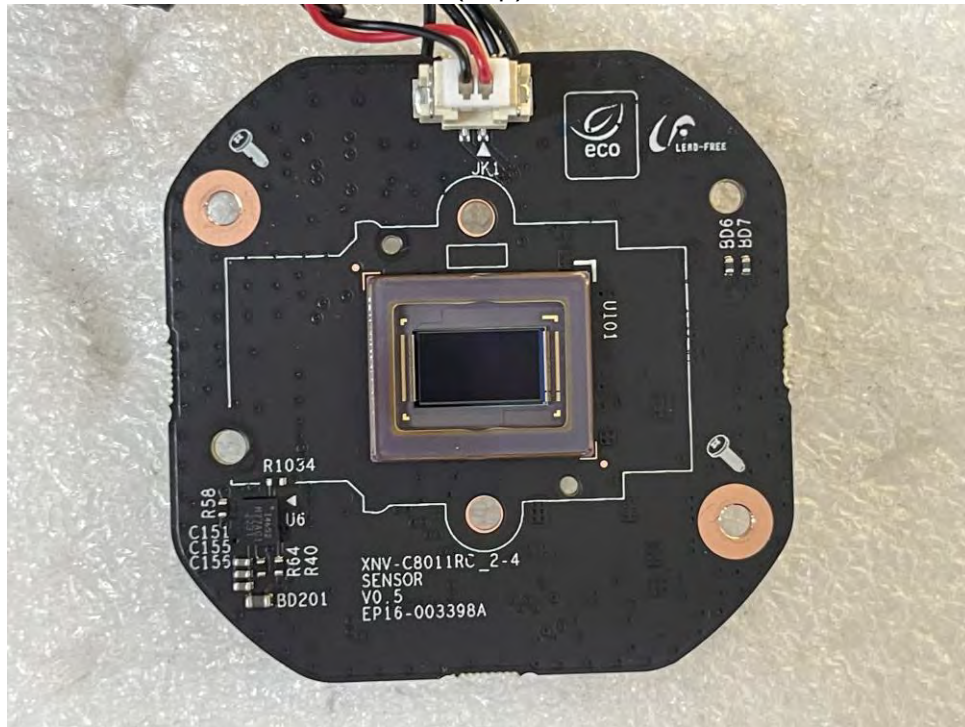
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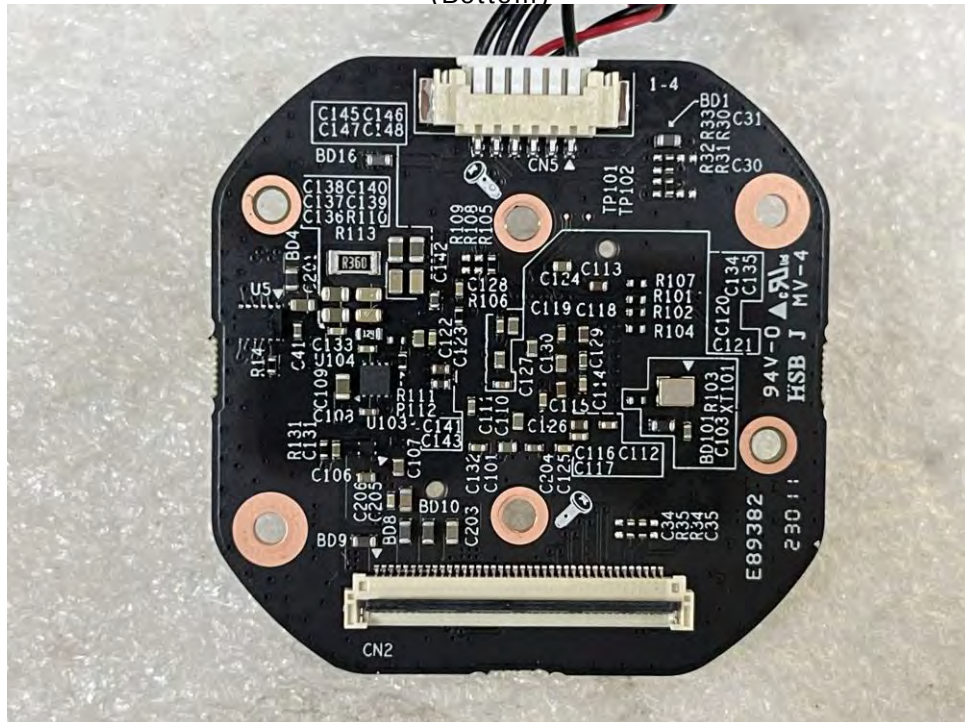
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EUT Internal View – Board 4

(Top)

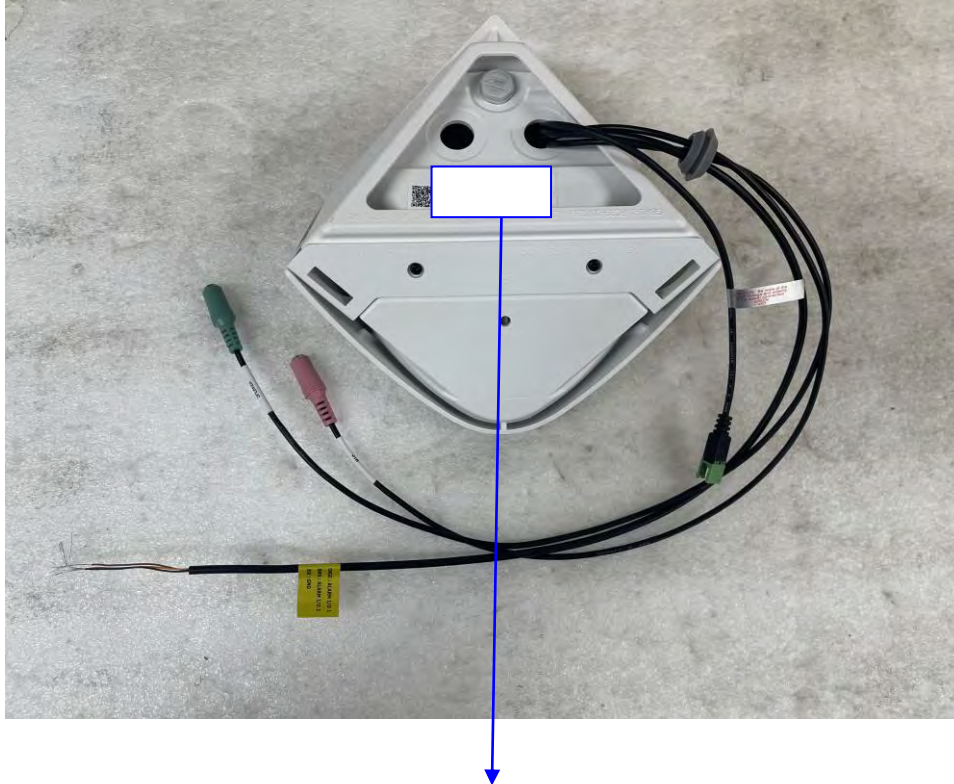


(Bottom)



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Label and Location



Network Camera

Model No : TNV-C7013RC

Manufacturer : HANWHA VISION VIETNAM COMPANY LIMITED

Made in Vietnam

