

# TEST REPORT



Report No. : KES-EM-23T0904

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**KES Co., Ltd.**

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## 1. Client

Applicant : Hanwha Vision Co., Ltd

Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do,  
Republic of Korea

## 2. Sample Description

Product name : NETWORK THERMAL CAMERA

Model/Type No. : TNM-C4940TD

Variant Model : TNM-C4940TDR, TNM-C4942TDR

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

3. Date of Receipt : Sep. 19, 2023

4. Test date : Oct. 04, 2023 ~ Oct. 11, 2023

5. Date of Issue : Oct. 25, 2023

6. Test Results : In Compliance

Tested by

Dong Hyun, Won  
EMC Test Engineer

Reviewed by

Dong Il, Lee  
EMC Technical Manager

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

**REPORT REVISION HISTORY**

Date	Test Report No.	Revision History
Oct. 25, 2023	KES-EM-23T0904	Issued

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## 1.0 General Product Description

Main Specifications of EUT are:

Spec Display Name	Thermal	Visible
<b>Video</b>		
Imaging Device	Uncooled micro bolometer	1/1.8" CMOS
Resolution	1280x960, 1280x720, 1024x768, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360	3840x2160, 3072x1728, 2592x1944, 2688x1520, 2560x1440, 2048x1536, 1920x1080, 1600x1200, 1280x1024, 1280x960, 1280x720, 1024x768, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360
Max. Framerate	H.265/H.264: Max. 30fps MJPEG: Max. 3fps	H.265/H.264: Max. 30fps/25fps(60Hz/50Hz) MJPEG: Max. 1fps/1fps(60Hz/50Hz)
NETD	< 60mK	None
Pixel Size	12μm	None
Min. Illumination	None	Color: 0.06Lux(F1.3, 1/30sec) BW: 0.004Lux(F1.3, 1/30sec), 0Lux(IR LED on)
Video Out	USB : Micro USB Type B	
<b>Lens</b>		
Focal Length (Zoom Ratio)	9.1mm fixed focal	4.4~9.3mm(2.2x) motorized varifocal
Max. Aperture Ratio	F1.0	F1.3(Wide)~F2.15(Tele)
Angular Field of View	H: 50.0°, V: 37.0°, D: 63.8°	H:112.1°(Wide)~47.5°(Tele) / V:58.0°(Wide)~26.6°(Tele) / D:137.5°(Wide)~54.6°(Tele)
Min. Object Distance	3.5m(11.48ft)	Wide: 1.75m(5.74ft) / Tele: 5.21m(17.09ft)
Focus Control	Fixed	Simple focus
Lens Type	None	
Mount Type	None	
Optional Lens	None	
<b>Pan / Tilt / Rotate</b>		
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	
<b>Operational</b>		
Camera Title	Displayed up to 85 characters	
Direction Indicator	None	None
Day & Night	None	Auto(ICR)
Backlight Compensation	None	BLC, WDR, SSDR
Wide Dynamic Range	None	WDR(120dB)
Digital Noise Reduction	None	SSNR V, WiseNR II
Digital Image Stabilization	None	Support(built-in gyro sensor)
Motion Detection	8ea, polygonal zones 6ea, rectangle zones	
Privacy Masking	- Color: Gray/Black/White	
Gain Control	None	Low / Middle / High
White Balance	None	ATW / AWC / Manual / Indoor / Outdoor
LDC	None	Support
Electronic Shutter Speed	None	Minimum / Maximum / Anti flicker(1/5~1/12,000sec) Auto prefer shutter control(Based on AI engine)
Analytics	- Analytics events : Directional detection, Motion detection, Enter/Exit, Virtual line, Temperature Change detection	- Analytics events based on AI engine(NPU) : Object detection (Person/Face/Vehicle(car/truck/bus/bicycle/motorcycle)/License plate), Bestshot, IVA (Virtual line/Area, Enter/Exit, Loitering, direction, intrusion), Stopped vehicle, Traffic jam - Analytics events : Defocus detection, Motion detection, Tampering, Audio detection, Sound classification, Shock detection, Appear/Disappear
Business Intelligence	None	None
Alarm I/O	4 configurable I/O ports	
Alarm Triggers	Analytics, Network disconnect, Alarm input	
Alarm Events	When alarm trigger occurred - File upload(image) : e-mail/FTP - Notification : e-mail - Recording : SD/SDHC/SDXC or NAS recording at event triggers - Alarm output - Handover(PTZ preset, Send message by HTTP/HTTPS/TCP)	
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 Viewable Length	None	30m
Color Palettes	Whitehot, Blackhot, Rainbow, Rainbow2, Sepia, Red, Iron, Custom	None

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Network		
Ethernet	Metal shielded RJ-45(10/100/1000BASE-T)	
Video Compression	H.265/H.264: Main/High, MJPEG	
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	
Smart Codec	WiseStreamⅡ	Manual(Sea area), WiseStreamⅢ
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(6 users) / Multicast	
	Multiple streaming(Up to 3 profiles)	
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, SRTP (TCP, UDP Unicast)	
Security	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)	
Application Programming Interface	Device certificate(Hanwha Techwin Root CA, pre-installed)	
	Secure boot, Secure firmware	
	ONVIF Profile S/T	
	SUNAPI(HTTP API)	
	Wisenet open platform (visible channel only)	
General		
Webpage Language	English, French, German, Spanish, Italian, Chinese, Korean, Russian, Swedish, Japanese, Portuguese, Czech, Polish, Turkish, Dutch, Hungarian, Greek	
Edge Storage	Micro SD/SDHC/SDXC 2slots 512GB	
Memory	4GB RAM, 512MB FLASH	
Environmental & Electrical		
Operating Temperature / Humidity	-40°C to +60°C(-58°F to +140°F)	
	* Start up should be done at above -30°C less than 95% RH(non-condensing)	
Storage Temperature / Humidity	-50°C to +60°C(-58°F to +140°F) / Less than 95% RH(Non-condensing)	
Certification	IP66/IP67, IK10, NEMA4X, NEMA TS 2(2.2.8, 2.2.9)	
Input Voltage	PoE+(IEEE802.3at, Class4), 12V <sub>DC</sub>	
Power Consumption	PoE+ : Max 25.5W	
	12V <sub>DC</sub> : Max 21.5W	
Mechanical		
Color / Material	White / Aluminum	
RAL Code	RAL9003	
Product Dimensions / Weight	353.4 * 287.5 * 191.2mm (13.92 * 11.32 * 7.53in) / 4.533kg	
DORI (EN62676-4 standard)		
Detect (25PPM/ 8PPF)	None	Wide: 51.7m(169.94ft) / Tele: 174.5m(572.64ft)
Observe (63PPM/ 19PPF)	None	Wide: 20.7m(67.85ft) / Tele: 69.8m(229.06ft)
Recognize (125PPM/ 38PPF)	None	Wide: 10.3m(33.93ft) / Tele: 34.9m(114.53ft)
Identify (250PPM/ 76PPF)	None	Wide: 5.2m(16.96ft) / Tele: 17.5m(57.26ft)

## 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

Add derivative model for vendor management

## 1.3 Device Modifications

Not applicable

## 1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
NETWORK THERMAL CAMERA	TNM-C4940TD	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT

## 1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Adapter	2ACB022F	-	Channel Well Technology (Guangzhou) Co., Ltd.	-
PoE Adapter	POE29U-1AT(PL)	-	Phihong Technology Co., Ltd.	-
Notebook	P95G001	9JM8HT2	DELL INC.	-
Notebook Adapter	HA65NM130	-	Chicony Power Technology (Suzhou)Co.,Ltd.	-
Headset	K550	-	Britz®	-
Alarm	PRO-SL	-	SENSOR PRO	-
Button Alarm	-	-	-	-
Smartphone	SM-N950N	R39J80FHA8	Samsung Electronics Co., Ltd.	-
Micro SD Card 1	-	-	Transcend	8 GB
Micro SD Card 2	-	-	Transcend	8 GB

## 1.6 External I/O Cabling

### ■ DC Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK THERMAL CAMERA (EUT)	DC In (2 Pin)	Adapter	Line	2.0	U
	RJ-45 (LAN)	Notebook	RJ-45	4.2	S
	3.5 mm (Audio In)	Headset	3.5 mm	1.8	U
	3.5 mm (Audio Out)		3.5 mm	1.8	U
	2 Pin (Alarm Out)	Alarm	2 Pin	3.1	U
	2 Pin (Alarm In)	Button Alarm	2 Pin	3.3	U
	Micro SD Card Slot	Micro SD Card 1	Micro SD Card Slot	-	-
	Micro SD Card Slot	Micro SD Card 2	Micro SD Card Slot	-	-
Notebook	3.5 mm	Smartphone	3.5 mm	1.4	U
	DC Jack	Notebook Adapter	DC Jack	2.0	U

\* Unshielded=U, Shielded=S

### ■ PoE Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK THERMAL CAMERA (EUT)	RJ-45 (PoE)	PoE Adapter	RJ-45	4.2	S
	3.5 mm (Audio In)	Headset	3.5 mm	1.8	U
	3.5 mm (Audio Out)		3.5 mm	1.8	U
	2 Pin (Alarm Out)	Alarm	2 Pin	3.1	U
	2 Pin (Alarm In)	Button Alarm	2 Pin	3.3	U
	Micro SD Card Slot	Micro SD Card 1	Micro SD Card Slot	-	-
	Micro SD Card Slot	Micro SD Card 2	Micro SD Card Slot	-	-
Notebook	3.5 mm	Smartphone	3.5 mm	1.4	U
	RJ-45 (LAN)	PoE Adapter	RJ-45	1.9	S
	DC Jack	Notebook Adapter	DC Jack	2.0	U

\* Unshielded=U, Shielded=S

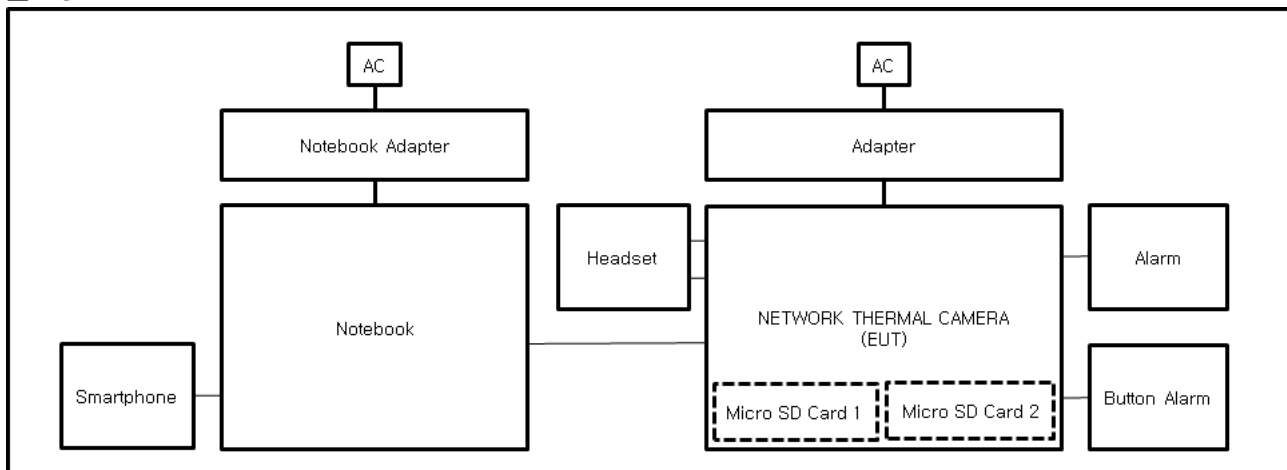
## 1.7 EUT Operating Mode(s)

Test mode	operating
DC	1. Run the Web Viewer on your laptop and check the camera video output 2. PingTest from your laptop to check the network status 3. After the test, the Micro SD Card storage file was checked.
PoE	

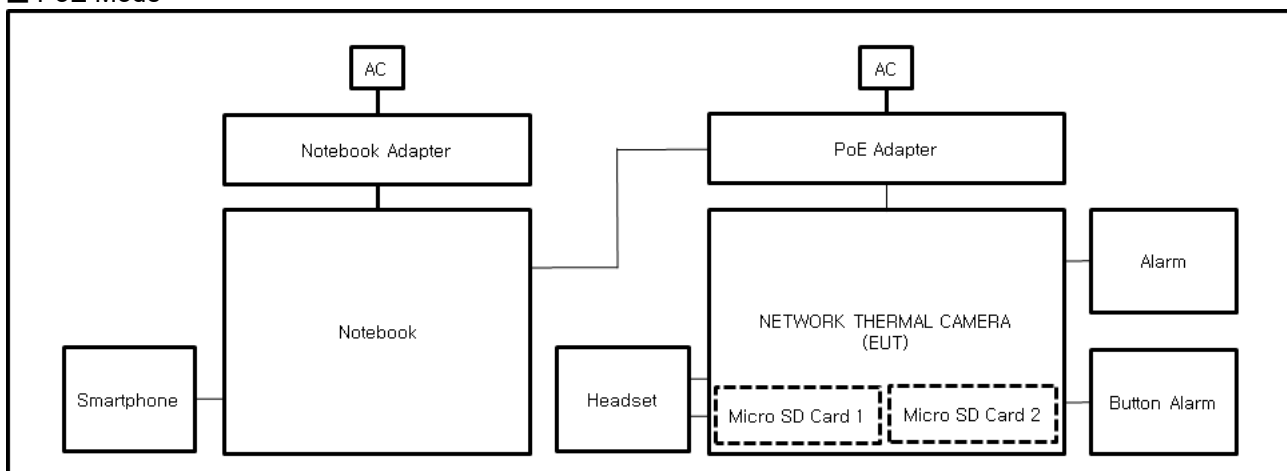
EUT Test operating S/W		
Name	Version	Manufacture Company
Web Viewer	-	Hanwha Vision Co., Ltd

## 1.8 Configuration

### ■ DC Mode



### ■ PoE Mode





## 1.9 Remarks when standards applied

Micro 5 Pin USB Port is not tested because it is for unused port.

## 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/A1:2014

☒ 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/A1:2014

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

## 2.1 Conducted Emissions at Mains Power Ports

**Test Date**

Oct. 04, 2023

**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	11, 11, 2023
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	11, 10, 2023
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	11, 10, 2023
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 10, 2023

**Test Conditions**

Temperature: (23,7 ± 0,1) °C

Relative Humidity: (47,2 ± 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.

## 2.2 Conducted Emissions at Telecommunication Ports

### Test Date

Oct. 04, 2023

### 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	11, 11, 2023
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	11, 10, 2023
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	11, 10, 2023
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 10, 2023
<input checked="" type="checkbox"/>	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	03, 06, 2024
<input type="checkbox"/>	CDN	CDNS502A	TESEQ	40431	11, 10, 2023

### Test Conditions

Temperature: (23,7 ± 0,1) °C

Relative Humidity: (47,2 ± 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.

## 2.3 Radiated Electric Field Emissions(Below 1 GHz)

**Test Date**

Oct. 11, 2023

**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	03, 21, 2024
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	11, 10, 2023
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 17, 2024
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	32173	03, 03, 2024

**Test Conditions**

Temperature: (23,5 ± 0,1) °C

Relative Humidity: (45,0 ± 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.

## 2.4 Radiated Electric Field Emissions(Above 1 GHz)

**Test Date**

Oct. 04, 2023

**Test Location**

SEMI ANECHOIC CHAMBER #5

**Test Equipment**

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	ES10/RE	TOYO Corporation	2022.01.000	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	Rohde & Schwarz	100552	03, 21, 2024
<input checked="" type="checkbox"/>	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	11, 08, 2023
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	HP	3008A00538	05, 31, 2024
<input checked="" type="checkbox"/>	ATTENUATOR	8491B	HP	23094	03, 21, 2024

**Test Conditions**

Temperature: (23,1 ± 0,1) °C

Relative Humidity: (47,9 ± 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.

## 2.5 Harmonic Current Emissions

**Test Date**

Oct. 05, 2023

**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	03, 27, 2024
<input checked="" type="checkbox"/>	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

**Test Conditions**

Temperature: (23,2 ± 0,1) °C

Relative Humidity: (48,5 ± 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.

## 2.6 Voltage Fluctuations and Flicker

**Test Date**

Oct. 05, 2023

**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	03, 27, 2024
<input checked="" type="checkbox"/>	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

**Test Conditions**

Temperature: (23,2 ± 0,1) °C

Relative Humidity: (48,5 ± 0,1) % 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/A1 :2014 Alarm systems-Part 4: Electromagnetic compatibility Product family standard:

Immunity requirements for components of fire, intruder and social alarm systems

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

**If as a result of the application of the tests defined in this standard, the apparatus**

**becomes dangerous or unsafe then the apparatus shall be deemed to have failed the test.**

**A functional description and a definition of performance by the manufacture and noted in the test report, based on the following criteria:**

#### **Electrostatic discharge**

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing that is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

#### **Radiated electromagnetic fields**

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing which could be interpreted by associated equipment as a change, and no such

Flickering of indicators occurs at a field strength of 3 V/m.

For components of CCTV systems, where the picture is allowed at 10 V/m, providing.

(a) there is no permanent damage or change to EUT

(e.g. no corruption of memory or changes to programmable setting etc.)

(b) at 3 V/m, any deterioration of the picture is so minor that the system could still be used; and

(c) there is no observable deterioration of the picture at 1 V/m.

### **Fast transient burst / slow high energy voltage surge**

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing

That there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

### **Conducted RF immunity**

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing

That there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change, and no such flickering of indicators oeuvres at  $U = 130 \text{ dB}\mu\text{V}$ .

For component of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at  $U = 140 \text{ dB}\mu\text{V}$ , providing:

- (a) there is no permanent damage or change to the EUT  
(e.g. no corruption of memory or changes to programmable settings etc.)
- (b) at  $U = 130 \text{ dB}\mu\text{V}$ , any deterioration of the picture is so minor that the system could still be used; and
- (c) there in no observable deterioration of the picture at  $U = 120 \text{ dB}\mu\text{V}$ .

### **Voltage dip/interruption / Voltage variation**

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test, after the conditioning.

### 3.1 Electrostatic Discharge

#### Reference Standard

EN 61000-4-2:2009

#### Test Date

Oct. 06, 2023

#### 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	ESS01Z0454	01, 31, 2024
<input checked="" type="checkbox"/>	HCP	-	KES	-	-
<input checked="" type="checkbox"/>	VCP	-	Noise Ken	-	-

#### Test Conditions

Temperature: (23,0 ± 0,1) °C  
 Relative Humidity: (47,3 ± 0,1) % R.H.  
 Atmospheric Pressure: (100,0 ± 0,1) kPa

#### Test Specifications

Discharge Factor: ≥ 1 s

Discharge Impedance: 330 ohm / 150 pF

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

Polarity: Positive and Negative

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

Discharge Voltage:	<b>Contact</b> <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	<b>Air</b> <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	<b>HCP</b> <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	<b>VCP</b> <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
--------------------	---	---	---	---

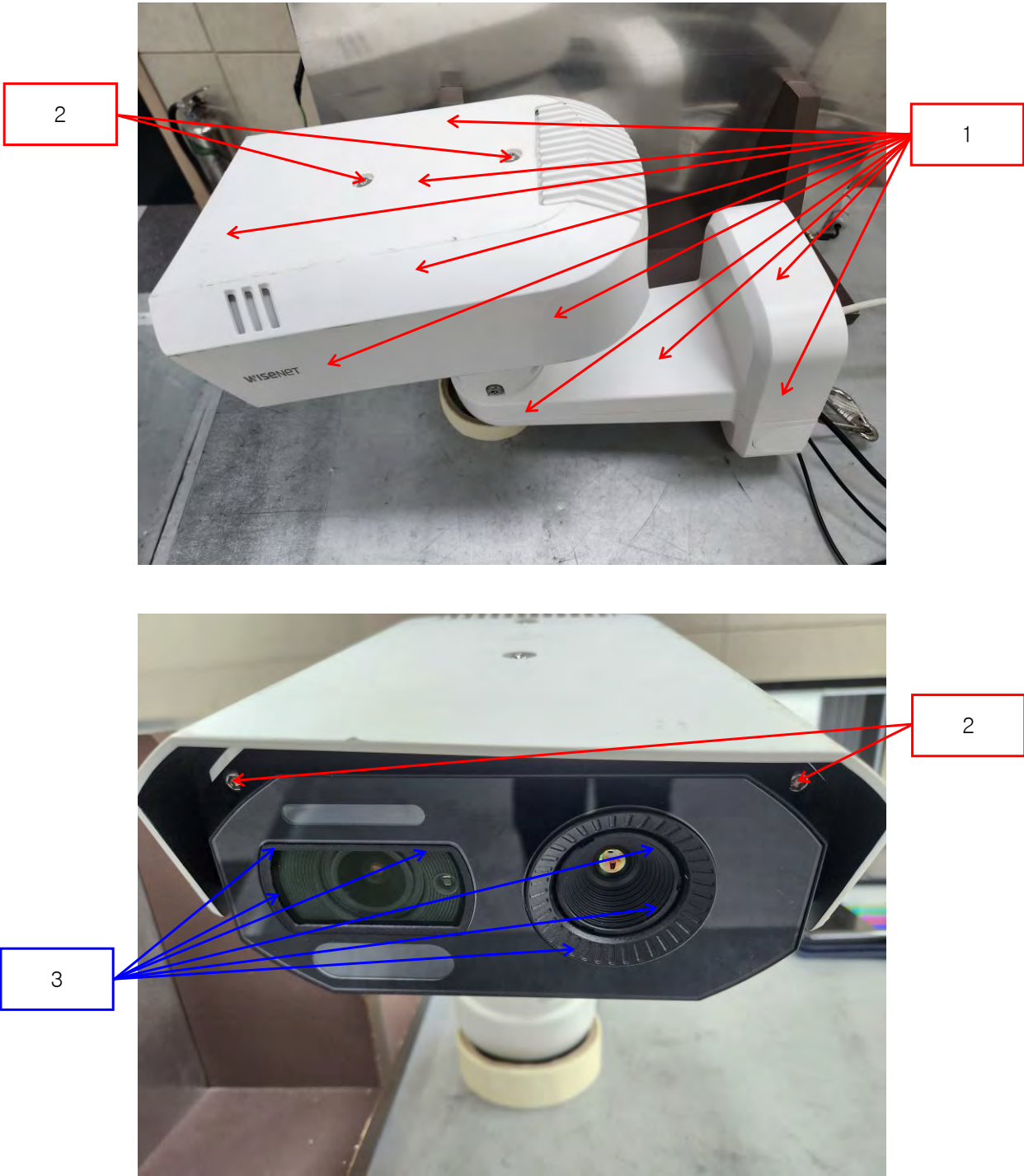
Notes: HCP: Horizontal coupling plane  
 VCP: Vertical coupling plane

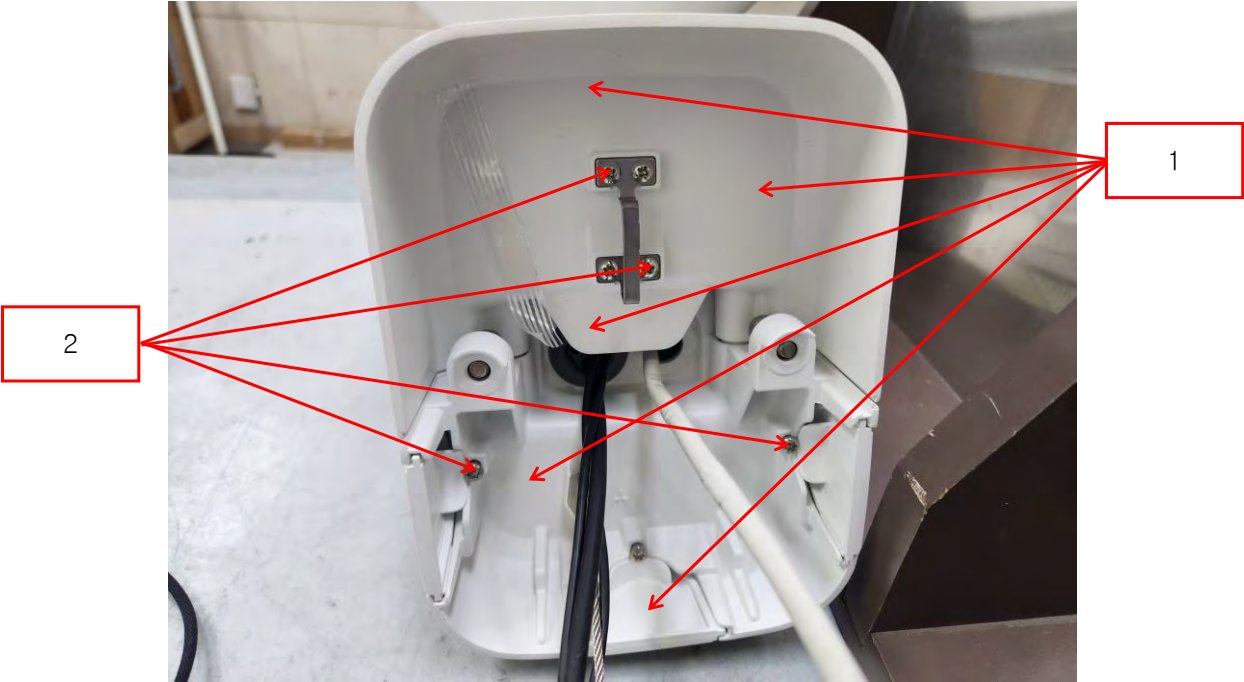
Required Performance Criteria: ☒ Complied

Location of Discharge:



■ DC, PoE Mode





**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	Contact Discharge	Complied	-
2	Screw	Contact Discharge	Complied	-
3	Lens	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	Screw	Contact Discharge	Complied	-
3	Lens	Contact Discharge	Complied	-

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

**Test Results**

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

**Remarks**

PASS Required Performance Criteria

### 3.2 Radiated Electric Field Immunity

#### Reference Standard

EN IEC 61000-4-3:2020

#### Test Date

Oct. 08, 2023

#### 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	Rohde & Schwarz	108252	07, 31, 2024
<input checked="" type="checkbox"/>	HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-
<input checked="" type="checkbox"/>	POWER METER	E4419B	Agilent	GB40203000	03, 21, 2024
<input checked="" type="checkbox"/>	AVERAGE POWER SENSOR	E9301A	Agilent	MY52170007	03, 21, 2024
<input checked="" type="checkbox"/>	AVERAGE POWER SENSOR	E9301A	Agilent	MY41498669	03, 21, 2024
<input checked="" type="checkbox"/>	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 06, 2024

#### Test Conditions

Temperature: (23,0 ± 0,2) °C  
 Relative Humidity: (45,5 ± 0,2) % R.H.  
 Atmospheric Pressure: (100,1 ± 0,1) kPa

**Test Specifications**

Antenna Polarization: Horizontal & vertical unless indicated otherwise

Antenna Distance: ☒ 3 m

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

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

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

Frequency step: ☒ 1 % step

Dwell Time: ☐ 1 s ☒ 3 s

# of Sides Radiated: ☒ 4

Required Performance Criteria: ☒ Complied



**Test Data**

## ■ DC 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

### 3.3 Electrical Fast Transients/Bursts

#### Reference Standard

EN 61000-4-4:2012

#### Test Date

Oct. 06, 2023

#### 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	5.4.8	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 28, 2023
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 29, 2023
<input checked="" type="checkbox"/>	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 28, 2023

#### Test Conditions

Temperature: (23,0 ± 0,1) °C  
 Relative Humidity: (47,3 ± 0,1) % R.H.  
 Atmospheric Pressure: (100,0 ± 0,1) 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 Mode

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

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
L	Complied	Complied
N	Complied	Complied
L – N	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 (LAN)	Complied	Complied
2 Pin (Alarm In)	Complied	Complied
2 Pin (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 (PoE)	Complied	Complied
2 Pin (Alarm In)	Complied	Complied
2 Pin (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/A1:2017

**Test Date**

Oct. 06, 2023

**Test Location**

EMS-Surge: 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	5.4.8	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 28, 2023
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 29, 2023
<input checked="" type="checkbox"/>	CDN	CNV 508N1	EM TEST	P1610176296	11, 29, 2023

**Test Conditions**

Temperature: (23,0 ± 0,2) °C  
Relative Humidity: (47,3 ± 0,1) % R.H.  
Atmospheric Pressure: (100,0 ± 0,1) kPa

**Test Specifications****AC Power Lines**

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

Surge Amplitude :

Common Mode☐ (0,5 / 1,0 / 2,0) kVDifferential 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)
-	-	-

**Signal Lines**☒ Line to Earth – Common Mode

Mode of Application	Coupling Method	Observations	
		(+) Surge (kV)	(-) Surge (kV)
RJ-45 (LAN)	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 (PoE)	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 61000-4-6:2014

**Test Date**

Oct. 07, 2023

**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	5.3.12	-
<input checked="" type="checkbox"/>	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	11, 10, 2023
<input checked="" type="checkbox"/>	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 10, 2023
<input checked="" type="checkbox"/>	CDN	CDN M016	TESEQ	43694	11, 10, 2023
<input checked="" type="checkbox"/>	CDN	CDN M016	TESEQ	43697	11, 10, 2023
<input checked="" type="checkbox"/>	CDN	CDN ST08A	TESEQ	43886	11, 10, 2023
<input checked="" type="checkbox"/>	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 14, 2023

**Test Conditions**

Temperature: (23,4 ± 0,2) °C  
 Relative Humidity: (48,4 ± 0,1) % R.H.  
 Atmospheric Pressure: (100,9 ± 0,1) 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

**Test Data****■ DC Mode**☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L – N	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 (LAN)	CDN	Complied
2Pin (Alarm In)	Clamp	Complied
2Pin (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 (PoE)	CDN	Complied
2Pin (Alarm In)	Clamp	Complied
2Pin (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 61000-4-11:2020

**Test Date**

Oct. 06, 2023

**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	5.4.8	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 29, 2023
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 29, 2023

**Test Conditions**

Temperature: (23,0 ± 0,1) °C  
Relative Humidity: (47,3 ± 0,1) % R.H.  
Atmospheric Pressure: (100,0 ± 0,1) kPa

**Test Specifications & Observations/Remarks**

## ■ DC Mode

## - 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>Degradation</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

Degradation - See "Remarks "

**Test Results**

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

**Remarks**

During the test, EUT was turned off but after the test, it was recovered without operator's intervention.

## APPENDIX A – TEST DATA

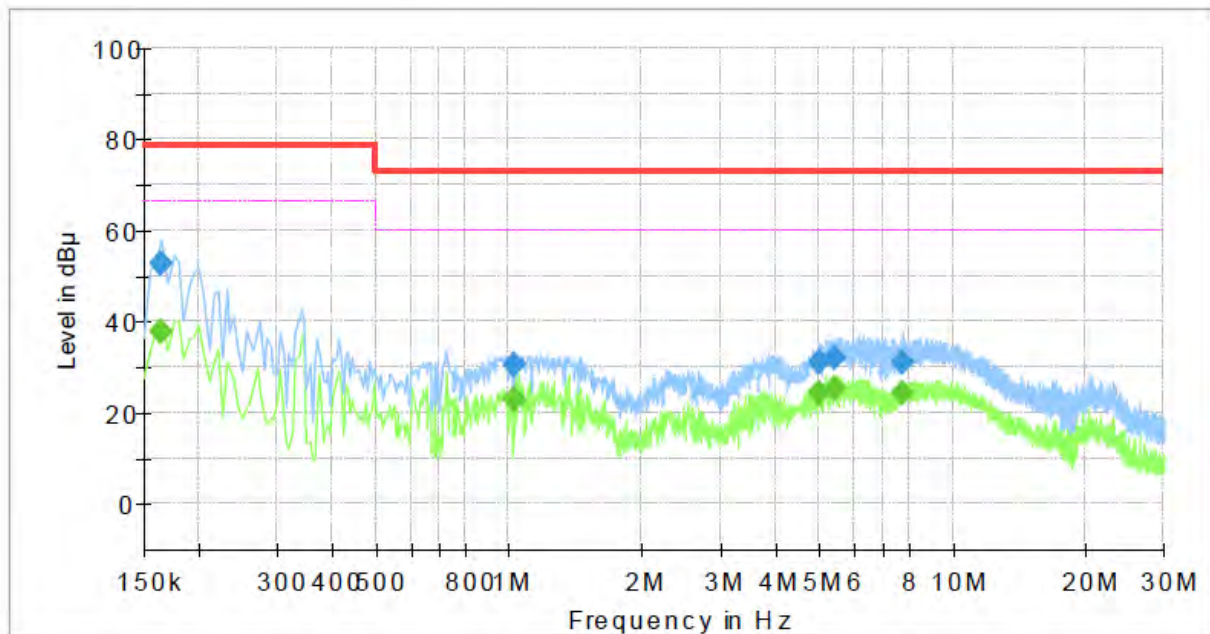
### Conducted Emissions at Mains Power Ports

■ DC Mode

[HOT]

### Common Information

Test Description:	Conducted Emission
Model No.:	TNM-C4940TD
Phase:	H
Mode:	DC
Operator Name:	KES



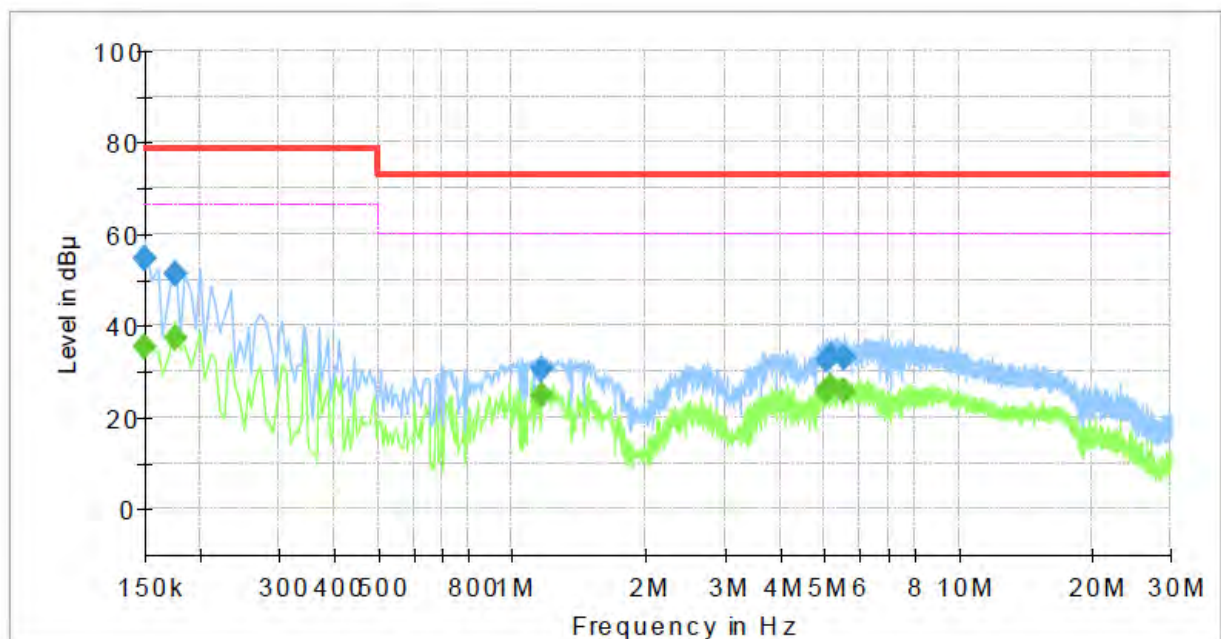
### Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.165000	---	37.77	66.00	28.23	1000.0	9.000	L1	19.4
0.165000	52.68	---	79.00	26.32	1000.0	9.000	L1	19.4
1.030000	---	22.63	60.00	37.37	1000.0	9.000	L1	19.5
1.030000	30.59	---	73.00	42.41	1000.0	9.000	L1	19.5
5.025000	---	24.25	60.00	35.75	1000.0	9.000	L1	19.7
5.025000	31.00	---	73.00	42.00	1000.0	9.000	L1	19.7
5.405000	---	25.22	60.00	34.78	1000.0	9.000	L1	19.8
5.405000	32.05	---	73.00	40.95	1000.0	9.000	L1	19.8
7.715000	---	24.33	60.00	35.67	1000.0	9.000	L1	19.9
7.715000	30.98	---	73.00	42.02	1000.0	9.000	L1	19.9

[NEUTRAL]

## Common Information

Test Description:	Conducted Emission
Model No.:	TNM-C4940TD
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)
0.150000	---	35.44	66.00	30.56	1000.0	9.000	N	19.4
0.150000	54.76	---	79.00	24.24	1000.0	9.000	N	19.4
0.175000	---	37.18	66.00	28.82	1000.0	9.000	N	19.4
0.175000	51.36	---	79.00	27.64	1000.0	9.000	N	19.4
1.170000	---	24.75	60.00	35.25	1000.0	9.000	N	19.5
1.170000	30.51	---	73.00	42.49	1000.0	9.000	N	19.5
5.090000	---	25.73	60.00	34.27	1000.0	9.000	N	19.7
5.090000	32.47	---	73.00	40.53	1000.0	9.000	N	19.7
5.215000	---	26.74	60.00	33.26	1000.0	9.000	N	19.7
5.215000	33.25	---	73.00	39.75	1000.0	9.000	N	19.7
5.535000	---	25.94	60.00	34.06	1000.0	9.000	N	19.8
5.535000	32.82	---	73.00	40.18	1000.0	9.000	N	19.8

### ◆ 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))

KES-QP16-F01(00-23-01-01)

KES Co., Ltd.

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

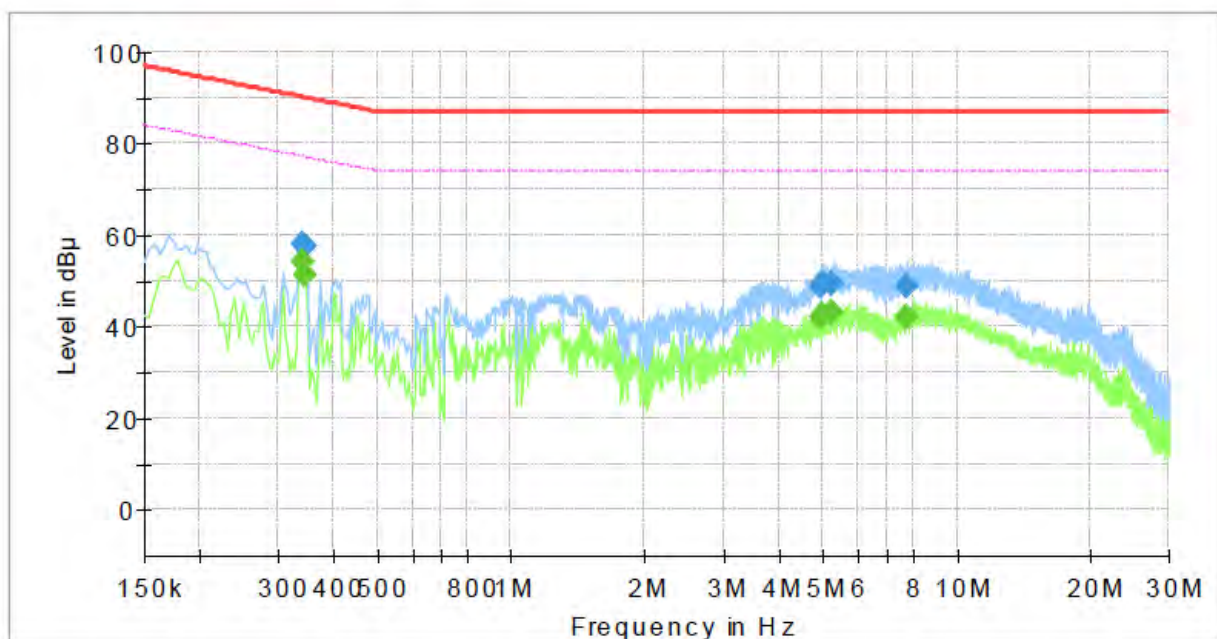
**Conducted Emissions at Telecommunication Ports**

■ DC Mode

[1 000 Mbps]

**Common Information**

Test Description:	Telecommunication Emission
Model No.:	TNM-C4940TD
Mode :	DC
Speed :	1 000 Mbps
Operator Name:	KES

**Final Result**

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.342000	---	54.22	77.15	22.93	1000.0	9.000	Single Line	19.1
0.342000	57.84	---	90.15	32.31	1000.0	9.000	Single Line	19.1
0.346000	---	51.47	77.06	25.59	1000.0	9.000	Single Line	19.1
0.346000	57.40	---	90.06	32.66	1000.0	9.000	Single Line	19.1
4.966000	---	41.99	74.00	32.01	1000.0	9.000	Single Line	19.5
4.966000	48.67	---	87.00	38.33	1000.0	9.000	Single Line	19.5
5.006000	---	42.49	74.00	31.51	1000.0	9.000	Single Line	19.5
5.006000	49.16	---	87.00	37.84	1000.0	9.000	Single Line	19.5
5.278000	---	42.88	74.00	31.12	1000.0	9.000	Single Line	19.5
5.278000	49.28	---	87.00	37.72	1000.0	9.000	Single Line	19.5
7.730000	---	42.19	74.00	31.81	1000.0	9.000	Single Line	19.6
7.730000	48.89	---	87.00	38.11	1000.0	9.000	Single Line	19.6

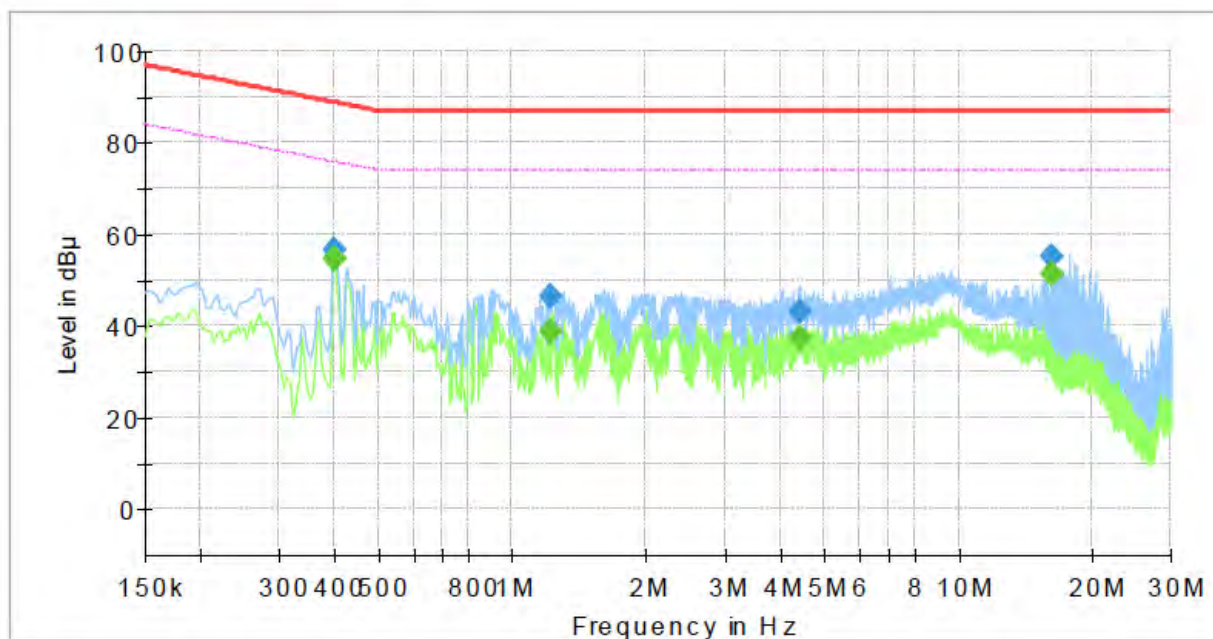


■ PoE Mode

[1 000 Mbps]

## Common Information

Test Description:	Telecommunication Emission
Model No.:	TNM-C4940TD
Mode :	PoE
Speed :	1 000 Mbps
Operator Name:	KES



## Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.398000	---	54.61	75.90	21.29	1000.0	9.000	Single Line	19.1
0.398000	56.44	---	88.90	32.46	1000.0	9.000	Single Line	19.1
1.222000	---	38.60	74.00	35.40	1000.0	9.000	Single Line	19.3
1.222000	46.40	---	87.00	40.60	1000.0	9.000	Single Line	19.3
4.414000	---	37.05	74.00	36.95	1000.0	9.000	Single Line	19.4
4.414000	43.25	---	87.00	43.75	1000.0	9.000	Single Line	19.4
16.230000	---	51.21	74.00	22.79	1000.0	9.000	Single Line	20.0
16.230000	55.04	---	87.00	31.96	1000.0	9.000	Single Line	20.0

### ◆ Calculation

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

QuasiPeak / CAverage : The Final Value

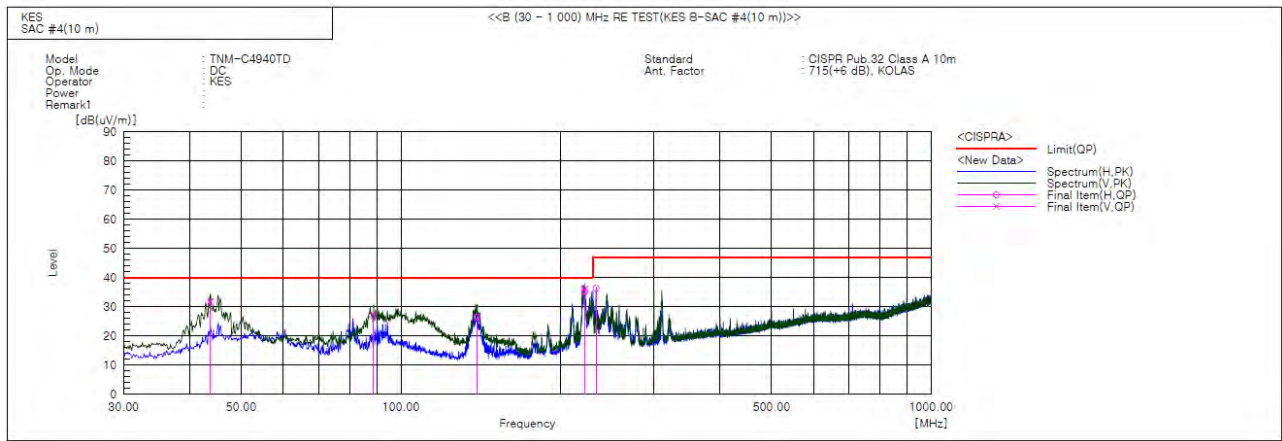
Reading Value : Not shown in the table.

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



Radiated Electric Field Emissions(Below 1 GHz)

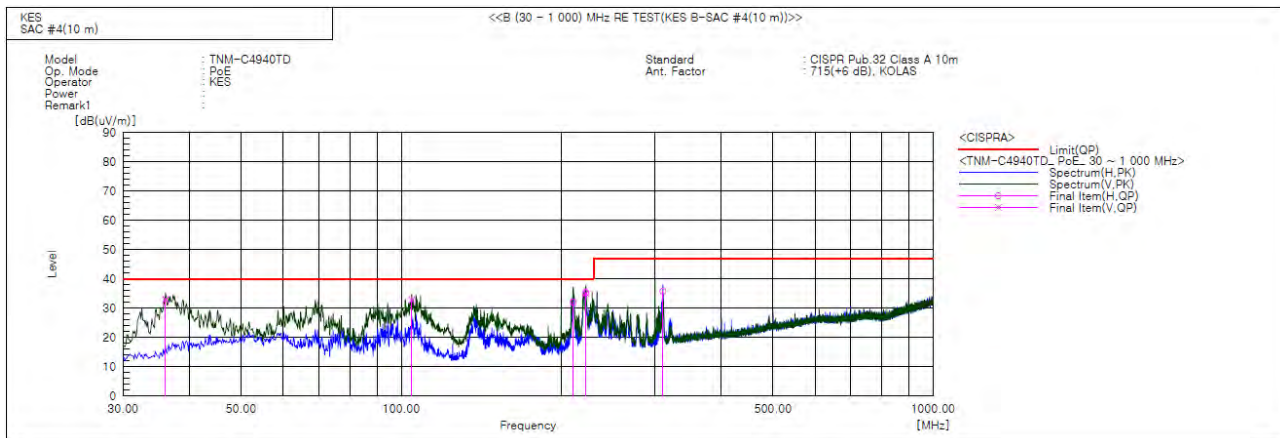
■ DC Mode



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	43.701	V	52.9	-21.1	31.8	40.0	8.2	108.0	330.0	
2	88.806	V	51.3	-24.3	27.0	40.0	13.0	150.0	78.0	
3	139.246	H	51.5	-25.1	26.4	40.0	13.6	365.0	36.0	
4	221.939	H	54.6	-19.5	35.1	40.0	4.9	298.0	251.0	
5	222.060	V	55.5	-19.5	36.0	40.0	4.0	112.0	196.0	
6	233.458	H	55.4	-19.1	36.3	47.0	10.7	400.0	273.0	

# **PoE Mode**



## **Final Result**

No.	Frequency (P)	Reading QP	c.f	Result QP	Limit QP	Margin QP	Height	Angle	Remark
	[MHz]	[dB(uV)]	[dB(1/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB]	[cm]	[deg]	
1	36.063	V 56.7	-23.8	32.9	40.0	7.1	150.0	34.0	
2	104.690	V 55.0	-22.2	32.8	40.0	7.2	148.0	328.0	
3	210.663	H 52.1	-20.1	32.0	40.0	8.0	384.0	260.0	
4	222.407	H 54.8	-19.5	35.3	40.0	4.7	400.0	260.0	
5	222.424	V 54.5	-19.5	35.0	40.0	5.0	110.0	140.0	
6	310.451	H 52.7	-16.9	35.8	47.0	11.2	299.0	296.0	

## **Calculation**

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

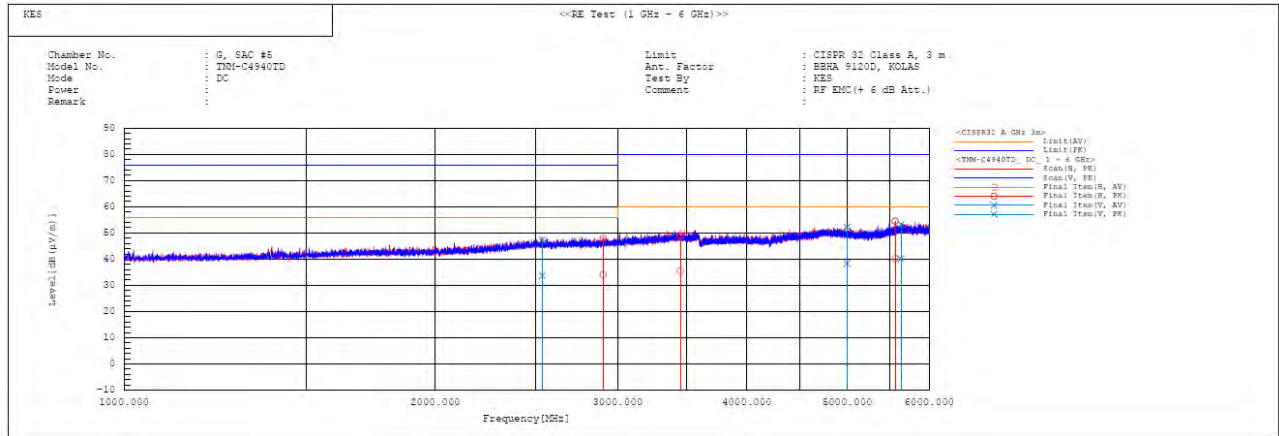
Margin(QP)[dB] = Limit[dB( $\mu$ V/m)] - Result(QP) [dB( $\mu$ V/m)]

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

Radiated Electric Field Emissions(Above 1 GHz)

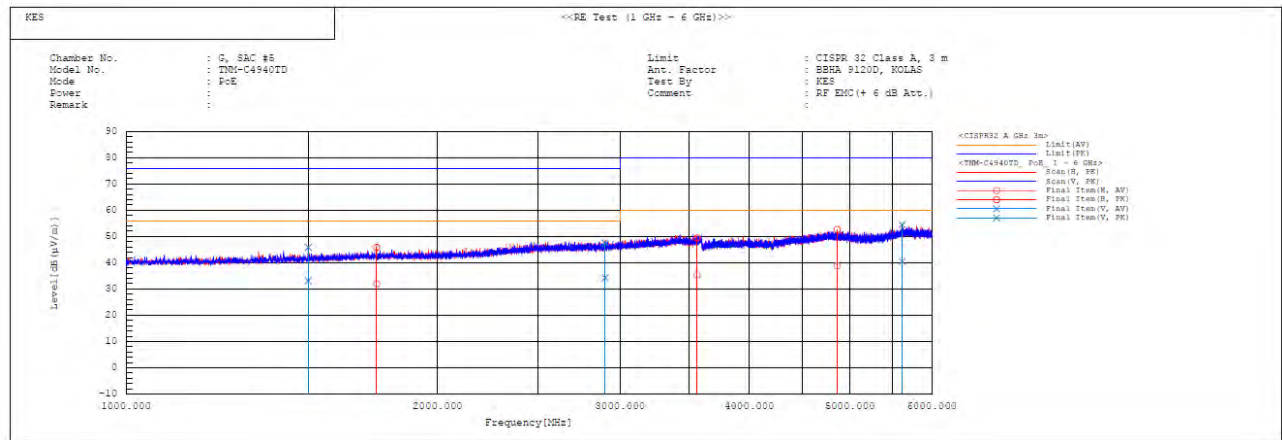
DC Mode



Final Result

No.	Frequency	Pol	Reading AV	Reading PK	c.f	Result AV	Result PK	Limit AV	Limit PK	Margin AV	Margin PK	Height	Angle	Remark
	[MHz]		[dB(μV)]	[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]	[dB]	[cm]	[deg]	
1	2536.306	V	28.9	42.5	4.8	33.7	47.3	56.0	76.0	22.3	28.7	100.0	85.6	
2	2903.848	H	28.0	41.9	6.0	34.0	47.9	56.0	76.0	22.0	28.1	100.0	148.7	
3	3450.094	H	28.6	42.0	6.8	35.4	48.8	60.0	80.0	24.6	31.2	100.0	328.8	
4	4998.689	V	28.9	39.8	12.4	38.3	52.2	60.0	80.0	21.7	27.8	100.0	44.0	
5	5562.957	H	27.1	41.4	13.1	40.2	54.5	60.0	80.0	19.8	25.5	100.0	217.8	
6	5635.952	V	26.9	40.1	13.2	40.1	53.3	60.0	80.0	19.9	26.7	100.0	131.6	

PoE Mode



No.	Frequency	Pol	Reading AV	Reading PK	c.f	Result AV	Result PK	Limit AV	Limit PK	Margin AV	Margin PK	Height	Angle	Remark
	[MHz]		[dB (μV)]	[dB (μV)]	[dB (1/m)]	[dB (μV/m)]	[dB (μV/m)]	[dB (μV/m)]	[dB (μV/m)]	[dB]	[dB]	[cm]	[deg]	
1	1499.993	V	32.4	45.2	0.7	33.1	45.9	56.0	76.0	22.9	30.1	100.0	147.0	
2	1745.987	H	30.3	44.1	1.7	32.0	45.8	56.0	76.0	24.0	30.2	100.0	171.6	
3	2902.614	V	28.2	41.5	6.0	34.2	47.5	56.0	76.0	21.8	28.5	100.0	359.9	
4	3560.499	H	28.4	42.5	6.9	35.3	49.4	60.0	80.0	24.7	30.6	100.0	78.4	
5	4862.648	H	27.1	40.9	11.7	38.8	52.6	60.0	80.0	21.2	27.4	100.0	316.4	
6	5619.633	V	27.3	41.3	13.2	40.5	54.5	60.0	80.0	19.5	25.5	100.0	227.7	

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

**Harmonic Current Emissions and Voltage Fluctuations and Flicker**

■ DC Mode

**Average harmonic current results**

Hn	I <sub>eff</sub> [A]	% of Limit	Limit [A]	Result
1	0.073			
2	0.001	0.115	1.080	n/a
3	0.066	2.856	2.300	PASS
4	0.002	0.397	0.430	n/a
5	0.065	5.671	1.140	PASS
6	0.002	0.520	0.300	n/a
7	0.063	8.123	0.770	PASS
8	0.002	0.679	0.230	n/a
9	0.057	14.233	0.400	PASS
10	0.001	0.774	0.184	n/a
11	0.052	15.657	0.330	PASS
12	0.001	0.890	0.153	n/a
13	0.047	22.182	0.210	PASS
14	0.001	1.117	0.131	n/a
15	0.041	27.316	0.150	PASS
16	0.001	1.241	0.115	n/a
17	0.035	26.653	0.132	PASS
18	0.001	1.383	0.102	n/a
19	0.030	25.350	0.118	PASS
20	0.001	1.542	0.092	n/a
21	0.025	15.592	0.161	PASS
22	0.001	1.713	0.084	n/a
23	0.020	13.947	0.147	PASS
24	0.001	1.876	0.077	n/a
25	0.017	12.550	0.135	PASS
26	0.001	1.933	0.071	n/a
27	0.014	11.385	0.125	PASS
28	0.001	1.969	0.066	n/a
29	0.013	10.971	0.116	PASS
30	0.001	2.095	0.061	n/a
31	0.012	10.890	0.109	PASS
32	0.001	2.191	0.058	n/a
33	0.012	11.350	0.102	PASS
34	0.001	2.234	0.054	n/a
35	0.011	11.828	0.096	PASS
36	0.001	2.261	0.051	n/a
37	0.011	11.967	0.091	PASS
38	0.001	2.269	0.048	n/a
39	0.010	12.037	0.087	PASS
40	0.001	2.393	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 <sub>eff</sub> [A]	% of Limit	Limit [A]	Result
1	0.074			
2	0.002	0.104	1.620	n/a
3	0.067	1.932	3.450	PASS
4	0.002	0.342	0.645	n/a
5	0.065	3.812	1.710	PASS
6	0.002	0.462	0.450	n/a
7	0.063	5.462	1.155	PASS
8	0.002	0.589	0.345	n/a
9	0.057	9.554	0.600	PASS
10	0.002	0.663	0.276	n/a
11	0.052	10.534	0.495	PASS
12	0.002	0.752	0.230	n/a
13	0.047	14.854	0.315	PASS
14	0.002	0.938	0.197	n/a
15	0.041	18.308	0.225	PASS
16	0.002	1.057	0.173	n/a
17	0.035	17.867	0.199	PASS
18	0.002	1.200	0.153	n/a
19	0.030	17.011	0.178	PASS
20	0.002	1.325	0.138	n/a
21	0.025	15.780	0.161	PASS
22	0.002	1.490	0.125	n/a
23	0.021	14.173	0.147	PASS
24	0.002	1.578	0.115	n/a
25	0.017	12.787	0.135	PASS
26	0.002	1.633	0.106	n/a
27	0.015	11.647	0.125	PASS
28	0.002	1.735	0.099	n/a
29	0.013	11.254	0.116	PASS
30	0.002	1.838	0.092	n/a
31	0.012	11.134	0.109	PASS
32	0.002	1.890	0.086	n/a
33	0.012	11.620	0.102	PASS
34	0.002	1.980	0.081	n/a
35	0.012	12.076	0.096	PASS
36	0.001	1.925	0.077	n/a
37	0.011	12.205	0.091	PASS
38	0.001	1.923	0.073	n/a
39	0.011	12.246	0.087	PASS
40	0.001	2.018	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.

Test Data - Voltage Fluctuations

■ DC Mode

**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

## Test Setup Photos and Configuration

### Conducted Emissions at Mains Power Ports

■ DC Mode





## Conducted Emissions at Telecommunication Ports

■ DC Mode



■ PoE Mode



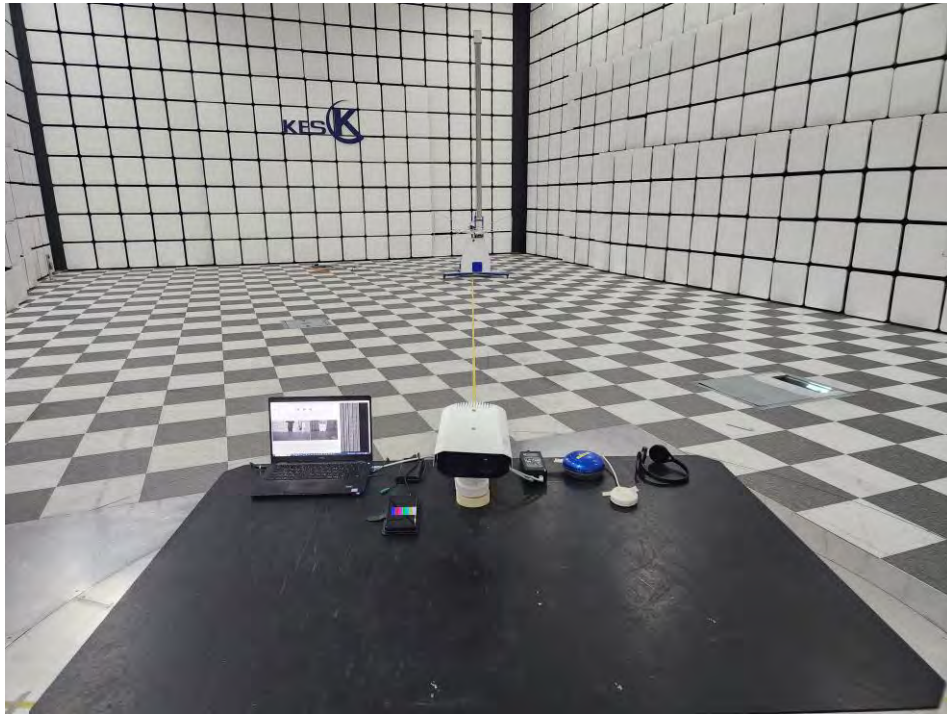
## Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode



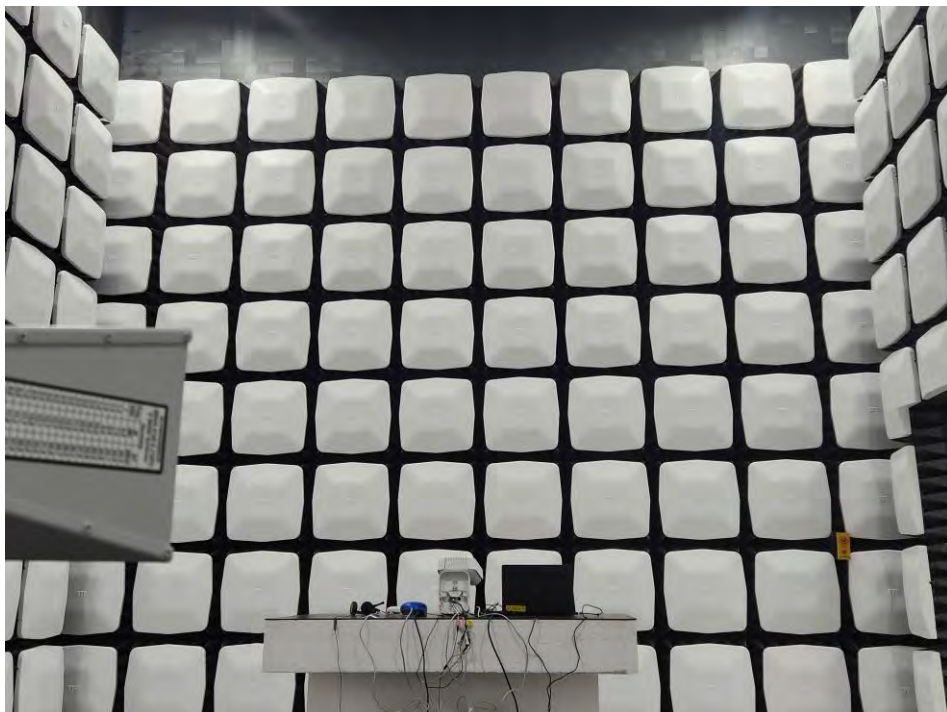
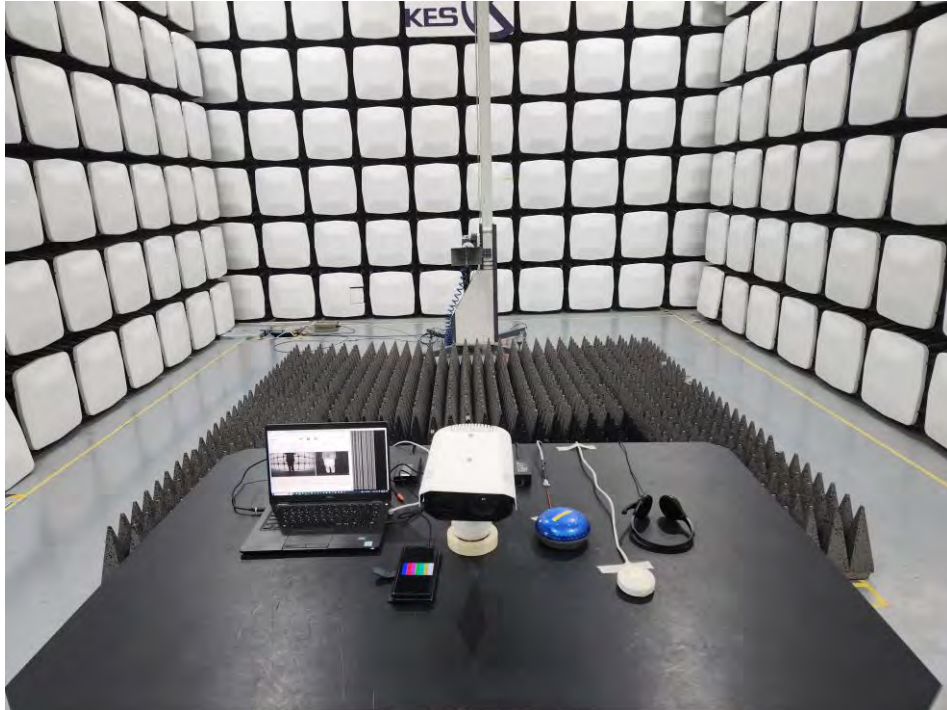


■ PoE Mode



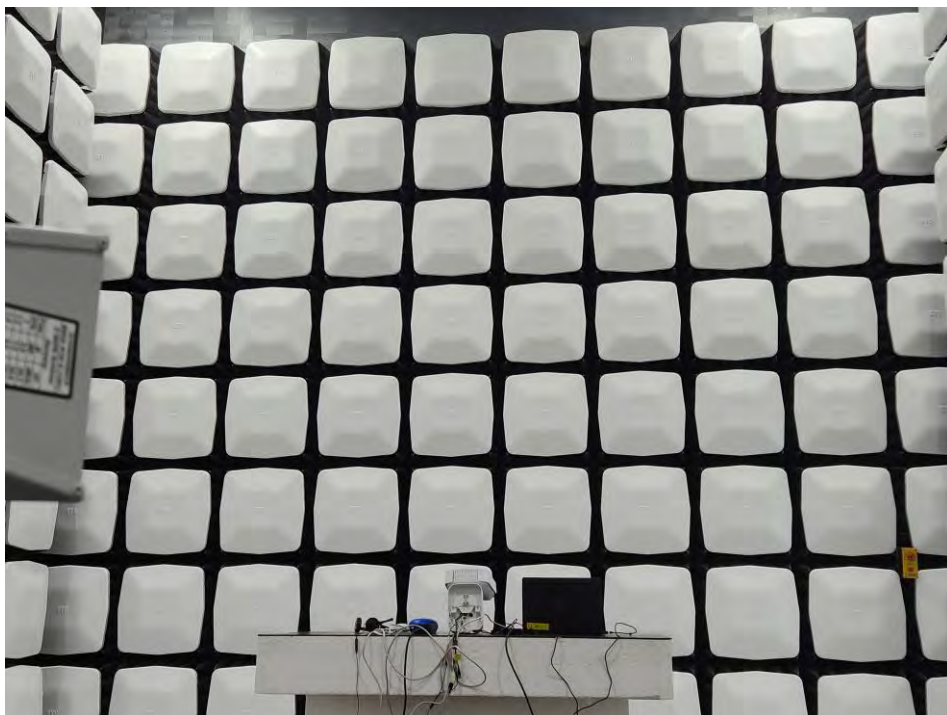
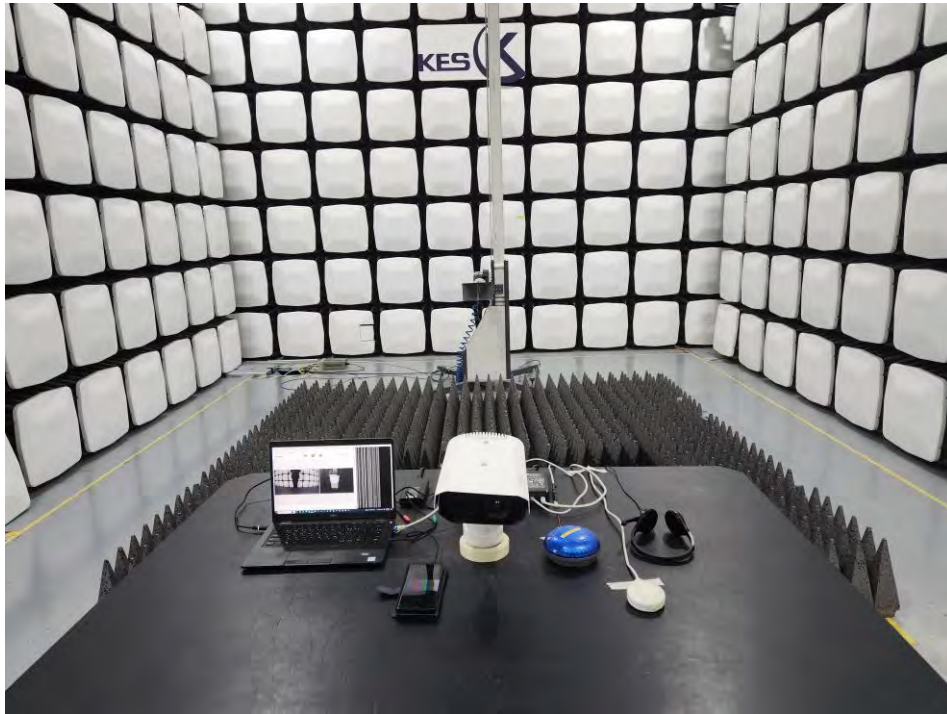
## Radiated Electric Field Emissions(Above 1 GHz)

■ DC Mode





■ PoE Mode



## Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ DC Mode



## Electrostatic Discharge

### ■ DC Mode



### ■ PoE Mode



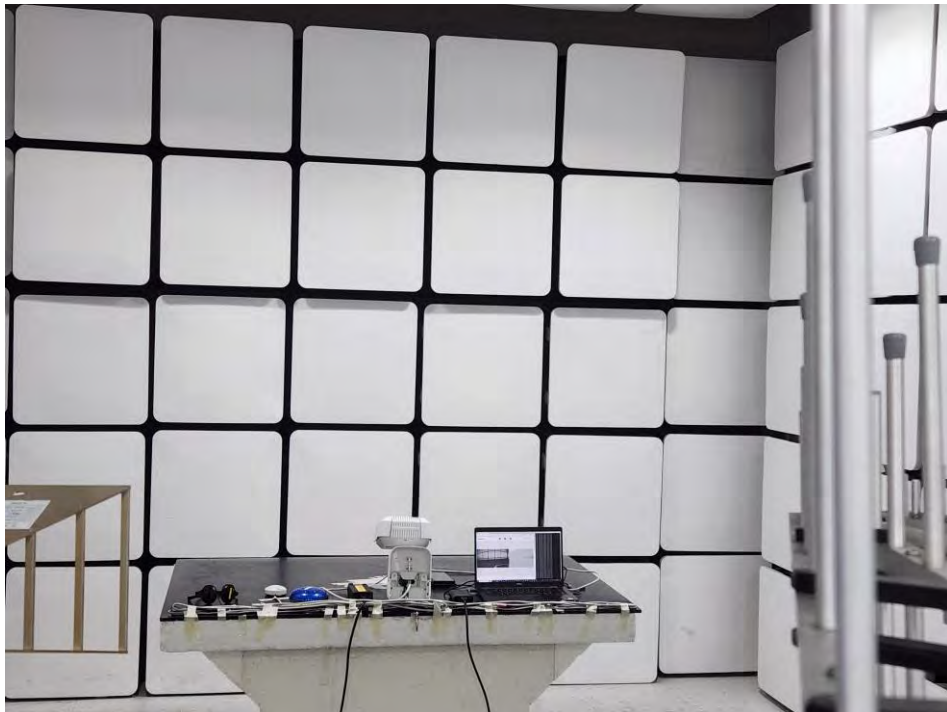


## Radiated Electric Field Immunity

### ■ DC Mode



### ■ PoE Mode



## Electrical Fast Transients/Bursts

### ■ DC Mode



### ■ PoE Mode



## Surge Transients

### ■ DC Mode



### ■ PoE Mode





## Conducted Disturbance

### ■ DC Mode



### ■ PoE Mode



## Voltage Dips and Short Interruptions

■ DC Mode



## EUT External Photographs

(Top)



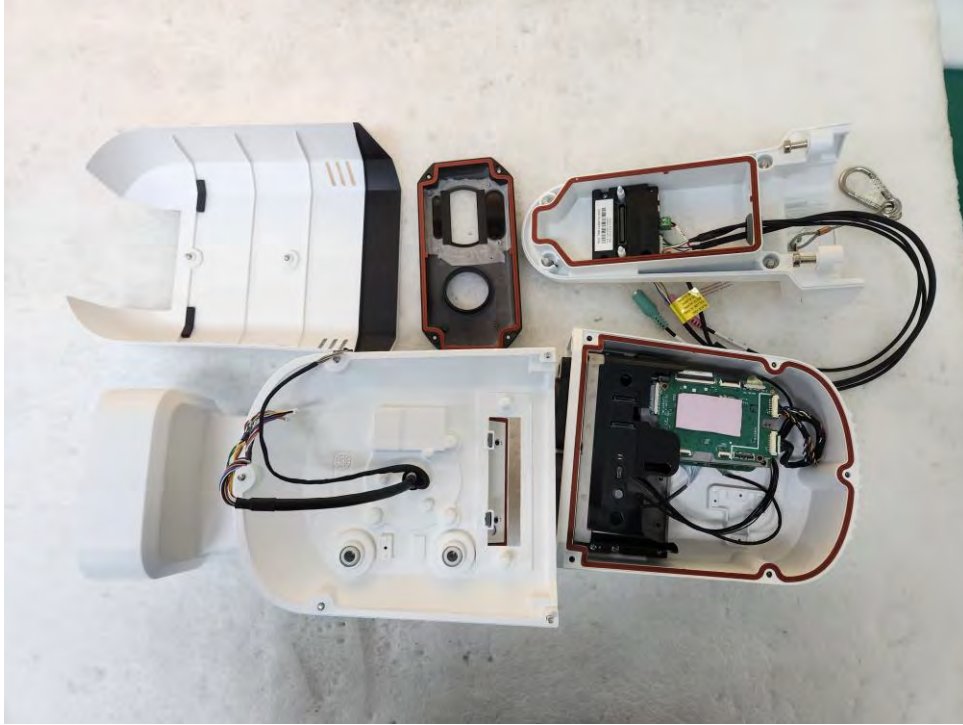
(Bottom)





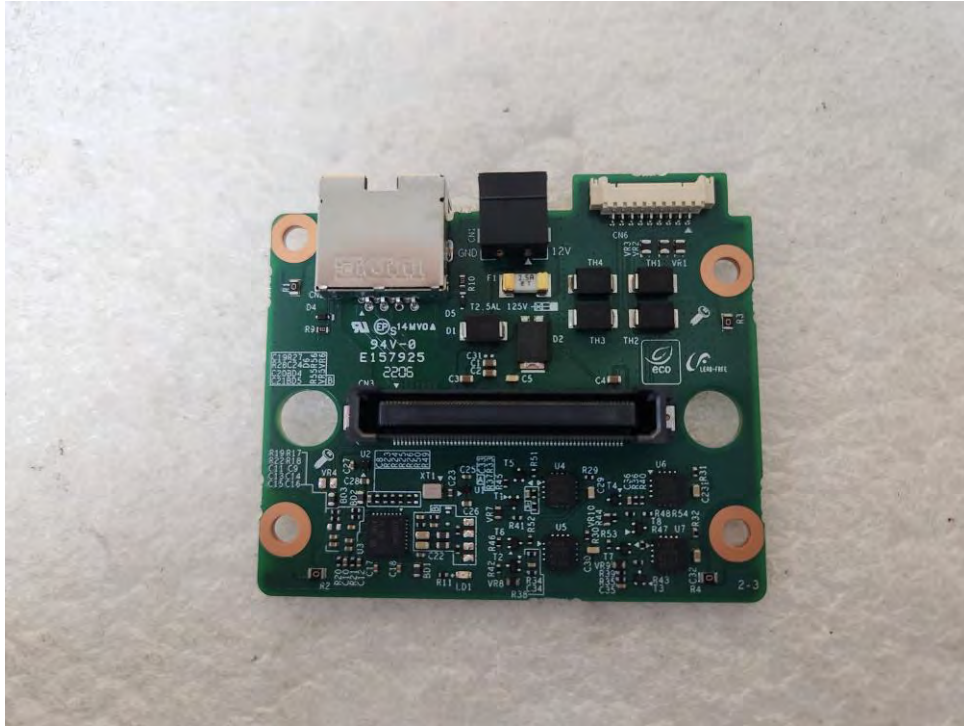
## EUT Internal Photographs

(Internal View)



## EUT Internal View – Board 1

(Top)



(Bottom)



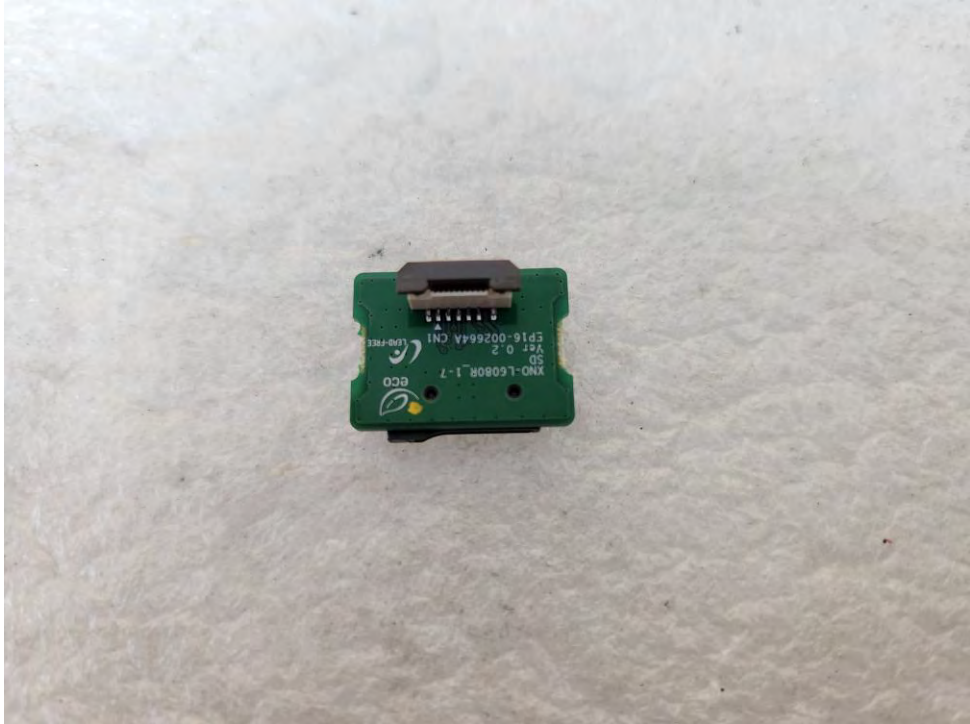


EUT Internal View – Board 2

(Top)



(Bottom)

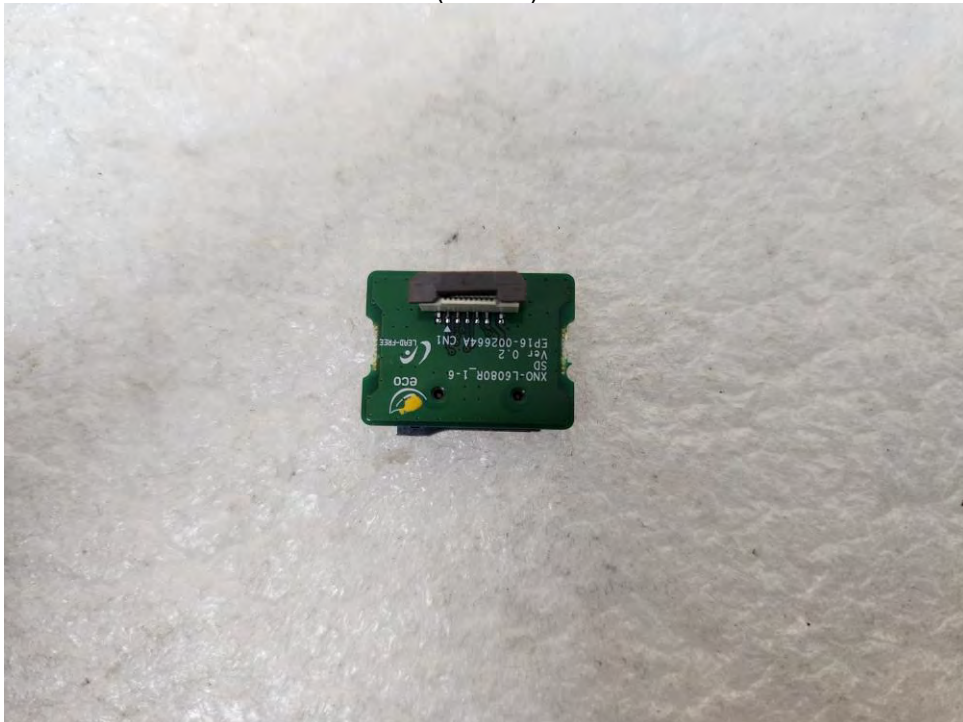


### EUT Internal View – Board 3

(Top)



(Bottom)





## EUT Internal View – Board 4

(Top)



(Bottom)



## EUT Internal View – Board 5

(Top)



(Bottom)





## EUT Internal View – Board 6

(Top)



(Bottom)



## EUT Internal View – Board 7

(Top)



(Bottom)





## EUT Internal View – Board 8

(Top)



(Bottom)



## EUT Internal View – Board 9

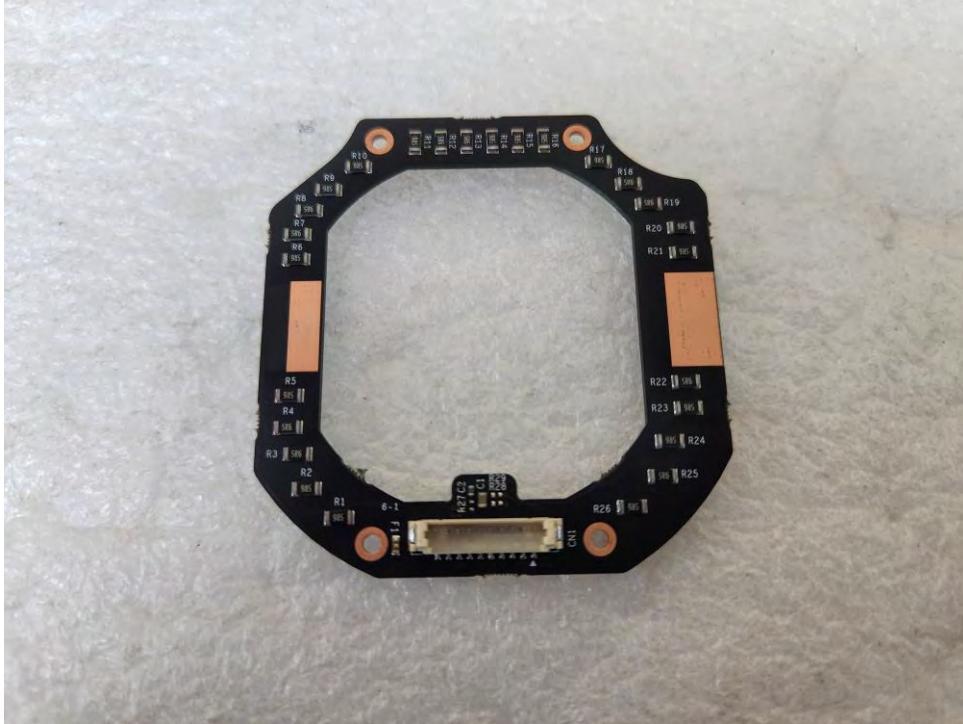
(Top)



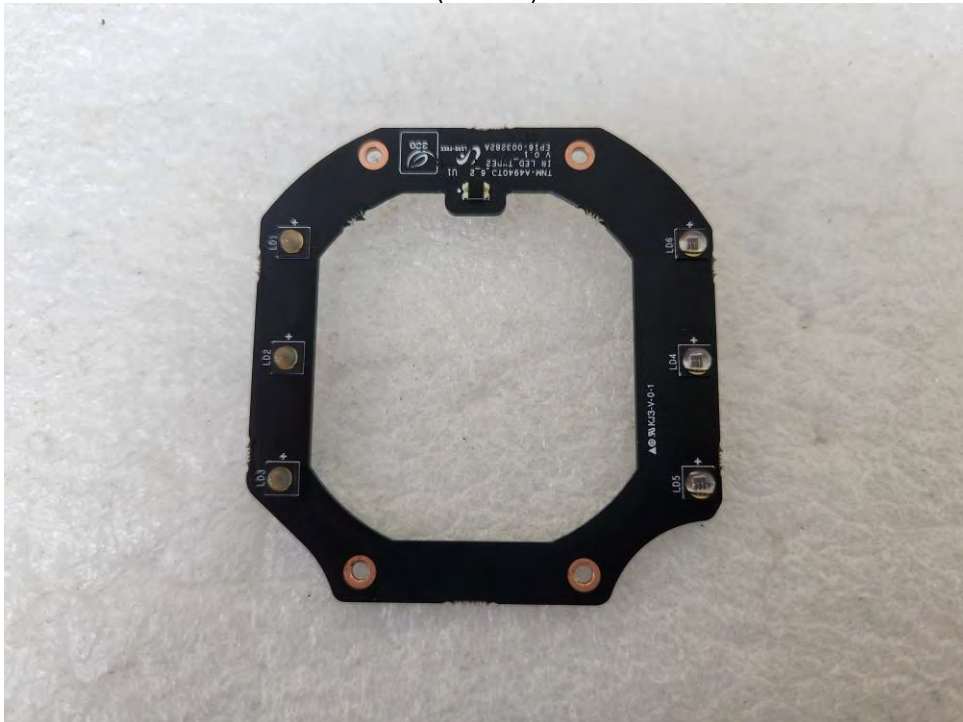


## EUT Internal View – Board 10

(Top)

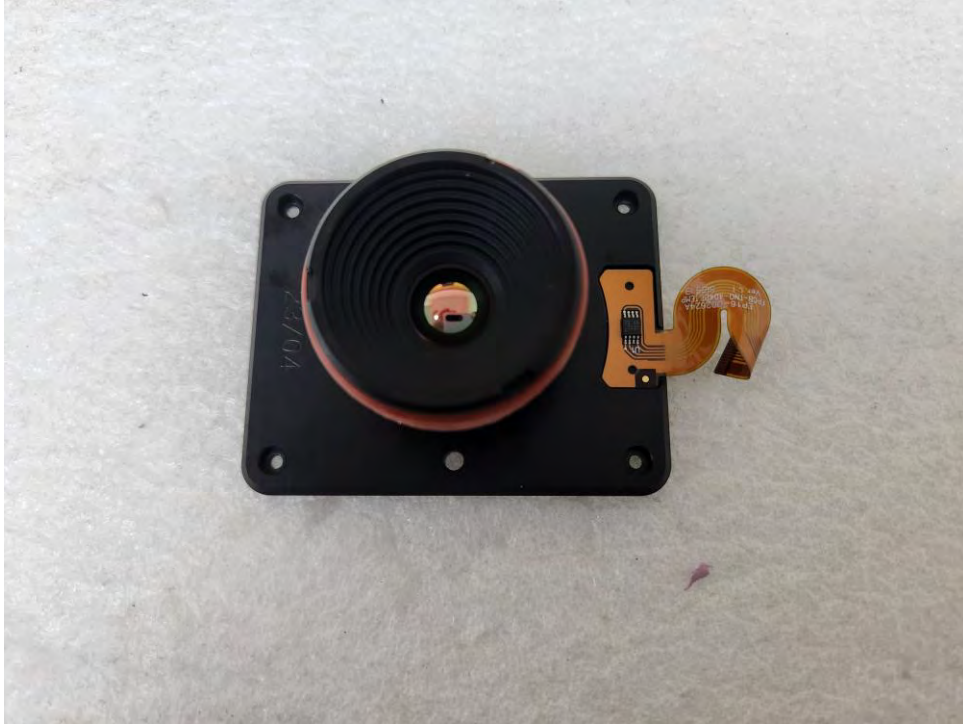


(Bottom)



## EUT Internal View – Lens 1

(Top)



(Bottom)



## EUT Internal View – Lens 2

(Top)

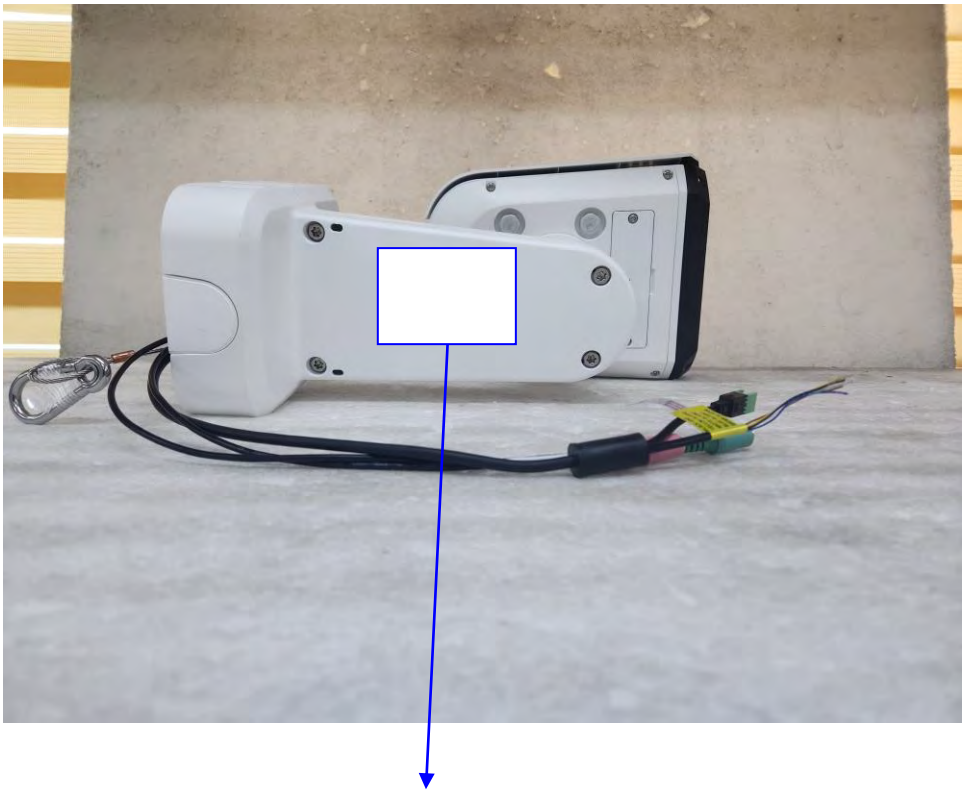


(Bottom)





Label and Location



<p><u>NETWORK THERMAL CAMERA</u></p> <p>Model No : TNM-C4940TD</p> <p>Manufacturer : HANWHA VISION VIETNAM COMPANY LIMITED</p> <p>Made in Vietnam</p>	<p>UK CA</p> <p>CE</p>
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