



EMC TEST REPORT For CE

Test Report No. : KES-EM-22T0305
Date of Issue : Apr. 01, 2022
Product name : THERMAL CAMERA
Model/Type No. : TNM-C4960TD
Variant Model : TNM-C4950TD
Applicant : Hanwha Techwin Co., Ltd.
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, Republic of Korea
Manufacturer : 1. HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.
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 : Mar. 11, 2022
Test date : Mar. 17, 2022 ~ Mar. 21, 2022
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Min Seong, Kim
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

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

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Apr. 01, 2022	KES-EM-22T0305	Issued

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1.0 General Product Description

Main Specifications of EUT are:

Video		
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(F1.7, 1/30sec) BW: 0.005Lux(F1.7, 1/30sec)
Video Out	USB : Micro USB Type B	
Lens		
Focal Length (Zoom Ratio)	25mm fixed focal	10.9~29mm(2.6x) motorized varifocal
Max. Aperture Ratio	F1.0	F1.7(Wide)~F1.73(Tele)
Angular Field of View	H: 17.4°, V: 13.1°, D: 21.6°	H:42.0°(Wide)~15.0°(Tele) / V:22.8°(Wide)~8.4°(Tele) / D:48.7°(Wide)~17.1°(Tele)
Min. Object Distance	26m(85.30ft)	Wide: 2.5m(8.20ft) / Tele: 6m(19.68ft)
Focus Control	Fixed	Simple focus
Lens Type	None	
Mount Type	None	
Optional Lens	None	
Pan / Tilt / Rotate		
Pan / Tilt / Rotate Range	None	
Pan Range	None	
Pan Speed	None	
Tilt Range	None	
Tilt Speed	None	
Rotate Range	None	
Sequence	None	
Preset Accuracy	None	
Operational		
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		
Privacy Masking	6ea, rectangle zones - 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)

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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 clip playback	
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	None
Color Palettes	Whitehot, Blackhot, Rainbow, Rainbow2, Sepia, Red, Iron, Custom	None
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) Device certificate(Hanwha Techwin Root CA, pre-installed) Secure boot, Secure firmware	
Application Programming Interface	ONVIF Profile S/T SUNAPI(HTTP API) Wisenet open platform (visible channel only)	

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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 _{DC}
Power Consumption	PoE+ : Max 23.5W 12V _{DC} : Max 19.5W
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)

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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

Addition of derivative models for place of sale management

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
THERMAL CAMERA	TNM-C4960TD	-	HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.	EUT

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1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
AC/DC Adapter	2ACB022F	-	ChAnnel Well Technology (Guangzhou) Co.,Ltd.	-
PoE Adapter	PT-PSE109GBRO-AH	-	Dongguan PROCET Network Technology Co.,Ltd	-
Notebook	LG15N54	507NZET040180	LG	-
Notebook Adapter	PA-1900-14	OF4A263348701J247	LITE-ON TECHNOLOGY COPORATION	-
Micro SD Card 1	-	-	SanDisk	32 GB
Micro SD Card 2	-	-	SanDisk	16 GB
MIC	MP1000	-	-	-
Speaker	BR1000A Cuve Black 2	-	DONGGUAN EDIFIER TECHNOLOGY Co., Ltd	-
Alarm	PRO-SL	-	SENSOR PRO	-
Button Alarm	-	-	-	-
Smart Phone	SM-N950N	R39JB0C3FB	SAMSUNG	-

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1.6 External I/O Cabling

■ DC Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
THERMAL CAMERA (EUT)	2 Pin	AC/DC Adapter	Line-Out (2 Pin)	1.0	U
	RJ-45	Notebook	RJ-45	3.0	S
	SLOT	Micro SD Card 1	SLOT	-	-
	SLOT	Micro SD Card 2	SLOT	-	-
	MIC (3.5 mm)	MIC	XLR	2.0	U
	Speaker (3.5 mm)	Speaker	Line-Out (3.5 mm)	1.6	U
	3 Pin	Alarm	Line-Out (3 Pin)	3.0	U
	3 Pin	Button Alarm	Line-Out (3 Pin)	3.0	U
Notebook	DC Jack	Notebook Adapter	Line-Out (DC Jack)	1.0	U
	3.5 mm	Smart Phone	3.5 mm	1.0	U

* Unshielded=U, Shielded=S

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■ PoE Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
THERMAL CAMERA (EUT)	RJ-45 (PoE)	PoE Adapter	RJ-45 (PoE)	3.0	S
	SLOT	Micro SD Card 1	SLOT	-	-
	SLOT	Micro SD Card 2	SLOT	-	-
	MIC (3.5 mm)	MIC	XLR	2.0	U
	Speaker (3.5 mm)	Speaker	Line-Out (3.5 mm)	1.6	U
	3 Pin	Alarm	Line-Out (3 Pin)	3.0	U
	3 Pin	Button Alarm	Line-Out (3 Pin)	3.0	U
Notebook	RJ-45	PoE Adapter	RJ-45 (DATA)	1.0	S
	DC Jack	Notebook Adapter	Line-Out (DC Jack)	1.0	U
	3.5 mm	Smart Phone	3.5 mm	1.0	U

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

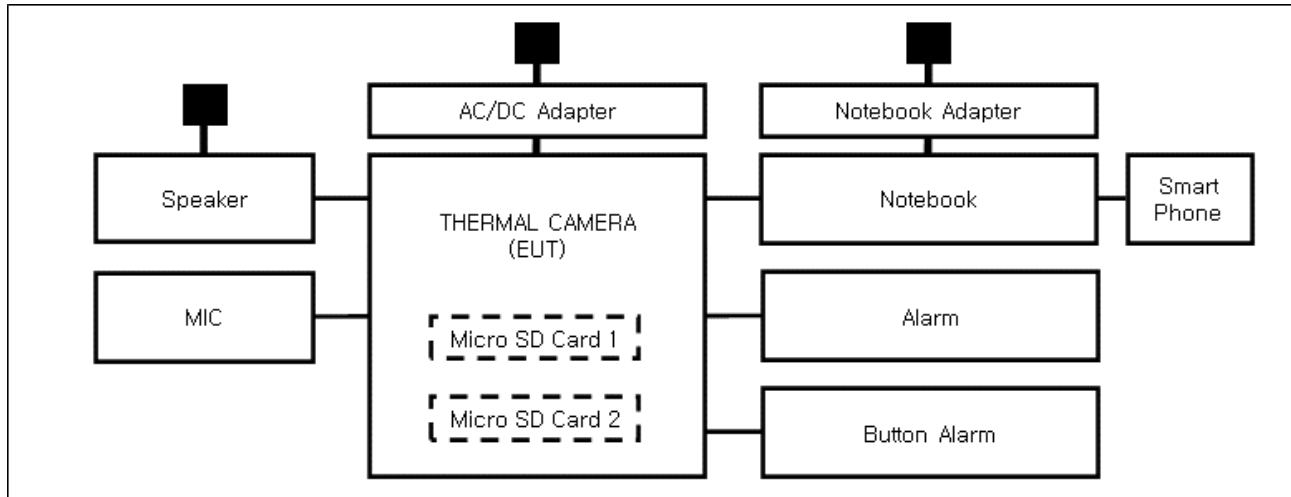
Test Mode	operating
Operation	- By connecting to the Web Viewer, checking the video output of EUT and performing a ping test, it was confirmed that the network function is operating normally. - After the test, the Micro SD Card was checked to see if it was recorded normally.

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

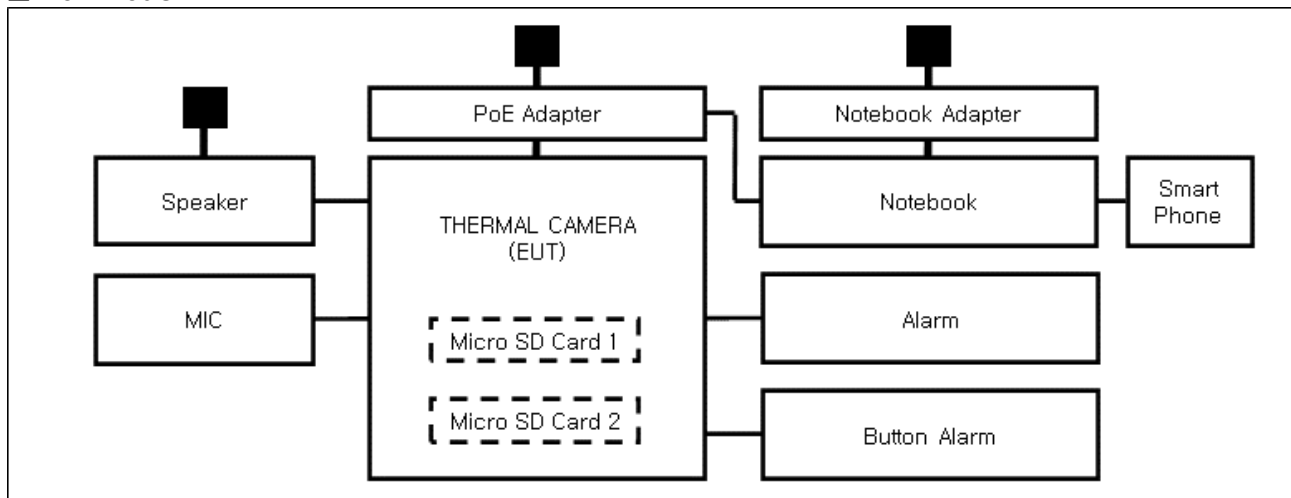
1.8 Configuration

■ AC Main
 □ DC Main

■ DC Mode



■ PoE Mode



1.9 Remarks when standards applied

- USB Port was excluded from testing because it is the management port.
- PoE port is considered to be wired network port, so power-related test items are excluded.

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, Yeoju-si, Gyeonggi-do, 12658, Korea. 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 , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
International	KOLAS	EMI (3 m & 10 m Semi-Anechoic Chamber , and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KT489
USA	FCC	3 m & 10 m Semi-Anechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Anechoic Chamber and Conducted test site	 23298-1
JAPAN	VCCI	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	 R-20056, C-20036, T-20040, G-20057
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Anechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 001633 0004

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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 2016/1091**

☒ BS EN 55032:2015/A11:2020 ☒ Class A ☐ Class B

☒ BS EN 50130-4:2011/A1:2014

☒ BS EN 61000-3-2:2014

☒ BS EN 61000-3-3:2013



2.1 Conducted Emissions at Mains Power Ports

Test Date

Mar. 17, 2022

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	12, 28, 2022
☒	LISN	ENV216	R & S	101787	12, 27, 2022
☒	LISN	ESH2-Z5	R & S	100450	12, 27, 2022
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 27, 2022

Test Conditions

Temperature: (24,6 ± 0,1) °C

Relative Humidity: (44,1 ± 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

Mar. 17, 2022

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	12, 28, 2022
☒	LISN	ENV216	R & S	101787	12, 27, 2022
☒	LISN	ESH2-Z5	R & S	100450	12, 27, 2022
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 27, 2022
☒	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	03, 07, 2023
☐	CDN	CDNS502A	TESEQ	40431	12, 27, 2022

Test Conditions

Temperature: (24,6 ± 0,1) °C

Relative Humidity: (44,1 ± 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

Mar. 17, 2022

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	04, 01, 2022
☒	AMPLIFIER	SCU 01	R & S	100603	11, 24, 2022
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	12, 08, 2022
☒	ATTENUATOR	8491A	HP	32173	03, 08, 2023

Test Conditions

Temperature: (23,7 ± 0,2) °C
Relative Humidity: (44,3 ± 0,3) % 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

Mar. 17, 2022

Test Location

SEMI ANECHOIC CHAMBER #5

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.120	-
☒	EMI TEST RECEIVER	ESU26	Rohde & Schwarz	100552	04, 01, 2022
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	12, 16, 2022
☒	PREAMPLIFIER	8449B	HP	3008A00538	06, 21, 2022

Test Conditions

Temperature: (25,3 ± 0,3) °C

Relative Humidity: (47,2 ± 0,5) % 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

Mar. 17, 2022

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, 2022
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: (24,0 ± 0,1) °C
Relative Humidity: (45,6 ± 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

Mar. 17, 2022

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, 2022
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: (24,3 ± 0,2) °C
Relative Humidity: (45,0 ± 0,4) % 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 / BS 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
BS EN 61000-4-2:2009

Test Date

Mar. 21, 2022

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	02, 24, 2023
☒	HCP	-	KES	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: (23,6 ± 0,1) °C
Relative Humidity: (44,7 ± 0,1) % R.H.
Atmospheric Pressure: (100,4 ± 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

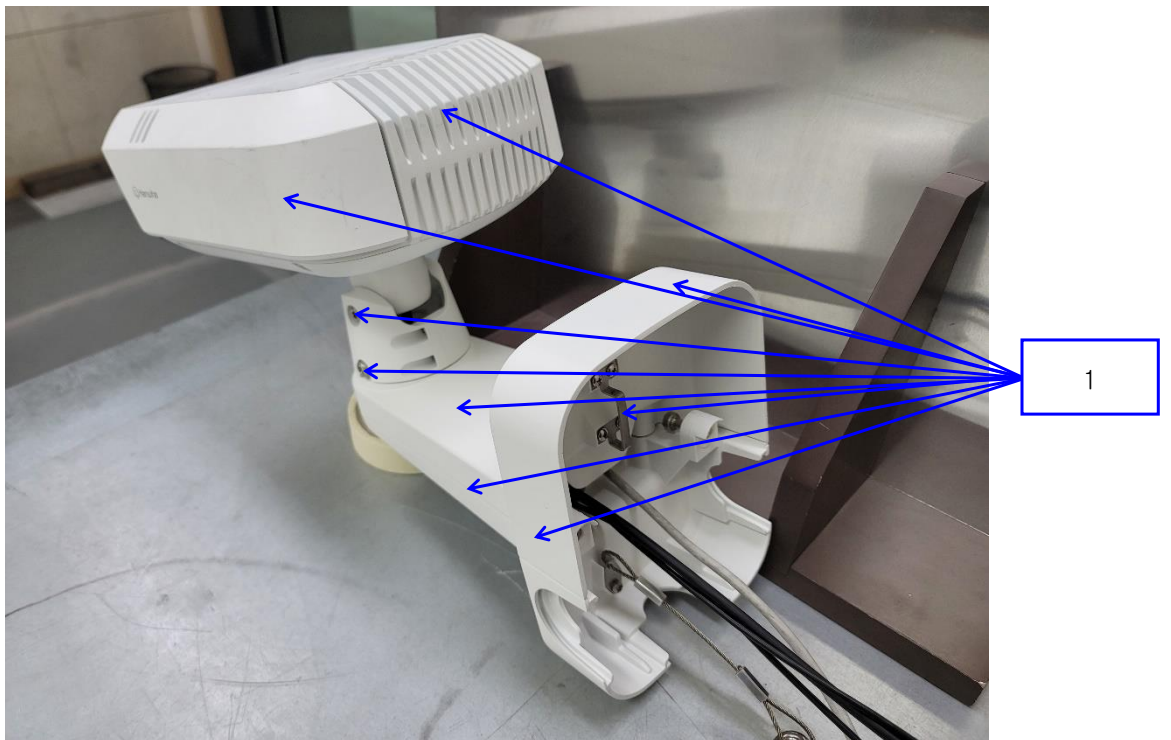
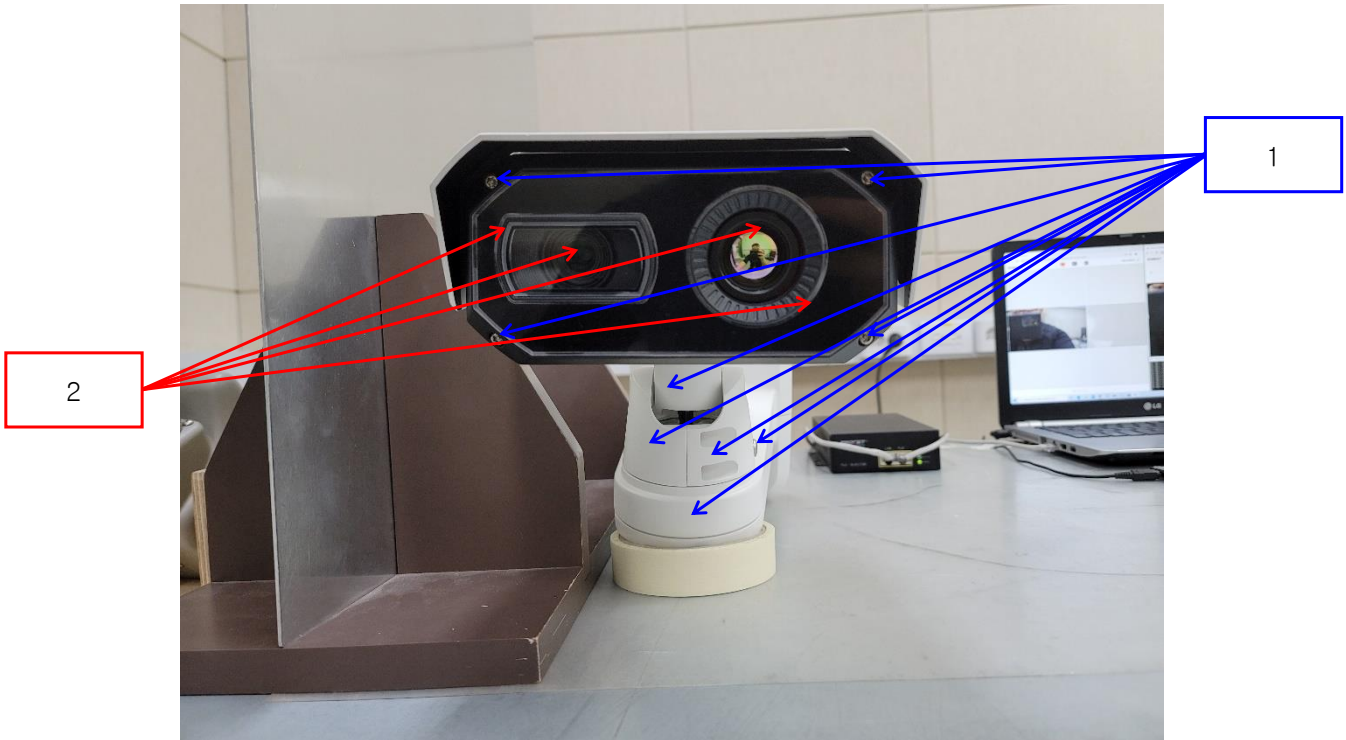
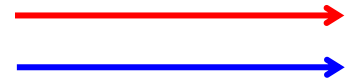
Required Performance Criteria: ☒ Complied

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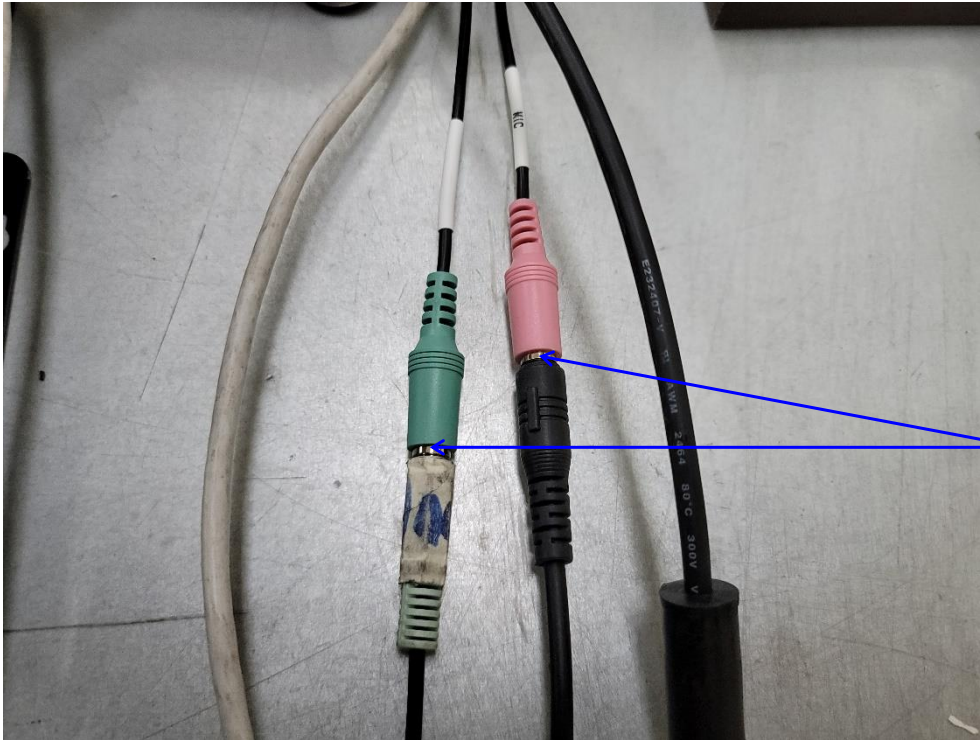
Location of Discharge:

■ DC / PoE Mode

Air
Contact



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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, Screws	Contact Discharge	Complied	-
2	Lens	Air Discharge	Complied	-
3	MIC Port, Speaker 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, Screws	Contact Discharge	Complied	-
2	Lens	Air Discharge	Complied	-
3	MIC Port, Speaker 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

Remarks

PASS Required Performance Criteria

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3.2 Radiated Electric Field Immunity

Reference Standard

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

Test Date

Mar. 19, 2022

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, 03, 2022
☒	HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-
☒	POWER METER	E4419B	Agilent	GB40203000	04, 01, 2022
☒	CW POWER SENSOR	E4412A	Agilent	US38488240	04, 01, 2022
☒	CW POWER SENSOR	E4412A	Agilent	MY41501662	04, 01, 2022
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 03, 2023

Test Conditions

Temperature: (24,8 ± 0,2) °C
Relative Humidity: (45,4 ± 0,4) % R.H.
Atmospheric Pressure: (100,0 ± 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

Remarks

PASS Required Performance Criteria

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3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012
BS EN 61000-4-4:2012

Test Date

Mar. 21, 2022

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	12, 03, 2022
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	04, 01, 2022
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	12, 03, 2022

Test Conditions

Temperature: (23,8 ± 0,1) °C
Relative Humidity: (44,3 ± 0,3) % R.H.
Atmospheric Pressure: (100,4 ± 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	-	-
L – N	Complied	Complied
L – PE	-	-
N – PE	-	-
L – N – PE	-	-

☐ 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
3 Pin (Alarm)	Complied	Complied
3 Pin (Button Alarm)	Complied	Complied

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■ PoE Mode

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

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

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
RJ-45 (PoE)	Complied	Complied
3 Pin (Alarm)	Complied	Complied
3 Pin (Button Alarm)	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria

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3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014
BS EN 61000-4-5:2014

Test Date

Mar. 21, 2022

Test 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	12, 03, 2022
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	04, 01, 2022
☒	CDN	CNV 508N1	EM TEST	P1610176296	12, 03, 2022

Test Conditions

Temperature: (23,5 ± 0,1) °C
Relative Humidity: (44,8 ± 0,2) % R.H.
Atmospheric Pressure: (100,4 ± 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

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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	-	-
N – PE	-	-

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
3 Pin (Alarm)	CDN	Complied	Complied
	LINE	Complied	Complied
3 Pin (Button Alarm)	CDN	Complied	Complied
	LINE	Complied	Complied

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☒ PoE Mode

☐ Line to Line – Differential Mode

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

☐ Line to Earth – Common Mode

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

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
3 Pin (Alarm)	CDN	Complied	Complied
	LINE	Complied	Complied
3 Pin (Button Alarm)	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
☐ NOT APPLICABLE

Remarks

PASS Required Performance Criteria



3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014
BS EN 61000-4-6:2014

Test Date

Mar. 20, 2022

Test 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, 24, 2022
☒	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 24, 2022
☒	CDN	CDN M016	TESEQ	43694	11, 24, 2022
☒	CDN	CDN M016	TESEQ	43697	11, 24, 2022
☐	CDN	CDN T8RJ45	EM TEST	0909-09	08, 03, 2022
☒	CDN	CDN ST08A	TESEQ	43886	11, 24, 2022
☒	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 25, 2022

Test Conditions

Temperature: (24,2 ± 0,2) °C
Relative Humidity: (44,1 ± 0,3) % R.H.
Atmospheric Pressure: (100,4 ± 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	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
3 Pin (Alarm)	Clamp	Complied
3 Pin (Button Alarm)	Clamp	Complied

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■ PoE Mode☐ Input a.c. power ports

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

☐ 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
3 Pin (Alarm)	Clamp	Complied
3 Pin (Button Alarm)	Clamp	Complied

Notes: CDN = Coupling Decoupling Network
"blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria

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3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004
BS EN 61000-4-11:2004

Test Date

Mar. 21, 2022

Test 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	04, 01, 2022
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	04, 01, 2022

Test Conditions

Temperature: (23,5 ± 0,1) °C
Relative Humidity: (44,7 ± 0,1) % R.H.
Atmospheric Pressure: (100,4 ± 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.



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APPENDIX A – TEST DATA

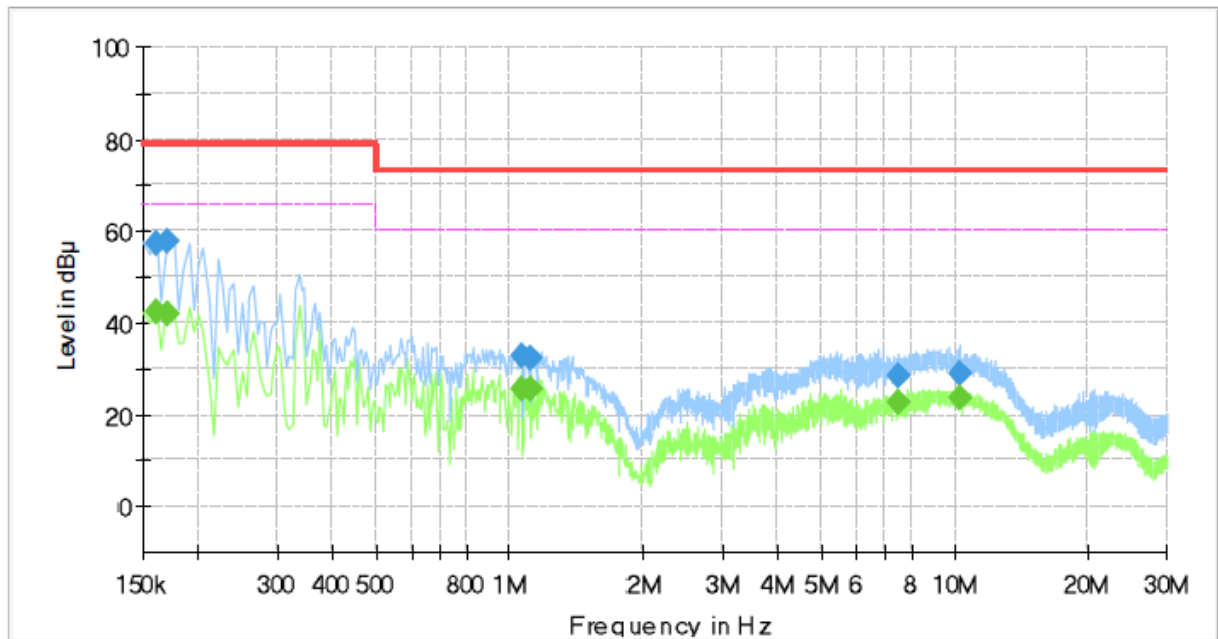
Conducted Emissions at Mains Power Ports

■ DC Mode

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	TNM-C4960TD
Phase:	H
Mode:	DC
Operator Name:	KES



Final Result

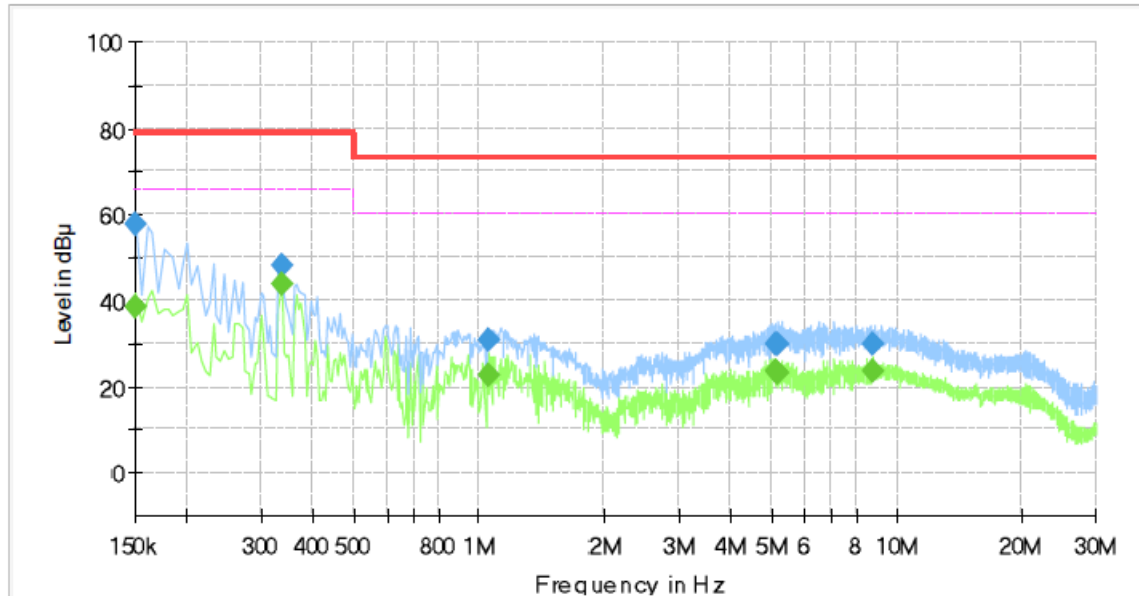
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.160000	---	42.19	66.00	23.81	1000.0	9.000	L1	19.4
0.160000	57.31	---	79.00	21.69	1000.0	9.000	L1	19.4
0.170000	---	42.08	66.00	23.92	1000.0	9.000	L1	19.4
0.170000	57.60	---	79.00	21.40	1000.0	9.000	L1	19.4
1.060000	---	25.64	60.00	34.36	1000.0	9.000	L1	20.1
1.060000	32.59	---	73.00	40.41	1000.0	9.000	L1	20.1
1.120000	---	25.33	60.00	34.67	1000.0	9.000	L1	20.1
1.120000	32.16	---	73.00	40.84	1000.0	9.000	L1	20.1
7.490000	---	22.69	60.00	37.31	1000.0	9.000	L1	19.5
7.490000	28.65	---	73.00	44.35	1000.0	9.000	L1	19.5
10.290000	---	23.53	60.00	36.47	1000.0	9.000	L1	19.9
10.290000	29.13	---	73.00	43.87	1000.0	9.000	L1	19.9

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[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	TNM-C4960TD
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	---	38.62	66.00	27.38	1000.0	9.000	N	19.4
0.150000	57.70	---	79.00	21.30	1000.0	9.000	N	19.4
0.335000	---	43.91	66.00	22.09	1000.0	9.000	N	19.5
0.335000	48.05	---	79.00	30.95	1000.0	9.000	N	19.5
1.050000	---	22.59	60.00	37.41	1000.0	9.000	N	20.1
1.050000	30.79	---	73.00	42.21	1000.0	9.000	N	20.1
5.105000	---	23.42	60.00	36.58	1000.0	9.000	N	19.6
5.105000	30.08	---	73.00	42.92	1000.0	9.000	N	19.6
5.175000	---	23.35	60.00	36.65	1000.0	9.000	N	19.6
5.175000	29.97	---	73.00	43.03	1000.0	9.000	N	19.6
8.750000	---	23.76	60.00	36.24	1000.0	9.000	N	19.7
8.750000	29.64	---	73.00	43.36	1000.0	9.000	N	19.7

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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



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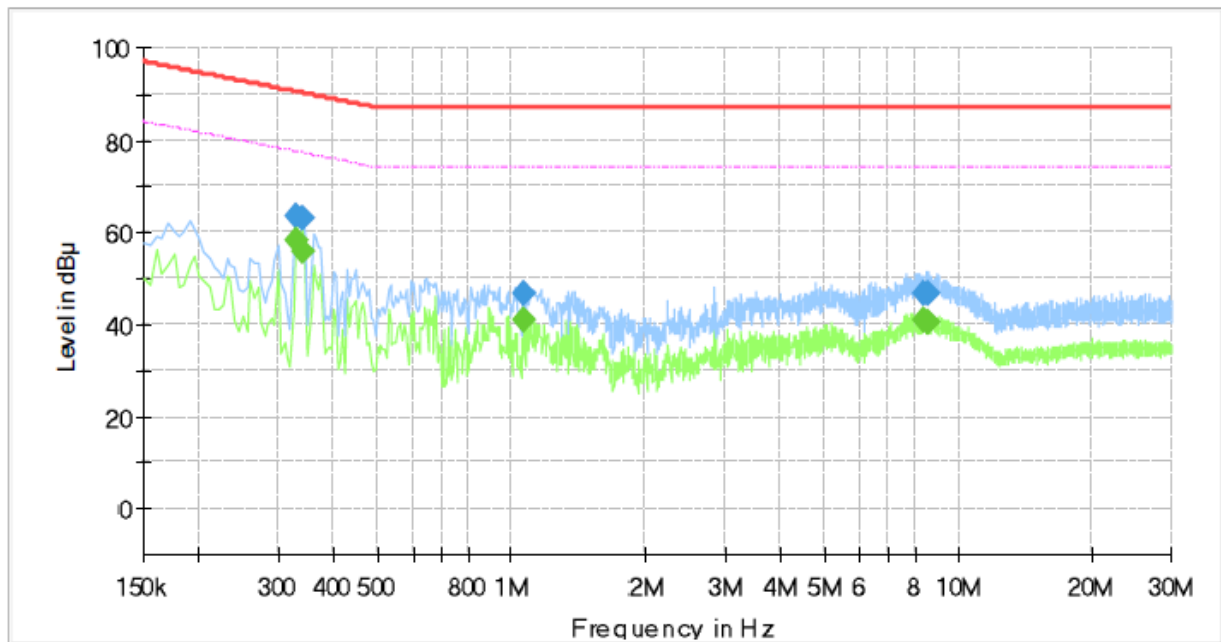
Conducted Emissions at Telecommunication Ports

■ DC Mode

[1 000 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNM-C4960TD
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)
0.330000	---	58.24	77.45	19.21	1000.0	9.000	Single Line	19.6
0.330000	63.49	---	90.45	26.96	1000.0	9.000	Single Line	19.6
0.340000	---	55.98	77.20	21.22	1000.0	9.000	Single Line	19.6
0.340000	63.18	---	90.20	27.02	1000.0	9.000	Single Line	19.6
1.065000	---	40.85	74.00	33.15	1000.0	9.000	Single Line	20.0
1.065000	46.88	---	87.00	40.12	1000.0	9.000	Single Line	20.0
8.410000	---	40.72	74.00	33.28	1000.0	9.000	Single Line	19.4
8.410000	46.83	---	87.00	40.17	1000.0	9.000	Single Line	19.4
8.590000	---	40.48	74.00	33.52	1000.0	9.000	Single Line	19.4
8.590000	46.54	---	87.00	40.46	1000.0	9.000	Single Line	19.4

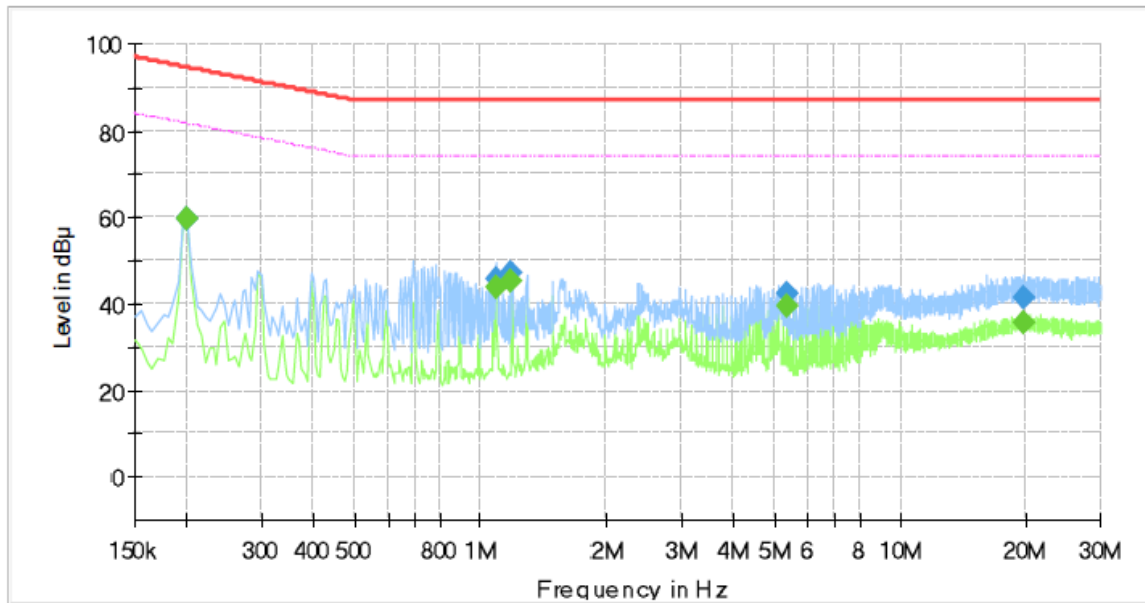
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■ PoE Mode

[1 000 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNM-C4960TD
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)
0.200000	---	59.59	81.61	22.02	1000.0	9.000	Single Line	19.7
0.200000	59.75	---	94.61	34.86	1000.0	9.000	Single Line	19.7
1.085000	---	43.89	74.00	30.11	1000.0	9.000	Single Line	20.0
1.085000	45.57	---	87.00	41.43	1000.0	9.000	Single Line	20.0
1.185000	---	45.11	74.00	28.89	1000.0	9.000	Single Line	20.0
1.185000	46.97	---	87.00	40.03	1000.0	9.000	Single Line	20.0
5.375000	---	39.37	74.00	34.63	1000.0	9.000	Single Line	19.3
5.375000	42.45	---	87.00	44.55	1000.0	9.000	Single Line	19.3
19.700000	---	35.81	74.00	38.19	1000.0	9.000	Single Line	19.8
19.700000	41.49	---	87.00	45.51	1000.0	9.000	Single Line	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 (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))



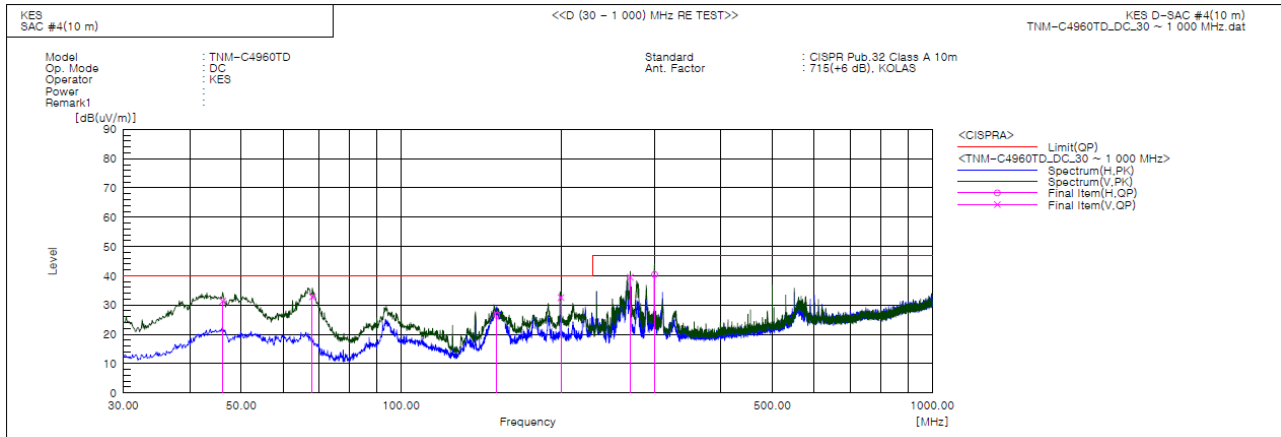
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Radiated Electric Field Emissions(Below 1 GHz)

■ 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	46.126	V	52.6	-21.3	31.3	40.0	8.7	100.0	197.0	
2	68.073	V	57.0	-24.2	32.8	40.0	7.2	131.0	84.0	
3	151.250	H	51.7	-25.2	26.5	40.0	13.5	354.0	302.0	
4	199.993	V	53.6	-21.0	32.6	40.0	7.4	146.0	84.0	
5	270.075	V	58.3	-18.8	39.5	47.0	7.5	100.0	224.0	
6	300.024	H	58.4	-18.0	40.4	47.0	6.6	366.0	204.0	

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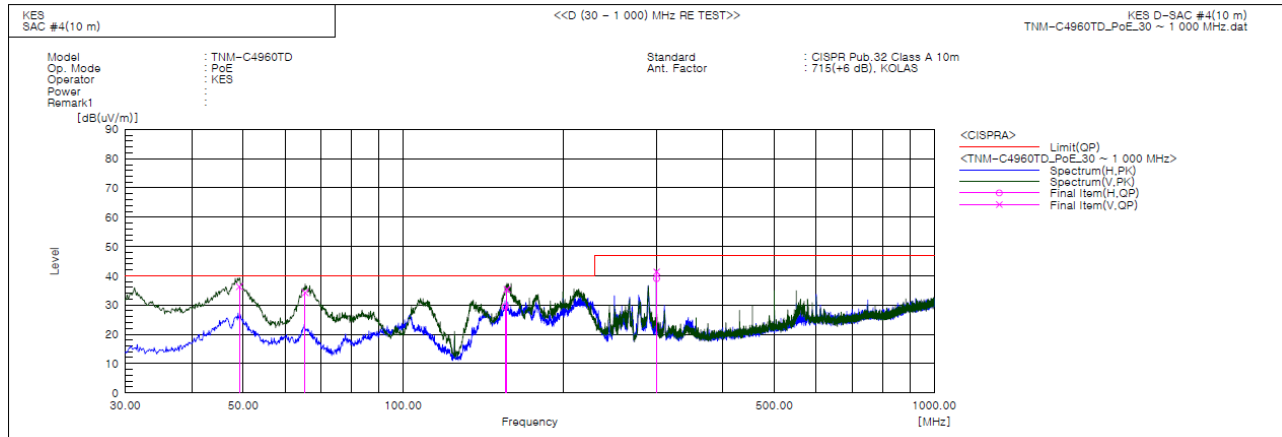


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■ PoE Mode



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	49.158	V	57.4	-21.1	36.3	40.0	3.7	117.0	287.0	
2	65.405	V	57.6	-23.4	34.2	40.0	5.8	100.0	87.0	
3	155.615	H	54.4	-24.9	29.5	40.0	10.5	344.0	298.0	
4	156.828	V	60.3	-24.9	35.4	40.0	4.6	100.0	69.0	
5	300.024	H	57.0	-18.0	39.0	47.0	8.0	367.0	102.0	
6	300.108	V	59.4	-18.0	41.4	47.0	5.6	142.0	197.0	

◆ 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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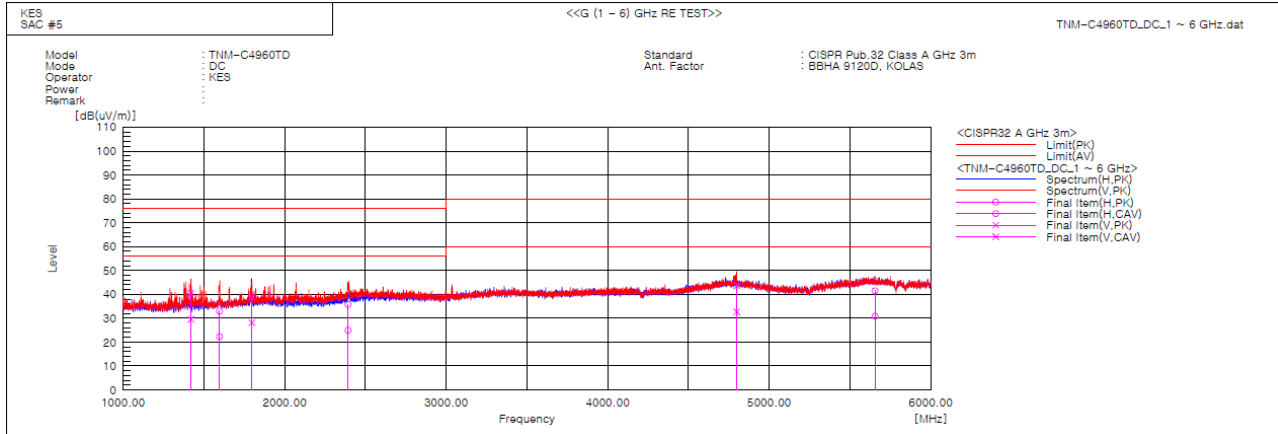
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Radiated Electric Field Emissions(Above 1 GHz)

■ 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	1420.046	V	45.7	34.8	-5.2	40.5	29.6	76.0	56.0	35.5	26.4	100.0	75.6	
2	1596.881	H	37.6	26.9	-4.6	33.0	22.3	76.0	56.0	43.0	33.7	100.0	188.0	
3	1796.244	V	42.7	31.9	-3.7	39.0	28.2	76.0	56.0	37.0	27.8	100.0	154.4	
4	2392.505	H	37.4	26.6	-1.6	35.8	25.0	76.0	56.0	40.2	31.0	100.0	202.8	
5	4798.421	V	37.0	26.1	6.6	43.6	32.7	80.0	60.0	36.4	27.3	100.0	4.5	
6	5655.625	H	33.4	22.8	8.1	41.5	30.9	80.0	60.0	38.5	29.1	100.0	72.2	

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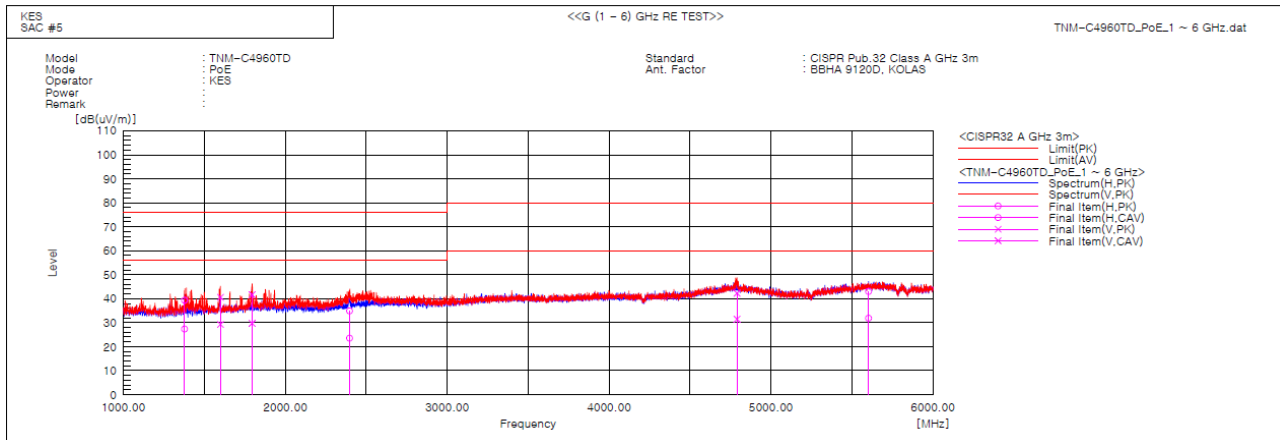


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PoE Mode



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1377.524	H	44.8	32.8	-5.4	39.4	27.4	76.0	56.0	36.6	28.6	100.0	130.0	
2	1598.740	V	45.2	33.9	-4.6	40.6	29.3	76.0	56.0	35.4	26.7	100.0	207.0	
3	1794.371	V	45.4	33.5	-3.7	41.7	29.8	76.0	56.0	34.3	26.2	100.0	187.8	
4	2396.847	H	36.4	25.1	-1.5	34.9	23.6	76.0	56.0	41.1	32.4	100.0	218.7	
5	4790.012	V	35.7	24.9	6.6	42.3	31.5	80.0	60.0	37.7	28.5	100.0	230.4	
6	5602.554	H	34.9	23.8	8.1	43.0	31.9	80.0	60.0	37.0	28.1	100.0	296.5	

◆ 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	0.075			
2	0.002	0.165	1.080	n/a
3	0.068	2.938	2.300	PASS
4	0.002	0.480	0.430	n/a
5	0.067	5.848	1.140	PASS
6	0.002	0.625	0.300	n/a
7	0.064	8.259	0.770	PASS
8	0.002	0.794	0.230	n/a
9	0.058	14.402	0.400	PASS
10	0.002	0.885	0.184	n/a
11	0.052	15.811	0.330	PASS
12	0.002	1.048	0.153	n/a
13	0.046	22.098	0.210	PASS
14	0.002	1.294	0.131	n/a
15	0.040	26.755	0.150	PASS
16	0.002	1.349	0.115	n/a
17	0.034	25.693	0.132	PASS
18	0.002	1.493	0.102	n/a
19	0.028	23.805	0.118	PASS
20	0.001	1.615	0.092	n/a
21	0.023	14.304	0.161	PASS
22	0.002	1.812	0.084	n/a
23	0.018	12.291	0.147	PASS
24	0.001	1.912	0.077	n/a
25	0.014	10.663	0.135	PASS
26	0.001	1.962	0.071	n/a
27	0.012	9.539	0.125	PASS
28	0.001	2.000	0.066	n/a
29	0.011	9.154	0.116	PASS
30	0.001	2.139	0.061	n/a
31	0.010	9.317	0.109	PASS
32	0.001	2.193	0.058	n/a
33	0.010	9.701	0.102	PASS
34	0.001	2.221	0.054	n/a
35	0.010	10.406	0.096	PASS
36	0.001	2.320	0.051	n/a
37	0.009	10.399	0.091	PASS
38	0.001	2.339	0.048	n/a
39	0.009	10.355	0.087	PASS
40	0.001	2.481	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	0.075			
2	0.002	0.136	1.620	n/a
3	0.068	1.983	3.450	PASS
4	0.002	0.361	0.645	n/a
5	0.067	3.924	1.710	PASS
6	0.002	0.468	0.450	n/a
7	0.064	5.531	1.155	PASS
8	0.002	0.612	0.345	n/a
9	0.058	9.647	0.600	PASS
10	0.002	0.683	0.276	n/a
11	0.052	10.598	0.495	PASS
12	0.002	0.791	0.230	n/a
13	0.047	14.792	0.315	PASS
14	0.002	0.991	0.197	n/a
15	0.040	17.926	0.225	PASS
16	0.002	1.033	0.173	n/a
17	0.034	17.232	0.199	PASS
18	0.002	1.124	0.153	n/a
19	0.029	16.064	0.178	PASS
20	0.002	1.248	0.138	n/a
21	0.023	14.533	0.161	PASS
22	0.002	1.361	0.125	n/a
23	0.018	12.565	0.147	PASS
24	0.002	1.452	0.115	n/a
25	0.015	10.993	0.135	PASS
26	0.002	1.492	0.106	n/a
27	0.012	9.916	0.125	PASS
28	0.001	1.480	0.099	n/a
29	0.011	9.458	0.116	PASS
30	0.001	1.578	0.092	n/a
31	0.010	9.592	0.109	PASS
32	0.001	1.606	0.086	n/a
33	0.010	9.912	0.102	PASS
34	0.001	1.665	0.081	n/a
35	0.010	10.668	0.096	PASS
36	0.001	1.761	0.077	n/a
37	0.010	10.578	0.091	PASS
38	0.001	1.725	0.073	n/a
39	0.009	10.593	0.087	PASS
40	0.001	1.875	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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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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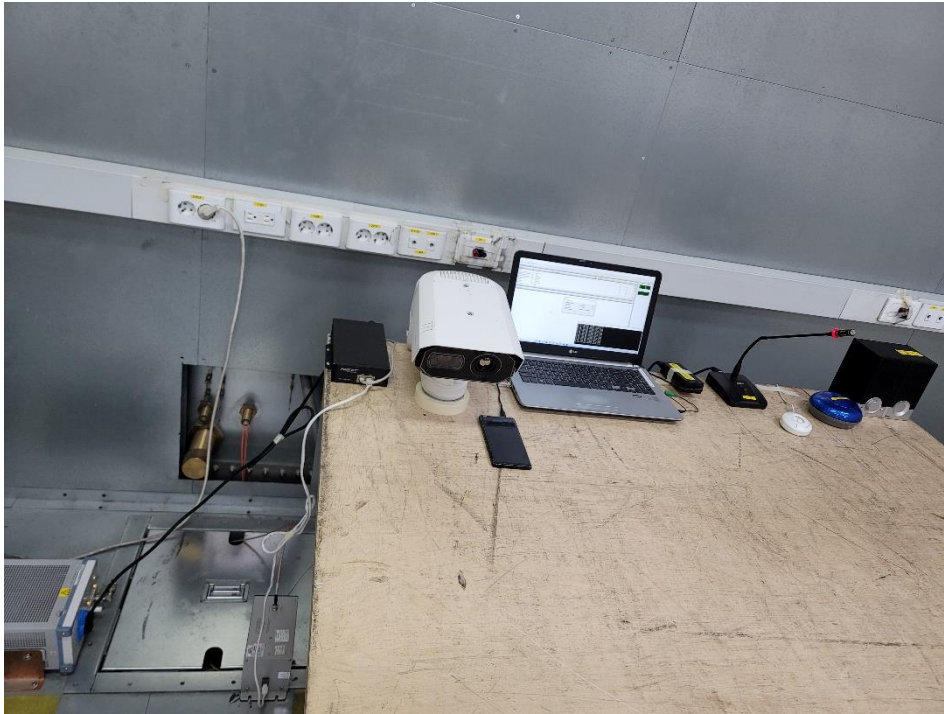
Conducted Emissions at Telecommunication Ports

■ DC Mode



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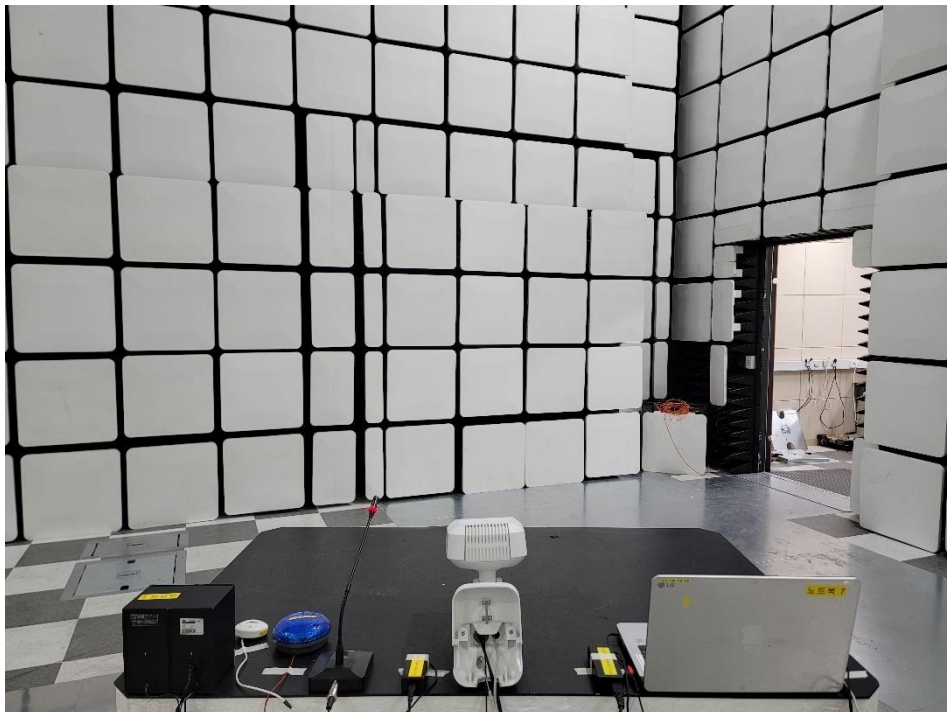
■ PoE Mode



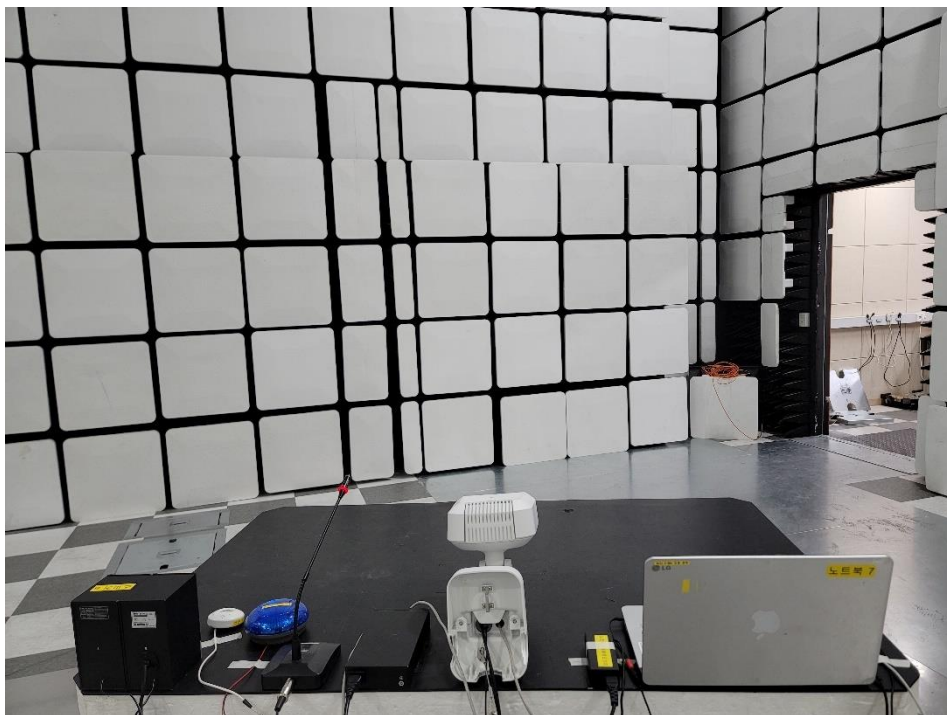
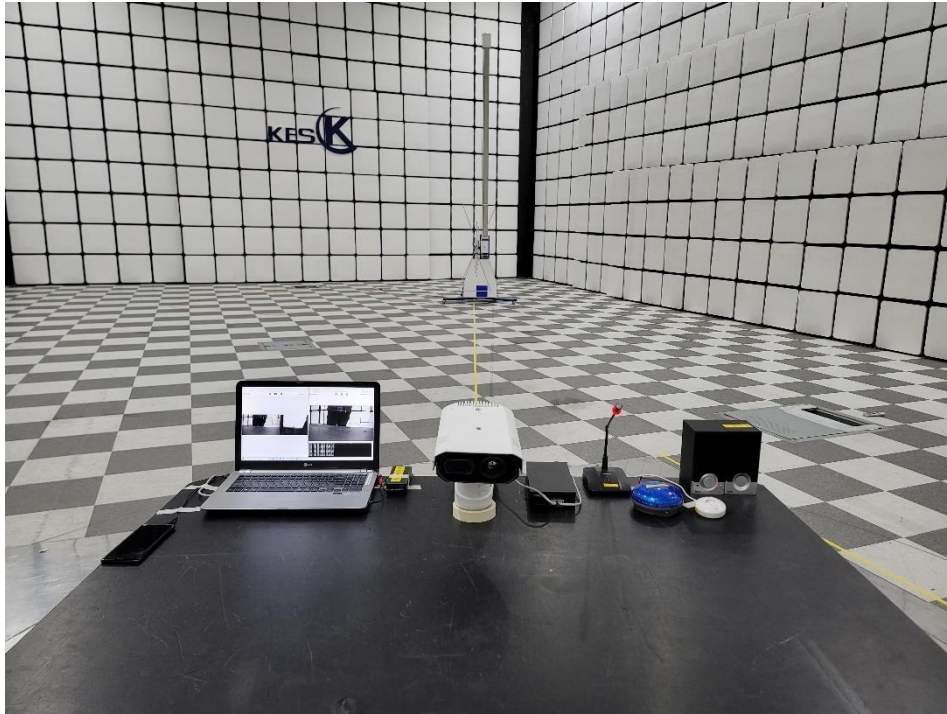
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Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode



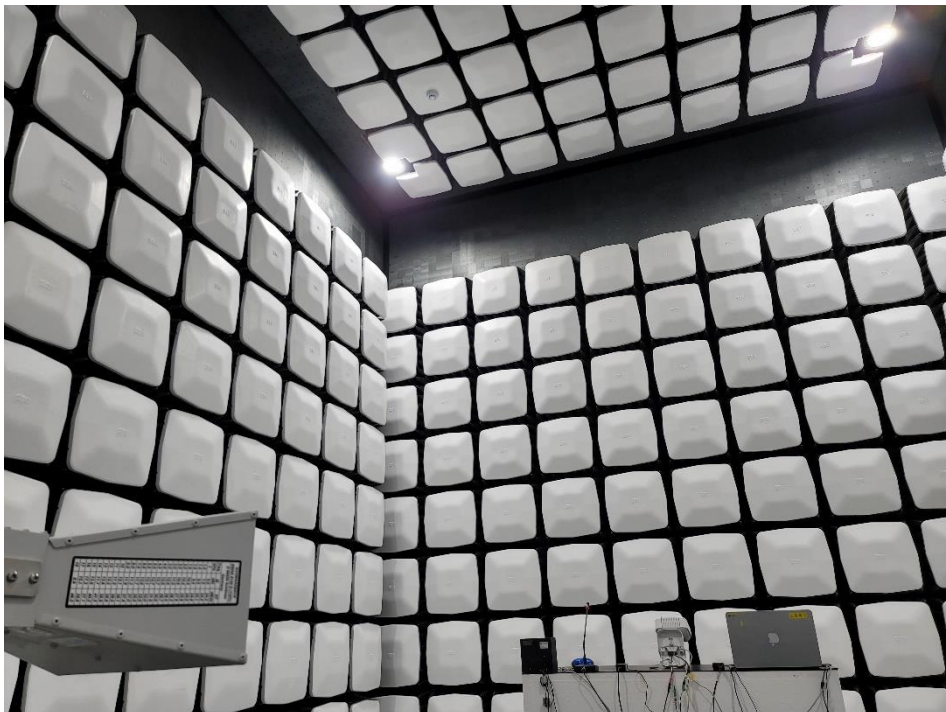
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■ PoE Mode

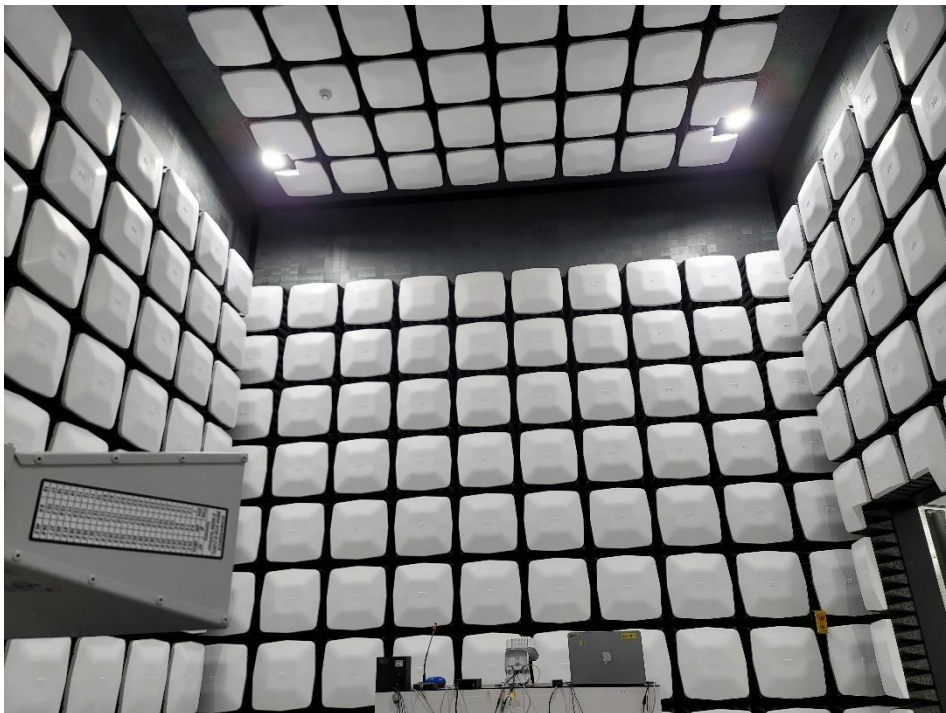
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Radiated Electric Field Emissions(Above 1 GHz)

■ DC Mode



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■ PoE Mode

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Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ DC Mode



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Electrostatic Discharge

■ DC Mode



■ PoE Mode



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Radiated Electric Field Immunity

■ DC Mode



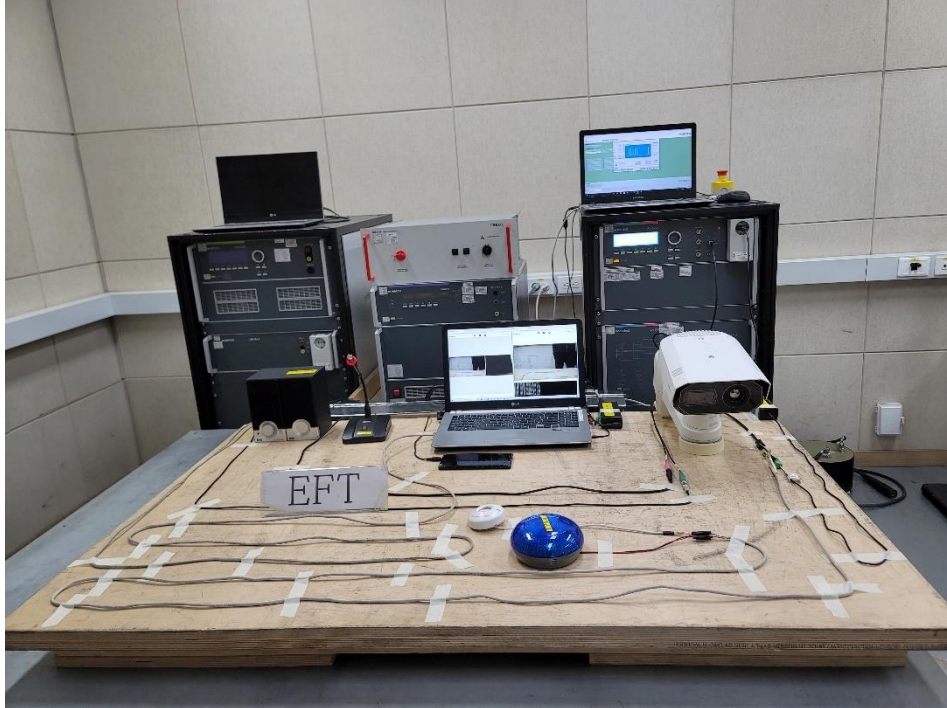
■ PoE Mode



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Electrical Fast Transients/Bursts

■ DC Mode



■ PoE Mode



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Surge Transients

■ DC Mode



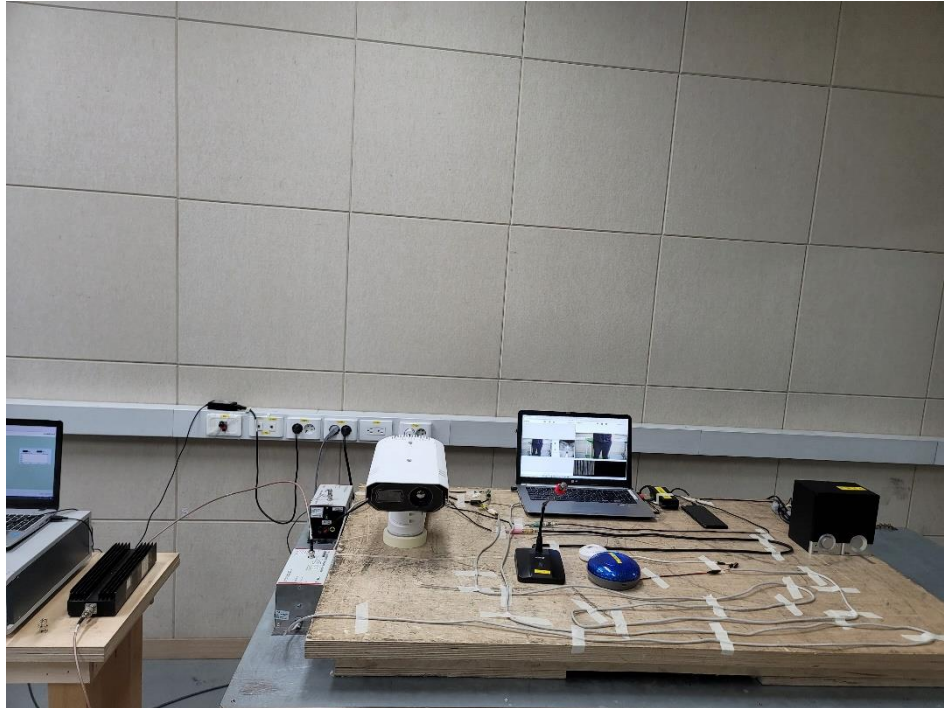
■ PoE Mode



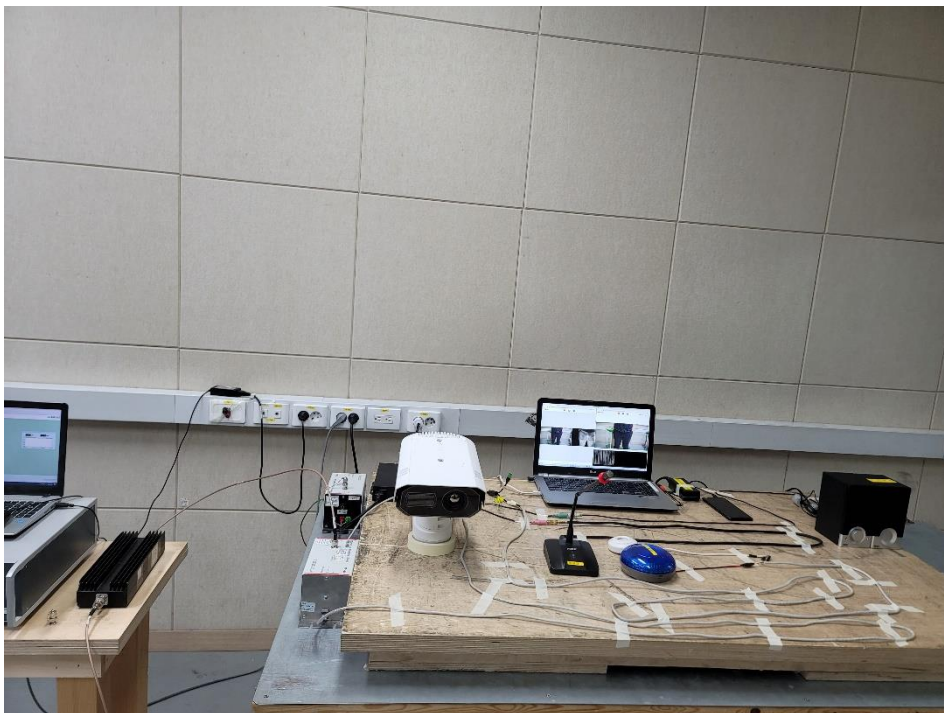
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Conducted Disturbance

■ DC Mode



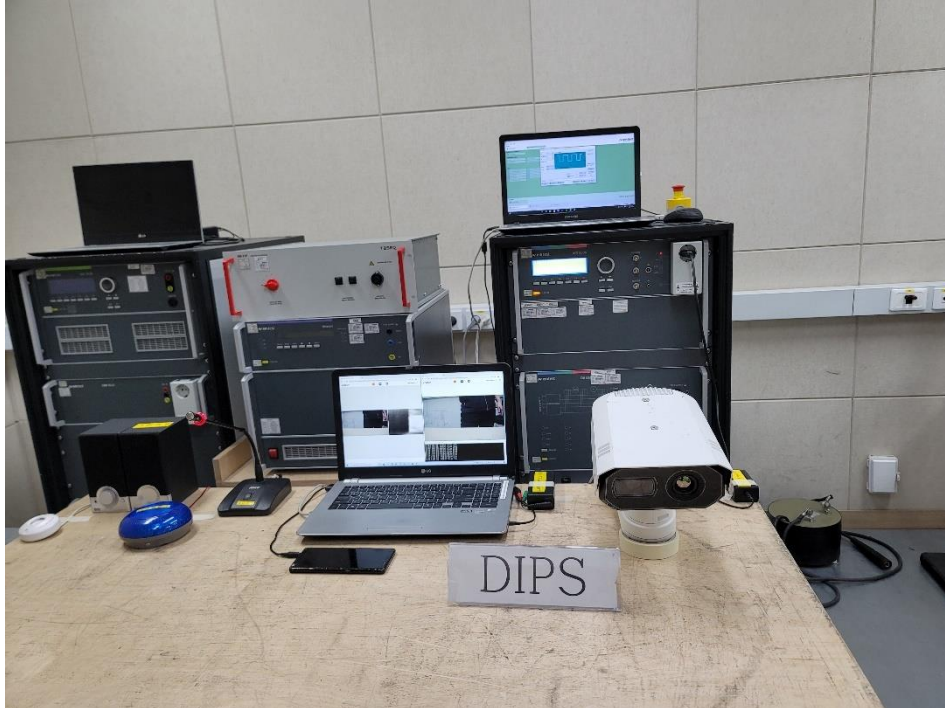
■ PoE Mode



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Voltage Dips and Short Interruptions

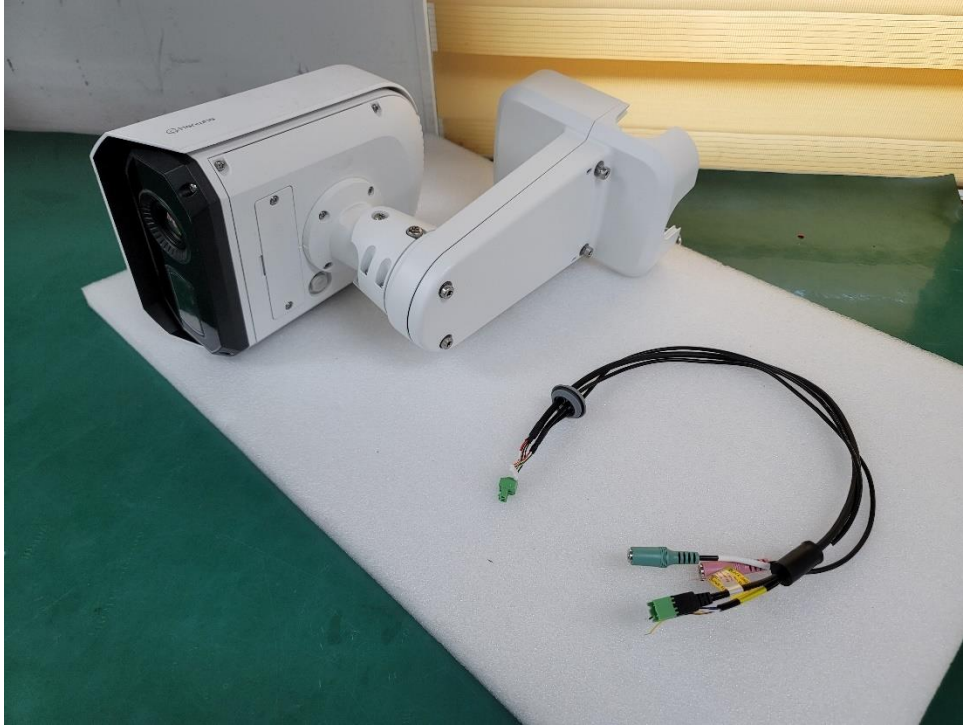
■ DC Mode



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EUT External Photographs

(Top)



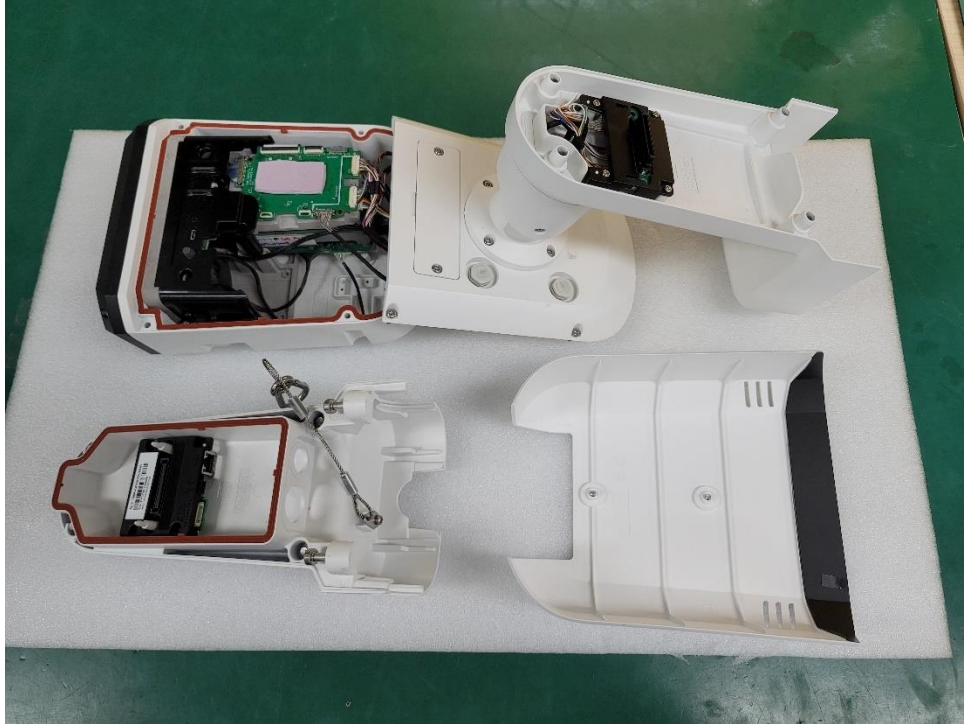
(Bottom)



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EUT Internal Photographs

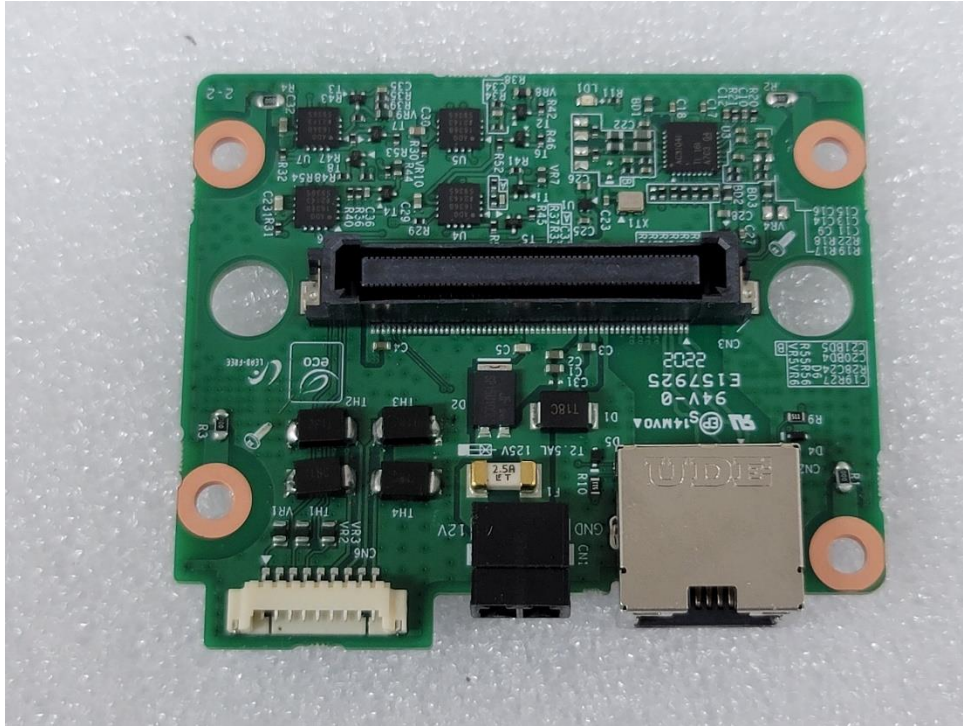
(Internal View)



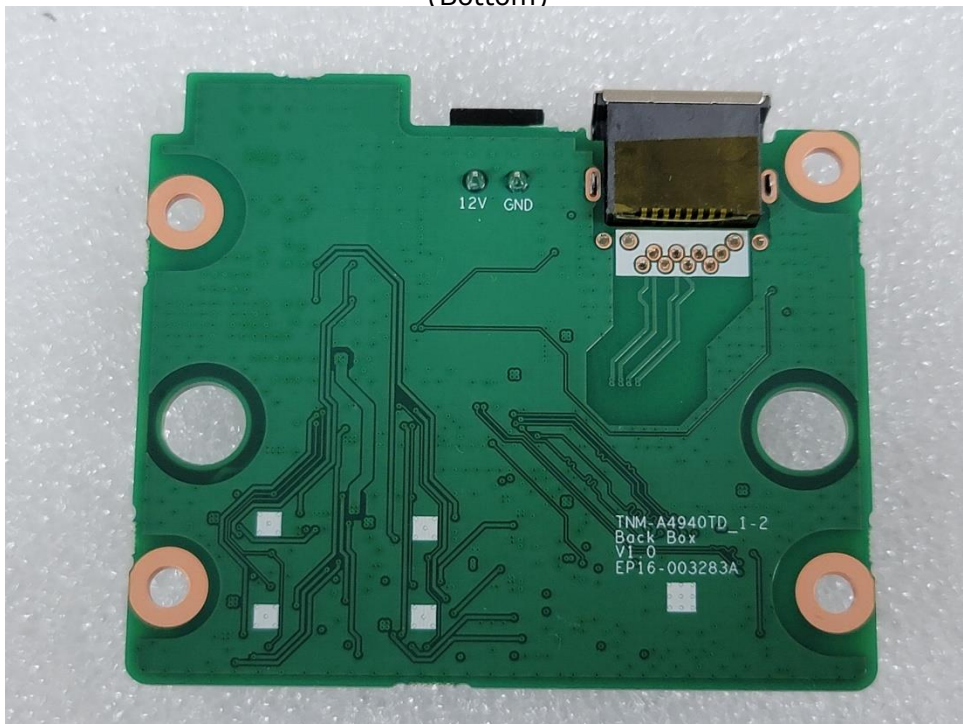
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EUT Internal View – Back Box Board

(Top)



(Bottom)



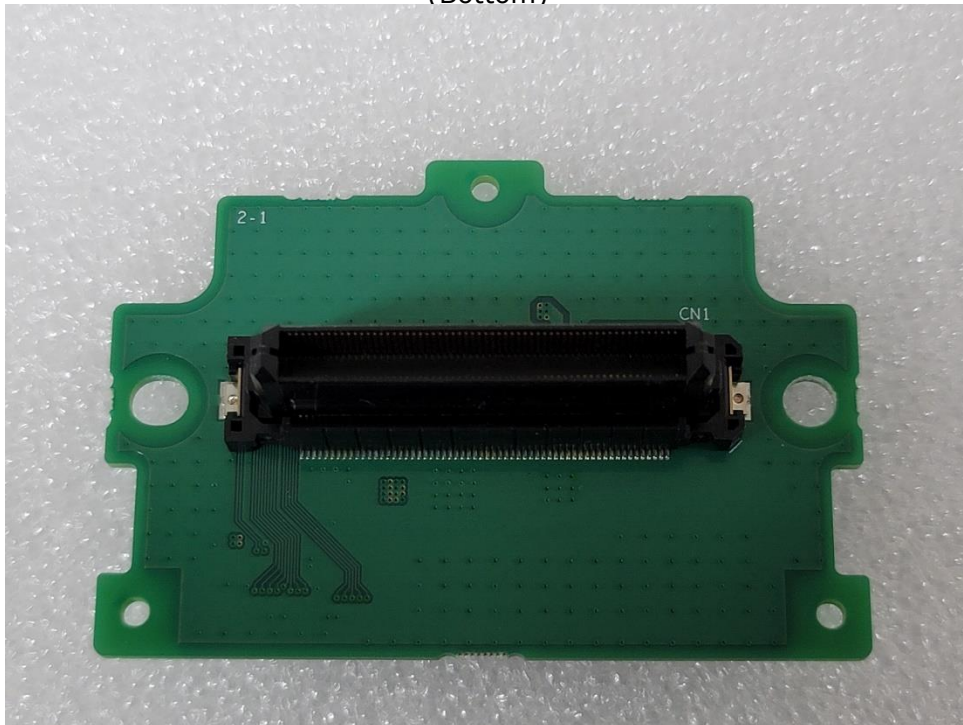
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EUT Internal View – Connector Board

(Top)



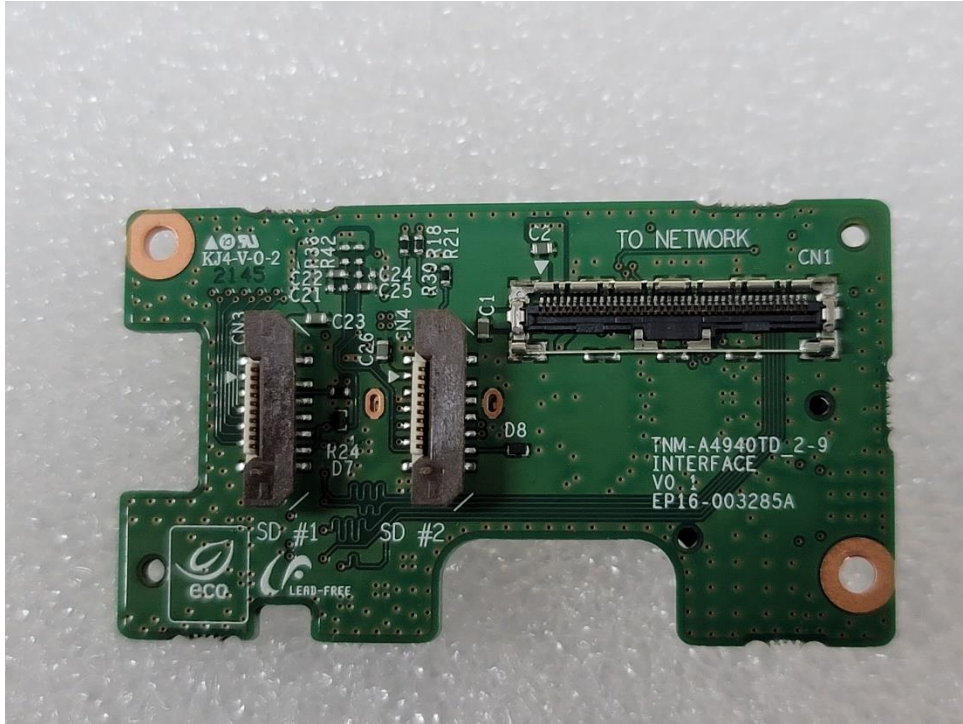
(Bottom)



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EUT Internal View – Interface Board

(Top)



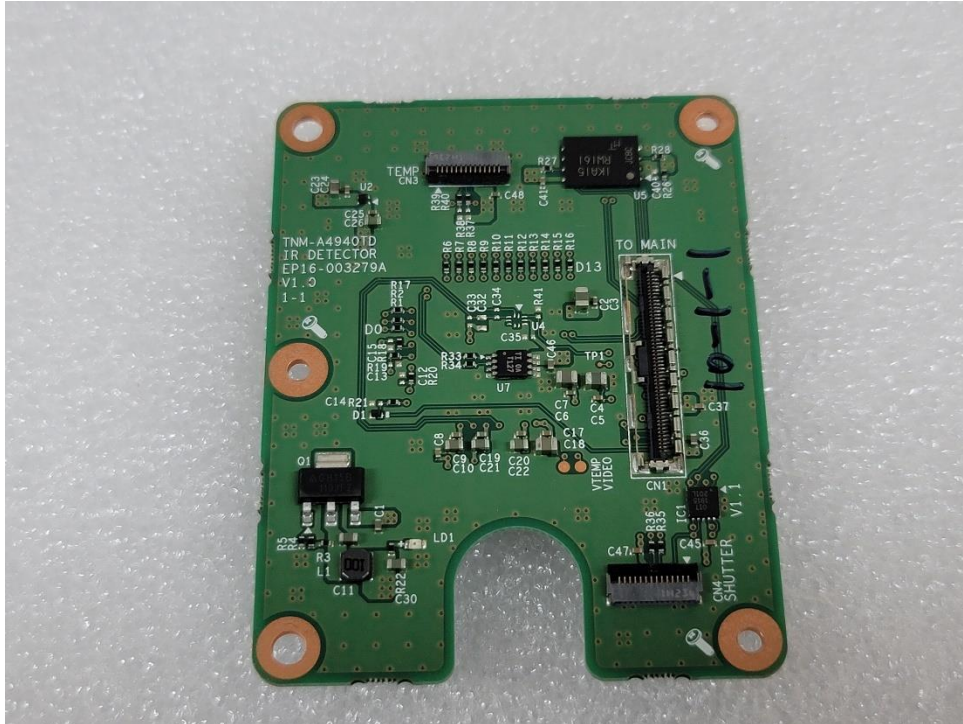
(Bottom)



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EUT Internal View – IR Detector Board

(Top)



(Bottom)



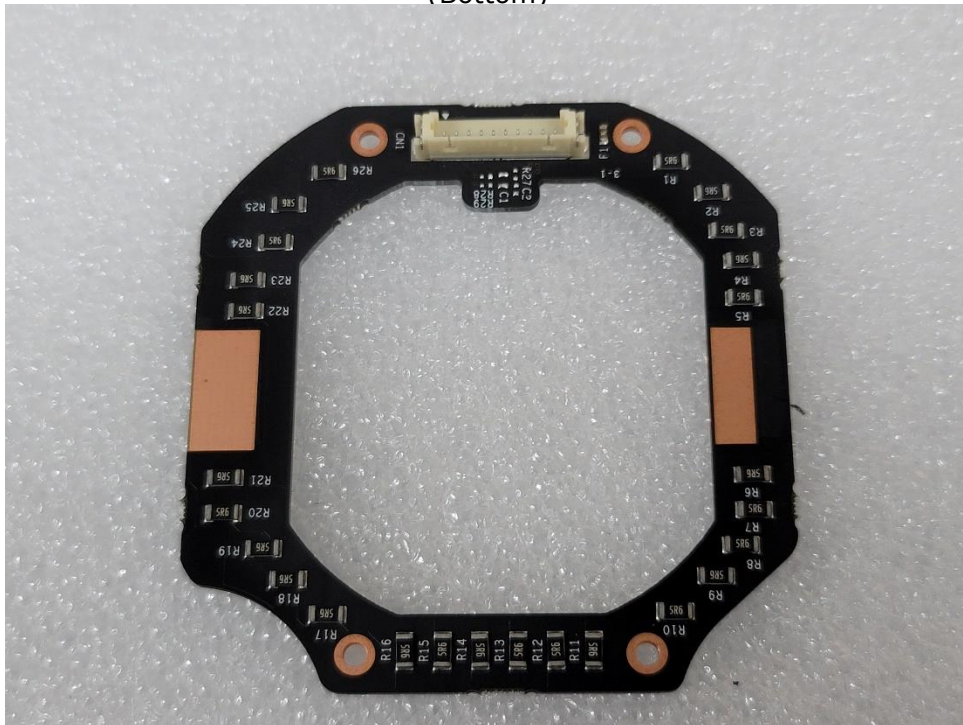
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EUT Internal View – IR Board

(Top)



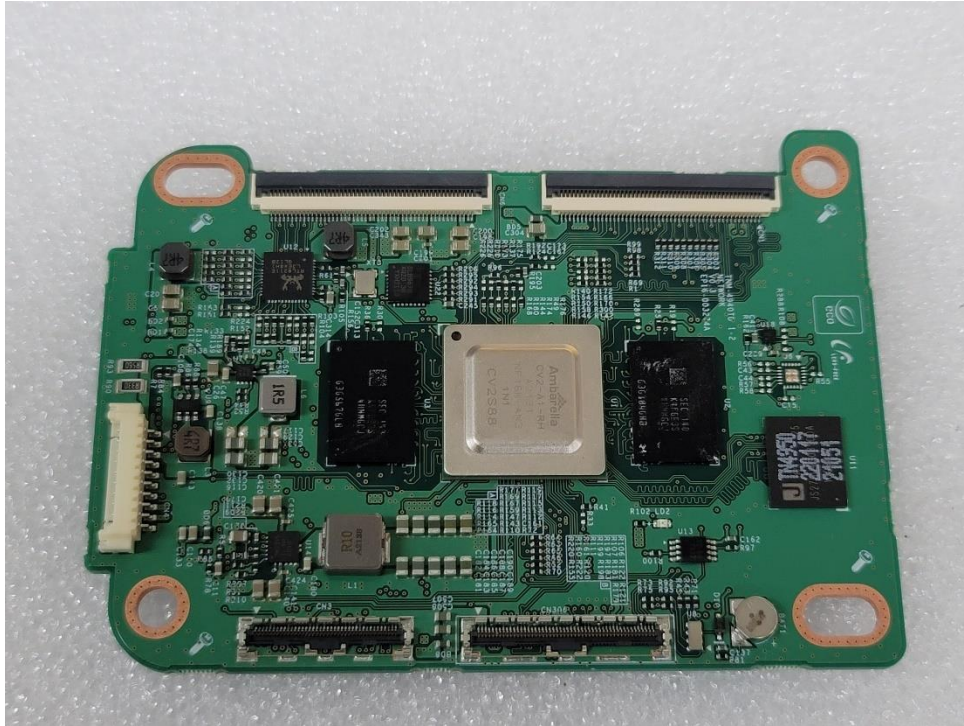
(Bottom)



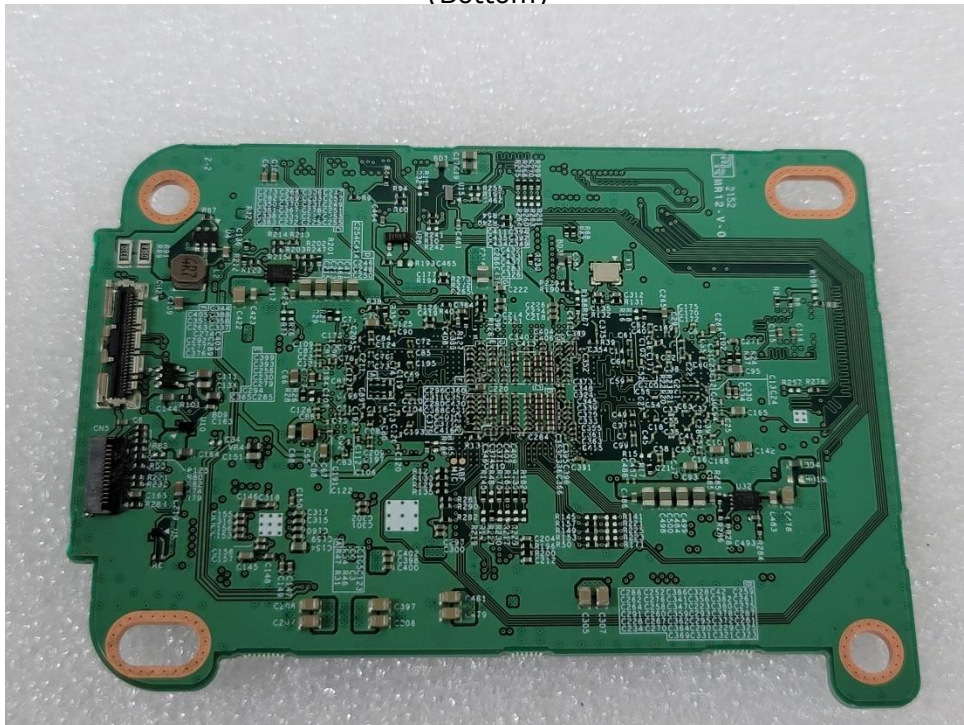
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EUT Internal View – Network Board

(Top)



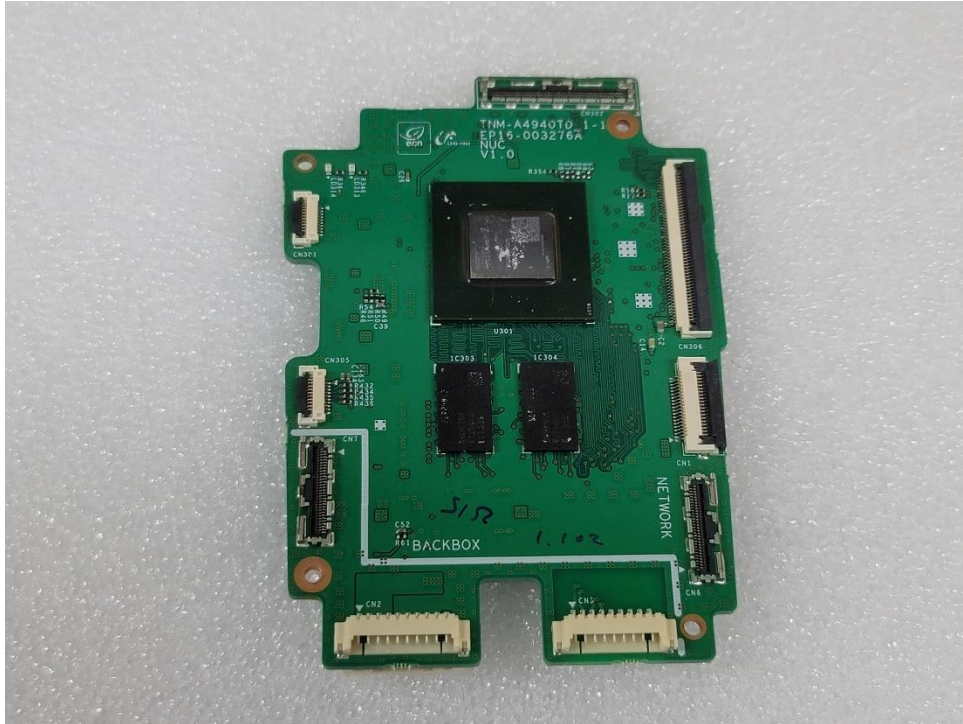
(Bottom)



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EUT Internal View – NUC Board

(Top)



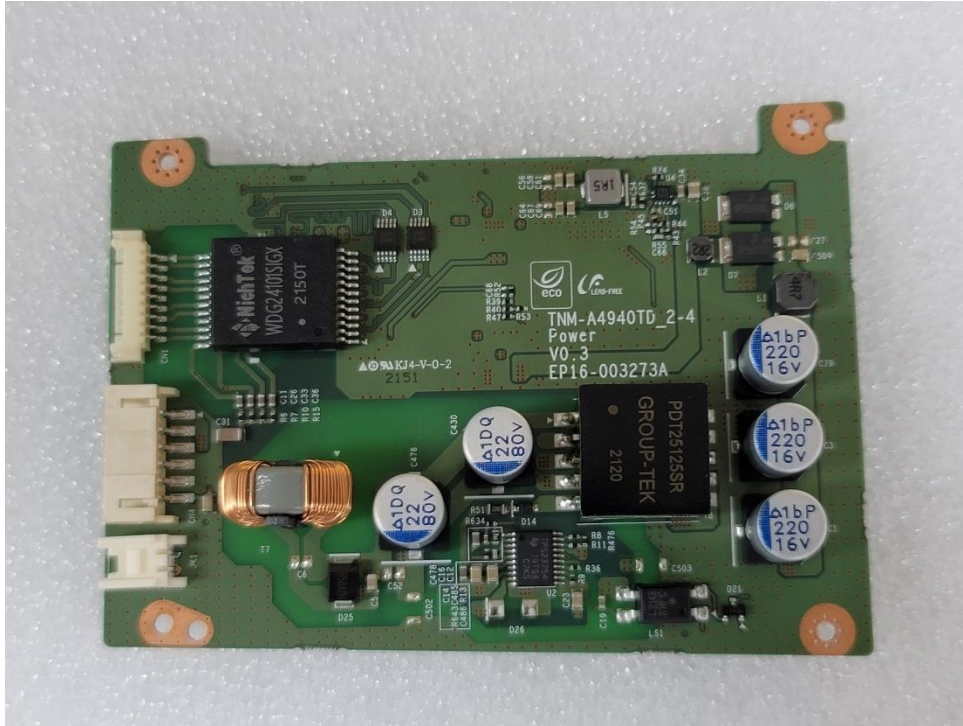
(Bottom)



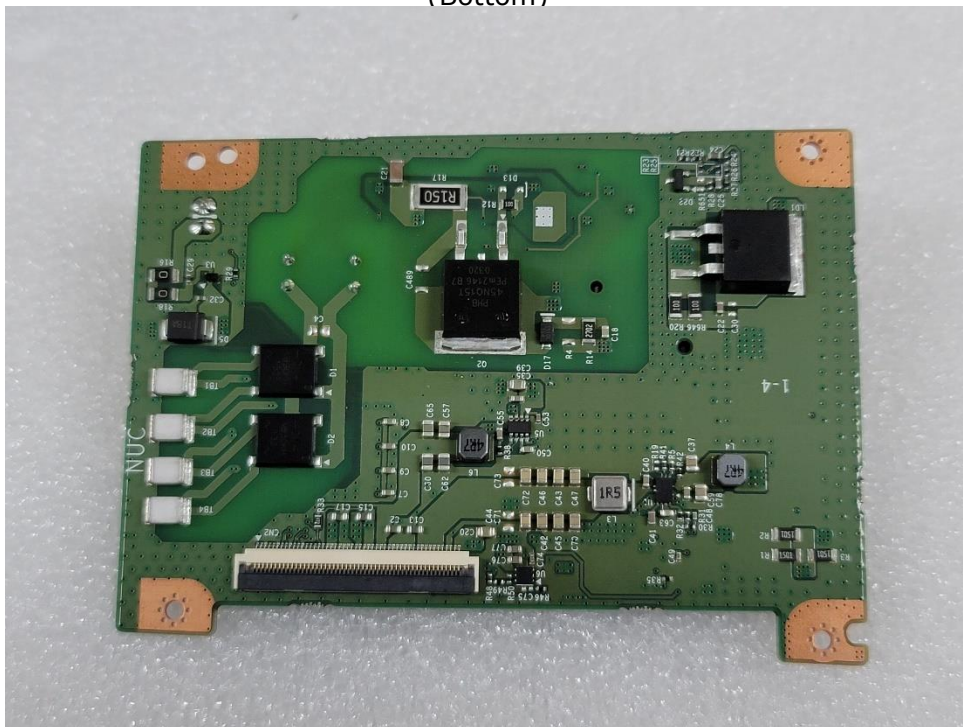
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EUT Internal View – Power Board

(Top)



(Bottom)



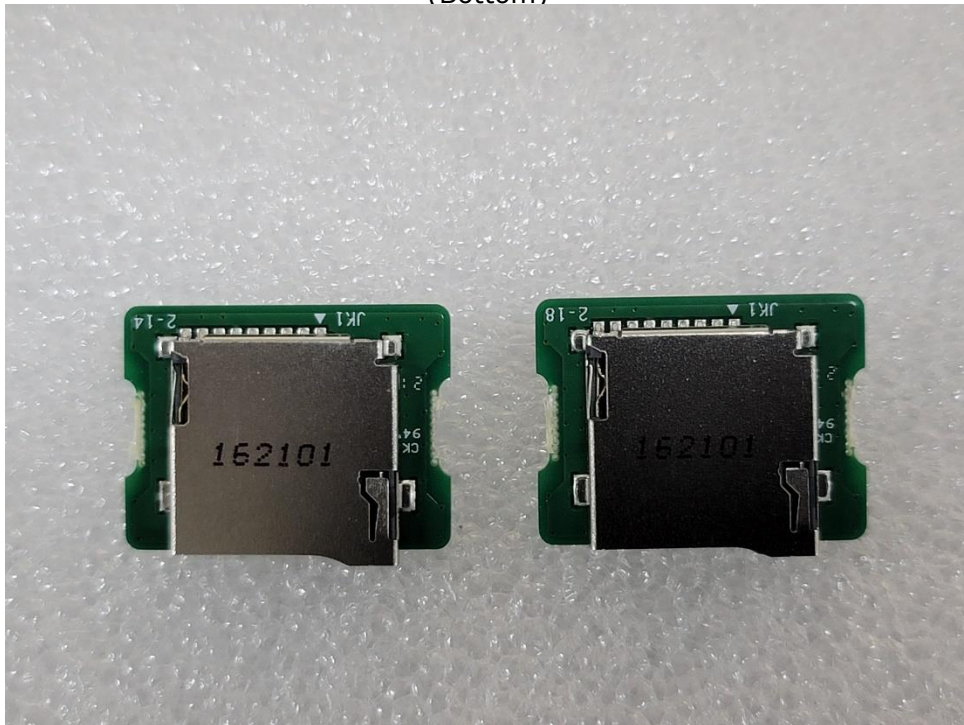
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EUT Internal View – SD Board

(Top)



(Bottom)



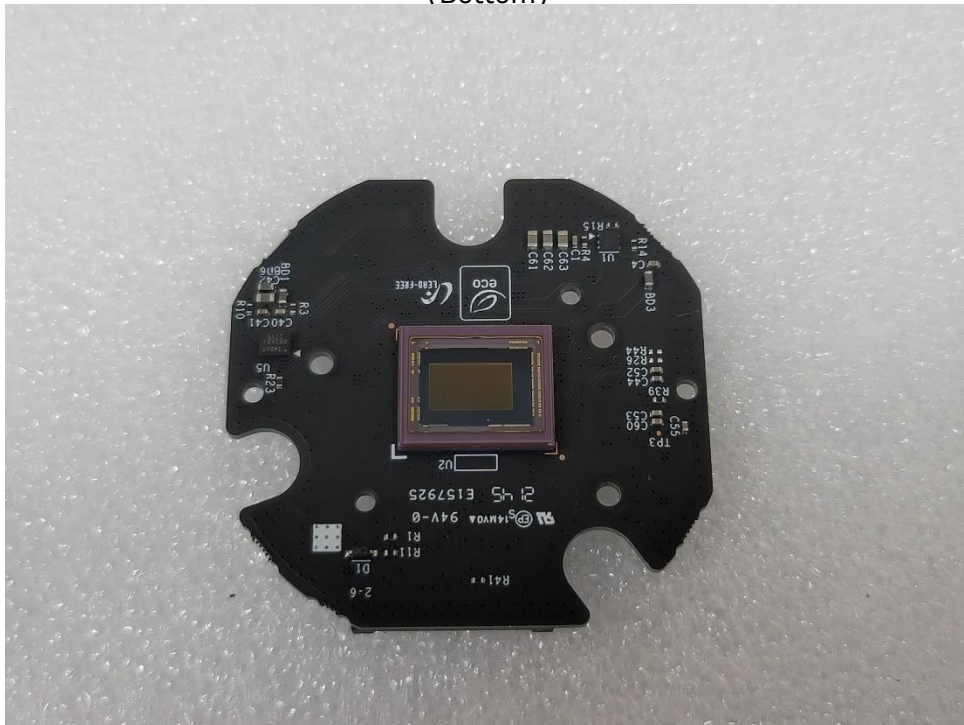
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EUT Internal View – Sensor Board

(Top)



(Bottom)



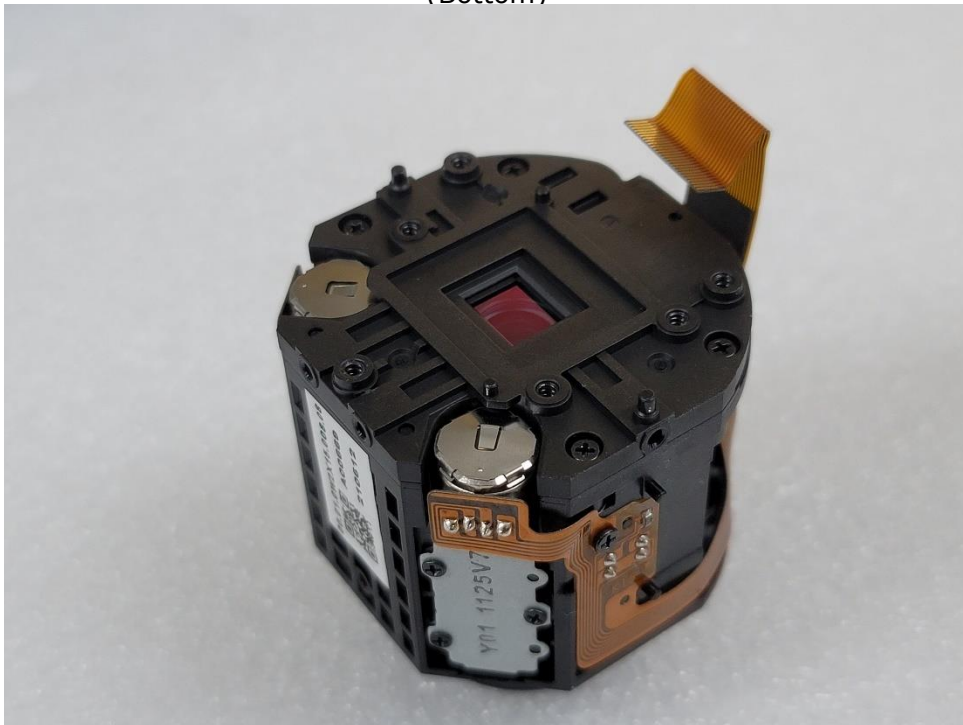
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EUT Internal View – Lens 1

(Top)



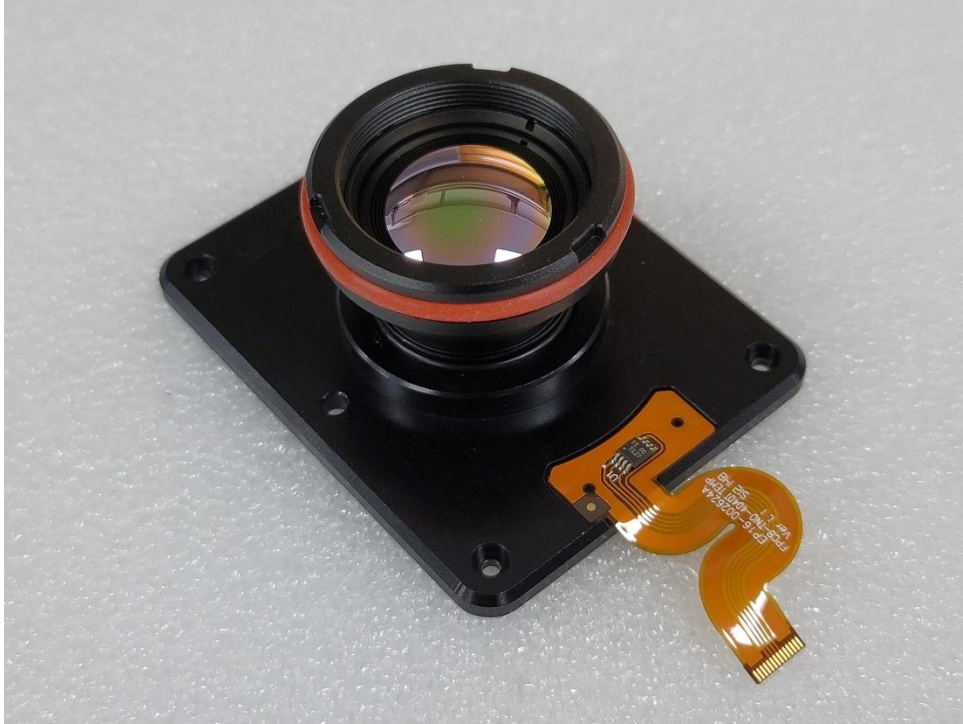
(Bottom)



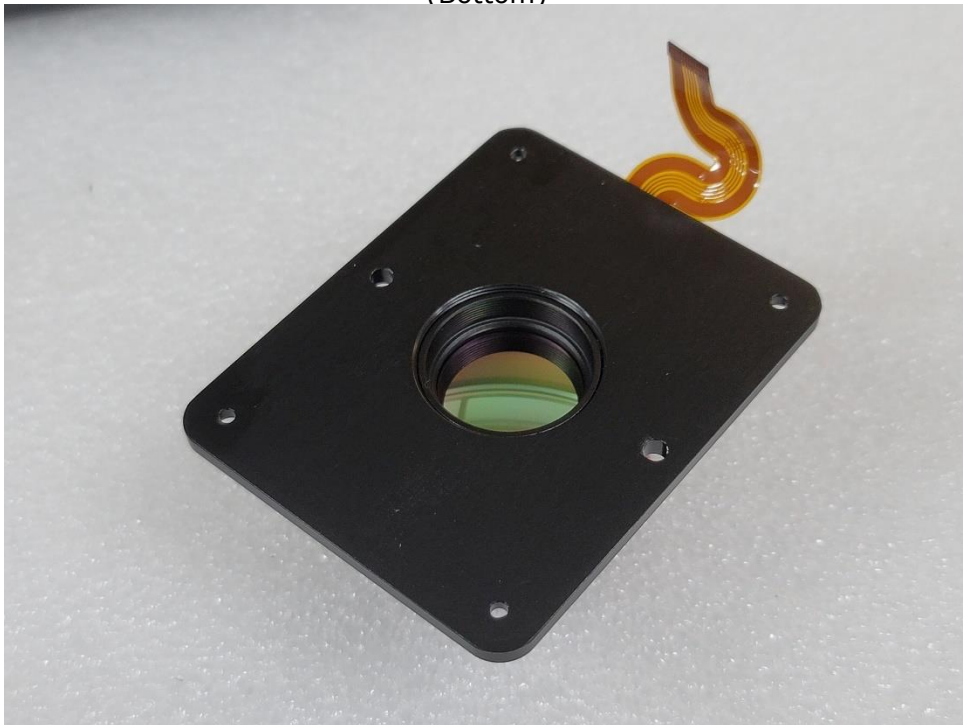
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EUT Internal View – Lens 2

(Top)



(Bottom)



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Manufacturer : HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.

Made in Vietnam

