



EMC TEST REPORT

Test Report No. : KES-EM-22T0674-R1
Date of Issue : Feb. 24, 2023
Product name : THERMAL CAMERA
Model/Type No. : TNO-4050T
Variant Model : TNO-4030T, TNO-4040T, TNO-L4030T
Applicant : Hanwha Vision Co., Ltd
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, Republic of Korea
Manufacturer : 1. HANWHA VISION VIETNAM COMPANY LIMITED
2. D-TECH CO.,LTD.
Manufacturer Address : 1. Lot O-2, Que Vo Industrial Zone extended area,
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam
2. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi- do,
Korea (Suwon Industrial Complex)
Date of Receipt : Jul. 21, 2022
Test date : Jul. 21, 2022 ~ Jul. 25, 2022
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

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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 No.:
KES-EM-22T0674-R1
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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Aug. 08, 2022	KES-EM-22T0674	Issued
Feb. 24, 2023	KES-EM-22T0674-R1	Change the Applicant and manufacturer at the request of the customer.

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1.0 General Product Description

Main Specifications of EUT are:

Video	
Imaging Device	Uncooled Micro volometer
Pixel size	17µm
Effective Pixels	640x480(Scale up 800x600)
Sensitivity	NETD < 50mK
Video Out	CVBS : 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P), for installation USB : Micro USB type B, 1280x720, for installation
Lens	
Focal Length (Zoom Ratio)	35mm fixed
Max. Aperture Ratio	1.0
Angular Field of View	H: 17°
Min. Object Distance	TBD
Focus Control	Fixed
Lens Type	TBD
Mount Type	Board-in type
Operational	
Camera Title	Off / On - WW : English/Numeric/Special Characters - China : English/Numeric/Special/Chinese Characters - Common : Multi-line (Max 5), Color (Grey/Green/Red/Blue/Black/White), Transparency, Auto Scale by Resolution
Digital Image Stabilization	Off / On(with Gyro)
Motion Detection	Off/ On(8ea, 8point Polygonal zones), Handover
Privacy Masking	Off / On (32ea, polygonal zones) - Color : Grey/Green/Red/Blue/Black/White - Mosaic
Gain Control	Off / Low / Middle / High
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (2 ~ 1/12,000sec)
Pan/Tilt	Pelco D/P, Samsung T/E, Honeywell, Bosch, Panasonic, Sungin, AD, Vicon, GE
Flip / Mirror	Flip : On/Off Mirror : On/Off Halfway view : 90°/270°
Video & Audio Analytics	Tampering, Loitering, Directional Detection, Virtual Line, Fence detection, Enter/Exit, Appear / Disappear, Audio Detection, Motion Detection, Sound Classification, Shock detection, drastic temperature swings
Alarm I/O	Input 2ea / Output 2ea
Alarm Triggers	Alarm Input, Motion Detection, Video & Audio Analytics, Network Disconnect
Alarm events	File upload via FTP, E-Mail Notification via E-Mail local storage(SD/SDHC/SDXC) or NAS recording at Event Triggers External output
Audio In	Selectable (Mic IN/Line IN), Supply voltage: 2.5VDC(4mA), Input impedance: approx. 2K Ohm
Audio out	Line out, Max output level: 1 Vrms
Pixel count	support
Digital zoom	-
Remote control	-
Network	
Ethernet	RJ-45 (10/100BASE-T)
Video Compression Format	H.265/H.264 (MPEG-4 Part 10/AVC) : Main/Baseline/High , Motion JPEG
Resolution	800x600, 640x480, 640x360, 320x240
Max. Framerate	H.265/H.264 : Max. 30fps at all resolutions Motion JPEG : Max. 30fps
Smart Codec	Manual Mode (area-based : SEA)
WiseStream II	Support
Video Quality Adjustment	H.264/H.265 : Target Bitrate Level Control MJPEG : Target Bitrate Level Control
Bitrate Control Method	H.264/H.265 : CBR or VBR MJPEG : VBR
Streaming Capability	Multiple Streaming (Up to 10 Profiles)
Audio Compression Format	G.711 u-law /G.726 Selectable G.726 (ADPCM) 8KHz, G.711 8KHz G.726 : 16Kbps, 24Kbps, 32Kbps, 40Kbps AAC-LC : 48Kbps at 8/16/32/48KHz
Audio Communication	Bi-directional (2-Way)
IP	IPv4, IPv6
Protocol	TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP,RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, PPPoE, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, PIM-SM, UPnP, Bonjour
Security	HTTPS(SSL) Login Authentication Digest Login Authentication IP Address Filtering User access Log 802.1X Authentication (EAP-TLS, EAP-LEAP)
Streaming Method	Unicast / Multicast
Max. User Access	20 users at Unicast Mode
Edge Storage	SD/SDHC/SDXC (up to 256 GB) - Motion images recorded in the SD/SDHC/SDXC memory card can be downloaded. NAS(Network Attached Storage) Local PC for Instant Recording
Application Programming Interface	ONVIF Profile S/G SUNAPI(HTTP API) Open Platform
Webpage Language	English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Swedish., Portuguese, Czech, Polish, Turkish, Dutch, Hungarian, Greek
Web Viewer	TBD
Central Management Software	SmartViewer, SSM
Environmental	
Operating Temperature / Humidity	-40°C ~ +60°C (-40°F ~ +131°F) / Less than 90% RH
Storage Temperature / Humidity	-50°C ~ +60°C (-58°F ~ +140°F) / Less than 90% RH
Ingress Protection	IP66, NEMA 4X
Vandal Resistance	IK10
Electrical	
Input Voltage / Current	24VAC ± 10%, 12VDC ± 10%, PoE(IEEE802.3af)
Power Consumption	TBD
Mechanical	
Color / Material	TBD
Dimension (WxHxD)	TBD
Weight	TBD
기타	Palette 7mode

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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

Added derivative model due to HW same FW difference.

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
THERMAL CAMERA	TNO-4050T	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
AC/DC Adapter	2ACB022F	-	ChAnnel Well Technology (Guangzhou) Co.,Ltd.	-
PoE Adapter	PSE156G	-	-	-
AC Adapter	DRL-246000AC	-	Dream Electronics Co., Ltd.	-
Notebook	LG15N54	410NZGK015231	LG Electronics Inc.	-
Notebook Adapter	ADP-90WH B	84ZW19F1663	DELTA ELECTRONICS (JIANGSU) LTD.	-
Alarm	PRO-SL	-	SENSOR PRO	-
Button Alarm	-	-	-	-
Headset	K550	-	Britz®	-
SmartPhone	SM-N920S	-	Samsung	-
Micro SD Card	-	-	SanDisk	-

1.6 External I/O Cabling

■ AC Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
THERMAL CAMERA (EUT)	2 Pin	AC Adapter	2 Pin	2.0	U
	RJ-45(LAN)	Notebook	RJ-45(LAN)	3.0	U
	Alarm OUT	Alarm	Alarm IN	4.0	U
	Alarm IN	Button Alarm	Alarm OUT	3.5	U
	3.5 mm	Headset	3.5 mm	1.8	U
	3.5 mm		3.5 mm	1.8	U
	Micro SD Card Slot	Micro SD Card	Micro SD Card Slot	-	-
Notebook	3.5 mm	SmartPhone	3.5 mm	1.1	U
	DC Jack	Notebook Adapter	DC Jack	1.9	U

* Unshielded=U, Shielded=S

■ DC Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
THERMAL CAMERA (EUT)	2 Pin	AC/DC Adapter	2 Pin	1.6	U
	RJ-45(LAN)	Notebook	RJ-45(LAN)	3.0	U
	Alarm OUT	Alarm	Alarm IN	4.0	U
	Alarm IN	Button Alarm	Alarm OUT	3.5	U
	3.5 mm	Headset	3.5 mm	1.8	U
	3.5 mm		3.5 mm	1.8	U
	Micro SD Card Slot	Micro SD Card	Micro SD Card Slot	-	-
Notebook	3.5 mm	SmartPhone	3.5 mm	1.1	U
	DC Jack	Notebook Adapter	DC Jack	1.9	U

* Unshielded=U, Shielded=S

■ 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	U
	Alarm OUT	Alarm	Alarm IN	4.0	U
	Alarm IN	Button Alarm	Alarm OUT	3.5	U
	3.5 mm	Headset	3.5 mm	1.8	U
	3.5 mm		3.5 mm	1.8	U
	Micro SD Card Slot	Micro SD Card	Micro SD Card Slot	-	-
PoE Adapter	RJ-45(LAN)	Notebook	RJ-45(LAN)	2.0	U
Notebook	3.5 mm	SmartPhone	3.5 mm	1.1	U
	DC Jack	Notebook Adapter	DC Jack	1.9	U

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

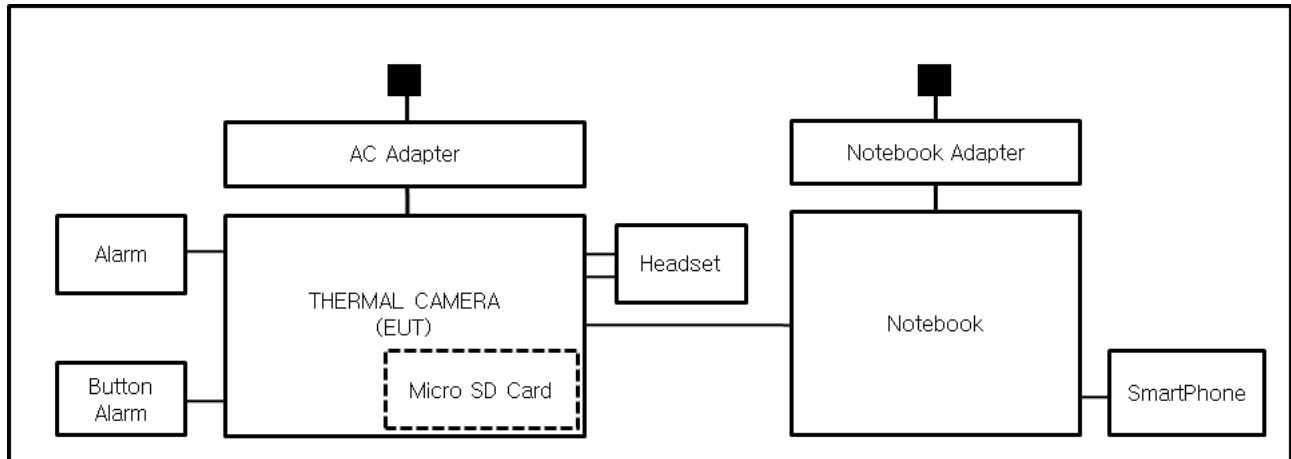
Test Mode	operating
AC Mode	Check the Normal Operation status. after testing, check if the recording is normally done on the Micro SD Card
DC Mode	
PoE Mode	

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

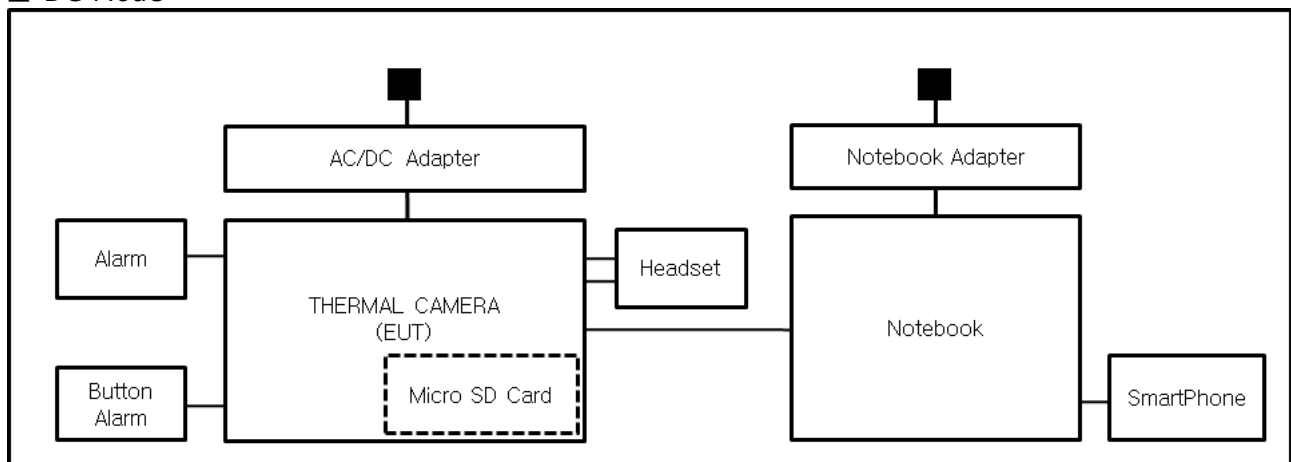
1.8 Configuration

■ AC Main
 □ DC Main

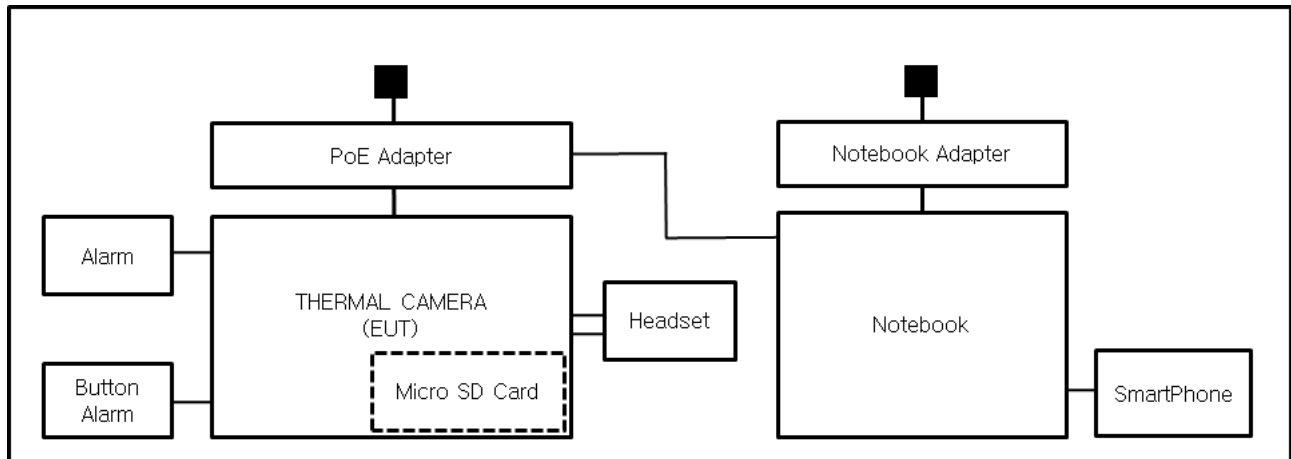
■ AC Mode



■ DC Mode



■ PoE Mode



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1.9 Remarks when standards applied

The USB, VIDEO ports were excluded from the test as administrator ports.

1.10 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less.

1.11 Test Facility

The measurement facility is located at 473-21, Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea, Republic of. The sites are constructed in conformance with the requirements of ANSI C63.4a-2017 and CISPR 16-1-4:2019

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
International	KOLAS	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KT489
USA	FCC	3 m & 10 m Semi-Anechoic Chamber Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Anechoic Chamber and Conducted test site	 23298
JAPAN	VCCI	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)	 C-20136, T-20137, R-20181, G-20176
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 001633 0004

2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **EMC – Directive 2014/30/EU**

☒ EN 55032:2015/A11:2020

☒ Class A

☐ Class B

☒ EN 50130-4:2011

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

☒ **EMC – Regulations 2016**

☒ EN 55032:2015/A11:2020

☒ Class A

☐ Class B

☒ EN 50130-4:2011

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

2.1 Conducted Emissions at Mains Power Ports

Test Date

Jul. 21, 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: (24,7 ± 0,2) °C

Relative Humidity: (45,4 ± 0,3) % 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

RemarksSee Appendix A for test data.

2.2 Conducted Emissions at Telecommunication Ports

Test Date

Jul. 21, 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
☒	8-WIRE ISN CAT3,5	ENY81	R & S	100174	12, 28, 2022
☐	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	03, 07, 2023

Test Conditions

Temperature: (24,7 ± 0,2) °C
Relative Humidity: (45,4 ± 0,2) % 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

Jul. 21, 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	03, 31, 2023
☒	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: (24,5 ± 0,3) °C

Relative Humidity: (44,9 ± 0,5) % 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

Jul. 21, 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	6.0.0	-
☒	EMI TEST RECEIVER	ESR7	R & S	101190	08, 01, 2023
☒	PREAMPLIFIER	8449B	AGILENT	3008A01967	04, 01, 2023
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 03, 2023

Test Conditions

Temperature: (24,8 ± 0,2) °C

Relative Humidity: (44,8 ± 0,4) % 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

Jul. 25, 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, 2023
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: (24,6 ± 0,2) °C

Relative Humidity: (46,8 ± 0,3) % 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

RemarksSee Appendix A for test data.

2.6 Voltage Fluctuations and Flicker

Test Date

Jul. 25, 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, 2023
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: (24,6 ± 0,4) °C

Relative Humidity: (46,8 ± 0,6) % R.H.

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:
EN 50130-4:2011 Alarm systems-Part 4: Electromagnetic compatibility Product family
standard: Immunity requirements for components of fire, intruder and social alarm systems

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

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

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

Electrostatic discharge

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of discharge is permissible, providing that is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

Radiated electromagnetic fields

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of discharge is permissible, providing which could be interpreted by associated equipment as a change, and no such
Flickering of indicators occurs at a field strength of 3 V/m.

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

- (a) there is no permanent damage or change to EUT
(e.g. no corruption of memory or changes to programmable setting etc.)
- (b) at 3 V/m, any deterioration of the picture is so minor that the system could still be used;
and
- (c) there is no observable deterioration of the picture at 1 V/m.

Fast transient burst / slow high energy voltage surge

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of discharge is permissible, providing
That there is no residual is permissible, providing that there is no residual change in the EUT or
any
change in outputs, which could be interpreted by associated equipment as a change.

Conducted RF immunity

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of discharge is permissible, providing
That there is no residual is permissible, providing that there is no residual change in the EUT or
any
change in outputs, which could be interpreted by associated equipment as a change,
and no such flickering of indicators oeuvres at $U = 130 \text{ dB}\mu\text{V}$.
For component of CCTV systems, where the status is monitored by observing the TV picture,
then deterioration of the picture is allowed at $U = 140 \text{ dB}\mu\text{V}$, providing:
(a) there is no permanent damage or change to the EUT
(e.g. no corruption of memory or changes to programmable settings etc.)
(b) at $U = 130 \text{ dB}\mu\text{V}$, any deterioration of the picture is so minor that the system could
still be used; and
(c) there in no observable deterioration of the picture at $U = 120 \text{ dB}\mu\text{V}$.

Voltage dip/interruption / Voltage variation

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

3.1 Electrostatic Discharge

Reference Standard

EN 61000-4-2:2009

Test Date

Jul. 25, 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: (24,7 ± 0,1) °C
Relative Humidity: (45,3 ± 0,1) % R.H.
Atmospheric Pressure: (99,2 ± 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

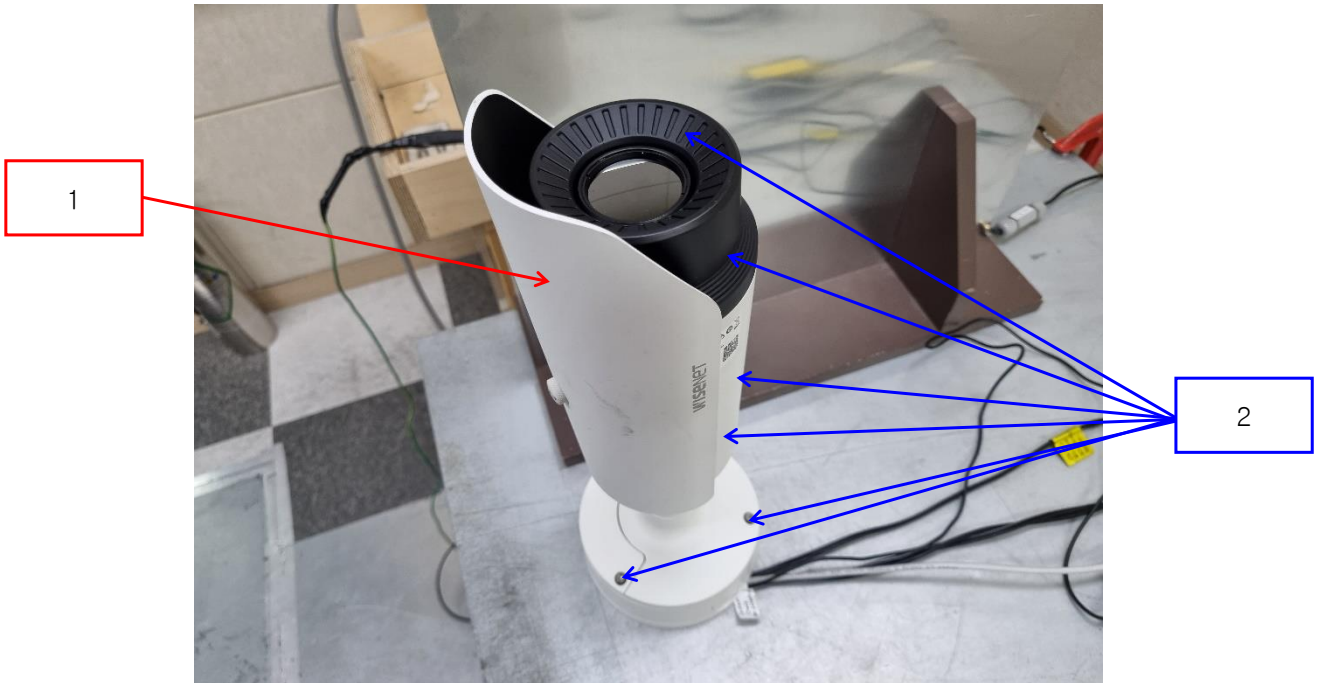
Discharge Voltage:	Contact ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	Air ☒ 2 kV ☒ 4 kV ☐ 6 kV ☒ 8 kV ☐ 15 kV	HCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	VCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV
--------------------	---	---	---	---

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

Required Performance Criteria: ☒ Complied

Location of Discharge:

Air
Contact



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Test Data

■ AC 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	Cover	Air Discharge	Complied	-
2	Enclosure, Around the lens, Screw	Contact Discharge	Complied	-

■ 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	Cover	Air Discharge	Complied	-
2	Enclosure, Around the lens, Screw	Contact Discharge	Complied	-

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■ 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	Cover	Air Discharge	Complied	-
2	Enclosure, Around the lens, Screw	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 IEC 61000-4-3:2020

Test Date

Jul. 23, 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	03, 31, 2023
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY52170007	04, 04, 2023
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY41498669	04, 04, 2023
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 03, 2023

Test Conditions

Temperature: (24,7 ± 0,4) °C
Relative Humidity: (44,8 ± 0,7) % R.H.
Atmospheric Pressure: (100,2 ± 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

■ AC Mode

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

■ 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

Jul. 25, 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	03, 31, 2023
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	12, 03, 2022

Test Conditions

Temperature: (24,7 ± 0,2) °C
Relative Humidity: (45,3 ± 0,3) % R.H.
Atmospheric Pressure: (99,2 ± 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

■ AC 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 (LAN)	Complied	Complied
Alarm IN	Complied	Complied
Alarm OUT	Complied	Complied

■ 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 (LAN)	Complied	Complied
Alarm IN	Complied	Complied
Alarm OUT	Complied	Complied

☒ PoE Mode

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

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
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
Alarm IN	Complied	Complied
Alarm OUT	Complied	Complied

Note: “Blank” = Not performed

Observations:

Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria

3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014/A1:2017

Test Date

Jul. 25, 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	03, 31, 2023
☒	CDN	CNV 508N1	EM TEST	P1610176296	12, 03, 2022

Test Conditions

Temperature: (24,7 ± 0,3) °C
Relative Humidity: (45,3 ± 0,3) % R.H.
Atmospheric Pressure: (99,2 ± 0,0) kPa



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Test Specifications

AC Power Lines

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

Surge Amplitude :

Common Mode

☐ (0,5 / 1,0 / 2,0) kV

Differential Mode

☒ (0,5 / 1,0) kV

Number of Surges:

☒ 5 surges per angle

Angle:

☒ 0°, 90°, 180°, 270° (input a.c. power port)

Polarity:

☒ Positive & Negative

Repetition Rate:

☐ 1 surge per min ☒ 1 surge per 30 sec.

Required Performance Criteria: ☒ Complied

Other supply / Signal Lines

Source Impedance:

42 ohm for common Mode

Surge Amplitude:

Common Mode

☒ (0,5 / 1,0) kV

Number of Surges:

☒ 5 Surges

Polarity:

☒ Positive & Negative

Repetition Rate:

☒ 1 surge per min ☐ 1 surge per 30 sec.

Required Performance Criteria: ☒ Complied

Test Data

☒ AC 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 (LAN)	CDN	Complied	Complied
	LINE	Complied	Complied

☒ 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 (LAN)	CDN	Complied	Complied
	LINE	Complied	Complied

☒ 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

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

Jul. 23, 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, 01, 2023
☒	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 25, 2022

Test Conditions

Temperature: (24,9 ± 0,3) °C
Relative Humidity: (45,1 ± 0,5) % R.H.
Atmospheric Pressure: (99,9 ± 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
■ AC 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
Alarm IN	Clamp	Complied
Alarm OUT	Clamp	Complied

■ 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
Alarm IN	Clamp	Complied
Alarm OUT	Clamp	Complied

■ PoE Mode☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L – N – PE	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
Alarm IN	Clamp	Complied
Alarm OUT	Clamp	Complied

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

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria

3.6 Voltage Dips and Short Interruptions

Reference Standard

EN IEC 61000-4-11:2020

Test Date

Jul. 25, 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	03, 31, 2023
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	03, 31, 2023

Test Conditions

Temperature: (24,7 ± 0,2) °C
Relative Humidity: (45,3 ± 0,2) % R.H.
Atmospheric Pressure: (99,2 ± 0,0) kPa



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Test Specifications & Observations/Remarks

■ AC Mode

- Voltage Dips and Short Interruptions

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
☒ 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>

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■ DC Mode

- Voltage Dips and Short Interruptions

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
☒ 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 without operator's intervention.

APPENDIX A – TEST DATA

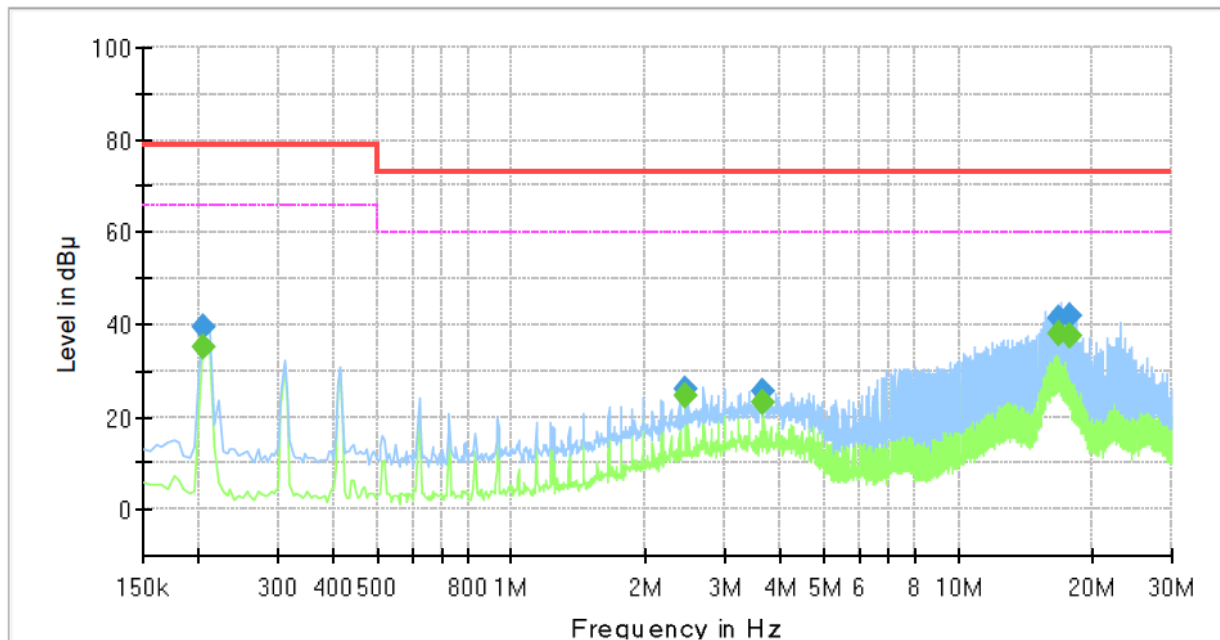
Conducted Emissions at Mains Power Ports

■ AC Mode

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-4050T
Phase:	H
Mode:	AC
Operator Name:	KES



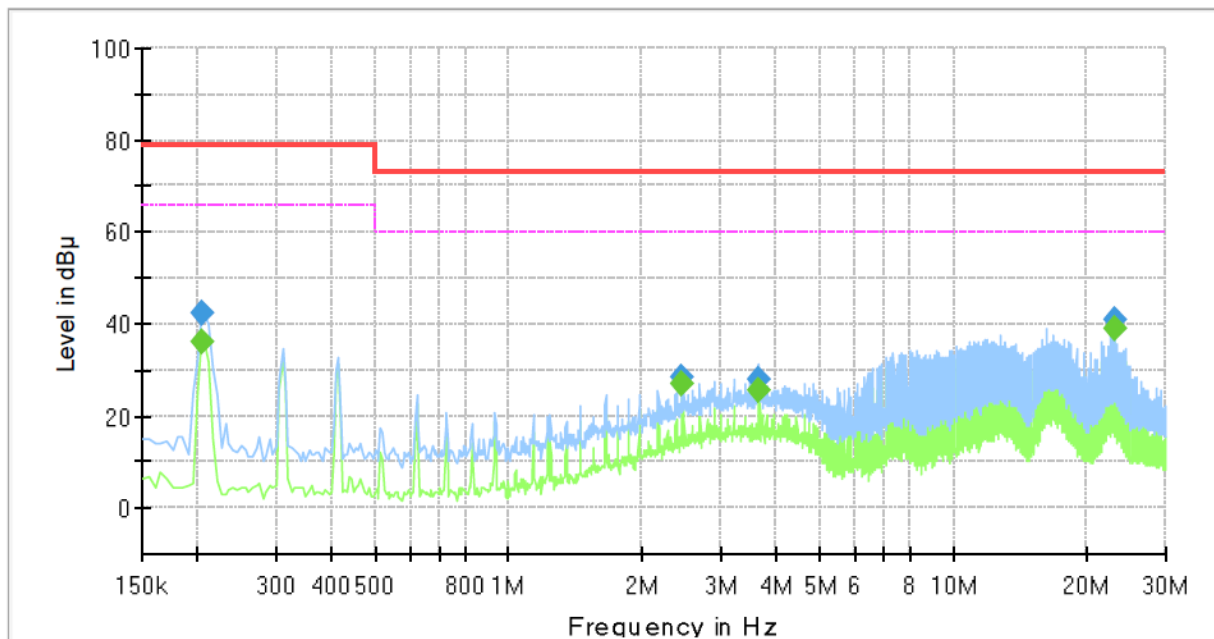
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.205000	---	35.12	66.00	30.88	1000.0	9.000	L1	19.4
0.205000	39.64	---	79.00	39.36	1000.0	9.000	L1	19.4
2.445000	---	24.43	60.00	35.57	1000.0	9.000	L1	20.3
2.445000	25.87	---	73.00	47.13	1000.0	9.000	L1	20.3
3.665000	---	22.91	60.00	37.09	1000.0	9.000	L1	20.0
3.665000	25.33	---	73.00	47.67	1000.0	9.000	L1	20.0
16.860000	---	37.91	60.00	22.09	1000.0	9.000	L1	19.9
16.860000	41.47	---	73.00	31.53	1000.0	9.000	L1	19.9
17.690000	---	37.34	60.00	22.66	1000.0	9.000	L1	20.0
17.690000	41.91	---	73.00	31.09	1000.0	9.000	L1	20.0

[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-4050T
Phase:	N
Mode:	AC
Operator Name:	KES



Final Result

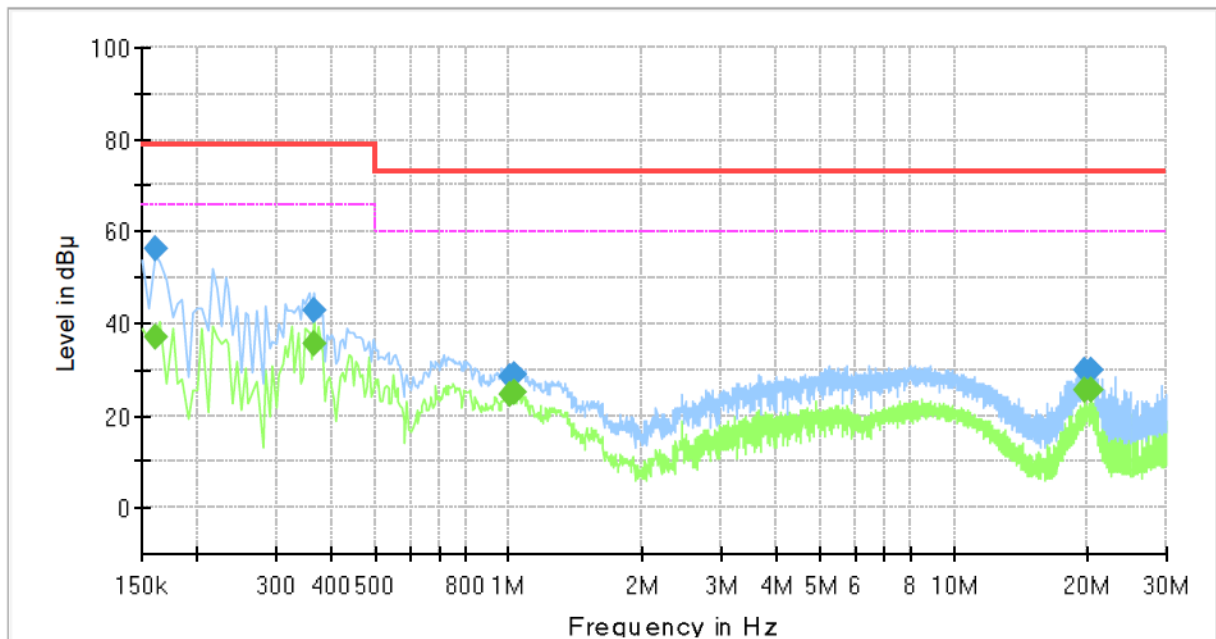
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.205000	---	35.95	66.00	30.05	1000.0	9.000	N	19.4
0.205000	42.26	---	79.00	36.74	1000.0	9.000	N	19.4
2.445000	---	27.14	60.00	32.86	1000.0	9.000	N	20.3
2.445000	28.55	---	73.00	44.45	1000.0	9.000	N	20.3
3.665000	---	25.73	60.00	34.27	1000.0	9.000	N	20.0
3.665000	28.13	---	73.00	44.87	1000.0	9.000	N	20.0
23.130000	---	39.10	60.00	20.90	1000.0	9.000	N	20.1
23.130000	40.79	---	73.00	32.21	1000.0	9.000	N	20.1

■ DC Mode

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-4050T
Phase:	H
Mode:	DC
Operator Name:	KES



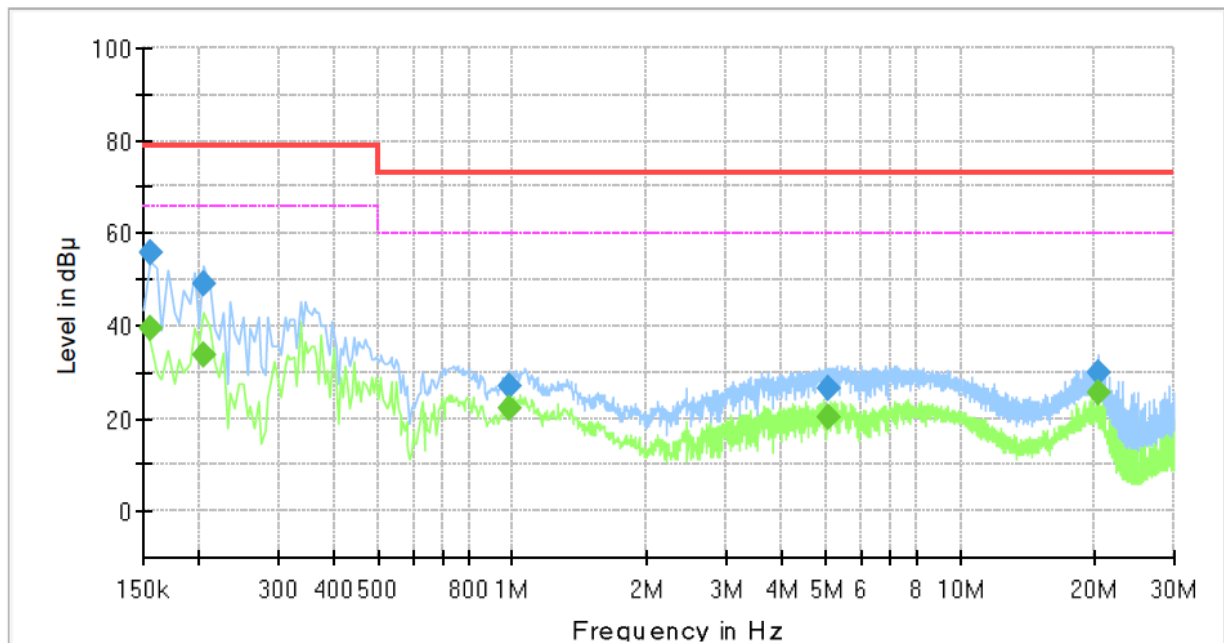
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.160000	---	37.21	66.00	28.79	1000.0	9.000	L1	19.4
0.160000	56.39	---	79.00	22.61	1000.0	9.000	L1	19.4
0.365000	---	35.56	66.00	30.44	1000.0	9.000	L1	19.6
0.365000	43.01	---	79.00	35.99	1000.0	9.000	L1	19.6
1.005000	---	24.47	60.00	35.53	1000.0	9.000	L1	20.0
1.005000	28.45	---	73.00	44.55	1000.0	9.000	L1	20.0
1.025000	---	24.95	60.00	35.05	1000.0	9.000	L1	20.1
1.025000	28.74	---	73.00	44.26	1000.0	9.000	L1	20.1
19.710000	---	25.75	60.00	34.25	1000.0	9.000	L1	20.1
19.710000	30.01	---	73.00	42.99	1000.0	9.000	L1	20.1
20.260000	---	25.60	60.00	34.40	1000.0	9.000	L1	20.1
20.260000	29.89	---	73.00	43.11	1000.0	9.000	L1	20.1

[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-4050T
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)
0.155000	---	39.60	66.00	26.40	1000.0	9.000	N	19.4
0.155000	55.91	---	79.00	23.09	1000.0	9.000	N	19.4
0.205000	---	33.68	66.00	32.32	1000.0	9.000	N	19.4
0.205000	48.87	---	79.00	30.13	1000.0	9.000	N	19.4
0.980000	---	22.41	60.00	37.59	1000.0	9.000	N	20.0
0.980000	26.96	---	73.00	46.04	1000.0	9.000	N	20.0
5.080000	---	20.48	60.00	39.52	1000.0	9.000	N	19.6
5.080000	26.72	---	73.00	46.28	1000.0	9.000	N	19.6
20.260000	---	25.68	60.00	34.32	1000.0	9.000	N	20.2
20.260000	29.97	---	73.00	43.03	1000.0	9.000	N	20.2

◆ Calculation

QuasiPeak [dBμV] / CAverage [dBμV] = Reading Value [dBμV] + 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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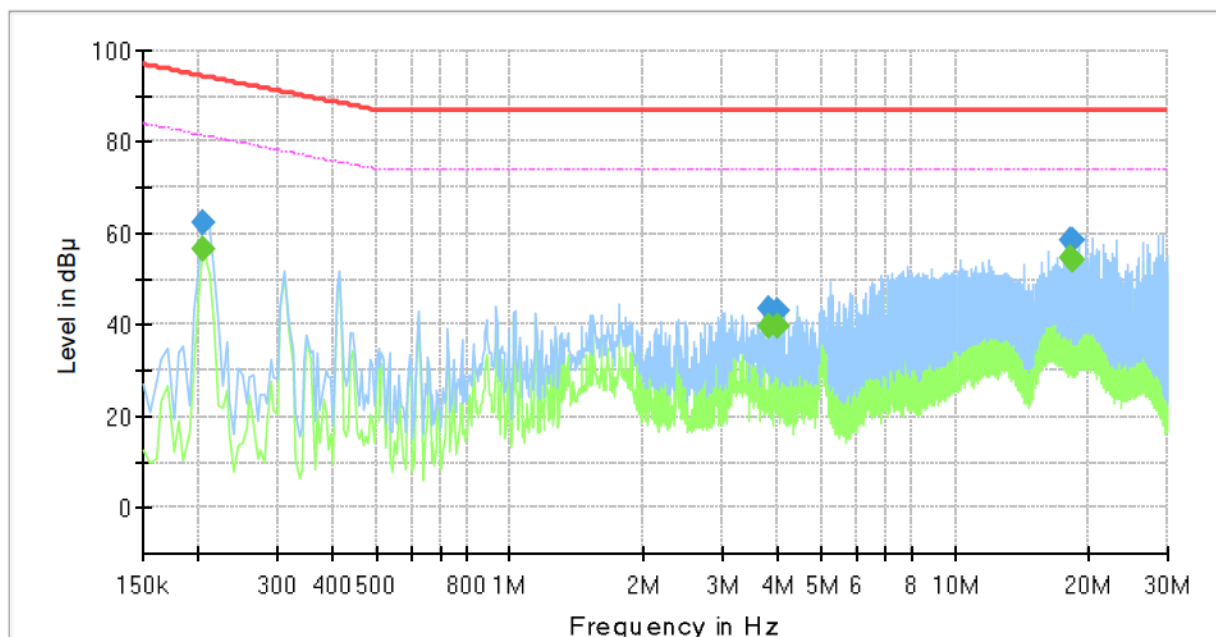
Conducted Emissions at Telecommunication Ports

■ AC Mode

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-4050T
Mode :	AC
Speed :	100 Mbps
Operator Name:	KES



Final Result

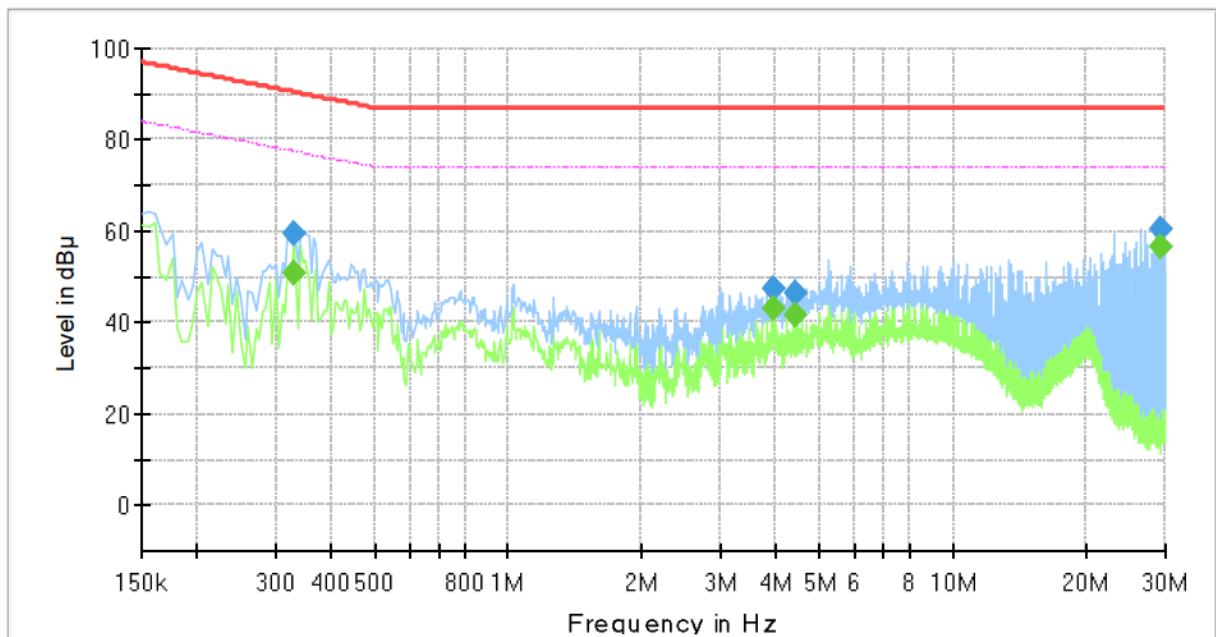
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.205000	---	56.58	81.41	24.83	1000.0	9.000	Single Line	19.7
0.205000	62.14	---	94.41	32.27	1000.0	9.000	Single Line	19.7
3.830000	---	39.48	74.00	34.52	1000.0	9.000	Single Line	19.8
3.830000	43.49	---	87.00	43.51	1000.0	9.000	Single Line	19.8
4.015000	---	39.48	74.00	34.52	1000.0	9.000	Single Line	19.7
4.015000	43.10	---	87.00	43.90	1000.0	9.000	Single Line	19.7
18.245000	---	54.64	74.00	19.36	1000.0	9.000	Single Line	19.8
18.245000	58.44	---	87.00	28.56	1000.0	9.000	Single Line	19.8
18.305000	---	54.30	74.00	19.70	1000.0	9.000	Single Line	19.8
18.305000	58.42	---	87.00	28.58	1000.0	9.000	Single Line	19.8

■ DC Mode

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-4050T
Mode :	DC
Speed :	100 Mbps
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.330000	---	50.56	77.45	26.89	1000.0	9.000	Single Line	19.7
0.330000	59.52	---	90.45	30.93	1000.0	9.000	Single Line	19.7
3.955000	---	42.99	74.00	31.01	1000.0	9.000	Single Line	19.7
3.955000	47.58	---	87.00	39.42	1000.0	9.000	Single Line	19.7
4.410000	---	41.42	74.00	32.58	1000.0	9.000	Single Line	19.6
4.410000	46.37	---	87.00	40.63	1000.0	9.000	Single Line	19.6
29.235000	---	56.82	74.00	17.18	1000.0	9.000	Single Line	20.4
29.235000	60.23	---	87.00	26.77	1000.0	9.000	Single Line	20.4

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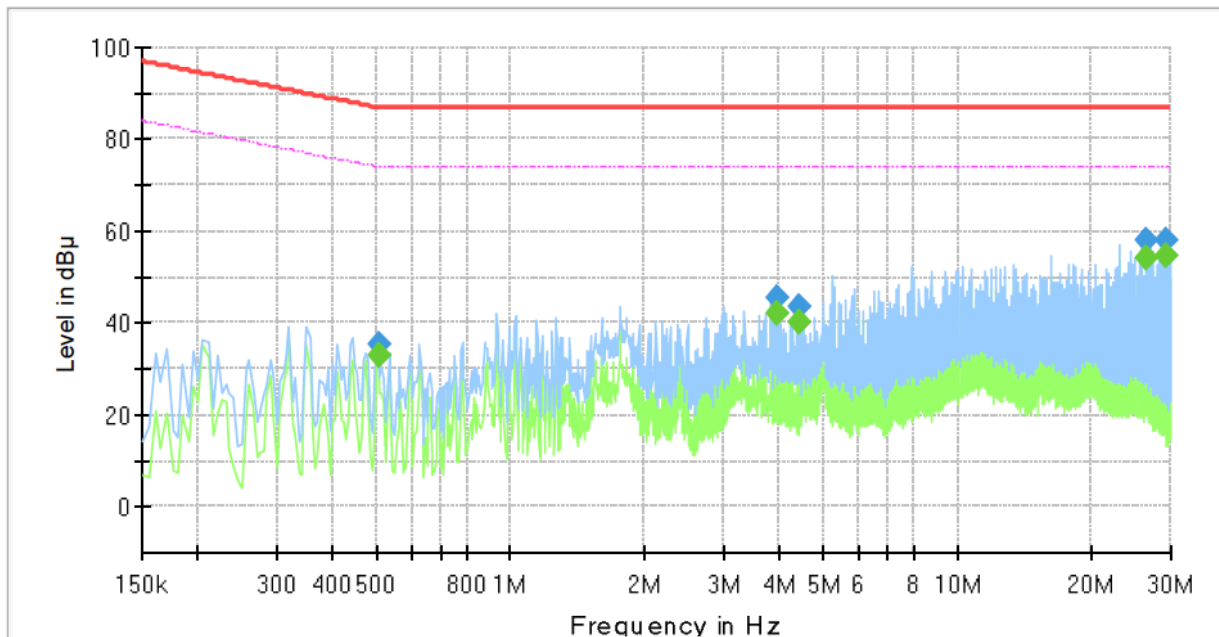
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■ PoE Mode

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-4050T
Mode :	PoE
Speed :	100 Mbps
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.505000	---	32.84	74.00	41.16	1000.0	9.000	Single Line	19.8
0.505000	35.50	---	87.00	51.50	1000.0	9.000	Single Line	19.8
3.955000	---	42.07	74.00	31.93	1000.0	9.000	Single Line	19.7
3.955000	45.50	---	87.00	41.50	1000.0	9.000	Single Line	19.7
4.410000	---	40.36	74.00	33.64	1000.0	9.000	Single Line	19.6
4.410000	43.72	---	87.00	43.28	1000.0	9.000	Single Line	19.6
26.610000	---	54.39	74.00	19.61	1000.0	9.000	Single Line	20.2
26.610000	58.09	---	87.00	28.91	1000.0	9.000	Single Line	20.2
29.235000	---	54.43	74.00	19.57	1000.0	9.000	Single Line	20.4
29.235000	58.11	---	87.00	28.89	1000.0	9.000	Single Line	20.4

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

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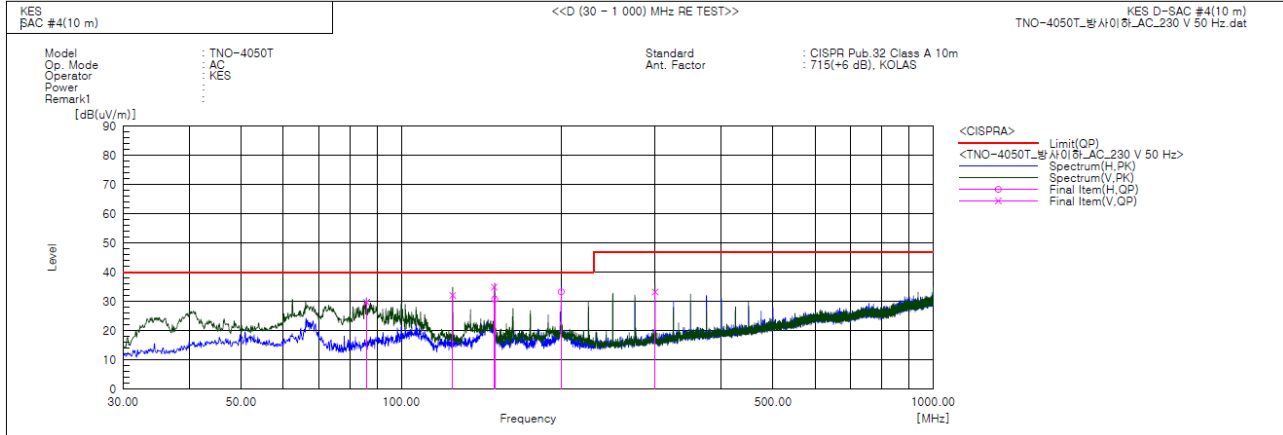
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Radiated Electric Field Emissions(Below 1 GHz)

■ AC 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	86.018	V	55.4	-25.7	29.7	40.0	10.3	117.0	18.0	
2	124.939	V	57.0	-24.9	32.1	40.0	7.9	100.0	127.0	
3	149.552	V	60.2	-25.3	34.9	40.0	5.1	199.0	250.0	
4	149.916	H	56.1	-25.3	30.8	40.0	9.2	395.0	34.0	
5	199.993	H	54.3	-21.0	33.3	40.0	6.7	400.0	143.0	
6	300.024	V	51.2	-18.0	33.2	47.0	13.8	182.0	268.0	

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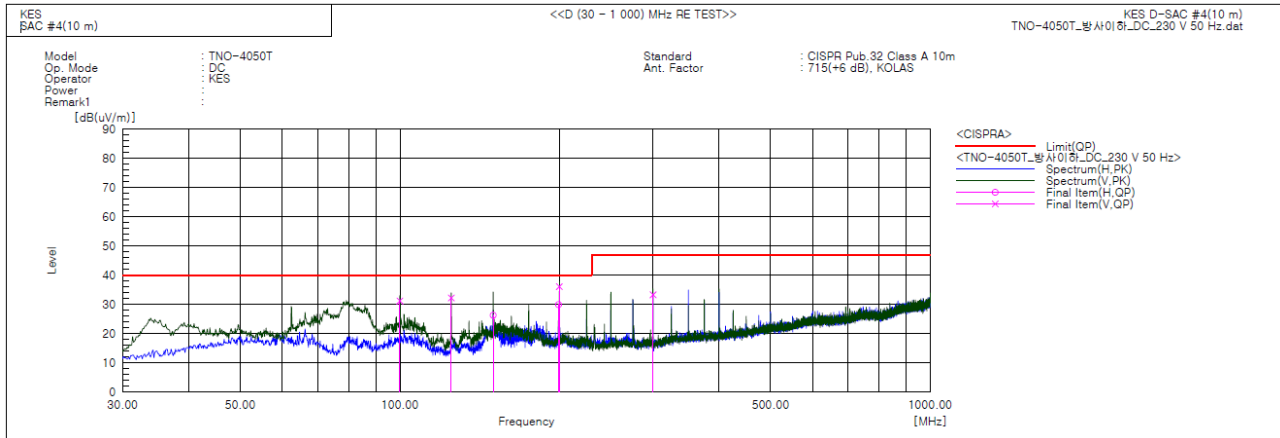
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DC Mode



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	99.961	V	53.7	-22.5	31.2	40.0	8.8	126.0	234.0	
2	124.939	V	57.1	-24.9	32.2	40.0	7.8	194.0	90.0	
3	149.916	H	51.6	-25.3	26.3	40.0	13.7	308.0	107.0	
4	199.116	H	50.9	-21.0	29.9	40.0	10.1	400.0	53.0	
5	199.744	V	57.1	-21.0	36.1	40.0	3.9	100.0	35.0	
6	300.024	V	51.3	-18.0	33.3	47.0	13.7	187.0	325.0	

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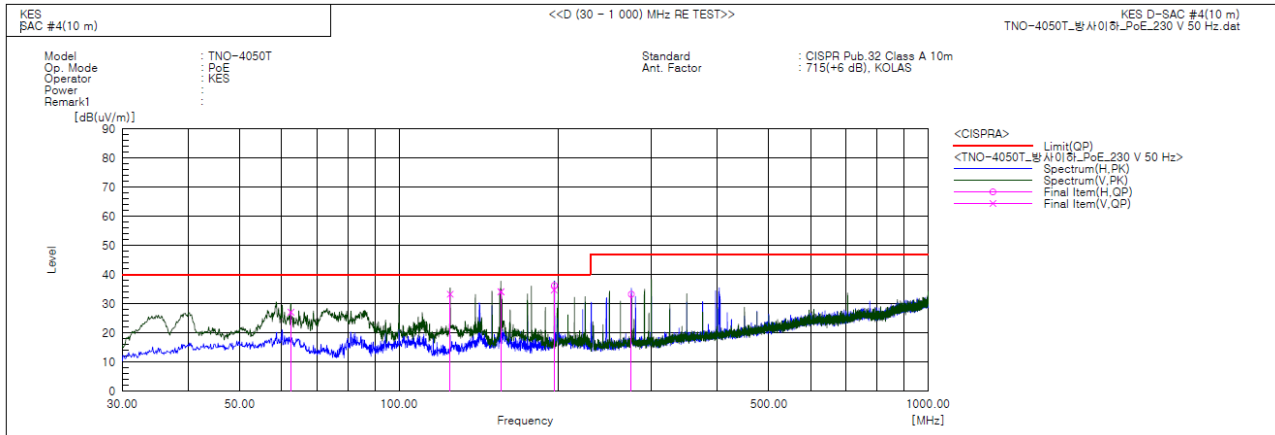
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PoE Mode



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	62.495	V	49.6	-22.5	27.1	40.0	12.9	113.0	69.0	
2	124.939	V	58.2	-24.9	33.3	40.0	6.7	195.0	33.0	
3	155.858	V	59.0	-24.9	34.1	40.0	5.9	100.0	160.0	
4	196.476	V	55.9	-21.2	34.7	40.0	5.3	106.0	141.0	
5	196.719	H	57.4	-21.2	36.2	40.0	3.8	305.0	104.0	
6	274.925	H	51.9	-18.7	33.2	47.0	13.8	400.0	287.0	

◆ 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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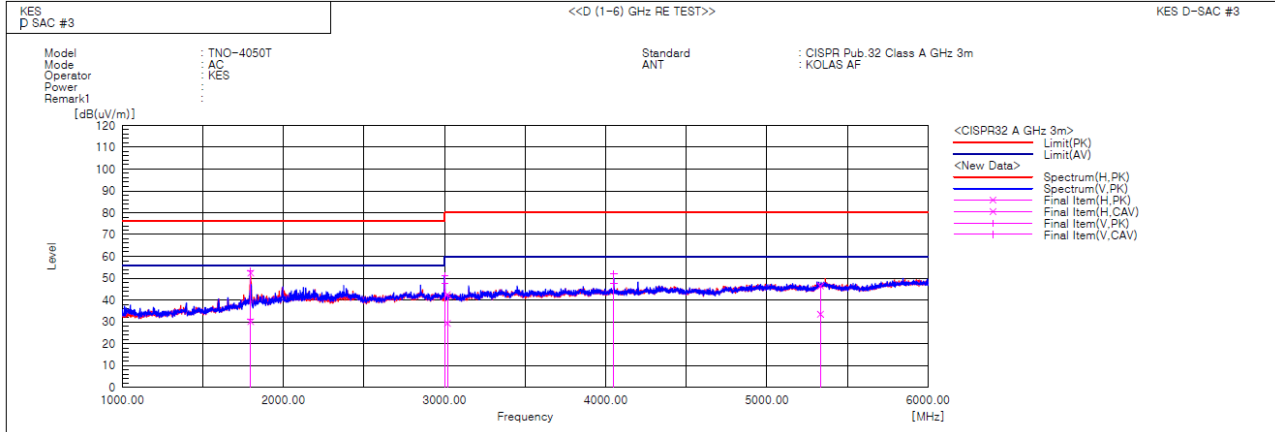
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Radiated Electric Field Emissions(Above 1 GHz)

■ AC Mode



Final Result

No.	Frequency (P) [MHz]	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	1795.251	V 55.6	33.3	-2.2	53.4	31.1	76.0	56.0	22.6	24.9	100.0	164.8	
2	1796.670	H 54.6	32.3	-2.2	52.4	30.1	76.0	56.0	23.6	25.9	100.0	148.4	
3	3000.280	V 49.1	45.5	2.2	51.3	47.7	80.0	60.0	28.7	12.3	100.0	67.5	
4	3016.817	H 40.3	27.1	2.2	42.5	29.3	80.0	60.0	37.5	30.7	100.0	116.8	
5	4049.960	V 46.2	41.7	5.8	52.0	47.5	80.0	60.0	28.0	12.5	100.0	237.7	
6	5332.084	H 37.2	24.2	9.3	46.5	33.5	80.0	60.0	33.5	26.5	100.0	238.7	

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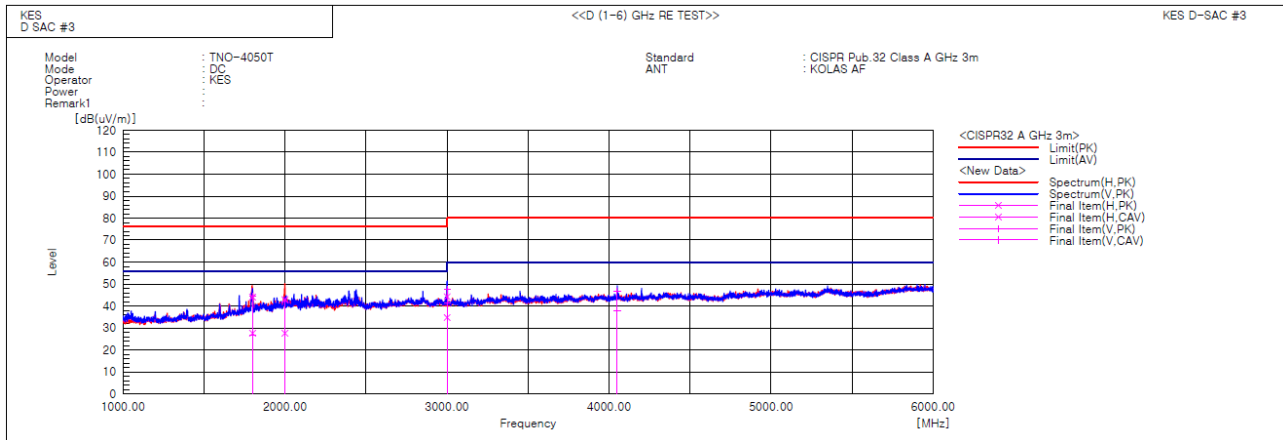
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DC Mode



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	1798.615	H	46.3	29.9	-2.2	44.1	27.7	76.0	56.0	31.9	28.3	100.0	35.7	
2	1799.445	V	46.6	29.1	-2.2	44.4	26.9	76.0	56.0	31.6	29.1	100.0	169.9	
3	1999.063	H	43.9	28.7	-1.0	42.9	27.7	76.0	56.0	33.1	28.3	100.0	147.4	
4	3000.116	H	42.1	32.6	2.2	44.3	34.8	80.0	60.0	35.7	25.2	100.0	114.5	
5	3000.316	V	45.2	39.2	2.2	47.4	41.4	80.0	60.0	32.6	18.6	100.0	159.5	
6	4051.033	V	41.0	31.9	5.8	46.8	37.7	80.0	60.0	33.2	22.3	100.0	248.7	

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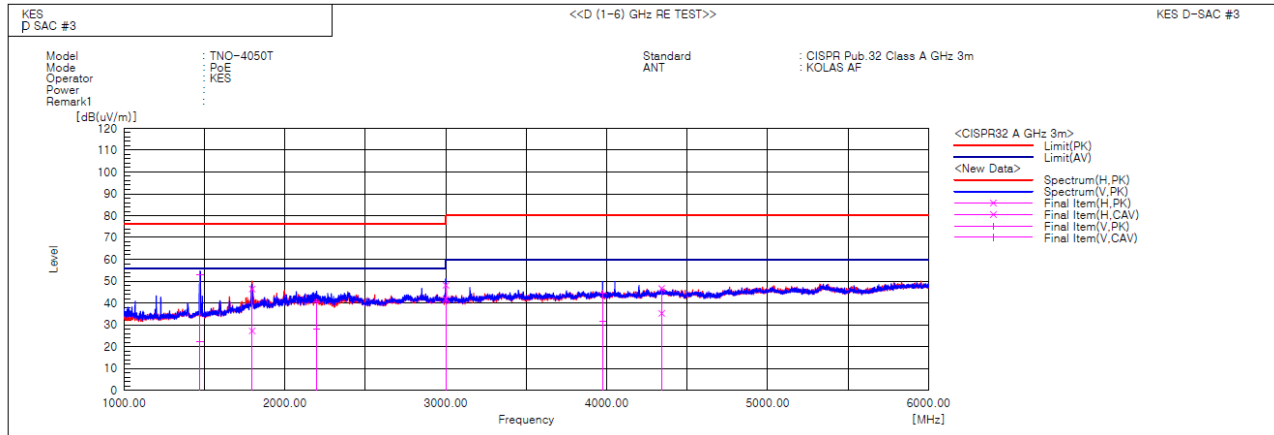
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PoE Mode



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Result CAV [dB(μV/m)]	Limit PK [dB(μV/m)]	Limit AV [dB(μV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1472.561	V	58.8	28.5	-6.0	52.8	22.5	76.0	56.0	23.2	33.5	100.0	4.9	
2	1797.054	H	48.6	29.4	-2.2	46.4	27.2	76.0	56.0	29.6	28.8	100.0	141.5	
3	2196.385	V	40.9	28.3	-0.3	40.6	28.0	76.0	56.0	35.4	28.0	100.0	57.4	
4	3000.055	H	45.9	39.6	2.2	48.1	41.8	80.0	60.0	31.9	18.2	100.0	110.1	
5	3974.184	V	38.6	25.9	5.8	44.4	31.7	80.0	60.0	35.6	28.3	100.0	52.9	
6	4340.851	H	39.8	28.4	6.9	46.7	35.3	80.0	60.0	33.3	24.7	100.0	301.4	

◆ Calculation

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

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

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

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

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Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ AC Mode

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.145			
2	0.001	0.104	1.080	n/a
3	0.049	2.114	2.300	PASS
4	0.001	0.234	0.430	n/a
5	0.038	3.291	1.140	PASS
6	0.001	0.233	0.300	n/a
7	0.015	2.009	0.770	PASS
8	0.001	0.287	0.230	n/a
9	0.012	2.980	0.400	PASS
10	0.001	0.361	0.184	n/a
11	0.003	0.996	0.330	n/a
12	0.001	0.404	0.153	n/a
13	0.002	1.113	0.210	n/a
14	0.001	0.496	0.131	n/a
15	0.002	1.611	0.150	n/a
16	0.001	0.571	0.115	n/a
17	0.002	1.578	0.132	n/a
18	0.001	0.650	0.102	n/a
19	0.002	1.312	0.118	n/a
20	0.001	0.860	0.092	n/a
21	0.001	0.802	0.161	n/a
22	0.001	0.897	0.084	n/a
23	0.001	0.552	0.147	n/a
24	0.001	0.831	0.077	n/a
25	0.002	1.180	0.135	n/a
26	0.001	0.982	0.071	n/a
27	0.001	0.807	0.125	n/a
28	0.001	1.200	0.066	n/a
29	0.001	0.731	0.116	n/a
30	0.001	1.026	0.061	n/a
31	0.001	0.660	0.109	n/a
32	0.001	1.083	0.058	n/a
33	0.001	0.861	0.102	n/a
34	0.001	1.221	0.054	n/a
35	0.001	0.873	0.096	n/a
36	0.001	1.173	0.051	n/a
37	0.001	0.981	0.091	n/a
38	0.001	1.307	0.048	n/a
39	0.001	1.061	0.087	n/a
40	0.001	1.301	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	0.145			
2	0.001	0.078	1.620	n/a
3	0.049	1.423	3.450	PASS
4	0.001	0.174	0.645	n/a
5	0.038	2.206	1.710	PASS
6	0.001	0.199	0.450	n/a
7	0.016	1.356	1.155	PASS
8	0.001	0.218	0.345	n/a
9	0.012	2.024	0.600	PASS
10	0.001	0.279	0.276	n/a
11	0.004	0.818	0.495	n/a
12	0.001	0.298	0.230	n/a
13	0.003	0.852	0.315	n/a
14	0.001	0.408	0.197	n/a
15	0.003	1.131	0.225	n/a
16	0.001	0.538	0.173	n/a
17	0.002	1.133	0.199	n/a
18	0.001	0.587	0.153	n/a
19	0.002	0.954	0.178	n/a
20	0.001	0.691	0.138	n/a
21	0.001	0.912	0.161	n/a
22	0.001	0.856	0.125	n/a
23	0.002	1.227	0.147	n/a
24	0.001	0.642	0.115	n/a
25	0.002	1.374	0.135	n/a
26	0.001	0.737	0.106	n/a
27	0.001	0.930	0.125	n/a
28	0.001	1.169	0.099	n/a
29	0.001	0.866	0.116	n/a
30	0.001	0.929	0.092	n/a
31	0.001	1.110	0.109	n/a
32	0.001	1.016	0.086	n/a
33	0.001	0.984	0.102	n/a
34	0.001	1.087	0.081	n/a
35	0.001	1.048	0.096	n/a
36	0.001	0.955	0.077	n/a
37	0.001	1.138	0.091	n/a
38	0.001	1.064	0.073	n/a
39	0.001	1.241	0.087	n/a
40	0.001	1.011	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.



■ DC Mode

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.041			
2	0.002	0.148	1.080	n/a
3	0.035	1.514	2.300	PASS
4	0.002	0.378	0.430	n/a
5	0.035	3.112	1.140	PASS
6	0.001	0.409	0.300	n/a
7	0.035	4.532	0.770	PASS
8	0.001	0.514	0.230	n/a
9	0.032	8.117	0.400	PASS
10	0.001	0.662	0.184	n/a
11	0.031	9.357	0.330	PASS
12	0.001	0.719	0.153	n/a
13	0.029	13.872	0.210	PASS
14	0.001	0.905	0.131	n/a
15	0.027	17.983	0.150	PASS
16	0.001	0.878	0.115	n/a
17	0.025	18.892	0.132	PASS
18	0.001	0.977	0.102	n/a
19	0.023	19.302	0.118	PASS
20	0.001	1.156	0.092	n/a
21	0.021	12.864	0.161	PASS
22	0.001	1.232	0.084	n/a
23	0.018	12.526	0.147	PASS
24	0.001	1.355	0.077	n/a
25	0.016	12.083	0.135	PASS
26	0.001	1.429	0.071	n/a
27	0.014	11.463	0.125	PASS
28	0.001	1.699	0.066	n/a
29	0.012	10.365	0.116	PASS
30	0.001	1.695	0.061	n/a
31	0.010	9.567	0.109	PASS
32	0.001	1.880	0.058	n/a
33	0.009	8.455	0.102	PASS
34	0.001	2.014	0.054	n/a
35	0.007	7.379	0.096	PASS
36	0.001	2.037	0.051	n/a
37	0.006	6.644	0.091	PASS
38	0.001	2.271	0.048	n/a
39	0.005	5.775	0.087	n/a
40	0.001	2.128	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	0.042			
2	0.002	0.136	1.620	n/a
3	0.036	1.030	3.450	PASS
4	0.002	0.295	0.645	n/a
5	0.036	2.090	1.710	PASS
6	0.001	0.318	0.450	n/a
7	0.035	3.041	1.155	PASS
8	0.001	0.403	0.345	n/a
9	0.033	5.473	0.600	PASS
10	0.001	0.501	0.276	n/a
11	0.031	6.292	0.495	PASS
12	0.001	0.554	0.230	n/a
13	0.029	9.300	0.315	PASS
14	0.001	0.679	0.197	n/a
15	0.027	12.052	0.225	PASS
16	0.001	0.728	0.173	n/a
17	0.025	12.668	0.199	PASS
18	0.001	0.774	0.153	n/a
19	0.023	12.960	0.178	PASS
20	0.001	0.899	0.138	n/a
21	0.021	12.948	0.161	PASS
22	0.001	0.986	0.125	n/a
23	0.019	12.620	0.147	PASS
24	0.001	1.055	0.115	n/a
25	0.016	12.195	0.135	PASS
26	0.001	1.079	0.106	n/a
27	0.014	11.598	0.125	PASS
28	0.001	1.316	0.099	n/a
29	0.012	10.523	0.116	PASS
30	0.001	1.263	0.092	n/a
31	0.011	9.703	0.109	PASS
32	0.001	1.467	0.086	n/a
33	0.009	8.652	0.102	PASS
34	0.001	1.551	0.081	n/a
35	0.007	7.511	0.096	PASS
36	0.001	1.593	0.077	n/a
37	0.006	6.782	0.091	PASS
38	0.001	1.711	0.073	n/a
39	0.005	5.948	0.087	PASS
40	0.001	1.628	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.

**KES Co., Ltd.**

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Report No.:

KES-EM-22T0674-R1

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Test Data - Voltage Fluctuations

Maximum Flicker results

■ AC 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

■ DC Mode

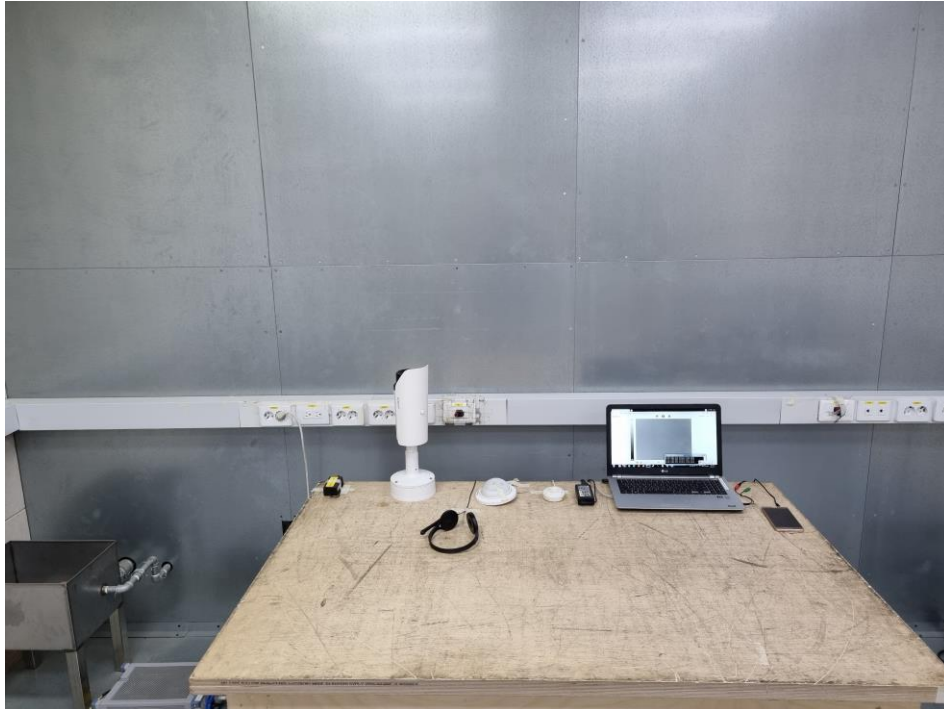
Flicker Measurements					
	Plt	Max Pst	Max Dc	Max Dmax	Max Tmax
Line 1:	0.028	0.028	0	< 0.2	0
Limits:	0.65	1	3.3	4	0.5
Results:	PASS	PASS	PASS	PASS	PASS

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Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports

■ AC, DC Mode



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Conducted Emissions at Telecommunication Ports

■ AC, DC Mode



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■ PoE Mode



Radiated Electric Field Emissions(Below 1 GHz)

■ AC, DC Mode



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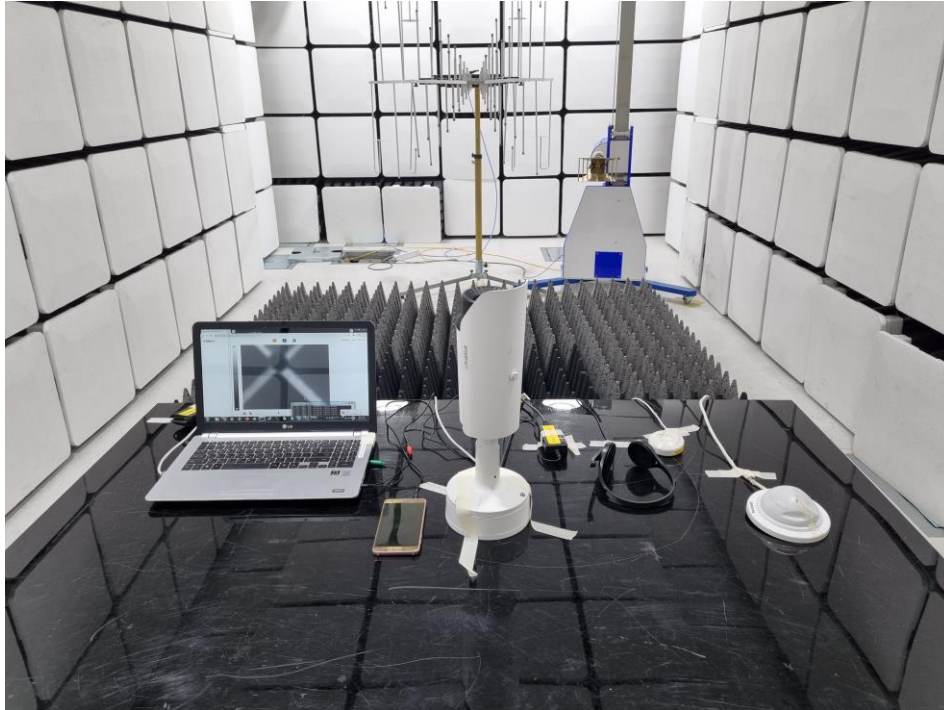
■ PoE Mode



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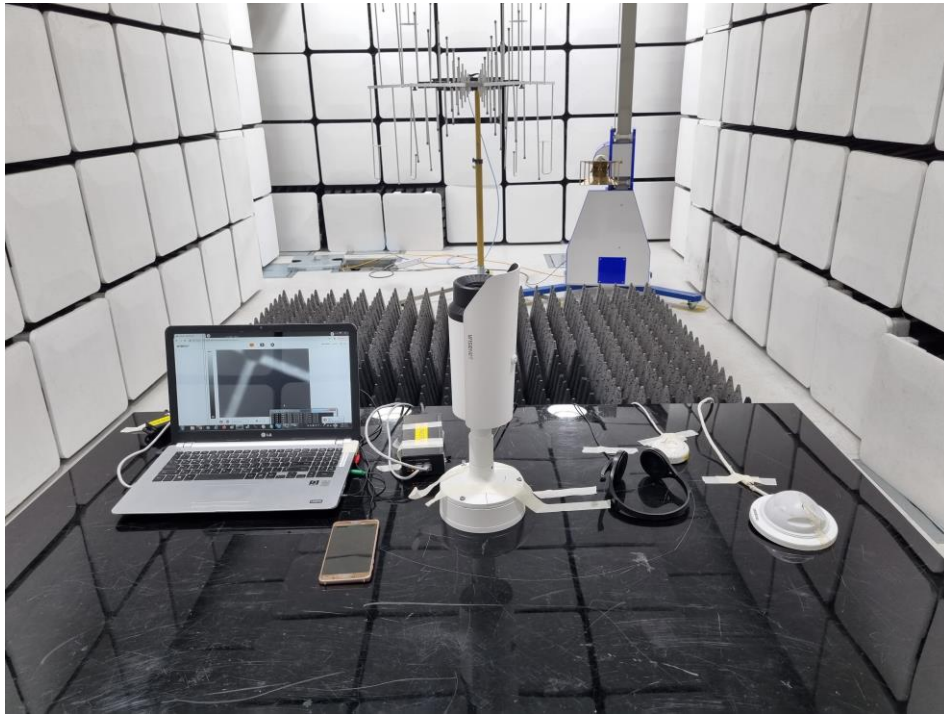
Radiated Electric Field Emissions(Above 1 GHz)

■ AC, DC Mode



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■ PoE Mode



Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ AC, DC Mode



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Electrostatic Discharge

■ AC, DC Mode



■ PoE Mode



Radiated Electric Field Immunity

■ AC, DC Mode

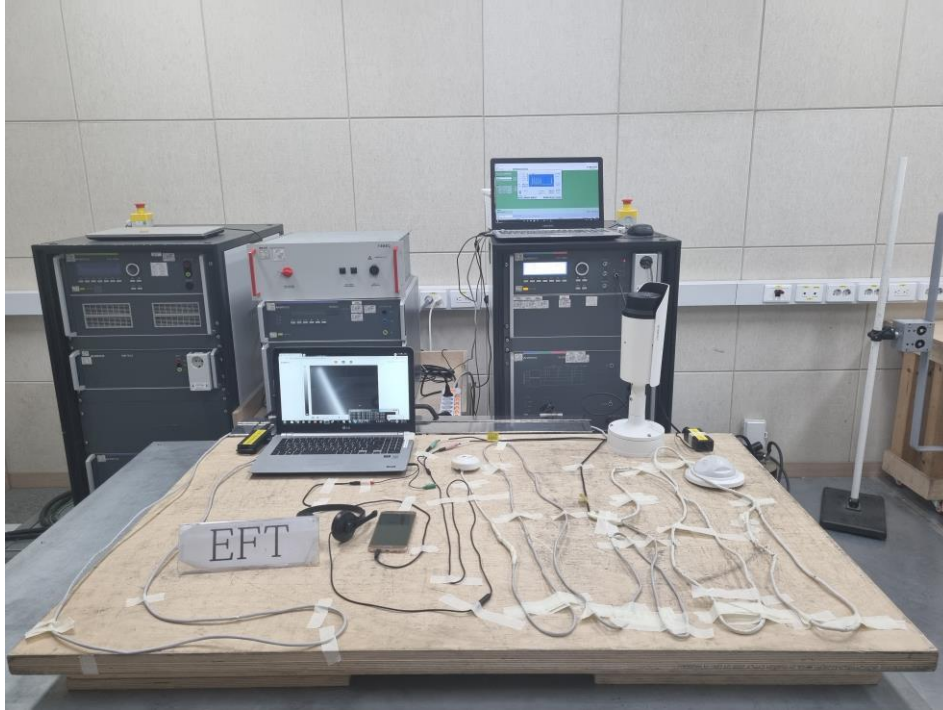


■ PoE Mode



Electrical Fast Transients/Bursts

■ AC, DC Mode



■ PoE Mode



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Surge Transients

■ AC, DC Mode



■ PoE Mode

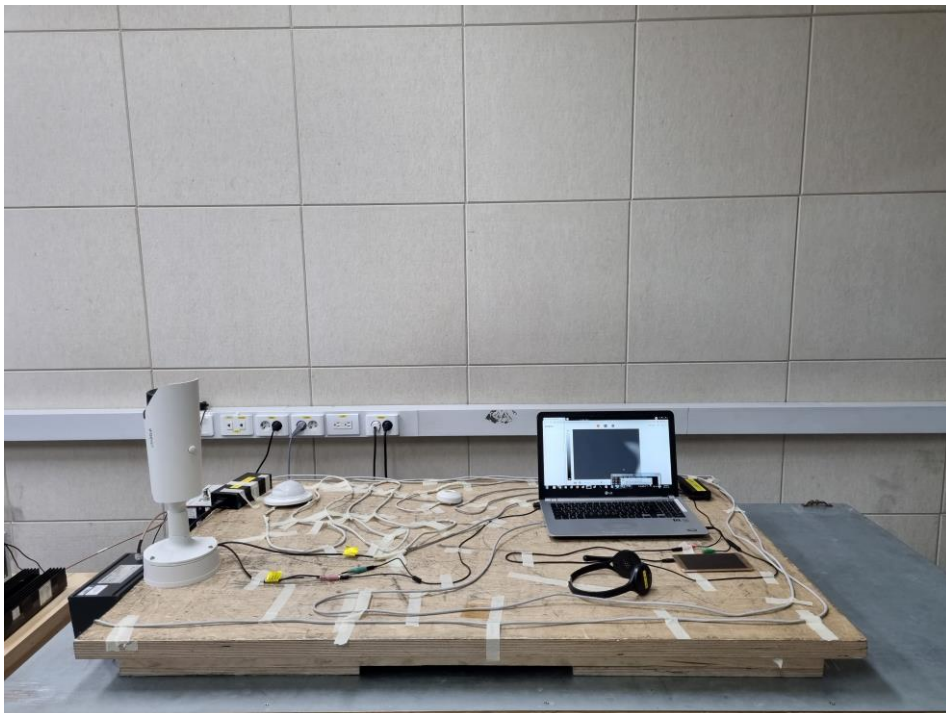


Conducted Disturbance

■ AC, DC Mode



■ PoE Mode



Voltage Dips and Short Interruptions

■ AC, DC Mode



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EUT External Photographs

(Top)

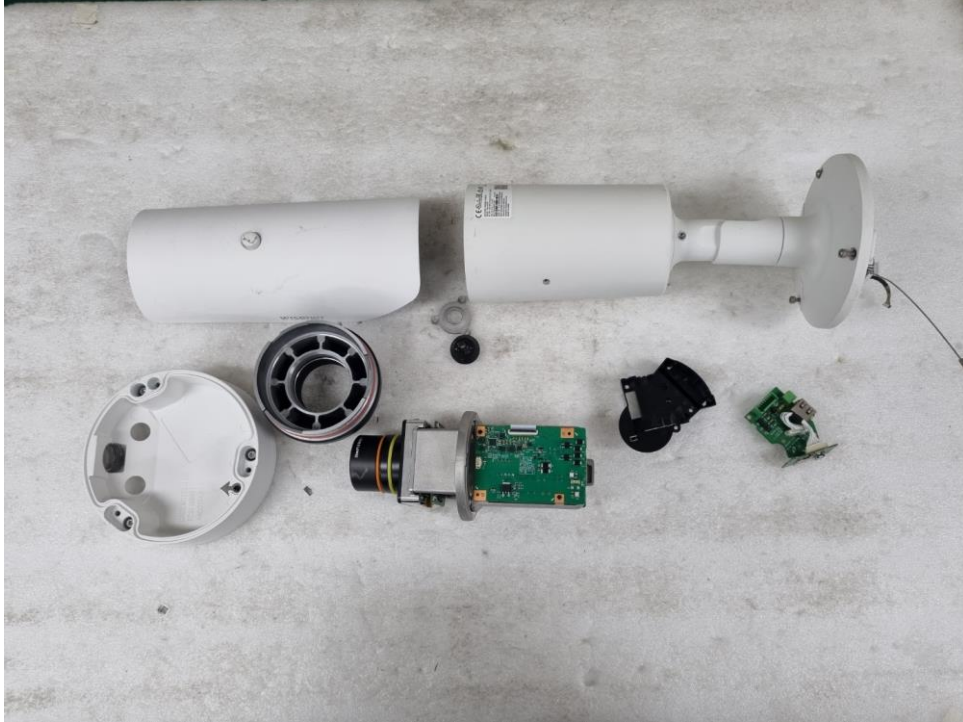


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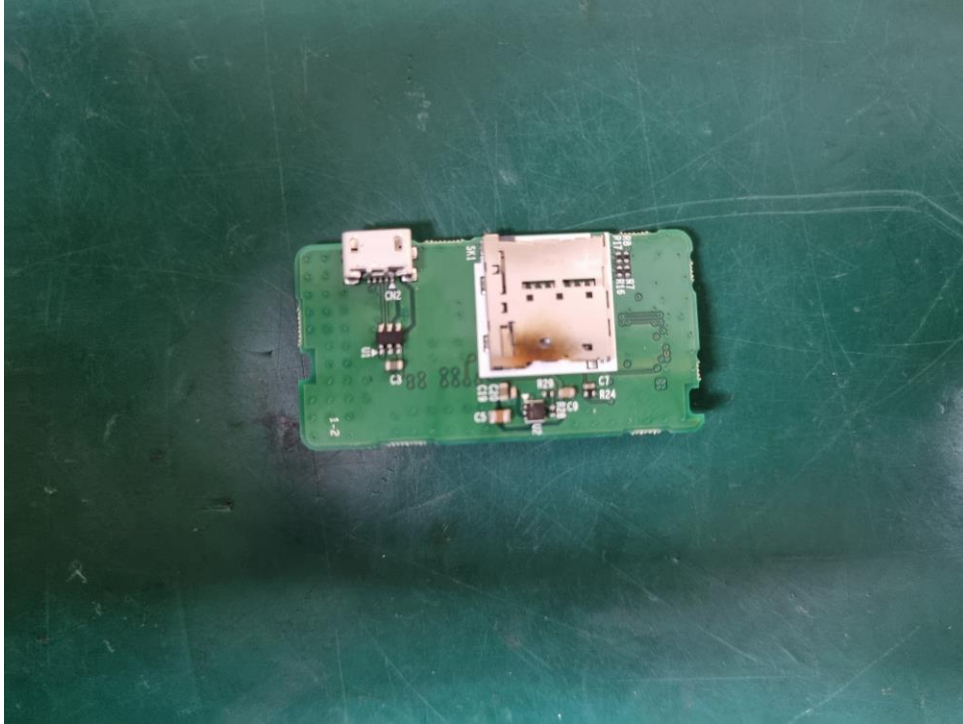
EUT Internal Photographs

(Internal View)



EUT Internal View – Board 1

(Top)



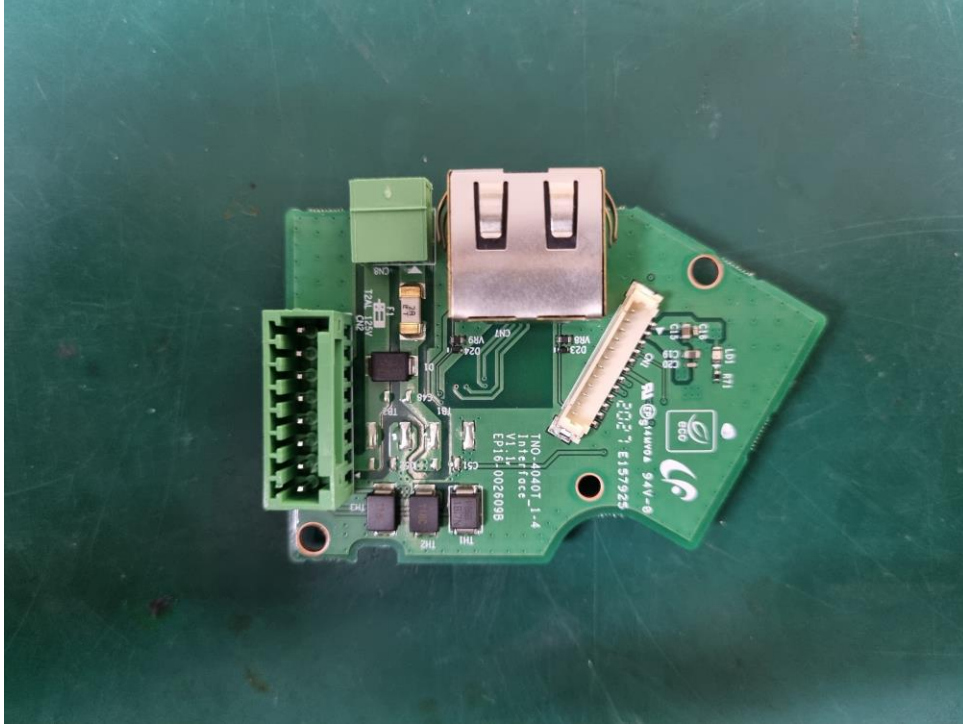
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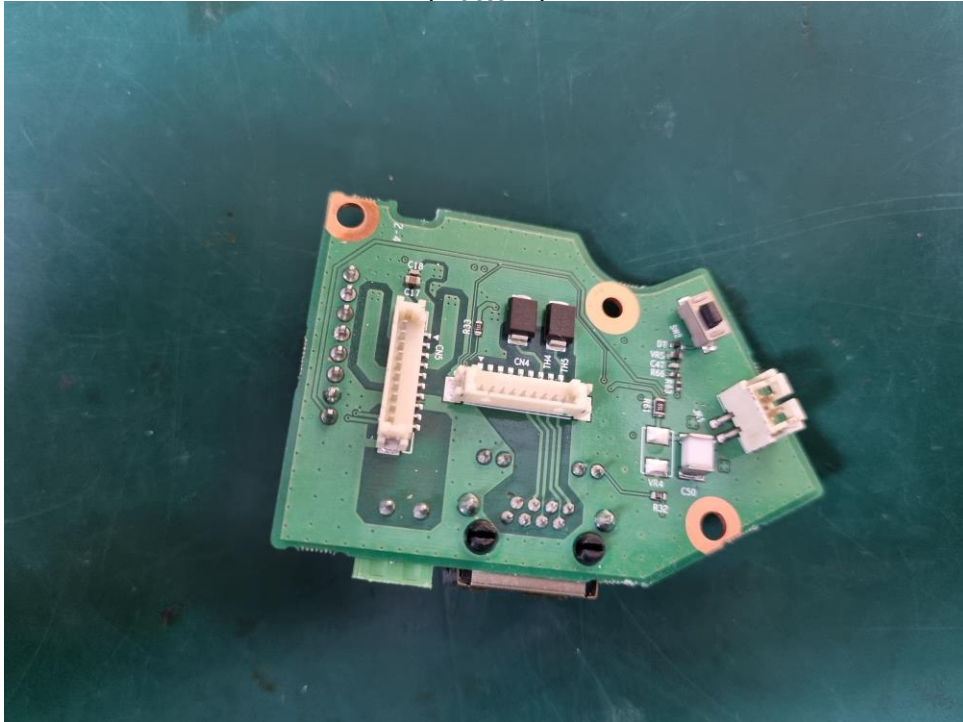
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EUT Internal View – Board 2

(Top)



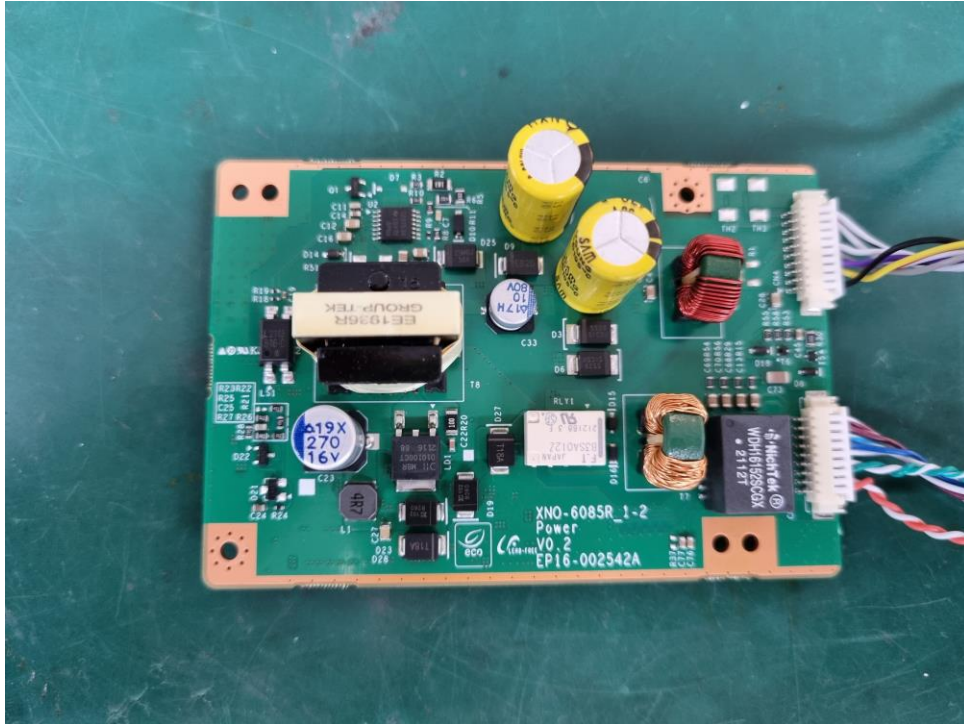
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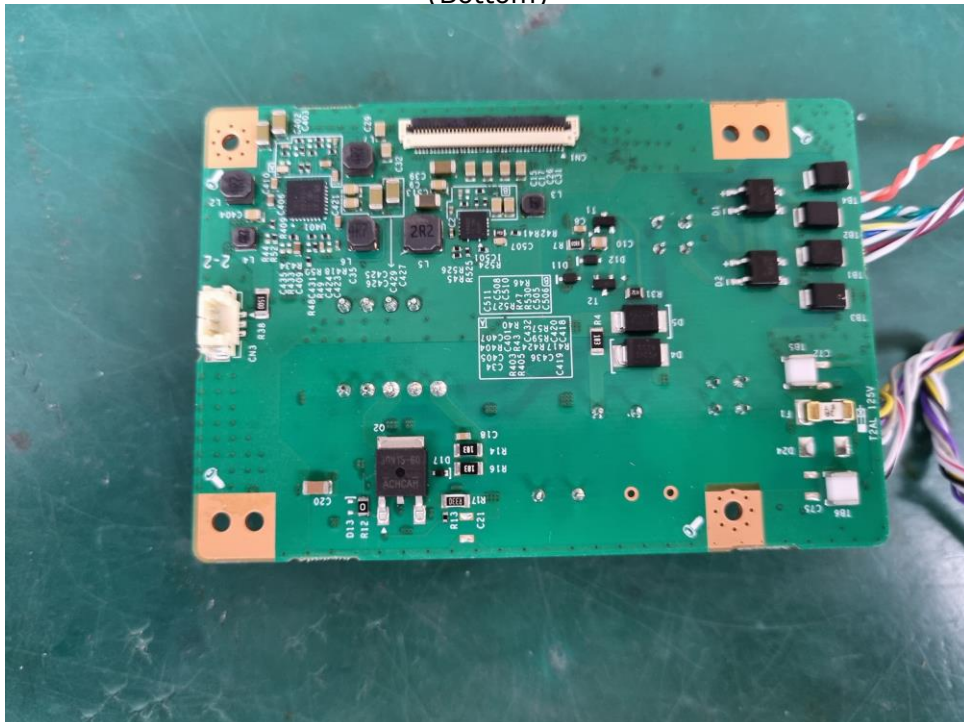
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EUT Internal View – Board 3

(Top)



(Bottom)

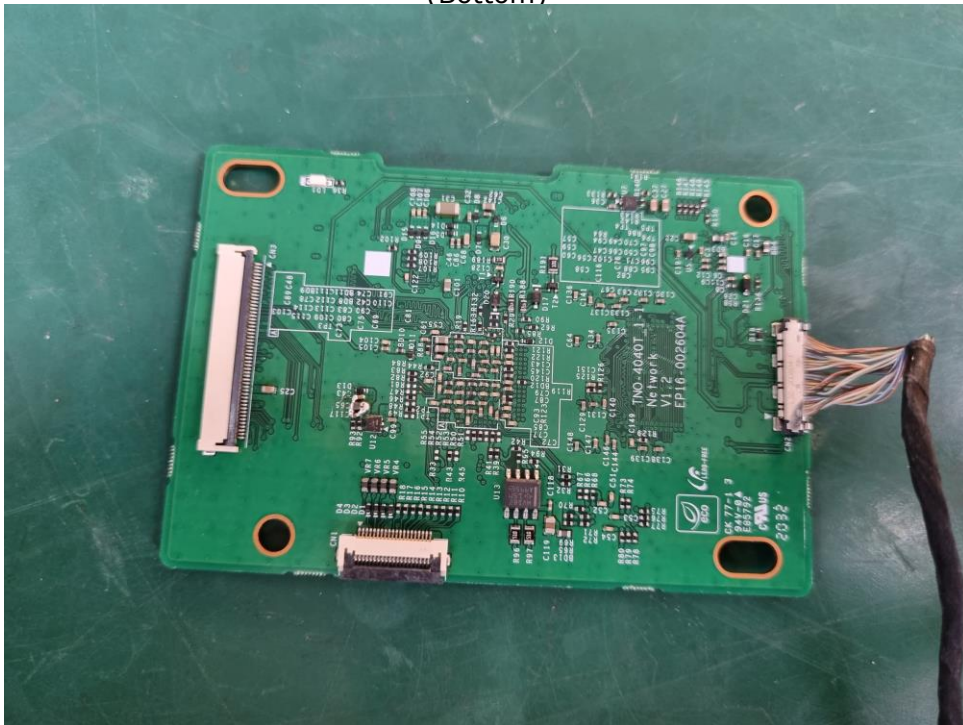


EUT Internal View – Board 4

(Top)



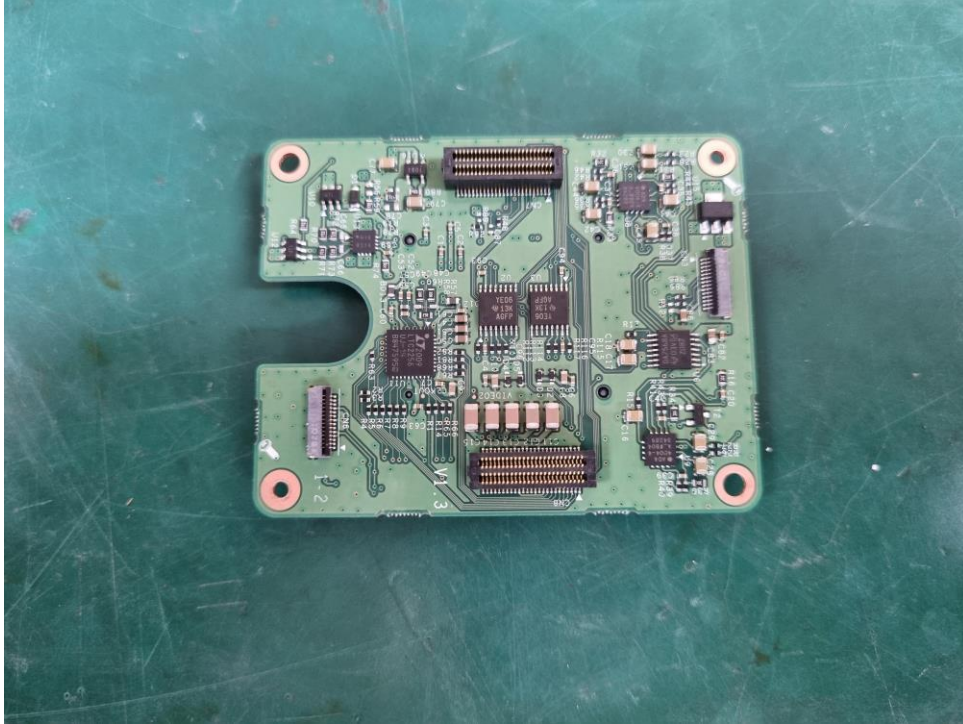
(Bottom)



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EUT Internal View – Board 5

(Top)



(Bottom)



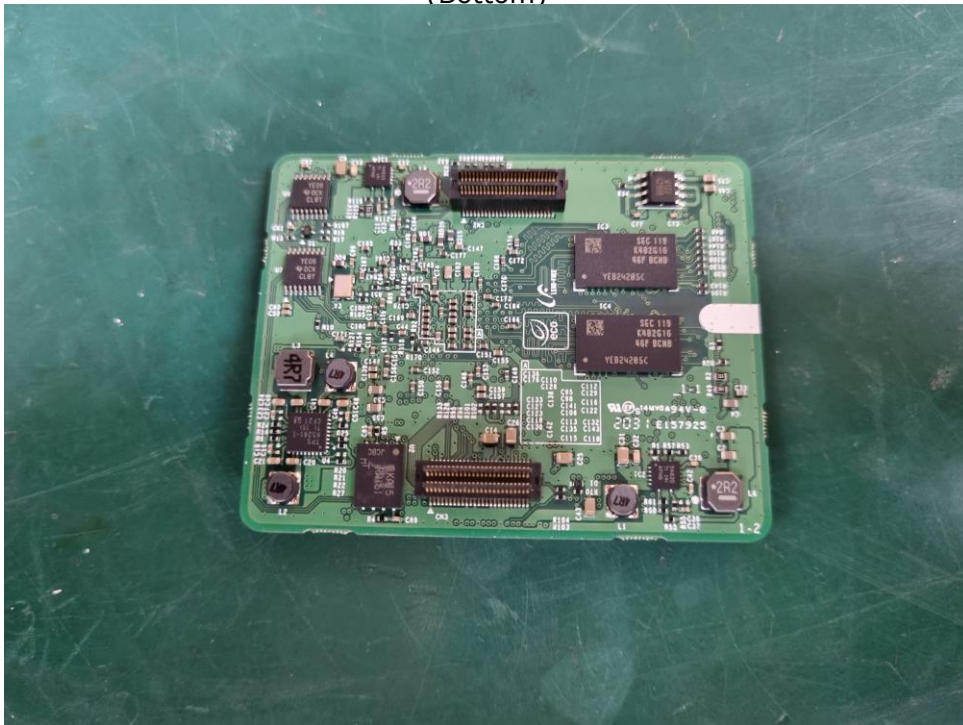
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EUT Internal View – Board 6

(Top)



(Bottom)



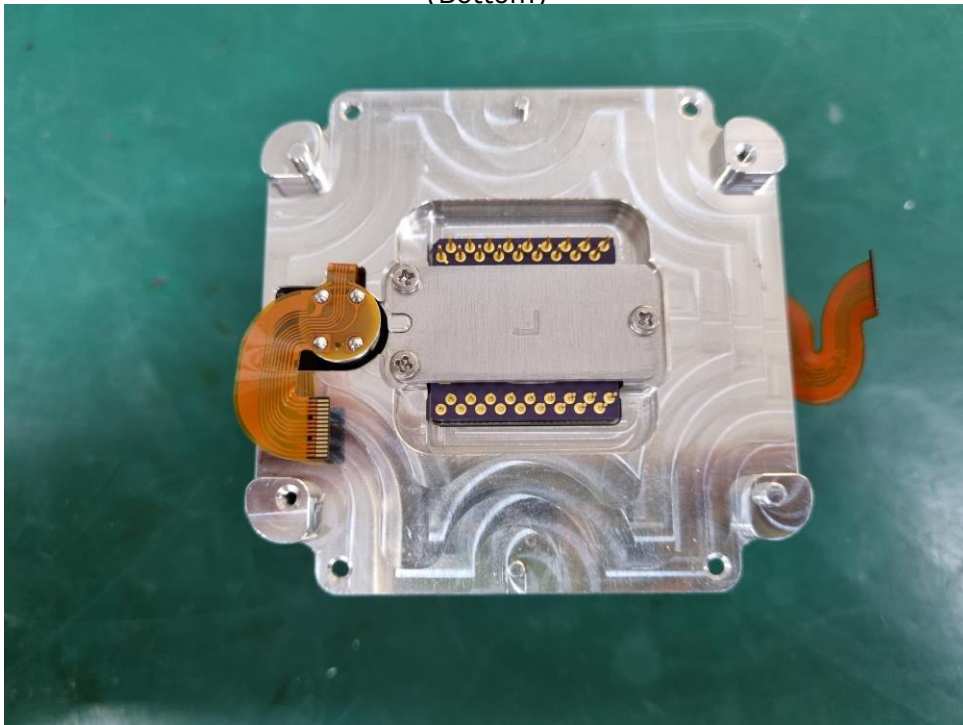
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EUT Internal View – Lens

(Top)

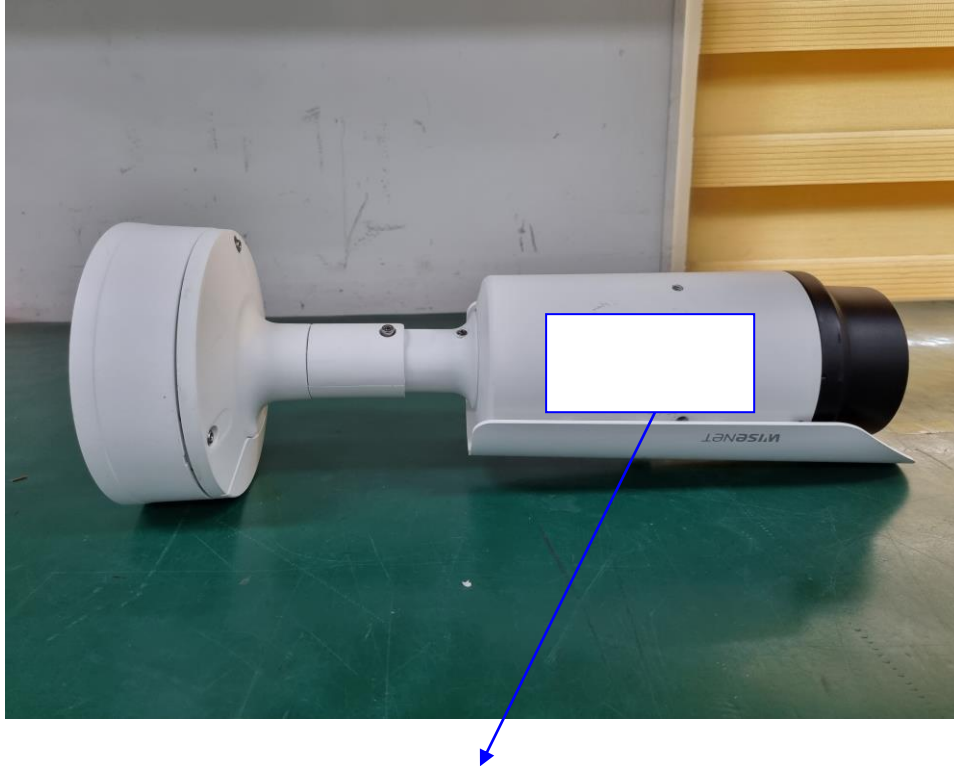


(Bottom)



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Manufacturer : HANWHA VISION VIETNAM COMPANY LIMITED

Made in Vietnam

