EMC TEST REPORT For CE

Test Report No.	:	KES-EM-22T0306-R1
Date of Issue	:	Feb. 24, 2023
Product name	:	THERMAL CAMERA
Model/Type No.	:	TNM-C4940TD
Variant Model	:	-
Applicant	:	Hanwha Vision Co., Ltd
Applicant Address	:	6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
Manufacturer	:	1. HANWHA VISION VIETNAM COMPANY LIMITED 2. D-TECH CO.,LTD.
Manufacturer Address	:	1. Lot O-2, Que Vo Industrial Zone extended area, Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam 2. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi- do, Korea (Suwon Industrial Complex)
Date of Receipt	:	Mar. 11, 2022
Test date	:	Mar. 16, 2022 ~ Mar. 21, 2022
Test Results	:	☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Tae Yeon, Kim
EMC Test Engineer

Tested by Ki Man, Kim
(Retired person)
Proxy signature : Tae Yeon, Kim

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. 04, 2022	KES-EM-22T0306	Issued
Feb. 24, 2023	KES-EM-22T0306-R1	- Change the Applicant and manufacturer at the request of the customer. - Update Test Regulation at customer request.

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1.0 General Product Description

Main Specifications of EUT are:

Spec Display Name	Thermal	Visible
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	12㎛	None
Min. Illumination	None	Color: 0.06Lux(F1.3, 1/30sec) BW: 0.004Lux(F1.3, 1/30sec), 0Lux(IR LED on)
Video Out	USB : Micro USB Type B	
Lens		
Focal Length (Zoom Ratio)	9.1mm fixed focal	4.4~9.3mm(2.2x) motorized varifocal
Max. Aperture Ratio	F1.0	F1.3(Wide)~F2.15(Tele)
Angular Field of View	H: 50.0°, V: 37.0°, D: 63.8°	H:112.1°(Wide)~47.5°(Tele) / V:58.0°(Wide)~26.6°(Tele) / D:137.5°(Wide)~54.6°(Tele)
Min. Object Distance	3.5m(11.48ft)	Wide: 1.75m(5.74ft) / Tele: 5.21m(17.09ft)
Focus Control	Fixed	Simple focus
Lens Type	None	
Mount Type	None	
Optional Lens	None	
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)
Defog	None	None
Motion Detection	8ea, polygonal zones	
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)
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	

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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	30m
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	WiseStream II	Manual(Sea area), WiseStream III
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)	
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 25.5W $12V_{DC}$: Max 21.5W	
Mechanical		
Color / Material	White / Aluminum	
RAL Code	RAL9003	
Product Dimensions / Weight	353.4 * 287.5 * 191.2mm (13.92 * 11.32 * 7.53in) / 4.533kg	
DORI (EN62676-4 standard)		
Detect (25PPM/ 8PPF)	None	Wide: 51.7m(169.94ft) / Tele: 174.5m(572.64ft)
Observe (63PPM/ 19PPF)	None	Wide: 20.7m(67.85ft) / Tele: 69.8m(229.06ft)
Recognize (125PPM/ 38PPF)	None	Wide: 10.3m(33.93ft) / Tele: 34.9m(114.53ft)
Identify (250PPM/ 76PPF)	None	Wide: 5.2m(16.96ft) / Tele: 17.5m(57.26ft)

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1.1 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

☒ AC 230 V, 50 Hz ☒ PoE

1.2 Variant Model Differences

Not applicable

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

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

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1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Adaptor	2ACB022F	-	Channel Well Technology (Guangzhou) Co., Ltd.	-
PoE Adaptor	PT-PSE106GBR-AH-S	-	Dongguan PROCET Network Technology Co., Ltd	-
Notebook	Latitude 5300	8C47BE45C060	DELL INC.	-
Notebook Adaptor	HA65NM130	-	Chicony Power Technology(Suzhou) Co.,Ltd.	-
MIC	MP1000	-	-	-
Headset	K550	-	Britz®	-
Alarm1	-	-	-	-
Alarm2	-	-	-	-
USB LAN Ccard	U2500	-	ipTIME	-
Micro SD Card1	-	-	SanDisk	32 GB
Micro SD Card2	-	-	SanDisk	32 GB

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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	Adaptor	2 Pin	1.2	U
	RJ-45	USB LAN Card	RJ-45	3.0	S
	3.5 mm	Headset	3.5 mm	1.7	U
	3.5 mm		3.5 mm	1.7	U
	SLOT	Micro SD Card1	SLOT	-	-
	SLOT	Micro SD Card2	SLOT	-	-
	2 Pin	Alarm1	2 Pin	3.0	U
	2 Pin	Alarm2	2 Pin	3.0	U
Notebook	DC Jack	Notebook Adaptor	DC Jack	1.2	U
	3.5 mm	MIC	3.5 mm	1.7	U
	USB	USB LAN Card	USB	0.1	S

* 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 Adaptor	RJ-45 (PoE)	3.0	S
	3.5 mm	Headset	3.5 mm	1.7	U
	3.5 mm		3.5 mm	1.7	U
	SLOT	Micro SD Card1	SLOT	-	-
	SLOT	Micro SD Card2	SLOT	-	-
	2 Pin	Alarm1	2 Pin	3.0	U
	2 Pin	Alarm2	2 Pin	3.0	U
Notebook	DC Jack	Notebook Adaptor	DC Jack	1.2	U
	3.5 mm	MIC	3.5 mm	1.7	U
	USB	USB LAN Card	USB	0.1	S
PoE Adaptor	RJ-45 (LAN)	USB LAN Card	RJ-45 (LAN)	3.0	S

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

operating
EUT Monitoring, Ping Test After the test, the Micro SD Card was checked to see if it was recorded normally.

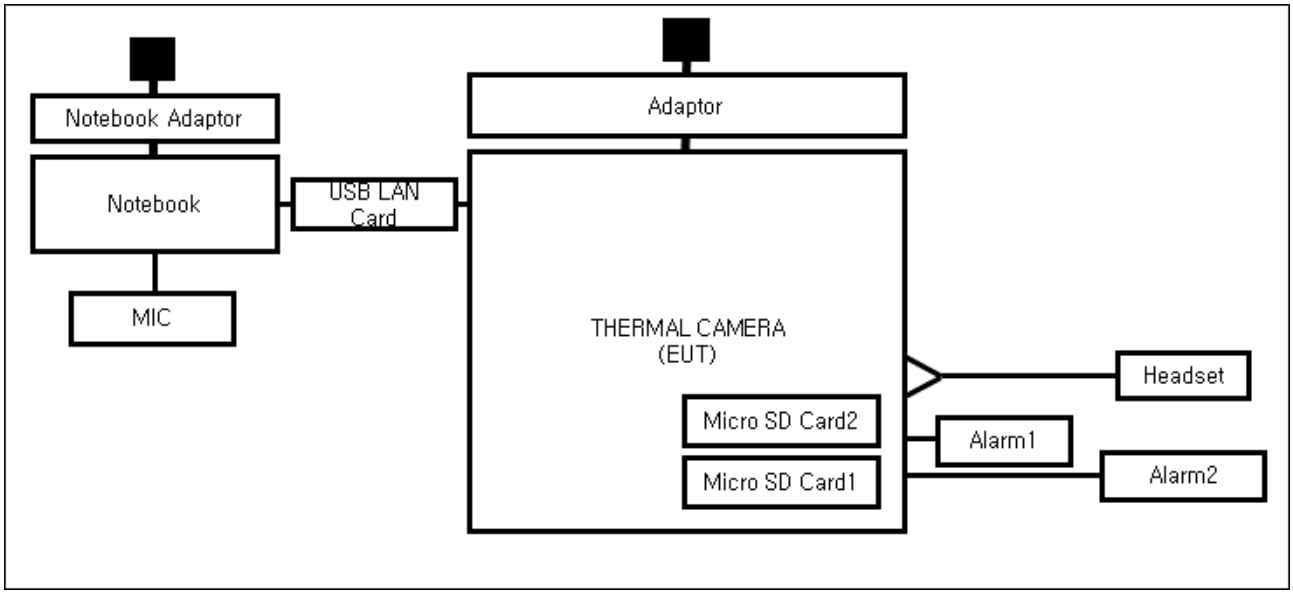
EUT Test operating S/W		
Name	Version	Manufacture Company
Web Viewer	-	Hanwha Vision Co., Ltd

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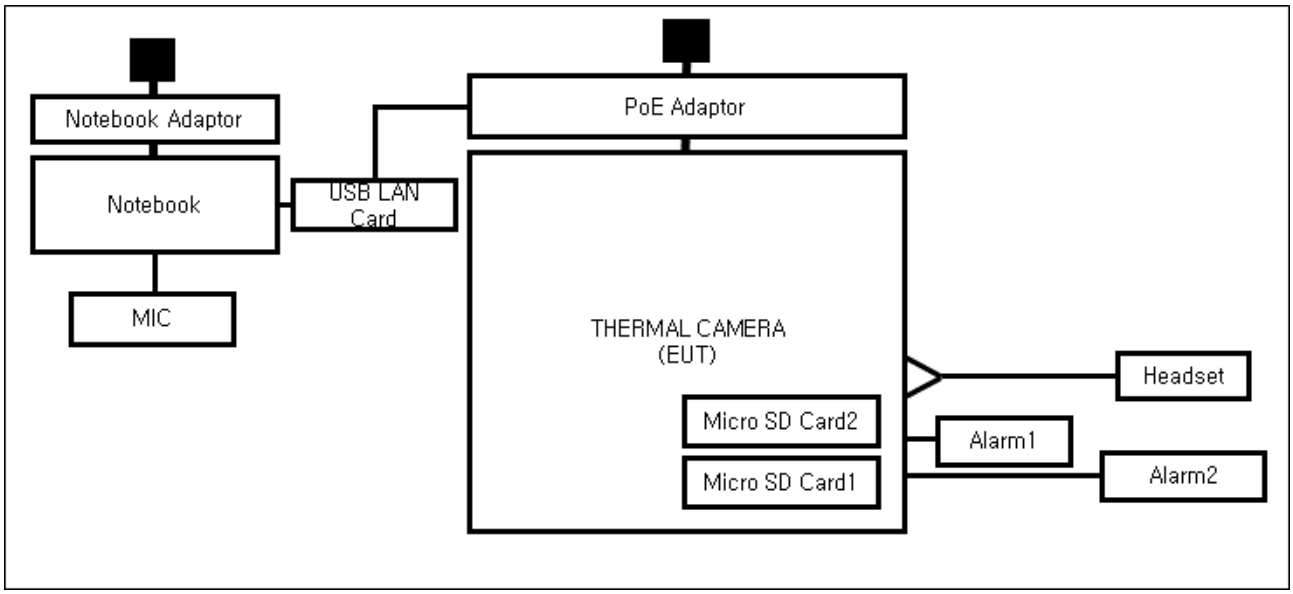
1.8 Configuration

■ AC Main
□ DC Main

■ DC Mode



■ PoE Mode



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1.9 Remarks when standards applied

USB port is not tested because it is an unused port.

1.10 Calibration Details of Equipment Used for Measurement

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

1.11 Test Facility

The measurement facility is located at 473-21, Gayeo-ro, Yeoju-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

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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

☒ BS EN 61000-3-2:2014

☒ BS EN 61000-3-3:2013

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2.1 Conducted Emissions at Mains Power Ports

Test Date
Mar. 16, 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: (24,4 ± 0,1) ℃
Relative Humidity: (43,8 ± 0,2) % R.H.

Frequency Range of Measurement
150 ㎑ to 30 ㎒

Instrument Settings
IF Band Width: 9 ㎑

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

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2.2 Conducted Emissions at Telecommunication Ports

Test Date
Mar. 16, 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: (24,4 ± 0,1) ℃
Relative Humidity: (43,8 ± 0,1) % R.H.

Frequency Range of Measurement
150 ㎑ to 30 ㎒

Instrument Settings
IF Band Width: 9 ㎑

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
- See Appendix A for test data.
- For Ethernet interfaces, measurements are required at the highest data rate supported by the interface.

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2.3 Radiated Electric Field Emissions(Below 1 ㎓)

Test Date
Mar. 16, 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: (24,0 ± 0,2) ℃
Relative Humidity: (43,9 ± 0,2) % R.H.

Frequency Range of Measurement
30 ㎒ to 1 ㎓

Instrument Settings
IF Band Width: 120 ㎑

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

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2.4 Radiated Electric Field Emissions(Above 1 ㎓)

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	03, 31, 2023
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	12, 16, 2022
☒	PREAMPLIFIER	8449B	HP	3008A00538	06, 21, 2022

Test Conditions
Temperature: (24,7 ± 0,2) ℃
Relative Humidity: (43,9 ± 0,3) % R.H.

Frequency Range of Measurement
1 ㎓ to 6 ㎓

Instrument Settings
IF Band Width: 1 ㎒

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

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2.5 Harmonic Current Emissions

Test Date
Mar. 16, 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: (23,7 ± 0,1) ℃
Relative Humidity: (54,4 ± 0,1) % R.H.

Classification of Equipment for Harmonic Current Emissions
☒ Class A
☐ Class B
☐ Class C(Below 25 W)
☐ Class C(Above 25 W)
☐ Class D

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

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2.6 Voltage Fluctuations and Flicker

Test Date
Mar. 16, 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: (23,7 ± 0,2) ℃
Relative Humidity: (54,4 ± 0,3) % R.H.

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

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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.

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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 dBμV.

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 dBμV, 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 dBμV, 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 dBμV.

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.

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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: (23,7 ± 0,2) ℃
Relative Humidity: (44,5 ± 0,3) % 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

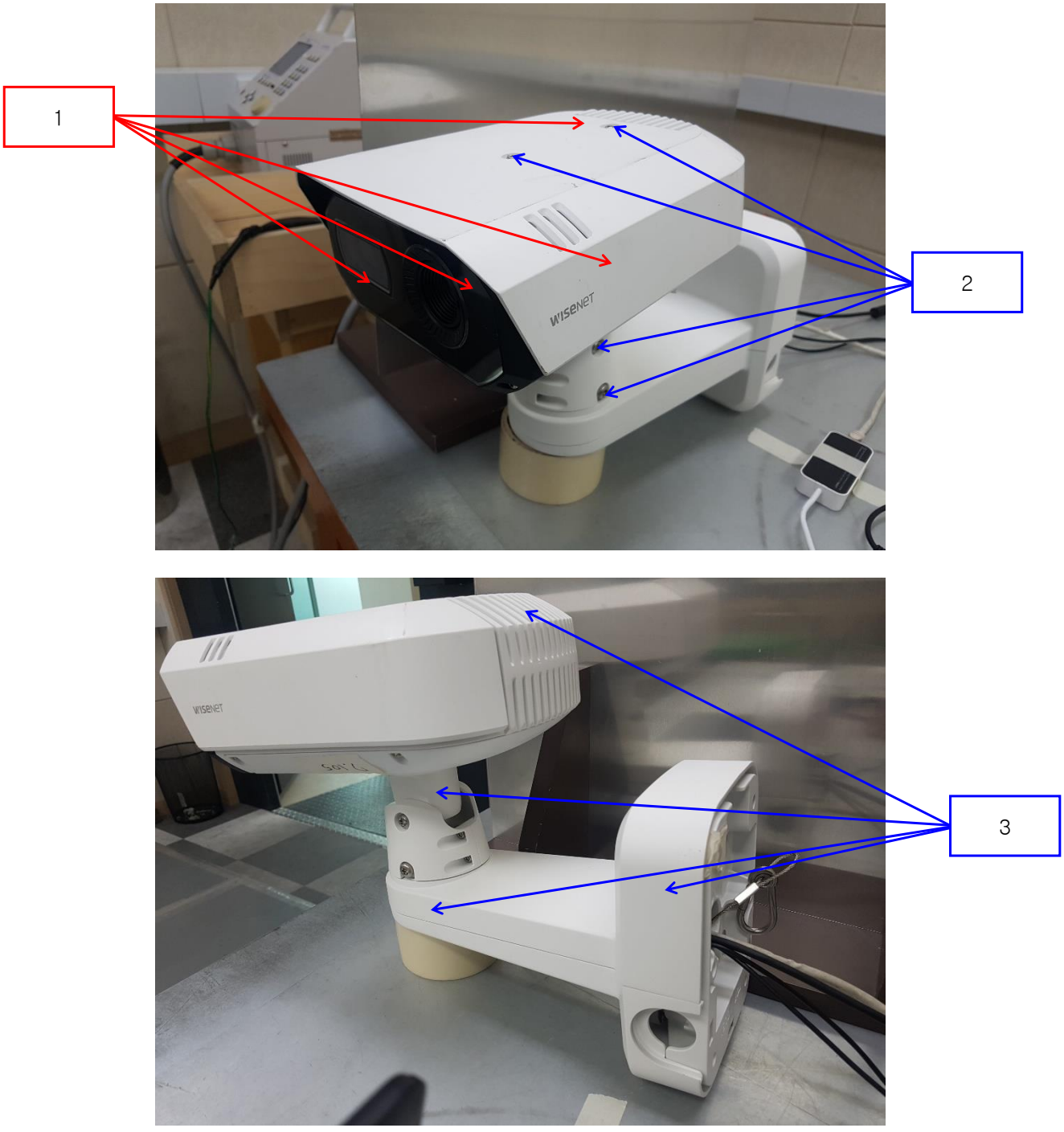
Required Performance Criteria: ☒ Complied

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Location of Discharge:

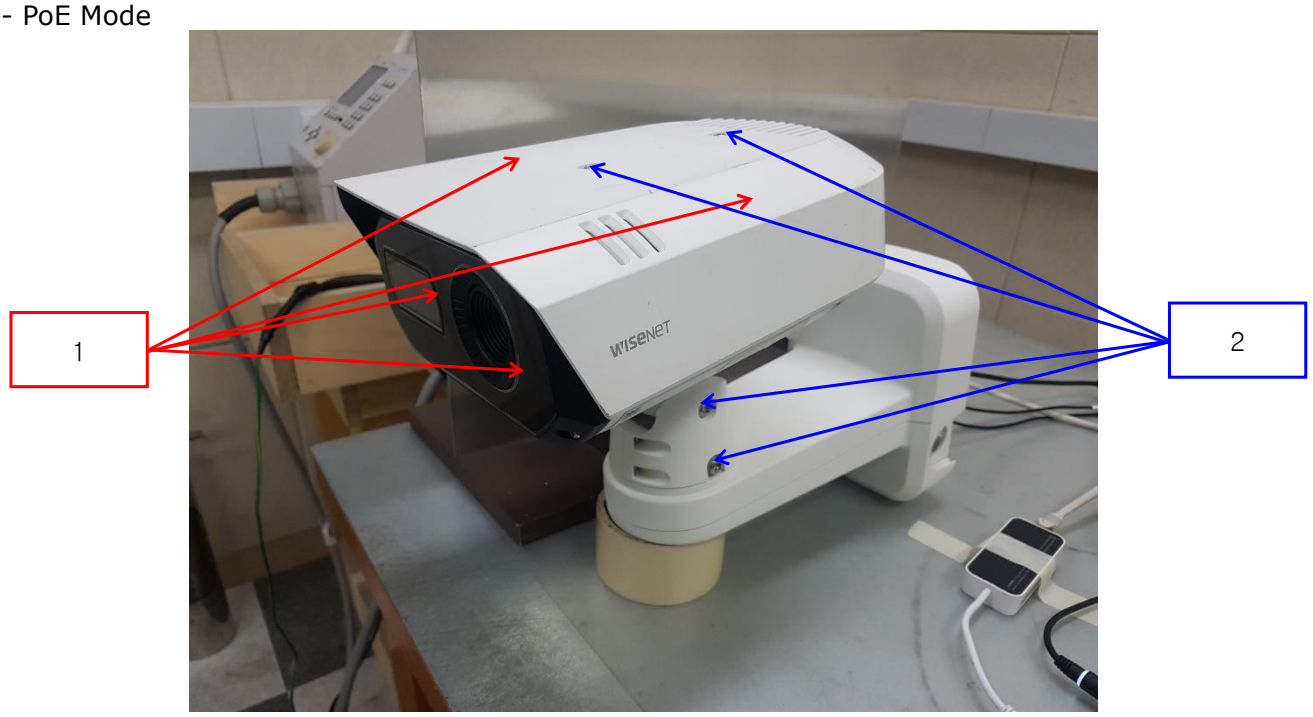
Air
Contact

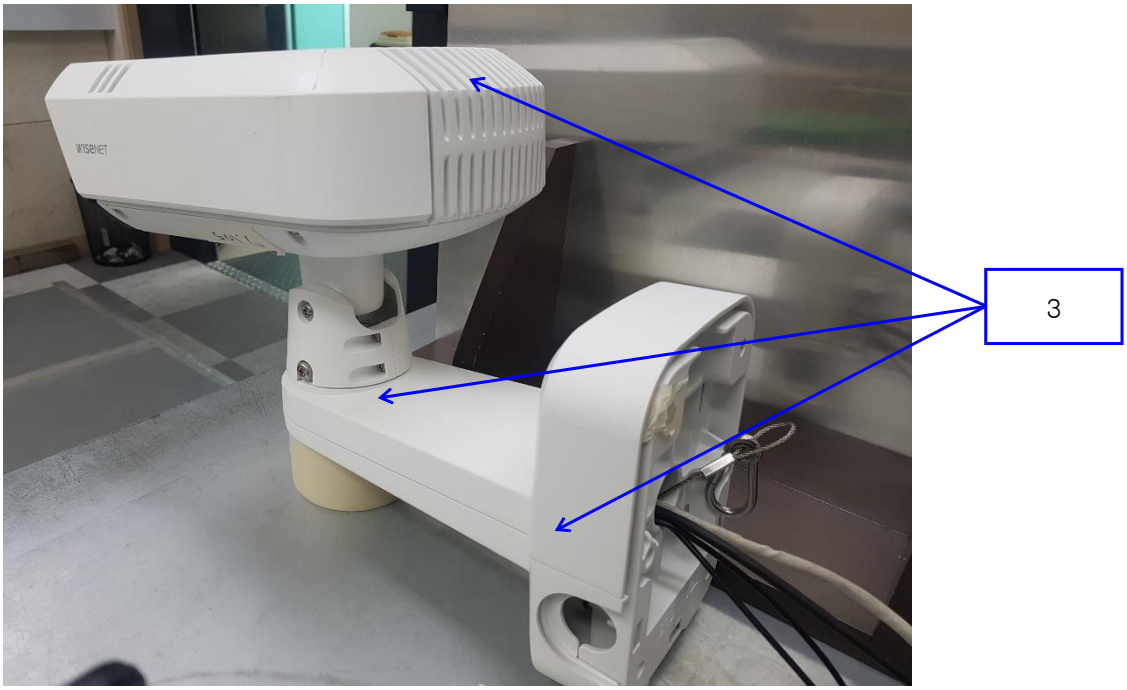
- DC Mode



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- PoE Mode





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Test Data

■ DC Mode

No.	Test Point	Discharge Method	Observations	Remarks
1	HCP Contact	Contact Discharge	Complied	-
2	VCP Contact	Contact Discharge	Complied	-

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Enclosure 1	Air Discharge	Complied	-
2	Screw	Contact Discharge	Complied	-
3	Enclosure 2	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 1	Air Discharge	Complied	-
2	Screw	Contact Discharge	Complied	-
3	Enclosure 2	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. 18, 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
☒	CW POWER SENSOR	E4412A	Agilent	US38488240	04, 01, 2022
☒	CW POWER SENSOR	E4412A	Agilent	MY41501662	03, 31, 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: (25,2 ± 0,2) ℃
Relative Humidity: (45,1 ± 0,4) % R.H.
Atmospheric Pressure: (99,6 ± 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 ☒ 10 V/m	☐ 3 V/m
Frequency Range:	☐ 80 MHz to 1 GHz ☒ 80 MHz to 2,7 GHz	☐ 1,4 GHz 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	03, 31, 2023
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	12, 03, 2022

Test Conditions

Temperature:	(23,7 ± 0,3) ℃
Relative Humidity:	(44,5 ± 0,3) % R.H.
Atmospheric Pressure:	(100,4 ± 0,0) ㎪

Test Specifications

Pulse Amplitude & Polarity: (AC Power Lines)	☐ ± 1.0 ㎸ ☐ ± 4.0 ㎸	☒ ± 2.0 ㎸
Pulse Amplitude & Polarity: (Other supply / Signal Lines)	☐ ± 0.5 ㎸ ☐ ± 2.0 ㎸	☒ ± 1.0 ㎸
Burst Period:	☒ 300 ㎳	☐ 2 s
Repetition Rate:	☐ 5 ㎑	☒ 100 ㎑
Duration of Test Voltage:	☒ ≥ 1 min	
Required Performance Criteria:	☒ Complied	

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Test Data

■ DC Mode

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (㎸)	(-) Burst (㎸)
RJ-45	Complied	Complied
Alarm In	Complied	Complied
Alarm Out	Complied	Complied

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■ PoE Mode

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

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

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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: (23,7 ± 0,3) ℃
Relative Humidity: (44,5 ± 0,4) % R.H.
Atmospheric Pressure: (100,4 ± 0,0) ㎪

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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 (㎸)	(-) Surge (㎸)
L – N	Complied	Complied

☐ Line to Earth – Common Mode

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

Signal Lines

☒ Line to Earth – Common Mode

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

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■ PoE Mode
☐ Line to Line – Differential Mode

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

☐ Line to Earth – Common Mode

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

Signal Lines

☒ Line to Earth – Common Mode

Mode of Application	Coupling Method	Observations	
		(+) Surge (㎸)	(-) Surge (㎸)
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
☐ NOT APPLICABLE

Remarks

PASS Required Performance Criteria

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3.5 Conducted Disturbance

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

Test Date
Mar. 17, 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 ST08A	TESEQ	43886	11, 24, 2022
☒	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 25, 2022

Test Conditions
Temperature: (24,8 ± 0,3) ℃
Relative Humidity: (43,7 ± 0,5) % R.H.
Atmospheric Pressure: (100,5 ± 0,0) kPa

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Test Specifications

Frequency range:	☒ 150 ㎑ to 100 ㎒	☐ 150 ㎑ to 80 ㎒
Voltage Level:	☐ 1 Vrms ☒ 10 Vrms	☐ 3 Vrms
Modulation:	☒ AM, 80 %, 1 ㎑ sine wave ☒ PM, 1 ㎐ (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
Alarm In	Clamp	Complied
Alarm Out	Clamp	Complied

■ PoE Mode

☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	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

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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	AMETEK CTS	7.1.2	-
☒	ULTRA COMPACT SIMULATOR	UCS 500 N5	EM TEST	V0936105120	03, 31, 2023
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	03, 31, 2023

Test Conditions
Temperature: (23,7 ± 0,1) ℃
Relative Humidity: (44,5 ± 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 ㎐)]	Results
☒ 20 % dip	☒ 250 / 5 000	Complied
☒ 30 % dip	☒ 25 / 500	Complied
☒ 60 % dip	☒ 10 / 200	Complied
☒ 100 % dip	☒ 250 / 5 000	Degradation

- Voltage variations

☒ Unom + 10 %	☒ 253.0 V (ac)	Complied
☒ Unom - 15 %	☒ 195.5 V (ac)	Complied

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

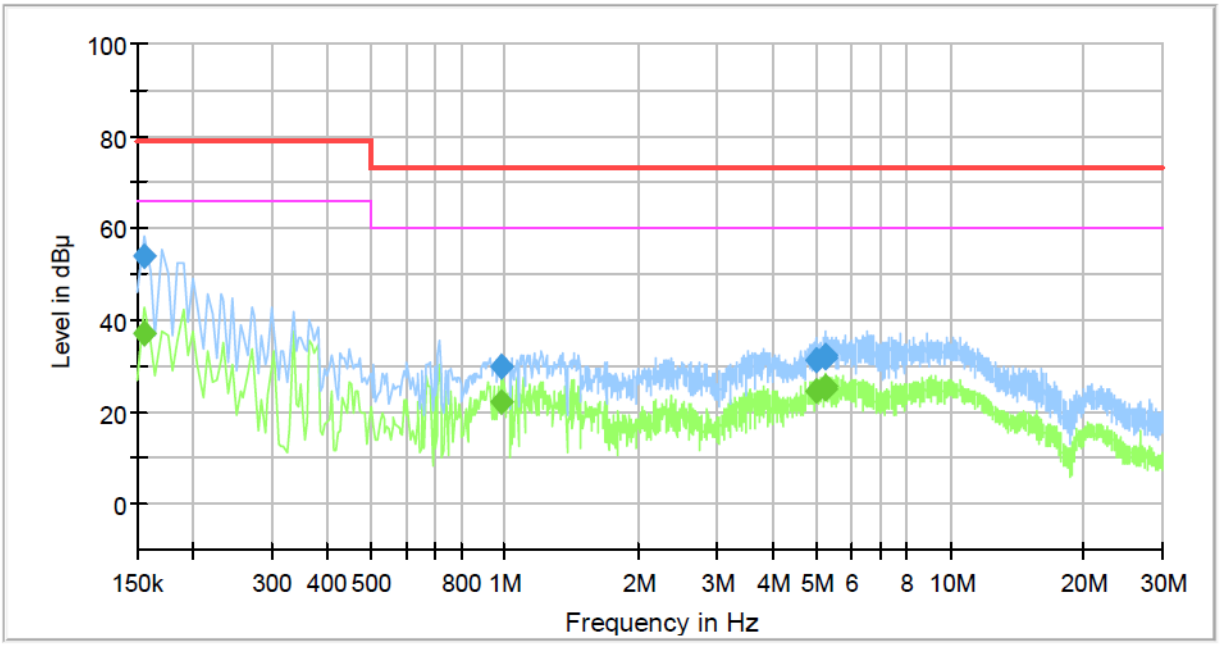
Conducted Emissions at Mains Power Ports

■ DC Mode

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	TNM-C4940TD
Phase:	L1
Mode:	DC
Operator Name:	KES



Final_Result

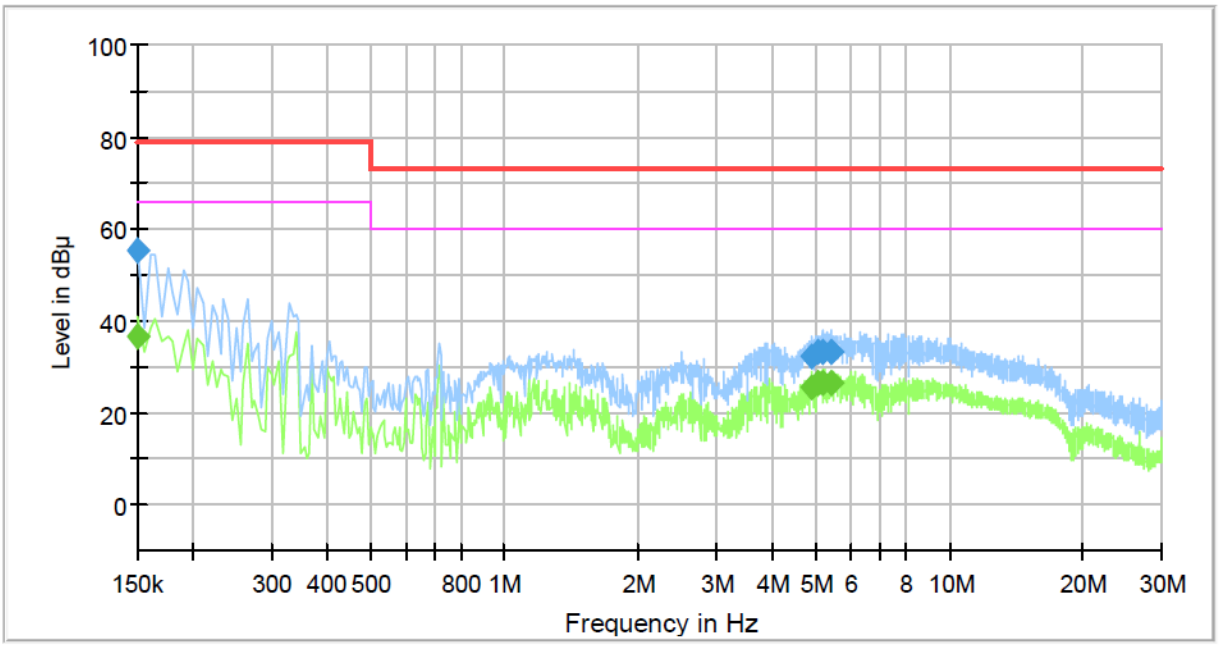
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	37.05	66.00	28.95	1000.0	9.000	L1	19.4
0.155000	53.72	---	79.00	25.28	1000.0	9.000	L1	19.4
0.985000	---	22.02	60.00	37.98	1000.0	9.000	L1	20.0
0.985000	29.85	---	73.00	43.15	1000.0	9.000	L1	20.0
4.990000	---	24.52	60.00	35.48	1000.0	9.000	L1	19.6
4.990000	31.11	---	73.00	41.89	1000.0	9.000	L1	19.6
5.230000	---	25.18	60.00	34.82	1000.0	9.000	L1	19.6
5.230000	31.93	---	73.00	41.07	1000.0	9.000	L1	19.6
5.260000	---	25.57	60.00	34.43	1000.0	9.000	L1	19.6
5.260000	32.15	---	73.00	40.85	1000.0	9.000	L1	19.6

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[NEUTRAL]

Common Information

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



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	---	36.44	66.00	29.56	1000.0	9.000	N	19.4
0.150000	55.20	---	79.00	23.80	1000.0	9.000	N	19.4
4.910000	---	25.47	60.00	34.53	1000.0	9.000	N	19.6
4.910000	32.07	---	73.00	40.93	1000.0	9.000	N	19.6
5.080000	---	26.57	60.00	33.43	1000.0	9.000	N	19.6
5.080000	33.14	---	73.00	39.86	1000.0	9.000	N	19.6
5.165000	---	26.64	60.00	33.36	1000.0	9.000	N	19.6
5.165000	33.19	---	73.00	39.81	1000.0	9.000	N	19.6
5.440000	---	26.40	60.00	33.60	1000.0	9.000	N	19.6
5.440000	33.39	---	73.00	39.61	1000.0	9.000	N	19.6

♦ Calculation
QuasiPeak[㏈uV] / CAverage [㏈uV] = Reading Value[㏈uV] + Corr. [㏈]
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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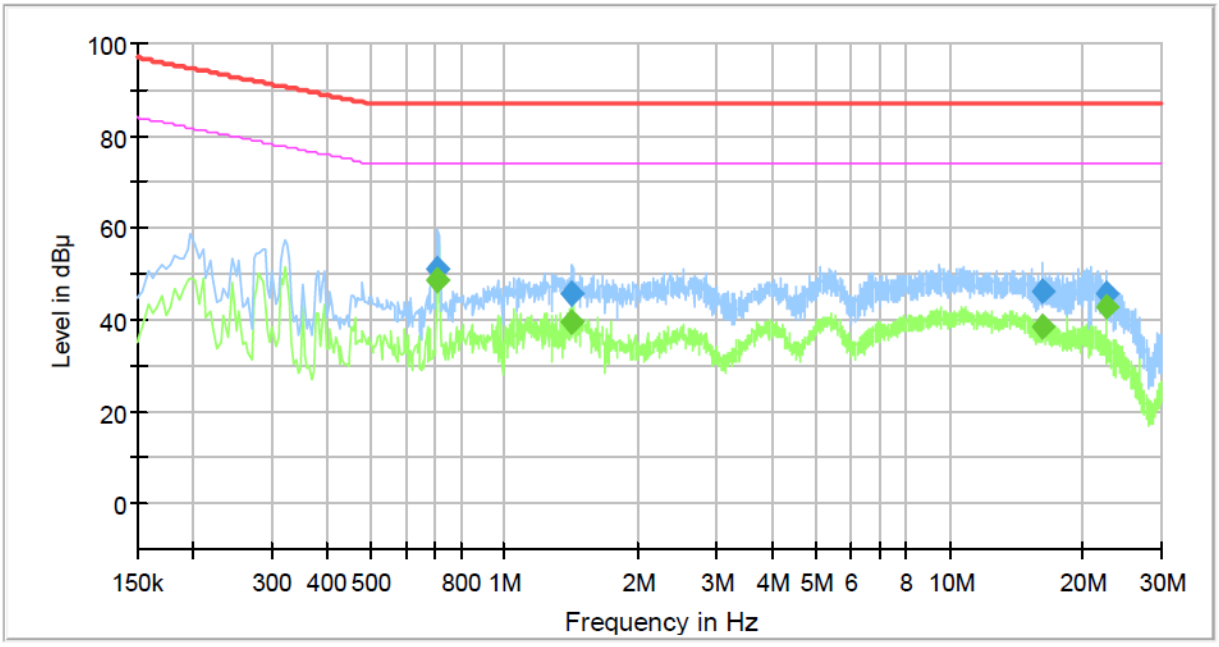
Conducted Emissions at Telecommunication Ports

■ DC Mode

[1 000 Mbps]

Common Information

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



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.710000	---	48.41	74.00	25.59	1000.0	9.000	Single Line	19.8
0.710000	51.23	---	87.00	35.77	1000.0	9.000	Single Line	19.8
1.422000	---	39.28	74.00	34.72	1000.0	9.000	Single Line	20.1
1.422000	45.92	---	87.00	41.08	1000.0	9.000	Single Line	20.1
16.186000	---	38.64	74.00	35.36	1000.0	9.000	Single Line	19.8
16.186000	46.42	---	87.00	40.58	1000.0	9.000	Single Line	19.8
22.530000	---	42.88	74.00	31.12	1000.0	9.000	Single Line	20.2
22.530000	45.93	---	87.00	41.07	1000.0	9.000	Single Line	20.2

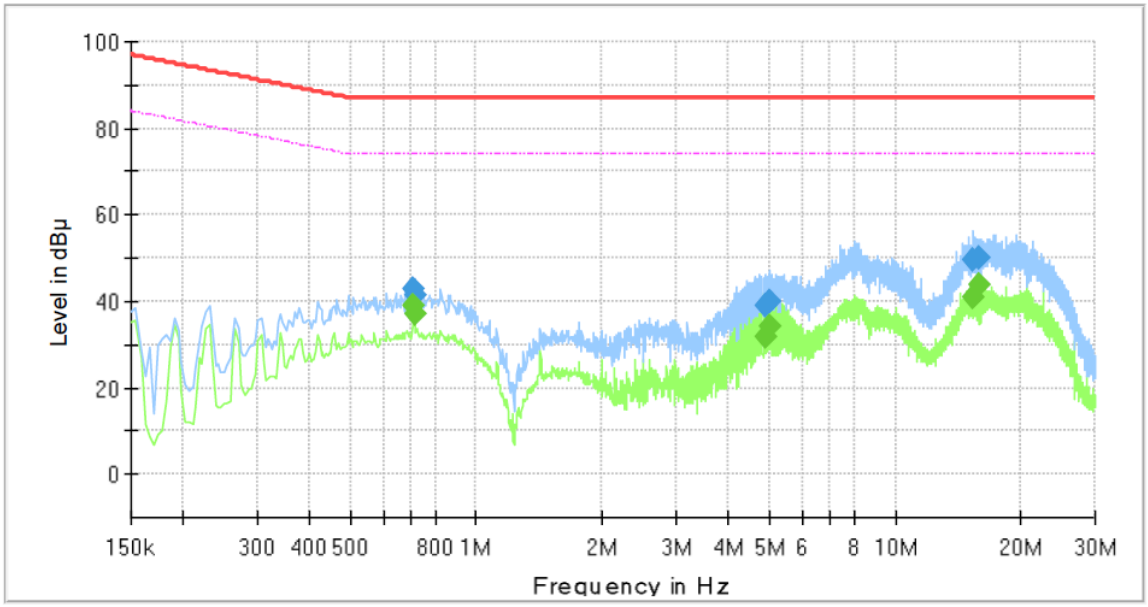
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■ PoE Mode

[1 000 Mbps]

Common Information

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



Final_Result

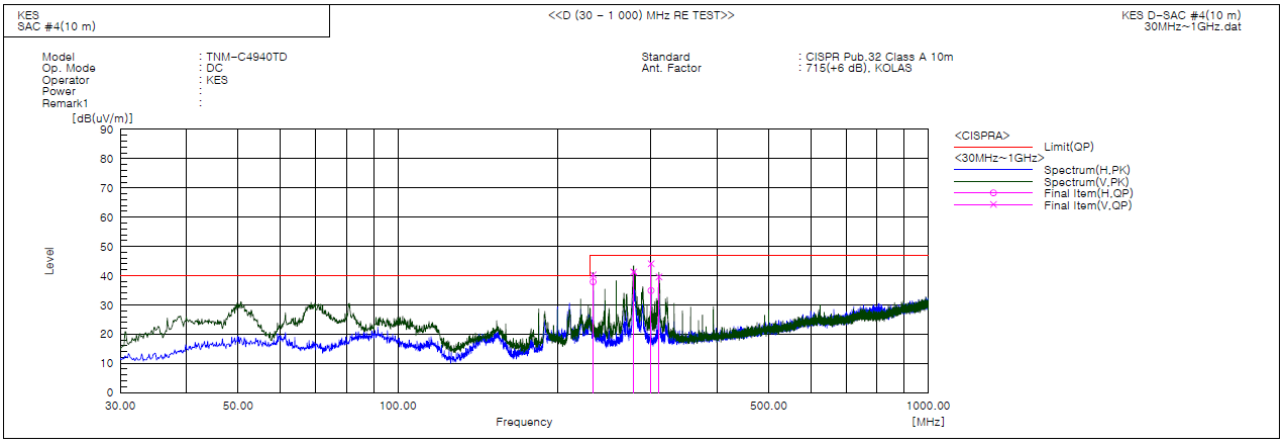
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.710000	---	38.79	74.00	35.21	1000.0	9.000	Single Line	19.8
0.710000	42.60	---	87.00	44.40	1000.0	9.000	Single Line	19.8
0.714000	---	36.97	74.00	37.03	1000.0	9.000	Single Line	19.8
0.714000	41.25	---	87.00	45.75	1000.0	9.000	Single Line	19.8
4.910000	---	31.80	74.00	42.20	1000.0	9.000	Single Line	19.5
4.910000	38.85	---	87.00	48.15	1000.0	9.000	Single Line	19.5
4.986000	---	34.37	74.00	39.63	1000.0	9.000	Single Line	19.5
4.986000	39.76	---	87.00	47.24	1000.0	9.000	Single Line	19.5
15.346000	---	40.85	74.00	33.15	1000.0	9.000	Single Line	19.8
15.346000	49.42	---	87.00	37.58	1000.0	9.000	Single Line	19.8
15.914000	---	43.62	74.00	30.38	1000.0	9.000	Single Line	19.8
15.914000	49.83	---	87.00	37.17	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 ㎓)

■ DC Mode

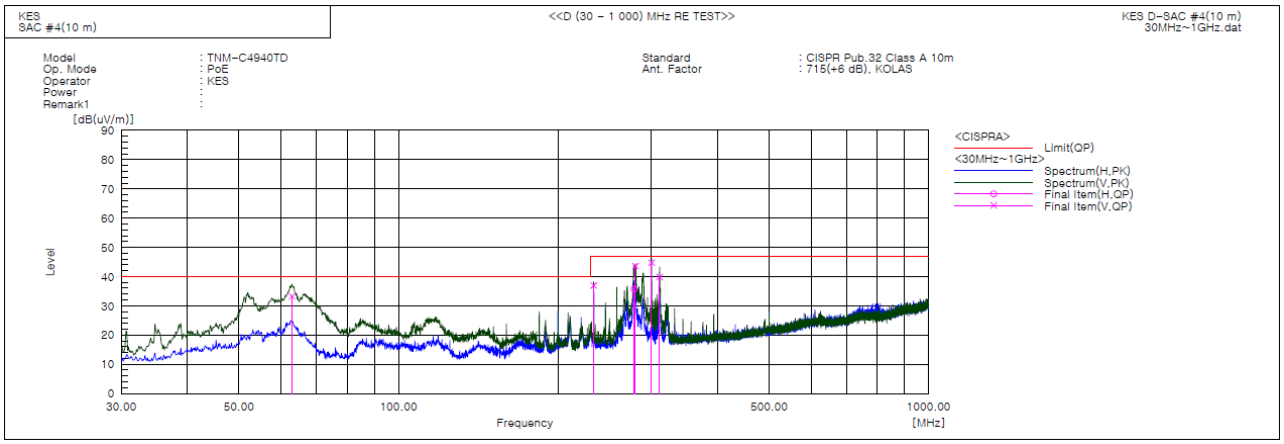


Final Result

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	233.458	V	60.2	-19.9	40.3	47.0	6.7	112.0	156.0	
2	233.462	H	57.8	-19.9	37.9	47.0	9.1	379.0	270.0	
3	278.199	V	60.0	-18.7	41.3	47.0	5.7	100.0	210.0	
4	300.024	V	62.1	-18.0	44.1	47.0	2.9	123.0	225.0	
5	300.029	H	52.9	-18.0	34.9	47.0	12.1	245.0	316.0	
6	310.573	V	57.0	-17.4	39.6	47.0	7.4	146.0	171.0	

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■ PoE Mode



Final Result

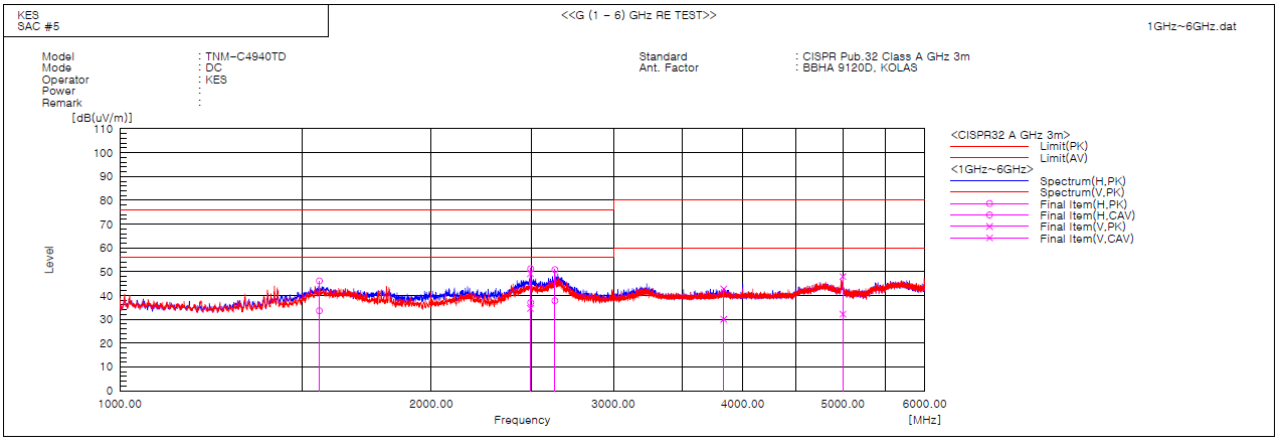
No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	62.980	V	56.0	-22.7	33.3	40.0	6.7	112.0	241.0	
2	233.458	V	56.9	-19.9	37.0	47.0	10.0	156.0	173.0	
3	278.199	H	54.5	-18.7	35.8	47.0	11.2	363.0	18.0	
4	279.775	V	62.2	-18.6	43.6	47.0	3.4	117.0	196.0	
5	300.024	V	62.8	-18.0	44.8	47.0	2.2	145.0	173.0	
6	310.815	V	57.3	-17.4	39.9	47.0	7.1	100.0	181.0	

♦ Calculation – SEMI ANECHOIC CHAMBER #4(10 m)
Result(QP) [dB(㎶/m)] = (Reading(QP)[dB(㎶)] + c.f[dB(1/m)]
Margin(QP)[dB] = Limit[dB(㎶/m)] - Result(QP) [dB(㎶/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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Radiated Electric Field Emissions(Above 1 ㎓)

■ DC Mode

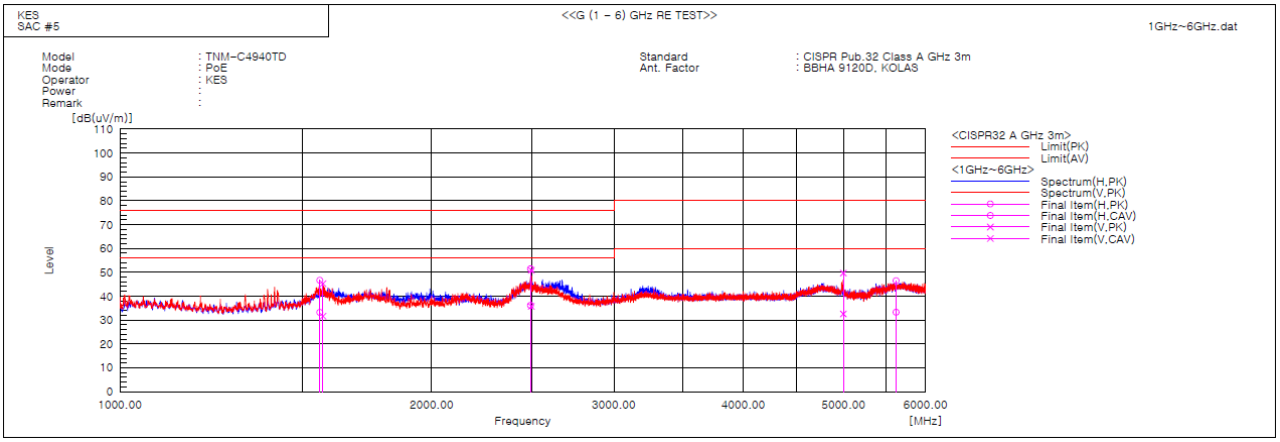


Final Result

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	2493.125	V	50.3	35.7	-1.1	49.2	34.6	76.0	56.0	26.8	21.4	100.0	288.5	
2	3835.000	V	40.2	27.4	2.6	42.8	30.0	80.0	60.0	37.2	30.0	100.0	207.0	
3	1558.750	H	50.8	38.3	-4.7	46.1	33.6	76.0	56.0	29.9	22.4	100.0	192.9	
4	2633.125	H	51.3	38.2	-0.4	50.9	37.8	76.0	56.0	25.1	18.2	100.0	176.4	
5	4998.750	V	41.1	25.3	6.9	48.0	32.2	80.0	60.0	32.0	27.8	100.0	96.6	
6	2495.625	H	52.4	38.1	-1.1	51.3	37.0	76.0	56.0	24.7	19.0	100.0	52.9	

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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	1559.375	H	51.4	37.9	-4.7	46.7	33.2	76.0	56.0	29.3	22.8	100.0	208.0	
2	1570.625	V	50.0	36.4	-4.7	45.3	31.7	76.0	56.0	30.7	24.3	100.0	315.4	
3	2491.875	H	52.6	37.3	-1.1	51.5	36.2	76.0	56.0	24.5	19.8	100.0	263.5	
4	2496.250	V	52.0	36.9	-1.1	50.9	35.8	76.0	56.0	25.1	20.2	100.0	276.4	
5	4996.250	V	42.8	25.7	6.9	49.7	32.6	80.0	60.0	30.3	27.4	100.0	82.7	
6	5620.000	H	38.4	25.2	8.1	46.5	33.3	80.0	60.0	33.5	26.7	100.0	341.9	

♦ Calculation
Result(PK/CAV) [dB(㎶/m)] = (Reading(PK/CAV)[dB(㎶)] + c.f[dB(1/m)]
Margin(PK/CAV)[dB] = Limit[dB(㎶/m)] - Result(PK/CAV) [dB(㎶/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	Ieff [A]	% of Limit	Limit [A]	Result
1	0.074			
2	0.001	0.124	1.080	n/a
3	0.067	2.905	2.300	PASS
4	0.002	0.425	0.430	n/a
5	0.066	5.758	1.140	PASS
6	0.002	0.555	0.300	n/a
7	0.064	8.249	0.770	PASS
8	0.002	0.699	0.230	n/a
9	0.058	14.503	0.400	PASS
10	0.002	0.852	0.184	n/a
11	0.053	15.971	0.330	PASS
12	0.001	0.966	0.153	n/a
13	0.048	22.665	0.210	PASS
14	0.001	1.141	0.131	n/a
15	0.042	28.010	0.150	PASS
16	0.002	1.334	0.115	n/a
17	0.036	27.480	0.132	PASS
18	0.002	1.482	0.102	n/a
19	0.031	26.260	0.118	PASS
20	0.002	1.704	0.092	n/a
21	0.026	16.330	0.161	PASS
22	0.002	1.837	0.084	n/a
23	0.022	14.756	0.147	PASS
24	0.002	2.030	0.077	n/a
25	0.018	13.418	0.135	PASS
26	0.002	2.130	0.071	n/a
27	0.016	12.421	0.125	PASS
28	0.001	2.178	0.066	n/a
29	0.014	12.042	0.116	PASS
30	0.001	2.331	0.061	n/a
31	0.013	12.052	0.109	PASS
32	0.001	2.401	0.058	n/a
33	0.013	12.295	0.102	PASS
34	0.001	2.482	0.054	n/a
35	0.012	12.848	0.096	PASS
36	0.001	2.494	0.051	n/a
37	0.012	12.971	0.091	PASS
38	0.001	2.455	0.048	n/a
39	0.011	12.982	0.087	PASS
40	0.001	2.536	0.046	n/a

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.
* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.

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Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	0.075			
2	0.002	0.098	1.620	n/a
3	0.068	1.962	3.450	PASS
4	0.002	0.359	0.645	n/a
5	0.066	3.864	1.710	PASS
6	0.002	0.432	0.450	n/a
7	0.064	5.527	1.155	PASS
8	0.002	0.557	0.345	n/a
9	0.058	9.704	0.600	PASS
10	0.002	0.640	0.276	n/a
11	0.053	10.741	0.495	PASS
12	0.002	0.734	0.230	n/a
13	0.048	15.166	0.315	PASS
14	0.002	0.898	0.197	n/a
15	0.042	18.732	0.225	PASS
16	0.002	1.052	0.173	n/a
17	0.037	18.394	0.199	PASS
18	0.002	1.160	0.153	n/a
19	0.031	17.591	0.178	PASS
20	0.002	1.330	0.138	n/a
21	0.026	16.435	0.161	PASS
22	0.002	1.417	0.125	n/a
23	0.022	14.881	0.147	PASS
24	0.002	1.541	0.115	n/a
25	0.018	13.542	0.135	PASS
26	0.002	1.637	0.106	n/a
27	0.016	12.556	0.125	PASS
28	0.002	1.682	0.099	n/a
29	0.014	12.153	0.116	PASS
30	0.002	1.846	0.092	n/a
31	0.013	12.204	0.109	PASS
32	0.002	1.864	0.086	n/a
33	0.013	12.440	0.102	PASS
34	0.002	1.928	0.081	n/a
35	0.013	12.999	0.096	PASS
36	0.001	1.935	0.077	n/a
37	0.012	13.082	0.091	PASS
38	0.001	1.912	0.073	n/a
39	0.011	13.105	0.087	PASS
40	0.001	2.007	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

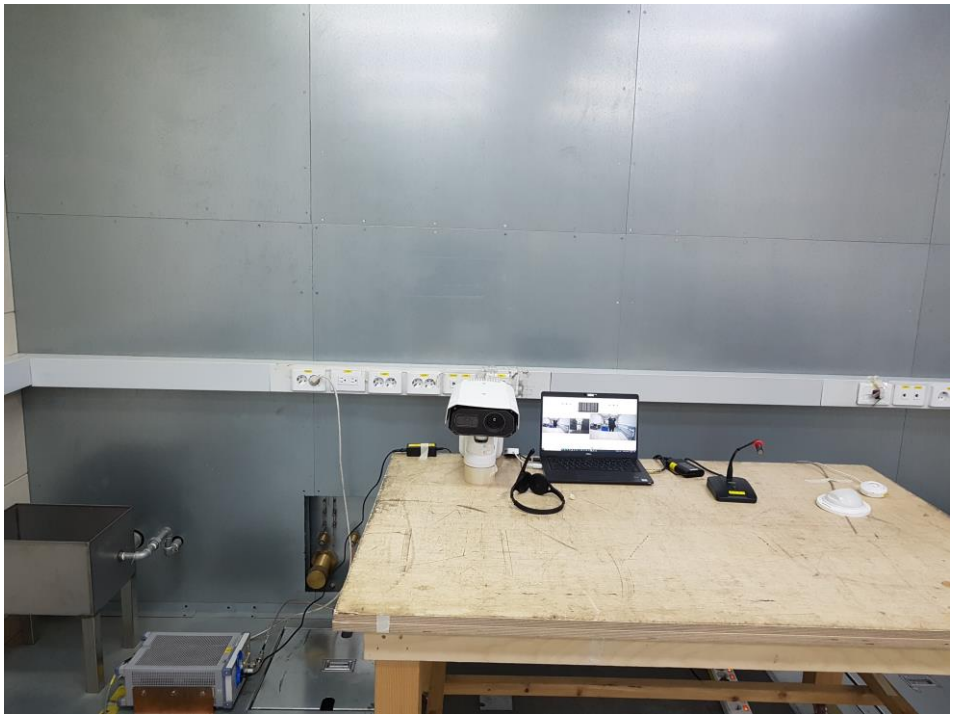
Flicker Measurements					
	Plt	**Max Pst**	**Max Dc**	**Max Dmax**	**Max Tmax**
Line 1:	0.028	0.028	0	< 0.2	0
Limits:	0.65	1	3.3	4	0.5
Results:	PASS	PASS	PASS	PASS	PASS

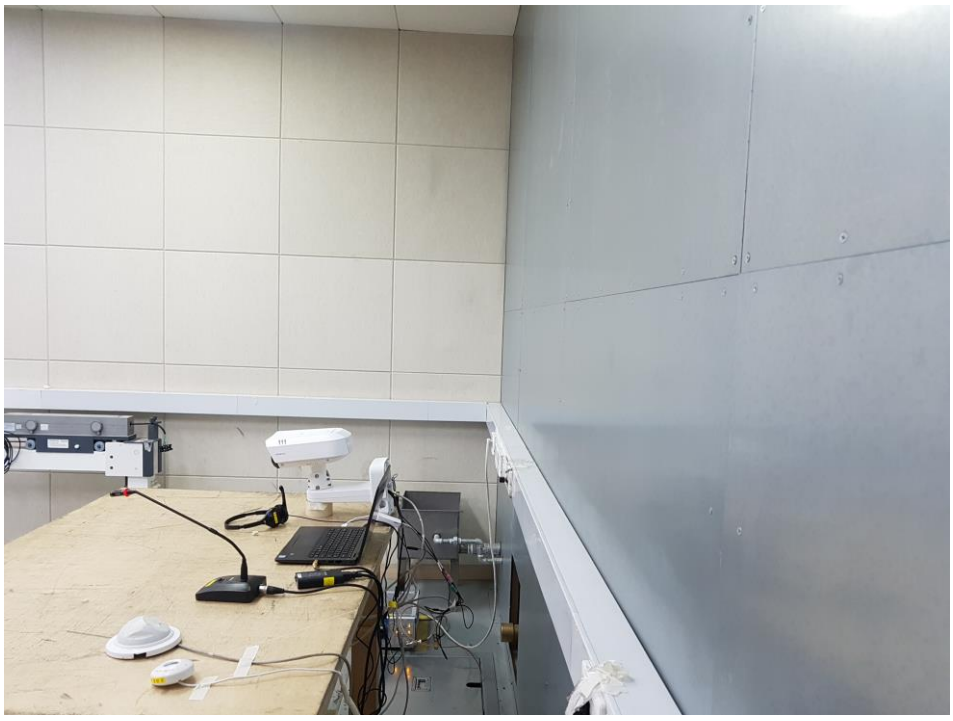
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Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports

■ DC Mode

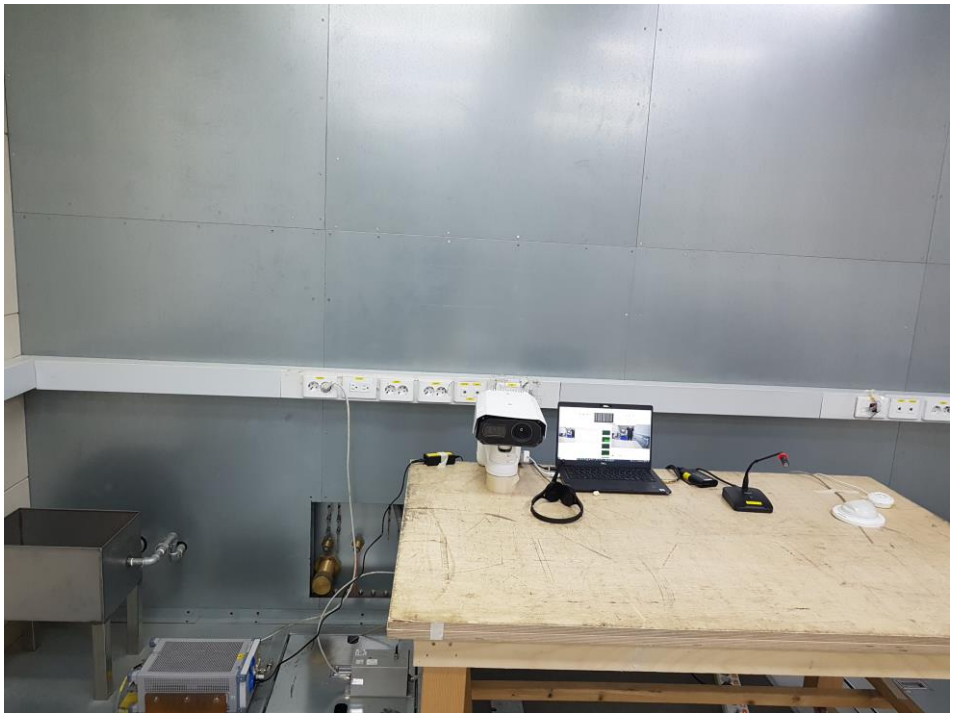




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Conducted Emissions at Telecommunication Ports

■ DC Mode





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■ PoE Mode

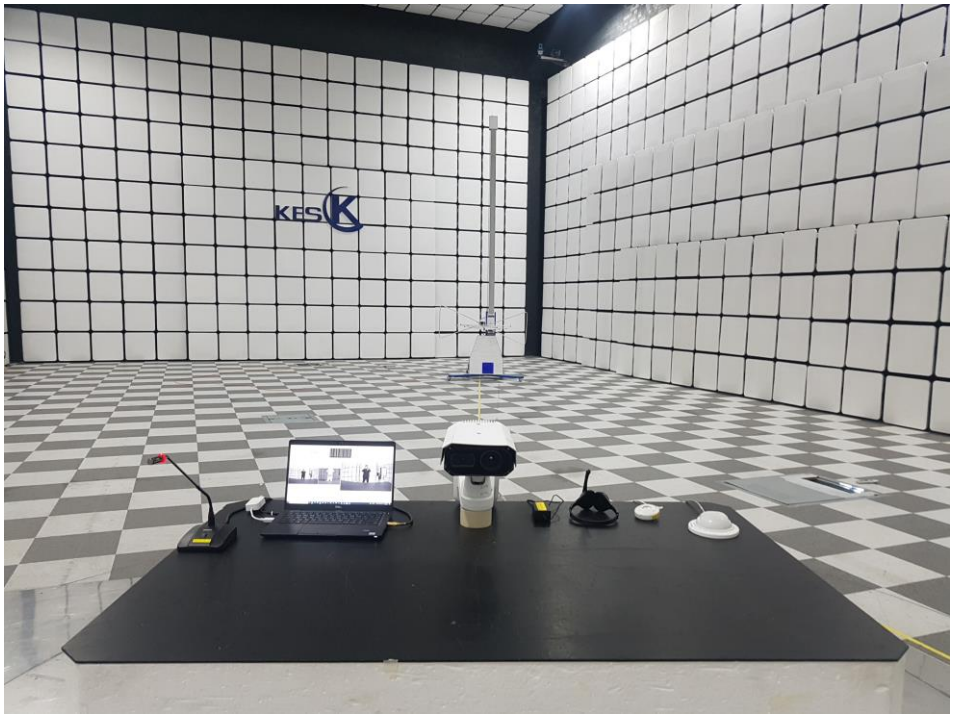




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Radiated Electric Field Emissions(Below 1 ㎓)

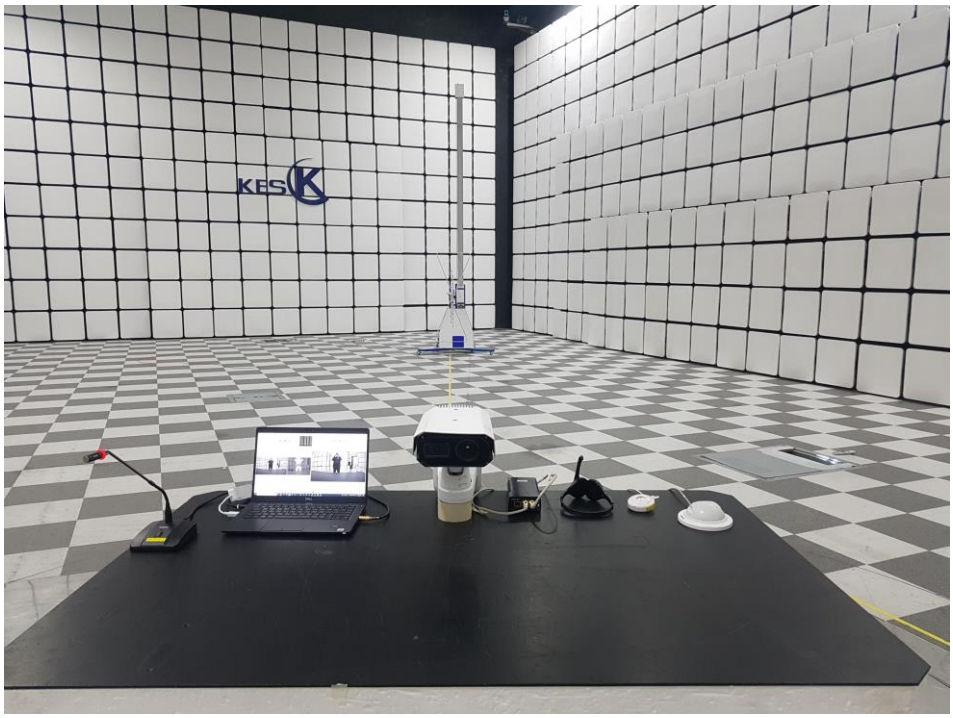
■ DC Mode

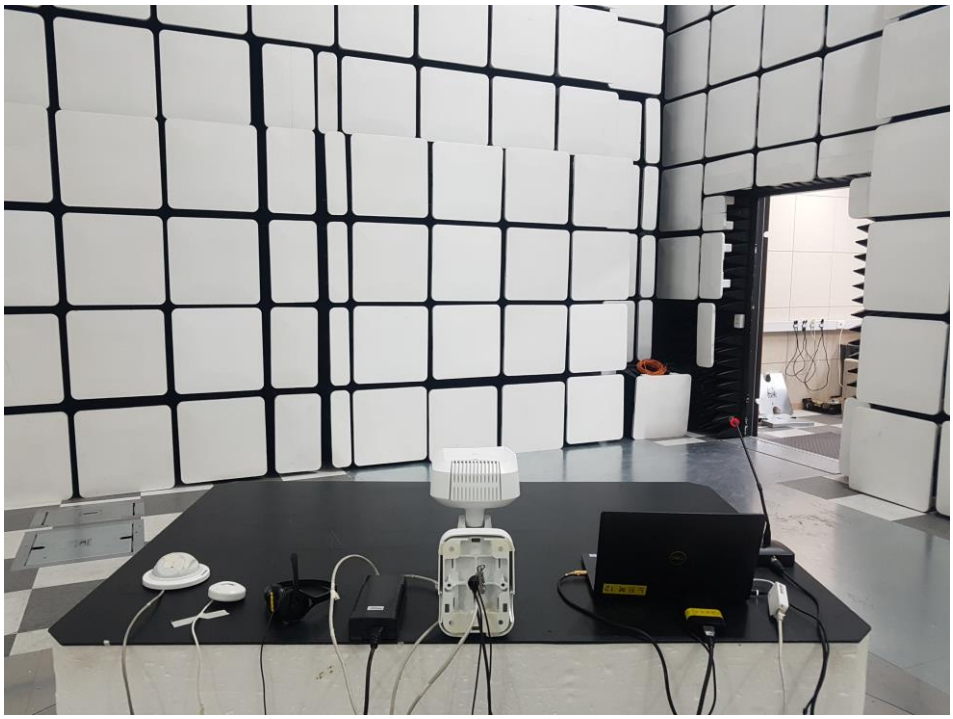




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■ PoE Mode

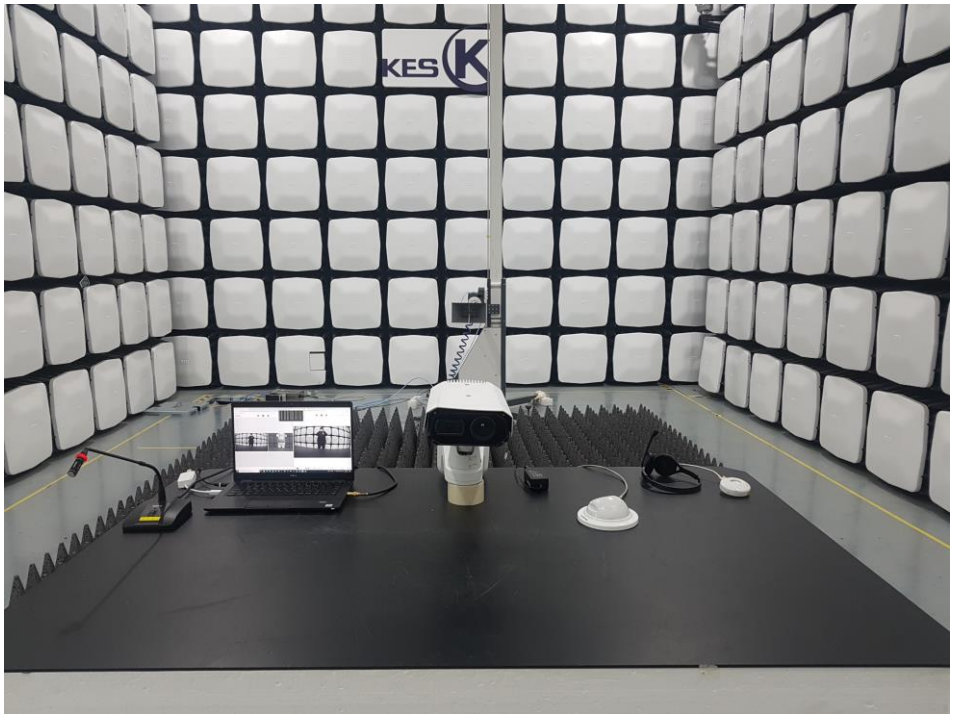




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Radiated Electric Field Emissions(Above 1 ㎓)

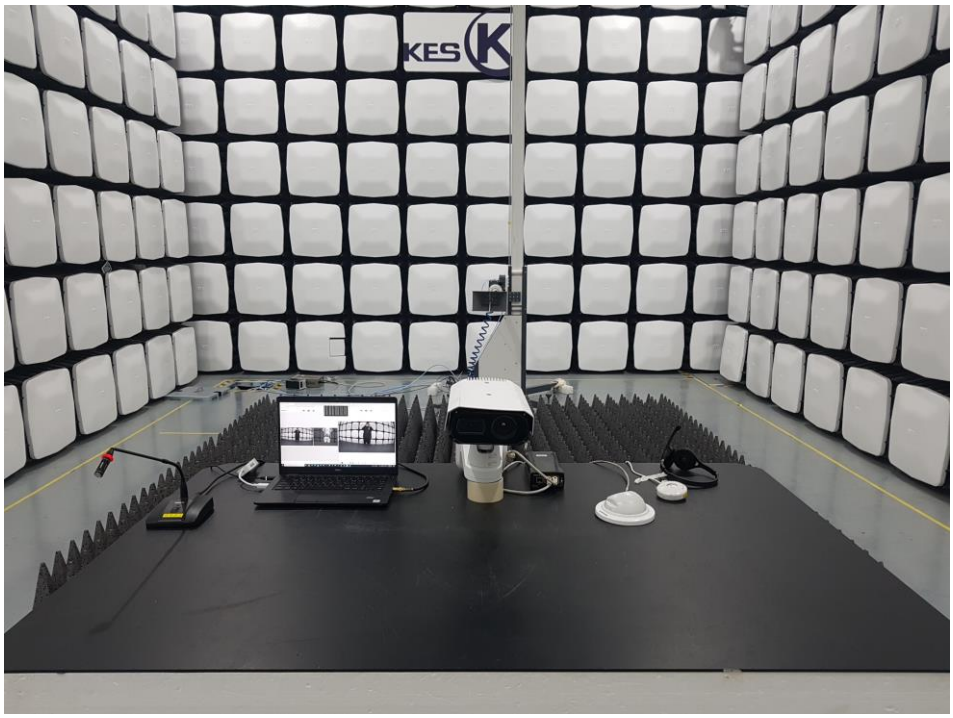
■ DC Mode

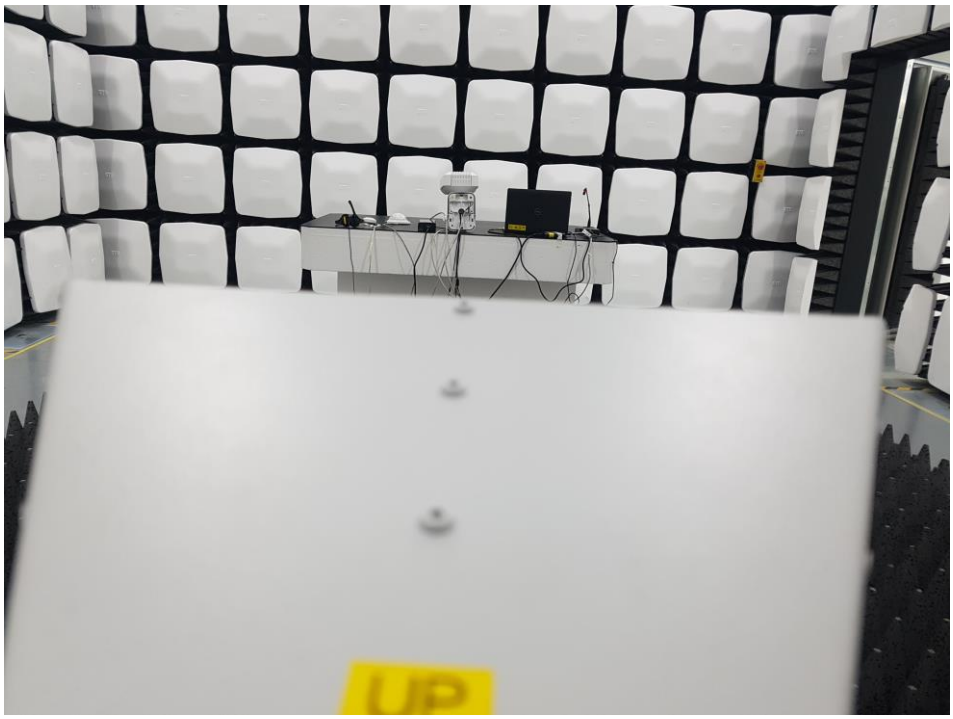




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■ PoE Mode





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Harmonic Current Emissions and Voltage Fluctuations and Flicker

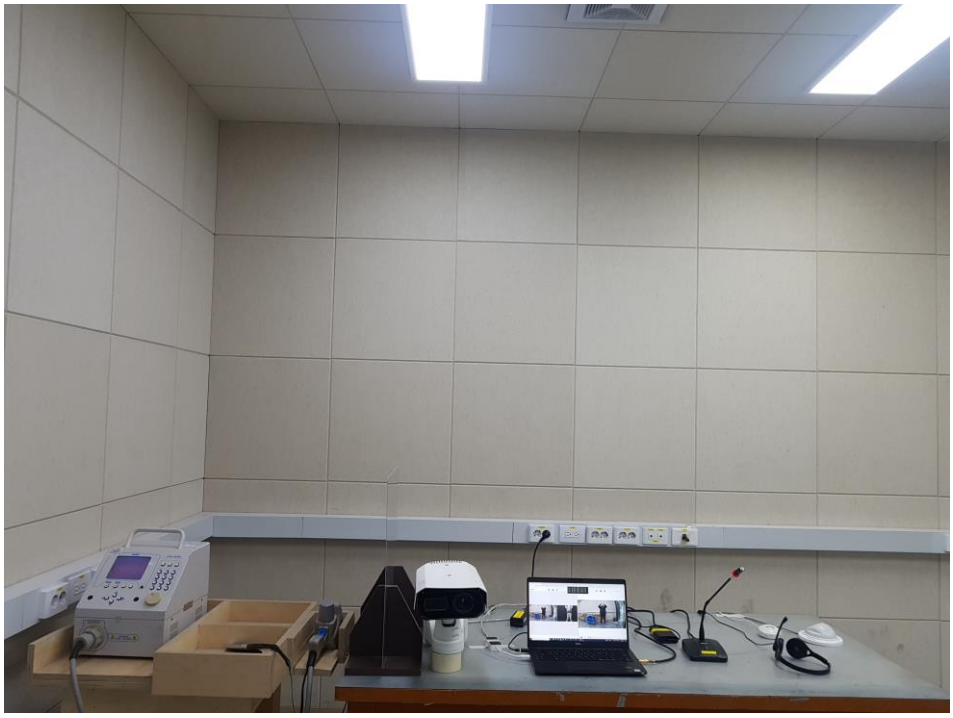
■ DC Mode



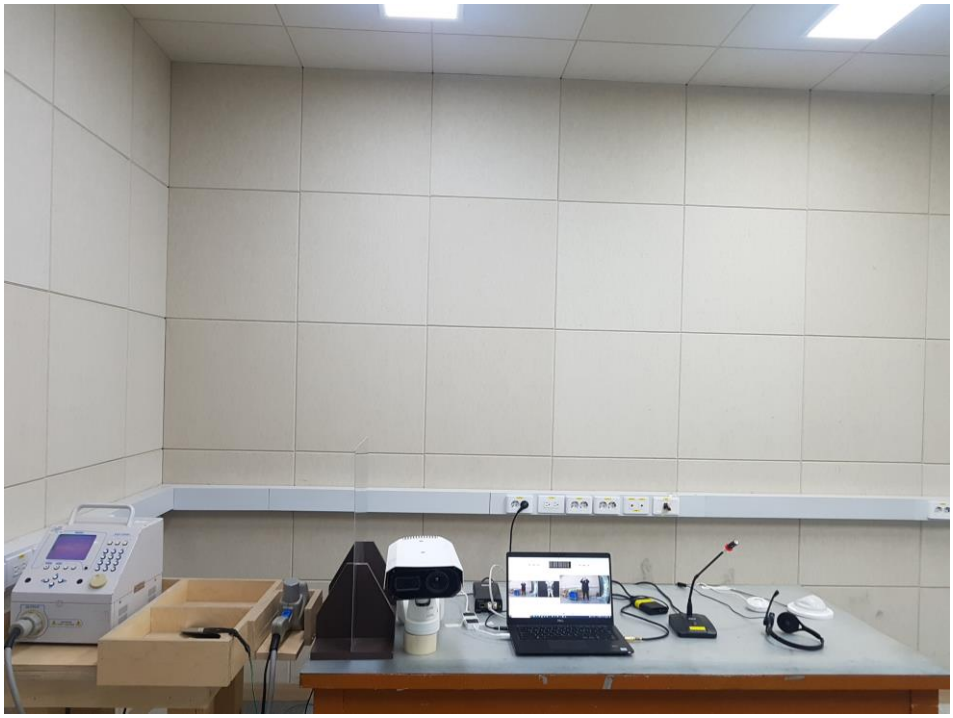
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Electrostatic Discharge

■ DC Mode



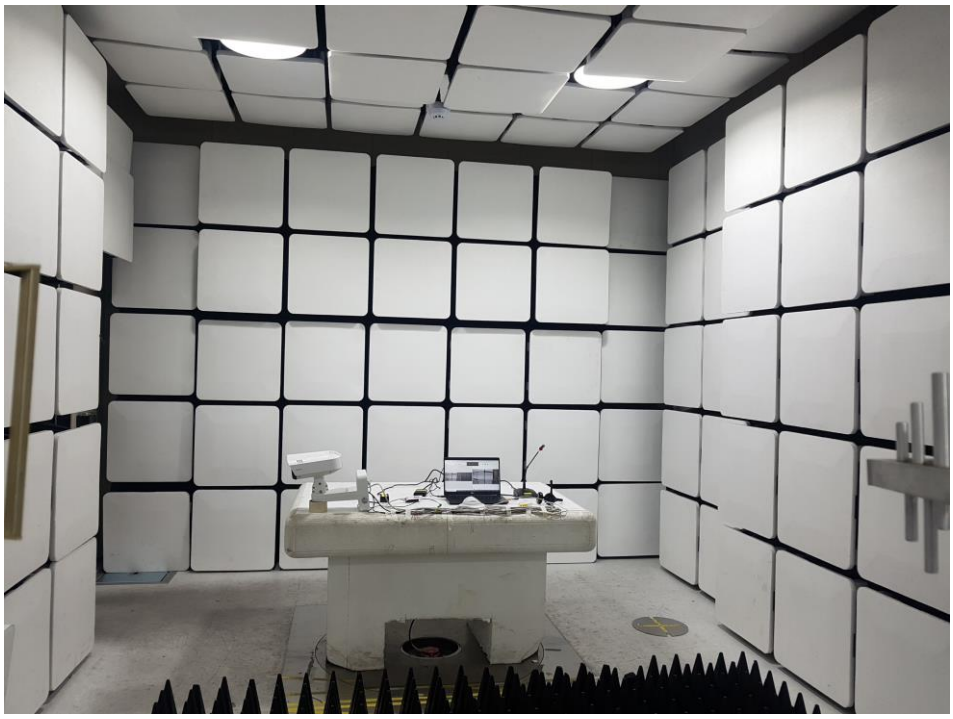
■ PoE Mode



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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



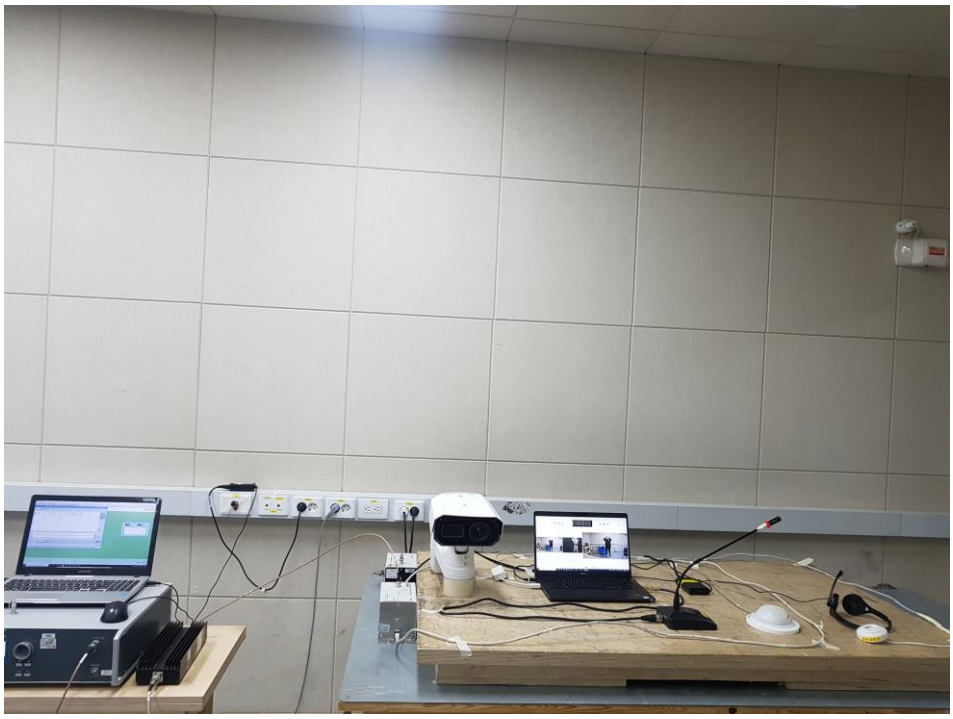
■ PoE Mode



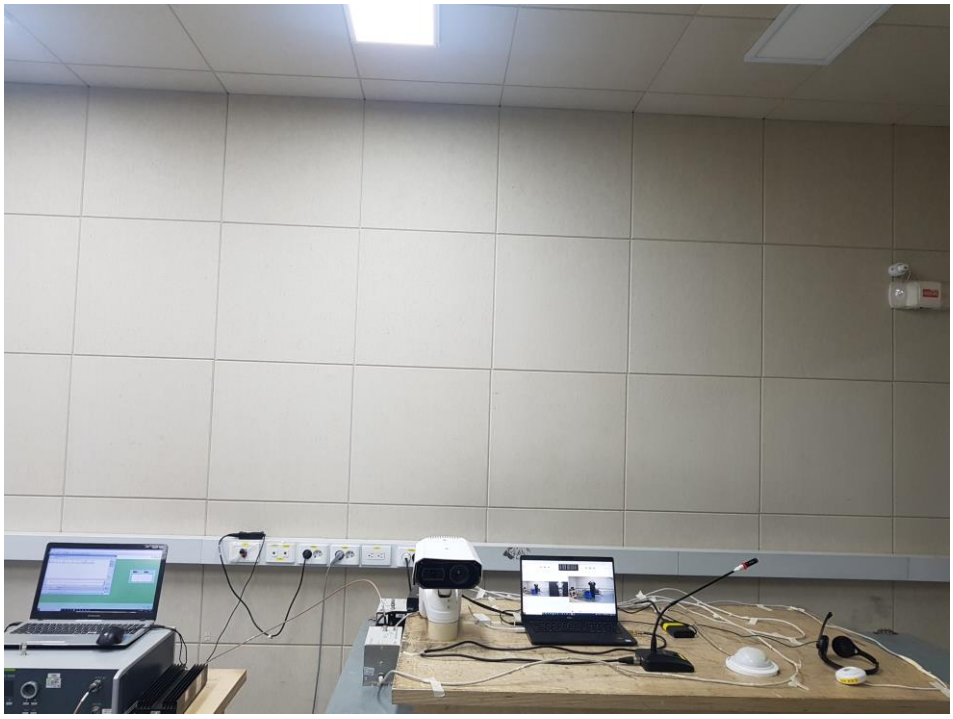
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Conducted Disturbance

■ DC Mode



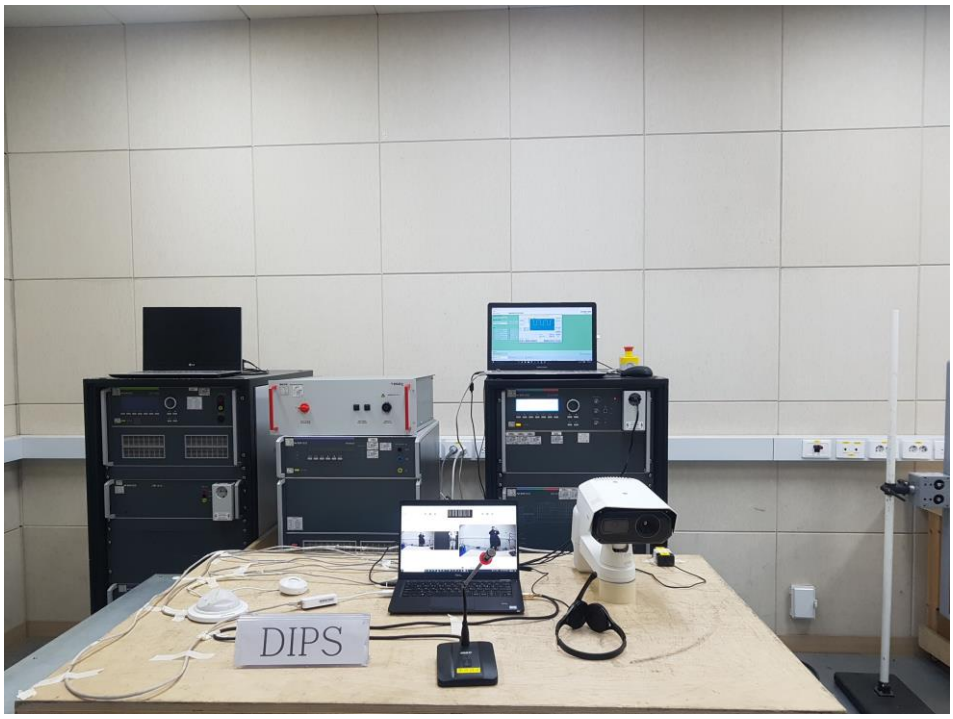
■ PoE Mode



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Voltage Dips and Short Interruptions

■ DC Mode



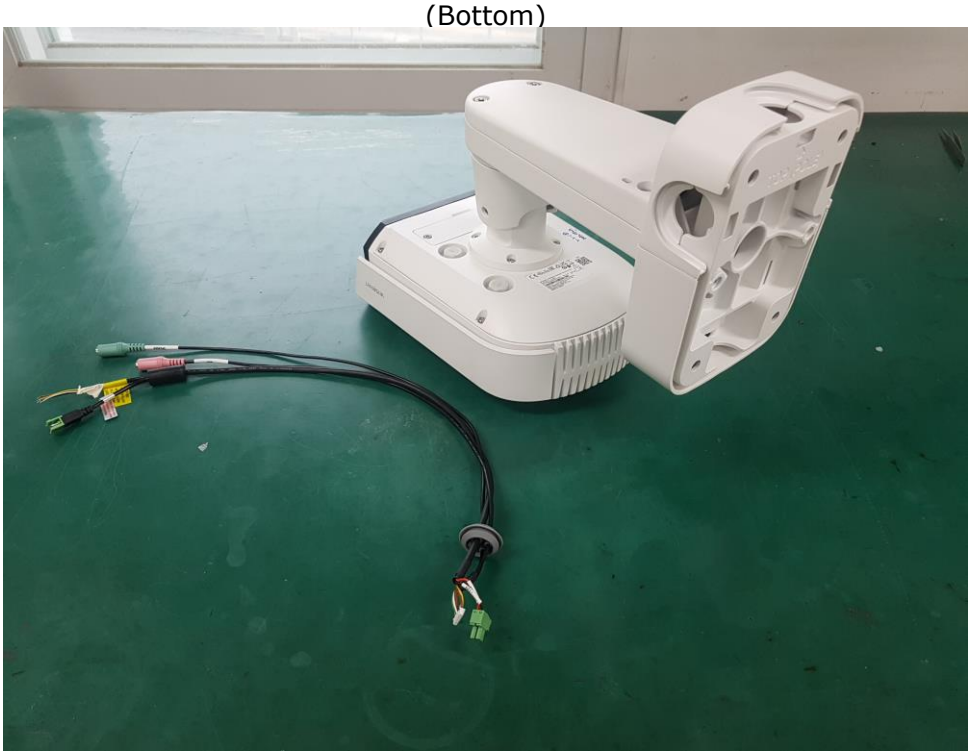
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EUT External Photographs

(Top)



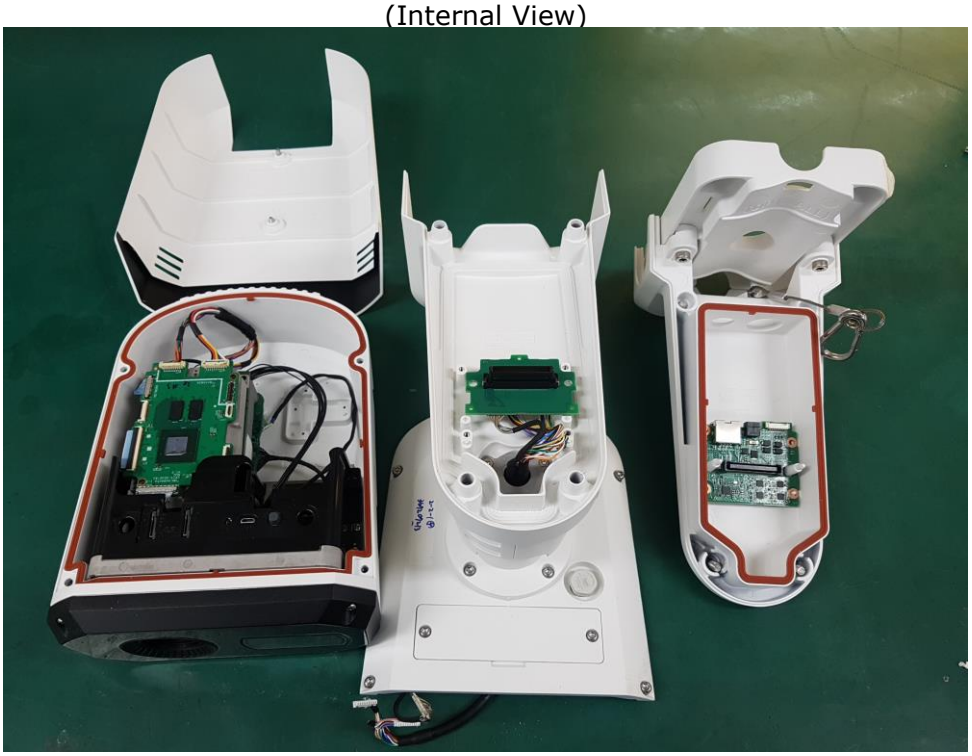
(Bottom)



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EUT Internal Photographs

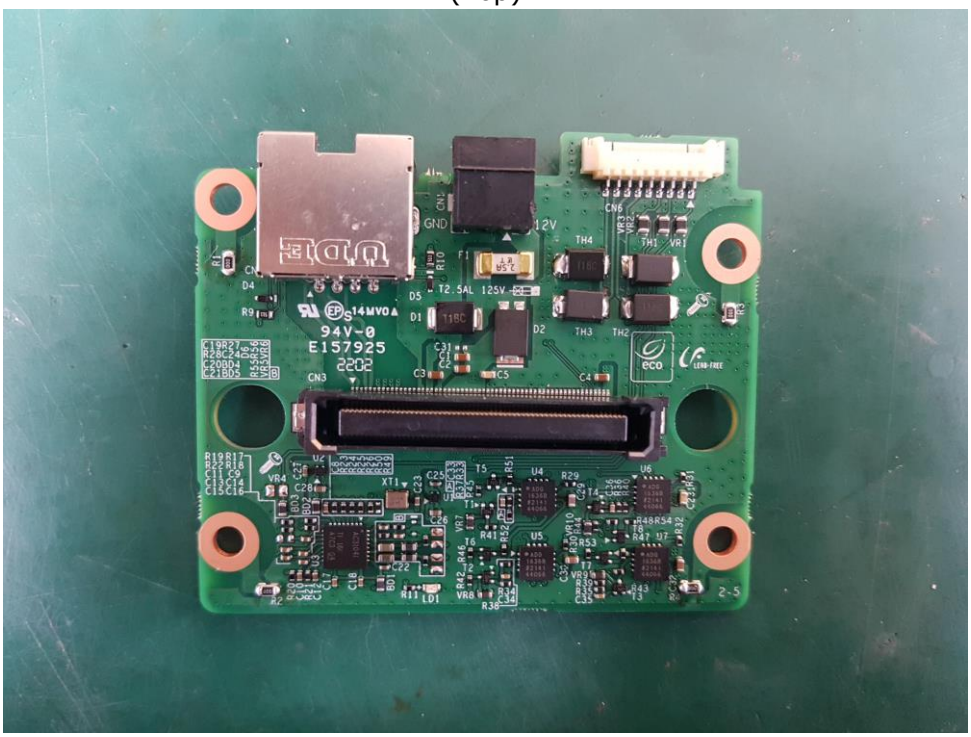
(Internal View)



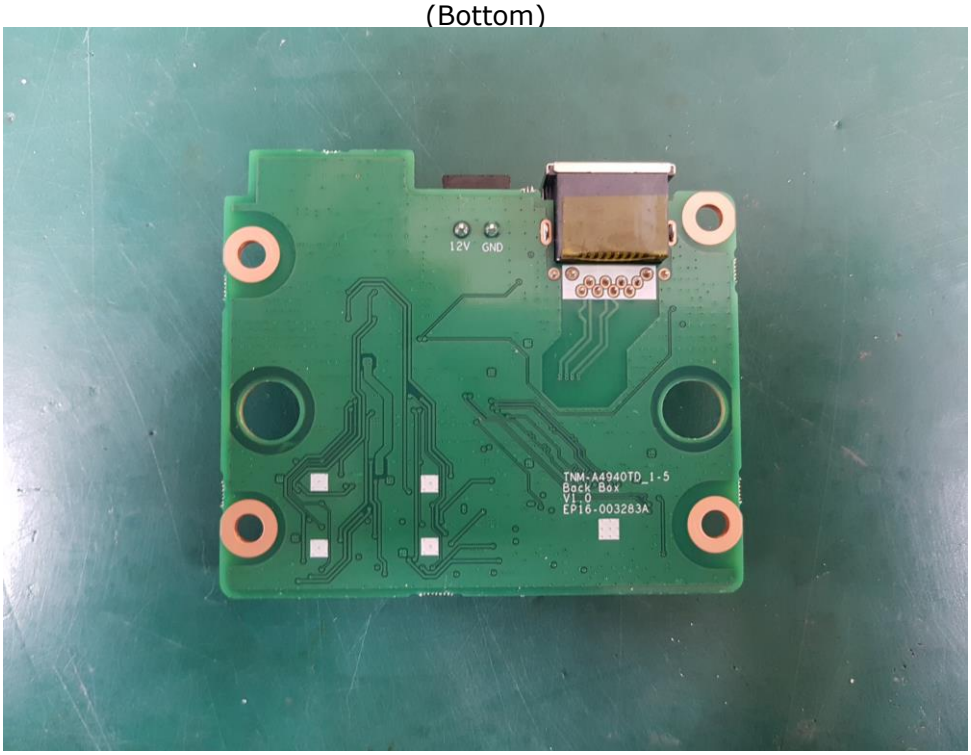
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EUT Internal View – Board 1

(Top)



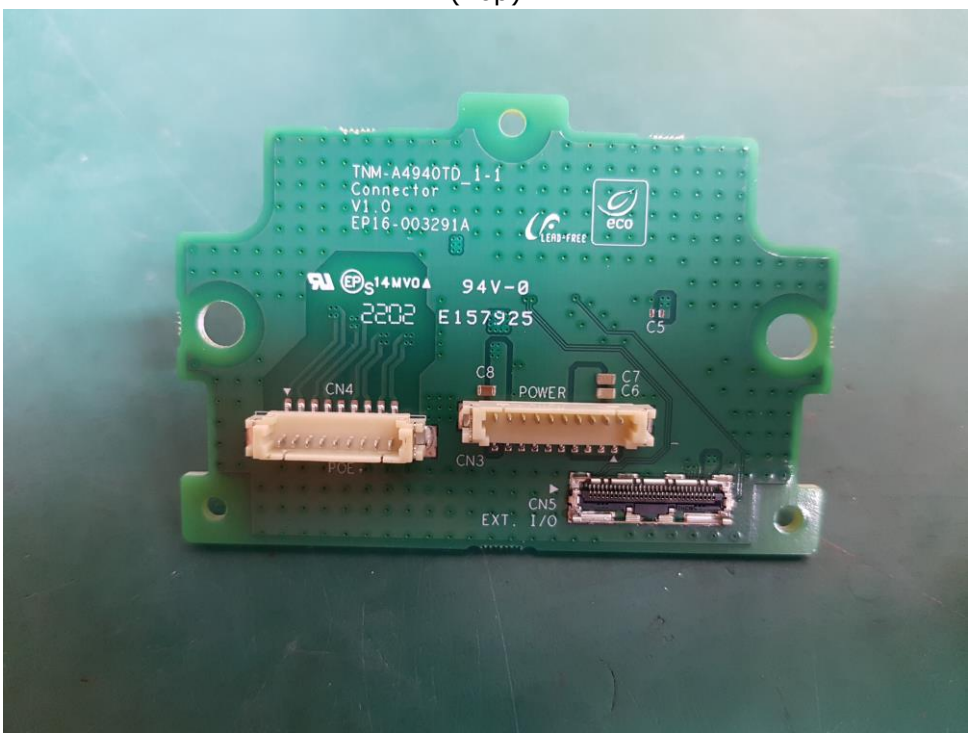
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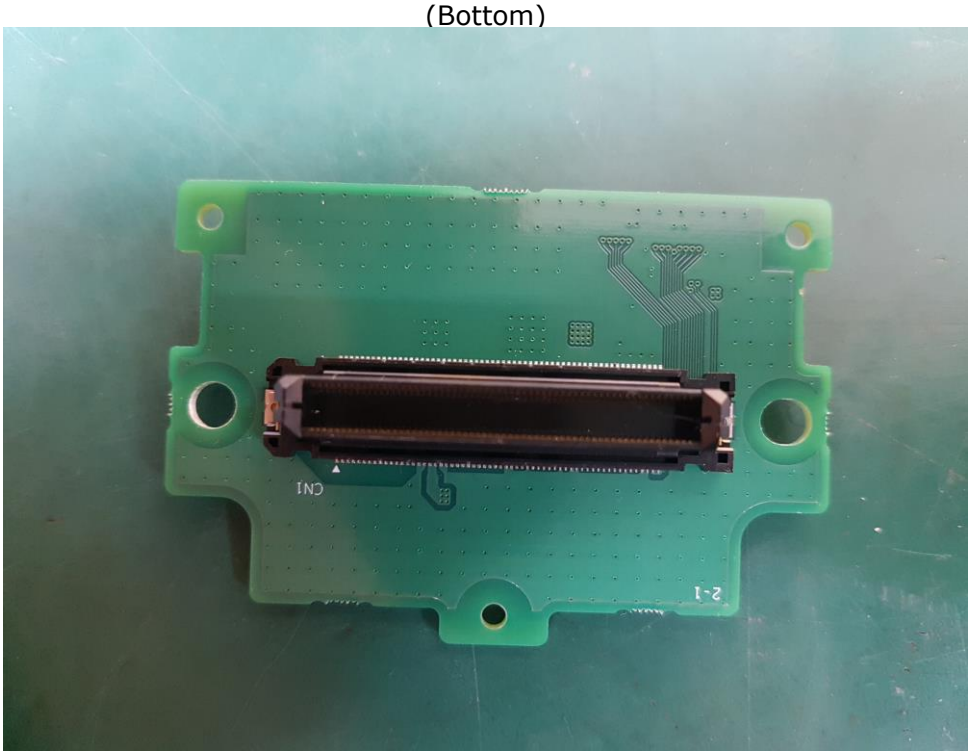
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EUT Internal View – Board 2

(Top)



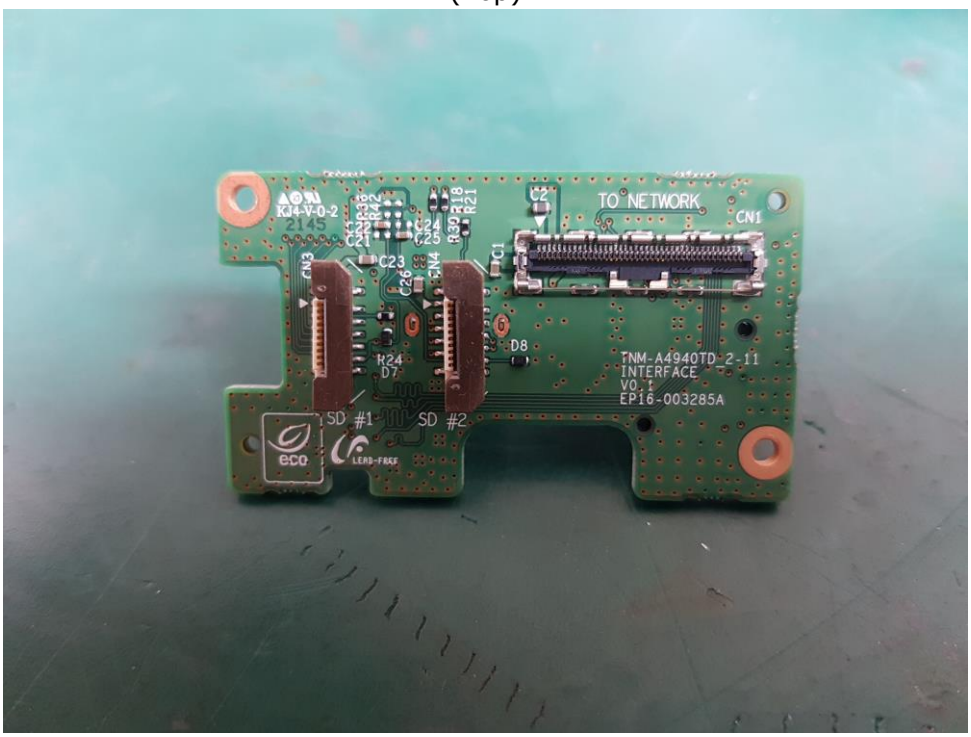
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EUT Internal View – Board 3

(Top)



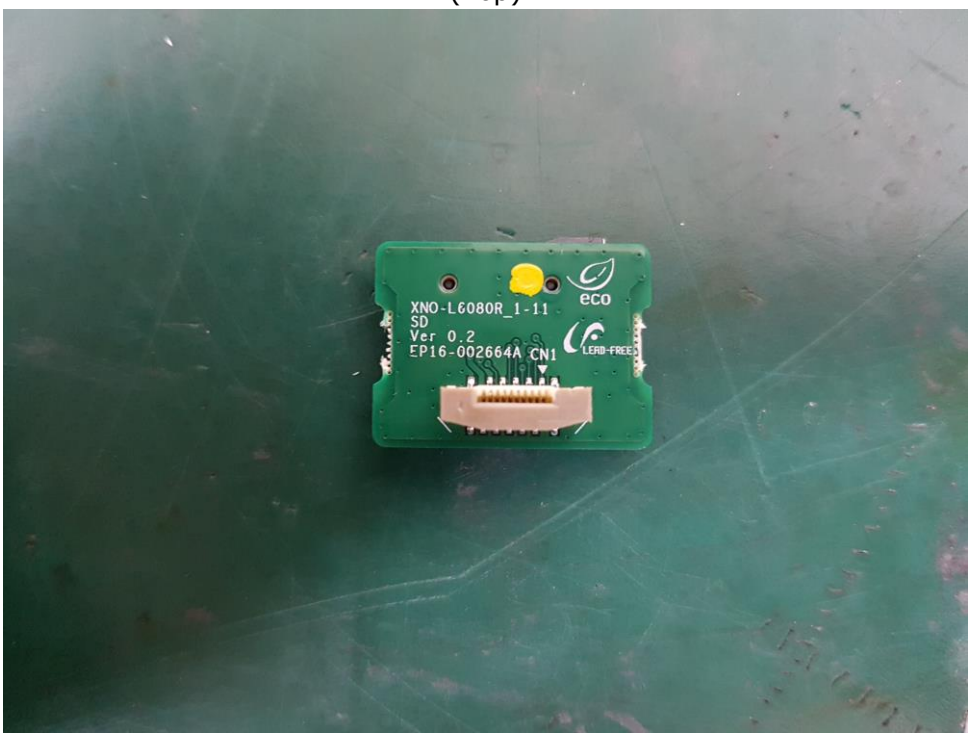
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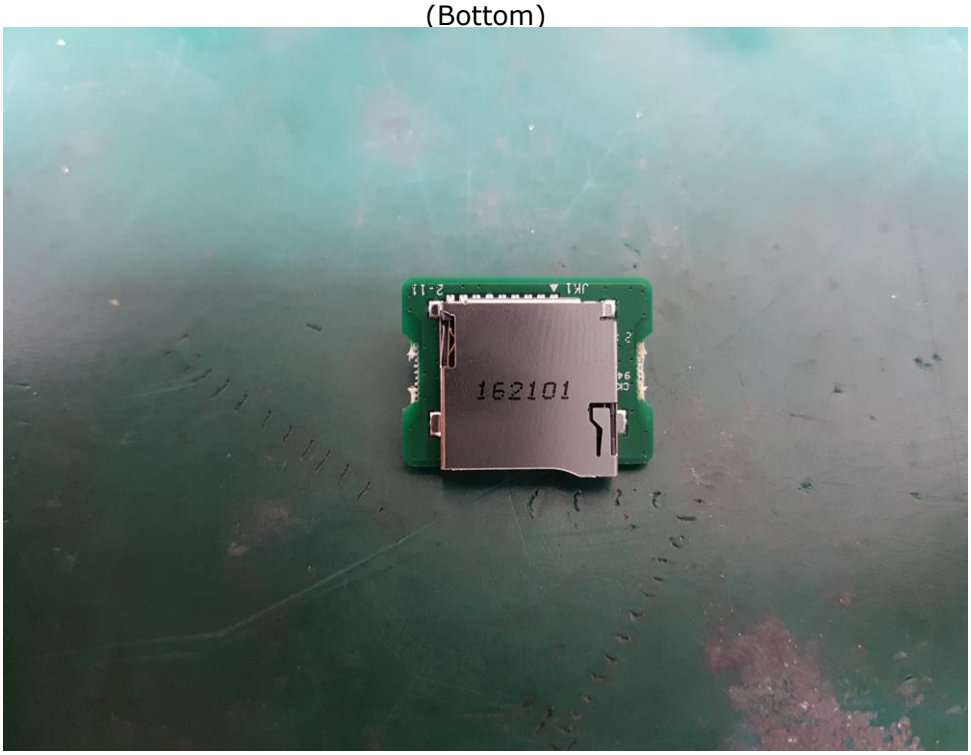
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EUT Internal View – Board 4

(Top)



(Bottom)



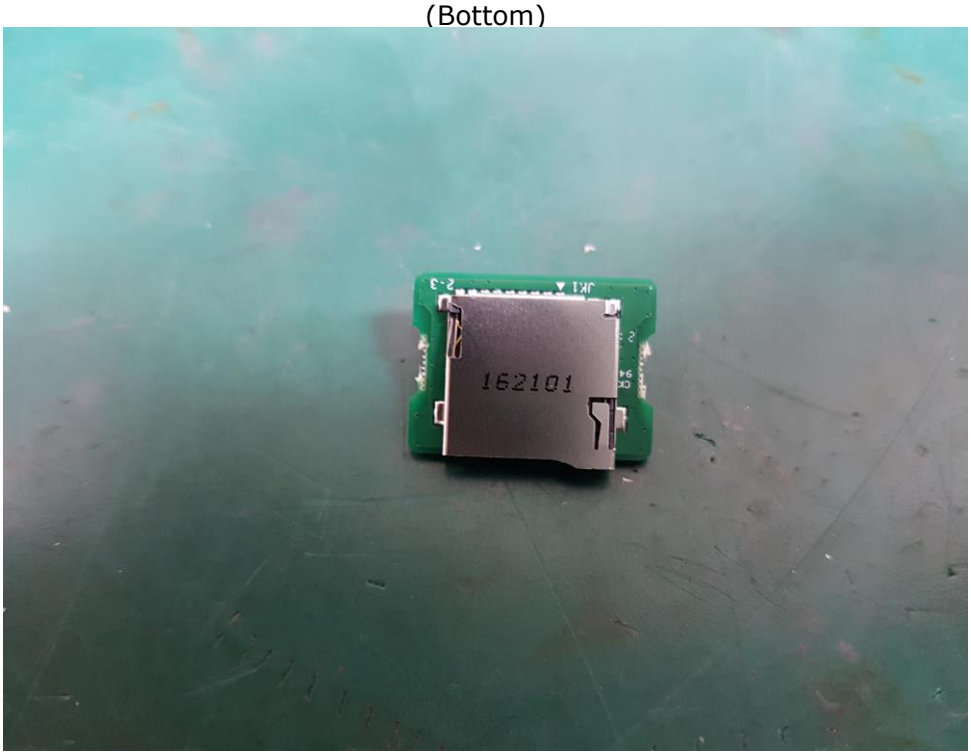
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EUT Internal View – Board 5

(Top)



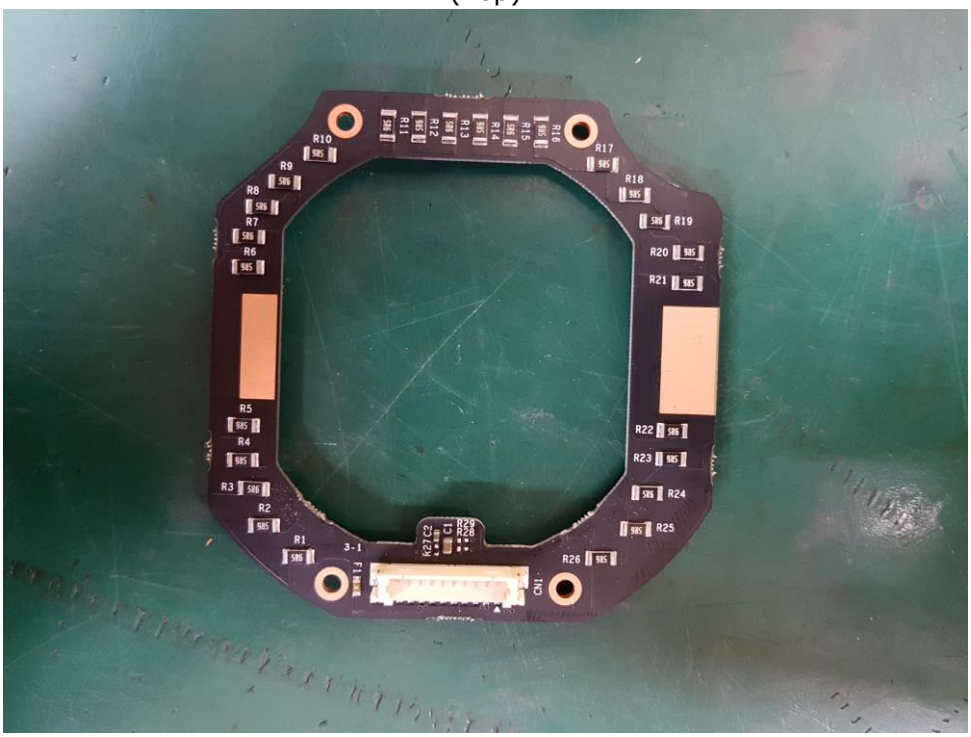
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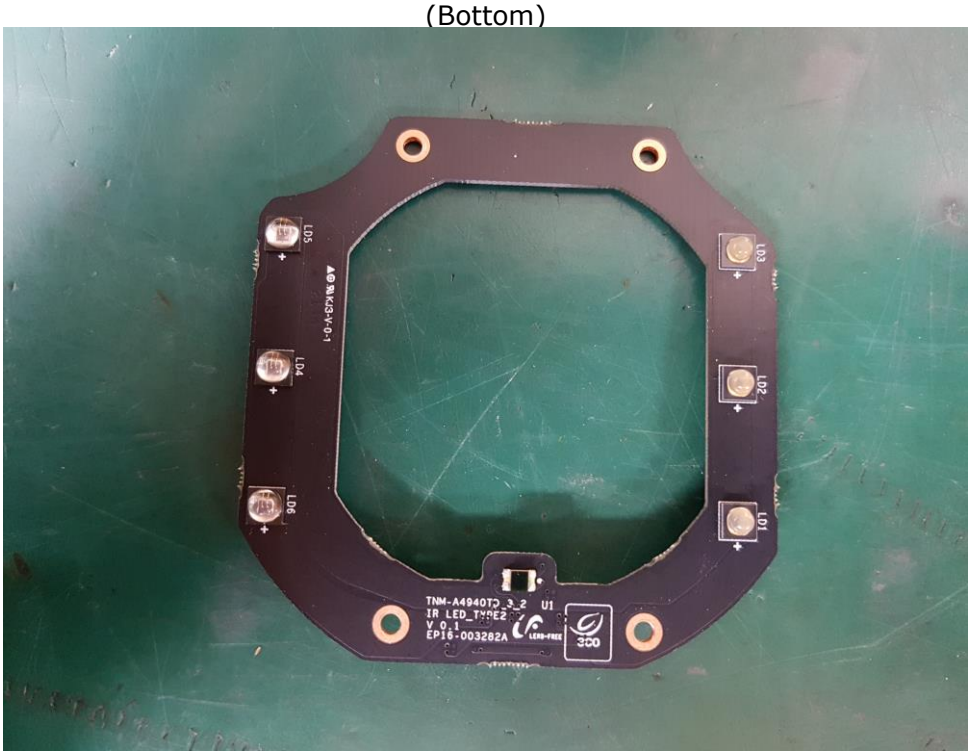
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EUT Internal View – Board 6

(Top)



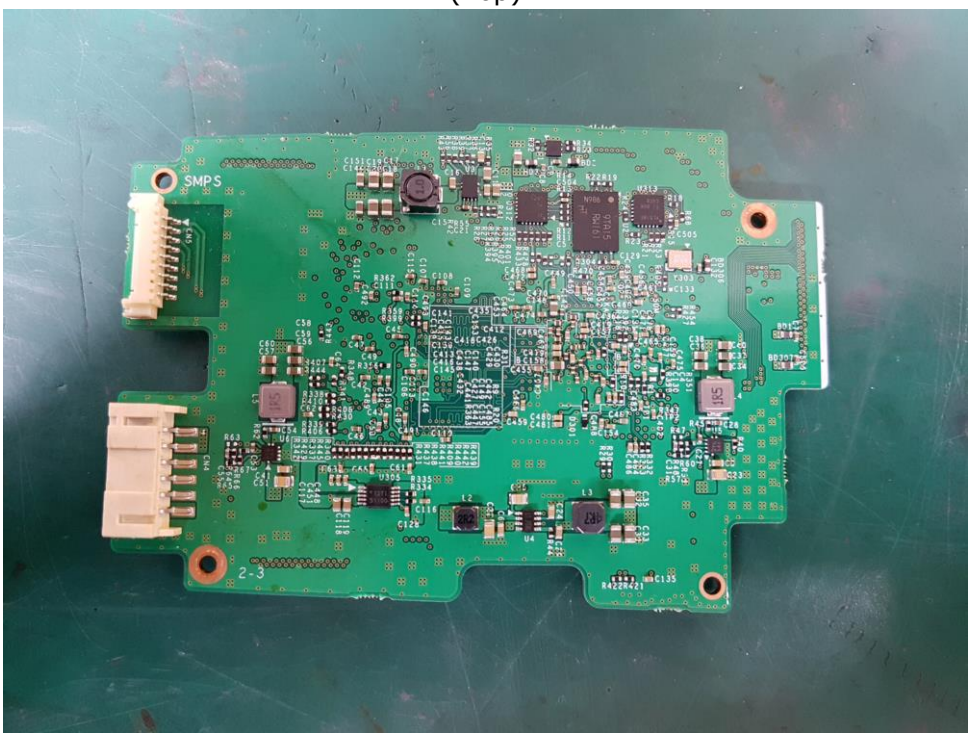
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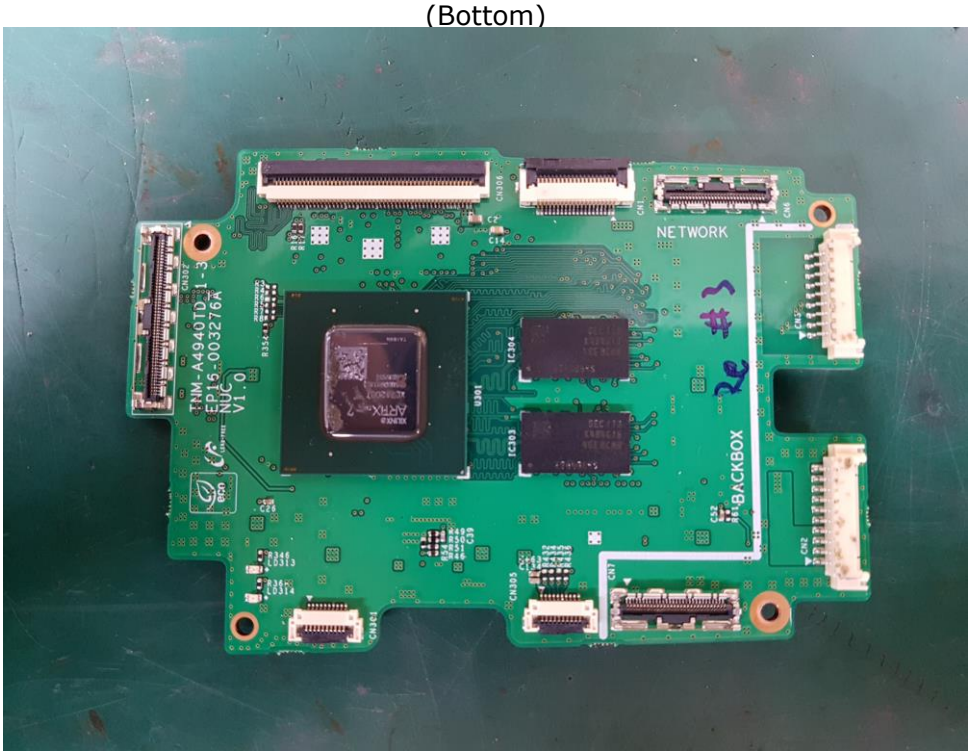
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EUT Internal View – Board 7

(Top)



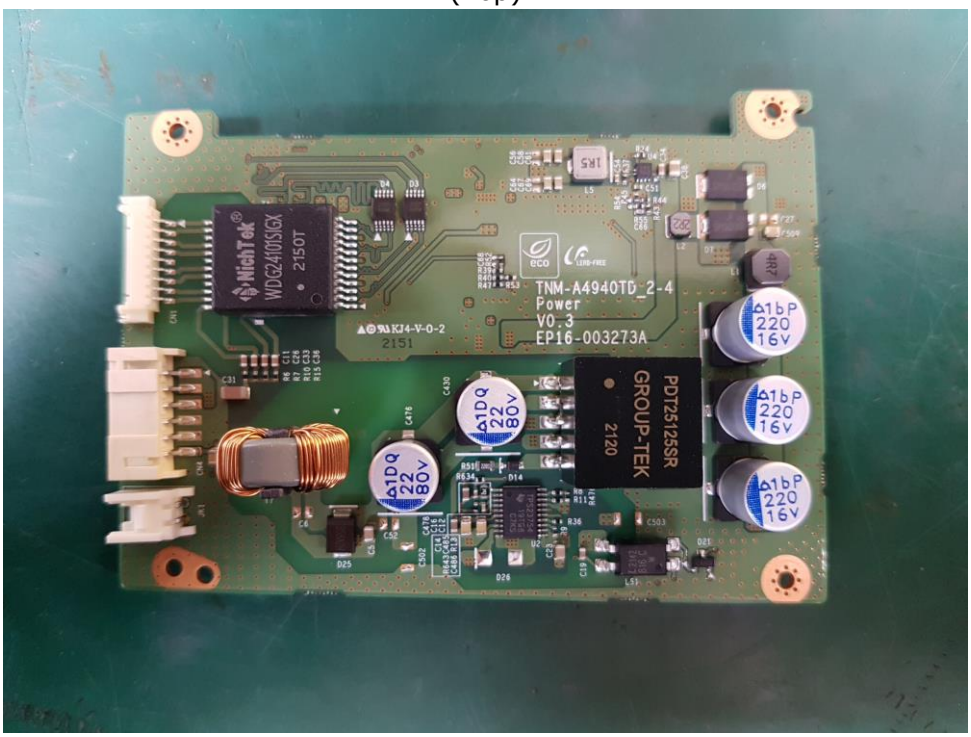
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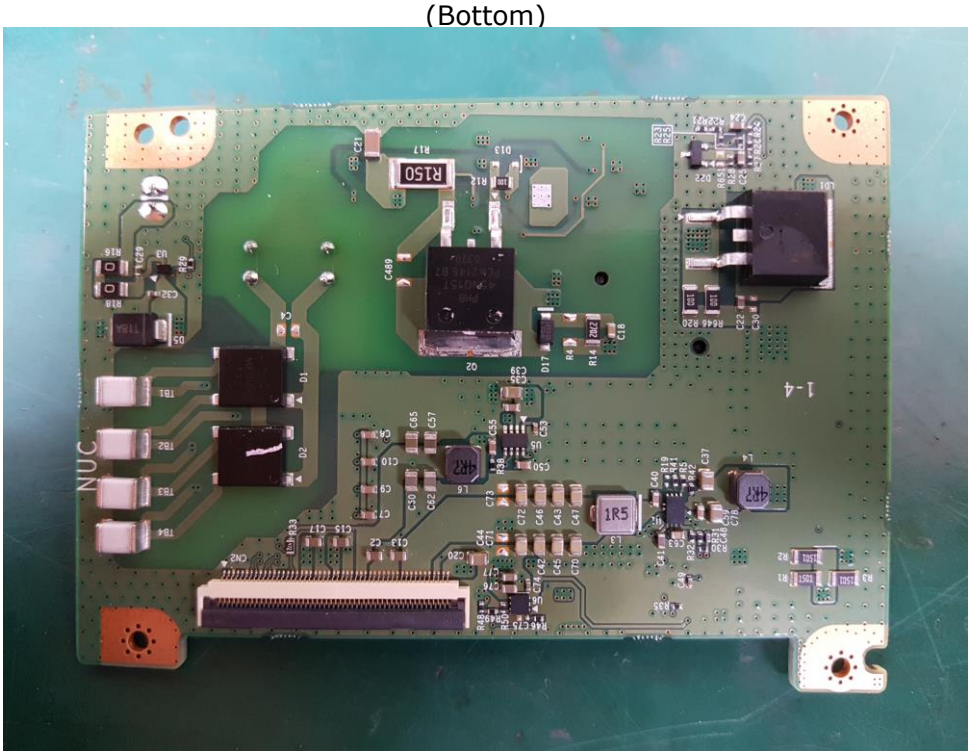
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EUT Internal View – Board 8

(Top)



(Bottom)



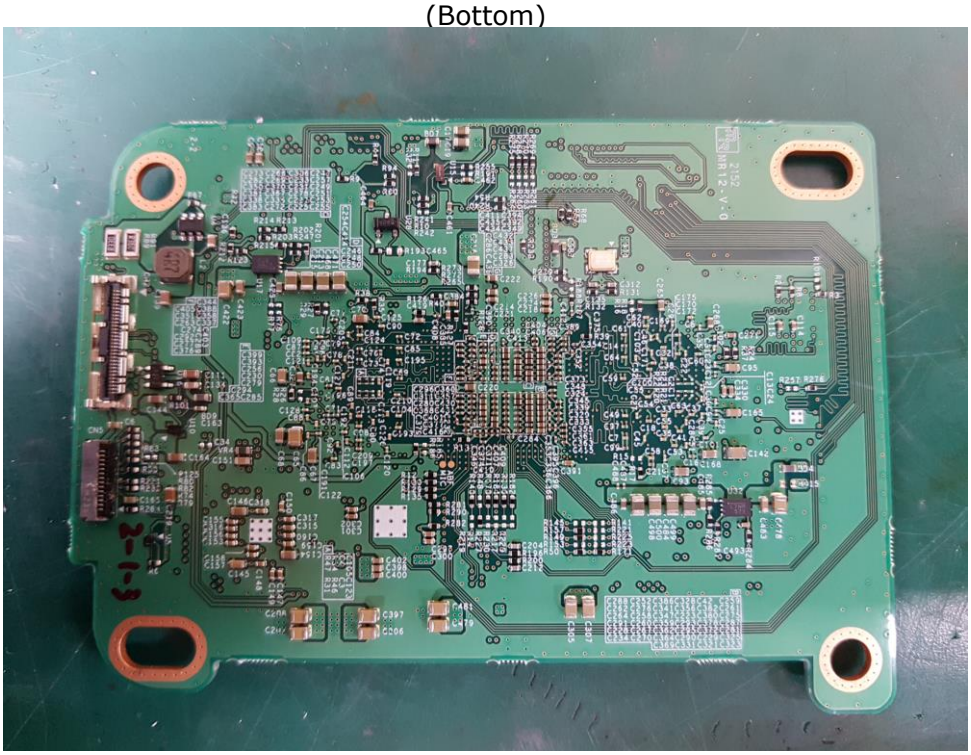
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EUT Internal View – Board 9

(Top)



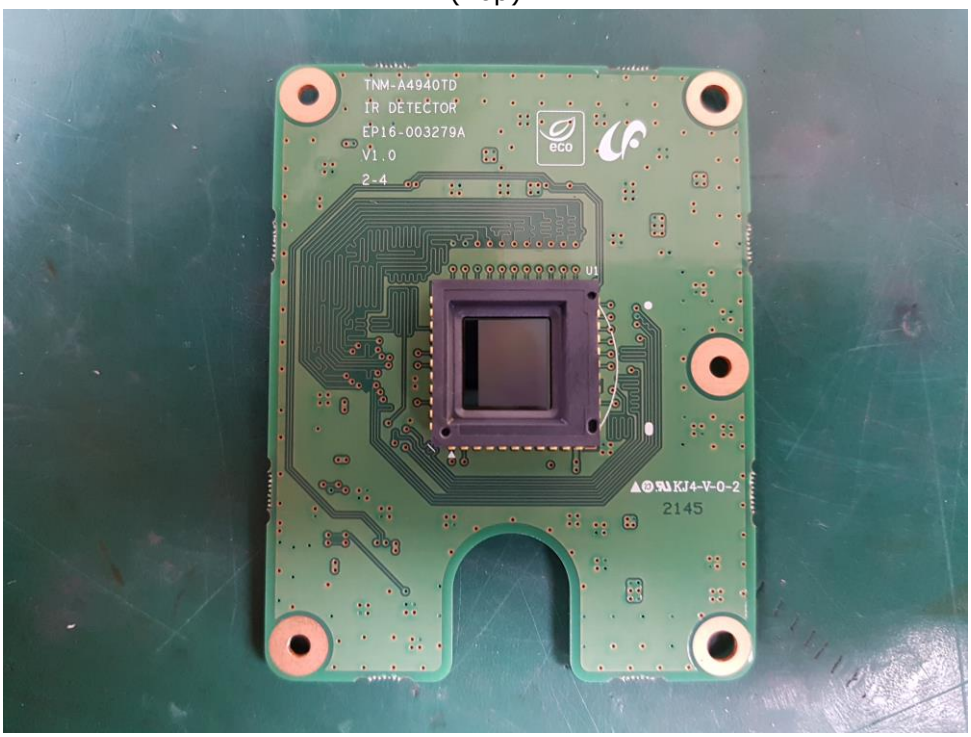
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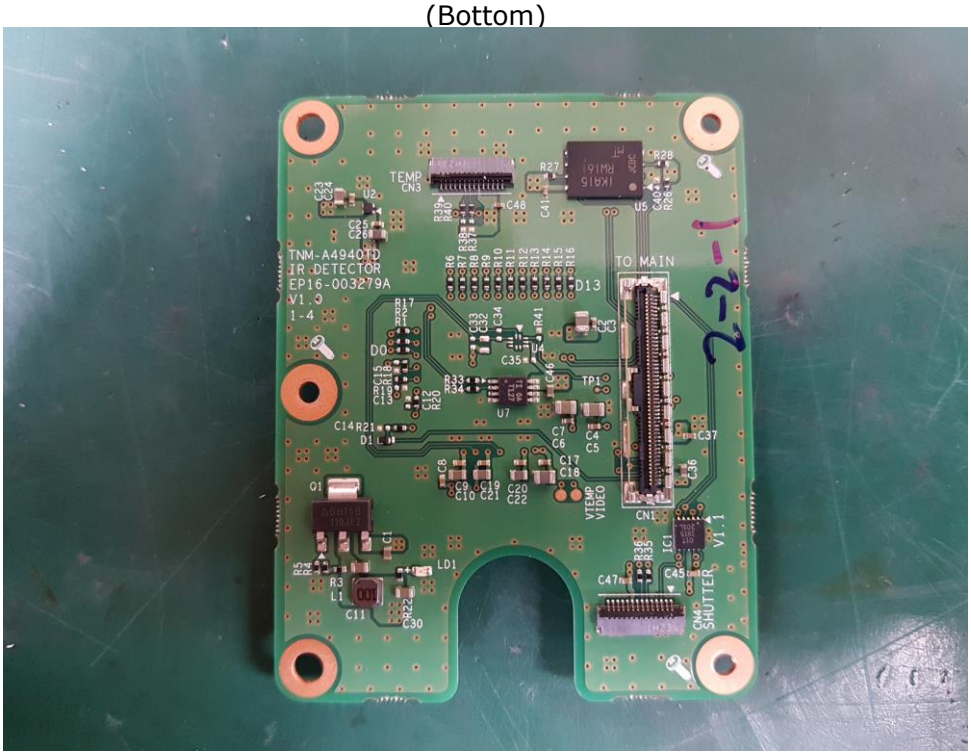
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EUT Internal View – Board 10

(Top)



(Bottom)



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EUT Internal View – Lens 1

(Top)



(Bottom)



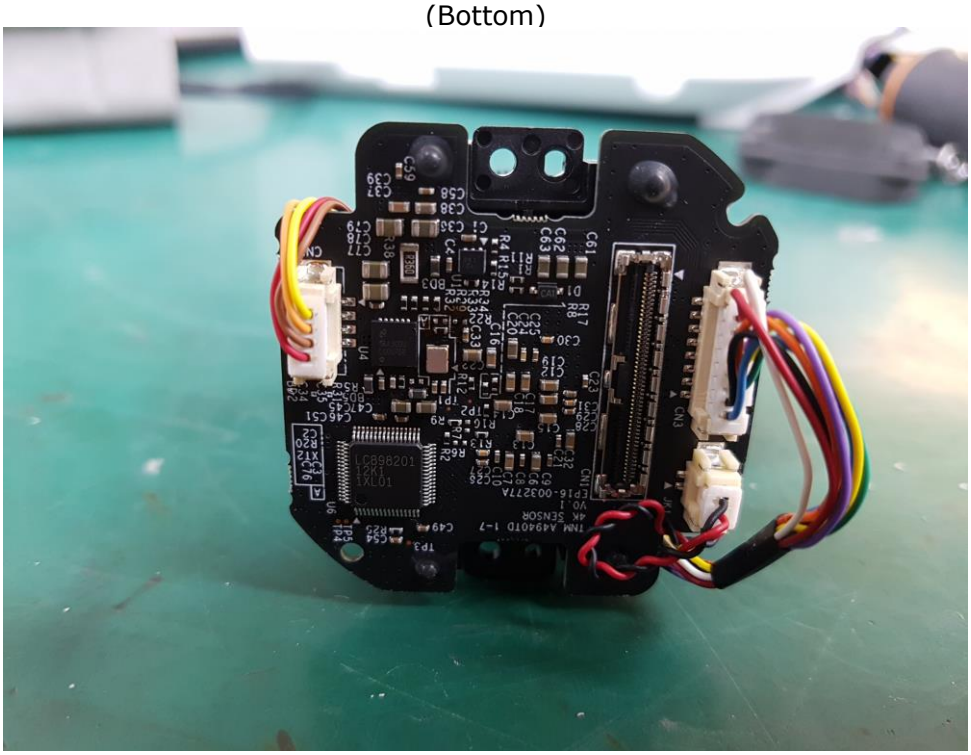
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EUT Internal View – Lens 2

(Top)

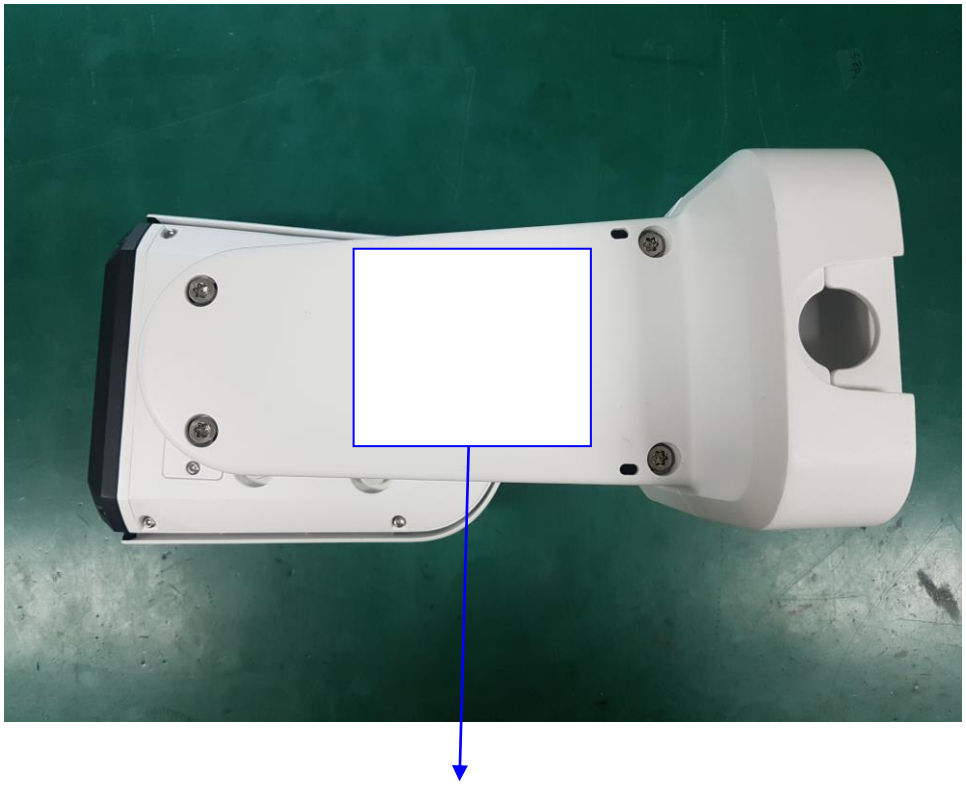


(Bottom)



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