EMC TEST REPORT For VCCI

Test Report No.	:	KES-EM-22T0677-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
Test Results	:	☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Seon Ho, Choi
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.

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Aug. 08, 2022	KES-EM-22T0677	Issued
Feb. 24, 2023	KES-EM-22T0677-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	17㎛
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 - W/W : 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, Pansonic, Sungin, AD, Vicon, GE
Flip / Mirror	Flip : On/Off Mirror : On/Off Hallway 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 : 5EA)
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-dierctional (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 SUNAP(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

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 100 V, 60 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 ㎜	Headset	3.5 ㎜	1.8	U
	3.5 ㎜		3.5 ㎜	1.8	U
	Micro SD Card Slot	Micro SD Card	Micro SD Card Slot	-	-
Notebook	3.5 ㎜	SmartPhone	3.5 ㎜	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 ㎜	Headset	3.5 ㎜	1.8	U
	3.5 ㎜		3.5 ㎜	1.8	U
	Micro SD Card Slot	Micro SD Card	Micro SD Card Slot	-	-
Notebook	3.5 ㎜	SmartPhone	3.5 ㎜	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 ㎜	Headset	3.5 ㎜	1.8	U
	3.5 ㎜		3.5 ㎜	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 ㎜	SmartPhone	3.5 ㎜	1.1	U
	DC Jack	Notebook Adapter	DC Jack	1.9	U

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

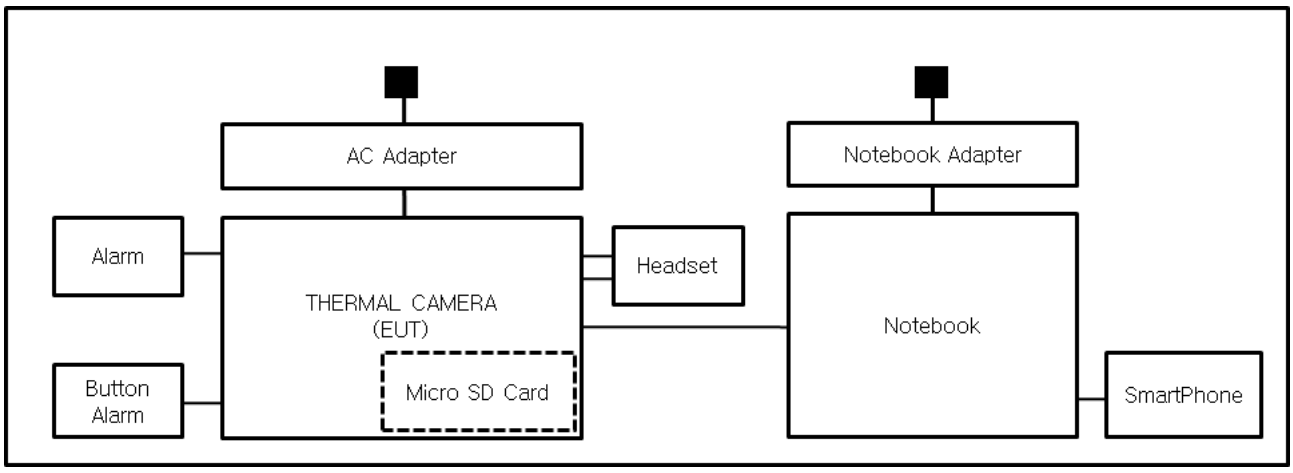
Test Mode	operating
AC Mode	Check the Normal Operation status. after testing, check if the recording is normally done on the Micro SD Card
DC Mode	
PoE Mode	

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

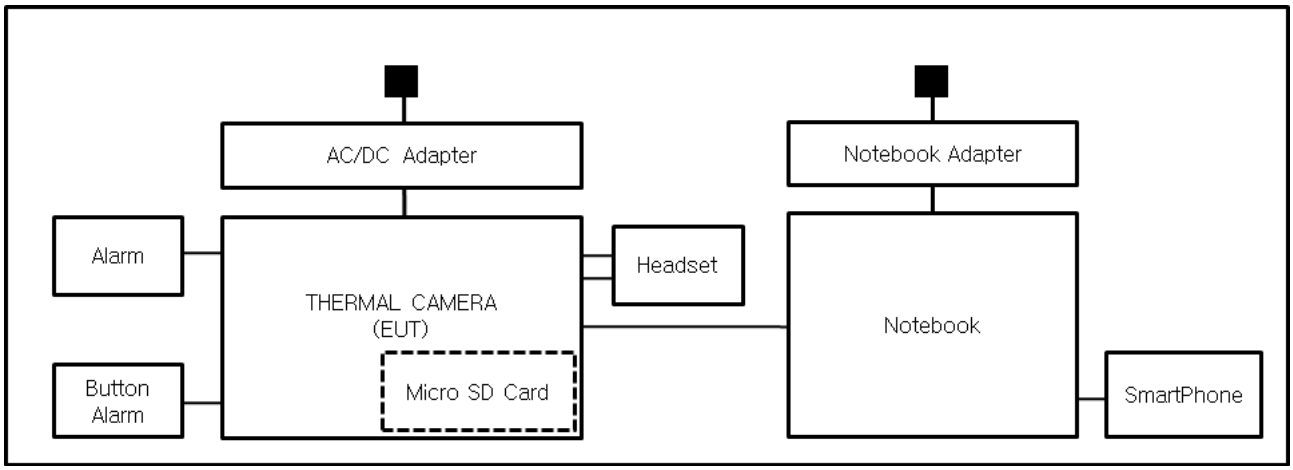
1.8 Configuration

■ AC Main
□ DC Main

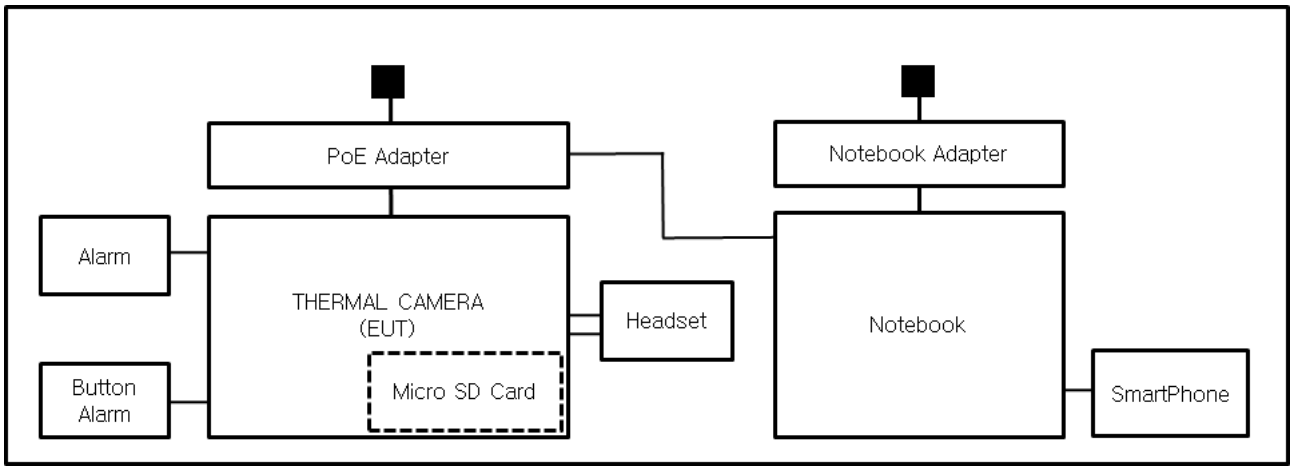
■ AC Mode



■ DC Mode



■ PoE Mode



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, 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

2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **VCCI-CISPR 32:2016** ☒ Class A ☐ Class B

2.1 Conducted Emissions 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) ℃
Relative Humidity: (45,4 ± 0,5) % 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.

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
☐	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	12, 28, 2022

Test Conditions
Temperature: (24,7 ± 0,3) ℃
Relative Humidity: (45,4 ± 0,3) % 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.

2.3 Radiated Electric Field Emissions(Below 1 ㎓)

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 ± 0,4) ℃
Relative Humidity: (44,9 ± 0,4) % 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.

2.4 Radiated Electric Field Emissions(Above 1 ㎓)

Test Date
Jul. 21, 2022

Test Location
SEMI ANECHOIC CHAMBER #3

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 ± 0,4) ℃
Relative Humidity: (44,8 ± 0,5) % 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.

APPENDIX A – TEST DATA

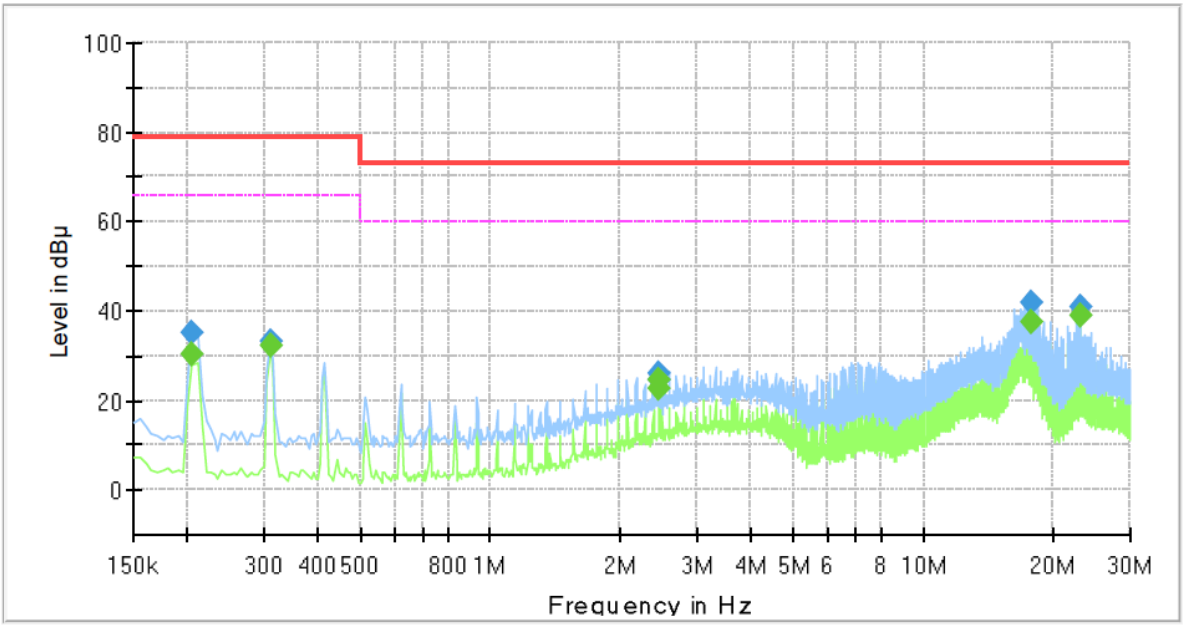
Conducted Emissions at Mains Power Ports

■ AC Mode

HOT LINE

Common Information

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



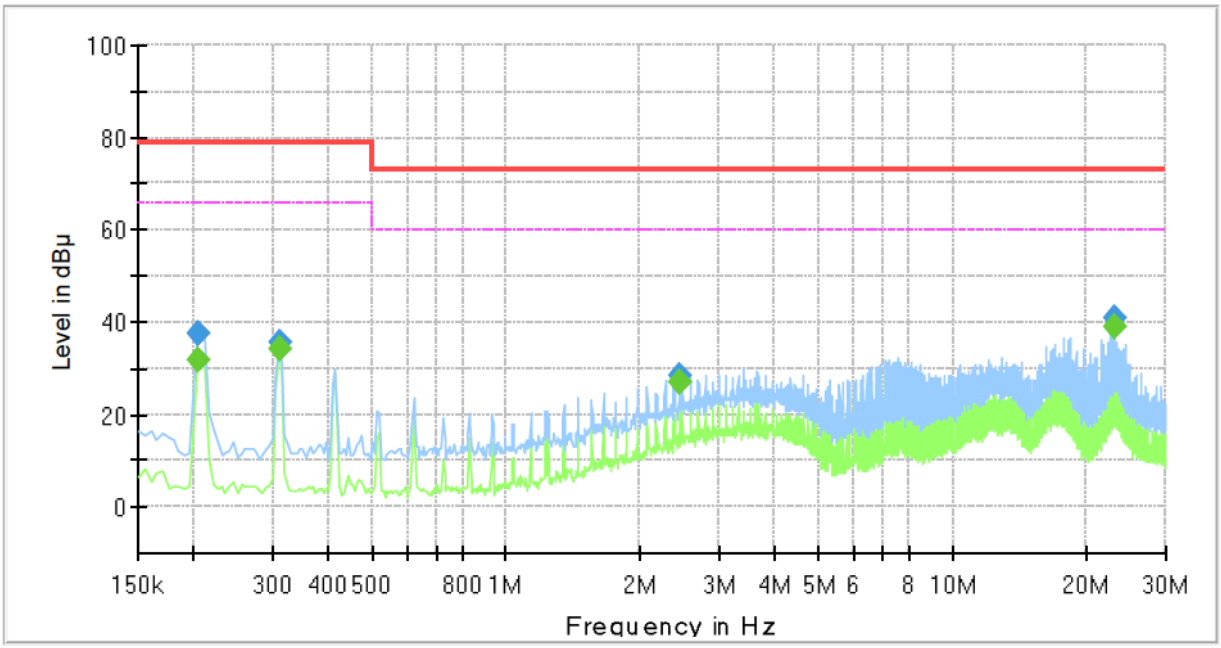
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.205000	---	30.46	66.00	35.54	1000.0	9.000	L1	19.4
0.205000	35.08	---	79.00	43.92	1000.0	9.000	L1	19.4
0.310000	---	32.12	66.00	33.88	1000.0	9.000	L1	19.5
0.310000	33.43	---	79.00	45.57	1000.0	9.000	L1	19.5
2.440000	---	22.65	60.00	37.35	1000.0	9.000	L1	20.3
2.440000	24.63	---	73.00	48.37	1000.0	9.000	L1	20.3
2.445000	---	24.56	60.00	35.44	1000.0	9.000	L1	20.3
2.445000	25.92	---	73.00	47.08	1000.0	9.000	L1	20.3
17.695000	---	37.43	60.00	22.57	1000.0	9.000	L1	20.0
17.695000	41.94	---	73.00	31.06	1000.0	9.000	L1	20.0
23.130000	---	38.86	60.00	21.14	1000.0	9.000	L1	20.1
23.130000	40.71	---	73.00	32.29	1000.0	9.000	L1	20.1

NEUTRAL LINE

Common Information

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



Final_Result

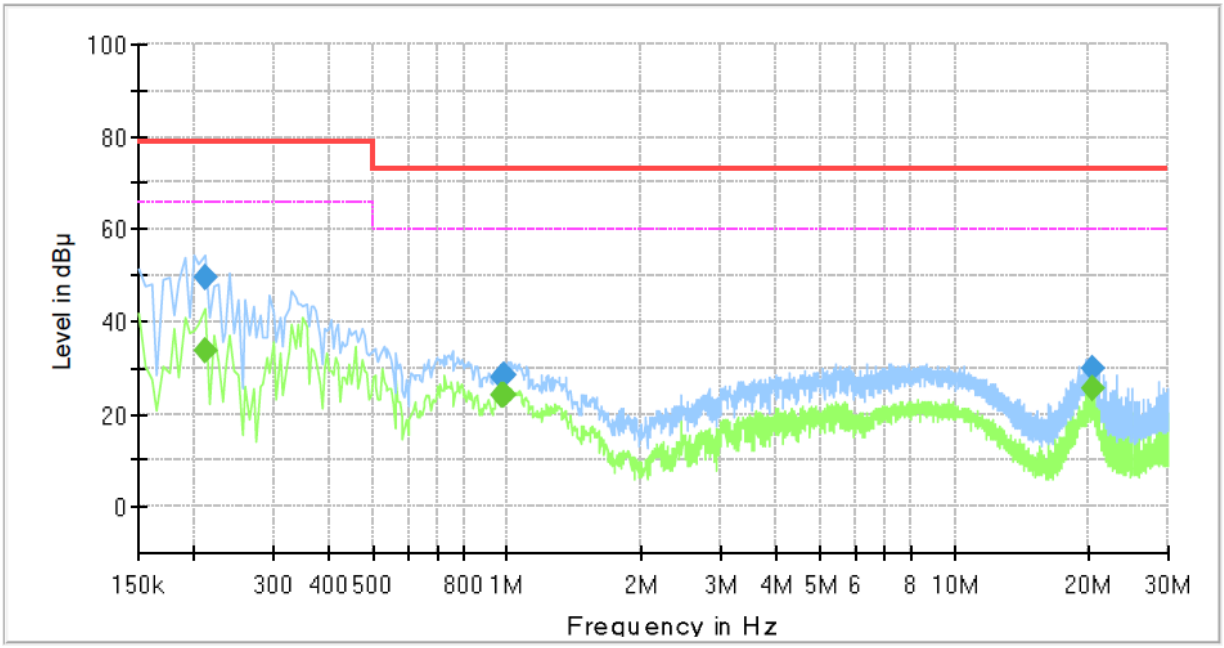
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.205000	---	31.67	66.00	34.33	1000.0	9.000	N	19.4
0.205000	37.43	---	79.00	41.57	1000.0	9.000	N	19.4
0.310000	---	34.29	66.00	31.71	1000.0	9.000	N	19.5
0.310000	35.66	---	79.00	43.34	1000.0	9.000	N	19.5
2.445000	---	27.14	60.00	32.86	1000.0	9.000	N	20.3
2.445000	28.56	---	73.00	44.44	1000.0	9.000	N	20.3
23.130000	---	39.22	60.00	20.78	1000.0	9.000	N	20.1
23.130000	41.14	---	73.00	31.86	1000.0	9.000	N	20.1

■ DC Mode

HOT LINE

Common Information

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



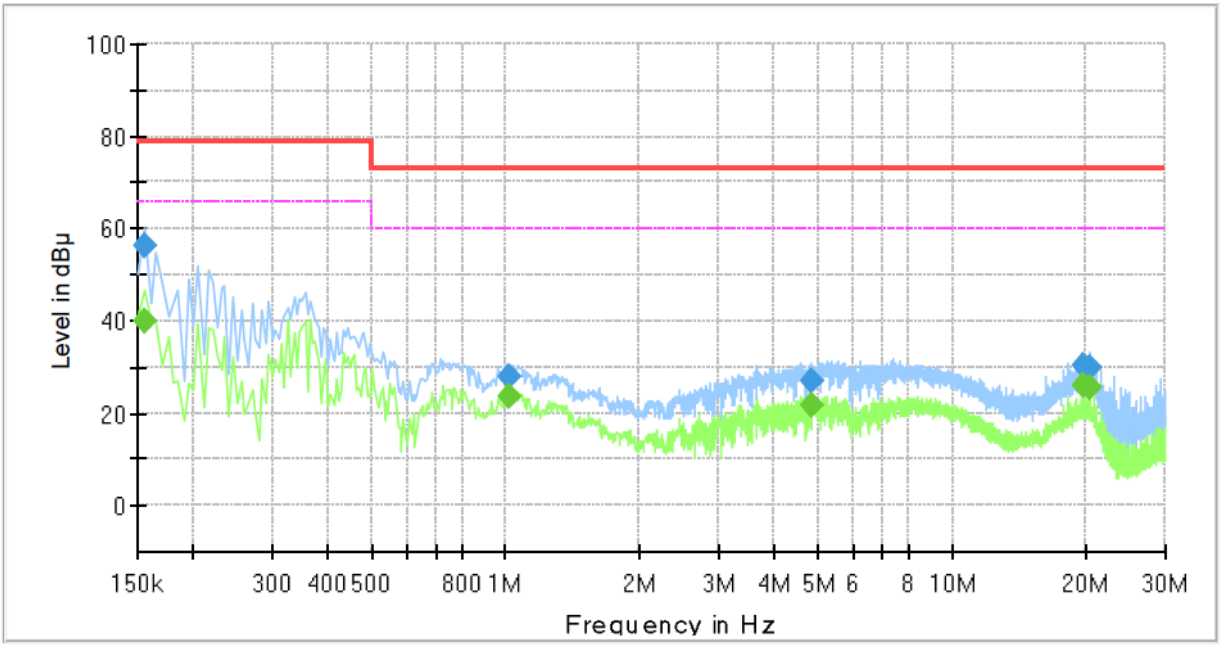
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.210000	---	33.92	66.00	32.08	1000.0	9.000	L1	19.4
0.210000	49.54	---	79.00	29.46	1000.0	9.000	L1	19.4
0.975000	---	24.15	60.00	35.85	1000.0	9.000	L1	20.0
0.975000	28.09	---	73.00	44.91	1000.0	9.000	L1	20.0
0.985000	---	24.02	60.00	35.98	1000.0	9.000	L1	20.0
0.985000	28.65	---	73.00	44.35	1000.0	9.000	L1	20.0
20.260000	---	25.61	60.00	34.39	1000.0	9.000	L1	20.1
20.260000	29.90	---	73.00	43.10	1000.0	9.000	L1	20.1

NEUTRAL LINE

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	---	40.03	66.00	25.97	1000.0	9.000	N	19.4
0.155000	56.52	---	79.00	22.48	1000.0	9.000	N	19.4
1.020000	---	23.86	60.00	36.14	1000.0	9.000	N	20.0
1.020000	27.90	---	73.00	45.10	1000.0	9.000	N	20.0
4.840000	---	21.58	60.00	38.42	1000.0	9.000	N	19.7
4.840000	27.11	---	73.00	45.89	1000.0	9.000	N	19.7
19.710000	---	25.94	60.00	34.06	1000.0	9.000	N	20.1
19.710000	30.31	---	73.00	42.69	1000.0	9.000	N	20.1
20.260000	---	25.76	60.00	34.24	1000.0	9.000	N	20.2
20.260000	29.99	---	73.00	43.01	1000.0	9.000	N	20.2

♦ Calculation
QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]
QuasiPeak / CAverage : The Final Value
Reading Value : Not shown in the table.
Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

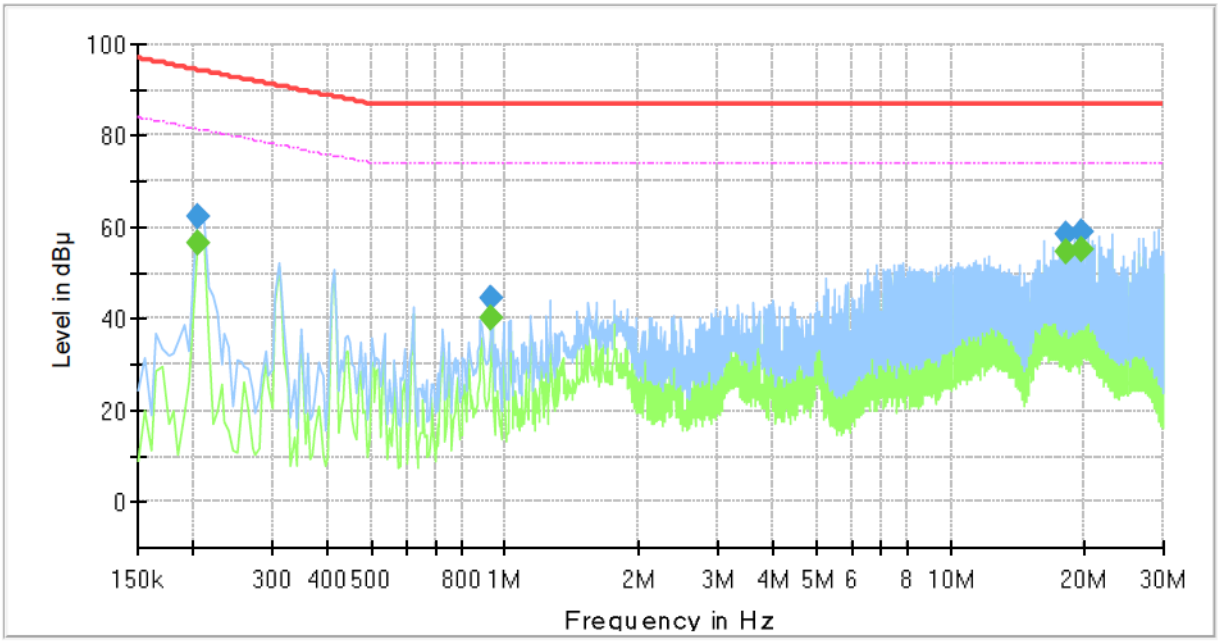
Conducted Emissions at Telecommunication Ports

■ AC Mode

[100 Mbps]

Common Information

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



Final_Result

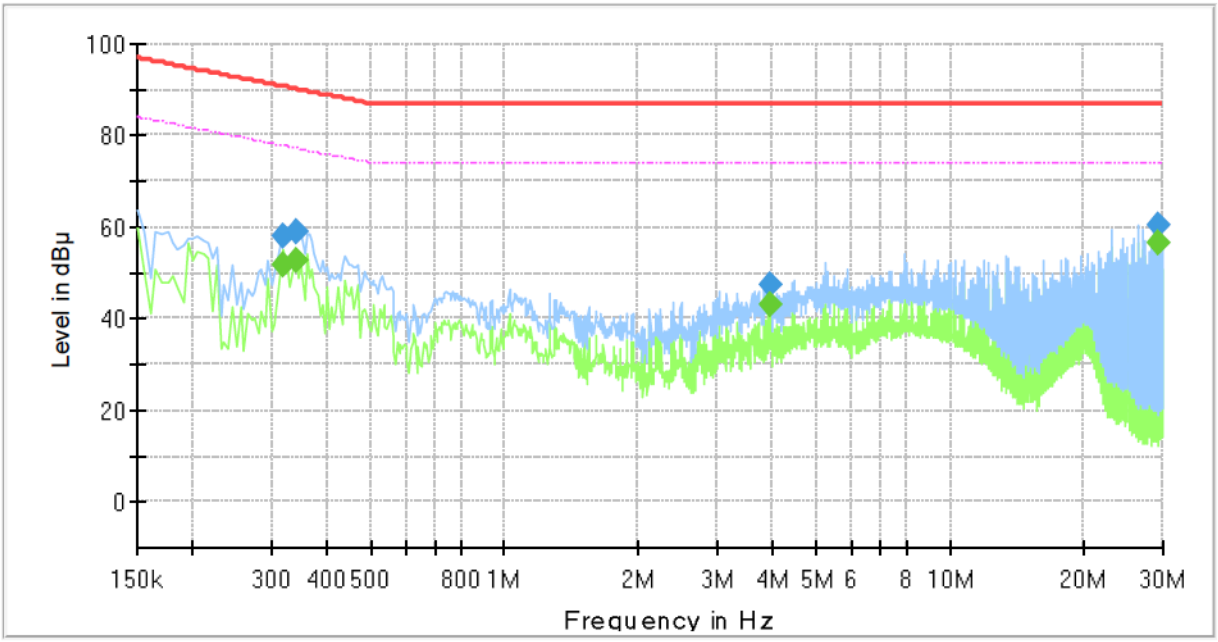
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.205000	---	56.69	81.41	24.72	1000.0	9.000	Single Line	19.7
0.205000	62.19	---	94.41	32.22	1000.0	9.000	Single Line	19.7
0.930000	---	40.36	74.00	33.64	1000.0	9.000	Single Line	20.0
0.930000	44.51	---	87.00	42.49	1000.0	9.000	Single Line	20.0
18.245000	---	54.72	74.00	19.28	1000.0	9.000	Single Line	19.8
18.245000	58.47	---	87.00	28.53	1000.0	9.000	Single Line	19.8
19.710000	---	55.35	74.00	18.65	1000.0	9.000	Single Line	20.0
19.710000	59.07	---	87.00	27.93	1000.0	9.000	Single Line	20.0

■ DC Mode

[100 Mbps]

Common Information

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



Final_Result

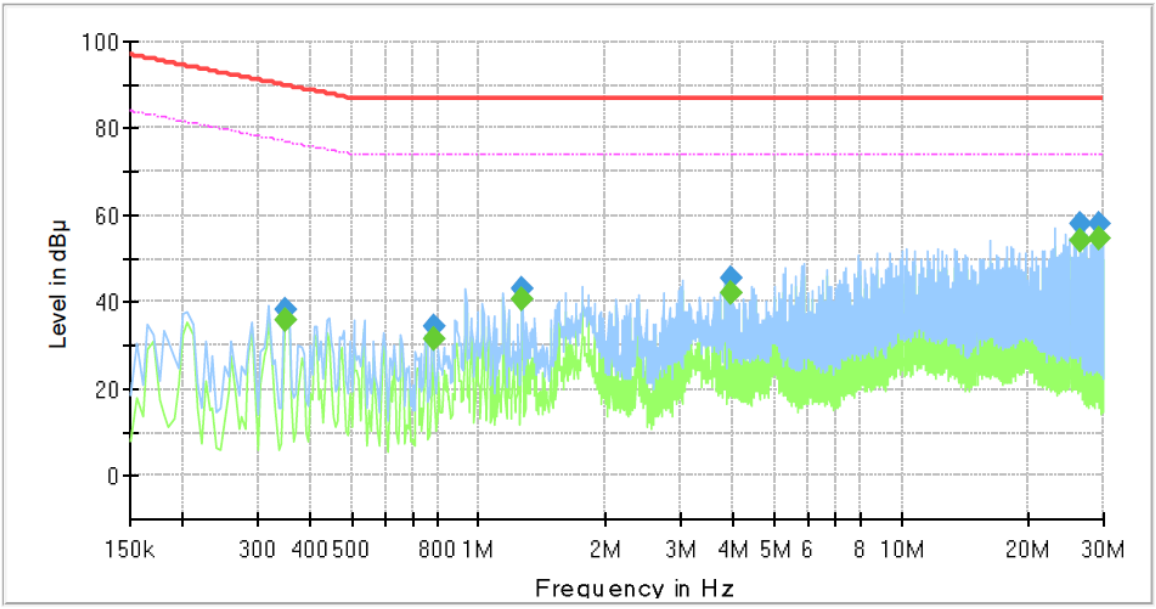
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.320000	---	51.99	77.71	25.72	1000.0	9.000	Single Line	19.7
0.320000	57.80	---	90.71	32.91	1000.0	9.000	Single Line	19.7
0.340000	---	52.63	77.20	24.57	1000.0	9.000	Single Line	19.7
0.340000	59.08	---	90.20	31.12	1000.0	9.000	Single Line	19.7
3.955000	---	43.04	74.00	30.96	1000.0	9.000	Single Line	19.7
3.955000	47.56	---	87.00	39.44	1000.0	9.000	Single Line	19.7
29.235000	---	56.82	74.00	17.18	1000.0	9.000	Single Line	20.4
29.235000	60.22	---	87.00	26.78	1000.0	9.000	Single Line	20.4

■ PoE Mode

[100 Mbps]

Common Information

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



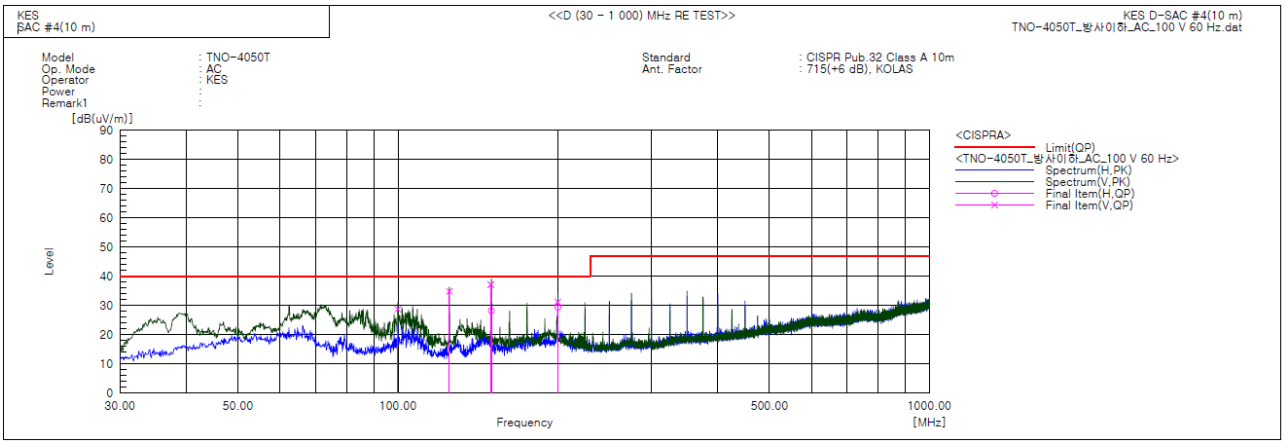
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.350000	---	35.97	76.96	40.99	1000.0	9.000	Single Line	19.7
0.350000	38.18	---	89.96	51.78	1000.0	9.000	Single Line	19.7
0.780000	---	31.39	74.00	42.61	1000.0	9.000	Single Line	19.9
0.780000	34.45	---	87.00	52.55	1000.0	9.000	Single Line	19.9
1.265000	---	40.44	74.00	33.56	1000.0	9.000	Single Line	20.0
1.265000	43.14	---	87.00	43.86	1000.0	9.000	Single Line	20.0
3.955000	---	42.18	74.00	31.82	1000.0	9.000	Single Line	19.7
3.955000	45.52	---	87.00	41.48	1000.0	9.000	Single Line	19.7
26.610000	---	54.37	74.00	19.63	1000.0	9.000	Single Line	20.2
26.610000	58.12	---	87.00	28.88	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))

Radiated Electric Field Emissions(Below 1 ㎓)

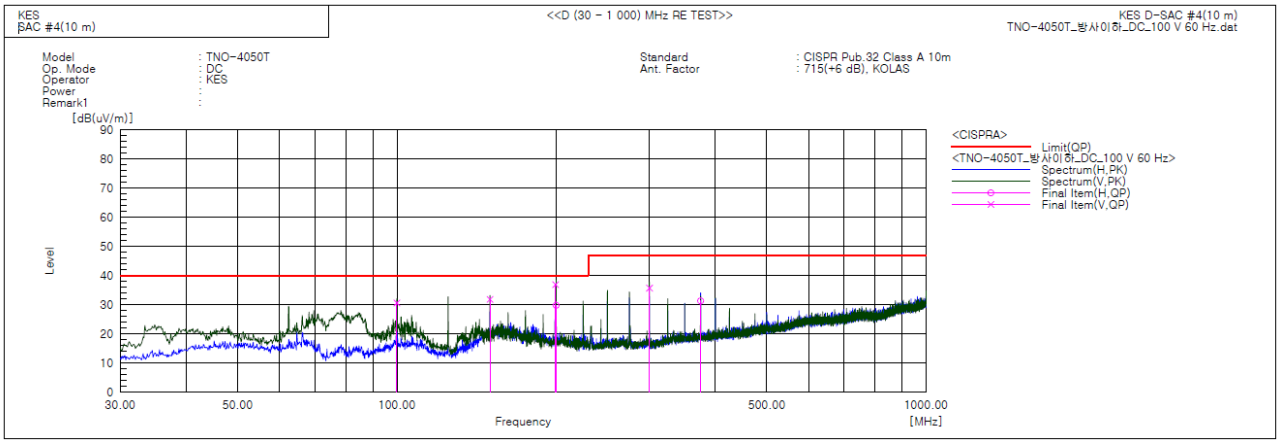
■ AC Mode



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	99.961	V	51.2	-22.5	28.7	40.0	11.3	106.0	216.0	
2	124.939	V	59.7	-24.9	34.8	40.0	5.2	198.0	253.0	
3	149.541	V	62.4	-25.3	37.1	40.0	2.9	106.0	197.0	
4	149.916	H	53.5	-25.3	28.2	40.0	11.8	391.0	35.0	
5	199.694	V	52.2	-21.0	31.2	40.0	8.8	100.0	143.0	
6	199.993	H	50.4	-21.0	29.4	40.0	10.6	400.0	72.0	

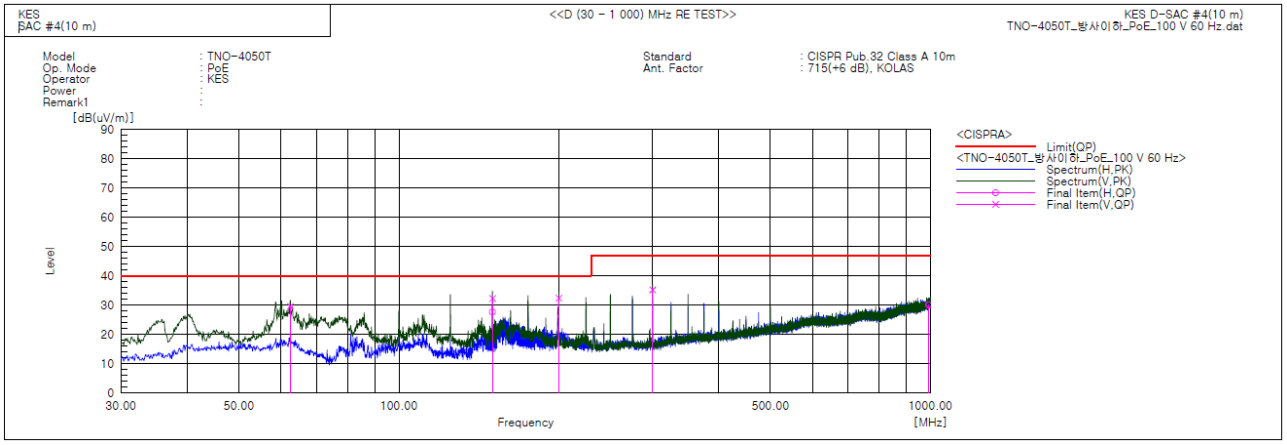
■ DC Mode



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	53.1	-22.5	30.6	40.0	9.4	100.0	217.0	
2	149.916	V	57.1	-25.3	31.8	40.0	8.2	109.0	162.0	
3	199.515	V	57.9	-21.0	36.9	40.0	3.1	106.0	17.0	
4	199.993	H	50.8	-21.0	29.8	40.0	10.2	309.0	125.0	
5	300.024	V	53.7	-18.0	35.7	47.0	11.3	114.0	217.0	
6	374.956	H	46.1	-14.8	31.3	47.0	15.7	300.0	124.0	

■ PoE Mode



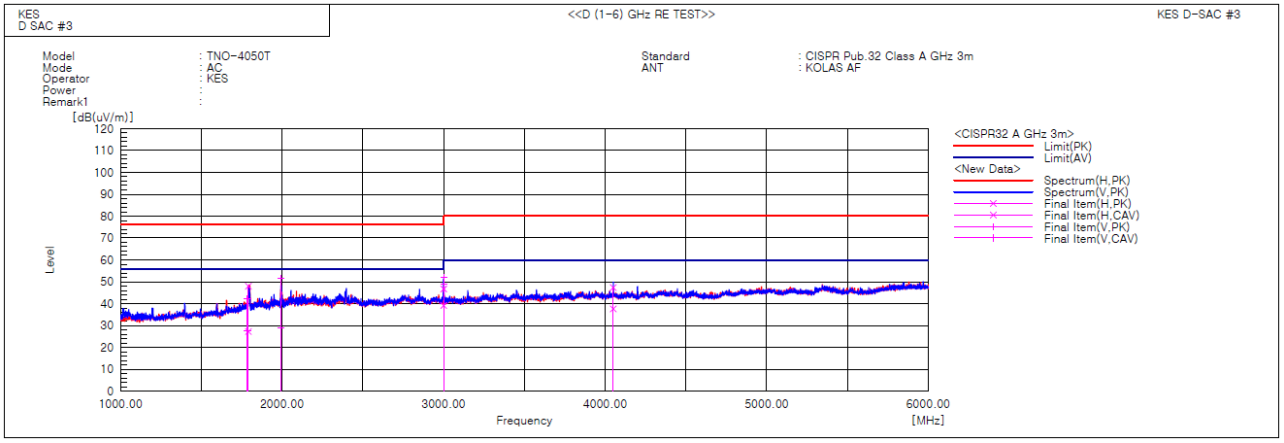
Final Result

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	52.1	-22.5	29.6	40.0	10.4	109.0	261.0	
2	149.916	H	53.0	-25.3	27.7	40.0	12.3	400.0	215.0	
3	149.995	V	57.6	-25.3	32.3	40.0	7.7	197.0	163.0	
4	199.993	V	53.4	-21.0	32.4	40.0	7.6	199.0	199.0	
5	300.024	V	53.2	-18.0	35.2	47.0	11.8	100.0	128.0	
6	992.604	H	32.8	-2.7	30.1	47.0	16.9	305.0	53.0	

♦ Calculation
Corrected Amplitude [㏈uV] = Amplitude[㏈uV] + Correction Factor [㏈]
Corrected Amplitude : The Final Value, Amplitude : Reading Value,
Correction Factor : ANT FACTOR + Cable loss

Radiated Electric Field Emissions(Above 1 ㎓)

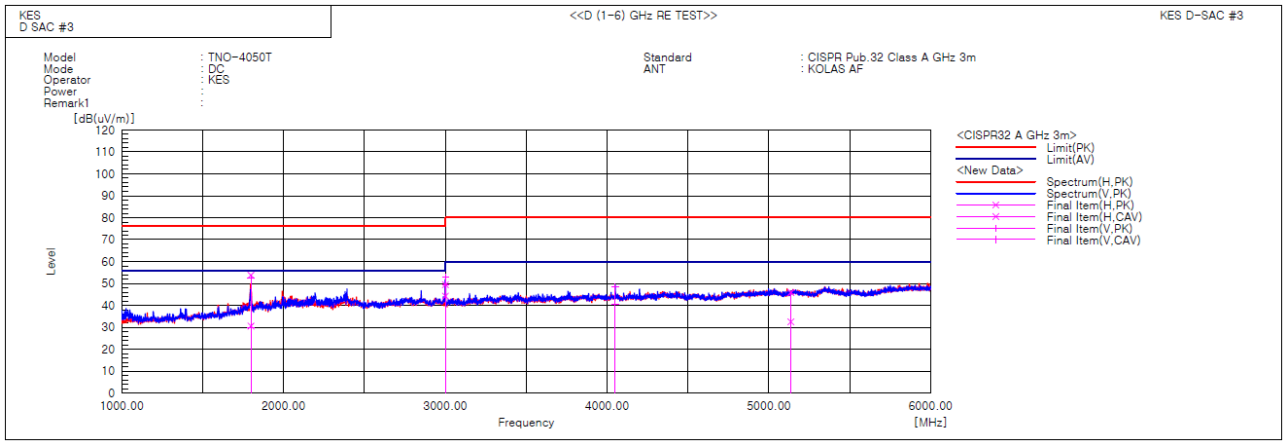
■ AC Mode



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	1783.653	V	44.7	29.9	-2.3	42.4	27.6	76.0	56.0	33.6	28.4	100.0	171.4	
2	1791.201	H	50.4	29.7	-2.3	48.1	27.4	76.0	56.0	27.9	28.6	100.0	36.8	
3	1991.230	V	52.9	29.9	-1.1	51.8	28.8	76.0	56.0	24.2	27.2	100.0	164.4	
4	3000.000	V	50.0	46.8	2.2	52.2	49.0	76.0	56.0	23.8	7.0	100.0	67.9	
5	3000.430	H	44.6	37.0	2.2	46.8	39.2	80.0	60.0	33.2	20.8	100.0	162.7	
6	4049.640	H	41.6	31.9	5.8	47.4	37.7	80.0	60.0	32.6	22.3	100.0	198.4	

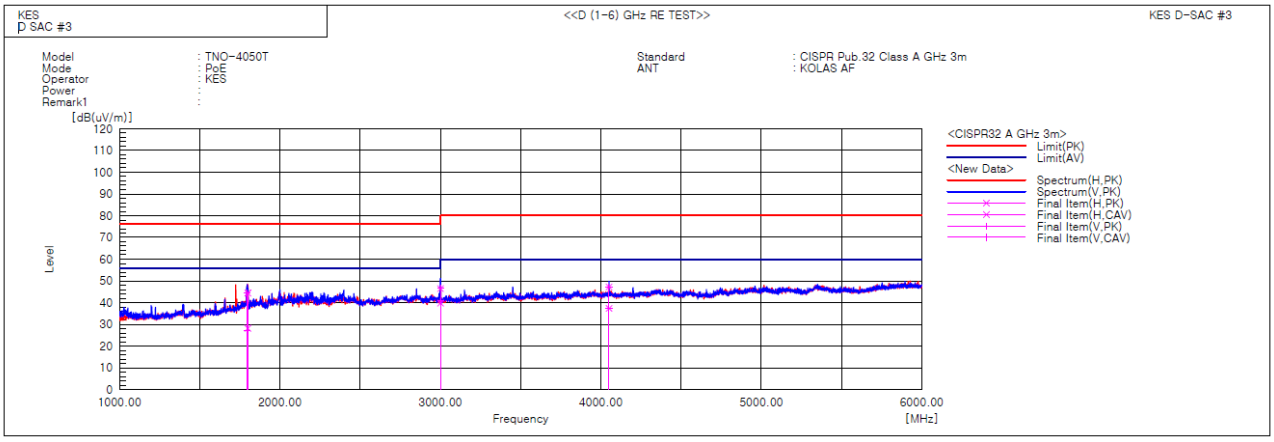
■ DC Mode



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	1797.730	V	54.9	32.2	-2.2	52.7	30.0	76.0	56.0	23.3	26.0	100.0	158.3	
2	1797.960	H	56.0	32.8	-2.2	53.8	30.6	76.0	56.0	22.2	25.4	100.0	40.8	
3	2999.950	H	47.3	42.1	2.2	49.5	44.3	76.0	56.0	26.5	11.7	100.0	227.2	
4	3000.170	V	50.7	47.2	2.2	52.9	49.4	80.0	60.0	27.1	10.6	100.0	151.8	
5	4049.550	V	42.9	34.7	5.8	48.7	40.5	80.0	60.0	31.3	19.5	100.0	233.4	
6	5135.106	H	37.1	23.7	8.8	45.9	32.5	80.0	60.0	34.1	27.5	100.0	222.6	

■ 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	1795.796	V	46.8	29.6	-2.2	44.6	27.4	76.0	56.0	31.4	28.6	100.0	167.0	
2	1798.610	H	46.7	30.5	-2.2	44.5	28.3	76.0	56.0	31.5	27.7	100.0	52.0	
3	3000.351	H	44.3	37.6	2.2	46.5	39.8	80.0	60.0	33.5	20.2	100.0	138.3	
4	3000.445	V	44.6	38.8	2.2	46.8	41.0	80.0	60.0	33.2	19.0	100.0	146.2	
5	4050.015	V	41.3	31.8	5.8	47.1	37.6	80.0	60.0	32.9	22.4	100.0	237.3	
6	4050.349	H	41.5	31.6	5.8	47.3	37.4	80.0	60.0	32.7	22.6	100.0	169.5	

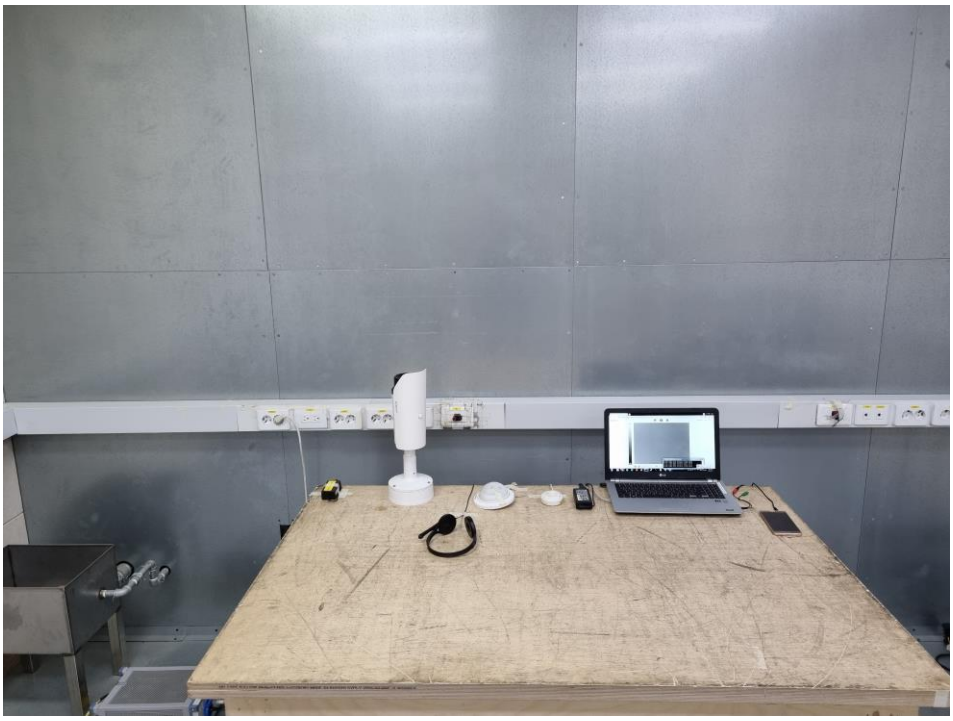
♦ Calculation

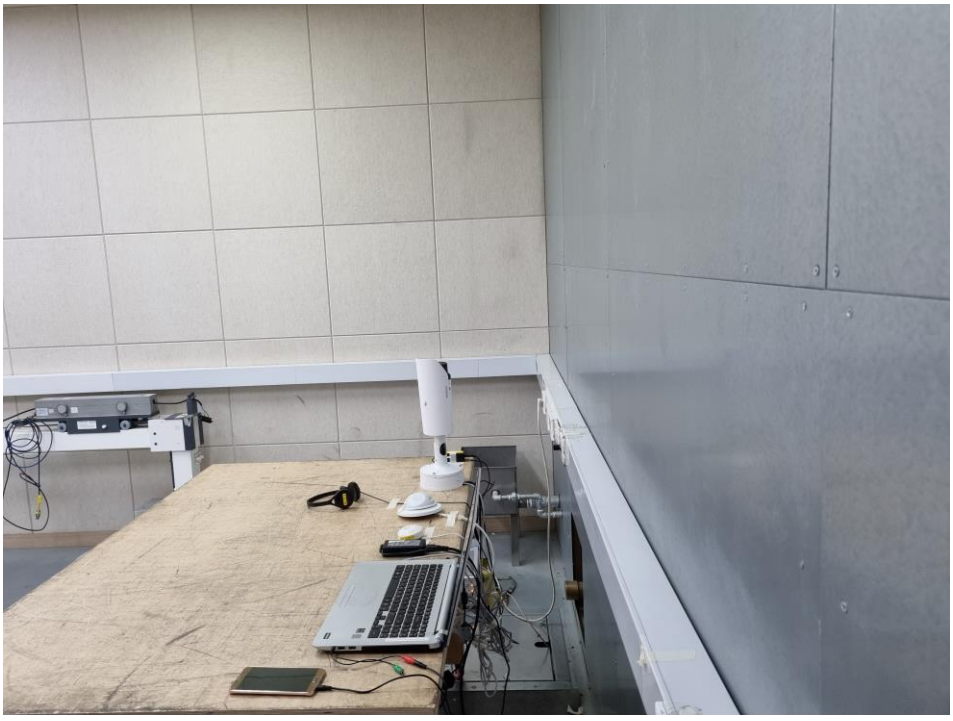
Result(PK/CAV) [dB(㎶/m)] = (Reading(PK/CAV)[dB(㎶)] + c.f[dB(1/m)]
Margin(PK/CAV)[dB] = Limit[dB(㎶/m)] - Result(PK/CAV) [dB(㎶/m)]
Reading(PK/CAV) : Reading value, Result(PK/CAV) : Reading value + Factor value
Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value

Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports

■ AC, DC Mode





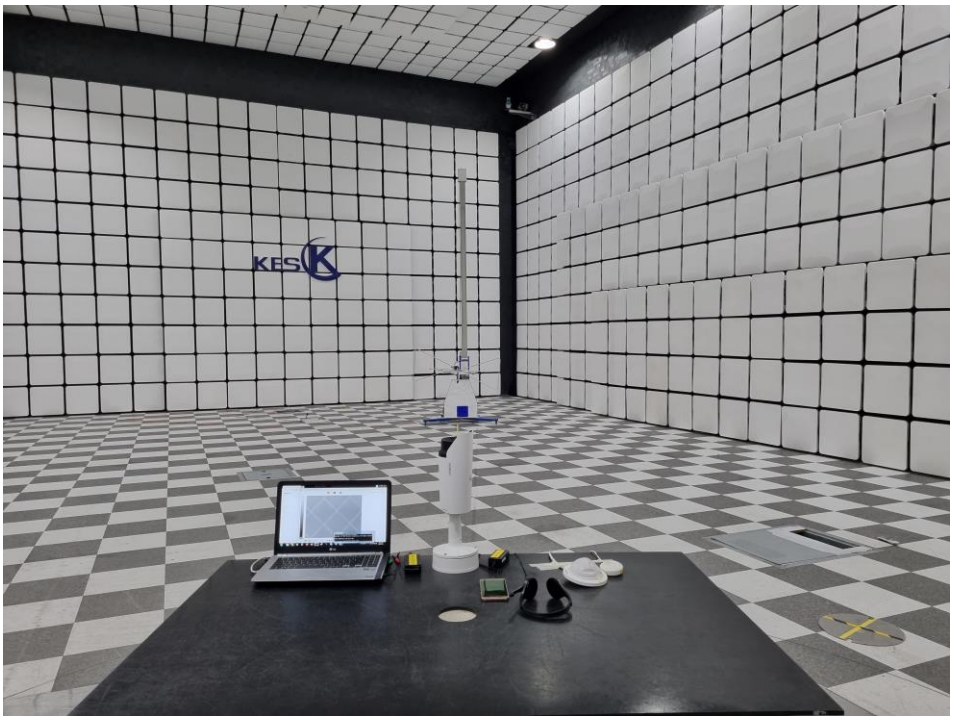
Conducted Emissions at Telecommunication Ports

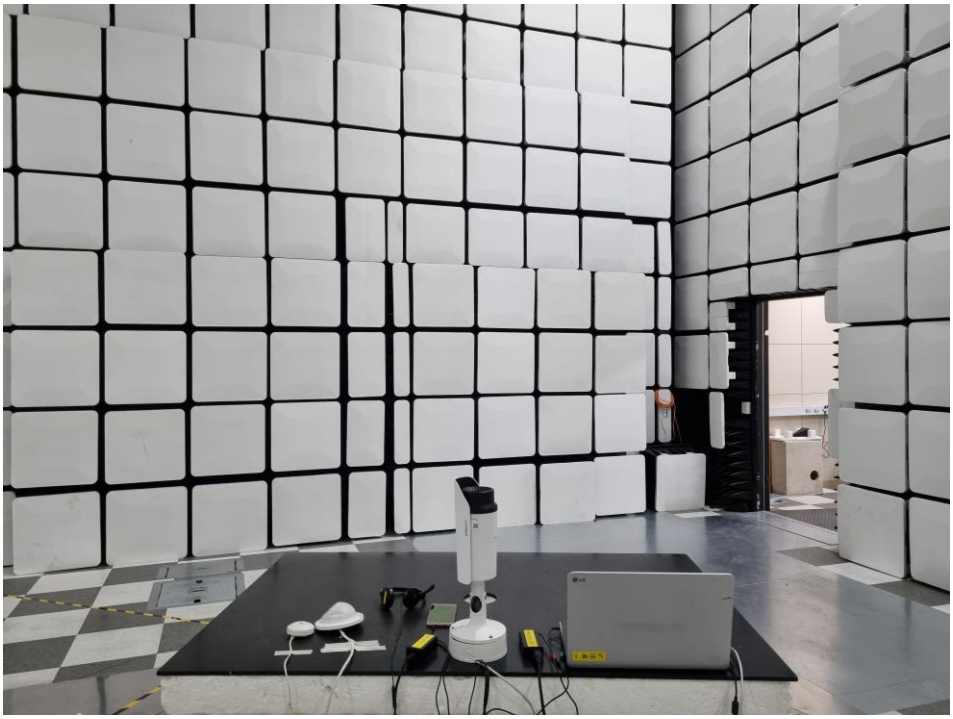
■ AC, DC Mode

■ PoE Mode

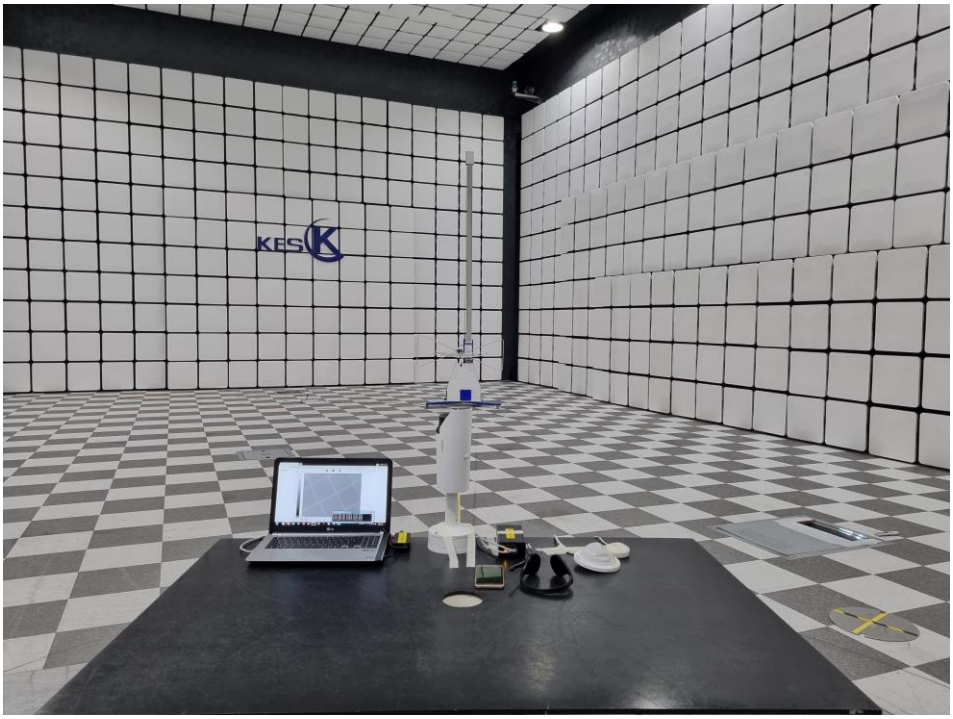
Radiated Electric Field Emissions(Below 1 ㎓)

■ AC, DC Mode



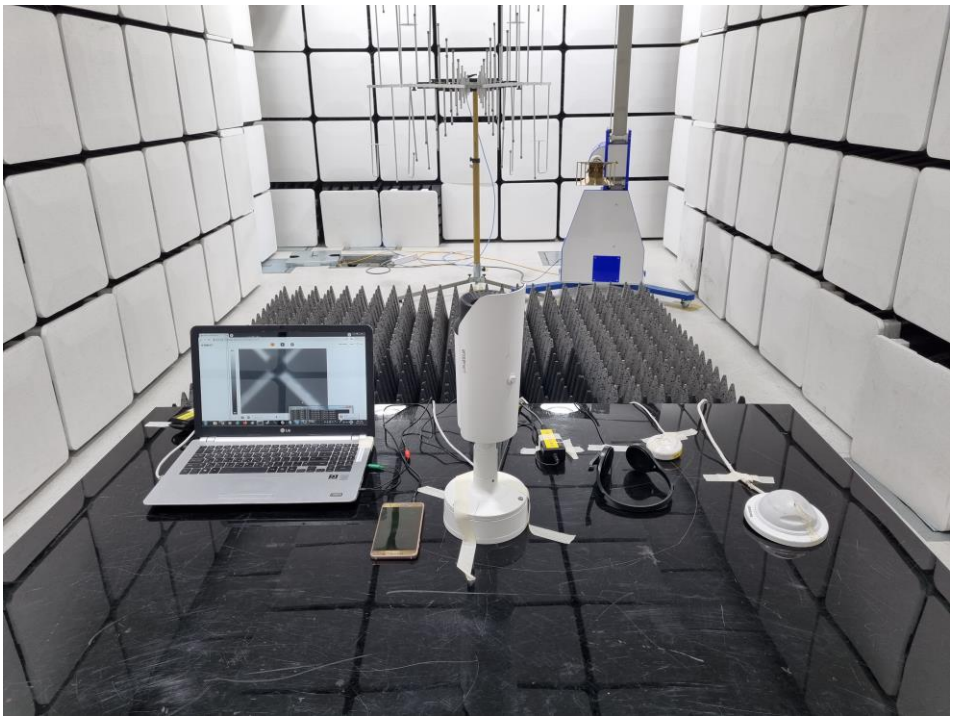


■ PoE Mode

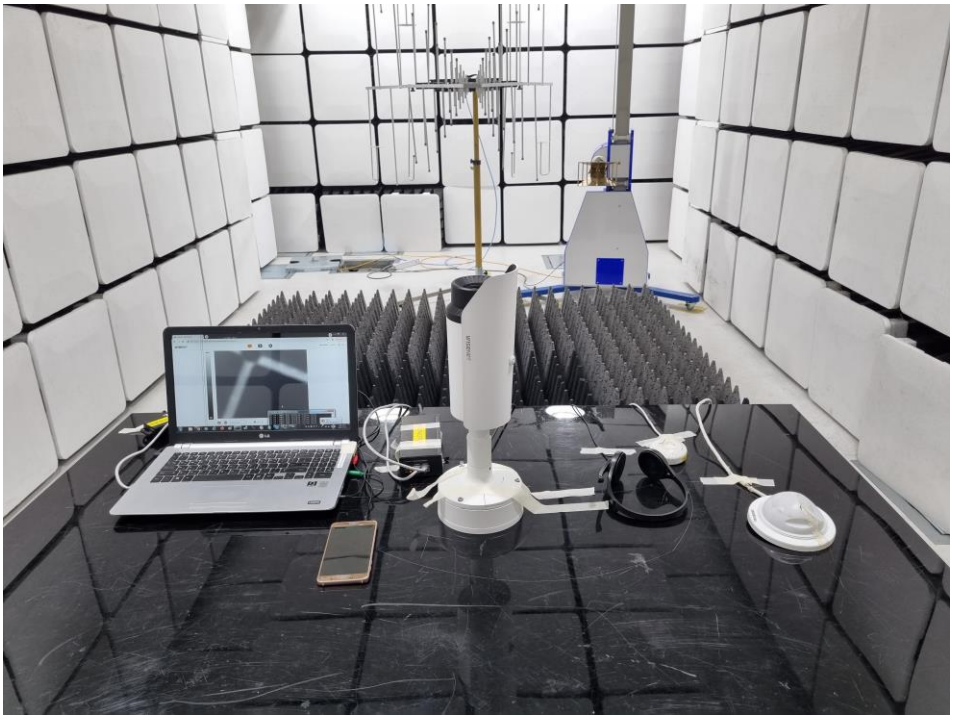


Radiated Electric Field Emissions(Above 1 ㎓)

■ AC, DC Mode



■ PoE Mode



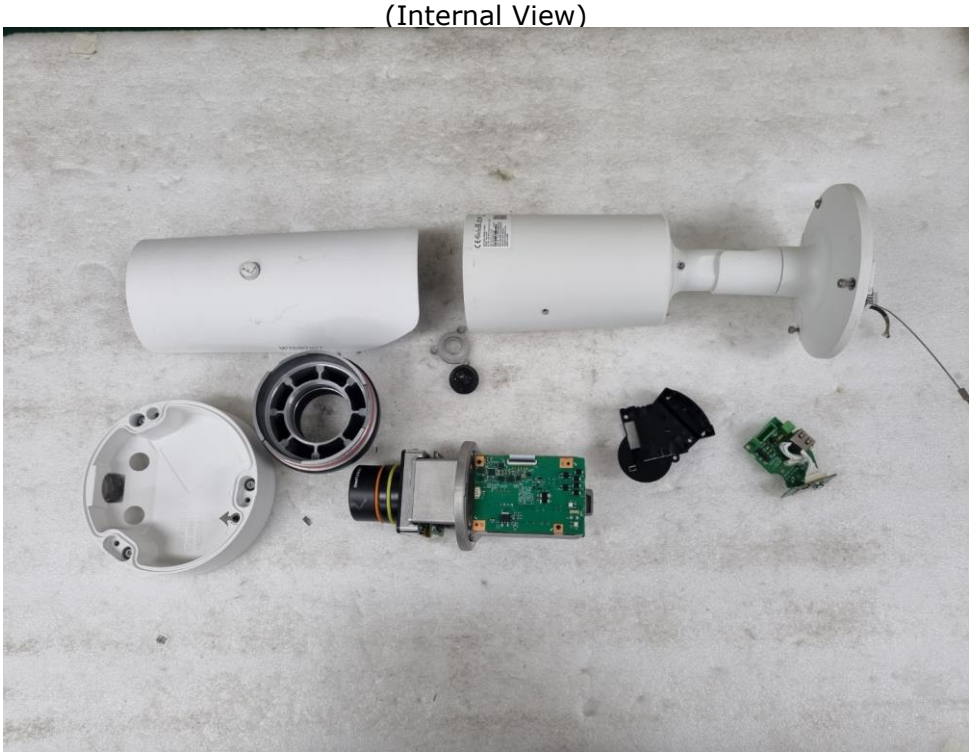
EUT External Photographs

(Top)

(Bottom)

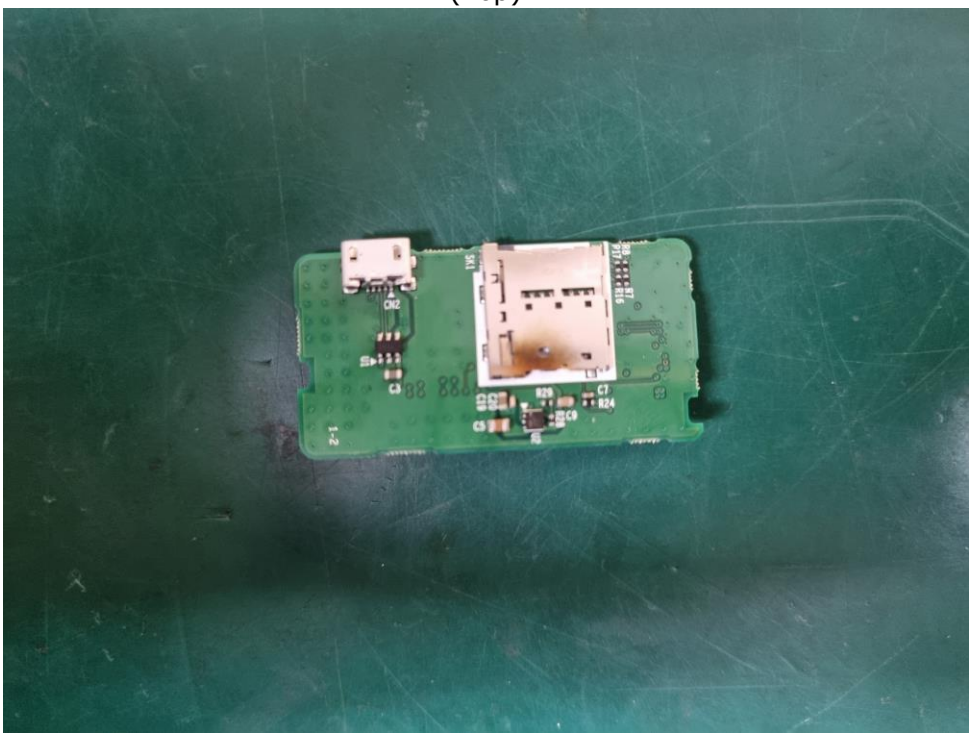
EUT Internal Photographs

(Internal View)

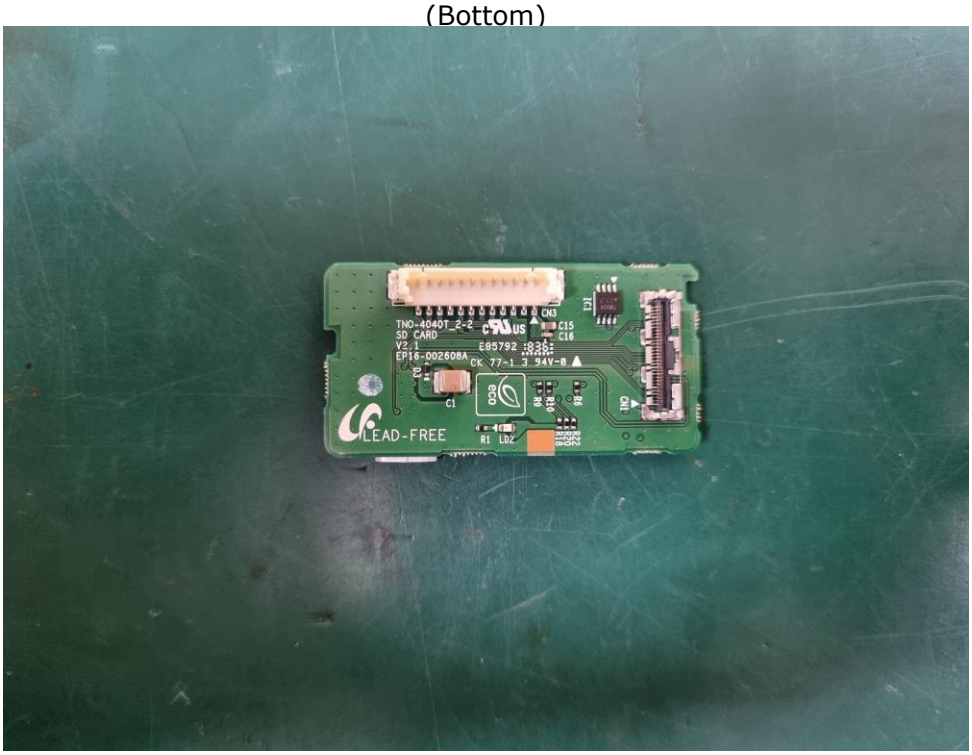


EUT Internal View – Board 1

(Top)

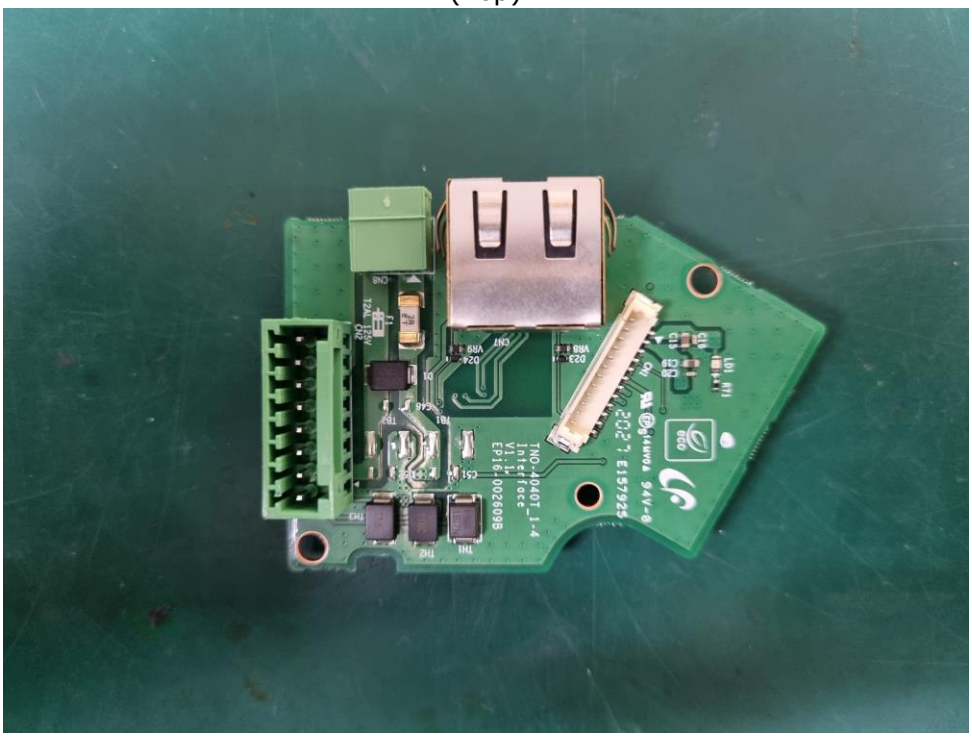


(Bottom)

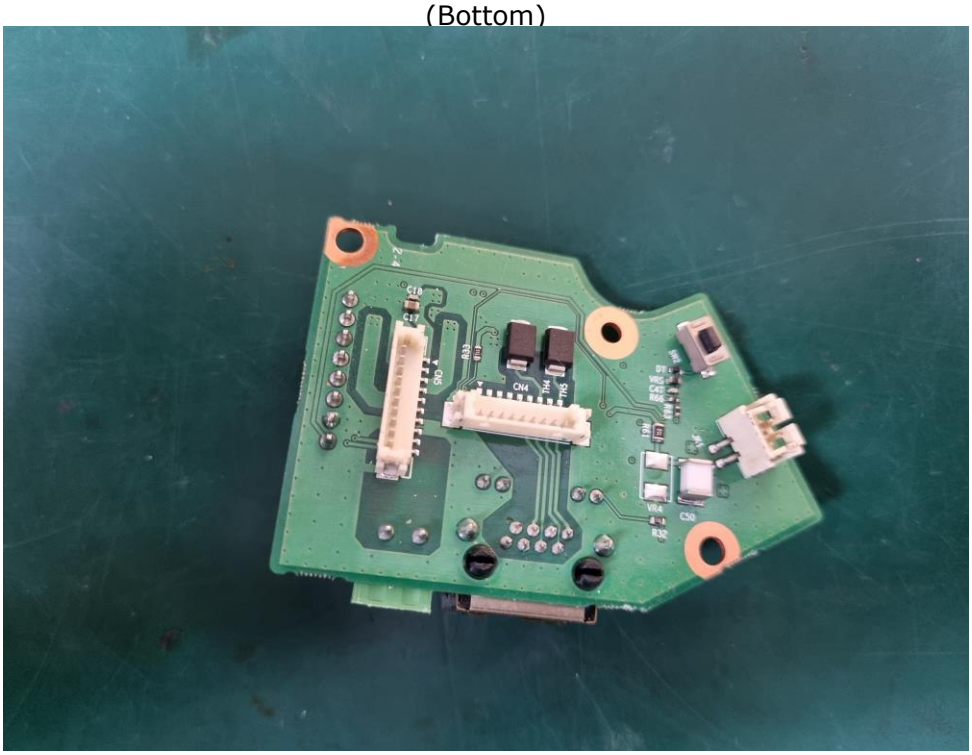


EUT Internal View – Board 2

(Top)

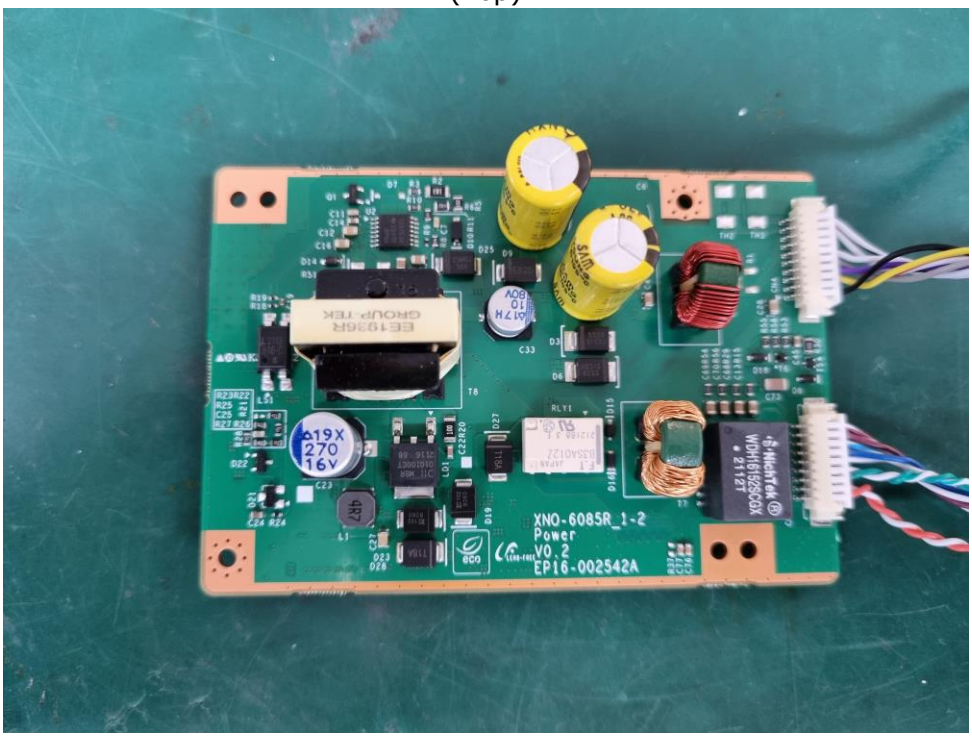


(Bottom)

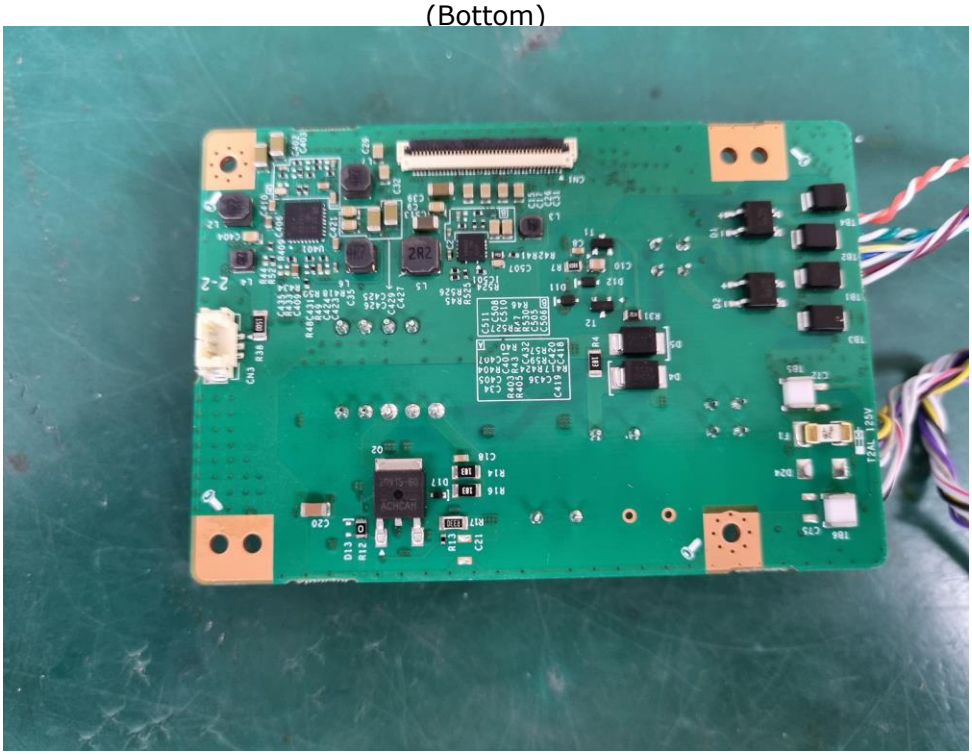


EUT Internal View – Board 3

(Top)

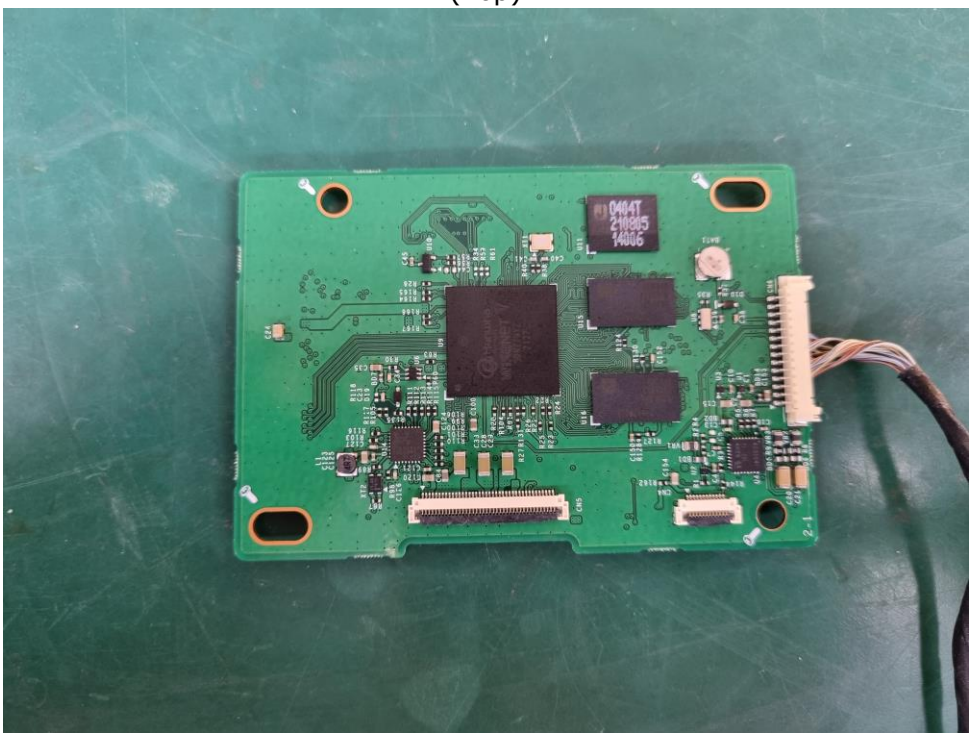


(Bottom)

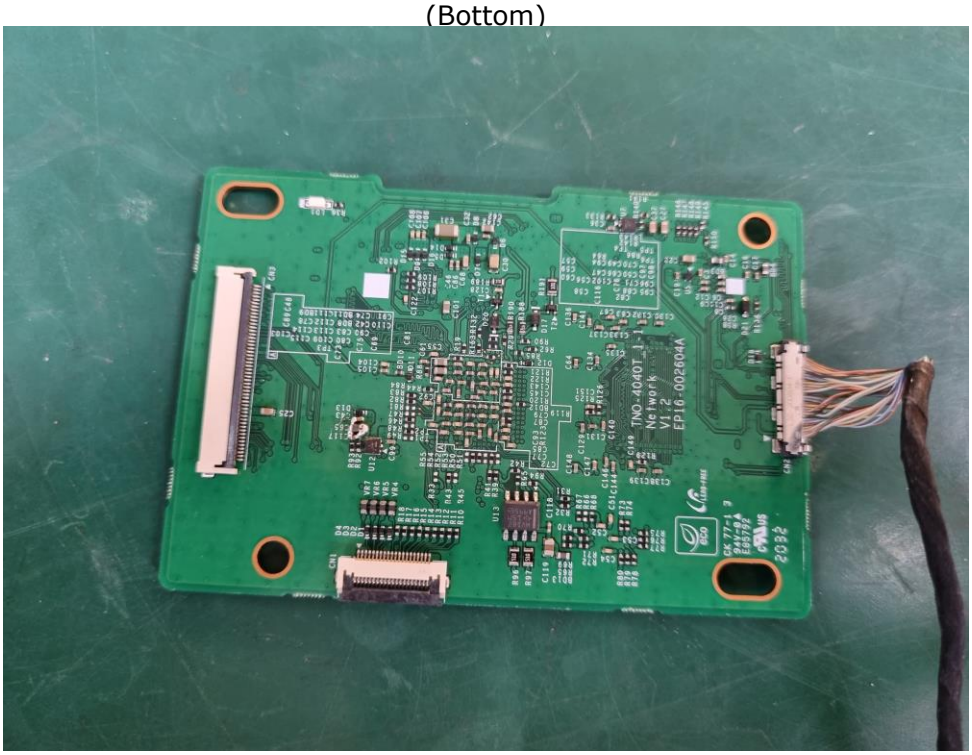


EUT Internal View – Board 4

(Top)

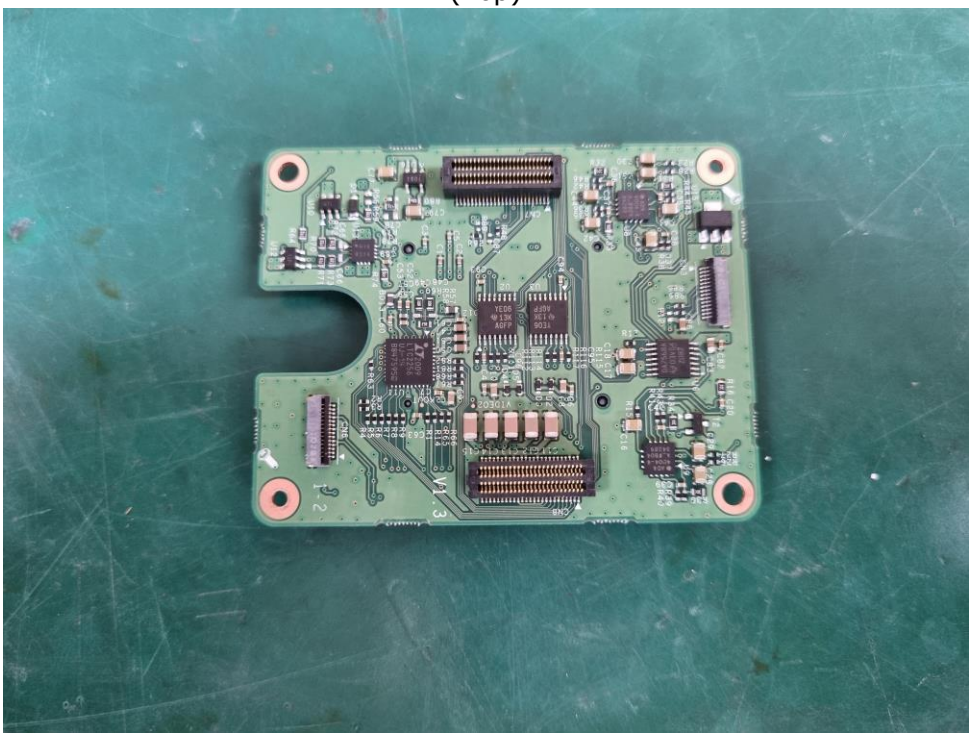


(Bottom)

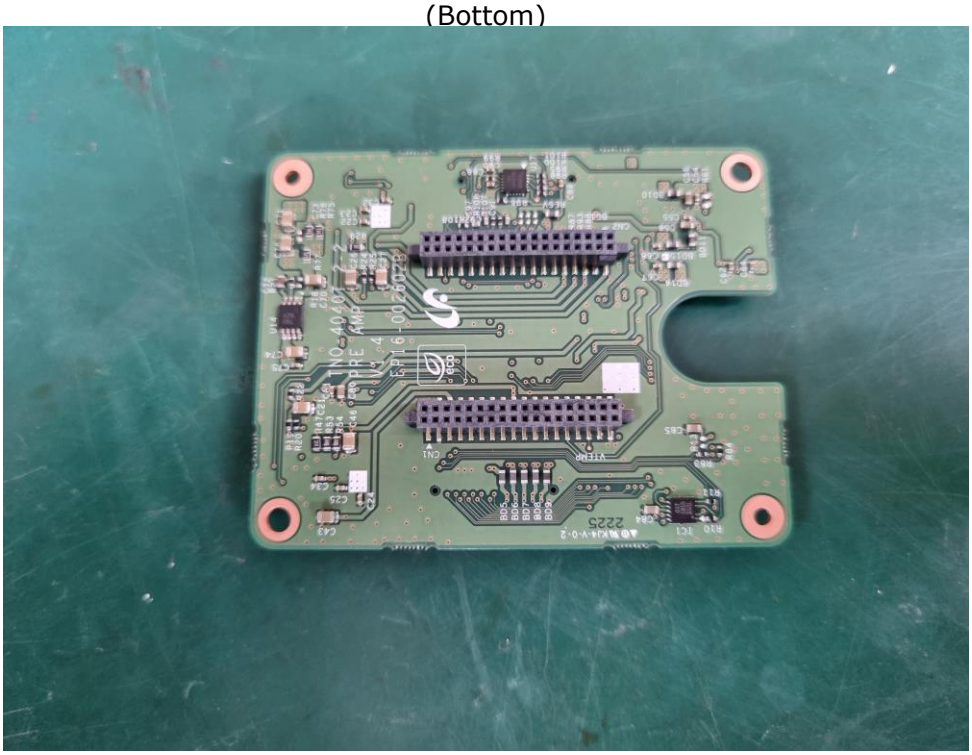


EUT Internal View – Board 5

(Top)

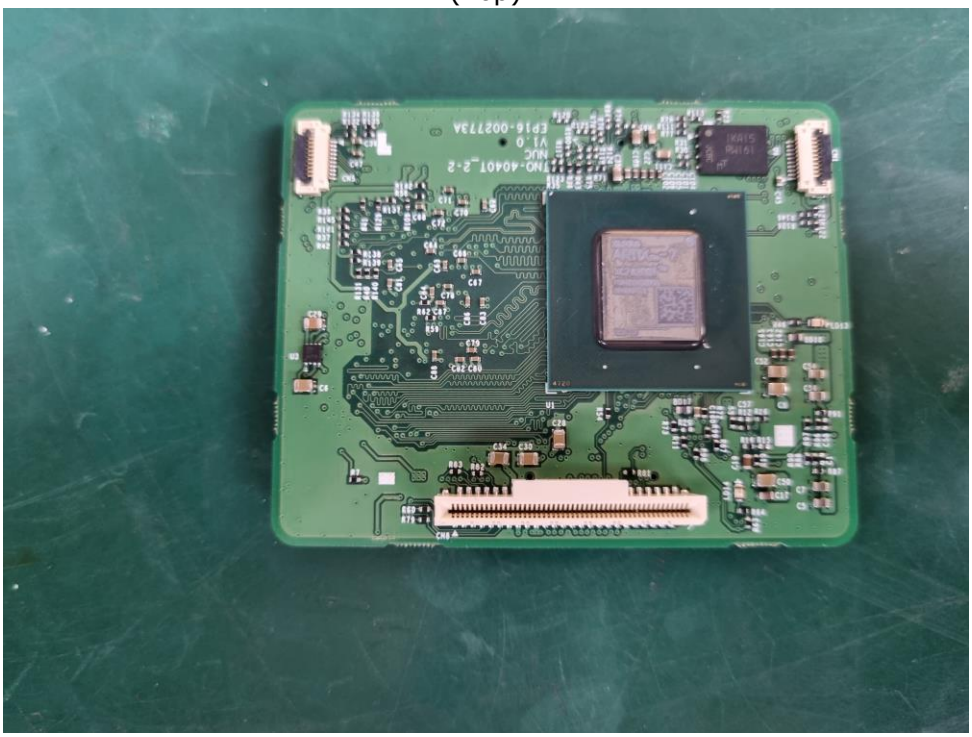


(Bottom)

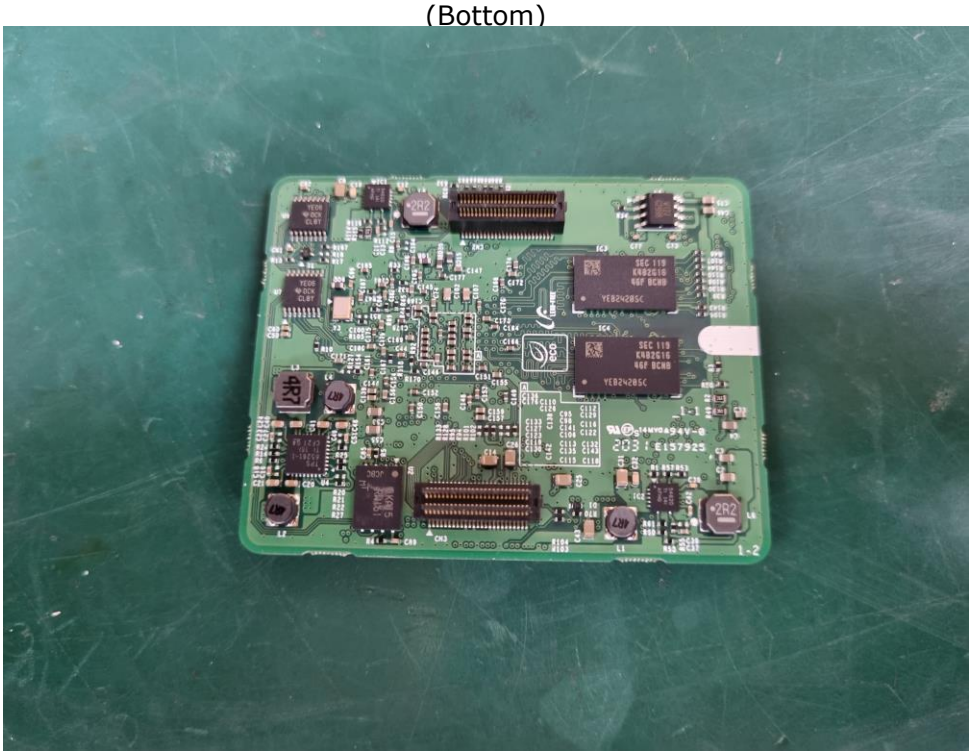


EUT Internal View – Board 6

(Top)

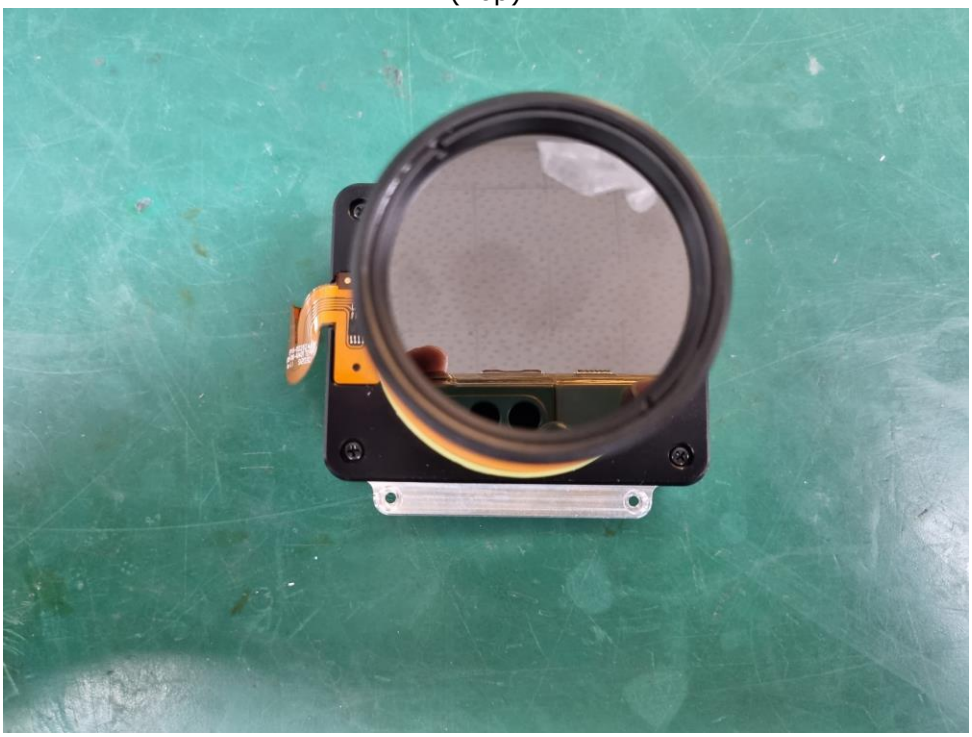


(Bottom)



EUT Internal View – Lens

(Top)



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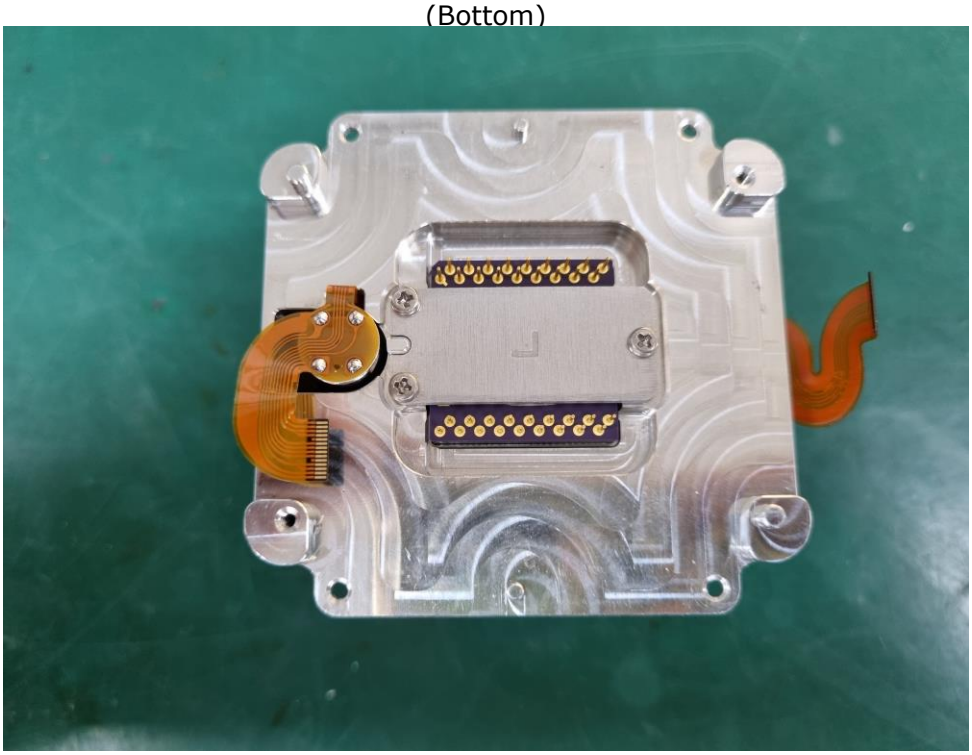
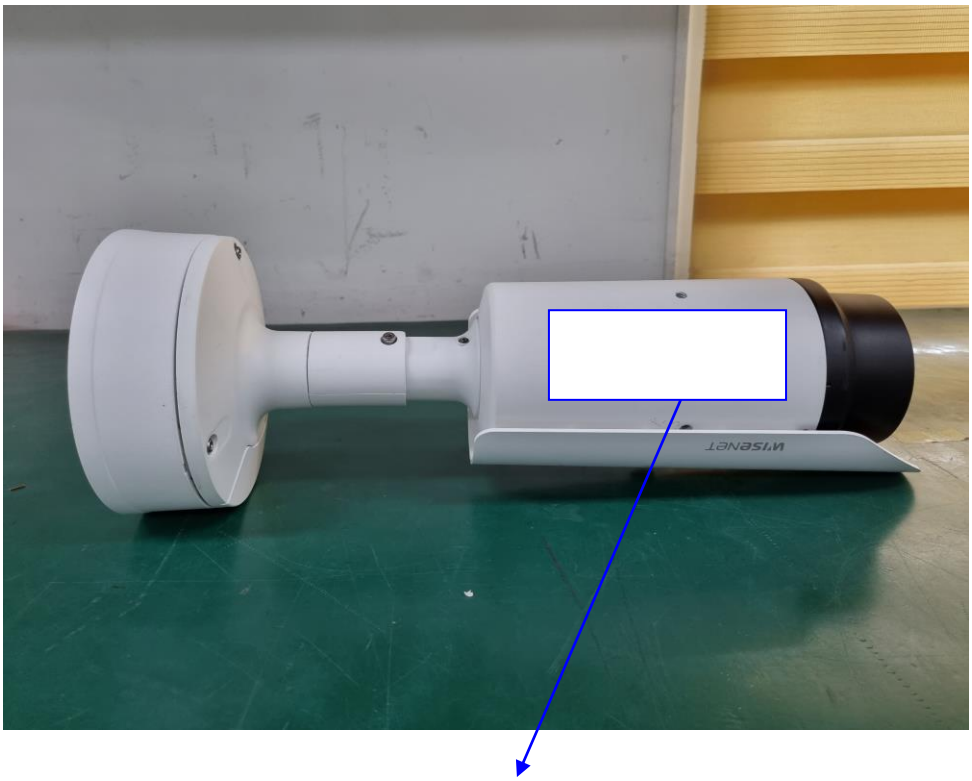


Label Photographs



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