

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-21T0248-R1

Page (1) of (50)

EMC TEST REPORT For RCM

Test Report No. : KES-EM-21T0248-R1
Date of Issue : Feb. 24, 2023
Product name : NETWORK THERMAL CAMERA
Model/Type No. : TNO-3050T
Variant Model : TNO-3040T
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. 22, 2021
Test date : Mar. 28, 2021 ~ Apr. 02, 2021
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Hyo Jin, Kim
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

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

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Apr. 16, 2021	KES-EM-21T0248	Issued
Feb. 24, 2023	KES-EM-21T0248-R1	Change the Applicant and manufacturer at the request of the customer.

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TABLE OF CONTENTS

1.0	General Product Description.....	4
1.1	Test Voltage & Frequency	7
1.2	Variant Model Differences	7
1.3	Device Modifications	7
1.4	Equipment Under Test.....	7
1.5	Support Equipments	8
1.6	External I/O Cabling	9
1.7	EUT Operating Mode(s)	10
1.8	Configuration.....	10
1.9	Remarks when standards applied	12
1.10	Calibration Details of Equipment Used for Measurement	12
1.11	Test Facility	12
1.12	Laboratory Accreditations and Listings	12
2.0	Test Regulations.....	13
2.1	Conducted Emissions at Mains Power Ports	15
2.2	Conducted Emissions at Telecommunication Ports.....	16
2.3	Radiated Electric Field Emissions(Below 1 GHz)	17
2.4	Radiated Electric Field Emissions(Above 1 GHz)	18
APPENDIX A – TEST DATA.....		19
Conducted Emissions at Mains Power Ports.....		19
Conducted Emissions at Telecommunication Ports		23
Radiated Electric Field Emissions(Below 1 GHz)		26
Radiated Electric Field Emissions(Above 1 GHz).....		29
Test Setup Photos and Configuration		32
Conducted Emissions at Mains Power Ports.....		32
Conducted Emissions at Telecommunication Ports		34
Radiated Electric Field Emissions(Below 1 GHz)		37
Radiated Electric Field Emissions(Above 1 GHz).....		40
EUT External Photographs		43
EUT Internal Photographs		44

1.0 General Product Description

Main Specifications of EUT are:

Video	
Imaging Device	Uncooled micro bolometer
Resolution	320x240
Max. Framerate	H.265/H.264: Max. 30fps/25fps(60Hz/50Hz) MJPEG: Max. 30fps/25fps(60Hz/50Hz)
NETD	< 60mK
Pixel Size	12 μ m
Video Out	CVBS: 1.0 Vp-p / 75 Ω composite, 720x480(N), 720x576(P) for installation USB: Micro USB Type B, 1280x720 for installation
Lens	
Focal Length (Zoom Ratio)	35mm fixed focal
Max. Aperture Ratio	F1.0
Angular Field of View	H: 6.3°, V: 4.7°, D: 7.8°
Min. Object Distance	51m
Focus Control	Fixed
Operational	
Camera Title	Displayed up to 85 characters
Digital Image Stabilization	Support(built-in gyro sensor)
Motion Detection	8ea, 8point polygonal zones
Privacy Masking	32ea, polygonal zones - Color: Grey/Green/Red/Blue/Black/White - Mosaic
Video Rotation	Flip, Mirror, Hallway view(90°/270°)
Analytics	Directional detection, Motion detection, Appear/Disappear, Enter/Exit, Loitering, Tampering, Virtual line, Audio detection, Temperature ditionction, Sound classification, Shock detection
Alarm I/O	Input 1ea / Output 2ea
Alarm Triggers	Analytics, Network disconnect, Alarm input

Alarm Events	File upload via FTP and e-mail Notification via e-mail SD/SDHC/SDXC or NAS recording at event triggers Alarm output Handover
Audio In	Selectable(mic in/line in) Supply voltage: 2.5VDC(4mA), Input impedance: 2K Ohm
Audio Out	Line out, Max.output level: 1Vrms
Color palettes	Whitehot, Blackhot, Rainbow, Rainbow2, Sepia, Red, Iron, Custom
Network	
Ethernet	RJ-45(10/100BASE-T)
Video Compression	H.265/H.264: Main/Baseline/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	Manual(5ea area), WiseStreamII
Bitrate Control	H.264/H.265: CBR or VBR MJPEG: VBR
Streaming	Unicast(20 users) / Multicast Multiple streaming(Up to 10 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, PIM-SM, UPnP, Bonjour, LLDP, SRTSP
Security	HTTPS(SSL) login authentication Digest login authentication IP address filtering User access log 802.1X authentication(EAP-TLS, EAP-LEAP) Device certificate(Hanwha Techwin Root CA)

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Report No.:

KES-EM-21T0248-R1

Page (6) of (50)

Application Programming Interface	ONVIF Profile S/G/T SUNAPI(HTTP API) Wisenet open platform
General	
Webpage Language	English, French, Italian, Spanish, German, Japanese, Russian, Swedish, Portuguese, Czech, Polish, Turkish, Dutch, Hungarian, Greek
Edge Storage	Micro SD/SDHC/SDXC 1slot 256GB
Memory	1024MB RAM, 256MB Flash
Environmental & Electrical	
Operating Temperature / Humidity	-40°C ~ +60°C (-40°F ~ +140°F) / Less than 90% RH
Storage Temperature / Humidity	-50°C ~ +60°C (-58°F ~ +140°F) / Less than 90% RH
Certification	IP66, NEMA4X
Input Voltage	PoE(IEEE802.3af, Class3), 24VAC, 12VDC
Power Consumption	PoE: Max. 8.7W, typical 7.5W 12VDC: Max. 7.8W, typical 6.7W 24VAC: Max. 9.2W, typical 8.0W
Mechanical	
Color / Material	White / Aluminum
RAL Code	RAL9003
Product dimensions / weight	Φ147.51x375.3mm(58.07x147.76") / 3124g(6.89 lb)

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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 240 V, 50 Hz ☒ PoE

1.2 Variant Model Differences

Addition of derivative models for place of sale management

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
NETWORK THERMAL CAMERA	TNO-3050T	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
AC Adapter	DRL-246000AC	-	Dream Electronics Co., Ltd.	-
DC Adapter	FSP060-DIBAN2	-	FSP GROUP INC.	-
PoE Adapter	PT-PSE109GBRO-AH	-	Dongguan PROCET Network Technology Co.,Ltd	-
Notebook	LG15N54	410NZGK015231	LG Electronics Co., Ltd.	-
Notebook Adapter	ADP-90WH B	84ZW19F1663	DELTA ELECTRONICS(JIANGSU) LTD.	-
Speaker	BR1000A Cuve Black 2	-	DONGGUAN EDIFIER TECHNOLOGY Co., Ltd	-
MIC	MP1000	-	-	-
Alarm	-	-	-	-
Button Alarm	-	-	-	-
Smartphone	A1586	-	APPLE .Inc	-
Micro SD Card	-	-	SanDisk	4 GB

1.6 External I/O Cabling

■ DC / AC Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK THERMAL CAMERA (EUT)	RJ-45	Notebook	RJ-45	3.0	U
	Audio Out	Speaker	3.5 mm	1.4	U
	Audio In	MIC	3.5 mm	1.4	U
	Alarm Out	Alarm	Alarm In	2.8	U
	Alarm In	Button Alarm	Alarm Out	2.6	U
	Micro SD Slot	Micro SD Card	Micro SD Slot	-	-
Notebook	3.5 mm	Smartphone	3.5 mm	0.5	U

* Unshielded=U, Shielded=S

■ PoE Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK THERMAL CAMERA (EUT)	RJ-45	PoE Adapter	RJ-45	3.0	U
	Audio Out	Speaker	3.5 mm	1.4	U
	Audio In	MIC	3.5 mm	1.4	U
	Alarm Out	Alarm	Alarm In	2.8	U
	Alarm In	Button Alarm	Alarm Out	2.6	U
	Micro SD Slot	Micro SD Card	Micro SD Slot	-	-
Notebook	RJ-45	PoE Adapter	RJ-45	3.0	U
	3.5 mm	Smartphone	3.5 mm	0.5	U

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

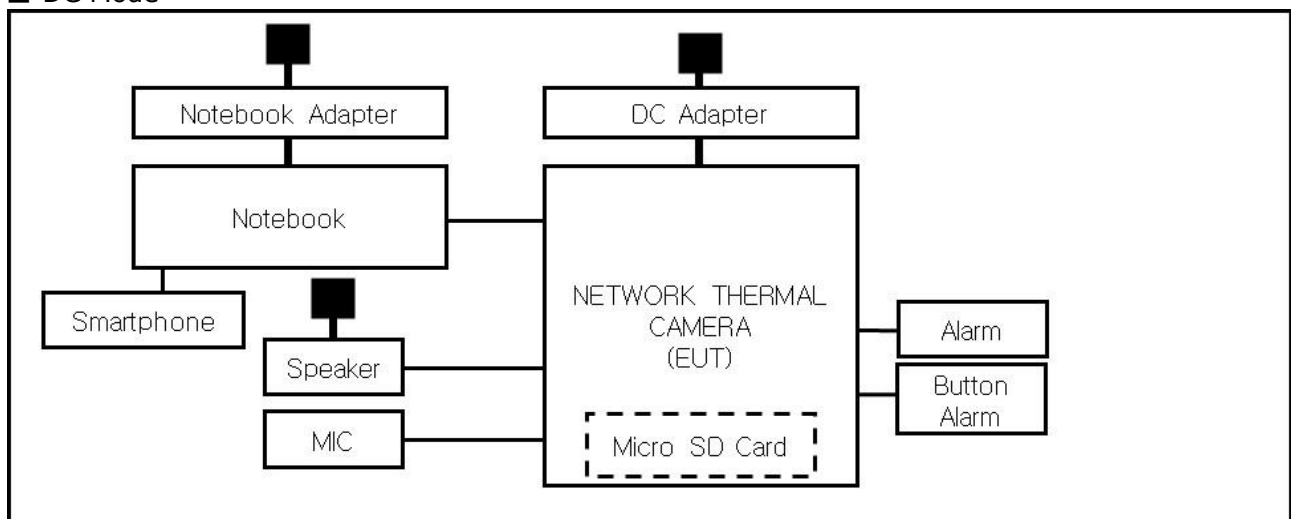
Test Mode	operating
DC Mode, AC Mode, PoE Mode	After placing the test equipment and peripheral devices as shown in the layout below, the tests were conducted while checking the 1KHz output from the smartphone, the camera video output from the notebook and verifying that they were operating normally while PING TEST.

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

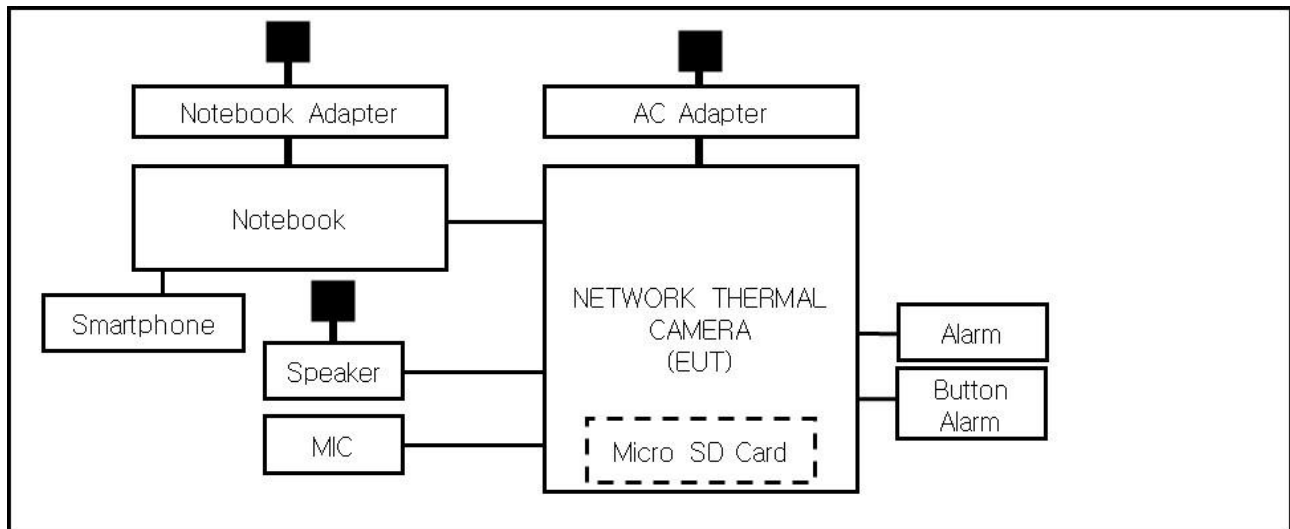
1.8 Configuration

■ AC Main
 □ DC Main

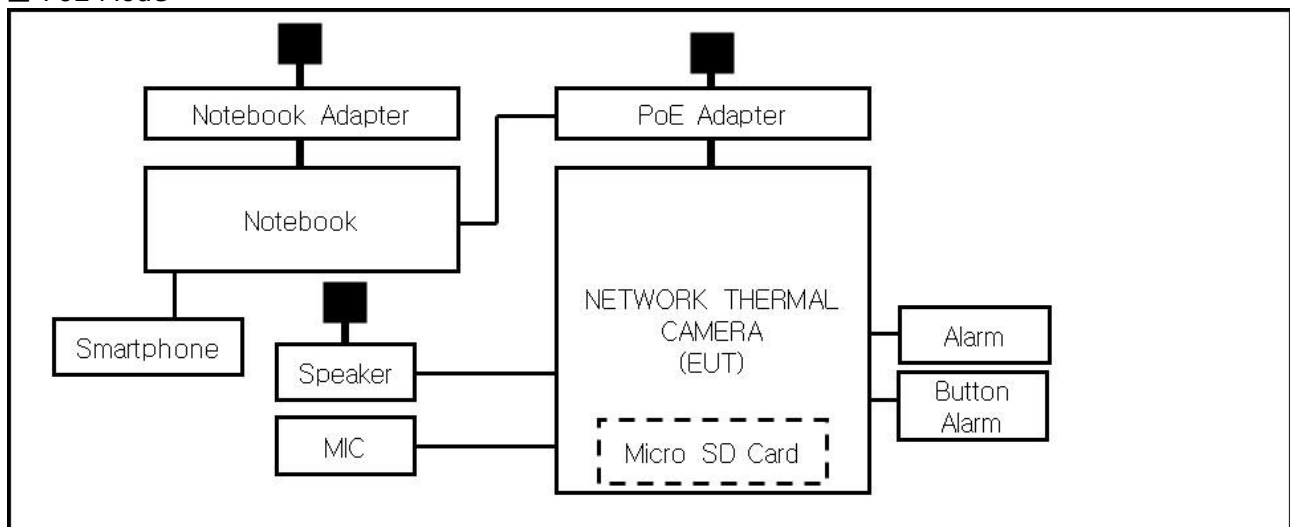
■ DC Mode



■ AC Mode



■ PoE Mode



1.9 Remarks when standards applied

The USB port and VIDEO port are excluded for testing as the Firmware update.

1.10 Calibration Details of Equipment Used for Measurement

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

1.11 Test Facility

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

1.12 Laboratory Accreditations and Listings

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

2.0 Test Regulations

The emissions tests were performed according to following regulations:

☐ **EMC – Directive 2014/30/EU**

☐ EN 61000-6-3:2011

☐ EN 61000-6-1:2007

☐ EN 61000-6-4:2007 +A1:2011

☐ EN 61000-6-2:2005

☐ EN 55011:2007 +A1:2010

☐ Group 1
☐ Class A

☐ Group 2
☐ Class B

☐ EN 55014-1:2006 +A2:2011

☐ EN 55014-2:1997 +A2:2008

☐ EN 55015:2013

☐ EN 55032:2015

☐ Class A

☐ Class B

☐ EN 55024:2010

☐ EN 50130-4:2011 +A1:2014

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



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Report No.:

KES-EM-21T0248-R1

Page (14) of (50)

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- | | | |
|--|---|----------------------------------|
| ☐ VCCI-CISPR 32:2016 | ☐ Class A | ☐ Class B |
| ☒ AS/NZS CISPR32:2015 | ☒ Class A | ☐ Class B |
|
 | | |
| ☐ 47 CFR Part 15, Subpart B | | |
| ☐ CISPR 22:2009 +A1:2010 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2009 | | |
|
 | | |
| ☐ IC Regulation ICES-003 : 2016 | | |
| ☐ CAN/CSA CISPR 22-10 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2014 | | |
|
 | | |
| ☐ RE- Directive 2014/53/EU | | |
|
 | | |
| ☐ EN 301 489-1 V1.9.2 | | |
| ☐ Equipment for fixed use | | |
| ☐ Equipment for vehicular use | | |
| ☐ Equipment for portable use | | |
|
 | | |
| ☐ EN 301 489-3 V1.6.1 | | |
|
 | | |
| ☐ EN 301 489-17 V2.2.1 | | |
|
 | | |
| ☐ EN 60945:2002 | | |

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2.1 Conducted Emissions at Mains Power Ports

Test Date

Apr. 02, 2021

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	01, 15, 2022
☒	LISN	ENV216	R & S	101787	12, 29, 2021
☒	LISN	ESH2-Z5	R & S	100450	12, 29, 2021
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 29, 2021

Test Conditions

Temperature: (23,8 ± 0,3) °C

Relative Humidity: (45,0 ± 0,2) % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

2.2 Conducted Emissions at Telecommunication Ports

Test Date

Apr. 02, 2021

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	01, 15, 2022
☒	LISN	ENV216	R & S	101787	12, 29, 2021
☒	LISN	ESH2-Z5	R & S	100450	12, 29, 2021
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 29, 2021
☒	8-WIRE ISN CAT3,5	ENY81	R & S	100174	12, 30, 2021
☐	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	12, 30, 2021
☐	CDN	CDNS502A	TESEQ	40431	12, 29, 2021

Test Conditions

Temperature: (23,8 ± 0,3) °C

Relative Humidity: (45,0 ± 0,2) % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Mar. 29, 2021

Test Location

☐ OPEN AREA TEST SITE #2 ☒ SEMI ANECHOIC CHAMBER #4(10m)

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESU26	R & S	100551	04, 01, 2022
☒	AMPLIFIER	SCU 01	R & S	100603	11, 25, 2021
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	12, 08, 2022
☒	ATTENUATOR	8491A	HP	32173	03, 10, 2022

Test Conditions

Temperature: (24,3 ± 0,2) °C
Relative Humidity: (44,7 ± 0,2) % R.H.

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Mar. 28, 2021

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, 05, 2021
☒	PREAMPLIFIER	8449B	AGILENT	3008A01967	04, 07, 2022
☐	ATTENUATOR	8491A	HP	35496	03, 10, 2022
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 11, 2022

Test Conditions

Temperature: (24,0 ± 0,3) °C

Relative Humidity: (45,1 ± 0,4) % R.H.

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

APPENDIX A – TEST DATA

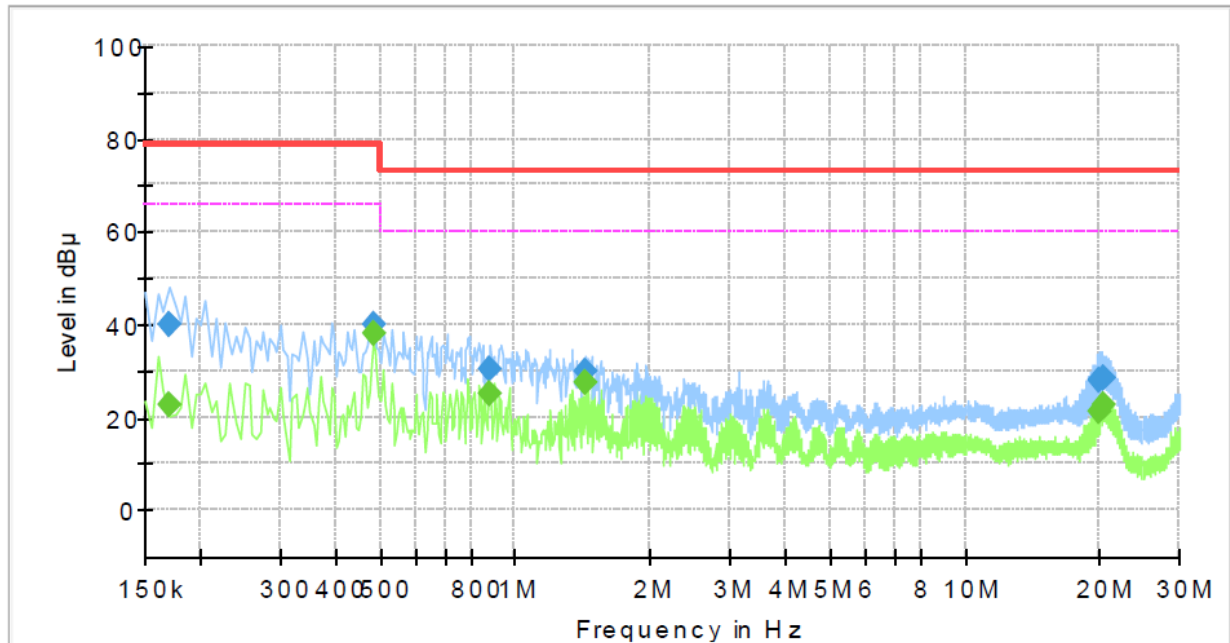
Conducted Emissions at Mains Power Ports

■ DC Mode

HOT LINE

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-3050T
Phase:	L1
Mode:	DC
Operator Name:	KES



Final Result

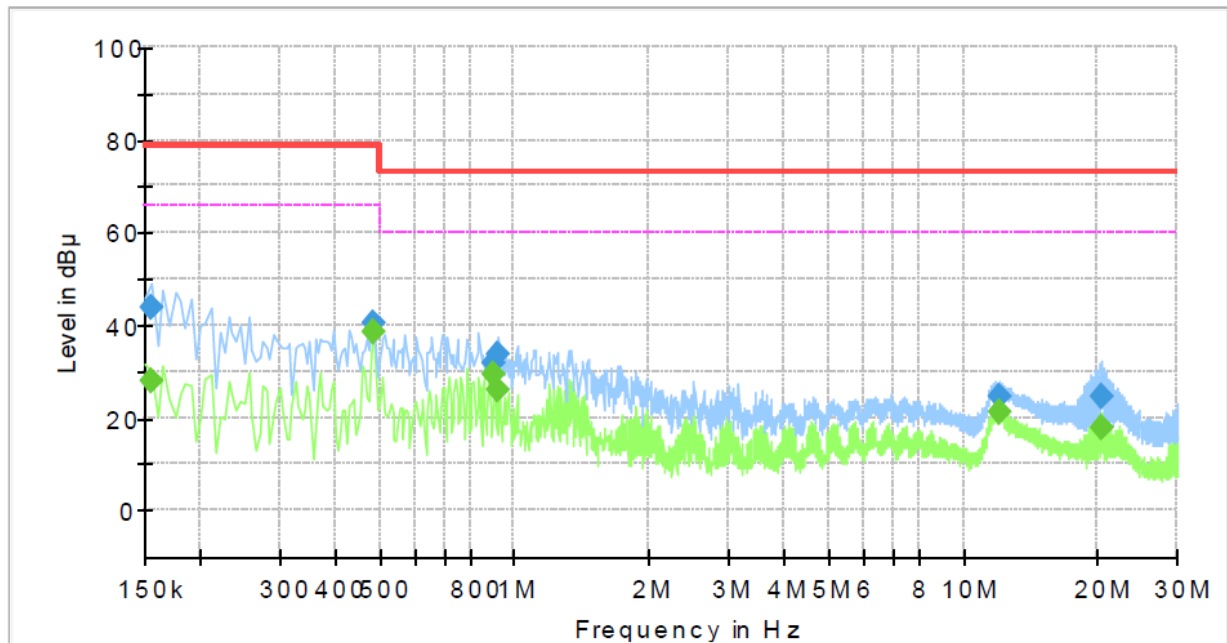
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.170000	---	22.68	66.00	43.32	1000.0	9.000	L1	19.4
0.170000	39.95	---	79.00	39.05	1000.0	9.000	L1	19.4
0.485000	---	38.26	66.00	27.74	1000.0	9.000	L1	19.7
0.485000	39.92	---	79.00	39.08	1000.0	9.000	L1	19.7
0.880000	---	25.17	60.00	34.83	1000.0	9.000	L1	20.0
0.880000	30.56	---	73.00	42.44	1000.0	9.000	L1	20.0
1.430000	---	27.29	60.00	32.71	1000.0	9.000	L1	20.1
1.430000	29.65	---	73.00	43.35	1000.0	9.000	L1	20.1
19.880000	---	21.07	60.00	38.93	1000.0	9.000	L1	20.1
19.880000	27.87	---	73.00	45.13	1000.0	9.000	L1	20.1
20.265000	---	22.57	60.00	37.43	1000.0	9.000	L1	20.1
20.265000	28.59	---	73.00	44.41	1000.0	9.000	L1	20.1

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NEUTRAL LINE

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-3050T
Phase:	N
Mode:	DC
Operator Name:	KES



Final Result

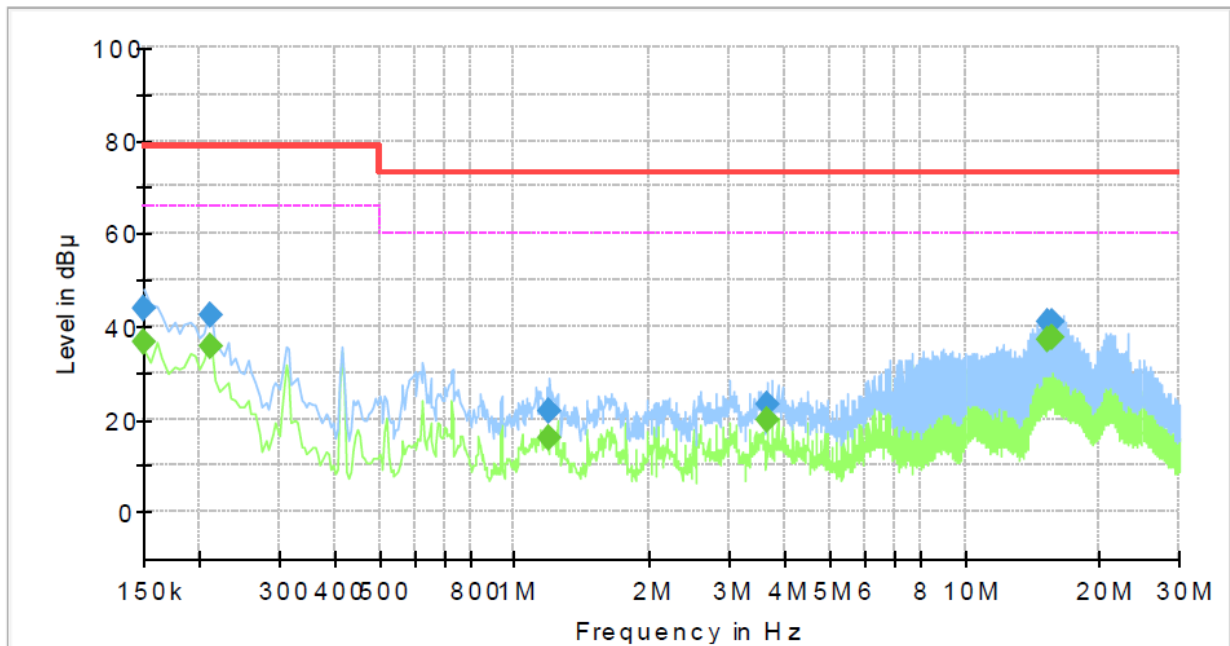
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	27.99	66.00	38.01	1000.0	9.000	N	19.4
0.155000	43.72	---	79.00	35.28	1000.0	9.000	N	19.4
0.485000	---	38.72	66.00	27.28	1000.0	9.000	N	19.7
0.485000	40.35	---	79.00	38.65	1000.0	9.000	N	19.7
0.900000	---	29.43	60.00	30.57	1000.0	9.000	N	20.0
0.900000	31.90	---	73.00	41.10	1000.0	9.000	N	20.0
0.920000	---	26.23	60.00	33.77	1000.0	9.000	N	20.0
0.920000	33.54	---	73.00	39.46	1000.0	9.000	N	20.0
12.095000	---	21.40	60.00	38.60	1000.0	9.000	N	20.0
12.095000	24.64	---	73.00	48.36	1000.0	9.000	N	20.0
20.280000	---	17.92	60.00	42.08	1000.0	9.000	N	20.1
20.280000	24.70	---	73.00	48.30	1000.0	9.000	N	20.1

■ AC Mode

HOT LINE

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-3050T
Phase:	L1
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)
0.150000	---	36.72	66.00	29.28	1000.0	9.000	L1	19.4
0.150000	43.98	---	79.00	35.02	1000.0	9.000	L1	19.4
0.210000	---	35.58	66.00	30.42	1000.0	9.000	L1	19.4
0.210000	42.12	---	79.00	36.88	1000.0	9.000	L1	19.4
1.200000	---	15.77	60.00	44.23	1000.0	9.000	L1	20.0
1.200000	21.82	---	73.00	51.18	1000.0	9.000	L1	20.0
3.630000	---	19.60	60.00	40.40	1000.0	9.000	L1	19.9
3.630000	23.25	---	73.00	49.75	1000.0	9.000	L1	19.9
15.350000	---	36.90	60.00	23.10	1000.0	9.000	L1	19.9
15.350000	40.71	---	73.00	32.29	1000.0	9.000	L1	19.9
15.660000	---	37.69	60.00	22.31	1000.0	9.000	L1	19.9
15.660000	40.72	---	73.00	32.28	1000.0	9.000	L1	19.9

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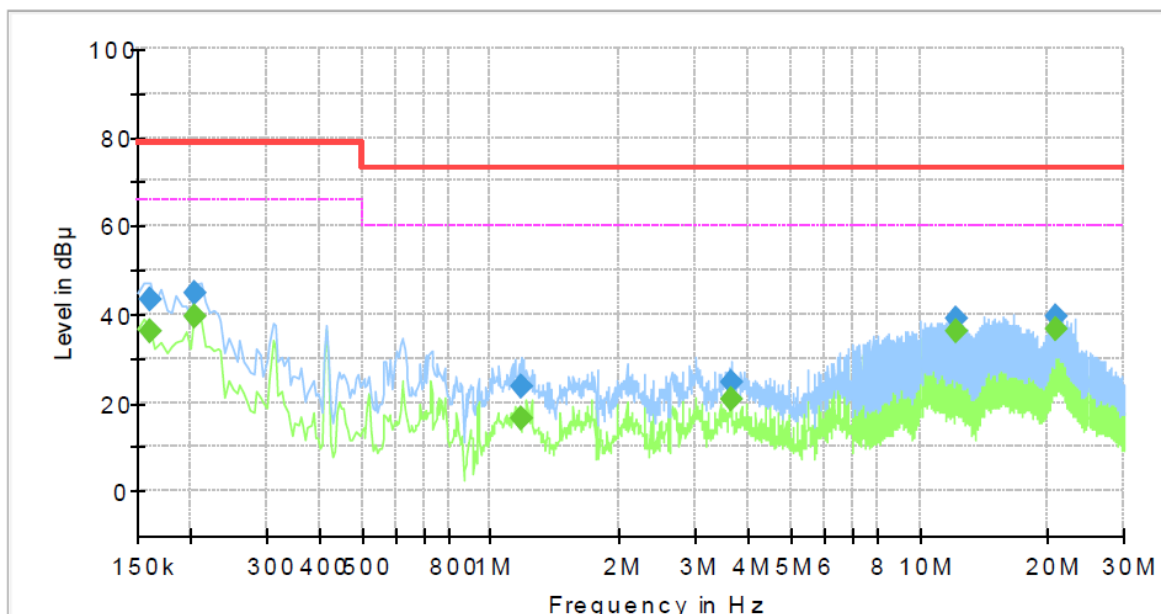
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NEUTRAL LINE

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-3050T
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)
0.160000	---	35.95	66.00	30.05	1000.0	9.000	N	19.4
0.160000	43.24	---	79.00	35.76	1000.0	9.000	N	19.4
0.205000	---	39.66	66.00	26.34	1000.0	9.000	N	19.4
0.205000	44.91	---	79.00	34.09	1000.0	9.000	N	19.4
1.175000	---	16.49	60.00	43.51	1000.0	9.000	N	20.0
1.175000	23.61	---	73.00	49.39	1000.0	9.000	N	20.0
3.630000	---	20.80	60.00	39.20	1000.0	9.000	N	19.9
3.630000	24.75	---	73.00	48.25	1000.0	9.000	N	19.9
12.135000	---	35.89	60.00	24.11	1000.0	9.000	N	20.0
12.135000	39.05	---	73.00	33.95	1000.0	9.000	N	20.0
20.950000	---	36.53	60.00	23.47	1000.0	9.000	N	20.2
20.950000	39.67	---	73.00	33.33	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))

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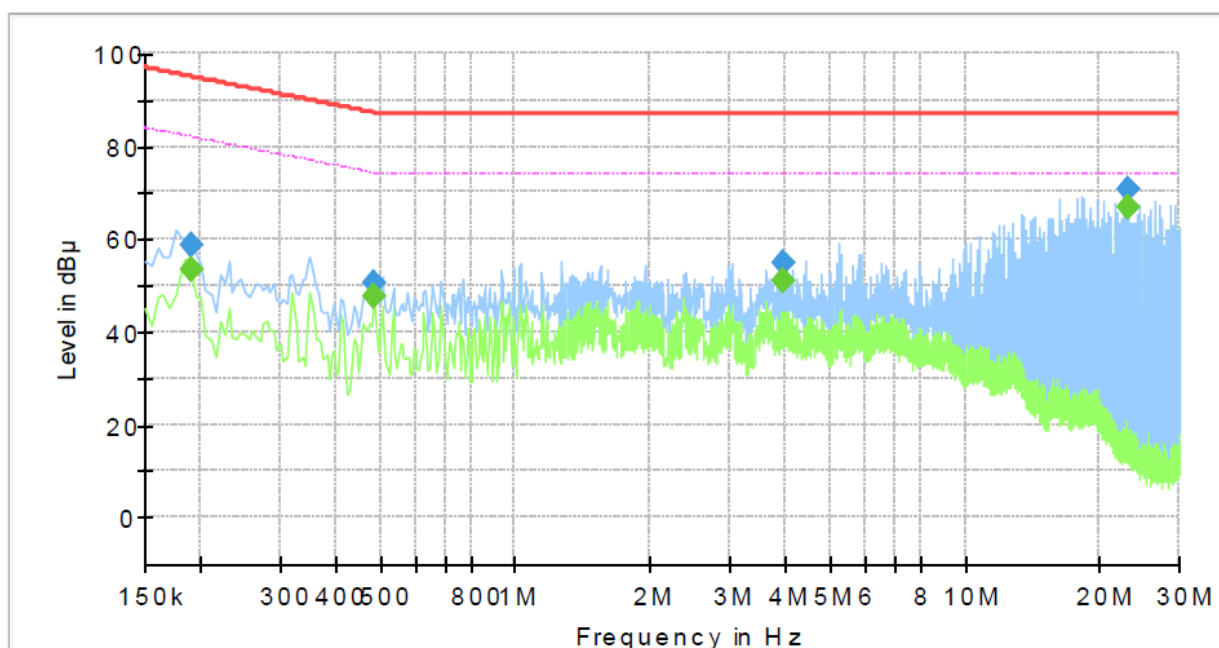
Conducted Emissions at Telecommunication Ports

■ DC Mode

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-3050T
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)
0.190000	---	53.60	82.04	28.44	1000.0	9.000	Single Line	19.8
0.190000	58.63	---	95.04	36.41	1000.0	9.000	Single Line	19.8
0.485000	---	47.76	74.25	26.49	1000.0	9.000	Single Line	19.8
0.485000	50.58	---	87.25	36.67	1000.0	9.000	Single Line	19.8
3.955000	---	50.88	74.00	23.12	1000.0	9.000	Single Line	19.7
3.955000	54.92	---	87.00	32.08	1000.0	9.000	Single Line	19.7
23.130000	---	66.96	74.00	7.04	1000.0	9.000	Single Line	20.1
23.130000	70.66	---	87.00	16.34	1000.0	9.000	Single Line	20.1

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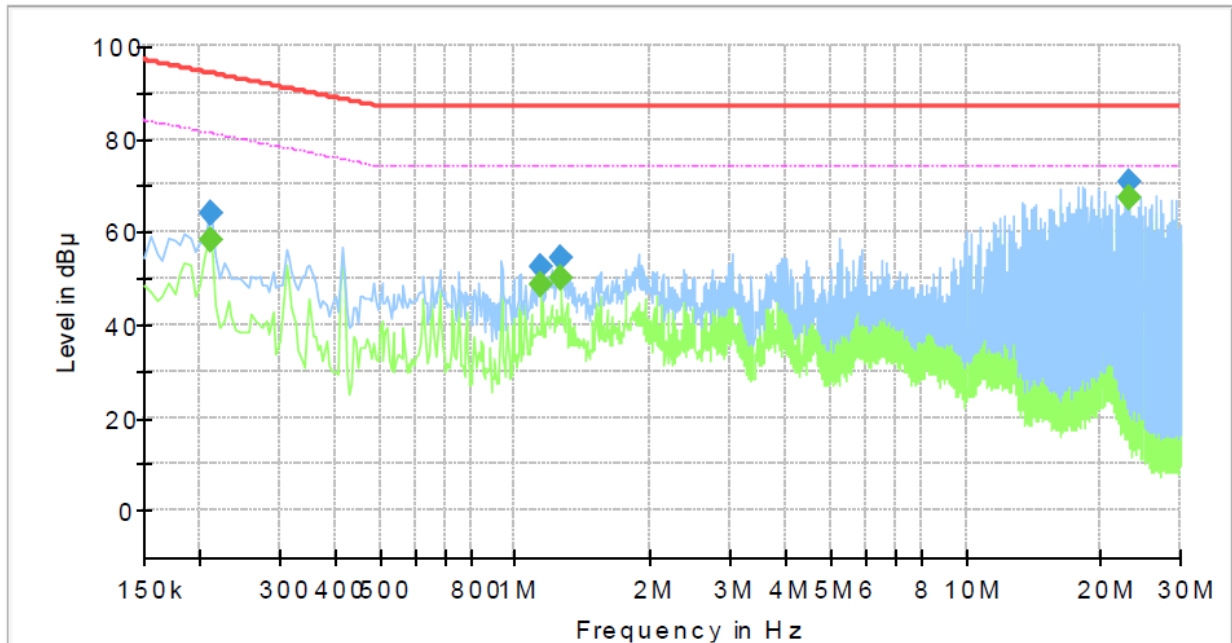
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■ AC Mode

[100 Mbps]
Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-3050T
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)
0.210000	---	58.41	81.21	22.80	1000.0	9.000	Single Line	19.7
0.210000	63.79	---	94.21	30.42	1000.0	9.000	Single Line	19.7
1.145000	---	48.55	74.00	25.45	1000.0	9.000	Single Line	20.0
1.145000	52.56	---	87.00	34.44	1000.0	9.000	Single Line	20.0
1.265000	---	49.88	74.00	24.12	1000.0	9.000	Single Line	20.0
1.265000	54.14	---	87.00	32.86	1000.0	9.000	Single Line	20.0
23.130000	---	67.24	74.00	6.76	1000.0	9.000	Single Line	20.1
23.130000	70.52	---	87.00	16.48	1000.0	9.000	Single Line	20.1

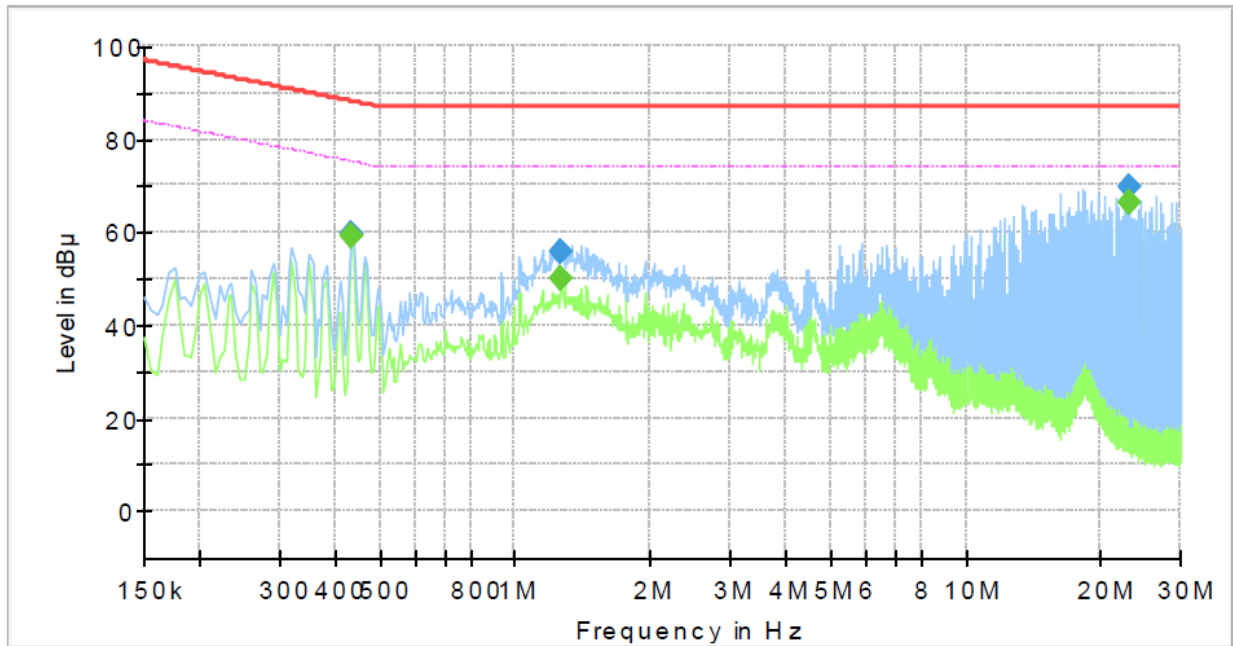
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PoE Mode
[100 Mbps]
Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-3050T
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)
0.435000	---	59.04	75.16	16.12	1000.0	9.000	Single Line	19.7
0.435000	59.77	---	88.16	28.39	1000.0	9.000	Single Line	19.7
1.265000	---	50.17	74.00	23.83	1000.0	9.000	Single Line	20.0
1.265000	55.70	---	87.00	31.30	1000.0	9.000	Single Line	20.0
23.130000	---	66.37	74.00	7.63	1000.0	9.000	Single Line	20.1
23.130000	69.89	---	87.00	17.11	1000.0	9.000	Single Line	20.1

◆ Calculation

$$\text{QuasiPeak [dBuV]} / \text{CAverage [dBuV]} = \text{Reading Value [dBuV]} + \text{Corr. [dB]}$$

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

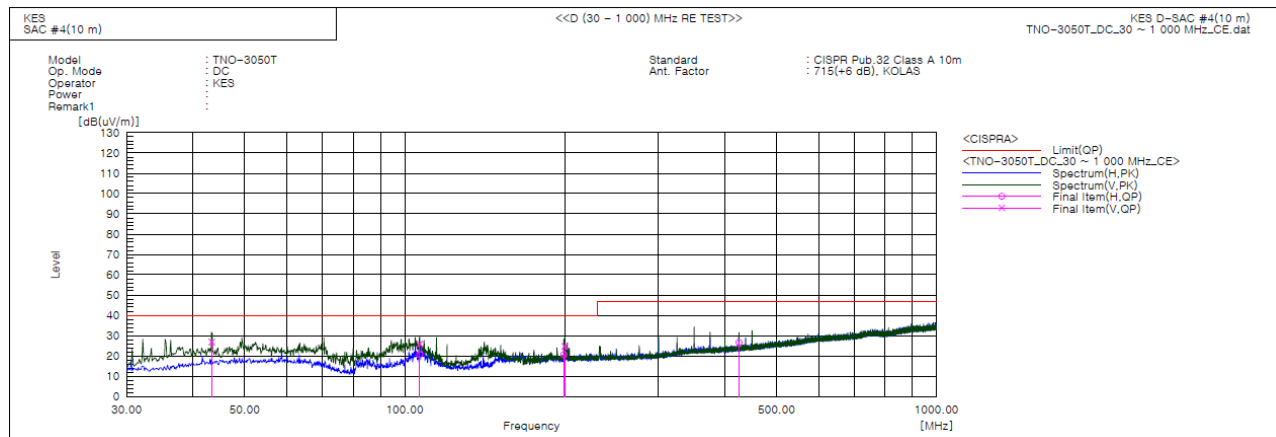
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KES-EM-21T0248-R1

Page (26) of (50)

Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode



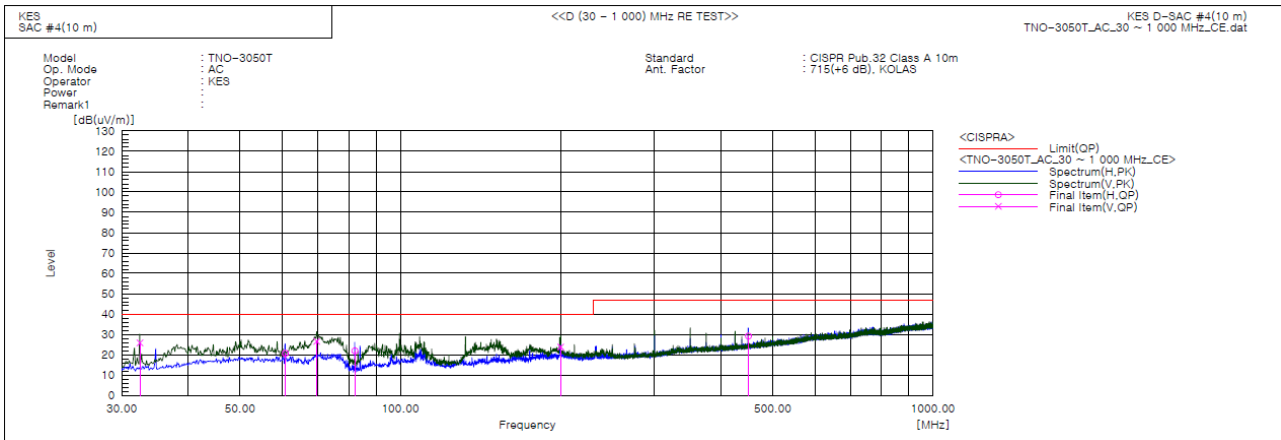
Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	43.351	V	48.5	-21.7	26.8	40.0	13.2	132.0	339.0	
2	106.656	V	48.2	-22.4	25.8	40.0	14.2	125.0	280.0	
3	106.661	H	43.1	-22.4	20.7	40.0	19.3	363.0	177.0	
4	199.173	H	41.5	-20.8	20.7	40.0	19.3	351.0	202.0	
5	199.893	V	45.6	-20.8	24.8	40.0	15.2	155.0	228.0	
6	425.073	H	40.4	-13.7	26.7	47.0	20.3	392.0	222.0	

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■ AC Mode

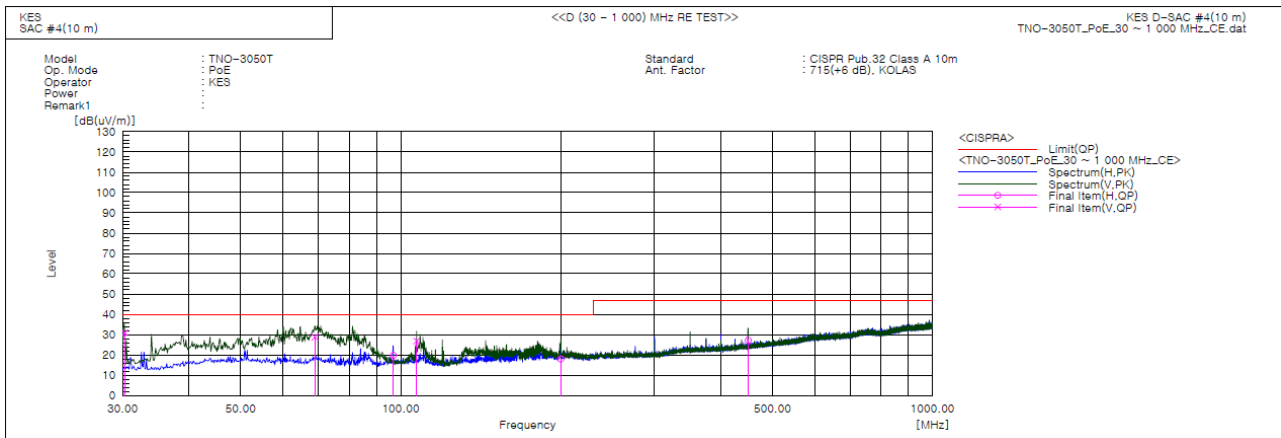


Final Result

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	32.443	V	50.9	-25.1	25.8	40.0	14.2	131.0	162.0	
2	60.831	H	42.8	-22.1	20.7	40.0	19.3	351.0	122.0	
3	69.646	V	51.3	-24.7	26.6	40.0	13.4	136.0	118.0	
4	82.171	H	49.2	-27.3	21.9	40.0	18.1	351.0	293.0	
5	199.893	V	44.6	-20.8	23.8	40.0	16.2	141.0	219.0	
6	450.041	H	42.2	-13.1	29.1	47.0	17.9	356.0	137.0	



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	30.273	V	56.2	-25.3	30.9	40.0	9.1	113.0	15.0	
2	68.954	V	53.3	-24.5	28.8	40.0	11.2	132.0	81.0	
3	96.834	H	42.9	-23.1	19.8	40.0	20.2	351.0	199.0	
4	107.141	V	49.2	-22.4	26.8	40.0	13.2	141.0	106.0	
5	199.893	H	38.7	-20.8	17.9	40.0	22.1	381.0	245.0	
6	450.045	H	40.3	-13.1	27.2	47.0	19.8	392.0	172.0	

Calculation

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

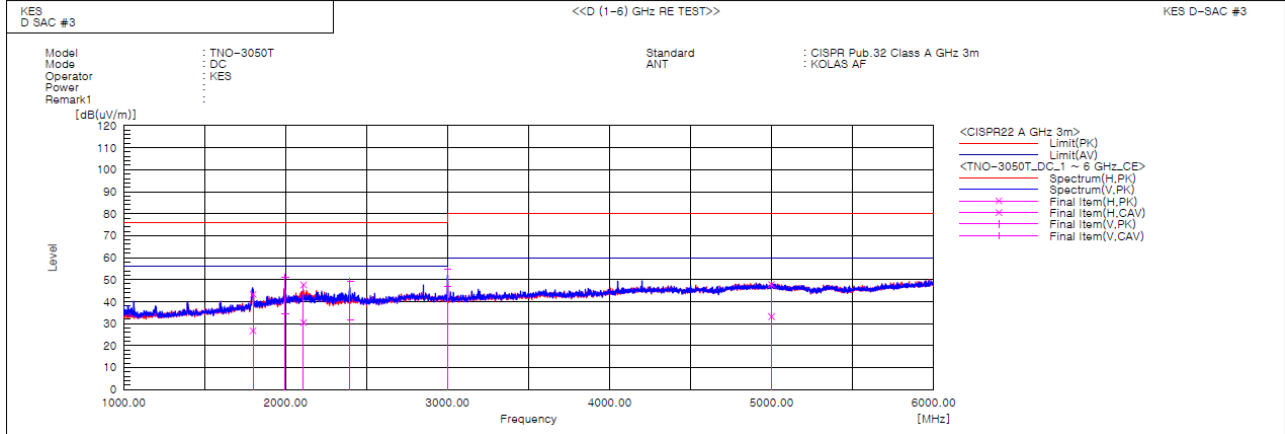
Margin(QP)[dB] = Limit[dB(μV/m)] - Result(QP) [dB(μV/m)]

Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

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

Radiated Electric Field Emissions(Above 1 GHz)

■ DC Mode



Final Result

No.	Frequency [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	1799.121	H	46.3	29.7	-3.0	43.3	26.7	76.0	56.0	32.7	29.3	100.0	221.9	
2	1997.251	V	52.2	35.5	-1.0	51.2	34.5	76.0	56.0	24.8	21.5	100.0	195.1	
3	2110.331	H	48.3	31.2	-0.7	47.6	30.5	76.0	56.0	28.4	25.5	100.0	166.8	
4	2397.412	V	49.1	31.6	0.1	49.2	31.7	76.0	56.0	26.8	24.3	100.0	229.9	
5	3000.092	V	53.3	45.1	1.6	54.9	46.7	80.0	60.0	25.1	13.3	100.0	155.9	
6	4999.221	H	38.9	24.3	8.9	47.8	33.2	80.0	60.0	32.2	26.8	100.0	118.2	

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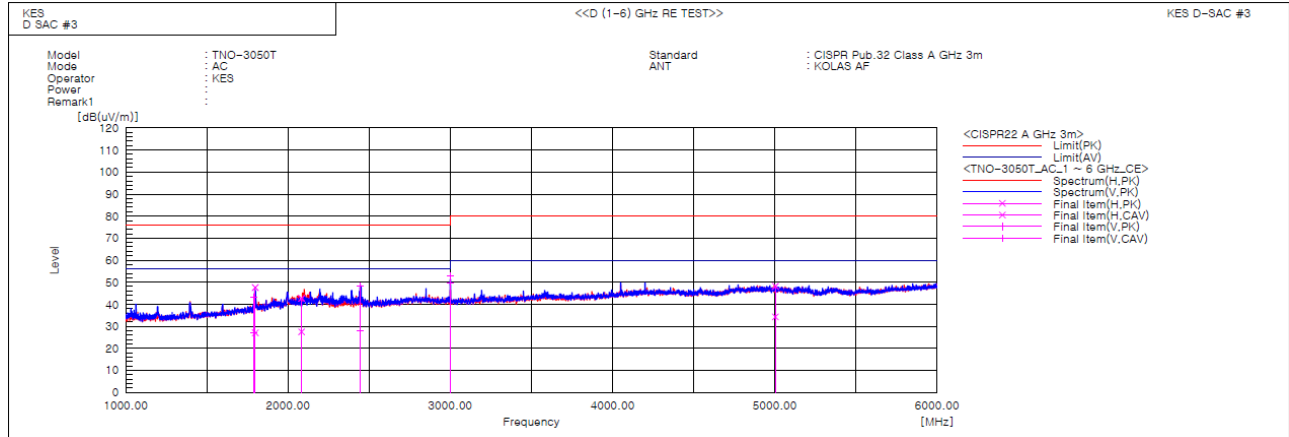
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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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Report No.:

KES-EM-21T0248-R1

Page (30) of (50)

AC Mode



Final Result

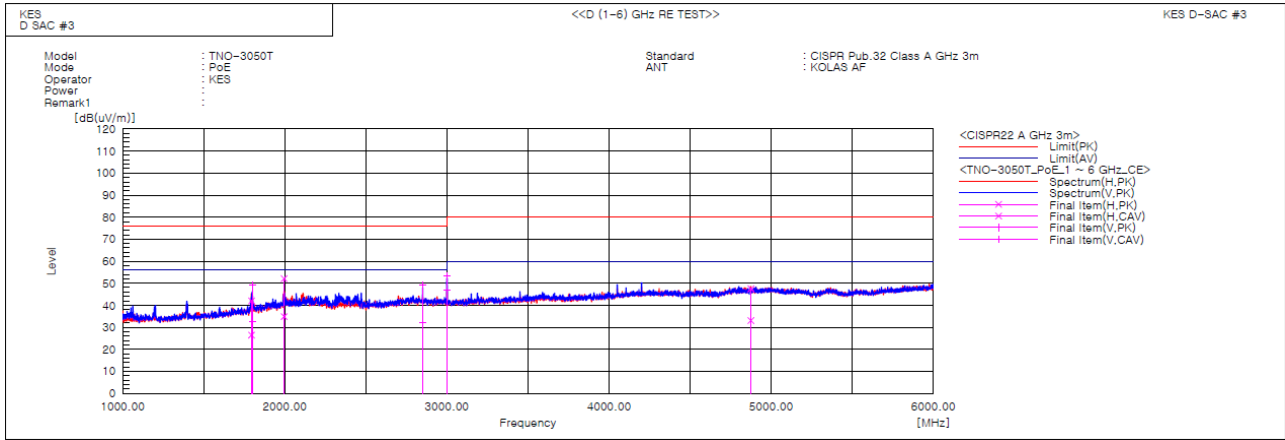
No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1787.652	V	46.4	30.4	-3.2	43.2	27.2	76.0	56.0	32.8	28.8	100.0	190.0	
2	1797.361	H	50.6	30.0	-3.0	47.6	27.0	76.0	56.0	28.4	29.0	100.0	120.5	
3	2082.953	H	43.4	28.2	-0.7	42.7	27.5	76.0	56.0	33.3	28.5	100.0	141.4	
4	2443.621	V	48.3	28.0	0.1	48.4	28.1	76.0	56.0	27.6	27.9	100.0	35.6	
5	2999.970	V	51.2	47.8	1.6	52.8	49.4	76.0	56.0	23.2	6.6	100.0	165.3	
6	5003.019	H	39.3	25.4	8.9	48.2	34.3	80.0	60.0	31.8	25.7	100.0	357.3	

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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	1794.211	H	45.1	29.6	-3.1	42.0	26.5	76.0	56.0	34.0	29.5	100.0	125.8	
2	1799.121	V	52.1	35.5	-3.0	49.1	32.5	76.0	56.0	26.9	23.5	100.0	177.0	
3	1995.312	H	53.1	35.9	-1.0	52.1	34.9	76.0	56.0	23.9	21.1	100.0	226.6	
4	2850.312	V	47.1	29.9	2.2	49.3	32.1	76.0	56.0	26.7	23.9	100.0	286.1	
5	3000.081	V	51.6	45.5	1.6	53.2	47.1	80.0	60.0	26.8	12.9	100.0	156.0	
6	4875.211	H	38.9	24.5	8.6	47.5	33.1	80.0	60.0	32.5	26.9	100.0	357.6	

Calculation

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

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

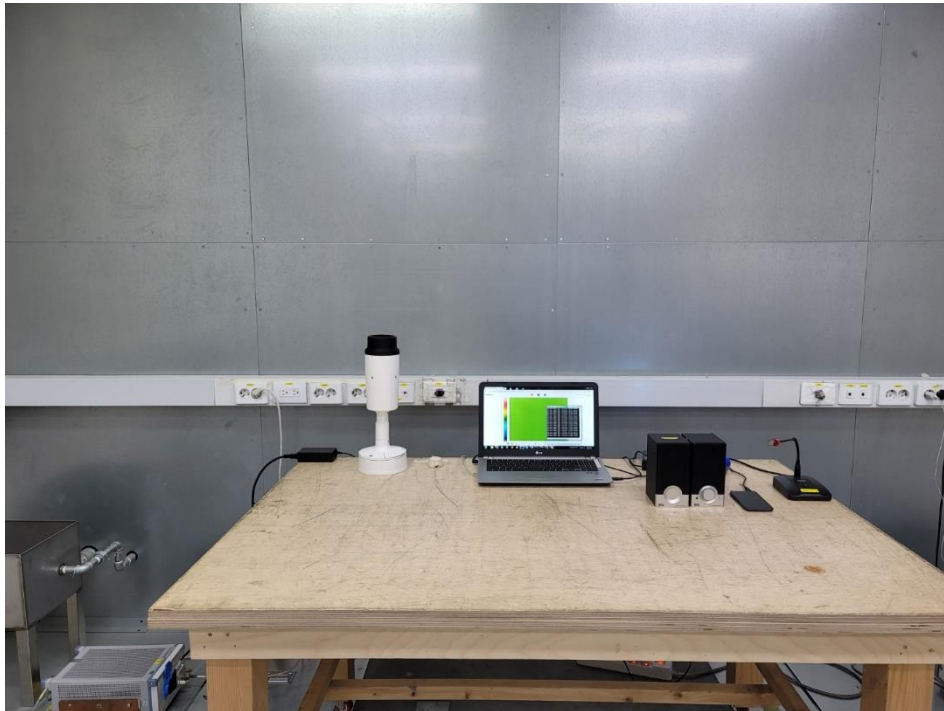
Reading(PK/CAV) : Reading value, Result(PK/CAV) : Reading value + Factor value

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

Test Setup Photos and Configuration

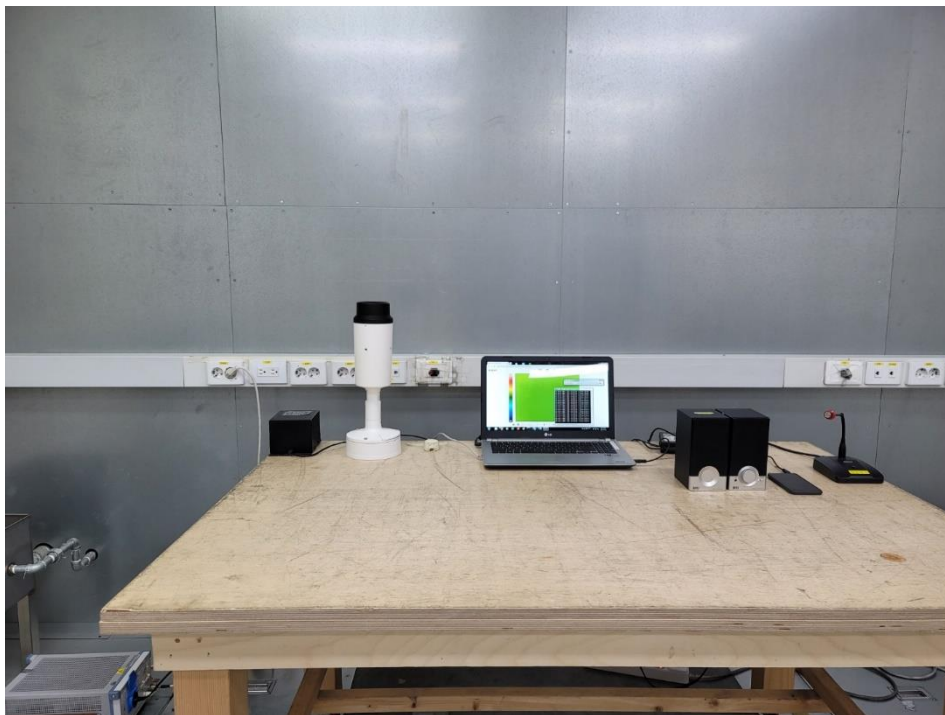
Conducted Emissions at Mains Power Ports

■ DC Mode



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■ AC Mode



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Conducted Emissions at Telecommunication Ports

■ DC Mode



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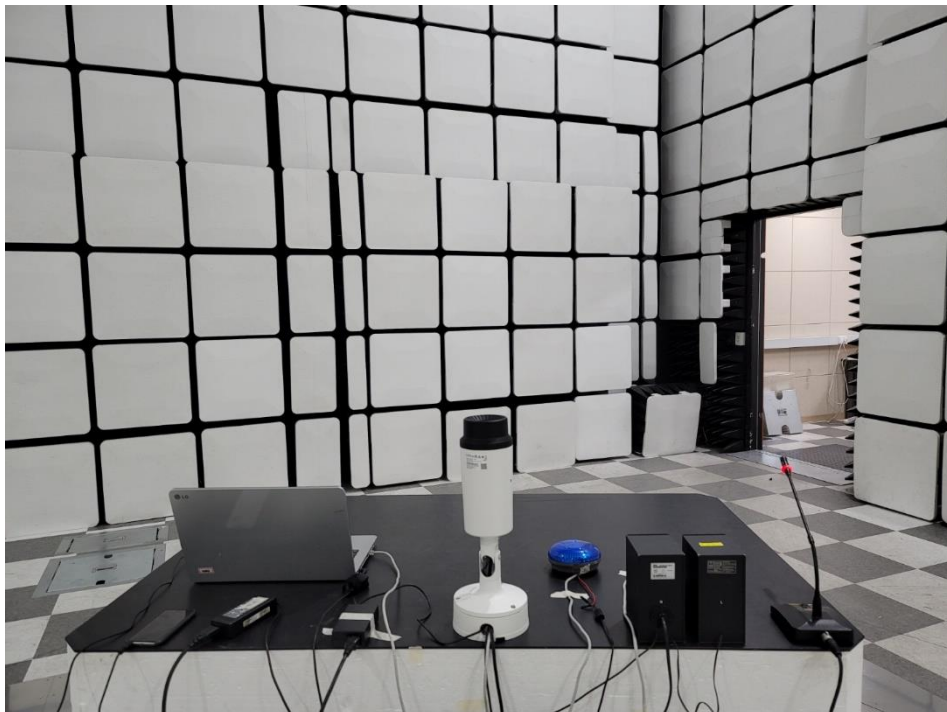
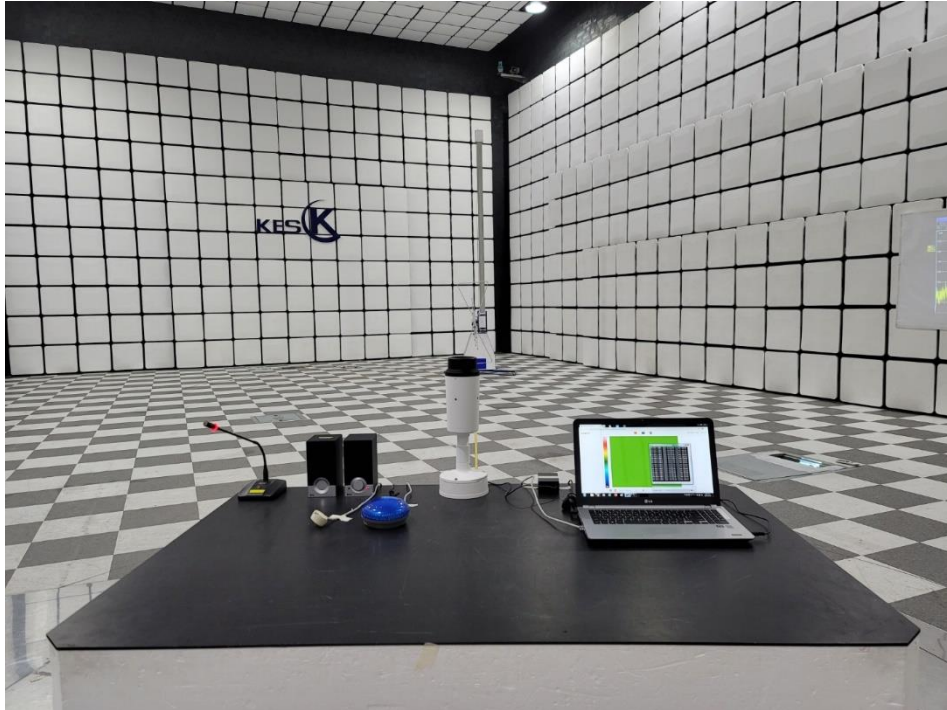
■ PoE Mode



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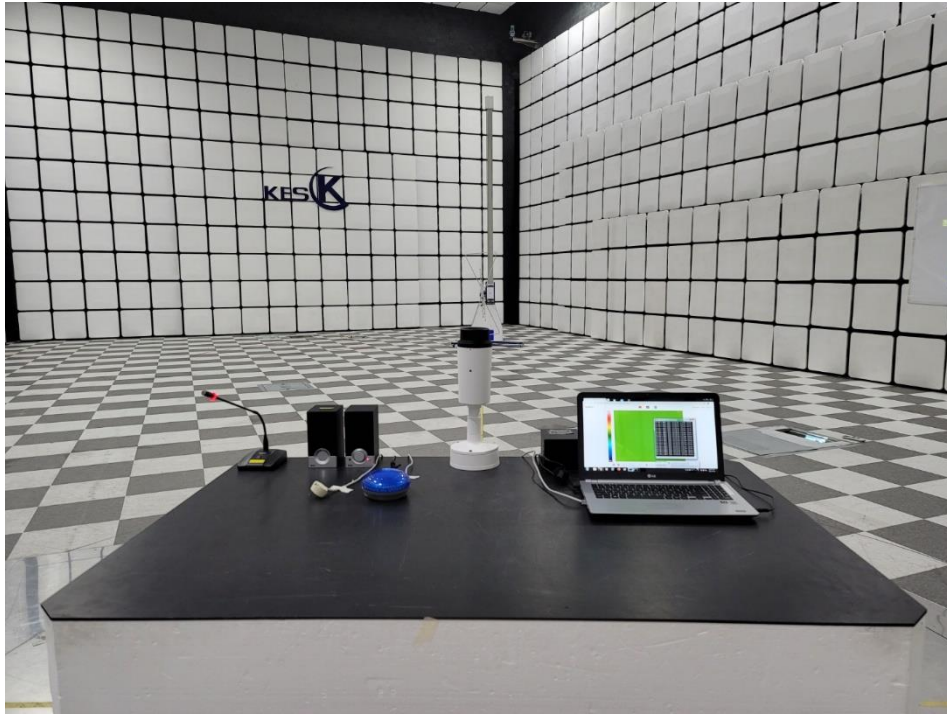
Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode

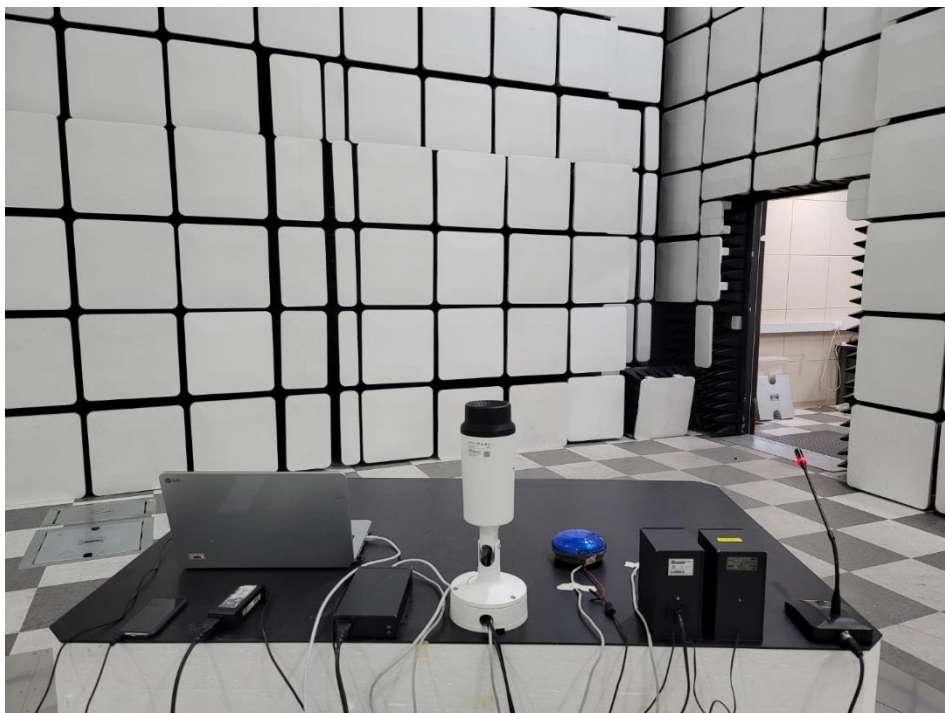
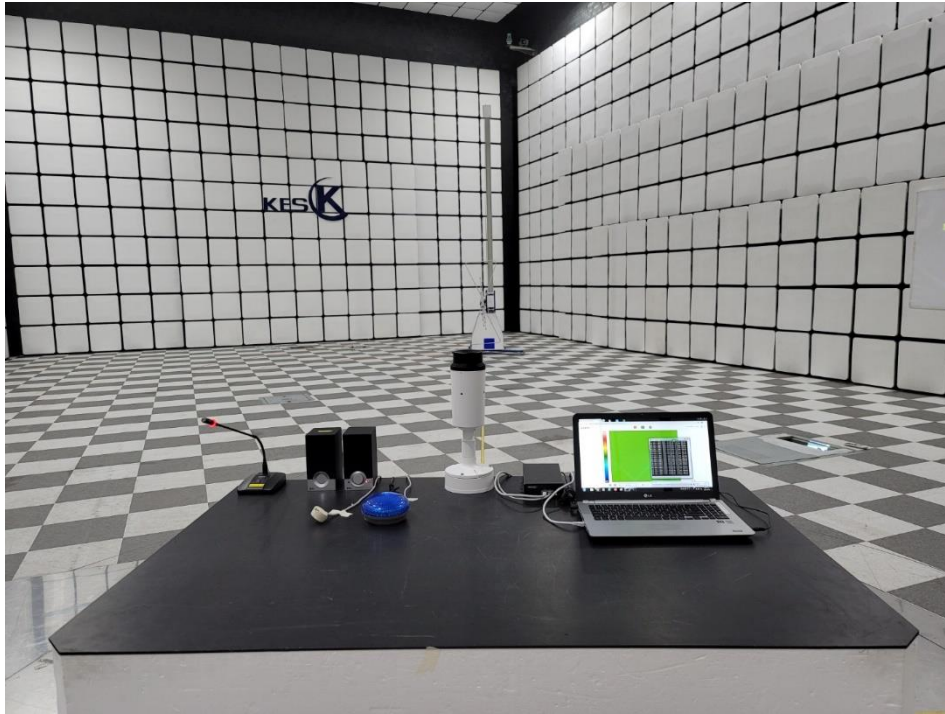


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■ AC Mode



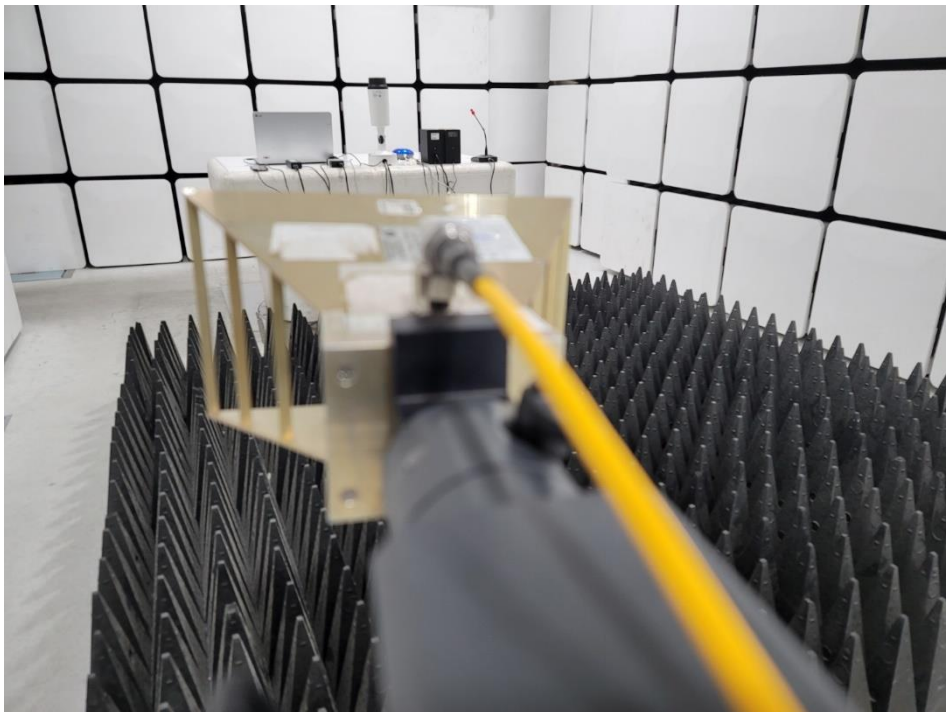
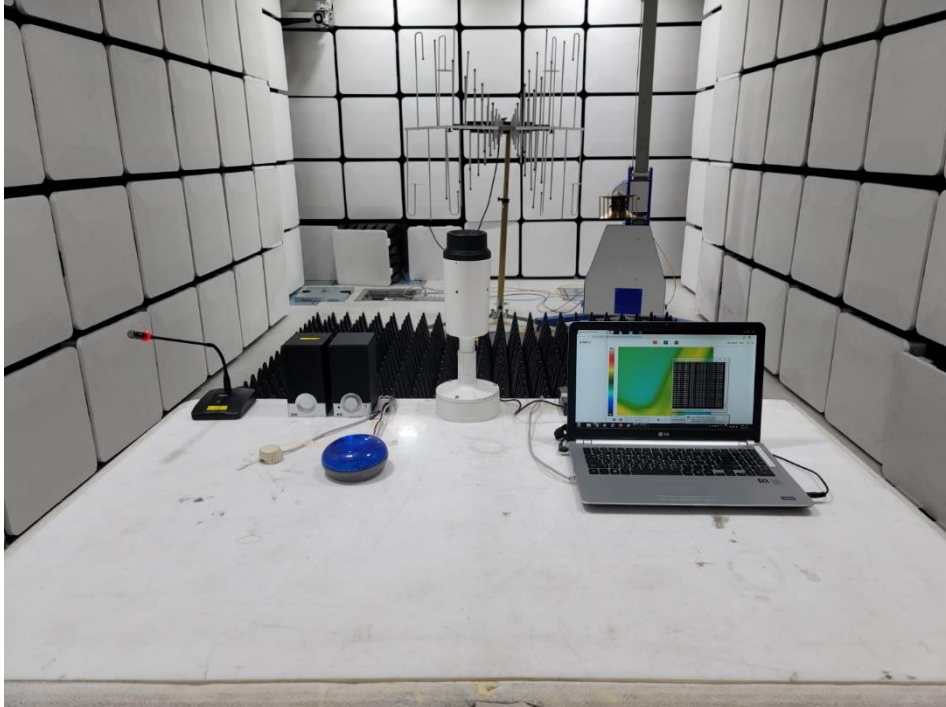
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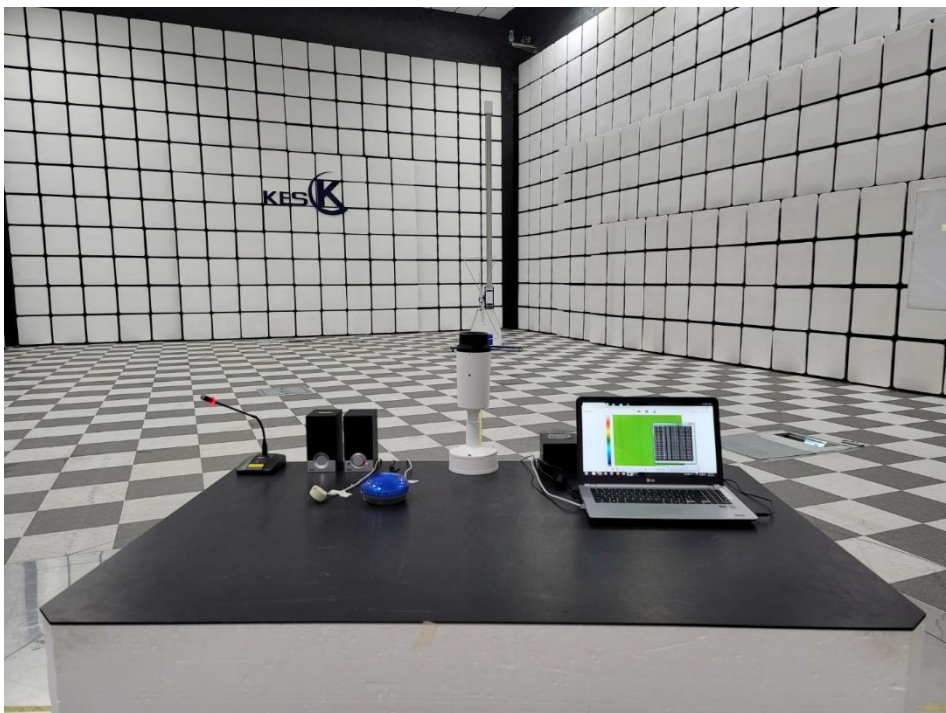
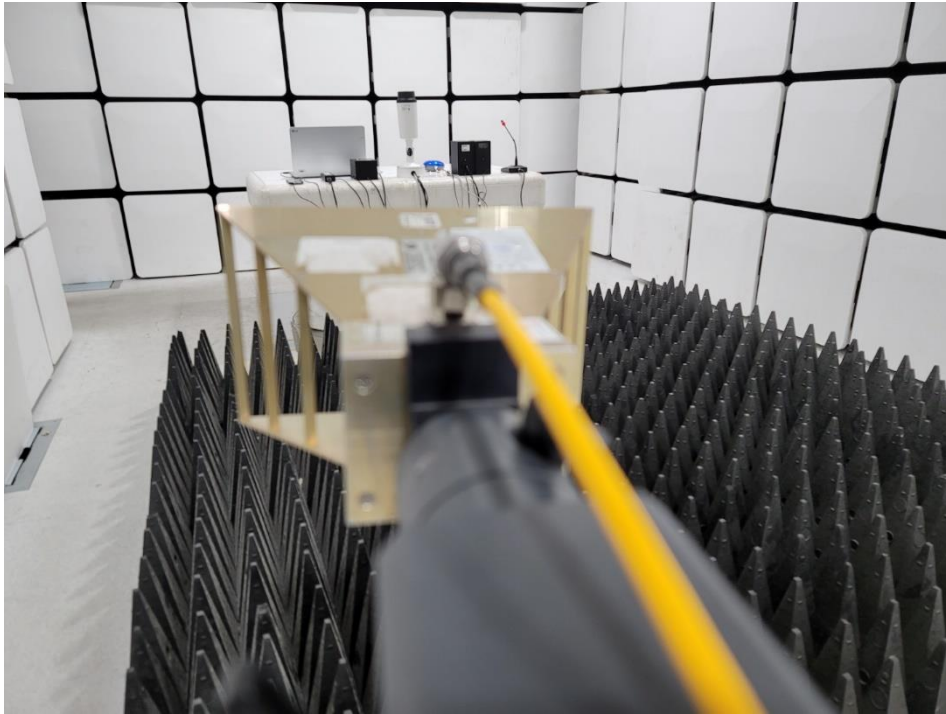
Radiated Electric Field Emissions(Above 1 GHz)

■ DC Mode



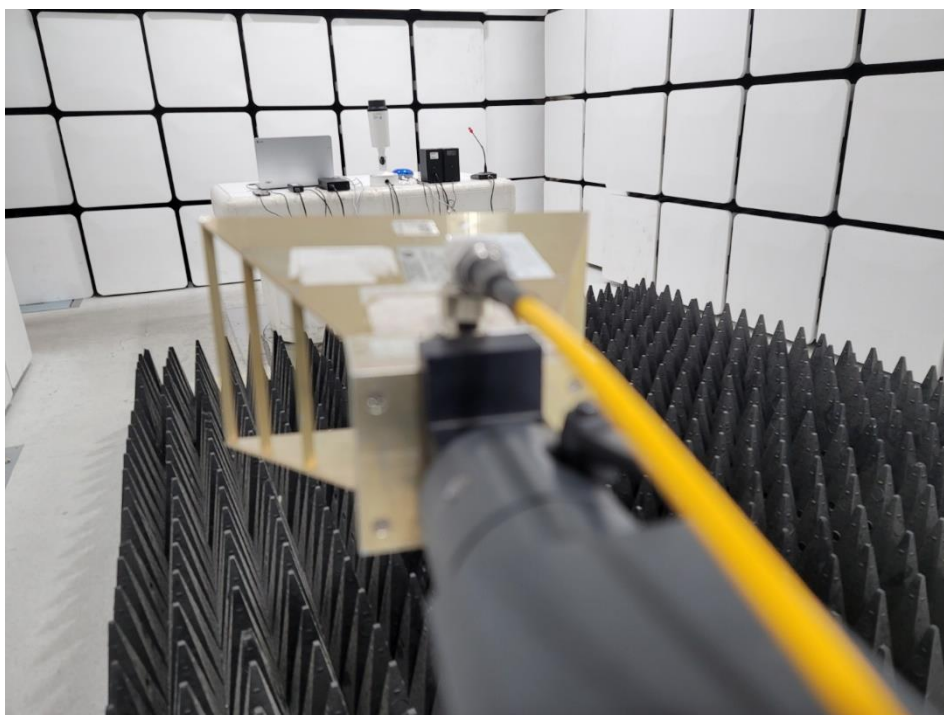
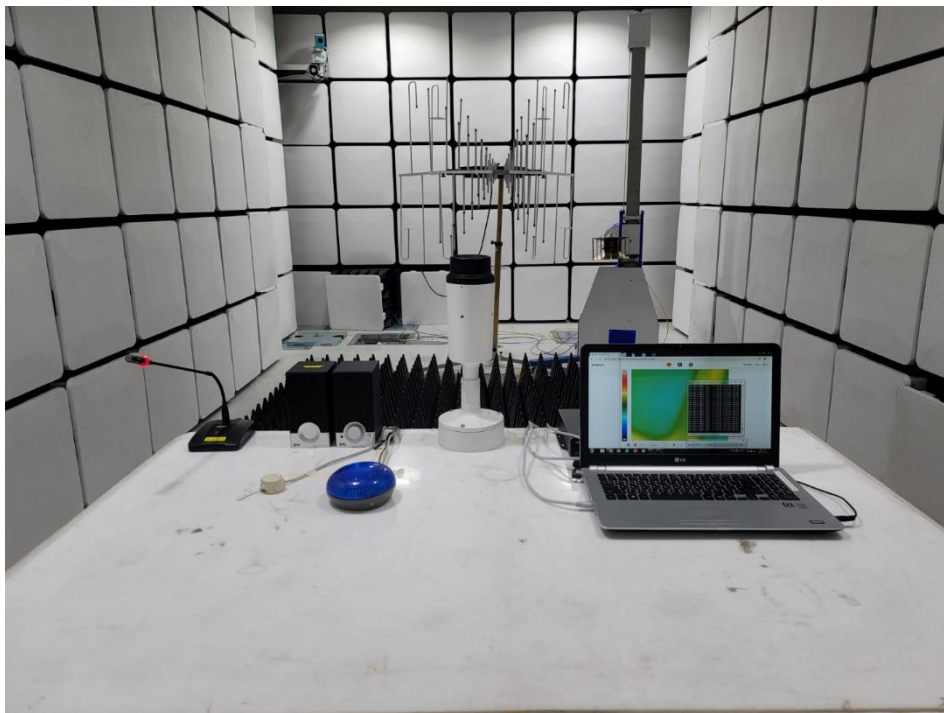
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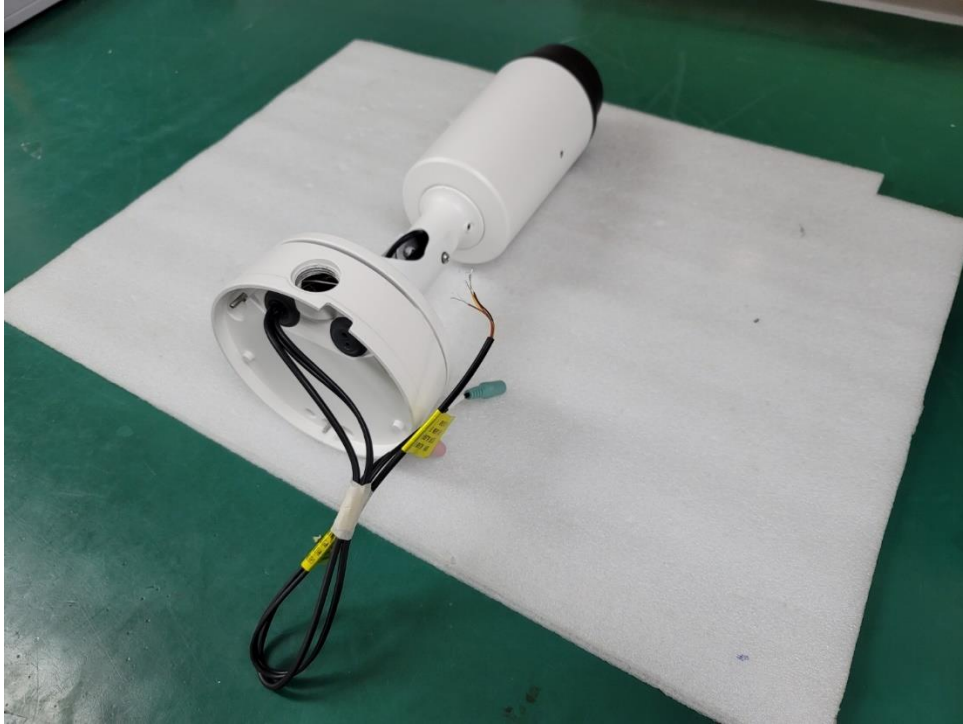
■ PoE Mode



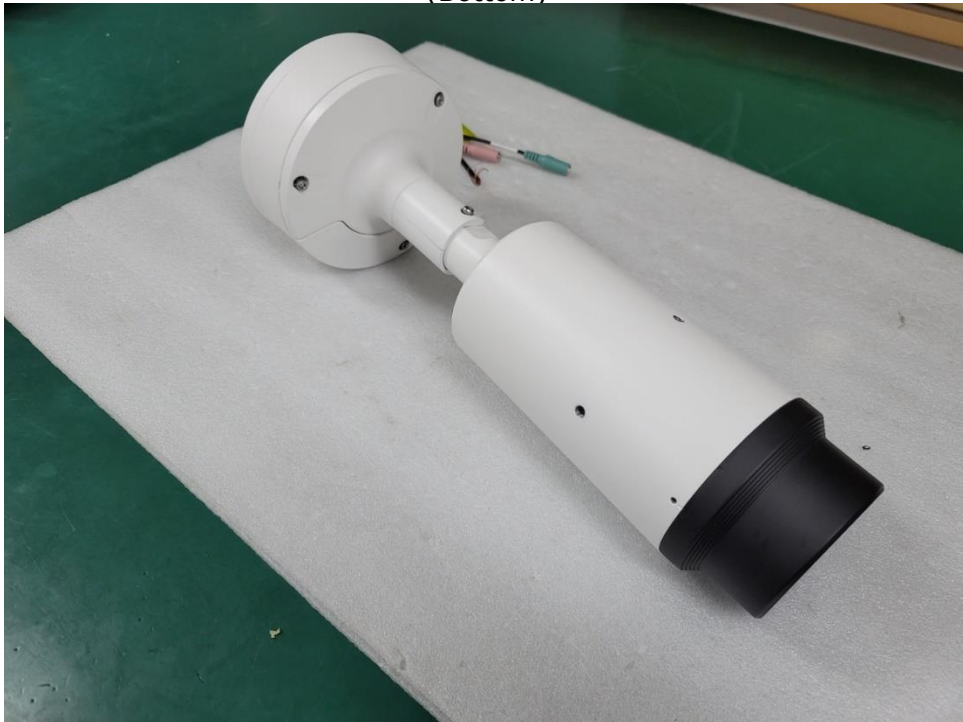
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EUT External Photographs

(Top)



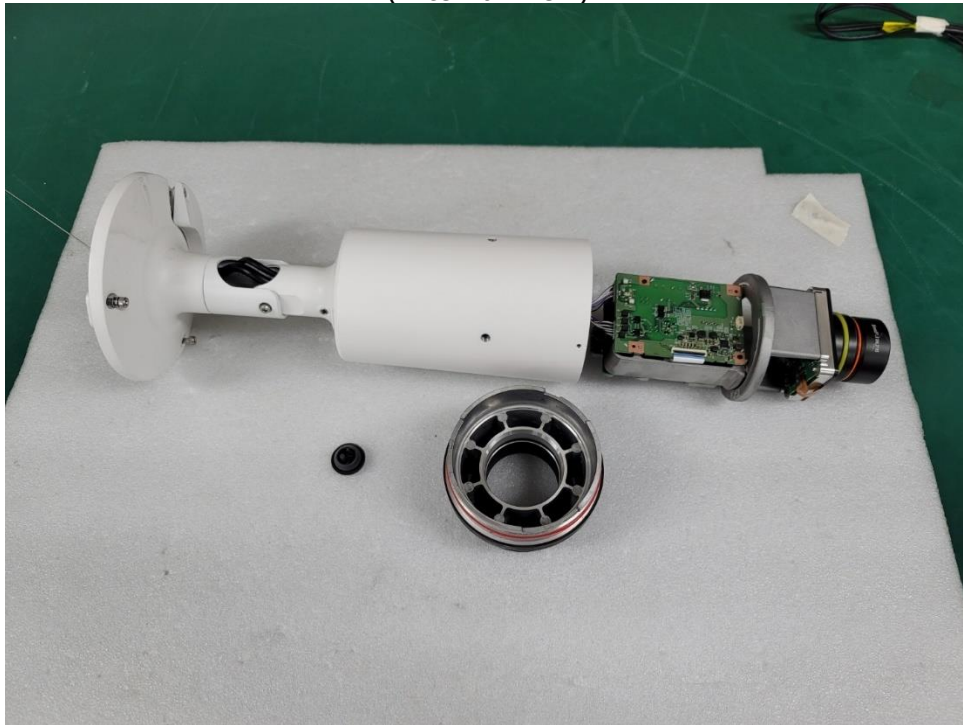
(Bottom)



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EUT Internal Photographs

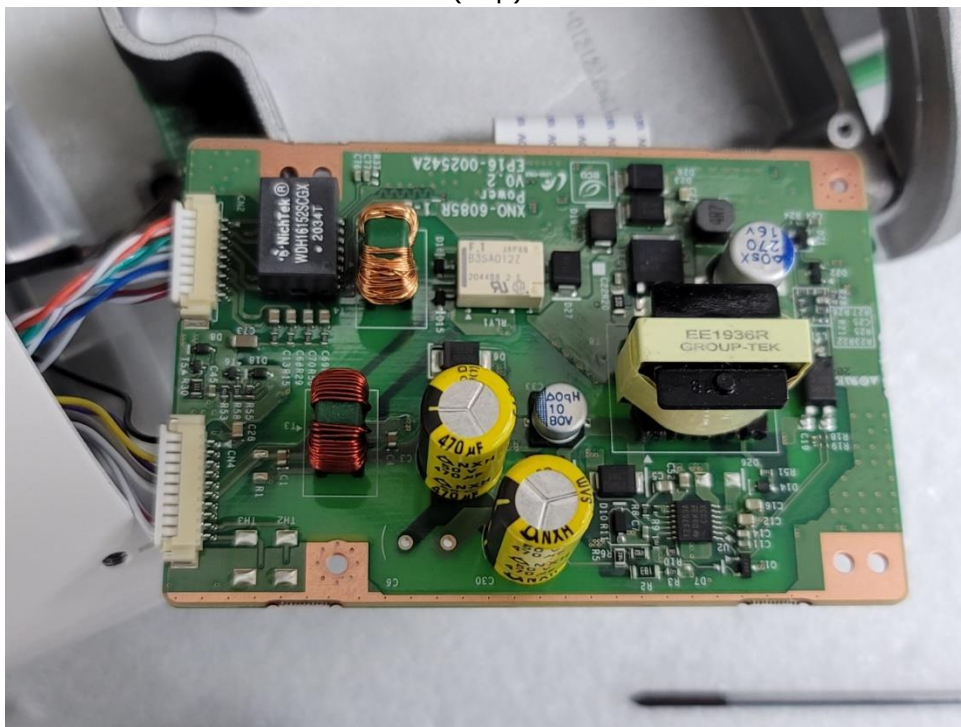
(Internal View)



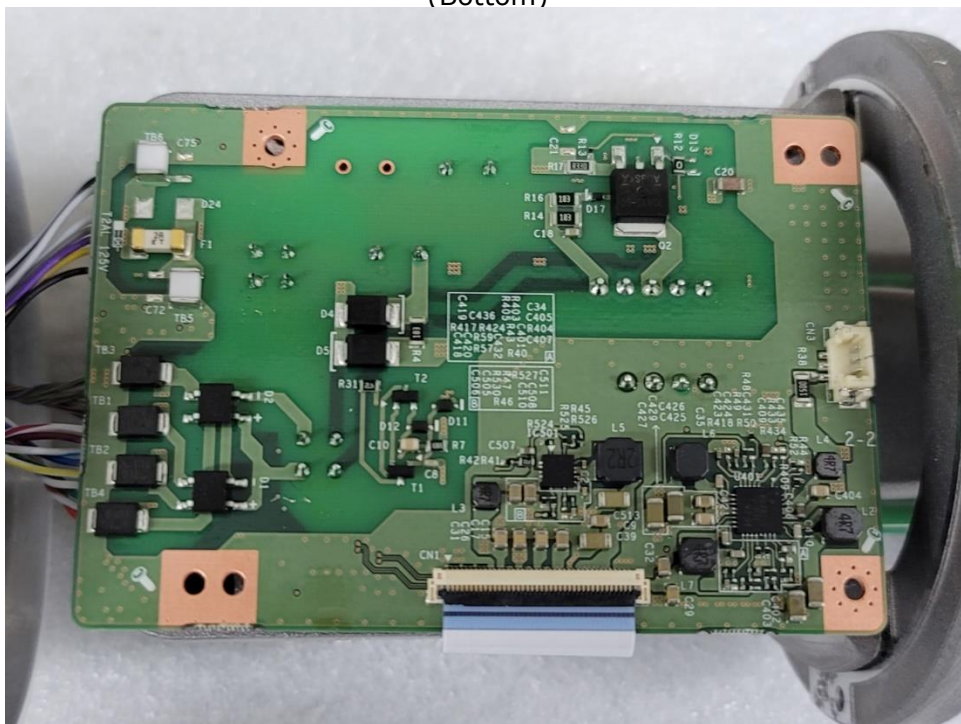
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EUT Internal View – Board 1

(Top)



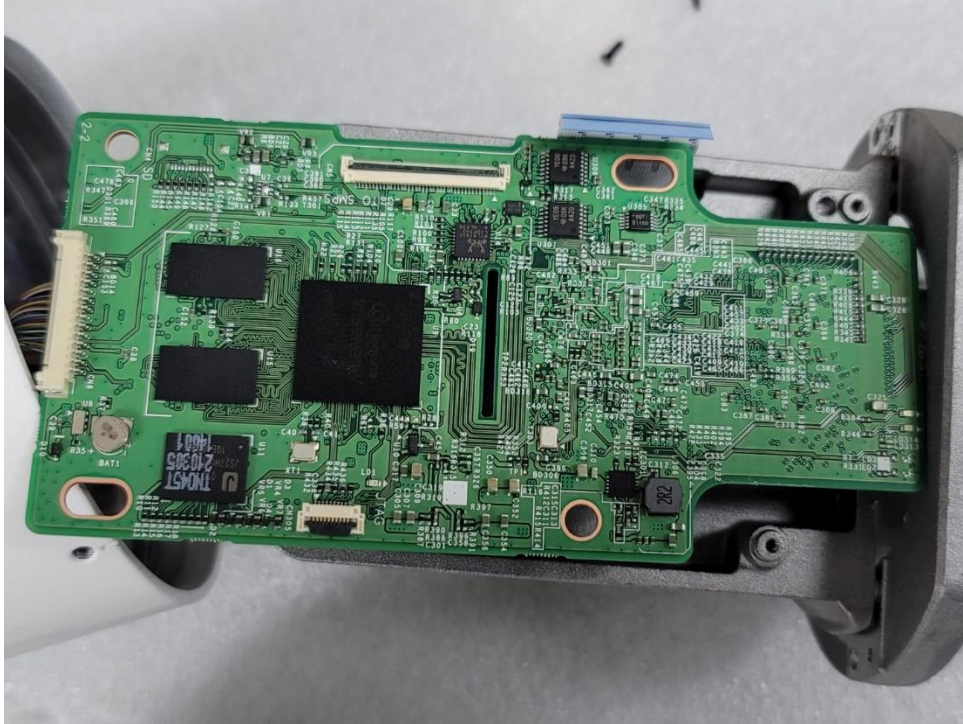
(Bottom)



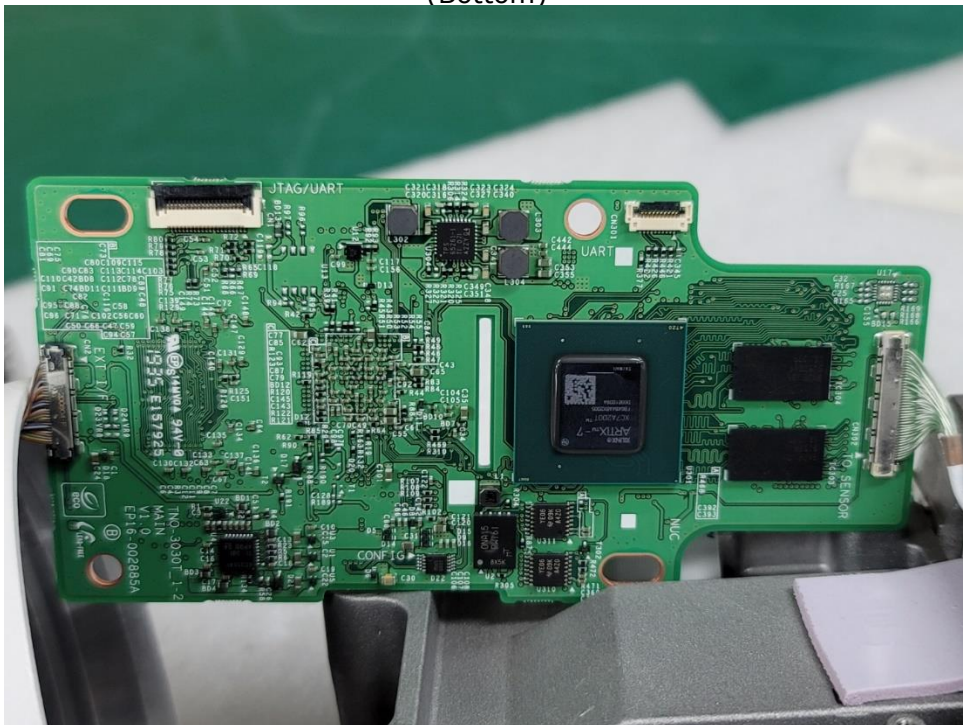
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EUT Internal View – Board 2

(Top)



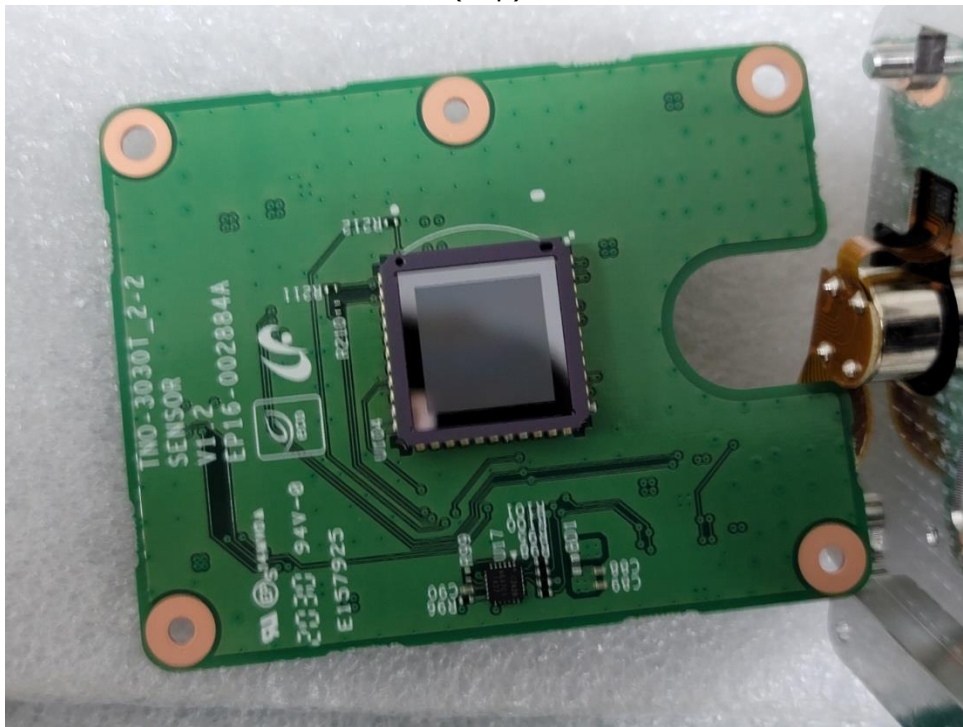
(Bottom)



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EUT Internal View – Board 3

(Top)



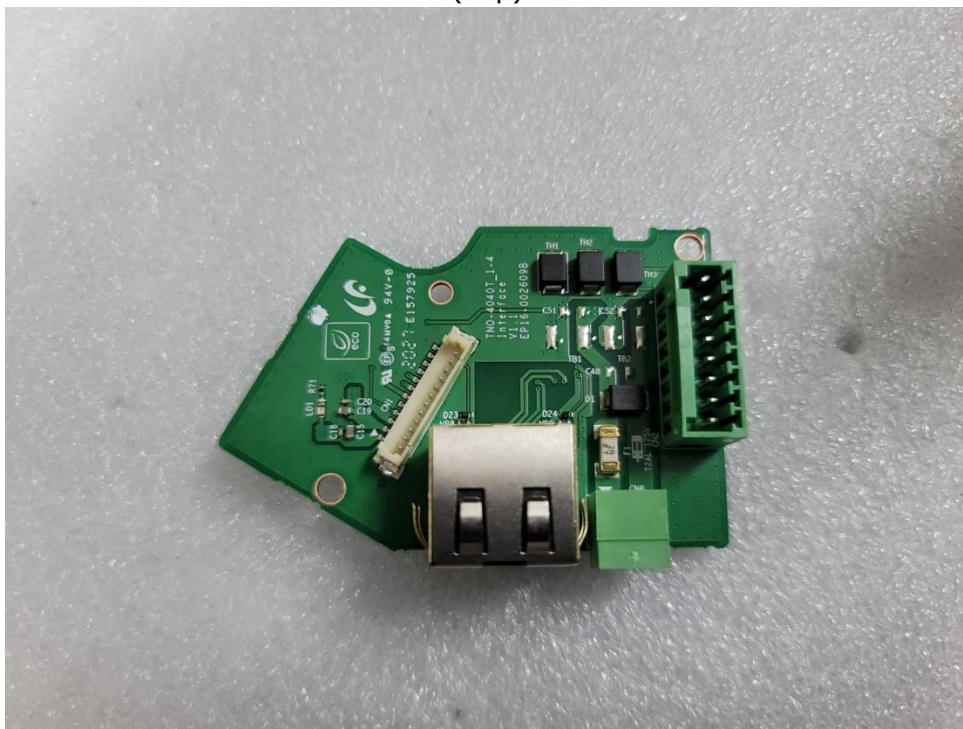
(Bottom)



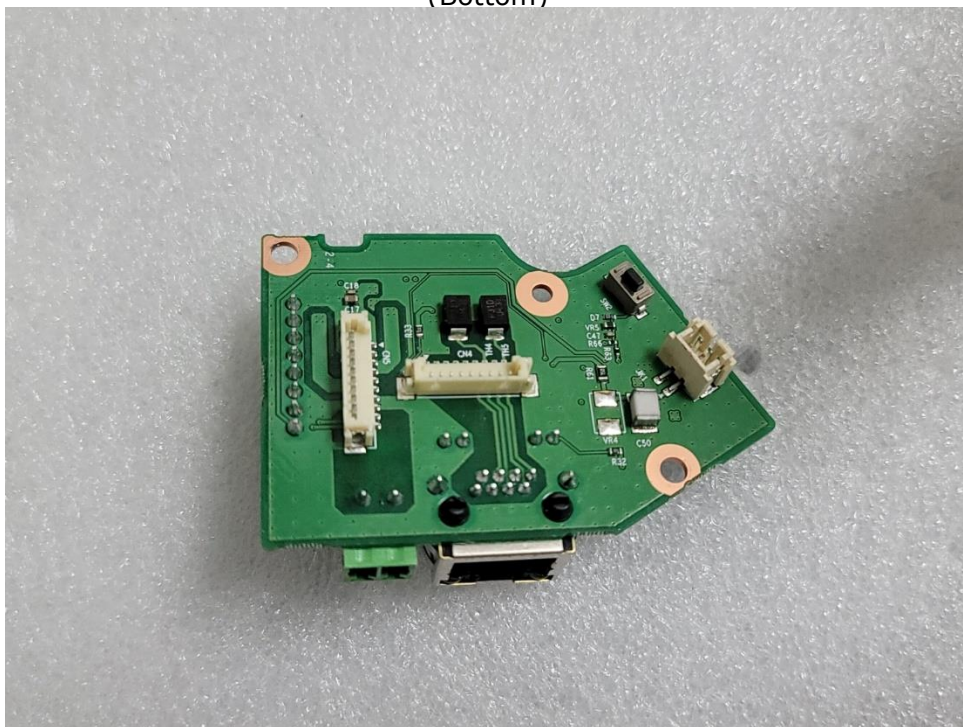
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EUT Internal View – Board 4

(Top)



(Bottom)



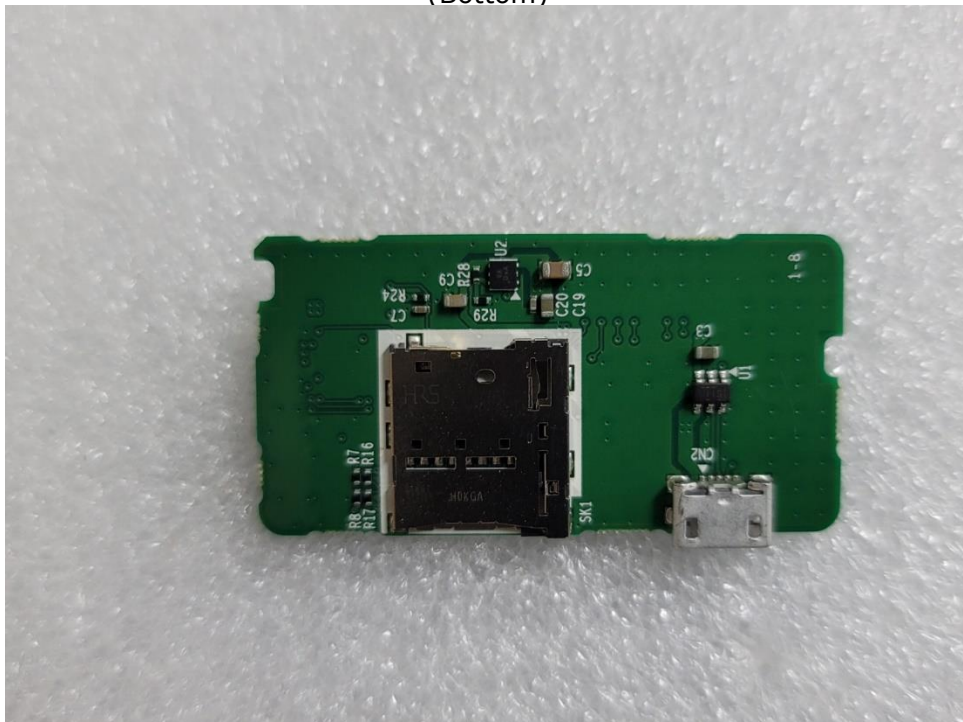
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EUT Internal View – Board 5

(Top)



(Bottom)



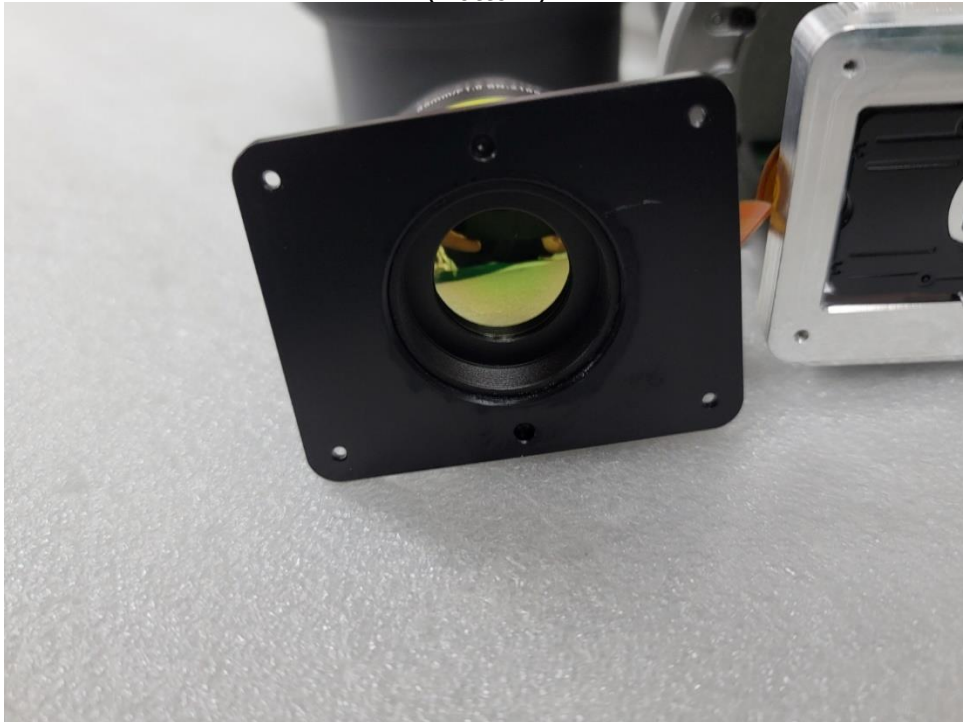
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EUT Internal View – Lens

(Top)



(Bottom)



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