



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-22T0688-R1

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EMC TEST REPORT For VCCI

Test Report No. : KES-EM-22T0688-R1
Date of Issue : Feb. 24, 2023
Product name : Thermal Camera
Model/Type No. : TNO-4041TR
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 : Jul. 21, 2022
Test date : Jul. 27, 2022 ~ Aug. 01, 2022
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Eun Gu, Jeon
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
Aug. 09, 2022	KES-EM-22T0688	Issued
Feb. 24, 2023	KES-EM-22T0688-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:

Imaging Device	Uncooled micro bolometer
Resolution	640x480, 640x360, 320x240
Max. Framerate	H.265/H.264: Max. 30fps/25fps(60Hz/50Hz) MJPEG: Max. 30fps/25fps(60Hz/50Hz)
NETD	<50mK
Pixel Size	17μm
Video Out	CVBS: 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P) for installation

Lens

Focal Length (Zoom Ratio)	19mm fixed focal
Max. Aperture Ratio	F1.0
Angular Field of View	H: 32° / V: 24.3° / D: 39.2°
Min. Object Distance	11m(36.09ft)
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 detection, Sound classification, Shock detection
Serial Interface	RS-485/422(Samsung-T, Pelco-D/P, Panasonic, Bosch, AD, GE, Vicon, Honeywell)
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

Radiometry

Temperature Detect Range	-20°C~130°C(-4°F~266°F)
Temperature Accuracy	±5°C(≤100°C), ±20%(>100°C)
Temperature Detection	3ea rectangular
Additional	Hybrid palettes, Spot temperature reading

Network

Ethernet	RJ-45(10/100BASE-T)
Video Compression	H.265/H.264: Main/Baseline/High, MJPEG

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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(Sea area), WiseStream II
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, SRTP
Security	HTTPS(SSL) Login Authentication Digest Login Authentication IP Address Filtering User access log 802.1X Authentication(EAP-TLS, EAP-LEAP)
Application Programming Interface	ONVIF Profile S/G/T SUNAPI(HTTP API) Wisenet open platform

General

Webpage Language	English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Swedish, Portuguese, Czech, Polish, Turkish, Dutch, Hungarian, Greek
Web Viewer	Supported OS: Windows 7, 8.1, 10, Mac OS X 10.10, 10.11, 10.12 Recommended Browser: Google Chrome Supported Browser: MS Explorer11, MS Edge, Mozilla Firefox(Window 64bit only), Apple Safari(Mac OS X only)
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, IK10, NEMA4X
Input Voltage	PoE(IEEE802.3af, Class3), 24VAC, 12VDC
Power Consumption	PoE: Max. 10W, typical 8.6W 12VDC: Max. 9W, typical 7.5W 24VAC: Max. 10.5W, typical 8.9W

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, IK10, NEMA4X
Input Voltage	PoE(IEEE802.3af, Class3), 24VAC, 12VDC
Power Consumption	PoE: Max. 10W, typical 8.6W 12VDC: Max. 9W, typical 7.5W 24VAC: Max. 10.5W, typical 8.9W

Mechanical

Color / Material	White / Aluminum
RAL Code	RAL9003
Product Dimensions / Weight	Φ101.97x309mm(4.01x12.17") / 2452g(5.41lb)

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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 100 V, 60 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	TNO-4041TR	-	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	PT-PSE109GBRO-AH	-	Dongguan PROCET Network Technology Co.,Ltd	-
AC Adapter	AP-2410A	-	Safety officer	-
Notebook	Latitude 5300	8C47BE45C060	Wistron Infocom (Chengdu) Company Limited	-
Notebook Adapter	HA65NM130	-	Chicony Power Technology(Suzhou)Co., Ltd.	-
Controller	SPC-1010	C50E67WG10100 F	SamSung Techwin Co.,Ltd.	-
Controller Adapter	AP-12005A	-	A Power Co., Ltd.	-
Alarm	-	-	-	-
Button Alarm	-	-	-	-
Headset	K550	-	Britz®	-
SmartPhone	SHV-E330S	-	Samsung Electronics Co., Ltd.	-
Micro SD Card	-	-	SanDisk	16 GB

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	Line	1.6	U
	RJ-45	Notebook	RJ-45	3.0	U
	Alarm OUT	Alarm	Alarm IN	3.0	U
	Alarm IN	Button Alarm	Alarm OUT	3.0	U
	RS-485	Controller	2 Pin	3.0	U
	3.5 mm (SPK)	Headset	3.5 mm	1.8	U
	3.5 mm (MIC)		3.5 mm	1.8	U
	Micro SD Slot	Micro SD Card	Micro SD Slot	-	-
Notebook	3.5 mm	SmartPhone	3.5 mm	1.1	U
	DC Jack	Notebook Adapter	DC Jack	1.6	U
Controller	DC Jack	Controller Adapter	DC Jack	1.2	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	Line	1.6	U
	RJ-45	Notebook	RJ-45	3.0	U
	Alarm OUT	Alarm	Alarm IN	3.0	U
	Alarm IN	Button Alarm	Alarm OUT	3.0	U
	RS-485	Controller	2 Pin	3.0	U
	3.5 mm (SPK)	Headset	3.5 mm	1.8	U
	3.5 mm (MIC)		3.5 mm	1.8	U
	Micro SD Slot	Micro SD Card	Micro SD Slot	-	-
Notebook	3.5 mm	SmartPhone	3.5 mm	1.1	U
	DC Jack	Notebook Adapter	DC Jack	1.6	U
Controller	DC Jack	Controller Adapter	DC Jack	1.2	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 Adapter	RJ-45	3.0	U
	Alarm OUT	Alarm	Alarm IN	3.0	U
	Alarm IN	Button Alarm	Alarm OUT	3.0	U
	RS-485	Controller	2 Pin	3.0	U
	3.5 mm (SPK)	Headset	3.5 mm	1.8	U
	3.5 mm (MIC)		3.5 mm	1.8	U
	Micro SD Slot	Micro SD Card	Micro SD Slot	-	-
PoE Adapter	RJ-45	Notebook	RJ-45	1.0	U
Notebook	3.5 mm	SmartPhone	3.5 mm	1.1	U
	DC Jack	Notebook Adapter	DC Jack	1.6	U
Controller	DC Jack	Controller Adapter	DC Jack	1.2	U

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

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

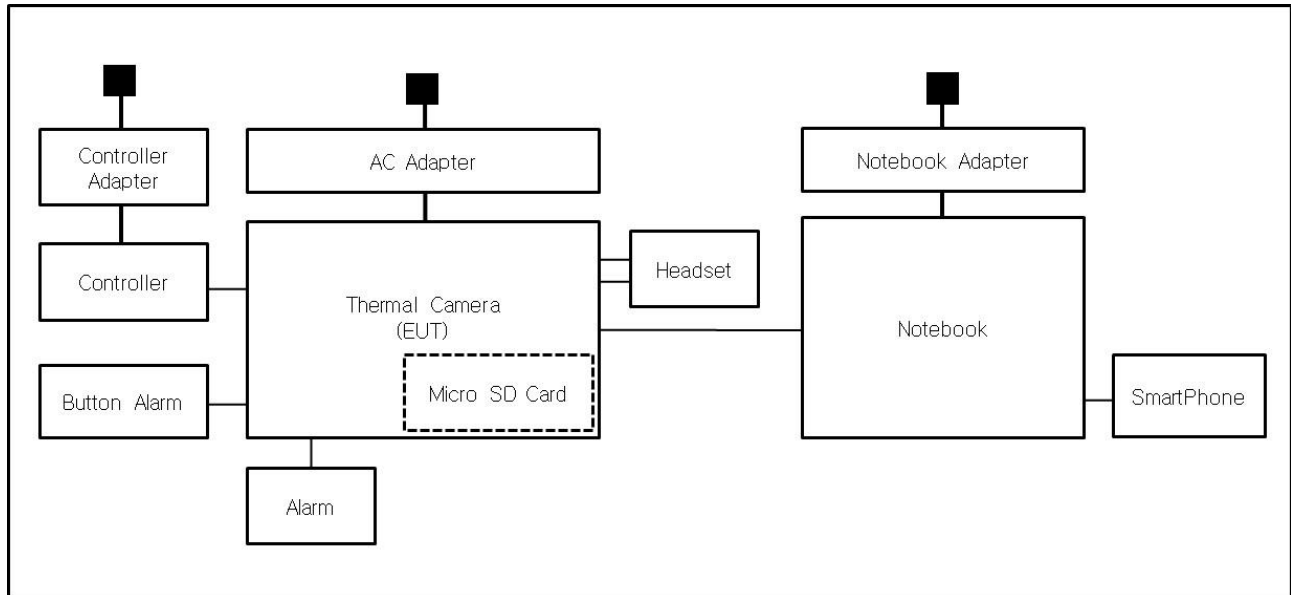
EUT Test operating S/W		
Name	Version	Manufacture Company
Web Viewer	-	Hanwha Vision Co., Ltd

1.8 Configuration

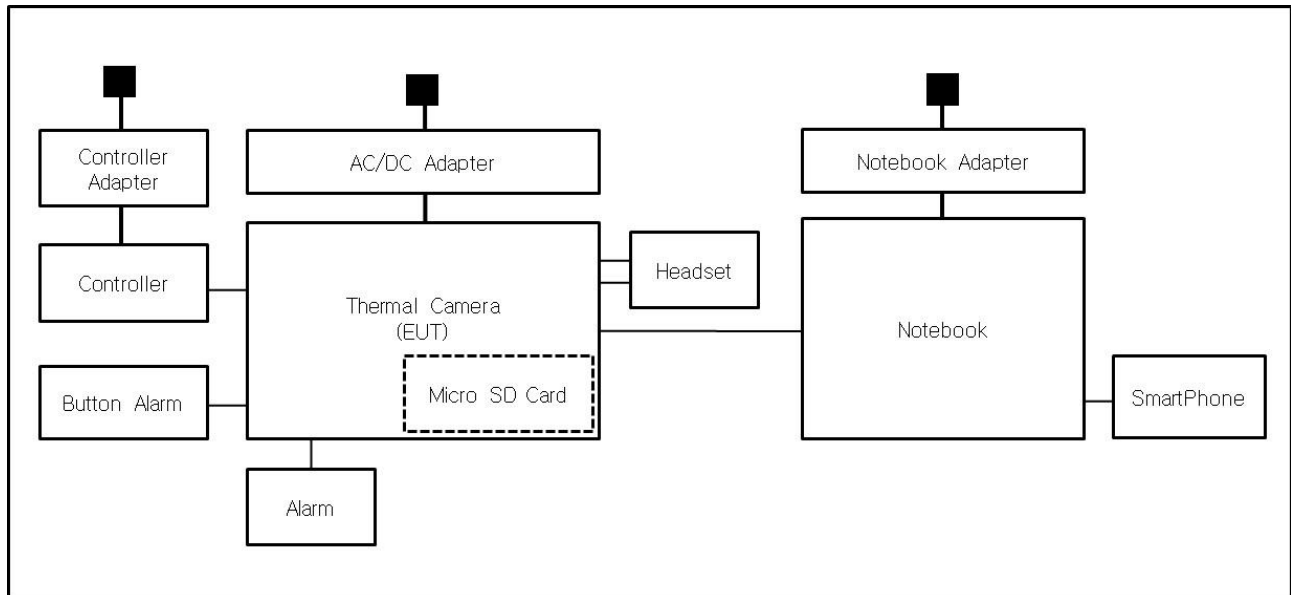
■ AC Main

□ DC Main

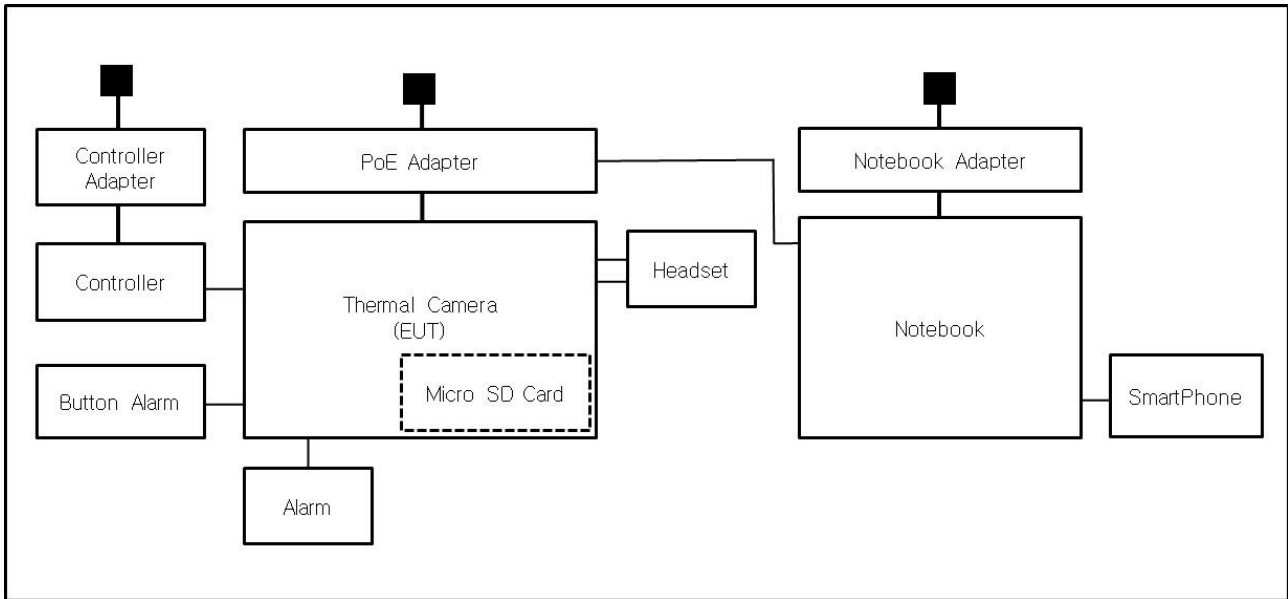
■ AC Mode



■ DC Mode



■ PoE Mode



1.9 Remarks when standards applied

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







1.10 Calibration Details of Equipment Used for Measurement

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

1.11 Test Facility

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

1.12 Laboratory Accreditations and Listings

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



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2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **VCCI-CISPR 32:2016**

☒ Class A

☐ Class B

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2.1 Conducted Emissions Mains Power Ports

Test Date

Jul. 27, 2022

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101783	12, 28, 2022
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	12, 27, 2022
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	12, 27, 2022
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 27, 2022

Test Conditions

Temperature: (24,5 ± 0,1) °C

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

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

2.2 Conducted Emissions at Telecommunication Ports

Test Date

Jul. 27, 2022

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101783	12, 28, 2022
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	12, 27, 2022
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	12, 27, 2022
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 27, 2022
<input checked="" type="checkbox"/>	8-WIRE ISN CAT3,5	ENY81	R & S	100174	12, 28, 2022
<input type="checkbox"/>	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	03, 07, 2023

Test Conditions

Temperature: (24,5 ± 0,1) °C

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

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

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

2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Jul. 28, 2022

Test Location

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

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	R & S	100551	03, 31, 2023
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	11, 24, 2022
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	12, 08, 2022
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	32173	03, 08, 2023

Test Conditions

Temperature: (24,4 ± 0,1) °C

Relative Humidity: (44,9 ± 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

Aug. 01, 2022

Test Location

SEMI ANECHOIC CHAMBER #5

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	ES10/RE	TOYO Corporation	2022.01.000	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	Rohde & Schwarz	100552	03, 31, 2023
<input checked="" type="checkbox"/>	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	12, 16, 2022
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	HP	3008A00538	06, 02, 2023

Test Conditions

Temperature: (24,1 ± 0,2) °C

Relative Humidity: (45,7 ± 0,2) % 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

RemarksSee Appendix A for test data.

APPENDIX A – TEST DATA

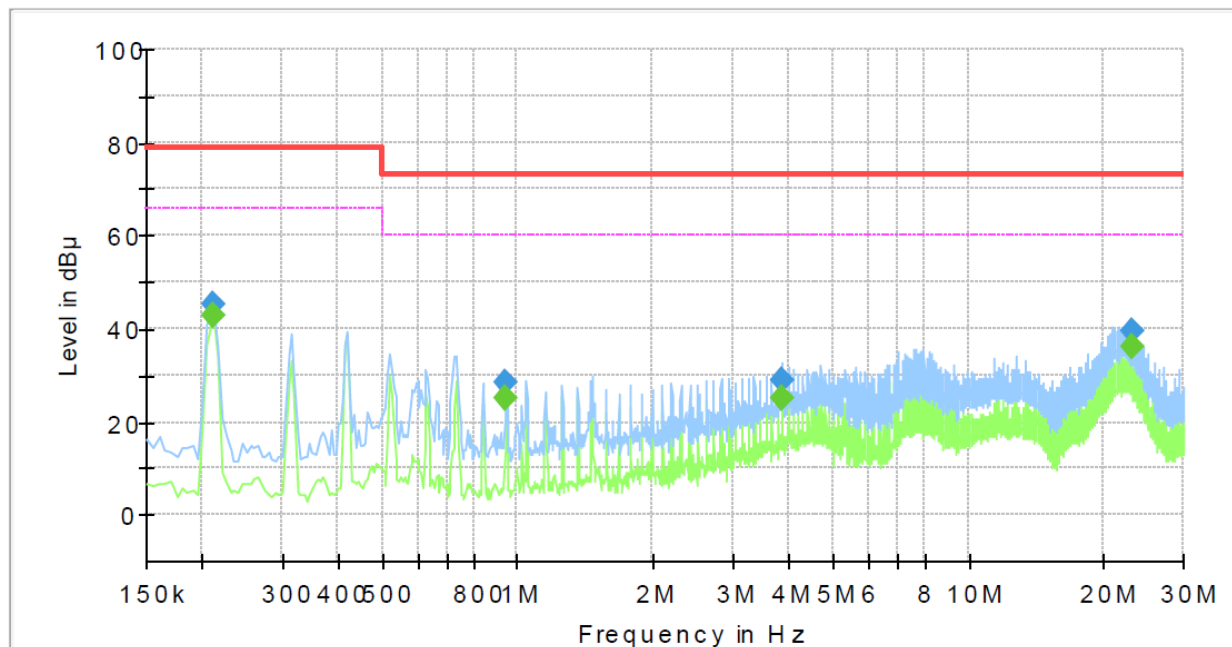
Conducted Emissions at Mains Power Ports

■ AC Mode

HOT LINE

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-4041R
Phase:	L1
Mode:	AC
Operator Name:	KES



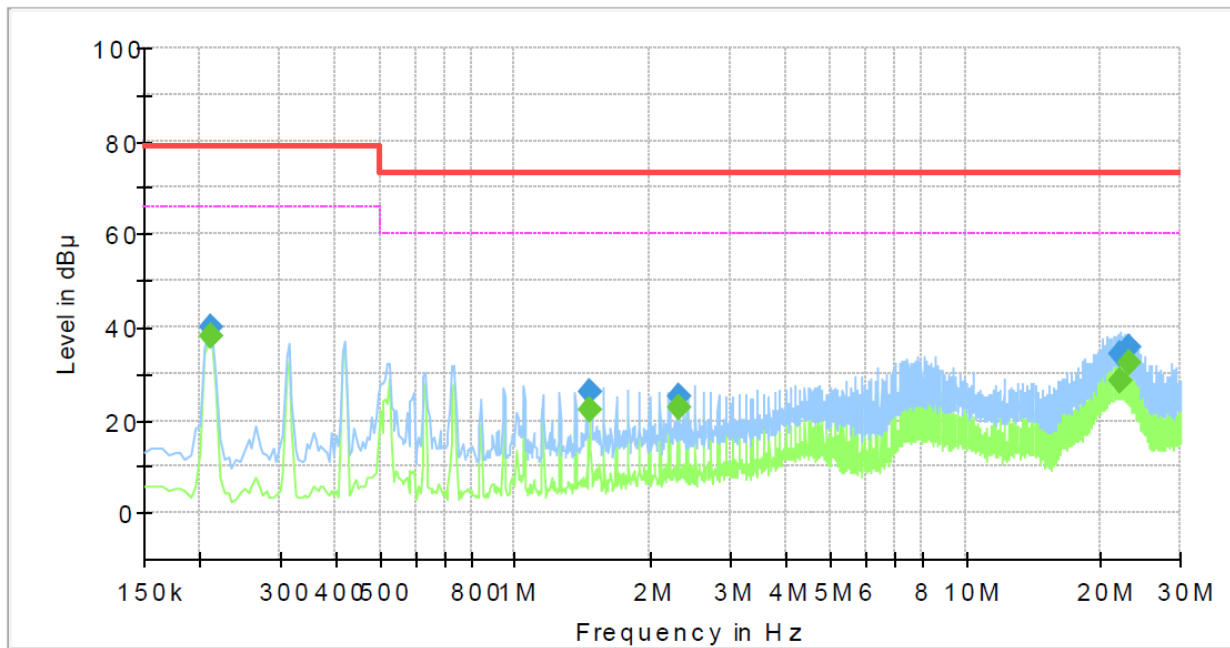
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.210000	---	42.93	66.00	23.07	1000.0	9.000	L1	19.4
0.210000	45.25	---	79.00	33.75	1000.0	9.000	L1	19.4
0.940000	---	25.15	60.00	34.85	1000.0	9.000	L1	20.1
0.940000	28.23	---	73.00	44.77	1000.0	9.000	L1	20.1
3.870000	---	25.02	60.00	34.98	1000.0	9.000	L1	19.9
3.870000	28.92	---	73.00	44.08	1000.0	9.000	L1	19.9
23.130000	---	36.30	60.00	23.70	1000.0	9.000	L1	20.1
23.130000	39.26	---	73.00	33.74	1000.0	9.000	L1	20.1

NEUTRAL LINE

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-4041R
Phase:	N
Mode:	AC
Operator Name:	KES



Final Result

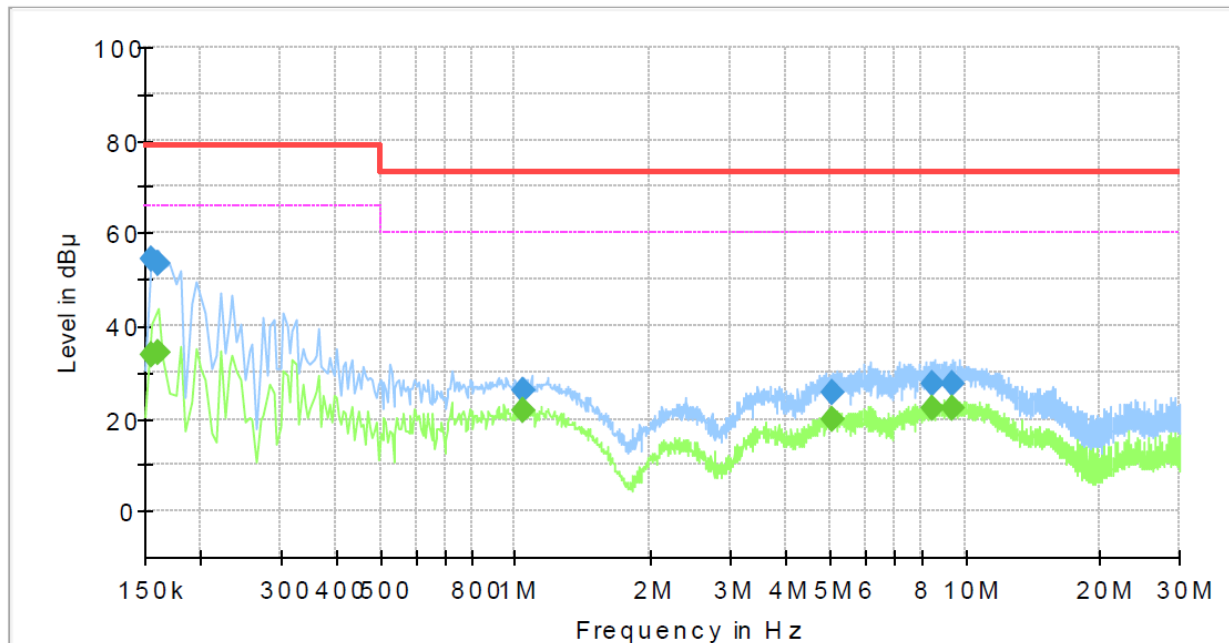
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.210000	---	38.21	66.00	27.79	1000.0	9.000	N	19.4
0.210000	39.91	---	79.00	39.09	1000.0	9.000	N	19.4
1.465000	---	22.15	60.00	37.85	1000.0	9.000	N	20.2
1.465000	25.98	---	73.00	47.02	1000.0	9.000	N	20.2
2.300000	---	22.55	60.00	37.45	1000.0	9.000	N	20.3
2.300000	24.96	---	73.00	48.04	1000.0	9.000	N	20.3
21.970000	---	28.60	60.00	31.40	1000.0	9.000	N	20.2
21.970000	34.08	---	73.00	38.92	1000.0	9.000	N	20.2
23.125000	---	32.28	60.00	27.72	1000.0	9.000	N	20.1
23.125000	35.55	---	73.00	37.45	1000.0	9.000	N	20.1

■ DC Mode

HOT LINE

Common Information

Test Description: Conducted Emission
 Model No.: TNO-4041R
 Phase: L1
 Mode: DC
 Operator Name: KES



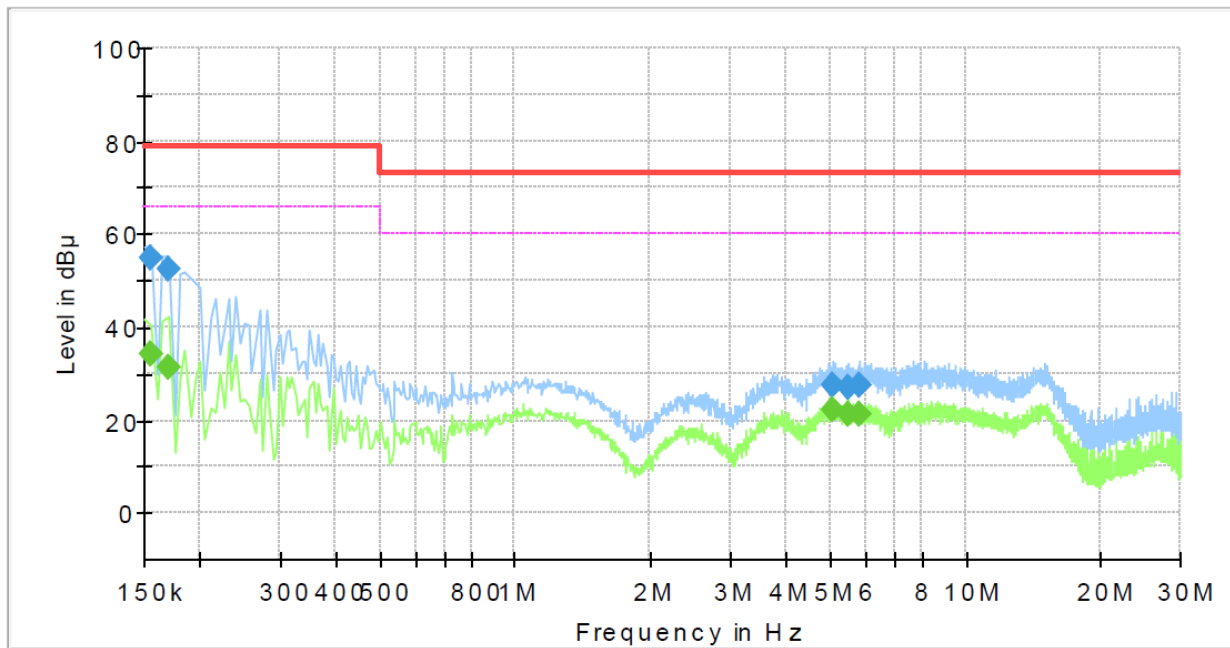
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	33.83	66.00	32.17	1000.0	9.000	L1	19.4
0.155000	54.26	---	79.00	24.74	1000.0	9.000	L1	19.4
0.160000	---	34.11	66.00	31.89	1000.0	9.000	L1	19.4
0.160000	53.39	---	79.00	25.61	1000.0	9.000	L1	19.4
1.040000	---	21.60	60.00	38.40	1000.0	9.000	L1	20.1
1.040000	25.83	---	73.00	47.17	1000.0	9.000	L1	20.1
5.080000	---	19.89	60.00	40.11	1000.0	9.000	L1	19.6
5.080000	25.71	---	73.00	47.29	1000.0	9.000	L1	19.6
8.495000	---	22.08	60.00	37.92	1000.0	9.000	L1	19.7
8.495000	27.23	---	73.00	45.77	1000.0	9.000	L1	19.7
9.365000	---	22.15	60.00	37.85	1000.0	9.000	L1	19.8
9.365000	27.31	---	73.00	45.69	1000.0	9.000	L1	19.8

NEUTRAL LINE

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-4041R
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	---	34.41	66.00	31.59	1000.0	9.000	N	19.4
0.155000	55.01	---	79.00	23.99	1000.0	9.000	N	19.4
0.170000	---	31.46	66.00	34.54	1000.0	9.000	N	19.4
0.170000	52.66	---	79.00	26.34	1000.0	9.000	N	19.4
5.100000	---	22.09	60.00	37.91	1000.0	9.000	N	19.6
5.100000	27.65	---	73.00	45.35	1000.0	9.000	N	19.6
5.485000	---	21.17	60.00	38.83	1000.0	9.000	N	19.6
5.485000	26.93	---	73.00	46.07	1000.0	9.000	N	19.6
5.830000	---	21.26	60.00	38.74	1000.0	9.000	N	19.5
5.830000	27.39	---	73.00	45.61	1000.0	9.000	N	19.5

◆ 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 (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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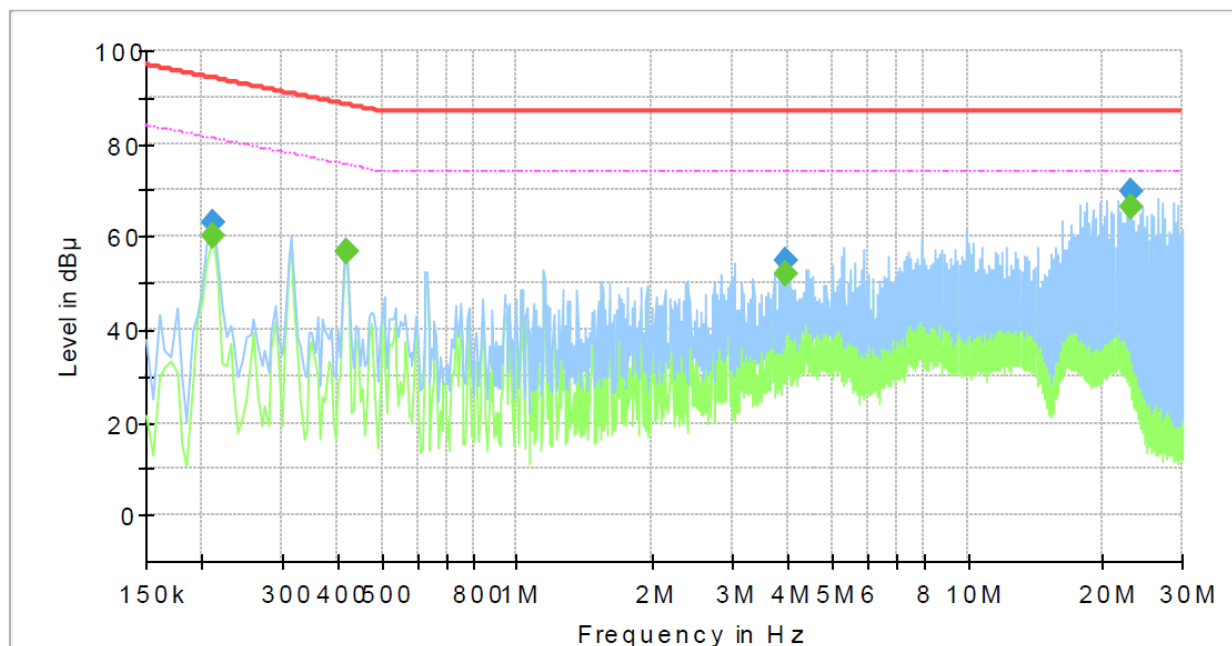
Conducted Emissions at Telecommunication Ports

■ AC Mode

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-4041R
Mode :	AC
Speed :	100 Mbps
Operator Name:	KES



Final Result

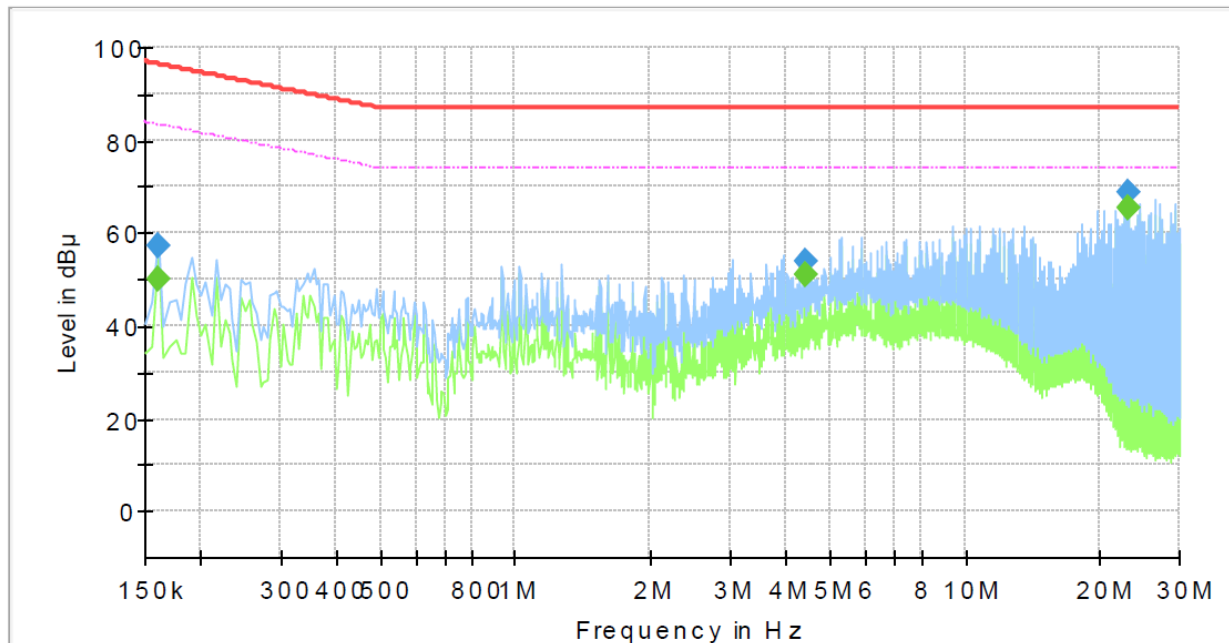
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.210000	---	60.24	81.21	20.97	1000.0	9.000	Single Line	19.7
0.210000	62.85	---	94.21	31.36	1000.0	9.000	Single Line	19.7
0.420000	---	56.54	75.45	18.91	1000.0	9.000	Single Line	19.7
0.420000	56.79	---	88.45	31.66	1000.0	9.000	Single Line	19.7
3.955000	---	51.79	74.00	22.21	1000.0	9.000	Single Line	19.7
3.955000	54.73	---	87.00	32.27	1000.0	9.000	Single Line	19.7
23.130000	---	66.51	74.00	7.49	1000.0	9.000	Single Line	20.1
23.130000	69.96	---	87.00	17.04	1000.0	9.000	Single Line	20.1

■ DC Mode

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-4041R
Mode :	DC
Speed :	100 Mbps
Operator Name:	KES



Final Result

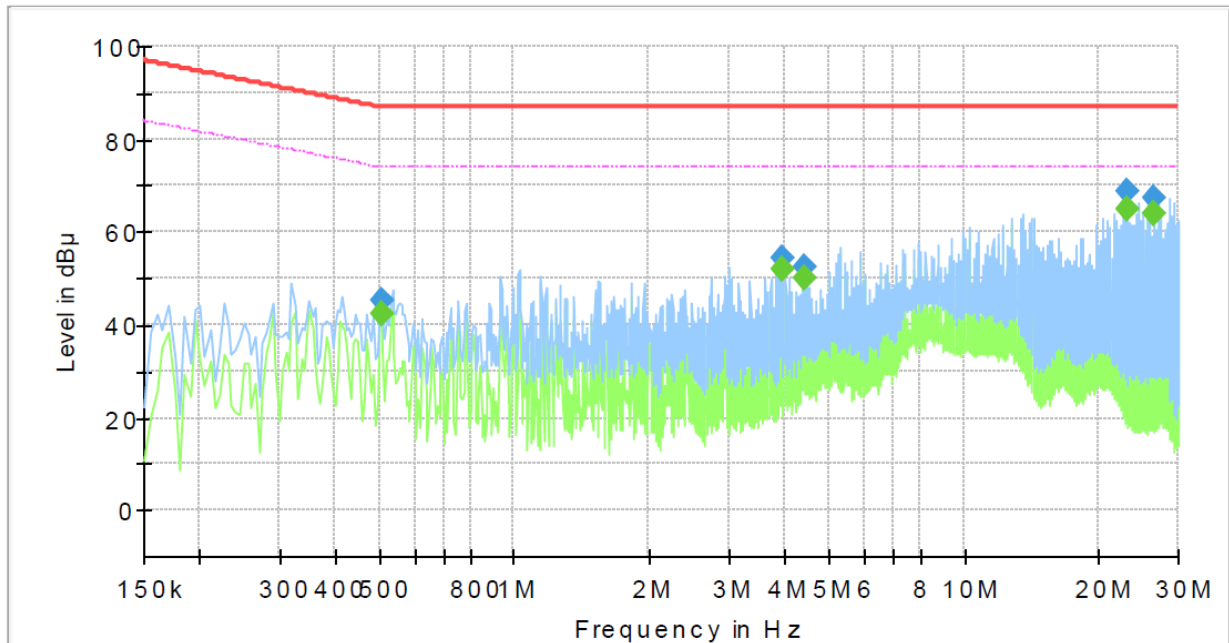
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.160000	---	50.27	83.46	33.19	1000.0	9.000	Single Line	19.8
0.160000	57.08	---	96.46	39.38	1000.0	9.000	Single Line	19.8
4.410000	---	50.82	74.00	23.18	1000.0	9.000	Single Line	19.6
4.410000	53.99	---	87.00	33.01	1000.0	9.000	Single Line	19.6
23.130000	---	65.58	74.00	8.42	1000.0	9.000	Single Line	20.1
23.130000	68.97	---	87.00	18.03	1000.0	9.000	Single Line	20.1

■ PoE Mode

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-4041R
Mode :	PoE
Speed :	100 Mbps
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.505000	---	42.16	74.00	31.84	1000.0	9.000	Single Line	19.8
0.505000	45.17	---	87.00	41.83	1000.0	9.000	Single Line	19.8
3.955000	---	51.90	74.00	22.10	1000.0	9.000	Single Line	19.7
3.955000	54.42	---	87.00	32.58	1000.0	9.000	Single Line	19.7
4.410000	---	49.87	74.00	24.13	1000.0	9.000	Single Line	19.6
4.410000	52.42	---	87.00	34.58	1000.0	9.000	Single Line	19.6
23.130000	---	65.05	74.00	8.95	1000.0	9.000	Single Line	20.1
23.130000	68.67	---	87.00	18.33	1000.0	9.000	Single Line	20.1
26.610000	---	63.90	74.00	10.10	1000.0	9.000	Single Line	20.2
26.610000	67.45	---	87.00	19.55	1000.0	9.000	Single Line	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 (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
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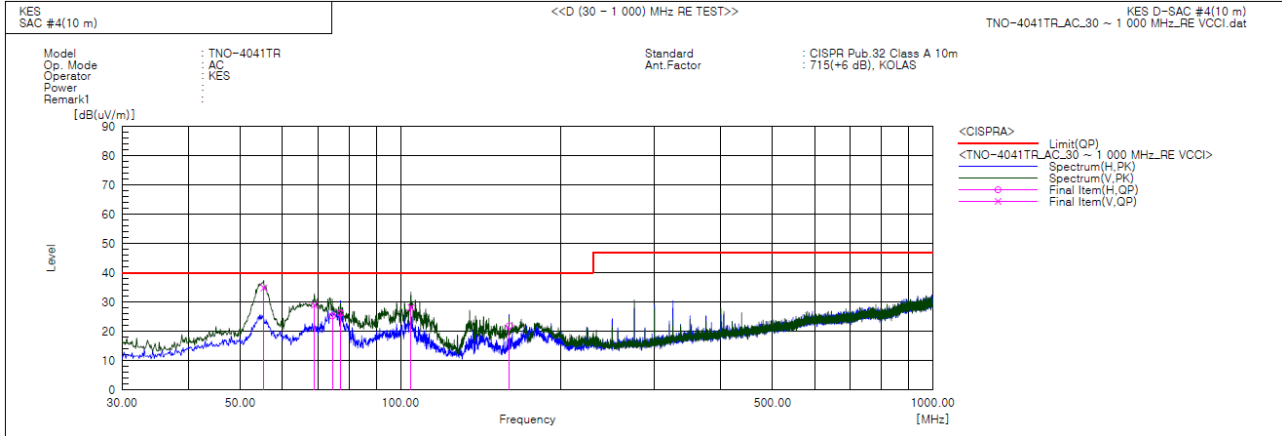
Report No.:

KES-EM-22T0688-R1

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Radiated Electric Field Emissions(Below 1 GHz)

■ AC Mode



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	55.341	V	56.2	-21.4	34.8	40.0	5.2	144.0	98.7	
2	68.921	V	53.4	-24.5	28.9	40.0	11.1	161.0	309.8	
3	74.499	H	52.0	-26.7	25.3	40.0	14.7	392.0	0.5	
4	77.192	H	53.8	-27.5	26.3	40.0	13.7	377.0	323.8	
5	104.693	V	50.6	-22.4	28.2	40.0	11.8	156.0	313.9	
6	159.989	H	46.6	-24.7	21.9	40.0	18.1	396.0	270.2	

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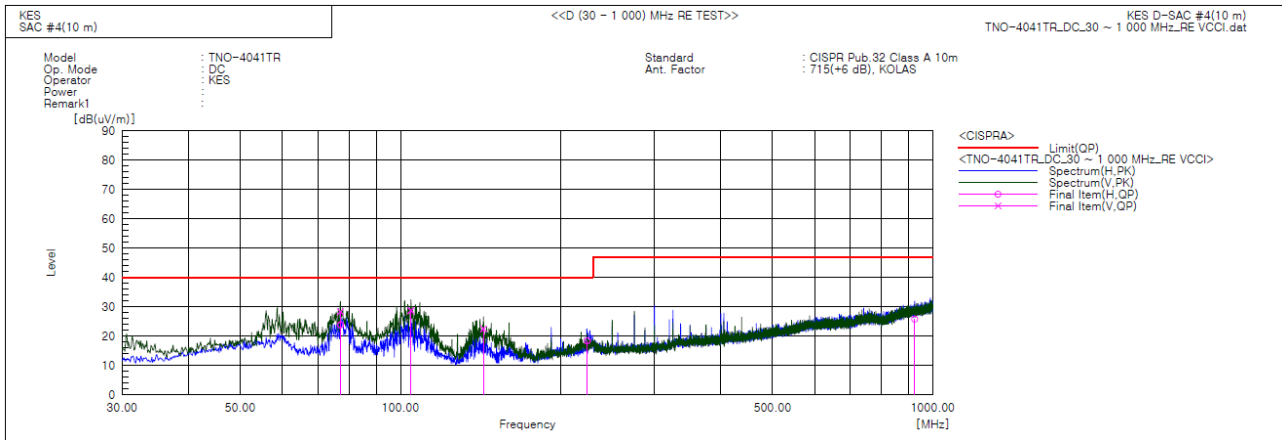
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DC Mode

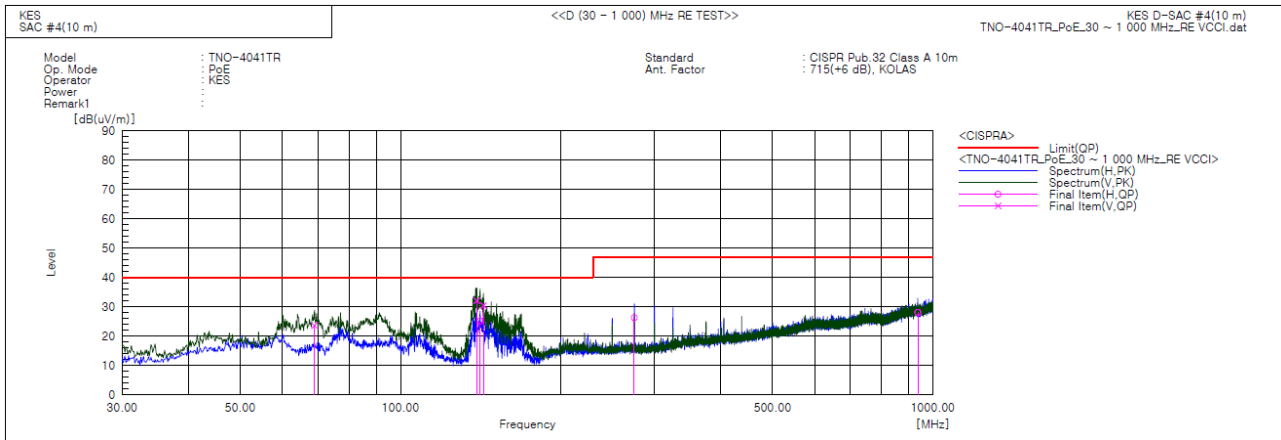


Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	77.131	V	55.7	-27.4	28.3	40.0	11.7	148.0	339.5	
2	77.194	H	51.3	-27.5	23.8	40.0	16.2	391.0	219.2	
3	104.694	V	51.1	-22.4	28.7	40.0	11.3	106.0	144.2	
4	143.248	V	48.0	-25.5	22.5	40.0	17.5	162.0	326.6	
5	224.425	H	38.6	-20.2	18.4	40.0	21.6	368.0	227.1	
6	925.094	H	29.7	-3.9	25.8	47.0	21.2	388.0	308.8	

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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	68.921	V	48.1	-24.5	23.6	40.0	16.4	116.0	342.0	
2	139.128	V	57.6	-25.5	32.1	40.0	7.9	126.0	71.7	
3	141.194	H	50.7	-25.5	25.2	40.0	14.8	393.0	307.8	
4	143.248	V	55.9	-25.5	30.4	40.0	9.6	128.0	323.4	
5	274.928	H	45.0	-18.7	26.3	47.0	20.7	379.0	42.2	
6	937.556	H	31.9	-3.8	28.1	47.0	18.9	364.0	113.7	

◆ Calculation

Corrected Amplitude [dBuV] = Amplitude[dBuV] + Correction Factor [dB]

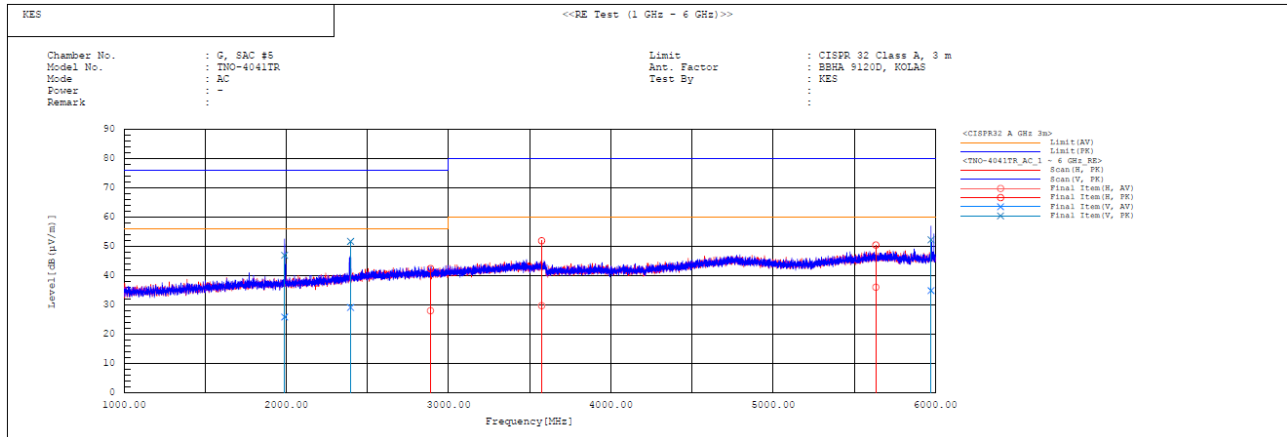
Corrected Amplitude : The Final Value, Amplitude : Reading Value,

Correction Factor : ANT FACTOR + Cable loss



Radiated Electric Field Emissions(Above 1 GHz)

■ AC Mode



Final Result

No.	Frequency [MHz]	Pol	Reading AV [dB(μV)]	Reading PK [dB(μV)]	c.f [dB(1/m)]	Result AV [dB(μV/m)]	Result PK [dB(μV/m)]	Limit AV [dB(μV/m)]	Limit PK [dB(μV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [deg]
1	1990.515	V	28.6	49.7	-2.8	25.8	46.9	56.0	76.0	30.2	29.1	100.0	204.4
2	2397.572	V	30.6	53.1	-1.5	29.1	51.6	56.0	76.0	26.9	24.4	100.0	86.1
3	2888.558	H	27.4	41.8	0.6	28.0	42.4	56.0	76.0	28.0	33.6	100.0	355.4
4	3574.246	H	27.7	49.9	2.0	29.7	51.9	60.0	80.0	30.3	28.1	100.0	79.6
5	5634.395	H	27.9	42.3	8.1	36.0	50.4	60.0	80.0	24.0	29.6	100.0	354.7
6	5974.358	V	26.2	43.5	8.7	34.9	52.2	60.0	80.0	25.1	27.8	100.0	134.9



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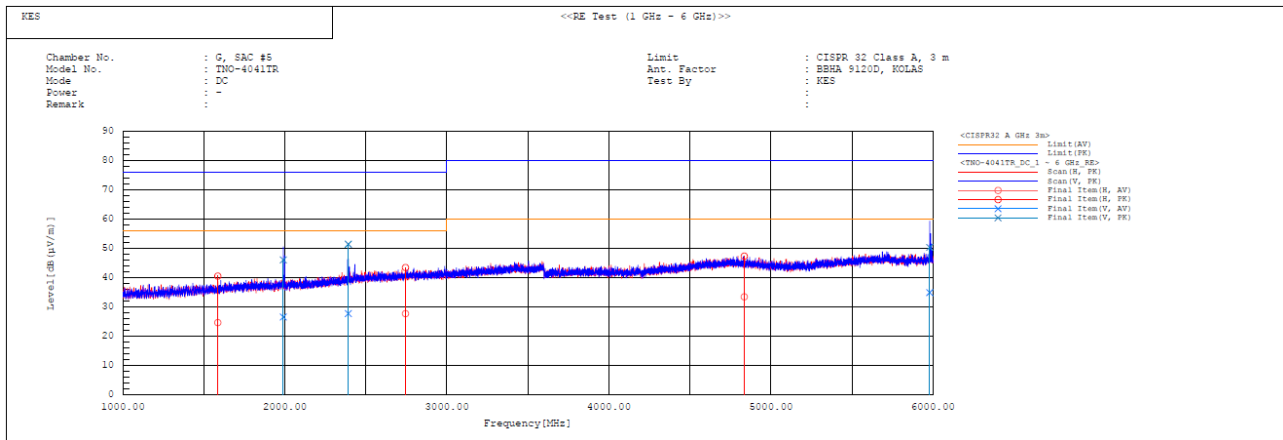
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DC Mode



Final Result

No.	Frequency [MHz]	Pol	Reading AV [dB (μV)]	Reading PK [dB (μV)]	c.f [dB (1/m)]	Result AV [dB (μV/m)]	Result PK [dB (μV/m)]	Limit AV [dB (μV/m)]	Limit PK [dB (μV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [deg]
1	1586.514	H	29.3	45.2	-4.7	24.6	40.5	56.0	76.0	31.4	35.5	100.0	47.9
2	1991.259	V	29.3	48.8	-2.8	26.5	46.0	56.0	76.0	29.5	30.0	100.0	33.8
3	2393.012	V	29.2	52.9	-1.5	27.7	51.4	56.0	76.0	28.3	24.6	100.0	100.0
4	2745.339	H	27.7	43.4	0.0	27.7	43.4	56.0	76.0	28.3	32.6	100.0	158.9
5	4836.612	H	26.8	40.7	6.6	33.4	47.3	60.0	80.0	26.6	32.7	100.0	47.9
6	5981.249	V	26.1	41.5	8.8	34.9	50.3	60.0	80.0	25.1	29.7	100.0	100.0

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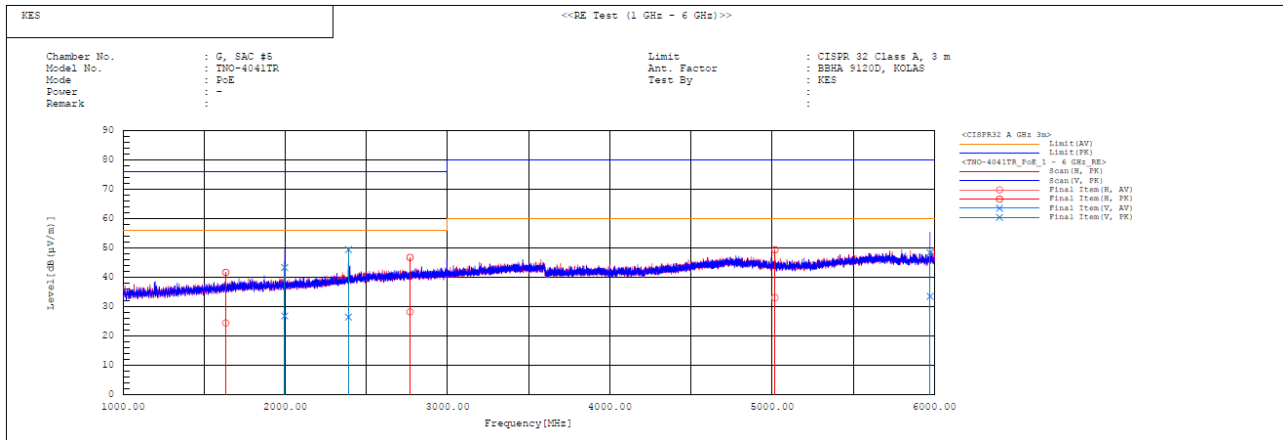
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PoE Mode



Final Result

No.	Frequency [MHz]	Pol	Reading AV [dB (μV)]	Reading PK [dB (μV)]	c.f [dB (1/m)]	Result AV [dB (μV/m)]	Result PK [dB (μV/m)]	Limit AV [dB (μV/m)]	Limit PK [dB (μV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [deg]
1	1634.429	H	28.9	46.1	-4.5	24.4	41.6	56.0	76.0	31.6	34.4	100.0	144.8
2	1997.012	V	29.5	46.0	-2.7	26.8	43.3	56.0	76.0	29.2	32.7	100.0	16.7
3	2390.525	V	27.9	50.9	-1.5	26.4	49.4	56.0	76.0	29.6	26.6	100.0	145.8
4	2769.541	H	28.1	46.6	0.1	28.2	46.7	56.0	76.0	27.8	29.3	100.0	36.6
5	5019.087	H	26.1	42.4	6.9	33.0	49.3	60.0	80.0	27.0	30.7	100.0	122.7
6	5974.084	V	24.8	39.6	8.7	33.5	48.3	60.0	80.0	26.5	31.7	100.0	189.2

◆ Calculation

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

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

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

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

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Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports

■ DC Mode



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Conducted Emissions at Telecommunication Ports

■ DC Mode



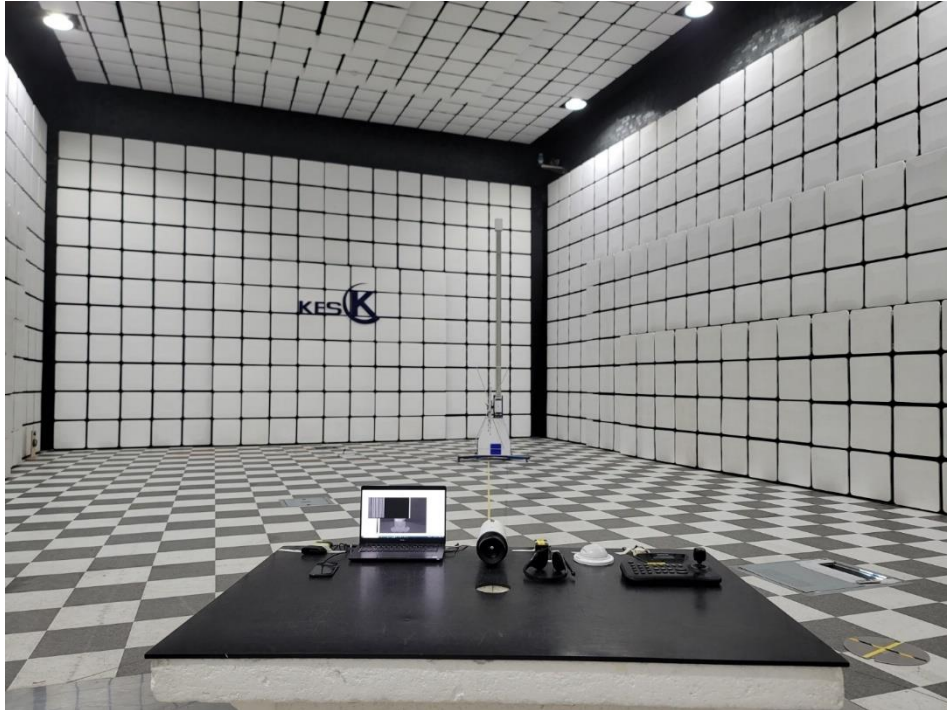
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■ PoE Mode



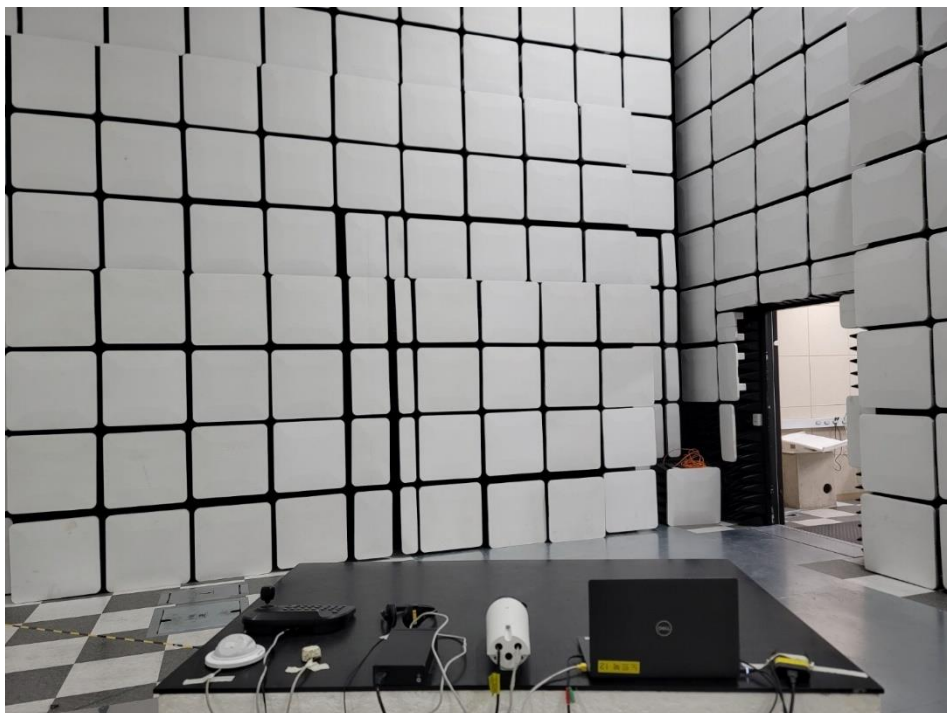
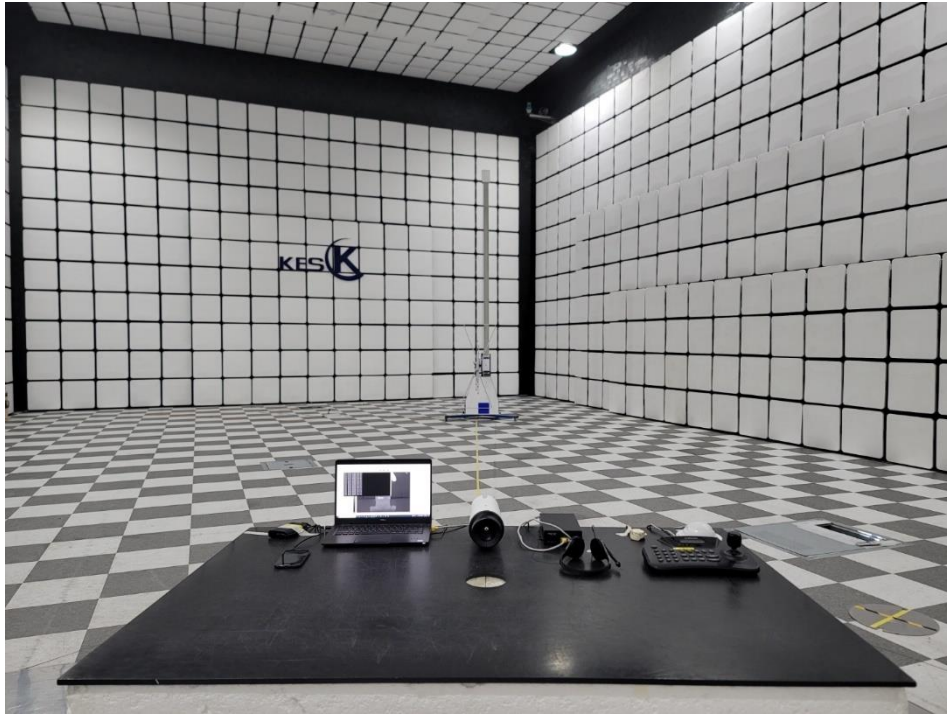
Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode



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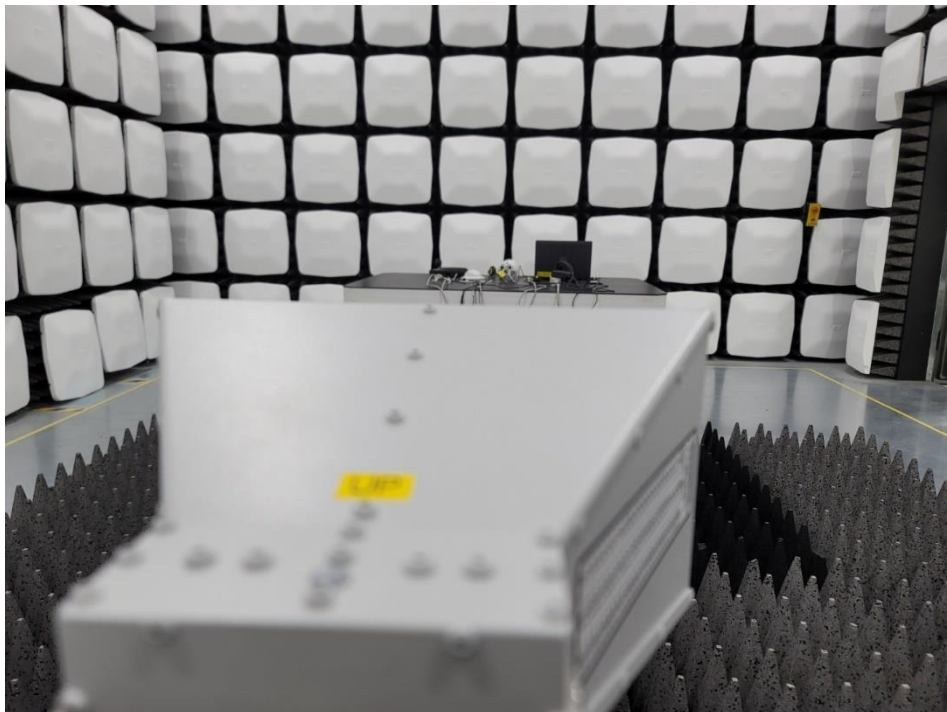
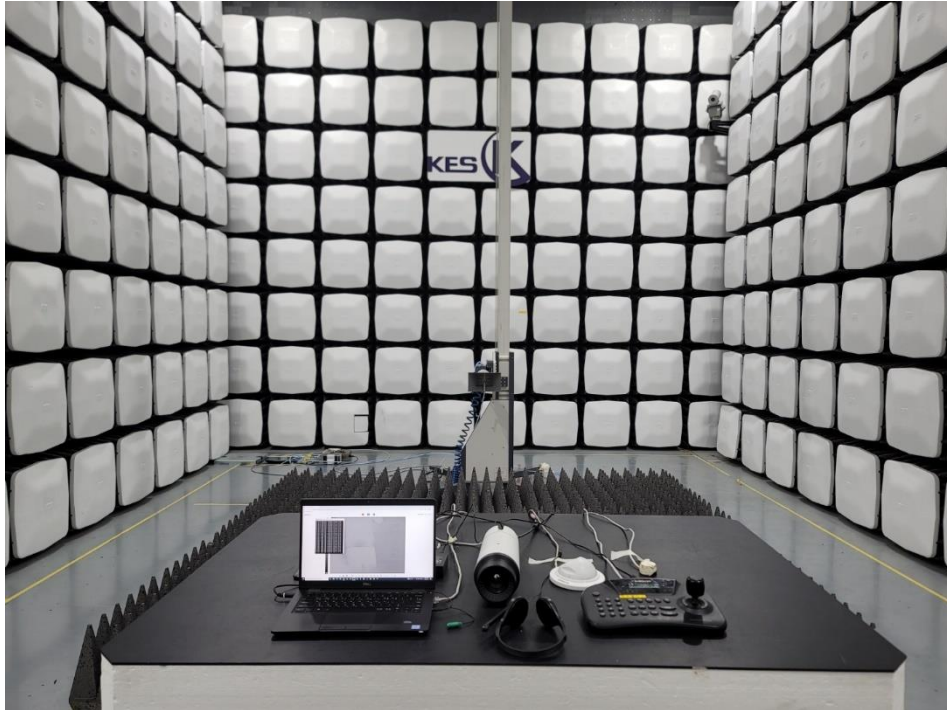
■ PoE Mode



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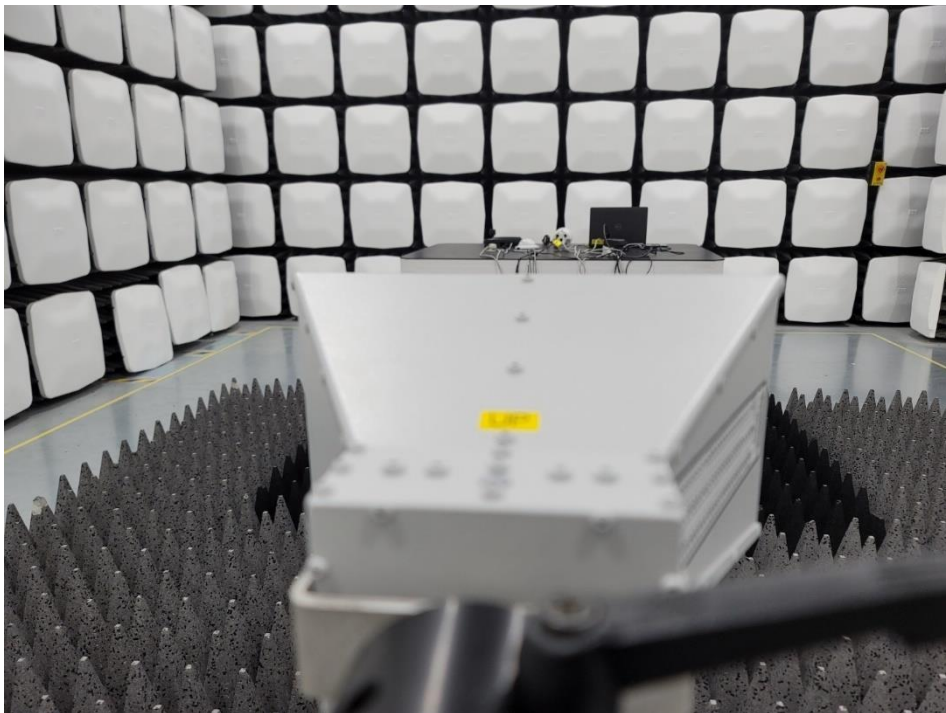
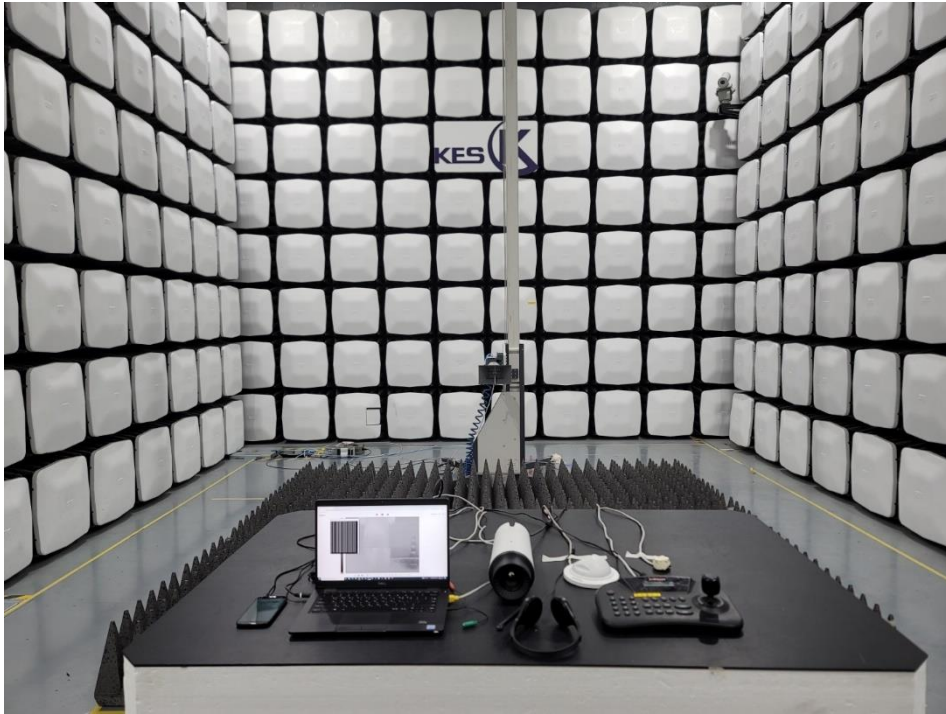
Radiated Electric Field Emissions(Above 1 GHz)

■ DC Mode



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■ PoE Mode



EUT External Photographs

(Top)



(Bottom)



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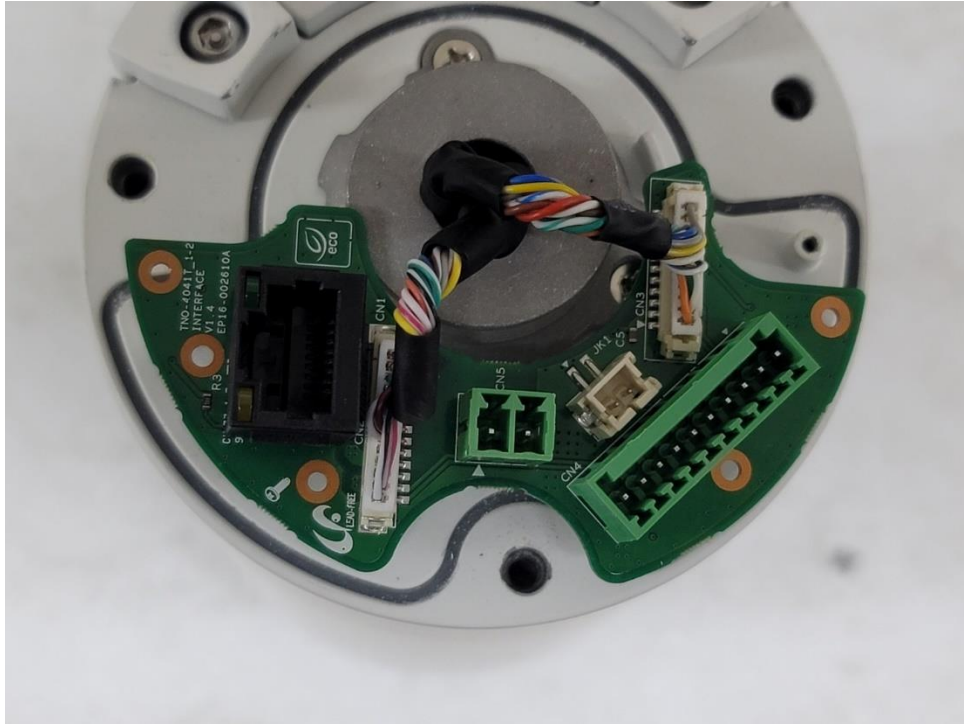
EUT Internal Photographs

(Internal View)



EUT Internal View – Board 1

(Top)



(Bottom)



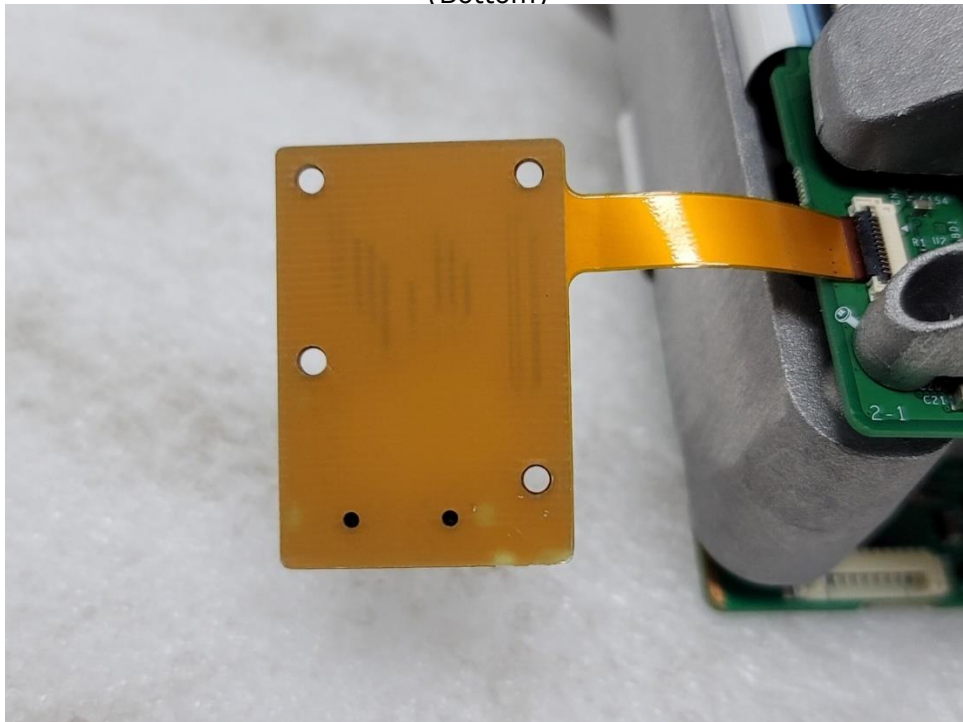
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EUT Internal View – Board 2

(Top)



(Bottom)



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EUT Internal View – Board 3

(Top)



(Bottom)



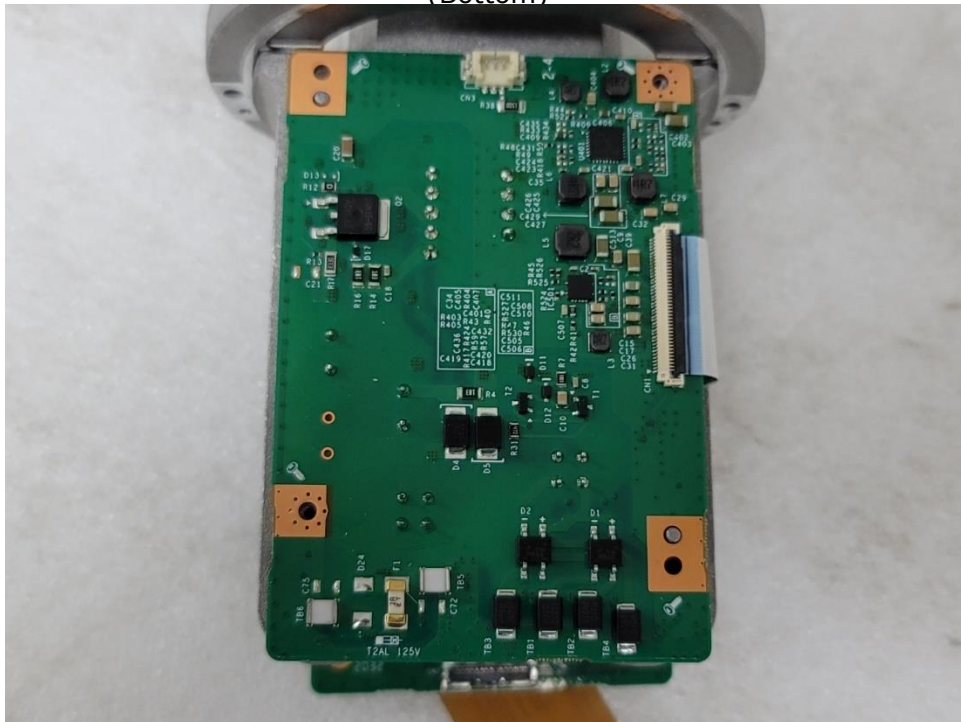
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EUT Internal View – Board 4

(Top)



(Bottom)



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EUT Internal View – Board 5

(Top)



(Bottom)



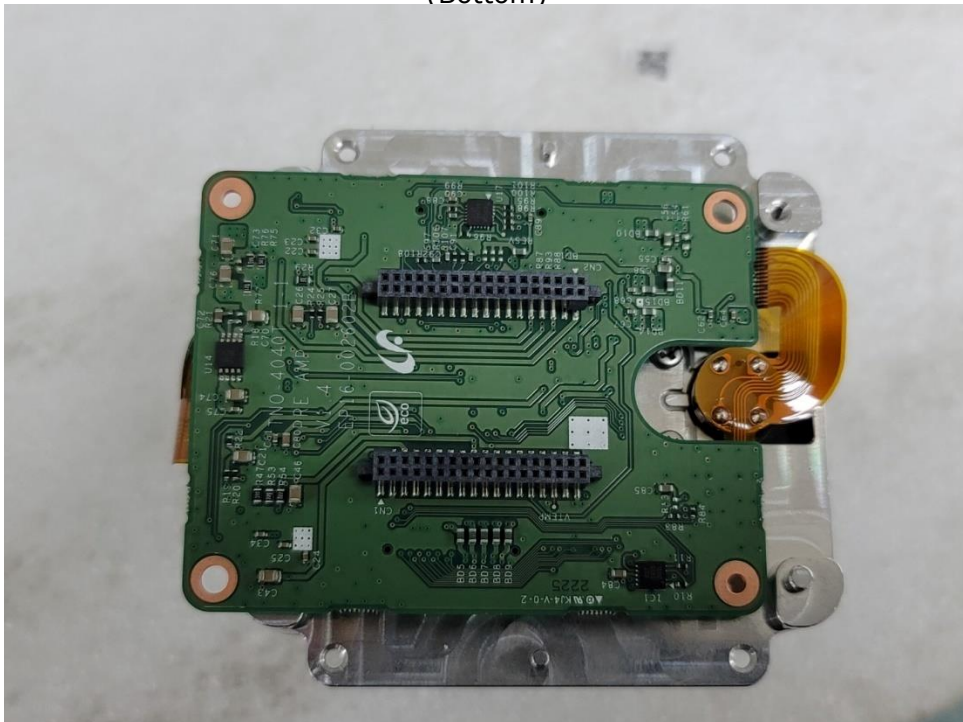
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EUT Internal View – Board 6

(Top)



(Bottom)



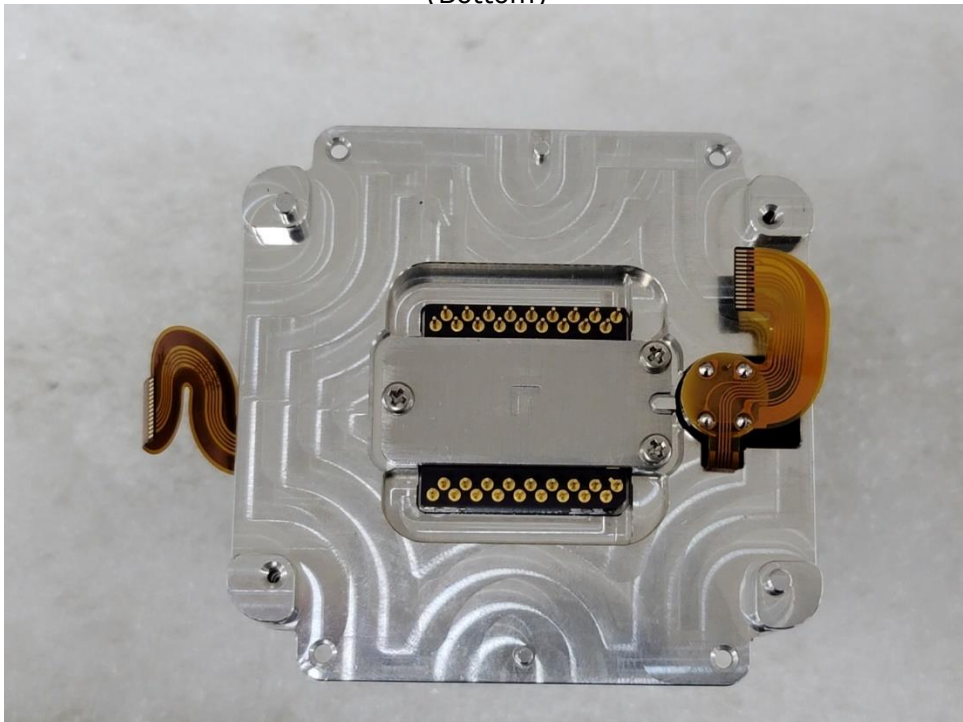
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EUT Internal View – Lens

(Top)

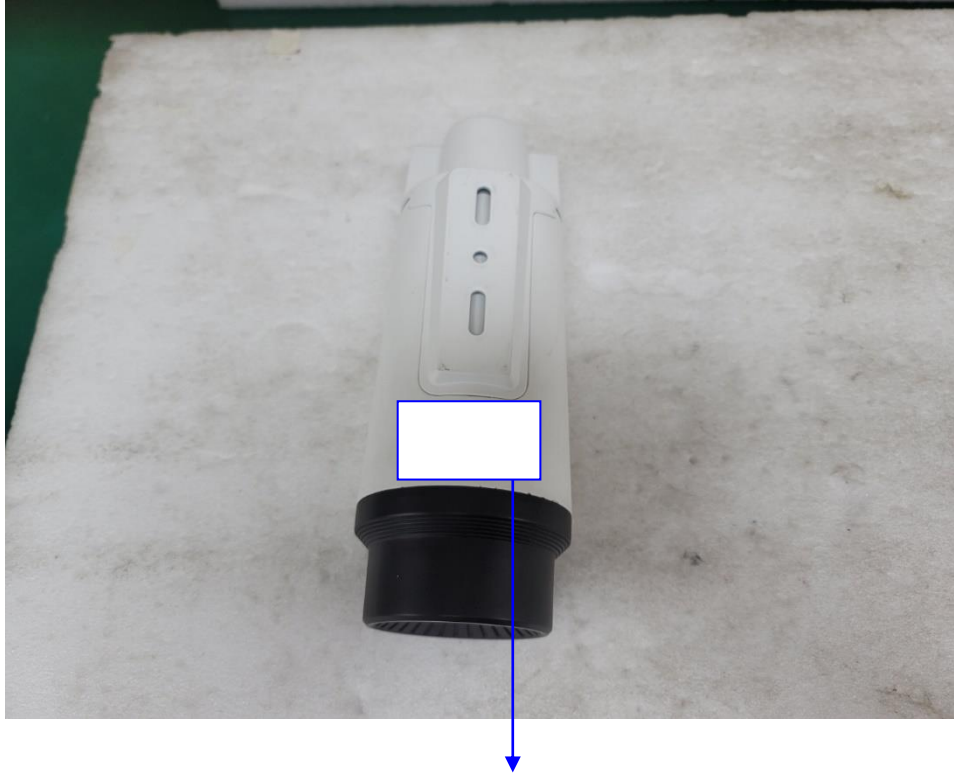


(Bottom)



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