



EMC TEST REPORT For VCCI

Test Report No. : KES-EM-21T0324-R1
Date of Issue : Feb. 24, 2023
Product name : NETWORK CAMERA
Model/Type No. : TNO-7180R
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 : Apr. 12, 2021
Test date : Apr. 20, 2021 ~ Apr. 21, 2021
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

In Han, Kang
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

Tested by In Han, Kang(Retired person)
Proxy signature: Dong Hyun, Won

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
May. 03, 2021	KES-EM-21T0324	Issued
Feb. 24, 2023	KES-EM-21T0324-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	1/1.8" 3MP CMOS
Effective Pixels	2048(H)x1536(V)
Min. Illumination	0.1 Lux (1/30, gain 48dB)
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)	6.8~120mm(18x) motorized varifocal
Max. Aperture Ratio	F1.6(Wide)~F4.13(Tele)
Angular Field of View	H: 58.5°(Wide)~3.7°(Tele)/V: 35.0°(Wide)~2.1°(Tele)
Min. Object Distance	2m
Focus Control	Simple focus, Focus save
Lens Type	DC auto iris
Mount Type	Borad in type
Operational	
IR Viewable Length	50m
License plate capture	vehicel speed : up to 250km/h, lane coverage : up to 2 lane
Camera Title	Displayed up to 85 characters
Day & Night	Auto(ICR)
Backlight Compensation	BLC, SDDR
Wide Dynamic Range	미지원
Digital Noise Reduction	SSNRV
Digital Image Stabilization	미지원 - 변경점 진행
Defog	미지원 - 변경점 진행
Motion Detection	8ea, polygonal zones
Privacy Masking	6ea, Rectangle zones - Color: Grey/Green/Red/Blue/Black/White(AI 카메라 사양 연동)
Gain Control	Support
White Balance	ATW / AWC / Manual / Indoor / Outdoor
LDC	Support
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (2 ~ 1/20,000sec) / Double shutter mode
Digital PTZ	
Video Rotation	Flip, Mirror
Analytics	Defocus detection, Directional detection, Fog detection, Face detection, Motion detection, Digital auto tracking, Appear/Disappear, Enter/Exit, Loitering, Tampering, Virtual line, Audio detection
Business Intelligence	None
Serial Interface	RS-485/422(Samsung-T, Pelco-D/P, Panasonic, Bosch, AD, GE, Vicon, Honeywell)
Alarm I/O	Configurable 4 Port
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
Audio In	Selectable(mic in/line in) Supply voltage: 2.5VDC(4mA), Input impedance: 2K Ohm
Audio Out	Line out, Max.output level: 1Vrms
IR Illuminator (Optional)	

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Network	
Ethernet	RJ-45(10/100/1000BASE-T)
Video Compression	H.265/H.264: Main/Baseline/High, MJPEG
Resolution	3M 2048x1536, 1920x1080, 1280x1024, 1280x960, 1280x720, 1024x768, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360, 320x240 2M 1920x1080, 1280x1024, 1280x960, 1280x720, 1024x768, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360, 320x240
Max. Framerate	H.265/H.264: Max. 60fps/50fps(60Hz/50Hz) MJPEG: Max. 30fps/25fps(60Hz/50Hz)
Smart Codec	Manual(Sea area), WiseStream II
Video Quality Adjustment	H.264/H.265: Target bitrate level control MJPEG: Target bitrate level control
Bitrate Control	H.264/H.265: CBR or VBR MJPEG: VBR
Streaming	Unicast(20 users) / Multicast Multiple streaming (Up to 10 profiles)
Audio Compression(TBD)	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
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) Secure boot TPM
Edge Storage	Micro SD/SDHC/SDXC 1slot (256GB)
Application Programming Interface	ONVIF Profile S/G/T SUNAPI(HTTP API) Wisenet open platform v3.60
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 Explore11, MS Edge, Mozilla Firefox(Window 64bit only), Apple Safari(Mac OS X only)
Memory	2048MB RAM, 256MB Flash

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Environmental	
Operating Temperature / Humidity	Normal : -40°C~+55°(-40°F ~ +131°F) / Intermittent : -40°C~+60°C(-40°F ~ +140°F) Maximum Temperature based on NEMA-TS 2(2.2.7) : +74°C(+165°F) Less than 95% RH(Non-condensing)
Storage Temperature / Humidity	-50°C~+60°C / Less than 95% RH(Non-dondensing)
Certification	IP66, IK10, NEMA 4X, NEMA TS 2(2.2.8, 2.2.9)
Electrical	
Input Voltage	HPoE, 12VDC
Power Consumption	Max 48W
Mechanical	
Color / Material	White
RAL Code	RAL9003
Product dimensions / weight	W186.9 x D293.7 x H259.3 (mm) / 4.8kg

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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
NETWORK CAMERA	TNO-7180R	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT
Fiber PoE Injector	PT-PSE109GBRO- AH-S	-	Dongguan PROCET Network Technology Co.,Ltd	EUT

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1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
AC/DC Adapter	2ACB022F	-	Channel Well Technology(Guangzhou) Co., Ltd.	-
Notebook	P95G001	8KM8HT2	Wistron Infocom (Chengdu) Company Limited	-
Notebook Adapter	LA65NS2-01	-	LITE-ON TECHNOLOGY(CHANGZHOU)CO.,LTD.	-
Alarm	-	-	-	-
Button alarm	-	-	-	-
Smartphone	A1586	-	APPLE .Inc	-
MIC	MP1000	-	-	-
Speaker	BR1000A Cuve Black 2	-	DONGGUAN EDIFIER TECHNOLOGY Co., Ltd	-
Micro SD Card	-	-	SanDisk	16 GB

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1.6 External I/O Cabling

■ DC Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA (EUT)	RJ-45	Notebook	RJ-45	3.0	S
	Alarm OUT	Alarm	Alarm IN	3.0	U
	Alarm IN	Button alarm	Alarm OUT	3.0	U
	Audio IN	MIC	Audio IN	1.4	U
	Audio OUT	Speaker	Audio OUT	1.4	U
	SLOT	Micro SD Card	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 CAMERA (EUT)	RJ-45 (PoE)	Fiber PoE Injector (EUT)	RJ-45 (PoE)	2.5	S
	Alarm OUT	Alarm	Alarm IN	3.0	U
	Alarm IN	Button alarm	Alarm OUT	3.0	U
	Audio IN	MIC	Audio IN	1.4	U
	Audio OUT	Speaker	Audio OUT	1.4	U
	SLOT	Micro SD Card	SLOT	-	-
Notebook	RJ-45 (LAN)	Fiber PoE Injector (EUT)	RJ-45 (LAN)	3.0	S
	3.5 mm	Smartphone	3.5 mm	0.5	U

* Unshielded=U, Shielded=S

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1.7 EUT Operating Mode(s)

■ DC / PoE Mode

Test Mode	operating
OP	the test was conducted while checking the camera video output from the laptop and making sure that they operate normally while performing a ping test.

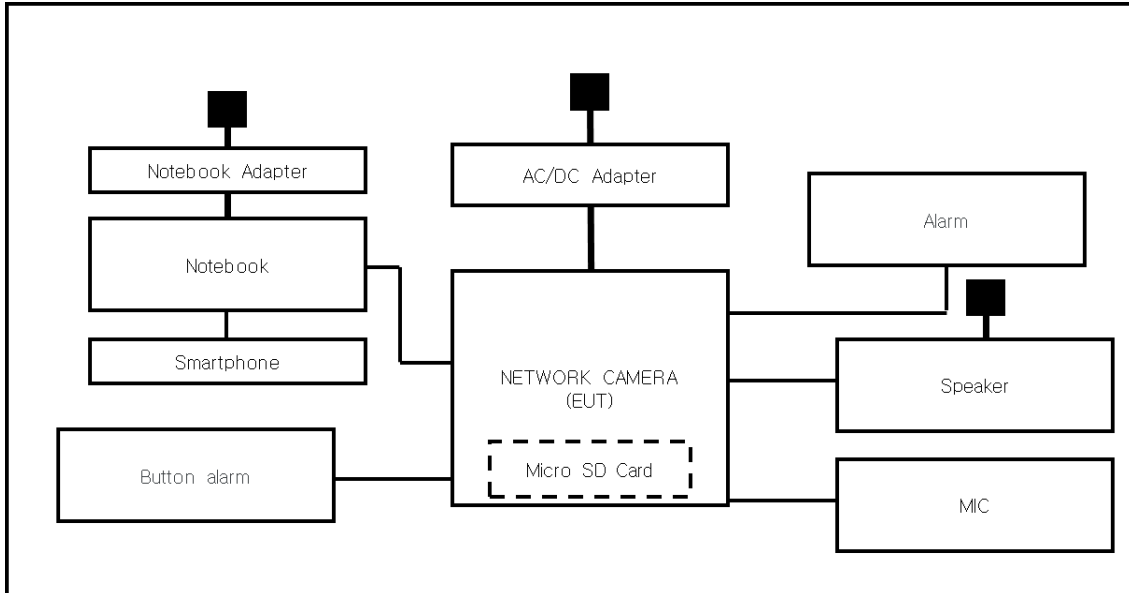
EUT Test operating S/W		
Name	Version	Manufacture Company
Web Viewer	-	Hanwha Vision Co., Ltd

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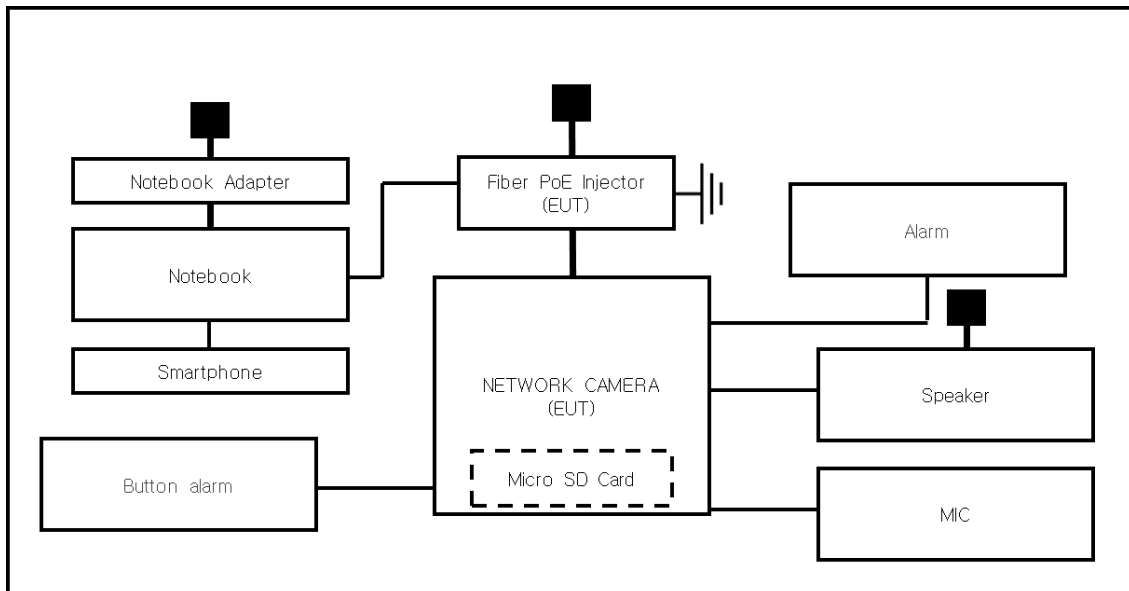
1.8 Configuration

■ AC Main
 □ DC Main

■ DC Mode



■ PoE Mode



1.9 Remarks when standards applied

USB Port and VIDEO 2 PIN Port are for administrator use and are excluded from testing.



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 61547 :2009

☐ EN 55032:2015

☐ Class A

☐ Class B

☐ EN 55024:2010 +A1:2015

☐ EN 50130-4:2011 +A1:2014

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



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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 C63.4-2017 | ☐ Class A | ☐ Class B |
| ☐ IC Regulation ICES-003 Issue 7 | | |
| ☐ CAN/CSA CISPR 32:17 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2017 | ☐ Class A | ☐ Class B |
|
☐ 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 Mains Power Ports

Test Date

Apr. 20, 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: (23,6 ± 0,1) °C

Relative Humidity: (45,4 ± 0,2) % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

2.2 Conducted Emissions at Telecommunication Ports

Test Date

Apr. 20, 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
☒	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	03, 10, 2022

Test Conditions

Temperature: (23,6 ± 0,1) °C

Relative Humidity: (45,4 ± 0,2) % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Apr. 21, 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: (24,2 ± 0,1) °C
Relative Humidity: (46,2 ± 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

Apr. 21, 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: (24,5 ± 0,1) °C

Relative Humidity: (46,1 ± 0,3) % 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

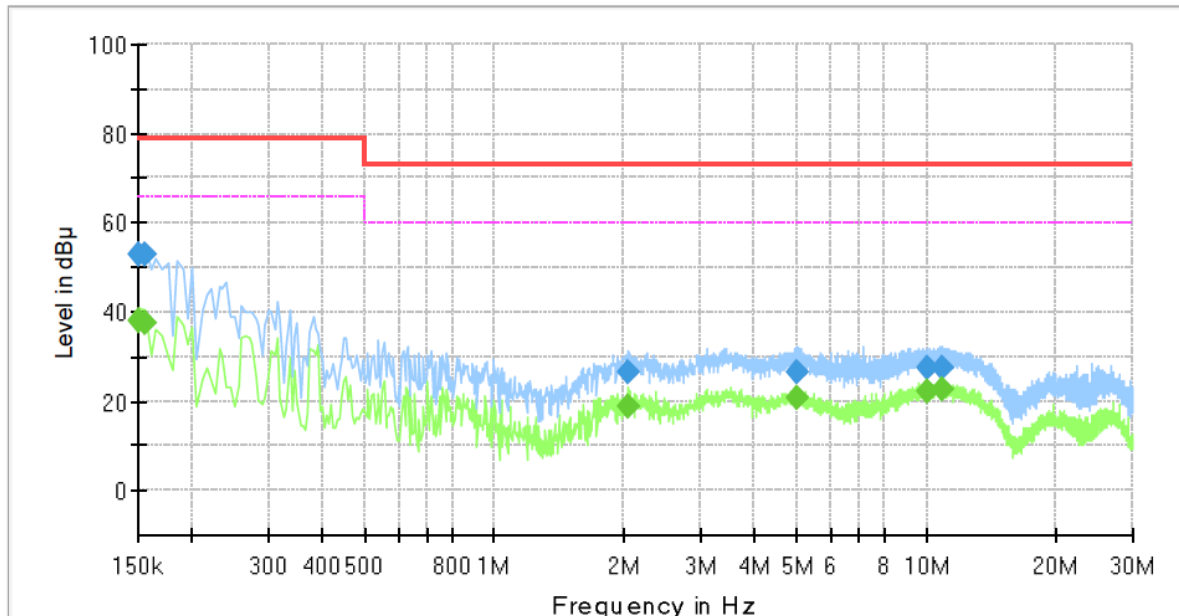
Conducted Emissions at Mains Power Ports

■ DC Mode

HOT LINE

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-7180R
Phase:	L1
Mode:	DC
Operator Name:	KES



Final Result

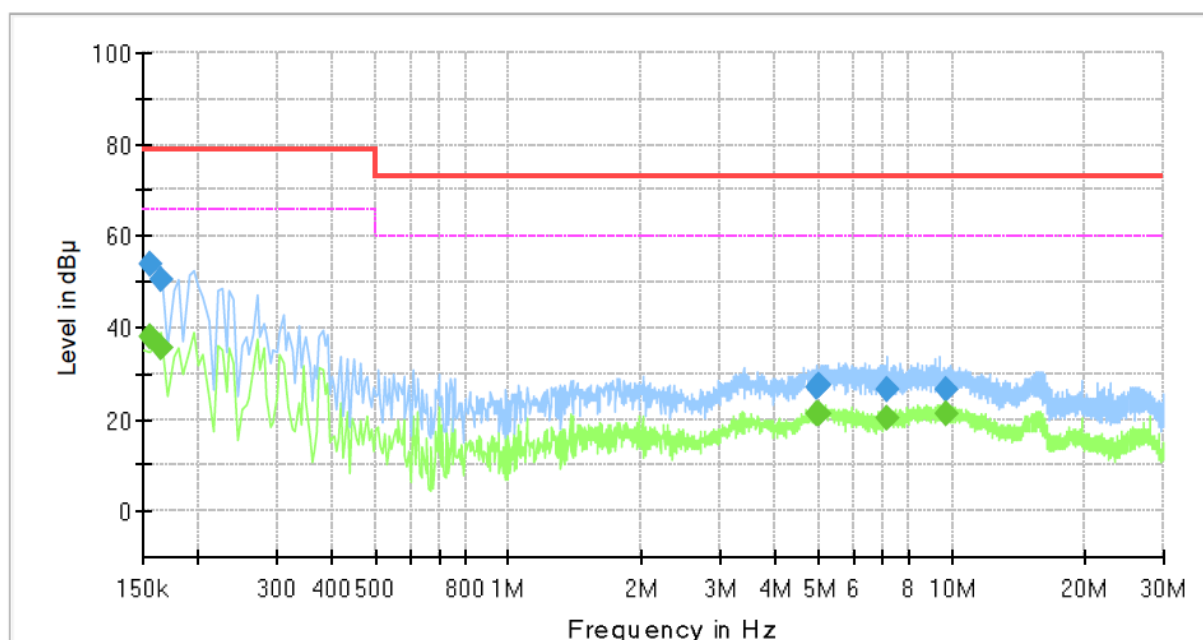
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	---	38.02	66.00	27.98	1000.0	9.000	L1	19.4
0.150000	52.96	---	79.00	26.04	1000.0	9.000	L1	19.4
0.155000	---	37.76	66.00	28.24	1000.0	9.000	L1	19.4
0.155000	53.05	---	79.00	25.95	1000.0	9.000	L1	19.4
2.035000	---	19.00	60.00	41.00	1000.0	9.000	L1	20.3
2.035000	26.62	---	73.00	46.38	1000.0	9.000	L1	20.3
5.040000	---	20.84	60.00	39.16	1000.0	9.000	L1	19.6
5.040000	26.62	---	73.00	46.38	1000.0	9.000	L1	19.6
10.100000	---	22.18	60.00	37.82	1000.0	9.000	L1	19.9
10.100000	27.43	---	73.00	45.57	1000.0	9.000	L1	19.9
10.860000	---	22.52	60.00	37.48	1000.0	9.000	L1	19.9
10.860000	27.44	---	73.00	45.56	1000.0	9.000	L1	19.9

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NEUTRAL LINE

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-7180R
Phase:	N
Mode:	DC
Operator Name:	KES



Final_Result

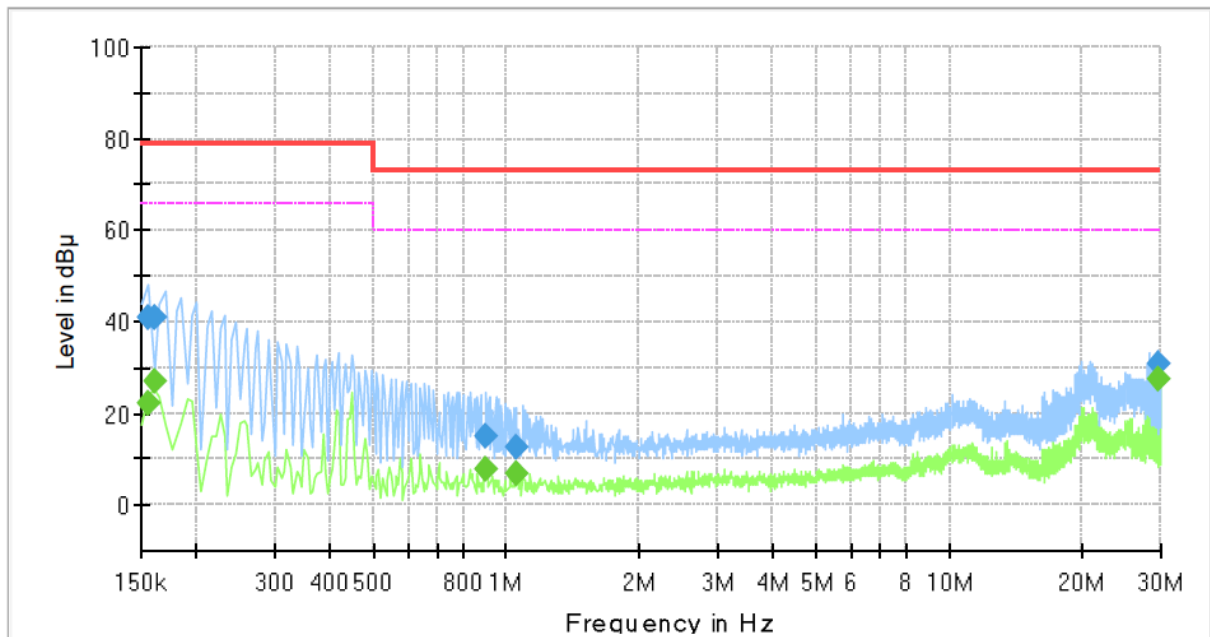
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	38.00	66.00	28.00	1000.0	9.000	N	19.4
0.155000	54.08	---	79.00	24.92	1000.0	9.000	N	19.4
0.165000	---	35.64	66.00	30.36	1000.0	9.000	N	19.4
0.165000	50.69	---	79.00	28.31	1000.0	9.000	N	19.4
4.980000	---	21.11	60.00	38.89	1000.0	9.000	N	19.6
4.980000	27.14	---	73.00	45.86	1000.0	9.000	N	19.6
5.010000	---	21.36	60.00	38.64	1000.0	9.000	N	19.6
5.010000	27.44	---	73.00	45.56	1000.0	9.000	N	19.6
7.130000	---	20.48	60.00	39.52	1000.0	9.000	N	19.5
7.130000	26.49	---	73.00	46.51	1000.0	9.000	N	19.5
9.670000	---	21.42	60.00	38.58	1000.0	9.000	N	19.8
9.670000	26.74	---	73.00	46.26	1000.0	9.000	N	19.8

■ PoE Mode

HOT LINE

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-7180R
Phase:	L1
Mode:	PoE
Operator Name:	KES



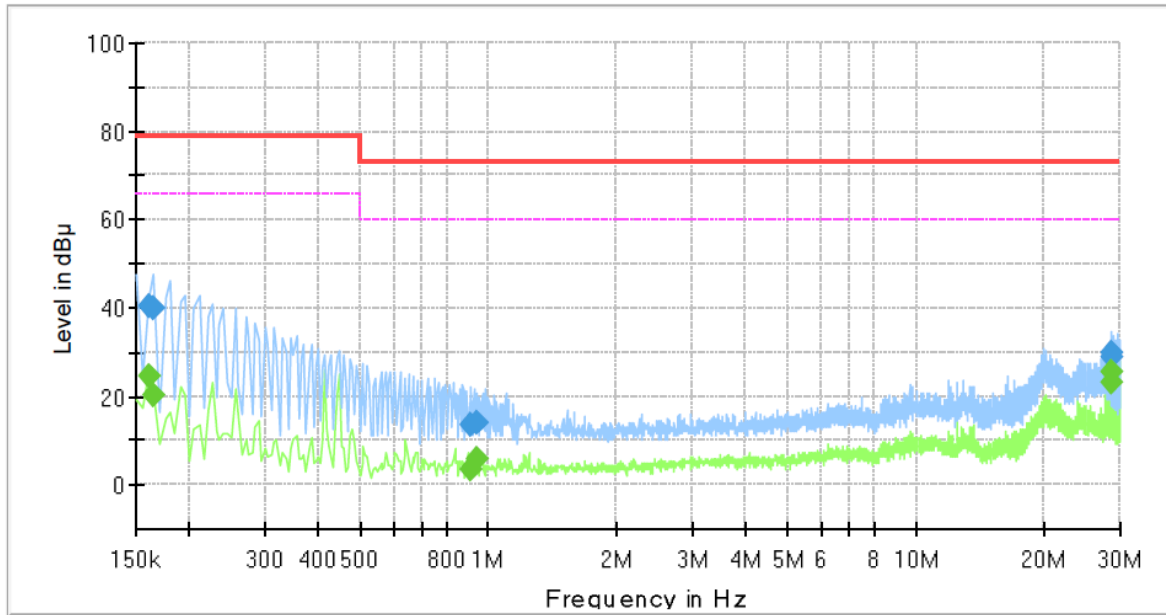
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	22.02	66.00	43.98	1000.0	9.000	L1	19.4
0.155000	41.04	---	79.00	37.96	1000.0	9.000	L1	19.4
0.160000	---	27.01	66.00	38.99	1000.0	9.000	L1	19.4
0.160000	40.69	---	79.00	38.31	1000.0	9.000	L1	19.4
0.900000	---	7.99	60.00	52.01	1000.0	9.000	L1	20.1
0.900000	14.93	---	73.00	58.07	1000.0	9.000	L1	20.1
1.055000	---	6.87	60.00	53.13	1000.0	9.000	L1	20.1
1.055000	12.63	---	73.00	60.37	1000.0	9.000	L1	20.1
29.805000	---	27.39	60.00	32.61	1000.0	9.000	L1	20.4
29.805000	30.78	---	73.00	42.22	1000.0	9.000	L1	20.4

NEUTRAL LINE

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-7180R
Phase:	N
Mode:	PoE
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	---	24.76	66.00	41.24	1000.0	9.000	N	19.4
0.160000	40.56	---	79.00	38.44	1000.0	9.000	N	19.4
0.165000	---	20.14	66.00	45.86	1000.0	9.000	N	19.4
0.165000	40.12	---	79.00	38.88	1000.0	9.000	N	19.4
0.910000	---	3.51	60.00	56.49	1000.0	9.000	N	20.1
0.910000	13.37	---	73.00	59.63	1000.0	9.000	N	20.1
0.935000	---	5.91	60.00	54.09	1000.0	9.000	N	20.0
0.935000	13.83	---	73.00	59.17	1000.0	9.000	N	20.0
28.550000	---	23.22	60.00	36.78	1000.0	9.000	N	20.4
28.550000	28.76	---	73.00	44.24	1000.0	9.000	N	20.4
28.660000	---	25.73	60.00	34.27	1000.0	9.000	N	20.4
28.660000	29.72	---	73.00	43.28	1000.0	9.000	N	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 (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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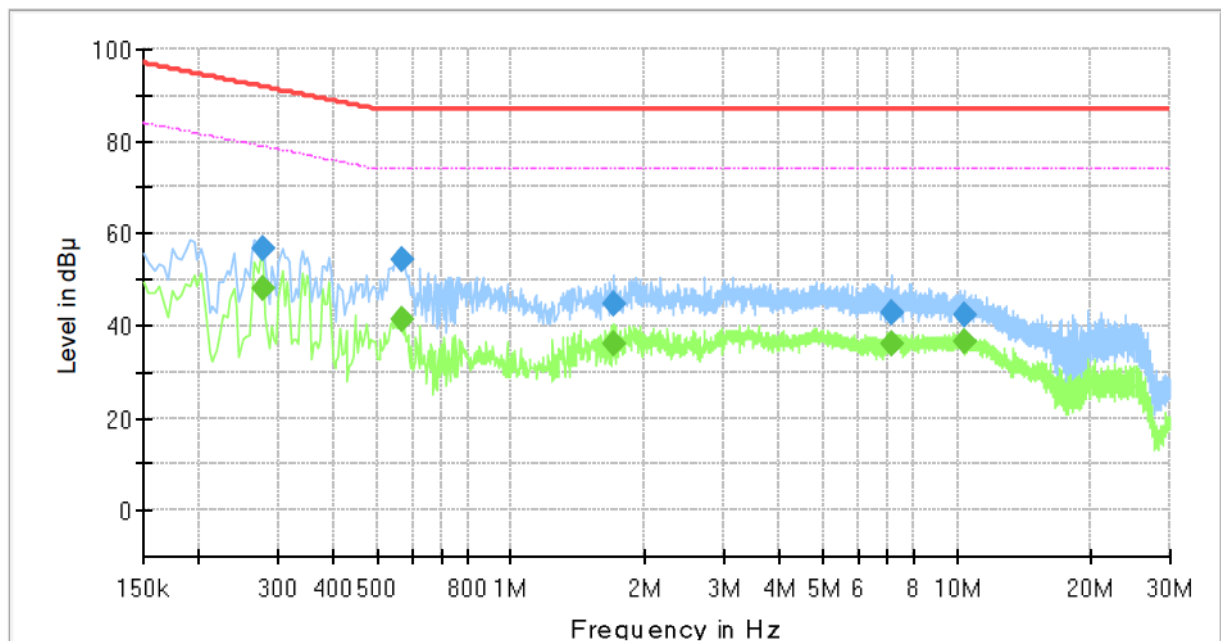
Conducted Emissions at Telecommunication Ports

■ DC Mode

[1 000 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-7180R
Mode :	DC
Speed :	1000 Mbps
Operator Name:	KES

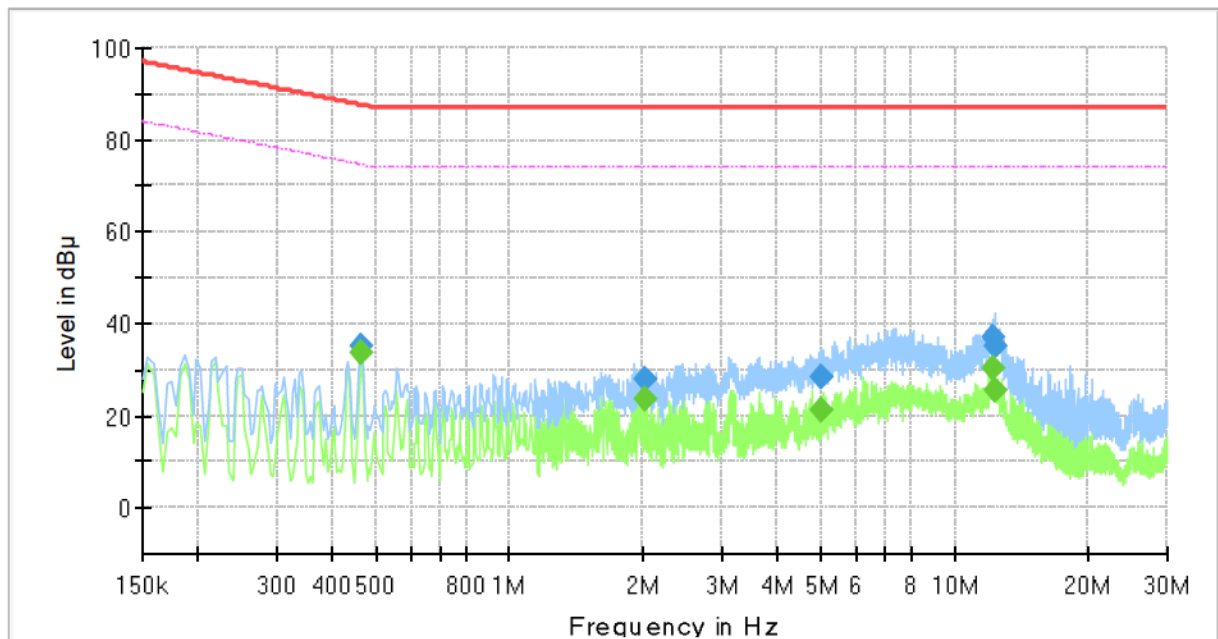


Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.278000	---	48.12	78.88	30.76	1000.0	9.000	Single Line	19.5
0.278000	56.73	---	91.88	35.15	1000.0	9.000	Single Line	19.5
0.566000	---	41.26	74.00	32.74	1000.0	9.000	Single Line	19.7
0.566000	54.31	---	87.00	32.69	1000.0	9.000	Single Line	19.7
1.698000	---	36.35	74.00	37.65	1000.0	9.000	Single Line	20.1
1.698000	44.93	---	87.00	42.07	1000.0	9.000	Single Line	20.1
7.126000	---	36.22	74.00	37.78	1000.0	9.000	Single Line	19.4
7.126000	42.85	---	87.00	44.15	1000.0	9.000	Single Line	19.4
10.374000	---	36.60	74.00	37.40	1000.0	9.000	Single Line	19.8
10.374000	42.13	---	87.00	44.87	1000.0	9.000	Single Line	19.8

PoE Mode
[1 000 Mbps]
Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-7180R
Mode :	PoE(LAN)
Speed :	1000 Mbps
Operator Name:	KES


Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.462000	---	33.68	74.66	40.98	1000.0	9.000	Single Line	19.6
0.462000	35.15	---	87.66	52.51	1000.0	9.000	Single Line	19.6
2.014000	---	23.48	74.00	50.52	1000.0	9.000	Single Line	20.2
2.014000	27.77	---	87.00	59.23	1000.0	9.000	Single Line	20.2
5.042000	---	21.00	74.00	53.00	1000.0	9.000	Single Line	19.5
5.042000	28.59	---	87.00	58.41	1000.0	9.000	Single Line	19.5
12.198000	---	30.54	74.00	43.46	1000.0	9.000	Single Line	19.9
12.198000	37.18	---	87.00	49.82	1000.0	9.000	Single Line	19.9
12.374000	---	25.51	74.00	48.49	1000.0	9.000	Single Line	19.9
12.374000	35.25	---	87.00	51.75	1000.0	9.000	Single Line	19.9

◆ 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))

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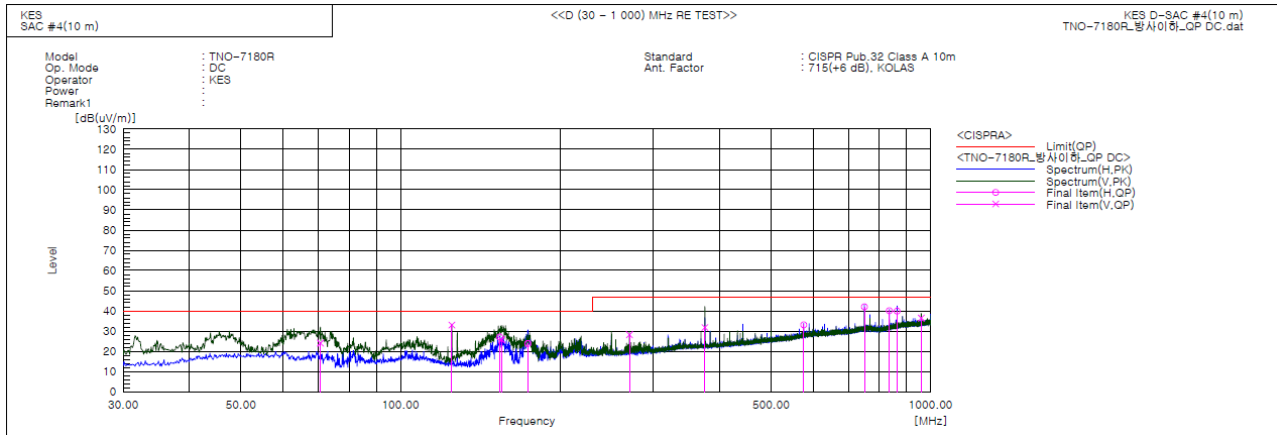
KES Co., Ltd.

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-21T0324-R1
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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	70.619	V	49.2	-25.1	24.1	40.0	15.9	112.0	95.0	
2	124.939	V	57.8	-24.8	33.0	40.0	7.0	115.0	129.0	
3	153.918	H	51.9	-24.9	27.0	40.0	13.0	389.0	338.0	
4	155.130	V	50.5	-24.8	25.7	40.0	14.3	108.0	292.0	
5	173.924	H	47.6	-23.8	23.8	40.0	16.2	397.0	210.0	
6	270.318	V	46.9	-18.7	28.2	47.0	18.8	108.0	196.0	
7	374.956	V	46.6	-14.8	31.8	47.0	15.2	103.0	223.0	
8	575.989	H	42.3	-9.2	33.1	47.0	13.9	245.0	7.0	
9	749.983	H	47.7	-5.7	42.0	47.0	5.0	199.0	313.0	
10	835.585	H	45.5	-5.4	40.1	47.0	6.9	162.0	293.0	
11	864.079	H	44.5	-4.6	39.9	47.0	7.1	188.0	84.0	
12	960.109	V	40.0	-3.5	36.5	47.0	10.5	122.0	102.0	

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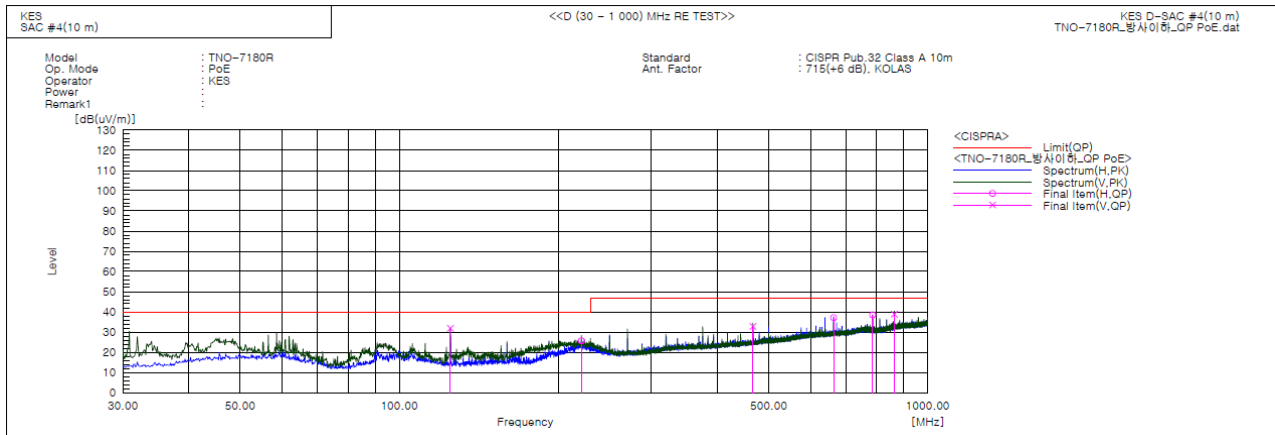
3701, 40, Simin-daero 365beon-gil,
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Report No.:

KES-EM-21T0324-R1

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■ PoE Mode



Final Result

No.	Frequency	(P)	Reading	c.f	Result	Limit	Margin	Height	Angle	Remark
	[MHz]		QP		QP	QP	QP			
			[dB(uV)]	[dB(1/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB]	[cm]	[deg]	
1	124.939	V	56.7	-24.8	31.9	40.0	8.1	102.0	337.0	
2	221.090	H	45.8	-20.1	25.7	40.0	14.3	388.0	110.0	
3	466.985	V	45.4	-12.6	32.8	47.0	14.2	108.0	13.0	
4	663.653	H	44.8	-7.7	37.1	47.0	9.9	169.0	102.0	
5	786.479	H	44.7	-6.2	38.5	47.0	8.5	160.0	288.0	
6	864.079	V	43.5	-4.6	38.9	47.0	8.1	122.0	212.0	

◆ Calculation

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

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

Correction Factor : ANT FACTOR + Cable loss

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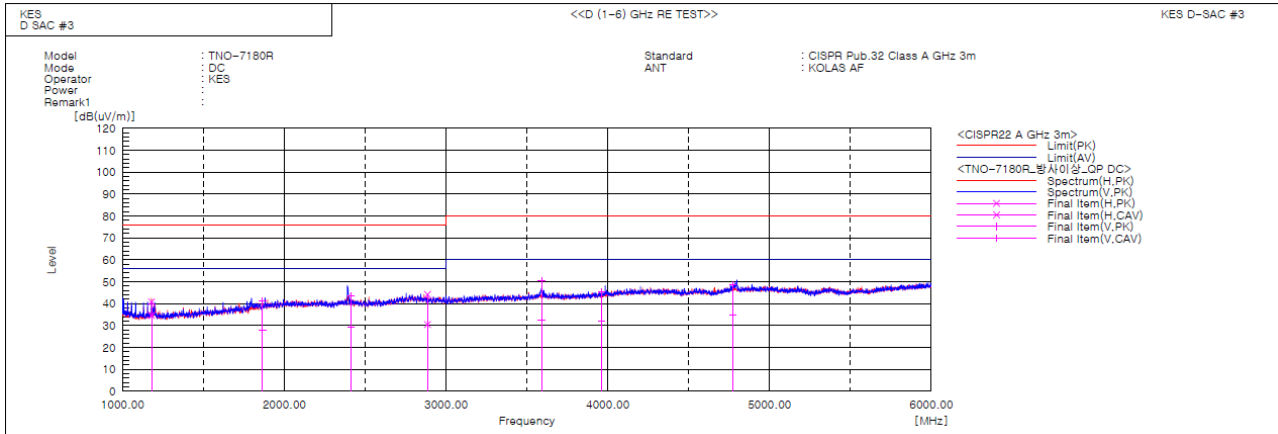
Report No.:

KES-EM-21T0324-R1

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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	1179.580	H	49.3	43.1	-8.5	40.8	34.6	76.0	56.0	35.2	21.4	100.0	333.3	
2	1865.273	V	43.5	29.9	-2.1	41.4	27.8	76.0	56.0	34.6	28.2	100.0	182.4	
3	2413.815	V	43.4	29.0	0.2	43.6	29.2	76.0	56.0	32.4	26.8	100.0	27.0	
4	2885.936	H	42.0	28.3	2.2	44.2	30.5	76.0	56.0	31.8	25.5	100.0	49.3	
5	3590.540	V	46.1	28.1	4.2	50.3	32.3	80.0	60.0	29.7	27.7	100.0	295.6	
6	3962.954	V	40.1	26.4	5.4	45.5	31.8	80.0	60.0	34.5	28.2	100.0	164.5	
7	4774.245	V	40.4	26.3	8.4	48.8	34.7	80.0	60.0	31.2	25.3	100.0	9.6	

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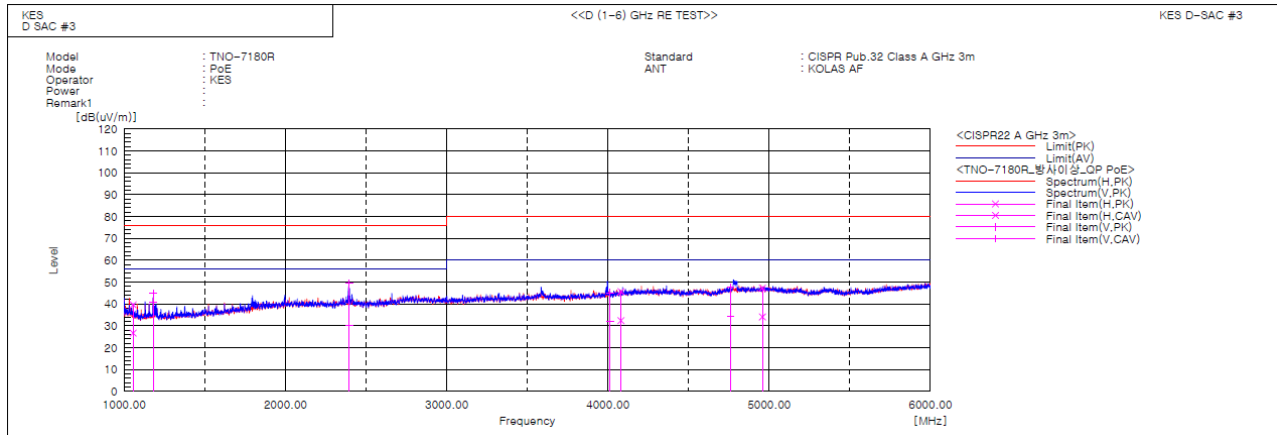
3701, 40, Simin-daero 365beon-gil,
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PoE Mode



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Result CAV [dB(μV/m)]	Limit PK [dB(μV/m)]	Limit AV [dB(μV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1055.875	H	48.7	35.8	-9.1	39.6	26.7	76.0	56.0	36.4	29.3	100.0	349.9	
2	1179.600	V	53.3	49.4	-8.5	44.8	40.9	76.0	56.0	31.2	15.1	100.0	3.3	
3	2396.309	V	49.5	29.9	0.2	49.7	30.1	76.0	56.0	26.3	25.9	100.0	4.5	
4	4014.026	V	39.4	26.2	5.8	45.2	32.0	80.0	60.0	34.8	28.0	100.0	41.7	
5	4080.999	H	39.3	26.1	6.3	45.6	32.4	80.0	60.0	34.4	27.6	100.0	357.1	
6	4759.364	V	39.3	26.1	8.3	47.6	34.4	80.0	60.0	32.4	25.6	100.0	47.4	
7	4958.748	H	38.3	25.1	9.0	47.3	34.1	80.0	60.0	32.7	25.9	100.0	332.8	

◆ 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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■ PoE Mode



Conducted Emissions at Telecommunication Ports

■ DC Mode



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■ PoE Mode

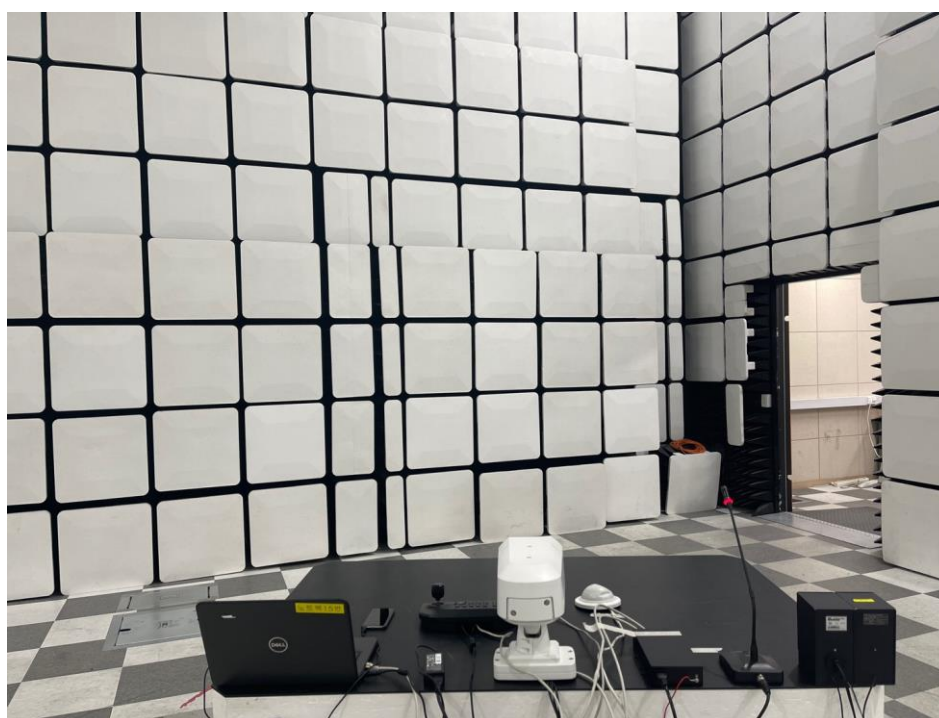


Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode



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■ PoE Mode

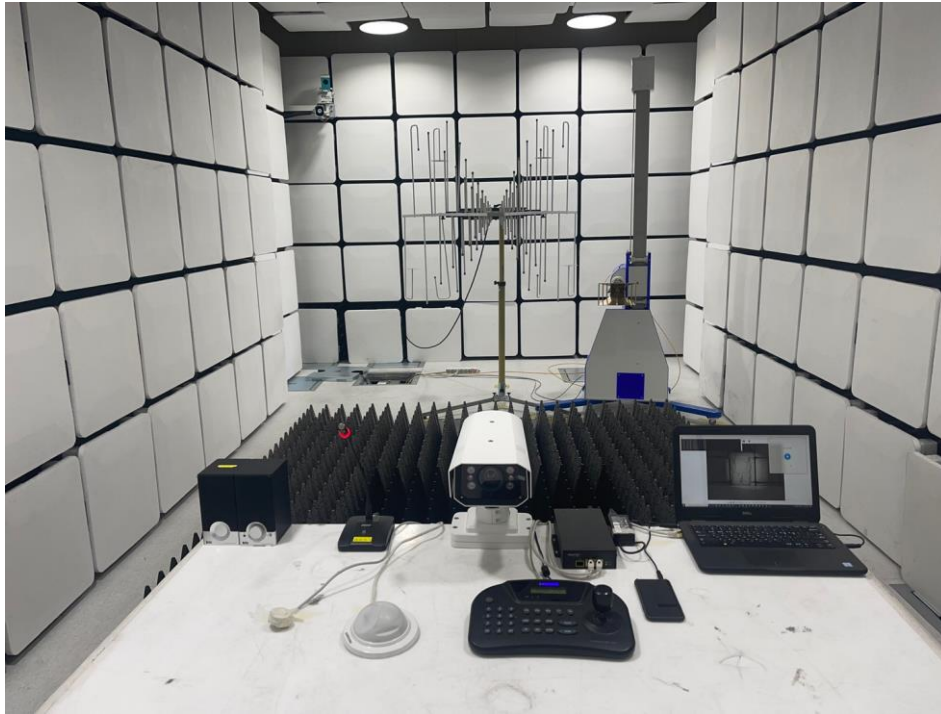
Radiated Electric Field Emissions(Above 1 GHz)

■ DC Mode



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■ PoE Mode



EUT External Photographs

(Top)



(Bottom)



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EUT Internal Photographs

(Internal View)

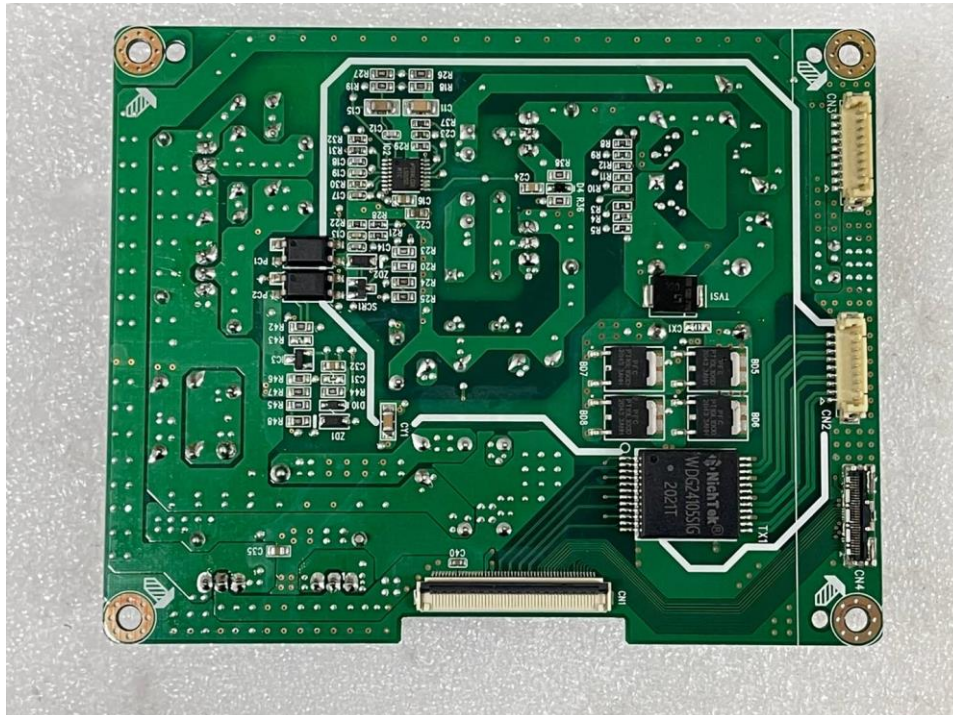


EUT Internal View – Board 1

(Top)



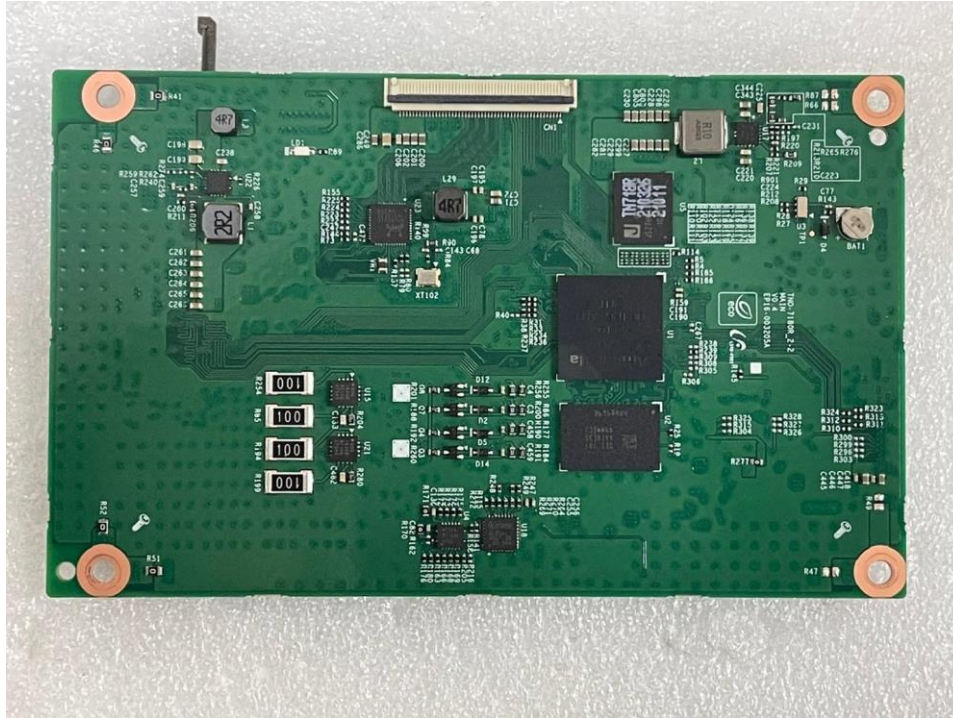
(Bottom)



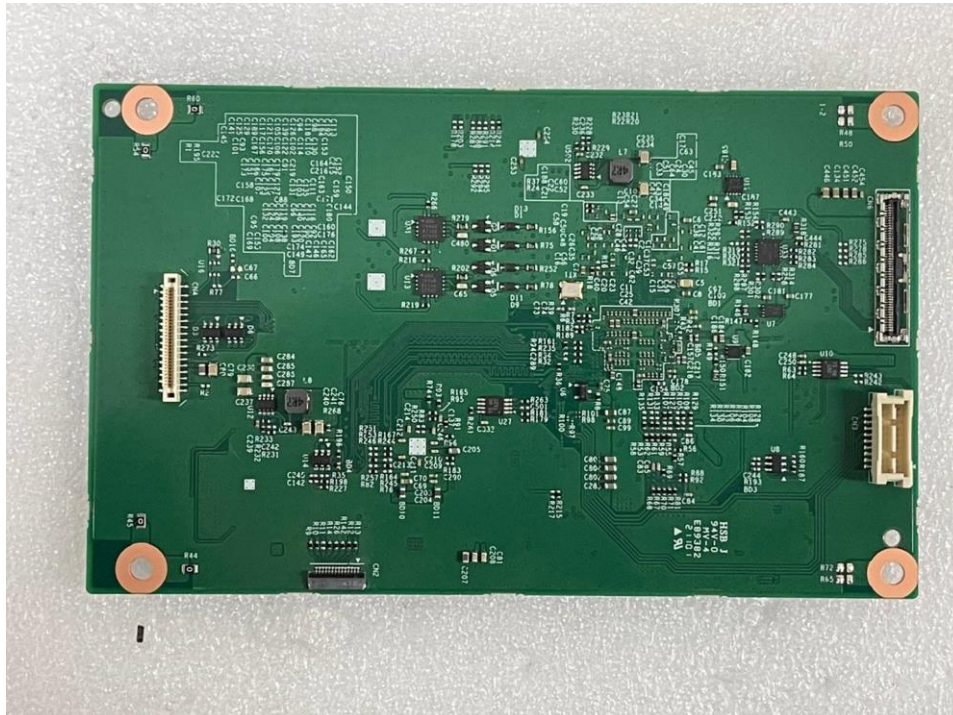
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EUT Internal View – Board 2

(Top)



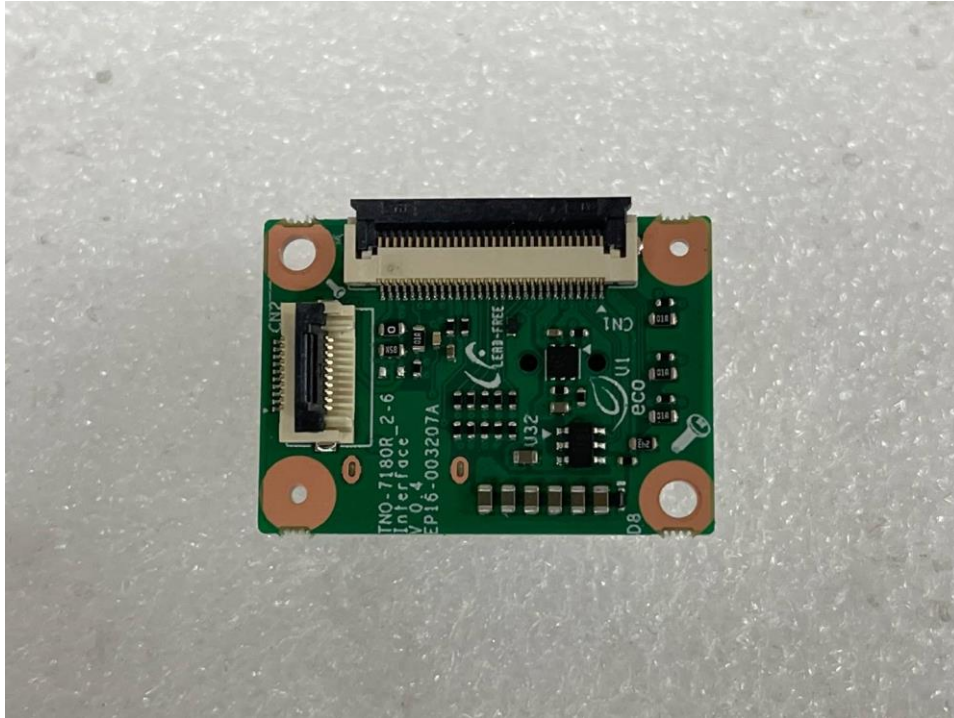
(Bottom)



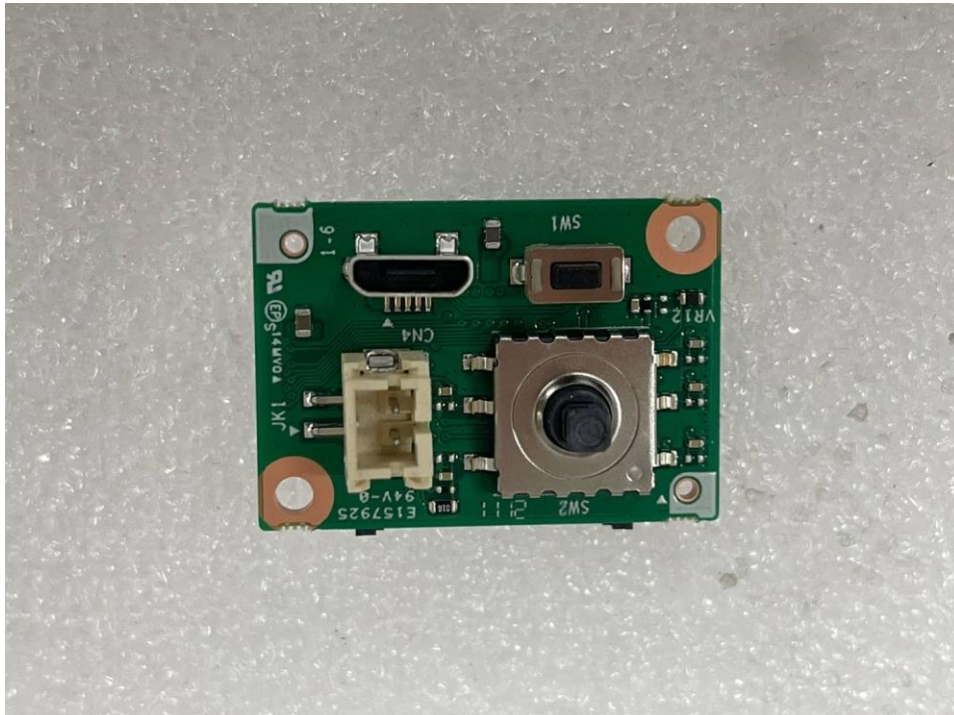
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EUT Internal View – Board 3

(Top)

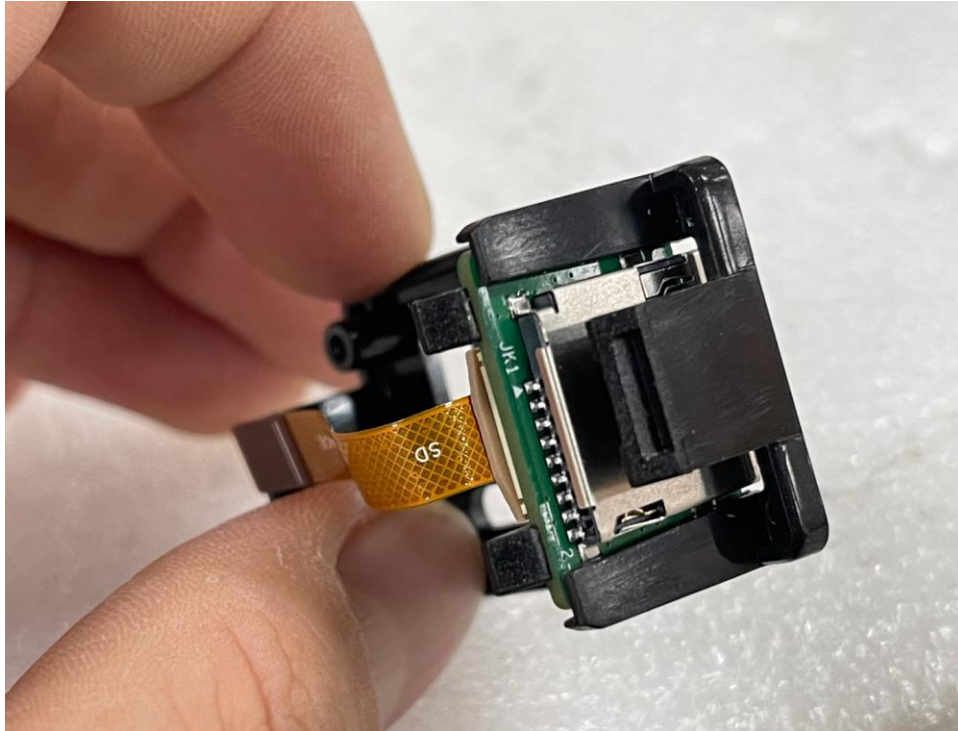


(Bottom)



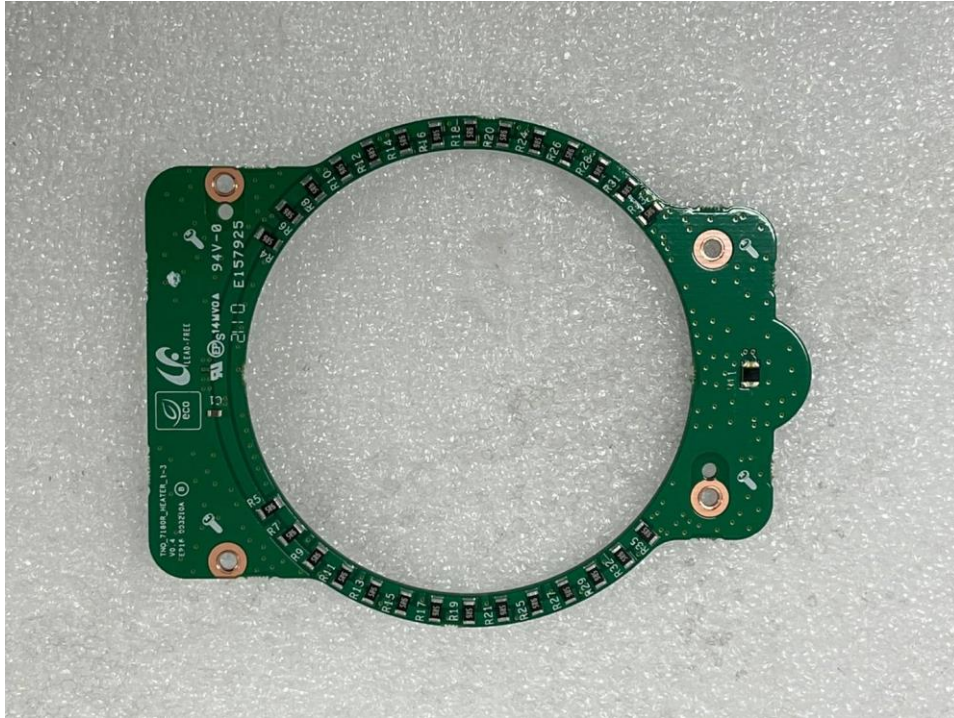
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EUT Internal View – Board 4

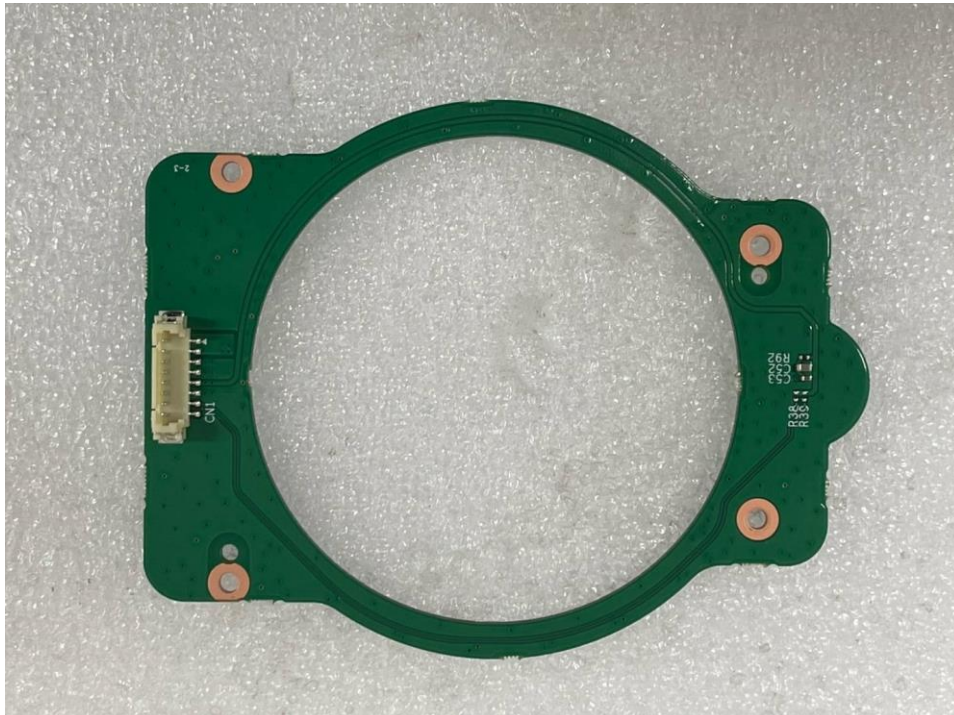


EUT Internal View – Board 5

(Top)

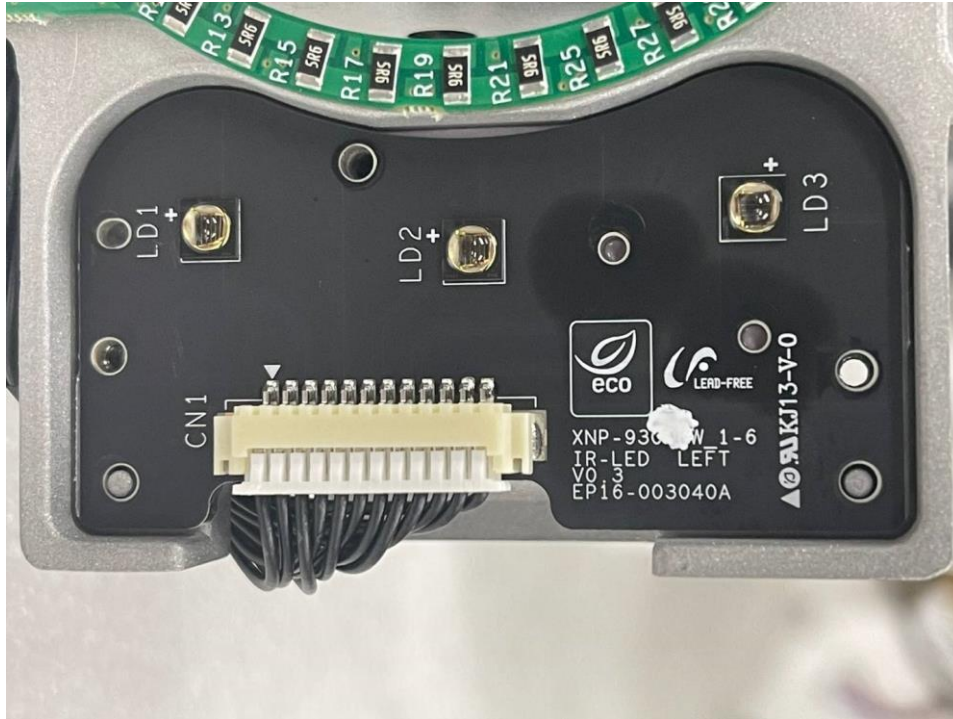


(Bottom)

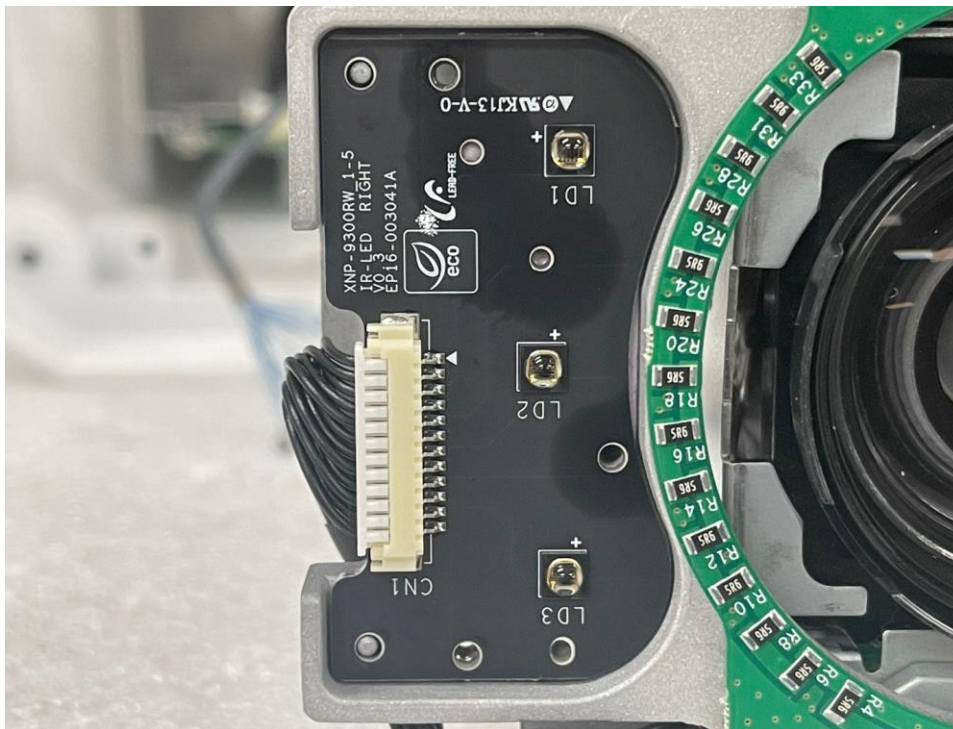


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EUT Internal View – Board 6



EUT Internal View – Board 6



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EUT Internal View – Board 8

(Top)

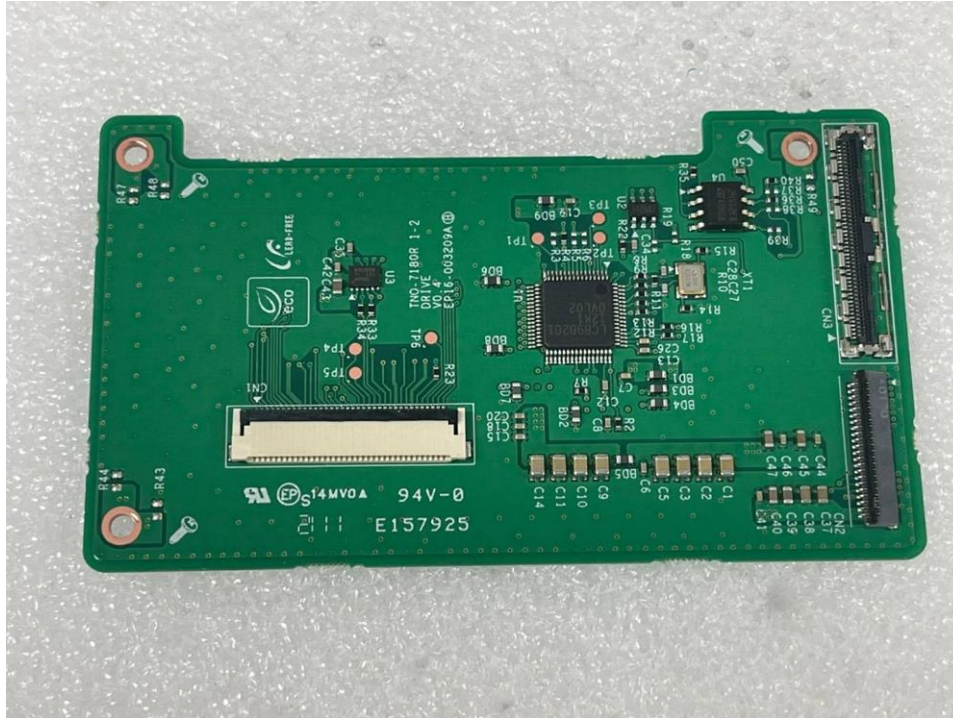


(Bottom)

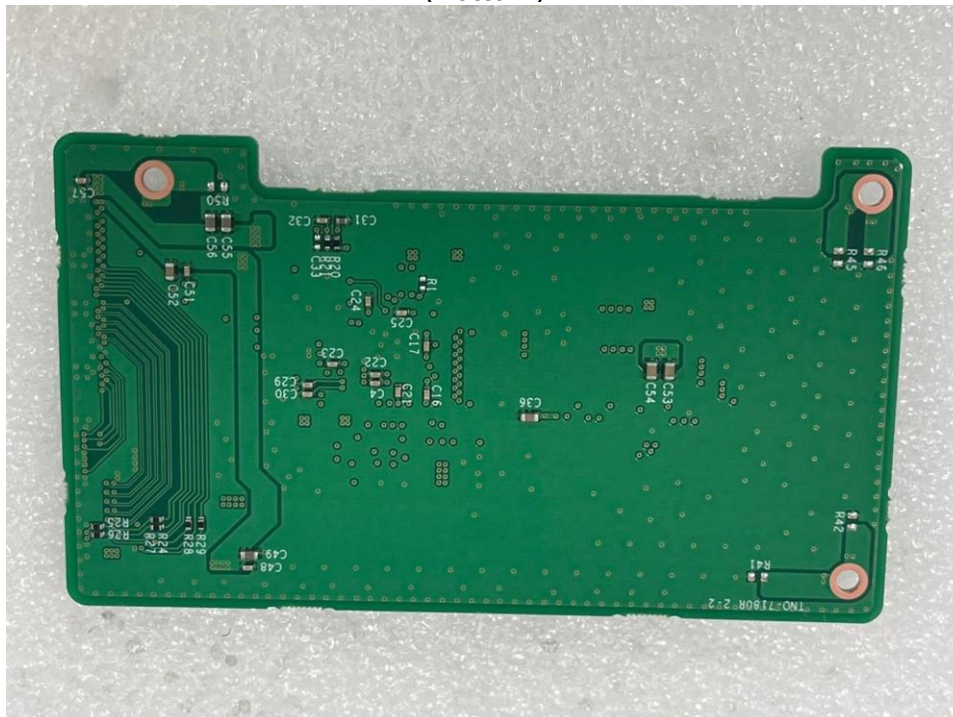


EUT Internal View – Board 9

(Top)



(Bottom)



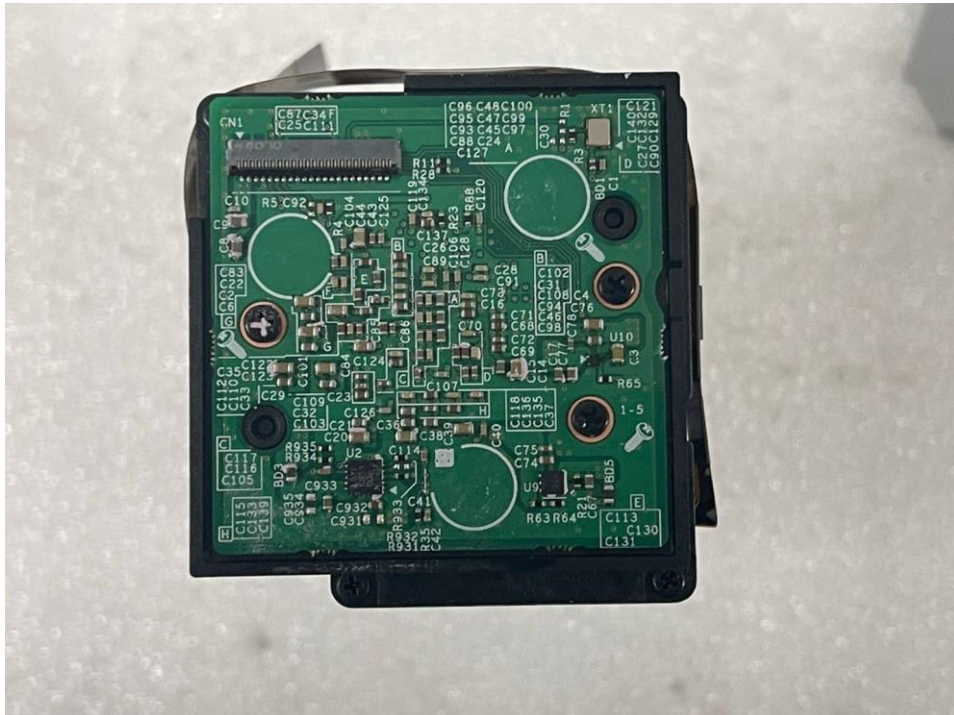
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EUT Internal View – Board 10

(Top)



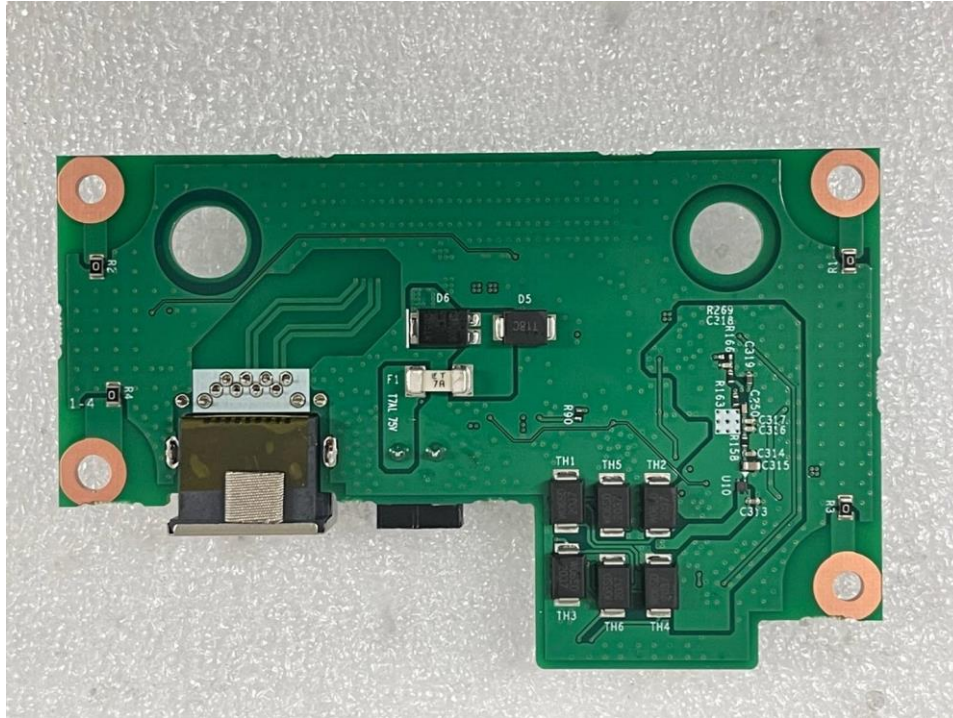
(Bottom)



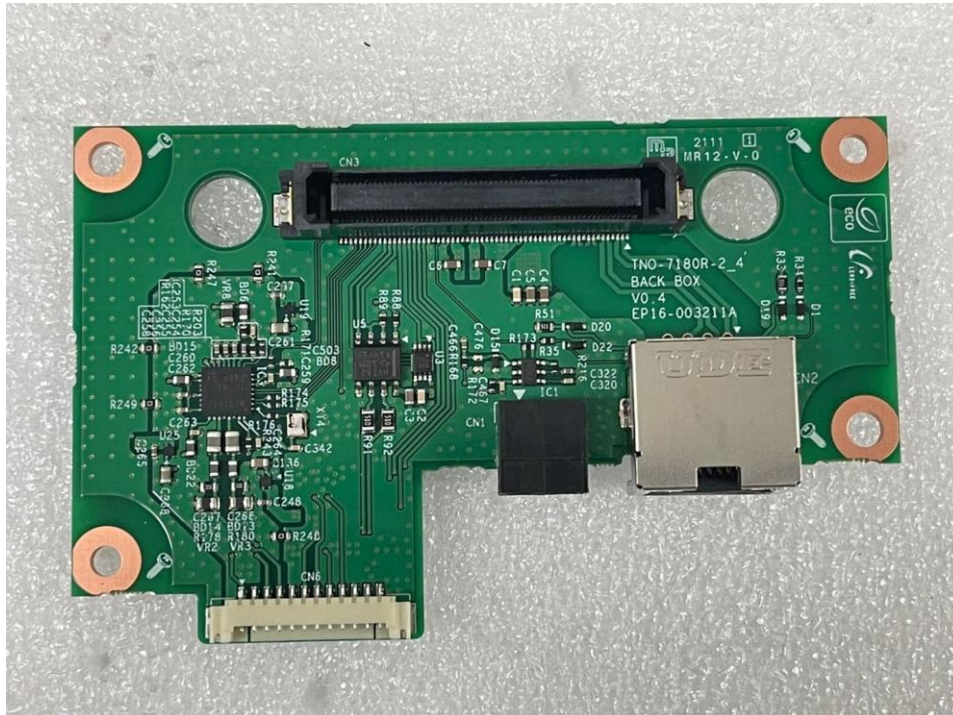
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EUT Internal View – Board 11

(Top)

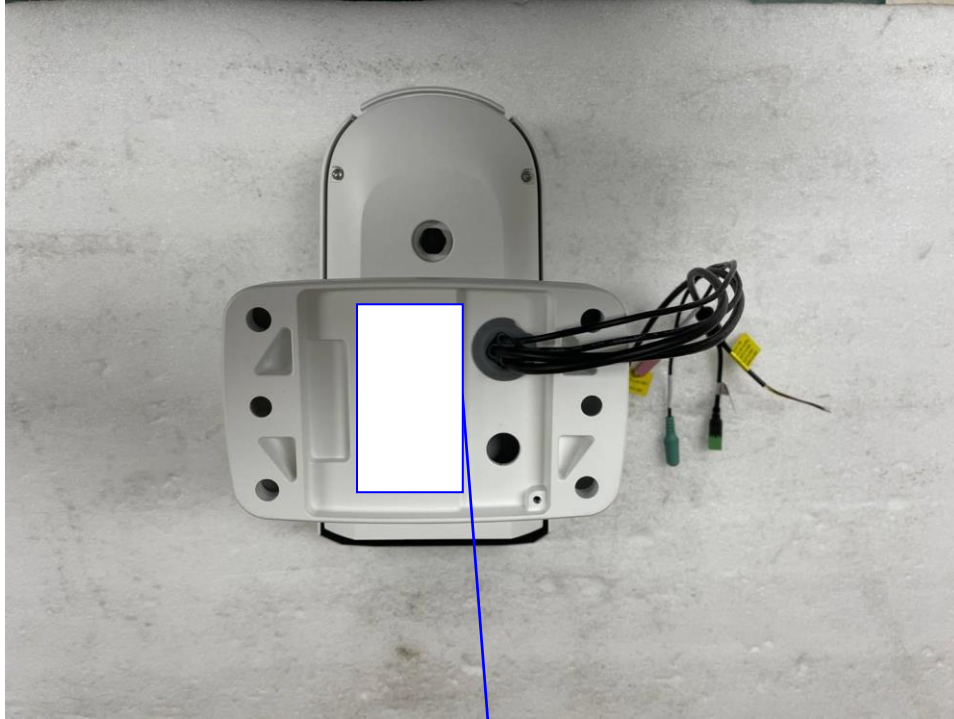


(Bottom)



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