

**KES Co., Ltd.**

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Report No.:

KES-EM-22T0930-R1

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EMC TEST REPORT For RCM

Test Report No. : KES-EM-22T0930-R1
Date of Issue : Feb. 24, 2023
Product name : ANPR CAMERA
Model/Type No. : TNO-7180RLP
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 : Nov. 04, 2022
Test date : Nov. 14, 2022
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Jae Won, Lee
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
Nov. 23, 2022	KES-EM-22T0930	Issued
Feb. 24, 2023	KES-EM-22T0930-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
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	3M: H.265/H.264: Max. 55fps/50fps(55Hz/50Hz), MJPEG: Max. 5fps(55Hz/50Hz) 2M: H.265/H.264: Max. 60fps/50fps(60Hz/50Hz), MJPEG: Max. 5fps (60Hz/50Hz)
NETD	none
Pixel Size	none
Min. Illumination	Color 0.1 Lux (1/30sec, 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
Video Transmission Distance	none
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: 54.5°(Wide)~3.4°(Tele)/V: 42.3°(Wide)~2.5°(Tele)
Min. Object Distance	2m
Focus Control	Simple focus, Focus save
Lens Type	DC auto iris
Mount Type	Board in type
Optional Lens	none
Pan / Tilt / Rotate	
Pan / Tilt / Rotate Range	None
Pan Range	None
Pan Speed	None
Tilt Range	None
Tilt Speed	None
Rotate Range	None
Sequence	None
Preset Accuracy	None
Operational	
Camera Title	Displayed up to 85 characters
Direction Indicator	none
Day & Night	Auto(ICR)

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Backlight Compensation	BLC, SDR
Wide Dynamic Range	none
Digital Noise Reduction	SSNR V
Digital Image Stabilization	not support
Defog	Not Support
Motion Detection	8ea, polygonal zones
Privacy Masking	6ea, Rectangle zones - Color: Grey/Green/Red/Blue/Black/White
Gain Control	Support
White Balance	ATW / AWC / Manual / Indoor / Outdoor
LDC	Not Support
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (1/25 ~ 1/12,000sec) / Double shutter mode
Digital PTZ	none
Video Rotation	Flip, Mirror
Analytics	Directional detection, Motion detection, Appear/Disappear, Enter/Exit, Loitering, Tampering, Virtual line
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 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 Viewable Length	50m
IR Illuminator (Optional)	none
Water Removal	None
Auto Tracking	None
Coaxial Protocol	None
Color Palettes	None
Radiometry	
Temperature detect range	None
Temperature accuracy	None
Temperature detection	None
Additional	None

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Network	
Ethernet	RJ-45(10/100/1000BASE-T)
Video Compression	H.265/H.264: Main/Baseline/High, MJPEG
Audio Compression	none
Smart Codec	Manual(5ea area), WiseStreamII
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)
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) Device Certificate(Hanwha Techwin root CA) Secure boot TPM
Application Programming Interface	ONVIF Profile S/G/T SUNAPI(HTTP API) Wisenet open platform v3.60
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	2048MB RAM, 256MB Flash

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Environmental & Electrical		
Operating Temperature / Humidity	Normal : -40°C~-+55°(-40°F ~ +131°F) / Intermittent : -40°C~-+60°C(-40°F ~ +140°F) Cold start : -40°C 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)	
Input Voltage	HPoE, 12VDC	
Power Consumption	PoE : Max 50W, Typical 27W 12VDC : Max 47.5W, Typical 25W	
Mechanical		
Color / Material	White	
RAL Code	RAL9003	
Product dimensions / weight	W186.9 x D293.7 x H259.3 (mm) / 4.8kg	
Compatible Conduit hole / Gangbox	None	
Hanging mount(Dome)	None	
Skin cover(Dome)	None	
Weather cap(Dome)	None	
Power module	None	
Backbox	None	
DORI (EN62676-4 standard)		
Detect (25PPM/ 8PPF)	None	
Observe (63PPM/ 19PPF)	None	
Recognize (125PPM/ 38PPF)	None	
Identify (250PPM/ 76PPF)	None	
Wisenet Road AI LPR/ANPR/MMCR		
Solution	City Traffic Observation	Highways
Speed Description	Regular Speed	High Speed
Lane Coverage	Up to 2 lanes	Up to 2 lanes
Speed limit	Up to 120kmh (75mph)	Up to 200kmh (125mph)
Min. Forward Distance	16m (52ft)	27m (90ft)
Max. Forward Distance	46m (150ft)	46m (150ft)
Max. Horizontal Angle	25°	15°
Max. Vertical Angle	25°	15°
Horizontal Offset	Up to 7m (24ft)	Up to 4m (12ft)
Camera Height	Up to 7m (24ft)	Up to 7m (24ft)
Vehicle Recognition	Make : 70+ Model : 600+ Color : 10	Make : 70+ Model : 600+ Color : 10

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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

Not applicable

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
ANPR CAMERA	TNO-7180RLP	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Adaptor	2ACB022F	-	Channel Well Technology (Guangzhou) Co., Ltd.	-
PoE Adaptor	PT-PSE109GBRO-A	-	Dongguan PROCET Network Technology Co.,Ltd	-
Notebook	LG15N54	503NZWY038929	LG Electronics	-
Notebook Adaptor	PA-1900-14	OF2R263348701 7764	LITE-ON TECHNOLOGY COPORATION	-
Controller	-	-	-	-
Controller Adaptor	-	-	-	-
Button Alarm	-	-	-	-
Alarm	-	-	-	-
Smartphone	-	-	APPLE INCORPORATED	-
Headset	K550	-	Britz®	-
Micro SD Card	-	-	Sandisk	8 GB

1.6 External I/O Cabling

■ DC Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
ANPR CAMERA (EUT)	RJ-45 (LAN)	Notebook	RJ-45 (LAN)	3.0	S
	Slot	Micro SD Card1	Slot	-	-
	RS-485	Controller	RS-485	3.0	U
	Alarm OUT	Alarm	Alarm IN	3.0	U
	Alarm IN	Button Alarm	Alarm OUT	3.0	U
	Audio IN	Headset	Audio OUT	1.7	U
	Audio OUT		Audio IN	1.7	U
Notebook	2 Pin	Adaptor	2 Pin	1.6	U
	3.5 mm	Smartphone	3.5 mm	0.8	U
	DC Jack	Notebook Adaptor	DC Jack	1.7	U

* Unshielded=U, Shielded=S

■ PoE Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
ANPR CAMERA (EUT)	RJ-45 (PoE)	PoE Adaptor	RJ-45 (PoE)	3.0	S
	Slot	Micro SD Card1	Slot	-	-
	RS-485	Controller	RS-485	3.0	U
	Alarm OUT	Alarm	Alarm IN	3.0	U
	Alarm IN	Button Alarm	Alarm OUT	3.0	U
	Audio IN	Headset	Audio OUT	1.7	U
	Audio OUT		Audio IN	1.7	U
Notebook	RJ-45 (LAN)	PoE Adaptor	RJ-45 (LAN)	3.5	S
	3.5 mm	Smartphone	3.5 mm	0.8	U
	DC Jack	Notebook Adaptor	DC Jack	1.7	U
PoE Adaptor	Enclosure Ground	Ground Connection	Enclosure Ground	1.5	-

* Unshielded=U, Shielded=S



1.7 EUT Operating Mode(s)

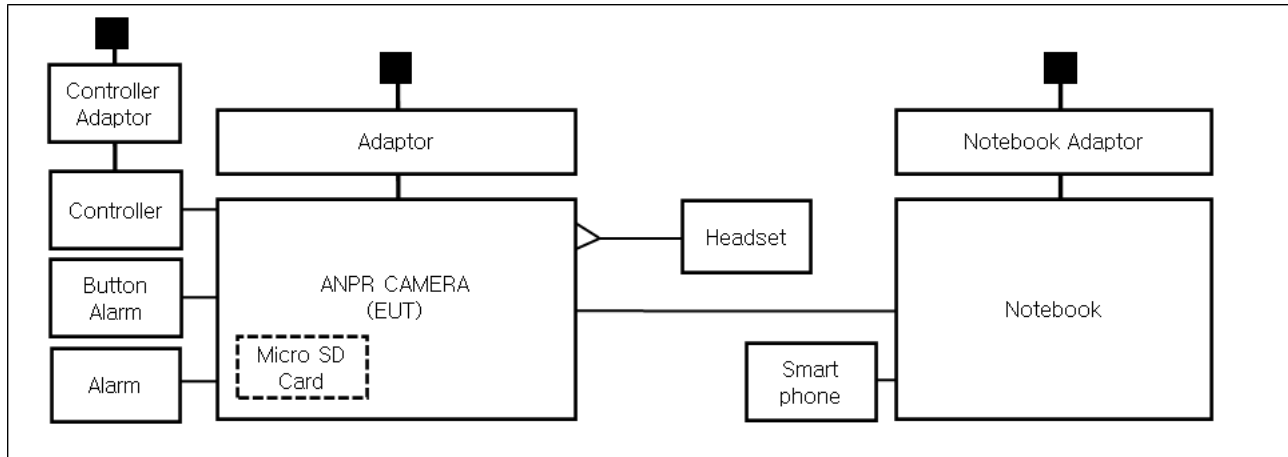
Test Mode	operating
DC, PoE Mode	<ol style="list-style-type: none">1. Check the camera video output on the laptop2. Check if the network status operates normally during the PING TEST3. Check the 1kHz tone output of the smartphone and the microphone input output of the headset4. Press the alarm button to check the normal operation of the button alarm.5. Check if the controller is controlled by the EUT.6. After testing, I checked the files stored on the Micro SD card.

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

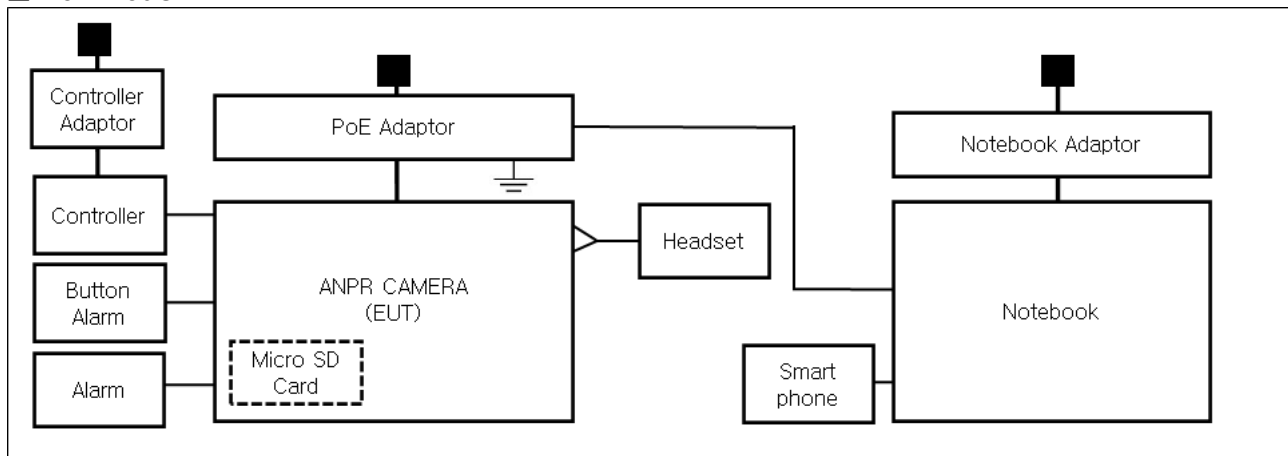
1.8 Configuration

■ AC Main
 □ DC Main

■ DC Mode



■ PoE Mode



1.9 Remarks when standards applied

The USB port and VIDEO port are not tested because they are for administrators.







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:

☒ **AS/NZS CISPR 32:2015 AMD 1:2020**

☒ Class A

☐ Class B

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2.1 Conducted Emissions at Mains Power Ports

Test Date

Nov. 14, 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	11, 11, 2023
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	11, 10, 2023
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	11, 10, 2023
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 10, 2023

Test Conditions

Temperature: (23,2 ± 0,1) °C

Relative Humidity: (47,1 ± 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

Nov. 14, 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	11, 11, 2023
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	11, 10, 2023
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	11, 10, 2023
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 10, 2023
<input checked="" type="checkbox"/>	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	03, 07, 2023
<input type="checkbox"/>	CDN	CDNS502A	TESEQ	40431	11, 10, 2023

Test Conditions

Temperature: (23,2 ± 0,1) °C

Relative Humidity: (47,1 ± 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

Nov. 14, 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, 10, 2023
<input checked="" type="checkbox"/>	BILOG ANTENNA	VULB 9168	SCHWARZBECK	9168-461	04, 27, 2024
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	32173	03, 08, 2023

Test Conditions

Temperature: (22,5 ± 0,1) °C
Relative Humidity: (46,5 ± 0,1) % 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

Nov. 14, 2022

Test Location

SEMI ANECHOIC CHAMBER #3

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	ESR7	R & S	101190	08, 01, 2023
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	AGILENT	3008A01967	04, 01, 2023
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	35496	03, 08, 2023
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 03, 2023

Test Conditions

Temperature: (22,2 ± 0,1) °C

Relative Humidity: (46,1 ± 0,1) % 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

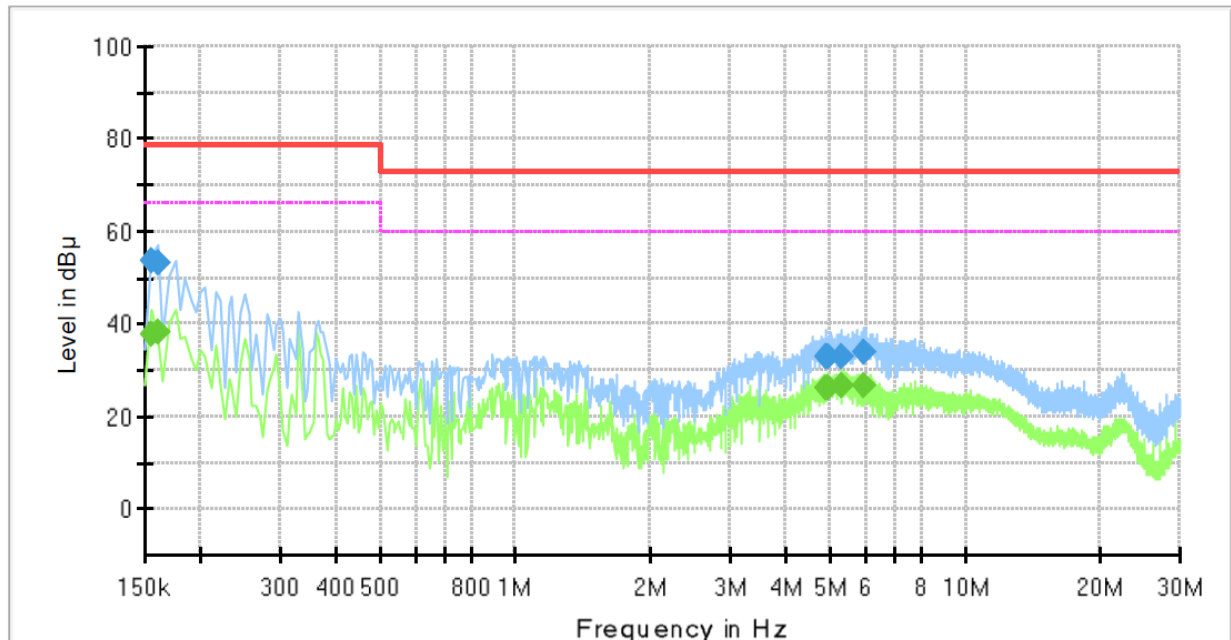
Conducted Emissions at Mains Power Ports

■ DC Mode

HOT LINE

Common Information

Test Description: Conducted Emission
 Model No.: TNO-7180RLP
 Phase: DC_L1
 Mode:
 Operator Name: KES



Final Result

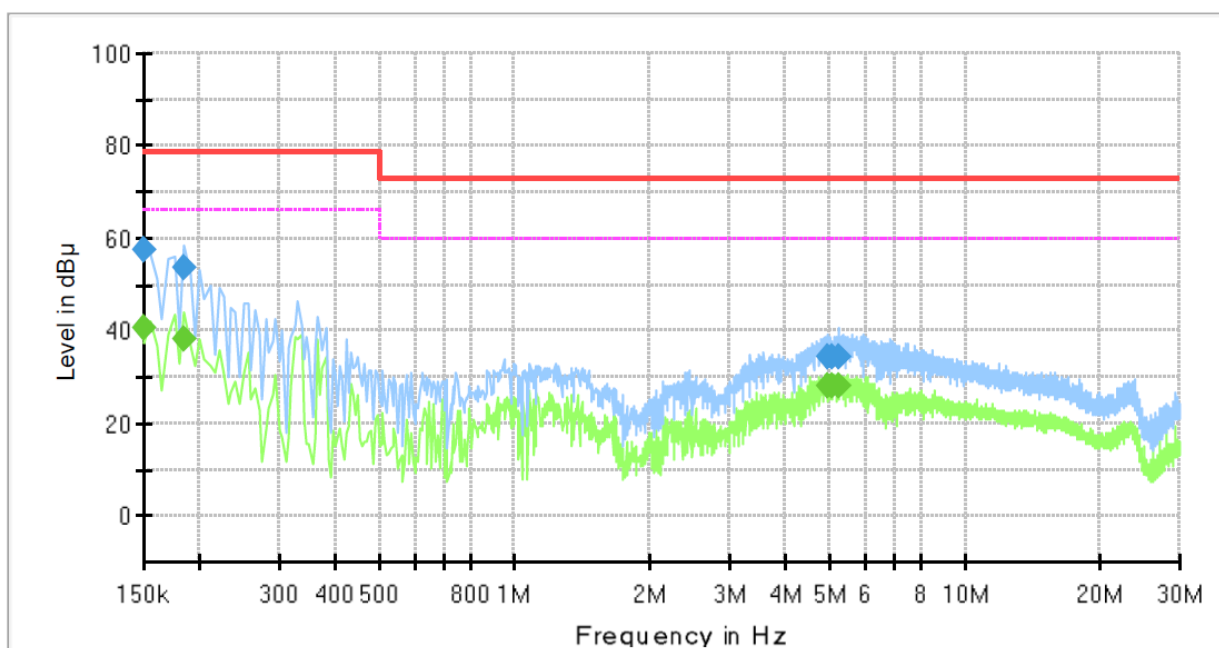
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	37.97	66.00	28.03	1000.0	9.000	L1	19.5
0.155000	53.58	---	79.00	25.42	1000.0	9.000	L1	19.5
0.160000	---	38.06	66.00	27.94	1000.0	9.000	L1	19.5
0.160000	53.39	---	79.00	25.61	1000.0	9.000	L1	19.5
4.915000	---	26.38	60.00	33.62	1000.0	9.000	L1	19.7
4.915000	32.83	---	73.00	40.17	1000.0	9.000	L1	19.7
4.945000	---	26.35	60.00	33.65	1000.0	9.000	L1	19.7
4.945000	32.86	---	73.00	40.14	1000.0	9.000	L1	19.7
5.290000	---	26.74	60.00	33.26	1000.0	9.000	L1	19.6
5.290000	32.93	---	73.00	40.07	1000.0	9.000	L1	19.6
5.970000	---	26.50	60.00	33.50	1000.0	9.000	L1	19.6
5.970000	34.08	---	73.00	38.92	1000.0	9.000	L1	19.6

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NEUTRAL LINE

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-7180RLP
Phase:	DC_N
Mode:	
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	---	40.47	66.00	25.53	1000.0	9.000	N	19.4
0.150000	57.55	---	79.00	21.45	1000.0	9.000	N	19.4
0.185000	---	38.02	66.00	27.98	1000.0	9.000	N	19.5
0.185000	53.51	---	79.00	25.49	1000.0	9.000	N	19.5
4.975000	---	28.18	60.00	31.82	1000.0	9.000	N	19.7
4.975000	34.60	---	73.00	38.40	1000.0	9.000	N	19.7
5.055000	---	28.08	60.00	31.92	1000.0	9.000	N	19.7
5.055000	34.59	---	73.00	38.41	1000.0	9.000	N	19.7
5.230000	---	28.13	60.00	31.87	1000.0	9.000	N	19.7
5.230000	34.44	---	73.00	38.56	1000.0	9.000	N	19.7

◆ 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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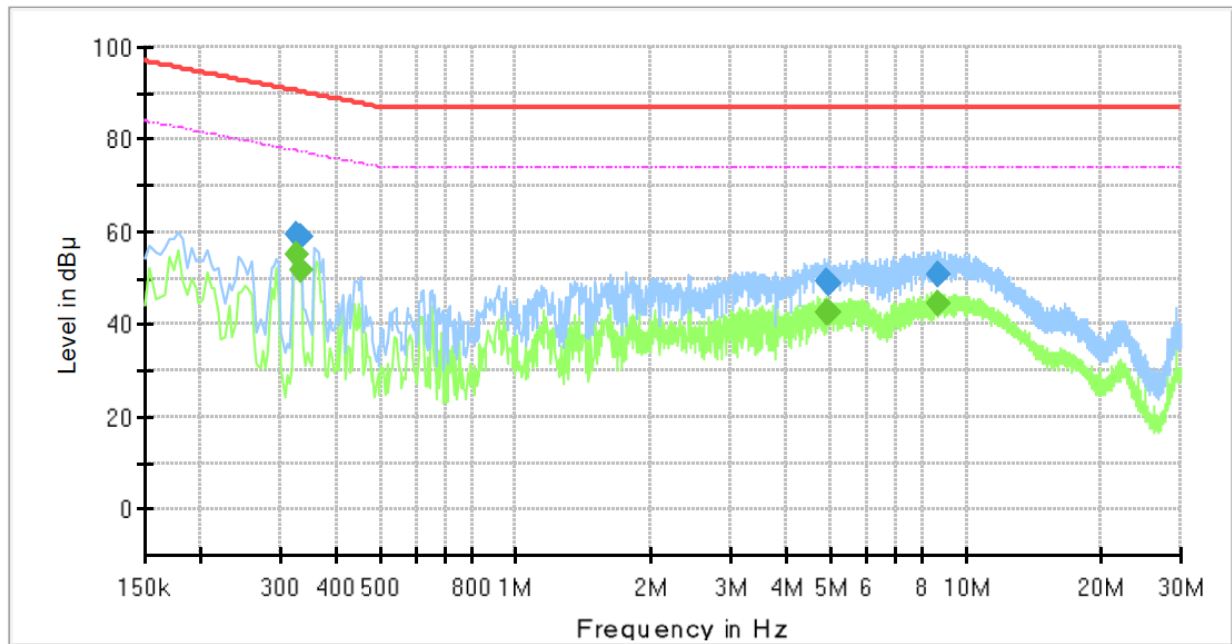
Conducted Emissions at Telecommunication Ports

■ DC Mode

[1 000 Mbps]

Common Information

Test Description: Telecommunication Emission
 Model No.: TNO-7180RLP
 Mode : DC_TEL 1 000 Mbps
 Speed :
 Operator Name: KES



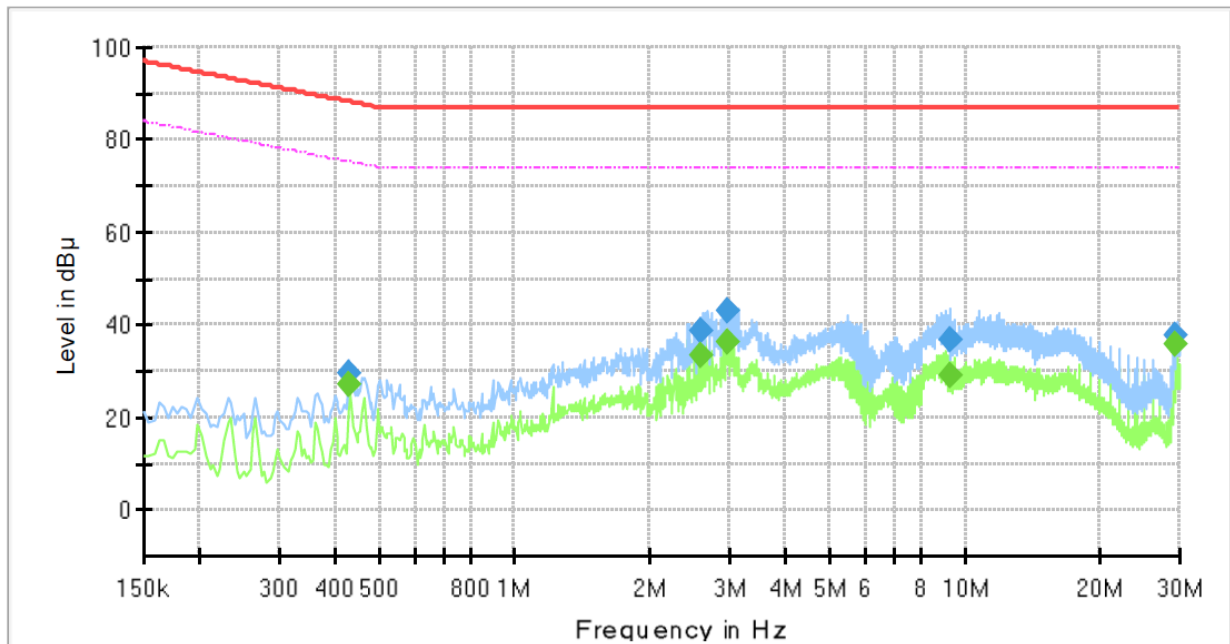
Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.326000	---	55.09	77.55	22.46	1000.0	9.000	Single Line	19.3
0.326000	59.33	---	90.55	31.22	1000.0	9.000	Single Line	19.3
0.334000	---	51.95	77.35	25.40	1000.0	9.000	Single Line	19.3
0.334000	58.83	---	90.35	31.52	1000.0	9.000	Single Line	19.3
4.890000	---	42.55	74.00	31.45	1000.0	9.000	Single Line	19.5
4.890000	49.14	---	87.00	37.86	1000.0	9.000	Single Line	19.5
4.938000	---	42.39	74.00	31.61	1000.0	9.000	Single Line	19.5
4.938000	49.05	---	87.00	37.95	1000.0	9.000	Single Line	19.5
8.690000	---	44.58	74.00	29.42	1000.0	9.000	Single Line	19.5
8.690000	50.99	---	87.00	36.01	1000.0	9.000	Single Line	19.5
8.710000	---	44.73	74.00	29.27	1000.0	9.000	Single Line	19.5
8.710000	50.97	---	87.00	36.03	1000.0	9.000	Single Line	19.5

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PoE Mode
[1 000 Mbps]
Common Information

Test Description: Telecommunication Emission
Model No.: TNO-7180RLP
Mode : PoE_TEL 1 000 Mbps
Speed :
Operator Name: KES


Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.430000	---	27.22	75.25	48.03	1000.0	9.000	Single Line	19.5
0.430000	29.34	---	88.25	58.91	1000.0	9.000	Single Line	19.5
2.586000	---	33.28	74.00	40.72	1000.0	9.000	Single Line	20.1
2.586000	38.83	---	87.00	48.17	1000.0	9.000	Single Line	20.1
2.970000	---	36.28	74.00	37.72	1000.0	9.000	Single Line	20.0
2.970000	42.90	---	87.00	44.10	1000.0	9.000	Single Line	20.0
9.254000	---	29.08	74.00	44.92	1000.0	9.000	Single Line	19.6
9.254000	36.94	---	87.00	50.06	1000.0	9.000	Single Line	19.6
29.186000	---	35.79	74.00	38.21	1000.0	9.000	Single Line	20.4
29.186000	37.65	---	87.00	49.35	1000.0	9.000	Single Line	20.4

♦ 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))

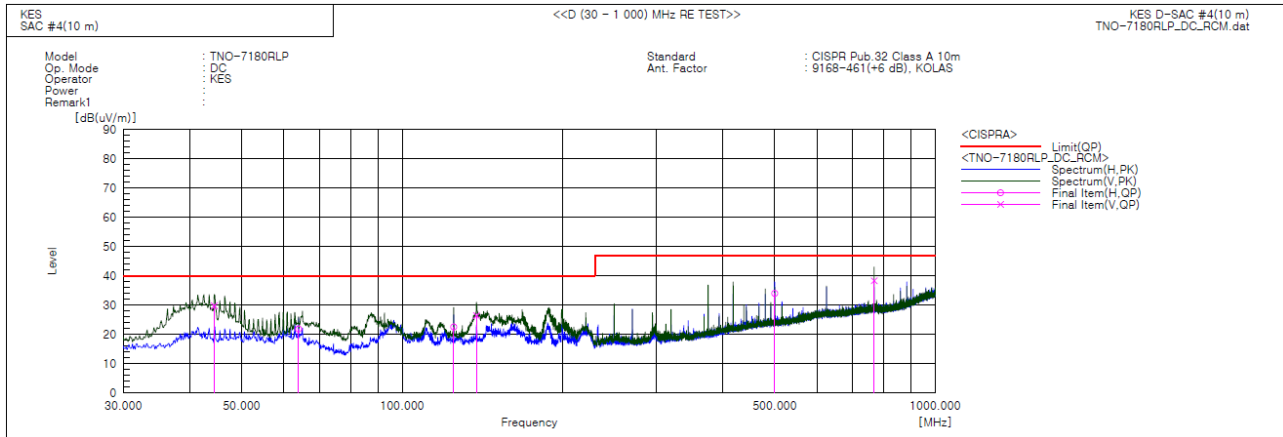
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Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode

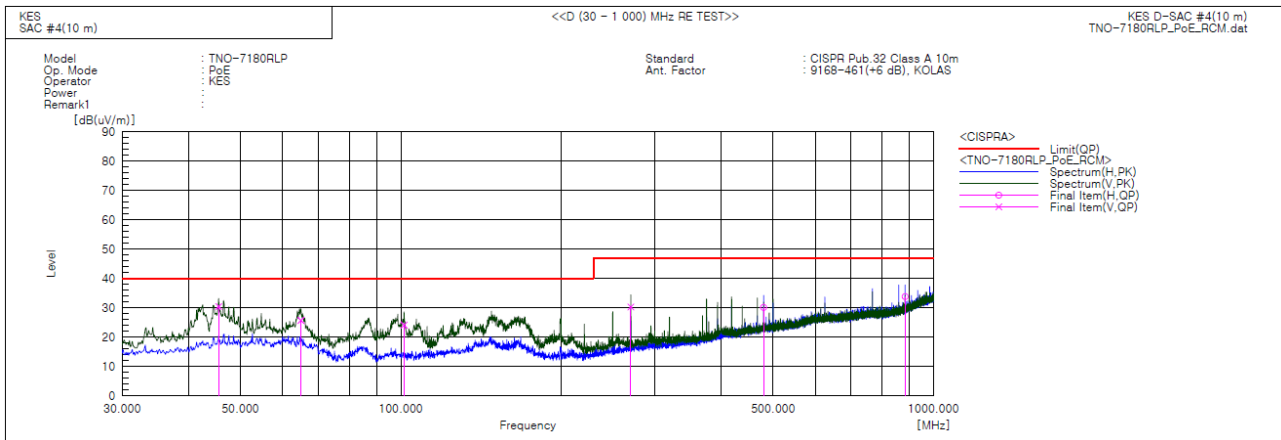


Final Result

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	44.429	V	51.0	-21.2	29.8	40.0	10.2	115.0	282.0	
2	63.950	H	43.3	-21.5	21.8	40.0	18.2	195.0	174.0	
3	124.939	H	44.4	-21.9	22.5	40.0	17.5	395.0	279.0	
4	137.913	V	46.8	-20.4	26.4	40.0	13.6	142.0	171.0	
5	499.965	H	44.2	-10.2	34.0	47.0	13.0	195.0	193.0	
6	768.049	V	43.5	-5.2	38.3	47.0	8.7	399.0	179.0	

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■ PoE Mode



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	45.520	V	51.5	-21.1	30.4	40.0	9.6	145.0	200.0	
2	64.920	V	47.4	-21.7	25.7	40.0	14.3	389.0	297.0	
3	101.416	V	48.6	-24.5	24.1	40.0	15.9	142.0	274.0	
4	270.318	V	49.0	-18.7	30.3	47.0	16.7	100.0	11.0	
5	479.959	H	40.8	-10.7	30.1	47.0	16.9	195.0	129.0	
6	884.813	H	37.3	-3.5	33.8	47.0	13.2	399.0	83.0	

◆ 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)]

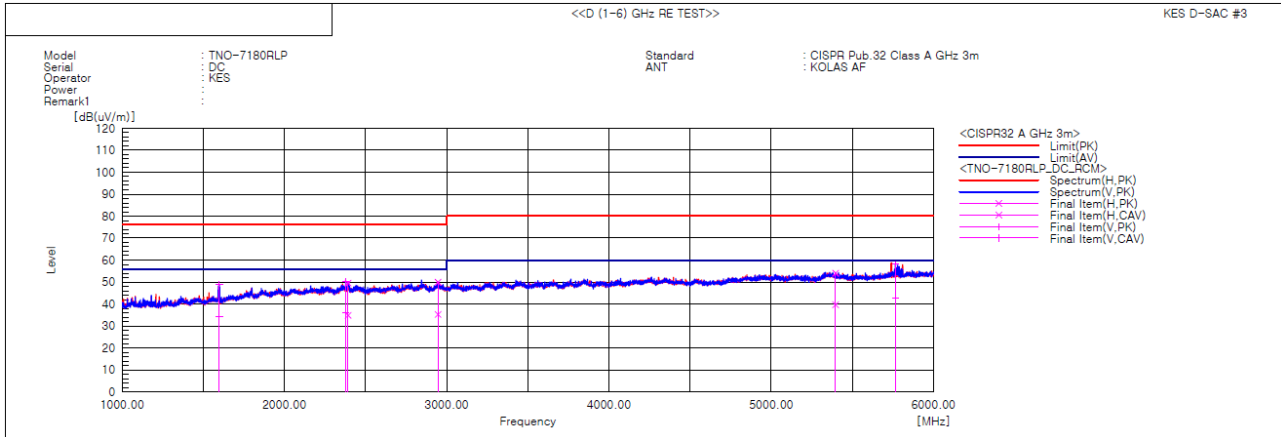
Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

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



Radiated Electric Field Emissions(Above 1 GHz)

■ DC Mode



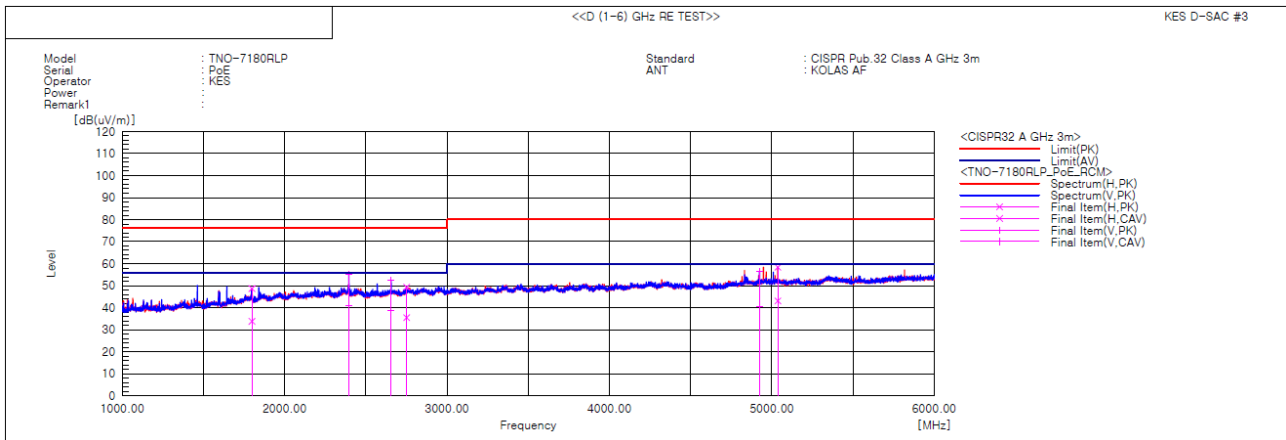
Final Result

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	1599.053	V	48.3	33.6	0.6	48.9	34.2	76.0	56.0	27.1	21.8	100.0	166.3	
2	2378.115	V	43.8	29.6	6.3	50.1	35.9	76.0	56.0	25.9	20.1	100.0	355.8	
3	2391.645	H	43.3	28.6	6.3	49.6	34.9	76.0	56.0	26.4	21.1	100.0	255.4	
4	2945.647	H	42.1	27.4	7.9	50.0	35.3	76.0	56.0	26.0	20.7	100.0	237.3	
5	5396.113	H	39.0	24.6	15.1	54.1	39.7	80.0	60.0	25.9	20.3	100.0	11.7	
6	5765.756	V	42.4	26.7	15.8	58.2	42.5	80.0	60.0	21.8	17.5	100.0	101.7	

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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	1797.536	H	45.4	30.6	3.3	48.7	33.9	76.0	56.0	27.3	22.1	100.0	161.5	
2	2395.535	V	48.9	34.6	6.3	55.2	40.9	76.0	56.0	20.8	15.1	100.0	216.4	
3	2655.646	V	45.6	31.9	6.7	52.3	38.6	76.0	56.0	23.7	17.4	100.0	153.2	
4	2750.053	H	42.0	28.2	7.4	49.4	35.6	76.0	56.0	26.6	20.4	100.0	194.7	
5	4924.115	V	42.2	26.1	14.2	56.4	40.3	80.0	60.0	23.6	19.7	100.0	159.0	
6	5037.085	H	44.0	28.7	14.4	58.4	43.1	80.0	60.0	21.6	16.9	100.0	326.5	

◆ 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)]

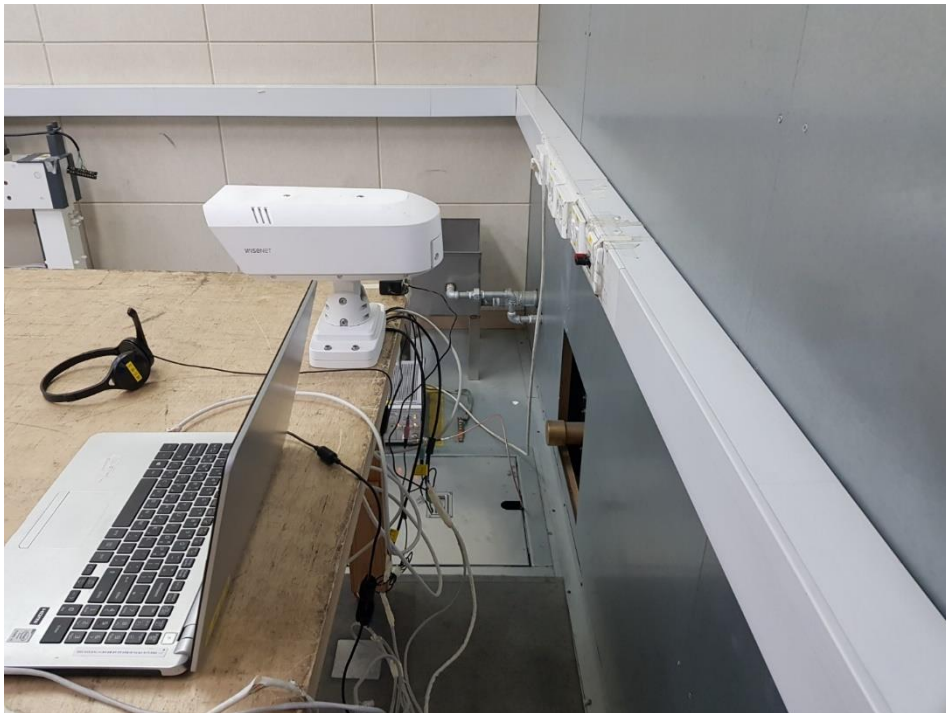
Reading(PK/CAV) : Reading value, Result(PK/CAV) : Reading value + Factor value

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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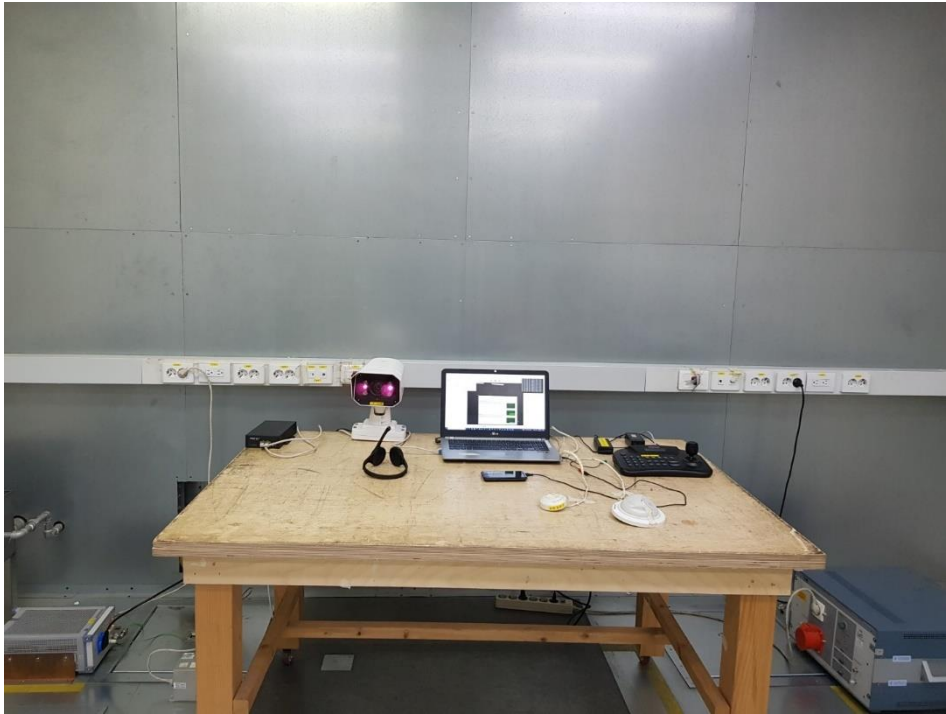
Conducted Emissions at Telecommunication Ports

■ DC Mode



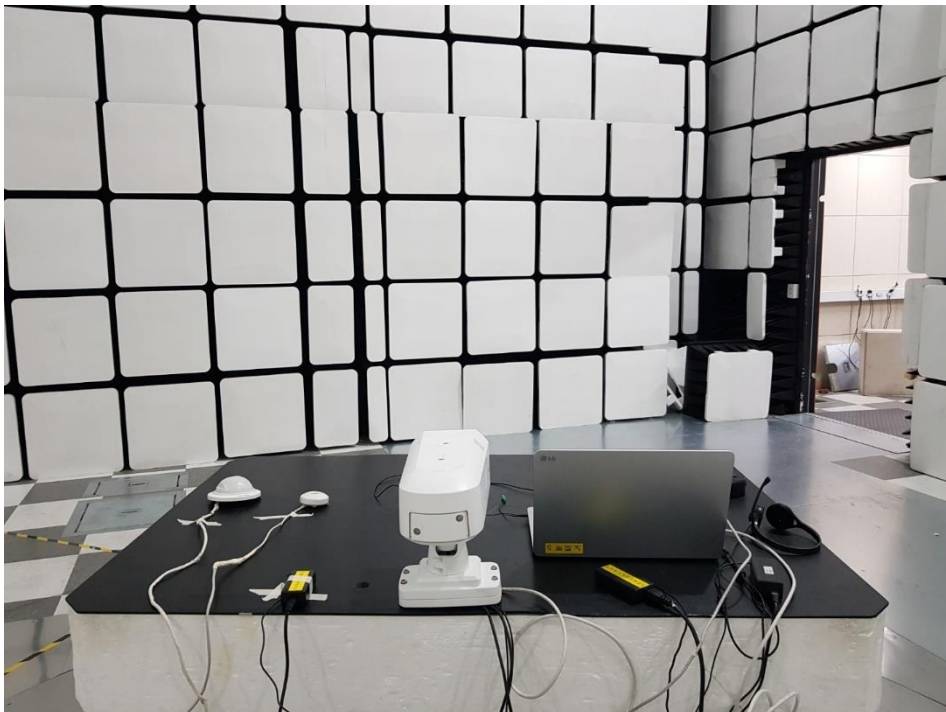
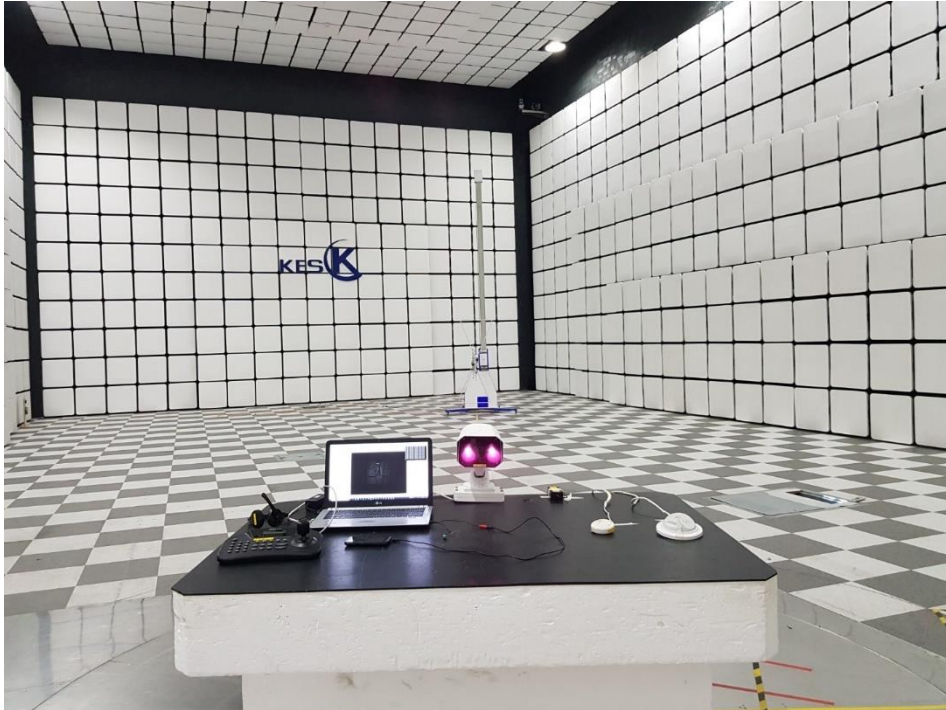
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■ PoE Mode



Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode



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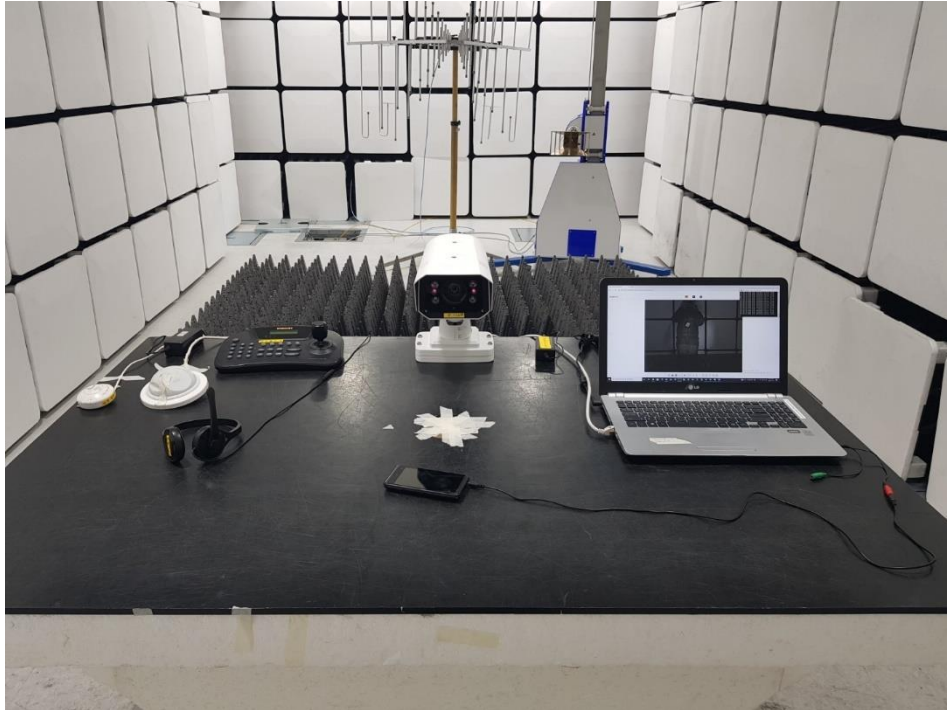
■ PoE Mode



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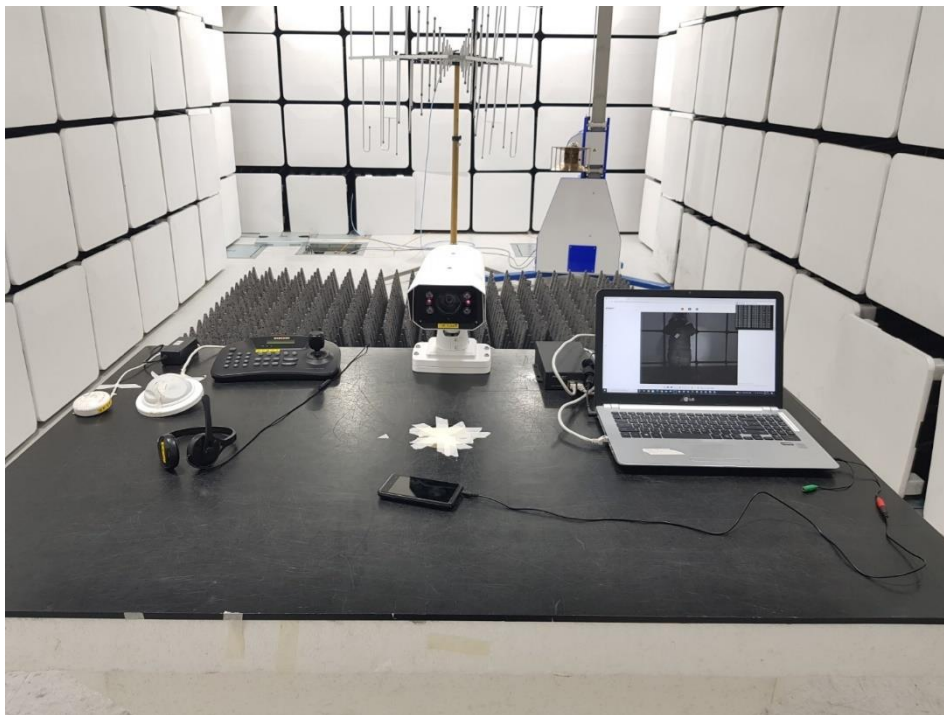
Radiated Electric Field Emissions(Above 1 GHz)

■ DC Mode



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■ PoE Mode



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EUT External Photographs

(Top)



(Bottom)



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EUT Internal Photographs

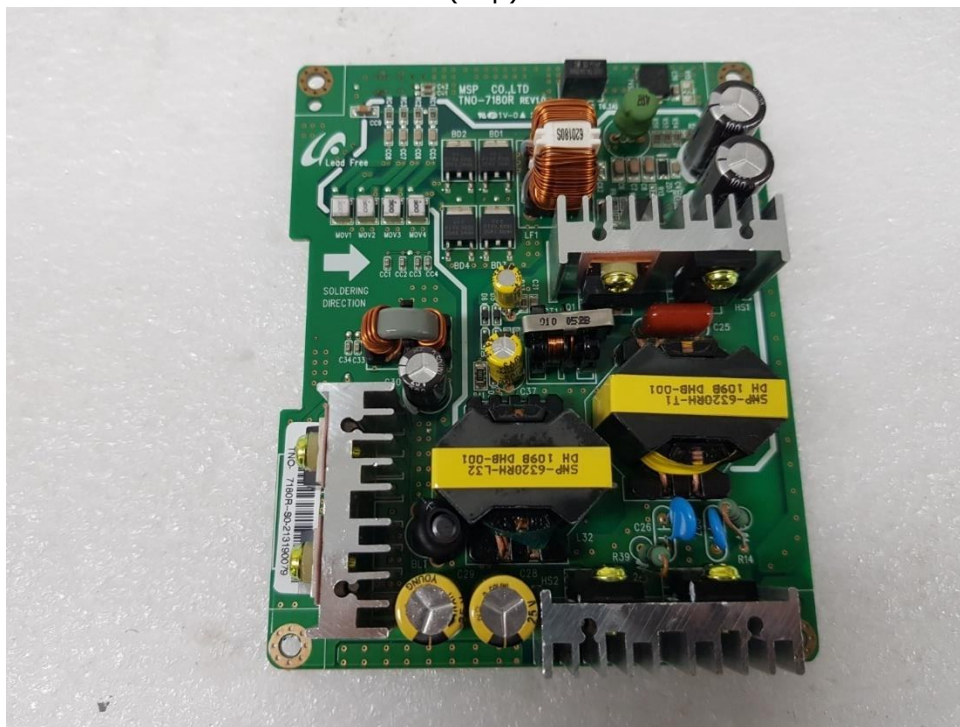
(Internal View)



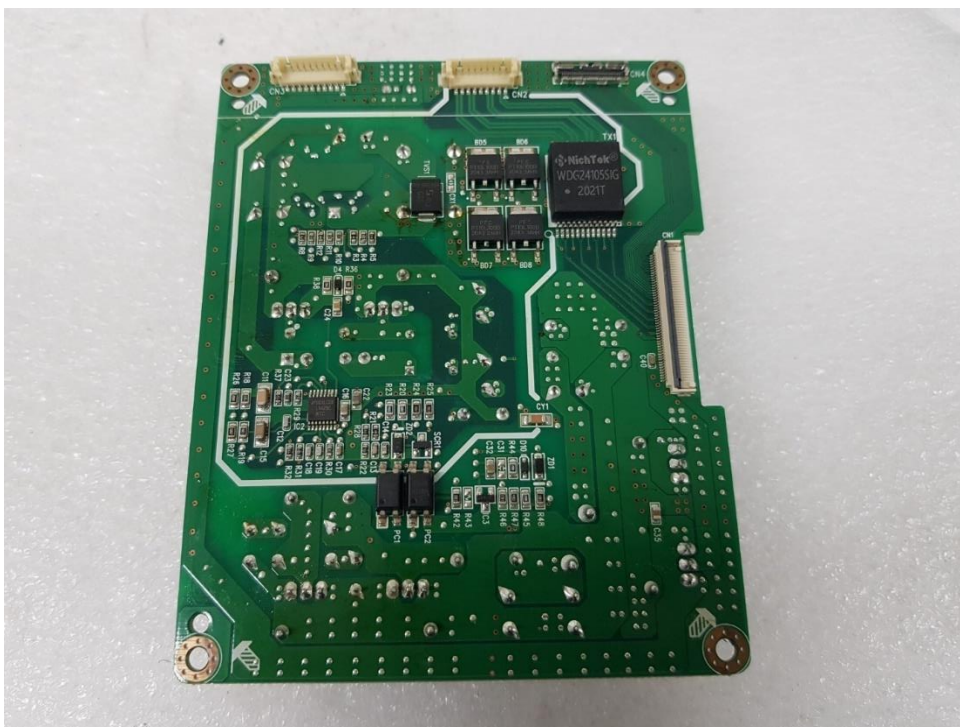
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EUT Internal View – Main Board

(Top)



(Bottom)



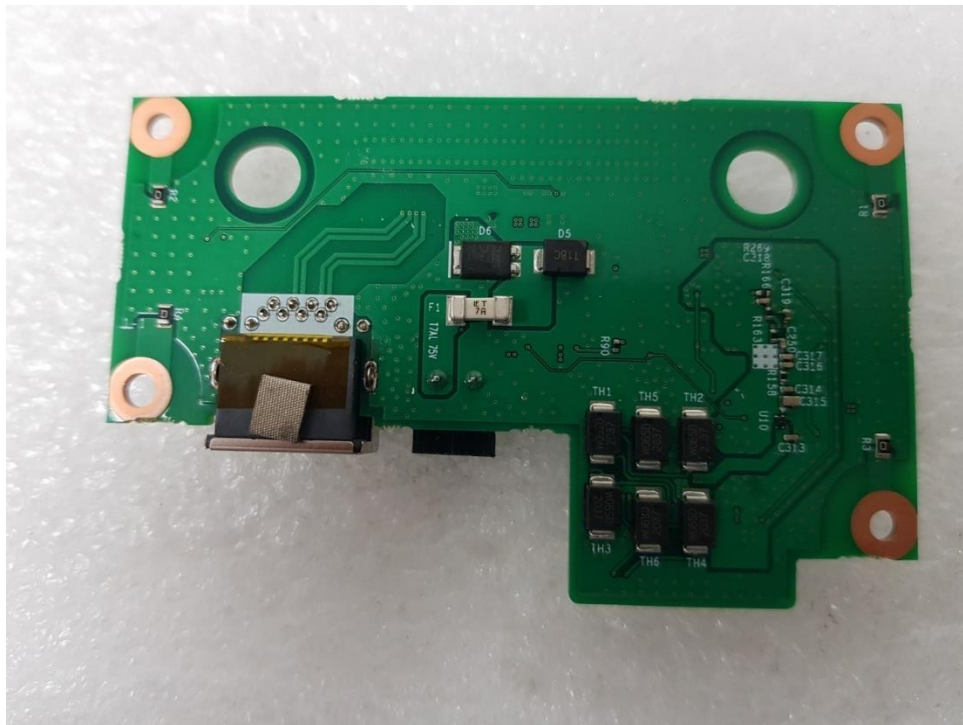
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EUT Internal View – Sub Board 1

(Top)



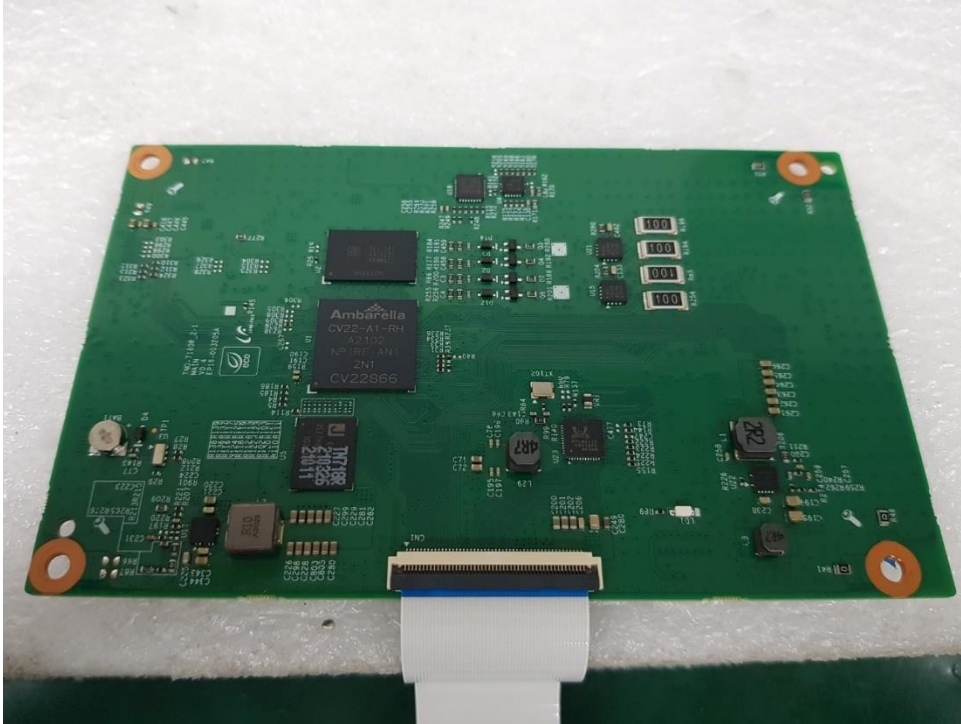
(Bottom)



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EUT Internal View – Sub Board 2

(Top)



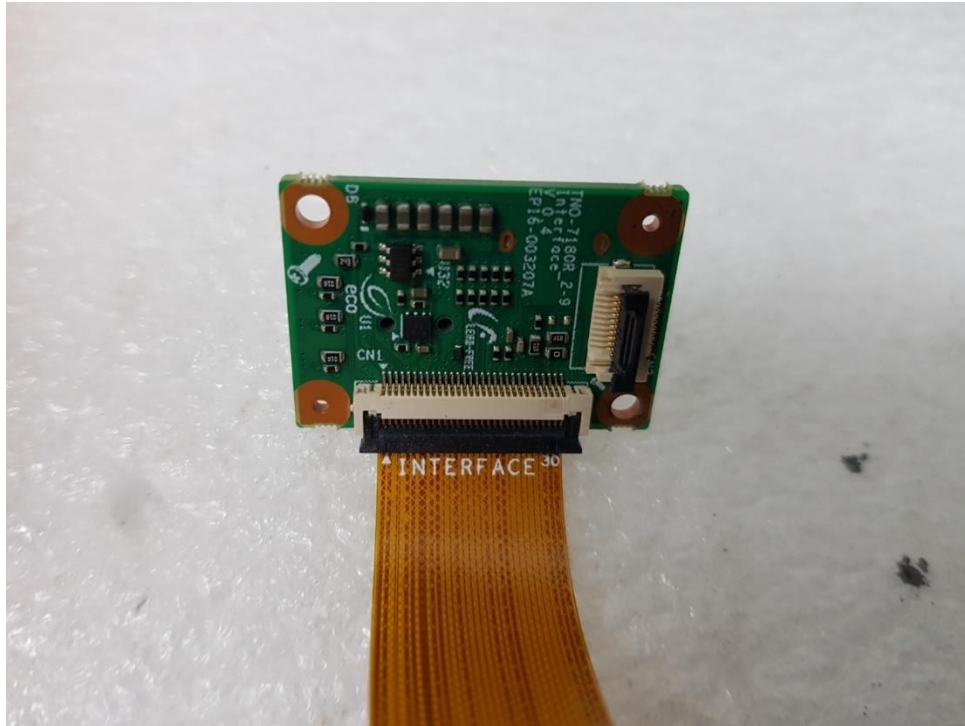
(Bottom)



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EUT Internal View – Sub Board 3

(Top)



(Bottom)



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EUT Internal View – Sub Board 4

(Top)



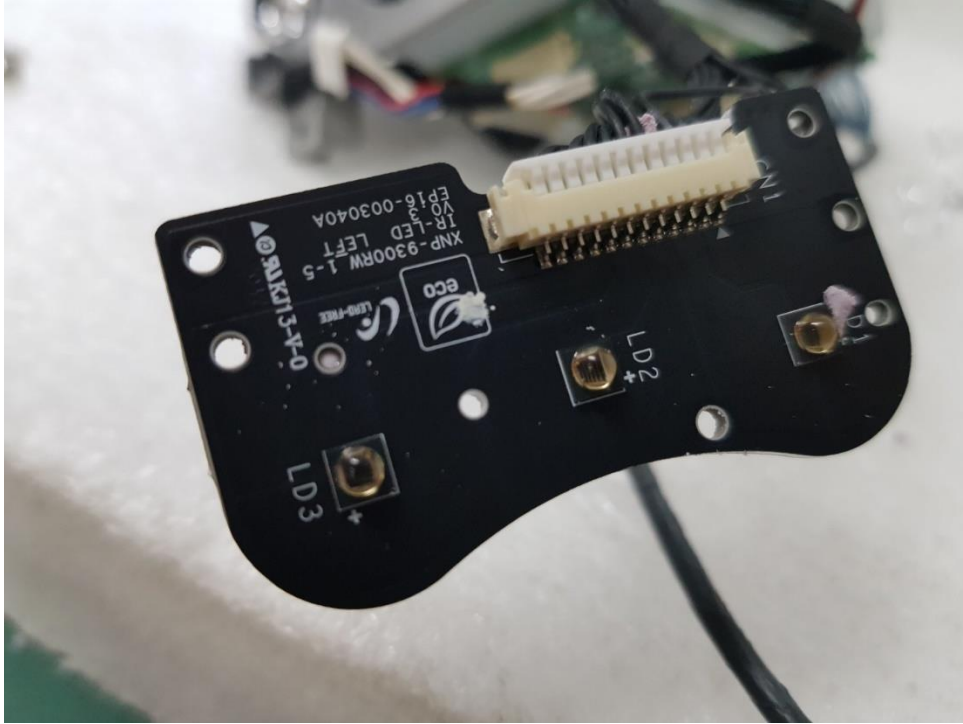
(Bottom)



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EUT Internal View – Sub Board 5

(Top)



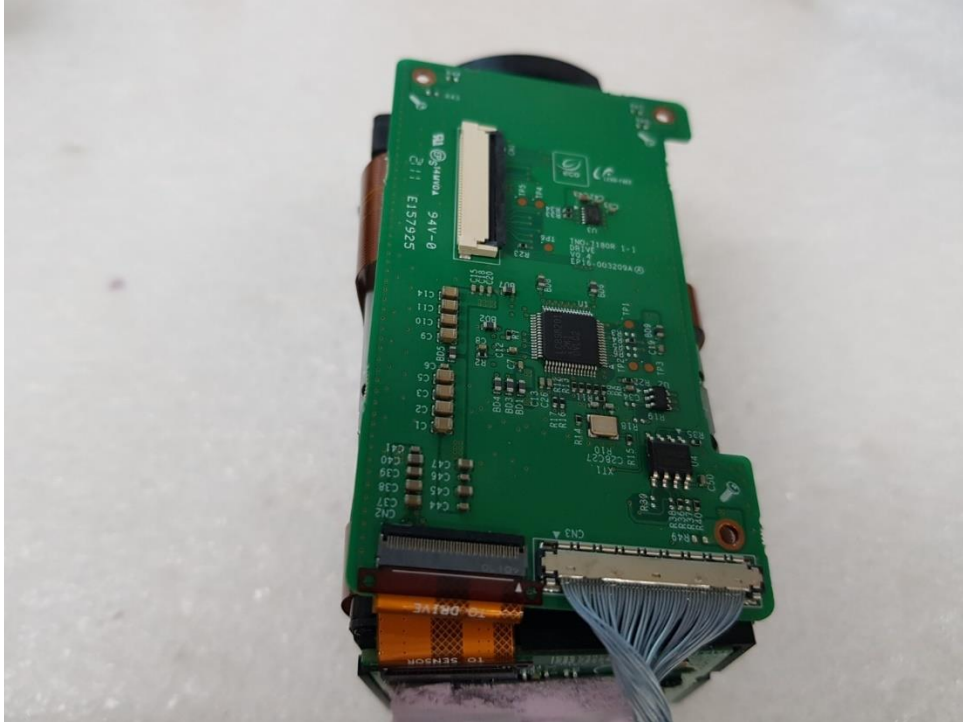
(Bottom)



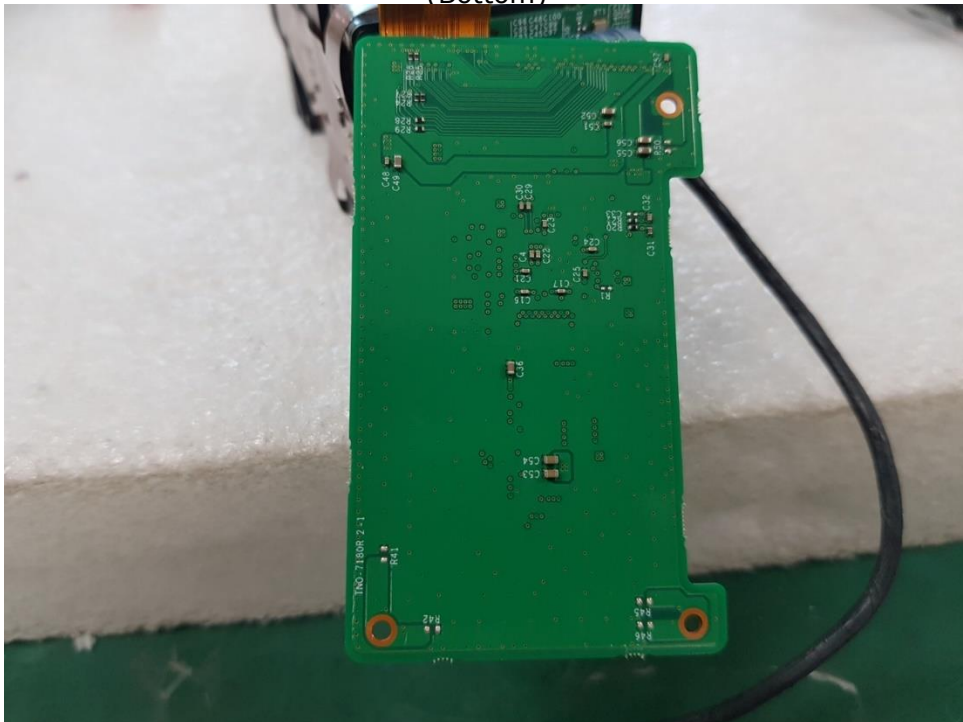
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EUT Internal View – Sub Board 6

(Top)



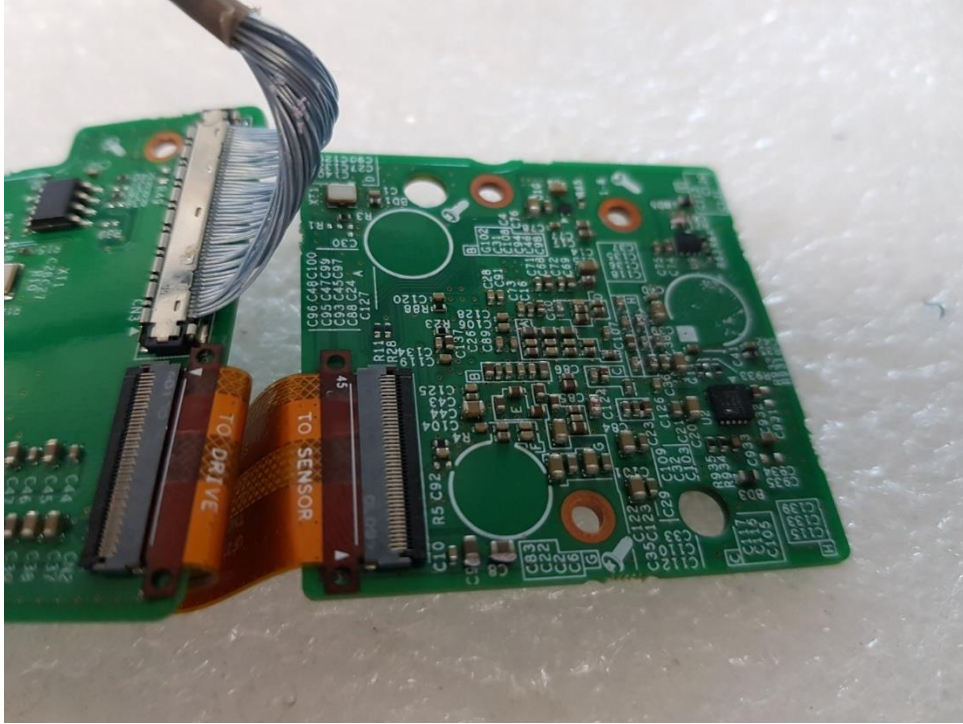
(Bottom)



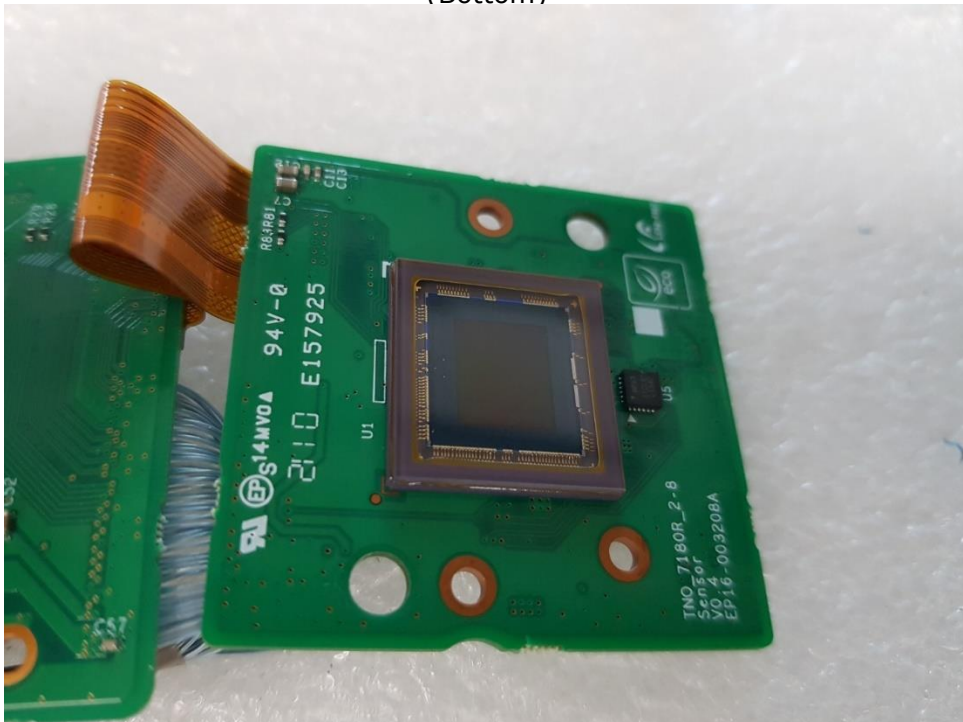
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EUT Internal View – Sub Board 7

(Top)



(Bottom)



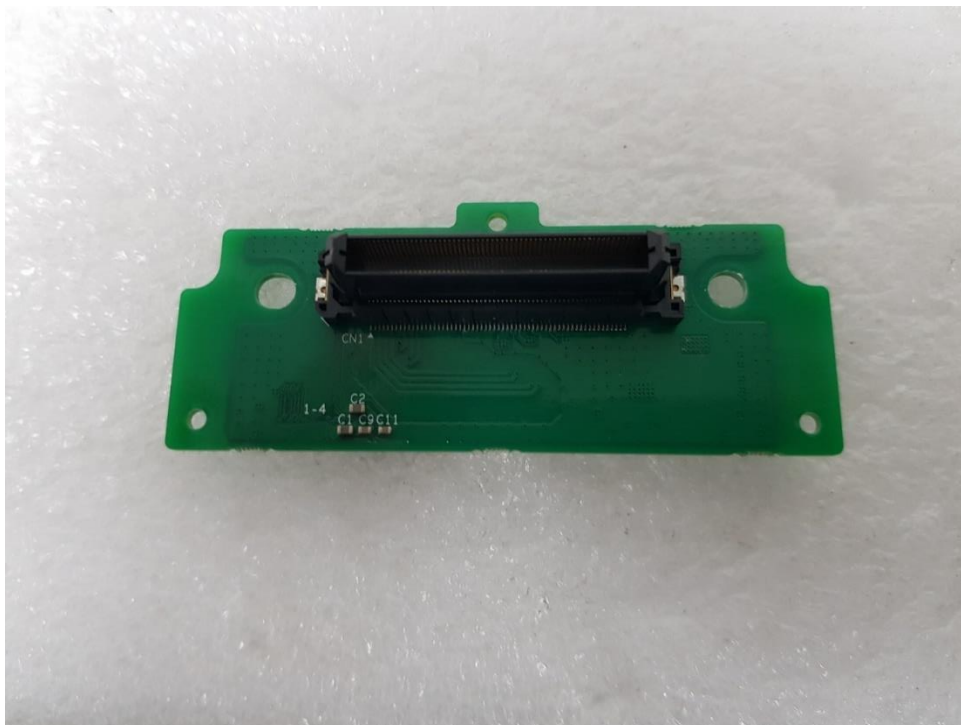
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EUT Internal View – Sub Board 8

(Top)



(Bottom)



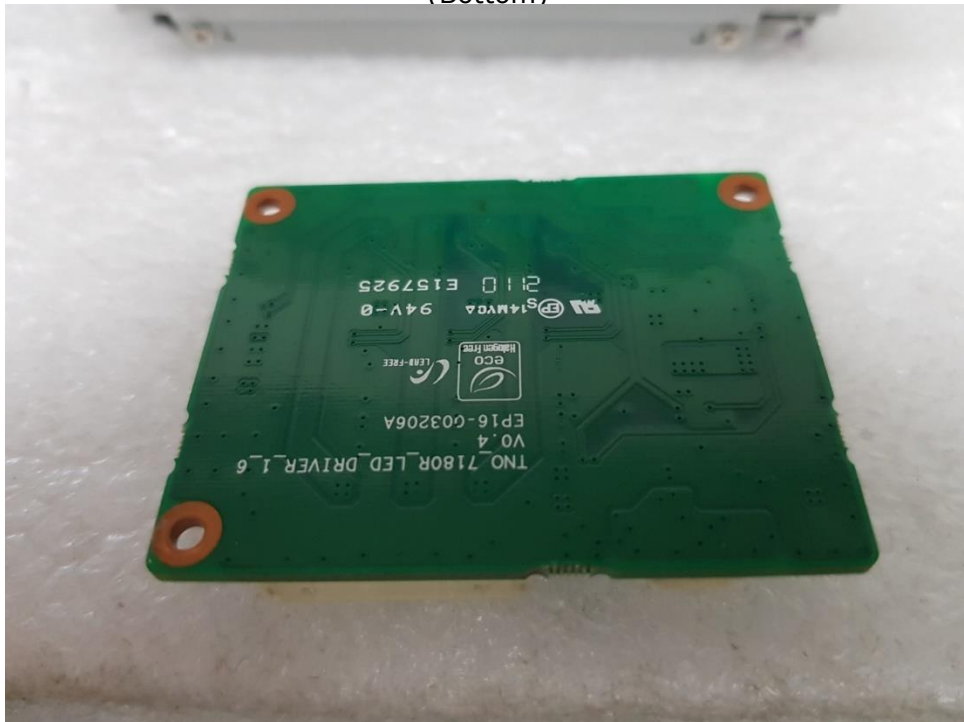
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EUT Internal View – Camera Main Board

(Top)



(Bottom)



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EUT Internal View – Lens

(Top)



(Bottom)



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