



**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-22T0927-R1

Page (1) of (81)

## EMC TEST REPORT

Test Report No. : KES-EM-22T0927-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 ~ Nov. 17, 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.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

**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-22T0927-R1  
Page (2) of (81)

## REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Nov. 23, 2022	KES-EM-22T0927	Issued
Feb. 24, 2023	KES-EM-22T0927-R1	Change the Applicant and manufacturer at the request of the customer

*This report shall not be reproduced except in full, without the written approval of KES Co., Ltd. This document may be altered or revised by KES Co., Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by KES Co., Ltd. will constitute fraud and shall nullify the document.*

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

---

## TABLE OF CONTENTS

1.0	General Product Description .....	4
1.1	Test Voltage & Frequency .....	8
1.2	Variant Model Differences .....	8
1.3	Device Modifications .....	8
1.4	Equipment Under Test .....	8
1.5	Support Equipments .....	8
1.6	External I/O Cabling .....	9
1.7	EUT Operating Mode(s) .....	10
1.8	Configuration .....	11
1.9	Remarks when standards applied .....	12
1.10	Calibration Details of Equipment Used for Measurement .....	12
1.11	Test Facility .....	12
1.12	Laboratory Accreditations and Listings .....	12
2.0	Test Regulations .....	13
2.1	Conducted Emissions at Mains Power Ports .....	14
2.2	Conducted Emissions at Telecommunication Ports .....	15
2.3	Radiated Electric Field Emissions(Below 1 GHz) .....	16
2.4	Radiated Electric Field Emissions(Above 1 GHz) .....	17
2.5	Harmonic Current Emissions .....	18
2.6	Voltage Fluctuations and Flicker .....	19
3.0	Criteria for compliance .....	20
3.1	Electrostatic Discharge .....	22
3.2	Radiated Electric Field Immunity .....	27
3.3	Electrical Fast Transients/Bursts .....	30
3.4	Surge Transients .....	33
3.5	Conducted Disturbance .....	37
3.6	Voltage Dips and Short Interruptions .....	41
APPENDIX A – TEST DATA .....		43
Conducted Emissions at Mains Power Ports .....		43
Conducted Emissions at Telecommunication Ports .....		45
Radiated Electric Field Emissions(Below 1 GHz) .....		47
Radiated Electric Field Emissions(Above 1 GHz) .....		49
Harmonic Current Emissions and Voltage Fluctuations and Flicker .....		51
Test Setup Photos and Configuration .....		54
Conducted Emissions at Mains Power Ports .....		54
Conducted Emissions at Telecommunication Ports .....		55
Radiated Electric Field Emissions(Below 1 GHz) .....		57
Radiated Electric Field Emissions(Above 1 GHz) .....		59
Harmonic Current Emissions and Voltage Fluctuations and Flicker .....		61
Electrostatic Discharge .....		62
Radiated Electric Field Immunity .....		63
Electrical Fast Transients/Bursts .....		64
Surge Transients .....		65
Conducted Disturbance .....		66
Voltage Dips and Short Interruptions .....		67
EUT External Photographs .....		68
EUT Internal Photographs .....		69



## 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-22T0927-R1

Page (4) of (81)

## 1.0 General Product Description

Main Specifications of EUT are:

<b>Video</b>	
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
<b>Lens</b>	
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
<b>Pan / Tilt / Rotate</b>	
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
<b>Operational</b>	
Camera Title	Displayed up to 85 characters
Direction Indicator	none
Dav & Night	Auto(I/CR)

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr



## 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-22T0927-R1

Page (5) of (81)

Backlight Compensation	BLC, SSDR
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
<b>Radiometry</b>	
Temperature detect range	None
Temperature accuracy	None
Temperature detection	None
Additional	None

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr



# 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-22T0927-R1  
Page (6) of (81)

<b>Network</b>	
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
<b>General</b>	
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)
Edge Storage	Micro SD/SDHC/SDXC 1slot (256GB)
Memory	2048MB RAM, 256MB Flash

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr



## 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-22T0927-R1

Page (7) of (81)

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+	Make : 70+
	Model : 600+	Model : 600+
	Color : 10	Color : 10

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

## 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 230 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

**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-22T0927-R1  
Page (10) of (81)

## 1.7 EUT Operating Mode(s)

Test Mode	operating
DC, PoE Mode	<ol style="list-style-type: none"><li>1. Check the camera video output on the laptop</li><li>2. Check if the network status operates normally during the PING TEST</li><li>3. Check the 1kHz tone output of the smartphone and the microphone input output of the headset</li><li>4. Press the alarm button to check the normal operation of the button alarm.</li><li>5. Check if the controller is controlled by the EUT.</li><li>6. After testing, I checked the files stored on the Micro SD card.</li></ol>

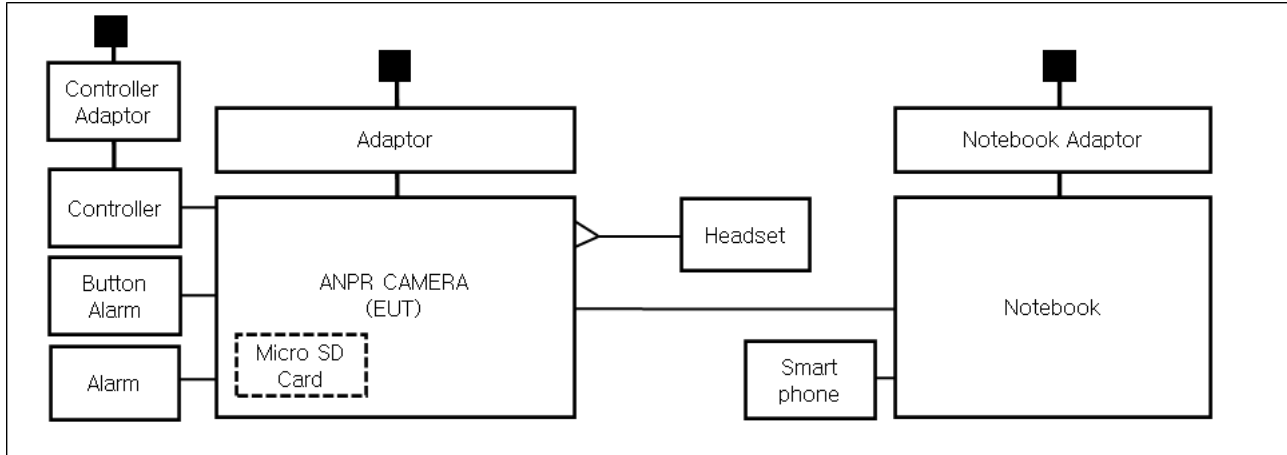
EUT Test operating S/W		
Name	Version	Manufacture Company
Web Viewer	-	Hanwha Vision Co., Ltd

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

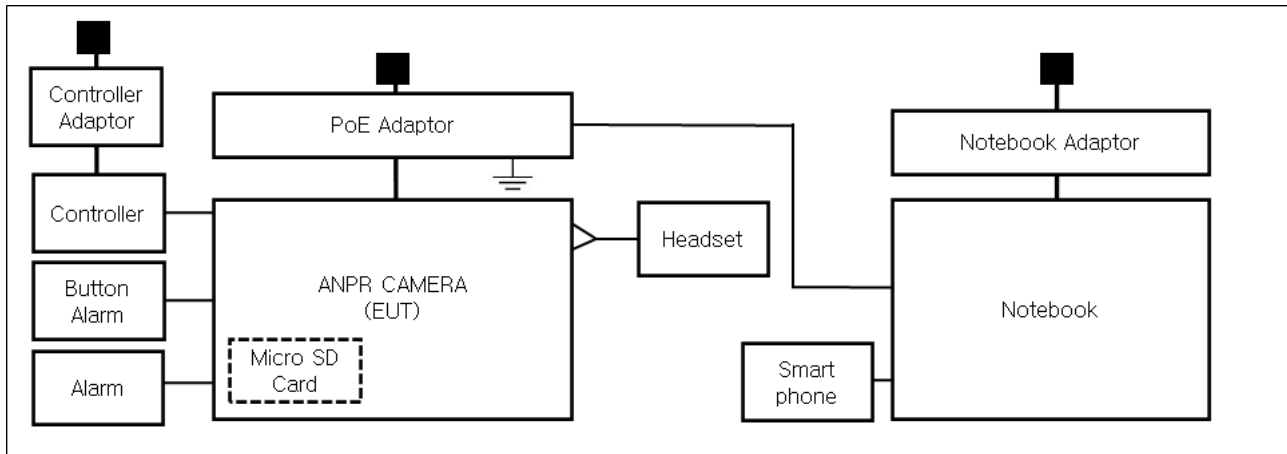
## 1.8 Configuration

■ 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

## 2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ EMC – Directive 2014/30/EU

☒ EN 55032: 2015/A11: 2020

☒ Class A

☐ Class B

☒ EN 50130-4: 2011

☒ EN 61000-3-2: 2014

☒ EN 61000-3-3: 2013

☒ EMC – Regulations 2016

☒ EN 55032: 2015/A11: 2020

☒ Class A

☐ Class B

☒ EN 50130-4: 2011

☒ EN 61000-3-2: 2014

☒ EN 61000-3-3: 2013

## 2.1 Conducted Emissions at Mains Power Ports

Test Date  
Nov. 14, 2022Test 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 MHzInstrument 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, 2022Test 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.



## 2.5 Harmonic Current Emissions

Test Date  
Nov. 15, 2022

Test Location  
Electro wave Shieldroom #3

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	net.control	EM TEST	2.1.4	-
<input checked="" type="checkbox"/>	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	04, 06, 2023
<input checked="" type="checkbox"/>	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

### Test Conditions

Temperature: (22,5 ± 0,1) °C  
Relative Humidity: (45,7 ± 0,1) % R.H.

### Classification of Equipment for Harmonic Current Emissions

- ☒ Class A  
☐ Class B  
☐ Class C (Below 25 W)  
☐ Class C (Above 25 W)  
☐ Class D

### Test Results

The requirements are:

- ☒ PASS  
☐ NOT PASS  
☐ NOT APPLICABLE

### Remarks

See Appendix A for test data.

**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-22T0927-R1  
Page (19) of (81)

## 2.6 Voltage Fluctuations and Flicker

Test Date  
Nov. 15, 2022

Test Location  
Electro wave Shieldroom #3

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	net.control	EM TEST	2.1.4	-
<input checked="" type="checkbox"/>	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	04, 06, 2023
<input checked="" type="checkbox"/>	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

### Test Conditions

Temperature: (22,5 ± 0,6) °C  
Relative Humidity: (45,7 ± 0,6) % R.H.

### Test Results

The requirements are:

- ☒ PASS  
☐ NOT PASS  
☐ NOT APPLICABLE

### Remarks

See Appendix A for test data.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

### 3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

EN 50130-4: 2011 Alarm systems-Part 4: Electromagnetic compatibility Product family  
standard: Immunity requirements for components of fire, intruder and social alarm systems

The variety and the diversity of the apparatus within the scope of this document makes it difficult to define precise criteria for the evaluation of the immunity test results.

If as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe then the apparatus shall be deemed to have failed the test.

A functional description and a definition of performance by the manufacture and noted in the test

report, based on the following criteria:

#### Electrostatic discharge

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing that is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

#### Radiated electromagnetic fields

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing which could be interpreted by associated equipment as a change, and no such

Flickering of indicators occurs at a field strength of 3 V/m.

For components of CCTV systems, where the picture is allowed at 10 V/m, providing.

(a) there is no permanent damage or change to EUT

(e.g. no corruption of memory or changes to programmable setting etc.)

(b) at 3 V/m, any deterioration of the picture is so minor that the system could still be used; and

(c) there is no observable deterioration of the picture at 1 V/m.

Fast transient burst / slow high energy voltage surge

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing

That there is no residual is permissible, providing that there is no residual change in the EUT or any

change in outputs, which could be interpreted by associated equipment as a change.

Conducted RF immunity

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing

That there is no residual is permissible, providing that there is no residual change in the EUT or any

change in outputs, which could be interpreted by associated equipment as a change,

and no such flickering of indicators oeuvres at  $U = 130 \text{ dB}\mu\text{V}$ .

For component of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at  $U = 140 \text{ dB}\mu\text{V}$ , providing:

(a) there is no permanent damage or change to the EUT

(e.g. no corruption of memory or changes to programmable settings etc.)

(b) at  $U = 130 \text{ dB}\mu\text{V}$ , any deterioration of the picture is so minor that the system could still be used; and

(c) there in no observable deterioration of the picture at  $U = 120 \text{ dB}\mu\text{V}$ .

Voltage dip/interruption / Voltage variation

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the conditioning is permissible, providing that there is no residual

change in the EUT or any change in outputs, which could be interpreted by associated equipment

as a change. The EUT shall meet the acceptance criteria for the functional test, after the conditioning.

### 3.1 Electrostatic Discharge

Reference Standard

EN 61000-4-2: 2009

Test Date

Nov. 15, 2022

Test Location

EMS-ESD: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	02, 24, 2023
<input checked="" type="checkbox"/>	HCP	-	KES	-	-
<input checked="" type="checkbox"/>	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: (22,6 ± 0,1) °C

Relative Humidity: (46,3 ± 0,1) % R.H.

Atmospheric Pressure: (100,9 ± 0,0) kPa

Test Specifications

Discharge Factor: ≥ 1 s

Discharge Impedance: 330 ohm / 150 pF

Kind of Discharge: Air, Contact (direct and indirect)

Polarity: Positive and Negative

Number of Discharge: **10 at all locations for Air discharge**

**10 at all locations for Contact discharge**

Discharge Voltage:

Contact

☐ 2 kV  
☐ 4 kV  
☒ 6 kV  
☐ 8 kV  
☐ 15 kV

Air

☒ 2 kV  
☒ 4 kV  
☐ 6 kV  
☒ 8 kV  
☐ 15 kV

HCP

☐ 2 kV  
☐ 4 kV  
☒ 6 kV  
☐ 8 kV  
☐ 15 kV

VCP

☐ 2 kV  
☐ 4 kV  
☒ 6 kV  
☐ 8 kV  
☐ 15 kV

Notes: HCP: Horizontal coupling plane

VCP: Vertical coupling plane

Required Performance Criteria:

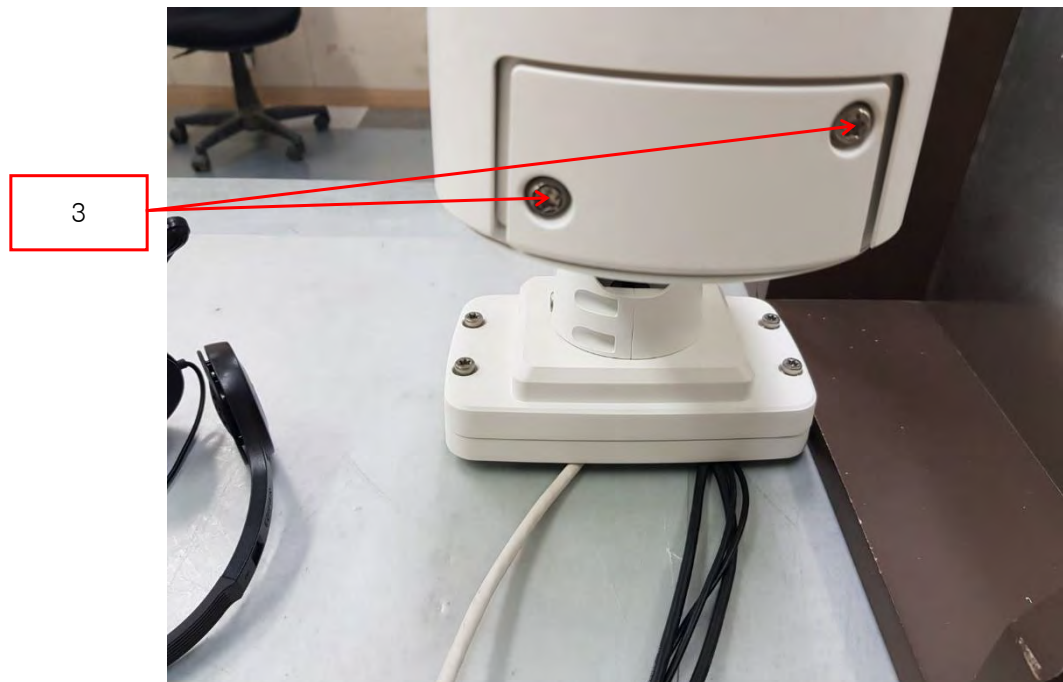
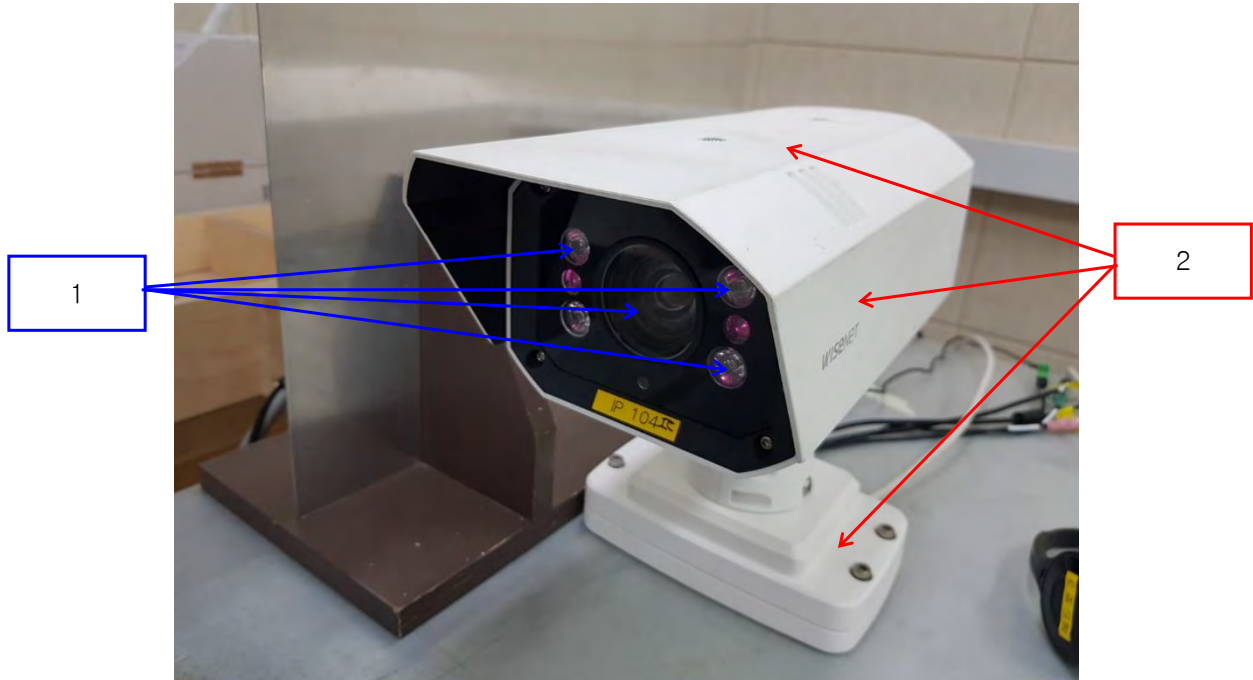
☒ Complied

Location of Discharge:

Air
Contact

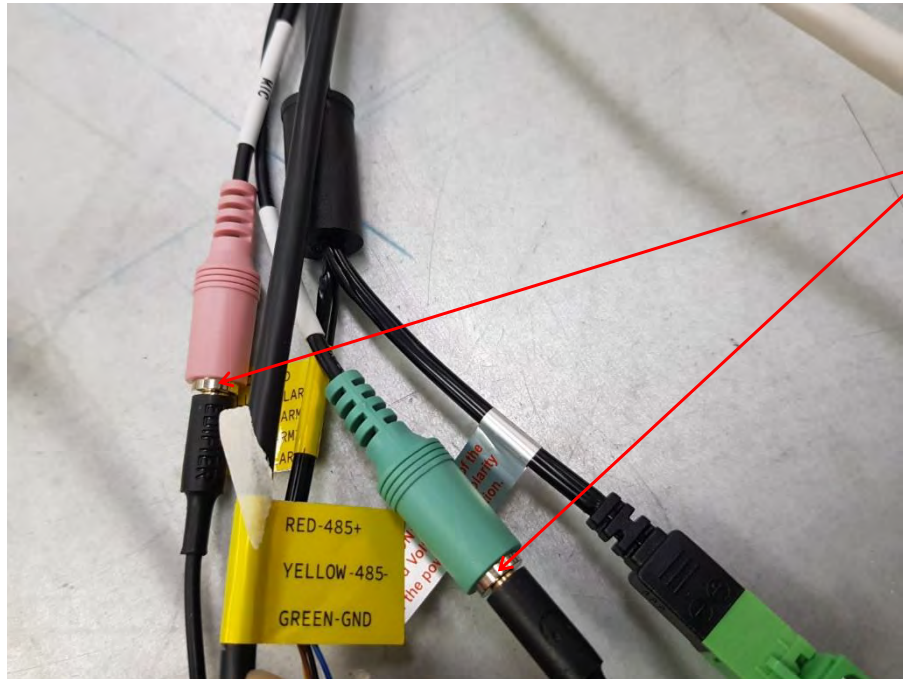


■ DC Mode

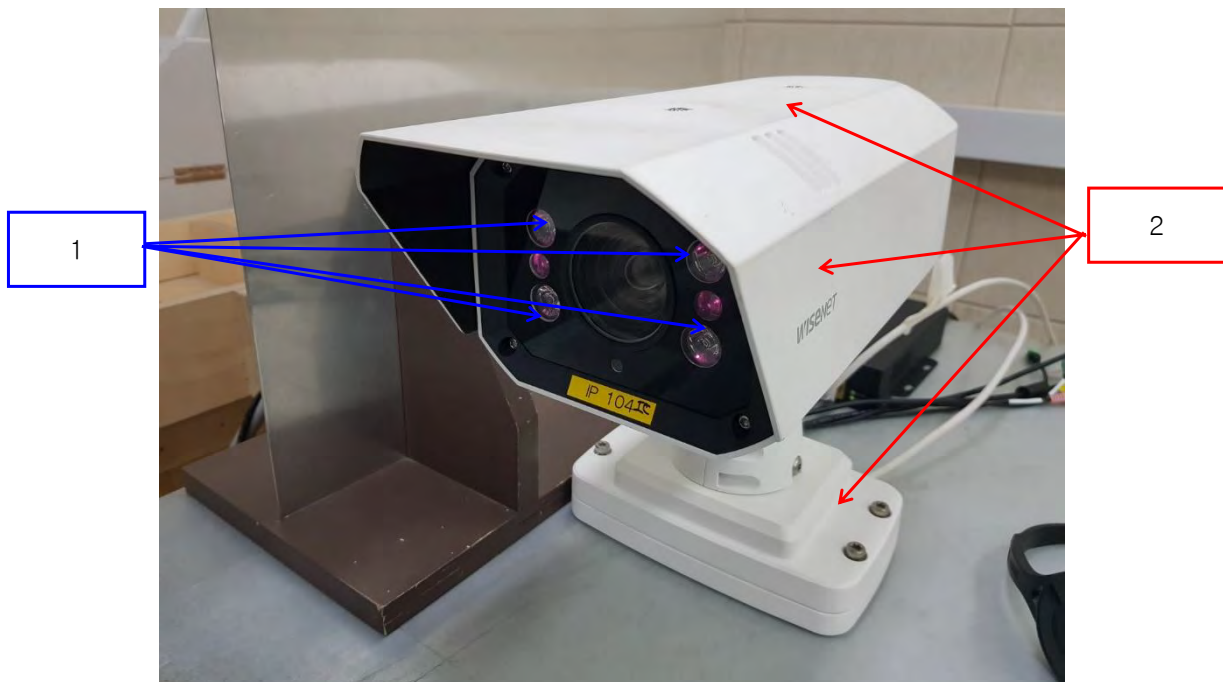


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

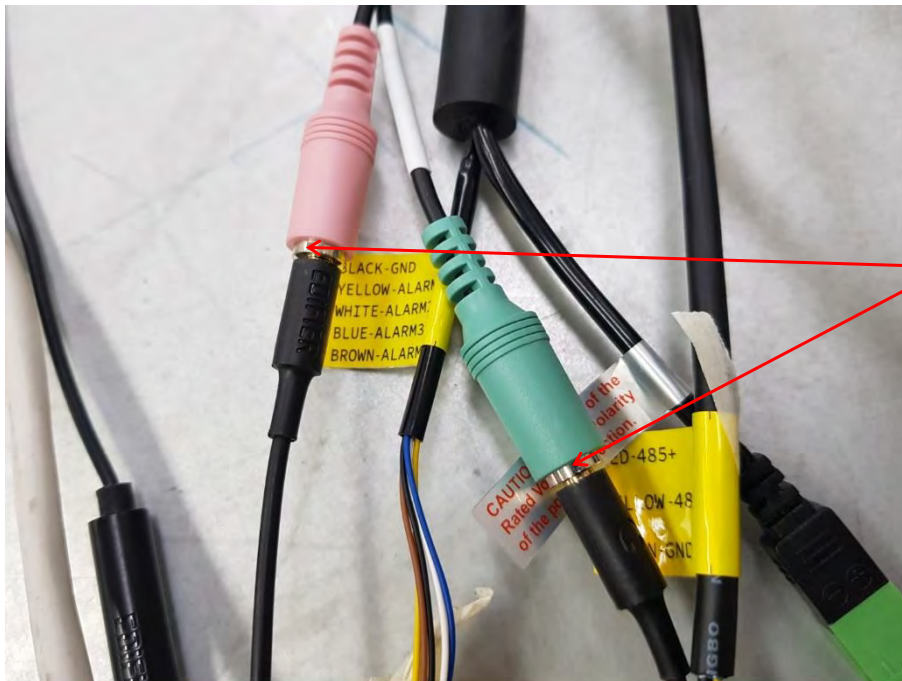




■ PoE Mode







### Test Data

#### ■ DC Mode

No.	Test Point	Discharge Method	Observations	Remarks
1	HCP Contact	Contact Discharge	Complied	-
2	VCP Contact	Contact Discharge	Complied	-

#### Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Camera Lens	Air Discharge	Complied	-
2	Enclosure	Contact Discharge	Complied	-
3	Screw	Contact Discharge	Complied	-
4	Around the Audio Port	Contact Discharge	Complied	-

#### ■ PoE Mode

#### Indirect Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	HCP Contact	Contact Discharge	Complied	-
2	VCP Contact	Contact Discharge	Complied	-

#### Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Camera Lens	Air Discharge	Complied	-
2	Enclosure	Contact Discharge	Complied	-
3	Screw	Contact Discharge	Complied	-
4	Around the Audio Port	Contact Discharge	Complied	-

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

### Test Results

- ☒ PASS Required Performance Criteria  
☐ NOT PASS Required Performance Criteria

### Remarks

PASS Required Performance Criteria

## 3.2 Radiated Electric Field Immunity

Reference Standard  
EN IEC 61000-4-3:2020

Test Date  
Nov. 16, 2022

Test Location  
EMS-RS: ☐ SEMI ANECHOIC CHAMBER #2 ☒ SEMI ANECHOIC CHAMBER #3

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	EMC32	R & S	10.10.02	-
<input checked="" type="checkbox"/>	SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	08, 01, 2023
<input checked="" type="checkbox"/>	HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-
<input checked="" type="checkbox"/>	POWER METER	E4419B	Agilent	GB40203000	03, 31, 2023
<input checked="" type="checkbox"/>	AVERAGE POWER SENSOR	E9301A	Agilent	MY52170007	04, 04, 2023
<input checked="" type="checkbox"/>	AVERAGE POWER SENSOR	E9301A	Agilent	MY41498669	04, 04, 2023
<input checked="" type="checkbox"/>	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 03, 2023

### Test Conditions

Temperature: (22,8 ± 0,6) °C  
Relative Humidity: (46,3 ± 0,6) % R.H.  
Atmospheric Pressure: (100,2 ± 0,0) kPa



## 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-22T0927-R1

Page (28) of (81)

### Test Specifications

Antenna Polarization: Horizontal & vertical unless indicated otherwise

Antenna Distance: ☒ 3 m

Field Strength: ☐ 1 V/m ☐ 3 V/m  
☒ 10 V/m

Frequency Range: ☐ 80 MHz to 1 GHz ☐ 1,4 GHz to 2,7 GHz  
☒ 80 MHz to 2,7 GHz

Modulation: ☒ AM, 80 %, 1 kHz sine wave  
☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step: ☒ 1 % step

Dwell Time: ☐ 1 s ☒ 3 s

# of Sides Radiated: ☒ 4

Required Performance Criteria: ☒ Complied

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

**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-22T0927-R1  
Page (29) of (81)

**Test Data****■ DC Mode**

Side Exposed	Observations	
	Horizontal	Vertical
Front	Complied	Complied
Right	Complied	Complied
Back	Complied	Complied
Left	Complied	Complied

**■ PoE Mode**

Side Exposed	Observations	
	Horizontal	Vertical
Front	Complied	Complied
Right	Complied	Complied
Back	Complied	Complied
Left	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

**Test Results**

- ☒ PASS Required Performance Criteria  
☐ NOT PASS Required Performance Criteria

**Remarks**

PASS Required Performance Criteria

### 3.3 Electrical Fast Transients/Bursts

Reference Standard  
 EN 61000-4-4: 2012

Test Date  
 Nov. 15, 2022

Test Location  
 EMS-EFT: Electro wave Shieldroom #7

#### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.8	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	12, 03, 2022
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	03, 31, 2023
<input checked="" type="checkbox"/>	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	12, 03, 2022

#### Test Conditions

Temperature: (22,6 ± 0,1) °C  
 Relative Humidity: (46,3 ± 0,1) % R.H.  
 Atmospheric Pressure: (100,9 ± 0,0) kPa

#### Test Specifications

Pulse Amplitude & Polarity:  
 (AC Power Lines) ☐ ± 1.0 kV ☒ ± 2.0 kV  
☐ ± 4.0 kV

Pulse Amplitude & Polarity:  
 (Other supply / Signal Lines) ☐ ± 0.5 kV ☒ ± 1.0 kV  
☐ ± 2.0 kV

Burst Period: ☒ 300 ms ☐ 2 s

Repetition Rate: ☐ 5 kHz ☒ 100 kHz

Duration of Test Voltage: ☒ ≥ 1 min

Required Performance Criteria: ☒ Complied

### Test Data

■ DC Mode

☒ Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
L	Complied	Complied
N	Complied	Complied
PE	-	-
L – N	Complied	Complied
L – PE	-	-
N – PE	-	-
L – N – PE	-	-

☐ Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
-	-	-

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
RJ-45 (LAN)	Complied	Complied
RS-485	Complied	Complied
ALARM OUT	Complied	Complied
ALARM IN	Complied	Complied

☒ PoE Mode

☐ Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
L	-	-
N	-	-
PE	-	-
L – N	-	-
L – PE	-	-
N – PE	-	-
L – N – PE	-	-

☐ Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
-	-	-

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
RJ-45 (PoE)	Complied	Complied
RS-485	Complied	Complied
ALARM OUT	Complied	Complied
ALARM IN	Complied	Complied

Note: “Blank” = Not performed

Observations:

Complied – No degradation of function

### Test Results

☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

### Remarks

PASS Required Performance Criteria



### 3.4 Surge Transients

Reference Standard

EN 61000-4-5: 2014/A1: 2017

Test Date

Nov. 15, 2022

Test Location

EMS-Surge: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.8	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	12, 03, 2022
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	03, 31, 2023
<input checked="" type="checkbox"/>	CDN	CNV 508N1	EM TEST	P1610176296	12, 03, 2022

Test Conditions

Temperature: (22,6 ± 0,6) °C

Relative Humidity: (46,3 ± 0,6) % R.H.

Atmospheric Pressure: (100,9 ± 0,0) kPa



## 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-22T0927-R1

Page (34) of (81)

### Test Specifications

#### AC Power Lines

Source Impedance: 12 ohm for common Mode and 2 ohm for differential Mode

Surge Amplitude :

Common Mode

☐ (0,5 / 1,0 / 2,0) kV

Differential Mode

☒ (0,5 / 1,0) kV

Number of Surges:

☒ 5 surges per angle

Angle:

☒ 0°, 90°, 180°, 270° (input a.c. power port)

Polarity:

☒ Positive & Negative

Repetition Rate:

☐ 1 surge per min    ☒ 1 surge per 30 sec.

Required Performance Criteria: ☒ Complied

#### Other supply / Signal Lines

Source Impedance:

42 ohm for common Mode

Surge Amplitude:

Common Mode

☒ (0,5 / 1,0) kV

Number of Surges:

☒ 5 Surges

Polarity:

☒ Positive & Negative

Repetition Rate:

☐ 1 surge per min    ☒ 1 surge per 30 sec.

Required Performance Criteria: ☒ Complied

### Test Data

☒ DC Mode

☒ Line to Line – Differential Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L – N	Complied	Complied

☐ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L – PE	-	-
N – PE	-	-

### Signal Lines

☒ Line to Earth – Common Mode

Mode of Application	Coupling Method	Observations	
		(+) Surge (kV)	(-) Surge (kV)
RJ-45 (LAN)	CDN	Complied	Complied
	LINE	Complied	Complied

**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-22T0927-R1

Page (36) of (81)

☒ PoE Mode☐ Line to Line – Differential Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L – N	-	-

☐ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L – PE	-	-
N – PE	-	-

## Signal Lines

☒ Line to Earth – Common Mode

Mode of Application	Coupling Method	Observations	
		(+) Surge (kV)	(-) Surge (kV)
RJ-45 (PoE)	CDN	Complied	Complied
	LINE	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

## Test Results

☒ PASS Required Performance Criteria☐ NOT PASS Required Performance Criteria

## Remarks

PASS Required Performance Criteria

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

The authenticity of the test report, contact kes@kes.co.kr

### 3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6: 2014

Test Date

Nov. 17, 2022

Test Location

EMS-CS: Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	icd.control	EM TEST	5.3.12	-
<input checked="" type="checkbox"/>	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	11, 10, 2023
<input checked="" type="checkbox"/>	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 10, 2023
<input checked="" type="checkbox"/>	CDN	CDN M016	TESEQ	43694	11, 10, 2023
<input checked="" type="checkbox"/>	CDN	CDN M016	TESEQ	43697	11, 10, 2023
<input checked="" type="checkbox"/>	CDN	CDN ST08A	TESEQ	43886	11, 10, 2023
<input checked="" type="checkbox"/>	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 14, 2023

Test Conditions

Temperature: (23,5 ± 0,6) °C

Relative Humidity: (48,3 ± 0,6) % R.H.

Atmospheric Pressure: (100,5 ± 0,0) kPa



# 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-22T0927-R1

Page (38) of (81)

## Test Specifications

Frequency range:

☒ 150 kHz to 100 MHz

☐ 150 kHz to 80 MHz

Voltage Level:

☐ 1 Vrms

☐ 3 Vrms

☒ 10 Vrms

Modulation:

☒ AM, 80 %, 1 kHz sine wave

☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step:

☒ 1 % step

Dwell Time:

☐ 1 s

☒ 3 s

Required Performance Criteria: ☒ Complied

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

**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-22T0927-R1

Page (39) of (81)

## Test Data

☒ DC Mode☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L – N	CDN	Complied

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	-	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45 (LAN)	CDN	Complied
RS-485	Clamp	Complied
ALARM OUT	Clamp	Complied
ALARM IN	Clamp	Complied

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

**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-22T0927-R1

Page (40) of (81)

☒ PoE Mode☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	-	-

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	-	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45 (PoE)	CDN	Complied
RS-485	Clamp	Complied
ALARM OUT	Clamp	Complied
ALARM IN	Clamp	Complied

Notes: CDN = Coupling Decoupling Network  
"blank" = Not performed

Observations:

Complied – No degradation of function

**Test Results**☒ PASS Required Performance Criteria☐ NOT PASS Required Performance Criteria**Remarks**PASS Required Performance Criteria

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr



### 3.6 Voltage Dips and Short Interruptions

Reference Standard  
EN IEC 61000-4-11:2020Test Date  
Nov. 15, 2022Test Location  
EMS-Voltage dip: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.8	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	03, 31, 2023
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	03, 31, 2023

Test Conditions

Temperature: (22,6 ± 0,1) °C  
Relative Humidity: (46,3 ± 0,1) % R.H.  
Atmospheric Pressure: (100,9 ± 0,0) kPa

**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-22T0927-R1  
Page (42) of (81)

**Test Specifications & Observations/Remarks****■ DC Mode****- Voltage Dips and Short Interruptions**

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
<input checked="" type="checkbox"/> 20 % dip	<input checked="" type="checkbox"/> 250 / 5 000	<u>Complied</u>
<input checked="" type="checkbox"/> 30 % dip	<input checked="" type="checkbox"/> 25 / 500	<u>Complied</u>
<input checked="" type="checkbox"/> 60 % dip	<input checked="" type="checkbox"/> 10 / 200	<u>Complied</u>
<input checked="" type="checkbox"/> 100 % dip	<input checked="" type="checkbox"/> 250 / 5 000	<u>Degradation</u>

**- Voltage variations**

<input checked="" type="checkbox"/> Unom + 10 %	<input checked="" type="checkbox"/> 253.0 V (ac)	<u>Complied</u>
<input checked="" type="checkbox"/> Unom - 15 %	<input checked="" type="checkbox"/> 195.5 V (ac)	<u>Complied</u>

**Observations:**

Complied – No degradation of function

Degradation - See "Remarks "

**Test Results**

- ☒ PASS Required Performance Criteria  
☐ NOT PASS Required Performance Criteria  
☐ NOT APPLICABLE

**Remarks**

During the test(100%, 250cycle), EUT was turned off but after the test, it was recovered by no operator's intervention.

## APPENDIX A – TEST DATA

### Conducted Emissions at Mains Power Ports

■ DC Mode

[HOT]

### Common Information

Test Description:

Conducted Emission

Model No.:

TNO-7180RLP

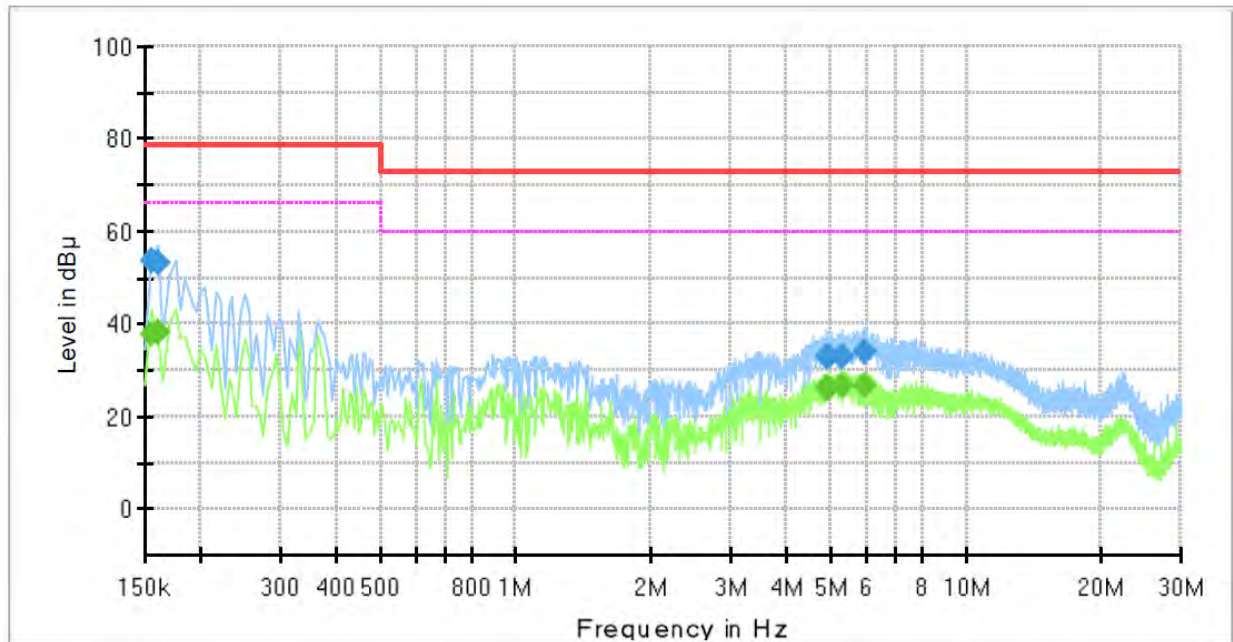
Phase:

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

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

The authenticity of the test report, contact kes@kes.co.kr

[NEUTRAL]

## Common Information

Test Description:

Model No.:

Phase:

Mode:

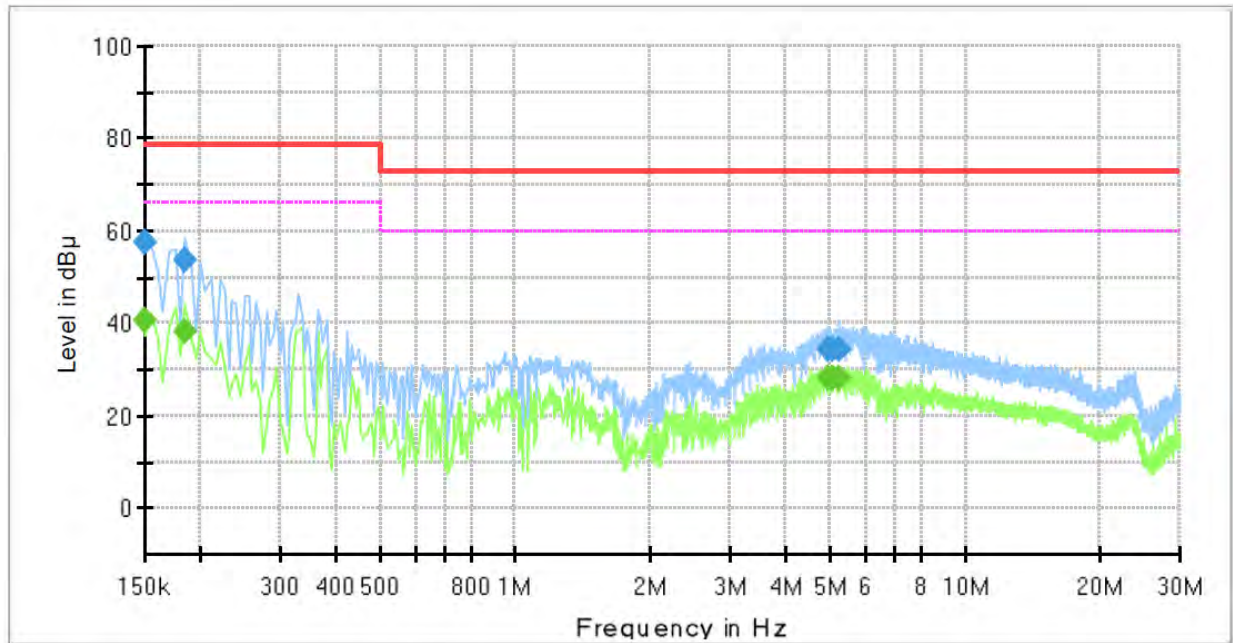
Operator Name:

Conducted Emission

TNO-7180RLP

DC\_N

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))

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

The authenticity of the test report, contact kes@kes.co.kr



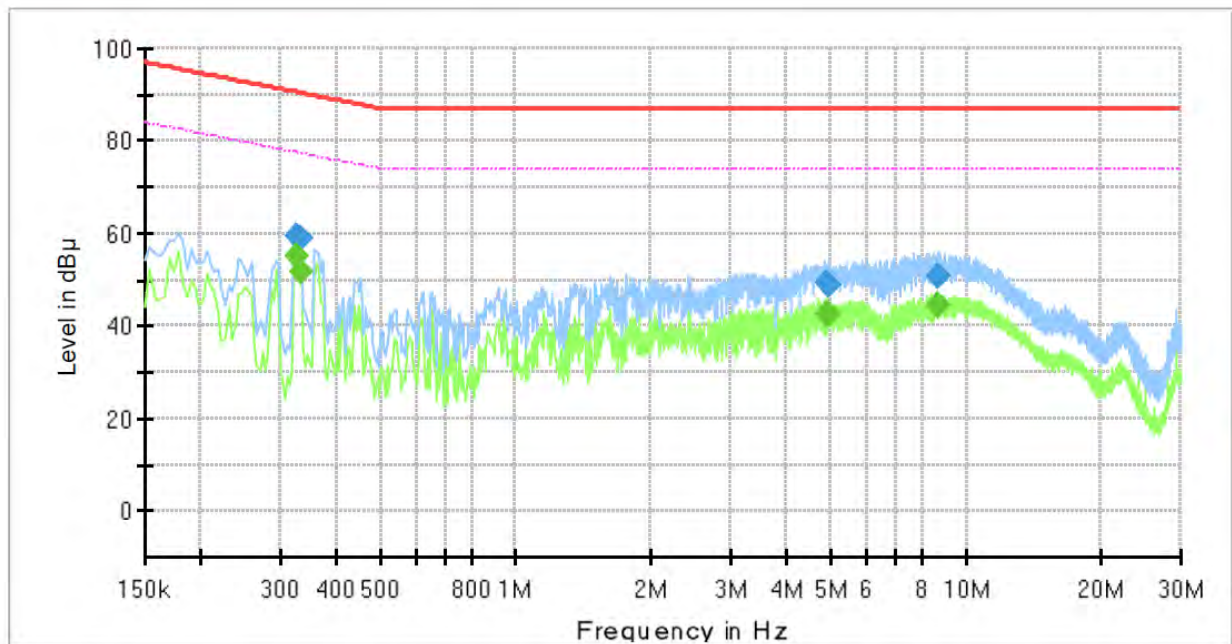
## Conducted Emissions at Telecommunication Ports

■ 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

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

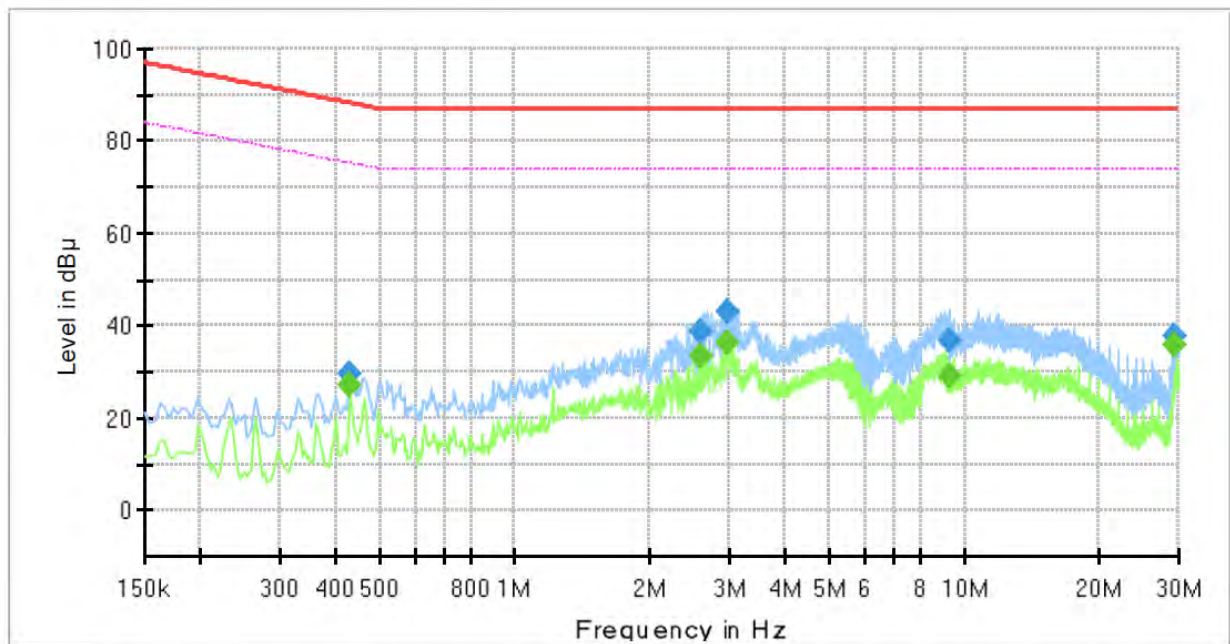
The authenticity of the test report, contact kes@kes.co.kr

**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))

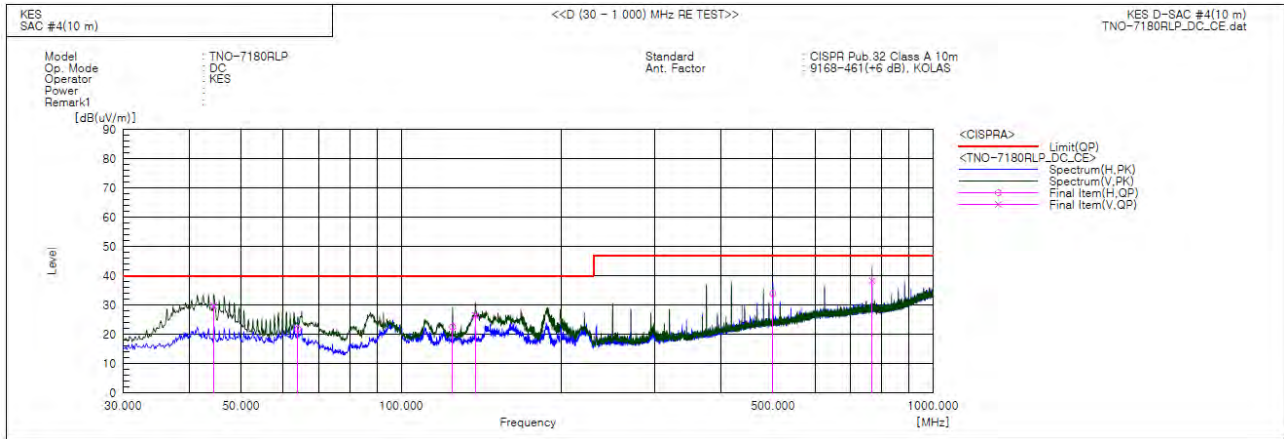
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

The authenticity of the test report, contact kes@kes.co.kr

## Radiated Electric Field Emissions(Below 1 GHz)

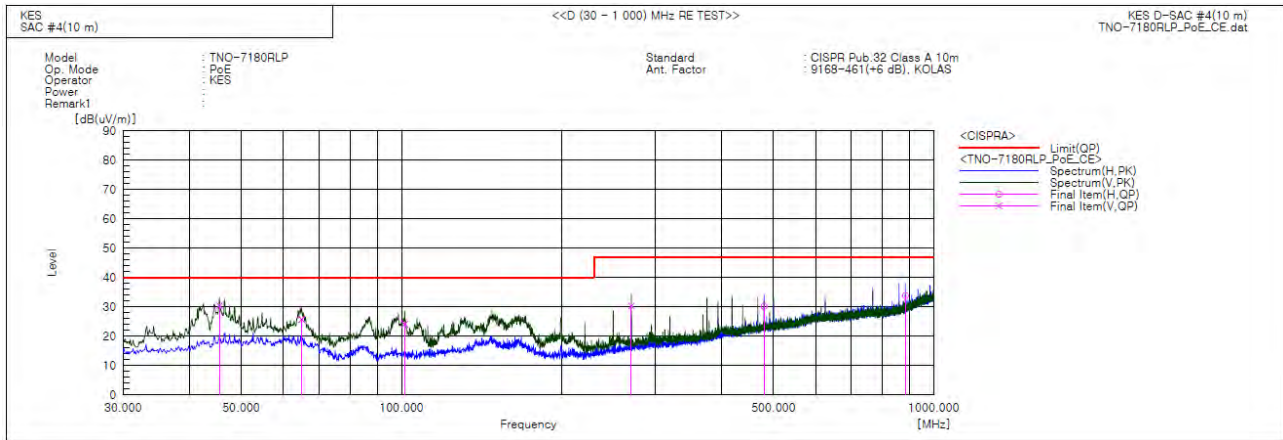
### ■ DC Mode



### 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	

## 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 – SEMI ANECHOIC CHAMBER #4(10 m)

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 - Preamplifier Factor), Margin: Margin value





## 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

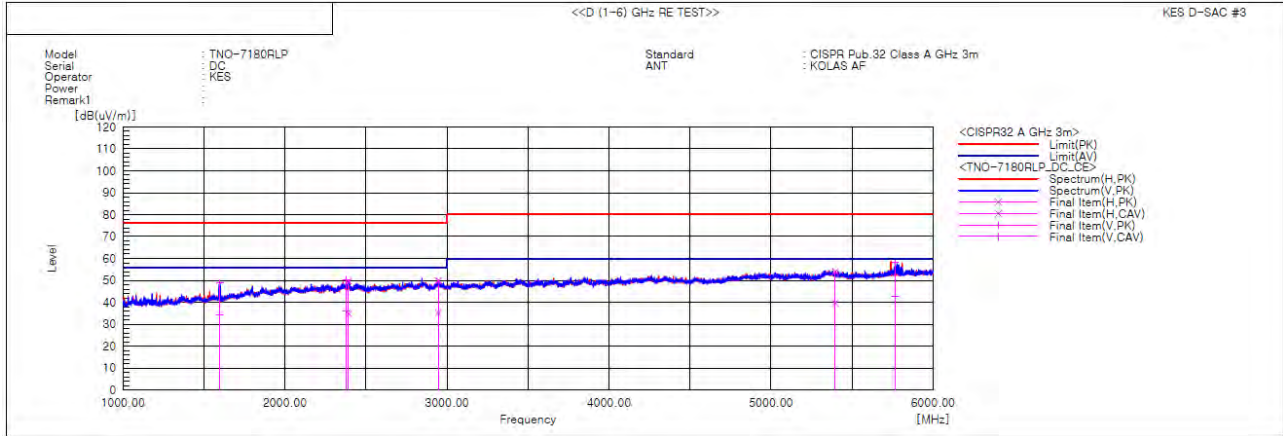
Report No.:

KES-EM-22T0927-R1

Page (49) of (81)

### 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	

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr



## KES Co., Ltd.

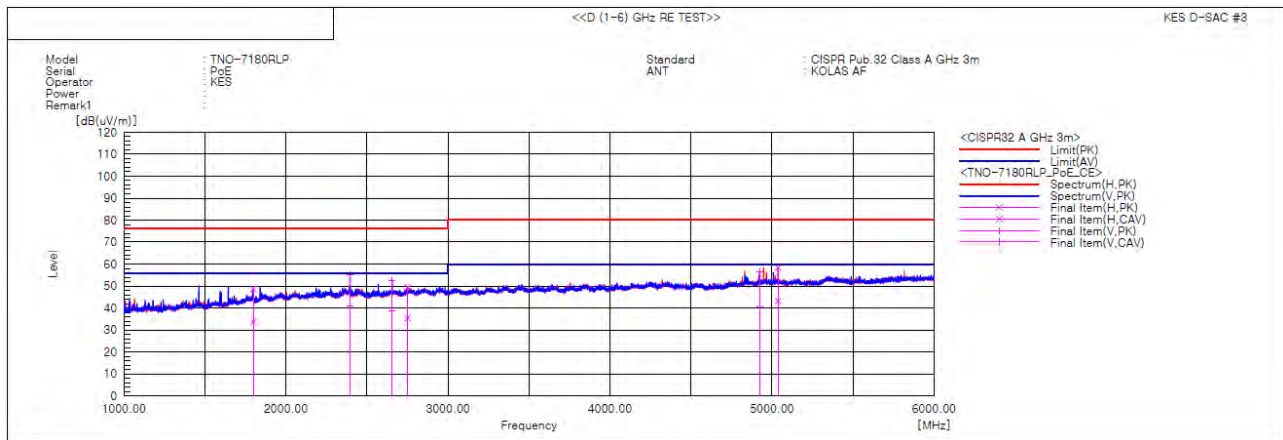
3701, 40, Simin-daero 365beon-gil,  
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea  
Tel: +82-31-425-6200 / Fax: +82-31-424-0450  
www.kes.co.kr

Report No.:

KES-EM-22T0927-R1

Page (50) of (81)

### ■ 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

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

The authenticity of the test report, contact kes@kes.co.kr

## Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ DC Mode

### Average harmonic current results

Hn	I <sub>eff</sub> [A]	% of Limit	Limit [A]	Result
1	0.085			
2	0.001	0.137	1.080	n/a
3	0.078	3.394	2.300	PASS
4	0.002	0.543	0.430	n/a
5	0.076	6.645	1.140	PASS
6	0.002	0.620	0.300	n/a
7	0.072	9.365	0.770	PASS
8	0.002	0.883	0.230	n/a
9	0.066	16.502	0.400	PASS
10	0.002	0.858	0.184	n/a
11	0.060	18.050	0.330	PASS
12	0.002	1.009	0.153	n/a
13	0.053	25.084	0.210	PASS
14	0.002	1.296	0.131	n/a
15	0.046	30.421	0.150	PASS
16	0.002	1.459	0.115	n/a
17	0.039	29.179	0.132	PASS
18	0.002	1.657	0.102	n/a
19	0.032	27.165	0.118	PASS
20	0.002	1.871	0.092	n/a
21	0.027	16.553	0.161	PASS
22	0.002	2.133	0.084	n/a
23	0.022	14.864	0.147	PASS
24	0.002	2.220	0.077	n/a
25	0.019	13.725	0.135	PASS
26	0.002	2.339	0.071	n/a
27	0.016	13.147	0.125	PASS
28	0.002	2.350	0.066	n/a
29	0.016	13.473	0.116	PASS
30	0.002	2.576	0.061	n/a
31	0.015	13.899	0.109	PASS
32	0.001	2.604	0.058	n/a
33	0.015	14.486	0.102	PASS
34	0.001	2.661	0.054	n/a
35	0.014	14.805	0.096	PASS
36	0.001	2.847	0.051	n/a
37	0.013	14.602	0.091	PASS
38	0.001	2.847	0.048	n/a
39	0.012	14.058	0.087	PASS
40	0.001	3.151	0.046	n/a

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

\* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.



Test Data - Harmonics (continued)

**Maximum harmonic current results**

Hn	I <sub>eff</sub> [A]	% of Limit	Limit [A]	Result
1	0.086			
2	0.002	0.138	1.620	n/a
3	0.079	2.286	3.450	PASS
4	0.003	0.464	0.645	n/a
5	0.077	4.476	1.710	PASS
6	0.002	0.538	0.450	n/a
7	0.073	6.346	1.155	PASS
8	0.003	0.756	0.345	n/a
9	0.067	11.104	0.600	PASS
10	0.002	0.778	0.276	n/a
11	0.060	12.133	0.495	PASS
12	0.002	0.871	0.230	n/a
13	0.053	16.820	0.315	PASS
14	0.002	1.062	0.197	n/a
15	0.046	20.424	0.225	PASS
16	0.002	1.213	0.173	n/a
17	0.039	19.547	0.199	PASS
18	0.002	1.394	0.153	n/a
19	0.032	18.288	0.178	PASS
20	0.002	1.537	0.138	n/a
21	0.027	16.705	0.161	PASS
22	0.002	1.766	0.125	n/a
23	0.022	15.031	0.147	PASS
24	0.002	1.852	0.115	n/a
25	0.019	13.874	0.135	PASS
26	0.002	2.090	0.106	n/a
27	0.017	13.298	0.125	PASS
28	0.002	2.107	0.099	n/a
29	0.016	13.683	0.116	PASS
30	0.002	2.182	0.092	n/a
31	0.015	14.117	0.109	PASS
32	0.002	2.257	0.086	n/a
33	0.015	14.821	0.102	PASS
34	0.002	2.165	0.081	n/a
35	0.015	15.091	0.096	PASS
36	0.002	2.345	0.077	n/a
37	0.014	14.938	0.091	PASS
38	0.002	2.362	0.073	n/a
39	0.012	14.389	0.087	PASS
40	0.002	2.529	0.069	n/a

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

\* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.

**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-22T0927-R1

Page (53) of (81)

Test Data - Voltage Fluctuations

**Maximum Flicker results**

## ■ DC Mode

Flicker Measurements					
	Plt	Max Pst	Max Dc	Max Dmax	Max Tmax
Line 1:	0.028	0.028	0	< 0.2	0
Limits:	0.65	1	3.3	4	0.5
Results:	PASS	PASS	PASS	PASS	PASS

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

## Test Setup Photos and Configuration

### Conducted Emissions at Mains Power Ports

■ DC Mode



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr



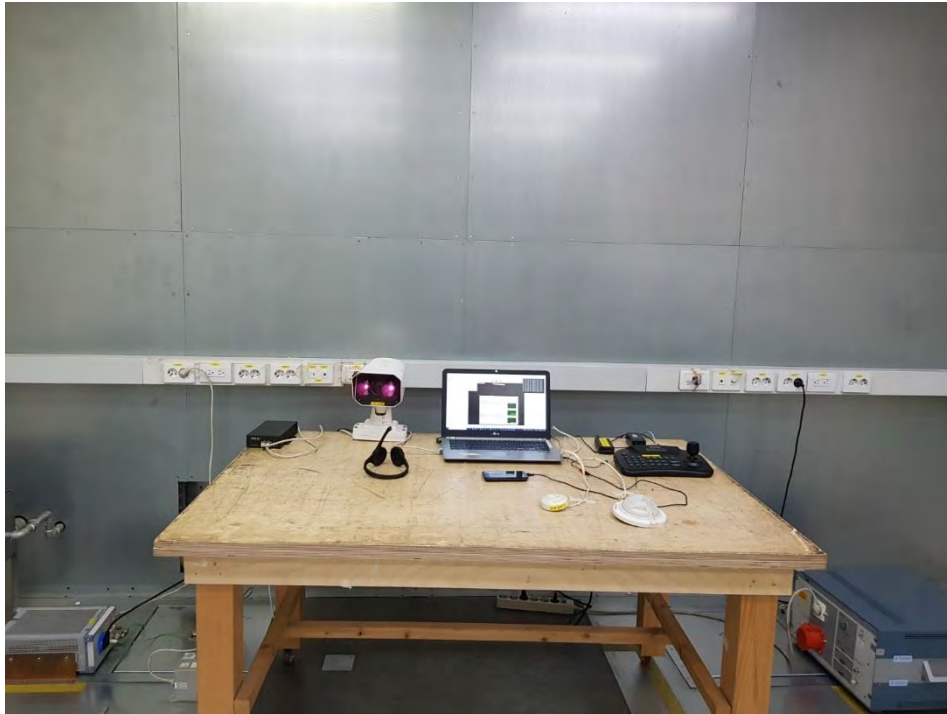
## Conducted Emissions at Telecommunication Ports

■ DC Mode



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

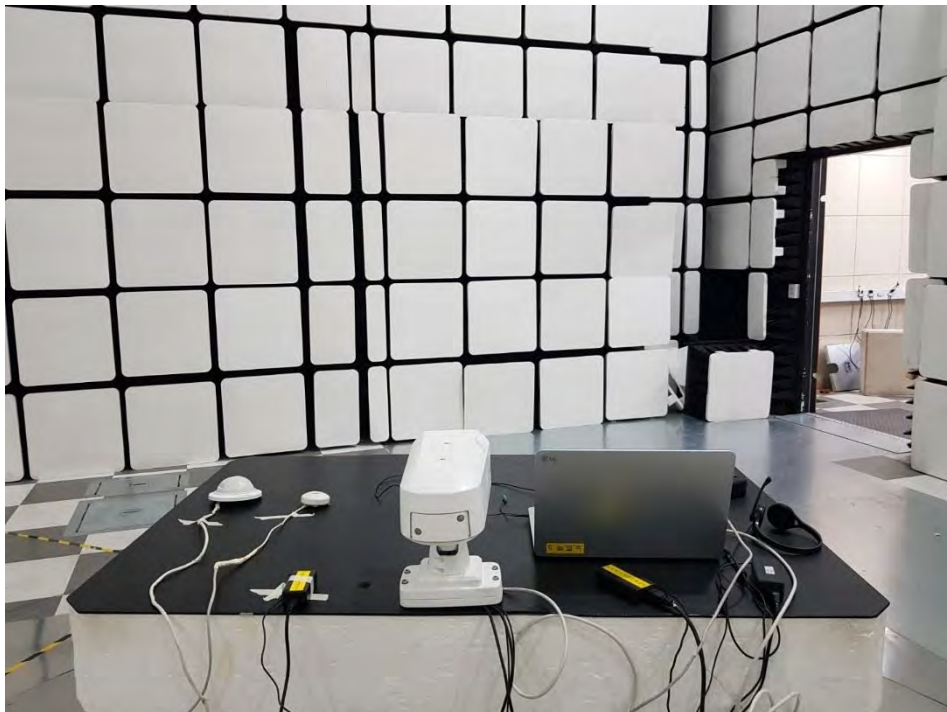
## ■ PoE Mode





## Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

## ■ PoE Mode

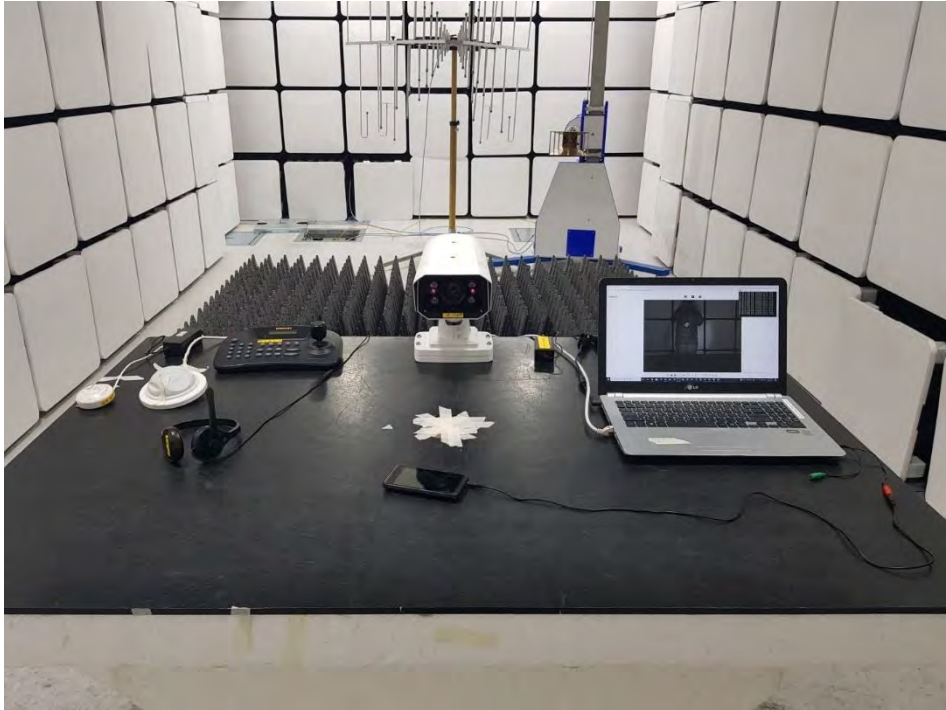


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr



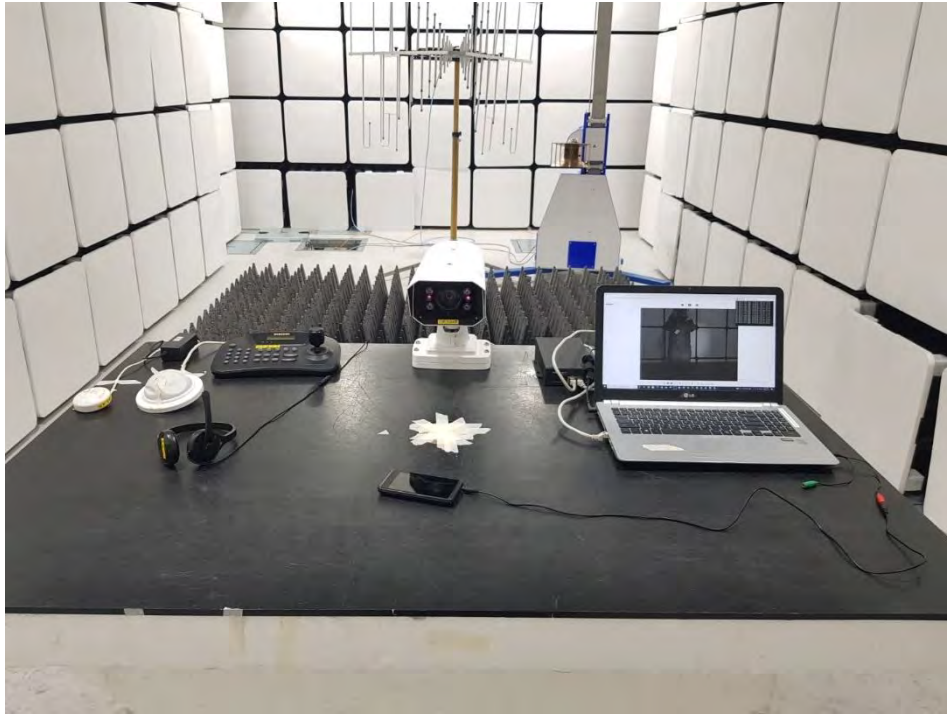
## Radiated Electric Field Emissions(Above 1 GHz)

■ DC Mode



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

■ PoE Mode



## Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ DC Mode



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr



## Electrostatic Discharge

### ■ DC Mode



### ■ PoE Mode



## Radiated Electric Field Immunity

### ■ DC Mode



### ■ PoE Mode



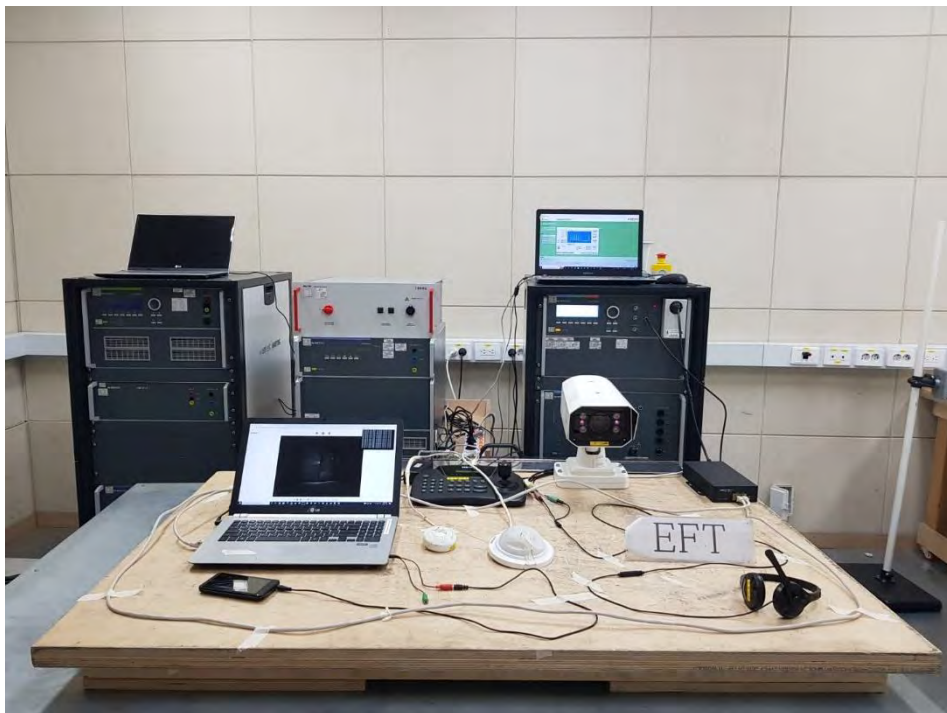


## Electrical Fast Transients/Bursts

### ■ DC Mode



### ■ PoE Mode

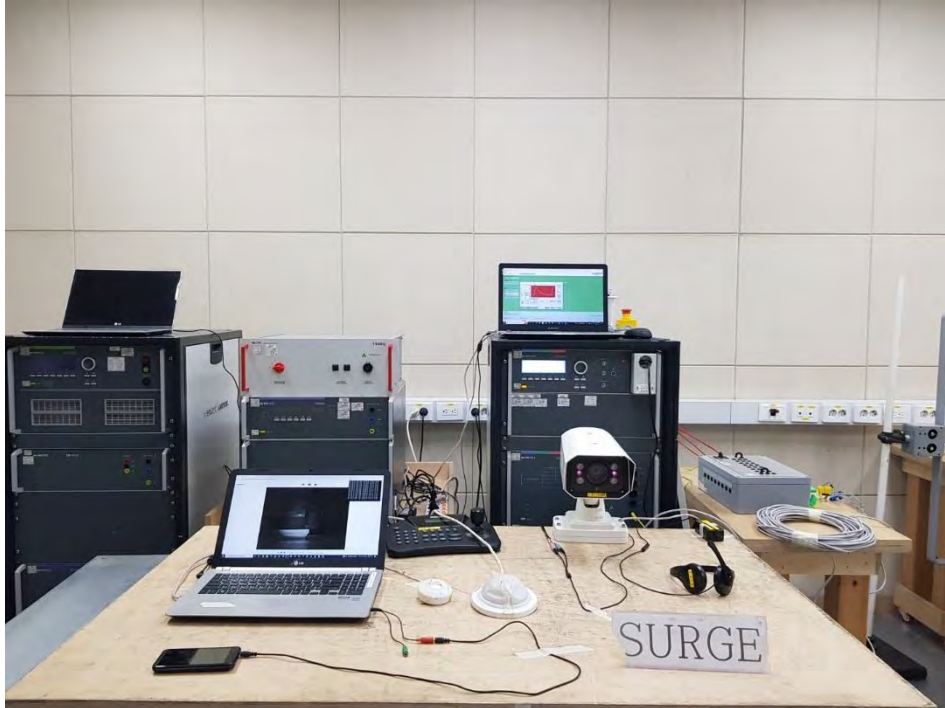


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

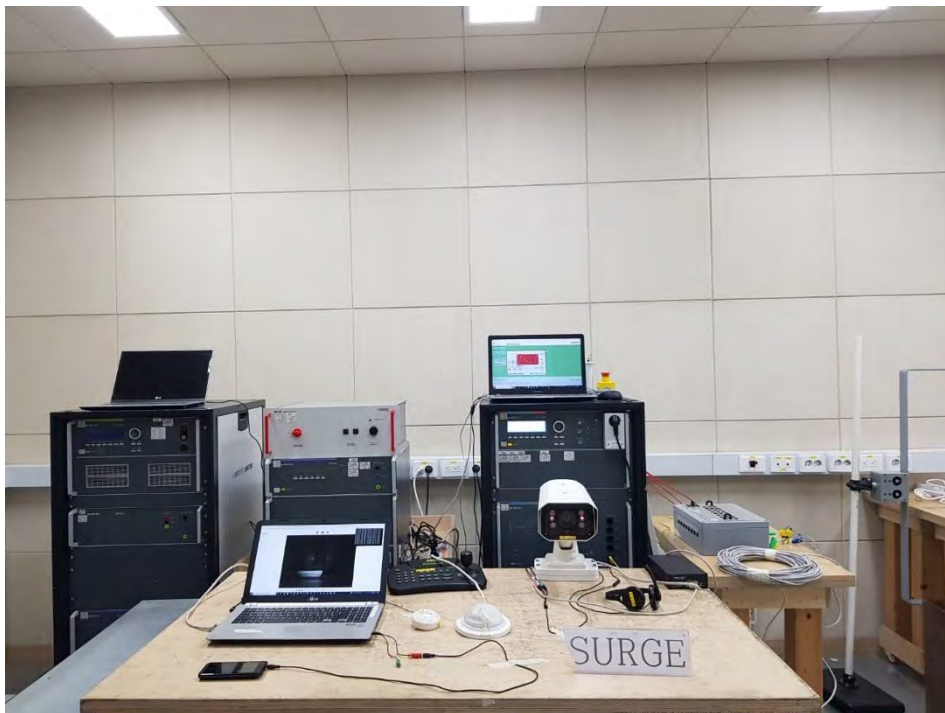


## Surge Transients

### ■ DC Mode



### ■ PoE Mode



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

## Conducted Disturbance

### ■ DC Mode



### ■ PoE Mode



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

## Voltage Dips and Short Interruptions

■ DC Mode



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr



## EUT External Photographs

(Top)



(Bottom)



## EUT Internal Photographs

(Internal View)



## EUT Internal View – Main Board

(Top)



(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

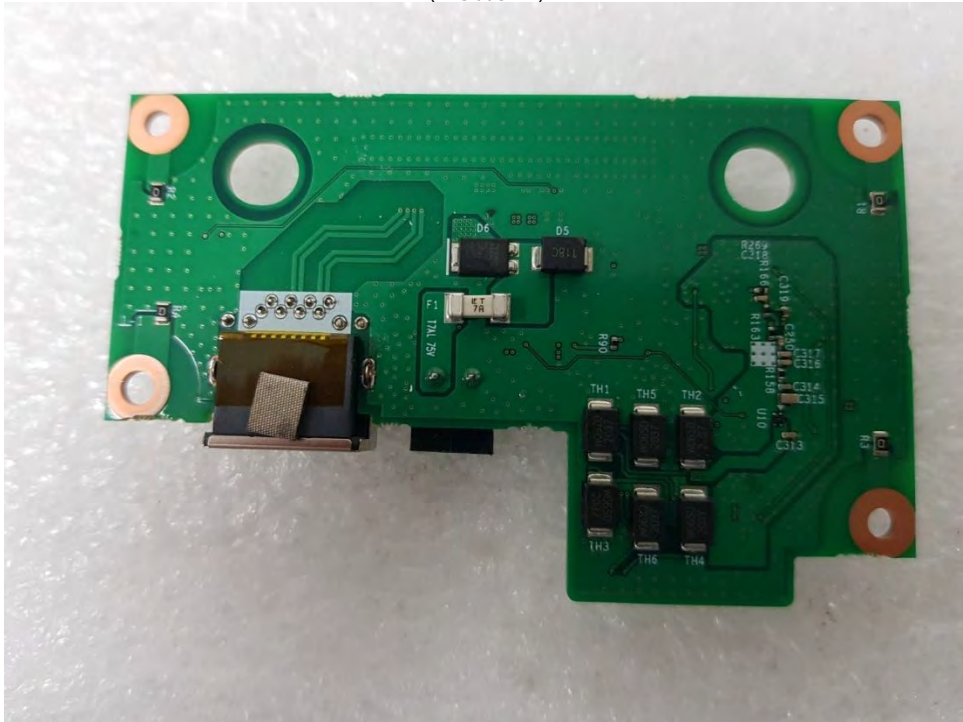


## EUT Internal View – Sub Board 1

(Top)



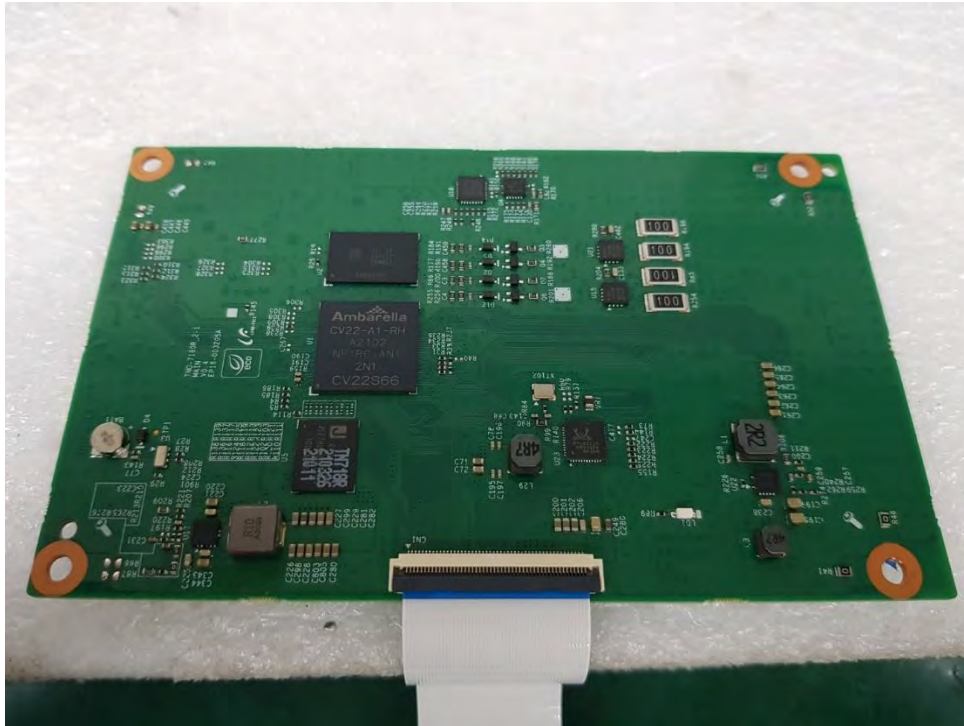
(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

## EUT Internal View - Sub Board 2

(Top)



(Bottom)

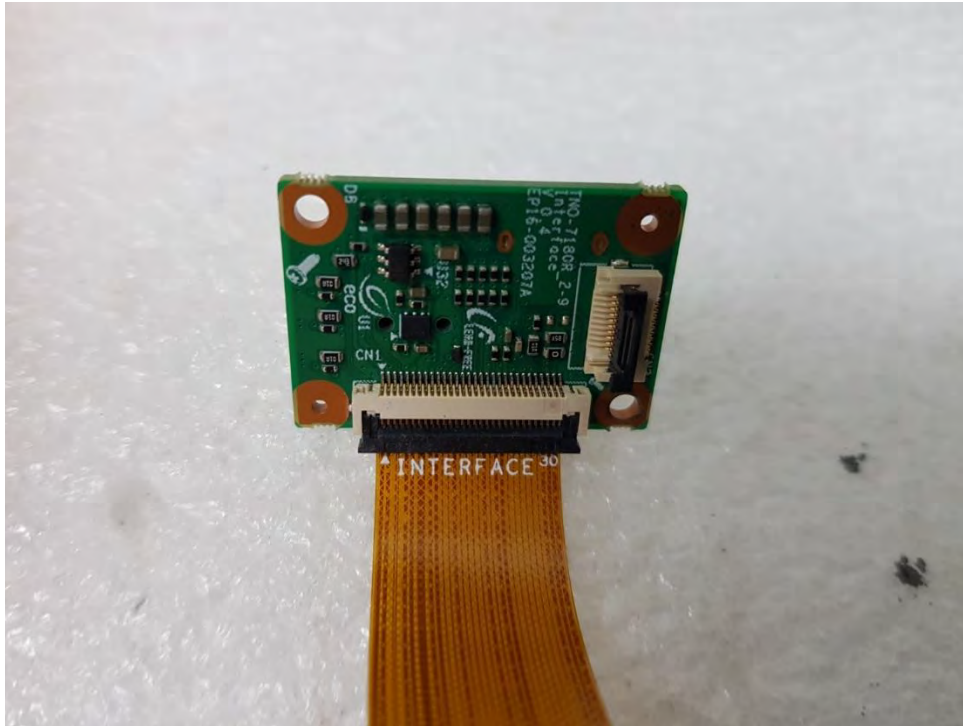


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr



## EUT Internal View – Sub Board 3

(Top)



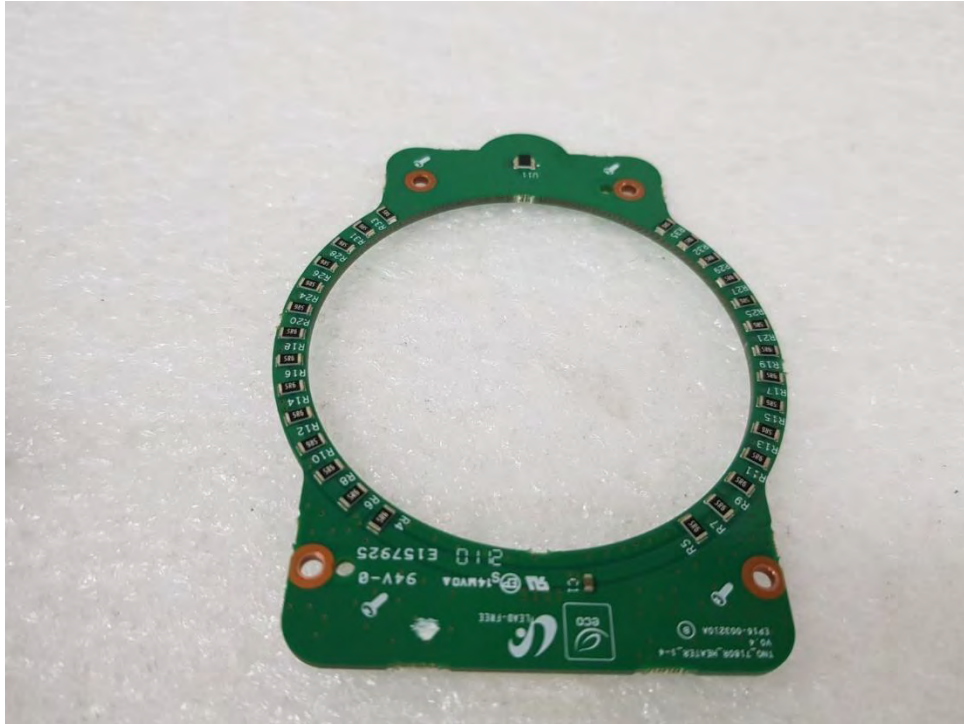
(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

## EUT Internal View – Sub Board 4

(Top)



(Bottom)

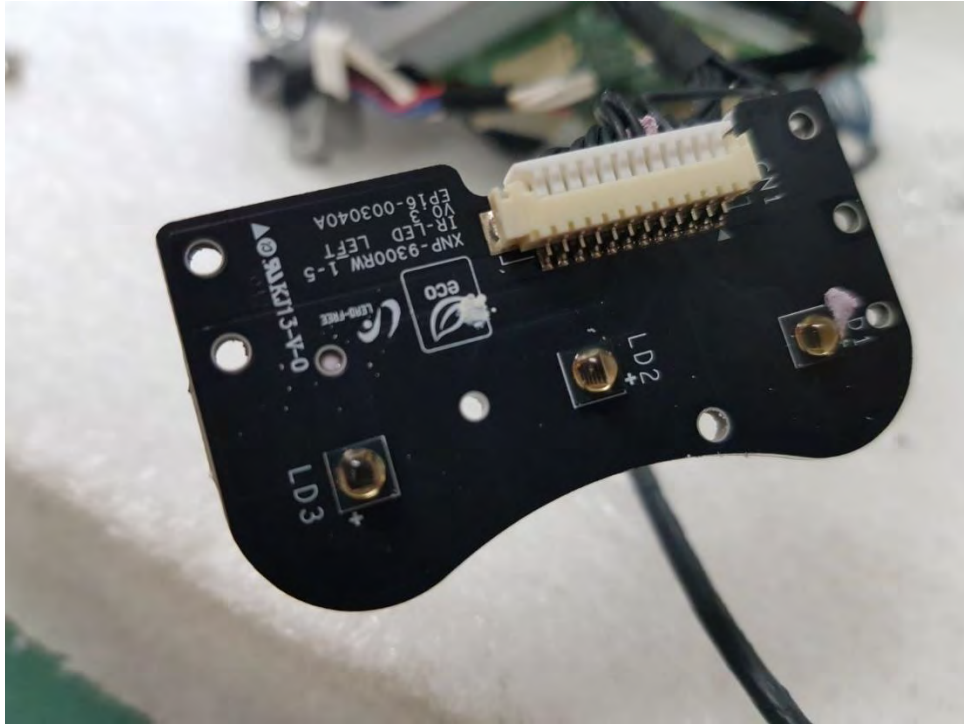


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

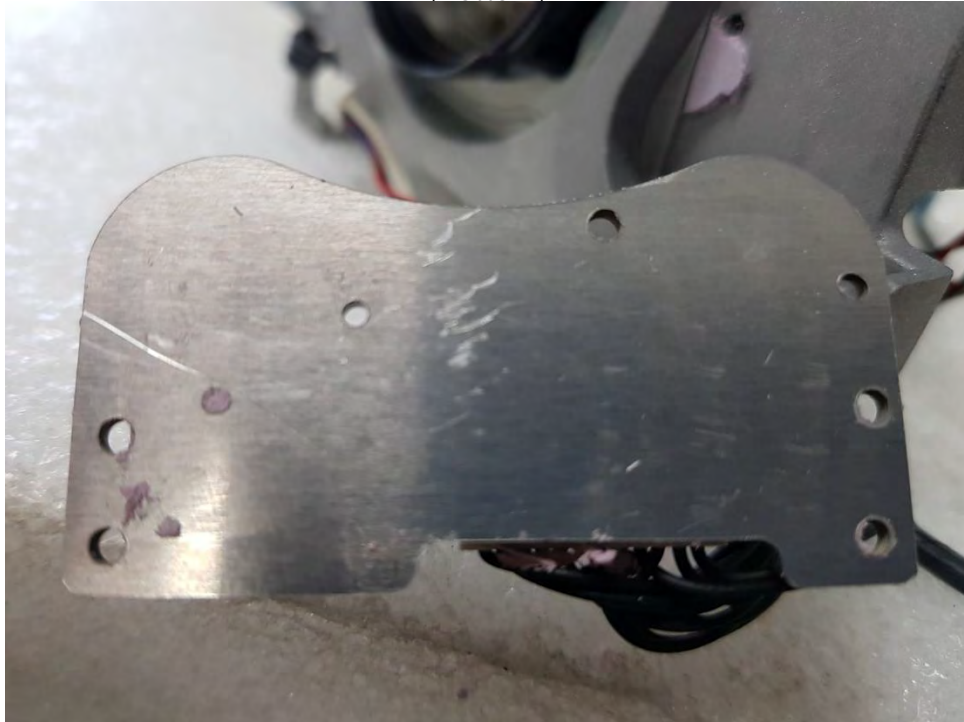


## EUT Internal View – Sub Board 5

(Top)



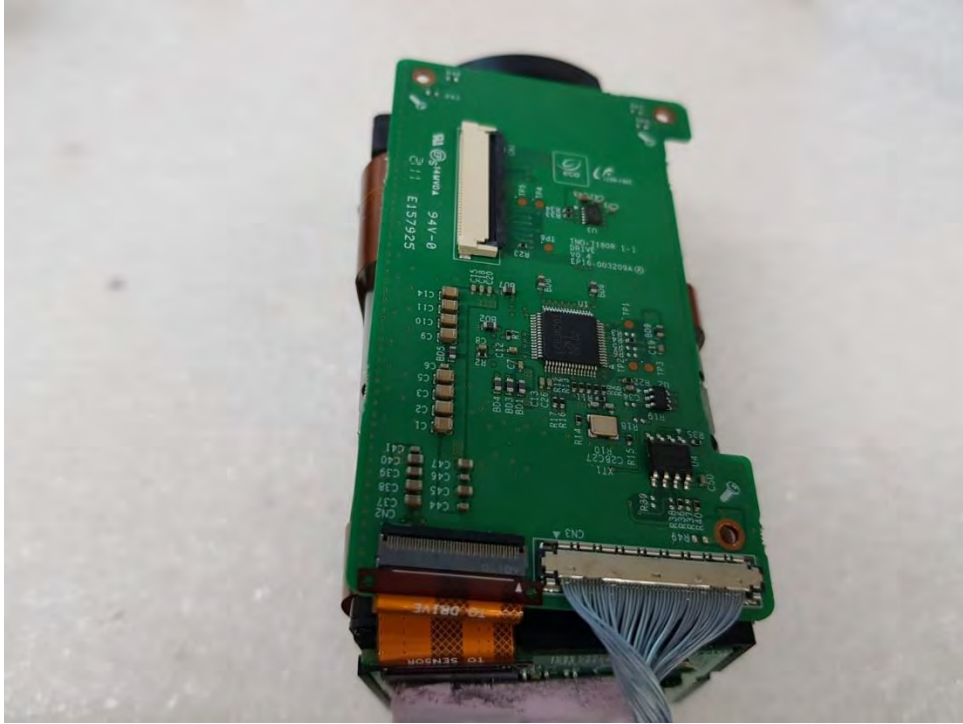
(Bottom)



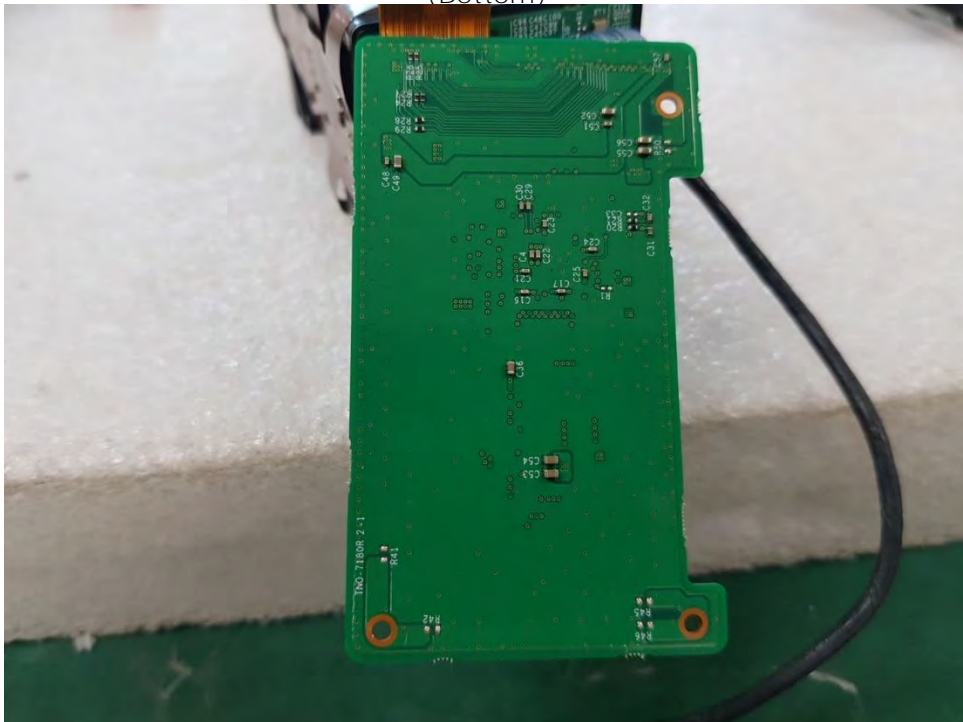
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

## EUT Internal View – Sub Board 6

(Top)



(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

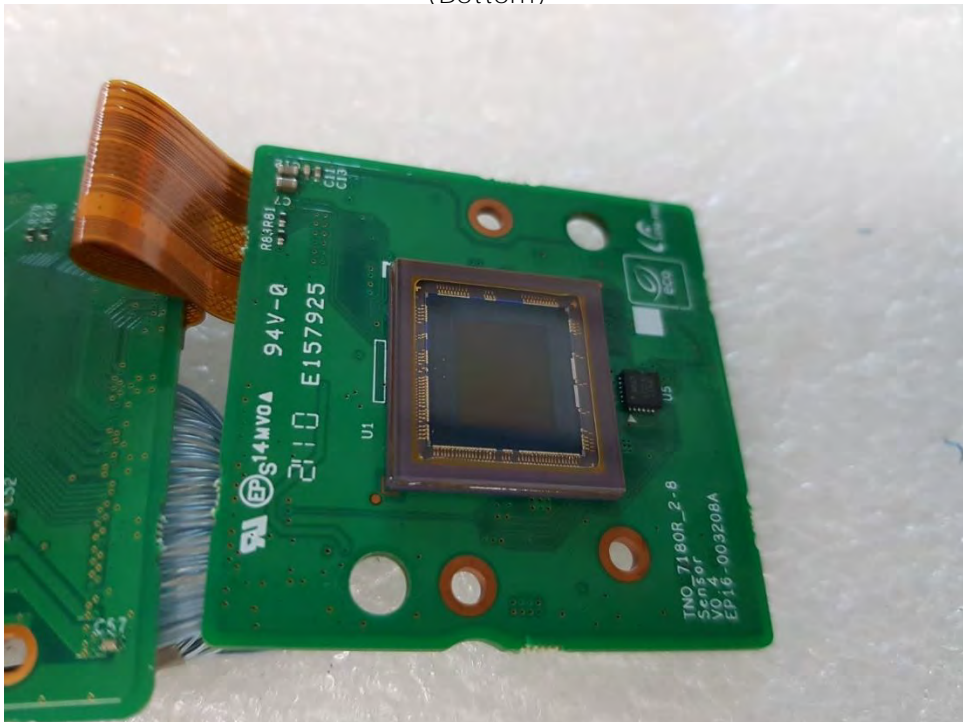


## EUT Internal View – Sub Board 7

(Top)



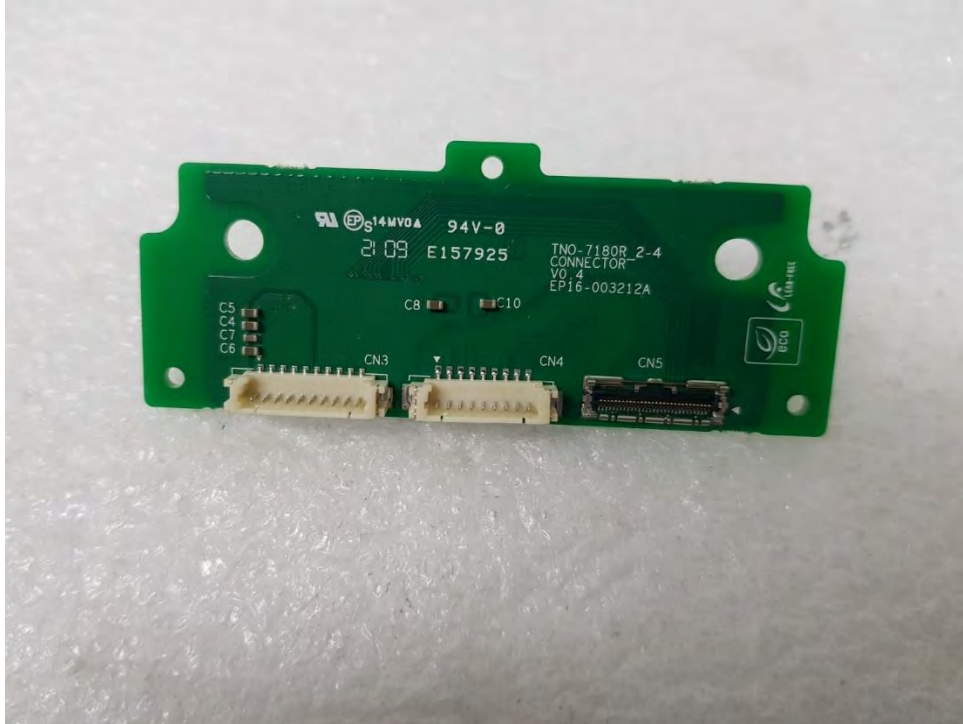
(Bottom)



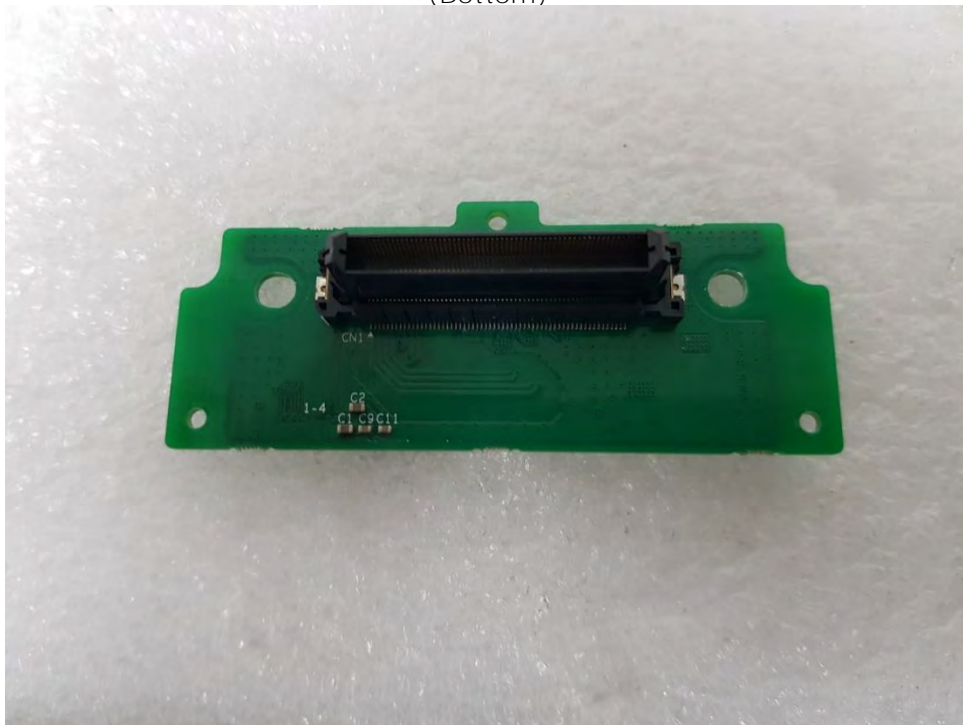
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

## EUT Internal View – Sub Board 8

(Top)



(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
 The authenticity of the test report, contact kes@kes.co.kr



## EUT Internal View – Camera Main Board

(Top)





## EUT Internal View – Lens

(Top)

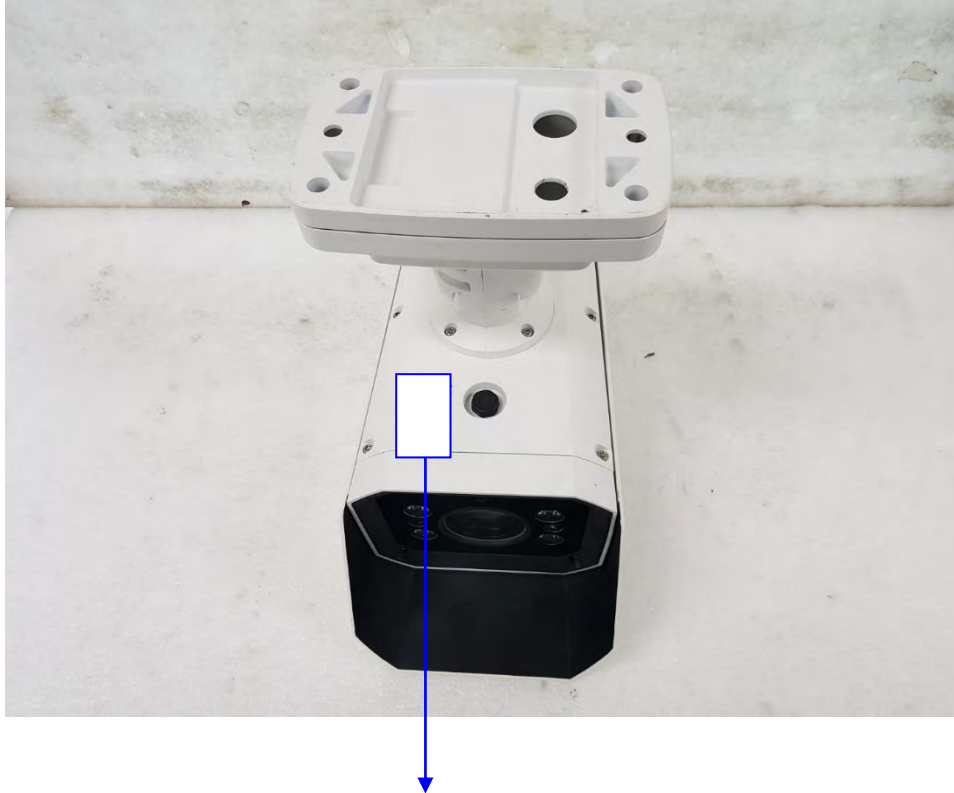


(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

## Label and Location



### ANPR CAMERA

Model No : TNO-7180RLP

Manufacturer : HANWHA VISION VIETNAM COMPANY LIMITED

Made in Vietnam

