



## EMC TEST REPORT For CE

Test Report No. : KES-E1-18T0071  
Date of Issue : Jan. 10, 2018  
Product name : Network Camera  
Model/Type No. : LNO-6070RP  
Variant Model : -  
Applicant : Hanwha Techwin Co., Ltd.  
Applicant Address : 1204, Changwon-daero, Seongsan-gu Changwon-si,  
Gyeongsangnam-do, Korea  
Manufacturer : Hanwha Techwin (Tianjin) Co., Ltd.  
Manufacturer Address : No.11 Weiliu Rd, Micro-Electronic Industrial Park, TEDA,  
Tianjin, 300385, People's Republic of China  
Date of Receipt : Dec. 21, 2017  
Test date : Jan. 02, 2018 ~ Jan. 05, 2018  
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

*Tested by*

Sung Min, Choi  
EMC Test Engineer

*Reviewed by*

Dong-Hun, Jang  
EMC Technical Manager

This test report is not related to KOLAS.

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**REPORT REVISION HISTORY**

Date	Test Report No.	Revision History
Jan. 10, 2018	KES-E1-18T0071	Issued

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## 1.0 General Product Description

### Main Specifications of E.U.T are:

<b>Video</b>	
Imaging Device	1/2.9" 2.19M CMOS
Total Pixels	2,000(H) x 1,121(V)
Effective Pixels	1,984(H) x 1,105(V)
Scanning System	Progressive
Min. Illumination	Color : 0.095Lux (1/30sec, F1.6), 0.003Lux (2sec, F1.6) B/W : 0Lux (IR LED on)
<b>Lens</b>	
Focal Length (Zoom Ratio)	3.2~10mm (3.1x) varifocal
Max. Aperture Ratio	F1.6~2.9
Angular Field of View	H : 101.6°(Wide) ~ 31.3°(Tele) V : 54.1°(Wide) ~ 17.8°(Tele) D : 120.6°(Wide) ~ 36.0°(Tele)
Min. Object Distance	0.5m
Focus Control	Manual
Lens Type	DC auto iris
Mount Type	Board type
<b>Operational</b>	
IR Viewable Length	30m
Camera Title	Off / On (Displayed up to 15 characters)
Day & Night	Auto(ICR) / Color / B/W / Schedule
Backlight Compensation	Off / BLC / WDR
Wide Dynamic Range	120dB
Contrast Enhancement	SSDR(Off / On)
Digital Noise Reduction	SSNR(Off / On)
Motion Detection	Off / On (4ea rectangler zones)
Privacy Masking	Off / On (6ea rectangler zones)
Gain Control	Off / Low / Middle / High
White Balance	ATW / AWC / Manual / Indoor / Outdoor
LDC(Lens distortion correction)	On/Off (5 levels with Min/Max)
Electronic Shutter Speed	Minimum / Maximum / Anti flicker
Flip / Mirror	Flip / Mirror / Hallway view
Intelligent Video Analytics	Motion Detection, Tampering
Alarm Triggers	Motion detection, Tampering Detection, SD card error
Alarm Events	File upload via FTP and E-Mail Local storage recording at Event Notification via E-Mail
<b>Network</b>	
Ethernet	RJ-45 (10/100BASE-T)
Video Compression Format	H.264, MJPEG

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Resolution	1920x1080 / 1280x1024 / 1280x960 / 1280x720 / 1024x768 / 800x600 / 800x448 / 720x576 / 640x480 / 640x360 / 320x240
Max. Framerate	H.264 : Max 30fps at all resolutions MJPEG : Max.1fps at 1920x1080/1280x1024/1280x720/1024x768, Max. 15fps at other resolution
WiseStreamII	Support
Video Quality Ajustment	H.264/MJPEG : Target Bitrate Level Control
Bitrate control method	H.264 : CBR or VBR, MJPEG : VBR
Streaming Capability	Multiple streaming(up to 3 profiles)
Audio I/O	-
Audio Compression Format	-
Audio Communication	-
IP	IPv4, IPv6
Protocol	TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP,RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, PPPoE, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, PIM-SM, UPnP, Bonjour
Security	HTTPS(SSL) Login Authentication, Digest Login Authentication IP Address Filtering, User access Log, 802.1X Authentication(EAP-TLS, EAP-LEAP)
Streaming Method	Unicast / Multicast
Max. User Access	6 users at Unicast Mode
Edge storage	Micro SD/SDHC/SDXC Max 32G - Motion images recorded in the SD memory card can be downloaded - Manual recording at Local PC
Application Programming Inter	ONVIF Profile S, G SUNAPI(HTTP API)
Webpage Language	English, French, German, Spanish, Italian, Chinese, Korean, Russian, Japanese, Swedish, Denish, Portuguese, Turkish, Polish, Czech, Rumanian, Serbian, Dutch, Croatia, Hungary, Greek, Finnish, Norwegian
Web Viewer	Supported OS : Windows 7, 8.1, 10, Mac OS X 10.10, 10.11, 10.12 <b>Non-plugin Webviewer</b> - Supported Browser : Google Chrome 63, MS Edge 41, Mozilla Firefox 57 (Window 64bit only), Apple Safari 11 (Mac OS X only) <b>Plug-in Webviewer</b> Supported Browser : MS Explore 11
Central Management Software	SmartViewer, SSM
Environmental	
Operating Temperature / Humi	-30°C ~ +55°C / Less than 90% RH * Start up should be done at above -20°C
Storage Temperature / Humidi	-30°C ~ +60°C (-22°F ~ +140°F) / Less than 90% RH
Ingress Protection	IP66
Electrical	
Input Voltage / Current	PoE(IEEE802.3af, Class3)
Power Consumption	6.5W

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Mechanical	
Color / Material	Dark gray / Plastic
Dimension (WxHxD)	Ø 78.0(3.07") x 262.0(10.32")
Weight	380g(0.84lb)

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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.

Voltage ☐ 230Vac ☐ 100 Vac ☐ 24 Vac ☐ 12 Vdc ☒ PoE

Frequency ☐ 50 Hz ☐ 60 Hz

## 1.2 Variant Model Differences

Not applicable

## 1.3 Device Modifications

Not applicable

## 1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
Network Camera	LNO-6070RP	-	Hanwha Techwin (Tianjin) Co.,Ltd.	E.U.T

## 1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
PoE Adaptor	POE 36U-1AT-R	P90215791A1	PHIHONG	-
Laptop	LG15N54	410NZET022292	LG	-
Laptop Adaptor	DA-1900-08	9700591703	Dongguang Lite Power 2 <sup>nd</sup> Plant	-
Micro SD Card	-	-	SanDisk	16 GB

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## 1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
Network Camera (E.U.T)	RJ-45 (PoE)	PoE Adaptor	RJ-45 (PoE)	3.0	U
	SLOT	Micro SD Card	SLOT	-	-
PoE Adaptor	RJ-45 (Data)	Laptop	RJ-45 (Data)	3.0	U

\* Unshielded=U, Shielded=S

## 1.7 E.U.T Operating Mode(s)

Test Mode	operating
PoE	E.U.T Monitoring, Ping Test

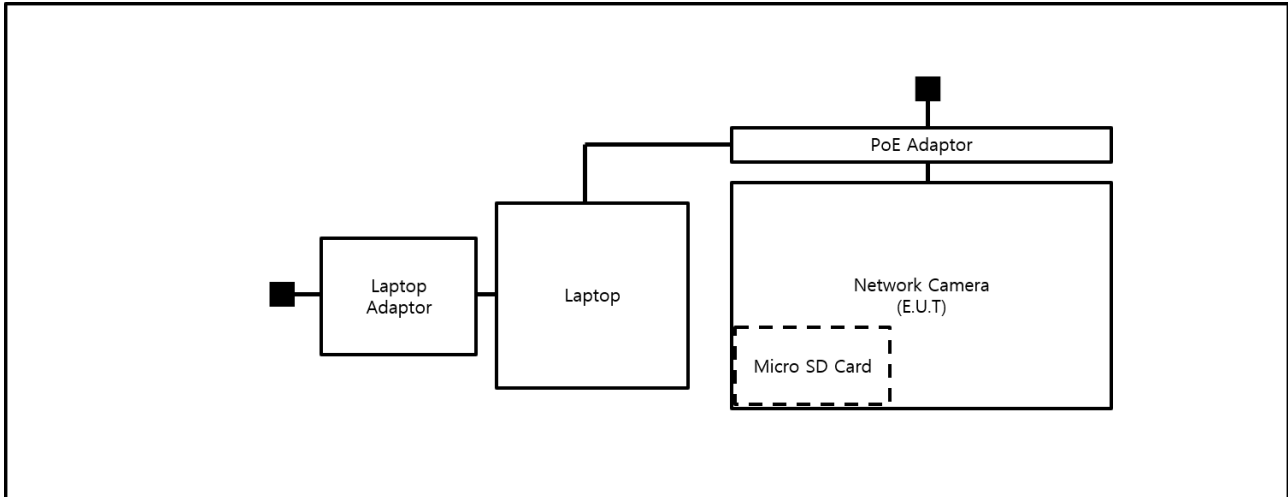
E.U.T Test operating S/W		
Name	Version	Manufacture Company
Webviewer	-	Hanwha Techwin Co., Ltd.

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## 1.8 Configuration

■ AC Main  
 □ DC Main



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## 1.9 Remarks when standards applied

N/A





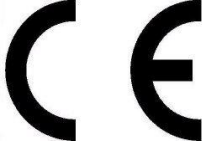

## 1.10 Calibration Details of Equipment Used for Measurement

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. The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 32.

## 1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	
JAPAN	VCCI	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	 R-4308, C-4798, T-2311, G-914
KOREA	MSIP	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
Canada	IC	3 & 10 meter Open Area Test Sites and one conducted site	 4769B-1
Europe	CE	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	
International	KOLAS	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	



## 2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **EMC – Directive 2014/30/EU**

☐ EN 61000-6-3:2011

☐ EN 61000-6-1:2007

☐ EN 61000-6-4:2007 +A1:2011

☐ EN 61000-6-2:2005

☐ EN 55011:2007 +A1:2010

☐ Group 1  
☐ Class A

☐ Group 2  
☐ Class B

☐ EN 55014-1:2006 +A2:2011

☐ EN 55014-2:1997 +A2:2008

☐ EN 55015:2013

☐ EN 61547:2009

☒ EN 55032:2012/AC:2013

☒ Class A

☐ Class B

☐ EN 55024:2010 +A1:2015

☒ EN 50130-4:2011

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



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- |   |                                  |                                  |
|---|----------------------------------|----------------------------------|
| <input type="checkbox"/> <b>VCCI V-3 / 2015.04</b>            | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> <b>AS/NZS CISPR22:2009 +A1:2010</b>  | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> <b>47 CFR Part 15, Subpart B</b>     |                                  |                                  |
| <input type="checkbox"/> CISPR 22:2009 +A1:2010               | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2009                      |                                  |                                  |
| <input type="checkbox"/> <b>IC Regulation ICES-003 : 2016</b> |                                  |                                  |
| <input type="checkbox"/> CAN/CSA CISPR 22-10                  | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2014                      |                                  |                                  |
| <input type="checkbox"/> <b>RE- Directive 2014/53/EU</b>      |                                  |                                  |
| <input type="checkbox"/> EN 301 489-1 V1.9.2                  |                                  |                                  |
| <input type="checkbox"/> Equipment for fixed use              |                                  |                                  |
| <input type="checkbox"/> Equipment for vehicular use          |                                  |                                  |
| <input type="checkbox"/> Equipment for portable use           |                                  |                                  |
| <input type="checkbox"/> EN 301 489-3 V1.6.1                  |                                  |                                  |
| <input type="checkbox"/> EN 301 489-17 V2.2.1                 |                                  |                                  |
| <input type="checkbox"/> EN 60945:2002                        |                                  |                                  |

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## 2.1 Conducted Emissions at Mains Power Ports

### Test Date

N/A

### Test Location

Electro wave Shieldroom

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101781	04, 27, 2018
<input type="checkbox"/>	LISN	ENV216	R & S	101787	01, 11, 2018
<input type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	04, 27, 2018
<input type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 27, 2018
<input type="checkbox"/>	LISN	NNBM8124	SCHWARZBECK	8124-1002	08, 07, 2018
<input type="checkbox"/>	LISN	NNBM8124	SCHWARZBECK	8124-1003	08, 07, 2018

### Test Conditions

Temperature:

°C

Relative Humidity:

% 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

N/A



## 2.2 Conducted Emissions at Telecommunication Ports

### Test Date

Jan. 03, 2018

### 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	101781	04, 27, 2018
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	01, 11, 2018
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	04, 27, 2018
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 27, 2018
<input checked="" type="checkbox"/>	8-WIRE ISN CAT3,5	ENY81	R & S	100174	01, 11, 2018
<input type="checkbox"/>	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	01, 11, 2018

### Test Conditions

Temperature: 23,1 °C  
Relative Humidity: 40,9 % R.H.

### Frequency Range of Measurement

150 kHz to 30 MHz

### Instrument Settings

IF Band Width: 9 kHz

### Test Results

The requirements are:

- ☒ PASS  
☐ NOT PASS  
☐ NOT APPLICABLE

### Remarks

See Appendix A for test data.



## 2.3 Radiated Electric Field Emissions(Below 1 GHz)

### Test Date

Jan. 04, 2018

### 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	04, 18, 2018
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	11, 27, 2018
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	716	11, 28, 2018

### Test Conditions

Temperature: 23,8 °C  
Relative Humidity: 41,7 % 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

Jan. 04, 2018

### 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, 07, 2018
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	AGILENT	3008A01967	05, 31, 2018
<input type="checkbox"/>	ATTENUATOR	8491A	HP	32173	03, 24, 2018
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 02, 2019

### Test Conditions

Temperature: 22,8 °C  
Relative Humidity: 41,5 % 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

N/A

### Test Location

Electro wave Shieldroom

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input type="checkbox"/>	EMI Test S/W	dpa.control	EM TEST	5.4.11.0	-
<input type="checkbox"/>	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	08, 09, 2018
<input type="checkbox"/>	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

### Test Conditions

Relative Humidity:                      °C  
    % 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

N/A : Because the E.U.T power is PoE, limits are not specified.



### 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

Jan. 02, 2018

### Test Location

EMS-ESD: Electro wave Shieldroom

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	10, 11, 2018
<input checked="" type="checkbox"/>	HCP	-	KES	-	-
<input checked="" type="checkbox"/>	VCP	-	KES	-	-

### Test Conditions

Temperature: 22,5 °C  
Relative Humidity: 42,1 % R.H.  
Atmospheric Pressure: 101,0 kPa

### Test Specifications

Discharge Factor:  $\geq 1$  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:	<b>Contact</b> <input type="checkbox"/> 2 kV <input type="checkbox"/> 4 kV <input checked="" type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	<b>Air</b> <input checked="" type="checkbox"/> 2 kV <input checked="" type="checkbox"/> 4 kV <input type="checkbox"/> 6 kV <input checked="" type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	<b>HCP</b> <input type="checkbox"/> 2 kV <input type="checkbox"/> 4 kV <input checked="" type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	<b>VCP</b> <input type="checkbox"/> 2 kV <input type="checkbox"/> 4 kV <input checked="" type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV
--------------------	---	---	---	---

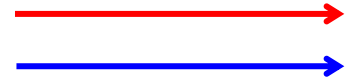
Notes: HCP: Horizontal coupling plane

VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

**Location of Discharge:**

Air
Contact



1

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**Test Data****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	screw	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 61000-4-3:2006 +A2:2010

### Test Date

Jan. 04, 2018

### 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	R & S	177586	08, 07, 2018
<input checked="" type="checkbox"/>	BROADBAND AMPLIFIER	BBA100	R & S	101239	08, 07, 2018
<input checked="" type="checkbox"/>	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 07, 2018
<input checked="" type="checkbox"/>	POWER METER	NRP2	R & S	103475	08, 07, 2018
<input checked="" type="checkbox"/>	AVG POWER SENSOR	NRP-Z91	R & S	102526	08, 07, 2018
<input checked="" type="checkbox"/>	AVG POWER SENSOR	NRP-Z91	R & S	102527	08, 07, 2018
<input checked="" type="checkbox"/>	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
<input checked="" type="checkbox"/>	DIRECTIONAL COUPLER	KYDC-D1070-DX40	KY TELECOM	KY150001	08, 07, 2018
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 02, 2019

### Test Conditions

Temperature: 22,8 °C  
Relative Humidity: 41,5 % R.H.  
Atmospheric Pressure: 101,7 kPa





## 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

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**Test Data**

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

Jan. 02, 2018

#### Test Location

EMS-EFT: Electro wave Shieldroom #3

#### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	AMETEK CTS	7.1.2	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500 N5	EM TEST	V0936105120	06, 26, 2018
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 26, 2018
<input checked="" type="checkbox"/>	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	070925	06, 26, 2018

#### Test Conditions

Temperature: 22,5 °C  
Relative Humidity: 42,1 % R.H.  
Atmospheric Pressure: 101,0 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

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**Test Data**

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

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

☐ 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	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

### Test Date

N/A

### Test Location

EMS-Surge: Electro wave Shieldroom

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.7	-
<input type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2018
<input type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2018
<input type="checkbox"/>	CDN	CNV 508N1	EM TEST	P1610176296	11, 28, 2018
<input type="checkbox"/>	CDN	CNV 504N7.3	EM TEST	P1744207079	12, 18, 2018

### Test Conditions

Temperature:

°C

Relative Humidity:

% R.H.

Atmospheric Pressure:

kPa



## 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

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**Test Data**

☐ Line to Earth – Common Mode

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

**Signal Lines**

☐ Line to Earth – Common Mode

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

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

**Test Results**

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

**Remarks**

N/A

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## 3.5 Conducted Disturbance

### Reference Standard

EN 61000-4-6:2014

### Test Date

Jan. 03, 2018

### 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	5.3.11	-
<input checked="" type="checkbox"/>	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	11, 27, 2018
<input checked="" type="checkbox"/>	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 27, 2018
<input checked="" type="checkbox"/>	CDN	CDN M016	TESEQ	43694	11, 27, 2018
<input type="checkbox"/>	CDN	CDN M016	TESEQ	43697	11, 27, 2018
<input checked="" type="checkbox"/>	CDN	CDN T800	TESEQ	42800	11, 27, 2018
<input type="checkbox"/>	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 28, 2018

### Test Conditions

Temperature: 23,1 °C  
Relative Humidity: 40,9 % R.H.  
Atmospheric Pressure: 101,2 kPa

### 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

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**Test Data**

☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	CDN ( <input type="checkbox"/> M2, <input type="checkbox"/> M3)	-

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	CDN ( <input type="checkbox"/> M2, <input type="checkbox"/> M3)	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45	CDN T800	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.



### 3.6 Voltage Dips and Short Interruptions

#### Reference Standard

EN 61000-4-11:2004

#### Test Date

N/A

#### Test Location

EMS-Voltage dip: Electro wave Shieldroom

#### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.7	-
<input type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2018
<input type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2018

#### Test Conditions

Temperature:

°C

Relative Humidity:

% R.H.

Atmospheric Pressure:

kPa

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**Test Specifications & Observations/Remarks**

(Test Voltage : V)

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

- Voltage variations

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

Observations:

Complied – No degradation of function

**Test Results**

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

**Remarks**

N/A

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## **APPENDIX A – TEST DATA**

### **Conducted Emissions at Mains Power Ports**

**[HOT]**

N/A



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**[ NEUTRAL ]**

N/A

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

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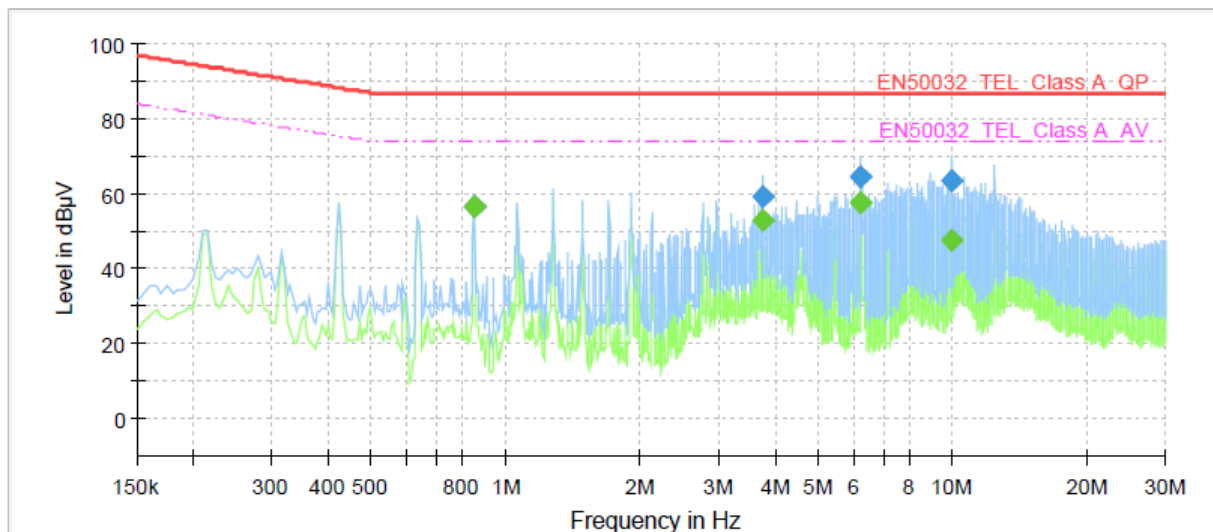
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## Conducted Emissions at Telecommunication Ports

[10 Mbps]

### Common Information

Test Description: Telecommunication Emission  
Model No.: LNO-6070RP  
Mode: PoE\_10 Mbps  
Operator Name: KES



### Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.850000	---	56.54	74.00	17.46	1000.0	9.000	Single Line	19.9
0.850000	56.64	---	87.00	30.36	1000.0	9.000	Single Line	19.9
3.750000	---	52.95	74.00	21.05	1000.0	9.000	Single Line	19.7
3.750000	59.18	---	87.00	27.82	1000.0	9.000	Single Line	19.7
6.250000	---	57.93	74.00	16.07	1000.0	9.000	Single Line	19.4
6.250000	64.34	---	87.00	22.66	1000.0	9.000	Single Line	19.4
10.005000	---	47.52	74.00	26.48	1000.0	9.000	Single Line	19.8
10.005000	63.54	---	87.00	23.46	1000.0	9.000	Single Line	19.8

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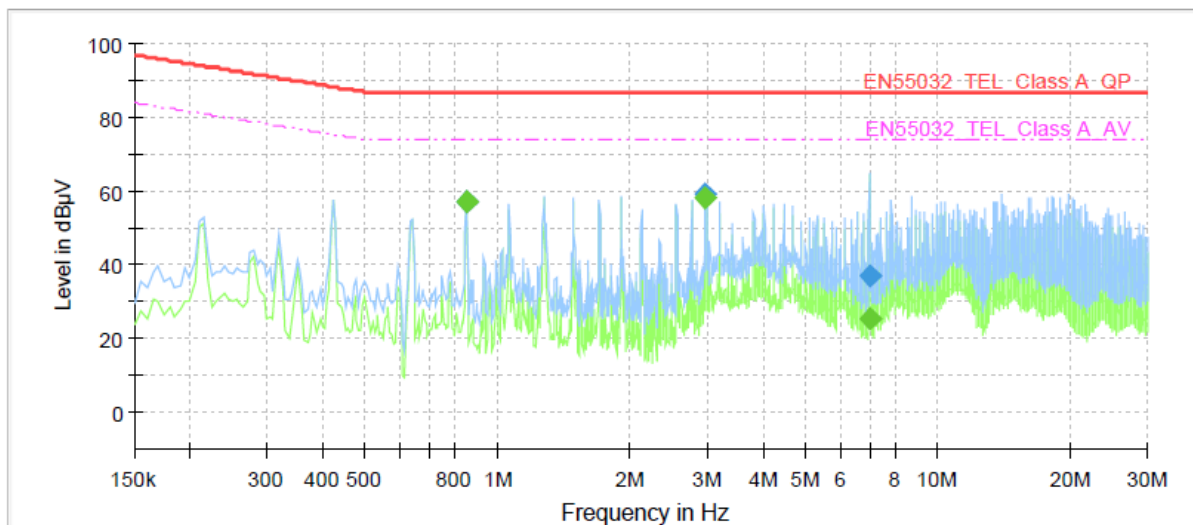
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### [100 Mbps]

## Common Information

Test Description:	Telecommunication Emission
Model No.:	LNO-6070RP
Mode	PoE_100 Mbps
Operator Name:	KES



## Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.850000	---	57.04	74.00	16.96	1000.0	9.000	Single Line	20.2
0.850000	57.07	---	87.00	29.93	1000.0	9.000	Single Line	20.2
2.975000	---	58.37	74.00	15.63	1000.0	9.000	Single Line	20.2
2.975000	59.54	---	87.00	27.46	1000.0	9.000	Single Line	20.2
6.985000	---	25.54	74.00	48.46	1000.0	9.000	Single Line	19.7
6.985000	36.86	---	87.00	50.14	1000.0	9.000	Single Line	19.7

### ◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

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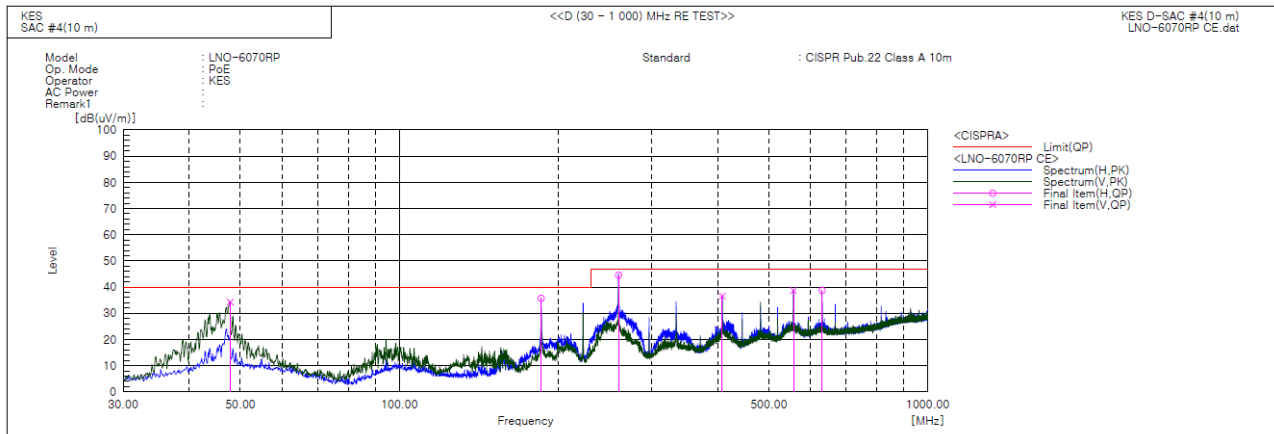


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### Radiated Electric Field Emissions(Below 1 GHz)



#### Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit QP [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	47.824	V	62.2	-27.9	34.3	40.0	5.7	150.0	295.0	
2	185.564	H	64.4	-28.7	35.7	40.0	4.3	400.0	133.0	
3	259.868	H	69.5	-25.0	44.5	47.0	2.5	400.0	71.0	
4	408.300	V	56.8	-20.2	36.6	47.0	10.4	100.0	84.0	
5	556.831	V	54.3	-15.6	38.7	47.0	8.3	400.0	199.0	
6	631.158	H	52.9	-14.2	38.7	47.0	8.3	200.0	112.0	

#### ◆ 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 - Preamp Factor), Margin: Margin value



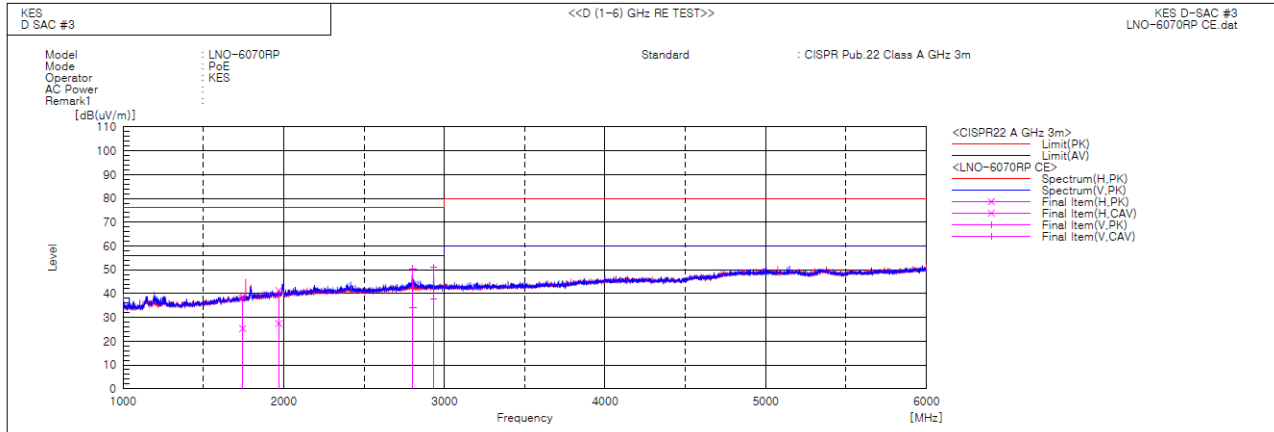


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### Radiated Electric Field Emissions(Above 1 GHz)



#### 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	1744.944	H	42.4	29.0	-3.7	38.7	25.3	76.0	56.0	37.3	30.7	101.0	7.3	
2	1969.015	H	43.2	29.3	-1.9	41.3	27.4	76.0	56.0	34.7	28.6	101.0	163.6	
3	2802.239	V	48.5	32.2	1.9	50.4	34.1	76.0	56.0	25.6	21.9	101.0	13.8	
4	2933.370	V	48.8	35.6	2.3	51.1	37.9	76.0	56.0	24.9	18.1	101.0	17.8	

#### ◆ Calculation

Result(PK/CAV) [dB( $\mu$ V/m)] = (Reading(PK/CAV)[dB( $\mu$ V)] + c.f[dB(1/m)])

Margin(PK/CAV)[dB] = Limit[dB( $\mu$ V/m)] - Result(PK/CAV) [dB( $\mu$ V/m)]

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

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

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www.kes.co.kr

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**Test Data - Voltage Fluctuations****Maximum Flicker results**

	<b>EUT values</b>	<b>Limit</b>	<b>Result</b>
Pst	N/A		
Plt			
dc [%]			
dmax [%]			
Tmax [s]			

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---

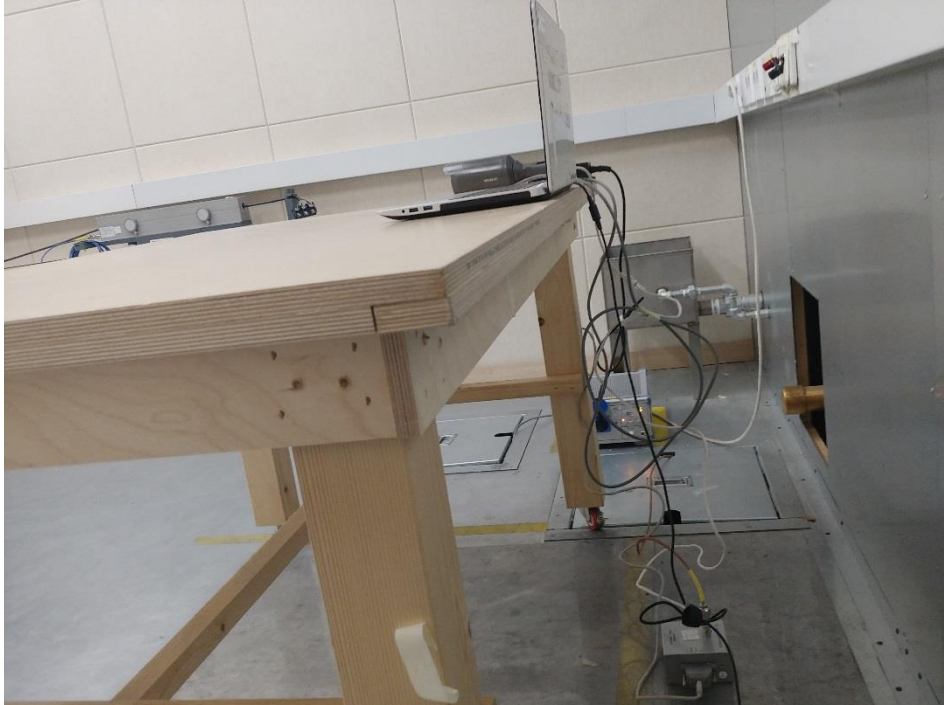
## **Test Setup Photos and Configuration**

### **Conducted Voltage Emissions**

N/A

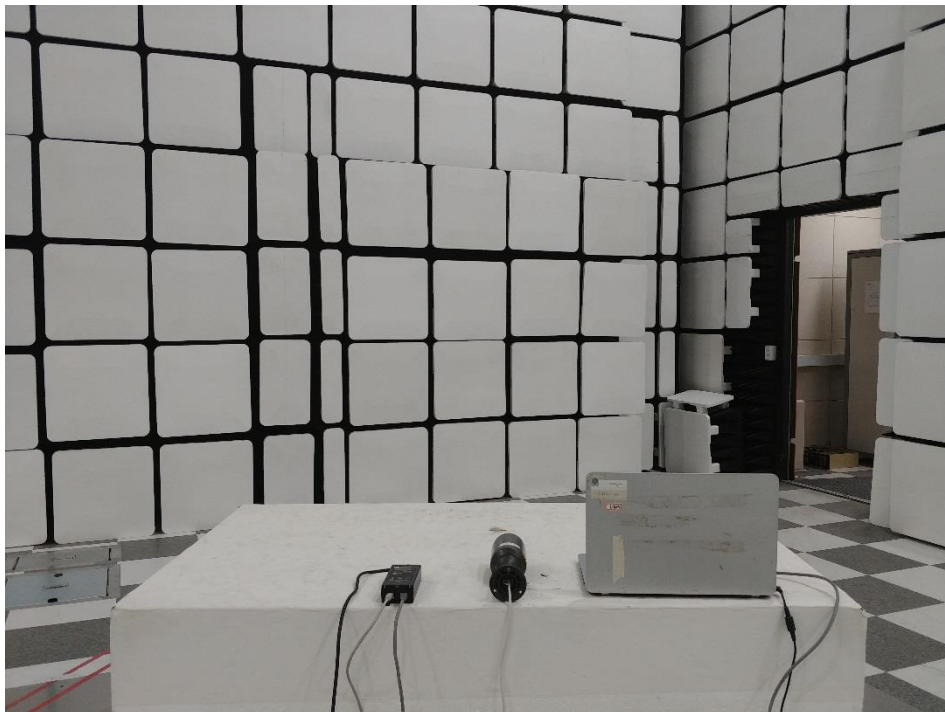
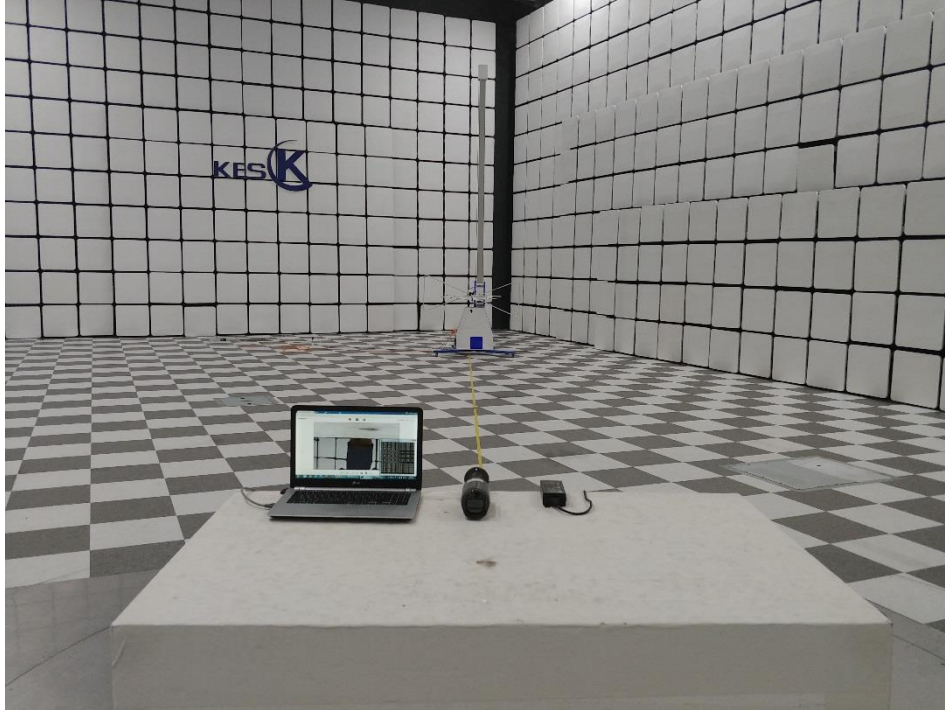
N/A

## Conducted Telecommunication Emissions



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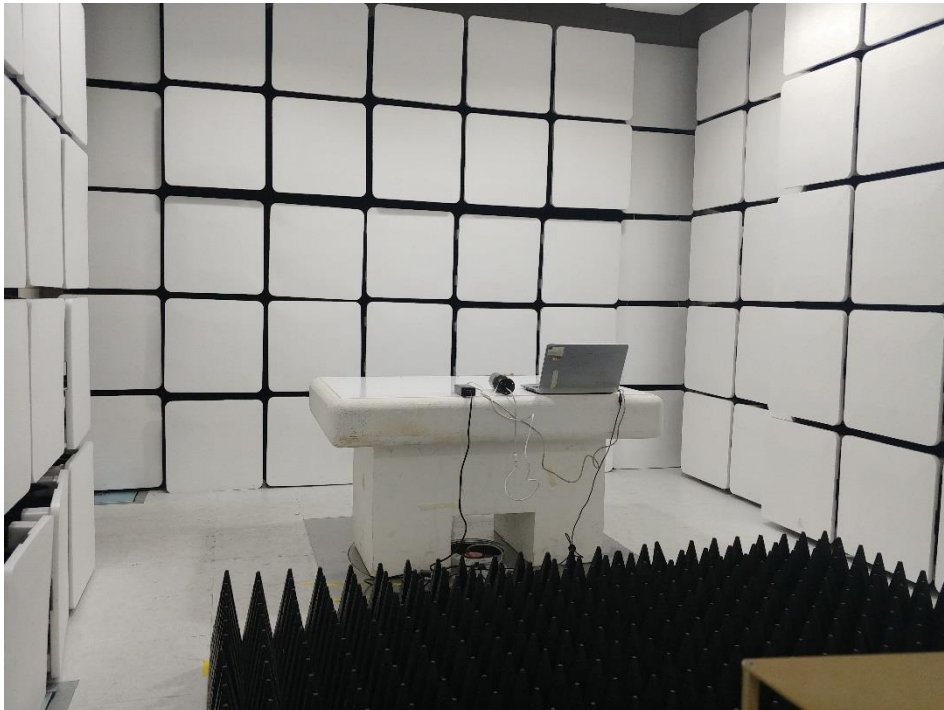
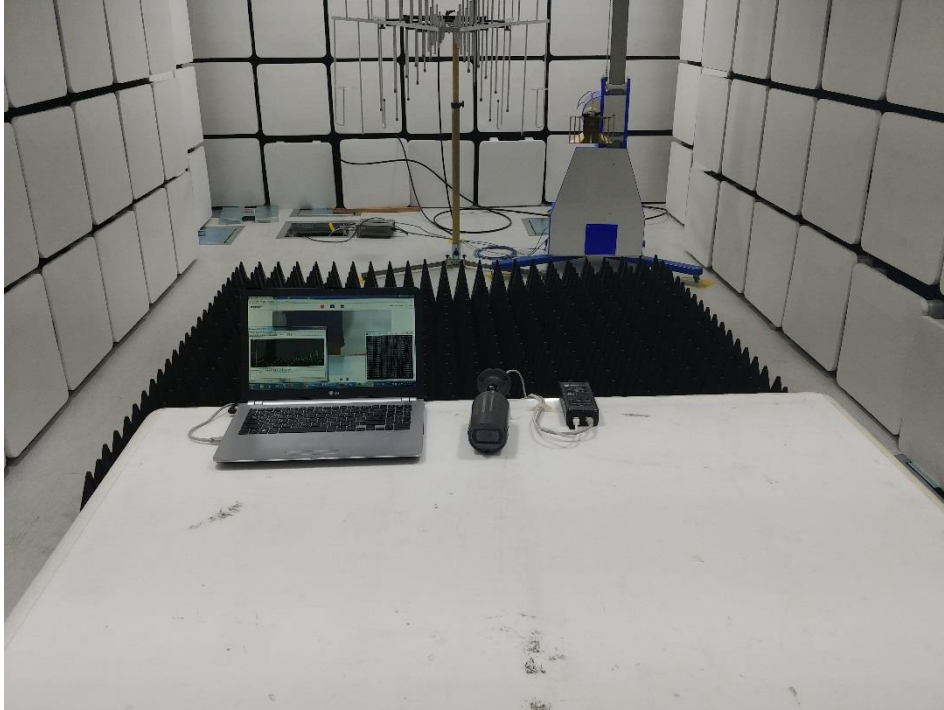
## Radiated Electric Field Emissions(Below 1 GHz)



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## Radiated Electric Field Emissions(Above 1 GHz)



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## **Harmonic Current Emissions and Voltage Fluctuations and Flicker**

N/A

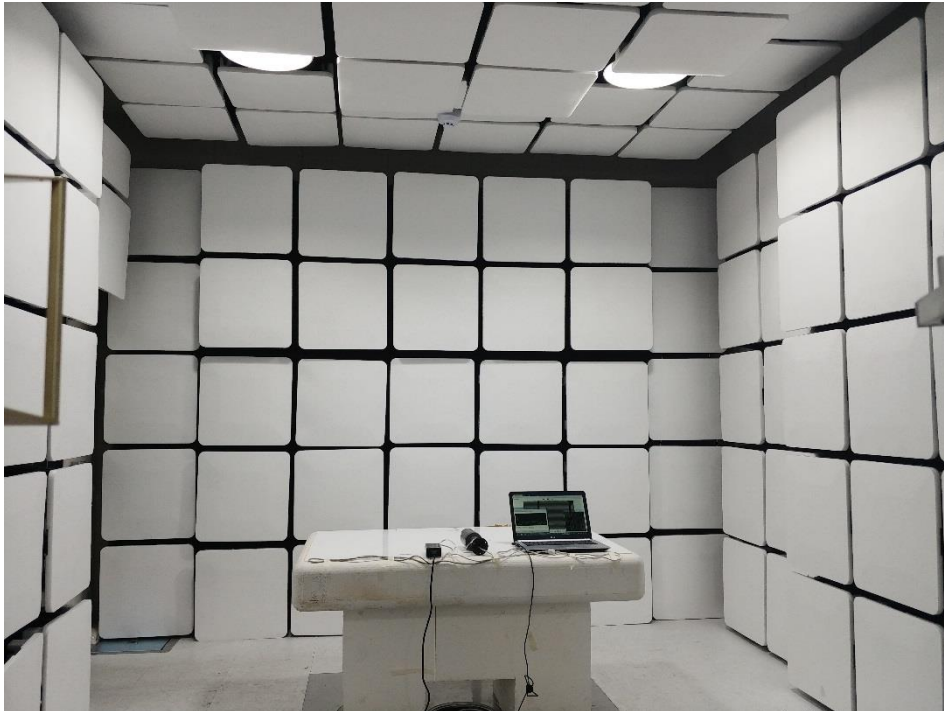
---

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## Electrostatic Discharge



## Radiated Electric Field Immunity



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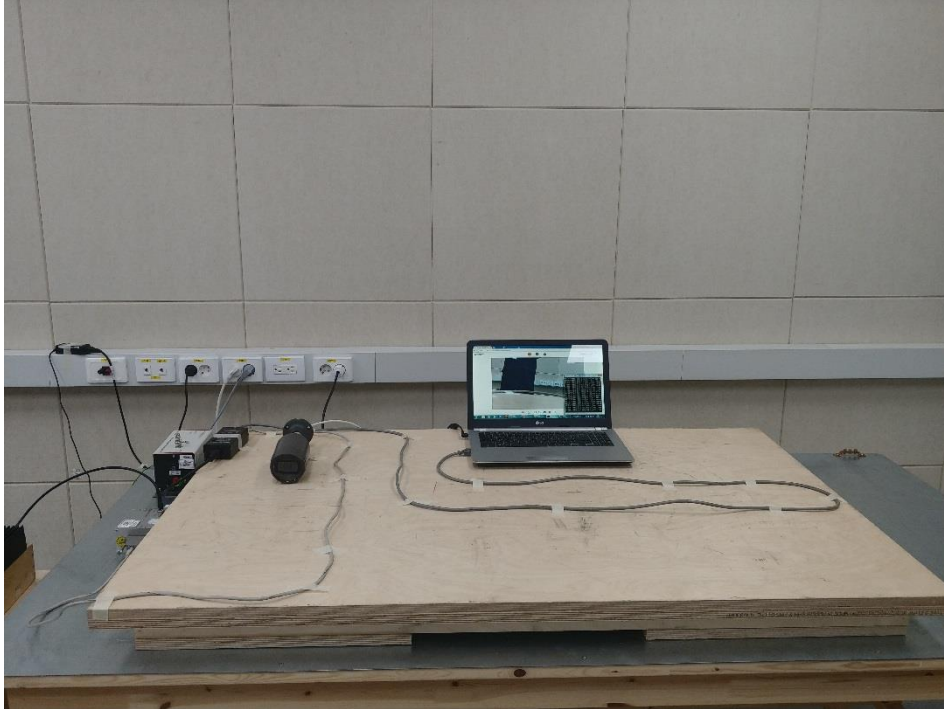
## Electrical Fast Transients/Bursts



## Surge Transients

N/A

## Conducted Disturbance



## Voltage Dips and Short Interruptions

N/A

## EUT External Photographs

(Top)



(Bottom)

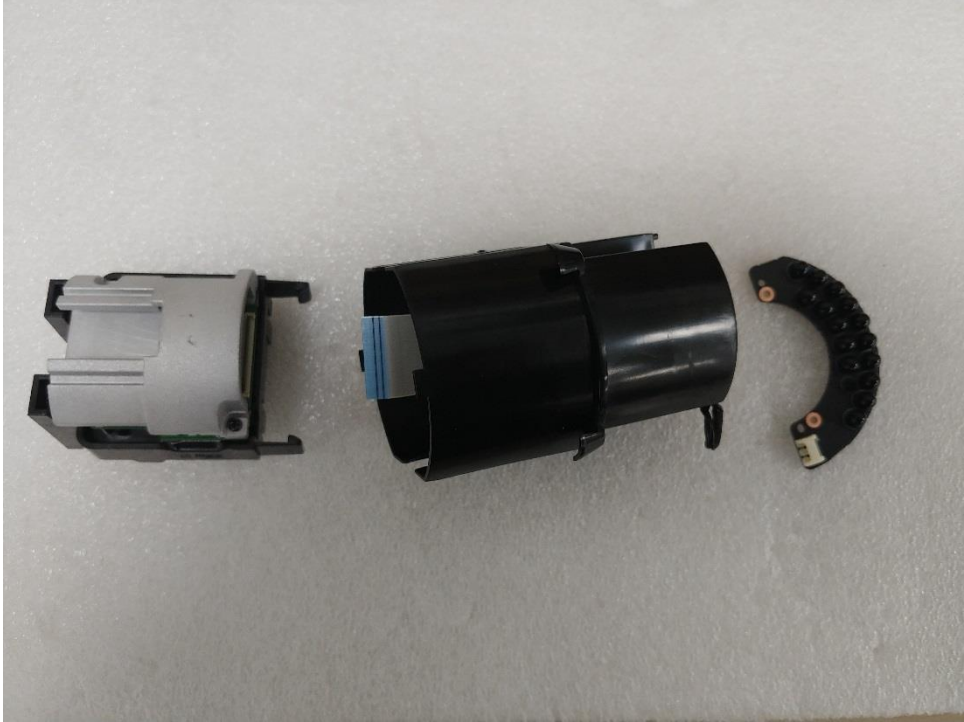


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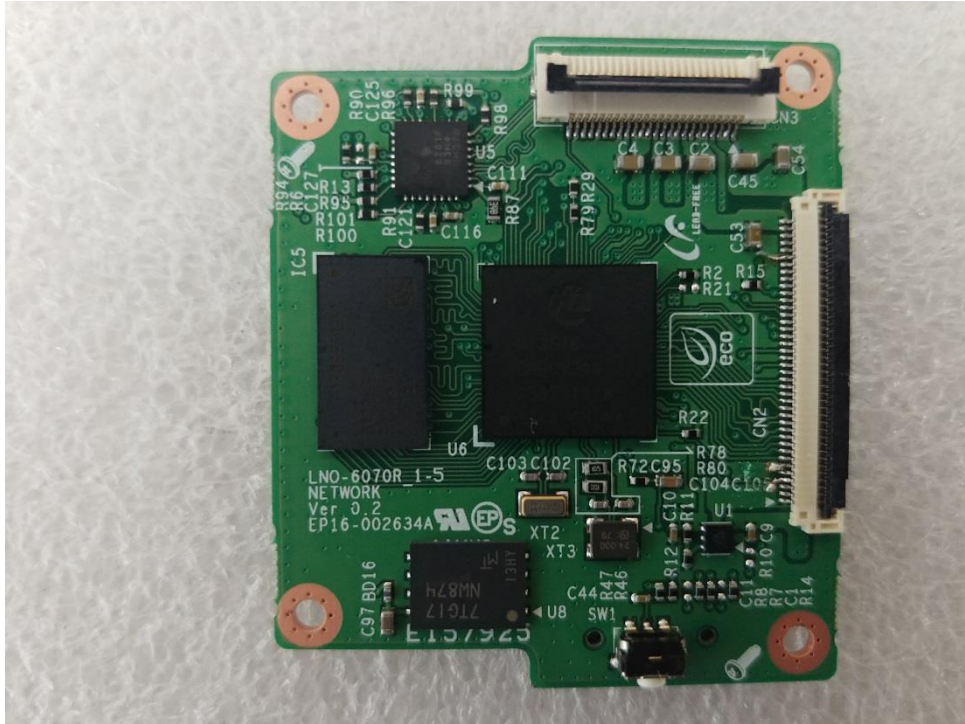
## EUT Internal Photographs

(Internal View)

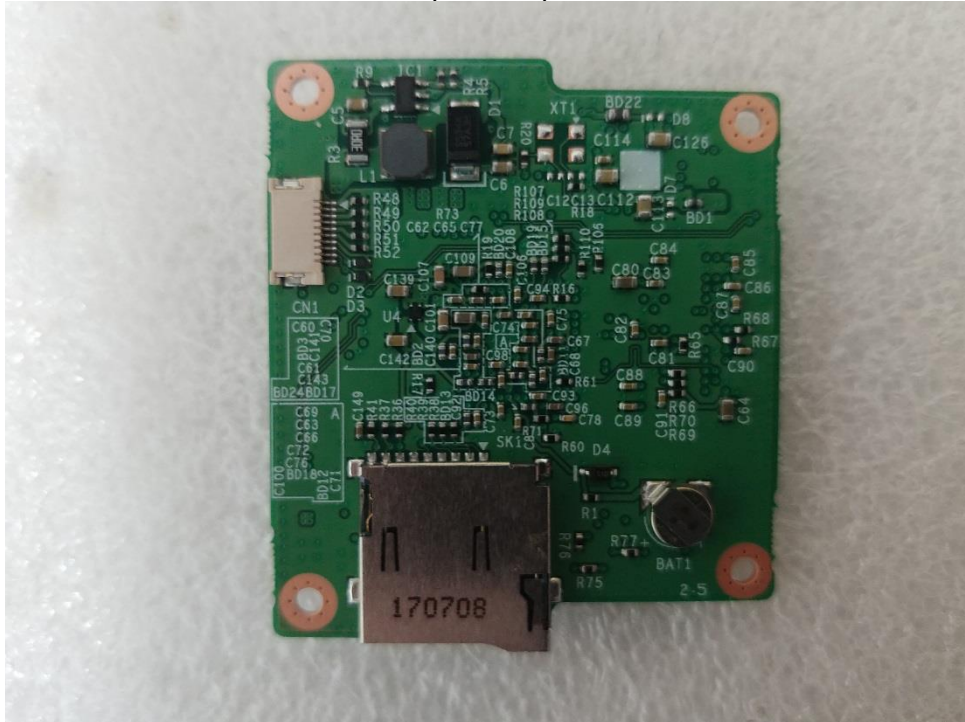


## EUT Internal View – board 1

(Top)



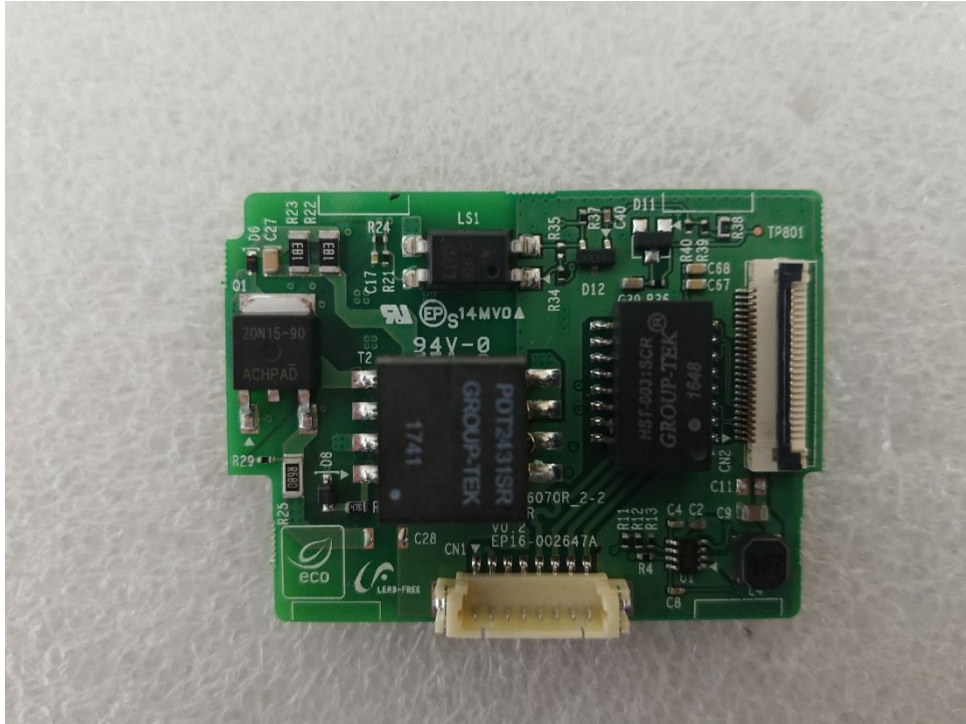
(Bottom)



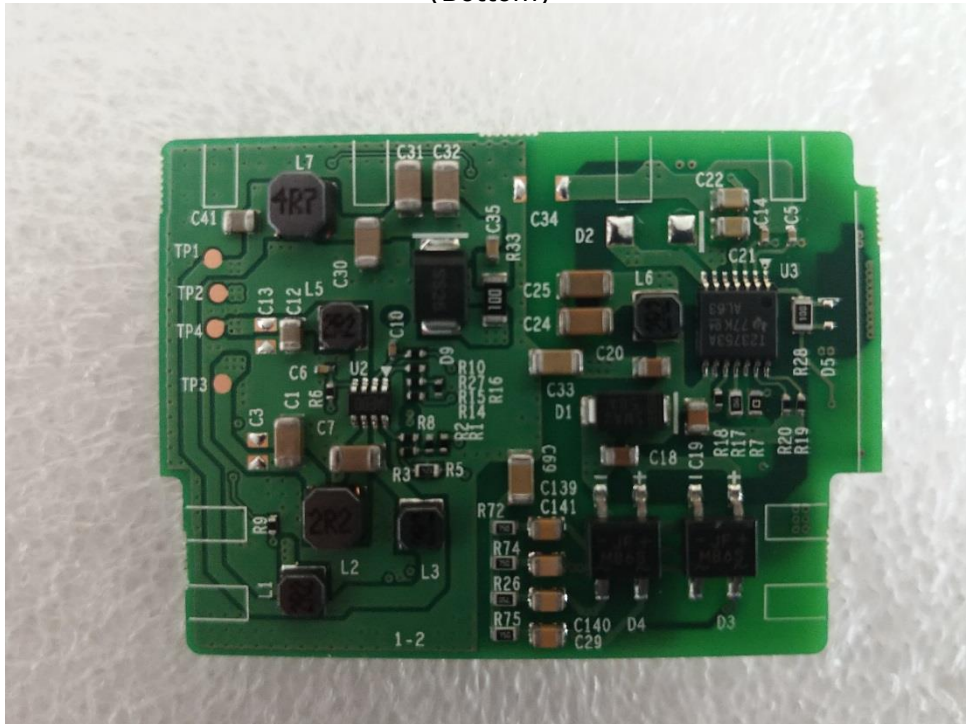
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## EUT Internal View – board 2

(Top)



(Bottom)



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## EUT Internal View – board 3

(Top)



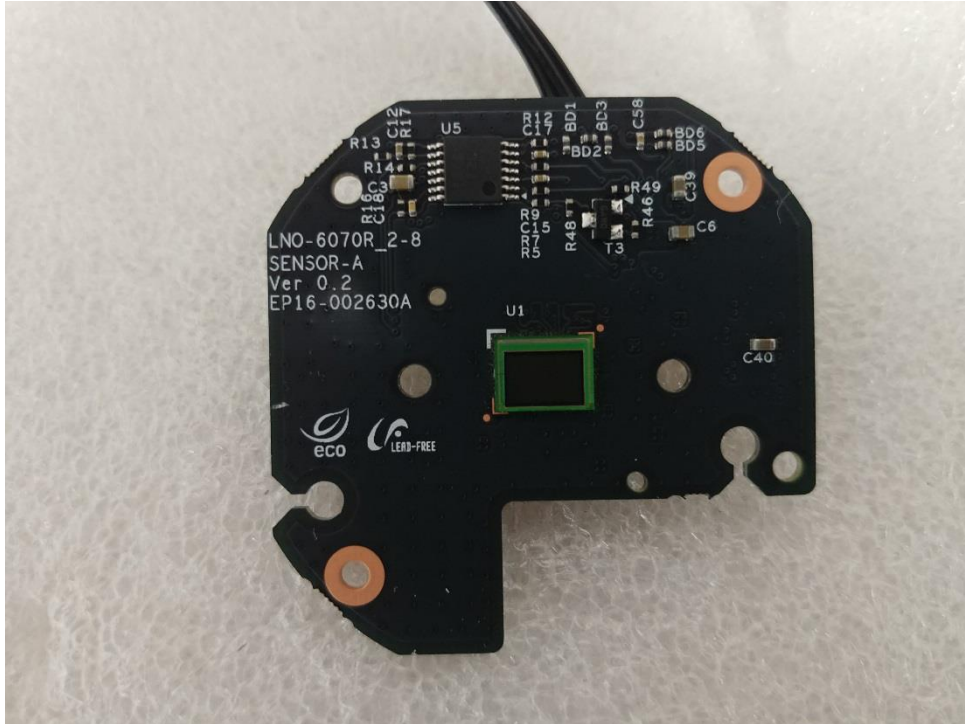
(Bottom)



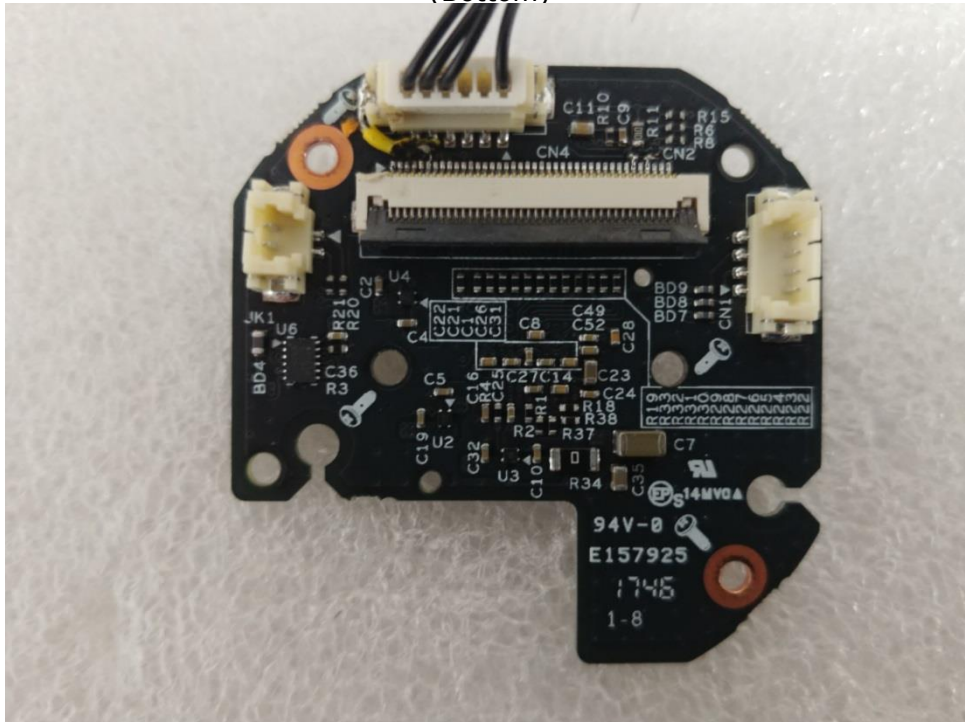
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## EUT Internal View – board 4

(Top)



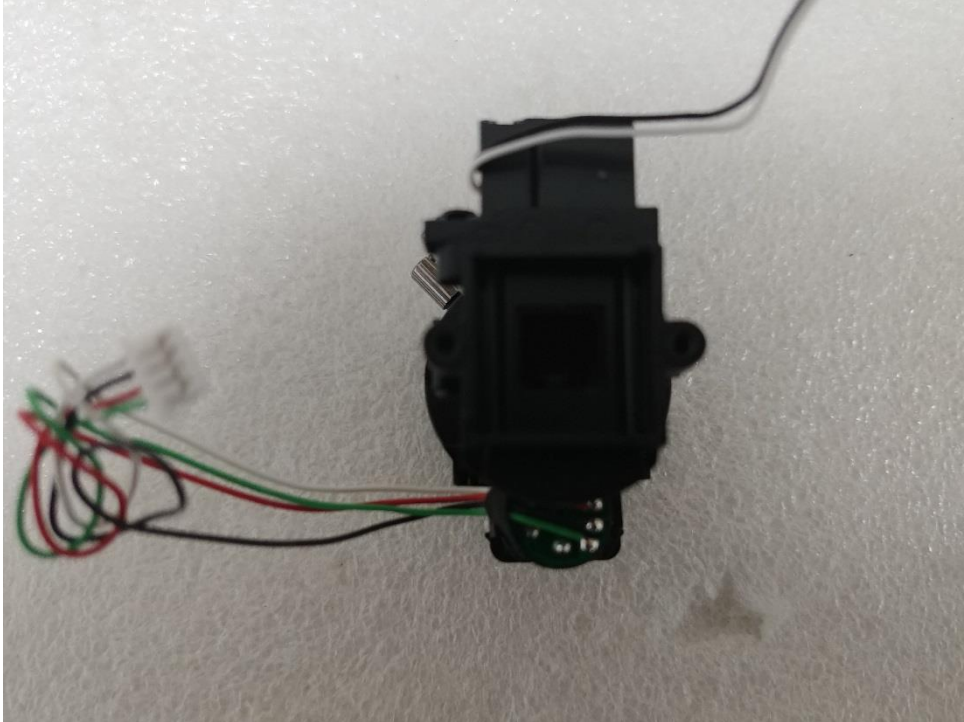
(Bottom)



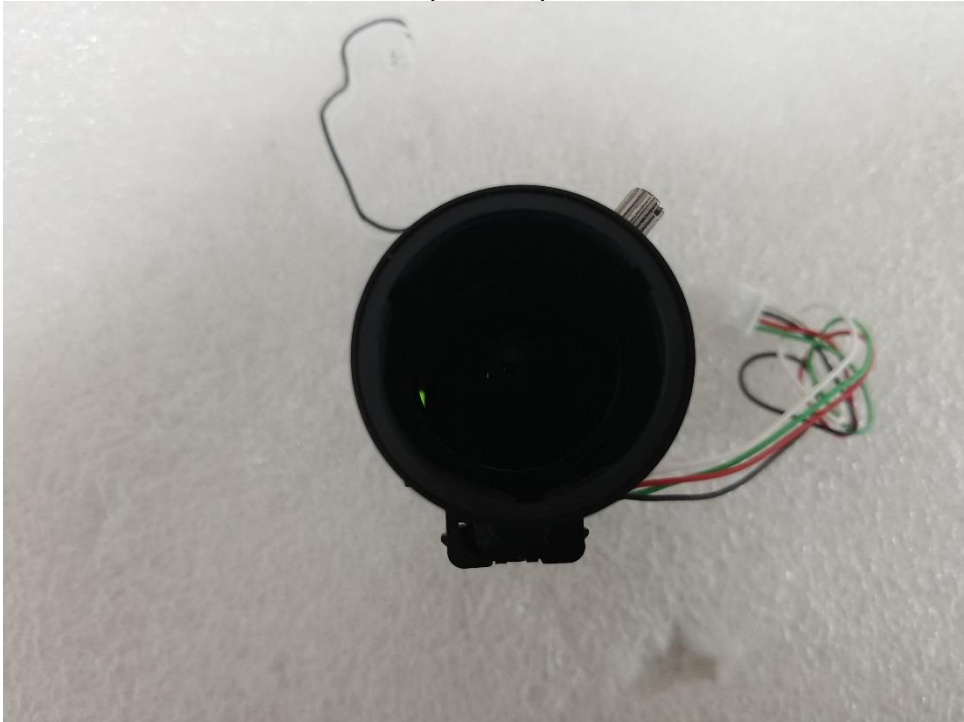
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## EUT Internal View – Lens

(Top)



(Bottom)



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## Label and Location



### **Network Camera**

Model No : LNO-6070RP

Manufacturer : Hanwha Techwin (Tianjin) Co.,Ltd.

Made in China

