



EMC TEST REPORT For CE

Test Report No. : KES-E1-18T0634-R1

Date of Issue : Jun. 10, 2019

Product name : Thermal Camera

Model/Type No. : TNO-4040TR

Variant Model : TNO-4030TR

Applicant : Hanwha Techwin Co., Ltd.

Applicant Address : 6, Pangyo-ro 319 Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13488, KOREA

Manufacturer : 1. Hanwha Techwin (Tianjin) Co.,Ltd.
2. HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.
3. D-TECH CO.,LTD.

Manufacturer Address : 1. No.11 Weiliu Rd, Micro-Electronic Industrial Park, TEDA, Tianjin,
300385, People's Republic of China
2. Lot O-2, Que Vo Industrial Zone extended area,
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam
3. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi-do,
Korea (Suwon Industrial Complex)

Date of Receipt : Nov. 06, 2018

Test date : Nov. 08, 2018 ~ Nov. 09, 2018

Test Results : ☒ In Compliance ☐ Not in Compliance

Tested by

Kang Hyeon, Kim
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 |
|---------------|-------------------|---|
| Nov. 16, 2018 | KES-E1-18T0634 | Issued |
| Jun. 10, 2019 | KES-E1-18T0634-R1 | Application standard due to customer request. |
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1.0 General Product Description

Main Specifications of EUT are:

| | |
|-----------------------------|--|
| VIDEO | |
| Imaging Device | Uncooled microbolometer, Pixel size : 17 μ m |
| Effective Pixels | 640(H) x 480(V) |
| NETD | <50mK |
| Video Out | CVBS : 1.0Vpp / 75 Ω composite, 720 x 480(N), 720 x 576(P), for installation USB : Micro USB type B, 1280 x 720, for installation |
| LENS | |
| Focal Length (Zoom Ratio) | 19mm fixed |
| Max. Aperture Ratio | F1.0 |
| Angular Field of View | H : 32° / V : 24.3° / D : 39.2° |
| Min. Object Distance | 11m (36.09ft) |
| Focus Control | Fixed |
| Lens / Mount Type | Board-in type |
| OPERATIONAL | |
| Camera Title | Off / On - W/W : English / Numeric / Special characters - China : English / Numeric / Special / Chinese characters - Common : Multi-line (Max. 5), Color (Gray / Green / Red / Blue / Black / White), Transparency, Auto scale by resolution |
| Motion Detection | Off / On (8ea, 8point polygonal zones), Handover |
| Privacy Masking | Off / On (32ea, polygonal zones) - Color : Gray / Green / Red / Blue / Black / White - Mosaic |
| Flip / Mirror | Off / On, Hallway : 90° / 270° |
| Video & Audio Analytics | Tampering, Loitering, Directional detection, Virtual line, Enter/Exit, (Dis) Appear, Audio detection, Motion detection, Sound classification, Shock detection, Temperature change detection |
| Alarm I/O | Input 1ea / Output 2ea |
| Digital Image Stabilization | Off / On (Built-in Gyro sensor) |
| Alarm Triggers | Alarm input, Motion detection, Video & Audio analytics, Network disconnect |
| Alarm Events | File upload Via FTP, E-mail, Notification Via E-mail, Local storage (SD/SDHC/ SDXC) or NAS recording at event triggers, External output |
| Pixel count | Support |
| NETWORK | |
| Ethernet | RJ-45 (10/100 BASE-T) |
| Video Compression Format | H.265 / H.264 (MPEG-4 part 10/AVC) : Main / Baseline / High, MJPEG |
| Resolution | 640 x 480, 640 x 360, 320 x 240 |
| Max. Framerate | H.265 / H.264 : Max. 30fps at all resolutions, MJPEG : Max. 30fps |
| WiseStreamII | Support |
| Video Quality Adjustment | H.265 / H.264 / MJPEG : Target Bitrate Level Control |
| Bitrate Control Method | H.265 / H.264 : CBR or VBR, MJPEG : VBR |
| Streaming Capability | Multiple streaming (Up to 10 profiles) |
| Audio In | Selectable (Mic in / Line in), Supply voltage : 2.5V DC (4mA), Input impedance : approx. 2K Ohm |
| Audio Out | Line out, Max output level: 1 Vrms |
| Audio Compression Format | G.711 u-law / G.726 selectable, G.726 (ADPCM) 8KHz, G.711 8KHz, G.726 : 16Kbps, 24Kbps, 32Kbps, 40Kbps, AAC-LC : 48Kbps at 8 / 16 / 32 / 48KHz |
| Audio Communication | Bi-directional (2-Way) |
| 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, UPnP, Bonjour |

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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 ☐ Hz

1.2 Variant Model Differences

A derivative model to the classification of customers simple.

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

| Description | Model Number | Serial Number | Manufacturer | Remarks |
|----------------|--------------|---------------|--------------------------------------|---------|
| Thermal Camera | TNO-4040TR | - | Hanwha Techwin (Tianjin) Co.,Ltd. | EUT |

1.5 Support Equipments

| Description | Model Number | Serial Number | Manufacturer | Remarks |
|---------------------|----------------|---------------|--|---------|
| AC Adaptor | DRL-46000AC | - | Dream Tech | - |
| PoE Adaptor | PD-9601GR | - | Microsemi | - |
| Notebook | ProBook4430s | - | HP | - |
| Notebook Adaptor | SeriesPPP0009H | - | CHICONY POWER TECHNOLOGY (SUZHOU) CO.,LTD, | - |
| Speaker | BR1000A | - | DONGGUAN 1 TECHNOLOGY Co., Ltd | - |
| MIC | MP1000 | - | - | - |
| Alarm | - | - | - | - |
| Button Alarm | - | - | - | - |
| iPod | A1367 | C3TDG2JGDCP9 | APPLE .Inc | - |

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| | | | | |
|---------------|---|---|---------|------|
| Micro SD Card | - | - | SanDisk | 8 GB |
|---------------|---|---|---------|------|

1.6 External I/O Cabling

■ AC 24 V, DC 12 V MODE

| Start | | END | | Cable Spec. | |
|----------------------|--------------|---------------|--------------|-------------|--------|
| Description | I/O Port | Description | I/O Port | Length | Shield |
| Thermal Camera (EUT) | RJ-45 | Notebook | RJ-45 | 3.0 | U |
| | Thermal 2Pin | Speaker | 3.5 mm | 1.4 | U |
| | Thermal 2Pin | MIC | 3.5 mm | 1.4 | U |
| | Thermal 2Pin | Alarm | Thermal 2Pin | 3.0 | U |
| | Thermal 2Pin | Button Alarm | Thermal 2Pin | 3.0 | U |
| | SLOT | Micro SD Card | SLOT | - | - |
| Notebook | 3.5 mm | Phone | 3.5 mm | 0.8 | U |

■ PoE MODE

| Start | | END | | Cable Spec. | |
|----------------------|--------------|---------------|--------------|-------------|--------|
| Description | I/O Port | Description | I/O Port | Length | Shield |
| Thermal Camera (EUT) | RJ-45 (PoE) | PoE Adaptor | RJ-45 (PoE) | 3.0 | U |
| | Thermal 2Pin | Speaker | 3.5 mm | 1.4 | U |
| | Thermal 2Pin | MIC | 3.5 mm | 1.4 | U |
| | Thermal 2Pin | Alarm | Thermal 2Pin | 3.0 | U |
| | Thermal 2Pin | Button Alarm | Thermal 2Pin | 3.0 | U |
| | SLOT | Micro SD Card | SLOT | - | - |
| Notebook | RJ-45 (DATA) | PoE Adaptor | RJ-45 (DATA) | 1.5 | U |
| | 3.5 mm | Phone | 3.5 mm | 0.8 | U |

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

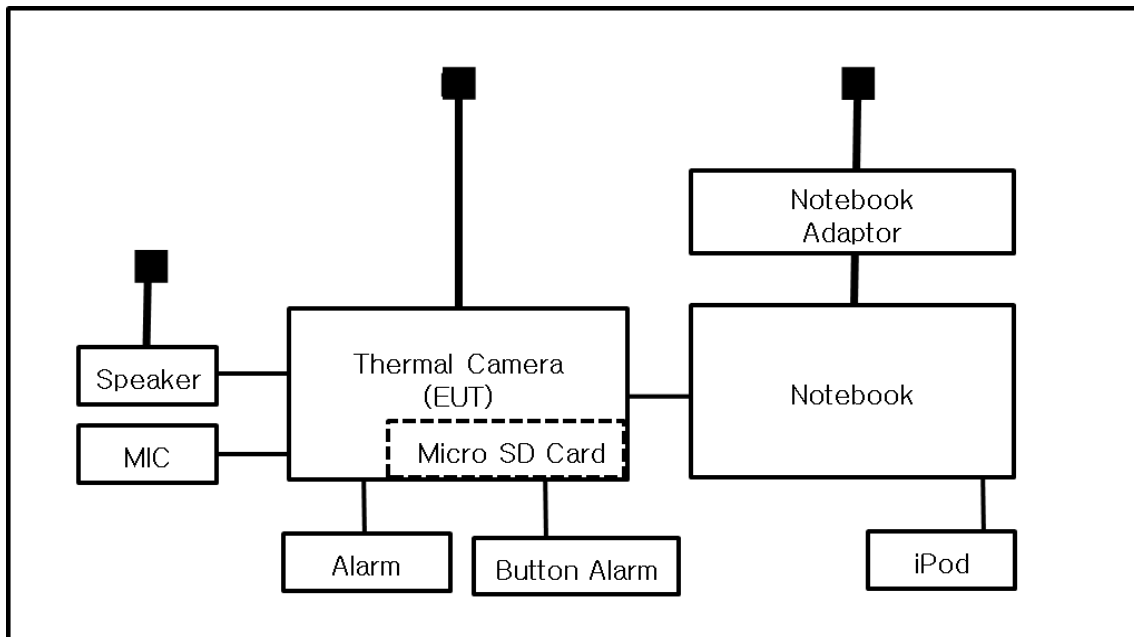
| Test Mode | operating |
|--------------------------|---------------------------|
| AC 24V DC 12 V PoE | EUT Monitoring, Ping Test |

| EUT Test operating S/W | | |
|------------------------|---------|--------------------------|
| Name | Version | Manufacture Company |
| WebViewer | - | Hanwha Techwin Co., Ltd. |

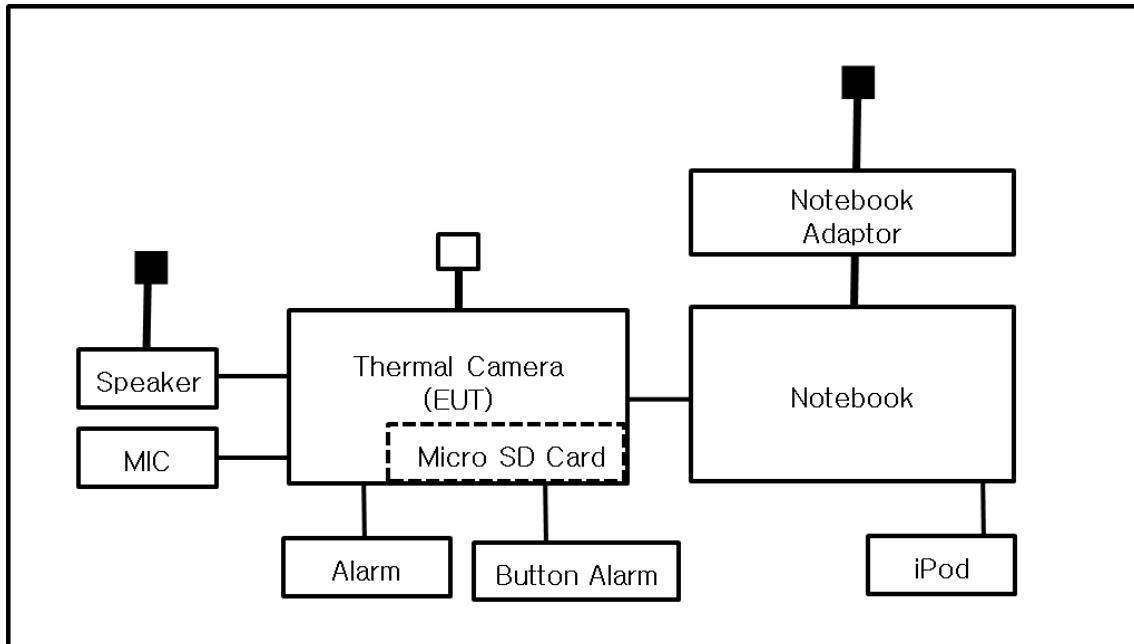
1.8 Configuration

■ AC Main
 □ DC Main

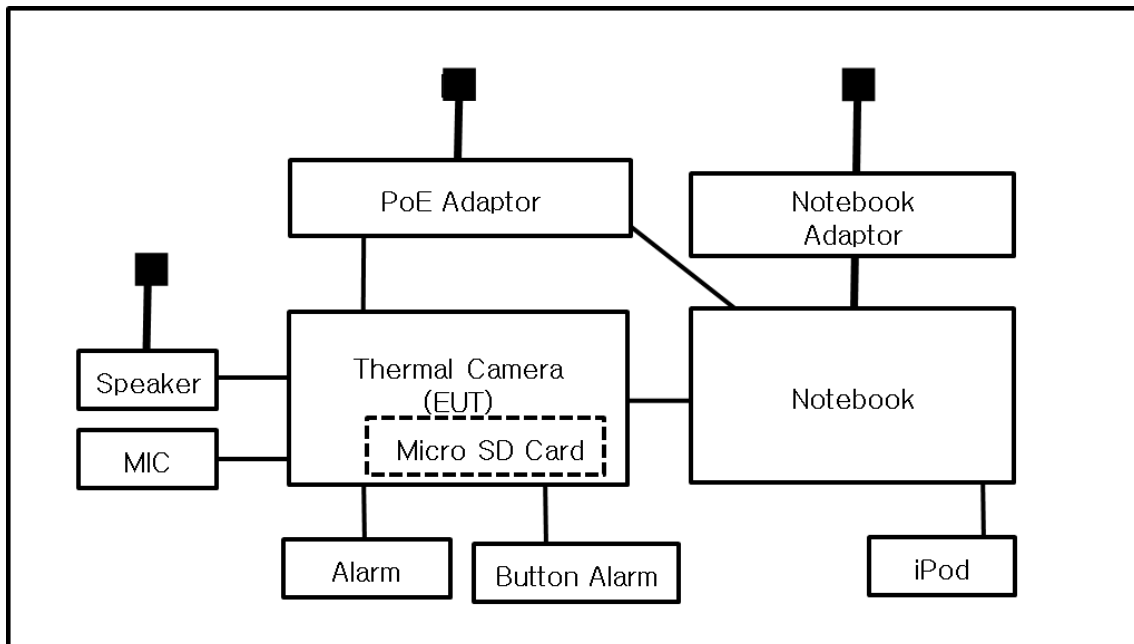
■ AC 24 V MODE



■ DC 12 V MODE



■ PoE MODE



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: 2014 and CISPR 16-1-4: 2012

1.12 Laboratory Accreditations and Listings

| Country | Agency | Scope of Accreditation | Logo |
|---------------|---------|---|--|
| KOREA | RRA | EMI (3 m & 10 m Semi-Aechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) |  KR0100 |
| International | KOLAS | EMI (3 m & 10 m Semi-Aechoic Chamber , and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) |  KT489 |
| USA | FCC | 3 m & 10 m Semi-Aechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements. |  KR0100 |
| Canada | ISED | 3 m & 10 m Semi-Aechoic Chamber and Conducted test site |  23298-1 |
| 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-20056, C-20036, T-20040, G-20036 |
| Europe | TÜV SÜD | EMI (3 m & 10 m Semi-Aechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) |  CARAT 17 07 01633 001 |

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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+A1: 2014

☒ EN 61000-3-2: 2014

☒ EN 61000-3-3: 2013

☐ EN 61326-1: 2013



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-
- | | | |
|--|----------------------------------|----------------------------------|
| <input type="checkbox"/> VCCI V-3 / 2015.04 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> AS/NZS CISPR22:2009 +A1:2010 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> 47 CFR Part 15, Subpart 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"/> IC Regulation ICES-003 : 2016 | | |
| <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"/> RE- Directive 2014/53/EU | | |
| <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

Nov. 08, 2018

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 | EMC32 | R & S | 9.12.00 | - |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER | ESR3 | R & S | 101783 | 04, 25, 2019 |
| <input checked="" type="checkbox"/> | LISN | ENV216 | R & S | 101137 | 01, 31, 2019 |
| <input checked="" type="checkbox"/> | LISN | ENV216 | R & S | 101786 | 04, 25, 2019 |

Test Conditions

Temperature: 22,4 °C

Relative Humidity: 54,1 % 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.

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2.2 Conducted Emissions at Telecommunication Ports

Test Date
Nov. 08, 2018

Test Location
Electro wave Shieldroom #3

Test Equipment

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|-------------------------------------|-------------------|--------------|--------------|---------------|--------------|
| <input checked="" type="checkbox"/> | SHIELD ROOM #3 | - | SEMITEC | - | - |
| <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 | 04, 25, 2019 |
| <input checked="" type="checkbox"/> | LISN | ENV216 | R & S | 101137 | 01, 31, 2019 |
| <input checked="" type="checkbox"/> | LISN | ENV216 | R & S | 101786 | 04, 25, 2018 |
| <input checked="" type="checkbox"/> | 8-WIRE ISN CAT3 | CAT3 8158 | SCHWARZBECK | 8158-0019 | 03, 22, 2019 |
| <input checked="" type="checkbox"/> | 8-WIRE ISN CAT5 | CAT5 8158 | SCHWARZBECK | 8158-0030 | 03, 22, 2019 |
| <input type="checkbox"/> | 8-WIRE ISN CAT6 | NTFM 8158 | SCHWARZBECK | 8158-0029 | 08, 10, 2019 |

Test Conditions

Temperature: 22,4 °C
Relative Humidity: 54,1 % 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.

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2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Nov. 08, 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, 11, 2019 |
| <input checked="" type="checkbox"/> | AMPLIFIER | SCU 01 | R & S | 100603 | 11, 27, 2018 |
| <input checked="" type="checkbox"/> | TRILOG-BROADBAND ANTENNA | VULB9163 | Schwarzbeck | 714 | 11, 28, 2018 |

Test Conditions

Temperature: 21,4 °C

Relative Humidity: 54,7 % 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

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2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Nov. 08, 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, 06, 2019 |
| <input checked="" type="checkbox"/> | PREAMPLIFIER | 8449B | AGILENT | 3008A01967 | 05, 31, 2019 |
| <input type="checkbox"/> | ATTENUATOR | 8491A | HP | 35496 | 03, 21, 2019 |
| <input checked="" type="checkbox"/> | DOUBLE RIDGED HORN ANTENNA | SAS-571 | A.H.SYSTEM,INC | 781 | 05, 02, 2019 |

Test Conditions

Temperature: 22,7 °C

Relative Humidity: 54,0 % 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.

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2.5 Harmonic Current Emissions

Test Date

Nov. 09, 2018

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 | dpa.control | EM TEST | 5.4.11.0 | - |
| <input checked="" type="checkbox"/> | DIGITAL POWER ANALYZER | DPA 500N | EM TEST | V1024106759 | 08, 08, 2019 |
| <input checked="" type="checkbox"/> | POWER SOURCE | ACS 500N6 | EM TEST | V1024106760 | - |

Test Conditions

Temperature: 23,0 °C

Relative Humidity: 55,3 % 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.It was tested only at the AC 24 MODE with the AC/AC Adapter.



2.6 Voltage Fluctuations and Flicker

Test Date
Nov. 09, 2018

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 | dpa.control | EM TEST | 5.4.11.0 | - |
| <input checked="" type="checkbox"/> | DIGITAL POWER ANALYZER | DPA 500N | EM TEST | V1024106759 | 08, 08, 2019 |
| <input checked="" type="checkbox"/> | POWER SOURCE | ACS 500N6 | EM TEST | V1024106760 | - |

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 55,3 % R.H.

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

It was tested only at the AC 24 MODE with the AC/AC Adapter.

7.1 Criteria for compliance

Criteria for compliance was based on the following guidelines:

EN 50130-4 : 2011+A1: 2014 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. 09, 2018

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 | 10, 11, 2019 |
| <input checked="" type="checkbox"/> | HCP | - | KES | - | - |
| <input checked="" type="checkbox"/> | VCP | - | KES | - | - |

Test Conditions

Temperature: 22,0 °C
Relative Humidity: 53,8 % R.H.
Atmospheric Pressure: 100,0 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 | Air | HCP | VCP |
| | <input type="checkbox"/> 2 kV | <input checked="" type="checkbox"/> 2 kV | <input type="checkbox"/> 2 kV | <input type="checkbox"/> 2 kV |
| | <input type="checkbox"/> 4 kV | <input checked="" type="checkbox"/> 4 kV | <input type="checkbox"/> 4 kV | <input type="checkbox"/> 4 kV |
| | <input checked="" type="checkbox"/> 6 kV | <input type="checkbox"/> 6 kV | <input checked="" type="checkbox"/> 6 kV | <input checked="" type="checkbox"/> 6 kV |
| | <input type="checkbox"/> 8 kV | <input checked="" type="checkbox"/> 8 kV | <input type="checkbox"/> 8 kV | <input type="checkbox"/> 8 kV |
| | <input type="checkbox"/> 15 kV | <input type="checkbox"/> 15 kV | <input type="checkbox"/> 15 kV | <input type="checkbox"/> 15 kV |

Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

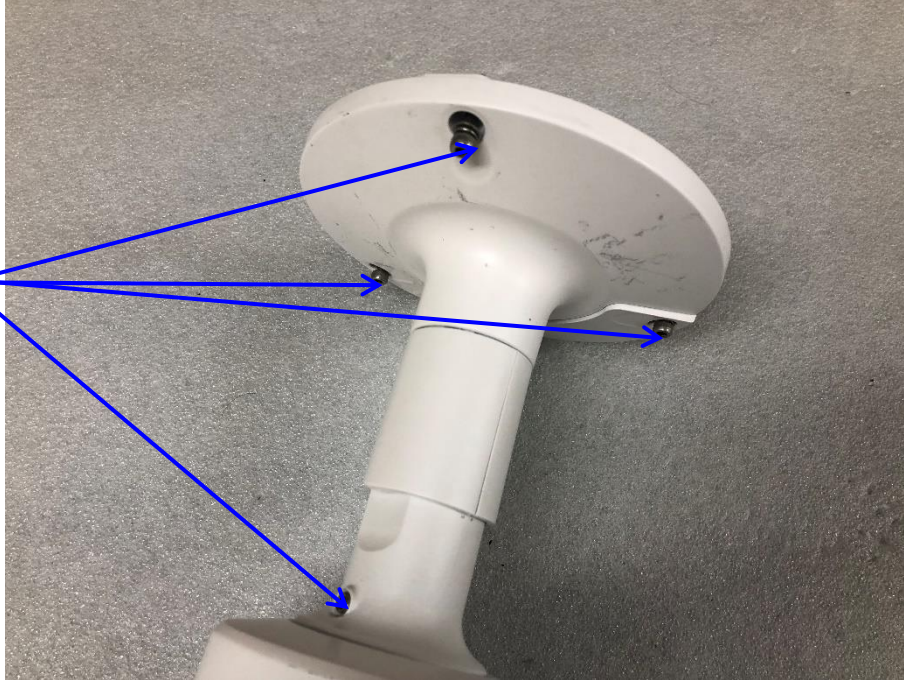
Required Performance Criteria: ☒ Complied

Location of Discharge:

| |
|---------|
| Air |
| Contact |



1



2

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Test Data

■ AC 24 V 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 | Screw | Contact Discharge | Complied | - |
| 2 | Port | Air Discharge | Complied | - |

Note: "Blank" = Not performed

■ DC 12 V 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 | Screw | Contact Discharge | Complied | - |
| 2 | Port | Air Discharge | Complied | - |

Note: "Blank" = Not performed

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■ 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 | Screw | Contact Discharge | Complied | - |
| 2 | Port | Air 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

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3.2 Radiated Electric Field Immunity

Reference Standard

EN 61000-4-3: 2006 +A2: 2010

Test Date

Nov. 09, 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, 06, 2019 |
| <input checked="" type="checkbox"/> | BROADBAND AMPLIFIER | BBA100 | R & S | 101239 | 08, 06, 2019 |
| <input checked="" type="checkbox"/> | BROADBAND AMPLIFIER | 100S1G6M1 | AR | 579931 | 08, 06, 2019 |
| <input checked="" type="checkbox"/> | POWER METER | NRP2 | R & S | 103475 | 08, 06, 2019 |
| <input checked="" type="checkbox"/> | AVG POWER SENSOR | NRP-Z91 | R & S | 102526 | 08, 06, 2019 |
| <input checked="" type="checkbox"/> | AVG POWER SENSOR | NRP-Z91 | R & S | 102527 | 08, 06, 2019 |
| <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, 06, 2019 |
| <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: 53,8 % R.H.

Atmospheric Pressure: 101,2 kPa

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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

■ AC 24 V MODE

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

■ DC 12 V 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. 09, 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, 2019 |
| <input checked="" type="checkbox"/> | MOTOR VARIAC | MV2616 | EM TEST | V0936105123 | 06, 26, 2019 |
| <input checked="" type="checkbox"/> | CAPACITIVE COUPLING CLAMP | HFK | EM TEST | 070925 | 06, 26, 2019 |

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 55,3 % R.H.
Atmospheric Pressure: 101,3 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

■ AC 24 V MODE

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

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

☐ 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 |
| Alarm | Complied | Complied |
| Button Alarm | Complied | Complied |

■ DC 12 V MODE

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

| Mode of Application | Observations | |
|---------------------|----------------|----------------|
| | (+) Burst (kV) | (-) Burst (kV) |
| L1 | Complied | Complied |
| L2 | Complied | Complied |
| L1 – L2 | Complied | Complied |

☐ 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 |
| Alarm | Complied | Complied |
| Button Alarm | Complied | Complied |

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■ PoE MODE

☐ 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 |
| Alarm | Complied | Complied |
| Button Alarm | 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

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3.4 Surge Transients

Reference Standard

EN 61000-4-5: 2014

Test Date

Nov. 09, 2018

Test Location

EMS-Surge: 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, 2019 |
| <input checked="" type="checkbox"/> | MOTOR VARIAC | MV2616 | EM TEST | V0936105123 | 06, 26, 2019 |
| <input checked="" type="checkbox"/> | CDN | CNV 508N1 | EM TEST | P1551168979 | 04, 25, 2019 |
| <input type="checkbox"/> | CDN | CNV 508T5 | EM TEST | P1549168422 | 04, 25, 2019 |

Test Conditions

Temperature:

23,0 °C

Relative Humidity:

55,3 % R.H.

Atmospheric Pressure:

101,3 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

Test Data

■ AC 24 V 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 | Complied | Complied |
| N - PE | Complied | Complied |

Signal Lines

☒ Line to Earth – Common Mode

| Mode of Application | Observations | |
|---------------------|----------------|----------------|
| | (+) Surge (kV) | (-) Surge (kV) |
| RJ-45 | Complied | Complied |
| Alarm | Complied | Complied |
| Button Alarm | Complied | Complied |

■ DC 12 V MODE

☐ Line to Line – Differential Mode

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

☒ Line to Earth – Common Mode

| Mode of Application | Observations | |
|---------------------|----------------|----------------|
| | (+) Surge (kV) | (-) Surge (kV) |
| L1 – PE | Complied | Complied |
| L2 - PE | Complied | Complied |

Signal Lines

☒ Line to Earth – Common Mode

| Mode of Application | Observations | |
|---------------------|----------------|----------------|
| | (+) Surge (kV) | (-) Surge (kV) |
| RJ-45 | Complied | Complied |
| Alarm | Complied | Complied |
| Button Alarm | Complied | Complied |

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■ PoE MODE

☐ Line to Line – Differential Mode

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

☐ 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) |
| RJ-45 | Complied | Complied |
| Alarm | Complied | Complied |
| Button Alarm | 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

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3.5 Conducted Disturbance

Reference Standard
EN 61000-4-6: 2014

Test Date
Nov. 09, 2018

Test Location
EMS-CS: Electro wave Shieldroom #3

Test Equipment

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|-------------------------------------|---------------------------|--------------|--------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMS Test S/W | icd.control | EM TEST | 5.3.7 | - |
| <input checked="" type="checkbox"/> | CONTINUOUS WAVE SIMULATOR | CWS 500N1 | EM TEST | V0936105119 | 08, 09, 2019 |
| <input checked="" type="checkbox"/> | ATTENUATOR | ATT6 | EM TEST | 1208-34 | 08, 08, 2019 |
| <input checked="" type="checkbox"/> | CDN | CDN-M2/M3N | EM TEST | 0909-06 | 08, 06, 2019 |
| <input checked="" type="checkbox"/> | CDN | CDN T8RJ45 | EM TEST | 0909-09 | 08, 06, 2019 |
| <input checked="" type="checkbox"/> | EM INJECTION CLAMP | EM 101 | Liithi | 35943 | 02, 02, 2019 |

Test Conditions
Temperature: 23,0 °C
Relative Humidity: 55,3 % R.H.
Atmospheric Pressure: 101,3 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

Test Data

■ AC 24 V 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 | CDN T800 | Complied |
| Alarm | Clamp | Complied |
| Button Alarm | Clamp | Complied |

■ DC 12 V 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 |
|--------------------------------------|-----------------|--------------|
| L1 - L2 | CDN | Complied |

☒ Signal ports and telecommunication ports

| Coupling Location (Line Stressed) | Coupling Method | Observations |
|--------------------------------------|-----------------|--------------|
| RJ-45 | CDN T800 | Complied |
| Alarm | Clamp | Complied |
| Button Alarm | Clamp | Complied |

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■ 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 | CDN T800 | Complied |
| Alarm | Clamp | Complied |
| Button Alarm | 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

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3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004

Test Date

Nov. 09, 2018

Test Location

EMS-Voltage dip: 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, 2019 |
| <input checked="" type="checkbox"/> | MOTOR VARIAC | MV2616 | EM TEST | V0936105123 | 11, 27, 2018 |

Test Conditions

Temperature:

23,0 °C

Relative Humidity:

55,3 % R.H.

Atmospheric Pressure:

101,3 kPa



Test Specifications & Observations/Remarks

■ AC 24 V MODE

(Test Voltage : 230 V)

| <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>Complied</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

Test Results

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

Remarks

PASS Required Performance Criteria

The test has been tested using the AC adaptor.

APPENDIX A – TEST DATA

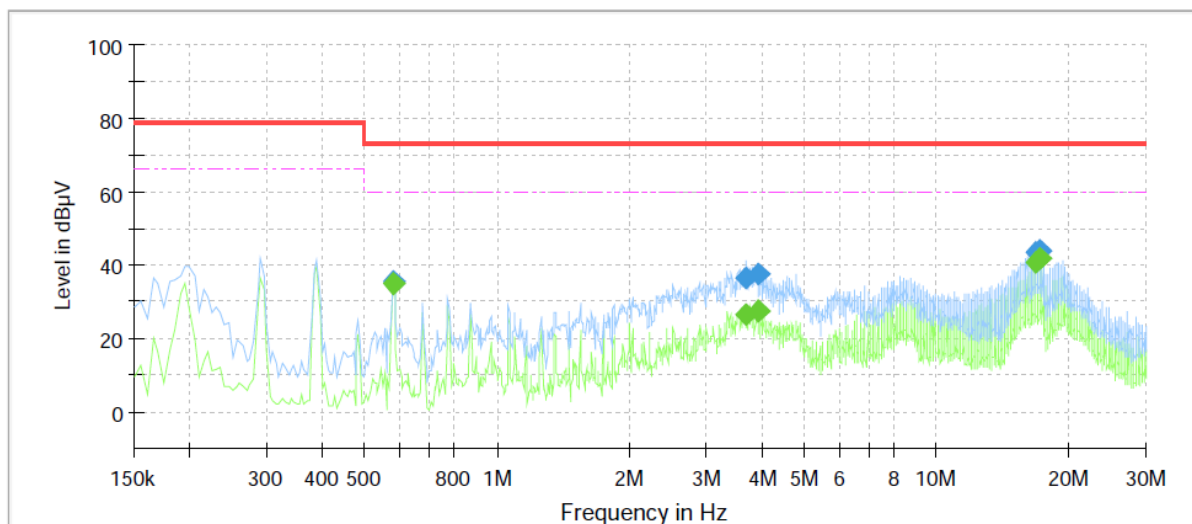
Conducted Emissions at Mains Power Ports

■ AC 24 V MODE

[HOT]

Common Information

| | |
|-------------------|--------------------|
| Test Description: | Conducted Emission |
| Model No.: | TNO-4040TR |
| Mode | AC |
| Operator Name: | KES |



Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.580000 | --- | 35.08 | 60.00 | 24.92 | 1000.0 | 9.000 | L1 | 9.8 |
| 0.580000 | 35.25 | --- | 73.00 | 37.75 | 1000.0 | 9.000 | L1 | 9.8 |
| 3.680000 | --- | 26.72 | 60.00 | 33.28 | 1000.0 | 9.000 | L1 | 10.1 |
| 3.680000 | 36.71 | --- | 73.00 | 36.29 | 1000.0 | 9.000 | L1 | 10.1 |
| 3.925000 | --- | 27.53 | 60.00 | 32.47 | 1000.0 | 9.000 | L1 | 10.1 |
| 3.925000 | 37.50 | --- | 73.00 | 35.50 | 1000.0 | 9.000 | L1 | 10.1 |
| 16.875000 | --- | 40.87 | 60.00 | 19.13 | 1000.0 | 9.000 | L1 | 10.3 |
| 16.875000 | 43.20 | --- | 73.00 | 29.80 | 1000.0 | 9.000 | L1 | 10.3 |
| 17.265000 | --- | 41.74 | 60.00 | 18.26 | 1000.0 | 9.000 | L1 | 10.3 |
| 17.265000 | 43.97 | --- | 73.00 | 29.03 | 1000.0 | 9.000 | L1 | 10.3 |



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www.kes.co.kr

Test report No.:

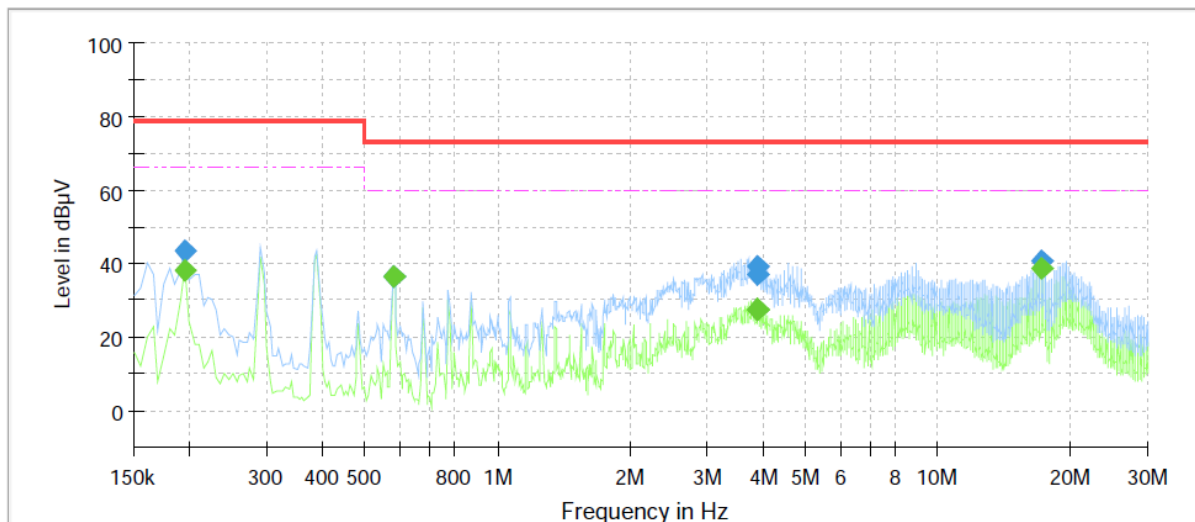
KES-EI-18T0634-R1

Page (40) of (71)

[NEUTRAL]

Common Information

Test Description: Conducted Emission
Model No.: TNO-4040TR
Mode: AC
Operator Name: KES



Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.195000 | --- | 38.06 | 66.00 | 27.94 | 1000.0 | 9.000 | N | 9.7 |
| 0.195000 | 43.60 | --- | 79.00 | 35.40 | 1000.0 | 9.000 | N | 9.7 |
| 0.580000 | --- | 36.30 | 60.00 | 23.70 | 1000.0 | 9.000 | N | 9.8 |
| 0.580000 | 36.44 | --- | 73.00 | 36.56 | 1000.0 | 9.000 | N | 9.8 |
| 3.875000 | --- | 27.77 | 60.00 | 32.23 | 1000.0 | 9.000 | N | 10.1 |
| 3.875000 | 37.31 | --- | 73.00 | 35.69 | 1000.0 | 9.000 | N | 10.1 |
| 3.910000 | --- | 27.65 | 60.00 | 32.35 | 1000.0 | 9.000 | N | 10.1 |
| 3.910000 | 39.09 | --- | 73.00 | 33.91 | 1000.0 | 9.000 | N | 10.1 |
| 17.165000 | --- | 38.44 | 60.00 | 21.56 | 1000.0 | 9.000 | N | 10.2 |
| 17.165000 | 40.52 | --- | 73.00 | 32.48 | 1000.0 | 9.000 | N | 10.2 |

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

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Test report No.:

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Conducted Emissions at Telecommunication Ports

■ AC 24 V MODE

[10 Mbps]

Common Information

Test Description:

Telecommunication Emission

Model No.:

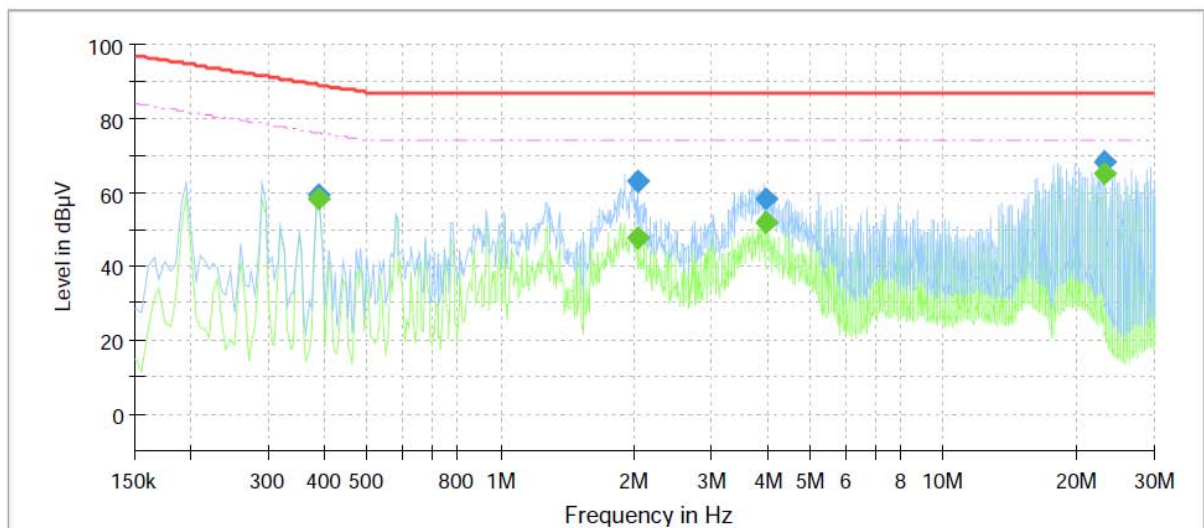
TNO-4040TR

Mode

AC 10

Operator Name:

KES



Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|-------------|------------|
| 0.390000 | --- | 58.15 | 76.06 | 17.91 | 1000.0 | 9.000 | Single Line | 10.1 |
| 0.390000 | 59.30 | --- | 89.06 | 29.76 | 1000.0 | 9.000 | Single Line | 10.1 |
| 2.040000 | --- | 47.79 | 74.00 | 26.21 | 1000.0 | 9.000 | Single Line | 10.3 |
| 2.040000 | 62.86 | --- | 87.00 | 24.14 | 1000.0 | 9.000 | Single Line | 10.3 |
| 3.955000 | --- | 52.05 | 74.00 | 21.95 | 1000.0 | 9.000 | Single Line | 10.2 |
| 3.955000 | 58.03 | --- | 87.00 | 28.97 | 1000.0 | 9.000 | Single Line | 10.2 |
| 23.130000 | --- | 64.87 | 74.00 | 9.13 | 1000.0 | 9.000 | Single Line | 10.1 |
| 23.130000 | 68.30 | --- | 87.00 | 18.70 | 1000.0 | 9.000 | Single Line | 10.1 |

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Test report No.:

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[100 Mbps]

Common Information

Test Description:

Model No.:

Mode

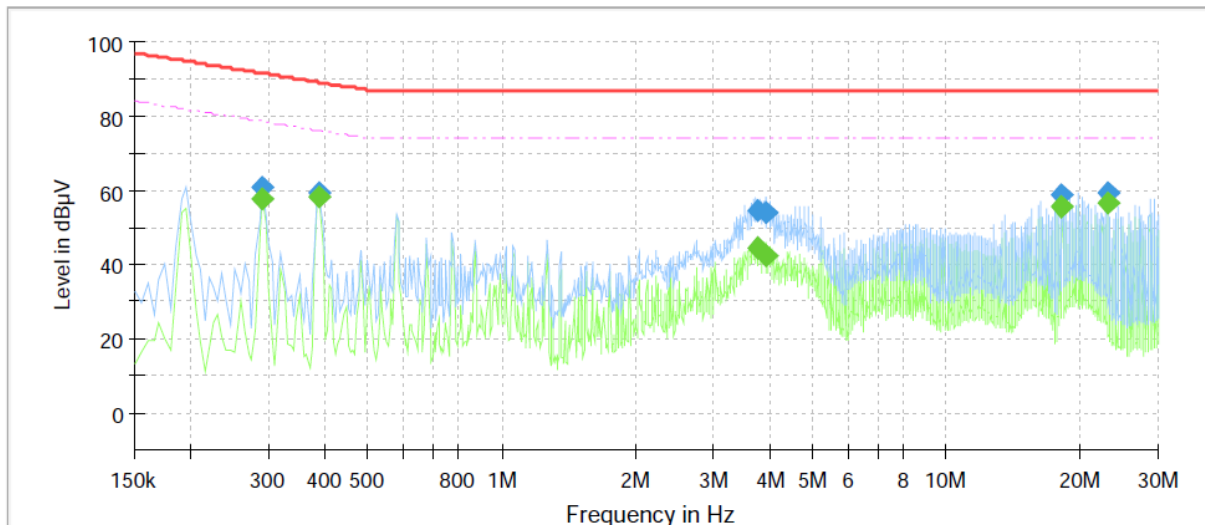
Operator Name:

Telecommunication Emission

TNO-4040TR

AC 100

KES



Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|-------------|------------|
| 0.290000 | --- | 57.48 | 78.52 | 21.04 | 1000.0 | 9.000 | Single Line | 9.6 |
| 0.290000 | 60.76 | --- | 91.52 | 30.76 | 1000.0 | 9.000 | Single Line | 9.6 |
| 0.390000 | --- | 58.06 | 76.06 | 18.00 | 1000.0 | 9.000 | Single Line | 9.6 |
| 0.390000 | 59.13 | --- | 89.06 | 29.93 | 1000.0 | 9.000 | Single Line | 9.6 |
| 3.775000 | --- | 44.25 | 74.00 | 29.75 | 1000.0 | 9.000 | Single Line | 9.7 |
| 3.775000 | 54.28 | --- | 87.00 | 32.72 | 1000.0 | 9.000 | Single Line | 9.7 |
| 3.915000 | --- | 42.27 | 74.00 | 31.73 | 1000.0 | 9.000 | Single Line | 9.7 |
| 3.915000 | 54.08 | --- | 87.00 | 32.92 | 1000.0 | 9.000 | Single Line | 9.7 |
| 18.245000 | --- | 55.40 | 74.00 | 18.60 | 1000.0 | 9.000 | Single Line | 9.7 |
| 18.245000 | 58.66 | --- | 87.00 | 28.34 | 1000.0 | 9.000 | Single Line | 9.7 |
| 23.130000 | --- | 56.53 | 74.00 | 17.47 | 1000.0 | 9.000 | Single Line | 9.6 |
| 23.130000 | 59.46 | --- | 87.00 | 27.54 | 1000.0 | 9.000 | Single Line | 9.6 |

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Test report No.:

KES-EI-18T0634-R1

Page (43) of (71)

■ DC 12 V MODE

[10 Mbps]

Common Information

Test Description:

Telecommunication Emission

Model No.:

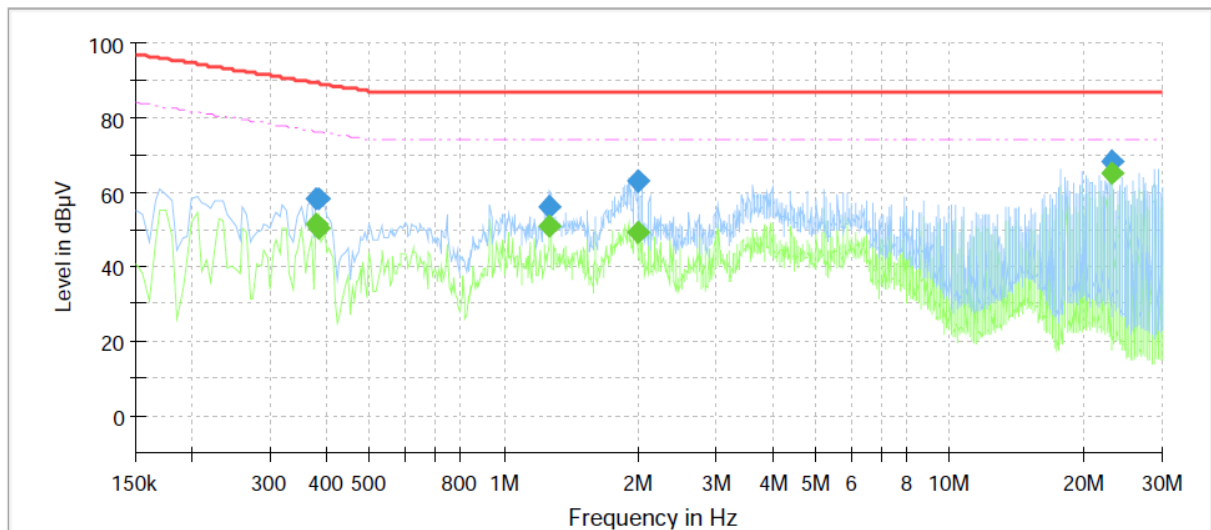
TNO-4040TR

Mode

DC 10

Operator Name:

KES



Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|-------------|------------|
| 0.380000 | --- | 51.27 | 76.28 | 25.01 | 1000.0 | 9.000 | Single Line | 10.1 |
| 0.380000 | 58.27 | --- | 89.28 | 31.01 | 1000.0 | 9.000 | Single Line | 10.1 |
| 0.385000 | --- | 50.13 | 76.17 | 26.04 | 1000.0 | 9.000 | Single Line | 10.1 |
| 0.385000 | 58.05 | --- | 89.17 | 31.12 | 1000.0 | 9.000 | Single Line | 10.1 |
| 1.265000 | --- | 50.82 | 74.00 | 23.18 | 1000.0 | 9.000 | Single Line | 10.3 |
| 1.265000 | 55.86 | --- | 87.00 | 31.14 | 1000.0 | 9.000 | Single Line | 10.3 |
| 1.995000 | --- | 49.47 | 74.00 | 24.53 | 1000.0 | 9.000 | Single Line | 10.3 |
| 1.995000 | 63.15 | --- | 87.00 | 23.85 | 1000.0 | 9.000 | Single Line | 10.3 |
| 23.130000 | --- | 64.87 | 74.00 | 9.13 | 1000.0 | 9.000 | Single Line | 10.1 |
| 23.130000 | 68.32 | --- | 87.00 | 18.68 | 1000.0 | 9.000 | Single Line | 10.1 |

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Test report No.:

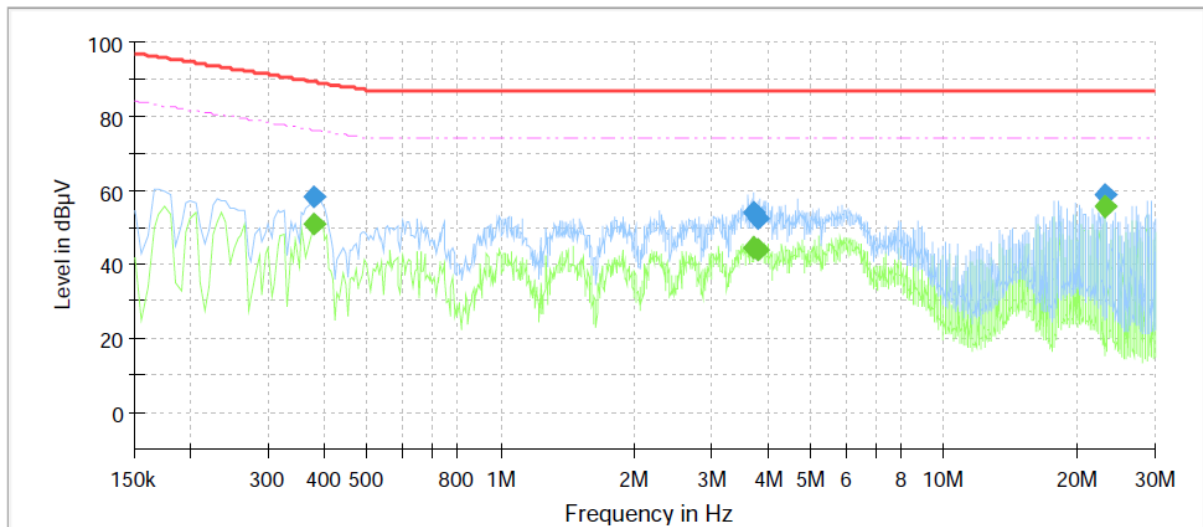
KES-EI-18T0634-R1

Page (44) of (71)

[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: TNO-4040TR
Mode: DC 100
Operator Name: KES



Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|-------------|------------|
| 0.380000 | --- | 50.87 | 76.28 | 25.41 | 1000.0 | 9.000 | Single Line | 9.6 |
| 0.380000 | 57.96 | --- | 89.28 | 31.32 | 1000.0 | 9.000 | Single Line | 9.6 |
| 3.710000 | --- | 44.35 | 74.00 | 29.65 | 1000.0 | 9.000 | Single Line | 9.7 |
| 3.710000 | 53.99 | --- | 87.00 | 33.01 | 1000.0 | 9.000 | Single Line | 9.7 |
| 3.820000 | --- | 43.85 | 74.00 | 30.15 | 1000.0 | 9.000 | Single Line | 9.7 |
| 3.820000 | 52.29 | --- | 87.00 | 34.71 | 1000.0 | 9.000 | Single Line | 9.7 |
| 23.130000 | --- | 55.45 | 74.00 | 18.55 | 1000.0 | 9.000 | Single Line | 9.6 |
| 23.130000 | 59.01 | --- | 87.00 | 27.99 | 1000.0 | 9.000 | Single Line | 9.6 |

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Test report No.:

KES-E1-18T0634-R1

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■ PoE MODE

[10 Mbps]

Common Information

Test Description:

Telecommunication Emission

Model No.:

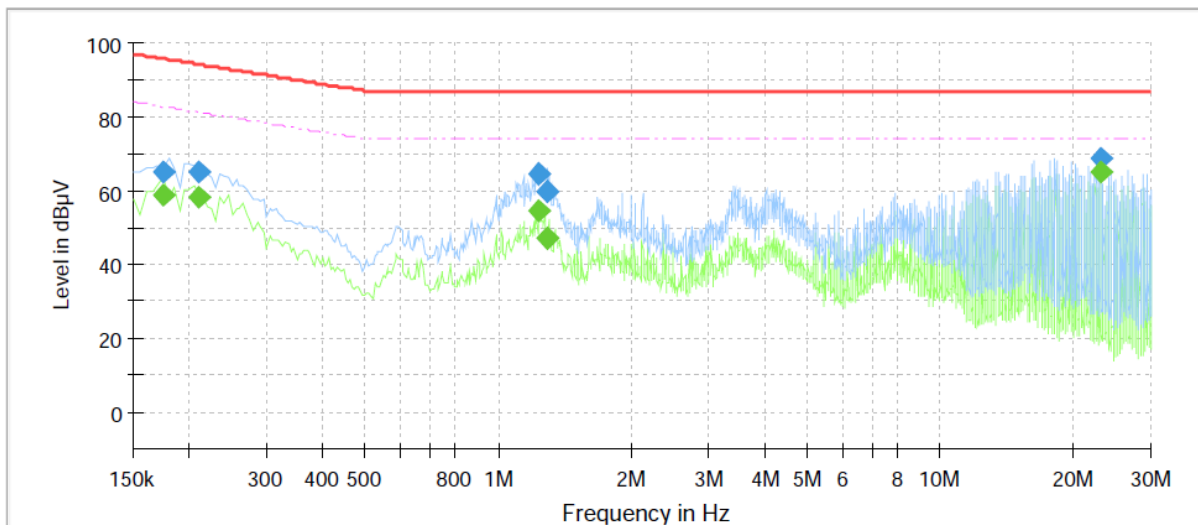
TNO-4040TR

Mode

PoE 10

Operator Name:

KES



Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|-------------|------------|
| 0.175000 | --- | 58.82 | 82.72 | 23.90 | 1000.0 | 9.000 | Single Line | 10.2 |
| 0.175000 | 65.03 | --- | 95.72 | 30.69 | 1000.0 | 9.000 | Single Line | 10.2 |
| 0.210000 | --- | 58.19 | 81.21 | 23.02 | 1000.0 | 9.000 | Single Line | 10.2 |
| 0.210000 | 65.11 | --- | 94.21 | 29.10 | 1000.0 | 9.000 | Single Line | 10.2 |
| 1.240000 | --- | 54.36 | 74.00 | 19.64 | 1000.0 | 9.000 | Single Line | 10.3 |
| 1.240000 | 64.37 | --- | 87.00 | 22.63 | 1000.0 | 9.000 | Single Line | 10.3 |
| 1.285000 | --- | 46.86 | 74.00 | 27.14 | 1000.0 | 9.000 | Single Line | 10.3 |
| 1.285000 | 59.77 | --- | 87.00 | 27.23 | 1000.0 | 9.000 | Single Line | 10.3 |
| 23.130000 | --- | 65.33 | 74.00 | 8.67 | 1000.0 | 9.000 | Single Line | 10.1 |
| 23.130000 | 68.88 | --- | 87.00 | 18.12 | 1000.0 | 9.000 | Single Line | 10.1 |

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Test report No.:

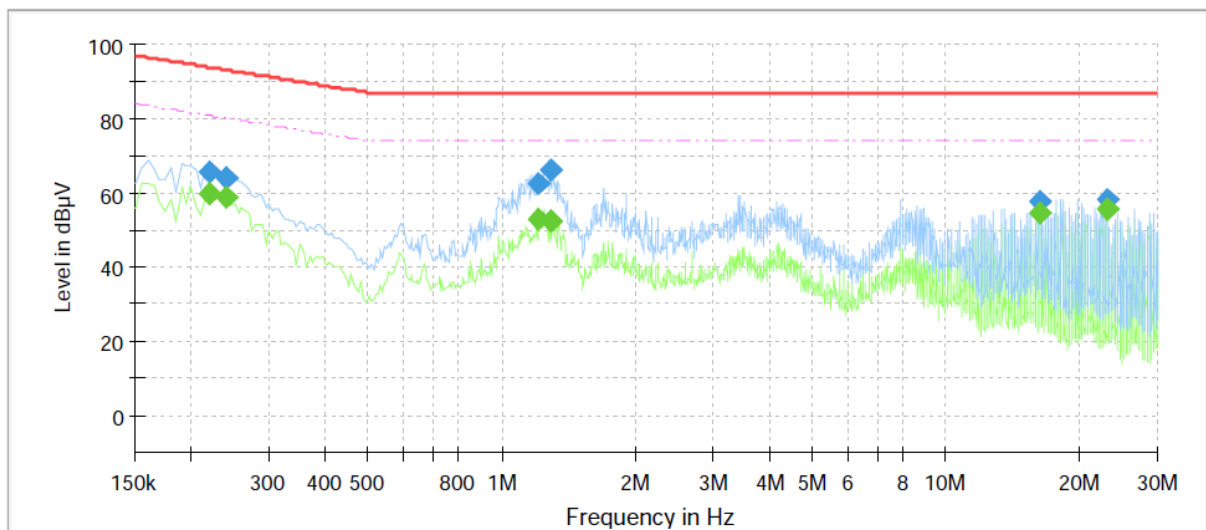
KES-EI-18T0634-R1

Page (46) of (71)

[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: TNO-4040TR
Mode: PoE 100
Operator Name: KES



Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|-------------|------------|
| 0.220000 | --- | 59.95 | 80.82 | 20.87 | 1000.0 | 9.000 | Single Line | 9.6 |
| 0.220000 | 65.59 | --- | 93.82 | 28.23 | 1000.0 | 9.000 | Single Line | 9.6 |
| 0.240000 | --- | 58.57 | 80.10 | 21.53 | 1000.0 | 9.000 | Single Line | 9.6 |
| 0.240000 | 63.84 | --- | 93.10 | 29.26 | 1000.0 | 9.000 | Single Line | 9.6 |
| 1.215000 | --- | 53.15 | 74.00 | 20.85 | 1000.0 | 9.000 | Single Line | 9.8 |
| 1.215000 | 62.46 | --- | 87.00 | 24.54 | 1000.0 | 9.000 | Single Line | 9.8 |
| 1.295000 | --- | 52.49 | 74.00 | 21.51 | 1000.0 | 9.000 | Single Line | 9.8 |
| 1.295000 | 65.89 | --- | 87.00 | 21.11 | 1000.0 | 9.000 | Single Line | 9.8 |
| 16.230000 | --- | 54.46 | 74.00 | 19.54 | 1000.0 | 9.000 | Single Line | 9.7 |
| 16.230000 | 57.67 | --- | 87.00 | 29.33 | 1000.0 | 9.000 | Single Line | 9.7 |
| 23.130000 | --- | 55.46 | 74.00 | 18.54 | 1000.0 | 9.000 | Single Line | 9.6 |
| 23.130000 | 58.21 | --- | 87.00 | 28.79 | 1000.0 | 9.000 | Single Line | 9.6 |

◆ 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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www.kes.co.kr

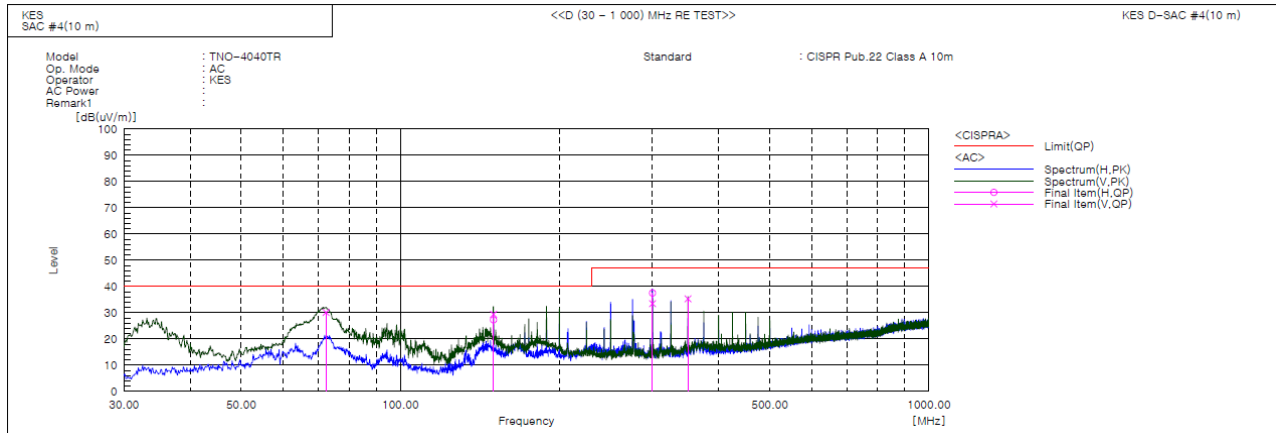
Test report No.:

KES-EI-18T0634-R1

Page (47) of (71)

Radiated Electric Field Emissions(Below 1 GHz)

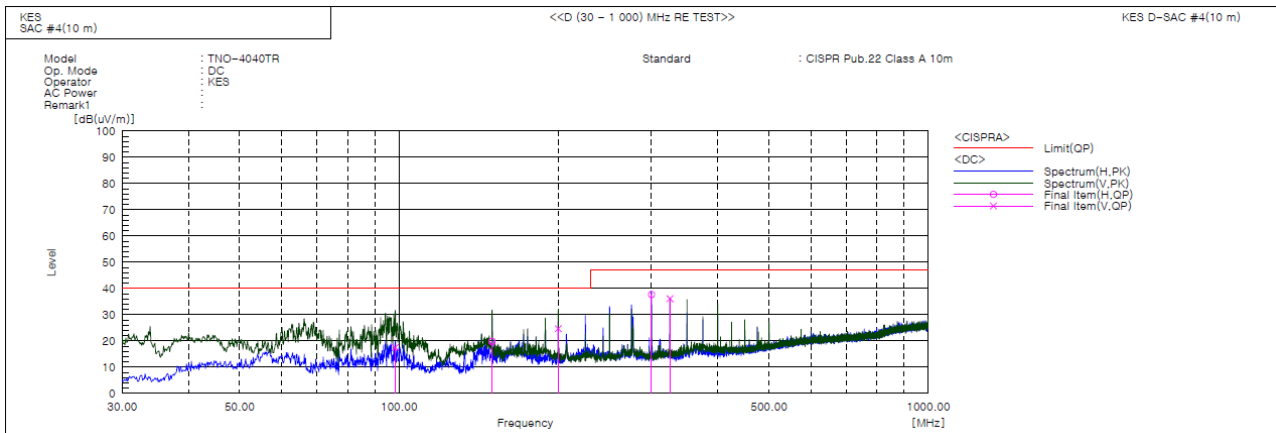
■ AC 24 V MODE



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 | 72.316 | V | 63.2 | -33.1 | 30.1 | 40.0 | 9.9 | 100.0 | 214.0 | |
| 2 | 150.038 | H | 59.4 | -32.1 | 27.3 | 40.0 | 12.7 | 400.0 | 124.0 | |
| 3 | 150.038 | V | 61.5 | -32.1 | 29.4 | 40.0 | 10.6 | 100.0 | 111.0 | |
| 4 | 300.024 | H | 62.3 | -24.8 | 37.5 | 47.0 | 9.5 | 400.0 | 139.0 | |
| 5 | 300.024 | V | 58.3 | -24.8 | 33.5 | 47.0 | 13.5 | 100.0 | 91.0 | |
| 6 | 349.979 | V | 58.5 | -23.2 | 35.3 | 47.0 | 11.7 | 100.0 | 87.0 | |

■ DC 12 V 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 | 98.385 | V | 46.6 | -29.1 | 17.5 | 40.0 | 22.5 | 100.0 | 273.0 | |
| 2 | 149.916 | H | 51.9 | -32.1 | 19.8 | 40.0 | 20.2 | 400.0 | 119.0 | |
| 3 | 199.993 | V | 52.2 | -27.5 | 24.7 | 40.0 | 15.3 | 100.0 | 36.0 | |
| 4 | 300.024 | H | 62.5 | -24.8 | 37.7 | 47.0 | 9.3 | 400.0 | 131.0 | |
| 5 | 325.001 | V | 60.2 | -24.1 | 36.1 | 47.0 | 10.9 | 100.0 | 147.0 | |

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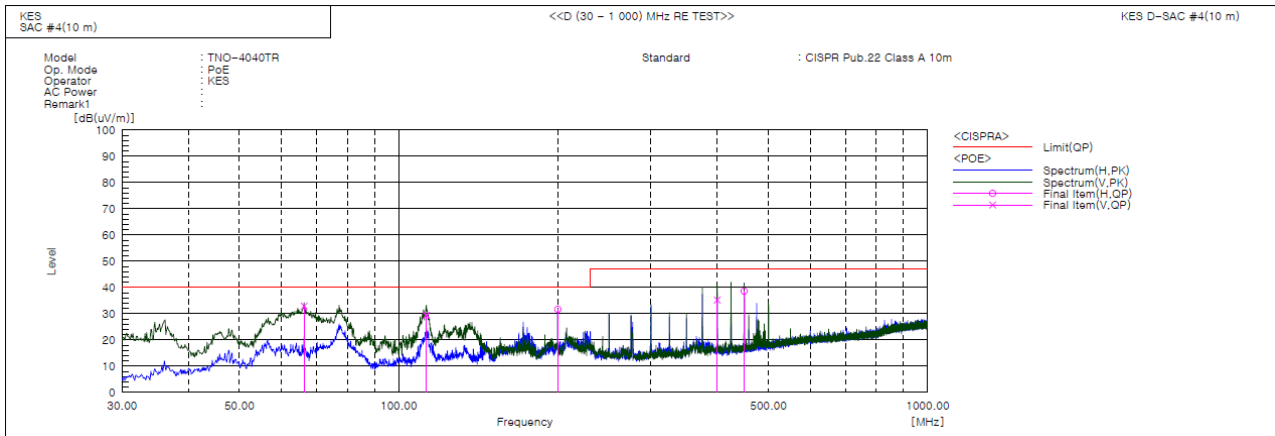
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KES-EI-18T0634-R1

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■ PoE MODE



Final Result

| No. | Frequency | (P) | Reading | c.f | Result | Limit | Margin | Height | Angle | Remark |
|-----|-----------|-----|----------|-----------|------------|------------|--------|--------|-------|--------|
| | [MHz] | | QP | | QP | QP | QP | | | |
| | | | [dB(uV)] | [dB(1/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB] | [cm] | [deg] | |
| 1 | 66.254 | V | 64.2 | -31.3 | 32.9 | 40.0 | 7.1 | 100.0 | 244.0 | |
| 2 | 112.814 | V | 59.7 | -30.3 | 29.4 | 40.0 | 10.6 | 100.0 | 113.0 | |
| 3 | 199.993 | H | 59.2 | -27.5 | 31.7 | 40.0 | 8.3 | 400.0 | 267.0 | |
| 4 | 400.055 | V | 56.6 | -21.4 | 35.2 | 47.0 | 11.8 | 100.0 | 26.0 | |
| 5 | 450.010 | H | 58.8 | -20.2 | 38.6 | 47.0 | 8.4 | 400.0 | 282.0 | |

◆ Calculation – SEMI ANECHOIC CHAMBER #4(10 m)

Result(QP) [dB(μ V/m)] = (Reading(QP)[dB(μ V)] + c.f[dB(1/m)]

Margin(OP)[dB] = Limit[dB(μ V/m)] - Result(QP) [dB(μ V/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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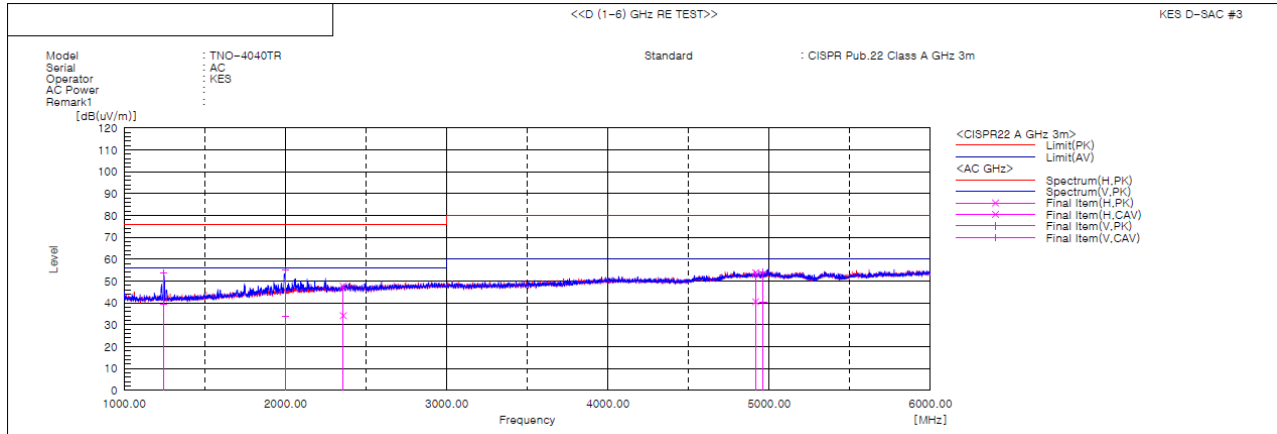
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Radiated Electric Field Emissions(Above 1 GHz)

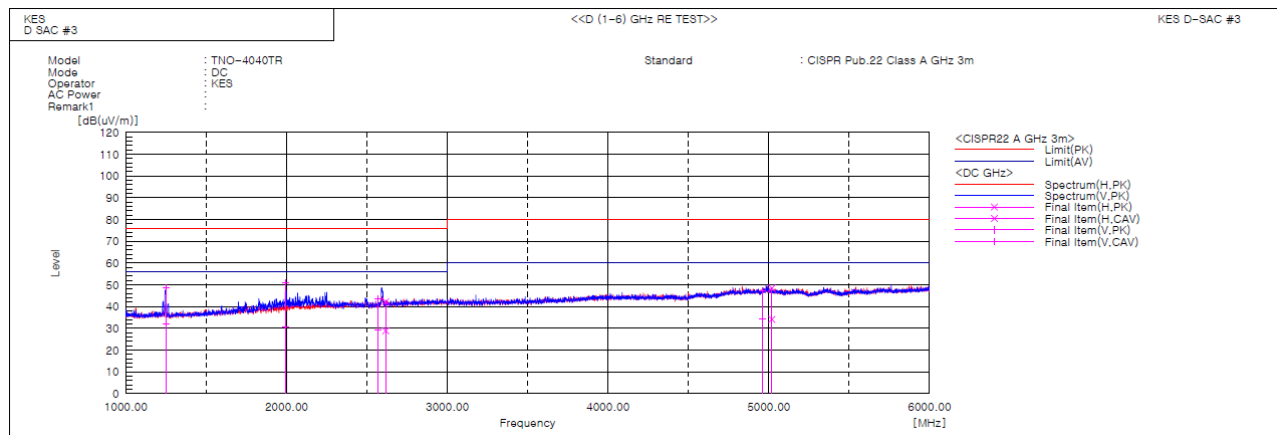
■ AC 24 V MODE



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 | 1246.710 | V | 54.6 | 40.4 | -1.0 | 53.6 | 39.4 | 76.0 | 56.0 | 22.4 | 16.6 | 100.0 | 210.0 | |
| 2 | 1999.189 | V | 51.0 | 30.0 | 3.9 | 54.9 | 33.9 | 76.0 | 56.0 | 21.1 | 22.1 | 100.0 | 2.5 | |
| 3 | 2358.444 | H | 42.2 | 28.8 | 5.5 | 47.7 | 34.3 | 76.0 | 56.0 | 28.3 | 21.7 | 100.0 | 299.1 | |
| 4 | 4916.399 | H | 39.6 | 26.3 | 14.3 | 53.9 | 40.6 | 80.0 | 60.0 | 26.1 | 19.4 | 100.0 | 342.2 | |
| 5 | 4963.524 | V | 39.6 | 25.9 | 14.4 | 54.0 | 40.3 | 80.0 | 60.0 | 26.0 | 19.7 | 100.0 | 271.2 | |

■ DC 12 V 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 | 1249.810 | V | 55.5 | 39.2 | -7.0 | 48.5 | 32.2 | 76.0 | 56.0 | 27.5 | 23.8 | 100.0 | 220.4 | |
| 2 | 1992.850 | V | 53.1 | 32.8 | -2.1 | 51.0 | 30.7 | 76.0 | 56.0 | 25.0 | 25.3 | 100.0 | 18.9 | |
| 3 | 2568.834 | V | 43.3 | 29.0 | 0.2 | 43.5 | 29.2 | 76.0 | 56.0 | 32.5 | 26.8 | 100.0 | 303.0 | |
| 4 | 2616.796 | H | 41.9 | 28.5 | 0.4 | 42.3 | 28.9 | 76.0 | 56.0 | 33.7 | 27.1 | 100.0 | 234.4 | |
| 5 | 4959.825 | V | 38.9 | 25.8 | 8.4 | 47.3 | 34.2 | 80.0 | 60.0 | 32.7 | 25.8 | 100.0 | 97.6 | |
| 6 | 5018.945 | H | 40.0 | 25.8 | 8.4 | 48.4 | 34.2 | 80.0 | 60.0 | 31.6 | 25.8 | 100.0 | 122.2 | |

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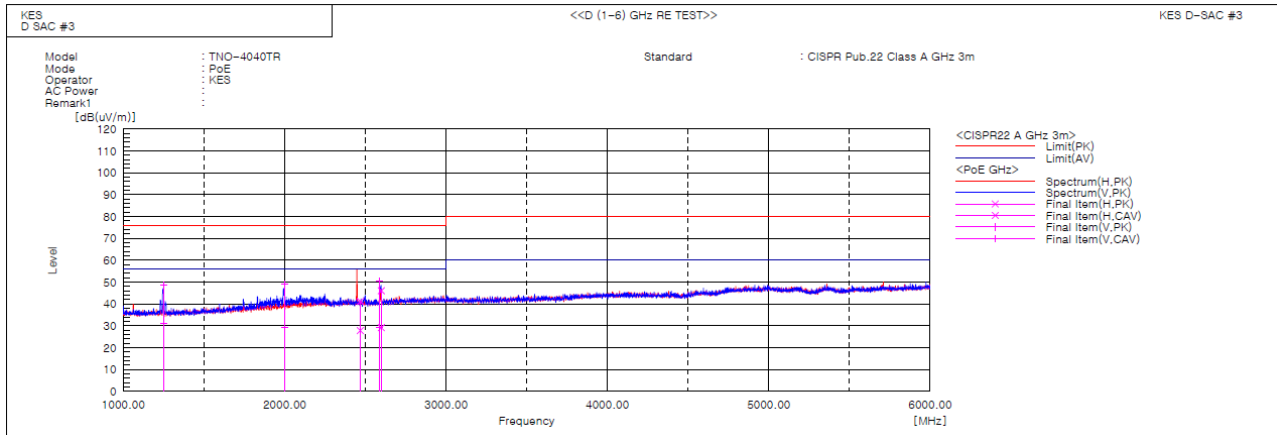
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Test report No.:

KES-EI-18T0634-R1

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■ PoE MODE



Final Result

| No. | Frequency [MHz] | (P) | Reading PK [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB(1/m)] | Result PK [dB(uV/m)] | Result CAV [dB(uV/m)] | Limit PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Margin PK [dB] | Margin CAV [dB] | Height [cm] | Angle [deg] | Remark |
|-----|-----------------|-----|---------------------|----------------------|---------------|----------------------|-----------------------|---------------------|---------------------|----------------|-----------------|-------------|-------------|--------|
| 1 | 1249.919 | V | 55.6 | 38.4 | -7.0 | 48.6 | 31.4 | 76.0 | 56.0 | 27.4 | 24.6 | 100.0 | 221.3 | |
| 2 | 1999.069 | V | 51.3 | 31.3 | -2.1 | 49.2 | 29.2 | 76.0 | 56.0 | 26.8 | 26.8 | 100.0 | 3.2 | |
| 3 | 2469.296 | H | 41.3 | 28.0 | -0.1 | 41.2 | 27.9 | 76.0 | 56.0 | 34.8 | 28.1 | 100.0 | 273.8 | |
| 4 | 2598.859 | H | 45.8 | 28.9 | 0.3 | 46.1 | 29.2 | 76.0 | 56.0 | 29.9 | 26.8 | 100.0 | 227.3 | |
| 5 | 2588.132 | V | 50.4 | 29.0 | 0.3 | 50.7 | 29.3 | 76.0 | 56.0 | 25.3 | 26.7 | 100.0 | 62.8 | |

◆ Calculation

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

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

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

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

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Harmonic Current Emissions and Voltage Fluctuations and Flicker

Average harmonic current results

| Hn | I _{eff} [A] | % of Limit | Limit [A] | Result |
|----|----------------------|------------|-----------|--------|
| 1 | 182.524E-3 | | | |
| 2 | 1.981E-3 | | | PASS |
| 3 | 61.359E-3 | 2.668 | 2.30 | PASS |
| 4 | 1.084E-3 | | | PASS |
| 5 | 36.094E-3 | 3.166 | 1.14 | PASS |
| 6 | 657.194E-6 | | | PASS |
| 7 | 15.834E-3 | 2.056 | 770.00E-3 | PASS |
| 8 | 694.115E-6 | | | PASS |
| 9 | 11.808E-3 | 2.952 | 400.00E-3 | PASS |
| 10 | 684.288E-6 | | | PASS |
| 11 | 3.693E-3 | | | PASS |
| 12 | 651.855E-6 | | | PASS |
| 13 | 2.028E-3 | | | PASS |
| 14 | 658.931E-6 | | | PASS |
| 15 | 2.378E-3 | | | PASS |
| 16 | 623.723E-6 | | | PASS |
| 17 | 2.317E-3 | | | PASS |
| 18 | 758.313E-6 | | | PASS |
| 19 | 1.378E-3 | | | PASS |
| 20 | 770.095E-6 | | | PASS |
| 21 | 1.087E-3 | | | PASS |
| 22 | 692.052E-6 | | | PASS |
| 23 | 1.119E-3 | | | PASS |
| 24 | 614.050E-6 | | | PASS |
| 25 | 958.943E-6 | | | PASS |
| 26 | 573.099E-6 | | | PASS |
| 27 | 819.805E-6 | | | PASS |
| 28 | 839.695E-6 | | | PASS |
| 29 | 910.091E-6 | | | PASS |
| 30 | 663.793E-6 | | | PASS |
| 31 | 699.567E-6 | | | PASS |
| 32 | 648.810E-6 | | | PASS |
| 33 | 892.864E-6 | | | PASS |
| 34 | 675.532E-6 | | | PASS |
| 35 | 625.723E-6 | | | PASS |
| 36 | 624.591E-6 | | | PASS |
| 37 | 937.604E-6 | | | PASS |
| 38 | 718.723E-6 | | | PASS |
| 39 | 773.310E-6 | | | PASS |
| 40 | 631.993E-6 | | | PASS |

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.

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Test report No.:

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Test Data - Harmonics (continued)

Maximum harmonic current results

| Hn | I _{eff} [A] | % of Limit | Limit [A] | Result |
|----|----------------------|------------|-----------|--------|
| 1 | 183.940E-3 | | | |
| 2 | 2.268E-3 | | | PASS |
| 3 | 61.518E-3 | 1.783 | 3.45 | PASS |
| 4 | 1.264E-3 | | | PASS |
| 5 | 36.458E-3 | 2.132 | 1.71 | PASS |
| 6 | 811.559E-6 | | | PASS |
| 7 | 16.057E-3 | 1.390 | 1.15 | PASS |
| 8 | 893.283E-6 | | | PASS |
| 9 | 12.174E-3 | 2.029 | 600.00E-3 | PASS |
| 10 | 834.823E-6 | | | PASS |
| 11 | 3.827E-3 | | | PASS |
| 12 | 789.117E-6 | | | PASS |
| 13 | 2.357E-3 | | | PASS |
| 14 | 938.150E-6 | | | PASS |
| 15 | 2.716E-3 | | | PASS |
| 16 | 818.859E-6 | | | PASS |
| 17 | 2.602E-3 | | | PASS |
| 18 | 902.879E-6 | | | PASS |
| 19 | 1.652E-3 | | | PASS |
| 20 | 1.020E-3 | | | PASS |
| 21 | 1.570E-3 | | | PASS |
| 22 | 781.784E-6 | | | PASS |
| 23 | 1.568E-3 | | | PASS |
| 24 | 739.845E-6 | | | PASS |
| 25 | 1.424E-3 | | | PASS |
| 26 | 703.566E-6 | | | PASS |
| 27 | 970.897E-6 | | | PASS |
| 28 | 1.123E-3 | | | PASS |
| 29 | 1.055E-3 | | | PASS |
| 30 | 770.530E-6 | | | PASS |
| 31 | 909.550E-6 | | | PASS |
| 32 | 803.838E-6 | | | PASS |
| 33 | 1.103E-3 | | | PASS |
| 34 | 789.479E-6 | | | PASS |
| 35 | 880.279E-6 | | | PASS |
| 36 | 743.214E-6 | | | PASS |
| 37 | 1.155E-3 | | | PASS |
| 38 | 976.988E-6 | | | PASS |
| 39 | 980.345E-6 | | | PASS |
| 40 | 787.909E-6 | | | PASS |

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.

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Test Data - Voltage Fluctuations

Maximum Flicker results

| | EUT values | Limit | Result |
|----------|------------|-------|--------|
| Pst | 0.303 | 1.00 | PASS |
| Plt | 0.303 | 0.65 | PASS |
| dc [%] | 0.000 | 3.30 | PASS |
| dmax [%] | 0.187 | 4.00 | PASS |
| Tmax [s] | 0.000 | 0.50 | PASS |

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Test Setup Photos and Configuration

Conducted Voltage Emissions

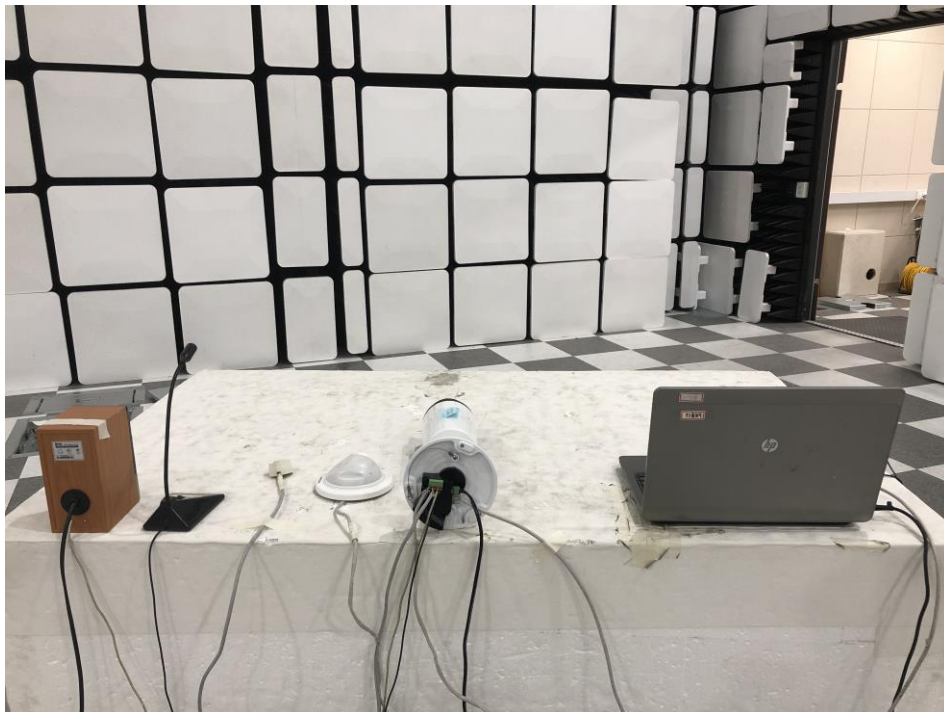


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Conducted Telecommunication Emissions



Radiated Electric Field Emissions(Below 1 GHz)



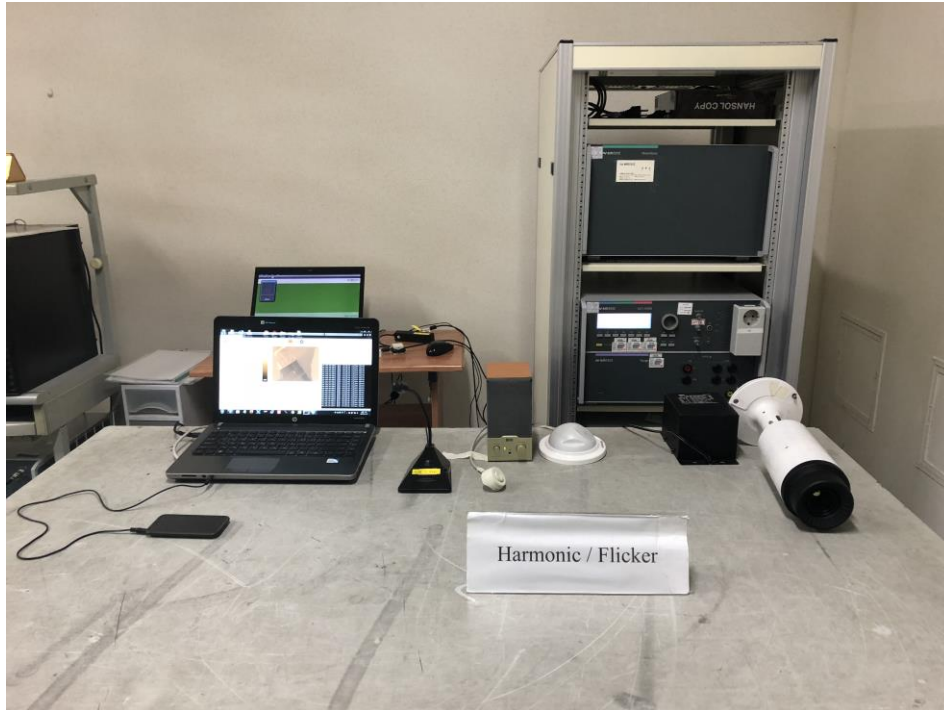
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Radiated Electric Field Emissions(Above 1 GHz)



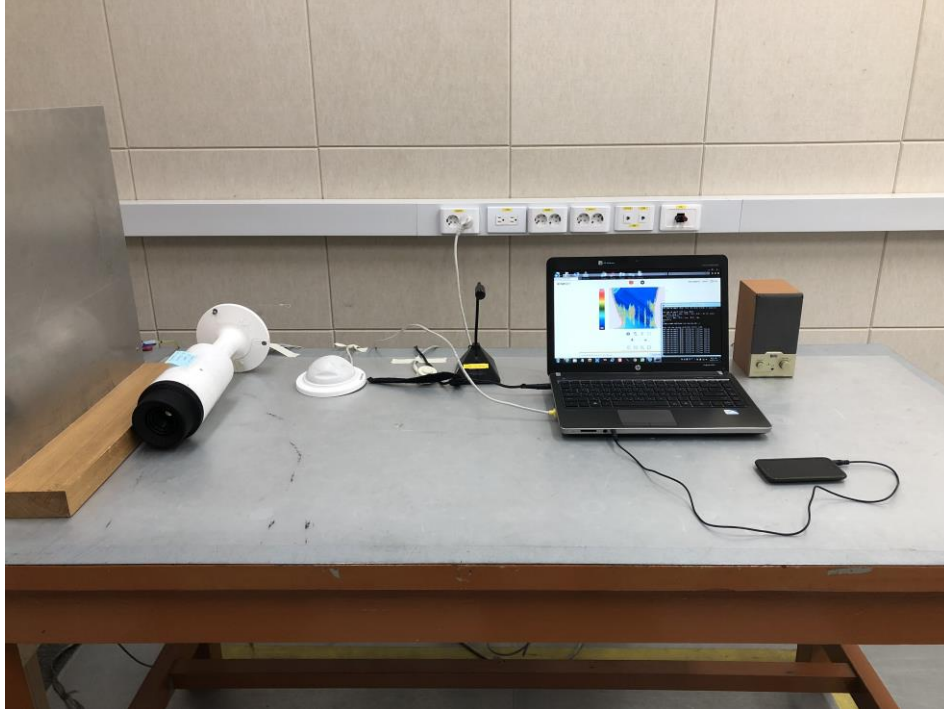
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Harmonic Current Emissions and Voltage Fluctuations and Flicker

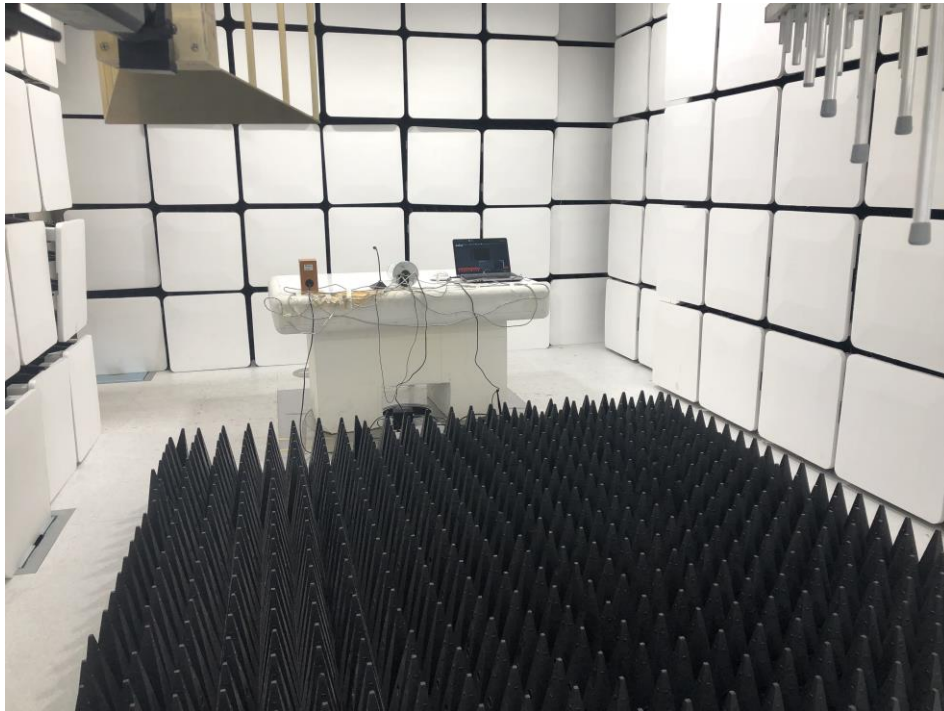


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Electrostatic Discharge



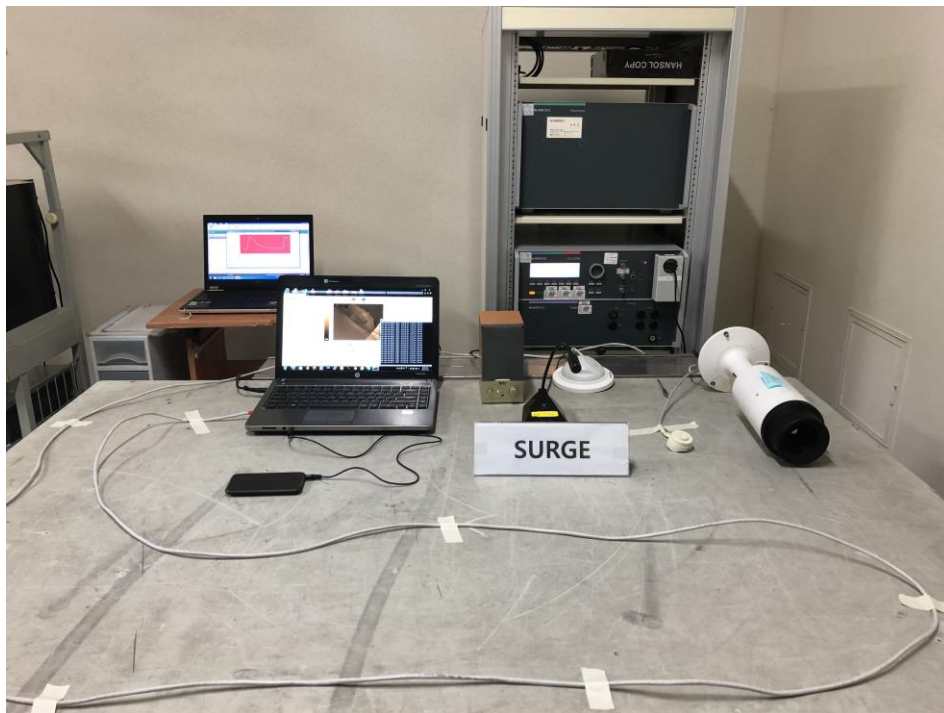
Radiated Electric Field Immunity



Electrical Fast Transients/Bursts

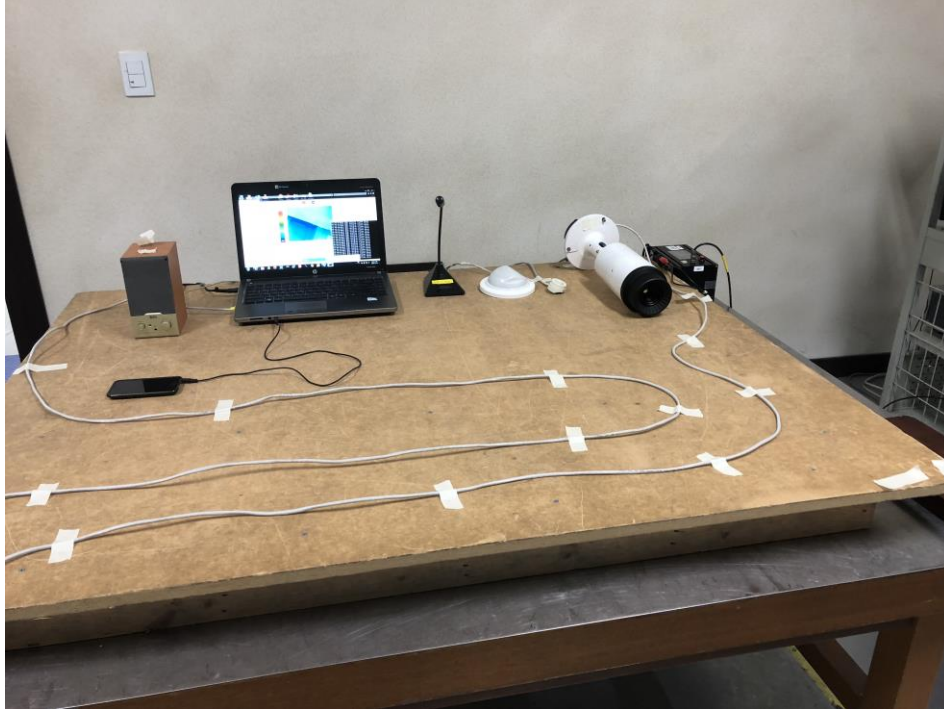


Surge Transients

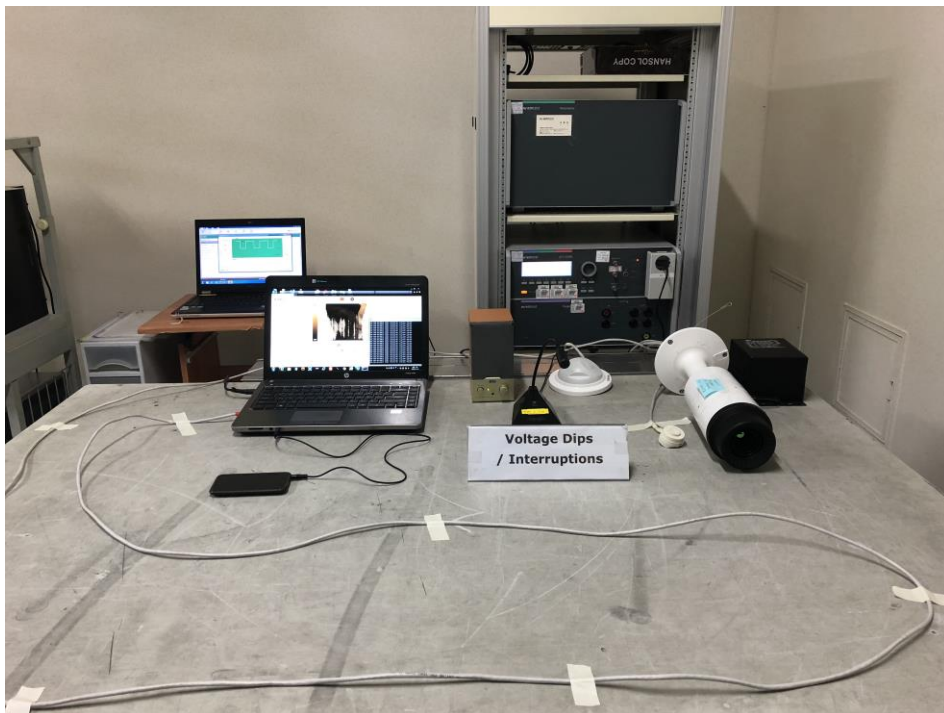


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Conducted Disturbance



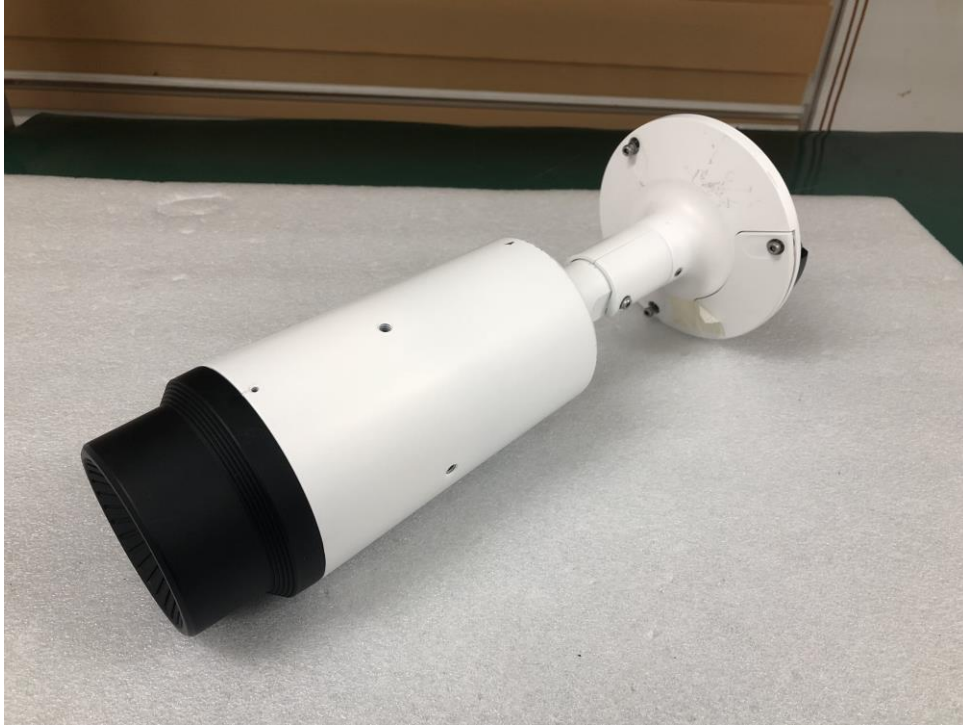
Voltage Dips and Short Interruptions



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EUT External Photographs

(Top)

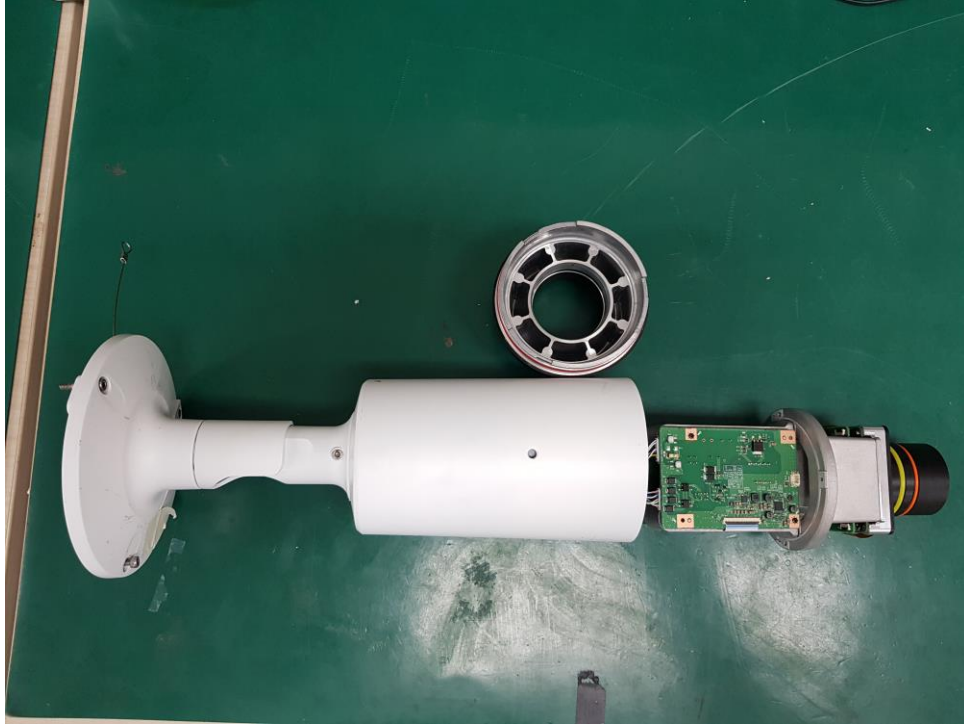


(Bottom)



EUT Internal Photographs

(Internal View)



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EUT Internal View – Interface Board

(Top)



(Bottom)



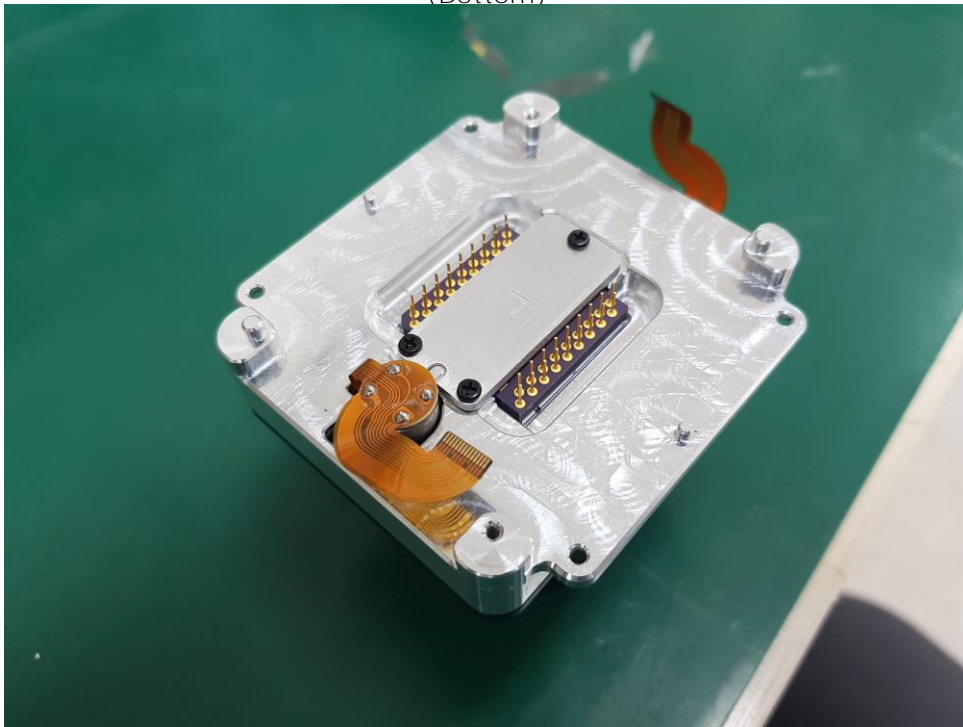
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EUT Internal View – Lens

(Top)



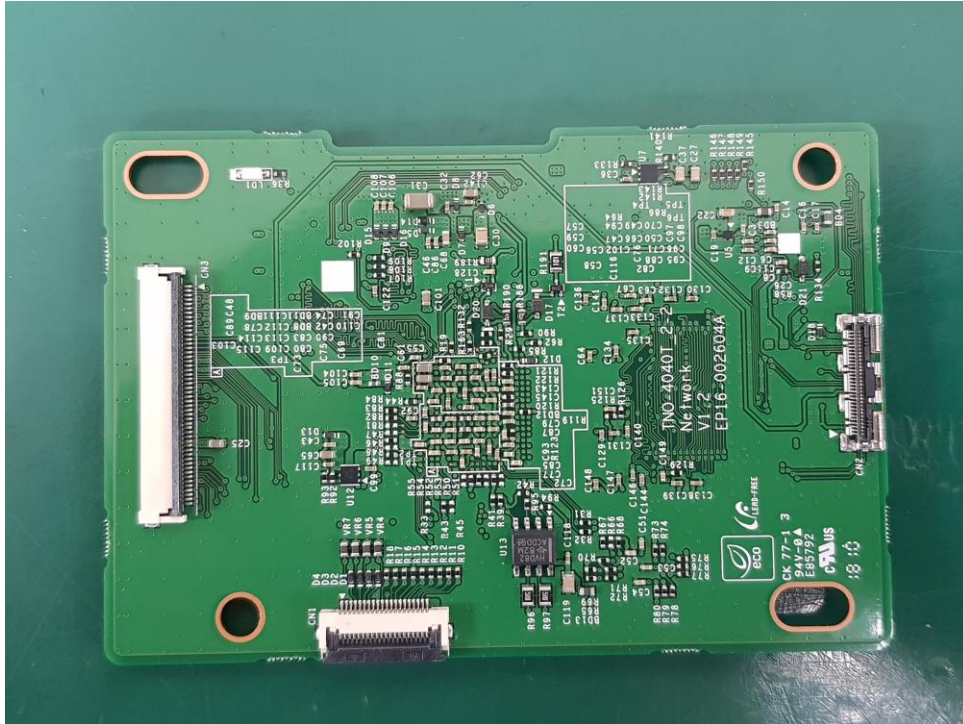
(Bottom)



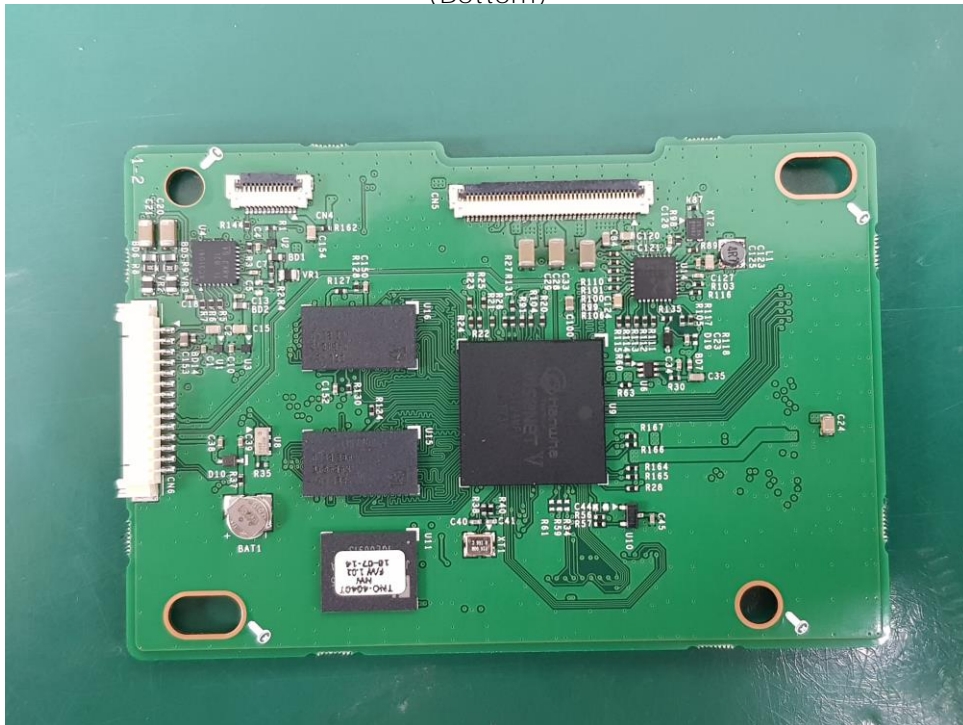
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EUT Internal View – Network Board

(Top)



(Bottom)



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EUT Internal View – NUC Board

(Top)



(Bottom)



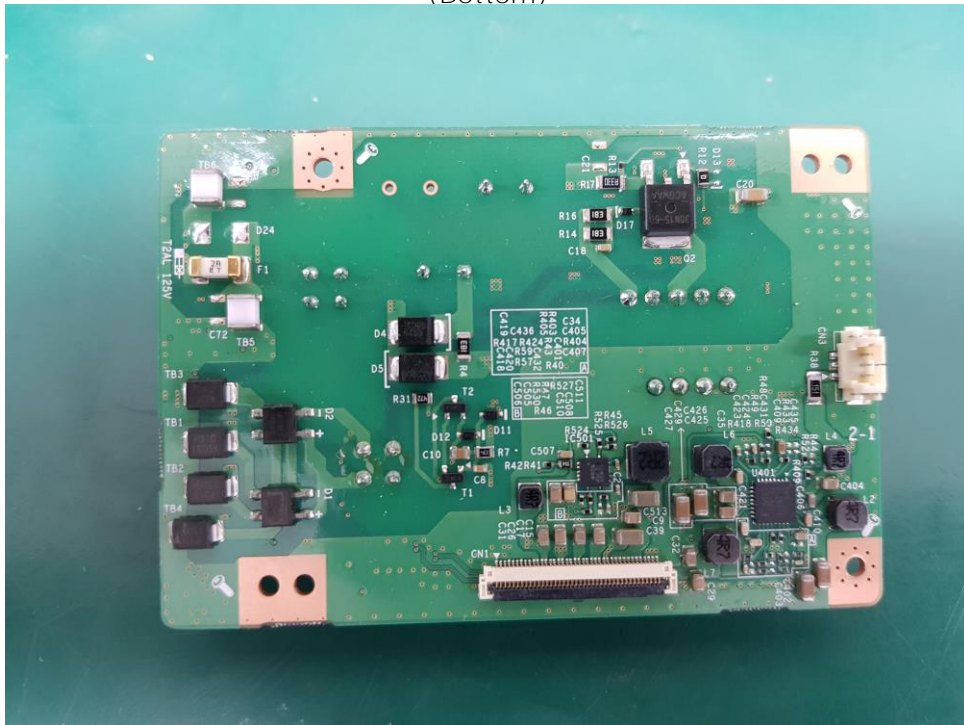
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EUT Internal View – Power Board

(Top)



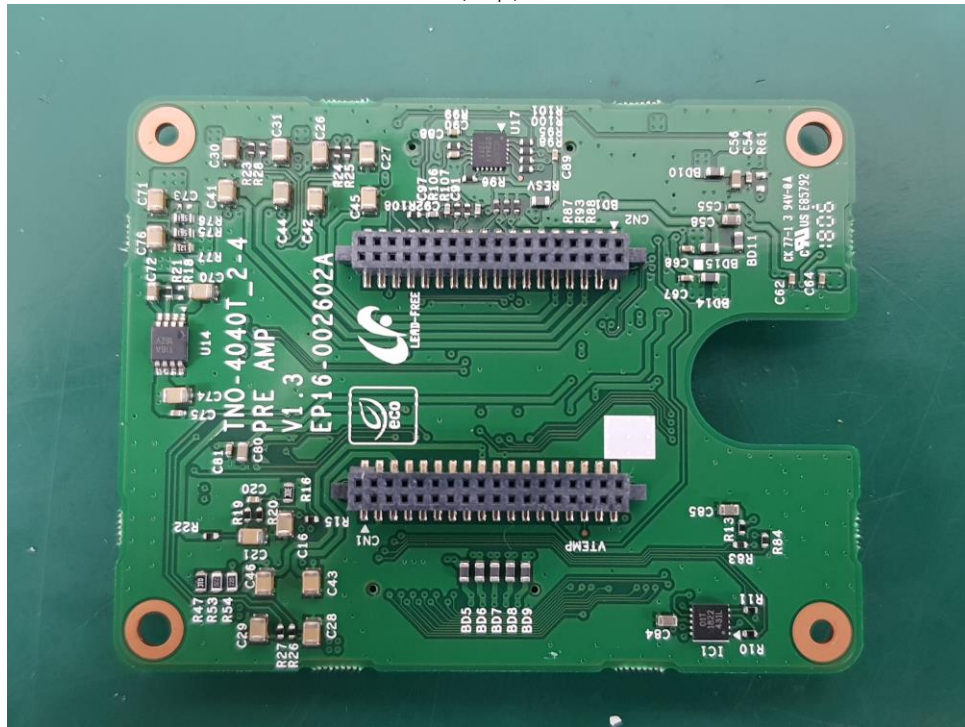
(Bottom)



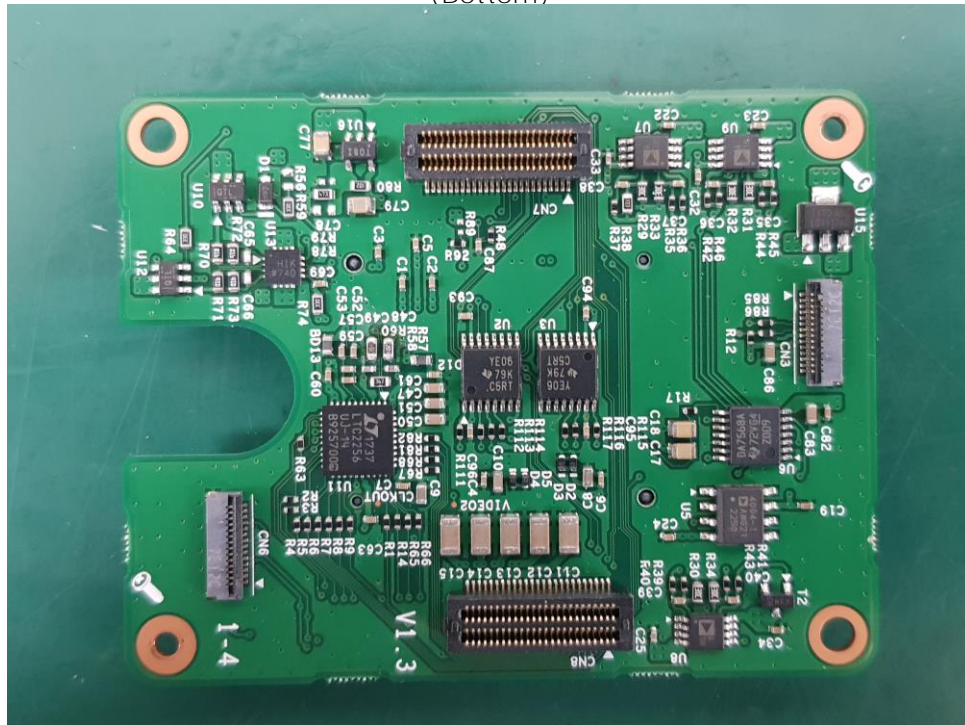
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EUT Internal View – PRE AMP Board

(Top)



(Bottom)



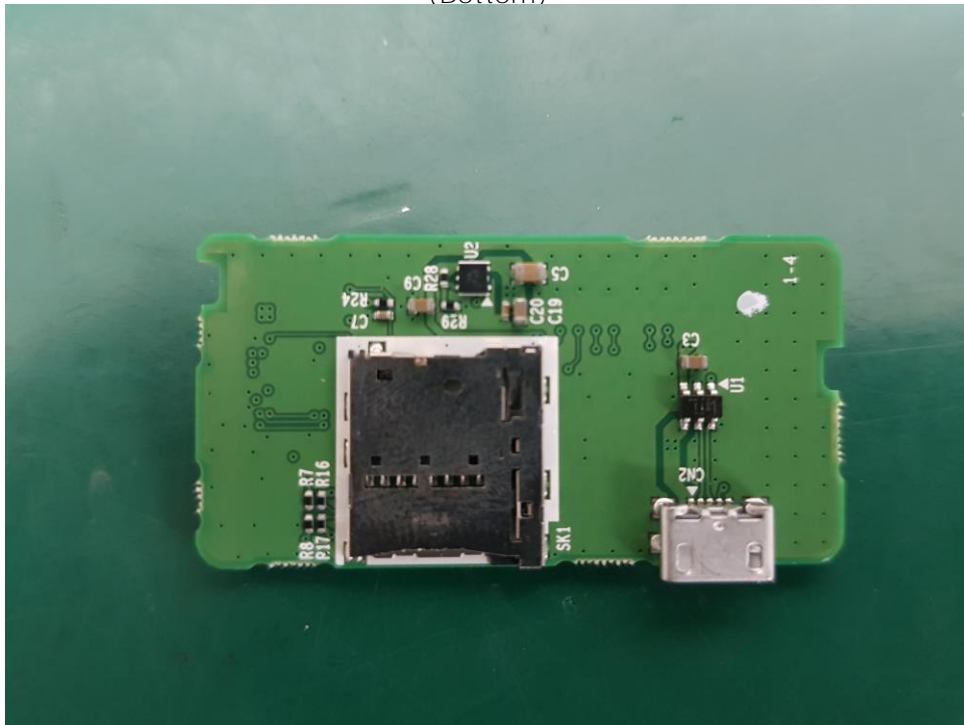
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EUT Internal View – SD Card Board

(Top)

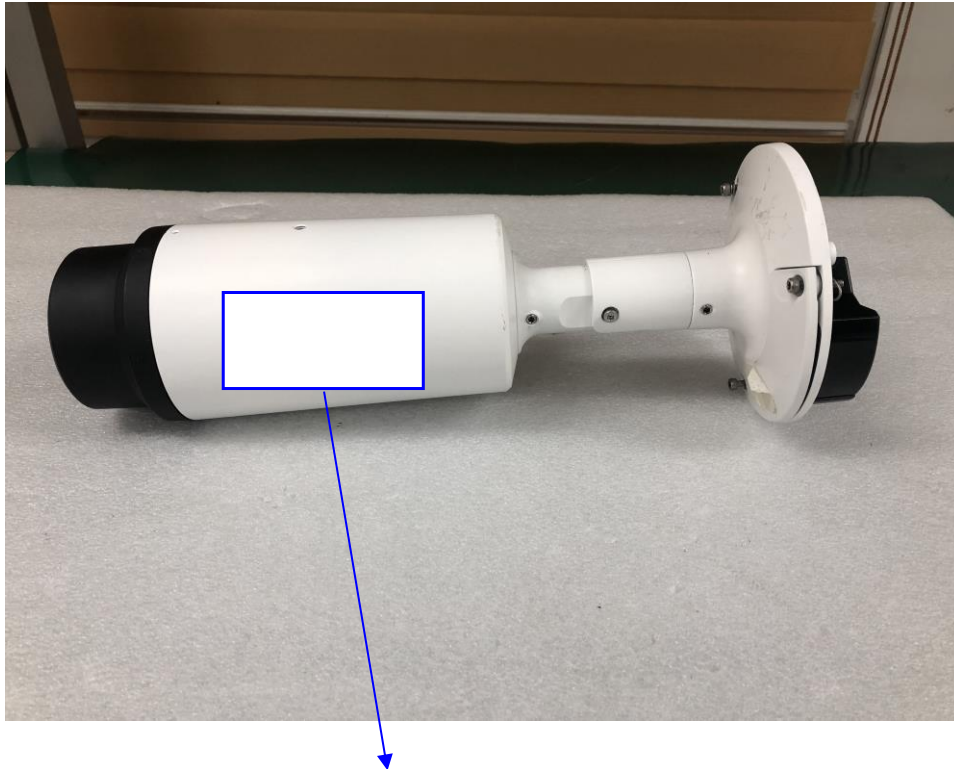


(Bottom)



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Label and Location



Thermal Camera

Model No : TNO-4040TR

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

Made in China

