



## EMC TEST REPORT

Test Report No. : KES-EM-22T0675-R1  
Date of Issue : Feb. 24, 2023  
Product name : THERMAL CAMERA  
Model/Type No. : TNO-4050T  
Variant Model : TNO-4030T, TNO-4040T, TNO-L4030T  
Applicant : Hanwha Vision Co., Ltd  
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,  
Gyeonggi-do, Republic of Korea  
Manufacturer : 1. HANWHA VISION VIETNAM COMPANY LIMITED  
2. D-TECH CO.,LTD.  
Manufacturer Address : 1. Lot O-2, Que Vo Industrial Zone extended area,  
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam  
2. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi- do,  
Korea (Suwon Industrial Complex)  
Equipment authorization : **Supplier's Declaration of Conformity**  
Date of Receipt : Jul. 21, 2022  
Test date : Jul. 21, 2022  
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Seon Ho, Choi  
EMC Test Engineer

Reviewed by

Dong-Hun, Jang  
EMC Technical Manager

This test report is not related to KS Q ISO/IEC 17025 and KOLAS.



## REPORT REVISION HISTORY

| Date          | Test Report No.   | Revision History                                                      |
|---------------|-------------------|-----------------------------------------------------------------------|
| Aug. 08, 2022 | KES-EM-22T0675    | Issued                                                                |
| Feb. 24, 2023 | KES-EM-22T0675-R1 | Change the Applicant and manufacturer at the request of the customer. |
|               |                   |                                                                       |
|               |                   |                                                                       |
|               |                   |                                                                       |
|               |                   |                                                                       |
|               |                   |                                                                       |
|               |                   |                                                                       |
|               |                   |                                                                       |
|               |                   |                                                                       |

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



## TABLE OF CONTENTS

|                                                      |                                                             |    |
|------------------------------------------------------|-------------------------------------------------------------|----|
| 1.0                                                  | General Product Description.....                            | 4  |
| 1.1                                                  | Test Voltage & Frequency .....                              | 5  |
| 1.2                                                  | Variant Model Differences .....                             | 5  |
| 1.3                                                  | Device Modifications .....                                  | 5  |
| 1.4                                                  | Equipment Under Test.....                                   | 5  |
| 1.5                                                  | Support Equipments .....                                    | 5  |
| 1.6                                                  | External I/O Cabling .....                                  | 6  |
| 1.7                                                  | EUT Operating Mode(s) .....                                 | 7  |
| 1.8                                                  | Configuration.....                                          | 8  |
| 1.9                                                  | Remarks when standards applied .....                        | 9  |
| 1.10                                                 | Calibration Details of Equipment Used for Measurement ..... | 9  |
| 1.11                                                 | Test Facility .....                                         | 9  |
| 1.12                                                 | Laboratory Accreditations and Listings .....                | 9  |
| 2.0                                                  | Test Regulations.....                                       | 10 |
| 2.1                                                  | Conducted Emissions at Mains Power Ports .....              | 11 |
| 2.2                                                  | Radiated Electric Field Emissions(Below 1 GHz) .....        | 13 |
| 2.3                                                  | Radiated Electric Field Emissions(Above 1 GHz) .....        | 15 |
| APPENDIX A – TEST DATA.....                          |                                                             | 17 |
| Conducted Emissions at Mains Power Ports.....        |                                                             | 17 |
| Radiated Electric Field Emissions(Below 1 GHz) ..... |                                                             | 23 |
| Radiated Electric Field Emissions(Above 1 GHz) ..... |                                                             | 29 |
| Test Setup Photos and Configuration .....            |                                                             | 32 |
| Conducted Emissions at Mains Power Ports.....        |                                                             | 32 |
| Radiated Electric Field Emissions(Below 1 GHz) ..... |                                                             | 34 |
| Radiated Electric Field Emissions(Above 1 GHz) ..... |                                                             | 36 |
| EUT External Photographs .....                       |                                                             | 38 |
| EUT Internal Photographs .....                       |                                                             | 39 |



## 1.0 General Product Description

### Main Specifications of EUT are:

|                                   |                                                                                                                                                                                                                                  |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Video</b>                      |                                                                                                                                                                                                                                  |
| Imaging Device                    | Uncooled Micro volometer                                                                                                                                                                                                         |
| Pixel size                        | 17μm                                                                                                                                                                                                                             |
| Effective Pixels                  | 640x480(Scale up 800x600)                                                                                                                                                                                                        |
| Sensitivity                       | NETD < 50mK                                                                                                                                                                                                                      |
| Video Out                         | CVBS : 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P), for installation<br>USB : Micro USB type B, 1280x720, for installation                                                                                                  |
| <b>Lens</b>                       |                                                                                                                                                                                                                                  |
| Focal Length (Zoom Ratio)         | 35mm fixed                                                                                                                                                                                                                       |
| Max. Aperture Ratio               | 1.0                                                                                                                                                                                                                              |
| Angular Field of View             | H: 17°                                                                                                                                                                                                                           |
| Min. Object Distance              | TBD                                                                                                                                                                                                                              |
| Focus Control                     | Fixed                                                                                                                                                                                                                            |
| Lens Type                         | TBD                                                                                                                                                                                                                              |
| Mount Type                        | Board-in type                                                                                                                                                                                                                    |
| <b>Operational</b>                |                                                                                                                                                                                                                                  |
| Camera Title                      | Off / On<br>- W/W : English/Numeric/Special Characters<br>- China : English/Numeric/Special/Chinese Characters<br>- Common : Multi-line (Max 5), Color (Grey/Green/Red/Blue/Black/White), Transparency, Auto Scale by Resolution |
| Digital Image Stabilization       | Off / On(with Gyro)                                                                                                                                                                                                              |
| Motion Detection                  | Off/ On(8ea, 8point Polygonal zones), Handover                                                                                                                                                                                   |
| Privacy Masking                   | Off / On (32ea, polygonal zones)<br>- Color : Grey/Green/Red/Blue/Black/White<br>- Mossic                                                                                                                                        |
| Gain Control                      | Off / Low / Middle / High                                                                                                                                                                                                        |
| Electronic Shutter Speed          | Minimum / Maximum / Anti flicker (2 ~ 1/12,000sec)                                                                                                                                                                               |
| Pan/Tilt                          | Pelco D/P, Samsung T/E, Honeywell, Bosch, Panasonic, Sungin, AD, Vicon, GE                                                                                                                                                       |
| Flip / Mirror                     | Flip : On/Off<br>Mirror : On/Off<br>Hallway view : 90°/270°                                                                                                                                                                      |
| Video & Audio Analytics           | Tampering, Loitering, Directional Detection, Virtual Line, Fence detection, Enter/Exit, Appear / Disappear, Audio Detection, Motion Detection, Sound Classification, Shock detection, drastic temperature swings                 |
| Alarm I/O                         | Input 2ea / Output 2ea                                                                                                                                                                                                           |
| Alarm Triggers                    | Alarm Input, Motion Detection, Video & Audio Analytics, Network Disconnect                                                                                                                                                       |
| Alarm events                      | File upload via FTP, E-Mail<br>Notification via E-Mail<br>local storage(SD/SDHC/SDXC) or NAS recording at Event Triggers                                                                                                         |
| Audio In                          | External output<br>Selectable (Mic IN/Line IN),<br>Supply voltage: 2.5VDC(4mA), Input impedance: approx. 2K Ohm                                                                                                                  |
| Audio out                         | Line out, Max output level: 1 Vrms                                                                                                                                                                                               |
| Pixel count                       | support                                                                                                                                                                                                                          |
| Digital zoom                      | -                                                                                                                                                                                                                                |
| Remote control                    | -                                                                                                                                                                                                                                |
| <b>Network</b>                    |                                                                                                                                                                                                                                  |
| Ethernet                          | RJ-45 (10/100BASE-T)                                                                                                                                                                                                             |
| Video Compression Format          | H.265/H.264 (MPEG-4 Part 10/AVC) : Main/Baseline/High , Motion JPEG                                                                                                                                                              |
| Resolution                        | 800x600, 640x480, 640x360, 320x240                                                                                                                                                                                               |
| Max. Framerate                    | H.265/H.264 : Max. 30fps at all resolutions<br>Motion JPEG : Max. 30fps                                                                                                                                                          |
| Smart Codec                       | Manual Mode (area-based : 5EA)                                                                                                                                                                                                   |
| WiseStream II                     | Support                                                                                                                                                                                                                          |
| Video Quality Adjustment          | H.264/H.265 : Target Bitrate Level Control<br>MJPEG : Target Bitrate Level Control                                                                                                                                               |
| Bitrate Control Method            | H.264/H.265 : CBR or VBR<br>MJPEG : VBR                                                                                                                                                                                          |
| Streaming Capability              | Multiple Streaming (Up to 10 Profiles)<br>G.711 u-law / G.726 Selectable<br>G.726 (ADPCM) 8KHz, G.711 8KHz<br>G.726 : 16Kbps, 24Kbps, 32Kbps, 40Kbps<br>AAC-LC : 48Kbps at 8/16/32/48KHz                                         |
| Audio Compression Format          | Bi-directional (2-Way)                                                                                                                                                                                                           |
| Audio Communication               | IPv4, IPv6                                                                                                                                                                                                                       |
| IP                                | 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                                                   |
| Protocol                          | HTTPS(SSL) Login Authentication<br>Digest Login Authentication<br>IP Address Filtering<br>User access Log<br>802.1X Authentication (EAP-TLS, EAP-LEAP)                                                                           |
| Security                          | Unicast / Multicast                                                                                                                                                                                                              |
| Streaming Method                  | 20 users at Unicast Mode                                                                                                                                                                                                         |
| Max. User Access                  | SD/SDHC/SDXC (up to 256 GB)<br>- Motion Images recorded in the SD/SDHC/SDXC memory card can be downloaded.<br>NAS(Network Attached Storage)<br>Local PC for Instant Recording                                                    |
| Edge Storage                      | ONVIF Profile S/G<br>SUNAPI(HTTP API)<br>Open Platform                                                                                                                                                                           |
| Application Programming Interface | English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Swedish,, Portuguese, Czech, Polish, Turkish, Dutch, Hungarian, Greek                                                                             |
| Webpage Language                  | TBD                                                                                                                                                                                                                              |
| Web Viewer                        | SmartViewer, SSM                                                                                                                                                                                                                 |
| Central Management Software       |                                                                                                                                                                                                                                  |
| <b>Environmental</b>              |                                                                                                                                                                                                                                  |
| Operating Temperature / Humidity  | -40°C ~ +60°C (-40°F ~ +131°F) / Less than 90% RH                                                                                                                                                                                |
| Storage Temperature / Humidity    | -50°C ~ +60°C (-58°F ~ +140°F) / Less than 90% RH                                                                                                                                                                                |
| Ingress Protection                | IP66, NEMA 4X                                                                                                                                                                                                                    |
| Vandal Resistance                 | IK10                                                                                                                                                                                                                             |
| <b>Electrical</b>                 |                                                                                                                                                                                                                                  |
| Input Voltage / Current           | 24VAC ± 10%, 12VDC ± 10%, PoE(IEEE802.3af)                                                                                                                                                                                       |
| Power Consumption                 | TBD                                                                                                                                                                                                                              |
| <b>Mechanical</b>                 |                                                                                                                                                                                                                                  |
| Color / Material                  | TBD                                                                                                                                                                                                                              |
| Dimension (WxHxD)                 | TBD                                                                                                                                                                                                                              |
| Weight                            | TBD                                                                                                                                                                                                                              |
| 기타                                | Palette 7mode                                                                                                                                                                                                                    |

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

## 1.1 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

- ☒ AC 120 V, 60 Hz (AC Adapter Input Power)
- ☒ AC 120 V, 60 Hz (DC Adapter Input Power)
- ☒ AC 120 V, 60 Hz (PoE Adapter Input Power)

## 1.2 Variant Model Differences

Added derivative model due to HW same FW difference.

## 1.3 Device Modifications

Not applicable

## 1.4 Equipment Under Test

| Description    | Model Number | Serial Number | Manufacturer                                | Remarks |
|----------------|--------------|---------------|---------------------------------------------|---------|
| THERMAL CAMERA | TNO-4050T    | -             | HANWHA VISION<br>VIETNAM COMPANY<br>LIMITED | EUT     |

## 1.5 Support Equipments

| Description      | Model Number | Serial Number | Manufacturer                                       | Remarks |
|------------------|--------------|---------------|----------------------------------------------------|---------|
| AC/DC Adapter    | 2ACB022F     | -             | ChAnnel Well<br>Technology<br>(Guangzhou) Co.,Ltd. | -       |
| PoE Adapter      | PSE156G      | -             | -                                                  | -       |
| AC Adapter       | DRL-246000AC | -             | Dream Electronics Co.,<br>Ltd.                     | -       |
| Notebook         | LG15N54      | 410NZGK015231 | LG Electronics Inc.                                | -       |
| Notebook Adapter | ADP-90WH B   | 84ZW19F1663   | DELTA ELECTRONICS<br>(JIANGSU) LTD.                | -       |
| Alarm            | PRO-SL       | -             | SENSOR PRO                                         | -       |
| Button Alarm     | -            | -             | -                                                  | -       |
| Headset          | K550         | -             | Britz®                                             | -       |
| SmartPhone       | SM-N920S     | -             | Samsung                                            | -       |
| Micro SD Card    | -            | -             | SanDisk                                            | -       |

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

## 1.6 External I/O Cabling

### ■ AC Mode

| Start                |                    | END              |                    | Cable Spec. |        |
|----------------------|--------------------|------------------|--------------------|-------------|--------|
| Description          | I/O Port           | Description      | I/O Port           | Length      | Shield |
| THERMAL CAMERA (EUT) | 2 Pin              | AC Adapter       | 2 Pin              | 2.0         | U      |
|                      | RJ-45(LAN)         | Notebook         | RJ-45(LAN)         | 3.0         | U      |
|                      | Alarm OUT          | Alarm            | Alarm IN           | 4.0         | U      |
|                      | Alarm IN           | Button Alarm     | Alarm OUT          | 3.5         | U      |
|                      | 3.5 mm             | Headset          | 3.5 mm             | 1.8         | U      |
|                      | 3.5 mm             |                  | 3.5 mm             | 1.8         | U      |
|                      | Micro SD Card Slot | Micro SD Card    | Micro SD Card Slot | -           | -      |
| Notebook             | 3.5 mm             | SmartPhone       | 3.5 mm             | 1.1         | U      |
|                      | DC Jack            | Notebook Adapter | DC Jack            | 1.9         | U      |

\* Unshielded=U, Shielded=S

### ■ DC Mode

| Start                |                    | END              |                    | Cable Spec. |        |
|----------------------|--------------------|------------------|--------------------|-------------|--------|
| Description          | I/O Port           | Description      | I/O Port           | Length      | Shield |
| THERMAL CAMERA (EUT) | 2 Pin              | AC/DC Adapter    | 2 Pin              | 1.6         | U      |
|                      | RJ-45(LAN)         | Notebook         | RJ-45(LAN)         | 3.0         | U      |
|                      | Alarm OUT          | Alarm            | Alarm IN           | 4.0         | U      |
|                      | Alarm IN           | Button Alarm     | Alarm OUT          | 3.5         | U      |
|                      | 3.5 mm             | Headset          | 3.5 mm             | 1.8         | U      |
|                      | 3.5 mm             |                  | 3.5 mm             | 1.8         | U      |
|                      | Micro SD Card Slot | Micro SD Card    | Micro SD Card Slot | -           | -      |
| Notebook             | 3.5 mm             | SmartPhone       | 3.5 mm             | 1.1         | U      |
|                      | DC Jack            | Notebook Adapter | DC Jack            | 1.9         | U      |

\* Unshielded=U, Shielded=S

■ PoE Mode

| Start                |                    | END              |                    | Cable Spec. |        |
|----------------------|--------------------|------------------|--------------------|-------------|--------|
| Description          | I/O Port           | Description      | I/O Port           | Length      | Shield |
| THERMAL CAMERA (EUT) | RJ-45(PoE)         | PoE Adapter      | RJ-45(PoE)         | 3.0         | U      |
|                      | Alarm OUT          | Alarm            | Alarm IN           | 4.0         | U      |
|                      | Alarm IN           | Button Alarm     | Alarm OUT          | 3.5         | U      |
|                      | 3.5 mm             | Headset          | 3.5 mm             | 1.8         | U      |
|                      | 3.5 mm             |                  | 3.5 mm             | 1.8         | U      |
|                      | Micro SD Card Slot | Micro SD Card    | Micro SD Card Slot | -           | -      |
| PoE Adapter          | RJ-45(LAN)         | Notebook         | RJ-45(LAN)         | 2.0         | U      |
| Notebook             | 3.5 mm             | SmartPhone       | 3.5 mm             | 1.1         | U      |
|                      | DC Jack            | Notebook Adapter | DC Jack            | 1.9         | U      |

\* Unshielded=U, Shielded=S

## 1.7 EUT Operating Mode(s)

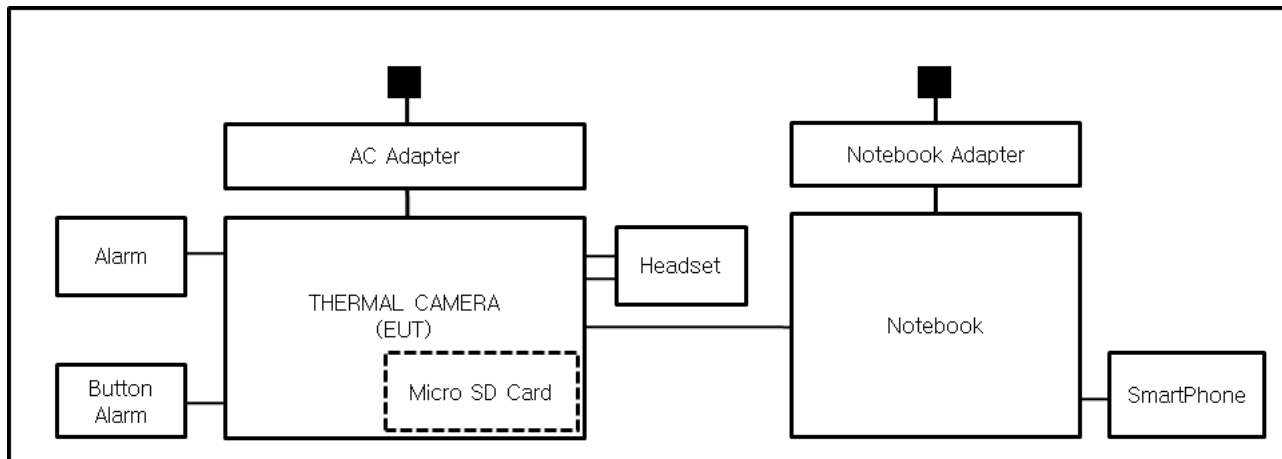
| Test Mode | operating                                                                                                         |
|-----------|-------------------------------------------------------------------------------------------------------------------|
| AC Mode   | Check the Normal Operation status.<br>after testing, check if the recording is normally done on the Micro SD Card |
| DC Mode   |                                                                                                                   |
| PoE Mode  |                                                                                                                   |

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

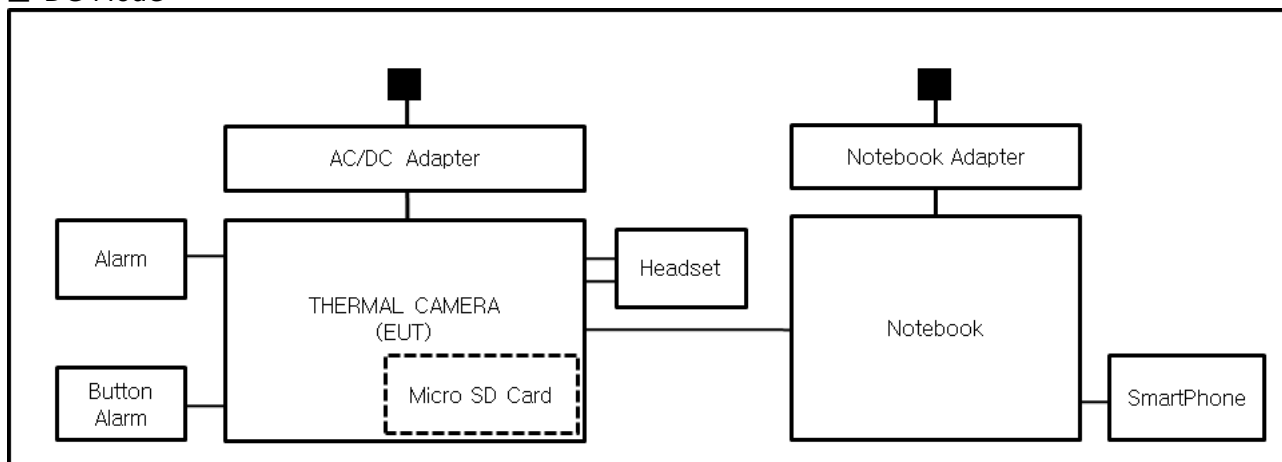
## 1.8 Configuration

■ AC Main  
 □ DC Main

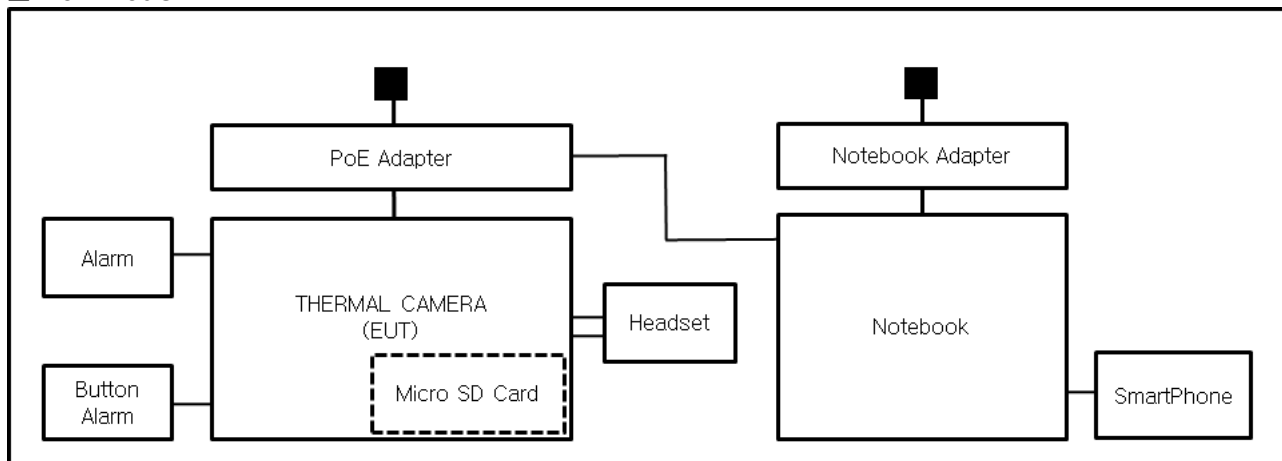
### ■ AC Mode



### ■ DC Mode



### ■ PoE Mode



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



## 1.9 Remarks when standards applied

The USB, VIDEO ports were excluded from the test as administrator ports.

## 1.10 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less.

## 1.11 Test Facility

The measurement facility is located at 473-21, Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea, Republic of. The sites are constructed in conformance with the requirements of ANSI C63.4a-2017 and CISPR 16-1-4:2019

## 1.12 Laboratory Accreditations and Listings

| Country       | Agency  | Scope of Accreditation                                                                                                                  | Logo                                                                                                                           |
|---------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| KOREA         | RRA     | EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) | <br>KR0100                                  |
| International | KOLAS   | EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) | <br>KT489                                 |
| USA           | FCC     | 3 m & 10 m Semi-Anechoic Chamber<br>Conducted test site to perform FCC Part 15/18 measurements.                                         | <br>KR0100                                |
| Canada        | ISED    | 3 m & 10 m Semi-Anechoic Chamber and Conducted test site                                                                                | <br>23298                                 |
| JAPAN         | VCCI    | EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)                                                                          | <br>C-20136, T-20137,<br>R-20181, G-20176 |
| Europe        | TÜV SÜD | EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) | <br>CARAT 001633 0004                     |

## 2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **47 CFR Part 15, Subpart B**

☐ CISPR 22:2009 +A1:2010

☐ Class A

☐ Class B

☒ ANSI C63.4a-2017

☒ Class A

☐ Class B

☒ **IC Regulation ICES-003 Issue 7**

☐ CAN/CSA-CISPR 32:17

☐ Class A

☐ Class B

☒ ANSI C63.4a-2017

☒ Class A

☐ Class B

## 2.1 Conducted Emissions at Mains Power Ports

### Test Date

Jul. 21, 2022

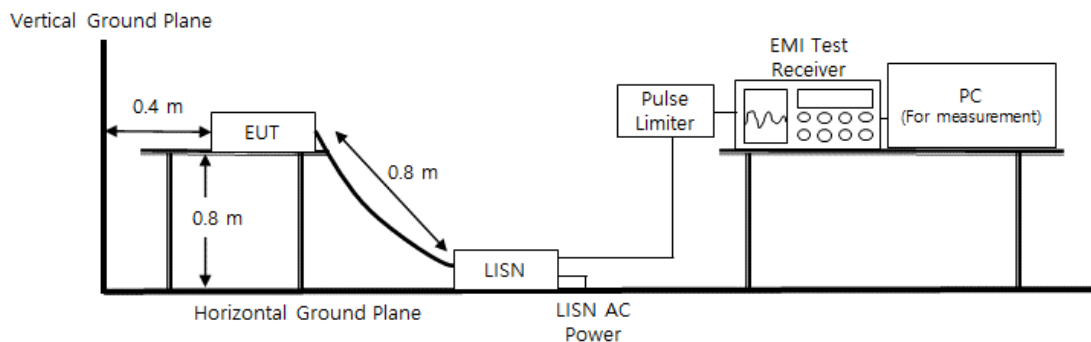
### Test Location

Electro wave Shieldroom #6

### Test Equipment

| Used                                | Description       | Model Number | Manufacturer | Serial Number | Cal. Due     |
|-------------------------------------|-------------------|--------------|--------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test S/W      | EMC32        | R & S        | 9.12.00       | -            |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER | ESR3         | R & S        | 101783        | 12, 28, 2022 |
| <input checked="" type="checkbox"/> | LISN              | ENV216       | R & S        | 101787        | 12, 27, 2022 |
| <input checked="" type="checkbox"/> | LISN              | ESH2-Z5      | R & S        | 100450        | 12, 27, 2022 |
| <input checked="" type="checkbox"/> | PULSE LIMITER     | ESH3-Z2      | R & S        | 101915        | 12, 27, 2022 |

### Diagram of test setup





## KES Co., Ltd.

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

Report No.:

KES-EM-22T0675-R1

Page (12) of (47)

### Test Conditions

Temperature: (24,7  $\pm$  0,2) °C

Relative Humidity: (45,4  $\pm$  0,3) % 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.

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

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

### Test Date

Jul. 21, 2022

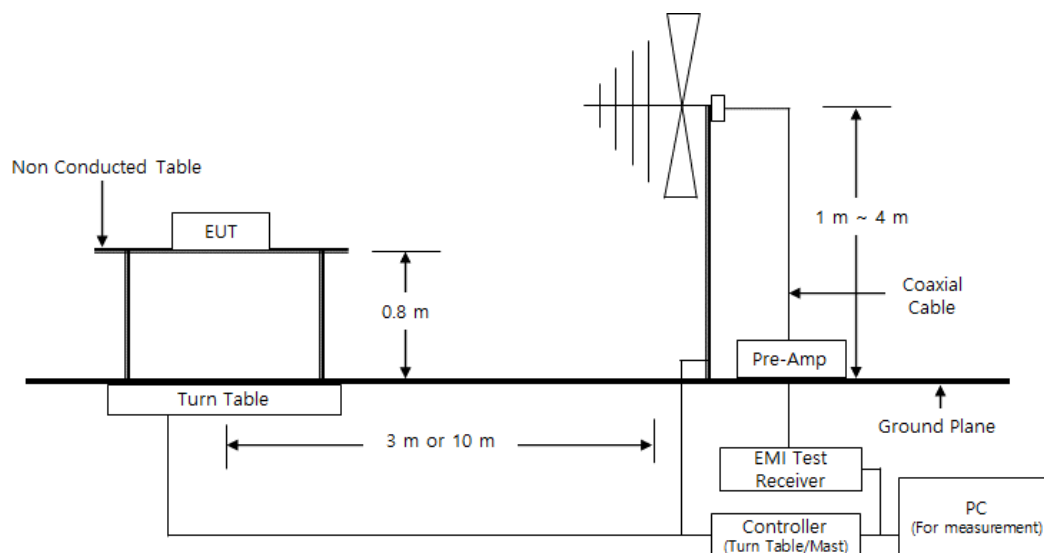
### Test Location

☐ OPEN AREA TEST SITE #2 ☒ SEMI ANECHOIC CHAMBER #4(10m)

### Test Equipment

| Used                                | Description              | Model Number | Manufacturer     | Serial Number | Cal. Due     |
|-------------------------------------|--------------------------|--------------|------------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test S/W             | EP5/RE       | TOYO Corporation | 6.0.0         | -            |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER        | ESU26        | R & S            | 100551        | 03, 31, 2023 |
| <input checked="" type="checkbox"/> | AMPLIFIER                | SCU 01       | R & S            | 100603        | 11, 24, 2022 |
| <input checked="" type="checkbox"/> | TRILOG-BROADBAND ANTENNA | VULB9163     | Schwarzbeck      | 715           | 12, 08, 2022 |
| <input checked="" type="checkbox"/> | ATTENUATOR               | 8491A        | HP               | 32173         | 03, 08, 2023 |

### Diagram of test setup





## KES Co., Ltd.

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

Report No.:

KES-EM-22T0675-R1

Page (14) of (47)

### Test Conditions

Temperature: (24,5 ± 0,3) °C

Relative Humidity: (44,9 ± 0,4) % 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.

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

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

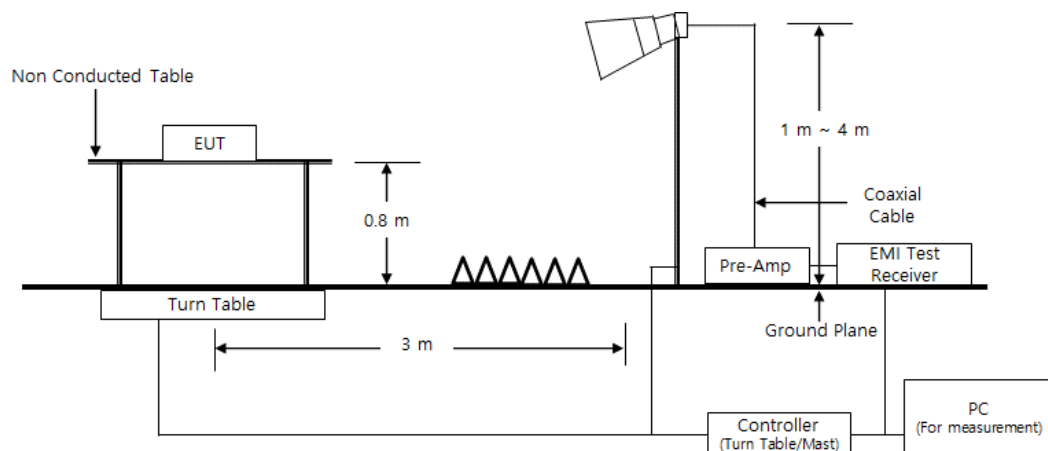
**Test Date**  
 Jul. 21, 2022

**Test Location**  
 SEMI ANECHOIC CHAMBER #3

### Test Equipment

| Used                                | Description                | Model Number | Manufacturer     | Serial Number | Cal. Due     |
|-------------------------------------|----------------------------|--------------|------------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test S/W               | EP5/RE       | TOYO Corporation | 6.0.0         | -            |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER          | ESR7         | R & S            | 101190        | 08, 01, 2023 |
| <input checked="" type="checkbox"/> | PREAMPLIFIER               | 8449B        | AGILENT          | 3008A01967    | 04, 01, 2023 |
| <input checked="" type="checkbox"/> | DOUBLE RIDGED HORN ANTENNA | SAS-571      | A.H.SYSTEM,INC   | 781           | 03, 03, 2023 |

### Diagram of test setup





## KES Co., Ltd.

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

Report No.:

KES-EM-22T0675-R1

Page (16) of (47)

### Test Conditions

Temperature: (24,5 ± 0,3) °C

Relative Humidity: (44,9 ± 0,3) % R.H.

### Frequency Range of Measurement

1 GHz to 5 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.

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

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

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



## APPENDIX A – TEST DATA

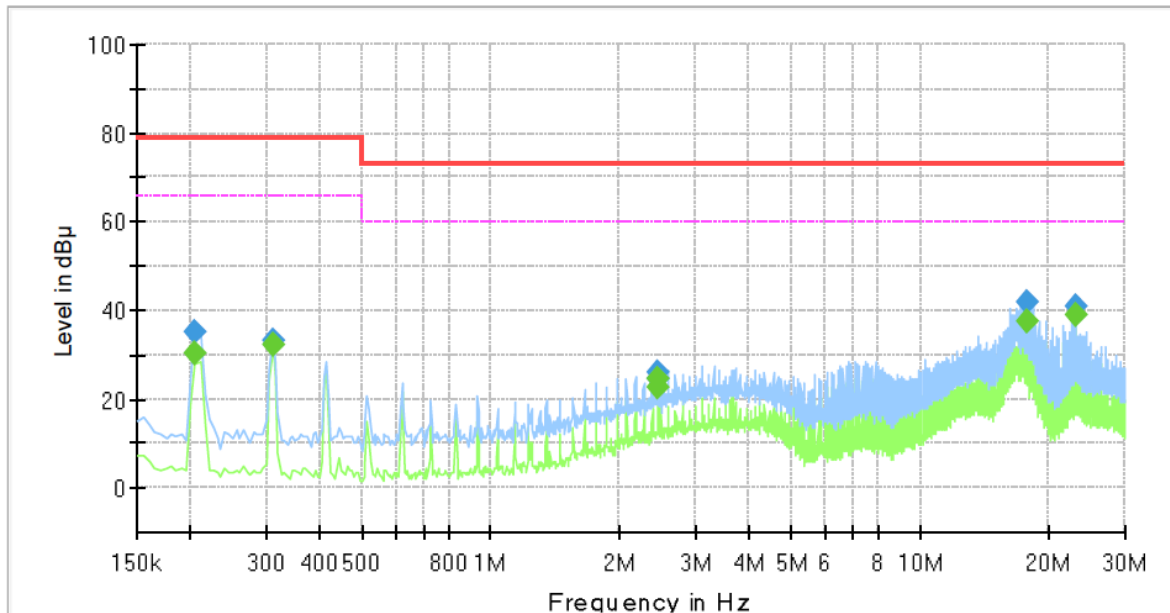
### Conducted Emissions at Mains Power Ports

■ AC Mode

HOT LINE

#### Common Information

|                   |                    |
|-------------------|--------------------|
| Test Description: | Conducted Emission |
| Model No.:        | TNO-4050T          |
| Phase:            | H                  |
| Mode:             | AC                 |
| Operator Name:    | KES                |



#### Final Result

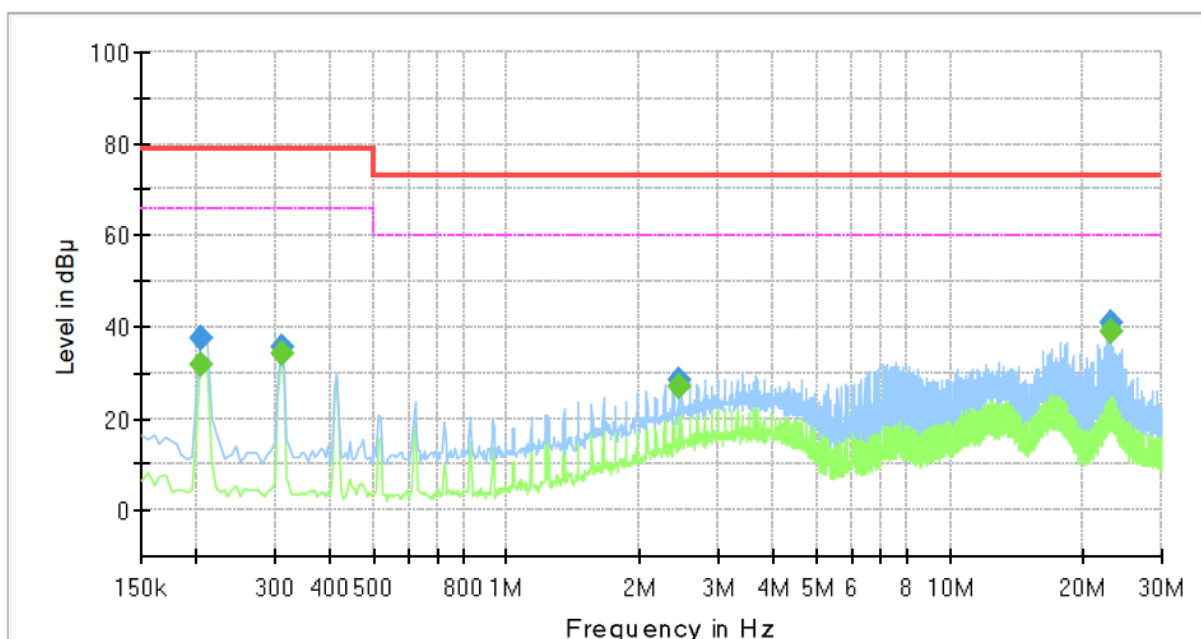
| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.205000        | ---              | 30.46           | 66.00        | 35.54       | 1000.0          | 9.000           | L1   | 19.4       |
| 0.205000        | 35.08            | ---             | 79.00        | 43.92       | 1000.0          | 9.000           | L1   | 19.4       |
| 0.310000        | ---              | 32.12           | 66.00        | 33.88       | 1000.0          | 9.000           | L1   | 19.5       |
| 0.310000        | 33.43            | ---             | 79.00        | 45.57       | 1000.0          | 9.000           | L1   | 19.5       |
| 2.440000        | ---              | 22.65           | 60.00        | 37.35       | 1000.0          | 9.000           | L1   | 20.3       |
| 2.440000        | 24.63            | ---             | 73.00        | 48.37       | 1000.0          | 9.000           | L1   | 20.3       |
| 2.445000        | ---              | 24.56           | 60.00        | 35.44       | 1000.0          | 9.000           | L1   | 20.3       |
| 2.445000        | 25.92            | ---             | 73.00        | 47.08       | 1000.0          | 9.000           | L1   | 20.3       |
| 17.695000       | ---              | 37.43           | 60.00        | 22.57       | 1000.0          | 9.000           | L1   | 20.0       |
| 17.695000       | 41.94            | ---             | 73.00        | 31.06       | 1000.0          | 9.000           | L1   | 20.0       |
| 23.130000       | ---              | 38.86           | 60.00        | 21.14       | 1000.0          | 9.000           | L1   | 20.1       |
| 23.130000       | 40.71            | ---             | 73.00        | 32.29       | 1000.0          | 9.000           | L1   | 20.1       |

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

## NEUTRAL LINE

### Common Information

|                   |                    |
|-------------------|--------------------|
| Test Description: | Conducted Emission |
| Model No.:        | TNO-4050T          |
| Phase:            | N                  |
| 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) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.205000        | ---              | 31.67           | 66.00        | 34.33       | 1000.0          | 9.000           | N    | 19.4       |
| 0.205000        | 37.43            | ---             | 79.00        | 41.57       | 1000.0          | 9.000           | N    | 19.4       |
| 0.310000        | ---              | 34.29           | 66.00        | 31.71       | 1000.0          | 9.000           | N    | 19.5       |
| 0.310000        | 35.66            | ---             | 79.00        | 43.34       | 1000.0          | 9.000           | N    | 19.5       |
| 2.445000        | ---              | 27.14           | 60.00        | 32.86       | 1000.0          | 9.000           | N    | 20.3       |
| 2.445000        | 28.56            | ---             | 73.00        | 44.44       | 1000.0          | 9.000           | N    | 20.3       |
| 23.130000       | ---              | 39.22           | 60.00        | 20.78       | 1000.0          | 9.000           | N    | 20.1       |
| 23.130000       | 41.14            | ---             | 73.00        | 31.86       | 1000.0          | 9.000           | N    | 20.1       |

## ■ DC Mode

## HOT LINE

## Common Information

Test Description:

Model No.:

Phase:

Mode:

Operator Name:

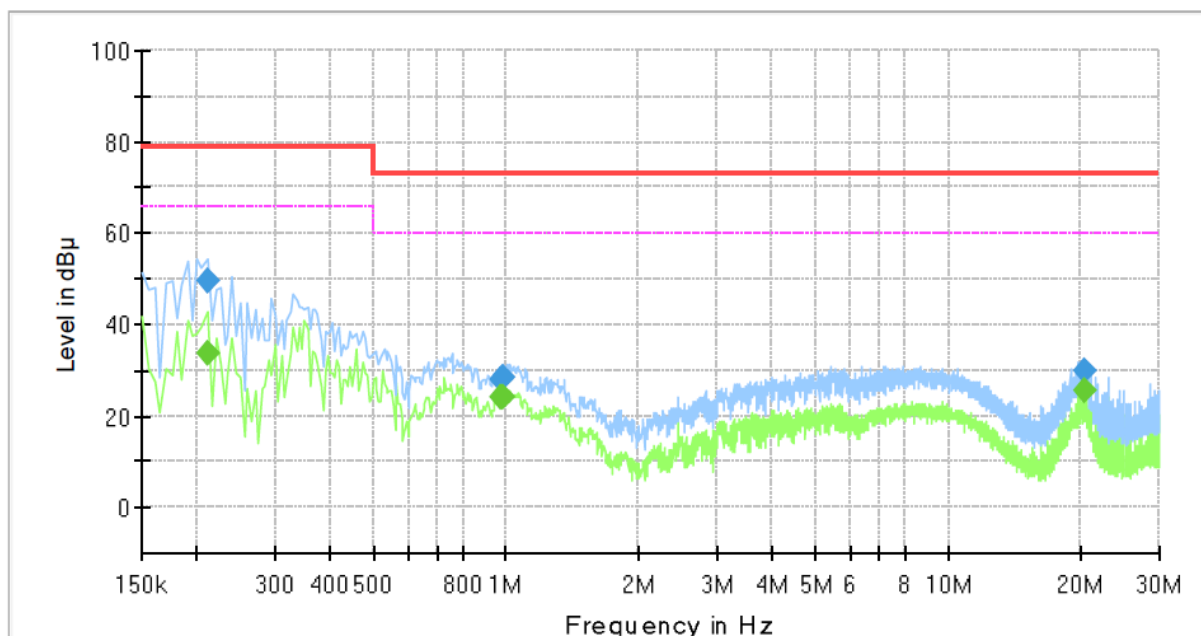
Conducted Emission

TNO-4050T

H

DC

KES



## Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.210000        | ---              | 33.92           | 66.00        | 32.08       | 1000.0          | 9.000           | L1   | 19.4       |
| 0.210000        | 49.54            | ---             | 79.00        | 29.46       | 1000.0          | 9.000           | L1   | 19.4       |
| 0.975000        | ---              | 24.15           | 60.00        | 35.85       | 1000.0          | 9.000           | L1   | 20.0       |
| 0.975000        | 28.09            | ---             | 73.00        | 44.91       | 1000.0          | 9.000           | L1   | 20.0       |
| 0.985000        | ---              | 24.02           | 60.00        | 35.98       | 1000.0          | 9.000           | L1   | 20.0       |
| 0.985000        | 28.65            | ---             | 73.00        | 44.35       | 1000.0          | 9.000           | L1   | 20.0       |
| 20.260000       | ---              | 25.61           | 60.00        | 34.39       | 1000.0          | 9.000           | L1   | 20.1       |
| 20.260000       | 29.90            | ---             | 73.00        | 43.10       | 1000.0          | 9.000           | L1   | 20.1       |

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

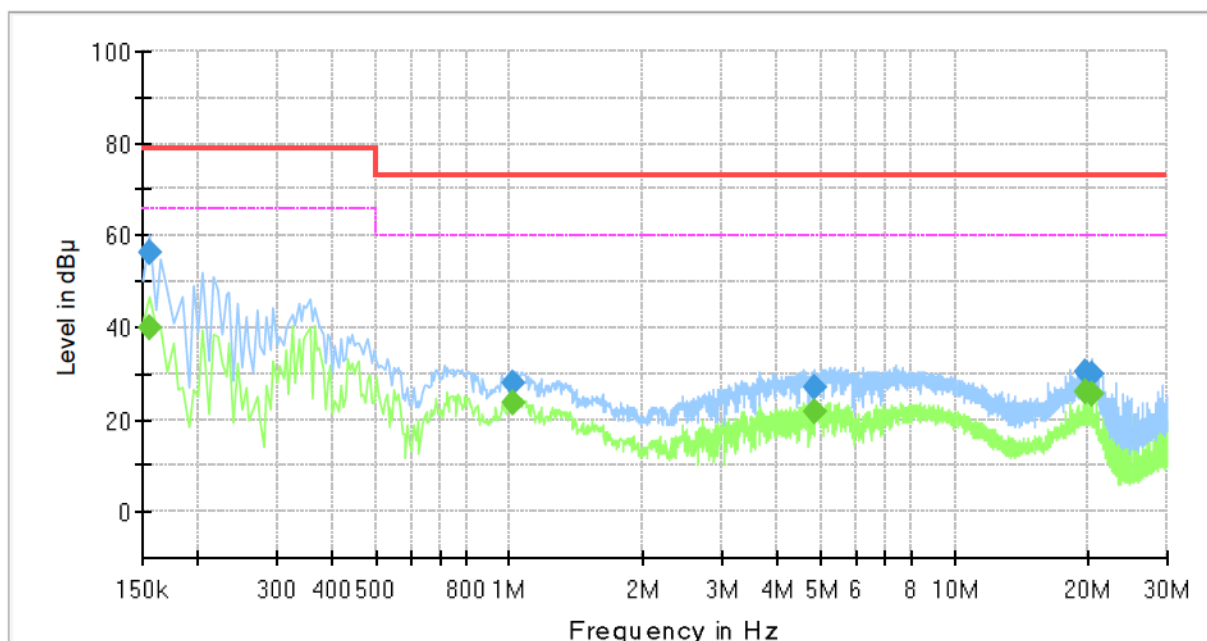
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

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

## NEUTRAL LINE

### Common Information

|                   |                    |
|-------------------|--------------------|
| Test Description: | Conducted Emission |
| Model No.:        | TNO-4050T          |
| Phase:            | N                  |
| Mode:             | DC                 |
| Operator Name:    | KES                |



### Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.155000        | ---              | 40.03           | 66.00        | 25.97       | 1000.0          | 9.000           | N    | 19.4       |
| 0.155000        | 56.52            | ---             | 79.00        | 22.48       | 1000.0          | 9.000           | N    | 19.4       |
| 1.020000        | ---              | 23.86           | 60.00        | 36.14       | 1000.0          | 9.000           | N    | 20.0       |
| 1.020000        | 27.90            | ---             | 73.00        | 45.10       | 1000.0          | 9.000           | N    | 20.0       |
| 4.840000        | ---              | 21.58           | 60.00        | 38.42       | 1000.0          | 9.000           | N    | 19.7       |
| 4.840000        | 27.11            | ---             | 73.00        | 45.89       | 1000.0          | 9.000           | N    | 19.7       |
| 19.710000       | ---              | 25.94           | 60.00        | 34.06       | 1000.0          | 9.000           | N    | 20.1       |
| 19.710000       | 30.31            | ---             | 73.00        | 42.69       | 1000.0          | 9.000           | N    | 20.1       |
| 20.260000       | ---              | 25.76           | 60.00        | 34.24       | 1000.0          | 9.000           | N    | 20.2       |
| 20.260000       | 29.99            | ---             | 73.00        | 43.01       | 1000.0          | 9.000           | N    | 20.2       |

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

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

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

**PoE Mode**
**HOT LINE**
**Common Information**

Test Description:

Model No.:

Phase:

Mode:

Operator Name:

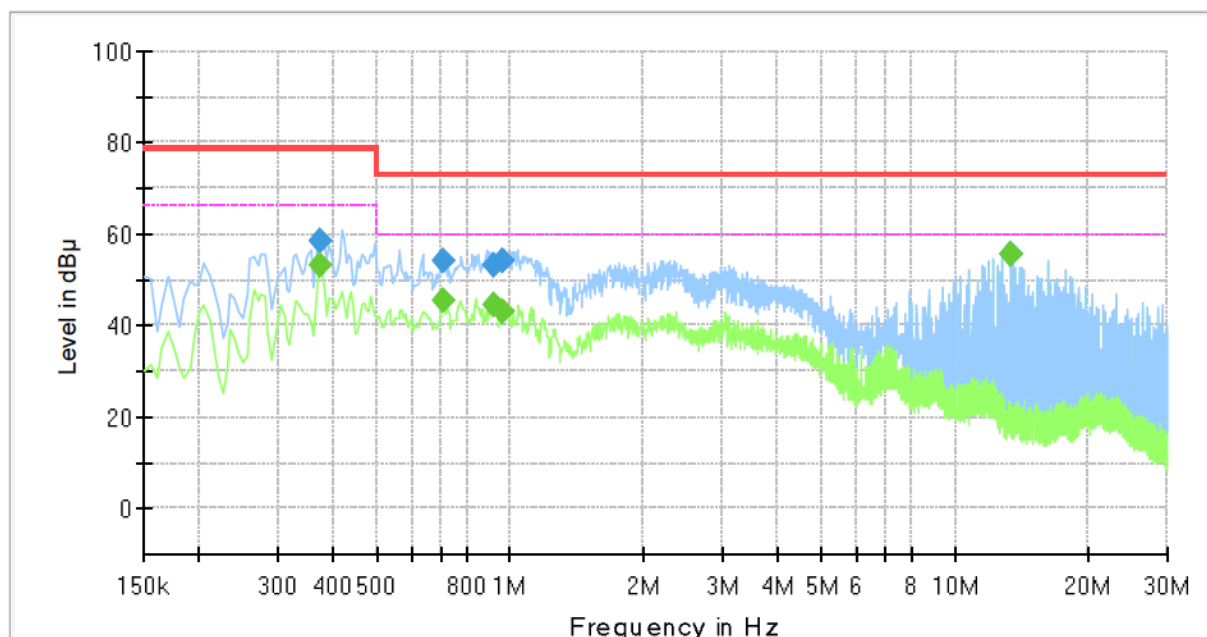
Conducted Emission

TNO-4050T

H

PoE

KES


**Final Result**

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.375000        | ---              | 53.40           | 66.00        | 12.60       | 1000.0          | 9.000           | L1   | 19.6       |
| 0.375000        | 58.69            | ---             | 79.00        | 20.31       | 1000.0          | 9.000           | L1   | 19.6       |
| 0.705000        | ---              | 45.66           | 60.00        | 14.34       | 1000.0          | 9.000           | L1   | 19.9       |
| 0.705000        | 54.21            | ---             | 73.00        | 18.79       | 1000.0          | 9.000           | L1   | 19.9       |
| 0.915000        | ---              | 44.37           | 60.00        | 15.63       | 1000.0          | 9.000           | L1   | 20.1       |
| 0.915000        | 53.36            | ---             | 73.00        | 19.64       | 1000.0          | 9.000           | L1   | 20.1       |
| 0.965000        | ---              | 43.19           | 60.00        | 16.81       | 1000.0          | 9.000           | L1   | 20.0       |
| 0.965000        | 54.09            | ---             | 73.00        | 18.91       | 1000.0          | 9.000           | L1   | 20.0       |
| 13.420000       | ---              | 55.65           | 60.00        | 4.35        | 1000.0          | 9.000           | L1   | 19.9       |
| 13.420000       | 55.82            | ---             | 73.00        | 17.18       | 1000.0          | 9.000           | L1   | 19.9       |

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

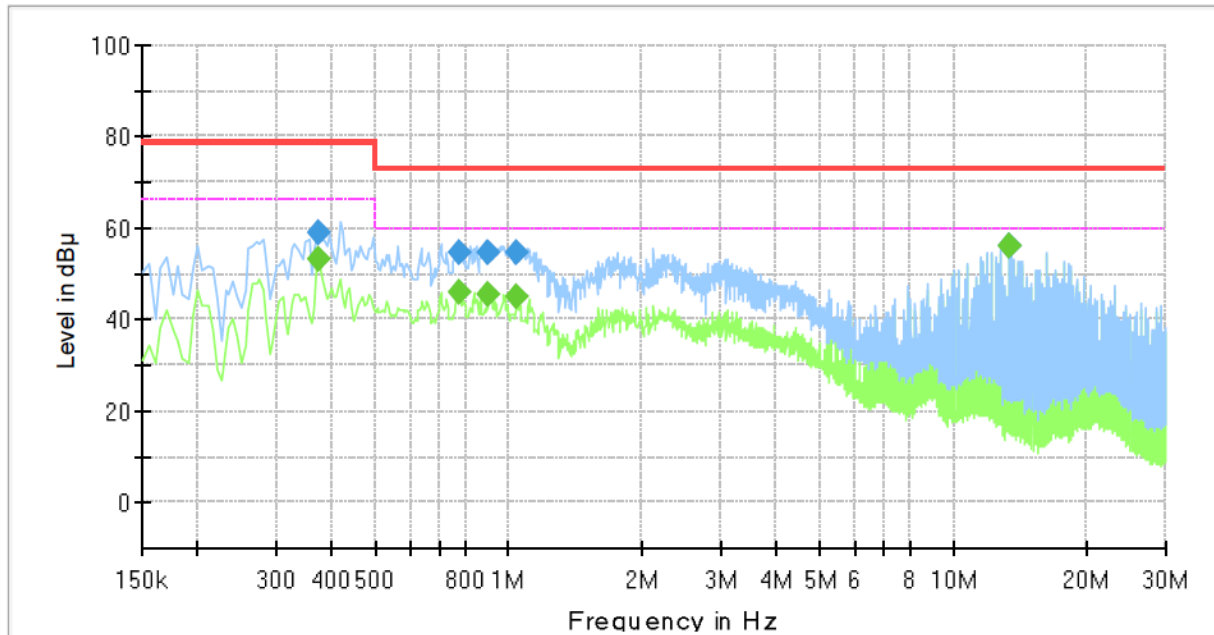
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

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

## NEUTRAL LINE

### Common Information

|                   |                    |
|-------------------|--------------------|
| Test Description: | Conducted Emission |
| Model No.:        | TNO-4050T          |
| Phase:            | N                  |
| Mode:             | PoE                |
| Operator Name:    | KES                |



### Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.375000        | ---              | 53.23           | 66.00        | 12.77       | 1000.0          | 9.000           | N    | 19.6       |
| 0.375000        | 59.20            | ---             | 79.00        | 19.80       | 1000.0          | 9.000           | N    | 19.6       |
| 0.775000        | ---              | 46.04           | 60.00        | 13.96       | 1000.0          | 9.000           | N    | 20.0       |
| 0.775000        | 54.85            | ---             | 73.00        | 18.15       | 1000.0          | 9.000           | N    | 20.0       |
| 0.900000        | ---              | 45.66           | 60.00        | 14.34       | 1000.0          | 9.000           | N    | 20.1       |
| 0.900000        | 54.42            | ---             | 73.00        | 18.58       | 1000.0          | 9.000           | N    | 20.1       |
| 1.040000        | ---              | 44.98           | 60.00        | 15.02       | 1000.0          | 9.000           | N    | 20.1       |
| 1.040000        | 54.54            | ---             | 73.00        | 18.46       | 1000.0          | 9.000           | N    | 20.1       |
| 13.420000       | ---              | 55.94           | 60.00        | 4.06        | 1000.0          | 9.000           | N    | 19.9       |
| 13.420000       | 56.12            | ---             | 73.00        | 16.88       | 1000.0          | 9.000           | N    | 19.9       |

#### ◆ 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))

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

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

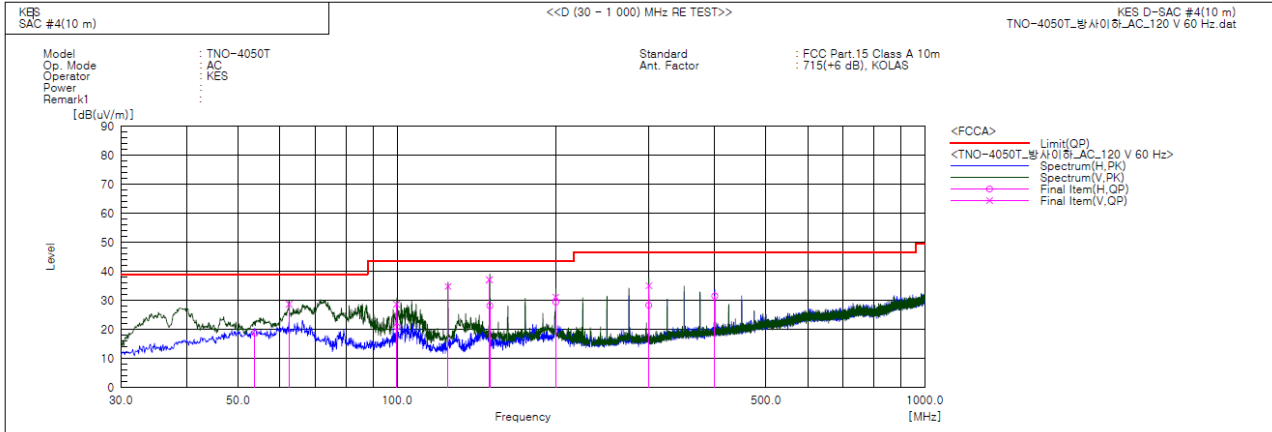
The authenticity of the test report, contact kes@kes.co.kr



## Radiated Electric Field Emissions(Below 1 GHz)

- 47 CFR Part 15, Subpart B

### ■ AC Mode



### Final Result

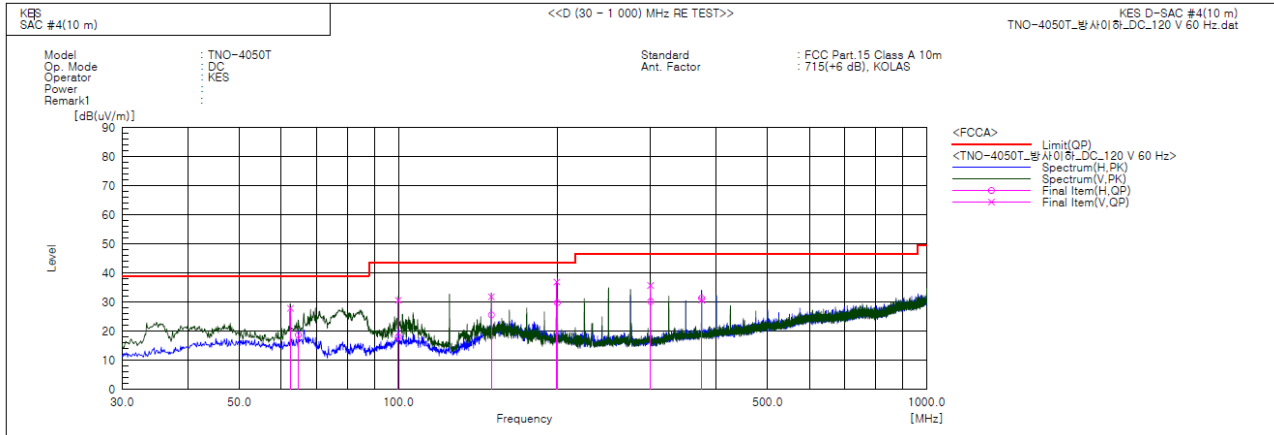
| No. | Frequency<br>[MHz] | (P) | Reading<br>QP<br>[dB(uV)] | c.f<br>[dB(1/m)] | Result<br>QP<br>[dB(uV/m)] | Limit<br>QP<br>[dB(uV/m)] | Margin<br>QP<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|-----|--------------------|-----|---------------------------|------------------|----------------------------|---------------------------|----------------------|----------------|----------------|--------|
| 1   | 53.765             | H   | 40.1                      | -21.3            | 18.8                       | 39.0                      | 20.2                 | 391.0          | 89.0           |        |
| 2   | 62.495             | V   | 51.2                      | -22.5            | 28.7                       | 39.0                      | 10.3                 | 109.0          | 289.0          |        |
| 3   | 99.778             | V   | 51.2                      | -22.5            | 28.7                       | 43.5                      | 14.8                 | 106.0          | 216.0          |        |
| 4   | 99.961             | H   | 43.4                      | -22.5            | 20.9                       | 43.5                      | 22.6                 | 385.0          | 35.0           |        |
| 5   | 124.939            | V   | 59.7                      | -24.9            | 34.8                       | 43.5                      | 8.7                  | 198.0          | 253.0          |        |
| 6   | 149.541            | V   | 62.4                      | -25.3            | 37.1                       | 43.5                      | 6.4                  | 106.0          | 197.0          |        |
| 7   | 149.916            | H   | 53.5                      | -25.3            | 28.2                       | 43.5                      | 15.3                 | 391.0          | 35.0           |        |
| 8   | 199.694            | V   | 52.2                      | -21.0            | 31.2                       | 43.5                      | 12.3                 | 100.0          | 143.0          |        |
| 9   | 199.993            | H   | 50.4                      | -21.0            | 29.4                       | 43.5                      | 14.1                 | 400.0          | 72.0           |        |
| 10  | 300.012            | H   | 46.3                      | -18.0            | 28.3                       | 46.5                      | 18.2                 | 354.0          | 237.0          |        |
| 11  | 300.024            | V   | 53.1                      | -18.0            | 35.1                       | 46.5                      | 11.4                 | 100.0          | 216.0          |        |
| 12  | 400.055            | H   | 45.7                      | -14.2            | 31.5                       | 46.5                      | 15.0                 | 311.0          | 132.0          |        |

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

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

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

## DC Mode



## Final Result

| No. | Frequency | (P) | Reading        | c.f       | Result           | Limit            | Margin     | Height | Angle | Remark |
|-----|-----------|-----|----------------|-----------|------------------|------------------|------------|--------|-------|--------|
|     | [MHz]     |     | QP<br>[dB(uV)] | [dB(1/m)] | QP<br>[dB(uV/m)] | QP<br>[dB(uV/m)] | QP<br>[dB] | [cm]   | [deg] |        |
| 1   | 62.495    | V   | 50.4           | -22.5     | 27.9             | 39.0             | 11.1       | 199.0  | 3.0   |        |
| 2   | 64.678    | H   | 41.9           | -23.2     | 18.7             | 39.0             | 20.3       | 315.0  | 353.0 |        |
| 3   | 99.961    | V   | 53.1           | -22.5     | 30.6             | 43.5             | 12.9       | 100.0  | 217.0 |        |
| 4   | 99.961    | H   | 40.6           | -22.5     | 18.1             | 43.5             | 25.4       | 384.0  | 54.0  |        |
| 5   | 149.916   | V   | 57.1           | -25.3     | 31.8             | 43.5             | 11.7       | 109.0  | 162.0 |        |
| 6   | 149.995   | H   | 50.9           | -25.3     | 25.6             | 43.5             | 17.9       | 351.0  | 107.0 |        |
| 7   | 199.515   | V   | 57.9           | -21.0     | 36.9             | 43.5             | 6.6        | 106.0  | 17.0  |        |
| 8   | 199.993   | H   | 50.8           | -21.0     | 29.8             | 43.5             | 13.7       | 309.0  | 125.0 |        |
| 9   | 300.024   | V   | 53.7           | -18.0     | 35.7             | 46.5             | 10.8       | 114.0  | 217.0 |        |
| 10  | 300.412   | H   | 48.2           | -18.0     | 30.2             | 46.5             | 16.3       | 400.0  | 269.0 |        |
| 11  | 374.956   | H   | 46.1           | -14.8     | 31.3             | 46.5             | 15.2       | 301.0  | 124.0 |        |
| 12  | 374.984   | V   | 45.5           | -14.8     | 30.7             | 46.5             | 15.8       | 183.0  | 152.0 |        |

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

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

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





# KES Co., Ltd.

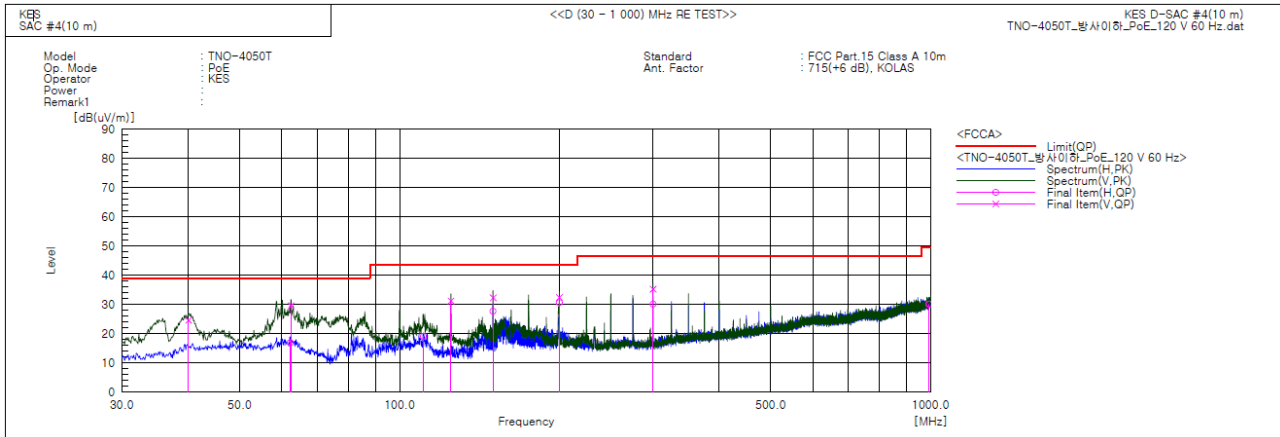
3701, 40, Simin-daero 365beon-gil,  
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea  
Tel: +82-31-425-6200 / Fax: +82-31-424-0450  
www.kes.co.kr

Report No.:

KES-EM-22T0675-R1

Page (25) of (47)

## PoE Mode



## Final Result

| No. | Frequency<br>[MHz] | (P) | Reading<br>QP<br>[dB(uV)] | c.f<br>[dB(1/m)] | Result<br>QP<br>[dB(uV/m)] | Limit<br>QP<br>[dB(uV/m)] | Margin<br>QP<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|-----|--------------------|-----|---------------------------|------------------|----------------------------|---------------------------|----------------------|----------------|----------------|--------|
| 1   | 40.064             | V   | 47.1                      | -22.5            | 24.6                       | 39.0                      | 14.4                 | 100.0          | 290.0          |        |
| 2   | 62.253             | H   | 39.4                      | -22.5            | 16.9                       | 39.0                      | 22.1                 | 308.0          | 324.0          |        |
| 3   | 62.495             | V   | 52.1                      | -22.5            | 29.6                       | 39.0                      | 9.4                  | 109.0          | 261.0          |        |
| 4   | 110.874            | H   | 41.5                      | -22.4            | 19.1                       | 43.5                      | 24.4                 | 314.0          | 269.0          |        |
| 5   | 124.939            | V   | 56.1                      | -24.9            | 31.2                       | 43.5                      | 12.3                 | 107.0          | 73.0           |        |
| 6   | 149.916            | H   | 53.0                      | -25.3            | 27.7                       | 43.5                      | 15.8                 | 400.0          | 215.0          |        |
| 7   | 149.995            | V   | 57.6                      | -25.3            | 32.3                       | 43.5                      | 11.2                 | 197.0          | 163.0          |        |
| 8   | 199.993            | V   | 53.4                      | -21.0            | 32.4                       | 43.5                      | 11.1                 | 199.0          | 199.0          |        |
| 9   | 199.993            | H   | 51.6                      | -21.0            | 30.6                       | 43.5                      | 12.9                 | 359.0          | 179.0          |        |
| 10  | 300.024            | V   | 53.2                      | -18.0            | 35.2                       | 46.5                      | 11.3                 | 100.0          | 128.0          |        |
| 11  | 300.024            | H   | 48.1                      | -18.0            | 30.1                       | 46.5                      | 16.4                 | 400.0          | 179.0          |        |
| 12  | 992.604            | H   | 32.8                      | -2.7             | 30.1                       | 49.5                      | 19.4                 | 305.0          | 53.0           |        |

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



## KES Co., Ltd.

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

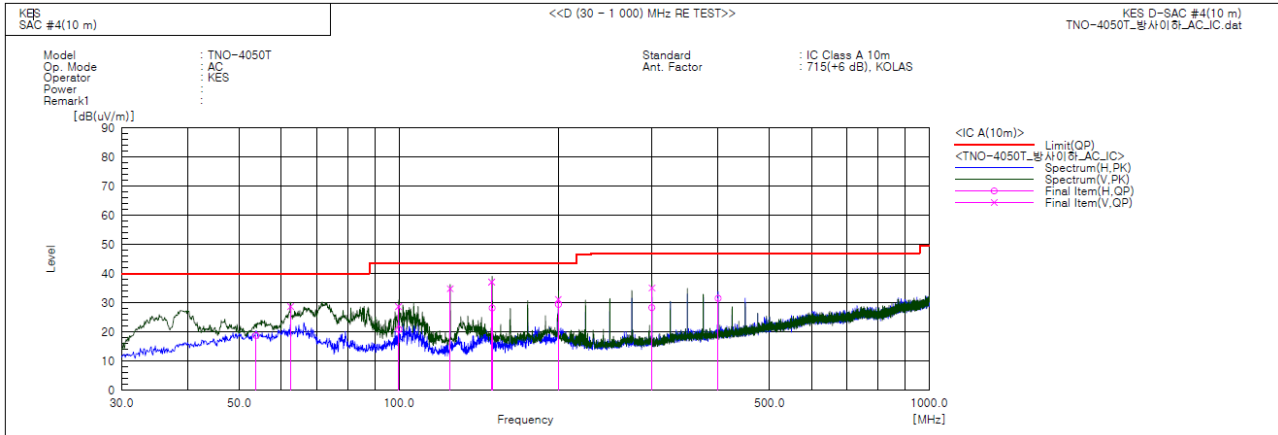
Report No.:

KES-EM-22T0675-R1

Page (26) of (47)

### - IC Regulation ICES-003 Issue 7

#### ■ AC Mode



#### Final Result

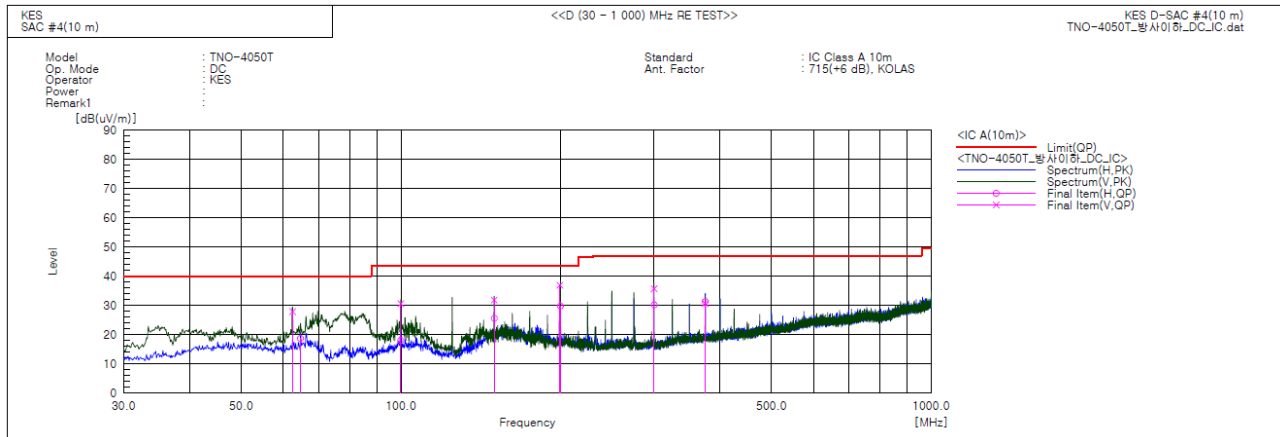
| No. | Frequency [MHz] | (P) | Reading QP [dB(uV)] | c.f [dB(1/m)] | Result QP [dB(uV/m)] | Limit QP [dB(uV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] | Remark |
|-----|-----------------|-----|---------------------|---------------|----------------------|---------------------|----------------|-------------|-------------|--------|
| 1   | 53.765          | H   | 40.1                | -21.3         | 18.8                 | 40.0                | 21.2           | 391.0       | 89.0        |        |
| 2   | 62.495          | V   | 51.2                | -22.5         | 28.7                 | 40.0                | 11.3           | 109.0       | 289.0       |        |
| 3   | 99.778          | V   | 51.2                | -22.5         | 28.7                 | 43.5                | 14.8           | 106.0       | 216.0       |        |
| 4   | 99.961          | H   | 43.4                | -22.5         | 20.9                 | 43.5                | 22.6           | 385.0       | 35.0        |        |
| 5   | 124.939         | V   | 59.7                | -24.9         | 34.8                 | 43.5                | 8.7            | 198.0       | 253.0       |        |
| 6   | 149.541         | V   | 62.4                | -25.3         | 37.1                 | 43.5                | 6.4            | 106.0       | 197.0       |        |
| 7   | 149.916         | H   | 53.5                | -25.3         | 28.2                 | 43.5                | 15.3           | 391.0       | 35.0        |        |
| 8   | 199.694         | V   | 52.2                | -21.0         | 31.2                 | 43.5                | 12.3           | 100.0       | 143.0       |        |
| 9   | 199.993         | H   | 50.4                | -21.0         | 29.4                 | 43.5                | 14.1           | 400.0       | 72.0        |        |
| 10  | 300.012         | H   | 46.3                | -18.0         | 28.3                 | 47.0                | 18.7           | 354.0       | 237.0       |        |
| 11  | 300.024         | V   | 53.1                | -18.0         | 35.1                 | 47.0                | 11.9           | 100.0       | 216.0       |        |
| 12  | 400.055         | H   | 45.7                | -14.2         | 31.5                 | 47.0                | 15.5           | 311.0       | 132.0       |        |

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

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

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

## DC Mode



## Final Result

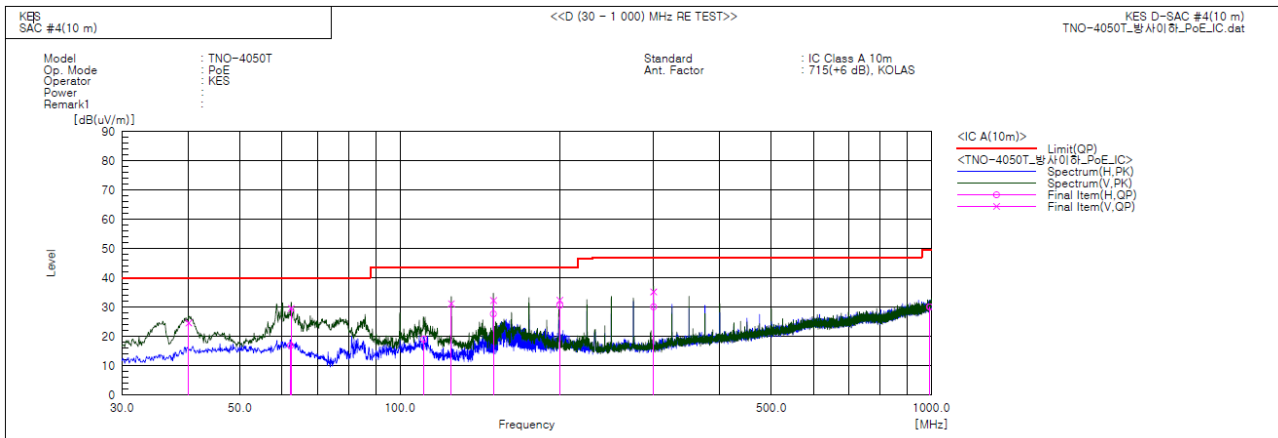
| No. | Frequency [MHz] | (P) | Reading QP [dB(uV)] | c.f [dB(1/m)] | Result QP [dB(uV/m)] | Limit QP [dB(uV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] | Remark |
|-----|-----------------|-----|---------------------|---------------|----------------------|---------------------|----------------|-------------|-------------|--------|
| 1   | 62.495          | V   | 50.4                | -22.5         | 27.9                 | 40.0                | 12.1           | 199.0       | 3.0         |        |
| 2   | 64.678          | H   | 41.9                | -23.2         | 18.7                 | 40.0                | 21.3           | 315.0       | 353.0       |        |
| 3   | 99.961          | V   | 53.1                | -22.5         | 30.6                 | 43.5                | 12.9           | 100.0       | 217.0       |        |
| 4   | 99.961          | H   | 40.6                | -22.5         | 18.1                 | 43.5                | 25.4           | 384.0       | 54.0        |        |
| 5   | 149.916         | V   | 57.1                | -25.3         | 31.8                 | 43.5                | 11.7           | 109.0       | 162.0       |        |
| 6   | 149.995         | H   | 50.9                | -25.3         | 25.6                 | 43.5                | 17.9           | 351.0       | 107.0       |        |
| 7   | 199.515         | V   | 57.9                | -21.0         | 36.9                 | 43.5                | 6.6            | 106.0       | 17.0        |        |
| 8   | 199.993         | H   | 50.8                | -21.0         | 29.8                 | 43.5                | 13.7           | 309.0       | 125.0       |        |
| 9   | 300.024         | V   | 53.7                | -18.0         | 35.7                 | 47.0                | 11.3           | 114.0       | 217.0       |        |
| 10  | 300.412         | H   | 48.2                | -18.0         | 30.2                 | 47.0                | 16.8           | 400.0       | 269.0       |        |
| 11  | 374.956         | H   | 46.1                | -14.8         | 31.3                 | 47.0                | 15.7           | 301.0       | 124.0       |        |
| 12  | 374.984         | V   | 45.5                | -14.8         | 30.7                 | 47.0                | 16.3           | 183.0       | 152.0       |        |

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

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

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

## PoE Mode



## 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   | 40.064          | V   | 47.1                | -22.5         | 24.6                 | 40.0                | 15.4           | 100.0       | 290.0       |        |
| 2   | 62.253          | H   | 39.4                | -22.5         | 16.9                 | 40.0                | 23.1           | 308.0       | 324.0       |        |
| 3   | 62.495          | V   | 52.1                | -22.5         | 29.6                 | 40.0                | 10.4           | 109.0       | 261.0       |        |
| 4   | 110.874         | H   | 41.5                | -22.4         | 19.1                 | 43.5                | 24.4           | 314.0       | 269.0       |        |
| 5   | 124.939         | V   | 56.1                | -24.9         | 31.2                 | 43.5                | 12.3           | 107.0       | 73.0        |        |
| 6   | 149.916         | H   | 53.0                | -25.3         | 27.7                 | 43.5                | 15.8           | 400.0       | 215.0       |        |
| 7   | 149.995         | V   | 57.6                | -25.3         | 32.3                 | 43.5                | 11.2           | 197.0       | 163.0       |        |
| 8   | 199.993         | V   | 53.4                | -21.0         | 32.4                 | 43.5                | 11.1           | 199.0       | 199.0       |        |
| 9   | 199.993         | H   | 51.6                | -21.0         | 30.6                 | 43.5                | 12.9           | 359.0       | 179.0       |        |
| 10  | 300.024         | V   | 53.2                | -18.0         | 35.2                 | 47.0                | 11.8           | 100.0       | 128.0       |        |
| 11  | 300.024         | H   | 48.1                | -18.0         | 30.1                 | 47.0                | 16.9           | 400.0       | 179.0       |        |
| 12  | 992.604         | H   | 32.8                | -2.7          | 30.1                 | 49.5                | 19.4           | 305.0       | 53.0        |        |

## ◆ Calculation – SAC #4(10 m)

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

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



## KES Co., Ltd.

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

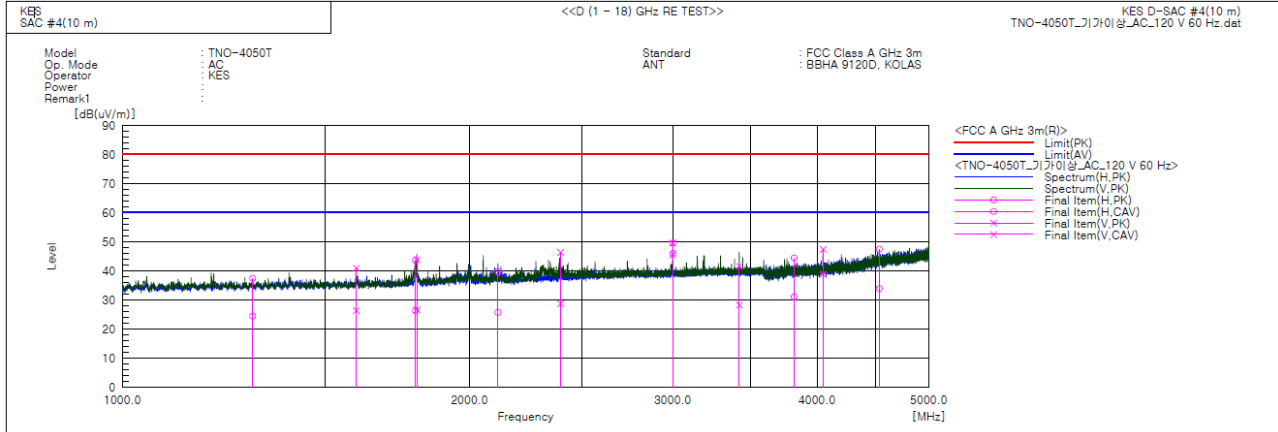
Report No.:

KES-EM-22T0675-R1

Page (29) of (47)

## Radiated Electric Field Emissions(Above 1 GHz)

### ■ AC 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   | 1297.135        | H   | 41.9                | 28.9                 | -4.4          | 37.5                 | 24.5                  | 80.0                | 60.0                | 42.5           | 35.5            | 352.0       | 262.0       |        |
| 2   | 1594.955        | V   | 43.8                | 29.3                 | -2.9          | 40.9                 | 26.4                  | 80.0                | 60.0                | 39.1           | 33.6            | 192.0       | 174.0       |        |
| 3   | 1794.850        | H   | 45.9                | 28.6                 | -2.2          | 43.7                 | 26.4                  | 80.0                | 60.0                | 36.3           | 33.6            | 400.0       | 189.0       |        |
| 4   | 1800.435        | V   | 45.9                | 28.8                 | -2.1          | 43.8                 | 26.7                  | 80.0                | 60.0                | 36.2           | 33.3            | 118.0       | 174.0       |        |
| 5   | 2116.360        | H   | 40.4                | 26.5                 | -0.7          | 39.7                 | 25.8                  | 80.0                | 60.0                | 40.3           | 34.2            | 306.0       | 207.0       |        |
| 6   | 2397.725        | V   | 45.6                | 28.0                 | 0.8           | 46.4                 | 28.8                  | 80.0                | 60.0                | 33.6           | 31.2            | 109.0       | 192.0       |        |
| 7   | 3000.010        | H   | 46.3                | 42.7                 | 3.3           | 49.6                 | 46.0                  | 80.0                | 60.0                | 30.4           | 14.0            | 358.0       | 262.0       |        |
| 8   | 3000.145        | V   | 46.3                | 42.3                 | 3.3           | 49.6                 | 45.6                  | 80.0                | 60.0                | 30.4           | 14.4            | 102.0       | 137.0       |        |
| 9   | 3425.650        | V   | 37.3                | 24.0                 | 4.3           | 41.6                 | 28.3                  | 80.0                | 60.0                | 38.4           | 31.7            | 100.0       | 210.0       |        |
| 10  | 3822.785        | H   | 38.2                | 24.9                 | 6.2           | 44.4                 | 31.1                  | 80.0                | 60.0                | 35.6           | 28.9            | 399.0       | 154.0       |        |
| 11  | 4050.050        | V   | 40.1                | 31.5                 | 7.3           | 47.4                 | 38.8                  | 80.0                | 60.0                | 32.6           | 21.2            | 100.0       | 174.0       |        |
| 12  | 4528.875        | H   | 37.0                | 23.5                 | 10.5          | 47.5                 | 34.0                  | 80.0                | 60.0                | 32.5           | 26.0            | 400.0       | 154.0       |        |

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

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

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



## KES Co., Ltd.

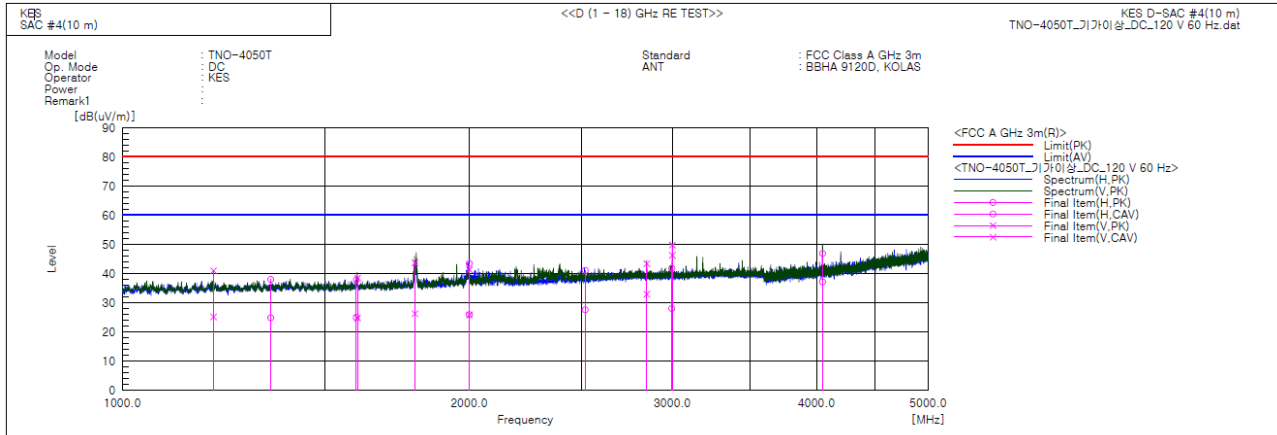
3701, 40, Simin-daero 365beon-gil,  
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea  
Tel: +82-31-425-6200 / Fax: +82-31-424-0450  
www.kes.co.kr

Report No.:

KES-EM-22T0675-R1

Page (30) of (47)

### DC Mode

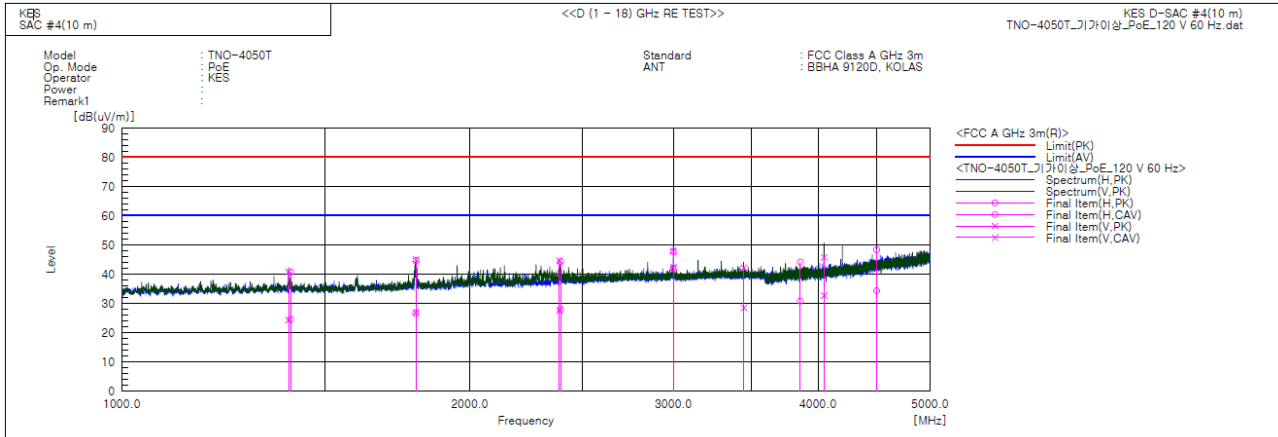


### Final Result

| No. | Frequency [MHz] | (P) | Reading PK [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB(1/m)] | Result PK [dB(uV/m)] | Result CAV [dB(uV/m)] | Limit PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Margin PK [dB] | Margin CAV [dB] | Height [cm] | Angle [deg] | Remark |
|-----|-----------------|-----|---------------------|----------------------|---------------|----------------------|-----------------------|---------------------|---------------------|----------------|-----------------|-------------|-------------|--------|
| 1   | 1199.480        | V   | 45.9                | 30.1                 | -4.9          | 41.0                 | 25.2                  | 80.0                | 60.0                | 39.0           | 34.8            | 114.0       | 5.0         |        |
| 2   | 1345.090        | H   | 42.1                | 29.0                 | -4.1          | 38.0                 | 24.9                  | 80.0                | 60.0                | 42.0           | 35.1            | 398.0       | 3.0         |        |
| 3   | 1595.800        | H   | 40.8                | 27.9                 | -2.9          | 37.9                 | 25.0                  | 80.0                | 60.0                | 42.1           | 35.0            | 357.0       | 115.0       |        |
| 4   | 1599.835        | V   | 41.4                | 27.7                 | -2.9          | 38.5                 | 24.8                  | 80.0                | 60.0                | 41.5           | 35.2            | 199.0       | 7.0         |        |
| 5   | 1793.495        | V   | 45.9                | 28.5                 | -2.2          | 43.7                 | 26.3                  | 80.0                | 60.0                | 36.3           | 33.7            | 186.0       | 77.0        |        |
| 6   | 1999.375        | V   | 42.7                | 27.2                 | -1.3          | 41.4                 | 25.9                  | 80.0                | 60.0                | 38.6           | 34.1            | 178.0       | 56.0        |        |
| 7   | 1999.490        | H   | 44.8                | 27.3                 | -1.3          | 43.5                 | 26.0                  | 80.0                | 60.0                | 36.5           | 34.0            | 311.0       | 315.0       |        |
| 8   | 2520.950        | H   | 39.7                | 26.2                 | 1.4           | 41.1                 | 27.6                  | 80.0                | 60.0                | 38.9           | 32.4            | 305.0       | 394.0       |        |
| 9   | 2850.100        | V   | 40.6                | 30.2                 | 2.8           | 43.4                 | 33.0                  | 80.0                | 60.0                | 36.6           | 27.0            | 109.0       | 55.0        |        |
| 10  | 2996.650        | H   | 38.7                | 24.9                 | 3.2           | 41.9                 | 28.1                  | 80.0                | 60.0                | 38.1           | 31.9            | 379.0       | 108.0       |        |
| 11  | 3000.105        | V   | 46.5                | 43.0                 | 3.3           | 49.8                 | 46.3                  | 80.0                | 60.0                | 30.2           | 13.7            | 100.0       | 298.0       |        |
| 12  | 4049.890        | H   | 39.6                | 29.9                 | 7.3           | 46.9                 | 37.2                  | 80.0                | 60.0                | 33.1           | 22.8            | 319.0       | 356.0       |        |

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

## PoE Mode



### 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   | 1394.270        | V   | 44.6                | 28.1                 | -3.8          | 40.8                 | 24.3                  | 80.0                | 60.0                | 39.2           | 35.7            | 100.0       | 261.0       |        |
| 2   | 1399.670        | H   | 44.6                | 28.5                 | -3.8          | 40.8                 | 24.7                  | 80.0                | 60.0                | 39.2           | 35.3            | 394.0       | 154.0       |        |
| 3   | 1796.350        | H   | 46.8                | 28.8                 | -2.1          | 44.7                 | 26.7                  | 80.0                | 60.0                | 35.3           | 33.3            | 400.0       | 210.0       |        |
| 4   | 1796.530        | V   | 47.1                | 29.1                 | -2.1          | 45.0                 | 27.0                  | 80.0                | 60.0                | 35.0           | 33.0            | 196.0       | 208.0       |        |
| 5   | 2390.960        | V   | 43.9                | 26.9                 | 0.8           | 44.7                 | 27.7                  | 80.0                | 60.0                | 35.3           | 32.3            | 115.0       | 243.0       |        |
| 6   | 2395.895        | H   | 43.5                | 27.2                 | 0.8           | 44.3                 | 28.0                  | 80.0                | 60.0                | 35.7           | 32.0            | 400.0       | 191.0       |        |
| 7   | 3000.030        | V   | 44.6                | 39.1                 | 3.3           | 47.9                 | 42.4                  | 80.0                | 60.0                | 32.1           | 17.6            | 127.0       | 278.0       |        |
| 8   | 3000.040        | H   | 44.4                | 38.7                 | 3.3           | 47.7                 | 42.0                  | 80.0                | 60.0                | 32.3           | 18.0            | 356.0       | 228.0       |        |
| 9   | 3450.635        | V   | 37.9                | 24.3                 | 4.3           | 42.2                 | 28.6                  | 80.0                | 60.0                | 37.8           | 31.4            | 184.0       | 261.0       |        |
| 10  | 3861.415        | H   | 37.7                | 24.4                 | 6.4           | 44.1                 | 30.8                  | 80.0                | 60.0                | 35.9           | 29.2            | 308.0       | 265.0       |        |
| 11  | 4050.490        | V   | 38.4                | 25.4                 | 7.3           | 45.7                 | 32.7                  | 80.0                | 60.0                | 34.3           | 27.3            | 100.0       | 225.0       |        |
| 12  | 4496.040        | H   | 38.2                | 24.2                 | 10.2          | 48.4                 | 34.4                  | 80.0                | 60.0                | 31.6           | 25.6            | 319.0       | 210.0       |        |

## Calculation

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

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

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

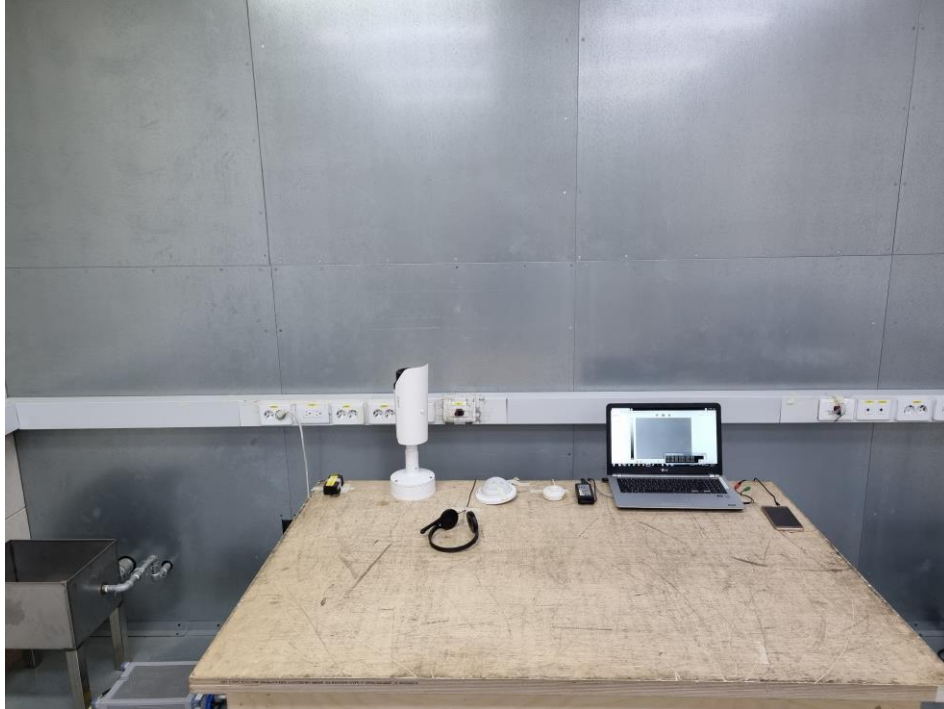
Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value



## Test Setup Photos and Configuration

### Conducted Emissions at Mains Power Ports

■ AC, DC Mode



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



## ■ PoE Mode



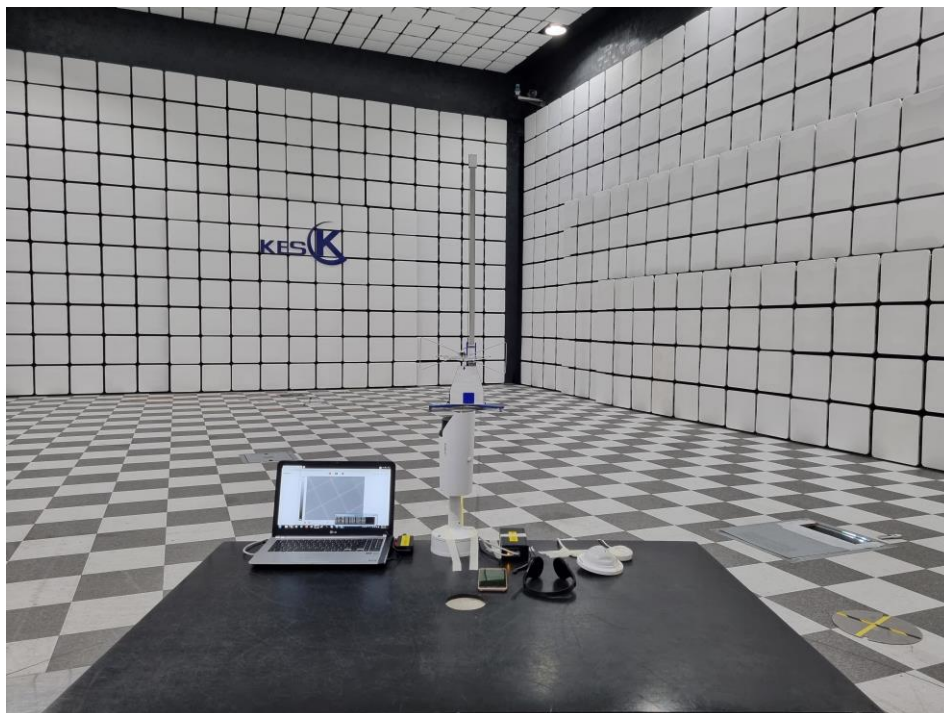
## Radiated Electric Field Emissions(Below 1 GHz)

### ■ AC, DC Mode



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

## ■ PoE Mode

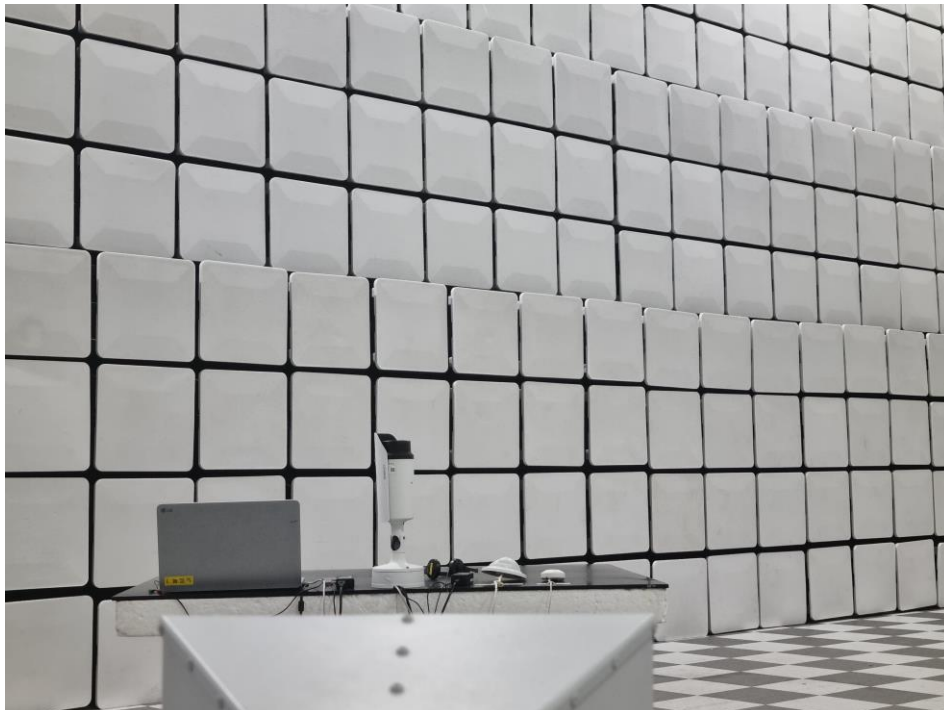
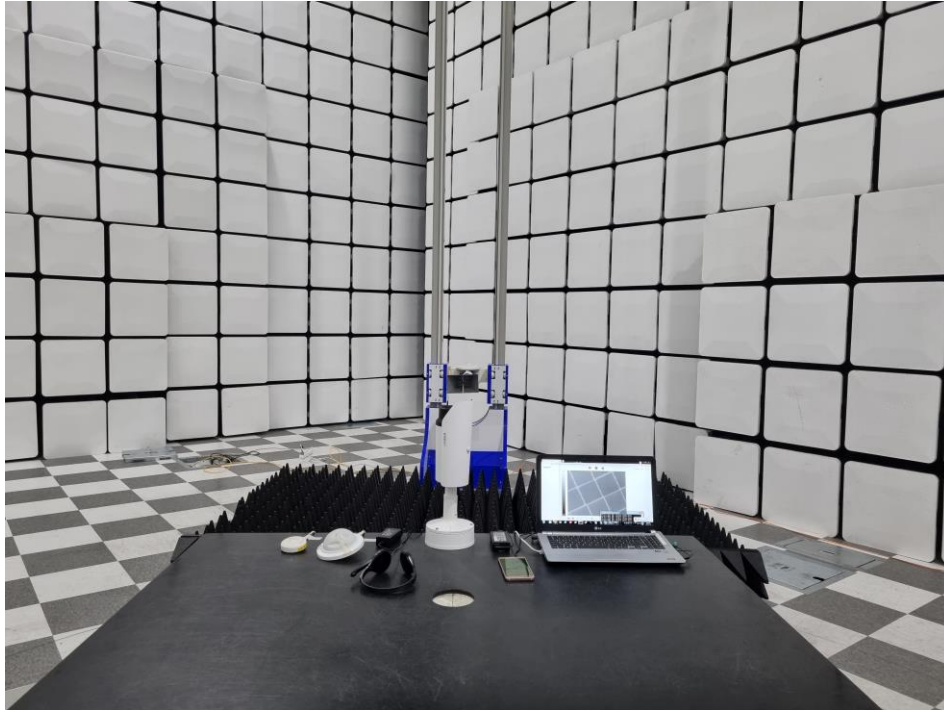


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr



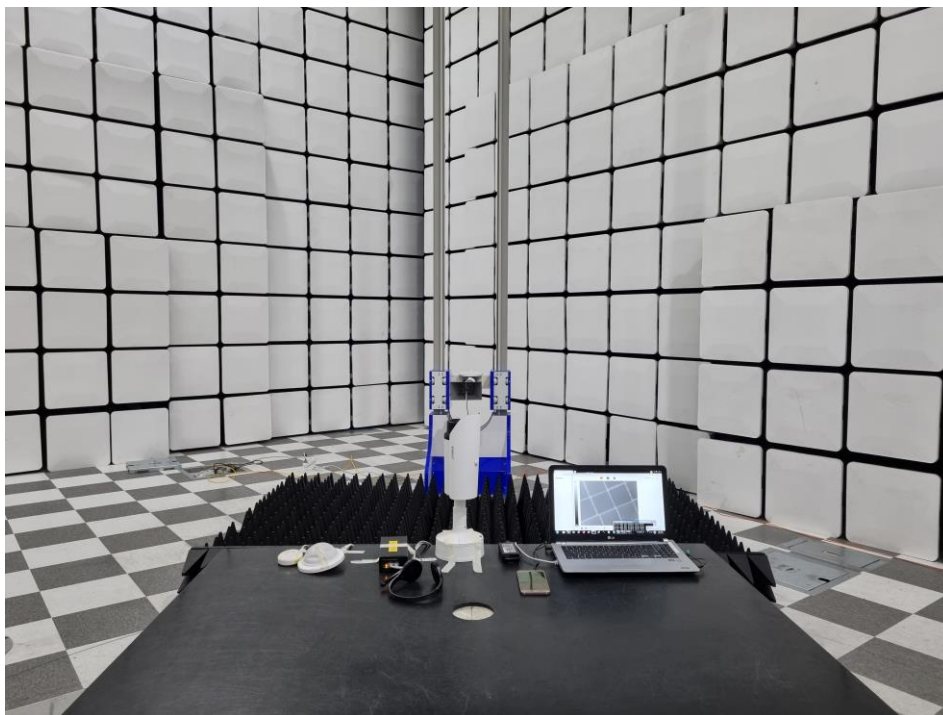
## Radiated Electric Field Emissions(Above 1 GHz)

### ■ AC, DC Mode



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

## ■ PoE Mode



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

**EUT External Photographs**

(Top)



(Bottom)

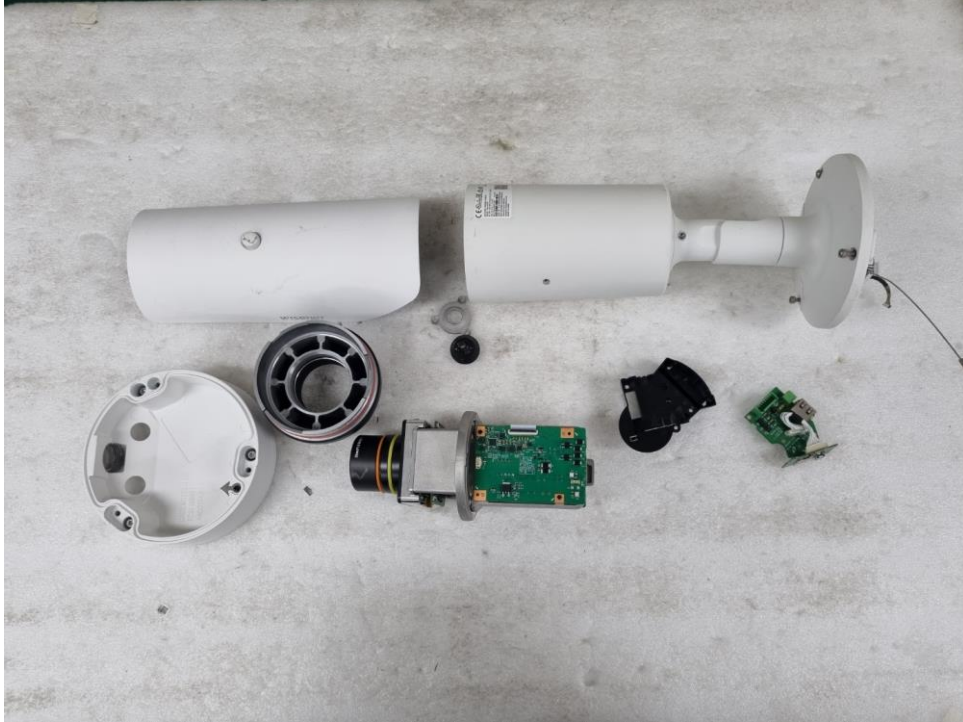


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr



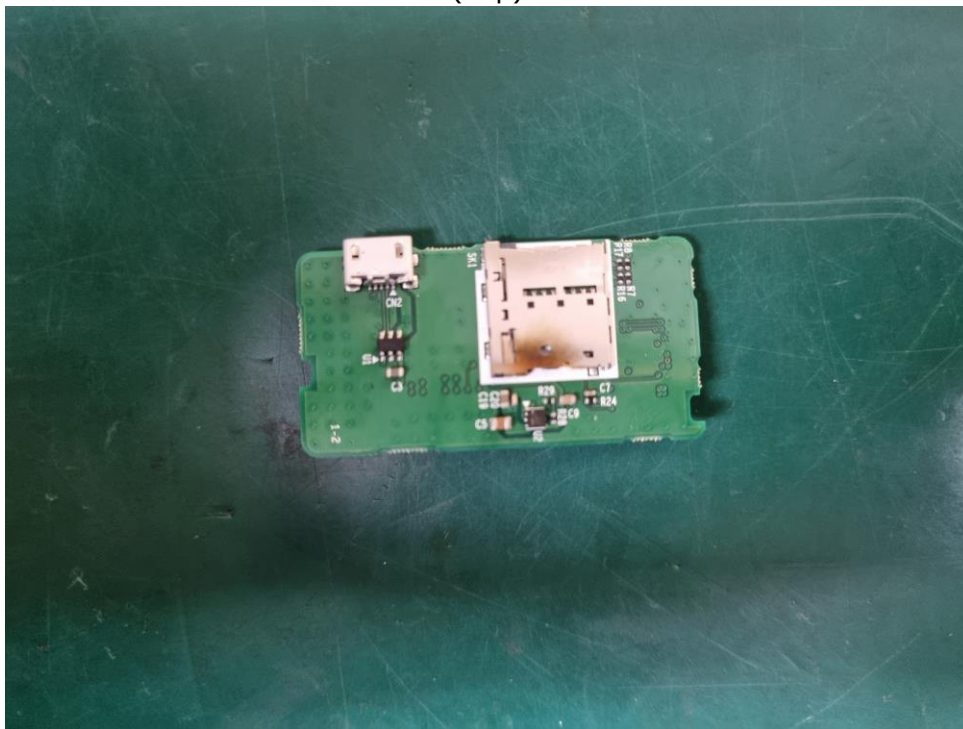
## **EUT Internal Photographs**

(Internal View)



## EUT Internal View – Board 1

(Top)



(Bottom)

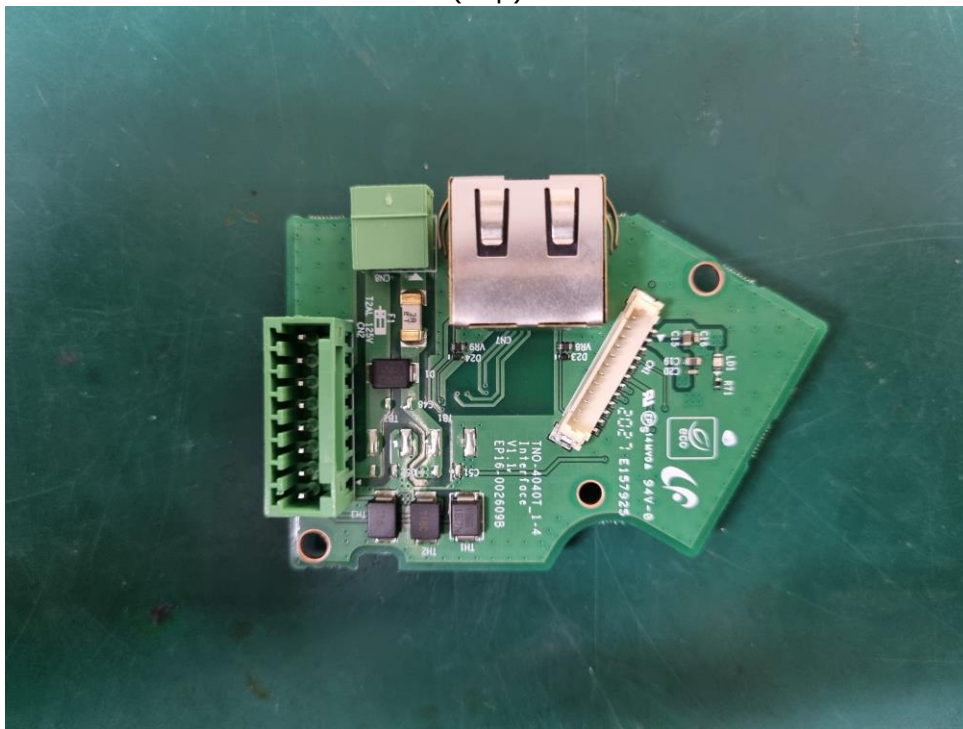


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr



## EUT Internal View – Board 2

(Top)



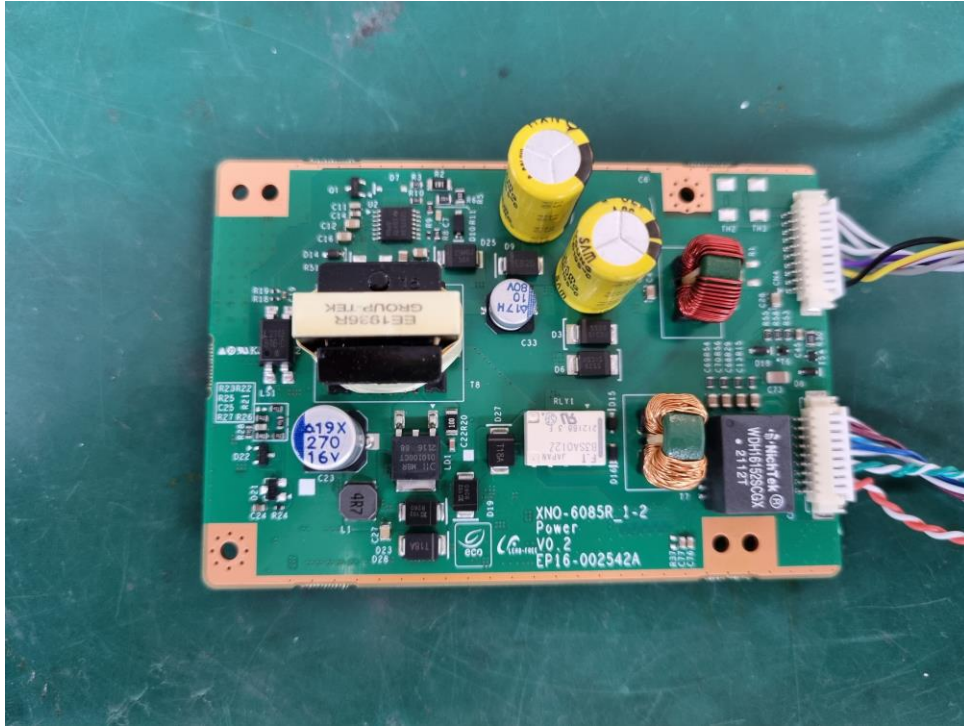
(Bottom)



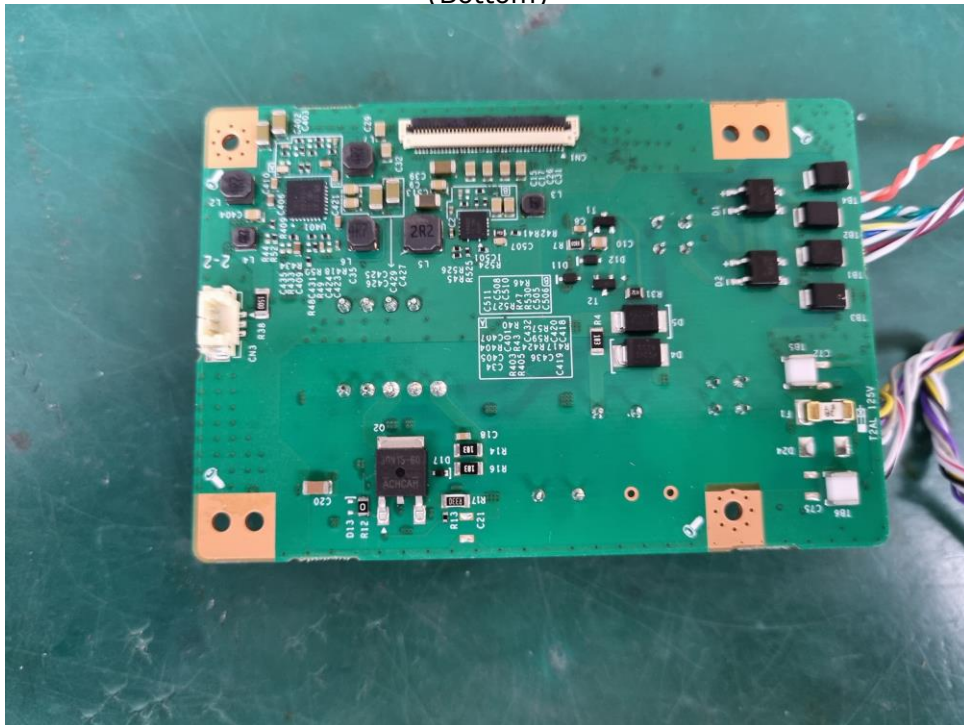
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
The authenticity of the test report, contact kes@kes.co.kr

## EUT Internal View – Board 3

(Top)



(Bottom)



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

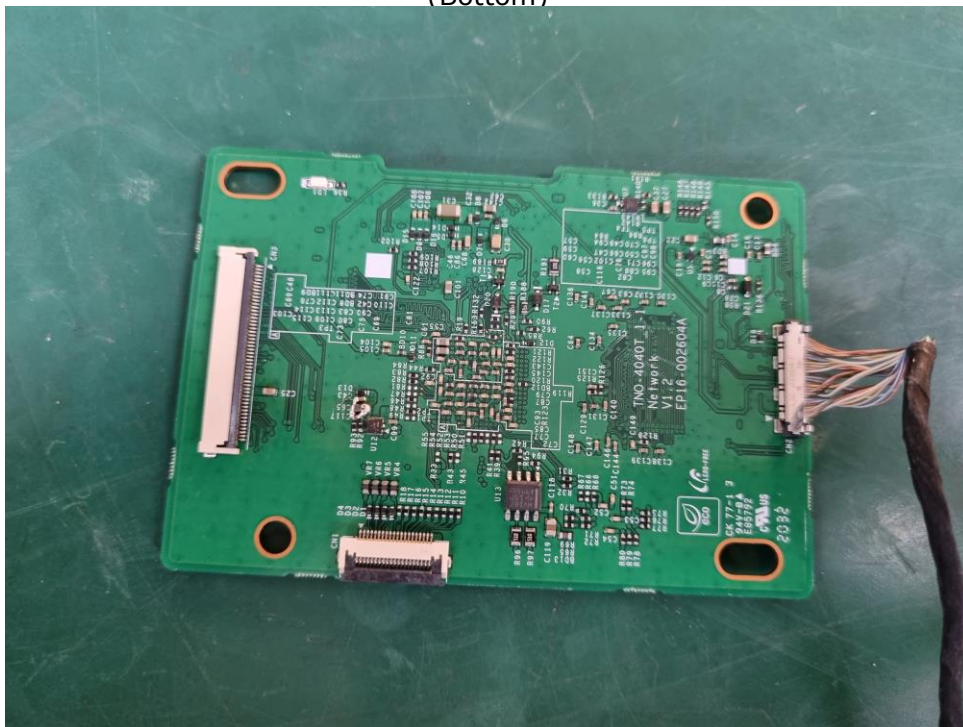


## EUT Internal View – Board 4

(Top)



(Bottom)



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

## EUT Internal View – Board 5

(Top)



(Bottom)



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



## EUT Internal View – Board 6

(Top)



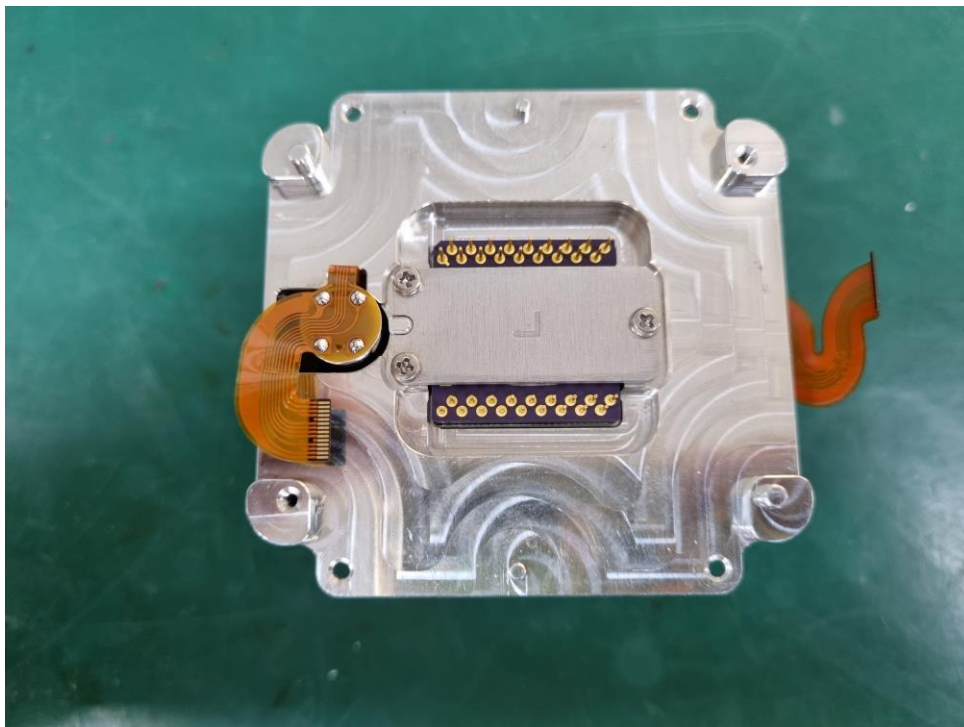
(Bottom)



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

**EUT Internal View – Lens**

(Top)



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

---

## Label Photographs

### FCC Label



Hanwha Vision Co., Ltd

TNO-4050T

### IC Label

### CAN ICES-003(A) / NMB-003(A)

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:  
(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.