

EMC TEST REPORT For CE

Test Report No. : KES-E1-19T0227

Date of Issue : Apr. 16, 2019

Product name : Network Camera

Model/Type No. : QNO-8030R

Variant Model : QNO-8020R, QNO-8010R

Applicant : Hanwha Techwin Co., Ltd.

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

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

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

Date of Receipt : Apr. 04, 2019

Test date : Apr. 10, 2019 ~ Apr. 12, 2019

Test Results : **In Compliance** **Not in Compliance**

Tested by

Young Ho, Lee
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

This test report is not related to KOLAS.



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-E1-19T0227
Page (2) of (58)

REPORT REVISION HISTORY

| Date | Test Report No. | Revision History |
|---------------|------------------------|-------------------------|
| Apr. 16, 2019 | KES-E1-19T0227 | Issued |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

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

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



TABLE OF CONTENTS

| | | |
|---|--|----|
| 1.0 | General Product Description | 4 |
| 1.1 | Test Voltage & Frequency | 6 |
| 1.2 | Variant Model Differences..... | 6 |
| 1.3 | Device Modifications..... | 6 |
| 1.4 | Equipment Under Test..... | 6 |
| 1.5 | Support Equipments..... | 6 |
| 1.6 | External I/O Cabling..... | 7 |
| 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..... | 12 |
| 2.2 | Conducted Emissions at Telecommunication Ports | 13 |
| 2.3 | Radiated Electric Field Emissions(Below 1 GHz) | 14 |
| 2.4 | Radiated Electric Field Emissions(Above 1 GHz)..... | 15 |
| 2.5 | Harmonic Current Emissions..... | 16 |
| 2.6 | Voltage Fluctuations and Flicker | 17 |
| 3.0 | Criteria for compliance..... | 18 |
| 3.1 | Electrostatic Discharge..... | 20 |
| 3.2 | Radiated Electric Field Immunity | 23 |
| 3.3 | Electrical Fast Transients/Bursts | 26 |
| 3.4 | Surge Transients..... | 28 |
| 3.5 | Conducted Disturbance | 31 |
| 3.6 | Voltage Dips and Short Interruptions | 33 |
| APPENDIX A – TEST DATA..... | | 35 |
| Conducted Emissions at Mains Power Ports..... | | 35 |
| Conducted Emissions at Telecommunication Ports | | 37 |
| Radiated Electric Field Emissions(Below 1 GHz) | | 39 |
| Radiated Electric Field Emissions(Above 1 GHz)..... | | 40 |
| Harmonic Current Emissions and Voltage Fluctuations and Flicker | | 41 |
| Test Setup Photos and Configuration | | 44 |
| Conducted Voltage Emissions | | 44 |
| Conducted Telecommunication Emissions | | 45 |
| Radiated Electric Field Emissions(Below 1 GHz) | | 46 |
| Radiated Electric Field Emissions(Above 1 GHz)..... | | 47 |
| Harmonic Current Emissions and Voltage Fluctuations and Flicker | | 48 |
| Electrostatic Discharge | | 49 |
| Radiated Electric Field Immunity | | 49 |
| Electrical Fast Transients/Bursts..... | | 50 |
| Surge Transients..... | | 50 |
| Conducted Disturbance..... | | 51 |
| Voltage Dips and Short Interruptions..... | | 51 |
| EUT External Photographs..... | | 52 |
| EUT Internal Photographs | | 53 |

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 shchoi@kes.co.kr



1.0 General Product Description

Main Specifications of EUT are:

| | |
|-----------------------------|--|
| Video | |
| Imaging Device | 1/2.8" 5MP CMOS |
| Effective Pixels | 2592(H)x1944(V) |
| NETD | None |
| Pixel Size | None |
| Min. Illumination | Color: 0.2Lux(F2.0, 1/30sec) (TBD) BW: 0Lux(IR LED on) |
| Video Out | CVBS: 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P) for installation |
| Lens | |
| Focal Length (Zoom Ratio) | 6.0mm fixed focal |
| Max. Aperture Ratio | F2.0 |
| Angular Field of View | H: 49.4° / V: 37.4° / D: 61.0° |
| Min. Object Distance | None |
| Focus Control | Fixed |
| Lens Type | None |
| Mount Type | None |
| Optional Lens | None |
| Pan / Tilt / Rotate | |
| Pan / Tilt / Rotate Range | None |
| Pan Range | None |
| Pan Speed | None |
| Tilt Range | None |
| Tilt Speed | None |
| Rotate Range | None |
| Sequence | None |
| Preset Accuracy | None |
| Azimuth | None |
| Auto Tracking | None |
| Operational | |
| IR Viewable Length | 30m(98.42ft) |
| Camera Title | Displayed up to 85 characters |
| Day & Night | Auto(ICR) |
| Backlight Compensation | BLC, WDR, SSSDR |
| Wide Dynamic Range | 120dB |
| Digital Noise Reduction | SSNR |
| Digital Image Stabilization | None |
| Defog | None |
| Motion Detection | 4ea, polygonal zones |
| Privacy Masking | 6ea, rectangular zones |
| Gain Control | Low / Middle / High |
| White Balance | ATW / AWC / Manual / Indoor / Outdoor |
| LDC | Support |
| Electronic Shutter Speed | Minimum / Maximum / Anti flicker (1/5~1/12,000sec) |
| Digital PTZ | None |
| Video Rotation | Flip, Mirror, Hallway view(90°/270°) |
| Analytics | Defocus detection, Directional detection, Motion detection, Enter/Exit, Tampering, Virtual line |
| Business Intelligence | None |
| Serial Interface | None |
| Alarm I/O | Input 1ea / Output 1ea |
| Alarm Triggers | Analytics, Network disconnect, Alarm input |
| Alarm Events | File upload via FTP and e-mail Notification via e-mail SD/SDHC/SDXC or NAS recording at event triggers Alarm output |
| Audio In | None |
| Audio Out | None |

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@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-E1-19T0227

Page (5) of (58)

| | |
|-----------------------------------|---|
| IR Illuminator (Optional) | None |
| Wiper | None |
| Coaxial Protocol | None |
| Video Transmission Distance | None |
| Radiometry | |
| Temperature detect range | None |
| Temperature accuracy | None |
| Temperature detection | None |
| Additional | None |
| Network | |
| Ethernet | RJ-45(10/100BASE-T) |
| Video Compression | H.265/H.264: Main/High, MJPEG |
| Resolution | 2592x1944, 2592x1464, 2560x1920, 2560x1440, 1920 x 1080, 1280 x 960, 1280 x 720, 800 x 600, 800 x 448, 720 x 576, 720 x 480, 640 x 480, 640 x 360 |
| Max. Framerate | H.265/H.264: Max. 30fps/25fps(60Hz/50Hz) MJPEG: Max. 15fps/12fps(60Hz/50Hz) |
| Smart Codec | WiseStreamII |
| Video Quality Adjustment | H.264/H.265: Target bitrate level control MJPEG: Quality level control |
| Bitrate Control | H.264/H.265: CBR or VBR MJPEG: VBR |
| Streaming | Unicast(6 users) / Multicast Multiple streaming (Up to 3 profiles) |
| Audio Compression | None |
| Protocol | IPv4, IPv6, TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP, RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, UPnP, Bonjour, LLDP |
| Security | HTTPS(SSL) Login Authentication Digest Login Authentication IP Address Filtering User access log 802.1X Authentication(EAP-TLS, EAP-LEAP) Device Certificate(Hanwha Techwin Root CA) |
| Edge Storage | Micro SD/SDHC/SDXC 1slot 256GB (TBD) |
| Application Programming Interface | ONVIF Profile S/G/T SUNAPI(HTTP API) Wisenet open platform |
| Webpage Language | English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Swedish, Portuguese, Czech, Polish, Turkish, Dutch |
| Web Viewer | Supported OS: Windows 7, 8.1, 10, Mac OS X 10.10, 10.11, 10.12 Recommended Browser: Google Chrome Supported Browser: MS Explore11, MS Edge, Mozilla Firefox(Window 64bit only), Apple Safari(Mac OS X only) |
| Memory | 512MB RAM, 256MB Flash |
| Environmental | |
| Operating Temperature / Humidity | -30°C ~ +55°C (-22°F ~ +131°F) / Less than 90% RH |
| Storage Temperature / Humidity | -30°C ~ +60°C (-22°F ~ +140°F) / Less than 90% RH |
| Certification | IP66, IK10 |
| Electrical | |
| Input Voltage | PoE(IEEE802.3af, Class3) |
| Power Consumption | TBD |
| Mechanical | |
| Color / Material | Dark grey / Aluminum |
| RAL Code | None |
| Product dimensions / weight | Ø70.0x246.0mm(Ø4.33x3.39"), TBD |
| Conduit hole | |
| Hanging mount(Dome) | |
| Skin cover(Dome) | |
| Weather cap(Dome) | |
| Power module | |
| Backbox | |

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 shchoi@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.

Voltage 230Vac 100 Vac 24 Vac 12 Vdc PoE
Frequency 50 Hz 60 Hz Hz

1.2 Variant Model Differences

- Add models for vendor-specific management models

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

| Description | Model Number | Serial Number | Manufacturer | Remarks |
|----------------|--------------|---------------|-----------------------------------|---------|
| Network Camera | QNO-8030R | - | Hanwha Techwin (Tianjin) Co.,Ltd. | EUT |

1.5 Support Equipments

| Description | Model Number | Serial Number | Manufacturer | Remarks |
|------------------|--------------|-----------------|-------------------------------|---------|
| PoE Adapter | POE36U-1AT-R | - | PHIHONG | - |
| Notebook | NT730U3E | JJRE91CF200065A | Samsung Electronics Co., Ltd. | - |
| Notebook Adapter | PA-1600-66 | AD-6019P | LITEON | - |
| Micro SD Card | - | - | SanDisk | - |
| Alarm | - | - | - | - |

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 shchoi@kes.co.kr



1.6 External I/O Cabling

| Start | | END | | Cable Spec. | |
|----------------------|--------------|---------------|--------------|-------------|--------|
| Description | I/O Port | Description | I/O Port | Length | Shield |
| Network Camera (EUT) | RJ-45 (PoE) | PoE Adapter | RJ-45 (PoE) | 3.0 | U |
| | SLOT | Micro SD Card | SLOT | - | - |
| | Alarm IN | Alarm | Alarm OUT | 3.0 | U |
| PoE Adapter | RJ-45 (DATA) | Notebook | RJ-45 (DATA) | 3.0 | U |

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

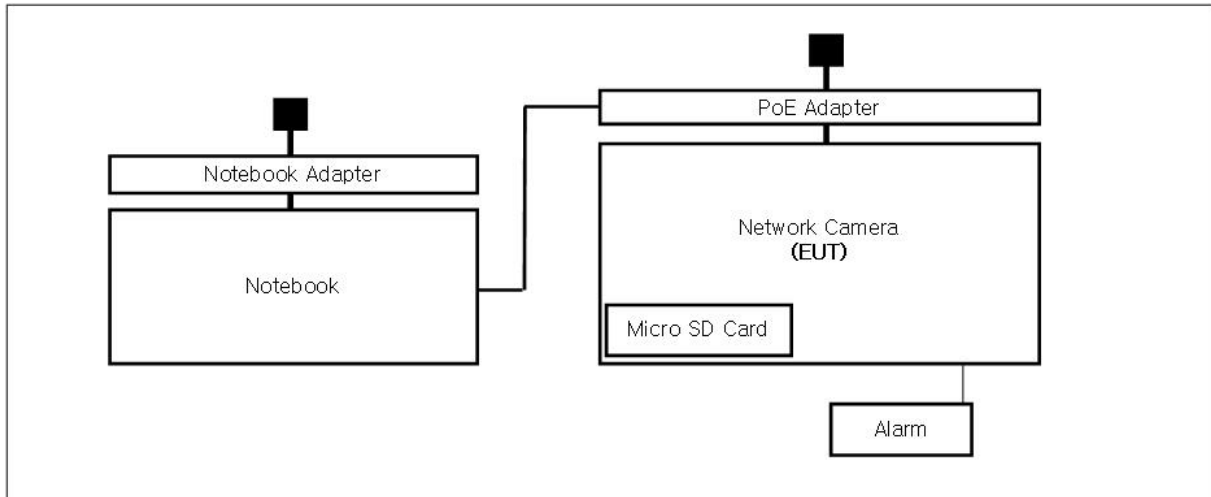
| Test Mode | operating |
|-----------|---------------------------|
| PoE | EUT Monitoring, Ping Test |

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

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

1.8 Configuration

■ AC Main
□ DC Main



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 shchoi@kes.co.kr

1.9 Remarks when standards applied

N/A







1.10 Calibration Details of Equipment Used for Measurement

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

1.11 Test Facility

The measurement facility is located at 473-21 Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4:2014 and CISPR 16-1-4:2012

1.12 Laboratory Accreditations and Listings

| Country | Agency | Scope of Accreditation | Logo |
|---------------|----------------|--|---|
| KOREA | RRA | EMI (3 m & 10 m Semi-Anechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) |  KR0100 |
| International | KOLAS | EMI (3 m & 10 m Semi-Anechoic Chamber , and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) |  KT489 |
| USA | FCC | 3 m & 10 m Semi-Anechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements. |  KR0100 |
| Canada | ISED | 3 m & 10 m Semi-Anechoic Chamber and Conducted test site |  23298-1 |
| JAPAN | VCCI | Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz |  R-4308, C-4798, T-2311, G-914 |
| Europe | TÜV SÜD | EMI (3 m & 10 m Semi-Anechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) |  CARAT 17 07 01633 001 |

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 shchoi@kes.co.kr

2.0 Test Regulations

The emissions tests were performed according to following regulations:

EMC – Directive 2014/30/EU

EN 61000-6-3:2011

EN 61000-6-1:2007

EN 61000-6-4:2007 +A1:2011

EN 61000-6-2:2005

EN 55011:2007 +A1:2010

Group 1
 Class A

Group 2
 Class B

EN 55014-1:2006 +A2:2011

EN 55014-2:1997 +A2:2008

EN 55015:2013

EN 61547:2009

EN 55032:2012/AC:2013

Class A

Class B

EN 55024:2010 +A1:2015

EN 50130-4:2011

EN 61000-3-2:2014

EN 61000-3-3:2013

EN 61326-1:2013



-
- | | | |
|---|----------------------------------|----------------------------------|
| <input type="checkbox"/> VCCI-CISPR 32:2016 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> AS/NZS CISPR32:2015 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> 47 CFR Part 15, Subpart B | | |
| <input type="checkbox"/> CISPR 22:2009 +A1:2010 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2014 | | |
| <input type="checkbox"/> IC Regulation ICES-003 : 2016 | | |
| <input type="checkbox"/> CAN/CSA CISPR 22-10 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2014 | | |
| <input type="checkbox"/> RE- Directive 2014/53/EU | | |
| <input type="checkbox"/> EN 301 489-1 V1.9.2 | | |
| <input type="checkbox"/> Equipment for fixed use | | |
| <input type="checkbox"/> Equipment for vehicular use | | |
| <input type="checkbox"/> Equipment for portable use | | |
| <input type="checkbox"/> EN 301 489-3 V1.6.1 | | |
| <input type="checkbox"/> EN 301 489-17 V2.2.1 | | |
| <input type="checkbox"/> EN 60945:2002 | | |

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 shchoi@kes.co.kr



2.1 Conducted Emissions at Mains Power Ports

Test Date

N/A

Test Location

Electro wave Shieldroom #6

Test Equipment

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|--------------------------|-------------------|--------------|--------------|---------------|--------------|
| <input type="checkbox"/> | EMI Test S/W | EMC32 | R & S | 9.12.00 | - |
| <input type="checkbox"/> | EMI TEST RECEIVER | ESR3 | R & S | 101781 | 04, 25, 2019 |
| <input type="checkbox"/> | LISN | ENV216 | R & S | 101787 | 01, 04, 2020 |
| <input type="checkbox"/> | LISN | ESH2-Z5 | R & S | 100450 | 04, 25, 2019 |

Test Conditions

Temperature: °C
Relative Humidity: % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- PASS
- NOT PASS
- NOT APPLICABLE

Remarks

It is not tested apply because it is powered by PoE.

2.2 Conducted Emissions at Telecommunication Ports

Test Date

Apr. 10, 2019

Test Location

Electro wave Shieldroom #6

Test Equipment

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|-------------------------------------|-------------------|--------------|--------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test S/W | EMC32 | R & S | 9.12.00 | - |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER | ESR3 | R & S | 101781 | 04, 25, 2019 |
| <input checked="" type="checkbox"/> | LISN | ENV216 | R & S | 101787 | 01, 04, 2020 |
| <input checked="" type="checkbox"/> | LISN | ESH2-Z5 | R & S | 100450 | 04, 25, 2019 |
| <input checked="" type="checkbox"/> | PULSE LIMITER | ESH3-Z2 | R & S | 101915 | 11, 26, 2019 |
| <input checked="" type="checkbox"/> | 8-WIRE ISN CAT3,5 | ENY81 | R & S | 100174 | 01, 07, 2020 |
| <input type="checkbox"/> | 8-WIRE ISN CAT6 | ENY81-CAT6 | R & S | 101665 | 01, 07, 2020 |

Test Conditions

Temperature: 22,6 °C
Relative Humidity: 41,5 % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- PASS
- NOT PASS
- NOT APPLICABLE

Remarks

See Appendix A for test data.

2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Apr. 10, 2019

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 | 100552 | 04, 18, 2019 |
| <input checked="" type="checkbox"/> | AMPLIFIER | SCU 01 | R & S | 100603 | 11, 26, 2019 |
| <input checked="" type="checkbox"/> | TRILOG-BROADBAND ANTENNA | VULB9163 | Schwarzbeck | 715 | 11, 29, 2020 |
| <input checked="" type="checkbox"/> | ATTENUATOR | 8491A | HP | 32173 | 03, 11, 2020 |

Test ConditionsTemperature: 23,3 °C
Relative Humidity: 43,1 % R.H.**Frequency Range of Measurement**

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

- PASS
 NOT PASS
 NOT APPLICABLE

RemarksSee Appendix A for test data.

2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Apr. 10, 2019

Test Location

SEMI ANECHOIC CHAMBER #3

Test Equipment

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|-------------------------------------|----------------------------|--------------|------------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test S/W | EP5/RE | TOYO Corporation | 6.0.0 | - |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER | ESR7 | R & S | 101190 | 08, 06, 2019 |
| <input checked="" type="checkbox"/> | PREAMPLIFIER | 8449B | AGILENT | 3008A01967 | 05, 31, 2019 |
| <input type="checkbox"/> | ATTENUATOR | 8491A | HP | 35496 | 03, 11, 2020 |
| <input checked="" type="checkbox"/> | DOUBLE RIDGED HORN ANTENNA | SAS-571 | A.H.SYSTEM,INC | 781 | 03, 12, 2021 |

Test Conditions

Temperature: 22,8 °C
Relative Humidity: 41,1 % R.H.

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- PASS
- NOT PASS
- NOT APPLICABLE

Remarks

See Appendix A for test data.



2.5 Harmonic Current Emissions

Test Date

N/A

Test Location

Electro wave Shieldroom #3

Test Equipment

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|--------------------------|------------------------|--------------|--------------|---------------|--------------|
| <input type="checkbox"/> | EMI Test S/W | dpa.control | EM TEST | 5.4.11.0 | - |
| <input type="checkbox"/> | DIGITAL POWER ANALYZER | DPA 500N | EM TEST | V1024106759 | 08, 08, 2019 |
| <input type="checkbox"/> | POWER SOURCE | ACS 500N6 | EM TEST | V1024106760 | - |

Test Conditions

Temperature: °C
Relative Humidity: % R.H.

Classification of Equipment for Harmonic Current Emissions

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

Test Results

The requirements are:

- PASS
- NOT PASS
- NOT APPLICABLE

Remarks

It is not tested apply because it is powered by PoE.



2.6 Voltage Fluctuations and Flicker

Test Date

N/A

Test Location

Electro wave Shieldroom #3

Test Equipment

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|--------------------------|------------------------|--------------|--------------|---------------|--------------|
| <input type="checkbox"/> | EMI Test S/W | dpa.control | EM TEST | 5.4.11.0 | - |
| <input type="checkbox"/> | DIGITAL POWER ANALYZER | DPA 500N | EM TEST | V1024106759 | 08, 08, 2019 |
| <input type="checkbox"/> | POWER SOURCE | ACS 500N6 | EM TEST | V1024106760 | - |

Test Conditions

Temperature: °C
Relative Humidity: % R.H.

Test Results

The requirements are:

- PASS
- NOT PASS
- NOT APPLICABLE

Remarks

It is not tested apply because it is powered by PoE.

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:
EN 50130-4:2011+A1:2014 Alarm systems-Part 4: Electromagnetic compatibility Product family standard: Immunity requirements for components of fire, intruder and social alarm systems

The variety and the diversity of the apparatus within the scope of this document makes it

difficult to define precise criteria for the evaluation of the immunity test results.

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

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

report, based on the following criteria:

Electrostatic discharge

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

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

Radiated electromagnetic fields

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

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

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

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

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

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

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

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

Fast transient burst / slow high energy voltage surge

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of discharge is permissible, providing
That there is no residual is permissible, providing that there is no residual change in the EUT or
any
change in outputs, which could be interpreted by associated equipment as a change.

Conducted RF immunity

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of discharge is permissible, providing
That there is no residual is permissible, providing that there is no residual change in the EUT or
any
change in outputs, which could be interpreted by associated equipment as a change,
and no such flickering of indicators oeuvres at $U = 130 \text{ dB}\mu\text{V}$.

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

- (a) there is no permanent damage or change to the EUT
(e.g. no corruption of memory or changes to programmable settings etc.)
- (b) at $U = 130 \text{ dB}\mu\text{V}$, any deterioration of the picture is so minor that the system could
still be used; and
- (c) there in no observable deterioration of the picture at $U = 120 \text{ dB}\mu\text{V}$.

Voltage dip/interruption / Voltage variation

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the conditioning is permissible, providing that there is no
residual
change in the EUT or any change in outputs, which could be interpreted by associated
equipment
as a change. The EUT shall meet the acceptance criteria for the functional test, after the
conditioning.

3.1 Electrostatic Discharge

Reference Standard

EN 61000-4-2:2009

Test Date

Apr. 12, 2019

Test Location

EMS-ESD: Electro wave Shieldroom #7

Test Equipment

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|-------------------------------------|---------------|--------------|--------------|---------------|--------------|
| <input checked="" type="checkbox"/> | ESD SIMULATOR | ESS-2000 | Noise Ken | ESS01Z0454 | 10, 11, 2019 |
| <input checked="" type="checkbox"/> | HCP | - | KES | - | - |
| <input checked="" type="checkbox"/> | VCP | - | KES | - | - |

Test Conditions

Temperature: 22,1 °C
Relative Humidity: 44,6 % R.H.
Atmospheric Pressure: 100,6 kPa

Test Specifications

Discharge Factor: ≥ 1 s

Discharge Impedance: 330 ohm / 150 pF

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

Polarity: Positive and Negative

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

| | | | | |
|--------------------|--|--|--|--|
| Discharge Voltage: | Contact | Air | HCP | VCP |
| | <input type="checkbox"/> 2 kV | <input checked="" type="checkbox"/> 2 kV | <input type="checkbox"/> 2 kV | <input type="checkbox"/> 2 kV |
| | <input type="checkbox"/> 4 kV | <input checked="" type="checkbox"/> 4 kV | <input type="checkbox"/> 4 kV | <input type="checkbox"/> 4 kV |
| | <input checked="" type="checkbox"/> 6 kV | <input type="checkbox"/> 6 kV | <input checked="" type="checkbox"/> 6 kV | <input checked="" type="checkbox"/> 6 kV |
| | <input type="checkbox"/> 8 kV | <input checked="" type="checkbox"/> 8 kV | <input type="checkbox"/> 8 kV | <input type="checkbox"/> 8 kV |
| | <input type="checkbox"/> 15 kV | <input type="checkbox"/> 15 kV | <input type="checkbox"/> 15 kV | <input type="checkbox"/> 15 kV |

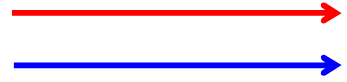
Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

Required Performance Criteria: Complied

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 shchoi@kes.co.kr

Location of Discharge:

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



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 shchoi@kes.co.kr



Test Data

Indirect Discharge

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

Direct Discharge

| No. | Test Point | Discharge Method | Observations | Remarks |
|-----|------------|-------------------|--------------|---------|
| 1 | Lens | Air Discharge | Complied | - |
| 2 | Enclosure | Contact Discharge | Complied | - |
| 3 | Screw | Contact Discharge | Complied | - |

Note: "Blank" = Not performed

Observations:
Complied – No degradation of function

Test Results

- PASS Required Performance Criteria
- NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria

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 shchoi@kes.co.kr

3.2 Radiated Electric Field Immunity

Reference Standard

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

Test Date

Apr. 11, 2019

Test Location

EMS-RS: SEMI ANECHOIC CHAMBER #2 SEMI ANECHOIC CHAMBER #3

Test Equipment

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|-------------------------------------|---------------------------------|--------------|-----------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMS Test S/W | EMC32 | R & S | 10.10.02 | 08, 06, 2019 |
| <input checked="" type="checkbox"/> | SIGNAL GENERATOR | SMB 100A | R & S | 177586 | 08, 06, 2019 |
| <input checked="" type="checkbox"/> | BROADBAND AMPLIFIER | BBA100 | R & S | 101239 | 08, 06, 2019 |
| <input checked="" type="checkbox"/> | POWER METER | NRP2 | R & S | 103475 | 08, 06, 2019 |
| <input checked="" type="checkbox"/> | AVG POWER SENSOR | NRP-Z91 | R & S | 102526 | 08, 06, 2019 |
| <input checked="" type="checkbox"/> | AVG POWER SENSOR | NRP-Z91 | R & S | 102527 | 08, 06, 2019 |
| <input checked="" type="checkbox"/> | STACKED DOUBLE LOG-PER- ANTENNA | STPL9128 E | Schwarzbeck | 9128ES-121 | - |
| <input checked="" type="checkbox"/> | DOUBLE RIDGED HORN ANTENNA | SAS-571 | A.H.SYSTEM,IN C | 781 | - |
| <input checked="" type="checkbox"/> | SIGNAL GENERATOR | SMB 100A | Rohde & Schwarz | 108252 | 08, 06, 2019 |
| <input checked="" type="checkbox"/> | HIGH POWER DUAL AMP | SSA532 | SUNGSAN | SSA532-001 | 05, 18, 2019 |
| <input checked="" type="checkbox"/> | POWER METER | E4419B | Agilent | GB40203000 | 05, 18, 2019 |
| <input checked="" type="checkbox"/> | CW POWER SENSOR | E4412A | Agilent | US38488240 | 05, 18, 2019 |
| <input checked="" type="checkbox"/> | CW POWER SENSOR | E4412A | Agilent | MY41501662 | 05, 18, 2019 |

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 shchoi@kes.co.kr



Test Conditions

Temperature: 22,2 °C
Relative Humidity: 41,8 % R.H.
Atmospheric Pressure: 100,5 kPa

Test Specifications

Antenna Polarization: Horizontal & vertical unless indicated otherwise

Antenna Distance: 3 m

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

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

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

Frequency step: 1 % step

Dwell Time: 1 s 3 s

of Sides Radiated: 4

Required Performance Criteria: Complied



Test Data

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

Note: "Blank" = Not performed

Observations:
Complied – No degradation of function

Test Results

- PASS Required Performance Criteria
- NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria

3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Apr. 12, 2019

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|-------------------------------------|---------------------------|--------------|--------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMS Test S/W | iec.control | EM TEST | 5.4.7 | - |
| <input checked="" type="checkbox"/> | ULTRA COMPACT SIMULATOR | UCS 500N7 | EM TEST | P1608172950 | 11, 27, 2019 |
| <input checked="" type="checkbox"/> | MOTOR VARIAC | MV2616 | EM TEST | P1552169719 | 11, 27, 2019 |
| <input checked="" type="checkbox"/> | CAPACITIVE COUPLING CLAMP | HFK | EM TEST | P1633183115 | 11, 26, 2019 |

Test Conditions

Temperature: 22,1 °C
Relative Humidity: 44,6 % R.H.
Atmospheric Pressure: 100,6 kPa

Test Specifications

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

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

Burst Period: 300 ms 2 s

Repetition Rate: 5 kHz 100 kHz

Duration of Test Voltage: ≥ 1 min

Required Performance Criteria: Complied

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 shchoi@kes.co.kr

Test Data

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

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

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

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

Signal ports and telecommunication ports – Coupling Clamp used

| Mode of Application | Observations | |
|---------------------|----------------|----------------|
| | (+) Burst (kV) | (-) Burst (kV) |
| RJ-45 (PoE) | Complied | Complied |
| Alarm | Complied | Complied |

Note: “Blank” = Not performed

Observations:

Complied – No degradation of function

Test Results

PASS Required Performance Criteria

NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria



3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

Test Date

N/A

Test Location

EMS-Surge: Electro wave Shieldroom #7

Test Equipment

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|--------------------------|-------------------------|--------------|--------------|---------------|--------------|
| <input type="checkbox"/> | EMS Test S/W | iec.control | EM TEST | 5.4.7 | - |
| <input type="checkbox"/> | ULTRA COMPACT SIMULATOR | UCS 500N7 | EM TEST | P1608172950 | 11, 26, 2019 |
| <input type="checkbox"/> | MOTOR VARIAC | MV2616 | EM TEST | P1552169719 | 11, 27, 2019 |
| <input type="checkbox"/> | CDN | CNV 508N1 | EM TEST | P1610176296 | 11, 28, 2019 |

Test Conditions

Temperature: °C
Relative Humidity: % R.H.
Atmospheric Pressure: kPa

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 shchoi@kes.co.kr



Test Specifications

AC Power Lines

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

Surge Amplitude : Common Mode
 (0,5 / 1,0 / 2,0) kV
Differential Mode
 (0,5 / 1,0) kV

Number of Surges: 5 surges per angle

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

Polarity: Positive & Negative

Repetition Rate: 1 surge per min 1 surge per 30 sec.

Required Performance Criteria: Complied

Other supply / Signal Lines

Source Impedance: 42 ohm for common Mode

Surge Amplitude: Common Mode
 (0,5 / 1,0) kV

Number of Surges: 5 Surges

Polarity: Positive & Negative

Repetition Rate: 1 surge per min 1 surge per 30 sec.

Required Performance Criteria: Complied



Test Data

Line to Line – Differential Mode

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

Line to Earth – Common Mode

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

Signal Lines

Line to Earth – Common Mode

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

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

- PASS Required Performance Criteria
- NOT PASS Required Performance Criteria

Remarks

It is not tested apply because it is powered by PoE.

3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Apr. 12, 2019

Test Location

EMS-CS: Electro wave Shieldroom #6

Test Equipment

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|-------------------------------------|---------------------------|--------------|--------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMS Test S/W | icd.control | EM TEST | 5.3.11 | - |
| <input checked="" type="checkbox"/> | CONTINUOUS WAVE SIMULATOR | CWS 500N1.4 | EM TEST | P1602169880 | 11, 26, 2019 |
| <input checked="" type="checkbox"/> | ATTENUATOR | ATT 6/80 | EM TEST | P1614178148 | 11, 26, 2019 |
| <input checked="" type="checkbox"/> | CDN | CDN M016 | TESEQ | 43694 | 11, 26, 2019 |
| <input type="checkbox"/> | CDN | CDN M016 | TESEQ | 43697 | 11, 26, 2019 |
| <input checked="" type="checkbox"/> | CDN | CDN T800 | TESEQ | 42800 | 11, 26, 2019 |
| <input checked="" type="checkbox"/> | EM CLAMP | KEMZ 801A | TESEQ | 44099 | 11, 27, 2019 |

Test Conditions

Temperature: 22,2 °C
Relative Humidity: 44,1 % R.H.
Atmospheric Pressure: 100,8 kPa

Test Specifications

Frequency range: 150 kHz to 100 MHz 150 kHz to 80 MHz

Voltage Level: 1 Vrms 3 Vrms
 10 Vrms

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

Frequency step: 1 % step

Dwell Time: 1 s 3 s

Required Performance Criteria: Complied

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 shchoi@kes.co.kr



Test Data

Input a.c. power ports

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

Input d.c. power ports

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

Signal ports and telecommunication ports

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

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

Observations:
Complied – No degradation of function

Test Results

- PASS Required Performance Criteria
- NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria



3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004

Test Date

N/A

Test Location

EMS-Voltage dip: Electro wave Shieldroom #7

Test Equipment

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|--------------------------|-------------------------|--------------|--------------|---------------|--------------|
| <input type="checkbox"/> | EMS Test S/W | iec.control | EM TEST | 5.4.7 | - |
| <input type="checkbox"/> | ULTRA COMPACT SIMULATOR | UCS 500N7 | EM TEST | P1608172950 | 11, 27, 2019 |
| <input type="checkbox"/> | MOTOR VARIAC | MV2616 | EM TEST | P1552169719 | 11, 27, 2019 |

Test Conditions

Temperature: °C
Relative Humidity: % R.H.
Atmospheric Pressure: kPa

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 shchoi@kes.co.kr



Test Specifications & Observations/Remarks

(Test Voltage :)

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

- Voltage variations

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

Observations:

Complied – No degradation of function

Test Results

- PASS Required Performance Criteria
- NOT PASS Required Performance Criteria
- NOT APPLICABLE

Remarks

It is not tested apply because it is powered by PoE.



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-E1-19T0227
Page (35) of (58)

APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

N/A

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 shchoi@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-E1-19T0227
Page (36) of (58)

[NEUTRAL]

N/A

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

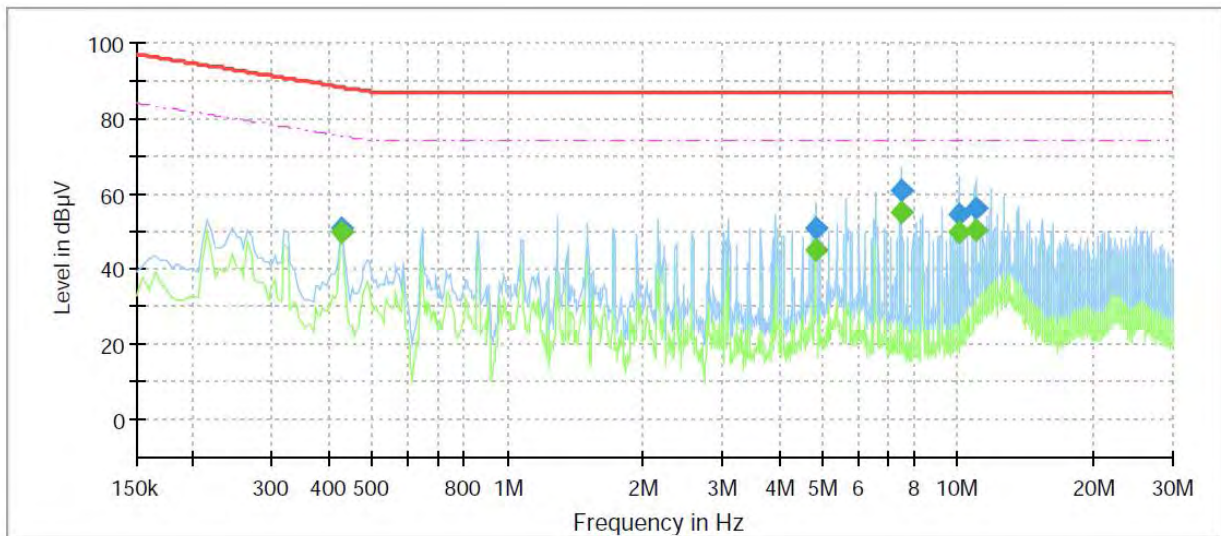
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

Conducted Emissions at Telecommunication Ports

[10 Mbps]

Common Information

| | |
|-------------------|----------------------------|
| Test Description: | Telecommunication Emission |
| Model No.: | QNO-8030R |
| Mode | 10 Mbps |
| Operator Name: | KES |



Final Result

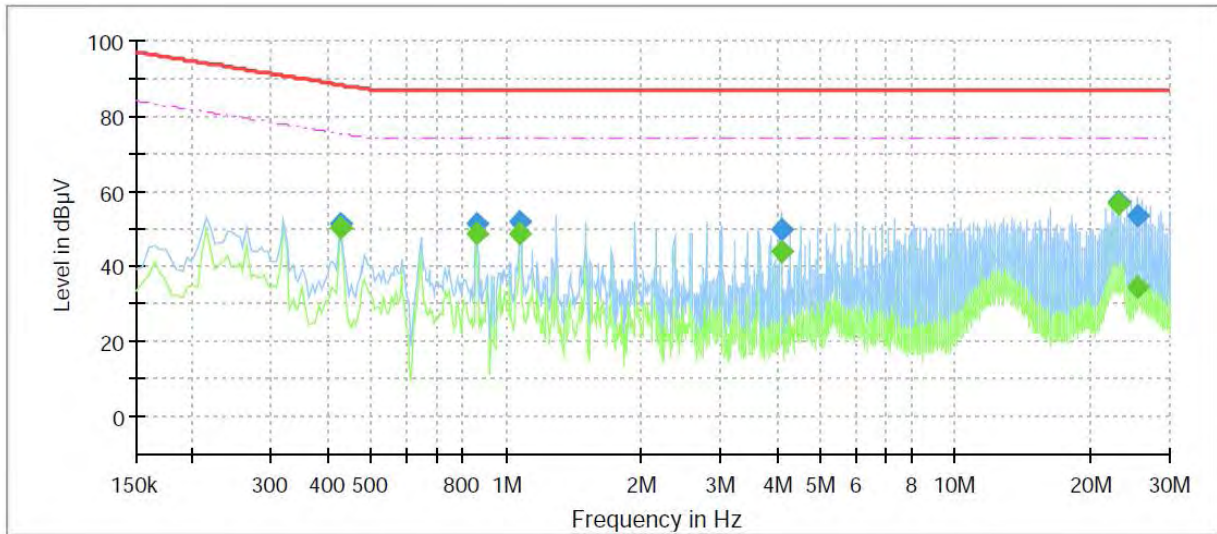
| Frequency (MHz) | QuasiPeak (dBµV) | CAverage (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|-------------|------------|
| 0.430000 | 50.68 | --- | 88.25 | 37.57 | 1000.0 | 9.000 | Single Line | 19.8 |
| 0.430000 | --- | 49.75 | 75.25 | 25.50 | 1000.0 | 9.000 | Single Line | 19.8 |
| 4.835000 | 51.05 | --- | 87.00 | 35.95 | 1000.0 | 9.000 | Single Line | 19.7 |
| 4.835000 | --- | 45.18 | 74.00 | 28.82 | 1000.0 | 9.000 | Single Line | 19.7 |
| 7.495000 | 60.72 | --- | 87.00 | 26.28 | 1000.0 | 9.000 | Single Line | 19.8 |
| 7.495000 | --- | 54.88 | 74.00 | 19.12 | 1000.0 | 9.000 | Single Line | 19.8 |
| 10.110000 | 54.67 | --- | 87.00 | 32.33 | 1000.0 | 9.000 | Single Line | 19.9 |
| 10.110000 | --- | 49.79 | 74.00 | 24.21 | 1000.0 | 9.000 | Single Line | 19.9 |
| 10.925000 | --- | 50.52 | 74.00 | 23.48 | 1000.0 | 9.000 | Single Line | 19.9 |
| 10.925000 | 56.31 | --- | 87.00 | 30.69 | 1000.0 | 9.000 | Single Line | 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 shchoi@kes.co.kr

[100 Mbps]

Common Information

| | |
|-------------------|----------------------------|
| Test Description: | Telecommunication Emission |
| Model No.: | QNO-8030R |
| Mode | 100 Mbps |
| Operator Name: | KES |



Final Result

| Frequency (MHz) | QuasiPeak (dBµV) | CAverage (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|-------------|------------|
| 0.430000 | --- | 50.15 | 75.25 | 25.10 | 1000.0 | 9.000 | Single Line | 19.7 |
| 0.430000 | 51.21 | --- | 88.25 | 37.04 | 1000.0 | 9.000 | Single Line | 19.7 |
| 0.860000 | --- | 48.70 | 74.00 | 25.30 | 1000.0 | 9.000 | Single Line | 19.6 |
| 0.860000 | 51.22 | --- | 87.00 | 35.78 | 1000.0 | 9.000 | Single Line | 19.6 |
| 1.075000 | --- | 48.95 | 74.00 | 25.05 | 1000.0 | 9.000 | Single Line | 19.6 |
| 1.075000 | 51.62 | --- | 87.00 | 35.38 | 1000.0 | 9.000 | Single Line | 19.6 |
| 4.090000 | --- | 44.16 | 74.00 | 29.84 | 1000.0 | 9.000 | Single Line | 19.6 |
| 4.090000 | 49.98 | --- | 87.00 | 37.02 | 1000.0 | 9.000 | Single Line | 19.6 |
| 23.130000 | --- | 56.66 | 74.00 | 17.34 | 1000.0 | 9.000 | Single Line | 20.3 |
| 23.130000 | 57.24 | --- | 87.00 | 29.76 | 1000.0 | 9.000 | Single Line | 20.3 |
| 25.340000 | --- | 34.37 | 74.00 | 39.63 | 1000.0 | 9.000 | Single Line | 20.3 |
| 25.340000 | 53.34 | --- | 87.00 | 33.66 | 1000.0 | 9.000 | Single Line | 20.3 |

◆ Calculation

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

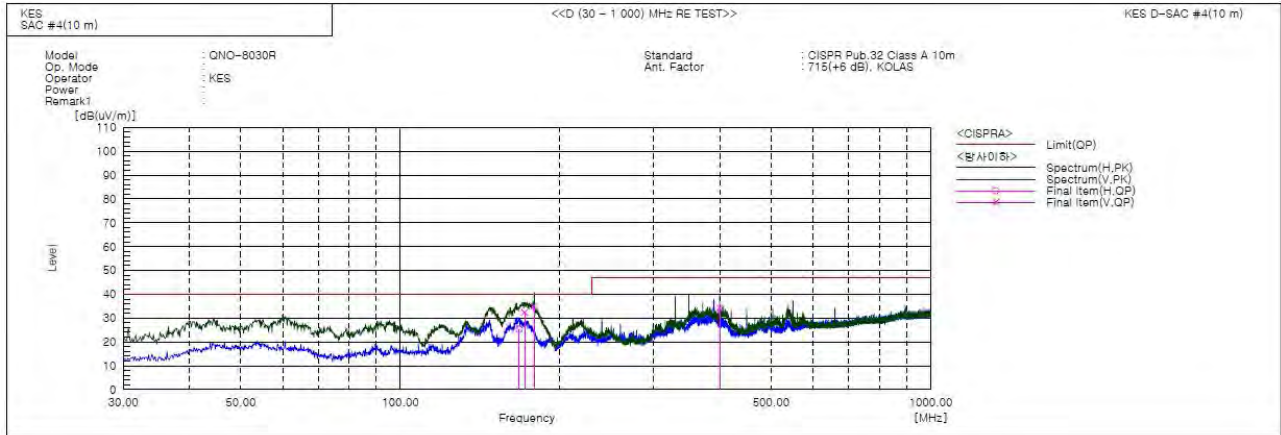
QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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



Radiated Electric Field Emissions(Below 1 GHz)



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 | 167.619 | H | 49.9 | -24.6 | 25.3 | 40.0 | 14.7 | 400.0 | 151.0 | |
| 2 | 171.499 | V | 56.7 | -24.4 | 32.3 | 40.0 | 7.7 | 100.0 | 279.0 | |
| 3 | 178.788 | V | 58.9 | -24.0 | 34.9 | 40.0 | 5.1 | 153.0 | 2.0 | |
| 4 | 400.055 | V | 49.6 | -15.3 | 34.3 | 47.0 | 12.7 | 100.0 | 197.0 | |

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

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

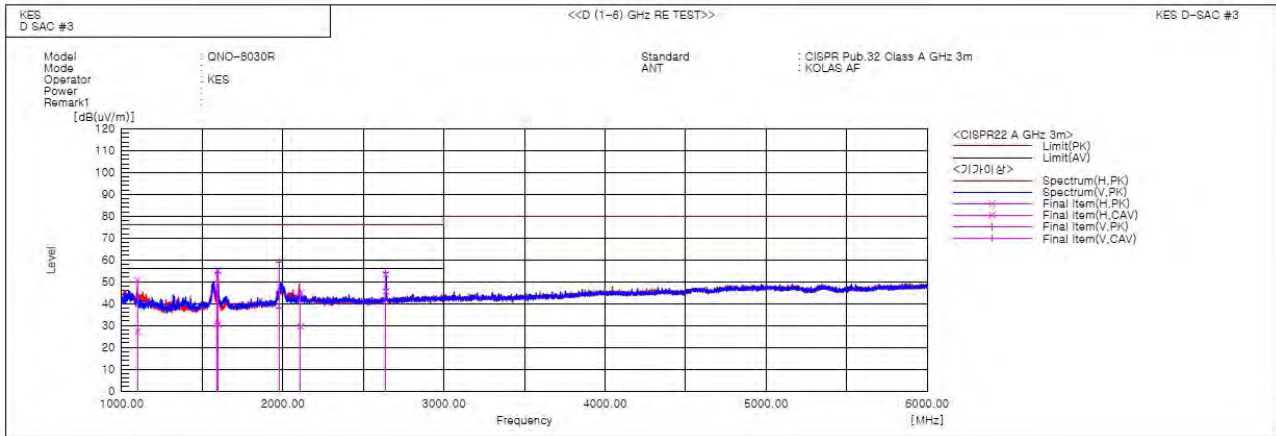
$$\text{Margin(QP)}[\text{dB}] = \text{Limit}[\text{dB}(\mu\text{V}/\text{m})] - \text{Result(QP)} [\text{dB}(\mu\text{V}/\text{m})]$$

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

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 shchoi@kes.co.kr

Radiated Electric Field Emissions(Above 1 GHz)



Final Result

| No. | Frequency (P) [MHz] | 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)] | Margin PK [dB] | Margin CAV [dB] | Height [cm] | Angle [deg] | Remark |
|-----|------------------------|---------------------------|----------------------------|------------------|----------------------------|-----------------------------|---------------------------|----------------------|-----------------------|----------------|----------------|--------|
| 1 | 1100.010 | H 57.6 | 34.0 | -6.9 | 50.7 | 27.1 | 76.0 | 25.3 | 28.9 | 100.0 | 214.9 | |
| 2 | 1594.220 | V 59.3 | 35.9 | -5.0 | 54.3 | 30.9 | 76.0 | 21.7 | 25.1 | 100.0 | 245.9 | |
| 3 | 1597.450 | H 60.1 | 35.7 | -5.0 | 55.1 | 30.7 | 76.0 | 20.9 | 25.3 | 100.0 | 149.6 | |
| 4 | 1980.152 | V 60.9 | 39.8 | -1.8 | 59.1 | 38.0 | 76.0 | 16.9 | 18.0 | 100.0 | 330.5 | |
| 5 | 2109.928 | H 46.3 | 30.8 | -1.3 | 45.0 | 29.5 | 76.0 | 31.0 | 26.5 | 100.0 | 341.2 | |
| 6 | 2640.120 | H 53.0 | 45.3 | 0.3 | 53.3 | 45.6 | 76.0 | 22.7 | 10.4 | 100.0 | 294.4 | |
| 7 | 2640.300 | V 53.7 | 46.2 | 0.3 | 54.0 | 46.5 | 76.0 | 22.0 | 9.5 | 100.0 | 63.2 | |

◆ Calculation

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

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

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

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



Harmonic Current Emissions and Voltage Fluctuations and Flicker

| Average harmonic current results | | | | |
|---|----------------------|------------|-----------|--------|
| Hn | I _{eff} [A] | % of Limit | Limit [A] | Result |
| | | N/A | | |

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

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 shchoi@kes.co.kr



Test Data - Harmonics (continued)

Maximum harmonic current results

| Hn | I _{eff} [A] | % of Limit | Limit [A] | Result |
|-----|----------------------|------------|-----------|--------|
| N/A | | | | |

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

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 shchoi@kes.co.kr



Test Data - Voltage Fluctuations

Maximum Flicker results

| | EUT values | Limit | Result |
|----------|-------------------|--------------|---------------|
| Pst | N/A | | |
| Plt | | | |
| dc [%] | | | |
| dmax [%] | | | |
| Tmax [s] | | | |

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 shchoi@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-E1-19T0227
Page (44) of (58)

Test Setup Photos and Configuration

Conducted Voltage Emissions

N/A

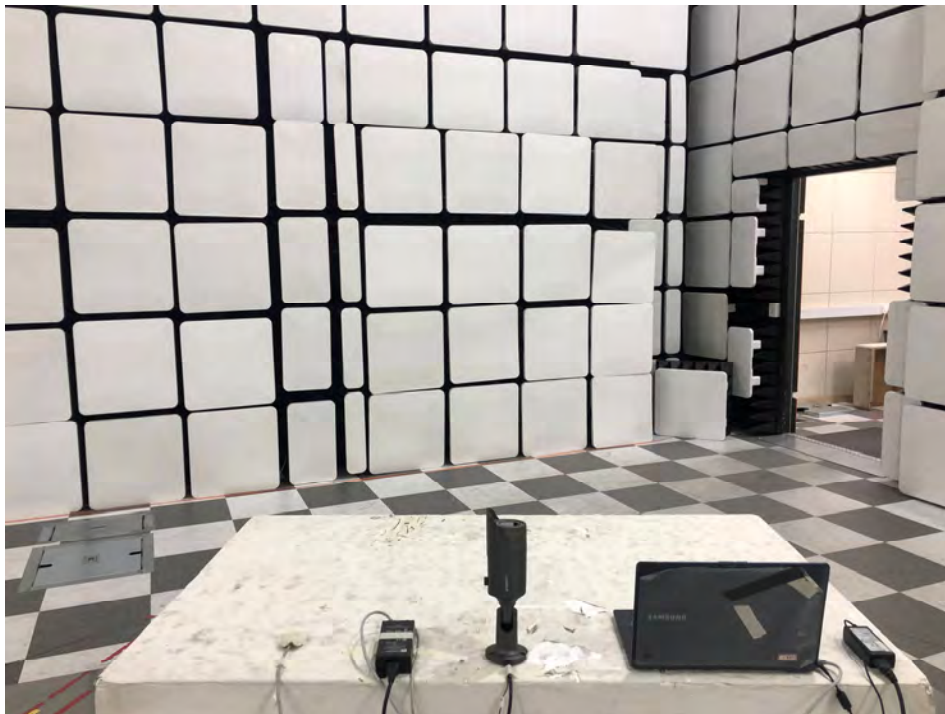
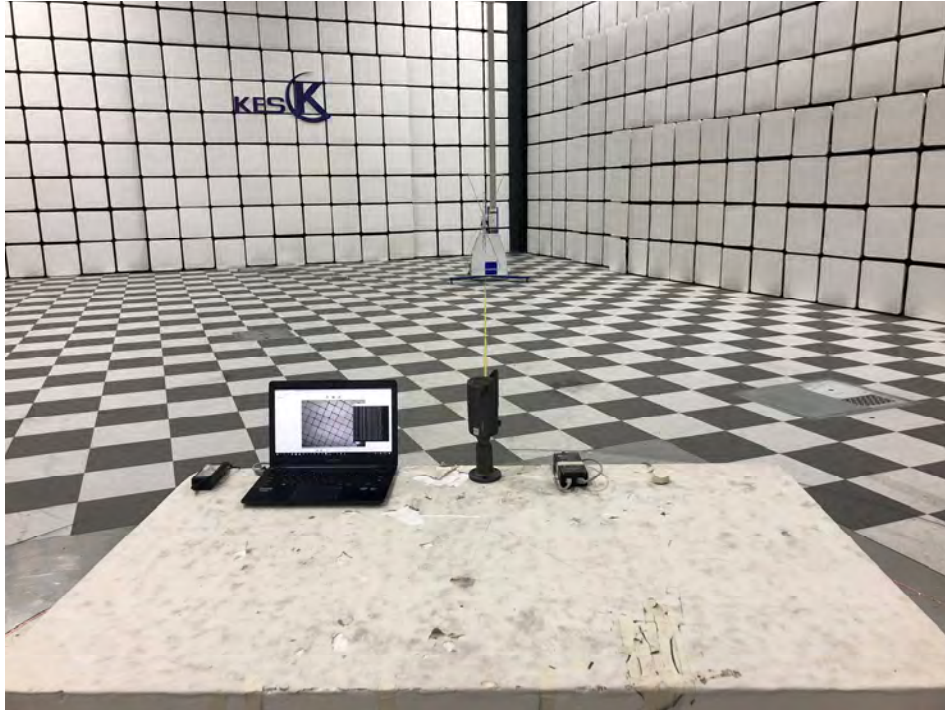
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

Conducted Telecommunication Emissions



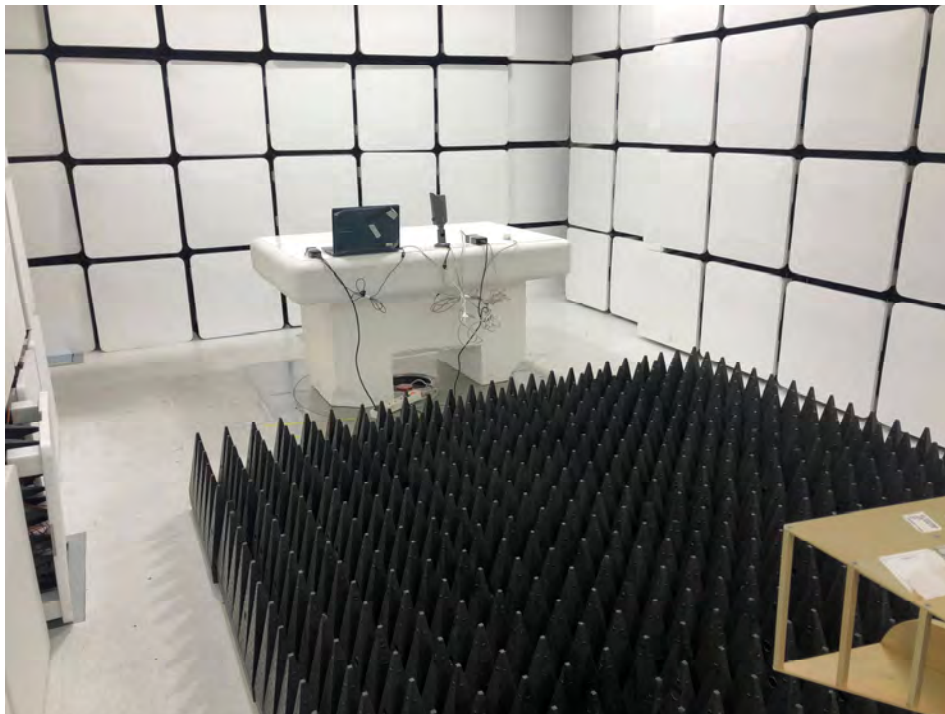
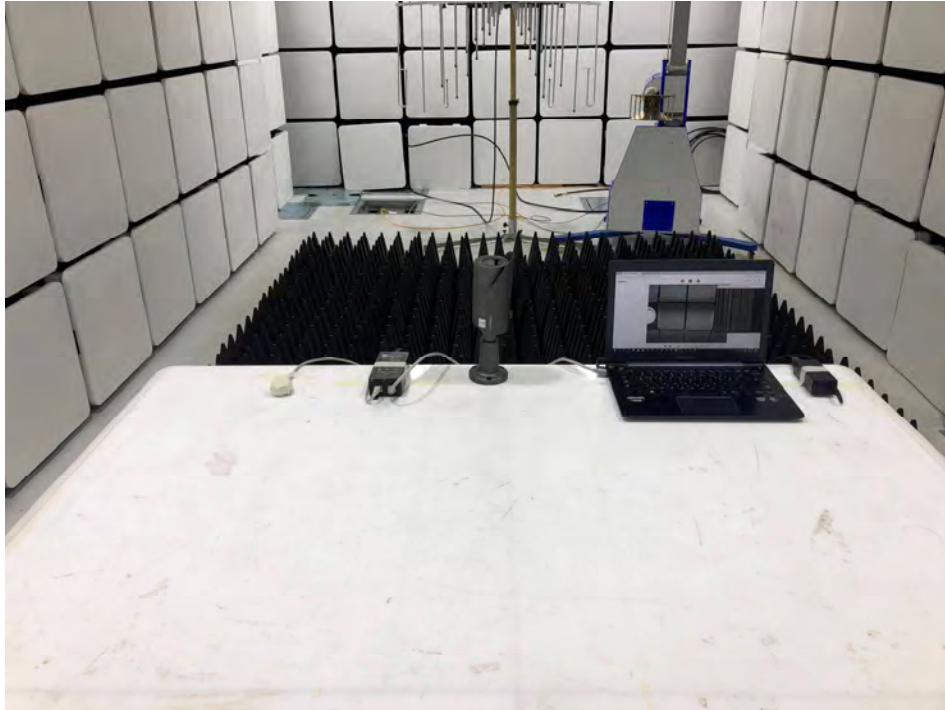
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

Radiated Electric Field Emissions(Below 1 GHz)



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 shchoi@kes.co.kr

Radiated Electric Field Emissions(Above 1 GHz)



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 shchoi@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-E1-19T0227
Page (48) of (58)

Harmonic Current Emissions and Voltage Fluctuations and Flicker

N/A

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 shchoi@kes.co.kr

Electrostatic Discharge



Radiated Electric Field Immunity



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 shchoi@kes.co.kr

Electrical Fast Transients/Bursts



Surge Transients

N/A

Conducted Disturbance



Voltage Dips and Short Interruptions

N/A

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 shchoi@kes.co.kr

EUT Internal Photographs

(Internal View)



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 shchoi@kes.co.kr

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 shchoi@kes.co.kr

EUT Internal View – Board 2

(Top)



(Bottom)



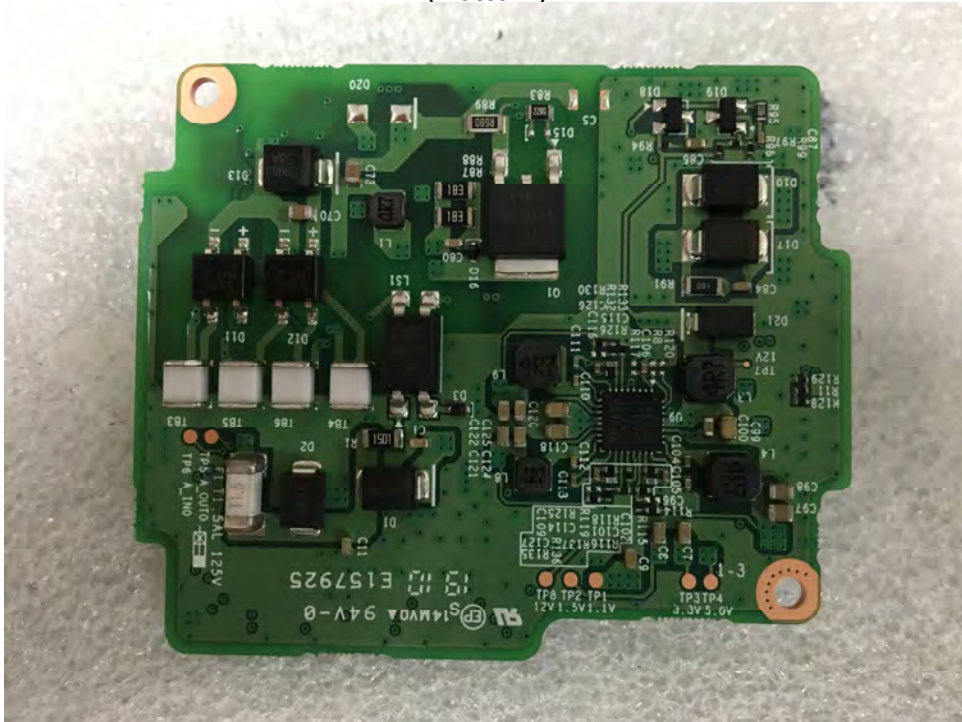
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

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 shchoi@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 shchoi@kes.co.kr

Label and Location



Network Camera

Model No : QNO-8030R

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

Made in China

