



## EMC TEST REPORT For RCM

Test Report No. : KES-EM-21T0449  
Date of Issue : Jun. 09, 2021  
Product name : Network Video Recorder  
Model/Type No. : QRN-430S  
Variant Model : -  
Applicant : Hanwha Techwin Co., Ltd.  
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,  
Gyeonggi-do, Republic of Korea  
Manufacturer : 1. HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.  
2. D-TECH CO.,LTD.  
Manufacturer Address : 1. Lot O-2, Que Vo Industrial Zone extended area,  
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam  
2. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi- do,  
Korea (Suwon Industrial Complex)  
Date of Receipt : May. 12, 2021  
Test date : May. 16, 2021 ~ May. 17, 2021  
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Ki Man, Kim  
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.

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**REPORT REVISION HISTORY**

| Date          | Test Report No. | Revision History |
|---------------|-----------------|------------------|
| Jun. 09, 2021 | KES-EM-21T0449  | Issued           |
|               |                 |                  |
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## 1.0 General Product Description

### Main Specifications of EUT are:

|                             |                       |                                                                                                         |
|-----------------------------|-----------------------|---------------------------------------------------------------------------------------------------------|
| <b>Display</b>              |                       |                                                                                                         |
| Video                       | Inputs                | Max. 4CH                                                                                                |
|                             | Resolution            | CIF ~ 8MP                                                                                               |
|                             | Protocols             | sunapi, ONVIF                                                                                           |
| Live                        | Local Display         | HDMI                                                                                                    |
|                             | Multi Screen Display  | [Local Monitor]<br>1 / 2V/ 2H / 3V / 4 / Sequence<br>[Web]<br>1 / 2V/ 2H / 3V / 4                       |
|                             | Resolution            | [Local Monitor]<br>8M(30fps), 1080p(120fps), 720P(120fps), D1(120fps)                                   |
| <b>Intelligent Analysis</b> |                       |                                                                                                         |
| Search                      | Object image          | N/A                                                                                                     |
| Comparison                  | Event Trigger         | N/A                                                                                                     |
| Attribute (AI)              | Person                | N/A                                                                                                     |
|                             | Face                  | N/A                                                                                                     |
|                             | Vehicle               | N/A                                                                                                     |
| <b>Performance</b>          |                       |                                                                                                         |
| System                      | Operating System      | Linux                                                                                                   |
| Record                      | Compression           | H.265, H.264, MJPEG, WiseStream(H.265, H.264)                                                           |
|                             | Recording Bandwidth   | 50M bps                                                                                                 |
|                             | Resolution            | CIF ~ 8MP                                                                                               |
|                             | Mode                  | Normal, Dual Stream, Schedule(Continuous/Event),<br>Event (Pre/Post), Bookmark                          |
|                             | Event Trigger         | Alarm Input, Video Loss,<br>Camera Event(Sensor, MD, Video Analytics, Defocus, Audio),<br>Dynamic Event |
|                             | Event Action          | e-Mail, Event Push, PTZ Preset, Alarm Out, Buzzer, Monitor Out                                          |
| Search & Play               | Playback Bandwidth    | Max 32Mbps                                                                                              |
|                             | User                  | Max. 4 Users (Local 1, Remote 3)                                                                        |
|                             | Mode                  | Time, Event, Text, Export, ARB, Bookmark                                                                |
|                             | Simultaneous playback | Max 16CH<br>- Set : 4CH<br>- Remote : 4CH Per User                                                      |
|                             | Resolution            | CIF ~ 8MP                                                                                               |
|                             | Fisheye De warping    | N/A                                                                                                     |
|                             | Playback Control      | Fast/Slow Forward / Backward, Move one step Up / Down                                                   |
| Storage                     | Built-In              | 2TB ~ 6TB                                                                                               |
|                             | Internal HDD          | 1ea (Max 6TB)                                                                                           |
|                             | External              | N/A                                                                                                     |
|                             | RAID                  | N/A                                                                                                     |
| Backup                      | File backup           | BU/Exe(GUI), JPG/AVI(Web)                                                                               |
|                             | Function              | Multi channel(Upto 4 CH) Play, Date-Time/Title display                                                  |
| Sensor                      | I/O                   | N/A                                                                                                     |
| Audio                       | Input/Output          | 4CH (network)                                                                                           |
|                             | Compression           | G.711, G.726, AAC(16/48KHz)                                                                             |
|                             | Audio Communication   | 2-Way                                                                                                   |

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|                        |                  |                                                                                                                                                                                                                                                       |
|------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Network</b>         |                  |                                                                                                                                                                                                                                                       |
| Interface              |                  | 4 Port PoE, RJ-45(10/100Mbps)                                                                                                                                                                                                                         |
| Protocol               |                  | TCP/IP, UDP/IP, RTP (UDP), RTP (TCP), RTSP, NTP, HTTP, DHCP (Server, Client), SMTP, ICMP, IGMP, ARP, DNS, DDNS, uPnP, HTTPS, SNMP, ONVIF (Profile-S), SUNAPI(Server, Client)                                                                          |
| DDNS                   |                  | Hanwha DDNS                                                                                                                                                                                                                                           |
| Transmission Bandwidth |                  | 50M bps                                                                                                                                                                                                                                               |
| Max Remote Users       |                  | Search (3), Live Unicast (10), Multicast (20)                                                                                                                                                                                                         |
| IP Version             |                  | IPv4/v6                                                                                                                                                                                                                                               |
| Security               |                  | IP address filtering, User access Log, 802.1x, Encryption                                                                                                                                                                                             |
| Language               |                  | English, French, German, Italian, Spanish, Russian, Turkish, Polish, Dutch, Swedish, Czech, Portuguese, Danish, Rumanian, Serbian, Croatian, Hungarian, Greek, Norwegian, Finnish, Korean, Chinese, Japanese, Thai, Vietnam                           |
| OS                     |                  | Window 10, Mac OS X(10.13)                                                                                                                                                                                                                            |
| Web Browser            |                  | Google Chrome, Mac Safari, Firefox, Edge                                                                                                                                                                                                              |
| Viewer Software        | Type             | WAVE (Sunapi 연동), SSM, Webviewer, Smart Viewer, Wisenet Mobile                                                                                                                                                                                        |
|                        | CMS Support      | Support SDK/CGI(SUNAPI) for integration to 3rd party VMS                                                                                                                                                                                              |
| <b>Functions</b>       |                  |                                                                                                                                                                                                                                                       |
| Camera Setup           | Register         | Auto, Manual                                                                                                                                                                                                                                          |
|                        | Setup Items      | IP address, Add profile edit, Bitrate, Camera MD setup (8 point polygon)<br>Camera video setup (Simple focus, Brightness/Contrast, Flip/Mirror, IRIS, WDR, D&N, SSNR, Shutter, SSDR, DIS), Fisheye Dewarping Mode, Hallway View Setup, Camera Webpage |
| PTZ                    | Control          | Via GUI, Webviewer                                                                                                                                                                                                                                    |
|                        | Preset           | 300 Presets                                                                                                                                                                                                                                           |
| Smart phone            | Support Model    | iOS, Android                                                                                                                                                                                                                                          |
|                        | Protocol Support | RTP, RTSP, HTTP, CGI(SUNAPI)                                                                                                                                                                                                                          |
|                        | Control          | Live(4ch) : Multi-Profile Support<br>Playback(4ch)                                                                                                                                                                                                    |
|                        | Max Remote Users | Search (3), Live Unicast (10)                                                                                                                                                                                                                         |
| Redundancy             | Failover         | N+1                                                                                                                                                                                                                                                   |
|                        | ARB              | Yes                                                                                                                                                                                                                                                   |
| Easy configuration     |                  | P2P(QR code)                                                                                                                                                                                                                                          |
| System Control         |                  | Mouse, Web                                                                                                                                                                                                                                            |

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| Indicator/Interface              |            |                                                              |
|----------------------------------|------------|--------------------------------------------------------------|
| Front                            | Indicator  | LED(Status indicator) :<br>- Power(1), Record(1), Network(1) |
| Connectors                       | HDMI       | 3840x2160 30Hz                                               |
|                                  | VGA        | N/A                                                          |
|                                  | Audio      | N/A                                                          |
|                                  | Ethernet   | PoE RJ-45(LAN, 10/100) 4 ea ,RJ-45 1ea (WAN, 10/100)         |
|                                  | Alarm      | N/A                                                          |
|                                  | USB        | 2EA(Front 1 x USB 2.0, Rear 1 x USB 2.0)                     |
|                                  | Storage    | N/A                                                          |
|                                  | Serial     | N/A                                                          |
|                                  | Reset      | Switch(1EA, PW clear)                                        |
|                                  | Power Cord | DC Adaptor                                                   |
|                                  | POE Budget | Max. 35W                                                     |
| System                           |            |                                                              |
| Log                              | Log List   | Max. 100,000 (System, Event each log)                        |
| Environmental                    |            |                                                              |
| Operating Temperature / Humidity |            | +0°C to +40°C(+32°F to +104°F)                               |
| Humidity                         |            | 20% ~ 85% RH                                                 |
| Noise                            |            | 47 db                                                        |
| Electrical                       |            |                                                              |
| Power                            |            | 100 ~ 240 VAC ±10%; 50/60 Hz                                 |
| Power Consumption                |            | 최대 56W(1HDDs, PoE on)                                        |
| Mechanical                       |            |                                                              |
| Color / Material                 |            | Black                                                        |
| Dimension (WxHxD)                |            | W370.0 x H44.0 x D320mm (1U)                                 |

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## 1.1 Test Voltage & Frequency

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

☒ AC 240 V, 50 Hz    ☐ PoE

## 1.2 Variant Model Differences

Not applicable

## 1.3 Device Modifications

Not applicable

## 1.4 Equipment Under Test

| Description            | Model Number | Serial Number | Manufacturer                                   | Remarks |
|------------------------|--------------|---------------|------------------------------------------------|---------|
| Network Video Recorder | QRN-430S     | -             | HANWHA TECHWIN<br>SECURITY VIETNAM<br>CO.,LTD. | EUT     |

## 1.5 System Configuration

| Description | Model Number | Serial Number | Manufacturer                               | Remarks |
|-------------|--------------|---------------|--------------------------------------------|---------|
| Mouse       | MOKJUO       | -             | Primax Electronics Ltd.                    | -       |
| Adaptor     | FSP065-DWAN3 | -             | Zhonghan Electronics<br>(Shenzhen) Co.,Ltd | -       |
| HDD         | ST3000VX009  | -             | SEAGATE                                    | 3 TB    |



## 1.6 Support Equipments

| Description      | Model Number   | Serial Number | Manufacturer                                     | Remarks |
|------------------|----------------|---------------|--------------------------------------------------|---------|
| Camera           | QND-7080RN/EX  | -             | HANWHA TECHWIN<br>SECURITY VIETNAM<br>CO.,LTD.   | -       |
| Notebook         | ProBook4430s   | -             | HP                                               | -       |
| Notebook Adaptor | SeriesPPP0009H | -             | CHICONY POWER<br>TECHNOLOGY<br>(SUZHOU) CO.,LTD, | -       |
| Monitor          | SMT-2233       | -             | Weihai Daewoo<br>Electronics Co., Ltd.           | -       |
| USB Memory       | -              | -             | Sandisk                                          | 32 GB   |

## 1.7 External I/O Cabling

| Start                              |                 | END            |                    | Cable Spec. |        |
|------------------------------------|-----------------|----------------|--------------------|-------------|--------|
| Description                        | I/O Port        | Description    | I/O Port           | Length      | Shield |
| Network Video<br>Recorder<br>(EUT) | RJ-45<br>(LAN)  | Notebook       | RJ-45<br>(LAN)     | 3.5         | U      |
|                                    | USB             | USB Memory     | USB                | -           | -      |
|                                    | RJ-45<br>(PoE)  | Camera         | RJ-45<br>(PoE)     | 3.0         | U      |
|                                    | HDMI            | Monitor        | HDMI               | 1.6         | S      |
|                                    | USB             | Mouse<br>(EUT) | USB                | 1.8         | U      |
|                                    | External Ground | Ground         | External<br>Ground | 2.0         | U      |

\* Unshielded=U, Shielded=S



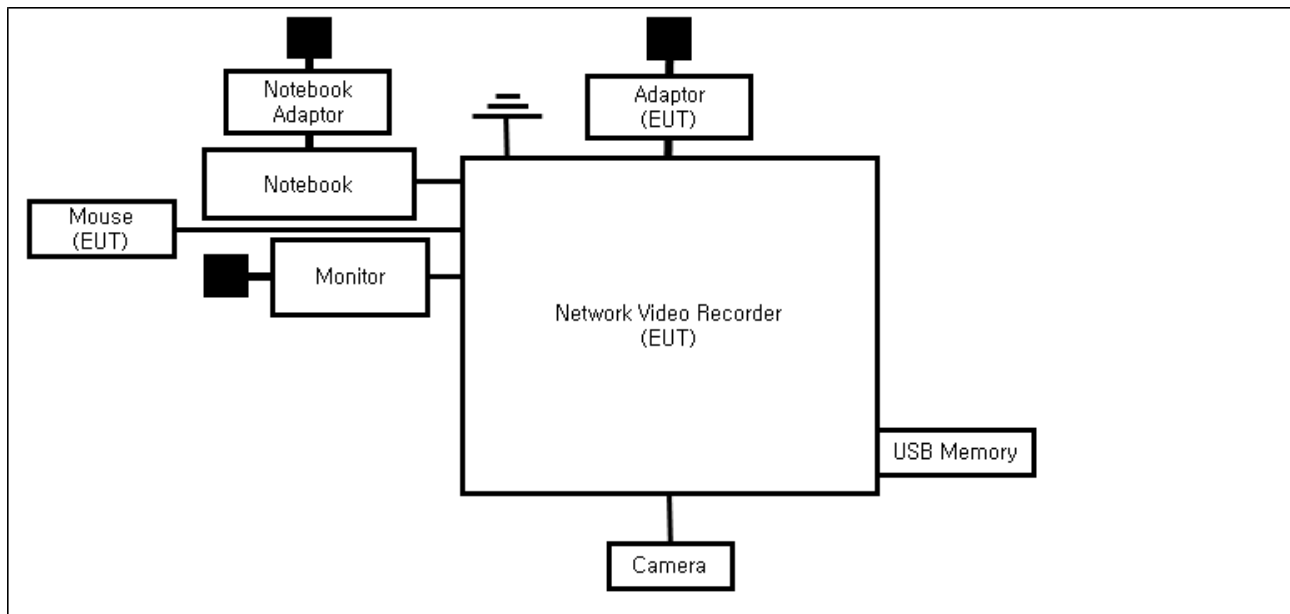
## 1.8 EUT Operating Mode(s)

| Test Mode | operating                                                                                                                                              |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operation | the test was conducted while checking the camera video output from the laptop and making sure that they operate normally while performing a ping test. |

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

## 1.9 Configuration

■ AC Main  
 □ DC Main



## 1.10 Remarks when standards applied

N/A

## 1.11 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.

## 1.12 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 16-1-4:2019

## 1.13 Laboratory Accreditations and Listings

| Country       | Agency  | Scope of Accreditation                                                                                                                                                                                     | Logo                                                                                                                           |
|---------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| KOREA         | RRA     | EMI (3 m & 10 m Semi-Anechoic Chamber ,<br>10 m Open Area and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS,<br>Magnetic, Dips and interruptions)                                             | <br>KR0100                                  |
| International | KOLAS   | EMI (3 m & 10 m Semi-Anechoic Chamber ,<br>and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS,<br>Magnetic, Dips and interruptions)                                                            | <br>KT489                                 |
| USA           | FCC     | 3 m & 10 m Semi-Anechoic Chamber, 10 m<br>Open Area and Conducted test site to<br>perform FCC Part 15/18 measurements.                                                                                     | <br>KR0100                                |
| Canada        | ISED    | 3 m & 10 m Semi-Anechoic Chamber and<br>Conducted test site                                                                                                                                                | <br>23298-1                               |
| JAPAN         | VCCI    | Mains Ports Conducted Interference<br>Measurement, Telecommunication Ports<br>Conducted Disturbance Measurement and<br>Radiation 10 meter site, Facility for<br>measuring radiated disturbance above 1 GHz | <br>R-20056, C-20036,<br>T-20040, G-20057 |
| Europe        | TÜV SÜD | EMI (3 m & 10 m Semi-Anechoic Chamber ,<br>10 m Open Area and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS,<br>Magnetic, Dips and interruptions)                                             | <br>CARAT 001633 0004                     |



## 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 55032:2015

☐ Class A

☐ Class B

☐ EN 55024:2010

☐ EN 50130-4:2011 +A1:2014

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



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- |                                                                    |                                             |                                  |
|--------------------------------------------------------------------|---------------------------------------------|----------------------------------|
| <input type="checkbox"/> <b>VCCI-CISPR 32:2016</b>                 | <input type="checkbox"/> Class A            | <input type="checkbox"/> Class B |
| <input checked="" type="checkbox"/> <b>AS/NZS CISPR32:2015</b>     | <input checked="" type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <br><input type="checkbox"/> <b>47 CFR Part 15, Subpart B</b>      |                                             |                                  |
| <input type="checkbox"/> CISPR 22:2009 +A1:2010                    | <input type="checkbox"/> Class A            | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2017                           | <input type="checkbox"/> Class A            | <input type="checkbox"/> Class B |
| <br><input type="checkbox"/> <b>IC Regulation ICES-003 Issue 7</b> |                                             |                                  |
| <input type="checkbox"/> CAN/CSA CISPR 32:17                       | <input type="checkbox"/> Class A            | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2017                           | <input type="checkbox"/> Class A            | <input type="checkbox"/> Class B |
| <br><input type="checkbox"/> <b>RE- Directive 2014/53/EU</b>       |                                             |                                  |
| <br><input type="checkbox"/> EN 301 489-1 V2.2.3                   |                                             |                                  |
| <input type="checkbox"/> Equipment for fixed use                   |                                             |                                  |
| <input type="checkbox"/> Equipment for vehicular use               |                                             |                                  |
| <input type="checkbox"/> Equipment for portable use                |                                             |                                  |
| <br><input type="checkbox"/> EN 301 489-3 V1.6.1                   |                                             |                                  |
| <br><input type="checkbox"/> EN 301 489-17 V2.2.1                  |                                             |                                  |
| <br><input type="checkbox"/> EN 60945:2002                         |                                             |                                  |

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## 2.1 Conducted Emissions at Mains Power Ports

**Test Date**

May. 16, 2021

**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        | 01, 15, 2022 |
| <input checked="" type="checkbox"/> | LISN              | ENV216       | R & S        | 101787        | 12, 29, 2021 |
| <input checked="" type="checkbox"/> | LISN              | ESH2-Z5      | R & S        | 100450        | 12, 29, 2021 |
| <input checked="" type="checkbox"/> | PULSE LIMITER     | ESH3-Z2      | R & S        | 101915        | 12, 29, 2021 |

**Test Conditions**

Temperature: (23,6 ± 0,1) °C

Relative Humidity: (43,7 ± 0,2) % R.H.

**Frequency Range of Measurement**

150 kHz to 30 MHz

**Instrument Settings**

IF Band Width: 9 kHz

**Test Results**

The requirements are:

- ☒ PASS  
☐ NOT PASS  
☐ NOT APPLICABLE

**Remarks**See Appendix A for test data.

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## 2.2 Conducted Emissions at Telecommunication Ports

**Test Date**

May. 16, 2021

**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        | 01, 15, 2022 |
| <input checked="" type="checkbox"/> | LISN              | ENV216       | R & S        | 101787        | 12, 29, 2021 |
| <input checked="" type="checkbox"/> | LISN              | ESH2-Z5      | R & S        | 100450        | 12, 29, 2021 |
| <input checked="" type="checkbox"/> | PULSE LIMITER     | ESH3-Z2      | R & S        | 101915        | 12, 29, 2021 |
| <input checked="" type="checkbox"/> | 8-WIRE ISN CAT3,5 | ENY81        | R & S        | 100174        | 12, 30, 2021 |
| <input type="checkbox"/>            | 8-WIRE ISN CAT6   | ENY81-CAT6   | R & S        | 101665        | 12, 30, 2021 |
| <input type="checkbox"/>            | CDN               | CDNS502A     | TESEQ        | 40431         | 12, 29, 2021 |

**Test Conditions**

Temperature: (23,6 ± 0,2) °C

Relative Humidity: (43,7 ± 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.- For Ethernet interfaces, measurements are required at the highest data rate supported by the interface.

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

### Test Date

May. 16, 2021

### Test Location

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

### Test Equipment

| Used                                | Description              | Model Number | Manufacturer     | Serial Number | Cal. Due     |
|-------------------------------------|--------------------------|--------------|------------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test S/W             | EP5/RE       | TOYO Corporation | 6.0.0         | -            |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER        | ESU26        | R & S            | 100551        | 04, 01, 2022 |
| <input checked="" type="checkbox"/> | AMPLIFIER                | SCU 01       | R & S            | 100603        | 11, 25, 2021 |
| <input checked="" type="checkbox"/> | TRILOG-BROADBAND ANTENNA | VULB9163     | Schwarzbeck      | 715           | 12, 08, 2022 |
| <input checked="" type="checkbox"/> | ATTENUATOR               | 8491A        | HP               | 32173         | 03, 10, 2022 |

### Test Conditions

Temperature: (23,7 ± 0,2) °C  
Relative Humidity: (44,0 ± 0,2) % R.H.

### Frequency Range of Measurement

30 MHz to 1 GHz

### Instrument Settings

IF Band Width: 120 kHz

### Test Results

The requirements are:

☒ PASS  
☐ NOT PASS  
☐ NOT APPLICABLE

### Remarks

See Appendix A for test data.



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

### Test Date

May. 17, 2021

### 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, 05, 2021 |
| <input checked="" type="checkbox"/> | PREAMPLIFIER               | 8449B        | AGILENT          | 3008A01967    | 04, 07, 2022 |
| <input type="checkbox"/>            | ATTENUATOR                 | 8491A        | HP               | 35496         | 03, 10, 2022 |
| <input checked="" type="checkbox"/> | DOUBLE RIDGED HORN ANTENNA | SAS-571      | A.H.SYSTEM,INC   | 781           | 03, 11, 2022 |

### Test Conditions

Temperature: (23,6 ± 0,1) °C

Relative Humidity: (44,6 ± 0,2) % R.H.

### Frequency Range of Measurement

1 GHz to 6 GHz

### Instrument Settings

IF Band Width: 1 MHz

### Test Results

The requirements are:

- ☒ PASS  
☐ NOT PASS  
☐ NOT APPLICABLE

### Remarks

See Appendix A for test data.





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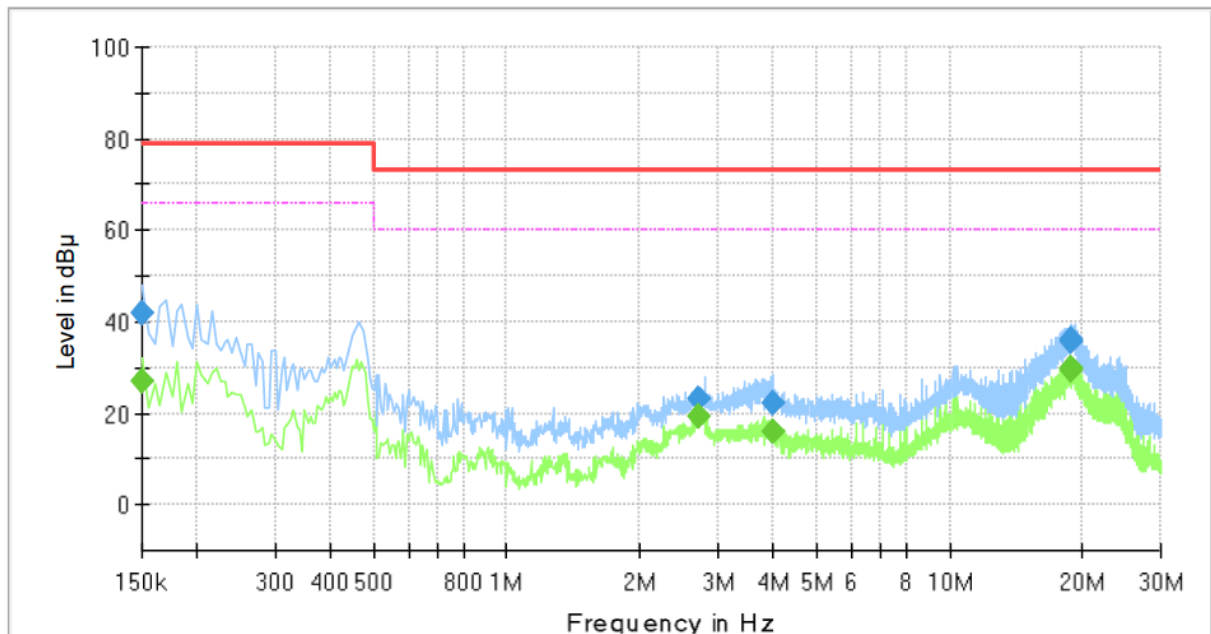
## APPENDIX A – TEST DATA

### Conducted Emissions at Mains Power Ports

HOT LINE

#### Common Information

Test Description: Conducted Emission  
Model No.: QRN-430S  
Phase: L1  
Mode:  
Operator Name: KES



#### Final Result

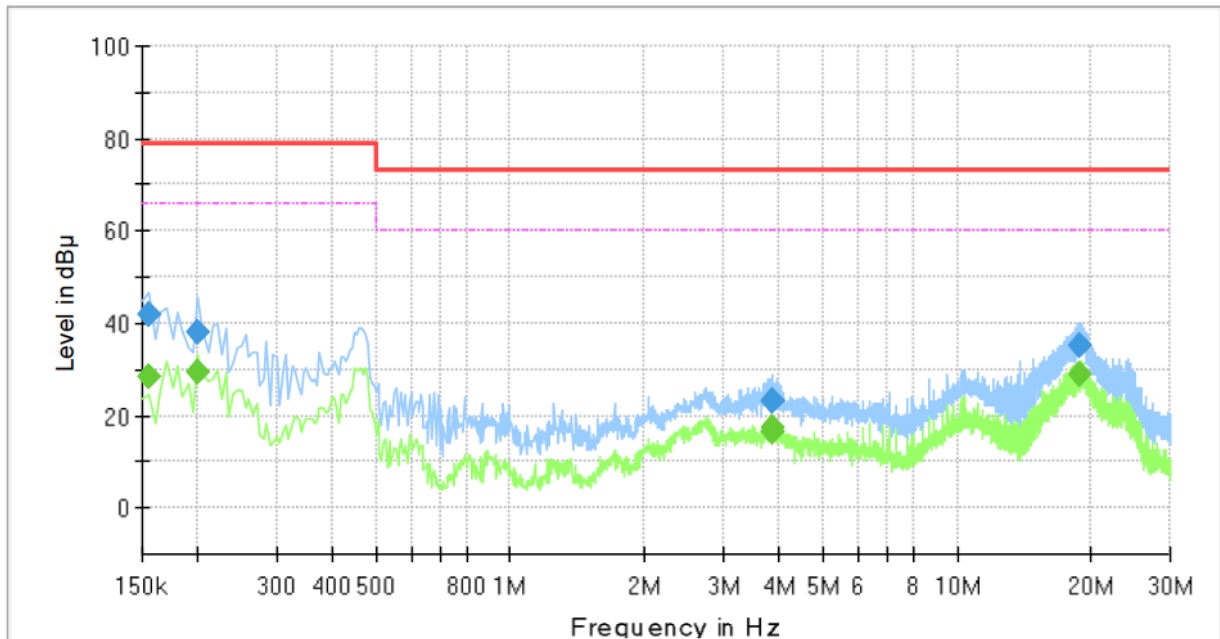
| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.150000        | ---              | 27.04           | 66.00        | 38.96       | 1000.0          | 9.000           | L1   | 19.4       |
| 0.150000        | 41.84            | ---             | 79.00        | 37.16       | 1000.0          | 9.000           | L1   | 19.4       |
| 2.725000        | ---              | 19.28           | 60.00        | 40.72       | 1000.0          | 9.000           | L1   | 20.2       |
| 2.725000        | 23.20            | ---             | 73.00        | 49.80       | 1000.0          | 9.000           | L1   | 20.2       |
| 3.990000        | ---              | 15.91           | 60.00        | 44.09       | 1000.0          | 9.000           | L1   | 19.9       |
| 3.990000        | 22.06            | ---             | 73.00        | 50.94       | 1000.0          | 9.000           | L1   | 19.9       |
| 18.770000       | ---              | 29.46           | 60.00        | 30.54       | 1000.0          | 9.000           | L1   | 20.1       |
| 18.770000       | 35.43            | ---             | 73.00        | 37.57       | 1000.0          | 9.000           | L1   | 20.1       |
| 18.860000       | ---              | 30.01           | 60.00        | 29.99       | 1000.0          | 9.000           | L1   | 20.1       |
| 18.860000       | 36.05            | ---             | 73.00        | 36.95       | 1000.0          | 9.000           | L1   | 20.1       |

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## NEUTRAL LINE

### Common Information

|                   |                    |
|-------------------|--------------------|
| Test Description: | Conducted Emission |
| Model No.:        | QRN-430S           |
| Phase:            | N                  |
| Mode:             |                    |
| Operator Name:    | KES                |



### Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.155000        | ---              | 28.26           | 66.00        | 37.74       | 1000.0          | 9.000           | N    | 19.4       |
| 0.155000        | 41.78            | ---             | 79.00        | 37.22       | 1000.0          | 9.000           | N    | 19.4       |
| 0.200000        | ---              | 29.35           | 66.00        | 36.65       | 1000.0          | 9.000           | N    | 19.4       |
| 0.200000        | 38.08            | ---             | 79.00        | 40.92       | 1000.0          | 9.000           | N    | 19.4       |
| 3.845000        | ---              | 16.65           | 60.00        | 43.35       | 1000.0          | 9.000           | N    | 19.9       |
| 3.845000        | 23.03            | ---             | 73.00        | 49.97       | 1000.0          | 9.000           | N    | 19.9       |
| 3.860000        | ---              | 17.17           | 60.00        | 42.83       | 1000.0          | 9.000           | N    | 19.9       |
| 3.860000        | 23.35            | ---             | 73.00        | 49.65       | 1000.0          | 9.000           | N    | 19.9       |
| 18.705000       | ---              | 29.11           | 60.00        | 30.89       | 1000.0          | 9.000           | N    | 20.1       |
| 18.705000       | 35.28            | ---             | 73.00        | 37.72       | 1000.0          | 9.000           | N    | 20.1       |

#### ◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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



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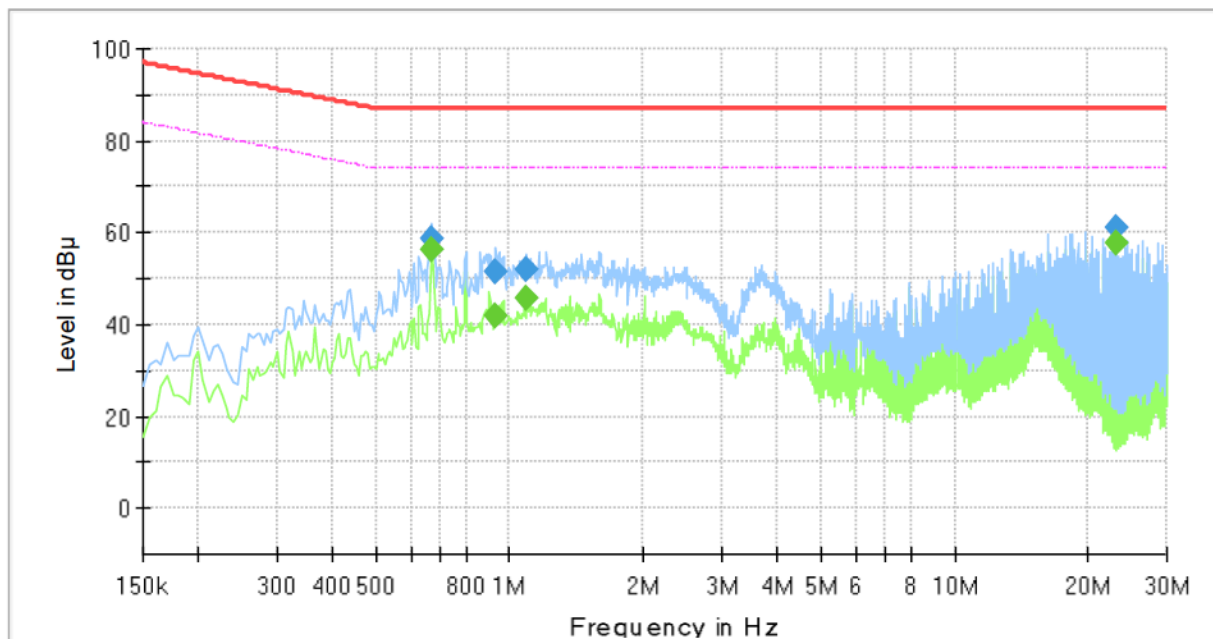
## Conducted Emissions at Telecommunication Ports

- LAN

[100 Mbps]

### Common Information

|                   |                            |
|-------------------|----------------------------|
| Test Description: | Telecommunication Emission |
| Model No.:        | QRN-430S                   |
| Mode :            | LAN                        |
| Speed :           | 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) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|-------------|------------|
| 0.670000        | ---              | 56.46           | 74.00        | 17.54       | 1000.0          | 9.000           | Single Line | 19.9       |
| 0.670000        | 58.89            | ---             | 87.00        | 28.11       | 1000.0          | 9.000           | Single Line | 19.9       |
| 0.930000        | ---              | 41.78           | 74.00        | 32.22       | 1000.0          | 9.000           | Single Line | 20.0       |
| 0.930000        | 51.31            | ---             | 87.00        | 35.69       | 1000.0          | 9.000           | Single Line | 20.0       |
| 1.095000        | ---              | 45.72           | 74.00        | 28.28       | 1000.0          | 9.000           | Single Line | 20.0       |
| 1.095000        | 51.98            | ---             | 87.00        | 35.02       | 1000.0          | 9.000           | Single Line | 20.0       |
| 23.130000       | ---              | 57.76           | 74.00        | 16.24       | 1000.0          | 9.000           | Single Line | 20.1       |
| 23.130000       | 60.99            | ---             | 87.00        | 26.01       | 1000.0          | 9.000           | Single Line | 20.1       |

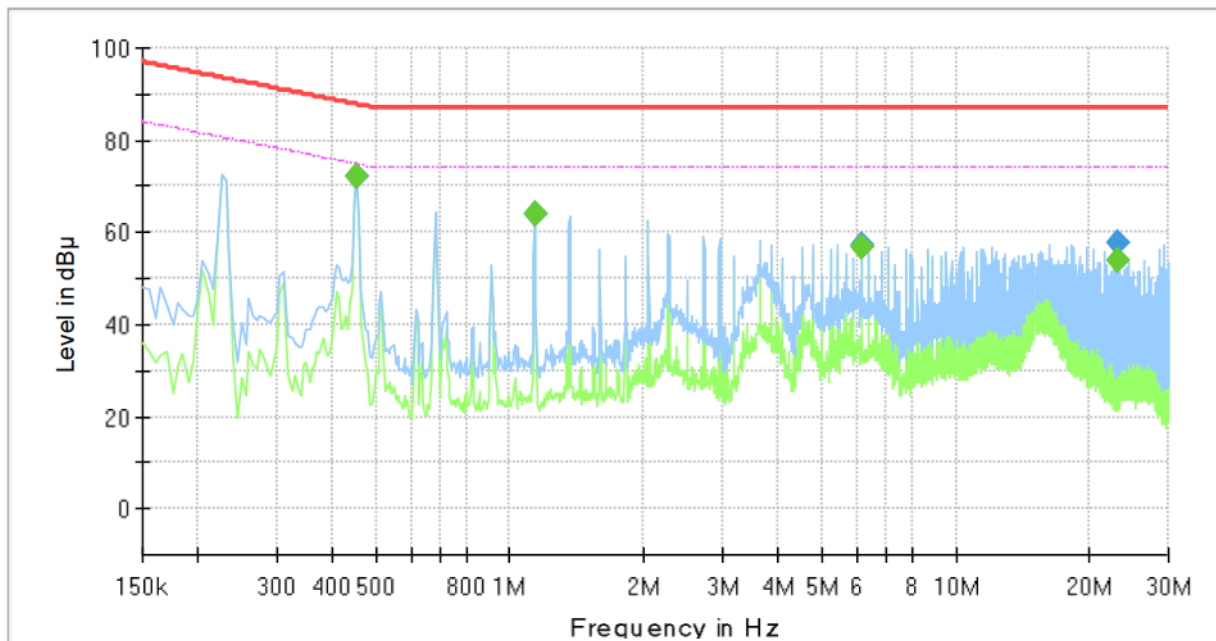
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- PoE

## [100 Mbps]

### Common Information

|                   |                            |
|-------------------|----------------------------|
| Test Description: | Telecommunication Emission |
| Model No.:        | QRN-430S                   |
| Mode :            | PoE                        |
| Speed :           | 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) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|-------------|------------|
| 0.455000        | ---              | 72.03           | 74.78        | 2.75        | 1000.0          | 9.000           | Single Line | 19.8       |
| 0.455000        | 72.05            | ---             | 87.78        | 15.73       | 1000.0          | 9.000           | Single Line | 19.8       |
| 1.135000        | ---              | 64.17           | 74.00        | 9.83        | 1000.0          | 9.000           | Single Line | 20.0       |
| 1.135000        | 64.15            | ---             | 87.00        | 22.85       | 1000.0          | 9.000           | Single Line | 20.0       |
| 6.135000        | ---              | 56.56           | 74.00        | 17.44       | 1000.0          | 9.000           | Single Line | 19.3       |
| 6.135000        | 57.02            | ---             | 87.00        | 29.98       | 1000.0          | 9.000           | Single Line | 19.3       |
| 23.130000       | ---              | 53.90           | 74.00        | 20.10       | 1000.0          | 9.000           | Single Line | 20.1       |
| 23.130000       | 57.69            | ---             | 87.00        | 29.31       | 1000.0          | 9.000           | Single Line | 20.1       |

#### ◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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



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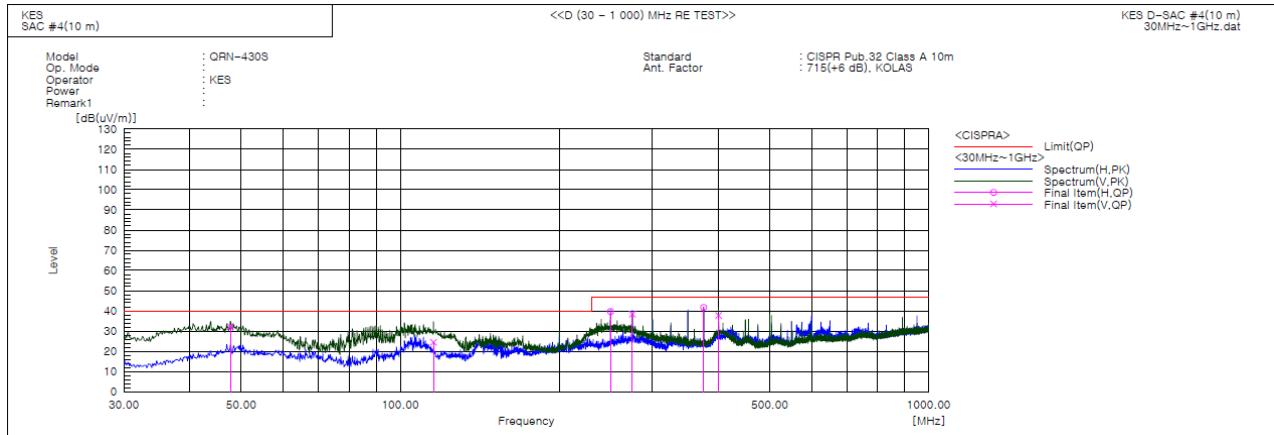
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### Radiated Electric Field Emissions(Below 1 GHz)



#### Final Result

| No. | Frequency<br>[MHz] | (P) | Reading<br>QP<br>[dB(μV)] | c.f<br>[dB(1/m)] | Result<br>QP<br>[dB(μV/m)] | Limit<br>QP<br>[dB(μV/m)] | Margin<br>QP<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|-----|--------------------|-----|---------------------------|------------------|----------------------------|---------------------------|----------------------|----------------|----------------|--------|
| 1   | 47.703             | V   | 53.5                      | -21.2            | 32.3                       | 40.0                      | 7.7                  | 141.0          | 260.0          |        |
| 2   | 115.603            | V   | 47.6                      | -23.1            | 24.5                       | 40.0                      | 15.5                 | 100.0          | 95.0           |        |
| 3   | 249.948            | H   | 58.8                      | -19.1            | 39.7                       | 47.0                      | 7.3                  | 361.0          | 146.0          |        |
| 4   | 274.925            | V   | 57.0                      | -18.6            | 38.4                       | 47.0                      | 8.6                  | 100.0          | 16.0           |        |
| 5   | 374.956            | H   | 56.5                      | -14.8            | 41.7                       | 47.0                      | 5.3                  | 177.0          | 21.0           |        |
| 6   | 400.055            | V   | 52.0                      | -14.3            | 37.7                       | 47.0                      | 9.3                  | 226.0          | 194.0          |        |

#### ◆ Calculation

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

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

Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

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

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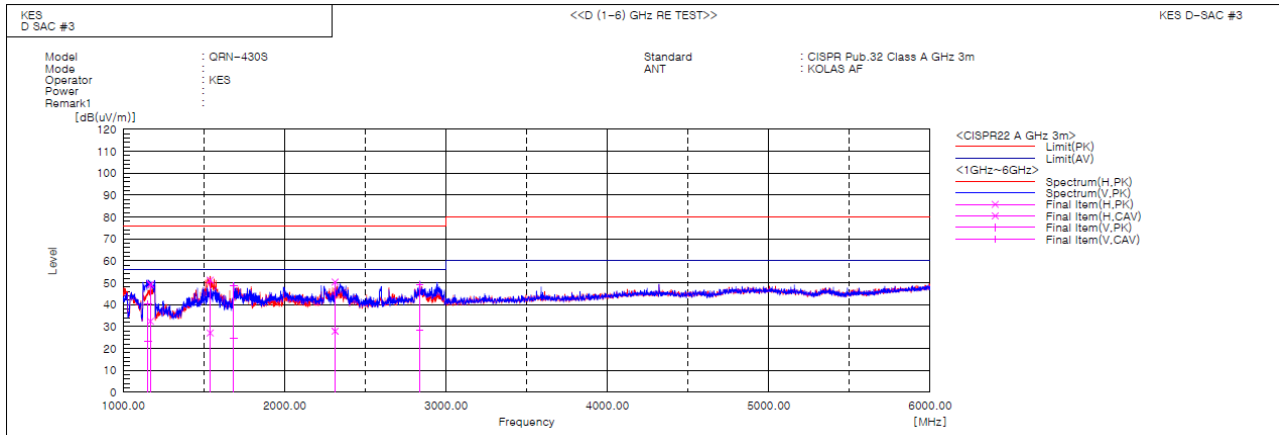
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## Radiated Electric Field Emissions(Above 1 GHz)



### Final Result

| No. | Frequency [MHz] | (P) | Reading PK [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB(1/m)] | Result PK [dB(uV/m)] | Result CAV [dB(uV/m)] | Limit PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Margin PK [dB] | Margin CAV [dB] | Height [cm] | Angle [deg] | Remark |
|-----|-----------------|-----|---------------------|----------------------|---------------|----------------------|-----------------------|---------------------|---------------------|----------------|-----------------|-------------|-------------|--------|
| 1   | 1154.000        | V   | 48.9                | 32.0                 | -8.6          | 40.3                 | 23.4                  | 76.0                | 56.0                | 35.7           | 32.6            | 100.0       | 17.3        |        |
| 2   | 1169.000        | H   | 57.8                | 40.9                 | -8.5          | 49.3                 | 32.4                  | 76.0                | 56.0                | 26.7           | 23.6            | 100.0       | 30.5        |        |
| 3   | 1539.000        | H   | 57.0                | 32.9                 | -5.8          | 51.2                 | 27.1                  | 76.0                | 56.0                | 24.8           | 28.9            | 100.0       | 56.9        |        |
| 4   | 1685.000        | V   | 52.9                | 28.8                 | -4.3          | 48.6                 | 24.5                  | 76.0                | 56.0                | 27.4           | 31.5            | 100.0       | 27.4        |        |
| 5   | 2313.000        | H   | 50.4                | 28.0                 | -0.1          | 50.3                 | 27.9                  | 76.0                | 56.0                | 25.7           | 28.1            | 100.0       | 67.3        |        |
| 6   | 2839.000        | V   | 46.7                | 26.1                 | 2.4           | 49.1                 | 28.5                  | 76.0                | 56.0                | 26.9           | 27.5            | 100.0       | 312.2       |        |

### ◆ Calculation

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

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

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

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

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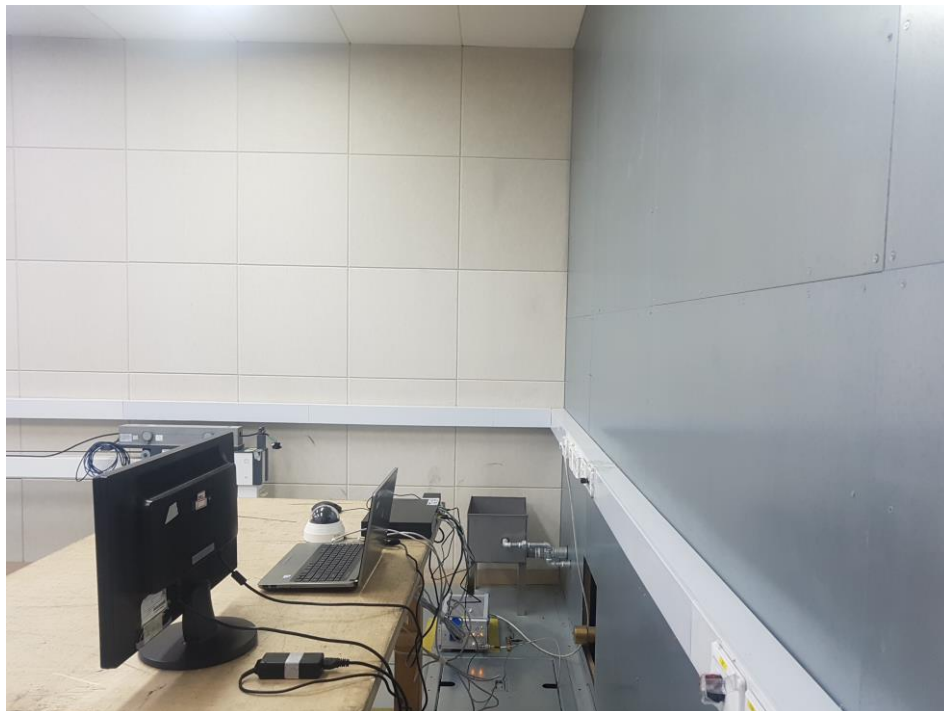
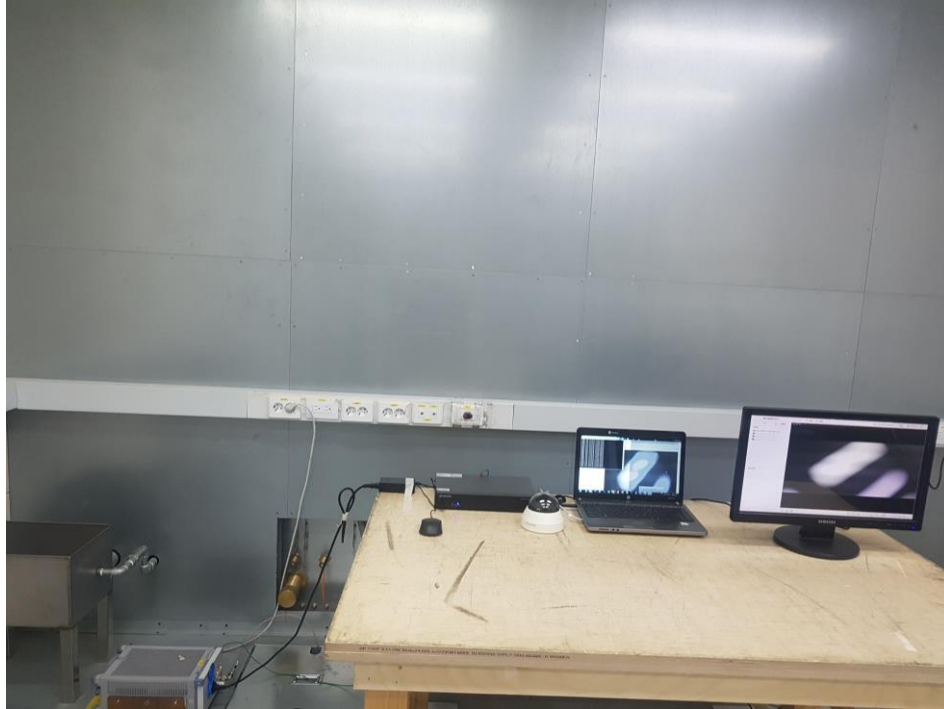
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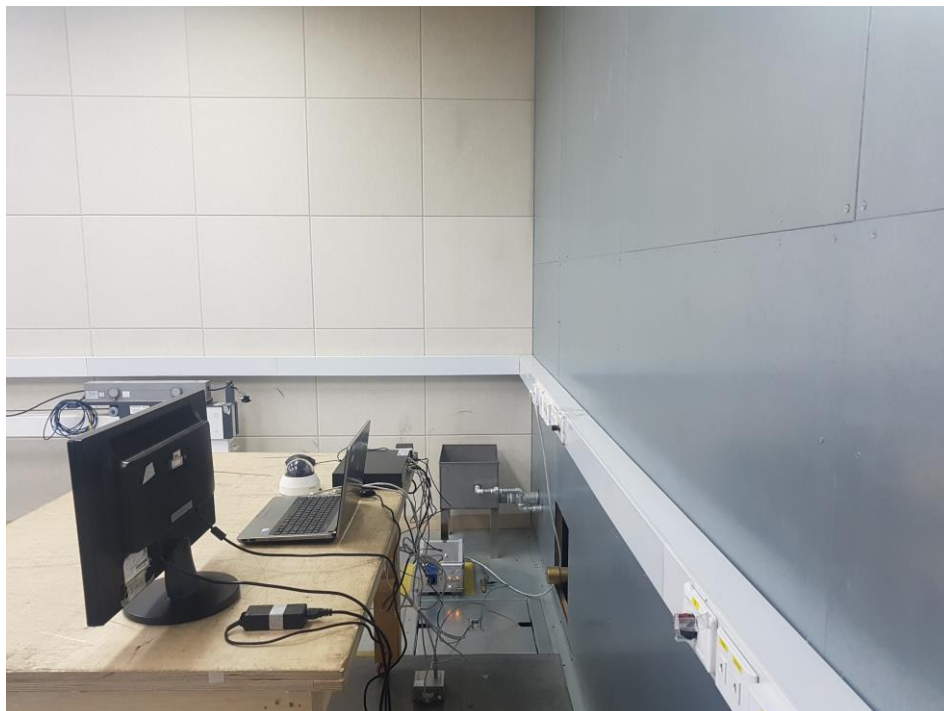
## Test Setup Photos and Configuration

### Conducted Emissions at Mains Power Ports



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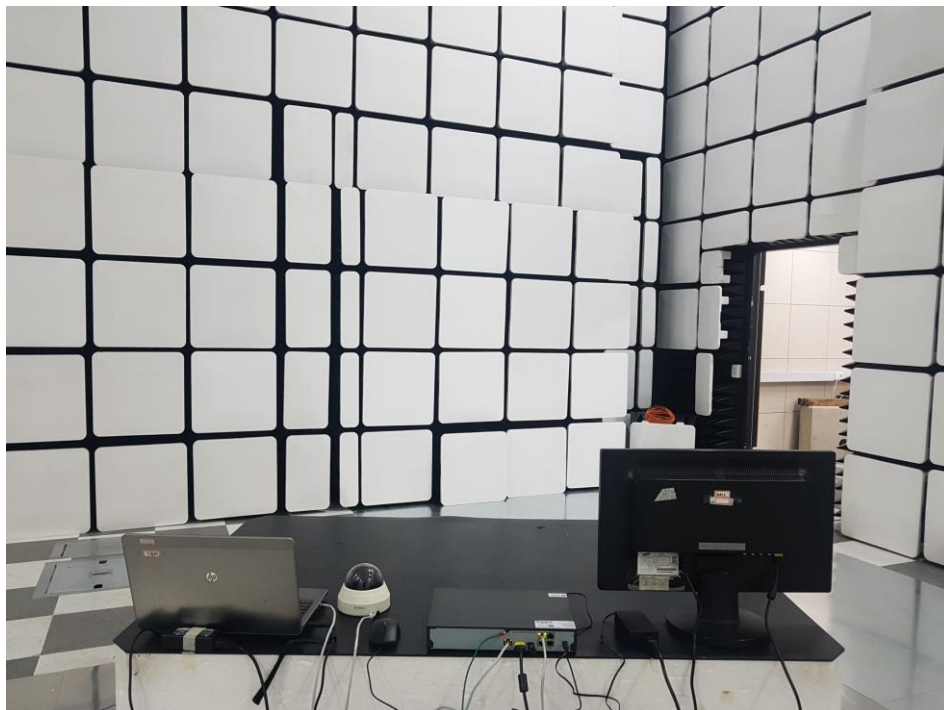
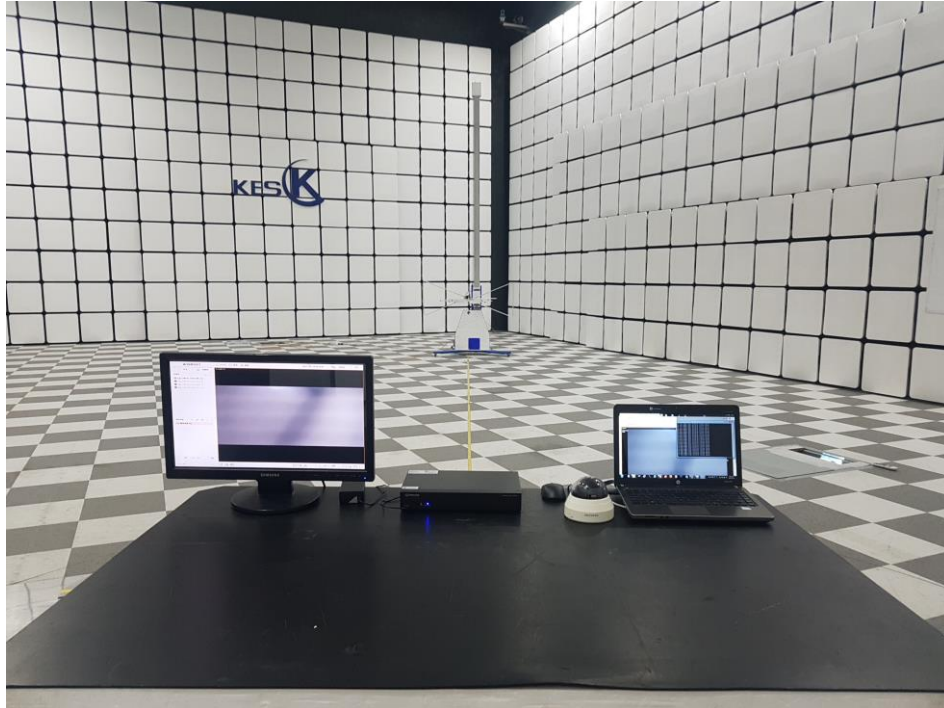
## Conducted Emissions at Telecommunication Ports



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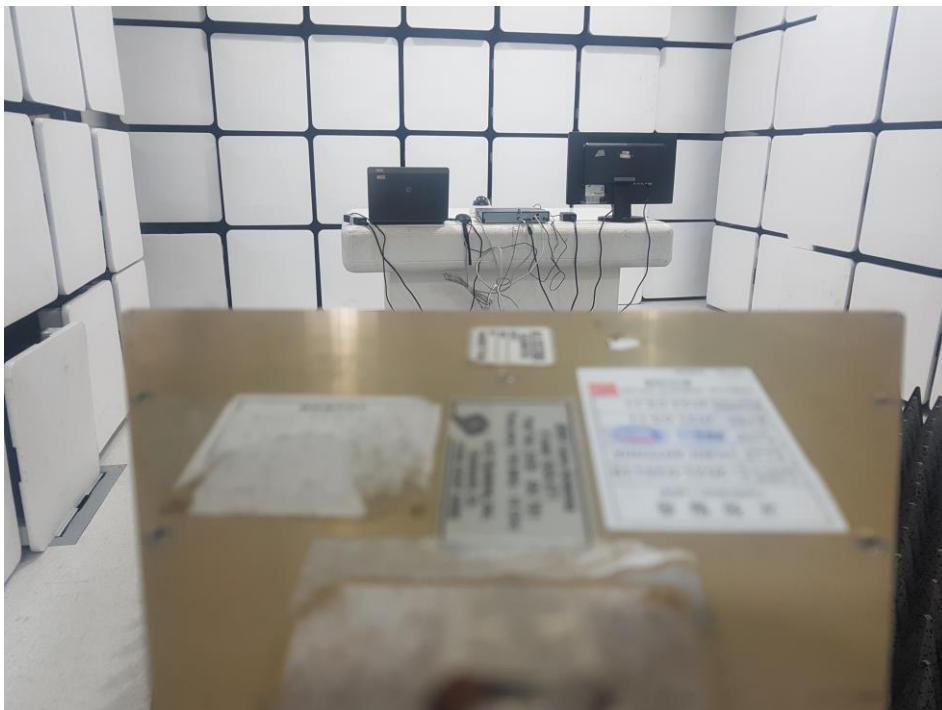


## Radiated Electric Field Emissions(Below 1 GHz)



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## Radiated Electric Field Emissions(Above 1 GHz)



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## EUT External Photographs

(Top)



(Bottom)



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## EUT Internal Photographs

(Internal View)

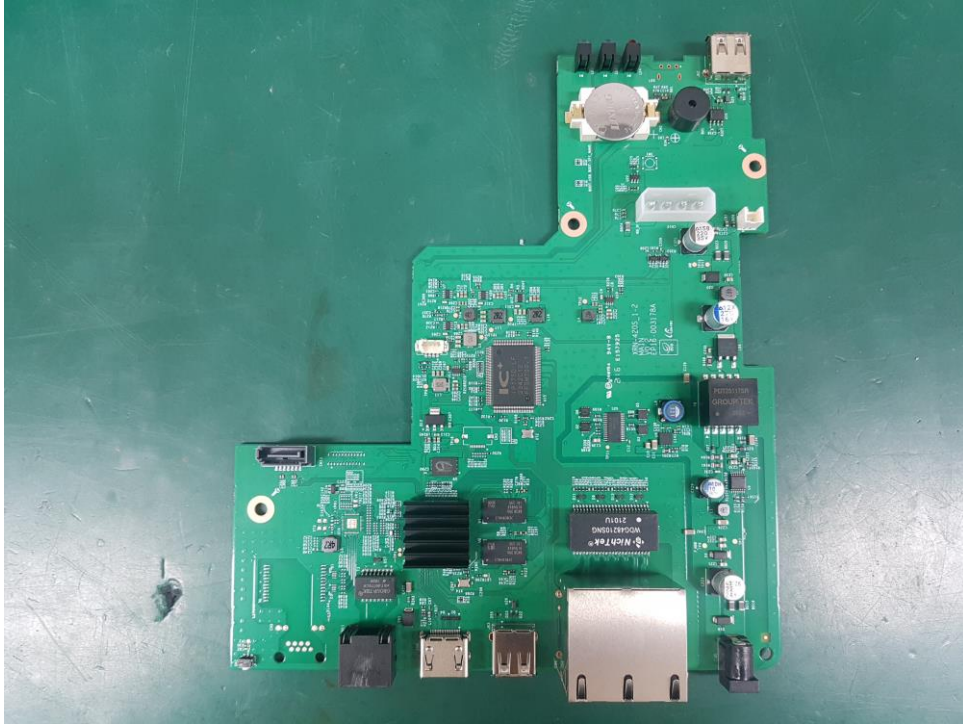


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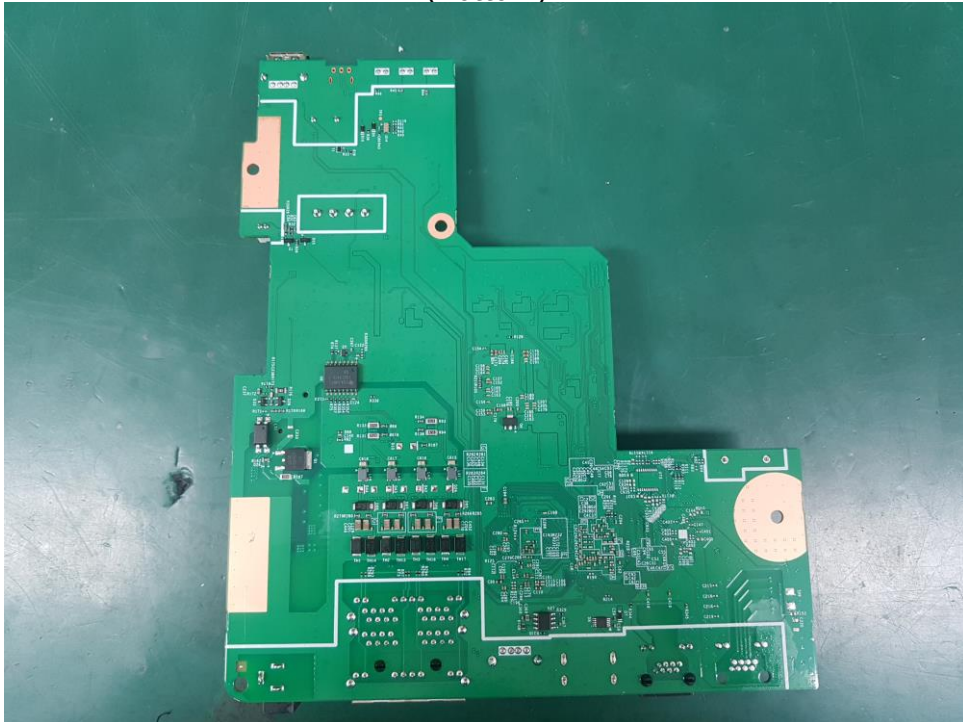


## EUT Internal View – Board

(Top)



(Bottom)



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## EUT Internal View – HDD

(Top)



(Bottom)



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