

**KES Co., Ltd.**

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Report No.:

KES-EM-21T0346-R1

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# EMC TEST REPORT For RCM

Test Report No. : KES-EM-21T0346-R1  
Date of Issue : Feb. 24, 2023  
Product name : DVR  
Model/Type No. : HRX-434  
Variant Model : -  
Applicant : Hanwha Vision Co., Ltd  
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,  
Gyeonggi-do, Republic of Korea  
Manufacturer : 1. HANWHA VISION VIETNAM COMPANY LIMITED  
2. D-TECH CO.,LTD.  
Manufacturer Address : 1. Lot O-2, Que Vo Industrial Zone extended area,  
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam  
2. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi- do,  
Korea (Suwon Industrial Complex)  
Date of Receipt : Apr. 09, 2021  
Test date : Apr. 15, 2021  
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Seon Ho, Choi  
EMC Test Engineer

Reviewed by

Dong-Hun, Jang  
EMC Technical Manager

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

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**REPORT REVISION HISTORY**

| Date          | Test Report No.   | Revision History                                                     |
|---------------|-------------------|----------------------------------------------------------------------|
| May. 06, 2021 | KES-EM-21T0346    | Issued                                                               |
| Feb. 24, 2023 | KES-EM-21T0346-R1 | Change the Applicant and manufacturer at the request of the customer |
|               |                   |                                                                      |
|               |                   |                                                                      |
|               |                   |                                                                      |
|               |                   |                                                                      |
|               |                   |                                                                      |
|               |                   |                                                                      |
|               |                   |                                                                      |
|               |                   |                                                                      |

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## 1.0 General Product Description

### Main Specifications of EUT are:

| Display            |                      |                                                                                                                                                                                                                                                                                                                   |
|--------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analog camera      | Inputs               | 4CH(1Vp-p 75ohm, BNC)                                                                                                                                                                                                                                                                                             |
|                    | Signal Type          | AHD(8MP, 5MP, 4MP, 1080p, 720p)<br>HDTVI(8MP, 5MP, 4MP, 1080p, 720p)                                                                                                                                                                                                                                              |
| Network camera     | Inputs               | Max. 6CH                                                                                                                                                                                                                                                                                                          |
|                    | Resolution           | 8MP ~ CIF                                                                                                                                                                                                                                                                                                         |
|                    | Protocols            | SUNAPI(Wisenet), ONVIF                                                                                                                                                                                                                                                                                            |
| Live               | Local Display        | HDMI: 3840 x 2160, 1920x1080, 1280x720<br>VGA: 1920x1080, 1280x720                                                                                                                                                                                                                                                |
|                    | Multi Screen Display | [Local monitor] 1 / 2H / 2V / 3V / 4 / 6(1+5) / 6(3x2) / Auto sequence<br>[Web] 1 / 4                                                                                                                                                                                                                             |
|                    | Resolution           | [Analog Camera(NTSC/PAL)]<br>- 8MP(15/12fps), 5MP(20/12fps), 4MP(30/25fps), 2MP(30/25fps), 1MP(30/25fps), 960H(or 720H)(30/25fps) * per CH<br>[Network Camera]<br>- Typ. 2MP(120fps)                                                                                                                              |
| Performance        |                      |                                                                                                                                                                                                                                                                                                                   |
| Operating System   | Embedded             | Linux                                                                                                                                                                                                                                                                                                             |
| Record             | Compression          | H.265, H.264, MJPEG                                                                                                                                                                                                                                                                                               |
|                    | Record Rate(Analog)  | Analog Camera)<br>(Main Stream) 8MP 8/8fps, 5M 12/12fps, 4M 15/12fps, 2M 30/25fps, 720p 30/25fps, 960H/640H 30/25fps (NTSC/PAL per CH)<br>(Sub Stream) 720p or higher : 640x360 full fps/CH, SD signal : upto SD full fps/CH<br>* The maximum recording frame rate depends on the frame rate of the input camera. |
|                    | Recording Bandwidth  | Max. 25Mbps                                                                                                                                                                                                                                                                                                       |
|                    | Resolution           | 8MP ~ CIF                                                                                                                                                                                                                                                                                                         |
|                    | Mode                 | Manual, Schedule (Continuous/Event), Event(Pre/Post), Dual Track                                                                                                                                                                                                                                                  |
| Event              | Event Trigger        | Alarm Input<br>Analog Camera : Video Loss, Motion Detection, Tampering<br>Network Camera : Camera Event (Sensor, MD, Video analytics), VA event (Tampering, Enter / Exit, Passing, Virtual- line, (Dis)Appear, Face Detection, Audio detection), Defocus camera event                                             |
|                    | Event Action         | E-mail, PTZ preset, Alarm out, Buzzer, Monitor out                                                                                                                                                                                                                                                                |
| Search & Play      | Playback Bandwidth   | Max. 32Mbps (6CH simultaneously)                                                                                                                                                                                                                                                                                  |
|                    | Resolution           | 8MP ~ CIF                                                                                                                                                                                                                                                                                                         |
|                    | Playback Control     | Fast Forward/Backward (x2, x4, x8, x16, x32, x64, x128, x256)<br>Slow Forward/Backward (x1/2, x1/4, x1/8)<br>※Move one step up/down                                                                                                                                                                               |
| Storage            | Supported HDD        | Up to 6TB                                                                                                                                                                                                                                                                                                         |
|                    | HDD Slot             | SATA 1ea(Max 6TB)                                                                                                                                                                                                                                                                                                 |
| Backup             | File backup          | BU, EXE(Include Player), AVI(Webviewer only)                                                                                                                                                                                                                                                                      |
|                    | Function             | Max. 6 CH play, Date-time/title display                                                                                                                                                                                                                                                                           |
| Network            |                      |                                                                                                                                                                                                                                                                                                                   |
| Protocol           |                      | TCP/IP, UDP/IP, RTP (UDP), RTP (TCP), RTSP, NTP, HTTP, DHCP (Server, Client), PPPoE, SMTP, ICMP, IGMP, ARP, DNS, DDNS, uPnP, HTTPS, SNMP, ONVIF (Profile-S), SUNAPI(Server, Client)                                                                                                                               |
| DDNS               |                      | Wisenet DDNS                                                                                                                                                                                                                                                                                                      |
| Transmission speed |                      | Analog Camera)<br>(Main Stream) 8MP 8/8fps, 5M 12/12fps, 4M 15/12fps, 2M 30/25fps, 720p 30/25fps, 960H/640H 30/25fps (NTSC/PAL per CH)<br>(Sub Stream) 720p or higher : 640x360 full fps/CH, SD signal : upto SD full fps/CH<br>* The maximum recording frame rate depends on the frame rate of the input camera. |
| Audio              | Input/Output         | 1 Line in / 1 Line out                                                                                                                                                                                                                                                                                            |
|                    | Compression          | G.711 (N/W Cam G.711, 726)                                                                                                                                                                                                                                                                                        |
|                    | Audio Communication  | 2-Way                                                                                                                                                                                                                                                                                                             |

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|                       |                   |                                                                                                                                                                                                                    |
|-----------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Max Remote Users      |                   | Search(3), Live Unicast(10), Multicast(20)                                                                                                                                                                         |
| Security              |                   | IP address filtering, User access log, 802.1x Authentication, Encryption (ID/PW, Recording, Transmission, Backup)<br>Device Certificate(Hanwha Techwin Root CA)                                                    |
| Web viewer            | Supported OS      | Window 10, Mac OS X (10.15 or above)                                                                                                                                                                               |
|                       | Supported browser | Google Chrome 88 or above, MS Edge 88 or above, Safari 13 or above<br>*support Plug-in free Web                                                                                                                    |
| Viewer Software       |                   | SSM, Webviewer, Smart Viewer, Wisenet mobile<br>Support SDK/CGI(SUNAPI) for integration to 3'rd party VMS                                                                                                          |
| <b>Functions</b>      |                   |                                                                                                                                                                                                                    |
| Camera Setup          | Register          | Auto, Manual                                                                                                                                                                                                       |
|                       | Item              | None                                                                                                                                                                                                               |
| PTZ                   | Control           | Via GUI, Webviewer, SSM, SmartViewer, Wisenet Mobile Viewer, System Controller                                                                                                                                     |
|                       | 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 Multi Playback, Max 2MP)<br>Event push                                                                                                                           |
|                       | Max. Remote Users | Search(3), Live Unicast(10)                                                                                                                                                                                        |
| Coaxial Control       |                   | CVBS(Pelco-C)/AHD/CVI/TVI                                                                                                                                                                                          |
| <b>Interface</b>      |                   |                                                                                                                                                                                                                    |
| Front                 | Indicator         | LED(Status indicator) :<br>Power(1), Record(1), Network(1)                                                                                                                                                         |
| Storage               |                   | None                                                                                                                                                                                                               |
| Reset                 |                   | Switch(1EA)                                                                                                                                                                                                        |
| HDD Key Lock          |                   | None                                                                                                                                                                                                               |
| HDMI                  |                   | 1EA                                                                                                                                                                                                                |
| VGA                   |                   | 1EA                                                                                                                                                                                                                |
| BNC                   |                   | 4CH In / 1CH Out(Spot Output)                                                                                                                                                                                      |
| DP                    |                   | None                                                                                                                                                                                                               |
| e-SATA                |                   | None                                                                                                                                                                                                               |
| Audio                 |                   | Out(1EA, RCA, Line)                                                                                                                                                                                                |
| Ethernet              |                   | RJ-45(10/100 BASE-T)                                                                                                                                                                                               |
| Alarm                 |                   | In 4EA, Out 1EA<br>- Relay Out1(NO/NC/COM)                                                                                                                                                                         |
| USB                   |                   | 2EA(Front/Rear USB2.0)                                                                                                                                                                                             |
| GPS                   |                   | None                                                                                                                                                                                                               |
| WiFi                  |                   | None                                                                                                                                                                                                               |
| Serial(Protocols)     |                   | RS-485 (Samsung-T/Pelco-D/Pelco-p) * for PTZ                                                                                                                                                                       |
| Power inlet           |                   | 1EA DC Input Jack                                                                                                                                                                                                  |
| <b>System</b>         |                   |                                                                                                                                                                                                                    |
| Log                   | Log List          | Max. 20,000 (System Log, Event Log each)                                                                                                                                                                           |
| 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 |
| <b>Environmental</b>  |                   |                                                                                                                                                                                                                    |
| Operating Temperature |                   | 0°C to +40°C(+32°F to +104°F)                                                                                                                                                                                      |
| Operating Humidity    |                   | 20% ~ 85% RH                                                                                                                                                                                                       |
| Certification         |                   | UL, CE, FCC, KC                                                                                                                                                                                                    |
| <b>Electrical</b>     |                   |                                                                                                                                                                                                                    |
| Power Input           |                   | DC12V                                                                                                                                                                                                              |
| Power Consumption     |                   | Max. 22W (6T HDD 1ea)                                                                                                                                                                                              |
| PoE Budget            |                   | None                                                                                                                                                                                                               |
| <b>Mechanical</b>     |                   |                                                                                                                                                                                                                    |
| Color / Material      |                   | Black / Metal                                                                                                                                                                                                      |
| Dimension (WxHxD)     |                   | 300 x 47 x 208.7mm (11.85" x 1.89" x 8.22")                                                                                                                                                                        |
| Weight                |                   | Approx. 1.5Kg (4TB HDD 1ea)                                                                                                                                                                                        |

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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

## 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 |
|-------------|--------------|---------------|---------------------------------------------|---------|
| DVR         | HRX-434      | -             | HANWHA VISION<br>VIETNAM COMPANY<br>LIMITED | EUT     |

## 1.5 System Configuration

| Description | Model Number | Serial Number | Manufacturer                                         | Remarks |
|-------------|--------------|---------------|------------------------------------------------------|---------|
| Mouse       | MOKJUO       | -             | Primax Electronics Ltd.                              | -       |
| HDD         | ST4000VX000  | ZGY8LJ5N      | SEAGATE                                              | 4 TB    |
| DVR Adaptor | KPL-048-VI   | -             | Channel Well<br>Techonolohgy<br>(Guangzhou) Co.,Ltd. | -       |



## 1.6 Support Equipments

| Description           | Model Number   | Serial Number   | Manufacturer                                         | Remarks |
|-----------------------|----------------|-----------------|------------------------------------------------------|---------|
| Camera                | HCD-7030RA     | -               | HANWHA VISION<br>VIETNAM COMPANY<br>LIMITED          | -       |
| Camera Adaptor        | MC12D-1200500  | -               | Shen zhen MaCable<br>Technology co.,ltd              | -       |
| Notebook              | ProBook4430s   | -               | HP                                                   | -       |
| Notebook Adapter      | SeriesPPP0009H | -               | CHICONY POWER<br>TECHNOLOGY<br>(SUZHOU) CO.,LTD,     | -       |
| Alarm IN              | -              | -               | -                                                    | -       |
| Alarm OUT             | -              | -               | -                                                    | -       |
| Monitor1              | SMT-2232       | C95V67VF900025B | Weihai Daewoo<br>Electronics Co., Ltd.               | -       |
| Monitor2              | HSTND-7041-L   | 6CM6020YQQ      | HP Inc.                                              | -       |
| Monitor3              | S24E370DL      | 0NTWHTPH200179Y | Samsung Electronics<br>Co., Ltd.                     | -       |
| Monitor3<br>Adaptor   | HP14300        | -               | Haneulcomplus Co.,<br>Ltd.                           | -       |
| iPad                  | A1432          | DQXJWFHDF193    | APPLE .Inc                                           | -       |
| Speaker               | BR1000A CUVE   | -               | Britz                                                | -       |
| Controller            | SPC-1010       | C50E67WG10100F  | SamSung Techwin<br>Co.,Ltd.                          | -       |
| Controller<br>Adaptor | RS-AB1000      | -               | Dongguan<br>Jinhuasheng Power<br>Technology 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 |
| DVR<br>(EUT) | NETWORK   | Notebook       | RJ-45     | 3.5         | U      |
|              | Alarm OUT | Alarm OUT      | Alarm IN  | 3.0         | U      |
|              | Alarm IN  | Alarm IN       | Alarm OUT | 3.0         | U      |
|              | RS485     | Controller     | 2 PIN     | 3.0         | U      |
|              | Audio OUT | Speaker        | Audio IN  | 1.4         | U      |
|              | Audio IN  | Smartphone     | Audio OUT | 1.6         | U      |
|              | USB       | USB Memory     | USB       | -           | -      |
|              | VIDEO IN  | Camera         | BNC       | 3.0         | S      |
|              | SPOT      | Monitor1       | BNC       | 3.0         | S      |
|              | VGA OUT   | Monitor2       | D-sub     | 1.6         | U      |
|              | HDMI      | Monitor3       | HDMI      | 1.5         | S      |
|              | USB       | Mouse<br>(EUT) | USB       | 1.8         | U      |

\* Unshielded=U, Shielded=S

## 1.8 EUT Operating Mode(s)

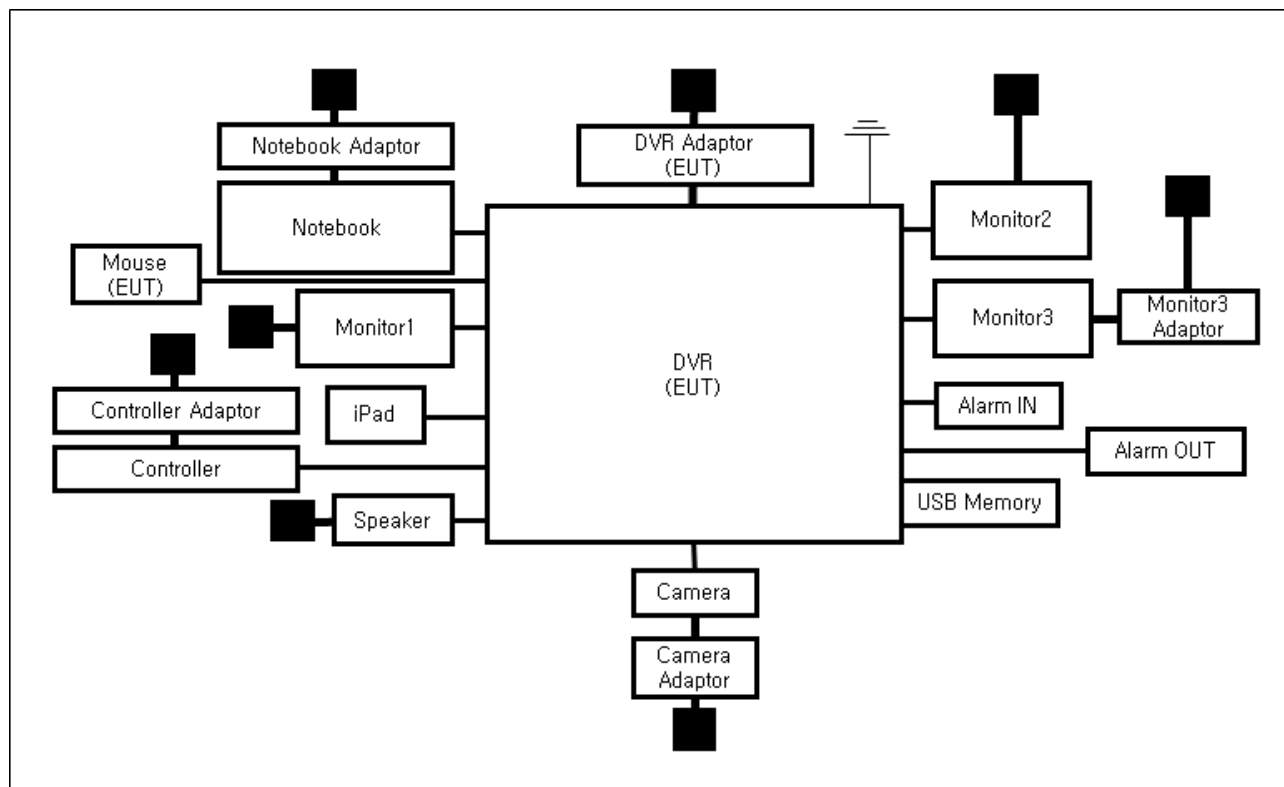
| Test Mode | operating                                                                                                                                              |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 Vision 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, Republic of. The sites are constructed in conformance with the requirements of ANSI C63.4a-2017 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 and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) | <br>KR0100                                  |
| International | KOLAS   | EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) | <br>KT489                                 |
| USA           | FCC     | 3 m & 10 m Semi-Anechoic Chamber<br>Conducted test site to perform FCC Part 15/18 measurements.                                         | <br>KR0100                                |
| Canada        | ISED    | 3 m & 10 m Semi-Anechoic Chamber and Conducted test site                                                                                | <br>23298                                 |
| JAPAN         | VCCI    | EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)                                                                          | <br>C-20136, T-20137,<br>R-20181, G-20176 |
| Europe        | TÜV SÜD | EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) | <br>CARAT 001633 0004                     |



## 2.0 Test Regulations

The emissions tests were performed according to following regulations:

☐ **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                       |                                             |                                  |
| <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                       |                                             |                                  |
| <br>                                                           |                                             |                                  |
| <input type="checkbox"/> <b>RE- Directive 2014/53/EU</b>       |                                             |                                  |
| <br>                                                           |                                             |                                  |
| <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            |                                             |                                  |
| <br>                                                           |                                             |                                  |
| <input type="checkbox"/> EN 301 489-3 V1.6.1                   |                                             |                                  |
| <input type="checkbox"/> EN 301 489-17 V2.2.1                  |                                             |                                  |
| <input type="checkbox"/> EN 60945:2002                         |                                             |                                  |

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## 2.1 Conducted Emissions at Mains Power Ports

### Test Date

Apr. 15, 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 ± 0,2) °C

Relative Humidity: (45,8 ± 0,1) % R.H.

### Frequency Range of Measurement

150 kHz to 30 MHz

### Instrument Settings

IF Band Width: 9 kHz

### Test Results

The requirements are:

- ☒ PASS  
☐ NOT PASS  
☐ NOT APPLICABLE

### Remarks

See Appendix A for test data.

## 2.2 Conducted Emissions at Telecommunication Ports

**Test Date**

Apr. 15, 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 ± 0,1) °C

Relative Humidity: (45,8 ± 0,1) % R.H.

**Frequency Range of Measurement**

150 kHz to 30 MHz

**Instrument Settings**

IF Band Width: 9 kHz

**Test Results**

The requirements are:

- ☒ PASS  
☐ NOT PASS  
☐ NOT APPLICABLE

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



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

### Test Date

Apr. 15, 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: (23,6 ± 0,4) °C

Relative Humidity: (45,9 ± 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**

Apr. 15, 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: (24,1 ± 0,3) °C

Relative Humidity: (45,8 ± 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.



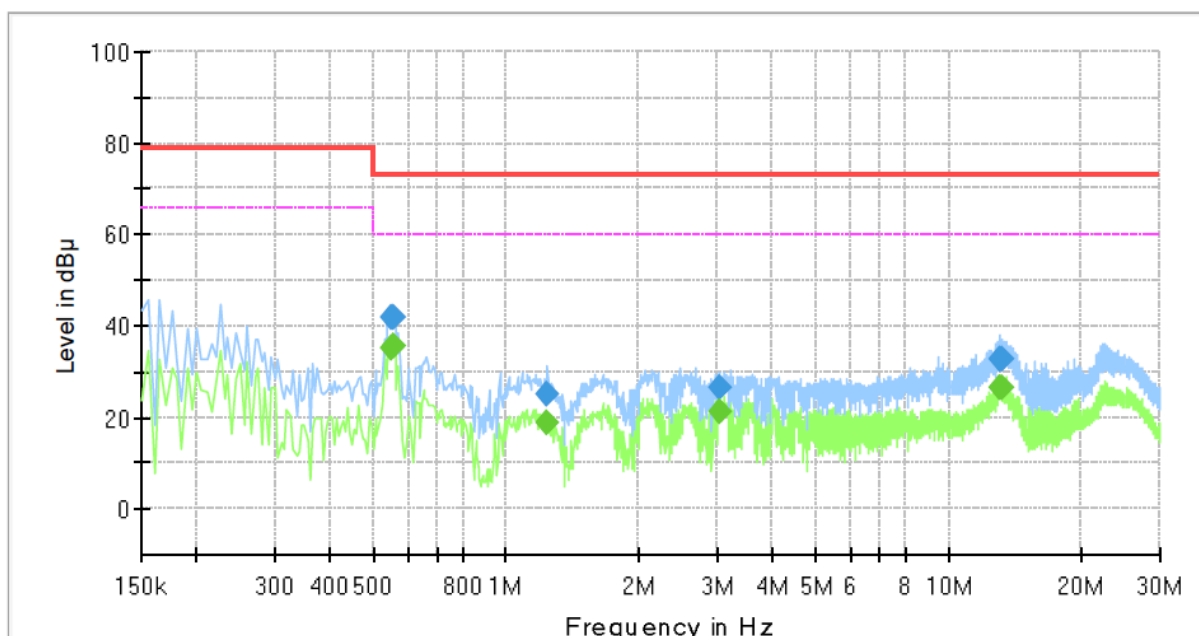
## APPENDIX A – TEST DATA

### Conducted Emissions at Mains Power Ports

HOT LINE

#### Common Information

|                   |                    |
|-------------------|--------------------|
| Test Description: | Conducted Emission |
| Model No.:        | HRX-434            |
| Phase:            | H                  |
| Mode:             | 240 V 50 Hz        |
| Operator Name:    | KES                |



#### Final Result

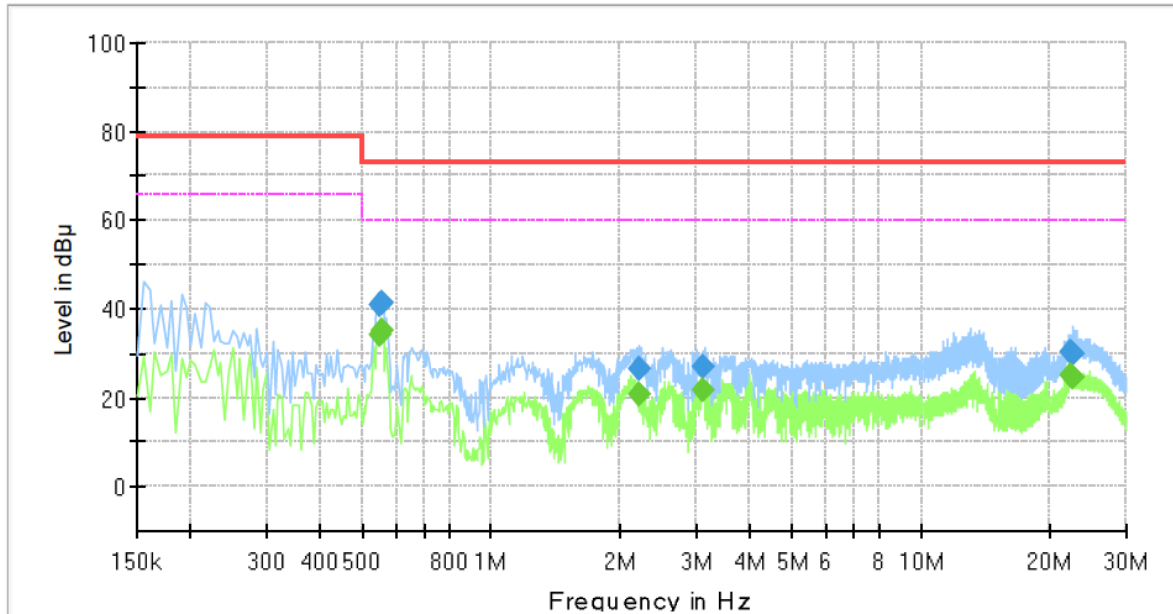
| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.550000        | ---              | 34.96           | 60.00        | 25.04       | 1000.0          | 9.000           | L1   | 19.8       |
| 0.550000        | 41.68            | ---             | 73.00        | 31.32       | 1000.0          | 9.000           | L1   | 19.8       |
| 0.555000        | ---              | 35.52           | 60.00        | 24.48       | 1000.0          | 9.000           | L1   | 19.8       |
| 0.555000        | 41.71            | ---             | 73.00        | 31.29       | 1000.0          | 9.000           | L1   | 19.8       |
| 1.240000        | ---              | 18.87           | 60.00        | 41.13       | 1000.0          | 9.000           | L1   | 20.1       |
| 1.240000        | 25.12            | ---             | 73.00        | 47.88       | 1000.0          | 9.000           | L1   | 20.1       |
| 3.025000        | ---              | 21.33           | 60.00        | 38.67       | 1000.0          | 9.000           | L1   | 20.1       |
| 3.025000        | 26.29            | ---             | 73.00        | 46.71       | 1000.0          | 9.000           | L1   | 20.1       |
| 13.055000       | ---              | 26.49           | 60.00        | 33.51       | 1000.0          | 9.000           | L1   | 19.9       |
| 13.055000       | 32.65            | ---             | 73.00        | 40.35       | 1000.0          | 9.000           | L1   | 19.9       |
| 13.220000       | ---              | 26.68           | 60.00        | 33.32       | 1000.0          | 9.000           | L1   | 19.9       |
| 13.220000       | 32.80            | ---             | 73.00        | 40.20       | 1000.0          | 9.000           | L1   | 19.9       |

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## NEUTRAL LINE

## Common Information

|                   |                    |
|-------------------|--------------------|
| Test Description: | Conducted Emission |
| Model No.:        | HRX-434            |
| Phase:            | N                  |
| Mode:             | 240 V 50 Hz        |
| Operator Name:    | KES                |



## Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.550000        | ---              | 34.19           | 60.00        | 25.81       | 1000.0          | 9.000           | N    | 19.8       |
| 0.550000        | 41.04            | ---             | 73.00        | 31.96       | 1000.0          | 9.000           | N    | 19.8       |
| 0.555000        | ---              | 34.97           | 60.00        | 25.03       | 1000.0          | 9.000           | N    | 19.8       |
| 0.555000        | 41.23            | ---             | 73.00        | 31.77       | 1000.0          | 9.000           | N    | 19.8       |
| 2.220000        | ---              | 20.60           | 60.00        | 39.40       | 1000.0          | 9.000           | N    | 20.3       |
| 2.220000        | 26.64            | ---             | 73.00        | 46.36       | 1000.0          | 9.000           | N    | 20.3       |
| 3.095000        | ---              | 21.61           | 60.00        | 38.39       | 1000.0          | 9.000           | N    | 20.1       |
| 3.095000        | 26.90            | ---             | 73.00        | 46.10       | 1000.0          | 9.000           | N    | 20.1       |
| 22.400000       | ---              | 25.17           | 60.00        | 34.83       | 1000.0          | 9.000           | N    | 20.2       |
| 22.400000       | 30.47            | ---             | 73.00        | 42.53       | 1000.0          | 9.000           | N    | 20.2       |
| 22.555000       | ---              | 24.40           | 60.00        | 35.60       | 1000.0          | 9.000           | N    | 20.2       |
| 22.555000       | 30.01            | ---             | 73.00        | 42.99       | 1000.0          | 9.000           | N    | 20.2       |

### ◆ Calculation

$$\text{QuasiPeak [dBuV]} / \text{CAverage [dBuV]} = \text{Reading Value [dBuV]} + \text{Corr. [dB]}$$

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

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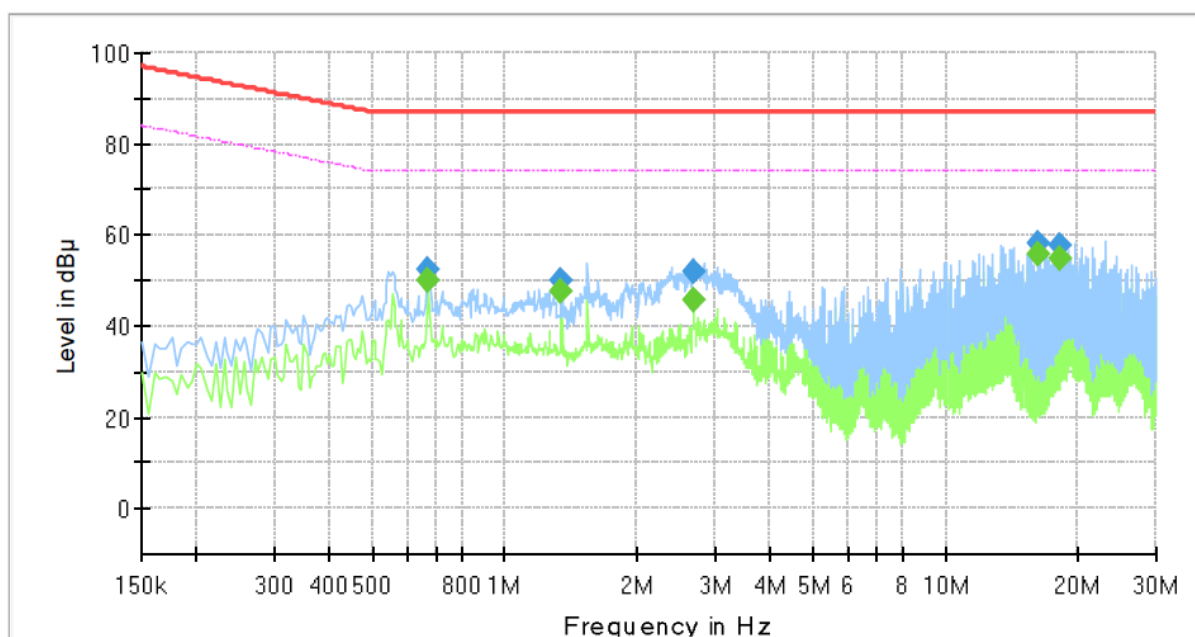
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## Conducted Emissions at Telecommunication Ports

[100 Mbps]

### Common Information

|                   |                            |
|-------------------|----------------------------|
| Test Description: | Telecommunication Emission |
| Model No.:        | HRX-434                    |
| Mode :            | 240 V 50 Hz                |
| 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        | ---              | 50.04           | 74.00        | 23.96       | 1000.0          | 9.000           | Single Line | 19.9       |
| 0.670000        | 52.41            | ---             | 87.00        | 34.59       | 1000.0          | 9.000           | Single Line | 19.9       |
| 1.340000        | ---              | 47.86           | 74.00        | 26.14       | 1000.0          | 9.000           | Single Line | 20.1       |
| 1.340000        | 50.04            | ---             | 87.00        | 36.96       | 1000.0          | 9.000           | Single Line | 20.1       |
| 2.675000        | ---              | 45.74           | 74.00        | 28.26       | 1000.0          | 9.000           | Single Line | 20.1       |
| 2.675000        | 51.83            | ---             | 87.00        | 35.17       | 1000.0          | 9.000           | Single Line | 20.1       |
| 16.165000       | ---              | 55.81           | 74.00        | 18.19       | 1000.0          | 9.000           | Single Line | 19.7       |
| 16.165000       | 58.44            | ---             | 87.00        | 28.56       | 1000.0          | 9.000           | Single Line | 19.7       |
| 18.245000       | ---              | 55.03           | 74.00        | 18.97       | 1000.0          | 9.000           | Single Line | 19.9       |
| 18.245000       | 57.93            | ---             | 87.00        | 29.07       | 1000.0          | 9.000           | Single Line | 19.9       |

#### ◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

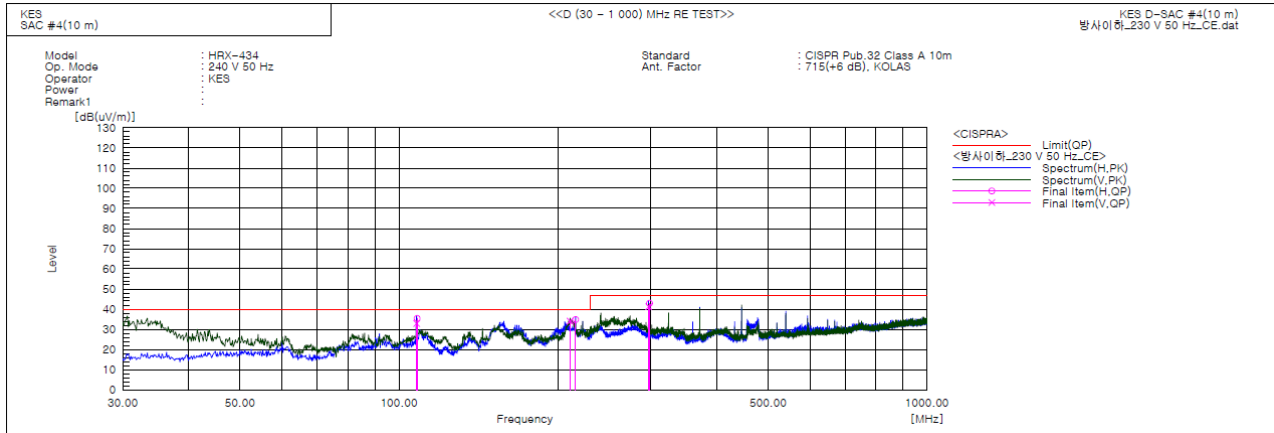
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## Radiated Electric Field Emissions(Below 1 GHz)



### Final Result

| No. | Frequency [MHz] | (P) | Reading QP [dB(μV)] | c.f [dB(1/m)] | Result QP [dB(μV/m)] | Limit QP [dB(μV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] | Remark |
|-----|-----------------|-----|---------------------|---------------|----------------------|---------------------|----------------|-------------|-------------|--------|
| 1   | 107.964         | V   | 55.3                | -22.4         | 32.9                 | 40.0                | 7.1            | 105.0       | 294.0       |        |
| 2   | 108.265         | H   | 57.8                | -22.4         | 35.4                 | 40.0                | 4.6            | 306.0       | 305.0       |        |
| 3   | 210.905         | V   | 54.6                | -20.5         | 34.1                 | 40.0                | 5.9            | 192.0       | 162.0       |        |
| 4   | 215.998         | H   | 55.1                | -20.3         | 34.8                 | 40.0                | 5.2            | 391.0       | 20.0        |        |
| 5   | 296.993         | V   | 59.3                | -18.0         | 41.3                 | 47.0                | 5.7            | 109.0       | 229.0       |        |
| 6   | 298.112         | H   | 60.9                | -18.0         | 42.9                 | 47.0                | 4.1            | 400.0       | 16.0        |        |

### ◆ Calculation

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

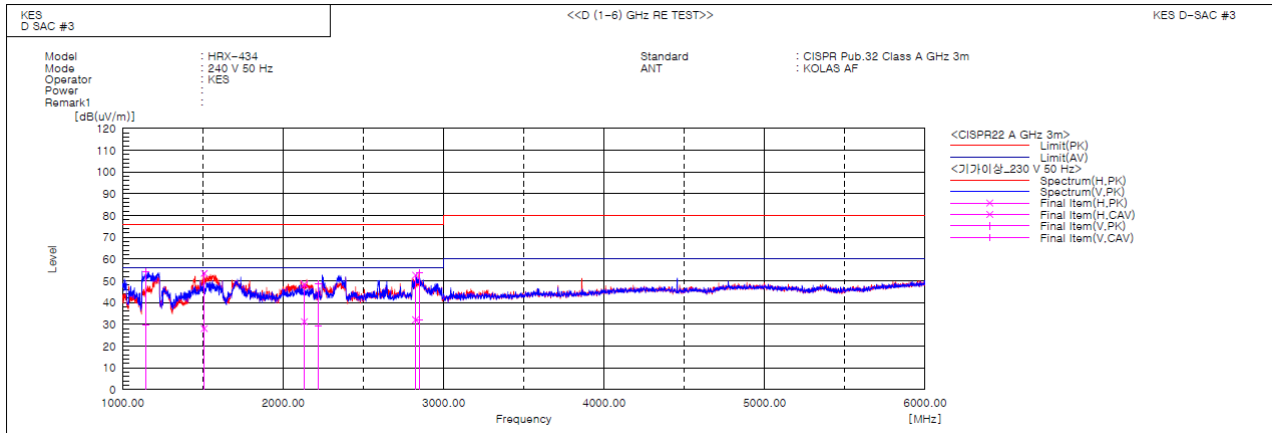
Margin(QP)[dB] = Limit[dB(μV/m)] - Result(QP) [dB(μV/m)]

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



## 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   | 1146.665        | V   | 62.7                | 38.3                 | -8.6          | 54.1                 | 29.7                  | 76.0                | 56.0                | 21.9           | 26.3            | 100.0       | 346.4       |        |
| 2   | 1508.930        | H   | 59.4                | 34.1                 | -6.0          | 53.4                 | 28.1                  | 76.0                | 56.0                | 22.6           | 27.9            | 100.0       | 307.0       |        |
| 3   | 2132.563        | H   | 49.0                | 31.8                 | -0.6          | 48.4                 | 31.2                  | 76.0                | 56.0                | 27.6           | 24.8            | 100.0       | 44.3        |        |
| 4   | 2220.335        | V   | 49.1                | 29.9                 | -0.6          | 48.5                 | 29.3                  | 76.0                | 56.0                | 27.5           | 26.7            | 100.0       | 330.2       |        |
| 5   | 2848.737        | V   | 51.3                | 29.8                 | 2.3           | 53.6                 | 32.1                  | 76.0                | 56.0                | 22.4           | 23.9            | 100.0       | 310.6       |        |
| 6   | 2825.704        | H   | 50.2                | 29.7                 | 2.4           | 52.6                 | 32.1                  | 76.0                | 56.0                | 23.4           | 23.9            | 100.0       | 332.4       |        |

### ◆ 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

## Test Setup Photos and Configuration

### Conducted Emissions at Mains Power Ports



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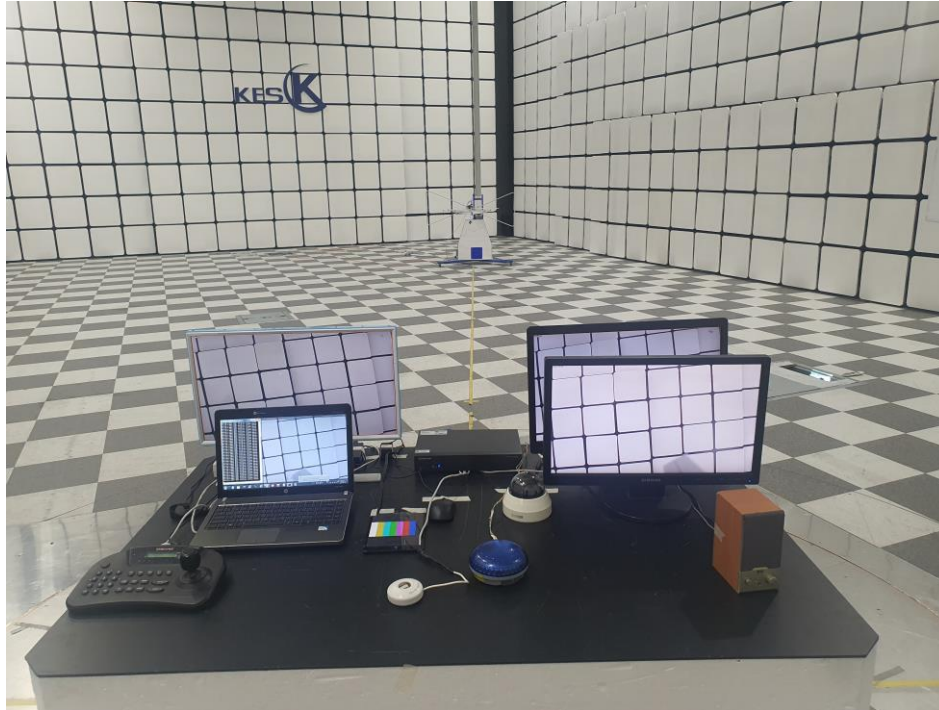


## Conducted Emissions at Telecommunication Ports



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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)

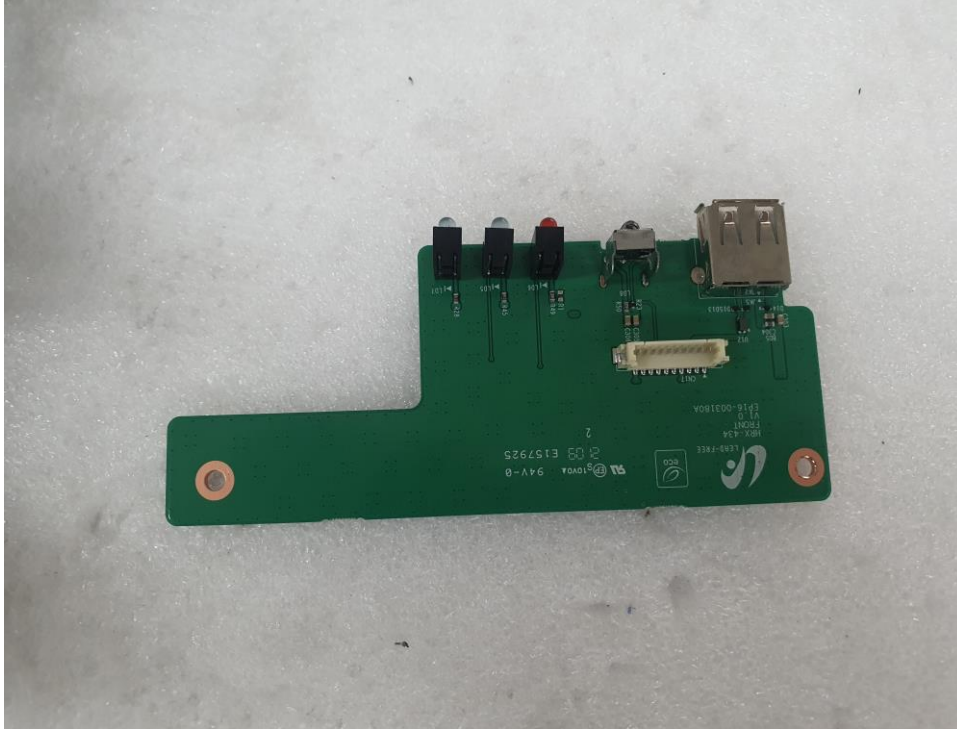


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**EUT Internal View – Board 1**

(Top)



(Bottom)



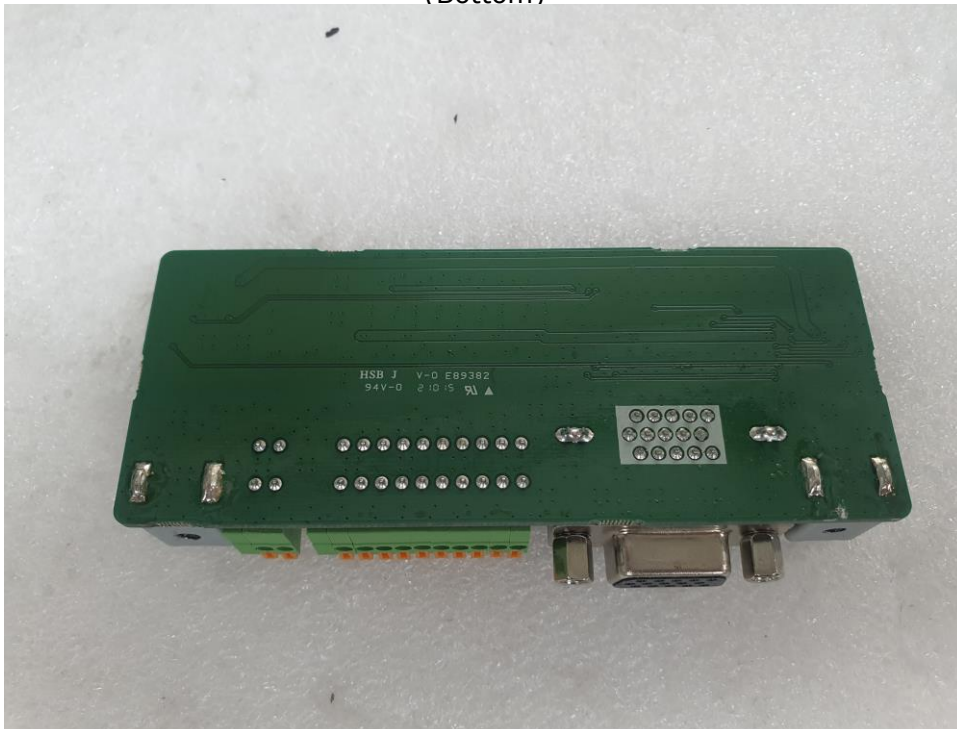
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**EUT Internal View – Board 2**

(Top)



(Bottom)



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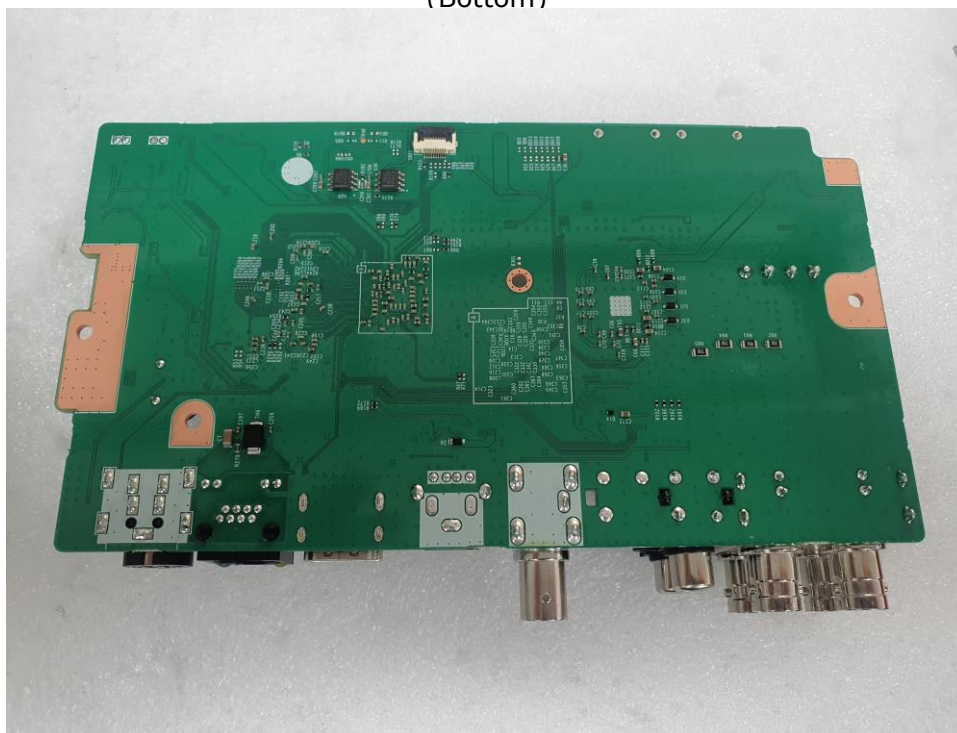


**EUT Internal View – Board 3**

(Top)



(Bottom)



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**EUT Internal View – HDD**

(Top)



(Bottom)

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