



## EMC TEST REPORT

Test Report No. : KES-EM-22T0339  
Date of Issue : Apr. 12, 2022  
Product name : NVR  
Model/Type No. : QRN-830S  
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)  
Equipment authorization : **Supplier's Declaration of Conformity**  
Date of Receipt : Mar. 24, 2022  
Test date : Mar. 28, 2022 ~ Mar. 30, 2022  
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.

**KES Co., Ltd.**

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**REPORT REVISION HISTORY**

| Date          | Test Report No. | Revision History |
|---------------|-----------------|------------------|
| Apr. 12, 2022 | KES-EM-22T0339  | Issued           |
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## 1.0 General Product Description

### Main Specifications of EUT are:

|                             |                       |                                                                                                                        |
|-----------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Display</b>              |                       |                                                                                                                        |
| Video                       | Inputs                | Max. 8CH                                                                                                               |
|                             | Resolution            | CIF ~ 8MP                                                                                                              |
|                             | Protocols             | sunapi, ONVIF                                                                                                          |
| Live                        | Local Display         | HDMI1 : 3840x2160 30Hz                                                                                                 |
|                             | Multi Screen Display  | [Local Monitor]<br>Dynamic layout                                                                                      |
|                             | Resolution            | [Local Monitor]<br>8M(60fps), 1080p(240fps), 720P(240fps),<br>D1(240fps)                                               |
| <b>Intelligent Analysis</b> |                       |                                                                                                                        |
| Search                      | Object image          | N/A                                                                                                                    |
| Comparision                 | Event Trigger         | N/A                                                                                                                    |
| Attribute (AI)              | Person                | N/A                                                                                                                    |
|                             | Face                  | N/A                                                                                                                    |
|                             | Vehicle               | N/A                                                                                                                    |
| <b>Performance</b>          |                       |                                                                                                                        |
| System                      | Operating System      | Linux                                                                                                                  |
|                             | Processor             | NT98336                                                                                                                |
| Record                      | Compression           | H.265, H.264, MJPEG, WiseStream(H.265,<br>H.264)                                                                       |
|                             | Recording Bandwidth   | 80Mbps                                                                                                                 |
|                             | Resolution            | CIF ~ 8MP                                                                                                              |
|                             | Mode                  | Normal, Dual Stream,<br>Schedule(Continuous/Event),<br>Event (Pre/Post), Bookmark                                      |
|                             | Event Trigger         | Alarm Input, Video Loss,<br>Camera Event(Sensor, MD, Video Analytics,<br>Defocus, Audio),<br>Dynamic Event, User Event |
|                             | Event Action          | e-Mail, Event Push, PTZ Preset, Alarm Out,<br>Buzzer, Monitor Out, FTP,<br>SUNAPI Command, Shutdown                    |
| Search & Play               | Playback Bandwidth    | Max 32Mbps                                                                                                             |
|                             | User                  | Max. 4 Users (Local 1, Remote 3)                                                                                       |
|                             | Mode                  | Time, Event, Text, Export, ARB, Bookmark                                                                               |
|                             | Simultaneous playback | Max 32CH<br>- Set : 8CH<br>- Remote : 8CH Per User                                                                     |
|                             | Resolution            | CIF ~ 8MP                                                                                                              |
|                             | Fisheye Dewarping     | No                                                                                                                     |
|                             | Playback Control      | Fast/Slow Forward / Backward, Move one<br>step Up / Down                                                               |
| Storage                     | Built-In              | 2TB ~ 6TB                                                                                                              |
|                             | Internal HDD          | 1ea (Max 6TB)                                                                                                          |

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|                        |                     |                                                                                                                                                                                                                                                       |
|------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        | External            | N/A                                                                                                                                                                                                                                                   |
|                        | RAID                | N/A                                                                                                                                                                                                                                                   |
| Backup                 | File backup         | BU/AVI(GUI), JPG/AVI(Network)                                                                                                                                                                                                                         |
|                        | Function            | Multi channel(Upto 8 CH) Play, Date-Time/Title display                                                                                                                                                                                                |
| Sensor                 | I/O                 | N/A                                                                                                                                                                                                                                                   |
| Audio                  | Input/Output        | 8CH (network)                                                                                                                                                                                                                                         |
|                        | Compression         | G.711, G.726, AAC(16/48KHz)                                                                                                                                                                                                                           |
|                        | Audio Communication | 2-Way                                                                                                                                                                                                                                                 |
| <b>Network</b>         |                     |                                                                                                                                                                                                                                                       |
| Interface              |                     | 8 Port PoE, RJ-45(1 Gbps)                                                                                                                                                                                                                             |
| 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), FTP SUNAPI(Server, Client)                                                                      |
| DDNS                   |                     | Hanwha DDNS                                                                                                                                                                                                                                           |
| Transmission Bandwidth |                     | 80Mbps                                                                                                                                                                                                                                                |
| 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, <del>Swedish</del> , Czech, Portuguese, Danish, Rumanian, Serbian, Croatian, Hungarian, Greek, Norwegian, Finnish, Korean, Chinese, Japanese, Thai, Vietnam               |
| OS                     |                     | Windows 10, Mac OS 11 Big Sur and later                                                                                                                                                                                                               |
| Web Browser            |                     | Chrome v99 or above, Edge v99 or above, Safari v14.0.3 or above                                                                                                                                                                                       |
| Viewer Software        | Type                | WAVE(Sunapi 연동), SSM, Webviewer, Smart Viewer, Wisenet Viewer, Wisenet Mobile                                                                                                                                                                         |
|                        | CMS Support         | Support 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 |

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|                                  |                   |                                                              |
|----------------------------------|-------------------|--------------------------------------------------------------|
| PTZ                              | Control           | Via GUI, Webviewer                                           |
|                                  | Preset            | 300 Presets                                                  |
| Smart phone                      | Support Model     | iOS, Android                                                 |
|                                  | Protocol Support  | RTP, RTSP, HTTP, CGI(SUNAPI)                                 |
|                                  | Control           | Live : Multi-Profile Support<br>Multi Channel Playback       |
|                                  | Max. Remote Users | Search (3), Live Unicast (10)                                |
| Redundancy                       | Failover          | N+1                                                          |
|                                  | ARB               | Yes                                                          |
| Easy configuration               |                   | P2P(QR code)                                                 |
| System Control                   |                   | Mouse, Keyboard, Web                                         |
| <b>Indicator/Interface</b>       |                   |                                                              |
| Front                            | Indicator         | LED(Status indicator) :<br>- Power(1), Record(1), Network(1) |
| Connectors                       | HDMI              | 1 EA                                                         |
|                                  | VGA               | N/A                                                          |
|                                  | Audio             | N/A                                                          |
|                                  | Ethernet          | PoE RJ-45(LAN, 10/100) 8 ea ,RJ-45 1ea<br>(WAN, 1Gbps)       |
|                                  | Alarm             | N/A                                                          |
|                                  | USB               | 2EA(Front 2, USB 2.0)                                        |
|                                  | Storage           | N/A                                                          |
|                                  | Serial            | N/A                                                          |
|                                  | Reset             | Switch(1EA, PW clear)                                        |
|                                  | Power Cord        | DC Adaptor                                                   |
|                                  | POE Budget        | Max. 65W                                                     |
| <b>System</b>                    |                   |                                                              |
| Log                              | Log List          | Max. 100,000 (System, Event each log)                        |
| <b>Environmental</b>             |                   |                                                              |
| Operating Temperature / Humidity |                   | +0°C to +40°C(+32°F to +104°F)                               |
| Humidity                         |                   | 20% ~ 85% RH                                                 |
| Noise                            |                   | 47 db                                                        |
| <b>Electrical</b>                |                   |                                                              |
| Power                            |                   | 54VDC / 1.55A                                                |
| Power Consumption                |                   | Max 84W(1HDD, PoE ON)                                        |
| <b>Mechanical</b>                |                   |                                                              |
| Color / Material                 |                   | Black                                                        |
| Dimension (WxHxD)                |                   | 300*47.6*238.9 (300*44*238.9 FOOT except)                    |
| Weight                           |                   | 1,324g                                                       |

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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 120 V, 60 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 |
|---------------|--------------|---------------|------------------------------------------------|---------|
| NVR           | QRN-830S     | -             | HANWHA TECHWIN<br>SECURITY VIETNAM<br>CO.,LTD. | EUT     |
| Mouse         | MOKJUO       | -             | Primax Electronics Ltd.                        | -       |
| AC/DC Adapter | FSP090-AWAN3 | -             | Zhonghan<br>Electronics(Shenzhen)<br>Co., Ltd. | -       |

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## 1.5 Support Equipments

| Description       | Model Number | Serial Number       | Manufacturer                                   | Remarks |
|-------------------|--------------|---------------------|------------------------------------------------|---------|
| Camera1           | QNV-6023R    | -                   | HANWHA TECHWIN<br>SECURITY VIETNAM<br>CO.,LTD. | -       |
| Camera2           | QNV-6023R    | -                   | HANWHA TECHWIN<br>SECURITY VIETNAM<br>CO.,LTD. | -       |
| Camera3           | QNV-6024RM   | -                   | HANWHA TECHWIN<br>SECURITY VIETNAM<br>CO.,LTD. | -       |
| Camera4           | QNV-6023R    | -                   | HANWHA TECHWIN<br>SECURITY VIETNAM<br>CO.,LTD. | -       |
| Camera5           | QNV-6020RN   | -                   | HANWHA TECHWIN<br>SECURITY VIETNAM<br>CO.,LTD. | -       |
| Camera6           | -            | -                   | HANWHA TECHWIN<br>SECURITY VIETNAM<br>CO.,LTD. | -       |
| Camera7           | LND-6070R    | -                   | HANWHA TECHWIN<br>SECURITY VIETNAM<br>CO.,LTD. | -       |
| Camera8           | SND-7084N    | -                   | HANWHA TECHWIN<br>SECURITY VIETNAM<br>CO.,LTD. | -       |
| Laptop            | P95G001      | 8KM8HT2             | DELL INC.                                      | -       |
| Laptop<br>Adapter | LA65NS2-01   | -                   | LITE-ON<br>TECHNOLOGY(CHANGZ<br>HOU)CO.,LTD.   | -       |
| Monitor           | SMT-2232     | C95V67VF90002<br>5B | Weihai Daewoo<br>Electronics Co., Ltd.         | -       |
| HDD               | 810051       | WXA2D91C1YPU        | WESTERN DIGITAL<br>TECHNOLOGIES, INC.          | 4 TB    |
| USB Memory        | -            | -                   | Sandisk                                        | 32 GB   |

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## 1.6 External I/O Cabling

| Start        |                | END                    |                | Cable Spec. |        |
|--------------|----------------|------------------------|----------------|-------------|--------|
| Description  | I/O Port       | Description            | I/O Port       | Length      | Shield |
| NVR<br>(EUT) | RJ-45<br>(PoE) | Camera1                | RJ-45<br>(PoE) | 3.0         | U      |
|              | RJ-45<br>(PoE) | Camera2                | RJ-45<br>(PoE) | 10.0        | U      |
|              | RJ-45<br>(PoE) | Camera3                | RJ-45<br>(PoE) | 10.0        | U      |
|              | RJ-45<br>(PoE) | Camera4                | RJ-45<br>(PoE) | 10.0        | U      |
|              | RJ-45<br>(PoE) | Camera5                | RJ-45<br>(PoE) | 10.0        | U      |
|              | RJ-45<br>(PoE) | Camera6                | RJ-45<br>(PoE) | 10.0        | U      |
|              | RJ-45<br>(PoE) | Camera7                | RJ-45<br>(PoE) | 10.0        | U      |
|              | RJ-45<br>(PoE) | Camera8                | RJ-45<br>(PoE) | 10.0        | U      |
|              | RJ-45<br>(LAN) | Laptop                 | RJ-45<br>(LAN) | 3.0         | U      |
|              | USB            | Mouse<br>(EUT)         | USB            | 1.4         | U      |
|              | USB            | USB Memory             | USB            | -           | -      |
|              | HDMI           | Monitor                | HDMI           | 1.5         | S      |
|              | grounding      | grounding              | grounding      | 1.2         | -      |
|              | SATA           | HDD                    | SATA           | 0.2         | U      |
|              | DC Jack        | AC/DC Adapter<br>(EUT) | DC Jack        | 1.6         | U      |
| Laptop       | DC Jack        | Laptop<br>Adapter      | DC Jack        | 1.6         | U      |

\* Unshielded=U, Shielded=S

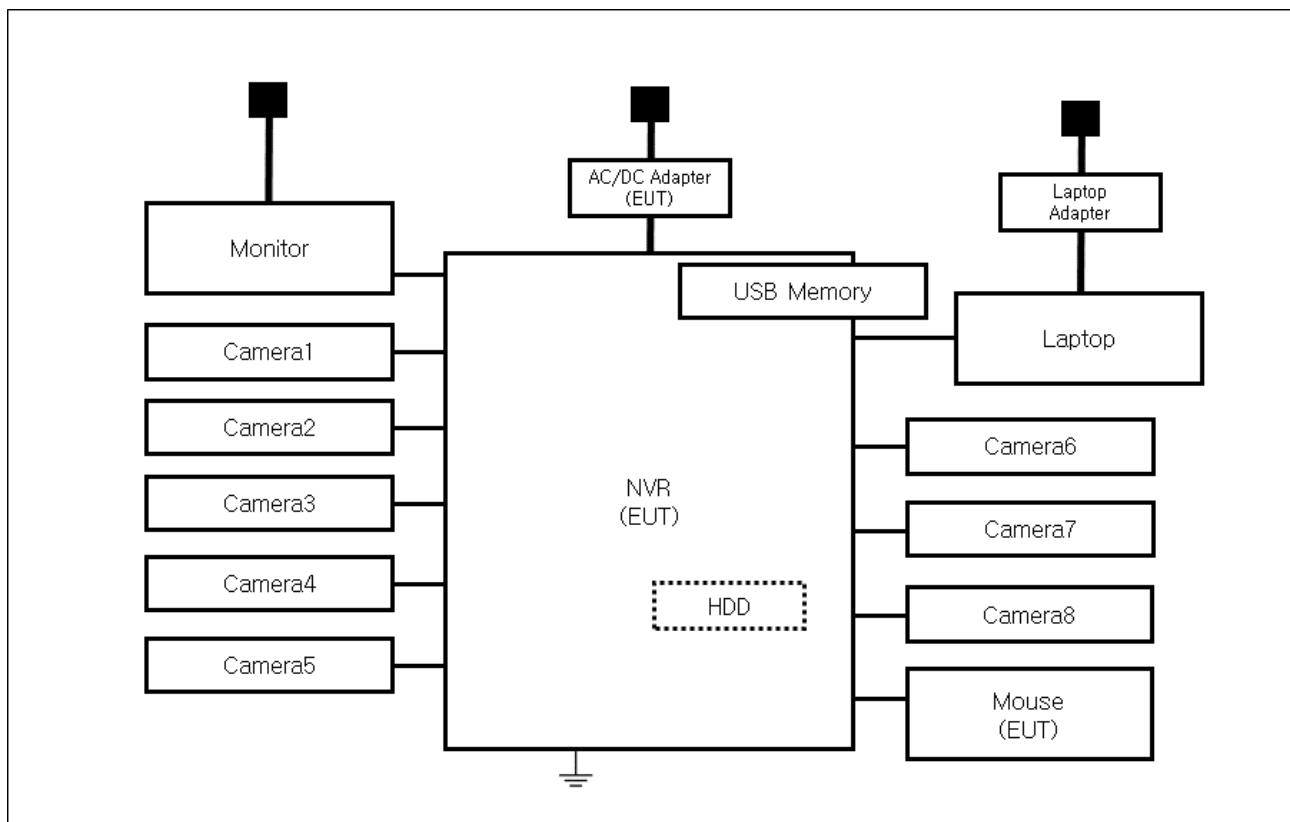
## 1.7 EUT Operating Mode(s)

| Test Mode      | operating                                                                                                     |
|----------------|---------------------------------------------------------------------------------------------------------------|
| Operation Mode | EUT Monitoring, Ping Test<br>after testing, check if the recording is normally done on the HDD and USB Memory |

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

## 1.8 Configuration

■ AC Main  
 □ DC Main



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## 1.9 Remarks when standards applied

N/A

## 1.10 Calibration Details of Equipment Used for Measurement

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

## 1.11 Test Facility

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

## 1.12 Laboratory Accreditations and Listings

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

☒ **47 CFR Part 15, Subpart B**

☐ CISPR 22:2009 +A1:2010

☐ Class A

☐ Class B

☒ ANSI C63.4a-2017

☒ Class A

☐ Class B

☒ **IC Regulation ICES-003 Issue 7**

☐ CAN/CSA-CISPR 32:17

☐ Class A

☐ Class B

☒ ANSI C63.4a-2017

☒ Class A

☐ Class B



## 2.1 Conducted Emissions at Mains Power Ports

### Test Date

Mar. 28, 2022

### Test Location

Electro wave Shieldroom #6

### Test Equipment

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

### Test Conditions

Temperature: (24,9 ± 0,1) °C

Relative Humidity: (44,8 ± 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.



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

### Test Date

Mar. 29, 2022

### Test Location

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

### Test Equipment

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

### Test Conditions

Temperature: (24,9 ± 0,2) °C  
Relative Humidity: (44,7 ± 0,3) % 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.



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

### Test Date

Mar. 30, 2022

### Test Location

SEMI ANECHOIC CHAMBER #5

### Test Equipment

| Used                                | Description       | Model Number | Manufacturer     | Serial Number | Cal. Due     |
|-------------------------------------|-------------------|--------------|------------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test S/W      | EP5/RE       | TOYO Corporation | 6.0.120       | -            |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER | ESU26        | Rohde & Schwarz  | 100552        | 03, 31, 2023 |
| <input checked="" type="checkbox"/> | HORN ANTENNA      | BBHA 9120D   | SCHWARZBECK      | 9120D-1802    | 12, 16, 2022 |
| <input checked="" type="checkbox"/> | PREAMPLIFIER      | 8449B        | HP               | 3008A00538    | 06, 21, 2022 |

### Test Conditions

Temperature: (25,2 ± 0,2) °C

Relative Humidity: (46,5 ± 0,4) % R.H.

### Frequency Range of Measurement

1 GHz to 5 GHz

### Instrument Settings

IF Band Width: 1 MHz

### Test Results

The requirements are:

- ☒ PASS  
☐ NOT PASS  
☐ NOT APPLICABLE

### Remarks

See Appendix A for test data.

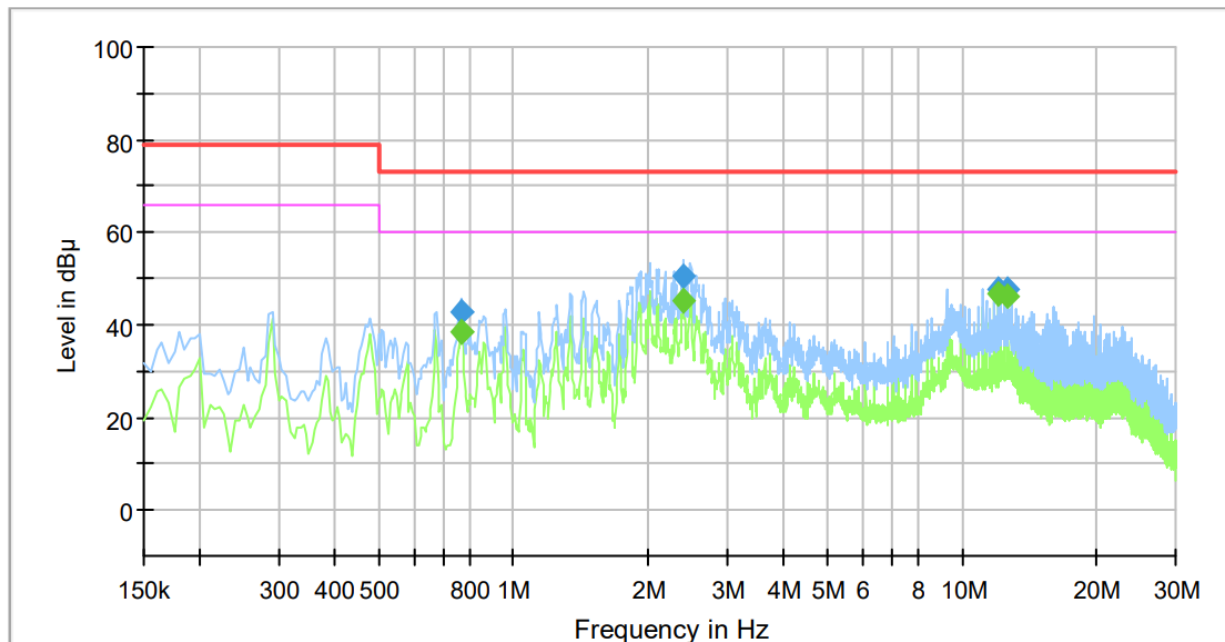


## APPENDIX A – TEST DATA

### Conducted Emissions at Mains Power Ports HOT LINE

#### Common Information

Test Description: Conducted Emission  
Model No.: QRN-830S  
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) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.765000        | ---              | 38.70           | 60.00        | 21.30       | 1000.0          | 9.000           | L1   | 20.0       |
| 0.765000        | 42.81            | ---             | 73.00        | 30.19       | 1000.0          | 9.000           | L1   | 20.0       |
| 2.395000        | ---              | 45.14           | 60.00        | 14.86       | 1000.0          | 9.000           | L1   | 20.3       |
| 2.395000        | 50.68            | ---             | 73.00        | 22.32       | 1000.0          | 9.000           | L1   | 20.3       |
| 12.005000       | ---              | 46.52           | 60.00        | 13.48       | 1000.0          | 9.000           | L1   | 20.0       |
| 12.005000       | 47.69            | ---             | 73.00        | 25.31       | 1000.0          | 9.000           | L1   | 20.0       |
| 12.685000       | ---              | 46.41           | 60.00        | 13.59       | 1000.0          | 9.000           | L1   | 19.9       |
| 12.685000       | 47.77            | ---             | 73.00        | 25.23       | 1000.0          | 9.000           | L1   | 19.9       |



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www.kes.co.kr

Report No.:

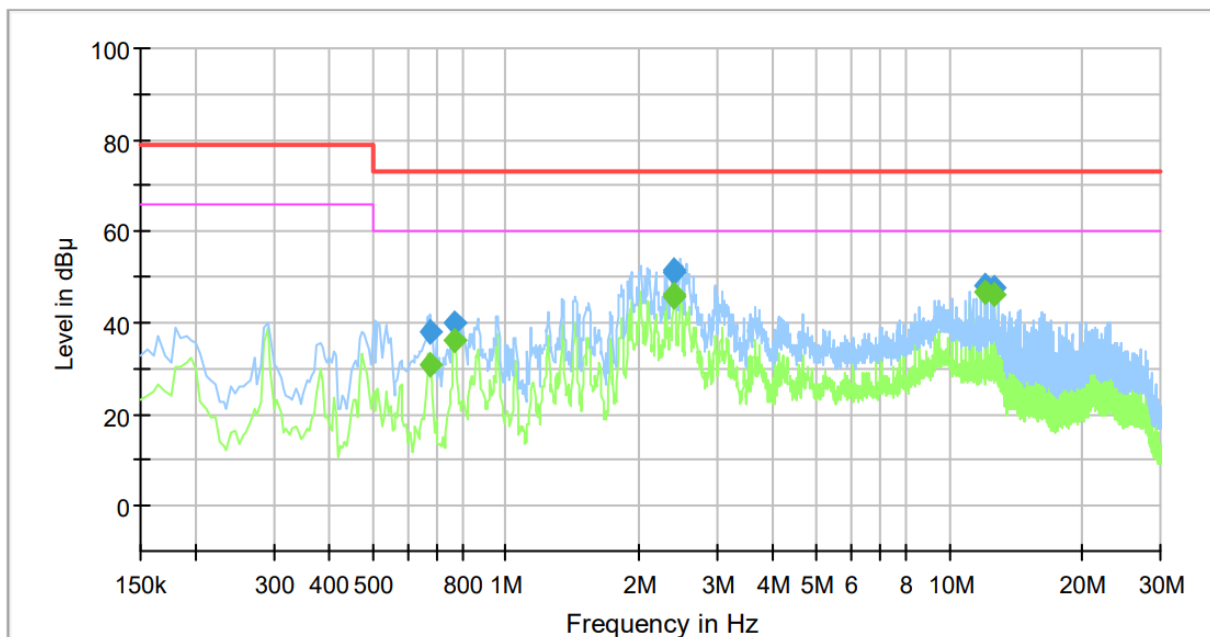
KES-EM-22T0339

Page (17) of (32)

### NEUTRAL LINE

## Common Information

Test Description: Conducted Emission  
Model No.: QRN-830S  
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) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.675000        | ---              | 30.73           | 60.00        | 29.27       | 1000.0          | 9.000           | N    | 19.9       |
| 0.675000        | 38.11            | ---             | 73.00        | 34.89       | 1000.0          | 9.000           | N    | 19.9       |
| 0.765000        | ---              | 36.19           | 60.00        | 23.81       | 1000.0          | 9.000           | N    | 20.0       |
| 0.765000        | 39.93            | ---             | 73.00        | 33.07       | 1000.0          | 9.000           | N    | 20.0       |
| 2.390000        | ---              | 45.93           | 60.00        | 14.07       | 1000.0          | 9.000           | N    | 20.3       |
| 2.390000        | 51.17            | ---             | 73.00        | 21.83       | 1000.0          | 9.000           | N    | 20.3       |
| 2.395000        | ---              | 46.39           | 60.00        | 13.61       | 1000.0          | 9.000           | N    | 20.3       |
| 2.395000        | 51.72            | ---             | 73.00        | 21.28       | 1000.0          | 9.000           | N    | 20.3       |
| 12.005000       | ---              | 46.72           | 60.00        | 13.28       | 1000.0          | 9.000           | N    | 20.0       |
| 12.005000       | 48.11            | ---             | 73.00        | 24.89       | 1000.0          | 9.000           | N    | 20.0       |
| 12.685000       | ---              | 46.42           | 60.00        | 13.58       | 1000.0          | 9.000           | N    | 19.9       |
| 12.685000       | 47.60            | ---             | 73.00        | 25.40       | 1000.0          | 9.000           | N    | 19.9       |

### ◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

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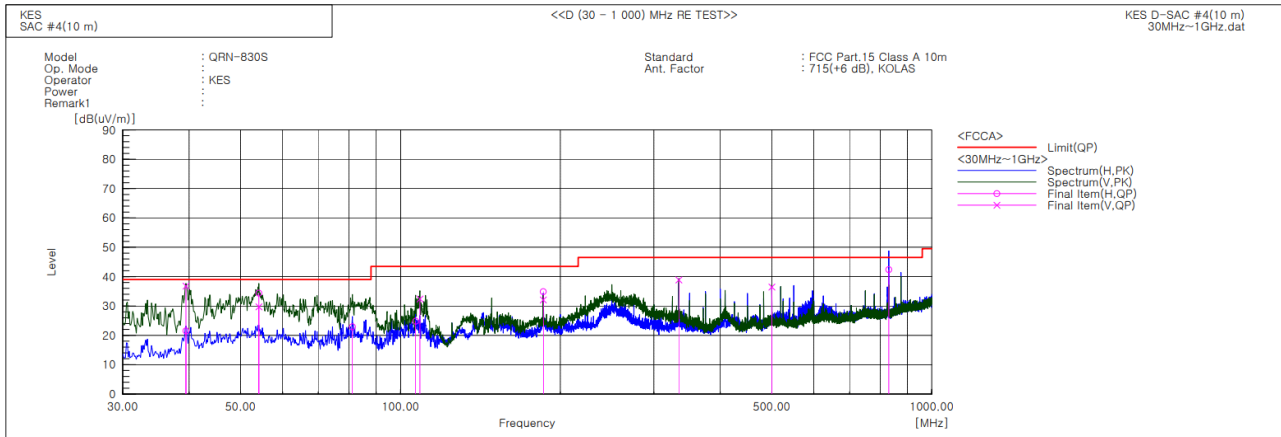
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## Radiated Electric Field Emissions(Below 1 GHz)

- 47 CFR Part 15, Subpart B



### Final Result

| No. | Frequency [MHz] | (P) | Reading QP [dB(uV)] | c.f [dB(1/m)] | Result QP [dB(uV/m)] | Limit QP [dB(uV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] | Remark |
|-----|-----------------|-----|---------------------|---------------|----------------------|---------------------|----------------|-------------|-------------|--------|
| 1   | 39.458          | H   | 44.3                | -22.8         | 21.5                 | 39.0                | 17.5           | 147.0       | 36.0        |        |
| 2   | 39.475          | V   | 59.6                | -22.8         | 36.8                 | 39.0                | 2.2            | 112.0       | 352.0       |        |
| 3   | 54.129          | V   | 51.0                | -21.3         | 29.7                 | 39.0                | 9.3            | 100.0       | 217.0       |        |
| 4   | 54.130          | H   | 55.7                | -21.3         | 34.4                 | 39.0                | 4.6            | 167.0       | 296.0       |        |
| 5   | 81.168          | H   | 50.5                | -27.6         | 22.9                 | 39.0                | 16.1           | 332.0       | 35.0        |        |
| 6   | 106.751         | H   | 47.2                | -22.4         | 24.8                 | 43.5                | 18.7           | 289.0       | 242.0       |        |
| 7   | 108.813         | V   | 54.8                | -22.4         | 32.4                 | 43.5                | 11.1           | 100.0       | 294.0       |        |
| 8   | 185.564         | H   | 57.7                | -22.8         | 34.9                 | 43.5                | 8.6            | 389.0       | 98.0        |        |
| 9   | 185.571         | V   | 54.9                | -22.8         | 32.1                 | 43.5                | 11.4           | 112.0       | 263.0       |        |
| 10  | 334.095         | V   | 54.8                | -15.9         | 38.9                 | 46.5                | 7.6            | 100.0       | 163.0       |        |
| 11  | 499.965         | V   | 48.0                | -11.5         | 36.5                 | 46.5                | 10.0           | 100.0       | 28.0        |        |
| 12  | 830.129         | H   | 48.7                | -6.3          | 42.4                 | 46.5                | 4.1            | 265.0       | 242.0       |        |

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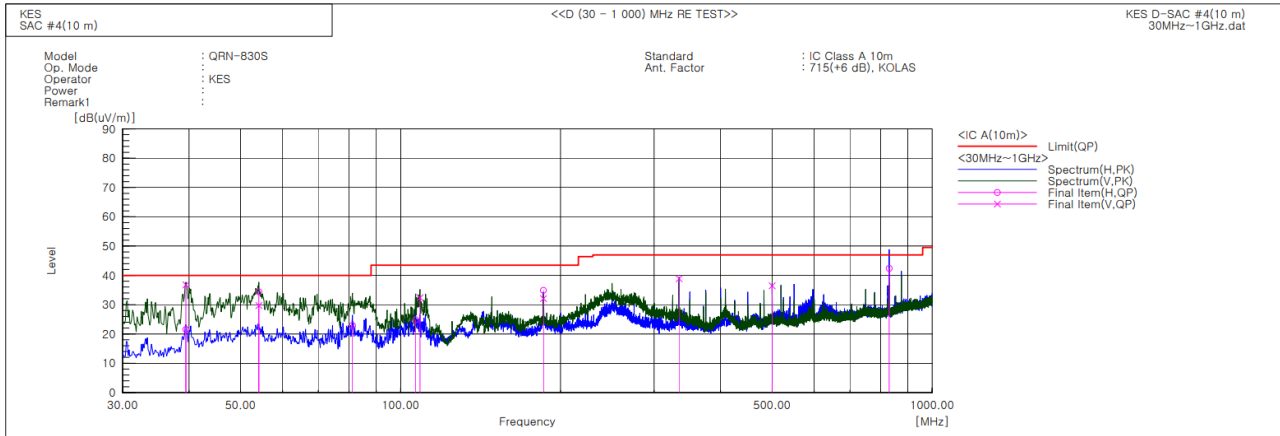


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Report No.:  
KES-EM-22T0339  
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## - IC Regulation ICES-003 Issue 7



### Final Result

| No. | Frequency [MHz] | (P) | Reading QP [dB(uV)] | c.f [dB(1/m)] | Result QP [dB(uV/m)] | Limit QP [dB(uV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] | Remark |
|-----|-----------------|-----|---------------------|---------------|----------------------|---------------------|----------------|-------------|-------------|--------|
| 1   | 39.458          | H   | 44.3                | -22.8         | 21.5                 | 40.0                | 18.5           | 147.0       | 36.0        |        |
| 2   | 39.475          | V   | 59.6                | -22.8         | 36.8                 | 40.0                | 3.2            | 112.0       | 352.0       |        |
| 3   | 54.129          | V   | 51.0                | -21.3         | 29.7                 | 40.0                | 10.3           | 100.0       | 217.0       |        |
| 4   | 54.130          | H   | 55.7                | -21.3         | 34.4                 | 40.0                | 5.6            | 167.0       | 296.0       |        |
| 5   | 81.168          | H   | 50.5                | -27.6         | 22.9                 | 40.0                | 17.1           | 332.0       | 35.0        |        |
| 6   | 106.751         | H   | 47.2                | -22.4         | 24.8                 | 43.5                | 18.7           | 289.0       | 242.0       |        |
| 7   | 108.813         | V   | 54.8                | -22.4         | 32.4                 | 43.5                | 11.1           | 100.0       | 294.0       |        |
| 8   | 185.564         | H   | 57.7                | -22.8         | 34.9                 | 43.5                | 8.6            | 389.0       | 98.0        |        |
| 9   | 185.571         | V   | 54.9                | -22.8         | 32.1                 | 43.5                | 11.4           | 112.0       | 263.0       |        |
| 10  | 334.095         | V   | 54.8                | -15.9         | 38.9                 | 47.0                | 8.1            | 100.0       | 163.0       |        |
| 11  | 499.965         | V   | 48.0                | -11.5         | 36.5                 | 47.0                | 10.5           | 100.0       | 28.0        |        |
| 12  | 830.129         | H   | 48.7                | -6.3          | 42.4                 | 47.0                | 4.6            | 265.0       | 242.0       |        |

### ◆ Calculation - SAC #4(10 m)

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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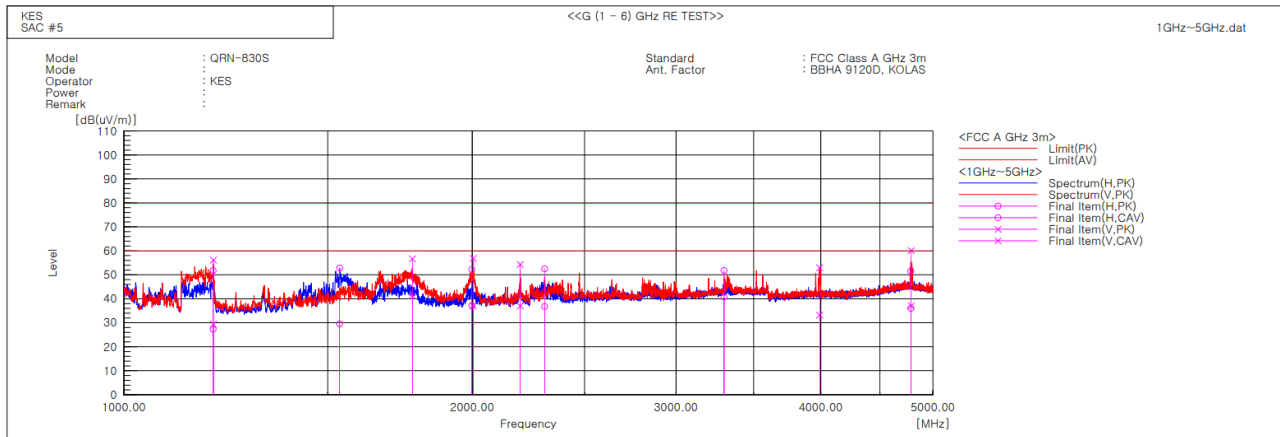
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KES-EM-22T0339

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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   | 1194.375        | H   | 58.5                | 34.0                 | -6.7          | 51.8                 | 27.3                  | 80.0                | 60.0                | 28.2           | 32.7            | 118.0       | 309.6       |        |
| 2   | 1195.000        | V   | 62.9                | 36.1                 | -6.7          | 56.2                 | 29.4                  | 80.0                | 60.0                | 23.8           | 30.6            | 245.0       | 5.6         |        |
| 3   | 1536.250        | H   | 57.6                | 34.4                 | -4.8          | 52.8                 | 29.6                  | 80.0                | 60.0                | 27.2           | 30.4            | 100.0       | 351.9       |        |
| 4   | 1775.000        | V   | 60.5                | 45.1                 | -3.8          | 56.7                 | 41.3                  | 80.0                | 60.0                | 23.3           | 18.7            | 112.0       | 54.8        |        |
| 5   | 1998.125        | H   | 55.0                | 39.9                 | -2.8          | 52.2                 | 37.1                  | 80.0                | 60.0                | 27.8           | 22.9            | 199.0       | 349.6       |        |
| 6   | 2003.125        | V   | 59.7                | 39.9                 | -2.8          | 56.9                 | 37.1                  | 80.0                | 60.0                | 23.1           | 22.9            | 357.0       | 6.5         |        |
| 7   | 2200.000        | V   | 56.6                | 39.3                 | -2.3          | 54.3                 | 37.0                  | 80.0                | 60.0                | 25.7           | 23.0            | 112.0       | 1.8         |        |
| 8   | 2309.375        | H   | 54.4                | 38.7                 | -1.9          | 52.5                 | 36.8                  | 80.0                | 60.0                | 27.5           | 23.2            | 100.0       | 60.1        |        |
| 9   | 3300.000        | H   | 50.2                | 39.2                 | 1.6           | 51.8                 | 40.8                  | 80.0                | 60.0                | 28.2           | 19.2            | 164.0       | 65.7        |        |
| 10  | 3989.375        | V   | 49.9                | 30.1                 | 3.1           | 53.0                 | 33.2                  | 80.0                | 60.0                | 27.0           | 26.8            | 257.0       | 149.2       |        |
| 11  | 4785.000        | H   | 45.1                | 29.5                 | 6.5           | 51.6                 | 36.0                  | 80.0                | 60.0                | 28.4           | 24.0            | 400.0       | 26.8        |        |
| 12  | 4787.500        | V   | 53.5                | 30.5                 | 6.6           | 60.1                 | 37.1                  | 80.0                | 60.0                | 19.9           | 22.9            | 100.0       | 154.0       |        |

### ◆ Calculation

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

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

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

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

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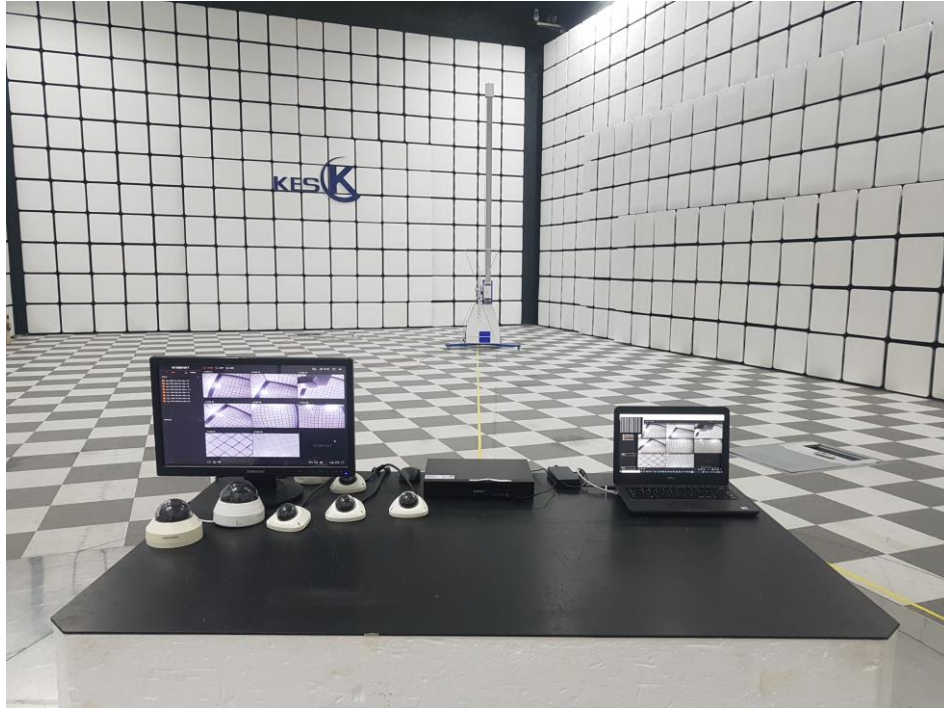
## Test Setup Photos and Configuration

### Conducted Emissions at Mains Power Ports



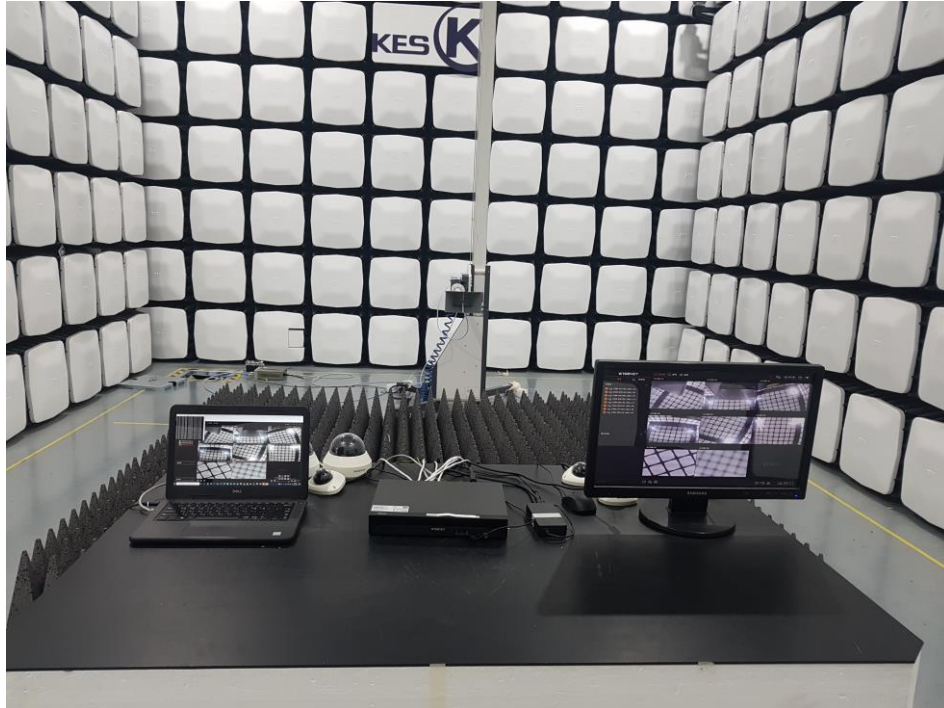
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## Radiated Electric Field Emissions(Below 1 GHz)



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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)



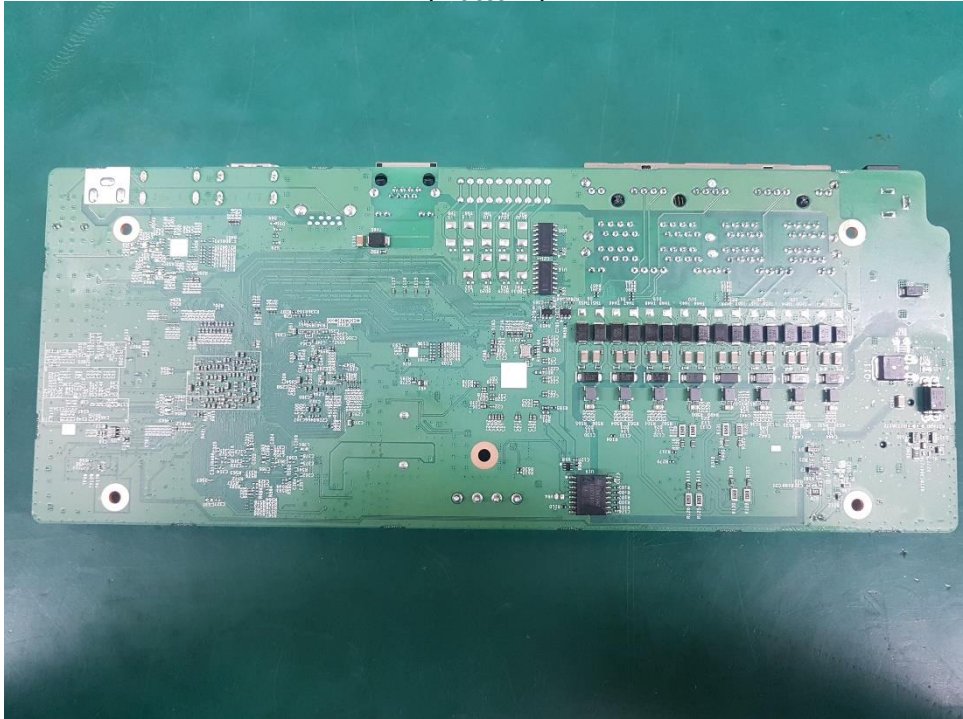
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## EUT Internal View – Board 1

(Top)



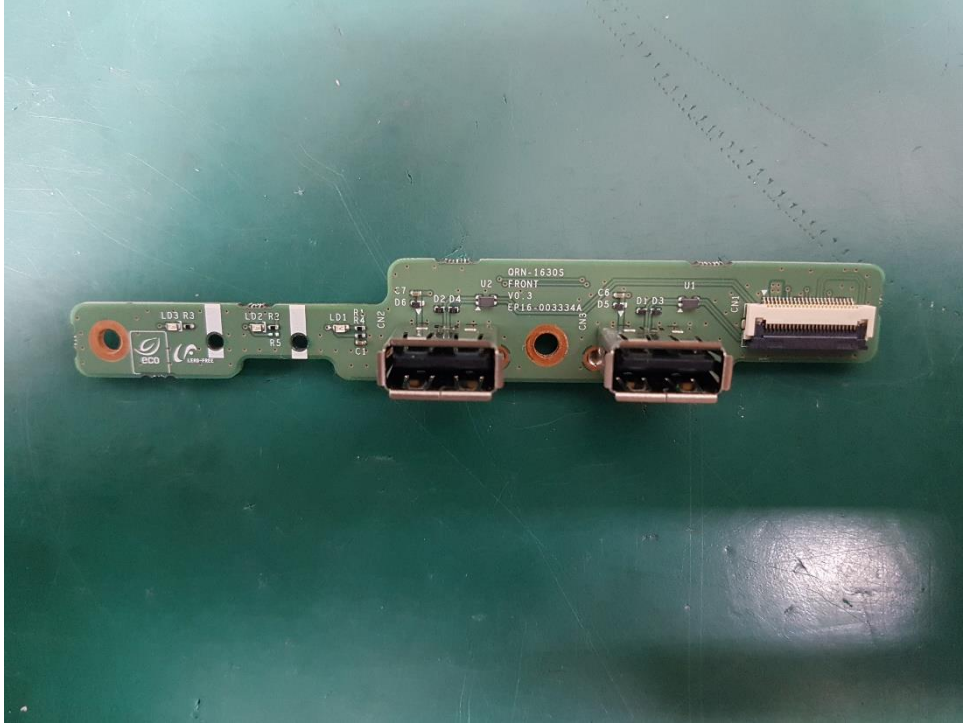
(Bottom)



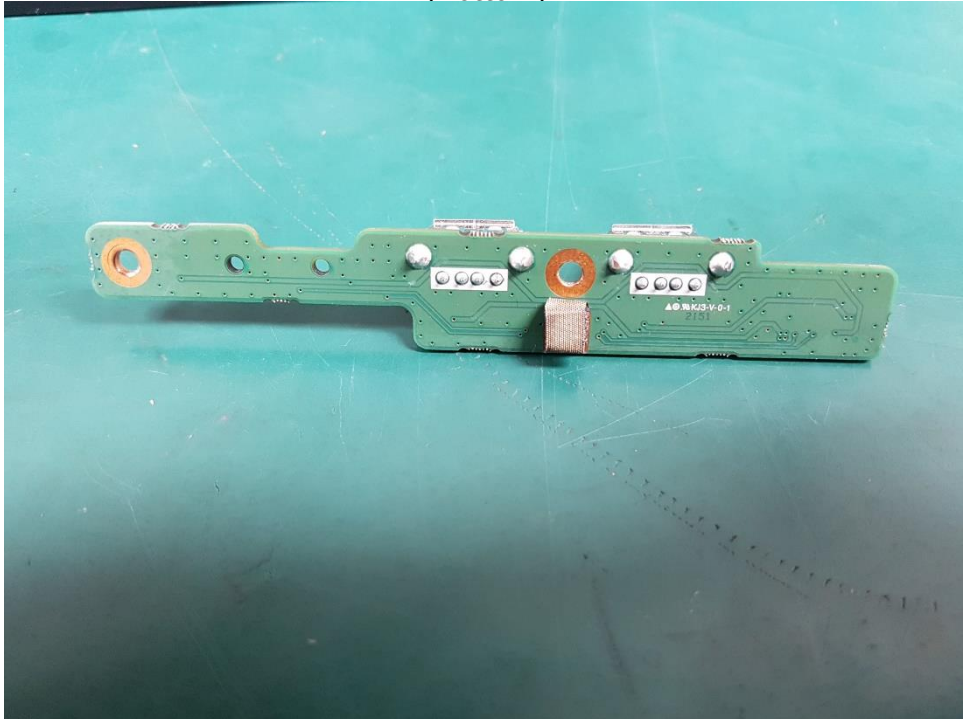
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## EUT Internal View – Board 2

(Top)



(Bottom)



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## EUT Internal View – Mouse

(Top)



(Bottom)



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## EUT Internal View – Mouse

(Label)



## EUT Internal View – Adaptor

(Top)



(Bottom)



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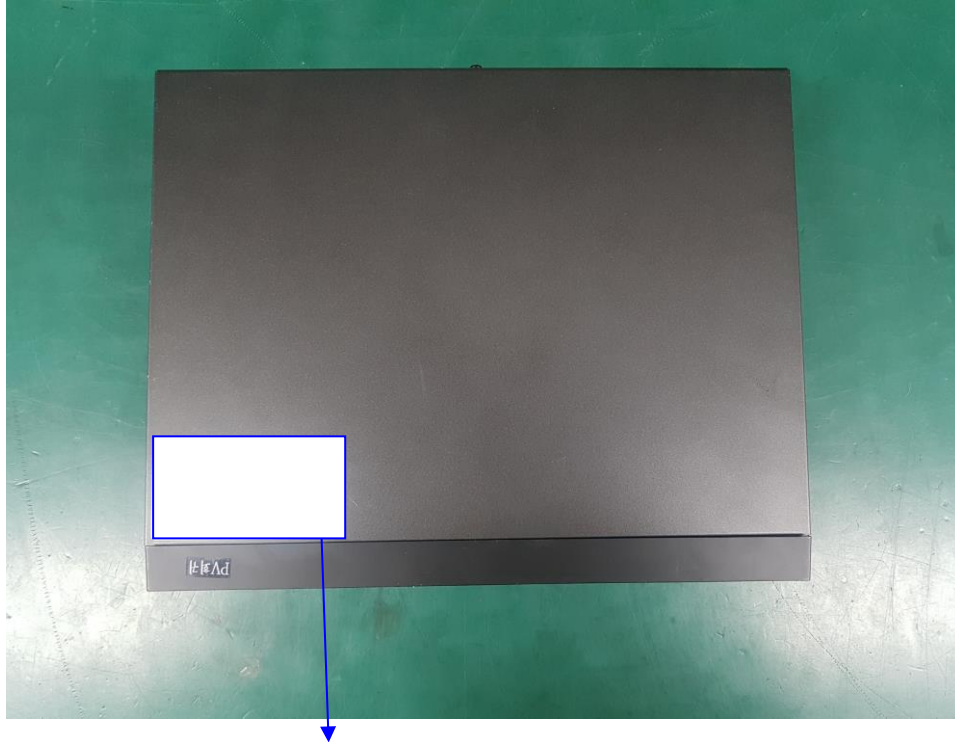
## EUT Internal View – Adaptor

(Label)



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## Label Photographs



CAN ICES-3(A) / NMB-3(A)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

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

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

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