



**KES Co., Ltd.**

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Report No.:

KES-E1-19T0800

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# EMC TEST REPORT For VCCI

Test Report No. : KES-E1-19T0800

Date of Issue : Dec. 16, 2019

Product name : NVR

Model/Type No. : LRN-1610S

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(TIANJIN) CO., LTD.  
2. HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.  
3. D-TECH CO.,LTD.

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

Date of Receipt : Nov. 19, 2019

Test date : Dec. 08, 2019

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

Tested by

Dong In, Kim  
EMC Test Engineer

Reviewed by

Dong-Hun, Jang  
EMC Technical Manager

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Report No.:  
KES-E1-19T0800  
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### REPORT REVISION HISTORY

| Date          | Test Report No. | Revision History |
|---------------|-----------------|------------------|
| Dec. 16, 2019 | KES-E1-19T0800  | Issued           |
|               |                 |                  |
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## 1.0 General Product Description

### Main Specifications of EUT are:

| LRN-1610S              |                       |                                                                                                                                                                                                 | Functions             |                                                                                                                                                                                                                                |
|------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Display</b>         |                       |                                                                                                                                                                                                 | Item                  | IP address, Add profile edit, Bitrate, Compression, GOP, Quality, Camera MD setup, Wisestream, Dynamic GOV/FPS, VA Setup                                                                                                       |
| Network camera         | Inputs                | Max. 16CH                                                                                                                                                                                       |                       | Camera video setup (Simple focus, Brightness/Contrast, Flip/Mirror, IRIS, WDR, D&N, SSNR, Shutter, SDR, DIS), Fisheye Dewarping Mode, Hallway View Setup, Camera Webpage                                                       |
|                        | Resolution            | 5MP ~ CIF                                                                                                                                                                                       |                       |                                                                                                                                                                                                                                |
|                        | Protocols             | Wisenet, ONVIF                                                                                                                                                                                  |                       |                                                                                                                                                                                                                                |
| Decoding               | Local Display         | HDMI: 1920x1080, 1280x720                                                                                                                                                                       | PTZ                   | Control                                                                                                                                                                                                                        |
|                        | Resolution            | 5MP(90fps), 3MP(120fps), 2MP(2400fps), 720p(480fps), D1(480fps)                                                                                                                                 | Smart phone           | Support Model                                                                                                                                                                                                                  |
| <b>Performance</b>     |                       |                                                                                                                                                                                                 |                       | Protocol Support                                                                                                                                                                                                               |
| Record                 | Compression           | H.265, H.264, MJPEG                                                                                                                                                                             |                       | Control                                                                                                                                                                                                                        |
|                        | Record Rate(Analog)   |                                                                                                                                                                                                 |                       | Max. Remote Users                                                                                                                                                                                                              |
|                        | Recording Bandwidth   | Max. 100Mbps                                                                                                                                                                                    | Redundancy            | Failover                                                                                                                                                                                                                       |
|                        | Resolution            | 5MP ~ CIF                                                                                                                                                                                       |                       | ARB                                                                                                                                                                                                                            |
|                        | Mode                  | Normal, Schedule(Continuous/Event), Event (Pre/Post), Dual track Recording                                                                                                                      | Easy configuration    | P2P(QR code)                                                                                                                                                                                                                   |
|                        | Event Trigger         | Alarm Input, Video Loss, Camera Event(Alarm, MD, Video Analytics, Defocus)                                                                                                                      | Coaxial Control       |                                                                                                                                                                                                                                |
|                        | Event Action          | e-Mail, PTZ Preset, Buzzer, Monitor Out                                                                                                                                                         | <b>Interface</b>      |                                                                                                                                                                                                                                |
|                        |                       |                                                                                                                                                                                                 | HDMI                  | 1EA                                                                                                                                                                                                                            |
| Search & Play          | Playback Bandwidth    | Max. 32Mbps(16CH simultaneously)                                                                                                                                                                | VGA                   | 1EA                                                                                                                                                                                                                            |
|                        | User                  | Max. 4 Users (Local 1, Remote 3)                                                                                                                                                                | Audio                 |                                                                                                                                                                                                                                |
|                        | Simultaneous playback | Max. 16CH(Network)                                                                                                                                                                              | Ethernet              | RJ-45(10/100/1000BASE-T) x 1<br>RJ-45(PoE+) x 16                                                                                                                                                                               |
|                        | Fisheye Dewarping     | WEB / CMS / Mobile                                                                                                                                                                              | Alarm                 |                                                                                                                                                                                                                                |
| Storage                | Supported HDD         | Up to 6TB                                                                                                                                                                                       | USB                   | 2EA(Front 1, Rear 1)                                                                                                                                                                                                           |
|                        | HDD Slot              | SATA 2ea(Max. 12TB)                                                                                                                                                                             | Power inlet           | AC 1EA                                                                                                                                                                                                                         |
|                        | External              |                                                                                                                                                                                                 | <b>System</b>         |                                                                                                                                                                                                                                |
| Backup                 | File backup           | BU/Exe(GUI), JPG/AVI(Network)                                                                                                                                                                   | System Control        | Mouse, IR remocon, Web                                                                                                                                                                                                         |
|                        | Function              | Multi channel(Upto 8CH) Play, Date-Time/Title display                                                                                                                                           | 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, Vietnamese |
| <b>Network</b>         |                       |                                                                                                                                                                                                 | <b>Environmental</b>  |                                                                                                                                                                                                                                |
| Protocol               |                       | IPv4, IPv6, 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) | Operating Temperature | 0°C to +40°C(32°F to 104°F)                                                                                                                                                                                                    |
|                        |                       |                                                                                                                                                                                                 | Operating Humidity    | 20% ~ 85% RH                                                                                                                                                                                                                   |
|                        |                       |                                                                                                                                                                                                 | <b>Electrical</b>     |                                                                                                                                                                                                                                |
| DDNS                   |                       | Wisenet DDNS                                                                                                                                                                                    | Power Input           | 100~240VAC±10%                                                                                                                                                                                                                 |
| Transmission Bandwidth |                       | Max. 100Mbps                                                                                                                                                                                    | Power Consumption     | Max. 188.2W(2HDDs, PoE on)<br>Max. 34.6W(2HDDs, PoE off)                                                                                                                                                                       |
| Audio                  | Input/Output          | 16CH(network)                                                                                                                                                                                   | PoE Budget            | Max. 130W                                                                                                                                                                                                                      |
|                        | Compression           | G.711, G.726, AAC(16/48KHz)                                                                                                                                                                     | <b>Mechanical</b>     |                                                                                                                                                                                                                                |
| Audio Communication    |                       | 2-Way                                                                                                                                                                                           | Color / Material      | Black / Metal                                                                                                                                                                                                                  |
|                        |                       |                                                                                                                                                                                                 | Dimension (WxHxD)     | W370.0 x H44.0 x D320 mm (14.57" x 1.73" x 12.6") (1U)                                                                                                                                                                         |
| Max Remote Users       |                       | Search(3), Live Unicast(10), Multicast(20)                                                                                                                                                      | Weight                | 2.79Kg (6.15lb)                                                                                                                                                                                                                |
| Security               |                       | HTTPS(SSL) Login Authentication                                                                                                                                                                 |                       |                                                                                                                                                                                                                                |
|                        |                       | Digest Login Authentication                                                                                                                                                                     |                       |                                                                                                                                                                                                                                |
|                        |                       | IP Address Filtering                                                                                                                                                                            |                       |                                                                                                                                                                                                                                |
|                        |                       | User access log                                                                                                                                                                                 |                       |                                                                                                                                                                                                                                |
|                        |                       | 802.1X Authentication(EAP-TLS, EAP-...                                                                                                                                                          |                       |                                                                                                                                                                                                                                |

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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.

Voltage ☐ 230 Vac ☒ 120 Vac ☐ 24 Vac ☐ 12 Vdc ☐ PoE

Frequency ☒ 50 Hz ☐ 60 Hz ☐ 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         | LRN-1610S        | -             | HANWHA TECHWIN (TIANJIN) CO., LTD | EUT     |
| HDD         | WD10EURX-63C57Y0 | -             | Western Digital                   | -       |
| PSU         | DPS-200PB185 C   | HAPD194104036 | DELTA ELECTRONICS, INC.           | -       |

## 1.5 Support Equipments

| Description      | Model Number            | Serial Number   | Manufacturer                        | Remarks |
|------------------|-------------------------|-----------------|-------------------------------------|---------|
| Notebook         | NT730U3E                | JJRE91CF200065A | SAMSUNG                             | -       |
| Notebook Adaptor | PA-1600-66              | AD-6019P        | LITEON                              | -       |
| Monitor          | 24M47VQ                 | 702NTQDA3604    | LG                                  | -       |
| Monitor Adaptor  | ADS-40FSG-19 19025GPG-1 | EAY62768621     | Shenzhen Honor Electronic Co., Ltd. | -       |
| Network Camera   | QNV-6023R               | -               | HANWHA TECHWIN (TIANJIN) CO., LTD   | -       |
| Mouse            | -                       | -               | -                                   | -       |
| USB Memory       | -                       | -               | Transcend                           | 16G     |



## 1.6 External I/O Cabling

| Start        |           | END            |           | Cable Spec. |        |
|--------------|-----------|----------------|-----------|-------------|--------|
| Description  | I/O Port  | Description    | I/O Port  | Length      | Shield |
| NVR<br>(EUT) | NETWORK 2 | Notebook       | NETWORK 2 | 3.0         | U      |
|              | HDMI      | Monitor        | HDMI      | 1.4         | S      |
|              | NETWORK 1 | Network Camera | NETWORK 1 | 3.0         | U      |
|              | USB Slot  | Mouse          | USB       | 1.2         | U      |
|              | USB Slot  | USB Memory     | USB       | -           | U      |

\* Unshielded=U, Shielded=S

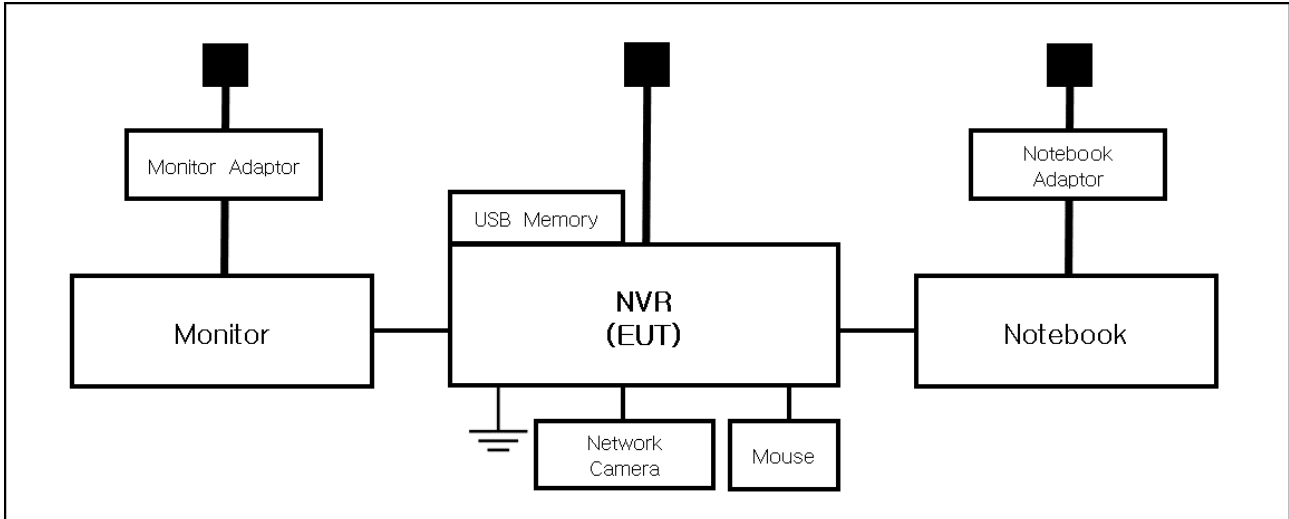
## 1.7 EUT Operating Mode(s)

| Test mode | operating                 |
|-----------|---------------------------|
| Operate   | Monitoring EUT, Ping Test |

| EUT Test operating S/W |         |                     |
|------------------------|---------|---------------------|
| Name                   | Version | Manufacture Company |
| -                      | -       | -                   |

## 1.8 Configuration

■ AC Main  
 □ DC Main



## 1.9 Remarks when standards applied

N/A

## 1.10 Calibration Details of Equipment Used for Measurement

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

## 1.11 Test Facility

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

## 1.12 Laboratory Accreditations and Listings

| Country       | Agency  | Scope of Accreditation                                                                                                                                                                                     | Logo                                                                                                                           |
|---------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| KOREA         | RRA     | EMI (3 m & 10 m Semi-Anechoic Chamber ,<br>10 m Open Area and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS,<br>Magnetic, Dips and interruptions)                                             | <br>KR0100                                  |
| International | KOLAS   | EMI (3 m & 10 m Semi-Anechoic Chamber ,<br>and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS,<br>Magnetic, Dips and interruptions)                                                            | <br>KT489                                 |
| USA           | FCC     | 3 m & 10 m Semi-Anechoic Chamber, 10 m<br>Open Area and Conducted test site to<br>perform FCC Part 15/18 measurements.                                                                                     | <br>KR0100                                |
| Canada        | ISED    | 3 m & 10 m Semi-Anechoic Chamber and<br>Conducted test site                                                                                                                                                | <br>23298-1                               |
| JAPAN         | VCCI    | Mains Ports Conducted Interference<br>Measurement, Telecommunication Ports<br>Conducted Disturbance Measurement and<br>Radiation 10 meter site, Facility for<br>measuring radiated disturbance above 1 GHz | <br>R-20056, C-20036,<br>T-20040, G-20057 |
| Europe        | TÜV SÜD | EMI (3 m & 10 m Semi-Anechoic Chamber ,<br>10 m Open Area and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS,<br>Magnetic, Dips and interruptions)                                             | <br>CARAT 001633 0003                     |

## 2.0 Test Regulations

The emissions tests were performed according to following regulations:

☐ **EMC – Directive 2014/30/EU**

☐ EN 61000-6-3:2011

☐ EN 61000-6-1:2007

☐ EN 61000-6-4:2007 +A1:2011

☐ EN 61000-6-2:2005

☐ EN 55011:2007 +A1:2010

☐ Group 1  
☐ Class A

☐ Group 2  
☐ Class B

☐ EN 55014-1:2006 +A2:2011

☐ EN 55014-2:1997 +A2:2008

☐ EN 55015:2013

☐ EN 61547 :2009

☐ EN 55032:2015

☐ Class A

☐ Class B

☐ EN 55024:2010 +A1:2015

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

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## 2.1 Conducted Emissions Mains Power Ports

### Test Date

Dec. 08, 2019

### Test Location

Electro wave Shieldroom #6

### Test Equipment

| Used                                | Description       | Model Number | Manufacturer | Serial Number | Cal. Due     |
|-------------------------------------|-------------------|--------------|--------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test S/W      | EMC32        | R & S        | 9.12.00       | -            |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER | ESR3         | R & S        | 101781        | 04, 22, 2020 |
| <input checked="" type="checkbox"/> | LISN              | ENV216       | R & S        | 101787        | 01, 04, 2020 |
| <input checked="" type="checkbox"/> | LISN              | ESH2-Z5      | R & S        | 100450        | 04, 22, 2020 |
| <input checked="" type="checkbox"/> | PULSE LIMITER     | ESH3-Z2      | R & S        | 101915        | 11, 25, 2020 |

### Test Conditions

Temperature: 21,8 °C  
Relative Humidity: 50,2 % 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 Conducted Emissions at Telecommunication Ports

### Test Date

Dec. 08, 2019

### Test Location

Electro wave Shieldroom #6

### Test Equipment

| Used                                | Description       | Model Number | Manufacturer | Serial Number | Cal. Due     |
|-------------------------------------|-------------------|--------------|--------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test S/W      | EMC32        | R & S        | 9.12.00       | -            |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER | ESR3         | R & S        | 101781        | 04, 22, 2020 |
| <input checked="" type="checkbox"/> | LISN              | ENV216       | R & S        | 101787        | 01, 04, 2020 |
| <input checked="" type="checkbox"/> | LISN              | ESH2-Z5      | R & S        | 100450        | 04, 22, 2020 |
| <input checked="" type="checkbox"/> | PULSE LIMITER     | ESH3-Z2      | R & S        | 101915        | 11, 25, 2020 |
| <input type="checkbox"/>            | 8-WIRE ISN CAT3,5 | ENY81        | R & S        | 100174        | 01, 07, 2020 |
| <input checked="" type="checkbox"/> | 8-WIRE ISN CAT6   | ENY81-CAT6   | R & S        | 101665        | 01, 07, 2020 |

### Test Conditions

Temperature: 21,8 °C  
Relative Humidity: 50,2 % 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.



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

### Test Date

Dec. 08, 2019

### Test Location

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

### Test Equipment

| Used                                | Description              | Model Number | Manufacturer     | Serial Number | Cal. Due     |
|-------------------------------------|--------------------------|--------------|------------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test S/W             | EP5/RE       | TOYO Corporation | 6.0.0         | -            |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER        | ESU26        | R & S            | 100551        | 04, 09, 2020 |
| <input checked="" type="checkbox"/> | AMPLIFIER                | SCU 01       | R & S            | 100603        | 11, 25, 2020 |
| <input checked="" type="checkbox"/> | TRILOG-BROADBAND ANTENNA | VULB9163     | Schwarzbeck      | 715           | 11, 29, 2020 |
| <input checked="" type="checkbox"/> | ATTENUATOR               | 8491A        | HP               | 32173         | 03, 11, 2020 |

### Test Conditions

Temperature: 22,2 °C  
Relative Humidity: 49,9 % 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

Dec. 08, 2019

### Test Location

SEMI ANECHOIC CHAMBER #3

### Test Equipment

| Used                                | Description                | Model Number | Manufacturer     | Serial Number | Cal. Due     |
|-------------------------------------|----------------------------|--------------|------------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test S/W               | EP5/RE       | TOYO Corporation | 6.0.0         | -            |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER          | ESR7         | R & S            | 101190        | 08, 06, 2020 |
| <input checked="" type="checkbox"/> | PREAMPLIFIER               | 8449B        | AGILENT          | 3008A01967    | 05, 27, 2020 |
| <input type="checkbox"/>            | ATTENUATOR                 | 8491A        | HP               | 35496         | 03, 11, 2020 |
| <input checked="" type="checkbox"/> | DOUBLE RIDGED HORN ANTENNA | SAS-571      | A.H.SYSTEM,INC   | 781           | 03, 12, 2020 |

### Test Conditions

Temperature: 22,5 °C  
Relative Humidity: 50,1 % R.H.

### Frequency Range of Measurement

1 GHz to 6 GHz

### Instrument Settings

IF Band Width: 1 MHz

### Test Results

The requirements are:

- ☒ PASS  
☐ NOT PASS  
☐ NOT APPLICABLE

### Remarks

See Appendix A for test data.



## KES Co., Ltd.

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Report No.:

KES-E1-19T0800

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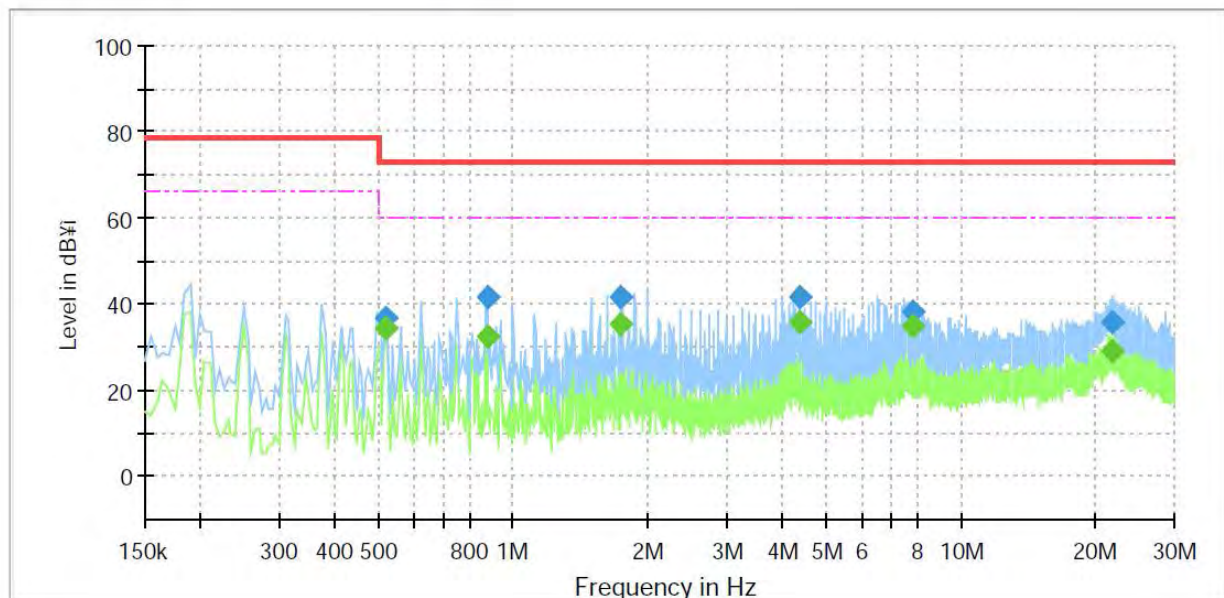
## APPENDIX A – TEST DATA

### Conducted Emissions at Mains Power Ports

HOT LINE

### Common Information

Test Description: Conducted Emission  
Model No.: LRN-1610S  
Phase: L1  
Mode:  
Operator Name: KES



### Final\_Result

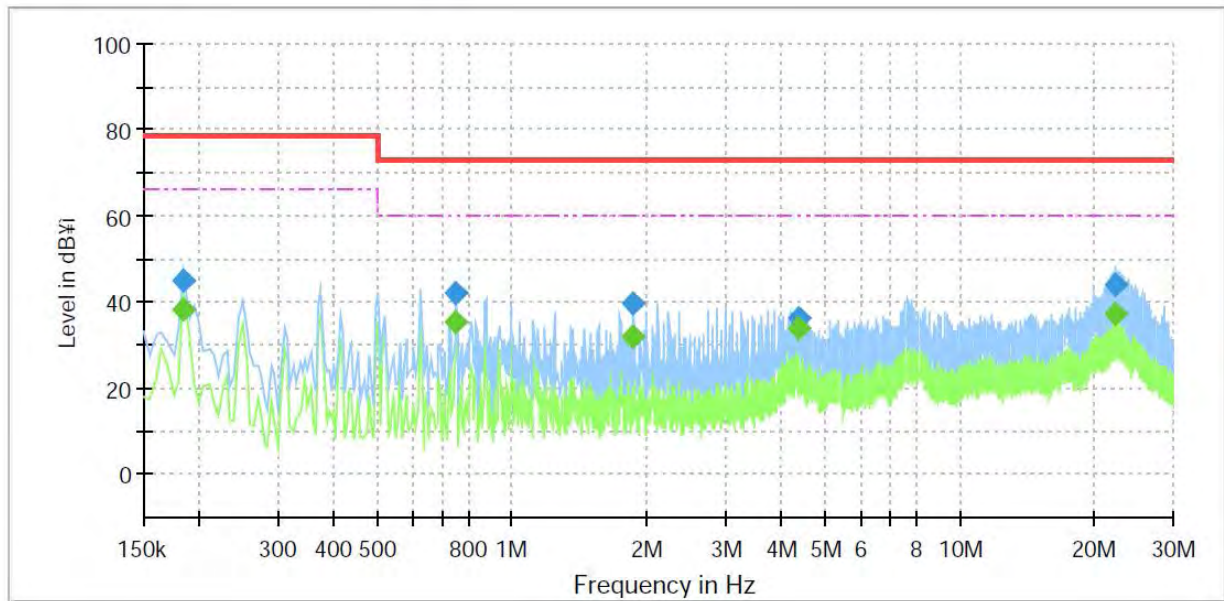
| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.520000        | ---              | 34.26           | 60.00        | 25.74       | 1000.0          | 9.000           | L1   | 19.9       |
| 0.520000        | 36.59            | ---             | 73.00        | 36.41       | 1000.0          | 9.000           | L1   | 19.9       |
| 0.875000        | ---              | 32.41           | 60.00        | 27.59       | 1000.0          | 9.000           | L1   | 20.3       |
| 0.875000        | 41.42            | ---             | 73.00        | 31.58       | 1000.0          | 9.000           | L1   | 20.3       |
| 1.745000        | ---              | 35.29           | 60.00        | 24.71       | 1000.0          | 9.000           | L1   | 20.4       |
| 1.745000        | 41.42            | ---             | 73.00        | 31.58       | 1000.0          | 9.000           | L1   | 20.4       |
| 4.365000        | ---              | 35.96           | 60.00        | 24.04       | 1000.0          | 9.000           | L1   | 19.7       |
| 4.365000        | 41.41            | ---             | 73.00        | 31.59       | 1000.0          | 9.000           | L1   | 19.7       |
| 7.790000        | ---              | 34.65           | 60.00        | 25.35       | 1000.0          | 9.000           | L1   | 20.1       |
| 7.790000        | 38.08            | ---             | 73.00        | 34.92       | 1000.0          | 9.000           | L1   | 20.1       |
| 21.700000       | ---              | 28.94           | 60.00        | 31.06       | 1000.0          | 9.000           | L1   | 20.4       |
| 21.700000       | 35.98            | ---             | 73.00        | 37.02       | 1000.0          | 9.000           | L1   | 20.4       |

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## NEUTRAL LINE

### Common Information

Test Description: Conducted Emission  
 Model No.: LRN-1610S  
 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) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.185000        | ---              | 38.15           | 66.00        | 27.85       | 1000.0          | 9.000           | N    | 19.5       |
| 0.185000        | 45.24            | ---             | 79.00        | 33.76       | 1000.0          | 9.000           | N    | 19.5       |
| 0.750000        | ---              | 35.33           | 60.00        | 24.67       | 1000.0          | 9.000           | N    | 20.1       |
| 0.750000        | 42.29            | ---             | 73.00        | 30.71       | 1000.0          | 9.000           | N    | 20.1       |
| 1.870000        | ---              | 32.13           | 60.00        | 27.87       | 1000.0          | 9.000           | N    | 20.5       |
| 1.870000        | 39.93            | ---             | 73.00        | 33.07       | 1000.0          | 9.000           | N    | 20.5       |
| 4.360000        | ---              | 33.68           | 60.00        | 26.32       | 1000.0          | 9.000           | N    | 19.7       |
| 4.360000        | 36.55            | ---             | 73.00        | 36.45       | 1000.0          | 9.000           | N    | 19.7       |
| 22.320000       | ---              | 37.48           | 60.00        | 22.52       | 1000.0          | 9.000           | N    | 20.5       |
| 22.320000       | 44.00            | ---             | 73.00        | 29.00       | 1000.0          | 9.000           | N    | 20.5       |

#### ◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

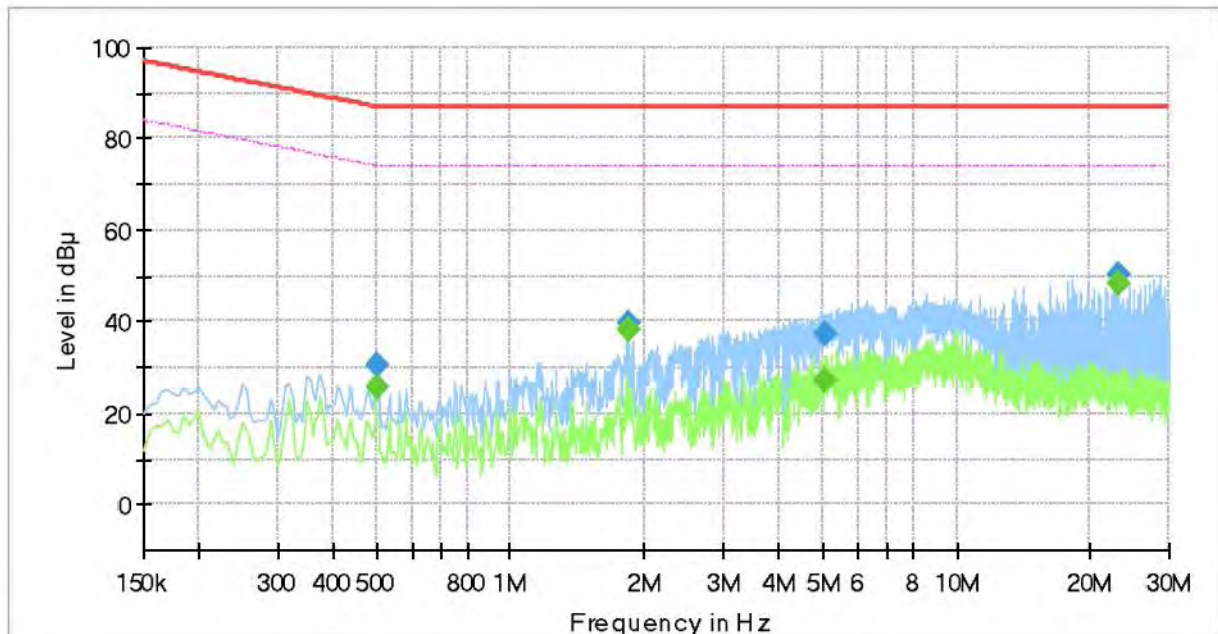
Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

## Conducted Emissions at Telecommunication Ports

### ■ NETWORK 1 [1 000 Mbps]

### Common Information

|                   |                            |
|-------------------|----------------------------|
| Test Description: | Telecommunication Emission |
| Model No.:        | LRN-1610S                  |
| Mode :            | RJ-45 1                    |
| Speed :           | 1 000 Mbps                 |
| Operator Name:    | KES                        |



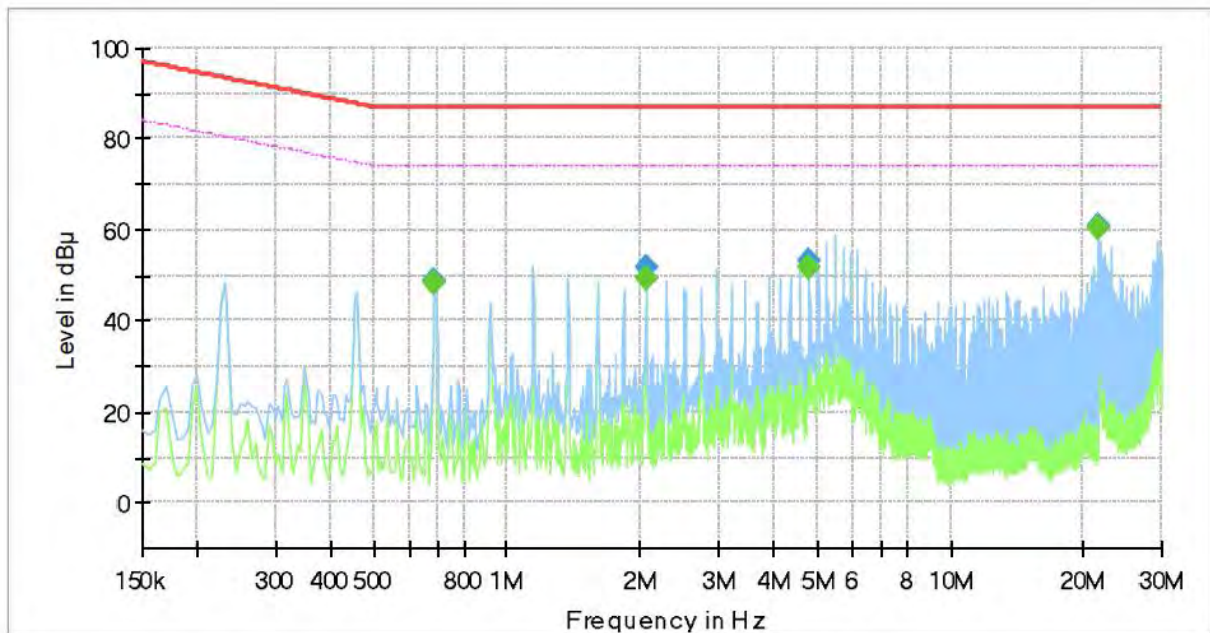
### Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line        | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|-------------|------------|
| 0.500000        | ---              | 25.71           | 74.00        | 48.29       | 1000.0          | 9.000           | Single Line | 19.6       |
| 0.500000        | 30.63            | ---             | 87.00        | 56.37       | 1000.0          | 9.000           | Single Line | 19.6       |
| 1.830000        | ---              | 38.23           | 74.00        | 35.77       | 1000.0          | 9.000           | Single Line | 19.5       |
| 1.830000        | 39.78            | ---             | 87.00        | 47.22       | 1000.0          | 9.000           | Single Line | 19.5       |
| 5.050000        | ---              | 27.36           | 74.00        | 46.64       | 1000.0          | 9.000           | Single Line | 19.5       |
| 5.050000        | 37.34            | ---             | 87.00        | 49.66       | 1000.0          | 9.000           | Single Line | 19.5       |
| 23.130000       | ---              | 48.35           | 74.00        | 25.65       | 1000.0          | 9.000           | Single Line | 19.7       |
| 23.130000       | 50.16            | ---             | 87.00        | 36.84       | 1000.0          | 9.000           | Single Line | 19.7       |

## ■ NETWORK 2 [1 000 Mbps]

### Common Information

|                   |                            |
|-------------------|----------------------------|
| Test Description: | Telecommunication Emission |
| Model No.:        | LRN-1610S                  |
| Mode :            | RJ-45 2                    |
| Speed :           | 1 000 Mbps                 |
| Operator Name:    | KES                        |



### Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line        | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|-------------|------------|
| 0.685000        | ---              | 48.59           | 74.00        | 25.41       | 1000.0          | 9.000           | Single Line | 19.6       |
| 0.685000        | 48.84            | ---             | 87.00        | 38.16       | 1000.0          | 9.000           | Single Line | 19.6       |
| 2.060000        | ---              | 49.54           | 74.00        | 24.46       | 1000.0          | 9.000           | Single Line | 19.5       |
| 2.060000        | 51.62            | ---             | 87.00        | 35.38       | 1000.0          | 9.000           | Single Line | 19.5       |
| 4.810000        | ---              | 51.67           | 74.00        | 22.33       | 1000.0          | 9.000           | Single Line | 19.5       |
| 4.810000        | 53.01            | ---             | 87.00        | 33.99       | 1000.0          | 9.000           | Single Line | 19.5       |
| 21.665000       | ---              | 60.24           | 74.00        | 13.76       | 1000.0          | 9.000           | Single Line | 19.7       |
| 21.665000       | 60.97            | ---             | 87.00        | 26.03       | 1000.0          | 9.000           | Single Line | 19.7       |

#### ◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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



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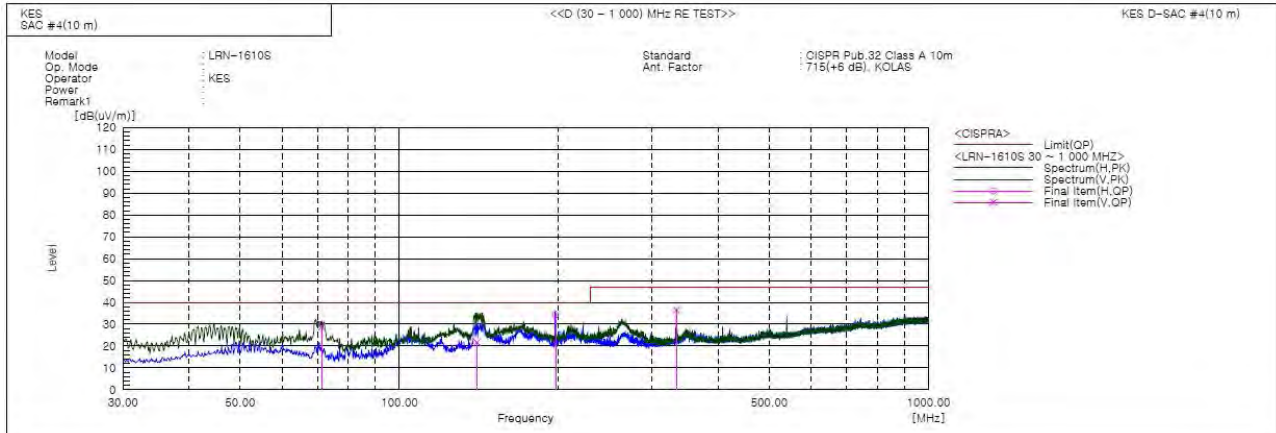
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### Radiated Electric Field Emissions(Below 1 GHz)



#### Final Result

| No. | Frequency<br>[MHz] | (P) | Reading<br>QP<br>[dB(uV)] | c.f<br>[dB(1/m)] | Result<br>QP<br>[dB(uV/m)] | Limit<br>QP<br>[dB(uV/m)] | Margin<br>QP<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|-----|--------------------|-----|---------------------------|------------------|----------------------------|---------------------------|----------------------|----------------|----------------|--------|
| 1   | 71.303             | V   | 54.2                      | -25.4            | 28.8                       | 40.0                      | 11.2                 | 105.0          | 241.0          |        |
| 2   | 140.155            | V   | 47.8                      | -26.1            | 21.7                       | 40.0                      | 18.3                 | 114.0          | 163.0          |        |
| 3   | 197.431            | H   | 56.5                      | -22.0            | 34.5                       | 40.0                      | 5.5                  | 389.0          | 161.0          |        |
| 4   | 334.116            | V   | 53.2                      | -16.7            | 36.5                       | 47.0                      | 10.5                 | 126.0          | 163.0          |        |

#### ◆ Calculation

Corrected Amplitude [dBuV] = Amplitude[dBuV] + Correction Factor [dB]

Corrected Amplitude : The Final Value, Amplitude : Reading Value,

Correction Factor : ANT FACTOR + Cable loss

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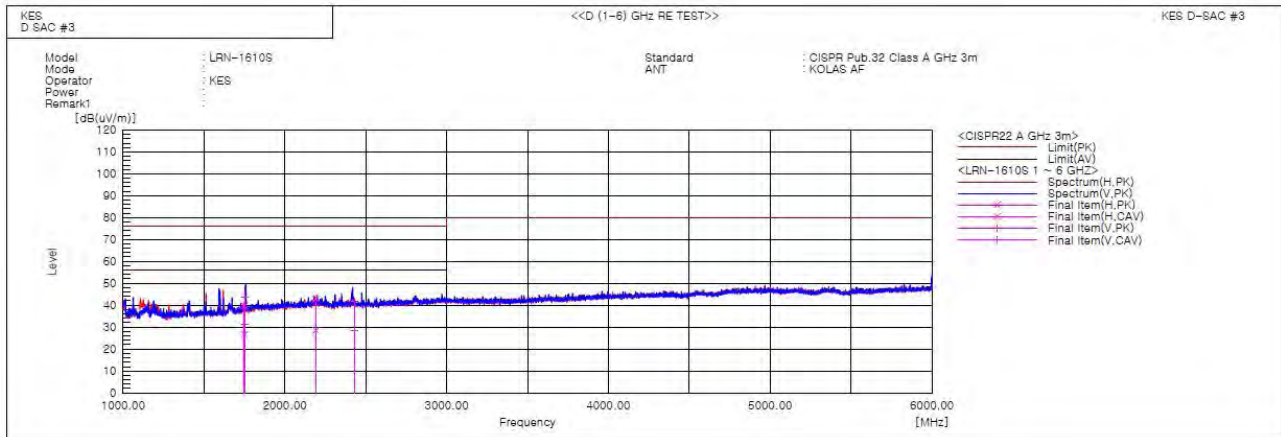
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### Radiated Electric Field Emissions(Above 1 GHz)



#### Final Result

| No. | Frequency<br>[MHz] | (P) | Reading<br>PK<br>[dB(uV)] | Reading<br>CAV<br>[dB(uV)] | c.f<br>[dB(1/m)] | Result<br>PK<br>[dB(uV/m)] | Result<br>CAV<br>[dB(uV/m)] | Limit<br>PK<br>[dB(uV/m)] | Limit<br>AV<br>[dB(uV/m)] | Margin<br>PK<br>[dB] | Margin<br>CAV<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|-----|--------------------|-----|---------------------------|----------------------------|------------------|----------------------------|-----------------------------|---------------------------|---------------------------|----------------------|-----------------------|----------------|----------------|--------|
| 1   | 1749.101           | H   | 43.8                      | 30.7                       | -4.1             | 39.7                       | 26.6                        | 76.0                      | 56.0                      | 36.3                 | 29.4                  | 100.0          | 71.9           |        |
| 2   | 1750.101           | V   | 47.9                      | 35.5                       | -4.0             | 43.9                       | 31.5                        | 76.0                      | 56.0                      | 32.1                 | 24.5                  | 100.0          | 120.9          |        |
| 3   | 2191.331           | H   | 44.2                      | 29.8                       | -1.3             | 42.9                       | 28.5                        | 76.0                      | 56.0                      | 33.1                 | 27.5                  | 100.0          | 143.7          |        |
| 4   | 2427.658           | V   | 42.2                      | 28.7                       | -0.5             | 41.7                       | 28.2                        | 76.0                      | 56.0                      | 34.3                 | 27.8                  | 100.0          | 10.2           |        |

#### ◆ Calculation

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

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

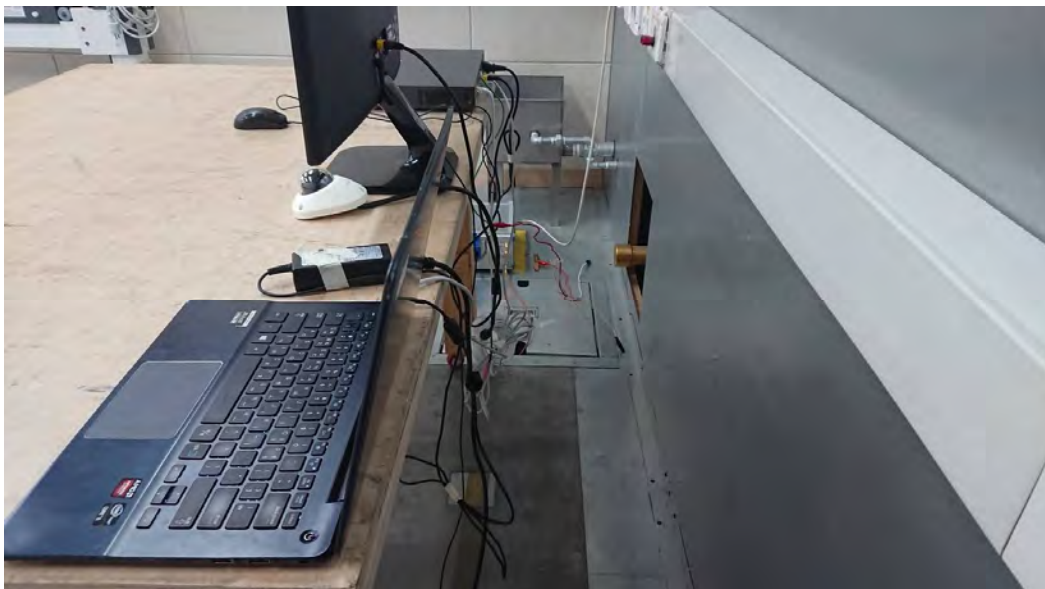
Reading(PK/CAV) : Reading value, Result(PK/CAV) : Reading value + Factor value

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

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## Test Setup Photos and Configuration

### Conducted Emissions at Mains Power Ports



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## Conducted Emissions at Telecommunication Ports



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## Radiated Electric Field Emissions(Below 1 GHz)



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## Radiated Electric Field Emissions(Above 1 GHz)



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## EUT External Photographs

(Top)



(Bottom)



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## **EUT Internal Photographs**

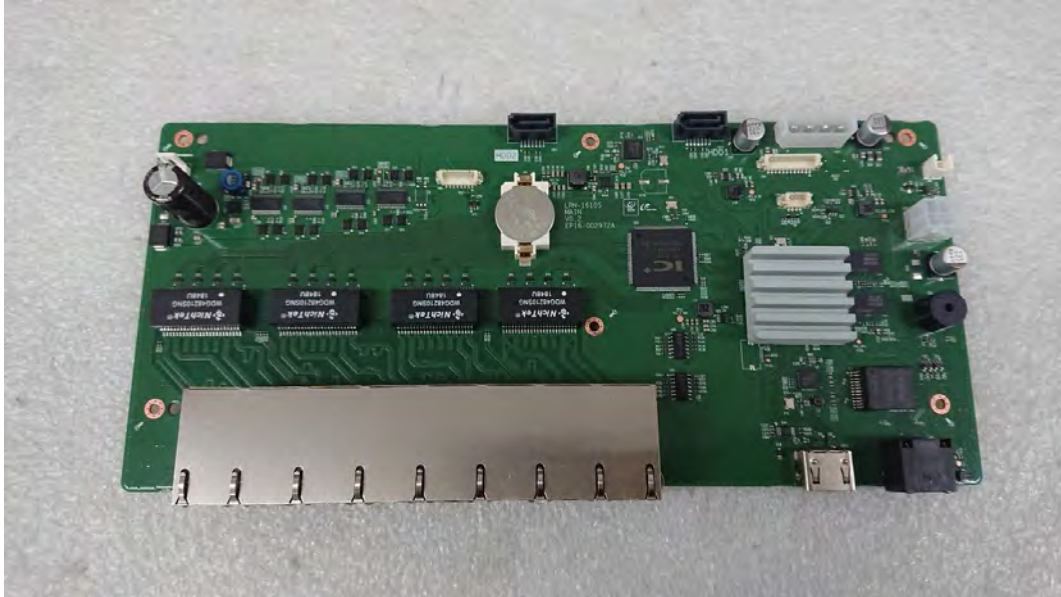
(Internal View)



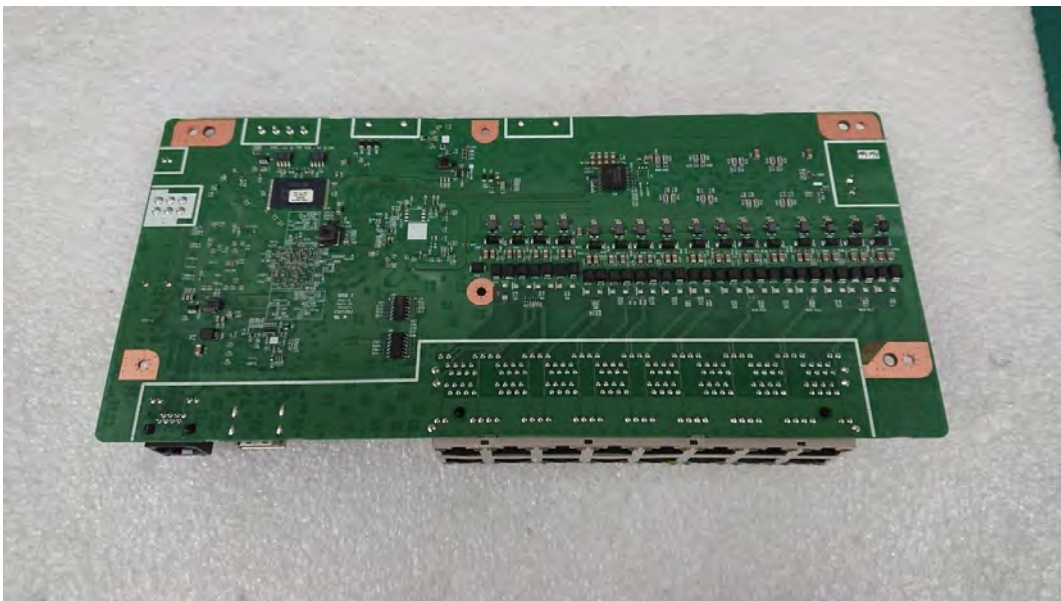
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## EUT Internal View – Main Board

(Top)



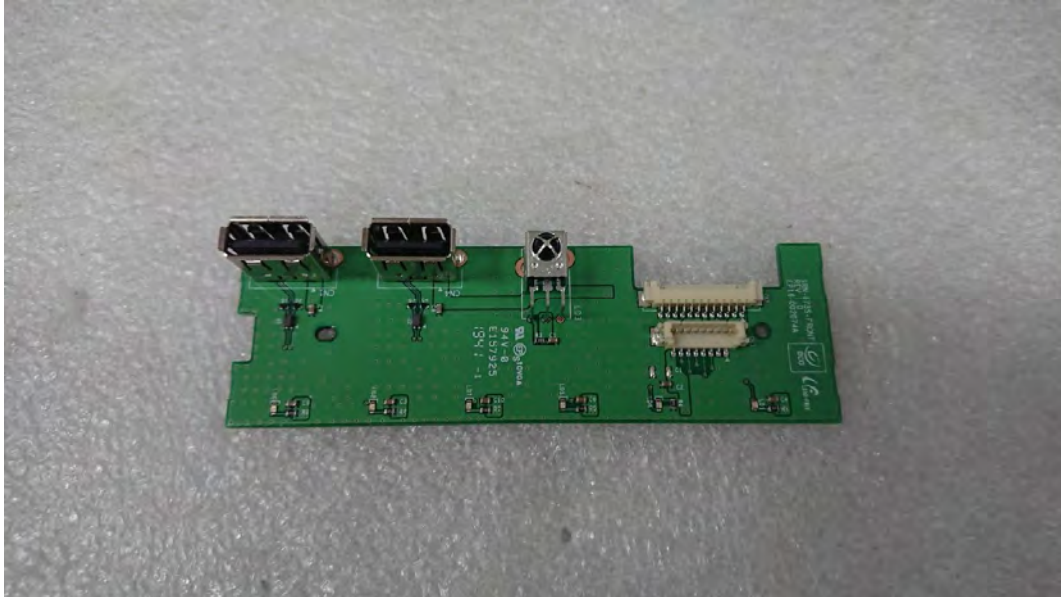
(Bottom)



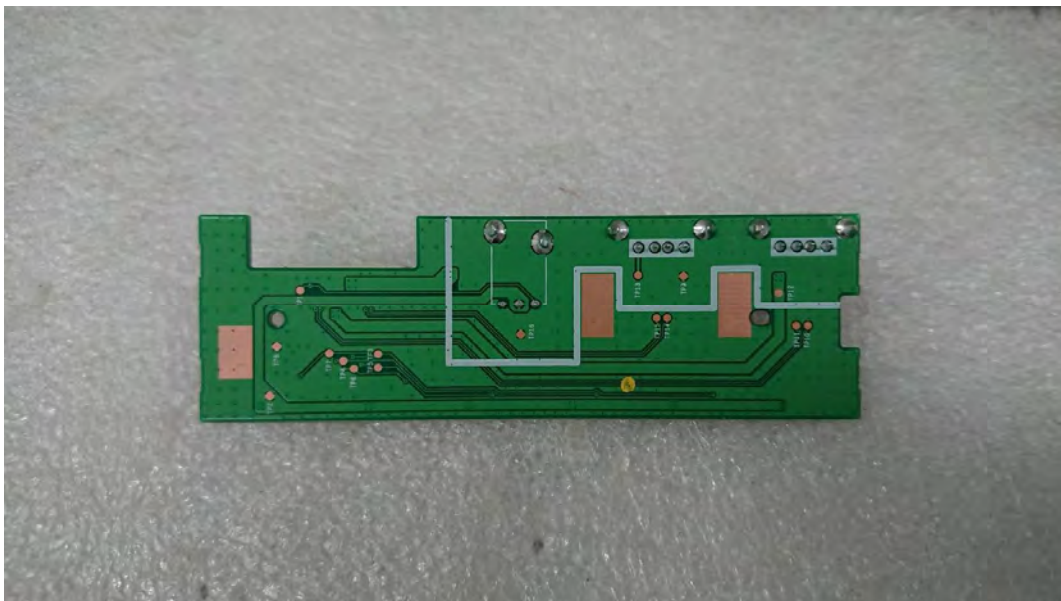
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## EUT Internal View – Sub Board

(Top)



(Bottom)



## Label Photographs



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