



## EMC TEST REPORT For IC

Test Report No. : KES-E1-17T0218  
Date of Issue : Mar. 15, 2017  
Product name : DVR  
Model/Type No. : HRD-442N  
Variant Model : -  
Applicant : Hanwha Techwin Co., Ltd.  
Applicant Address : 1204, Changwon-daero, Seongsan-gu Changwon-si,  
Gyeongsangnam-do, Korea  
Manufacturer : Hanwha Techwin (Tianjin) Co.,Ltd.  
Manufacturer Address : No.11 Weiliu Rd, Micro-Electronic Industrial Park, TEDA, Tianjin,  
300385, people's Republic of China  
Date of Receipt : Feb, 21, 2017  
Test date : Mar, 10, 2017 ~ Mar, 13, 2017  
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

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EMC Test Engineer

Reviewed by

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EMC Technical Manager

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Test report No.:  
KES-E1-17T0218  
Page (2) of (31)

**REPORT REVISION HISTORY**

| Date          | Test Report No. | Revision History |
|---------------|-----------------|------------------|
| Mar, 15, 2017 | KES-E1-17T0218  | Issued           |
|               |                 |                  |
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## TABLE OF CONTENTS

|                                                      |                                                            |    |
|------------------------------------------------------|------------------------------------------------------------|----|
| 1.0                                                  | General Product Description.....                           | 4  |
| 1.1                                                  | Test Voltage & Frequency .....                             | 6  |
| 1.2                                                  | Variant Model Differences.....                             | 6  |
| 1.3                                                  | Device Modifications.....                                  | 6  |
| 1.4                                                  | Equipment Under Test.....                                  | 6  |
| 1.5                                                  | Support Equipments.....                                    | 7  |
| 1.6                                                  | External I/O Cabling .....                                 | 8  |
| 1.7                                                  | EUT Operating Mode(s) .....                                | 9  |
| 1.8                                                  | Configuration .....                                        | 9  |
| 1.9                                                  | Calibration Details of Equipment Used for Measurement..... | 10 |
| 1.10                                                 | Test Facility .....                                        | 10 |
| 1.11                                                 | Laboratory Accreditations and Listings .....               | 10 |
| 2.0                                                  | Test Regulations .....                                     | 11 |
| 2.1                                                  | Conducted Emissions Mains Power Ports .....                | 13 |
| 2.2                                                  | Radiated Electric Field Emissions(Below 1 GHz) .....       | 14 |
| 2.3                                                  | Radiated Electric Field Emissions(Above 1 GHz) .....       | 15 |
| APPENDIX A – TEST DATA .....                         |                                                            | 16 |
| Conducted Emissions at Mains Power Ports.....        |                                                            | 16 |
| Radiated Electric Field Emissions(Below 1 GHz) ..... |                                                            | 18 |
| Radiated Electric Field Emissions(Above 1 GHz) ..... |                                                            | 19 |
| Test Setup Photos and Configuration.....             |                                                            | 23 |
| Conducted Voltage Emissions .....                    |                                                            | 23 |
| Radiated Electric Field Emissions(Below 1 GHz) ..... |                                                            | 24 |
| Radiated Electric Field Emissions(Above 1 GHz) ..... |                                                            | 25 |
| EUT External Photographs.....                        |                                                            | 26 |
| EUT Internal Photographs .....                       |                                                            | 27 |



## 1.0 General Product Description

### Main Specifications of EUT are:

| item               |                             | Details                                                                                                                                                                                                                                                           |
|--------------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Video              | Input                       | 4channel BNC : AHD(~4MP), TVI(~2MP), CVI(~2MP), NTSC/PAL                                                                                                                                                                                                          |
|                    | Resolution                  | 2560x1440, 1920 x 1080, 1280 x 720, 960 x 480, 704 x 480 / 960 x 576, 704 x 576                                                                                                                                                                                   |
| Live               | Frame rate                  | 120fps , 100fps                                                                                                                                                                                                                                                   |
|                    | Resolution                  | 2560x1440, 1920 x 1080, 1280 x 720, 960 x 480, 704 x 480 / 960 x 576, 704 x 576                                                                                                                                                                                   |
|                    | Multi Screen display        | 1/4//PIP/Sequence                                                                                                                                                                                                                                                 |
| <b>Performance</b> |                             |                                                                                                                                                                                                                                                                   |
| Operating System   | Embedded                    | Linux                                                                                                                                                                                                                                                             |
| Recording          | Compression                 | H.264, Wisestream                                                                                                                                                                                                                                                 |
|                    | Record Rate                 | NTSC : Up to 60fps@4MP / PAL : Up to 50fps@4MP<br>NTSC : Up to 120fps@1920 x 1080 / PAL : Up to 100fps@1920 x 1080<br>NTSC : Up to 120fps @ 1280 x 720, 928x480, 704x480, 704x240, 352x240<br>PAL : Up to 100fps @ 1280 x 720, 928x576, 704x576, 704x288, 352x288 |
|                    | Mode                        | Manual, Schedule (Continuous/Event), Event(Pre/Post), Time lapse (1~30 fps(N), 1~25fps(P))                                                                                                                                                                        |
|                    | Event                       | Video Loss, Motion(Level 1~10), Alarm Input(16), Tampering(Level Low,Medium, High)                                                                                                                                                                                |
|                    | Overwrite modes             | Continuous                                                                                                                                                                                                                                                        |
|                    | Pre-alarm                   | Up to 30 sec (5, 10, 20, 30 Sec)                                                                                                                                                                                                                                  |
|                    | Post-Alarm                  | Up to 6 hour (5, 10, 20, 30 sec, 1, 3, 5, 10, 20 min, 1, 2, 3, 4, 5, 6 hour)                                                                                                                                                                                      |
| Search & Playback  | Search mode                 | Date/time, Event, Back up, POS, Motion (※ All Search Included Preview Function)                                                                                                                                                                                   |
|                    | Playback function           | Fast Forward/Backward (x2,x4,x8,x16,x32,x64) ※ Backward Play with I-frame Only,<br>Slow Forward/Backward (x1/2,x1/4,x1/8)<br>Step Forward/Backward ※ Backward Play with I-frame Only                                                                              |
|                    | Simultaneous Playback       | 4CH(Local Monitor, CMS)                                                                                                                                                                                                                                           |
| Network (IPv4)     | Transmission speed          | Record(Main) Stream) 4MP : 15fps/CH, 3MP : 18fps/CH, 1080p/720p/WD1/4CIF/<br>CIF : 30fps/CH(N), 25fps/CH(P)<br>Network(Sub) Stream) WD1/4CIF : 12fps/CH, 2CIF/CIF/QVGA/QCUF : 30fps/CH(N),                                                                        |
|                    | Transmission Bandwidth      | Up to 64Mbps                                                                                                                                                                                                                                                      |
|                    | Bandwidth control           | Selectable                                                                                                                                                                                                                                                        |
|                    | Stream                      | Record Stream and Network Stream Selectable (at monitoring Viewer)                                                                                                                                                                                                |
|                    | Remote users Maximum        | Search(3)/Live Unicast(10)/Live Multicast(20)                                                                                                                                                                                                                     |
|                    | Protocol support            | TCP/IP, DHCP, PPPoE, SMTP, NTP, HTTP, DDNS, RTP, RTSP, SNMP, SUNAPI                                                                                                                                                                                               |
|                    | Web Browser                 | Windows OS : Internet Explorer 8, 9, 10, Firefox 3.6 or higher, Chrome 12 or higher<br>Mac OS : Safari 5 or higher, Firefox 3.6 or higher                                                                                                                         |
| Smart phone        | Viewer Software             | SSM, Webviewer, SmartViewer, iPOLIS mobile viewer, WiseNet Mobile (~Apr. 2017)                                                                                                                                                                                    |
|                    | Platform                    | Android, ios                                                                                                                                                                                                                                                      |
|                    | Protocol support            | RTP, RTSP, HTTP, CGI(SUNAPI)                                                                                                                                                                                                                                      |
|                    | Control                     | Live(8ch) : Multi-Profile<br>Support<br>Playback(1ch)<br>Event push                                                                                                                                                                                               |
|                    | Remote users Maximum        | Search (3), Live Unicast (10), Multicast (20)                                                                                                                                                                                                                     |
| Storage            | Internal                    | Up to 2 SATA HDDs<br>(0~8TB HDD)                                                                                                                                                                                                                                  |
|                    | External (E-SATA Interface) | USB(for Backup)                                                                                                                                                                                                                                                   |
|                    | File Format (Back-up)       | BU(DVR Player), SEC(Include Player), AVI                                                                                                                                                                                                                          |
| Security           | Password Protection         | 1 Admin, 10 Group , 10 User per 1 Group                                                                                                                                                                                                                           |
|                    | Data Authentication         | Watermark                                                                                                                                                                                                                                                         |
| Easy Configuration |                             | P2P (TUTK)                                                                                                                                                                                                                                                        |



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Test report No.:  
KES-E1-17T0218  
Page (5) of (31)

| Interface     |                                    |                                                                                                                                                                                                                                                                |
|---------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Monitors      | VGA                                | 1 VGA (1920x1080, 1280x1024, 1280x720)                                                                                                                                                                                                                         |
|               | Composite(Spot)                    | BNC(1CH) ※ Included OSD On Screen, Multi mode Support                                                                                                                                                                                                          |
|               | Loop Outputs                       | -                                                                                                                                                                                                                                                              |
| Audio         | Inputs/Output                      | 4CH line in / 1CH line out                                                                                                                                                                                                                                     |
|               | Compression                        | G.711                                                                                                                                                                                                                                                          |
|               | Sampling rate                      | 8KHz                                                                                                                                                                                                                                                           |
| Alarm         | Inputs/Outputs                     | Terminal 4 Inputs (NO/NC) / Terminal 1 relay Outputs (NO/NC),<br>Rating : 30V DC/2A, 250V AC/0.25A                                                                                                                                                             |
|               | Remote notification                | Notification via e-mail                                                                                                                                                                                                                                        |
| Connections   | Ethernet                           | 1 RJ45 10/100/1000 Base-T                                                                                                                                                                                                                                      |
|               | Serial interface                   | RS-485(Full Duplex) for PTZ, Samsung System Keyboard                                                                                                                                                                                                           |
|               | USB                                | 2 ports(Front)                                                                                                                                                                                                                                                 |
|               | e-SATA                             | -                                                                                                                                                                                                                                                              |
|               | Application Suport                 | Mouse, IR Remocon, SPC-2000 (RS-485 protocol)                                                                                                                                                                                                                  |
|               | Protocol support(RS-485)           | Samsung-E/Samsung-T/Pelco-D/Pelco-p/Panasonic/ Phillips/ AD/ DIAMOND/<br>ERNA/ KALATEL/ VCL TP/VICON/ ELMO/GE                                                                                                                                                  |
|               | Protocol support(Coaxial)          | NTSC/PAL : Pelco-C (Coaxitron)<br>AHD : ACP(AHD Coax Protocol)                                                                                                                                                                                                 |
| General       |                                    |                                                                                                                                                                                                                                                                |
| Electrical    | Input Voltage/Current              | DC12V Adaptor(100~250V AC ±10% , 50/60Hz)                                                                                                                                                                                                                      |
|               | Power consumption                  | -                                                                                                                                                                                                                                                              |
| Environmental | Operating Temperature/<br>Humidity | +0°C to +40°C (+32°F to +104°F) / 20% to 85% RH                                                                                                                                                                                                                |
| Mechanical    | Dimension (W x H x D)              | TBD W370.0x H 44.0 x D 320(14.57" x 1.73" x 12.6")                                                                                                                                                                                                             |
|               | Weight (With hard disks)           | TBD Approx. 2.68Kg(5.91lb)                                                                                                                                                                                                                                     |
| Lauguage      | GUI                                | English, French, German, Spanish, Italian, Russian, Polish, Czech, Turkish, Netherlands<br>Portuguese, Swedish, Danish, Rumania, Serbia, Croatia, Hungary, Greek, Finnish,<br>Norwegian, Korean, Japanese, Chinese(Traditional), Thai , Taiwanese(25 Language) |
|               | Web Browser                        | English, French, German, Italian, Spanish, Russian, Turkish, Polish, Dutch,<br>Swedish, Czech, Portuguese, Danish, Rumanian, Serbian, Croatian, Hungarian,<br>Greek, Norwegian, Finnish, Korean, Chinese(Simplified), Japanese, Thai (23 Language)             |

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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 |
|-------------------|--------------|----------------|------------------------------------------|---------|
| DVR               | HRD-442N     | -              | Hanwha Techwin Co., Ltd.                 | E.U.T   |
| AC / DC Adaptor   | FSP040-RHAN2 | -              | Zhonghan Electronics(Shenzhen) Co., Ltd. | -       |
| Mouse1            | MOEIUOA      | PMX-MMOEIUA(B) | PRIMAX ELECTRONICS LTD.                  | -       |
| Remote Controller | EP10-000331A | -              | Samsung Techwin (Sta)                    | -       |
| HDD               | WD10PURX     | WCC4J7TS2NSC   | WD Purple                                | 2 TB    |

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Test report No.:  
KES-E1-17T0218  
Page (7) of (31)

## 1.5 Support Equipments

| Description            | Model Number | Serial Number                 | Manufacturer                        | Remarks |
|------------------------|--------------|-------------------------------|-------------------------------------|---------|
| Notebook               | X56K         | HN11N5151FJ0045W              | HANSUNG                             | -       |
| Notebook Adaptor       | A12-120P1A   | F180271552011758              | CHICONY POWER TECHNOLOGY CO.,LTD.   | -       |
| MONITOR1               | SMT-2232     | C95V67VF900015Y               | Weihai Daewoo Electronics Co., Ltd. | -       |
| MONITOR2               | LT23C350     | 009MHYCH106388P               | Samsung Electro-Mechanics Co.,Ltd   | -       |
| MONITOR2 Adaptor       | A4514_DSM    | CN07BN4400721ASE3<br>8GCOY0XS | Samsung Electro-Mechanics Co.,Ltd   | -       |
| MONITOR3               | HSTND-7041-L | 6CM6020YQQ                    | HP Inc.                             | -       |
| CAMERA x 4             | SDC-8440BC   | -                             | Hanwha Techwin (Tianjin) Co.,Ltd    | -       |
| CAMERA AC / DC Adaptor | EO-1210      | -                             | EO Electronics                      | -       |
| I Phone                | A1530        | -                             | APPLE                               | -       |
| Speaker                | BR-100A      | -                             | Britz International Co., Ltd.       | -       |
| MIC                    | CMK-303      | -                             | CAMAC                               | -       |
| Mouse2                 | SMB-400      | 0DJM010118                    | SEJIN ELECTRON INC.                 | -       |
| 2.0 USB Memory         | -            | -                             | SanDisk                             | 64 GB   |
| Alarm1                 | -            | -                             | -                                   | -       |
| Alarm2                 | -            | -                             | -                                   | -       |

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## 1.6 External I/O Cabling

| Start       |          | END               |          | Cable Spec. |        |
|-------------|----------|-------------------|----------|-------------|--------|
| Description | I/O Port | Description       | I/O Port | Length      | Shield |
| DVR         | RJ-45    | Notebook          | RJ-45    | 3.0         | U      |
|             | BNC      | MONITOR1          | BNC      | 3.0         | S      |
|             | HDMI     | MONITOR2          | HDMI     | 1.5         | S      |
|             | D-SUB    | MONITOR3          | D-SUB    | 1.5         | S      |
|             | BNC x 4  | CAMERA x 4        | BNC x 4  | 10.0        | S      |
|             | RCA      | Speaker           | RCA      | 1.4         | U      |
|             | RCA      | MIC               | RCA      | 1.2         | U      |
|             | USB      | 2.0 USB Memory    | USB      | -           | U      |
|             | 2 Pin    | Alarm1            | 2 Pin    | 3.5         | U      |
|             | 2 Pin    | Alarm2            | 2 Pin    | 3.5         | U      |
|             | USB      | Mouse1            | USB      | 1.5         | U      |
|             | RS 232   | Mouse2            | RS 232   | 1.2         | U      |
|             | -        | Remote Controller | -        | -           | -      |
| Notebook    | 3.5 mm   | I Phone           | 3.5 mm   | 1.0         | U      |

\* Unshielded = U, Shielded = S

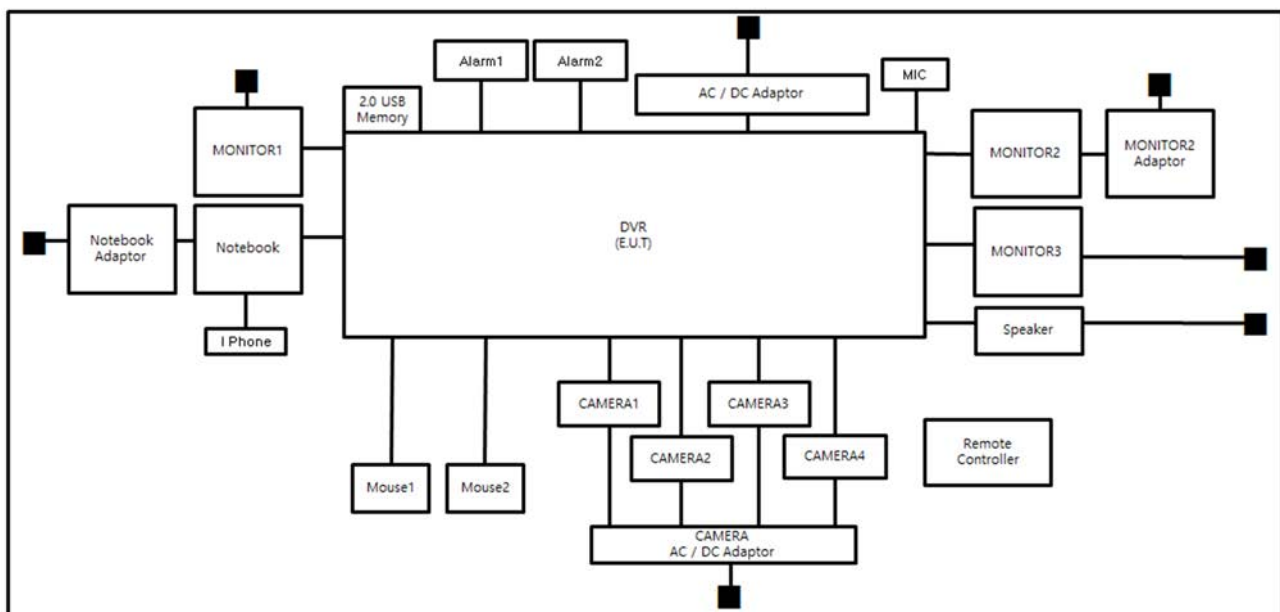
## 1.7 EUT Operating Mode(s)

| operating                   |
|-----------------------------|
| E.U.T Monitoring, Ping test |

| E.U.T Test operating S/W |         |                          |
|--------------------------|---------|--------------------------|
| Name                     | Version | Manufacture Company      |
| WebView                  | -       | Hanwha Techwin Co., Ltd. |

## 1.8 Configuration

■ AC Main  
□ DC Main



## 1.9 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.

## 1.10 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 and CISPR Publication 22.

## 1.11 Laboratory Accreditations and Listings

| Country       | Agency | Scope of Accreditation                                                                                                                                                                                 | Logo                                                                                                                     |
|---------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| USA           | FCC    | 3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.                                                                                                       | <br>R-4308, C-4798,<br>T-2311, G-914  |
| JAPAN         | VCCI   | Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz         | <br>R-4308, C-4798,<br>T-2311, G-914 |
| KOREA         | MSIP   | EMI (10 meter Open Area Test Site and two conducted sites)<br>Radio(3 & 10 meter Open Area Test Sites and one conducted site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) | <br>KR0100                          |
| Canada        | IC     | 3 & 10 meter Open Area Test Sites and one conducted site                                                                                                                                               | <br>4769B-1                         |
| Europe        | CE     | EMI (10 meter Open Area Test Site and two conducted sites)<br>Radio(3 & 10 meter Open Area Test Sites and one conducted site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) |                                     |
| International | KOLAS  | EMI (10 meter Open Area Test Site and two conducted sites)<br>Radio(3 & 10 meter Open Area Test Sites and one conducted site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) |                                     |



## 2.0 Test Regulations

The emissions tests were performed according to following regulations:

☐ **EMC – Directive 2014/30/EU**

☐ EN 61000-6-3:2011

☐ EN 61000-6-1:2007

☐ EN 61000-6-4:2007 +A1:2011

☐ EN 61000-6-2:2005

☐ EN 55011:2007 +A1:2010

☐ Group 1  
☐ Class A

☐ Group 2  
☐ Class B

☐ EN 55014-1:2006 +A2:2011

☐ EN 55014-2:1997 +A2:2008

☐ EN 55015:2013

☐ EN 61547 :2009

☐ EN 55032:2012

☐ 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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Test report No.:  
KES-E1-17T0218  
Page (12) of (31)

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- |                                                                          |                                             |                                  |
|--------------------------------------------------------------------------|---------------------------------------------|----------------------------------|
| <input type="checkbox"/> <b>VCCI V-3 / 2015.04</b>                       | <input type="checkbox"/> Class A            | <input type="checkbox"/> Class B |
| <input type="checkbox"/> <b>AS/NZS CISPR22:2009 + A1:2010</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 checked="" type="checkbox"/> <b>IC Regulation ICES-003 : 2016</b> |                                             |                                  |
| <input checked="" type="checkbox"/> CAN/CSA CISPR 22-10                  | <input checked="" 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>                 |                                             |                                  |
| <br>                                                                     |                                             |                                  |
| <input type="checkbox"/> EN 301 489-1 V1.9.2                             |                                             |                                  |
| <input type="checkbox"/> Equipment for fixed use                         |                                             |                                  |
| <input type="checkbox"/> Equipment for vehicular use                     |                                             |                                  |
| <input type="checkbox"/> Equipment for portable use                      |                                             |                                  |
| <br>                                                                     |                                             |                                  |
| <input type="checkbox"/> EN 301 489-3 V1.6.1                             |                                             |                                  |
| <br>                                                                     |                                             |                                  |
| <input type="checkbox"/> EN 301 489-17 V2.2.1                            |                                             |                                  |
| <br>                                                                     |                                             |                                  |
| <input type="checkbox"/> EN 60945:2002                                   |                                             |                                  |

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## 2.1 Conducted Emissions Mains Power Ports

### Test Date

Mar, 13, 2017

### Test Location

Electro wave Shieldroom

### Test Equipment

| Used                                | Description       | Model Number | Manufacturer | Serial Number | Cal. Due     |
|-------------------------------------|-------------------|--------------|--------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test Receiver | ESR3         | R & S        | 101783        | 05, 03, 2017 |
| <input checked="" type="checkbox"/> | LISN              | ENV216       | R & S        | 101137        | 02, 03, 2018 |
| <input checked="" type="checkbox"/> | LISN              | ENV216       | R & S        | 101786        | 05, 02, 2017 |
| <input checked="" type="checkbox"/> | PULSE LIMITER     | ESH3-Z2      | R & S        | 101914        | 12, 13, 2017 |
| <input checked="" type="checkbox"/> | Shield Room #3    | -            | SEMITEC      | -             | -            |
| <input checked="" type="checkbox"/> | EMI Test S/W      | EMC32        | R & S        | 9.12.00       | -            |

### Test Conditions

Temperature: 21,3 °C  
Relative Humidity: 32,8 %

### 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, 10, 2017

### Test Location

☐ Open Area Test Site #1 ☒ Open Area Test Site #2

### Test Equipment

| Used                                | Description              | Model Number | Manufacturer    | Serial Number | Cal. Due     |
|-------------------------------------|--------------------------|--------------|-----------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test Receiver        | ESVS10       | Rohde & Schwarz | 826008/014    | 04, 18, 2017 |
| <input checked="" type="checkbox"/> | Trilog-Broadband Antenna | VULB9163     | Schwarzbeck     | 714           | 11, 28, 2018 |
| <input checked="" type="checkbox"/> | Open Area Test Site      | -            | KES             | -             | -            |
| <input checked="" type="checkbox"/> | Antenna Mast             | -            | DAEIL EMC       | -             | -            |
| <input checked="" type="checkbox"/> | Turn Table               | -            | DAEIL EMC       | -             | -            |
| <input checked="" type="checkbox"/> | EMI Test S/W             | -            | -               | -             | -            |

### Test Conditions

Temperature: 9,8 °C  
Relative Humidity: 36,0 %

### 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, 10, 2017

### Test Location

Semi Anechoic Chamber #2

### Test Equipment

| Used                                | Description                    | Model Number | Manufacturer                  | Serial Number | Cal. Due     |
|-------------------------------------|--------------------------------|--------------|-------------------------------|---------------|--------------|
| <input checked="" type="checkbox"/> | Log-Periodic Antenna           | STLP 9149    | SCHWARZBECK                   | 9149-255      | 05, 17, 2018 |
| <input checked="" type="checkbox"/> | EMI Test Receiver              | ESU26        | R & S                         | 100552        | 04, 24, 2017 |
| <input checked="" type="checkbox"/> | Broadband Coaxial Preamplifier | BBV 9718     | Schwarzbeck Mess - Elektronik | 9718-246      | 10, 14, 2017 |
| <input checked="" type="checkbox"/> | Semi Anechoic Chamber #2       | -            | SEMITEC                       | -             | -            |
| <input checked="" type="checkbox"/> | Antenna Mast                   | -            | AUDIX                         | -             | -            |
| <input checked="" type="checkbox"/> | Turn Table                     | -            | AUDIX                         | -             | -            |
| <input checked="" type="checkbox"/> | EMI Test S/W                   | e3           | AUDIX                         | 8.083b        | -            |

### Test Conditions

Temperature: 20,6 °C

Relative Humidity: 36,1 %

### Frequency Range of Measurement

1 GHz to 6 GHz

### Instrument Settings

IF Band Width: 1 MHz

### Test Results

The requirements are:

- ☒ PASS  
☐ NOT PASS  
☐ NOT APPLICABLE

### Remarks

See Appendix A for test data.

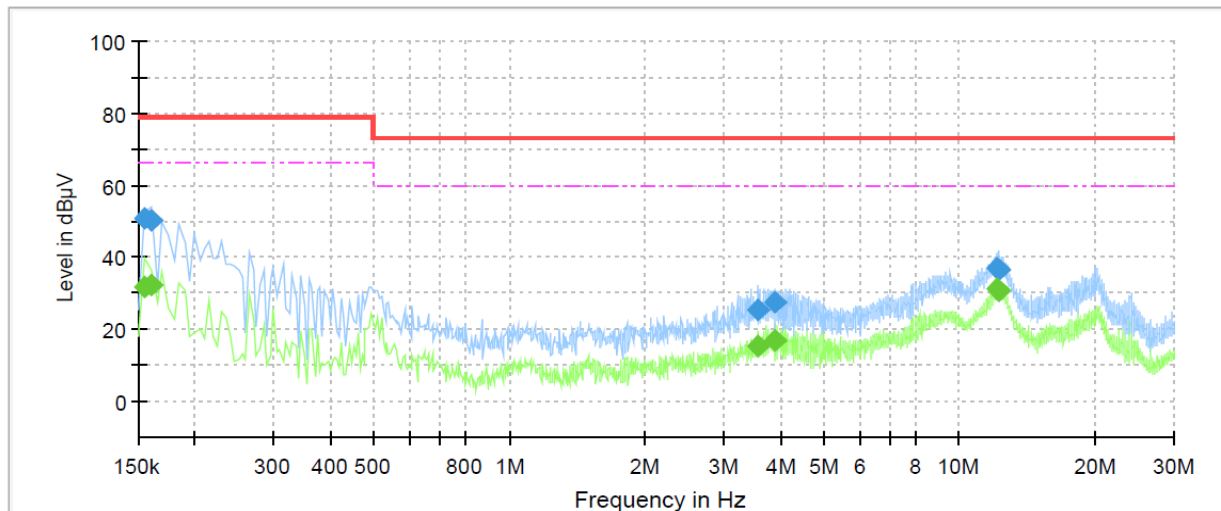
## APPENDIX A – TEST DATA

### Conducted Emissions at Mains Power Ports

[HOT]

### Common Information

Test Description: Conducted Emission  
Model No.: HRD-442N  
Mode: H  
Operator Name: KES



### Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.155000        | ---              | 31.85           | 66.00        | 34.15       | 1000.0          | 9.000           | L1   | 21.0       |
| 0.155000        | 50.71            | ---             | 79.00        | 28.29       | 1000.0          | 9.000           | L1   | 21.0       |
| 0.160000        | ---              | 32.39           | 66.00        | 33.61       | 1000.0          | 9.000           | L1   | 21.0       |
| 0.160000        | 50.40            | ---             | 79.00        | 28.60       | 1000.0          | 9.000           | L1   | 21.0       |
| 3.550000        | ---              | 15.35           | 60.00        | 44.65       | 1000.0          | 9.000           | L1   | 19.7       |
| 3.550000        | 25.34            | ---             | 73.00        | 47.66       | 1000.0          | 9.000           | L1   | 19.7       |
| 3.900000        | ---              | 16.84           | 60.00        | 43.16       | 1000.0          | 9.000           | L1   | 19.7       |
| 3.900000        | 27.33            | ---             | 73.00        | 45.67       | 1000.0          | 9.000           | L1   | 19.7       |
| 12.125000       | ---              | 31.07           | 60.00        | 28.93       | 1000.0          | 9.000           | L1   | 19.9       |
| 12.125000       | 37.07            | ---             | 73.00        | 35.93       | 1000.0          | 9.000           | L1   | 19.9       |
| 12.235000       | ---              | 30.87           | 60.00        | 29.13       | 1000.0          | 9.000           | L1   | 19.9       |
| 12.235000       | 36.65            | ---             | 73.00        | 36.35       | 1000.0          | 9.000           | L1   | 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))

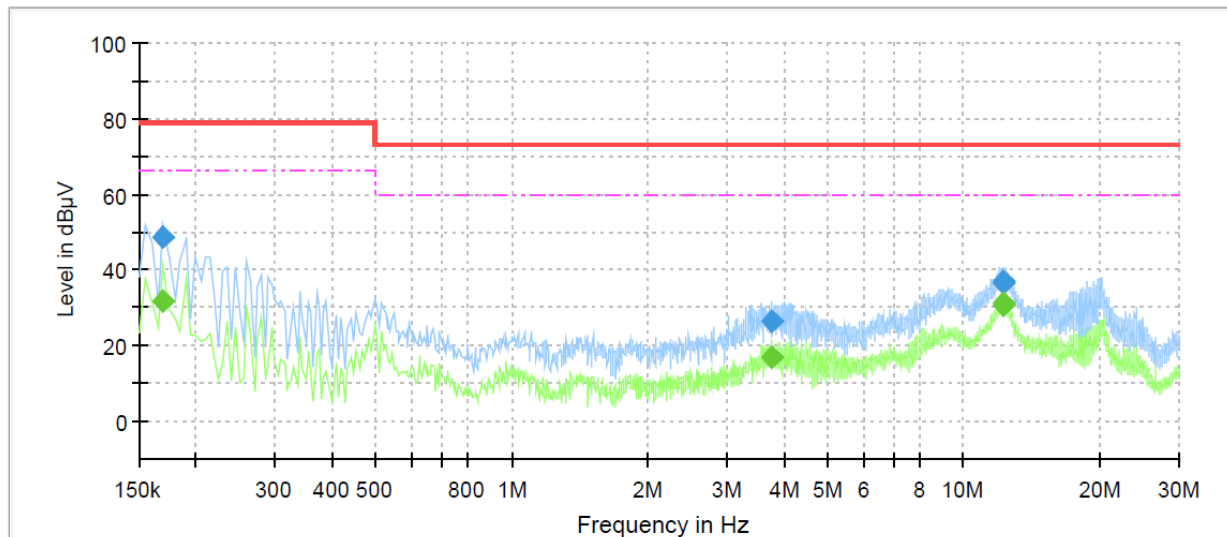
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[NEUTRAL]

## Common Information

Test Description: Conducted Emission  
Model No.: HRD-442N  
Mode: N  
Operator Name: KES



## Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.170000        | ---              | 31.54           | 66.00        | 34.46       | 1000.0          | 9.000           | N    | 20.9       |
| 0.170000        | 48.83            | ---             | 79.00        | 30.17       | 1000.0          | 9.000           | N    | 20.9       |
| 3.770000        | ---              | 17.07           | 60.00        | 42.93       | 1000.0          | 9.000           | N    | 19.7       |
| 3.770000        | 26.56            | ---             | 73.00        | 46.44       | 1000.0          | 9.000           | N    | 19.7       |
| 12.255000       | ---              | 31.19           | 60.00        | 28.81       | 1000.0          | 9.000           | N    | 20.0       |
| 12.255000       | 37.08            | ---             | 73.00        | 35.92       | 1000.0          | 9.000           | N    | 20.0       |
| 12.270000       | ---              | 30.78           | 60.00        | 29.22       | 1000.0          | 9.000           | N    | 20.0       |
| 12.270000       | 36.76            | ---             | 73.00        | 36.24       | 1000.0          | 9.000           | N    | 20.0       |

### ◆ 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))

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

| Frequency | Amplitude    | ANT             | ANT. Height | Correction Factor |               | Corrected Amplitude | Applicable Limit | Margin<br>[dB] |
|-----------|--------------|-----------------|-------------|-------------------|---------------|---------------------|------------------|----------------|
| [MHz]     | [dB $\mu$ V] | Polar.<br>(H/V) | [m]         | ANT.<br>[dB/m]    | Cable<br>[dB] | [dB $\mu$ V/m]      | [dB $\mu$ V/m]   |                |
| 252.33    | 14.30        | H               | 3.99        | 12.53             | 3.71          | 30.54               | 47.00            | 16.46          |
| 371.94    | 13.60        | V               | 1.00        | 15.00             | 4.40          | 33.00               | 47.00            | 14.00          |
| 500.00    | 15.70        | H               | 4.00        | 17.35             | 5.20          | 38.25               | 47.00            | 8.75           |
| 594.68    | 12.10        | V               | 1.02        | 19.22             | 5.84          | 37.16               | 47.00            | 9.84           |
| 625.74    | 11.60        | V               | 1.01        | 19.40             | 5.94          | 36.94               | 47.00            | 10.06          |
| 752.67    | 11.00        | H               | 3.98        | 20.36             | 6.73          | 38.09               | 47.00            | 8.91           |

\* H : Horizontal, V : Vertical

## ◆ Calculation

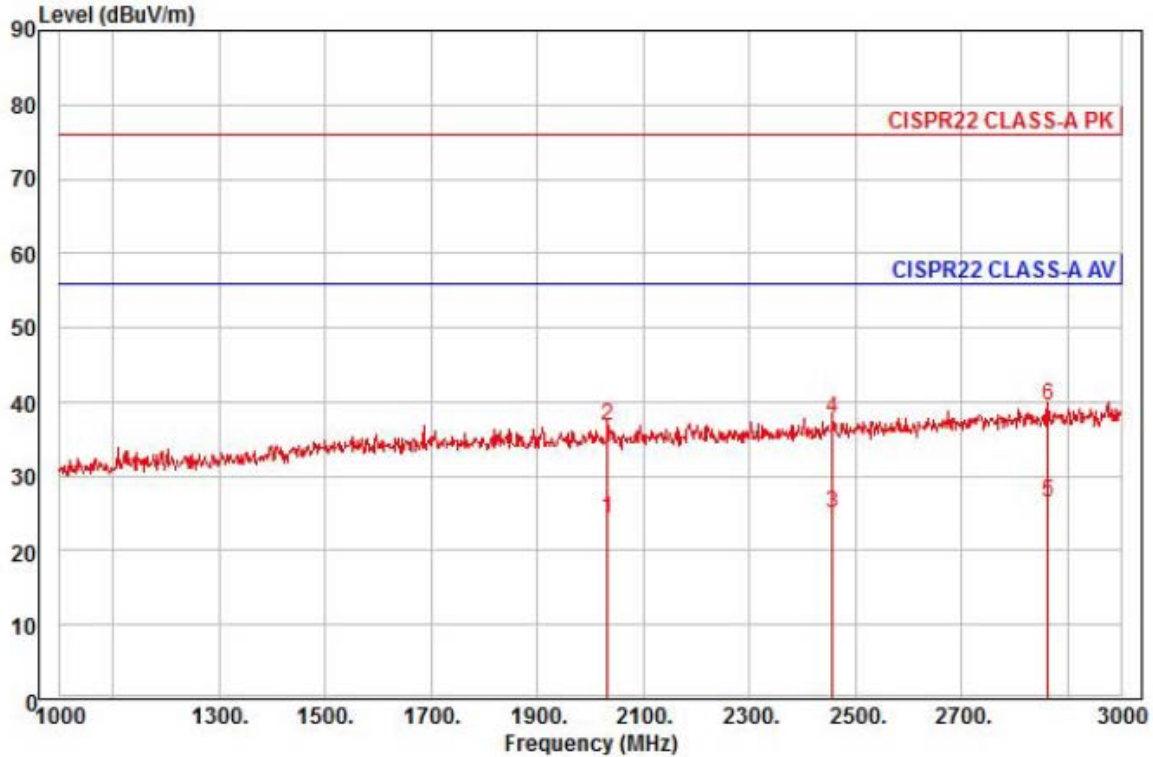
Corrected Amplitude [dB $\mu$ V] = Amplitude[dB $\mu$ V] + Correction Factor [dB]

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

Correction Factor : ANT FACTOR + Cable loss



## Radiated Electric Field Emissions(Above 1 GHz)



Site : chamber  
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) horizontal  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HRD-442N  
Mode :  
Memo : 1 ~ 3 GHz

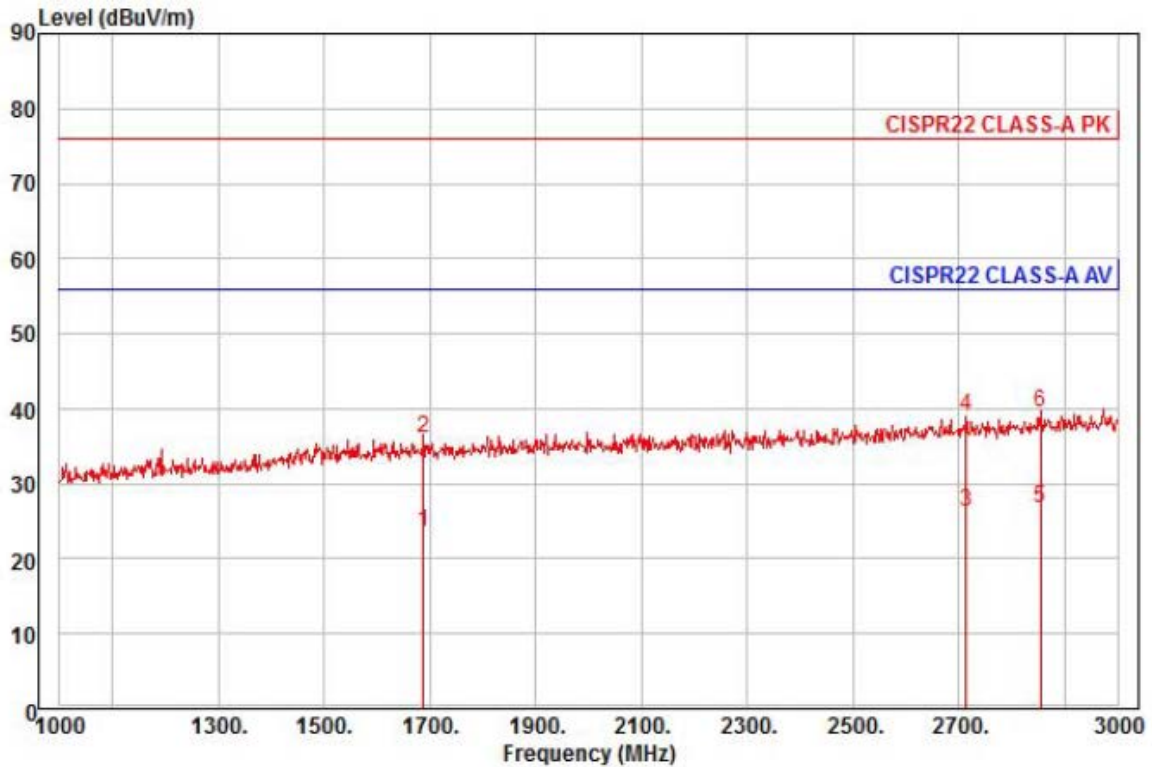
|      | Freq    | Read Level | Ant Factor | Cable Loss | Preamp Factor | TPos | Limit Line | Over Limit | Pol/Phase  | Remark  |
|------|---------|------------|------------|------------|---------------|------|------------|------------|------------|---------|
|      | MHz     | dBuV       | dB/m       | dB         | dB            | deg  | dBuV/m     | dB         |            |         |
| 1    | 2032.00 | 28.45      | 25.73      | 9.41       | 39.41         | 12   | 56.00      | -31.82     | horizontal | Average |
| 2    | 2032.00 | 41.05      | 25.73      | 9.41       | 39.41         | 12   | 76.00      | -39.22     | horizontal | Peak    |
| 3    | 2456.00 | 26.77      | 27.40      | 10.44      | 39.48         | 136  | 56.00      | -30.87     | horizontal | Average |
| 4    | 2456.00 | 39.50      | 27.40      | 10.44      | 39.48         | 136  | 76.00      | -38.14     | horizontal | Peak    |
| 5 pp | 2864.00 | 25.94      | 29.19      | 11.38      | 39.95         | 139  | 56.00      | -29.44     | horizontal | Average |
| 6 pk | 2864.00 | 38.77      | 29.19      | 11.38      | 39.95         | 139  | 76.00      | -36.61     | horizontal | Peak    |

### ◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,  
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

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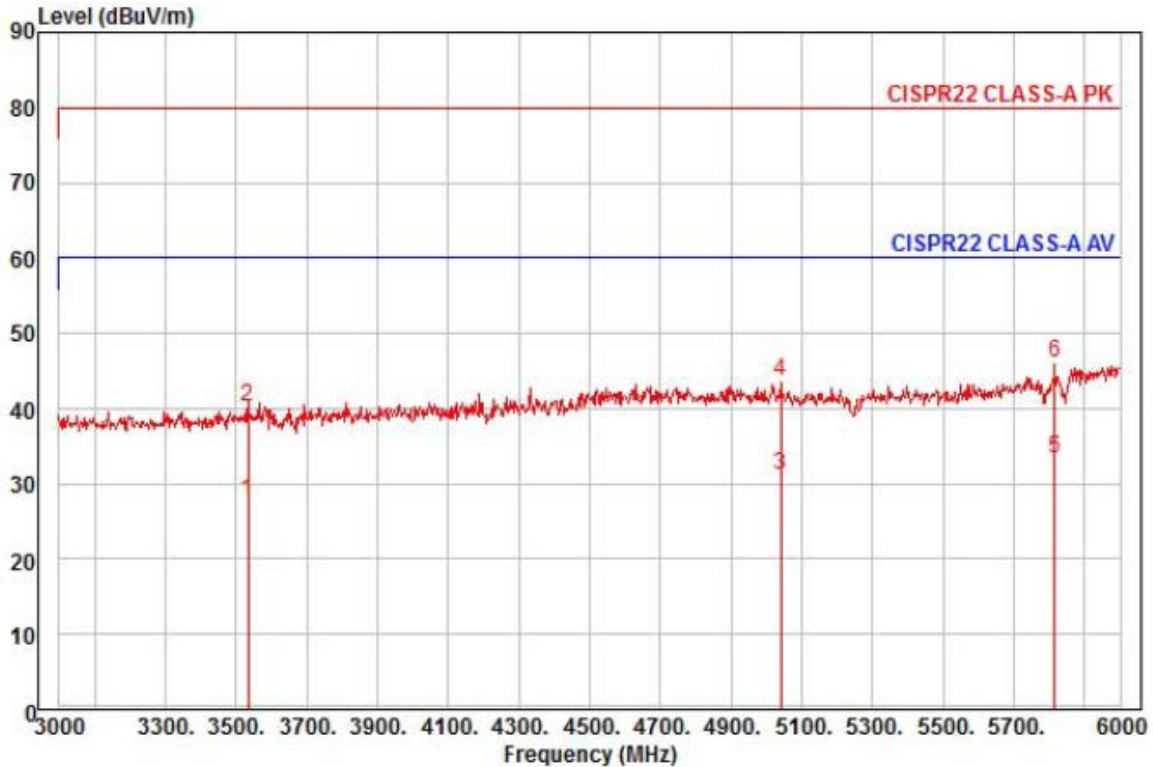
Site : chamber  
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) vertical  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HRD-442N  
Mode :  
Memo : 1 ~ 3 GHz

|      | Freq    | Read Level | Ant Factor | Cable Loss | Preamp Factor | TPos | Limit Line | Over Limit | Pol/Phase | Remark  |
|------|---------|------------|------------|------------|---------------|------|------------|------------|-----------|---------|
|      | MHz     | dBuV       | dB/m       | dB         | dB            | deg  | dBuV/m     | dB         |           |         |
| 1    | 1688.00 | 29.86      | 24.48      | 8.54       | 39.26         | 212  | 56.00      | -32.38     | vertical  | Average |
| 2    | 1688.00 | 42.19      | 24.48      | 8.54       | 39.26         | 212  | 76.00      | -40.05     | vertical  | Peak    |
| 3    | 2714.00 | 26.42      | 28.52      | 11.02      | 39.78         | 161  | 56.00      | -29.82     | vertical  | Average |
| 4    | 2714.00 | 39.19      | 28.52      | 11.02      | 39.78         | 161  | 76.00      | -37.05     | vertical  | Peak    |
| 5 pp | 2854.00 | 26.07      | 29.14      | 11.36      | 39.94         | 26   | 56.00      | -29.37     | vertical  | Average |
| 6 pk | 2854.00 | 38.81      | 29.14      | 11.36      | 39.94         | 26   | 76.00      | -36.63     | vertical  | Peak    |

◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,  
Cable Loss : Cable loss, Preamp Factor : Preamp Factor



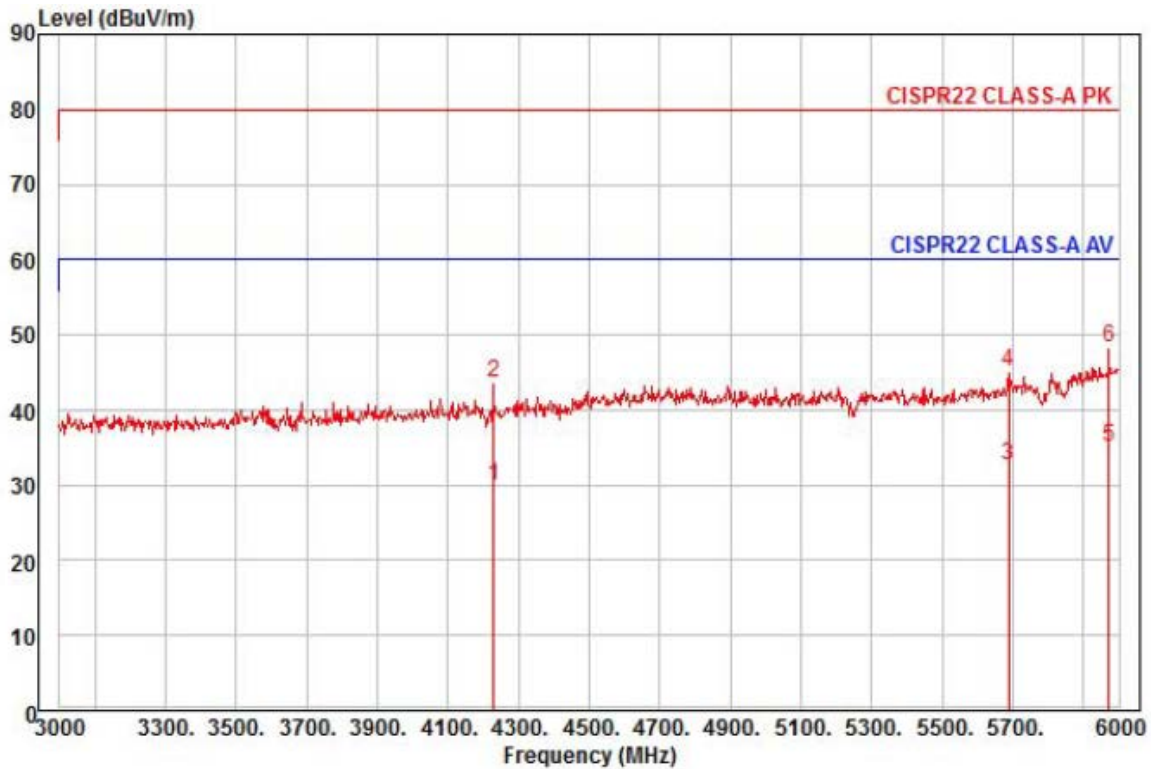
Site : chamber  
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) horizontal  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HRD-442N  
Mode :  
Memo : 3 ~ 6 GHz

|      | Read    | Ant    | Cable | Preamp | TPos  | Limit  | Over  |           |                    |
|------|---------|--------|-------|--------|-------|--------|-------|-----------|--------------------|
| Freq | Level   | Factor | Loss  | Factor |       | Line   | Limit | Pol/Phase | Remark             |
| MHz  | dBuV    | dB/m   | dB    | dB     | deg   | dBuV/m | dB    |           |                    |
| 1    | 3534.00 | 25.47  | 30.36 | 12.69  | 40.87 | 30     | 60.00 | -32.35    | horizontal Average |
| 2    | 3534.00 | 38.15  | 30.36 | 12.69  | 40.87 | 30     | 80.00 | -39.67    | horizontal Peak    |
| 3    | 5040.00 | 22.93  | 33.25 | 15.39  | 40.34 | 245    | 60.00 | -28.77    | horizontal Average |
| 4    | 5040.00 | 35.45  | 33.25 | 15.39  | 40.34 | 245    | 80.00 | -36.25    | horizontal Peak    |
| 5 pp | 5817.00 | 21.88  | 35.45 | 16.73  | 40.68 | 320    | 60.00 | -26.62    | horizontal Average |
| 6 pk | 5817.00 | 34.57  | 35.45 | 16.73  | 40.68 | 320    | 80.00 | -33.93    | horizontal Peak    |

◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,  
Cable Loss : Cable loss, Preamp Factor : Preamp Factor



Site : chamber  
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) vertical  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HRD-442N  
Mode :  
Memo : 3 ~ 6 GHz

|      | Freq    | Read Level | Ant Factor | Cable Loss | Preamp Factor | TPos | Limit Line | Over Limit | Pol/Phase | Remark  |
|------|---------|------------|------------|------------|---------------|------|------------|------------|-----------|---------|
|      | MHz     | dBuV       | dB/m       | dB         | dB            | deg  | dBuV/m     | dB         |           |         |
| 1    | 4230.00 | 24.58      | 32.04      | 13.99      | 40.73         | 157  | 60.00      | -30.12     | vertical  | Average |
| 2    | 4230.00 | 38.40      | 32.04      | 13.99      | 40.73         | 157  | 80.00      | -36.30     | vertical  | Peak    |
| 3    | 5688.00 | 22.24      | 34.67      | 16.50      | 40.85         | 165  | 60.00      | -27.44     | vertical  | Average |
| 4    | 5688.00 | 34.92      | 34.67      | 16.50      | 40.85         | 165  | 80.00      | -34.76     | vertical  | Peak    |
| 5 pp | 5973.00 | 22.02      | 36.39      | 17.02      | 40.47         | 196  | 60.00      | -25.04     | vertical  | Average |
| 6 pk | 5973.00 | 35.29      | 36.39      | 17.02      | 40.47         | 196  | 80.00      | -31.77     | vertical  | Peak    |

◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,  
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

## Test Setup Photos and Configuration Conducted Voltage Emissions



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## Radiated Electric Field Emissions(Below 1 GHz)



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## Radiated Electric Field Emissions(Above 1 GHz)



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## EUT External Photographs

(Top)



(Bottom)



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## EUT Internal Photographs

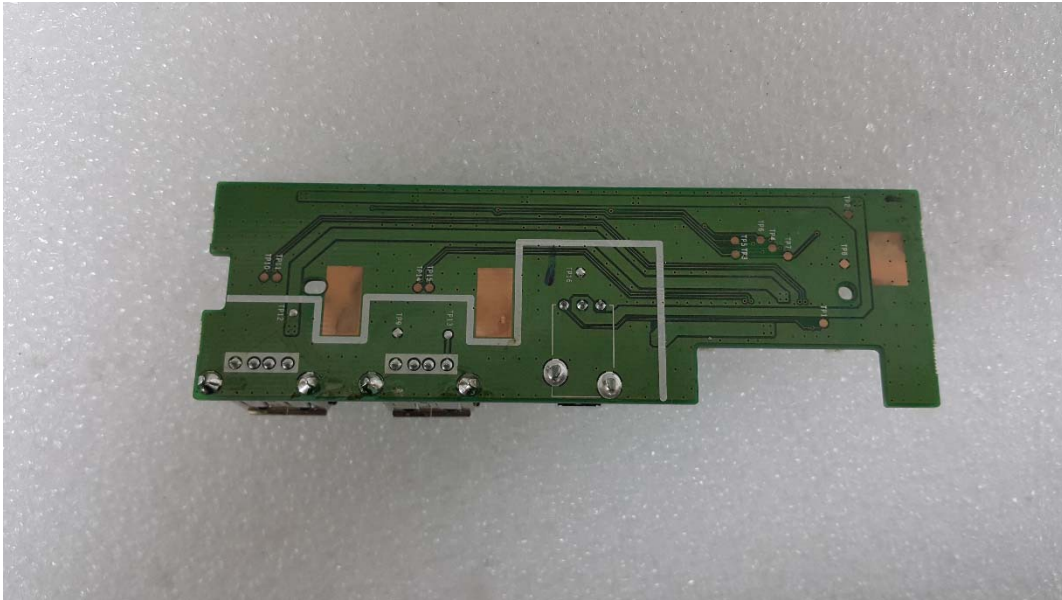
(Internal View)



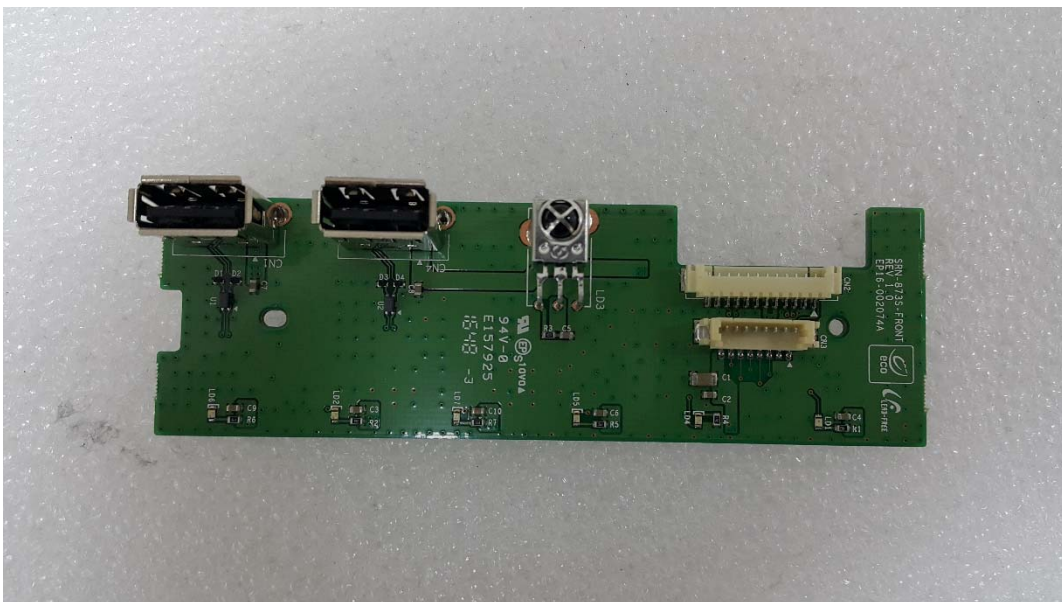
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## EUT Internal View – Board 1

(Top)



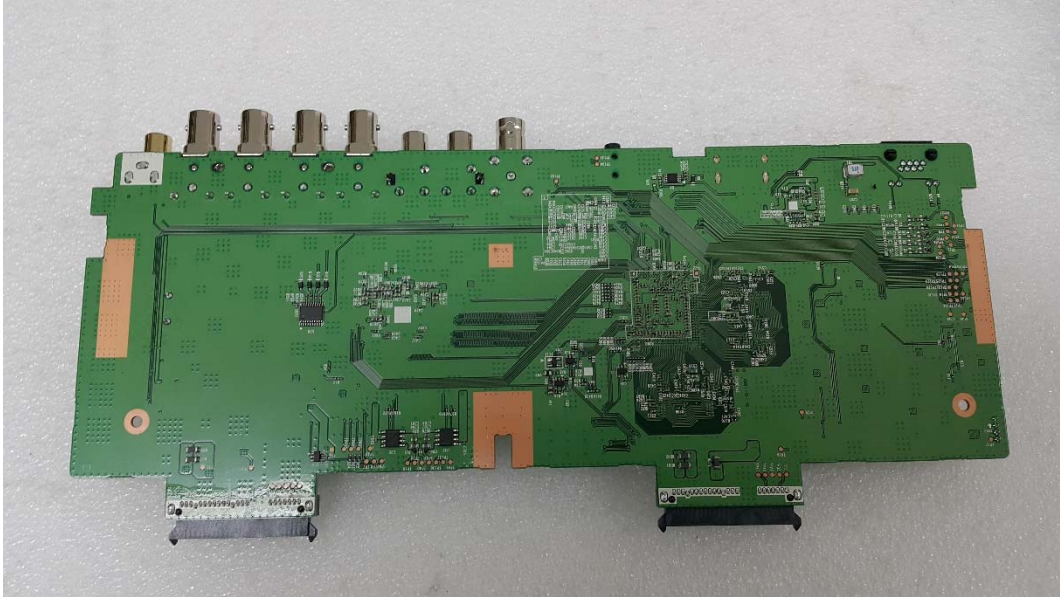
(Bottom)



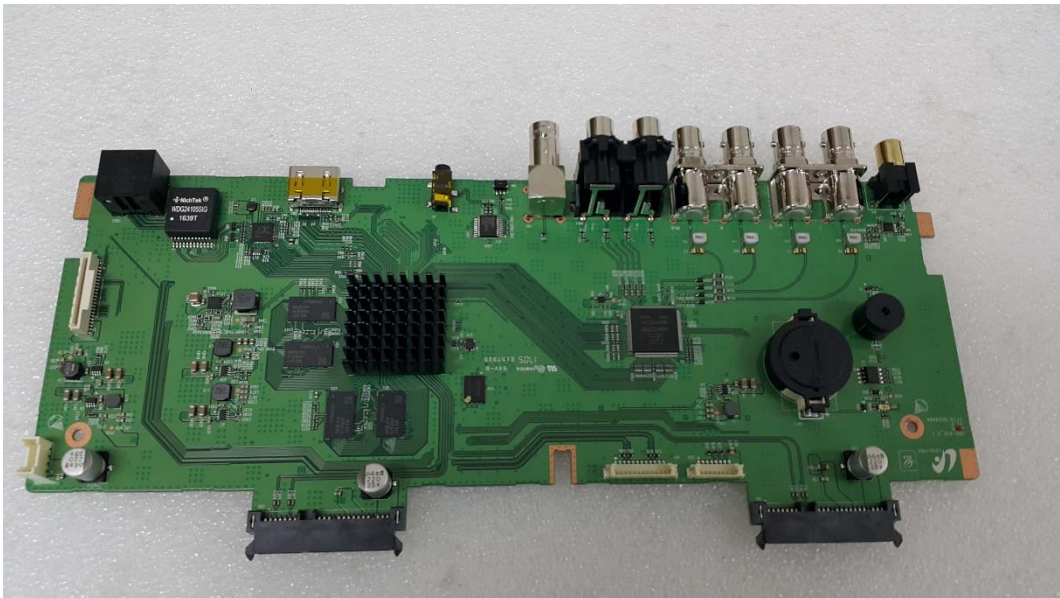
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## EUT Internal View – Board 2

(Top)



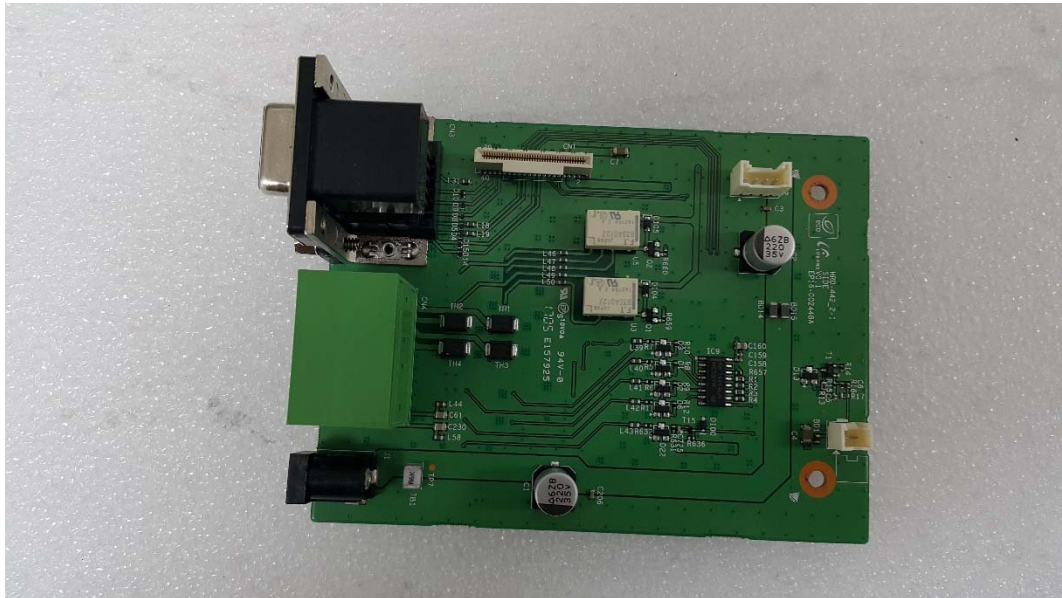
(Bottom)



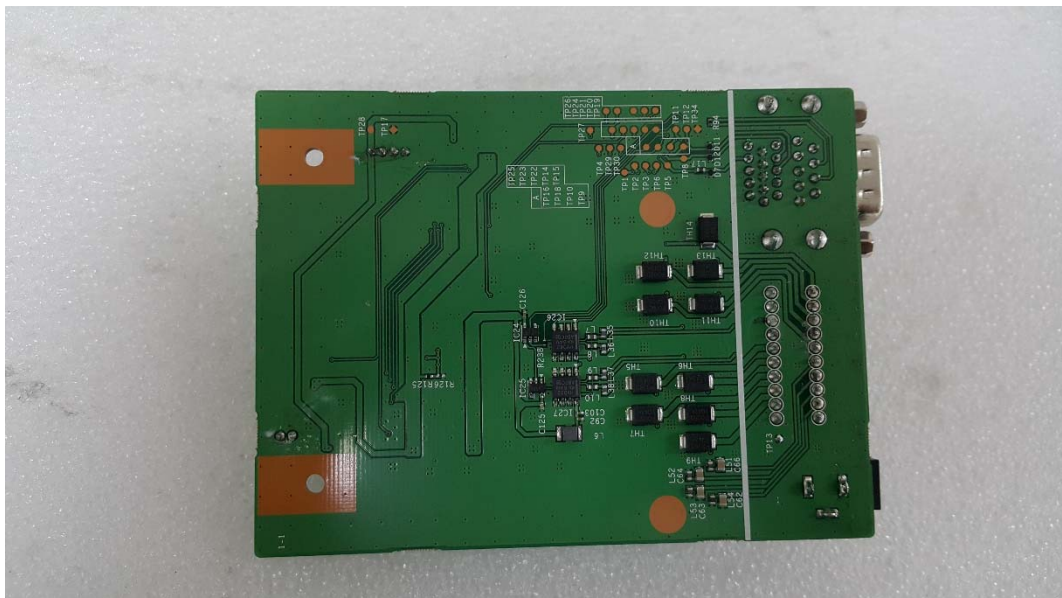
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## EUT Internal View – Board 3

(Top)

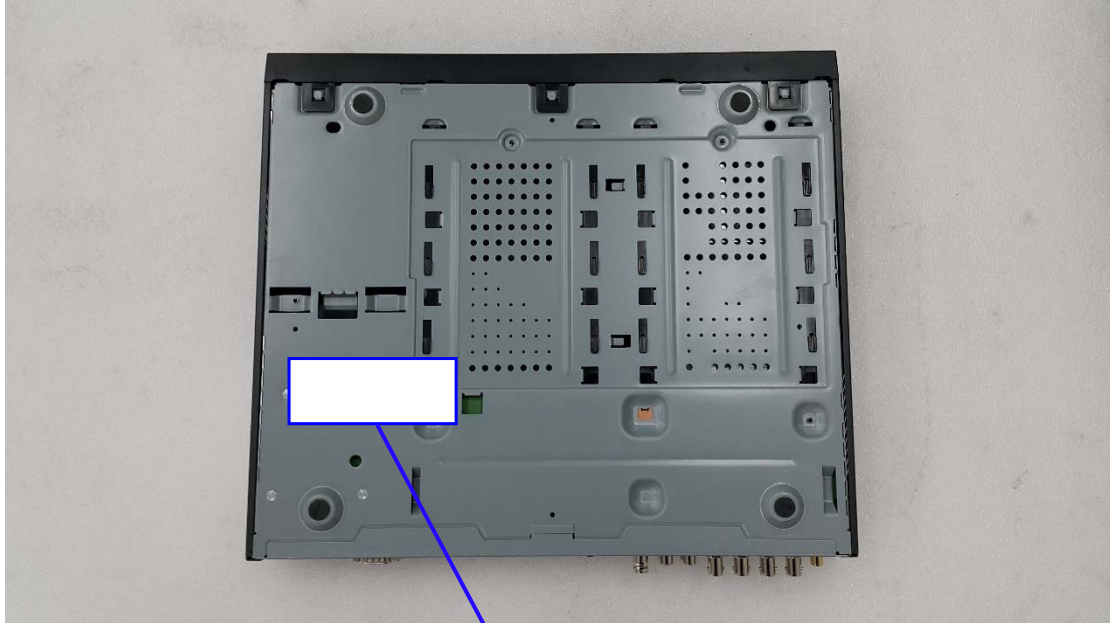


(Bottom)



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## Label Photographs



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

[LABEL VIEW]