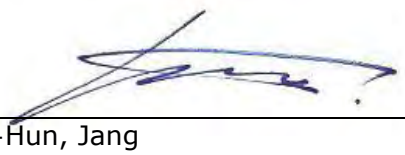
# EMC TEST REPORT For IC

| | | |
|---|---|---|
| Test Report No. | : | KES-E1-17T0646 |
| Date of Issue | : | Sep. 21, 2017 |
| Product name | : | PoE Switch |
| Model/Type No. | : | SPN-10080P |
| 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 |
| Equipment authorization | : | ☐ **Declaration of Conformity**<br>☒ **Verification**<br>☐ **Certification** |
| Date of Receipt | : | Sep. 06, 2017 |
| Test date | : | Sep. 16, 2017 |
| Test Results | : | ☒ **In Compliance** ☐ **Not in Compliance** |

*Tested by*

Young Jun, Jo
EMC Test Engineer

*Reviewed by*



Dong-Hun, Jang
EMC Technical Manager

This test report is not related to KOLAS.

# REPORT REVISION HISTORY

| Date | Test Report No. | Revision History |
|---|---|---|
| Sep. 21, 2017 | KES-E1-17T0646 | Issued |
| | | |
| | | |
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| | | |

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# 1.0 General Product Description

## Main Specifications of EUT are:

| | |
|---|---|
| **PoE** | |
| Maximum PoE Budget | 64W |
| PoE Standard | IEEE 802.3af / 802.3at |
| PoE/PoE+ Ports | Port 1 ~ 8 : PoE/PoE+ |
| **Compatible Devices** | |
| Network CCTV Devices | WiseNet Network Cameras, TRM NVR Series |
| **Interface** | |
| 1000Base-T Interface | 2 (M12, A-Code, 8P Female) |
| 100Base-T PoE Interface | 8 (M12, D-Code, 4P Female) |
| MDI/MDIX adjustable | Yes |
| Power Input | Molex 6P -> 6P Gender Included |
| **Indicator** | |
| LED | Power Status : 1 -> 0<br>Ethernet : Link 10-> 2, ACT 10 ->2<br>PoE Status : 8 -> PoE Link: 8 |
| **General** | |
| Dimension (W x D x H) | 270 x 134 x 93mm |
| Weight | TBD |
| Operation Temperature | -20 ~ 55°C |
| Operation/Storage Humidity | 0% - 95% RH |
| Maximum Power Consumption | TBD |
| Power Input | 9 ~ 36 VDC (Fanless) |
| Color/Material | Black / Al |
| Imgression | X |

## 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 |
|---|---|---|---|---|
| PoE Switch | SPN-10080P | - | Hanwha Techwin (Tianjin) Co.,Ltd. | E.U.T |

## 1.5 Support Equipments

| Description | Model Number | Serial Number | Manufacturer | Remarks |
|---|---|---|---|---|
| Notebook | NT63025J | JK9091EF400432X | SAMSUNG Electronics Co., Ltd. | - |
| Notebook AC/DC adapter | A13-040N2A | - | Chicony Power Technbology Co., Ltd. | - |
| PoE Camera 1 | - | - | SAMSUNG | - |
| PoE Camera 2 | RS-CH292H3C-36P-ST | - | SAMSUNG | 7 EA |

## 1.6 External I/O Cabling

| Start | | END | | Cable Spec. | |
|---|---|---|---|---|---|
| **Description** | **I/O Port** | **Description** | **I/O Port** | **Length** | **Shield** |
| PoE Switch (E.U.T) | RJ-45 | Notebook | RJ-45 | 3.5 | S |
| | RJ-45 | PoE Camera 1 | RJ-45 | 3.5 | S |
| | RJ-45 | PoE Camera 2 | RJ-45 | 5.0 | S |
| | RJ-45 | PoE Camera 2 | RJ-45 | 5.0 | S |
| | RJ-45 | PoE Camera 2 | RJ-45 | 5.0 | S |
| | RJ-45 | PoE Camera 2 | RJ-45 | 5.0 | S |
| | RJ-45 | PoE Camera 2 | RJ-45 | 5.0 | S |
| | RJ-45 | PoE Camera 2 | RJ-45 | 5.0 | S |
| | RJ-45 | PoE Camera 2 | RJ-45 | 5.0 | S |

* Unshielded=U, Shielded=S

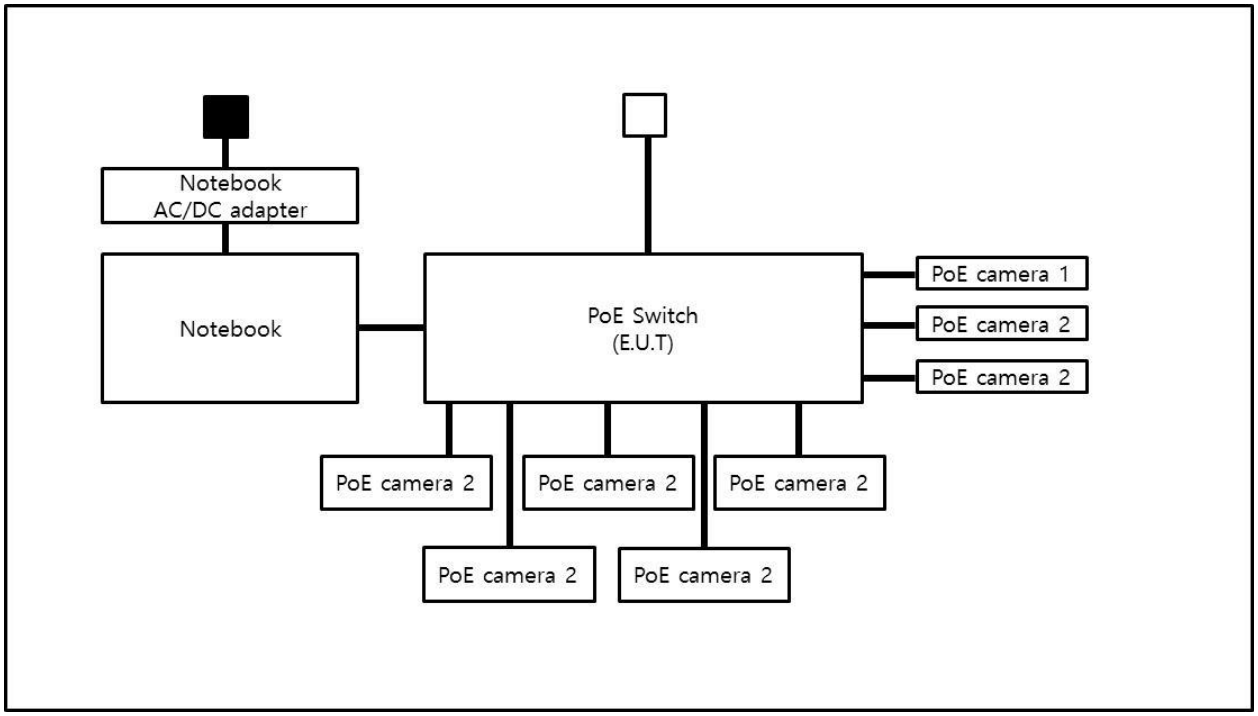
## 1.7 EUT Operating Mode(s)

| Test mode | operating |
|---|---|
| Normal Operating | Check the video output of the camera & Ping test |

| E.U.T 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, Yeoju-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22.

## 1.12 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. | |
| 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 | R-4308, C-4798, 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) | KR0100 |
| Canada | **IC** | 3 & 10 meter Open Area Test Sites and one conducted site | 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) | KOREA LABORATORY ACCREDITATION SCHEME KOLAS TESTING NO. 489 |

# 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<br>☐ Class A | ☐ Group 2<br>☐ 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 | | |

☐ **VCCI V-3 / 2015.04** ☐ Class A ☐ Class B

☐ **AS/NZS CISPR22:2009 +A1:2010** ☐ Class A ☐ Class B

☐ **47 CFR Part 15, Subpart B**

- ☐ CISPR 22:2009 +A1:2010 ☐ Class A ☐ Class B
- ☐ ANSI C63.4-2009

☒ **IC Regulation ICES-003 : 2016**

- ☒ CAN/CSA CISPR 22-10 ☒ Class A ☐ Class B
- ☐ ANSI C63.4-2014

☐ **RE– Directive 2014/53/EU**

☐ EN 301 489-1 V1.9.2

- ☐ Equipment for fixed use
- ☐ Equipment for vehicular use
- ☐ Equipment for portable use

☐ EN 301 489-3 V1.6.1

☐ EN 301 489-17 V2.2.1

☐ EN 60945:2002

# 2.1 Conducted Emissions Mains Power Ports

### Test Date
N/A

### Test Location
Electro wave Shieldroom

### Test Equipment

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|---|---|---|---|---|---|
| ☐ | EMI Test S/W | EMC32 | R & S | 9.12.00 | - |
| ☐ | EMI TEST RECEIVER | ESR3 | R & S | 101783 | 04, 27, 2018 |
| ☐ | LISN | ENV216 | R & S | 101137 | 02, 03, 2018 |
| ☐ | LISN | ENV216 | R & S | 101786 | 04, 27, 2018 |
| ☐ | PULSE LIMITER | ESH3-Z2 | R & S | 101914 | 12, 13, 2017 |

### Test Conditions
Temperature: ℃
Relative Humidity: %

### Frequency Range of Measurement
150 ㎑ to 30 ㎒

### Instrument Settings
IF Band Width: 9 ㎑

### Test Results
The requirements are:

☐ PASS
☐ NOT PASS
☒ NOT APPLICABLE

### Remarks
N/A

# 2.2 Radiated Electric Field Emissions(Below 1 ㎓)

**Test Date**
Sep. 16, 2017

**Test Location**
☒ OPEN AREA TEST SITE #2 ☐ SAC #4(10 m)

**Test Equipment**

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|---|---|---|---|---|---|
| ☒ | EMI TEST RECEIVER | ESVS10 | R & S | 826008/014 | 04, 18, 2018 |
| ☒ | TRILOG-BROADBAND ANTENNA | VULB9163 | Schwarzbeck | 714 | 11, 28, 2018 |

**Test Conditions**
Temperature: 25,7 ℃
Relative Humidity: 54,0 %

**Frequency Range of Measurement**
30 ㎒ to 1 ㎓

**Instrument Settings**
IF Band Width: 120 ㎑

**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 ㎓)

**Test Date**
Sep. 16, 2017

**Test Location**
SEMI ANECHOIC CHAMBER #2

**Test Equipment**

| Used | Description | Model Number | Manufacturer | Serial Number | Cal. Due |
|---|---|---|---|---|---|
| ☒ | EMI Test S/W | e3 | AUDIX | 8.083b | - |
| ☒ | EMI TEST RECEIVER | ESU26 | R & S | 100552 | 04, 19, 2018 |
| ☒ | PREAMPLIFIER | 8449B | AGILENT | 3008A01729 | 05, 31, 2018 |
| ☐ | ATTENUATOR | 8491A | HP | 35496 | 03, 24, 2018 |
| ☒ | LOG-PERIODIC ANTENNA | STLP 9149 | SCHWARZBECK | 9149-255 | 05, 17, 2018 |

**Test Conditions**
Temperature: 23,0 ℃
Relative Humidity: 52,1 %

**Frequency Range of Measurement**
1 ㎓ to 6 ㎓

**Instrument Settings**
IF Band Width: 1 ㎒

**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]**

N/A

**[NEUTRAL]**

N/A

♦ 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))

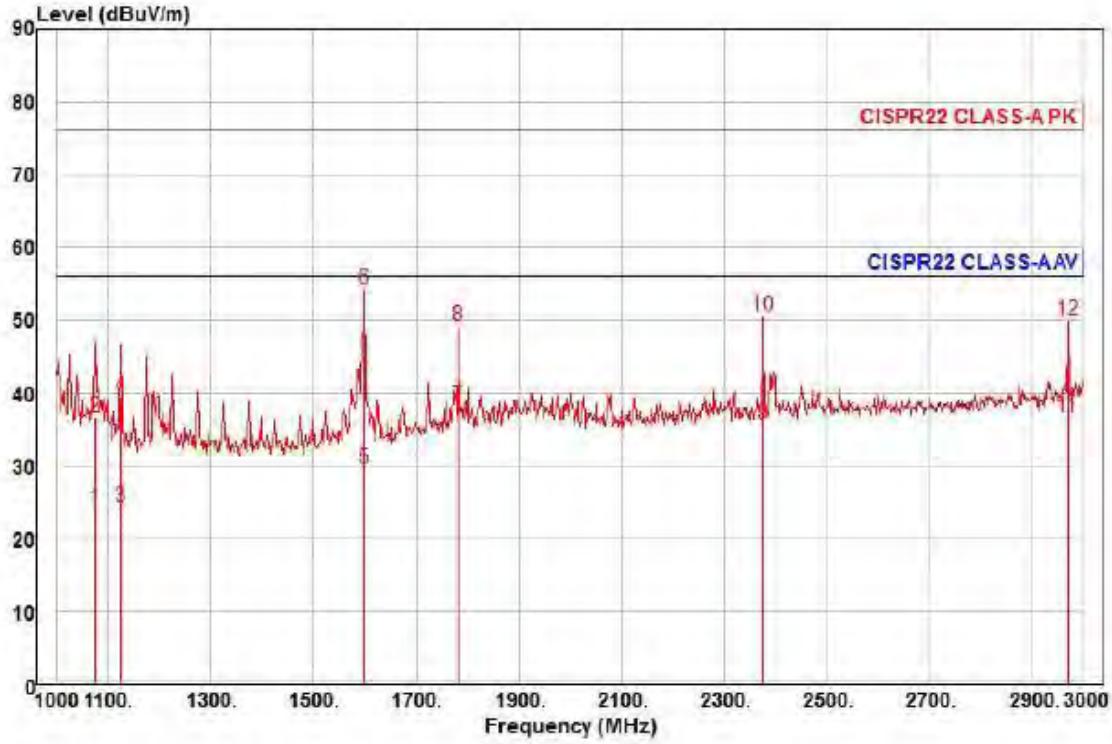
## Radiated Electric Field Emissions(Below 1 ㎓)

| Frequency | Amplitude | ANT Polar. (H/V) | ANT. Height | Correction Factor | | Corrected Amplitude | Applicable Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| [㎒] | [dB㎶] | | [m] | ANT. [dB/m] | Cable [dB] | [dB㎶/m] | [dB㎶/m] | [dB] |
| 249.35 | 18.90 | V | 1.00 | 12.48 | 4.61 | 35.99 | 47.00 | 11.01 |
| 299.76 | 20.40 | H | 3.85 | 13.42 | 5.01 | 38.83 | 47.00 | 8.17 |
| 349.20 | 16.10 | H | 3.90 | 14.50 | 5.55 | 36.15 | 47.00 | 10.85 |
| 371.54 | 17.50 | V | 1.00 | 14.99 | 5.82 | 38.31 | 47.00 | 8.69 |
| 482.66 | 12.90 | H | 4.00 | 17.05 | 6.84 | 36.79 | 47.00 | 10.21 |
| 525.09 | 11.50 | H | 4.00 | 17.84 | 7.16 | 36.50 | 47.00 | 10.50 |

* H : Horizontal, V : Vertical

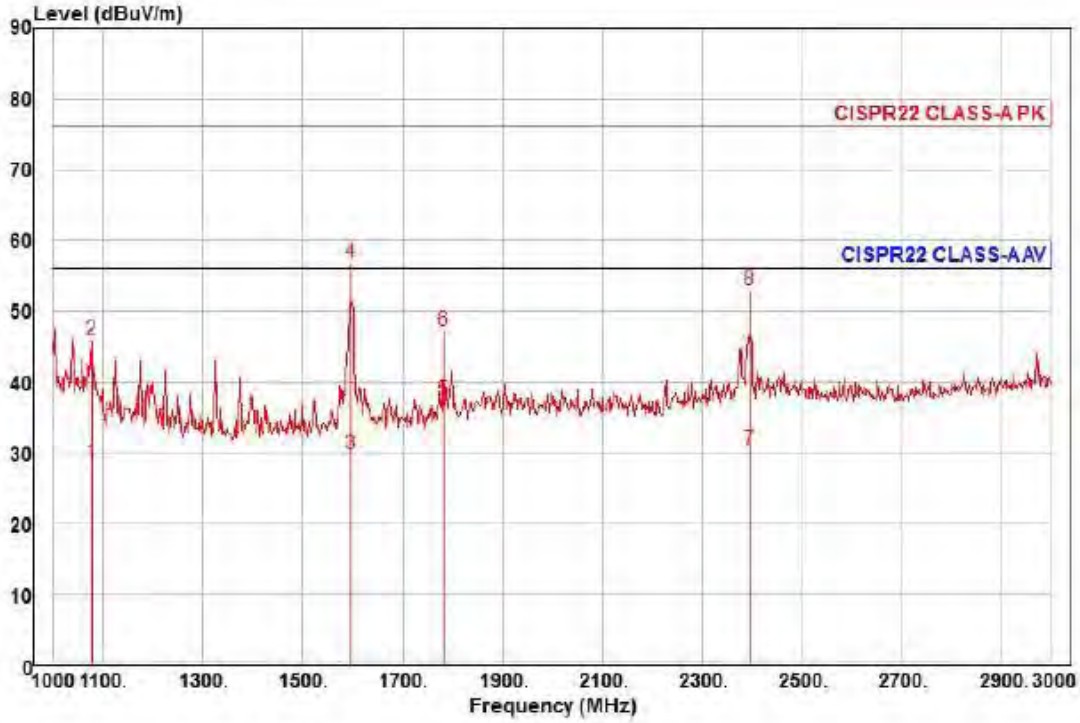
♦ Calculation
Corrected Amplitude [㏈uV] = Amplitude[㏈uV] + Correction Factor [㏈]
Corrected Amplitude : The Final Value, Amplitude : Reading Value,
Correction Factor : ANT FACTOR + Cable loss

# Radiated Electric Field Emissions(Above 1 ㎓)



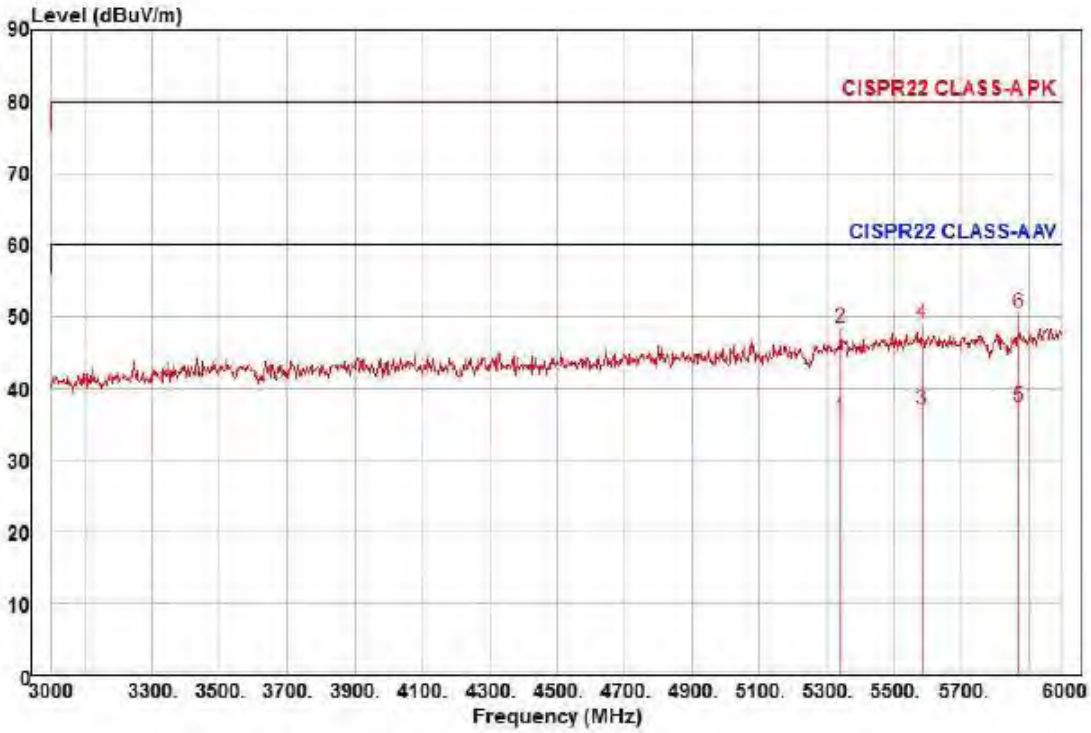

Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SPN-10080P
Mode :
Memo : 1 - 3 GHz

| | 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 | 1074.00 | 30.53 | 22.72 | 6.88 | 35.99 | 196 | 56.00 | -31.86 | horizontal | Average |
| 2 | 1074.00 | 43.01 | 22.72 | 6.88 | 35.99 | 196 | 76.00 | -39.38 | horizontal | Peak |
| 3 | 1124.00 | 30.26 | 22.88 | 7.04 | 35.95 | 151 | 56.00 | -31.77 | horizontal | Average |
| 4 | 1124.00 | 45.40 | 22.88 | 7.04 | 35.95 | 151 | 76.00 | -36.63 | horizontal | Peak |
| 5 | 1598.00 | 32.31 | 24.41 | 8.50 | 35.53 | 286 | 56.00 | -26.31 | horizontal | Average |
| 6 pk | 1598.00 | 56.93 | 24.41 | 8.50 | 35.53 | 286 | 76.00 | -21.69 | horizontal | Peak |
| 7 pp | 1782.00 | 39.47 | 25.14 | 9.04 | 35.36 | 254 | 56.00 | -17.71 | horizontal | Average |
| 8 | 1782.00 | 50.38 | 25.14 | 9.04 | 35.36 | 254 | 76.00 | -26.80 | horizontal | Peak |
| 9 | 2376.00 | 33.28 | 27.15 | 10.54 | 35.32 | 136 | 56.00 | -20.35 | horizontal | Average |
| 10 | 2376.00 | 48.18 | 27.15 | 10.54 | 35.32 | 136 | 76.00 | -25.45 | horizontal | Peak |
| 11 | 2970.00 | 30.46 | 29.61 | 12.06 | 35.55 | 67 | 56.00 | -19.42 | horizontal | Average |
| 12 | 2970.00 | 43.85 | 29.61 | 12.06 | 35.55 | 67 | 76.00 | -26.03 | horizontal | Peak |



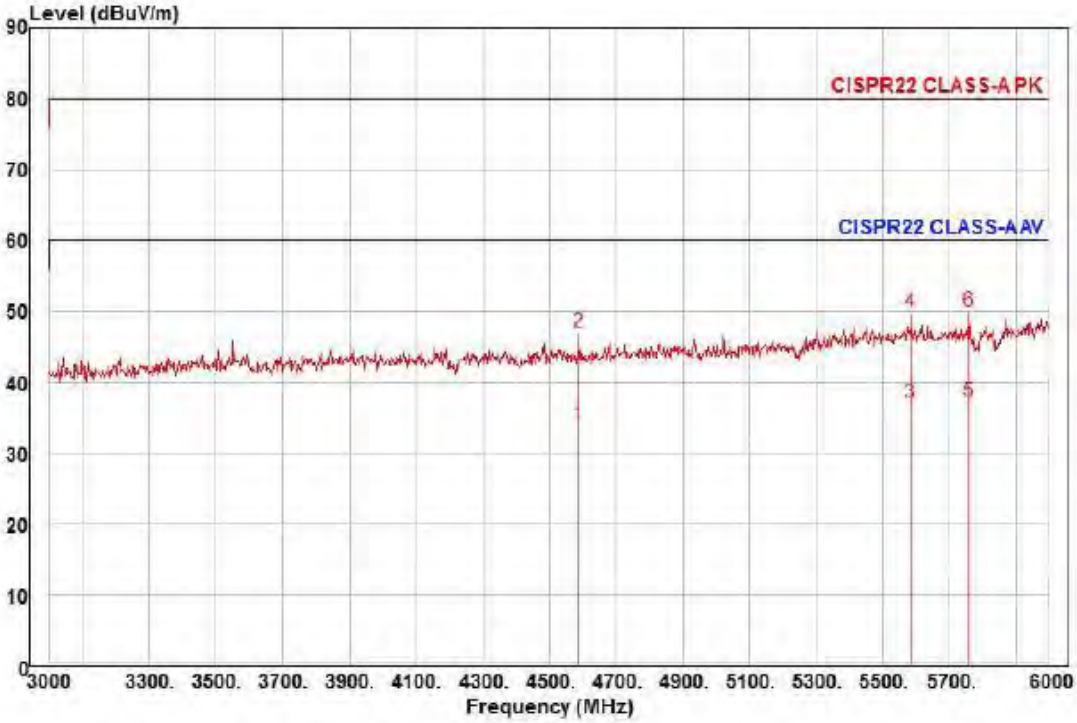

Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SPN-10080P
Mode :
Memo : 1 - 3 GHz

| | 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 | 1076.00 | 35.04 | 22.73 | 6.88 | 35.99 | 68 | 56.00 | -27.34 | vertical | Average |
| 2 | 1076.00 | 52.36 | 22.73 | 6.88 | 35.99 | 68 | 76.00 | -30.02 | vertical | Peak |
| 3 | 1596.00 | 32.51 | 24.40 | 8.49 | 35.53 | 4 | 56.00 | -26.13 | vertical | Average |
| 4 pk | 1596.00 | 59.43 | 24.40 | 8.49 | 35.53 | 4 | 76.00 | -19.21 | vertical | Peak |
| 5 pp | 1782.00 | 38.61 | 25.14 | 9.04 | 35.36 | 80 | 56.00 | -18.57 | vertical | Average |
| 6 | 1782.00 | 48.51 | 25.14 | 9.04 | 35.36 | 80 | 76.00 | -28.67 | vertical | Peak |
| 7 | 2396.00 | 27.84 | 27.21 | 10.58 | 35.32 | 96 | 56.00 | -25.69 | vertical | Average |
| 8 | 2396.00 | 50.54 | 27.21 | 10.58 | 35.32 | 96 | 76.00 | -22.99 | vertical | Peak |




Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SPN-10080P
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 | 5343.00 | 20.50 | 34.75 | 16.34 | 35.65 | 290 | 60.00 | -24.06 | horizontal | Average |
| 2 | 5343.00 | 32.92 | 34.75 | 16.34 | 35.65 | 290 | 80.00 | -31.64 | horizontal | Peak |
| 3 | 5583.00 | 20.49 | 35.49 | 16.74 | 35.66 | 68 | 60.00 | -22.94 | horizontal | Average |
| 4 | 5583.00 | 32.40 | 35.49 | 16.74 | 35.66 | 68 | 80.00 | -31.03 | horizontal | Peak |
| 5 pp | 5874.00 | 19.94 | 35.93 | 17.27 | 35.68 | 32 | 60.00 | -22.54 | horizontal | Average |
| 6 pk | 5874.00 | 33.09 | 35.93 | 17.27 | 35.68 | 32 | 80.00 | -29.39 | horizontal | Peak |




Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SPN-10080P
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 | 4590.00 | 21.73 | 32.55 | 15.11 | 35.49 | 19 | 60.00 | -26.10 | vertical | Average |
| 2 | 4590.00 | 34.87 | 32.55 | 15.11 | 35.49 | 19 | 80.00 | -32.96 | vertical | Peak |
| 3 | 5586.00 | 20.49 | 35.50 | 16.74 | 35.67 | 159 | 60.00 | -22.94 | vertical | Average |
| 4 | 5586.00 | 33.31 | 35.50 | 16.74 | 35.67 | 159 | 80.00 | -30.12 | vertical | Peak |
| 5 pp | 5760.00 | 20.14 | 35.76 | 16.99 | 35.68 | 57 | 60.00 | -22.79 | vertical | Average |
| 6 pk | 5760.00 | 33.01 | 35.76 | 16.99 | 35.68 | 57 | 80.00 | -29.92 | vertical | Peak |

♦ Calculation
Over Limit [dB] = (Read Level[dBμV] + Ant Factor[dB/m] + Cable Loss [dB] – Preamp Factor [dB]) – Limit Line[dBμV]
Over Limit : Margin, Read Level : Reading value, Ant Factor : ANT Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

# Test Setup Photos and Configuration

## Conducted Voltage Emissions

N/A

N/A

## Radiated Electric Field Emissions(Below 1 ㎓)

## Radiated Electric Field Emissions(Above 1 ㎓)

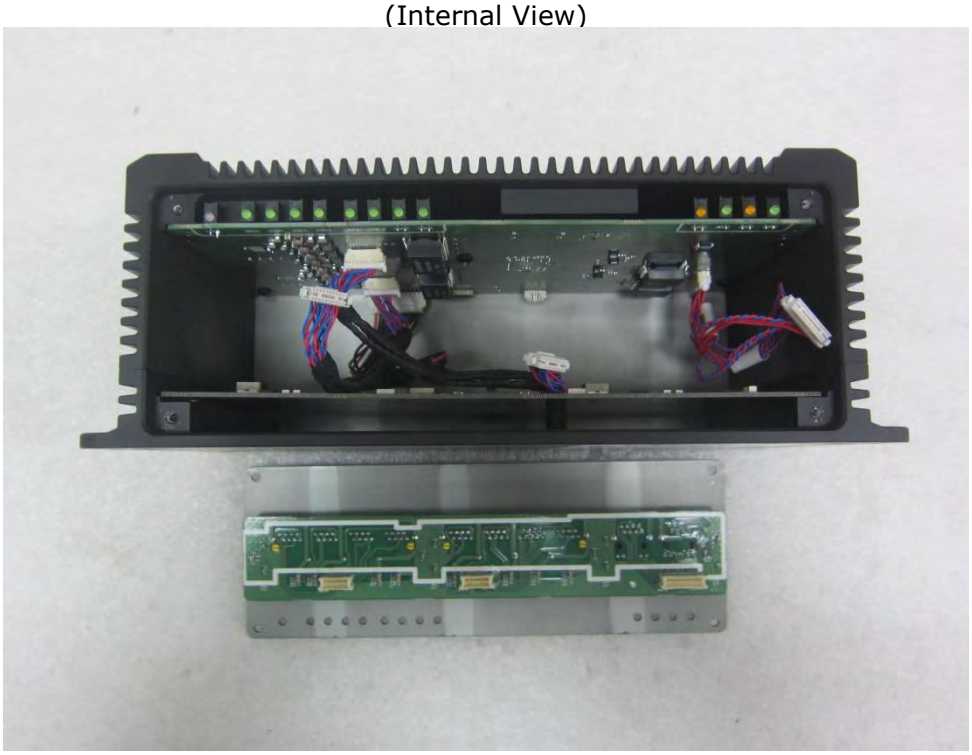
# EUT External Photographs

(Top)

(Bottom)

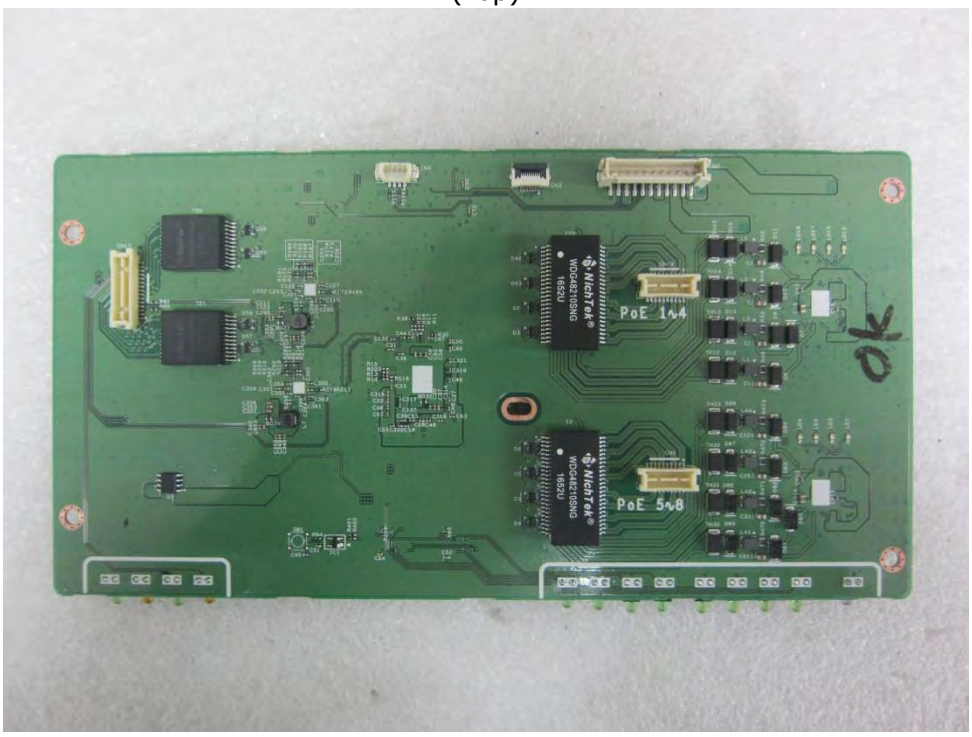
# EUT Internal Photographs

(Internal View)

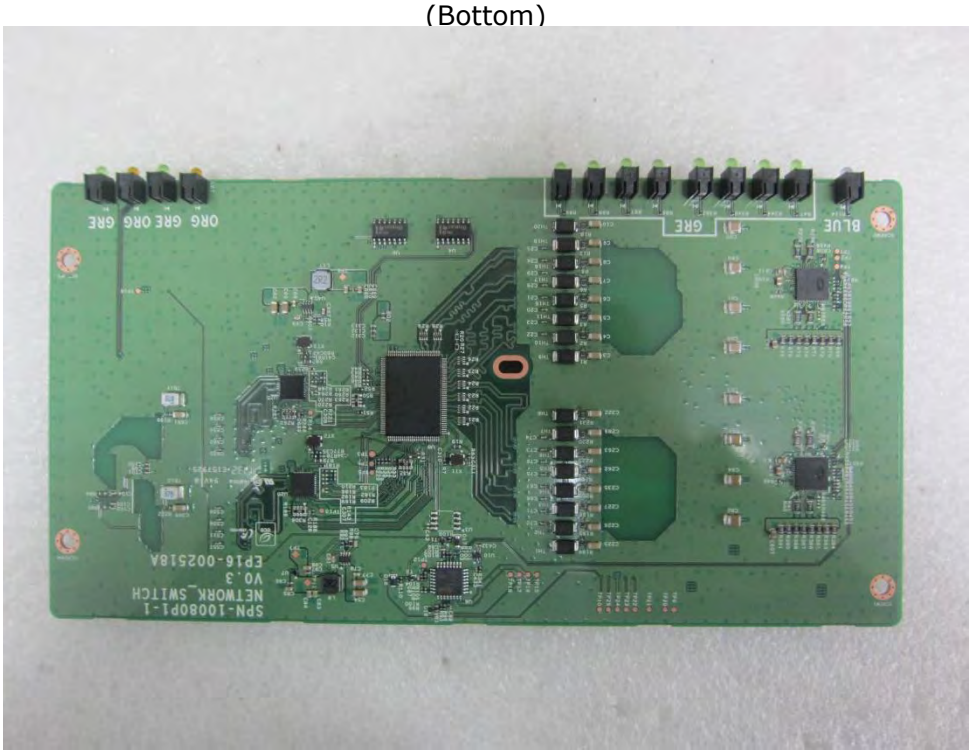


# EUT Internal View – Main Board

(Top)

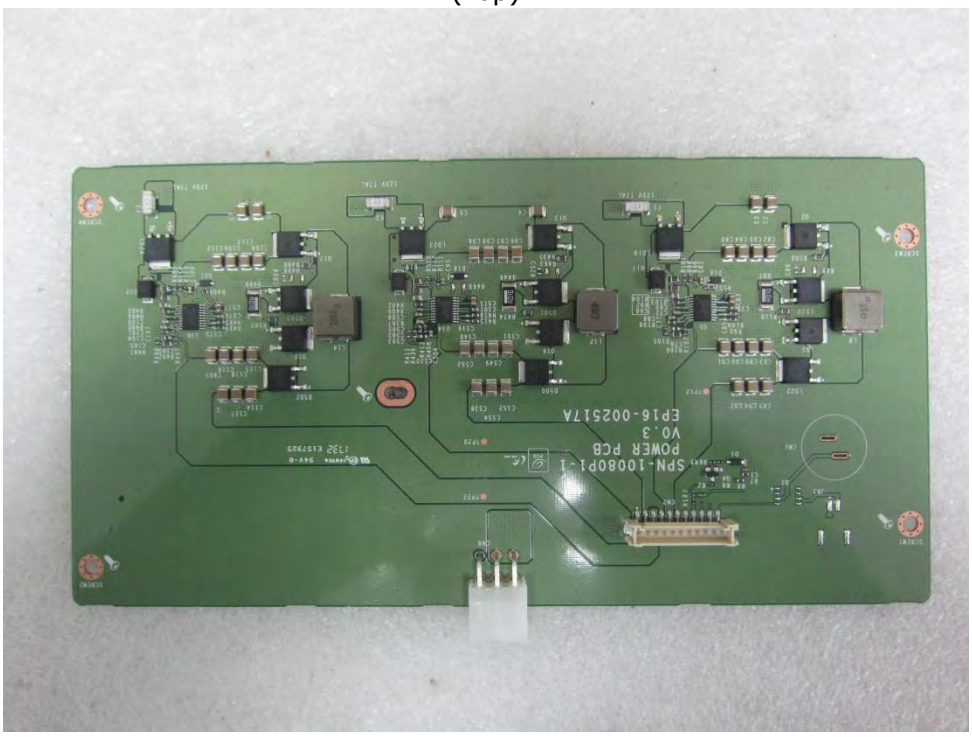



(Bottom)

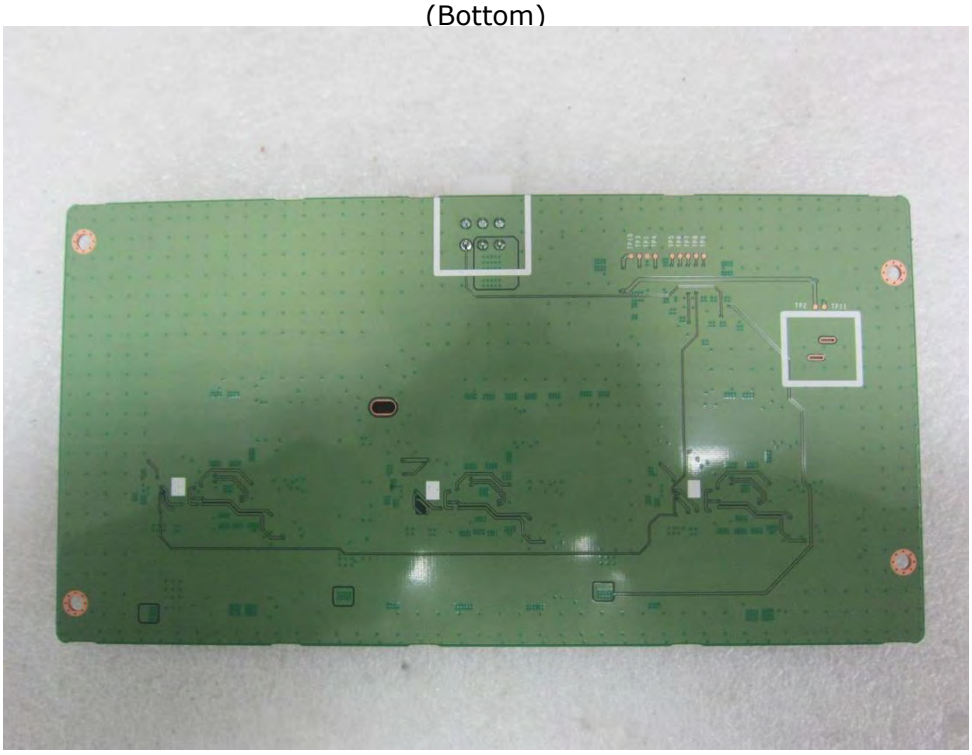


# EUT Internal View – Power Board

(Top)

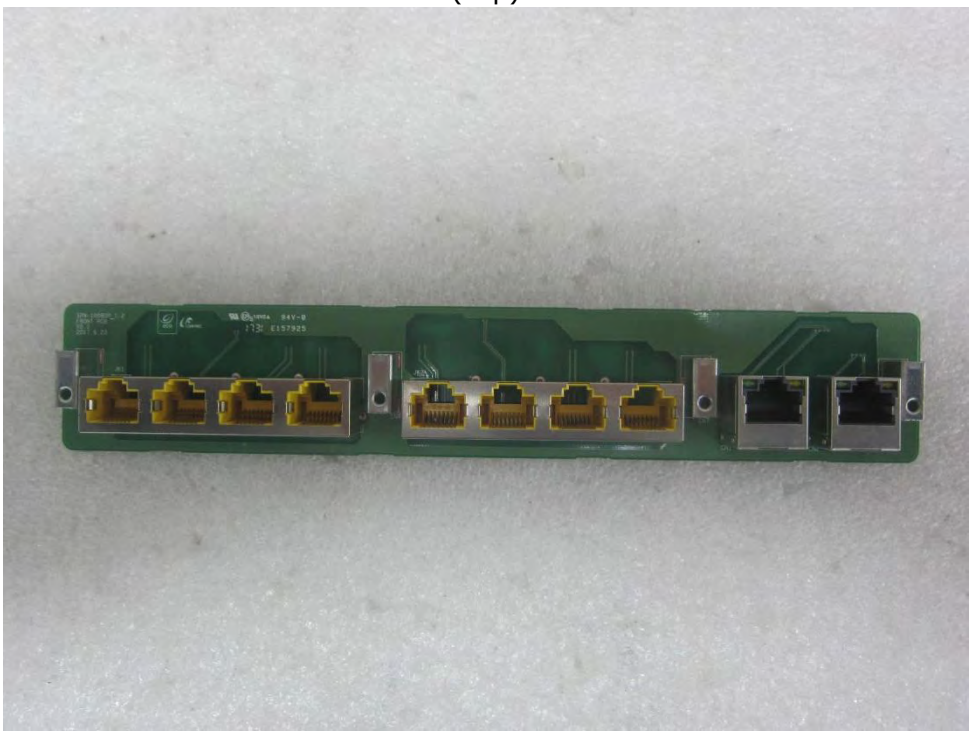



(Bottom)

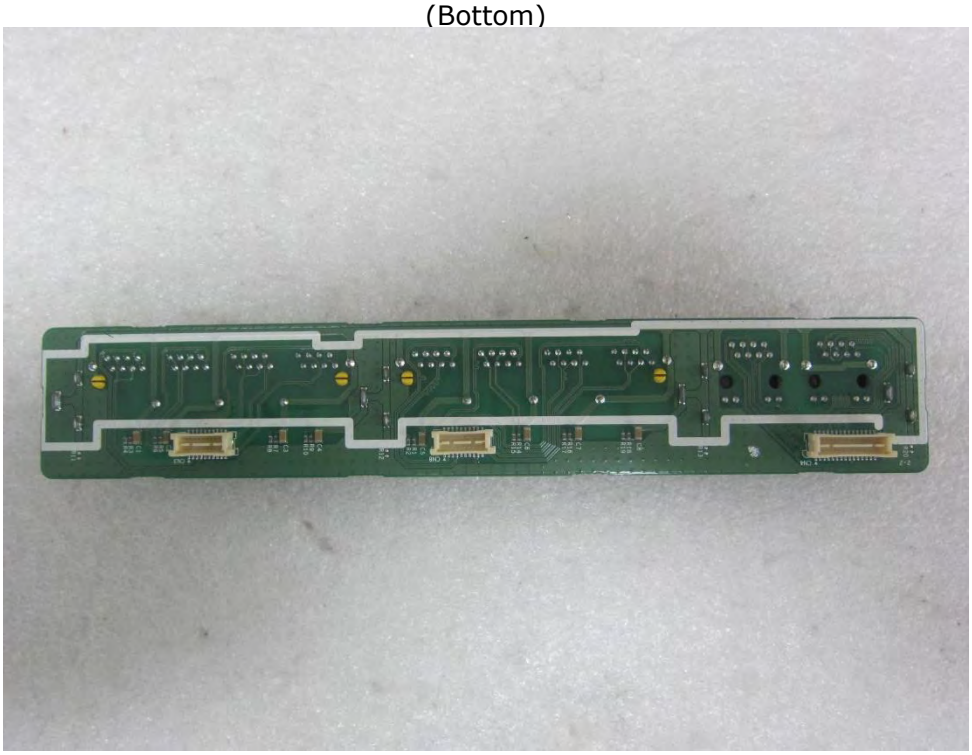


# EUT Internal View – Slot Board

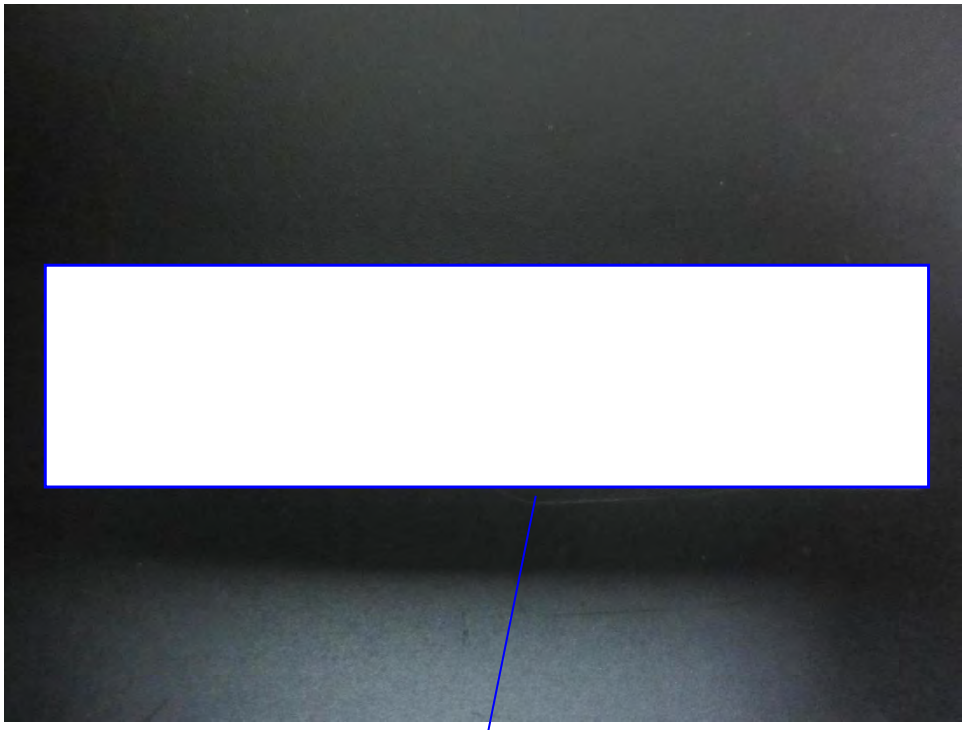
(Top)



(Bottom)



# Label Photographs



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

[LABEL VIEW]