



## EMC TEST REPORT For IC

Test Report No. : KES-E1-17T0528  
Date of Issue : Aug. 14, 2017  
Product name : CCTV CAMERA  
Model/Type No. : HCV-6080RN  
Variant Model : HCV-6070RN  
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 : Aug. 01, 2017  
Test date : Aug. 02, 2017 ~ Aug. 03, 2017  
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Dong Il, Lee  
EMC Test Engineer

Reviewed by

Dong-Hun, Jang  
EMC Technical Manager

This test report is not related to KOLAS.

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### REPORT REVISION HISTORY

| Date          | Test Report No. | Revision History |
|---------------|-----------------|------------------|
| Aug. 14, 2017 | KES-E1-17T0528  | Issued           |
|               |                 |                  |
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## 1.0 General Product Description

### Main Specifications of EUT are:

|                             | HCV-6080RN                                                                                                                                                                 | HCV-6080RP   |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Video</b>                |                                                                                                                                                                            |              |
| Imaging Device              | 1/2.8" 2M CMOS                                                                                                                                                             |              |
| Total Pixels                | 1,945(H) x 1,109(V) 2.16M pixels                                                                                                                                           |              |
| Effective Pixels            | 1,945(H) x 1,097(V) 2.13M pixels                                                                                                                                           |              |
| Scanning System             | Progressive Scan                                                                                                                                                           |              |
| Min. Illumination           | Color : 0.2Lux (F1.4, 50IRE); 0.11Lux (F1.4, 30IRE)<br>B/W : 0Lux(IR LED on)                                                                                               |              |
| S / N Ratio                 | 52dB (AGC off, Weight on)                                                                                                                                                  |              |
| Video Output                | BNC(AHD / TVI / CVI / CVBS Selectable)                                                                                                                                     |              |
| Resolution                  | 1920 x 1080                                                                                                                                                                |              |
| Max. Framerate              | 30fps @1080p                                                                                                                                                               | 25fps @1080p |
| <b>Pan / Tilt / Rotate</b>  |                                                                                                                                                                            |              |
| Pan / Tilt / Rotate Range   | 0° ~ 350° / 0° ~ 67° / 0° ~ 355°                                                                                                                                           |              |
| <b>Lens Type</b>            |                                                                                                                                                                            |              |
| Focal Length (Zoom Ratio)   | 2.8 ~ 12mm (4.3x) motorized varifocal                                                                                                                                      |              |
| Max. Aperture Ratio         | F1.4                                                                                                                                                                       |              |
| Angular Field of View       | H : 103.8°(Wide) ~ 32.4°(Tele) / V : 53.7°(Wide) ~ 18.4°(Tele) D : 121.9°(Wide) ~ 37.1°(Tele)                                                                              |              |
| Min. Object Distance        | 0.5m (1.64ft)                                                                                                                                                              |              |
| Focus Control               | Simple focus(Motorized V/F) / Manual                                                                                                                                       |              |
| Lens Type                   | DC Auto Iris                                                                                                                                                               |              |
| Mount Type                  | Board-in type                                                                                                                                                              |              |
| Auto Back Focus(ABF)        | -                                                                                                                                                                          |              |
| <b>Operational</b>          |                                                                                                                                                                            |              |
| IR LED                      |                                                                                                                                                                            |              |
| Viewable length             | 30m (98.43ft)                                                                                                                                                              |              |
| On Screen Display           | Multi-language Support(16)<br>English, Japanese, Spanish, French, Portuguese, Korean, German, Italian, Russian, Polish, Czech, Romanian, Serbian, Swedish, Danish, Turkish |              |
| Camera Title                | Off / On (Displayed 15 characters)                                                                                                                                         |              |
| Day & Night                 | Auto (ICR) / Color / B/W                                                                                                                                                   |              |
| Backlight Compensation      | Off / User BLC / HLC                                                                                                                                                       |              |
| Wide Dynamic Range          | 120dB                                                                                                                                                                      |              |
| Contrast Enhancement        | -                                                                                                                                                                          |              |
| Digital Noise Reduction     | SSNR4 ( Off / On )                                                                                                                                                         |              |
| Defog                       | AUTO / MANUAL / OFF                                                                                                                                                        |              |
| Digital Image Stabilization | Not support                                                                                                                                                                |              |
| Motion Detection            | Off / On(4 zones)                                                                                                                                                          |              |
| Privacy Masking             | Off / On (4zones rectangle)                                                                                                                                                |              |
| Gain Control                | Off / Low / Middle / High / Very High                                                                                                                                      |              |

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|                                  |                                                                                               |
|----------------------------------|-----------------------------------------------------------------------------------------------|
| White Balance                    | ATW / Outdoor / Indoor / Manual / AWC (1,800K° ~ 10,500K°)                                    |
| LDC (Lens Distortion Correction) | Not support                                                                                   |
| Electronic Shutter Speed         | 1sec~ 1/12,000sec                                                                             |
| Digital Zoom                     | Not support                                                                                   |
| Reverse                          | Off / H-Rev / V-Rev / HV-Rev                                                                  |
| Profile                          | Basic, Day & Night, Backlight, ITS, Indoor, User                                              |
| Intelligent Video Analytics      | Not support                                                                                   |
| Alarm                            | MD output 1                                                                                   |
| Remote control interface         | Coaxial                                                                                       |
| Protocol                         | NTSC/PAL : Pelco-C (Coaxitron)<br>AHD : ACP(AHD Coax Protocol)                                |
| Video Transmission Distance      | 500m(5C2V Coaxial Cable)                                                                      |
| <b>Environmental</b>             |                                                                                               |
| Operating Temperature / Humidity | -30°C ~ +55°C (-22°F ~ +131°F) / Less than 90% RH<br>* Start up should be done at above -10°C |
| Ingress Protection               | IP66                                                                                          |
| Vandal Resistance                | IK10                                                                                          |
| <b>Electrical</b>                |                                                                                               |
| Input Voltage/Current            | Dual ( 24VAC±10% & 12VDC±10% )                                                                |
| Power Consumption                | Max. 4.2W                                                                                     |
| <b>Mechanical</b>                |                                                                                               |
| Color / Material                 | Ivory / Aluminum                                                                              |
| Dimension (WxHxD)                | 106.1* Φ137mm                                                                                 |
| Weight                           | 716g                                                                                          |

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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

The Variant model is management model of each different sellers.

## 1.3 Device Modifications

Not applicable

## 1.4 Equipment Under Test

| Description | Model Number | Serial Number | Manufacturer                      | Remarks |
|-------------|--------------|---------------|-----------------------------------|---------|
| CCTV CAMERA | HCV-6080RN   | -             | Hanwha Techwin (Tianjin) Co.,Ltd. | E.U.T   |

## 1.5 Support Equipments

| Description     | Model Number  | Serial Number | Manufacturer               | Remarks |
|-----------------|---------------|---------------|----------------------------|---------|
| MONITOR         | 23MA53D       | 303KKMH9Z019  | LG Electronics Co., Ltd.   | -       |
| MONITOR Adapter | PSAB-L205A    | EAY62850201   | LG Innotek Yantai Co. Ltd. | -       |
| Alarm           | SIP-1201DD D0 | -             | SAMSUNG TECHWIN CO., LTD.  | -       |



## 1.6 External I/O Cabling

- AC 24 V Mode

| Start                  |          | END         |           | Cable Spec. |        |
|------------------------|----------|-------------|-----------|-------------|--------|
| Description            | I/O Port | Description | I/O Port  | Length      | Shield |
| CCTV CAMERA<br>(E.U.T) | BNC      | MONITOR     | Component | 3.5         | S      |
|                        | 2 Pin    | Alarm       | 2 Pin     | 3.0         | U      |

- DC 12 V Mode

| Start                  |          | END         |           | Cable Spec. |        |
|------------------------|----------|-------------|-----------|-------------|--------|
| Description            | I/O Port | Description | I/O Port  | Length      | Shield |
| CCTV CAMERA<br>(E.U.T) | BNC      | MONITOR     | Component | 3.5         | S      |
|                        | 2 Pin    | Alarm       | 2 Pin     | 3.0         | U      |

\* Unshielded = U, Shielded = S

## 1.7 EUT Operating Mode(s)

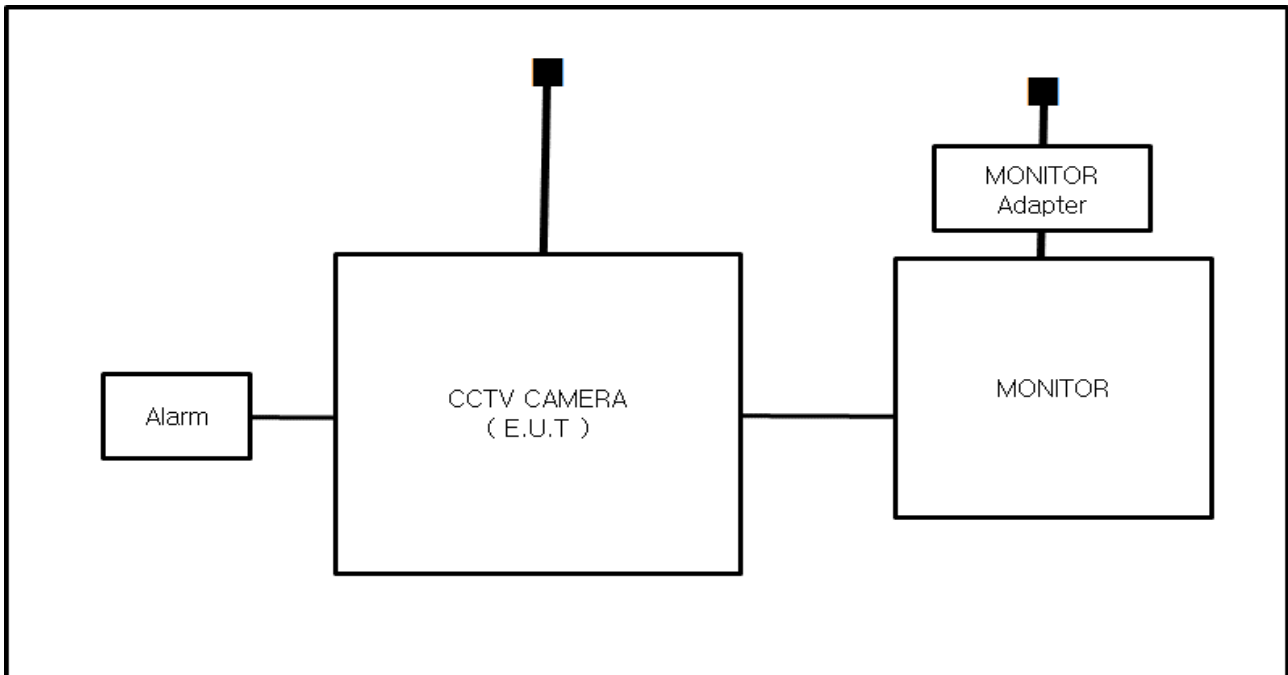
| Test mode | operating        |
|-----------|------------------|
| AC 24 V   | E.U.T Monitoring |
| DC 12 V   | E.U.T Monitoring |

| E.U.T Test operating S/W |         |                     |
|--------------------------|---------|---------------------|
| Name                     | Version | Manufacture Company |
| -                        | -       | -                   |

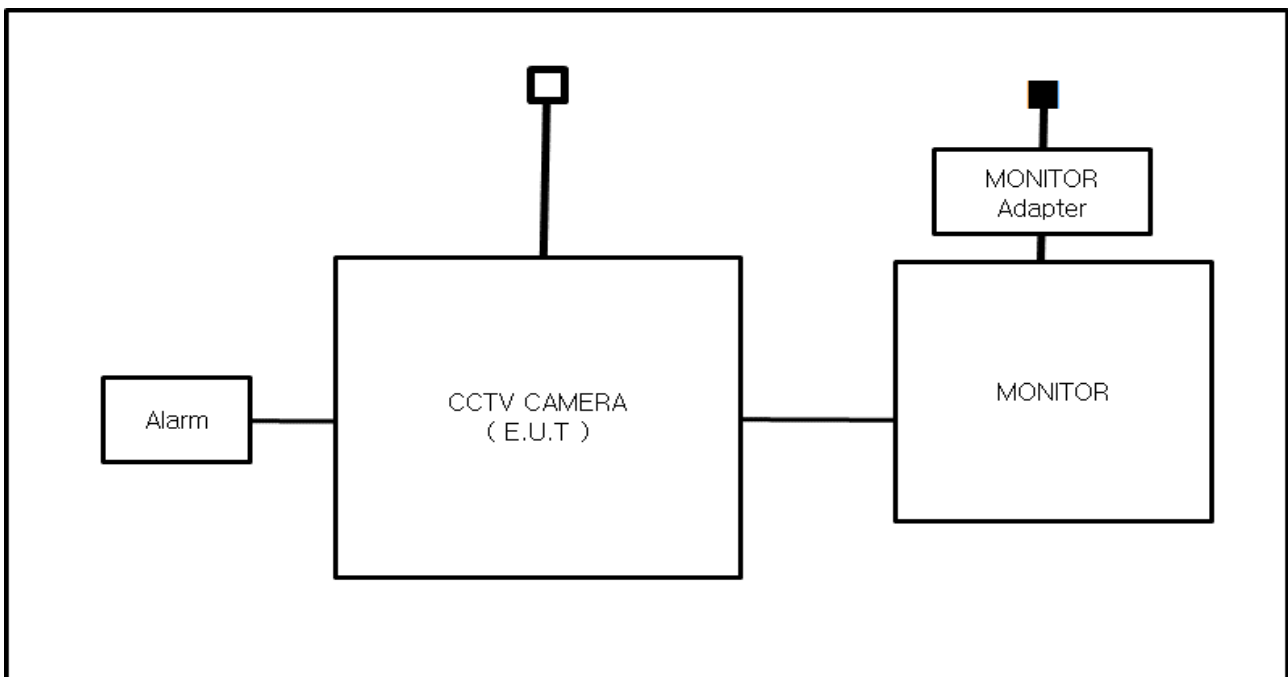
## 1.8 Configuration

■ AC Main  
□ DC Main

- AC 24 V Mode



- DC 12 V Mode



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## 1.9 Remarks when standards applied

- N/A

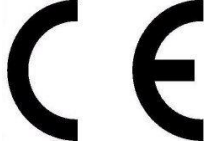
## 1.10 Calibration Details of Equipment Used for Measurement

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

## 1.11 Test Facility

The measurement facility is located at 473-21 Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4 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         | <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) |                                      |

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## 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



- 
- |                                                                          |                                             |                                  |
|--------------------------------------------------------------------------|---------------------------------------------|----------------------------------|
| <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>                 |                                             |                                  |
| <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                                   |                                             |                                  |



## 2.1 Conducted Emissions Mains Power Ports

### Test Date

Aug. 02, 2017

### Test Location

Electro wave Shieldroom

### Test Equipment

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

### Test Conditions

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

### 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

Aug. 02, 2017

### Test Location

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

### Test Equipment

| Used                                | Description              | Model Number | Manufacturer | Serial Number | Cal. Due     |
|-------------------------------------|--------------------------|--------------|--------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test S/W             | -            | -            | -             | -            |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER        | ESVS10       | R & S        | 826008/014    | 04, 18, 2018 |
| <input checked="" type="checkbox"/> | TRILOG-BROADBAND ANTENNA | VULB9163     | Schwarzbeck  | 714           | 11, 28, 2018 |

### Test Conditions

Temperature: 31,3 °C

Relative Humidity: 68,0 %

### 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

Aug. 03, 2017

### Test Location

SEMI ANECHOIC CHAMBER #2

### Test Equipment

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

### Test Conditions

Temperature: 22,2 °C

Relative Humidity: 44,1 %

### 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

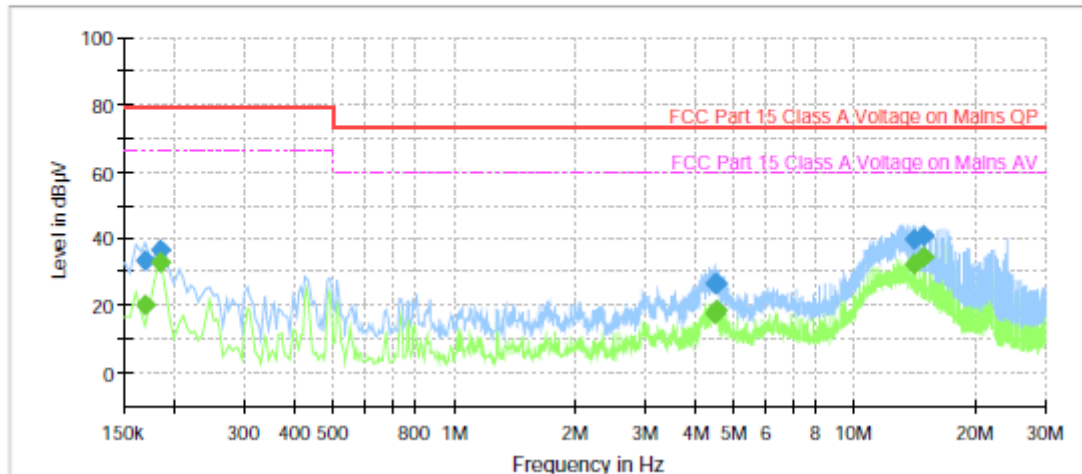
### Conducted Emissions at Mains Power Ports

- AC 24 V Mode

[HOT]

#### Common Information

|                   |                    |
|-------------------|--------------------|
| Test Description: | Conducted Emission |
| Model No.:        | HCV-6080RN         |
| Mode              | AC                 |
| 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        | ---              | 19.88           | 66.00        | 46.12       | 1000.0          | 9.000           | L1   | 19.4       |
| 0.170000        | 33.40            | ---             | 79.00        | 45.60       | 1000.0          | 9.000           | L1   | 19.4       |
| 0.185000        | ---              | 32.77           | 66.00        | 33.23       | 1000.0          | 9.000           | L1   | 19.4       |
| 0.185000        | 36.32            | ---             | 79.00        | 42.68       | 1000.0          | 9.000           | L1   | 19.4       |
| 4.460000        | ---              | 17.44           | 60.00        | 42.56       | 1000.0          | 9.000           | L1   | 19.9       |
| 4.460000        | 26.58            | ---             | 73.00        | 46.42       | 1000.0          | 9.000           | L1   | 19.9       |
| 4.525000        | ---              | 18.34           | 60.00        | 41.66       | 1000.0          | 9.000           | L1   | 19.9       |
| 4.525000        | 26.52            | ---             | 73.00        | 46.48       | 1000.0          | 9.000           | L1   | 19.9       |
| 14.070000       | ---              | 32.37           | 60.00        | 27.63       | 1000.0          | 9.000           | L1   | 19.9       |
| 14.070000       | 39.64            | ---             | 73.00        | 33.36       | 1000.0          | 9.000           | L1   | 19.9       |
| 14.850000       | ---              | 34.41           | 60.00        | 25.59       | 1000.0          | 9.000           | L1   | 19.9       |
| 14.850000       | 40.68            | ---             | 73.00        | 32.32       | 1000.0          | 9.000           | L1   | 19.9       |

Calculation

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

QuasiPeak / CAverage : The Final Value

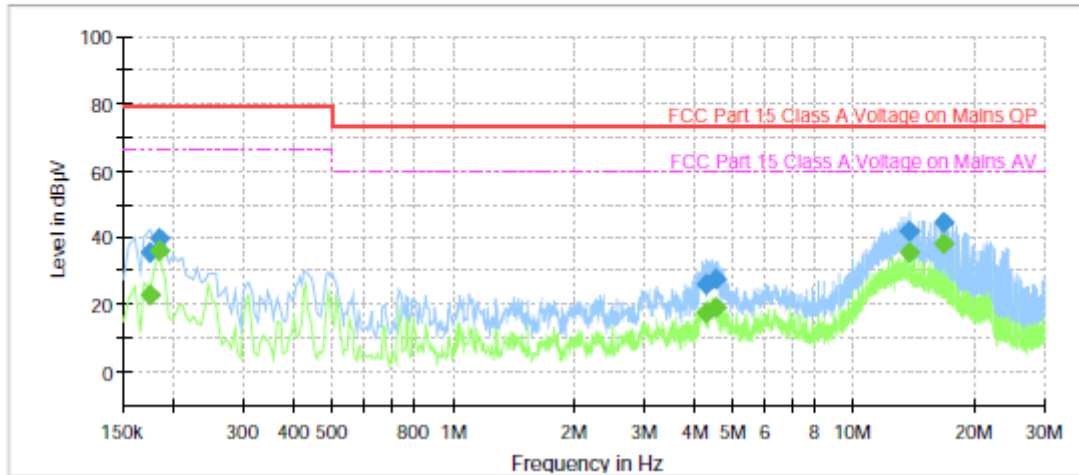
Reading Value : Not shown in the table.

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

## [NEUTRAL]

### Common Information

|                   |                    |
|-------------------|--------------------|
| Test Description: | Conducted Emission |
| Model No.:        | HCV-6080RN         |
| Mode              | AC                 |
| Operator Name:    | KES                |



### Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.175000        | ---              | 22.75           | 66.00        | 43.25       | 1000.0          | 9.000           | N    | 19.4       |
| 0.175000        | 35.49            | ---             | 79.00        | 43.51       | 1000.0          | 9.000           | N    | 19.4       |
| 0.185000        | ---              | 36.17           | 66.00        | 29.83       | 1000.0          | 9.000           | N    | 19.4       |
| 0.185000        | 39.66            | ---             | 79.00        | 39.34       | 1000.0          | 9.000           | N    | 19.4       |
| 4.270000        | ---              | 17.29           | 60.00        | 42.71       | 1000.0          | 9.000           | N    | 19.9       |
| 4.270000        | 26.10            | ---             | 73.00        | 46.90       | 1000.0          | 9.000           | N    | 19.9       |
| 4.510000        | ---              | 19.09           | 60.00        | 40.91       | 1000.0          | 9.000           | N    | 19.9       |
| 4.510000        | 27.81            | ---             | 73.00        | 45.19       | 1000.0          | 9.000           | N    | 19.9       |
| 13.820000       | ---              | 35.33           | 60.00        | 24.67       | 1000.0          | 9.000           | N    | 19.9       |
| 13.820000       | 41.68            | ---             | 73.00        | 31.32       | 1000.0          | 9.000           | N    | 19.9       |
| 16.890000       | ---              | 38.21           | 60.00        | 21.79       | 1000.0          | 9.000           | N    | 20.0       |
| 16.890000       | 44.64            | ---             | 73.00        | 28.36       | 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)**

- AC 24 V Mode

| Frequency | Amplitude    | ANT             | ANT. Height | Correction Factor |               | Corrected Amplitude | Applicable Limit | Margin |
|-----------|--------------|-----------------|-------------|-------------------|---------------|---------------------|------------------|--------|
| [MHz]     | [dB $\mu$ V] | Polar.<br>(H/V) | [m]         | ANT.<br>[dB/m]    | Cable<br>[dB] | [dB $\mu$ V/m]      | [dB $\mu$ V/m]   | [dB]   |
| 142.16    | 26.50        | V               | 1.00        | 7.62              | 3.31          | 37.43               | 40.00            | 2.57   |
| 172.74    | 20.10        | V               | 1.00        | 8.86              | 3.70          | 32.66               | 40.00            | 7.34   |
| 185.20    | 19.90        | V               | 1.00        | 9.89              | 3.83          | 33.62               | 40.00            | 6.38   |
| 196.43    | 17.30        | V               | 1.00        | 11.35             | 3.96          | 32.61               | 40.00            | 7.39   |
| 229.26    | 16.70        | V               | 1.63        | 12.21             | 4.36          | 33.27               | 40.00            | 6.73   |
| 368.11    | 17.60        | V               | 1.08        | 14.91             | 5.78          | 38.29               | 47.00            | 8.71   |

\* H : Horizontal, V : Vertical

## ◆ Calculation

Corrected Amplitude [dB $\mu$ V] = Amplitude[dBuV] + Correction Factor [dB]Corrected Amplitude : The Final Value, Amplitude : Reading Value,  
Correction Factor : ANT FACTOR + Cable loss

- DC 12 V Mode

| Frequency | Amplitude    | ANT             | ANT. Height | Correction Factor |               | Corrected Amplitude | Applicable Limit | Margin |
|-----------|--------------|-----------------|-------------|-------------------|---------------|---------------------|------------------|--------|
| [MHz]     | [dB $\mu$ V] | Polar.<br>(H/V) | [m]         | ANT.<br>[dB/m]    | Cable<br>[dB] | [dB $\mu$ V/m]      | [dB $\mu$ V/m]   | [dB]   |
| 123.18    | 23.20        | V               | 1.00        | 8.59              | 3.04          | 34.83               | 40.00            | 5.17   |
| 133.08    | 24.70        | V               | 1.00        | 7.98              | 3.18          | 35.86               | 40.00            | 4.14   |
| 145.27    | 25.40        | V               | 1.00        | 7.73              | 3.36          | 36.49               | 40.00            | 3.51   |
| 148.29    | 26.20        | V               | 1.74        | 7.83              | 3.41          | 37.44               | 40.00            | 2.56   |
| 222.59    | 20.30        | V               | 1.00        | 12.12             | 4.28          | 36.70               | 40.00            | 3.30   |
| 368.14    | 18.60        | V               | 1.23        | 14.91             | 5.78          | 39.29               | 47.00            | 7.71   |

\* H : Horizontal, V : Vertical

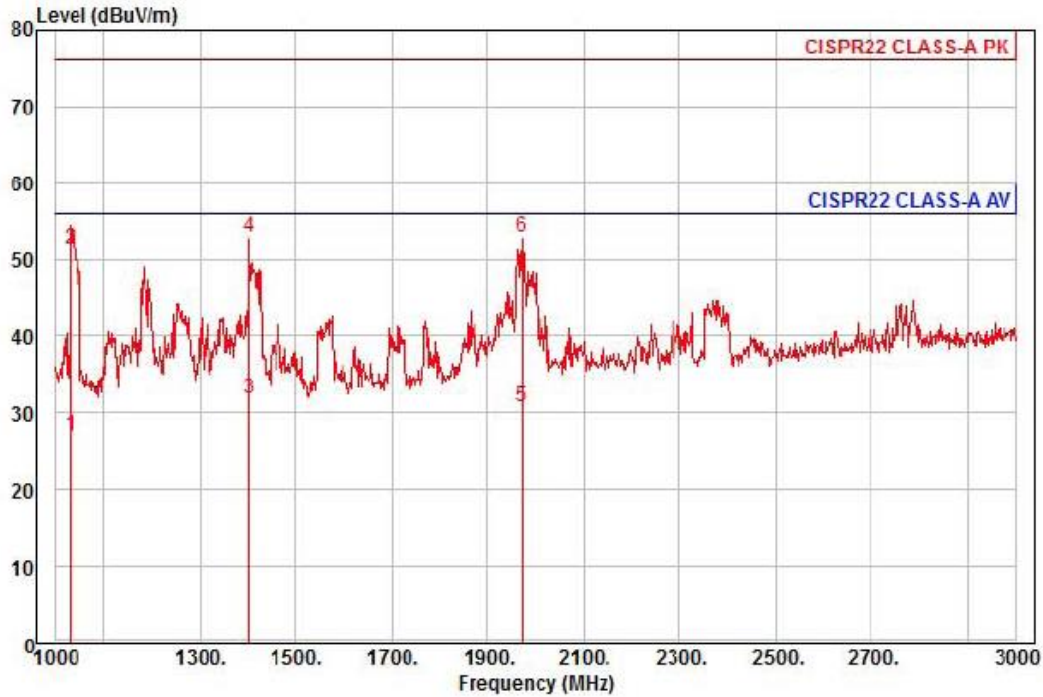
## ◆ Calculation

Corrected Amplitude [dB $\mu$ V] = Amplitude[dBuV] + Correction Factor [dB]Corrected Amplitude : The Final Value, Amplitude : Reading Value,  
Correction Factor : ANT FACTOR + Cable loss



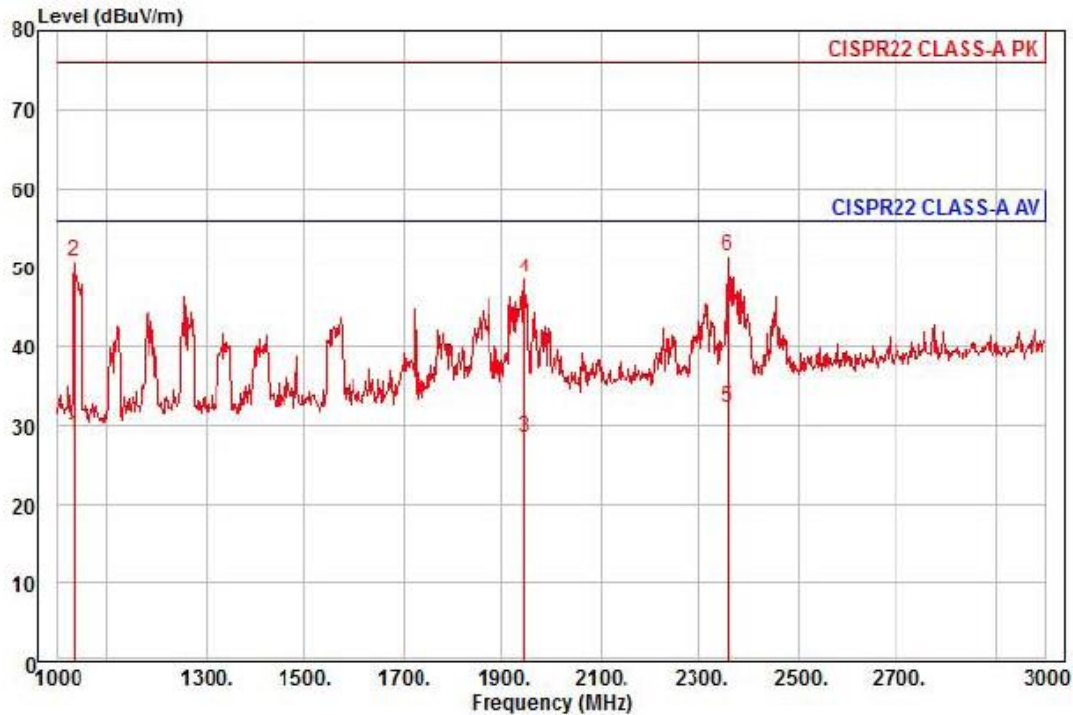
## Radiated Electric Field Emissions(Above 1 GHz)

- AC 24 V Mode



Site : chamber  
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HCV-6080RN  
Mode : AC  
Memo :

|      | Freq    | Read Level | Ant Factor | Cable Loss | Preampl Factor | TPos | Limit Line | Over Limit | Pol/Phase  | Remark  |
|------|---------|------------|------------|------------|----------------|------|------------|------------|------------|---------|
|      | MHz     | dBuV       | dB/m       | dB         | dB             | deg  | dBuV/m     | dB         |            |         |
| 1    | 1030.00 | 33.69      | 22.59      | 6.73       | 36.03          | 356  | 56.00      | -29.02     | horizontal | Average |
| 2    | 1030.00 | 58.09      | 22.59      | 6.73       | 36.03          | 356  | 76.00      | -24.62     | horizontal | Peak    |
| 3 av | 1402.00 | 35.91      | 23.72      | 7.93       | 35.70          | 48   | 56.00      | -24.14     | horizontal | Average |
| 4 pp | 1402.00 | 57.12      | 23.72      | 7.93       | 35.70          | 48   | 76.00      | -22.93     | horizontal | Peak    |
| 5    | 1972.00 | 30.42      | 25.90      | 9.57       | 35.19          | 40   | 56.00      | -25.30     | horizontal | Average |
| 6    | 1972.00 | 52.75      | 25.90      | 9.57       | 35.19          | 40   | 76.00      | -22.97     | horizontal | Peak    |



Site : chamber  
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HCV-6080RN  
Mode : AC  
Memo :

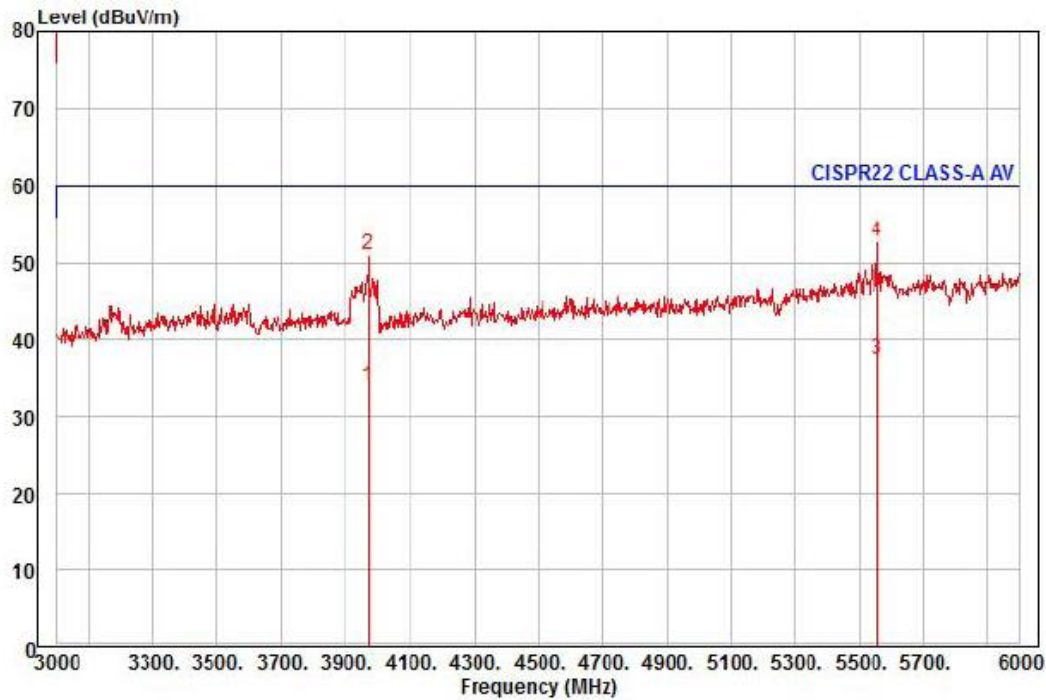
|      | Freq    | Read Level | Ant Factor | Cable Loss | Preamp Factor | TPos | Limit Line | Over Limit | Pol/Phase | Remark  |
|------|---------|------------|------------|------------|---------------|------|------------|------------|-----------|---------|
|      | MHz     | dBuV       | dB/m       | dB         | dB            | deg  | dBuV/m     | dB         |           |         |
| 1    | 1032.00 | 35.48      | 22.60      | 6.74       | 36.03         | 7    | 56.00      | -27.21     | vertical  | Average |
| 2    | 1032.00 | 57.64      | 22.60      | 6.74       | 36.03         | 7    | 76.00      | -25.05     | vertical  | Peak    |
| 3    | 1946.00 | 28.47      | 25.80      | 9.50       | 35.22         | 360  | 56.00      | -27.45     | vertical  | Average |
| 4    | 1946.00 | 48.59      | 25.80      | 9.50       | 35.22         | 360  | 76.00      | -27.33     | vertical  | Peak    |
| 5 pp | 2358.00 | 30.02      | 27.10      | 10.50      | 35.31         | 26   | 56.00      | -23.69     | vertical  | Average |
| 6 pk | 2358.00 | 49.37      | 27.10      | 10.50      | 35.31         | 26   | 76.00      | -24.34     | vertical  | Peak    |



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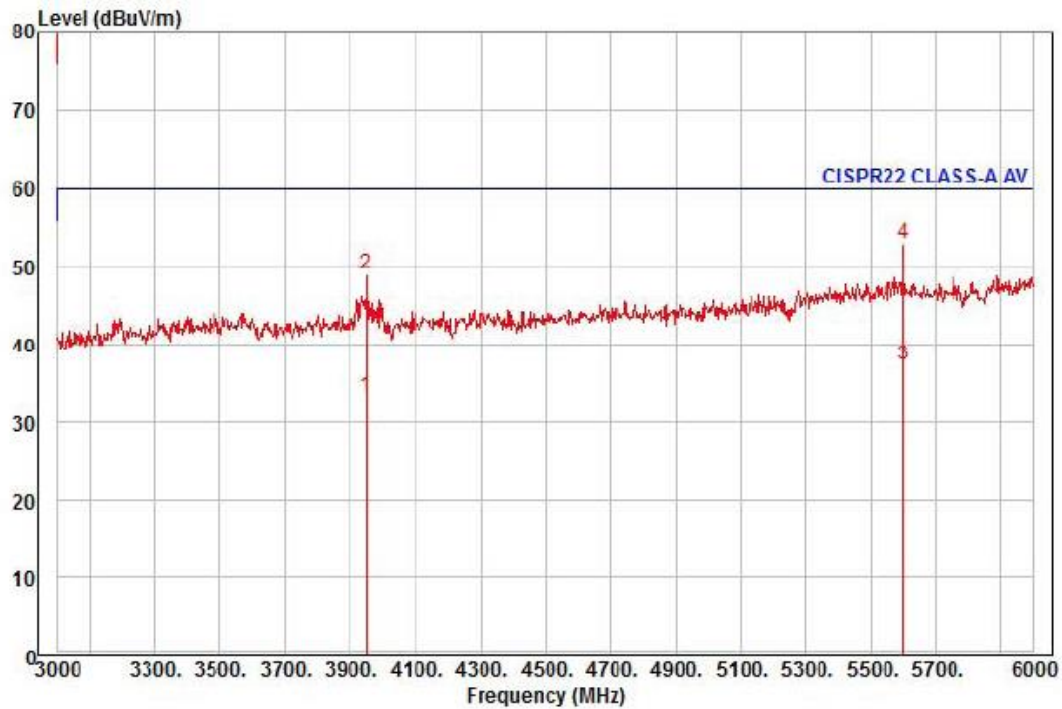
Test report No.:  
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Site : chamber  
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HCV-6080RN  
Mode : AC  
Memo :

|      | 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    | 3972.00 | 22.57      | 32.42      | 14.01      | 35.29         | 56   | 60.00      | -26.29     | horizontal | Average |
| 2    | 3972.00 | 39.85      | 32.42      | 14.01      | 35.29         | 56   | 80.00      | -29.01     | horizontal | Peak    |
| 3 pp | 5559.00 | 21.07      | 35.46      | 16.70      | 35.66         | 58   | 60.00      | -22.43     | horizontal | Average |
| 4 pk | 5559.00 | 36.17      | 35.46      | 16.70      | 35.66         | 58   | 80.00      | -27.33     | horizontal | Peak    |

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Site : chamber  
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HCV-6080RN  
Mode : AC  
Memo :

|      | 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    | 3951.00 | 22.11      | 32.37      | 13.96      | 35.29         | 61   | 60.00      | -26.85     | vertical  | Average |
| 2    | 3951.00 | 37.93      | 32.37      | 13.96      | 35.29         | 61   | 80.00      | -31.03     | vertical  | Peak    |
| 3 pp | 5601.00 | 20.68      | 35.52      | 16.77      | 35.67         | 15   | 60.00      | -22.70     | vertical  | Average |
| 4 pk | 5601.00 | 36.39      | 35.52      | 16.77      | 35.67         | 15   | 80.00      | -26.99     | vertical  | Peak    |

◆ Calculation

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

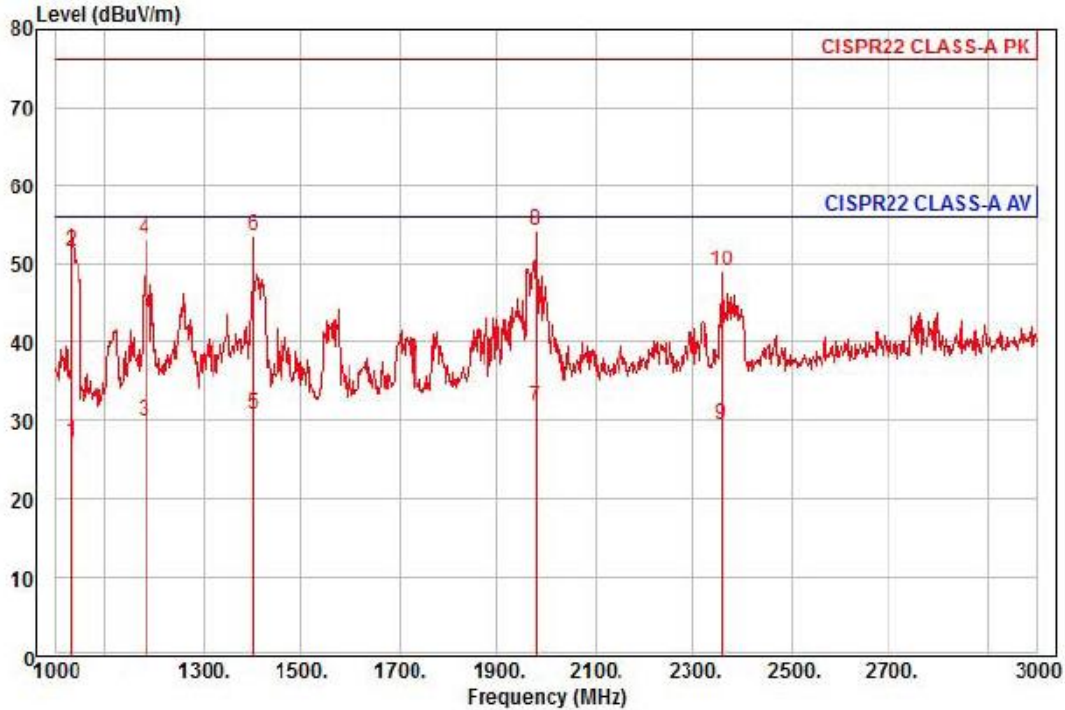
Margin(PK/CAV)[dB] = Limit[dB(μV/m)] - Result(PK/CAV) [dB(μV/m)]

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



- DC 12 V Mode



Site : chamber  
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HCV-6080RN  
Mode : DC  
Memo :

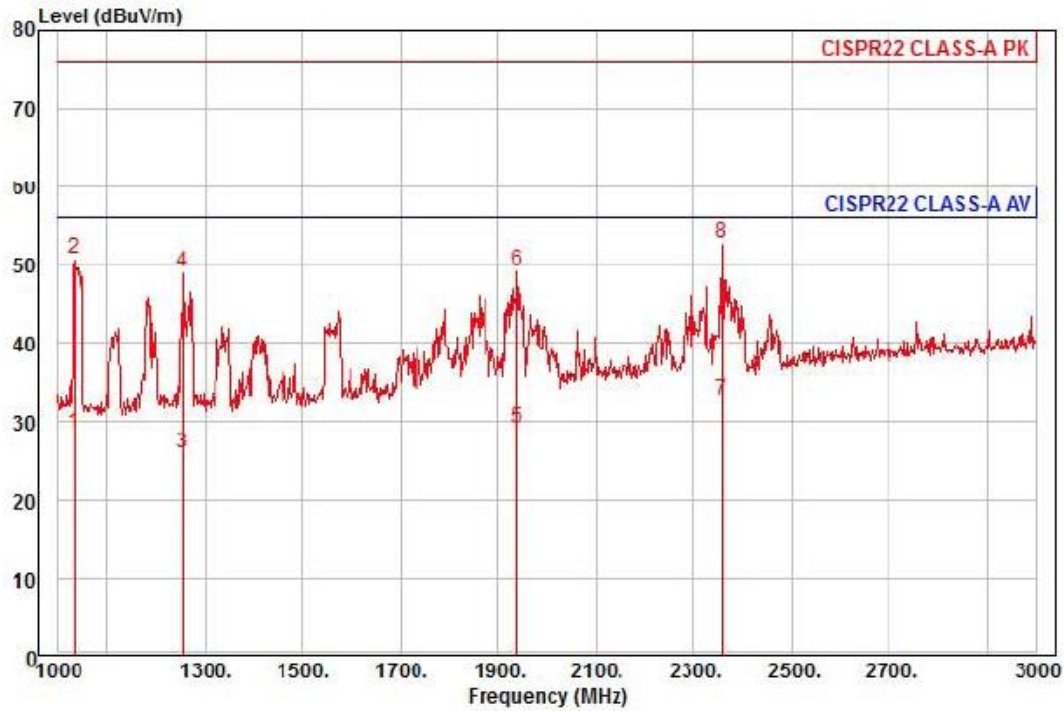
|      | Freq    | Read Level | Ant Factor | Cable Loss | Preamp Factor | TPos | Limit Line | Over Limit | Pol/Phase  | Remark  |
|------|---------|------------|------------|------------|---------------|------|------------|------------|------------|---------|
|      | MHz     | dBuV       | dB/m       | dB         | dB            | deg  | dBuV/m     | dB         |            |         |
| 1    | 1030.00 | 34.00      | 22.59      | 6.73       | 36.03         | 360  | 56.00      | -28.71     | horizontal | Average |
| 2    | 1030.00 | 58.27      | 22.59      | 6.73       | 36.03         | 360  | 76.00      | -24.44     | horizontal | Peak    |
| 3    | 1182.00 | 35.42      | 23.05      | 7.22       | 35.90         | 313  | 56.00      | -26.21     | horizontal | Average |
| 4    | 1182.00 | 58.76      | 23.05      | 7.22       | 35.90         | 313  | 76.00      | -22.87     | horizontal | Peak    |
| 5    | 1402.00 | 34.74      | 23.72      | 7.93       | 35.70         | 55   | 56.00      | -25.31     | horizontal | Average |
| 6    | 1402.00 | 57.71      | 23.72      | 7.93       | 35.70         | 55   | 76.00      | -22.34     | horizontal | Peak    |
| 7 av | 1978.00 | 31.52      | 25.92      | 9.59       | 35.19         | 48   | 56.00      | -24.16     | horizontal | Average |
| 8 pp | 1978.00 | 53.93      | 25.92      | 9.59       | 35.19         | 48   | 76.00      | -21.75     | horizontal | Peak    |
| 9    | 2358.00 | 27.13      | 27.10      | 10.50      | 35.31         | 71   | 56.00      | -26.58     | horizontal | Average |
| 10   | 2358.00 | 46.70      | 27.10      | 10.50      | 35.31         | 71   | 76.00      | -27.01     | horizontal | Peak    |



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Site : chamber  
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HCV-6080RN  
Mode : DC  
Memo :

|      | 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    | 1032.00 | 35.32      | 22.60      | 6.74       | 36.03         | 0    | 56.00      | -27.37     | vertical  | Average |
| 2    | 1032.00 | 57.51      | 22.60      | 6.74       | 36.03         | 0    | 76.00      | -25.18     | vertical  | Peak    |
| 3    | 1254.00 | 30.94      | 23.27      | 7.46       | 35.83         | 52   | 56.00      | -30.16     | vertical  | Average |
| 4    | 1254.00 | 54.09      | 23.27      | 7.46       | 35.83         | 52   | 76.00      | -27.01     | vertical  | Peak    |
| 5    | 1938.00 | 29.12      | 25.76      | 9.47       | 35.23         | 356  | 56.00      | -26.88     | vertical  | Average |
| 6    | 1938.00 | 49.35      | 25.76      | 9.47       | 35.23         | 356  | 76.00      | -26.65     | vertical  | Peak    |
| 7 av | 2358.00 | 30.32      | 27.10      | 10.50      | 35.31         | 20   | 56.00      | -23.39     | vertical  | Average |
| 8 pp | 2358.00 | 50.57      | 27.10      | 10.50      | 35.31         | 20   | 76.00      | -23.14     | vertical  | Peak    |

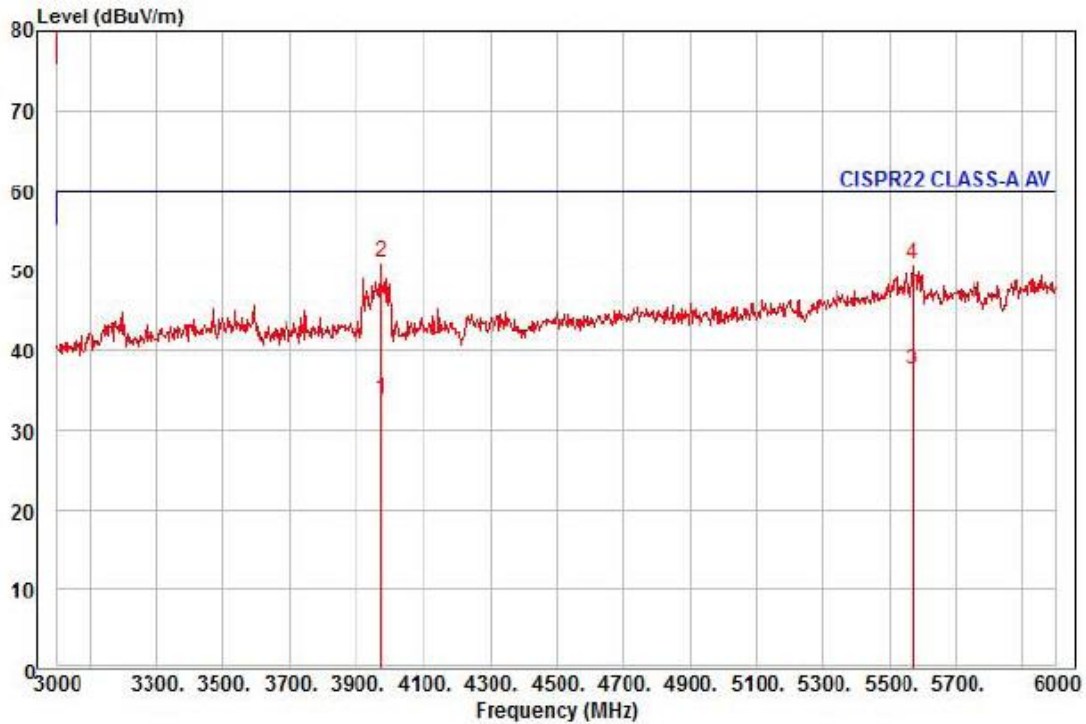
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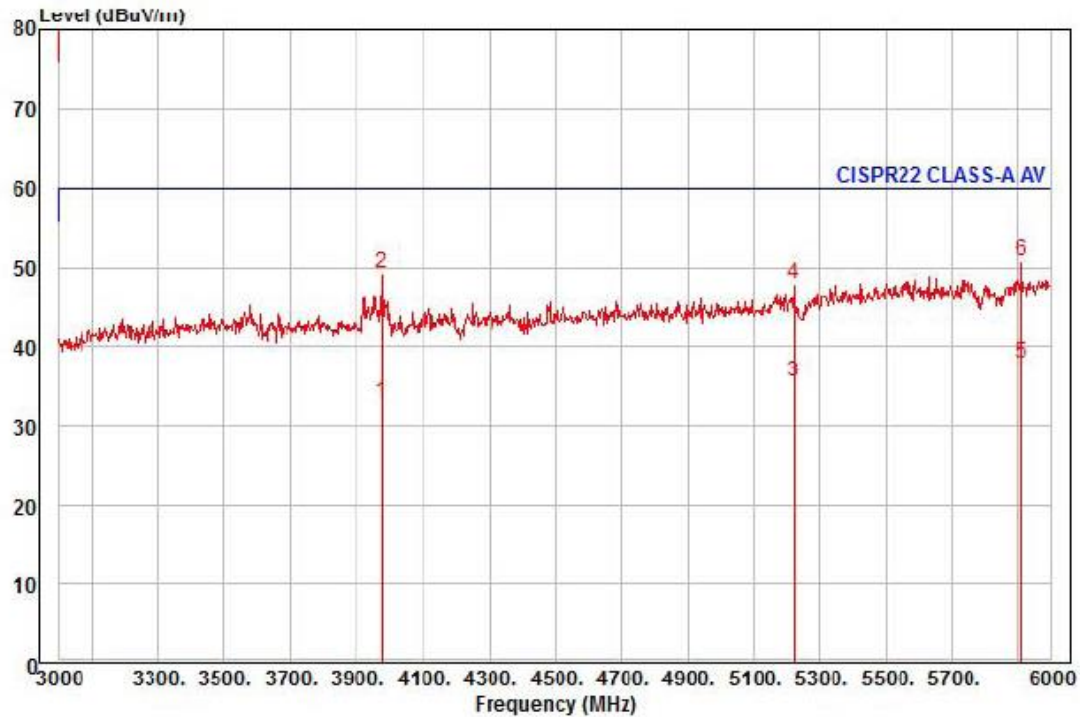
Test report No.:  
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Site : chamber  
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HCV-6080RN  
Mode : DC  
Memo :

|      | 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    | 3975.00 | 22.68      | 32.43      | 14.02      | 35.29         | 55   | 60.00      | -26.16     | horizontal | Average |
| 2 pk | 3975.00 | 40.12      | 32.43      | 14.02      | 35.29         | 55   | 80.00      | -28.72     | horizontal | Peak    |
| 3 pp | 5574.00 | 20.84      | 35.48      | 16.73      | 35.66         | 17   | 60.00      | -22.61     | horizontal | Average |
| 4    | 5574.00 | 34.35      | 35.48      | 16.73      | 35.66         | 17   | 80.00      | -29.10     | horizontal | Peak    |

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Site : chamber  
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical  
: RBW:1000.000kHz VBW:1000.000kHz SwT:Auto  
Project :  
Model : HCV-6080RN  
Mode : DC  
Memo :

|      | 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    | 3978.00 | 21.79      | 32.44      | 14.02      | 35.29         | 57   | 60.00      | -27.04     | vertical  | Average |
| 2    | 3978.00 | 38.09      | 32.44      | 14.02      | 35.29         | 57   | 80.00      | -30.74     | vertical  | Peak    |
| 3    | 5223.00 | 20.81      | 34.28      | 16.11      | 35.64         | 213  | 60.00      | -24.44     | vertical  | Average |
| 4    | 5223.00 | 33.31      | 34.28      | 16.11      | 35.64         | 213  | 80.00      | -31.94     | vertical  | Peak    |
| 5 pp | 5910.00 | 20.21      | 35.99      | 17.37      | 35.68         | 218  | 60.00      | -22.11     | vertical  | Average |
| 6 pk | 5910.00 | 33.02      | 35.99      | 17.37      | 35.68         | 218  | 80.00      | -29.30     | vertical  | Peak    |

◆ Calculation

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

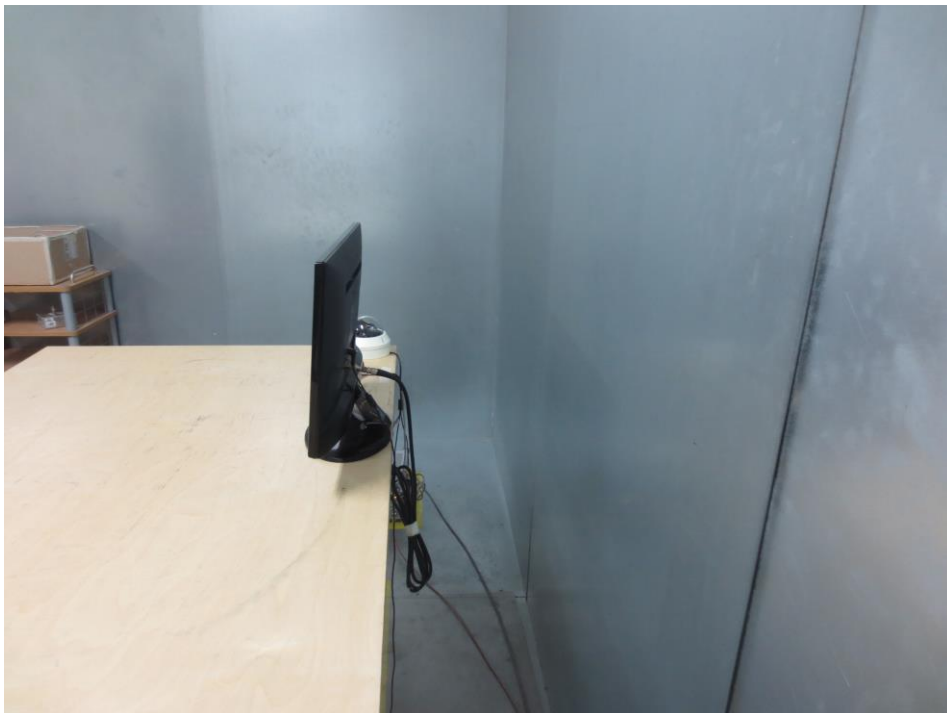
Margin(PK/CAV)[dB] = Limit[dB(μV/m)] - Result(PK/CAV) [dB(μV/m)]

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

## Test Setup Photos and Configuration

### Conducted Voltage Emissions



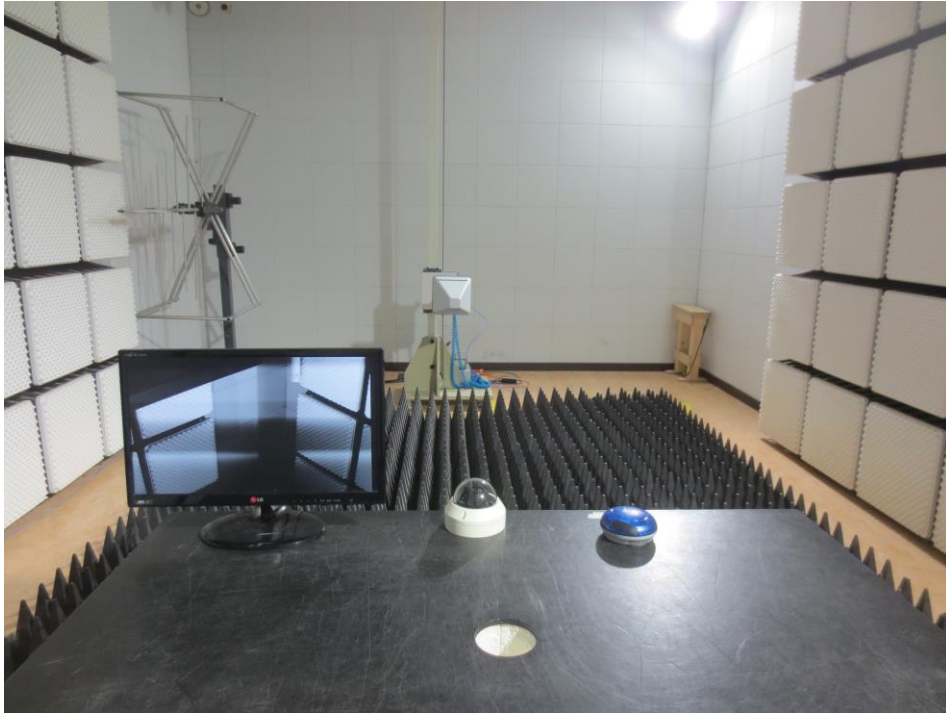
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## Radiated Electric Field Emissions(Below 1 GHz)



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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

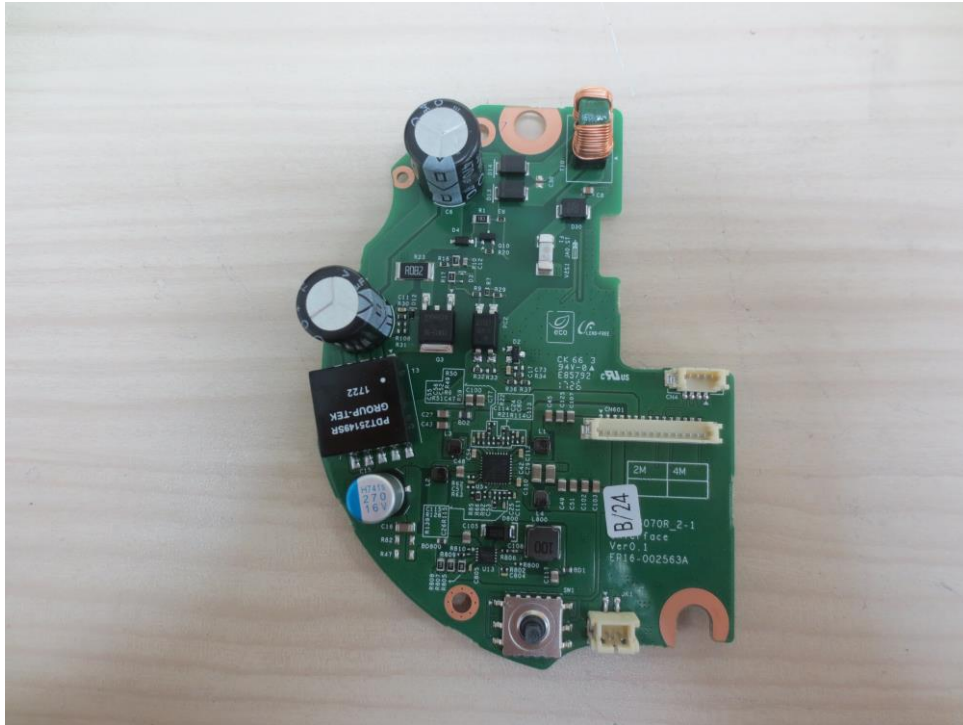
(Internal View)



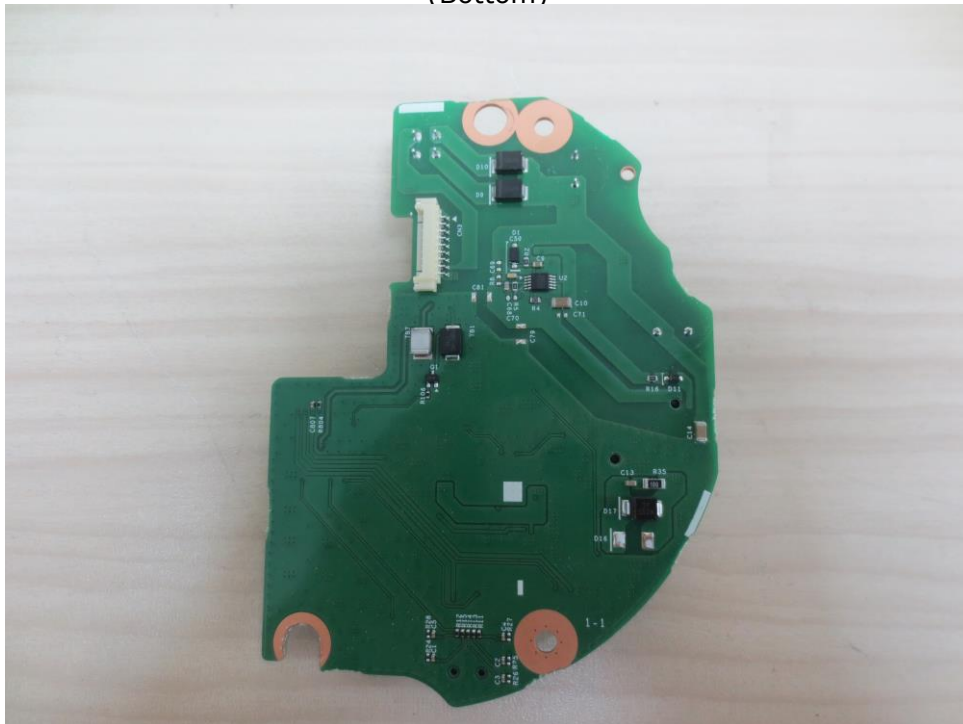
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## EUT Internal View – Main board

(Top)



(Bottom)



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## EUT Internal View – Serve board 1

(Top)



(Bottom)



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## EUT Internal View – Serve board 1

(Top)



(Bottom)



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## Label Photographs



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

[LABEL VIEW]