



# TEST REPORT



Report No. : KES-EM251647-R1

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**KES Co., Ltd.**

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## 1. Client

Applicant : Hanwha Vision Co., Ltd

Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea

## 2. Sample Description

Product name : LED MODULE

Model/Type No. : SPI-BWN0

Variant Model : SPI-BWM0, SPI-BWM1, SPI-BWW0

Manufacturer : 1. HANWHA VISION VIETNAM COMPANY LIMITED  
2. D-TECH CO.,LTD.

Manufacturer Address : 1. Lot O-2, Que Vo Industrial Zone extended Area, Nam Son Ward, Bac Ninh Province, Vietnam  
2. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi- do, Korea (Suwon Industrial Complex)

3. Date of Receipt : Aug. 12, 2025

4. Test date : May. 18, 2025

5. Date of Issue : Aug. 18, 2025

6. Test Results : In Compliance

Tested by

Reviewed by

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Eun Gu, Jeon  
EMC Test Engineer

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Dong Hun, Jang  
EMC Technical Manager

This test report is not related to KS Q ISO/IEC 17025 and KOLAS.



REPORT REVISION HISTORY

| Date          | Test Report No. | Revision History                                                     |
|---------------|-----------------|----------------------------------------------------------------------|
| Jun. 05, 2025 | KES-EM251647    | Issued                                                               |
| Aug. 18, 2025 | KES-EM251647-R1 | Reissuance of modifications due to addition of derivative model name |
|               |                 |                                                                      |
|               |                 |                                                                      |
|               |                 |                                                                      |
|               |                 |                                                                      |
|               |                 |                                                                      |
|               |                 |                                                                      |
|               |                 |                                                                      |
|               |                 |                                                                      |

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## 1.0 General Product Description

Main Specifications of EUT are:

| Division                             |             | Specificity     |
|--------------------------------------|-------------|-----------------|
| Internal highest operating frequency |             | 120 Hz          |
| Power                                | Rated Power | DC 24 V         |
|                                      | Test Power  | AC 240 V, 50 Hz |
| Ports                                | I/O Port    | LED DRIVER 1 EA |
|                                      | Unused Port | N/A             |
| Components                           |             | Main Body 1 EA  |

|                                  |                                  |
|----------------------------------|----------------------------------|
| Electrical Input                 | 24 VDC $\pm$ 10%                 |
| Max. Power Consumption           | 6.9 W                            |
| Color temperature                | 6,500 K $\pm$ 10%                |
| LED Quantity                     | 16EA                             |
| Angle                            | FWHM : 12°<br>10-% : 32°         |
| Operation Temperature / Humidity | -40°C ~ +55°C / 0~95% RH         |
| Storage Temperature / Humidity   | -40°C ~ +60°C / Less than 95% RH |
| Dimension                        | W101.2 x D53.8 x H78.2           |
| Weight                           | 200g                             |
| Certification                    | FCC, UL, CE, KC, IEC 62471       |



## 1.1 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

☒ AC 240 V, 50 Hz

## 1.2 Variant Model Differences

Differences between base model and derivative: Only LED Lens with different light emission angle specifications differ / Same electronics/instruments

- Basic model: SPI-BWN0 / Light dissipation angle 12°

- Derivatives: SPI-BWM0 / Light divergence angle 25°, SPI-BWM1 / Light divergence angle 43°, SPI-BWW0 / Light divergence angle 60°

## 1.3 Device Modifications

Not applicable

## 1.4 Equipment Under Test

| Description | Model Number | Serial Number | Manufacturer                          | Remarks |
|-------------|--------------|---------------|---------------------------------------|---------|
| LED MODULE  | SPI-BWN0     | -             | HANWHA VISION VIETNAM COMPANY LIMITED | EUT     |

## 1.5 Support Equipments

| Description          | Model Number    | Serial Number | Manufacturer                             | Remarks |
|----------------------|-----------------|---------------|------------------------------------------|---------|
| AC/DC Adapter        | WTS-2405N(120W) | -             | Sun Electronics Co., Ltd.                | -       |
| BARCODE READER       | TNS-7000M       |               | HANWHA VISION VIETNAM COMPANY LIMITED    | -       |
| Laptop               | P95G001         | 9JM8HT2       | DELL INC.                                | -       |
| Laptop AC/DC Adapter | HA65NM130       | -             | Chicony Power Technology(Suzhou)Co.,Ltd. | -       |
| Micro SD Card        | -               | -             | Sandisk                                  | 8 GB    |



## 1.6 External I/O Cabling

| Start            |               | END            |               | Cable Spec. |        |
|------------------|---------------|----------------|---------------|-------------|--------|
| Description      | I/O Port      | Description    | I/O Port      | Length      | Shield |
| LED MODULE (EUT) | LED DRIVER    | BARCODE READER | LED DRIVER    | -           | -      |
| BARCODE READER   | 8 Pin         | AC/DC Adapter  | Line          | 2.8         | U      |
|                  | Micro SD Slot | Micro SD Card  | Micro SD Slot | -           | -      |
|                  | 12 Pin        | Laptop         | RJ-45         | 5.0         | S      |
| Laptop           | DC Jack       | Laptop Adapter | Line          | 1.5         | U      |

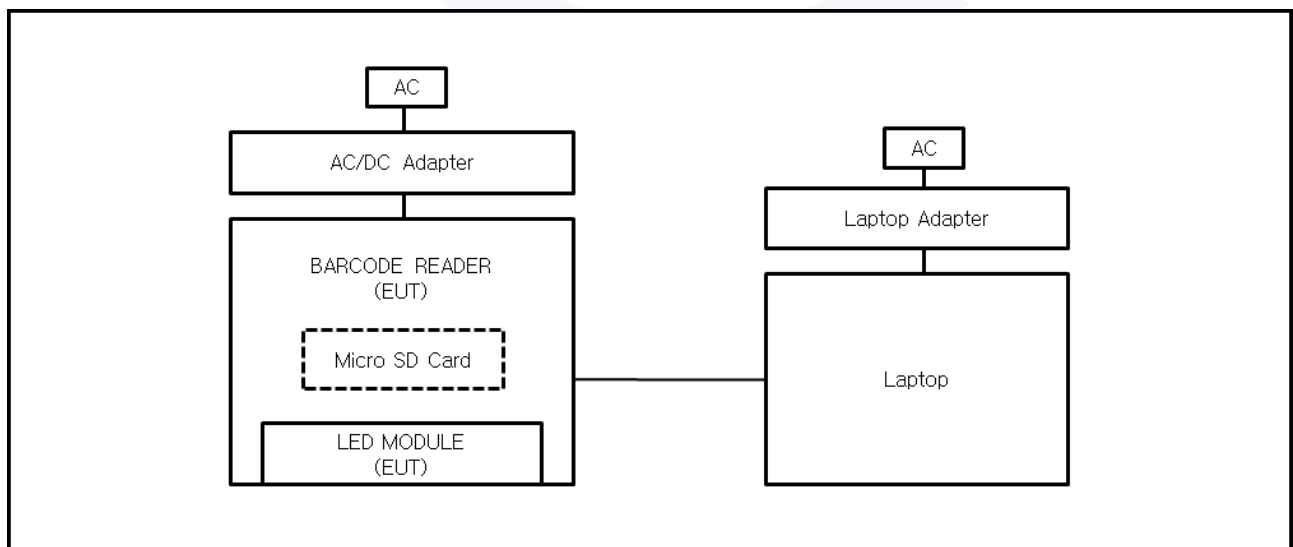
\* Unshielded=U, Shielded=S

## 1.7 EUT Operating Mode(s)

| Test mode | Normal operating                                                                                            | Test Voltages   |
|-----------|-------------------------------------------------------------------------------------------------------------|-----------------|
| Operating | - Check the operation of BARCODE READER through the laptop's web viewer and check the LED operation of EUT. | AC 240 V, 50 Hz |

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

## 1.8 Configuration



**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, Republic of. The sites are constructed in conformance with the requirements of ANSI C63.4a-2017 and CISPR 16-1-4:2019

**1.12 Laboratory Accreditations and Listings**

| Country       | Agency  | Scope of Accreditation                                                                                                                  | Logo                                                                                                                           |
|---------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| KOREA         | RRA     | EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) | <br>KR0100                                  |
| International | KOLAS   | EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) | <br>KT489                                  |
| USA           | FCC     | 3 m & 10 m Semi-Anechoic Chamber<br>Conducted test site to perform FCC Part 15/18 measurements.                                         | <br>KR0100                                |
| Canada        | ISED    | 3 m & 10 m Semi-Anechoic Chamber and Conducted test site                                                                                | <br>23298                                 |
| JAPAN         | VCCI    | EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)                                                                          | <br>C-20136, T-20137,<br>R-20181, G-20176 |
| Europe        | TÜV SÜD | EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) | <br>CARAT 001633 0008                     |



## 2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **AS/NZS CISPR 32:2015 AMD 1:2020**

☒ Class A

☐ Class B





## 2.1 Conducted Emissions at Mains Power Ports

**Test Date**

May. 18, 2025

**Test Location**

Electro wave Shieldroom #6

**Test Equipment**

| Used                                | Description       | Model Number | Manufacturer | Serial Number | Cal. Due     |
|-------------------------------------|-------------------|--------------|--------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test S/W      | EMC32        | R & S        | 9.12.00       | -            |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER | ESR3         | R & S        | 101783        | 11, 06, 2025 |
| <input checked="" type="checkbox"/> | LISN              | ENV216       | R & S        | 101786        | 01, 09, 2026 |
| <input checked="" type="checkbox"/> | LISN              | ESH2-Z5      | R & S        | 100450        | 11, 06, 2025 |
| <input checked="" type="checkbox"/> | PULSE LIMITER     | ESH3-Z2      | R & S        | 101915        | 11, 06, 2025 |

**Test Conditions**

Temperature: (23,1 ± 0,1) °C

Relative Humidity: (46,4 ± 0,1) % R.H.

**Frequency Range of Measurement**

150 kHz to 30 MHz

**Instrument Settings**

IF Band Width: 9 kHz

**Test Results**

The requirements are:

- ☒ PASS  
☐ NOT PASS  
☐ NOT APPLICABLE

**Remarks**See Appendix A for test data.



## 2.2 Conducted Emissions at Telecommunication Ports

**Test Date**

N/A

**Test Location**

Electro wave Shieldroom #6

**Test Equipment**

| Used                     | Description              | Model Number | Manufacturer | Serial Number | Cal. Due     |
|--------------------------|--------------------------|--------------|--------------|---------------|--------------|
| <input type="checkbox"/> | EMI Test S/W             | EMC32        | R & S        | 9.12.00       | -            |
| <input type="checkbox"/> | EMI TEST RECEIVER        | ESR3         | R & S        | 101783        | 11, 06, 2025 |
| <input type="checkbox"/> | LISN                     | ENV216       | R & S        | 101786        | 01, 09, 2026 |
| <input type="checkbox"/> | ARTIFICIAL MAINS NETWORK | ESH2-Z5      | R & S        | 100450        | 11, 06, 2025 |
| <input type="checkbox"/> | PULSE LIMITER            | ESH3-Z2      | R & S        | 101915        | 11, 06, 2025 |
| <input type="checkbox"/> | ISN                      | ISN S8       | SCHWARZBECK  | ISN-S8-0019   | 02, 27, 2026 |

**Test Conditions**

Temperature:

°C

Relative Humidity:

% R.H.

**Frequency Range of Measurement**

150 kHz to 30 MHz

**Instrument Settings**

IF Band Width: 9 kHz

**Test Results**

The requirements are:

- ☐ PASS  
☐ NOT PASS  
☒ NOT APPLICABLE

**Remarks**Not tested because there is no communication port.



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

**Test Date**

May. 18, 2025

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

| Used                                | Description       | Model Number | Manufacturer     | Serial Number | Cal. Due     |
|-------------------------------------|-------------------|--------------|------------------|---------------|--------------|
| <input checked="" type="checkbox"/> | EMI Test S/W      | EP5/RE       | TOYO Corporation | 6.0.0         | -            |
| <input checked="" type="checkbox"/> | EMI TEST RECEIVER | ESW8         | R & S            | 101319        | 03, 24, 2026 |
| <input checked="" type="checkbox"/> | AMPLIFIER         | SCU 01       | R & S            | 100603        | 11, 06, 2025 |
| <input checked="" type="checkbox"/> | BILOG ANTENNA     | VULB 9168    | SCHWARZBECK      | 9168-461      | 05, 09, 2026 |
| <input checked="" type="checkbox"/> | ATTENUATOR        | 6806.17.A    | HUBER+SUHNER     | -             | 02, 13, 2026 |

**Test Conditions**

Temperature: (23,4 ± 0,1) °C

Relative Humidity: (47,6 ± 0,1) % R.H.

**Frequency Range of Measurement**

30 MHz to 1 GHz

**Instrument Settings**

IF Band Width: 120 kHz

**Test Results**

The requirements are:

- ☒ PASS  
☐ NOT PASS  
☐ NOT APPLICABLE

**Remarks**See Appendix A for test data.



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

**Test Date**

N/A

**Test Location**

SEMI ANECHOIC CHAMBER #5

**Test Equipment**

| Used                     | Description       | Model Number | Manufacturer     | Serial Number | Cal. Due     |
|--------------------------|-------------------|--------------|------------------|---------------|--------------|
| <input type="checkbox"/> | EMI Test S/W      | ES10/RE      | TOYO Corporation | 2022.01.000   | -            |
| <input type="checkbox"/> | EMI TEST RECEIVER | ESU26        | Rohde & Schwarz  | 100552        | 02, 13, 2026 |
| <input type="checkbox"/> | HORN ANTENNA      | BBHA 9120D   | SCHWARZBECK      | 9120D-1802    | 11, 04, 2025 |
| <input type="checkbox"/> | PREAMPLIFIER      | 8449B        | HP               | 3008A00899    | 03, 05, 2026 |
| <input type="checkbox"/> | ATTENUATOR        | 8491B        | HP               | 23094         | 02, 13, 2026 |

**Test Conditions**

Temperature:

°C

Relative Humidity:

% R.H.

**Frequency Range of Measurement**

1 GHz to 6 GHz

**Instrument Settings**

IF Band Width: 1 MHz

**Test Results**

The requirements are:

- ☐ PASS  
☐ NOT PASS  
☒ NOT APPLICABLE

**Remarks**It does not apply because the frequency is less than 108 MHz.



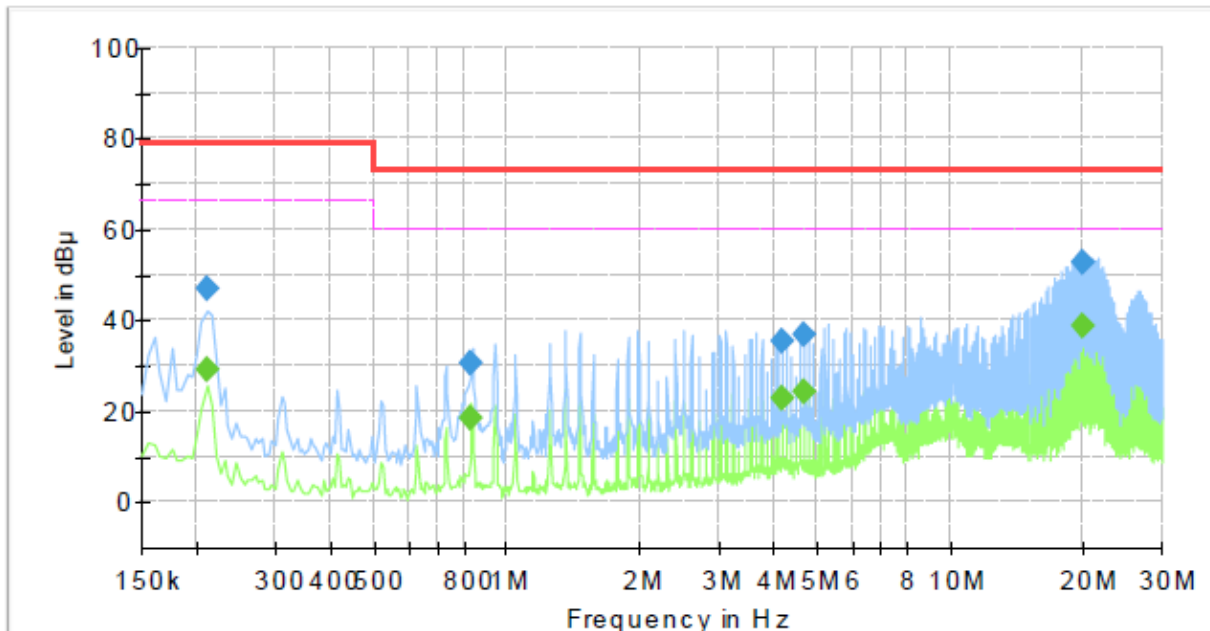
## APPENDIX A – TEST DATA

### Conducted Emissions at Mains Power Ports

HOT LINE

#### Common Information

Test Description: Conducted Emission  
Job No.: KES-EM251647  
Phase: L  
Mode:  
Operator Name: KES



#### Final\_Result

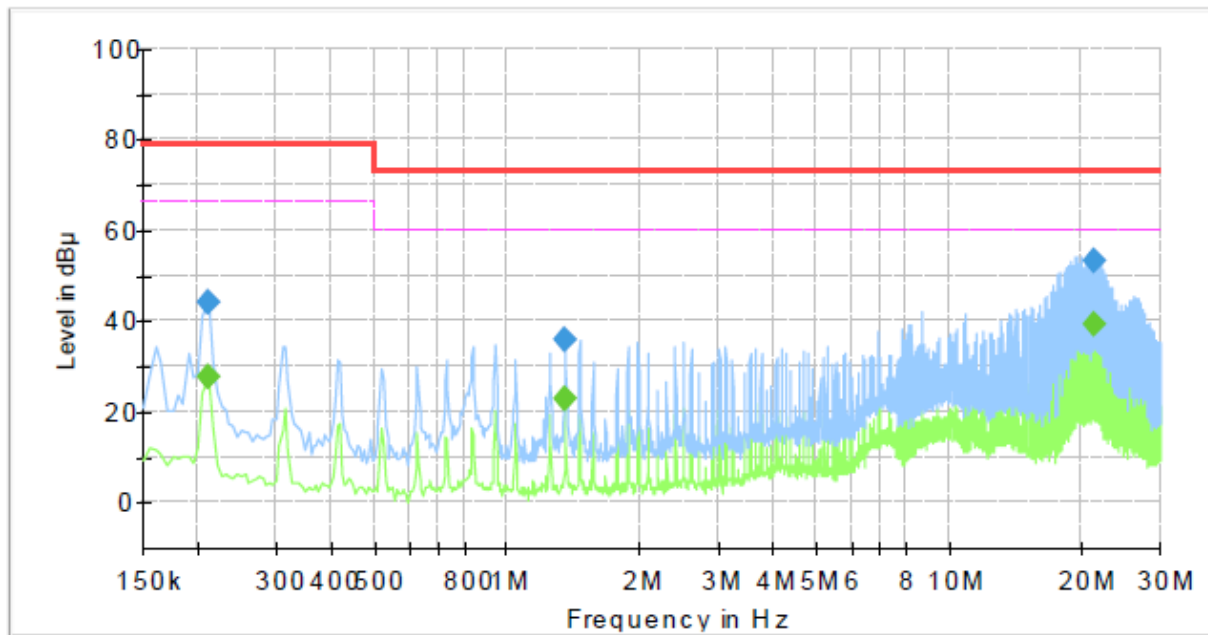
| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.210000        | —                | 29.11           | 66.00        | 36.89       | 1000.0          | 9.000           | L1   | 19.5       |
| 0.210000        | 46.89            | —               | 79.00        | 32.11       | 1000.0          | 9.000           | L1   | 19.5       |
| 0.830000        | —                | 18.48           | 60.00        | 41.52       | 1000.0          | 9.000           | L1   | 19.6       |
| 0.830000        | 30.61            | —               | 73.00        | 42.39       | 1000.0          | 9.000           | L1   | 19.6       |
| 4.165000        | —                | 22.82           | 60.00        | 37.18       | 1000.0          | 9.000           | L1   | 19.8       |
| 4.165000        | 35.25            | —               | 73.00        | 37.75       | 1000.0          | 9.000           | L1   | 19.8       |
| 4.690000        | —                | 24.16           | 60.00        | 35.84       | 1000.0          | 9.000           | L1   | 19.9       |
| 4.690000        | 36.90            | —               | 73.00        | 36.10       | 1000.0          | 9.000           | L1   | 19.9       |
| 19.900000       | —                | 38.89           | 60.00        | 21.11       | 1000.0          | 9.000           | L1   | 20.3       |
| 19.900000       | 52.88            | —               | 73.00        | 20.12       | 1000.0          | 9.000           | L1   | 20.3       |



## NEUTRAL LINE

**Common Information**

Test Description: Conducted Emission  
Job No.: KES-EM251647  
Phase: N  
Mode:  
Operator Name: KES

**Final Result**

| Frequency (MHz) | QuasiPeak (dBuV) | CAverage (dBuV) | Limit (dBuV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.210000        | —                | 27.44           | 66.00        | 38.56       | 1000.0          | 9.000           | N    | 19.5       |
| 0.210000        | 43.83            | —               | 79.00        | 35.17       | 1000.0          | 9.000           | N    | 19.5       |
| 1.355000        | —                | 22.75           | 60.00        | 37.25       | 1000.0          | 9.000           | N    | 19.6       |
| 1.355000        | 35.74            | —               | 73.00        | 37.26       | 1000.0          | 9.000           | N    | 19.6       |
| 21.360000       | —                | 39.28           | 60.00        | 20.72       | 1000.0          | 9.000           | N    | 20.4       |
| 21.360000       | 53.14            | —               | 73.00        | 19.86       | 1000.0          | 9.000           | N    | 20.4       |

## ◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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



## Conducted Emissions at Telecommunication Ports

[100 Mbps]

N/A

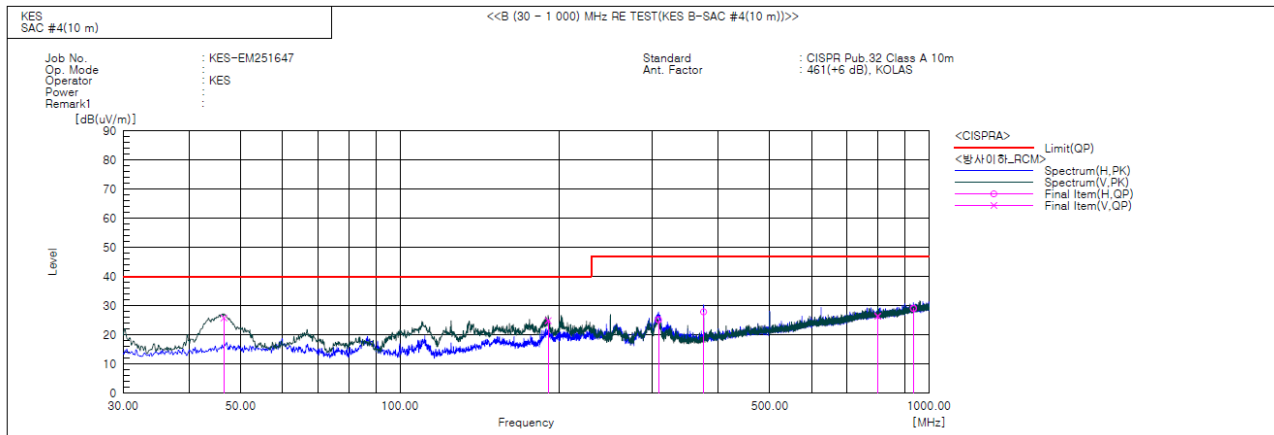
### ◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

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

| No. | Frequency [MHz] | (P) | Reading QP [dB(μV)] | c.f [dB(1/m)] | Result QP [dB(μV/m)] | Limit QP [dB(μV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] | Remark |
|-----|-----------------|-----|---------------------|---------------|----------------------|---------------------|----------------|-------------|-------------|--------|
| 1   | 46.490          | V   | 46.9                | -21.1         | 25.8                 | 40.0                | 14.2           | 152.0       | 225.0       |        |
| 2   | 190.656         | V   | 46.5                | -21.6         | 24.9                 | 40.0                | 15.1           | 158.0       | 71.0        |        |
| 3   | 308.148         | H   | 41.9                | -16.7         | 25.2                 | 47.0                | 21.8           | 313.0       | 268.0       |        |
| 4   | 374.956         | H   | 42.5                | -14.6         | 27.9                 | 47.0                | 19.1           | 363.0       | 248.0       |        |
| 5   | 800.059         | V   | 30.1                | -3.7          | 26.4                 | 47.0                | 20.6           | 133.0       | 182.0       |        |
| 6   | 934.283         | H   | 30.0                | -0.9          | 29.1                 | 47.0                | 17.9           | 286.0       | 107.0       |        |

**◆ Calculation**

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

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

Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

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



## Radiated Electric Field Emissions(Above 1 GHz)

N/A

### ◆ Calculation

Result(PK/CAV) [dB( $\mu\text{V}/\text{m}$ )] = (Reading(PK/CAV)[dB( $\mu\text{V}$ )] + c.f[dB(1/m)])

Margin(PK/CAV)[dB] = Limit[dB( $\mu\text{V}/\text{m}$ )] - Result(PK/CAV) [dB( $\mu\text{V}/\text{m}$ )]

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

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



## Test Setup Photos and Configuration

### Conducted Emissions at Mains Power Ports





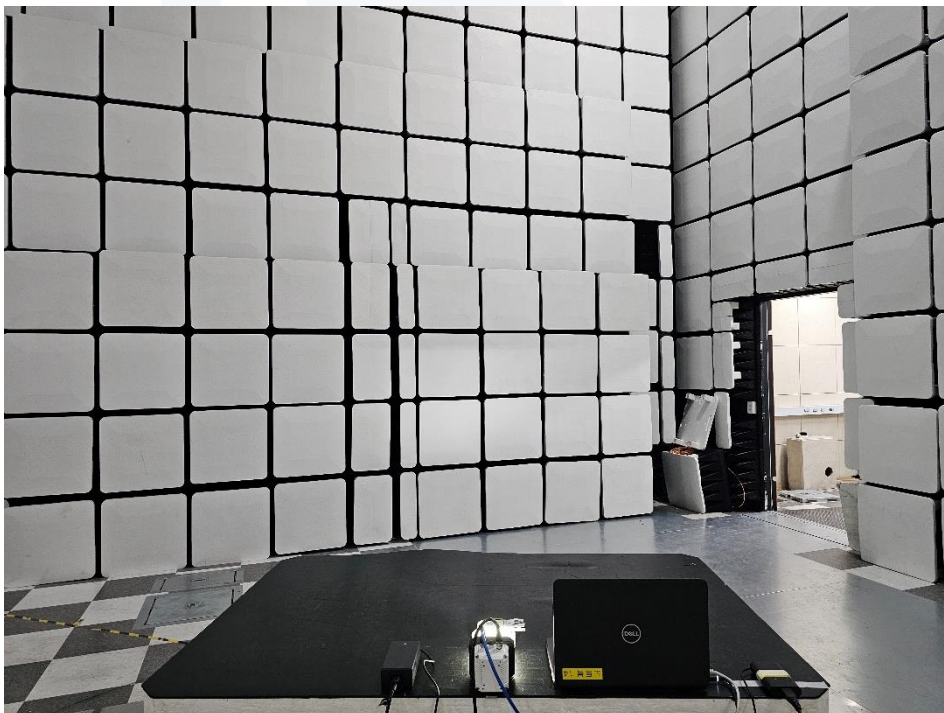
## Conducted Emissions at Telecommunication Ports

N/A





## Radiated Electric Field Emissions(Below 1 GHz)





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

N/A



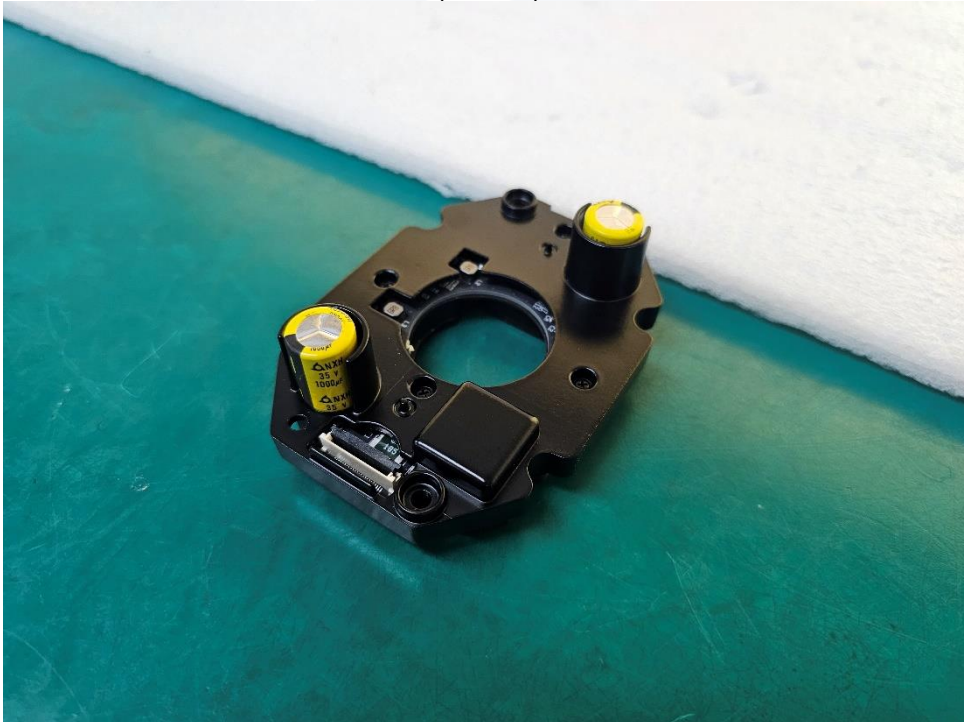


## EUT External Photographs

(Top)



(Bottom)





## EUT Internal Photographs

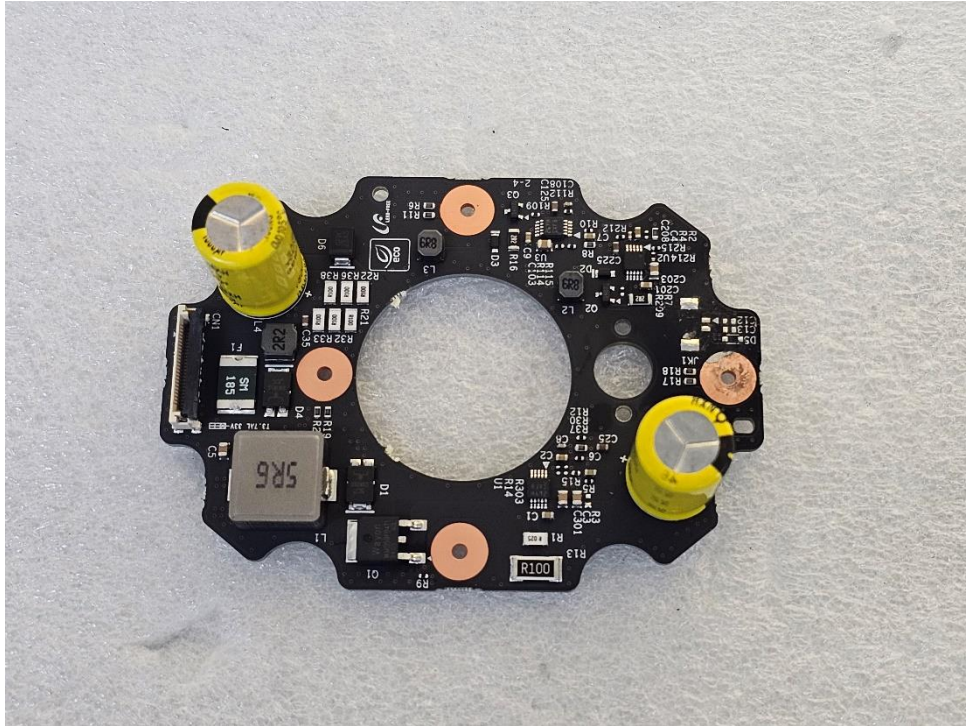
(Internal View)



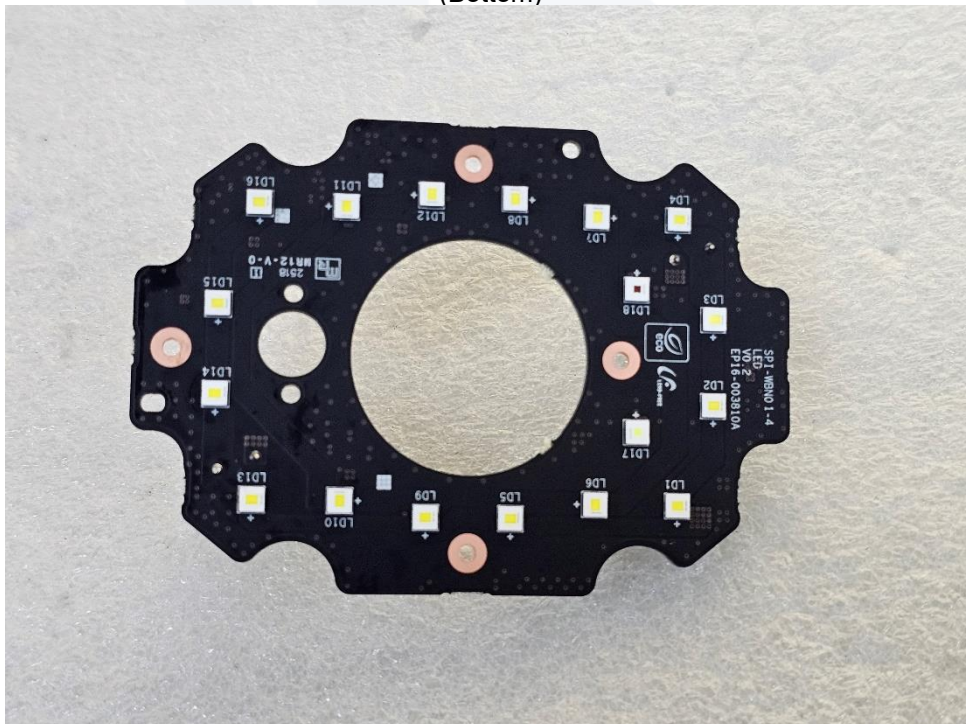


## EUT Internal View – Board

(Top)



(Bottom)



The End.