TEST REPORT

KES Co., Ltd.
#3002, #3503, #3701, 40, Simin-daero365beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Republic of Korea
Tel : +82-31-425-6200, Fax : +82-31-341-3838

1. Client

○ Name	:	Hanwha Vision Co., Ltd.
○ Address	:	6, Pangyo-ro 319beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea

2. Sample Description

◯ Product item	:	LED MODULE
◯ Model name	:	SPI-BBN0
◯ Variant model	:	SPI-BBM0, SPI-BBM1, SPI-BBW0
◯ Manufacturer etc.	:	HANWHA VISION VIETNAM COMPANY LIMITED
◯ Manufacturer address	:	Lot O-2, Que Vo Industrial Zone Extended Area, Nam Son Ward, Bac Ninh Province, Vietnam
◯ Manufacturer etc.	:	D-TECH CO.,LTD.
◯ Manufacturer address	:	173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi-do, Korea (Suwon Industrial Complex)

3. Date of test : 2025. 09. 03. ~ 2025. 09. 04.

4. Location of Test : Permanent Testing Lab

○ Address : 473-21, Gayeo-ro, Yeoju-si, Gyeonggi-do, 12658, Republic of Korea

5. Test method used : EN 55032:2015/A1:2020,EN 55035:2017/A11:2020,EN IEC 61000-3-2:2019, EN 61000-3-3:2013/A2:2021

6. Test result : PASS

This test report is not related to KOLAS accreditation.

Affirmation	Tested by	Technical Manager by
	Name : SeongMin Jang [장성민]2025/10/22	Name : DongHun Jang [장동훈]2025/10/22

2025. 10. 22

KES Co., Ltd.

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
2025. 09. 09	KES-EM252989	Issued
2025. 10. 22	KES-EM252989-R1	Reissue due to addition of derivative models

Use of uncertainty of measurement for decisions on conformity (decision rule):

■ No decision rule is specified by the1 standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty(“simple acceptance” decision rule, previously known as “accuracy method”).

□ Other (to be specified, for example when required by the standard or client)

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1 Laboratory Information

1.1 Test Location

Category	Details
Addres	473-21, Gayeo-ro, Yeoju-si, Gyeonggi-do, 12658, Republic of Korea
Telephone Number	070-4910-6200
Facsimile Number	031-341-3838

The measurement facility is located at 473-21, Gayeo-ro, Yeoju-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

1.2 Laboratory Accreditations and Listings

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

2 Test Summary

2.1 Class and Voltage

Test Class	Test Voltage
Class A	AC 230 V, 50 Hz

2.2 Summary of Test Results

Regulation
EMC Directive 2014/30/EU EMC Regulations SI 2016/1091

Test Item	Test Standard		Test Result	Remark
Conducted Emissions at Mains Power Ports	EN 55032:2015/A1:2020		PASS	-
Conducted Emissions at Telecommunication Ports			N/A	NOTE 1
Conducted Emissions at Broadcast Receiver Tuner Ports			N/A	NOTE 2
Conducted Emissions at RF Modulator Output Port			N/A	NOTE 3
Radiated Emissions(Below 1 ㎓)			PASS	-
Radiated Emissions(Above 1 ㎓)			N/A	NOTE 4
Harmonic Current Emissions	EN IEC 61000-3-2:2019		PASS	-
Voltage Fluctuations and Flicker	EN 61000-3-3:2013/A2:2021		PASS	-
Electrostatic Discharge	EN 55035:2017/A1:2020	EN 61000-4-2:2009	PASS	-
Continuous RF electromagnetic field disturbances		EN IEC 61000-4-3:2020	PASS	-
Electrical Fast Transients/Bursts		EN 61000-4-4:2012	PASS	-
Surge		EN 61000-4-5 :2014/A1:2017	PASS	-
Continuous Induced RF Disturbances		EN IEC 61000-4-6:2023	PASS	-
Power Frequency Magnetic Field		EN 61000-4-8:2010	N/A	NOTE 5
Voltage Dips and Interruptions		EN IEC 61000-4-11:2020	PASS	-

* N/A: Not Applicable

(NOTE 1) This test equipment does not have Telecommunication Ports, so it is not applicable.
(NOTE 2) This test equipment does not have a broadcast receiver tuner port, so it is not applicable.
(NOTE 3) This test equipment does not have an RF modulator output port, so it is not applicable.
(NOTE 4) This test equipment has an internal maximum operating frequency of 108 MHz or less, so it is not applicable.
(NOTE 5) This test equipment does not have magnetic field sensitive parts, so it is not applicable.

2.3 Remarks when standards applied

N/A

2.4 Variant Model Differences

Differences in LED Lenses for Wide Angle Adjustment (Basic model : SPI-BBN0 : divergence angle 12°)
SPI-BBM0 : divergence angle 25°
SPI-BBM1 : divergence angle 43°
SPI-BBW0 : divergence angle 60°

2.5 Device Modifications

N/A

3 General Product Description

Division		Specificity
Internal maximum operating frequency		120 Hz
Power	Rated power supply	DC 24 V
	Test Power	AC 230 V, 50 Hz
I/O Ports	User port	LED DRIVER
	Unused/Administrator Port	N/A
function	Product features	LED MODULE
	Wireless function	N/A
Components		Main body
Others		Please refer to the specifications listed below.

Model	SPI-BBN0
Electrical Input	24 VDC ± 10%
Max. Power Consumption	6.9 W
Wavelength	455nm
LED Quantity	16EA
Angle	FWHM : 12° 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
Ingress level	IP66, IP67(camera and front cover must be assembled)
Certification	FCC, UL, CE, KC, IEC 62471

4 EUT Setup and Operation Mode

4.1 EUT Configuration

Product Name	Model Number	Serial Number	Manufacturer	Remarks
LED MODULE	SPI-BBN0	-	HANWHA VISION VIETNAM CO MPANY LIMITED	EUT
BARCODE READER	TNS-7000M	-	HANWHA VISION VIETNAM CO MPANY LIMITED	-
Power Supply	LRS-350-24	-	MEAN WELL	-
Laptop	NT550XDZ	-	SAMSUNG	-
Laptop Adaptor	A13-040N2A	-	CHICONY POWER TECHNOLOGY (Chongqing) CO., LTD.	-

4.2 System Configuration

Product Name	Model Number	Serial Number	Manufacturer	Remarks
-	-	-	-	-

4.3 External I/O Cabling

Start		End		Cable Spec.	
Product Name	I/O Port	Product Name	Product Name	I/O Port	Product Name
LED MODULE (EUT)	LED DRIVER	BARCODE READER	LED DRIVER	-	-

* Unshielded=U, Shielded=S

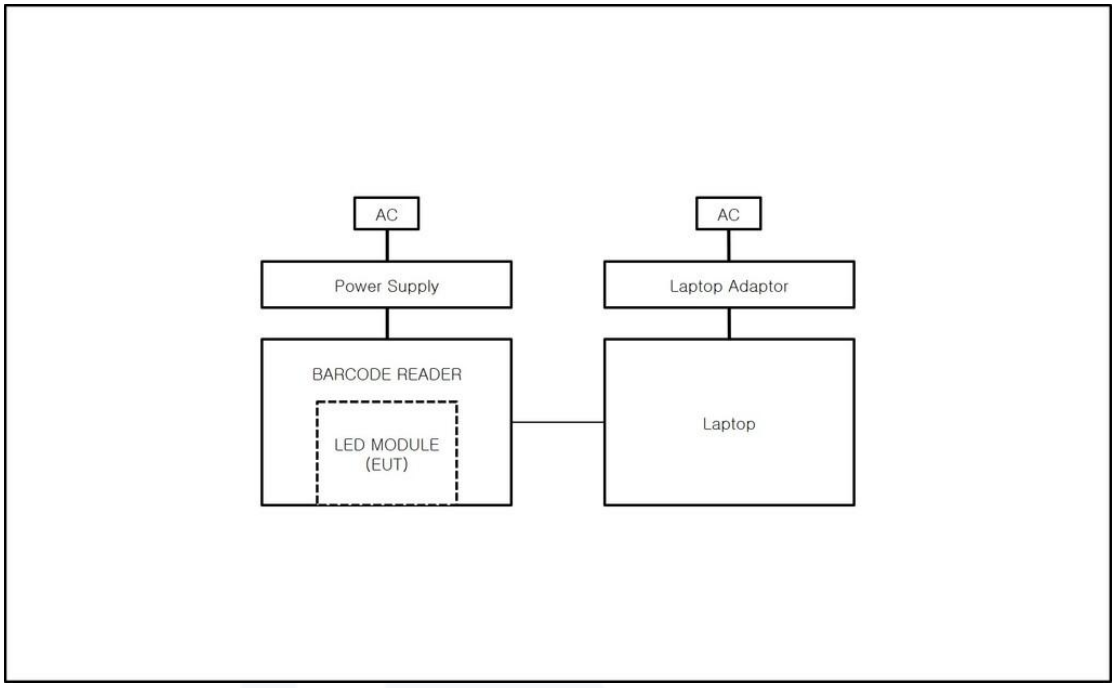
4.4 EUT Operating Mode(s)

Category	Mode	Operating
Mode 1	Operation	The test equipment was connected to the laptop through the BARCODE READER, and proper operation was verified via Web Viewer.

4.5 Test operating S/W

Name	Version	Manufacture Company
-	-	-

4.6 Configuration



Mode 1

5 General Performance Criteria

General
General performance criteria are defined in 8.2, 8.3 and 8.4. These criteria shall be used during the testing of primary functions where no relevant annex is applicable.
When assessing the impact of a disturbance on a function, the assessment should take into consideration the function's performance prior to the application of the disturbance and only identify as failures those changes in performance that are a result of the disturbance.

Performance criterion A
The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B
During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.
If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C
Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.
Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

6 Test Item

6.1 Conducted Emissions at Mains Power Ports

6.1.1 Test Equipment

Equipment Name	Model Number	Manufacturer	Serial No.	Cal. Date	Next Cal. Date	Used
SHIELD ROOM #6	-	DYMSTEC	-	-	-	■
EMC32 Measurement Software	EMC32	R&S	9.12.00	-	-	■
EMI TEST RECEIVER	ESR3	Rohde & Schwarz	101783	2024-11-06	2025-11-06	■
LISN	ENV216	Rohde & Schwarz	101786	2025-01-09	2026-01-09	■
ARTIFICIAL MAINS NETWORK	ESH2-Z5	Rohde & Schwarz	100450	2024-11-06	2025-11-06	■
PULSE LIMITER	ESH3-Z2	Rohde & Schwarz	101915	2024-11-06	2025-11-06	■

6.1.2 Test Location : SHIELD ROOM #6

6.1.3 Test Conditions :

Temperature	Relative Humidity
(24.6 ~ 24.7) °C	(58.2 ~ 58.3) % R.H.

6.1.4 Test Result

○ Test Date : 2025-09-04

● Test Mode : Mode 1

Test Report

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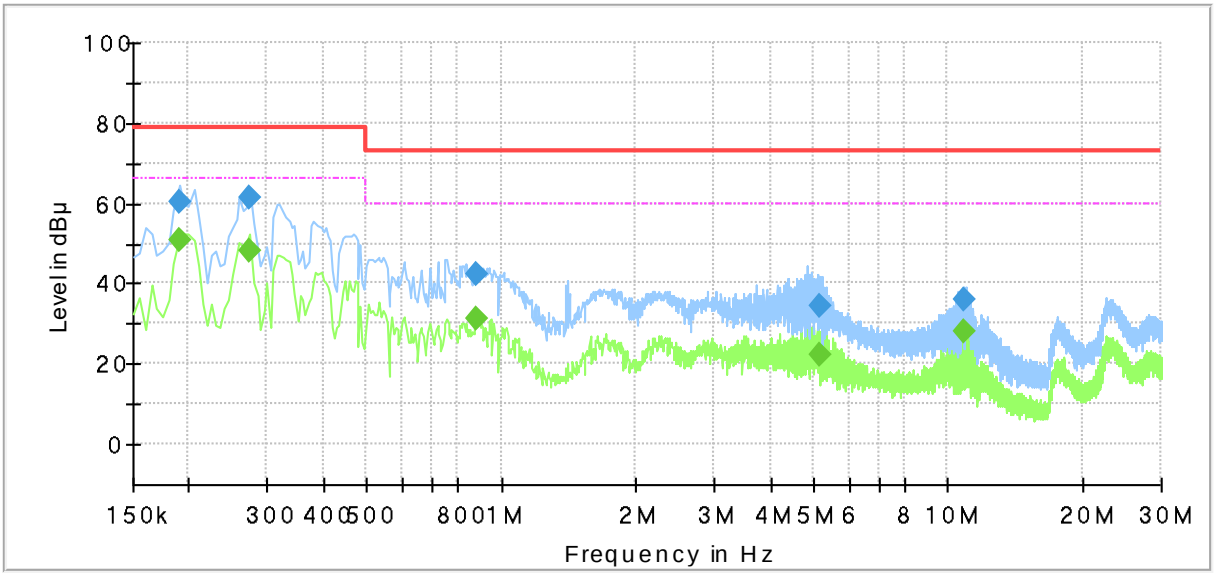
Test Description:	Conducted Emission
Job No.:	KES-EM252989
Phase:	L
Mode:	
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.190000	---	50.76	66.00	15.24	1000.0	9.000	L1	19.5
0.190000	60.57	---	79.00	18.43	1000.0	9.000	L1	19.5
0.275000	---	48.31	66.00	17.69	1000.0	9.000	L1	19.5
0.275000	61.53	---	79.00	17.47	1000.0	9.000	L1	19.5
0.880000	---	31.24	60.00	28.76	1000.0	9.000	L1	19.6
0.880000	42.12	---	73.00	30.88	1000.0	9.000	L1	19.6
5.170000	---	22.10	60.00	37.90	1000.0	9.000	L1	19.9
5.170000	34.26	---	73.00	38.74	1000.0	9.000	L1	19.9
10.825000	---	28.27	60.00	31.73	1000.0	9.000	L1	20.1
10.825000	36.04	---	73.00	36.96	1000.0	9.000	L1	20.1

○ Test Date : 2025-09-04
● Test Mode : Mode 1

Test Report

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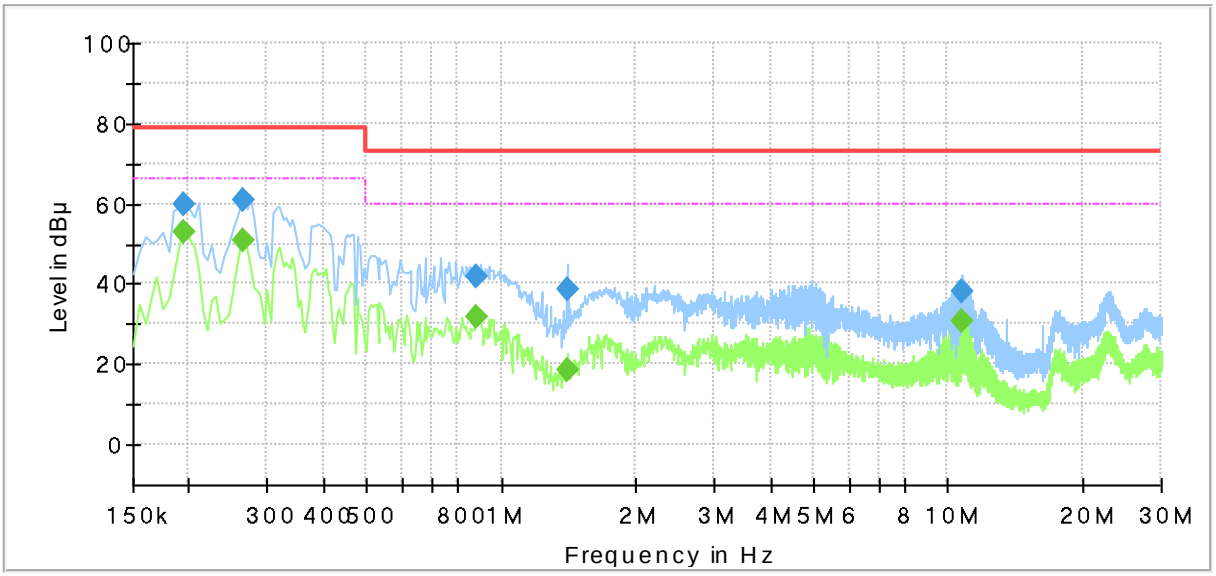
Test Description: Conducted Emission
Job No.: KES-EM252989
Phase: N
Mode:
Operator Name: KES



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.195000	---	52.79	66.00	13.21	1000.0	9.000	N	19.5
0.195000	59.87	---	79.00	19.13	1000.0	9.000	N	19.5
0.265000	---	50.92	66.00	15.08	1000.0	9.000	N	19.5
0.265000	60.92	---	79.00	18.08	1000.0	9.000	N	19.5
0.885000	---	31.84	60.00	28.16	1000.0	9.000	N	19.6
0.885000	42.03	---	73.00	30.97	1000.0	9.000	N	19.6
1.405000	---	18.77	60.00	41.23	1000.0	9.000	N	19.6
1.405000	38.42	---	73.00	34.58	1000.0	9.000	N	19.6
10.690000	---	30.54	60.00	29.46	1000.0	9.000	N	20.0
10.690000	37.94	---	73.00	35.06	1000.0	9.000	N	20.0

6.1.5 Remark

Complies with the test requirements.

6.2 Radiated Emissions(Below 1 ㎓)

6.2.1 Test Equipment

Equipment Name	Model Number	Manufacturer	Serial No.	Cal. Date	Next Cal. Date	Used
SEMI ANECHOIC CHAMBER #4(10 m)	-	DYMSTEC	-	-	-	■
EP5/RE Software	EP5/RE	TOYO	6.0.0	-	-	■
EMI TEST RECEIVER	ESU26	Rohde & Schwarz	100551	2025-02-13	2026-02-13	■
AMPLIFIER	SCU 01	Rohde & Schwarz	100603	2024-11-06	2025-11-06	■
BILOG ANTENNA	VULB 9168	SCHWARZBECK	9168-461	2024-05-09	2026-05-09	■
ATTENUATOR	6806.17.A	HUBER+SUHNER	-	2025-02-13	2026-02-13	■

6.2.2 Test Location : SEMI ANECHOIC CHAMBER #4(10 m) Measurement Distance : □ 3 m, ■ 10 m

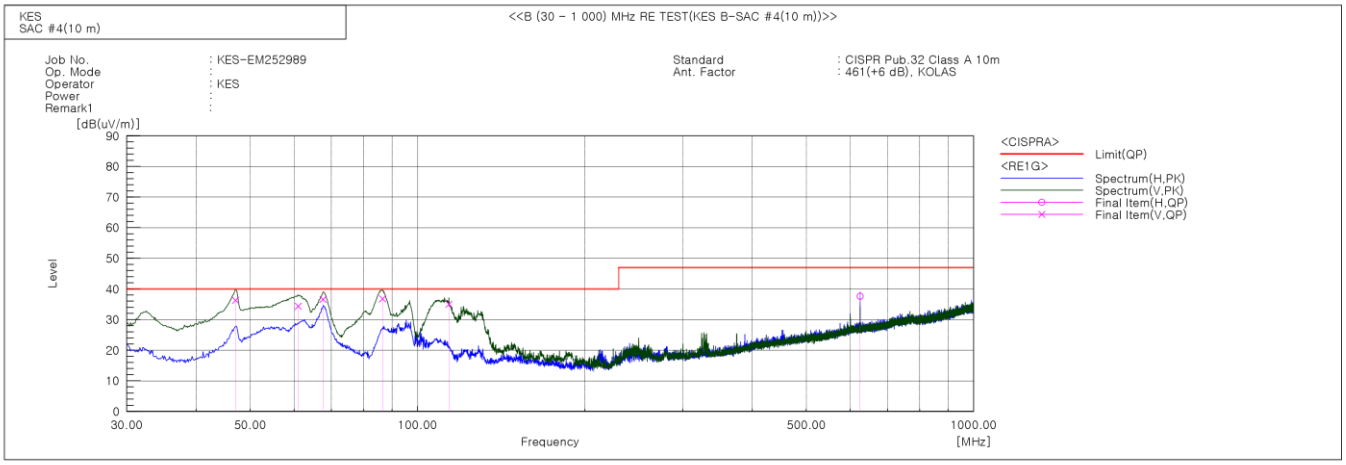
6.2.3 Test Conditions :

Temperature	Relative Humidity
(26.5 ~ 26.7) °C	(53.2 ~ 53.3) % R.H.

6.2.4 Test Result

○ Test Date : 2025-09-03

● Test Mode : Mode 1



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	47.096	V	57.5	-21.2	36.3	40.0	3.7	103.0	108.0	
2	61.040	V	55.9	-21.5	34.4	40.0	5.6	105.0	22.0	
3	67.588	V	58.9	-22.3	36.6	40.0	3.4	142.0	320.0	
4	86.503	V	63.0	-26.2	36.8	40.0	3.2	113.0	287.0	
5	113.905	V	58.1	-23.1	35.0	40.0	5.0	107.0	149.0	
6	624.974	H	44.1	-6.5	37.6	47.0	9.4	199.0	20.0	

※ The data is the result measured by the detector in Quasi-Peak mode on the Peak graph.

6.2.5 Remark

Complies with the test requirements.

6.3 Harmonic Current Emissions

6.3.1 Test Equipment

Equipment Name	Model Number	Manufacturer	Serial No.	Cal. Date	Next Cal. Date	Used
SHIELD ROOM #7	-	DYMSTEC	-	-	-	■
net.control Software	net.control	EM TEST	2.1.4	-	-	■
DIGITAL POWER ANALYZER (Harmonic)	DPA 500N	EM TEST	V1024106759	2025-03-31	2026-03-31	■
POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-	-	■

6.3.2 Test Location : SHIELD ROOM #7

6.3.3 Test Conditions :

Temperature	Relative Humidity
(25.5 ~ 25.6) °C	(54.7 ~ 54.8) % R.H.

6.3.4 Classification of Equipment for Harmonic Current Emissions

■ Limits for Class A equipment
□ Limits for Class B equipment
□ Limits for Class C equipment(Rated Power > 25 W)
□ Limits for Class C equipment(Rated Power ≥ 5 W and ≤ 25 W)
□ Limits for Class D equipment

6.3.5 Test Result

○ Test Date : 2025-09-03

● Test Mode : Mode 1

Maximum harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	0.058			
2	0.001	0.135	1.080	n/a
3	0.045	1.965	2.300	PASS
4	0.002	0.561	0.430	n/a
5	0.044	3.821	1.140	PASS
6	0.002	0.602	0.300	n/a
7	0.042	5.434	0.770	PASS
8	0.002	0.658	0.230	n/a
9	0.039	9.773	0.400	PASS
10	0.002	1.112	0.184	n/a
11	0.036	10.877	0.330	PASS
12	0.002	1.078	0.153	n/a
13	0.033	15.684	0.210	PASS
14	0.001	0.793	0.131	n/a
15	0.030	19.848	0.150	PASS
16	0.001	0.773	0.115	n/a
17	0.026	19.554	0.132	PASS
18	0.001	0.864	0.102	n/a
19	0.022	18.273	0.118	PASS
20	0.001	0.862	0.092	n/a
21	0.018	10.989	0.161	PASS
22	0.001	0.746	0.084	n/a
23	0.014	9.607	0.147	PASS
24	0.001	0.891	0.077	n/a
25	0.011	7.852	0.135	PASS
26	0.001	0.854	0.071	n/a
27	0.007	5.916	0.125	PASS
28	0.001	0.880	0.066	n/a
29	0.005	4.097	0.116	n/a
30	0.001	1.013	0.061	n/a
31	0.003	2.372	0.109	n/a
32	0.001	1.096	0.058	n/a
33	0.001	0.906	0.102	n/a
34	0.001	1.204	0.054	n/a
35	0.001	1.302	0.096	n/a
36	0.001	1.225	0.051	n/a
37	0.002	2.413	0.091	n/a
38	0.001	1.329	0.048	n/a
39	0.003	3.264	0.087	n/a
40	0.001	1.313	0.046	n/a

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

Test Data - Harmonics (continued)

Average harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	0.186			
2	0.003	0.256	1.080	n/a
3	0.176	7.646	2.300	PASS
4	0.004	0.957	0.430	n/a
5	0.168	14.693	1.140	PASS
6	0.004	1.181	0.300	n/a
7	0.156	20.272	0.770	PASS
8	0.003	1.510	0.230	n/a
9	0.141	35.281	0.400	PASS
10	0.004	1.971	0.184	n/a
11	0.125	37.753	0.330	PASS
12	0.003	2.013	0.153	n/a
13	0.107	50.939	0.210	PASS
14	0.003	2.353	0.131	n/a
15	0.089	59.023	0.150	PASS
16	0.003	2.195	0.115	n/a
17	0.070	53.266	0.132	PASS
18	0.002	1.905	0.102	n/a
19	0.053	45.074	0.118	PASS
20	0.002	1.725	0.092	n/a
21	0.038	23.592	0.161	PASS
22	0.001	1.573	0.084	n/a
23	0.025	17.019	0.147	PASS
24	0.001	1.313	0.077	n/a
25	0.014	10.655	0.135	PASS
26	0.001	1.171	0.071	n/a
27	0.006	4.934	0.125	PASS
28	0.001	1.181	0.066	n/a
29	0.001	0.753	0.116	n/a
30	0.001	1.055	0.061	n/a
31	0.004	3.315	0.109	n/a
32	0.001	1.086	0.058	n/a
33	0.005	5.161	0.102	PASS
34	0.001	1.185	0.054	n/a
35	0.006	6.090	0.096	PASS
36	0.001	1.310	0.051	n/a
37	0.005	5.654	0.091	PASS
38	0.001	1.353	0.048	n/a
39	0.004	4.337	0.087	n/a
40	0.001	1.291	0.046	n/a

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.
* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.

6.3.6 Remark

Complies with the test requirements.

6.4 Voltage Fluctuations and Flicker

6.4.1 Test Equipment

Equipment Name	Model Number	Manufacturer	Serial No.	Cal. Date	Next Cal. Date	Used
SHIELD ROOM #7	-	DYMSTEC	-	-	-	■
net.control Software	net.control	EM TEST	2.1.4	-	-	■
DIGITAL POWER ANALYZER (Flicker)	DPA 500N	EM TEST	V1024106759	2025-04-01	2026-04-01	■
POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-	-	■

6.4.2 Test Location : SHIELD ROOM #7

6.4.3 Test Conditions :

Temperature	Relative Humidity
(25.5 ~ 25.7) °C	(54.7 ~ 54.8) % R.H.

6.4.4 Test Result

○ Test Date : 2025-09-03

● Test Mode : Mode 1

Flicker Measurements					
	P_{lt}	Max P_{st}	Max D_c	Max D_{max}	Max T_{max}
Line 1:	0.028	0.028	0	< 0.2	0
Limits:	0.65	1	3.3	4	0.5
Results:	PASS	PASS	PASS	PASS	PASS

6.4.5 Remark

Complies with the test requirements.

6.5 Electrostatic Discharge

6.5.1 Test Equipment

Equipment Name	Model Number	Manufacturer	Serial No.	Cal. Date	Next Cal. Date	Used
SHIELD ROOM #6	-	DYMSTEC	-	-	-	■
ESD SIMULATOR	ESS-2000	NoiseKen	ESS01Z0454	2025-01-21	2026-01-21	■
HCP	-	KES	-	-	-	■
VCP	-	Noise Ken	-	-	-	■

6.5.2 Test Location : SHIELD ROOM #6

6.5.3 Test Conditions :

Temperature	Relative Humidity
Temperature(15 ~ 35) °C	(24.6 ~ 24.7) °C
Relative Humidity(30 ~ 60) % R.H.	(58.3 ~ 58.3) % R.H.
Atmospheric Pressure(86 ~ 106) kPa	(99.5 ~ 99.5) kPa

6.5.4 Test Specifications :

Discharge Factor : 1 s

Discharge Impedance : 330 Ω / 150 pF

Kind of Discharge : Direct Discharge - Contact Discharge, Air Discharge
Indirect Discharge - HCP, VCP

Polarity : Positive and Negative

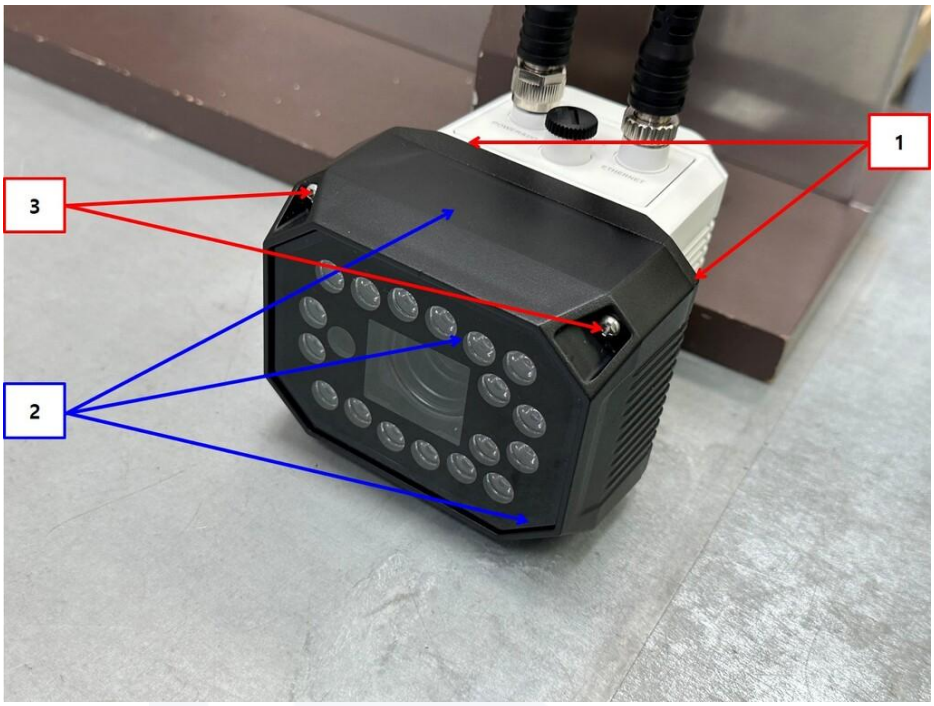
Number of Discharge : 10 at all locations for Contact Discharge,
10 at all locations for Air Discharge

Performance Criteria : B

Discharge Voltage :

Type	Direct Discharge		Indirect Discharge	
	Contact Discharge	Air Discharge	Horizontal Coupling Plane	Vertical Coupling Plane
Test Voltage	-	± 2 kV	-	-
	± 4 kV	± 4 kV	± 4 kV	± 4 kV
	-	± 8 kV	-	-

6.5.5 Location of Discharge



<Location of Discharge-1>

6.5.6 Test Result

○ Test Date : 2025-09-03

● Test Mode : Mode 1

○ **Indirect Discharge**

No.	Test Point	Discharge Method	Performance Criteria	Result
1	HCP Contact	Contact Discharge	B	A
2	VCP Contact	Contact Discharge	B	A

○ **Direct Discharge**

No.	Test Point	Discharge Method	Performance Criteria	Result
1	BARCODE READER Enclosure 1	Contact Discharge	B	A
2	BARCODE READER Enclosure 2	Air Discharge	B	A
3	BARCODE READER Screw	Contact Discharge	B	A

6.5.7 Remark

No loss of performance of function.

6.6 Continuous RF electromagnetic field disturbances

6.6.1 Test Equipment

Equipment Name	Model Number	Manufacturer	Serial No.	Cal. Date	Next Cal. Date	Used
SEMI ANECHOIC CHAMBER #3	-	DYMSTEC	-	-	-	■
EMC32 Measurement Software	EMC32	R&S	10.10.02	-	-	■
SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	2025-07-28	2026-07-28	■
HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-	-	■
POWER METER	E4419B	Agilent	GB40203000	2025-02-13	2026-02-13	■
DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H. SYSTEM,INC	781	2025-03-05	2026-03-05	■
AVERAGE POWER SENSOR	E9301A	Agilent	MY52170007	2025-02-13	2026-02-13	■
AVERAGE POWER SENSOR	E9301A	Agilent	MY41498669	2025-02-13	2026-02-13	■
STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	SCHWARZBECK	9128ES-121	-	-	■

6.6.2 Test Location : SEMI ANECHOIC CHAMBER #3

6.6.3 Test Conditions :

Temperature	Relative Humidity
(23.8 ~ 24.0) °C	(57.2 ~ 57.3) % R.H.

6.6.4 Test Specifications :

Antenna Polarization	:	Horizontal & Vertical unless indicated otherwise
Antenna Distance	:	3 m
Field Strength	:	3 V/m (rms)
Frequency Range	:	80 MHz ~ 1 GHz
Spot Frequency	:	1.8 GHz, 2.6 GHz, 3.5 GHz, 5 GHz
Modulation	:	AM 80 %, 1 kHz, Sine wave
Dwell Time	:	1 s / 3 s (Spot Frequency)
Frequency Step	:	1 %
Application method	:	4
Performance Criteria	:	A

6.6.5 Test Result

○ Test Date : 2025-09-03

● Test Mode : Mode 1

○ Enclosure Ports

Side Exposed	Performance Criteria	Result	
		Horizontal	Vertical
Front	A	A	A
Rear	A	A	A
Right	A	A	A
Left	A	A	A

○ Audio Output Function
(□Electrical Measurements / □ Acoustic Measurements) (□ On-ear, □ Off-ear)

Side Exposed	Performance Criteria	Result	
		Horizontal	Vertical
N/A	A	-	-

○ Telecommunication Terminal (□ TTE / □ Acoustic Measurements)

Side Exposed	Performance Criteria	Result	
		Horizontal	Vertical
N/A	A	-	-

○ Additional Spot Frequencies[(80, 120, 160, 230, 434, 460, 600, 863, 900) MHz (± 1 %)]

Side Exposed	Performance Criteria	Result	
		Horizontal	Vertical
N/A	A	-	-

6.6.6 Remark

No loss of performance of function.

6.7 Electrical Fast Transients/Bursts

6.7.1 Test Equipment

Equipment Name	Model Number	Manufacturer	Serial No.	Cal. Date	Next Cal. Date	Used
SHIELD ROOM #7	-	DYMSTEC	-	-	-	■
iec.control Software	iec.control	EM TEST	5.4.8	-	-	■
ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	2024-11-06	2025-11-06	■
MOTOR VARIAC	MV 2616	EM TEST	P1552169719	2024-11-07	2025-11-07	■

6.7.2 Test Location : SHIELD ROOM #7

6.7.3 Test Conditions :

Temperature	Relative Humidity
(25.5 ~ 25.6) °C	(54.8 ~ 54.8) % R.H.

6.7.4 Test Specifications :

Pulse Amplitude & Polarity	:	Input a.c power ports ± 1.0 kV
		Input d.c power poets ± 0.5 kV
		Signal ports and telecommunication ports ± 0.5 kV
Repetition Rate	:	5 kHz
Impulse Rise Time	:	5 ns ± 30 %
Impulse Period	:	50 ns ± 30 %
Burst Duration	:	15 ms ± 20 %
Burst Period	:	300 ms ± 20 %
Duration of Test Voltage	:	1 min
Application Method	:	a.c / d.c power ports (Coupling / Decoupling Network)
		Other than a.c / d.c power poerts (Capacitive Coupling Clamp)
Performance Criteria	:	B

6.7.5 Test Result

○ Test Date : 2025-09-03

● Test Mode : Mode 1

○ Input a.c power poets

Mode of Application	Performance Criteria	Results (+) Burst	Results (-) Burst
L	B	A	A
N	B	A	A
PE	B	A	A
L-N	B	A	A
L-PE	B	A	A
N-PE	B	A	A
L-N-PE	B	A	A

○ Input d.c power poets

Mode of Application	Performance Criteria	Results (+) Burst	Results (-) Burst
N/A	B	-	-

○ Signal ports and telecommunication ports

Mode of Application	Performance Criteria	Results (+) Burst	Results (-) Burst
N/A	B	-	-

6.7.6 Remark

No loss of performance of function.

6.8 Surge

6.8.1 Test Equipment

Equipment Name	Model Number	Manufacturer	Serial No.	Cal. Date	Next Cal. Date	Used
SHIELD ROOM #7	-	DYMSTEC	-	-	-	■
iec.control Software	iec.control	EM TEST	5.4.8	-	-	■
ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	2024-11-07	2025-11-07	■
MOTOR VARIAC	MV 2616	EM TEST	P1552169719	2024-11-07	2025-11-07	■

6.8.2 Test Location : SHIELD ROOM #7

6.8.3 Test Conditions :

Temperature	Relative Humidity
(25.5 ~ 25.7) °C	(54.8 ~ 54.9) % R.H.

6.8.4 Test Specifications :

Surge	Input a.c power ports	Line to Line	±1.0 kV
		Line to Ground	±2.0 kV
	Input d.c power ports	Line to Ground	±0.5 kV
	Signal ports and telecommunication ports	Line to Ground	±1.0 kV or ±4.0 kV(10/700 μs)
		Shield to Ground	±0.5 kV or ±4.0 kV(1.2/50 μs)

Input a.c / d.c power ports	
Open-Circuit Voltage Waveform	1.2/50 μs
Short-Circuit Current Waveform	8/20 μs
Number of Applications	Apply 5 surges for each polarity
Phase Angle	90˚, 270˚
Polarity	Positive and Negative
Repetition Rate	1 surge per 30 s
Performance Criteria	B
Signal ports and telecommunication ports	
Open-Circuit Voltage Waveform	10/700 μs (1.2/50 μs)
Performance Criteria	C

6.8.5 Test Result

○ Test Date : 2025-09-03

● Test Mode : Mode 1

○ Input a.c power ports

Mode of Application	Performance Criteria	Results (+) Surge	Results (-) Surge
L-N	B	A	A
L-PE	B	A	A
N-PE	B	A	A

○ Input d.c power ports

Mode of Application	Performance Criteria	Results (+) Surge	Results (-) Surge
N/A	B	-	-

○ Signal ports and telecommunication ports

Mode of Application	Performance Criteria	Results (+) Surge	Results (-) Surge
N/A	B	-	-

6.8.6 Remark

No loss of performance of function.

6.9 Continuous Induced RF Disturbances

6.9.1 Test Equipment

Equipment Name	Model Number	Manufacturer	Serial No.	Cal. Date	Next Cal. Date	Used
SHIELD ROOM #7	-	DYMSTEC	-	-	-	■
icd.control Software	icd.control	EM TEST	8.0.0	-	-	■
TEST SYSTEM FOR CONDUCTED AND RADIATED	NSG4070	TESEQ	65585	2024-11-18	2025-11-18	■
ATTENUATOR	ATT 6/80	EM TEST	P1614178148	2024-11-06	2025-11-06	■
CDN	CDN M016	TESEQ	43694	2024-11-07	2025-11-07	■
CDN	CDN M016	TESEQ	43697	2024-11-07	2025-11-07	■

6.9.2 Test Location : SHIELD ROOM #7

6.9.3 Test Conditions :

Temperature	Relative Humidity
(23.2 ~ 23.3°)C	(58.8 ~ 58.9) % R.H.

6.9.4 Test Specifications

Frequency range and Voltage Level	:	0.15 MHz ~ 10 MHz : 3 V(r.m.s)
	:	10 MHz ~ 30 MHz : 3 V(r.m.s) ~ 1 V(r.m.s)
	:	30 MHz ~ 80 MHz : 1 V(r.m.s)
Modulation	:	AM 80 %, 1 kHz, Sine wave
Dwell Time	:	1 s
Frequency Step	:	1 %
Performance Criteria	:	A

6.9.5 Test Result

○ Test Date : 2025-09-03

● Test Mode : Mode 1

○ Input a.c power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
L-N-PE	CDN	A	A

○ Input d.c power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
N/A	-	A	-

○ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
N/A	-	A	-

○ Audio Output Function
(□Electrical Measurements / □ Acoustic Measurements) (□ On-ear, □ Off-ear)

Measured parts	Coupling Method	Performance Criteria	Results
N/A	-	A	-

○ Devices Supporting Telephony (□ TTE / □ Acoustic Measurements)

Measured parts	Coupling Method	Performance Criteria	Results
N/A	-	A	-

○ Additional Spot Frequencies [(0.2, 1, 7.1, 13.56, 21, 27.12, 40.68) MHz (± 1 %)]

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
N/A	-	A	-

6.9.6 Remark

-No loss of performance of function.

6.10 Voltage Dips and Interruptions

6.10.1 Test Equipment

Equipment Name	Model Number	Manufacturer	Serial No.	Cal. Date	Next Cal. Date	Used
SHIELD ROOM #7	-	DYMSTEC	-	-	-	■
iec.control Software	iec.control	EM TEST	5.4.8	-	-	■
ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	2024-11-07	2025-11-07	■
MOTOR VARIAC	MV 2616	EM TEST	P1552169719	2024-11-07	2025-11-07	■

6.10.2 Test Location : SHIELD ROOM #7

6.10.3 Test Conditions :

Temperature	Relative Humidity
(25.5 ~ 25.6) °C	(54.7 ~ 54.8) % R.H.

6.10.4 Test Specifications

Instantaneous peak overshoot/undershoot of the actual voltage : Less than 5 %

Voltage Rise Time, Voltage Fall Time : Between 1 μs and 5 μs

Test Voltage Frequency Deviation for Voltage Dips : with in ± 2 %

EUT Voltage : AC 230 V, 50 Hz

Number of Applications : 3 cycles

Test Interval : 10 s

Performance Criteria : B, C

Voltage Dips and Interruptions	Duration	Performance Criteria
95 % (Voltage Dips)	0.5	B
30 % (Voltage Dips)	25	C
95 % (Voltage Interruptions)	250	C

6.10.5 Test Result

○ Test Date: 2025-09-03

● Test Mode: Mode 1

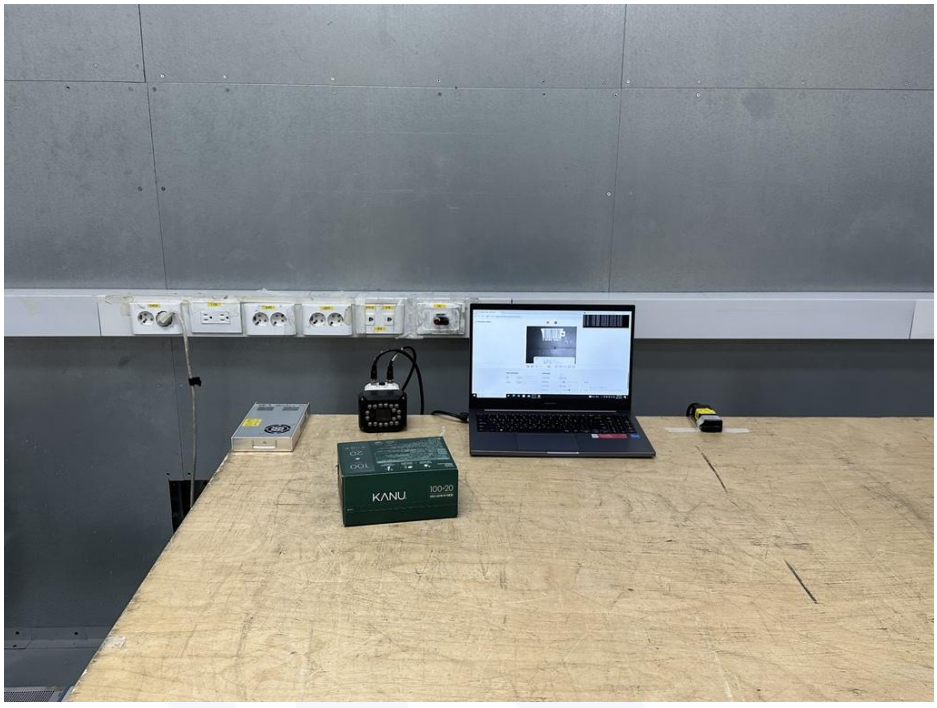
Depth	Duration	Performance Criteria	Results
Above 95 % (Dips)	0.5 T	B	A
30 % (Dips)	25 T	C	A
Above 95 % (Interruption)	250 T	C	C

6.10.6 Remark

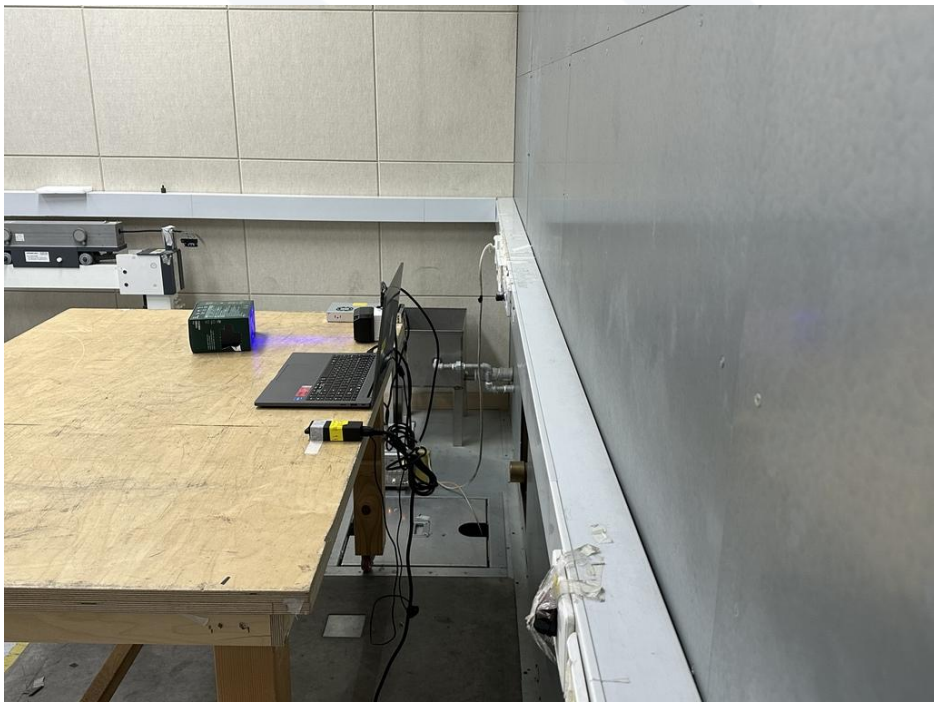
C : Temporary loss of function or performance which requires operator intervention or system reset.

7 Test Setup Photos and EUT Photographs

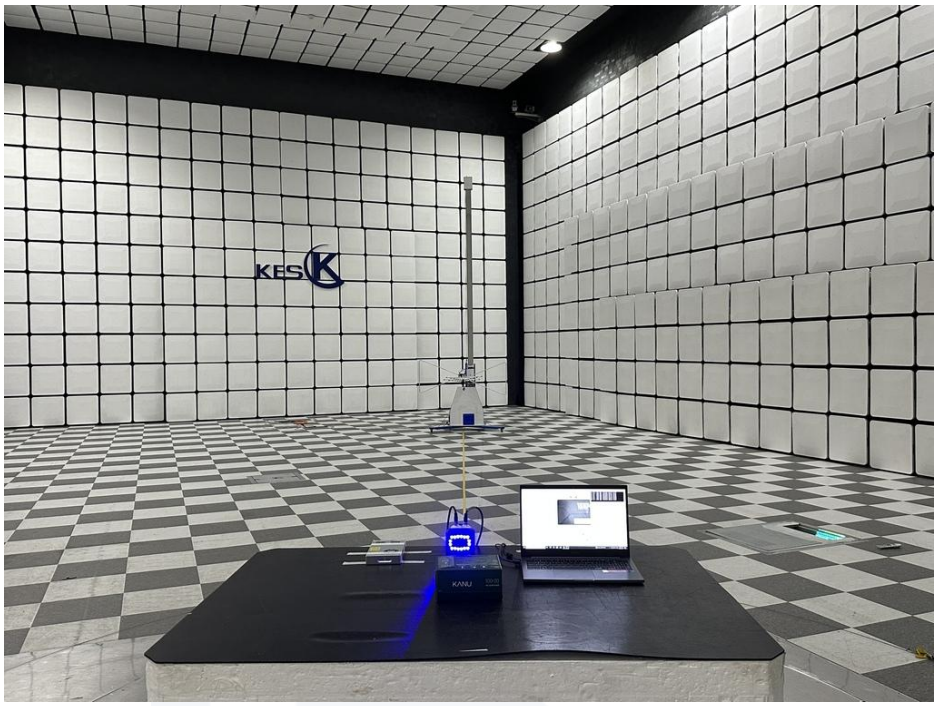
7.1 Test Setup Photos



<Conducted Emissions at Mains Power Ports - Front>



<Conducted Emissions at Mains Power Ports - Rear>



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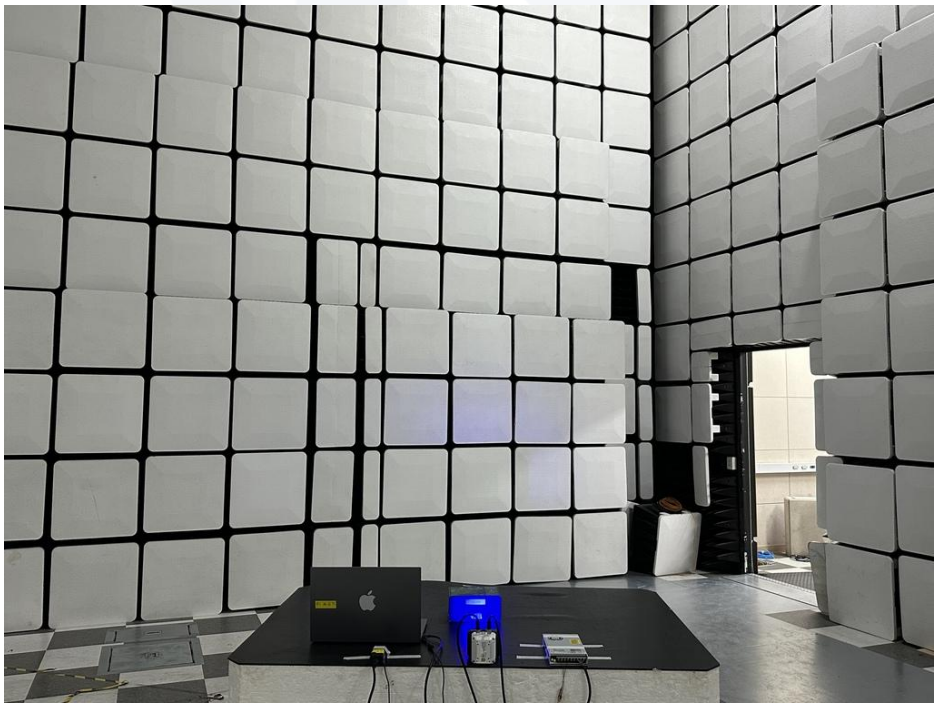
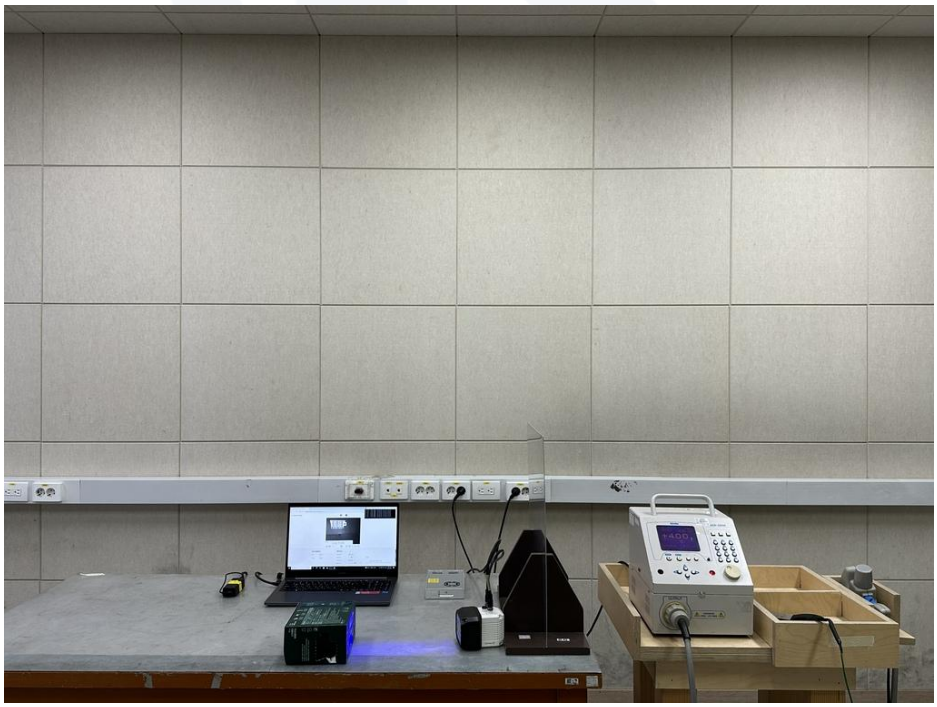


<Radiated Emissions(Below 1 ㎓) - Rear>

<Harmonic Current Emissions and Voltage Fluctuations and Flicker>



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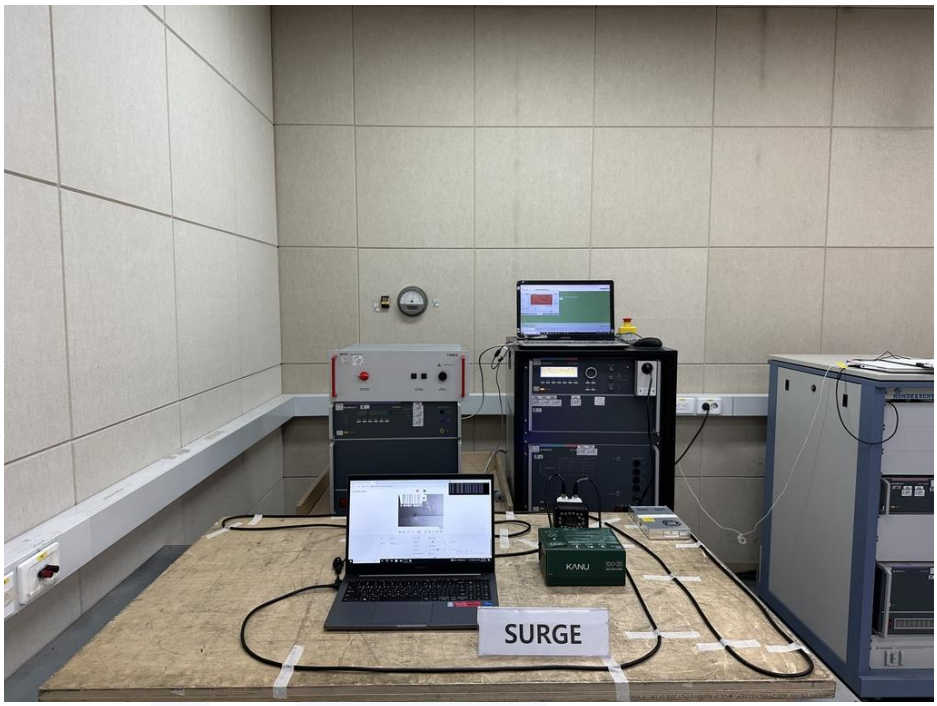
<Continuous RF electromagnetic field disturbances>

<Electrical Fast Transients/Bursts>



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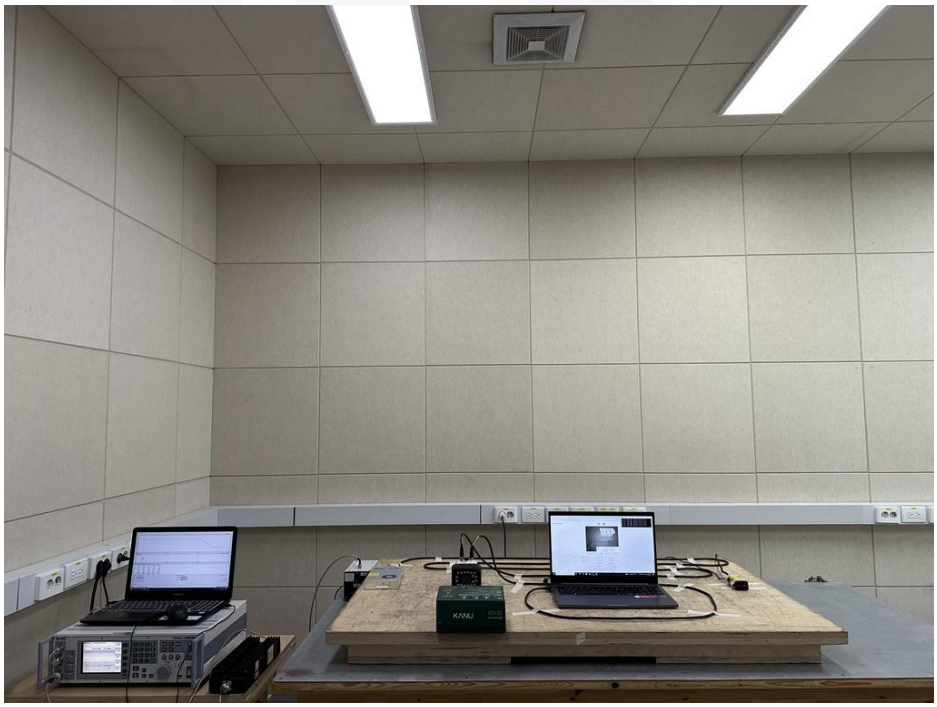
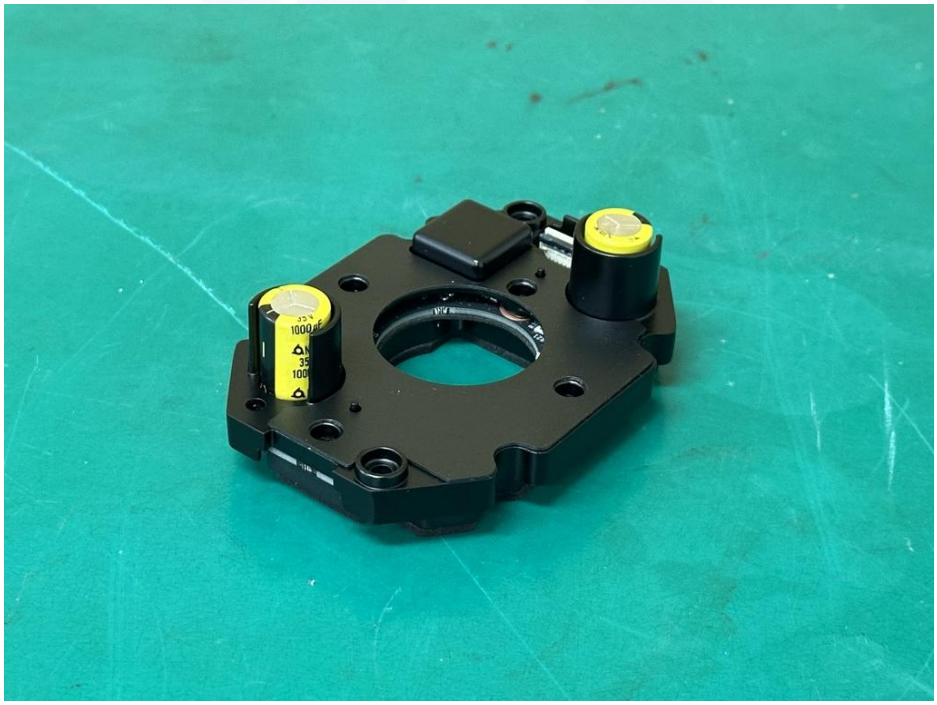


<Continuous Induced RF Disturbances>

<Voltage Dips and Interruptions>

7.2 EUT Photographs

<EUT External Photographs - Top>



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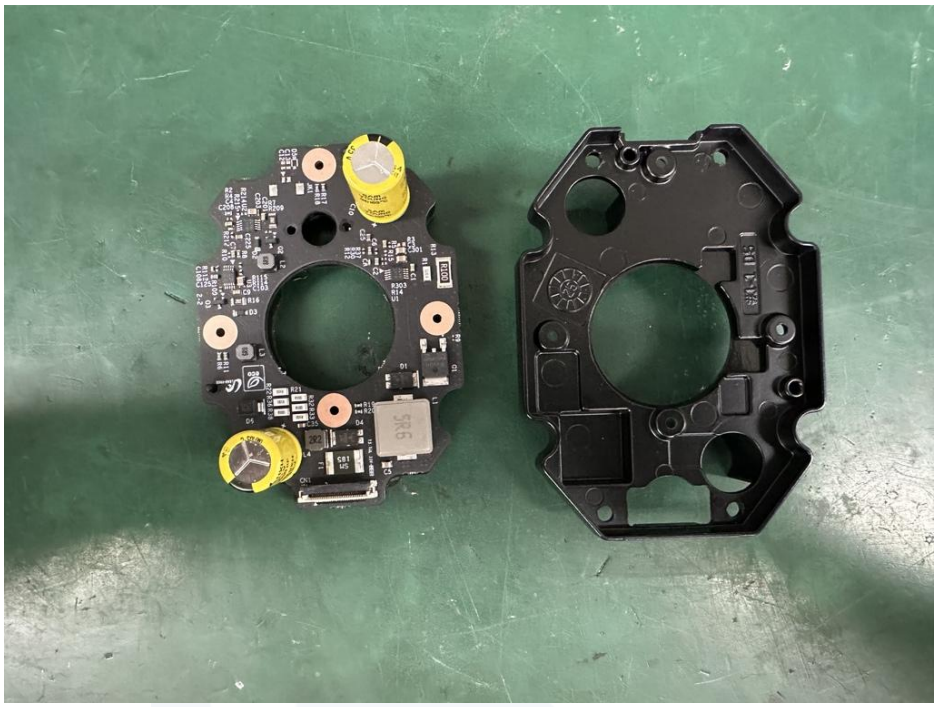

<EUT Internal Photographs>

7.3 Label

Name	:	Hanwha Vision Co., Ltd.
Product item	:	LED MODULE
Model name	:	SPI-BBN0

The End.