



TEST REPORT



Report No. : KES-EM253474
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KES Co., Ltd.

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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 : NETWORK CAMERA
- Model name : XNF-A9014RV
- Variant name : XNF-A8014RV
- Manufacturer etc. : 1. HANWHA VISION VIETNAM COMPANY LIMITED
2. D-TECH CO.,LTD.

3. Date of test : Oct. 03, 2025 ~ Oct. 05, 2025

4. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

- Address : 473-21, Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea

5. Test method used : IEC 62236-3-2(2018)

6. Test result : In Compliance

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

This laboratory is not accredited for the test results Marked *

This test report is not related to KOLAS accreditation.

Affirmation	Tested by	Technical manager
	Name : Seong Min, Jang (<i>Signature</i>)	Name : Dong Hun, Jang (<i>Signature</i>)

The above test report provides test result(s) under the scope accredited by Korea Laboratory Accreditation Scheme (KOLAS), which signed the ILAC-MRA.

2025 .11. 14.

KES Co., Ltd.

**REPORT REVISION HISTORY**

Date	Test Report No.	Revision History
Nov. 14, 2025	KES-EM253183	Issued

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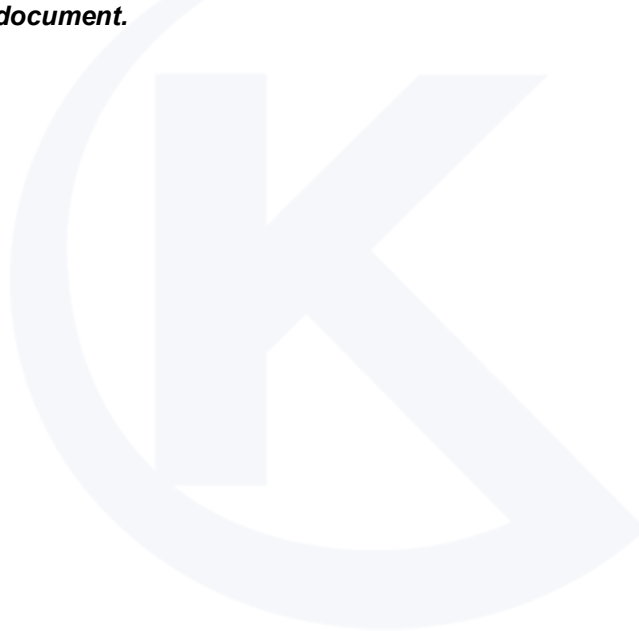




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1.0 General Product Description

Main Specifications of EUT are:

	XNF-A9014RV
Video	
Imaging Device	1/1.6" CMOS
Resolution	Original view: 3536x3536, 3008x3008, 2560x2560, 1600x1600, 1280x1280, 800x800, 640x640, 480x480, 160x160 Double panorama: 3584x1792, 2560x1280, 1920x960, 1280x640, 1024x512, 640x320 Single panorama: 3584x896, 2560x640, 1920x480, 1280x320, 1024x256, 640x160 Quad view: 3584x2688, 2560x1920, 1792x1344, 1280x960, 1024x768, 800x600, 640x480 Q1/Q2/Q3/Q4: 1792x1344, 1280x960, 1024x768, 800x600, 640x480, 320x240
Max. Framerate	Original view: Max.30fps@3536x3536 Double panorama: Max.30fps@3584x1792 Single panorama: Max.30fps@3584x896 Quad view: Max.30fps@3584x2688 Q1/Q2/Q3/Q4(4:3): Max.30fps@1792x1344 MJPEG: Max.5fps
NETD	None
Pixel Size	None
Min. Illumination	Color: 0.02Lux (F1.8, 1/30sec) (TBD) BW: 0.001Lux (F1.8, 1/30sec) (TBD)
Video Out	None
Video Transmission Distance	None
Lens	
Focal Length (Zoom Ratio)	1.76mm fixed focal
Optical Zoom	None
Max. Aperture Ratio	F1.8
Angular Field of View	H: 185° / V: 185° / D: 185°
Min. Object Distance	0.5m(1.64ft)
Focus Control	None
Lens Type	None
Mount Type	None
Optional Lens	None
Pan / Tilt / Rotate	
Pan / Tilt / Rotate	Digital Rotation
Operational	
Camera Title	Displayed up to 85 characters
Direction Indicator	None
Day & Night	Auto(ICR)
Backlight Compensation	BLC, HLC, WDR, SDR
Wide Dynamic Range	120dB
Digital Noise Reduction	SSNRV, WiseNR II(Based on AI engine/AI-ISP)
Digital Image Stabilization	Support
Defog	Support
Motion Detection	8ea, 8point polygonal zones
Privacy Masking	32ea, 8point polygonal zones - Color: gray/green/red/blue/black/white - Mosaic
Gain Control	Off / Max Gain / Manual
White Balance	ATW / NarrowATW / AWC / Manual / Indoor / Outdoor
LDC	None
Electronic Shutter Speed	Minimum / Maximum / Anti flicker(2~1/30,000sec) Prefer shutter control(Based on AI engine)
Digital PTZ	Support
Video Rotation	Flip, mirror



Analytics	Classified object type: Person/Vehicle Attributes: Person(Upper/lower clothes color), Vehicle(Color) Support BestShot Analytics events based on AI engine - Motion detection, Object detection, Virtual line(Crossing/Direction), Virtual area(Loitering/Intrusion/Enter/Exit/Appear/Disappear), Sound classification(To be released) Analytics events - Defocus detection, Tampering, Shock detection, Audio detection
Business Intelligence	Based on AI engine: People/Vehicle/Crowd counting, Queue management, Heatmap
Serial Interface	None
Alarm I/O	2 configurable I/O ports *Support extra alarm I/O via optional I/O box
Alarm Triggers	Analytics, Network disconnection, Alarm input, App event, Time schedule, MQTT subscription, Day/Night change, SD/NAS disruption, Case open tempering
Alarm Events	When alarm trigger occurred - File upload(image): e-mail/FTP/SFTP - File upload(video clip): FTP/SFTP - Notification: e-mail - Recording: SD/SDHC/SDXC or NAS recording at event triggers - Alarm output - Handover: PTZ preset, send message by HTTP/HTTPS/TCP - Audio clip playback(WAV, MP3) - MQTT: publication - SIP(TBD)
Audio Streaming	None
Audio In	Selectable(mic in/line in). Built-in 3 mic with noise reduction
Audio Out	Line out
Light Type	IR LED
Light Viewable Length	WiseIR up to 15m(49.21ft)
IR Viewable Length	None
IR Illuminator (Optional)	None
IR Radiation angle	None
IR LED	None
IR Wavelength	850nm
IR Operation	None
Water Removal	None
Auto Tracking	None
Coaxial Protocol	None
Color Palettes	None
Network	
Ethernet	Metal shielded RJ-45(10/100BASE-T)
Video Compression	H.265/H.264: Main/Baseline/High MJPEG
Audio Compression	G.711(PCM): 8kHz(64Kbps) G.726(ADPCM): 8kHz(16/24/32/40Kbps) AAC-LC: 16/32/44.1/48kHz(48Kbps) OPUS: 8/16/48kHz
Smart Codec	WiseStream(Based on AI engine)
Video Quality Adjustment	None
Bitrate Control	H.264/H.265: CBR or VBR MJPEG: VBR
Streaming	Unicast(20 users) / Multicast Multiple streaming (Up to 5 profiles)
Protocol	IPv4, IPv6, TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP, RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, FTP/SFTP, SMTP(StartTLS), ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, UPnP, Bonjour, LLDP, SRTP(TCP, UDP Unicast), CDP, MQTT, Syslog, SIP(TBD)
SIP support (VoIP, Peer-to-peer)	Support(TBD)



Security	None
Application Programming Interface	ONVIF Profile S/G/T/M SUNAPI(HTTP API) Hanwha Vision Open Platform - WiseAI application included - Cloud connector application included - Sound classification(Based on AI engine) application (To be released)
Security	
OS / Firmware Protect	Encrypted Firmware, Secure boot, Signed Firmware
User authentication	Digest Authentication, Prevent brute-force attack
Network authentication	802.1X Authentication(EAP-TLS, EAP-LEAP, EAP-PEAP MSCHAPv2), 802.1AE(MACsec)
Secure Communication	HTTPS, SRTP, WSS(Websocket secure)
Access Control	IP-based access control, MAC-based access control, Auto logout
Data Protect	Encryption Credentials, Encrypt compress for live recording file export
Audit	Access / System / Event Log management
Device ID	Device Certificate(Hanwha vision Root CA)
Secure Storage	Secure element, SDcard partition encrypt
Security Certificate	ETSI EN 303 645, Secure element(FIPS 140-3 level3, CC EAL6+)
General	
Webpage Language	English, Korean, Simplified Chinese, Traditional Chinese, French, Italian, Spanish, German, Japanese, Russian, Portuguese, Czech, Polish, Turkish, Dutch, Hungarian, Greek
Web Viewer	None
Edge Storage	Micro SD/SDHC/SDXC 1slot Max. 1TB
Edge Storage(OnCloud)	Micro SD/SDHC/SDXC 1slot Max. 1TB * Hanwha Vision branded microSD cards have been certified and recommended for OnCloud edge recording.
Memory	4GB RAM, 8GB eMMC
Environmental & Electrical	
Operating Temperature / Humidity	-40°C~+55°C (-40°F ~ +131°F) 0~100%RH(Condensing) In PoE+ mode, IR illuminator will turn off if the temperature is higher than 50°C
Storage Temperature / Humidity	-50°C~+60°C(-58°F~+140°F) / 0~95% RH
Wind Load	None
EPA(Effective Projected Area)	0.009m ²
Input Voltage	WisePower(PoE(IEEE802.3af, class3)/PoE+(IEEE802.3at type2, Class4)), 12VDC
Power Consumption	PoE+: Max. 19.8W, typical 10.5W for 15m IR LED distance 12VDC: Max 20.0W, typical 10.9W PoE: Max. 11.2W, typical 7.7W for 10m IR LED distance 12VDC: Max 11.3W, typical 7.9W Support Wisepower - Power monitoring(Max./Current/Avg.) - Power logging
Mechanical	
RAL Code	RAL9003
Product Dimensions / Weight	Ø160x75mm(6.23x2.95") / 1020g
Compatible Conduit hole / Gasket	single, double, 4" octagon, 4" square



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 230 V, 50 Hz

1.2 Variant Model Differences

Simple derivations due to SW differences Add Model
(Basic models, circuits, hardware No changes. Same inside.)

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
NETWORK CAMERA	XNF-A9014RV	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT

1.5 System Configuration

Description	Model Number	Serial Number	Manufacturer	Remarks
-	-	-	-	-

1.6 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Adaptor	2ACB022F	-	Channel Well Technology (Guangzhou) Co., Ltd.	-
PoE Injector	PT-PSE109GBRO-A	-	Dongguan PROCET Network Technology Co.,Ltd	-
LED Alarm	-	-	-	-
Button Alarm	-	-	-	-
Headset	K550	-	Britz®	-
Micro SD Card	-	-	Sandisk	8 GB
Laptop	LG15N54	506NZGK000615	LG	-
Laptop Adaptor	PA-1650-43(65W)	OF58U63849302Y609	LG	-



1.7 External I/O Cabling

■ Mode 1

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA (EUT)	DC 12 V	Adaptor	2 Pin	0.8	U
	PoE	Laptop	RJ-45	3.2	U
	Micro SD Card Slot	Micro SD Card	Micro SD Card Slot	-	-
	Alarm OUT	LED Alarm	Alarm IN	3.1	U
	Alarm IN	Button Alarm	Alarm OUT	3.3	U
	MIC	Headset	3.5 mm	2.0	U
	SPEAKER				
Laptop	DC Jack	Laptop Adaptor	DC Jack	1.5	U

• Unshielded = U, Shielded = S

■ Mode 2

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA (EUT)	PoE	PoE Injector	RJ-45	3.2	U
	Micro SD Card Slot	Micro SD Card	Micro SD Card Slot	-	-
	Alarm OUT	LED Alarm	Alarm IN	3.1	U
	Alarm IN	Button Alarm	Alarm OUT	3.3	U
	MIC	Headset	3.5 mm	2.0	U
	SPEAKER				
Laptop	DC Jack	Laptop Adaptor	DC Jack	1.5	U

• Unshielded = U, Shielded = S



1.8 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

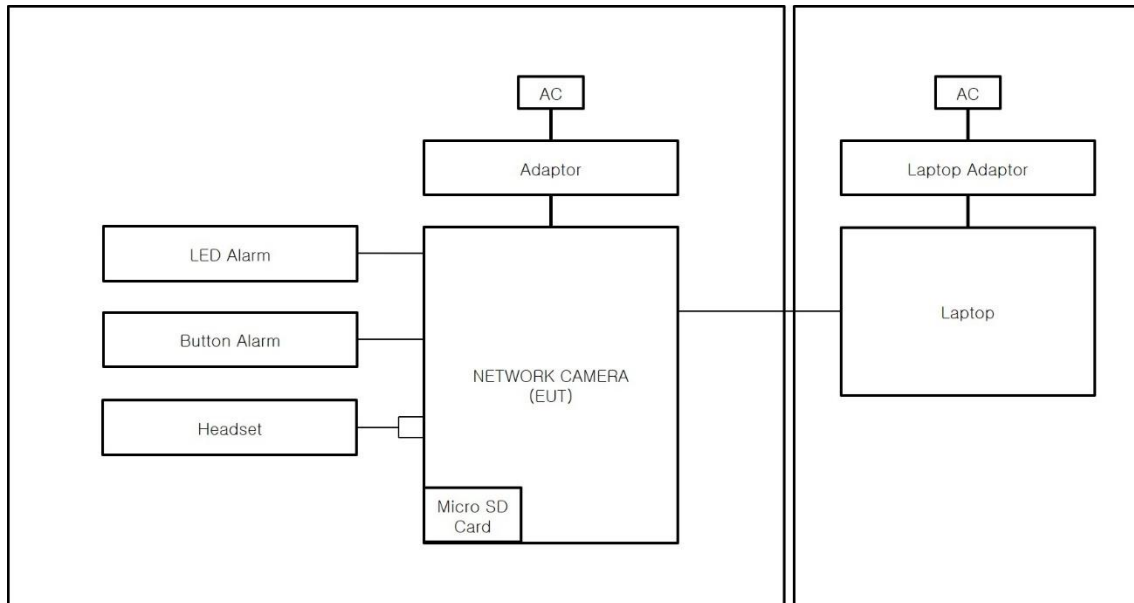
Test mode	Test Voltage	Test No.	operating
Mode 1	DC 12 V	1	- Check the network behavior of the EUT with the laptop's ping test - View images of the camera through the Web Viewer
Mode 2	PoE	2	- Play the 1 kHz tone through the Web Viewer to see the sound output with the headset - When the alarm is pressed, make sure the button alarm is working - After testing, check the recording with Micro SD Card

EUT Test operating S/W		
Name	Version	Manufacture Company
Web Viewer	-	HANWHA VISION VIETNAM COMPANY LIMITED

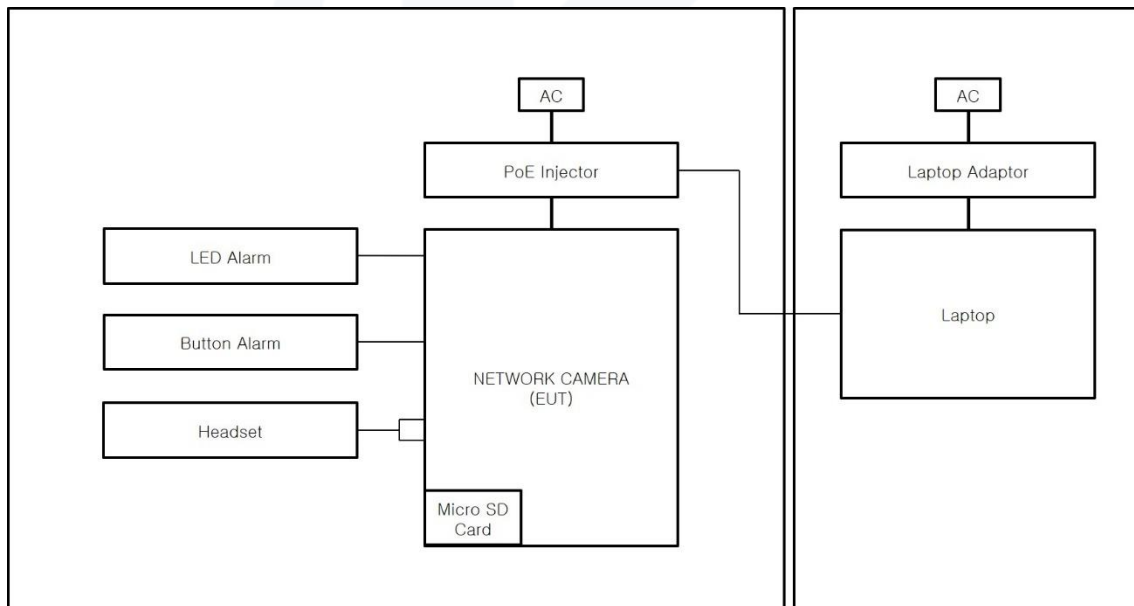


1.9 Configuration

■ Mode 1



■ Mode 2



**1.10 Remarks When Standards Applied**

N/A

1.11 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.

1.12 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 C63.4:2014 and CISPR 16-1-4:2012

1.13 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



2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ IEC 62236-3-2:2018





2.1 Conducted Emissions at Mains Power Ports

Reference Standard

IEC 62236-3-2:2018

Test Date

Oct. 03, 2025

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101783	11, 06, 2025
☒	LISN	ENV216	R & S	101786	11, 09, 2026
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 06, 2025

Test Conditions

Temperature: (25,7 ± 0,1) °C

Relative Humidity: (56,0 ± 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:

- ☒ Test result reference
☐ NOT APPLICABLE

RemarksSee Appendix A for test data.



2.2 Radiated Electric Field Emissions(Below 1 GHz)

Reference Standard

IEC 61000-6-4:2018

Test Date

Oct. 04, 2025

Test Location

SEMI ANECHOIC CHAMBER #4(10 m)

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESU26	R & S	100551	02, 13, 2026
☒	AMPLIFIER	SCU 01	R & S	100603	11, 06, 2025
☒	BILOG ANTENNA	VULB9168	Schwarzbeck	715	05, 09, 2026
☒	ATTENUATOR	6806.17.A	HUBER+SUHNER	-	02, 13, 2026

Test Conditions

Temperature: (23,2 ± 0,2) °C

Relative Humidity: (56,4 ± 0,2) % R.H.

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

- ☒ Test result reference
☐ NOT APPLICABLE

RemarksSee Appendix A for test data.



2.3 Radiated Electric Field Emissions(Above 1 GHz)

Reference Standard

IEC 61000-6-4:2018

Test Date

Oct. 04, 2025

Test Location

SEMI ANECHOIC CHAMBER #4

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	ES10/RE	TOYO Corporation	2022.01.000	-
☒	EMI TEST RECEIVER	ESU26	Rohde & Schwarz	100552	02, 13, 2026
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	11, 04, 2025
☒	PREAMPLIFIER	8449B	HP	3008A00538	04, 30, 2026
☒	ATTENUATOR	8491B	HP	23094	02, 13, 2026

Test Conditions

Temperature: (23,8 ± 0,2) °C
Relative Humidity: (55,8 ± 0,2) % R.H.

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- ☒ Test result reference
☐ NOT APPLICABLE

RemarksSee Appendix A for test data.



3.0 Criteria for Compliance

Criteria for compliance was based on the following guidelines:

General performance criteria

The general principles (performance criteria) for the evaluation of the immunity test results are the following.

Performance criterion A

The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus 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, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.



3.1 Electrostatic discharge

Reference Standard

IEC 61000-4-2:2008

Test Date

Oct. 03, 2025

Test Location

EMS-ESD: Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	01, 21, 2026
☒	HCP	-	KES	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: (25,7 ± 0,1) °C
Relative Humidity: (56,0 ± 0,2) % R.H.
Atmospheric Pressure: (100,1 ± 0.1) kPa

Test Specifications

Discharge Factor: ≥ 1 s
Discharge Impedance: 330 ohm / 150 pF
Kind of Discharge: Air, Contact (direct and indirect)
Polarity: Positive and Negative
Number of Discharge: 10 at all locations for Air discharge
10 at all locations for Contact discharge

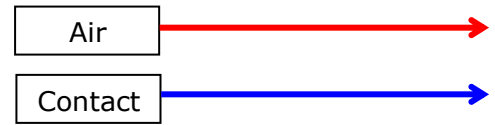
Discharge Voltage:	Contact	Air	HCP	VCP
	☒ 2 kV	☒ 2 kV	☐ 2 kV	☐ 2 kV
	☒ 4 kV	☒ 4 kV	☐ 4 kV	☐ 4 kV
	☒ 6 kV	☐ 6 kV	☒ 6 kV	☒ 6 kV
	☐ 8 kV	☒ 8 kV	☐ 8 kV	☐ 8 kV
	☐ 15 kV	☐ 15 kV	☐ 15 kV	☐ 15 kV

Notes: HCP: Horizontal Coupling Plane
VCP: Vertical Coupling Plane

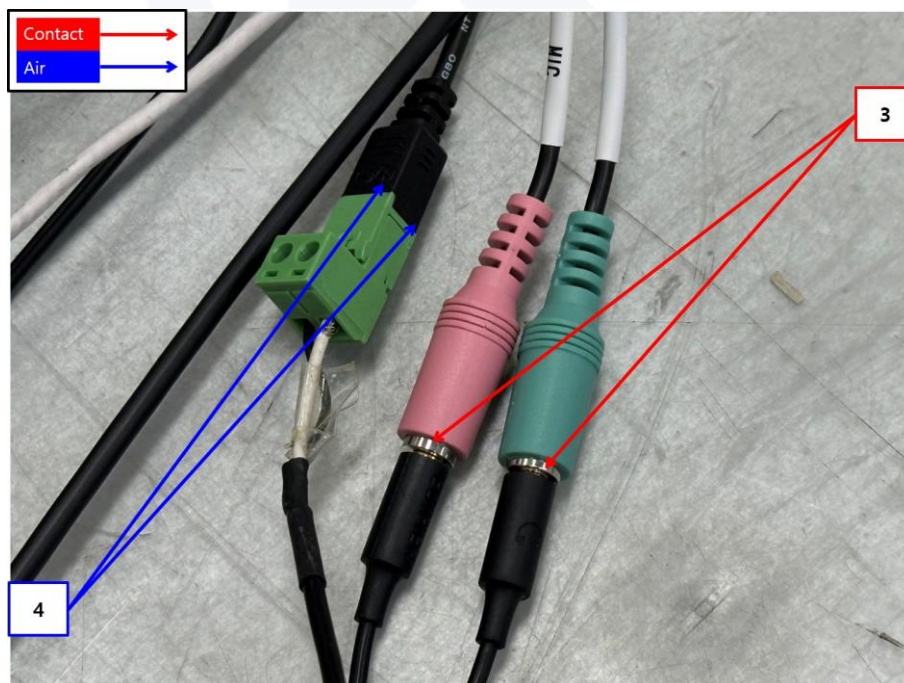
Required Performance Criteria: ☒ B



Location of Discharge:

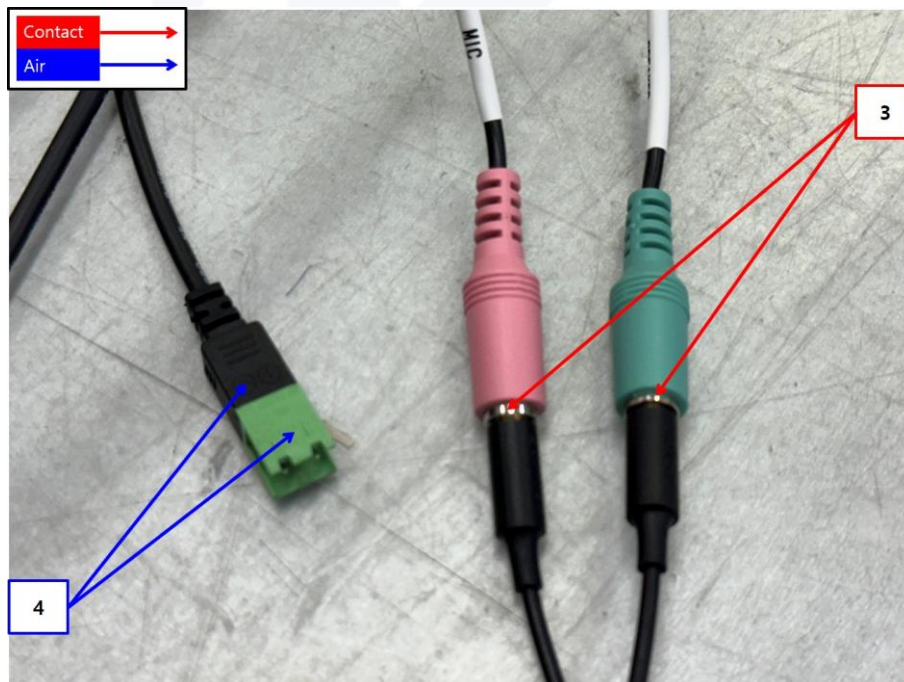


■ Mode 1





■ Mode 2



**Test Data**

■ Mode 1

Indirect Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	HCP Contact	Contact Discharge	A	-
2	VCP Contact	Contact Discharge	A	-

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Enclosure 1	Contact Discharge	A	-
2	Enclosure 2	Air Discharge	A	-
3	Port 1	Contact Discharge	A	-
4	Port 2	Air Discharge	A	-

■ Mode 2

Indirect Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	HCP Contact	Contact Discharge	A	-
2	VCP Contact	Contact Discharge	A	-

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Enclosure 1	Contact Discharge	A	-
2	Enclosure 2	Air Discharge	A	-
3	Port 1	Contact Discharge	A	-
4	Port 2	Air Discharge	A	-

Note: "Blank" = Not performed

Observations:

A – No response observed from EUT

B – Unit shuts down then automatically restarts when full voltage is restored.

C – Unit shuts down then manually restarts when full voltage is restored or Loss of function.

Test Results

☒ Test result reference

☐ NOT APPLICABLE

Remarks

During the test, There are no degradation of performance was found.



3.2 Radio-frequency electromagnetic field

Reference Standard

IEC 61000-4-3:2020

Test Date

Oct. 05, 2025

Test LocationEMS-RS: ☒ SEMI ANECHOIC CHAMBER #3 ☐ SEMI ANECHOIC CHAMBER #4(10 m)**Test Equipment**

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	EMC32	R & S	10.10.02	-
☒	SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	07, 28, 2026
☒	HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-
☒	POWER METER	E4419B	Agilent	GB40203000	02, 13, 2026
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY52170007	02, 13, 2026
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY41498669	02, 13, 2026
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 05, 2026

Test Conditions

Temperature: (24,5 ± 0,3) °C
Relative Humidity: (57,3 ± 0,3) % R.H.
Atmospheric Pressure: (99,9 ± 0,2) kPa



Test Specifications

Antenna Polarization: Horizontal & Vertical unless indicated otherwise

Antenna Distance: ☒ 3 m

Frequency Range: ☒ 80 MHz to 800 MHz [20V/m]
[Field Strength] ☒ 800 MHz to 1 GHz [20 V/m]
☒ 1,4 GHz to 2,0 GHz [10 V/m]
☒ 2,0 GHz to 2,7 GHz [5 V/m]
☒ 5,1 GHz to 6,0 GHz [3 V/m]

Modulation: ☒ 80 % AM, 1 kHz sine wave

Frequency Step: ☒ 1 % step

Dwell Time: ☒ 3 s

of Sides Radiated: ☒ 4

Required Performance Criteria: ☒ A

**Test Data**

■ Mode 1

Side Exposed	Observations	
	Horizontal	Vertical
Front	A	A
Right	A	A
Back	A	A
Left	A	A

■ Mode 2

Side Exposed	Observations	
	Horizontal	Vertical
Front	A	A
Right	A	A
Back	A	A
Left	A	A

Note: "Blank" = Not performed

Observations:

A – No response observed from EUT

B – Unit shuts down then automatically restarts when full voltage is restored.

C – Unit shuts down then manually restarts when full voltage is restored or Loss of function.

Test Results

- ☒ Test result reference
☐ NOT APPLICABLE

Remarks

PASS Required Performance Criteria.



3.3 Fast transients

Reference Standard

IEC 61000-4-4:2012

Test Date

Oct. 04, 2025

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 06, 2025
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 07, 2025
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 06, 2025

Test Conditions

Temperature: (24,4 ± 0,2) °C
Relative Humidity: (58,6 ± 0,2) % R.H.
Atmospheric Pressure: (100,2 ± 0,1) kPa

Test Specifications

Pulse Amplitude & Polarity: ☒ ± 2.0 kV
(Power Lines)

Pulse Amplitude & Polarity: ☒ ± 2.0 kV
(Signal Lines)

Burst Period: ☒ 300 ms

Repetition Rate: ☒ 5 kHz

Duration of Test Voltage: ☒ ≥ 1 min

Required Performance Criteria: ☒ A

**Test Data**

■ Mode 1

☒ Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
L	A	A
N	A	A
L - N	A	A

☐ Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
-	-	-

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
PoE	A	A
Alarm IN, Alarm OUT	A	A

■ Mode 2

☐ Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
-	-	-

☐ Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
-	-	-

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
PoE	A	A
Alarm IN, Alarm OUT	A	A

Note: “Blank” = Not performed

Observations:

- A – No response observed from EUT
- B – Unit shuts down then automatically restarts when full voltage is restored.
- C – Unit shuts down then manually restarts when full voltage is restored or Loss of function.

Test Results

- ☒ Test result reference
- ☐ NOT APPLICABLE

RemarksDuring the test, There are no degradation of performance was found.



3.4 Surges

Reference Standard

IEC 61000-4-5:2014+A1:2017

Test Date

Oct. 04, 2025

Test Location

EMS-Surge: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 07, 2025
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 07, 2025
☒	CDN	CNV 504N7.3	EM TEST	P1744207079	11, 08, 2025

Test Conditions

Temperature: (24,4 ± 0,2) °C
Relative Humidity: (58,6 ± 0,2) % R.H.
Atmospheric Pressure: (100,2 ± 0,1) kPa

**Test Specifications****AC Power Lines**Source Impedance: ☒ 42 Ω + 0.5 μ FSurge Amplitude: Common Mode
☐ (2,0) kV
Differential Mode
☒ (1,0) kVVoltage waveform: ☒ 1,2 / 50 μ sCurrent waveform: ☒ 8 / 20 μ sNumber of Surges: ☒ 5 surges per angleAngle: ☒ 0°, 90°, 180°, 270° (input AC power port)Polarity: ☒ Positive & NegativeRepetition Rate: ☒ 1 surge per min ☐ 1 surge per 30 sec.Required Performance Criteria: ☒ B**DC Power Lines**Source Impedance: ☐ 42 Ω + 0.5 μ FSurge Amplitude: Common Mode
☐ (2,0) kV
Differential Mode
☐ (1,0) kVVoltage waveform: ☐ 1,2 / 50 μ sCurrent waveform: ☐ 8 / 20 μ sNumber of Surges: ☐ 5 SurgesPolarity: ☐ Positive & NegativeRepetition Rate: ☐ 1 surge per min ☐ 1 surge per 30 sec.Required Performance Criteria: ☐ B

**Test Data**

■ Mode 1

AC Power Lines☒ Line to Line – Differential Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L - N	A	A

☐ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
-	-	-

DC Power Lines☐ Line to Line – Differential Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
-	-	-

☐ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
-	-	-

Note: "Blank" = Not performed

Observations:

- A – No response observed from EUT
- B – Unit shuts down then automatically restarts when full voltage is restored.
- C – Unit shuts down then manually restarts when full voltage is restored or Loss of function.

Test Results

- ☒ Test result reference
- ☐ NOT APPLICABLE

RemarksDuring the test, There are no degradation of performance was found.



3.5 Radio-frequency common mode

Reference Standard

IEC 61000-4-6:2023

Test Date

Oct. 03, 2025

Test Location

EMS-CS: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	icd.control	EM TEST	8.0.0	-
☒	TEST SYSTEM FOR CONDUCTED AND RADIATED	NSG4070	TESEQ	65585	11, 18, 2025
☒	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 06, 2025
☒	CDN	CDN M016	TESEQ	43694	11, 07, 2025
☒	CDN	CDN T8 RJ45	SCHWARZBECK	00103	11, 07, 2026
☒	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 08, 2025

Test Conditions

Temperature: (23,9 ± 0,2) °C
Relative Humidity: (58,3 ± 0,1) % R.H.
Atmospheric Pressure: (100,1 ± 0,1) kPa

Test Specifications

Frequency Range: ☒ 150 kHz to 80 MHz
Voltage Level: ☒ 10 V (rms)
Modulation: ☒ 80 % AM, 1 kHz sine wave
Frequency Step: ☒ 1 % step
Dwell Time: ☒ 3 s
Required Performance Criteria: ☒ A

**Test Data**

■ Mode 1

☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L - N	CDN	A

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	-	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
PoE	CDN	A
Alarm IN, Alarm OUT	Clamp	A

■ Mode 2

☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	-	-

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	-	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
PoE	CDN	A
Alarm IN, Alarm OUT	Clamp	A

Notes: CDN = Coupling Decoupling Network
"blank" = Not performed

Observations:

- A – No response observed from EUT
- B – Unit shuts down then automatically restarts when full voltage is restored.
- C – Unit shuts down then manually restarts when full voltage is restored or Loss of function.

Test Results☒ Test result reference☐ NOT APPLICABLE**Remarks**

During the test, There are no degradation of performance was found.

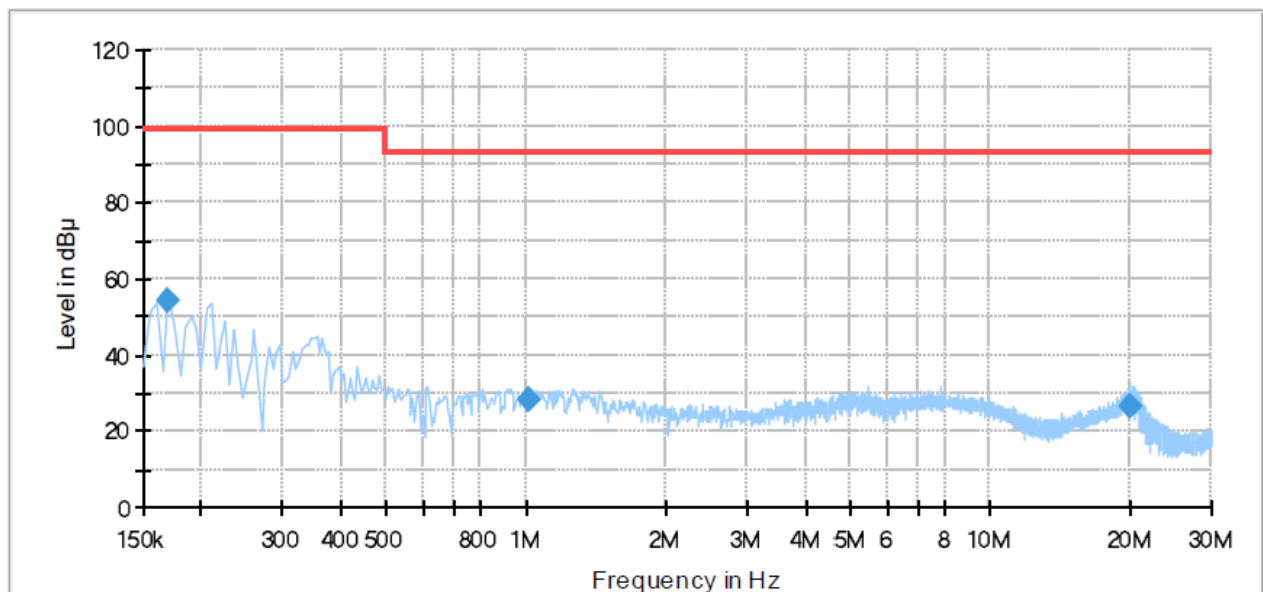


APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[LINE 1]

Test Description: Conducted Emission
Job No.: KES-EM253474
Phase: L
Mode: Mode 1
Operator Name: KES



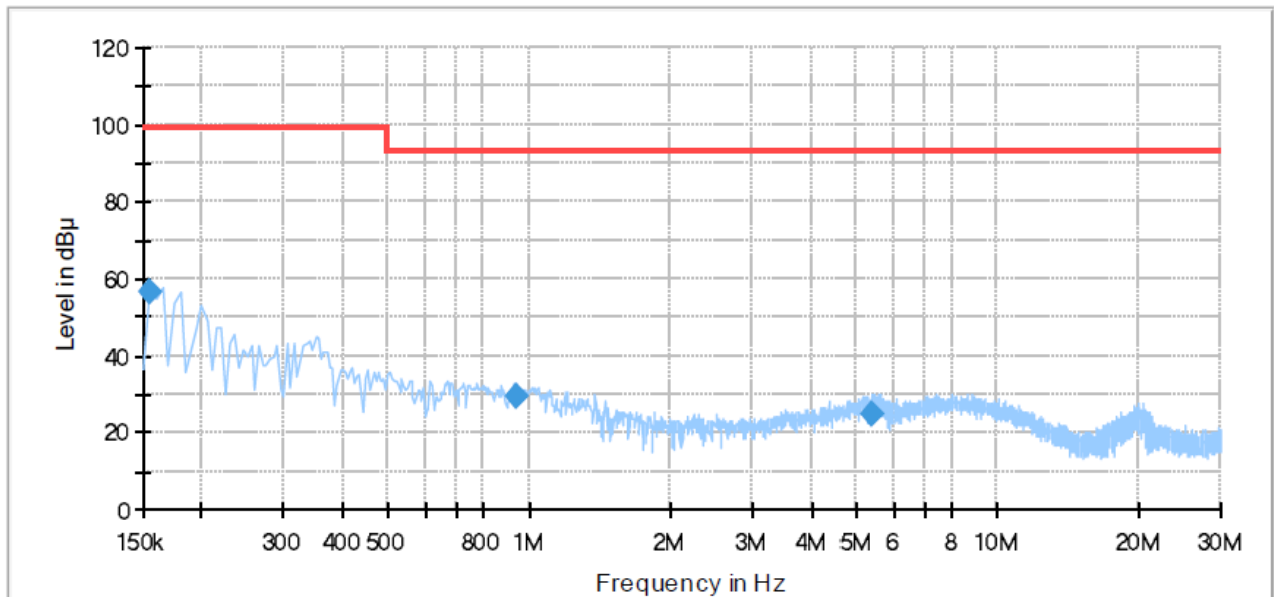
Final_Result

Frequency (MHz)	QuasiPeak (dB μ V)	CAverage (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.170000	54.37	---	99.00	44.63	1000.0	9.000	L1	19.5
1.010000	28.38	---	93.00	64.62	1000.0	9.000	L1	19.6
19.950000	26.41	---	93.00	66.59	1000.0	9.000	L1	20.3



[LINE 2]

Test Description: Conducted Emission
Job No.: KES-EM253474
Phase: N
Mode: Mode 1
Operator Name: KES



Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	56.73	---	99.00	42.27	1000.0	9.000	N	19.5
0.945000	29.24	---	93.00	63.76	1000.0	9.000	N	19.6
5.380000	25.03	---	93.00	67.97	1000.0	9.000	N	19.9

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

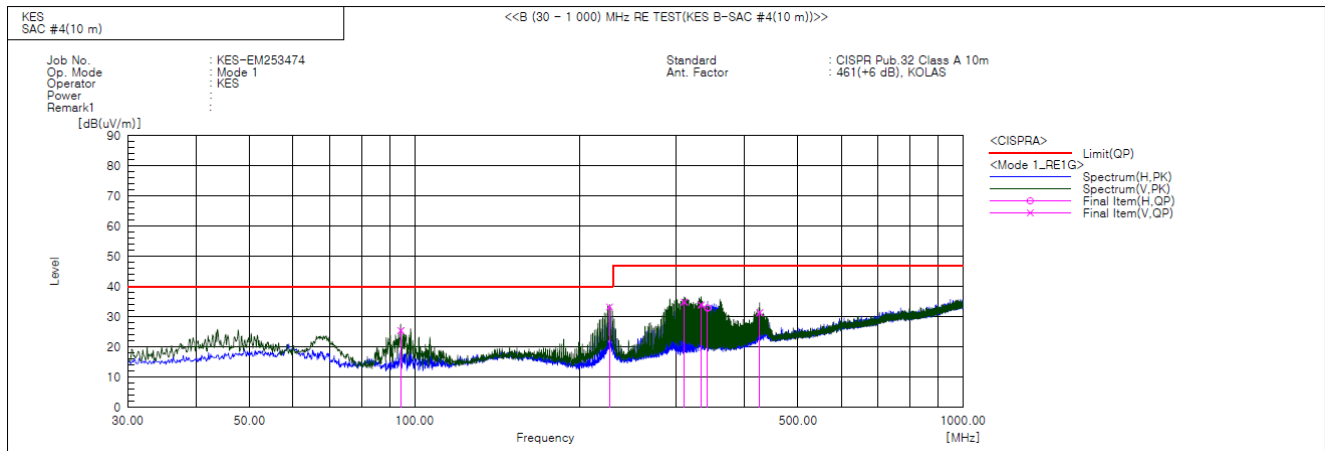
Reading Value : Not shown in the table.

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



Radiated Electric Field Emissions(Below 1 GHz)

■ Mode 1

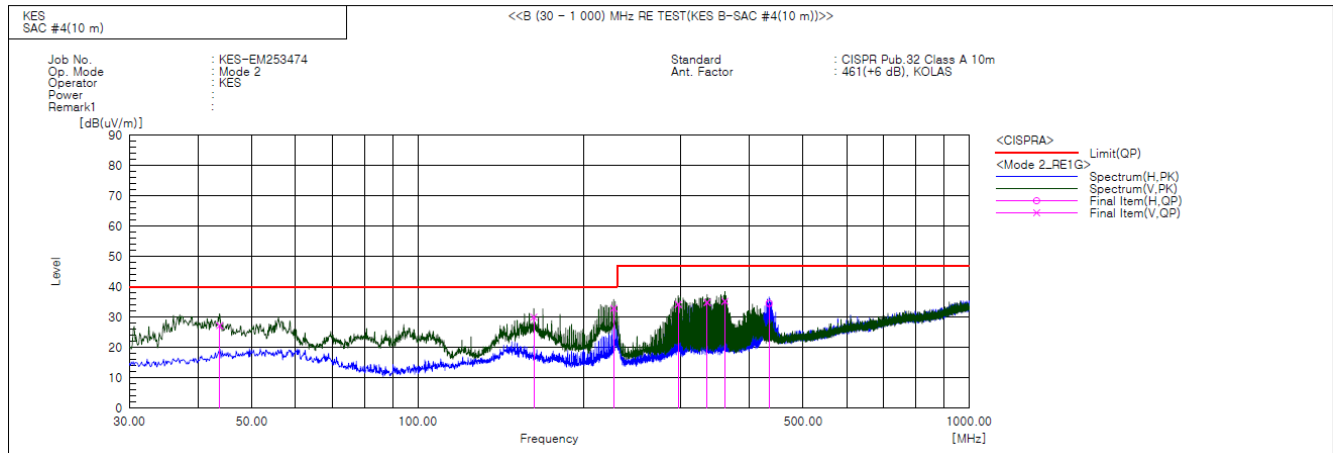


Final Result

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	94.384	V	51.2	-25.8	25.4	40.0	14.6	101.0	111.0	
2	226.668	V	54.1	-20.9	33.2	40.0	6.8	100.0	149.0	
3	310.330	V	51.6	-16.7	34.9	47.0	12.1	102.0	349.0	
4	333.125	V	49.9	-16.0	33.9	47.0	13.1	105.0	146.0	
5	342.219	H	48.6	-15.7	32.9	47.0	14.1	201.0	93.0	
6	426.003	V	43.9	-12.5	31.4	47.0	15.6	101.0	146.0	



■ Mode 2



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	43.701	V	48.7	-21.5	27.2	40.0	12.8	102.0	276.0	
2	162.405	V	49.6	-19.6	30.0	40.0	10.0	106.0	50.0	
3	226.668	V	53.8	-20.9	32.9	40.0	7.1	100.0	58.0	
4	296.750	V	51.4	-17.2	34.2	47.0	12.8	101.0	241.0	
5	334.823	V	50.7	-15.9	34.8	47.0	12.2	108.0	188.0	
6	360.649	V	50.3	-15.1	35.2	47.0	11.8	107.0	203.0	
7	433.763	H	46.7	-12.2	34.5	47.0	12.5	299.0	107.0	

◆ Calculation – SAC #4(10 m)

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)]

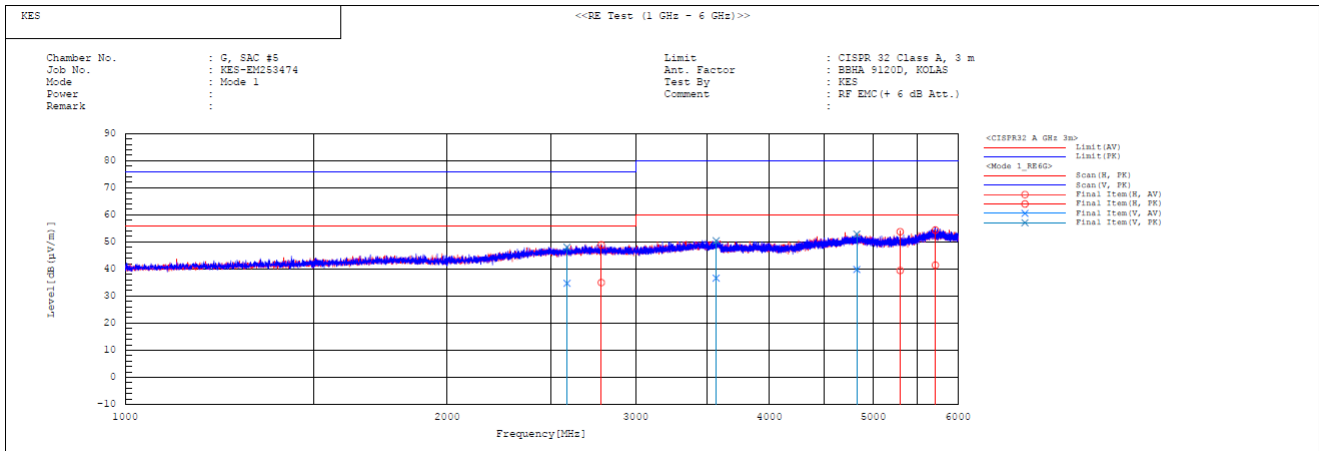
Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

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



Radiated Electric Field Emissions(Above 1 GHz)

■ Mode 1

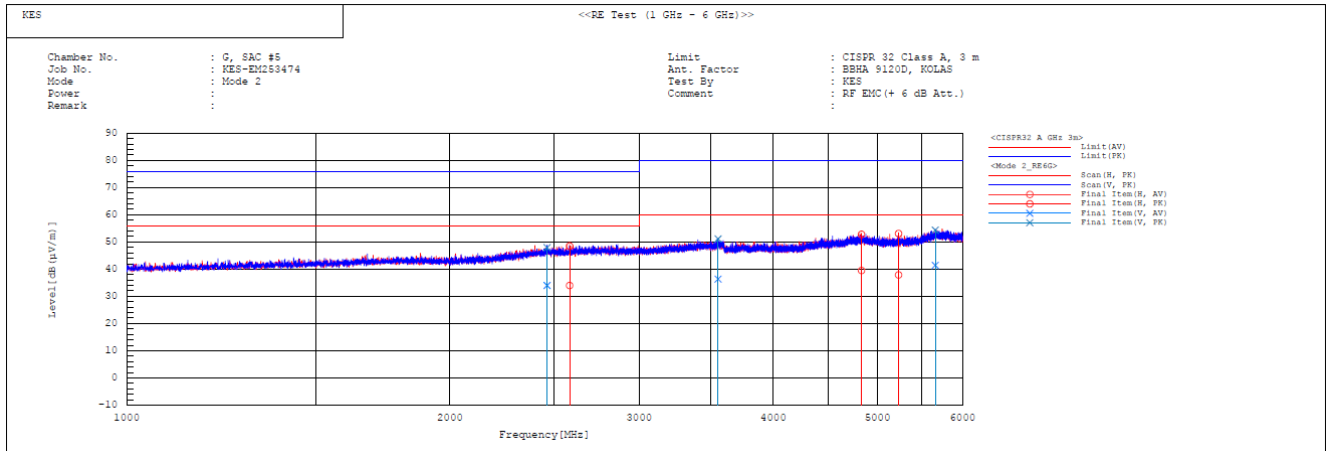


Final Result

No.	Frequency	Pol	Reading	Reading	c.f	Result	Result	Limit	Limit	Margin	Margin	Height	Angle
	[MHz]		AV	PK		AV	PK	AV	PK	AV	PK		
			[dB(μV)]	[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]	[dB]	[cm]	[deg]
1	2588.146	V	29.4	42.7	5.3	34.7	48.0	56.0	76.0	21.3	28.0	100.0	277.3
2	2786.359	H	28.9	42.8	6.1	35.0	48.9	56.0	76.0	21.0	27.1	100.0	53.5
3	3567.012	V	28.9	42.7	7.7	36.6	50.4	60.0	80.0	23.4	29.6	100.0	200.7
4	4828.243	V	28.0	41.1	11.8	39.8	52.9	60.0	80.0	20.2	27.1	100.0	99.7
5	5299.741	H	26.3	40.6	13.1	39.4	53.7	60.0	80.0	20.6	26.3	100.0	265.9
6	5717.085	H	27.4	40.4	14.0	41.4	54.4	60.0	80.0	18.6	25.6	100.0	351.5



■ Mode 2



Final Result

No.	Frequency [MHz]	Pol	Reading AV [dB(μV)]	Reading PK [dB(μV)]	c.f [dB(1/m)]	Result AV [dB(μV/m)]	Result PK [dB(μV/m)]	Limit AV [dB(μV/m)]	Limit PK [dB(μV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [deg]
1	2463.073	V	28.9	42.8	5.1	34.0	47.9	56.0	76.0	22.0	28.1	100.0	3.1
2	2584.348	H	28.7	43.2	5.3	34.0	48.5	56.0	76.0	22.0	27.5	100.0	286.0
3	3554.379	V	28.6	43.4	7.7	36.3	51.1	60.0	80.0	23.7	28.9	100.0	105.6
4	4832.259	H	27.7	41.0	11.8	39.5	52.8	60.0	80.0	20.5	27.2	100.0	244.9
5	5231.266	H	24.9	40.1	13.0	37.9	53.1	60.0	80.0	22.1	26.9	100.0	240.6
6	5661.176	V	27.5	40.5	13.9	41.4	54.4	60.0	80.0	18.6	25.6	100.0	152.0

◆ 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(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

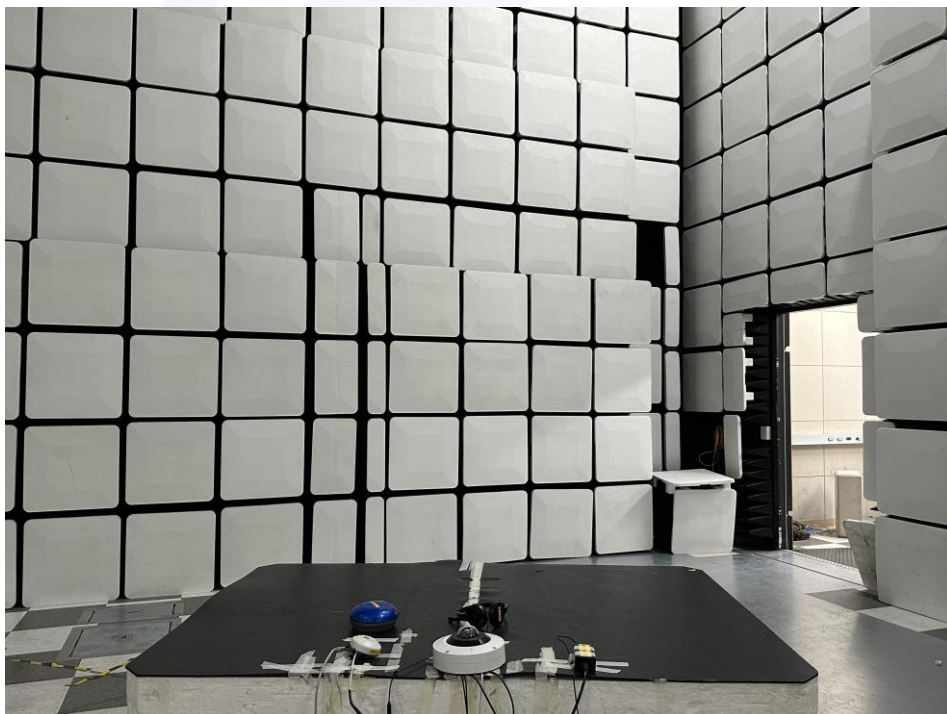
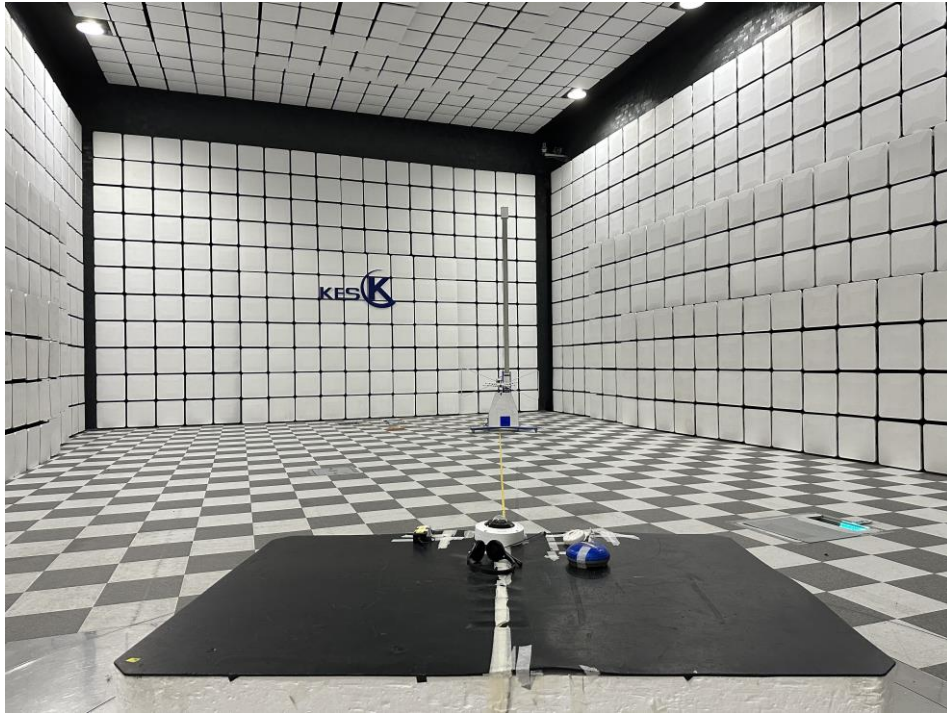
■ Mode 1





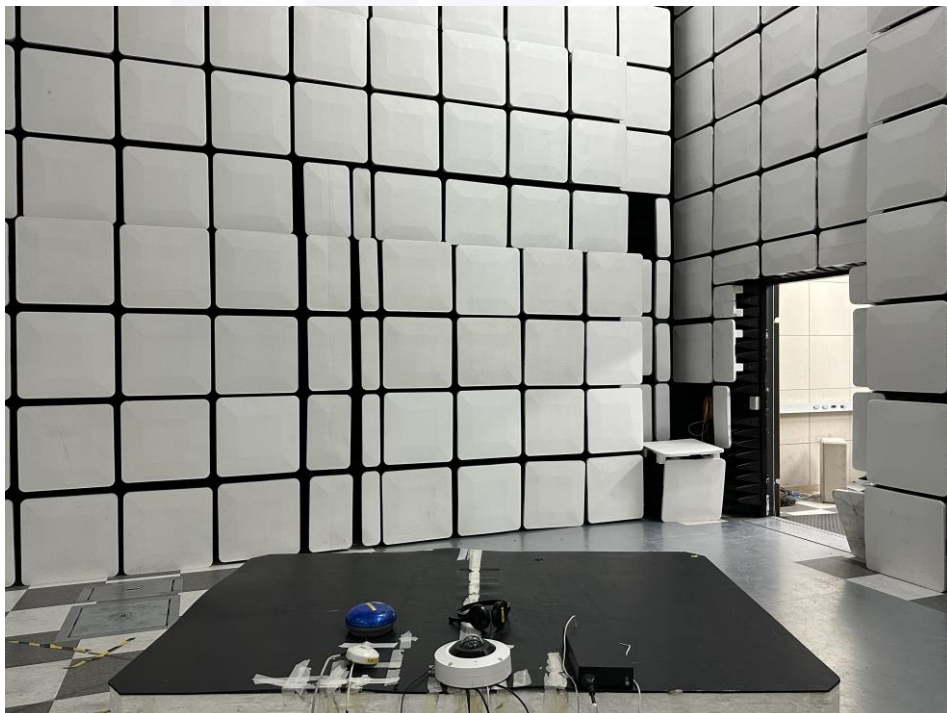
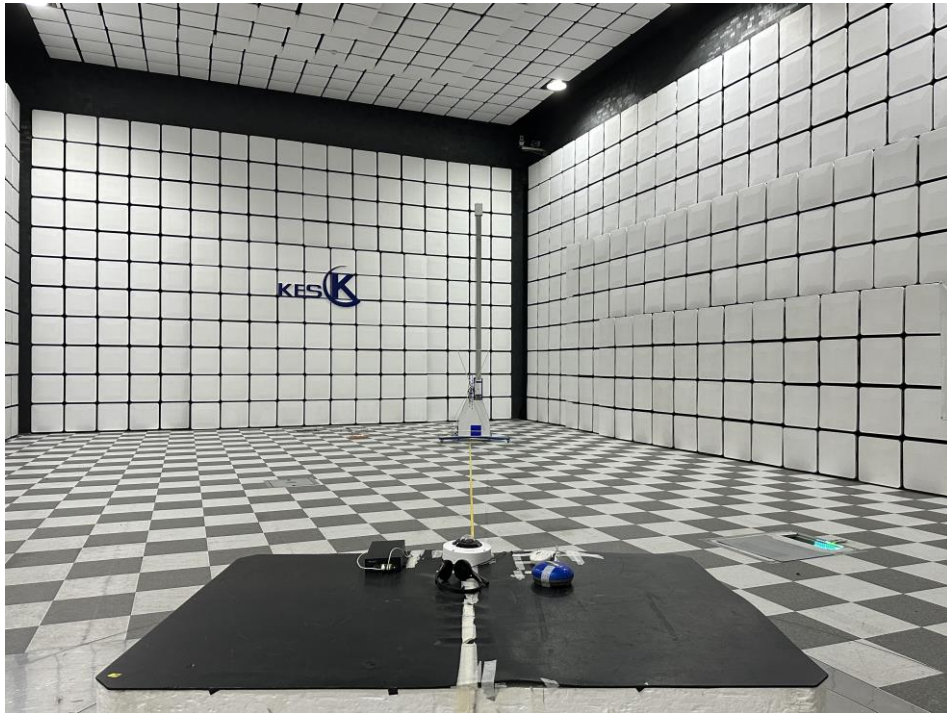
Radiated Electric Field Emissions(Below 1 GHz)

■ Mode 1





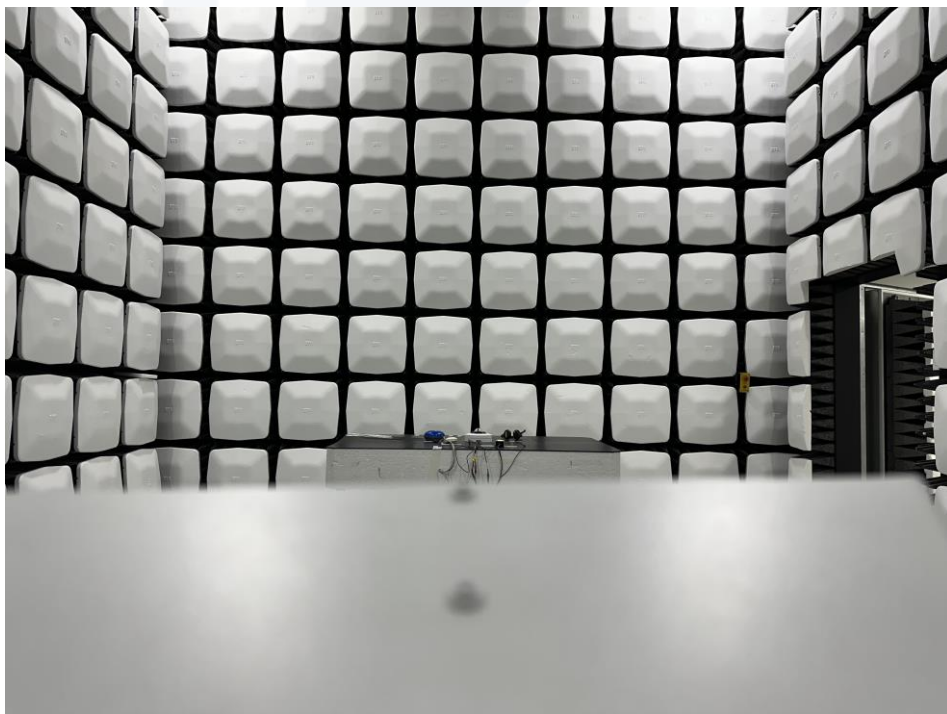
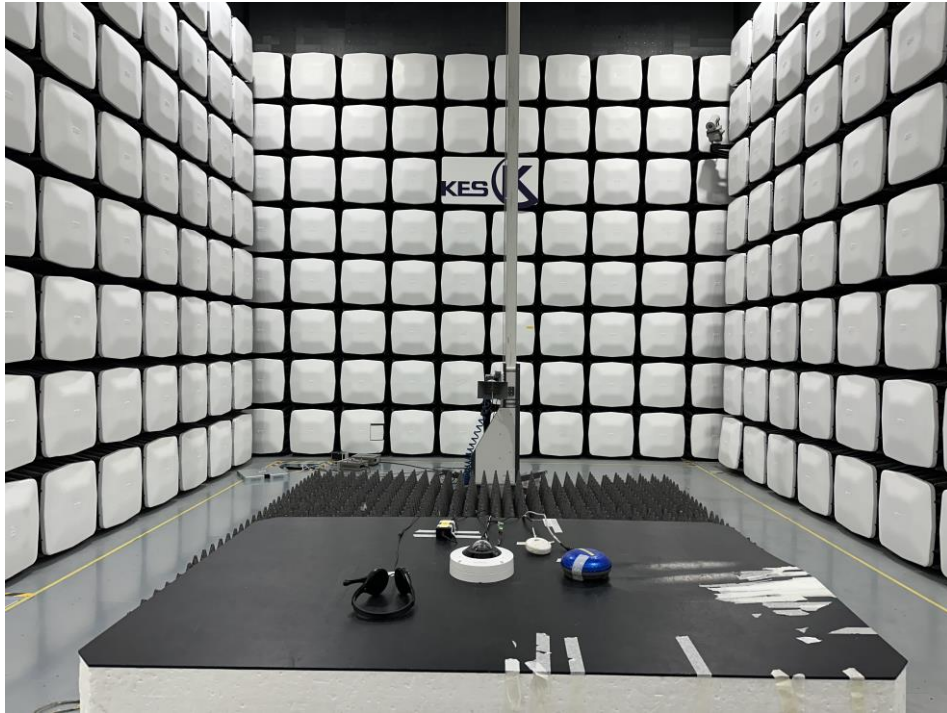
■ Mode 2





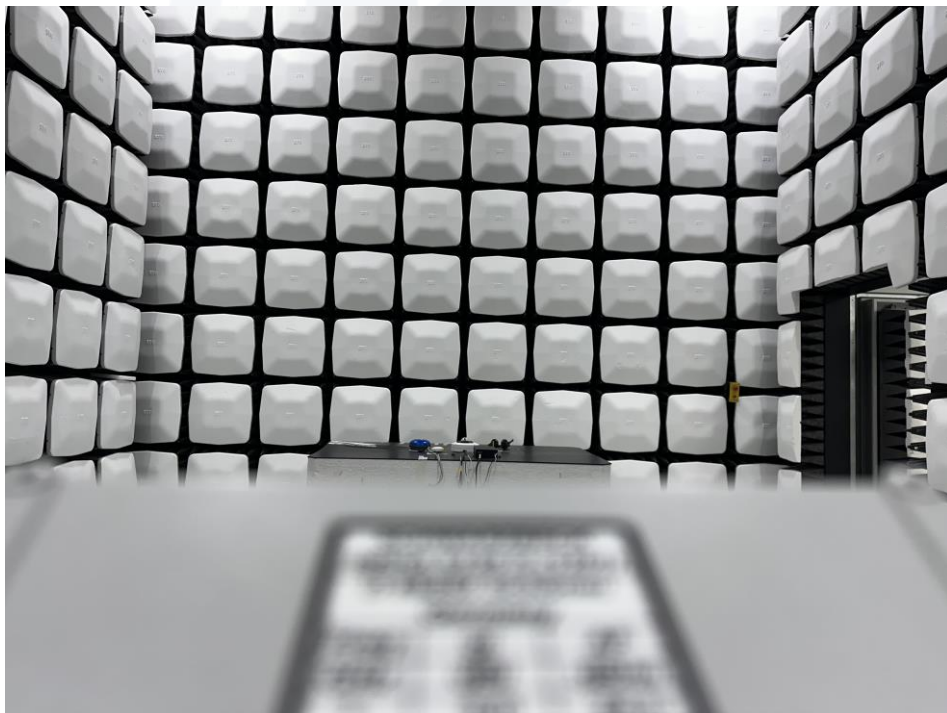
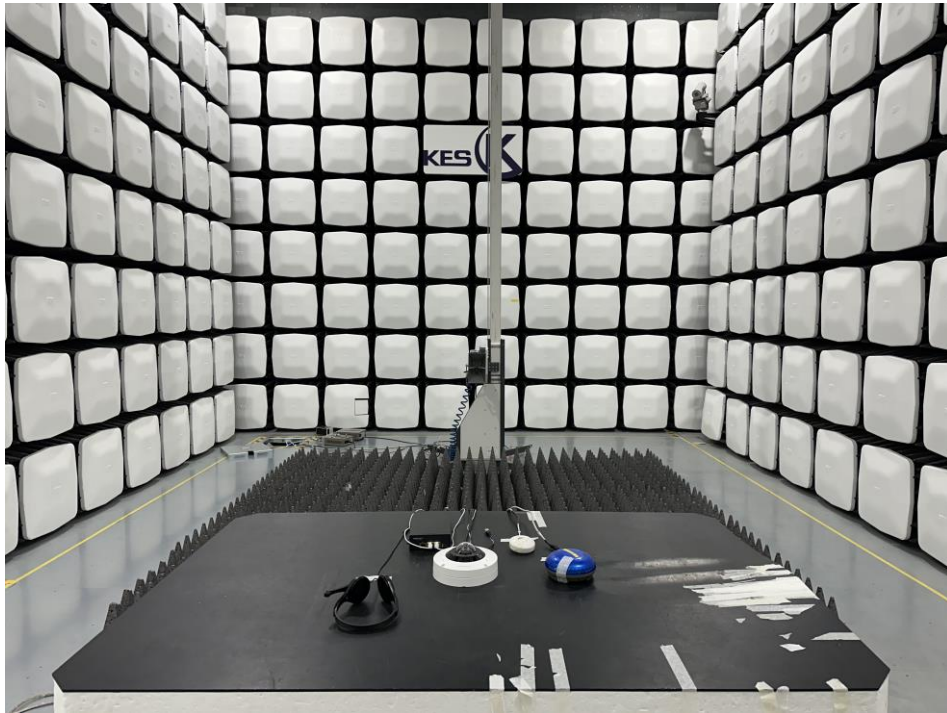
Radiated Electric Field Emissions(Above 1 GHz)

■ Mode 1





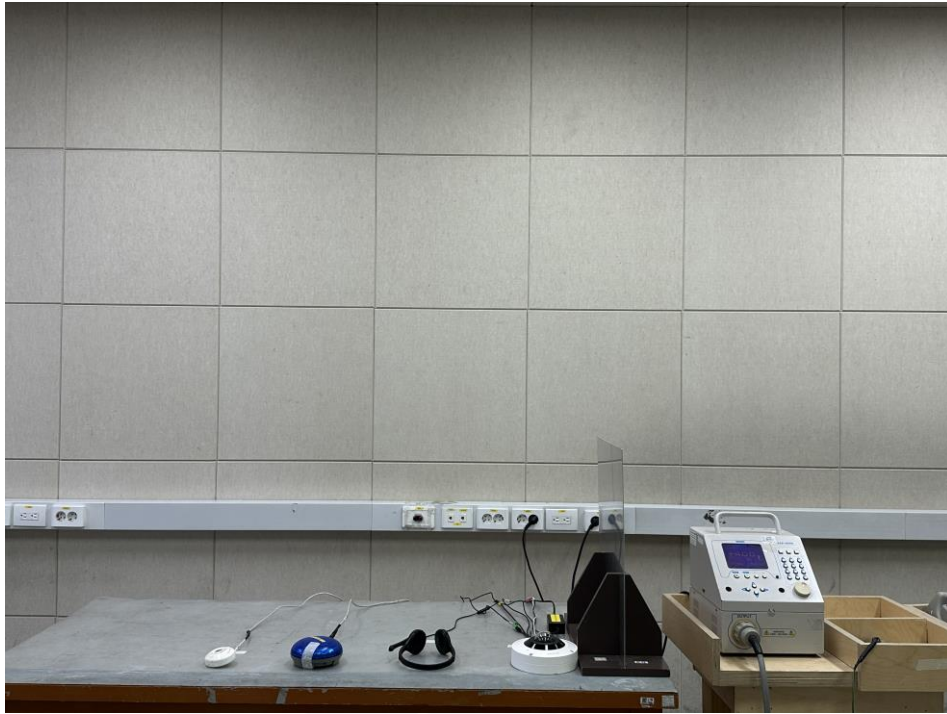
■ Mode 2





Electrostatic discharge

■ Mode 1



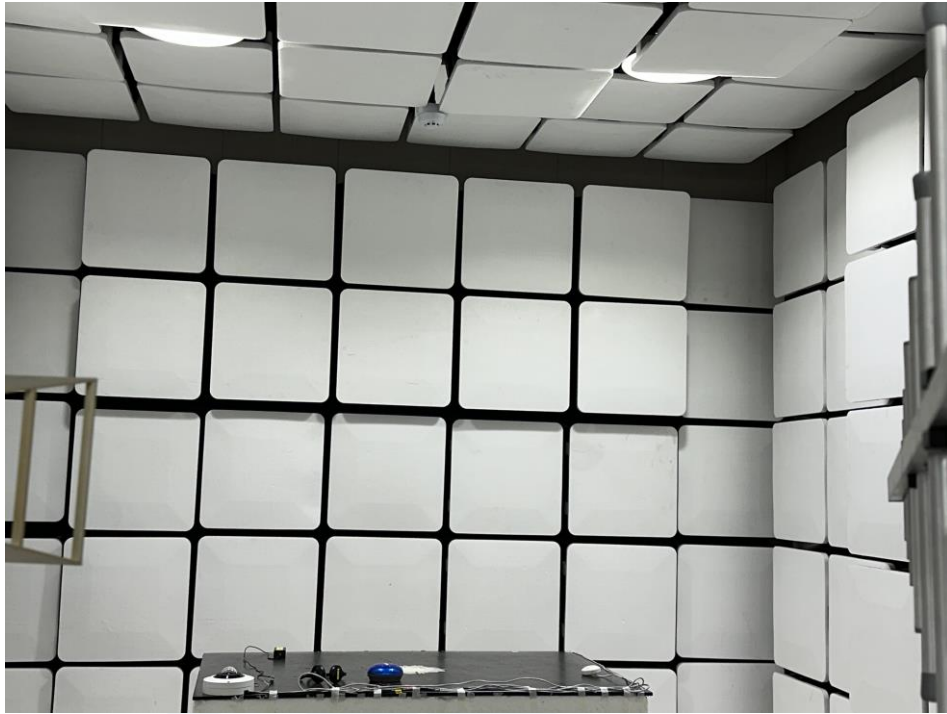
■ Mode 2





Radio-frequency electromagnetic field

■ Mode 1



■ Mode 2





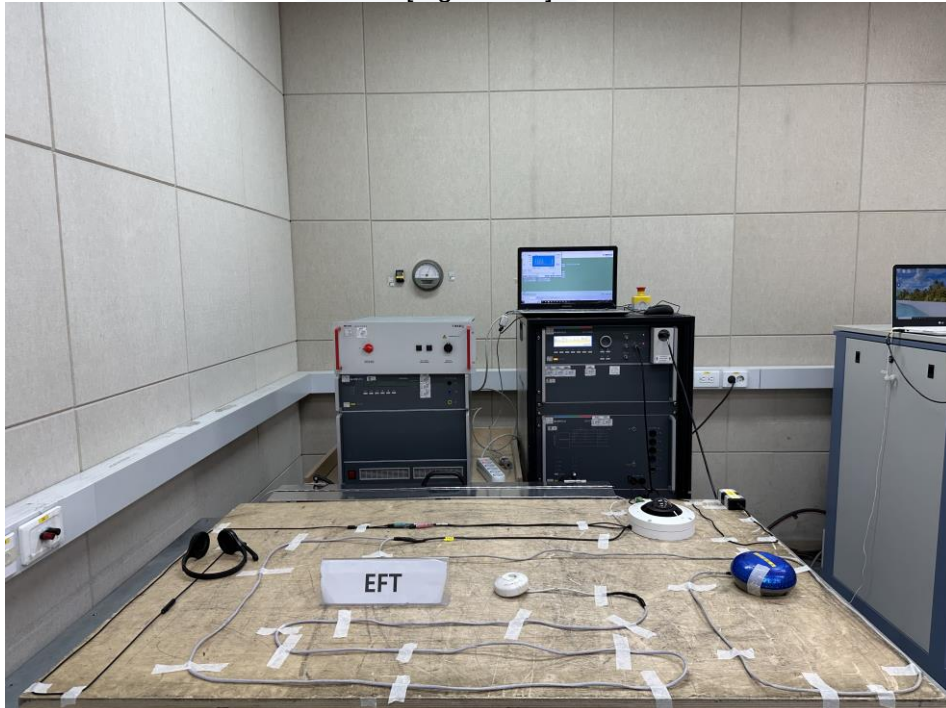
Fast transients

■ Mode 1

[Power Line]



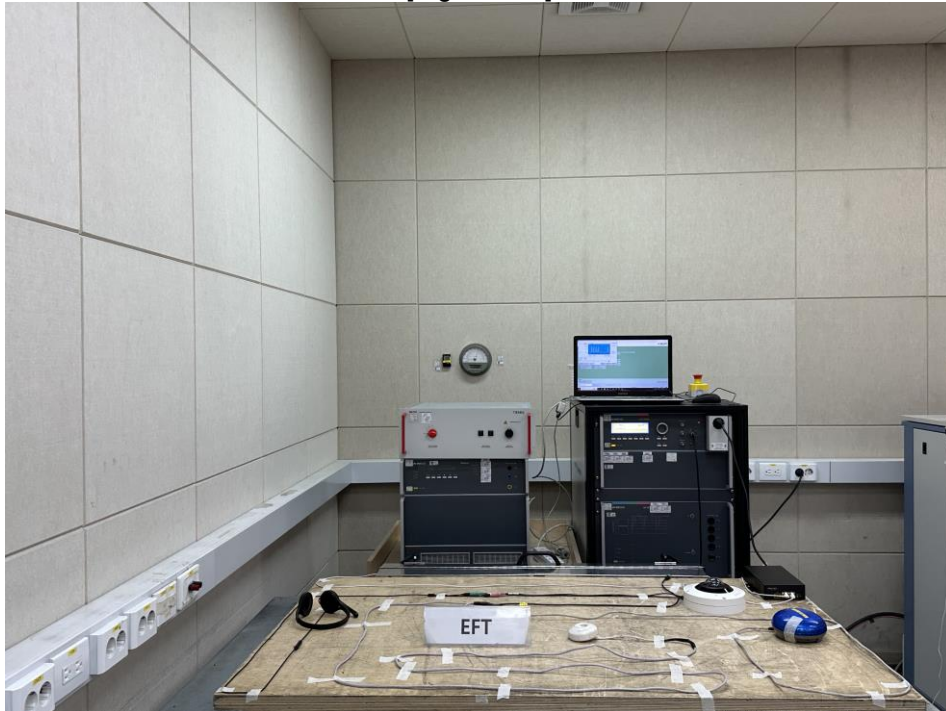
[Signal Line]





■ Mode 2

[Signal Line]





Surges

■ Mode 1

[Power Line]





Radio-frequency common mode

■ Mode 1

[Power Line]



[Signal Line]





■ Mode 2

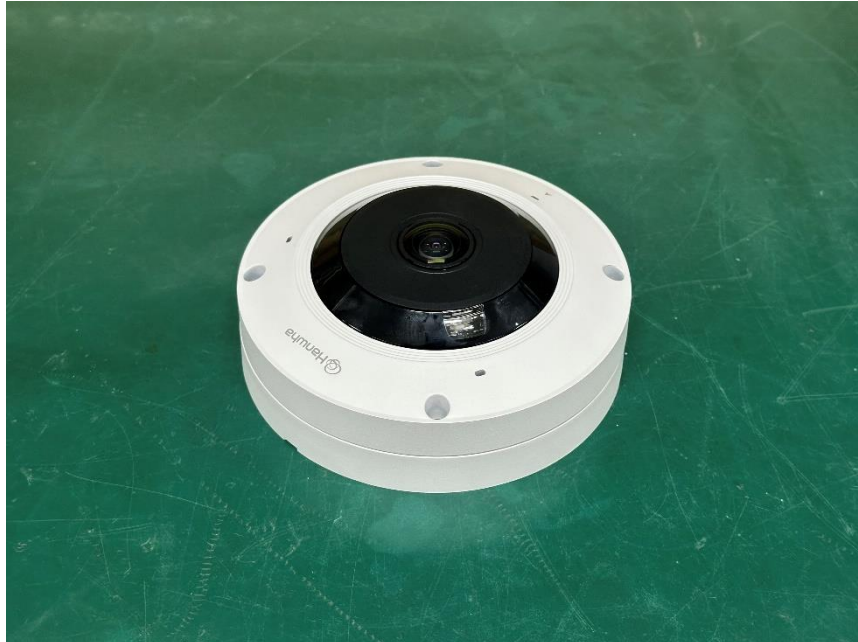
[Signal Line]





EUT External Photographs

(Top)

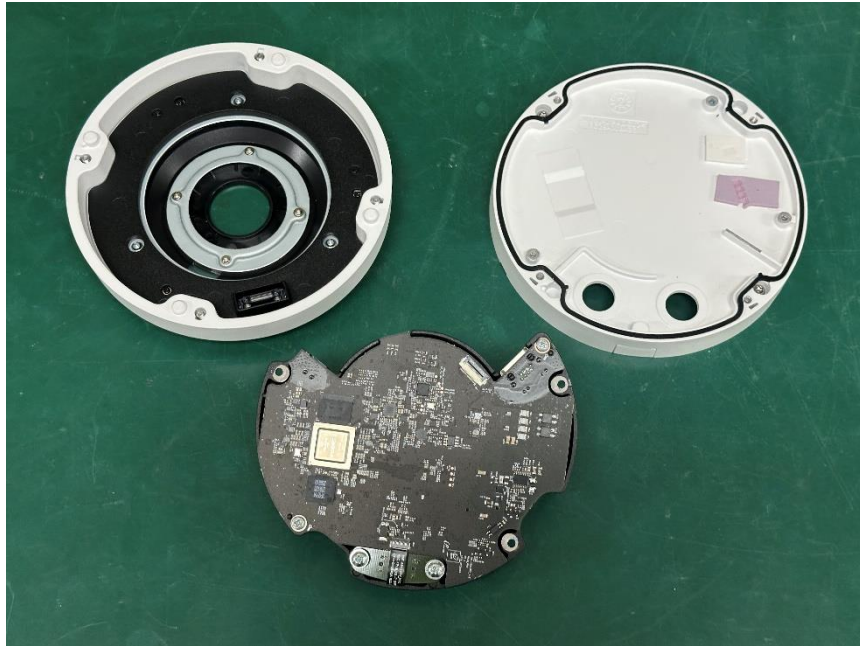


(Bottom)





(Internal)



The End.