



TEST REPORT



Report No. : KES-EM241549

Page 1 / 78

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 : +82-31-425-6200

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 : NETWORK CAMERA
Model/Type No. : XNB-6003
Variant Model : -
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 City, Bac Ninh Province, Vietnam
2. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi- do, Korea (Suwon Industrial Complex)

3. Date of Receipt : May. 10, 2024

4. Test date : May. 11, 2024 ~ May. 19, 2024

5. Date of Issue : May. 24, 2024

6. Test Results : In Compliance

Tested by

Reviewed by

Dae Soo, Kim
EMC Test Engineer

Dong Il, Lee
EMC Technical Manager

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

KES-QP16-F01(00-23-01-01)

KES Co., Ltd.

The authenticity of this test report can be found on the verification page of our website (www.kes.co.kr).

**REPORT REVISION HISTORY**

Date	Test Report No.	Revision History
May. 24, 2024	KES-EM241549	Issued

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd. This document may be altered or revised by KES Co., Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by KES Co., Ltd. will constitute fraud and shall nullify the document.



TABLE OF CONTENTS

1.0 General Product Description	4
1.1 Test Voltage & Frequency	5
1.2 Variant Model Differences	5
1.3 Device Modifications	5
1.4 Equipment Under Test	5
1.5 System Configuration	5
1.6 Support Equipments	6
1.7 External I/O Cabling.....	7
1.8 EUT Operating Mode(s).....	9
1.9 Configuration	10
1.10 Remarks When Standards Applied.....	11
1.11 Calibration Details of Equipment Used for Measurement	11
1.12 Test Facility	11
1.13 Laboratory Accreditations and Listings	11
2.0 Test Regulations	12
2.1 Conducted Emissions at Mains Power Ports.....	13
2.2 Conducted Emissions at Telecommunication Ports.....	14
2.3 Impulse Noise (click).....	15
2.4 Radiated Electric Field Emissions(Below 1 GHz).....	16
2.5 Radiated Electric Field Emissions(Above 1 GHz)	17
2.6 Harmonic Current Emissions	18
2.7 Voltage Fluctuations and Flicker.....	19
3.0 Criteria for Compliance	20
3.1 Electrostatic Discharge	21
3.2 Radio-frequency Electromagnetic Field.....	24
3.3 Fast Transients	27
3.4 Surges.....	30
3.5 Conducted Disturbance	34
3.6 Power Frequency Magnetic Field Immunity	37
APPENDIX A – TEST DATA	40
Conducted Emissions at Mains Power Ports	40
Conducted Emissions at Telecommunication Ports	42
Impulse Noise (click)	44
Radiated Electric Field Emissions(Below 1 GHz)	45
Radiated Electric Field Emissions(Above 1 GHz).....	47
Harmonic Current Emissions and Voltage Fluctuations and Flicker	49
Test Setup Photos and Configuration.....	52
Conducted Emissions at Mains Power Ports	52
Conducted Emissions at Telecommunication Ports	53
Impulse Noise (click)	55
Radiated Electric Field Emissions(Below 1 GHz)	56
Radiated Electric Field Emissions(Above 1 GHz).....	58
Harmonic Current Emissions and Voltage Fluctuations and Flicker	60
Electrostatic Discharge.....	61
Radio-frequency Electromagnetic Field	62
Fast Transients.....	63
Surges	65
Conducted Disturbance.....	66
Power Frequency Magnetic Field Immunity	67
EUT Photographs	71
EUT Internal Layout Photographs	72



1.0 General Product Description

Main Specifications of EUT are:

XNB-6003			
Video		Privacy Masking	32ea. Quadangle zones - Color : Gray, Green, Red, Blue, Black, White - Mosaic
Imaging Device	1/2.8" progressive CMOS	Gain Control	Support
Resolution	1920x1080, 1280x1024, 1280x960, 1280x720, 1024x768, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360, 320x240	White Balance	ATW / Narrow ATW / AWC / Manual / Indoor / Outdoor
Max. Framerate	H.265/H.264: Max. 120fps/100fps(50Hz/50Hz)(WDR off) Max. 60fps/50fps(60Hz/50Hz)(WDR on) MJPEG: Max. 30fps/25fps(60Hz/50Hz)	LDC	Support (Fill/stretch mode)
NETD	None	Electronic Shutter Speed	Minimum / Maximum / Anti Flicker (2~1/12,000sec) Auto prefer shutter control(Based on AI engine)
Pixel Size	None	Digital PTZ	Support
Min. Illumination	(1TB) Color: 0.011Lux(f1.4, 1/30sec, 30IRE) B/W : 0.0011Lux(f1.4, 1/30sec, 30IRE), 0Lux(IR LED on), 30/25fps	Video Rotation	Flip, Mirror, Hallway view(90°/270°)
	Color: 0.022Lux(f1.4, 1/60sec, 30IRE) B/W : 0.0022Lux(f1.4, 1/60sec, 30IRE), 0Lux(IR LED on), 60/50fps	Analytics	- Analytics events based on AI engine(NPU) : Object detection (Person/Face/Vehicle(car/truck/bus/bicycle/motorcycle)/Licence plate), IVA (Virtual line/Area, Enter/Exit, Loitering, direction, intrusion) - Analytics events : Defocus detection, Motion detection, Tampering, Fog detection, Audio detection, Sound classification, Shock detection, Appear/Disappear
	Color: 0.022Lux(f1.4, 1/60sec, 30IRE) B/W : 0.0022Lux(f1.4, 1/60sec, 30IRE), 0Lux(IR LED on), 120/100fps	Business Intelligence	Based on AI engine(NPU) : People counting, Queue management, Heatmap
	CVBS: 1.0 Vp-p / 75Ω composite, 720x480i60, 720x576iP for installation USB: Micro USB Type B, 1280x720 for installation	Serial Interface	RS-485(Samsung-T, Pelco-D/P, Panasonic, Bosch, AD, GE, Vicon, Honeywell)
Video Out		Alarm I/O	2 configurable I/O ports
Video Transmission Distance	None	Alarm Triggers	Analytics, Network disconnect, Alarm input, App event, Time schedule
Lens		Alarm Events	When alarm trigger occurred - File upload(image) : e-mail/FTP - 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 - PTZ preset
Focal Length (Zoom Ratio)	None		
Max. Aperture Ratio	None		
Angular Field of View	None		
Min. Object Distance	None	Audio In	Selectable(mic in/line in/Built-in MIC) Supply voltage: 2.5VDC(4mA), Input impedance: 2K Ohm
Focus Control	Simple focus		Line out, Max.output level: TVrms
Lens Type	DC auto iris, P-Iris, Manual, I-CS		
Mount Type	C mount, CS mount		
Optional Lens	None	Audio Out	
Pan / Tilt / Rotate		IR Viewable Length	None
Pan / Tilt / Rotate Range	None	IR Illuminator (Optional)	None
Pan Range	None	Water Removal	None
Pan Speed	None	Auto Tracking	None
Tilt Range	None	Coaxial Protocol	None
Tilt Speed	None	Color Palettes	None
Rotate Range	None	Radiometry	
Sequence	None	Temperature Detect Range	None
Preset Accuracy	None	Temperature Accuracy	None
Operational		Temperature Detection	None
Camera Title	Displayed up to 85 characters	Additional	None
Direction Indicator	None	Network	
Day & Night	Auto(ICR)	Ethernet	Metal shielded RJ-45(10/100/1000BASE-T)
Backlight Compensation	BLC, HLC, WDR, SDDR	Video Compression	H.265/H.264: Main/High, MJPEG
Wide Dynamic Range	extremeWDR (150dB)		
Digital Noise Reduction	WiseNR II (Based on AI engine), SSNR-V	Audio Compression	G.711 u-law / G.726 Selectable G.726ADPCM: 8KHz, G.711 8KHz G.726: 16Kbps, 24Kbps, 32Kbps, 40Kbps AAC-LC: 48Kbps at 16KHz
Digital Image Stabilization	Support(built-in gyro sensor)	Smart Codec	Manual(Sea area), WiseStream II, WiseStream III (Based on AI engine)
Defog	Support		
Motion Detection	Box, 8-point Polygonal zones		
Video Quality Adjustment	H.264/H.265: Target bitrate level control MJPEG: Target bitrate level control		
Bitrate Control	H.264/H.265: CBR or VBR MJPEG: VBR		
Streaming	Unicast(20 users) / Multicast Multiple streaming(Up to 10 profiles, 3 virtual channel support)		
Protocol	IPv4, IPv6, TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP, RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, FTP, SMTP, ICMP, IGMP, SNMP(V1/v2/v3/MIB-2), ARP, DNS, DDNS, QoS, UPnP, Bonjour, LLDP, SRTP (TCP, UDP Unicast)		
Security	TPM 2.0 (TPM 1.2 level 2) HTTPS/SSL Login Authentication Digest Login Authentication IP Address Filtering User access log 802.1X Authentication(EAP-TLS, EAP-LEAP, EAP-PEAP MSCHAPv2) Device Certificate(Hanwha Techwin Root CA, pre-installed) Secure by default certificate(TBD) Secure OS/Boot/Storage, Verify firmware forgery		
Application Programming Interface	ONVIF Profile S/G/T SUNAPI(HTTP API) Wisenet open platform		
General			
Webpage Language	English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Swedish, Portuguese, Czech, Polish, Turkish, Dutch, Greek, Hungarian		
Web Viewer	None		
Edge Storage	Micro SD/SDHC/SDXC 2slot Max. 1TB (512GB * 2)		
Memory	2GB RAM, 512MB Flash		
Environmental & Electrical			
Operating Temperature / Humidity	-10 °C ~ 55 °C(-14 °F ~ +131 °F) less than 95%RH(non-condensing)		
Storage Temperature / Humidity	-50 °C ~ +60 °C(-58 °F ~ +140 °F) / Less than 90% RH		
Certification	None		
Input Voltage	PoE(IEEE802.3af, Class3), 12VDC(TBD)		
Power Consumption	TBD Power redundancy failover(TBD)		
Mechanical			
Color / Material	Black / Aluminum		
RAL Code	None		
Product Dimensions / Weight	81(W)x67(H)x165(D)mm(3.19x2.64x6.48"), 0.88kg(1.94 lb) (TBD)		
Compatible Conduit hole / Gangbox	None		
Hanging Mount (Dome)	None		
Skin Cover (Dome)	None		
Weather Cap (Dome)	None		
Power Module	None		
Backbox	None		
DORI (EN62676-4 standard)			
Detect (25PPM/ 8PPF)	None		
Observe (63PPM/ 19PPF)	None		
Recognize (125PPM/ 38PPF)	None		
Identify (250PPM/ 76PPF)	None		



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 (AC/DC Adapter Input Power)
- ☒ AC 230 V, 50 Hz (PoE Adapter Input Power)

1.2 Variant Model Differences

Not applicable

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
NETWORK CAMERA	XNB-6003	-	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
Notebook	LG15U56	605NZ8J002174	LG	-
Notebook Adapter	ADS-65AI-19-3	EAY65689605	SHENZHEN HONOR ELECTRONIC CO.,LTD.	-
Lens	-	-	-	-
AC/DC Adapter	KPL-048F-VI	-	Channel Well Technology Co.,Ltd.	-
PoE Injector	PT-PSE109GBRO-AH	-	Dongguan PROCET Network Technology Co., Ltd	-
Earphone	-	-	QKZ	-
Mic	MP1000	-	-	-
Alarm	PRO-SL	-	SENSOR PRO	-
Button Alarm	-	-	-	-
Controller	SPC-1010	C50E67WG10100F	HANWHA VISION VIETNAM COMPANY LIMITED	-
Controller Adapter	AP-12005A	-	APOWER	-
Micro SD Card	-	-	SanDisk	-
Smartphone	-	-	LG	-



1.7 External I/O Cabling

■ DC

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA (EUT)	DC IN	AC/DC Adapter	DC OUT	1.5	U
	RJ-45 (LAN)	Notebook	RJ-45 (LAN)	3.5	U
	5 Pin	Lens	5 Pin	0.2	U
	Audio OUT	Headset Mic	Audio IN	1.8	U
	Audio IN		Audio OUT	1.8	U
	Alarm OUT	Alarm	Alarm IN	3.5	U
	Alarm IN	Button Alarm	Alarm OUT	3.5	U
	RS-485	Controller	RS-485	3.5	U
	Micro SD Slot	Micro SD Card	Micro SD Slot	-	-
	Ground	Ground	Ground	2.0	U
Notebook	3.5 mm	Smartphone	3.5 mm	1.0	U
	DC Jack	Notebook Adapter	DC Jack	1.5	U
Controller	DC Jack	Controller Adapter	DC Jack	1.2	U

* Unshielded=U, Shielded=S



■ PoE

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA (EUT)	RJ-45 (PoE)	PoE Adapter	RJ-45 (PoE)	3.5	U
	5 Pin	Lens	5 Pin	0.2	U
	Audio OUT	Headset Mic	Audio IN	1.8	U
	Audio IN		Audio OUT	1.8	U
	Alarm OUT	Alarm	Alarm IN	3.5	U
	Alarm IN	Button Alarm	Alarm OUT	3.5	U
	RS-485	Controller	RS-485	3.5	U
	Micro SD Slot	Micro SD Card	Micro SD Slot	-	-
	Ground	Ground	Ground	2.0	U
PoE Adapter	RJ-45 (LAN)	Notebook	RJ-45 (LAN)	1.0	U
Notebook	3.5 mm	Smartphone	3.5 mm	1.0	U
	DC Jack	Notebook Adapter	DC Jack	1.5	U
Controller	DC Jack	Controller Adapter	DC Jack	1.2	U

* Unshielded=U, Shielded=S



1.8 EUT Operating Mode(s)

■ DC, PoE

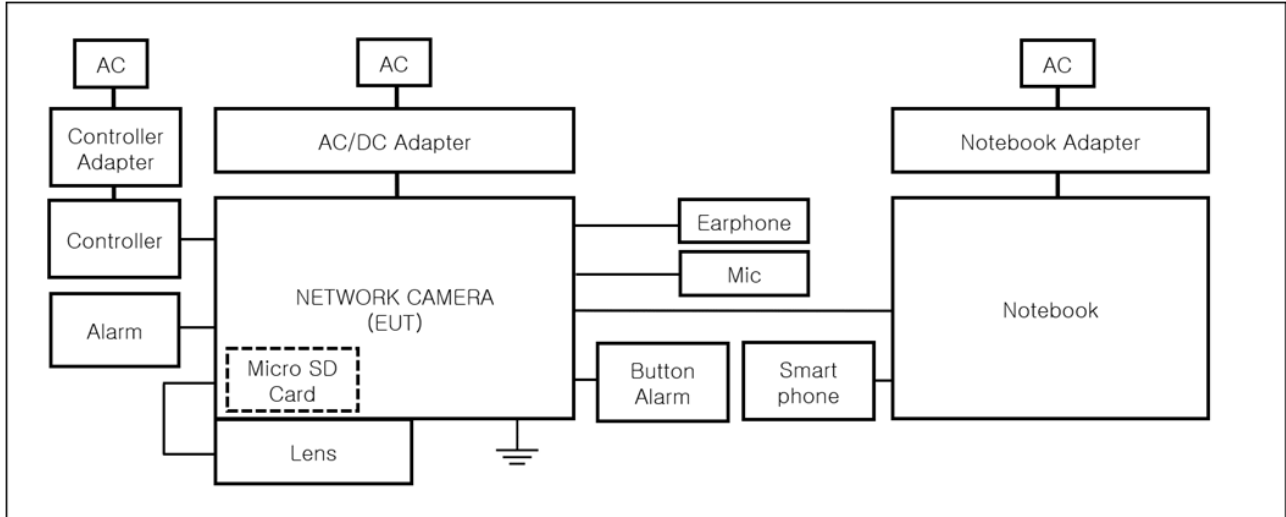
Normal operating	
1. Check the camera video output on the Notebook. 2. Check if the network status is operating normally during PING TEST. 3. Check the output of the 1 kHz tone output from the smartphone and the microphone input from the headset. 4. Press the alarm button to check the normal operation of the button alarm. 5. After testing, I checked the files stored on Micro SD card.	

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

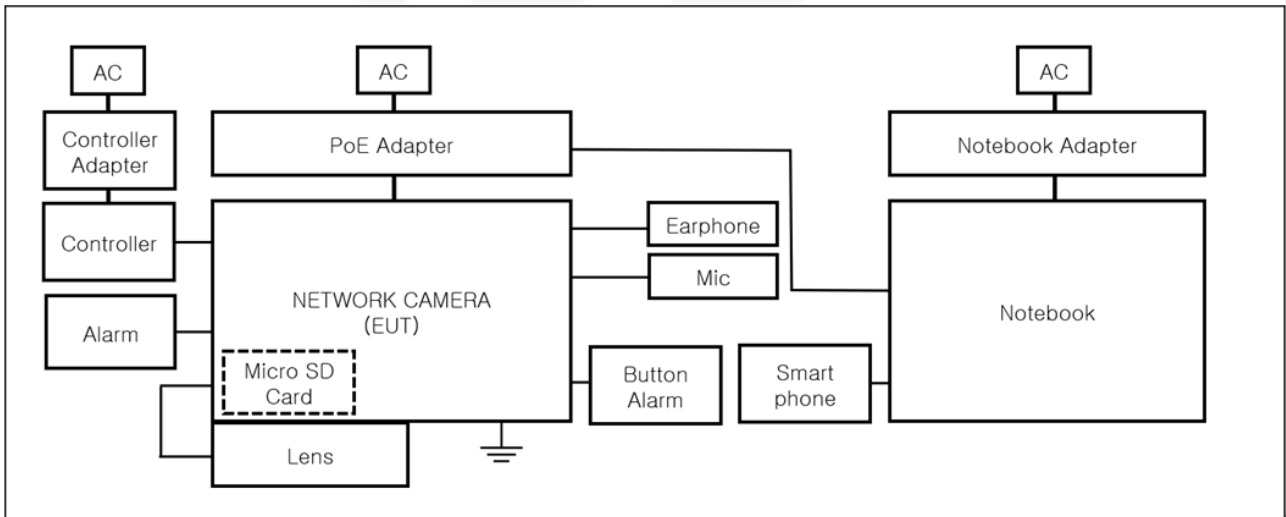


1.9 Configuration

■ DC



■ PoE



**1.10 Remarks When Standards Applied**

- In PoE mode, the LAN port is regarded as a wired communication network port and power-related ports are not tested.

- USB, VIDEO ports are for administrator use and is excluded from testing.

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 C63.4a-2017 and CISPR 16-1-4:2019

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 0004



2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **EMC – Directive 2014/30/EU**

☒ EN 50121-4:2016/A1:2019

☒ EN IEC 61000-3-2:2019

☒ EN 61000-3-3:2013/A2:2021

☒ **EMC – Regulations 2016**

☒ EN 50121-4:2016/A1:2019

☒ EN IEC 61000-3-2:2019

☒ EN 61000-3-3:2013/A2:2021



2.1 Conducted Emissions at Mains Power Ports

Test Date

May. 11, 2024

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	Nov 08, 2024
☒	LISN	ENV216	R & S	101787	Nov 08, 2024
☒	LISN	ESH2-Z5	R & S	100450	Nov 08, 2024
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	Nov 08, 2024

Test Conditions

Temperature: (23,0 ± 0,0) °C

Relative Humidity: (49,4 ± 0,0) % 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

RemarksSee Appendix A for test data.



2.2 Conducted Emissions at Telecommunication Ports

Test Date

May. 11, 2024

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	Nov 08, 2024
☒	LISN	ENV216	R & S	101787	Nov 08, 2024
☒	LISN	ESH2-Z5	R & S	100450	Nov 08, 2024
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	Nov 08, 2024
☐	8-WIRE ISN CAT3,5	ENY81	R & S	100174	Nov 09, 2024
☒	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101666	Mar 05, 2025

Test Conditions

Temperature: (23,0 ± 0,0) °C

Relative Humidity: (49,4 ± 0,0) % 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

RemarksSee Appendix A for test data.



2.3 Impulse Noise (click)

Test Date

N/A

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☐	EMI Test S/W	CLICK METER SOFTWARE CMS FOR DDA55	AFJ	4.19	-
☐	CLICK ANALYZER	DDA55+	AFJ INSTRUMENTS	14042211198	Feb 13, 2025
☐	LISN	ENV216	R & S	101787	Nov 08, 2024

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

RemarksImpulse Noise(click) does not occurrence.



2.4 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

May 11, 2024

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	Feb 13, 2025
☒	AMPLIFIER	SCU 01	R & S	100603	Nov 08, 2024
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	Nov 17, 2024
☒	ATTENUATOR	8491A	HP	32173	Feb 13, 2025

Test Conditions

Temperature: (22,4 ± 0,1) °C

Relative Humidity: (48,8 ± 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

RemarksSee Appendix A for test data.



2.5 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

May 11, 2024

Test Location

SEMI ANECHOIC CHAMBER #5

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	Feb 13, 2025
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	Nov 03, 2024
☒	PREAMPLIFIER	8449B	HP	3008A00899	Apr 30, 2025
☒	ATTENUATOR	8491B	HP	23094	Feb 13, 2025

Test Conditions

Temperature: (22,7 ± 0,1) °C
Relative Humidity: (46,1 ± 0,1) % 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

- See Appendix A for test data.
- The Average of the test data is the cispr average result.



2.6 Harmonic Current Emissions

Test Date

May 12, 2024

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	net.control	EM TEST	2.1.4	-
☒	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	Mar 28, 2025
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: (22,4 ± 0,0) °C

Relative Humidity: (45,0 ± 0,0) % R.H.

Classification of Equipment for Harmonic Current Emissions

- ☒ Class A
☐ Class B
☐ Class C(Below 25 W)
☐ Class C(Above 25 W)
☐ Class D

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

RemarksSee Appendix A for test data.



2.7 Voltage Fluctuations and Flicker

Test Date

May 12, 2024

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	net.control	EM TEST	2.1.4	-
☒	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	Mar 28, 2025
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: (22,4 ± 0,2) °C

Relative Humidity: (45,0 ± 0,2) % R.H.

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ 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 criteria 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 criteria 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 criteria 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

EN 61000-4-2:2009

Test Date

May 12, 2024

Test Location

EMS-ESD: Electro wave Shieldroom#7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	Jan 30, 2025
☒	HCP	-	KES	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: (22,7 ± 0,0) °C
Relative Humidity: (48,6 ± 0,0) % R.H.
Atmospheric Pressure: (100,0 ± 0,0) 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

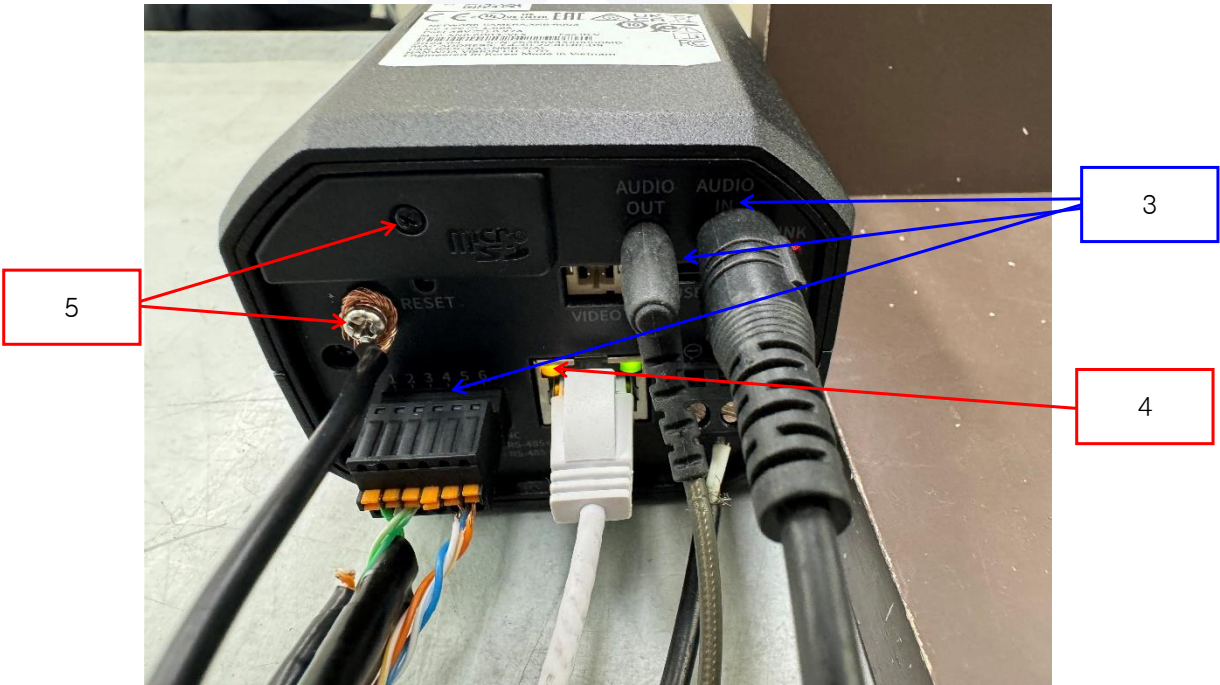
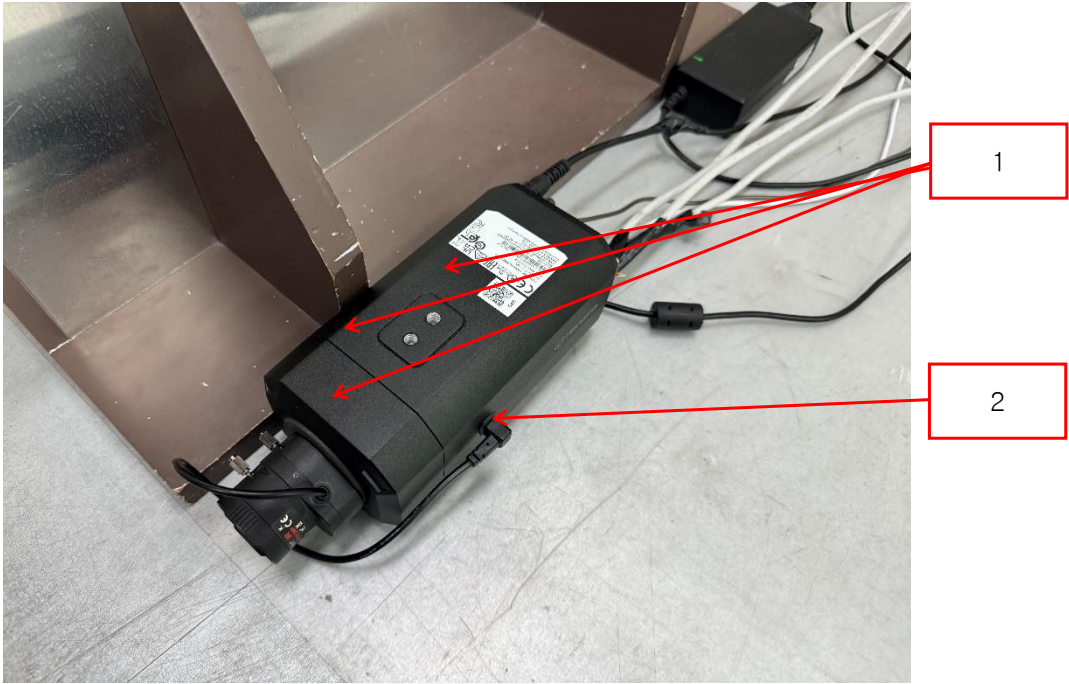
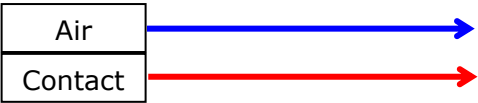
VCP: Vertical Coupling Plane

Required Performance Criteria: ☒ B



Location of Discharge:

■ DC, PoE



**Test Data**

■ DC

Indirect Discharge

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

Direct Discharge

No.	Test Point	Discharge Method	Performance	
			Criteria	Results
1	Enclosure	Contact Discharge	B	A
2	Port 1	Contact Discharge	B	A
3	Port 2	Air Discharge	B	A
4	Port 3	Contact Discharge	B	A
5	Screw	Contact Discharge	B	A

■ PoE

Indirect Discharge

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

Direct Discharge

No.	Test Point	Discharge Method	Performance	
			Criteria	Results
1	Enclosure	Contact Discharge	B	A
2	Port 1	Contact Discharge	B	A
3	Port 2	Air Discharge	B	A
4	Port 3	Contact Discharge	B	A
5	Screw	Contact Discharge	B	A

Note: "Blank" = Not performed

Results:

A – No degradation of function

B – Distortion/Error of function (self-recoverable)

C – Loss of function

Test Results☒ PASS Required Performance Criteria☐ NOT PASS Required Performance Criteria**Remarks**Any degradations of performance was not observed during in the test.



3.2 Radio-frequency Electromagnetic Field

Reference Standard

EN IEC 61000-4-3:2020

Test Date

May 15, 2024

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	9.12.00	-
☒	SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	Jul 31, 2024
☒	HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-
☒	POWER METER	E4419B	Agilent	GB40203000	Feb 13, 2025
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY52170007	Feb 13, 2025
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY41498669	Feb 13, 2025
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	Mar 05, 2025

Test Conditions

Temperature: (22,6 ± 0,2) °C
Relative Humidity: (46,7 ± 0,2) % R.H.
Atmospheric Pressure: (100,0 ± 0,0) kPa



Test Specifications

Antenna Polarization: Horizontal & Vertical unless indicated otherwise

Antenna Distance: ☒ 3 m

Frequency Range:
[Field Strength] ☒ 80 MHz to 800 MHz [10V/m]
☒ 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: ☐ 1 s ☒ 3 s

of Sides Radiated: ☒ 4

Required Performance Criteria: ☒ A

**Test Data****■ DC**

Side Exposed	Performance Criteria	Results	
		Horizontal	Vertical
Front	A	A	A
Right	A	A	A
Back	A	A	A
Left	A	A	A

■ PoE

Side Exposed	Performance Criteria	Results	
		Horizontal	Vertical
Front	A	A	A
Right	A	A	A
Back	A	A	A
Left	A	A	A

Note: "Blank" = Not performed

Results:

A – No degradation of function

B – Distortion/Error of function (self-recoverable)

C – Loss of function

Test Results

☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

Remarks

Any degradations of performance was not observed during in the test.



3.3 Fast Transients

Reference Standard

EN 61000-4-4:2012

Test Date

May 19, 2024

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	Nov 09, 2024
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	Nov 09, 2024
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	Nov 10, 2024

Test Conditions

Temperature: $(22,4 \pm 0,1) ^\circ\text{C}$
Relative Humidity: $(45,9 \pm 0,1) \% \text{ R.H.}$
Atmospheric Pressure: $(100,0 \pm 0,0) \text{ kPa}$

Test Specifications

Pulse Amplitude & Polarity: ☒ $\pm 2.0 \text{ kV}$ ☐ $\pm 4.0 \text{ kV}$
(Power Lines)

Pulse Amplitude & Polarity: ☒ $\pm 2.0 \text{ kV}$ ☐ $\pm 4.0 \text{ kV}$
(Signal Lines)

Pulse Amplitude & Polarity: ☒ $\pm 1.0 \text{ kV}$
(Earth Lines)

Burst Period: ☒ 300 ms

Repetition Rate: ☒ 5 kHz

Duration of Test Voltage: ☒ $\geq 1 \text{ min}$

Required Performance Criteria: ☒ A

**Test Data**

■ DC

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

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
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

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
RJ-45	B	A	A
Alarm IN	B	A	A
Alarm OUT	B	A	A
RS-485	B	A	A

☒ Earth ports – Coupling Clamp used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
Ground	A	A	A

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

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
-	B	-	-

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
RJ-45	B	A	A
Alarm IN	B	A	A
Alarm OUT	B	A	A
RS-485	B	A	A

☒ Earth ports – Coupling Clamp used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
Ground	B	A	A

Note: "Blank" = Not performed

Results:

A – No degradation of function

B – Distortion/Error of function (self-recoverable)

C – Loss of function

Test Results☒ PASS Required Performance Criteria☐ NOT PASS Required Performance Criteria**Remarks**Any degradations of performance was not observed during in the test.



3.4 Surges

Reference Standard

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

Test Date

May 19, 2024

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	Nov 09, 2024
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	Nov 09, 2024
☒	CDN	CNV 508N1	EM TEST	P1610176296	Nov 10, 2024

Test Conditions

Temperature: (22,4 ± 0,2) °C
Relative Humidity: (45,9 ± 0,2) % R.H.
Atmospheric Pressure: (100,0 ± 0,0) kPa

**Test Specifications****AC Power Lines**

Source Impedance: 12 ohm for common mode and 2 ohm for differential mode

Surge Amplitude :
Common Mode
☒ (2,0) kV
Differential Mode
☒ (1,0) kVNumber 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 ohm
Surge Amplitude: Common Mode
☐ (2,0) kV
Differential Mode
☐ (1,0) kVNumber of Surges: ☐ 5 SurgesPolarity: ☐ Positive & NegativeRepetition Rate: ☐ 1 surge per min ☐ 1 surge per 30 sec.Required Performance Criteria: ☐ B**Signal Lines**Source Impedance: 42 ohm
Surge Amplitude: Common Mode
☐ (2,0) kV
Differential Mode
☒ (1,0) kVNumber of Surges: ☒ 5 SurgesPolarity: ☒ Positive & NegativeRepetition Rate: ☒ 1 surge per min ☐ 1 surge per 30 sec.Required Performance Criteria: ☒ B

**Test Data**☒ DC☒ Line to Line – Differential Mode

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

☒ Line to Earth – Common Mode

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

Signal Lines☒ Line to Line – Differential Mode

Mode of Application	Performance Criteria	Observations	
		(+) Surge (kV)	(-) Surge (kV)
RJ-45	B	A	A

☐ Line to Earth – Common Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
-	B	-	-

☒ PoE☐ Line to Line – Differential Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
-	B	-	-

☐ Line to Earth – Common Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
-	B	-	-

Signal Lines☒ Line to Line – Differential Mode

Mode of Application	Performance Criteria	Observations	
		(+) Surge (kV)	(-) Surge (kV)
RJ-45	B	A	A

☐ Line to Earth – Common Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
-	B	-	-

Note: "Blank" = Not performed

Results:

A – No degradation of function

B – Distortion/Error of function (self-recoverable)

C – Loss of function

Test Results☒ PASS Required Performance Criteria☐ NOT PASS Required Performance Criteria**Remarks**Any degradations of performance was not observed during in the test.



3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

May 16, 2024

Test Location

EMS-CS: Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	icd.control	EM TEST	5.3.12	-
☒	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	Nov 08, 2024
☒	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	Nov 08, 2024
☒	CDN	CDN M016	TESEQ	43694	Nov 08, 2024
☒	CDN	CDN M016	TESEQ	43697	Nov 08, 2024
☒	CDN	CDN T800	TESEQ	42800	Nov 08, 2024
☒	EM CLAMP	KEMZ 801A	TESEQ	44099	Nov 09, 2024

Test Conditions

Temperature: (22,6 ± 0,3) °C
Relative Humidity: (46,0 ± 0,3) % R.H.
Atmospheric Pressure: (100,1 ± 0,0) kPa

Test Specifications

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

**Test Data**

■ DC

☒ Input a.c. power ports

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

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
RJ-45	CDN	A	A
Alarm IN	Clamp	A	A
Alarm OUT	Clamp	A	A
RS-485	Clamp	A	A

☒ Earth ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
Ground	Clamp	A	A

**■ PoE**☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
-	CDN	-	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
RJ-45	CDN	A	A
Alarm IN	Clamp	A	A
Alarm OUT	Clamp	A	A
RS-485	Clamp	A	A

☒ Earth ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
Ground	Clamp	A	A

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

Results:

A – No degradation of function

B – Distortion/Error of function (self-recoverable)

C – Loss of function

Test Results☒ PASS Required Performance Criteria☐ NOT PASS Required Performance Criteria**Remarks**Any degradations of performance was not observed during in the test.



3.6 Power Frequency Magnetic Field Immunity

Reference Standard

EN 61000-4-8:2010

Test Date

May 19, 2024

Test Location

EMS-Magnetic: 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	-
☒	EMS Test S/W	NET.CONTROL	EM TEST	1.2.11	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	Nov 09, 2024
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	Nov 09, 2024
☒	MAGNETIC FIELD COIL	MS 100N	EM TEST	P1536163691	Nov 10, 2024
☒	CURRENT TRANSFORMER	MC 26100 (100 A 교정)	EM TEST	P1550168963	Feb 14, 2025
☒	MULTIFUNCTION AC/DC POWER SOURCE	NETWAVE 7-400	EM TEST	P1614178393	Nov 08, 2024
☒	MAGNETICFIELD COIL	INA 703	Teseq AG	3006	Feb 14, 2025

Test Conditions

Temperature: (22,4 ± 0,1) °C
Relative Humidity: (45,9 ± 0,1) % R.H.
Atmospheric Pressure: (100,0 ± 0,0) kPa



Test Specifications

Field Strength(Power Source):

☒ 100 A/m (ac)

☒ 300 A/m (dc)

Frequency (ac):

☒ 16.7 Hz

☒ 50 Hz

☐ 60 Hz

Frequency (dc):

☒ 0 Hz

Required Performance Criteria:

☒ A



**Test Data**

■ DC

☒ Immersion method

Coil orientation	Performance	
	Criteria	Results
X - axis	A	A
Y - axis	A	A
Z - axis	A	A

■ PoE

☒ Immersion method

Coil orientation	Performance	
	Criteria	Results
X - axis	A	A
Y - axis	A	A
Z - axis	A	A

Note: "blank" = Not performed

Results:

A – No degradation of function

B – Distortion/Error of function (self-recoverable)

C – Loss of function

Test Results☒ PASS Required Performance Criteria☐ NOT PASS Required Performance Criteria**Remarks**Any degradations of performance was not observed during in the test.



APPENDIX A – TEST DATA

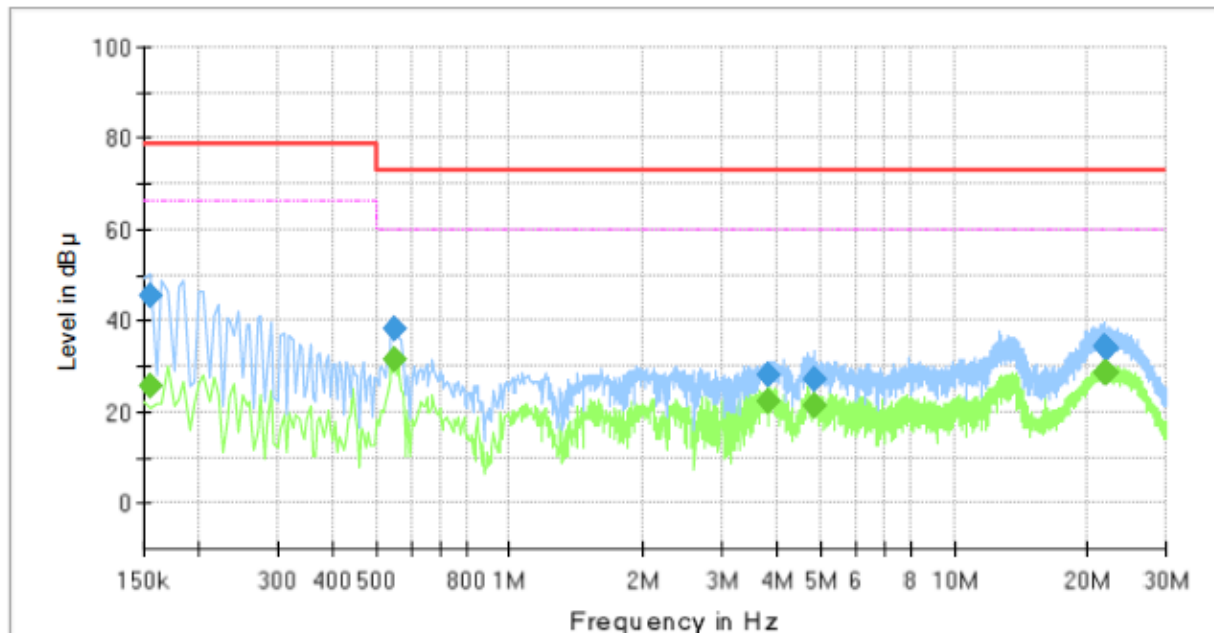
Conducted Emissions at Mains Power Ports

■ DC

[HOT]

Common Information

Test Description:	Conducted Emission
Job No.:	XNB-6003
Phase:	L
Mode:	DC
Operator Name:	KES



Final Result

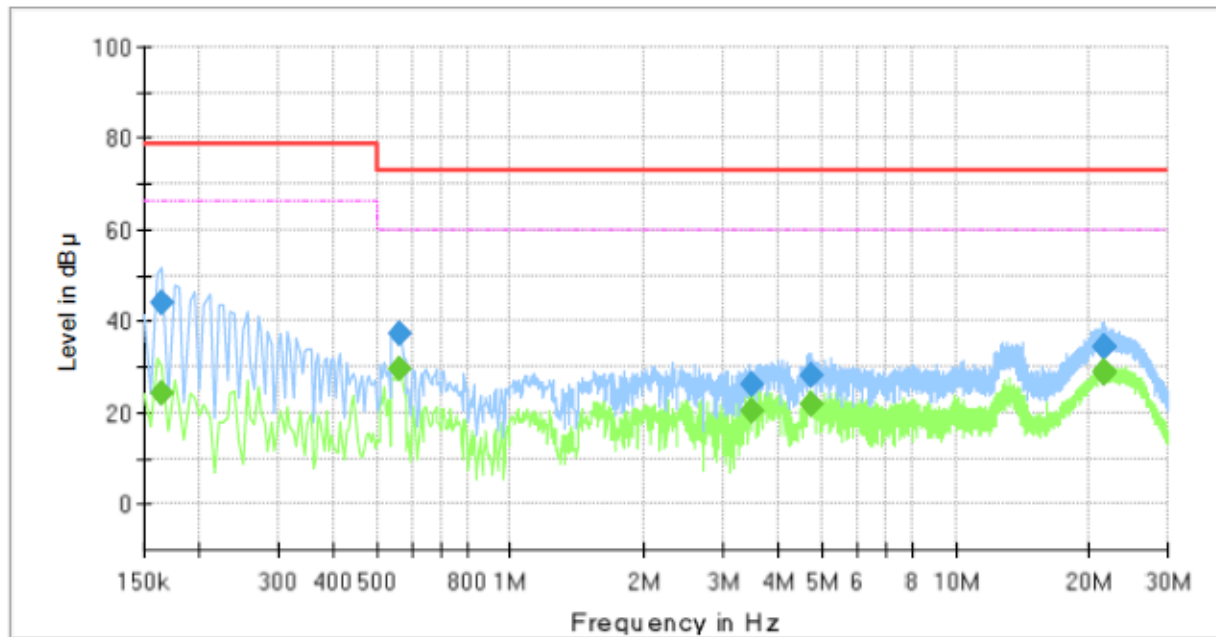
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	25.73	66.00	40.27	1000.0	9.000	L1	19.4
0.155000	45.33	---	79.00	33.67	1000.0	9.000	L1	19.4
0.550000	---	31.43	60.00	28.57	1000.0	9.000	L1	19.4
0.550000	38.35	---	73.00	34.65	1000.0	9.000	L1	19.4
3.805000	---	22.32	60.00	37.68	1000.0	9.000	L1	19.6
3.805000	27.97	---	73.00	45.03	1000.0	9.000	L1	19.6
4.860000	---	21.26	60.00	38.74	1000.0	9.000	L1	19.7
4.860000	27.15	---	73.00	45.85	1000.0	9.000	L1	19.7
21.920000	---	28.69	60.00	31.31	1000.0	9.000	L1	20.3
21.920000	34.17	---	73.00	38.83	1000.0	9.000	L1	20.3
22.010000	---	28.63	60.00	31.37	1000.0	9.000	L1	20.3
22.010000	34.11	---	73.00	38.89	1000.0	9.000	L1	20.3



[NEUTRAL]

Common Information

Test Description: Conducted Emission
Job No.: XNB-6003
Phase: N
Mode: DC
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.165000	---	24.16	66.00	41.84	1000.0	9.000	N	19.3
0.165000	43.84	---	79.00	35.16	1000.0	9.000	N	19.3
0.560000	---	29.40	60.00	30.60	1000.0	9.000	N	19.4
0.560000	37.04	---	73.00	35.96	1000.0	9.000	N	19.4
3.475000	---	20.34	60.00	39.66	1000.0	9.000	N	19.6
3.475000	26.39	---	73.00	46.61	1000.0	9.000	N	19.6
4.710000	---	21.72	60.00	38.28	1000.0	9.000	N	19.7
4.710000	27.95	---	73.00	45.05	1000.0	9.000	N	19.7
21.535000	---	28.76	60.00	31.24	1000.0	9.000	N	20.3
21.535000	34.20	---	73.00	38.80	1000.0	9.000	N	20.3
21.630000	---	28.87	60.00	31.13	1000.0	9.000	N	20.3
21.630000	34.24	---	73.00	38.76	1000.0	9.000	N	20.3

◆ 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))

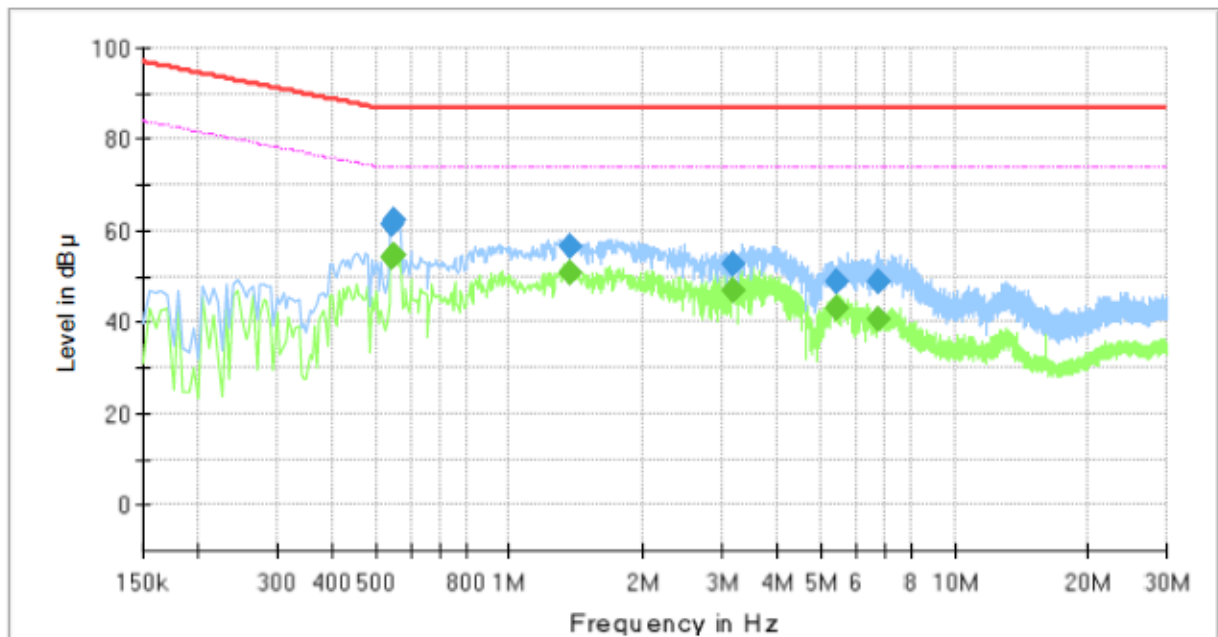
**Conducted Emissions at Telecommunication Ports**

■ DC

[1 000 Mbps]

Common Information

Test Description: Telecommunication Emission
Job No.: XNB-6003
Mode : DC
Speed : 1 000 Mbps
Operator Name: KES

**Final Result**

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.545000	---	54.27	74.00	19.73	1000.0	9.000	Single Line	19.2
0.545000	61.61	---	87.00	25.39	1000.0	9.000	Single Line	19.2
0.550000	---	54.71	74.00	19.29	1000.0	9.000	Single Line	19.2
0.550000	62.17	---	87.00	24.83	1000.0	9.000	Single Line	19.2
1.365000	---	50.57	74.00	23.43	1000.0	9.000	Single Line	19.2
1.365000	56.66	---	87.00	30.34	1000.0	9.000	Single Line	19.2
3.185000	---	47.00	74.00	27.00	1000.0	9.000	Single Line	19.2
3.185000	52.84	---	87.00	34.16	1000.0	9.000	Single Line	19.2
5.445000	---	42.88	74.00	31.12	1000.0	9.000	Single Line	19.3
5.445000	48.96	---	87.00	38.04	1000.0	9.000	Single Line	19.3
6.720000	---	40.74	74.00	33.26	1000.0	9.000	Single Line	19.4
6.720000	49.06	---	87.00	37.94	1000.0	9.000	Single Line	19.4

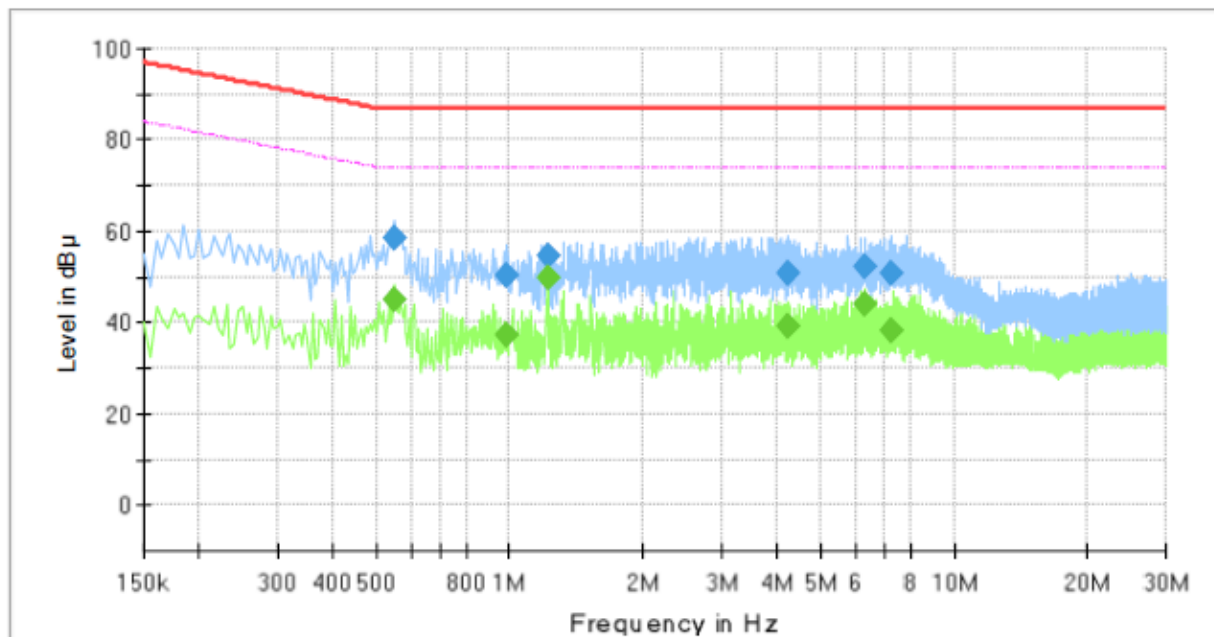


■ PoE

[1 000 Mbps]

Common Information

Test Description: Telecommunication Emission
Job No.: XNB-6003
Mode : PoE
Speed : 1 000 Mbps
Operator Name: KES

**Final Result**

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.550000	58.68	---	87.00	28.32	1000.0	9.000	Single Line	19.2
0.550000	---	44.91	74.00	29.09	1000.0	9.000	Single Line	19.2
0.985000	---	37.07	74.00	36.93	1000.0	9.000	Single Line	19.2
0.985000	50.24	---	87.00	36.76	1000.0	9.000	Single Line	19.2
1.215000	---	49.93	74.00	24.07	1000.0	9.000	Single Line	19.2
1.215000	54.67	---	87.00	32.33	1000.0	9.000	Single Line	19.2
4.250000	---	39.32	74.00	34.68	1000.0	9.000	Single Line	19.3
4.250000	50.76	---	87.00	36.24	1000.0	9.000	Single Line	19.3
6.285000	---	44.15	74.00	29.85	1000.0	9.000	Single Line	19.4
6.285000	52.04	---	87.00	34.96	1000.0	9.000	Single Line	19.4
7.245000	---	38.40	74.00	35.60	1000.0	9.000	Single Line	19.4
7.245000	50.60	---	87.00	36.40	1000.0	9.000	Single Line	19.4

◆ Calculation

$$\text{QuasiPeak [dBuV]} / \text{CAverage [dBuV]} = \text{Reading Value [dBuV]} + \text{Corr. [dB]}$$

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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



Impulse Noise (click)

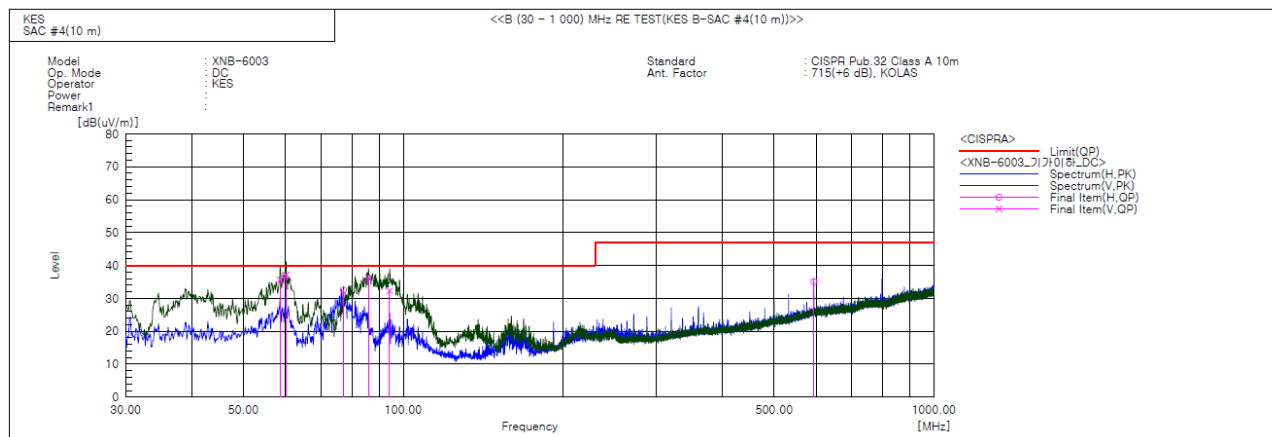
N/A



Report No. : KES-EM241549

Radiated Electric Field Emissions(Below 1 GHz)

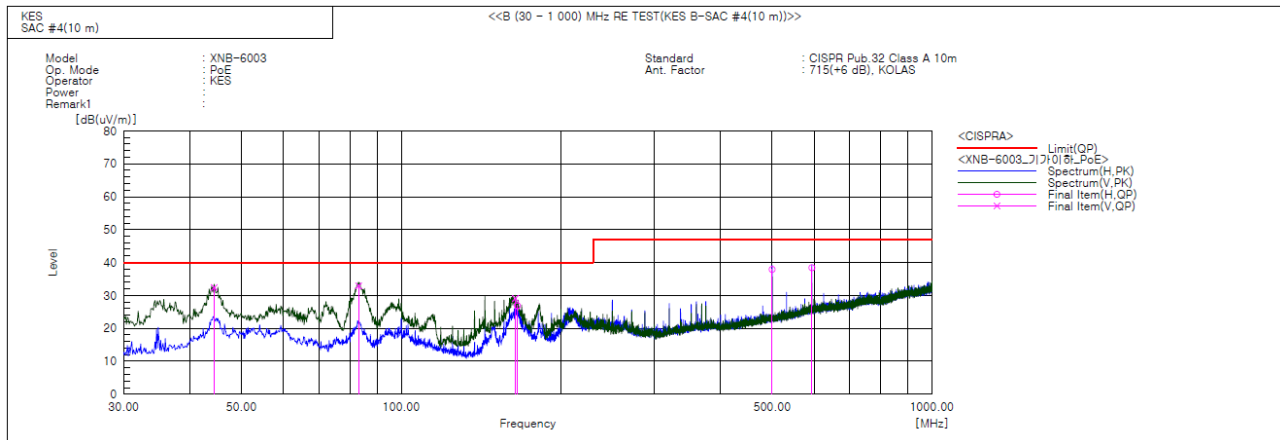
■ DC

**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	58.615	V	57.6	-21.9	35.7	40.0	4.3	117.0	62.0	
2	60.191	V	59.3	-22.2	37.1	40.0	2.9	100.0	99.0	
3	86.018	V	62.1	-25.9	36.2	40.0	3.8	122.0	271.0	
4	94.263	V	55.2	-22.9	32.3	40.0	7.7	129.0	240.0	
5	77.166	H	60.0	-27.4	32.6	40.0	7.4	400.0	63.0	
6	594.055	H	43.2	-8.1	35.1	47.0	11.9	289.0	342.0	



■ PoE



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	44.429	V	54.0	-21.6	32.4	40.0	7.6	105.0	251.0	
2	83.108	V	60.0	-27.1	32.9	40.0	7.1	119.0	266.0	
3	164.103	V	53.7	-24.6	29.1	40.0	10.9	156.0	205.0	
4	165.558	H	51.4	-24.5	26.9	40.0	13.1	314.0	240.0	
5	500.086	H	49.0	-11.1	37.9	47.0	9.1	298.0	211.0	
6	594.055	H	46.5	-8.1	38.4	47.0	8.6	400.0	334.0	

◆ Calculation

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

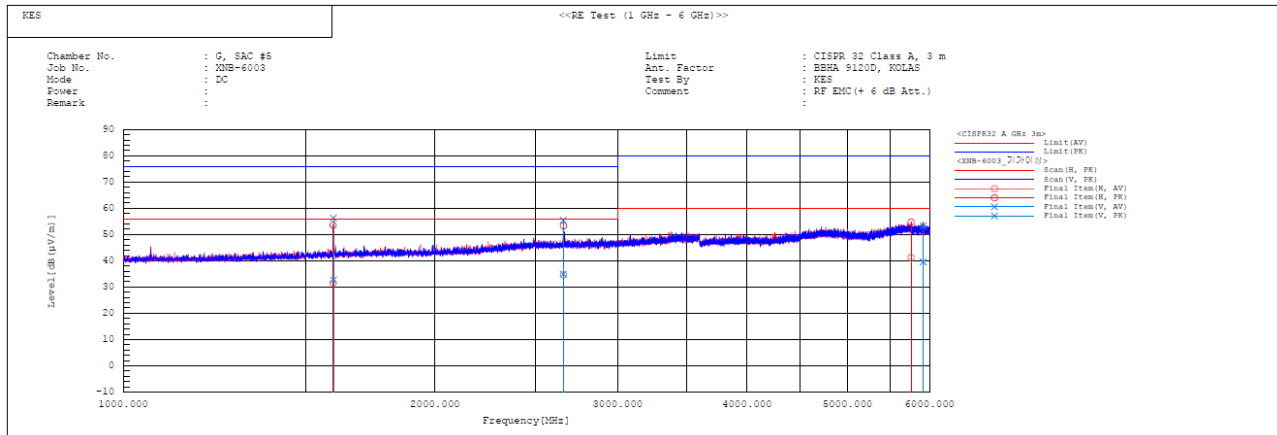
Margin(QP)[dB] = Limit[dB(μV/m)] - Result(QP) [dB(μV/m)]

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)**

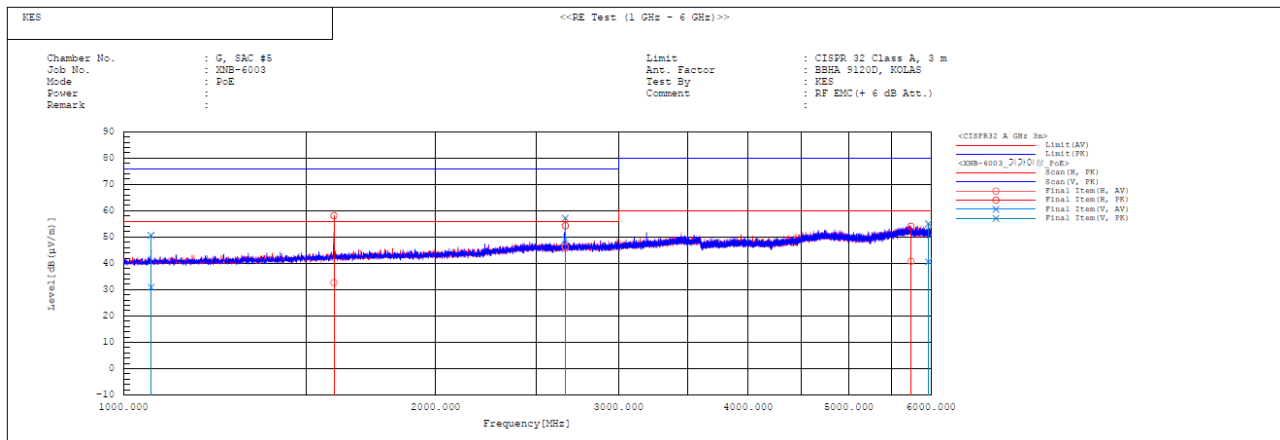
■ DC

**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]	Remark
1	1594.500	H	30.1	52.0	1.5	31.6	53.5	56.0	76.0	24.4	22.5	100.0	36.9	
2	1596.000	V	31.2	54.8	1.5	32.7	56.3	56.0	76.0	23.3	19.7	100.0	318.9	
3	2659.000	V	29.3	49.8	5.6	34.9	55.4	56.0	76.0	21.1	20.6	100.0	216.9	
4	2660.500	H	29.0	47.7	5.6	34.6	53.3	56.0	76.0	21.4	22.7	100.0	154.5	
5	5759.000	H	27.1	40.5	14.2	41.3	54.7	60.0	80.0	18.7	25.3	100.0	0.3	
6	5916.000	V	25.3	38.9	14.3	39.6	53.2	60.0	80.0	20.4	26.8	100.0	140.4	



■ PoE



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]	Remark
1	1063.500	V	32.1	51.8	-1.2	30.9	50.6	56.0	76.0	25.1	25.4	100.0	88.5	
2	1595.500	H	31.2	56.6	1.5	32.7	58.1	56.0	76.0	23.3	17.9	100.0	119.8	
3	2666.000	H	40.6	48.7	5.6	46.2	54.3	56.0	76.0	9.8	21.7	100.0	185.1	
4	2666.000	V	43.4	51.5	5.6	49.0	57.1	56.0	76.0	7.0	18.9	100.0	195.9	
5	5739.000	H	26.7	39.9	14.1	40.8	54.0	60.0	80.0	19.2	26.0	100.0	293.3	
6	5967.000	V	26.3	40.7	14.3	40.6	55.0	60.0	80.0	19.4	25.0	100.0	115.3	

◆ Calculation

Over Limit [dB] = (Read Level [dB μV] + Ant Factor [dB/m] + Cable Loss [dB] – Preamp Factor [dB]) – Limit Line [dB μV]

Over Limit : Margin, Read Level : Reading value, Ant Factor : ANT Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

**Harmonic Current Emissions and Voltage Fluctuations and Flicker**

■ DC

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.047			
2	0.004	0.376	1.080	n/a
3	0.040	1.735	2.300	PASS
4	0.003	0.810	0.430	n/a
5	0.039	3.409	1.140	PASS
6	0.005	1.656	0.300	n/a
7	0.038	4.956	0.770	PASS
8	0.004	1.619	0.230	n/a
9	0.038	9.454	0.400	PASS
10	0.003	1.753	0.184	n/a
11	0.037	11.157	0.330	PASS
12	0.003	2.191	0.153	n/a
13	0.035	16.815	0.210	PASS
14	0.003	2.608	0.131	n/a
15	0.034	22.390	0.150	PASS
16	0.003	2.900	0.115	n/a
17	0.032	24.145	0.132	PASS
18	0.003	3.156	0.102	n/a
19	0.030	25.608	0.118	PASS
20	0.003	3.141	0.092	n/a
21	0.028	17.567	0.161	PASS
22	0.003	3.497	0.084	n/a
23	0.027	18.078	0.147	PASS
24	0.003	3.545	0.077	n/a
25	0.025	18.168	0.135	PASS
26	0.002	3.435	0.071	n/a
27	0.022	17.990	0.125	PASS
28	0.002	3.706	0.066	n/a
29	0.021	17.712	0.116	PASS
30	0.002	3.404	0.061	n/a
31	0.018	16.848	0.109	PASS
32	0.002	3.468	0.058	n/a
33	0.016	16.018	0.102	PASS
34	0.002	3.458	0.054	n/a
35	0.015	15.043	0.096	PASS
36	0.001	2.932	0.051	n/a
37	0.012	13.585	0.091	PASS
38	0.002	3.123	0.048	n/a
39	0.011	12.417	0.087	PASS
40	0.001	2.654	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.



Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.048			
2	0.005	0.312	1.620	PASS
3	0.040	1.162	3.450	PASS
4	0.004	0.655	0.645	n/a
5	0.039	2.298	1.710	PASS
6	0.006	1.337	0.450	PASS
7	0.039	3.349	1.155	PASS
8	0.005	1.332	0.345	n/a
9	0.038	6.348	0.600	PASS
10	0.004	1.443	0.276	n/a
11	0.037	7.483	0.495	PASS
12	0.004	1.782	0.230	n/a
13	0.036	11.295	0.315	PASS
14	0.004	2.124	0.197	n/a
15	0.034	14.999	0.225	PASS
16	0.004	2.394	0.173	n/a
17	0.032	16.263	0.199	PASS
18	0.004	2.589	0.153	n/a
19	0.030	17.162	0.178	PASS
20	0.004	2.569	0.138	n/a
21	0.028	17.672	0.161	PASS
22	0.004	2.859	0.125	n/a
23	0.027	18.162	0.147	PASS
24	0.003	2.885	0.115	n/a
25	0.025	18.295	0.135	PASS
26	0.003	2.826	0.106	n/a
27	0.023	18.084	0.125	PASS
28	0.003	3.053	0.099	n/a
29	0.021	17.823	0.116	PASS
30	0.003	2.786	0.092	n/a
31	0.018	16.984	0.109	PASS
32	0.002	2.884	0.086	n/a
33	0.016	16.121	0.102	PASS
34	0.002	2.895	0.081	n/a
35	0.015	15.169	0.096	PASS
36	0.002	2.438	0.077	n/a
37	0.013	13.719	0.091	PASS
38	0.002	2.574	0.073	n/a
39	0.011	12.519	0.087	PASS
40	0.002	2.220	0.069	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.



Test Data - Voltage Fluctuations

Maximum Flicker results

■ DC

Flicker Measurements					
	Plt	Max Pst	Max Dc	Max Dmax	Max Tmax
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

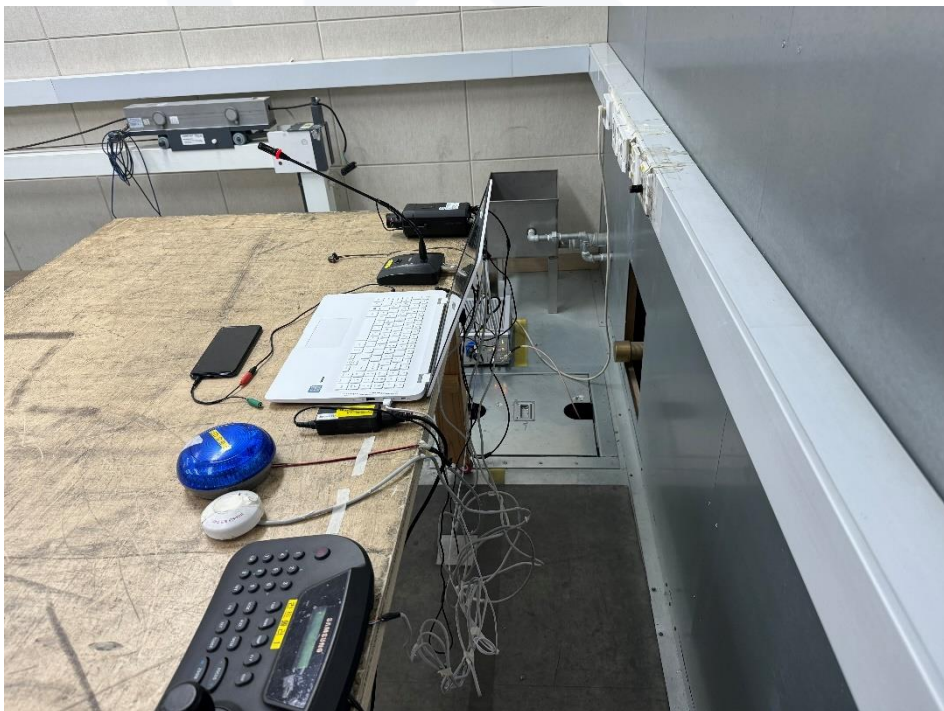




Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports

■ DC





Conducted Emissions at Telecommunication Ports

■ DC





■ PoE





Impulse Noise (click)

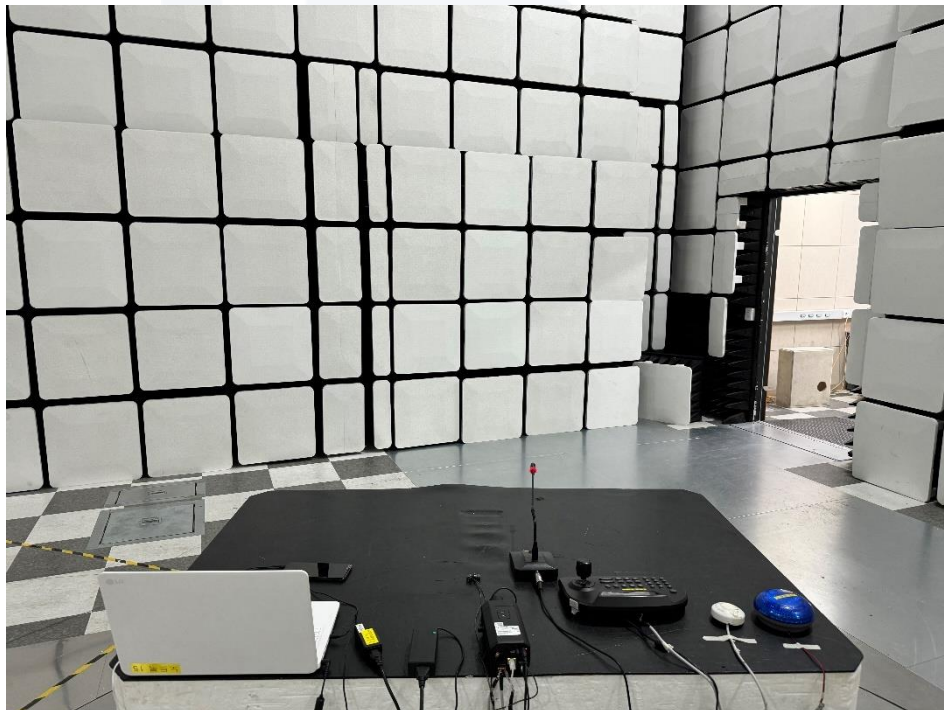
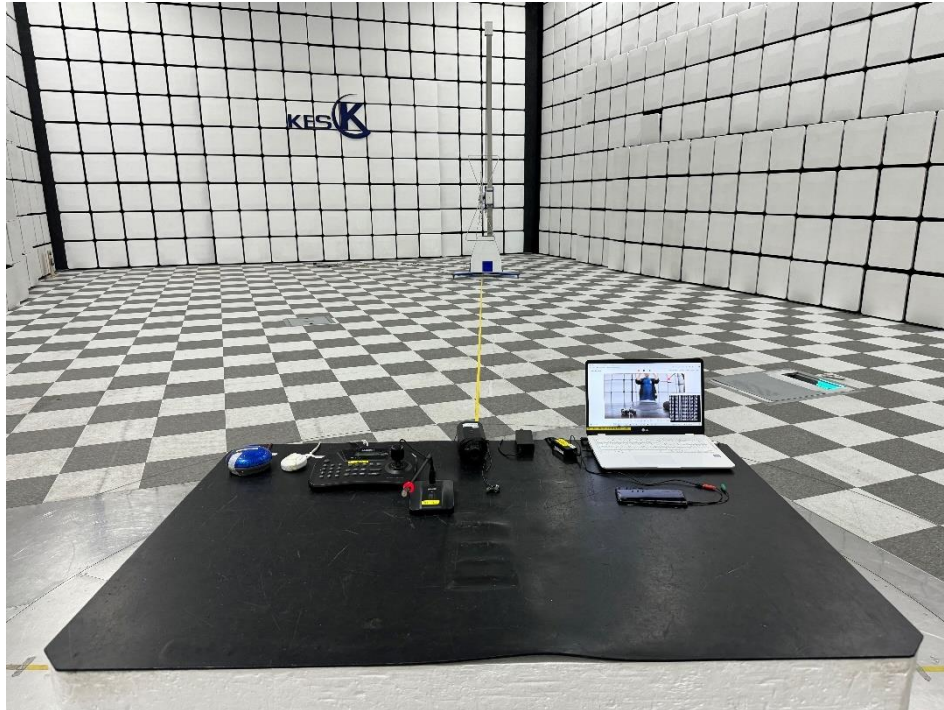
N/A





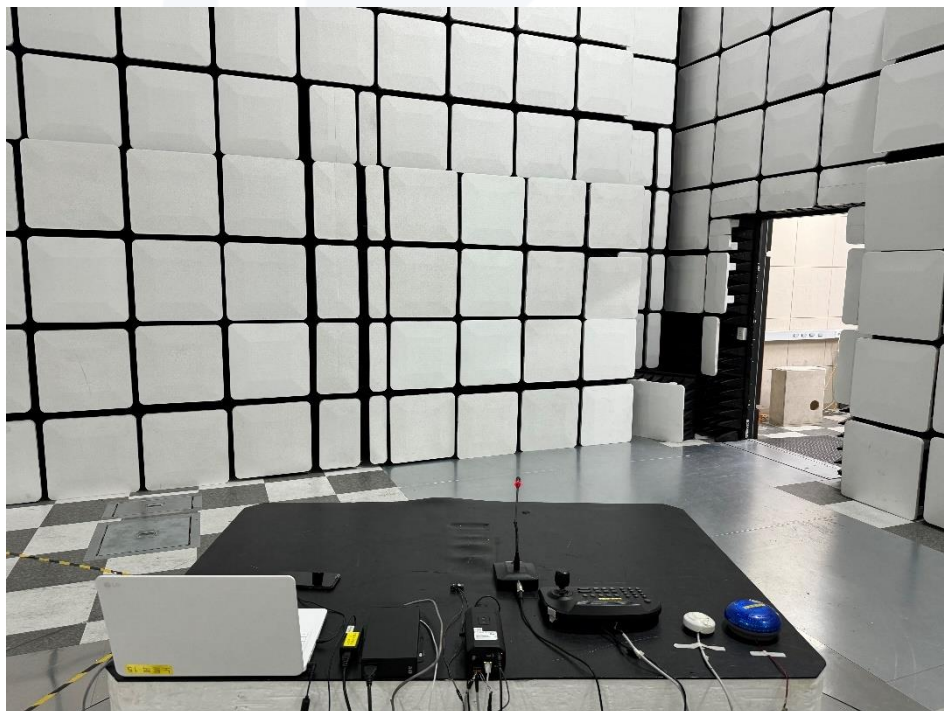
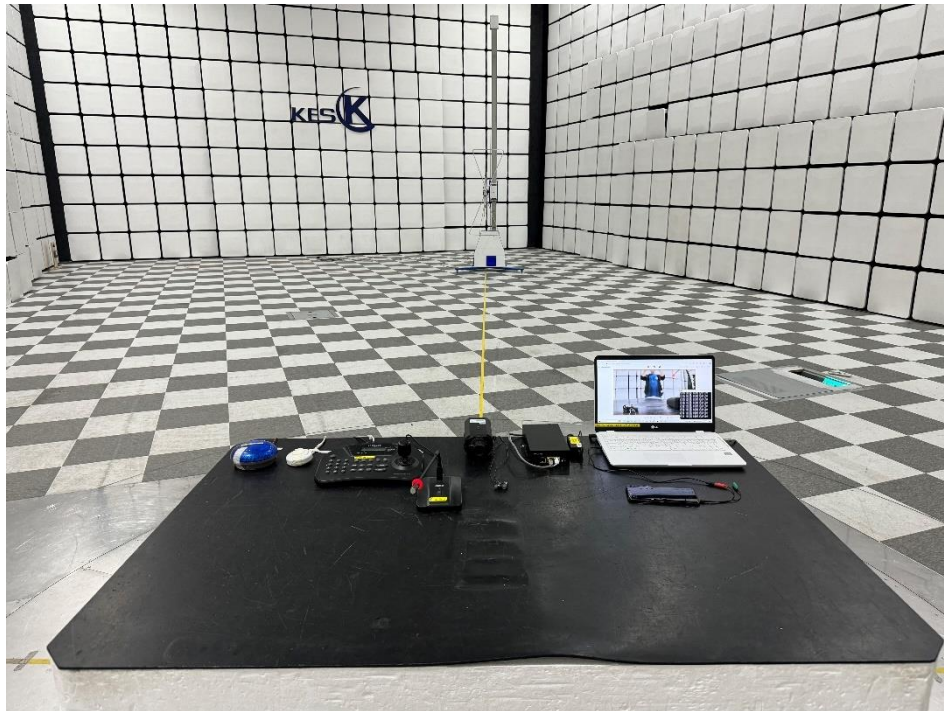
Radiated Electric Field Emissions(Below 1 GHz)

■ DC





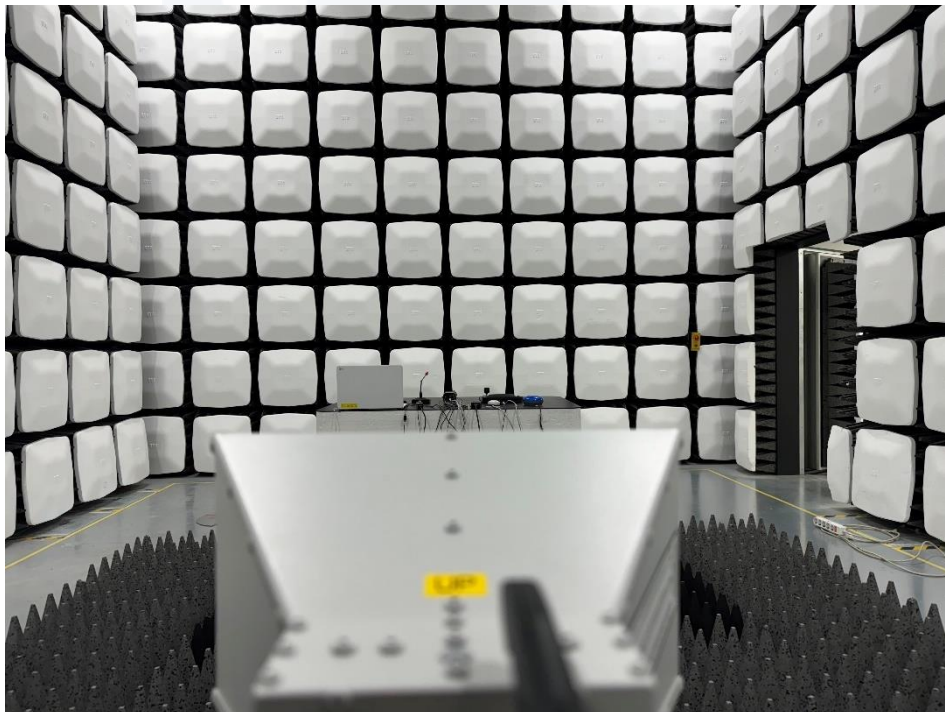
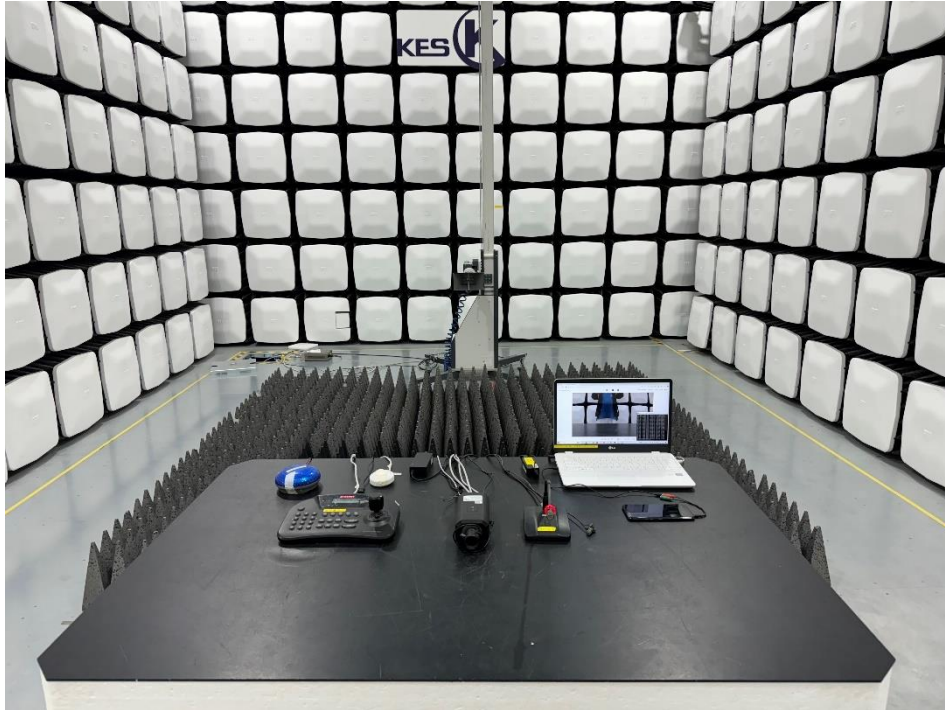
■ PoE





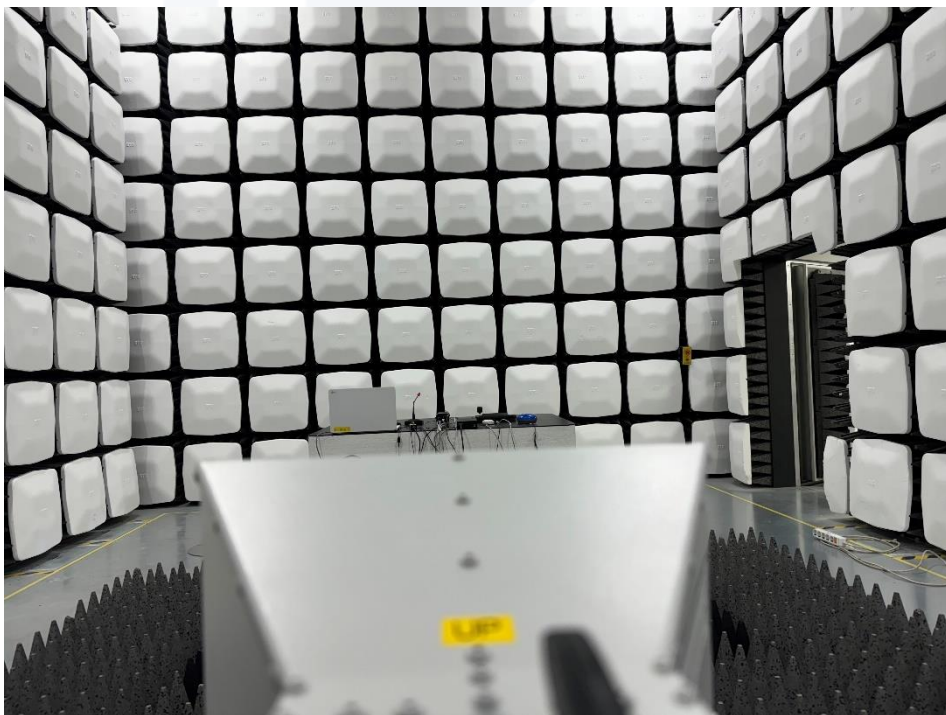
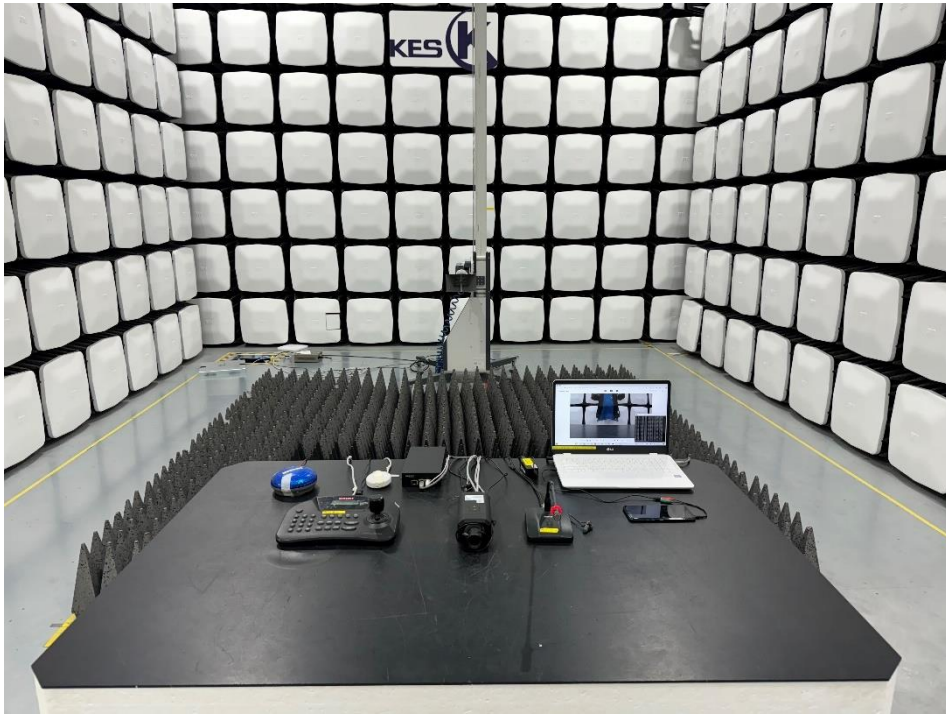
Radiated Electric Field Emissions(Above 1 GHz)

■ DC





■ PoE





Harmonic Current Emissions and Voltage Fluctuations and Flicker

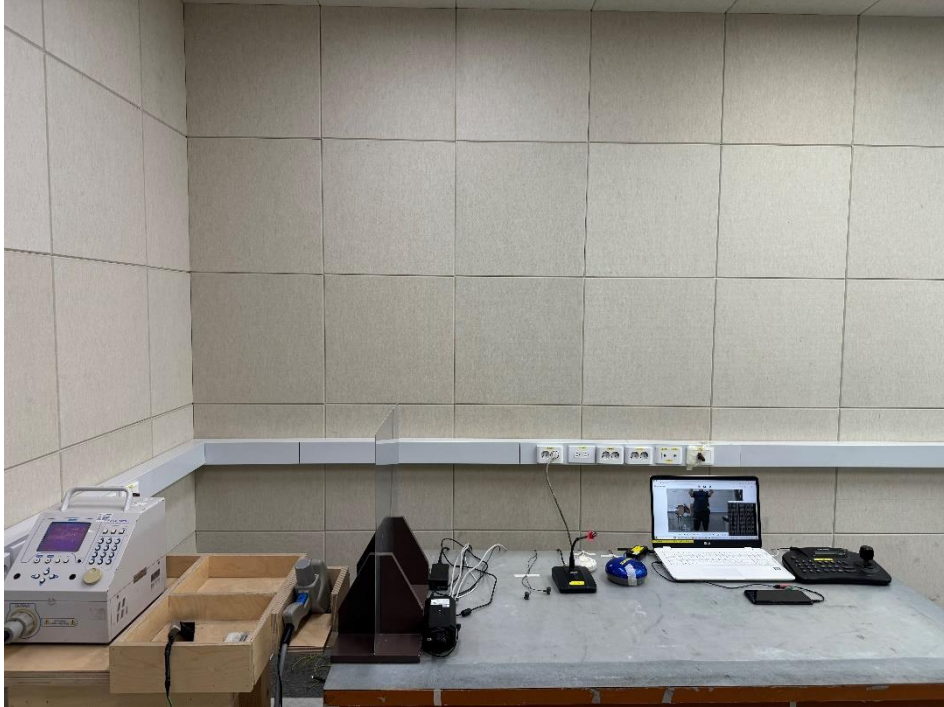
■ DC



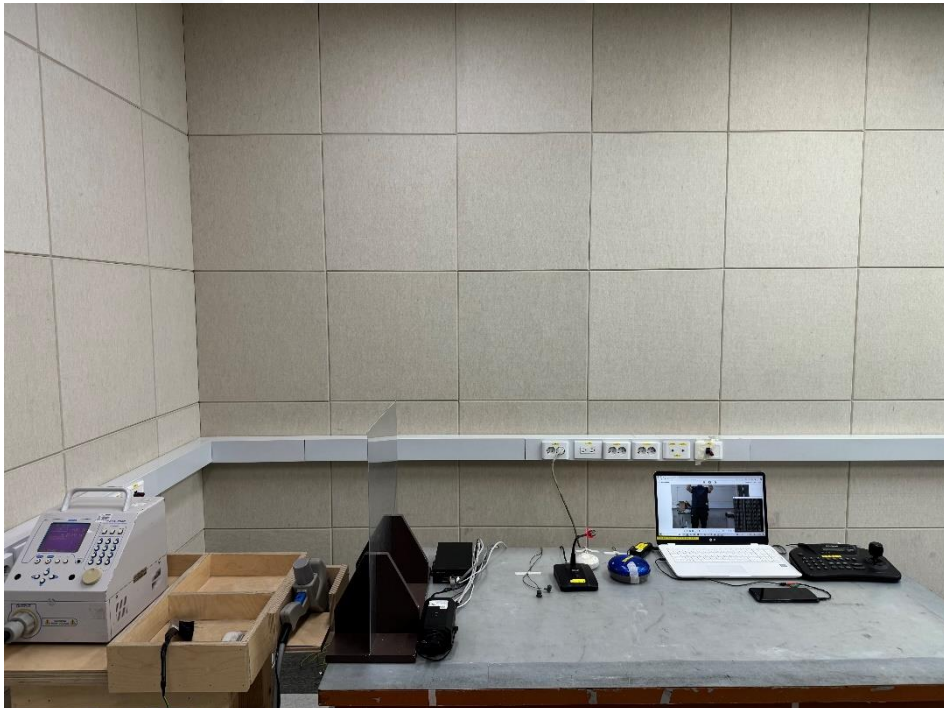


Electrostatic Discharge

■ DC



■ PoE

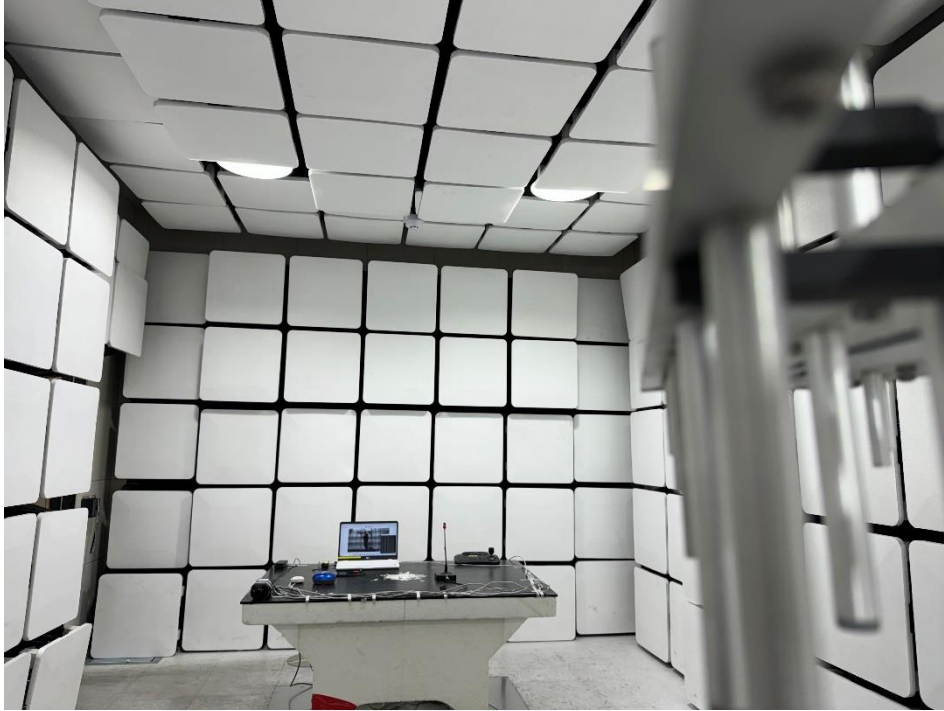




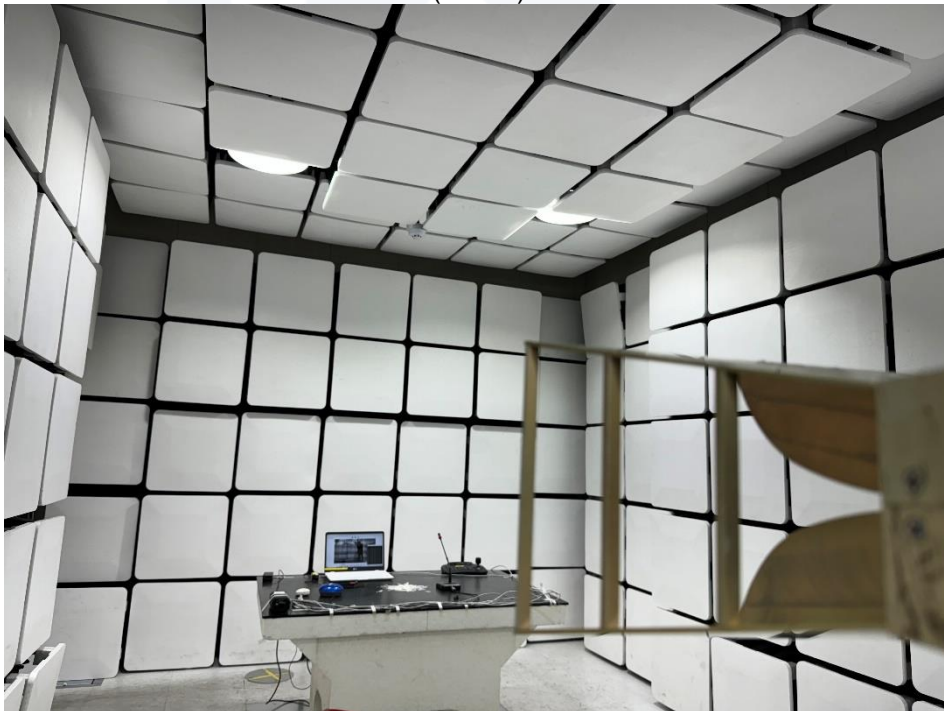
Radio-frequency Electromagnetic Field

■ DC

(Below)



(Above)





■ PoE

(Below)



(Above)



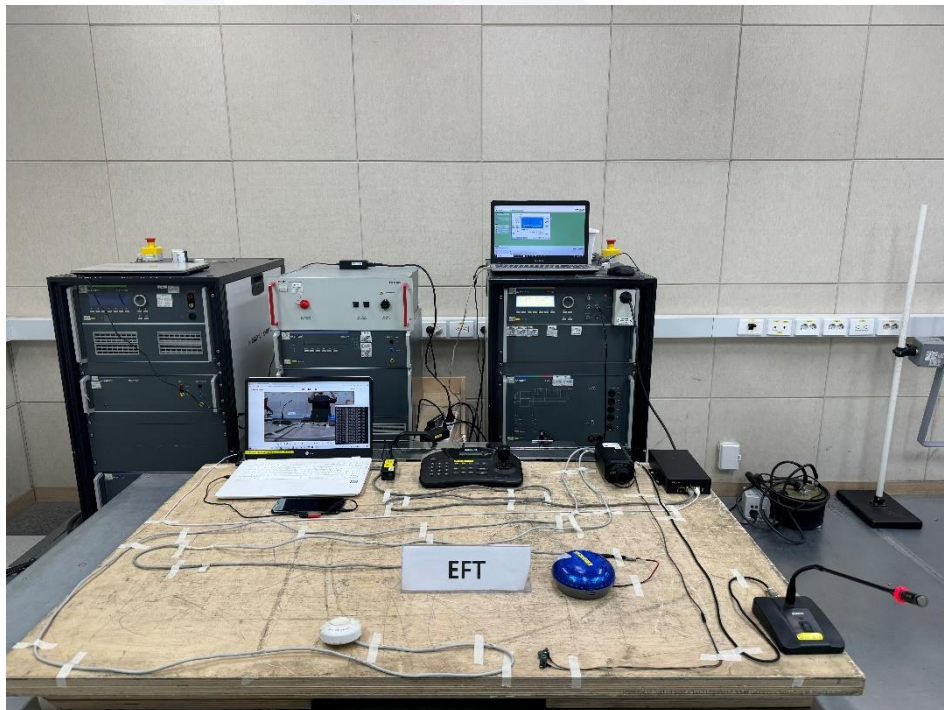


Fast Transients

■ DC



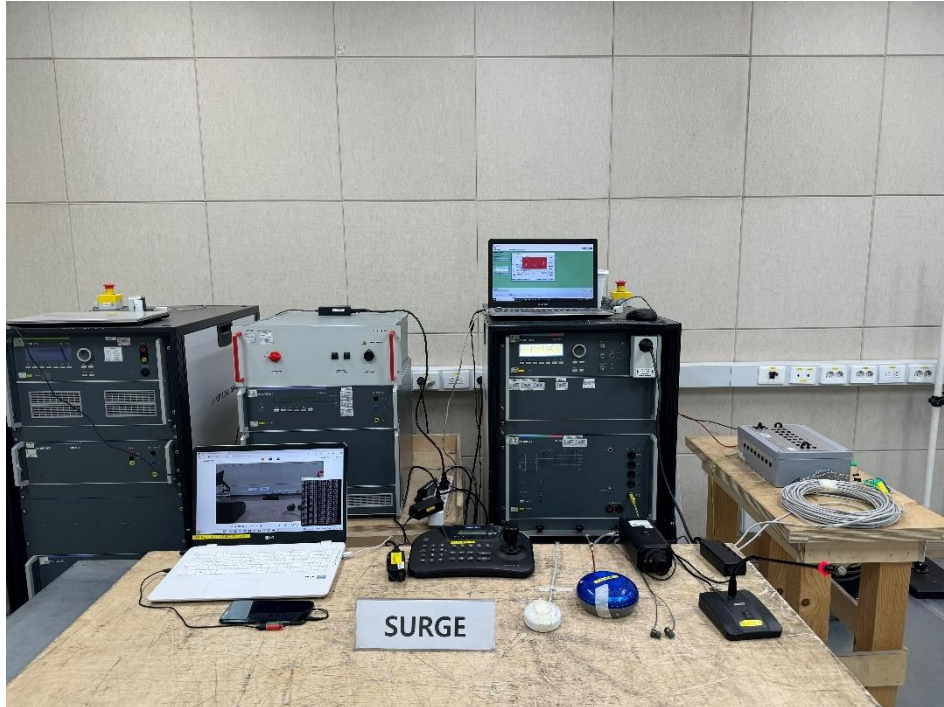
■ PoE





Surges

■ DC



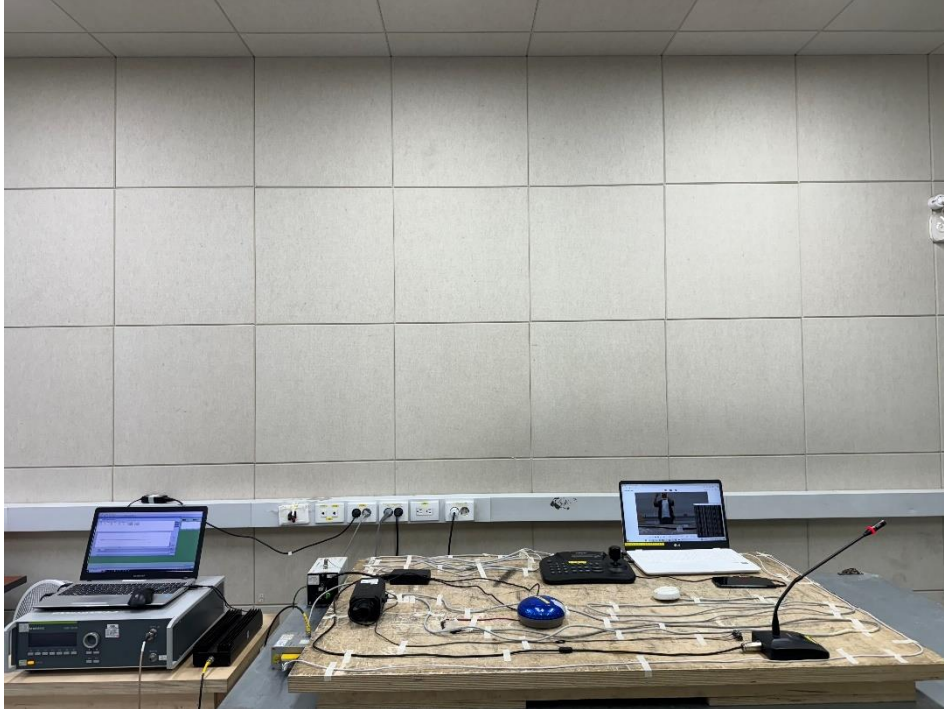
■ PoE





Conducted Disturbance

■ DC



■ PoE





Power Frequency Magnetic Field Immunity

■ DC

[16.7 Hz (AC), 100 A/m]



[50 Hz (AC), 100 A/m]





[0 Hz (DC), 300 A/m]





■ PoE

[16.7 Hz (AC), 100 A/m]



[50 Hz (AC), 100 A/m]





[0 Hz (DC), 300 A/m]



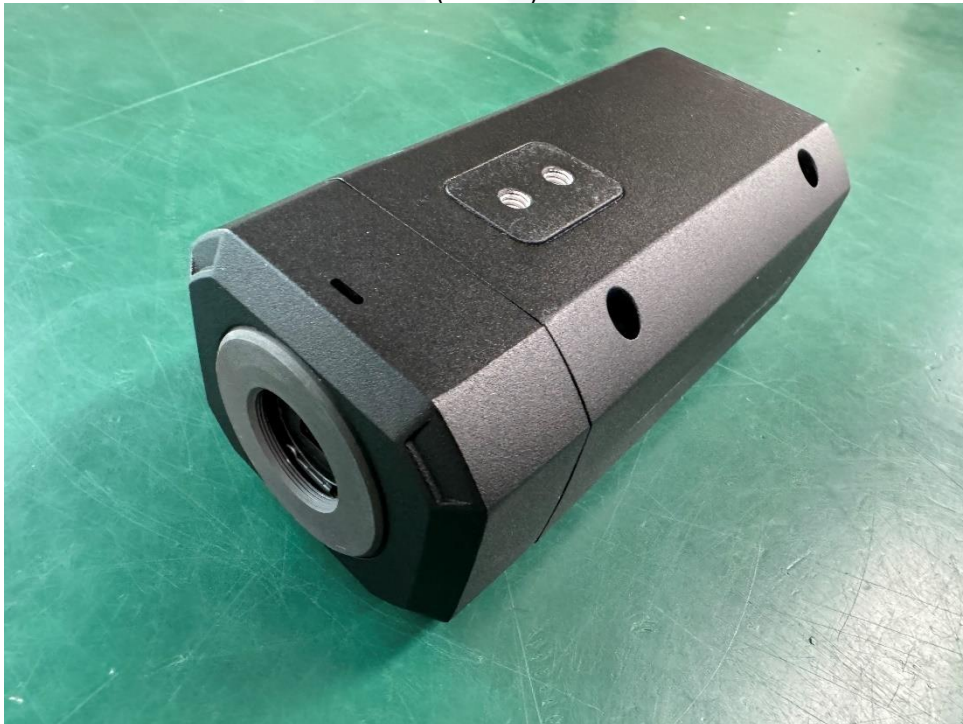


EUT Photographs

(Top)

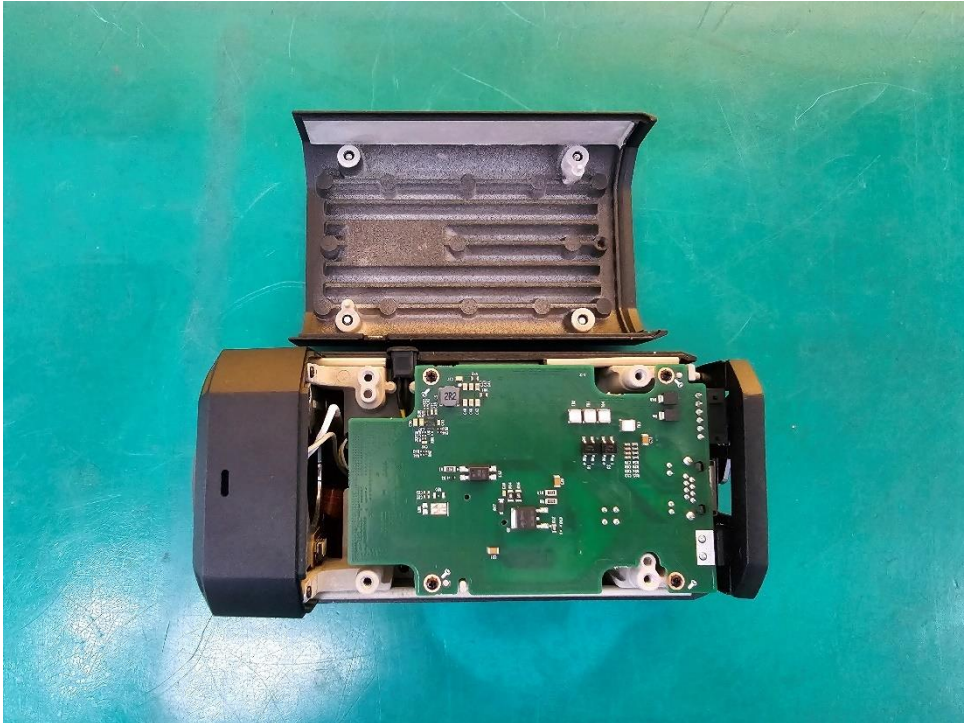


(Bottom)





EUT Internal Layout Photographs



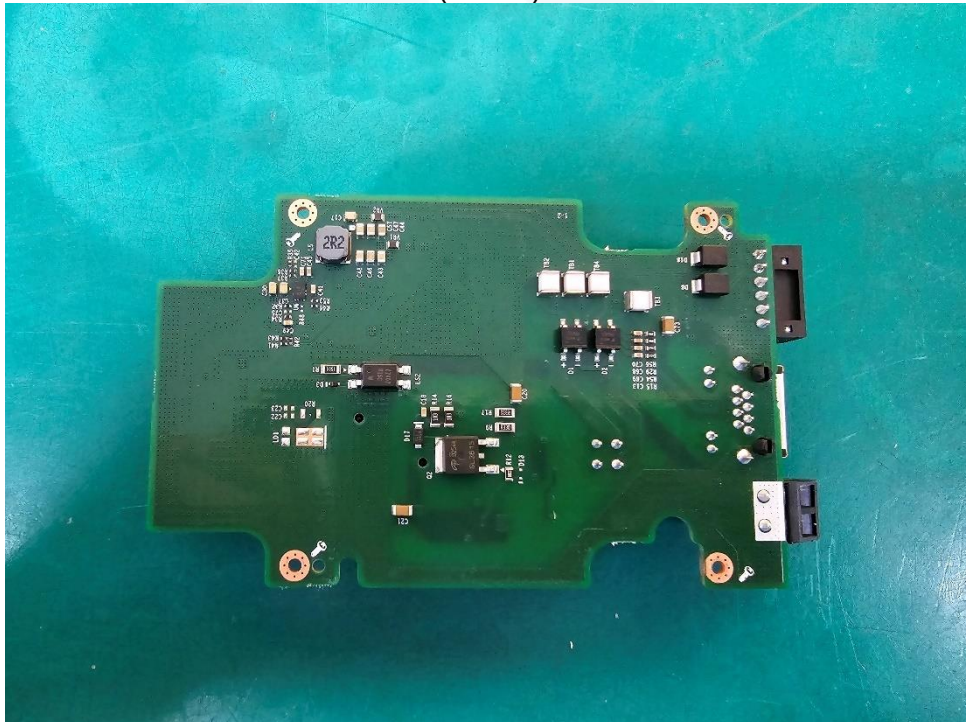


EUT Internal View – Board 1

(Top)



(Bottom)





EUT Internal View – Board 2

(Top)



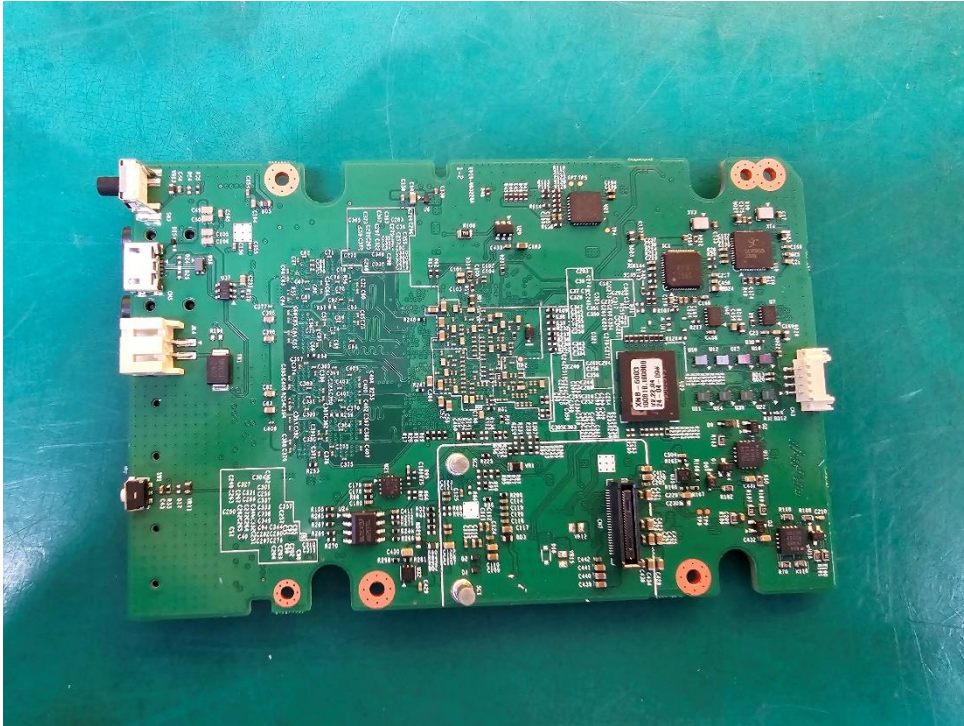
(Bottom)



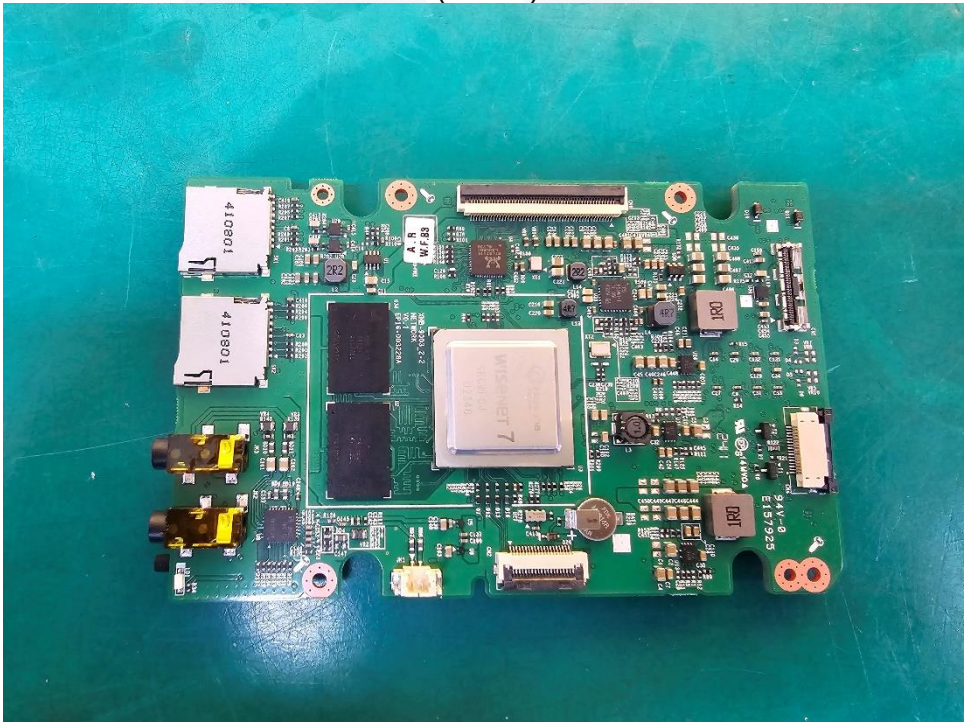


EUT Internal View – Board 3

(Top)



(Bottom)



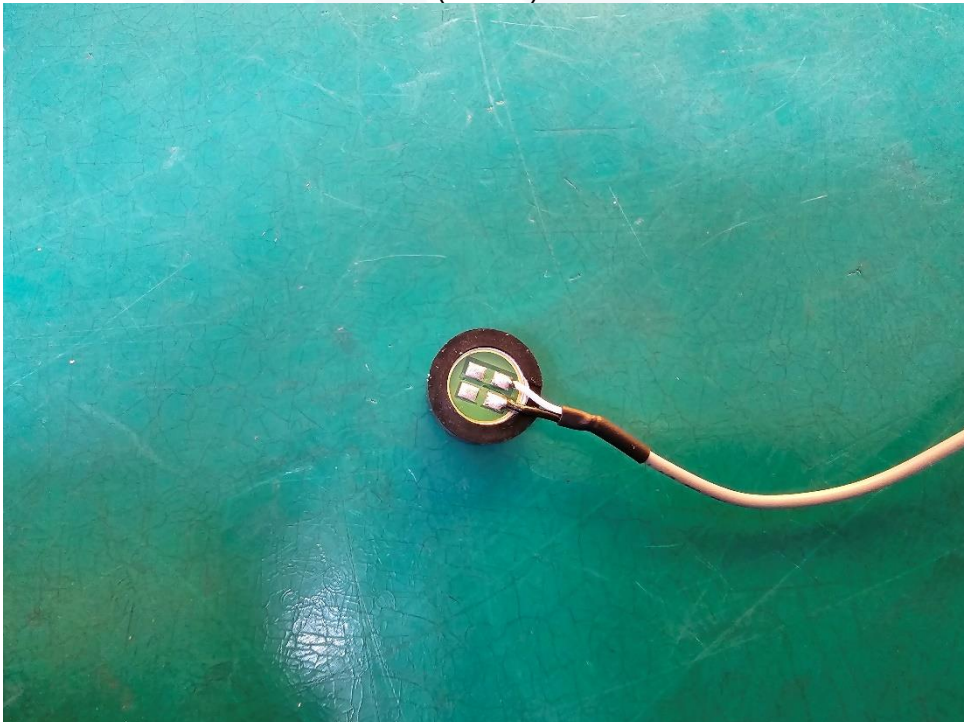


EUT Internal View – Board 4

(Top)



(Bottom)





Label and Location



NETWORK CAMERA

Model No : XNB-6003

Manufacturer : HANWHA VISION VIETNAM COMPANY LIMITED

Made in Vietnam

