



TEST REPORT



Report No. : KES-EM241855

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KES Co., Ltd.

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1. Client

Applicant : Hanwha Vision Co., Ltd

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

2. Sample Description

Product name : NETWORK THERMAL CAMERA

Model/Type No. : TNO-C3032TRA

Variant Model : TNO-C3012TRA, TNO-C3022TRA

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. 31, 2024

4. Test date : Jun. 09, 2024 ~ Jun. 11, 2024

5. Date of Issue : Jun. 25, 2024

6. Test Results : In Compliance

Tested by

Reviewed by

Jae Won, Lee
EMC Test Engineer

Dae Jung, Choi
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
Jun. 25, 2024	KES-EM241855	Issued

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1.0 General Product Description

Main Specifications of EUT are:

Video	
Imaging Device	Uncooled micro bolometer
Resolution	768x576, 384x288(original)
Max. Framerate	H.265/H.264/MJPEG: Max. 8fps
NETD	< 30mK
Pixel Size	17μm
Min. Illumination	None
Video Out	USB: Micro USB Type B, 768x576 for installation
Video Transmission Distance	None
Lens	
Focal Length (Zoom Ratio)	9.7mm: fixed focal
Max. Aperture Ratio	F1.0
Angular Field of View	H: 37.9° / V: 28.7° / D: 46.7° (FoV: 1.8 mRad)
Min. Object Distance	2.8M
Focus Control	Fixed
Lens Type	None
Mount Type	None
Optional Lens	None
Pan / Tilt / Rotate	
Pan / Tilt / Rotate Range	0°~350° / 0°~90° / 0°~350°
Pan Range	None
Pan Speed	None
Tilt Range	None
Tilt Speed	None
Rotate Range	None
Sequence	None
Preset Accuracy	None
Operational	
Camera Title	Displayed up to 85 characters
Direction Indicator	None
Day & Night	None
Backlight Compensation	None
Wide Dynamic Range	None
Digital Noise Reduction	None
Digital Image Stabilization	None
Defog	None
Motion Detection	8ea, 8point polygonal zones
Privacy Masking	6ea, Rectangle zones - color : Grey, Black, White
Gain Control	None
White Balance	None
LDC	None
Electronic Shutter Speed	None
Digital PTZ	None
Video Rotation	Flip, Mirror, Hallway view(90°/270°)
Analytics	Classified object type: Person/Vehicle Support BestShot Analytics events based on AI engine - WiseMD, Object detection, Virtual line*(Crossing/Direction), Virtual area*(Loitering/Intrusion/Enter/Exit) Analytics events - Motion detection, Tampering, Audio detection, Sound classification, Shock detection, Virtual area(Appear/Disappear)
Business Intelligence	Support (Temperature Analysis)
Serial Interface	RS-485
Alarm I/O	2 configurable I/O ports
Alarm Triggers	Analytics, Network disconnect, Alarm input, Time schedule, MQTT subscription
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 - MQTT: publication
Audio Streaming	None
Audio In	Selectable(mic in/line in)
Audio Out	Line out
IR Viewable Length	None
IR Illuminator (Optional)	None
IR Radiation angle	None
IR LED	None
IR Wavelength	None
IR Operation	None
Water Removal	None
Auto Tracking	None
Coaxial Protocol	None
Color Palettes	Whitehot, Blackhot, Rainbow, Rainbow2, Sepia, Red, Iron, Custom, Hybrid palettes



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Radiometry	
Temperature Detect Range	-40°C~-550°C(-40°F~-1022°F)
Temperature Accuracy	below 150°C: up to ±2°C Above 150°C: up to ±20% * based on measurements in a room temperature environment.
Temperature Detection	10 Polygonal ROI zones, whole FoV area
Additional	Hybrid palettes, Spot temperature reading (ROI condition monitoring: Above/ Below/ Increase/ Decrease)
Network	
Ethernet	Metal shielded RJ-45(10/100/1000BASE-T)
Video Compression	H.265/H.264: Main/Baseline/High, MJPEG
Audio Compression	G.711 u-law / G.726 Selectable G.726(ADPCM) 8KHz, G.711 8KHz G.726: 16Kbps, 24Kbps, 32Kbps, 40Kbps AAC-LC: 48Kbps at 16KHz
Smart Codec	Manual(Sea area), WiseStreamⅡ, WiseStreamⅢ(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 10 profiles)
Protocol	IPv4, IPv6, TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP, RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, UPnP, Bonjour, LLDP, CDP, SRTP (TCP, UDP Unicast), MQTT
Security	None
Application Programming Interface	ONVIF Profile S/G/T/M SUNAPI(HTTP API) Wisenet open platform
Security	
OS / Firmware Protect	Secure boot, Signed firmware, Firmware encryption
User authentication	Digest Authentication, Prevent brute-force attack
Network authentication	802.1X Authentication(EAP-TLS, EAP-LEAP, EAP-PEAP MSCHAPv2)
Secure Communication	HTTPS, SRTP, WSS(Websocket secure)
Access Control	Access control based on IP address
Data Protect	Authentication information encryption, ZIP compression encryption
Audit	User Access/System/Event log management
Device ID	Device Certificate(Hanwha Private Root CA)
Secure Storage	TPM(Trusted platform module), SDcard partition encrypt
Security Certificate	TPM with FIPS 140-2 level 2
General	
Webpage Language	English, Korean, 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
Memory	2GB RAM, 512MB Flash
Environmental & Electrical	
Operating Temperature / Humidity	-40°C~-+60°C(-40°F~-+140°F) / 0~95% RH(non-condensing)
Storage Temperature / Humidity	-50°C~-+60°C(-58°F~-+140°F) / Less than 95% RH
Certification	IP66, IK10, NEMA4X
Input Voltage	PoE(IEEE802.3af, Class3), 12VDC
Power Consumption	PoE: Max 10.8W, typical 9W 12VDC: Max 9.4W, typical 7.7W
Mechanical	
Color / Material	White / Aluminum + PC
RAL Code	RAL9003
Product Dimensions / Weight	ø93.8x233.5mm(ø3.69x9.19"), 1700g(3.75 lb)
Compatible Conduit hole / Gang	5BO-147BA(Sold seperately) / single, double, 4" octagon, 4" square
Hanging Mount (Dome)	TBD
Skin Cover	TBD
Skin Cover (Dome)	TBD
Weather Cap (Dome)	TBD
Power Module	TBD
Backbox	include
Certifications & Standards	
Network	None
EMC	TBD
Safety	TBD
Environment	TBD
Video	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 (DC Adapter Input Power)
☒ PoE

1.2 Variant Model Differences

Add Model Name due to Fixed Lens Differences.

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
NETWORK THERMAL CAMERA	TNO-C3032TRA	-	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
Laptop	P95G001	9JM8HT2	DELL INC.	-
Laptop Adapter	HA65NM130	-	Chicony Power Technology(Suzhou)Co.,Ltd.	-
PoE Injector	PT-PSE109GBRO-AH	-	Dongguan PROCET Network Technology Co.,Ltd	-
Micro SD Card	-	-	SanDisk	16 GB
AC/DC Adapter	2ACB022F	-	ChAnnel Well Technology (Guangzhou) Co.,Ltd.	-
Alarm	-	-	-	-
Button Alarm	-	-	-	-
Smartphone	SM-J500	R59M503KX0M	Samsung Electronics	-
Headset	K550	-	Britz®	-
Controller	SPC-1010	C50E67WG10100F	SamSung Techwin Co.,Ltd.	-
Controller Adapter	-	-	-	-



1.7 External I/O Cabling

■ #1

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA (EUT)	2 Pin	AC/DC Adapter	2 Pin	1.5	U
	RJ-45 (LAN)	Laptop	RJ-45 (LAN)	3.5	U
	Audio OUT	Headset	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 Card SLOT	Micro SD Card	Micro SD Card SLOT	-	-
Controller	DC Jack	Controller Adapter	DC Jack	1.5	U
Laptop	3.5 mm	Smartphone	3.5 mm	1.0	U
	DC Jack	Laptop Adaptor	DC Jack	1.5	U

* Unshielded=U, Shielded=S



■ #2

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
	Audio OUT	Headset	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 Card SLOT	Micro SD Card	Micro SD Card SLOT	-	-
PoE Adapter	RJ-45 (LAN)	Laptop	RJ-45 (LAN)	2.0	U
Controller	DC Jack	Controller Adapter	DC Jack	1.5	U
Laptop	3.5 mm	Smartphone	3.5 mm	1.0	U
	DC Jack	Laptop Adapter	DC Jack	1.5	U

* Unshielded=U, Shielded=S



1.8 EUT Operating Mode(s)

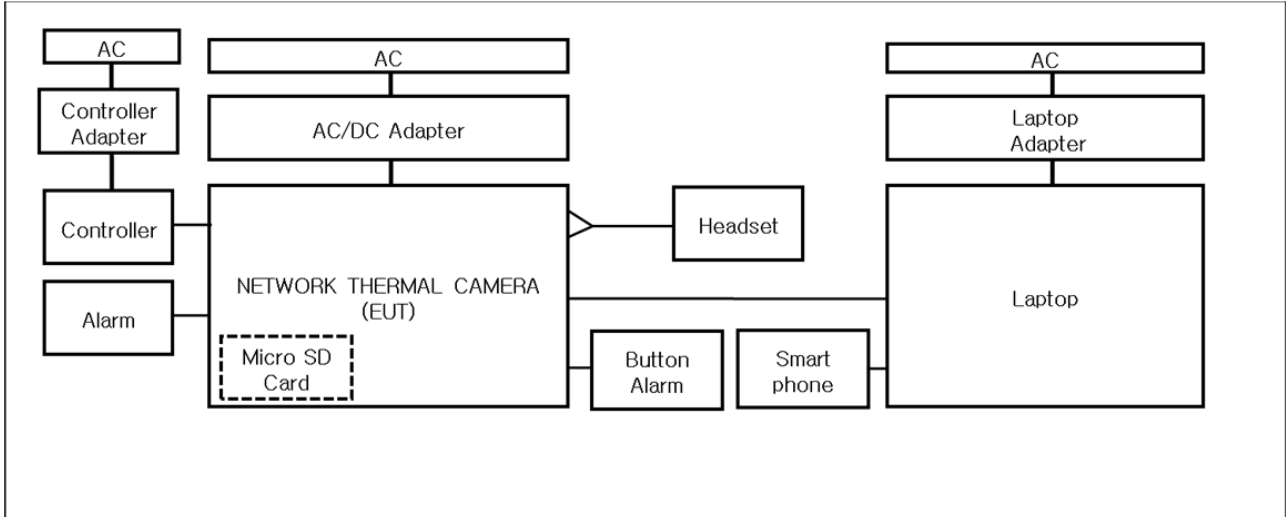
Division	Mode name	Operating status
#1	AC/DC Adapter	1. After connecting EUT and AD/DC Adapter 2. Check the camera video output on the Notebook. 3. Check if the network status is operating normally during PING TEST. 4. Check the output of the 1 kHz tone output from the smartphone and the microphone input from the headset. 5. Press the alarm button to check the normal operation of the button alarm. 6. Check camera operation through controller 7. After testing, I checked the files stored on Micro SD card.
#2	PoE	1. After connecting EUT and PoE Injector 2. Check the camera video output on the Notebook. 3. Check if the network status is operating normally during PING TEST. 4. Check the output of the 1 kHz tone output from the Laptop and the microphone input from the headset. 5. Press the alarm button to check the normal operation of the button alarm. 6. Check camera operation through controller 7. 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

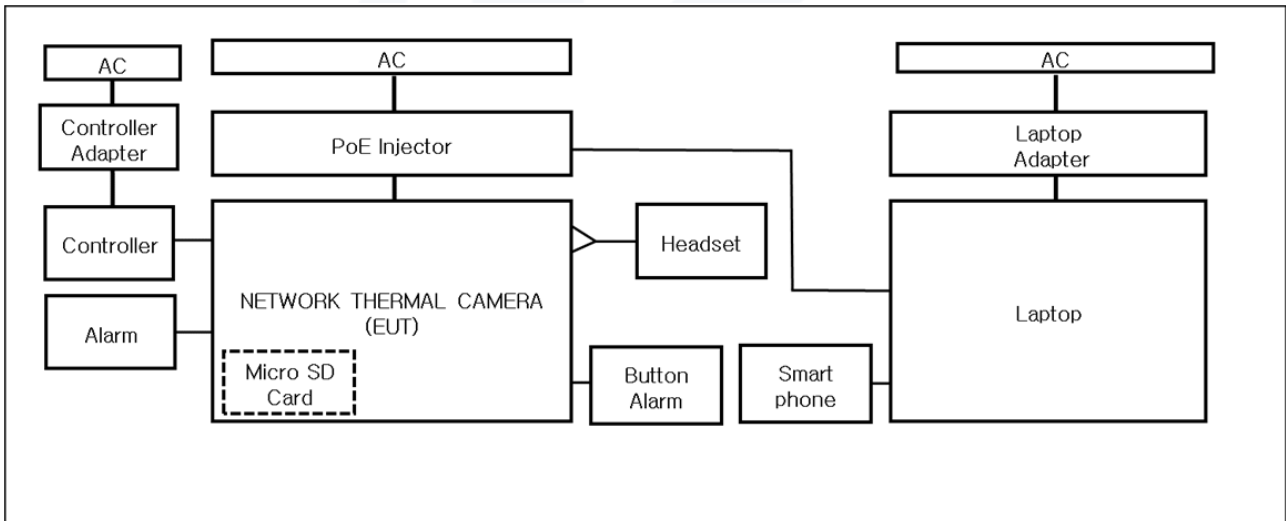


1.9 Configuration

■ #1



■ #2





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 ports are for administrator use only and are not tested.
- Port photo for administrator



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 0008



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

Jun. 09, 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	ENV216	R & S	101137	Jan 10, 2025
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	Nov 08, 2024

Test Conditions

Temperature: (23,2 ± 0,1) °C

Relative Humidity: (46,5 ± 0,1) % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

RemarksSee Appendix A for test data.



2.2 Conducted Emissions at Telecommunication Ports

Test Date

Jun. 09, 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	ENV216	R & S	101137	Jan 10, 2025
☒	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: (23,2 ± 0,1) °C

Relative Humidity: (46,5 ± 0,1) % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

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	101786	Jan 10, 2025

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

Jun. 09, 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: (22,9 ± 0,1) °C

Relative Humidity: (45,9 ± 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

Jun. 09, 2024

Test Location

SEMI ANECHOIC CHAMBER #3

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	ESR7	R & S	101190	Jul 31, 2024
☒	PREAMPLIFIER	8449B	AGILENT	3008A01967	Mar 05, 2025
☒	ATTENUATOR	8491A	HP	35496	Feb 13, 2025
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	Mar 05, 2025

Test Conditions

Temperature: (22,9 ± 0,1) °C

Relative Humidity: (45,5 ± 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

RemarksSee Appendix A for test data.



2.6 Harmonic Current Emissions

Test Date

Jun. 09, 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: (22,9 ± 0,1) °C

Relative Humidity: (45,7 ± 0,1) % 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

Remarks

- See Appendix A for test data.

- The LAN port is regarded as a wired communication network port and power related ports are not tested.



2.7 Voltage Fluctuations and Flicker

Test Date

Jun. 09, 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: (22,9 ± 0,6) °C

Relative Humidity: (45,7 ± 0,6) % R.H.

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks- See Appendix A for test data.- The LAN port is regarded as a wired communication network port and power related ports are not tested.



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

Jun. 10, 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: (23,1 ± 0,1) °C
Relative Humidity: (47,3 ± 0,1) % R.H.
Atmospheric Pressure: (100,1 ± 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

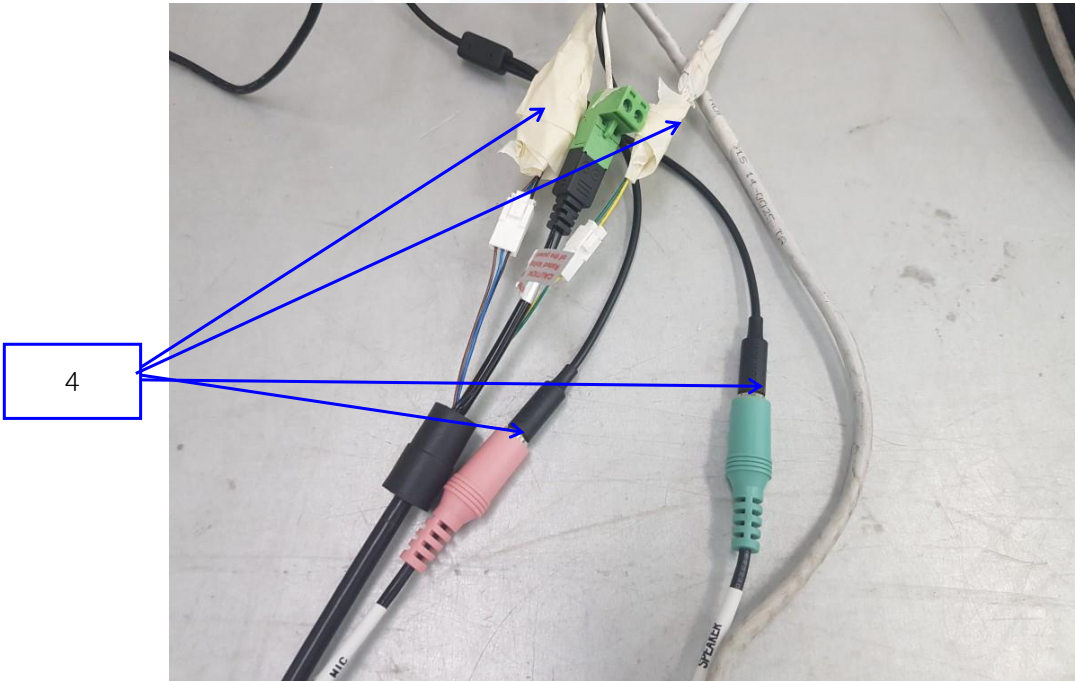
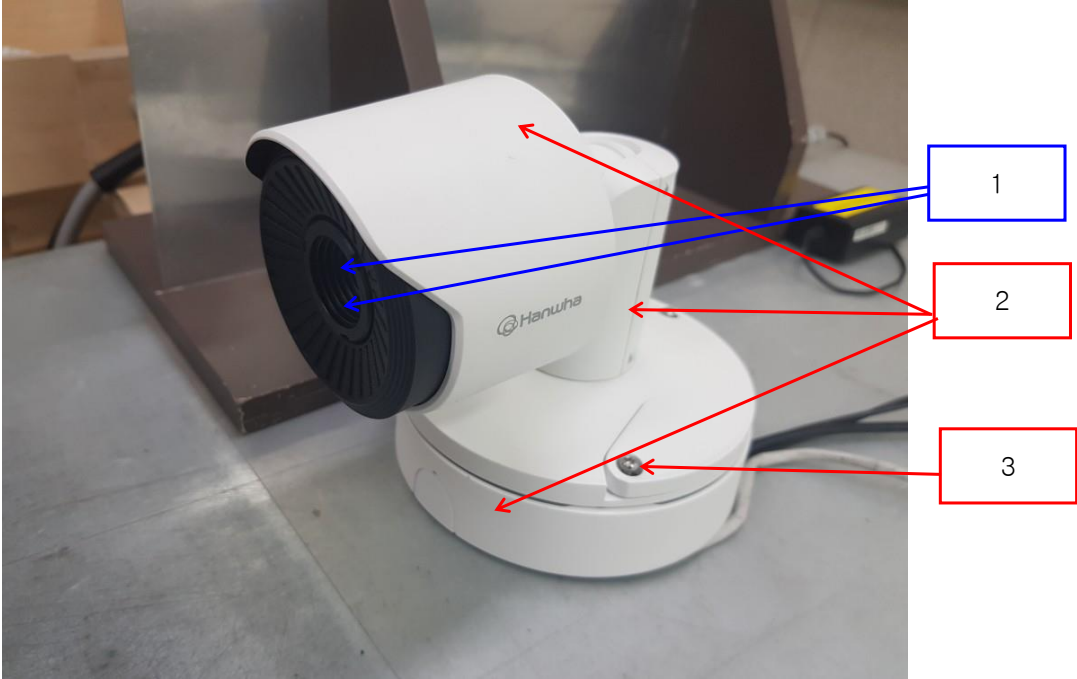
Required Performance Criteria: ☒ B



Location of Discharge:

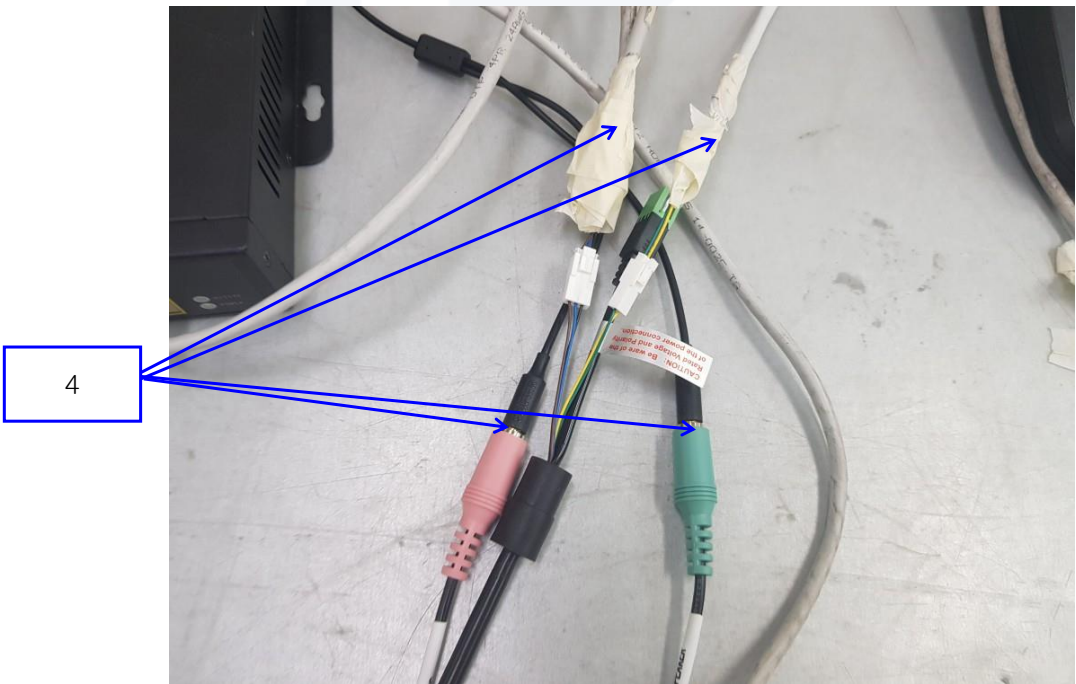
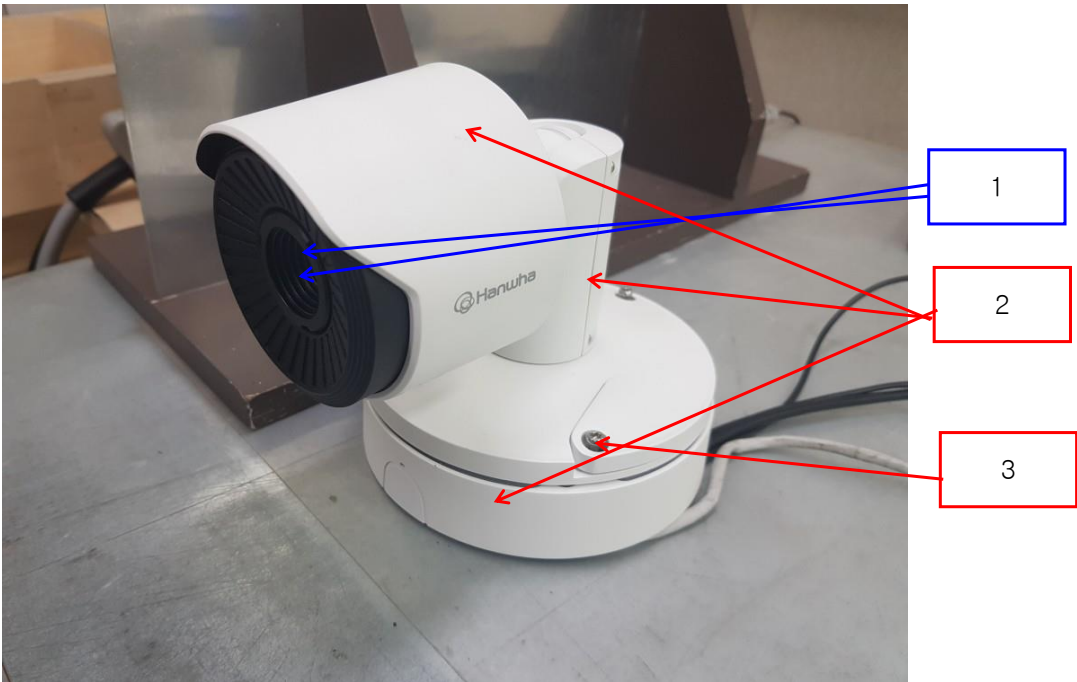


■ #1





■ #2



**Test Data**

■ #1

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	Camera Lens	Air Discharge	B	A
2	Enclosure	Contact Discharge	B	A
3	Screw	Contact Discharge	B	A
4	Around the Port	Air Discharge	B	A

■ #2

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	Camera Lens	Air Discharge	B	A
2	Enclosure	Contact Discharge	B	A
3	Screw	Contact Discharge	B	A
4	Around the Port	Air 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

Jun. 10, 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: (23,0 ± 0,6) °C
Relative Humidity: (45,9 ± 0,6) % R.H.
Atmospheric Pressure: (99,6 ± 0,0) kPa



Test Specifications

Antenna Polarization: Horizontal & Vertical unless indicated otherwise

Antenna Distance: ☒ 3 m

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

of Sides Radiated: ☒ 4

Required Performance Criteria: ☒ A

**Test Data**

■ #1

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

■ #2

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

Jun. 11, 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: (22,7 ± 0,1) °C
Relative Humidity: (46,9 ± 0,1) % R.H.
Atmospheric Pressure: (99,9 ± 0,0) kPa

Test Specifications

Pulse Amplitude & Polarity: ☒ ± 2.0 kV ☐ ± 4.0 kV
(Power Lines)

Pulse Amplitude & Polarity: ☒ ± 2.0 kV ☐ ± 4.0 kV
(Signal Lines)

Pulse Amplitude & Polarity: ☐ ± 1.0 kV
(Earth Lines)

Burst Period: ☒ 300 ms

Repetition Rate: ☒ 5 kHz

Duration of Test Voltage: ☒ ≥ 1 min

Required Performance Criteria: ☒ A

**Test Data**

■ #1

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

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

☐ Earth ports – Coupling Clamp used

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



■ #2

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

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

☐ Earth ports – Coupling Clamp used

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

Jun. 11, 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: (22,7 ± 0,6) °C
Relative Humidity: (46,9 ± 0,6) % R.H.
Atmospheric Pressure: (99,9 ± 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**

■ #1

☒ 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)
-	B	-	-

Signal Lines☒ Line to Line – Differential Mode

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

☐ Line to Earth – Common Mode

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



■ #2

☒ Line to Line – Differential Mode

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

Jun. 11, 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: (22,7 ± 0,6) °C
Relative Humidity: (46,9 ± 0,6) % R.H.
Atmospheric Pressure: (99,9 ± 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**

■ #1

☒ Input a.c. power ports

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

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
RJ-45 (LAN)	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
-	-	-	-



■ #2

☐ 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 (PoE)	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
-	-	-	-

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

Jun. 11, 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)	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: (22,7 ± 0,1) °C
Relative Humidity: (46,9 ± 0,1) % R.H.
Atmospheric Pressure: (99,9 ± 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**

■ #1

☒ Immersion method

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

■ #2

☒ 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

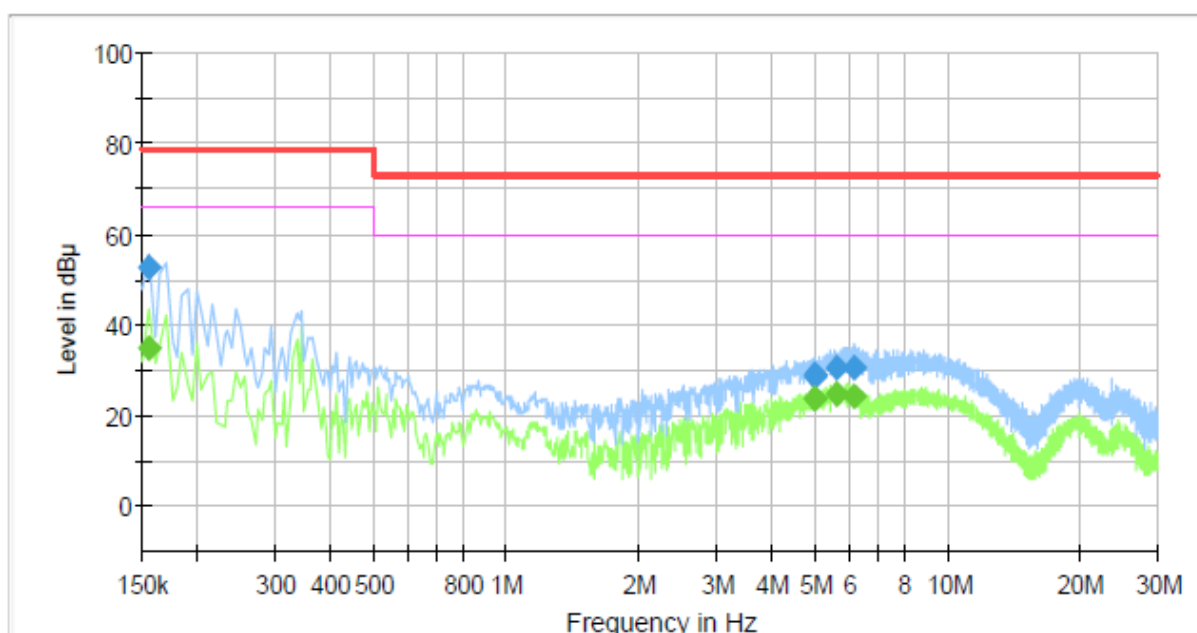
Conducted Emissions at Mains Power Ports

■ #1

[HOT]

Common Information

Test Description: Conducted Emission
Job No.: KES-EM241855
Phase: #1_L1
Mode:
Operator Name: KES



Final Result

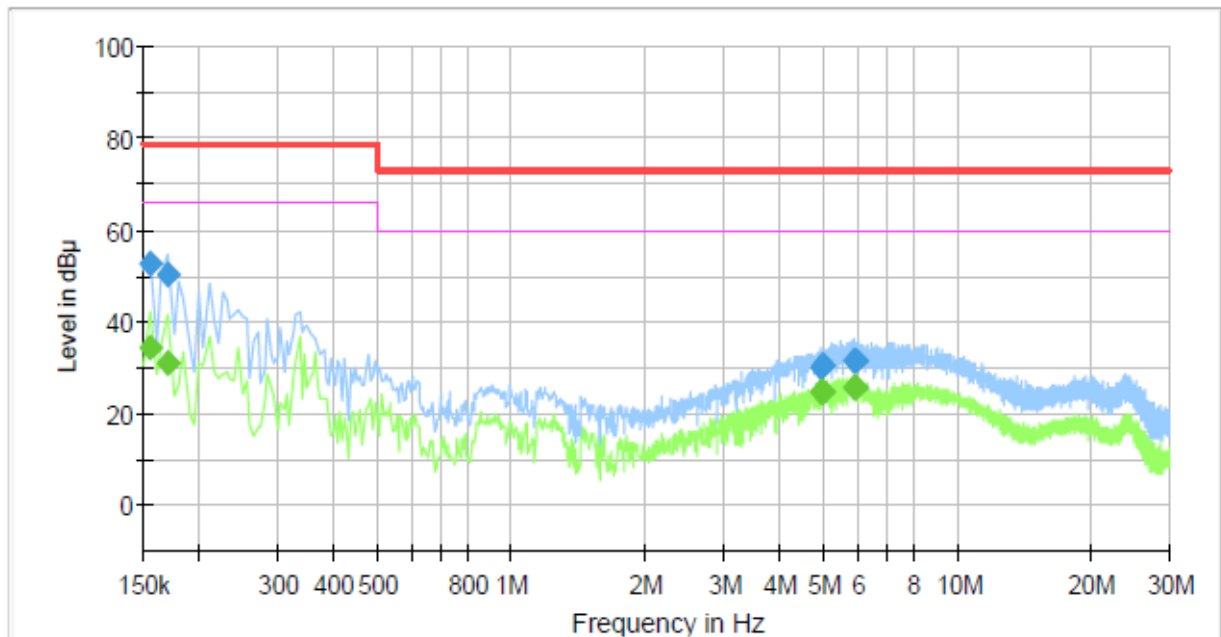
Frequency (MHz)	QuasiPeak (dB μ V)	CAverage (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	34.90	66.00	31.10	1000.0	9.000	L1	19.4
0.155000	52.86	---	79.00	26.14	1000.0	9.000	L1	19.4
5.025000	---	23.71	60.00	36.29	1000.0	9.000	L1	19.7
5.025000	28.79	---	73.00	44.21	1000.0	9.000	L1	19.7
5.035000	---	23.72	60.00	36.28	1000.0	9.000	L1	19.7
5.035000	28.94	---	73.00	44.06	1000.0	9.000	L1	19.7
5.650000	---	24.80	60.00	35.20	1000.0	9.000	L1	19.8
5.650000	30.49	---	73.00	42.51	1000.0	9.000	L1	19.8
6.190000	---	24.06	60.00	35.94	1000.0	9.000	L1	19.8
6.190000	30.65	---	73.00	42.35	1000.0	9.000	L1	19.8



[NEUTRAL]

Common Information

Test Description: Conducted Emission
Job No.: KES-EM241855
Phase: #1_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)
0.155000	---	34.54	66.00	31.46	1000.0	9.000	N	19.3
0.155000	52.53	---	79.00	26.47	1000.0	9.000	N	19.3
0.170000	---	31.04	66.00	34.96	1000.0	9.000	N	19.3
0.170000	50.12	---	79.00	28.88	1000.0	9.000	N	19.3
4.980000	---	24.57	60.00	35.43	1000.0	9.000	N	19.7
4.980000	30.19	---	73.00	42.81	1000.0	9.000	N	19.7
5.025000	---	24.88	60.00	35.12	1000.0	9.000	N	19.7
5.025000	30.51	---	73.00	42.49	1000.0	9.000	N	19.7
5.870000	---	25.64	60.00	34.36	1000.0	9.000	N	19.8
5.870000	31.64	---	73.00	41.36	1000.0	9.000	N	19.8
5.925000	---	25.66	60.00	34.34	1000.0	9.000	N	19.8
5.925000	31.52	---	73.00	41.48	1000.0	9.000	N	19.8

◆ 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))

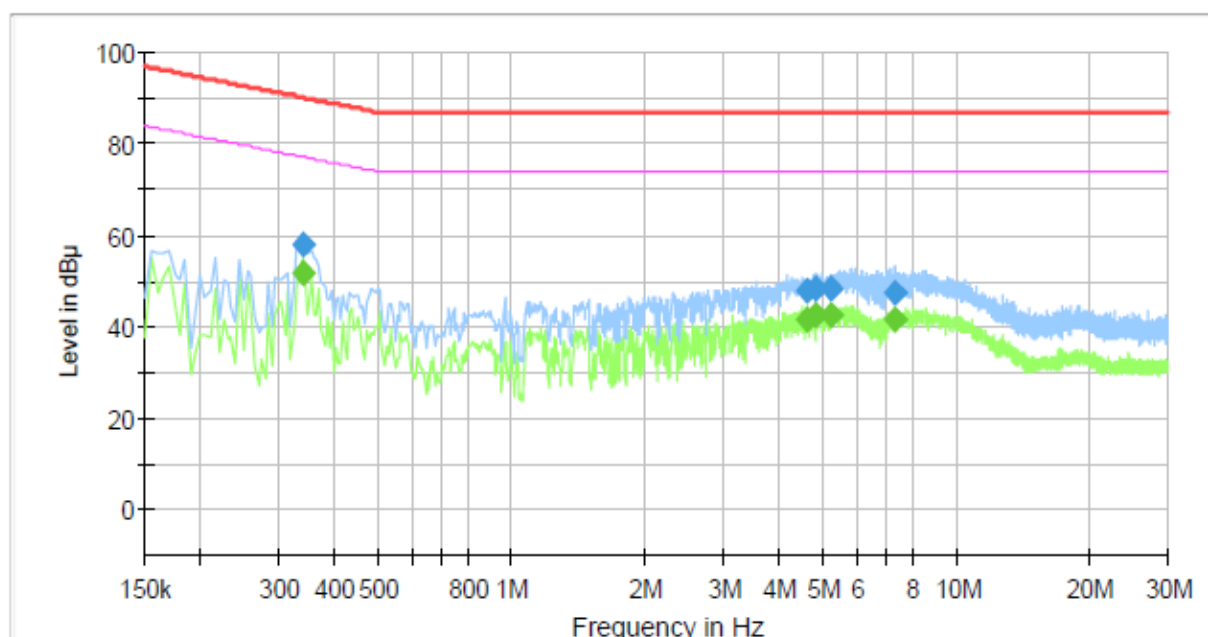
**Conducted Emissions at Telecommunication Ports**

■ #1

[1 000 Mbps]

Common Information

Test Description: Telecommunication Emission
Job No.: KES-EM241855
Mode : #1_TEL 1 000 Mbps
Speed :
Operator Name: KES

**Final Result**

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.340000	---	51.74	77.20	25.46	1000.0	9.000	Single Line	19.3
0.340000	58.25	---	90.20	31.95	1000.0	9.000	Single Line	19.3
4.620000	---	41.82	74.00	32.18	1000.0	9.000	Single Line	19.3
4.620000	47.88	---	87.00	39.12	1000.0	9.000	Single Line	19.3
4.850000	---	42.39	74.00	31.61	1000.0	9.000	Single Line	19.3
4.850000	48.29	---	87.00	38.71	1000.0	9.000	Single Line	19.3
5.235000	---	42.50	74.00	31.50	1000.0	9.000	Single Line	19.3
5.235000	48.36	---	87.00	38.64	1000.0	9.000	Single Line	19.3
7.300000	---	41.52	74.00	32.48	1000.0	9.000	Single Line	19.4
7.300000	47.61	---	87.00	39.39	1000.0	9.000	Single Line	19.4

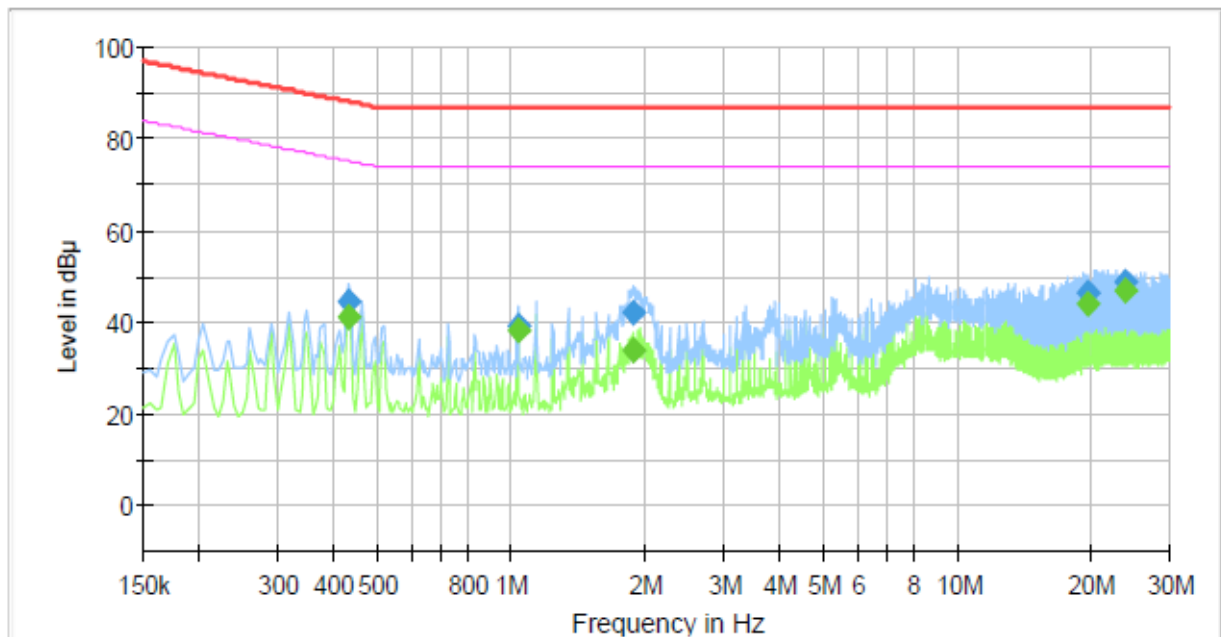


■ #2

[1 000 Mbps]

Common Information

Test Description: Telecommunication Emission
Job No.: KES-EM241855
Mode : #2_TEL 1 000 Mbps
Speed :
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.435000	---	41.33	75.16	33.83	1000.0	9.000	Single Line	19.3
0.435000	44.67	---	88.16	43.49	1000.0	9.000	Single Line	19.3
1.035000	---	38.26	74.00	35.74	1000.0	9.000	Single Line	19.2
1.035000	39.27	---	87.00	47.73	1000.0	9.000	Single Line	19.2
1.890000	---	34.11	74.00	39.89	1000.0	9.000	Single Line	19.2
1.890000	41.92	---	87.00	45.08	1000.0	9.000	Single Line	19.2
19.570000	---	44.26	74.00	29.74	1000.0	9.000	Single Line	19.7
19.570000	46.38	---	87.00	40.62	1000.0	9.000	Single Line	19.7
23.815000	---	47.11	74.00	26.89	1000.0	9.000	Single Line	19.9
23.815000	48.98	---	87.00	38.02	1000.0	9.000	Single Line	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 (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))



Report No. : KES-EM241855

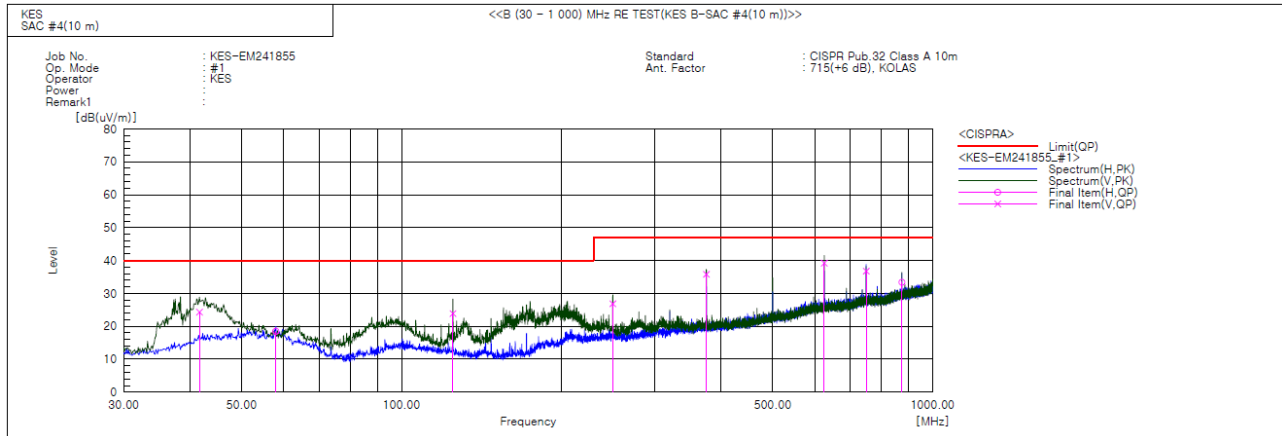
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Impulse Noise (click)

N/A

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

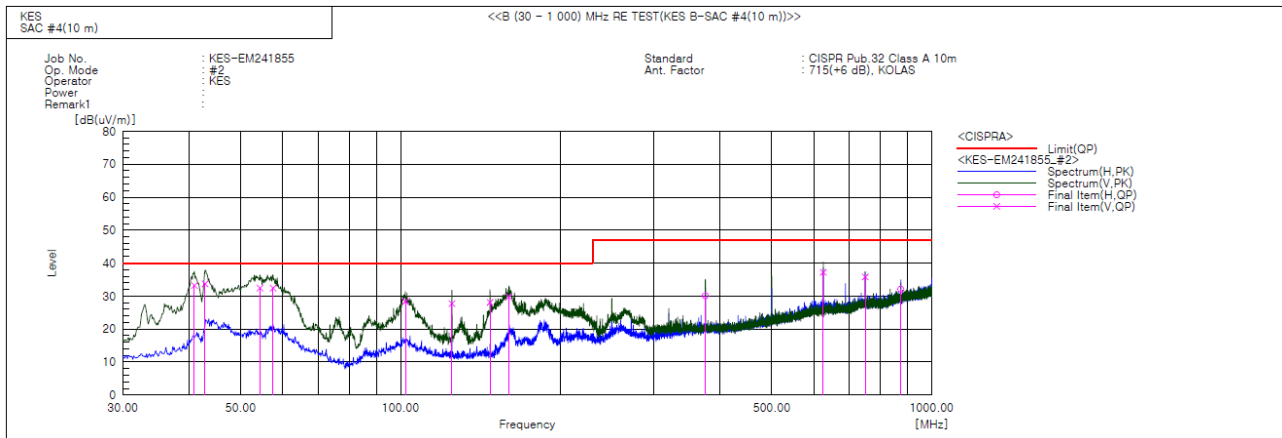
■ #1

**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	41.640	V	46.6	-22.3	24.3	40.0	15.7	141.0	73.0	
2	58.009	H	40.3	-21.8	18.5	40.0	21.5	195.0	60.0	
3	124.939	V	48.5	-24.6	23.9	40.0	16.1	112.0	121.0	
4	249.948	V	45.7	-18.8	26.9	47.0	20.1	147.0	44.0	
5	374.956	V	50.2	-14.4	35.8	47.0	11.2	106.0	25.0	
6	624.974	V	46.8	-7.6	39.2	47.0	7.8	112.0	125.0	
7	749.983	V	42.0	-5.2	36.8	47.0	10.2	141.0	51.0	
8	875.113	H	36.8	-3.4	33.4	47.0	13.6	396.0	327.0	



■ #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	40.913	V	55.7	-22.5	33.2	40.0	6.8	141.0	88.0	
2	42.853	V	55.7	-22.0	33.7	40.0	6.3	100.0	218.0	
3	54.371	V	53.8	-21.3	32.5	40.0	7.5	112.0	95.0	
4	57.524	V	54.1	-21.7	32.4	40.0	7.6	396.0	107.0	
5	102.144	V	50.8	-22.4	28.4	40.0	11.6	141.0	110.0	
6	124.939	V	52.3	-24.6	27.7	40.0	12.3	112.0	188.0	
7	147.370	V	53.3	-25.2	28.1	40.0	11.9	146.0	314.0	
8	159.980	V	54.6	-24.8	29.8	40.0	10.2	396.0	4.0	
9	374.956	H	44.5	-14.4	30.1	47.0	16.9	194.0	227.0	
10	624.974	V	44.8	-7.6	37.2	47.0	9.8	115.0	136.0	
11	749.983	V	41.0	-5.2	35.8	47.0	11.2	100.0	236.0	
12	874.991	H	35.5	-3.4	32.1	47.0	14.9	396.0	52.0	

◆ Calculation

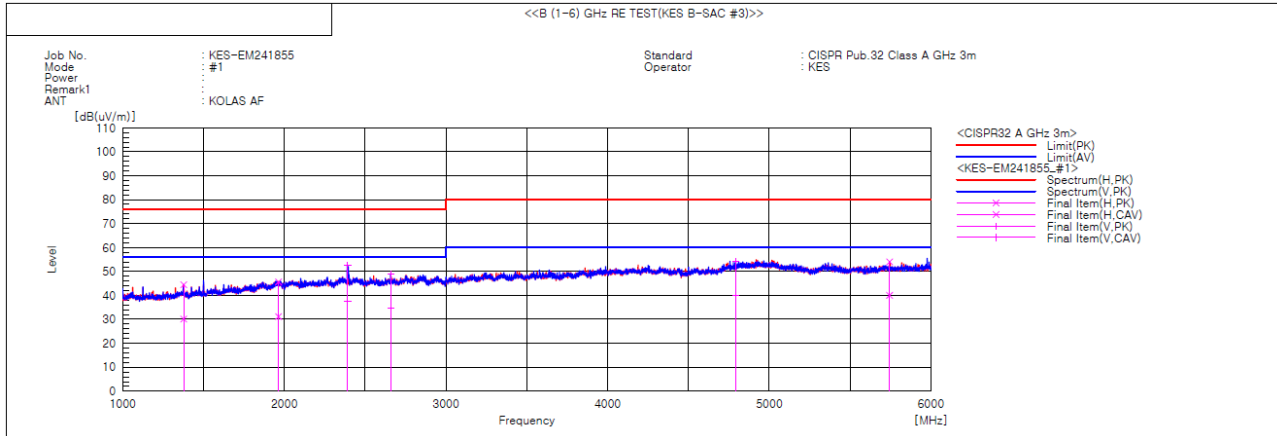
$$\text{Result(QP)} [\text{dB}(\mu\text{V/m})] = (\text{Reading(QP)} [\text{dB}(\mu\text{V})] + \text{c.f} [\text{dB}(1/\text{m})])$$
$$\text{Margin(QP)} [\text{dB}] = \text{Limit} [\text{dB}(\mu\text{V/m})] - \text{Result(QP)} [\text{dB}(\mu\text{V/m})]$$

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)**

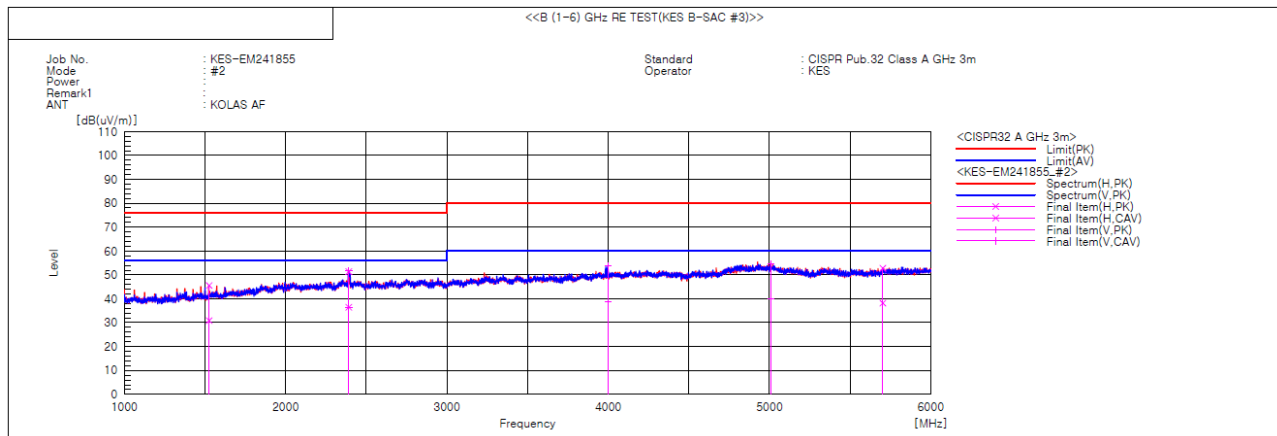
■ #1

**Final Result**

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1376.867	H	45.5	31.2	-1.0	44.5	30.2	76.0	56.0	31.5	25.8	100.0	48.1	
2	1962.811	H	41.2	26.7	4.5	45.7	31.2	76.0	56.0	30.3	24.8	100.0	87.3	
3	2390.992	V	46.6	31.5	5.9	52.5	37.4	76.0	56.0	23.5	18.6	100.0	314.4	
4	2657.315	V	42.7	28.3	6.4	49.1	34.7	76.0	56.0	26.9	21.3	100.0	76.2	
5	4793.852	V	40.0	25.6	14.3	54.3	39.9	80.0	60.0	25.7	20.1	100.0	352.2	
6	5744.063	H	39.4	25.4	14.7	54.1	40.1	80.0	60.0	25.9	19.9	100.0	22.0	



■ #2



No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1524.742	H	45.7	31.0	-0.1	45.6	30.9	76.0	56.0	30.4	25.1	100.0	8.8	
2	2390.752	V	46.0	30.5	5.9	51.9	36.4	76.0	56.0	24.1	19.6	100.0	317.1	
3	2390.711	H	45.5	30.6	5.9	51.4	36.5	76.0	56.0	24.6	19.5	100.0	27.3	
4	3998.067	V	42.5	27.5	11.2	53.7	38.7	80.0	60.0	26.3	21.3	100.0	180.4	
5	5008.867	V	39.2	24.4	15.5	54.7	39.9	80.0	60.0	25.3	20.1	100.0	52.6	
6	5702.022	H	38.5	23.9	14.3	52.8	38.2	80.0	60.0	27.2	21.8	100.0	43.3	

◆ Calculation

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

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**

■ #1

Average harmonic current results				
Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.039			
2	0.001	0.120	1.080	n/a
3	0.032	1.380	2.300	PASS
4	0.002	0.434	0.430	n/a
5	0.032	2.804	1.140	PASS
6	0.001	0.442	0.300	n/a
7	0.032	4.197	0.770	PASS
8	0.001	0.597	0.230	n/a
9	0.030	7.580	0.400	PASS
10	0.001	0.757	0.184	n/a
11	0.029	8.648	0.330	PASS
12	0.001	0.859	0.153	n/a
13	0.027	12.932	0.210	PASS
14	0.001	1.072	0.131	n/a
15	0.026	17.050	0.150	PASS
16	0.001	1.138	0.115	n/a
17	0.024	18.032	0.132	PASS
18	0.001	1.238	0.102	n/a
19	0.022	18.657	0.118	PASS
20	0.001	1.336	0.092	n/a
21	0.020	12.623	0.161	PASS
22	0.001	1.507	0.084	n/a
23	0.018	12.490	0.147	PASS
24	0.001	1.653	0.077	n/a
25	0.017	12.288	0.135	PASS
26	0.001	1.702	0.071	n/a
27	0.015	11.881	0.125	PASS
28	0.001	1.928	0.066	n/a
29	0.013	11.081	0.116	PASS
30	0.001	1.920	0.061	n/a
31	0.011	10.392	0.109	PASS
32	0.001	2.111	0.058	n/a
33	0.010	9.443	0.102	PASS
34	0.001	2.188	0.054	n/a
35	0.008	8.448	0.096	PASS
36	0.001	2.266	0.051	n/a
37	0.007	7.607	0.091	PASS
38	0.001	2.469	0.048	n/a
39	0.006	6.620	0.087	PASS
40	0.001	2.361	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	0.040			
2	0.002	0.095	1.620	n/a
3	0.033	0.956	3.450	PASS
4	0.002	0.374	0.645	n/a
5	0.033	1.917	1.710	PASS
6	0.002	0.344	0.450	n/a
7	0.033	2.868	1.155	PASS
8	0.002	0.463	0.345	n/a
9	0.031	5.182	0.600	PASS
10	0.002	0.607	0.276	n/a
11	0.030	5.973	0.495	PASS
12	0.002	0.676	0.230	n/a
13	0.028	8.853	0.315	PASS
14	0.002	0.804	0.197	n/a
15	0.026	11.639	0.225	PASS
16	0.001	0.867	0.173	n/a
17	0.024	12.303	0.199	PASS
18	0.001	0.958	0.153	n/a
19	0.023	12.693	0.178	PASS
20	0.001	1.039	0.138	n/a
21	0.021	12.851	0.161	PASS
22	0.001	1.179	0.125	n/a
23	0.019	12.639	0.147	PASS
24	0.001	1.263	0.115	n/a
25	0.017	12.429	0.135	PASS
26	0.001	1.294	0.106	n/a
27	0.015	11.995	0.125	PASS
28	0.001	1.516	0.099	n/a
29	0.013	11.193	0.116	PASS
30	0.001	1.444	0.092	n/a
31	0.011	10.492	0.109	PASS
32	0.001	1.592	0.086	n/a
33	0.010	9.559	0.102	PASS
34	0.001	1.662	0.081	n/a
35	0.008	8.560	0.096	PASS
36	0.001	1.725	0.077	n/a
37	0.007	7.728	0.091	PASS
38	0.001	1.865	0.073	n/a
39	0.006	6.724	0.087	PASS
40	0.001	1.773	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

■ #1

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

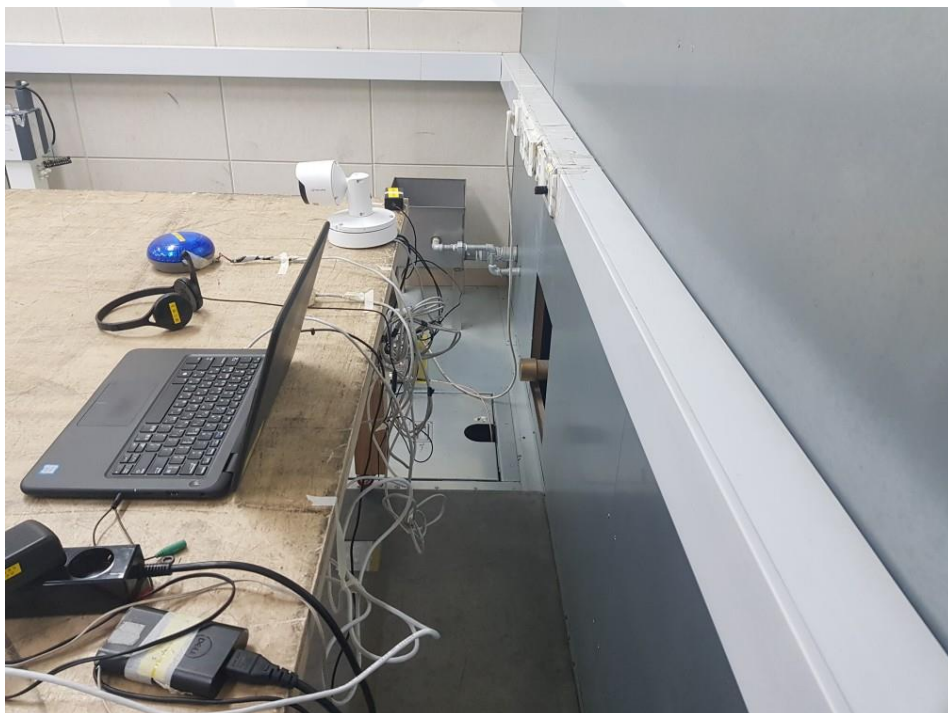




Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports

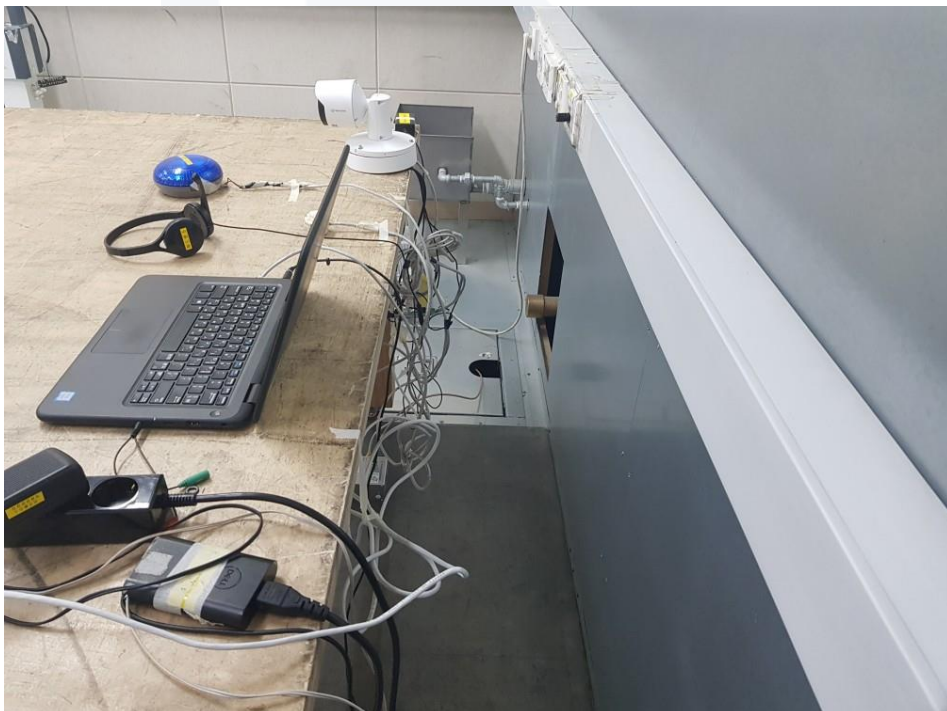
■ #1





Conducted Emissions at Telecommunication Ports

■ #1





■ #2





Impulse Noise (click)

N/A





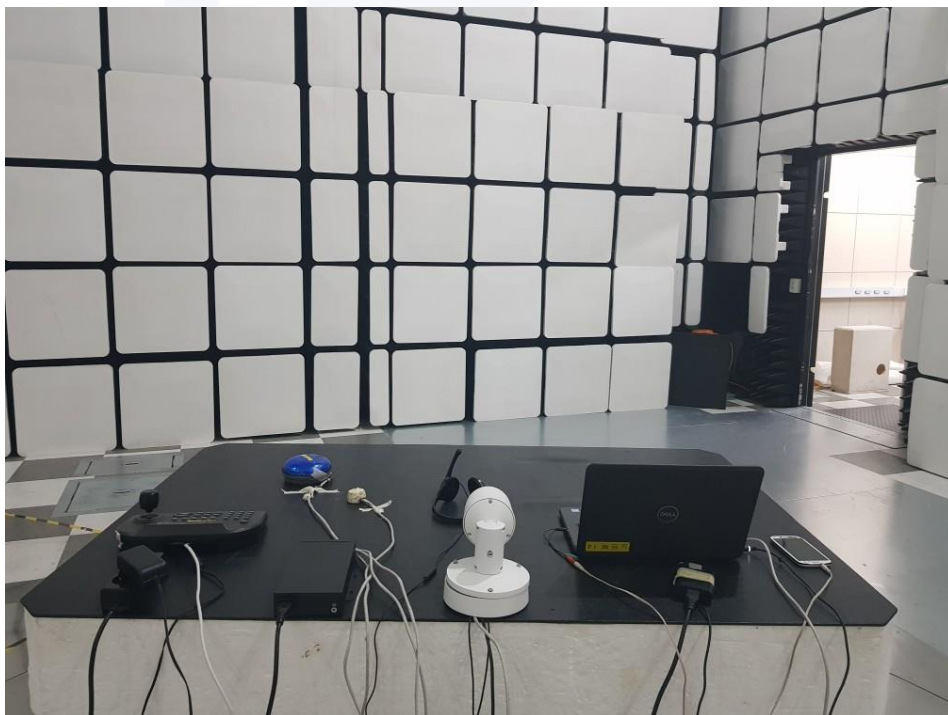
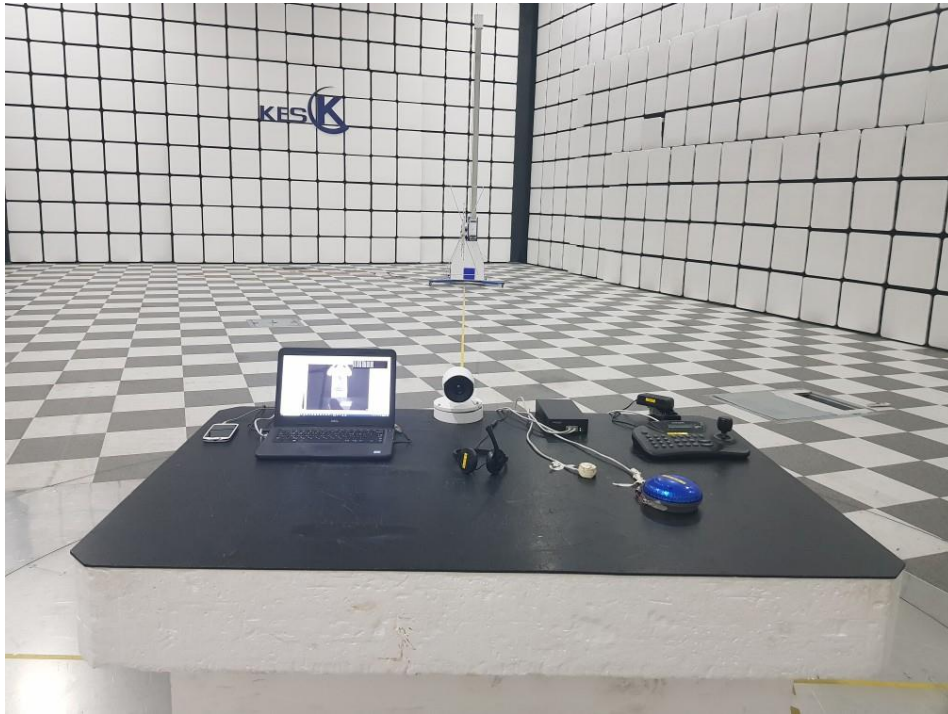
Radiated Electric Field Emissions(Below 1 GHz)

■ #1





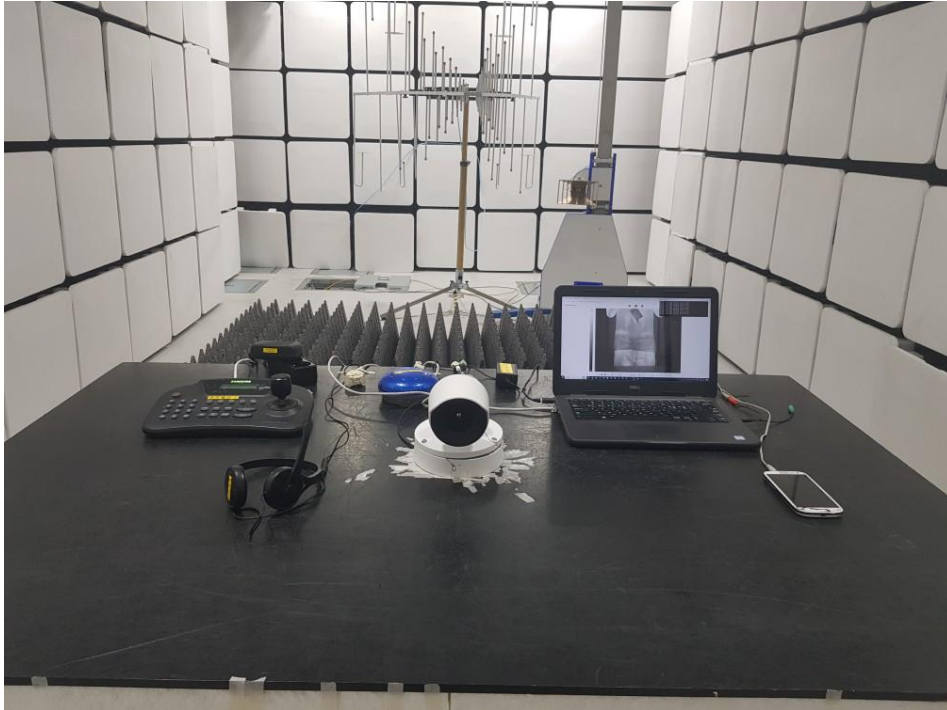
■ #2





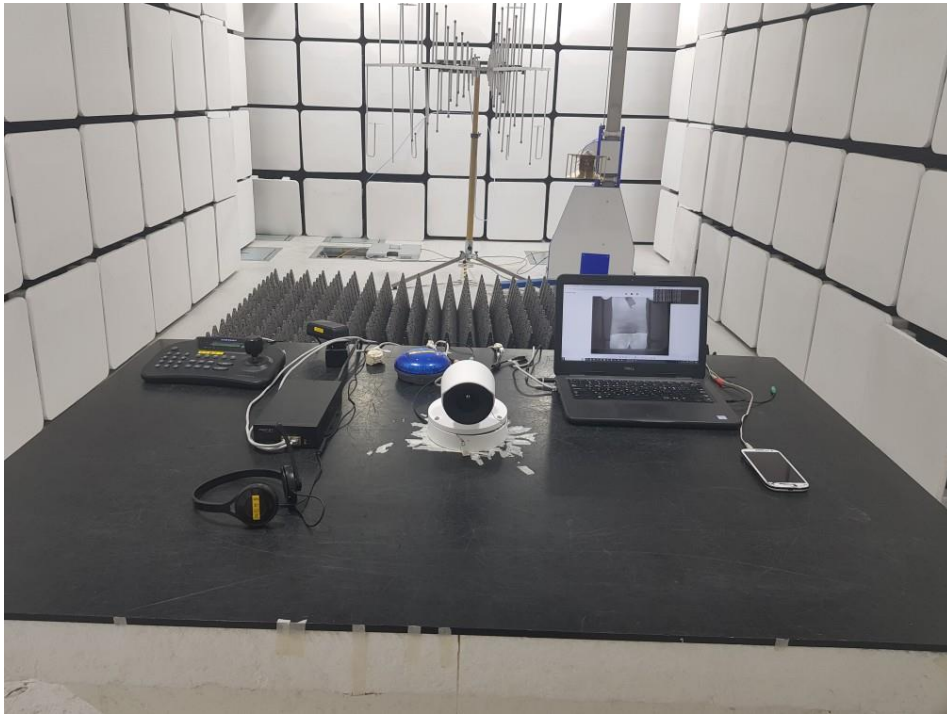
Radiated Electric Field Emissions(Above 1 GHz)

■ #1





■ #2





Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ #1





Electrostatic Discharge

■ #1



■ #2





Radio-frequency Electromagnetic Field

■ #1



■ #2





Fast Transients

■ #1



■ #2





Surges

■ #1



■ #2





Conducted Disturbance

■ #1



■ #2





Power Frequency Magnetic Field Immunity

■ #1

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

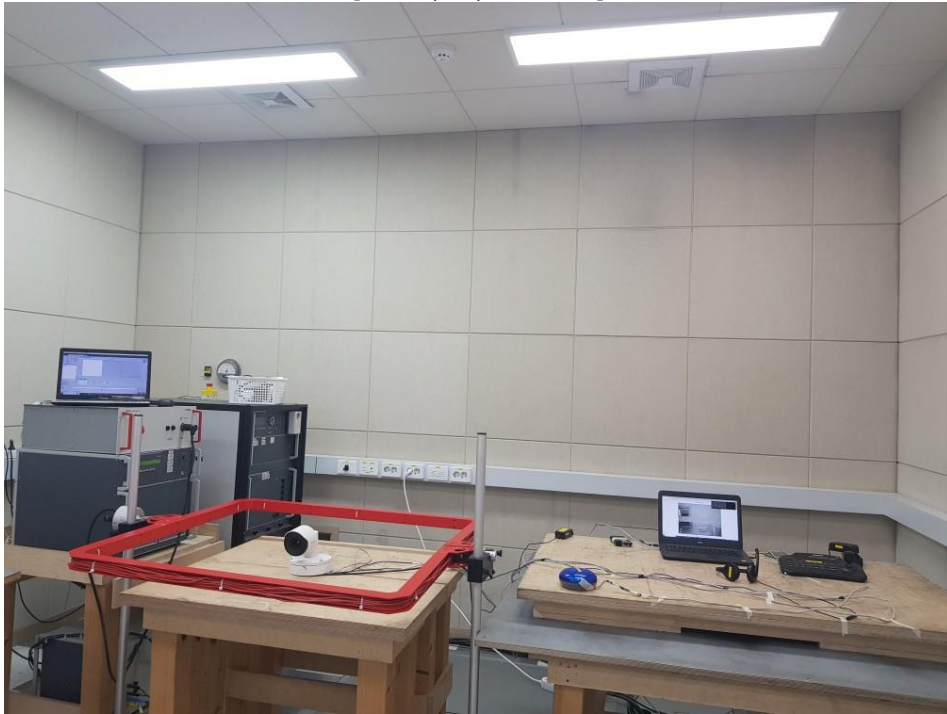


[50 Hz (AC), 100 A/m]





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





■ #2

[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 – IR Board

(Top)



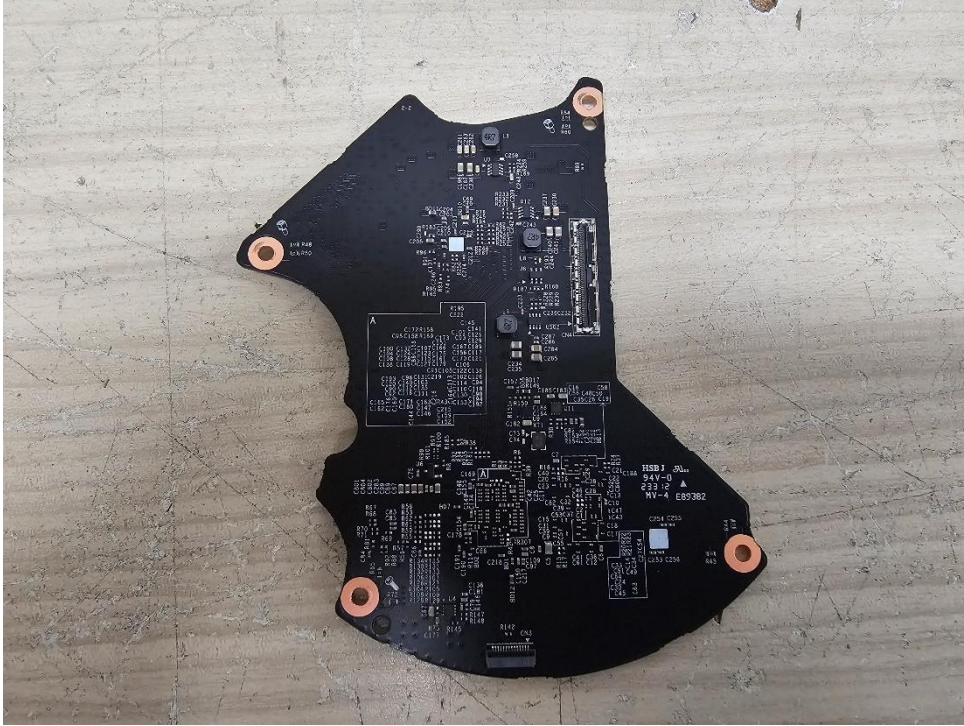
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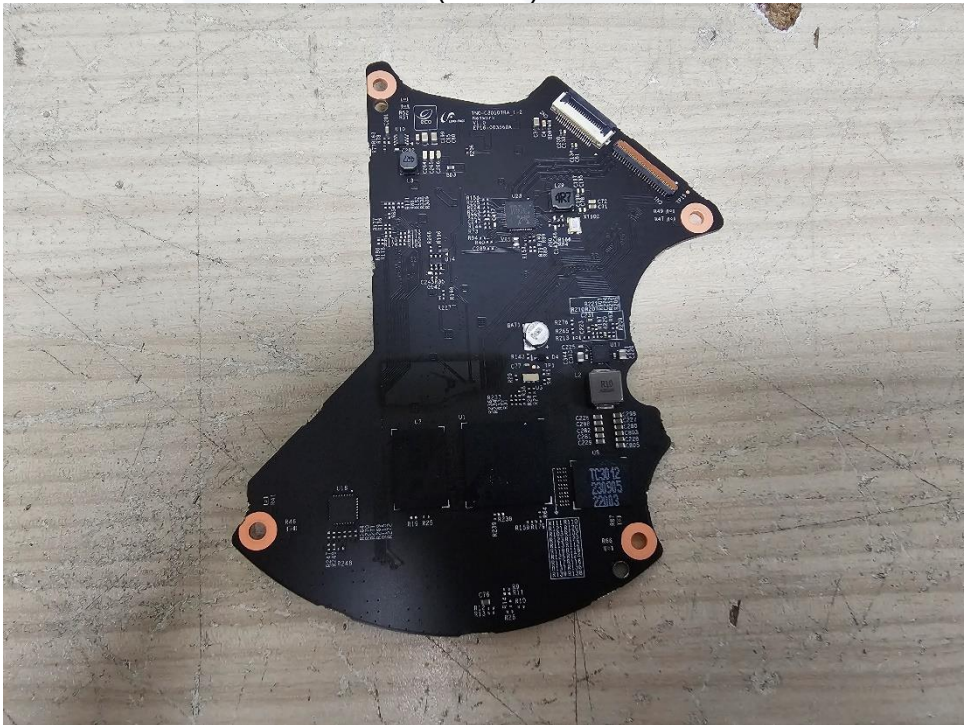


EUT Internal View – Network Board

(Top)



(Bottom)



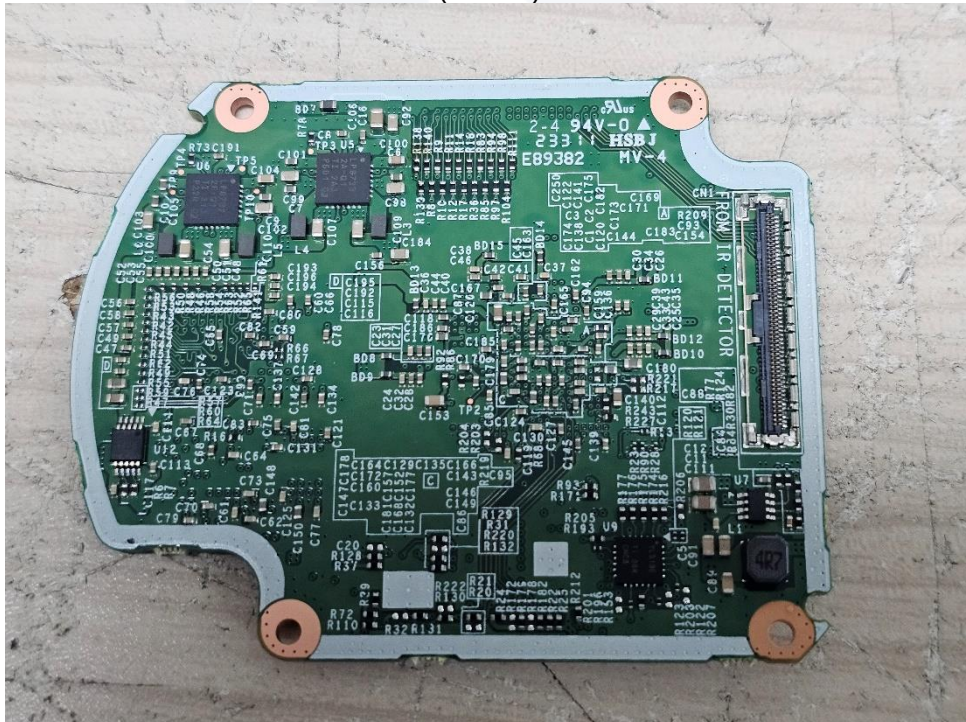


EUT Internal View – NUC Board

(Top)



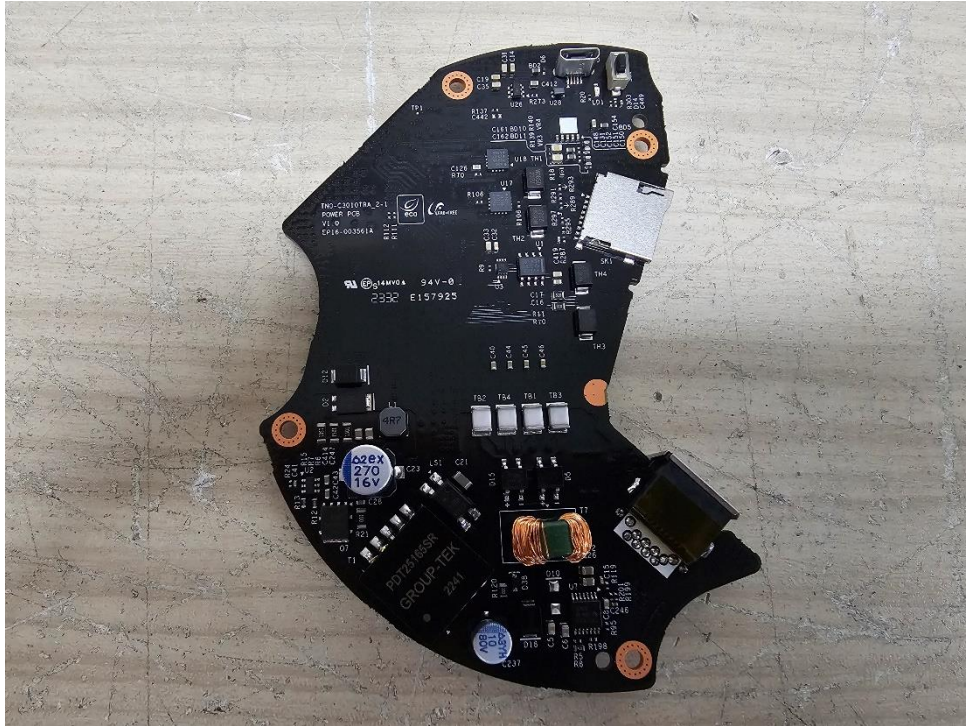
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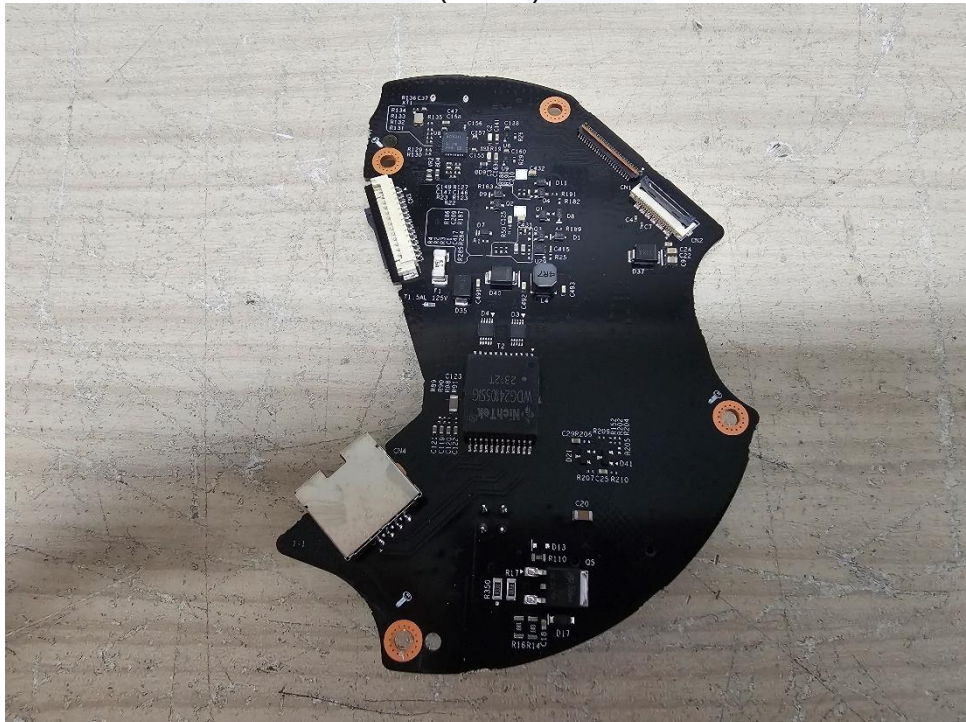


EUT Internal View – Power Board

(Top)



(Bottom)





EUT Internal View – Lens

(Top)



(Bottom)





EUT Internal View – cable





Label and Location



NETWORK THERMAL CAMERA

Model No : TNO-C3032TRA

Manufacturer : HANWHA VISION VIETNAM COMPANY LIMITED

Made in Vietnam

UK CA CE