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Report No.:
KES-EM-23T0787
Page (1) of(56)

EMC TEST REPORT

Test Report No. : KES-EM-23T0787
Date of Issue : Sep. 08, 2023
Product name : NETWORK CAMERA
Model/Type No. : PNM-C16013RVQ
Variant Model : -
Applicant : Hanwha Vision Co., Ltd
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, Republic of Korea
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 commune, Bac Ninh city, Bac Ninh province, Vietnam
2. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi- do,
Korea (Suwon Industrial Complex)
Date of Receipt : Aug. 22, 2023
Test date : Sep. 05, 2023 ~ Sep. 06, 2023
Test Results : ☒ In Compliance ☐ Not in Compliance

Tested by

Kang Hyeon, Kim
EMC Test Engineer

Reviewed by

Dae Jung, Choi
EMC Technical Manager

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

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Page (2) of(56)

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Sep. 08, 2023	KES-EM-23T0787	Issued

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TABLE OF CONTENTS

1.0	General Product Description.....	4
1.1	Test Voltage & Frequency.....	7
1.2	Variant Model Differences.....	7
1.3	Device Modifications.....	7
1.4	Equipment Under Test.....	7
1.5	Support Equipments.....	7
1.6	External I/O Cabling.....	8
1.7	EUT Operating Mode(s).....	8
1.8	Configuration.....	9
1.9	Remarks when standards applied.....	10
1.10	Calibration Details of Equipment Used for Measurement.....	10
1.11	Test Facility.....	10
1.12	Laboratory Accreditations and Listings.....	10
2.0	Test Regulations.....	11
2.1	Conducted Emissions at Mains Power Ports.....	12
2.2	Conducted Emissions at Telecommunication Ports.....	13
2.3	Radiated Electric Field Emissions(Below 1 GHz).....	14
2.4	Radiated Electric Field Emissions(Above 1 GHz).....	15
2.5	Harmonic Current Emissions.....	16
2.6	Voltage Fluctuations and Flicker.....	17
3.0	Criteria for compliance.....	18
3.1	Electrostatic Discharge.....	20
3.2	Radiated Electric Field Immunity.....	23
3.3	Electrical Fast Transients/Bursts.....	26
3.4	Surge Transients.....	28
3.5	Conducted Disturbance.....	31
3.6	Voltage Dips and Short Interruptions.....	34
APPENDIX A – TEST DATA.....		36
Conducted Emissions at Mains Power Ports.....		36
Conducted Emissions at Telecommunication Ports.....		38
Radiated Electric Field Emissions(Below 1 GHz).....		39
Radiated Electric Field Emissions(Above 1 GHz).....		40
Harmonic Current Emissions and Voltage Fluctuations and Flicker.....		41
Test Setup Photos and Configuration.....		44
Conducted Emissions at Mains Power Ports.....		44
Conducted Emissions at Telecommunication Ports.....		45
Radiated Electric Field Emissions(Below 1 GHz).....		46
Radiated Electric Field Emissions(Above 1 GHz).....		47
Harmonic Current Emissions and Voltage Fluctuations and Flicker.....		48
Electrostatic Discharge.....		49
Radiated Electric Field Immunity.....		49
Electrical Fast Transients/Bursts.....		50
Surge Transients.....		50
Conducted Disturbance.....		51
Voltage Dips and Short Interruptions.....		51
EUT External Photographs.....		52
EUT Internal Photographs.....		53



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Report No.:
KES-EM-23T0787
Page (4) of(56)

1.0 General Product Description

Main Specifications of EUT are:

Video	
Imaging Device	1/2.8" CMOS: each CH
Resolution	2592x1520, 2560x1440, 1920x1080, 1280x1024, 1280x960, 1280x720, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360, 320x240
Max. Framerate	(TBD) H.265/H.264: Max. 15fps/15fps MJPEG: Max. 15fps/15fps
NETD	None
Pixel Size	None
Min. Illumination	Color: 0.075Lux(F1.2, 1/30sec, 30IRE) BW : 0Lux(IR LED on)
Video Out	USB: Micro USB Type B, 1280x720 for installation
Video Transmission Distance	None
Lens	
Focal Length (Zoom Ratio)	3.19mm fixed focal
Max. Aperture Ratio	F1.2
Angular Field of View	H: 97° / V: 54° / D: 116°
Min. Object Distance	2m(6.56ft)
Focus Control	Manual
Lens Type	Fixed Iris
Mount Type	M12
Optional Lens	None
Pan / Tilt / Rotate	
Pan / Tilt / Rotate Range	0~360°(100° per CH)/ 0~75° / 0~90°
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	Auto(ICR)
Backlight Compensation	BLC, WDR, SDR
Wide Dynamic Range	120db
Digital Noise Reduction	WiseNR II (Based on AI engine), SSNR V
Digital Image Stabilization	None
Defog	None
Motion Detection	8ea, 8point Polygonal zones
Privacy Masking	6ea, Rectangular zones - Color: Gray, Black, White
Gain Control	Low / Middle / High
White Balance	ATW / AWC / Manual / Indoor / Outdoor
LDC	Support
Electronic Shutter Speed	Minimum / Maximum / Anti flicker(1/5~1/12,000sec) Auto Prefer shutter control(Based on AI engine)
Digital PTZ	None
Video Rotation	Flip, Mirror, Hallway view(90°/270°) - Each channel separately
Analytics	Classified object type: Person/Face/Vehicle/License plate Attributes: Vehicle(Type: Car/Bus/Truck/Motorcycle/Bicycle) Support BestShot Analytics events based on AI engine - Object detection, Virtual line(Crossing/Direction), Virtual area(Loitering/Intrusion/Enter/Exit) Analytics events - Motion detection, Tampering, Virtual area(Appear/Disappear) * Audio detection, Sound classification(with NW I/O box SPM-4210)
Business Intelligence	None
Serial Interface	None
Alarm I/O	None

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Report No.:
KES-EM-23T0787
Page (5) of(56)

Alarm Triggers	Analytics, Network disconnect, App event, Time schedule, MQTT subscription * Alarm input(with NW I/O Box SPM-4210)
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(with NW I/O box SPM-4210) - Handover: PTZ preset, Send message by HTTP/HTTPS/TCP - MQTT: publication
Audio In	Support via NW I/O Box SPM-4210
Audio Out	Support via NW I/O Box SPM-4210
IR Viewable Length	20m(65.62ft)
IR Illuminator (Optional)	None
Water Removal	None
Auto Tracking	None
Coaxial Protocol	None
Color Palettes	None
Radiometry	
Temperature Detect Range	None
Temperature Accuracy	None
Temperature Detection	None
Additional	None
Network	
Ethernet	Metal shielded RJ-45(10/100/1000BASE-T)
Video Compression	H.265/H.264: Main/Baseline/High, MJPEG
Audio Compression	None
Smart Codec	Manual(5ea area), WiseStreamII, WiseStreamIII(Based on AI engine)
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(10 users) / Multicast Multiple streaming(Up to 3 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, PIM-SM, UPnP, Bonjour, LLDP, CDP, SRTP(TCP, UDP Unicast), MQTT
Security	TPM 2.0(FIPS 140-2 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 Private Root CA, pre-installed) Secure OS/Boot/Storage, Verify firmware forgery
SIP support (VoIP, Peer-to-peer, SIP/PB)	None
Application Programming Interface	ONVIF Profile S/T/M SUNAPI(HTTP API) Wisenet open platform
Security	
OS / Firmware Protect	Secure boot, Verify firmware forgery, 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	IP address filtering
Data Protect	Authentication information encryption, ZIP compression encryption
Audit	User Access/System/Event log
Device ID	Device Certificate(Hanwha Techwin Root CA, pre-installed)
Secure Storage	TPM 2.0 with FIPS 140-2 level2
Security Certificate	Secure by default
General	
Webpage Language	English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Portuguese, Czech, Polish, Turkish, Dutch, Greek, Hungarian
Web Viewer	None
Edge Storage	Micro SD/SDHC/SDXC 2slot Max. 1TB(512GBx2)

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Report No.:
KES-EM-23T0787
Page (6) of(56)

Memory	4GB RAM, 512MB Flash
Environmental & Electrical	
Operating Temperature / Humidity	-40°C~+55°C(-40°F~+131°F) * Start up should be done at above -35°C 0~95% RH(non-condensing), Humidity control /w AIR vent
Storage Temperature / Humidity	-50°C~+60°C(-58°F~+140°F) / 0~90% RH
Certification	IP66, NEMA4X, IK10
Input Voltage	PoE+(IEEE802.3at type 2, Class4)
Power Consumption	PoE+: 22W, typical ??W
Mechanical	
Color / Material	White / Aluminum Hard-coated dome bubble
RAL Code	RAL9003
Product Dimensions / Weight	Ø200x80mm(7.87x3.15"), ???g(??? lb)
Compatible Conduit hole / Gangbox	None / single, double, 4" octagon, 4" square
Hanging Mount (Dome)	SBP-200HMMW
Skin Cover (Dome)	None
Weather Cap (Dome)	None
Power Module	None
Backbox	None
Certifications & Standards	
Network	None
EMC	FCC 47 CFR 15 Subpart B Class A ICES-3(A)/NMB-3(A) CE/UKCA - EN 55032 Class A, EN 50130-4 VCCI CISPR 32 Class A RCM AS/NZS CISPR 32 Class A KS C 9832 Class A, KS C 9835
Safety	UL 62368-1, CAN/CSA C22.2 NO. 62368-1 IEC 62471
Environment	
Environment	EN IEC 63000 IEC 60529 IP66, IEC 62262 IK10 NEMA 250 type 4X
Video	None
DORI (EN62676-4 standard)	
Detect (25PPM/ 8PPF)	45.9m(150.47ft)
Observe (63PPM/ 19PPF)	18.3m(60.19ft)
Recognize (125PPM/ 38PPF)	9.2m(30.09ft)
Identify (250PPM/ 76PPF)	4.6m(15.05ft)

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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 (PoE)

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	PNM-C16013RVQ	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
PoE Injector	PT-PSE109GBRO-AH	-	Dongguan PROCET Network Technology Co.,Ltd	
Laptop	LG15N54	-	LG	-
Laptop Adapter	PA-1900-14	-	LITE-ON TECHNOLOGY (CHANGZHOU)CO., LTD	-
Micro SD Card1	-	-	Transcend	16 GB
Micro SD Card2	-	-	Transcend	16 GB

1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA (EUT)	RJ-45(PoE)	PoE Injector	RJ-45(PoE)	4.0	U
	Micro SD Card Slot	Micro SD Card1	Micro SD Card Slot	-	-
	Micro SD Card Slot	Micro SD Card2	Micro SD Card Slot	-	-
Laptop	RJ-45(LAN)	PoE Injector	RJ-45(LAN)	1.0	U
	DC Jack	Laptop Adapter	DC Jack	1.6	U

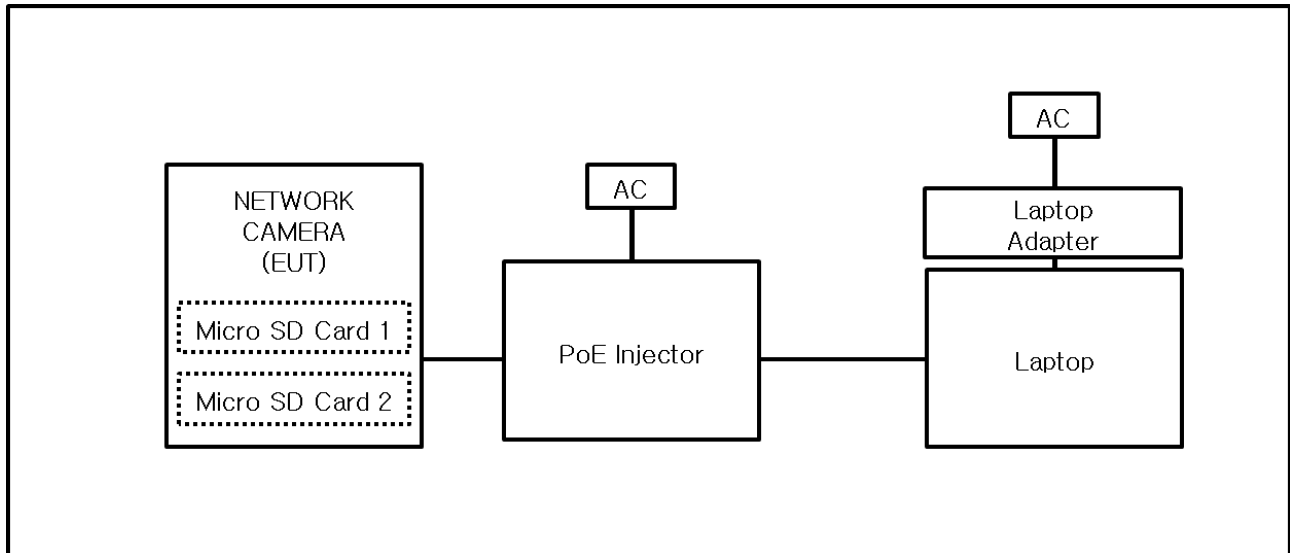
* Unshielded = U, Shielded = S

1.7 EUT Operating Mode(s)

Test mode	operating
Operater	1. Run the Web Viewer on your laptop and check the camera video output 2. PingTest from your laptop to check the network status 3. After the test, the Micro SD Card storage file was checked.

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

1.8 Configuration



1.9 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 Type-B Micro is not tested because it is for administrator use.

1.10 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less.

1.11 Test Facility

The measurement facility is located at 473-21, Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea, Republic of. The sites are constructed in conformance with the requirements of ANSI C63.4a-2017 and CISPR 16-1-4:2019

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site) 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 55032:2015/A11:2020

☒ Class A

☐ Class B

☒ EN 50130-4:2011/A1:2014

☒ **EMC –Regulations 2016**

☒ EN 55032:2015/A11:2020

☒ Class A

☐ Class B

☒ EN 50130-4:2011/A1:2014

2.1 Conducted Emissions at Mains Power Ports

Test Date

N/A

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☐	EMI Test SW	EMC32	R & S	9.12.00	-
☐	EMI TEST RECEIVER	ESR3	R & S	101783	11, 11, 2023
☐	LISN	ENV216	R & S	101787	11, 10, 2023
☐	LISN	ESH2-Z5	R & S	100450	11, 10, 2023
☐	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 10, 2023

Test Conditions

Temperature:

°C

Relative Humidity:

% R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☐ PASS
☐ NOT PASS
☒ NOT APPLICABLE

Remarks

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

2.2 Conducted Emissions at Telecommunication Ports

Test Date

Sep. 05, 2023

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101783	11, 11, 2023
☒	LISN	ENV216	R & S	101787	11, 10, 2023
☒	LISN	ESH2-Z5	R & S	100450	11, 10, 2023
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 10, 2023
☐	8-WIRE ISN CAT3,5	ENY81	R & S	100174	11, 22, 2023
☒	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	11, 22, 2023
☐	CDN	CDNS502A	TESEQ	40431	11, 10, 2023

Test Conditions

Temperature: (25,0 ± 0,2) °C

Relative Humidity: (49,3 ± 0,2) % 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 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Sep. 05, 2023

Test Location☐ OPEN AREA TEST SITE #2☒ 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	03, 21, 2024
☒	AMPLIFIER	SCU 01	R & S	100603	11, 10, 2023
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 17, 2024
☒	ATTENUATOR	8491A	HP	32173	03, 03, 2024

Test Conditions

Temperature: (24,5 ± 0,1) °C

Relative Humidity: (48,7 ± 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.

2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Sep. 05, 2023

Test Location

SEMI ANECHOIC CHAMBER #5

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test SW	ES10/RE	TOYO Corporation	2022.01.000	-
☒	EMI TEST RECEIVER	ESU26	Rohde & Schwarz	100552	03, 21, 2024
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	11, 08, 2023
☒	PREAMPLIFIER	8449B	HP	3008A00538	05, 31, 2024
☒	ATTENUATOR	8491B	HP	23094	03, 21, 2024

Test Conditions

Temperature: (24,1 ± 0,2) °C

Relative Humidity: (47,5 ± 0,2) % R.H.

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

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

2.5 Harmonic Current Emissions

Test Date

N/A

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☐	EMI Test SW	net.control	EM TEST	2.1.4	-
☐	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	03, 27, 2024
☐	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature:

°C

Relative Humidity:

% 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

RemarksEquipment with a nominal voltage less than 220 V is not tested.

2.6 Voltage Fluctuations and Flicker

Test Date

N/A

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☐	EMI Test SW	net.control	EM TEST	2.1.4	-
☐	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	03, 27, 2024
☐	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature:

°C

Relative Humidity:

% R.H.

Test Results

The requirements are:

- ☐ PASS
☐ NOT PASS
☒ NOT APPLICABLE

RemarksEquipment with a nominal voltage less than 220 V is not tested.

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

EN 50130-4:2011/A1:2014 Alarm systems-Part 4: Electromagnetic compatibility Product family standard:
Immunity requirements for components of fire, intruder and social alarm systems

The variety and the diversity of the apparatus within the scope of this document makes it difficult to define precise criteria for the evaluation of the immunity test results.

If as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe then the apparatus shall be deemed to have failed the test.

A functional description and a definition of performance by the manufacture and noted in the test report, based on the following criteria:

Electrostatic discharge

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing that is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

Radiated electromagnetic fields

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing which could be interpreted by associated equipment as a change, and no such

Flickering of indicators occurs at a field strength of 3 V/m.

For components of CCTV systems, where the picture is allowed at 10 V/m, providing.

(a) there is no permanent damage or change to EUT

(e.g. no corruption of memory or changes to programmable setting etc.)

(b) at 3 V/m, any deterioration of the picture is so minor that the system could still be used; and

(c) there is no observable deterioration of the picture at 1 V/m.

Fast transient burst / slow high energy voltage surge

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing

That there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

Conducted RF immunity

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing

That there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change,
and no such flickering of indicators oeuvres at $U = 130 \text{ dB}\mu\text{V}$.

For component of CCTV systems, where the status is monitored by observing the TV picture,
then deterioration of the picture is allowed at $U = 140 \text{ dB}\mu\text{V}$, providing:

- (a) there is no permanent damage or change to the EUT
(e.g. no corruption of memory or changes to programmable settings etc.)
- (b) at $U = 130 \text{ dB}\mu\text{V}$, any deterioration of the picture is so minor that the system could still be used; and
- (c) there in no observable deterioration of the picture at $U = 120 \text{ dB}\mu\text{V}$.

Voltage dip/interruption / Voltage variation

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test, after the conditioning.

3.1 Electrostatic Discharge

Reference Standard

EN 61000-4-2:2009

Test Date

Sep. 06, 2023

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	01, 31, 2024
☒	HCP	-	KES	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: (25,0 ± 0,1) °C
Relative Humidity: (48,2 ± 0,1) % R.H.
Atmospheric Pressure: (99,8 ± 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

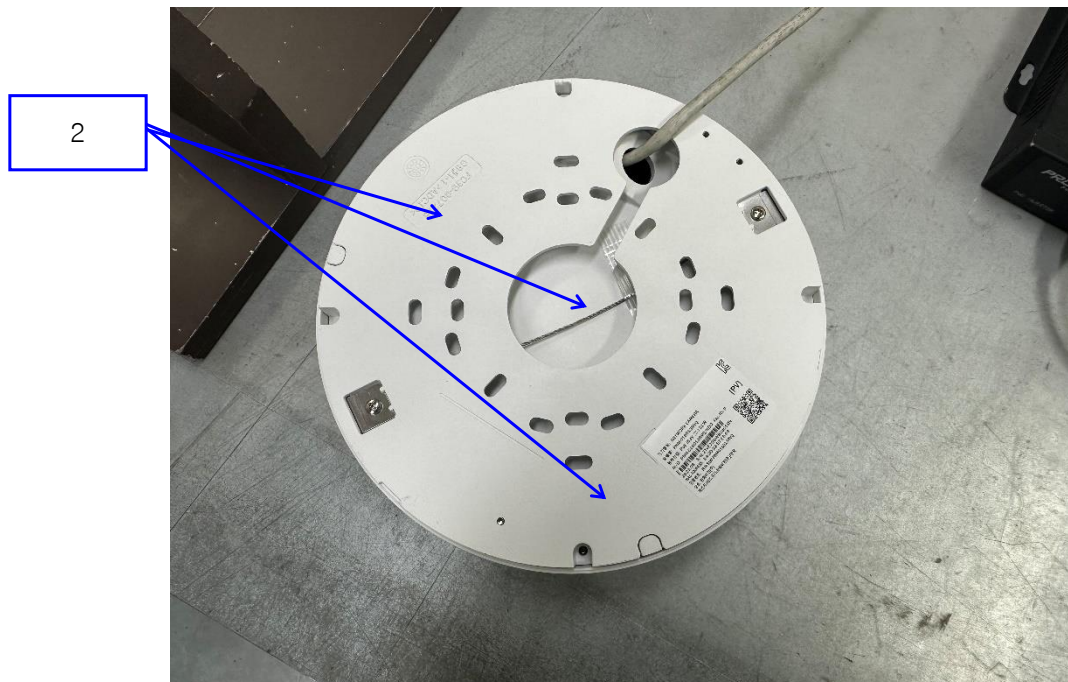
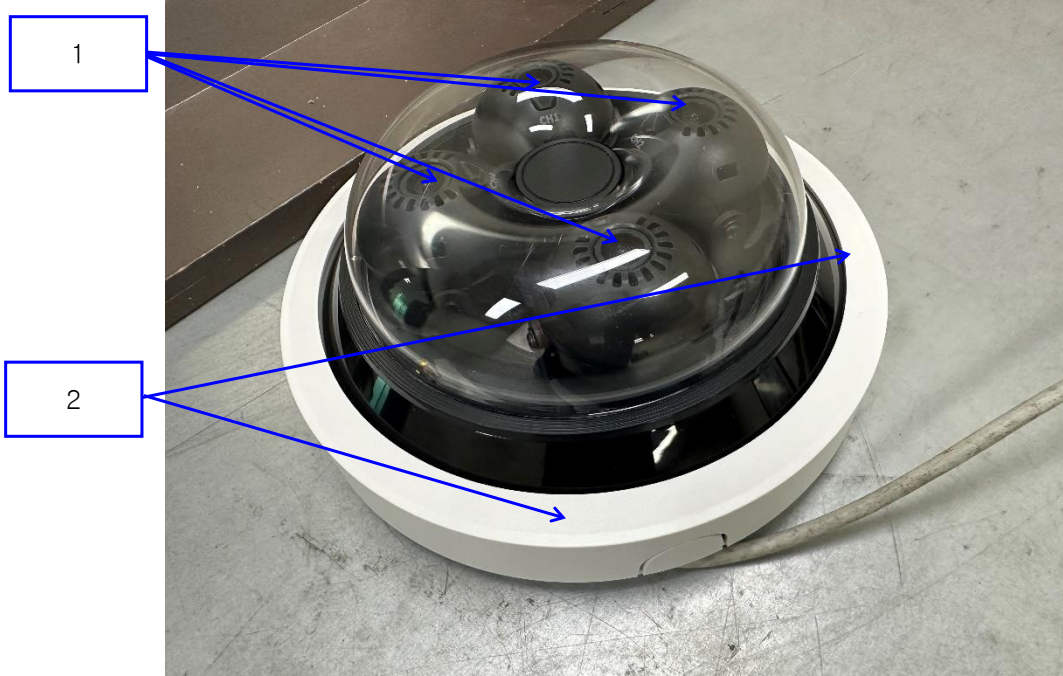
Discharge Voltage:	Contact	Air	HCP	VCP
	☐ 2 kV	☒ 2 kV	☐ 2 kV	☐ 2 kV
	☐ 4 kV	☒ 4 kV	☐ 4 kV	☐ 4 kV
	☒ 6 kV	☐ 6 kV	☒ 6 kV	☒ 6 kV
	☐ 8 kV	☒ 8 kV	☐ 8 kV	☐ 8 kV
	☐ 15 kV	☐ 15 kV	☐ 15 kV	☐ 15 kV

Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

Location of Discharge:

Air
Contact



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Report No.:

KES-EM-23T0787

Page (22) of(56)

Test Data

Indirect Discharge

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

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Lens	Air Discharge	Complied	-
2	Enclosure	Air Discharge	Complied	-

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

- ☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

RemarksPASS Required Performance Criteria

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3.2 Radiated Electric Field Immunity

Reference Standard

EN IEC 61000-4-3:2020

Test Date

Sep. 06, 2023

Test LocationEMS-RS: ☒ SEMI ANECHOIC CHAMBER #2 ☐ SEMI ANECHOIC CHAMBER #3**Test Equipment**

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test SW	KTI_RS2012	KTI	2.1.1	-
☒	POWER METER	E4419B	Agilent	GB40201439	01, 27, 2024
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY41495698	01, 27, 2024
☒	CW POWER SENSOR	E4412A	Agilent	MY41501662	01, 27, 2024
☒	AMPLIFIER	ITA0300-200	Infinitech	-	-
☒	AMPLIFIER	ITA0750-200	Infinitech	-	-
☒	AMPLIFIER	ITA1500-100	Infinitech	-	-
☒	AMPLIFIER	ITA2500-100	Infinitech	-	-
☒	GPIB INTERFACE CONTROL	SYSTEM CONTROL UNIT	Infinitech	-	--
☒	POWER SUPPLY	SYSTEM POWER SUPPLY	Infinitech	-	-
☒	SIGNAL GENERATOR	SMIQ06B	Rohde & Schwarz	100236	01, 27, 2024
☒	HIGH POWER AMPLIFIER	ITA-4500KL-50	Infinitech	4500KL-2203 0002	-
☒	HYBRID LOG- PERIODIC ANTENNA	HLP-2603	TDK	100400	
☒	LOG-PERIODIC ANTENNA	STLP 9149	SCHWARZBECK	9149-255	

Test ConditionsTemperature: (24,2 ± 0,3) °C
Relative Humidity: (48,4 ± 0,3) % R.H.
Atmospheric Pressure: (100,0 ± 0,0) kPa

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Report No.:
KES-EM-23T0787
Page (24) of(56)

Test Specifications

Antenna Polarization: Horizontal & vertical unless indicated otherwise

Antenna Distance: ☒ 3 m

Field Strength: ☐ 1 V/m ☐ 3 V/m
☒ 10 V/m

Frequency Range: ☐ 80 MHz to 1 GHz ☐ 1,4 GHz to 2,7 GHz
☒ 80 MHz to 2,7 GHz

Modulation: ☒ AM, 80 %, 1 kHz sine wave
☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step: ☒ 1 % step

Dwell Time: ☐ 1 s ☒ 3 s

of Sides Radiated: ☒ 4

Required Performance Criteria: ☒ Complied

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Report No.:

KES-EM-23T0787

Page (25) of(56)

Test Data

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

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

- ☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria

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3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Sep. 06, 2023

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 28, 2023
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 29, 2023
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 28, 2023

Test Conditions

Temperature: (25,0 ± 0,2) °C
Relative Humidity: (48,2 ± 0,2) % R.H.
Atmospheric Pressure: (99,8 ± 0,0) kPa

Test Specifications

Pulse Amplitude & Polarity:
(AC Power Lines) ☐ ± 1.0 kV ☐ ± 2.0 kV
☐ ± 4.0 kV

Pulse Amplitude & Polarity:
(Other supply / Signal Lines) ☐ ± 0.5 kV ☒ ± 1.0 kV
☐ ± 2.0 kV

Burst Period: ☒ 300 ms ☐ 2 s

Repetition Rate: ☐ 5 klz ☒ 100 klz

Duration of Test Voltage: ☒ ≥ 1 min

Required Performance Criteria: ☒ Complied

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

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

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
RJ-45 (PoE)	Complied	Complied

Note: “Blank” = Not performed

Observations:

Complied – No degradation of function

Test Results
☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

Remarks
PASS Required Performance Criteria

3.4 Surge Transients

Reference Standard

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

Test Date

Sep. 06, 2023

Test Location

EMS-Surge: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 28, 2023
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 29, 2023
☒	CDN	CNV 508N1	EM TEST	P1610176296	11, 29, 2023

Test Conditions

Temperature: (25,0 ± 0,6) °C
Relative Humidity: (48,2 ± 0,6) % R.H.
Atmospheric Pressure: (99,8 ± 0,0) kPa



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Report No.:
KES-EM-23T0787
Page (29) of(56)

Test Specifications

AC Power Lines

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

Surge Amplitude :

Common Mode

☐ (0,5 / 1,0 / 2,0) kV

Differential Mode

☐ (0,5 / 1,0) kV

Number of Surges:

☐ 5 surges per angle

Angle:

☐ 0°, 90°, 180°, 270° (input a.c. power port)

Polarity:

☐ Positive & Negative

Repetition Rate:

☐ 1 surge per min ☐ 1 surge per 30 sec.

Required Performance Criteria:

☐ Complied

Other supply / Signal Lines

Source Impedance:

42 ohm for common Mode

Surge Amplitude:

Common Mode

☒ (0,5 / 1,0) kV

Number of Surges:

☒ 5 Surges

Polarity:

☒ Positive & Negative

Repetition Rate:

☒ 1 surge per min ☐ 1 surge per 30 sec.

Required Performance Criteria:

☒ Complied

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Test Data

☐ Line to Line – Differential Mode

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

☐ Line to Earth – Common Mode

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

Signal Lines

☒ Line to Earth – Common Mode

Mode of Application	Coupling Method	Observations	
		(+) Surge (kV)	(-) Surge (kV)
RJ-45 (PoE)	CDN	Complied	Complied
	LINE	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

- ☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria

3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Sep. 06, 2023

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	11, 10, 2023
☒	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 10, 2023
☒	CDN	CDN M016	TESEQ	43694	11, 10, 2023
☒	CDN	CDN M016	TESEQ	43697	11, 10, 2023
☒	CDN	CDN T8RJ45	EM TEST	0909-09	07, 31, 2024
☐	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 14, 2023

Test Conditions

Temperature: (24,4 ± 0,5) °C
Relative Humidity: (48,9 ± 0,5) % R.H.
Atmospheric Pressure: (100,1 ± 0,0) kPa



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Report No.:
KES-EM-23T0787
Page (32) of(56)

Test Specifications

Frequency range: ☒ 150 kHz to 100 MHz ☐ 150 kHz to 80 MHz

Voltage Level: ☐ 1 Vrms ☐ 3 Vrms
☒ 10 Vrms

Modulation: ☒ AM, 80 %, 1 kHz sine wave
☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step: ☒ 1 % step

Dwell Time: ☐ 1 s ☒ 3 s

Required Performance Criteria: ☒ Complied

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Test Data☐ Input a.c. power ports

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

☐ Input d.c. power ports

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

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45 (PoE)	CDN	Complied

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

Observations:

Complied – No degradation of function

Test Results☒ PASS Required Performance Criteria☐ NOT PASS Required Performance Criteria**Remarks**PASS Required Performance Criteria

3.6 Voltage Dips and Short Interruptions

Reference Standard

EN IEC 61000-4-11:2020

Test Date

N/A

Test Location

EMS-Voltage dip: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☐	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☐	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 29, 2023
☐	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 29, 2023

Test Conditions

Temperature:

°C

Relative Humidity:

% R.H.

Atmospheric Pressure:

kPa

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Report No.:
KES-EM-23T0787
Page (35) of(56)

Test Specifications & Observations/Remarks**- Voltage Dips and Short Interruptions**

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
☐ 20 % dip	☐ 250 / 5 000	<u>N/A</u>
☐ 30 % dip	☐ 25 / 500	<u>N/A</u>
☐ 60 % dip	☐ 10 / 200	<u>N/A</u>
☐ 100 % dip	☐ 250 / 5 000	<u>N/A</u>

- Voltage variations

☐ Unom + 10 %	☐ 253.0 V (ac)	<u>N/A</u>
☐ Unom - 15 %	☐ 195.5 V (ac)	<u>N/A</u>

Observations:

Complied – No degradation of function

Degradation - See "Remarks "

Test Results

- ☐ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria
☒ NOT APPLICABLE

Remarks

N/A

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Report No.:
KES-EM-23T0787
Page (36) of(56)

APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

N/A

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Report No.:
KES-EM-23T0787
Page (37) of(56)

[NEUTRAL]

N/A

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

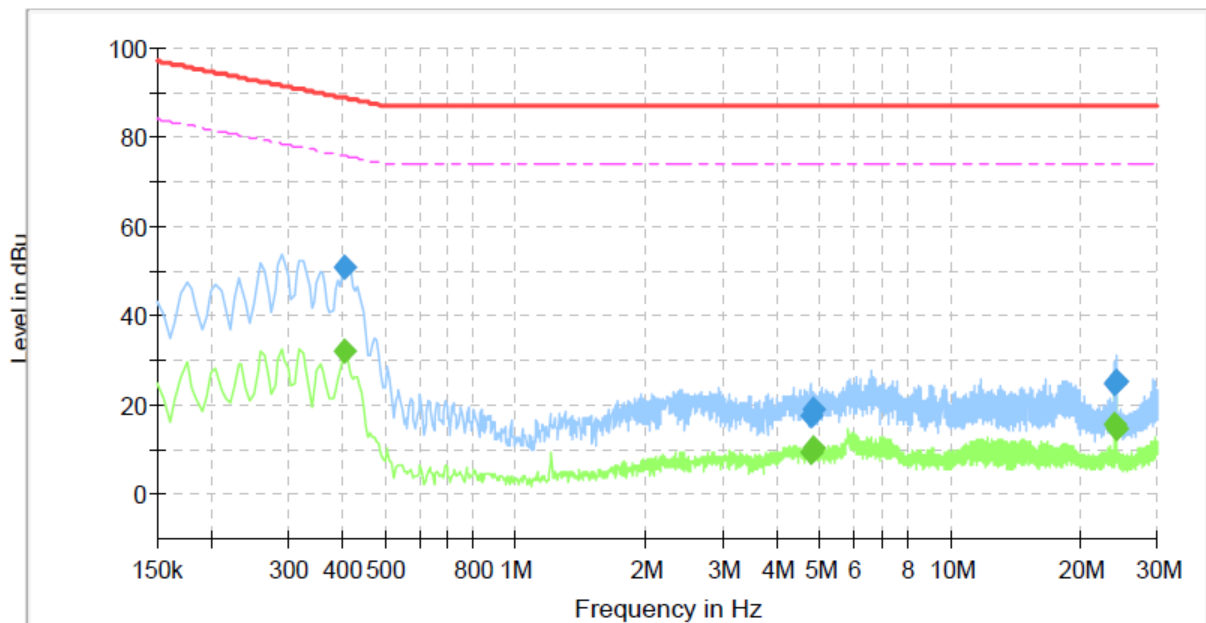
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Conducted Emissions at Telecommunication Ports

[1 000 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	PNM-C16013RVQ
Mode :	PoE
Speed :	1000
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.405000	---	32.16	75.75	43.59	1000.0	9.000	Single Line	19.4
0.405000	50.57	---	88.75	38.18	1000.0	9.000	Single Line	19.4
4.765000	---	9.46	74.00	64.54	1000.0	9.000	Single Line	19.4
4.765000	17.70	---	87.00	69.30	1000.0	9.000	Single Line	19.4
4.820000	---	10.18	74.00	63.82	1000.0	9.000	Single Line	19.4
4.820000	19.04	---	87.00	67.96	1000.0	9.000	Single Line	19.4
23.875000	---	15.35	74.00	58.65	1000.0	9.000	Single Line	20.0
23.875000	24.89	---	87.00	62.11	1000.0	9.000	Single Line	20.0
24.065000	---	14.67	74.00	59.33	1000.0	9.000	Single Line	20.0
24.065000	25.29	---	87.00	61.71	1000.0	9.000	Single Line	20.0

◆ Calculation

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

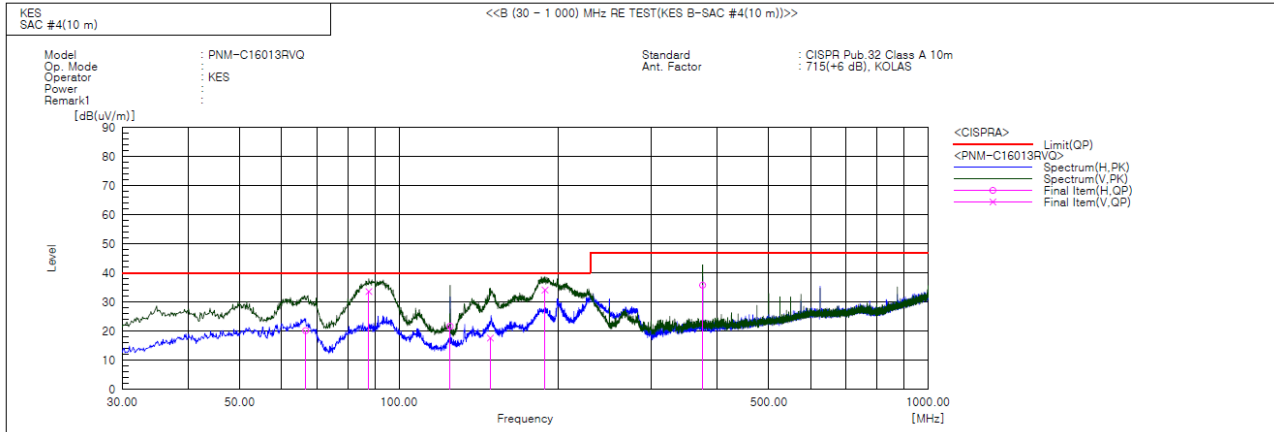
QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

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Radiated Electric Field Emissions(Below 1 GHz)



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	66.618	H	43.5	-23.3	20.2	40.0	19.8	100.0	15.0	
2	87.715	V	58.4	-24.8	33.6	40.0	6.4	100.0	236.0	
3	124.939	H	46.0	-24.3	21.7	40.0	18.3	363.0	288.0	
4	148.825	V	42.6	-25.0	17.6	40.0	22.4	125.0	334.0	
5	188.838	V	56.3	-22.2	34.1	40.0	5.9	100.0	28.0	
6	374.956	H	49.8	-14.0	35.8	47.0	11.2	400.0	247.0	

◆ Calculation

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

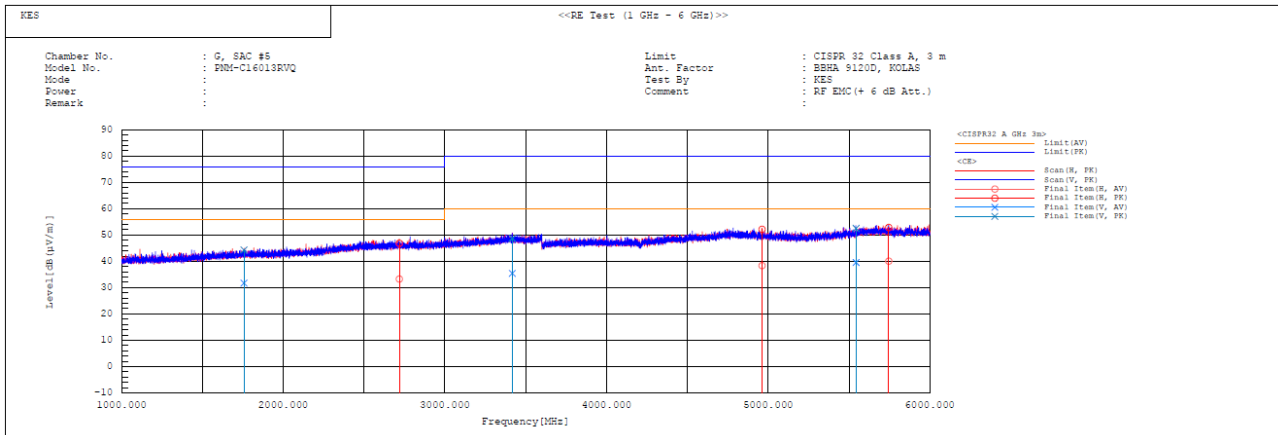
Margin(QP)[dB] = Limit[dB(μV/m)] - Result(QP) [dB(μV/m)]

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)



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	1758.428	V	29.9	42.5	1.8	31.7	44.3	56.0	76.0	24.3	31.7	100.0	170.0	
2	2718.403	H	27.9	41.5	5.4	33.3	46.9	56.0	76.0	22.7	29.1	100.0	281.4	
3	3417.337	V	28.6	41.9	6.8	35.4	48.7	60.0	80.0	24.6	31.3	100.0	338.0	
4	4962.079	H	26.2	40.0	12.2	38.4	52.2	60.0	80.0	21.6	27.8	100.0	52.6	
5	5543.879	V	26.6	39.5	13.0	39.6	52.5	60.0	80.0	20.4	27.5	100.0	134.4	
6	5746.933	H	26.8	39.6	13.3	40.1	52.9	60.0	80.0	19.9	27.1	100.0	175.1	

◆ Calculation

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

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

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

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

Report No.:
KES-EM-23T0787
Page (42) of(56)

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Report No.:
KES-EM-23T0787
Page (43) of(56)

Test Data - Voltage Fluctuations

Maximum Flicker results

Flicker Measurements					
	Plt	Max Pst	Max Dc	Max Dmax	Max Tmax
Line 1:	N/A				
Limits:					
Results:					

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The authenticity of the test report, contact kes@kes.co.kr



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Report No.:
KES-EM-23T0787
Page (44) of(56)

Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports

N/A

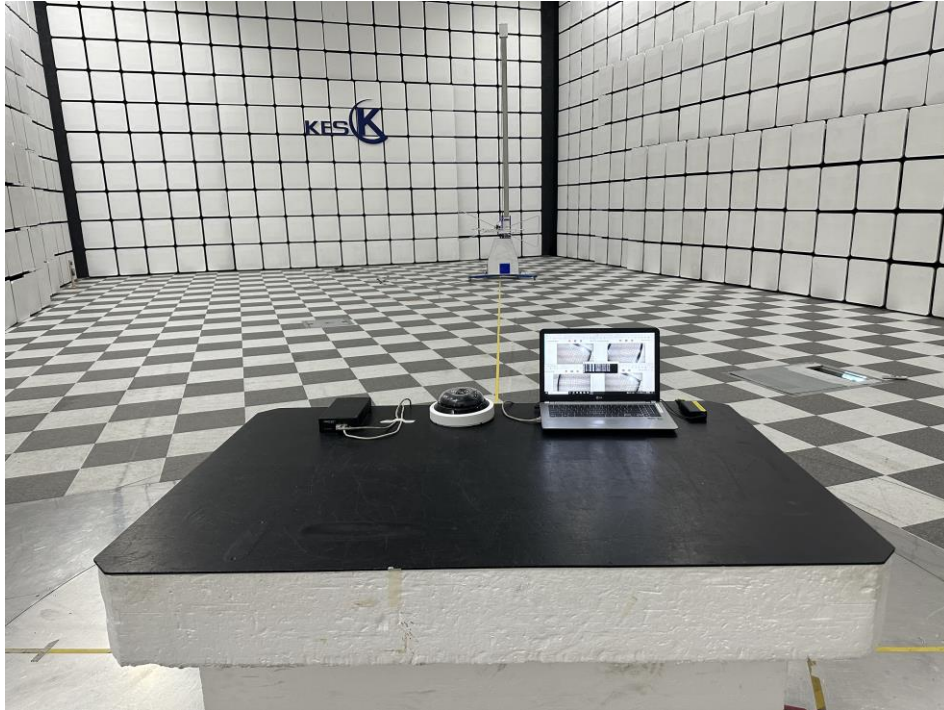
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Conducted Emissions at Telecommunication Ports



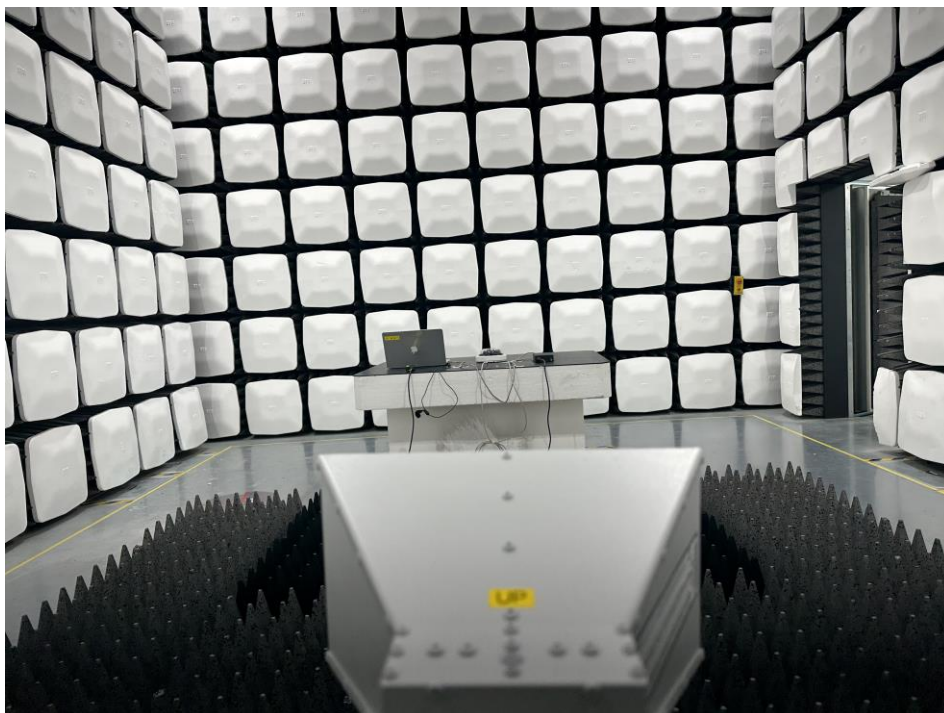
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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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Report No.:
KES-EM-23T0787
Page (48) of(56)

Harmonic Current Emissions and Voltage Fluctuations and Flicker

N/A

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Electrostatic Discharge



Radiated Electric Field Immunity



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Electrical Fast Transients/Bursts



Surge Transients



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Conducted Disturbance

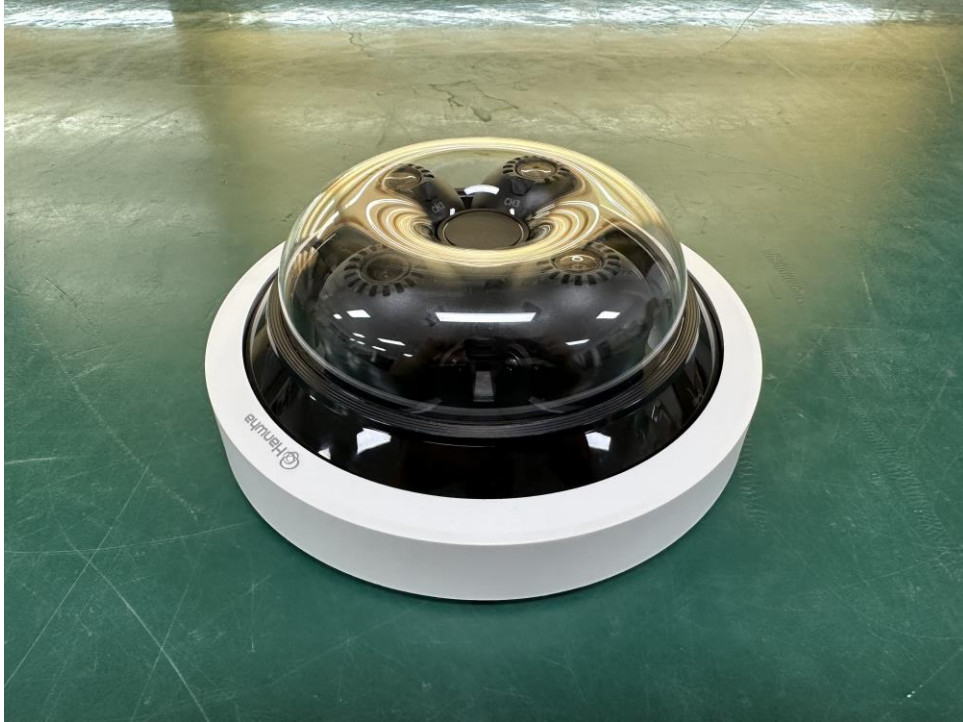


Voltage Dips and Short Interruptions

N/A

EUT External Photographs

(Top)



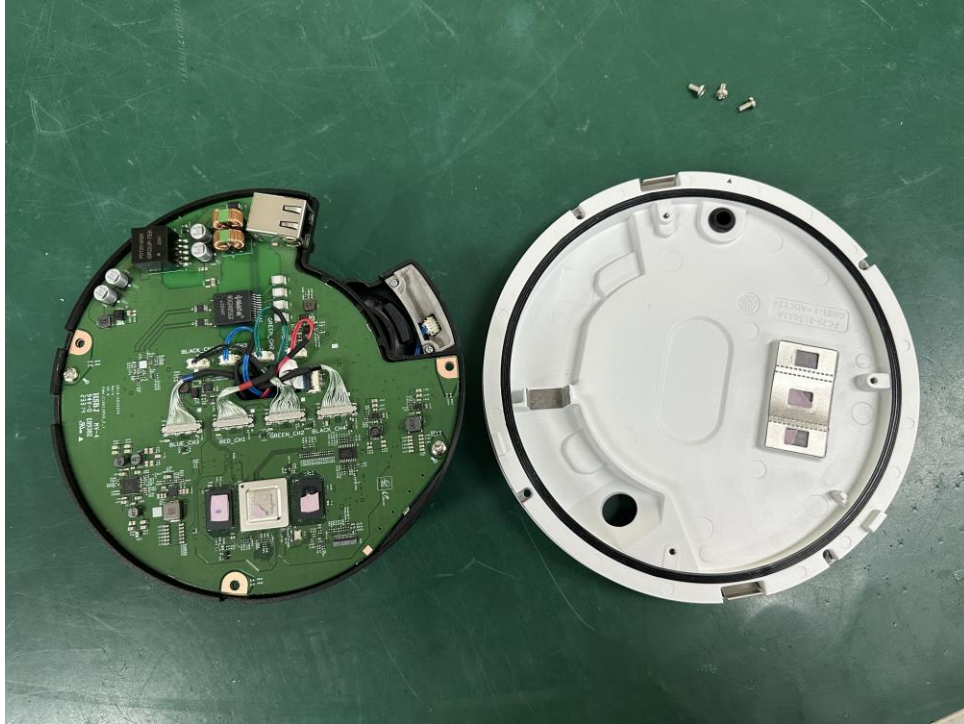
(Bottom)



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EUT Internal Photographs

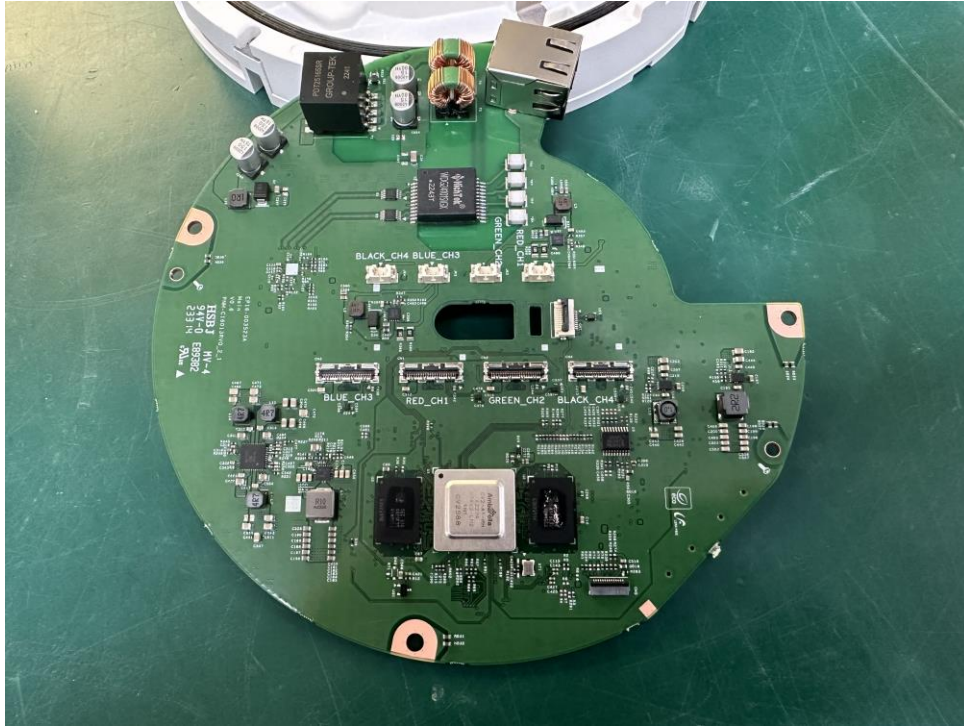
(Internal View)



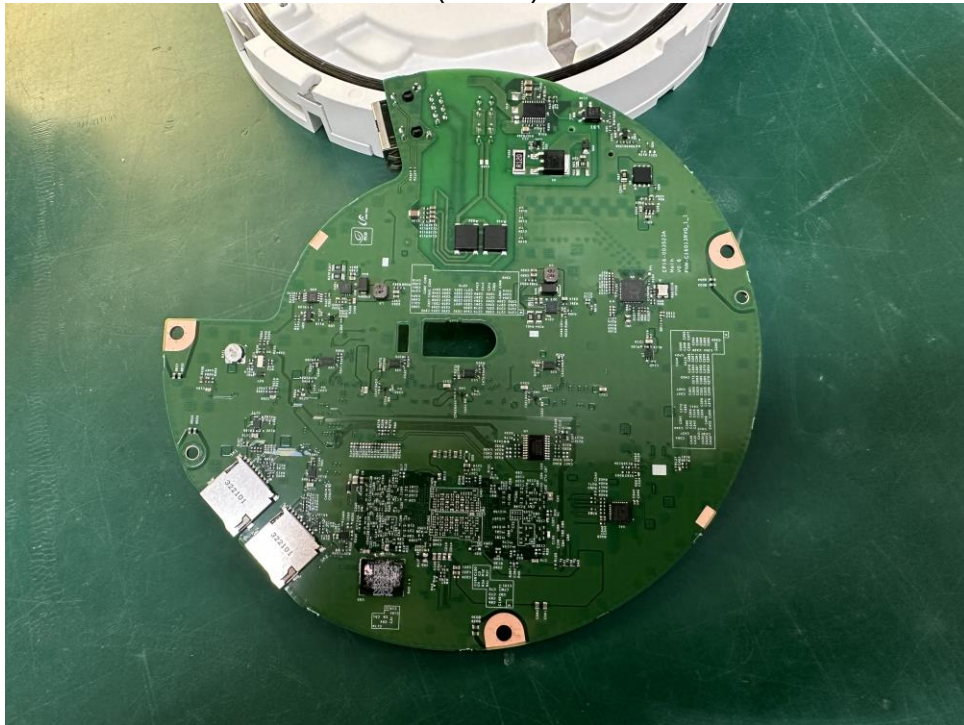
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EUT Internal View – Board 1

(Top)



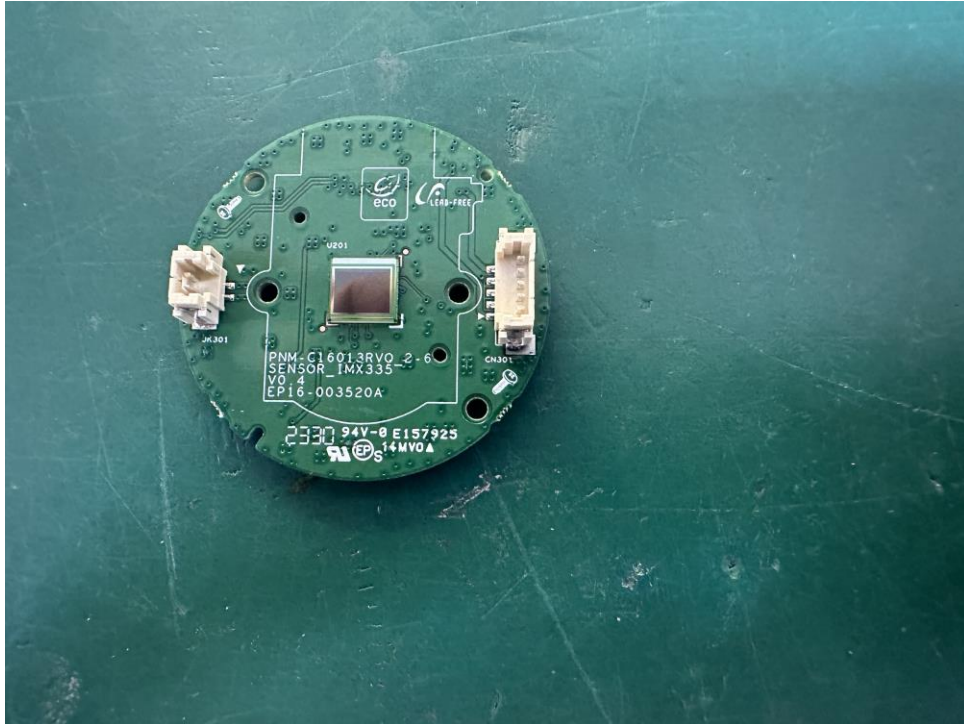
(Bottom)



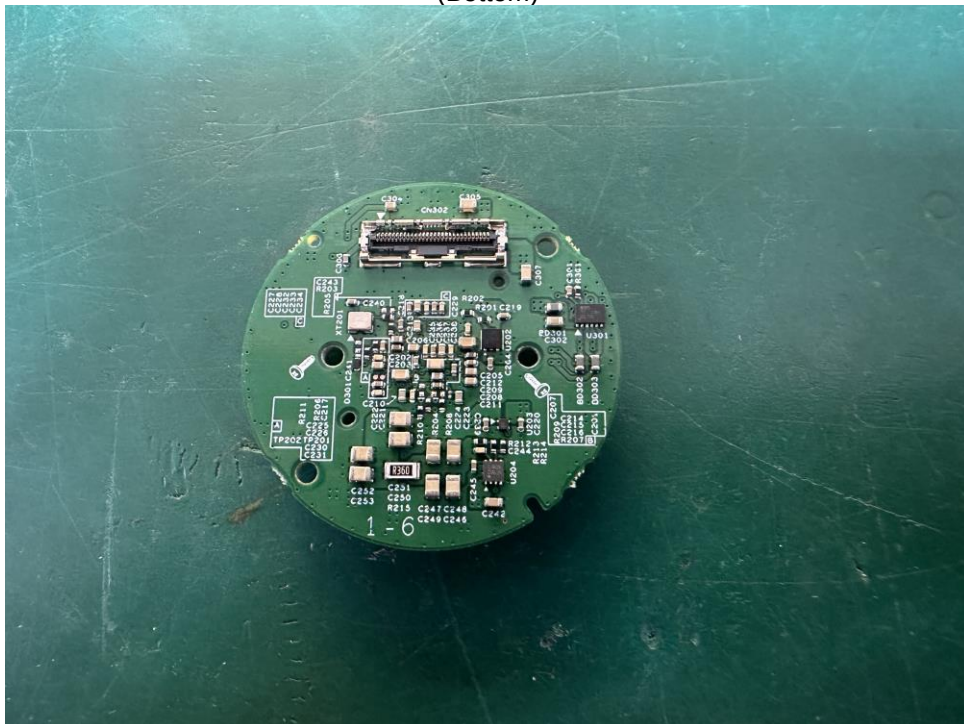
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EUT Internal View – Board 2

(Top)

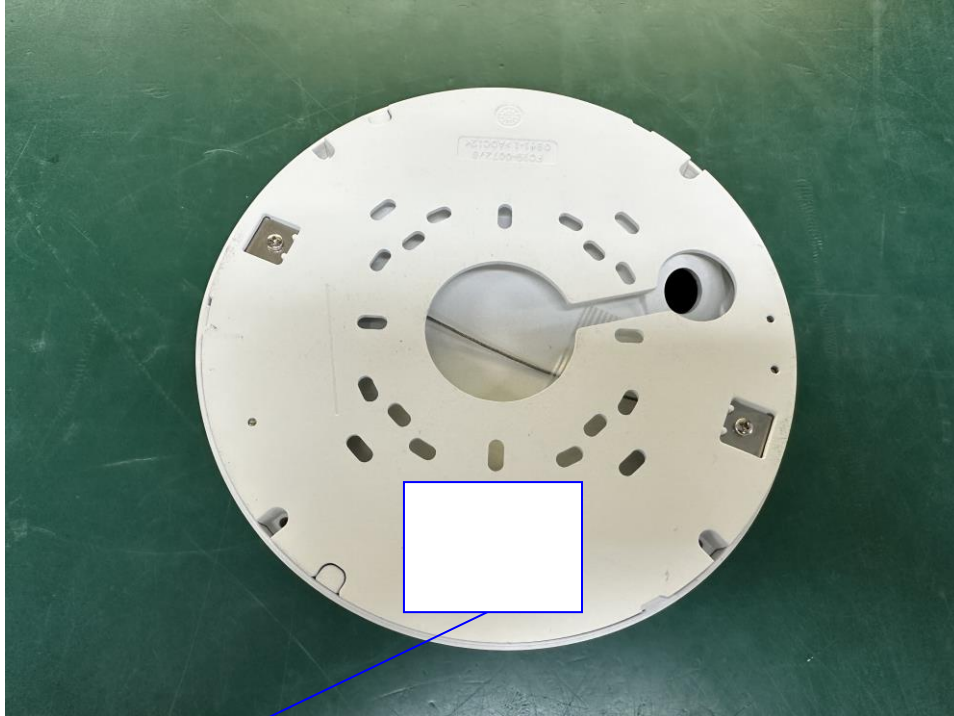


(Bottom)



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Label and Location



NETWORK CAMERA

Model No : PNM-C16013RVQ

Manufacturer : HANWHA VISION VIETNAM COMPANY LIMITED

Made in Vietnam

