TEST REPORT

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

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 : Explosion Proof Camera

Model/Type No. : TNO-C8083E

Variant Model : -

Manufacturer : INDUS VISION Co., Ltd.

Manufacturer Address : No. 203-704 / 388 Songnae-daero, Bucheon-si, Gyeonggi-do 14502, Republic of Korea

3. Date of Receipt : Dec. 22, 2023

4. Test date : Dec. 28, 2023 ~ Dec. 30, 2023

5. Date of Issue : Jan. 09, 2024

6. Test Results : In Compliance

Tested by

[이재원]2024/01/09

Jae Won, Lee
EMC Test Engineer

Reviewed by

[최대중]2024/01/09

Dae Jung, Choi
EMC Technical Manager

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

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Jan. 09, 2024	EM-234375	Issued

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1.0 General Product Description

Main Specifications of EUT are:

Video	
Imaging Device	1/2.8" CMOS
Resolution	2592x1944, 2560x1440, 1920x1080, 1280x960, 1280x720, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360, 320x240
Max. Framerate	H.265/H.264: Max. 30fps/25fps(60Hz/50Hz) MJPEG: Max. 30fps(@5MP Max. 5fps)
NETD	None
Pixel Size	None
Min. Illumination	Color: 0.07Lux(F1.6, 1/30sec, 30IRE) BW: 0.007Lux(F1.6, 1/30sec, 30IRE)
Video Out	None
Video Transmission Distance	None
Lens	
Focal Length (Zoom Ratio)	3.2~10.2mm(3.2x) motorized varifocal
Max. Aperture Ratio	F1.6(Wide)~F3.1(Tele)
Angular Field of View	H: 95°(Wide)~29°(Tele) V: 69°(Wide)~21°(Tele) D: 126°(Wide)~36°(Tele)
Min. Object Distance	1.2m (3.93ft)
Focus Control	Simple focus
Lens Type	DC auto iris(IR corrected)
Mount Type	None
Optional Lens	None
Pan / Tilt / Rotate	
Pan / Tilt / Rotate Range	None
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, SSDR
Wide Dynamic Range	120dB
Digital Noise Reduction	SSNRⅤ, WiseNRⅡ(Based on AI engine)
Digital Image Stabilization	None
Defog	None
Additional	None
Network	
Ethernet	RJ-45 (10/100BASE-T)
Video Compression	H.265/H.264: Main/High, MJPEG
Audio Compression	None
Smart Codec	Manual(5ea area), WiseStreamⅢ(Based on AI engine)
Video Quality Adjustment	H.264/H.265: Target bitrate level control MJPEG: Quality Level control
Bitrate Control	H.264/H.265: CBR or VBR MJPEG: VBR
Streaming	Unicast(20 users) / Multicast Multiple streaming(Up to 5 profiles)
Protocol	IPv4, IPv6, TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP, RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, UPnP, Bonjour, LLDP, CDP, SRTP (TCP, UDP Unicast)
SIP support (VoIP, Peer-to-peer,	None
Security	OS / Firmware Protect : Secure boot, Signed firmware, Firmware encryption User authentication : Digest Authentication Network authentication : 802.1X Authentication(EAP-TLS, EAP-LEAP, EAP-PEAP MSCHAPv2) Secure Communication : HTTPS, 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 : Secure by default, CyberSecurity assuarance program UL CAP (UL 2900-1)
Application Programming Interfa	ONVIF Profile S/T/M SUNAPI(HTTP API)
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)

Motion Detection	8ea, 8point polygonal zones
Privacy Masking	32ea, 4point quadrangle zones
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)
Digital PTZ	Support
Video Rotation	Flip, Mirror, Hallway view(90°/270°)
Analytics	Classified object type: Person/Vehicle Attributes: Vehicle(Typecar/bus/truck/motorcycle/bicycle) Support DetectionShot Analytics events based on AI engine - Motion detection*, Object detection, Virtual line*(Crossing/Direction), Virtual area*(Loitering/Intrusion/Enter/Exit) Analytics events - Defocus detection, Tampering, Virtual area(Appear/Disappear) * Some of the video analytics only works with people and vehicle detection
Business Intelligence	Support
Serial Interface	None
Alarm I/O	None
Alarm Triggers	Analytics, Network disconnect
Alarm Events	- File upload via FTP and e-mail - Notification via e-mail - Handover(PTZ preset, Send message by HTTP/HTTPS/TCP)
Audio Streaming	None
Audio In	None
Audio Out	None
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	None
Radiometry	
Temperature Detect Range	None
Temperature Accuracy	None
Temperature Detection	None
Secure Storage	None
Security Certificate	Secure by default
General	
Webpage Language	English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Portuguese, Czech, Polish, Turkish, Dutch, Hungarian, Greek
Web Viewer	None
Edge Storage	None
Memory	2GB RAM, 1GB Flash
Environmental & Electrical	
Operating Temperature / Humidi	-30°C~+55°C(-22°F ~ +131°F) / 0~95% RH(non-condensing) * Start up should be done at above -30°C Humidity control /w Air vent
Storage Temperature / Humidity	-50°C~+60°C(-58°F ~ +140°F) / 0~95% RH
Certification	IP67, IK10, IECEx, ATEX, JPEx, KCs II 2 G Ex db IIC T6 Gb II 2 G Ex td IIIC T80°C Db Ex db IIC T6 Gb Ex td IIC T80°C Db IIC T6 Gb IIIC T80°C Db
Input Voltage	PoE(IEEE802.3af, Class3)
Power Consumption	PoE: Max 12W, typical 5.3W
Mechanical	
Color / Material	Silver / stainless (SUS316L)
RAL Code	TBD
Product Dimensions / Weight	TBD
Compatible Conduit hole / Gang	TBD
Hanging Mount (Dome)	TBD
Skin Cover	TBD
Skin Cover (Dome)	TBD
Weather Cap (Dome)	TBD
Power Module	TBD
Backbox	TBD
Certifications & Standards	
Network	None
EMC	TBD
Safety	TBD
Environment	TBD

Video	None
DORI (EN62676-4 standard)	
Detect (25PPM/ 8PPF)	Wide: 42.7m(140.20ft) / Tele: 186.9m(613.28ft)
Observe (63PPM/ 19PPF)	Wide: 17.2m(56.08ft) / Tele: 75.4m(245.31ft)
Recognize (125PPM/ 38PPF)	Wide: 8.5m(28.04ft) / Tele: 37.4m(122.66ft)
Identify (250PPM/ 76PPF)	Wide: 4.3m(14.02ft) / Tele: 18.7m(61.33ft)
LPR/ANPR/MMCR	
Speed Description	None
Speed limit	None
Min. Forward Distance	None
Max. Forward Distance	None
Max. Horizontal Angle	None
Max. Vertical Angle	None
Horizontal Offset	None
Camera Height	None
Lane Coverage	None
Vehicle Recognition	None
Available Countries	None
Wisenet Road AI LPR/ANPR/MMCR	
Solution	None
Speed Description	None
Lane Coverage	None
Speed limit	None
Min. Forward Distance	None
Max. Forward Distance	None
Max. Horizontal Angle	None
Max. Vertical Angle	None
Horizontal Offset	None
Camera Height	None
Vehicle Recognition	None
Available Countries	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.

☒ 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
Explosion Proof Camera	TNO-C8083E	-	INDUS VISION Co., Ltd.	EUT

1.5 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	-

1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	**I/O Port**	**Description**	**I/O Port**	**Length**	**Shield**
Explosion Proof Camera (EUT)	Micro SD Slot	Micro SD Card	Micro SD Slot	-	-
	RJ-45(PoE)	PoE Injector	RJ-45(PoE)	3.5	U
PoE Injector	RJ-45(LAN)	Laptop	RJ-45(LAN)	2.0	U
Laptop	DC Jack	Laptop Adapter	DC Jack	1.6	U

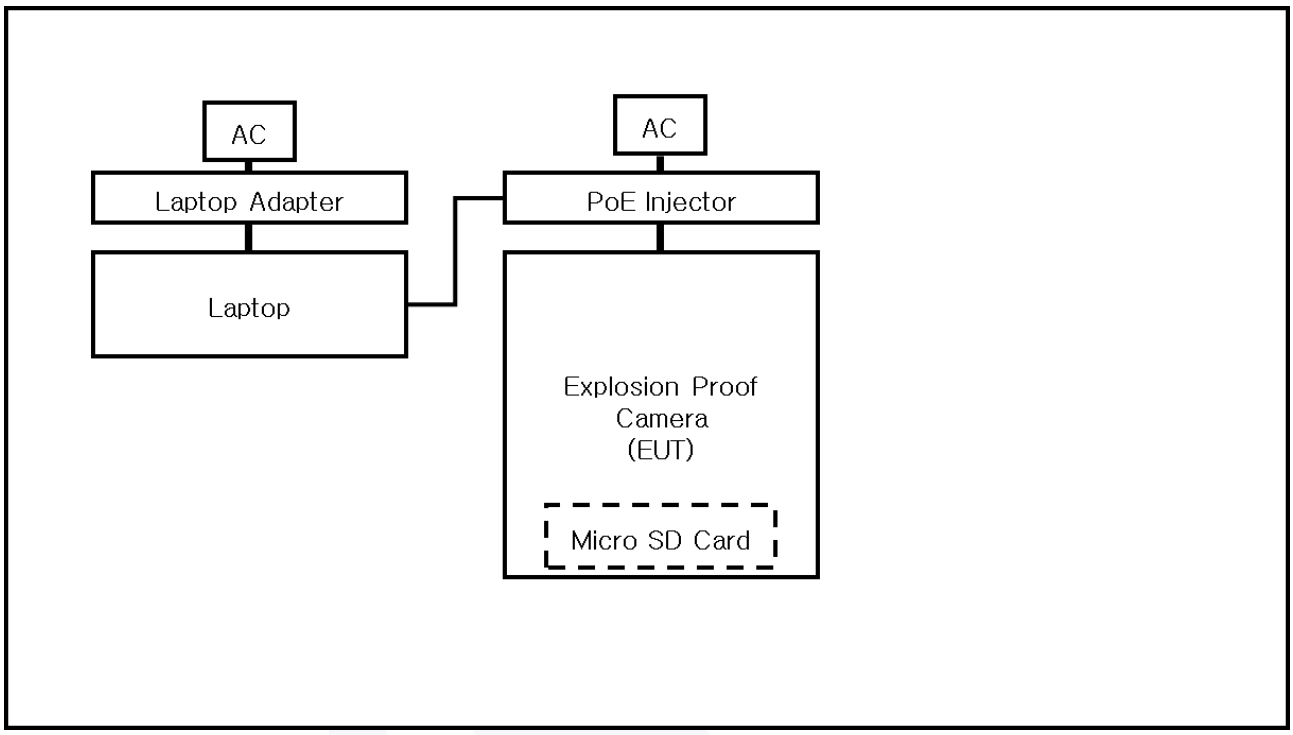
* Unshielded = U, Shielded = S

1.7 EUT Operating Mode(s)

Test mode	operating
Operating	1. Monitoring EUT Using Web Viewer, Ping Test 2. After testing, checked the files stored on Micro SD card.

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

1.8 Configuration



1.9 Remarks when standards applied

- The Micro USB port was excluded from the test because it was for administrators.
- It receives PoE power, and the PoE port is considered a wired network port.
  Test items related to the power port are not applicable.
- Administrator port photo

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, Yeoju-si, Gyeonggi-do, 12658, Korea, Republic of. The sites are constructed in conformance with the requirements of ANSI C63.4a-2017 and CISPR 16-1-4:2019

1.12 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 S/W	EMC32	R & S	9.12.00	-
☐	EMI TEST RECEIVER	ESR3	R & S	101783	11, 08, 2024
☐	LISN	ENV216	R & S	101787	11, 08, 2024
☐	LISN	ESH2-Z5	R & S	100450	11, 08, 2024
☐	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 08, 2024

Test Conditions
Temperature: ℃
Relative Humidity: % R.H.

Frequency Range of Measurement
150 ㎑ to 30 ㎒

Instrument Settings
IF Band Width: 9 ㎑

Test Results
The requirements are:

☐ PASS
☐ NOT PASS
☒ NOT APPLICABLE

Remarks
It receives PoE power, and the PoE port is considered a wired network port.
Test items related to the power port are not applicable.

2.2 Conducted Emissions at Telecommunication Ports

Test Date
Dec. 29, 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, 08, 2024
☒	LISN	ENV216	R & S	101787	11, 08, 2024
☒	LISN	ESH2-Z5	R & S	100450	11, 08, 2024
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 08, 2024
☒	8-WIRE ISN CAT3,5	ENY81	R & S	100174	11, 09, 2024
☐	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	11, 09, 2024
☐	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	03, 06, 2024

Test Conditions
Temperature: (21,7 ± 0,1) ℃
Relative Humidity: (46,0 ± 0,1) % R.H.

Frequency Range of Measurement
150 ㎑ to 30 ㎒

Instrument Settings
IF Band Width: 9 ㎑

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

2.3 Radiated Electric Field Emissions(Below 1 ㎓)

Test Date
Dec. 29, 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, 08, 2024
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 17, 2024
☒	ATTENUATOR	8491A	HP	32173	03, 03, 2024

Test Conditions
Temperature: (22,0 ± 0,1) ℃
Relative Humidity: (46,8 ± 0,1) % R.H.

Frequency Range of Measurement
30 ㎒ to 1 ㎓

Instrument Settings
IF Band Width: 120 ㎑

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

2.4 Radiated Electric Field Emissions(Above 1 ㎓)

Test Date
Dec. 28, 2023

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	07, 31, 2024
☒	PREAMPLIFIER	8449B	AGILENT	3008A01967	03, 06, 2024
☒	ATTENUATOR	8491A	HP	35496	03, 03, 2024
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 06, 2024

Test Conditions
Temperature: (21,2 ± 0,1) ℃
Relative Humidity: (46,7 ± 0,1) % R.H.

Frequency Range of Measurement
1 ㎓ to 6 ㎓

Instrument Settings
IF Band Width: 1 ㎒

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

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 S/W	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: ℃
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

Remarks
It receives PoE power, and the PoE port is considered a wired network port.
Test items related to the power port are not applicable.

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 S/W	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: ℃
Relative Humidity: % R.H.

Test Results
The requirements are:

☐ PASS
☐ NOT PASS
☒ NOT APPLICABLE

Remarks
It receives PoE power, and the PoE port is considered a wired network port.
Test items related to the power port are not applicable.

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 $dB\mu V$.

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 $dB\mu V$, 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 $dB\mu V$, 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 $dB\mu V$.

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
Dec. 30, 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: (22,0 ± 0,1) ℃
Relative Humidity: (46,2 ± 0,1) % R.H.
Atmospheric Pressure: (100,8 ± 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:

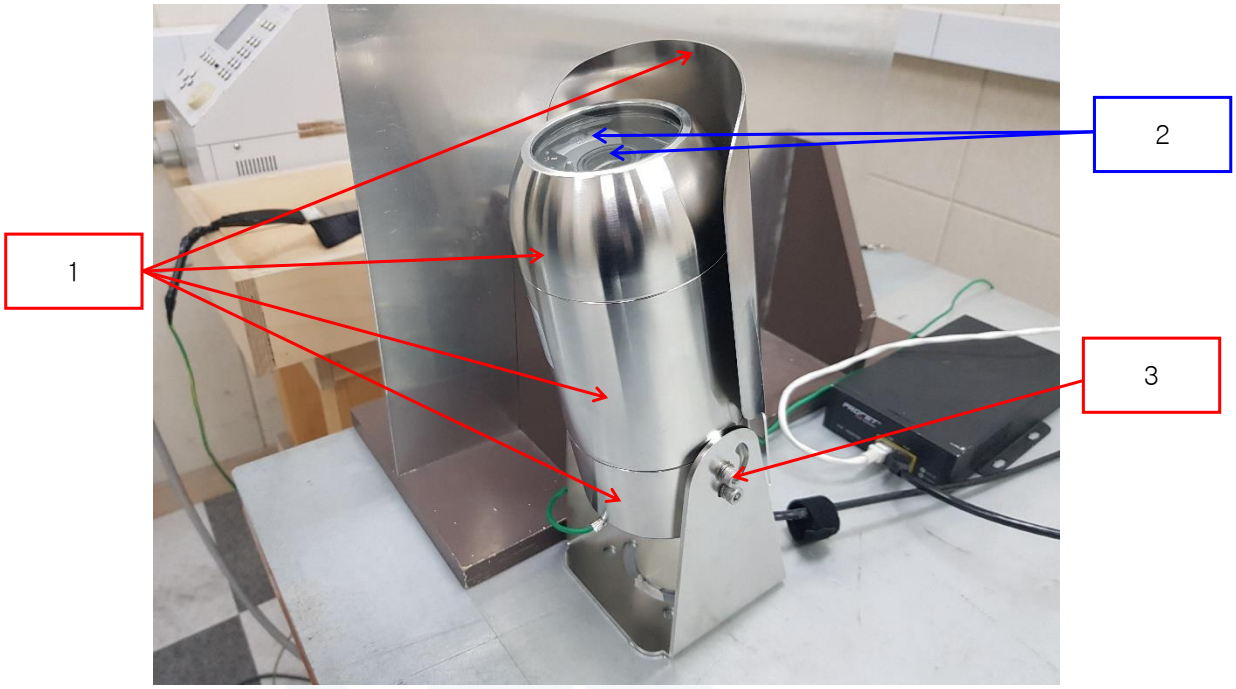
Contact	Air	HCP	VCP
☐ 2 kV	☒ 2 kV	☐ 2 kV	☐ 2 kV
☐ 4 kV	☒ 4 kV	☐ 4 kV	☐ 4 kV
☒ 6 kV	☐ 6 kV	☒ 6 kV	☒ 6 kV
☐ 8 kV	☒ 8 kV	☐ 8 kV	☐ 8 kV
☐ 15 kV	☐ 15 kV	☐ 15 kV	☐ 15 kV

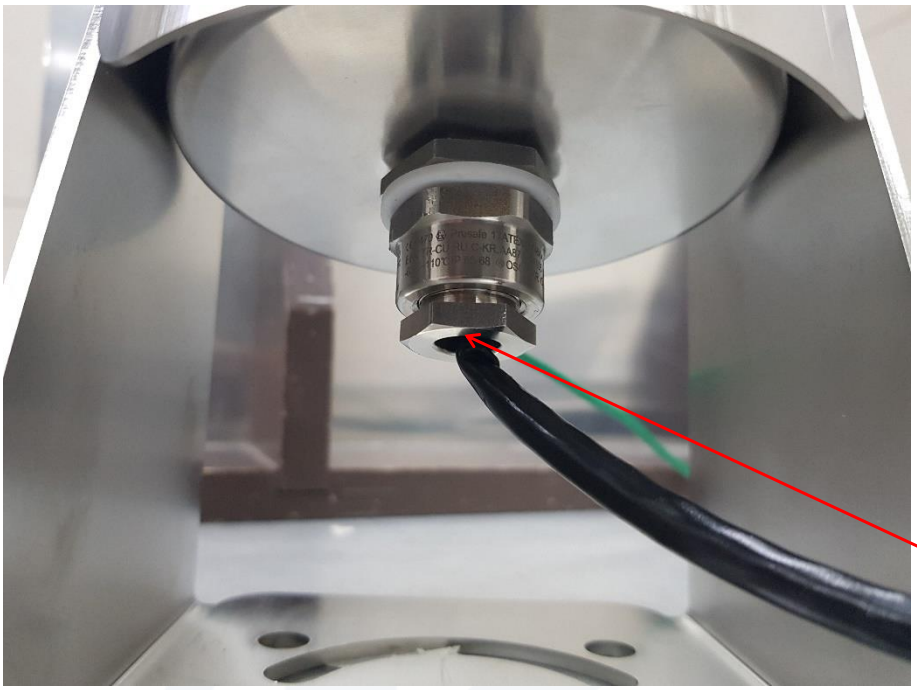
Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

Location of Discharge:

Air
Contact





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	Enclosure	Contact Discharge	Complied	-
2	Camera Lens	Air Discharge	Complied	-
3	Screw	Contact Discharge	Complied	-
4	Around the Port	Contact Discharge	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

3.2 Radiated Electric Field Immunity

Reference Standard
EN IEC 61000-4-3:2020

Test Date
Dec. 28, 2023

Test Location
EMS-RS: ☐ SEMI ANECHOIC CHAMBER #2 ☒ SEMI ANECHOIC CHAMBER #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	EMC32	R & S	10.10.02	-
☒	SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	07, 31, 2024
☒	HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-
☒	POWER METER	E4419B	Agilent	GB40203000	03, 21, 2024
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY52170007	03, 21, 2024
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY41498669	03, 21, 2024
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 06, 2024

Test Conditions

Temperature: (21,7 ± 0,6) ℃
Relative Humidity: (46,8 ± 0,6) % R.H.
Atmospheric Pressure: (100,4 ± 0,1) kPa

Test Specifications

Antenna Polarization:	Horizontal & vertical unless indicated otherwise	
Antenna Distance:	☒ 3 m	
Field Strength:	☐ 1 V/m ☒ 10 V/m	☐ 3 V/m
Frequency Range:	☐ 80 MHz to 1 GHz ☒ 80 MHz to 2,7 GHz	☐ 1,4 GHz 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

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

3.3 Electrical Fast Transients/Bursts

Reference Standard
EN 61000-4-4:2012

Test Date
Dec. 30, 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, 09, 2024
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 09, 2024
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 10, 2024

Test Conditions

Temperature: (22,0 ± 0,1) ℃
Relative Humidity: (46,2 ± 0,1) % R.H.
Atmospheric Pressure: (100,8 ± 0,0) kPa

Test Specifications

Pulse Amplitude & Polarity: (AC Power Lines)	☐ ± 1.0 kV ☐ ± 4.0 kV	☐ ± 2.0 kV
Pulse Amplitude & Polarity: (Other supply / Signal Lines)	☐ ± 0.5 kV ☐ ± 2.0 kV	☒ ± 1.0 kV
Burst Period:	☒ 300 ms	☐ 2 s
Repetition Rate:	☐ 5 kHz	☒ 100 kHz
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 (㎸)	(-) Burst (㎸)
-	-	-

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (㎸)	(-) Burst (㎸)
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
Dec. 30, 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, 09, 2024
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 09, 2024
☒	CDN	CNV 508N1	EM TEST	P1610176296	11, 10, 2024

Test Conditions

Temperature: (22,0 ± 0,6) ℃
Relative Humidity: (46,2 ± 0,6) % R.H.
Atmospheric Pressure: (100,8 ± 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
☐ (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

Test Data

☐ Line to Line – Differential Mode

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

☐ Line to Earth – Common Mode

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

Signal Lines

☒ Line to Earth – Common Mode

Mode of Application	Coupling Method	Observations	
		(+) Surge (㎸)	(-) Surge (㎸)
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
Dec. 30, 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, 08, 2024
☒	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 08, 2024
☒	CDN	CDN M016	TESEQ	43694	11, 08, 2024
☒	CDN	CDN M016	TESEQ	43697	11, 08, 2024
☐	CDN	CDN T800	TESEQ	42800	11, 08, 2024
☒	CDN	CDN T8RJ45	EM TEST	0909-09	07, 31, 2024

Test Conditions

Temperature: (22,8 ± 0,6) ℃
Relative Humidity: (46,2 ± 0,6) % R.H.
Atmospheric Pressure: (100,4 ± 0,0) kPa

Test Specifications

Frequency range:	☒ 150 ㎑ to 100 ㎒	☐ 150 ㎑ to 80 ㎒
Voltage Level:	☐ 1 Vrms ☒ 10 Vrms	☐ 3 Vrms
Modulation:	☒ AM, 80 %, 1 ㎑ sine wave ☒ PM, 1 ㎐ (0,5 s ON : 0,5 s OFF)	
Frequency step:	☒ 1 % step	
Dwell Time:	☐ 1 s	☒ 3 s
Required Performance Criteria:	☒ Complied	

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, 09, 2024
☐	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 09, 2024

Test Conditions

Temperature: ℃
Relative Humidity: % R.H.
Atmospheric Pressure: kPa

Test Specifications & Observations/Remarks

- Voltage Dips and Short Interruptions

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

- Voltage variations

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

Observations:
Complied – No degradation of function
Degradation - See "Remarks "

Test Results

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

Remarks

It receives PoE power, and the PoE port is considered a wired network port.
Test items related to the power port are not applicable.

APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

N/A

[NEUTRAL]

N/A

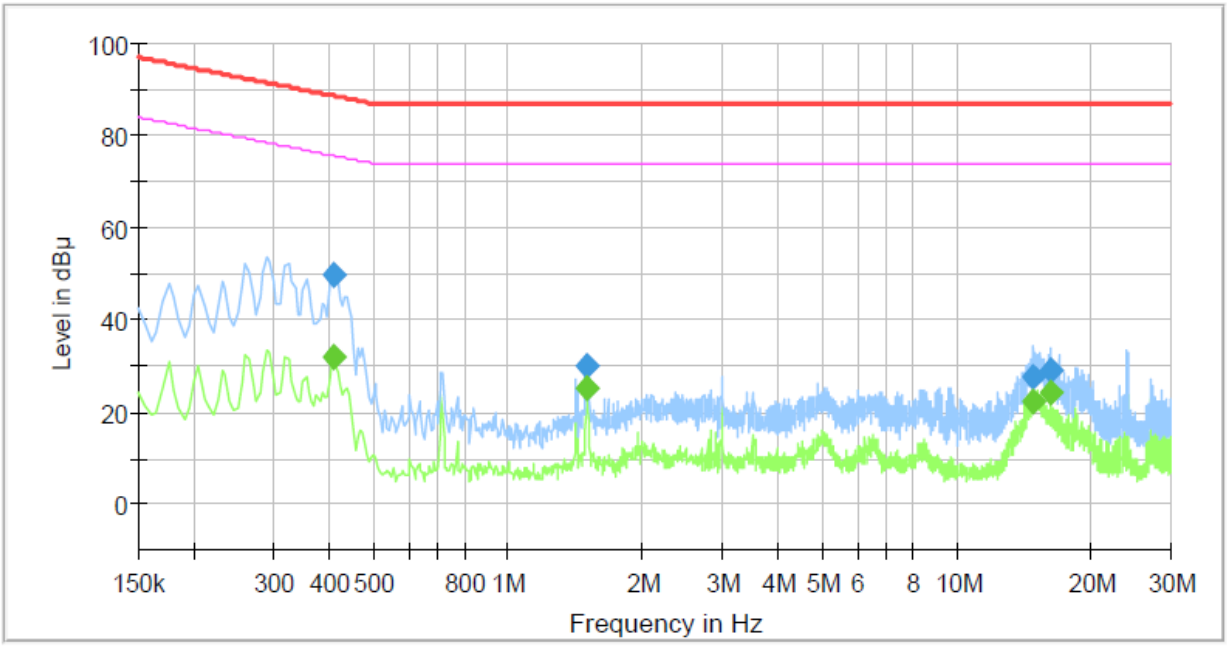
♦ Calculation
QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]
QuasiPeak / CAverage : The Final Value
Reading Value : Not shown in the table.
Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

Conducted Emissions at Telecommunication Ports

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-C8083E
Mode :	PoE_TEL 100 Mbps
Speed :	
Operator Name:	KES

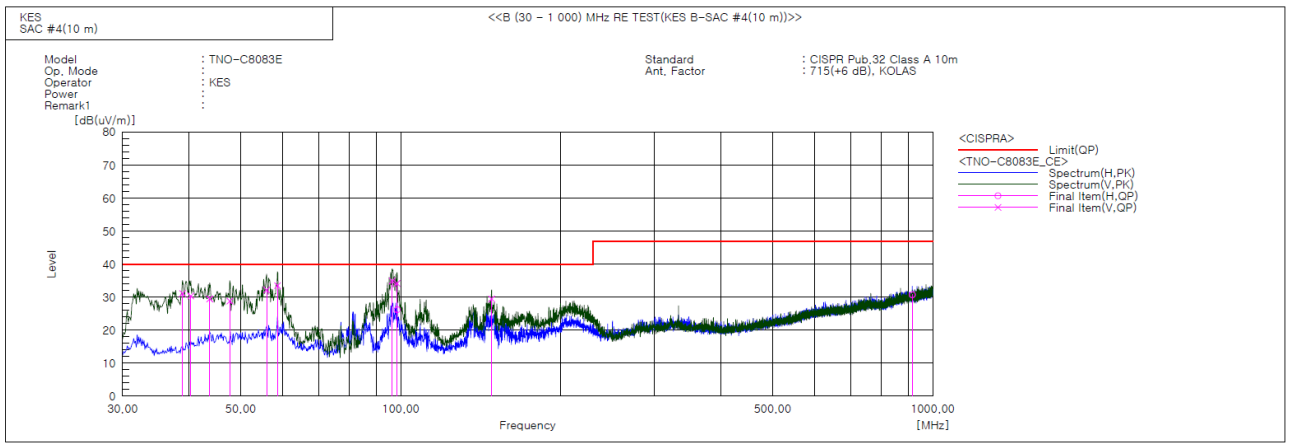


Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.410000	---	31.80	75.65	43.85	1000.0	9.000	Single Line	19.4
0.410000	49.64	---	88.65	39.01	1000.0	9.000	Single Line	19.4
1.505000	---	25.07	74.00	48.93	1000.0	9.000	Single Line	19.3
1.505000	30.13	---	87.00	56.87	1000.0	9.000	Single Line	19.3
14.880000	---	22.28	74.00	51.72	1000.0	9.000	Single Line	19.8
14.880000	27.45	---	87.00	59.55	1000.0	9.000	Single Line	19.8
16.230000	---	24.46	74.00	49.54	1000.0	9.000	Single Line	19.8
16.230000	29.32	---	87.00	57.68	1000.0	9.000	Single Line	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 (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

Radiated Electric Field Emissions(Below 1 ㎓)

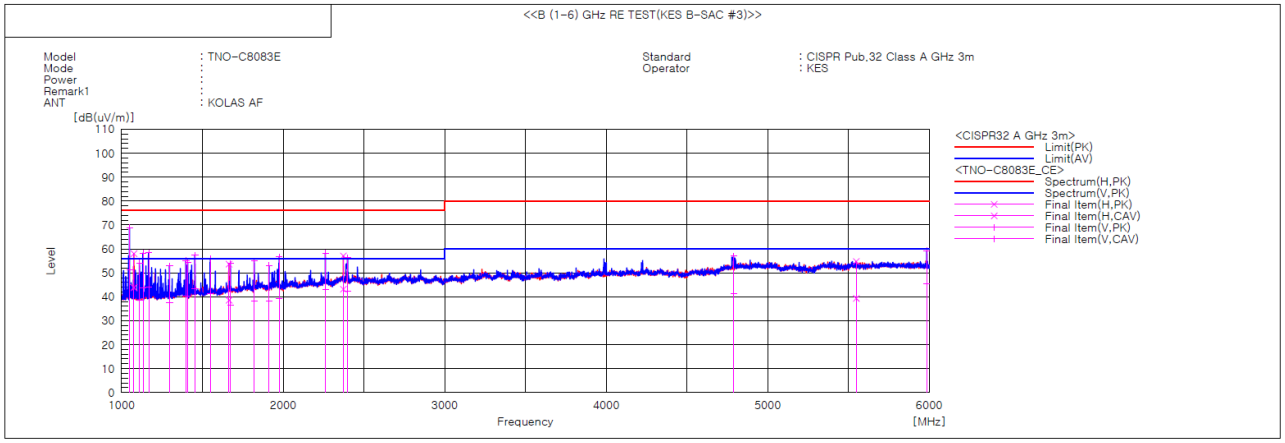


Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	38.851	V	54.4	-23.3	31.1	40.0	8.9	141.0	34.0	
2	40.306	V	53.0	-22.7	30.3	40.0	9.7	112.0	330.0	
3	43.701	V	51.2	-21.7	29.5	40.0	10.5	115.0	75.0	
4	47.703	V	49.9	-21.1	28.8	40.0	11.2	107.0	101.0	
5	55.948	V	53.6	-21.4	32.2	40.0	7.8	396.0	333.0	
6	58.615	V	55.3	-21.8	33.5	40.0	6.5	107.0	333.0	
7	96.324	V	57.5	-22.6	34.9	40.0	5.1	141.0	206.0	
8	98.385	V	56.6	-22.4	34.2	40.0	5.8	146.0	206.0	
9	98.396	H	48.6	-22.4	26.2	40.0	13.8	196.0	12.0	
10	148.098	V	54.6	-25.1	29.5	40.0	10.5	100.0	79.0	
11	915.125	H	33.6	-2.9	30.7	47.0	16.3	396.0	337.0	

♦ Calculation
Result(QP) [㏈(㎶/m)] = (Reading(QP)[㏈(㎶)] + c.f[㏈(1/m)]
Margin(QP)[㏈] = Limit[㏈(㎶/m)] - Result(QP) [㏈(㎶/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 ㎓)



Final Result

No.	Frequency	(P)	Reading PK	Reading CAV	c.f	Result PK	Result CAV	Limit PK	Limit AV	Margin PK	Margin CAV	Height	Angle	Remark
	[MHz]		[dB(uV)]	[dB(uV)]	[dB(1/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB]	[dB]	[cm]	[deg]	
1	1048.968	V	72.0	54.4	-3.1	68.9	51.3	76.0	56.0	7.1	4.7	100.0	183.7	
2	1076.163	H	61.0	46.9	-3.0	58.0	43.9	76.0	56.0	18.0	12.1	100.0	182.0	
3	1110.151	V	56.9	41.5	-2.9	54.0	38.6	76.0	56.0	22.0	17.4	100.0	183.7	
4	1131.857	V	60.9	46.3	-2.7	58.2	43.6	76.0	56.0	17.8	12.4	100.0	113.2	
5	1167.809	V	60.9	46.6	-2.5	58.4	44.1	76.0	56.0	17.6	11.9	100.0	155.4	
6	1295.735	V	54.1	38.7	-1.3	52.8	37.4	76.0	56.0	23.2	18.6	100.0	314.5	
7	1397.846	V	55.6	40.7	-0.5	55.1	40.2	76.0	56.0	20.9	15.8	100.0	100.2	
8	1409.854	V	54.6	40.6	-0.4	54.2	40.2	76.0	56.0	21.8	15.8	100.0	132.1	
9	1453.224	V	57.5	43.5	-0.2	57.3	43.3	76.0	56.0	18.7	12.7	100.0	121.2	
10	1548.085	V	55.6	40.9	0.3	55.9	41.2	76.0	56.0	20.1	14.8	100.0	34.8	
11	1664.617	H	52.4	37.3	1.3	53.7	38.6	76.0	56.0	22.3	17.4	100.0	24.4	
12	1674.967	V	52.5	34.9	1.4	53.9	36.3	76.0	56.0	22.1	19.7	100.0	9.1	
13	1821.842	V	52.0	35.2	2.9	54.9	38.1	76.0	56.0	21.1	17.9	100.0	121.2	
14	1913.051	V	49.4	34.6	3.6	53.0	38.2	76.0	56.0	23.0	17.8	100.0	165.6	
15	1975.073	V	52.7	35.3	4.0	56.7	39.3	76.0	56.0	19.3	16.7	100.0	116.2	
16	2261.968	V	52.8	37.8	5.4	58.2	43.2	76.0	56.0	17.8	12.8	100.0	309.4	
17	2372.161	H	50.9	37.0	6.2	57.1	43.2	76.0	56.0	18.9	12.8	100.0	273.4	
18	2398.846	V	50.0	35.9	6.3	56.3	42.2	76.0	56.0	19.7	13.8	100.0	150.3	
19	4789.116	V	42.7	27.0	14.3	57.0	41.3	80.0	60.0	23.0	18.7	100.0	183.7	
20	5547.967	H	39.2	23.8	15.6	54.8	39.4	80.0	60.0	25.2	20.6	100.0	187.0	
21	5985.096	V	42.8	29.3	16.3	59.1	45.6	80.0	60.0	20.9	14.4	100.0	150.3	

♦ Calculation

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

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

Harmonic Current Emissions and Voltage Fluctuations and Flicker

Average harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
		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	Ieff [A]	% of Limit	Limit [A]	Result
		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

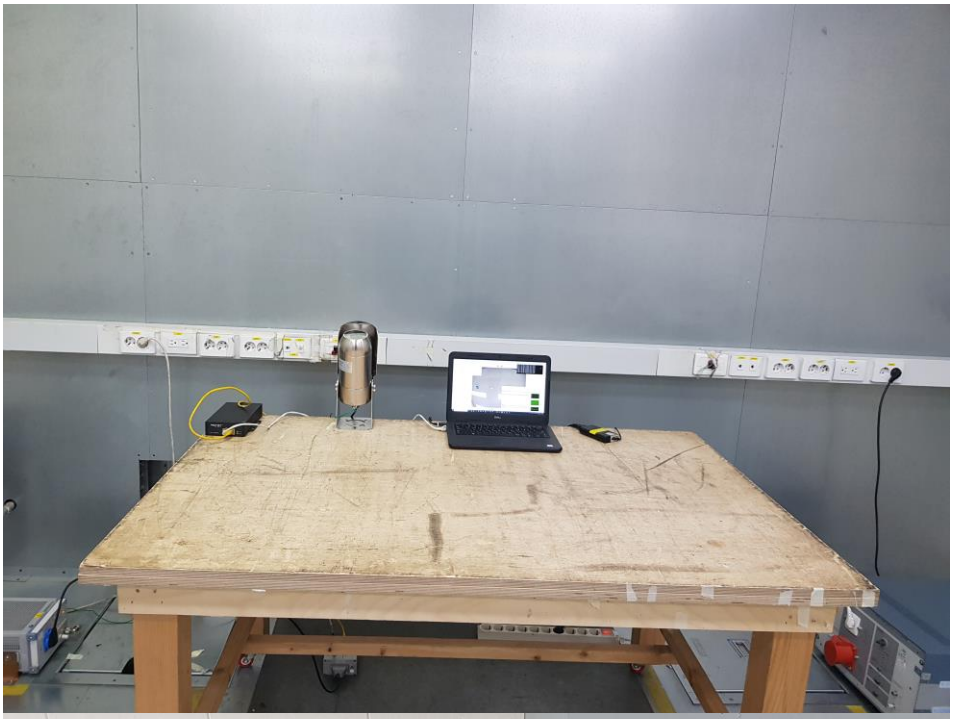
Flicker Measurements					
	Plt	**Max Pst**	**Max Dc**	**Max Dmax**	**Max Tmax**
Line 1:	N/A				
Limits:					
Results:					

Test Setup Photos and Configuration

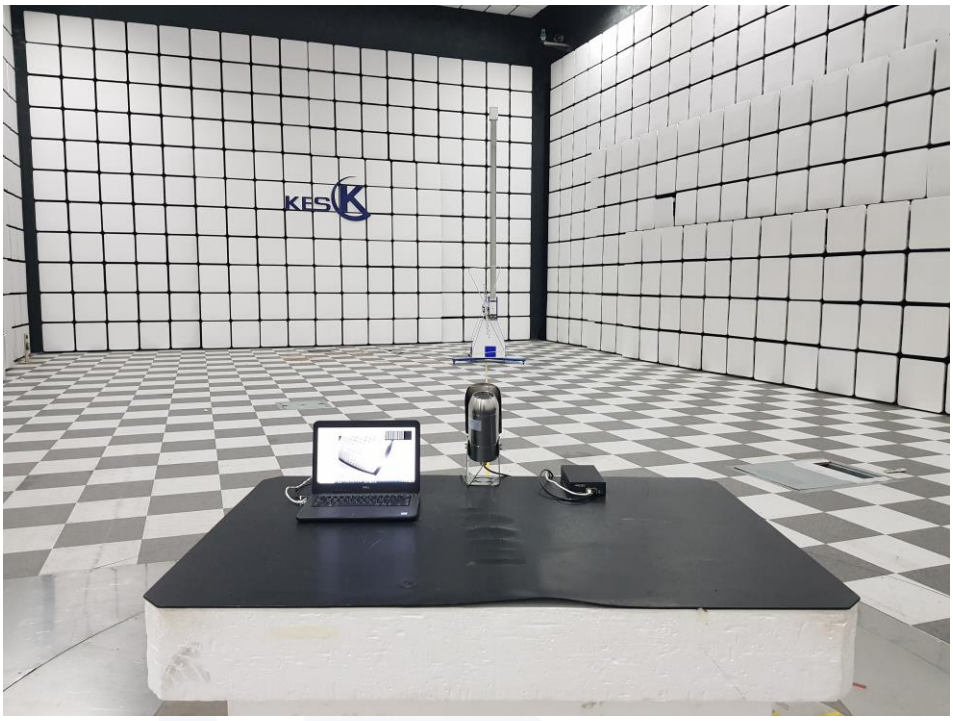
Conducted Emissions at Mains Power Ports

N/A

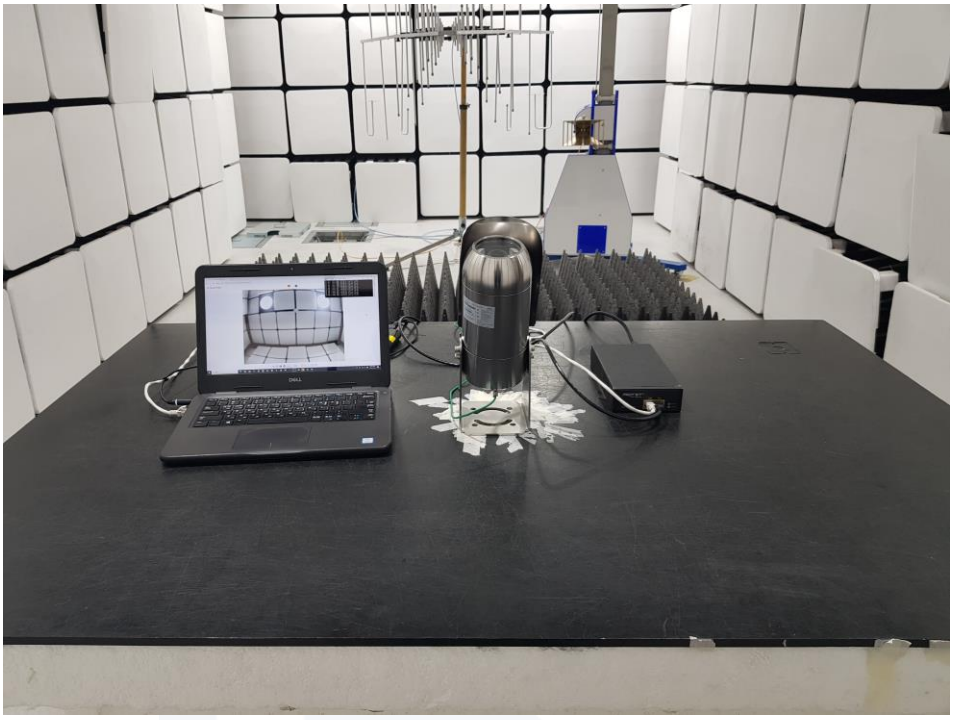
Conducted Emissions at Telecommunication Ports

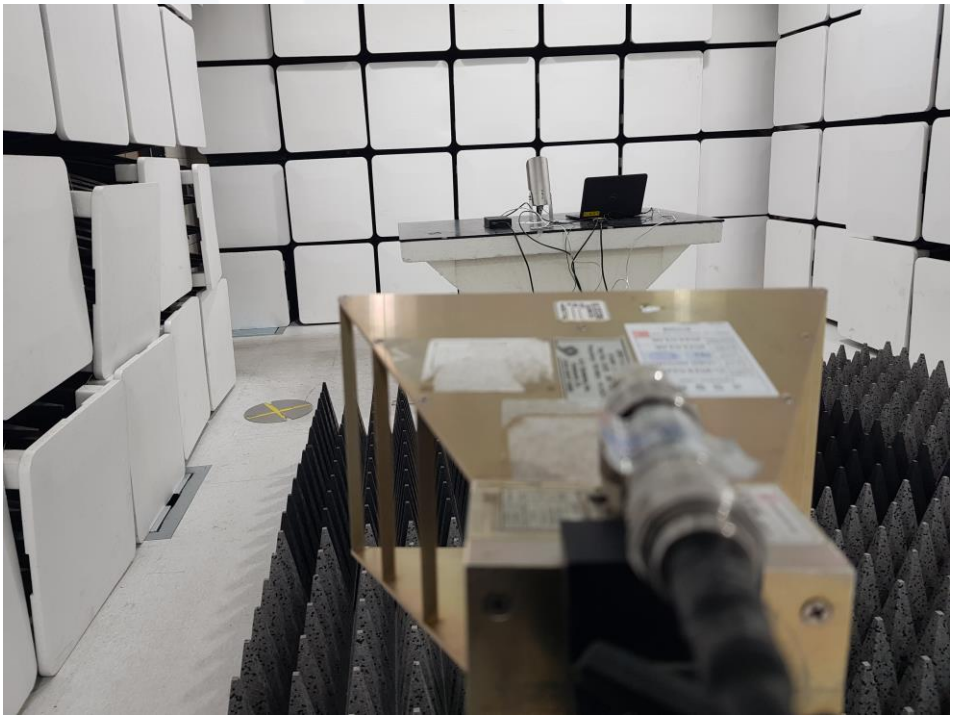


Radiated Electric Field Emissions(Below 1 ㎓)



Radiated Electric Field Emissions(Above 1 ㎓)





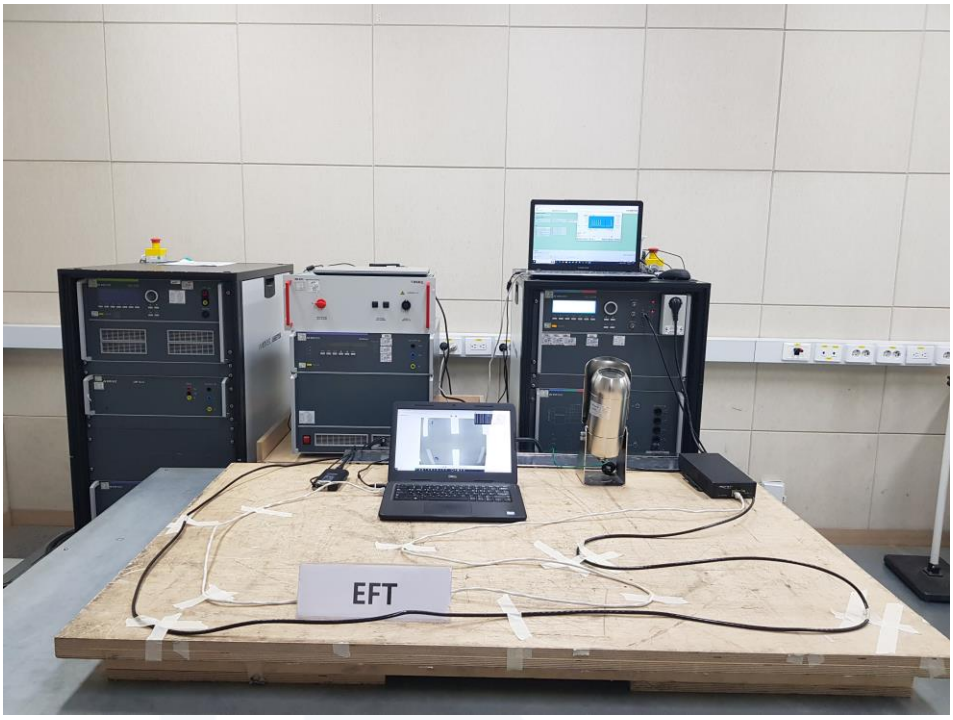
Harmonic Current Emissions and Voltage Fluctuations and Flicker

N/A

Electrostatic Discharge

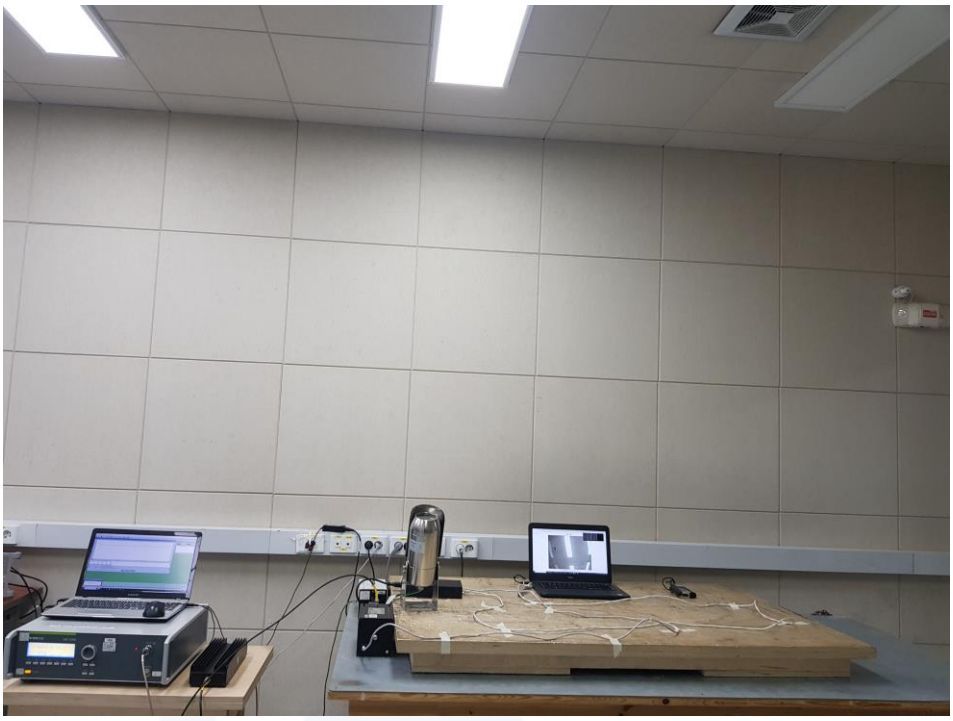
Radiated Electric Field Immunity

Electrical Fast Transients/Bursts



Surge Transients

Conducted Disturbance

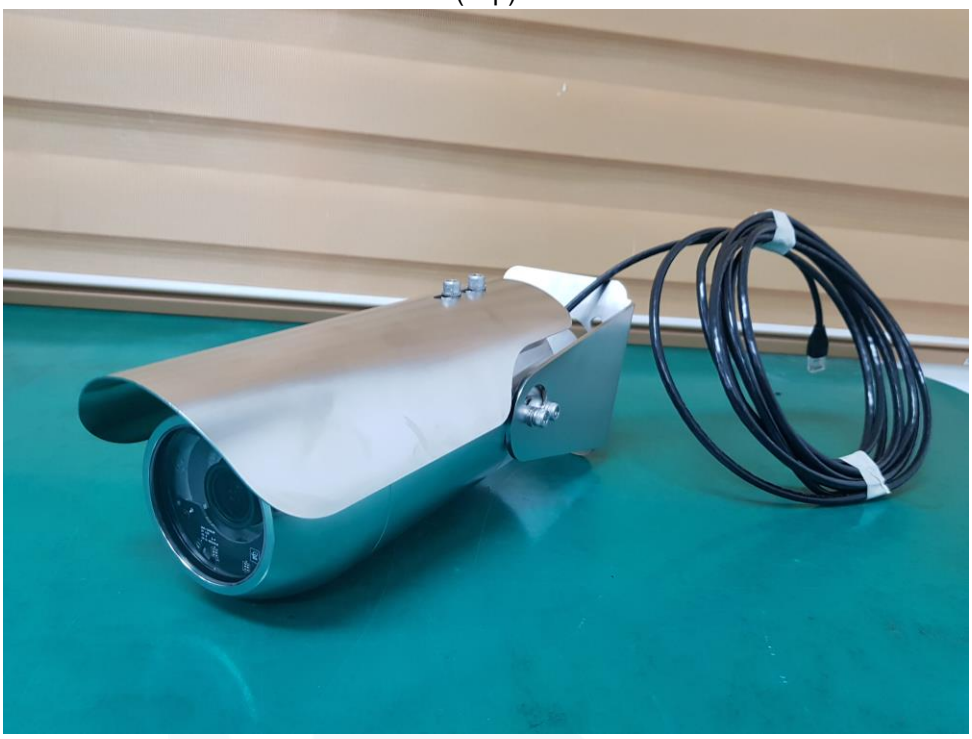


Voltage Dips and Short Interruptions

N/A

EUT External Photographs

(Top)



(Bottom)

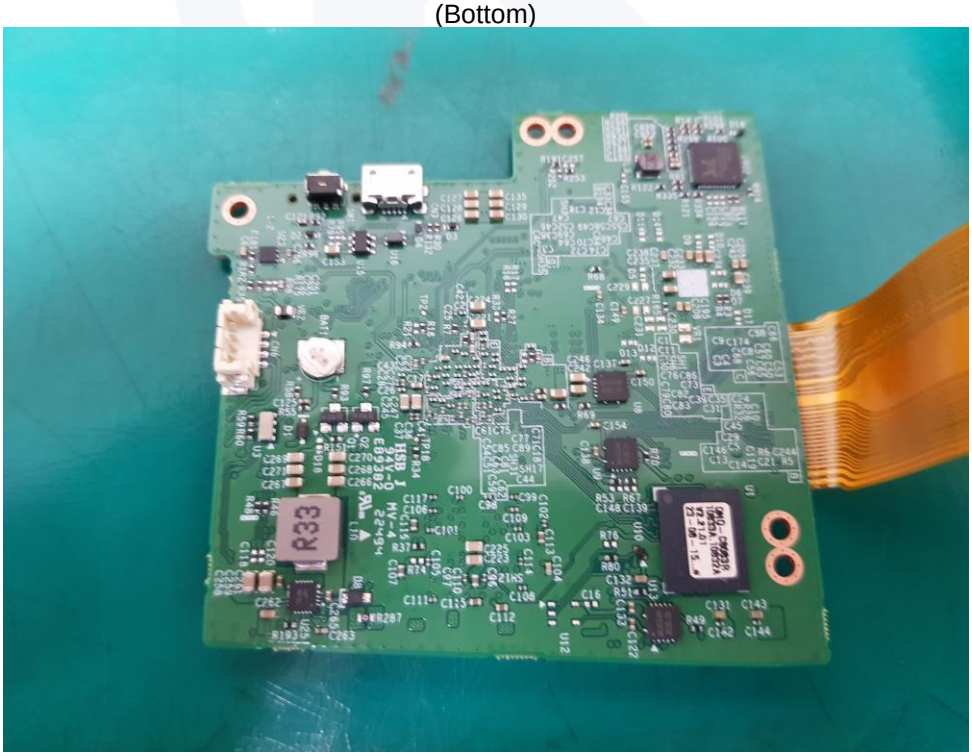
EUT Internal Photographs

(Internal View)

EUT Internal View – Main Board

(Top)

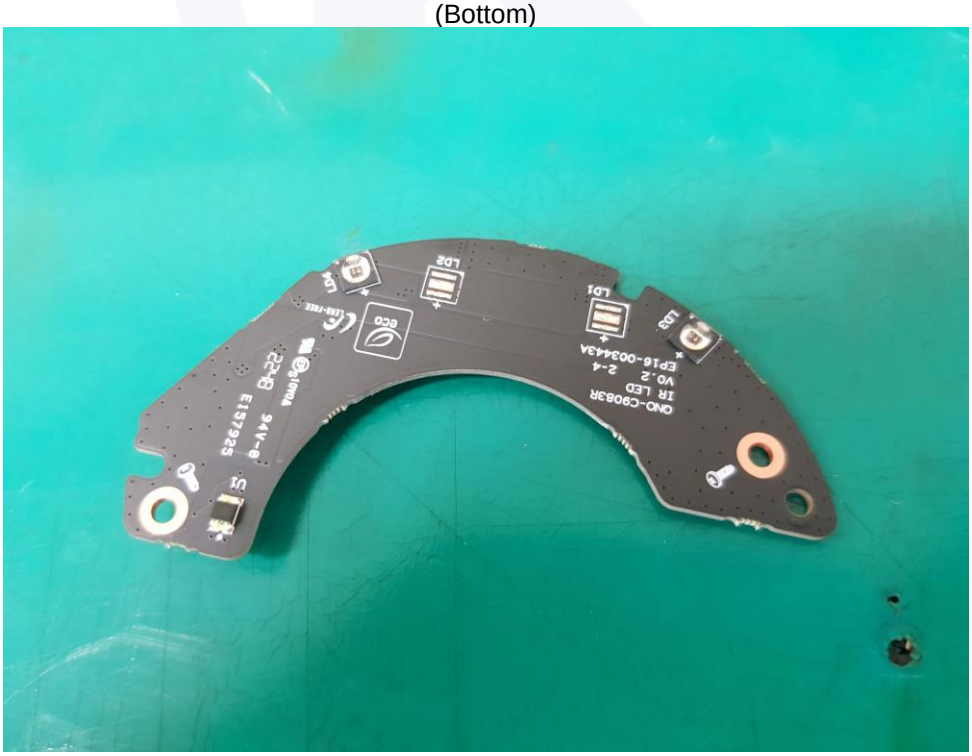
(Bottom)



EUT Internal View – Sub Board 1

(Top)

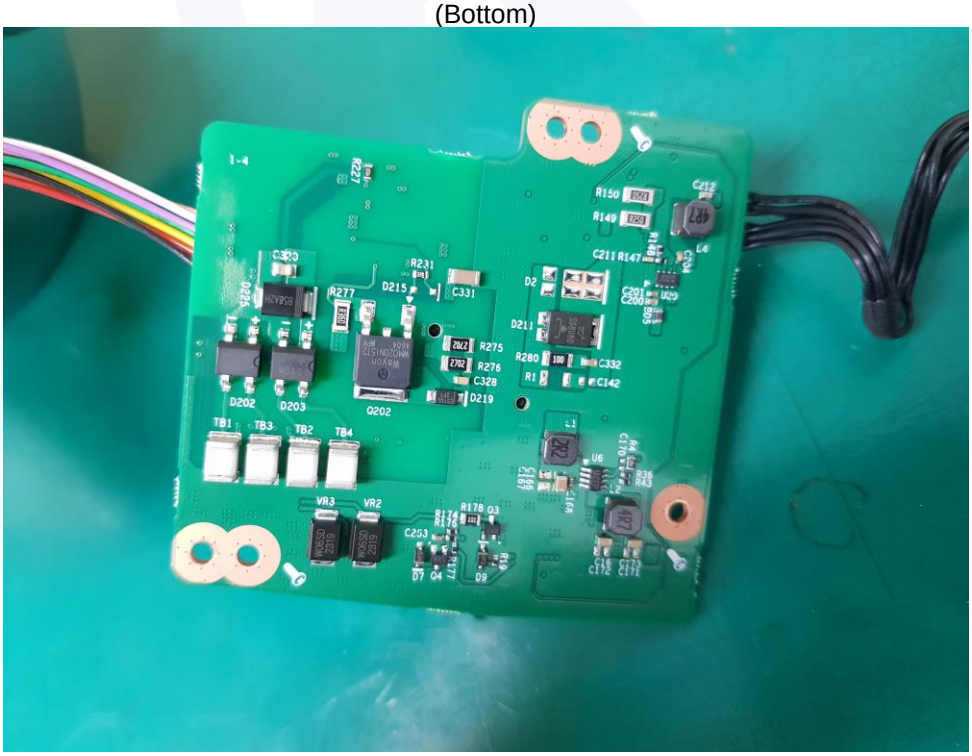
(Bottom)



EUT Internal View – Sub Board 2

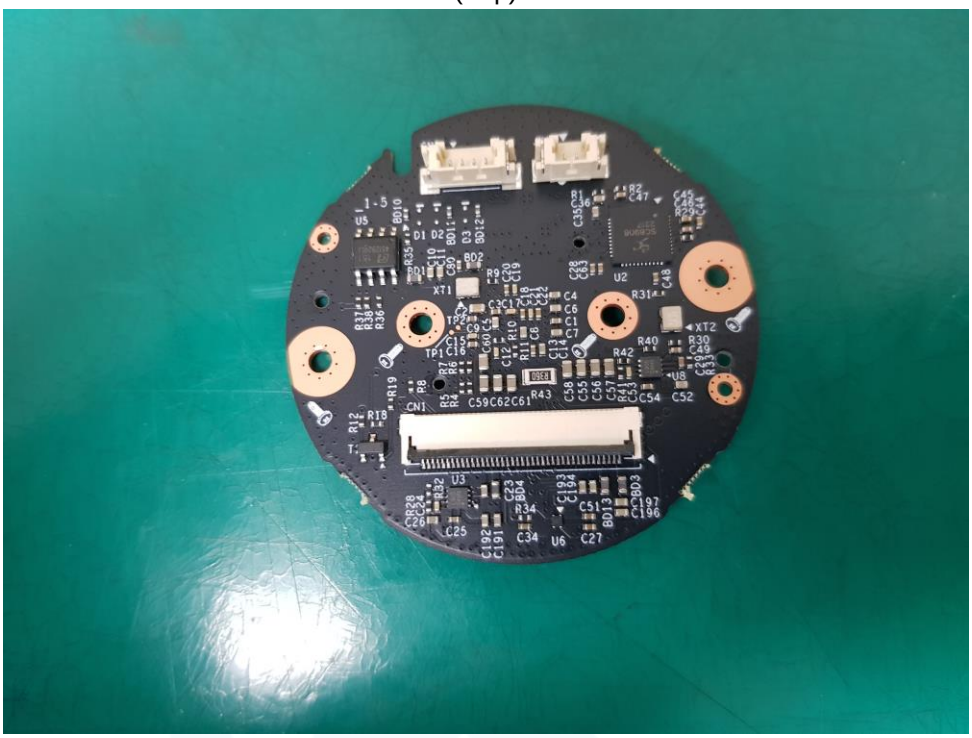
(Top)

(Bottom)

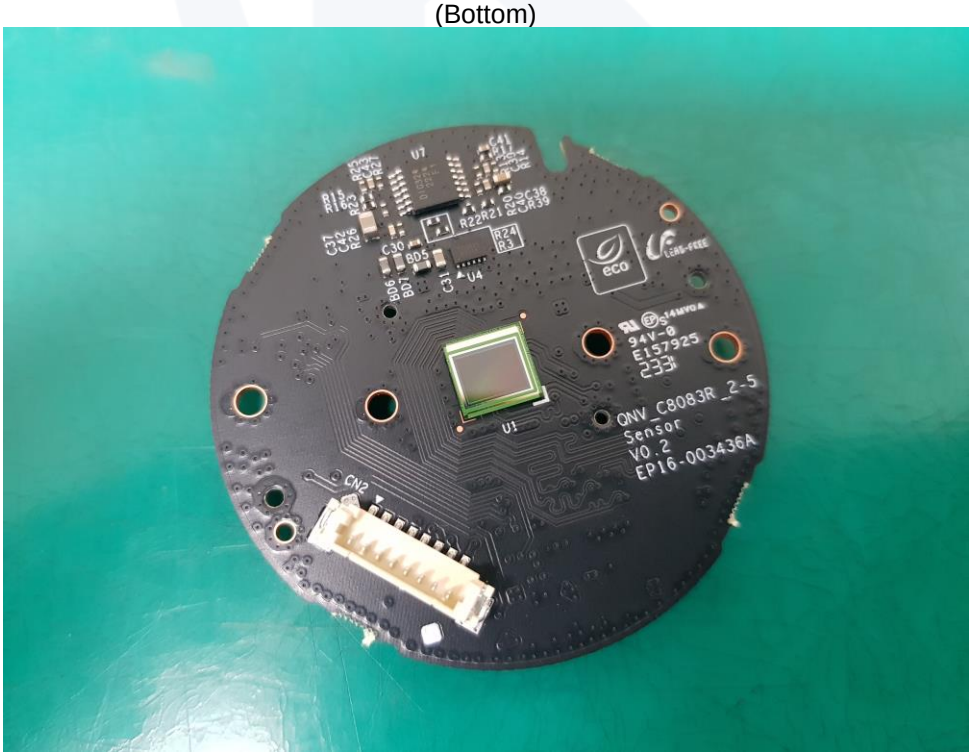


EUT Internal View – Camera Board

(Top)



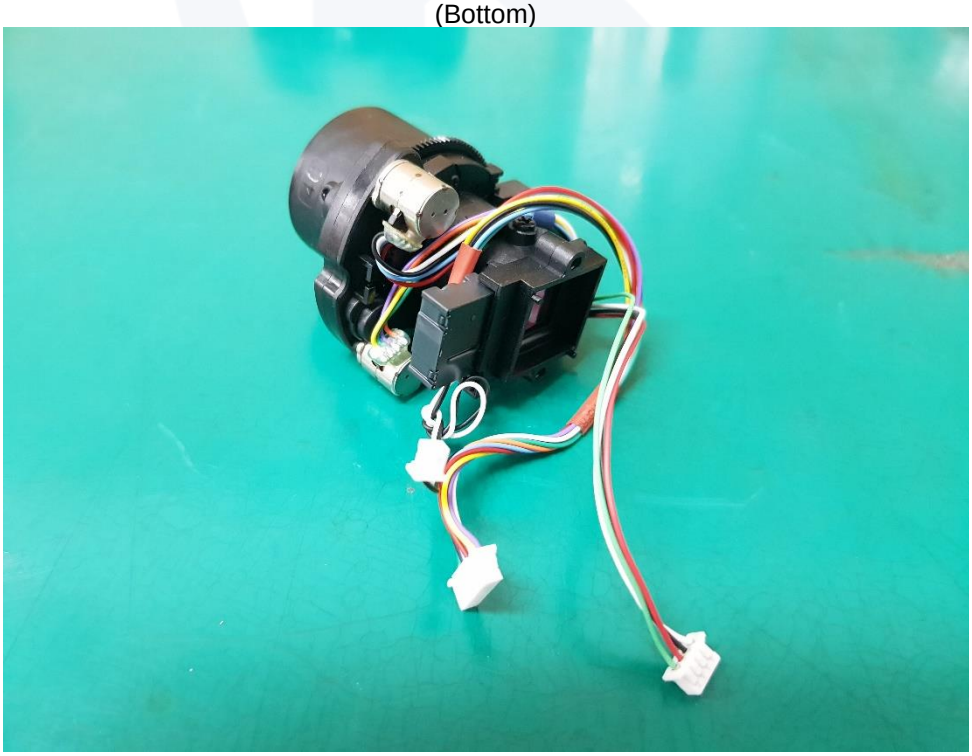
(Bottom)



EUT Internal View – Camera Lens

(Top)

(Bottom)



Label and Location

Explosion Proof Camera

Model No : TNO-C8083E

Manufacturer : INDUS VISION Co., Ltd.

Made in Korea