

EMC TEST REPORT

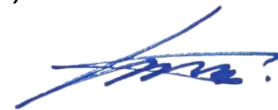
Test Report No. : KES-EM-21T0010-R3
Date of Issue : Feb. 24, 2023
Product name : NETWORK CAMERA
Model/Type No. : TNF-9010
Variant Model : -
Applicant : Hanwha Vision Co., Ltd
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, Republic of Korea
Manufacturer : 1. HANWHA 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 : Dec. 07, 2020
Test date : Dec. 20, 2020 ~ Dec. 21, 2020
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by



Dong In, Kim
EMC Test Engineer

Reviewed by



Dong-Hun, Jang
EMC Technical Manager

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



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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Jan. 05, 2021	KES-EM-21T0010	Issued
May. 31, 2022	KES-EM-21T0010-R1	Re-issue due to regulations update
Jun. 09, 2022	KES-EM-21T0010-R2	Test regulation addition on customer request.
Feb. 24, 2023	KES-EM-21T0010-R3	Change the Applicant and manufacturer at the request of the customer.

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1.0 General Product Description

Main Specifications of EUT are:

TNF-9010			
Video		Radiometry	
Imaging Device	1/2.3" 12MP CMOS	Temperature detect range	None
Resolution	Original view(1:1): 3008x3008~480x480,	Temperature accuracy	None
	Quad view: 3584x2688~640x480,	Temperature detection	None
	Q1/Q2/Q3/Q4(4:3): 1792x1344~640x480	Additional	None
Max. Framerate	H.265/H.264: Max.30fps/25fps@3008x3008(60Hz/50Hz), MJPEG: Max.30fps/25fps@1080x1080(60Hz/50Hz)	Network	
NETD	None	Ethernet	Metal shielded RJ-45(10/100BASE-T)
Pixel Size	None	Video Compression	H.265/H.264: Main/Baseline/High, MJPEG 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
Min. Illumination	Color: 0.39 Lux (F2.2, 1/30sec), BW : 0Lux(IR LED on)	Audio Compression	
Video Out	CVBS : 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P), for Installation	Smart Codec	Manual(Sea area), WiseStreamII
Video Transmission Distance	None	Video Quality Adjustment	H.264/H.265: Target bitrate level control MJPEG: Quality level control
Lens		Bitrate Control	H.264/H.265: CBR or VBR MJPEG: VBR
Focal Length (Zoom Ratio)	1.08mm fixed focal	Streaming	Unicast(20 users) / Multicast Multiple streaming(Up to 10 profiles)
Max. Aperture Ratio	F2.2		IPV4, IPV6, TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTSP,RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, UPnP, Bonjour, LLDP, SRTP (TCP, UDP Unicast)
Angular Field of View	H: 187° / V: 187° / D: 187°		
Min. Object Distance	0.5m(1.64ft)	Protocol	
Focus Control	None		
Lens Type	None		
Mount Type	None	Security	HTTPS(SSL) Login Authentication Digest Login Authentication IP Address Filtering User access log 802.1X Authentication(EAP-TLS, EAP-LEAP) Device Certificate(Hanwha Techwin Root CA, pre-installed) Secure by default certificate HTPM (Hanwha Trusted platform module) Secure OS/Boot/Storage, Verify firmware forgery
Optional Lens	None		
Pan / Tilt / Rotate			
Pan / Tilt / Rotate Range	Rotate : +/- 180	Application Programming Interface	ONVIF Profile S/T SUNAPI(HTTP API) Wisenet open platform(T8D)
Pan Range	None		
Pan Speed	None		
Tilt Range	None	General	
Tilt Speed	None		English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Swedish, Portuguese, Czech, Polish, Turkish, Dutch, Hungarian, Greek
Rotate Range	None		
Sequence	None	Webpage Language	
Preset Accuracy	None	Web Viewer	None
Operational		Edge Storage	Micro SD/SDHC/SDXC 1slot 512GB
Camera Title	Displayed up to 85 characters	Memory	4096MB RAM, 512MB Flash
Direction Indicator	None	Environmental & Electrical	
Day & Night	Auto(Electrical)	Operating Temperature / Humidity	-10°C ~ +50°C (14°F ~ +122°F) / Less than 95% RH
Backlight Compensation	BLC, HLC, WDR, SSDR	Storage Temperature / Humidity	-50°C ~ +60°C(-58°F ~ +140°F) / Less than 95% RH
Wide Dynamic Range	extremeWDR (120dB)	Certification	None
Digital Noise Reduction	SSNRV	Input Voltage	PoE(IEEE802.3af, Class3), 12VDC
Digital Image Stabilization	None	Power Consumption	PoE : Max 12.95W, Typical 10W 12VDC: Max 10W, Typical 8.3W
Defog	None	Mechanical	
Motion Detection	8ea, 8point polygonal zones	Color / Material	White / Aluminum
Privacy Masking	32ea, polygonal zones	RAL Code	RAL9003
	- Color: Grey/Green/Red/Blue/Black/White	Product dimensions / weight	Ø158x80.5mm(6.22x3.17), 1,280g(2.82lb)
	- Mosaic	Conduit hole	None
Gain Control	Low / Middle / High	Hanging mount(Dome)	None
White Balance	ATW / Narrow ATW / AWC / Manual / Indoor / Outdoor	Skin cover(Dome)	None
LDC	None	Weather cap(Dome)	None
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (1/5~1/12,000sec)	Power module	None
Digital PTZ	Support(Preset, Group)	Backbox	None
Video Rotation	Flip, Mirror	DORI (EN62676-4 standard)	
Analytics	- Parking detection based on AI engine (LED color: Green/Red/Blue/Pink/Yellow/Skyblue/Purple)	Detect (25PPM/ 8PPF)	34.9m(114.49ft)
	- Analytics events : Defocus detection, Motion detection, Tampering	Observe (63PPM/ 19PPF)	13.9m(45.60ft)
		Recognize (125PPM/ 38PPF)	7.0m(22.96ft)
Business Intelligence	None	Identify (250PPM/ 76PPF)	3.5m(11.48ft)
Serial Interface	None		
Alarm I/O	1/1		
Alarm Triggers	Analytics, Network disconnect, Alarm input		
Alarm Events	File upload via FTP and e-mail		
	Notification via e-mail		
	SD/SDHC/SDXC or NAS recording at event triggers		
	Alarm output		
	PTZ Preset		
Audio In	Handover		
	Audio clip playback		
	LED status		
Audio Out	Selectable(mic in/line in)		
	Supply voltage: 2.5VDC(4mA), Input impedance: 2K Ohm		
	Line out, Max. output level: 1Vrms		
IR Viewable Length	None		
IR Illuminator (Optional)	None		
Water Removal	None		
Auto Tracking	None		
Coaxial Protocol	None		
Color Palettes	None		

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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.

Voltage ☒ 230 Vac ☐ 100 Vac ☐ 24 Vac ☐ 12 Vdc ☒ PoE

Frequency ☒ 50 Hz ☐ 60 Hz ☐ Hz

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	TNF-9010	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT

**KES Co., Ltd.**

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1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
AC/DC Adapter	FSP060-DIBAN2	-	FSP GROUP INC.	-
PoE Adapter	GS728TPP	-	NETGEAR	-
Notebook	CQ61-127TU	CNF91801TM	HP	-
Notebook Adapter	PPP09D	601W94D1CKU	HP	-
Speaker	BR1000A Cuve Black 2	-	DONGGUAN EDIFIER TECHNOLOGY Co., Ltd	-
Mic	MP1000	-	-	-
SmartPhone	SM-G900	-	SAMSUNG	-
Alarm	-	-	-	-
Alarm Adapter	2ACB022F	-	Channel Well Technology (Guangzhou) Co., Ltd.	-
Button Alarm	-	-	-	-
Micro SD Card	-	-	Sandisk	-

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1.6 External I/O Cabling

■ DC Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA (EUT)	RJ-45 (LAN)	Notebook	RJ-45 (LAN)	3.0	U
	3.5 mm	Speaker	3.5 mm	1.4	U
	3.5 mm	Mic	3.5 mm	1.4	U
	2 Pin	Button Alarm	2 Pin	3.0	U
	2 Pin	Alarm	2 Pin	3.0	U
	Micro SD Card Slot	Micro SD Card	Micro SD Card Slot	-	-
Notebook	3.5 mm	SmartPhone	3.5 mm	1.2	U

* Unshielded=U, Shielded=S

■ PoE Mode

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)	3.0	U
	3.5 mm	Speaker	3.5 mm	1.4	U
	3.5 mm	Mic	3.5 mm	1.4	U
	2 Pin	Button Alarm	2 Pin	3.0	U
	2 Pin	Alarm	2 Pin	3.0	U
	Micro SD Card Slot	Micro SD Card	Micro SD Card Slot	-	-
PoE Adapter	RJ-45 (LAN)	Notebook	RJ-45 (LAN)	3.0	U
Notebook	3.5 mm	SmartPhone	3.5 mm	1.2	U

* Unshielded=U, Shielded=S



1.7 EUT Operating Mode(s)

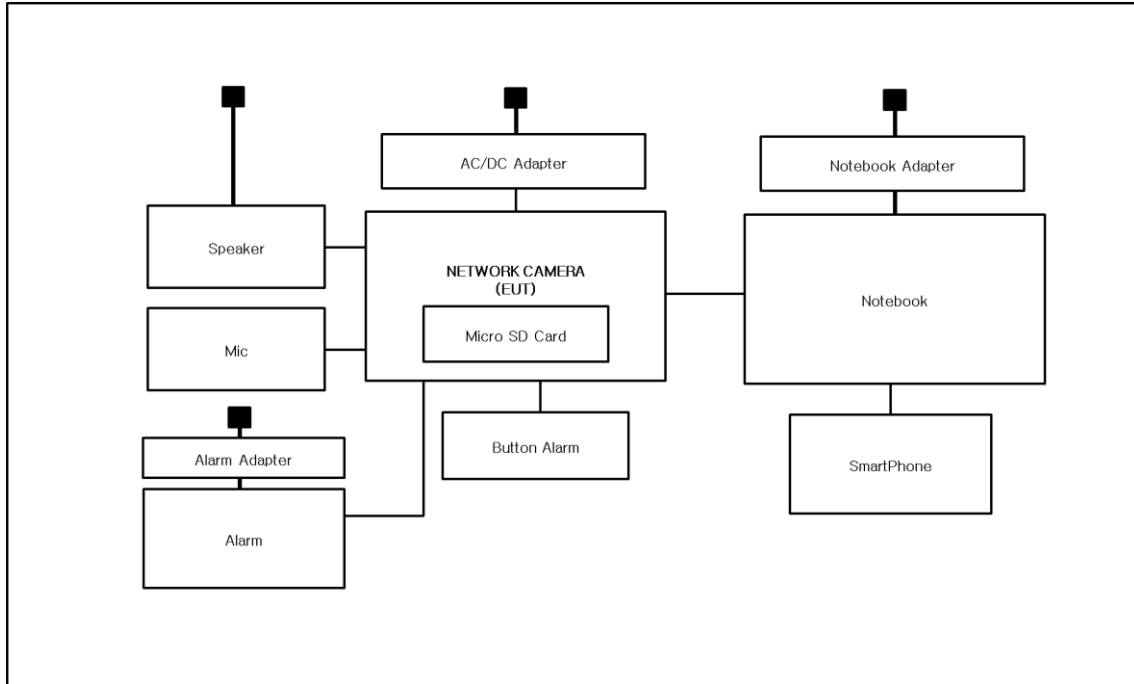
Test Mode	operating
DC	Tested by checking the operation status through the screen transmitted to the web viewer and Notebook and conducting a PING test.
PoE	

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

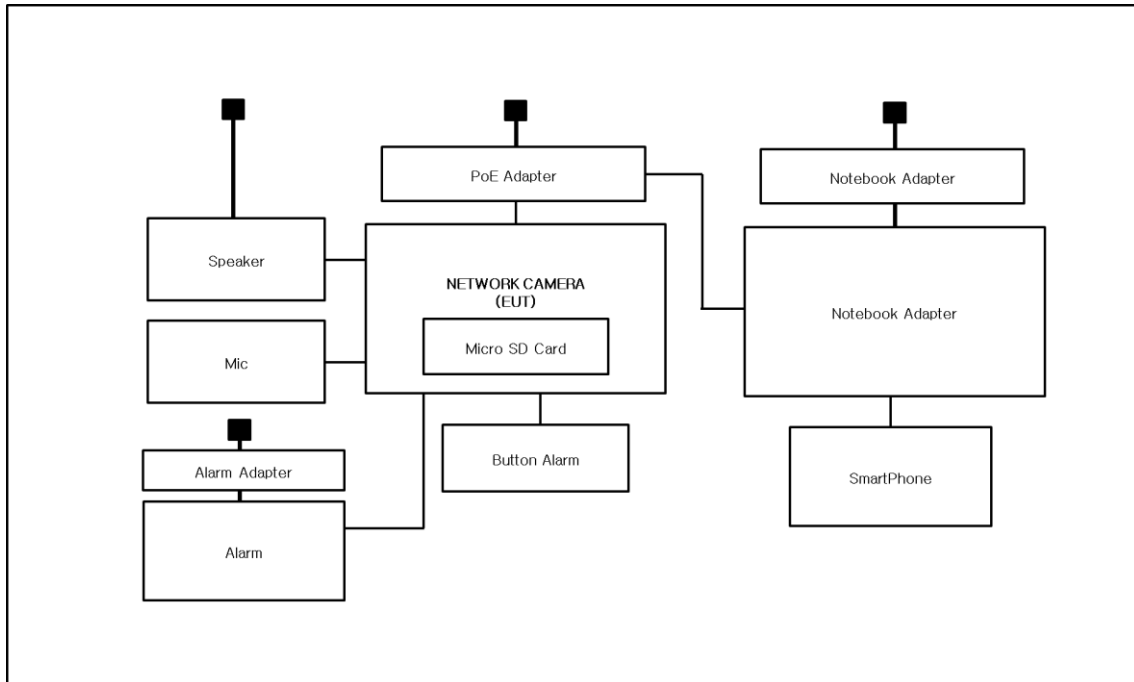
1.8 Configuration

■ AC Main
 □ DC Main

■ DC Mode



■ PoE Mode



1.9 Remarks when standards applied

N/A

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

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

☒ **EMC – Regulations 2016**

☒ EN 55032:2015/A11:2020

☒ Class A

☐ Class B

☒ EN 50130-4:2011

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

2.1 Conducted Emissions at Mains Power Ports

Test Date

Dec. 20, 2020

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	01, 20, 2021
☒	LISN	ENV216	R & S	101787	12, 29, 2021
☒	LISN	ESH2-Z5	R & S	100450	12, 29, 2021
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 29, 2021

Test Conditions

Temperature: 22,6 °C

Relative Humidity: 46,9 % 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

Dec. 20, 2020

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	01, 20, 2021
☒	LISN	ENV216	R & S	101787	12, 29, 2021
☒	LISN	ESH2-Z5	R & S	100450	12, 29, 2021
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 29, 2021
☒	8-WIRE ISN CAT3,5	ENY81	R & S	100174	12, 30, 2021
☐	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	12, 30, 2021
☐	CDN	CDNS502A	TESEQ	40431	12, 29, 2021

Test Conditions

Temperature: 22,6 °C
Relative Humidity: 46,9 % 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

See Appendix A for test data.

2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Dec. 20, 2020

Test Location☐ OPEN AREA TEST SITE #2 ☒ SEMI ANECHOIC CHAMBER #4(10m)**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	04, 01, 2021
☒	AMPLIFIER	SCU 01	R & S	100603	11, 25, 2021
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	12, 08, 2022
☒	ATTENUATOR	8491A	HP	32173	03, 10, 2021

Test ConditionsTemperature: 23,1 °C
Relative Humidity: 47,6 % 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**Remarks**See Appendix A for test data.

2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Dec. 21, 2020

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	08, 05, 2021
☒	PREAMPLIFIER	8449B	AGILENT	3008A01967	04, 20, 2021
☐	ATTENUATOR	8491A	HP	35496	03, 10, 2021
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 11, 2021

Test ConditionsTemperature: 23,4 °C
Relative Humidity: 47,3 % 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.

2.5 Harmonic Current Emissions

Test Date

Dec. 20, 2020

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	04, 06, 2021
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 21,4 °C
Relative Humidity: 46,4 % 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.

2.6 Voltage Fluctuations and Flicker

Test Date

Dec. 20, 2020

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	04, 06, 2021
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 21,4 °C
Relative Humidity: 46,4 % R.H.

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

EN 50130-4:2011 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

Dec. 21, 2020

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	ESS05X4620	01, 28, 2021
☒	HCP	-	KES	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: 23,2 °C
Relative Humidity: 48,2 % R.H.
Atmospheric Pressure: 101,1 kPa

Test Specifications

Discharge Factor: ≥ 1 s

Discharge Impedance: 330 ohm / 150 pF

Kind of Discharge: Air, Contact (direct and indirect)

Polarity: Positive and Negative

Number of Discharge: 10 at all locations for Air discharge
10 at all locations for Contact discharge

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

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

Required Performance Criteria: ☒ Complied

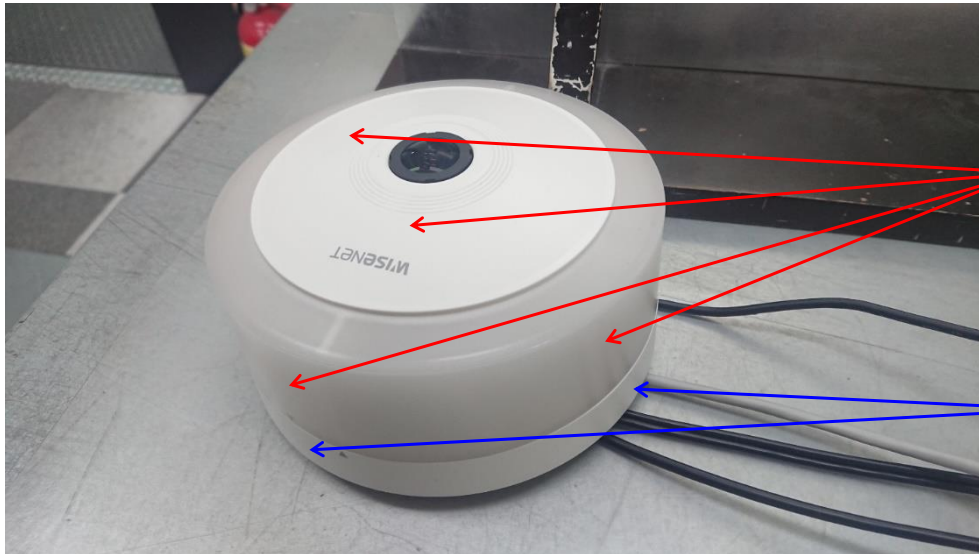
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Location of Discharge:

Air
Contact

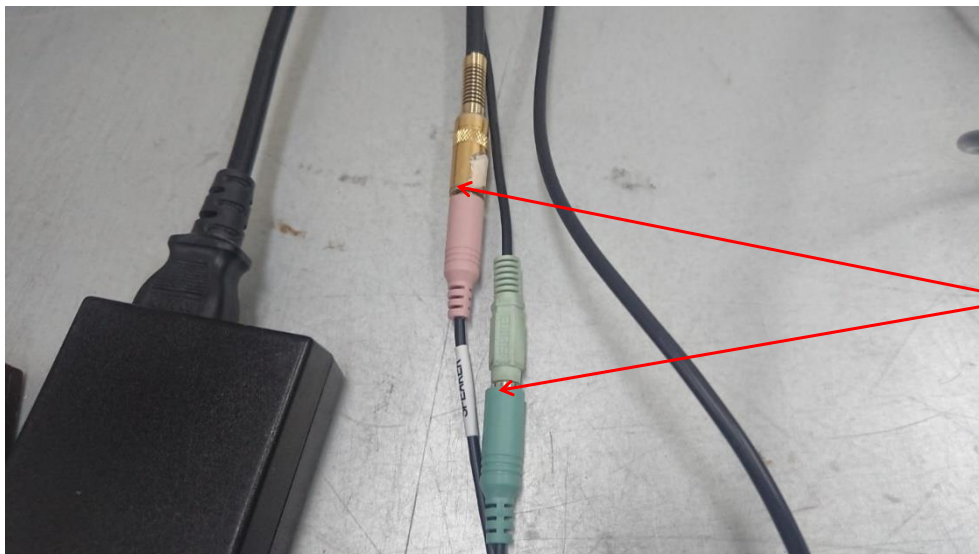


■ DC Mode



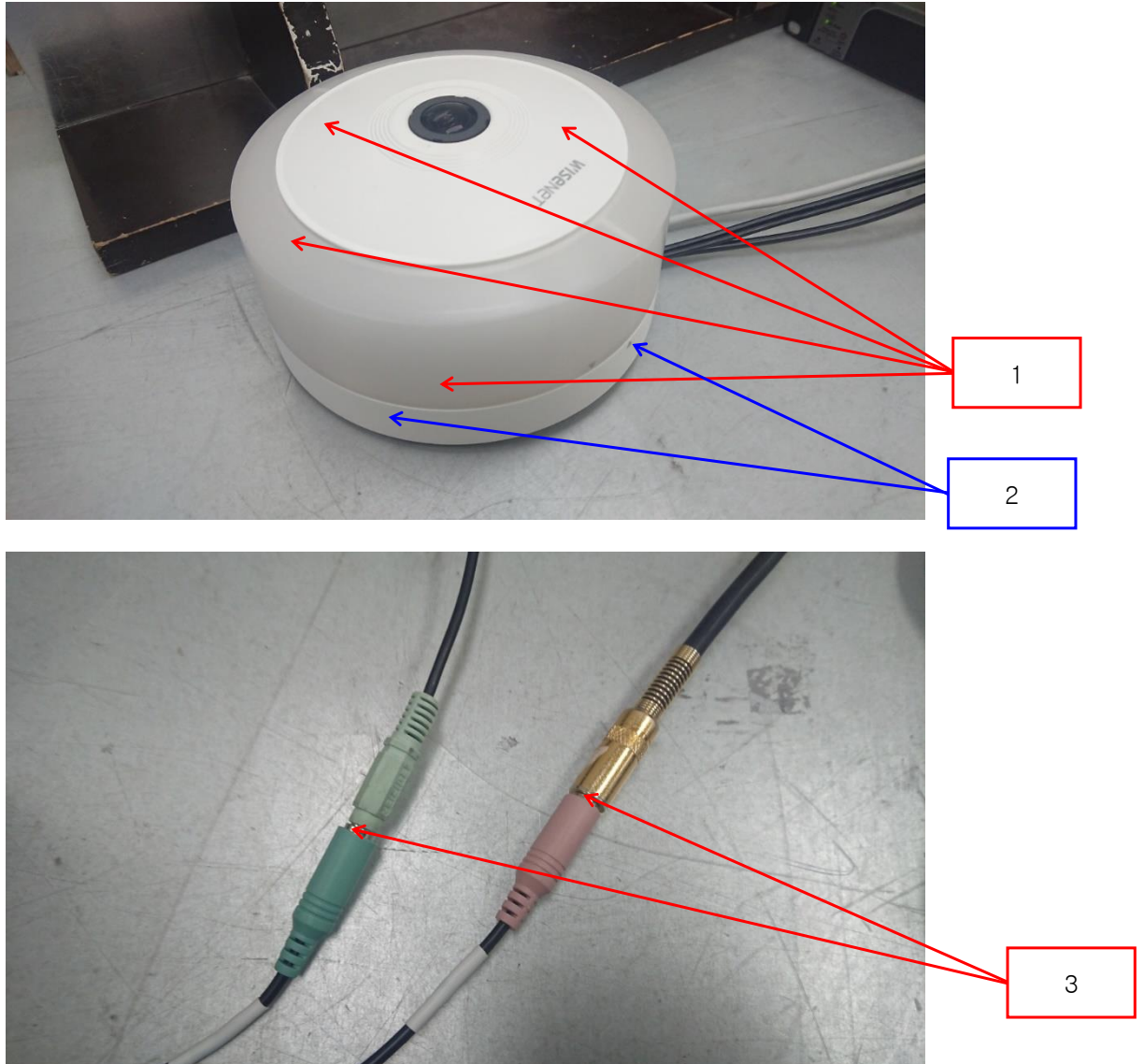
1

2



3

■ PoE Mode



Test Data

■ DC Mode

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	Upper Enclosure	Air Discharge	Complied	-
2	Bottom Enclosure	Contact Discharge	Complied	-
3	Around Port	Contact Discharge	Complied	-

■ PoE Mode

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	Upper Enclosure	Air Discharge	Complied	-
2	Bottom Enclosure	Contact Discharge	Complied	-
3	Around 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. 21, 2020

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	9.12.00	-
☒	SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	08, 05, 2021
☒	HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-
☒	POWER METER	E4419B	Agilent	GB40203000	04, 20, 2021
☒	CW POWER SENSOR	E4412A	Agilent	US38488240	04, 20, 2021
☒	CW POWER SENSOR	E4412A	Agilent	MY41501662	04, 20, 2021
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 11, 2021

Test Conditions

Temperature: 23,4 °C
Relative Humidity: 47,3 % R.H.
Atmospheric Pressure: 100,2 kPa



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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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Test Data

■ DC Mode

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

■ PoE Mode

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

RemarksPASS Required Performance Criteria

3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Dec. 21, 2020

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	5.4.7	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 26, 2021
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 26, 2021
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 26, 2021

Test Conditions

Temperature: 23,2 °C
Relative Humidity: 48,2 % R.H.
Atmospheric Pressure: 101,1 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

■ DC Mode

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

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
L	Complied	Complied
N	Complied	Complied
PE	Complied	Complied
L – N	Complied	Complied
L – PE	Complied	Complied
N – PE	Complied	Complied
L – N – PE	Complied	Complied

☐ 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 (LAN)	Complied	Complied
Alarm	Complied	Complied
Button Alarm	Complied	Complied

■ PoE Mode

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

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

☐ 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
Alarm	Complied	Complied
Button Alarm	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. 21, 2020

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	5.4.7	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 26, 2021
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 26, 2021
☒	CDN	CNV 508N1	EM TEST	P1610176296	11, 27, 2021

Test Conditions

Temperature: 23,2 °C
Relative Humidity: 48,2 % R.H.
Atmospheric Pressure: 101,1 kPa



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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

■ DC Mode

☒ Line to Line – Differential Mode

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

☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L – PE	Complied	Complied
N – PE	Complied	Complied

Signal Lines

☒ Line to Earth – Common Mode

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

☒ PoE Mode

☐ Line to Line – Differential Mode

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

☐ Line to Earth – Common Mode

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

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

☐ NOT APPLICABLE

Remarks

PASS Required Performance Criteria

3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Dec. 20, 2020

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	5.3.11	-
☒	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	11, 25, 2021
☒	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 25, 2021
☒	CDN	CDN M016	TESEQ	43694	11, 25, 2021
☒	CDN	CDN M016	TESEQ	43697	11, 25, 2021
☒	CDN	CDN T8RJ45	EM TEST	0909-09	08, 05, 2021
☒	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 26, 2021

Test Conditions

Temperature: 22,6 °C
Relative Humidity: 46,9 % R.H.
Atmospheric Pressure: 100,9 kPa

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

Test Data

■ DC Mode

☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L – N – PE	CDN	Complied

☐ 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 (LAN)	CDN	Complied
Alarm	Clamp	Complied
Button Alarm	Clamp	Complied

■ PoE Mode☐ 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
Alarm	Clamp	Complied
Button Alarm	Clamp	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

Dec. 21, 2020

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	5.4.7	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 26, 2021
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 26, 2021

Test Conditions

Temperature: 23,2 °C
Relative Humidity: 48,2 % R.H.
Atmospheric Pressure: 101,1 kPa

Test Specifications & Observations/Remarks

■ DC Mode

- 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>Complied</u>
☒ 30 % dip	☒ 25 / 500	<u>Complied</u>
☒ 60 % dip	☒ 10 / 200	<u>Complied</u>
☒ 100 % dip	☒ 250 / 5 000	<u>Degradation</u>

- Voltage variations

☒ Unom + 10 %	☒ 253.0 V (ac)	<u>Complied</u>
☒ Unom - 15 %	☒ 195.5 V (ac)	<u>Complied</u>

Observations:

Complied – No degradation of function

Degradation - See "Remarks "

Test Results

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

Remarks

During the test(100%, 250cycle), EUT was turned off but after the test, it was recovered by no operator's intervention.

APPENDIX A – TEST DATA

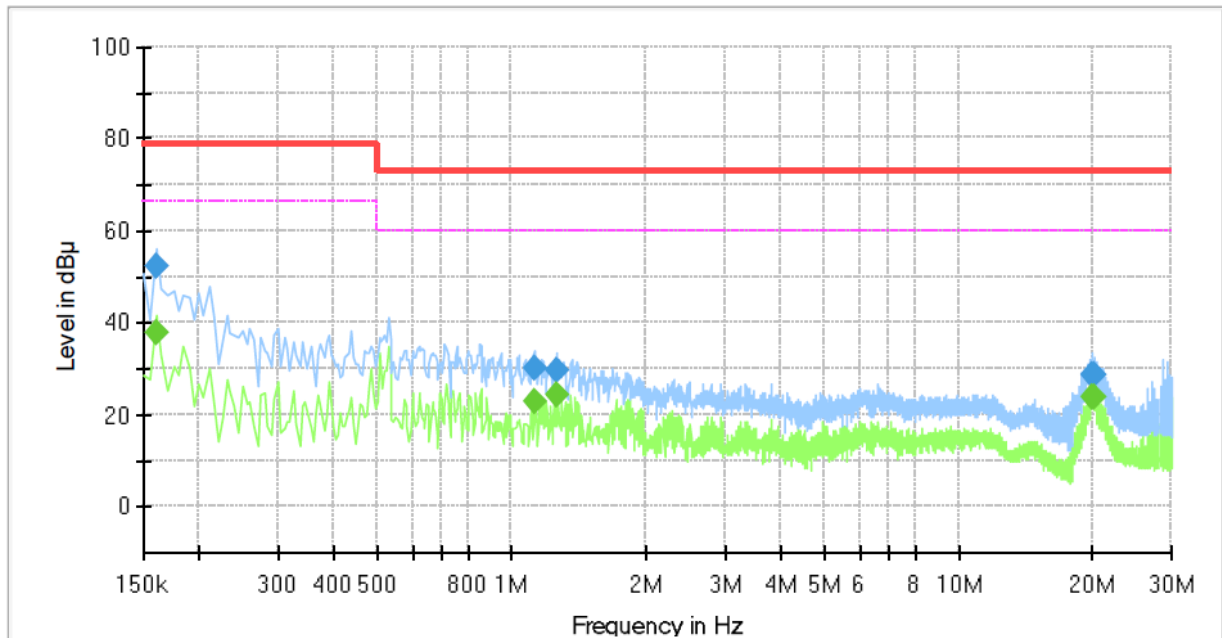
Conducted Emissions at Mains Power Ports

■ DC Mode

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	TNF-9010
Phase:	L1
Mode:	DC
Operator Name:	KES



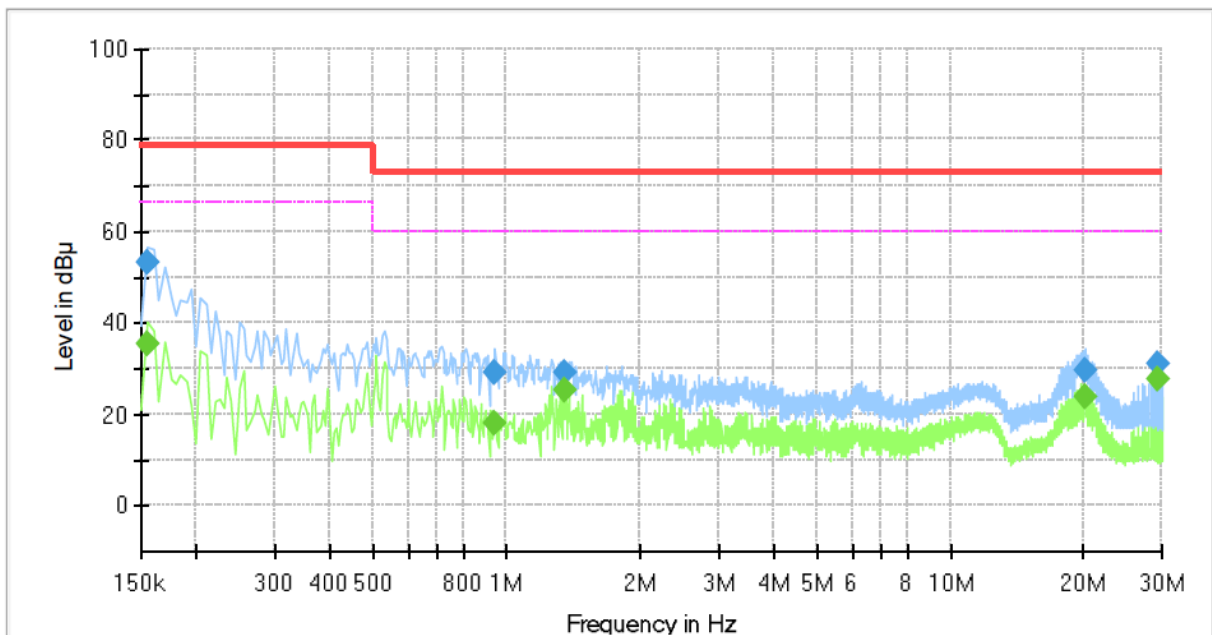
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.160000	---	37.58	66.00	28.42	1000.0	9.000	L1	19.5
0.160000	52.28	---	79.00	26.72	1000.0	9.000	L1	19.5
1.130000	---	22.82	60.00	37.18	1000.0	9.000	L1	20.1
1.130000	29.81	---	73.00	43.19	1000.0	9.000	L1	20.1
1.270000	---	24.47	60.00	35.53	1000.0	9.000	L1	20.1
1.270000	29.60	---	73.00	43.40	1000.0	9.000	L1	20.1
19.960000	---	23.69	60.00	36.31	1000.0	9.000	L1	20.2
19.960000	28.81	---	73.00	44.19	1000.0	9.000	L1	20.2
20.105000	---	23.64	60.00	36.36	1000.0	9.000	L1	20.2
20.105000	28.66	---	73.00	44.34	1000.0	9.000	L1	20.2

[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	TNF-9010
Phase:	N
Mode:	DC
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	35.51	66.00	30.49	1000.0	9.000	N	19.4
0.155000	53.34	---	79.00	25.66	1000.0	9.000	N	19.4
0.940000	---	17.95	60.00	42.05	1000.0	9.000	N	20.1
0.940000	29.03	---	73.00	43.97	1000.0	9.000	N	20.1
1.360000	---	25.04	60.00	34.96	1000.0	9.000	N	20.1
1.360000	28.91	---	73.00	44.09	1000.0	9.000	N	20.1
20.100000	---	23.84	60.00	36.16	1000.0	9.000	N	20.3
20.100000	29.74	---	73.00	43.26	1000.0	9.000	N	20.3
29.235000	---	27.53	60.00	32.47	1000.0	9.000	N	20.5
29.235000	30.82	---	73.00	42.18	1000.0	9.000	N	20.5

◆ 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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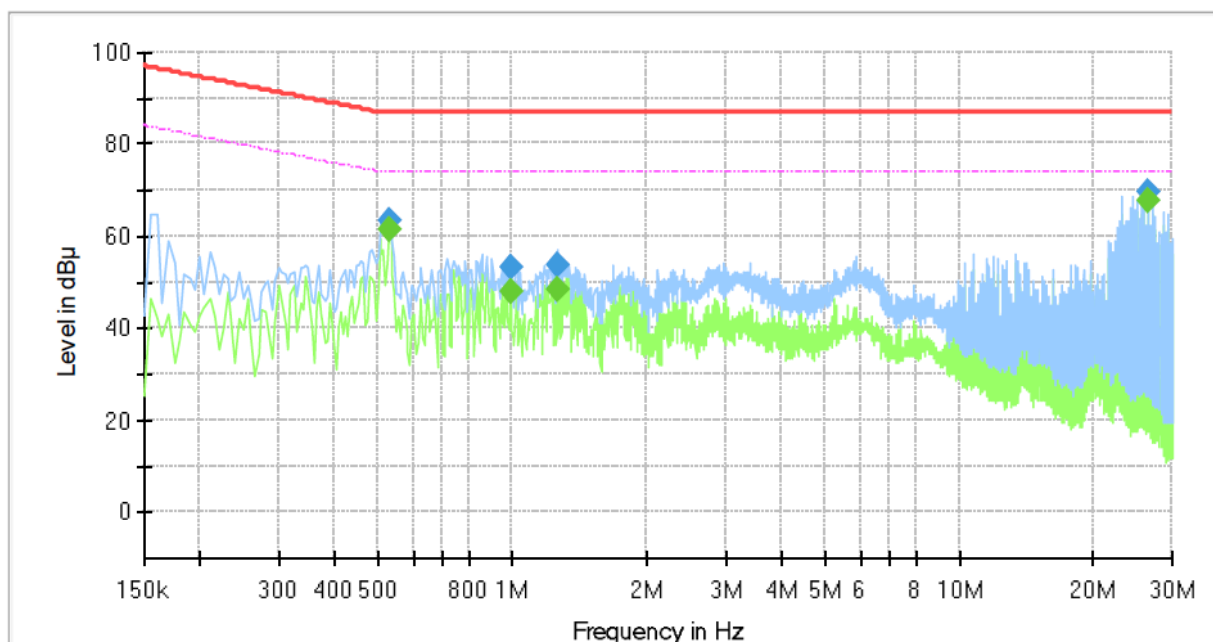
Conducted Emissions at Telecommunication Ports

■ DC Mode

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNF-9010
Mode :	DC
Speed :	100 Mbps
Operator Name:	KES



Final Result

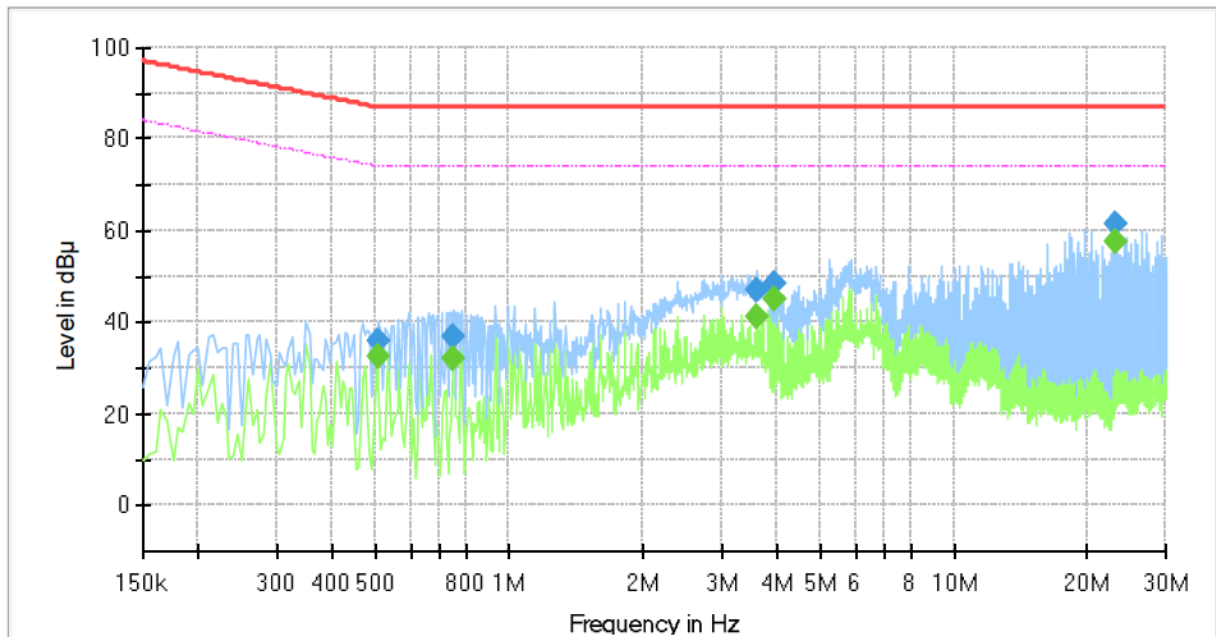
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.530000	---	61.55	74.00	12.45	1000.0	9.000	Single Line	19.8
0.530000	63.44	---	87.00	23.56	1000.0	9.000	Single Line	19.8
0.990000	---	48.07	74.00	25.93	1000.0	9.000	Single Line	20.0
0.990000	53.39	---	87.00	33.61	1000.0	9.000	Single Line	20.0
1.265000	---	48.54	74.00	25.46	1000.0	9.000	Single Line	20.0
1.265000	53.51	---	87.00	33.49	1000.0	9.000	Single Line	20.0
26.610000	---	67.59	74.00	6.41	1000.0	9.000	Single Line	20.3
26.610000	69.72	---	87.00	17.28	1000.0	9.000	Single Line	20.3

■ PoE Mode

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNF-9010
Mode :	PoE
Speed :	100 Mbps
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.505000	---	32.30	74.00	41.70	1000.0	9.000	Single Line	19.8
0.505000	35.89	---	87.00	51.11	1000.0	9.000	Single Line	19.8
0.750000	---	32.13	74.00	41.87	1000.0	9.000	Single Line	19.9
0.750000	36.96	---	87.00	50.04	1000.0	9.000	Single Line	19.9
3.620000	---	41.00	74.00	33.00	1000.0	9.000	Single Line	19.6
3.620000	47.08	---	87.00	39.92	1000.0	9.000	Single Line	19.6
3.955000	---	45.17	74.00	28.83	1000.0	9.000	Single Line	19.6
3.955000	48.45	---	87.00	38.55	1000.0	9.000	Single Line	19.6
23.130000	---	57.61	74.00	16.39	1000.0	9.000	Single Line	20.1
23.130000	61.31	---	87.00	25.69	1000.0	9.000	Single Line	20.1

◆ 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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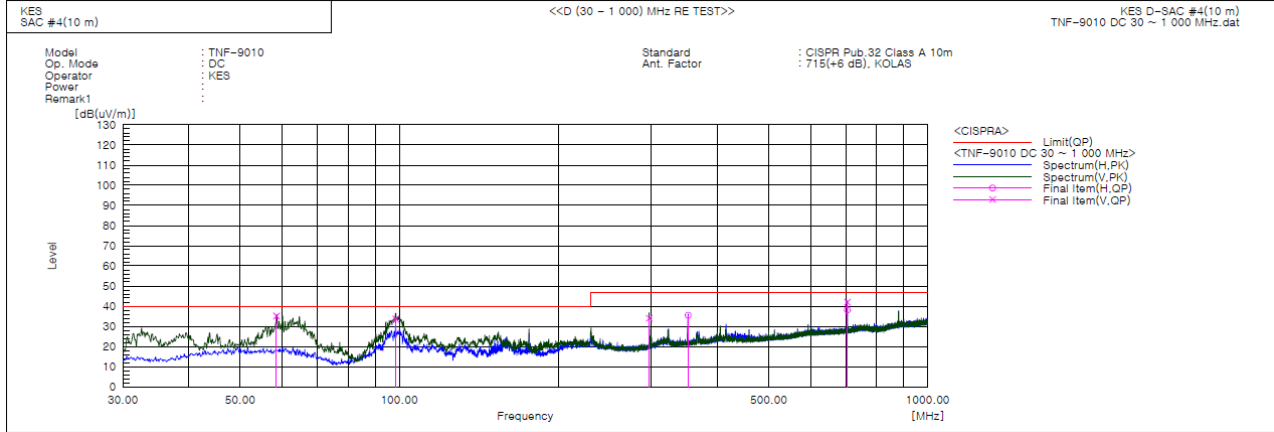
Report No.:

KES-EM-21T0010-R3

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Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode

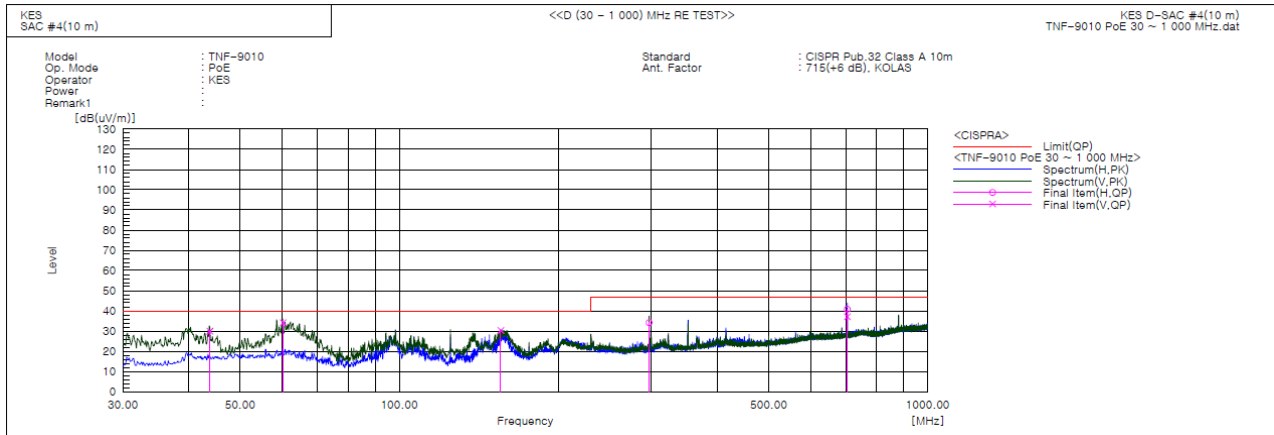


Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	58.551	V	57.4	-22.2	35.2	40.0	4.8	100.0	269.0	
2	98.453	V	57.0	-23.3	33.7	40.0	6.3	108.0	216.0	
3	297.005	V	52.9	-18.9	34.0	47.0	13.0	100.0	168.0	
4	351.989	H	51.8	-16.3	35.5	47.0	11.5	371.0	102.0	
5	704.002	H	47.1	-9.0	38.1	47.0	8.9	283.0	128.0	
6	703.999	V	51.0	-9.0	42.0	47.0	5.0	179.0	88.0	

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■ PoE Mode



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit QP [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	43.816	V	51.9	-21.9	30.0	40.0	10.0	100.0	132.0	
2	60.311	V	56.7	-22.5	34.2	40.0	5.8	100.0	184.0	
3	155.610	V	55.9	-25.6	30.3	40.0	9.7	115.0	163.0	
4	297.051	H	53.1	-18.9	34.2	47.0	12.8	400.0	249.0	
5	704.001	V	46.1	-9.0	37.1	47.0	9.9	184.0	132.0	
6	703.986	H	49.8	-9.0	40.8	47.0	6.2	311.0	128.0	

◆ Calculation – SEMI ANECHOIC CHAMBER #4(10 m)

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

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

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

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



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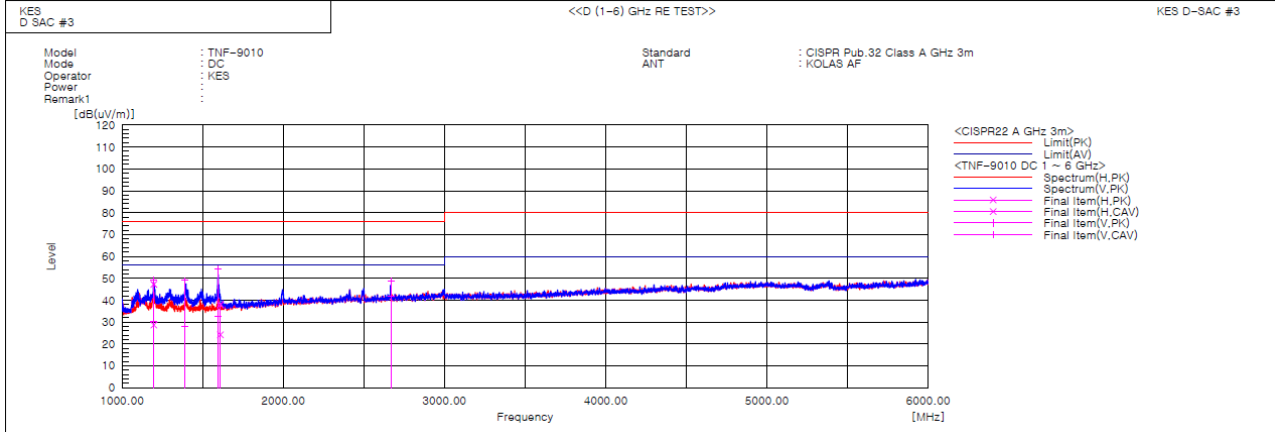
Report No.:

KES-EM-21T0010-R3

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Radiated Electric Field Emissions(Above 1 GHz)

■ DC Mode



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	1196.670	V	57.5	38.9	-8.5	49.0	30.4	76.0	56.0	27.0	25.6	100.0	192.6	
2	1196.840	H	55.8	37.1	-8.5	47.3	28.6	76.0	56.0	28.7	27.4	100.0	139.3	
3	1390.671	V	56.3	35.3	-7.3	49.0	28.0	76.0	56.0	27.0	28.0	100.0	184.9	
4	1609.577	H	43.7	29.9	-5.7	38.0	24.2	76.0	56.0	38.0	31.8	100.0	252.1	
5	1595.710	V	60.0	38.4	-5.8	54.2	32.6	76.0	56.0	21.8	23.4	100.0	228.0	
6	2666.220	V	48.5	41.3	0.3	48.8	41.6	76.0	56.0	27.2	14.4	100.0	326.3	

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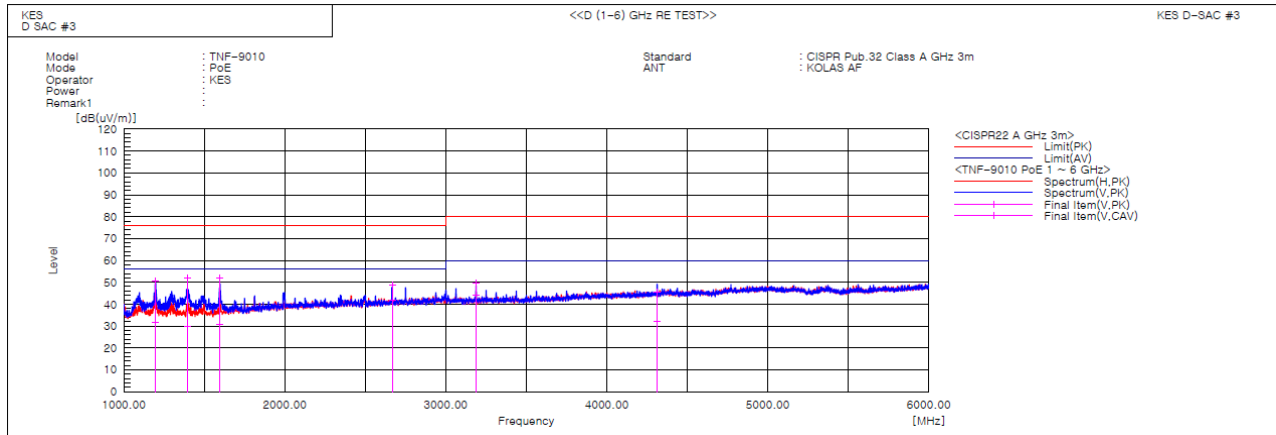
3701, 40, Simin-daero 365beon-gil,
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■ PoE Mode



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	1197.170	V	59.1	40.0	-8.5	50.6	31.5	76.0	56.0	25.4	24.5	100.0	353.0	
2	1393.980	V	59.1	37.3	-7.3	51.8	30.0	76.0	56.0	24.2	26.0	100.0	231.9	
3	1595.500	V	57.9	36.6	-5.8	52.1	30.8	76.0	56.0	23.9	25.2	100.0	219.4	
4	2666.200	V	48.4	41.3	0.3	48.7	41.6	76.0	56.0	27.3	14.4	100.0	343.9	
5	3187.520	V	48.1	42.6	1.6	49.7	44.2	80.0	60.0	30.3	15.8	100.0	165.8	
6	4309.071	V	39.9	26.7	5.5	45.4	32.2	80.0	60.0	34.6	27.8	100.0	166.9	

◆ Calculation

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

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

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Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ DC Mode

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.040			
2	0.005	0.417	1.080	n/a
3	0.031	1.369	2.300	PASS
4	0.004	0.934	0.430	n/a
5	0.031	2.697	1.140	PASS
6	0.006	1.890	0.300	PASS
7	0.030	3.925	0.770	PASS
8	0.004	1.804	0.230	n/a
9	0.030	7.485	0.400	PASS
10	0.004	1.907	0.184	n/a
11	0.029	8.820	0.330	PASS
12	0.004	2.439	0.153	n/a
13	0.028	13.325	0.210	PASS
14	0.004	2.981	0.131	n/a
15	0.027	17.855	0.150	PASS
16	0.004	3.351	0.115	n/a
17	0.026	19.310	0.132	PASS
18	0.004	3.685	0.102	n/a
19	0.024	20.482	0.118	PASS
20	0.003	3.707	0.092	n/a
21	0.022	13.984	0.161	PASS
22	0.003	4.007	0.084	n/a
23	0.021	14.448	0.147	PASS
24	0.003	4.161	0.077	n/a
25	0.020	14.648	0.135	PASS
26	0.003	4.045	0.071	n/a
27	0.018	14.545	0.125	PASS
28	0.003	4.315	0.066	n/a
29	0.017	14.444	0.116	PASS
30	0.002	4.001	0.061	n/a
31	0.015	13.835	0.109	PASS
32	0.002	3.778	0.058	n/a
33	0.014	13.230	0.102	PASS
34	0.002	3.861	0.054	n/a
35	0.012	12.673	0.096	PASS
36	0.002	3.234	0.051	n/a
37	0.011	11.519	0.091	PASS
38	0.002	3.327	0.048	n/a
39	0.009	10.691	0.087	PASS
40	0.001	2.886	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	0.041			
2	0.005	0.318	1.620	PASS
3	0.032	0.917	3.450	PASS
4	0.004	0.687	0.645	n/a
5	0.031	1.812	1.710	PASS
6	0.006	1.380	0.450	PASS
7	0.031	2.644	1.155	PASS
8	0.005	1.328	0.345	n/a
9	0.030	5.011	0.600	PASS
10	0.004	1.397	0.276	n/a
11	0.029	5.911	0.495	PASS
12	0.004	1.791	0.230	n/a
13	0.028	8.916	0.315	PASS
14	0.004	2.187	0.197	n/a
15	0.027	11.945	0.225	PASS
16	0.004	2.449	0.173	n/a
17	0.026	13.031	0.199	PASS
18	0.004	2.688	0.153	n/a
19	0.024	13.746	0.178	PASS
20	0.004	2.708	0.138	n/a
21	0.023	14.108	0.161	PASS
22	0.004	2.907	0.125	n/a
23	0.021	14.575	0.147	PASS
24	0.003	3.019	0.115	n/a
25	0.020	14.725	0.135	PASS
26	0.003	2.950	0.106	n/a
27	0.018	14.630	0.125	PASS
28	0.003	3.125	0.099	n/a
29	0.017	14.560	0.116	PASS
30	0.003	2.924	0.092	n/a
31	0.015	13.941	0.109	PASS
32	0.002	2.753	0.086	n/a
33	0.014	13.356	0.102	PASS
34	0.002	2.821	0.081	n/a
35	0.012	12.791	0.096	PASS
36	0.002	2.417	0.077	n/a
37	0.011	11.647	0.091	PASS
38	0.002	2.518	0.073	n/a
39	0.009	10.806	0.087	PASS
40	0.001	2.170	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.

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Test Data - Voltage Fluctuations

Maximum Flicker results

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

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Test Setup Photos and Configuration

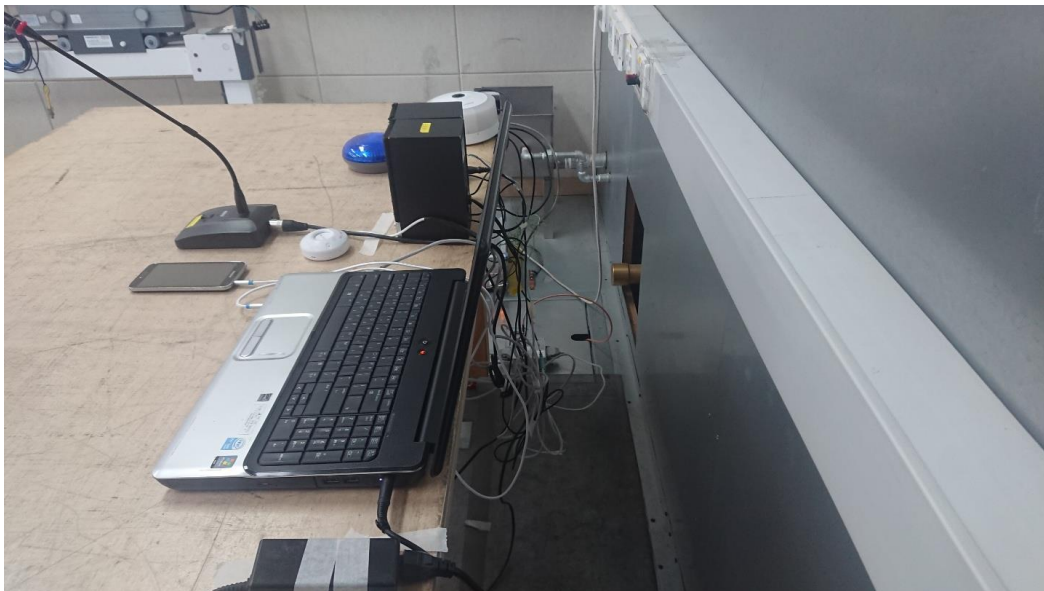
Conducted Emissions at Mains Power Ports

■ DC Mode



Conducted Emissions at Telecommunication Ports

■ DC Mode

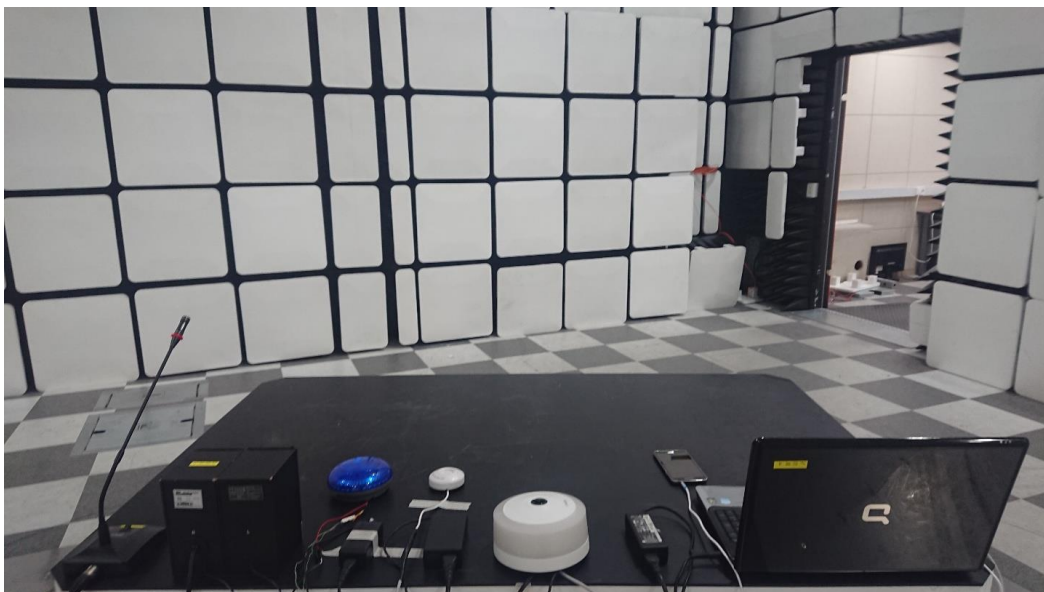
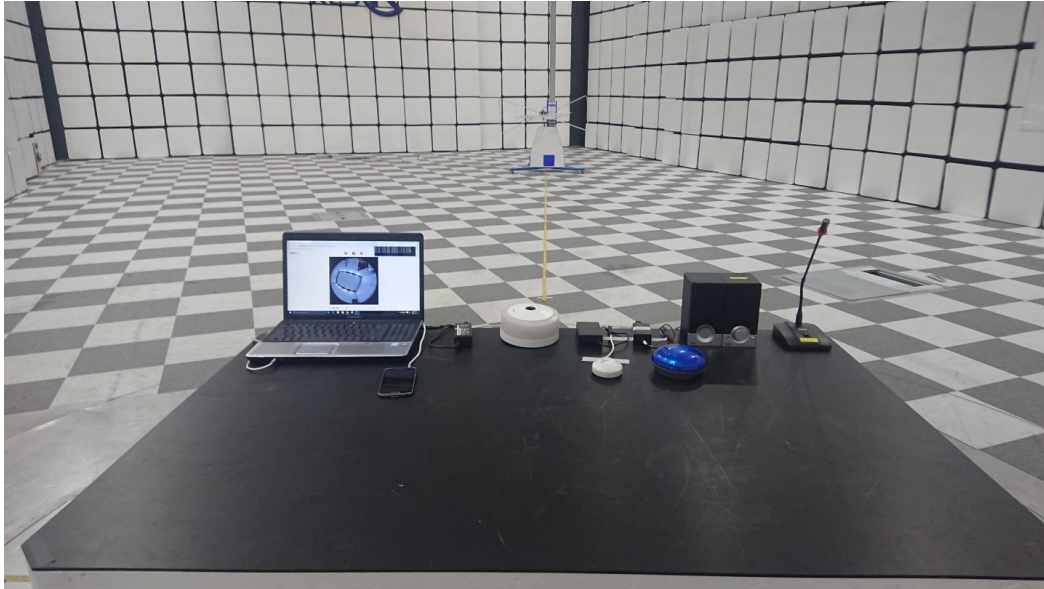


■ PoE Mode



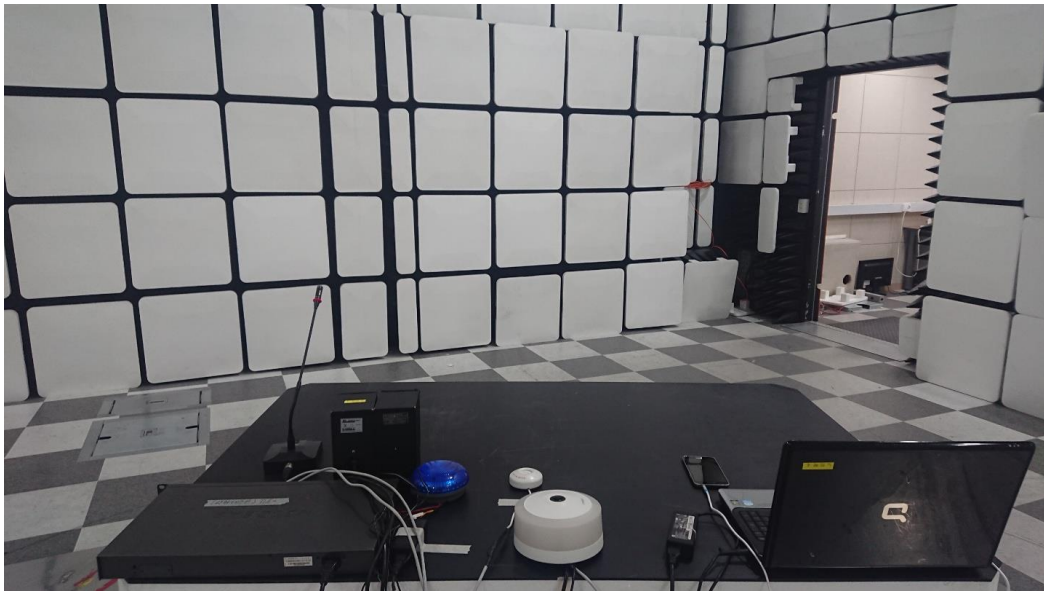
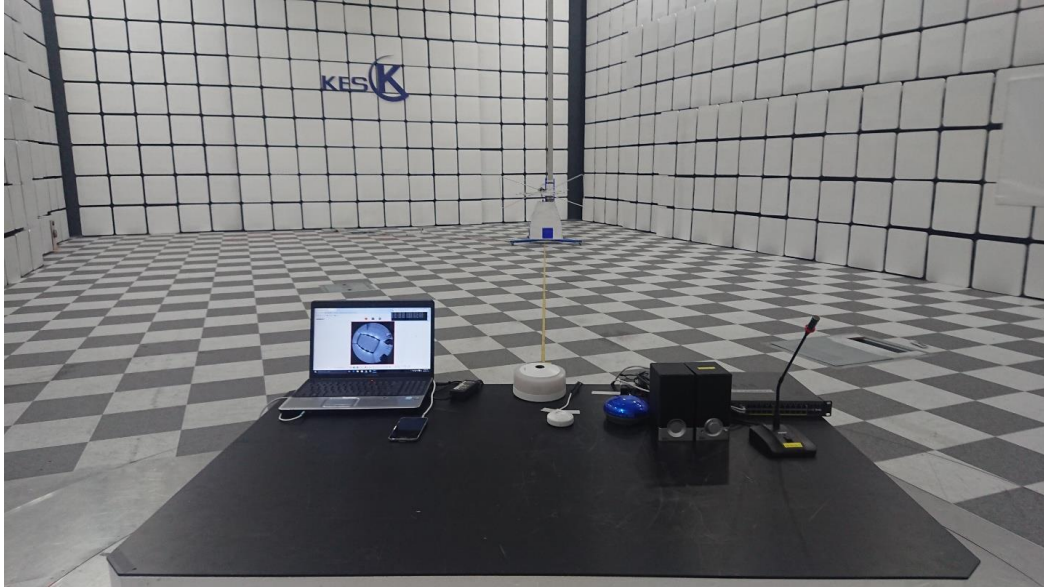
Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode



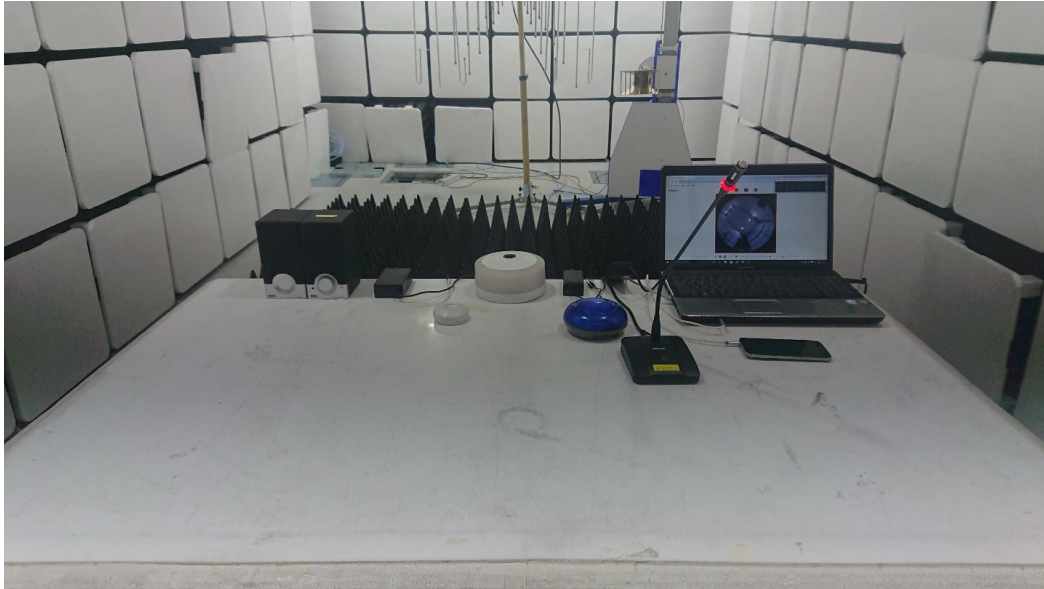
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■ PoE Mode

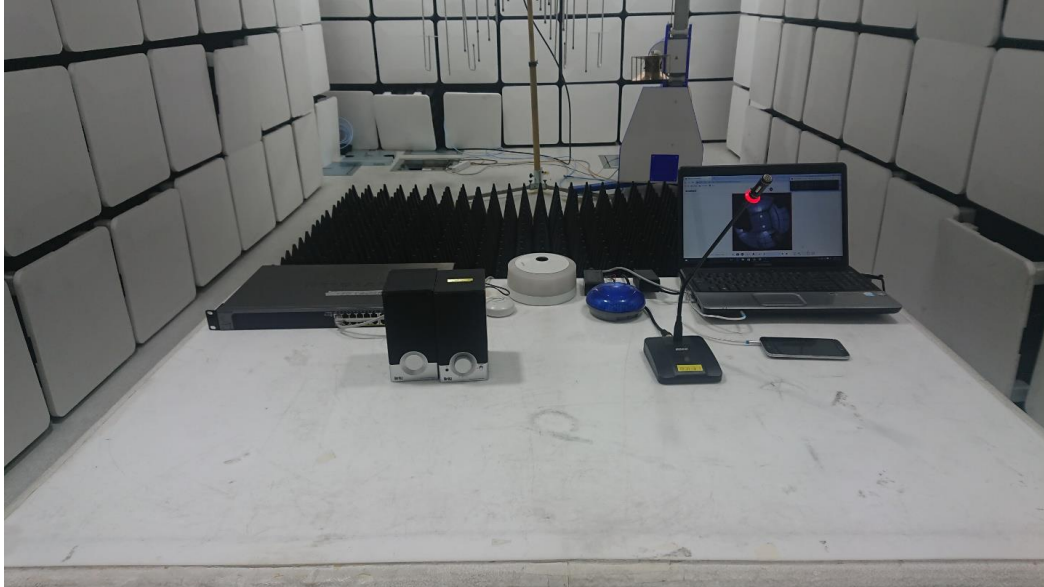


Radiated Electric Field Emissions(Above 1 GHz)

■ DC Mode

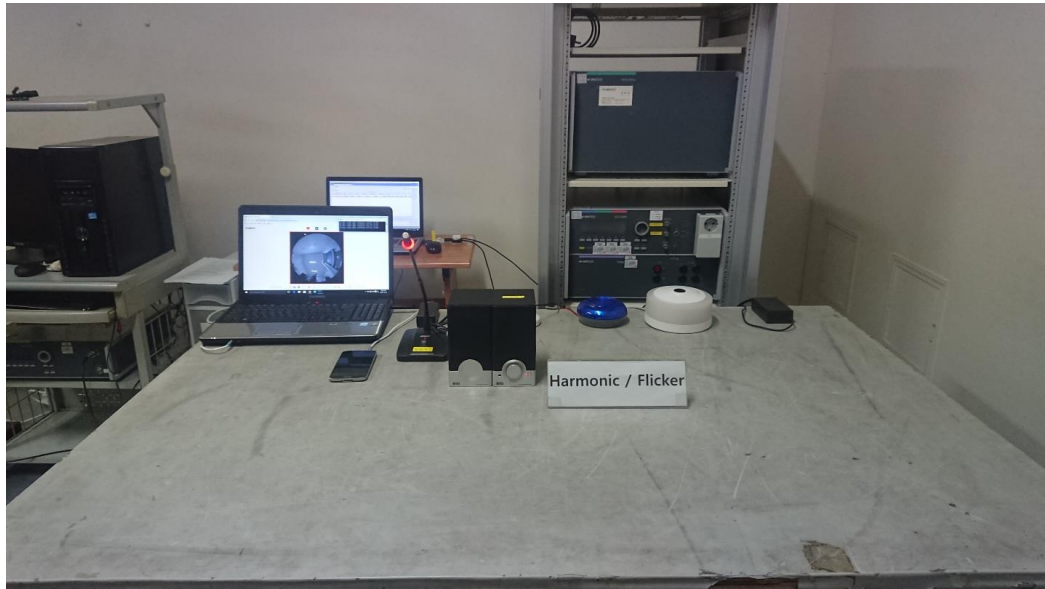


■ PoE Mode



Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ DC Mode



Electrostatic Discharge

■ DC Mode

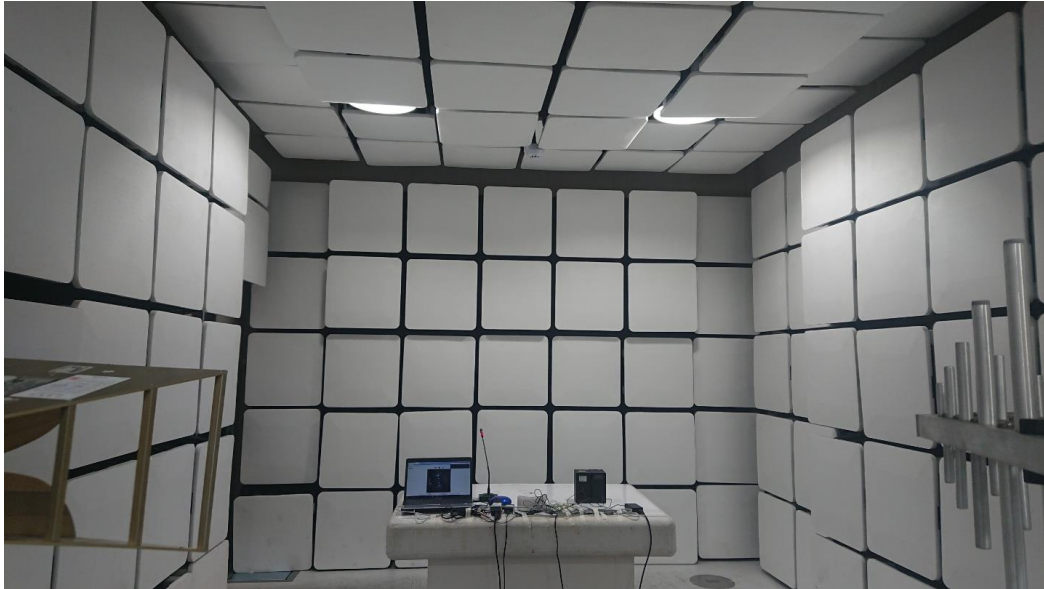


■ PoE Mode



Radiated Electric Field Immunity

■ DC Mode



■ PoE Mode

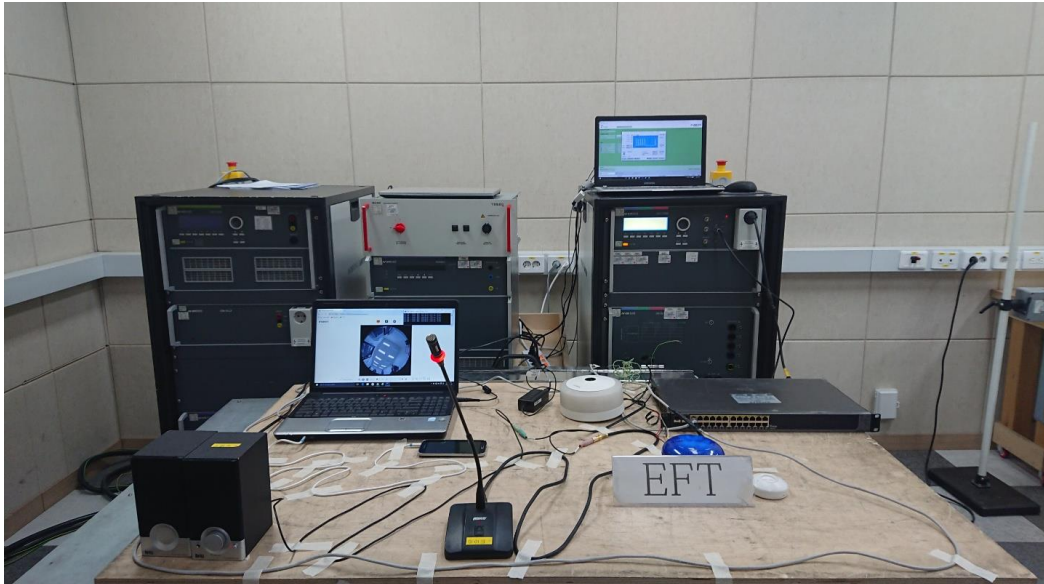


Electrical Fast Transients/Bursts

■ DC Mode

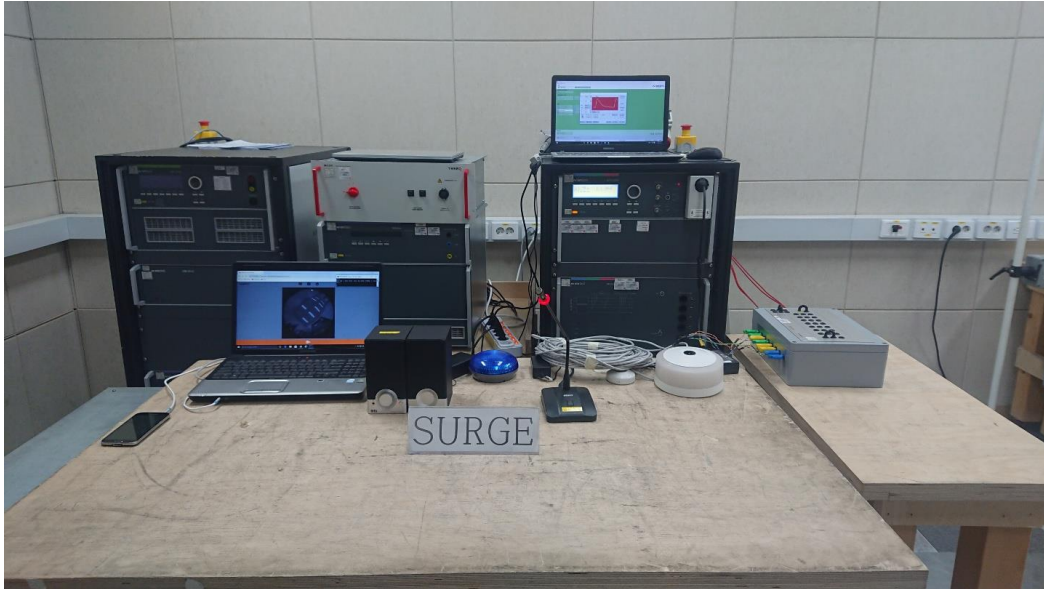


■ PoE Mode



Surge Transients

■ DC Mode



■ PoE Mode



Conducted Disturbance

■ DC Mode

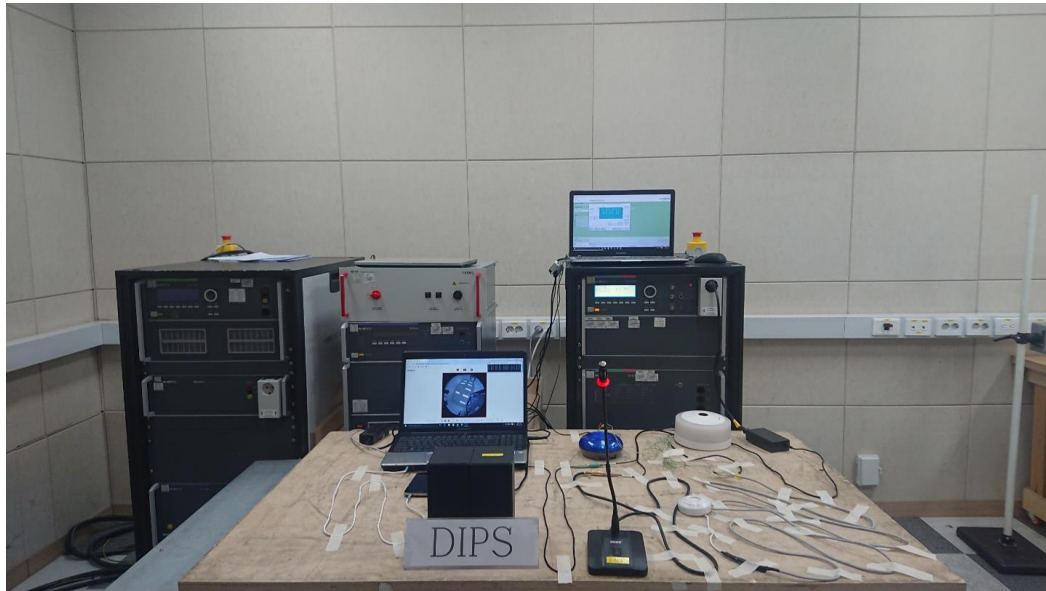


■ PoE Mode



Voltage Dips and Short Interruptions

■ DC Mode



EUT External Photographs

(Top)

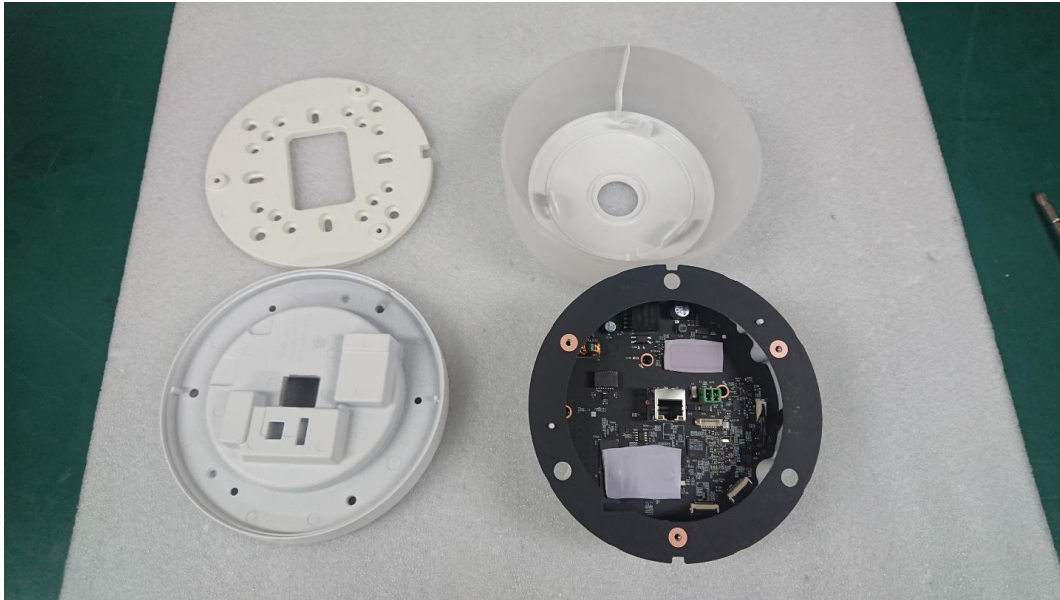


(Bottom)



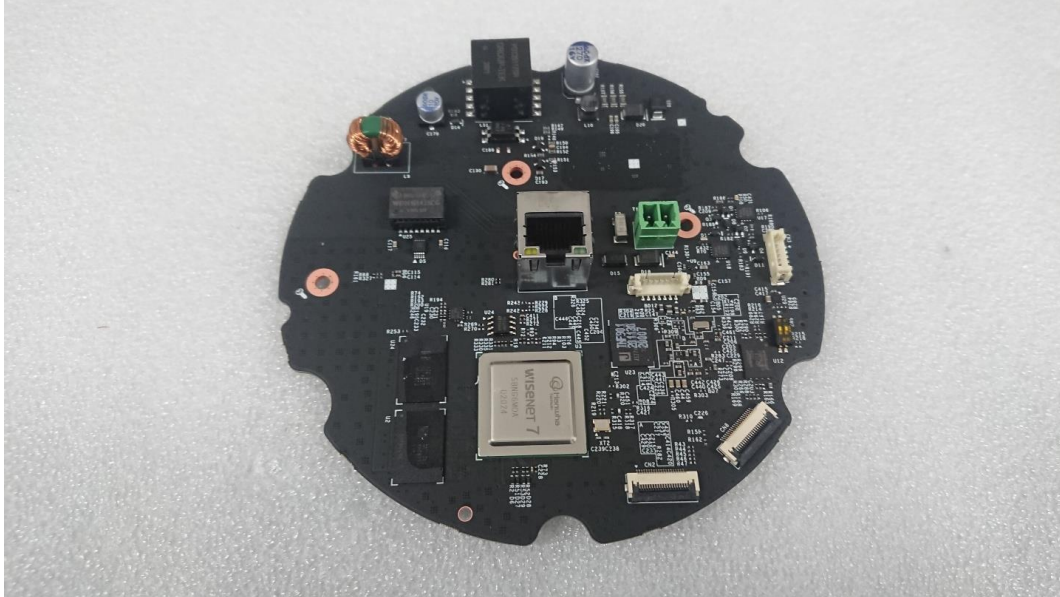
EUT Internal Photographs

(Internal View)

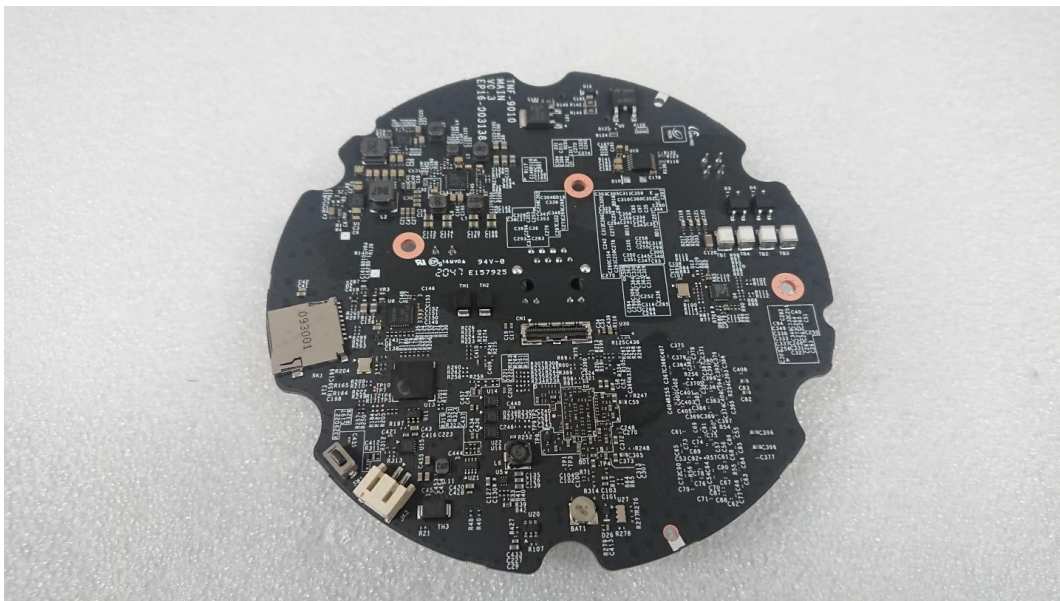


EUT Internal View – Main Board

(Top)



(Bottom)



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EUT Internal View – LED Board

(Top)



(Bottom)



Label and Location



NETWORK CAMERA

Model No : TNF-9010

Manufacturer : HANWHA VISION VIETNAM COMPANY LIMITED

Made in Vietnam

