



EMC TEST REPORT For CE

Test Report No. : KES-EM-20T0769
Date of Issue : Nov. 05, 2020
Product name : THERMAL CAMERA
Model/Type No. : TNM-3620TDY
Variant Model : -
Applicant : Hanwha Techwin Co., Ltd.
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, Republic of Korea
Manufacturer : 1. HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.
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 : Sep. 11, 2020
Test date : Oct. 24, 2020 ~ Oct. 31, 2020
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Min Seong, 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.



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:
KES-EM-20T0769
Page (2) of (80)

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Nov. 05, 2020	KES-EM-20T0769	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.....	8
1.6	External I/O Cabling.....	9
1.7	EUT Operating Mode(s).....	10
1.8	Configuration.....	11
1.9	Remarks when standards applied	12
1.10	Calibration Details of Equipment Used for Measurement.....	12
1.11	Test Facility	12
1.12	Laboratory Accreditations and Listings	12
2.0	Test Regulations.....	13
2.1	Conducted Emissions at Mains Power Ports.....	15
2.2	Conducted Emissions at Telecommunication Ports	16
2.3	Radiated Electric Field Emissions(Below 1 GHz)	17
2.4	Radiated Electric Field Emissions(Above 1 GHz).....	18
2.5	Harmonic Current Emissions.....	19
2.6	Voltage Fluctuations and Flicker	20
3.0	Criteria for compliance.....	21
3.1	Electrostatic Discharge.....	23
3.2	Radiated Electric Field Immunity	28
3.3	Electrical Fast Transients/Bursts	31
3.4	Surge Transients.....	34
3.5	Conducted Disturbance	38
3.6	Voltage Dips and Short Interruptions	42
APPENDIX A – TEST DATA.....		44
Conducted Emissions at Mains Power Ports.....		44
Conducted Emissions at Telecommunication Ports		46
Radiated Electric Field Emissions(Below 1 GHz)		48
Radiated Electric Field Emissions(Above 1 GHz).....		50
Harmonic Current Emissions and Voltage Fluctuations and Flicker		52
Test Setup Photos and Configuration		55
Conducted Emissions at Mains Power Ports.....		55
Conducted Emissions at Telecommunication Ports		56
Radiated Electric Field Emissions(Below 1 GHz)		58
Radiated Electric Field Emissions(Above 1 GHz).....		60
Harmonic Current Emissions and Voltage Fluctuations and Flicker		62
Electrostatic Discharge		63
Radiated Electric Field Immunity		64
Electrical Fast Transients/Bursts.....		65
Surge Transients.....		66
Conducted Disturbance.....		67
Voltage Dips and Short Interruptions.....		68
EUT External Photographs.....		69
EUT Internal Photographs		70



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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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Report No.:
KES-EM-20T0769
Page (4) of (80)

1.0 General Product Description

Main Specifications of EUT are:

Video	Thermal	Visible
Imaging Device	Uncooled micro bolometer	1/2.8" 2MP CMOS
Effective Pixels	320(H)x240(V)	1945(H)x1109(V)
NETD	< 60mK	None
Pixel Size	12μm	None
Min. Illumination	None	Color: 0.05 lux(F1.6, 1/30sec) B/W: 0.005 lux(F1.6, 1/30sec)
Video Out	CVBS: 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P) for installation USB : Micro USB Type B, 1280x720 for installation	
Lens		
Focal Length (Zoom Ratio)	4.7mm fixed focal	4mm fixed focal
Max. Aperture Ratio	F1.0	F1.6
Angular Field of View	H: 50.0°, V: 36.4°, D: 65.3°	H: 87.6, V: 46.4°, D: 104.5°
Min. Object Distance	1m(3.28ft)	None
Focus Control	Fixed	Fixed
Lens Type	None	
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	
Azimuth	None	
Auto Tracking	None	
Operational		
IR Viewable Length	None	
Camera Title	Displayed up to 85 characters	
Day & Night	None	Auto(ICR)
Backlight Compensation	None	BLC, WDR, SSDR
Wide Dynamic Range	None	extreme WDR
Digital Noise Reduction	None	SSNR V
Digital Image Stabilization	Support(built-in gyro sensor)	
Defog	None	None
Motion Detection	8ea, 8point polygonal zones	
Privacy Masking	32ea, polygonal zones - Color: Grey/Green/Red/Blue/Black/White - Mosaic	
Gain Control	None	Low / Middle / High
White Balance	None	ATW / AWC / Manual / Indoor / Outdoor
LDC	None	Support
Electronic Shutter Speed	None	Minimum / Maximum / Anti flicker(2~1/12,000sec)
Digital PTZ	None	None
Video Rotation	Flip, Mirror	

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Report No.:
KES-EM-20T0769
Page (5) of (80)

Analytics	Normal mode : Directional detection, Motion detection, Enter/Exit, Tampering, Virtual line, Audio detection, Temperature detection EBT mode : Temperature detection, Blackbody abnormal	
Business Intelligence	None	None
Serial Interface	None	None
Alarm I/O	Input 1ea / Output 2ea	
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 Handover (Normal mode only) Audio playback Beep alarm (EBT mode only)	
Audio In	Selectable(mic in/line in) Supply voltage: 2.5VDC(4mA), Input impedance: 2K Ohm	
Audio Out	Line out, Max.output level: 1Vrms	
IR Illuminator (Optional)	None	None
Wiper	None	None
Coaxial Protocol	None	None
Video Transmission Distance	None	None
Color Palettes	Estimated Body Temperature Mode (Thermal Face detection) : Whitehot Estimated Body Temperature Mode (Visible Face detection) & Normal mode : Whitehot, Blackhot, Rainbow, Rainbow2, Sepia, Red, Iron, Custom	None
Radiometry		
Temperature detect range	Estimated Body Temperature Mode : 30~45°C(86°F~113°F) Normal mode : -20~+130°C(-4°F~+266°F)	None
Temperature accuracy	Estimated Body Temperature Mode : ±0.5°C(±0.3°C with Blackbody) Normal mode : ±5°C(≤100°C), ±20%(>100°C)	None
Temperature detection	3ea rectangular	None
Additional	Hybrid palettes (Normal mode), Spot temperature reading (Normal mode - Thermal image only), Estimated body temperature mode	None
Network		
Ethernet	RJ-45(10/100BASE-T)	
Video Compression	H.265/H.264: Main/Baseline/High, MJPEG	
Resolution	320x240	1920x1080, 1280x1024, 1280x960, 1280x720, 1024x768, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360, 320x240
Max. Framerate	H.265/H.264: Max. 30fps/25fps(60Hz/50Hz) MJPEG: Max. 30fps/25fps(60Hz/50Hz)	H.265/H.264 : Max. 30fps/25fps(60Hz/50Hz) MJPEG: Max. 30fps/25fps(60Hz/50Hz)
Smart Codec	Manual(5ea area) (Visible image only), WiseStreamII (Thermal & Visible)	
Video Quality Adjustment	H.264/H.265: Target bitrate level control MJPEG: Target bitrate level control	
Bitrate Control	H.264/H.265: CBR or VBR MJPEG: VBR	
Streaming	Unicast(20 users) / Multicast Multiple streaming(Up to 6 profiles)	

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Report No.:

KES-EM-20T0769

Page (6) of (80)

Audio Compression	G.711 u-law /G.726 Selectable G.726(ADPCM) 8KHz, G.711 8KHz G.726: 16Kbps, 24Kbps, 32Kbps, 40Kbps AAC-LC: 48Kbps at 16KHz
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
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)
Edge Storage	Micro SD/SDHC/SDXC 1slot 256GB
Application Programming Interface	ONVIF Profile S/T SUNAPI(HTTP API)
Webpage Language	English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Swedish, Portuguese, Czech, Polish, Turkish, Dutch, Hungarian, Greek
Web Viewer	Supported OS: Windows 7, 8.1, 10, Mac OS X 10.10, 10.11, 10.12, 10.13, 10.14 Recommended Browser: Google Chrome Supported Browser: MS Explorer11, MS Edge, Mozilla Firefox(Window 64bit only), Apple Safari(Mac OS X only)
Memory	4608MB RAM, 512MB Flash
Environmental	
Operating Temperature / Humidity	Body temperature simulation mode : +10°C~+35°C(+50°F~+95°F) / Less than 95% RH Normal mode : -10°C~+55°C(+14°F~+131°F) / Less than 95% RH
Storage Temperature / Humidity	-30°C~+60°C(-22°F~+140°F) / Less than 95% RH
Certification	None
Electrical	
Input Voltage	PoE+(IEEE802.3at), 12VDC
Power Consumption	PoE+: Max. 17.0W, typical 12.5W 12VDC: Max. 14.5W, typical 11.0W
Mechanical	
Color / Material	White / Aluminum
RAL Code	RAL-9003
Product dimensions / weight	135x75x188.5mm / 1.7Kg
Conduit hole	None
Hanging mount(Dome)	None
Skin cover(Dome)	None
Weather cap(Dome)	None
Power module	None
Backbox	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
THERMAL CAMERA	TNM-3620TDY	-	THERMAL CAMERA	EUT

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Report No.:
KES-EM-20T0769
Page (8) of (80)

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
AC / DC Adapter	2ACB022F	-	Channel Well Technology (Guangzhou) Co., Ltd.	-
PoE Adapter	GS728TPP	-	NETGEAR	-
Notebook	ProBook4430s	-	HP	-
Notebook Adapter	SeriesPPP0009H	-	CHICONY POWER TECHNOLOGY (SUZHOU) CO.,LTD,	-
Speaker	BR1000A Cuve Black 2	-	DONGGUAN EDIFIER TECHNOLOGY Co., Ltd	-
MIC	MP1000	-	-	-
Alarm	SIP-1201DD D0	-	SAMSUNG TECHWIN CO., LTD.	-
Button Alarm	-	-	-	-
Micro SD Card	-	-	SanDisk	16 GB
Smart Phone	LG-SU760	108KPQJ0186212	LG Electronics Co., Ltd.	-
HOT Black Body	4181	B5B353	FLUKE	-

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Report No.:

KES-EM-20T0769

Page (9) of (80)

1.6 External I/O Cabling

■ DC Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
THERMAL CAMERA (EUT)	PoE+	Notebook	RJ-45	3.0	U
	AUDIO OUT	Speaker	Line-Out (3.5 mm)	1.4	U
	LINE IN	MIC	XLR	1.4	U
	ALARM OUT	Alarm	ALARM IN	3.0	U
	ALARM IN	Button Alarm	ALARM OUT	3.0	U
	SLOT	Micro SD Card	SLOT	-	-
	Ground	Ground	Ground	2.0	U
Notebook	MIC	Smart Phone	3.5 mm	1.0	U

* Unshielded=U, Shielded=S

■ PoE Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
THERMAL CAMERA (EUT)	PoE+	PoE Adapter	PoE	3.0	U
	AUDIO OUT	Speaker	Line-Out (3.5 mm)	1.4	U
	LINE IN	MIC	XLR	1.4	U
	ALARM OUT	Alarm	ALARM IN	3.0	U
	ALARM IN	Button Alarm	ALARM OUT	3.0	U
	SLOT	Micro SD Card	SLOT	-	-
	Ground	Ground	Ground	2.0	U
Notebook	RJ-45	PoE Adapter	DATA	1.5	U
	MIC	Smart Phone	3.5 mm	1.0	U

* Unshielded=U, Shielded=S

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Report No.:
KES-EM-20T0769
Page (10) of (80)

1.7 EUT Operating Mode(s)

Test Mode	operating
DC Mode, PoE Mode	Monitoring EUT Using Web Viewer, Ping Test

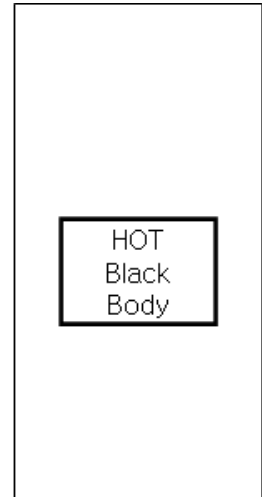
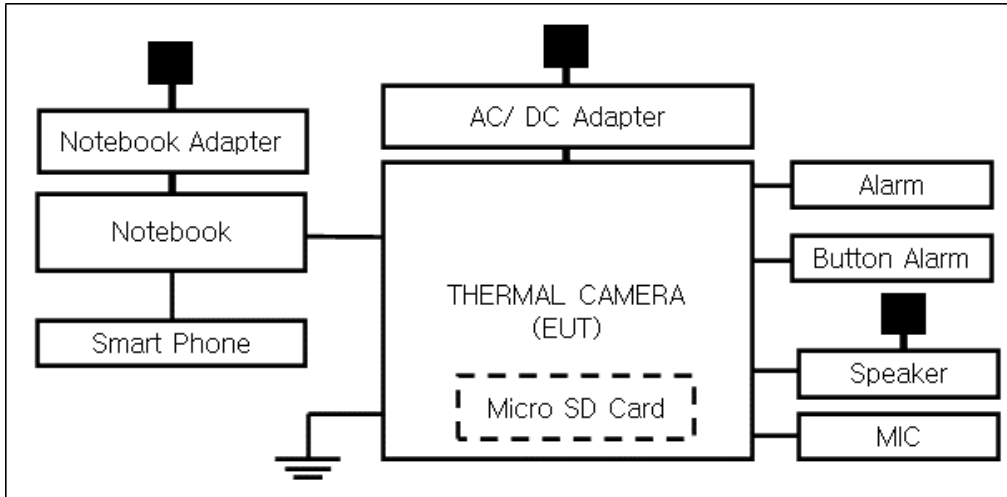
EUT Test operating S/W		
Name	Version	Manufacture Company
Web Viewer	-	Hanwha Techwin Co., Ltd.

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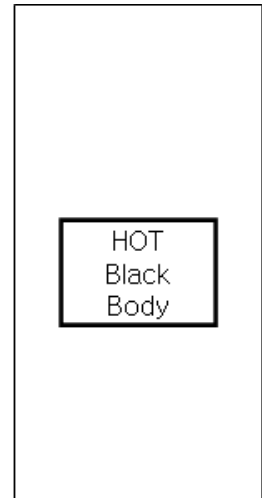
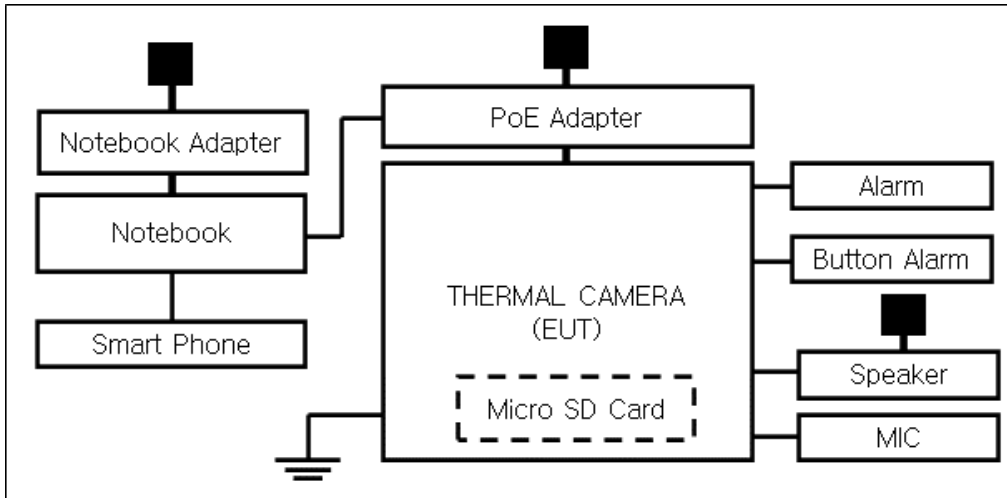
1.8 Configuration

■ AC Main
 □ DC Main

■ DC Mode



■ PoE Mode



1.9 Remarks when standards applied

- USB port and VIDEO port were excluded from testing as management ports.
- HOT Black Body was used during EMS test.

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. The sites are constructed in conformance with the requirements of ANSI C63.4:2014 and CISPR 16-1-4:2012

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Anechoic Chamber , 10 m Open Area 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, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Anechoic Chamber and Conducted test site	 23298-1
JAPAN	VCCI	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	 R-20056, C-20036, T-20040, G-20057
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Anechoic Chamber , 10 m Open Area 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 61000-6-3:2011

☐ EN 61000-6-1:2007

☐ EN 61000-6-4:2007 +A1:2011

☐ EN 61000-6-2:2005

☐ EN 55011:2007 +A1:2010

☐ Group 1
☐ Class A

☐ Group 2
☐ Class B

☐ EN 55014-1:2006 +A2:2011

☐ EN 55014-2:1997 +A2:2008

☐ EN 55015:2013

☐ EN 61547:2009

☒ EN 55032:2012/AC:2013

☒ Class A

☐ Class B

☐ EN 55024:2010 +A1:2015

☒ EN 50130-4:2011

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

☐ EN 61326-1:2013



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www.kes.co.kr

Report No.:
KES-EM-20T0769
Page (14) of (80)

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- | | | |
|---|----------------------------------|----------------------------------|
| ☐ VCCI-CISPR 32:2016 | ☐ Class A | ☐ Class B |
| ☐ AS/NZS CISPR32:2015 | ☐ Class A | ☐ Class B |
| ☐ 47 CFR Part 15, Subpart B | | |
| ☐ CISPR 22:2009 +A1:2010 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2014 | | |
| ☐ IC Regulation ICES-003 : 2016 | | |
| ☐ CAN/CSA CISPR 22-10 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2014 | | |
| ☐ RE- Directive 2014/53/EU | | |
| ☐ EN 301 489-1 V1.9.2 | | |
| ☐ Equipment for fixed use | | |
| ☐ Equipment for vehicular use | | |
| ☐ Equipment for portable use | | |
| ☐ EN 301 489-3 V1.6.1 | | |
| ☐ EN 301 489-17 V2.2.1 | | |
| ☐ EN 60945:2002 | | |

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Report No.:

KES-EM-20T0769

Page (15) of (80)

2.1 Conducted Emissions at Mains Power Ports

Test Date

Oct. 24, 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	01, 02, 2021
☒	LISN	ESH2-Z5	R & S	100450	01, 02, 2021
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	01, 02, 2021

Test Conditions

Temperature: 23.5 °C
Relative Humidity: 50.2 % 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.

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2.2 Conducted Emissions at Telecommunication Ports

Test Date

Oct. 24, 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	01, 02, 2021
☒	LISN	ESH2-Z5	R & S	100450	01, 02, 2021
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	01, 02, 2021
☒	8-WIRE ISN CAT3,5	ENY81	R & S	100174	01, 07, 2021
☐	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	01, 07, 2021
☐	CDN	CDNS502A	TESEQ	40431	01, 02, 2021

Test Conditions

Temperature: 23,5 °C
Relative Humidity: 50,2 % 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

Remarks

See Appendix A for test data.



2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Oct. 24, 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, 2020
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 29, 2020
☒	ATTENUATOR	8491A	HP	32173	03, 10, 2021

Test Conditions

Temperature: 23,4 °C
Relative Humidity: 50,0 % 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

Oct. 25, 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 Conditions

Temperature: 23,6 °C
Relative Humidity: 50,2 % 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.



2.5 Harmonic Current Emissions

Test Date

Oct. 25, 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: 21,6 °C
Relative Humidity: 49,6 % 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

Oct. 25, 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: 21,6 °C
Relative Humidity: 49,6 % 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

Oct. 30, 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: 22,9 °C
Relative Humidity: 49,2 % R.H.
Atmospheric Pressure: 100,9 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

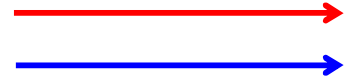
Discharge Voltage:	Contact ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	Air ☒ 2 kV ☒ 4 kV ☐ 6 kV ☒ 8 kV ☐ 15 kV	HCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	VCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV
--------------------	---	---	---	---

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

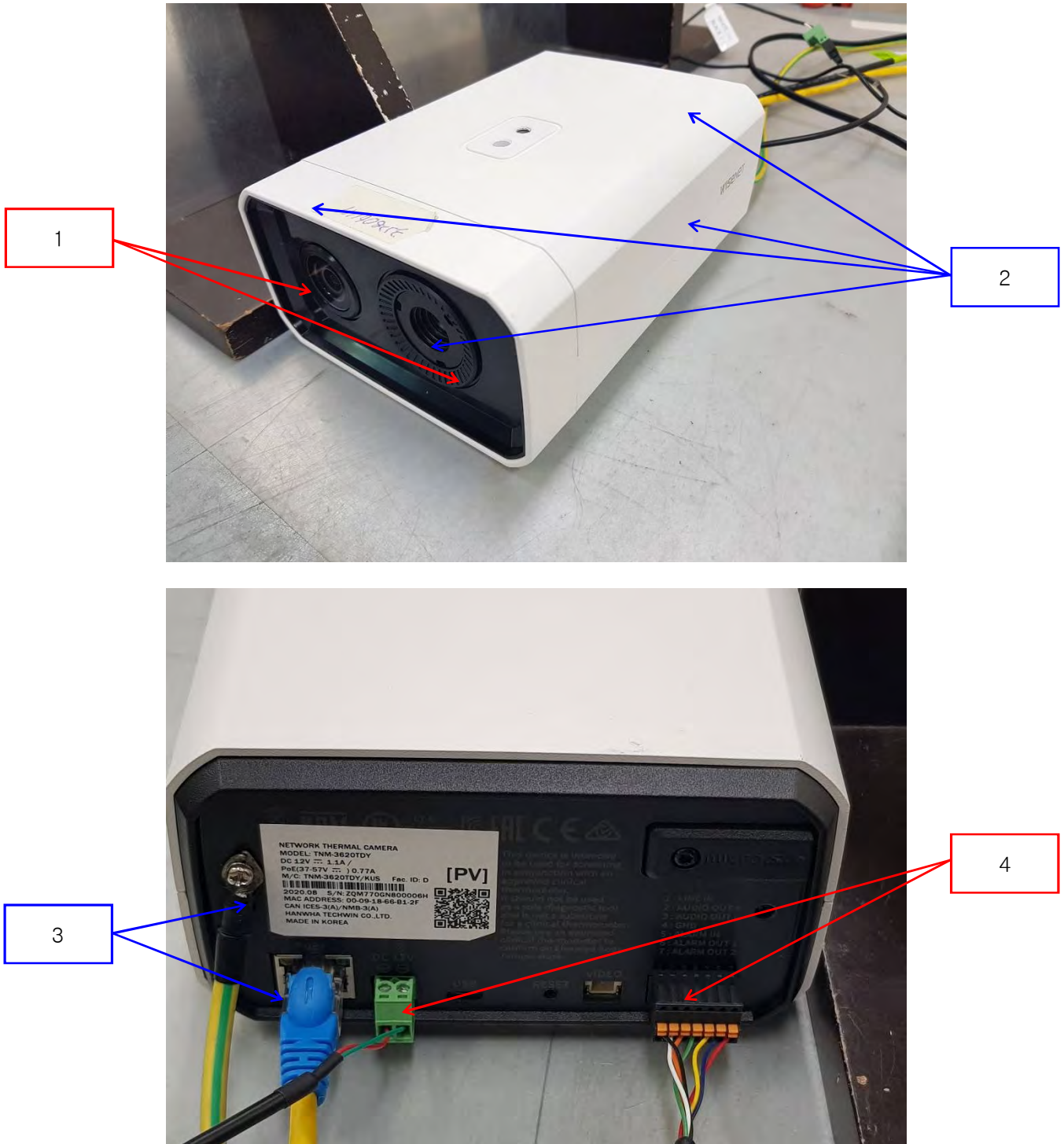
Required Performance Criteria: ☒ Complied

Location of Discharge:

Air
Contact

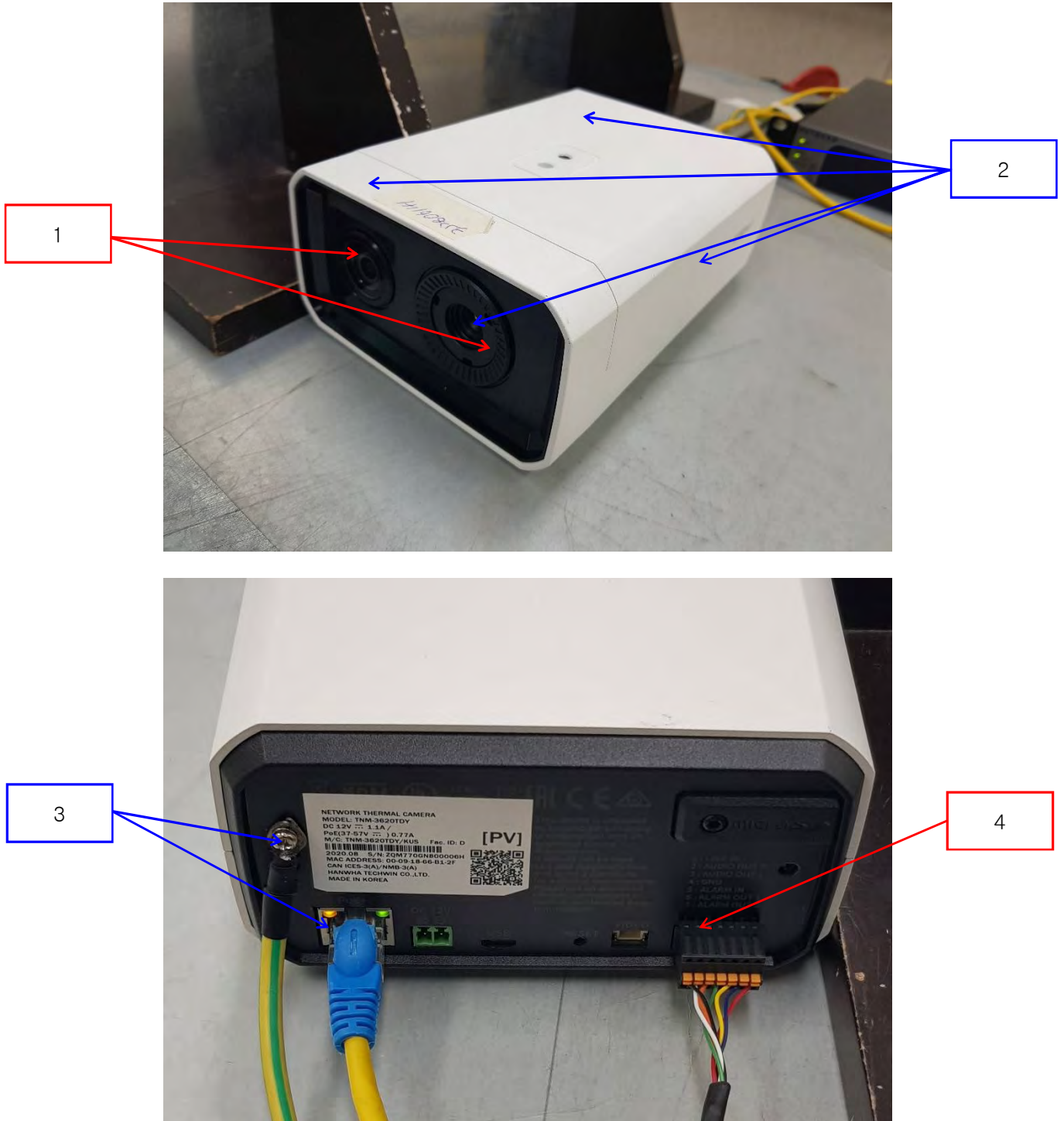


■ DC Mode



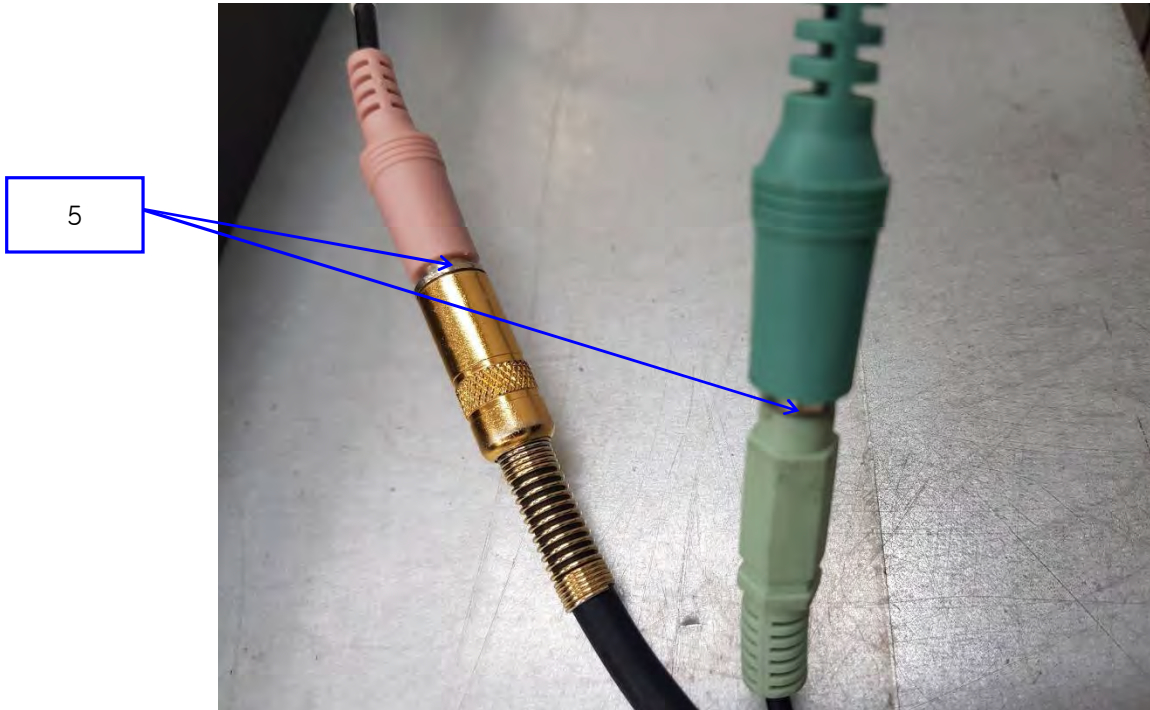
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■ PoE Mode



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■ DC Mode, PoE Mode



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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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Report No.:
KES-EM-20T0769
Page (27) of (80)

Test Data**■ DC 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	Lens Around	Air Discharge	Complied	-
2	Enclosure, Lens	Contact Discharge	Complied	-
3	PoE+Port, Ground	Contact Discharge	Complied	-
4	Power Port, Operating Port	Air Discharge	Complied	-
5	Audio 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	Lens Around	Air Discharge	Complied	-
2	Enclosure, Lens	Contact Discharge	Complied	-
3	PoE+Port, Ground	Contact Discharge	Complied	-
4	Operating Port	Air Discharge	Complied	-
5	Audio 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

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3.2 Radiated Electric Field Immunity

Reference Standard

EN 61000-4-3:2006 +A2:2010

Test Date

Oct. 27, 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: 23,2 °C
Relative Humidity: 49,5 % R.H.
Atmospheric Pressure: 100,1 kPa



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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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Report No.:

KES-EM-20T0769

Page (29) of (80)

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-20T0769

Page (30) of (80)

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

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3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Oct. 31, 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, 27, 2020
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2020
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 27, 2020

Test Conditions

Temperature: 22,9 °C
Relative Humidity: 49,0 % R.H.
Atmospheric Pressure: 100,7 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

■ 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	-	-
L – N	Complied	Complied
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)
PoE+	Complied	Complied
Alarm IN	Complied	Complied
Alarm OUT	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)
PoE+	Complied	Complied
Alarm IN	Complied	Complied
Alarm OUT	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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Report No.:
KES-EM-20T0769
Page (34) of (80)

3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

Test Date

Oct. 31, 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, 27, 2020
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2020
☒	CDN	CNV 508N1	EM TEST	P1610176296	11, 27, 2020

Test Conditions

Temperature: 22,9 °C
Relative Humidity: 49,0 % R.H.
Atmospheric Pressure: 100,7 kPa

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Report No.:
KES-EM-20T0769
Page (35) of (80)

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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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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Report No.:

KES-EM-20T0769

Page (36) of (80)

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	-	-
N – PE	-	-

Signal Lines☒ Line to Earth – Common Mode

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

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Report No.:

KES-EM-20T0769

Page (37) of (80)

☒ PoE Mode☐ 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)
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

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3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Oct. 29, 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	07, 22, 2021
☒	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 25, 2020
☒	CDN	CDN M016	TESEQ	43694	11, 25, 2020
☒	CDN	CDN M016	TESEQ	43697	11, 25, 2020
☐	CDN	CDN T800	TESEQ	42800	11, 25, 2020
☒	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 26, 2020
☒	CDN	CDN T8RJ45	EM TEST	0909-09	08, 05, 2021

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 49,5 % R.H.
Atmospheric Pressure: 100,3 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

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Report No.:

KES-EM-20T0769

Page (39) of (80)

Required Performance Criteria: ☒ Complied

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Report No.:

KES-EM-20T0769

Page (40) of (80)

Test Data**■ DC Mode**☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L – N	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
PoE+	CDN	Complied
Alarm IN	Clamp	Complied
Alarm OUT	Clamp	Complied

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Report No.:

KES-EM-20T0769

Page (41) of (80)

■ 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
PoE+	CDN	Complied
Alarm IN	Clamp	Complied
Alarm OUT	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

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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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Report No.:

KES-EM-20T0769

Page (42) of (80)

3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004

Test Date

Oct. 31, 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, 27, 2020
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2020

Test Conditions

Temperature: 22,9 °C
Relative Humidity: 49,0 % R.H.
Atmospheric Pressure: 100,7 kPa

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Page (43) of (80)

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.

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APPENDIX A – TEST DATA

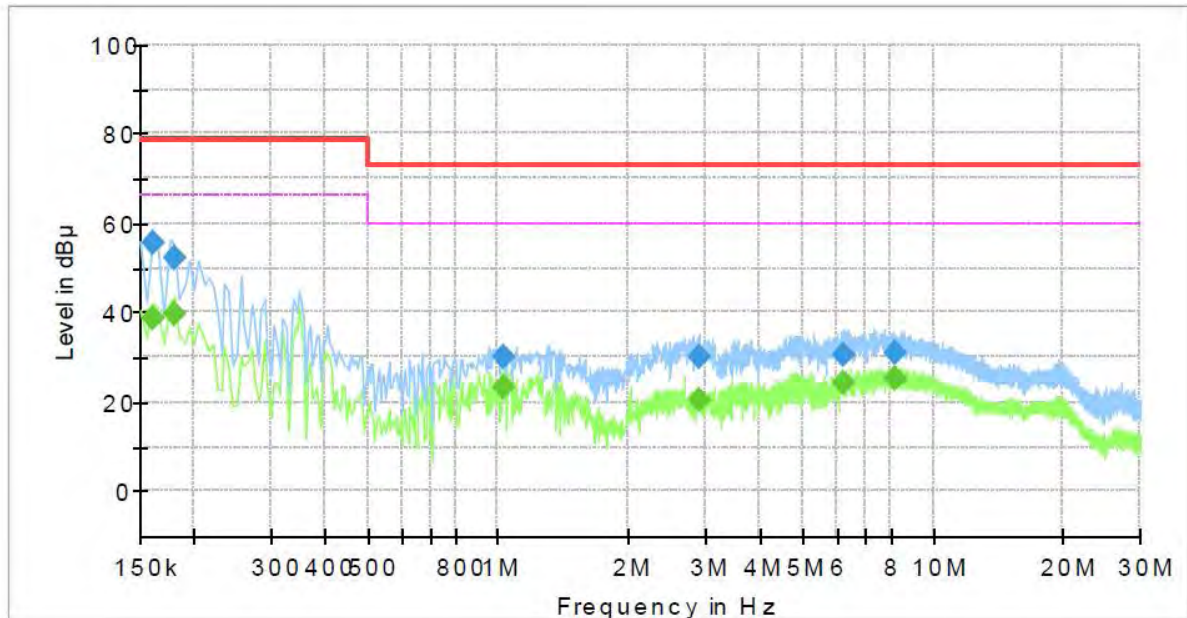
Conducted Emissions at Mains Power Ports

■ DC Mode

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	TNM-3620TDY
Phase:	H
Mode:	DC
Operator Name:	KES



Final Result

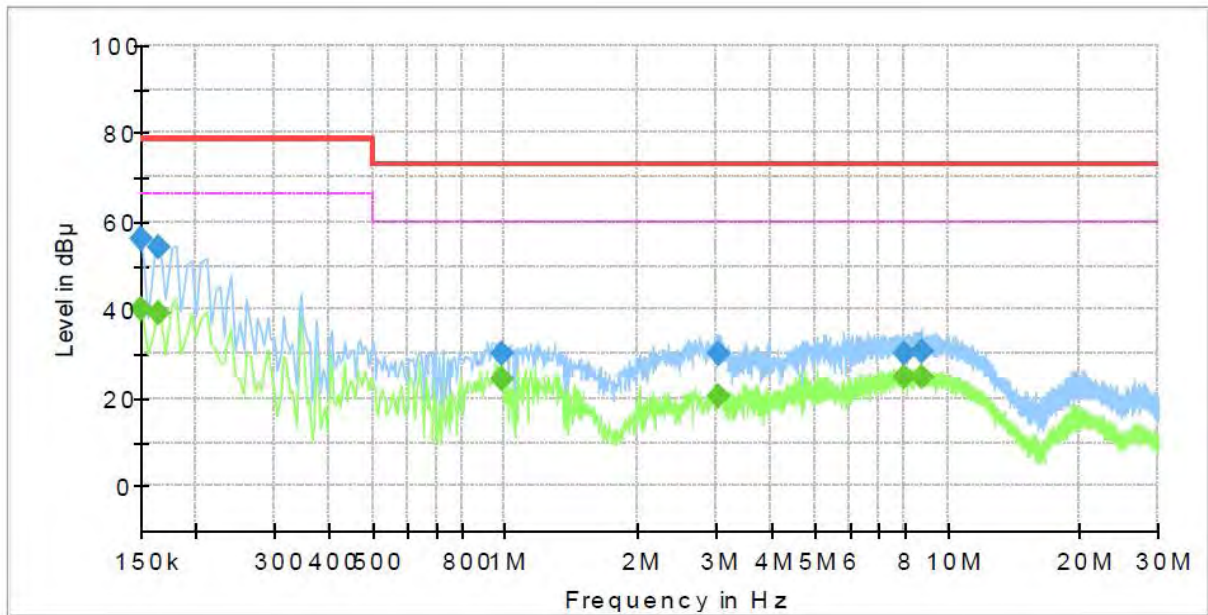
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.160000	---	38.49	66.00	27.51	1000.0	9.000	L1	19.5
0.160000	55.66	---	79.00	23.34	1000.0	9.000	L1	19.5
0.180000	---	39.59	66.00	26.41	1000.0	9.000	L1	19.5
0.180000	52.12	---	79.00	26.88	1000.0	9.000	L1	19.5
1.030000	---	23.53	60.00	36.47	1000.0	9.000	L1	20.1
1.030000	30.06	---	73.00	42.94	1000.0	9.000	L1	20.1
2.910000	---	20.63	60.00	39.37	1000.0	9.000	L1	20.1
2.910000	29.84	---	73.00	43.16	1000.0	9.000	L1	20.1
6.230000	---	24.07	60.00	35.93	1000.0	9.000	L1	19.6
6.230000	30.75	---	73.00	42.25	1000.0	9.000	L1	19.6
8.190000	---	25.41	60.00	34.59	1000.0	9.000	L1	19.7
8.190000	31.00	---	73.00	42.00	1000.0	9.000	L1	19.7

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[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	TNM-3620TDY
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)
0.150000	---	40.21	66.00	25.79	1000.0	9.000	N	19.4
0.150000	55.93	---	79.00	23.07	1000.0	9.000	N	19.4
0.165000	---	39.18	66.00	26.82	1000.0	9.000	N	19.4
0.165000	54.15	---	79.00	24.85	1000.0	9.000	N	19.4
0.980000	---	24.11	60.00	35.89	1000.0	9.000	N	20.1
0.980000	30.26	---	73.00	42.74	1000.0	9.000	N	20.1
3.045000	---	20.43	60.00	39.57	1000.0	9.000	N	20.1
3.045000	30.00	---	73.00	43.00	1000.0	9.000	N	20.1
7.985000	---	24.58	60.00	35.42	1000.0	9.000	N	19.7
7.985000	30.15	---	73.00	42.85	1000.0	9.000	N	19.7
8.730000	---	24.81	60.00	35.19	1000.0	9.000	N	19.8
8.730000	30.49	---	73.00	42.51	1000.0	9.000	N	19.8

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
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Report No.:
KES-EM-20T0769
Page (46) of (80)

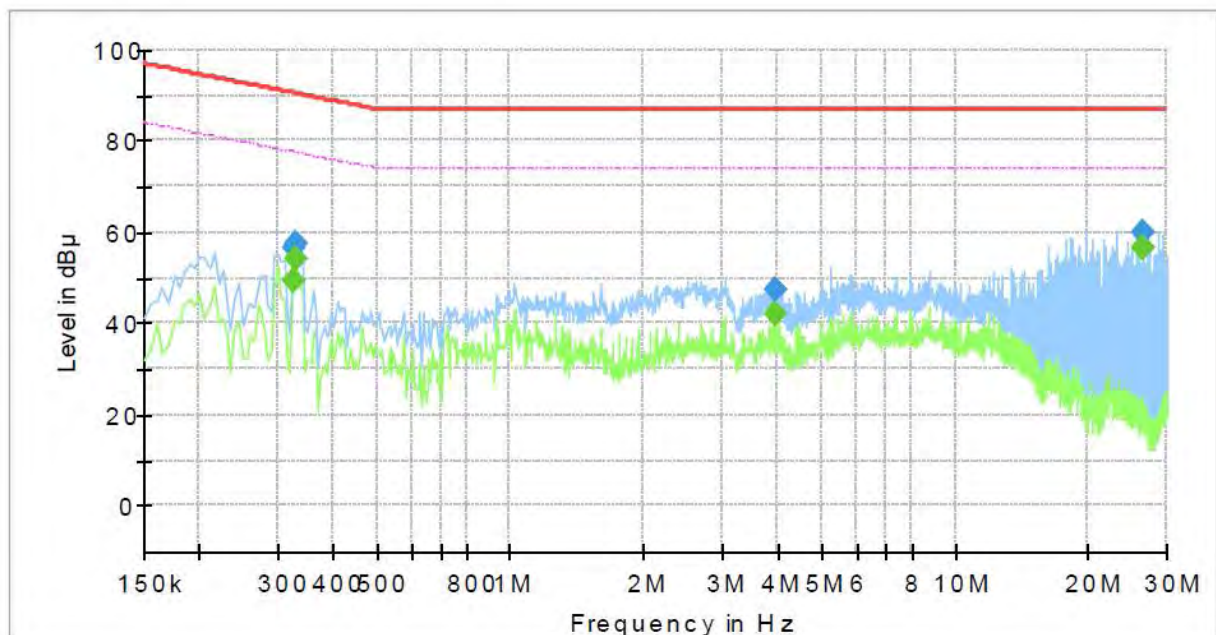
Conducted Emissions at Telecommunication Ports

■ DC Mode

[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: TNM-3620TDY
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)
0.325000	---	49.49	77.58	28.09	1000.0	9.000	Single Line	19.7
0.325000	56.68	---	90.58	33.90	1000.0	9.000	Single Line	19.7
0.330000	---	54.25	77.45	23.20	1000.0	9.000	Single Line	19.7
0.330000	57.47	---	90.45	32.98	1000.0	9.000	Single Line	19.7
3.955000	---	42.20	74.00	31.80	1000.0	9.000	Single Line	19.6
3.955000	47.39	---	87.00	39.61	1000.0	9.000	Single Line	19.6
26.485000	---	56.77	74.00	17.23	1000.0	9.000	Single Line	20.3
26.485000	60.04	---	87.00	26.96	1000.0	9.000	Single Line	20.3
26.610000	---	56.63	74.00	17.37	1000.0	9.000	Single Line	20.3
26.610000	60.14	---	87.00	26.86	1000.0	9.000	Single Line	20.3

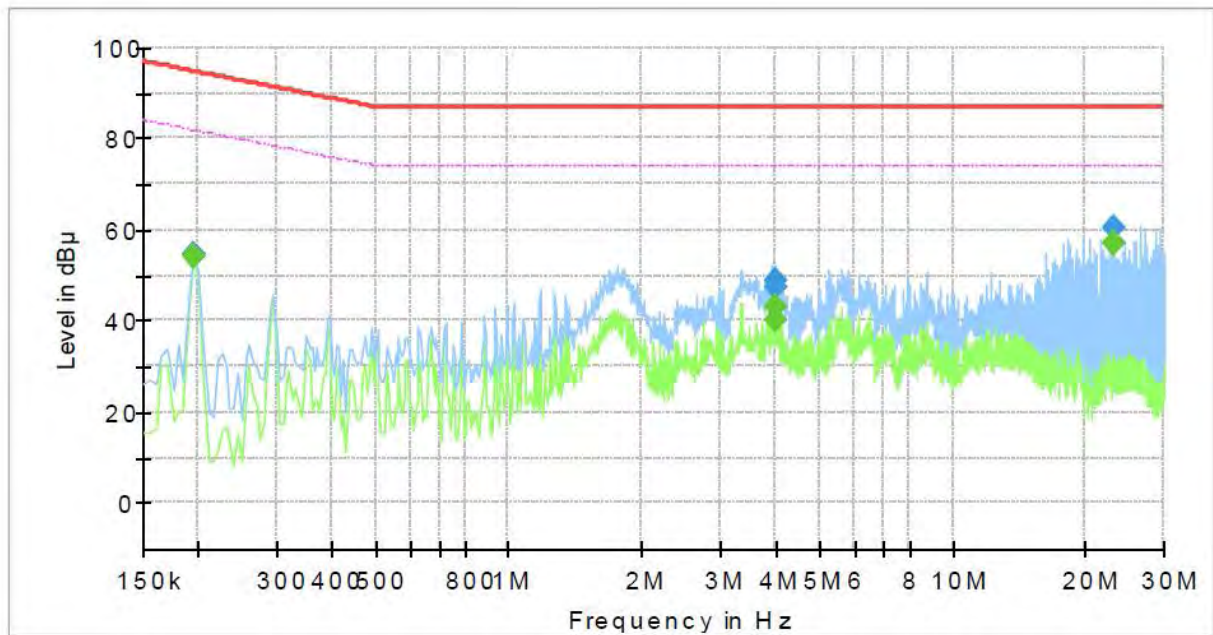
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■ PoE Mode

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNM-3620TDY
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)
0.195000	---	54.14	81.82	27.68	1000.0	9.000	Single Line	19.7
0.195000	54.42	---	94.82	40.40	1000.0	9.000	Single Line	19.7
4.010000	---	40.14	74.00	33.86	1000.0	9.000	Single Line	19.5
4.010000	47.44	---	87.00	39.56	1000.0	9.000	Single Line	19.5
4.015000	---	42.86	74.00	31.14	1000.0	9.000	Single Line	19.5
4.015000	49.01	---	87.00	37.99	1000.0	9.000	Single Line	19.5
23.130000	---	56.83	74.00	17.17	1000.0	9.000	Single Line	20.1
23.130000	60.42	---	87.00	26.58	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))



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
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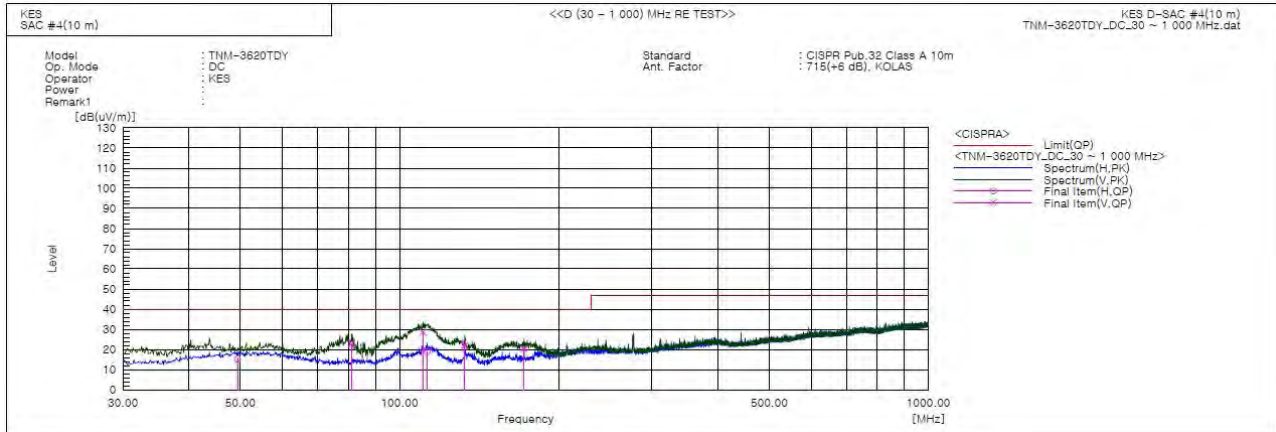
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KES-EM-20T0769

Page (48) of (80)

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	49.400	H	36.7	-21.4	15.3	40.0	24.7	312.0	155.0	
2	81.168	V	50.3	-27.5	22.8	40.0	17.2	127.0	202.0	
3	110.753	V	51.3	-22.8	28.5	40.0	11.5	100.0	329.0	
4	112.814	H	41.9	-23.0	18.9	40.0	21.1	378.0	116.0	
5	132.820	V	47.8	-25.8	22.0	40.0	18.0	100.0	358.0	
6	171.984	V	44.8	-24.4	20.4	40.0	19.6	105.0	286.0	

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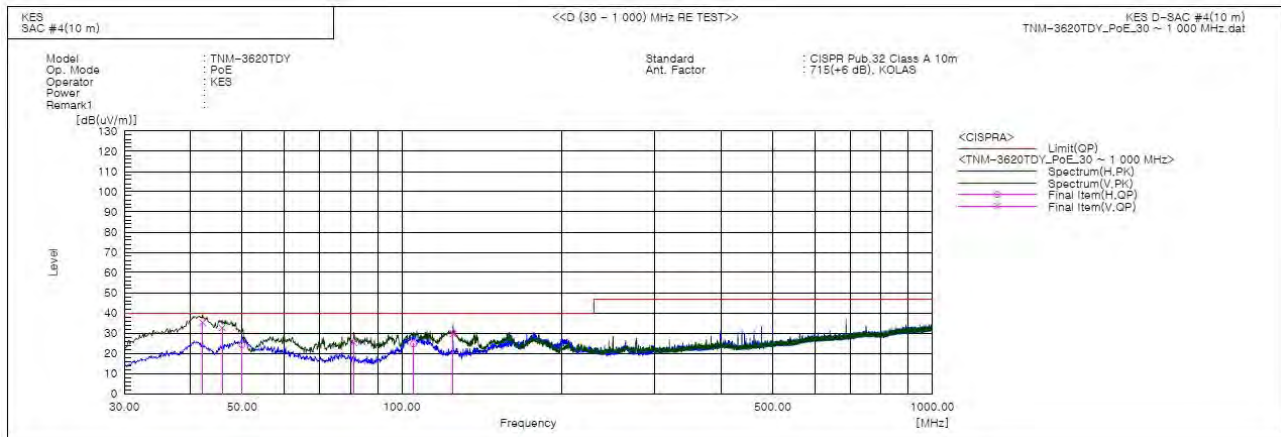
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Report No.:

KES-EM-20T0769

Page (49) of (80)

PoE 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	42.125	V	57.4	-22.3	35.1	40.0	4.9	123.0	274.0	
2	45.884	V	54.4	-21.8	32.6	40.0	7.4	217.0	186.0	
3	50.006	H	45.6	-21.4	24.2	40.0	15.8	400.0	20.0	
4	81.168	V	52.8	-27.5	25.3	40.0	14.7	112.0	274.0	
5	105.175	H	47.1	-22.5	24.6	40.0	15.4	400.0	195.0	
6	124.939	V	54.5	-24.8	29.7	40.0	10.3	132.0	230.0	

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

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

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

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

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



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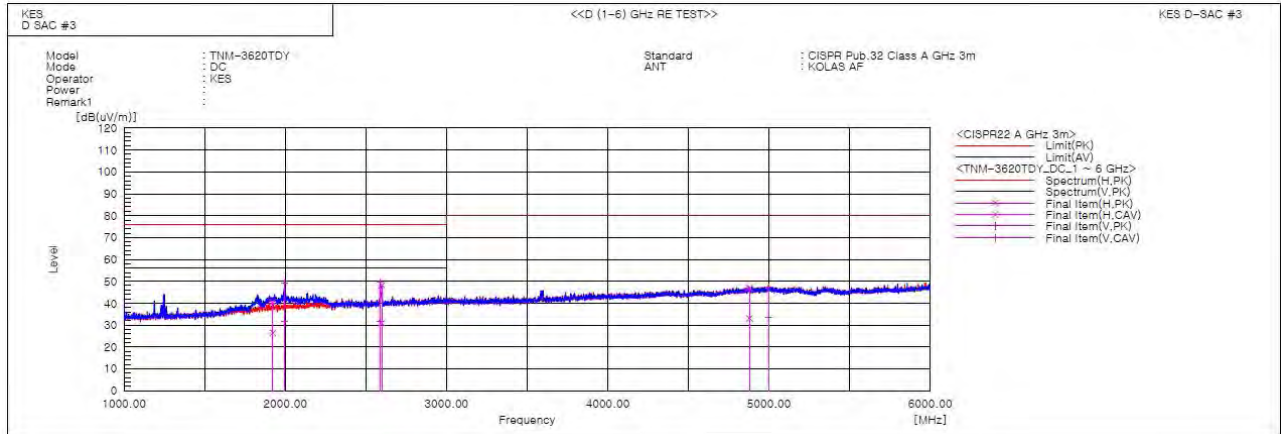
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Page (50) of (80)

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	1922.245	H	43.2	29.3	-2.8	40.4	26.5	76.0	56.0	35.6	29.5	100.0	247.8	
2	1996.949	V	51.5	33.9	-2.3	49.2	31.6	76.0	56.0	26.8	24.4	100.0	356.2	
3	2588.772	V	49.5	31.8	0.0	49.5	31.8	76.0	56.0	26.5	24.2	100.0	285.6	
4	2599.179	H	48.1	30.9	0.1	48.2	31.0	76.0	56.0	27.8	25.0	100.0	56.5	
5	4877.709	H	39.0	25.2	7.9	46.9	33.1	80.0	60.0	33.1	26.9	100.0	226.5	
6	5000.629	V	39.0	25.2	8.4	47.4	33.6	80.0	60.0	32.6	26.4	100.0	275.3	

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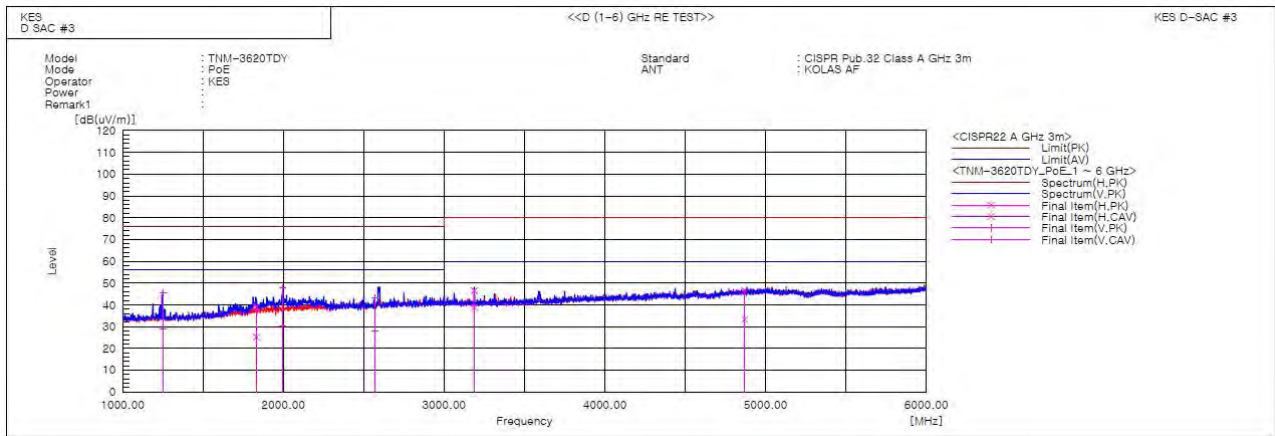


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KES-EM-20T0769
Page (51) of (80)

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	1249.949	V	53.6	37.2	-8.2	45.4	29.0	76.0	56.0	30.6	27.0	100.0	203.5	
2	1832.016	H	42.5	28.7	-3.5	39.0	25.2	76.0	56.0	37.0	30.8	100.0	114.1	
3	1994.920	V	50.1	32.7	-2.3	47.8	30.4	76.0	56.0	28.2	25.6	100.0	3.5	
4	2569.465	V	43.0	27.9	0.0	43.0	27.9	76.0	56.0	33.0	28.1	100.0	352.5	
5	3187.610	H	44.9	37.2	1.6	46.5	38.8	80.0	60.0	33.5	21.2	100.0	229.9	
6	4868.493	H	38.6	25.4	7.9	46.5	33.3	80.0	60.0	33.5	26.7	100.0	160.8	

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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Page (52) of (80)

Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ DC Mode

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.055			
2	0.002	0.154	1.080	n/a
3	0.049	2.130	2.300	PASS
4	0.002	0.421	0.430	n/a
5	0.049	4.257	1.140	PASS
6	0.002	0.580	0.300	n/a
7	0.047	6.091	0.770	PASS
8	0.002	0.717	0.230	n/a
9	0.044	10.949	0.400	PASS
10	0.002	0.876	0.184	n/a
11	0.041	12.422	0.330	PASS
12	0.002	1.011	0.153	n/a
13	0.038	17.988	0.210	PASS
14	0.002	1.189	0.131	n/a
15	0.034	22.777	0.150	PASS
16	0.001	1.264	0.115	n/a
17	0.031	23.115	0.132	PASS
18	0.001	1.402	0.102	n/a
19	0.027	22.755	0.118	PASS
20	0.001	1.558	0.092	n/a
21	0.023	14.572	0.161	PASS
22	0.001	1.707	0.084	n/a
23	0.020	13.500	0.147	PASS
24	0.001	1.846	0.077	n/a
25	0.017	12.411	0.135	PASS
26	0.001	1.944	0.071	n/a
27	0.014	11.186	0.125	PASS
28	0.001	2.093	0.066	n/a
29	0.012	9.909	0.116	PASS
30	0.001	2.147	0.061	n/a
31	0.010	9.043	0.109	PASS
32	0.001	2.283	0.058	n/a
33	0.008	8.289	0.102	PASS
34	0.001	2.287	0.054	n/a
35	0.008	8.178	0.096	PASS
36	0.001	2.378	0.051	n/a
37	0.007	7.979	0.091	PASS
38	0.001	2.378	0.048	n/a
39	0.007	8.326	0.087	PASS
40	0.001	2.357	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.

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Report No.:

KES-EM-20T0769

Page (53) of (80)

Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.055			
2	0.003	0.158	1.620	n/a
3	0.051	1.477	3.450	PASS
4	0.002	0.338	0.645	n/a
5	0.049	2.873	1.710	PASS
6	0.002	0.516	0.450	n/a
7	0.048	4.128	1.155	PASS
8	0.002	0.608	0.345	n/a
9	0.044	7.391	0.600	PASS
10	0.002	0.751	0.276	n/a
11	0.041	8.372	0.495	PASS
12	0.002	0.783	0.230	n/a
13	0.038	12.170	0.315	PASS
14	0.002	0.915	0.197	n/a
15	0.035	15.386	0.225	PASS
16	0.002	0.990	0.173	n/a
17	0.031	15.514	0.199	PASS
18	0.002	1.153	0.153	n/a
19	0.027	15.246	0.178	PASS
20	0.002	1.249	0.138	n/a
21	0.024	14.709	0.161	PASS
22	0.002	1.397	0.125	n/a
23	0.020	13.617	0.147	PASS
24	0.002	1.494	0.115	n/a
25	0.017	12.579	0.135	PASS
26	0.002	1.612	0.106	n/a
27	0.014	11.370	0.125	PASS
28	0.002	1.655	0.099	n/a
29	0.012	10.094	0.116	PASS
30	0.002	1.720	0.092	n/a
31	0.010	9.226	0.109	PASS
32	0.002	1.798	0.086	n/a
33	0.009	8.470	0.102	PASS
34	0.001	1.737	0.081	n/a
35	0.008	8.429	0.096	PASS
36	0.001	1.808	0.077	n/a
37	0.007	8.199	0.091	PASS
38	0.001	1.788	0.073	n/a
39	0.008	8.683	0.087	PASS
40	0.001	1.796	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.



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:
KES-EM-20T0769
Page (54) of (80)

Test Data - Voltage Fluctuations

Maximum Flicker results

■ DC Mode

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



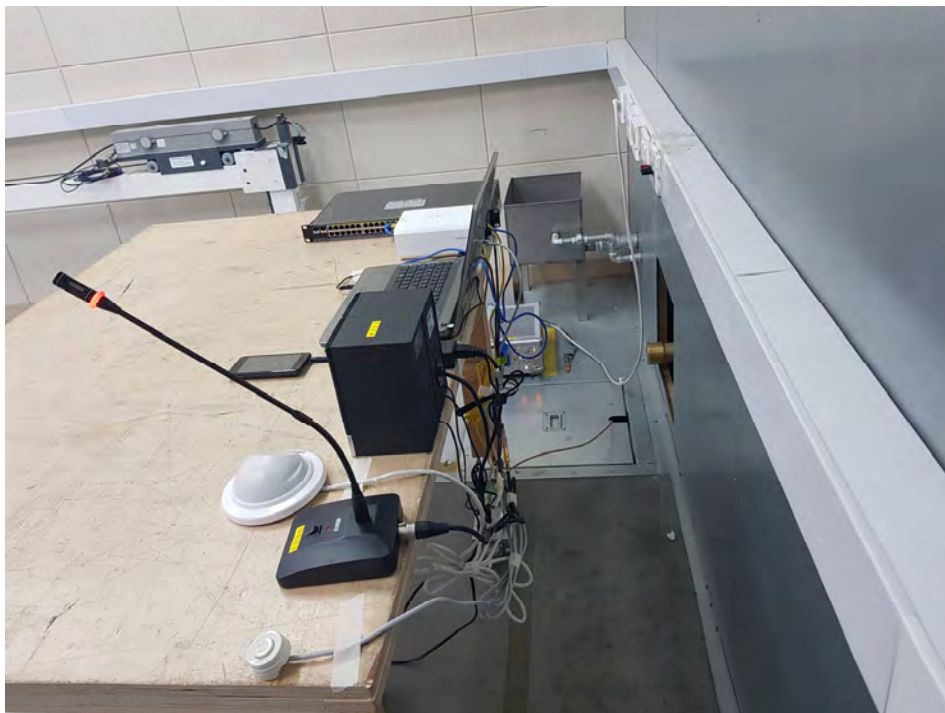
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Conducted Emissions at Telecommunication Ports

■ DC Mode



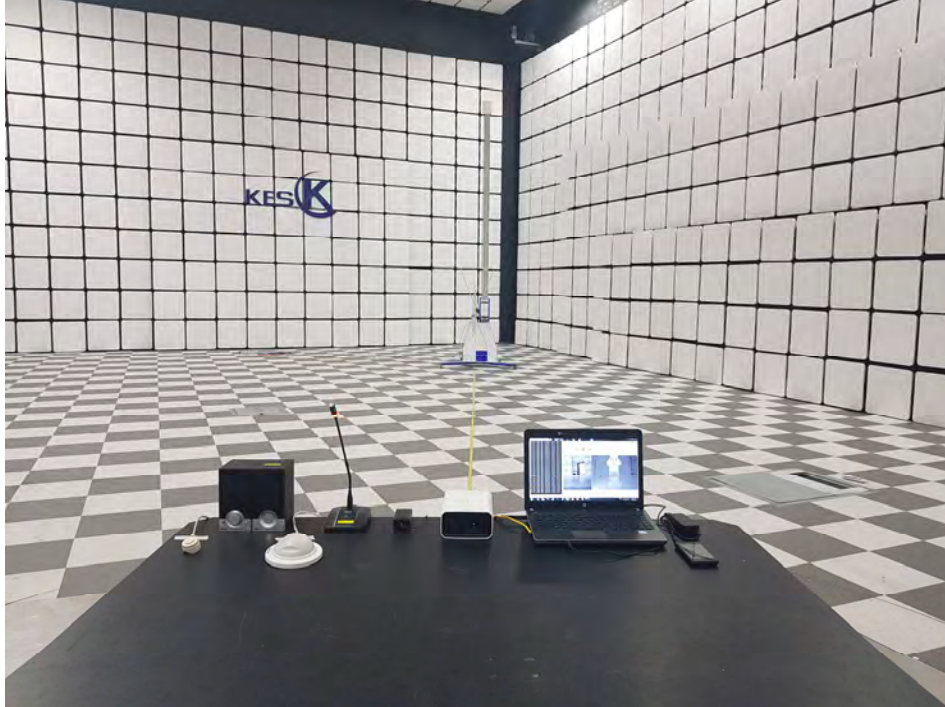
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■ PoE Mode

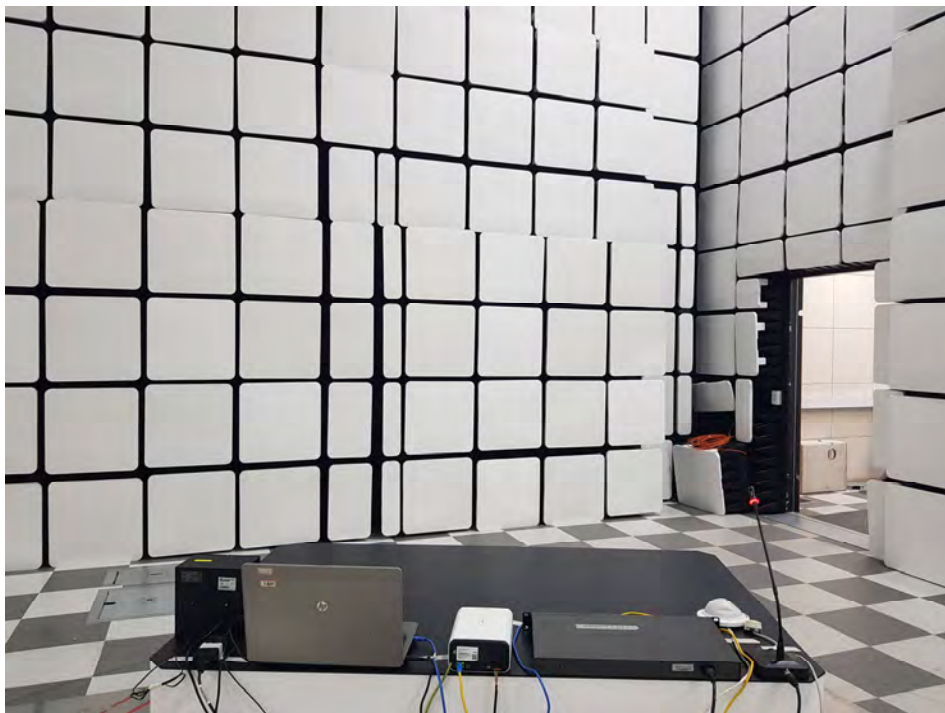
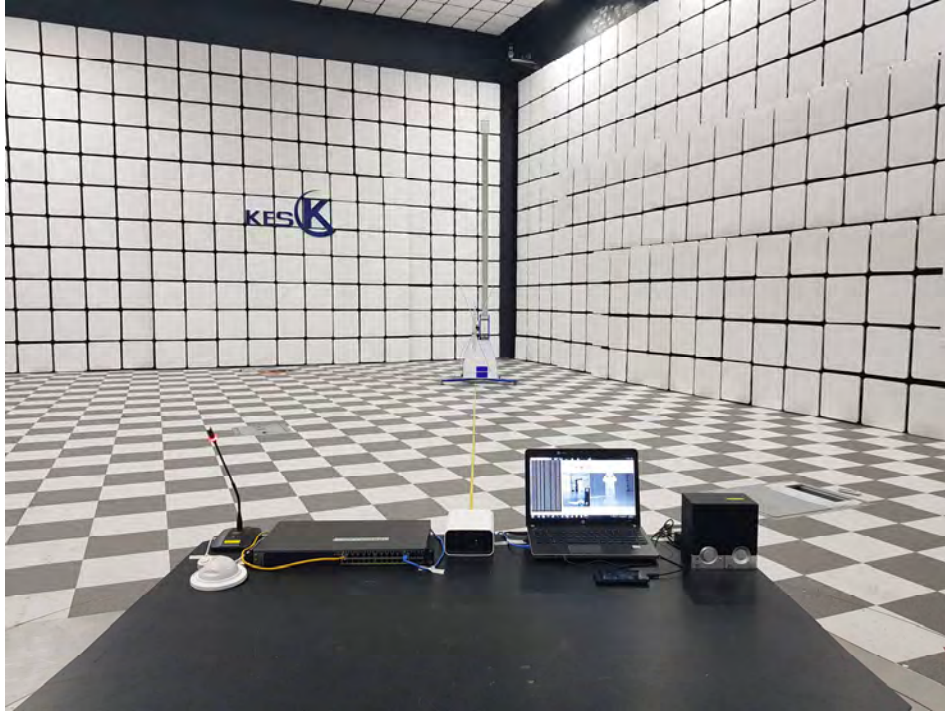
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Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode



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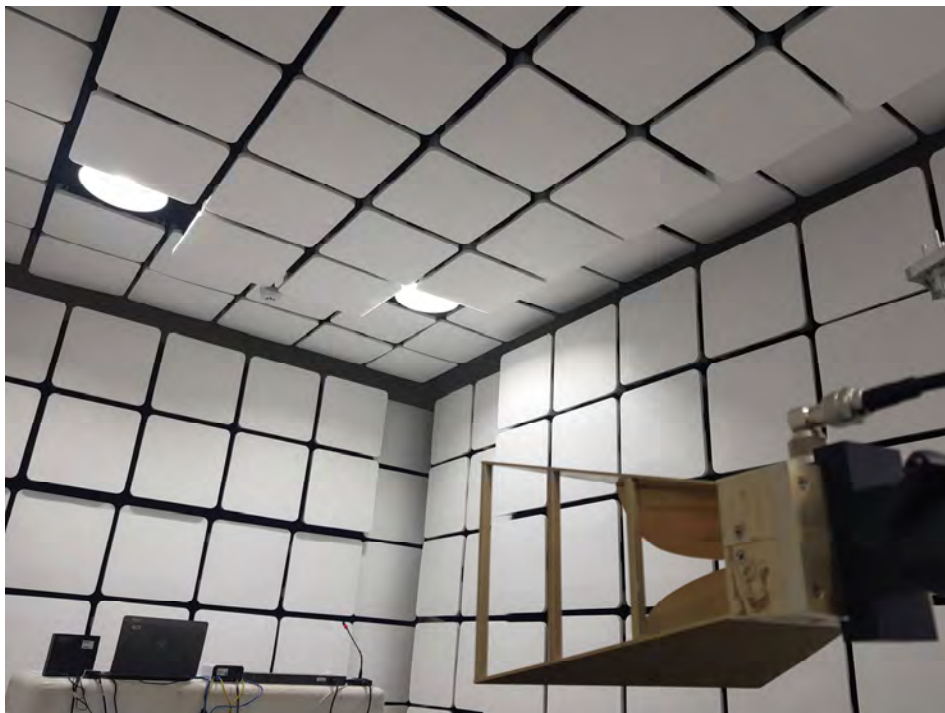
■ PoE Mode

Radiated Electric Field Emissions(Above 1 GHz)

■ DC Mode



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■ PoE Mode

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Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ DC Mode



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Electrostatic Discharge

■ DC Mode



■ PoE Mode



Radiated Electric Field Immunity

■ DC Mode



■ PoE Mode



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Electrical Fast Transients/Bursts

■ DC Mode



■ PoE Mode



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Surge Transients

■ DC Mode



■ PoE Mode



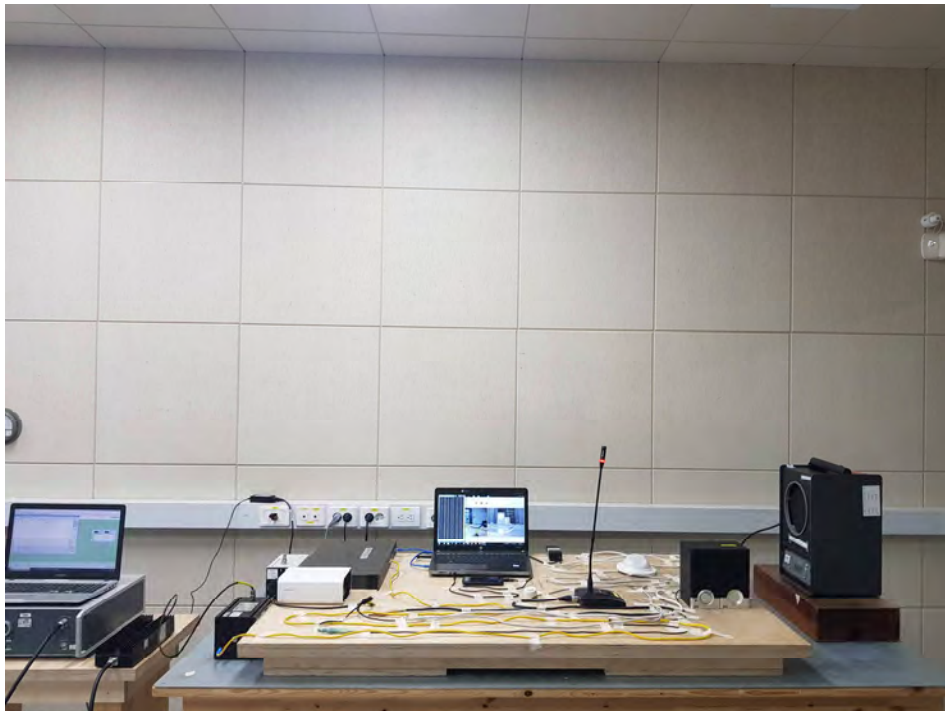
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Conducted Disturbance

■ DC Mode



■ PoE Mode



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Voltage Dips and Short Interruptions

■ DC Mode



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EUT External Photographs

(Top)



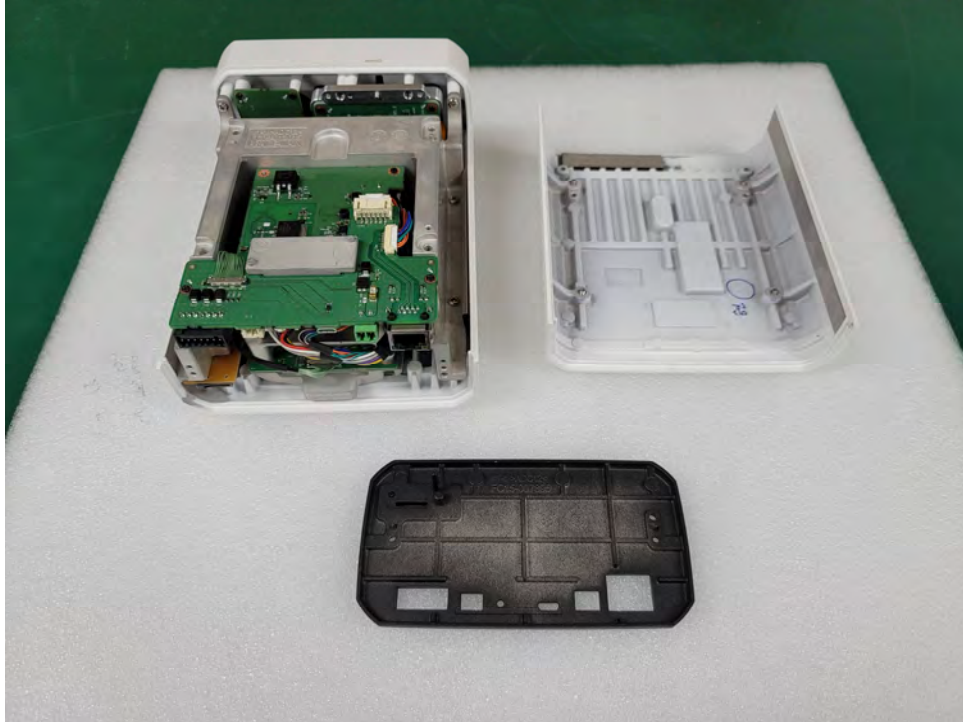
(Bottom)



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EUT Internal Photographs

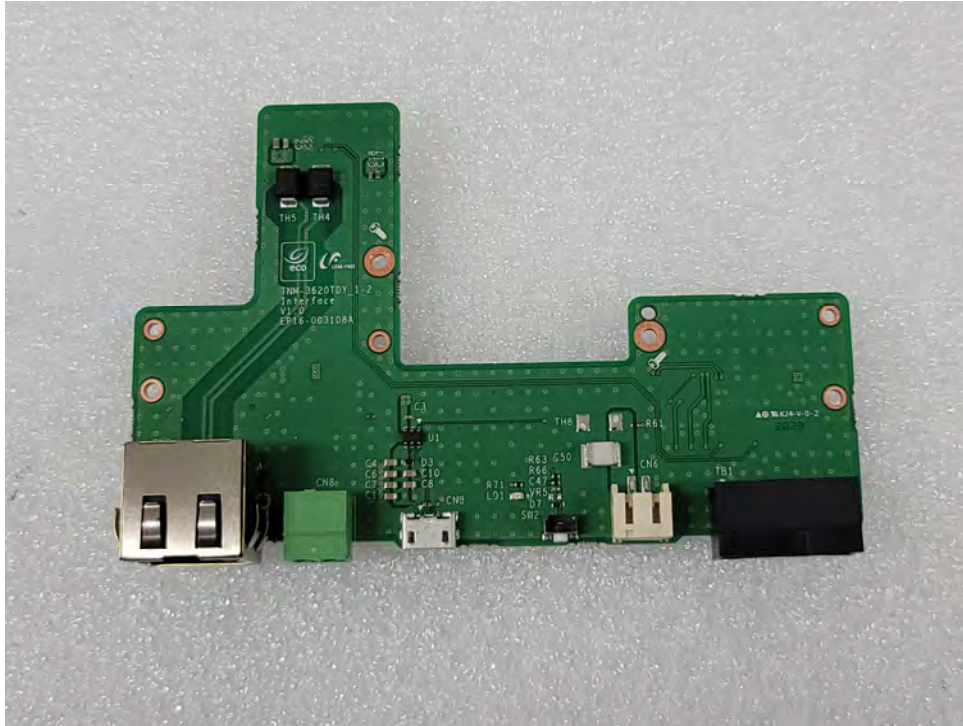
(Internal View)



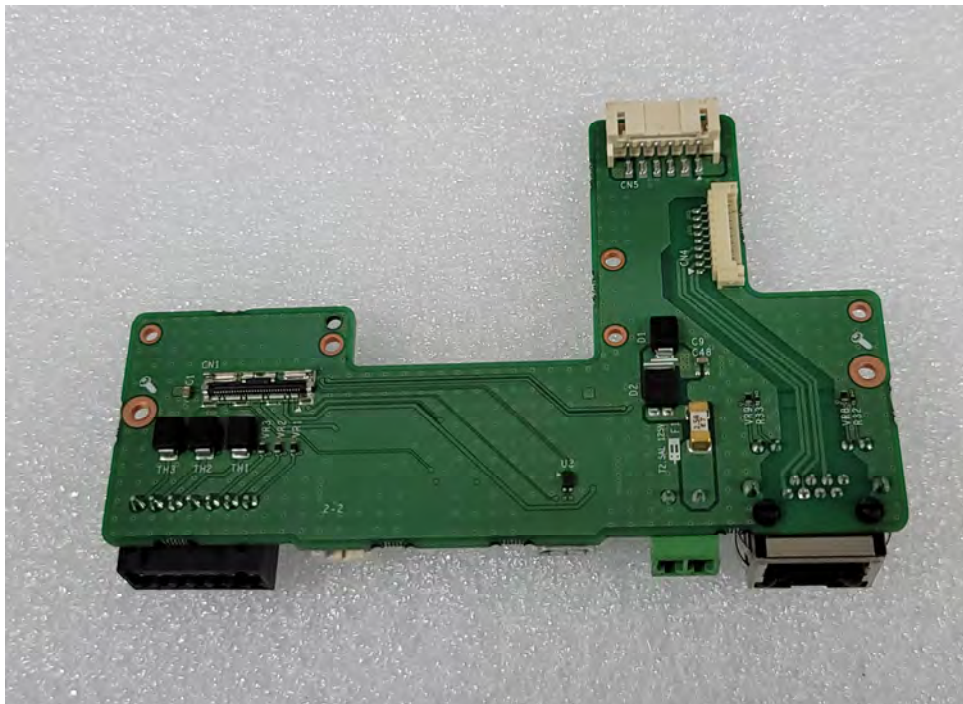
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EUT Internal View – Interface Board

(Top)



(Bottom)



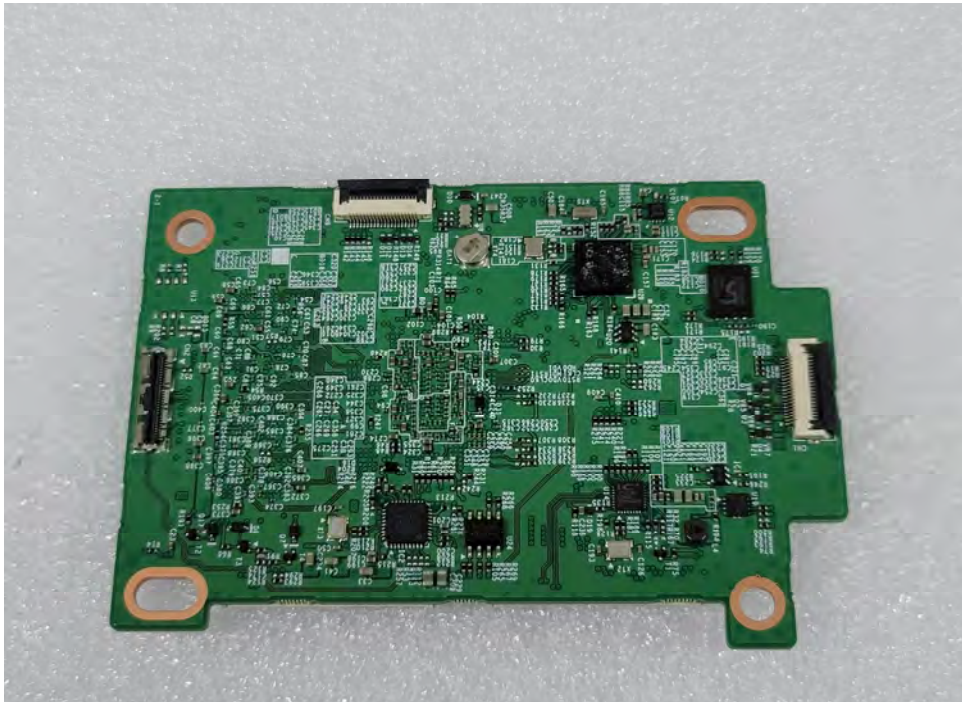
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EUT Internal View – NETWORK Board

(Top)



(Bottom)



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EUT Internal View – NUC Board

(Top)



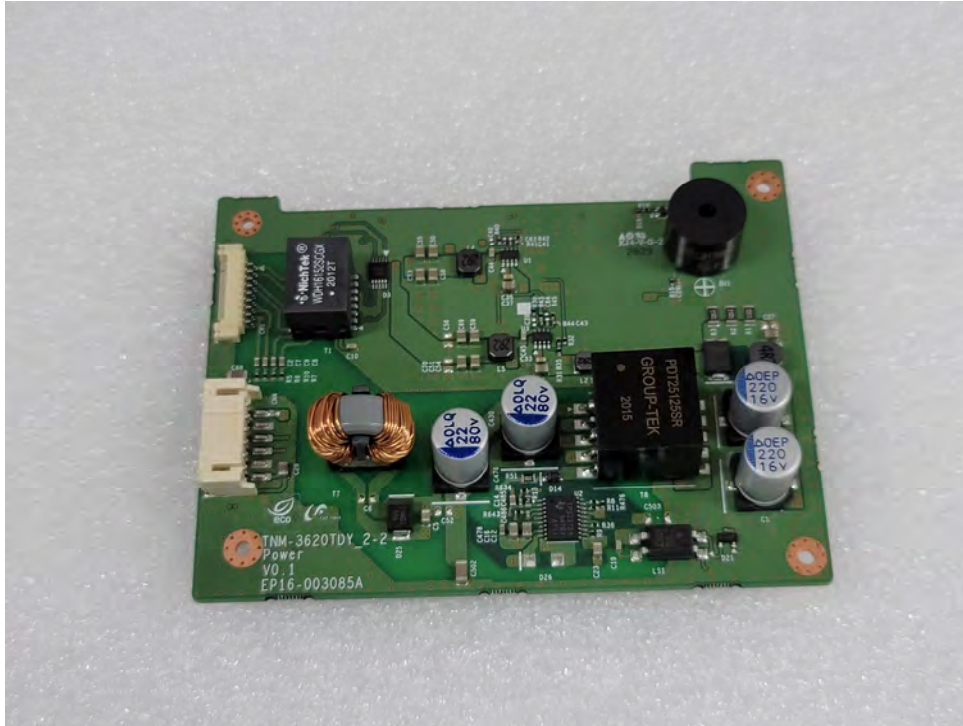
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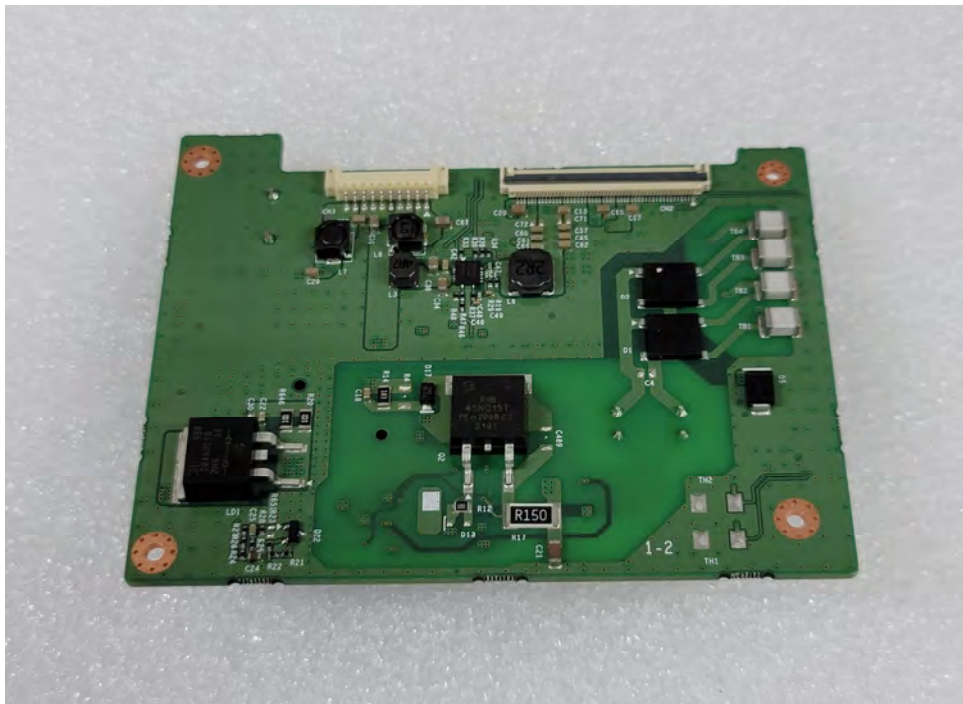
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EUT Internal View – Power Board

(Top)



(Bottom)



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EUT Internal View – SD Board

(Top)



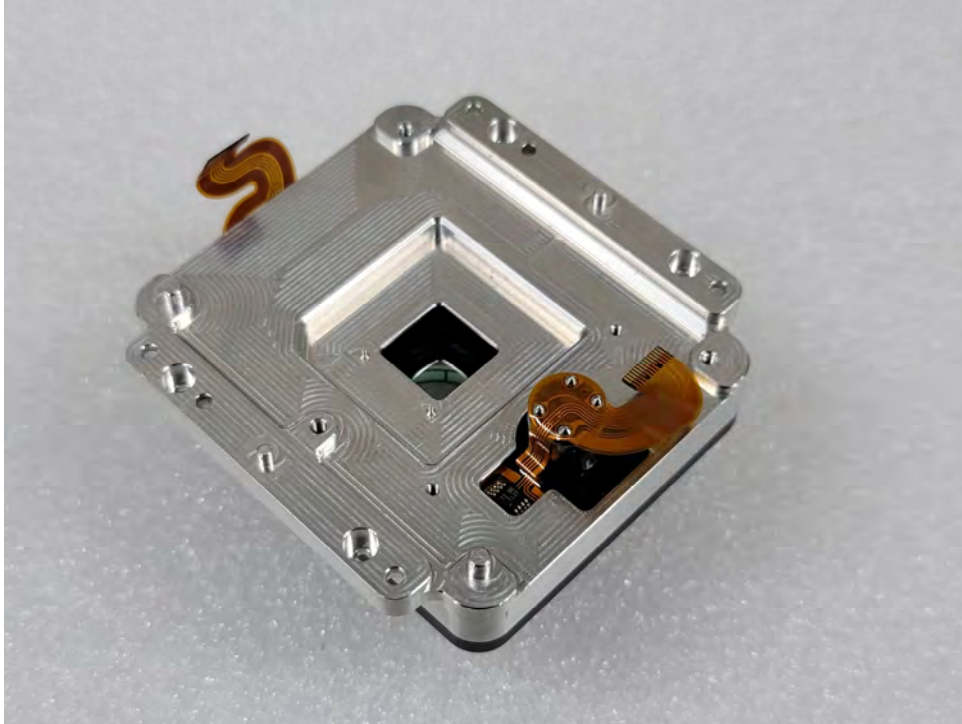
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EUT Internal View – SENSOR Board Lens

(Top)



(Bottom)



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EUT Internal View – SENSOR Board

(Top)



(Bottom)



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EUT Internal View – CMOS_SENSOR Lens

(Top)



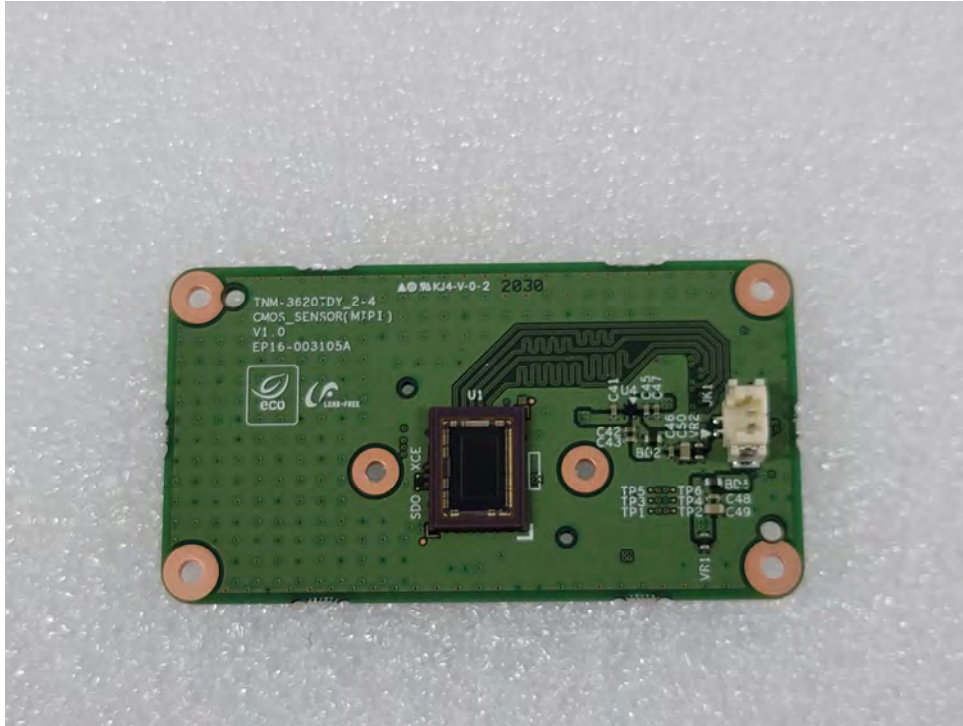
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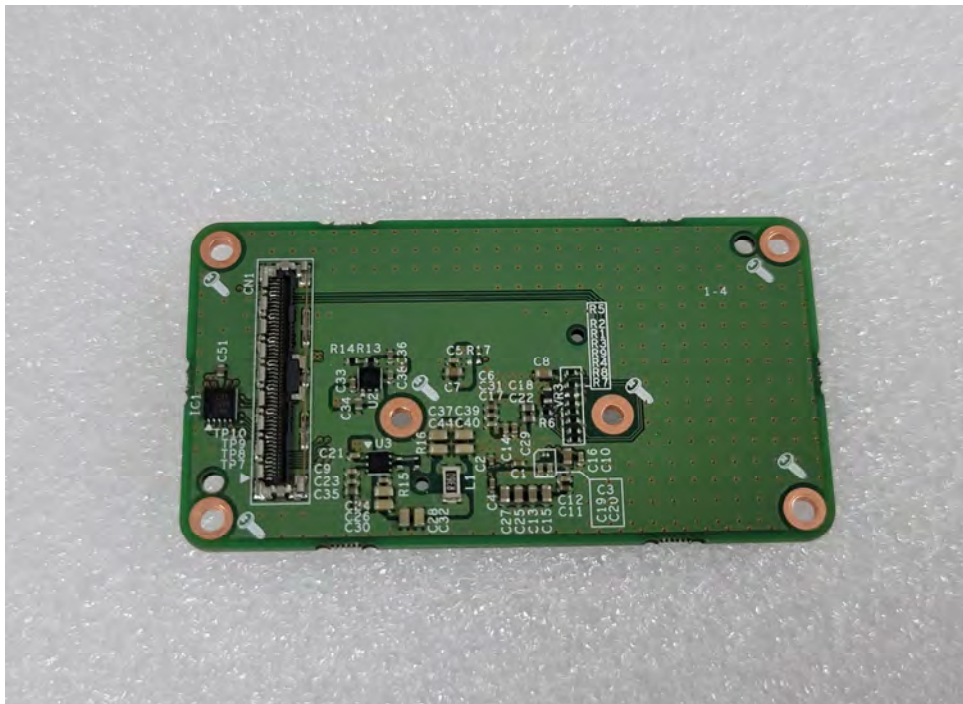
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EUT Internal View – CMOS_SENSOR Board

(Top)

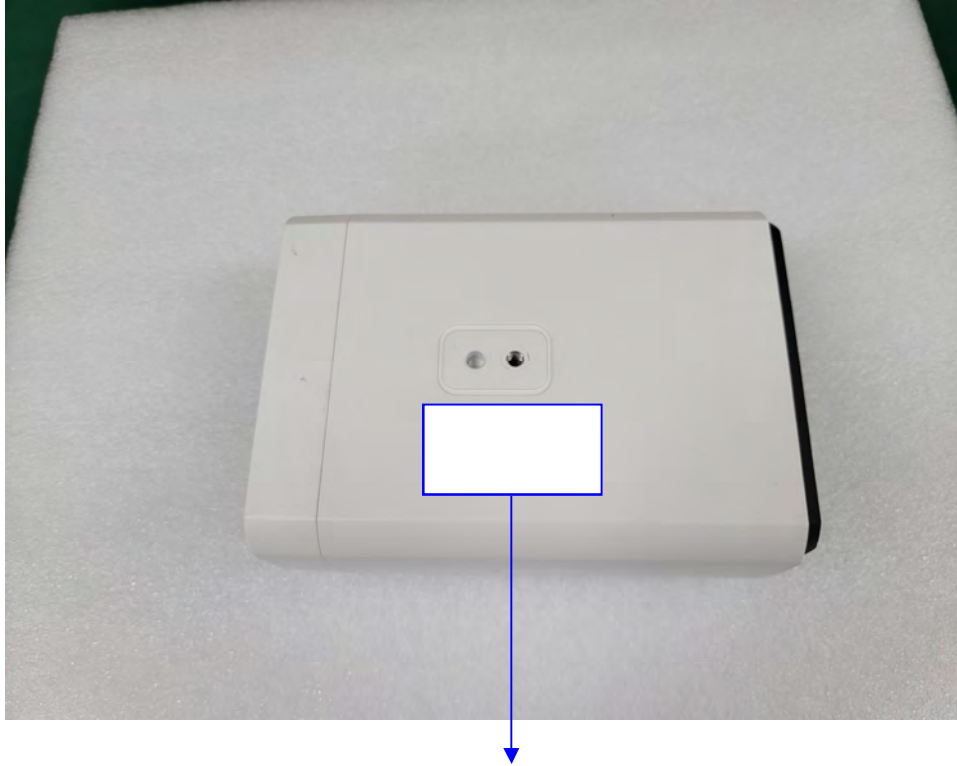


(Bottom)



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Manufacturer : HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.

Made in Vietnam

