



EMC TEST REPORT For CE

Test Report No. : KES-EM-21T0729
Date of Issue : Aug. 24, 2021
Product name : NETWORK VIDEO ENCODER
Model/Type No. : SPE-420
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 : Jul. 21, 2021
Test date : Aug. 04, 2021 ~ Aug. 10, 2021
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Ki Man, 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
Aug. 24, 2021	KES-EM-21T0729	Issued

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1.0 General Product Description

Main Specifications of EUT are:

Video	
Input Channel	4CH BNC, 1.0 Vp-p / 75Ω composite NTSC/PAL
Input Signal & Resolution	CVBS, AHD/CVI/TVI (1, 2, 4, 5MP) Auto Detection
Video Out	1 HDMI OUT (4 multi Image, 1920x1080)
Operational	
Motion Detection	Off / On
Privacy Masking	Off / On (4ea rectangular zones)
De-Interlacing	support
Alarm I/O	4 Input / 2 Output
Alarm Trigger	Motion Detection, Alarm Input, Video Loss, Tampering, Network disconnect
Alarm Events	File Upload Via FTP, E-mail
Audio I/O	4 Line Input / 1 Line Output(1 NO/COM/NC, 1 NO/COM)
OSD	Title
Remote Control Interface	1ea RS-485(Half Duplex)
RS-485 Protocol	SAMSUNG-T, PELCO-P/D
Coaxial Control	CVBS(Pelco-C) AHD, TVI, CVI
Network	
Ethernet	1 RJ-45 10/100
Video Compression Format	H.265, H.264 (MPEG-4 Part 10/AVC) : Main / Baseline / High, MJPEG
Resolution	2560x1920, 2560x1440, 1920x1080, 1280x720, 928x480(N), 928x240(N), 704x480(N), 704x240(N), 640x360, 352x240(N) 928x576(P), 928x288(P), 704x576(P), 704x288(P), 640x360, 352x288(P)
Max. Framerate	- Main Stream 5MP : 12fps/CH, 4MP : 15fps/CH, 1080p/720p/WD1/4CIF/CIF : 30fps/CH(N), 25fps/CH(P) - Sub Stream WD1/4CIF : 30fps/CH, 2CIF/CIF/QVGA/QCIF : 30fps/CH(N), 25fps/CH(P) - MJPEG : 2fps @ 640x360, 352x240, SD camera : 2fps @ 480x240, 352x240
Video Quality Adjustment	-
Bitrate Control Method	H.265, H.264 : CBR or VBR
Streaming Capability	Multiple Streaming (Up to 2 Profiles per channel)
Audio Compression	G.711 u-law
IP	IPv4, IPv6
Protocol	TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP, RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, PPPoE, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, UPnP, ONVIF, Bonjour
Security	HTTPS (SSL) Login Authentication, Digest Login Authentication IP Address Filtering, User Access Log, 802.1X Authentication (EAP-TLS, EAP-LEAP)
Streaming Method	Unicast / Multicast
Max. User Access	max. 16 users(4 Users/CH) at Unicast Mode
Webpage Languages	English, French, German, Spanish, Italian, Russian, Turkish, Polish, Dutch, Swedish, Portuguese, Czech, Chinese, Japanese, Korean, Hungarian, Greek
Web Viewer	"Supported OS: Windows 10 or later, Mac OS X 10.13 or later Non-plugin WebViewer Supported Browser: Google Chrome 80 or later, MS Edge 83 or later, Mozilla Firefox 72 or later, Apple Safari 11.0.1 or later * The video playback performance of the web viewer depends on the user's CPU/GPU performance"
Application Programming Interface	ONVIF profile S, SUNAPI (HTTP API)
Compatible Software & Recorder	SmartViewer, NVR(Hanwha Techwin, P/X/Q series)
Environmental	
Operating Temperature / Humidity	-10°C ~ +50°C / 20% ~ 80% RH
Electrical	
Input Voltage / Current	DC12V, PoE(IEEE 802.3af)
Power Consumption	MAX : 5W (12V, 0.417A)
Mechanical	
Color / Material	Dark Gray / Metal
Dimension (WxHxD)	(W) 178.0 × (H) 34.0 × (D) 127.8(include Connector 148.7)mm
Weight	520g(1.146lb)
Video	
Input Channel	4CH BNC, 1.0 Vp-p / 75Ω composite NTSC/PAL

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Input Signal & Resolution	CVBS, AHD/CVI/TVI (1, 2, 4, 5MP) Auto Detection
Video Out	1 HDMI OUT (4 multi Image, 1920x1080)
Operational	
Motion Detection	Off / On
Privacy Masking	Off / On (4ea rectangular zones)
De-Interlacing	support
Alarm I/O	4 Input / 2 Output
Alarm Trigger	Motion Detection, Alarm Input, Video Loss, Tampering, Network disconnect
Alarm Events	File Upload Via FTP, E-mail
Audio I/O	4 Line Input / 1 Line Output(1 NO/COM/NC, 1 NO/COM)
OSD	Title
Remote Control Interface	1ea RS-485(Half Duplex)
RS-485 Protocol	SAMSUNG-T, PELCO-P/D
Coaxial Control	CVBS(Pelco-C) AHD, TVI, CVI
Network	
Ethernet	1 RJ-45 10/100/1000 Base-T
Video Compression Format	H.265, H.264 (MPEG-4 Part 10/AVC) : Main / Baseline / High, MJPEG
Resolution	2560x1920, 2560x1440, 1920x1080, 1280x720, 928x480(N), 928x240(N), 704x480(N), 704x240(N), 640x360, 352x240(N) 928x576(P), 928x288(P), 704x576(P), 704x288(P), 640x360, 352x288(P)
Max. Framerate	- Main Stream 5MP : 12fps/CH, 4MP : 15fps/CH, 1080p/720p/WD1/4CIF/CIF : 30fps/CH(N), 25fps/CH(P) - Sub Stream WD1/4CIF : 30fps/CH, 2CIF/CIF/QVGA/QCIF : 30fps/CH(N), 25fps/CH(P) - MJPEG : 2fps @ 640x360, 352x240, SD camera : 2fps @ 480x240, 352x240
Video Quality Adjustment	-
Bitrate Control Method	H.265, H.264 : CBR or VBR
Streaming Capability	Multiple Streaming (Up to 2 Profiles per channel)
Audio Compression	G.711 u-law
IP	IPv4, IPv6
Protocol	TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP, RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, PPPoE, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, UPnP, ONVIF, Bonjour
Security	HTTPS (SSL) Login Authentication, Digest Login Authentication IP Address Filtering, User Access Log, 802.1X Authentication (EAP-TLS, EAP-LEAP)
Streaming Method	Unicast / Multicast
Max. User Access	max. 16 users(4 Users/CH) at Unicast Mode
Webpage Languages	English, French, German, Spanish, Italian, Russian, Turkish, Polish, Dutch, Swedish, Portuguese, Czech, Chinese, Japanese, Korean, Hungarian, Greek
Web Viewer	"Supported OS: Windows 10 or later, Mac OS X 10.13 or later Non-plugin WebViewer Supported Browser: Google Chrome 80 or later, MS Edge 83 or later, Mozilla Firefox 72 or later, Apple Safari 11.0.1 or later * The video playback performance of the web viewer depends on the user's CPU/GPU performance"
Application Programming Interface	ONVIF profile S, SUNAPI (HTTP API)
Compatible Software & Recoder	SmartViewer, NVR(Hanwha Techwin, P/X/Q series)
Environmental	
Operating Temperature / Humidity	-10°C ~ +50°C / 20% ~ 80% RH
Electrical	
Input Voltage / Current	DC12V, PoE(IEEE 802.3af)
Power Consumption	MAX : 5W (12V, 0.417A)
Mechanical	
Color / Material	Dark Gray / Metal
Dimension (WxHxD)	(W) 178.0 × (H) 34.0 × (D)127.8(include Connector 148.7)mm
Weight	520g(1.146lb)
Video	
Input Channel	4CH BNC, 1.0 Vp-p / 75Ω composite NTSC/PAL
Input Signal & Resolution	CVBS, AHD/CVI/TVI (1, 2, 4, 5MP) Auto Detection

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1.1 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

☒ AC 230 V, 50Hz ☒ PoE

1.2 Variant Model Differences

Not applicable

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
NETWORK VIDEO ENCODER	SPE-420	-	HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.	EUT

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1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Adaptor	2ACB022F	-	Channel Well Technology (Guangzhou) Co., Ltd.	-
CAMERA	SCD-6083RN	-	HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.	-
CAMERA Adaptor	JH10099-15001	-	KOREA Power	-
Monitor	SMT-2232	C95V67VF900025 B	Weihai Daewoo Electronics Co., Ltd.	-
PoE Adaptor	PSE156G 4-Pair,Hi-Power	-	-	-
Notebook	P95G001	8KM8HT2	DELL	-
Notebook Adaptor	LA65NS2-01	-	LITE-ON TECHNOLOGY (CHANGZHOU)CO.,LTD.	-
Alarm1	-	-	-	-
Alarm2	-	-	-	-
Speaker	BR10000A CUVE	-	BEIJING EDIFIER HI-TECH GROUP.	-
MIC	CMK-303	-	CAMAC	-
Controller	SPC-1010	C50E67WG10100F	SamSung Techwin Co.,Ltd.	-
Controller Adaptor	RS-AB1000	-	Dongguan Jinhuasheng Power Technology Co.,Ltd.	-

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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 VIDEO ENCODER (EUT)	RJ-45 (LAN)	Notebook	RJ-45 (LAN)	3.0	U
	BNC	CAMERA	BNC	3.0	S
	HDMI	Monitor	HDMI	1.6	S
	RCA	MIC	RCA	1.6	U
	RCA	Speaker	RCA	1.6	U
	2 Pin	Alarm1	2 Pin	3.0	U
	2 Pin	Alarm2	2 Pin	3.0	U
	RS-485	Controller	RS-485	3.0	U
	2 Pin	Adaptor	2 Pin	1.6	U
CAMERA	2 Pin	CAMERA Adaptor	2 Pin	1.6	U
Controller	DC Jack	Controller Adaptor	DC Jack	1.5	U
Notebook	DC Jack	Notebook Adaptor	DC Jack	1.7	U

* Unshielded=U, Shielded=S

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■ PoE Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK VIDEO ENCODER (EUT)	RJ-45 (PoE)	PoE Adaptor	RJ-45 (PoE)	3.0	U
	BNC	CAMERA	BNC	3.0	S
	HDMI	Monitor	HDMI	1.6	S
	RCA	MIC	RCA	1.6	U
	RCA	Speaker	RCA	1.6	U
	2 Pin	Alarm1	2 Pin	3.0	U
	2 Pin	Alarm2	2 Pin	3.0	U
	RS-485	Controller	RS-485	3.0	U
CAMERA	2 Pin	CAMERA Adaptor	2 Pin	1.6	U
Controller	DC Jack	Controller Adaptor	DC Jack	1.5	U
Notebook	RJ-45 (LAN)	PoE Adaptor	RJ-45 (LAN)	3.0	U
Notebook	DC Jack	Notebook Adaptor	DC Jack	1.7	U

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

Test Mode	operating
DC Mode	EUT Monitoring, Ping Test
PoE Mode	

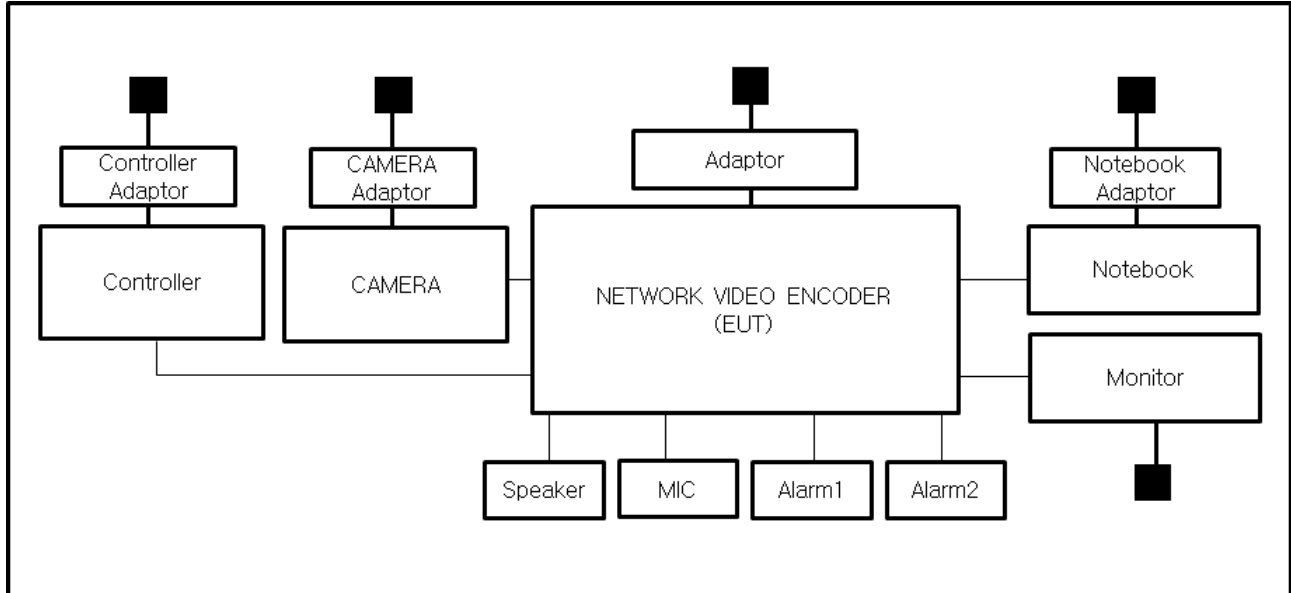
EUT Test operating S/W		
Name	Version	Manufacture Company
Web Viewer	-	Hanwha Techwin Co., Ltd.

1.8 Configuration

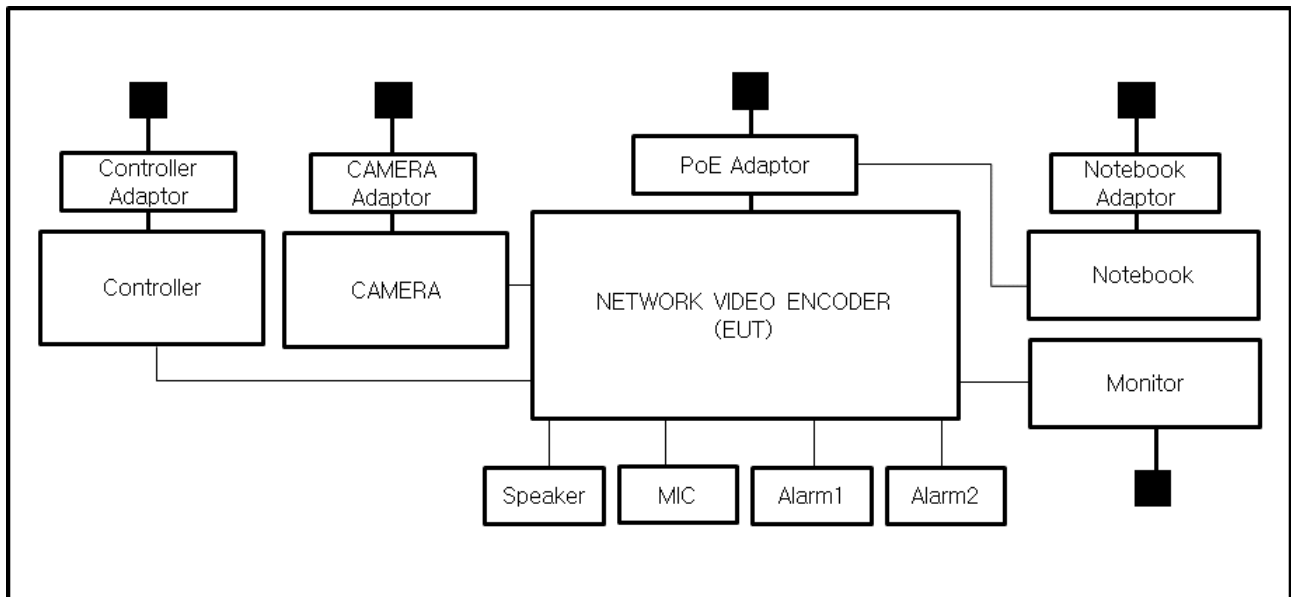
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■ AC Main
□ DC Main

■ 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. The sites are constructed in conformance with the requirements of ANSI C63.4:2014 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 , 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 55032:2015/A11:2020

☒ 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

☒ **EMC – Regulations 2016/1091**

☒ BS EN 55032:2015/A11:2020

☒ Class A

☐ Class B

☒ BS EN 50130-4:2011

☒ BS EN 61000-3-2:2014

☒ BS EN 61000-3-3:2013



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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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2.1 Conducted Emissions at Mains Power Ports

Test Date

Aug. 04, 2021

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, 15, 2022
☒	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: (24,9 ± 0,1) °C

Relative Humidity: (47,3 ± 0,2) % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

2.2 Conducted Emissions at Telecommunication Ports

Test Date

Aug. 04, 2021

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, 15, 2022
☒	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	

Test Conditions

Temperature: (24,9 ± 0,1) °C
Relative Humidity: (47,3 ± 0,2) % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

- For Ethernet interfaces, measurements are required at the highest data rate supported by the interface.



2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Aug. 05, 2021

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, 2022
☒	AMPLIFIER	SCU 01	R & S	100603	11, 25, 2021
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	12, 08, 2022
☒	ATTENUATOR	8491A	HP	32173	03, 10, 2022

Test Conditions

Temperature: (24,8 ± 0,2) °C
Relative Humidity: (47,0 ± 0,2) % 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

Aug. 05, 2021

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, 03, 2022
☒	PREAMPLIFIER	8449B	AGILENT	3008A01967	04, 07, 2022
☐	ATTENUATOR	8491A	HP	35496	03, 10, 2022
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 11, 2022

Test Conditions

Temperature: (24,7 ± 0,2) °C
Relative Humidity: (46,8 ± 0,3) % 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

Remarks

See Appendix A for test data.



2.5 Harmonic Current Emissions

Test Date

Aug. 09, 2021

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, 2022
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: (24,7 ± 0,1) °C
Relative Humidity: (48,6 ± 0,1) % R.H.

Classification of Equipment for Harmonic Current Emissions

- ☒ Class A
- ☐ Class B
- ☐ Class C(Below 25 W)
- ☐ Class C(Above 25 W)
- ☐ Class D

Test Results

The requirements are:

- ☒ PASS
- ☐ NOT PASS
- ☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.6 Voltage Fluctuations and Flicker

Test Date

Aug. 09, 2021

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, 2022
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: (24,7 ± 0,2) °C
Relative Humidity: (48,6 ± 0,3) % 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 / BS 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
BS EN 61000-4-2:2009

Test Date

Aug. 10, 2021

Test Location

EMS-ESD: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	02, 01, 2022
☒	HCP	-	KES	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: (24,7 ± 0,1) °C
Relative Humidity: (47,4 ± 0,2) % R.H.
Atmospheric Pressure: (99,5 ± 0,0) kPa

Test Specifications

Discharge Factor: ≥ 1 s

Discharge Impedance: 330 ohm / 150 pF

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

Polarity: Positive and Negative

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

Discharge Voltage:	Contact ☐ 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

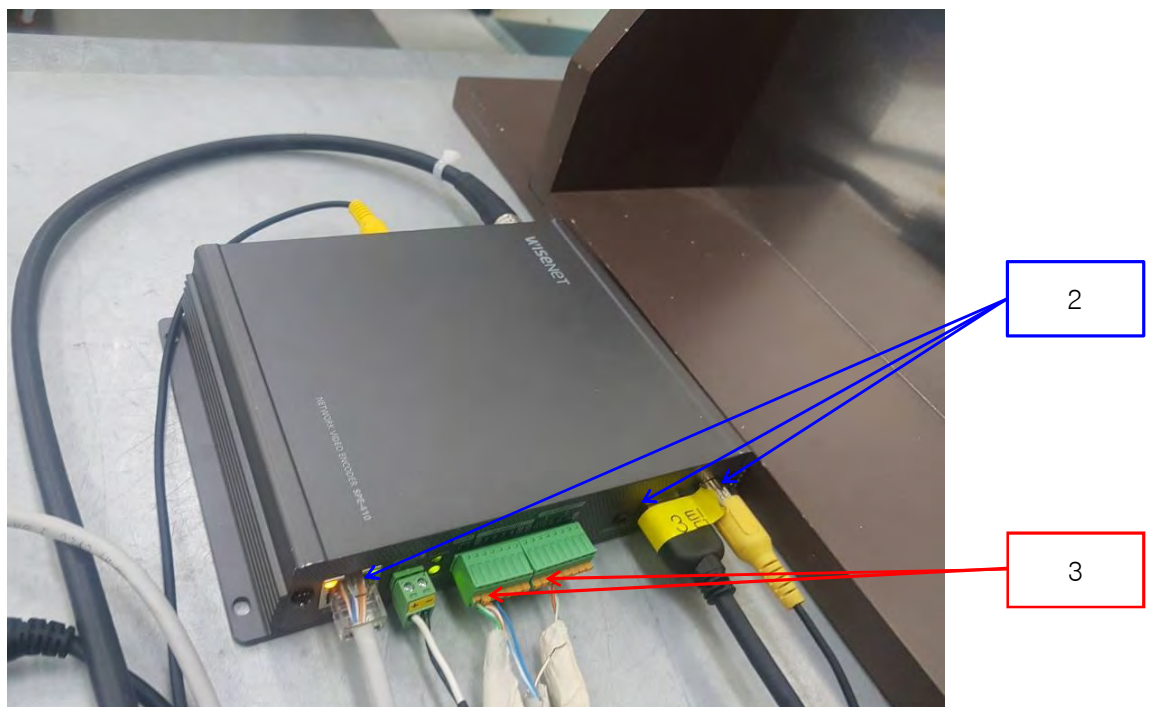
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Location of Discharge:

Air
Contact

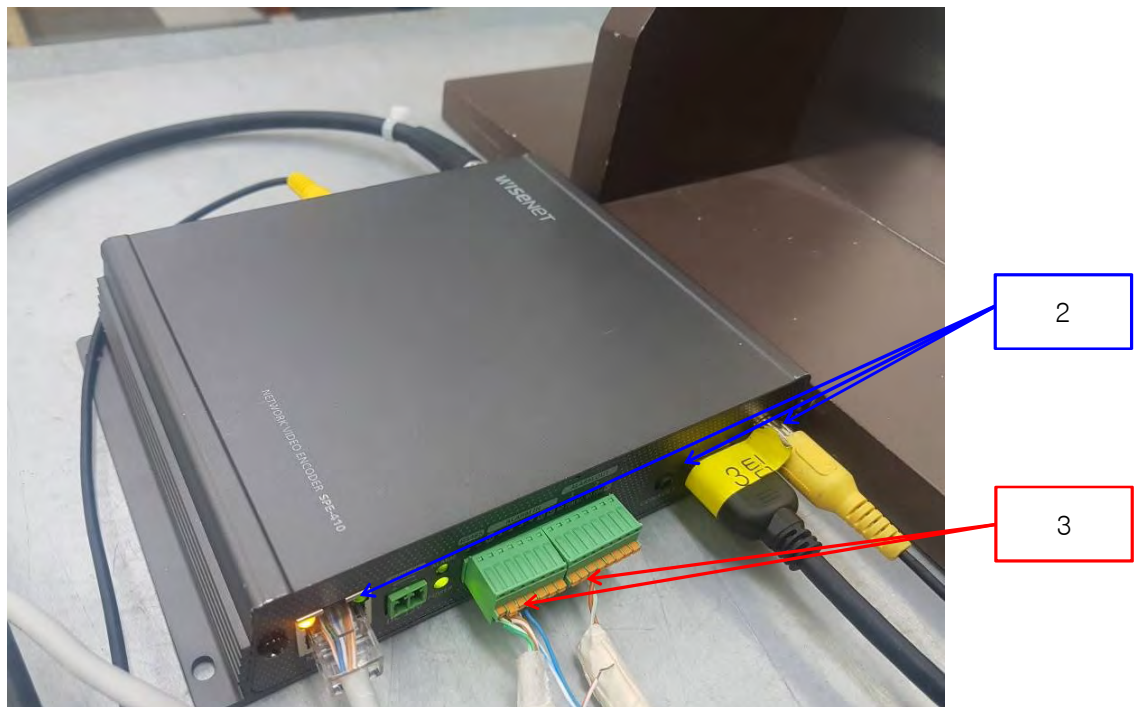


■ DC Mode



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■ PoE Mode



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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	Enclosure	Contact Discharge	Complied	-
2	Around the port1	Contact Discharge	Complied	-
3	Around the port2	Air 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	Enclosure	Contact Discharge	Complied	-
2	Around the port1	Contact Discharge	Complied	-
3	Around the port2	Air Discharge	Complied	-

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

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

RemarksPASS Required Performance Criteria

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3.2 Radiated Electric Field Immunity

Reference Standard

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

Test Date

Aug. 06, 2021

Test Location

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

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	EMC32	R & S	10.10.02	-
☒	SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	08, 03, 2022
☒	HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-
☒	POWER METER	E4419B	Agilent	GB40203000	04, 01, 2022
☒	CW POWER SENSOR	E4412A	Agilent	US38488240	04, 01, 2022
☒	CW POWER SENSOR	E4412A	Agilent	MY41501662	04, 01, 2022
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 11, 2022

Test Conditions

Temperature: (25,0 ± 0,3) °C
Relative Humidity: (46,5 ± 0,4) % R.H.
Atmospheric Pressure: (99,4 ± 0,0) 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

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3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012
BS EN 61000-4-4:2012

Test Date

Aug. 10, 2021

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 26, 2021
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 26, 2021
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 26, 2021

Test Conditions

Temperature: (24,7 ± 0,2) °C
Relative Humidity: (47,4 ± 0,3) % R.H.
Atmospheric Pressure: (99,5 ± 0,0) kPa

Test Specifications

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

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

Burst Period: ☒ 300 ms ☐ 2 s

Repetition Rate: ☐ 5 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	-	-
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)
RJ-45 (LAN)	Complied	Complied
Alarm 1	Complied	Complied
Alarm 2	Complied	Complied
BNC	Complied	Complied
RS-485	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 1	Complied	Complied
Alarm 2	Complied	Complied
BNC	Complied	Complied
RS-485	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria

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3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

BS EN 61000-4-5:2014

Test Date

Aug. 10, 2021

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 26, 2021
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 26, 2021
☒	CDN	CNV 508N1	EM TEST	P1610176296	11, 27, 2021

Test Conditions

Temperature: (24,7 ± 0,2) °C
Relative Humidity: (47,4 ± 0,4) % R.H.
Atmospheric Pressure: (99,5 ± 0,0) 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

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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)
RJ-45 (LAN)	CDN	Complied	Complied
	LINE	Complied	Complied

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☒ 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

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3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014
BS EN 61000-4-6:2014

Test Date

Aug. 04, 2021

Test Location

EMS-CS: Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	icd.control	EM TEST	5.3.12	-
☒	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	11, 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: (24,9 ± 0,3) °C
Relative Humidity: (47,3 ± 0,5) % R.H.
Atmospheric Pressure: (99,4 ± 0,0) kPa



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Test Specifications

Frequency range:

☒ 150 kHz to 100 MHz

☐ 150 kHz to 80 MHz

Voltage Level:

☐ 1 Vrms

☐ 3 Vrms

☒ 10 Vrms

Modulation:

☒ AM, 80 %, 1 kHz sine wave

☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step:

☒ 1 % step

Dwell Time:

☐ 1 s

☒ 3 s

Required Performance Criteria: ☒ Complied

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Test Data**■ 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
RJ-45 (LAN)	CDN	Complied
Alarm 1	Clamp	Complied
Alarm 2	Clamp	Complied
BNC	Clamp	Complied
RS-485	Clamp	Complied

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■ 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 1	Clamp	Complied
Alarm 2	Clamp	Complied
BNC	Clamp	Complied
RS-485	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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3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004

BS EN 61000-4-11:2004

Test Date

Aug. 10, 2021

Test Location

EMS-Voltage dip: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 26, 2021
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 26, 2021

Test Conditions

Temperature: (24,7 ± 0,2) °C
Relative Humidity: (47,4 ± 0,2) % R.H.
Atmospheric Pressure: (99,5 ± 0,0) kPa

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Test Specifications & Observations/Remarks

■ DC Mode

- Voltage Dips and Short Interruptions

Test Level	Duration [in period/ms (50 Hz)]	Results
☒ 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

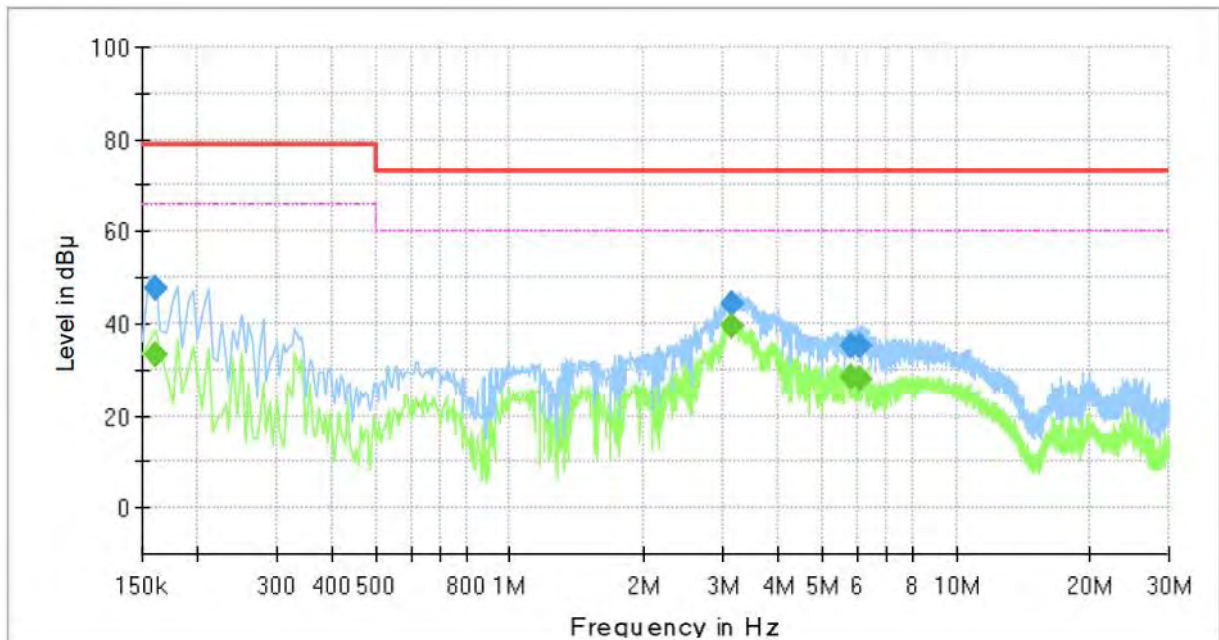
Conducted Emissions at Mains Power Ports

■ DC Mode

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	SPE-420
Phase:	L1
Mode:	DC
Operator Name:	KES



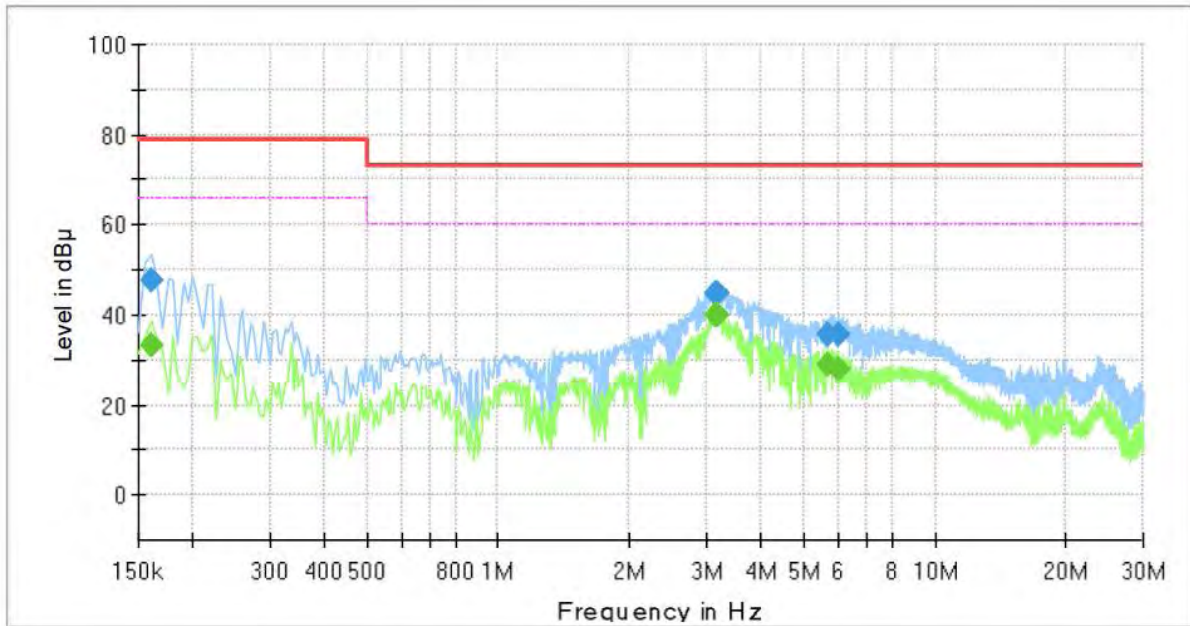
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.160000	---	33.08	66.00	32.92	1000.0	9.000	L1	19.5
0.160000	47.51	---	79.00	31.49	1000.0	9.000	L1	19.5
3.135000	---	39.51	60.00	20.49	1000.0	9.000	L1	20.2
3.135000	44.50	---	73.00	28.50	1000.0	9.000	L1	20.2
5.820000	---	28.48	60.00	31.52	1000.0	9.000	L1	19.6
5.820000	35.38	---	73.00	37.62	1000.0	9.000	L1	19.6
6.090000	---	28.04	60.00	31.96	1000.0	9.000	L1	19.6
6.090000	35.16	---	73.00	37.84	1000.0	9.000	L1	19.6

[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	SPE-420
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)
0.160000	---	33.26	66.00	32.74	1000.0	9.000	N	19.4
0.160000	47.62	---	79.00	31.38	1000.0	9.000	N	19.4
3.150000	---	39.99	60.00	20.01	1000.0	9.000	N	20.1
3.150000	44.58	---	73.00	28.42	1000.0	9.000	N	20.1
3.175000	---	40.03	60.00	19.97	1000.0	9.000	N	20.1
3.175000	44.68	---	73.00	28.32	1000.0	9.000	N	20.1
5.665000	---	29.08	60.00	30.92	1000.0	9.000	N	19.6
5.665000	35.82	---	73.00	37.18	1000.0	9.000	N	19.6
6.030000	---	28.07	60.00	31.93	1000.0	9.000	N	19.5
6.030000	35.48	---	73.00	37.52	1000.0	9.000	N	19.5

◆ 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))

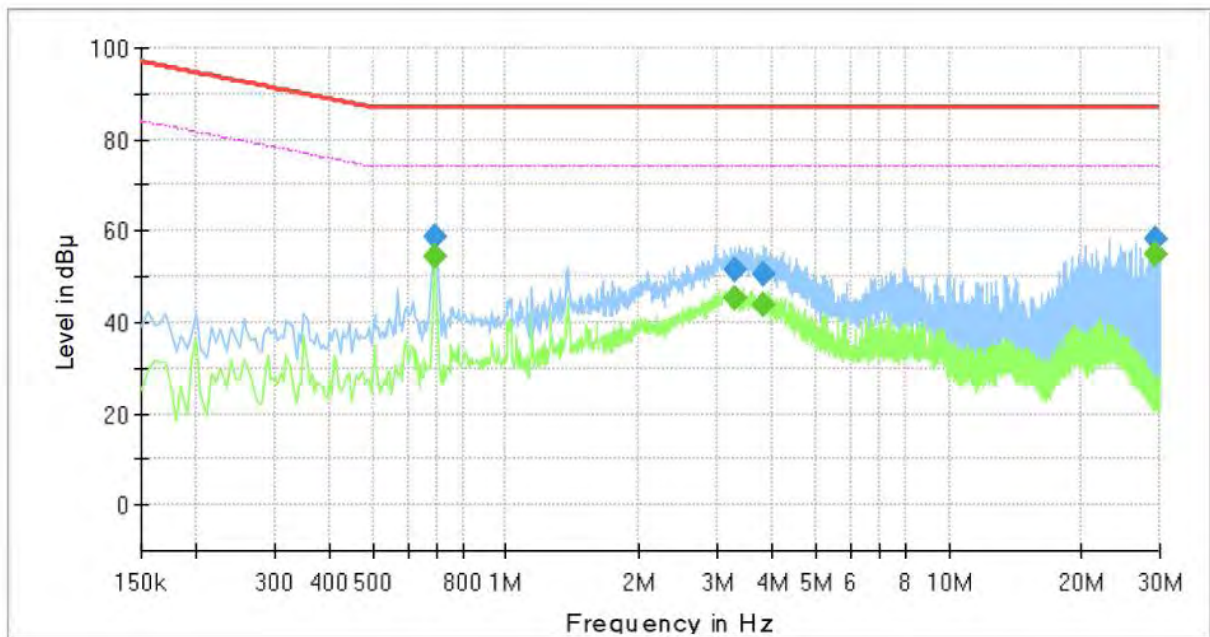
Conducted Emissions at Telecommunication Ports

■ DC Mode

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	SPE-420
Mode :	DC
Speed :	100 Mbps
Operator Name:	KES



Final Result

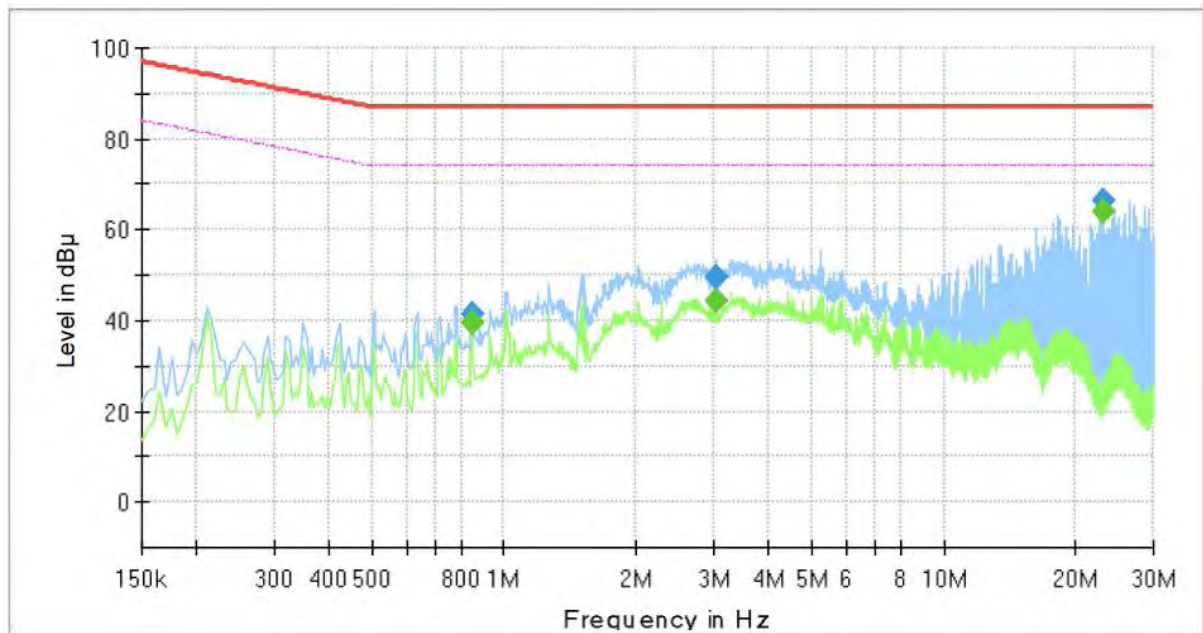
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.690000	---	54.31	74.00	19.69	1000.0	9.000	Single Line	20.0
0.690000	58.56	---	87.00	28.44	1000.0	9.000	Single Line	20.0
3.285000	---	45.27	74.00	28.73	1000.0	9.000	Single Line	20.0
3.285000	51.29	---	87.00	35.71	1000.0	9.000	Single Line	20.0
3.820000	---	43.64	74.00	30.36	1000.0	9.000	Single Line	19.8
3.820000	50.59	---	87.00	36.41	1000.0	9.000	Single Line	19.8
29.235000	---	55.07	74.00	18.93	1000.0	9.000	Single Line	20.5
29.235000	58.09	---	87.00	28.91	1000.0	9.000	Single Line	20.5

PoE Mode

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	SPE-420
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)
0.845000	---	39.46	74.00	34.54	1000.0	9.000	Single Line	20.1
0.845000	41.51	---	87.00	45.49	1000.0	9.000	Single Line	20.1
3.035000	---	44.39	74.00	29.61	1000.0	9.000	Single Line	20.0
3.035000	49.50	---	87.00	37.50	1000.0	9.000	Single Line	20.0
23.130000	---	64.03	74.00	9.97	1000.0	9.000	Single Line	20.2
23.130000	66.46	---	87.00	20.54	1000.0	9.000	Single Line	20.2

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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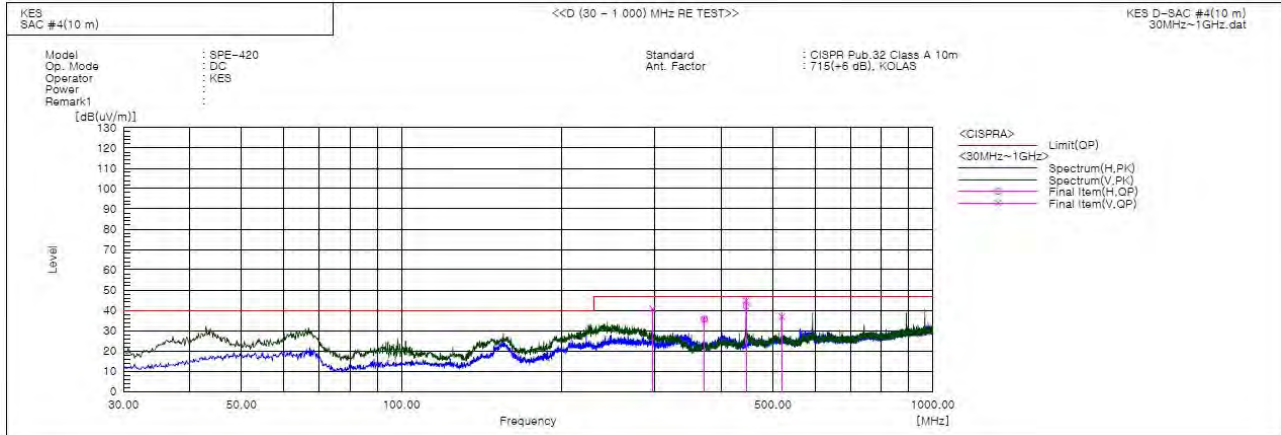
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Radiated Electric Field Emissions(Below 1 GHz)

■ 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	296.993	V	58.7	-18.0	40.7	47.0	6.3	172.0	83.0	
2	371.198	H	50.5	-14.9	35.6	47.0	11.4	268.0	104.0	
3	371.319	V	50.3	-14.9	35.4	47.0	11.6	317.0	106.0	
4	445.429	H	55.1	-13.2	41.9	47.0	5.1	178.0	104.0	
5	445.524	V	58.0	-13.2	44.8	47.0	2.2	121.0	68.0	
6	519.729	V	48.0	-11.1	36.9	47.0	10.1	400.0	1.0	

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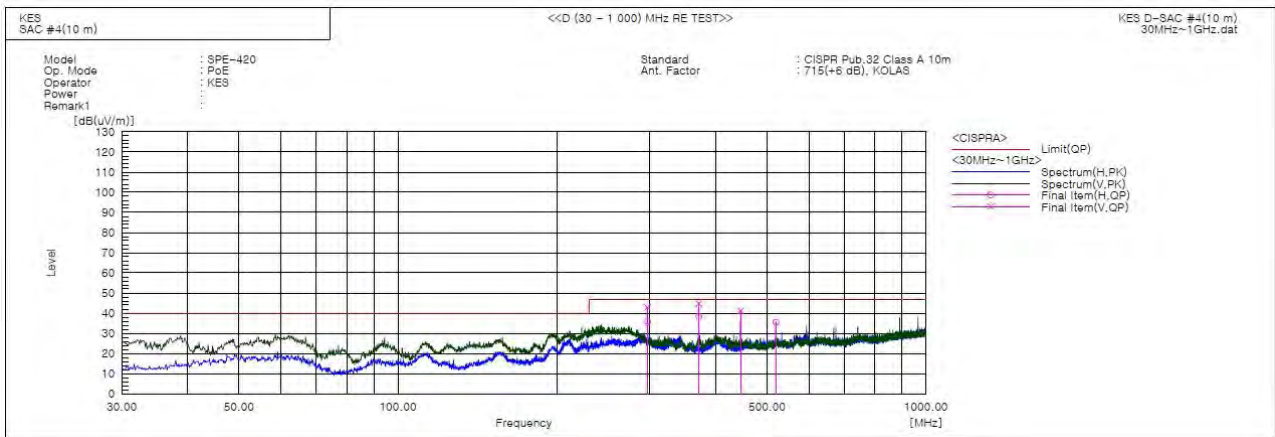
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■ PoE Mode



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	296.842	V	60.9	-18.0	42.9	47.0	4.1	147.0	66.0	
2	296.993	H	53.8	-18.0	35.8	47.0	11.2	368.0	353.0	
3	371.198	H	53.3	-14.9	38.4	47.0	8.6	400.0	358.0	
4	371.319	V	59.6	-14.9	44.7	47.0	2.3	141.0	20.0	
5	445.524	V	54.4	-13.2	41.2	47.0	5.8	150.0	300.0	
6	519.729	H	46.6	-11.1	35.5	47.0	11.5	215.0	52.0	

◆ 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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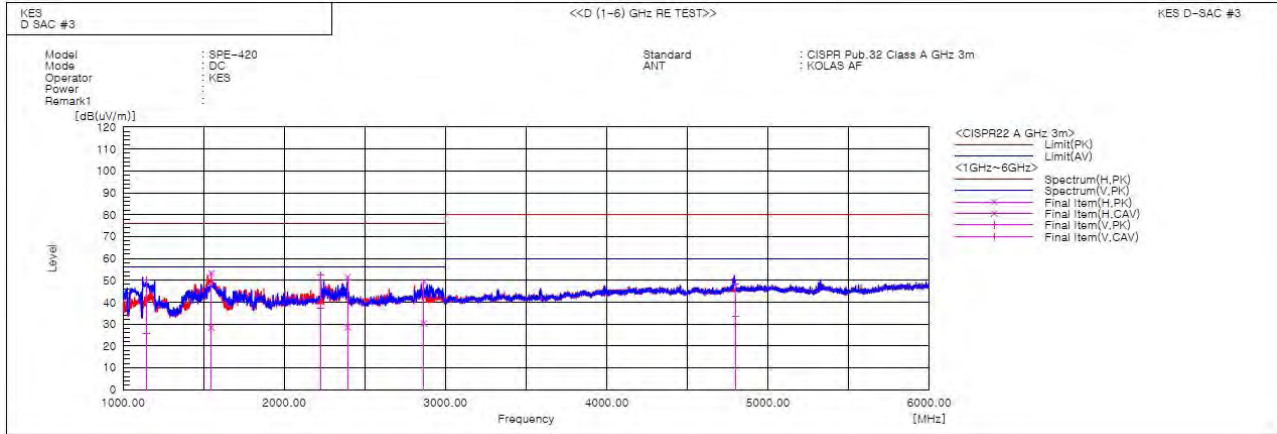
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Radiated Electric Field Emissions(Above 1 GHz)

■ 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	1143.966	V	58.8	34.4	-8.9	49.9	25.5	76.0	56.0	26.1	30.5	100.0	6.5	
2	1547.585	H	59.0	34.2	-5.8	53.2	28.4	76.0	56.0	22.8	27.6	100.0	43.3	
3	2227.530	V	52.7	37.7	-0.4	52.3	37.3	76.0	56.0	23.7	18.7	100.0	356.1	
4	2392.000	H	51.2	28.3	0.2	51.4	28.5	76.0	56.0	24.6	27.5	100.0	39.2	
5	2865.207	H	47.5	28.4	1.8	49.3	30.2	76.0	56.0	26.7	25.8	100.0	68.6	
6	4796.637	V	40.6	25.5	7.9	48.5	33.4	80.0	60.0	31.5	26.6	100.0	26.1	

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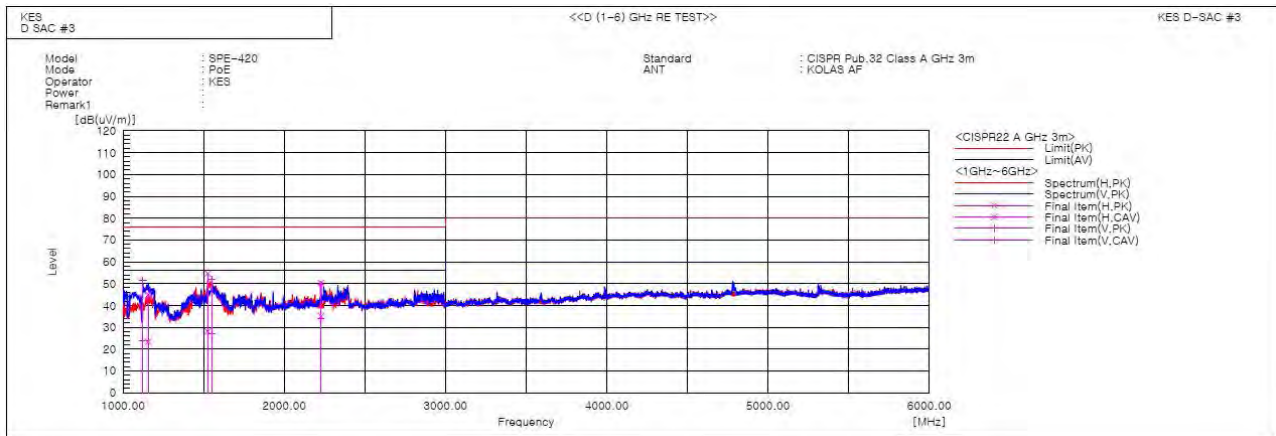
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■ PoE Mode



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	1123.180	V	60.4	33.1	-9.1	51.3	24.0	76.0	56.0	24.7	32.0	100.0	3.3	
2	1156.283	H	53.9	32.2	-8.9	45.0	23.3	76.0	56.0	31.0	32.7	100.0	354.1	
3	1524.760	H	60.5	34.0	-5.9	54.6	28.1	76.0	56.0	21.4	27.9	100.0	67.1	
4	1549.535	V	57.8	32.8	-5.7	52.1	27.1	76.0	56.0	23.9	28.9	100.0	4.5	
5	2227.290	H	50.5	35.4	-0.4	50.1	35.0	76.0	56.0	25.9	21.0	100.0	36.7	
6	2272.950	V	50.2	34.3	-0.4	49.8	33.9	76.0	56.0	26.2	22.1	100.0	352.7	

◆ 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	0.023			
2	0.002	0.170	1.080	n/a
3	0.016	0.709	2.300	PASS
4	0.001	0.337	0.430	n/a
5	0.017	1.532	1.140	PASS
6	0.001	0.468	0.300	n/a
7	0.017	2.197	0.770	PASS
8	0.001	0.634	0.230	n/a
9	0.016	3.974	0.400	PASS
10	0.002	0.845	0.184	n/a
11	0.016	4.771	0.330	PASS
12	0.001	0.917	0.153	n/a
13	0.015	7.285	0.210	PASS
14	0.001	1.106	0.131	n/a
15	0.014	9.636	0.150	PASS
16	0.001	1.188	0.115	n/a
17	0.014	10.655	0.132	PASS
18	0.001	1.324	0.102	n/a
19	0.013	11.361	0.118	PASS
20	0.001	1.462	0.092	n/a
21	0.013	7.817	0.161	PASS
22	0.001	1.492	0.084	n/a
23	0.012	8.232	0.147	PASS
24	0.001	1.714	0.077	n/a
25	0.011	8.290	0.135	PASS
26	0.001	1.686	0.071	n/a
27	0.010	8.377	0.125	PASS
28	0.001	1.759	0.066	n/a
29	0.010	8.275	0.116	PASS
30	0.001	1.833	0.061	n/a
31	0.009	8.081	0.109	PASS
32	0.001	1.812	0.058	n/a
33	0.008	7.939	0.102	PASS
34	0.001	2.007	0.054	n/a
35	0.007	7.332	0.096	PASS
36	0.001	1.922	0.051	n/a
37	0.007	7.127	0.091	PASS
38	0.001	1.966	0.048	n/a
39	0.006	6.580	0.087	PASS
40	0.001	2.015	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	0.023			
2	0.003	0.164	1.620	n/a
3	0.017	0.487	3.450	PASS
4	0.002	0.269	0.645	n/a
5	0.018	1.031	1.710	PASS
6	0.002	0.373	0.450	n/a
7	0.017	1.477	1.155	PASS
8	0.002	0.501	0.345	n/a
9	0.016	2.686	0.600	PASS
10	0.002	0.671	0.276	n/a
11	0.016	3.203	0.495	PASS
12	0.002	0.740	0.230	n/a
13	0.015	4.886	0.315	PASS
14	0.002	0.877	0.197	n/a
15	0.015	6.476	0.225	PASS
16	0.002	0.969	0.173	n/a
17	0.014	7.160	0.199	PASS
18	0.002	1.035	0.153	n/a
19	0.014	7.628	0.178	PASS
20	0.002	1.170	0.138	n/a
21	0.013	7.886	0.161	PASS
22	0.002	1.211	0.125	n/a
23	0.012	8.302	0.147	PASS
24	0.001	1.299	0.115	n/a
25	0.011	8.373	0.135	PASS
26	0.001	1.300	0.106	n/a
27	0.011	8.463	0.125	PASS
28	0.001	1.379	0.099	n/a
29	0.010	8.370	0.116	PASS
30	0.001	1.432	0.092	n/a
31	0.009	8.162	0.109	PASS
32	0.001	1.379	0.086	n/a
33	0.008	8.029	0.102	PASS
34	0.001	1.554	0.081	n/a
35	0.007	7.434	0.096	PASS
36	0.001	1.479	0.077	n/a
37	0.007	7.242	0.091	PASS
38	0.001	1.500	0.073	n/a
39	0.006	6.720	0.087	PASS
40	0.001	1.494	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

■ DC Mode

Maximum Flicker results

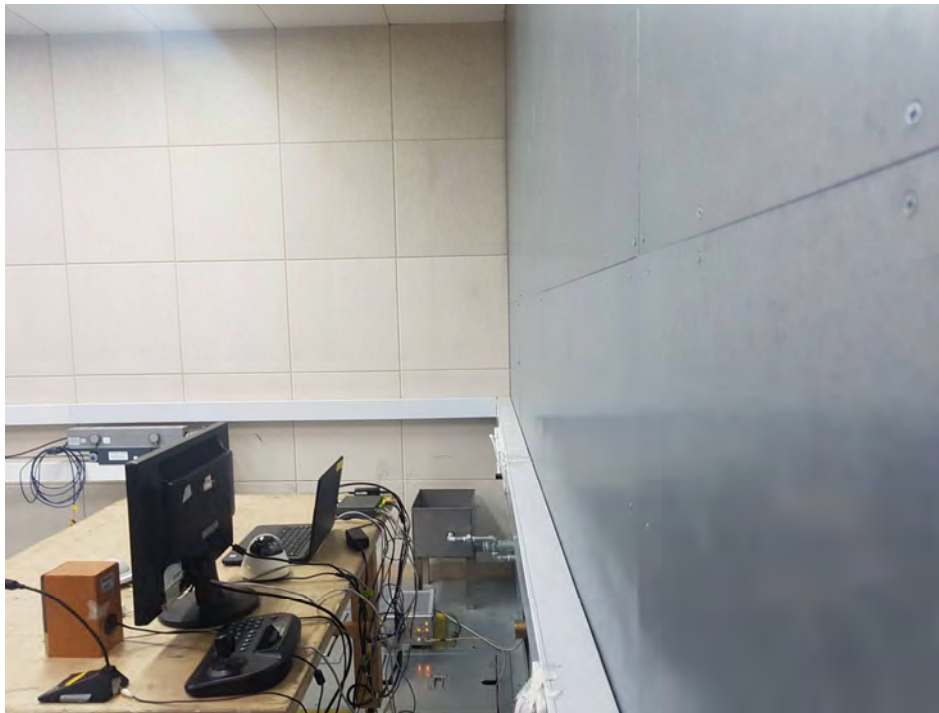
Flicker Measurements					
	Plt	Max Pst	Max Dc	Max Dmax	Max Tmax
Line 1:	0.028	0.028	0	< 0.2	0
Limits:	0.65	1	3.3	4	0.5
Results:	PASS	PASS	PASS	PASS	PASS

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Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports

■ DC Mode



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Conducted Emissions at Telecommunication Ports

■ DC Mode



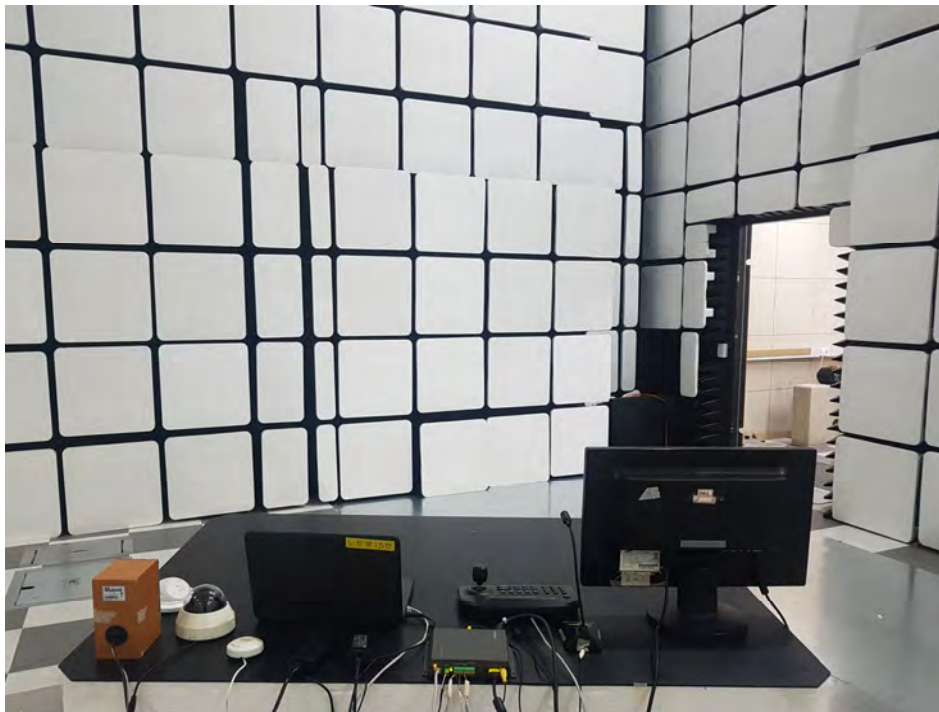
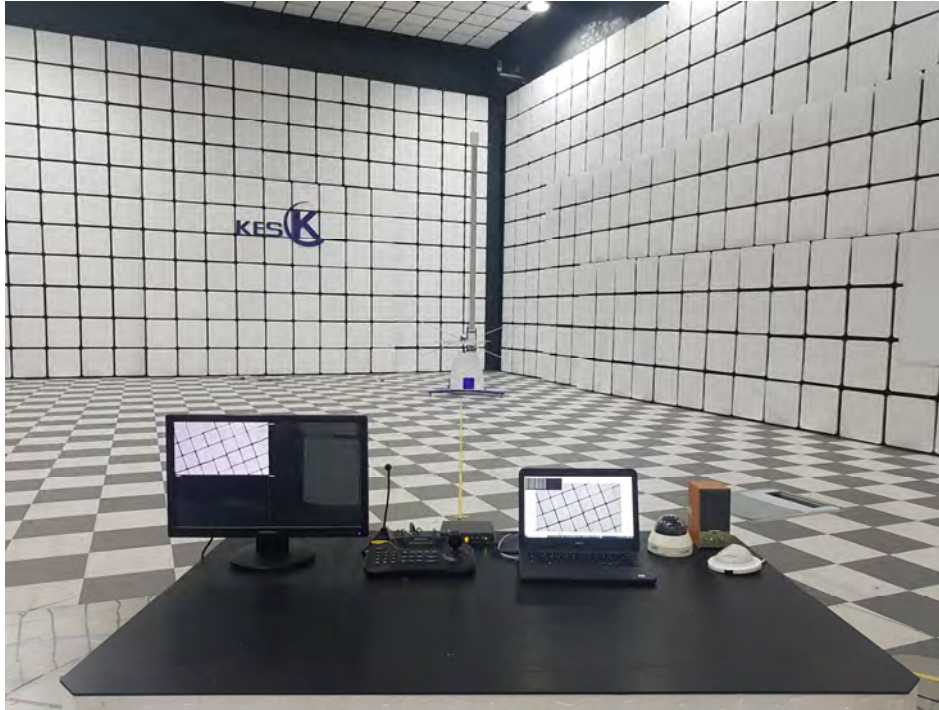
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■ PoE Mode

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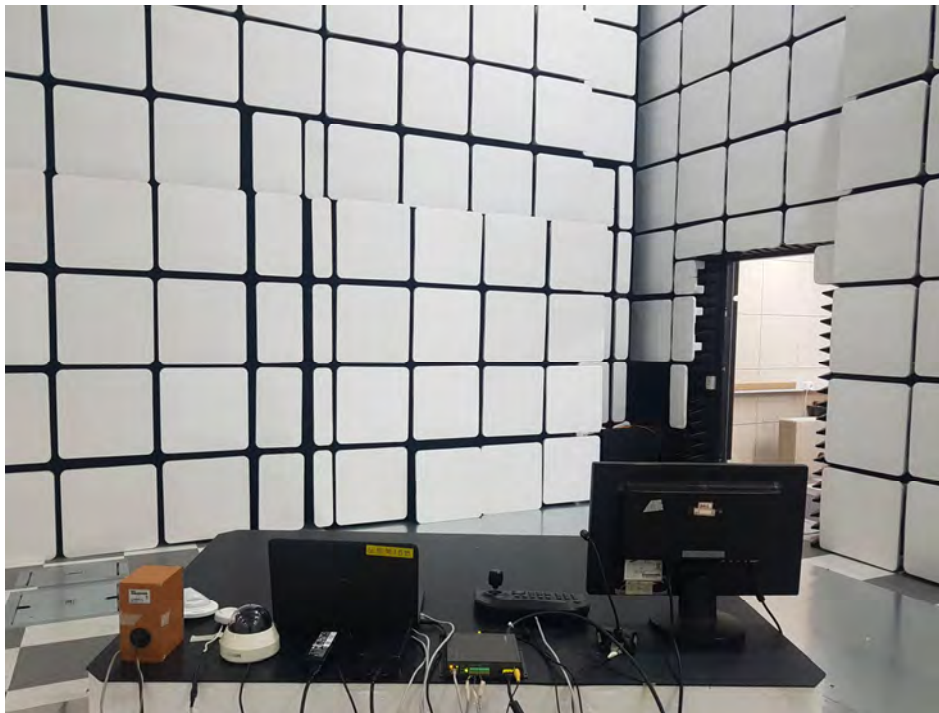
Radiated Electric Field Emissions(Below 1 GHz)

■ DC Mode



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■ PoE Mode



Radiated Electric Field Emissions(Above 1 GHz)

■ DC Mode



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■ PoE Mode



Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ DC Mode



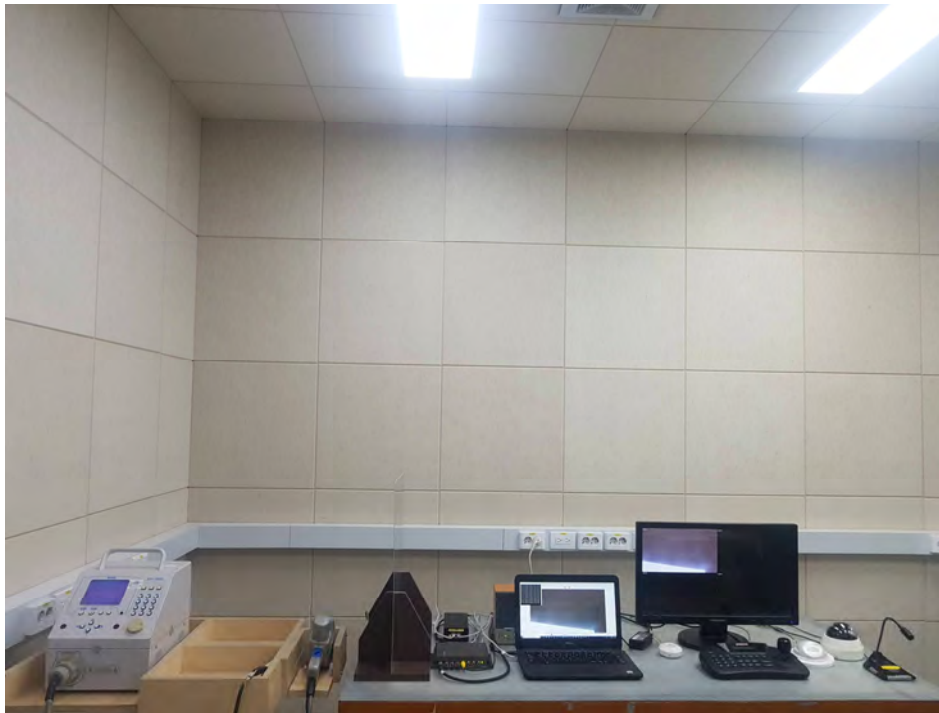
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Electrostatic Discharge

■ DC Mode



■ PoE Mode



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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

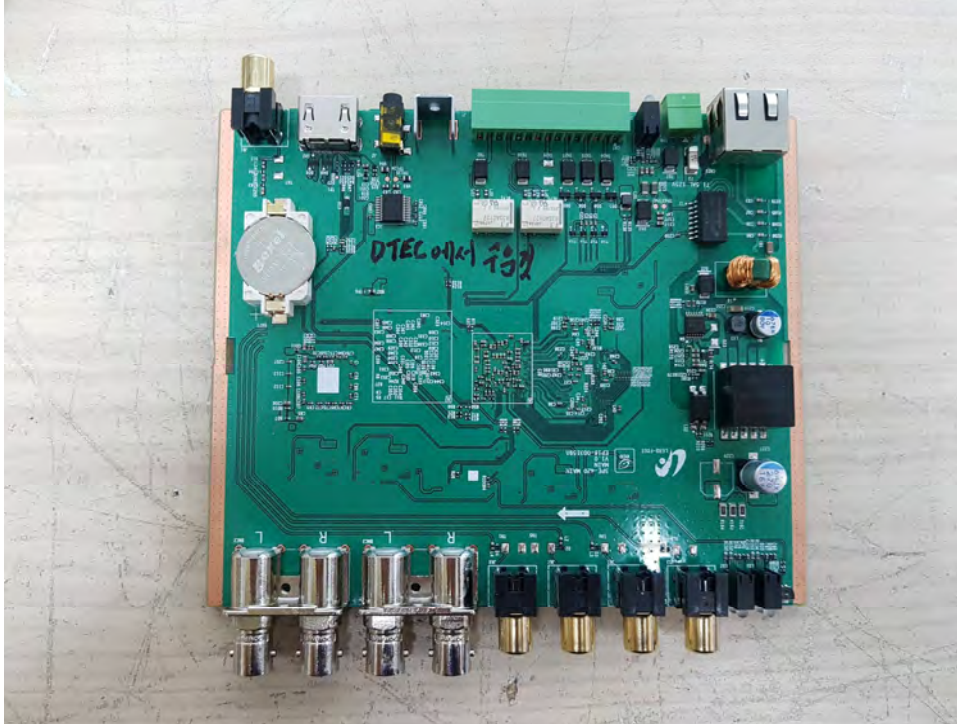
(Internal View)



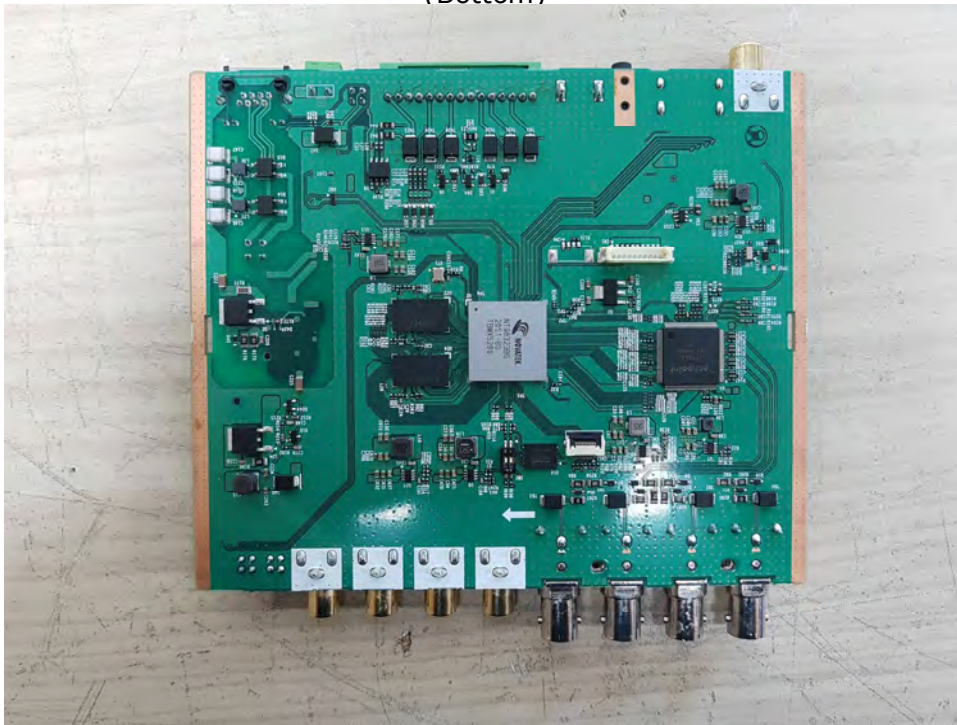
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EUT Internal View – Board

(Top)

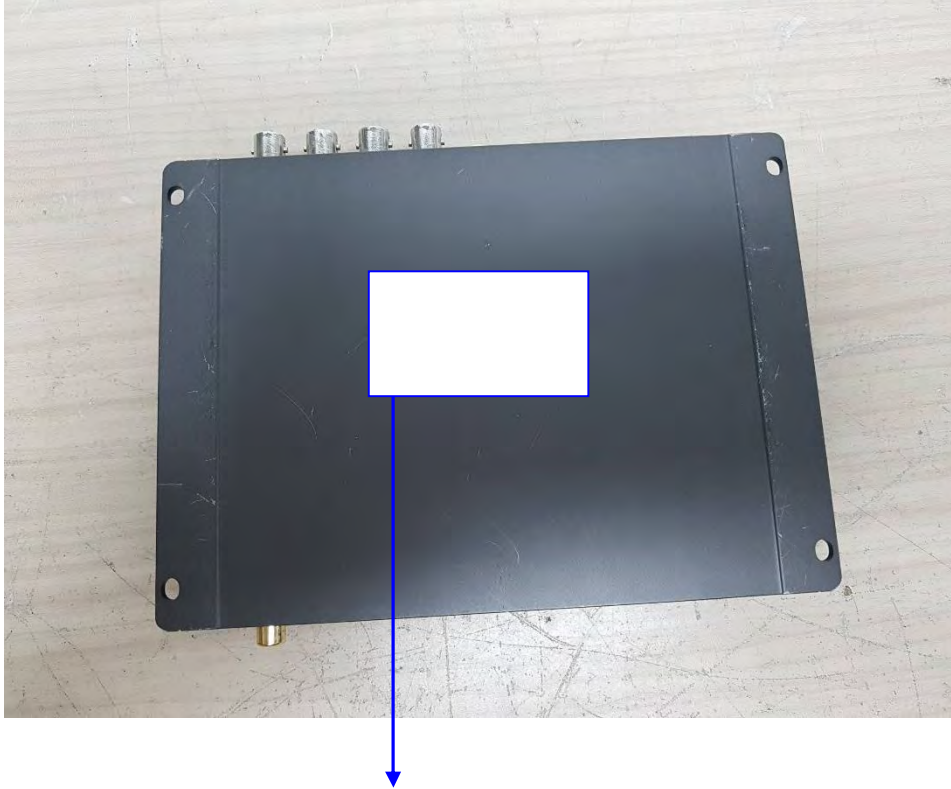


(Bottom)



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Label and Location



NETWORK VIDEO ENCODER

Model No : SPE-420

Manufacturer : HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.

Made in Vietnam

