



EMC TEST REPORT For CE

Test Report No. : KES-EM-21T0343
Date of Issue : May. 06, 2021
Product name : DVR
Model/Type No. : HRX-1632
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 : Apr. 09, 2021
Test date : Apr. 22, 2021 ~ Apr. 26, 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
May. 06, 2021	KES-EM-21T0343	Issued

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1.0 General Product Description

Main Specifications of EUT are:

Analog camera	Inputs	16CH(1Vp-p 75ohm, BNC)
	Signal Type	AHD(4MP, 1080p, 720p) HDTVI(4MP, 1080p, 720p) HDCVI(4MP, 1080p, 720p) CVBS(NTSC/PAL)
Network camera	Inputs	Max 16CH
	Resolution	8MP ~ CIF
	Protocols	SUNAPI(Wisenet), ONVIF
Live	Local Display	1x HDMI, 1x VGA (Dual monitor)
	Multi Screen Display	[Local monitor] 1, 2H, 2V, 3V, 4, 6(1+5), 8(1+7), 9, 13, 16, 20(5x4) / Auto sequence, [Web] 1 / 4 / 9 / sequence
	Resolution	[Analog Camera(NTSC/PAL)] - 4MP(30/25fps), 2MP(30/25fps), 1MP(30/25fps), 960H(or 720H)(30/25fps) * per CH [Network Camera] - Typ. 2MP(480fps)
Performance		
Operating System	Embedded	Linux
Record	Compression	H.265, H.264, MJPEG
	Record Rate(Analog)	Analog Camera(NTSC/PAL) (Main Stream) 4M 7/7fps CH, 2M 15/15fps/CH, 720p 30/25fps/CH, under 960H 30/25fps/CH (Sub Stream) 720p or higher : 640x360 full fps/CH, SD signal : upto SD full fps/CH * The maximum recording frame rate depends on the frame rate of the input camera.
	Recording Bandwidth	Max. 70Mbps
	Resolution	4MP ~ CIF
Event	Mode	Manual, Schedule (Continuous/Event), Event(Pre/Post), Dual Track
	Event Trigger	Alarm Input Analog Camera : Video Loss, Motion Detection, Tampering Network Camera : Camera Event (Sensor, MD, Video analytics), VA event (Tampering, Enter / Exit, Passing, Virtual-line, (Dis)Appear, Face Detection, Audio detection), Defocus camera event
	Event Action	E-mail, PTZ preset, Alarm out, Buzzer, Monitor out
Search & Play	Playback Bandwidth	Max. 32Mbps (16CH simultaneously)
	Resolution	4MP ~ CIF
	Playback Control	Fast Forward/Backward (x2, x4, x8, x16, x32, x64, x128, x256) Slow Forward/Backward (x1/2, x1/4, x1/8) ※Move one step up/down
Storage	Supported HDD	Up to 6TB
	HDD Slot	SATA 4ea(Max. 24TB)
	External	None
	RAID	None
Backup	File backup	BU, EXE(Include Player), AVI(Webviewer only)
Network		
Protocol		TCP/IP, UDP/IP, RTP (UDP), RTP (TCP), RTSP, NTP, HTTP, DHCP (Server, Client), PPPoE, SMTP, ICMP, IGMP, ARP, DNS, DDNS, uPnP, HTTPS, SNMP, ONVIF (Profile-S), SUNAPI(Server, Client)
DDNS		Wisenet DDNS
Transmission speed		Analog Camera (Main Stream) 4M 7/7fps, 2M 15/15fps, 720p 30/25fps, 960H/640H 30/25fps (NTSC/PAL per CH) (Sub Stream) 720p or higher : 640x360 full fps/CH, SD signal : upto SD full fps/CH
Audio	Input/Output	16 Line in (Built in 4 Line, Option : Audio Extension Cable) / 1Line line out
	Compression	G.711 (N/W Cam G.711, 726)
	Audio Communication	2-Way
Max Remote Users		Search(3), Live Unicast(10), Multicast(20)
Security		IP address filtering, User access log, 802.1x Authentication, Encryption (ID/PW, Recording, Transmission, Backup) Device Certificate(Hanwha Techwin Root CA)
Web viewer	Supported OS	Window 10, Mac OS X (10.15 or above)
	Supported browser	Google Chrome 88 or above, MS Edge 88 or above, Safari 13 or above *support Plug-in free Web
Viewer Software		SSM, Webviewer, SmartViewer, Wisenet Mobile Viewer Support SDK/CGI(SUNAPI) for integration to 3rd party VMS
Functions		
Camera Setup	Register	Auto, Manual
	Item	None
PTZ	Control	Via GUI, Webviewer, SSM, SmartViewer, Wisenet Mobile Viewer, System Controller
	Preset	300 presets
Smart phone	Support Model	iOS, Android
	Protocol Support	RTP, RTSP, HTTP, CGI(SUNAPI)
	Control	Live(16ch) : Multi-Profile Support Playback(4Ch Multi Playback, Max 2MP) Event push
	Max. Remote Users	Search(3), Live Unicast(10)
Easy configuration		Setup Wizard (Language Date/Time, Password, Network, Auto Camera Configuration), P2P (QR code)
Coaxial Control		CVBS(Pelco-C)/AHD/CVI/TVI

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Interface		
Front	Indicator	LED(Status indicator) : Power(1), HDD Action(1), Alarm(1), Record(1), Network(1), Backup(1)
Reset		Switch(1EA)
HDD Key Lock		None
HDMI		1EA
VGA		1EA
BNC		16CH In / 1CH Out(Spot Output)
Audio		Out(1EA, RCA, Line)
Ethernet		RJ-45(10/100/1000BASE-T)
Alarm		In 16EA, Out 4EA - Relay Out1(NO/NC/COM) - Relay Out2~4(NO/COM)
USB		2EA(Front USB2.0, Rear USB 3.0)
Serial(Protocols)		RS-485/422 (Samsung-T/Pelco-D/Pelco-p) * for PTZ
Power inlet		1EA AC
System		
Log	Log List	Max. 20,000 (System Log, Event Log each)
Power Management	Shutdown Delay	None
	Startup Delay	None
Language		English, French, German, Italian, Spanish, Russian, Turkish, Polish, Dutch, Swedish, Czech, Portuguese, Danish, Rumanian, Serbian, Croatian, Hungarian, Greek, Norwegian, Finnish, Korean, Chinese, Japanese, Thai
Environmental		
Operating Temperature		0°C to +40°C(+32°F to +104°F)
Operating Humidity		20% ~ 85% RH
Certification		UL, CE, FCC, KC
Electrical		
Power Input		100~240 VAC±10%, 50/60 Hz
Power Consumption		Max. 120W (6T HDD 4ea)
PoE Budget		None
Mechanical		
Color / Material		Black / Metal
Dimension (WxHxD)		440 x 88 x 384.8mm(17.32" x 3.46" x 15.15")
Weight		Approx. 5.4Kg (4TB HDD 1ea)

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1.1 Test Voltage & Frequency

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

☒ AC 230 V, 50 Hz

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
DVR	HRX-1632	-	HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.	EUT
mouse	MOKJUO	-	Primax Electronics Ltd.	-
SMPS	FSAK250J	-	Channel Well Technology (Guangzhou) Co., Ltd.	-
HDD	WD40PURX- 64N96Y0	-	Western Digital	4 TB

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1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Adaptor	2ACB022F	-	Channel Well Technology(Guangzhou) Co., Ltd.	-
Camera	HCD-7030RA		HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.	
Notebook	LG15N54	410NZGK015231	LG	-
Notebook Adaptor	ADP-90WH B	84ZW19F1663	DELTA ELECTRONICS(JIANGSU) LTD.	-
Alarm1	-	-	-	-
Alarm2	-	-	-	-
Monitor1	SMT-2233	ZC6U67VH50019 4D	Weihai Daewoo Electronics Co., Ltd.	-
Monitor2	23MA53D	303KKMH9Z019	LG	-
Monitor2 Adaptor	PSAB-L205A	EAY62850201	LG Innotek Yantai Co. Ltd.	-
Monitor3	LT23C350	009MHYCH10638 8P	SAMSUNG	-
Monitor3 Adaptor	A4514_DDY	CN07BN44-00593BD07G690 189	SAMSUNG ELECTRONIC JAPAN Co., Ltd.	-
Smartphone	LG-SU760	108KPQJ0186212	LG	-
Speaker	E5	-	PreSonus®	-
Controller	SPC-1010	C50E67WG10100 F	SamSung Techwin Co.,Ltd.	-
Controller Adaptor	RS-AB1000	-	Dongguan Jinhuasheng Power Technology Co.,Ltd.	-
USB Memory	-	-	Sandisk	32 GB

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1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
DVR (EUT)	RJ-45	Notebook	RJ-45	3.5	U
	Alarm OUT	Alarm1	Alarm IN	3.0	U
	Alarm IN	Alarm2	Alarm OUT	3.0	U
	2 PIN	Controller	2 PIN	3.0	U
	Audio OUT	Speaker	Audio OUT	1.4	U
	Audio IN	Smartphone	Audio IN	1.6	U
	USB	USB Memory	USB	-	-
	BNC	Camera	BNC	3.0	S
	BNC	Monitor1	BNC	3.0	S
	HDMI	Monitor2	HDMI	1.6	S
	D-sub	Monitor3	D-sub	1.5	S
	USB	mouse (EUT)	USB	1.8	U
	External Ground	Ground	External Ground	2.0	U

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

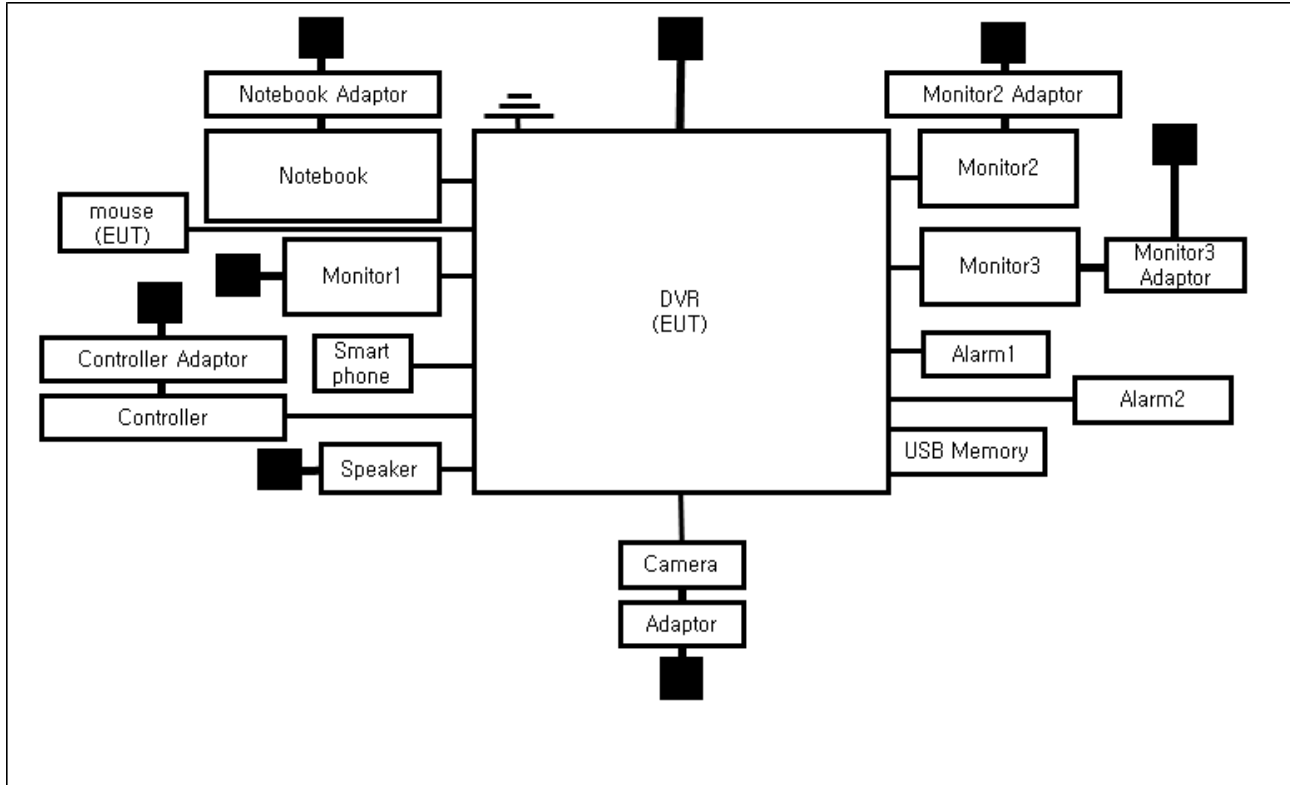
Test Mode	operating
Operation	the test was conducted while checking the camera video output from the laptop and making sure that they operate normally while performing a ping test.

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



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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 55032:2012/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

☒ **EMC – Regulations 2016/1091**

☒ BS EN 55032:2012/A1:2013

☒ 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 C63.4-2017 | ☐ Class A | ☐ Class B |
| ☐ IC Regulation ICES-003 Issue 7 | | |
| ☐ CAN/CSA CISPR 32:17 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2017 | ☐ Class A | ☐ Class B |
| ☐ RE– Directive 2014/53/EU | | |
| ☐ EN 301 489-1 V2.2.3 | | |
| ☐ 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

Apr. 22, 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: (24,5 ± 0,1) °C

Relative Humidity: (45,7 ± 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

Apr. 22, 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	12, 29, 2021

Test Conditions

Temperature: (24,5 ± 0,1) °C
Relative Humidity: (45,7 ± 0,1) % 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

Apr. 22, 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: (24,3 ± 0,1) °C
Relative Humidity: (45,9 ± 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

Apr. 23, 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, 05, 2021
☒	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: (24,8 ± 0,1) °C

Relative Humidity: (45,9 ± 0,2) % R.H.

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.5 Harmonic Current Emissions

Test Date

Apr. 22, 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: (24,1 ± 0,1) °C
Relative Humidity: (45,8 ± 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

Apr. 22, 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: (24,1 ± 0,2) °C
Relative Humidity: (45,8 ± 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 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

Apr. 26, 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: (23,3 ± 0,1) °C
Relative Humidity: (45,3 ± 0,2) % R.H.
Atmospheric Pressure: (100,2 ± 0,0) kPa

Test Specifications

Discharge Factor: ≥ 1 s

Discharge Impedance: 330 ohm / 150 pF

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

Polarity: Positive and Negative

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

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

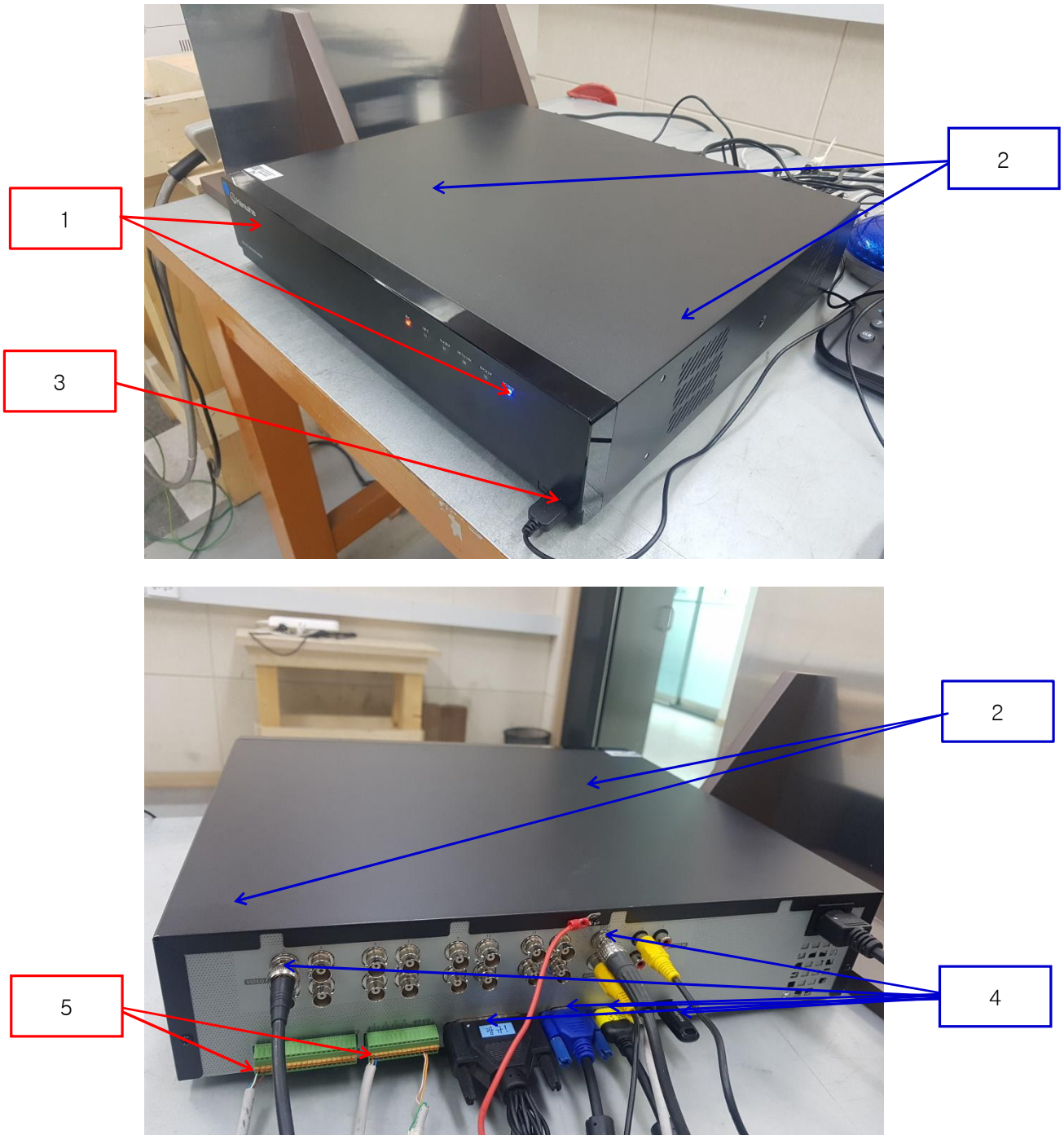
Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

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Location of Discharge:

Air
Contact



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Test Data

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 1	Air Discharge	Complied	-
2	Enclosure 2	Contact Discharge	Complied	-
3	USB	Air Discharge	Complied	-
4	Around the port 1	Contact Discharge	Complied	-
5	Around the port 2	Air Discharge	Complied	-
6	Mouse Enclosure	Air Discharge	Complied	-

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

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

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

Apr. 23, 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	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, 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: (24,8 ± 0,2) °C
Relative Humidity: (45,9 ± 0,3) % R.H.
Atmospheric Pressure: (100,2 ± 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

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

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria



3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

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

Test Conditions

Temperature: (23,3 ± 0,2) °C
Relative Humidity: (45,3 ± 0,3) % R.H.
Atmospheric Pressure: (100,2 ± 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

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

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

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
RJ-45	Complied	Complied
Alarm 1	Complied	Complied
Alarm 2	Complied	Complied
BNC (Camera)	Complied	Complied
BNC (Monitor)	Complied	Complied
2 PIN (Controller)	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

Test Date

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

Test Conditions

Temperature: (23,3 ± 0,3) °C
Relative Humidity: (45,3 ± 0,4) % R.H.
Atmospheric Pressure: (100,2 ± 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

☒ Line to Line – Differential Mode

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

☒ Line to Earth – Common Mode

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

Signal Lines

☒ Line to Earth – Common Mode

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

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria



3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Apr. 22, 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	5.3.11	-
☒	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	11, 25, 2021
☒	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 25, 2021
☒	CDN	CDN M016	TESEQ	43694	11, 25, 2021
☒	CDN	CDN M016	TESEQ	43697	11, 25, 2021
☒	CDN	CDN T8RJ45	EM TEST	0909-09	08, 05, 2021
☒	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 26, 2021

Test Conditions

Temperature: (24,5 ± 0,3) °C
Relative Humidity: (45,7 ± 0,4) % R.H.
Atmospheric Pressure: (100,3 ± 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

☒ Input a.c. power ports

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

☐ Input d.c. power ports

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

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45	CDN	Complied
Alarm 1	Clamp	Complied
Alarm 2	Clamp	Complied
BNC (Camera)	Clamp	Complied
BNC (Monitor)	Clamp	Complied
2 PIN (Controller)	Clamp	Complied

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

Observations:
Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria



3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004

Test Date

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

Test Conditions

Temperature: (23,3 ± 0,2) °C
Relative Humidity: (45,3 ± 0,3) % R.H.
Atmospheric Pressure: (100,2 ± 0,0) kPa



Test Specifications & Observations/Remarks

- Voltage Dips and Short Interruptions

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
☒ 20 % dip	☒ 250 / 5 000	<u>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.



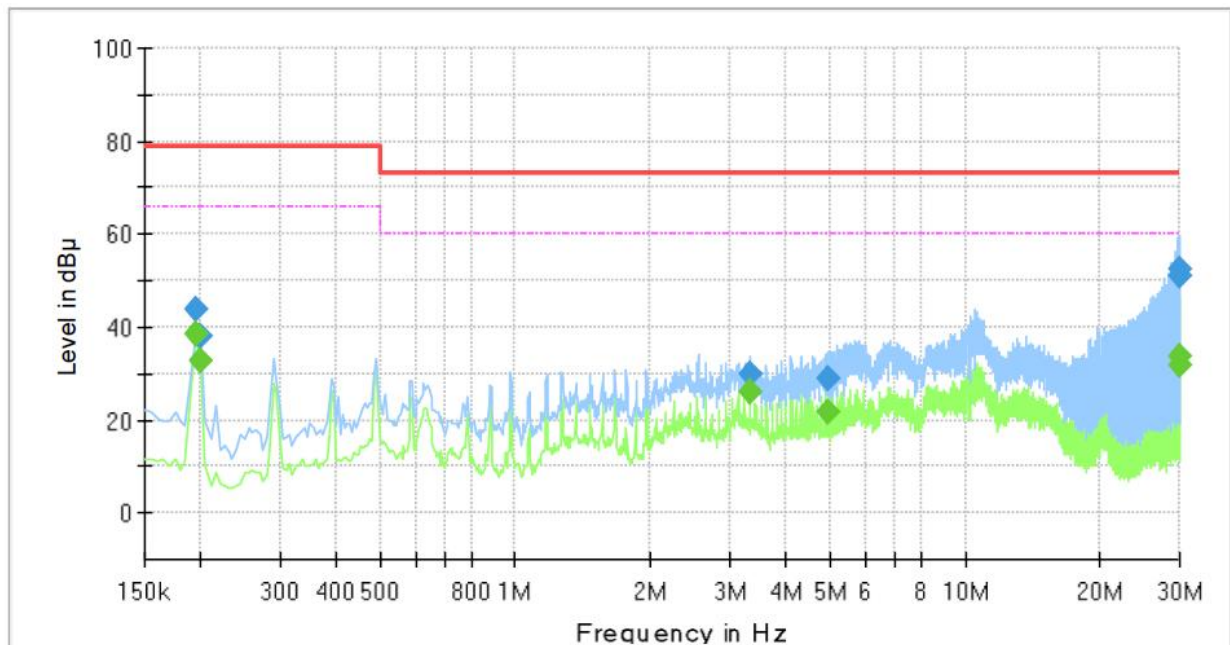
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description: Conducted Emission
Model No.: HRX-1632
Phase: L1
Mode:
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	---	38.74	66.00	27.26	1000.0	9.000	L1	19.4
0.195000	43.79	---	79.00	35.21	1000.0	9.000	L1	19.4
0.200000	---	32.86	66.00	33.14	1000.0	9.000	L1	19.4
0.200000	38.09	---	79.00	40.91	1000.0	9.000	L1	19.4
3.325000	---	25.94	60.00	34.06	1000.0	9.000	L1	20.1
3.325000	29.95	---	73.00	43.05	1000.0	9.000	L1	20.1
4.980000	---	21.67	60.00	38.33	1000.0	9.000	L1	19.7
4.980000	28.83	---	73.00	44.17	1000.0	9.000	L1	19.7
29.870000	---	31.91	60.00	28.09	1000.0	9.000	L1	20.4
29.870000	51.11	---	73.00	21.89	1000.0	9.000	L1	20.4
29.930000	---	33.76	60.00	26.24	1000.0	9.000	L1	20.4
29.930000	52.60	---	73.00	20.40	1000.0	9.000	L1	20.4

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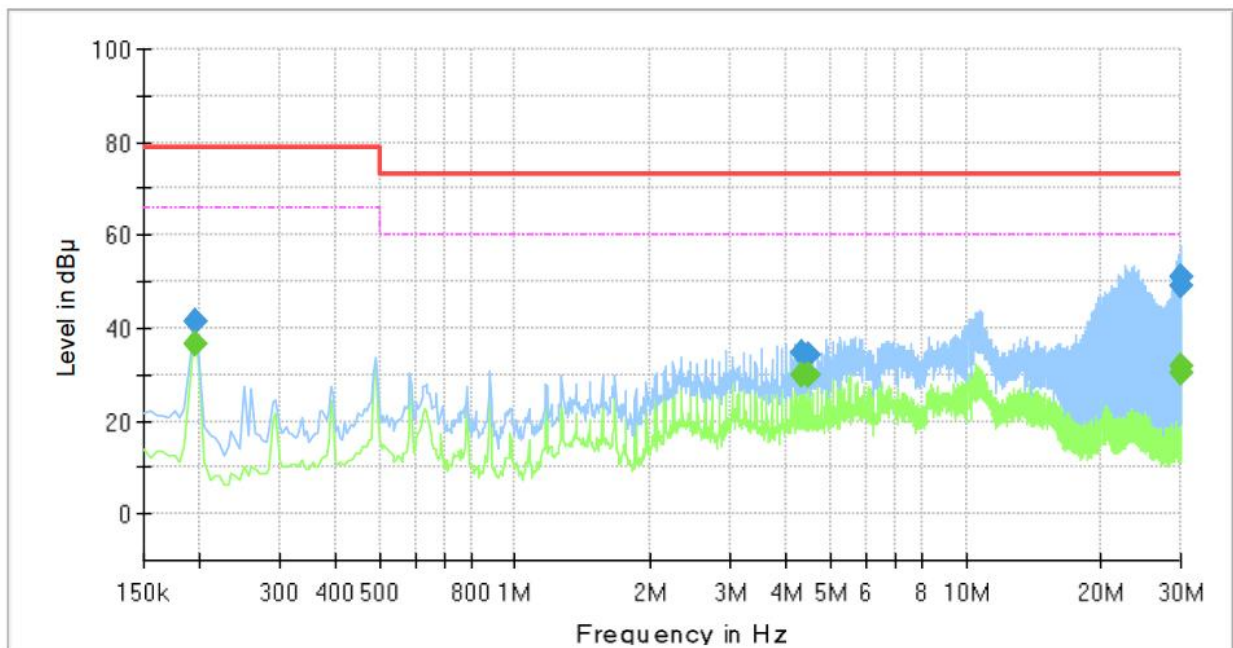
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[NEUTRAL]

Common Information

Test Description: Conducted Emission
Model No.: HRX-1632
Phase: N
Mode:
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	---	36.45	66.00	29.55	1000.0	9.000	N	19.4
0.195000	41.59	---	79.00	37.41	1000.0	9.000	N	19.4
4.300000	---	29.66	60.00	30.34	1000.0	9.000	N	19.8
4.300000	34.59	---	73.00	38.41	1000.0	9.000	N	19.8
4.495000	---	29.80	60.00	30.20	1000.0	9.000	N	19.8
4.495000	34.00	---	73.00	39.00	1000.0	9.000	N	19.8
29.895000	---	31.95	60.00	28.05	1000.0	9.000	N	20.4
29.895000	50.81	---	73.00	22.19	1000.0	9.000	N	20.4
29.965000	---	30.40	60.00	29.60	1000.0	9.000	N	20.4
29.965000	49.14	---	73.00	23.86	1000.0	9.000	N	20.4

◆ 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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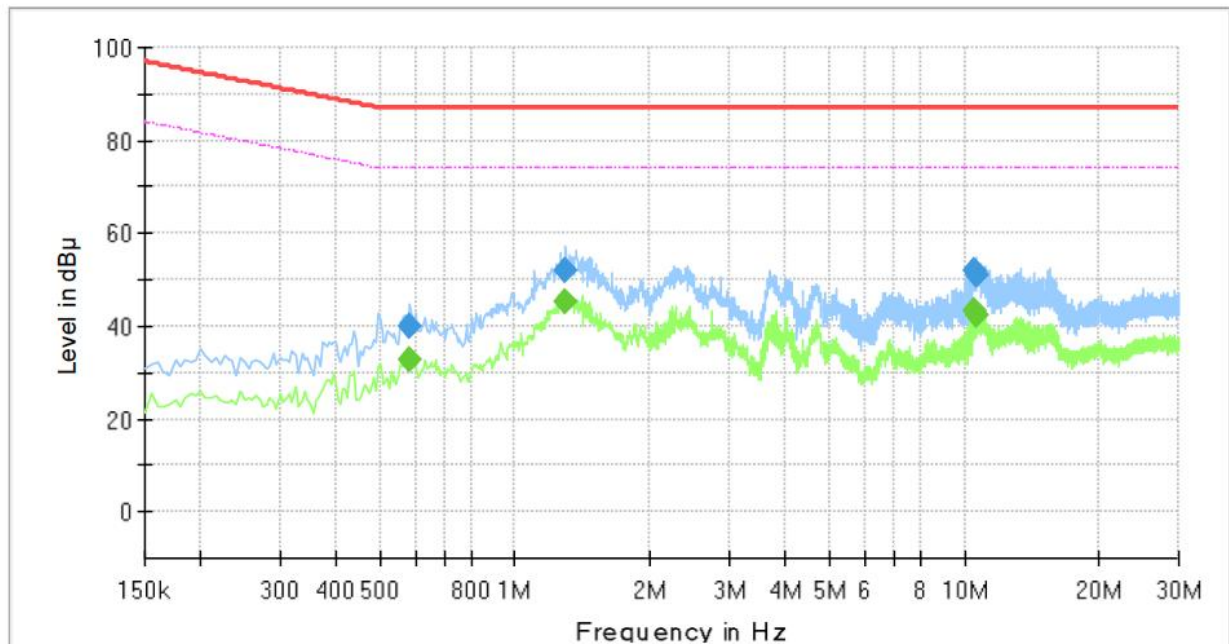
3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
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Report No.:
KES-EM-21T0343
Page (40) of (62)

Conducted Emissions at Telecommunication Ports [1 000 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: HRX-1632
Mode :
Speed : 1 000 Mbps
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.585000	---	32.80	74.00	41.20	1000.0	9.000	Single Line	19.8
0.585000	39.84	---	87.00	47.16	1000.0	9.000	Single Line	19.8
1.295000	---	45.31	74.00	28.69	1000.0	9.000	Single Line	20.1
1.295000	52.18	---	87.00	34.82	1000.0	9.000	Single Line	20.1
10.540000	---	43.24	74.00	30.76	1000.0	9.000	Single Line	19.7
10.540000	51.85	---	87.00	35.15	1000.0	9.000	Single Line	19.7
10.670000	---	42.37	74.00	31.63	1000.0	9.000	Single Line	19.7
10.670000	51.09	---	87.00	35.91	1000.0	9.000	Single Line	19.7

◆ 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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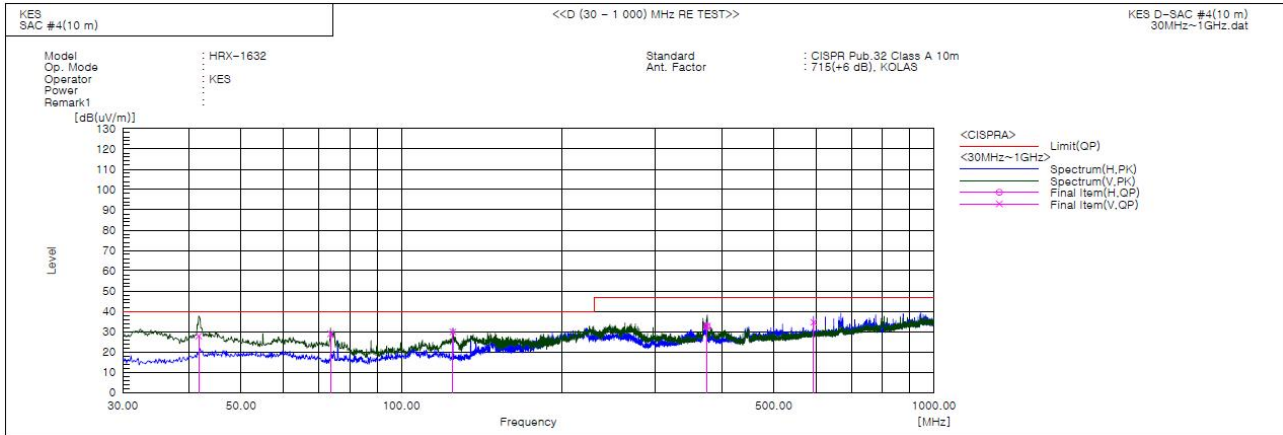


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Radiated Electric Field Emissions(Below 1 GHz)



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	41.640	V	49.9	-22.0	27.9	40.0	12.1	316.0	319.0	
2	73.650	V	55.4	-26.4	29.0	40.0	11.0	162.0	317.0	
3	124.939	V	54.7	-24.8	29.9	40.0	10.1	111.0	204.0	
4	374.956	H	47.3	-14.8	32.5	47.0	14.5	142.0	153.0	
5	375.078	V	47.6	-14.8	32.8	47.0	14.2	100.0	174.0	
6	594.055	V	43.3	-8.6	34.7	47.0	12.3	400.0	170.0	

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

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

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

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

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

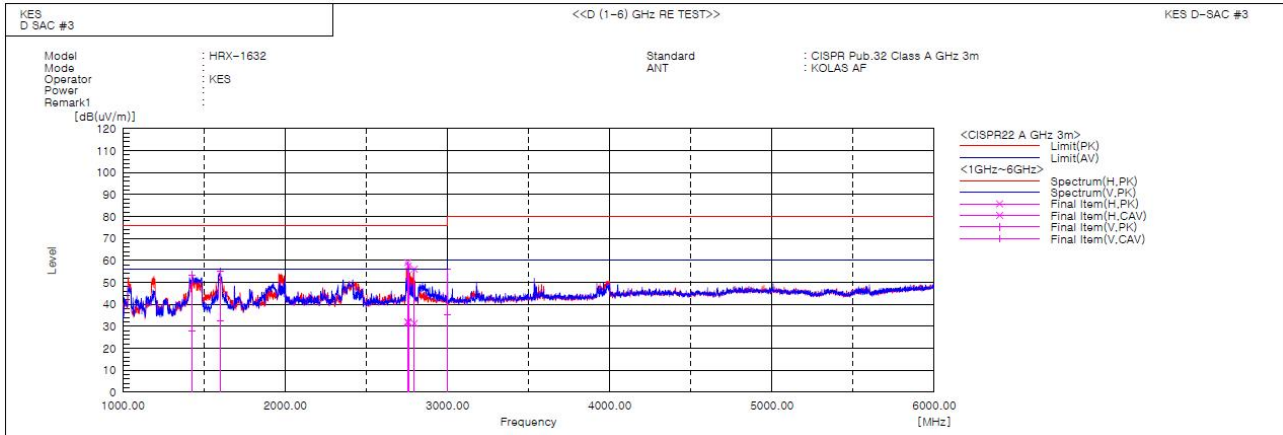


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Radiated Electric Field Emissions(Above 1 GHz)



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	1427.131	V	60.1	34.4	-6.7	53.4	27.7	76.0	56.0	22.6	28.3	100.0	2.9	
2	1599.539	V	60.1	37.7	-5.2	54.9	32.5	76.0	56.0	21.1	23.5	100.0	305.5	
3	2755.300	H	57.0	29.9	2.1	59.1	32.0	76.0	56.0	16.9	24.0	100.0	313.9	
4	2759.278	H	55.5	29.6	2.1	57.6	31.7	76.0	56.0	18.4	24.3	100.0	312.4	
5	2795.329	H	53.6	28.9	2.4	56.0	31.3	76.0	56.0	20.0	24.7	100.0	314.4	
6	2999.080	V	54.4	33.6	1.8	56.2	35.4	76.0	56.0	19.8	20.6	100.0	157.5	

◆ Calculation

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

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

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

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

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Harmonic Current Emissions and Voltage Fluctuations and Flicker

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.144			
2	0.075	6.914	1.080	PASS
3	0.173	7.540	2.300	PASS
4	0.070	16.283	0.430	PASS
5	0.045	3.945	1.140	PASS
6	0.019	6.435	0.300	PASS
7	0.014	1.757	0.770	PASS
8	0.011	4.990	0.230	PASS
9	0.011	2.795	0.400	PASS
10	0.010	5.680	0.184	PASS
11	0.015	4.579	0.330	PASS
12	0.011	7.024	0.153	PASS
13	0.013	6.319	0.210	PASS
14	0.010	7.288	0.131	PASS
15	0.010	6.927	0.150	PASS
16	0.008	6.787	0.115	PASS
17	0.007	5.652	0.132	PASS
18	0.006	5.414	0.102	PASS
19	0.005	4.440	0.118	PASS
20	0.005	5.347	0.092	n/a
21	0.004	2.695	0.161	n/a
22	0.005	5.917	0.084	n/a
23	0.004	3.066	0.147	n/a
24	0.005	6.041	0.077	n/a
25	0.005	3.709	0.135	PASS
26	0.004	6.282	0.071	n/a
27	0.005	3.819	0.125	n/a
28	0.004	6.536	0.066	n/a
29	0.004	3.397	0.116	n/a
30	0.004	5.710	0.061	n/a
31	0.003	3.070	0.109	n/a
32	0.003	5.193	0.058	n/a
33	0.003	2.814	0.102	n/a
34	0.003	5.342	0.054	n/a
35	0.003	2.690	0.096	n/a
36	0.003	5.220	0.051	n/a
37	0.002	2.624	0.091	n/a
38	0.002	4.873	0.048	n/a
39	0.002	2.684	0.087	n/a
40	0.002	4.713	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	0.152			
2	0.091	5.611	1.620	PASS
3	0.180	5.228	3.450	PASS
4	0.079	12.298	0.645	PASS
5	0.049	2.877	1.710	PASS
6	0.024	5.249	0.450	PASS
7	0.016	1.419	1.155	PASS
8	0.013	3.841	0.345	PASS
9	0.013	2.200	0.600	PASS
10	0.012	4.437	0.276	PASS
11	0.017	3.355	0.495	PASS
12	0.013	5.708	0.230	PASS
13	0.015	4.621	0.315	PASS
14	0.012	5.870	0.197	PASS
15	0.012	5.126	0.225	PASS
16	0.009	5.038	0.173	PASS
17	0.008	4.129	0.199	PASS
18	0.007	4.332	0.153	PASS
19	0.006	3.468	0.178	PASS
20	0.006	4.141	0.138	PASS
21	0.005	3.263	0.161	PASS
22	0.006	4.462	0.125	PASS
23	0.006	3.762	0.147	PASS
24	0.005	4.631	0.115	PASS
25	0.006	4.355	0.135	PASS
26	0.005	4.770	0.106	PASS
27	0.005	4.245	0.125	PASS
28	0.005	4.961	0.099	n/a
29	0.004	3.692	0.116	n/a
30	0.004	4.528	0.092	n/a
31	0.004	3.501	0.109	n/a
32	0.004	4.064	0.086	n/a
33	0.003	3.180	0.102	n/a
34	0.003	4.158	0.081	n/a
35	0.003	3.269	0.096	n/a
36	0.003	3.923	0.077	n/a
37	0.003	3.218	0.091	n/a
38	0.003	3.893	0.073	n/a
39	0.003	3.068	0.087	n/a
40	0.003	3.748	0.069	n/a

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.

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Test Data - Voltage Fluctuations

Maximum Flicker results

Flicker Measurements					
	Plt	Max Pst	Max Dc	Max Dmax	Max Tmax
Line 1:	0.141	0.15	0.005	< 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



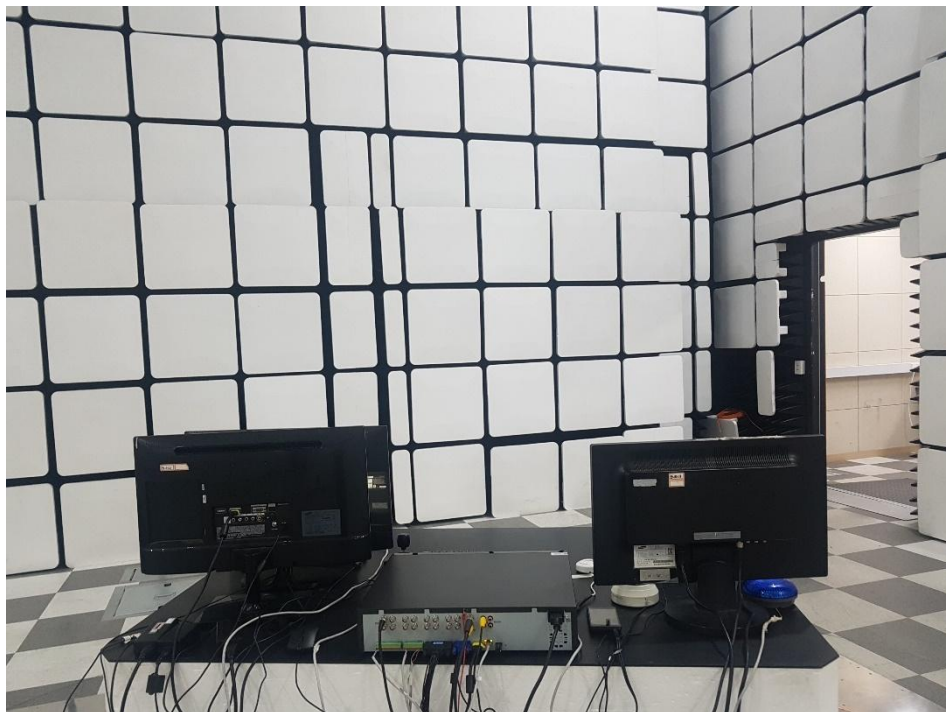
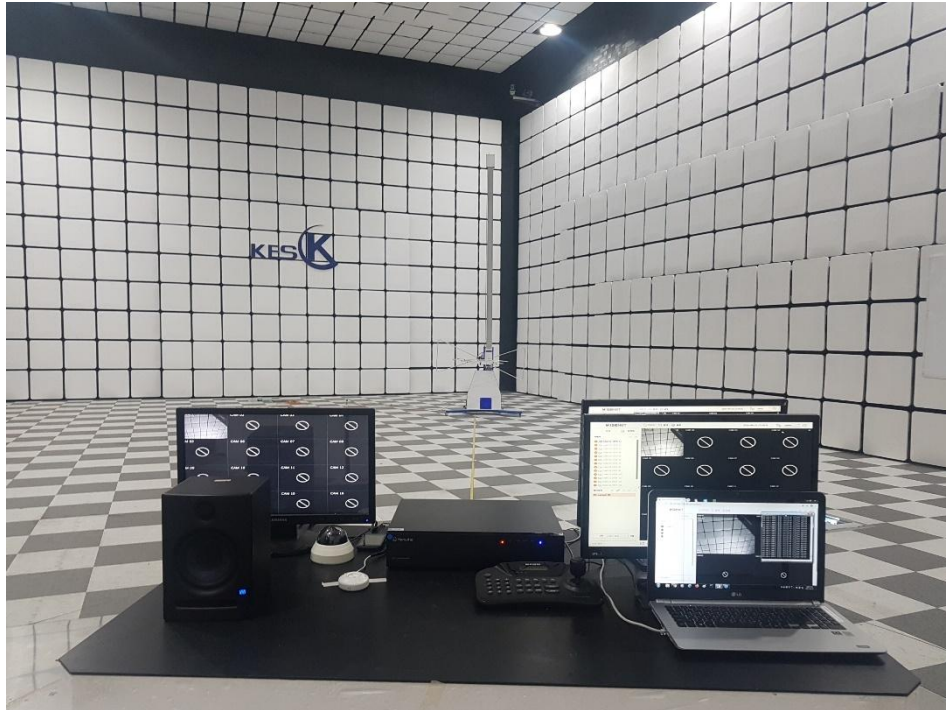
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Conducted Emissions at Telecommunication Ports



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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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Harmonic Current Emissions and Voltage Fluctuations and Flicker



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Electrostatic Discharge



Radiated Electric Field Immunity



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Electrical Fast Transients/Bursts



Surge Transients

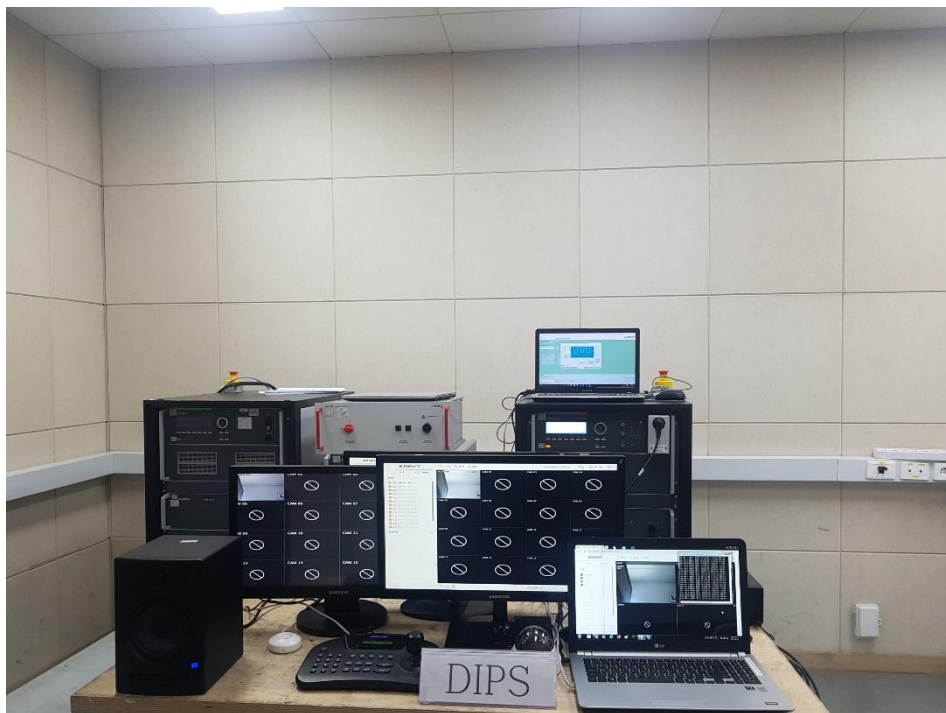


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Conducted Disturbance



Voltage Dips and Short Interruptions



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EUT External Photographs

(Top)



(Bottom)



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EUT Internal Photographs

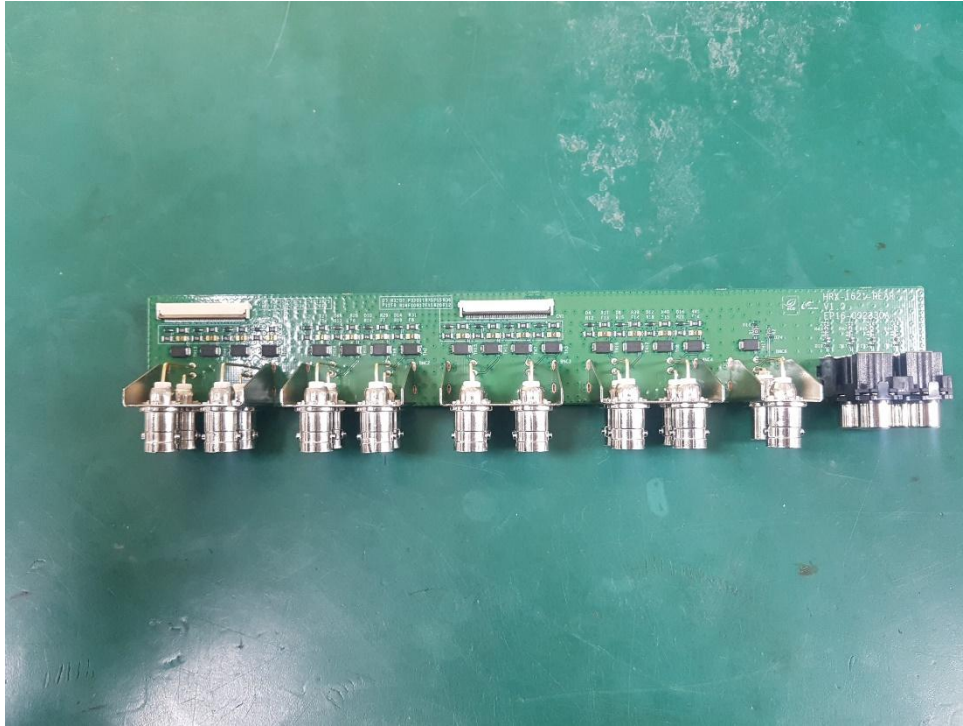
(Internal View)



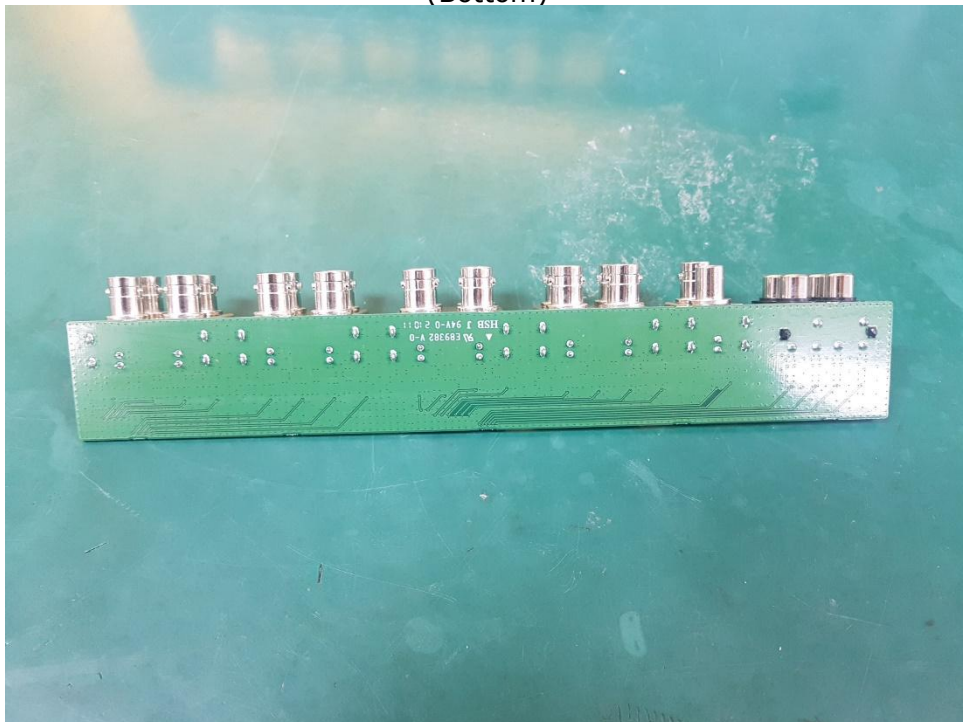
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EUT Internal View – Board 1

(Top)



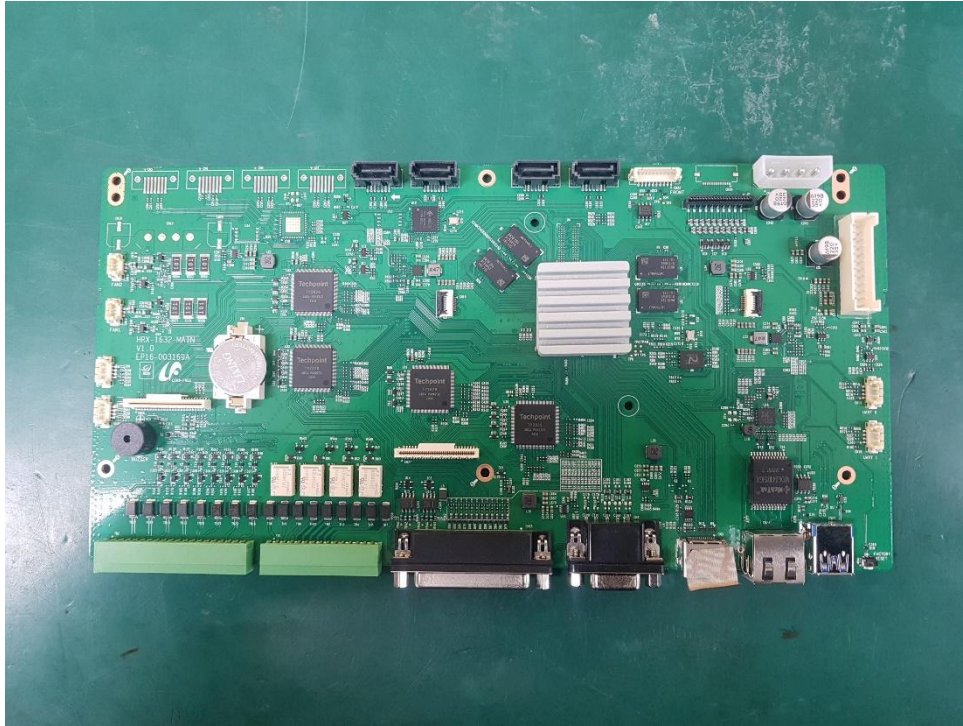
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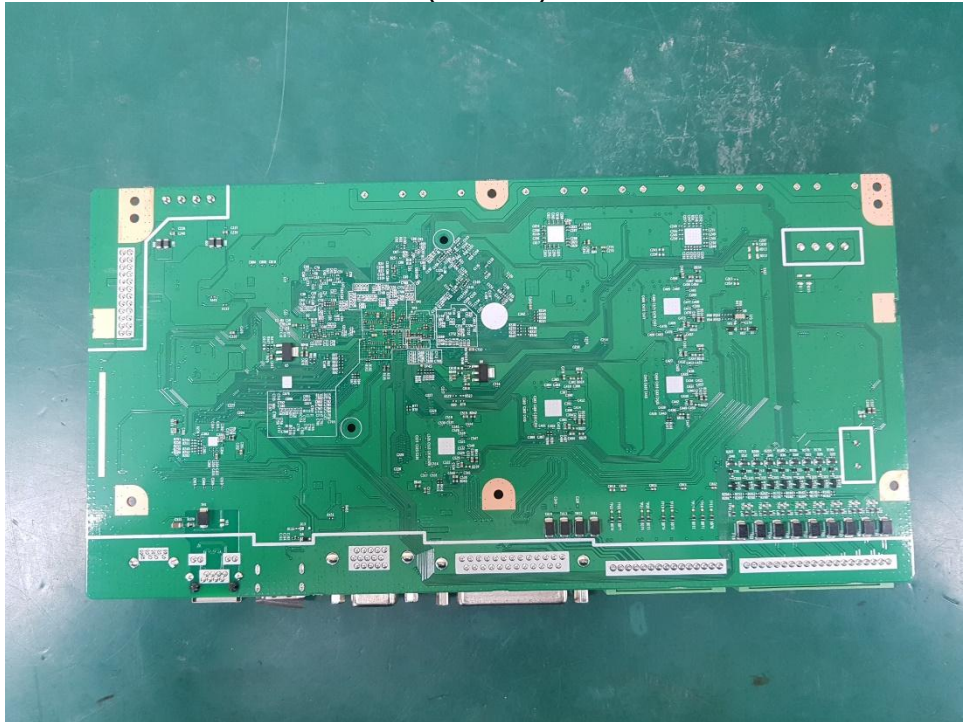
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EUT Internal View – Board 2

(Top)



(Bottom)



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EUT Internal View – Board 3

(Top)



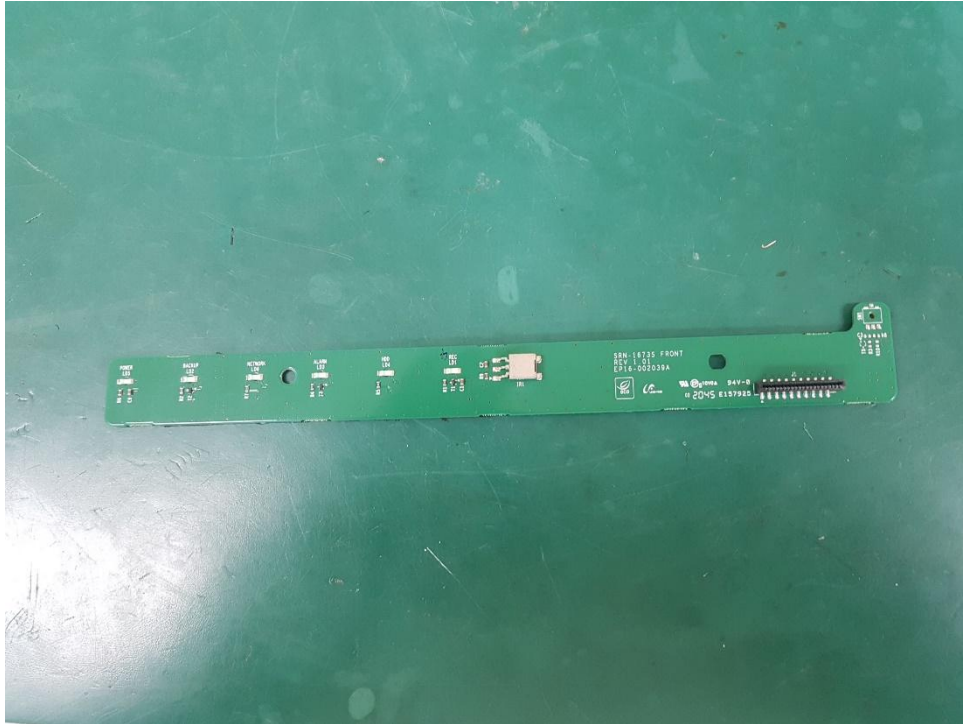
(Bottom)



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EUT Internal View – Board 4

(Top)



(Bottom)



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EUT Internal View – HDD

(Top)



(Bottom)



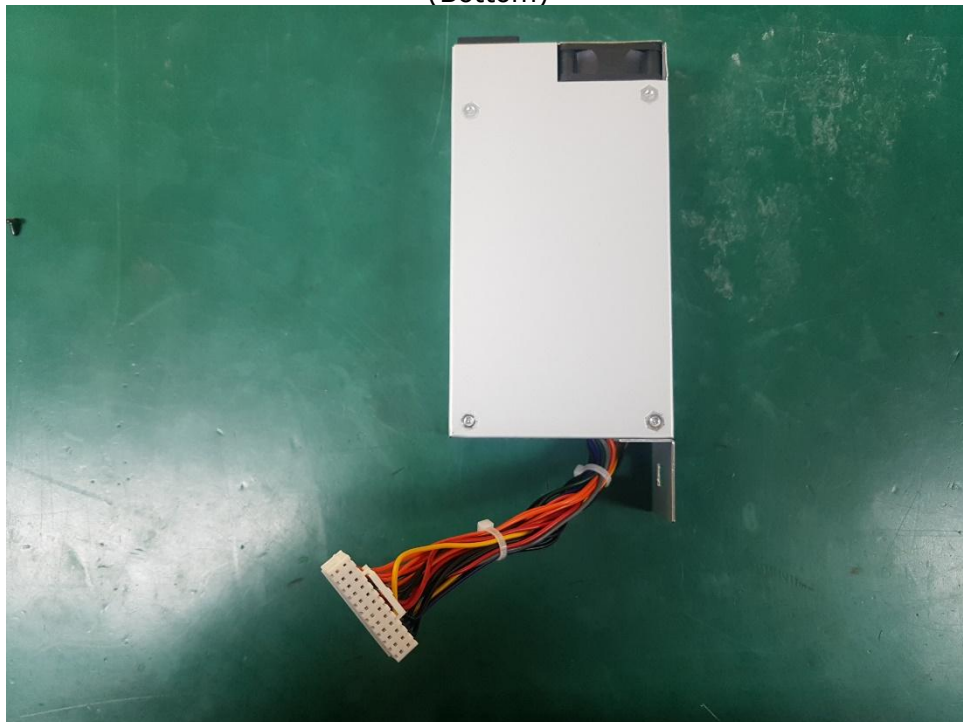
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EUT Internal View – SMPS

(Top)



(Bottom)



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Label and Location



DVR

Model No : HRX-1632

Manufacturer : HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.

Made in Vietnam

