



## EMC TEST REPORT For CE

Test Report No. : KES-EM-22T0281  
Date of Issue : Mar. 30, 2022  
Product name : DVR  
Model/Type No. : HRX-1634  
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 : Mar. 02, 2022  
Test date : Mar. 07, 2022 ~ Mar. 11, 2022  
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Dong Hyun, Won  
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
Mar. 30, 2022	KES-EM-22T0281	Issued

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## 1.0 General Product Description

### Main Specifications of EUT are:

Display		
Analog camera	Inputs	16CH(1Vp-p 75ohm, BNC)
	Signal Type	- AHD(8MP, 5MP, 4MP, 1080p, 720p) - HDTVI(8MP, 5MP, 4MP, 1080p, 720p) - HDCVI(8MP, 5MP, 4MP, 1080p, 720p) - NTSC/PAL
Network camera	Inputs	2CH (Up to 18CH)
	Resolution	8MP ~ CIF
	Protocols	SUNAPI(Wisenet), ONVIF
Live	Local Display	1x HDMI, 1x VGA (Dual monitor) HDMI: 3840 x 2160, 2560x1440, 1920x1080, 1280x1044, 1280x720 (Expand mode 1920x1080) VGA: 1920x1080, 1280x1024, 1280x720 (Expand 1024*768)
	Multi Screen Display	[Local monitor] Dynamic layout/Sequence, [Web] 1 / 4 / 9 / sequence
	Resolution	[Analog Camera(NTSC/PAL)] - 8MP(15/12fps), 5MP(20/12fps), 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)	(Main Stream, NT/PAL) 8M 8/8fps, 5M 12/12fps, 4M 15/12fps, 2M 30/25fps, 720p 30/25fps, Under 960H 30/25fps/CH (Sub Stream) 720p/CH or Higher : 640x360 Full fps, SD : upto SD Full fps * The maximum recording frame rate depends on the frame rate of the input camera.
	Recording Bandwidth	Max. 128Mbps (HRX-1635)
	Resolution	8MP ~ CIF
	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, Dynamic camera event
	Event Action	E-mail, PTZ preset, Alarm out, Buzzer, Monitor out
Search & Play	Playback Bandwidth	Max. 32Mbps (18CH simultaneously)
	User	Max. 4 users (Set 1, Remote 3)
	Simultaneous playback	18CH(Local Monitor), 16Ch (CMS), 4Ch (Wisenet Mobile), 1Ch(Web)
	Fisheye Dewarping	WEB / CMS
	Search Mode	Date & Time (Calendar) / Event log list / Text search (POS), Back up, Motion, Smart search (Virtual Line w/ direction, Enter / Exit) * All Search Included Preview Function ARB search
	Resolution	8MP ~ 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 2ea(Max. 12TB)
Backup	File backup	BU, EXE(Include Player), AVI(Webviewer only)
	Function	Max. 16 CH play, Date-time/title display

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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(NTSC/PAL) (Main Stream) 8MP 8/8fps CH, 5M 12/12fps CH, 4M 15/12fps CH, 2M 30/25fps CH, 720p 30/25fps/CH, SD 30/25fps/CH (Sub Stream) HD 640x360 full fps/CH, SD upto SD full fps/CH * The maximum recording frame rate depends on the frame rate of the input camera.
Transmission Bandwidth		Max. 100Mbps
Audio	Input/Output	4 Line in (RCA 4 Line/ 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	Windows 10, Mac OS 11 Big Sur and later
	Supported browser	Chrome v99 / Edge v99 /Safari v14.0.3 Higher (2022/03)
Viewer Software		SSM, Webviewer, SmartViewer, Wisenet Mobile Viewer, Wisenet 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
Interface		
Front	Indicator	LED(Status indicator) : Power(1), HDD Action(1), Alarm(1), Record(1), Network(1), Backup(1)
Reset		Switch(1EA)
HDMI		1EA
VGA		1EA
BNC		16CH In / 1CH Out(Spot Output)
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 (Samsung-T/Pelco-D/Pelco-p) * for PTZ
Power inlet		1EA DC Jack
System		
Log	Log List	Max. 100,000 (System Log, Event Log each), (HRX-1632)
System Control		Mouse, Webviewer, System Controller(SPC-7000, SPC-6000, SPC-2000)
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

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<b>Environmental</b>		
Operating Temperature		0°C to +40°C(+32°F to +104°F)
Operating Humidity		20% ~ 85% RH
Certification		UL, CE, FCC, KC, UKCA
<b>Electrical</b>		
Power Input		DC12V
Power Consumption		Max. 41W (6T HDD 2ea)
PoE Budget		None
<b>Mechanical</b>		
Color / Material		Black / Metal
Dimension (WxHxD)		W370.0x H44.0 xD320(14.57" x 1.73" x12.6")
Weight		Approx. 2.6Kg (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 (Adapter)

## 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-1634	-	HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.	EUT
Adapter	FSP060-DHAN3	HU10142-18167	Zhonghan Electronics (Shenzhen) Co., Ltd.	-
Mouse	MOKJUO	-	Primax Electronics Ltd.	-
HDD	ST4000VX000	ZGY8V4WJ	SEAGATE	4 TB

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## 1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	P98F004	21599158359	DELL INC.	-
Notebook Adapter	LA240PM190	-	LITE-ON TECHNOLOGY (CHANGZHOU)CO.,LTD.	-
Monitor 1	SMT-2232	C95V67VF90002 5B	Weihai Daewoo Electronics Co., Ltd.	-
Monitor 2	SMT-2232	C95V67VF90003 8B	Weihai Daewoo Electronics Co., Ltd.	-
Monitor 3	DELL E2222H DVT	8221TCM10D001 03X	DELL INC.	-
Speaker	E5	-	PreSonus®	-
Controller	SPC-1010	C50E67WG10100 F	SamSung Techwin Co.,Ltd.	-
Controller Adapter	-	-	-	-
Alarm	PRO-SL	-	SENSOR PRO	-
ButtonAlarm	-	-	-	-
Camera 1	SCD-6083RN	-	TB-eye Ltd.	-
Camera 1 Adapter	KP-1220	JH10099-15001	KEPCO	-
Camera 2	HCV-6070R	-	HANWHA TECHWIN CO.,LTD.	-
Camera 2 Adapter	DAD12050DKA	KTLSA10022-8001	Dream Electronics Inc.	-
NETWORK VIDEO ENCODER 1	SPE-410	-	HANWHA TECHWIN CO.,LTD.	-
NETWORK VIDEO ENCODER 1 Adapter	2ACB022F	-	Channel Well Technology (Guangzhou) Co., Ltd.	-
NETWORK VIDEO ENCODER 2	SPE-410	-	HANWHA TECHWIN CO.,LTD.	-
NETWORK VIDEO ENCODER 2 Adapter	2ACB022F	-	Channel Well Technology (Guangzhou) Co., Ltd.	-
USB Memory	-	-	NOVOMATIC	-

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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)	DC Jack	Adapter (EUT)	DC Jack	1.4	U
	USB 2.0	Mouse (EUT)	USB	1.5	U
	RJ-45	Notebook	RJ-45	-	S
	AUDIO IN	Notebook	3.5 mm	1.6	U
	SPOT	Monitor 1	BNC	3.5	S
	D-SUB	Monitor 2	D-SUB	1.8	S
	HDMI	Monitor 3	HDMI	2.0	S
	AUDIO OUT	Speaker	RCA	2.8	U
	RS-485	Controller	RS-485	4.0	U
	Alarm OUT	Alarm	Alarm IN	3.0	U
	Alarm IN	ButtonAlarm	Alarm OUT	3.0	U
	BNC	NETWORK VIDEO ENCODER 1	BNC	10.0	U
	BNC		BNC	10.0	U
	BNC		BNC	10.0	U
	BNC		BNC	10.0	U
	BNC		BNC	10.0	U
	BNC		BNC	10.0	U
	BNC		BNC	10.0	U
	BNC		BNC	10.0	U
	BNC	NETWORK VIDEO ENCODER 2	BNC	10.0	U
	BNC		BNC	10.0	U
	BNC		BNC	10.0	U
	BNC		BNC	10.0	U
	BNC		BNC	10.0	U
	BNC		BNC	10.0	U
	BNC		BNC	10.0	U
	BNC		BNC	10.0	U
	USB 3.0	USB Memory	USB	-	-

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Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK VIDEO ENCODER 1	BNC	Camera 1	BNC	1.6	U
NETWORK VIDEO ENCODER 2	BNC	Camera 2	BNC	1.5	U
Notebook	DC Jack	Notebook Adapter	DC Jack	2.2	S
Controller	DC Jack	Controller Adapter	DC Jack	1.8	U
NETWORK VIDEO ENCODER 1	2 Pin	NETWORK VIDEO ENCODER 1 Adapter	2 Pin	2.0	U
NETWORK VIDEO ENCODER 2	2 Pin	NETWORK VIDEO ENCODER 2 Adapter	2 Pin	2.0	U
Camera 1	2 Pin	Camera 1 Adapter	2 Pin	1.8	U
Camera 2	2 Pin	Camera 2 Adapter	2 Pin	2.0	U

\* Unshielded=U, Shielded=S

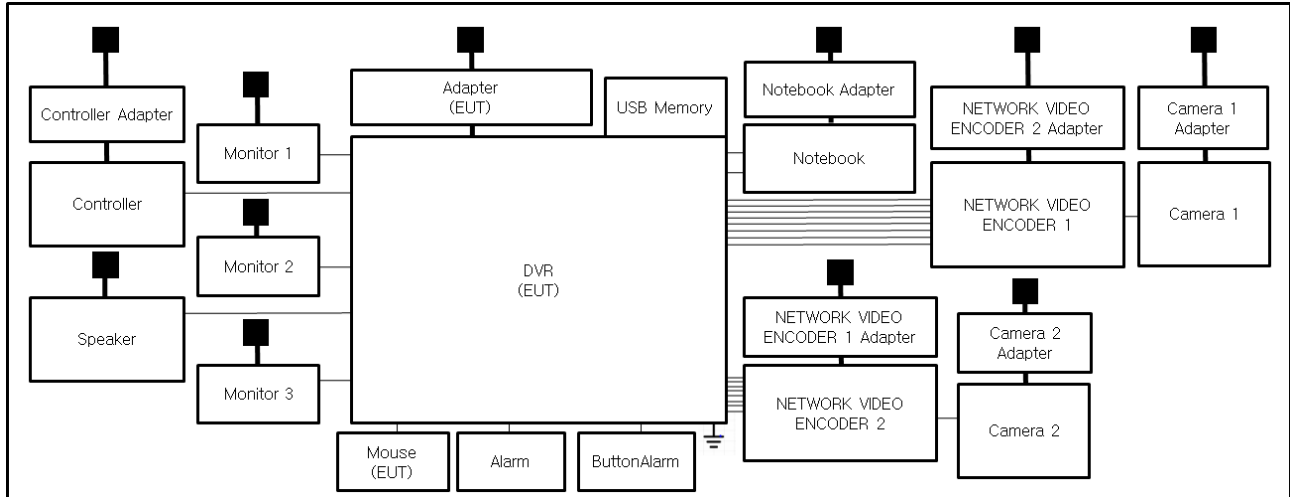
## 1.7 EUT Operating Mode(s)

Test Mode	operating
Operating Mode	EUT Monitoring, Ping Test

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

## 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 C63.4a-2017 and CISPR 16-1-4:2019

## 1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Anechoic Chamber , 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 55032:2015/A11:2020 ☒ Class A ☐ Class B

☒ EN 50130-4:2011

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

☒ **EMC – Regulations 2016/1091**

☒ BS EN 55032:2015/A11:2020 ☒ Class A ☐ Class B

☒ BS EN 50130-4:2011/A1:2014

☒ BS EN 61000-3-2:2014

☒ BS EN 61000-3-3:2013



## 2.1 Conducted Emissions at Mains Power Ports

### Test Date

Mar. 07, 2022

### Test Location

Electro wave Shieldroom #6

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101783	12, 28, 2022
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	12, 27, 2022
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	12, 27, 2022
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 27, 2022

### Test Conditions

Temperature: (23,4 ± 0,1) °C

Relative Humidity: (43,5 ± 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.



## 2.2 Conducted Emissions at Telecommunication Ports

### Test Date

Mar. 03, 2022

### Test Location

Electro wave Shieldroom #6

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101783	12, 28, 2022
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	12, 27, 2022
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	12, 27, 2022
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 27, 2022
<input type="checkbox"/>	8-WIRE ISN CAT3,5	ENY81	R & S	100174	12, 28, 2022
<input checked="" type="checkbox"/>	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	03, 07, 2023

### Test Conditions

Temperature: (23,4 ± 0,1) °C

Relative Humidity: (43,5 ± 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.
- 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

Mar. 07, 2022

### Test Location

☐ OPEN AREA TEST SITE #2 ☒ SEMI ANECHOIC CHAMBER #4(10m)

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	R & S	100551	04, 01, 2022
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	11, 24, 2022
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	12, 08, 2022
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	32173	03, 08, 2023

### Test Conditions

Temperature: (23,7 ± 0,2) °C  
Relative Humidity: (43,7 ± 0,1) % 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.

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## 2.4 Radiated Electric Field Emissions(Above 1 GHz)

**Test Date**

Mar. 08, 2022

**Test Location**

SEMI ANECHOIC CHAMBER #5

**Test Equipment**

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.120	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	Rohde & Schwarz	100552	04, 01, 2022
<input checked="" type="checkbox"/>	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	12, 16, 2022
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	HP	3008A00538	06, 21, 2022

**Test Conditions**

Temperature: (23,2 ± 0,2) °C

Relative Humidity: (43,1 ± 0,1) % 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.

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## 2.5 Harmonic Current Emissions

### Test Date

Mar. 11, 2022

### Test Location

Electro wave Shieldroom #3

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	net.control	EM TEST	2.1.4	-
<input checked="" type="checkbox"/>	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	04, 06, 2022
<input checked="" type="checkbox"/>	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

### Test Conditions

Temperature: (24,5 ± 0,1) °C  
Relative Humidity: (44,6 ± 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

Mar. 11, 2022

### Test Location

Electro wave Shieldroom #3

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	net.control	EM TEST	2.1.4	-
<input checked="" type="checkbox"/>	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	04, 06, 2022
<input checked="" type="checkbox"/>	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

### Test Conditions

Temperature: (24,5 ± 0,1) °C  
Relative Humidity: (44,6 ± 0,1) % 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/A1:2014 Alarm systems-Part 4: Electromagnetic compatibility Product family standard: Immunity requirements for components of fire, intruder and social alarm systems

**The variety and the diversity of the apparatus within the scope of this document makes it difficult to define precise criteria for the evaluation of the immunity test results.**

**If as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe then the apparatus shall be deemed to have failed the test.**

**A functional description and a definition of performance by the manufacture and noted in the test**

**report, based on the following criteria:**

#### **Electrostatic discharge**

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing that is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

#### **Radiated electromagnetic fields**

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing which could be interpreted by associated equipment as a change, and no such

Flickering of indicators occurs at a field strength of 3 V/m.

For components of CCTV systems, where the picture is allowed at 10 V/m, providing.

(a) there is no permanent damage or change to EUT

(e.g. no corruption of memory or changes to programmable setting etc.)

(b) at 3 V/m, any deterioration of the picture is so minor that the system could still be used; and

(c) there is no observable deterioration of the picture at 1 V/m.



---

### **Fast transient burst / slow high energy voltage surge**

There shall be no damage, malfunction or change of status due to the conditioning.  
Flickering of an indicator during the application of discharge is permissible, providing  
That there is no residual is permissible, providing that there is no residual change in the EUT or  
any  
change in outputs, which could be interpreted by associated equipment as a change.

### **Conducted RF immunity**

There shall be no damage, malfunction or change of status due to the conditioning.  
Flickering of an indicator during the application of discharge is permissible, providing  
That there is no residual is permissible, providing that there is no residual change in the EUT or  
any  
change in outputs, which could be interpreted by associated equipment as a change,  
and no such flickering of indicators oeuvres at  $U = 130 \text{ dB}\mu\text{V}$ .  
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

Mar. 11, 2022

#### Test Location

EMS-ESD: Electro wave Shieldroom #7

#### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	02, 24, 2023
<input checked="" type="checkbox"/>	HCP	-	KES	-	-
<input checked="" type="checkbox"/>	VCP	-	Noise Ken	-	-

#### Test Conditions

Temperature: (24,4 ± 0,1) °C  
Relative Humidity: (44,6 ± 0,1) % R.H.  
Atmospheric Pressure: (100,6 ± 0,1) kPa

#### Test Specifications

Discharge Factor: ≥ 1 s

Discharge Impedance: 330 ohm / 150 pF

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

Polarity: Positive and Negative

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

Discharge Voltage:	<b>Contact</b> <input type="checkbox"/> 2 kV <input type="checkbox"/> 4 kV <input checked="" type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	<b>Air</b> <input checked="" type="checkbox"/> 2 kV <input checked="" type="checkbox"/> 4 kV <input type="checkbox"/> 6 kV <input checked="" type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	<b>HCP</b> <input type="checkbox"/> 2 kV <input type="checkbox"/> 4 kV <input checked="" type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	<b>VCP</b> <input type="checkbox"/> 2 kV <input type="checkbox"/> 4 kV <input checked="" type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV
--------------------	---	---	---	---

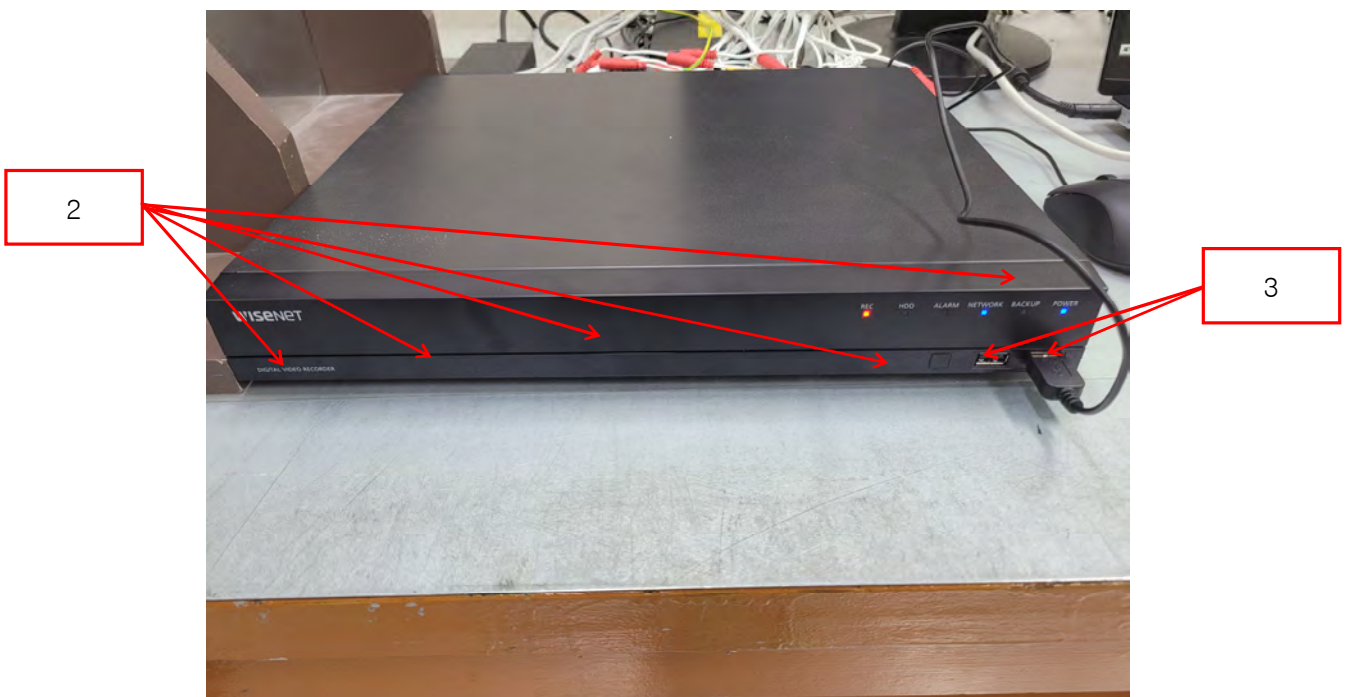
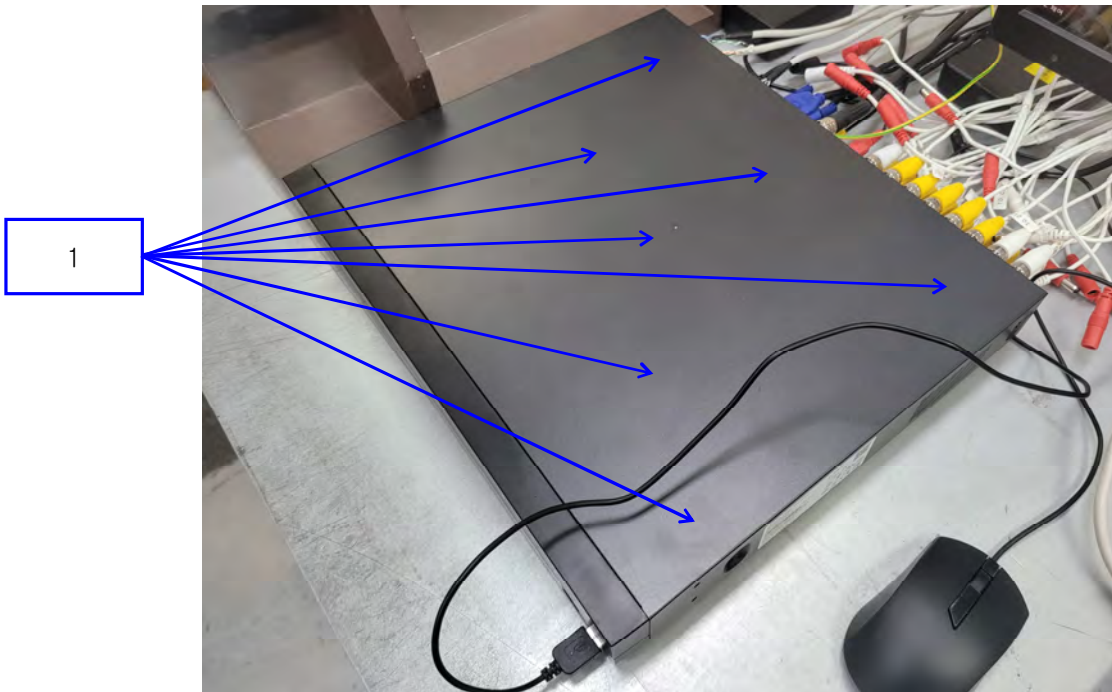
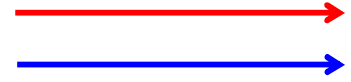
Notes: HCP: Horizontal coupling plane  
VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

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**Location of Discharge:**

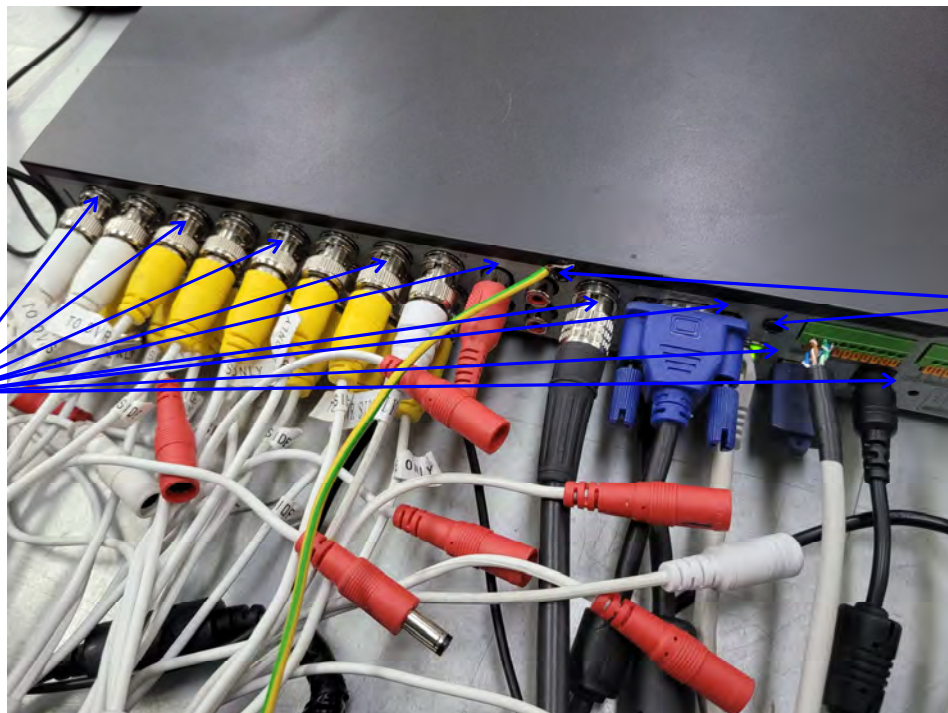
Air
Contact



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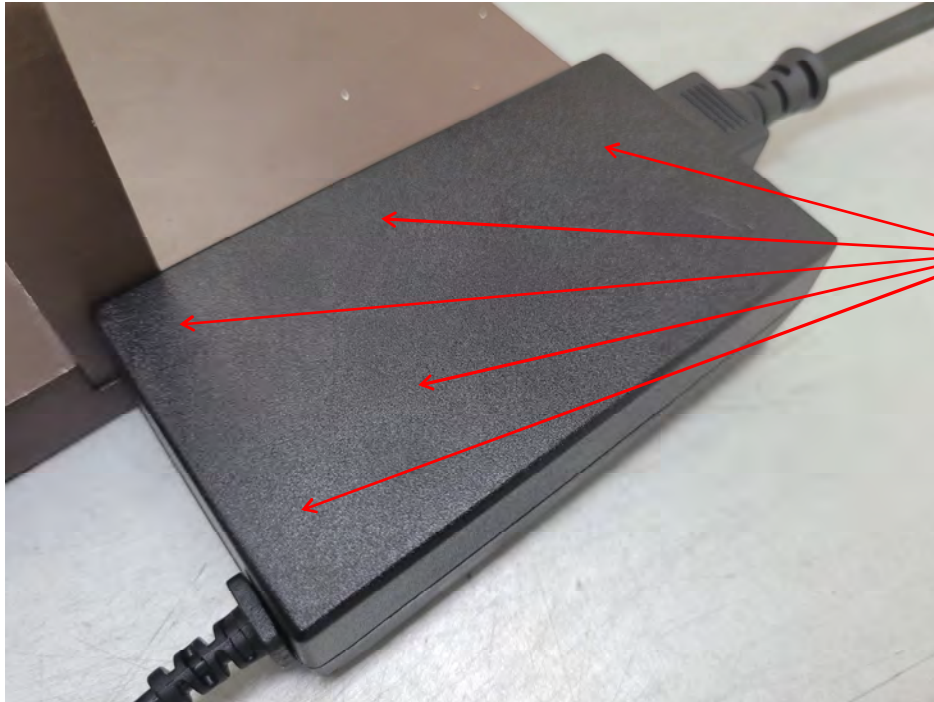
4



5

6





7

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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	Contact Discharge	Complied	-
2	Enclosure 2	Air Discharge	Complied	-
3	USB Port	Air Discharge	Complied	-
4	Mouse Enclosure	Air Discharge	Complied	-
5	Screw	Contact Discharge	Complied	-
6	Port	Contact Discharge	Complied	-
7	Adapter 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  
BS EN 61000-4-3:2006 +A2:2010

### Test Date

Mar. 08, 2022

### Test Location

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

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	EMC32	R & S	10.10.02	-
<input checked="" type="checkbox"/>	SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	08, 03, 2022
<input checked="" type="checkbox"/>	HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-
<input checked="" type="checkbox"/>	POWER METER	E4419B	Agilent	GB40203000	04, 01, 2022
<input checked="" type="checkbox"/>	CW POWER SENSOR	E4412A	Agilent	US38488240	04, 01, 2022
<input checked="" type="checkbox"/>	CW POWER SENSOR	E4412A	Agilent	MY41501662	04, 01, 2022
<input checked="" type="checkbox"/>	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 03, 2023

### Test Conditions

Temperature: (24,2 ± 0,2) °C  
Relative Humidity: (43,9 ± 0,1) % R.H.  
Atmospheric Pressure: (100,9 ± 0,1) 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  
BS EN 61000-4-4:2012

#### Test Date

Mar. 10, 2022

#### Test Location

EMS-EFT: Electro wave Shieldroom #7

#### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.8	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	12, 03, 2022
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	04, 01, 2022
<input checked="" type="checkbox"/>	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	12, 03, 2022

#### Test Conditions

Temperature: (24,3 ± 0,2) °C  
Relative Humidity: (44,5 ± 0,1) % R.H.  
Atmospheric Pressure: (100,7 ± 0,1) 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 In	Complied	Complied
Alarm Out	Complied	Complied
RS-485	Complied	Complied
BNC (VIDEO IN)	Complied	Complied
BNC (SPOT)	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

## Test Results

☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

## Remarks

PASS Required Performance Criteria

## 3.4 Surge Transients

### Reference Standard

EN 61000-4-5:2014  
BS EN 61000-4-5:2014

### Test Date

Mar. 10, 2022

### Test Location

EMS-EFT: Electro wave Shieldroom #7

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.8	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	12, 03, 2022
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	04, 01, 2022
<input checked="" type="checkbox"/>	CDN	CNV 508N1	EM TEST	P1610176296	12, 03, 2022

### Test Conditions

Temperature: (24,3 ± 0,2) °C  
Relative Humidity: (44,5 ± 0,2) % R.H.  
Atmospheric Pressure: (100,7 ± 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  
BS EN 61000-4-6:2014

#### Test Date

Mar. 09, 2022

#### Test Location

EMS-CS: Electro wave Shieldroom #6

#### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	icd.control	EM TEST	5.3.12	-
<input checked="" type="checkbox"/>	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	11, 24, 2022
<input checked="" type="checkbox"/>	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 24, 2022
<input checked="" type="checkbox"/>	CDN	CDN M016	TESEQ	43694	11, 24, 2022
<input checked="" type="checkbox"/>	CDN	CDN M016	TESEQ	43697	11, 24, 2022
<input checked="" type="checkbox"/>	CDN	CDN ST08A	TESEQ	43886	11, 24, 2022
<input checked="" type="checkbox"/>	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 25, 2022

#### Test Conditions

Temperature: (23,9 ± 0,2) °C  
Relative Humidity: (43,6 ± 0,2) % R.H.  
Atmospheric Pressure: (100,8 ± 0,1) 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 In	Clamp	Complied
Alarm Out	Clamp	Complied
RS-485	Clamp	Complied
BNC (VIDEO IN)	Clamp	Complied
BNC (SPOT)	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**

Mar. 10, 2022

**Test Location**

EMS-Voltage dip: Electro wave Shieldroom #7

**Test Equipment**

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.8	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	04, 01, 2022
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	04, 01, 2022

**Test Conditions**

Temperature: (24,3 ± 0,1) °C  
Relative Humidity: (44,5 ± 0,1) % R.H.  
Atmospheric Pressure: (100,7 ± 0,1) kPa

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## Test Specifications & Observations/Remarks

### - Voltage Dips and Short Interruptions

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
<input checked="" type="checkbox"/> 20 % dip	<input checked="" type="checkbox"/> 250 / 5 000	<u>Complied</u>
<input checked="" type="checkbox"/> 30 % dip	<input checked="" type="checkbox"/> 25 / 500	<u>Complied</u>
<input checked="" type="checkbox"/> 60 % dip	<input checked="" type="checkbox"/> 10 / 200	<u>Complied</u>
<input checked="" type="checkbox"/> 100 % dip	<input checked="" type="checkbox"/> 250 / 5 000	<u>Degradation</u>

### - Voltage variations

<input checked="" type="checkbox"/> Unom + 10 %	<input checked="" type="checkbox"/> 253.0 V (ac)	<u>Complied</u>
<input checked="" type="checkbox"/> Unom - 15 %	<input checked="" type="checkbox"/> 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

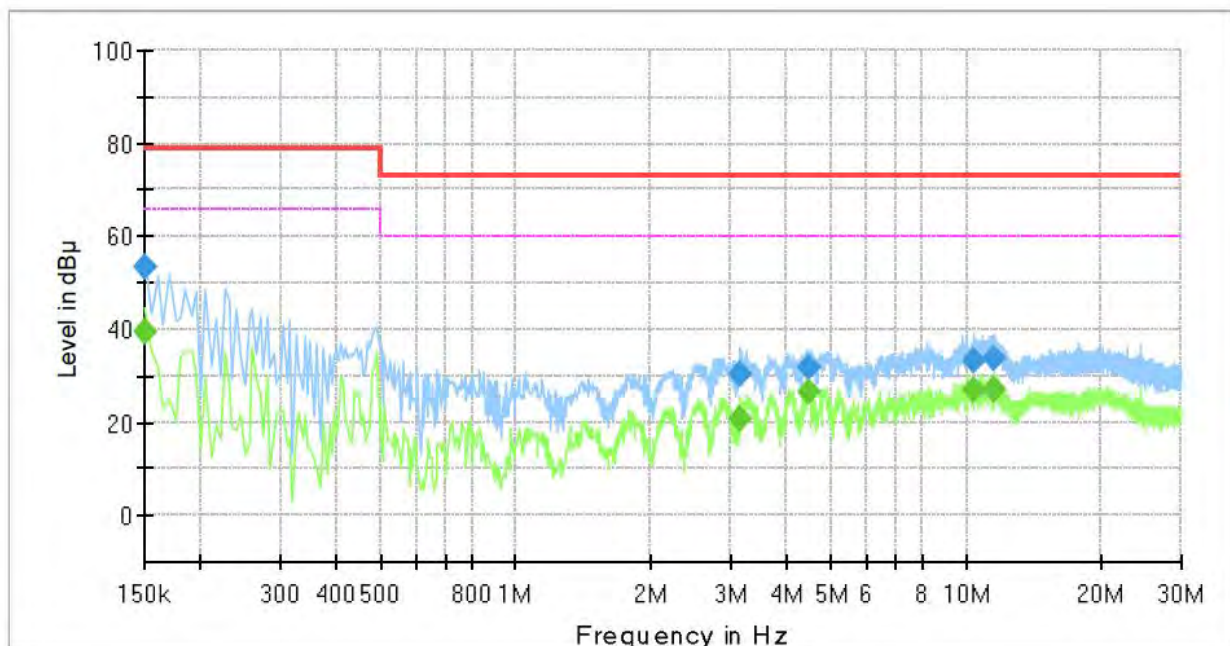
During the test(100%, 250cycle), EUT was turned off but after the test, it was recovered by no operator's intervention.

## APPENDIX A – TEST DATA

### Conducted Emissions at Mains Power Ports [HOT]

#### Common Information

Test Description:	Conducted Emission
Model No.:	HRX-1634
Phase:	
Mode:	H
Operator Name:	KES



#### Final Result

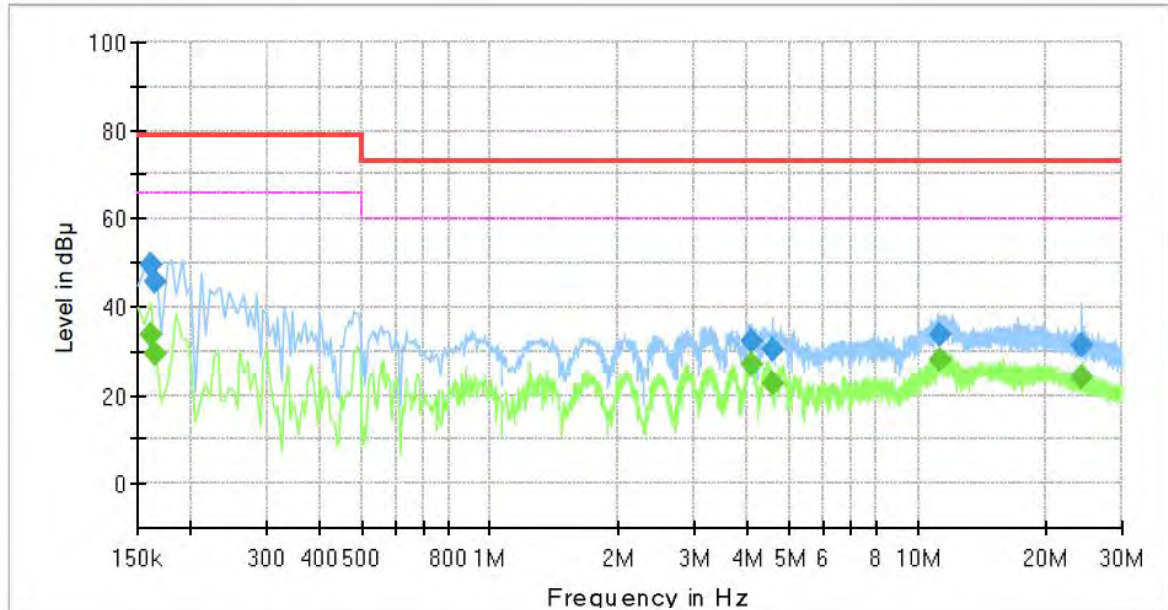
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	---	39.58	66.00	26.42	1000.0	9.000	L1	19.4
0.150000	53.18	---	79.00	25.82	1000.0	9.000	L1	19.4
3.150000	---	20.85	60.00	39.15	1000.0	9.000	L1	20.1
3.150000	30.49	---	73.00	42.51	1000.0	9.000	L1	20.1
4.455000	---	26.27	60.00	33.73	1000.0	9.000	L1	19.8
4.455000	31.67	---	73.00	41.33	1000.0	9.000	L1	19.8
10.430000	---	26.75	60.00	33.25	1000.0	9.000	L1	19.9
10.430000	33.31	---	73.00	39.69	1000.0	9.000	L1	19.9
11.505000	---	26.86	60.00	33.14	1000.0	9.000	L1	20.0
11.505000	33.59	---	73.00	39.41	1000.0	9.000	L1	20.0



**[NEUTRAL]**

**Common Information**

Test Description: Conducted Emission  
 Model No.: HRX-1634  
 Phase:  
 Mode: N  
 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	---	33.92	66.00	32.08	1000.0	9.000	N	19.4
0.160000	49.46	---	79.00	29.54	1000.0	9.000	N	19.4
0.165000	---	29.19	66.00	36.81	1000.0	9.000	N	19.4
0.165000	45.93	---	79.00	33.07	1000.0	9.000	N	19.4
4.070000	---	26.99	60.00	33.01	1000.0	9.000	N	19.9
4.070000	32.48	---	73.00	40.52	1000.0	9.000	N	19.9
4.575000	---	22.50	60.00	37.50	1000.0	9.000	N	19.7
4.575000	30.40	---	73.00	42.60	1000.0	9.000	N	19.7
11.300000	---	27.76	60.00	32.24	1000.0	9.000	N	20.0
11.300000	33.93	---	73.00	39.07	1000.0	9.000	N	20.0
24.215000	---	23.87	60.00	36.13	1000.0	9.000	N	20.1
24.215000	31.13	---	73.00	41.87	1000.0	9.000	N	20.1

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

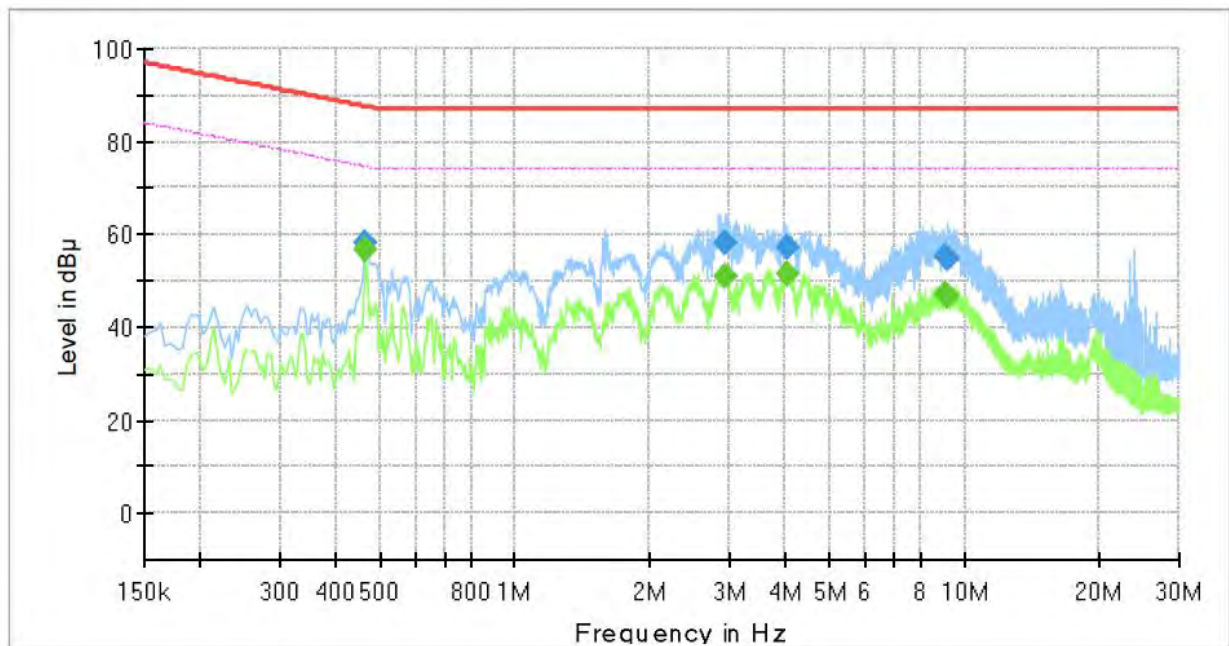
Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))



## Conducted Emissions at Telecommunication Ports [1 000 Mbps]

### Common Information

Test Description: Telecommunication Emission  
 Model No.: HRX-1634  
 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)
0.466000	---	56.81	74.58	17.77	1000.0	9.000	Single Line	19.5
0.466000	58.34	---	87.58	29.24	1000.0	9.000	Single Line	19.5
2.926000	---	50.96	74.00	23.04	1000.0	9.000	Single Line	20.1
2.926000	58.20	---	87.00	28.80	1000.0	9.000	Single Line	20.1
4.038000	---	51.26	74.00	22.74	1000.0	9.000	Single Line	19.7
4.038000	57.05	---	87.00	29.95	1000.0	9.000	Single Line	19.7
9.034000	---	46.94	74.00	27.06	1000.0	9.000	Single Line	19.6
9.034000	55.20	---	87.00	31.80	1000.0	9.000	Single Line	19.6
9.186000	---	46.85	74.00	27.15	1000.0	9.000	Single Line	19.6
9.186000	55.01	---	87.00	31.99	1000.0	9.000	Single Line	19.6

#### ◆ 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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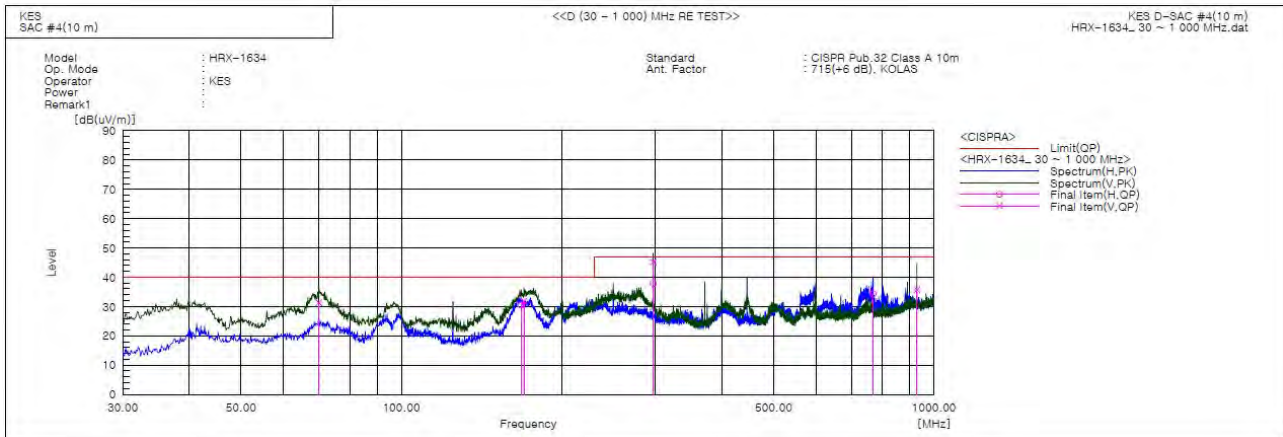


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Report No.:  
KES-EM-22T0281  
Page (43) of (64)

### 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	70.013	V	56.2	-24.9	31.3	40.0	8.7	154.0	115.0	
2	167.740	H	54.7	-24.3	30.4	40.0	9.6	395.0	202.0	
3	169.923	V	56.0	-24.2	31.8	40.0	8.2	118.0	184.0	
4	296.993	H	56.0	-18.1	37.9	47.0	9.1	400.0	266.0	
5	297.017	V	63.3	-18.1	45.2	47.0	1.8	106.0	188.0	
6	768.170	H	40.9	-6.6	34.3	47.0	12.7	359.0	318.0	
7	928.220	V	39.7	-3.9	35.8	47.0	11.2	148.0	175.0	

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

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

Margin(QP)[dB] = Limit[dB( $\mu$ V/m)] - Result(QP) [dB( $\mu$ 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

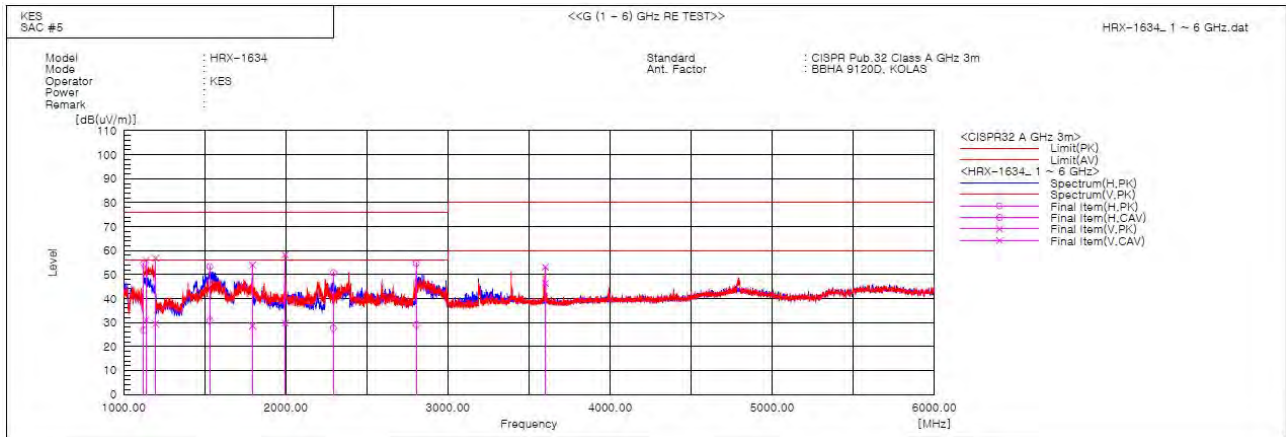


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Report No.:  
KES-EM-22T0281  
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### Radiated Electric Field Emissions(Above 1 GHz)



#### 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	1122.627	H	61.5	33.9	-7.0	54.5	26.9	76.0	56.0	21.5	29.1	100.0	23.9	
2	1137.142	V	62.9	38.0	-6.9	56.0	31.1	76.0	56.0	20.0	24.9	100.0	356.1	
3	1194.842	V	63.6	36.2	-6.7	56.9	29.5	76.0	56.0	19.1	26.5	100.0	358.0	
4	1530.600	H	58.2	35.6	-4.8	53.4	30.8	76.0	56.0	22.6	25.2	100.0	287.2	
5	1794.128	V	57.8	32.3	-3.7	54.1	28.6	76.0	56.0	21.9	27.4	100.0	128.8	
6	1995.554	V	61.2	32.6	-2.9	58.3	29.7	76.0	56.0	17.7	26.3	100.0	97.5	
7	2293.030	H	52.8	29.7	-2.0	50.8	27.7	76.0	56.0	25.2	28.3	100.0	57.2	
8	2804.774	H	54.3	28.7	0.4	54.7	29.1	76.0	56.0	21.3	26.9	100.0	300.8	
9	3599.944	V	51.2	44.5	1.9	53.1	46.4	80.0	60.0	26.9	13.6	100.0	193.8	

#### ◆ 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 <sub>eff</sub> [A]	% of Limit	Limit [A]	Result
1	0.095			
2	0.004	0.416	1.080	n/a
3	0.090	3.899	2.300	PASS
4	0.005	1.231	0.430	PASS
5	0.087	7.641	1.140	PASS
6	0.006	1.999	0.300	PASS
7	0.085	11.001	0.770	PASS
8	0.005	2.304	0.230	PASS
9	0.082	20.582	0.400	PASS
10	0.005	2.924	0.184	PASS
11	0.078	23.786	0.330	PASS
12	0.005	3.545	0.153	PASS
13	0.074	35.087	0.210	PASS
14	0.005	3.955	0.131	PASS
15	0.068	45.653	0.150	PASS
16	0.005	4.272	0.115	n/a
17	0.063	47.802	0.132	PASS
18	0.005	4.736	0.102	n/a
19	0.058	48.819	0.118	PASS
20	0.005	5.115	0.092	n/a
21	0.052	32.356	0.161	PASS
22	0.005	5.492	0.084	n/a
23	0.046	31.588	0.147	PASS
24	0.004	5.487	0.077	n/a
25	0.041	30.010	0.135	PASS
26	0.004	5.549	0.071	n/a
27	0.035	27.923	0.125	PASS
28	0.004	5.505	0.066	n/a
29	0.029	25.247	0.116	PASS
30	0.003	5.333	0.061	n/a
31	0.024	22.131	0.109	PASS
32	0.003	5.180	0.058	n/a
33	0.019	18.934	0.102	PASS
34	0.003	4.774	0.054	n/a
35	0.015	15.363	0.096	PASS
36	0.002	4.534	0.051	n/a
37	0.011	12.000	0.091	PASS
38	0.002	4.194	0.048	n/a
39	0.008	8.756	0.087	PASS
40	0.002	3.990	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)

<b>Maximum harmonic current results</b>				
Hn	I <sub>eff</sub> [A]	% of Limit	Limit [A]	Result
1	0.097			
2	0.006	0.354	1.620	PASS
3	0.092	2.655	3.450	PASS
4	0.007	1.117	0.645	PASS
5	0.089	5.202	1.710	PASS
6	0.008	1.702	0.450	PASS
7	0.086	7.484	1.155	PASS
8	0.007	2.084	0.345	PASS
9	0.084	14.009	0.600	PASS
10	0.007	2.661	0.276	PASS
11	0.080	16.176	0.495	PASS
12	0.007	3.140	0.230	PASS
13	0.075	23.844	0.315	PASS
14	0.007	3.533	0.197	PASS
15	0.070	30.986	0.225	PASS
16	0.007	3.893	0.173	PASS
17	0.064	32.397	0.199	PASS
18	0.007	4.255	0.153	PASS
19	0.059	33.048	0.178	PASS
20	0.006	4.638	0.138	PASS
21	0.053	32.811	0.161	PASS
22	0.006	4.925	0.125	PASS
23	0.047	32.036	0.147	PASS
24	0.006	4.991	0.115	PASS
25	0.041	30.358	0.135	PASS
26	0.005	5.031	0.106	PASS
27	0.035	28.204	0.125	PASS
28	0.005	4.974	0.099	n/a
29	0.030	25.511	0.116	PASS
30	0.004	4.850	0.092	n/a
31	0.024	22.353	0.109	PASS
32	0.004	4.644	0.086	n/a
33	0.020	19.198	0.102	PASS
34	0.003	4.289	0.081	n/a
35	0.015	15.633	0.096	PASS
36	0.003	3.985	0.077	n/a
37	0.011	12.292	0.091	PASS
38	0.003	3.645	0.073	n/a
39	0.008	9.060	0.087	PASS
40	0.002	3.438	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
<b>Line 1:</b>	0.028	0.028	0	< 0.2	0
<b>Limits:</b>	0.65	1	3.3	4	0.5
<b>Results:</b>	PASS	PASS	PASS	PASS	PASS

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## Test Setup Photos and Configuration

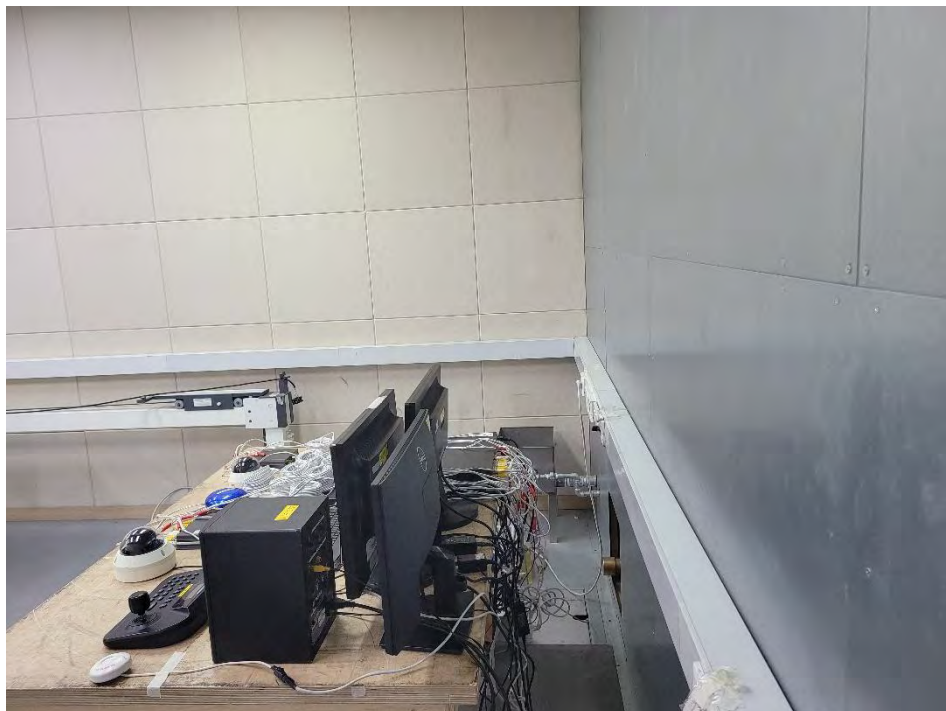
### Conducted Emissions at Mains Power Ports



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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

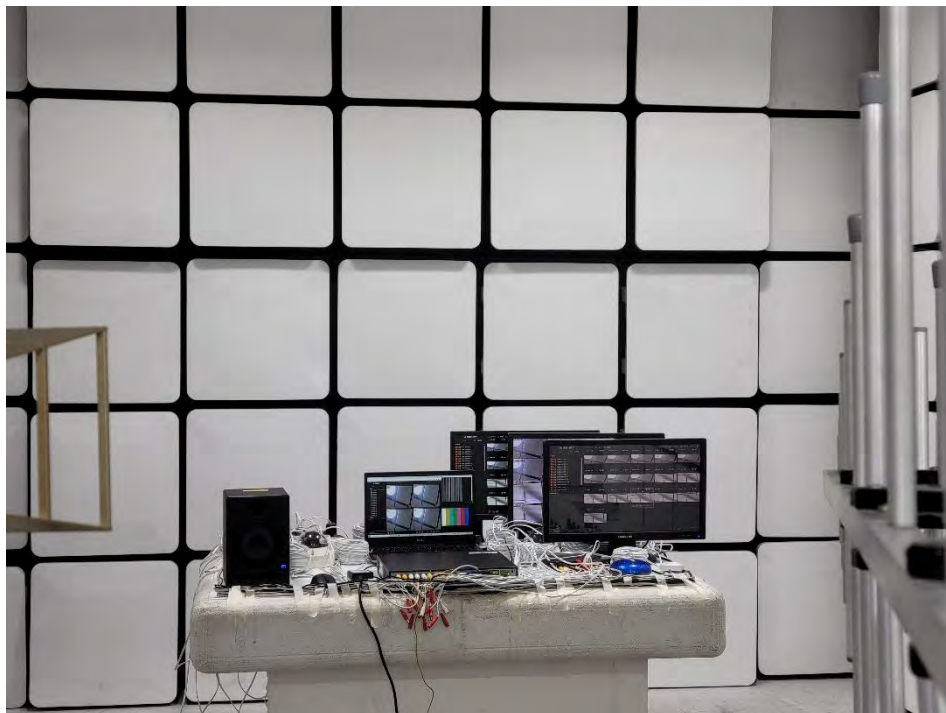


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## Electrostatic Discharge



## 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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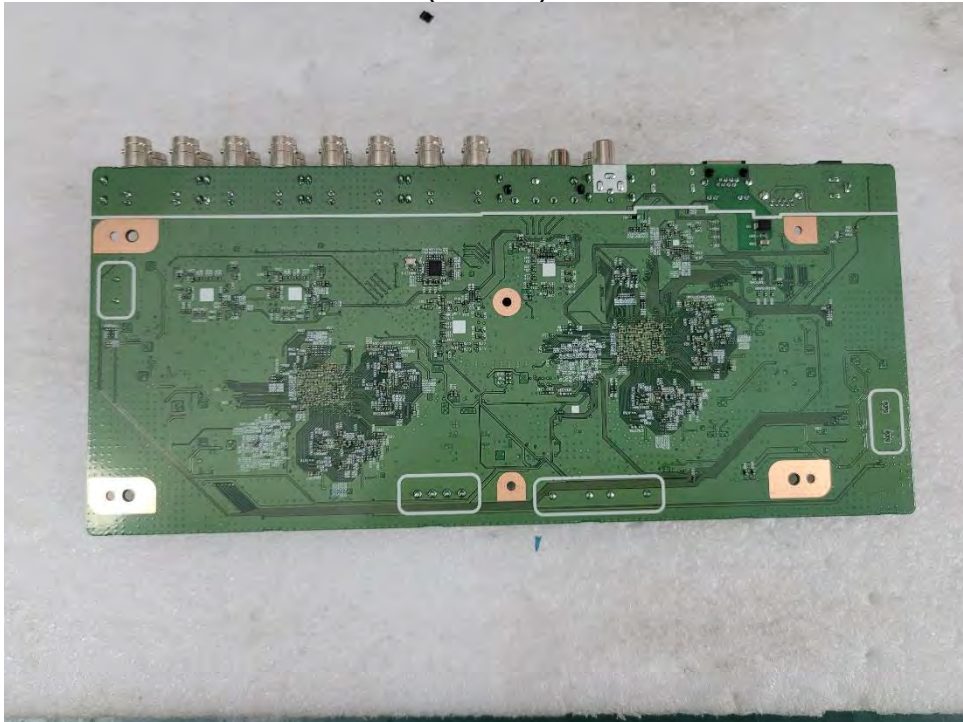


## EUT Internal View – Main Board

(Top)



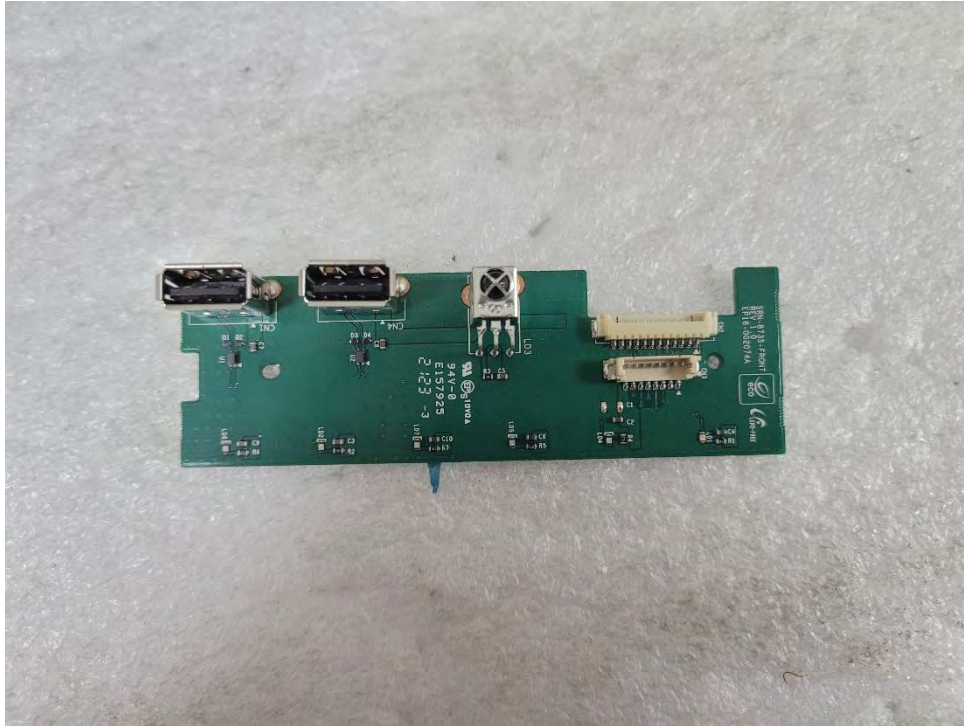
(Bottom)



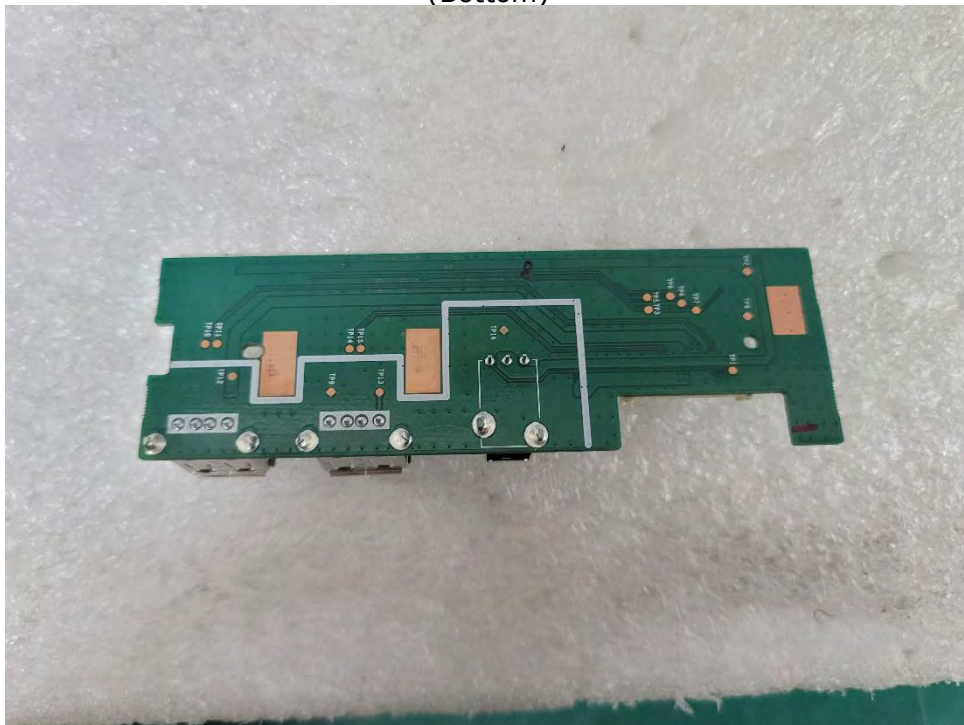
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## EUT Internal View – USB Port Board

(Top)



(Bottom)

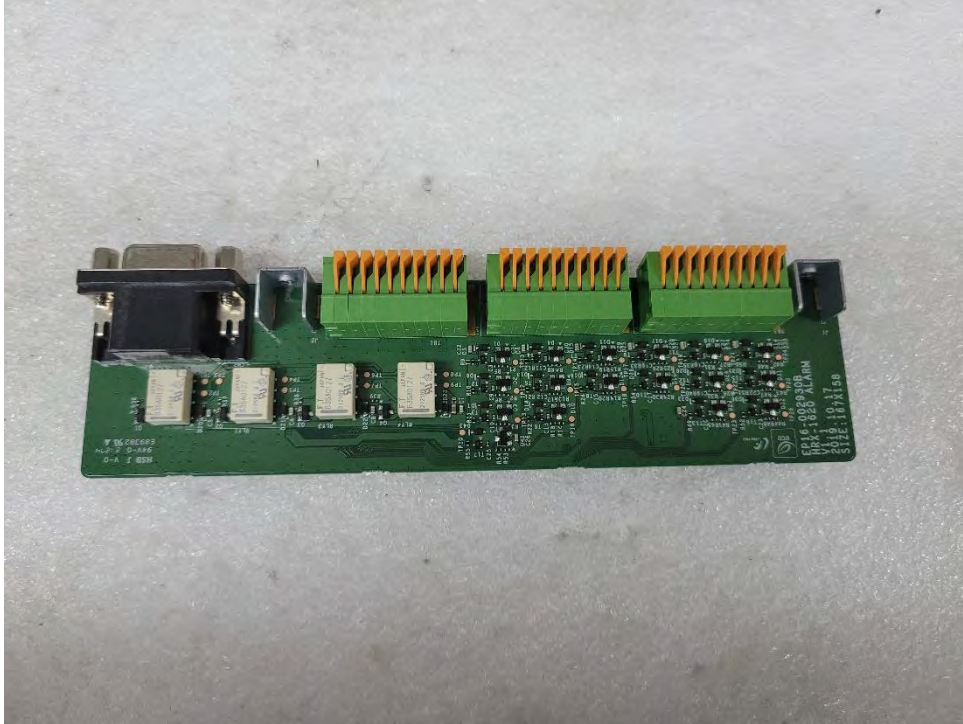


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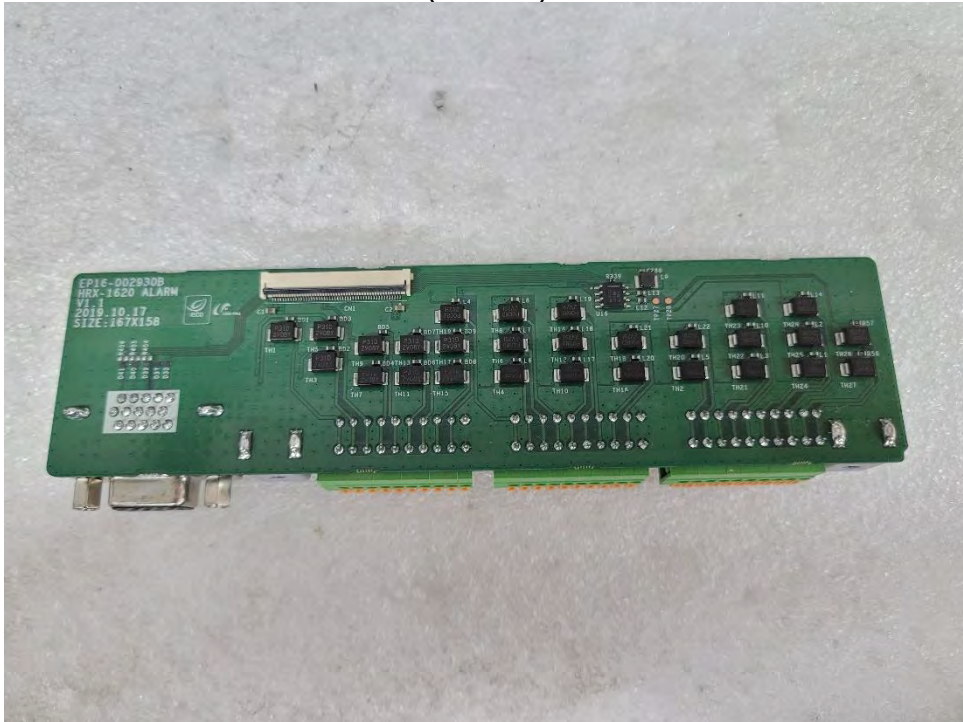


## EUT Internal View – Alarm Port Board

(Top)



(Bottom)



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## EUT Internal View – HDD

(Top)



(Bottom)

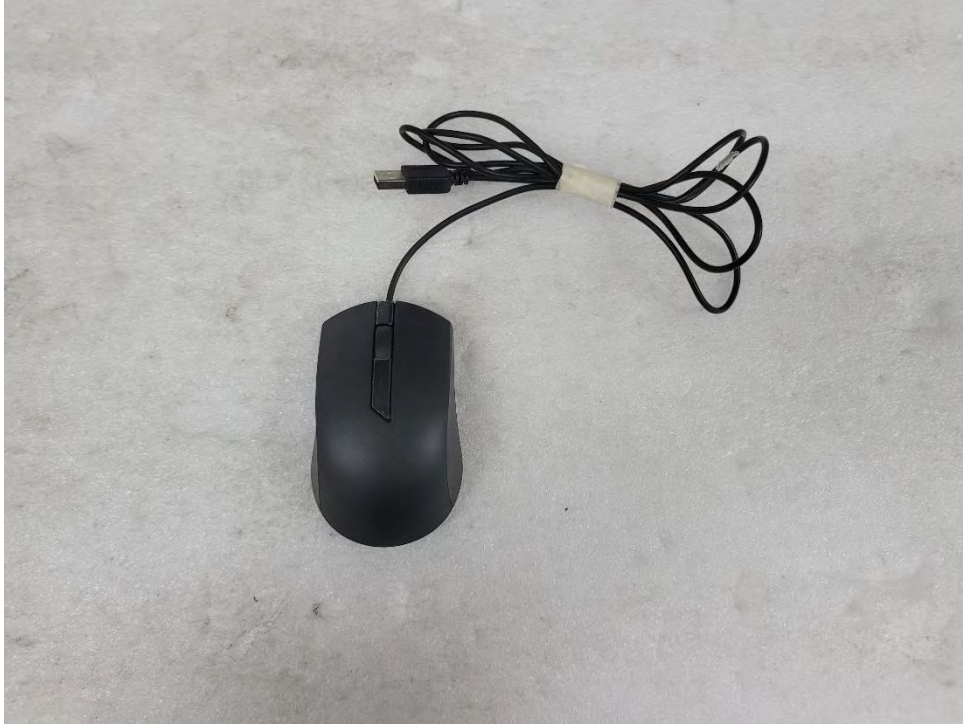


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## EUT Internal View – Mouse

(Top)



(Bottom)



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## EUT Internal View – Adapter

(Top)



(Bottom)



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## Label and Location



### **DVR**

Model No : HRX-1634

Manufacturer : HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.

Made in Vietnam

