

**KES Co., Ltd.**

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

Report No.:

KES-EM-22T0284

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EMC TEST REPORT For RCM

Test Report No. : KES-EM-22T0284

Date of Issue : Mar. 30, 2022

Product name : DVR

Model/Type No. : HRX-1635

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. 08, 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-22T0284	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 16CH)
	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 (H.265)
	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 (16CH simultaneously)
	User	Max. 4 users (Set 1, Remote 3)
	Simultaneous playback	16CH(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
Storage	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
	Supported HDD	Up to 6TB
Backup	HDD Slot	SATA 6es(Max. 48TB)
	File backup	BU, EXE(Include Player), AVI(Webviewer only)
	Function	Max. 16 CH play, Date-time/title display
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

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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	16 Uline in (RCA 4 Line, Option : Audio Extension Cable) / 1Line line out
	Compression	G.711 (NW 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-485/422 (Samsung-T/Pelco-D/Pelco-p) * for PTZ
Power inlet		1EA AC (AC100~240V)
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
Environmental		
Operating Temperature		0°C to +40°C(+32°F to +104°F)
Operating Humidity		20% ~ 85% RH

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Certification		UL, CE, FCC, KC, UKCA
Electrical		
Power Input		100~240 VAC±10%, 50/60 Hz
Power Consumption		Max. 200W (6TB HDD 8ea)
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. 5.7Kg (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 240 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-1635	-	HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.	EUT
Mouse	MOKJUO	-	Primax Electronics Ltd.	-
HDD	ST2000VX012	WFM30EFP	SEAGATE	2 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)	USB 2.0	Mouse (EUT)	USB	1.5	U
	RJ-45	Notebook	RJ-45	-	S
	AUDIO IN	Notebook	3.5 mm	1.6	U
	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

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Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
DVR (EUT)	BNC	NETWORK VIDEO ENCODER 2	BNC	10.0	U
	USB 3.0	USB Memory	USB	-	-
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)

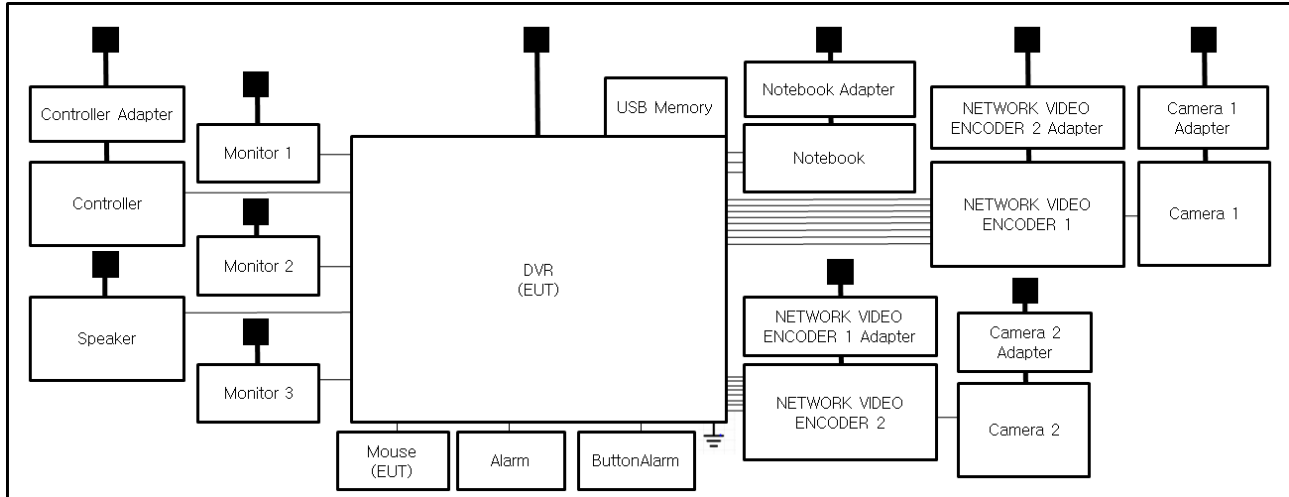
Test Mode	operating
Operating Mode	EUT Monitoring, Ping Test

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

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1.8 Configuration

■ AC Main
 □ DC Main



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



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2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **AS/NZS CISPR32:2015**

☒ Class A

☐ Class B

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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.

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2.2 Conducted Emissions at Telecommunication 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
<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.

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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

RemarksSee Appendix A for test data.

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APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

HOT LINE

Common Information

Test Description:

Conducted Emission

Model No.:

HRX-1635

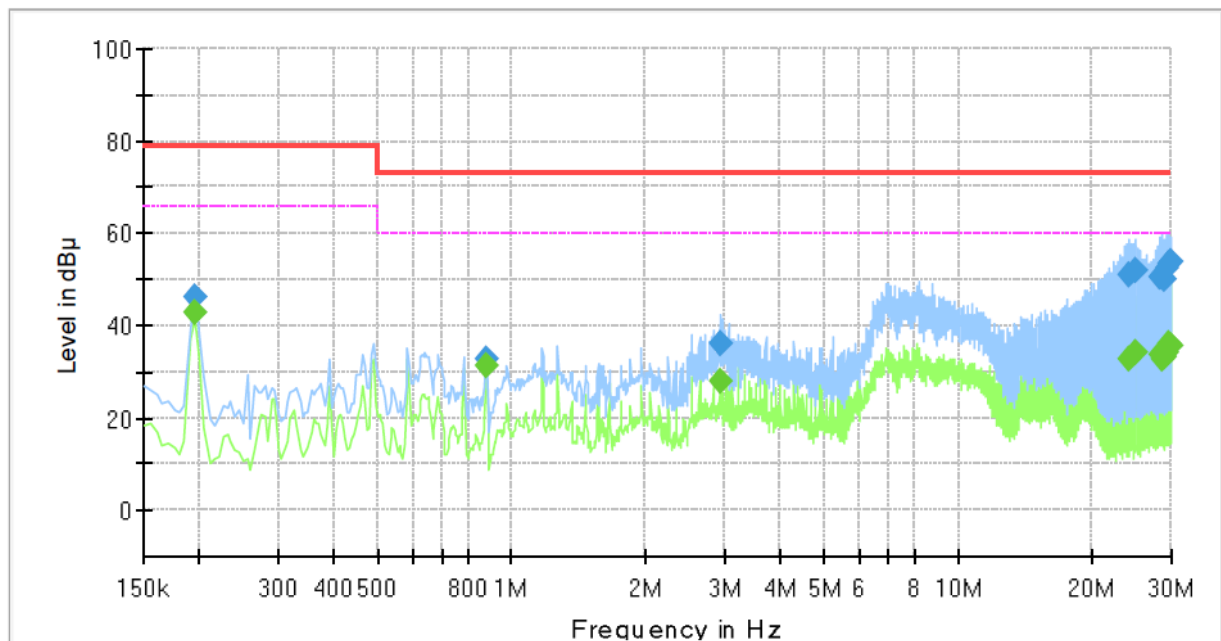
Phase:

Mode:

H

Operator Name:

KES



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Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.195000	46.20	---	79.00	32.80	1000.0	9.000	L1	19.4
0.195000	---	42.72	66.00	23.28	1000.0	9.000	L1	19.4
0.880000	32.89	---	73.00	40.11	1000.0	9.000	L1	20.1
0.880000	---	31.43	60.00	28.57	1000.0	9.000	L1	20.1
2.930000	35.92	---	73.00	37.08	1000.0	9.000	L1	20.2
2.930000	---	27.83	60.00	32.17	1000.0	9.000	L1	20.2
24.235000	51.00	---	73.00	22.00	1000.0	9.000	L1	20.1
24.235000	---	32.66	60.00	27.34	1000.0	9.000	L1	20.1
24.980000	---	34.17	60.00	25.83	1000.0	9.000	L1	20.1
24.980000	51.93	---	73.00	21.07	1000.0	9.000	L1	20.1
28.415000	---	33.50	60.00	26.50	1000.0	9.000	L1	20.3
28.415000	50.70	---	73.00	22.30	1000.0	9.000	L1	20.3
28.750000	50.72	---	73.00	22.28	1000.0	9.000	L1	20.3
28.750000	---	32.89	60.00	27.11	1000.0	9.000	L1	20.3
28.945000	49.90	---	73.00	23.10	1000.0	9.000	L1	20.3
28.945000	---	33.05	60.00	26.95	1000.0	9.000	L1	20.3
29.225000	52.56	---	73.00	20.44	1000.0	9.000	L1	20.3
29.225000	---	34.32	60.00	25.68	1000.0	9.000	L1	20.3
29.665000	53.41	---	73.00	19.59	1000.0	9.000	L1	20.3
29.665000	---	35.88	60.00	24.12	1000.0	9.000	L1	20.3
29.965000	54.07	---	73.00	18.93	1000.0	9.000	L1	20.3
29.965000	---	35.53	60.00	24.47	1000.0	9.000	L1	20.3

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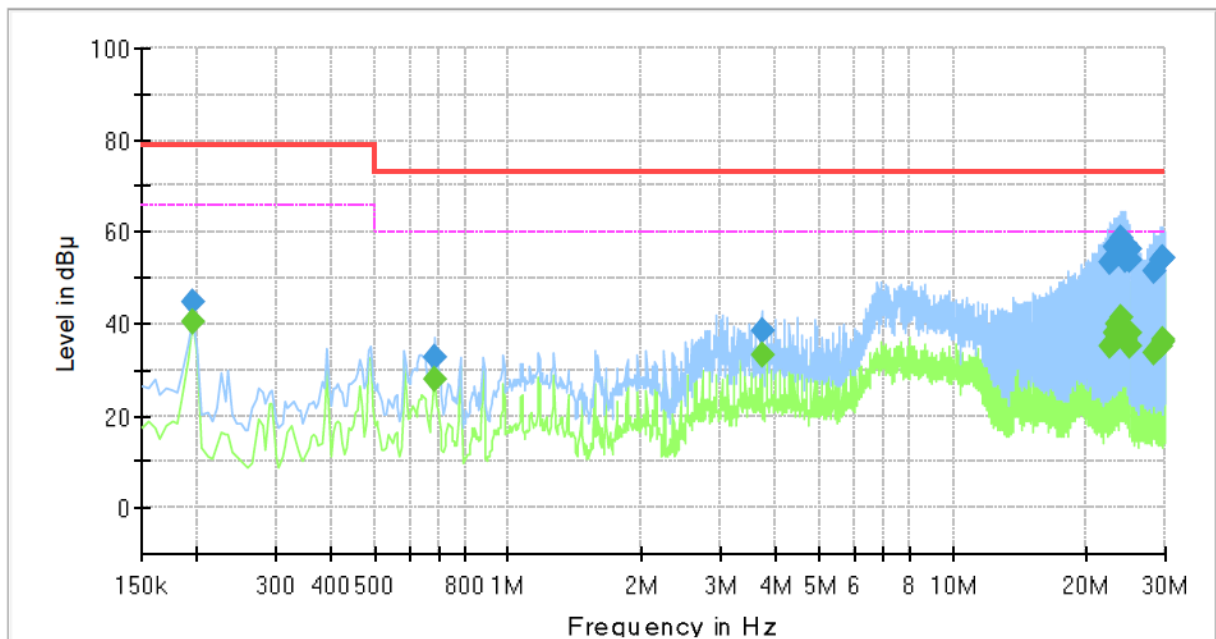
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KES-EM-22T0284
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NEUTRAL LINE

Common Information

Test Description:	Conducted Emission
Model No.:	HRX-1635
Phase:	
Mode:	N
Operator Name:	KES



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Report No.:

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Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.195000	44.73	---	79.00	34.27	1000.0	9.000	N	19.4
0.195000	---	40.52	66.00	25.48	1000.0	9.000	N	19.4
0.685000	32.77	---	73.00	40.23	1000.0	9.000	N	19.9
0.685000	---	27.78	60.00	32.22	1000.0	9.000	N	19.9
3.710000	38.44	---	73.00	34.56	1000.0	9.000	N	20.0
3.710000	---	33.28	60.00	26.72	1000.0	9.000	N	20.0
22.560000	53.27	---	73.00	19.73	1000.0	9.000	N	20.2
22.560000	---	35.22	60.00	24.78	1000.0	9.000	N	20.2
23.040000	56.59	---	73.00	16.41	1000.0	9.000	N	20.1
23.040000	---	37.89	60.00	22.11	1000.0	9.000	N	20.1
23.230000	---	39.77	60.00	20.23	1000.0	9.000	N	20.1
23.230000	56.71	---	73.00	16.29	1000.0	9.000	N	20.1
23.910000	58.90	---	73.00	14.10	1000.0	9.000	N	20.1
23.910000	---	41.47	60.00	18.53	1000.0	9.000	N	20.1
24.090000	55.38	---	73.00	17.62	1000.0	9.000	N	20.1
24.090000	---	37.66	60.00	22.34	1000.0	9.000	N	20.1
24.310000	---	38.68	60.00	21.32	1000.0	9.000	N	20.1
24.310000	57.27	---	73.00	15.73	1000.0	9.000	N	20.1
24.570000	---	36.48	60.00	23.52	1000.0	9.000	N	20.1
24.570000	53.97	---	73.00	19.03	1000.0	9.000	N	20.1
24.885000	---	38.01	60.00	21.99	1000.0	9.000	N	20.2
24.885000	56.30	---	73.00	16.70	1000.0	9.000	N	20.2
25.020000	---	35.35	60.00	24.65	1000.0	9.000	N	20.2
25.020000	53.91	---	73.00	19.09	1000.0	9.000	N	20.2
28.340000	---	33.83	60.00	26.17	1000.0	9.000	N	20.3
28.340000	51.32	---	73.00	21.68	1000.0	9.000	N	20.3
29.320000	---	35.36	60.00	24.64	1000.0	9.000	N	20.3
29.320000	53.72	---	73.00	19.28	1000.0	9.000	N	20.3
29.675000	---	36.83	60.00	23.17	1000.0	9.000	N	20.4
29.675000	54.53	---	73.00	18.47	1000.0	9.000	N	20.4
29.810000	---	36.22	60.00	23.78	1000.0	9.000	N	20.4
29.810000	54.36	---	73.00	18.64	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))

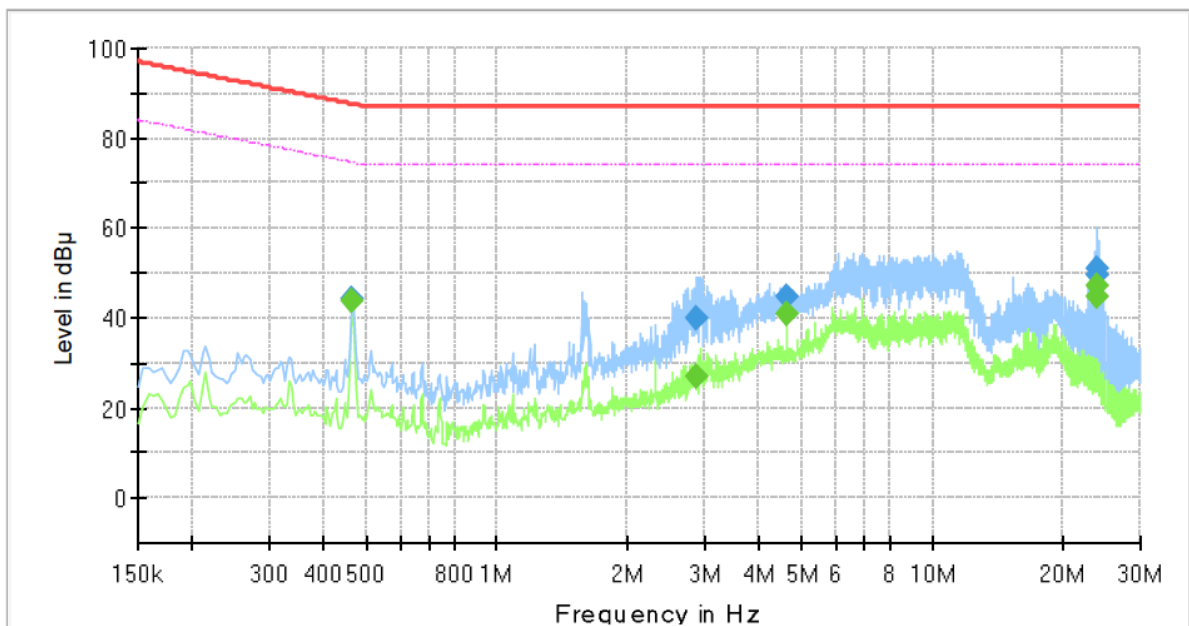
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Conducted Emissions at Telecommunication Ports

[1 000 Mbps]

Common Information

Test Description: Telecommunication Emission
 Model No.: HRX-1635
 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	---	43.90	74.58	30.68	1000.0	9.000	Single Line	19.5
0.466000	44.36	---	87.58	43.22	1000.0	9.000	Single Line	19.5
2.874000	---	27.04	74.00	46.96	1000.0	9.000	Single Line	20.1
2.874000	40.12	---	87.00	46.88	1000.0	9.000	Single Line	20.1
4.618000	---	41.14	74.00	32.86	1000.0	9.000	Single Line	19.6
4.618000	44.84	---	87.00	42.16	1000.0	9.000	Single Line	19.6
23.878000	---	44.82	74.00	29.18	1000.0	9.000	Single Line	20.2
23.878000	51.09	---	87.00	35.91	1000.0	9.000	Single Line	20.2
23.982000	---	47.33	74.00	26.67	1000.0	9.000	Single Line	20.2
23.982000	49.68	---	87.00	37.32	1000.0	9.000	Single Line	20.2

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

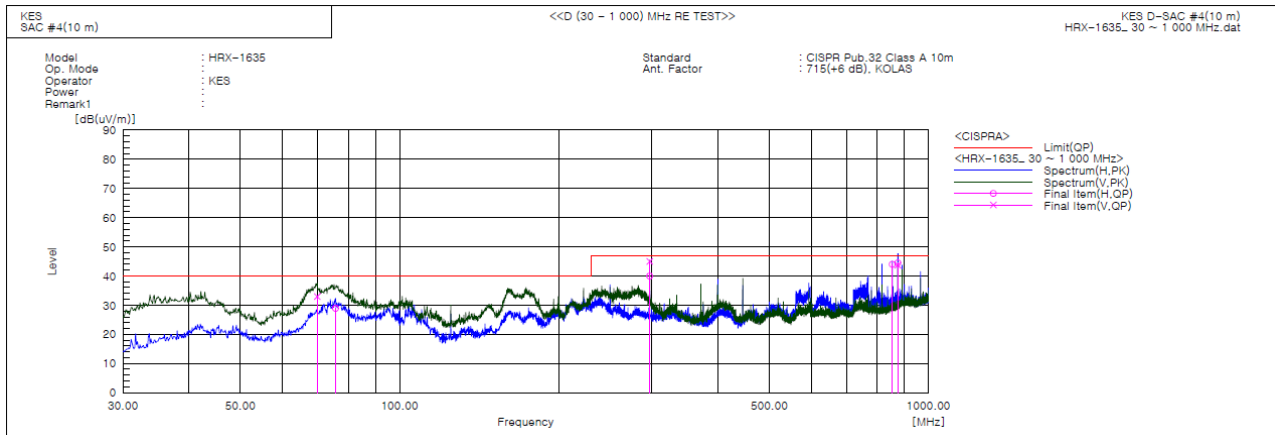
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Radiated Electric Field Emissions(Below 1 GHz)



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	69.891	V	57.8	-24.8	33.0	40.0	7.0	148.0	142.0	
2	75.711	H	56.0	-27.1	28.9	40.0	11.1	400.0	148.0	
3	296.993	H	58.1	-18.1	40.0	47.0	7.0	286.0	194.0	
4	297.016	V	63.1	-18.1	45.0	47.0	2.0	100.0	187.0	
5	853.894	H	49.4	-5.4	44.0	47.0	3.0	365.0	11.0	
6	874.991	V	48.3	-4.6	43.7	47.0	3.3	152.0	213.0	
7	875.000	H	49.1	-4.6	44.5	47.0	2.5	395.0	174.0	

◆ Calculation

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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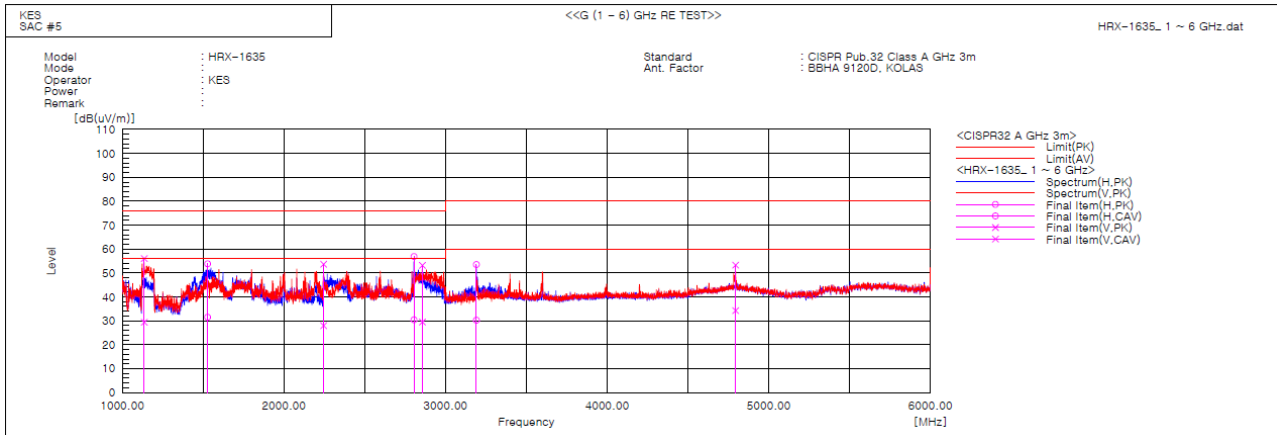
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Radiated Electric Field Emissions(Above 1 GHz)



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	1135.323	V	63.0	36.3	-6.9	56.1	29.4	76.0	56.0	19.9	26.6	100.0	14.1	
2	1527.880	H	58.6	36.3	-4.8	53.8	31.5	76.0	56.0	22.2	24.5	100.0	295.1	
3	2244.920	V	55.9	30.2	-2.2	53.7	28.0	76.0	56.0	22.3	28.0	100.0	317.4	
4	2804.822	H	56.5	30.0	0.4	56.9	30.4	76.0	56.0	19.1	25.6	100.0	297.1	
5	2856.482	V	52.6	29.0	0.6	53.2	29.6	76.0	56.0	22.8	26.4	100.0	348.5	
6	3190.842	H	52.0	28.8	1.5	53.5	30.3	80.0	60.0	26.5	29.7	100.0	91.2	
7	4794.777	V	46.7	27.7	6.6	53.3	34.3	80.0	60.0	26.7	25.7	100.0	150.7	

◆ Calculation

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

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

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

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

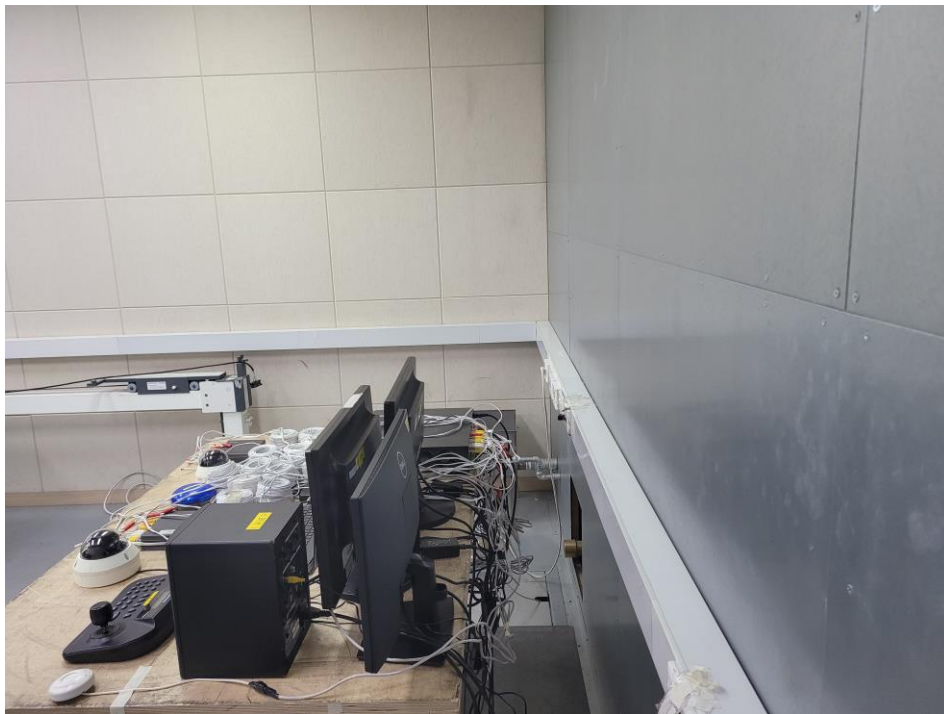
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Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports



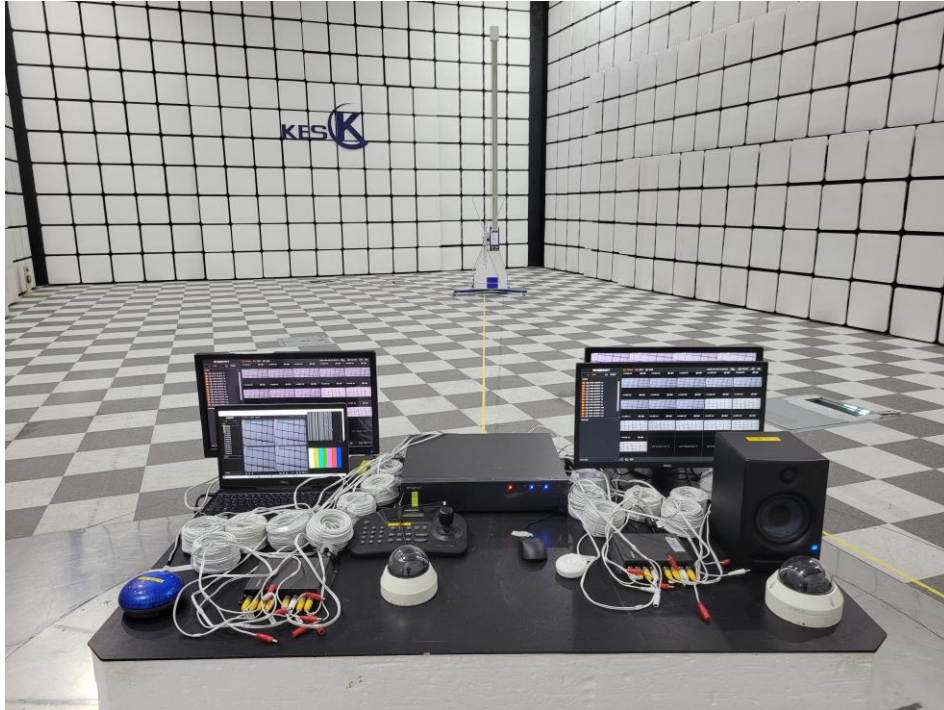
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Conducted Emissions at Telecommunication Ports



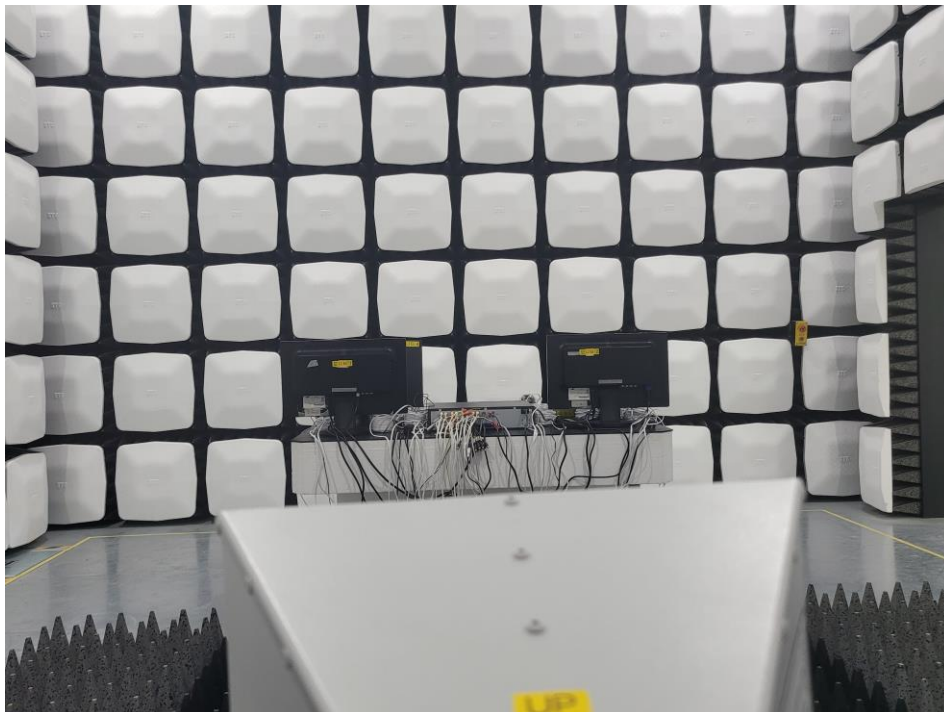
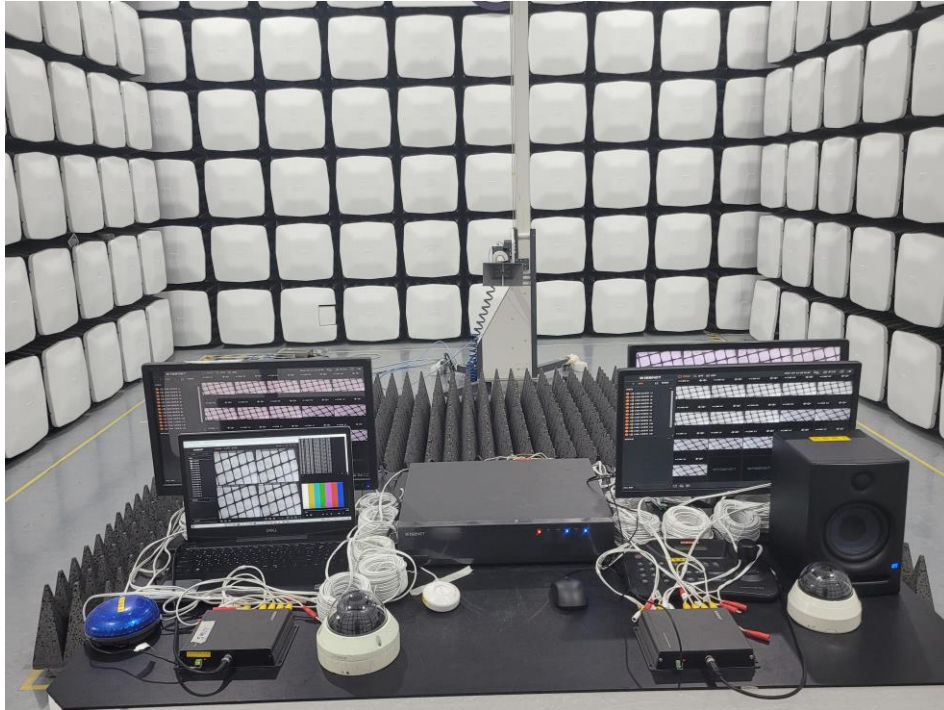
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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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EUT External Photographs

(Top)



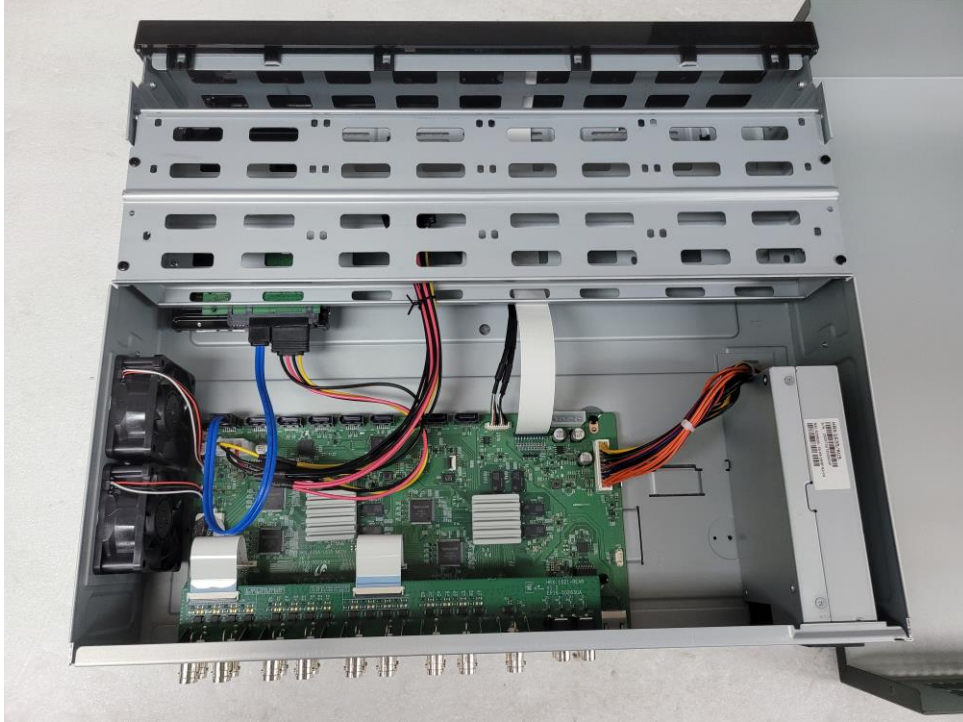
(Bottom)



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EUT Internal Photographs

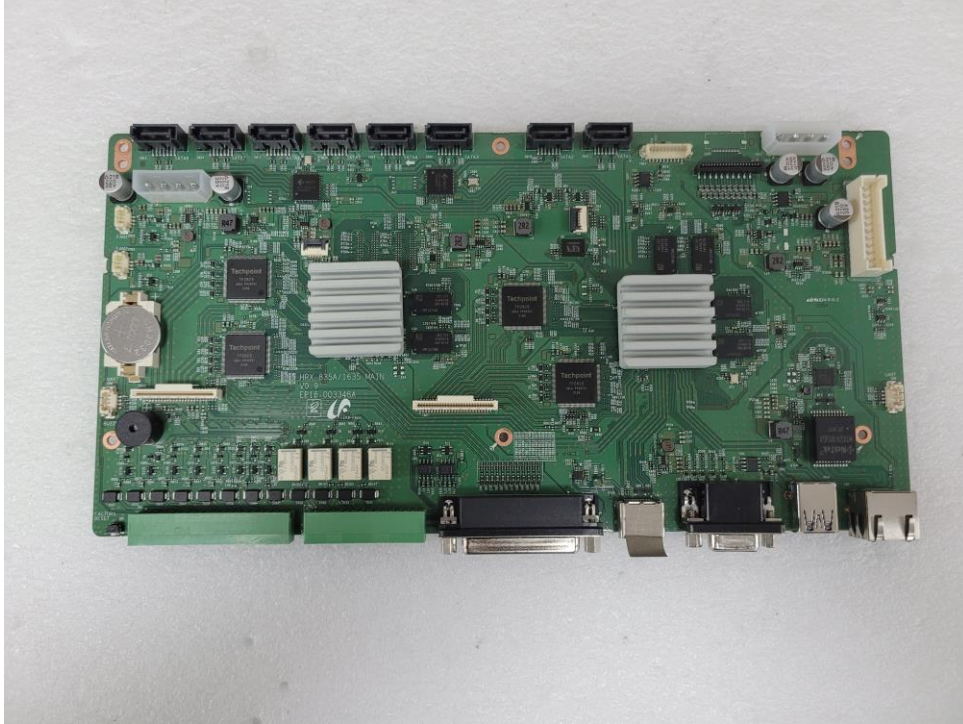
(Internal View)



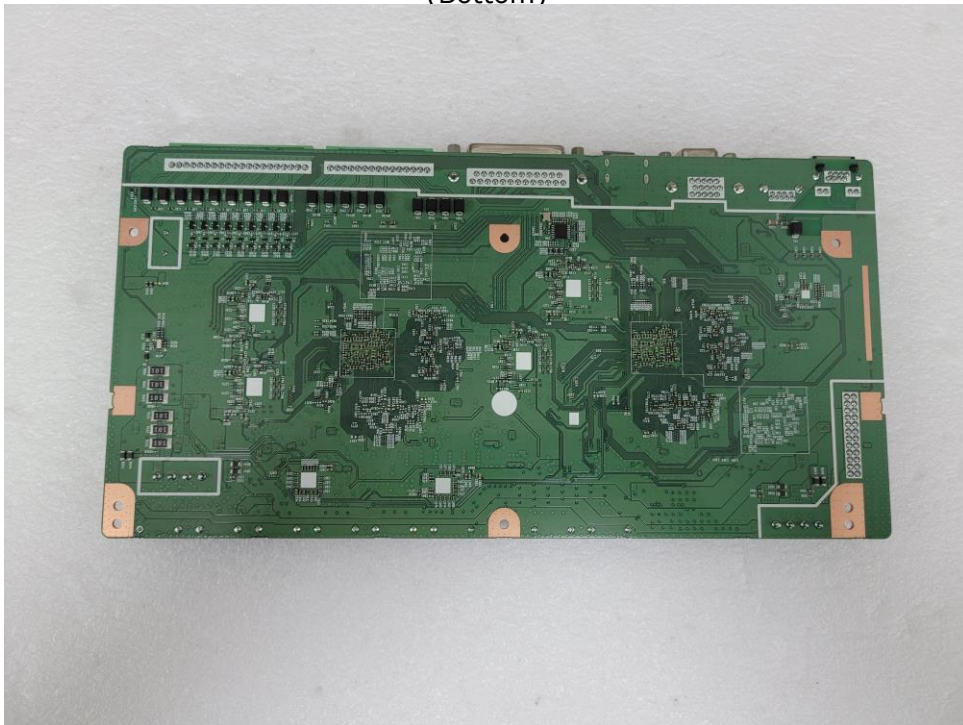
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EUT Internal View – Main Board

(Top)



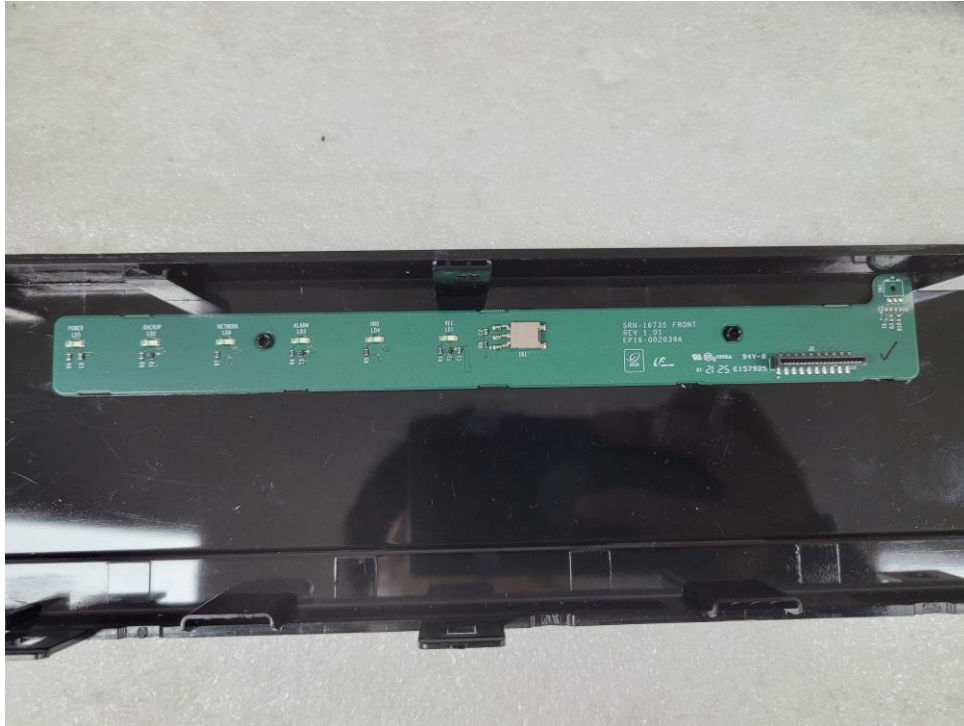
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EUT Internal View – LED Board

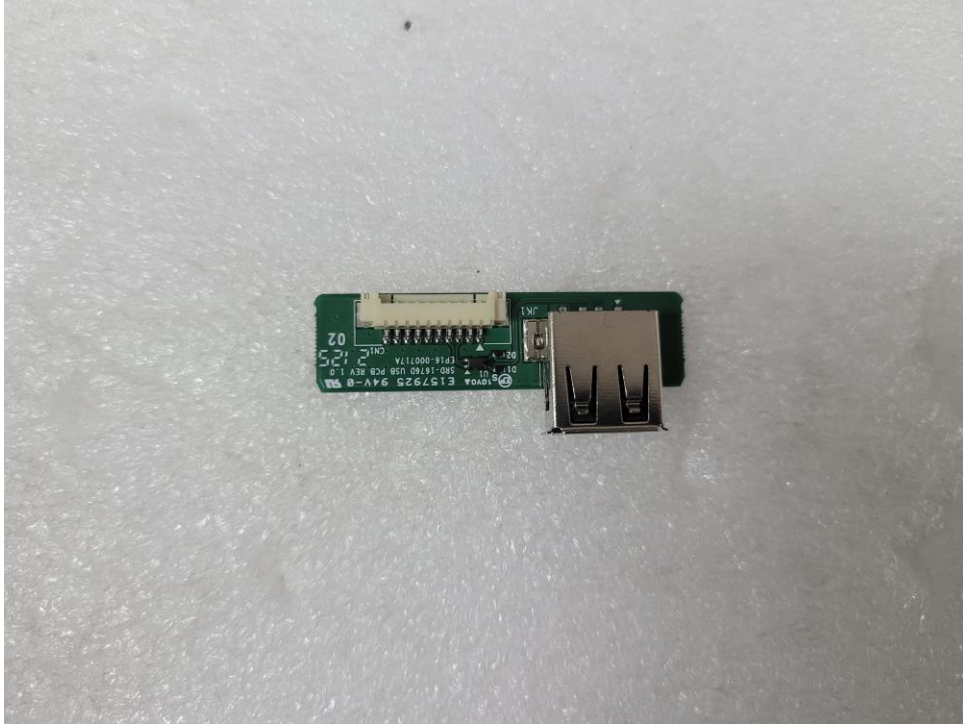
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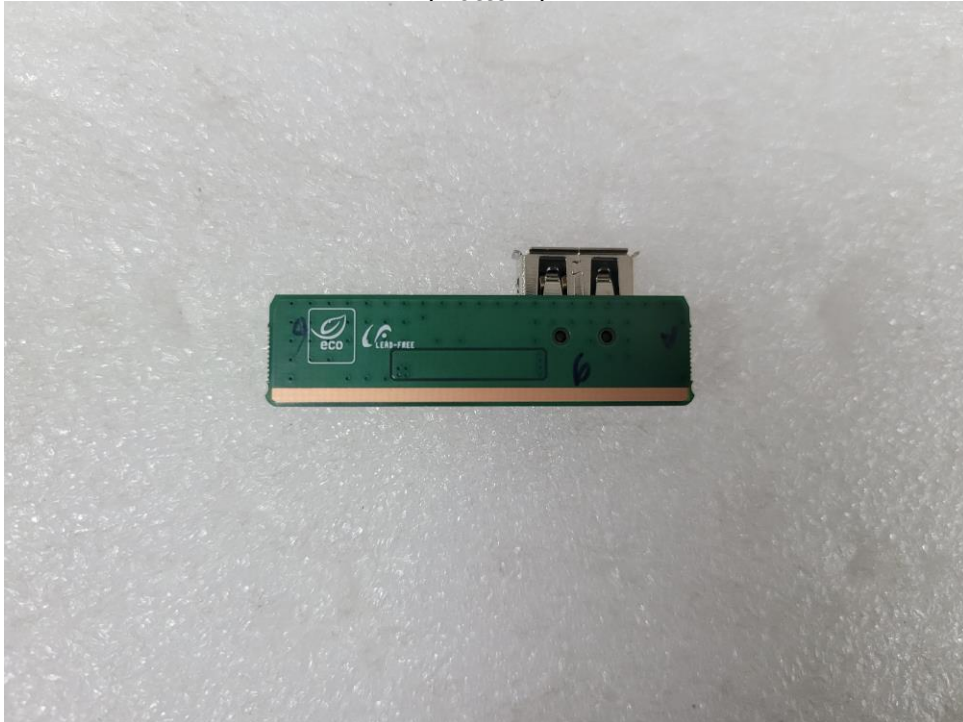
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EUT Internal View – USB Port Board

(Top)



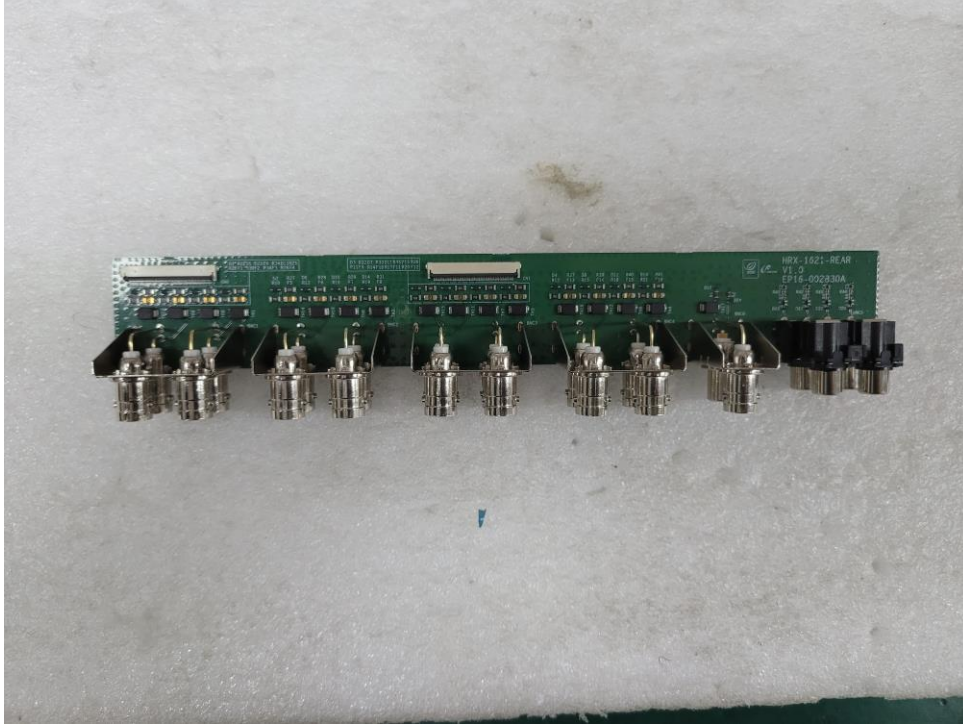
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EUT Internal View – Port Board

(Top)



(Bottom)



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