



EMC TEST REPORT For IC

Test Report No. : KES-EM-21T0318-R1
Date of Issue : Feb. 24, 2023
Product name : DVR
Model/Type No. : HRX-435
Variant Model : -
Applicant : Hanwha Vision Co., Ltd
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, Republic of Korea
Manufacturer : 1. HANWHA VISION VIETNAM COMPANY LIMITED
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. 20, 2021
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Seon Ho, Choi
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.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



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-21T0318-R1
Page (2) of (27)

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
May. 03, 2021	KES-EM-21T0318	Issued
Feb. 24, 2023	KES-EM-21T0318-R1	Change the Applicant and manufacturer at the request of the customer

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd. This document may be altered or revised by KES Co., Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by KES Co., Ltd. will constitute fraud and shall nullify the document.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



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-21T0318-R1
Page (3) of (27)

TABLE OF CONTENTS

1.0	General Product Description.....	4
1.1	Test Voltage & Frequency	6
1.2	Variant Model Differences	6
1.3	Device Modifications	6
1.4	Equipment Under Test.....	6
1.5	System Configuration	6
1.6	Support Equipments	7
1.7	External I/O Cabling	8
1.8	EUT Operating Mode(s)	9
1.9	Configuration.....	9
1.10	Remarks when standards applied	10
1.11	Calibration Details of Equipment Used for Measurement	10
1.12	Test Facility	10
1.13	Laboratory Accreditations and Listings	10
2.0	Test Regulations.....	11
2.1	Conducted Emissions Mains Power Ports.....	13
2.2	Radiated Electric Field Emissions(Below 1 GHz)	14
2.3	Radiated Electric Field Emissions(Above 1 GHz)	15
APPENDIX A – TEST DATA.....		16
Conducted Emissions at Mains Power Ports.....		16
Radiated Electric Field Emissions(Below 1 GHz)		18
Radiated Electric Field Emissions(Above 1 GHz)		19
Test Setup Photos and Configuration		20
Conducted Emissions at Mains Power Ports.....		20
Radiated Electric Field Emissions(Below 1 GHz)		21
Radiated Electric Field Emissions(Above 1 GHz)		22
EUT External Photographs		23
EUT Internal Photographs		24

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



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-21T0318-R1

Page (4) of (27)

1.0 General Product Description

Main Specifications of EUT are:

Display		
Analog camera	Inputs	4CH(1Vp-p 75ohm, BNC)
	Signal Type	AHD(8MP, 5MP, 4MP, 1080p, 720p)
Network camera	Inputs	HDTVI(8MP, 5MP, 4MP, 1080p, 720p) Max. 6CH
	Resolution	8MP ~ CIF
	Protocols	SUNAPI(Wisenet), ONVIF
Live	Local Display	HDMI: 3840 x 2160, 1920x1080, 1280x720 VGA: 1920x1080, 1280x720
	Multi Screen Display	[Local monitor] 1 / 2H / 2V / 3V / 4 / 6(1+5) / 6(3x2) / Auto sequence [Web] 1 / 4
	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(120fps)
Performance		
Operating System	Embedded	Linux
Record	Compression	H.265, H.264, MJPEG
	Record Rate(Analog)	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) 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. 25Mbps
	Resolution	8MP ~ CIF
	Mode	Manual, Schedule (Continuous/Event), Event(Pre/Post), Dual Track
	Event	Event Trigger
	Event Action	E-mail, PTZ preset, Alarm out, Buzzer, Monitor out
Search & Play	Playback Bandwidth	Max. 32Mbps (6CH simultaneously)
	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. 6 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
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, 720p 30/25fps/CH, SD 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.
Audio	Input/Output	4 Line in / 1 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, Smart Viewer, Wisenet mobile Support SDK/CGI(SUNAPI) for integration to 3rd party VMS

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



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-21T0318-R1

Page (5) of (27)

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(4ch) : Multi-Profile Support Playback(4Ch Multi Playback, Max 2MP) Event push
	Max. Remote Users	Search(3), Live Unicast(10)
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)
Storage		None
Reset		Switch(1EA)
HDD Key Lock		None
HDMI		1EA
VGA		1EA
BNC		4CH In / 1CH Out(Spot Output)
DP		None
e-SATA		None
Audio		Out(1EA, RCA, Line)
Ethernet		RJ-45(10/100 BASE-T)
Alarm		In 4EA, Out 2EA - Relay Out1(NO/NC/COM) - Relay Out2(NO/COM)
USB		2EA(Front/Rear USB2.0)
GPS		None
WiFi		None
Serial(Protocols)		RS-485/422 (Samsung-T/Pelco-D/Pelco-p) * for PTZ
Power inlet		1EA DC Input Jack
System		
Log	Log List	Max. 20,000 (System Log, Event Log each)
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		DC12V
Power Consumption		Max. 40W (6T HDD 2ea)
PoE Budget		None
Mechanical		
Color / Material		Black / Metal
Dimension (WxHxD)		370.0x 44.0 x 320mm(14.57" x 1.73" x 12.6")
Weight		Approx. 2.4Kg (2TB HDD 1ea)

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



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 120 V, 60 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-434	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT

1.5 System Configuration

Description	Model Number	Serial Number	Manufacturer	Remarks
Mouse	MOKJUO	-	Primax Electronics Ltd.	-
HDD	ST2000VX003	Z52B1P7Q	SEAGATE	2 TB
DVR Adaptor	KPL-048-VI	-	Channel Well Techonolohgy (Guangzhou) Co.,Ltd.	-



1.6 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Camera	HCD-7030RA	-	HANWHA VISION VIETNAM COMPANY LIMITED	-
Camera Adaptor	MC12D- 1200500	-	Shen zhen MaCable Technology co.,ltd	
Video splitter	SPE-410	-	HANWHA VISION VIETNAM COMPANY LIMITED	-
Video splitter Adaptor	2ACB022F	-	Channel Well Technology (Guangzhou) Co., Ltd	
Notebook	ProBook4430s	-	HP	-
Notebook Adapter	SeriesPPP0009H	-	CHICONY POWER TECHNOLOGY (SUZHOU) CO.,LTD,	-
Alarm IN	-	-	-	-
Alarm OUT	-	-	-	-
Monitor1	SMT-2232	C95V67VF900025B	WeiHai Daewoo Electronics Co., Ltd.	-
Monitor2	HSTND-7041-L	6CM6020YQQ	HP Inc.	-
Monitor3	S24E370DL	0NTWHTPH200179Y	Samsung Electronics Co., Ltd.	-
Monitor3 Adaptor	HP14300	-	Haneulcomplus Co., Ltd.	-
iPad	A1432	DQXJWFHDF193	APPLE .Inc	-
Speaker	BR1000A CUVE	-	Britz	-
Controller	SPC-1010	C50E67WG10100F	SamSung Techwin Co.,Ltd.	-
Controller Adaptor	RS-AB1000	-	Dongguan JinhuaSheng Power Technology Co.,Ltd.	-
USB Memory	-	-	Sandisk	32 GB
DVD Player	IV-8000HD	-	Shenzhen Wanlida Education Electronics Co., Ltd	



1.7 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
DVR (EUT)	NETWORK	Notebook	RJ-45	3.5	U
	Alarm OUT	Alarm OUT	Alarm IN	3.0	U
	Alarm IN	Alarm IN	Alarm OUT	3.0	U
	RS485	Controller	2 PIN	3.0	U
	Audio OUT	Speaker	Audio IN	1.4	U
	Audio IN	iPad	Audio OUT	1.7	U
	USB	USB Memory	USB	-	-
	VIDEO IN 1	Video splitter	BNC	0.8	S
	VIDEO IN 2		BNC	0.8	S
	VIDEO IN 3		BNC	0.8	S
	VIDEO IN 4		BNC	0.8	S
	Audio IN 1	DVD Player	Audio OUT	1.0	U
	Audio IN 2		Audio OUT	1.0	U
	Audio IN 3		Audio OUT	1.0	U
	SPOT	Monitor1	BNC	3.0	S
	VGA OUT	Monitor2	D-sub	1.6	U
	HDMI	Monitor3	HDMI	1.5	S
	USB	Mouse (EUT)	USB	1.8	U
Video splitter	BNC	Camera	BNC	1.5	U

* Unshielded=U, Shielded=S

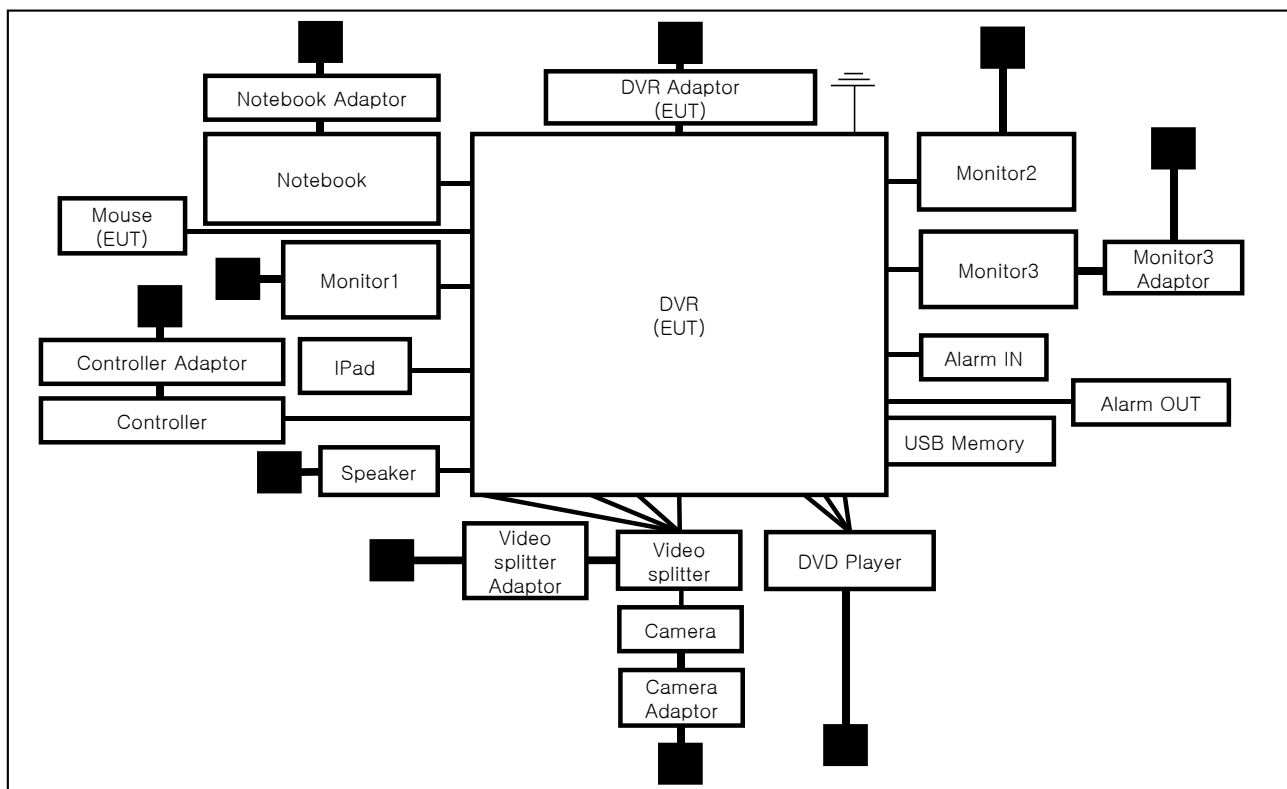
1.8 EUT Operating Mode(s)

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 Vision Co., Ltd

1.9 Configuration

■ AC Main
 □ DC Main



1.10 Remarks when standards applied

N/A

1.11 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.

1.12 Test Facility

The measurement facility is located at 473-21, Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea, Republic of. The sites are constructed in conformance with the requirements of ANSI C63.4a-2017 and CISPR 16-1-4:2019

1.13 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Anechoic Chamber 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 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
JAPAN	VCCI	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)	 C-20136, T-20137, R-20181, G-20176
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Anechoic Chamber 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

☐ Group 2

☐ Class A

☐ Class B

☐ EN 55014-1:2006 +A2:2011

☐ EN 55014-2:1997 +A2:2008

☐ EN 55015:2013

☐ EN 61547 :2009

☐ EN 55032:2012

☐ Class A

☐ Class B

☐ EN 55024:2010 +A1:2015

☐ EN 50130-4:2011 +A1:2014

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



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-21T0318-R1

Page (12) of (27)

-
- | | | |
|---|---|----------------------------------|
| ☐ VCCI V-3 / 2015.04 | ☐ Class A | ☐ Class B |
| ☐ AS/NZS CISPR22:2009 +A1:2010 | ☐ 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 | | |

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

**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-21T0318-R1

Page (13) of (27)

2.1 Conducted Emissions Mains Power Ports

Test Date

Apr. 20, 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: (23,6 ± 0,1) °C

Relative Humidity: (45,4 ± 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

RemarksSee Appendix A for test data.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



2.2 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Apr. 20, 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 ± 0,3) °C

Relative Humidity: (46,0 ± 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.

**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-21T0318-R1

Page (15) of (27)

2.3 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Apr. 20, 2021

Test Location

SEMI ANECHOIC CHAMBER #5

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.120	-
☒	EMI TEST RECEIVER	ESU26	Rohde & Schwarz	100552	04, 01, 2022
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	12, 14, 2021
☒	PREAMPLIFIER	8449B	HP	3008A00538	06, 23, 2021

Test Conditions

Temperature: (23,8 ± 0,4) °C

Relative Humidity: (42,7 ± 0,3) % R.H.

Frequency Range of Measurement

1 GHz to 5 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

RemarksSee Appendix A for test data.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

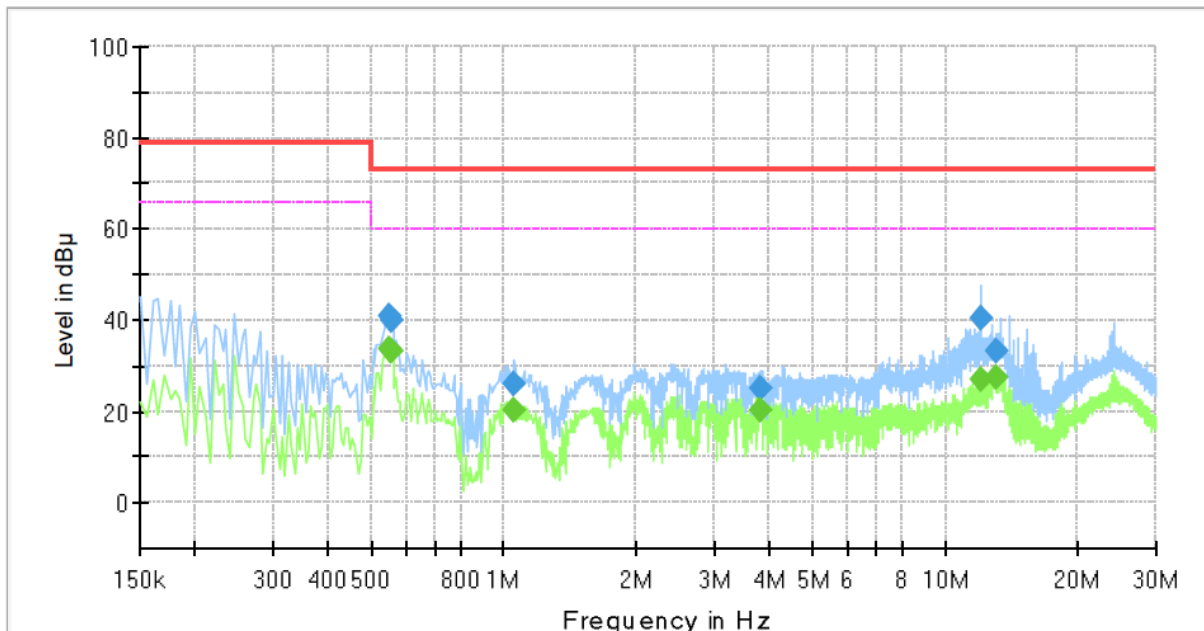
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

HOT LINE

Common Information

Test Description:	Conducted Emission
Model No.:	HRX-435
Phase:	H
Mode:	120 V 60 Hz
Operator Name:	KES



Final Result

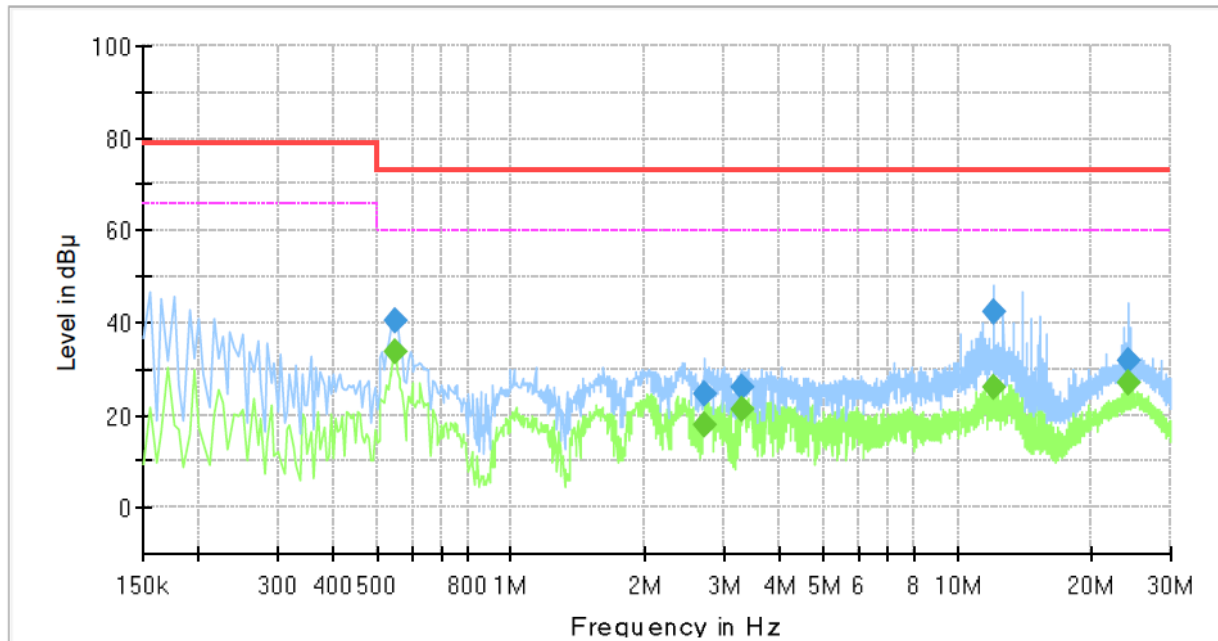
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.550000	---	33.92	60.00	26.08	1000.0	9.000	L1	19.8
0.550000	40.78	---	73.00	32.22	1000.0	9.000	L1	19.8
0.555000	---	33.14	60.00	26.86	1000.0	9.000	L1	19.8
0.555000	40.12	---	73.00	32.88	1000.0	9.000	L1	19.8
1.055000	---	20.20	60.00	39.80	1000.0	9.000	L1	20.1
1.055000	26.21	---	73.00	46.79	1000.0	9.000	L1	20.1
3.830000	---	20.42	60.00	39.58	1000.0	9.000	L1	19.9
3.830000	24.83	---	73.00	48.17	1000.0	9.000	L1	19.9
12.050000	---	26.99	60.00	33.01	1000.0	9.000	L1	20.0
12.050000	40.55	---	73.00	32.45	1000.0	9.000	L1	20.0
13.125000	---	27.41	60.00	32.59	1000.0	9.000	L1	19.9
13.125000	33.27	---	73.00	39.73	1000.0	9.000	L1	19.9

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact kes@kes.co.kr

NEUTRAL LINE

Common Information

Test Description:	Conducted Emission
Model No.:	HRX-435
Phase:	N
Mode:	120 V 60 Hz
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.550000	---	33.54	60.00	26.46	1000.0	9.000	N	19.8
0.550000	40.33	---	73.00	32.67	1000.0	9.000	N	19.8
2.710000	---	17.89	60.00	42.11	1000.0	9.000	N	20.2
2.710000	24.64	---	73.00	48.36	1000.0	9.000	N	20.2
3.275000	---	21.16	60.00	38.84	1000.0	9.000	N	20.1
3.275000	26.12	---	73.00	46.88	1000.0	9.000	N	20.1
12.050000	---	26.18	60.00	33.82	1000.0	9.000	N	20.0
12.050000	42.43	---	73.00	30.57	1000.0	9.000	N	20.0
24.250000	---	26.84	60.00	33.16	1000.0	9.000	N	20.2
24.250000	32.00	---	73.00	41.00	1000.0	9.000	N	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 (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

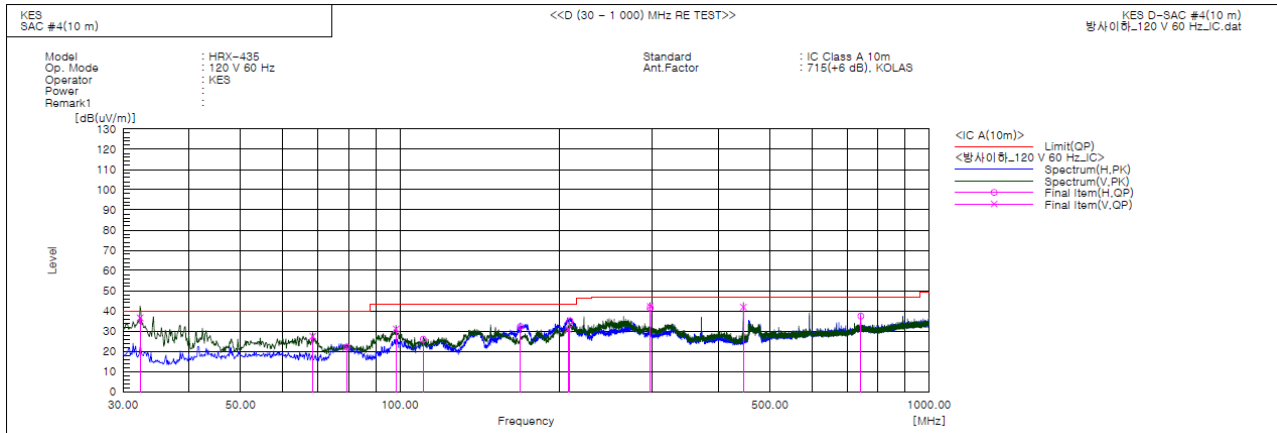


KES Co., Ltd.

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-21T0318-R1
Page (18) of (27)

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	32.304	V	61.7	-25.1	36.6	40.0	3.4	103.0	24.0	
2	68.436	V	51.8	-24.3	27.5	40.0	12.5	101.0	91.0	
3	79.349	H	49.8	-27.7	22.1	40.0	17.9	391.0	187.0	
4	98.385	V	53.8	-22.7	31.1	43.5	12.4	151.0	202.0	
5	110.753	H	48.3	-22.3	26.0	43.5	17.5	302.0	276.0	
6	168.953	H	56.4	-24.1	32.3	43.5	11.2	309.0	183.0	
7	207.995	V	51.5	-20.6	30.9	43.5	12.6	191.0	175.0	
8	209.571	H	55.6	-20.5	35.1	43.5	8.4	351.0	135.0	
9	296.943	H	59.6	-18.0	41.6	47.0	5.4	359.0	254.0	
10	296.993	V	60.3	-18.0	42.3	47.0	4.7	193.0	129.0	
11	445.524	V	55.2	-13.3	41.9	47.0	5.1	184.0	190.0	
12	742.465	H	43.3	-5.9	37.4	47.0	9.6	400.0	101.0	

◆ Calculation – SAC #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

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



KES Co., Ltd.

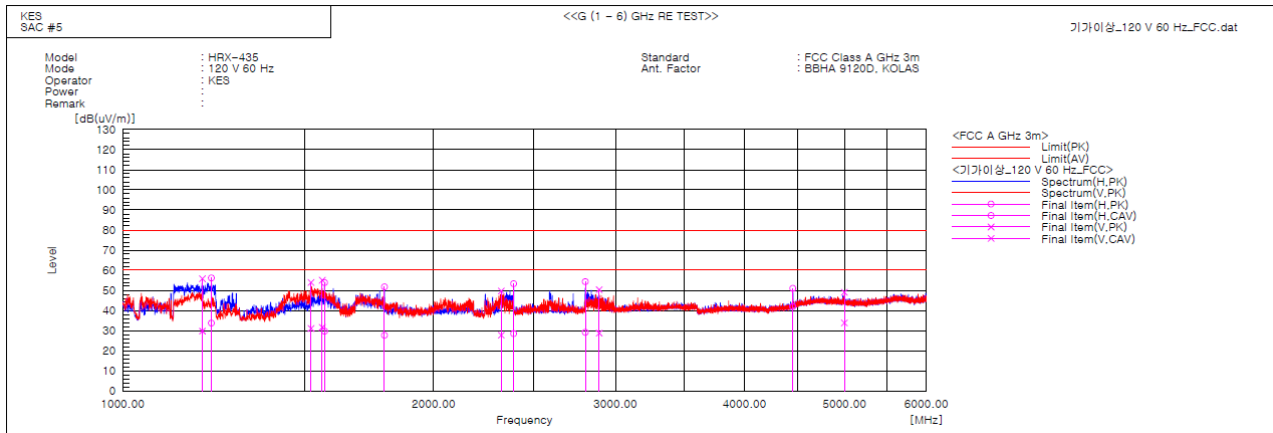
3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-21T0318-R1

Page (19) of (27)

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	1194.375	V	62.5	36.5	-6.7	55.8	29.8	80.0	60.0	24.2	30.2	191.0	335.9	
2	1218.750	H	62.7	40.2	-6.5	56.2	33.7	80.0	60.0	23.8	26.3	351.0	55.8	
3	1521.250	V	59.2	36.3	-5.2	54.0	31.1	80.0	60.0	26.0	28.9	180.0	41.7	
4	1560.000	V	60.1	36.6	-5.0	55.1	31.6	80.0	60.0	24.9	28.4	119.0	46.4	
5	1568.750	H	58.9	34.7	-5.0	53.9	29.7	80.0	60.0	26.1	30.3	301.0	39.3	
6	1792.500	H	55.9	31.8	-4.1	51.8	27.7	80.0	60.0	28.2	32.3	297.0	15.9	
7	2325.625	V	52.2	30.3	-2.5	49.7	27.8	80.0	60.0	30.3	32.2	138.0	50.7	
8	2390.625	H	55.6	30.8	-2.3	53.3	28.5	80.0	60.0	26.7	31.5	305.0	9.1	
9	2805.000	H	54.8	29.6	-0.5	54.3	29.1	80.0	60.0	25.7	30.9	309.0	45.4	
10	2893.125	V	50.7	29.1	-0.3	50.4	28.8	80.0	60.0	29.6	31.2	156.0	46.7	
11	4455.000	H	46.5	37.4	4.5	51.0	41.9	80.0	60.0	29.0	18.1	325.0	343.2	
12	4998.125	V	42.0	26.7	7.1	49.1	33.8	80.0	60.0	30.9	26.2	112.0	131.5	

◆ 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

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports



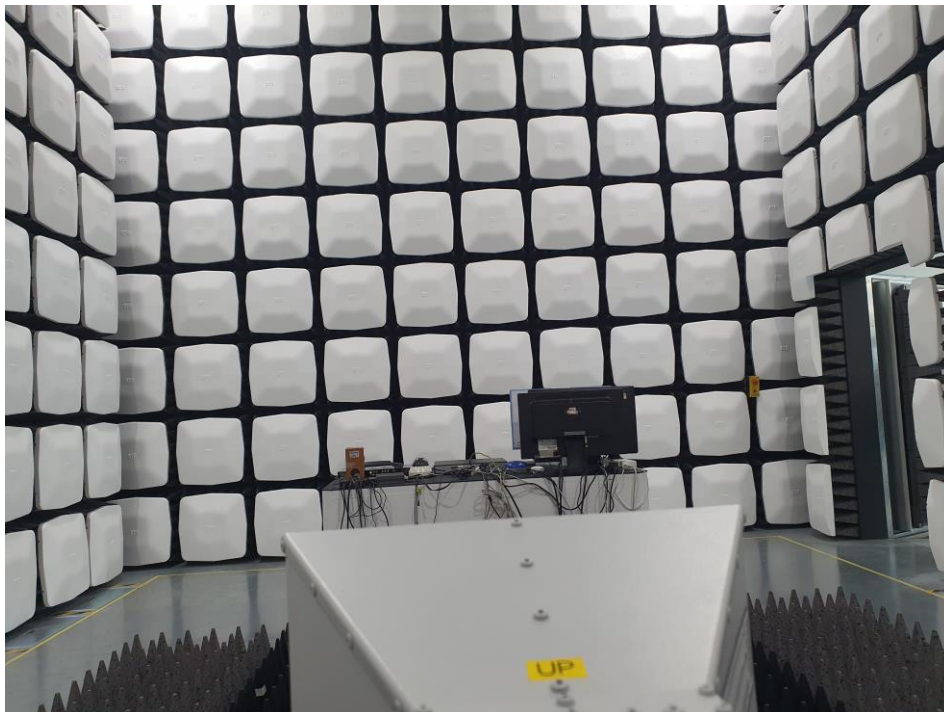
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Radiated Electric Field Emissions(Below 1 GHz)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Radiated Electric Field Emissions(Above 1 GHz)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

EUT External Photographs

(Top)



(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

EUT Internal Photographs

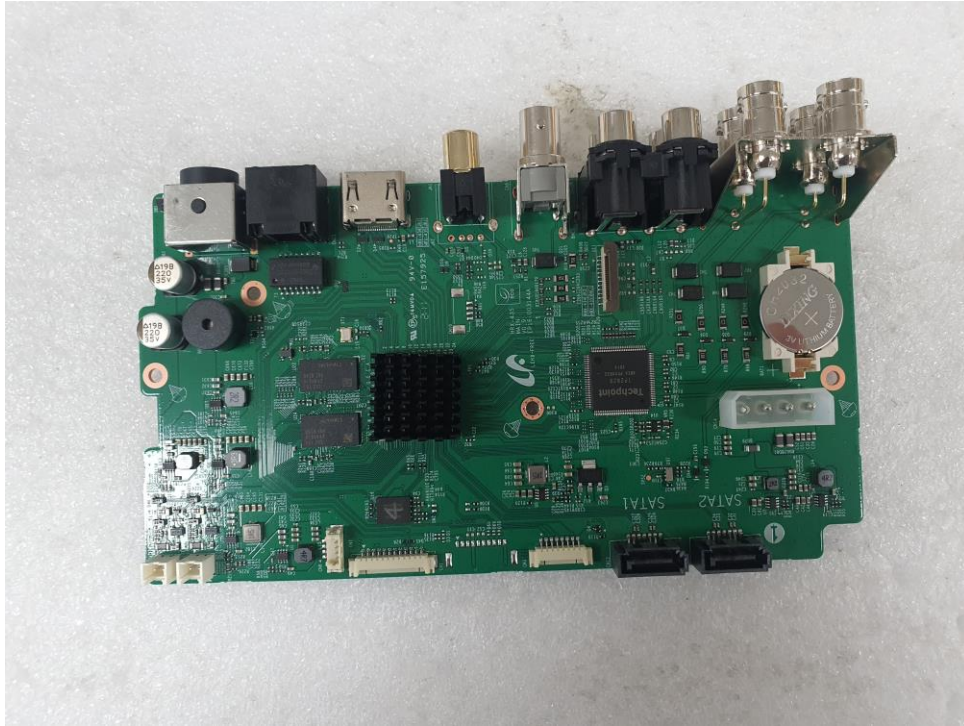
(Internal View)



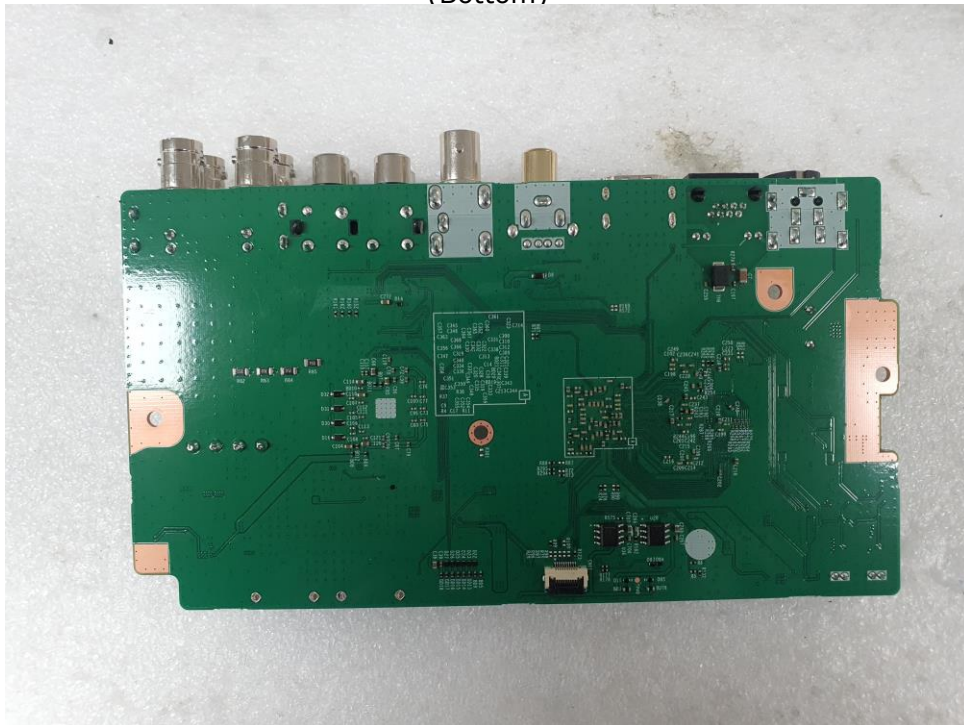
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

EUT Internal View – Board 1

(Top)



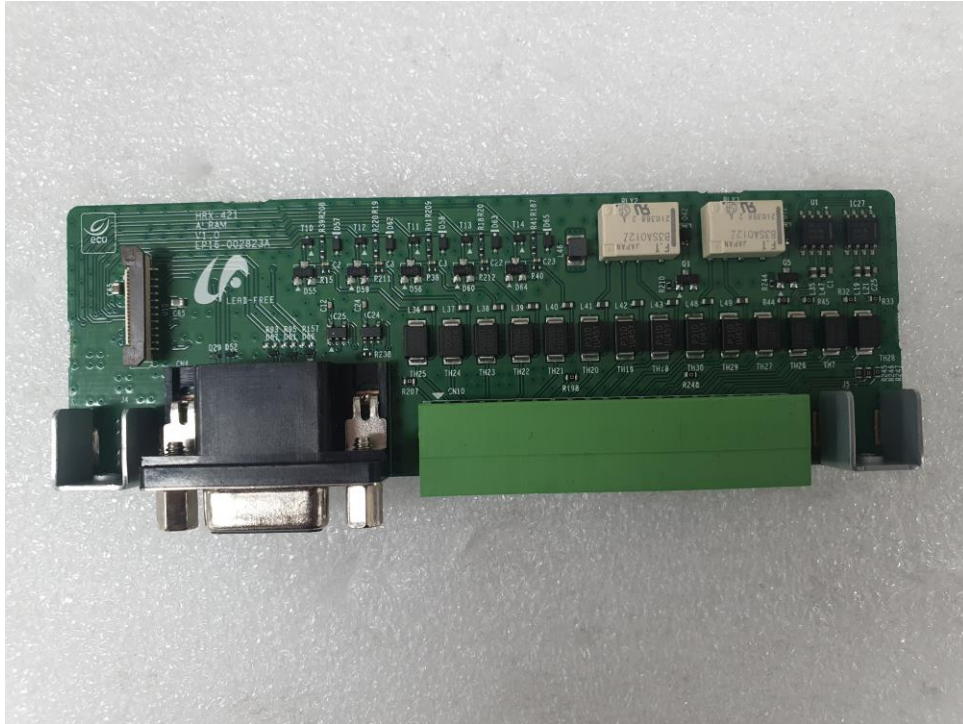
(Bottom)



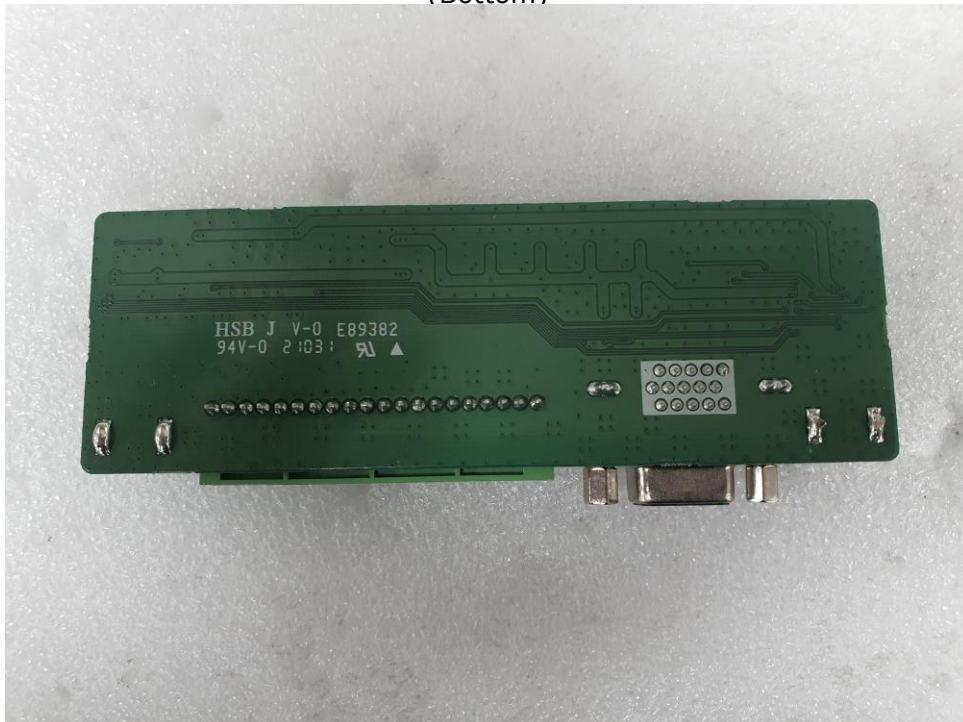
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

EUT Internal View – Board 2

(Top)



(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Label Photographs



CAN ICES-3 (A)/NMB-3(A)

[LABEL VIEW]