EMC TEST REPORT

Test Report No.	:	KES-EM-23T0301
Date of Issue	:	Apr 10, 2023
Product Name	:	NETWORK VIDEO ENCODER
Model/Type No.	:	SPE-1630
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	:	Mar 23, 2023
Test Date	:	Mar 25, 2023 ~ Mar 30, 2023
Test Results	:	☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Jae Won, Lee
EMC Test Engineer

Reviewed by

Dae Jung, Choi
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

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Apr 10, 2023	KES-EM-23T0301	Issued

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.

TABLE OF CONTENTS

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

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

1.0 General Product Description

Main Specifications of EUT are:

Specifications

Video	
Input Channel	16CH BNC, 1.0 Vp-p / 75Ω composite NTSC/PAL
Input Signal & Resolution	CVBS, AHD/CVI/TVI (1, 2, 4, 5MP) Auto Detection
Video Out	1 HDMI OUT (16 multi Image, 1920x1080)

Operational	
Motion Detection	Off / On
Privacy Masking	Off / On (4ea rectangular zones)
De-Interlacing	support
Alarm I/O	16 Input/ 4 Output
Alarm Trigger	Motion Detection, Alarm Input, Video Loss, Tampering, Network disconnect
Alarm Events	File Upload Via FTP, E-mail
Audio I/O	4 Line Input / 1 Line Output(1 NO/COM/NC, 3 NO/COM)
OSD	Title
Remote Control Interface	1ea RS-485(Half Duplex)
RS-485 Protocol	SAMSUNG-T, PELCO-P/D
Coaxial Control	CVBS(Pelco-C) AHD, TVI, CVI

Network	
Ethernet	1 RJ-45 10/100/1000 Base-T
Video Compression Format	H.265, H.264 (MPEG-4 Part 10/AVC) : Main / Baseline / High, MJPEG
Resolution	2560x1920, 2560x1440, 1920x1080, 1280x720, 928x480(N), 928x240(N), 704x480(N), 704x240(N), 640x368, 352x240(N) 928x576(P), 928*288(P), 704x576(P), 704x288(P), 640x368, 352x288(P)
Max. Framerate	- Main Stream 5MP : 12fps/CH, 4MP : 15fps/CH, 1080p/720p/WD1/4CIF/CIF : 30fps/CH(N), 25fps/CH(P) - Sub Stream WD1/4CIF : 30fps/CH, 2CIF/CIF/QVGA/QCIF : 30fps/CH(N), 25fps/CH(P) - MJPEG : 5fps @ 640x368, 352x240, SD Camera : 5fps @ 480x240, 352x240
Bitrate Control Method	H.265, H.264 : CBR or VBR
Streaming Capability	Multiple Streaming (Up to 3 Profiles per channel)
Audio Compression	G.711 u-law
IP	IPv4, IPv6
Protocol	TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP,RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, UPnP, ONVIF, Bonjour
Security	HTTPS (SSL) Login Authentication, Digest Login Authentication IP Address Filtering, User Access Log, 802.1X Authentication (EAP-TLS, EAP-LEAP)
Streaming Method	Unicast / Multicast
Max. User Access	rtp/rtsp max. 48 users(4 Users/CH) at Unicast Mode , http max.32 users
Webpage Languages	English, French, German, Spanish, Italian, Russian, Turkish, Polish, Dutch, Swedish, Portuguese, Czech, Chinese, Japanese, Korean, Hungarian, Greek
Web Viewer	Supported OS : Windows 10 or later, Mac OS X 10.13 or later Non-plugin WebViewer Supported Browser : Google Chrome 80 or later,, MS Edge 83 or later, Mozilla Firefox 72 or later, Apple Safari 11.0.1 or later

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

Application Programming Interface	ONVIF profile S, SUNAPI (HTTP API)
Compatabile Software & Recoder	SmartViewer), SSM, NVR(Hanwha Techwin, P/X/Q/L series)

Environmental

Operating Temperature / Humidity	-10°C ~ +50°C / 20% ~ 80% RH (-10°C ~ +40°C when installed in RACK)

Electrical

Input Voltage / Current	DC12V/5A
Power Consumption	MAX : 20.0W (12V, 1.67A)

Mechanical

Color / Material	Black / Metal
Dimension (WxHxD)	(W) 370.0 × (H) 44.0 x (D) 320.0(include Connector 330.9)mm
Weight	2.32kg(5.115lb)

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 230 V, 50 Hz

1.2 Variant Model Differences

Not applicable

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
NETWORK VIDEO ENCODER	SPE-1630	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT

1.5 System Configuration

Description	Model Number	Serial Number	Manufacturer	Remarks
AC/DC Adapter	FSP060-DHAN3	-	Zhonghan Electronics (Shenzhen) Co., Ltd.	-

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

1.6 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	Latitude 5300	8C47BE45C060	DELL INC.	-
Notebook Adapter	HA65NM130	-	Chicony Power Technology (Suzhou)Co.,Ltd.	-
Monitor	24M47VQ	-	LG	-
Monitor Adapter	LCAP26-E	-	Genmao Electronics (Suzhou) Co., Ltd	-
Speaker	BR10000A CUVE	-	BEIJING EDIFIER HI-TECH GROUP.	-
Controller	SPC-1010	C50E67WG10100F	SamSung Techwin Co.,Ltd.	-
Controller Adapter	AP-12005A	-	A Power Co., Ltd.	-
Alarm	PRO-SL	-	SENSOR PRO	-
Button Alarrm	-	-	-	-
Camera 1	HCD-6020R	-	HANWHA VISION VIETNAM COMPANY LIMITED	-
Camera 1 Adapter	2ACB022F	-	Channel Well Technology (Guangzhou) Co., Ltd.	-
Camera 2	RS-CA292NC-S-36W-ST	-	-	-
Camera 2 Adapter	JL1205B	-	Dooheon Electric Co., Ltd.	-
Network Video Encoder1	SPE-410	-	HANWHA TECHWIN CO.,LTD.	-
Network Video Encoder2	SPE-410	-	HANWHA TECHWIN CO.,LTD.	-
Network Video Encoder Adapter 1	DAD12050DKA	-	Dream Electronics Co., Ltd.	-
Network Video Encoder Adapter 2	2ACB022F	-	Channel Well Technology (Guangzhou) Co., Ltd.	-

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

1.7 External I/O Cabling

Start		END		Cable Spec.	
Description	**I/O Port**	**Description**	**I/O Port**	**Length**	**Shield**
NETWORK VIDEO ENCODER (EUT)	DC Jack	AC/DC Adapter (EUT)	DC Jack	1.3	U
	Enclosure Ground	Ground	Enclosure Ground	3.5	-
	RJ-45	Notebook	RJ-45	4.0	U
	Audio Input (RCA)		3.5 ㎜	1.5	U
	HDMI	Monitor	HDMI	2.0	S
	Audio Output (RCA)	Speaker	Audio Input (RCA)	1.5	U
	RS-485	Controller	RS-485	3.5	U
	Alarm Output	Alarm	Alarm Input	3.5	U
	Alarm Input	Button Alarrm	Alarm Output	3.5	U
	BNC_1 ~ 8	Network Video Encoder 1	BNC	10.0	S
	BNC_9 ~ 16	Network Video Encoder 2	BNC	10.0	S
Network Video Encoder 1	BNC	Camera 1	BNC	10.0	S
Network Video Encoder 2	BNC	Camera 2	BNC	2.0	S
Controller	DC Jack	Controller Adapter	DC Jack	1.7	U
Camera 1	DC Jack	Camera 1 Adapter	DC Jack	1.5	U
Camera 2	DC Jack	Camera 2 Adapter	DC Jack	1.5	U
Network Video Encoder 1	2 Pin	Network Video Encoder Adapter 1	2 Pin	1.6	U
Network Video Encoder 2	2 Pin	Network Video Encoder Adapter 2	2 Pin	1.6	U
Monitor	DC Jack	Monitor Adapter	DC Jack	1.5	U
Notebook	DC Jack	Notebook Adapter	DC Jack	1.5	U

* Unshielded=U, Shielded=S

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

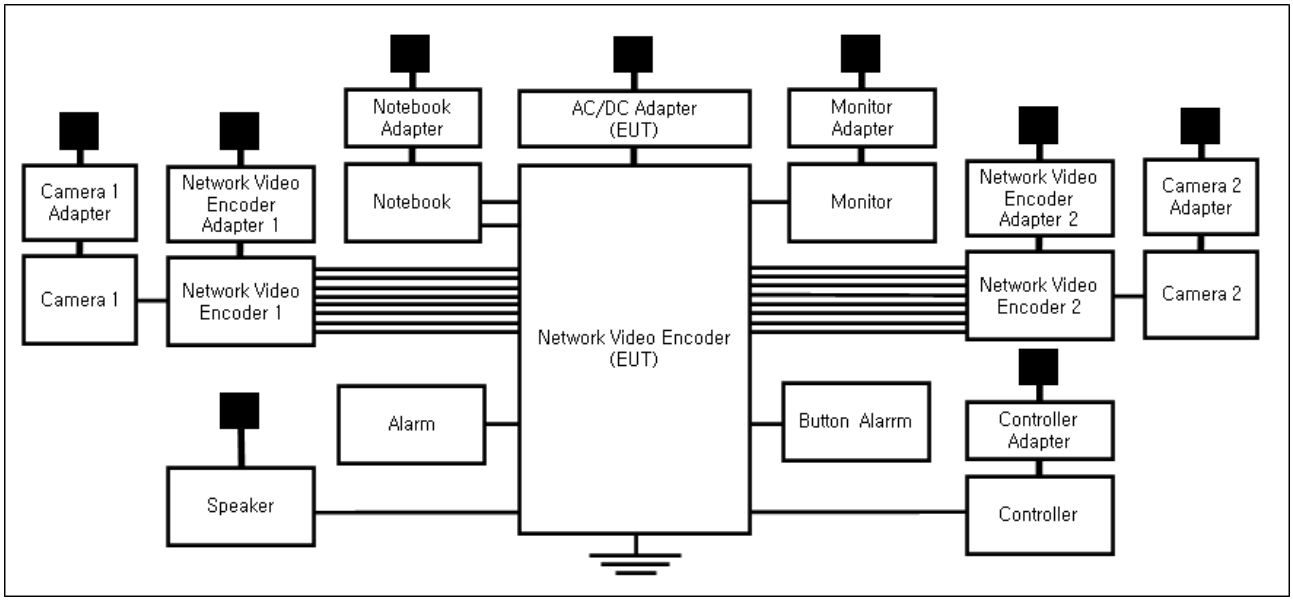
1.7 EUT Operating Mode(s)

Test mode	operating
Operating	- Check that the video from the cameras are displayed normally on the monitor. - Connect to the web viewer on your laptop and check if the video from the cameras are displayed normally. - Network ping test on the laptop - Check the status a moving color bars and 1 kHz tone - Check the operation of the alarm by pressing the button alarm and check if the alarm is displayed in the web viewer of the laptop.

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

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, Yeoju-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

1.12 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

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

2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **EMC – Directive 2014/30/EU**

☒ EN 50121-4:2016/A1:2019

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

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

2.1 Conducted Emissions at Mains Power Ports

Test Date
Mar 26, 2023

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	Nov 11, 2023
☒	LISN	ENV216	R & S	101787	Nov 10, 2023
☒	LISN	ESH2-Z5	R & S	100450	Nov 10, 2023
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	Nov 10, 2023

Test Conditions
Temperature: (23,4 ± 0,1) ℃
Relative Humidity: (43,7 ± 0,1) % R.H.

Frequency Range of Measurement
150 ㎑ to 30 ㎒

Instrument Settings
IF Band Width: 9 ㎑

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See 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 Conducted Emissions at Telecommunication Ports

Test Date
Mar 26, 2023

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	Nov 11, 2023
☒	LISN	ENV216	R & S	101787	Nov 10, 2023
☒	LISN	ESH2-Z5	R & S	100450	Nov 10, 2023
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	Nov 10, 2023
☐	8-WIRE ISN CAT3,5	ENY81	R & S	100174	Nov 22, 2023
☒	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	Nov 22, 2023

Test Conditions
Temperature: (23,4 ± 0,1) ℃
Relative Humidity: (43,7 ± 0,1) % R.H.

Frequency Range of Measurement
150 ㎑ to 30 ㎒

Instrument Settings
IF Band Width: 9 ㎑

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See 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

2.3 Impulse Noise (click)

Test Date
N/A

Test Location
Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☐	EMI Test S/W	CLICK METER SOFTWARE CMS FOR DDA55	AFJ	4.19	-
☐	CLICK ANALYZER	DDA55+	AFJ INSTRUMENTS	14042211198	Mar 21, 2024
☐	LISN	ENV216	R & S	101787	Nov 10, 2023
☐	LISN	ESH2-Z5	R & S	100450	Nov 10, 2023

Test Conditions
Temperature: ℃
Relative Humidity: % R.H.

Frequency Range of Measurement
150 ㎑ to 30 ㎒

Instrument Settings
IF Band Width: 9 ㎑

Test Results
The requirements are:

☐ PASS
☐ NOT PASS
☒ NOT APPLICABLE

Remarks
N/A

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

2.4 Radiated Electric Field Emissions(Below 1 ㎓)

Test Date
Mar 26, 2023

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

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	Mar 21, 2024
☒	AMPLIFIER	SCU 01	R & S	100603	Nov 10, 2023
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	Nov 17, 2024
☒	ATTENUATOR	8491A	HP	32173	Mar 03, 2024

Test Conditions
Temperature: (23,8 ± 0,1) ℃
Relative Humidity: (44,1 ± 0,1) % R.H.

Frequency Range of Measurement
30 ㎒ to 1 ㎓

Instrument Settings
IF Band Width: 120 ㎑

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See 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

2.5 Radiated Electric Field Emissions(Above 1 ㎓)

Test Date
Mar 26, 2023

Test Location
SEMI ANECHOIC CHAMBER #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESR7	R & S	101190	Aug 01, 2023
☒	PREAMPLIFIER	8449B	AGILENT	3008A01967	Mar 06, 2024
☒	ATTENUATOR	8491A	HP	35496	Mar 03, 2024
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	Mar 06, 2024

Test Conditions
Temperature: (23,5 ± 0,1) ℃
Relative Humidity: (43,8 ± 0,1) % R.H.

Frequency Range of Measurement
1 ㎓ to 6 ㎓

Instrument Settings
IF Band Width: 1 ㎒

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See 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

2.6 Harmonic Current Emissions

Test Date
Mar 30, 2023

Test Location
Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	net.control	EM TEST	2.1.4	-
☒	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	Mar 27, 2024
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions
Temperature: (23,6 ± 0,1) ℃
Relative Humidity: (44,1 ± 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.

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

2.7 Voltage Fluctuations and Flicker

Test Date
Mar 30, 2023

Test Location
Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	net.control	EM TEST	2.1.4	-
☒	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	Mar 27, 2024
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions
Temperature: (23,6 ± 0,6) ℃
Relative Humidity: (44,1 ± 0,6) % R.H.

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See 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

3.0 Criteria for Compliance

Criteria for compliance was based on the following guidelines:

General performance criteria

The general principles (performance criteria) for the evaluation of the immunity test results are the following.

Performance criterion A

The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

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

3.1 Electrostatic Discharge

Reference Standard
EN 61000-4-2:2009

Test Date
Mar 25, 2023

Test Location
EMS-ESD: Electro wave Shieldroom#7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	Jan 31, 2024
☒	HCP	-	KES	-	-
☒	VCP	-	KES	-	-

Test Conditions
Temperature: (23,6 ± 0,1) ℃
Relative Humidity: (44,2 ± 0,1) % R.H.
Atmospheric Pressure: (100,2 ± 0,0) kPa

Test Specifications

Discharge Factor: ≥ 1 s

Discharge Impedance: 330 ohm / 150 pF

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

Polarity: Positive and Negative

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

Discharge Voltage:

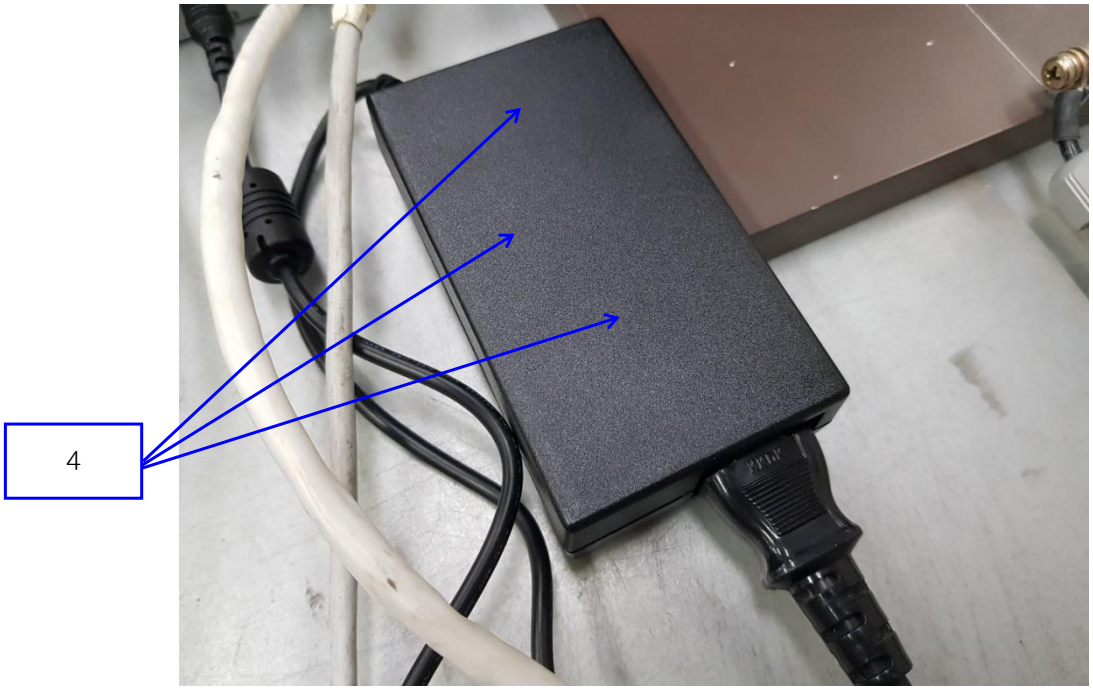
Contact	Air	HCP	VCP
☒ 2 kV	☒ 2 kV	☒ 2 kV	☒ 2 kV
☒ 4 kV	☒ 4 kV	☒ 4 kV	☒ 4 kV
☒ 6 kV	☐ 6 kV	☒ 6 kV	☒ 6 kV
☐ 8 kV	☒ 8 kV	☐ 8 kV	☐ 8 kV
☐ 15 kV	☐ 15 kV	☐ 15 kV	☐ 15 kV

Notes: HCP: Horizontal Coupling Plane
VCP: Vertical Coupling Plane
Required Performance Criteria: ☒ B

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

Location of Discharge:

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



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 Data

Indirect Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	HCP Contact	Contact Discharge	A	-
2	VCP Contact	Contact Discharge	A	-

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Enclosure	Contact Discharge	A	-
2	Around the Port	Contact Discharge	A	-
3	Screw	Contact Discharge	A	-
4	AC/DC Adapter Enclosure	Air Discharge	A	-

Note: "Blank" = Not performed

Observations:
A – No response observed from EUT
B – Unit shuts down then automatically restarts when full voltage is restored.
C – Unit shuts down then manually restarts when full voltage is restored or Loss of function.

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

Any degradations of performance was not observed during in the test.

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

3.2 Radio-frequency Electromagnetic Field

Reference Standard
EN IEC 61000-4-3:2020

Test Date
Mar 26, 2023

Test Location
EMS-RS: ☒ SEMI ANECHOIC CHAMBER #3 ☐ SEMI ANECHOIC CHAMBER #4(10 m)

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	EMC32	R & S	10.10.02	-
☒	SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	Aug 01, 2023
☒	HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-
☒	POWER METER	E4419B	Agilent	GB40203000	Mar 21, 2024
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY52170007	Mar 21, 2024
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY41498669	Mar 21, 2024
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	Mar 06, 2024

Test Conditions
Temperature: (23,5 ± 0,6) ℃
Relative Humidity: (43,8 ± 0,6) % R.H.
Atmospheric Pressure: (100,3 ± 0,0) kPa

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 Specifications

Antenna Polarization:	Horizontal & Vertical unless indicated otherwise
Antenna Distance:	☒ 3 m
Frequency Range: [Field Strength]	☒ 80 MHz to 800 MHz [10V/m] ☒ 800 MHz to 1 GHz [20 V/m] ☒ 1,4 GHz to 2,0 GHz [10 V/m] ☒ 2,0 GHz to 2,7 GHz [5 V/m] ☒ 5,1 GHz to 6,0 GHz [3 V/m]
Modulation:	☒ 80 % AM, 1 kHz sine wave
Frequency Step:	☒ 1 % step
Dwell Time:	☐ 1 s ☒ 3 s
# of Sides Radiated:	☒ 4
Required Performance Criteria:	☒ A

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 Data

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

Note: "Blank" = Not performed

Observations:
A – No response observed from EUT
B – Unit shuts down then automatically restarts when full voltage is restored.
C – Unit shuts down then manually restarts when full voltage is restored or Loss of function.

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

Any degradations of performance was not observed during in the test.

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

3.3 Fast Transients

Reference Standard
EN 61000-4-4:2012

Test Date
Mar 28, 2023

Test Location
EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	Nov 28, 2023
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	Nov 29, 2023
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	Nov 28, 2023
☐	3-PHASE CDN	CNI 503B8	EM TEST	P1622180299	Dec 01, 2023

Test Conditions
Temperature: (23,3 ± 0,4) ℃
Relative Humidity: (43,9 ± 0,4) % R.H.
Atmospheric Pressure: (100,3 ± 0,0) kPa

Test Specifications

Pulse Amplitude & Polarity: (Power Lines)	☒ ± 2.0 kV	☐ ± 4.0 kV
Pulse Amplitude & Polarity: (Signal Lines)	☒ ± 2.0 kV	☐ ± 4.0 kV
Pulse Amplitude & Polarity: (Earth Lines)	☒ ± 1.0 kV	
Burst Period:	☒ 300 ms	
Repetition Rate:	☒ 5 kHz	
Duration of Test Voltage:	☒ ≥ 1 min	
Required Performance Criteria:	☒ A	

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 Data

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (㎸)	(-) Burst (㎸)
RJ-45	A	A
RS-485	A	A
Alarm OUTPUT	A	A
Alarm INPUT	A	A
BNC	A	A

☒ Earth ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (㎸)	(-) Burst (㎸)
Enclosure Ground	A	A

Note: "Blank" = Not performed

Observations:
A – No response observed from EUT
B – Unit shuts down then automatically restarts when full voltage is restored.
C – Unit shuts down then manually restarts when full voltage is restored or Loss of function.

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

Any degradations of performance was not observed during in the test.

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

3.4 Surges

Reference Standard
EN 61000-4-5:2014+A1:2017

Test Date
Mar 29, 2023

Test Location
EMS-Surge: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	Nov 28, 2023
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	Nov 29, 2023
☒	CDN	CNV 508N1	EM TEST	P1610176296	Nov 29, 2023

Test Conditions
Temperature: (23,7 ± 0,6) ℃
Relative Humidity: (43,7 ± 0,6) % R.H.
Atmospheric Pressure: (100,2 ± 0,0) kPa

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 Specifications

AC Power Lines

Source Impedance: 12 ohm for common mode and 2 ohm for differential mode

Surge Amplitude : Common Mode
☒ (2,0) kV
Differential Mode
☒ (1,0) kV

Number of Surges: ☒ 5 surges per angle

Angle: ☒ 0°, 90°, 180°, 270° (input AC power port)

Polarity: ☒ Positive & Negative

Repetition Rate: ☒ 1 surge per min ☐ 1 surge per 30 sec.

Required Performance Criteria: ☒ B

DC Power Lines

Source Impedance: 42 ohm
Surge Amplitude: Common Mode
☐ (2,0) kV
Differential Mode
☐ (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: ☐ B

Signal Lines

Source Impedance: 42 ohm
Surge Amplitude: Common Mode
☒ (2,0) kV
Differential Mode
☒ (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: ☒ B

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 Data

☒ Line to Line – Differential Mode

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

☒ Line to Earth – Common Mode

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

Signal Lines

☒ Line to Line – Differential Mode

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

☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (㎸)	(-) Surge (㎸)
RJ-45 (LAN)	A	A

Note:"Blank" = Not performed

Observations:
A – No response observed from EUT
B – Unit shuts down then automatically restarts when full voltage is restored.
C – Unit shuts down then manually restarts when full voltage is restored or Loss of function.

Test Results

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

Remarks

Any degradations of performance was not observed during in the test.

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

3.5 Conducted Disturbance

Reference Standard
EN 61000-4-6:2014

Test Date
Mar 28, 2023

Test Location
EMS-CS: Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	icd.control	EM TEST	5.3.12	-
☒	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	Nov 10, 2023
☒	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	Nov 10, 2023
☒	CDN	CDN M016	TESEQ	43694	Nov 10, 2023
☒	CDN	CDN M016	TESEQ	43697	Nov 10, 2023
☒	CDN	CDN T800	TESEQ	42800	Nov 10, 2023
☒	EM CLAMP	KEMZ 801A	TESEQ	44099	Nov 14, 2023

Test Conditions
Temperature: (23,5 ± 0,6) ℃
Relative Humidity: (43,3 ± 0,6) % R.H.
Atmospheric Pressure: (100,4 ± 0,0) ㎪

Test Specifications
Frequency Range: ☒ 150 ㎑ to 80 ㎒

Voltage Level: ☒ 10 Vrms

Modulation: ☒ 80 % AM, 1 ㎑ sine wave

Frequency Step: ☒ 1 % step

Dwell Time: ☐ 1 s ☒ 3 s

Required Performance Criteria: ☒ A

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 Data

☒ Input a.c. power ports

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

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45	CDN	A
RS-485	Clamp	A
Alarm OUTPUT	Clamp	A
Alarm INPUT	Clamp	A
BNC	Clamp	A

☒ Earth ports

Coupling Location (Line Stressed)	Coupling Method	Observations
Enclsoure Ground	Clamp	A

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

Observations:
A – No response observed from EUT
B – Unit shuts down then automatically restarts when full voltage is restored.
C – Unit shuts down then manually restarts when full voltage is restored or Loss of function.

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

Any degradations of performance was not observed during in the test.

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

3.6 Power Frequency Magnetic Field Immunity

Reference Standard
EN 61000-4-8:2010

Test Date
Mar 29, 2023

Test Location
EMS-Magnetic: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	EMS Test S/W	NET.CONTROL	EM TEST	1.2.11	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	Nov 28, 2023
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	Nov 29, 2023
☒	MAGNETIC FIELD COIL	MS 100N	EM TEST	P1536163691	Nov 28, 2023
☒	CURRENT TRANSFORMER	MC 26100	EM TEST	P1550168963	Mar 22, 2024
☒	MULTIFUNCTION AC/DC POWER SOURCE	NETWAVE 7-400	EM TEST	P1614178393	Nov 11, 2023
☒	MAGNETICFIELD COIL	INA 703	Teseq AG	3006	Mar 22, 2024

Test Conditions
Temperature: (23,7 ± 0,1) ℃
Relative Humidity: (43,7 ± 0,1) % R.H.
Atmospheric Pressure: (100,2 ± 0,0) kPa

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 Specifications

Field Strength(Power Source): ☒ 100 A/m (ac)

☒ 300 A/m (dc)

Frequency (ac): ☒ 16.7 Hz ☒ 50 Hz ☐ 60 Hz

Frequency (dc): ☒ 0 Hz

Required Performance Criteria: ☒ A

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 Data

☒ Immersion method

Coil orientation	Result
X	A
Y	A
Z	A

☐ Proximity method

Coil orientation	Result
X	-
Y	-
Z	-

Note: "blank" = Not performed

Observations:
A – No response observed from EUT
B – Unit shuts down then automatically restarts when full voltage is restored.
C – Unit shuts down then manually restarts when full voltage is restored or Loss of function.

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

Any degradations of performance was not observed during in the test.

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

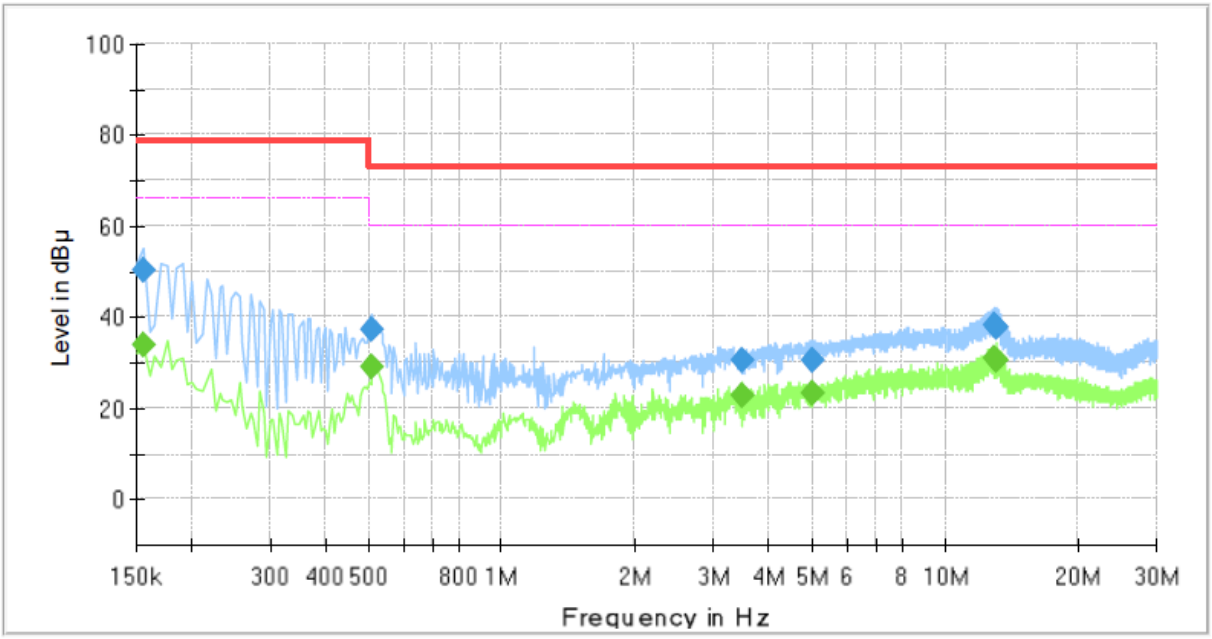
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	SPE-1630
Phase:	L1
Mode:	
Operator Name:	KES



Final_Result

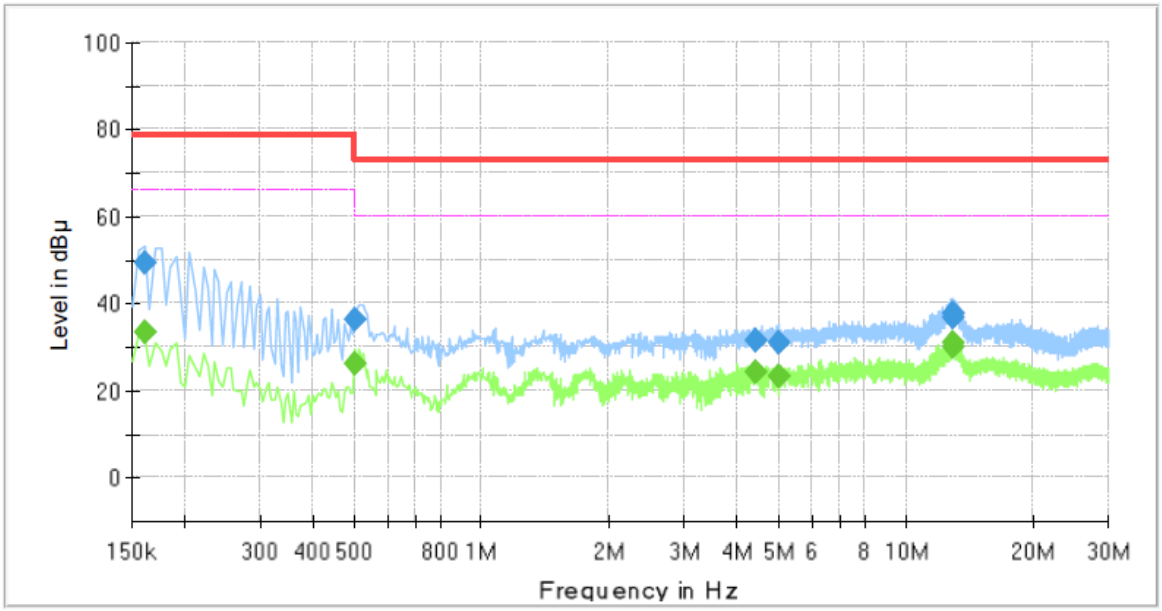
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	33.87	66.00	32.13	5000.0	9.000	L1	19.5
0.155000	50.25	---	79.00	28.75	5000.0	9.000	L1	19.5
0.510000	---	29.01	60.00	30.99	5000.0	9.000	L1	19.7
0.510000	37.13	---	73.00	35.87	5000.0	9.000	L1	19.7
3.485000	---	22.95	60.00	37.05	5000.0	9.000	L1	20.0
3.485000	30.30	---	73.00	42.70	5000.0	9.000	L1	20.0
5.015000	---	23.34	60.00	36.66	5000.0	9.000	L1	19.7
5.015000	30.71	---	73.00	42.29	5000.0	9.000	L1	19.7
12.910000	---	31.21	60.00	28.79	5000.0	9.000	L1	20.0
12.910000	38.34	---	73.00	34.66	5000.0	9.000	L1	20.0
12.995000	---	30.55	60.00	29.45	5000.0	9.000	L1	20.0
12.995000	37.71	---	73.00	35.29	5000.0	9.000	L1	20.0

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]

Common Information

Test Description:	Conducted Emission
Model No.:	SPE-1630
Phase:	N
Mode:	
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.160000	---	33.35	66.00	32.65	5000.0	9.000	N	19.4
0.160000	49.39	---	79.00	29.61	5000.0	9.000	N	19.4
0.500000	---	26.17	66.00	39.83	5000.0	9.000	N	19.7
0.500000	36.31	---	73.00	36.69	5000.0	9.000	N	19.7
4.440000	---	24.45	60.00	35.55	5000.0	9.000	N	19.8
4.440000	31.54	---	73.00	41.46	5000.0	9.000	N	19.8
5.005000	---	23.08	60.00	36.92	5000.0	9.000	N	19.7
5.005000	30.79	---	73.00	42.21	5000.0	9.000	N	19.7
12.885000	---	31.14	60.00	28.86	5000.0	9.000	N	20.0
12.885000	37.65	---	73.00	35.35	5000.0	9.000	N	20.0
12.930000	---	29.97	60.00	30.03	5000.0	9.000	N	20.0
12.930000	36.77	---	73.00	36.23	5000.0	9.000	N	20.0

♦ 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))

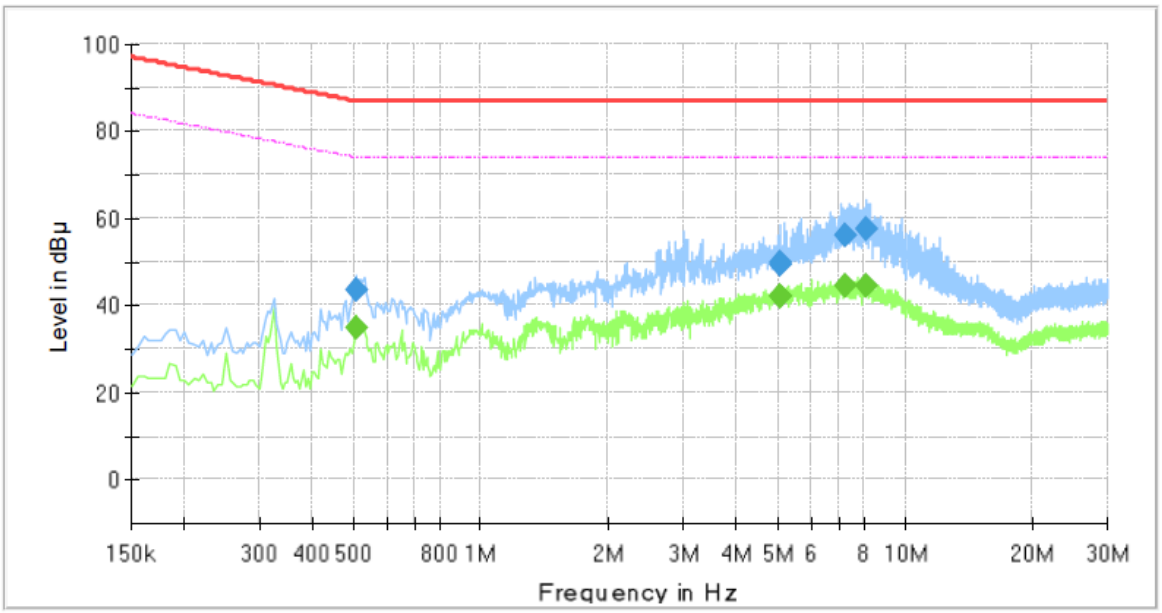
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Conducted Emissions at Telecommunication Ports

[1 000 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	SPE-1630
Mode :	TEL 1 000 Mbps
Speed :	
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.505000	---	34.72	74.00	39.28	1000.0	9.000	Single Line	19.7
0.505000	43.57	---	87.00	43.43	1000.0	9.000	Single Line	19.7
5.075000	---	41.97	74.00	32.03	1000.0	9.000	Single Line	19.4
5.075000	49.44	---	87.00	37.56	1000.0	9.000	Single Line	19.4
5.090000	---	42.17	74.00	31.83	1000.0	9.000	Single Line	19.4
5.090000	49.85	---	87.00	37.15	1000.0	9.000	Single Line	19.4
7.210000	---	44.34	74.00	29.66	1000.0	9.000	Single Line	19.3
7.210000	55.87	---	87.00	31.13	1000.0	9.000	Single Line	19.3
8.120000	---	44.38	74.00	29.62	1000.0	9.000	Single Line	19.3
8.120000	57.54	---	87.00	29.46	1000.0	9.000	Single Line	19.3

♦ 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))

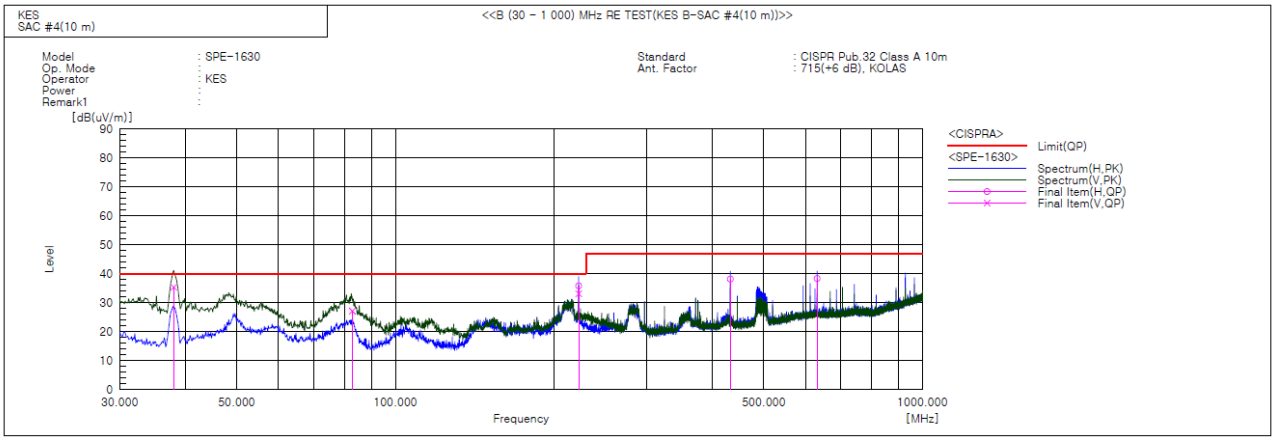
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Impulse Noise (click)

N/A

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 ㎓)



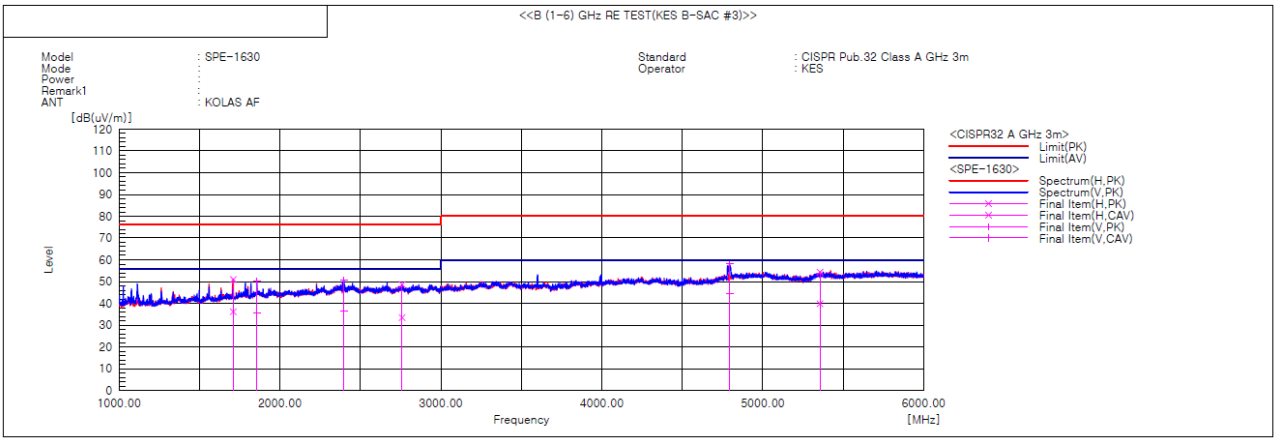
Final Result

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	38.003	V	58.5	-23.2	35.3	40.0	4.7	100.0	208.0	
2	82.865	V	54.2	-27.1	27.1	40.0	12.9	145.0	229.0	
3	222.652	V	52.9	-19.8	33.1	40.0	6.9	106.0	63.0	
4	222.666	H	55.6	-19.8	35.8	40.0	4.2	389.0	174.0	
5	431.944	H	51.3	-13.2	38.1	47.0	8.9	199.0	246.0	
6	631.158	H	46.3	-8.0	38.3	47.0	8.7	196.0	167.0	

♦ Calculation – SAC #4(10 m)
Result(QP) [㏈(㎶/m)] = (Reading(QP)[㏈(㎶)] + c.f[㏈(1/m)]
Margin(QP)[㏈] = Limit[㏈(㎶/m)] - Result(QP) [㏈(㎶/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

Radiated Electric Field Emissions(Above 1 ㎓)



Final Result

No.	Frequency	(P)	Reading PK	Reading CAV	c.f	Result PK	Result CAV	Limit PK	Limit AV	Margin PK	Margin CAV	Height	Angle	Remark
	[MHz]		[dB(uV)]	[dB(uV)]	[dB(1/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB]	[dB]	[cm]	[deg]	
1	1708.656	H	49.2	34.4	1.8	51.0	36.2	76.0	56.0	25.0	19.8	100.0	87.1	
2	1856.642	V	46.9	32.5	3.2	50.1	35.7	76.0	56.0	25.9	20.3	100.0	14.6	
3	2397.365	V	44.5	30.2	6.1	50.6	36.3	76.0	56.0	25.4	19.7	100.0	315.8	
4	2758.564	H	41.7	26.5	7.0	48.7	33.5	76.0	56.0	27.3	22.5	100.0	148.0	
5	4794.977	V	44.4	30.6	13.7	58.1	44.3	80.0	60.0	21.9	15.7	100.0	350.2	
6	5355.046	H	38.7	24.2	15.7	54.4	39.9	80.0	60.0	25.6	20.1	100.0	151.6	

♦ Calculation
Over Limit [㏈] = (Read Level[㏈㎶] + Ant Factor[㏈/m] + Cable Loss [㏈] – Preamp Factor [㏈]) – Limit Line[㏈㎶]
Over Limit : Marjin, Read Level : Reading value, Ant Factor : ANT Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

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

Harmonic Current Emissions and Voltage Fluctuations and Flicker

Average harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	0.062			
2	0.003	0.324	1.080	n/a
3	0.056	2.425	2.300	PASS
4	0.004	0.952	0.430	n/a
5	0.054	4.760	1.140	PASS
6	0.005	1.571	0.300	n/a
7	0.053	6.926	0.770	PASS
8	0.003	1.514	0.230	n/a
9	0.052	13.109	0.400	PASS
10	0.003	1.791	0.184	n/a
11	0.050	15.300	0.330	PASS
12	0.003	2.234	0.153	n/a
13	0.048	22.855	0.210	PASS
14	0.003	2.593	0.131	n/a
15	0.045	30.238	0.150	PASS
16	0.003	2.742	0.115	n/a
17	0.043	32.220	0.132	PASS
18	0.003	3.053	0.102	n/a
19	0.040	33.632	0.118	PASS
20	0.003	3.247	0.092	n/a
21	0.037	22.824	0.161	PASS
22	0.003	3.530	0.084	n/a
23	0.034	23.029	0.147	PASS
24	0.003	3.493	0.077	n/a
25	0.031	22.764	0.135	PASS
26	0.002	3.447	0.071	n/a
27	0.028	22.070	0.125	PASS
28	0.002	3.615	0.066	n/a
29	0.024	21.012	0.116	PASS
30	0.002	3.468	0.061	n/a
31	0.021	19.525	0.109	PASS
32	0.002	3.393	0.058	n/a
33	0.018	17.896	0.102	PASS
34	0.002	3.226	0.054	n/a
35	0.015	16.044	0.096	PASS
36	0.001	2.845	0.051	n/a
37	0.013	13.865	0.091	PASS
38	0.001	2.820	0.048	n/a
39	0.010	11.773	0.087	PASS
40	0.001	2.444	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.*

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 Data - Harmonics (continued)

Maximum harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	0.062			
2	0.004	0.244	1.620	n/a
3	0.056	1.620	3.450	PASS
4	0.005	0.727	0.645	n/a
5	0.055	3.209	1.710	PASS
6	0.005	1.199	0.450	PASS
7	0.054	4.646	1.155	PASS
8	0.004	1.136	0.345	n/a
9	0.053	8.766	0.600	PASS
10	0.004	1.328	0.276	n/a
11	0.051	10.238	0.495	PASS
12	0.004	1.683	0.230	n/a
13	0.048	15.280	0.315	PASS
14	0.004	1.969	0.197	n/a
15	0.046	20.287	0.225	PASS
16	0.004	2.106	0.173	n/a
17	0.043	21.588	0.199	PASS
18	0.004	2.354	0.153	n/a
19	0.040	22.492	0.178	PASS
20	0.003	2.451	0.138	n/a
21	0.037	22.923	0.161	PASS
22	0.003	2.643	0.125	n/a
23	0.034	23.109	0.147	PASS
24	0.003	2.656	0.115	n/a
25	0.031	22.880	0.135	PASS
26	0.003	2.632	0.106	n/a
27	0.028	22.164	0.125	PASS
28	0.003	2.813	0.099	n/a
29	0.025	21.125	0.116	PASS
30	0.002	2.674	0.092	n/a
31	0.021	19.617	0.109	PASS
32	0.002	2.638	0.086	n/a
33	0.018	17.990	0.102	PASS
34	0.002	2.453	0.081	n/a
35	0.016	16.183	0.096	PASS
36	0.002	2.156	0.077	n/a
37	0.013	13.991	0.091	PASS
38	0.002	2.158	0.073	n/a
39	0.010	11.923	0.087	PASS
40	0.001	1.880	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.*

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 Data - Voltage Fluctuations

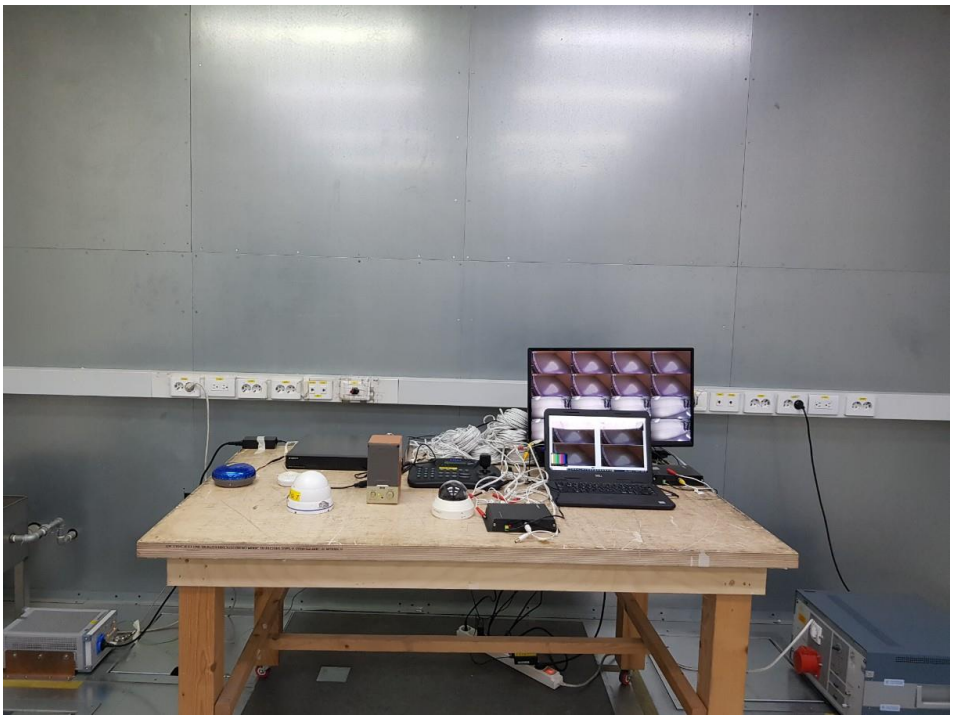
Maximum Flicker results

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

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

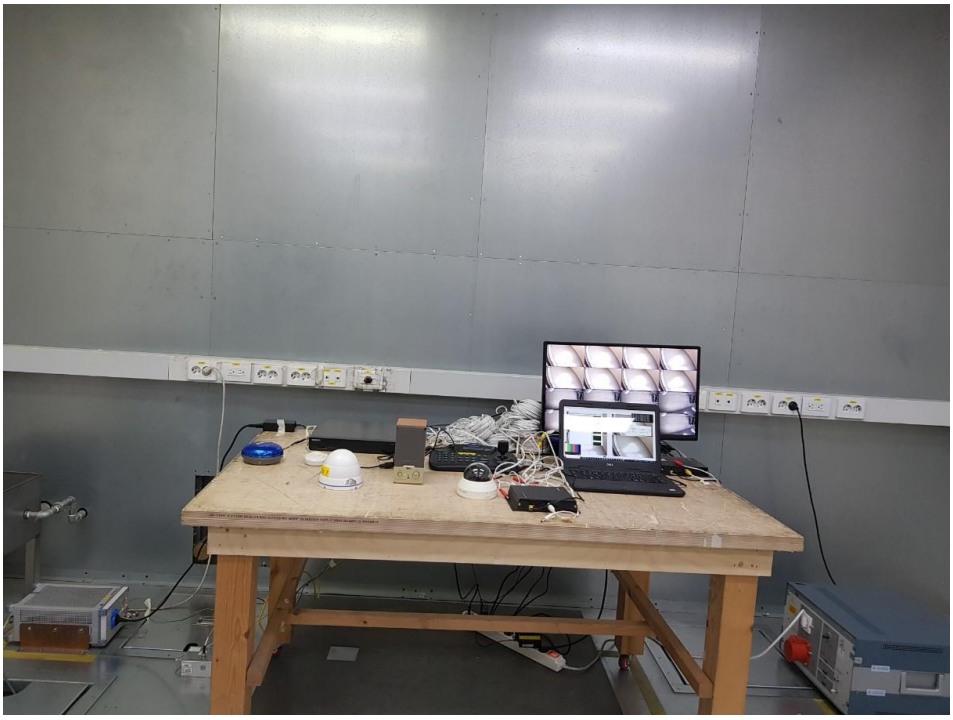
Test Setup Photos and Configuration

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

Conducted Emissions at Telecommunication Ports



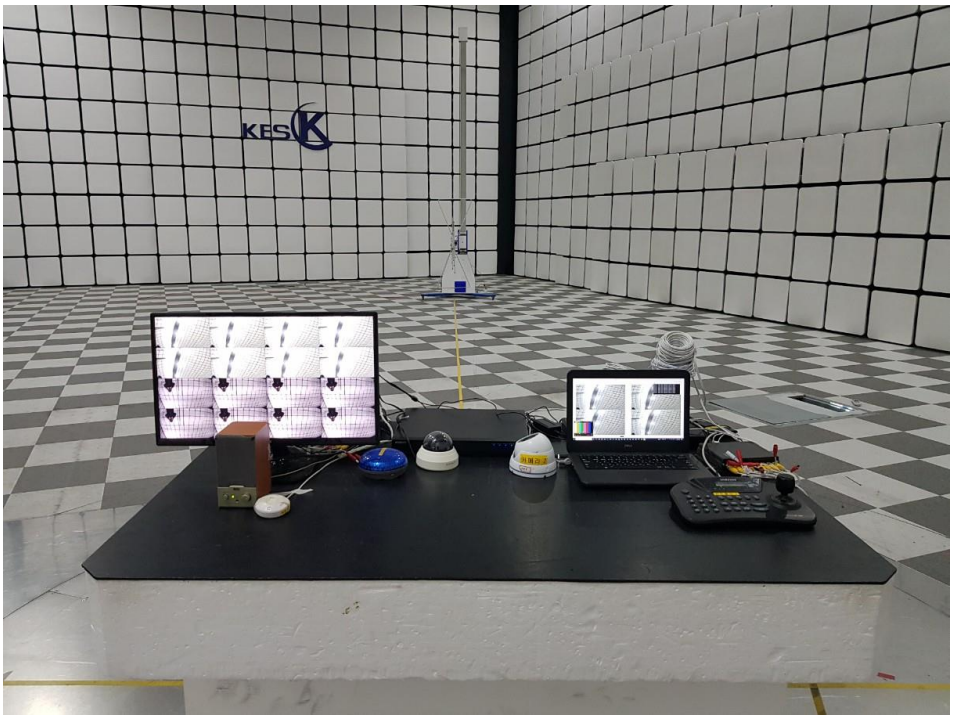
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

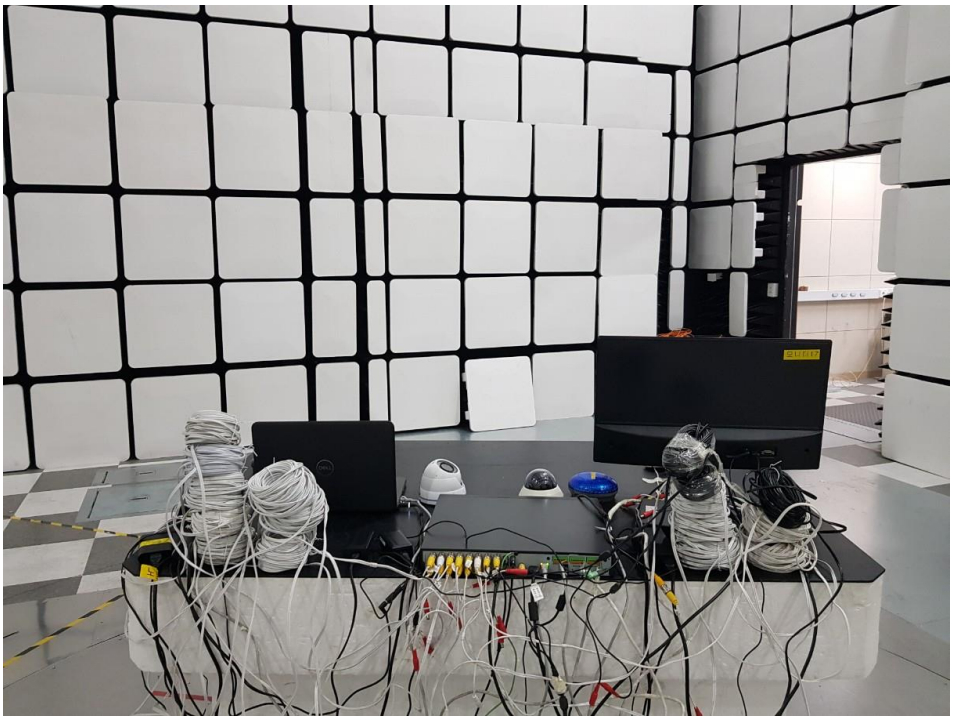
Impulse Noise (click)

N/A

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

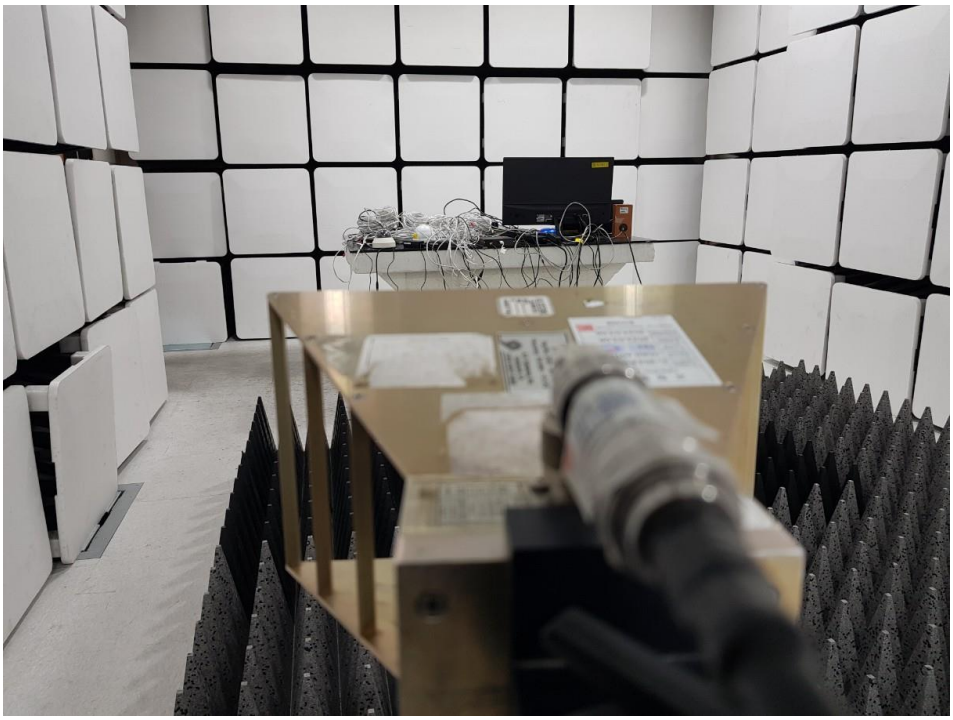
Radiated Electric Field Emissions(Below 1 ㎓)





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 ㎓)

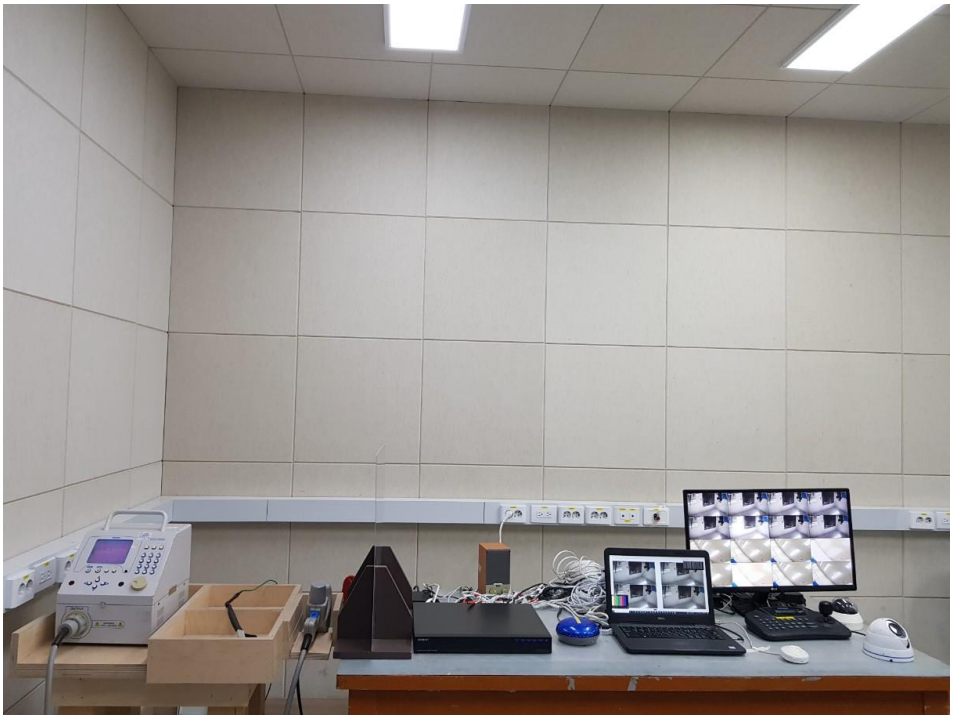


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Harmonic Current Emissions and Voltage Fluctuations and Flicker

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

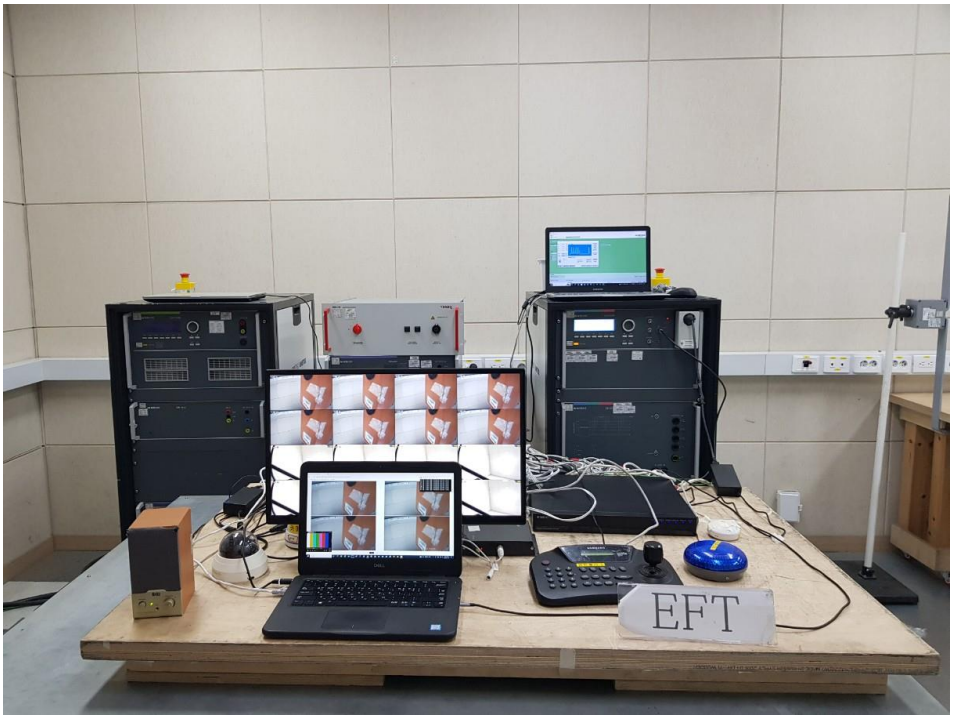
Electrostatic Discharge



Radio-frequency Electromagnetic Field

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

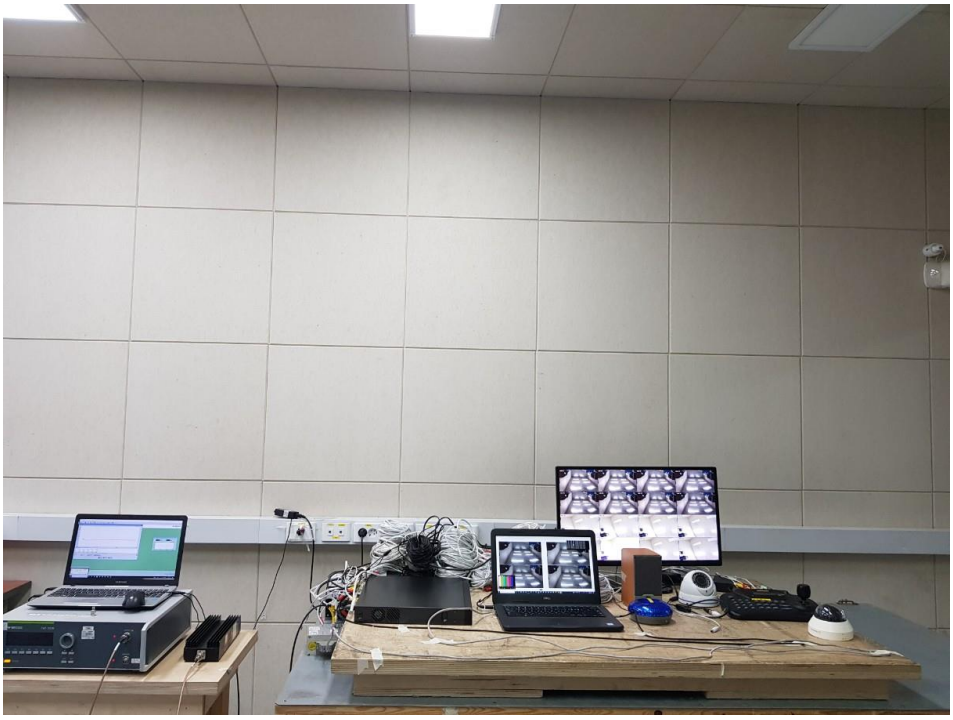
Fast Transients



Surges

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

Conducted Disturbance

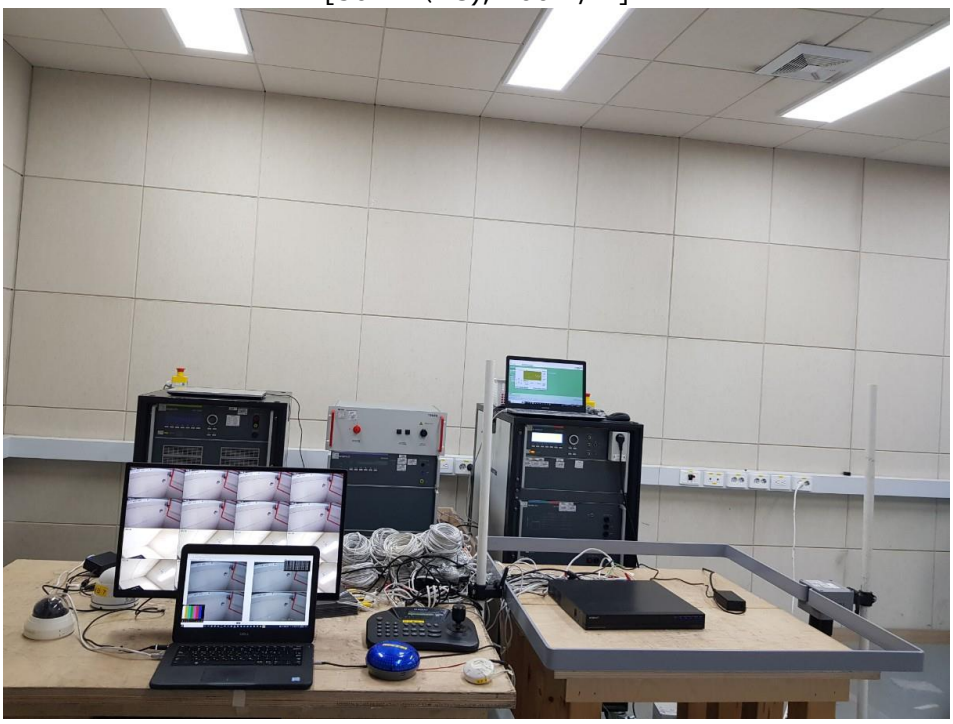


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Power Frequency Magnetic Field Immunity

[16.7 Hz (AC), 100 A/m]

[50 Hz (AC), 100 A/m]



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

[0 ㎐ (DC), 300 A/m]

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

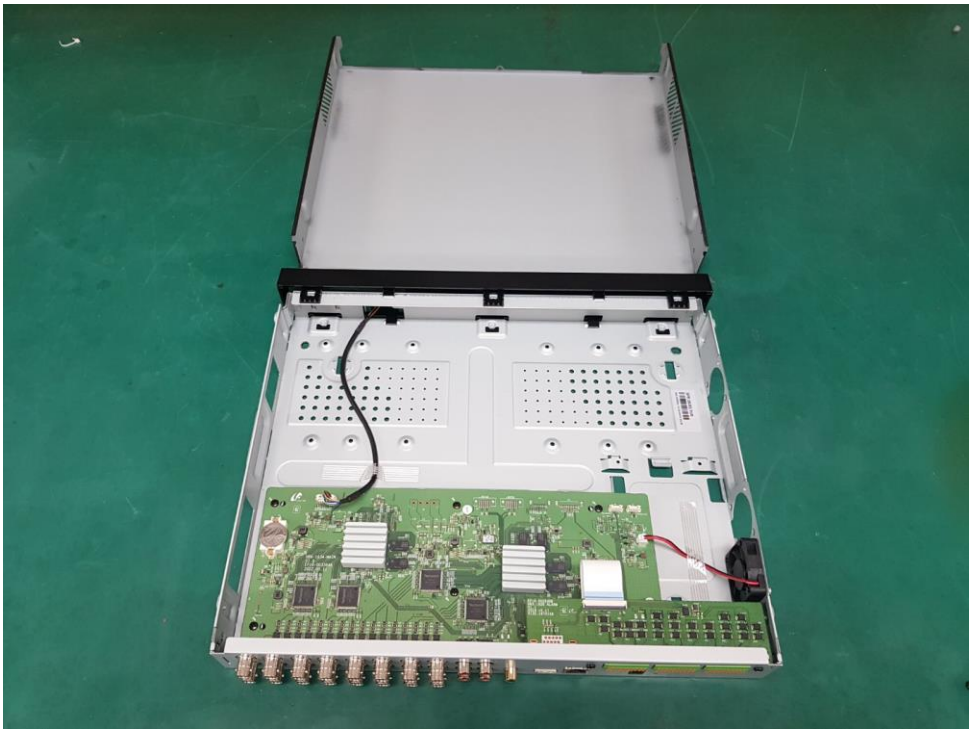
EUT Photographs

(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 Layout Photographs

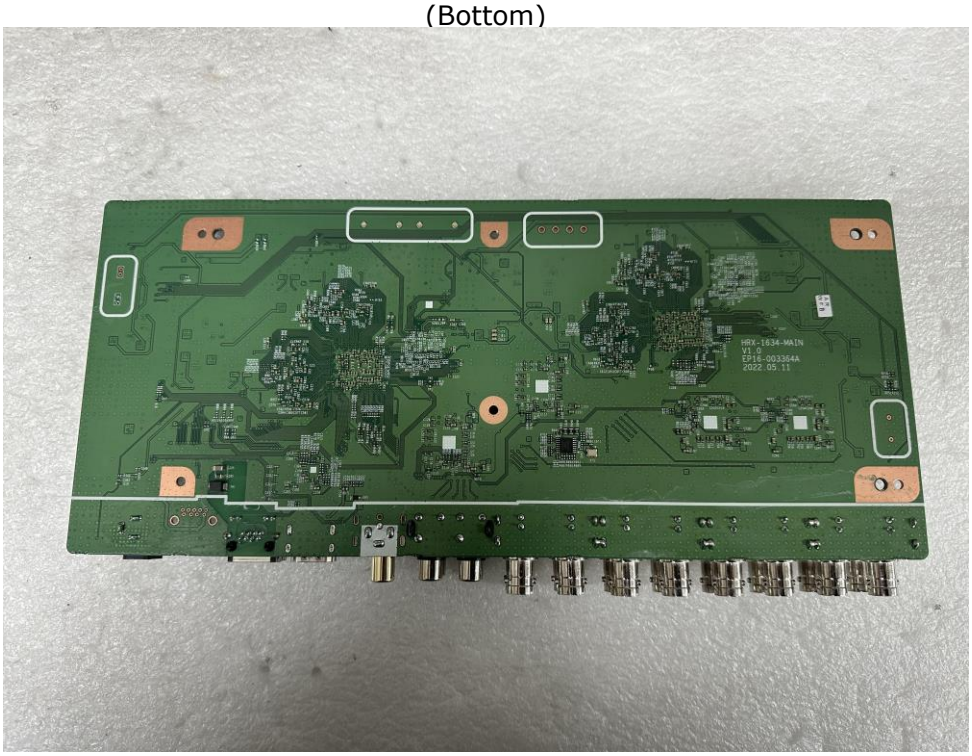


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

EUT Internal View – Main Board

(Top)

(Bottom)

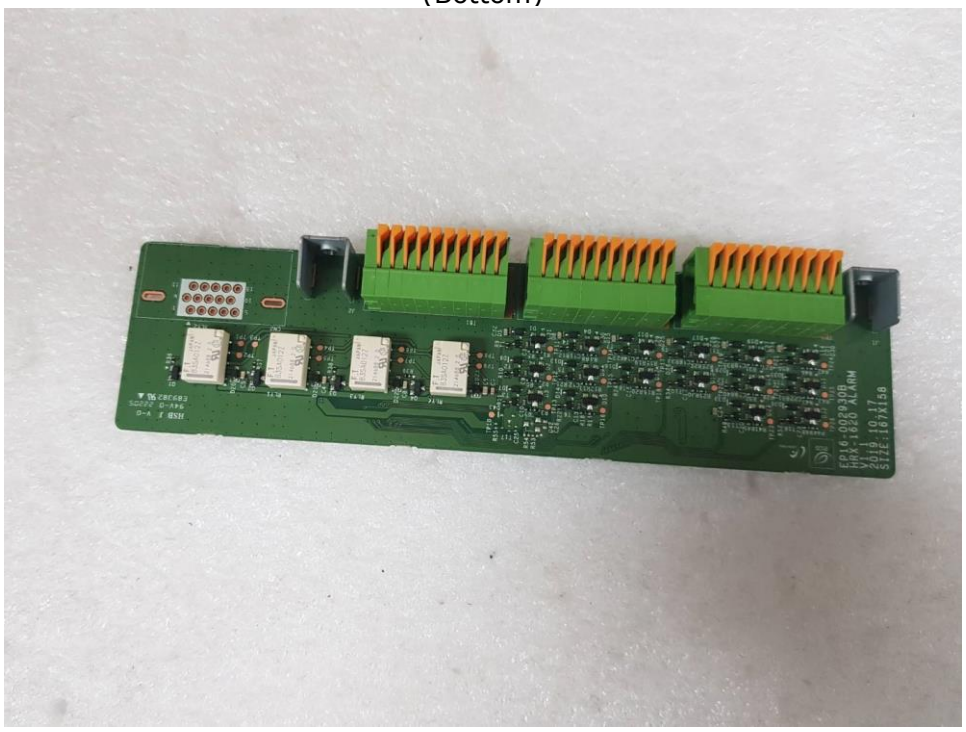


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

EUT Internal View – SUB Board 1

(Top)

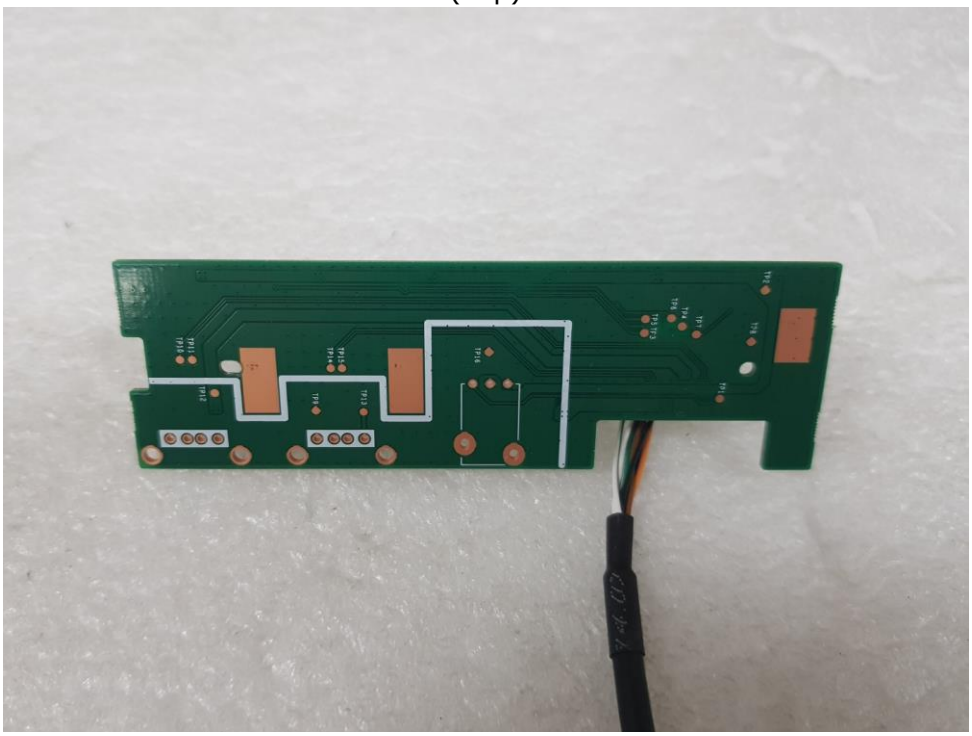
(Bottom)



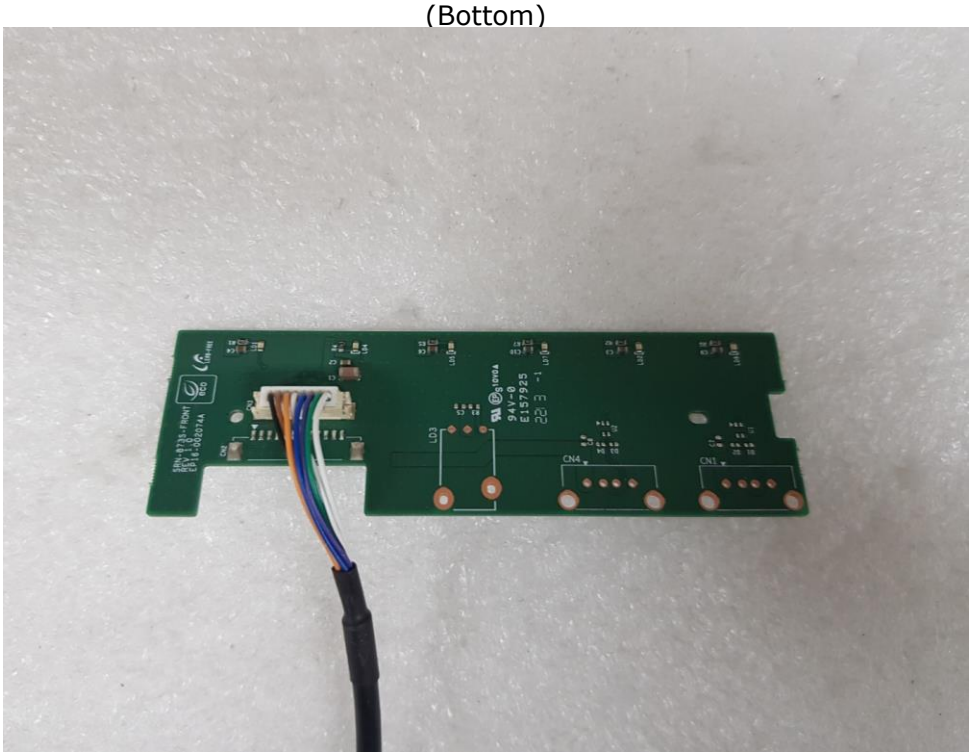
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

EUT Internal View – SUB 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

EUT Internal View – Adapter

(Top)

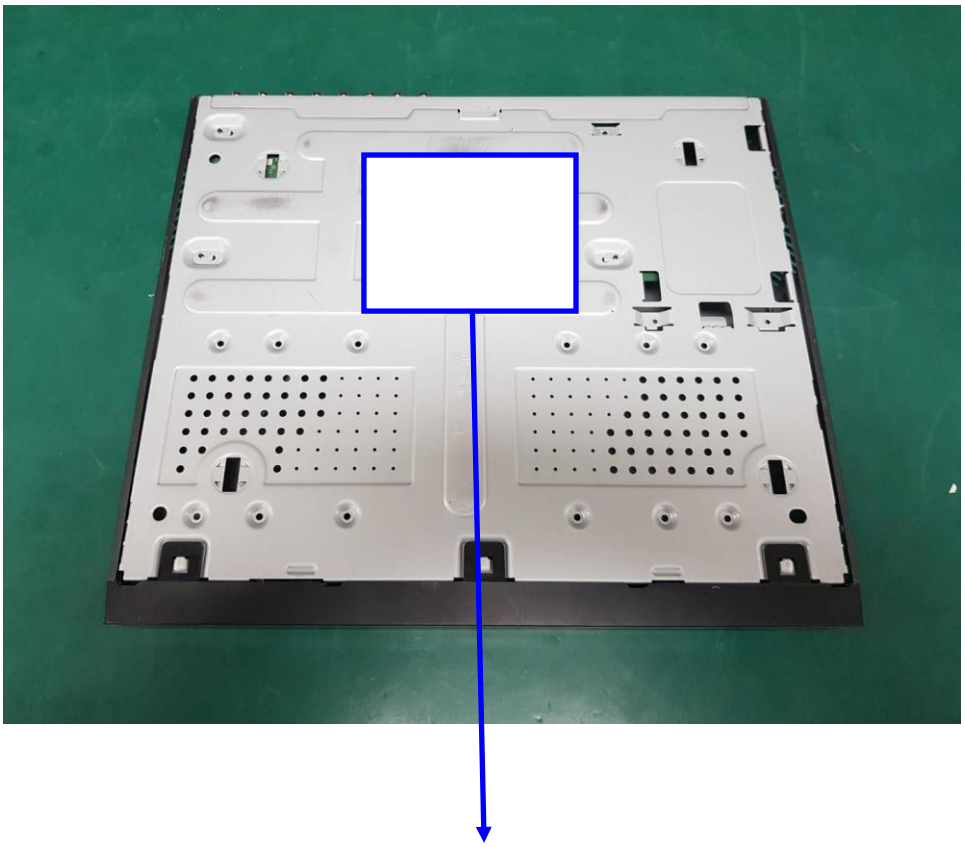
(Bottom)

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)


FSP
Switching Power Adapter
(FUENTE DE ALIMENTACIÓN CONMUTADA)
RoHS
IEC60950-1
LISTED
I.T.E. POWER SUPPLY
L.P.S.
E190414
R-41091570
www.bis.gov.in
EFFICIENCY LEVEL VI
NOM
TÜV RT
P/N. :9NA06080
S/N. :H00000934
D/C. :215110

Label and Location



NETWORK VIDEO ENCODER

Model No : SPE-1630

Manufacturer : HANWHA VISION VIETNAM COMPANY LIMITED

Made in Vietnam

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