EMC TEST REPORT For CE

Test Report No.	:	KES-E1-17T0189
Date of Issue	:	Mar, 02, 2017
Product name	:	DVR
Model/Type No.	:	HRD-1642P
Variant Model	:	-
Applicant	:	Hanwha Techwin Co., Ltd.
Applicant Address	:	1204, Changwon-daero, Seongsan-gu, Changwon-si, Gyeongsangnam-do, Korea
Manufacturer	:	Hanwha Techwin (Tianjin) Co.,Ltd.
Manufacturer Address	:	No.11 Weiliu Rd,Micro-Electronic Industrial Park,TEDA, Tianjin, 300385,people's Republic of China
Date of Receipt	:	Feb, 13, 2017
Test date	:	Feb, 20, 2017 – Feb, 22, 2017
Test Results	:	☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Young Suk, Song
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

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.

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Mar, 02, 2017	KES-E1-17T0189	Issued

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd. This document Jun 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

1.0 General Product Description 4
1.1 Test Voltage & Frequency 5
1.2 Variant Model Differences 5
1.3 Device Modifications 5
1.4 Equipment Under Test 5
1.5 Support Equipments 6
1.6 External I/O Cabling 7
1.7 E.U.T Operating Mode(s) 7
1.8 Configuration 8
1.9 Calibration Details of Equipment Used for Measurement 9
1.10 Test Facility 9
1.11 Laboratory Accreditations and Listings 9
2.0 Test Regulations 10
2.1 Conducted Emissions at Mains Power Ports 12
2.2 Conducted Emissions at Telecommunication Ports 13
2.3 Radiated Electric Field Emissions(Below 1 ㎓) 14
2.4 Radiated Electric Field Emissions(Above 1 ㎓) 15
2.5 Harmonic Current Emissions 16
2.6 Voltage Fluctuations and Flicker 17
3.0 Criteria for compliance 18
3.1 Electrostatic Discharge 20
3.2 Radiated Electric Field Immunity 23
3.3 Electrical Fast Transients/Bursts 26
3.4 Surge Transients 28
3.5 Conducted Disturbance 31
3.6 Voltage Dips and Short Interruptions 33
APPENDIX A – TEST DATA 35
Conducted Emissions at Mains Power Ports 35
Conducted Emissions at Telecommunication Ports 37
Radiated Electric Field Emissions(Below 1 ㎓) 39
Radiated Electric Field Emissions(Above 1 ㎓) 40
Harmonic Current Emissions and Voltage Fluctuations and Flicker 44
Test Setup Photos and Configuration 47
Conducted Voltage Emissions 47
Conducted Telecommunication Emissions 48
Radiated Electric Field Emissions(Below 1 ㎓) 49
Radiated Electric Field Emissions(Above 1 ㎓) 50
Harmonic Current Emissions and Voltage Fluctuations and Flicker 51
Electrostatic Discharge 52
Radiated Electric Field Immunity 52
Electrical Fast Transients/Bursts 53
Surge Transients 54
Conducted Disturbance 55
Voltage Dips and Short Interruptions 56
EUT External Photographs 57
AEUT Internal Photographs 58

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.

1.0 General Product Description

Main Specifications of E.U.T are:

		HRD-1642
Video	Inputs	16channel BNC : AHD(~4MP), TVI(~2MP), CVI(~2MP), NTSC/PAL
	Resolution	2560x1440, 1920 x 1080, 1280 x 720, 960 x 480, 704 x 480 / 960 x 576, 704 x 576
Live	Frame rate	480fps , 400fps
	Resolution	2560x1440, 1920 x 1080, 1280 x 720, 960 x 480, 704 x 480 / 960 x 576, 704 x 576
	Multi Screen display	1/4/7/9/13/16/16A/PIP/Sequence
Performance		
Operating System	Embedded	Linux
Recording	Compression	H.264, Wisestream
	Record Rate(Analog)	NTSC : Up to 240fps@4MP / PAL : Up to 200fps@4MP -
		NTSC : Up to 480fps@1920 x 1080 / PAL : Up to 400fps@1920 x 1080
		NTSC: Up to 480fps @ 1280 x 720, 928x480, 704X480, 704X240, 352X240 PAL: Up to 400fps @ 1280 x 720, 928x576, 704x576, 704x288, 352x288
	Mode	Manual, Schedule (Continuous/Event), Event(Pre/Post), Time lapse (1~30 fps(N), 1~25fps(P))
	Event	Video Loss, Motion(Level 1~10), Alarm Input(16), Tampering(Level Low,Medium, High)
	Overwrite modes	Continuous
	Pre-alarm	Up to 30 sec (5,10,20,30 Sec)
	Post-Alarm	Up to 6 hour (5,10,20,30 sec,1,3,5,10,20 min,1,2,3,4,5,6 hour)
Search & Playback	Search mode	Date/time, Event, Back up, POS(SD Signal only), Motion (※ All Search Included Preview Function)
	Playback function	Fast Forward/Backward (x2,x4,x8,x16,x32,x64) ※Backward Play with I-frame Only, Slow Forward/Backward (x1/2,x1/4,x1/8) Step Forward/Backward ※ Backward Play with I-frame Only
	Simultaneous playback	16CH(Local Monitor, CMS)
Network(IPv4)	Transmission speed	Record(Main) Stream) 4MP : 15fps/CH, 1080p/720p/WD1/4CIF/CIF : 30fps/CH(N), 25fps/CH(P) Network(Sub) Stream) WD1/4CIF : 12fps/CH, 2CIF/CIF/QVGA/QCUF : 30fps/CH(N), 25fps/CH(P)
	Transmission Bandwidth	Up to 64Mbps
	Bandwidth control	Selectable
	Stream	Record Stream and Network Stream Selectable (at monitoring Viewer)
	Remote users Maximum	Search(3)/Live Unicast(10)/Live Multicast(20)
	Protocol support	TCP/IP,DHCP,PPPoE,SMTP,NTP,HTTP,DDNS,RTP,RTSP,SNMP,(SUNAPI 2017.07)
	Web Browser	Windows OS : Internet Explorer 8, 9, 10, Firefox 3.6 or higher, Chrome 12 or higher Mac OS : Safari 5 or higher, Firefox 3.6 or higher
	Viewer Software	SSM, Webviewer, SmartViewer, iPOLiS mobile viewer, WiseNet Mobile (~7. 2017)
Smart phone	Platform	Android , iOS
	Protocol support	RTP, RTSP, HTTP,CGI(SUNAPI 2017.07)
	Control	Live(8ch) : Multi-Profile Support Playback(1ch)
	Remote users Maximum	Search (3), Live Unicast (10), Multicast (20)
Storage	Internal	Up to 8 SATA HDDs (0~8TB HDD)
	External (e-SATA Interface)	e-SATA, USB(for Backup)
	File Format (Back-up)	BU(DVR Player), SEC(Include Player), AVI
Security	Password Protection	1 Admin, 10 Group , 10 User per 1 Group
	Data Authentication	Watermark
Easy Configuration	Easy Configuration	P2P (TUTK) (~7. 2017)
Interface		
Monitors	VGA	1 VGA (1920x1080, 1280x1024, 1280x720)
	HDMI	1 HDMI (4K(3840 x 2160), 2K(2560 x 1440), 1920x1080, 1280x1024, 1280x720)
	Composite(Spot)	BNC(1CH) ※ Included OSD On Screen, Multi mode Support
	Loop Outputs	-
Audio	Inputs/Output	16CH line in (Built in 4CH, Option : Audio Extension Cable)/ 1CH line out
	Compression	G.711
	Sampling rate	8KHz
Alarm	Inputs/Outputs	Terminal 16 Inputs (NO/NC) / Terminal 4 relay Outputs (NO/NC), Rating : 30V DC/2A, 250V AC/0.25A
	Remote notification	Notification via e-mail
Connections	Ethernet	1 RJ45 10/100/1000 Base-T
	Serial interface	RS-485(Full Duplex) for PTZ, Samsung System Keyboard
	USB	1 ports(USB 3.0, Rear), 1 ports(USB 2.0, Front)
	e-SATA	2 External SATA ports
	Application Supoort	Mouse, Remote Controller,SPC-2000/7000 (RS-485 protocol)TBD
	Protocol support(RS-485)	Samsung-E/Samsung-T/Pelco-D/Pelco-p/Panasonic/ Phillips/ AD/ DIAMOND/ ERNA/ KALATEL/ VCL TP/VICON/ ELMO/GE
	Protocol support(Coaxial)	NTSC/PAL : Pelco-C (Coaxitron) AHD : ACP(AHD Coax Protocol)
General		
Electrical	Input Voltage/Current	100 ~ 240 VAC ±10%; 50/60 Hz
	Power consumption	smps 250w
Environmental	Operating Temperature/Humidity	+0°C to +40°C (+32°F to +104°F) / 20% to 85% RH
Mechanical	Dimension (W x H x D)	W440 x H88 x D384.8(17.32" x 3.46" x 15.14")
	Weight (with hard disks)	5.665kg
Lauguage	GUI	English, French, German, Spanish, Italian, Russian, Polish, Czech, Turkish, Netherlands Portuguese, Swedish, Danish, Rumania, Serbia, Croatia, Hungary, Greek, Finnish, Norwegian, Korean, Japanese, Chinese(Traditional), Thai , Taiwanese(25 Language)
	Web Browser	English, French, German, Italian, Spanish, Russian, Turkish, Polish, Dutch, Swedish, Czech, Portuguese, Danish, Rumanian, Serbian, Croatian, Hungarian, Greek, Norwegian, Finnish, Korean, Chinese(Simplified), Japanese, Thai

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.

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.

Voltage ☒ 230 Vac ☐ 100 Vac ☐ 24 Vac ☐ 12 Vdc ☐ PoE

Frequency ☒ 50 Hz ☐ 60 Hz ☐ 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	HRD-1642P	-	Hanwha Techwin (Tianjin) Co.,Ltd	E.U.T
Mouse 1	MOEIUOA	PMX-MMOEIUA	PRIMAX ELECTRONICS LTD.	-
Remote Controller	EP10-000329A	-	Samsung Techwin (Sta)	-
HDD	WD10PURX	WCC4J7TS2NSC	WD Purple	1TB
Switching Power Supply	FSP250-50GUB	-	FSP	-

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.

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
MONITOR 1	W2261VT	005NDCRDV451	LG Electronics NanJing Display Co., Ltd	-
MONITOR 2	S24E370DL	0NTWHTPH200179Y	Samsung Electronics Co., Ltd	-
MONITOR 2 Adaptor	A3514_FPN	CN07BN4400832ASK28GCTR235 R.D	POWERNET Technologies Crop.	-
MONITOR 3	SMT-2232	C95V67VF900025B	Weihai Daewoo Electronics Co., Ltd.	-
Notebook	X56K	HN11N5151FJ0045W	HANSUNG	-
Notebook Adaptor	A12-120P1A	F180271552011758	CHICONY POWER TECHNOLOGY CO.,LTD.	-
CAMERA	SDC-8440BC	-	Hanwha Techwin (Tianjin) Co.,Ltd	-
CAMERA AC / DC Adapter	EO-1210	-	EO Electronics	-
Speaker	BR-100A	-	Britz International Co., Ltd.	-
Microphone 1	CMK-303	-	CAMAC	-
Microphone 2	CMK-303	-	CAMAC	-
Mouse 2	SMB-400	0DJM010118	SEJIN ELECTRON INC.	-
External hard disk drives	MDY-US2528	-	Q-DRIVER	-
Alarm 1	-	-	-	-
Alarm 2	-	-	-	-

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.

1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	**I/O Port**	**Description**	**I/O Port**	**Length**	**Shield**
DVR (E.U.T)	RJ 45	Notebook	RJ 45	3.0	U
	D-SUB	MONITOR 1	D-SUB	1.5	S
	HDMI	MONITOR 2	HDMI	1.5	S
	BNC	MONITOR 3	BNC	3.0	S
	BNC	CAMERA	BNC	10	S
	Audio out	Speaker	Audio in	1.4	U
	Audio in	Microphone 1	Audio out	1.2	U
	Audio in	Microphone 2	Audio out	1.7	U
	USB	Mouse 1	USB	1.2	U
	RS 232	Mouse 2	RS 232	1.4	U
	e sata	External hard disk drives	e sata	0.15	U
	2 Pin	Alarm 1	2 Pin	3.0	U
	2 Pin	Alarm 2	2 Pin	3.0	U

* Unshielded=U, Shielded=S

1.7 E.U.T Operating Mode(s)

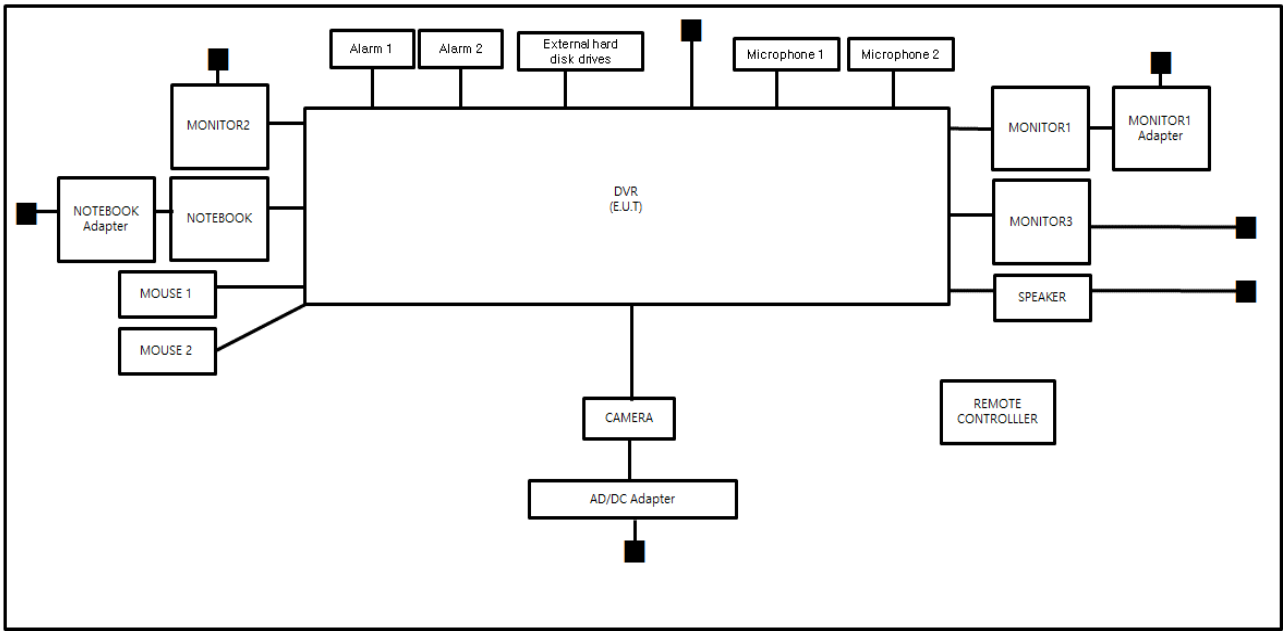
Test mode	operating
AC 230 V	E.U.T Monitoring, Ping test, 1 ㎑

E.U.T Test operating S/W		
Name	**Version**	**Manufacture Company**
SmartViewer	-	Hanwha Techwin 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.

1.8 Configuration

■ AC Main
□ DC Main



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.

1.9 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.

1.10 Test Facility

The measurement facility is located at 473-21 Gayeo-ro, Yeoju-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22.

1.11 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	**FCC**	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	
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-4308, C-4798, T-2311, G-914
KOREA	**MSIP**	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	KR0100
Canada	**IC**	3 & 10 meter Open Area Test Sites and one conducted site	4769B-1
Europe	**CE**	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	
International	**KOLAS**	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	KOREA LABORATORY ACCREDITATION SCHEME KOLAS TESTING NO. 489

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.

2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **EMC – Directive 2014/30/EU**

☐ EN 61000-6-3:2011		
☐ EN 61000-6-1:2007		
☐ EN 61000-6-4:2007 +A1:2011		
☐ EN 61000-6-2:2005		
☐ EN 55011:2007 +A1:2010	☐ Group 1 ☐ Class A	☐ Group 2 ☐ Class B
☐ EN 55014-1:2006 +A2:2011		
☐ EN 55014-2:1997 +A2:2008		
☐ EN 55015:2013		
☐ EN 61547:2009		
☒ EN 55032:2012	☒ 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		

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.

☐ **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 C63.4-2009

☐ **IC Regulation ICES-003 : 2016**

- ☐ CAN/CSA CISPR 22-10 ☐ Class A ☐ Class B
- ☐ ANSI C63.4-2014

☐ **RE– Directive 2014/53/EU**

☐ EN 301 489-1 V1.9.2

- ☐ 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.

2.1 Conducted Emissions at Mains Power Ports

Test Date
Feb, 20, 2017

Test Location
Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test Receiver	ESR3	R & S	101783	05, 03, 2017
☒	LISN	ENV216	R & S	101137	02, 03, 2018
☒	LISN	ENV216	R & S	101786	05, 02, 2017
☒	PULSE LIMITER	ESH3-Z2	R & S	101914	12, 13, 2017
☒	Shield Room #3	-	SEMITEC	-	-
☒	EMI Test S/W	EMC32	R & S	9.12.00	-

Test Conditions
Temperature: 20,9 ℃
Relative Humidity: 40,4 %

.

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.

2.2 Conducted Emissions at Telecommunication Ports

Test Date
Feb, 20, 2017

Test Location
Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test Receiver	ESR3	R & S	101783	05, 03, 2017
☒	LISN	ENV216	R & S	101137	02, 03, 2018
☒	LISN	ENV216	R & S	101786	05, 02, 2017
☒	8-Wire ISN CAT3	CAT3 8158	Schwarzbeck Mess	8158-0019	04, 01, 2017
☒	8-Wire ISN CAT5	CAT5 8158	Schwarzbeck Mess	8158-0030	04, 01, 2017
☐	8-Wire ISN CAT6	NTFM 8158	Schwarzbeck Mess	8158-0029	08, 11, 2017
☒	PULSE LIMITER	ESH3-Z2	R & S	101914	12, 13, 2017
☒	Shield Room #3	-	SEMITEC	-	-
☒	EMI Test S/W	EMC32	R & S	9.12.00	

Test Conditions
Temperature: 20,9 ℃
Relative Humidity: 40,4 %

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.

2.3 Radiated Electric Field Emissions(Below 1 ㎓)

Test Date
Feb, 20, 2017

Test Location
☐ Open Area Test Site #1 ☒ Open Area Test Site #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI TEST Receiver	ESR3	R & S	101781	05, 03, 2017
☒	Trilog-Broadband ANT	VULB9163	Schwarzbeck	715	04, 14, 2018
☒	Open Area Test Site	-	KES	-	-
☒	Antenna Mast	-	DAEIL EMC	-	-
☒	Turn Table	-	DAEIL EMC	-	-
☒	EMI Test S/W	-	-	-	-

Test Conditions
Temperature: 2,1 ℃
Relative Humidity: 42,0 %

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.

2.4 Radiated Electric Field Emissions(Above 1 ㎓)

Test Date
Feb, 20, 2017

Test Location
Semi Anechoic Chamber #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Log-Periodic Antenna	STLP 9149	SCHWARZBECK	9149-255	05, 17, 2018
☒	EMI Test Receiver	ESU26	R & S	100552	04, 24, 2017
☒	Broadband Coaxial Preamplifier	BBV 9718	Schwarzbeck Mess - Elektronik	9718-246	10, 14, 2017
☒	Semi Anachoic Chamber #2	-	SEMITEC	-	-
☒	Antenna Mast	-	AUDIX	-	-
☒	Turn Table	-	AUDIX	-	-
☒	EMI Test S/W	e3	AUDIX	8.083b	-

Test Conditions
Temperature: 20,9 ℃
Relative Humidity: 40,4 %

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.

2.5 Harmonic Current Emissions

Test Date
Feb, 20, 2017

Test Location
Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	AC Source	ACS 500 N	EM TEST	V1024106760	08, 08, 2017
☒	Digital Power Analyzer	DPA 500 N	EM TEST	V1024106759	08, 08, 2017
☒	EMI Test S/W	dpa.control	EM TEST AG	5.4.8.0	-

Test Conditions
Temperature: 20,9 ℃
Relative Humidity: 40,4 %

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.

2.6 Voltage Fluctuations and Flicker

Test Date
Feb, 20, 2017

Test Location
Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	AC Source	ACS 500 N	EM test	V1024106760	08, 08, 2017
☒	Digital Power Analyzer	DPA 500 N	EM test	V1024106759	08, 08, 2017
☒	EMI Test S/W	dpa.control	EM TEST AG	5.4.8.0	-

Test Conditions
Temperature: 20,9 ℃
Relative Humidity: 40,4 %

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.

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:
EN 50130-4:2011 +A1:2014 Alarm systems-Part 4: Electromagnetic compatibility Product family standard: Immunity requirements for components of fire, intruder and social alarm systems

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

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

A functional description and a definition of performance by the manufacture and noted in the test report, based on the following criteria:

Electrostatic discharge

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

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

Radiated electromagnetic fields

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

Flickering of an indicator during the application of discharge is permissible, providing

which could be interpreted by associated equipment as a change, and no such

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

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

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

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

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

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

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.

Fast transient burst / slow high energy voltage surge

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

Flickering of an indicator during the application of discharge is permissible, providing

That there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

Conducted RF immunity

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

Flickering of an indicator during the application of discharge is permissible, providing

That there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change,

and no such flickering of indicators oeuvres at U = 130 $dB\mu V$.

For component of CCTV systems, where the status is monitored by observing the TV picture,

then deterioration of the picture is allowed at U = 140 $dB\mu V$, providing:

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

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

(b) at U = 130 $dB\mu V$, any deterioration of the picture is so minor that the system could

still be used; and

(c) there in no observable deterioration of the picture at U = 120 $dB\mu V$.

Voltage dip/interruption / Voltage variation

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

Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test, after the conditioning.

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.

3.1 Electrostatic Discharge

Reference Standard
EN 61000-4-2:2009

Test Date
Feb, 21, 2017

Test Location
EMS-ESD: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS05X4620	02, 24, 2018
☒	HCP	-	Noise Ken	-	-
☒	VCP	-	Noise Ken	-	-
☒	EMS Test S/W	-	-	-	-

Test Conditions
Temperature: 21,4 ℃
Relative Humidity: 41,3 %
Atmospheric Pressure: 101,8 kPa

Test Specifications
Discharge Factor: ≥ 1 s

Discharge Impedance: 330 ohm / 150 pF

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

Polarity: Positive and Negative

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

Discharge Voltage:

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

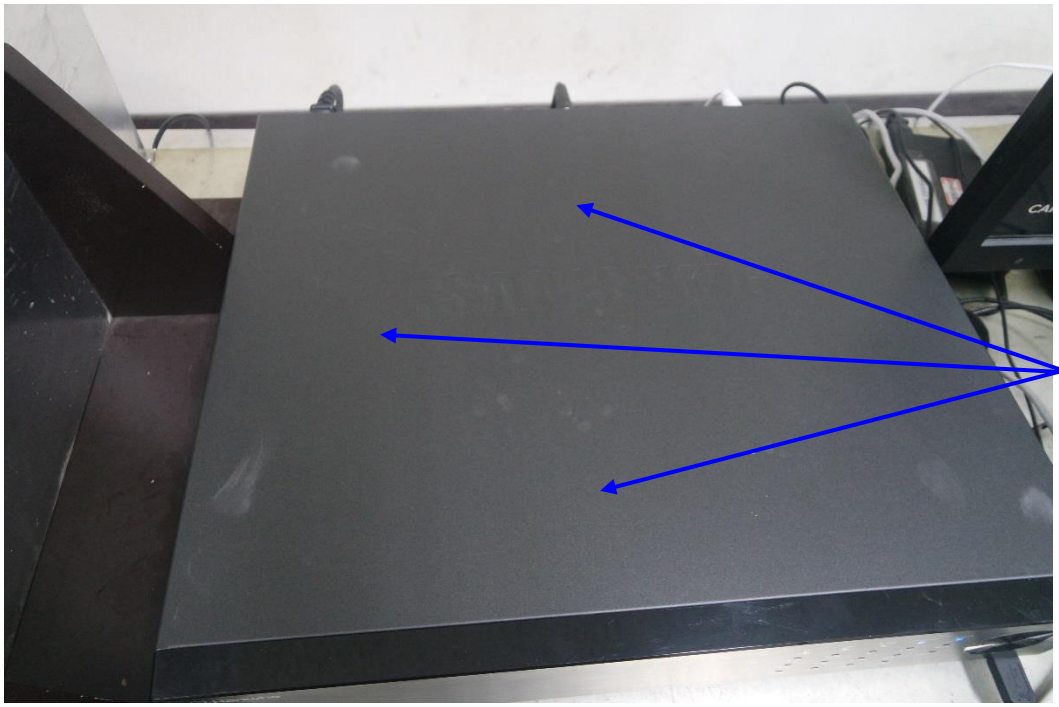
Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

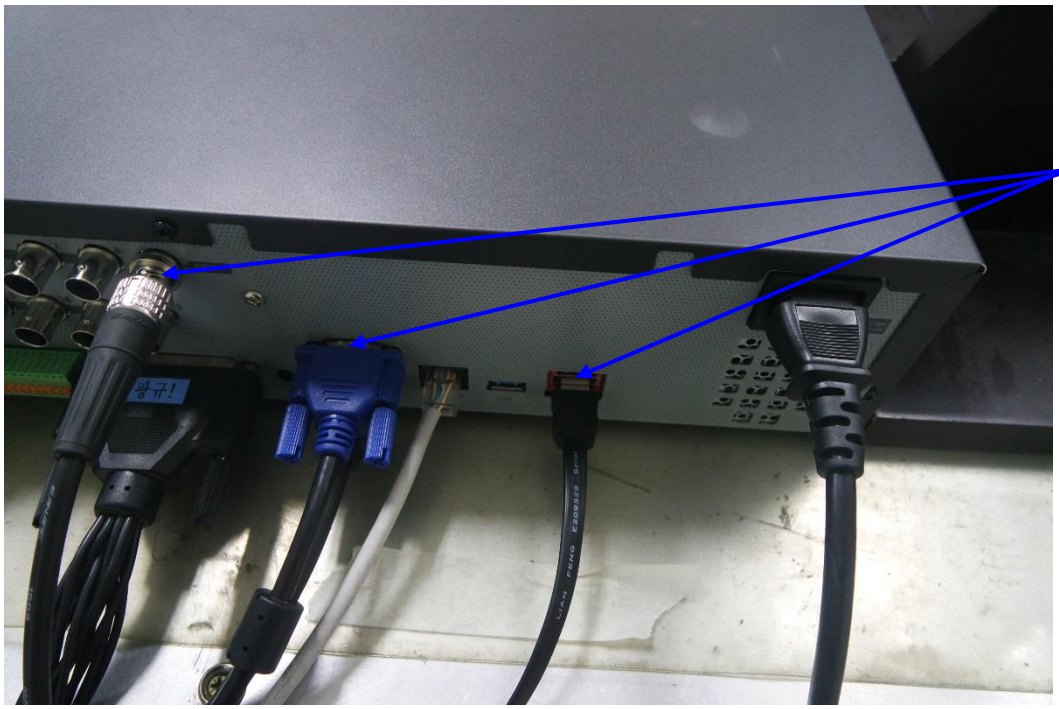
Required Performance Criteria: ☒ Complied

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.

Location of Discharge:

Air
Contact





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.

Test Data

Indirect Discharge

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

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Surface	Contact Discharge	Complied	-
2	Ports	Contact Discharge	Complied	-

Note: "Blank" = Not performed

Observations:
Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.

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.

3.2 Radiated Electric Field Immunity

Reference Standard
EN 61000-4-3:2006 +A2:2010

Test Date
Feb, 21, 2017

Test Location
EMS-RS: ☐ Semi Anechoic Chamber #1 ☒ Semi Anechoic Chamber #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Signal Generator	ESG-3000A	HP	US37040210	11, 01, 2017
☒	Amplifier	ITA0300-200	Infinitech	-	11, 01, 2017
☒	Amplifier	ITA0750-200	Infinitech	-	11, 01, 2017
☒	Amplifier	ITA1500-100	Infinitech	-	11, 01, 2017
☒	Amplifier	ITA2500-100	Infinitech	-	11, 01, 2017
☒	GPIB INTERFACE CONTROL	SYSTEM CONTROL UNIT	Infinitech	-	-
☒	POWER SUPPLY	SYSTEM POWER SUPPLY	Infinitech	-	-
☒	Power Meter	E4419B	Agilent	MY45101506	06, 27, 2017
☒	Average Power Sensor	E9301A	Agilent	-	06, 27, 2017
☒	Average Power Sensor	E9301A	Agilent	MY41495698	11, 17, 2017
☒	Stacked Double Log-Per- Antenna	STPL9128 D	SCHWARZBECK	9128D038	-
☐	MICROPHONE	MP201	BSWA	520963	11, 11, 2017
☐	SOUND ACOUSTIC TESTER	TST-1000	TESTEK	150045	11, 01, 2017
☒	Semi Anechoic Chamber #2	-	SEMITEC	-	-
☒	EMS Test S/W	KTI_RS2012	KOREA TECHNOLOGY INSTITUDE CO., LTD	2.1.1	-

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.

Test Conditions

Temperature:	21,4 ℃
Relative Humidity:	41,3 %
Atmospheric Pressure:	101,8 kPa

Test Specifications

Antenna Polarization: Horizontal & vertical unless indicated otherwise

Antenna Distance: ☒ 3 m

Field Strength: ☐ 1 V/m ☐ 3 V/m
☒ 10 V/m

Frequency Range: ☐ 80 MHz to 1 GHz ☐ 1,4 GHz to 2,7 GHz
☒ 80 MHz to 2,7 GHz

Modulation: ☒ AM, 80 %, 1 kHz sine wave
☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step: ☒ 1 % step

Dwell Time: ☐ 1 s ☒ 3 s

# of Sides Radiated: ☒ 4

Required Performance Criteria: ☒ Complied

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.

Test Data

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

Note: "Blank" = Not performed

Observations:
Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.

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.

3.3 Electrical Fast Transients/Bursts

Reference Standard
EN 61000-4-4:2012

Test Date
Feb, 22, 2017

Test Location
EMS-EFT: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Ultra Compact Simulator	UCS 500 N5	EM TEST	V0936105120	06, 27, 2017
☒	Motor Variac	MV2616	EM TEST	V0936105123	06, 27, 2017
☒	Capacitive Coupling Clamp	HFK	EM TEST	070925	06, 27, 2017
☒	EMS Test S/W	iec.control	EM TEST AG	5.0.9.0	-

Test Conditions

Temperature:	21,6 ℃
Relative Humidity:	40,9 %
Atmospheric Pressure:	100,8 kPa

Test Specifications

Pulse Amplitude & Polarity: (AC Power Lines)	☐ ± 1.0 kV ☐ ± 4.0 kV	☒ ± 2.0 kV
Pulse Amplitude & Polarity: (Other supply / Signal Lines)	☐ ± 0.5 kV	☒ ± 1.0 kV ☐ ± 2.0 kV
Burst Period:	☒ 300 ms	☐ 2 s
Repetition Rate:	☐ 5 kHz	☒ 100 kHz
Duration of Test Voltage:	☒ ≥ 1 min	
Required Performance Criteria:	☒ Complied	

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.

Test Data

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

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

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (㎸)	(-) Burst (㎸)
BNC	Complied	Complied
RJ-45	Complied	Complied
Alarm	Complied	Complied

Note: "Blank" = Not performed

Observations:
Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.

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.

3.4 Surge Transients

Reference Standard
EN 61000-4-5:2014

Test Date
Feb, 22, 2017

Test Location
EMS-Surge: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ULTRA COMPACT SIMULATOR	UCS 500 N5	EM TEST	V0936105120	06, 27, 2017
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 27, 2017
☒	CDN	CNV 508N1	EM TEST	P1551168979	04, 27, 2017
☐	CDN	CNV 508T5	EM TEST	P1549168422	04, 27, 2017
☒	EMS Test S/W	iec.control	EM TEST	5.0.9.0	-

Test Conditions
Temperature: 21,6 ℃
Relative Humidity: 40,9 %
Atmospheric Pressure: 100,8 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.

Test Specifications

AC Power Lines

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

Surge Amplitude : Common Mode
☒ (0,5 / 1,0 / 2,0) kV
Differential Mode
☐ (0,5 / 1,0) kV

Number of Surges: ☒ 5 surges per angle

Angle: ☒ 0°, 90°, 180°, 270° (input a.c. power port)

Polarity: ☒ Positive & Negative

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

Required Performance Criteria: ☒ Complied

Other supply / Signal Lines

Source Impedance: 42 ohm for common mode
Surge Amplitude: Common Mode
☒ (0,5 / 1,0) kV

Number of Surges: ☒ 5 Surges

Polarity: ☒ Positive & Negative

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

Required Performance Criteria: ☒ Complied

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.

Test Data

Power Lines

☒ Line to Line – Differential Mode

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

☐ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (㎸)	(-) Surge (㎸)
L1-PE	-	-
L2-PE	-	-

Signal Lines

☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (㎸)	(-) Surge (㎸)
BNC	Complied	Complied
RJ-45	Complied	Complied
Alarm	Complied	Complied

Note: "Blank" = Not performed

Observations:
Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.

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.

3.5 Conducted Disturbance

Reference Standard
EN 61000-4-6:2014

Test Date
Feb, 22, 2017

Test Location
EMS-CS: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Continuous Wave Generator	CWS 500N1	EM TEST	V0936105119	08, 08, 2017
☒	6 dB Attenuator	ATT6	EM TEST	1208-34	08, 08, 2017
☒	CDN	CDN-M2/M3N	EM TEST	0909-06	08, 08, 2017
☐	CDN	CDN-T2-RJ11	EM TEST	0909-07	08, 08, 2017
☐	CDN	CDN-T4	EM TEST	0909-08	08, 08, 2017
☐	CDN	CDN-T8RJ45	EM TEST	0909-09	08, 08, 2017
☐	CDN	CDN-AF2	EM TEST	0909-10	08, 08, 2017
☐	CDN	CDN-AF4	EM TEST	0909-11	08, 08, 2017
☒	EM Injection Clamp	EM 101	Liithi	35943	02, 03, 2018
☒	EMS Test S/W	icd.control	EM TEST	5.3.7	-

Test Conditions
Temperature: 21,6 ℃
Relative Humidity: 40,9 %
Atmospheric Pressure: 100,8 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.

Test Specifications

Frequency range: ☒ 150 ㎑ to 100 ㎒ ☐ 150 ㎑ to 80 ㎒

Voltage Level: ☐ 1 Vrms ☐ 3 Vrms
☒ 10 Vrms

Modulation: ☒ AM, 80 %, 1 ㎑ sine wave
☒ PM, 1 ㎐ (0,5 s ON : 0,5 s OFF)

Frequency step: ☒ 1 % step

Dwell Time: ☒ 1 s ☐ 3 s

Required Performance Criteria: ☒ Complied

Test Data

☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L – N - PE	CDN (☐M2, ☒M3)	Complied

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L1 – L2	CDN (☐M2, ☐M3)	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
BNC	EM Injection Clamp	Complied
RJ-45	EM Injection Clamp	Complied
Alarm	EM Injection Clamp	Complied

Notes: CDN = Coupling Decoupling Network

"blank" = Not performed

Observations:
Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.

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.

3.6 Voltage Dips and Short Interruptions

Reference Standard
EN 61000-4-11:2004

Test Date
Feb, 22, 2017

Test Location
EMS-Voltage dip: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Ultra Compact Simulator	UCS 500 N5	EM TEST	V0936105120	06, 27, 2017
☒	Motor Variac	MV2616	EM TEST	V0936105123	06, 27, 2017
☒	EMS Test S/W	iec.control	EM TEST	5.0.9.0	-

Test Conditions

Temperature:	21,6 ℃
Relative Humidity:	40,9 %
Atmospheric Pressure:	100,8 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.

Test Specifications & Observations/Remarks

(Test Voltage : 230 V)

Test Level	Duration [in period/ms (50 ㎐)]	Results
☒ 20 % dip	☒ 250 / 5000	Complied
☒ 30 % dip	☒ 25 / 500	Complied
☒ 60 % dip	☒ 10 / 200	Complied
☒ 100 % dip	☒ 250 / 5000	Complied

- Voltage cariations

☒ Unom + 10 %	☒ 253.0 V (ac)	Complied
☒ Unom - 15 %	☒ 195.5 V (ac)	Complied

Observations:
Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria

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.

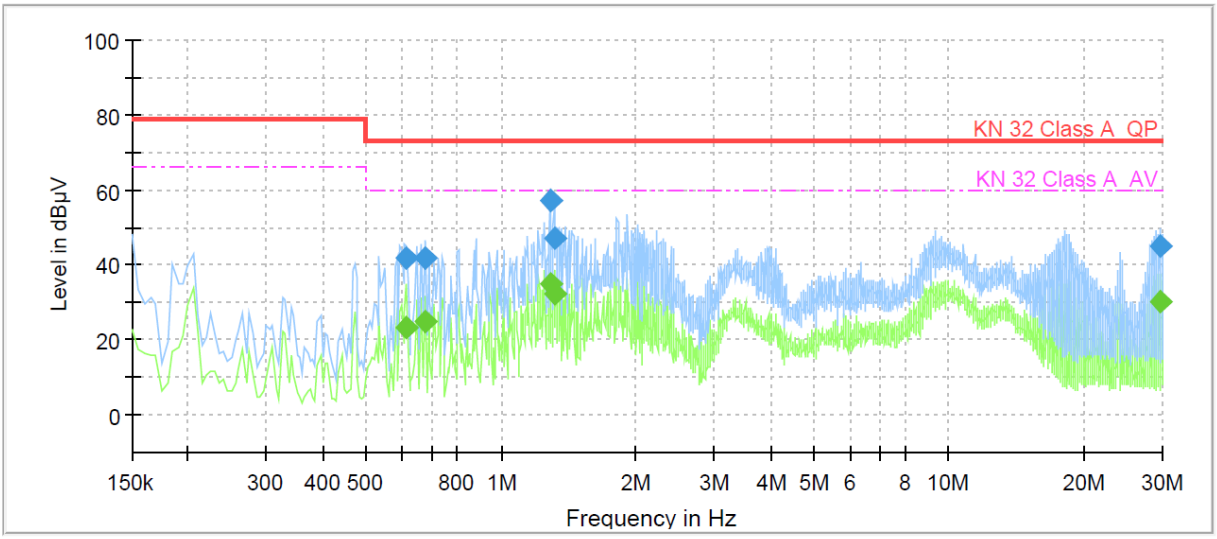
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	HRD-1642P
Mode	
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.615000	---	23.48	60.00	36.52	1000.0	9.000	L1	20.4
0.615000	41.73	---	73.00	31.27	1000.0	9.000	L1	20.4
0.680000	---	25.03	60.00	34.97	1000.0	9.000	L1	20.4
0.680000	42.07	---	73.00	30.93	1000.0	9.000	L1	20.4
1.285000	---	34.79	60.00	25.21	1000.0	9.000	L1	20.0
1.285000	57.17	---	73.00	15.83	1000.0	9.000	L1	20.0
1.315000	---	32.35	60.00	27.65	1000.0	9.000	L1	20.0
1.315000	47.28	---	73.00	25.72	1000.0	9.000	L1	20.0
29.665000	---	30.20	60.00	29.80	1000.0	9.000	L1	20.3
29.665000	45.14	---	73.00	27.86	1000.0	9.000	L1	20.3

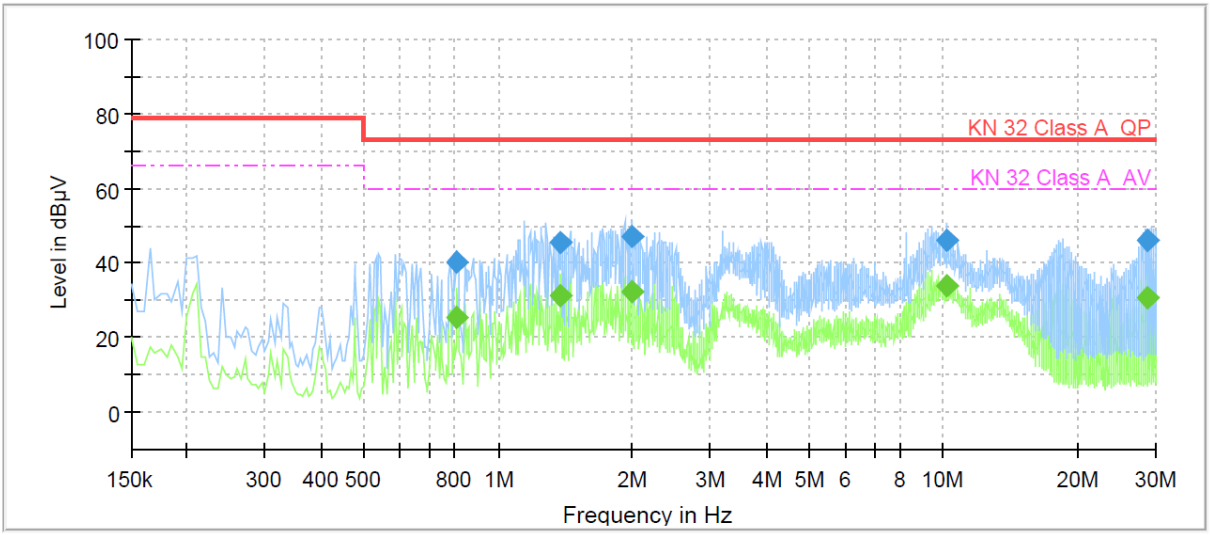
♦ Calculation
QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]
QuasiPeak / CAverage : The Final Value
Reading Value : Not shown in the table.
Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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.

[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	HRD-1642P
Mode	
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.810000	---	25.44	60.00	34.56	1000.0	9.000	N	20.3
0.810000	40.14	---	73.00	32.86	1000.0	9.000	N	20.3
1.385000	---	31.34	60.00	28.66	1000.0	9.000	N	20.0
1.385000	45.63	---	73.00	27.37	1000.0	9.000	N	20.0
1.990000	---	32.35	60.00	27.65	1000.0	9.000	N	19.8
1.990000	47.29	---	73.00	25.71	1000.0	9.000	N	19.8
10.160000	---	33.73	60.00	26.27	1000.0	9.000	N	19.9
10.160000	46.05	---	73.00	26.95	1000.0	9.000	N	19.9
28.740000	---	30.77	60.00	29.23	1000.0	9.000	N	20.3
28.740000	45.92	---	73.00	27.08	1000.0	9.000	N	20.3

♦ 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 (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

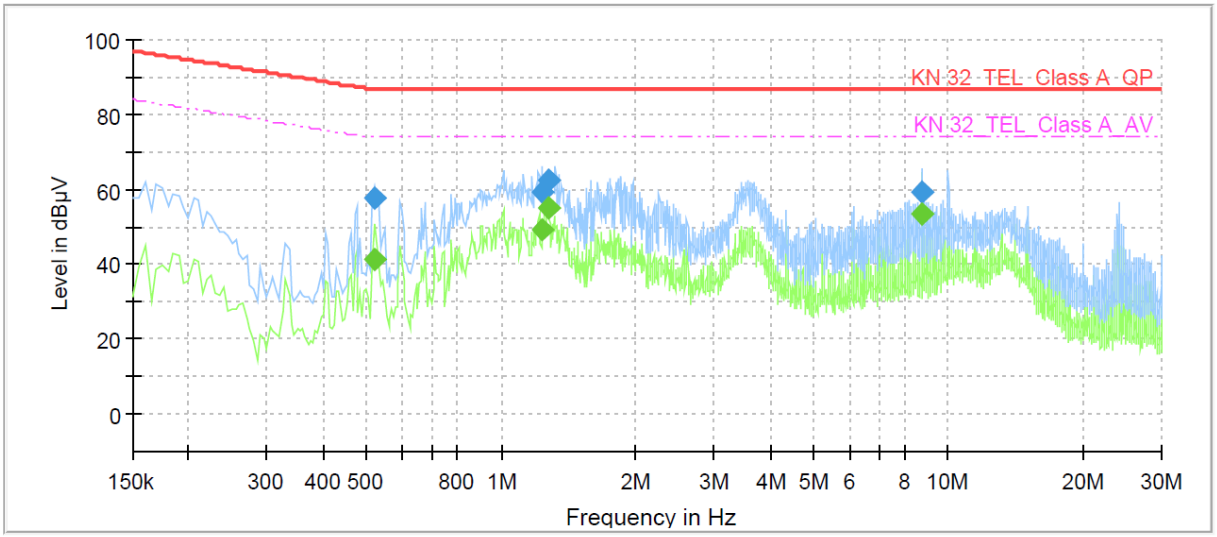
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Conducted Emissions at Telecommunication Ports

[10 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	HRD-1642P
Mode	
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.520000	---	41.24	74.00	32.76	1000.0	9.000	Single Line	20.8
0.520000	57.95	---	87.00	29.05	1000.0	9.000	Single Line	20.8
1.235000	---	49.07	74.00	24.93	1000.0	9.000	Single Line	20.2
1.235000	59.46	---	87.00	27.54	1000.0	9.000	Single Line	20.2
1.270000	---	54.93	74.00	19.07	1000.0	9.000	Single Line	20.2
1.270000	62.66	---	87.00	24.34	1000.0	9.000	Single Line	20.2
8.750000	---	53.70	74.00	20.30	1000.0	9.000	Single Line	19.9
8.750000	59.34	---	87.00	27.66	1000.0	9.000	Single Line	19.9

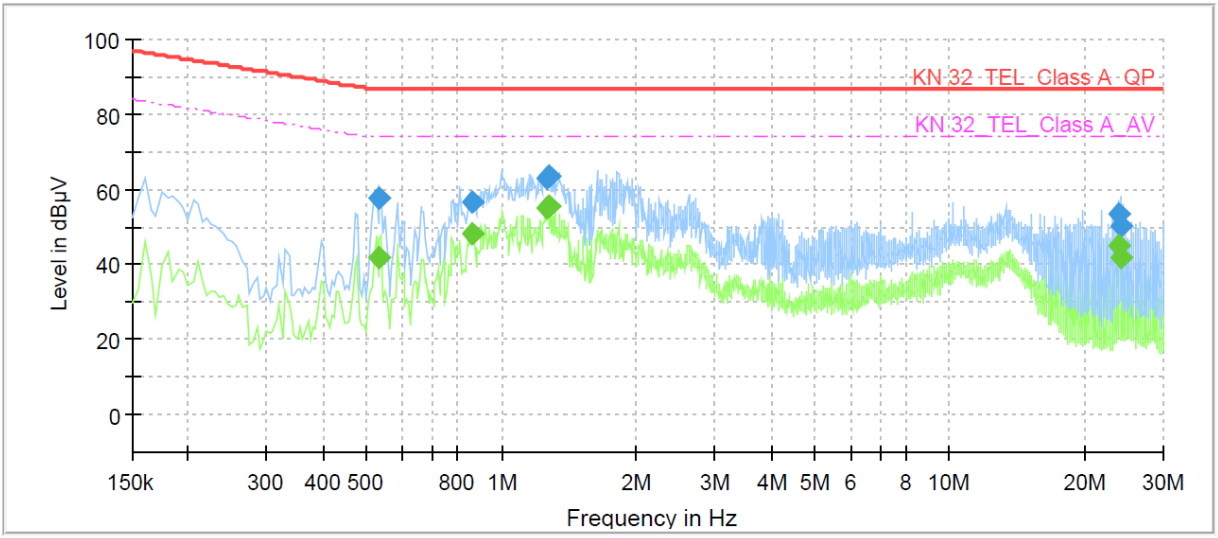
♦ Calculation
QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]
QuasiPeak / CAverage : The Final Value
Reading Value : Not shown in the table.
Corr. : Correction values (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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.

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	HRD-1642P
Mode	
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.535000	---	42.03	74.00	31.97	1000.0	9.000	Single Line	20.3
0.535000	57.69	---	87.00	29.31	1000.0	9.000	Single Line	20.3
0.860000	---	48.24	74.00	25.76	1000.0	9.000	Single Line	20.0
0.860000	56.76	---	87.00	30.24	1000.0	9.000	Single Line	20.0
1.265000	---	55.29	74.00	18.71	1000.0	9.000	Single Line	19.7
1.265000	63.02	---	87.00	23.98	1000.0	9.000	Single Line	19.7
1.270000	---	55.69	74.00	18.31	1000.0	9.000	Single Line	19.7
1.270000	63.32	---	87.00	23.68	1000.0	9.000	Single Line	19.7
23.980000	---	44.79	74.00	29.21	1000.0	9.000	Single Line	19.6
23.980000	53.42	---	87.00	33.58	1000.0	9.000	Single Line	19.6
24.150000	---	41.78	74.00	32.22	1000.0	9.000	Single Line	19.6
24.150000	50.10	---	87.00	36.90	1000.0	9.000	Single Line	19.6

♦ Calculation
QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]
QuasiPeak / CAverage : The Final Value
Reading Value : Not shown in the table.
Corr. : Correction values (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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.

Radiated Electric Field Emissions(Below 1 ㎓)

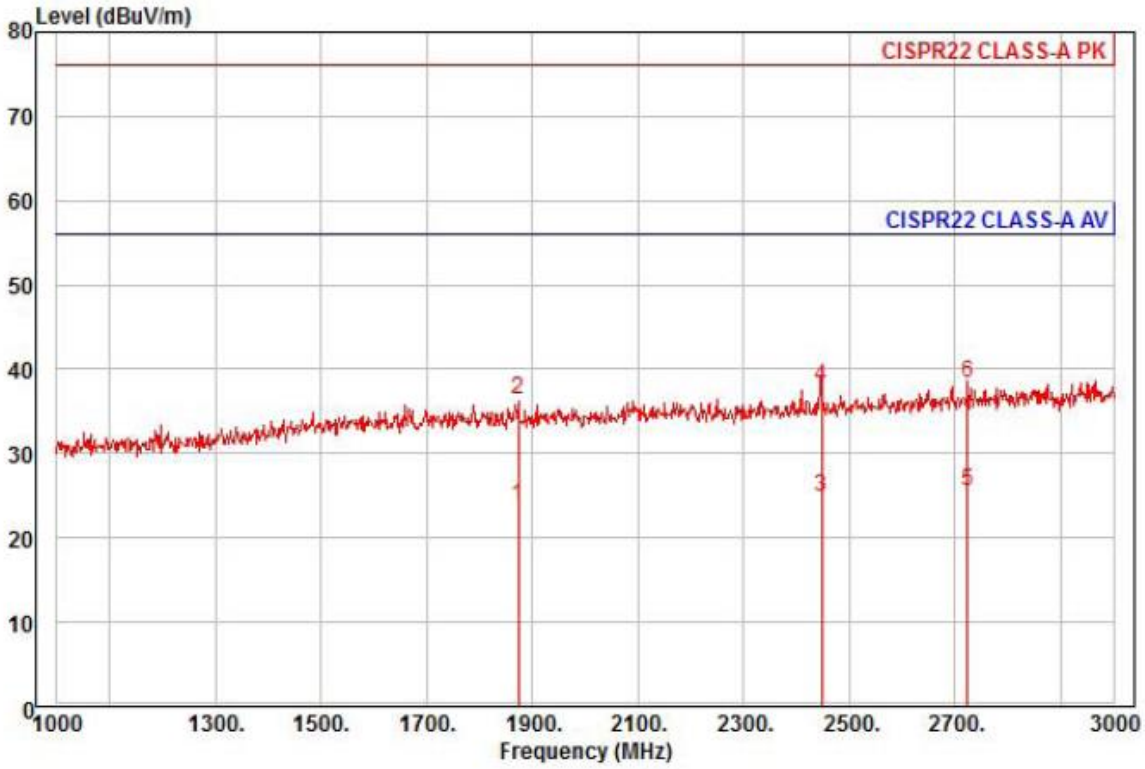
Frequency	Amplitude	ANT Polar. (H/V)	ANT. Height	Correction Factor		Corrected Amplitude	Applicable Limit	Margin [dB]
[㎒]	[dB㎶]		[m]	ANT. [dB/m]	Cable [dB]	[dB㎶/m]	[dB㎶/m]	
152.36	11.23	V	2.36	8.28	3.05	22.56	40.00	17.44
254.37	14.25	H	1.25	12.62	4.19	31.06	47.00	15.94
321.25	11.69	H	2.33	13.86	4.74	30.29	47.00	16.71
372.55	14.58	V	1.52	14.97	5.09	34.64	47.00	12.36
374.97	13.02	H	2.95	15.03	5.11	33.16	47.00	13.84
518.37	14.58	H	1.25	17.66	6.28	38.52	47.00	8.48
594.26	15.36	V	3.01	19.16	6.79	41.31	47.00	5.69
667.59	10.25	V	1.22	19.56	7.33	37.14	47.00	9.86

* H : Horizontal, V : Vertical

♦ Calculation
Corrected Amplitude [㏈uV] = Amplitude[㏈uV] + Correction Factor [㏈]
Corrected Amplitude : The Final Value, Amplitude : Reading Value,
Correction Factor : ANT FACTOR + Cable loss

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.

Radiated Electric Field Emissions(Above 1 ㎓)



Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-1642P
Mode :
Memo : 1 ~ 3 GHz

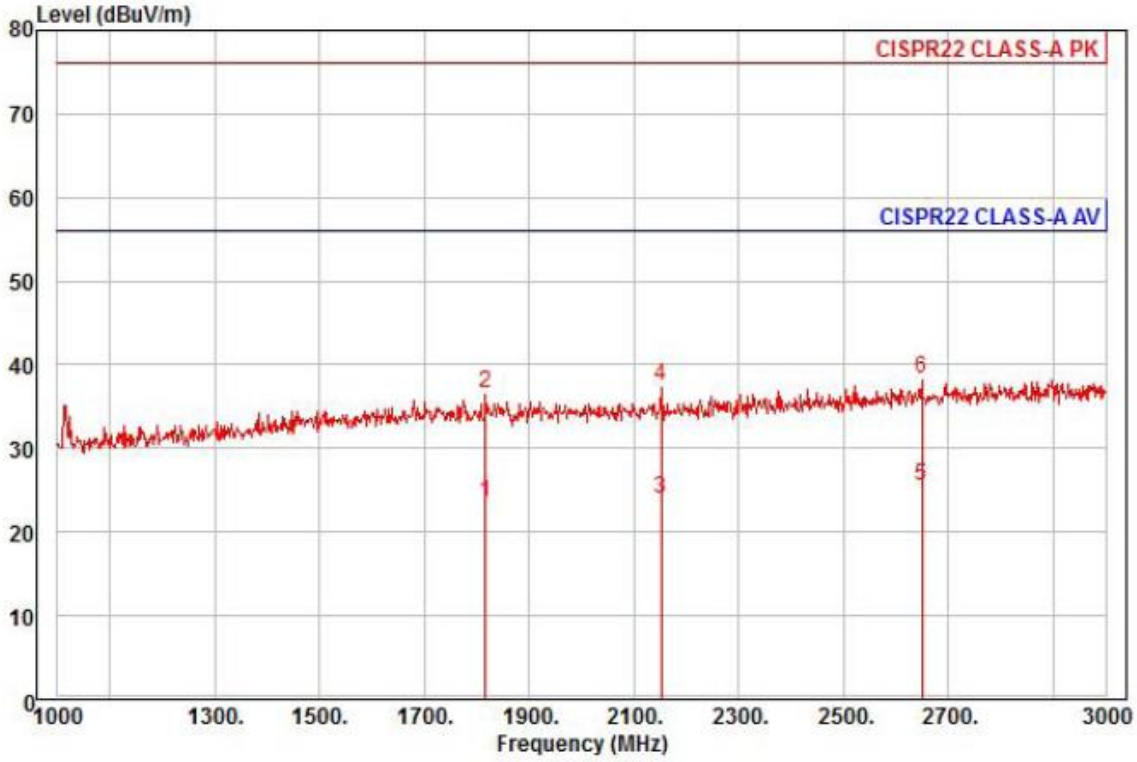
	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1874.00	28.90	25.15	9.02	39.35	248	56.00	-32.28	horizontal	Average
2	1874.00	41.49	25.15	9.02	39.35	248	76.00	-39.69	horizontal	Peak
3	2448.00	26.51	27.37	10.42	39.48	25	56.00	-31.18	horizontal	Average
4	2448.00	39.72	27.37	10.42	39.48	25	76.00	-37.97	horizontal	Peak
5 pp	2724.00	25.72	28.56	11.05	39.79	157	56.00	-30.46	horizontal	Average
6 pk	2724.00	38.62	28.56	11.05	39.79	157	76.00	-37.56	horizontal	Peak

♦ Calculation

Over Limit [㏈] = (Read Level[㏈uV] + Ant Factor[㏈/m] + Cable Loss [㏈] − Preamp Factor [㏈]) − Limit Line[㏈uV]

Over Limit : Margin Value, 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.




```
Site      : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) vertical
          : RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project   :
Model     : HRD-1642P
Mode      :
Memo      : 1 ~ 3 GHz
```

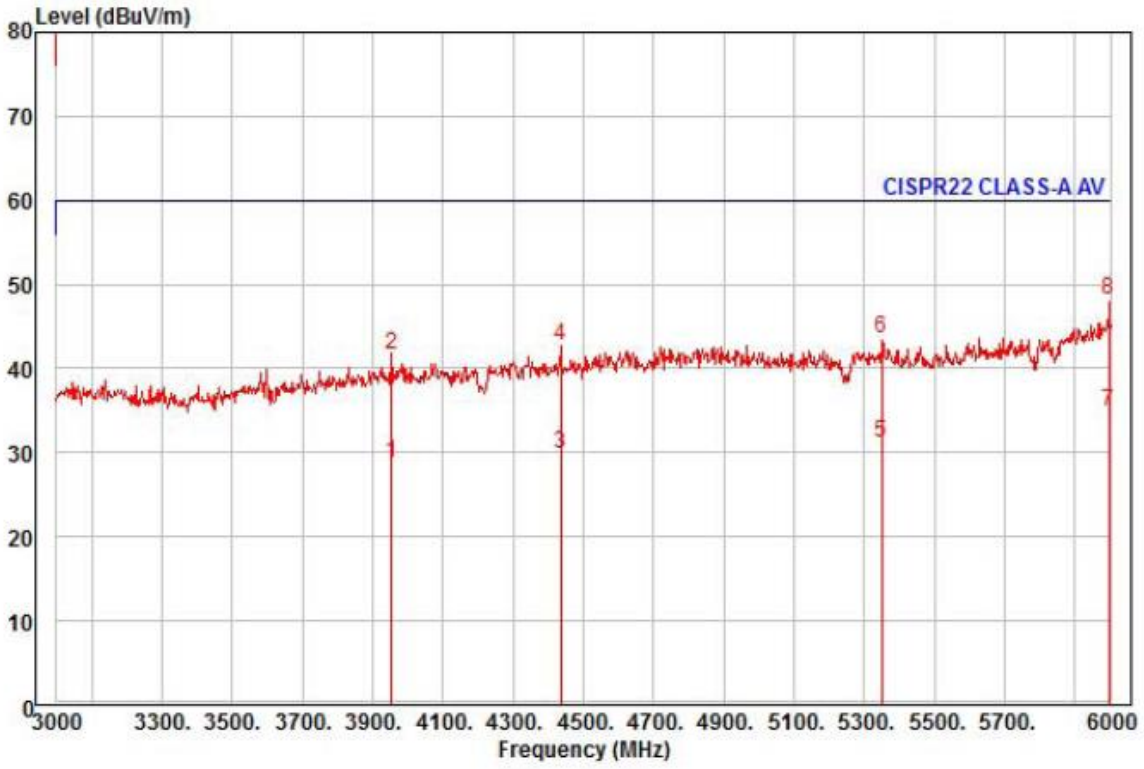
	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1816.00	29.07	24.94	8.87	39.32	360	56.00	-32.44	vertical	Average
2	1816.00	42.11	24.94	8.87	39.32	360	76.00	-39.40	vertical	Peak
3	2152.00	27.53	26.20	9.69	39.41	256	56.00	-31.99	vertical	Average
4	2152.00	40.91	26.20	9.69	39.41	256	76.00	-38.61	vertical	Peak
5 pp	2650.00	26.05	28.24	10.86	39.71	261	56.00	-30.56	vertical	Average
6 pk	2650.00	39.02	28.24	10.86	39.71	261	76.00	-37.59	vertical	Peak

♦ Calculation

Over Limit [㏈] = (Read Level[㏈uV] + Ant Factor[㏈/m] + Cable Loss [㏈] − Preamp Factor [㏈]) − Limit Line[㏈uV]

Over Limit : Margin Value, 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.



Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-1642P
Mode :
Memo : 3 ~ 6 GHz

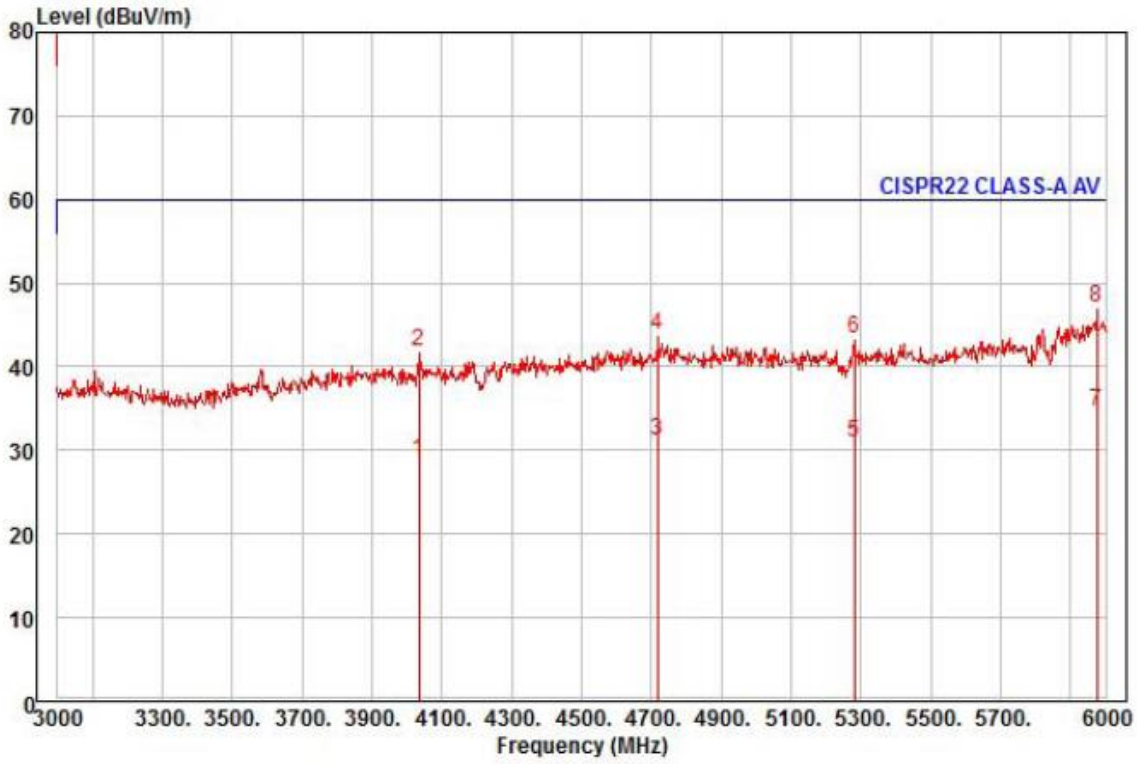
	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3954.00	24.69	31.29	13.48	40.72	91	60.00	-31.26	horizontal	Average
2	3954.00	37.64	31.29	13.48	40.72	91	80.00	-38.31	horizontal	Peak
3	4437.00	23.58	32.62	14.34	40.76	262	60.00	-30.22	horizontal	Average
4	4437.00	36.63	32.62	14.34	40.76	262	80.00	-37.17	horizontal	Peak
5	5349.00	22.62	33.45	15.95	40.85	175	60.00	-28.83	horizontal	Average
6	5349.00	34.99	33.45	15.95	40.85	175	80.00	-36.46	horizontal	Peak
7 pp	5997.00	21.68	36.53	17.07	40.43	301	60.00	-25.15	horizontal	Average
8 pk	5997.00	35.00	36.53	17.07	40.43	301	80.00	-31.83	horizontal	Peak

♦ Calculation

Over Limit [㏈] = (Read Level[㏈uV] + Ant Factor[㏈/m] + Cable Loss [㏈] − Preamp Factor [㏈]) − Limit Line[㏈uV]

Over Limit : Margin Value, 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.



Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-1642P
Mode :
Memo : 3 ~ 6 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	4035.00	24.35	31.49	13.63	40.70	305	60.00	-31.23	vertical	Average
2	4035.00	37.41	31.49	13.63	40.70	305	80.00	-38.17	vertical	Peak
3	4719.00	23.74	32.99	14.92	40.55	302	60.00	-28.90	vertical	Average
4	4719.00	36.53	32.99	14.92	40.55	302	80.00	-36.11	vertical	Peak
5	5280.00	22.36	33.40	15.84	40.73	349	60.00	-29.13	vertical	Average
6	5280.00	34.80	33.40	15.84	40.73	349	80.00	-36.69	vertical	Peak
7 pp	5976.00	21.70	36.41	17.03	40.46	61	60.00	-25.32	vertical	Average
8 pk	5976.00	34.20	36.41	17.03	40.46	61	80.00	-32.82	vertical	Peak

♦ Calculation
Over Limit [㏈] = (Read Level[㏈uV] + Ant Factor[㏈/m] + Cable Loss [㏈] − Preamp Factor [㏈]) − Limit Line[㏈uV]
Over Limit : Margin Value, 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.

Harmonic Current Emissions and Voltage Fluctuations and Flicker

Average harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	144.295E-3			
2	28.163E-3	2.608	1.08	PASS
3	85.885E-3	3.734	2.30	PASS
4	6.350E-3	1.477	430.00E-3	PASS
5	15.373E-3	1.349	1.14	PASS
6	3.899E-3			PASS
7	6.183E-3	0.803	770.00E-3	PASS
8	2.741E-3			PASS
9	8.979E-3	2.245	400.00E-3	PASS
10	2.017E-3			PASS
11	9.221E-3	2.794	330.00E-3	PASS
12	1.016E-3			PASS
13	6.046E-3	2.879	210.00E-3	PASS
14	2.275E-3			PASS
15	3.058E-3			PASS
16	1.497E-3			PASS
17	2.001E-3			PASS
18	1.666E-3			PASS
19	2.125E-3			PASS
20	1.620E-3			PASS
21	3.042E-3			PASS
22	785.553E-6			PASS
23	2.287E-3			PASS
24	993.164E-6			PASS
25	1.313E-3			PASS
26	756.172E-6			PASS
27	533.039E-6			PASS
28	512.690E-6			PASS
29	568.942E-6			PASS
30	513.274E-6			PASS
31	456.274E-6			PASS
32	511.661E-6			PASS
33	757.783E-6			PASS
34	486.476E-6			PASS
35	577.068E-6			PASS
36	568.052E-6			PASS
37	510.965E-6			PASS
38	459.397E-6			PASS
39	637.474E-6			PASS
40	428.503E-6			PASS

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.

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.

Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	146.136E-3			
2	33.447E-3	2.065	1.62	PASS
3	91.370E-3	2.648	3.45	PASS
4	8.308E-3	1.288	645.00E-3	PASS
5	18.287E-3	1.069	1.71	PASS
6	4.844E-3			PASS
7	7.546E-3	0.653	1.15	PASS
8	3.543E-3			PASS
9	10.064E-3	1.677	600.00E-3	PASS
10	2.729E-3			PASS
11	10.036E-3	2.027	495.00E-3	PASS
12	1.931E-3			PASS
13	6.956E-3	2.208	315.00E-3	PASS
14	3.135E-3			PASS
15	3.842E-3			PASS
16	2.052E-3			PASS
17	2.824E-3			PASS
18	2.430E-3			PASS
19	2.642E-3			PASS
20	2.257E-3			PASS
21	3.737E-3			PASS
22	1.069E-3			PASS
23	2.649E-3			PASS
24	1.344E-3			PASS
25	1.736E-3			PASS
26	971.124E-6			PASS
27	1.177E-3			PASS
28	721.926E-6			PASS
29	871.318E-6			PASS
30	763.787E-6			PASS
31	650.060E-6			PASS
32	795.480E-6			PASS
33	1.163E-3			PASS
34	711.723E-6			PASS
35	793.679E-6			PASS
36	866.520E-6			PASS
37	753.696E-6			PASS
38	687.764E-6			PASS
39	964.973E-6			PASS
40	627.976E-6			PASS

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.

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.

Test Data - Voltage Fluctuations

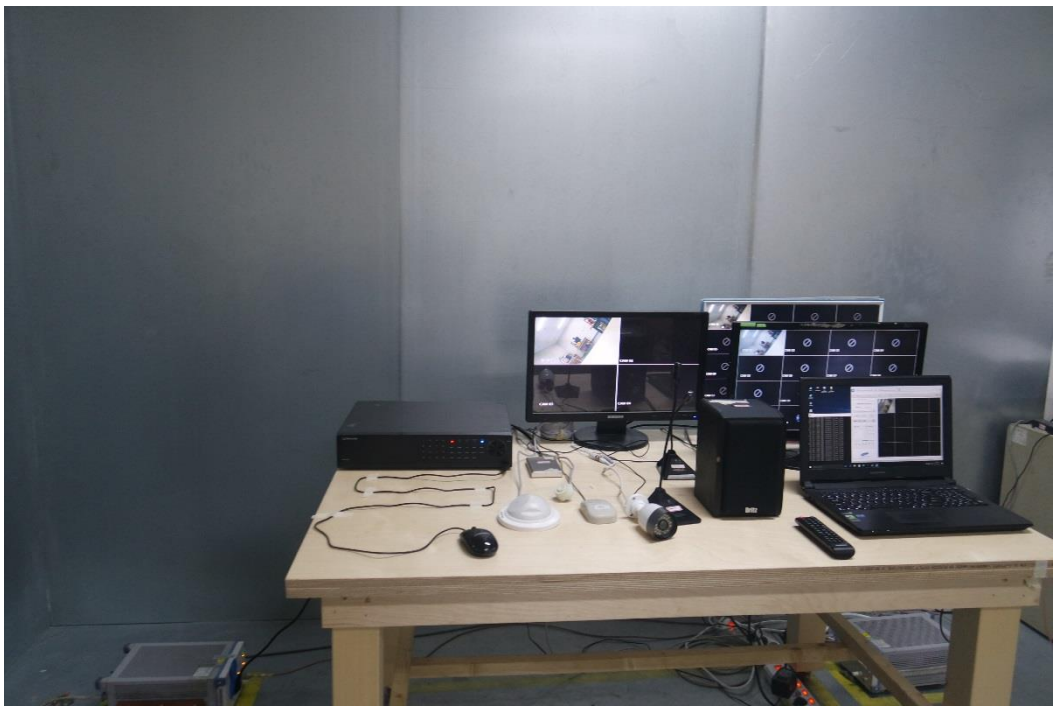
Maximum Flicker results

	EUT values	Limit	Result
Pst	0.069	1.00	PASS
Plt	0.069	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.101	4.00	PASS
Tmax [s]	0.000	0.50	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.

Test Setup Photos and Configuration

Conducted Voltage Emissions





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.

Conducted Telecommunication Emissions





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.

Radiated Electric Field Emissions(Below 1 ㎓)

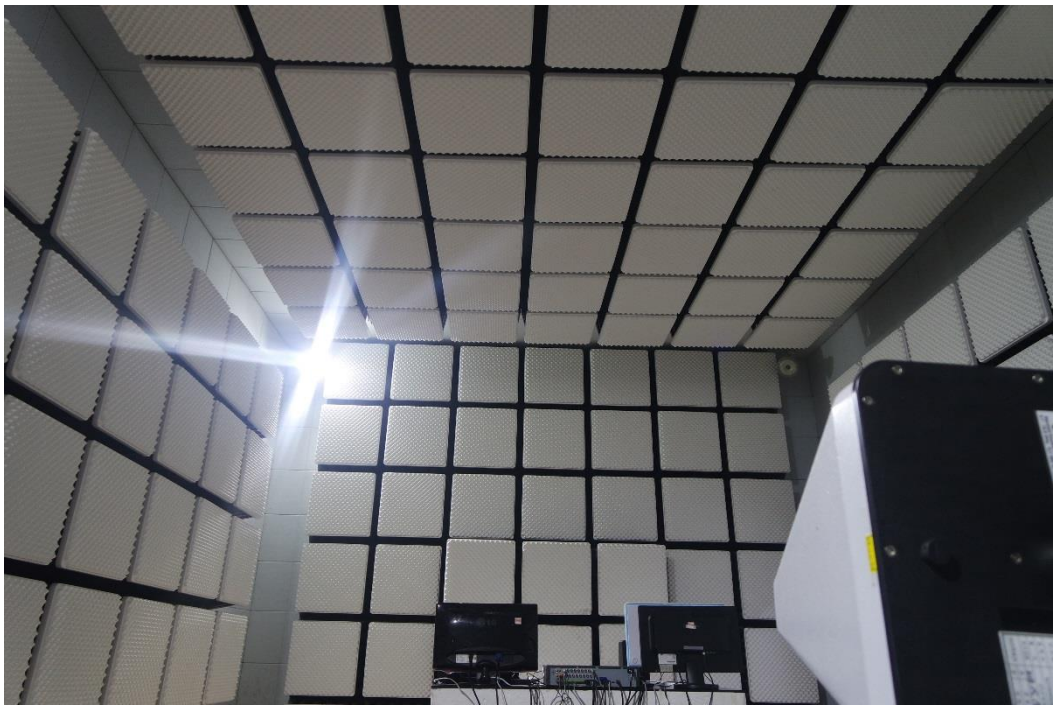




This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Radiated Electric Field Emissions(Above 1 ㎓)





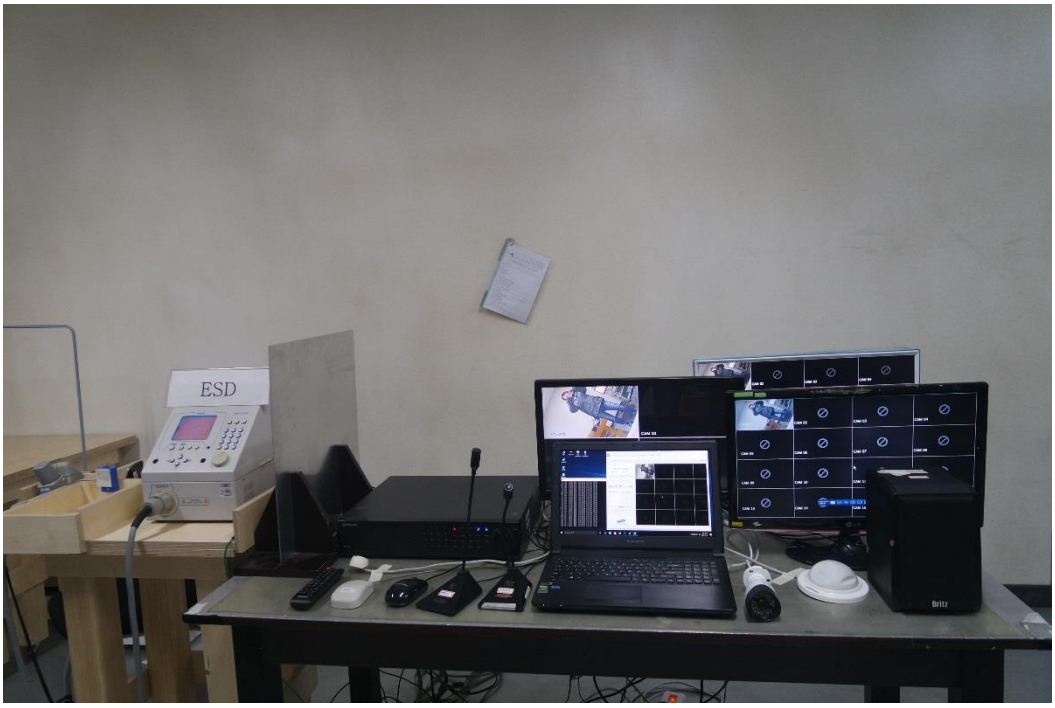
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Harmonic Current Emissions and Voltage Fluctuations and Flicker

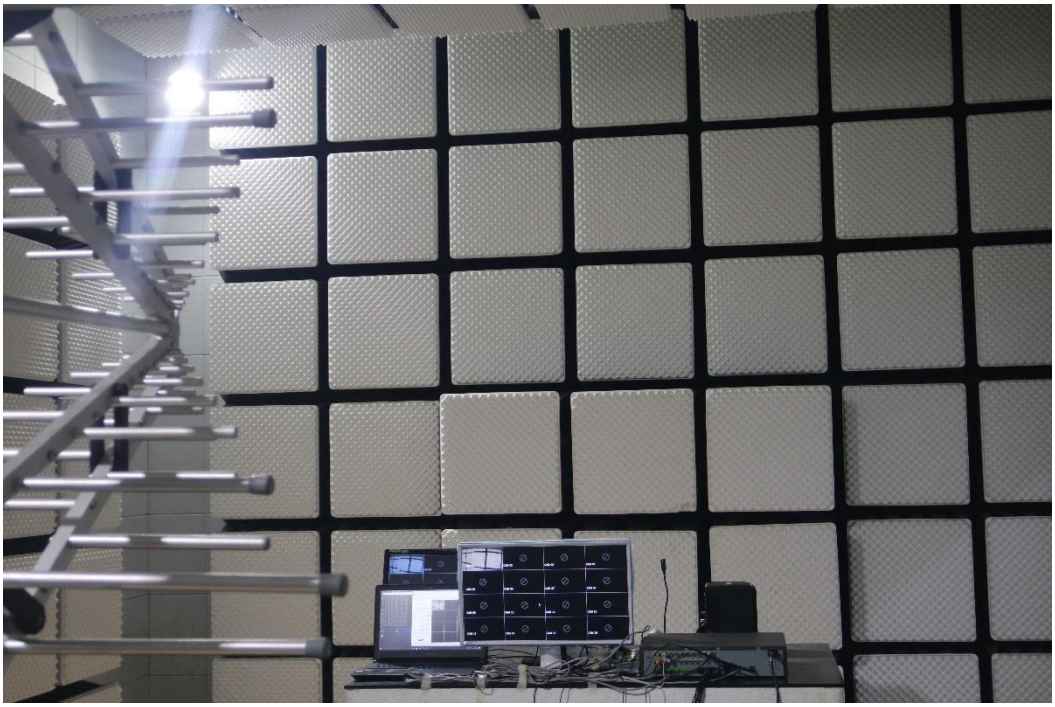


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Electrostatic Discharge



Radiated Electric Field Immunity



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.

Electrical Fast Transients/Bursts





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.

Surge Transients



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.

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.

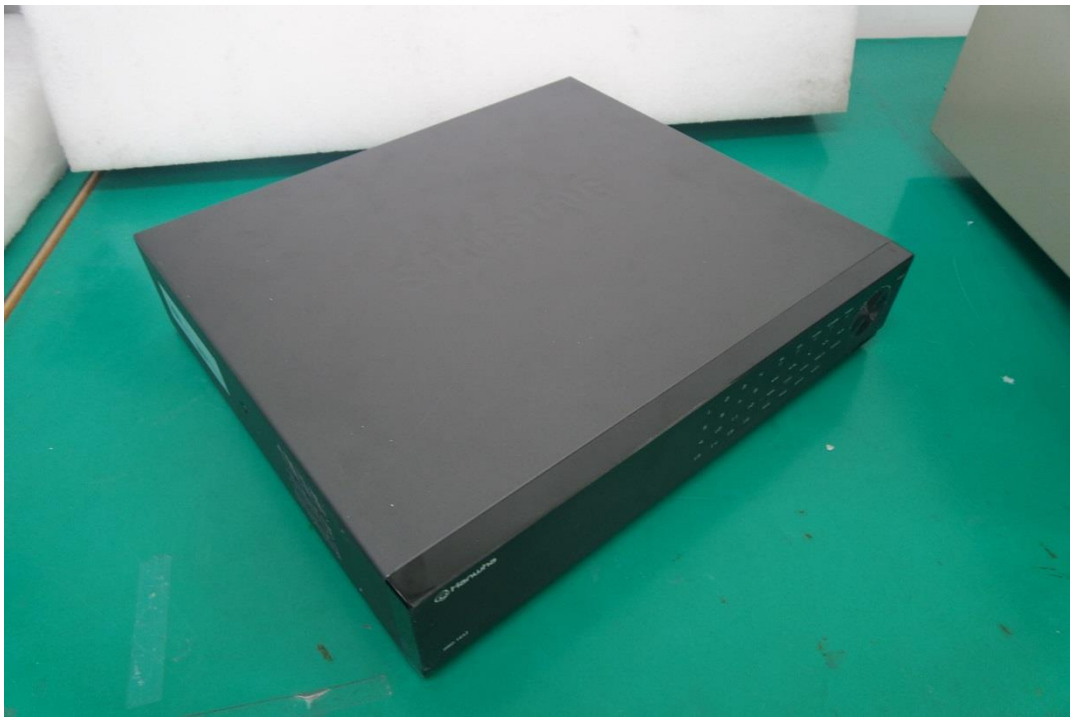
Voltage Dips and Short Interruptions



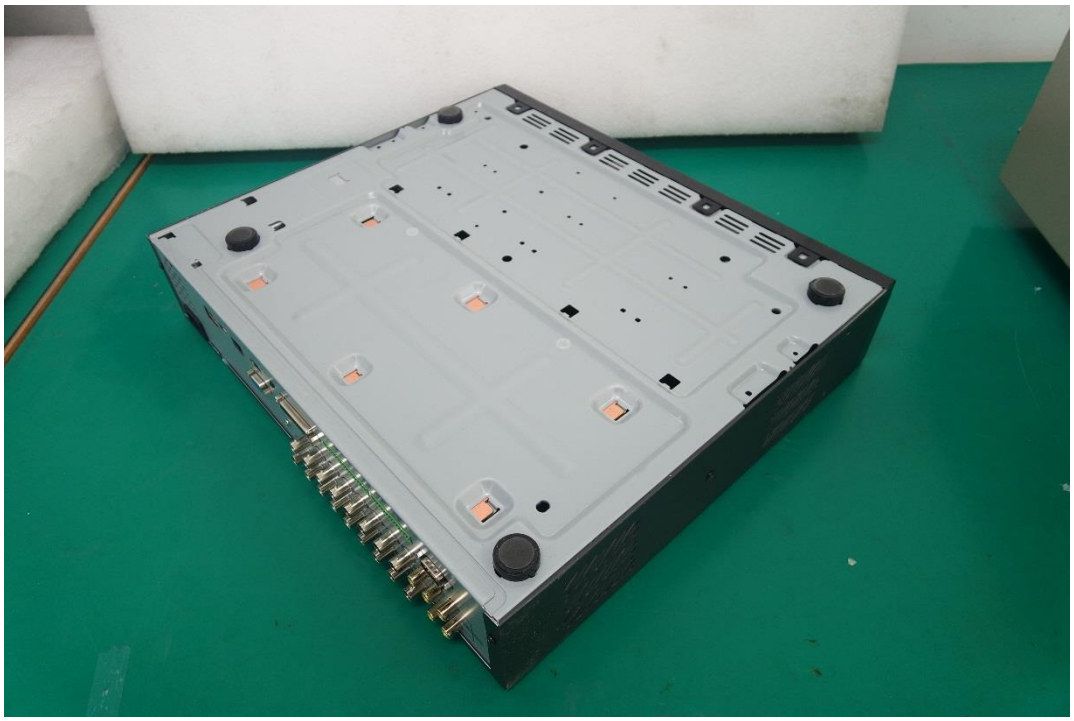
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT External Photographs

(Top)



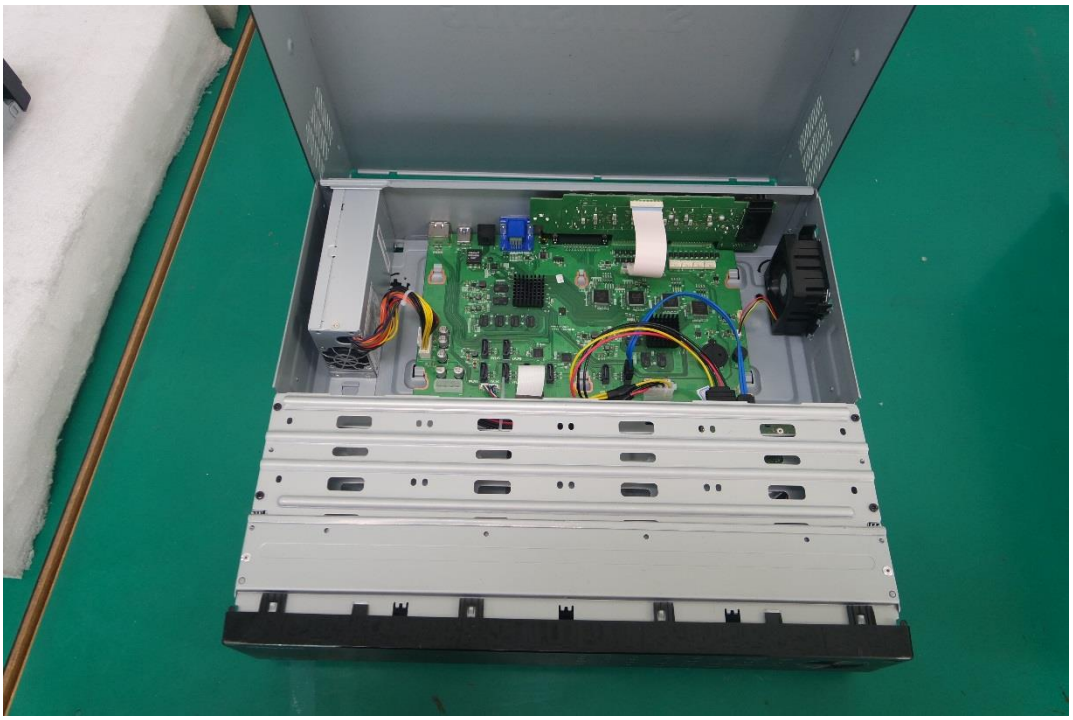
(Bottom)



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.

AEUT Internal Photographs

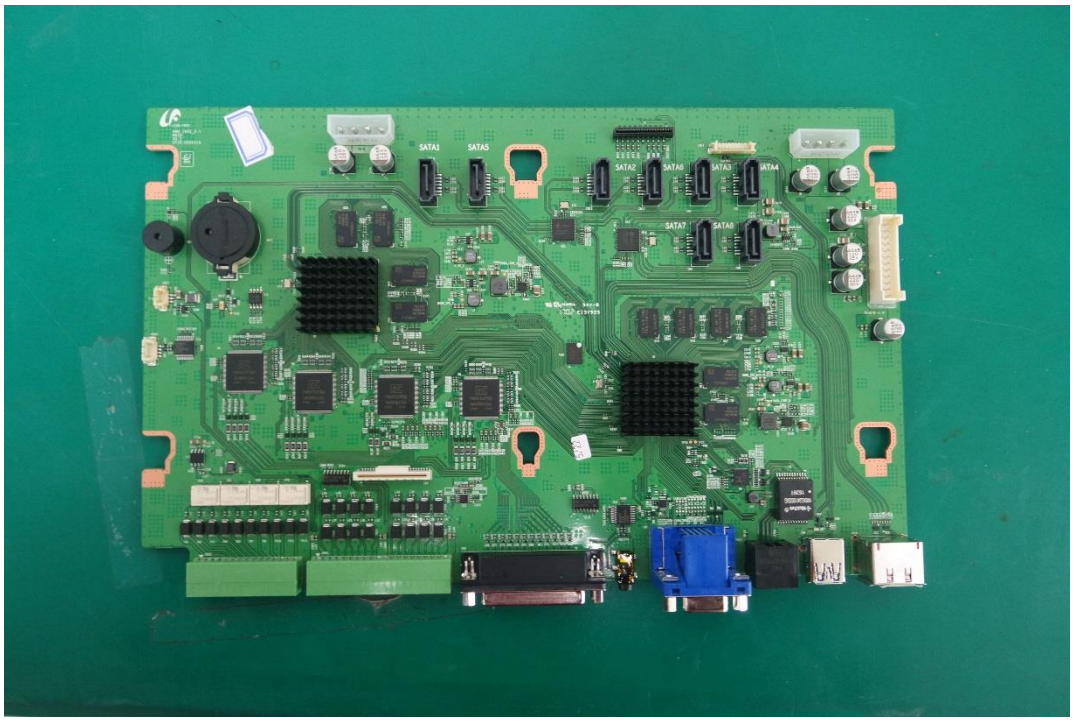
(Internal View)



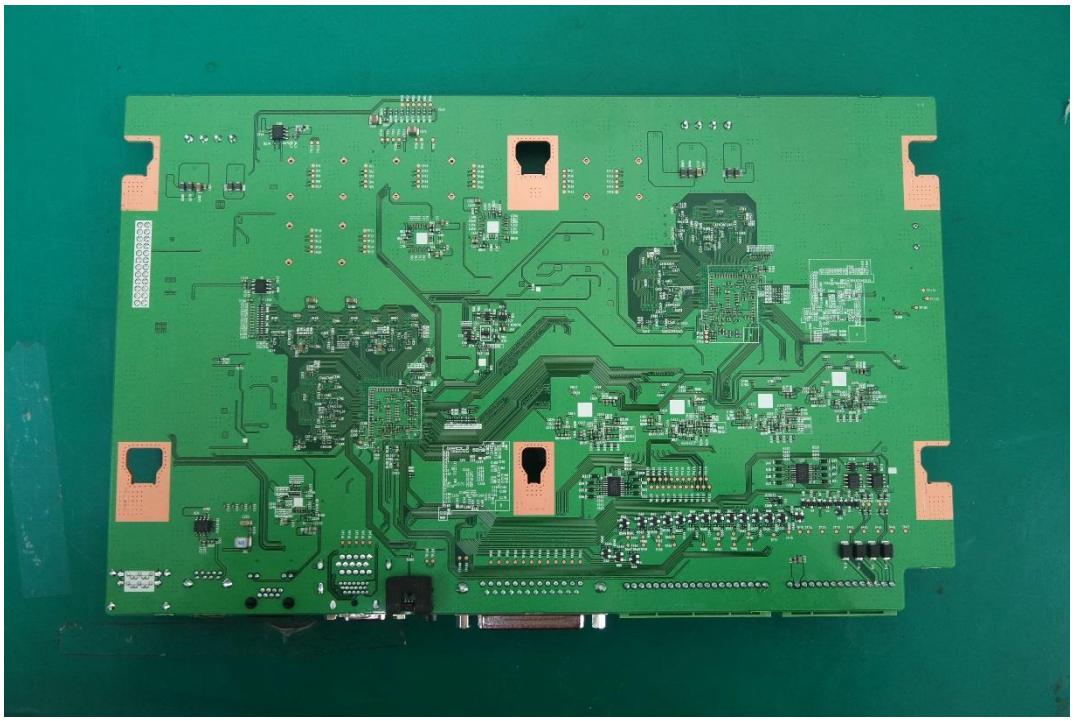
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal View – Main Board

(Top)



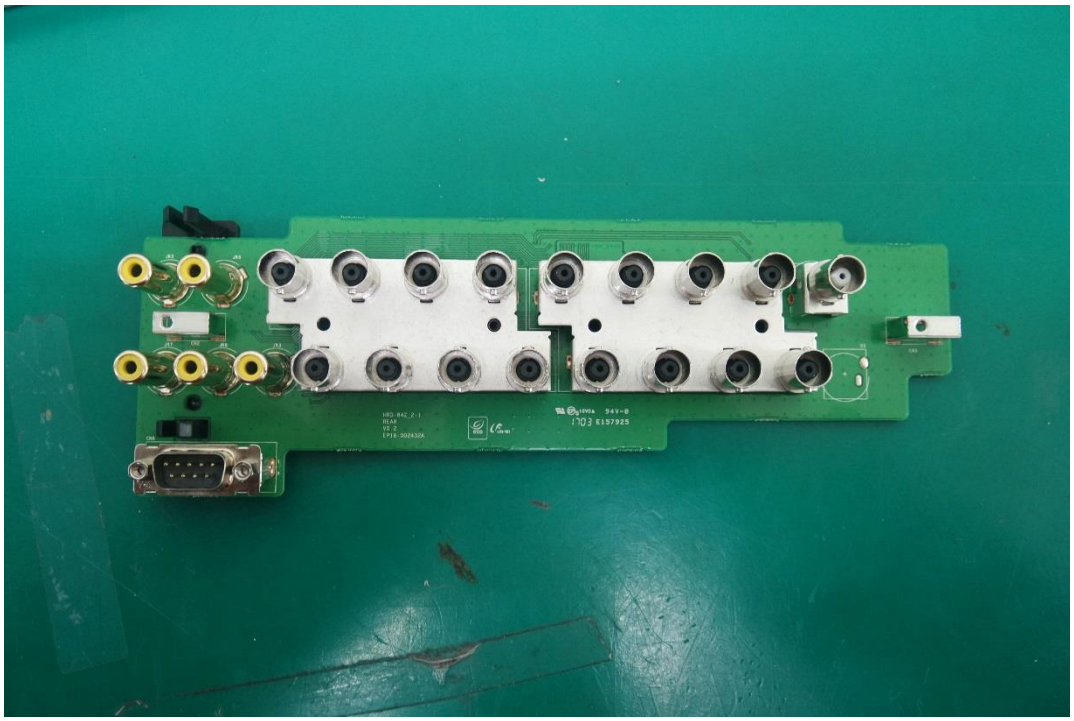
(Bottom)



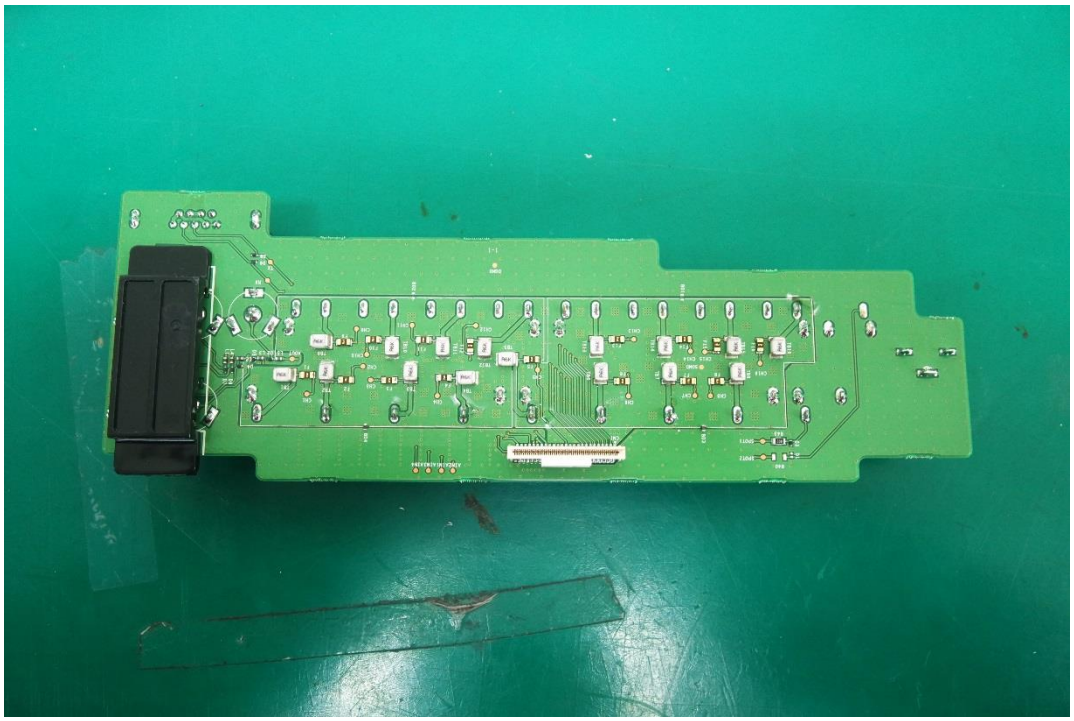
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal View – Sub Board 1

(Top)



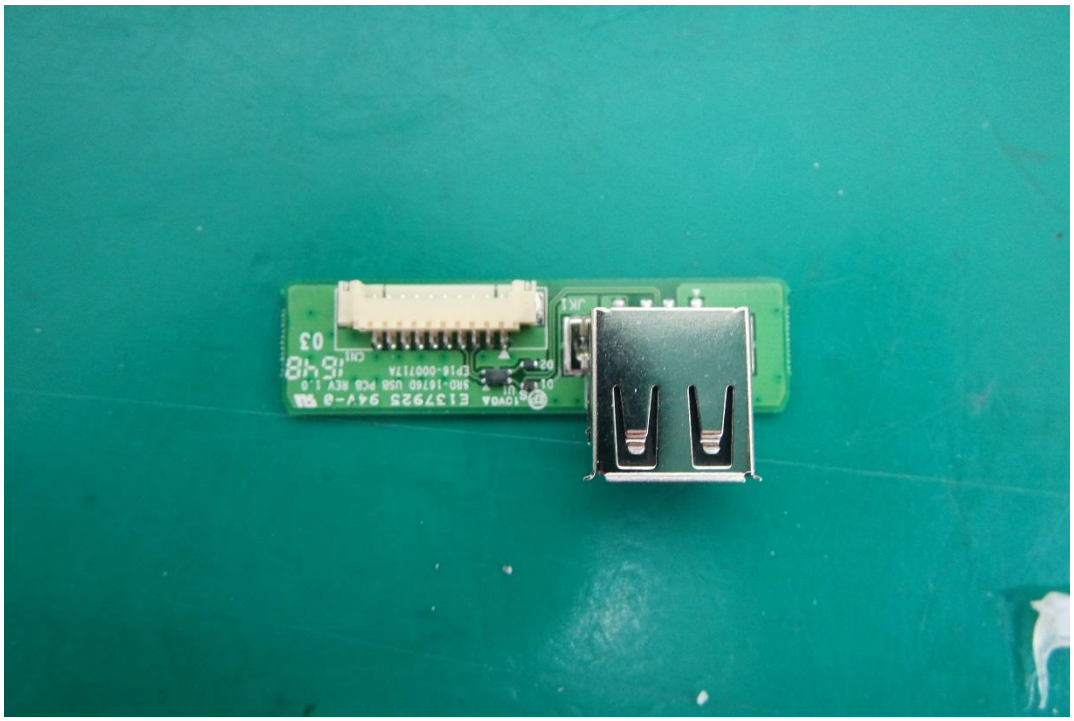
(Bottom)



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.

EUT Internal View – Sub Board 2

(Top)



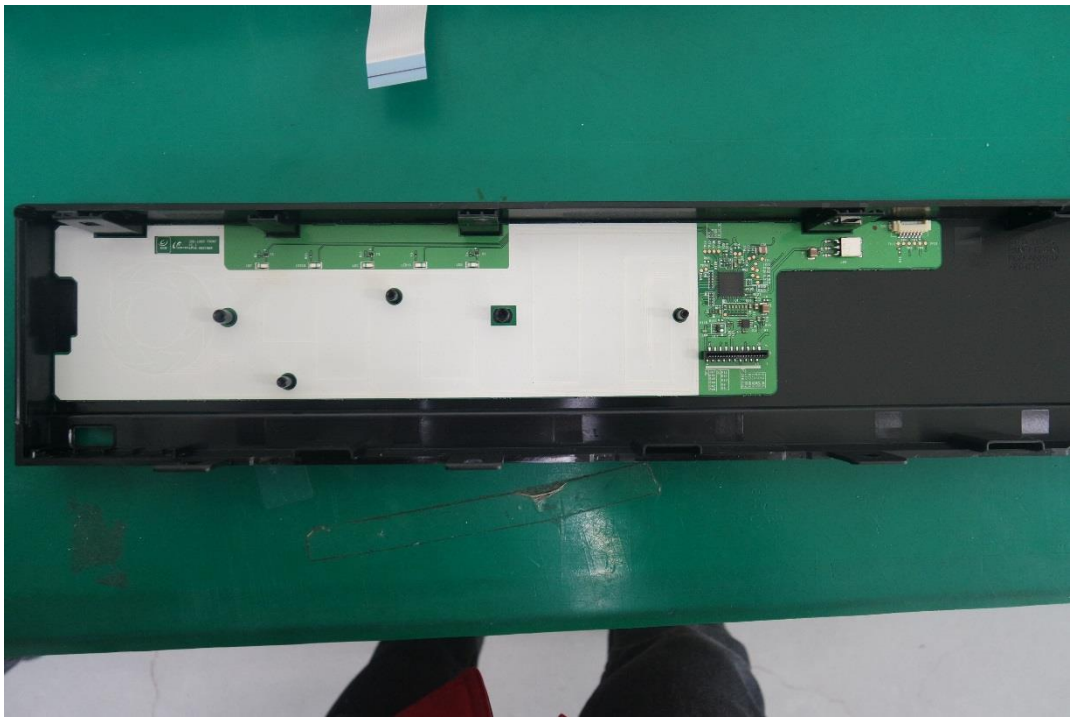
(Bottom)



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.

EUT Internal View – Board 3

(Top)



(Bottom)

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.

EUT Internal View – HDD

(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.

Label and Location



DVR

Model No : HRD-1642P

Manufacturer : Hanwha Techwin (Tianjin) Co.,Ltd.

Made in of China

CE

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.