



EMC TEST REPORT For CE

Test Report No. : KES-E1-16T0164-R4

Date of Issue : Apr. 09, 2019

Product name : NETWORK VIDEO RECORDER

Model/Type No. : XRN-2011

Variant Model : XRN-2011P, XRN-2011P1T, XRN-2011A, XRN-2011-1T

Applicant : Hanwha Techwin Co., Ltd.

Applicant Address : 6, Pangyo-ro 319 Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13488, KOREA

Manufacturer : 1. Hanwha Techwin (Tianjin) Co.,Ltd.
2. HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.
3. D-TECH CO.,LTD.

Manufacturer Address : 1. No.11 Weiliu Rd, Micro-Electronic Industrial Park, TEDA, Tianjin,
300385, People's Republic of China
2. Lot O-2, Que Vo Industrial Zone extended area,
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam
3. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi-do,
Korea (Suwon Industrial Complex)

Date of Receipt : Mar. 25, 2016

Test date : Apr. 05, 2016 – Apr. 11, 2016

Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Dae Hyun, Kim
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

This test report is not related to 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 shchoi@kes.co.kr

**KES Co., Ltd.**

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

Test report No.:
KES-E1-16T0164-R4
Page (2) of (64)

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Apr. 14, 2016	KES-E1-16T0164	Issued
Apr. 25, 2018	KES-E1-16T0164-R1	Re-issue due to manufacturer change
Oct. 05, 2018	KES-E1-16T0164-R2	Add a derived model
Nov. 27, 2018	KES-E1-16T0164-R3	Reissue due to additional derivative model
Apr. 09, 2019	KES-E1-16T0164-R4	Reissue due to additional derivative model

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

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



TABLE OF CONTENTS

1.0	General Product Description	4
1.1	Test Voltage & Frequency	6
1.2	Variant Model Differences.....	6
1.3	Device Modifications	6
1.4	Equipment Under Test.....	6
1.5	Support Equipments	7
1.6	External I/O Cabling	8
1.7	E.U.T Operating Mode(s)	8
1.8	Configuration.....	9
1.9	Remarks when standards applied	10
1.10	Calibration Details of Equipment Used for Measurement	10
1.11	Test Facility	10
1.12	Laboratory Accreditations and Listings	10
2.0	Test Regulations.....	11
2.1	Conducted Emissions at Mains Power Ports	13
2.2	Conducted Emissions at Telecommunication Ports	14
2.3	Radiated Electric Field Emissions(Below 1 GHz)	15
2.4	Radiated Electric Field Emissions(Above 1 GHz)	16
2.5	Harmonic Current Emissions.....	17
2.6	Voltage Fluctuations and Flicker	18
3.0	Criteria for compliance.....	19
3.1	Electrostatic Discharge.....	21
3.2	Radiated Electric Field Immunity	25
3.3	Electrical Fast Transients/Bursts	27
3.4	Surge Transients	29
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 GHz)	39
	Radiated Electric Field Emissions(Above 1 GHz).....	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 GHz)	49
	Radiated Electric Field Emissions(Above 1 GHz).....	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
	EUT Internal Photographs	58



1.0 General Product Description

Main Specifications of E.U.T are:

단계		DVR
Model		XRN-2011
Display		
Network Camera	Inputs	Max. 32CH
	Resolution	CIF ~ 12MP
	Protocols	Samsung, ONVIF
Live	Local Display	1x HDMI / 1x VGA
	Multi-Channel Display	[Local Monitor] 1 / 2V / 3V / 4 / 6 / 8 / 9 / 13 / 16 / 25 / 36 / Sequence [Web] 1 / 2V / 3V / 4 / 6 / 9 / 16 / 25 / 36 / Sequenc
	Performance	[Local Monitor] - 12M (30fps) - 8.3M (120fps) - 720P (960fps) - D1 (1920fps) [Web] TBD
Performance		
Operating System	Embedded	Linux
Record	Compression	H.265, H.264, MJPEG
	Recording Bandwidth	Max. 256Mbps (2MP 32camera real-time recording) Max. 100Mbps (RAID-5 Mode)
	Resolution	CIF ~ 12MP
	Type	Manual, Schedule (Continuous/Event), Event (Pre/Post)
	Event Trigger	Alarm Input, Video Loss, Camera Event (Sensor, MD, Video Analytics)
Search & Play	Event Action	e-Mail, PTZ Preset, Alarm Out, Buzzer, Monitor Out
	Playback Bandwidth	32Mbps (16CH simultaneously)
	Performance	Max. 4 Users (Local 1, Remote 3)
	Mode	Date & Time (Calendar)/Event Log list / Text Search
	Simultaneous playback	Max. 16CH (Local Monitor, CMS)
	Resolution	CIF ~ 12MP
	Fisheye Dewarping	Remote Viewer (CMS, WEB)
Storage	Built-in	0TB ~ 8TB
	Internal HDD	8 (Cold Swap) - Max 48TB (Non-RAID), Max 36TB (RAID-5)
	External	iSCSI storage (Max. 384TB) ① Promise VessRaid R2600
	RAID	RAID-5 (Array Size : 4-HDD x 2 Array)
Backup	File backup (Via Web)	BU/Exe (GUI), JPG/AVI (Network)
	Function	Multi channel (Upto 16CH) Play, Date-Time/Title display
Sensor	I/O	8/4 (NO/NC Selectable)
Audio	Input	32 CH (network)
	Compression	G.711, G.726, AAC (16/48KHz)
	Audio Communication	2-Way
Network		
Interface		RJ-45, Gigabit Ethernet x2
Protocol		TCP/IP, UDP/IP, RTP (UDP), RTSP (TCP), NTP, HTTP, DHCP (Server, Client), PPPoE, SMTP, ICMP, IGMP, ARP, DNS, DDNS, uPnP, HTTPS, SNMP, ONVIF (Profile-S), SUNAPI (Server, Client)
DDNS		Samsung iPolis DDNS
Transmission Bandwidth		☞ - 512Mbps (iSCSI Off), 256Mbps (iSCSI On)
Max Remote Users		Search (3), Live Unicast (10), Multicast (20)
IP Version		IPv4/v6
Security		User access Log, IP Filtering, 802.1x, Encryption
Language (24)		English, French, German, Italian, Spanish, Russian, Turkish, Polish, Dutch, Swedish, Czech, Portuguese, Danish, Rumanian, Serbian, Croatian, Hungarian, Greek, Norwegian, Finnish, Korean, Chinese, 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.
The authenticity of the test report, contact shchoi@kes.co.kr



KES Co., Ltd.

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

Test report No.:

KES-E1-16T0164-R4

Page (5) of (64)

OS		Supported OS : Vista, 7, 8, 10, Mac OS X(10.7 or above)
Web Browser		MS IE, Google Chrome, Mac Safari, Firefox
Viewer Software	Type	SSM, Webviewer, Smart Viewer, iPolis Mobile
	CMS Support	Support SDK/CGI
Smart phone	Support Model	I-Phone, Android
	Protocol Support	RTP, RTSP, HTTP, CGI
	Control	Live(16ch) : Multi-Profile Support Playback(1ch)
	Max. Remote Users	Search (3), Live Unicast (10), Multicast (20)
Functions		
Camera Setup	Register	Auto, Manual
	Setup Items	IP address, Add profile edit, Bitrate, Compression, GOP, Quality, Camera MD setup Camera video setup (Simple focus, Brightness/Contrast, Flip/Mirror, IRIS, WDR, D&N, SSNR, Shutter, SSDR, DIS), Fisheye Dewarping, Hallway View Setup, Camera Web
	PoE Power Control	N/A
PTZ	Control	Via GUI, Webviewer, SPC-2000
	Preset	255 Presets
Redundancy	Failover	N+1
	ARB	Yes
System Control		Mouse, Web, SPC-2000 (Controller)
Indicator/Interface		
Front	Indicator	LED(Status indicator) : - SRN-2000 (674) ① HDD Action(1), ② Alarm(1), ③ Power(1), ④ Record(1), ⑤ Backup(1), ⑥ Network(1)
	Switch	N/A
Connectors	VGA	1 EA (Support Live screen upto 16 div. mode)
	HDMI	1 EA (Both Support Live / PB / Setup) - Support upto 4K (3840 x 2160)
	Audio	Out(1EA, RCA, Line)
	Ethernet	RJ-45 2ea (LAN/WAN, 1Gbps)
	Alarm	(1) In(8EA, Terminal Block) (2) Alarm Reset(1EA) (3) Out(4EA, Terminal Block) - Relay Out1(NO/NC/COM) - Relay Out2~4(NO/COM)
	USB	2EA(Front 1, Rear 1(USB3.0))
	Storage	1 e-SATA
	Serial	RS-232C
	Reset	Switch(1EA)
	Power Cord	1EA AC Inlet
System		
Log	Log List	Max. 20000 (System Log, Event Log each)
Environmental		
Operating Temperature / Humidity		+0°C to +40°C(+32°F to +104°F)
Humidity		20% ~ 85% RH
Electrical		
Power		100 to 240 VAC ±10%; 50/60 Hz, 4~1.5A
Power Consumption		Normal 90W, MAX200W
PoE Budget		N/A
Mechanical		
Color / Material		Black / Metal
Dimension (WxHxD)		440*88*384.8
Weight		5.88kg
Standards		
Approvals	Safety	UL, KC
	EMC	CE, FCC, CCC, Gost-R, KC

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 shchoi@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.

Voltage ☐ 220 Vac ☒ 230 Vac ☐ 240 Vac ☐ 24 Vac ☐ PoE
Frequency ☒ 50 Hz ☐ 60 Hz ☐ Hz

1.2 Variant Model Differences

The Variant model is management model of each different sellers.

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
NETWORK VIDEO RECORDER	XRN-2011	-	Hanwha Techwin (Tianjin) Co.,Ltd.	E.U.T
HDD	ST1000VM002	-	Seagate	1 TB
Switching Power Supply	FSP250-50GUB	-	FSP GROUP INC.	-

**KES Co., Ltd.**

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

Test report No.:
KES-E1-16T0164-R4
Page (7) of (64)

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	NT63025J	JK9091EF400142M	Samsung Electronics Co., Ltd	-
Notebook Adapter	A13-040N2A	CN60BA4400313AD0N 843KO200	Chicony Power Technology (suzhou)Co., Ltd.	-
Mouse 1	SMB-400	0DJM010118	SEJIN ELECTRON INC.	-
Monitor 1	SMT-2232	C95V67VF900038B	Weihai Daewoo Electronics Co., Ltd.	-
Monitor 2	LS23C340	ZXPCHTMF A02346H	Samsung Electronics Co., Ltd	-
Monitor Adapter	A2514_DPN	CN07BN4400591BSK2 8F5NK904	11ssan Elecom(shen yang) Co., Ltd	-
NETWORK CAMERA	SND-E5031RP	ZBUM67ZG101007H	Hanwha Techwin Co., Ltd.	-
Adapter 1	PA-1041-0	-	DONGGUANG LITE POWER 2ND PLANT	-
Speaker	MS-760	-	MASS	-
Mouse	YTOP-589	-	Hanwha Techwin Co., Ltd.	-
External Hard drive	NEXT-652DC	1207230749	YCN	-
Adapter 2	GT-41062-1805-T3	-	GlobTek, Inc.	-
HDD	Diamond Max Plus9	Y41P45KE	Maxtor	-
USB 3.0 Memoery	-	-	-	-

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 shchoi@kes.co.kr

1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK VIDEO RECORDER (E.U.T)	HDMI	Monitor 1	HDMI	1.5	S
	D-SUB	Monitor 2	D-SUB	1.4	S
	RJ-45(LAN) (Notebook)	Notebook	RJ-45(LAN)	3.0	U
	RJ-45(LAN) (NETWORK CAMERA)	NETWORK CAMERA	RJ-45(LAN)	3.0	U
	RS-232	Mouse 1	RS-232	2.2	U
	USB 3.0	USB 3.0 Memoery	USB 3.0	-	-
	USB	Mouse 2	USB	1.3	U
	ALARM	Impedance Terminating	-	-	-
	eSATA	External Hard drive	eSATA	1.1	U

* Unshielded=U, Shielded=S

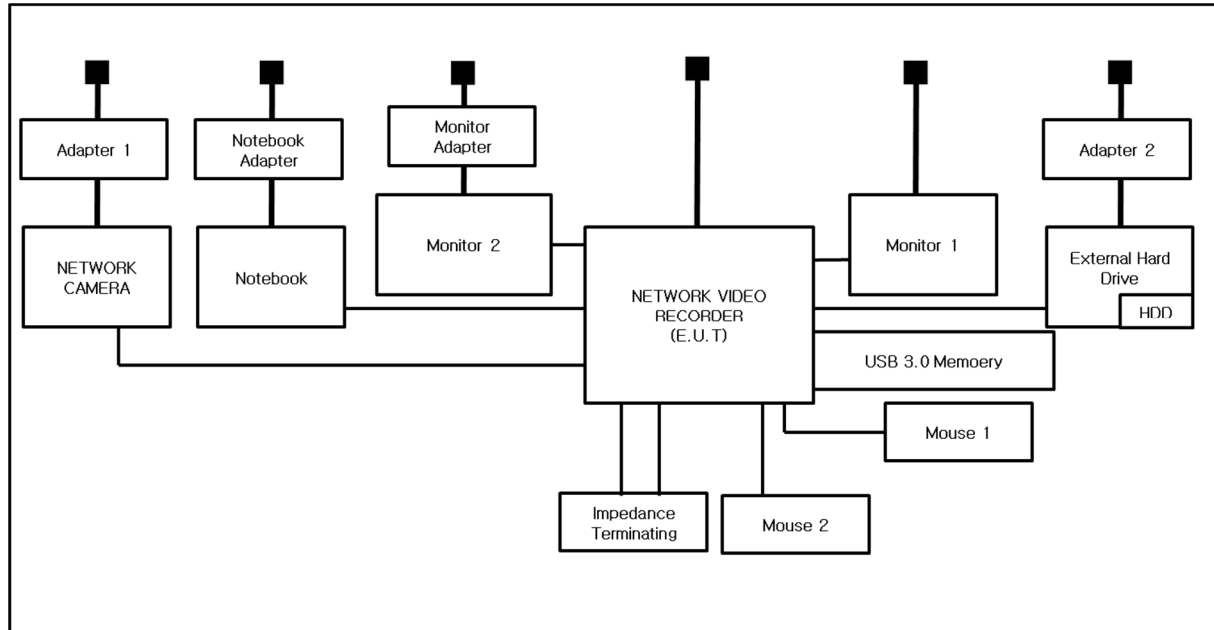
1.7 E.U.T Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

Test mode	Normal operating
OP	MONITORING Network ping test

1.8 Configuration

■ AC Main
 □ DC Main



1.9 Remarks when standards applied

N/A

1.10 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less.

1.11 Test Facility

The measurement facility is located at 473-21 Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4:2014 and CISPR 16-1-4:2012

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Accreditation No
KOREA	RRA	EMI (3 m & 10 m Semi-Aechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
International	KOLAS	EMI (3 m & 10 m Semi-Aechoic Chamber , and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KT489
USA	FCC	3 m & 10 m Semi-Aechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Aechoic Chamber and Conducted test site	 23298-1
JAPAN	VCCI	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	 R-4308, C-4798, T-2311, G-914
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Aechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 17 07 01633 001



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 55032:2012/AC:2013

☒ Class A

☐ Class B

☐ EN 55024:2010 +A1:2015

☒ EN 50130-4:2011

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

☐ EN 61326-1:2013



-
- | | | |
|---|----------------------------------|----------------------------------|
| ☐ 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 | | |



2.1 Conducted Emissions at Mains Power Ports

Test Date

Apr. 11, 2016

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test Receiver	ESR3	R&S	101783	05, 06, 2016
☒	LISN	ENV216	R&S	101137	02, 04, 2017
☒	LISN	ENV216	R&S	101786	05, 06, 2016
☒	Electro wave Shieldroom	-	SEMITEC	-	-

Test Conditions

Temperature: 21.2 °C

Relative Humidity: 33.5 %

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

2.2 Conducted Emissions at Telecommunication Ports

Test Date

Apr. 11, 2016

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test Receiver	ESR3	R&S	101783	05, 06, 2016
☒	LISN	ENV216	R&S	101137	02, 04, 2017
☒	LISN	ENV216	R&S	101786	05, 06, 2016
☒	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, 14, 2016
☒	Electro wave Shieldroom	-	SEMITEC	-	-

Test Conditions

Temperature: 21.2 °C

Relative Humidity: 33.5 %

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Apr. 11, 2016

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, 06, 2016
☒	Trilog-Broadband Antenna	VULB 9163	SCHWARZBECK	9168-713	05, 15, 2017
☒	Open Area Test Site	-	KES	-	-
☒	Antenna Mast	-	DAEIL EMC	-	-
☒	Turn Table	-	DAEIL EMC	-	-

Test Conditions

Temperature: 19.1 °C

Relative Humidity: 35.0 %

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

☒ PASS

☐ NOT PASS

☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Apr. 11, 2016

Test Location

Semi Anchoic Chamber #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test Receiver	ESU26	R&S	100552	05, 06, 2016
☒	Broadband Coaxial Preamplifier	BBV 9718	Schwarzbeck Mess - Elektronik	9718-246	10, 23, 2016
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 07, 2017
☒	Semi Anchoic Chamber #2	-	SEMITEC	-	-
☒	Antenna Mast	-	AUDIX	-	-
☒	Turn Table	-	AUDIX	-	-

Test Conditions

Temperature: 21.2 °C

Relative Humidity: 33.5 %

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.5 Harmonic Current Emissions

Test Date

Apr. 05, 2016

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, 13, 2016
☒	Digital Power Analyzer	DPA 500 N	EM TEST	V1024106759	08, 13, 2016

Test Conditions

Temperature: 24.5 °C
Relative Humidity: 33.1 %

Classification of Equipment for Harmonic Current Emissions

- ☒ Class A
☐ Class B
☐ Class C(Below 25 W)
☐ Class C(Above 25 W)
☐ Class D

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.6 Voltage Fluctuations and Flicker

Test Date

Apr. 05, 2016

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, 13, 2016
☒	Digital Power Analyzer	DPA 500 N	EM test	V1024106759	08, 13, 2016

Test Conditions

Temperature: 24.5 °C
Relative Humidity: 33.1 %

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

EN 50130-4:2011 +A1:2014 Alarm systems-Part 4: Electromagnetic compatibility Product family standard: Immunity requirements for components of fire, intruder and social alarm systems

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

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

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

Electrostatic discharge

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

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

Radiated electromagnetic fields

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

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

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

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

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

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

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

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

Fast transient burst / slow high energy voltage surge

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

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

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

Conducted RF immunity

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

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

That there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change,
and no such flickering of indicators oeuvres at $U = 130 \text{ dB}\mu\text{V}$.

For component of CCTV systems, where the status is monitored by observing the TV picture,
then deterioration of the picture is allowed at $U = 140 \text{ dB}\mu\text{V}$, providing:

- (a) there is no permanent damage or change to the EUT
(e.g. no corruption of memory or changes to programmable settings etc.)
- (b) at $U = 130 \text{ dB}\mu\text{V}$, any deterioration of the picture is so minor that the system could still be used; and
- (c) there in no observable deterioration of the picture at $U = 120 \text{ dB}\mu\text{V}$.

Voltage dip/interruption / Voltage variation

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

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



3.1 Electrostatic Discharge

Reference Standard

EN 61000-4-2:2009

Test Date

Apr. 08, 2016

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, 2017
☒	HCP	-	Noise Ken	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: 22.6 °C
Relative Humidity: 39.3 %
Atmospheric Pressure: 99,7 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

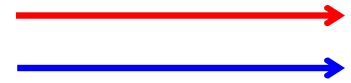
Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

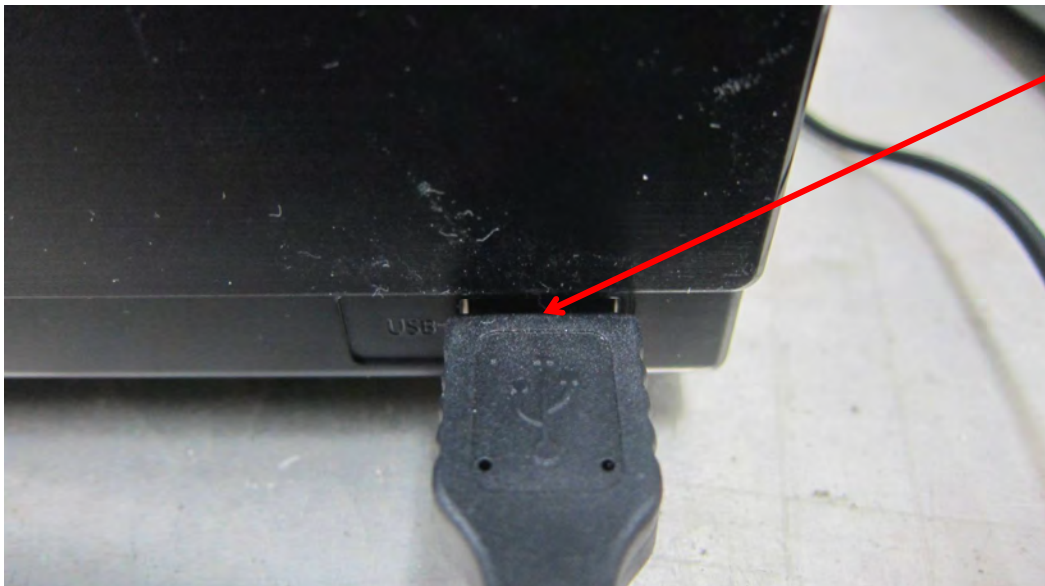
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

Location of Discharge:

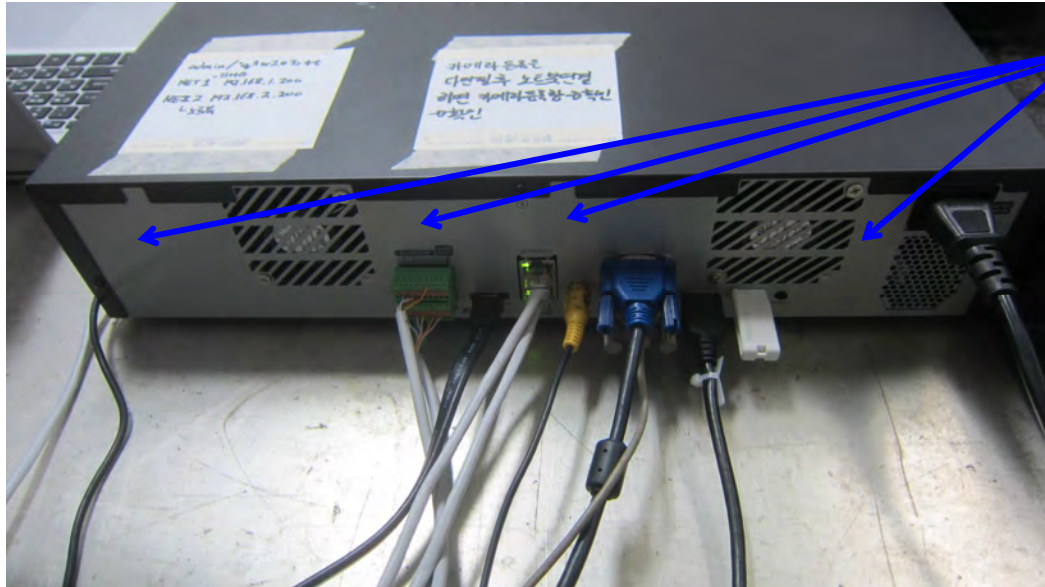
Air
Contact



1. Contact



2. Air



3. Contact

**KES Co., Ltd.**

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

Test report No.:
KES-E1-16T0164-R4
Page (24) of (64)

Test Data

Indirect Discharge

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

Direct Discharge

No.	Test Point	Discharge Method	Performance	Remarks
			Observation	
1	EUT Enclosure	Contact Discharge	Complied	-
2	EUT USB Port	Air Discharge	Complied	-
3	EUT back side	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.



3.2 Radiated Electric Field Immunity

Reference Standard

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

Test Date

Apr. 06, 2016

Test Location

EMS-RS: ☐ Semi Anchoic Chamber #1 ☒ Semi Anchoic Chamber #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	SIGNAL GENERATOR	SMB 100A	R&S	108252	08, 13, 2016
☒	BROADBAND AMPLIFIER	BBA100	R&S	101239	08, 13, 2016
☒	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 13, 2016
☒	POWER METER	NRP2	R&S	103475	08, 13, 2016
☒	AVG POWER SENSOR	NRP-Z91	R&S	102526	08, 13, 2016
☒	AVG POWER SENSOR	NRP-Z91	R&S	102527	08, 13, 2016
☒	Stacked Log.-Per.Antenna	STLP 9128 D	Schwarzbeck	9128D038	-
☒	Semi Anchoic Chamber #2		SEMITEC	-	-

**KES Co., Ltd.**

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

Test report No.:

KES-E1-16T0164-R4

Page (26) of (64)

Test Conditions

Temperature: 19,2 °C
Relative Humidity: 36,6 %
Atmospheric Pressure: 100,5 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 % stepDwell Time: ☒ 1 s ☐ 3 s# of Sides Radiated: ☒ 4Required Performance Criteria: ☒ Complied**Test Data**

Side Exposed	Observation	
	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.
The authenticity of the test report, contact shchoi@kes.co.kr

3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Apr. 05, 2016

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	07, 14, 2016
☒	Capacitive Coupling Clamp	HFK	EM TEST	070925	07, 14, 2016
☒	MotorVariac	MV2616	EM TEST	V0936105123	07, 14, 2016

Test Conditions

Temperature: 25.1 °C
Relative Humidity: 41.2 %
Atmospheric Pressure: 100.3 kPa

Test Specifications

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

Test Data

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

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

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	OBSERVATIONS	
	(+) Burst (kV)	(-) Burst (kV)
RJ-45(LAN)(Notebook)	Complied	Complied
RJ-45(LAN)(Network Camera)	Complied	Complied

Note: “Blank” = Not performed

Observations:

A – No degradation of function

B – Distortion/Error of function (self-recoverable)

C – Loss of function

Test Results

☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.

3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

Test Date

Apr. 05, 2016

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	07, 14, 2016
☒	MotorVariac	MV2616	EM TEST	V0936105123	07, 14, 2016
☒	CDN	CNV 508T5	EM TEST	P1530162238	01, 25, 2017

Test Conditions

Temperature: 24.5 °C
Relative Humidity: 33.1 %
Atmospheric Pressure: 100,8 kPa

Test Specifications

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

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

Test Data

☒ Line to Line – Differential Mode

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

☒ Line to Earth – Common Mode

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

Signal Lines

☒ Line to Earth – Common Mode

Mode of Application	OBSERVATIONS	
	(+) Surge (kV)	(-) Surge (kV)
RJ-45(LAN)(Notebook)	Complied	Complied
RJ-45(LAN)(Network Camera)	Complied	Complied

Note: "Blank" = Not performed

Observations:

- A – No degradation of function
- B – Distortion/Error of function (self-recoverable)
- C – Loss of function

Test Results

- ☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.



3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2009

Test Date

Apr. 07, 2016

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	09, 25, 2016
☒	6dB Attenuator	ATT6	EM TEST	1208-34	08, 13, 2016
☒	CDN	CDN-M2/M3N	EM TEST	0909-06	08, 13, 2016
☐	CDN	CDN-T2-RJ11	EM TEST	0909-07	08, 13, 2016
☐	CDN	CDN-T4	EM TEST	0909-08	08, 13, 2016
☐	CDN	CDN-T8RJ45	EM TEST	0909-09	08, 13, 2016
☐	CDN	CDN-AF2	EM TEST	0909-10	08, 13, 2016
☐	CDN	CDN-AF4	EM TEST	0909-11	08, 13, 2016
☒	EM Injection Clamp	EM 101	Liithi	35943	02, 04, 2017

Test Conditions

Temperature: 24.5 °C
Relative Humidity: 37.0 %
Atmospheric Pressure: 99.3 kPa

Test Specifications

Frequency range: ☒ 150 kHz to 100 MHz ☐ 10 kHz to 30 MHz
☐ 150 kHz to 230 MHz ☐ 10 kHz to 100 MHz

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

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

Frequency step: ☒ 1 % step

Dwell Time: ☒ 1 s ☐ 3 s

Required Performance Criteria: ☒ Complied

Test Data

☒ Input a.c. power ports

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

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observation
-	CDN (☐ M2, ☐ M3)	-

☒ Signal ports and telecommunication ports

Mode of Application	OBSERVATIONS	
	(+) Surge (kV)	(-) Surge (kV)
RJ-45(LAN)(Notebook)	Complied	Complied
RJ-45(LAN)(Network Camera)	Complied	Complied

Notes: CDN = Coupling Decoupling Network
 EMC = Electro Magnetic Clamp
 "blank" = Not performed

Observations:

A – No degradation of function
 B – Distortion/Error of function (self-recoverable)
 C – Loss of function

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.



3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-6:2009

Test Date

Apr. 07, 2016

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	07, 14, 2016
☒	MotorVariac	MV2616	EM TEST	V0936105123	07, 14, 2016

Test Conditions

Temperature: 24.5 °C
Relative Humidity: 33.1 %
Atmospheric Pressure: 100.8 kPa



Test Specifications & Observations/Remarks

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

- Voltage variations

☒ Unom + 10 %	☒ 253 V (ac)	<u>Complied</u>
☒ Unom - 15 %	☒ 195.5 V (ac)	<u>Complied</u>

Observations:

- A - No response observed from E.U.T
- 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

PASS Required Performance Criteria.

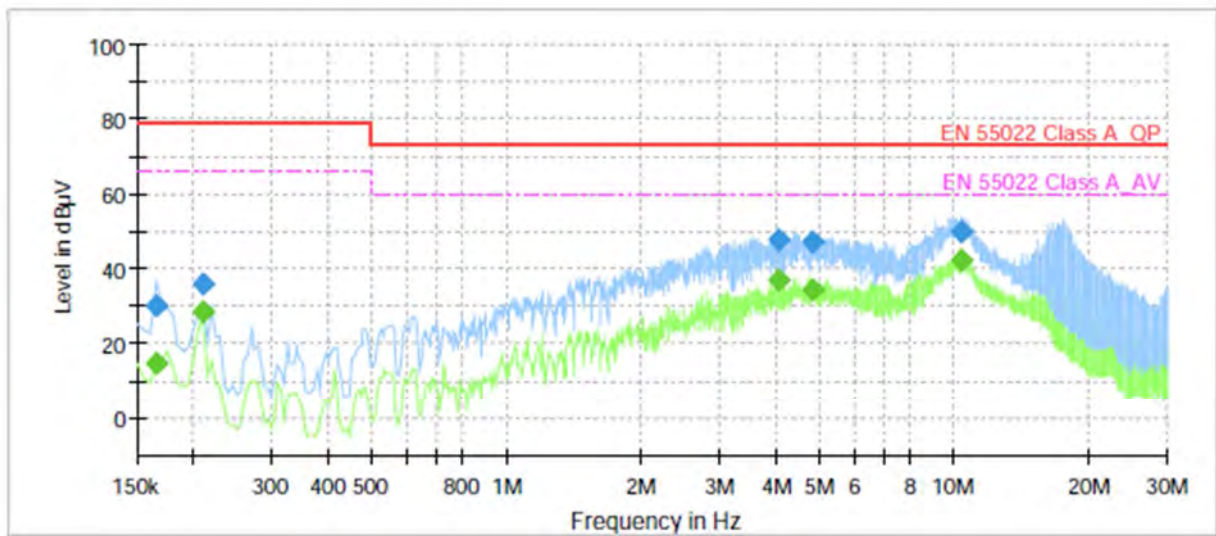
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description: Conducted Emission
Model No.: XRN-2011P
Mode
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.165000	---	14.83	66.00	51.17	1000.0	9.000	L1	9.7
0.165000	30.42	---	79.00	48.58	1000.0	9.000	L1	9.7
0.210000	---	28.40	66.00	37.60	1000.0	9.000	L1	9.7
0.210000	36.06	---	79.00	42.94	1000.0	9.000	L1	9.7
4.060000	---	36.89	60.00	23.11	1000.0	9.000	L1	9.8
4.060000	47.72	---	73.00	25.28	1000.0	9.000	L1	9.8
4.815000	---	34.53	60.00	25.47	1000.0	9.000	L1	9.8
4.815000	46.97	---	73.00	26.03	1000.0	9.000	L1	9.8
10.360000	---	42.38	60.00	17.62	1000.0	9.000	L1	10.0
10.360000	49.52	---	73.00	23.48	1000.0	9.000	L1	10.0

[NEUTRAL]

Common Information

Test Description:

Conducted Emission

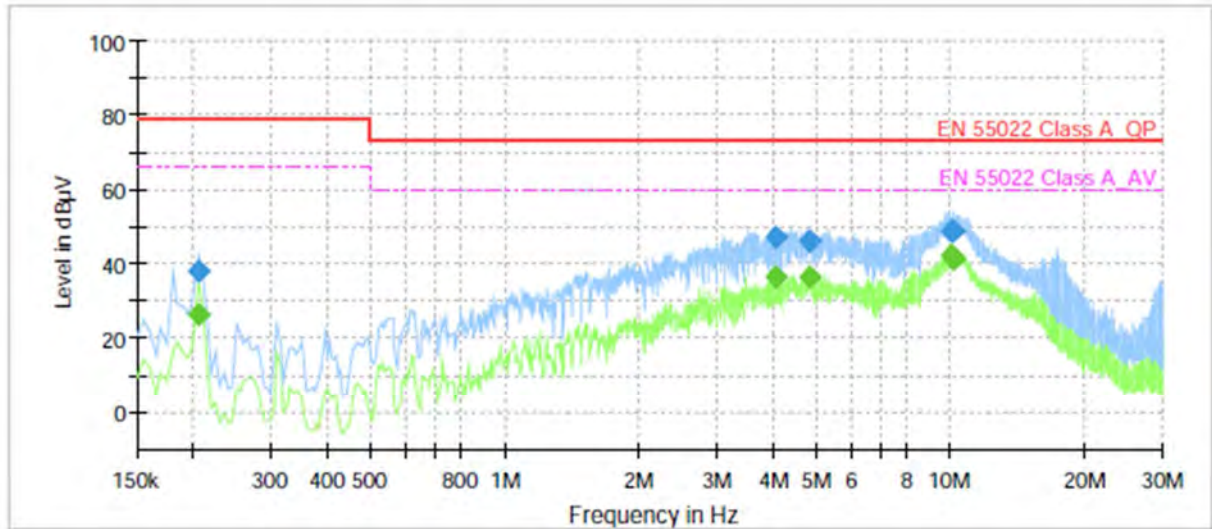
Model No.:

XRN-2011P

Mode

Operator Name:

KES



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.205000	---	26.28	66.00	39.72	1000.0	9.000	N	9.6
0.205000	37.99	---	79.00	41.01	1000.0	9.000	N	9.6
4.060000	---	36.68	60.00	23.32	1000.0	9.000	N	9.8
4.060000	47.22	---	73.00	25.78	1000.0	9.000	N	9.8
4.845000	---	36.74	60.00	23.26	1000.0	9.000	N	9.8
4.845000	45.87	---	73.00	27.13	1000.0	9.000	N	9.8
10.090000	---	42.18	60.00	17.82	1000.0	9.000	N	10.0
10.090000	48.86	---	73.00	24.14	1000.0	9.000	N	10.0
10.205000	---	41.28	60.00	18.72	1000.0	9.000	N	10.0
10.205000	48.92	---	73.00	24.08	1000.0	9.000	N	10.0

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.

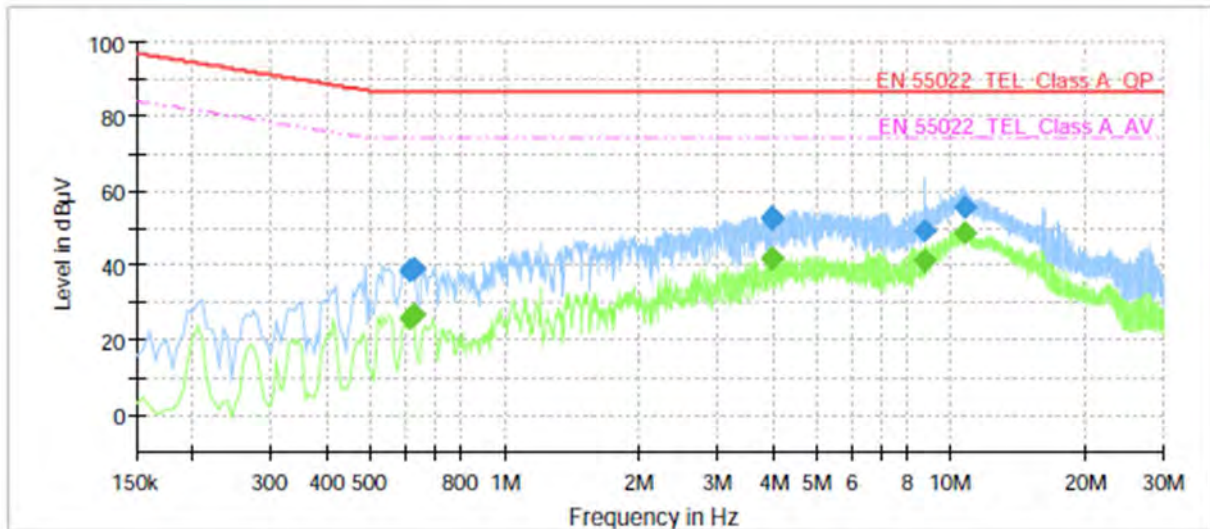
The authenticity of the test report, contact shchoi@kes.co.kr

Conducted Emissions at Telecommunication Ports

[10 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	XRN-2011P
Mode	10 Mbps
Operator Name:	KES



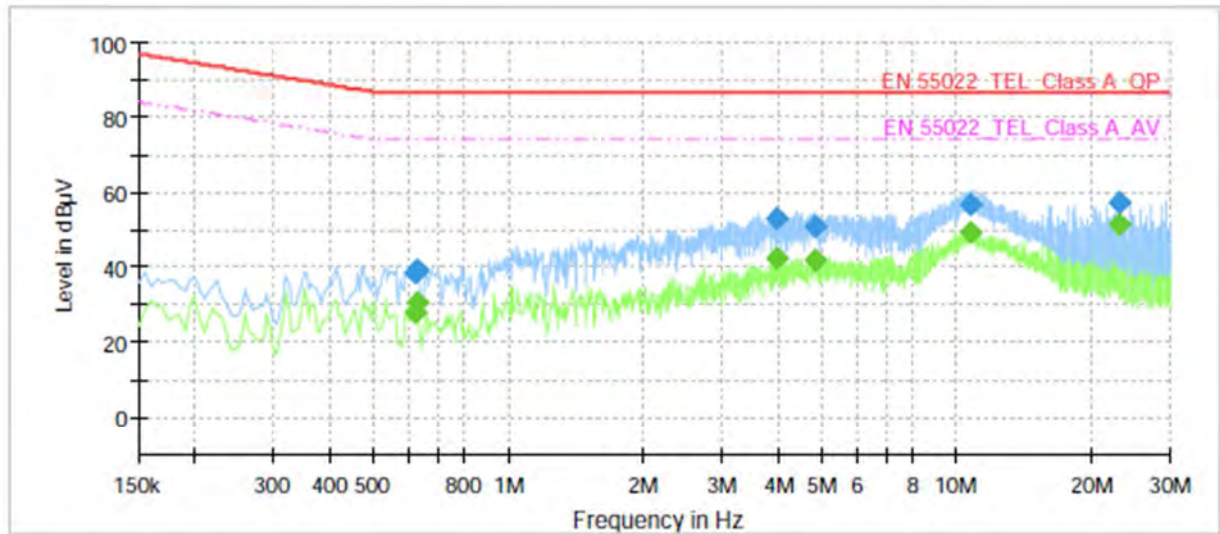
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.615000	---	25.76	74.00	48.24	1000.0	9.000	Single Line	9.9
0.615000	38.41	---	87.00	48.59	1000.0	9.000	Single Line	9.9
0.625000	---	26.76	74.00	47.24	1000.0	9.000	Single Line	9.9
0.625000	38.96	---	87.00	48.04	1000.0	9.000	Single Line	9.9
3.955000	---	41.92	74.00	32.08	1000.0	9.000	Single Line	9.8
3.955000	53.01	---	87.00	33.99	1000.0	9.000	Single Line	9.8
3.990000	---	41.66	74.00	32.34	1000.0	9.000	Single Line	9.8
3.990000	52.18	---	87.00	34.82	1000.0	9.000	Single Line	9.8
8.750000	---	41.37	74.00	32.63	1000.0	9.000	Single Line	10.0
8.750000	49.07	---	87.00	37.93	1000.0	9.000	Single Line	10.0
10.740000	---	48.53	74.00	25.47	1000.0	9.000	Single Line	10.1
10.740000	55.34	---	87.00	31.66	1000.0	9.000	Single Line	10.1

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	XRN-2011P
Mode	100 Mbps
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.620000	---	27.99	74.00	46.01	1000.0	9.000	Single Line	9.4
0.620000	38.48	---	87.00	48.52	1000.0	9.000	Single Line	9.4
0.625000	---	30.78	74.00	43.22	1000.0	9.000	Single Line	9.4
0.625000	39.41	---	87.00	47.59	1000.0	9.000	Single Line	9.4
3.955000	---	42.14	74.00	31.86	1000.0	9.000	Single Line	9.3
3.955000	52.72	---	87.00	34.28	1000.0	9.000	Single Line	9.3
4.845000	---	41.90	74.00	32.10	1000.0	9.000	Single Line	9.4
4.845000	51.04	---	87.00	35.96	1000.0	9.000	Single Line	9.4
10.755000	---	49.13	74.00	24.87	1000.0	9.000	Single Line	9.6
10.755000	56.51	---	87.00	30.49	1000.0	9.000	Single Line	9.6
23.130000	---	51.46	74.00	22.54	1000.0	9.000	Single Line	9.5
23.130000	57.27	---	87.00	29.73	1000.0	9.000	Single Line	9.5

**KES Co., Ltd.**

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

Test report No.:
KES-E1-16T0164-R4
Page (39) of (64)

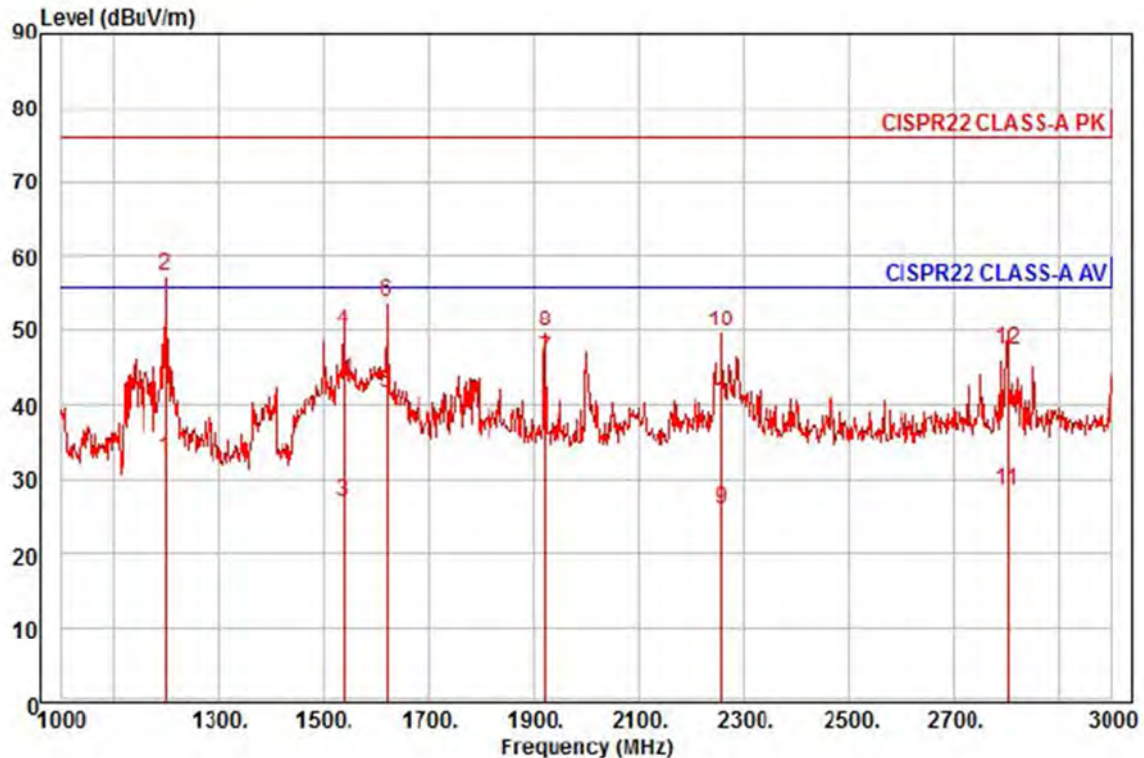
Radiated Electric Field Emissions(Below 1 GHz)

Frequency	Amplitude	ANT	ANT. Height	Correction Factor		Corrected Amplitude	Applicable Limit	Margin
[MHz]	[dB μ V]	Polar. (H/V)	[m]	ANT. [dB/m]	Cable [dB]	[dB μ V/m]	[dB μ V/m]	[dB]
48.39	18.22	V	1.00	13.88	1.43	33.53	40.00	6.47
77.06	16.87	V	1.10	7.83	1.88	26.58	40.00	13.42
144.15	15.43	V	1.00	7.99	2.74	26.16	40.00	13.84
169.29	13.35	V	1.20	8.95	2.94	25.24	40.00	14.76
225.71	17.46	H	4.00	11.87	3.54	32.87	40.00	7.13
598.35	10.64	H	2.80	19.26	6.31	36.21	47.00	10.79

* H : Horizontal, V : Vertical

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 shchoi@kes.co.kr

Radiated Electric Field Emissions(Above 1 GHz)



Site : chamber

Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) horizontal

: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto

Project : NETWORK VIDEO RECORDER

Model : XRN-2011P

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	1200.00	41.15	24.70	7.09	40.02	117	56.00	-23.08	horizontal	Average
2	pk 1200.00	65.68	24.70	7.09	40.02	117	76.00	-18.55	horizontal	Peak
3	1536.00	32.76	26.04	8.06	39.86	52	56.00	-29.00	horizontal	Average
4	1536.00	55.71	26.04	8.06	39.86	52	76.00	-26.05	horizontal	Peak
5	1620.00	46.94	26.37	8.31	39.82	353	56.00	-14.20	horizontal	Average
6	1620.00	59.18	26.37	8.31	39.82	353	76.00	-21.96	horizontal	Peak
7	pp 1920.00	49.16	27.56	9.13	39.67	28	56.00	-9.82	horizontal	Average
8	1920.00	52.81	27.56	9.13	39.67	28	76.00	-26.17	horizontal	Peak
9	2258.00	27.57	28.51	9.75	39.78	74	56.00	-29.95	horizontal	Average
10	2258.00	51.19	28.51	9.75	39.78	74	76.00	-26.33	horizontal	Peak
11	2802.00	27.85	29.84	10.75	40.10	254	56.00	-27.66	horizontal	Average
12	2802.00	46.75	29.84	10.75	40.10	254	76.00	-28.76	horizontal	Peak

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 shchoi@kes.co.kr



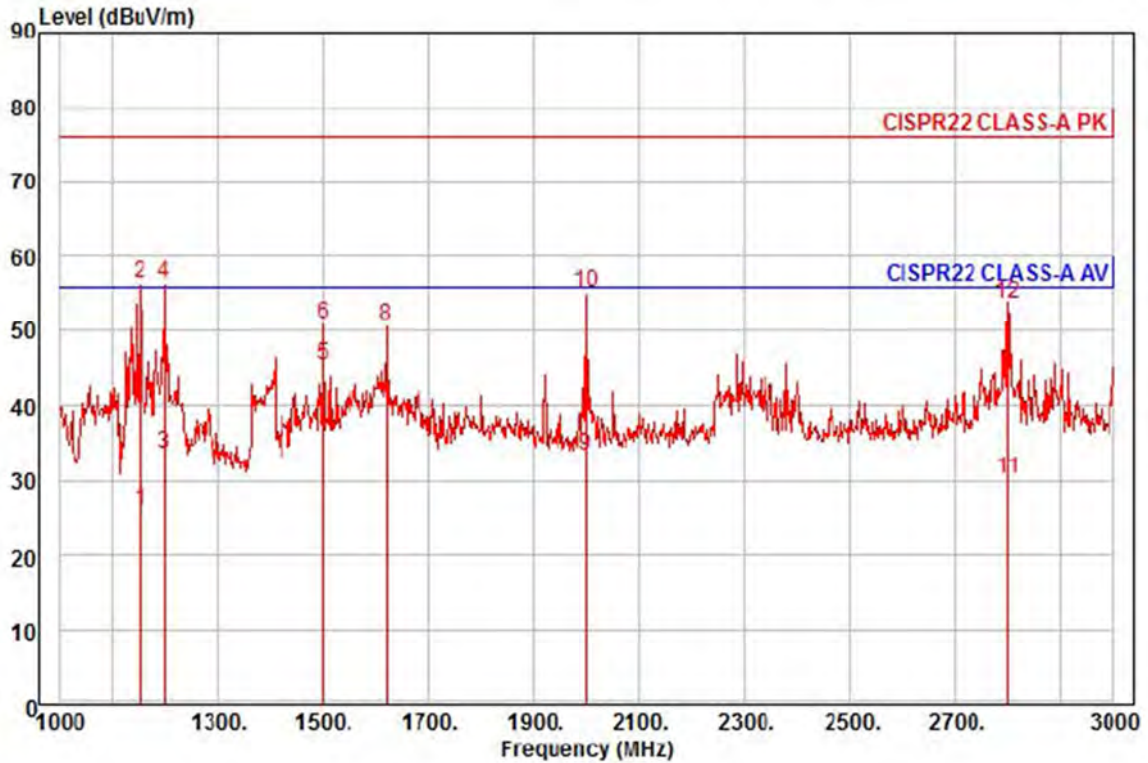
KES Co., Ltd.

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

Test report No.:

KES-E1-16T0164-R4

Page (41) of (64)



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project : NETWORK VIDEO RECORDER
Model : XRN-2011P
Mode :
Memo : 1 ~ 3 GHz

		Read	Ant	Cable	Preamp	TPos	Limit	Over		
	Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1152.00	34.47	24.51	6.95	40.05	12	56.00	-30.12	vertical	Average
2	1152.00	64.94	24.51	6.95	40.05	12	76.00	-19.65	vertical	Peak
3	1200.00	41.85	24.70	7.09	40.02	184	56.00	-22.38	vertical	Average
4 pk	1200.00	64.75	24.70	7.09	40.02	184	76.00	-19.48	vertical	Peak
5 pp	1500.00	51.42	25.90	7.96	39.88	190	56.00	-10.60	vertical	Average
6	1500.00	56.99	25.90	7.96	39.88	190	76.00	-25.03	vertical	Peak
7	1620.00	45.41	26.37	8.31	39.82	23	56.00	-15.73	vertical	Average
8	1620.00	55.94	26.37	8.31	39.82	23	76.00	-25.20	vertical	Peak
9	2000.00	35.65	27.88	9.35	39.63	216	56.00	-22.75	vertical	Average
10	2000.00	57.58	27.88	9.35	39.63	216	76.00	-20.82	vertical	Peak
11	2800.00	29.67	29.84	10.75	40.09	315	56.00	-25.83	vertical	Average
12	2800.00	53.21	29.84	10.75	40.09	315	76.00	-22.29	vertical	Peak

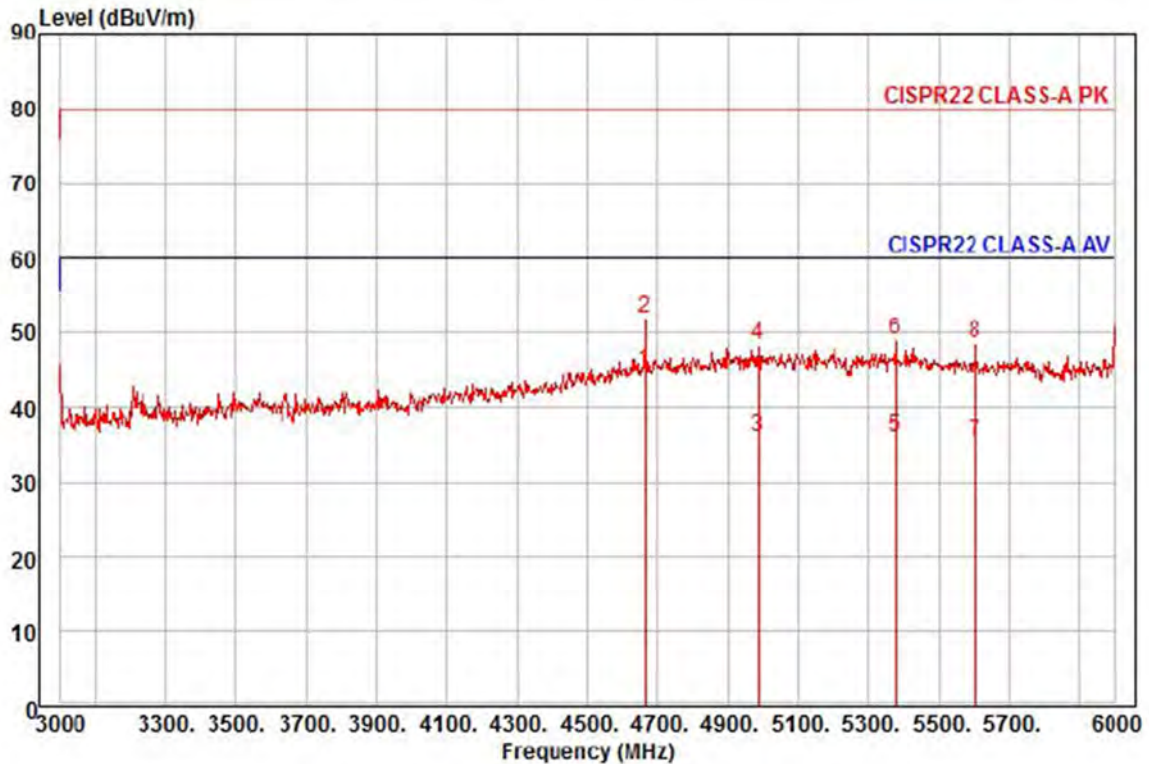
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr



KES Co., Ltd.

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

Test report No.:
KES-E1-16T0164-R4
Page (42) of (64)



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) horizontal
: RBW:1000.000kHz VBN:1000.000kHz SWT:Auto
Project : NETWORK VIDEO RECORDER
Model : XRN-2011P
Mode :
Memo : 3 ~ 6 GHz

		Read	Ant	Cable	Preamp	TPos	Limit	Over		
	Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	pp	4665.00	34.86	35.81	14.73	40.41	16	60.00	-15.01	horizontal Average
2	pk	4665.00	41.75	35.81	14.73	40.41	16	80.00	-28.12	horizontal Peak
3		4983.00	23.46	37.62	15.30	40.41	13	60.00	-24.03	horizontal Average
4		4983.00	35.78	37.62	15.30	40.41	13	80.00	-31.71	horizontal Peak
5		5376.00	23.65	36.96	15.77	40.36	353	60.00	-23.98	horizontal Average
6		5376.00	36.56	36.96	15.77	40.36	353	80.00	-31.07	horizontal Peak
7		5604.00	23.13	36.50	16.12	40.33	336	60.00	-24.58	horizontal Average
8		5604.00	36.29	36.50	16.12	40.33	336	80.00	-31.42	horizontal Peak

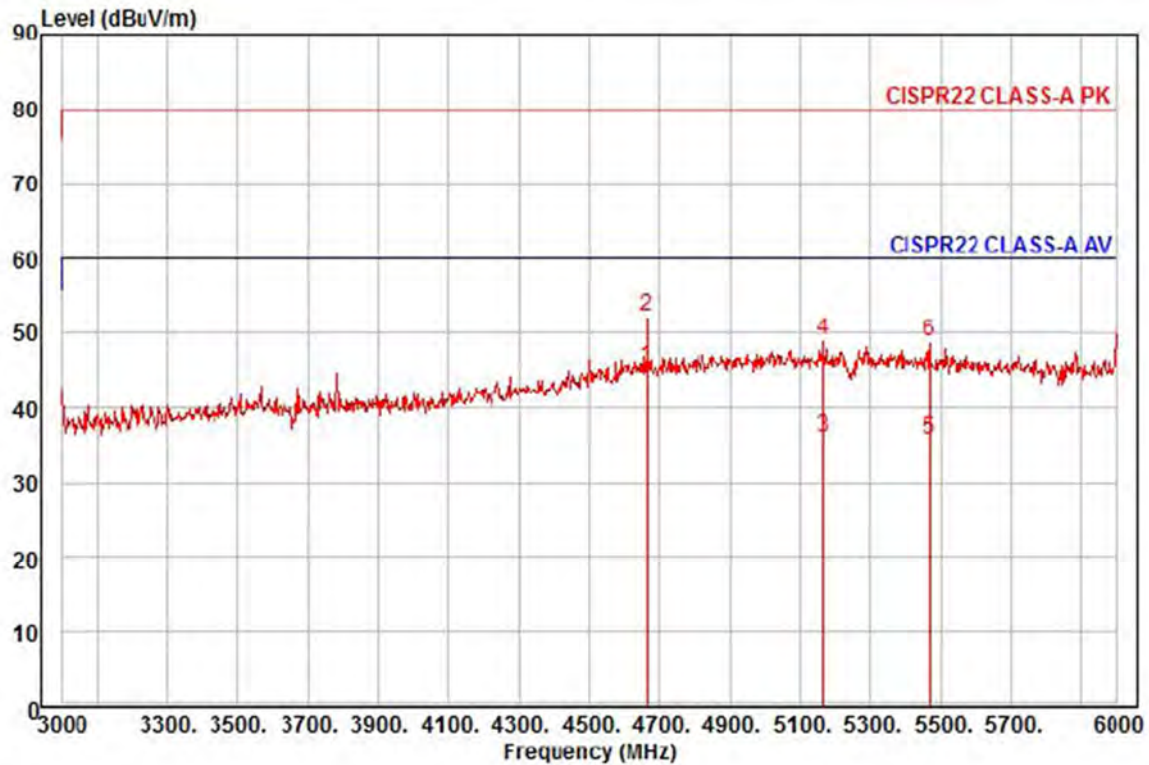
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr



KES Co., Ltd.

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

Test report No.:
KES-E1-16T0164-R4
Page (43) of (64)



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project : NETWORK VIDEO RECORDER
Model : XRN-2011P
Mode :
Memo : 3 ~ 6 GHz

		Read	Ant	Cable	Preamp	TPos	Limit	Over		
	Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1 pp	4665.00	35.12	35.81	14.73	40.41	343	60.00	-14.75	vertical	Average
2 pk	4665.00	42.02	35.81	14.73	40.41	343	80.00	-27.85	vertical	Peak
3	5163.00	23.51	37.39	15.52	40.39	67	60.00	-23.97	vertical	Average
4	5163.00	36.53	37.39	15.52	40.39	67	80.00	-30.95	vertical	Peak
5	5469.00	23.50	36.77	15.88	40.34	295	60.00	-24.19	vertical	Average
6	5469.00	36.40	36.77	15.88	40.34	295	80.00	-31.29	vertical	Peak

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 shchoi@kes.co.kr

**KES Co., Ltd.**

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

Test report No.:
KES-E1-16T0164-R4
Page (44) of (64)

Harmonic Current Emissions and Voltage Fluctuations and Flicker**Average harmonic current results**

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	113.649E-3			
2	9.394E-3	0.966	972.00E-3	PASS
3	74.409E-3	3.595	2.07	PASS
4	5.902E-3	1.525	387.00E-3	PASS
5	14.596E-3	1.423	1.03	PASS
6	3.189E-3			PASS
7	6.425E-3	0.927	693.00E-3	PASS
8	1.561E-3			PASS
9	7.885E-3	2.190	360.00E-3	PASS
10	1.434E-3			PASS
11	7.185E-3	2.419	297.00E-3	PASS
12	1.520E-3			PASS
13	4.345E-3			PASS
14	1.240E-3			PASS
15	2.370E-3			PASS
16	1.043E-3			PASS
17	1.707E-3			PASS
18	1.125E-3			PASS
19	1.835E-3			PASS
20	886.895E-6			PASS
21	1.650E-3			PASS
22	837.112E-6			PASS
23	1.381E-3			PASS
24	798.622E-6			PASS
25	1.120E-3			PASS
26	611.087E-6			PASS
27	919.459E-6			PASS
28	508.539E-6			PASS
29	601.538E-6			PASS
30	521.059E-6			PASS
31	515.680E-6			PASS
32	475.166E-6			PASS
33	517.536E-6			PASS
34	468.522E-6			PASS
35	518.117E-6			PASS
36	410.350E-6			PASS
37	492.355E-6			PASS
38	382.913E-6			PASS
39	470.167E-6			PASS
40	405.913E-6			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 shchoi@kes.co.kr

**KES Co., Ltd.**

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

Test report No.:

KES-E1-16T0164-R4

Page (45) of (64)

Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	115.078E-3			
2	11.247E-3	0.521	2.16	PASS
3	79.174E-3	1.721	4.60	PASS
4	7.870E-3	0.915	860.00E-3	PASS
5	16.012E-3	0.702	2.28	PASS
6	4.310E-3			PASS
7	7.633E-3	0.496	1.54	PASS
8	1.827E-3			PASS
9	9.491E-3	1.186	800.00E-3	PASS
10	1.732E-3			PASS
11	8.247E-3	1.250	660.00E-3	PASS
12	1.881E-3			PASS
13	4.778E-3			PASS
14	1.932E-3			PASS
15	2.690E-3			PASS
16	1.490E-3			PASS
17	2.020E-3			PASS
18	1.546E-3			PASS
19	2.237E-3			PASS
20	978.010E-6			PASS
21	2.112E-3			PASS
22	1.096E-3			PASS
23	1.639E-3			PASS
24	995.997E-6			PASS
25	1.414E-3			PASS
26	734.397E-6			PASS
27	1.356E-3			PASS
28	583.078E-6			PASS
29	720.640E-6			PASS
30	662.123E-6			PASS
31	682.718E-6			PASS
32	600.954E-6			PASS
33	671.537E-6			PASS
34	613.909E-6			PASS
35	688.761E-6			PASS
36	505.605E-6			PASS
37	642.789E-6			PASS
38	486.011E-6			PASS
39	565.142E-6			PASS
40	502.905E-6			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 shchoi@kes.co.kr



KES Co., Ltd.

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

Test report No.:
KES-E1-16T0164-R4
Page (46) of (64)

Test Data - Voltage Fluctuations

Maximum Flicker results

	EUT values	Limit	Result
Pst	0.075	1.00	PASS
Plt	0.075	0.65	PASS
dc [%]	0.012	3.30	PASS
dmax [%]	0.169	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.
The authenticity of the test report, contact shchoi@kes.co.kr

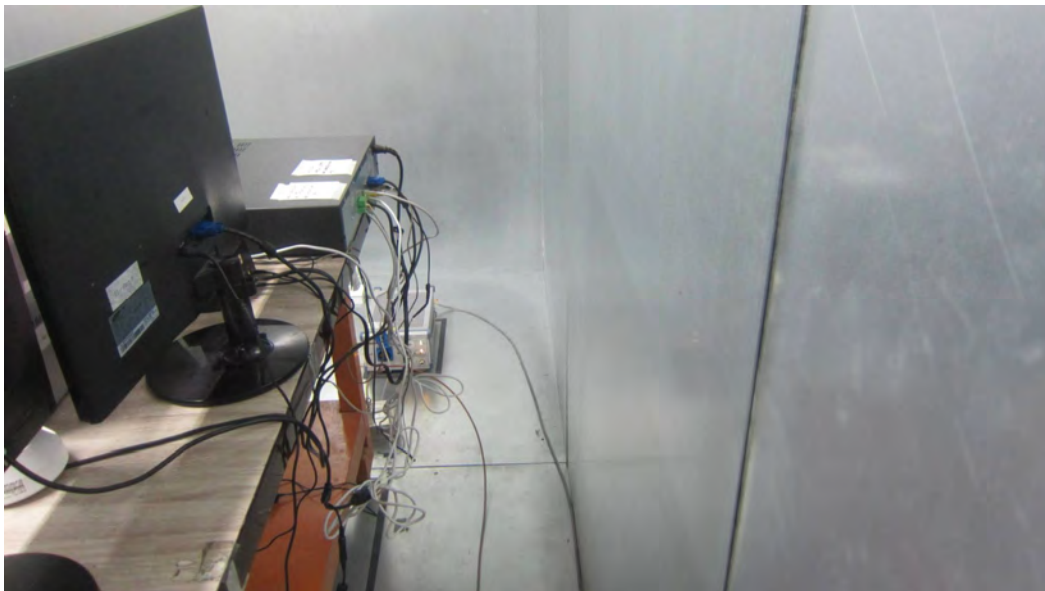
Test Setup Photos and Configuration

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.
The authenticity of the test report, contact shchoi@kes.co.kr

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.
The authenticity of the test report, contact shchoi@kes.co.kr

Radiated Electric Field Emissions(Below 1 GHz)



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

Radiated Electric Field Emissions(Above 1 GHz)



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

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.
The authenticity of the test report, contact shchoi@kes.co.kr

Electrical Fast Transients/Bursts



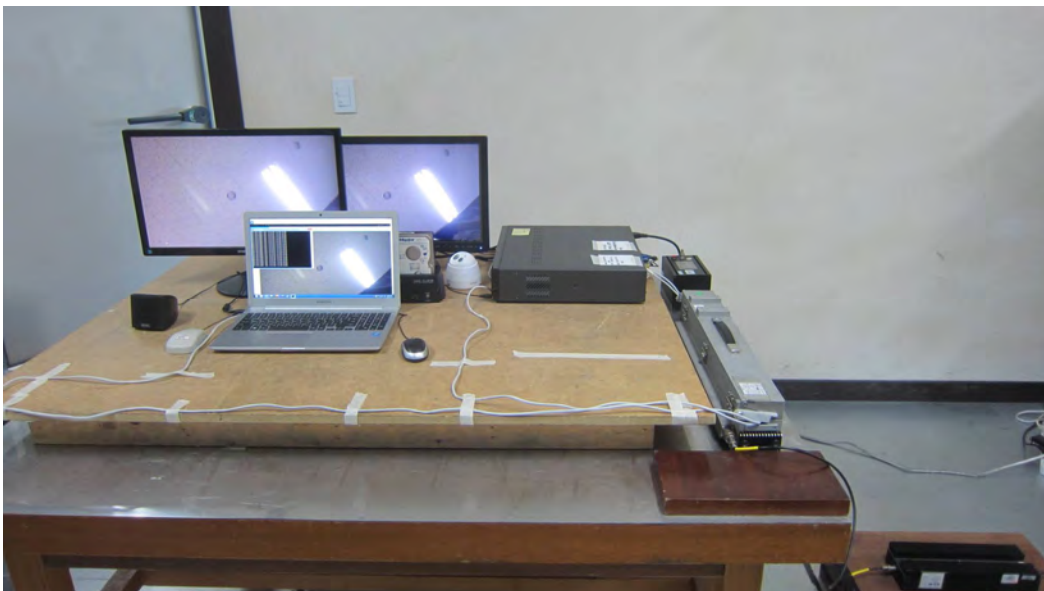
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

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.
The authenticity of the test report, contact shchoi@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 shchoi@kes.co.kr

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.
The authenticity of the test report, contact shchoi@kes.co.kr

EUT External Photographs

(Top)



(Bottom)



EUT Internal Photographs

(Internal View)



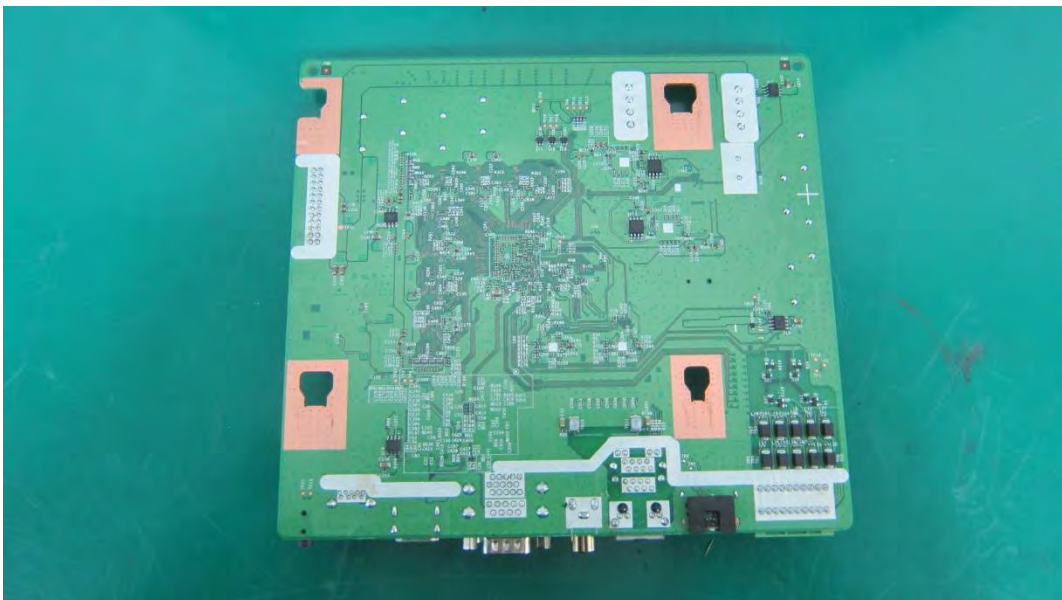
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

Main Board 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 shchoi@kes.co.kr

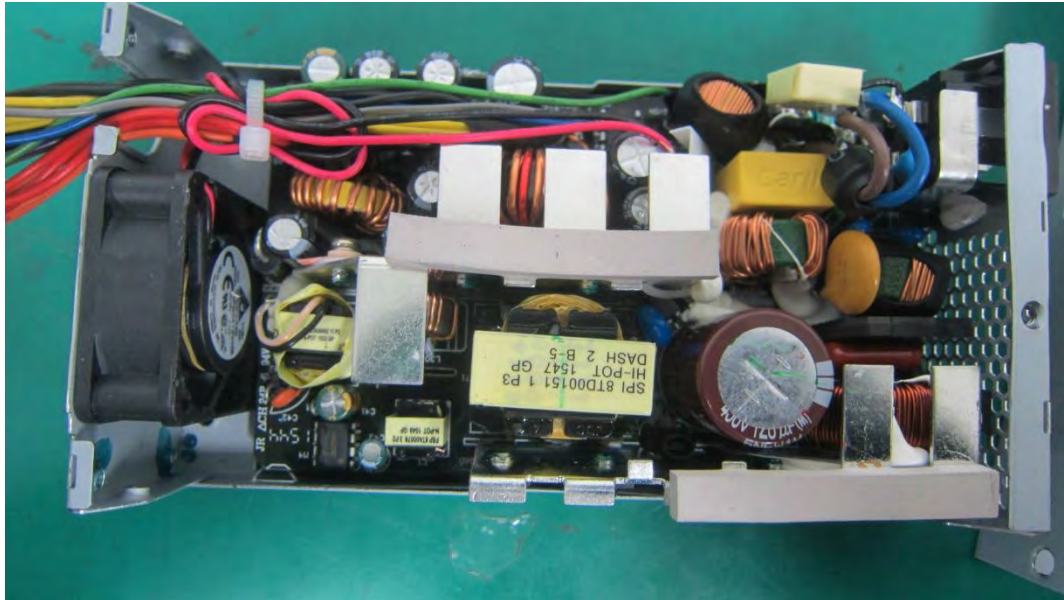
Main Board EUT Internal View – Sub Board

(Top)



Main Board EUT Internal View – Power Main Board

(Top)



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 shchoi@kes.co.kr

Main Board 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.
The authenticity of the test report, contact shchoi@kes.co.kr

Main Board EUT Internal View – POWER

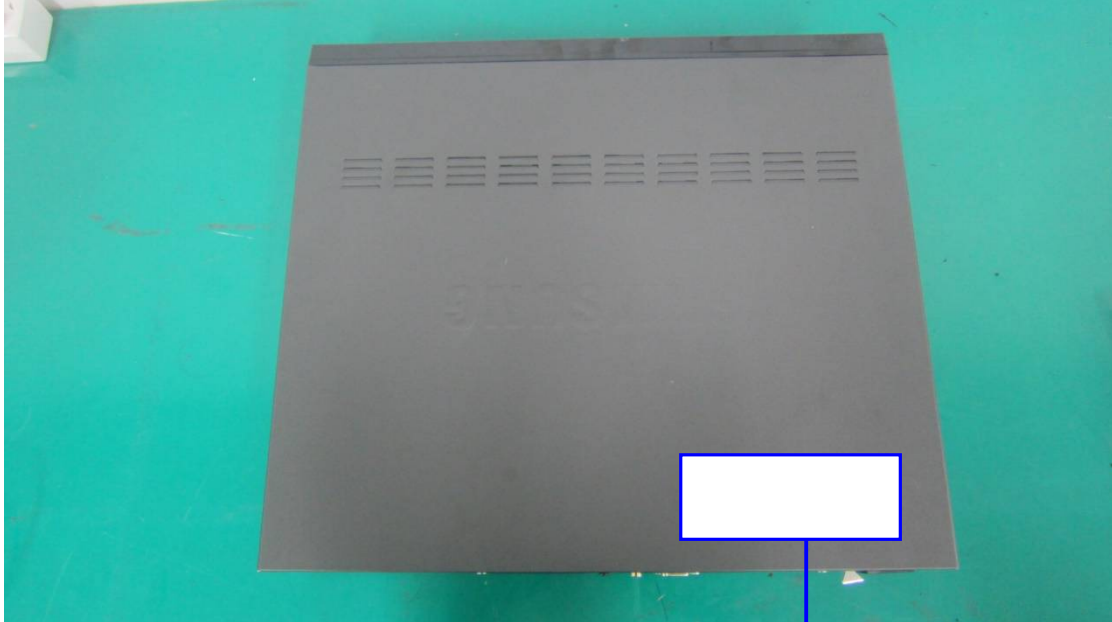
(Top)



(Bottom)



Label and Location



NETWORK VIDEO RECORDER

Model No : XRN-2011

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

Made in China