



EMC TEST REPORT For IC

Test Report No. : KES-E1-16T0368-R1

Date of Issue : Nov. 27, 2018

Product name : NETWORK VIDEO RECORDER

Model/Type No. : XRN-2011

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

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. 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-E1-16T0368-R1

Page (2) of (33)

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Jul. 21, 2016	KES-E1-16T0368	Issued
Nov. 27, 2018	KES-E1-16T0368-R1	Adding standard updates and derived models

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	EUT Operating Mode(s)	8
1.8	Configuration.....	9
1.9	Calibration Details of Equipment Used for Measurement	10
1.10	Test Facility	10
1.11	Laboratory Accreditations and Listings	10
2.0	Test Regulations.....	11
2.1	Conducted Emissionsat Mains Power Ports.....	13
2.2	Radiated Electric Field Emissions(Below 1 GHz)	14
2.3	Radiated Electric Field Emissions(Above 1 GHz)	15
APPENDIX A – TEST DATA.....		16
Conducted Emissions at Mains Power Ports.....		16
Radiated Electric Field Emissions(Below 1 GHz)		18
Radiated Electric Field Emissions(Above 1 GHz)		19
Test Setup Photos and Configuration		23
Conducted Voltage Emissions		23
Radiated Electric Field Emissions(Below 1 GHz)		24
Radiated Electric Field Emissions(Above 1 GHz)		25
EUT External Photographs		26
EUT Internal Photographs		27

1.0 General Product Description

Main Specifications of EUT 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	Playback Control	Fast/Slow Forward / Backward, Move one step Up / Down
	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)
Sensor	Function	Multi channel (Upto 16CH) Play, Date-Time/Title display
	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), RTP (TCP), RTSP, NTP, HTTP, DHCP (Server, Client), PPPoE, SMTP, ICMP, IGMP, ARP, DNS, DDNS, uPnP, HTTPS, SNMP, ONVIF (Profile-S), SUNAPI (Server, Client)	
DDNS	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-EI-16T0368-R1

Page (5) of (33)

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 (67H) 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 ☐ 100 Vac ☐ 110 Vac ☒ 120 Vac ☐ 24 Vac ☐ 12 Vdc

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-E1-16T0368-R1

Page (7) of (33)

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	NT63025J	JK9091EF400142M	Samsung Electronics Co., Ltd	-
Notebook Adapter	A13-040N2A	CN60BA4400313AD0N 843KO2OO	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-E5031RN	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

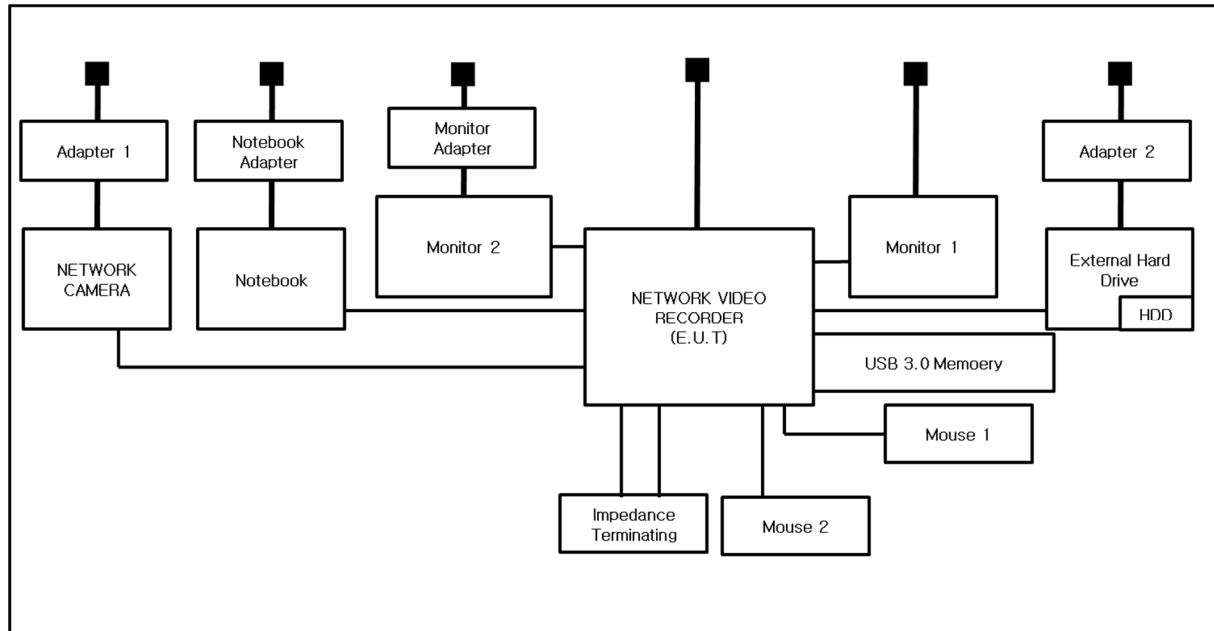
1.7 EUT Operating Mode(s)

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 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, 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

1.11 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 55032:2015

☐ Class A

☐ Class B

☐ EN 55024:2010

☐ EN 50130-4:2011 +A1:2014

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



KES Co., Ltd.

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

Test report No.:
KES-E1-16T0368-R1
Page (12) of (33)

- | | | |
|--|---|----------------------------------|
| ☐ VCCI V-3 / 2015.04 | ☐ Class A | ☐ Class B |
| ☐ AS/NZS:2013 | ☐ Class A | ☐ Class B |
| ☐ 47 CFR Part 15, Subpart B | | |
| ☐ CISPR 22:2009 +A1:2010 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2014 | ☐ Class A | ☐ Class B |
| ☒ IC Regulation ICES-003 : 2016 | | |
| ☐ CAN/CSA CISPR 22-10 | ☐ Class A | ☐ Class B |
| ☒ ANSI C63.4-2014 | ☒ Class A | ☐ Class B |
|
☐ 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.
The authenticity of the test report, contact shchoi@kes.co.kr.



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, 03, 2017
☒	LISN	ENV216	R&S	101137	02, 04, 2017
☒	LISN	ENV216	R&S	101786	05, 02, 2017
☒	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 Radiated Electric Field Emissions(Below 1 GHz)

7 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, 03, 2017
☒	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.



2.3 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	100551	04, 18, 2017
☒	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.

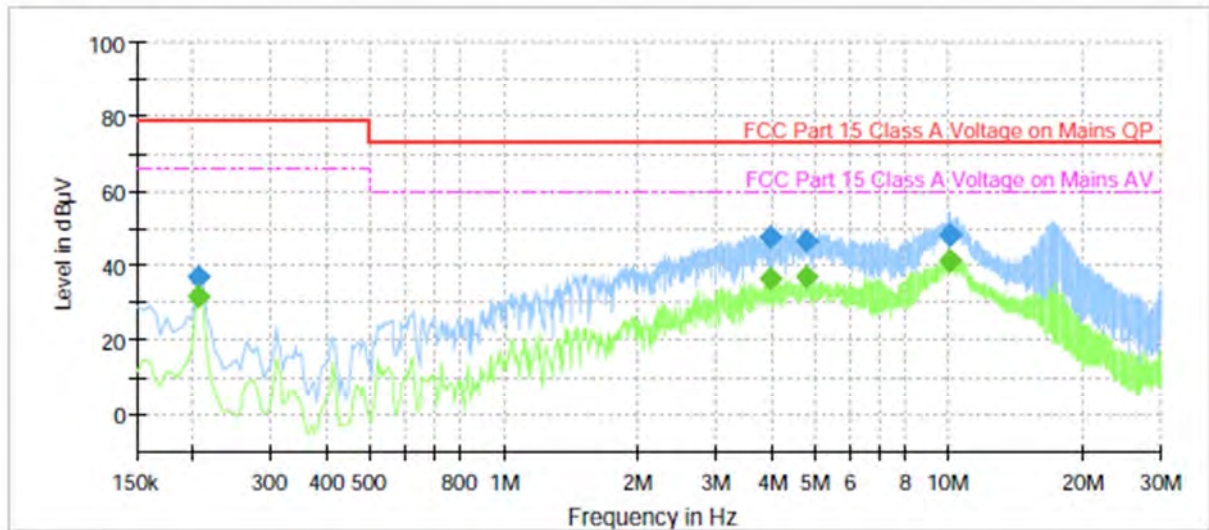
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

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



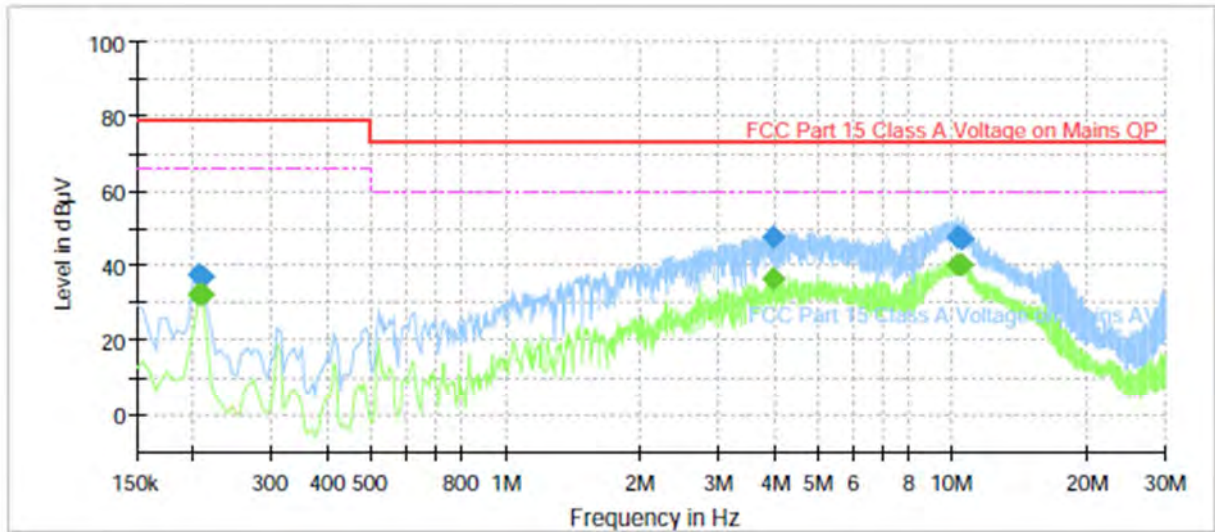
Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.205000	---	31.92	66.00	34.08	1000.0	9.000	L1	9.7
0.205000	37.32	---	79.00	41.68	1000.0	9.000	L1	9.7
3.955000	---	36.40	60.00	23.60	1000.0	9.000	L1	9.8
3.955000	47.63	---	73.00	25.37	1000.0	9.000	L1	9.8
4.775000	---	36.97	60.00	23.03	1000.0	9.000	L1	9.8
4.775000	46.60	---	73.00	26.40	1000.0	9.000	L1	9.8
10.020000	---	41.11	60.00	18.89	1000.0	9.000	L1	10.0
10.020000	47.97	---	73.00	25.03	1000.0	9.000	L1	10.0
10.090000	---	41.06	60.00	18.94	1000.0	9.000	L1	10.0
10.090000	48.22	---	73.00	24.78	1000.0	9.000	L1	10.0

[NEUTRAL]

Common Information

Test Description: Conducted Emission
Model No.: XRN-2011N
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	---	32.11	66.00	33.89	1000.0	9.000	N	9.6
0.205000	37.57	---	79.00	41.43	1000.0	9.000	N	9.6
0.210000	---	32.25	66.00	33.75	1000.0	9.000	N	9.6
0.210000	36.87	---	79.00	42.13	1000.0	9.000	N	9.6
3.955000	---	36.39	60.00	23.61	1000.0	9.000	N	9.8
3.955000	47.59	---	73.00	25.41	1000.0	9.000	N	9.8
10.340000	---	40.11	60.00	19.89	1000.0	9.000	N	10.0
10.340000	47.82	---	73.00	25.18	1000.0	9.000	N	10.0
10.540000	---	40.14	60.00	19.86	1000.0	9.000	N	10.0
10.540000	47.02	---	73.00	25.98	1000.0	9.000	N	10.0

**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-E1-16T0368-R1

Page (18) of (33)

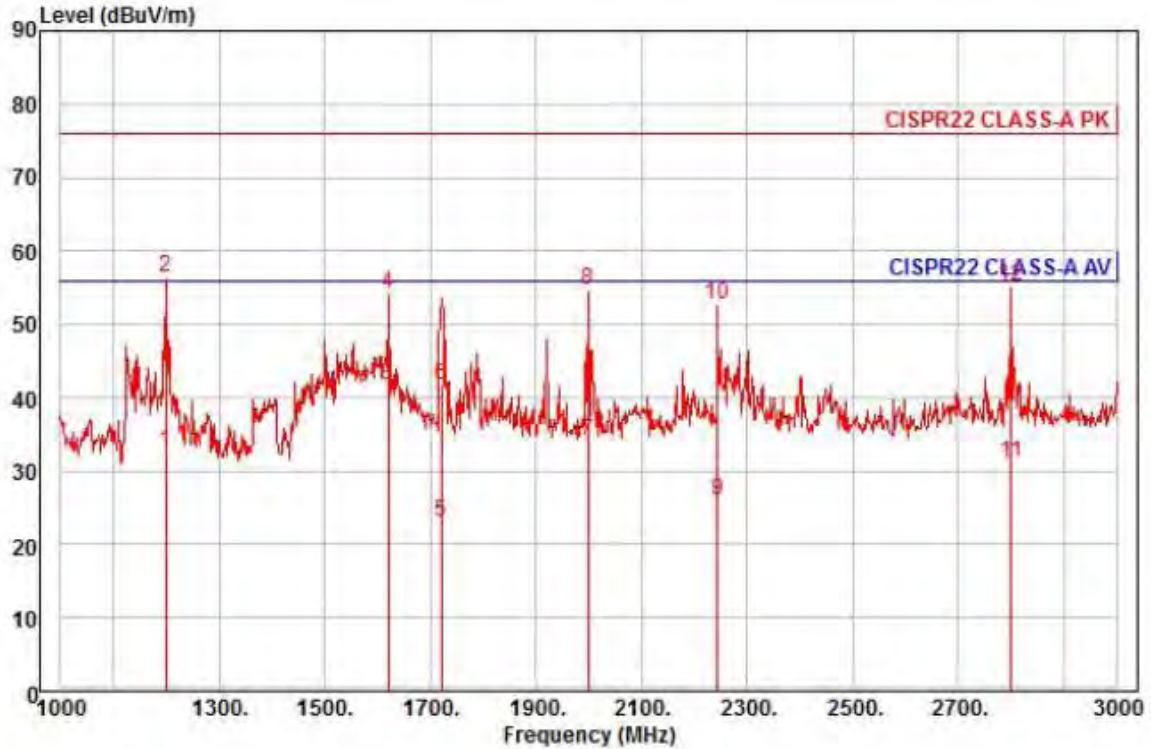
Radiated Electric Field Emissions(Below 1 GHz)

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]
48.33	18.16	V	1.00	13.87	1.43	33.46	40.00	6.54
77.26	17.52	V	1.00	7.78	1.88	27.18	40.00	12.82
142.30	15.61	V	1.00	7.92	2.73	26.26	40.00	13.74
253.00	16.03	H	4.00	12.47	3.82	32.32	47.00	14.68
598.24	8.64	H	3.00	19.26	6.31	34.21	47.00	12.79
648.73	8.07	V	2.10	19.49	6.77	34.33	47.00	12.67

* 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.

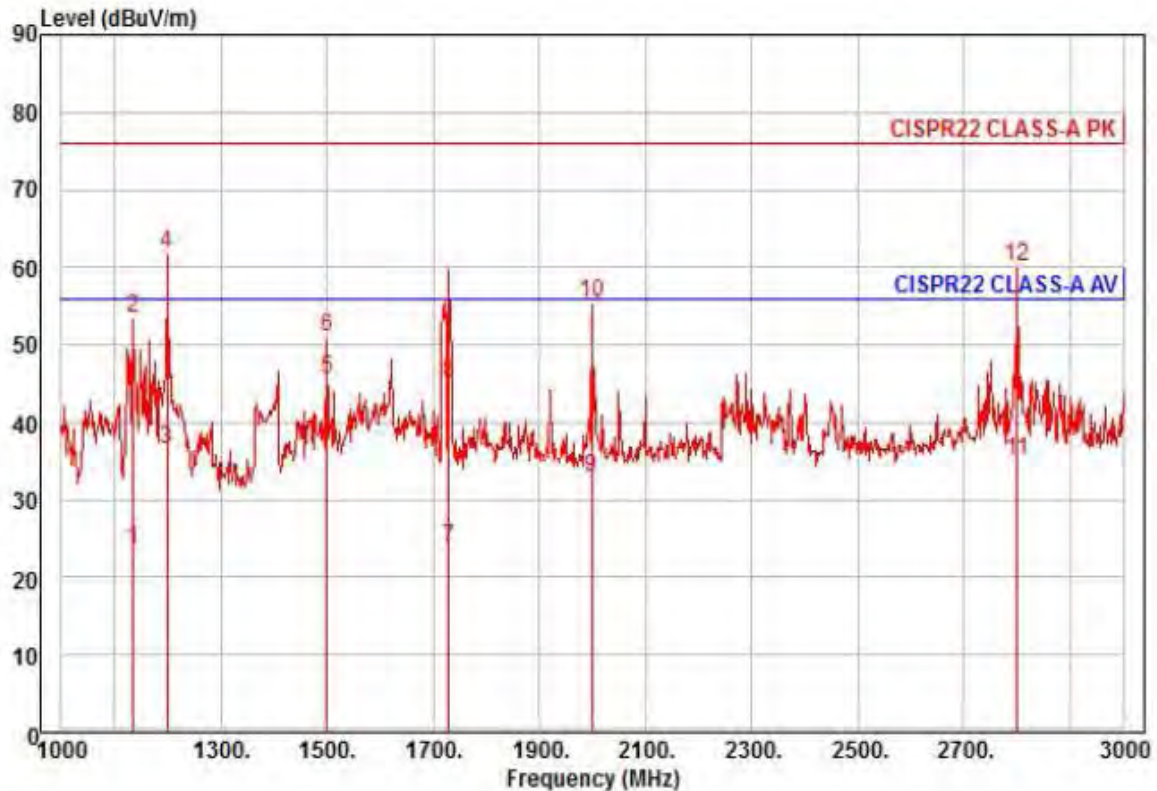
Radiated Electric Field Emissions(Above 1 GHz)



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-2011N
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	1200.00	40.81	24.70	7.09	40.02	111	56.00	-23.42	horizontal Average
2	pk 1200.00	64.57	24.70	7.09	40.02	111	76.00	-19.66	horizontal Peak
3	pp 1620.00	46.82	26.37	8.31	39.82	353	56.00	-14.32	horizontal Average
4	1620.00	59.22	26.37	8.31	39.82	353	76.00	-21.92	horizontal Peak
5	1720.00	27.41	26.77	8.58	39.77	267	56.00	-33.01	horizontal Average
6	1720.00	46.10	26.77	8.58	39.77	267	76.00	-34.32	horizontal Peak
7	2000.00	36.39	27.88	9.35	39.63	261	56.00	-22.01	horizontal Average
8	2000.00	56.97	27.88	9.35	39.63	261	76.00	-21.43	horizontal Peak
9	2244.00	27.63	28.48	9.72	39.77	42	56.00	-29.94	horizontal Average
10	2244.00	54.35	28.48	9.72	39.77	42	76.00	-23.22	horizontal Peak
11	2800.00	30.70	29.84	10.75	40.09	293	56.00	-24.80	horizontal Average
12	2800.00	54.76	29.84	10.75	40.09	293	76.00	-20.74	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.



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-2011N
Mode :
Memo : 1 ~ 3 GHz

	Read Freq	Ant Level	Cable Factor	Preamp Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1134.00	32.14	24.44	6.90	40.05	30	56.00	-32.57	vertical	Average
2	1134.00	62.08	24.44	6.90	40.05	30	76.00	-22.63	vertical	Peak
3	1200.00	44.81	24.70	7.09	40.02	130	56.00	-19.42	vertical	Average
4 pk	1200.00	69.97	24.70	7.09	40.02	130	76.00	-14.26	vertical	Peak
5 pp	1500.00	51.68	25.90	7.96	39.88	196	56.00	-10.34	vertical	Average
6	1500.00	57.03	25.90	7.96	39.88	196	76.00	-24.99	vertical	Peak
7	1730.00	28.19	26.81	8.61	39.76	298	56.00	-32.15	vertical	Average
8	1730.00	49.42	26.81	8.61	39.76	298	76.00	-30.92	vertical	Peak
9	2000.00	35.32	27.88	9.35	39.63	230	56.00	-23.08	vertical	Average
10	2000.00	57.86	27.88	9.35	39.63	230	76.00	-20.54	vertical	Peak
11	2800.00	34.59	29.84	10.75	40.09	289	56.00	-20.91	vertical	Average
12	2800.00	59.55	29.84	10.75	40.09	289	76.00	-15.95	vertical	Peak

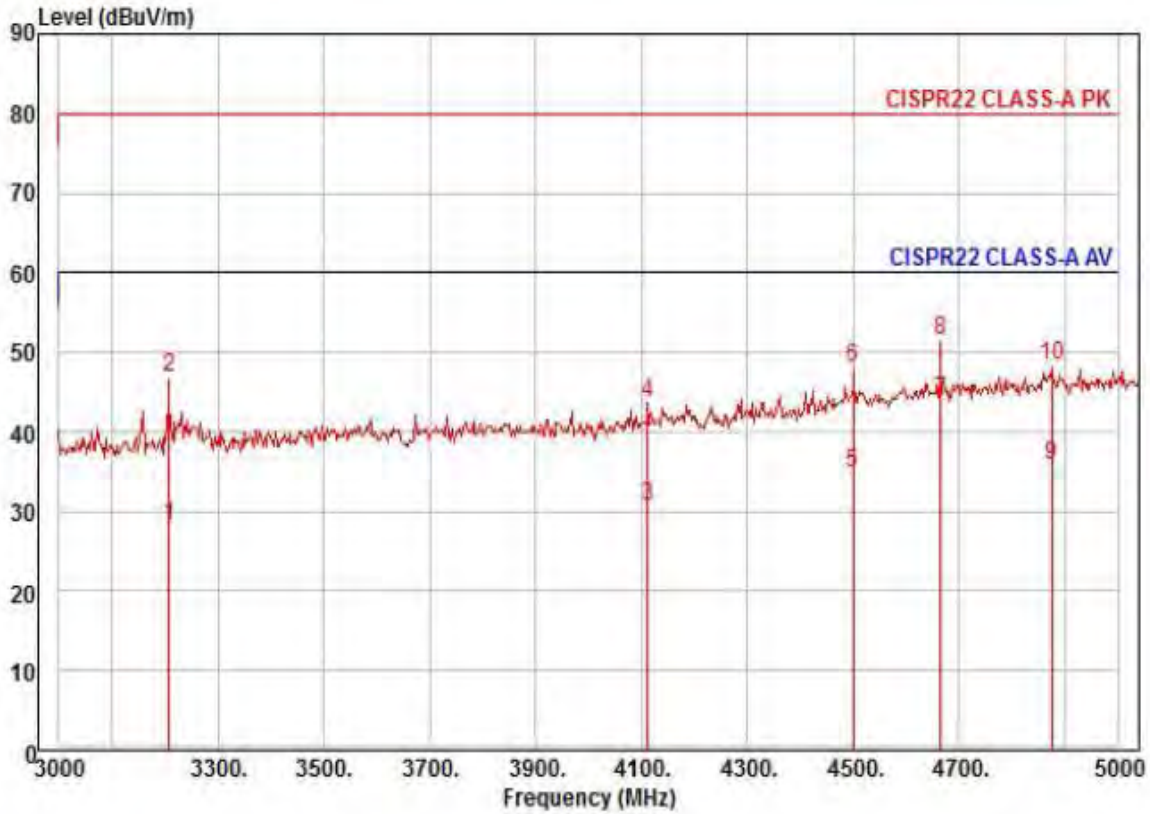
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr.



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

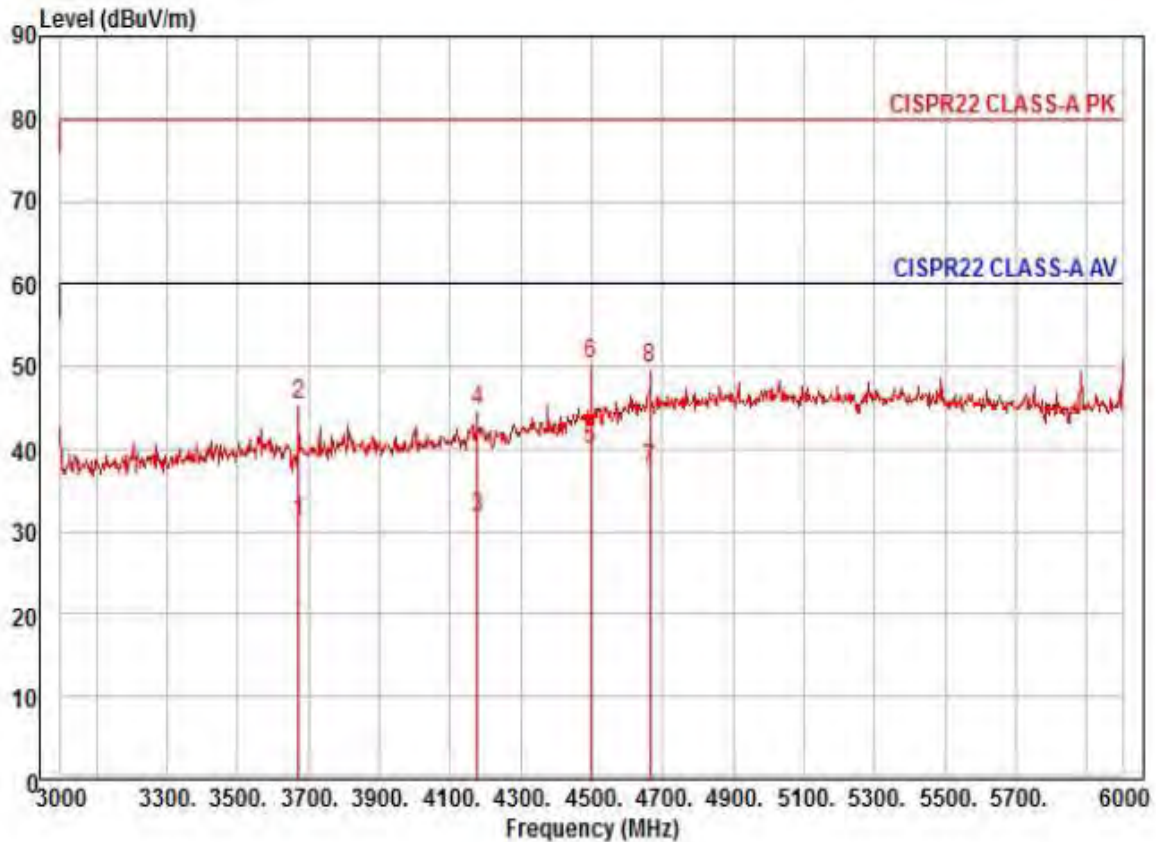
Test report No.:
KES-E1-16T0368-R1
Page (21) of (33)



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-2011N
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	3207.00	25.92	30.68	11.75	40.25	75	60.00	-31.90	horizontal	Average
2	3207.00	44.78	30.68	11.75	40.25	75	80.00	-33.04	horizontal	Peak
3	4113.00	24.69	32.66	13.72	40.41	330	60.00	-29.34	horizontal	Average
4	4113.00	37.80	32.66	13.72	40.41	330	80.00	-36.23	horizontal	Peak
5	4500.00	25.86	34.86	14.43	40.41	135	60.00	-25.26	horizontal	Average
6	4500.00	39.19	34.86	14.43	40.41	135	80.00	-31.93	horizontal	Peak
7 pp	4665.00	33.75	35.81	14.73	40.41	15	60.00	-16.12	horizontal	Average
8 pk	4665.00	41.35	35.81	14.73	40.41	15	80.00	-28.52	horizontal	Peak
9	4875.00	24.18	37.01	15.10	40.41	211	60.00	-24.12	horizontal	Average
10	4875.00	36.64	37.01	15.10	40.41	211	80.00	-31.66	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.



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-2011N

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	3672.00	27.18	31.46	12.85	40.34	50	60.00	-28.85	vertical	Average
2	3672.00	41.31	31.46	12.85	40.34	50	80.00	-34.72	vertical	Peak
3	4179.00	25.14	33.03	13.84	40.41	55	60.00	-28.40	vertical	Average
4	4179.00	38.26	33.03	13.84	40.41	55	80.00	-35.28	vertical	Peak
5 pp	4500.00	30.98	34.86	14.43	40.41	179	60.00	-29.14	vertical	Average
6 pk	4500.00	41.32	34.86	14.43	40.41	179	80.00	-29.80	vertical	Peak
7	4665.00	27.42	35.81	14.73	40.41	316	60.00	-22.45	vertical	Average
8	4665.00	39.65	35.81	14.73	40.41	316	80.00	-30.22	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.

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.

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.

EUT External Photographs

(Top)



(Bottom)



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

EUT Internal Photographs

(Internal View)



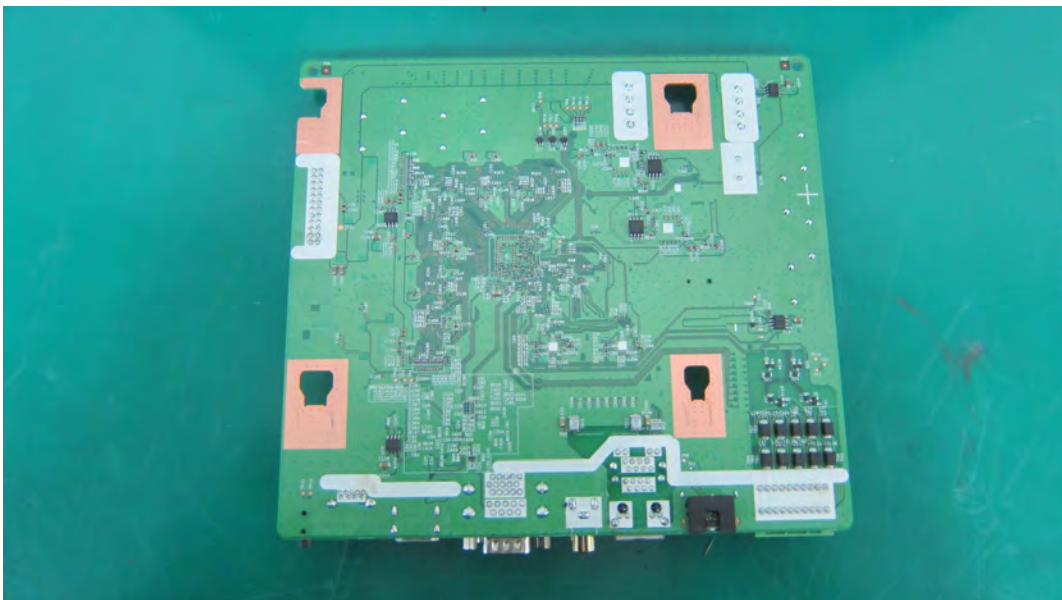
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr.

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.

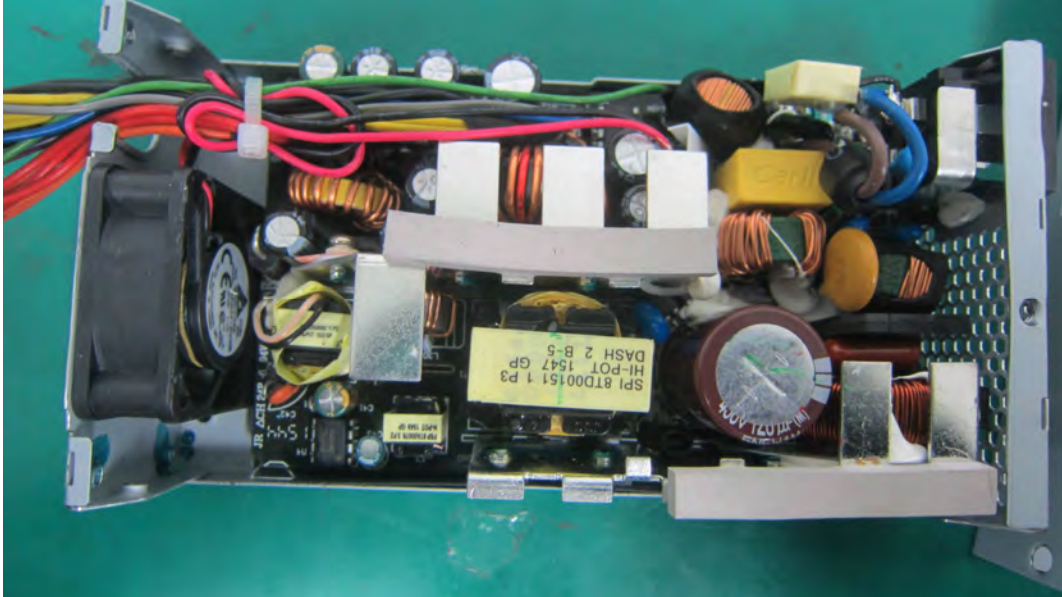
Main Board EUT Internal View – Sub Board

(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

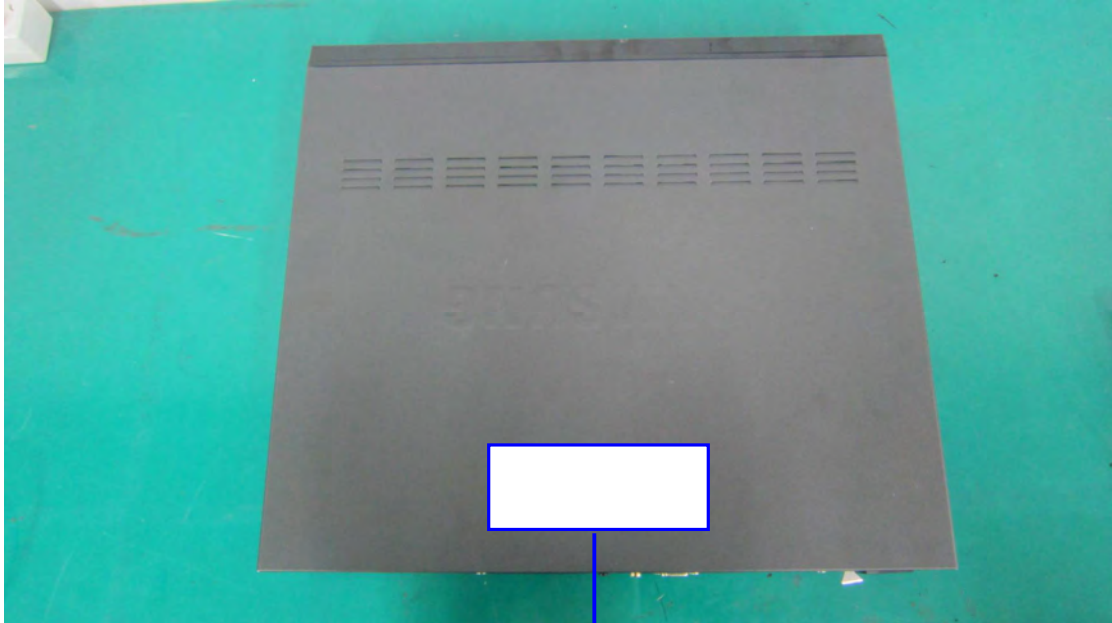
(Top)



(Bottom)



Label Photographs



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

[LABEL VIEW]