



EMC TEST REPORT For CE

Test Report No. : KES-E1-16T0271-R4

Date of Issue : Nov. 27. 2018

Product name : NETWORK VIDEO RECORDER

Model/Type No. : XRN-1610S

Variant Model : XRN-1610SP/DM, XRN-1610S-1T, XRN-1610S-2T, XRN-1610,
XRN-1610-1T, XRN-1610SA

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 : Jun. 02, 2016

Test date : Jun. 13, 2016 – Jun. 16, 2016

Test Results : ☒ In Compliance ☐ Not in Compliance

Tested by

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This test report is not related to KOLAS.



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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Jun. 21, 2016	KES-E1-16T0271	Issued
Jun. 19, 2017	KES-E1-16T0271-R1	Reissue due to manufacturer change and additional derivative model
Jun. 29, 2018	KES-E1-16T0271-R2	Re-issue due to manufacturer change
Oct. 29, 2018	KES-E1-16T0271-R3	Reissue due to additional derivative model
Nov. 27, 2018	KES-E1-16T0271-R4	Reissue due to additional derivative model

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1.0 General Product Description

Main Specifications of E.U.T are:

Model		XRN-1610S	
Display			
Network Camera	Inputs	Max. 16CH	
	Resolution	CIF ~ 12MP	
	Fish-Eye Devarping	NA (processed on Web / CMS)	
	Protocols	Samsung, ONVIF	
Live	Local Display	1x HDMI / 1x VGA Dual Monitor	
	Multi-Channel Display	[Local Monitor] 1 / 4 / 8 / 9 / 13 / 16 / Auto Sequence [Web] 1 / 4 / 9 / 16 / Auto Sequence	
	Performance	[Local Monitor] 12MP (30fps) 8MP (120fps) 5MP (180fps), 3MP (240fps), 2MP (480fps), 720p (480fps), D1 (480fps) [Web] 5MP (30fps), 3MP (60fps), 2MP (120fps), 720p (240fps), D1 (480fps)	
Performance			
Operating System	Embedded	Linux	
Record	Compression	H.265, H.264, MJPEG	
	Recording Bandwidth	128Mbps	
	Resolution	CIF ~ 12MP	
	Type	Manual, Schedule(Continuous Event), Event (Pre/Post)	
	Event Trigger	- Alarm Input(8) - Video Loss - Camera Event(Sensor, MD, Video Analytics) - VA Event(Tampering, Enter/Exit, Passing/Virtual-Line, Appearing/Disappearing, Face Detection, Audio Detection) - Defocus Camera Event	
	Event Action	e-Mail, PTZ Preset, Alarm Out, Buzzer, Monitor Out	
Search & Play	Playback Bandwidth	32Mbps (16ch simultaneous)	
	Performance	Max. 3 Users (Remote 3)	
	Mode	Date & Time(Calendar) Event Log list	
		Text Search(POS, ANPR)	
	Simultaneous playback	Up to 16CH (Local, Network)	
	Resolution	CIF ~ 12MP	
	Fish-Eye Devarping	NA (processed on Web / CMS)	
	Playback Control	Fast/Slow Forward/Backward, Move one step up/down	
	Storage	Default Built-In	0TB ~ 8TB (TBD, dependent on region)
Internal		4 SATA	
Hot Swap		NA	
External(DAS)		1 e-SATA	
External(NAS, iSCSI)		iSCSI	
Max.Capacity		Internal (32TB=4x8TB)	
RAID		NA	
Backup	File backup	BU/EXE(USB), JPG(X1)/Web, CMS)	
	Function	Max. 16CH Play, Date-Time/Title display	
Sensor	I/O	84 (I/O 3EA, NC/NC 1EA)	
Audio	Input	16CH (network)	
	Compression	G.711, G.726, AAC(16/48KHz)	
	Audio Communication	2-Way (pass-through between camera and SSM)	

Network		TCP/IP, UDP/IP, RTP/UDP, RTP/TCP, RTSP, NTP, HTTP, DHCP(Server, Client), PPPoE, SMTP, ICMP, IGMP, ARP, DNS, DDNS, uPrP, HTTPS, SNMP, ONVIF Profile S, SUNAPI(Server, Client)	
Protocol			
DDNS		Pols DDNS	
Transmission Bandwidth		Max. 256Mbps (iSCSI off) (128Mbps, iSCSI on)	
Max Remote Users		Search(3) / Live unicast(10) / Live multicast(20)	
IP Version		IPv4/v6	
Security		User access Log	
		IP Filtering 802.1x Encryption(ID/PW, Recording, Transmission, Backup)	
Language	GUI	(1) English, (2) French, (3) German, (4) Italian, (5) Spanish, (6) Russian, (7) Turkish, (8) Polish, (9) Dutch, (10) Swedish, (11) Czech, (12) Portuguese, (13) Danish, (14) Rumanian, (15) Serbian, (16) Croatian, (17) Hungarian, (18) Greek, (19) Norwegian, (20) Finnish, (21) Korean, (22) Chinese, (23) Japanese, (24) Thai	
	Web	(1) English, (2) French, (3) German, (4) Italian, (5) Spanish, (6) Russian, (7) Turkish, (8) Polish, (9) Dutch, (10) Swedish, (11) Czech, (12) Portuguese, (13) Danish, (14) Rumanian, (15) Serbian, (16) Croatian, (17) Hungarian, (18) Greek, (19) Norwegian, (20) Finnish, (21) Korean, (22) Chinese, (23) Japanese	
OS		Supported OS : Window XP(service pack 2 or above), Vista, 7, 8, 10, Mac OS X(10.7 or above)	
Web Browser		Non-plugin Webviewer Supported Browser: Google Chrome 47, MS Edge 20 WMF : 1CH LIVE(800X600), SETUP	
		Plug-in Webviewer Supported Browser: MS Explore 11, Mozilla Firefox 43, Apple Safari 9 * Mac OS X only	
Viewer Software	Type	SSM, Webviewer, Smart Viewer, iPolis Mobile	
	CMS Support	Support SDK/CGI(SUNAPI)	
Smart phone	Support Model	I-Phone, Android	
	Protocol Support	RTP, RTSP, HTTP, CGI(SUNAPI)	
	Control	Live(16ch) : Multi-Profile Support Playback(1ch, Max 2MP)	
	Max. Remote Users	Search (3), Live Unicast (10), Multicast (20)	
Functions			
Camera Setup	Register	1) PrnP mode 2) Manual mode	
	Setup Items	(1) IP Address, Add Profile Edit, Etrate, Compression, GOP, Quality (2) Camera Event Setup - MD - VA - Tampering, Enter/Exit, Passing/Virtual-Line, Appearing/Disappearing, Face Detection, Audio Detection (3) Video Setup/Simple Focus, Brightness/Contrast, Flip/Mirror, IRIS, WDR, D&N, SSNR, Shutter, SSGR, DIS (4) Fisheye Devarping, Halfway View Setup, Camera Webpage	
Camera Control	PoE	1) Monitor PoE Power consumption 2) On/Off Control for each PoE camera 3) Remote Reset for each PoE camera	
	Time Sync	NVR Time Protocol for PoE Camera (Time sync based on NVR time)	
Easy Configuration		Setup Wizard (Language, Date/Time, Network, Auto Camera Configuration) o selectable between PrnP and Manual mode	

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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 ☐ PoE ☐ 12 Vdc
Frequency ☒ 50 Hz ☐ 60 Hz ☐ Hz

1.2 Variant Model Differences

Variant Model	Differences
XRN-1610SP/DM, XRN-1610S-1T, XRN-1610S-2T, XRN-1610, XRN-1610-1T, XRN-1610SA	Customer-specific management model

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
NETWORK VIDEO RECORDER	XRN-1610S	-	HANWHA TECHWIN (TIANJIN) CO., LTD	E.U.T
Mouse	-	-	-	-
HDD	WD10PURX	WCC4J4EX436	WD	-
POWER	DPS-280AB-6 A	HIED1609002094	Delta Electronics Power(Dongguan) Co., Ltd.	-

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1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Monitor 1	LS23C340	ZXPCHTMF B01032M	SAMSUNG	-
Monitor adapter 1	A2514_DPN	CN07BN4400591BSK2 8F6NF841	11ssan Elecom(shen yang) Co., Ltd	-
Monitor 2	SMT-2232	C95V67VF900025B	Weiha Daewoo Electronics Co., Ltd.	-
Notebook	LG15N54	410NZET022292	LG	-
Adapter	ADP-90WH B	84ZW19F1557	DELTA ELECTRONICS (JIANGSU) LTD.	-
Camera	SND-L6013RN	-	SAMSUNG TECHWIN CO.,LTD.	-
Speaker	-	-	MASS	-
Alarm 1	SIP-1201DD DO	C53R67JZ301878 L	SAMSUNG TECHWIN CO.,LTD.	-
Alarm 2	SIE-0001 DO	C54167JB601268 F	SAMSUNG TECHWIN CO.,LTD.	-
External HDD	MDT-US2528	-	-	-
3.0 USB Memory	-	-	Transcend	16GB

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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)	RJ-45	Notebook	RJ-45	3.0	U
	D-SUB	Monitor 1	D-SUB	1.5	S
	HDMI	Monitor 2	HDMI	1.7	S
	Audio Out	Speaker	Audio OUT	1.2	U
	USB	Mouse	USB	1.2	U
	RJ-45	Camera	RJ-45	4.0	S
	Alarm IN	Alarm 1	Alarm IN	3.0	U
	Alarm OUT	Alarm 2	Alarm OUT	3.0	U
	e-SATA	External HDD	e-SATA	0.5	U
	3.0 USB	3.0 USB Memory	3.0 USB	-	-

* Unshielded=U, Shielded=S

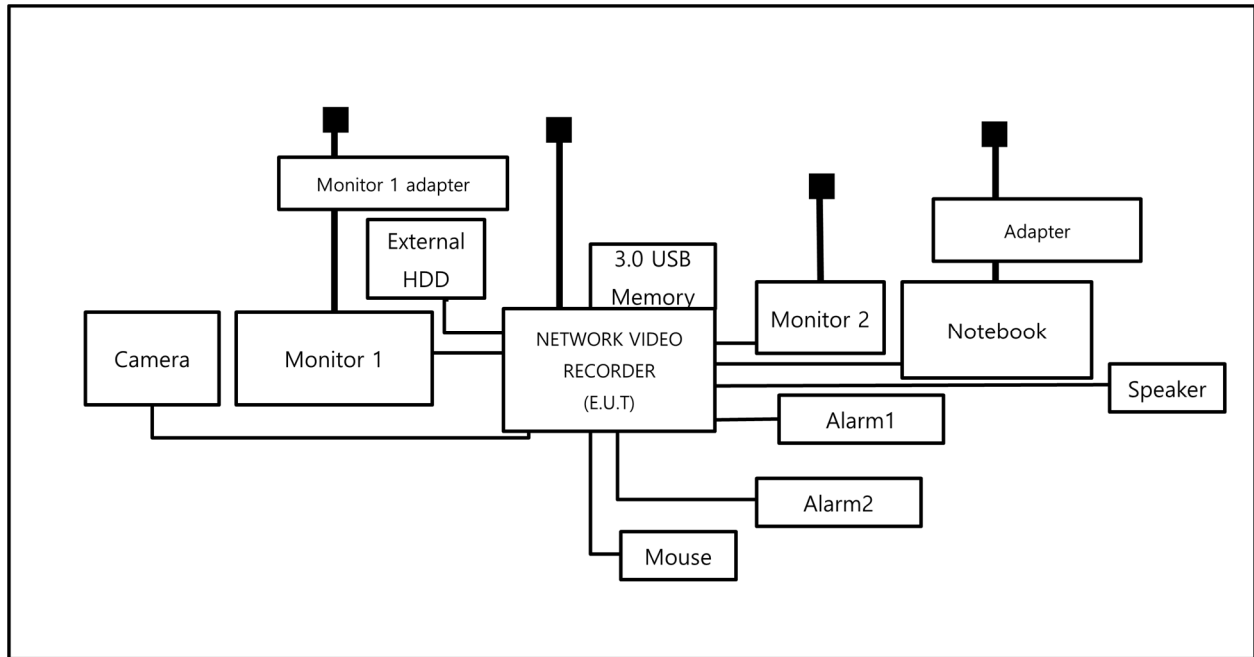
1.7 E.U.T Operating Mode(s)

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

Test mode	Normal operating
OP	Tested by checking the movement whether it works well or not, with executing Ping test in a Notebook and outputting an image to a monitor after arrangement E.U.T with peripheral device as follows.

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 61547:2009

☒ 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

Jun. 13, 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: 27,8 °C

Relative Humidity: 50,1 %

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

Jun. 13, 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
☒	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: 27,8 °C

Relative Humidity: 50,1 %

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

Jun. 13, 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	9163-715	04, 14, 2018
☒	Open Area Test Site	-	KES	-	-
☒	Antenna Mast	-	EMCO	-	-
☒	Turn Table	-	DAEIL EMC	-	-

Test Conditions

Temperature: 28,1 °C

Relative Humidity: 68,0 %

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

Jun. 14, 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	04, 24, 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: 29,2 °C
Relative Humidity: 51,5 %

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

Jun. 15, 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: 28,8 °C

Relative Humidity: 47,0 %

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

Jun. 15, 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: 28,8 °C

Relative Humidity: 47,0 %

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 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

Jun. 16, 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: 25,6 °C
Relative Humidity: 37,3 %
Atmospheric Pressure: 98,0 kPa

Test Specifications

Discharge Factor: ≥ 1 s

Discharge Impedance: 330 ohm / 150 pF

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

Polarity: Positive and Negative

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

Discharge Voltage:	Contact ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	Air ☒ 2 kV ☒ 4 kV ☐ 6 kV ☒ 8 kV ☐ 15 kV	HCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	VCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV
--------------------	---	---	---	---

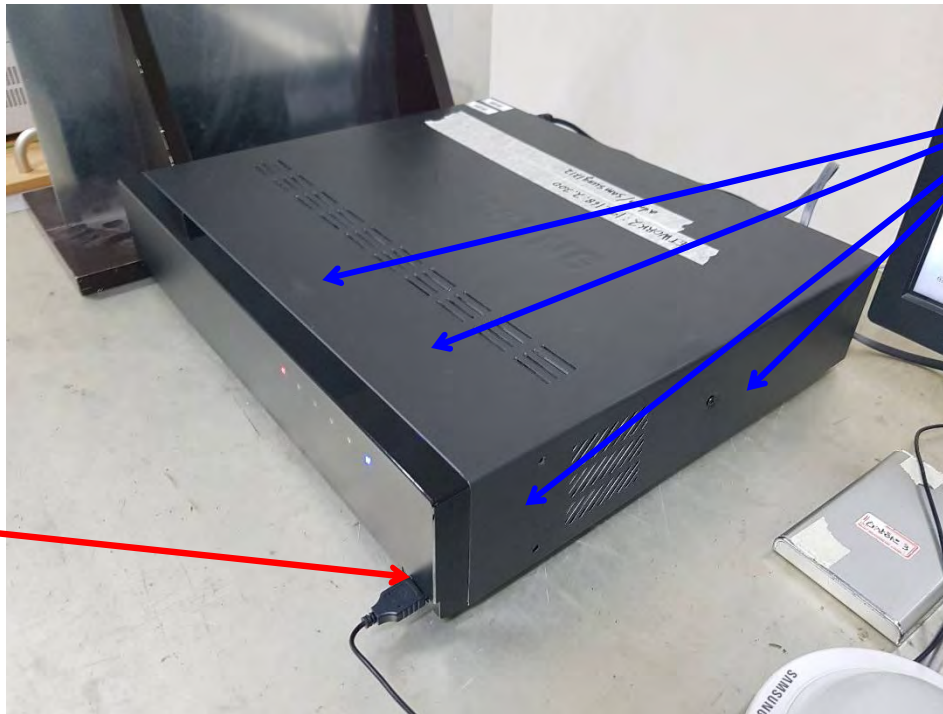
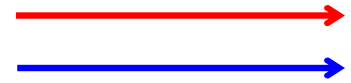
Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

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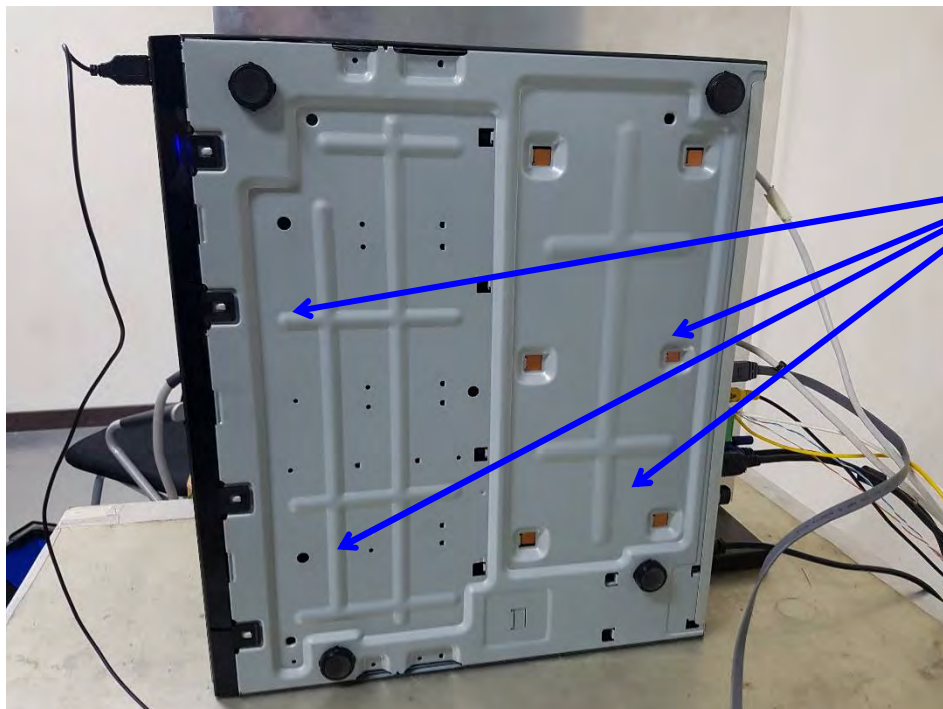
Location of Discharge:

Air
Contact



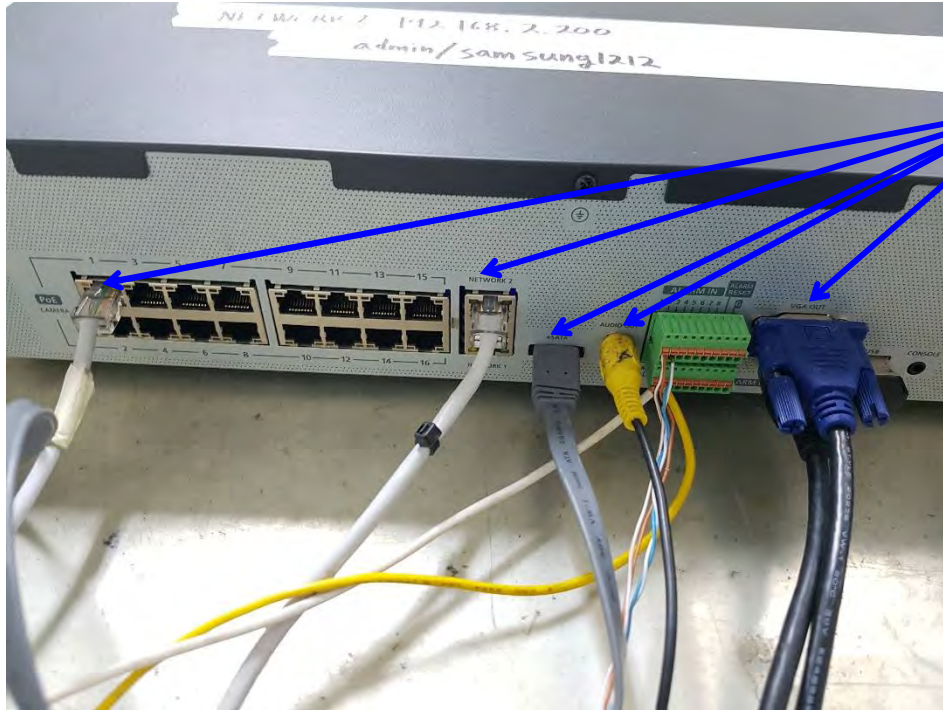
1. Contact

4. Air



2. Contact

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3. Contact

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
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www.kes.co.kr

Test report No.:
KES-E1-16T0271-R4
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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	enclosure 1	Contact Discharge	Complied	-
2	enclosure 2	Contact Discharge	Complied	-
3	Port surroudings	Contact Discharge	Complied	-
4	USB	Air 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.

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3.2 Radiated Electric Field Immunity

Reference Standard

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

Test Date

Jun. 14, 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	-
☒	DIRECTIONAL COUPLER	KYDC-D1070-DX40	KyTelecom Co., Ltd.	KY150001	09, 25, 2016
☒	Semi Anchoic Chamber #2		SEMITEC	-	-

Test Conditions

Temperature: 29,2 °C
Relative Humidity: 51,5 %
Atmospheric Pressure: 98,0 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

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.

3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Jun. 15, 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: 28,8 °C
Relative Humidity: 47,0 %
Atmospheric Pressure: 97,9 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	Complied	Complied
Alarm IN, OUT	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.

3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

Test Date

Jun. 15, 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	P1549168422	04, 27, 2017

Test Conditions

Temperature: 28,8 °C
Relative Humidity: 47,0 %
Atmospheric Pressure: 97,9 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

Signal lines

☒ (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	Complied	Complied
Alarm IN, OUT	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.

3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2009

Test Date

Jun. 16, 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: 25,6 °C
Relative Humidity: 37,3 %
Atmospheric Pressure: 98,0 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

Coupling Location (Line Stressed)	Coupling Method	Observation
RJ-45	Complied	Complied
Alarm IN, OUT	Complied	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.



3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-6:2009

Test Date

Jun. 15, 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: 28,8 °C
Relative Humidity: 47,0 %
Atmospheric Pressure: 97,9 kPa



Test Specifications & Observations/Remarks

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

- Voltage variations

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

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria.

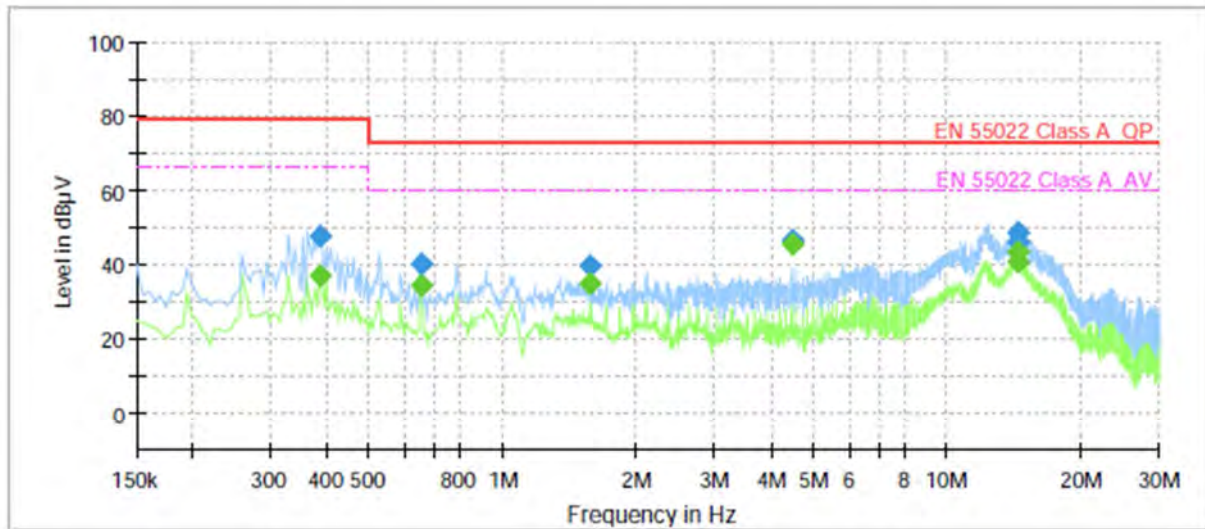
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description: Conducted Emission
Model No.: XRN-1610SP
Mode
Operator Name: KES



Final Result

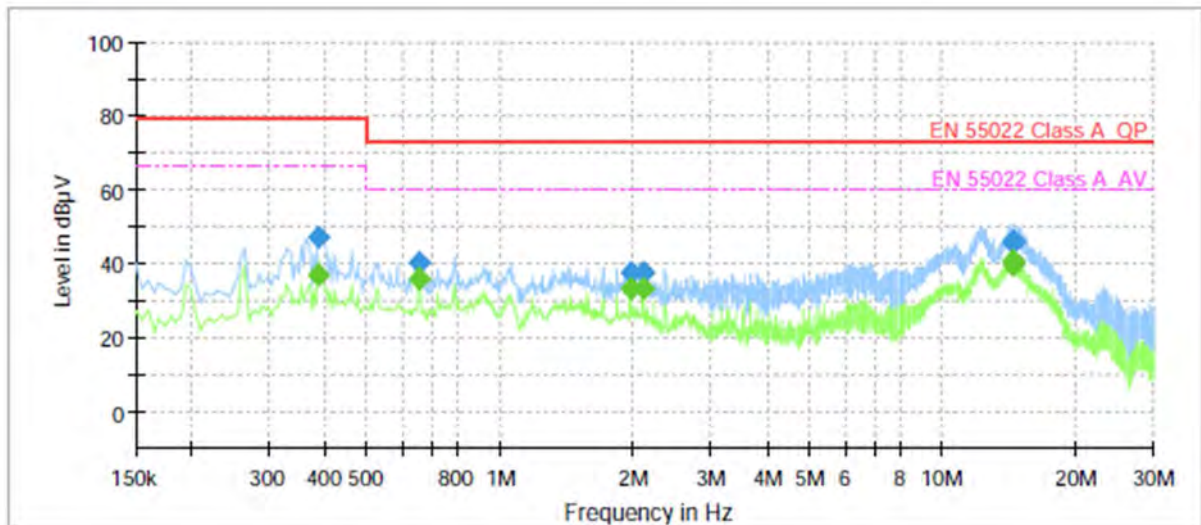
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.390000	---	37.19	66.00	28.81	1000.0	9.000	L1	9.7
0.390000	47.39	---	79.00	31.61	1000.0	9.000	L1	9.7
0.655000	---	34.37	60.00	25.63	1000.0	9.000	L1	9.7
0.655000	40.41	---	73.00	32.59	1000.0	9.000	L1	9.7
1.575000	---	34.69	60.00	25.31	1000.0	9.000	L1	9.7
1.575000	39.59	---	73.00	33.41	1000.0	9.000	L1	9.7
4.460000	---	45.78	60.00	14.22	1000.0	9.000	L1	9.8
4.460000	46.69	---	73.00	26.31	1000.0	9.000	L1	9.8
14.435000	---	43.42	60.00	16.58	1000.0	9.000	L1	10.0
14.435000	48.66	---	73.00	24.34	1000.0	9.000	L1	10.0
14.445000	---	40.76	60.00	19.24	1000.0	9.000	L1	10.0
14.445000	46.07	---	73.00	26.93	1000.0	9.000	L1	10.0

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[NEUTRAL]

Common Information

Test Description: Conducted Emission
Model No.: XRN-1610SP
Mode:
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.390000	---	37.32	66.00	28.68	1000.0	9.000	N	9.6
0.390000	47.16	---	79.00	31.84	1000.0	9.000	N	9.6
0.655000	---	36.22	60.00	23.78	1000.0	9.000	N	9.7
0.655000	40.48	---	73.00	32.52	1000.0	9.000	N	9.7
1.970000	---	33.59	60.00	26.41	1000.0	9.000	N	9.7
1.970000	37.47	---	73.00	35.53	1000.0	9.000	N	9.7
2.100000	---	33.57	60.00	26.43	1000.0	9.000	N	9.7
2.100000	37.54	---	73.00	35.46	1000.0	9.000	N	9.7
14.380000	---	40.64	60.00	19.36	1000.0	9.000	N	10.1
14.380000	46.00	---	73.00	27.00	1000.0	9.000	N	10.1
14.435000	---	39.90	60.00	20.10	1000.0	9.000	N	10.1
14.435000	45.78	---	73.00	27.22	1000.0	9.000	N	10.1

Conducted Emissions at Telecommunication Ports

[10 Mbps]

Common Information

Test Description:

Telecommunication Emission

Model No.:

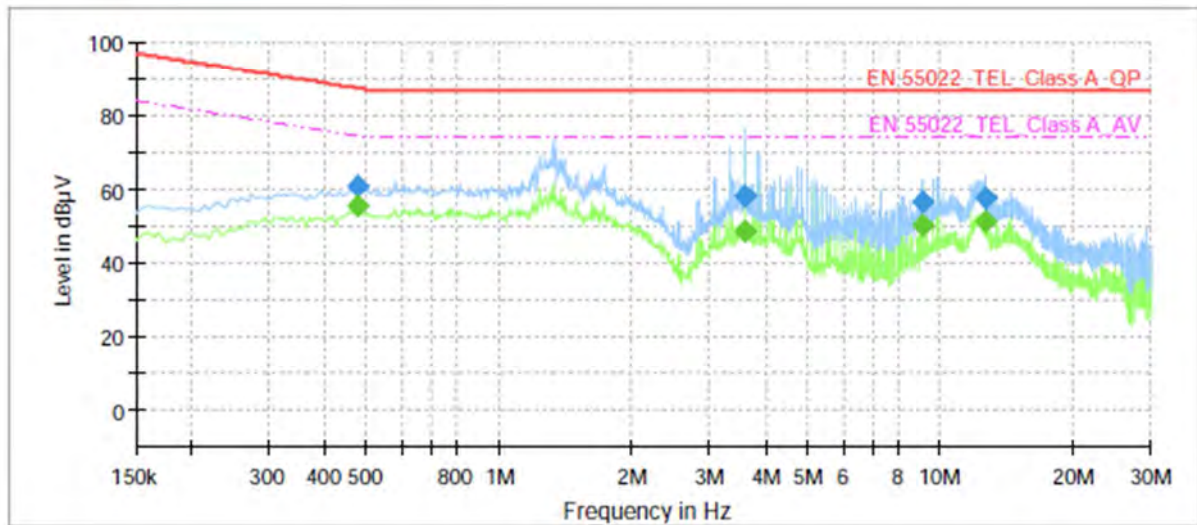
XRN-1610SP

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)
0.475000	---	55.72	74.43	18.71	1000.0	9.000	Single Line	10.0
0.475000	60.66	---	87.43	26.77	1000.0	9.000	Single Line	10.0
3.605000	---	48.46	74.00	25.54	1000.0	9.000	Single Line	9.8
3.605000	58.47	---	87.00	28.53	1000.0	9.000	Single Line	9.8
9.075000	---	50.21	74.00	23.79	1000.0	9.000	Single Line	10.1
9.075000	56.40	---	87.00	30.60	1000.0	9.000	Single Line	10.1
12.605000	---	51.33	74.00	22.67	1000.0	9.000	Single Line	10.1
12.605000	57.59	---	87.00	29.41	1000.0	9.000	Single Line	10.1

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[100 Mbps]

Common Information

Test Description:

Model No.:

Mode

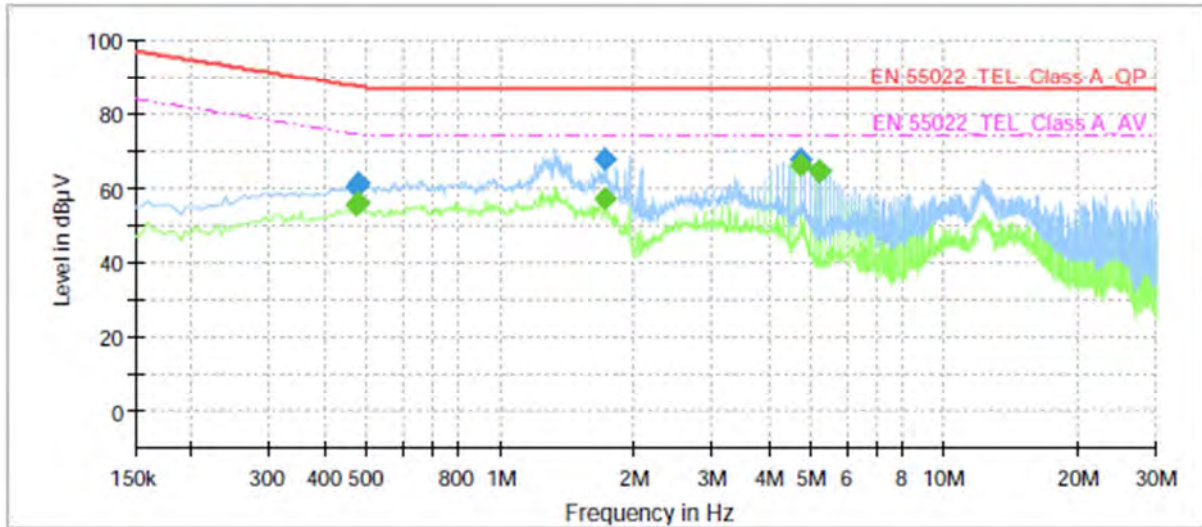
Operator Name:

Telecommunication Emission

XRN-1610SP

100 Mbps

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.470000	---	55.43	74.51	19.08	1000.0	9.000	Single Line	9.5
0.470000	60.34	---	87.51	27.17	1000.0	9.000	Single Line	9.5
0.475000	---	56.22	74.43	18.21	1000.0	9.000	Single Line	9.5
0.475000	61.19	---	87.43	26.24	1000.0	9.000	Single Line	9.5
1.715000	---	56.94	74.00	17.06	1000.0	9.000	Single Line	9.3
1.715000	68.00	---	87.00	19.00	1000.0	9.000	Single Line	9.3
4.725000	---	66.16	74.00	7.84	1000.0	9.000	Single Line	9.4
4.725000	67.76	---	87.00	19.24	1000.0	9.000	Single Line	9.4
5.250000	---	64.34	74.00	9.66	1000.0	9.000	Single Line	9.4
5.250000	64.83	---	87.00	22.17	1000.0	9.000	Single Line	9.4

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KES-E1-16T0271-R4
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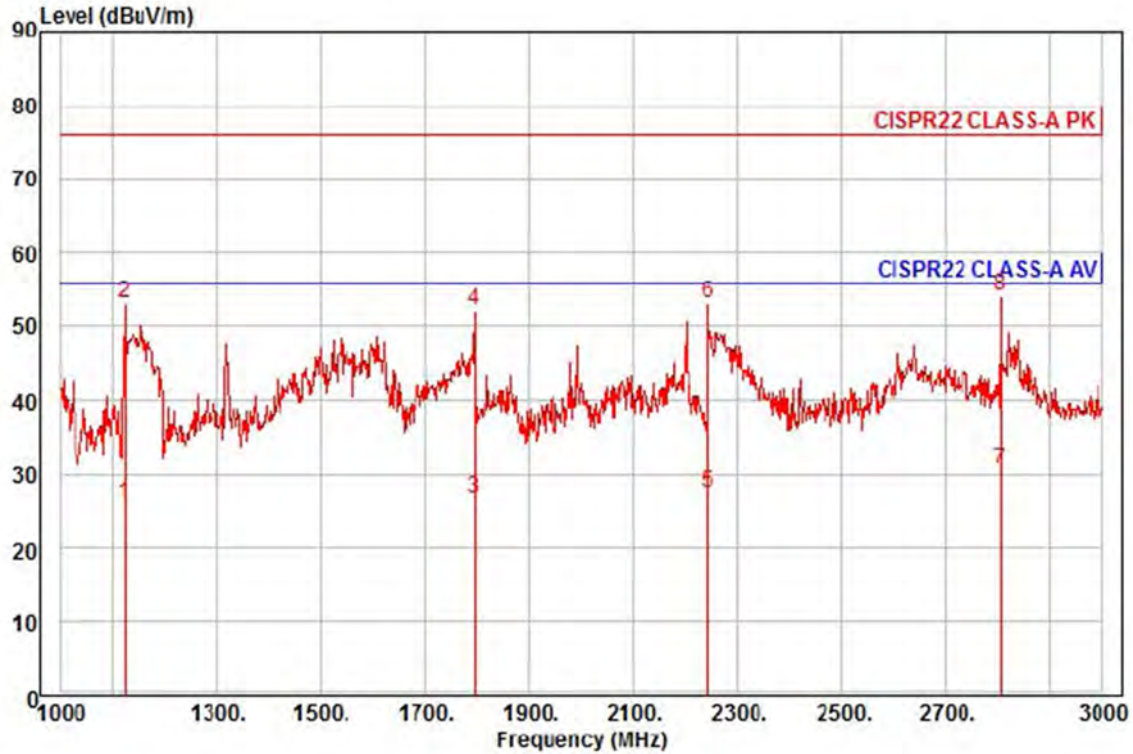
Radiated Electric Field Emissions(Below 1 GHz)

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]
149.04	14.27	V	1.00	8.18	2.46	24.91	40.00	15.09
350.31	15.18	H	4.00	14.49	3.89	33.56	47.00	13.44
400.39	13.11	V	1.00	15.58	4.22	32.91	47.00	14.09
425.19	15.50	H	4.00	16.01	4.40	35.91	47.00	11.09
446.18	12.45	V	1.00	16.37	4.56	33.38	47.00	13.62
625.05	10.04	H	4.00	19.38	5.67	35.09	47.00	11.91

* H : Horizontal, V : Vertical

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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 :

Model : XRN-1610SP

Mode :

Memo :

	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	1122.00	34.80	24.39	6.86	40.06	353	56.00	-30.01	horizontal	Average
2	1122.00	62.00	24.39	6.86	40.06	353	76.00	-22.81	horizontal	Peak
3	1794.00	30.73	27.06	8.78	39.73	71	56.00	-29.16	horizontal	Average
4	1794.00	56.21	27.06	8.78	39.73	71	76.00	-23.68	horizontal	Peak
5	2244.00	29.06	28.48	9.72	39.77	71	56.00	-28.51	horizontal	Average
6	2244.00	54.90	28.48	9.72	39.77	71	76.00	-22.67	horizontal	Peak
7 av	2806.00	30.22	29.85	10.76	40.10	63	56.00	-25.27	horizontal	Average
8 pp	2806.00	53.80	29.85	10.76	40.10	63	76.00	-21.69	horizontal	Peak

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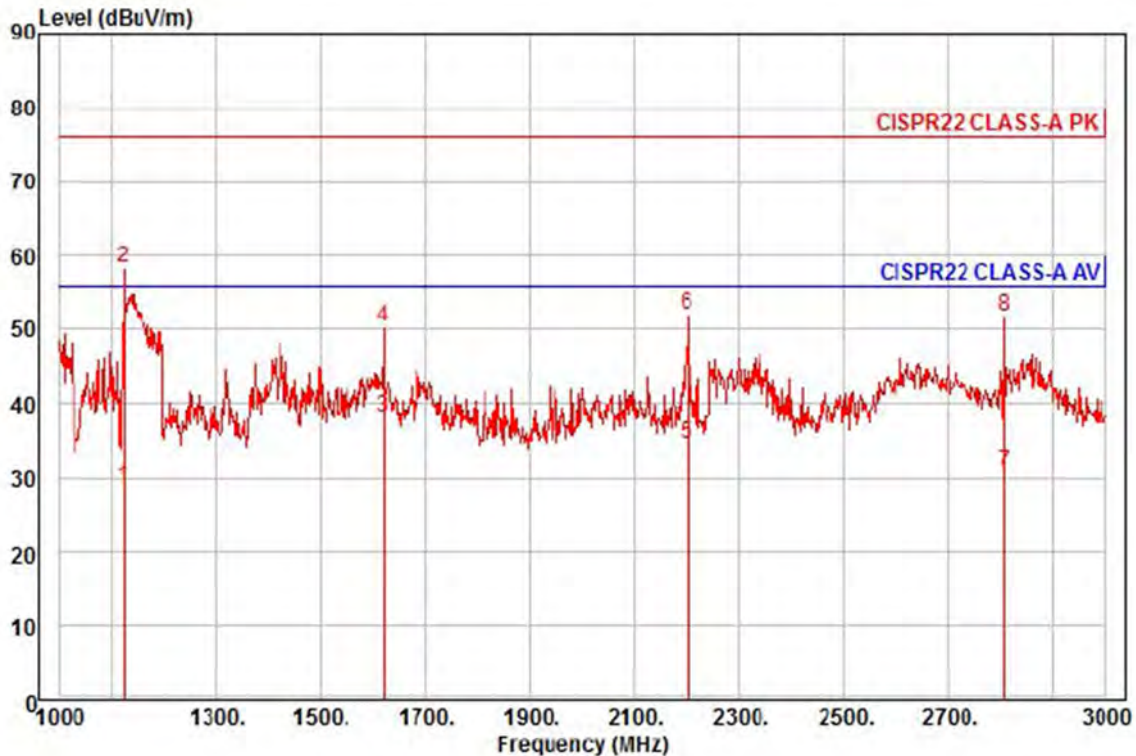
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Test report No.:

KES-E1-16T0271-R4

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Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : XRN-1610SP
Mode :
Memo :

	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	1122.00	37.51	24.39	6.86	40.06	18	56.00	-27.30	vertical	Average
2 pp	1122.00	67.24	24.39	6.86	40.06	18	76.00	-17.57	vertical	Peak
3 av	1620.00	43.23	26.37	8.31	39.82	47	56.00	-17.91	vertical	Average
4	1620.00	55.30	26.37	8.31	39.82	47	76.00	-25.84	vertical	Peak
5	2200.00	36.18	28.37	9.66	39.75	36	56.00	-21.54	vertical	Average
6	2200.00	53.63	28.37	9.66	39.75	36	76.00	-24.09	vertical	Peak
7	2808.00	30.29	29.86	10.76	40.10	27	56.00	-25.19	vertical	Average
8	2808.00	51.13	29.86	10.76	40.10	27	76.00	-24.35	vertical	Peak

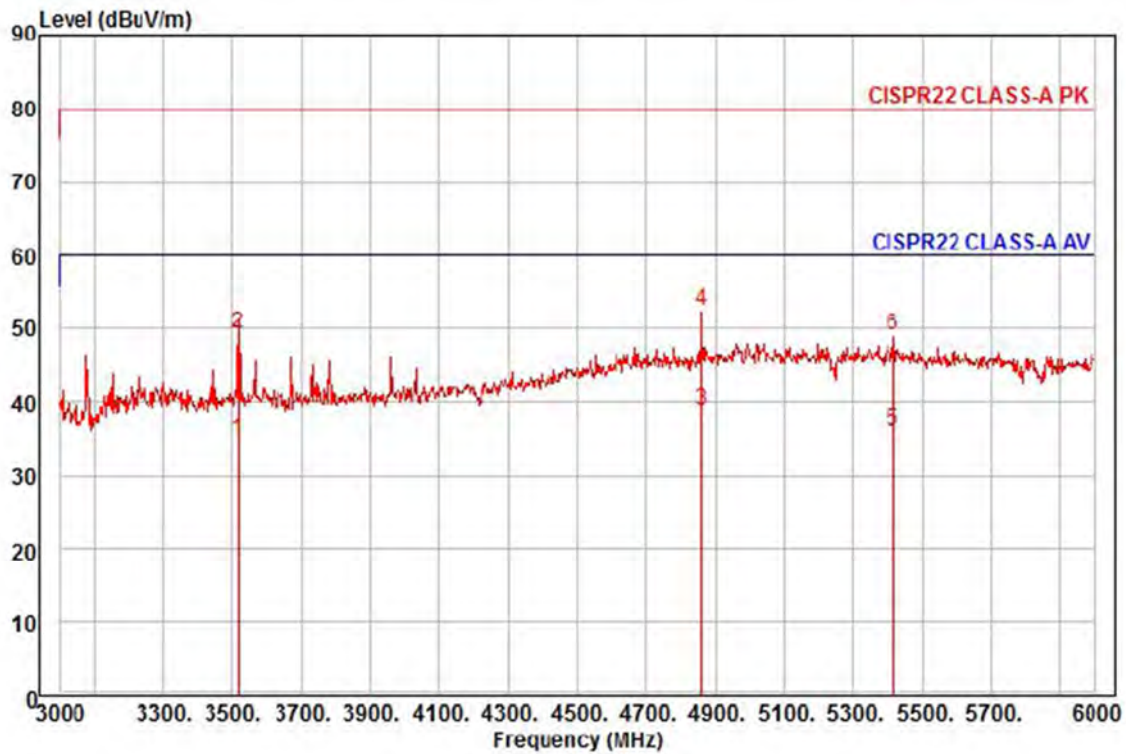
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Test report No.:
KES-E1-16T0271-R4
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Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : XRN-1610SP
Mode :
Memo :

	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	3519.00	31.38	31.20	12.55	40.31	351	60.00	-25.18	horizontal	Average
2	3519.00	45.96	31.20	12.55	40.31	351	80.00	-30.60	horizontal	Peak
3 pp	4860.00	27.24	36.92	15.08	40.41	214	60.00	-21.17	horizontal	Average
4 pk	4860.00	40.79	36.92	15.08	40.41	214	80.00	-27.62	horizontal	Peak
5	5418.00	23.66	36.88	15.82	40.35	33	60.00	-23.99	horizontal	Average
6	5418.00	36.73	36.88	15.82	40.35	33	80.00	-30.92	horizontal	Peak

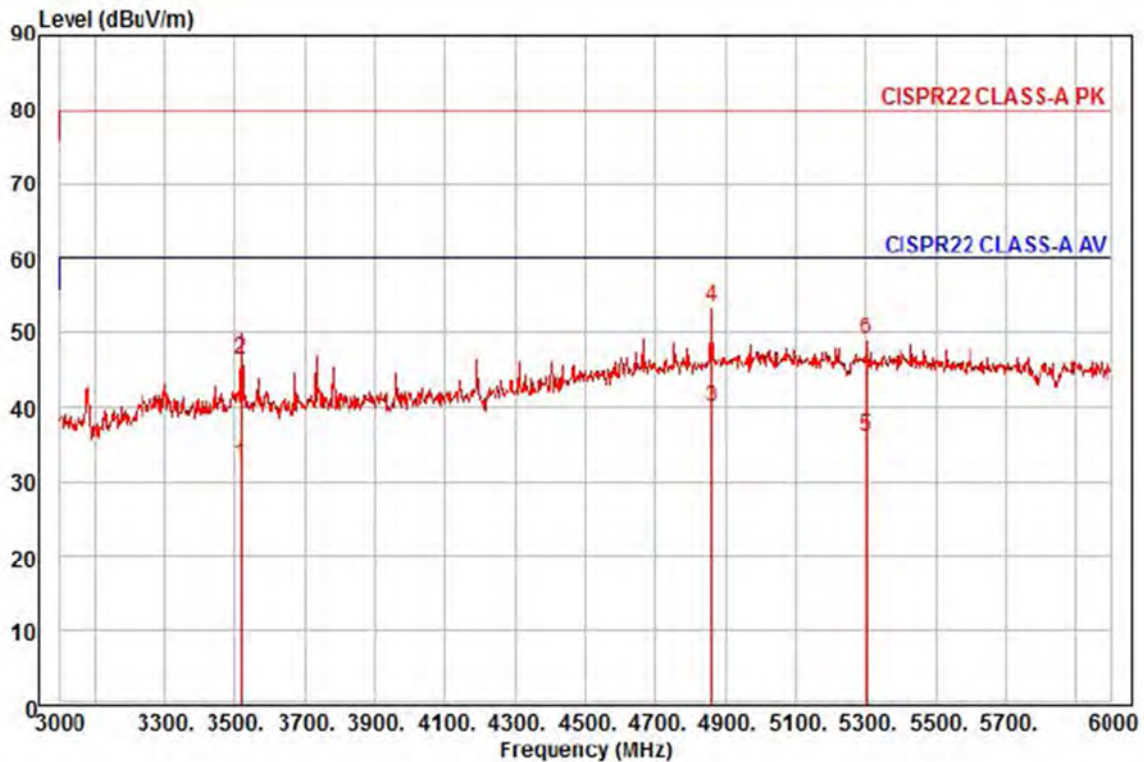
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Test report No.:
KES-E1-16T0271-R4
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Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : XRN-1610SP
Mode :
Memo :

	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	3519.00	28.95	31.20	12.55	40.31	195	60.00	-27.61	vertical	Average
2	3519.00	43.00	31.20	12.55	40.31	195	80.00	-33.56	vertical	Peak
3 pp	4860.00	28.38	36.92	15.08	40.41	169	60.00	-20.03	vertical	Average
4 pk	4860.00	41.82	36.92	15.08	40.41	169	80.00	-26.59	vertical	Peak
5	5301.00	23.67	37.11	15.69	40.37	134	60.00	-23.90	vertical	Average
6	5301.00	36.60	37.11	15.69	40.37	134	80.00	-30.97	vertical	Peak

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Test report No.:

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

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	175.556E-3			
2	246.322E-6			PASS
3	43.047E-3	1.386	3.10	PASS
4	163.568E-6			PASS
5	17.387E-3	1.130	1.54	PASS
6	199.173E-6			PASS
7	9.416E-3	0.906	1.04	PASS
8	188.384E-6			PASS
9	9.878E-3	1.829	540.00E-3	PASS
10	198.038E-6			PASS
11	7.167E-3	1.609	445.50E-3	PASS
12	151.667E-6			PASS
13	5.361E-3	1.891	283.50E-3	PASS
14	219.923E-6			PASS
15	5.882E-3	2.905	202.50E-3	PASS
16	253.970E-6			PASS
17	5.209E-3	2.915	178.67E-3	PASS
18	174.802E-6			PASS
19	3.582E-3			PASS
20	284.708E-6			PASS
21	3.189E-3			PASS
22	225.444E-6			PASS
23	3.018E-3			PASS
24	164.526E-6			PASS
25	4.391E-3			PASS
26	282.930E-6			PASS
27	3.627E-3			PASS
28	225.371E-6			PASS
29	2.935E-3			PASS
30	186.068E-6			PASS
31	3.225E-3			PASS
32	280.841E-6			PASS
33	2.819E-3			PASS
34	218.247E-6			PASS
35	2.757E-3			PASS
36	165.175E-6			PASS
37	1.820E-3			PASS
38	257.695E-6			PASS
39	1.528E-3			PASS
40	260.764E-6			PASS

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Test report No.:

KES-E1-16T0271-R4

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Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	176.715E-3			
2	397.648E-6			PASS
3	43.285E-3	0.627	6.90	PASS
4	276.451E-6			PASS
5	17.675E-3	0.517	3.42	PASS
6	322.043E-6			PASS
7	9.564E-3	0.414	2.31	PASS
8	277.296E-6			PASS
9	10.016E-3	0.835	1.20	PASS
10	390.323E-6			PASS
11	7.376E-3	0.745	990.00E-3	PASS
12	325.355E-6			PASS
13	5.531E-3	0.878	630.00E-3	PASS
14	311.030E-6			PASS
15	6.263E-3	1.392	450.00E-3	PASS
16	353.117E-6			PASS
17	5.447E-3	1.372	397.05E-3	PASS
18	309.010E-6			PASS
19	3.734E-3			PASS
20	405.691E-6			PASS
21	3.349E-3			PASS
22	320.181E-6			PASS
23	3.267E-3			PASS
24	290.038E-6			PASS
25	4.672E-3			PASS
26	415.982E-6			PASS
27	3.808E-3			PASS
28	417.971E-6			PASS
29	3.306E-3			PASS
30	315.348E-6			PASS
31	3.388E-3			PASS
32	536.097E-6			PASS
33	3.094E-3			PASS
34	353.020E-6			PASS
35	2.902E-3			PASS
36	437.896E-6			PASS
37	1.960E-3			PASS
38	383.829E-6			PASS
39	1.648E-3			PASS
40	359.334E-6			PASS

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Test Data - Voltage Fluctuations

Maximum Flicker results

	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.101	4.00	PASS
Tmax [s]	0.000	0.50	PASS

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Test Setup Photos and Configuration

Conducted Voltage Emissions



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Conducted Telecommunication Emissions



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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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Harmonic Current Emissions and Voltage Fluctuations and Flicker

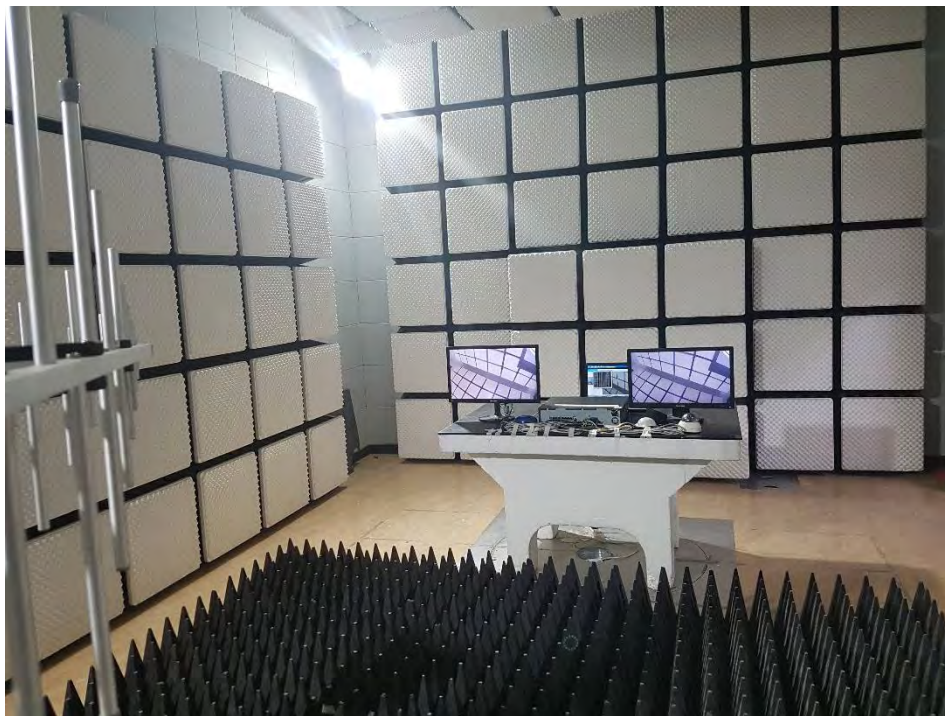


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Electrostatic Discharge



Radiated Electric Field Immunity



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Electrical Fast Transients/Bursts



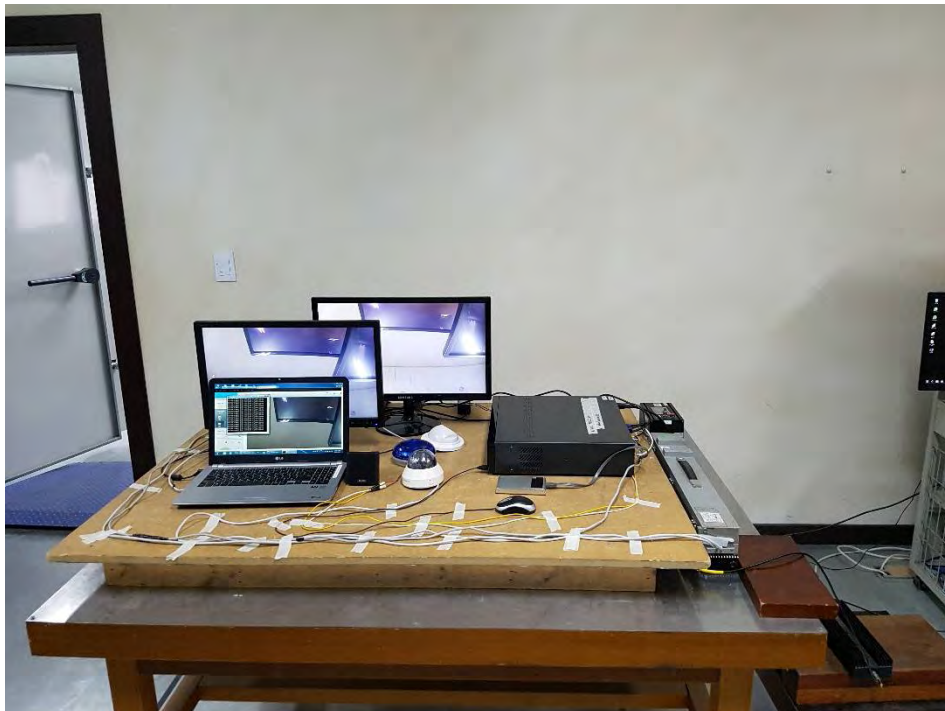
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Surge Transients



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Conducted Disturbance



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Voltage Dips and Short Interruptions



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EUT External Photographs

(Top)



(Bottom)



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EUT Internal Photographs

(Internal View)



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Main Board EUT Internal View – Board 1

(Top)



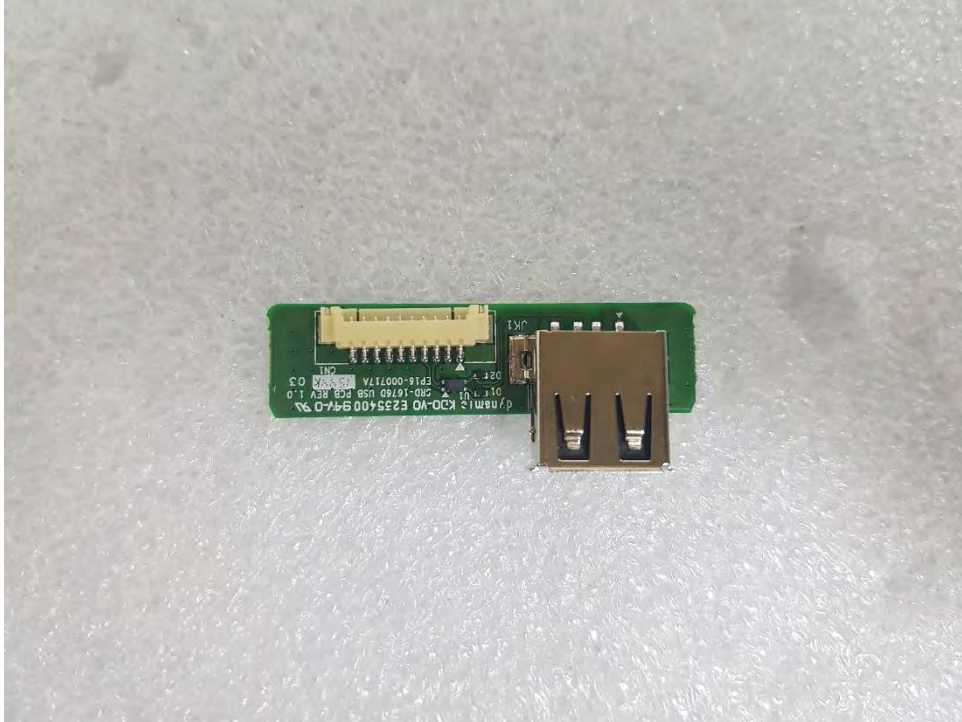
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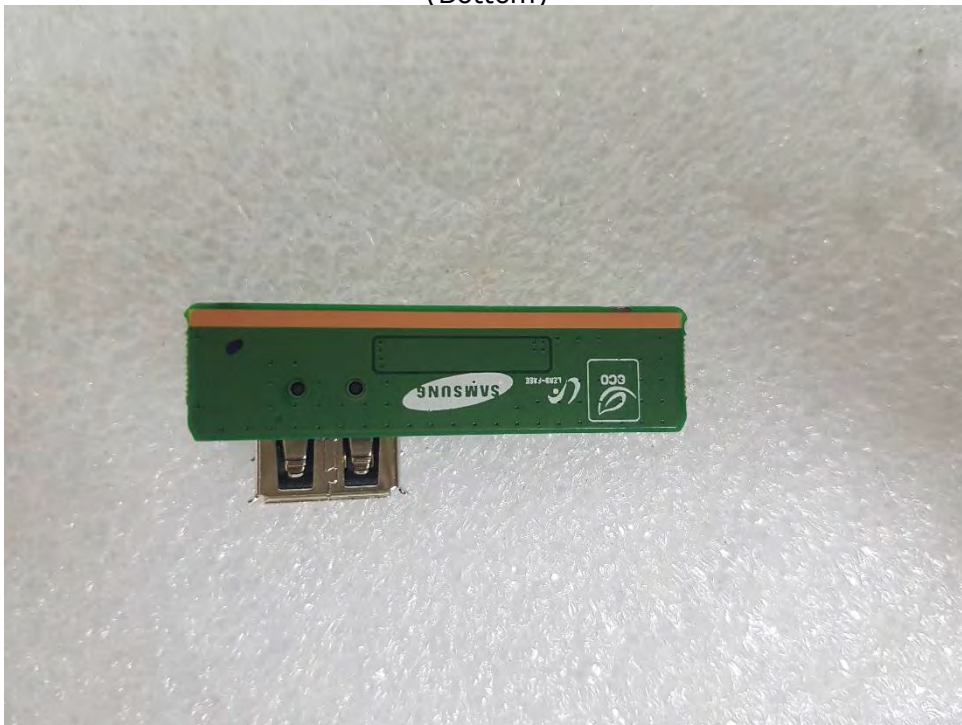
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Main Board EUT Internal View – Board 2

(Top)



(Bottom)



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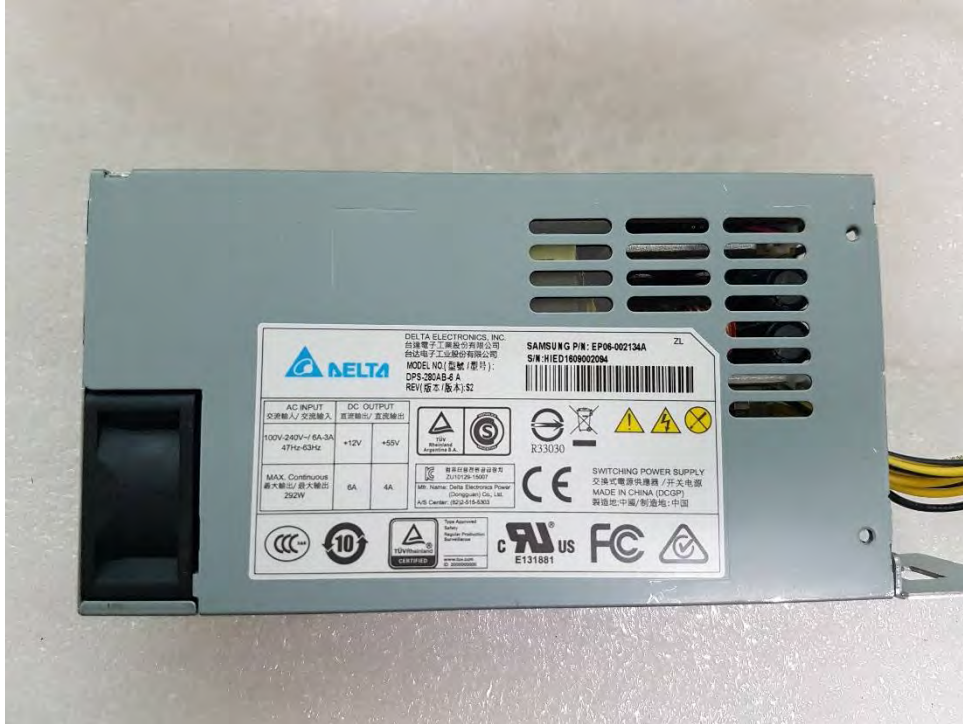
Main Board EUT Internal View – Board 3

(Top)

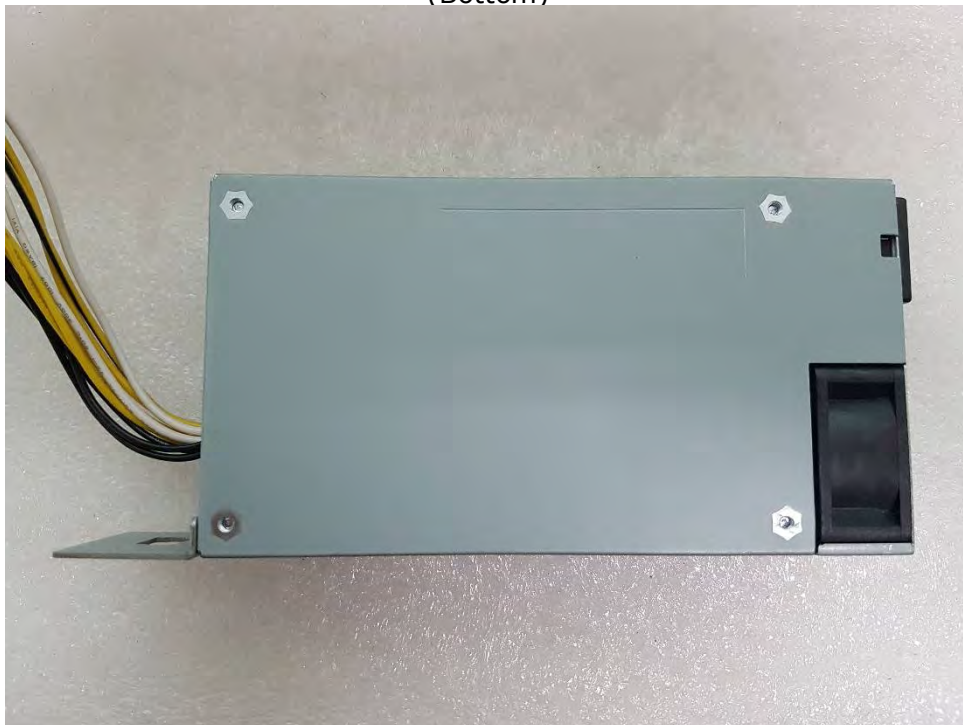


Main Board EUT Internal View – Power

(Top)



(Bottom)



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Main Board EUT Internal View – HDD

(Top)

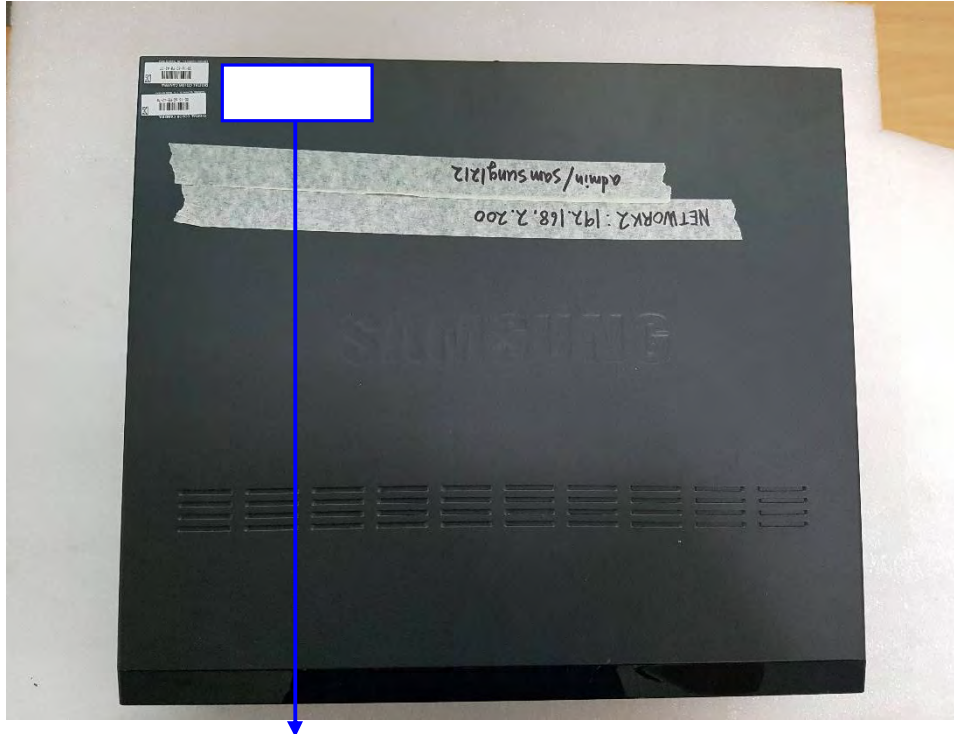


(Bottom)



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