



EMC TEST REPORT For CE

Test Report No. : KES-E1-18T0247-R1

Date of Issue : Jun. 27, 2018

Product name : NVR

Model/Type No. : QRN-1610S

Variant Model : -

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. 27, 2018

Test date : Apr. 03, 2018 ~ Apr. 04, 2018

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

Tested by

Young Jun, Jo
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

This test report is not related to KOLAS.

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Apr. 08, 2018	KES-E1-18T0247	Issued
Jun. 27, 2018	KES-E1-18T0247-R1	Re-issue due to manufacturer change

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1.0 General Product Description

Main Specifications of EUT are:

Key Features		[Q Series 16ch Network Video Recorder with PoE Switch] • Up to 16ch 8megapixel supported • H.265, H.264, MJPEG codec supported • WiseStream support • 128Mbps network camera recording • Plug & play by 16 PoE ports • Max. 2HDDs supported • HDMI / VGA local monitor • P2P service(QR code connect) support
Display		
Network Camera	Inputs	Max. 16ch
	Resolution	CIF ~ 8MP
	Fish-Eye Dewarping	N/A (process on Web / CMS)
	Protocols	Samsung, ONVIF
Live	Local Display	1x HDMI / 1x VGA
	Multi-Channel Display	[Local Monitor] 1 / 2H / 2V / 3V / 4 / 6 / 8 / 9 / 13 / 16 / Auto Sequence [Web] 1 / 4 / 9 / 16 / Auto Sequence
	Performance	[Local Monitor] 8MP(60fps) 5MP(90fps), 3MP(120fps), 2MP(240fps), 720p(480fps), D1(480fps)
Performance		
Operating System	Embedded	Linux
Record	Compression	H.265, H.264, MJPEG
	Recording Bandwidth	Max. 128Mbps
	Resolution	CIF ~ 8MP
	Type	Manual, Schedule(Continuous/Event), Event (Pre/Post)
	Event Trigger	- Alarm Input(4) - Video Loss - Camera event (Sensor, MD, Video analytics, Defocus)
	Event Action	e-Mail, PTZ Preset, Alarm Out, Buzzer, Monitor Out
Search & Play	Playback Bandwidth	32Mbps (16ch simultaneously)
	Performance	Max. 3 Users (Local 1, Remote 3)

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	Mode	Date & Time(Calendar) Event Log list Text Search(POS) ARB Search Smart Search - Virtual Line w/ direction, Enter/Exit
	Simultaneous playback	Max. 16ch (Local, Network)
	Resolution	CIF ~ 8MP
	Fish-Eye Dewarping	N/A (processed on Web / CMS)
	Playback Control	Fast/Slow Forward / Backward, Move one step Up / Down
Storage	Default Built-In	0 ~ 6TB
	Internal	2(Max.12TB)
Backup	File backup	BU/Exe(USB), JPG/AVI(Web, CMS)
	Function	Multi channel(Upto 16ch) Play, Date-Time/Title display
Sensor	I/O	4/2 (NO 1EA, NO/NC 1EA)
Audio	Input	16 ch (network)
	Compression	G.711, G.726, AAC(16/48KHz)
	Audio Communication	2-Way
Network		
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		Hanwha Security DDNS
Transmission Bandwidth		128Mbps
Max Remote Users		Search (3), Live Unicast (10), Multicast (20)
IP Version		IPv4/IPv6
Security		User access Log, IP Filtering, 802.1x, Encryption
Language	GUI	English, French, German, Italian, Spanish, Russian, Turkish, Polish, Dutch, Swedish, Czech, Portuguese, Danish, Rumanian, Serbian, Croatian, Hungarian, Greek, Norwegian, Finnish, Korean, Chinese(Simplified), Japanese, Thai

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	Web	English, French, German, Italian, Spanish, Russian, Turkish, Polish, Dutch, Swedish, Czech, Portuguese, Danish, Rumanian, Serbian, Croatian, Hungarian, Greek, Norwegian, Finnish, Korean, Chinese(Simplified), Japanese, Thai
OS		Windows 7, 8, 10, Mac OS X 10.9. 10.10. 10.11
Web Browser		- Plug-in free web viewer : Google Chrome 47, MS Edge 20 - Plug-in Webviewer : MS Explorer 11, Apple Safari 9(Mac OS X only)
Viewer Software	Type	SSM, Webviewer, Smart Viewer, Wisenet Mobile
	CMS Support	Support SDK/CGI(SUNAPI)
Functions		
Camera Setup	Register	PnP, 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(web), Hallway 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
Easy Configuration		Setup Wizard (Date/Time, Network, Auto Camera Configuration) P2P (QR code)
ARB		Yes
PTZ	Control	Via GUI, Webviewer, 300 preset
Smart phone	Support Model	I-Phone, Android
	Protocol Support	RTP, RTSP, HTTP, CGI(SUNAPI)
	Control	Live(16ch) : Multi-Profile Support Playback(1ch) Event push
	Max. Remote Users	Search (3), Live Unicast (10), Multicast (20)
System Control		Mouse, Web, IR Remocon
Indicator/Interface		
Front	Indicator	LED (Status indicator) : 6ea HDD action 1, Alarm 1, Power 1, Record 1, Backup 1, Network1

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Connectors	VGA	1EA(1920x1080, 1280x720)
	HDMI	1 EA (3840 x 2160, 1920x1080, 1280x720)
	Audio	Out(1EA, RCA, Line)
	Ethernet	■ 16EA (PoE, 100Mbps) ■ 1EA (WAN, 1Gbps) - WAN : Uplink to CMS
	Alarm	In(4EA, Terminal Block) Out(2EA, Terminal Block)
	USB	Front 1EA(USB2.0), Rear 1(USB3.0)
	Ext. Storage	N/A
	Serial	N/A
	Reset	Switch(1EA)
	Power Cord	Included
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 Input		100 to 240 VAC ±10%
Power Consumption		TBD (MAX. 99W(338BTU, 8TB HDD x 2ea))
PoE Budget		MAX. 100W
Mechanical		
Color / Material		Black / Metal
Dimension (WxHxD)		W370.0 x H44.0 x D320 mm(1U)
Weight		TBD
Accessories		
IR Remocon		Yes
Mouse		Yes

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

Frequency ☒ 50 Hz ☐ 60 Hz ☐ Hz

1.2 Variant Model Differences

Not applicable

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
NVR	QRN-1610S	-	HANWHA TECHWIN (TIANJIN) CO., LTD.	EUT
Mouse	YTOP589	-	-	-
Remote Controller	-	-	SAMSUNG	-
HDD	ST2000VM003	-	SEAGATE	2TB

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1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	LG15N54	410NZET022292	LG Electronics Co., Ltd.	-
Notebook AC/DC Adapter	DA-1900-08	9700591703	Dongguang Lite Power 2nd Plant	-
Monitor1	SMT-2232	C95V67VF900025 B	Weihai Daewoo Electronics Co., Ltd.	-
Monitor2	HSTND-7041-L	6CM6020YQQ	HP Inc.	-
Camera	SND-L6013P	-	HANWHA TECHWIN CO.,LTD.	-
USB Memory	-	-	-	4 GB
Speaker	BR10000A CUVE	-	BEIJING EDIFIER HI- TECH GROUP.	-
Alarm1	SIP-1201DD D0	-	SAMSUNG TECHWIN CO., LTD.	-
Alarm2	-	-	-	-

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1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NVR (EUT)	RJ45	Notebook	RJ45	3.5	U
	HDMI	Monitor1	HDMI	1.2	S
	D-SUB	Monitor1	D-SUB	1.3	U
	RJ45	Camera	RJ45	5.0	S
	USB	USB Memory	USB	-	-
	USB	Mouse	USB	1.0	U
	RCA	Speaker	RCA	1.6	U
	2 PIN	Alarm1	2 PIN	3.5	U
	2 PIN	Alarm2	2 PIN	3.5	U
	IR	Remote Controller	IR	-	-

* Unshielded=U, Shielded=S

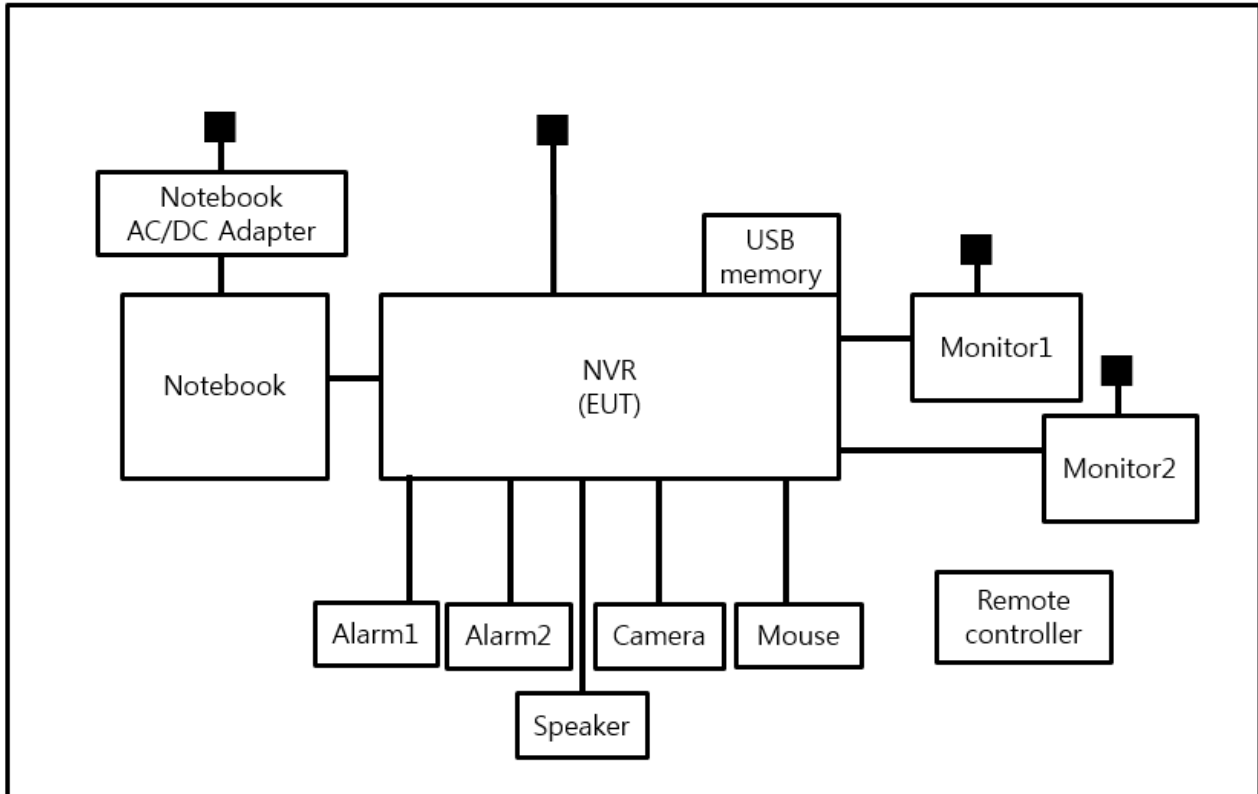
1.7 EUT Operating Mode(s)

Test Mode	operating
	E.U.T Monitoring, Ping test

EUT Test operating S/W		
Name	Version	Manufacture Company
WebViewer	-	Hanwha Techwin Co., Ltd.

1.8 Configuration

■ AC Main
□ DC Main



1.9 Remarks when standards applied

N/A

1.10 Calibration Details of Equipment Used for Measurement

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

1.11 Test Facility

The measurement facility is located at 473-21 Gayeo-ro, 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 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



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

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2.1 Conducted Emissions at Mains Power Ports

Test Date

Apr. 03, 2018

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101781	04, 27, 2018
☒	LISN	ENV216	R & S	101787	01, 05, 2019
☒	LISN	ESH2-Z5	R & S	100450	04, 27, 2018
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 27, 2018
☐	LISN	NNBM8124	SCHWARZBECK	8124-1002	08, 07, 2018
☐	LISN	NNBM8124	SCHWARZBECK	8124-1003	08, 07, 2018

Test Conditions

Temperature: 23,2 °C
Relative Humidity: 41,8 % R.H.

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. 03, 2018

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101781	04, 27, 2018
☒	LISN	ENV216	R & S	101787	01, 05, 2019
☒	LISN	ESH2-Z5	R & S	100450	04, 27, 2018
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 27, 2018
☒	8-WIRE ISN CAT3,5	ENY81	R & S	100174	01, 07, 2019
☐	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	01, 07, 2019
☒	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	05, 12, 2018
☐	CDN	CDNS502A	TESEQ	40431	01, 05, 2019

Test Conditions

Temperature: 23,2 °C
Relative Humidity: 41,8 % R.H.

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. 03, 2018

Test Location

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

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESU26	R & S	100551	04, 18, 2018
☒	AMPLIFIER	SCU 01	R & S	100603	11, 27, 2018
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	714	11, 28, 2018

Test Conditions

Temperature: 18,6 °C
Relative Humidity: 55,3 % R.H.

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. 03, 2018

Test Location

SEMI ANECHOIC CHAMBER #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESR7	R & S	101190	08, 07, 2018
☒	PREAMPLIFIER	8449B	AGILENT	3008A01967	05, 31, 2018
☐	ATTENUATOR	8491A	HP	35496	03, 21, 2019
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 02, 2019

Test Conditions

Temperature: 21,5 °C
Relative Humidity: 52,9 % R.H.

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. 03, 2018

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	dpa.control	EM TEST	5.4.11.0	-
☒	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	08, 09, 2018
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 23,4 °C
Relative Humidity: 43,5 % R.H.

Classification of Equipment for Harmonic Current Emissions

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

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.6 Voltage Fluctuations and Flicker

Test Date

Apr. 03, 2018

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	dpa.control	EM TEST	5.4.11.0	-
☒	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	08, 08, 2018
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 23,4 °C
Relative Humidity: 43,5 % R.H.

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

Apr. 04, 2018

Test Location

EMS-ESD: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	10, 11, 2018
☒	HCP	-	KES	-	-
☒	VCP	-	KES	-	-

Test Conditions

Temperature: 22,1 °C
Relative Humidity: 42,0 % R.H.
Atmospheric Pressure: 100,6 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

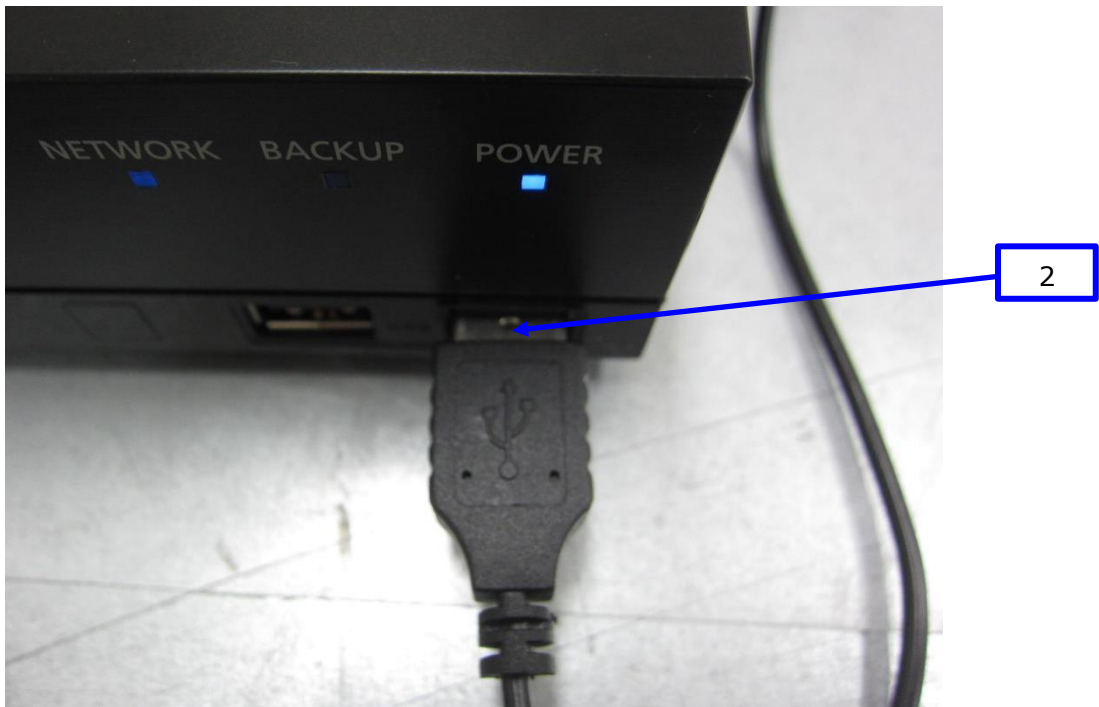
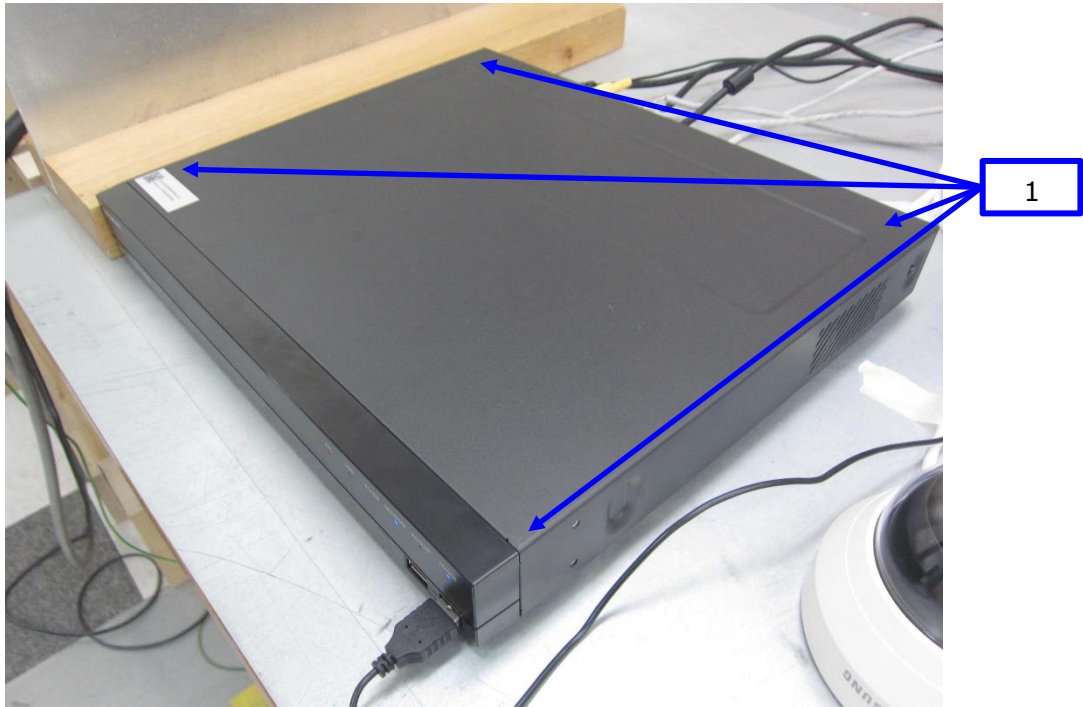
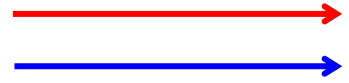
Discharge Voltage:	Contact ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	Air ☒ 2 kV ☒ 4 kV ☐ 6 kV ☒ 8 kV ☐ 15 kV	HCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	VCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV
--------------------	---	---	---	---

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

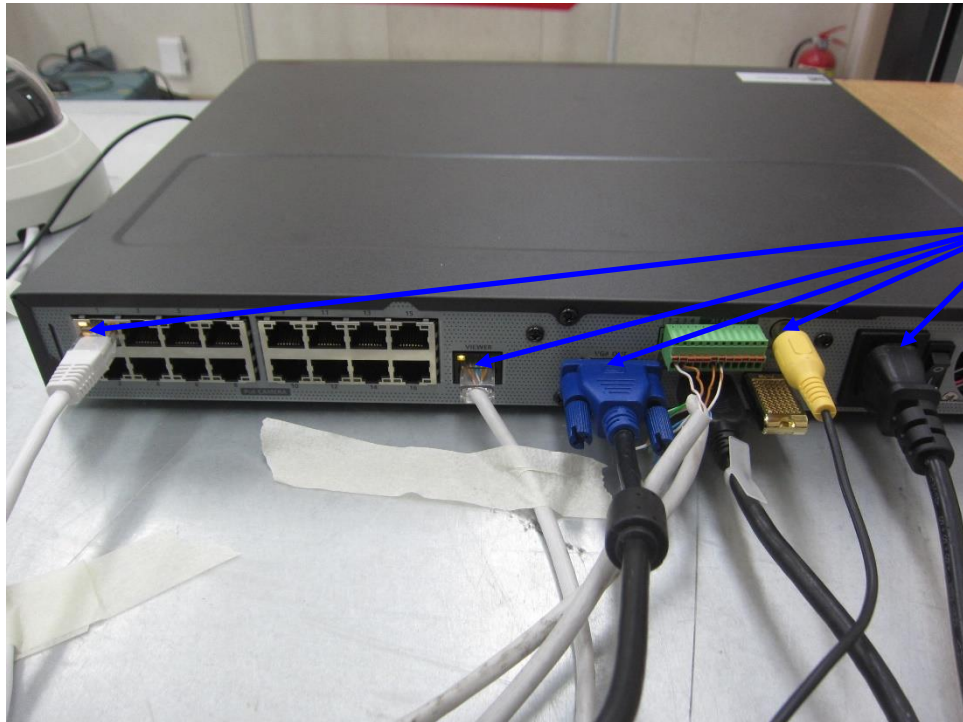
Required Performance Criteria: ☒ Complied

Location of Discharge:

Air
Contact



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Test Data**Indirect Discharge**

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

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Surface	Contact Discharge	Complied	-
2	USB Port	Contact Discharge	Complied	-
3	Backside surface / port	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. 03, 2018

Test Location

EMS-RS: ☐ SEMI ANECHOIC CHAMBER #2☒ SEMI ANECHOIC CHAMBER #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	EMC32	R & S	10.10.02	-
☒	SIGNAL GENERATOR	SMB 100A	R & S	177586	08, 07, 2018
☒	BROADBAND AMPLIFIER	BBA100	R & S	101239	08, 07, 2018
☒	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 07, 2018
☒	POWER METER	NRP2	R & S	103475	08, 07, 2018
☒	AVG POWER SENSOR	NRP-Z91	R & S	102526	08, 07, 2018
☒	AVG POWER SENSOR	NRP-Z91	R & S	102527	08, 07, 2018
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	DIRECTIONAL COUPLER	KYDC-D1070-DX40	KY TELECOM	KY150001	08, 07, 2018
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM, INC	781	05, 02, 2019

Test Conditions

Temperature: 21,5 °C
Relative Humidity: 52,9 % R.H.
Atmospheric Pressure: 100,6 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

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Test Data

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

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria.

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3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Apr. 04, 2018

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.7	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2018
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2018
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 27, 2018

Test Conditions

Temperature: 22,1 °C
Relative Humidity: 42,0 % R.H.
Atmospheric Pressure: 100,6 kPa

Test Specifications

Pulse Amplitude & Polarity: (AC Power Lines)	☐ ± 1.0 kV ☐ ± 4.0 kV	☒ ± 2.0 kV
Pulse Amplitude & Polarity: (Other supply / Signal Lines)	☐ ± 0.5 kV ☐ ± 2.0 kV	☒ ± 1.0 kV
Burst Period:	☒ 300 ms	☐ 2 s
Repetition Rate:	☐ 5 kHz	☒ 100 kHz
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)	Complied	Complied
RJ-45 (PoE)	Complied	Complied
2 PIN (Alarm1)	Complied	Complied
2 PIN (Alarm2)	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

Apr. 04, 2018

Test Location

EMS-Surge: Electro wave Shieldroom #7 , #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.7	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2018
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2018
☒	EMS Test S/W	iec.control	AMETEK CTS	7.1.2	-
☒	ULTRA COMPACT SIMULATOR	UCS 500 N5	EM TEST	V0936105120	10, 16, 2018
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 26, 2018
☒	CDN	CNV 508T5	EM TEST	P1549168422	04, 26, 2018

Test Conditions (Electro wave Shieldroom #7)

Temperature: 22,1 °C
Relative Humidity: 42,0 % R.H.
Atmospheric Pressure: 100,6 kPa

Test Conditions (Electro wave Shieldroom #3)

Temperature: 22,9 °C
Relative Humidity: 43,3 % R.H.
Atmospheric Pressure: 100,9 kPa



Test Specifications

AC Power Lines

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

Surge Amplitude :

Common Mode

☒ (0,5 / 1,0 / 2,0) kV

Differential Mode

☒ (0,5 / 1,0) kV

Number of Surges:

☒ 5 surges per angle

Angle:

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

Polarity:

☒ Positive & Negative

Repetition Rate:

☒ 1 surge per min ☐ 1 surge per 30 sec.

Required Performance Criteria: ☒ Complied

Other supply / Signal Lines

Source Impedance:

42 ohm for common Mode

Surge Amplitude:

Common Mode

☒ (0,5 / 1,0) kV

Number of Surges:

☒ 5 Surges

Polarity:

☒ Positive & Negative

Repetition Rate:

☒ 1 surge per min ☐ 1 surge per 30 sec.

Required Performance Criteria: ☒ Complied

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Test Data☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L – N	Complied	Complied
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)	Complied	Complied
RJ-45 (PoE)	Complied	Complied
2 PIN (Alarm1)	Complied	Complied
2 PIN (Alarm2)	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 61000-4-6:2014

Test Date

Apr. 04, 2018

Test Location

EMS-CS: Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	icd.control	EM TEST	5.3.11	-
☒	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	11, 27, 2018
☒	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 27, 2018
☒	CDN	CDN M016	TESEQ	43694	11, 27, 2018
☐	CDN	CDN M016	TESEQ	43697	11, 27, 2018
☒	CDN	CDN T800	TESEQ	42800	11, 27, 2018
☒	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 28, 2018

Test Conditions

Temperature: 23,1 °C
Relative Humidity: 41,5 % R.H.
Atmospheric Pressure: 100,8 kPa

Test Specifications

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

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Test Data☒ Input a.c. power ports

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

☐ Input d.c. power ports

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

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45 (LAN)	CDN T800	Complied
RJ-45 (PoE)	CDN T800	Complied
2PIN (Alarm1)	Clamp	Complied
2PIN (Alarm2)	Clamp	Complied

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

Observations:

Complied – No degradation of function

Test Results

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

RemarksPASS Required Performance Criteria.



3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004

Test Date

Apr. 04, 2018

Test Location

EMS-Voltage dip: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.7	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2018
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2018

Test Conditions

Temperature: 22,1 °C
Relative Humidity: 42,0 % R.H.
Atmospheric Pressure: 100,6 kPa

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Test Specifications & Observations/Remarks

(Test Voltage : 230 V)

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
☒ 20 % dip	☒ 250 / 5 000	<u>Complied</u>
☒ 30 % dip	☒ 25 / 500	<u>Complied</u>
☒ 60 % dip	☒ 10 / 200	<u>Complied</u>
☒ 100 % dip	☒ 250 / 5 000	<u>Complied</u>

- Voltage variations

☒ Unom + 10 %	☒ 253.0 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

RemarksPASS Required Performance Criteria.

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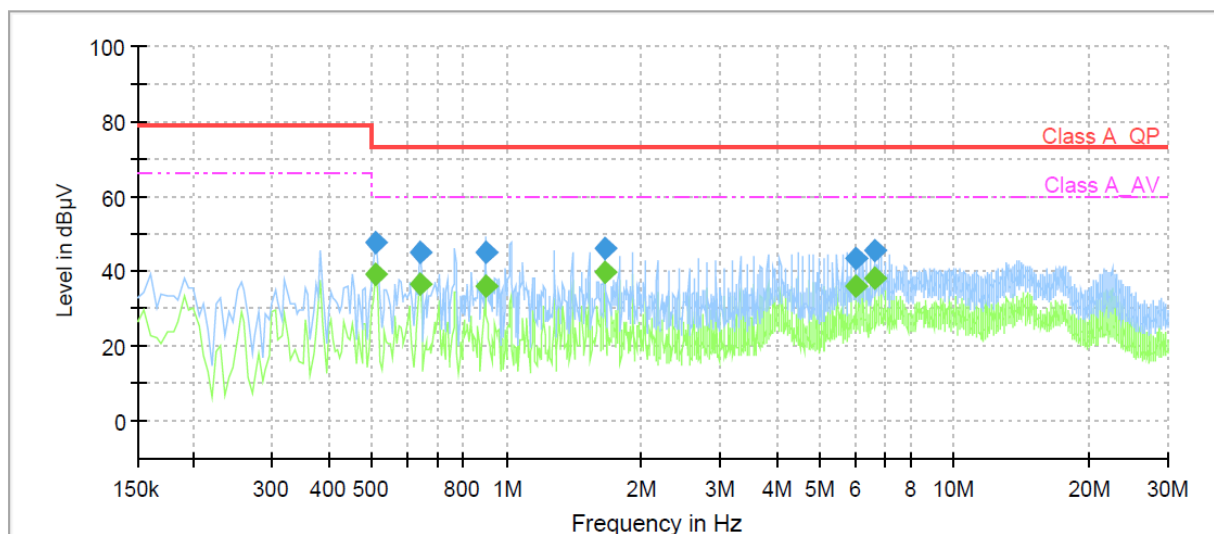
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description: Conducted Emission
Model No.: QRN-1610S
Mode
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.510000	---	39.28	60.00	20.72	1000.0	9.000	L1	19.6
0.510000	47.62	---	73.00	25.38	1000.0	9.000	L1	19.6
0.640000	---	36.33	60.00	23.67	1000.0	9.000	L1	19.7
0.640000	44.99	---	73.00	28.01	1000.0	9.000	L1	19.7
0.895000	---	35.89	60.00	24.11	1000.0	9.000	L1	19.9
0.895000	45.16	---	73.00	27.84	1000.0	9.000	L1	19.9
1.660000	---	39.78	60.00	20.22	1000.0	9.000	L1	20.1
1.660000	45.86	---	73.00	27.14	1000.0	9.000	L1	20.1
5.995000	---	35.94	60.00	24.06	1000.0	9.000	L1	19.6
5.995000	43.27	---	73.00	29.73	1000.0	9.000	L1	19.6
6.635000	---	37.98	60.00	22.02	1000.0	9.000	L1	19.6
6.635000	45.29	---	73.00	27.71	1000.0	9.000	L1	19.6



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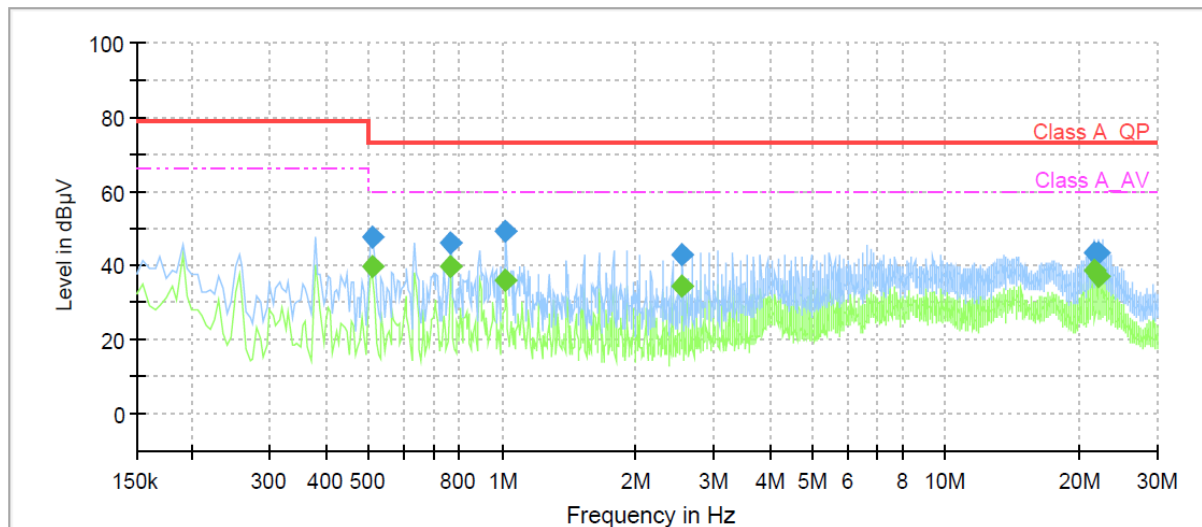
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[NEUTRAL]

Common Information

Test Description: Conducted Emission
Model No.: QRN-1610S
Mode
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.510000	---	39.59	60.00	20.41	1000.0	9.000	N	19.6
0.510000	47.68	---	73.00	25.32	1000.0	9.000	N	19.6
0.765000	---	39.79	60.00	20.21	1000.0	9.000	N	19.8
0.765000	46.29	---	73.00	26.71	1000.0	9.000	N	19.8
1.020000	---	36.25	60.00	23.75	1000.0	9.000	N	20.0
1.020000	49.12	---	73.00	23.88	1000.0	9.000	N	20.0
2.550000	---	34.44	60.00	25.56	1000.0	9.000	N	20.1
2.550000	42.64	---	73.00	30.36	1000.0	9.000	N	20.1
21.665000	---	38.64	60.00	21.36	1000.0	9.000	N	20.4
21.665000	43.61	---	73.00	29.39	1000.0	9.000	N	20.4
22.065000	---	37.23	60.00	22.77	1000.0	9.000	N	20.4
22.065000	43.37	---	73.00	29.63	1000.0	9.000	N	20.4

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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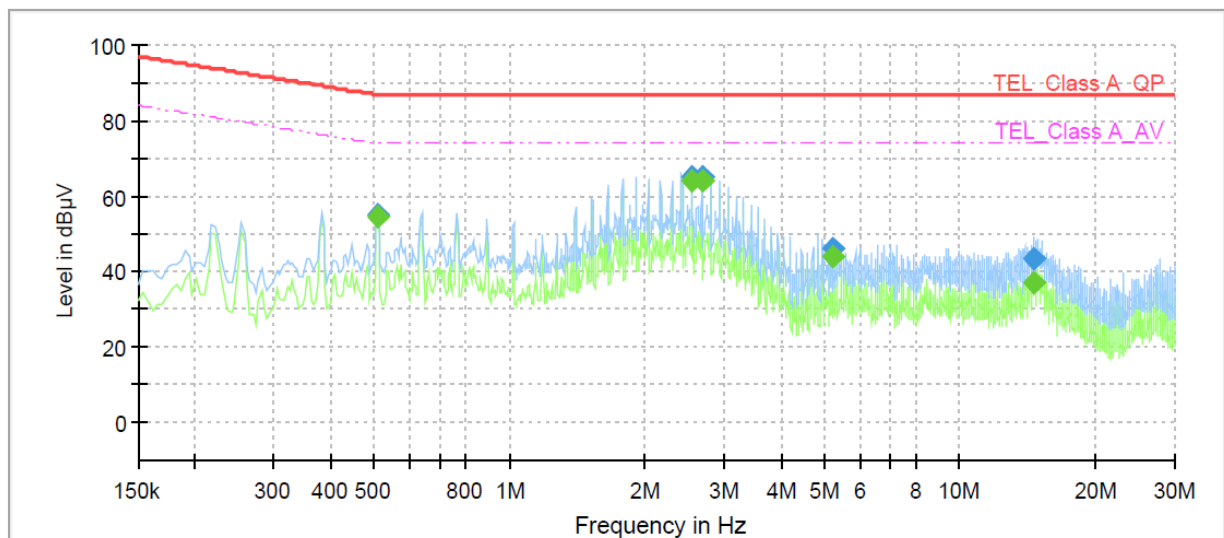
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Conducted Emissions at Telecommunication Ports

■ PoE Mode
[10 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: QRN-1610S
Mode: PoE 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)
0.510000	---	54.62	74.00	19.38	1000.0	9.000	Single Line	19.6
0.510000	55.25	---	87.00	31.75	1000.0	9.000	Single Line	19.6
2.546000	---	63.93	74.00	10.07	1000.0	9.000	Single Line	20.0
2.546000	65.13	---	87.00	21.87	1000.0	9.000	Single Line	20.0
2.674000	---	64.08	74.00	9.92	1000.0	9.000	Single Line	20.0
2.674000	65.04	---	87.00	21.96	1000.0	9.000	Single Line	20.0
5.222000	---	44.19	74.00	29.81	1000.0	9.000	Single Line	19.6
5.222000	46.02	---	87.00	40.98	1000.0	9.000	Single Line	19.6
14.550000	---	37.13	74.00	36.87	1000.0	9.000	Single Line	20.0
14.550000	43.66	---	87.00	43.34	1000.0	9.000	Single Line	20.0

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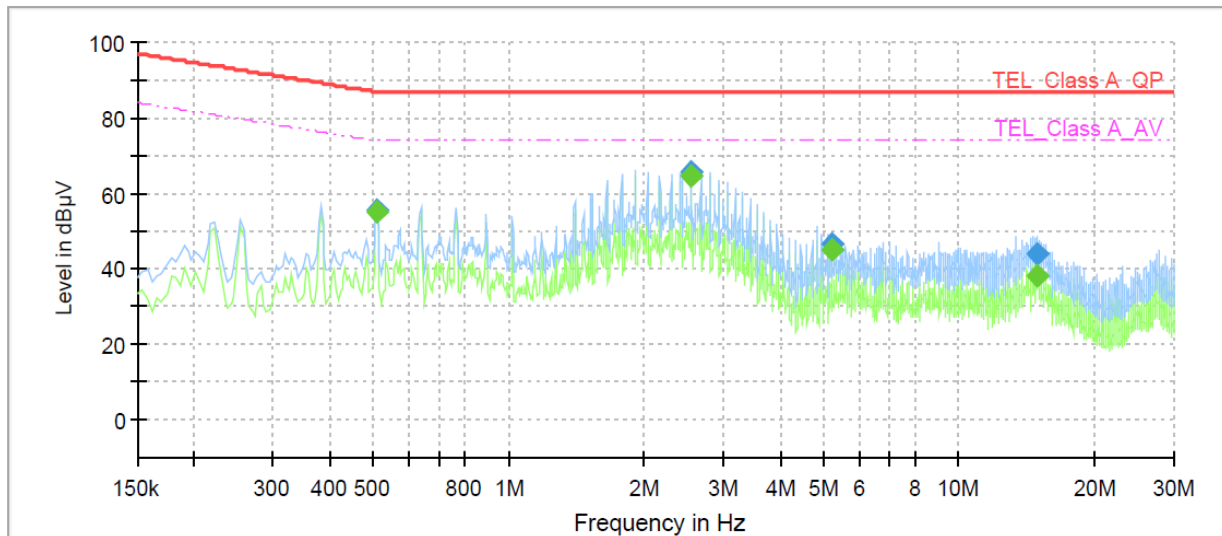
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[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: QRN-1610S
Mode: PoE 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)
0.510000	---	55.16	74.00	18.84	1000.0	9.000	Single Line	19.6
0.510000	55.76	---	87.00	31.24	1000.0	9.000	Single Line	19.6
2.546000	---	64.66	74.00	9.34	1000.0	9.000	Single Line	20.0
2.546000	65.80	---	87.00	21.20	1000.0	9.000	Single Line	20.0
5.222000	---	44.82	74.00	29.18	1000.0	9.000	Single Line	19.6
5.222000	46.57	---	87.00	40.43	1000.0	9.000	Single Line	19.6
14.842000	---	38.12	74.00	35.88	1000.0	9.000	Single Line	20.0
14.842000	44.20	---	87.00	42.80	1000.0	9.000	Single Line	20.0

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Test report No.:

KES-E1-18T0247-R1

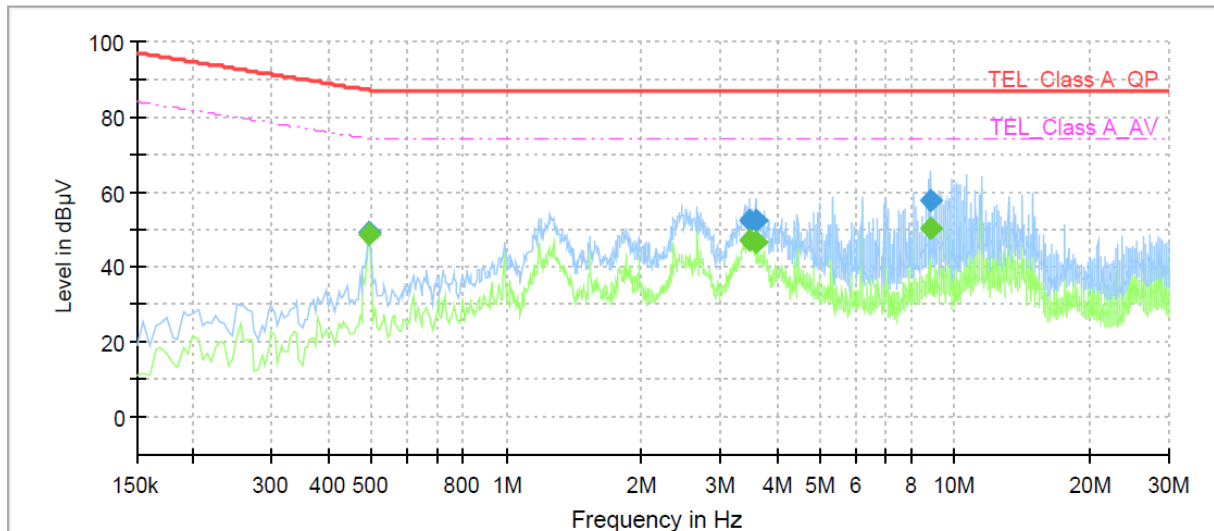
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■ LAN Mode

[10 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: QRN-1610S
Mode: LAN 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)
0.495000	---	48.68	74.08	25.40	1000.0	9.000	Single Line	19.5
0.495000	49.02	---	87.08	38.06	1000.0	9.000	Single Line	19.5
3.495000	---	46.86	74.00	27.14	1000.0	9.000	Single Line	19.6
3.495000	52.24	---	87.00	34.76	1000.0	9.000	Single Line	19.6
3.585000	---	46.69	74.00	27.31	1000.0	9.000	Single Line	19.6
3.585000	52.17	---	87.00	34.83	1000.0	9.000	Single Line	19.6
8.805000	---	50.45	74.00	23.55	1000.0	9.000	Single Line	19.5
8.805000	57.95	---	87.00	29.05	1000.0	9.000	Single Line	19.5

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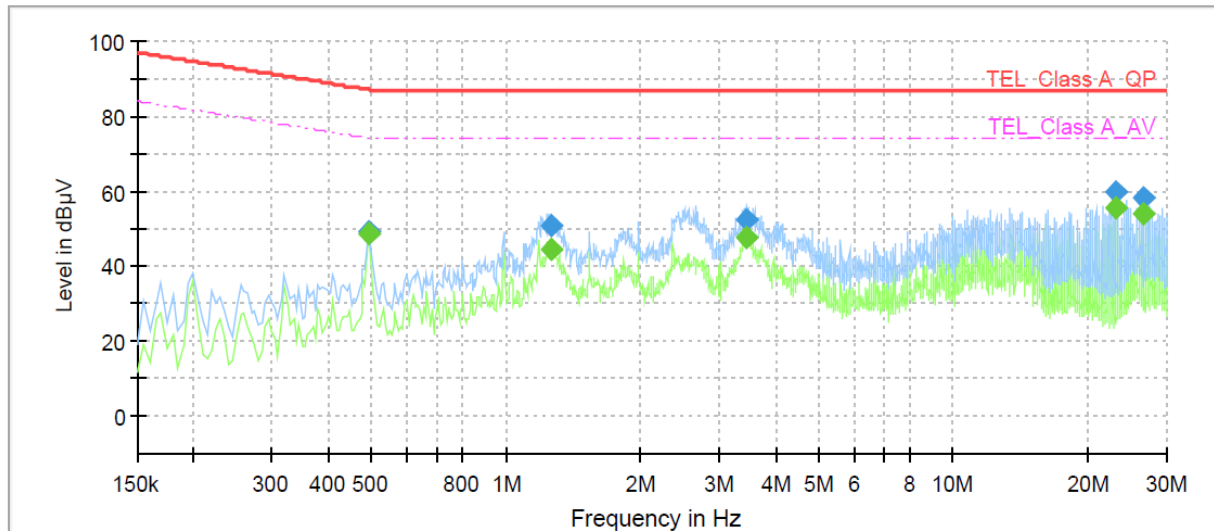
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[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: QRN-1610S
Mode: LAN 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)
0.495000	---	48.80	74.08	25.28	1000.0	9.000	Single Line	19.4
0.495000	49.11	---	87.08	37.97	1000.0	9.000	Single Line	19.4
1.260000	---	44.51	74.00	29.49	1000.0	9.000	Single Line	19.7
1.260000	50.57	---	87.00	36.43	1000.0	9.000	Single Line	19.7
3.455000	---	47.40	74.00	26.60	1000.0	9.000	Single Line	19.5
3.455000	52.60	---	87.00	34.40	1000.0	9.000	Single Line	19.5
23.130000	---	55.49	74.00	18.51	1000.0	9.000	Single Line	20.1
23.130000	59.66	---	87.00	27.34	1000.0	9.000	Single Line	20.1
26.610000	---	54.18	74.00	19.82	1000.0	9.000	Single Line	20.2
26.610000	58.22	---	87.00	28.78	1000.0	9.000	Single Line	20.2

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

Corr. : Correction values (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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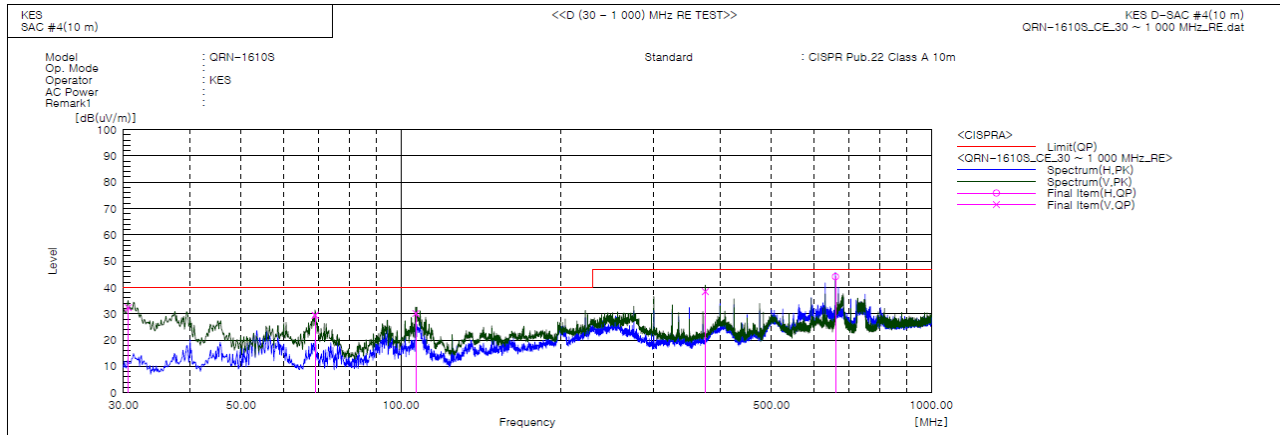
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Radiated Electric Field Emissions(Below 1 GHz)



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	30.606	V	65.2	-32.9	32.3	40.0	7.7	133.0	303.0	
2	68.928	V	61.5	-32.1	29.4	40.0	10.6	109.0	71.0	
3	106.751	V	59.5	-29.4	30.1	40.0	9.9	173.0	281.0	
4	375.078	V	60.7	-22.3	38.4	47.0	8.6	284.0	210.0	
5	660.010	H	59.4	-15.3	44.1	47.0	2.9	173.0	251.0	

◆ Calculation – SEMI ANECHOIC CHAMBER #4(10 m)

Result(QP) [dB(μV/m)] = (Reading(QP)[dB(μV)] + c.f[dB(1/m)])

Margin(QP)[dB] = Limit[dB(μV/m)] - Result(QP) [dB(μV/m)]

Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value



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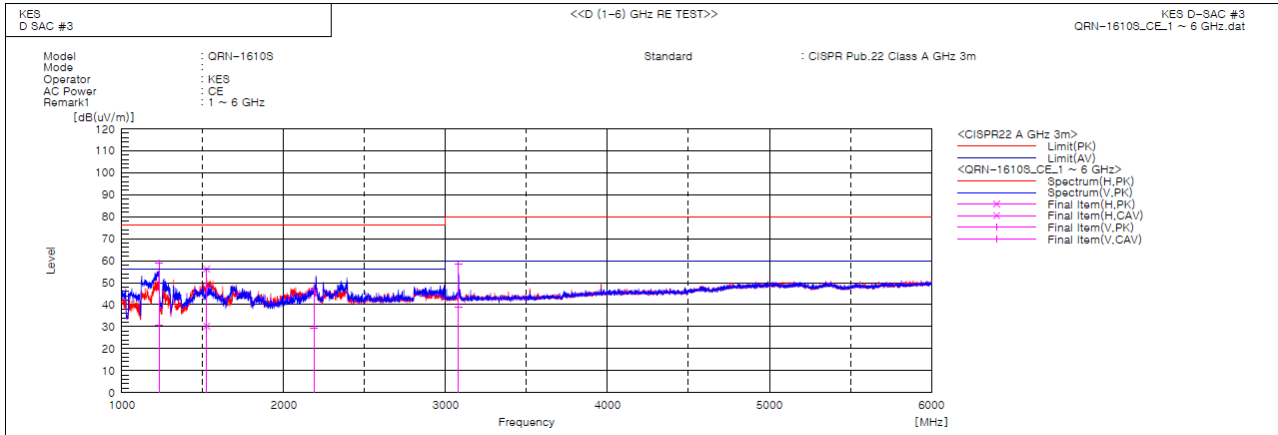
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Test report No.:

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Radiated Electric Field Emissions(Above 1 GHz)



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1230.139	V	66.8	38.7	-8.1	58.7	30.6	76.0	56.0	17.3	25.4	100.0	9.1	
2	1524.076	H	61.9	35.9	-5.7	56.2	30.2	76.0	56.0	19.8	25.8	100.0	63.4	
3	2186.423	V	47.3	29.9	-0.5	46.8	29.4	76.0	56.0	29.2	26.6	100.0	121.5	
4	3079.970	V	55.6	36.0	2.9	58.5	38.9	80.0	60.0	21.5	21.1	100.0	104.7	

◆ Calculation

Result(PK/CAV) [dB(μV/m)] = (Reading(PK/CAV)[dB(μV)] + c.f[dB(1/m)])

Margin(PK/CAV)[dB] = Limit[dB(μV/m)] - Result(PK/CAV) [dB(μV/m)]

Reading(PK/CAV) : Reading value, Result(PK/CAV) : Reading value + Factor value

Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value

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

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	123.385E-3			
2	719.542E-6			PASS
3	24.983E-3	1.086	2.30	PASS
4	725.951E-6			PASS
5	7.631E-3	0.669	1.14	PASS
6	654.512E-6			PASS
7	3.189E-3			PASS
8	614.958E-6			PASS
9	3.895E-3			PASS
10	715.089E-6			PASS
11	3.451E-3			PASS
12	680.127E-6			PASS
13	2.167E-3			PASS
14	658.187E-6			PASS
15	1.992E-3			PASS
16	599.507E-6			PASS
17	2.456E-3			PASS
18	587.909E-6			PASS
19	1.736E-3			PASS
20	669.456E-6			PASS
21	2.022E-3			PASS
22	578.704E-6			PASS
23	1.478E-3			PASS
24	655.503E-6			PASS
25	2.264E-3			PASS
26	613.594E-6			PASS
27	1.414E-3			PASS
28	698.708E-6			PASS
29	1.566E-3			PASS
30	678.153E-6			PASS
31	1.824E-3			PASS
32	673.755E-6			PASS
33	1.749E-3			PASS
34	662.779E-6			PASS
35	951.701E-6			PASS
36	652.866E-6			PASS
37	1.015E-3			PASS
38	648.928E-6			PASS
39	907.772E-6			PASS
40	648.437E-6			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.



Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	125.248E-3			
2	1.193E-3			PASS
3	25.849E-3	0.749	3.45	PASS
4	949.863E-6			PASS
5	8.531E-3	0.499	1.71	PASS
6	798.577E-6			PASS
7	3.874E-3			PASS
8	764.119E-6			PASS
9	4.138E-3			PASS
10	850.947E-6			PASS
11	3.611E-3			PASS
12	909.712E-6			PASS
13	2.404E-3			PASS
14	888.221E-6			PASS
15	3.116E-3			PASS
16	694.489E-6			PASS
17	3.214E-3			PASS
18	685.358E-6			PASS
19	2.108E-3			PASS
20	808.979E-6			PASS
21	2.152E-3			PASS
22	664.157E-6			PASS
23	1.699E-3			PASS
24	776.016E-6			PASS
25	2.475E-3			PASS
26	783.636E-6			PASS
27	1.911E-3			PASS
28	896.893E-6			PASS
29	1.776E-3			PASS
30	884.834E-6			PASS
31	2.126E-3			PASS
32	872.711E-6			PASS
33	1.968E-3			PASS
34	804.687E-6			PASS
35	1.155E-3			PASS
36	808.635E-6			PASS
37	1.397E-3			PASS
38	830.134E-6			PASS
39	1.535E-3			PASS
40	903.152E-6			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

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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 [%]	0.066	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

■ PoE Mode



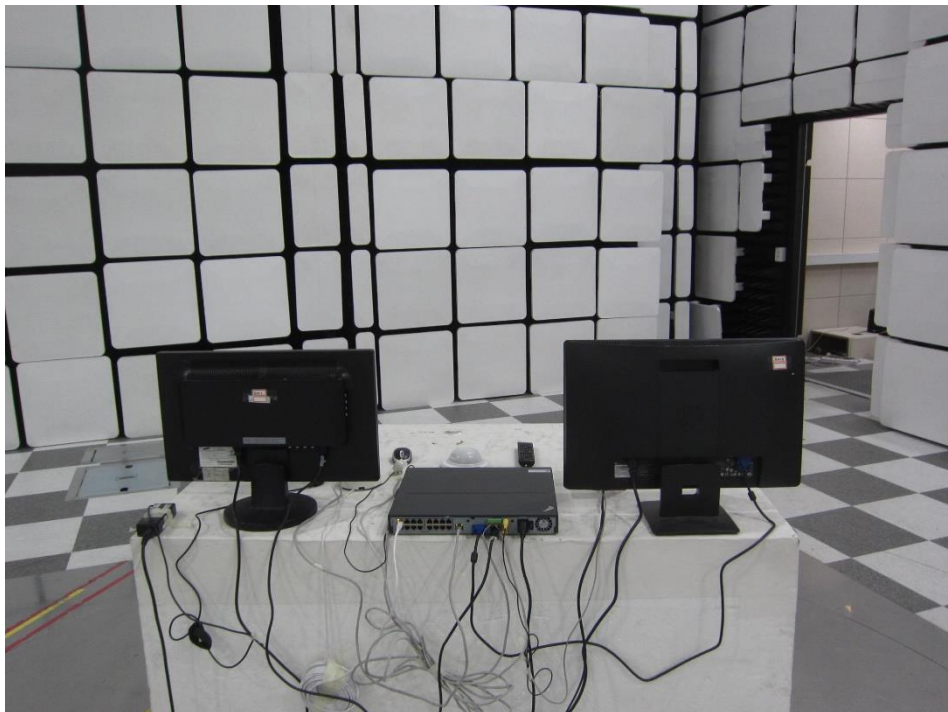
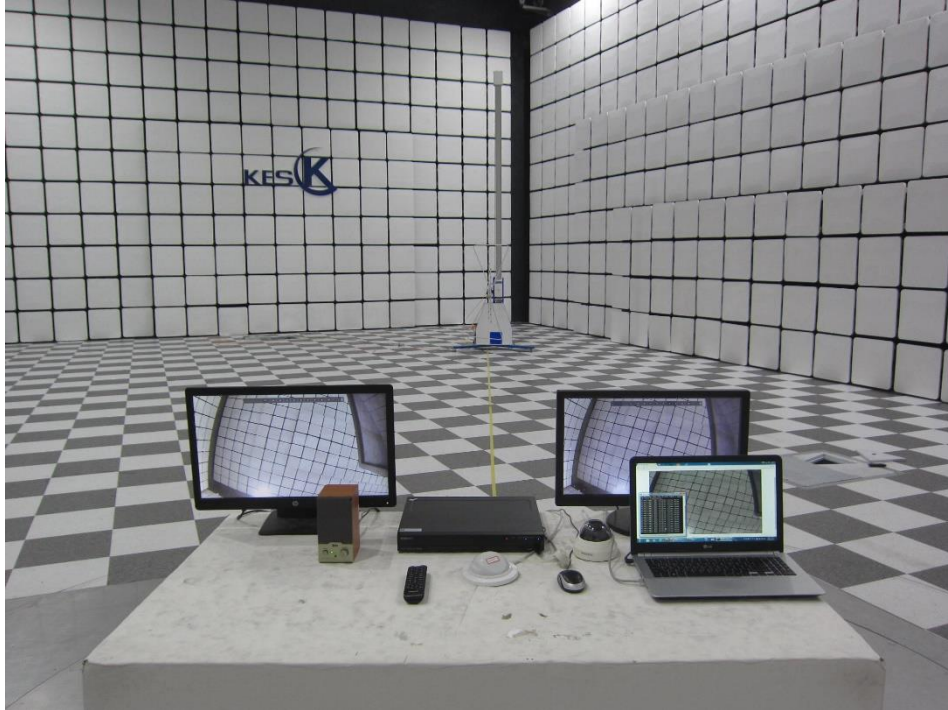
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■ LAN Mode



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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)

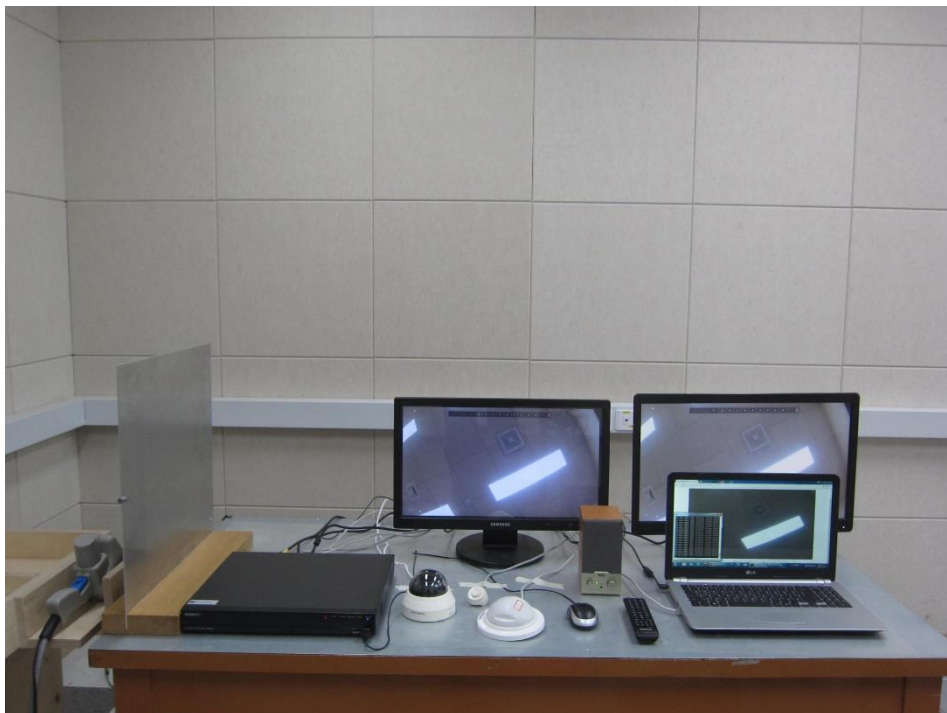


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Harmonic Current Emissions and Voltage Fluctuations and Flicker



Electrostatic Discharge



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Radiated Electric Field Immunity



Electrical Fast Transients/Bursts



Surge Transients



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Conducted Disturbance



Voltage Dips and Short Interruptions



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EUT External Photographs

(Top)



(Bottom)



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EUT Internal Photographs

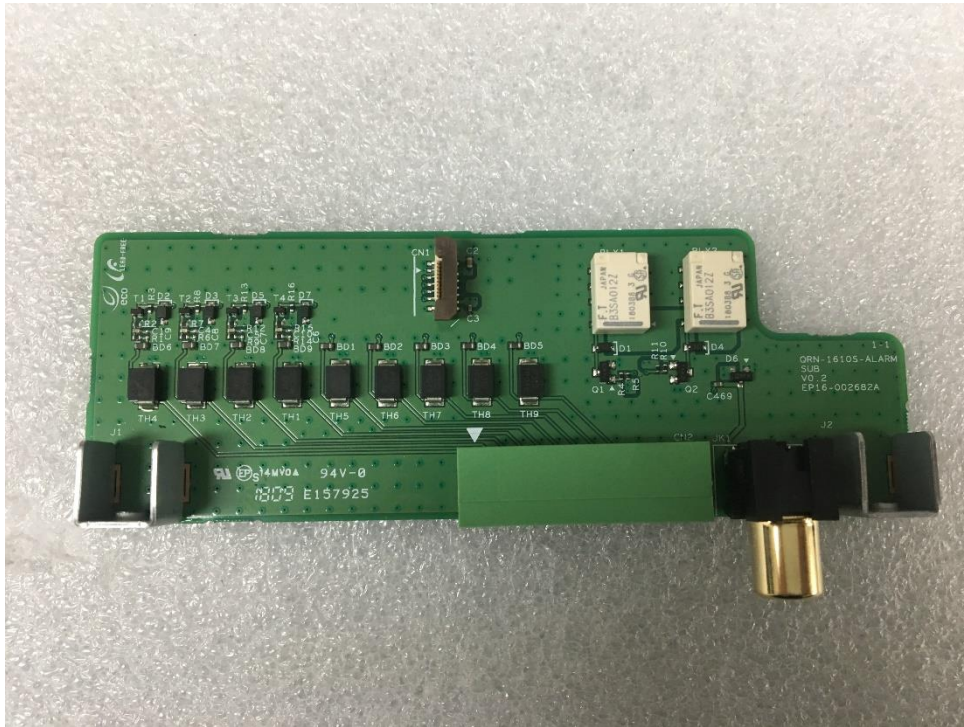
(Internal View)



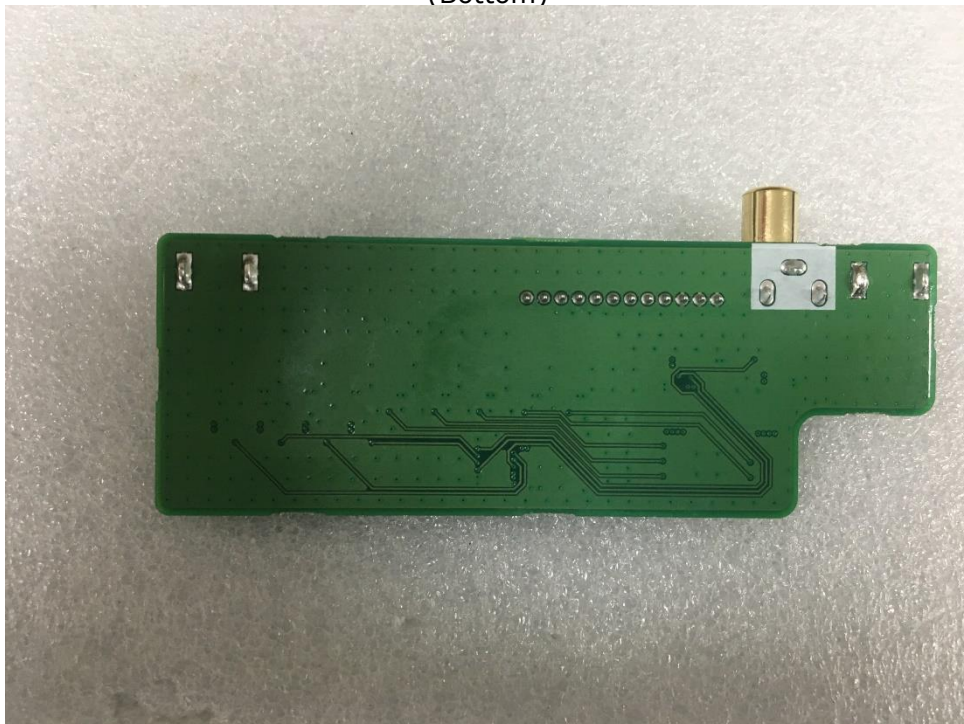
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EUT Internal View – board 1

(Top)



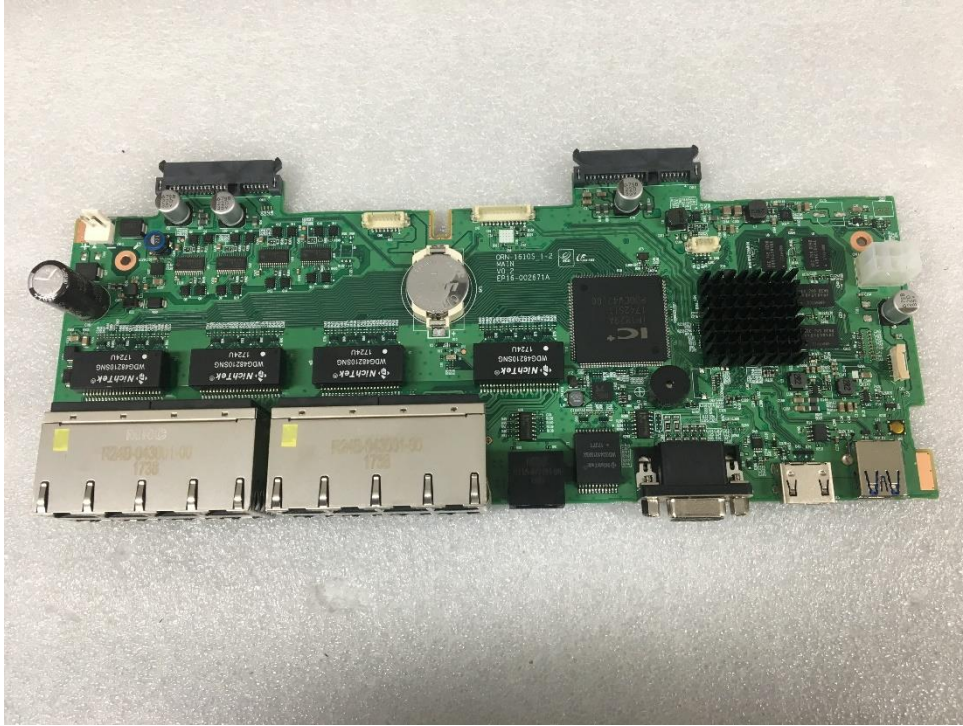
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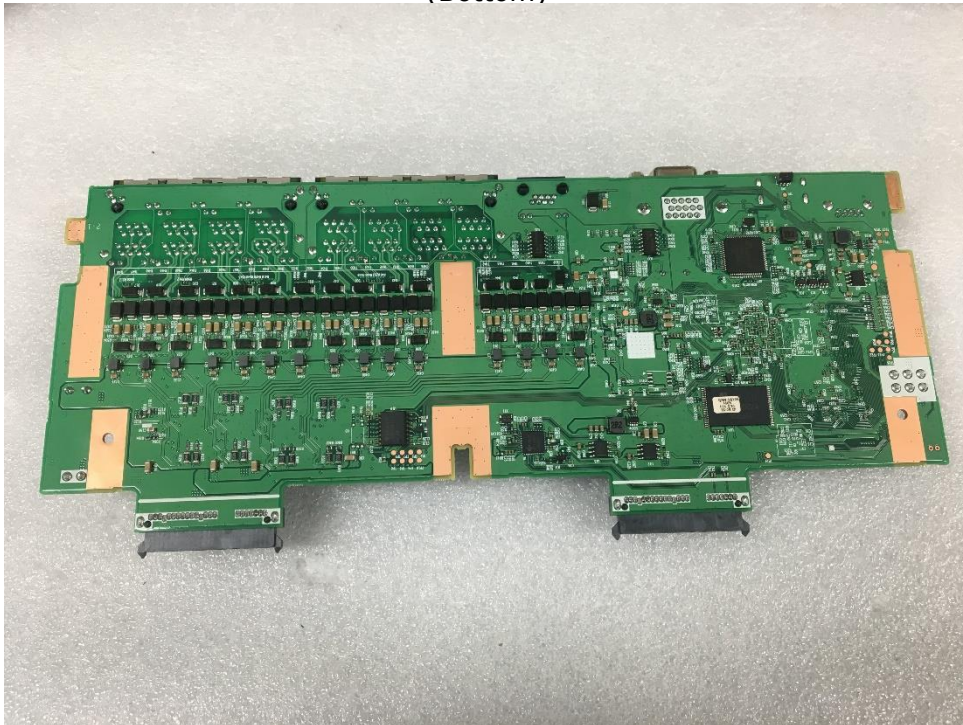
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EUT Internal View – board 2

(Top)

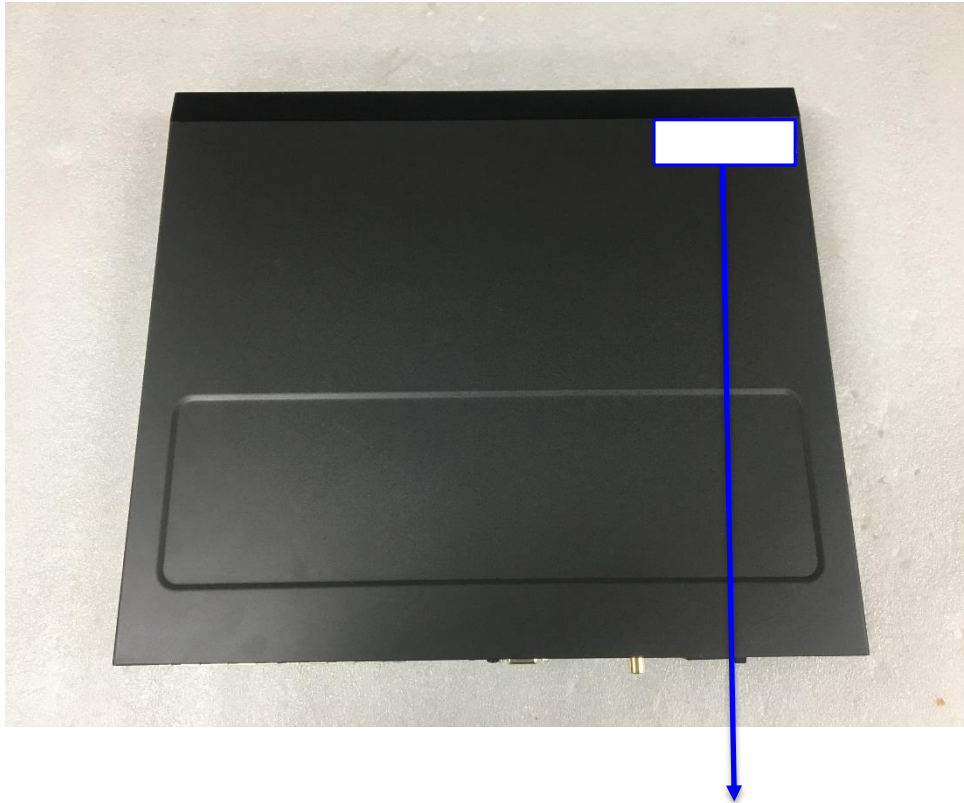


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Label and Location



NVR

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Manufacturer : HANWHA TECHWIN(TIANJIN)CO., LTD

Made in China

