



EMC TEST REPORT For CE

Test Report No. : KES-E1-17T0462-R1
Date of Issue : Oct. 23, 2017
Product name : DVR
Model/Type No. : HRD-841P
Variant Model : -
Applicant : Hanwha Techwin Co., Ltd.
Applicant Address : 1204, Changwon-daero, Seongsan-gu, Changwon-si,
Gyeongsangnam-do, Korea
Manufacturer : Hanwha Techwin (Tianjin) Co., Ltd.
Manufacturer Address : No.11 Weiliu Rd, Micro-Electronic Industrial
Park, TEDA, Tianjin, 300385, People's Republic of China.
Date of Receipt : Jul. 10, 2017
Test date : Jul. 17, 2017 – Jul. 20, 2017
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

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EMC Test Engineer

Reviewed 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
Jul. 24, 2017	KES-E1-17T0462	Issued
Oct. 23, 2017	KES-E1-17T0462-R1	Standard Revision

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1.0 General Product Description

Main Specifications of E.U.T are:

HRD-841		
Video	Inputs	8channel BNC : AHD(2MP, 4MP), HDTV(Only 2MP), HDCVI(Only 2MP), NTSC/PAL
	Resolution	2560x1440, 1920 x 1080, 960 x 480, 704 x 480 / 960 x 576, 704 x 576
Live	Frame rate	240fps, 200fps
	Resolution	2560x1440, 1920 x 1080, 960 x 480, 704 x 480 / 960 x 576, 704 x 576
Multi Screen display		1/4/7/8/13/PIP/Sequence
Performance		
Operating System	Embedded	Linux
	Compression	H.264, Wisestream
Recording	Record Rate(Analog)	NTSC : Up to 120fps@4MP / PAL : Up to 100fps@4MP NTSC : Up to 240fps@1920 x 1080 / PAL : Up to 200fps@1920 x 1080 NTSC: Up to 240fps @ 1280 x 720, 928x480, 704X480, 704X240, 352X240 PAL: Up to 200fps @ 1280 x 720, 928x576, 704x576, 704x288, 352x288
	Mode	Manual, Schedule (Continuous/Event), Event(Pre/Post), Time lapse (1~30 fps(N), 1~25fps(P))
	Event	Video Loss, Motion(Level 1~10), Alarm, Tampering(Level Low,Medium, High)
	Overwrite modes	Continuous
	Pre-alarm	Up to 30 sec (5,10,20,30 Sec)
	Post-Alarm	Up to 6 hour (5,10,20,30 sec,1,3,5,10,20 min,1,2,3,4,5,6 hour)
Search & Playback	Search mode	Date/time, Event, Back up, Motion (※ All Search Included Preview Function)
	Playback function	Fast Forward/Backward (x2,x4,x8,x16,x32,x64,) ※ Backward Play with I-frame Only, Slow Forward/Backward (x1/2,x1/4,x1/8) Step Forward/Backward ※ Backward Play with I-frame Only
	Simultaneous playback	8CH(Local Monitor, CMS)
	Transmission speed	Record(Main) Stream) 4MP : 15fps/CH, 1080p/720p/WD1/4CIF/2CIF/CIF : 30fps/CH(N), 25fps/CH(P) Network(Sub) Stream) WD1/4CIF : 12fps/CH, 2CIF/CIF/QVGA/QCUF : 30fps/CH(N), 25fps/CH(P)
Network(IPv4)	Transmission Bandwidth	Up to 64Mbps
	Bandwidth control	Selectable
	Stream	Record Stream and Network Stream Selectable (at monitoring Viewer)
	Remote users Maximum	Search(3)/Live Unicast(10)/Live Multicast(20)
	Protocol support	TCP/IP,DHCP,PPPoE,SMTP,NTP,HTTP,DDNS,RTP,RTSP,SNMP
	Web Browser	Windows OS : Internet Explorer 8, 9, 10, Firefox 3.6 or higher, Chrome 12 or higher Mac OS : Safari 5 or higher, Firefox 3.6 or higher
	Viewer Software	SSM, Webviewer, SmartViewer, iPOLIS mobile viewer
	Platform	Android, iOS
Smart phone	Protocol support	RTP, RTSP, HTTP,
	Control	Live(8ch) : Multi-Profile Support Playback(1ch)
	Remote users Maximum	Search (3), Live Unicast (10), Multicast (20)
	Internal	Up to 2 SATA HDDs (0~6TB HDD)
Storage	External (e-SATA Interface)	e-SATA, USB(for Backup)
	File Format (Back-up)	BU(DVR Player), SEC(Include Player), AVI
Security	Password Protection	1 Admin, 10 Group, 10 User per 1 Group
	Data Authentication	Watermark
Easy Configuration		N/A
Interface		
Monitors	VGA	1 VGA (1920x1080, 1280x1024, 1280x720)
	HDMI	1 HDMI (4K(3840 x 2160), 2K(2560 x 1440), 1920x1080, 1280x1024, 1280x720)
	Composite(Spot)	BNC(1CH) ※ Included OSD On Screen, Multi mode Support
	Loop Outputs	N/A
Audio	Inputs/Output	4CH line in / 1CH line out
	Compression	G.711
	Sampling rate	8KHz
Alarm	Inputs/Outputs	Terminal 8 Inputs (NO/NC) / Terminal 4 relay Outputs (NO/NC), Rating : 30V DC/2A, 250V AC/0.25A
	Remote notification	Notification via e-mail
Connections	Ethernet	1 RJ45 10/100/1000 Base-T
	Serial interface	RS-485(Half Duplex) for PTZ, Samsung System Keyboard
	USB	1 ports(USB 3.0, Rear), 2 ports(USB 2.0, Front)
	e-SATA	1 External SATA ports
	Application Support	Mouse, IR Remote
	Protocol support(RS-485)	Samsung-E/Samsung-T/Pelco-D/Pelco-p/Panasonic/ Phillips/ AD/ DIAMOND/ ERNA/ KALATEL/ VCL TP/VICON/ ELMO/GE
	Protocol support(Coaxial)	NTSC/PAL : Pelco-C (Coaxitron) AHD : ACP(AHD Coax Protocol)
General		
Electrical	Input Voltage/Current	DC12V Adaptor(100~250V AC ±10% , 50/60Hz)
	Power consumption	Max.50W
Environmental	Operating Temperature/Humidity	+0°C to +40°C (+32°F to +104°F) / 20% to 85% RH
	Dimension (W x H x D)	W370.0x H44.0 x D320(14.57" x 1.73" x 12.6")
Mechanical	Weight (no hard disks)	Approx. 2.278kg
	Language	English, French, German, Spanish, Italian, Russian, Polish, Czech, Turkish, Netherlands Portuguese, Swedish, Danish, Rumania, Serbia, Croatia, Hungary, Greek, Finnish, Norwegian, Korean, Japanese, Chinese(Traditional), Thai, Chinese(Simplified)(25 Language) * For Korean Model : Korean
	GUI	English, French, German, Spanish, Italian, Russian, Polish, Czech, Turkish, Netherlands Portuguese, Swedish, Danish, Rumania, Serbia, Croatia, Hungary, Greek, Finnish, Norwegian, Korean, Japanese, Chinese(Traditional), Thai, Chinese(Simplified)(25 Language) * For Korean Model : Korean
	Web Browser	English, French, German, Spanish, Italian, Russian, Polish, Czech, Turkish, Netherlands Portuguese, Swedish, Danish, Rumania, Serbia, Croatia, Hungary, Greek, Finnish, Norwegian, Korean, Japanese, Chinese(Traditional), Thai, Chinese(Simplified)(25 Language) * For Korean Model : Korean

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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
DVR	HRD-841P	-	Hanwha Techwin (Tianjin) Co.,Ltd.	E.U.T
DVR ADAPTOR	FSP060-DIBAN2	H00001194	Zhonghan Electronics (Shenzhen) Co., Ltd.	-
HDD	WD30PURX	WCC4N0FSDUVD	WD	3 TB
IR REMOTE CONROL	EP10-000331A	-	-	-
MOUSE	MOKJUO	-	Primax Electronics Ltd.	-



1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
MONITOR 1	23MA53D	303KKMH9Z019	LG	-
MONITOR 1 ADAPTOR	PSAB-L205A	EAY62850201	LG Innotek Yantai Co. Ltd.	-
MONITOR 2	S24E370DL	ONTWHTPH200179Y	SAMSUNG	-
MONITOR 2 ADAPTOR	A3514_FPN	CN07BN4400832AS K28GCTR235 R.D	POWERNET Technologies Crop.	-
MONITOR 3	SMT-2232	C95V67VF900038B	Weihai Daewoo Electronics Co., Ltd.	-
CCTV CAMERA	SDH-C74041- CAM	-	SMASUNG	-
CCTV CAMERA ADAPTOR	FSP060-DIBAN2	H00000195	Zhonghan Electronics (Shenzhen) Co., Ltd.	
CONTROLLER	SPC-1010	C50E67WG10100F	SamSung Techwin Co.,Ltd	-
CONTROLLER ADAPTOR	RS-AB1000	-	Dongguan Jinhua sheng Power Technology Co.,Ltd	-
SPEAKER	BR10000A CUVE	-	BEIJING EDIFIER HI-TECH GROUP.	-
MIC	CMK-303	-	CAMAC	-
ALARM 1	-	-	-	-
ALARM 2	-	-	-	-
USB 3.0 Memory	-	-	Sandisk	16 GB
Notebook	X56K	HN11N5151FJ0045 W	HANSUNG	-
Notebook ADAPTOR	A12-120P1A	F180271552011758	CHICONY POWER TECHNOLOGY CO.,LTD.	-
SSD Memory	SSD320	B12734-0373	Transcend	64 GB

1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
DVR (E.U.T)	D-SUB	MONITOR 1	D-SUB	1.4	S
	HDMI	MONITOR 2	HDMI	1.4	S
	BNC	MONITOR 3	BNC	2.5	S
	BNC	CCTV CAMERA	BNC	10.0	S
	2 Pin	CONTROLLER	2 Pin	3.2	U
	Audio Out	SPEAKER	Audio Out	1.2	U
	Audio IN	MIC	Audio IN	1.2	U
	3 Pin	ALARM 1	3 Pin	3.2	U
	3 Pin	ALARM 2	3 Pin	3.6	U
	USB 3.0	USB 3.0 Memory	USB 3.0	-	-
	RJ-45	Notebook	RJ-45	5.2	U
	e-SATA	SSD Memory	e-SATA	0.5	U
	USB 2.0	MOUSE	USB 2.0	1.5	U

* Unshielded=U, Shielded=S

1.7 E.U.T Operating Mode(s)

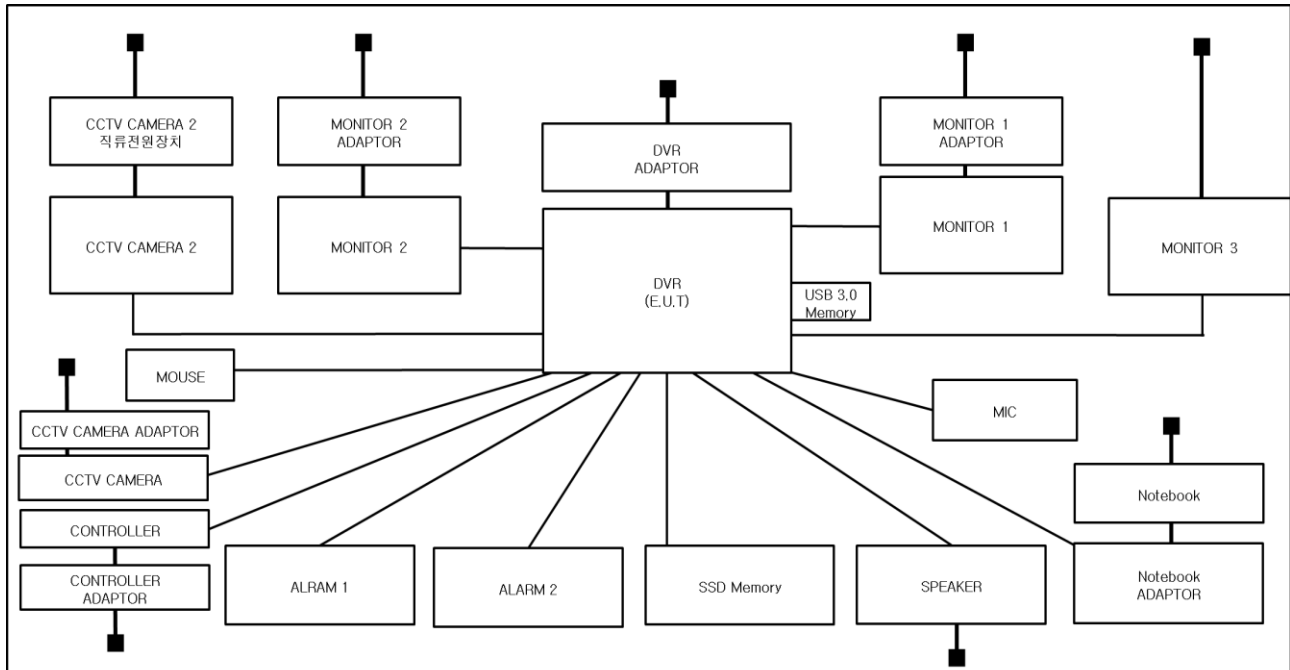
operating
1. Check the output of the camera images on the monitor 2. Check the video output of the camera via the laptop and ping test.

E.U.T Test operating S/W		
Name	Version	Manufacture Company
-	-	-

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1.8 Configuration

■ AC Main
□ DC Main



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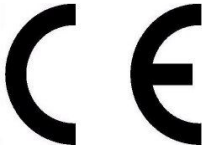
1.9 Calibration Details of Equipment Used for Measurement

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 and CISPR Publication 22.

1.11 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	
JAPAN	VCCI	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	 R-4308, C-4798, T-2311, G-914
KOREA	MSIP	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
Canada	IC	3 & 10 meter Open Area Test Sites and one conducted site	 4769B-1
Europe	CE	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	
International	KOLAS	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	



2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **EMC – Directive 2014/30/EU**

☐ EN 61000-6-3:2011

☐ EN 61000-6-1:2007

☐ EN 61000-6-4:2007 +A1:2011

☐ EN 61000-6-2:2005

☐ EN 55011:2007 +A1:2010

☐ Group 1
☐ Class A

☐ Group 2
☐ Class B

☐ EN 55014-1:2006 +A2:2011

☐ EN 55014-2:1997 +A2:2008

☐ EN 55015:2013

☐ EN 61547:2009

☒ EN 55032:2012

☒ Class A

☐ Class B

☐ EN 55024:2010 +A1:2015

☒ EN 50130-4:2011

☒ 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

Jul. 17, 2017

Test Location

Electro wave Shieldroom #3

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	101783	04, 27, 2018
☒	LISN	ENV216	R & S	101137	02, 03, 2018
☒	LISN	ENV216	R & S	101786	04, 27, 2018
☒	PULSE LIMITER	ESH3-Z2	R & S	101914	12, 13, 2017

Test Conditions

Temperature: 21,3 °C

Relative Humidity: 52,6 %

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

Jul. 17, 2017

Test Location

Electro wave Shieldroom

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	101783	04, 27, 2018
☒	LISN	ENV216	R & S	101137	02, 03, 2018
☒	LISN	ENV216	R & S	101786	04, 27, 2018
☒	PULSE LIMITER	ESH3-Z2	R & S	101914	12, 13, 2017
☒	8-WIRE ISN CAT3	CAT3 8158	SCHWARZBECK	8158-0019	03, 29, 2018
☒	8-WIRE ISN CAT5	CAT5 8158	SCHWARZBECK	8158-0030	03, 29, 2018
☒	8-WIRE ISN CAT6	NTFM 8158	SCHWARZBECK	8158-0029	11, 08, 2017

Test Conditions

Temperature: 21,3 °C

Relative Humidity: 52,6 %

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

RemarksSee Appendix A for test data.



2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Jul. 18, 2017

Test Location

☐ OPEN AREA TEST SITE #2 ☒ SAC #4(10 m)

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	12, 13, 2017
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	716	11, 28, 2018

Test Conditions

Temperature: 22,8 °C

Relative Humidity: 51,8 %

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

Jul. 18, 2017

Test Location

SEMI ANECHOIC CHAMBER #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	e3	AUDIX	8.083b	-
☒	EMI TEST RECEIVER	ESU26	R & S	100552	04, 19, 2018
☒	PREAMPLIFIER	8449B	AGILENT	3008A01729	05, 31, 2018
☒	LOG-PERIODIC ANTENNA	STLP 9149	SCHWARZBECK	9149-255	05, 17, 2018

Test Conditions

Temperature: 22,9 °C

Relative Humidity: 51,9 %

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

Jul. 19, 2017

Test Location

Electro wave Shieldroom #3

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, 2017
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	08, 08, 2017

Test Conditions

Temperature: 22,6 °C

Relative Humidity: 48,4 %

Classification of Equipment for Harmonic Current Emissions

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

Test Results

The requirements are:

- ☒ PASS
- ☐ NOT PASS
- ☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.6 Voltage Fluctuations and Flicker

Test Date

Jul. 19, 2017

Test Location

Electro wave Shieldroom #3

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, 2017
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	08, 08, 2017

Test Conditions

Temperature: 22,6 °C

Relative Humidity: 48,4 %

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

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

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

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

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

Electrostatic discharge

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

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

Radiated electromagnetic fields

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

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

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

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

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

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

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

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

Fast transient burst / slow high energy voltage surge

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

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

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

Conducted RF immunity

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

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

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

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

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

Voltage dip/interruption / Voltage variation

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

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



3.1 Electrostatic Discharge

Reference Standard

EN 61000-4-2:2009

Test Date

Jul. 19, 2017

Test Location

EMS-ESD: Electro wave Shieldroom #3

Test Equipment

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

Test Conditions

Temperature: 22,6 °C
Relative Humidity: 48,4 %
Atmospheric Pressure: 99,0 kPa



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Test Specifications

Discharge Factor: ≥ 1 s

Discharge Impedance: 330 ohm / 150 pF

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

Polarity: Positive and Negative

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

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

Notes: HCP: Horizontal coupling plane

VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

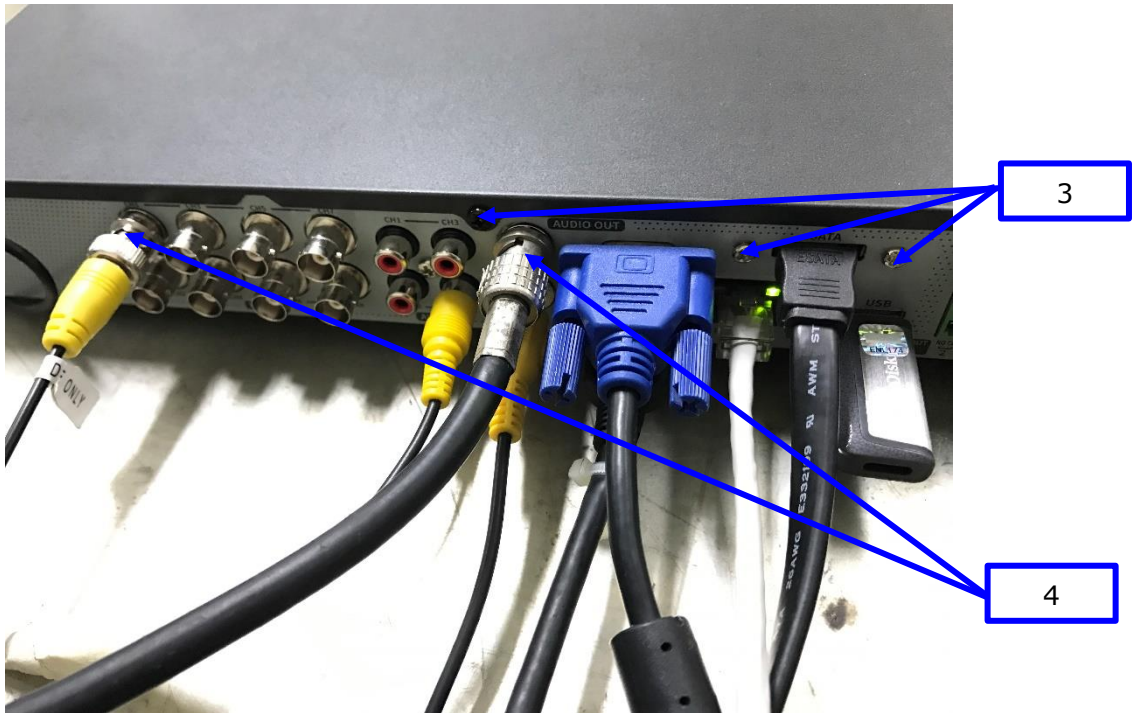
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Location of Discharge:

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	Enclosure	Contact Discharge	Complied	-
2	USB 2.0 Port	Contact Discharge	Complied	-
3	Screw	Contact Discharge	Complied	-
4	BNC 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.

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3.2 Radiated Electric Field Immunity

Reference Standard

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

Test Date

Jul. 19, 2017

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	-	-
☒	SIGNAL GENERATOR	SMB 100A	R & S	177586	08, 08, 2017
☒	BROADBAND AMPLIFIER	BBA100	R & S	101239	08, 08, 2017
☒	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 08, 2017
☒	POWER METER	NRP2	R & S	103475	08, 08, 2017
☒	AVG POWER SENSOR	NRP-Z91	R & S	102526	08, 08, 2017
☒	AVG POWER SENSOR	NRP-Z91	R & S	102527	08, 08, 2017
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	MICROPHONE	MP201	BSWA	520963	11, 11, 2017
☒	SOUND ACOUSTIC TESTER	TST-1000	TESTEK	150045	11, 08, 2017

Test Conditions

Temperature: 24,4 °C
Relative Humidity: 53,3 %
Atmospheric Pressure: 99,2 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

Jul. 20, 2017

Test Location

EMS-EFT: Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.3.9	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N5T	EM TEST	P1317117973	02, 08, 2018
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	02, 08, 2018
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	070925	06, 26, 2018

Test Conditions

Temperature: 23,4 °C
Relative Humidity: 46,9 %
Atmospheric Pressure: 99,2 kPa

Test Specifications

Pulse Amplitude & Polarity:
(AC Power Lines) ☐ ± 1.0 kV ☒ ± 2.0 kV
☐ ± 4.0 kV

Pulse Amplitude & Polarity:
(Other supply / Signal Lines) ☐ ± 0.5 kV ☒ ± 1.0 kV
☐ ± 2.0 kV

Burst Period: ☒ 300 ms ☐ 2 s

Repetition Rate: ☐ 5 kHz ☒ 100 kHz

Duration of Test Voltage: ☒ ≥ 1 min

Required Performance Criteria: ☒ Complied



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)
CCTV CAMERA (BNC)	Complied	Complied
CONTROLLER (2 PIN)	Complied	Complied
ALARM 1,2 (3 PIN)	Complied	Complied
RJ-45	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

Jul. 20, 2017

Test Location

EMS-Surge: Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.3.9	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N5T	EM TEST	P1317117973	02, 08, 2018
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	02, 08, 2018
☒	CDN	CNV 508T5	EM TEST	P1549168422	04, 26, 2018

Test Conditions

Temperature: 23,4 °C
Relative Humidity: 46,9 %
Atmospheric Pressure: 99.2 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

**Test Data**☒ Line to Line – Differential Mode

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

☐ Line to Earth – Common Mode

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

Signal Lines☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
CONTROLLER (2 PIN)	Complied	Complied
ALARM 1,2 (3 PIN)	Complied	Complied
RJ-45	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

Jul. 20, 2017

Test Location

EMS-CS: Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	icd.control	EM TEST	5.3.7	-
☒	CONTINUOUS WAVE SIMULATOR	CWS 500N1	EM TEST	V0936105119	08, 08, 2017
☒	ATTENUATOR	ATT6	EM TEST	1208-34	08, 08, 2017
☒	CDN	CDN-M2/M3N	EM TEST	0909-06	08, 08, 2017
☒	CDN	CDN T8RJ45	EM TEST	0909-09	08, 08, 2017
☒	EM INJECTION CLAMP	EM 101	Liithi	35943	02, 03, 2018
☒	MICROPHONE	MP201	BSWA	520963	11, 11, 2017
☒	SOUND ACOUSTIC TESTER	TST-1000	TESTEK	150045	11, 08, 2017

Test Conditions

Temperature: 23,4 °C
Relative Humidity: 46,9 %
Atmospheric Pressure: 99,2 kPa



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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
CCTV CAMERA (BNC)	Complied	Complied
CONTROLLER (2 PIN)	Complied	Complied
ALARM 1,2 (3 PIN)	Complied	Complied
RJ-45	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 61000-4-11:2004

Test Date

Jul. 20, 2017

Test Location

EMS-Voltage dip: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.3.9	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N5T	EM TEST	P1317117973	02, 08, 2018
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	02, 08, 2018

Test Conditions

Temperature: 23,4 °C
Relative Humidity: 46,9 %
Atmospheric Pressure: 99,2 kPa



Test Specifications & Observations/Remarks

(Test Voltage : 50 Hz)

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

Remarks

PASS Required Performance Criteria.

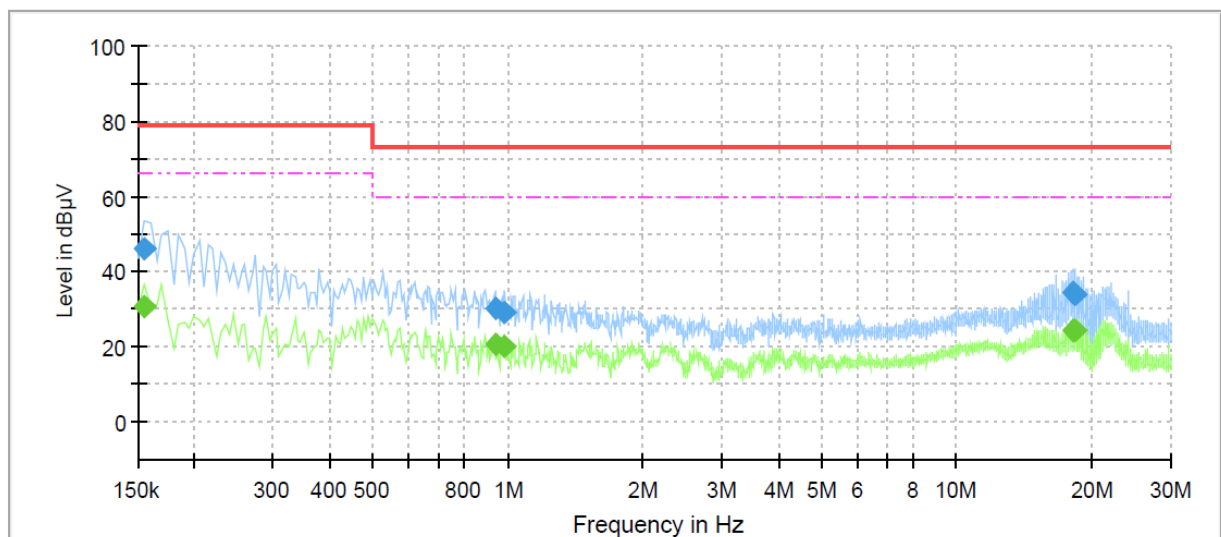
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description: Conducted Emission
Model No.: HRD-841P
Mode: H
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	30.89	66.00	35.11	1000.0	9.000	L1	21.0
0.155000	46.05	---	79.00	32.95	1000.0	9.000	L1	21.0
0.935000	---	20.81	60.00	39.19	1000.0	9.000	L1	20.2
0.935000	30.02	---	73.00	42.98	1000.0	9.000	L1	20.2
0.985000	---	20.24	60.00	39.76	1000.0	9.000	L1	20.1
0.985000	29.26	---	73.00	43.74	1000.0	9.000	L1	20.1
18.090000	---	24.30	60.00	35.70	1000.0	9.000	L1	20.2
18.090000	34.58	---	73.00	38.42	1000.0	9.000	L1	20.2
18.280000	---	24.40	60.00	35.60	1000.0	9.000	L1	20.3
18.280000	34.03	---	73.00	38.97	1000.0	9.000	L1	20.3

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

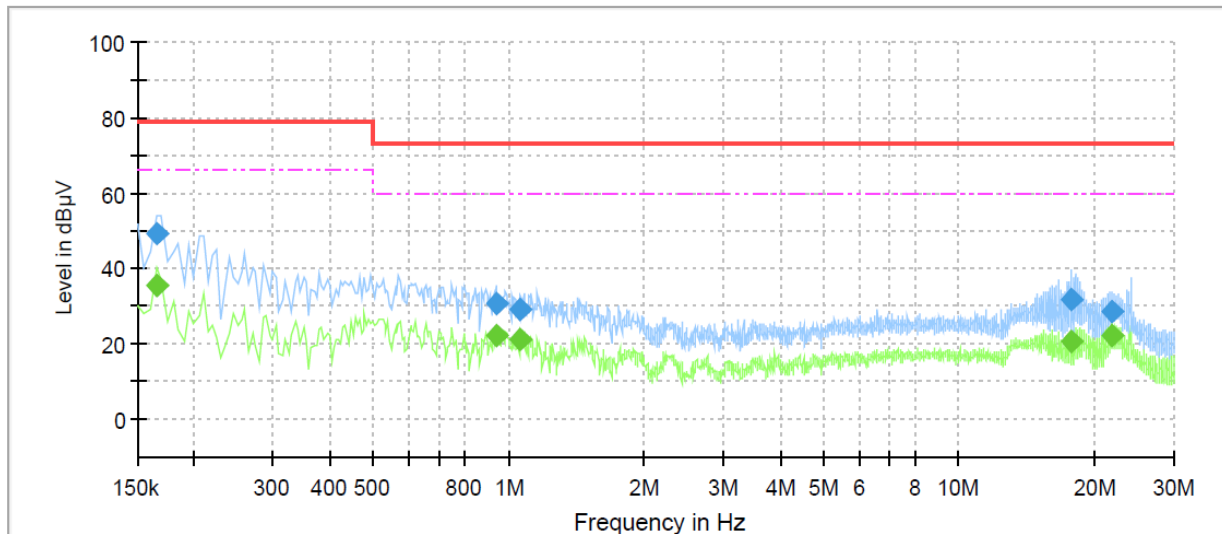
Reading Value : Not shown in the table.

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

[NEUTRAL]

Common Information

Test Description: Conducted Emission
Model No.: HRD-841P
Mode: N
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.165000	---	35.45	66.00	30.55	1000.0	9.000	N	21.0
0.165000	49.11	---	79.00	29.89	1000.0	9.000	N	21.0
0.935000	---	22.03	60.00	37.97	1000.0	9.000	N	20.2
0.935000	30.76	---	73.00	42.24	1000.0	9.000	N	20.2
1.065000	---	21.16	60.00	38.84	1000.0	9.000	N	20.1
1.065000	29.02	---	73.00	43.98	1000.0	9.000	N	20.1
17.850000	---	20.55	60.00	39.45	1000.0	9.000	N	20.1
17.850000	31.80	---	73.00	41.20	1000.0	9.000	N	20.1
21.800000	---	22.36	60.00	37.64	1000.0	9.000	N	20.2
21.800000	28.60	---	73.00	44.40	1000.0	9.000	N	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 (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

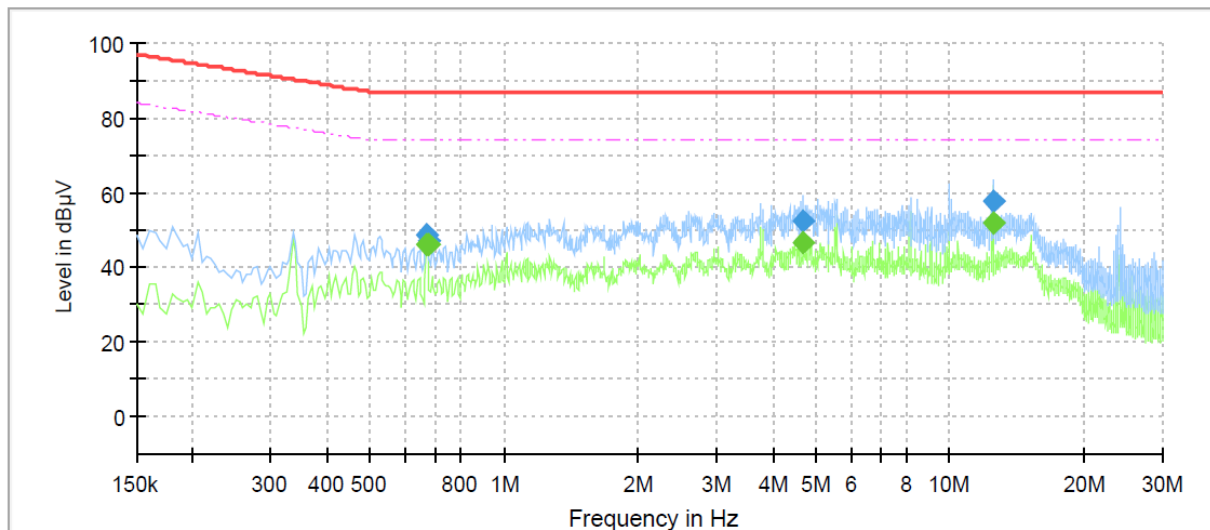


Conducted Emissions at Telecommunication Ports

[10 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: HRD-841P
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)
0.670000	---	46.24	74.00	27.76	1000.0	9.000	Single Line	20.6
0.670000	48.65	---	87.00	38.35	1000.0	9.000	Single Line	20.6
0.675000	---	46.20	74.00	27.80	1000.0	9.000	Single Line	20.6
0.675000	47.35	---	87.00	39.65	1000.0	9.000	Single Line	20.6
4.675000	---	46.42	74.00	27.58	1000.0	9.000	Single Line	19.8
4.675000	52.28	---	87.00	34.72	1000.0	9.000	Single Line	19.8
12.500000	---	52.12	74.00	21.88	1000.0	9.000	Single Line	20.0
12.500000	57.82	---	87.00	29.18	1000.0	9.000	Single Line	20.0

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

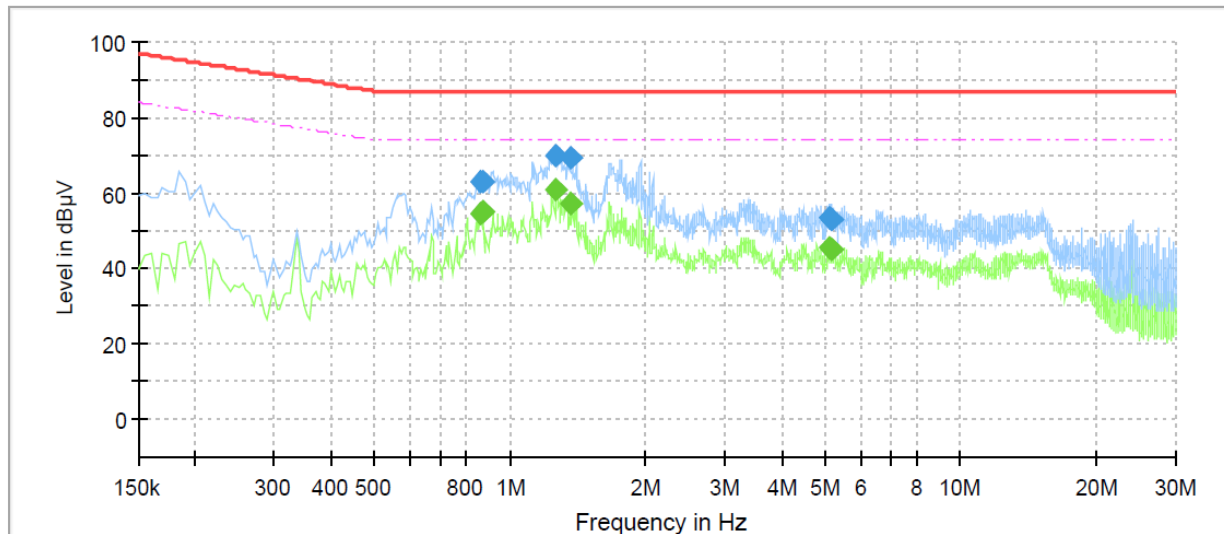
Corr. : Correction values (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))



[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: HRD-841P
Mode: 100 Mbps
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.860000	---	54.67	74.00	19.33	1000.0	9.000	Single Line	20.0
0.860000	63.07	---	87.00	23.93	1000.0	9.000	Single Line	20.0
0.870000	---	55.05	74.00	18.95	1000.0	9.000	Single Line	20.0
0.870000	62.93	---	87.00	24.07	1000.0	9.000	Single Line	20.0
1.265000	---	60.88	74.00	13.12	1000.0	9.000	Single Line	19.7
1.265000	69.73	---	87.00	17.27	1000.0	9.000	Single Line	19.7
1.365000	---	57.37	74.00	16.63	1000.0	9.000	Single Line	19.7
1.365000	69.28	---	87.00	17.72	1000.0	9.000	Single Line	19.7
5.130000	---	45.79	74.00	28.21	1000.0	9.000	Single Line	19.3
5.130000	53.70	---	87.00	33.30	1000.0	9.000	Single Line	19.3
5.190000	---	44.93	74.00	29.07	1000.0	9.000	Single Line	19.3
5.190000	52.82	---	87.00	34.18	1000.0	9.000	Single Line	19.3

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

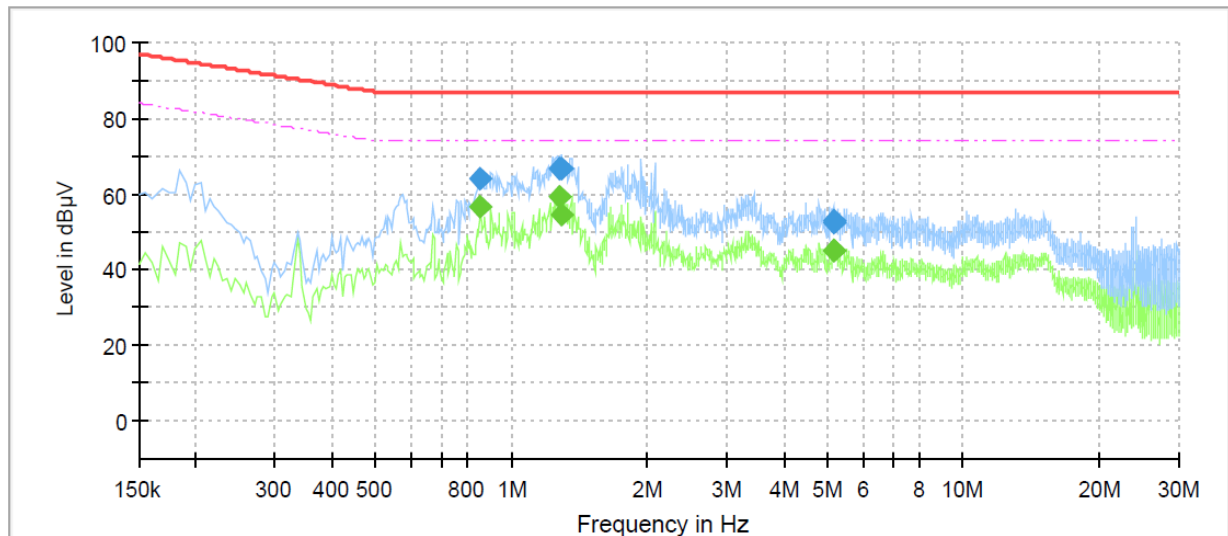
Reading Value : Not shown in the table.

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

[1 000 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: HRD-841P
Mode: 1 000 Mbps
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.855000	---	56.61	74.00	17.39	1000.0	9.000	Single Line	19.9
0.855000	64.19	---	87.00	22.81	1000.0	9.000	Single Line	19.9
1.275000	---	59.15	74.00	14.85	1000.0	9.000	Single Line	19.6
1.275000	66.79	---	87.00	20.21	1000.0	9.000	Single Line	19.6
1.285000	---	54.51	74.00	19.49	1000.0	9.000	Single Line	19.6
1.285000	66.60	---	87.00	20.40	1000.0	9.000	Single Line	19.6
5.190000	---	44.90	74.00	29.10	1000.0	9.000	Single Line	19.3
5.190000	52.75	---	87.00	34.25	1000.0	9.000	Single Line	19.3
5.195000	---	44.79	74.00	29.21	1000.0	9.000	Single Line	19.3
5.195000	52.35	---	87.00	34.65	1000.0	9.000	Single Line	19.3

◆ Calculation

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

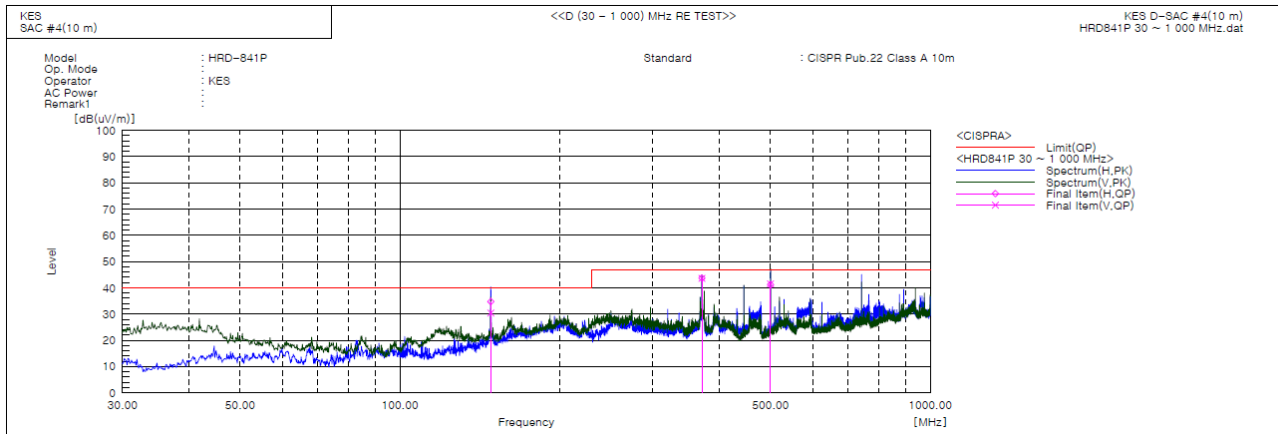
QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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



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	148.467	V	61.8	-31.4	30.4	40.0	9.6	150.0	51.0	
2	148.465	H	66.1	-31.4	34.7	40.0	5.3	400.0	7.0	
3	371.197	H	64.9	-21.2	43.7	47.0	3.3	200.0	70.0	
4	371.190	V	64.8	-21.2	43.6	47.0	3.4	400.0	43.0	
5	499.965	V	59.0	-17.5	41.5	47.0	5.5	100.0	359.0	
6	500.086	H	58.7	-17.5	41.2	47.0	5.8	400.0	214.0	

◆ Calculation – SAC #4(10 m)

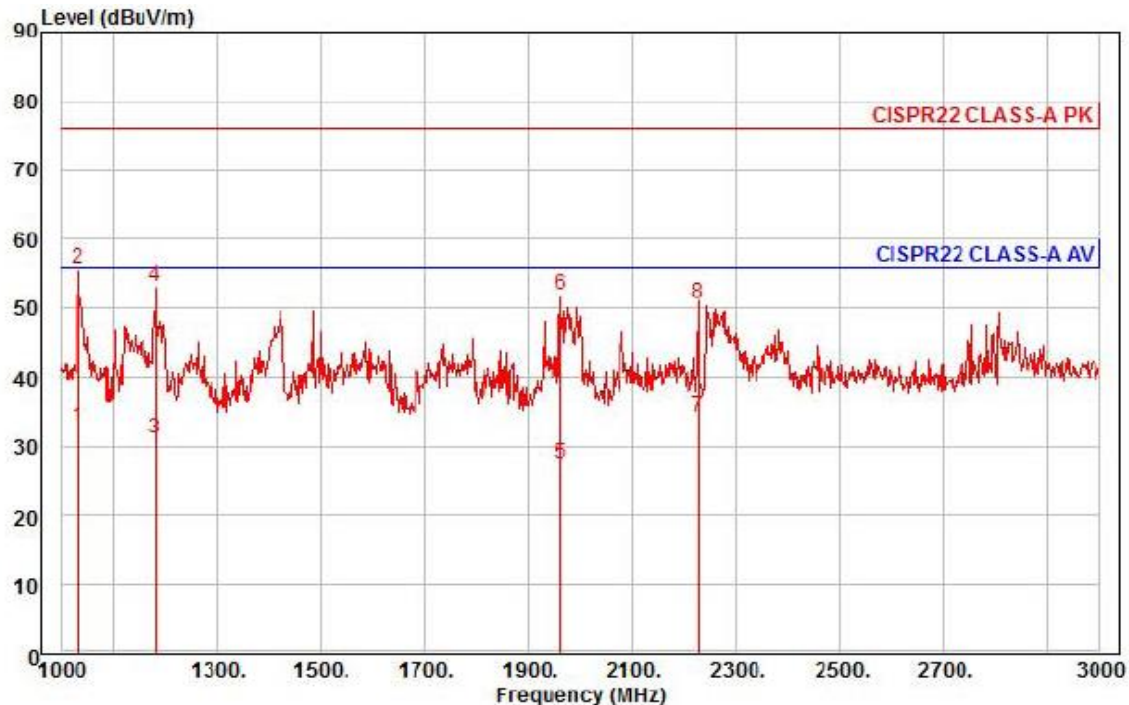
Result(QP) [dB(μV/m)] = (Reading(QP)[dB(μV)] + c.f[dB(1/m)])

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

Radiated Electric Field Emissions(Above 1 GHz)



Site : chamber

Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto

Project :

Model : HRD-841P

Mode :

Memo :

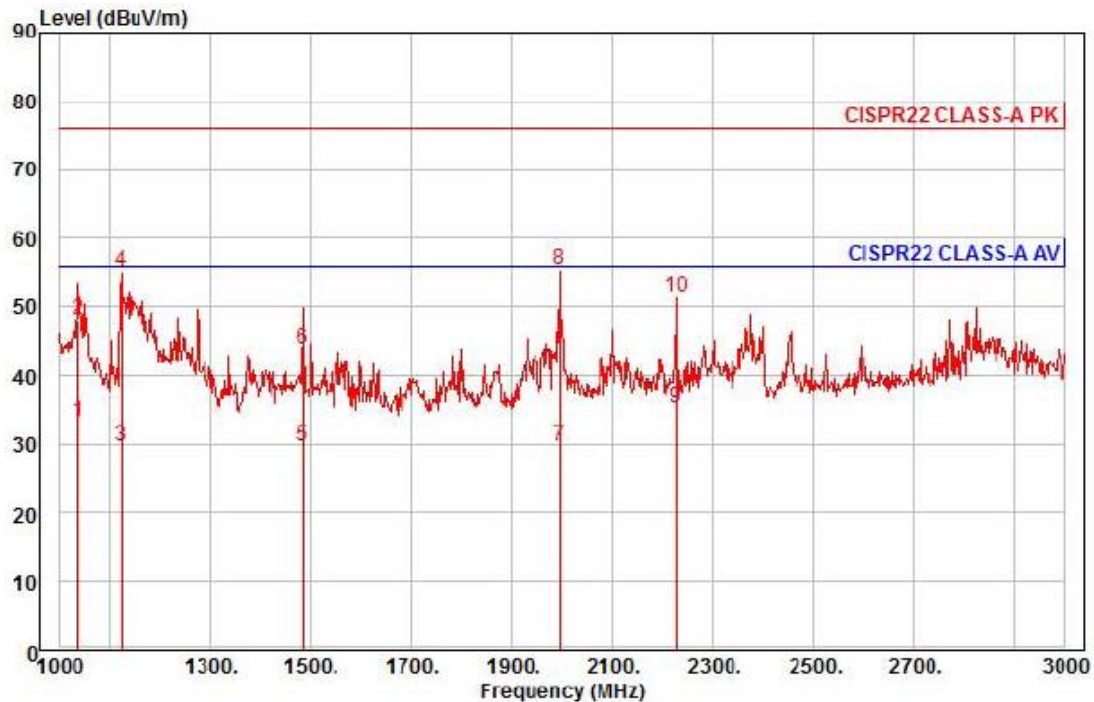
	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1032.00	39.70	22.60	6.58	36.03	323	56.00	-23.15	horizontal	Average
2 pp	1032.00	62.49	22.60	6.58	36.03	323	76.00	-20.36	horizontal	Peak
3	1182.00	36.84	23.05	7.08	35.90	0	56.00	-24.93	horizontal	Average
4	1182.00	59.09	23.05	7.08	35.90	0	76.00	-22.68	horizontal	Peak
5	1962.00	27.60	25.86	9.24	35.20	14	56.00	-28.50	horizontal	Average
6	1962.00	52.15	25.86	9.24	35.20	14	76.00	-23.95	horizontal	Peak
7 av	2228.00	32.97	26.70	9.87	35.26	79	56.00	-21.72	horizontal	Average
8	2228.00	49.41	26.70	9.87	35.26	79	76.00	-25.28	horizontal	Peak

◆ Calculation

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

Over Limit : Margin, Read Level : Reading value, Ant Factor : ANT Factor,

Cable Loss : Cable loss, Preamp Factor : Preamp Factor



Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-841P
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	1038.00	40.23	22.62	6.60	36.03	31	56.00	-22.58	vertical	Average
2	1038.00	54.83	22.62	6.60	36.03	31	76.00	-27.98	vertical	Peak
3	1122.00	35.91	22.87	6.88	35.95	275	56.00	-26.29	vertical	Average
4	1122.00	61.38	22.87	6.88	35.95	275	76.00	-20.82	vertical	Peak
5	1484.00	33.42	23.97	7.97	35.63	341	56.00	-26.27	vertical	Average
6	1484.00	47.66	23.97	7.97	35.63	341	76.00	-32.03	vertical	Peak
7	1996.00	29.43	25.99	9.33	35.17	159	56.00	-26.42	vertical	Average
8 pp	1996.00	55.37	25.99	9.33	35.17	159	76.00	-20.48	vertical	Peak
9 av	2228.00	33.98	26.70	9.87	35.26	1	56.00	-20.71	vertical	Average
10	2228.00	50.21	26.70	9.87	35.26	1	76.00	-24.48	vertical	Peak

◆ Calculation

Over Limit [dB] = (Read Level[dB μ V] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dB μ V]

Over Limit : Margin, Read Level : Reading value, Ant Factor : ANT Factor,

Cable Loss : Cable loss, Preamp Factor : Preamp Factor



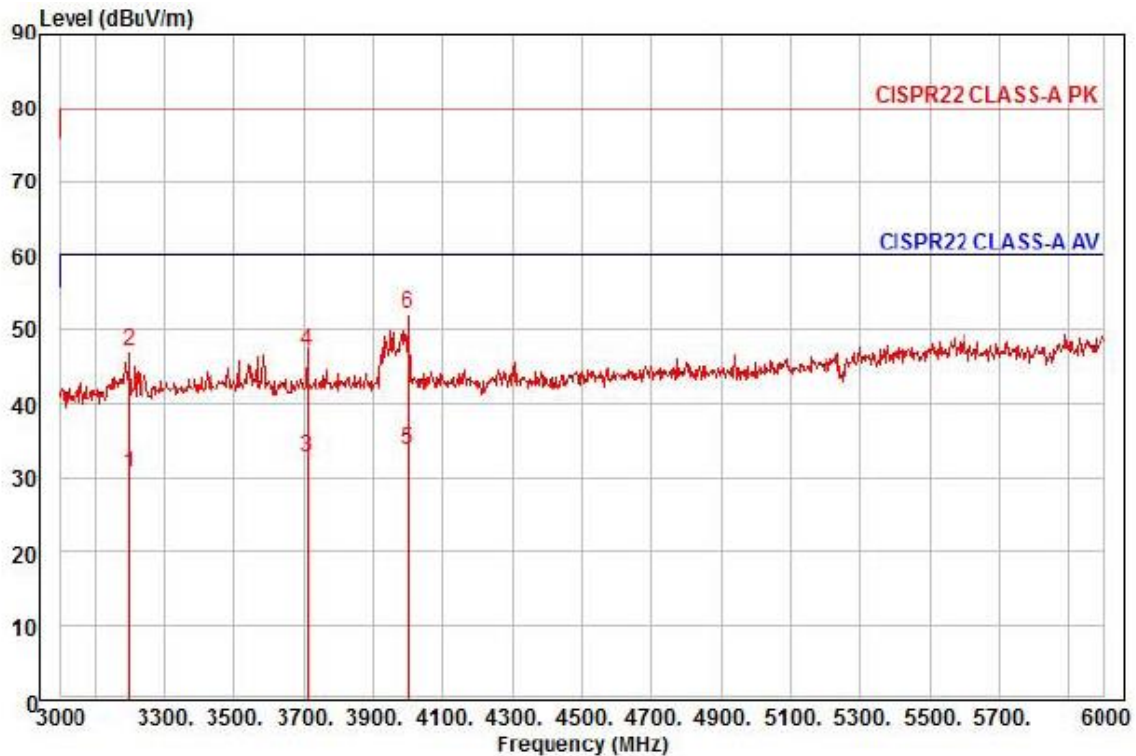
KES Co., Ltd.

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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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www.kes.co.kr

Test report No.:

KES-E1-17T0462-R1

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Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-841P
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	3198.00	23.78	30.30	12.05	35.50	291	60.00	-29.37	horizontal	Average
2	3198.00	40.21	30.30	12.05	35.50	291	80.00	-32.94	horizontal	Peak
3	3711.00	23.45	31.72	13.01	35.36	68	60.00	-27.18	horizontal	Average
4	3711.00	37.83	31.72	13.01	35.36	68	80.00	-32.80	horizontal	Peak
5 pp	3999.00	23.14	32.50	13.56	35.28	36	60.00	-26.08	horizontal	Average
6 pk	3999.00	41.42	32.50	13.56	35.28	36	80.00	-27.80	horizontal	Peak

◆ Calculation

Over Limit [dB] = (Read Level[dB μ V] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dB μ V]

Over Limit : Margin, Read Level : Reading value, Ant Factor : ANT Factor,

Cable Loss : Cable loss, Preamp Factor : Preamp Factor

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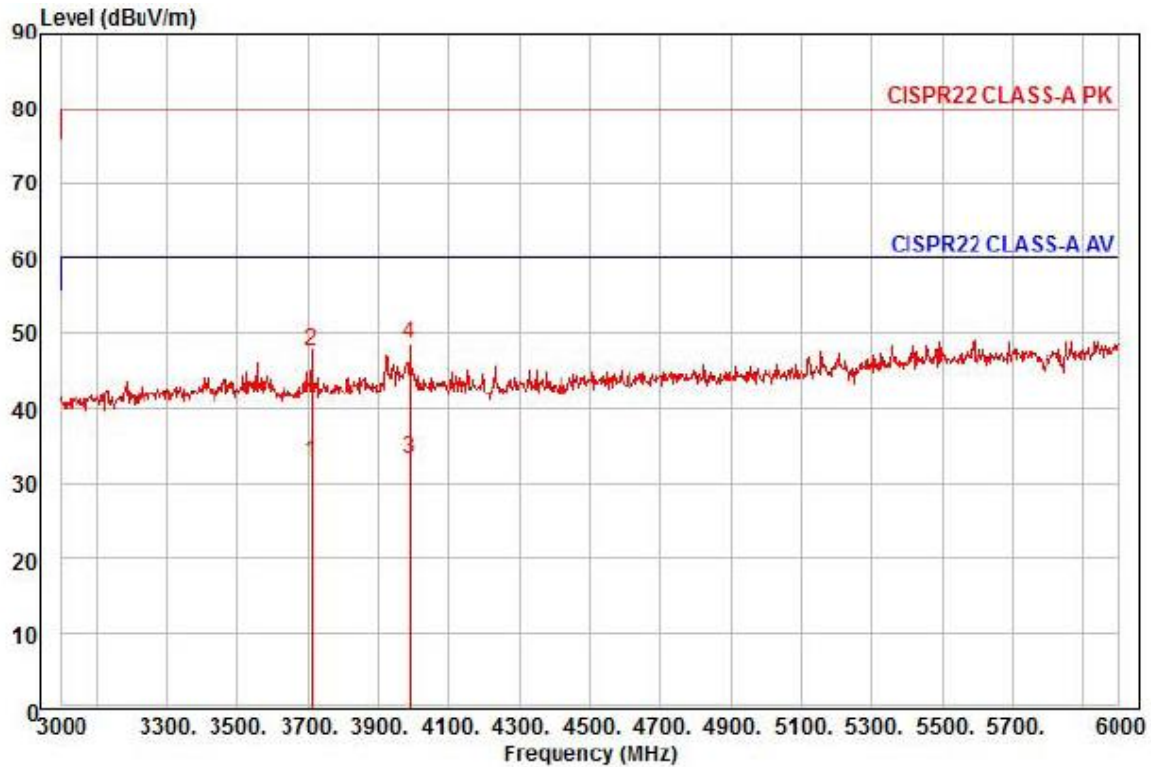
KES Co., Ltd.

C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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Test report No.:

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Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-841P
Mode :
Memo :

	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	3711.00	23.37	31.72	13.01	35.36	327	60.00	-27.26	vertical
2	3711.00	38.11	31.72	13.01	35.36	327	80.00	-32.52	vertical
3 pp	3987.00	22.69	32.46	13.54	35.28	354	60.00	-26.59	vertical
4 pk	3987.00	37.79	32.46	13.54	35.28	354	80.00	-31.49	vertical

◆ Calculation

Over Limit [dB] = (Read Level[dB μ V] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dB μ V]

Over Limit : Margin, Read Level : Reading value, Ant Factor : ANT Factor,

Cable Loss : Cable loss, Preamp Factor : Preamp Factor

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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	79.065E-3			
2	2.710E-3			PASS
3	73.765E-3	3.207	2.30	PASS
4	3.774E-3			PASS
5	71.932E-3	6.310	1.14	PASS
6	4.147E-3			PASS
7	70.567E-3	9.165	770.00E-3	PASS
8	3.212E-3			PASS
9	68.871E-3	17.218	400.00E-3	PASS
10	3.374E-3			PASS
11	66.039E-3	20.012	330.00E-3	PASS
12	3.462E-3			PASS
13	62.617E-3	29.818	210.00E-3	PASS
14	3.290E-3			PASS
15	59.009E-3	39.340	150.00E-3	PASS
16	3.031E-3			PASS
17	55.226E-3	41.727	132.35E-3	PASS
18	3.094E-3			PASS
19	51.188E-3	43.226	118.42E-3	PASS
20	3.039E-3			PASS
21	46.821E-3	29.134	160.71E-3	PASS
22	2.898E-3			PASS
23	42.542E-3	28.990	146.74E-3	PASS
24	2.642E-3			PASS
25	38.118E-3	28.236	135.00E-3	PASS
26	2.467E-3			PASS
27	33.658E-3	26.928	124.99E-3	PASS
28	2.377E-3			PASS
29	29.282E-3	25.159	116.39E-3	PASS
30	2.166E-3			PASS
31	25.055E-3	23.013	108.87E-3	PASS
32	1.966E-3			PASS
33	21.104E-3	20.635	102.27E-3	PASS
34	1.768E-3			PASS
35	17.314E-3	17.954	96.44E-3	PASS
36	1.497E-3			PASS
37	13.757E-3	15.082	91.21E-3	PASS
38	1.346E-3			PASS
39	10.649E-3	12.306	86.53E-3	PASS
40	1.225E-3			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	79.769E-3			
2	3.247E-3			PASS
3	74.483E-3	2.159	3.45	PASS
4	4.262E-3			PASS
5	73.370E-3	4.291	1.71	PASS
6	5.097E-3	1.133	450.00E-3	PASS
7	71.252E-3	6.169	1.15	PASS
8	3.625E-3			PASS
9	69.556E-3	11.593	600.00E-3	PASS
10	3.921E-3			PASS
11	66.685E-3	13.472	495.00E-3	PASS
12	4.163E-3			PASS
13	63.186E-3	20.059	315.00E-3	PASS
14	4.043E-3			PASS
15	59.637E-3	26.505	225.00E-3	PASS
16	3.724E-3			PASS
17	55.778E-3	28.096	198.52E-3	PASS
18	3.677E-3			PASS
19	51.717E-3	29.115	177.63E-3	PASS
20	3.458E-3			PASS
21	47.159E-3	29.344	160.71E-3	PASS
22	3.323E-3			PASS
23	42.796E-3	29.164	146.74E-3	PASS
24	3.197E-3			PASS
25	38.317E-3	28.383	135.00E-3	PASS
26	2.897E-3			PASS
27	33.863E-3	27.091	124.99E-3	PASS
28	2.852E-3			PASS
29	29.413E-3	25.273	116.39E-3	PASS
30	2.507E-3			PASS
31	25.214E-3	23.159	108.87E-3	PASS
32	2.264E-3			PASS
33	21.508E-3	21.031	102.27E-3	PASS
34	2.060E-3			PASS
35	17.470E-3	18.116	96.44E-3	PASS
36	1.733E-3			PASS
37	13.876E-3	15.212	91.21E-3	PASS
38	1.528E-3			PASS
39	11.027E-3	12.743	86.53E-3	PASS
40	1.375E-3			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.

**KES Co., Ltd.**

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Test report No.:

KES-E1-17T0462-R1

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Test Data - Voltage Fluctuations

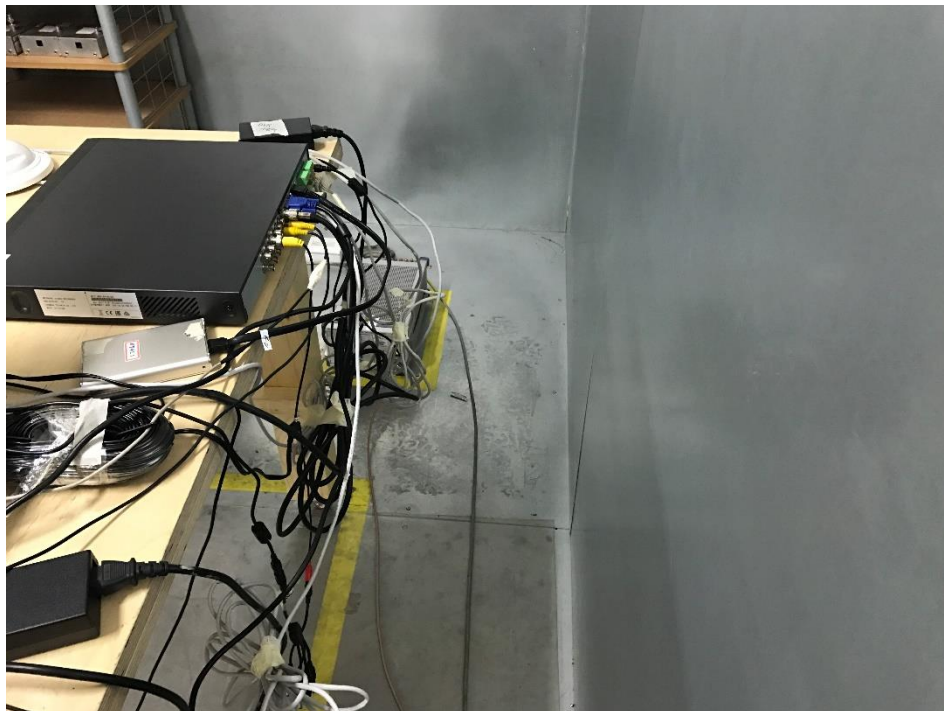
Maximum Flicker results

	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.034	4.00	PASS
Tmax [s]	0.000	0.50	PASS

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Test Setup Photos and Configuration

Conducted Voltage Emissions



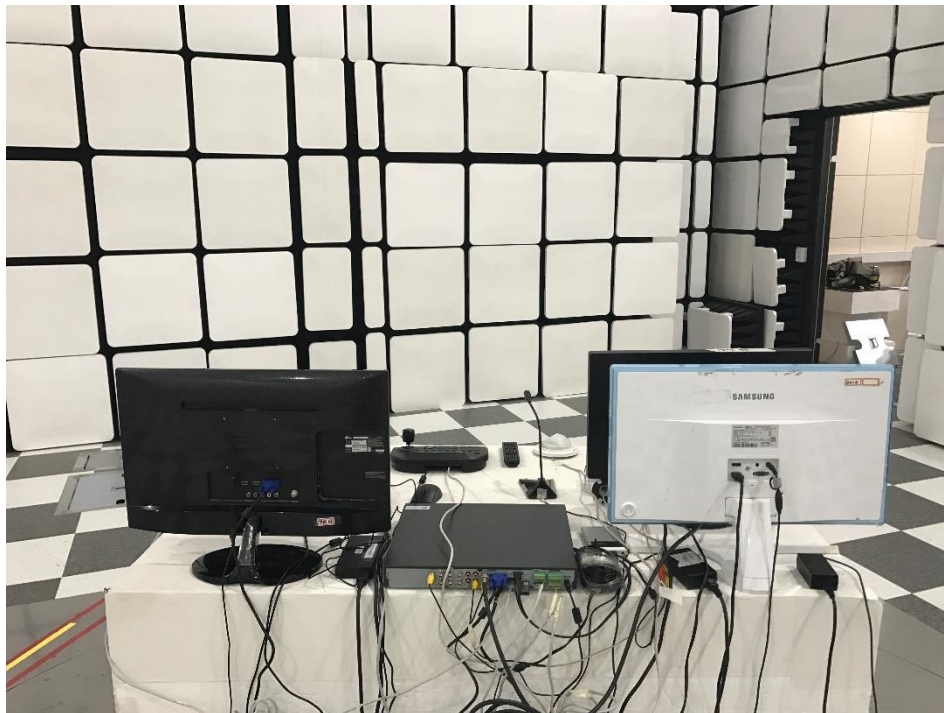
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Conducted Telecommunication Emissions



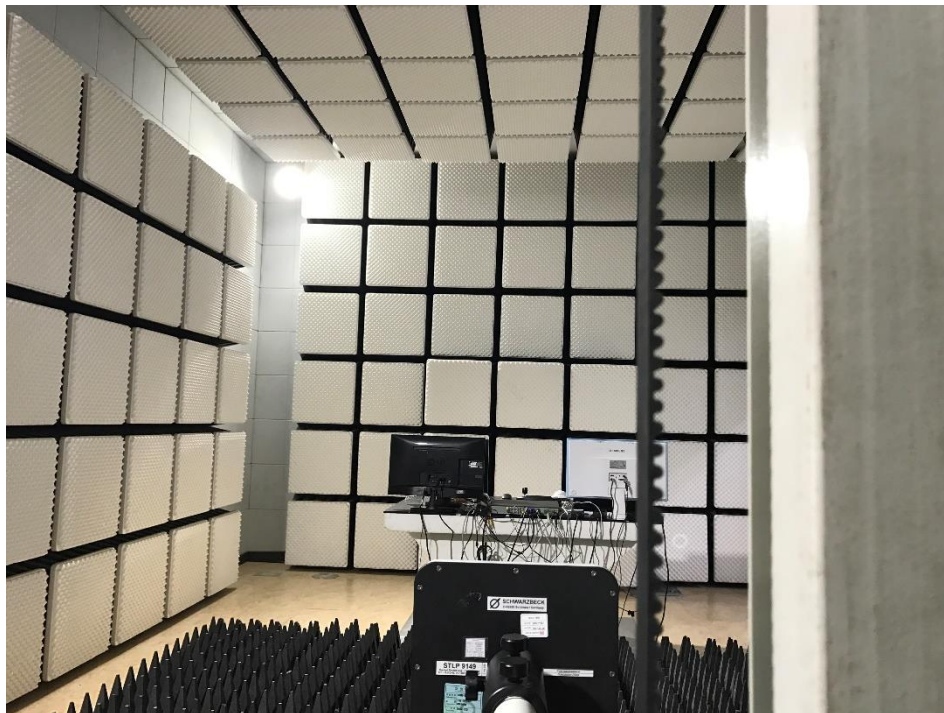
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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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Harmonic Current Emissions and Voltage Fluctuations and Flicker

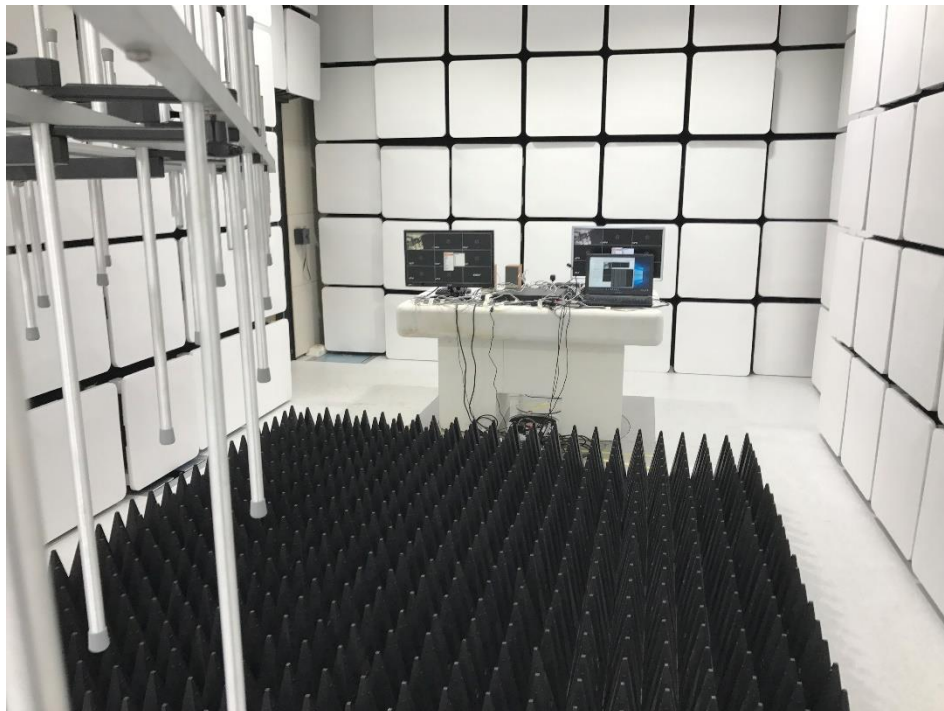


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Electrostatic Discharge



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

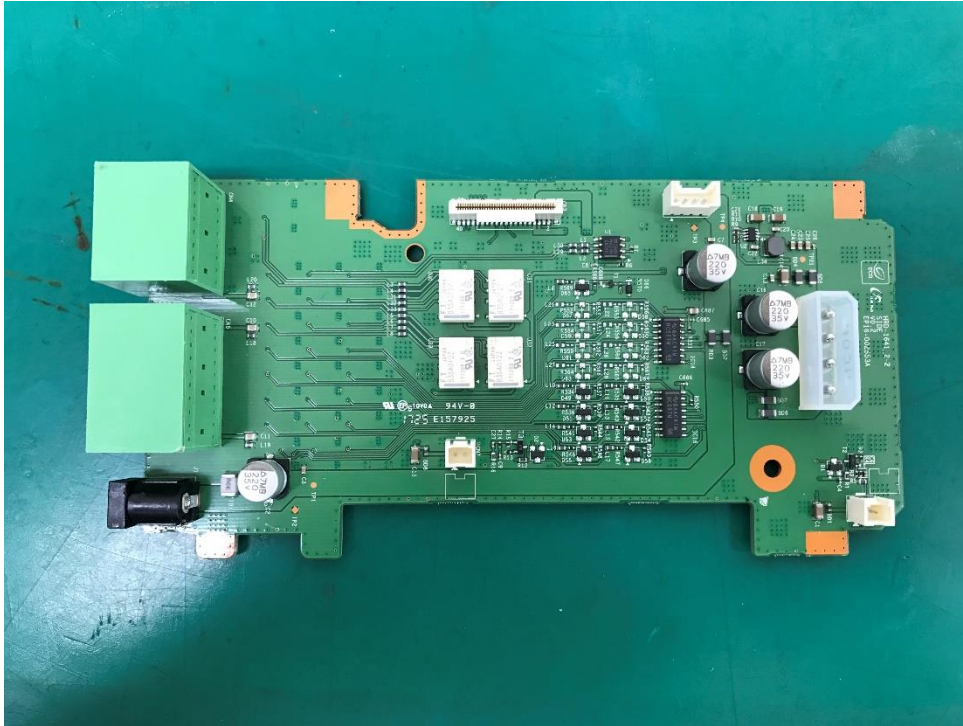
(Internal View)



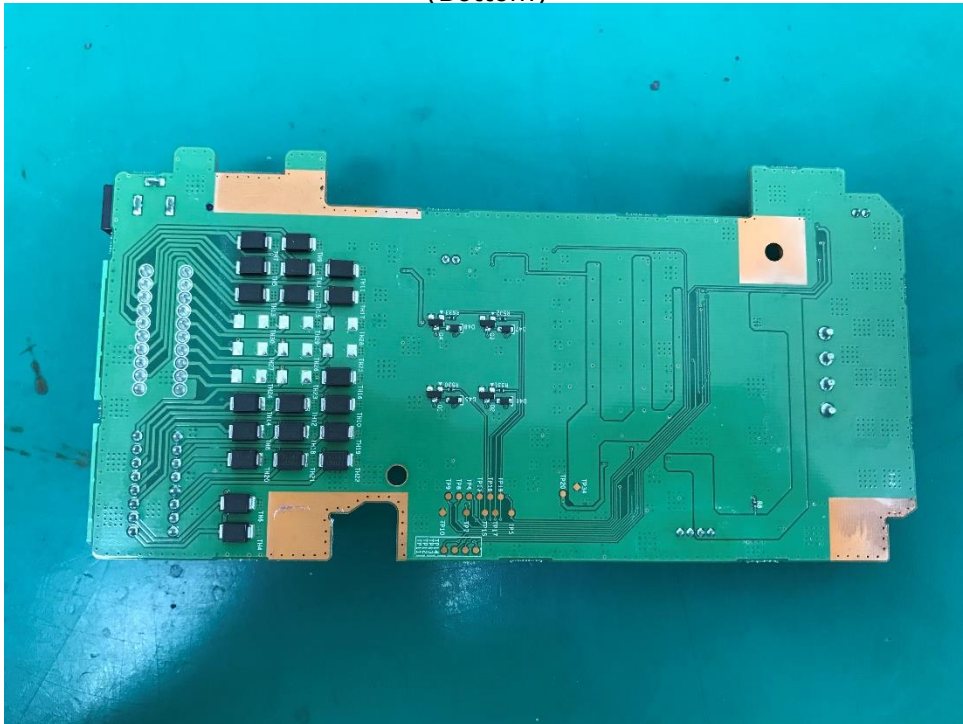
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EUT Internal View – Board 1

(Top)



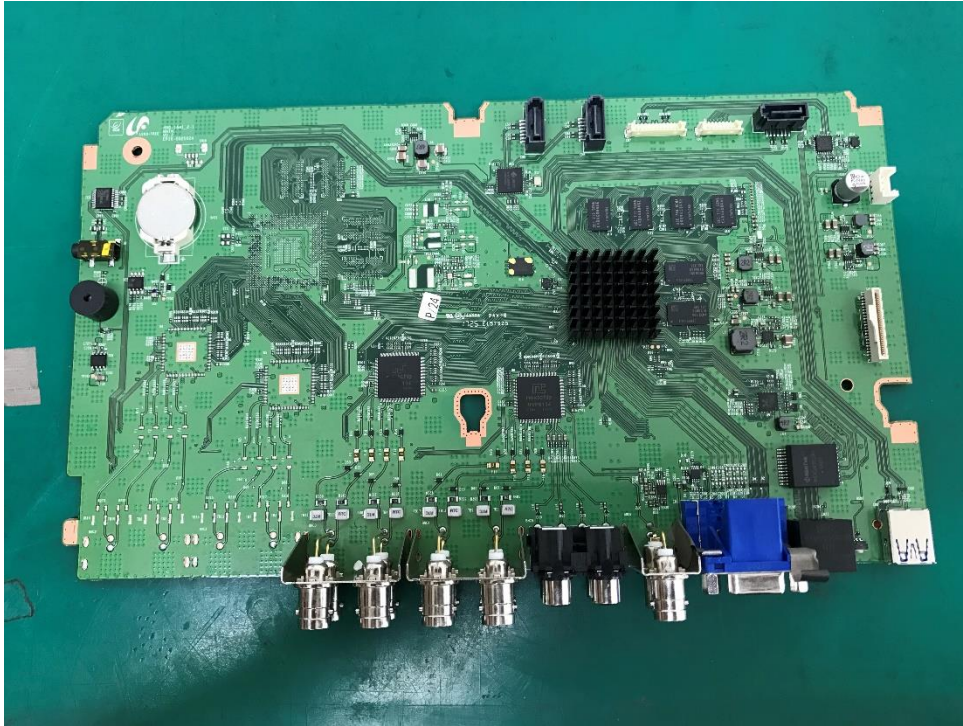
(Bottom)



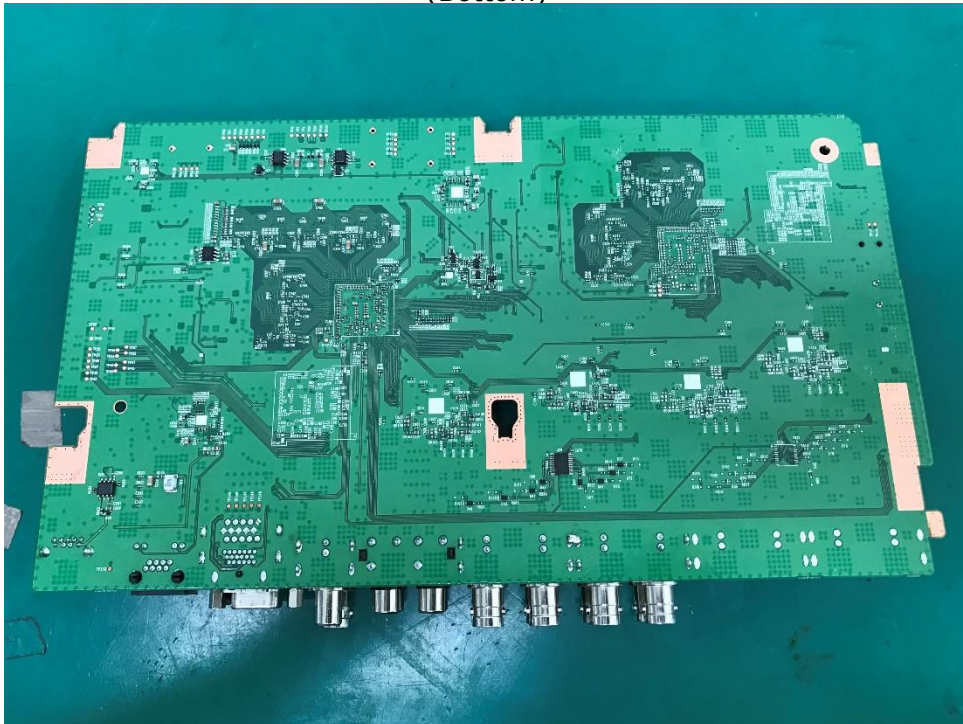
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EUT Internal View – Board 2

(Top)



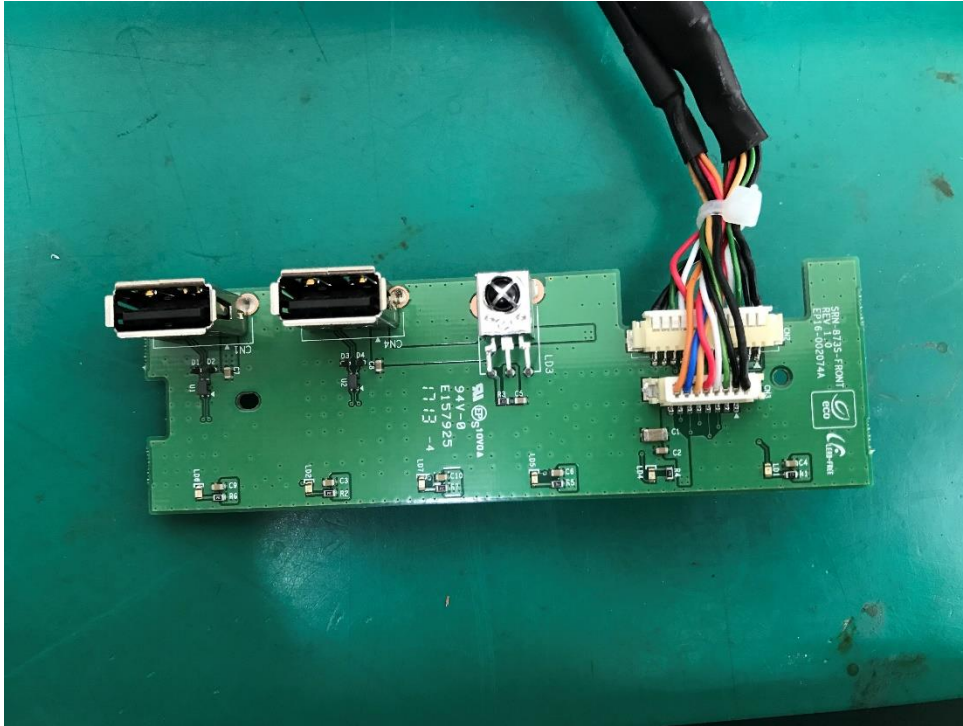
(Bottom)



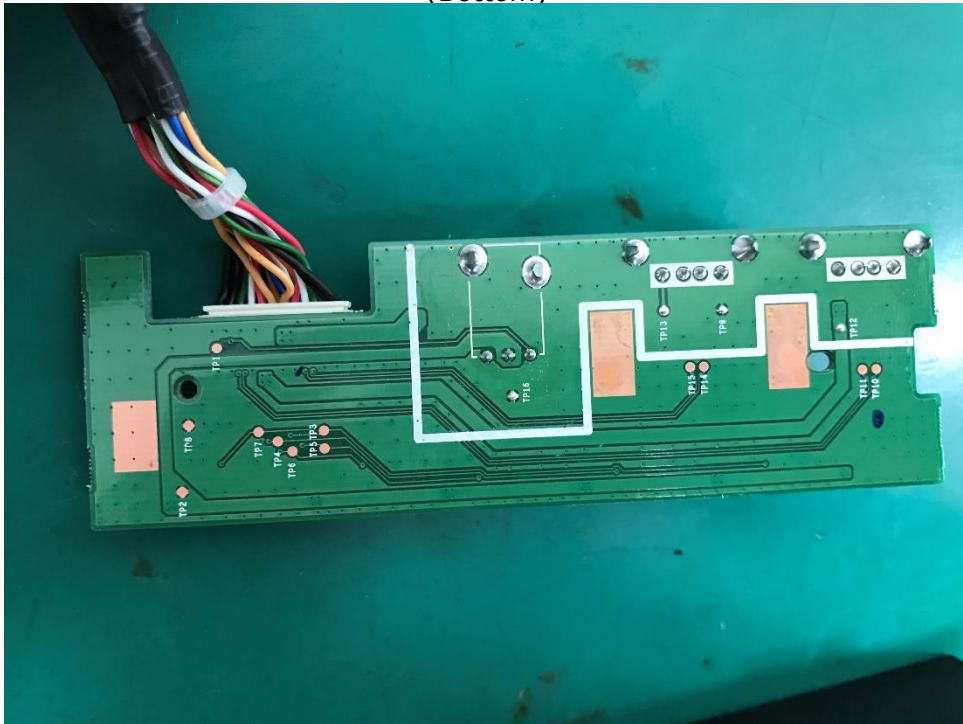
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EUT Internal View – Board 3

(Top)

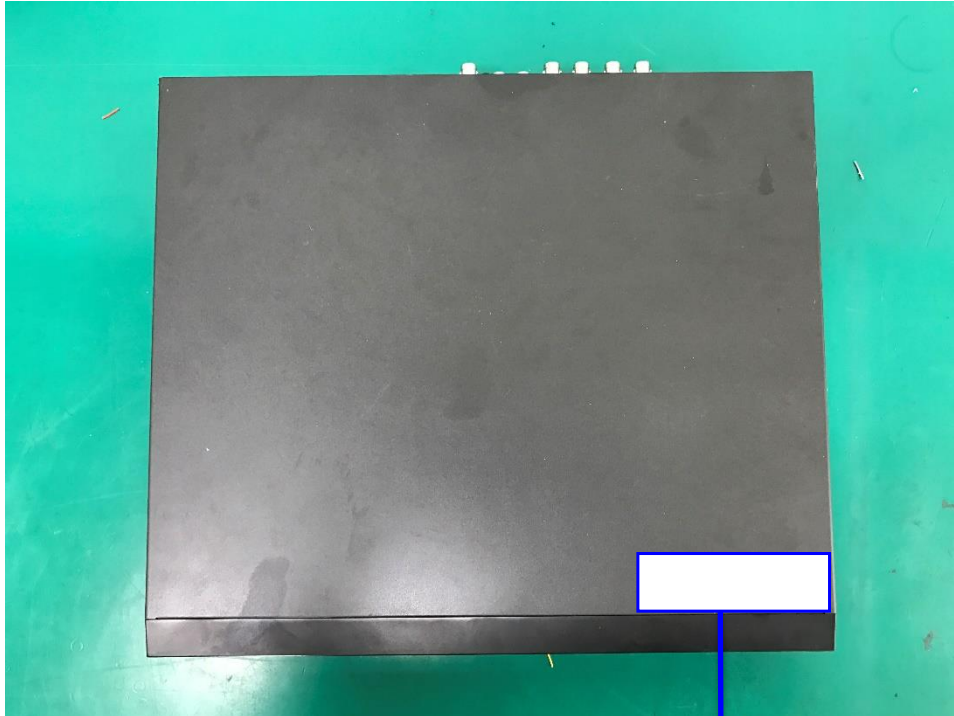


(Bottom)



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Label and Location



DVR

Model No : HRD-841P

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

Made in of China

