



EMC TEST REPORT For CE

Test Report No. : KES-E1-18T0284
Date of Issue : Apr. 26, 2018
Product name : PC NVR
Model/Type No. : PRP-5000H16
Variant Model : -
Applicant : Hanwha Teschwin Co., Ltd.
Applicant Address : 6, Pangyo-ro 319 Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13488, KOREA
Manufacturer : Dream I System co.,Ltd.
Manufacturer Address : #510.Daerung Post Tower 6. 50-3 Gasan-dong, Geumcheon-gu,
Seoul, Korea
Date of Receipt : Apr. 10, 2018
Test date : Apr. 20, 2018 ~ Apr. 23, 2018
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

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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. 26, 2018	KES-E1-18T0284	Issued

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1.0 General Product Description

Main Specifications of EUT are:

			PRP-5000H16
디스플레이			
디스플레이	네트워크 카메라	입력	Max. 128CH
		해상도	CIF ~ 12MP
		프로토콜	Wisenet, ONVIF
	라이브	모니터 출력	VGA, DVI, HDMI
		분할화면	1/4/9/16/25/36/49/64/72/100/121/132/Custom/Auto Mode
		압축 방식	H.264, H.265, MPEG-4, MJPEG
기능 / 성능			
운영체제		Windows 10 IoT Enterprise	
CMS		SSM preinstalled	
하드웨어	PROCESSOR	Xeon E3-1275 v5 (8M Cache 3.6GHz)	
	MEMORY	Unbuffered ECC DDR3 8GB x2	
	OS DISK	M.2 SSD 128G	
	DRIVER TYPE	SATA 6Gb/s	
	HDD	3.5" 16EA Hot Swap (Max 160TB)	
	RAID	0, 1, 5, 6	
	DISPLAY PORT	VGA, DVI, HDMI	
	NETWORK	Gigabit Ethernet RJ-45 (1000 Base-T) x2, IPMI	
전원/환경/기구			
Electric	AC INPUT	100 ~ 240VAC, 50 ~ 60Hz	
	POWER SUPPLY	Redundant 500W x2	
	CURRENT(Max)	4A (100V); 2A (240V)	
Environmental	OPERATING	+5°C to +40°C(+41°F to +104°F) / Less than 80%	
Mechanical	COLOR/MATERIAL	Silver / Metal	
	FORM FACTOR	3U, 19" Rackmount	
	DIMENSIONS (WxHxD)	447 x 131 x 503mm	
	WEIGHT	17.6kg (w/o HDD)	
Warranty	WARRANTY	3 Year	

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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
PC NVR	PRP-5000H16	-	Dream I System co.,Ltd.	E.U.T

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1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
POE Adaptor	PSE156G	3115156G000013	UBIQNET	-
Network Camera	SNV-L5083RP	ZBQN6V2H40002K J	Hanwha Techwin Co.,Ltd.	-
Speaker1	BR10000A CUVE	-	BEIJING EDIFIER HI- TECH GROUP.	-
Speaker2	BZ-T3400 AV Soundbar	-	AVIM AUDIO	-
MIC	CMK-303	-	CAMAC	-
Keyboard	K100		Logitech Inc.	-
Mouse	1113	-	Microsoft	-
USB Memory	-	-	Lexar	8GB
Monitor1	W2361VZ-PFV	106NDNUA7871	LG	-
Monitor2	LS23C340	ZXPCHTMFA02348 F	SAMSUNG	-
Monitor2 Adaptor	A2514_DPN	CN07BN4400591B SK28F5NK904	Samsung Electro- Mechanics Co.,Ltd	-
Monitor3	SMT-2233	ZC6U67VH500194 D	Weihai Daewoo Electronics Co., Ltd.	-
Disk array (RAID)	VessJBOD 1840	IB0035033780	PROMISE TECHNOLOGY, INC.	-

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1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
PC NVR (EUT)	RJ-45	POE Adaptor	RJ-45	3.0	U
	3.5 mm	Speaker1	3.5 mm	1.6	U
	3.5 mm	MIC	3.5 mm	1.7	U
	optical	Speaker2	optical	1.0	-
	USB	Mouse1	USB	1.3	U
	PS/2	Keyboard	PS/2	1.4	U
	D-SUB	Monitor1	D-SUB	1.5	U
	HDMI	Monitor2	HDMI	1.3	U
	DVI	Monitor3	DVI	1.6	U
	USB3.0	USB Memory	USB3.0	-	U
	SAS	Disk array (RAID)	SAS	1.2	U
POE Adaptor	RJ-45	Network Camera	RJ-45	3.0	U

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

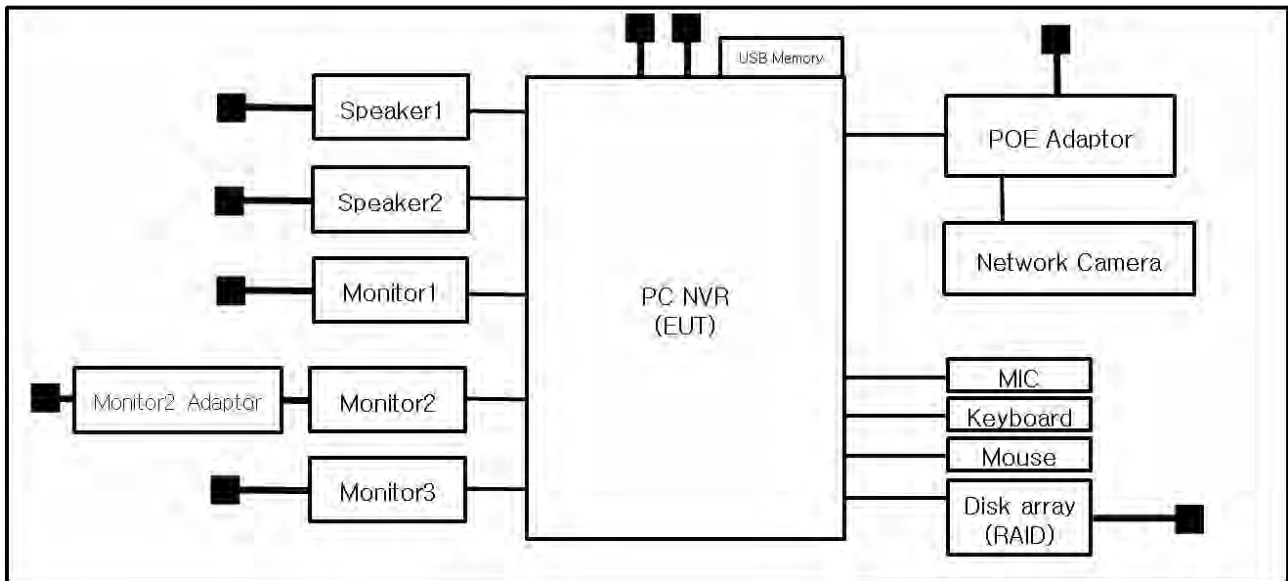
Test Mode	operating
OP	EUT Monitoring, Ping Test

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

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1.8 Configuration

■ AC Main
 □ DC Main



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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 and CISPR Publication 32.

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 m & 10 m Semi-Aechoic Chamber, 10 m Open Area and Conducted test 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	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
Canada	IC	3 m & 10 m Semi-Aechoic Chamber and Conducted test site	 4769B-1
Europe	CE	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)	
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)	

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. 20, 2018

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	01, 31, 2019
☒	LISN	ENV216	R & S	101786	04, 27, 2018
☐	PULSE LIMITER	ESH3-Z2	R & S	101914	11, 27, 2018
☐	LISN	NNBM8124	SCHWARZBECK	8124-1002	08, 07, 2018
☐	LISN	NNBM8124	SCHWARZBECK	8124-1003	08, 07, 2018

Test Conditions

Temperature: 23,4 °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. 20, 2018

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	01, 31, 2019
☒	LISN	ENV216	R & S	101786	04, 27, 2018
☐	PULSE LIMITER	ESH3-Z2	R & S	101914	11, 27, 2018
☒	8-WIRE ISN CAT3	CAT3 8158	SCHWARZBECK	8158-0019	03, 22, 2019
☐	8-WIRE ISN CAT5	CAT5 8158	SCHWARZBECK	8158-0030	03, 22, 2019
☒	8-WIRE ISN CAT6	NTFM 8158	SCHWARZBECK	8158-0029	08, 10, 2018
☐	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	05, 12, 2018

Test Conditions

Temperature: 23,4 °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. 20, 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, 11, 2019
☒	AMPLIFIER	SCU 01	R & S	100603	11, 27, 2018
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	714	11, 28, 2018

Test Conditions

Temperature: 22,1 °C
Relative Humidity: 41,8 % 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. 21, 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, 2019
☐	ATTENUATOR	8491A	HP	35496	03, 21, 2019
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 02, 2019

Test ConditionsTemperature: 22,3 °C
Relative Humidity: 41,3 % 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

RemarksSee Appendix A for test data.



2.5 Harmonic Current Emissions

Test Date

Apr. 20, 2018

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, 09, 2018
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 23,4 °C
Relative Humidity: 41,8 % 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. 20, 2018

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, 2018
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 23,4 °C
Relative Humidity: 41,8 % 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. 23, 2018

Test Location

EMS-ESD: Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS05X4620	02, 19, 2019
☒	HCP	-	Noise Ken	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: 23,3 °C
Relative Humidity: 44,4 % R.H.
Atmospheric Pressure: 100,9 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

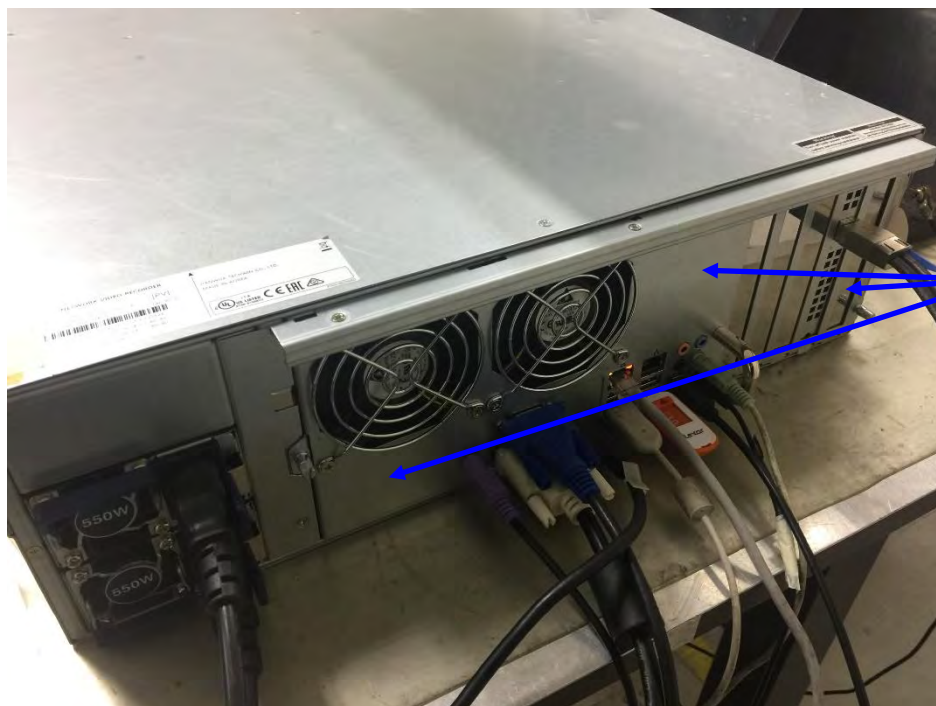
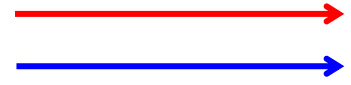
Discharge Voltage:	Contact ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	Air ☒ 2 kV ☒ 4 kV ☐ 6 kV ☒ 8 kV ☐ 15 kV	HCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	VCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV
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Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

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	Enclosure	Contact Discharge	Complied	-
2	Backside	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

Apr. 21, 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: 22,3 °C
Relative Humidity: 41,3 % R.H.
Atmospheric Pressure: 100,9 kPa



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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. 23, 2018

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	AMETEK CTS	7.1.2	-
☒	ULTRA COMPACT SIMULATOR	UCS 500 N5	EM TEST	V0936105120	06, 26, 2018
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 26, 2018
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	070925	06, 26, 2018

Test Conditions

Temperature: 23,3 °C
Relative Humidity: 44,4 % R.H.
Atmospheric Pressure: 100,9 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	

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Test Data

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

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

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
RJ-45	Complied	Complied

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. 23, 2018

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	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 508N1	EM TEST	P1551168979	04, 26, 2018

Test Conditions

Temperature: 23,3 °C
Relative Humidity: 44,4 % 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

**Test Data**☒ Line to Earth –Differential mode

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

☒ Line to Earth – Common Mode

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

Signal Lines☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
RJ-45	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

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

RemarksPASS Required Performance Criteria.

3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Apr. 23, 2018

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, 07, 2018
☒	ATTENUATOR	ATT6	EM TEST	1208-34	08, 07, 2018
☒	CDN	CDN-M2/M3N	EM TEST	0909-06	08, 07, 2018
☒	CDN	CDN T8RJ45	EM TEST	0909-09	08, 07, 2018
☐	EM INJECTION CLAMP	EM 101	Liithi	35943	02, 02, 2019

Test Conditions

Temperature: 23,3 °C
Relative Humidity: 44,4 % R.H.
Atmospheric Pressure: 100,9 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	Complied

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	CDN	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45	CDN T800	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

Apr. 23, 2018

Test Location

EMS-Voltage dip: Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	AMETEK CTS	7.1.2	-
☒	ULTRA COMPACT SIMULATOR	UCS 500 N5	EM TEST	V0936105120	06, 26, 2018
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 26, 2018

Test Conditions

Temperature: 23,3 °C
Relative Humidity: 44,4 % R.H.
Atmospheric Pressure: 100,9 kPa



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

Remarks

PASS Required Performance Criteria.

APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

■ P1

[HOT]

Common Information

Test Description:

Model No.:

Mode

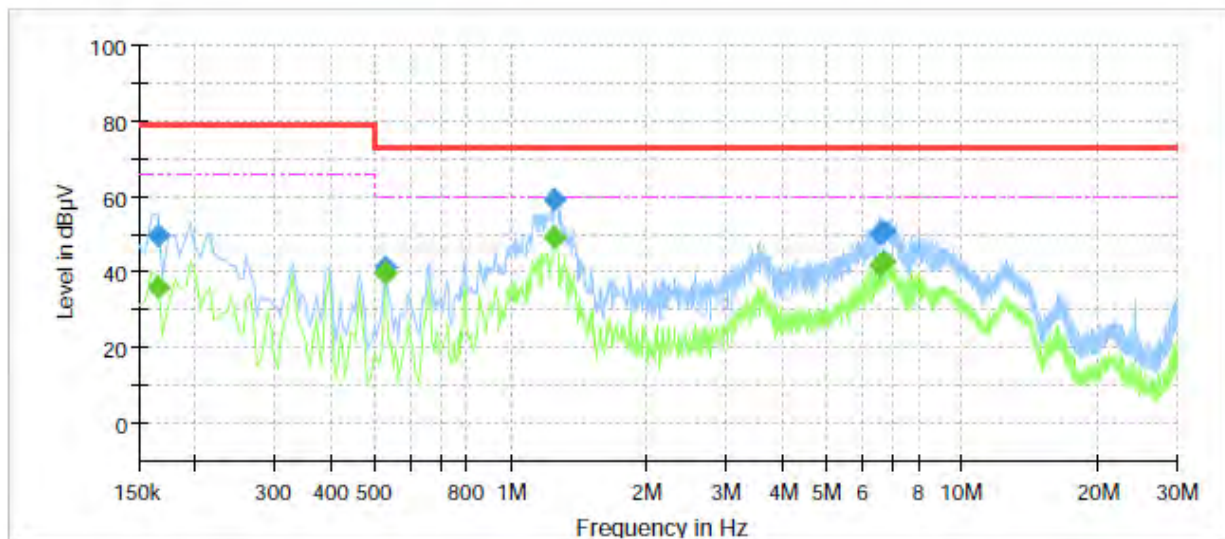
Operator Name:

Conducted Emission

PRP-5000H16

P1

KES



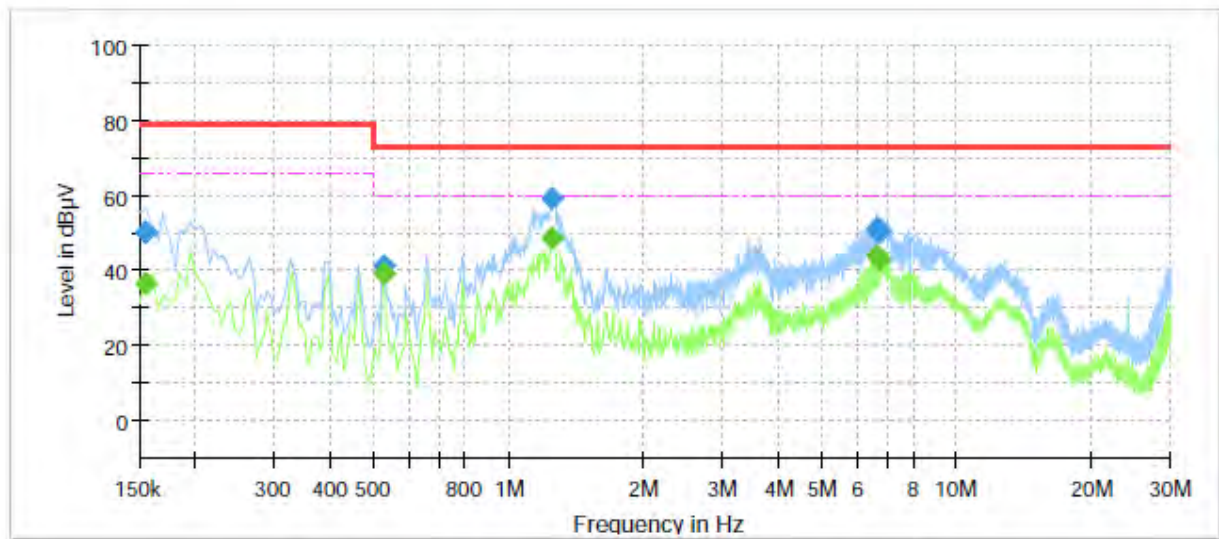
Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.165000	---	36.09	66.00	29.91	1000.0	9.000	L1	9.6
0.165000	49.60	---	79.00	29.40	1000.0	9.000	L1	9.6
0.525000	---	39.62	60.00	20.38	1000.0	9.000	L1	9.8
0.525000	41.55	---	73.00	31.45	1000.0	9.000	L1	9.8
1.255000	---	49.15	60.00	10.85	1000.0	9.000	L1	10.0
1.255000	59.44	---	73.00	13.56	1000.0	9.000	L1	10.0
6.540000	---	41.75	60.00	18.25	1000.0	9.000	L1	9.9
6.540000	50.13	---	73.00	22.87	1000.0	9.000	L1	9.9
6.680000	---	42.91	60.00	17.09	1000.0	9.000	L1	9.9
6.680000	50.80	---	73.00	22.20	1000.0	9.000	L1	9.9

[NEUTRAL]

Common Information

Test Description: Conducted Emission
Model No.: PRP-5000H16
Mode: P1
Operator Name: KES



Final Result

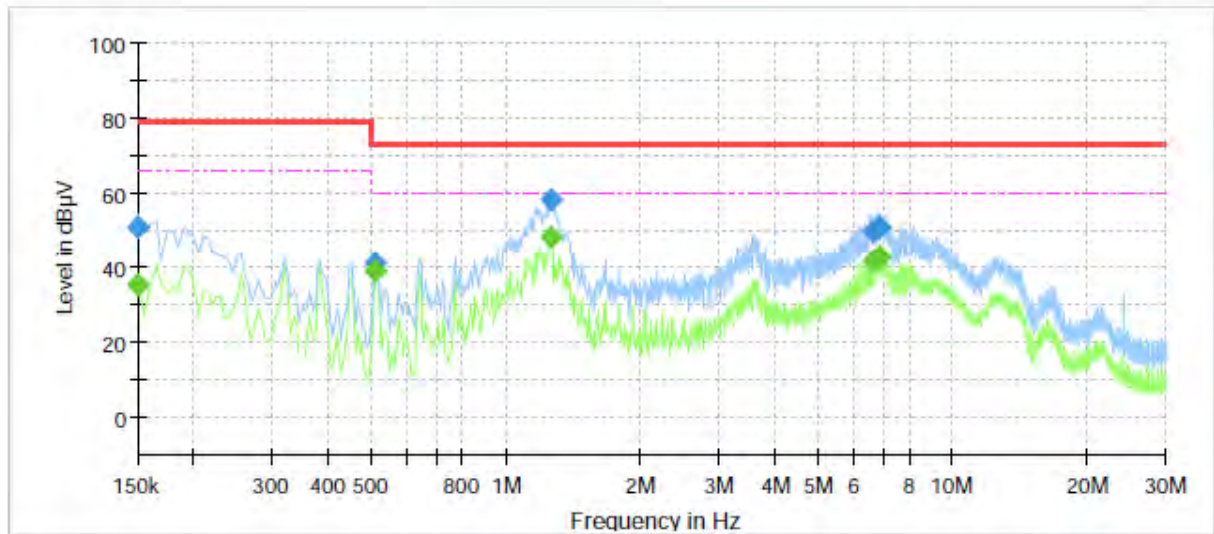
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	36.28	66.00	29.72	1000.0	9.000	N	9.6
0.155000	50.12	---	79.00	28.88	1000.0	9.000	N	9.6
0.525000	---	39.35	60.00	20.65	1000.0	9.000	N	9.8
0.525000	41.38	---	73.00	31.62	1000.0	9.000	N	9.8
1.255000	---	48.72	60.00	11.28	1000.0	9.000	N	10.0
1.255000	59.07	---	73.00	13.93	1000.0	9.000	N	10.0
6.610000	---	43.71	60.00	16.29	1000.0	9.000	N	9.9
6.610000	51.35	---	73.00	21.65	1000.0	9.000	N	9.9
6.745000	---	42.63	60.00	17.37	1000.0	9.000	N	9.9
6.745000	50.28	---	73.00	22.72	1000.0	9.000	N	9.9

■ P2

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	PRP-5000H16
Mode	P2
Operator Name:	KES



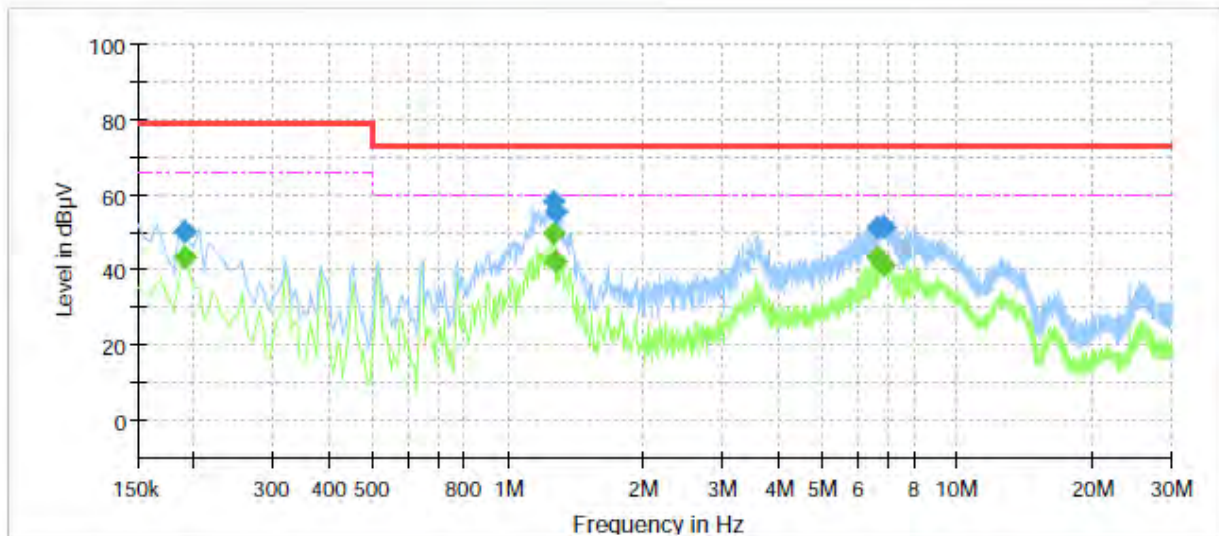
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	---	35.60	66.00	30.40	1000.0	9.000	L1	9.6
0.150000	50.66	---	79.00	28.34	1000.0	9.000	L1	9.6
0.510000	---	39.29	60.00	20.71	1000.0	9.000	L1	9.8
0.510000	41.34	---	73.00	31.66	1000.0	9.000	L1	9.8
1.260000	---	48.30	60.00	11.70	1000.0	9.000	L1	10.0
1.260000	58.26	---	73.00	14.74	1000.0	9.000	L1	10.0
6.620000	---	42.02	60.00	17.98	1000.0	9.000	L1	9.9
6.620000	50.01	---	73.00	22.99	1000.0	9.000	L1	9.9
6.865000	---	43.08	60.00	16.92	1000.0	9.000	L1	9.9
6.865000	50.72	---	73.00	22.28	1000.0	9.000	L1	9.9

[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	PRP-5000H16
Mode	P2
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.190000	---	43.58	66.00	22.42	1000.0	9.000	N	9.6
0.190000	50.16	---	79.00	28.84	1000.0	9.000	N	9.6
1.265000	---	49.53	60.00	10.47	1000.0	9.000	N	10.0
1.265000	58.40	---	73.00	14.60	1000.0	9.000	N	10.0
1.275000	---	42.52	60.00	17.48	1000.0	9.000	N	10.0
1.275000	55.37	---	73.00	17.63	1000.0	9.000	N	10.0
6.610000	---	43.60	60.00	16.40	1000.0	9.000	N	9.9
6.610000	51.42	---	73.00	21.58	1000.0	9.000	N	9.9
6.895000	---	41.10	60.00	18.90	1000.0	9.000	N	9.9
6.895000	51.14	---	73.00	21.86	1000.0	9.000	N	9.9

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

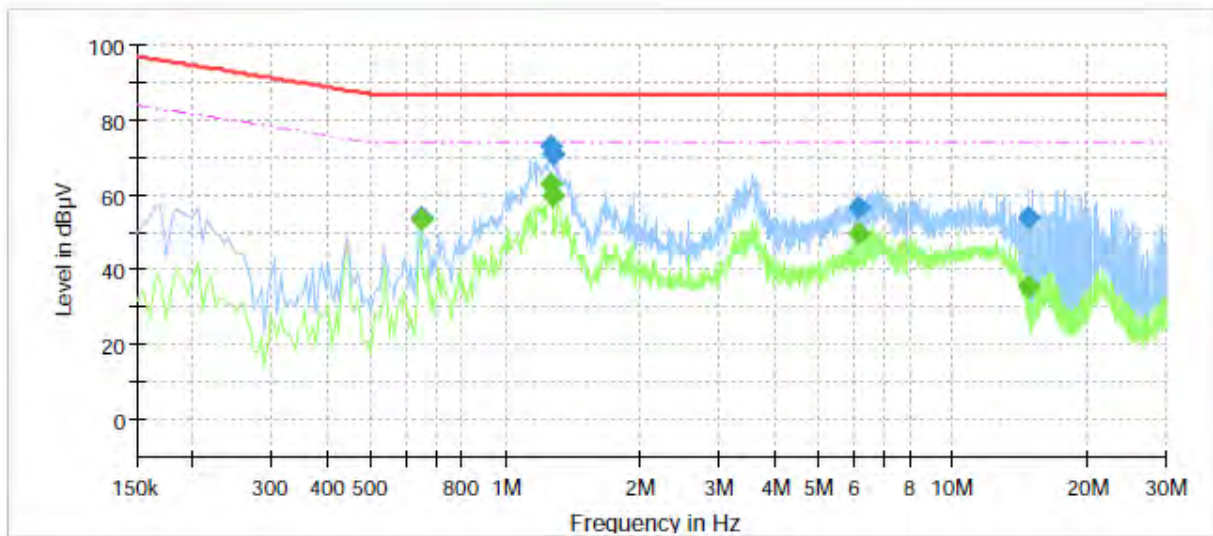
Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

Conducted Emissions at Telecommunication Ports

[10 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: PRP-5000H16
Mode: 10
Operator Name: KES



Final Result

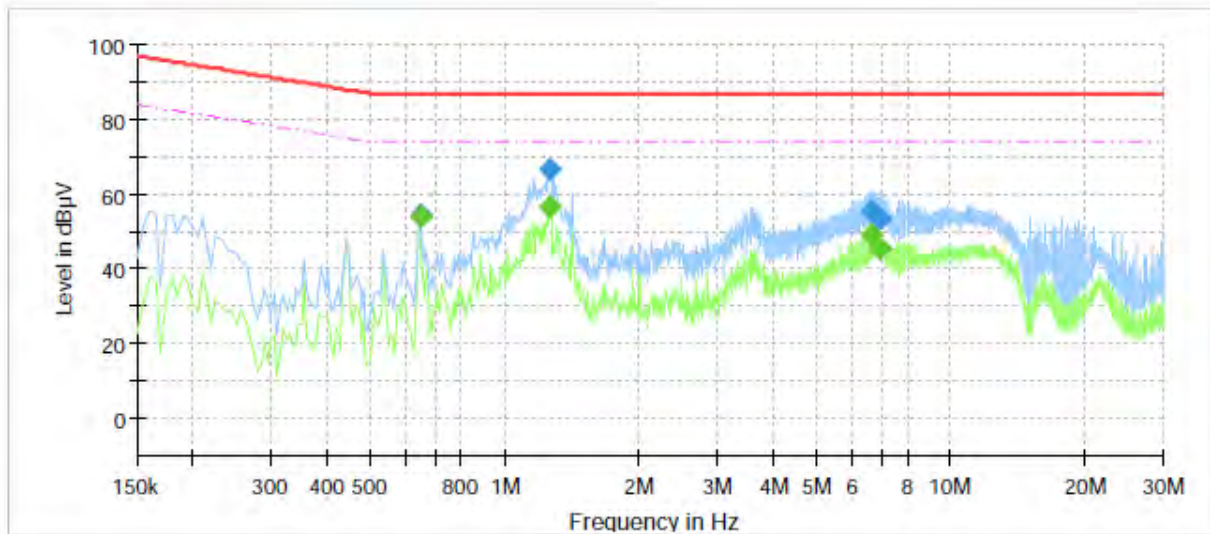
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.645000	---	53.51	74.00	20.49	1000.0	9.000	Single Line	10.1
0.645000	54.16	---	87.00	32.84	1000.0	9.000	Single Line	10.1
1.260000	---	62.90	74.00	11.10	1000.0	9.000	Single Line	10.3
1.260000	73.23	---	87.00	13.77	1000.0	9.000	Single Line	10.3
1.270000	---	59.91	74.00	14.09	1000.0	9.000	Single Line	10.3
1.270000	70.78	---	87.00	16.22	1000.0	9.000	Single Line	10.3
6.170000	---	49.83	74.00	24.17	1000.0	9.000	Single Line	10.1
6.170000	56.53	---	87.00	30.47	1000.0	9.000	Single Line	10.1
14.780000	---	35.60	74.00	38.40	1000.0	9.000	Single Line	10.1
14.780000	54.19	---	87.00	32.81	1000.0	9.000	Single Line	10.1

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[1 000 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	PRP-5000H16
Mode	1000
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.645000	---	54.04	74.00	19.96	1000.0	9.000	Single Line	9.6
0.645000	54.63	---	87.00	32.37	1000.0	9.000	Single Line	9.6
1.260000	---	56.41	74.00	17.59	1000.0	9.000	Single Line	9.7
1.260000	66.79	---	87.00	20.21	1000.0	9.000	Single Line	9.7
6.625000	---	49.02	74.00	24.98	1000.0	9.000	Single Line	9.5
6.625000	55.80	---	87.00	31.20	1000.0	9.000	Single Line	9.5
6.940000	---	45.72	74.00	28.28	1000.0	9.000	Single Line	9.5
6.940000	53.61	---	87.00	33.39	1000.0	9.000	Single Line	9.5

◆ 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))



KES Co., Ltd.

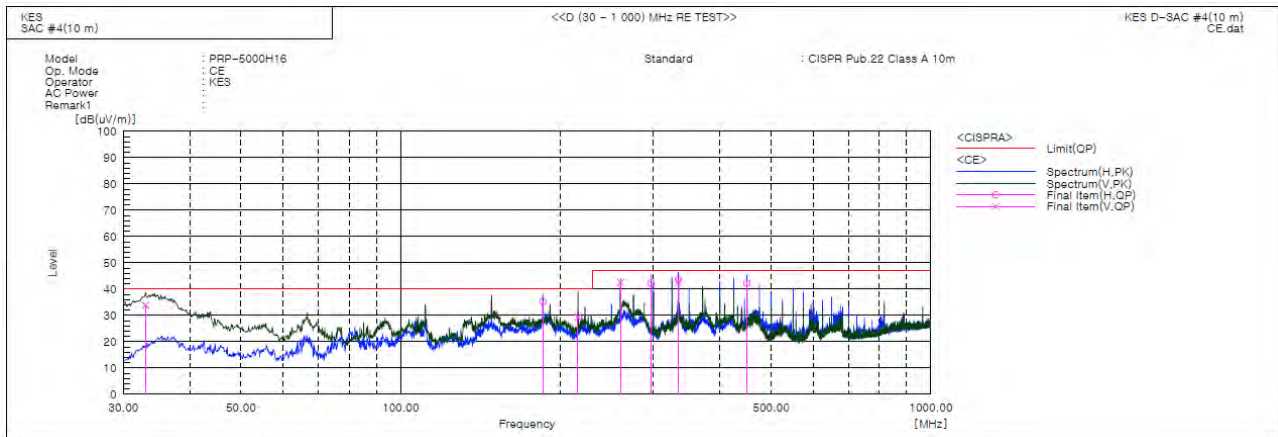
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Test report No.:

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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	33.031	V	66.5	-32.6	33.9	40.0	6.1	150.0	258.0	
2	185.564	H	64.7	-29.4	35.3	40.0	4.7	400.0	240.0	
3	215.998	V	56.7	-27.3	29.4	40.0	10.6	100.0	198.0	
4	259.890	V	68.6	-26.1	42.5	47.0	4.5	100.0	175.0	
5	296.993	H	67.2	-24.9	42.3	47.0	4.7	400.0	147.0	
6	334.095	H	67.6	-23.9	43.7	47.0	3.3	200.0	150.0	
7	334.095	V	66.5	-23.9	42.6	47.0	4.4	100.0	86.0	
8	450.010	H	62.6	-20.3	42.3	47.0	4.7	200.0	89.0	

◆ 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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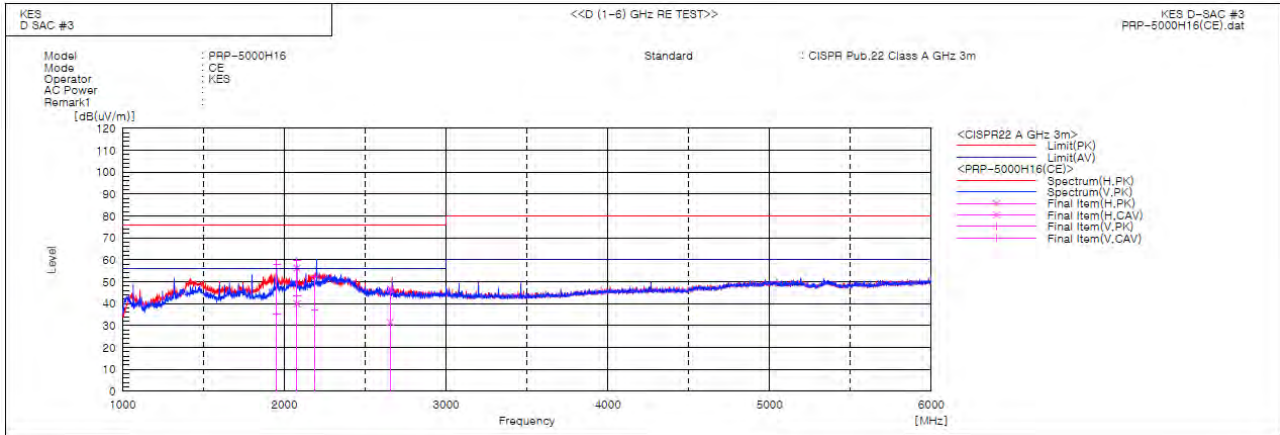
3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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KES-E1-18T0284

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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	1952.680	V	59.8	37.2	-1.7	58.1	35.5	76.0	56.0	17.9	20.5	100.0	6.0	
2	2077.470	H	57.2	41.0	-1.0	56.2	40.0	76.0	56.0	19.8	16.0	100.0	5.8	
3	2077.590	V	60.7	44.6	-1.0	59.7	43.6	76.0	56.0	16.3	12.4	100.0	82.2	
4	2186.943	V	52.7	37.8	-0.5	52.2	37.3	76.0	56.0	23.8	18.7	100.0	222.9	
5	2655.912	H	45.3	30.1	1.4	46.7	31.5	76.0	56.0	29.3	24.5	100.0	23.1	

◆ Calculation

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

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

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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	29.235E-3			
2	3.621E-3			PASS
3	16.166E-3	0.703	2.30	PASS
4	2.728E-3			PASS
5	15.866E-3	1.392	1.14	PASS
6	4.211E-3			PASS
7	15.690E-3	2.038	770.00E-3	PASS
8	3.043E-3			PASS
9	15.596E-3	3.899	400.00E-3	PASS
10	2.190E-3			PASS
11	15.245E-3	4.620	330.00E-3	PASS
12	2.491E-3			PASS
13	14.797E-3	7.046	210.00E-3	PASS
14	2.868E-3			PASS
15	14.286E-3	9.524	150.00E-3	PASS
16	2.872E-3			PASS
17	13.806E-3	10.432	132.35E-3	PASS
18	2.812E-3			PASS
19	13.390E-3	11.307	118.42E-3	PASS
20	2.606E-3			PASS
21	12.556E-3	7.813	160.71E-3	PASS
22	2.397E-3			PASS
23	12.114E-3	8.255	146.74E-3	PASS
24	2.353E-3			PASS
25	11.582E-3	8.579	135.00E-3	PASS
26	2.148E-3			PASS
27	10.737E-3	8.590	124.99E-3	PASS
28	2.047E-3			PASS
29	10.260E-3	8.815	116.39E-3	PASS
30	1.904E-3			PASS
31	9.570E-3	8.790	108.87E-3	PASS
32	1.663E-3			PASS
33	8.760E-3	8.566	102.27E-3	PASS
34	1.617E-3			PASS
35	8.305E-3	8.612	96.44E-3	PASS
36	1.421E-3			PASS
37	7.463E-3	8.182	91.21E-3	PASS
38	1.205E-3			PASS
39	6.791E-3	7.847	86.53E-3	PASS
40	1.198E-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	30.468E-3			
2	4.123E-3			PASS
3	16.472E-3	0.477	3.45	PASS
4	3.365E-3			PASS
5	16.423E-3	0.960	1.71	PASS
6	4.749E-3			PASS
7	16.303E-3	1.411	1.15	PASS
8	3.554E-3			PASS
9	15.790E-3	2.632	600.00E-3	PASS
10	3.075E-3			PASS
11	15.415E-3	3.114	495.00E-3	PASS
12	3.117E-3			PASS
13	15.030E-3	4.771	315.00E-3	PASS
14	3.315E-3			PASS
15	14.610E-3	6.493	225.00E-3	PASS
16	3.203E-3			PASS
17	14.346E-3	7.227	198.52E-3	PASS
18	3.223E-3			PASS
19	13.805E-3	7.772	177.63E-3	PASS
20	3.052E-3			PASS
21	12.965E-3	8.067	160.71E-3	PASS
22	2.867E-3			PASS
23	12.581E-3	8.573	146.74E-3	PASS
24	2.795E-3			PASS
25	11.912E-3	8.823	135.00E-3	PASS
26	2.539E-3			PASS
27	10.913E-3	8.730	124.99E-3	PASS
28	2.356E-3			PASS
29	10.423E-3	8.956	116.39E-3	PASS
30	2.203E-3			PASS
31	9.719E-3	8.927	108.87E-3	PASS
32	1.973E-3			PASS
33	8.934E-3	8.736	102.27E-3	PASS
34	1.960E-3			PASS
35	8.422E-3	8.733	96.44E-3	PASS
36	1.658E-3			PASS
37	7.587E-3	8.318	91.21E-3	PASS
38	1.443E-3			PASS
39	6.895E-3	7.968	86.53E-3	PASS
40	1.454E-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.



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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 [%]	0.065	4.00	PASS
Tmax [s]	0.000	0.50	PASS

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Test Setup Photos and Configuration

Conducted Voltage Emissions



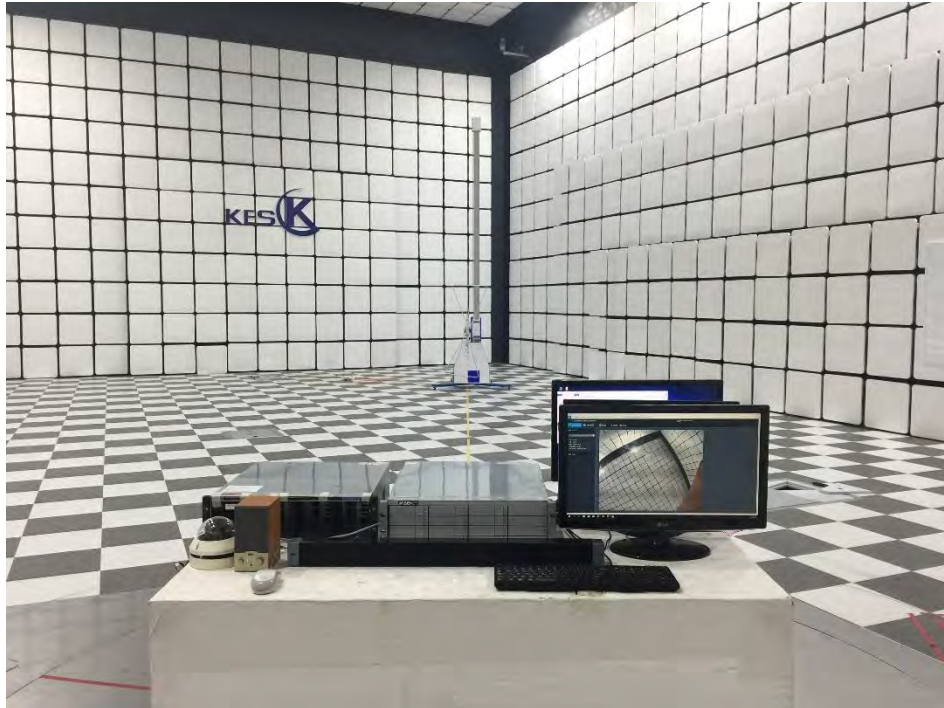
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Conducted Telecommunication Emissions



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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



Electrostatic Discharge



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Radiated Electric Field Immunity



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Electrical Fast Transients/Bursts



Surge Transients



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Conducted Disturbance



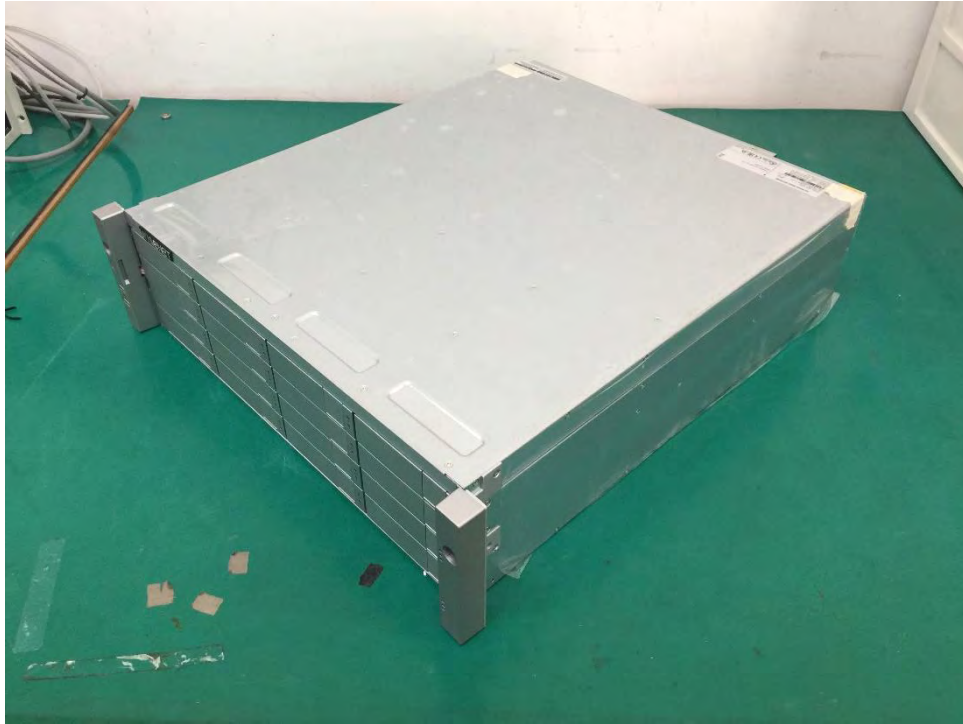
Voltage Dips and Short Interruptions



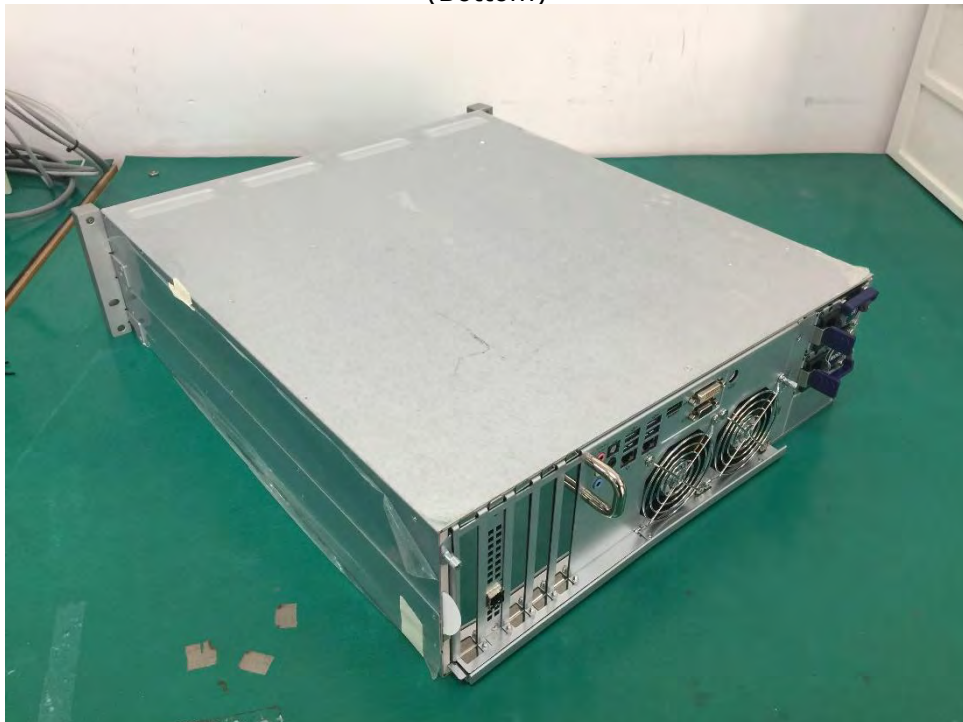
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EUT External Photographs

(Top)



(Bottom)



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EUT Internal Photographs

(Internal View)



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EUT Internal View – board 1

(Top)



(Bottom)



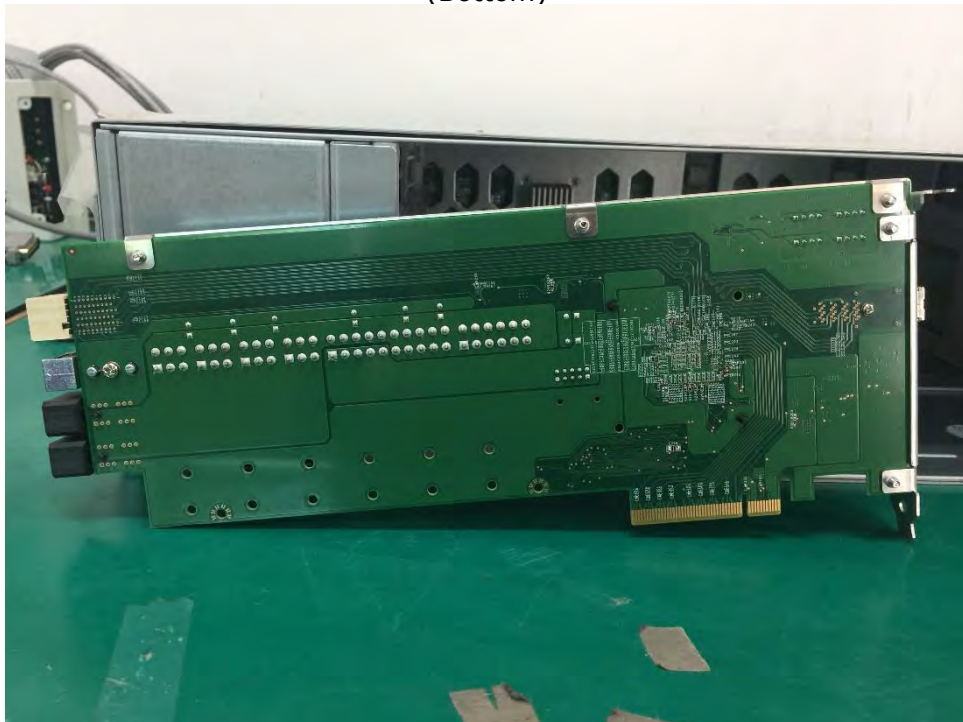
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EUT Internal View – board 2

(Top)



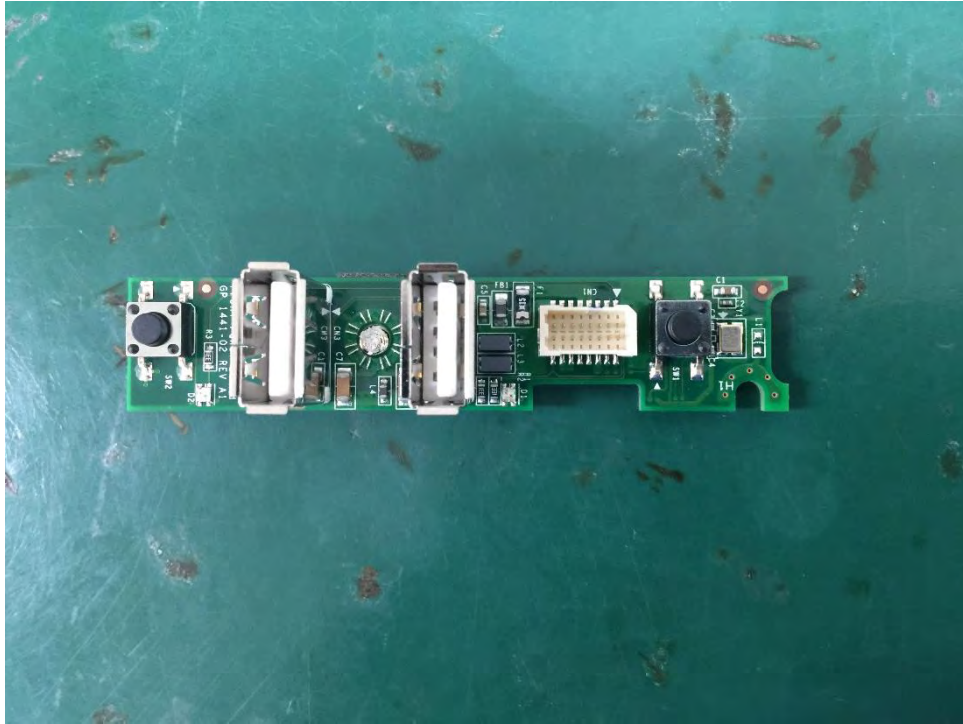
(Bottom)



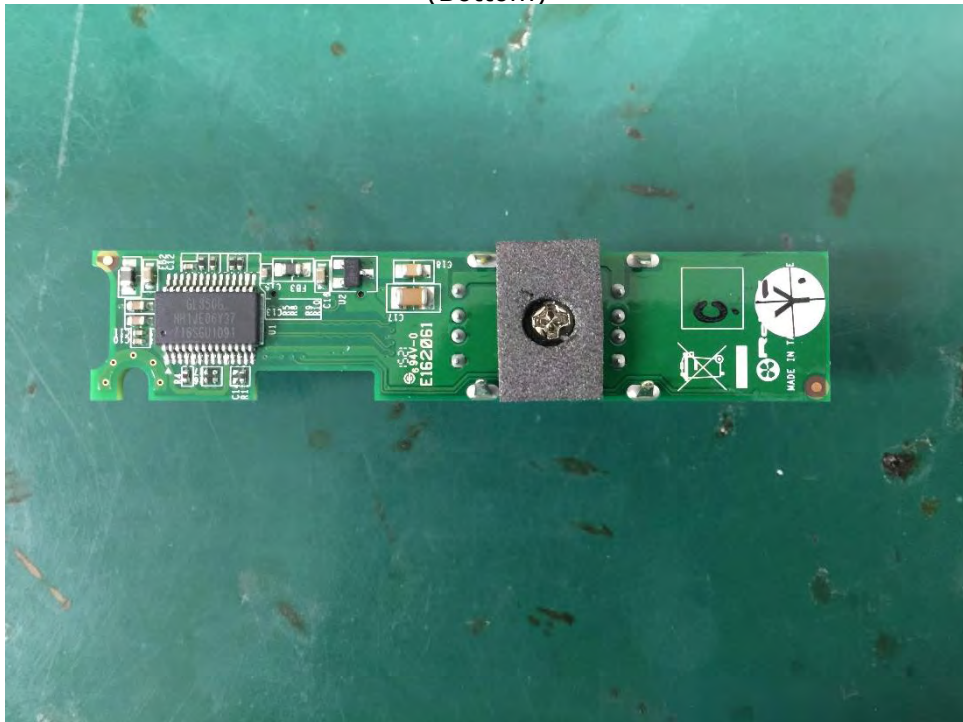
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EUT Internal View – board 3

(Top)



(Bottom)



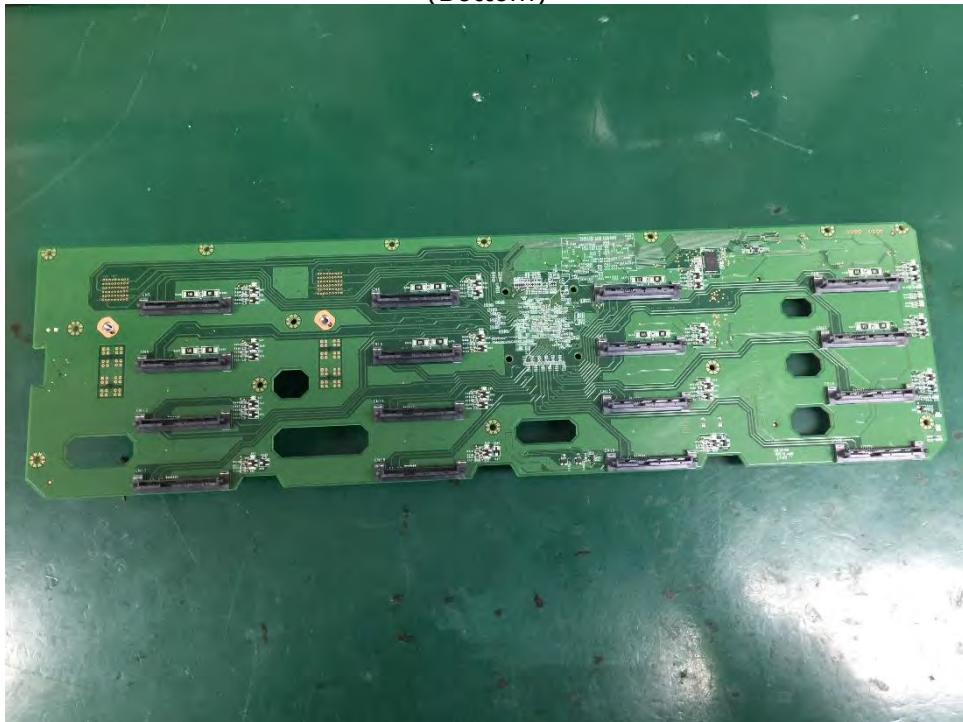
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EUT Internal View – board 4

(Top)



(Bottom)



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EUT Internal View – CPU

(Top)



(Bottom)



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EUT Internal View – POWER

(Top)



(Bottom)



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EUT Internal View – mSATA

(Top)



(Bottom)



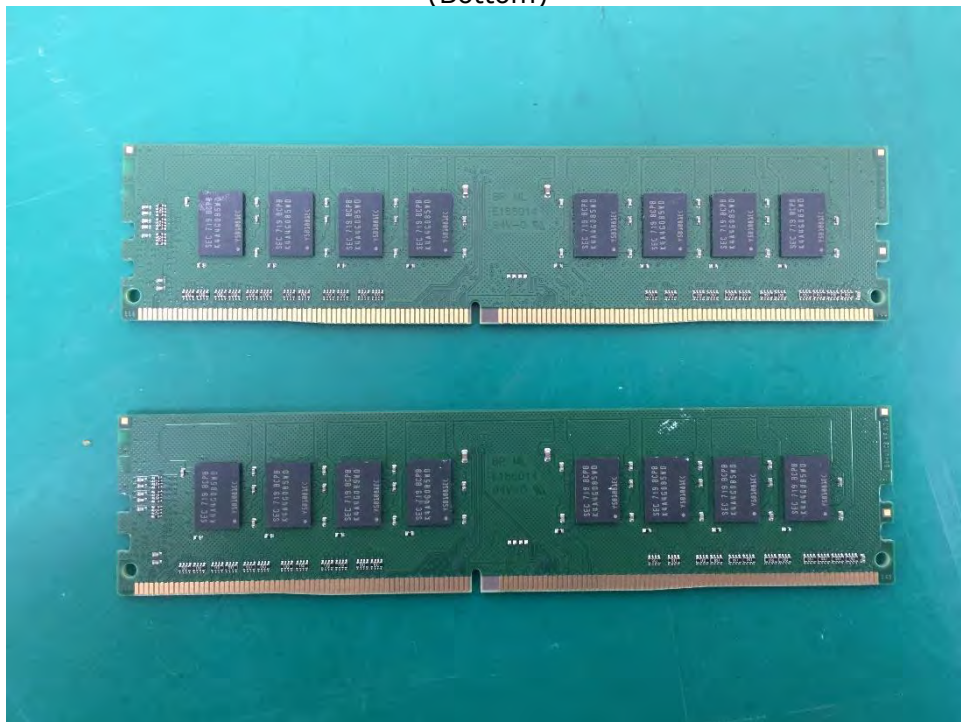
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EUT Internal View – RAM

(Top)



(Bottom)



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Label and Location



PC NVR

Model No : PRP-5000H16

Manufacturer : Dream I System co.,Ltd.

Made in Korea

