



EMC TEST REPORT For CE

Test Report No. : KES-E1-17T0799-R1

Date of Issue : Jun. 10, 2019

Product name : Network Video Decoder Rack

Model/Type No. : SPD-1660R

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 : Nov. 08, 2017

Test date : Nov. 29, 2017 – Dec. 01, 2017

Test Results : ☒ In Compliance ☐ Not in Compliance

Tested by

Young Suk, Song
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
Dec. 07, 2017	KES-E1-17T0799	Issued
Jun. 10, 2019	KES-E1-17T0799-R1	Changed customer's address, factory addition, variant model addition and application standard due to customer request.

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1.0 General Product Description

Main Specifications of E.U.T are:

H/W	Video Output	HDMI	Max. 16ea (8ea : up-to 4K, 8ea : up-to 1080p)
		VGA	Max. 16ea (up-to 1080p)
		Format	HDMI1 : 3840*2160@60HZ/30HZ, 2560*1440@60HZ/30HZ, 1920*1080@60HZ 1280*1024@60H, 1280*720@60Hz HDMI2 : 1920*1080@60HZ, 1280*1024@60H, 1280*720@60Hz VGA1/VGA2 : 1920*1080@60HZ, 1280*1024@60H, 1280*720@60Hz
	Video Input	HDMI	Max. 8ea
		Format	1920*1080@60Hz, 1280*720@60Hz
	External	Ethernet	1ea (10/100/1000BASE-T)
		Serial	RS-485 1ea (Reserved), Half Duplex
		USB	USB 2.0 2ea
		Audio Out	1ea
		Alarm In/Out	16ea / 8ea
		LED	Power, Decoding Operation, Network
	Electrical	Power	100 to 240 VAC $\pm$ 10%; 50/60 Hz
		Power Consumption	Max. 90W (When SPD-260B 8ea installed)
	Environmental	Operating Temperature	+0°C ~ +40°C
		Humidity	20% ~ 85% RH
	Mechanical	Color / Material	Black
		Dimension (WxHxD)	487.8 X 187 X 363.4 (mm)
		Weight	6.79 kg (without SPD-260B)
S/W	Operating System		Embedded Linux
	Video	Codec	H.265/H.264/MJPEG
		Max. Channel	32CH 4K@30fps, 48CH 5M@30fps, 64CH 4M@30fps, 80CH 3M@30fps, 128CH 2M(1080P)@30fps
		Camera Resolution	30fps@8MP, up-to 12MP
		Max. Decoding Bandwidth	512Mbps
		Division (/monitor)	(HDMI) 1/4/6/8/9/13/16/2V/3V ※ VGA is a clone of HDMI
		Layout	Up-to 20ea/monitor, Sequence support
	Audio	Codec	G.711/G.726/AAC
		Monitor Merge	1x2, 2x1, 2x2, 2x3, 3x2, 2x4, 2x5, 4x2, 3x3, 3x4, 4x3, 4x4, 3x5, 5x3, 5x2
	Management		SSM, Web-Viewer
	Time Setting		NTP/Manual
	Export/Import		Configuration Export/Import
	Log		Max.20000 (System log, Event log each)
	Protocol		SUNAPI 2.3 ~, SVNIP



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
Network Video Decoder Rack	SPD-1660R	-	Hanwha Techwin (Tianjin) Co.,Ltd	E.U.T
Switching Power Supply	FSP250-50GUB	-	Shenzhen Huili Electronics Co.,Ltd.	-

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1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	X56K	HN11N5151FJ0045W	Hansung computer co., Ltd.	-
Notebook Adaptor	PA-1900-14	-	LITE-ON TECHNOLOGY (CHANGZHOU)CO., LTD.	-
Monitor 1	LS23C340	ZXPCHTMFA02348F	Samsung Electronic Co.,Ltd	-
Monitor 1 Adaptor	A2514_DPN	CN07BN4400591BSK 28F5NK904	Samsung Electro-Mechanics Co.,Ltd	-
Monitor 2	24M47VQ	702NTQDA3604	LG Electronic Co.,Ltd	-
Monitor 2 Adaptor	ADS-40FSG-19 19025GPG-1	EAY62768621	Shenzhen Honor Electronic Co., Ltd.	-
Camera	SND-L6013R	-	Hanwha Techwin (Tianjin) Co.,Ltd.	-
PoE Adaptor	GS728TPP	-	NETGEAR, INC.	-
Speaker	BR10000A CUVE	-	BEIJING EDIFIER HI-TECH GROUP.	-
Alarm	SIP-1201DD D0	-	SAMSUNG TECHWIN CO., LTD.	-
Controller	SPC-1010	C50E67WG10100F	SamSung Techwin Co.,Ltd.	-
Controller Adaptor	RS-AB1000	-	Dongguan Jinhuasheng Power Technology Co.,Ltd.	-
2.0 USB Memory	-	-	SanDisk	64 GB

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1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
Network Video Decoder Rack (E.U.T)	HDMI	Notebook	HDMI	1.6	S
	D-SUB	Monitor 1	D-SUB	1.7	S
	HDMI	Monitor 2	HDMI	1.6	S
	RJ-45	PoE Adaptor	RJ-45	3.0	U
	3.5 mm	Speaker	3.5 mm	1.6	U
	3 Pin	Alarm	3 Pin	4.0	U
	RS-485 (3 Pin)	Controller	RS-485 (3 Pin)	3.5	U
	2.0 USB	2.0 USB Memory	2.0 USB	-	-
PoE Adaptor	RJ-45 (Data)	Notebook	RJ-45 (Data)	3.0	U
	RJ-45 (PoE)	Camera	RJ-45 (PoE)	3.0	U

* Unshielded=U, Shielded=S

1.7 E.U.T Operating Mode(s)

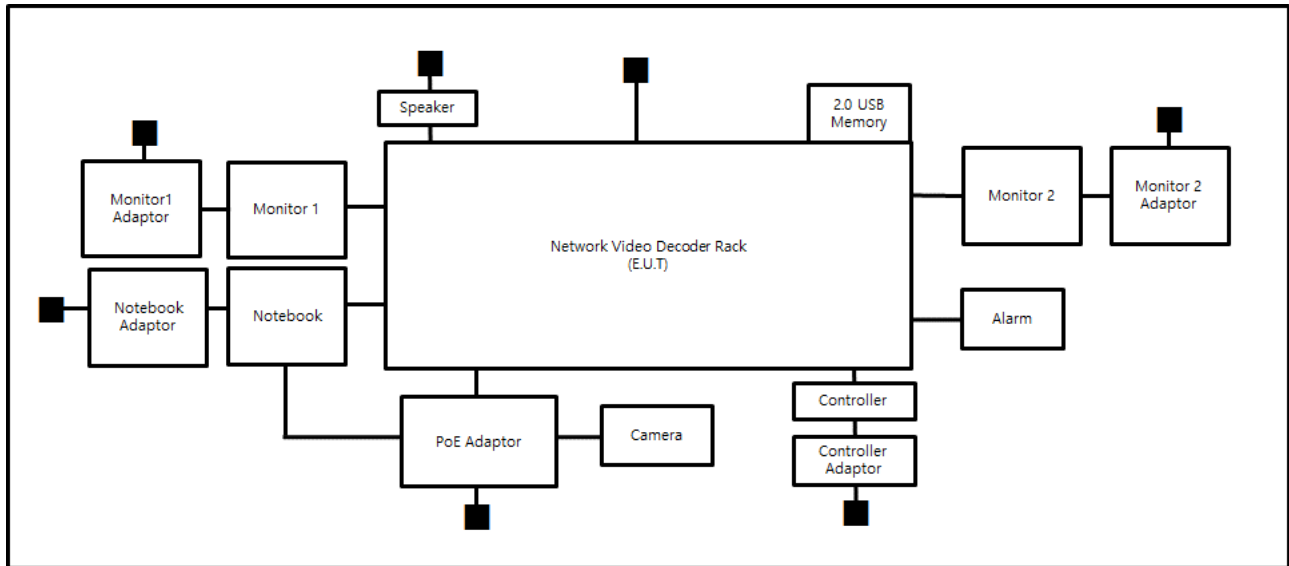
operating	
230 V 50 Hz	E.U.T Monitoring, Ping Test

E.U.T Test operating S/W		
Name	Version	Manufacture Company
Webviewer	-	Hanwha Techwin Co., Ltd.

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1.8 Configuration

■ AC Main
□ DC Main



1.9 Remarks when standards applied

- Only one port on the same port is on the test site.

1. Only one of the 8 input HDMI ports was used.
2. Only one of the 16 output HDMI ports was used.
3. Only one of the 16 output D-SUB ports was used.
4. Only one of the 2 USB 2.0 ports was used.
5. Only one of the 2 Alarm ports was used.
6. Only one of the 2 RS-485 ports was used.

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	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Anechoic 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-Anechoic Chamber , and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KT489
USA	FCC	3 m & 10 m Semi-Anechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Anechoic 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-Anechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 17 07 01633 001



2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **EMC – Directive 2014/30/EU**

☐ EN 61000-6-3:2011

☐ EN 61000-6-1:2007

☐ EN 61000-6-4:2007 +A1:2011

☐ EN 61000-6-2:2005

☐ EN 55011:2007 +A1:2010

☐ Group 1
☐ Class A

☐ Group 2
☐ Class B

☐ EN 55014-1:2006 +A2:2011

☐ EN 55014-2:1997 +A2:2008

☐ EN 55015:2013

☐ EN 61547:2009

☒ EN 55032:2012/AC:2013

☒ Class A

☐ Class B

☐ EN 55024:2010 +A1:2015

☒ EN 50130-4:2011

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

☐ EN 61326-1:2013



-
- | | | |
|---|----------------------------------|----------------------------------|
| ☐ VCCI V-3 / 2015.04 | ☐ Class A | ☐ Class B |
| ☐ AS/NZS CISPR22:2009 +A1:2010 | ☐ Class A | ☐ Class B |
| ☐ 47 CFR Part 15, Subpart B | | |
| ☐ CISPR 22:2009 +A1:2010 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2009 | | |
| ☐ IC Regulation ICES-003 : 2016 | | |
| ☐ CAN/CSA CISPR 22-10 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2014 | | |
|
☐ RE- Directive 2014/53/EU | | |
|
☐ EN 301 489-1 V1.9.2 | | |
| ☐ Equipment for fixed use | | |
| ☐ Equipment for vehicular use | | |
| ☐ Equipment for portable use | | |
|
☐ EN 301 489-3 V1.6.1 | | |
|
☐ EN 301 489-17 V2.2.1 | | |
|
☐ EN 60945:2002 | | |



2.1 Conducted Emissions at Mains Power Ports

Test Date

Nov. 29, 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	11, 27, 2018
☐	LISN	NNBM8124	SCHWARZBECK	8124-1002	08, 07, 2018
☐	LISN	NNBM8124	SCHWARZBECK	8124-1003	08, 07, 2018

Test Conditions

Temperature: 21,3 °C
Relative Humidity: 43,2 % 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

Nov. 29, 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	11, 27, 2018
☒	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	08, 10, 2018

Test Conditions

Temperature: 21,3 °C
Relative Humidity: 43,2 % 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

Nov. 29, 2017

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	716	11, 28, 2018

Test Conditions

Temperature: 21,7 °C
Relative Humidity: 40,3 % 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

Nov. 29, 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
☐	ATTENUATOR	8491A	HP	35496	03, 24, 2018
☐	LOG-PERIODIC ANTENNA	STLP 9149	SCHWARZBECK	9149-255	05, 17, 2018
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	09, 04, 2019

Test Conditions

Temperature: 21,5 °C
Relative Humidity: 42,7 % 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

Nov. 29, 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, 09, 2018
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 21,3 °C
Relative Humidity: 43,2 % 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

Nov. 29, 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, 2018
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 21,3 °C
Relative Humidity: 43,2 % 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

Nov. 30, 2017

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, 24, 2018
☒	HCP	-	(주) 케이 이 에스	-	-
☒	VCP	-	(주) 케이 이 에스	-	-

Test Conditions

Temperature: 21,5 °C
Relative Humidity: 42,7 % R.H.
Atmospheric Pressure: 99,9 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

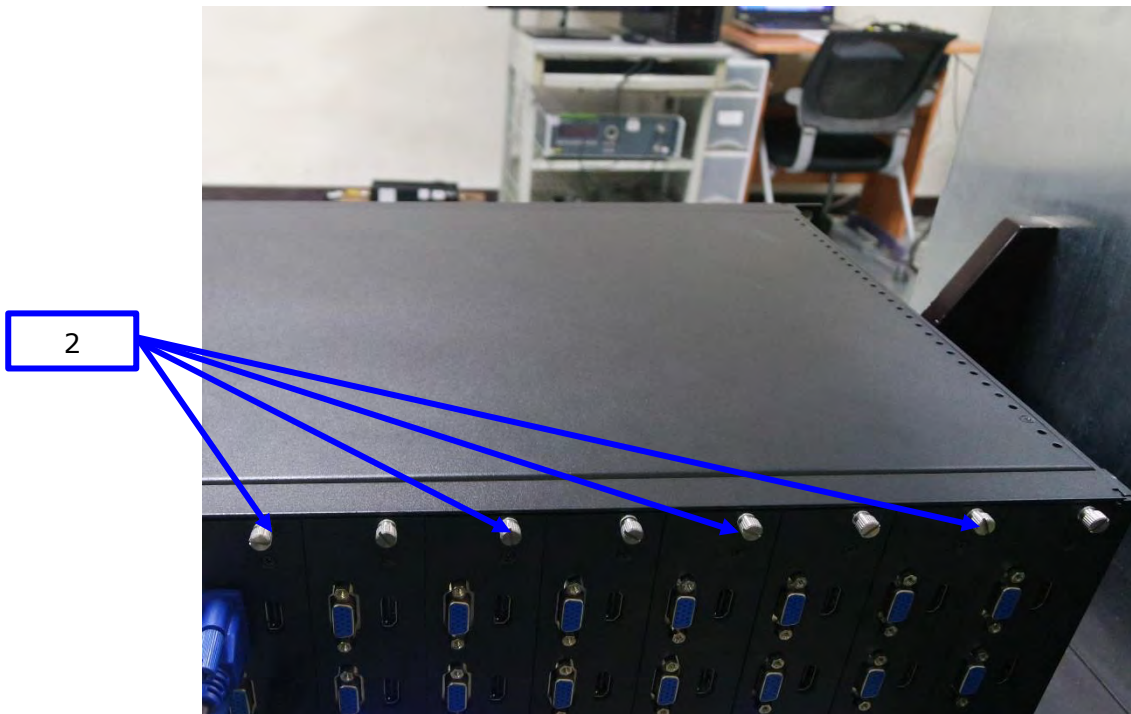
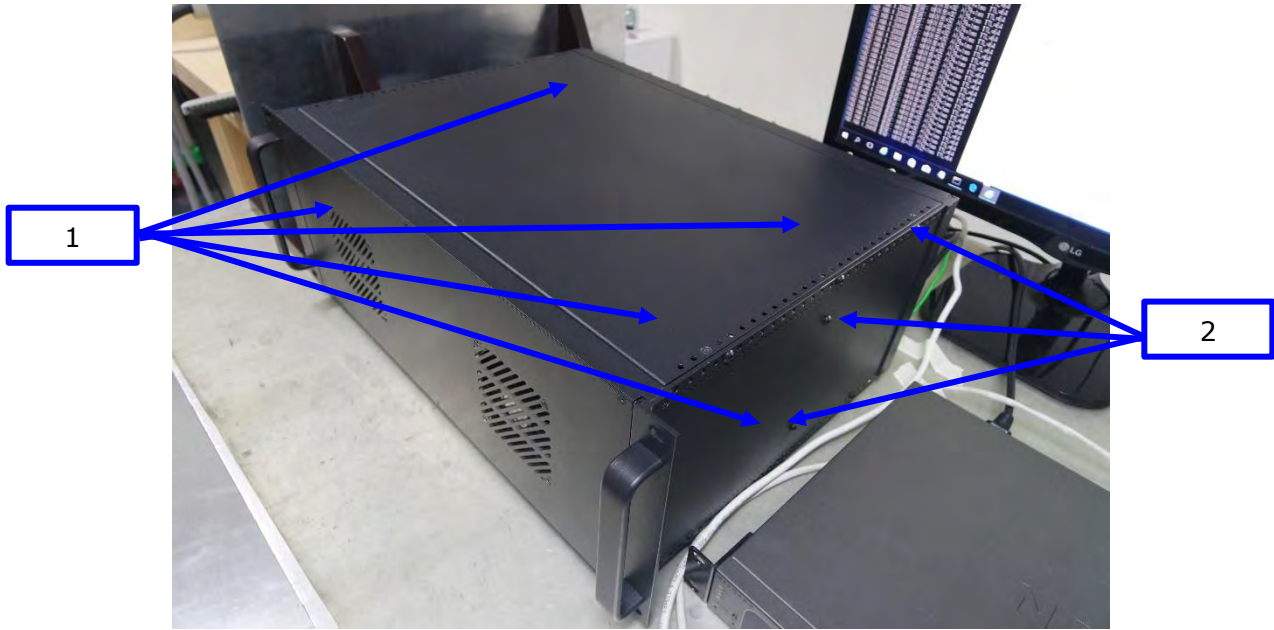
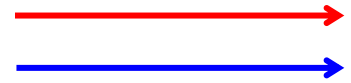
VCP: Vertical coupling plane

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	Surface	Contact Discharge	Complied	-
2	Screw	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

Nov. 30, 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	KTI_RS2012	KOREA TECHNOLOGY INSTITUTE CO., LTD	2.1.1	-
☒	SIGNAL GENERATOR	ESG-3000A	HP	US37040210	11, 01, 2018
☒	AMPLIFIER	ITA0300-200	Infinitech	-	11, 01, 2018
☒	AMPLIFIER	ITA0750-200	Infinitech	-	11, 01, 2018
☒	AMPLIFIER	ITA1500-100	Infinitech	-	11, 01, 2018
☒	AMPLIFIER	ITA2500-100	Infinitech	-	11, 01, 2018
☒	POWER METER	E4419B	Agilent	MY45101506	06, 26, 2018
☒	AVERAGE POWER SENSOR	E9301A	Agilent	-	06, 26, 2018
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY41495698	06, 26, 2018
☒	HYBRID LOG-PERIODIC ANTENNA	HLP-2603	TDK	100400	-

Test Conditions

Temperature: 21,5 °C
Relative Humidity: 42,7 % R.H.
Atmospheric Pressure: 99,9 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

Nov. 30, 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	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: 21,3 °C
Relative Humidity: 46,2 % R.H.
Atmospheric Pressure: 100,3 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	Complied	Complied
Alarm (3 Pin)	Complied	Complied
RS-485 (3 Pin)	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

Dec. 01, 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	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
☐	CDN	CNV 508T5	EM TEST	P1549168422	04, 26, 2018

Test Conditions

Temperature: 21,3 °C
Relative Humidity: 46,2 % R.H.
Atmospheric Pressure: 100,3 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

☒ Line to Earth – Common Mode

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

Signal Lines

☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
RJ-45	Complied	Complied
Alarm (3 Pin)	Complied	Complied
RS-485 (3 Pin)	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

Dec. 01, 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, 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, 03, 2018

Test Conditions

Temperature: 21,3 °C
Relative Humidity: 46,2 % R.H.
Atmospheric Pressure: 100,3 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
RJ-45	Complied	Complied
Alarm (3 Pin)	Complied	Complied
RS-485 (3 Pin)	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

Dec. 01, 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	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: 21,3 °C
Relative Humidity: 46,2 % R.H.
Atmospheric Pressure: 100,3 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.

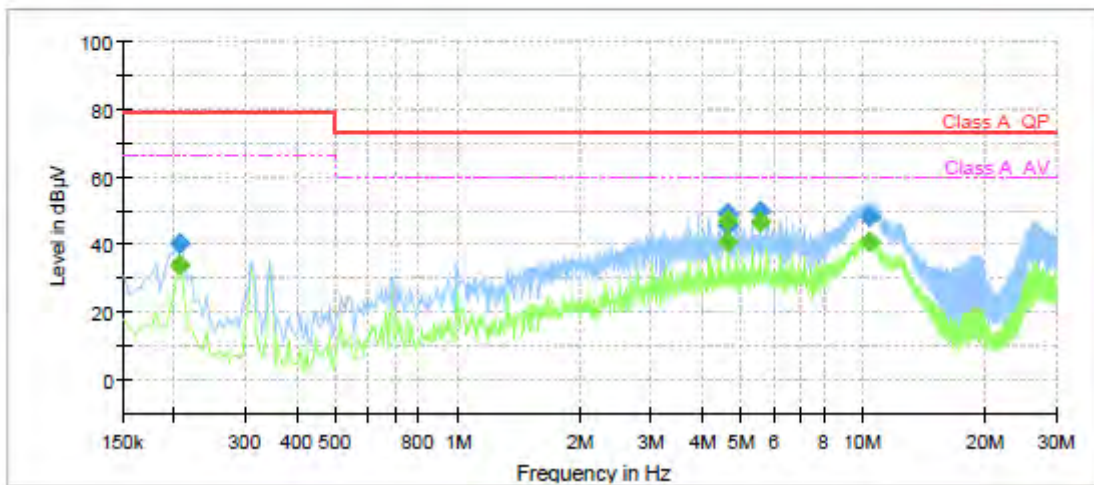
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	SPD-1660RP
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)
0.205000	---	33.97	66.00	32.03	1000.0	9.000	L1	19.4
0.205000	40.14	---	79.00	38.86	1000.0	9.000	L1	19.4
4.635000	---	40.79	60.00	19.21	1000.0	9.000	L1	19.9
4.635000	45.33	---	73.00	27.67	1000.0	9.000	L1	19.9
4.640000	---	47.15	60.00	12.85	1000.0	9.000	L1	19.9
4.640000	49.35	---	73.00	23.65	1000.0	9.000	L1	19.9
5.570000	---	46.54	60.00	13.46	1000.0	9.000	L1	19.8
5.570000	49.87	---	73.00	23.13	1000.0	9.000	L1	19.8
10.355000	---	40.94	60.00	19.06	1000.0	9.000	L1	19.7
10.355000	48.17	---	73.00	24.83	1000.0	9.000	L1	19.7

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

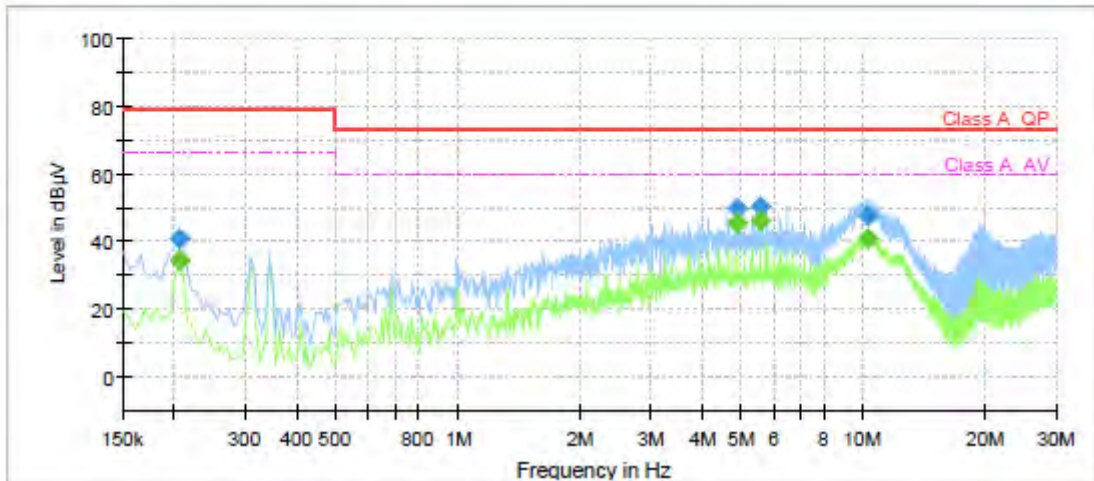
Reading Value : Not shown in the table.

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

[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	SPD-1660RP
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)
0.205000	---	34.66	66.00	31.34	1000.0	9.000	N	19.4
0.205000	40.99	---	79.00	38.01	1000.0	9.000	N	19.4
4.870000	---	45.71	60.00	14.29	1000.0	9.000	N	19.9
4.870000	49.57	---	73.00	23.43	1000.0	9.000	N	19.9
5.565000	---	46.19	60.00	13.81	1000.0	9.000	N	19.8
5.565000	50.10	---	73.00	22.90	1000.0	9.000	N	19.8
10.235000	---	40.92	60.00	19.08	1000.0	9.000	N	19.7
10.235000	47.75	---	73.00	25.25	1000.0	9.000	N	19.7

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

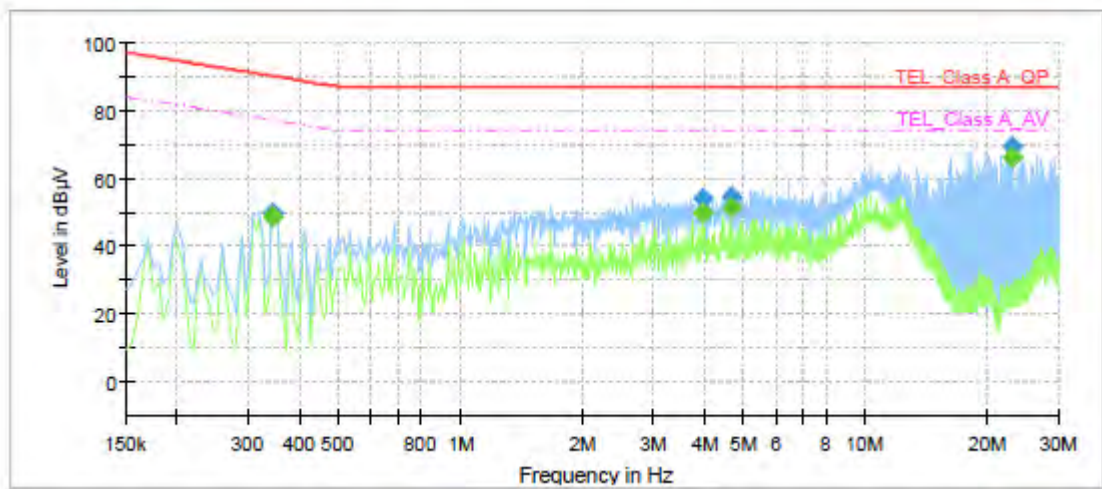
Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

Conducted Emissions at Telecommunication Ports

[10 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	SPD-1660RP
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)
0.345000	---	48.61	77.08	28.47	1000.0	9.000	Single Line	19.9
0.345000	49.73	---	90.08	40.35	1000.0	9.000	Single Line	19.9
3.955000	---	49.88	74.00	24.12	1000.0	9.000	Single Line	20.0
3.955000	53.76	---	87.00	33.24	1000.0	9.000	Single Line	20.0
4.660000	---	51.28	74.00	22.72	1000.0	9.000	Single Line	20.0
4.660000	54.73	---	87.00	32.27	1000.0	9.000	Single Line	20.0
23.130000	---	65.98	74.00	8.02	1000.0	9.000	Single Line	19.9
23.130000	69.36	---	87.00	17.64	1000.0	9.000	Single Line	19.9

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

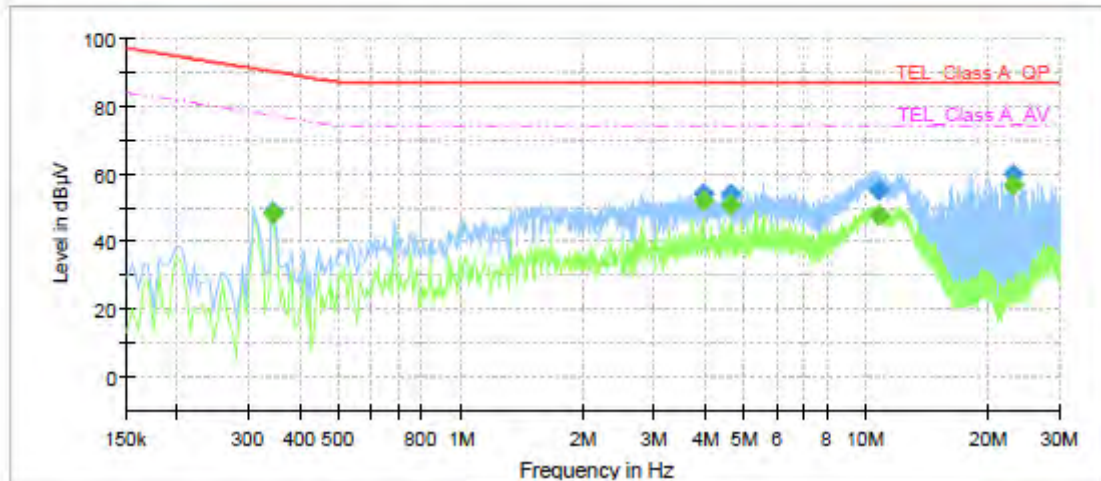
Reading Value : Not shown in the table.

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

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	SPD-1660RP
Mode	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)
0.345000	---	48.27	77.08	28.81	1000.0	9.000	Single Line	19.4
0.345000	48.59	---	90.08	41.49	1000.0	9.000	Single Line	19.4
3.955000	---	51.69	74.00	22.31	1000.0	9.000	Single Line	19.5
3.955000	54.08	---	87.00	32.92	1000.0	9.000	Single Line	19.5
4.650000	---	50.86	74.00	23.14	1000.0	9.000	Single Line	19.5
4.650000	53.84	---	87.00	33.16	1000.0	9.000	Single Line	19.5
10.770000	---	47.80	74.00	26.20	1000.0	9.000	Single Line	19.3
10.770000	54.82	---	87.00	32.18	1000.0	9.000	Single Line	19.3
23.130000	---	56.76	74.00	17.24	1000.0	9.000	Single Line	19.4
23.130000	59.96	---	87.00	27.04	1000.0	9.000	Single Line	19.4

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

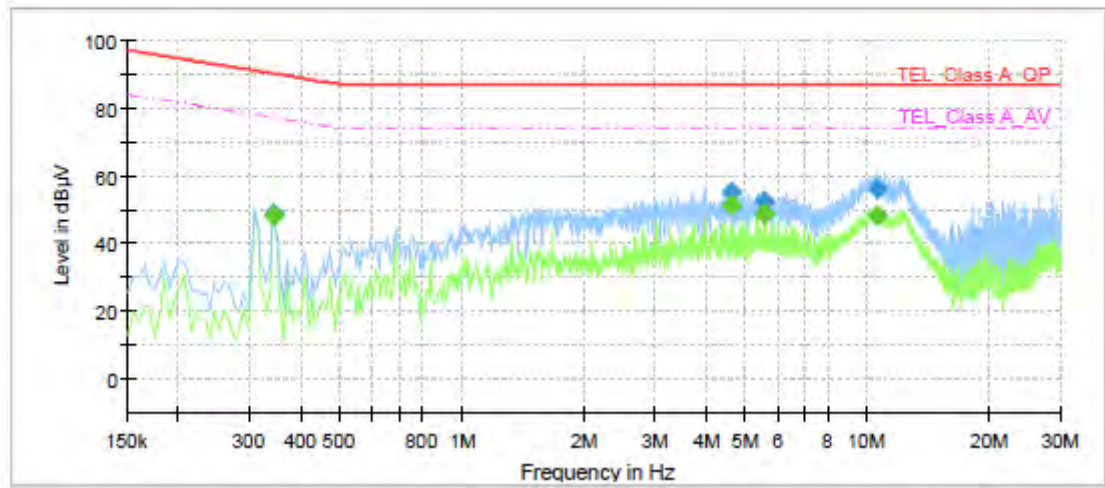
Reading Value : Not shown in the table.

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

[1 000 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	SPD-1660RP
Mode	1 000 Mbps
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.345000	---	48.40	77.08	28.68	1000.0	9.000	Single Line	19.3
0.345000	48.61	---	90.08	41.47	1000.0	9.000	Single Line	19.3
4.655000	---	51.54	74.00	22.46	1000.0	9.000	Single Line	19.4
4.655000	55.25	---	87.00	31.75	1000.0	9.000	Single Line	19.4
5.580000	---	48.65	74.00	25.35	1000.0	9.000	Single Line	19.4
5.580000	52.31	---	87.00	34.69	1000.0	9.000	Single Line	19.4
10.625000	---	48.35	74.00	25.65	1000.0	9.000	Single Line	19.2
10.625000	56.24	---	87.00	30.76	1000.0	9.000	Single Line	19.2

◆ 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))

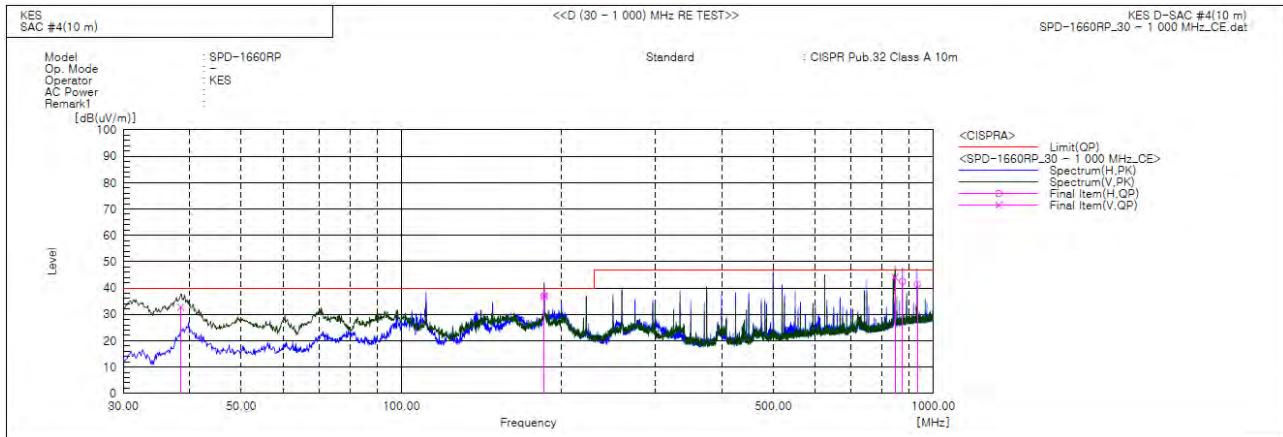


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Test report No.:
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Radiated Electric Field Emissions(Below 1 GHz)



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	38.488	V	62.8	-30.1	32.7	40.0	7.3	104.0	287.0	
2	185.564	H	65.7	-28.7	37.0	40.0	3.0	400.0	31.0	
3	185.663	V	65.5	-28.6	36.9	40.0	3.1	109.0	203.0	
4	846.861	V	54.9	-10.8	44.1	47.0	2.9	100.0	354.0	
5	874.991	H	52.6	-10.1	42.5	47.0	4.5	199.0	35.0	
6	933.070	H	50.9	-9.5	41.4	47.0	5.6	140.0	8.0	

◆ Calculation – SAC #4(10 m)

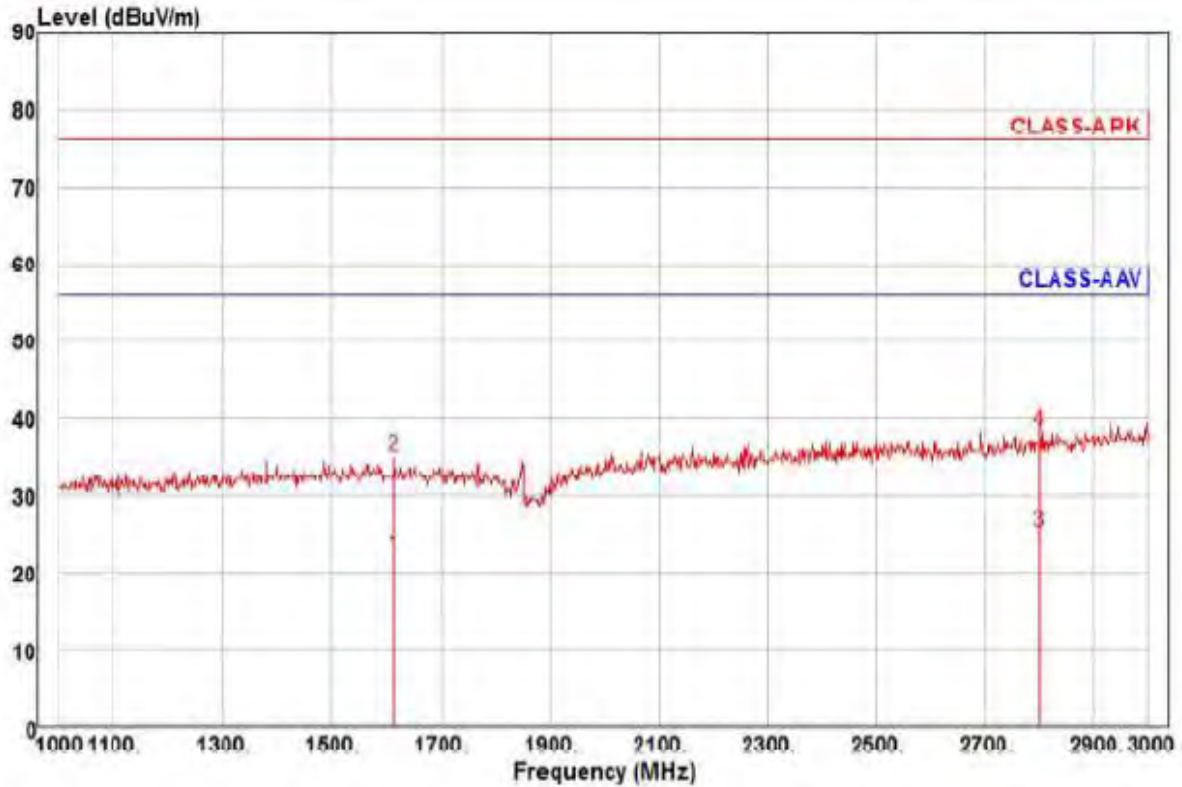
Result(QP) [dB(μV/m)] = (Reading(QP)[dB(μV)] + c.f[dB(1/m)])

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 : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m BBHA 9120D(RRA 2019-09-04) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SPD-1660RP
Mode :
Memo : 1 ~ 3 GHz

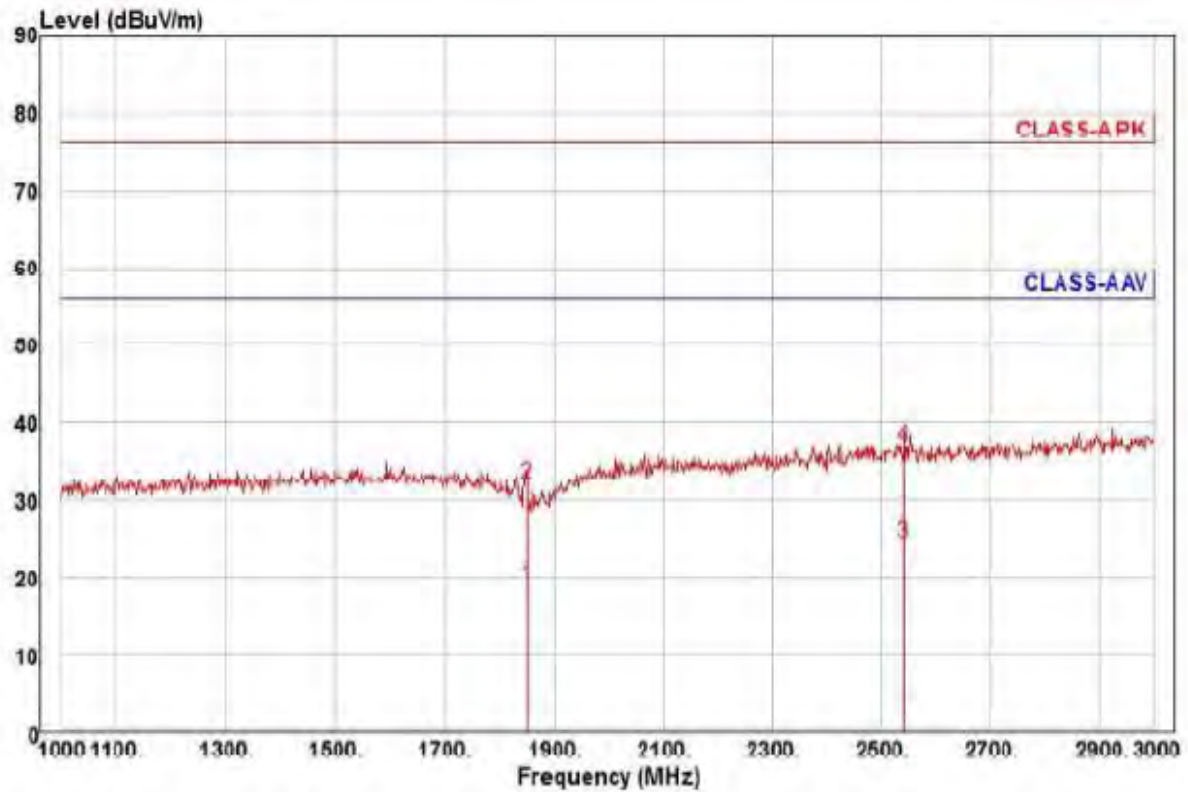
	Freq	Read Level	Ant Factor	Cable Loss	Preamplifier Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1616.00	23.54	25.71	8.55	35.51	154	56.00	-33.71	horizontal	Average
2	1616.00	36.37	25.71	8.55	35.51	154	76.00	-40.88	horizontal	Peak
3 pp	2802.00	21.19	28.00	11.61	35.48	46	56.00	-30.68	horizontal	Average
4 pk	2802.00	34.11	28.00	11.61	35.48	46	76.00	-37.76	horizontal	Peak



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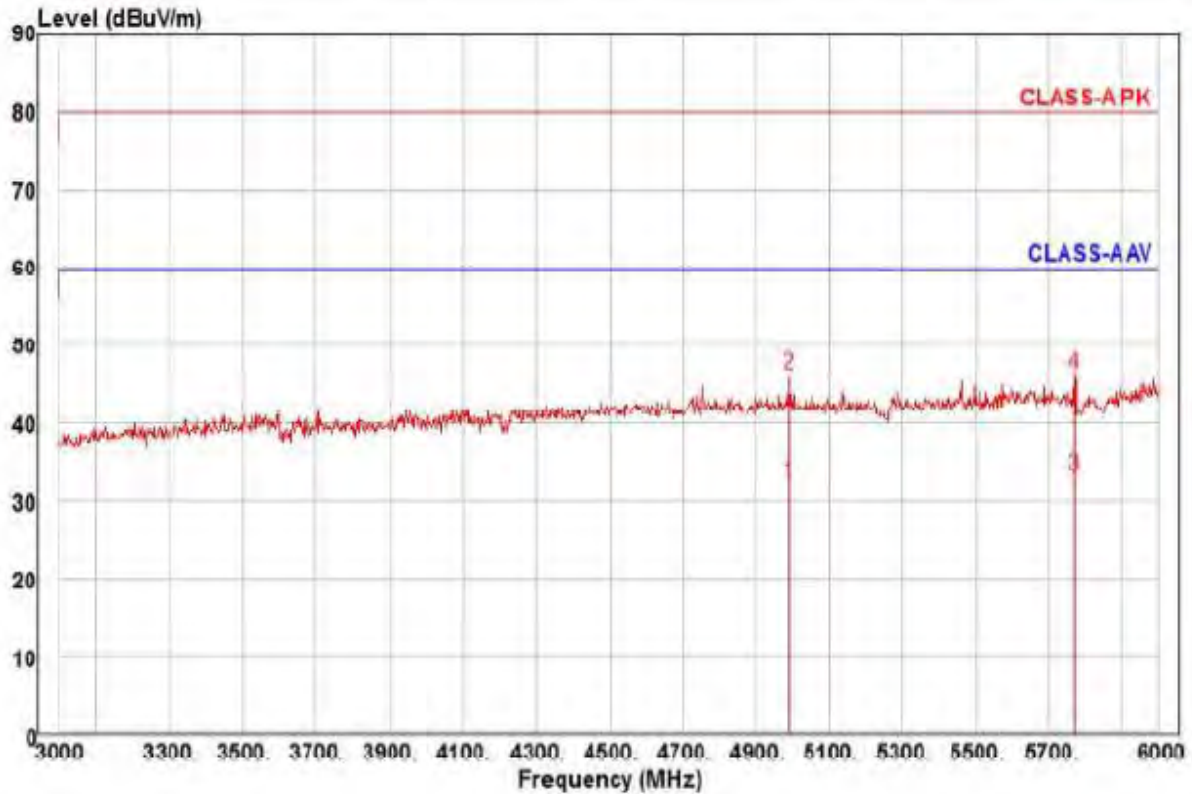
Test report No.:
KES-E1-17T0799-R1
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m BBHA 9120D(RRA 2019-09-04) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SPD-1660RP
Mode :
Memo : 1 ~ 3 GHz

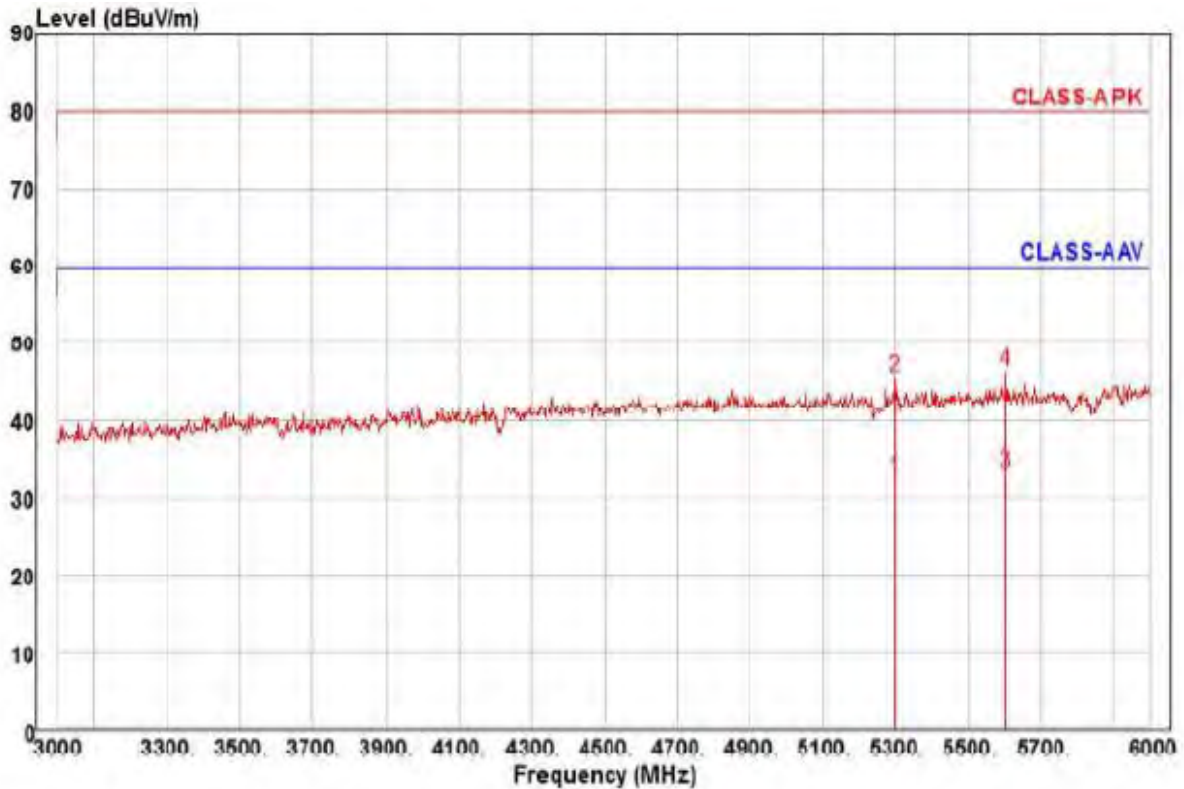
	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1850.00	18.85	25.98	9.23	35.30	246	56.00	-37.24	vertical	Average
2	1850.00	32.33	25.98	9.23	35.30	246	76.00	-43.76	vertical	Peak
3 pp	2544.00	21.73	27.32	10.93	35.38	179	56.00	-31.40	vertical	Average
4 pk	2544.00	33.93	27.32	10.93	35.38	179	76.00	-39.20	vertical	Peak

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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m BBHA 9120D(RRA 2019-09-04) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SPD-1660RP
Node :
Memo : 3 ~ 6 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamplifier Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	4995.00	20.82	31.47	15.76	35.63	168	60.00	-27.58	horizontal	Average
2 pk	4995.00	34.63	31.47	15.76	35.63	168	80.00	-33.77	horizontal	Peak
3 pp	5772.00	19.87	32.22	17.01	35.68	48	60.00	-26.58	horizontal	Average
4	5772.00	32.64	32.22	17.01	35.68	48	80.00	-33.81	horizontal	Peak



Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m BBHA 9120D(RRA 2019-09-04) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SPD-1660RP
Node :
Memo : 3 ~ 6 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	5301.00	20.48	31.65	16.26	35.65	107	60.00	-27.26	vertical	Average
2	5301.00	33.44	31.65	16.26	35.65	107	80.00	-34.30	vertical	Peak
1 pp	5607.00	20.33	31.95	16.78	35.67	239	60.00	-26.61	vertical	Average
4 pk	5607.00	33.50	31.95	16.78	35.67	239	80.00	-33.44	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

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

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	295.693E-3			
2	642.373E-6			PASS
3	198.350E-3	9.582	2.07	PASS
4	849.562E-6			PASS
5	36.847E-3	3.591	1.03	PASS
6	881.257E-6			PASS
7	17.341E-3	2.502	693.00E-3	PASS
8	828.488E-6			PASS
9	26.982E-3	7.495	360.00E-3	PASS
10	901.808E-6			PASS
11	14.146E-3	4.763	297.00E-3	PASS
12	780.541E-6			PASS
13	6.992E-3	3.699	189.00E-3	PASS
14	789.807E-6			PASS
15	7.357E-3	5.450	135.00E-3	PASS
16	754.697E-6			PASS
17	7.977E-3	6.697	119.11E-3	PASS
18	696.250E-6			PASS
19	5.825E-3	5.465	106.58E-3	PASS
20	703.939E-6			PASS
21	3.707E-3			PASS
22	721.306E-6			PASS
23	3.655E-3			PASS
24	903.269E-6			PASS
25	3.415E-3			PASS
26	689.209E-6			PASS
27	2.363E-3			PASS
28	671.008E-6			PASS
29	1.859E-3			PASS
30	668.671E-6			PASS
31	979.437E-6			PASS
32	644.037E-6			PASS
33	963.804E-6			PASS
34	706.106E-6			PASS
35	985.755E-6			PASS
36	685.043E-6			PASS
37	1.248E-3			PASS
38	713.315E-6			PASS
39	1.418E-3			PASS
40	704.224E-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	296.548E-3			
2	842.428E-6			PASS
3	198.633E-3	4.318	4.60	PASS
4	1.109E-3			PASS
5	37.167E-3	1.630	2.28	PASS
6	1.115E-3			PASS
7	17.725E-3	1.151	1.54	PASS
8	1.078E-3			PASS
9	27.173E-3	3.397	800.00E-3	PASS
10	1.135E-3			PASS
11	14.501E-3	2.197	660.00E-3	PASS
12	964.408E-6			PASS
13	7.182E-3	1.710	420.00E-3	PASS
14	932.667E-6			PASS
15	7.610E-3	2.537	300.00E-3	PASS
16	847.773E-6			PASS
17	8.136E-3	3.073	264.70E-3	PASS
18	821.134E-6			PASS
19	6.015E-3	2.540	236.84E-3	PASS
20	805.571E-6			PASS
21	3.884E-3			PASS
22	827.013E-6			PASS
23	3.979E-3			PASS
24	1.234E-3			PASS
25	3.617E-3			PASS
26	787.714E-6			PASS
27	2.456E-3			PASS
28	741.945E-6			PASS
29	2.073E-3			PASS
30	758.083E-6			PASS
31	1.181E-3			PASS
32	714.738E-6			PASS
33	1.052E-3			PASS
34	785.128E-6			PASS
35	1.075E-3			PASS
36	834.978E-6			PASS
37	1.366E-3			PASS
38	812.607E-6			PASS
39	1.545E-3			PASS
40	776.115E-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 [%]	0.035	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



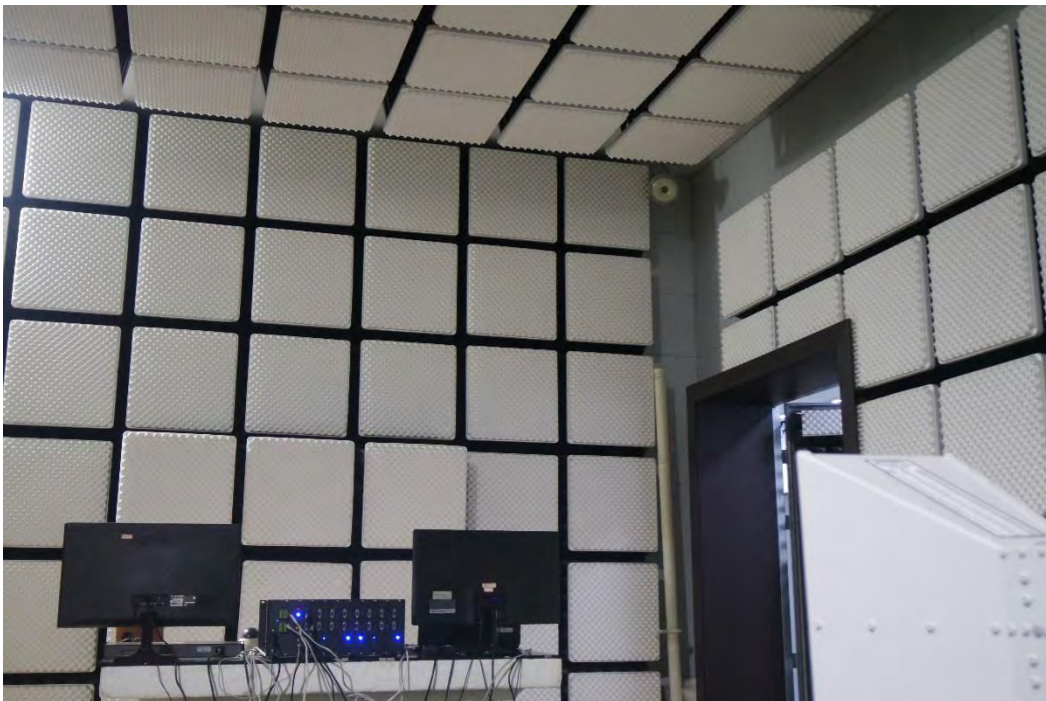
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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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Harmonic Current Emissions and Voltage Fluctuations and Flicker

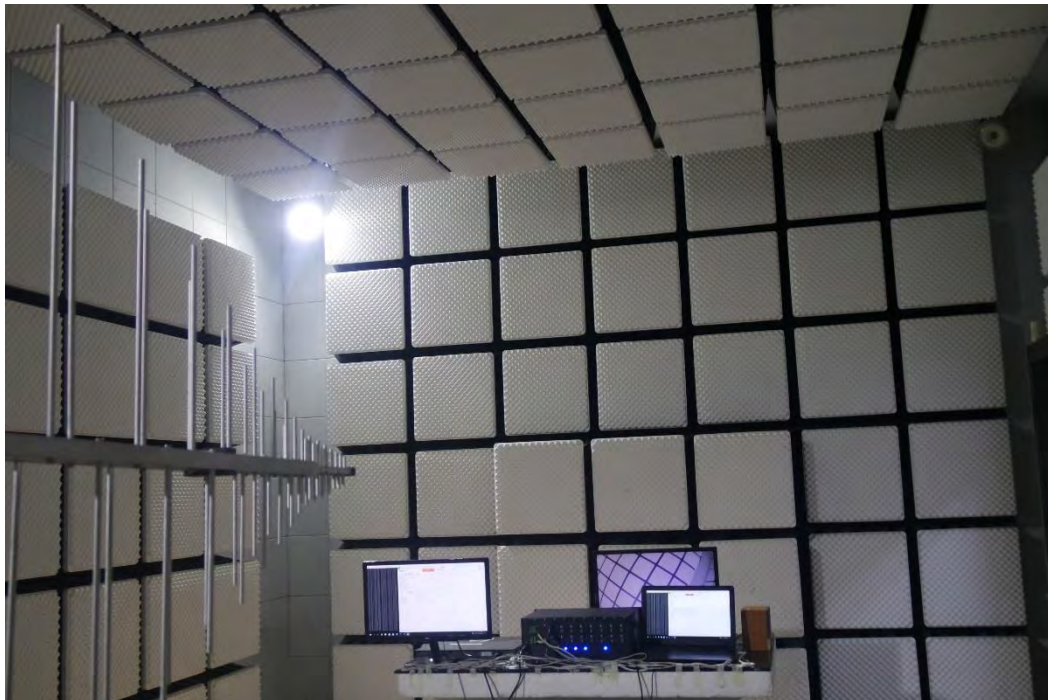


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Electrostatic Discharge



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)



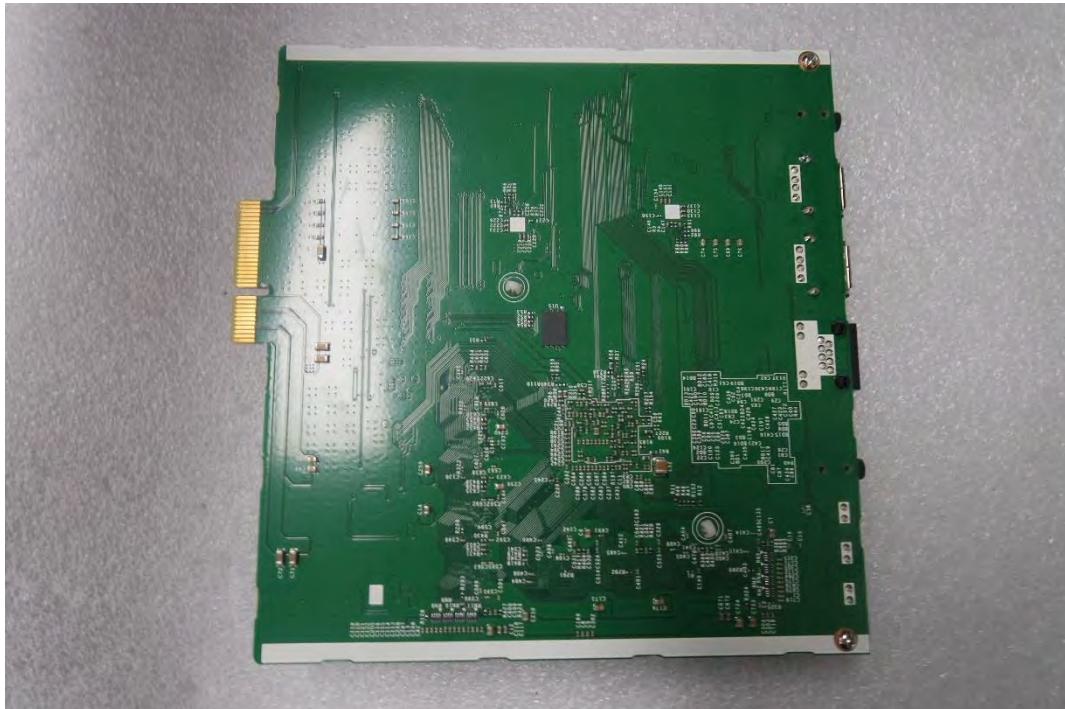
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EUT Internal View – Main Board

(Top)



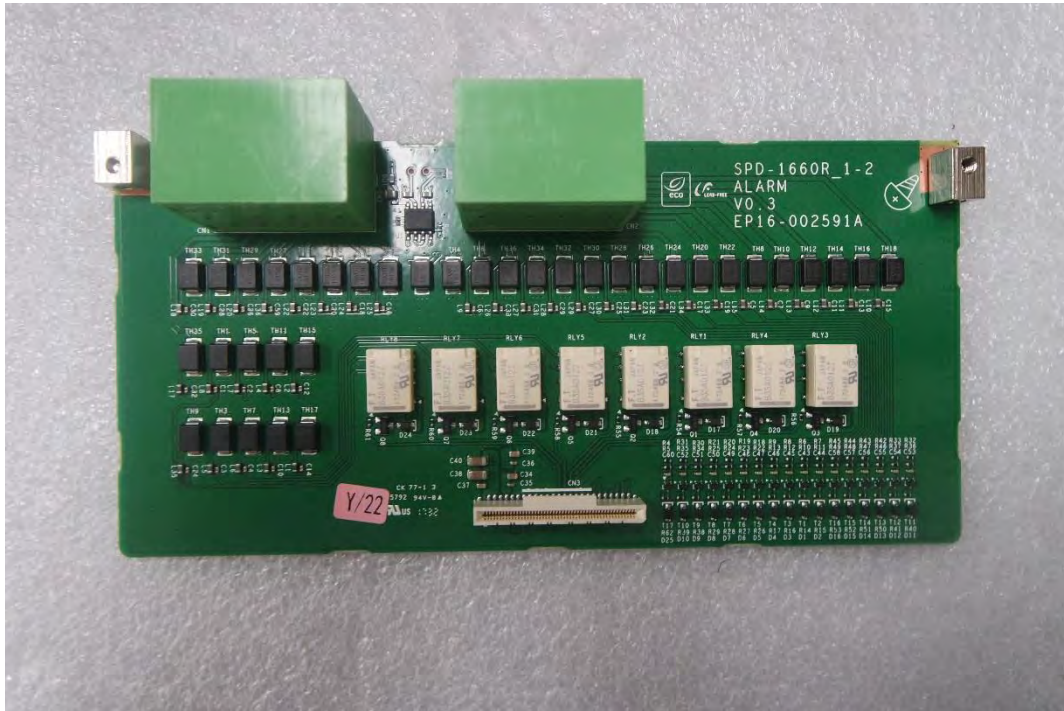
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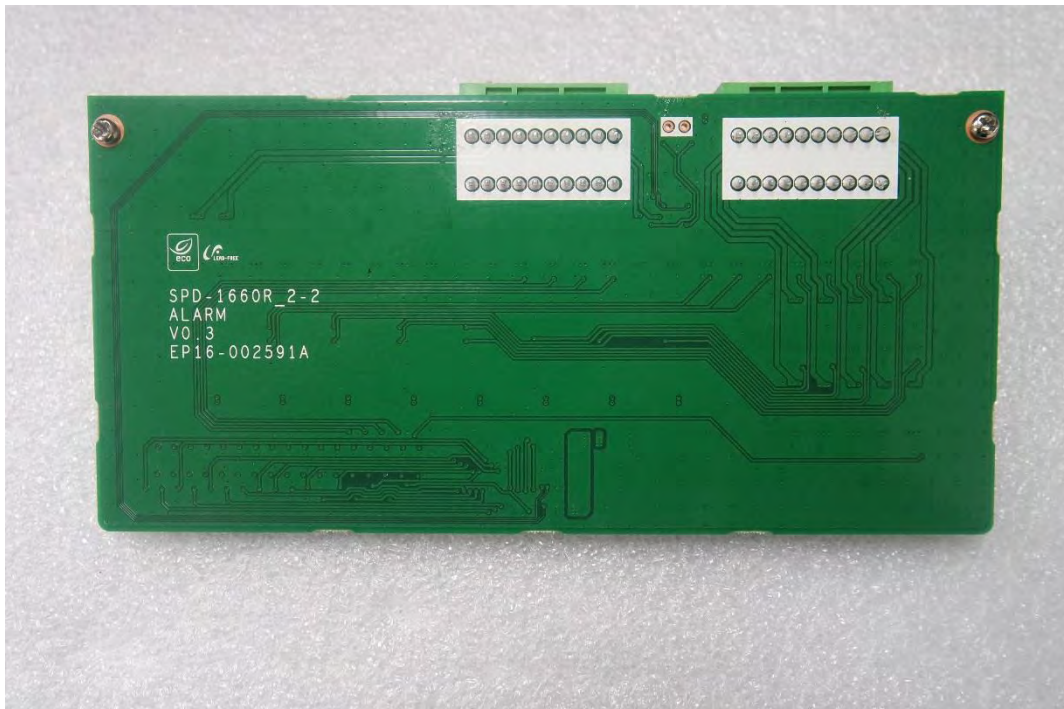
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EUT Internal View – Alarm Board

(Top)



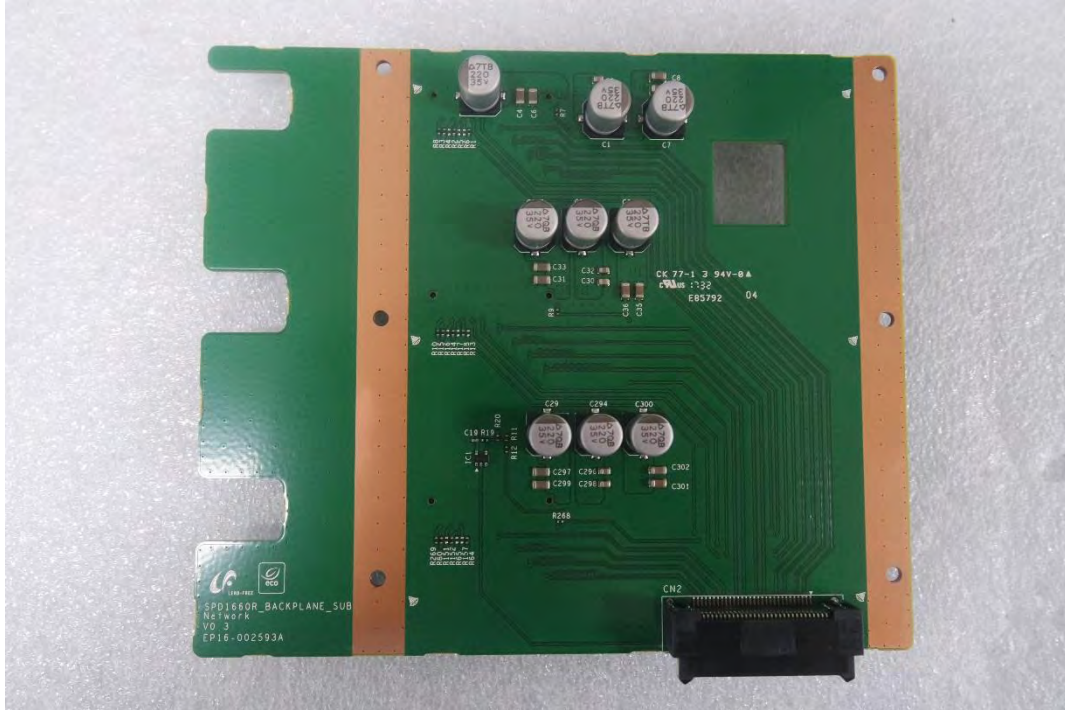
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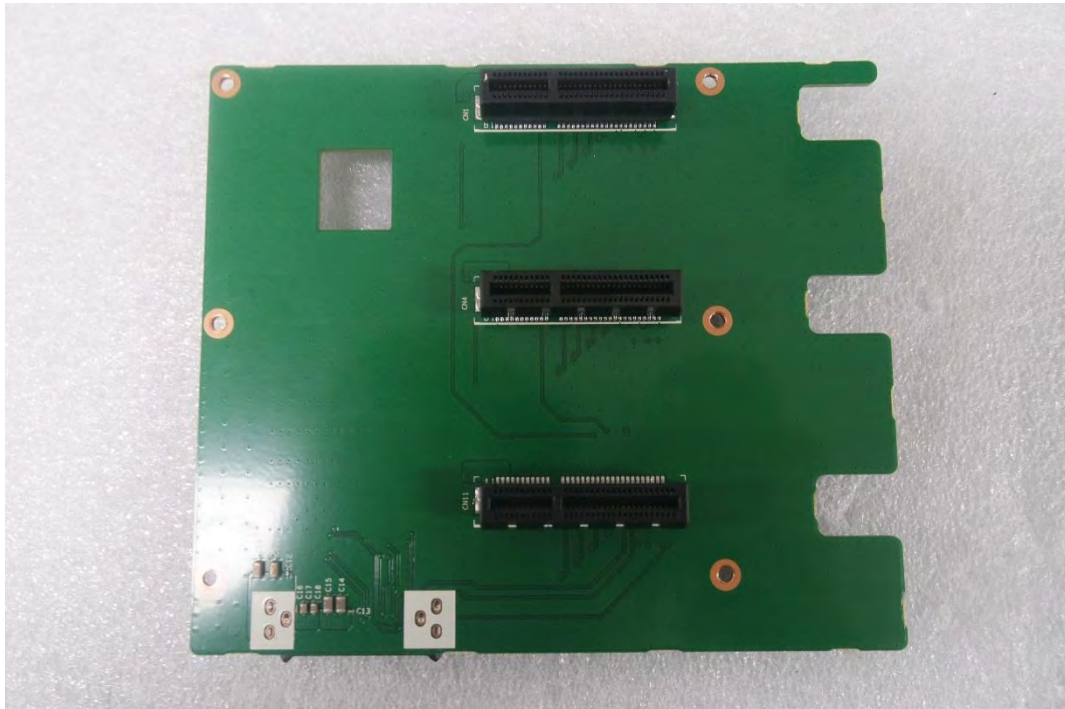
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EUT Internal View – Back Plane Sub Board

(Top)



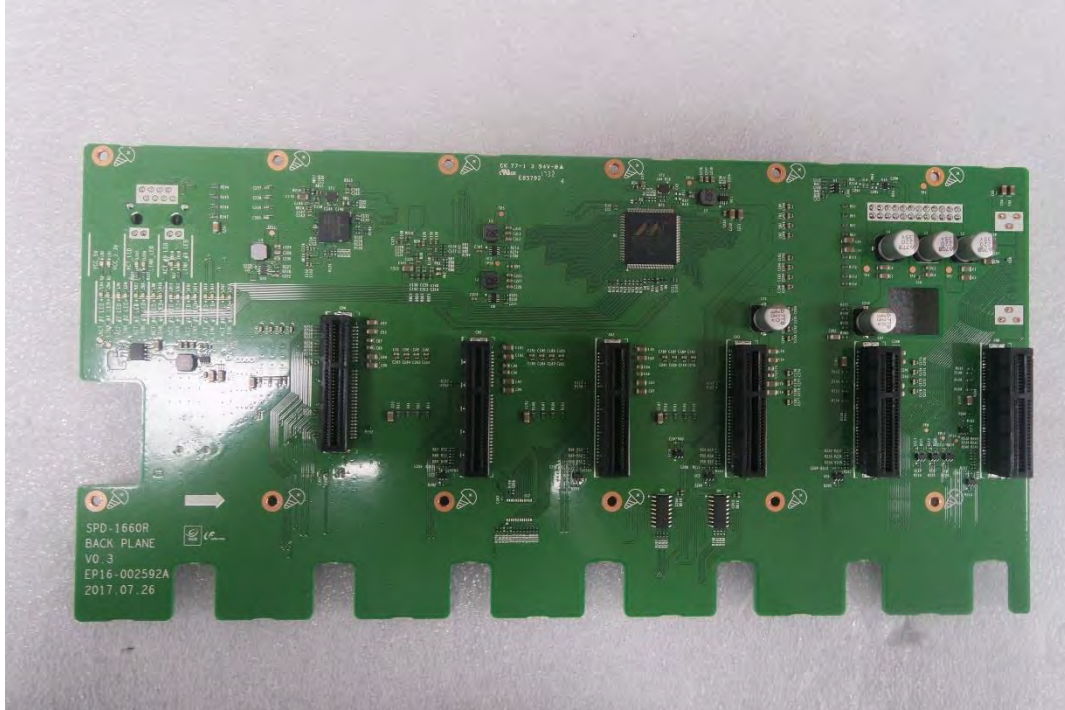
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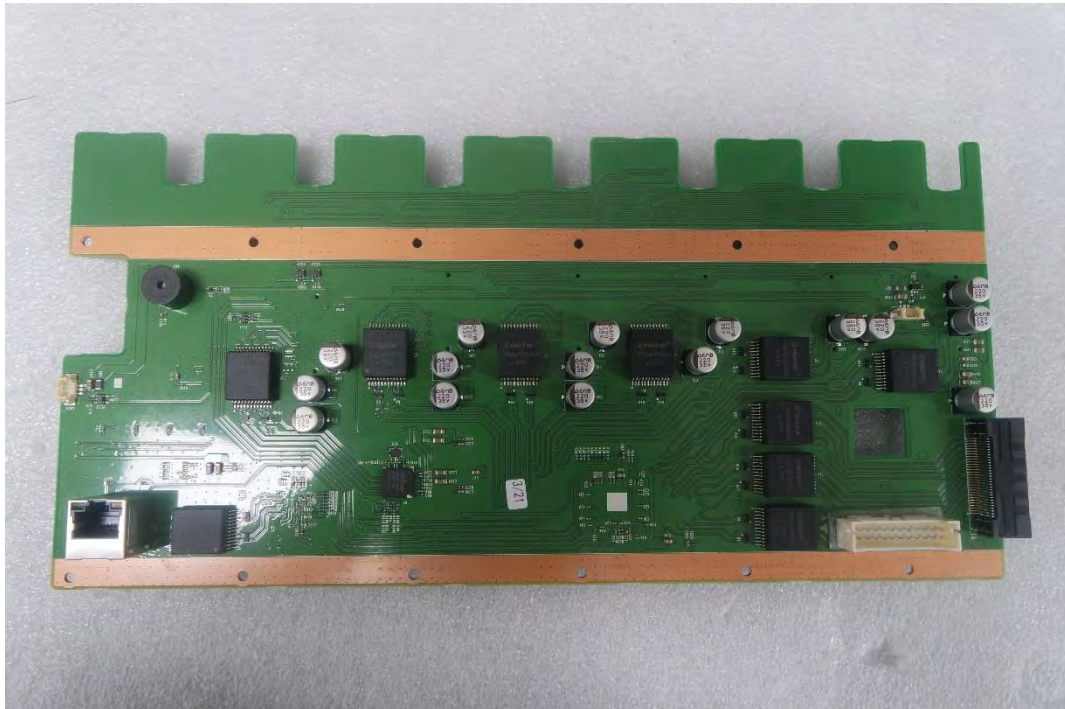
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EUT Internal View – Back Plan Board

(Top)



(Bottom)



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EUT Internal View – Decode Board

(Top)



(Bottom)



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EUT Internal View – Power Supply

(Top)



(Bottom)



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Label and Location



Network Video Decoder Rack

Model No : SPD-1660R

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

Made in China

